COMMONWEALTH of VIRGINIA

Commonwealth Transportation Board

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Agenda Item # 15

RESOLUTION
OF THE
COMMONWEALTH TRANSPORTATION BOARD

December 9, 2015

MOTION
Made By: Mr. Kasprowicz, Seconded By: Mr. Rosen
Action: Motion Carried, Unanimously

Title: VTrans2040
Virginia's Statewide Multimodal Long-Range Transportation Plan
Vision Plan and Needs Assessments

WHEREAS, pursuant to § 33.2-353 of the Code of Virginia, the General Assembly of Virginia has directed the Commonwealth Transportation Board (CTB), with assistance from the Office of Intermodal Planning and Investment, to conduct a comprehensive review of statewide transportation needs in a Statewide Transportation Plan setting forth assessment of capacity needs for all corridors of statewide significance, regional networks, and improvements to promote urban development areas established pursuant to § 15.2-2223.1 of the Code of Virginia; and,

WHEREAS, the General Assembly has directed that the Statewide Transportation Plan shall be updated as needed, but no less than once every four years and promote economic development and all transportation modes, intermodal connectivity, environmental quality, accessibility for people and freight, and transportation safety; and,

WHEREAS, the Statewide Transportation Plan shall establish goals, objectives, and priorities that cover at least a 20-year planning horizon; and,

WHEREAS, in the designation of corridors of statewide significance, the CTB shall not be constrained by local, district, regional or modal plans and the designation of the transportation corridors shall be in sufficient detail so that local jurisdictions can place them on their comprehensive plans; and

WHEREAS, the Secretary of Transportation created a Multimodal Working Group, consisting of the Office of the Secretary of Transportation and the lead planning divisions of the Department of Transportation, Department of Rail and Public Transportation, Department of Aviation, the Virginia Commercial Spaceflight Authority, the Motor Vehicle Dealer Board, the Department of Motor Vehicles, and the Virginia Port Authority to help guide the development of the Statewide Transportation Plan (known as VTrans2040); and,

WHEREAS, the Secretary of Transportation created a Multimodal Advisory Committee to provide technical support in developing the VTrans2040; and,

WHEREAS the Multimodal Advisory Committee consisted of (a) staff from the transportation agencies listed above, (b) deputy and/or assistant secretaries or other appropriate leadership from the Departments of Commerce, Health & Human Resources, Natural Resources, Veterans and Homeland Security, and Agriculture and Forestry; (c) representation from the Virginia Association of Planning District Commissions, the Virginias Association of Metropolitan Planning Organizations, the Virginia Municipal League, the Virginia Association of Counties, the Virginia Chapter of the American Planning Association, the Hampton Roads Transportation Accountability Commission and Northern Virginia Transportation Authority; (d) federal partners from the Federal Highway Administration; and (e) private and public freight stakeholders from the Virginia Freight Transportation Technical Committee; and,

WHEREAS, the findings of draft economic, demographic/social, technological, and environmental trends assessments developed by the study team were shared with the Board in October and November of 2014 and these finding and stakeholder input culminated in the draft VTrans Vision Plan, which was presented to the CTB on February 17, 2015; and,

WHEREAS, the draft methodology for the needs assessments being conducted for the Corridors of Statewide Significance, Regional Networks, and Urban Development Areas was presented to the Board on February 17, 2015,

WHEREAS, the draft Needs Assessments were posted publically on August 1, 2015 and were presented to Board members on an individual basis throughout the months of October and November of 2015; and,

WHEREAS, extensive stakeholder and public outreach has been conducted as part of the VTrans2040 development including two rounds of regional forums where the needs assessments for all geographies (CoSS, RN, UDA) where developed, as well as additional 2 to 3 meetings at the MPO regional level; and,

WHEREAS, there was a two week comment period from August 1st to August 18th, 2015, as part of the VTrans2040 development,

NOW, THEREFORE, BE IT RESOLVED by the CTB that the VTrans2040 Vision and Needs Assessment is hereby accepted.

BE IT FURTHER RESOLVED, that the VTrans2040 Update shall be forwarded to the Governor and the General Assembly as required by § 33.2- 353 of the Code of Virginia; and,

BE IT FURTHER RESOLVED, that the Office of Intermodal Planning and Investment shall, under the direction of the Secretary of Transportation, develop or identify a new methodology for examining reliability that considers both the frequency and severity of occurrences of unreliable transportation conditions; and,

BE IT FURTHER RESOLVED, that the Office of Intermodal Planning and Investment shall, under the direction of the Secretary of Transportation, identify areas where significant changes in the transportation system have taken place since the data used in the VTrans2040 Needs Assessment was captured and update the Needs Assessment for those areas using data that captures the impact of any such significant changes;

BE IT FURTHER RESOVLED, that the Office of Intermodal Planning and Investment shall, under the direction of the Secretary of Transportation, develop a VTrans action plan that prioritizes the needs identified in the VTrans Needs Assessment and develops recommendations for such prioritized needs based on the VTrans Vision and constrained resources;

BE IT FURTHER RESOLVED, that the Office of Intermodal Planning and Investment shall under the direction of the Secretary of Transportation develop an Analysis of 2040 Scenarios to assess the impacts of divergent futures trends on the transportation network, local communities and regions; and,

BE IT FURTHER RESOLVED, that in development of such VTrans action plan and 2040 Scenario Assessment the Office of Intermodal Planning and Investment shall coordinate with VDOT, DRPT and other stakeholders as noted above; and,

BE IT FURTHER RESOLVED, that such action plan and scenario analysis shall be provided to the CTB by the end of 2016.

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Office of INTERMODAL Planning and Investment

LOCAL / GLOBAL / MOBILE / A CONNECTED COMMONWEALTH

VTrans2040 Draft Vision, Goals & Objectives, and Guiding Principles

Vision

Virginia's multimodal transportation system will be ***Good for Business***, ***Good for Communities***, and ***Good to Go***. Virginians will benefit from a sustainable, reliable transportation system that advances Virginia businesses, attracts a 21st century workforce, and promotes healthy communities where Virginians of all ages and abilities can thrive.

Guiding Principles

GP 1: Optimize Return on Investments

Implement the right solution at the right price, striving to meet current needs while advancing long-term prosperity and livability.

GP 2: Ensure Safety, Security, and Resiliency

Provide a transportation system that is safe for all users, responds immediately to short-term shocks such as weather events or security emergencies, and adapts effectively to long-term stressors such as sea level rise.

GP 3: Efficiently Deliver Programs

Deliver high-quality projects and programs in a cost-effective and timely manner.

GP4: Consider Operational Improvements and Demand Management First

Maximize capacity of the transportation network through increased use of technology and operational improvements as well as managing demand for the system before investing in major capacity expansions.

GP5: Ensure Transparency and Accountability, and Promote Performance Management

Work openly with partners and engage stakeholders in project development and implementation, and establish performance targets that consider the needs of all communities, measure progress towards targets, and to adjust programs and policies as necessary to achieve the established targets.

GP6: Improve Coordination Between Transportation and Land Use

Encourage local governments to plan and manage transportation-efficient land development by providing incentives, technical support, and collaborative initiatives.

GP7: Ensure Efficient Intermodal Connections

Provide seamless connections between modes of transportation to harness synergies

Office of INTERMODAL Planning and Investment

Goals

Goal A – Economic Competitiveness and Prosperity: *invest in a transportation system that supports a robust, diverse, and competitive economy.*

Objectives:

A.1. Reduce the amount of travel that takes place in severe congestion.
A.2. Reduce the number and severity of freight bottlenecks.
A.3. Improve reliability on key corridors for all modes.

Goal B – Accessible and Connected Places: *increase the opportunities for people and businesses to efficiently access jobs, services, activity centers, and distribution hubs.*

Objectives:

B.1. Reduce average peak-period travel times in metropolitan areas
B.2. Reduce average daily trip lengths in metropolitan areas.
B.3. Increase the accessibility to jobs via transit, walking and driving in metropolitan areas.

Goal C – Safety for All Users: *provide a safe transportation system for passengers and goods on all travel modes.*

Objectives:

C.1. Reduce the number and rate of motorized fatalities and severe injuries.
C.2. Reduce the number of non-motorized fatalities and severe injuries.

Goal D – Proactive System Management: *maintain the transportation system in good condition and leverage technology to optimize existing and new infrastructure.*

Objectives:

D.1. Improve the condition of all bridges based on deck area.
D.2. Increase the lane miles of pavement in good or fair condition.
D.3. Increase percent of transit vehicles and facilities in good or fair condition.

Goal E – Healthy Communities and Sustainable Transportation Communities: *support a variety of community types promoting local economies and healthy lifestyles that provide travel options, while preserving agricultural, natural, historic and cultural resources.*

Objectives:

E.1. Reduce per-capita vehicle miles traveled.
E.2. Reduce transportation related NOX, VOC, PM and CO emissions.
E.3. Increase the number of trips traveled by active transportation (bicycling and walking).

VTrans2040 Multimodal Transportation Plan

Urban Development Areas Needs Assessment

Office of INTERMODAL Planning and Investment

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Note: All UDAs included in the Needs Assessment were designated through local Comprehensive Plan Amendments before October 1, 2015 and reviewed by the Office of Intermodal Planning and Investment (OIPI) to confirm the consistent with the Code of Virginia §15.2-2223.1.

There are pending reviews of Comprehensive Plan Amendments as well as anticipated future amendments where OIPI will be working directly with local jurisdictions to process and add into the Needs Assessment throughout 2016.

VTrans2040 Multimodal Transportation Plan
Urban Development Areas

Designated **Urban Development Areas (UDAs)** and other locally **designated growth areas (DGAs)** represent the community level multimodal travel market component of VTrans2040.

More information is available at: http://www.vtrans.org/vtrans2040.asp

What You Need to Know

Problem – The idea of Urban Development Areas evolved from a recognition that a continuing trend of dispersed development patterns generate increased vehicle traffic, limit reasonable alternatives to private vehicle use for all travel, and increase the financial burden to the Commonwealth and local jurisdictions of maintaining and expanding the transportation network and other public utilities.

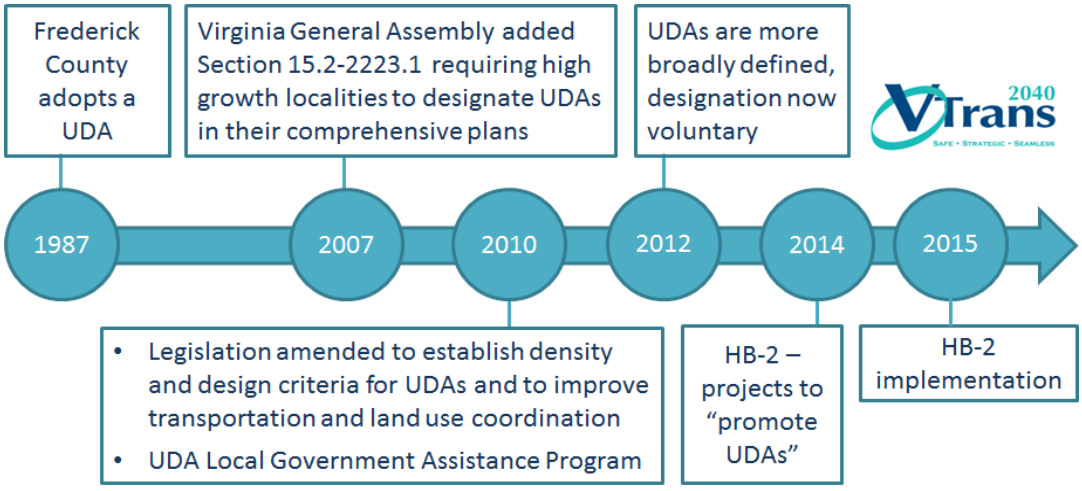
Legislation – Starting in 2007, the General Assembly has considered the role of UDAs in coordinated land use and transportation planning:

- In 2007, Section 15.2-2223.1 required high-growth localities to designate UDAs in comprehensive plans. UDAs were to be areas of compact development that can accommodate 10 to 20 years of projected growth.
- In 2010, the legislation was amended to establish density and design criteria for UDAs.
- In 2012, the legislation was amended again to make the UDA designation voluntary across all localities and defined UDAs more broadly to incorporate aspects of Traditional Neighborhood Development (TND).

Status – The process in local comprehensive plans to designate UDAs (or code referenced growth areas) has diversified since 2007. Research to date has found over **180** of these types of places in local plans across Virginia.

What is a UDA?

- Areas designated by a locality that may be sufficient to meet projected residential and commercial growth in the locality for at least 10 years.
- Areas that may be appropriate for development at a density on the developable acreage of at least four single-family residences and an authorized floor area ratio of at least 0.4 per acres for commercial development.
- Areas that incorporate principles of traditional neighborhood development (TND).



Urban Development Areas/Designated Growth Areas

Current Status

Are UDAs all Urban?

The designation of UDAs has taken place in urban, suburban, and rural communities. The key feature of UDAs, traditional neighborhood development (TND), is a concept that seeks to create communities with features traditionally found in Virginia prior to World War II. Many of Virginia's traditional towns, such as Bedford, Harrisonburg, and Fredericksburg exhibit the characteristics of traditional neighborhood development that UDAs seek to promote. Many smaller, rural communities also show these characteristics, including towns like South Hill, Tappahannock, and Luray.

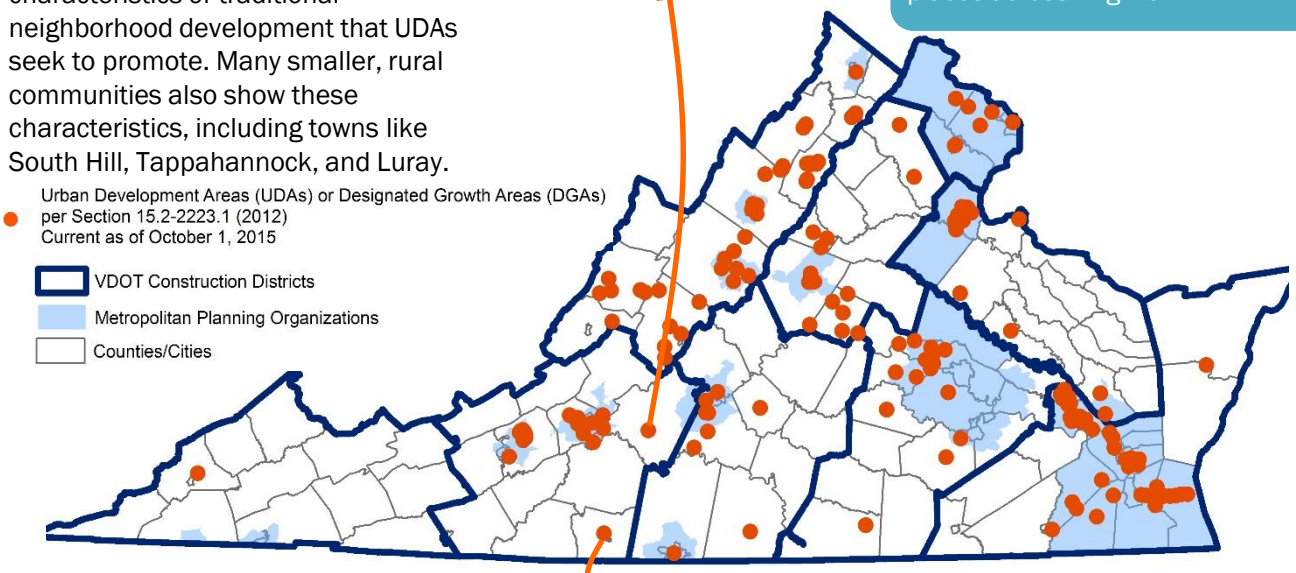
Bedford, Virginia – TND Example



Photo Source: Bedford Main Street, Inc.

Why are UDAs Important?

While the concept is not new to Virginia, with the passage of HB2 in 2014, transportation projects promoting UDAs are now a part of Virginia's priority transportation funding decisions. VTrans2040 has included outreach with community planners to determine the transportation needs of these places across Virginia.



Uptown Martinsville

Locality: *Martinsville City*

Designation: *2011 Comprehensive Plan Amendment*

Goal: Adaptive reuse of vacant mill sites and adjacent properties.

Development: The New College Institute, built a 52,000 square foot facility on the Baldwin Block in 2014, creating an education and technology hub. A block away, a developer is converting an empty hotel into a mixed use development.



New College Institute (Image: The Roanoke Times)

What's Next

The Office of Intermodal Planning and Investment (OIPI) is finalizing the VTrans Multimodal Transportation Plan in October 2015. For each UDA (and designated growth area), the Plan will include a profile describing planning status, socioeconomic characteristics, and transportation needs.

Keep up to date on everything going on at: http://www.vtrans.org/vtrans2040.asp

VTrans2040 Multimodal Transportation Plan
Urban Development Areas

Designated **Urban Development Areas (UDAs)** and other locally **designated growth areas (DGAs)** represent the community level multimodal travel market component of VTrans2040.

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Needs Assessment Approach

Determine Locations – Starting in summer 2014, the Office of Intermodal Planning and Investment (OIPI) and VDOT worked with jurisdictions and Planning District Commissions across the Commonwealth to identify code referenced locations in comprehensive plans and provide guidance on the approach to amend comprehensive plans to be consistent with the Code of Virginia §15.2-2223.1. As of October 1, 2015, the research has identified over 180 UDAs or DGAs (across 62 jurisdictions) that are designated in local comprehensive plans per §15.2-2223.1.

The local process for designating UDAs started with the original legislation in 2007 and mostly ended once the legislation became voluntary in 2012.

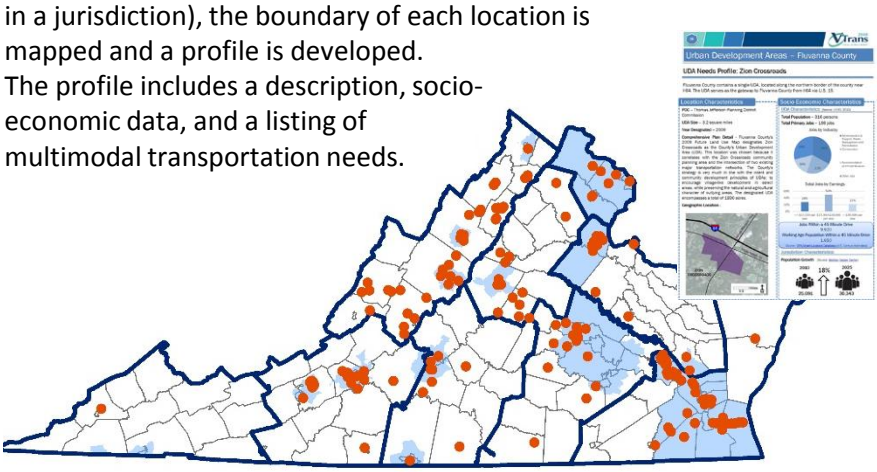
HB2 Project Prioritization – The final HB2 implementation and policy guide provided flexibility to localities submitting projects to promote UDAs. Jurisdictions that amend their comprehensive plans to include a code reference for locally designated growth areas that meet the intent of §15.2-2223.1 are eligible to submit projects that address the needs of these areas.

OIPIs grant program plus HB2 inclusion of projects that "promote UDAs" or other DGAs meeting the intent of §15.2-2223.1 helped reinvigorate interest in planning for these places.

Locally Specified Transportation Needs – The UDA needs assessment is driven at the individual UDA or DGA level, supported by local planning information and socioeconomic data to help organize and communicate needs to stakeholders and the public. This approach relies on local input from planning officials through an online needs form. The online form included questions about multimodal transportation needs required to promote development within UDAs and other locally designated growth areas identified in comprehensive plans.

Outreach to local planners included a webinar, an online needs form, and two rounds of five regional forums to help identify existing and potential locations and transportation needs.

Mapping and Profiles – For each UDA or DGA (or groups of such locations in a jurisdiction), the boundary of each location is mapped and a profile is developed. The profile includes a description, socio-economic data, and a listing of multimodal transportation needs.



Detailed needs profiles and mapping for each designated location is used to inform the HB2 process and supports other state, regional, and local coordinated land use and transportation planning goals.

Urban Development Areas/Designated Growth Areas

Place Type Summary

Diverse Places

UDA and DGAs are located in urban, suburban, and rural communities. The existing land uses of these areas range from greenfields and vacant urban land to densely developed downtowns like Norfolk and Tysons Corner. The intensity of planned uses and development character varies depending on growth potential and the policies and priorities of each jurisdiction. The Department of Rail and Public Transportation Multimodal System Design Guidelines provides multimodal planning and design guidance at the community scale. Six multimodal center place types are identified that reflect varying development characteristics and transportation needs. The pie charts below reflect how diverse these places are and are planned to be.



Rural or Village Center



Small Town



Medium Town



Large Town

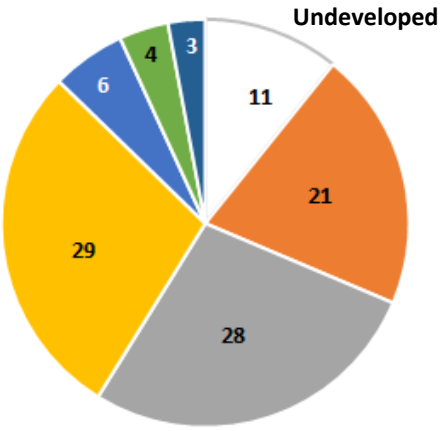


Urban Center

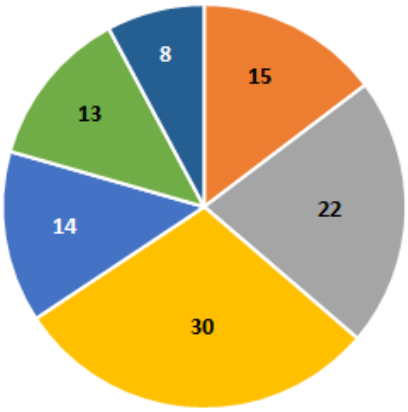


Urban Core

Existing Place Type



Planned Place Type



Andersons Corner
James City County



Amelia Village
Amelia County



Broadway Town



Manassas



Lynchburg
Downtown



Downtown Area
Norfolk

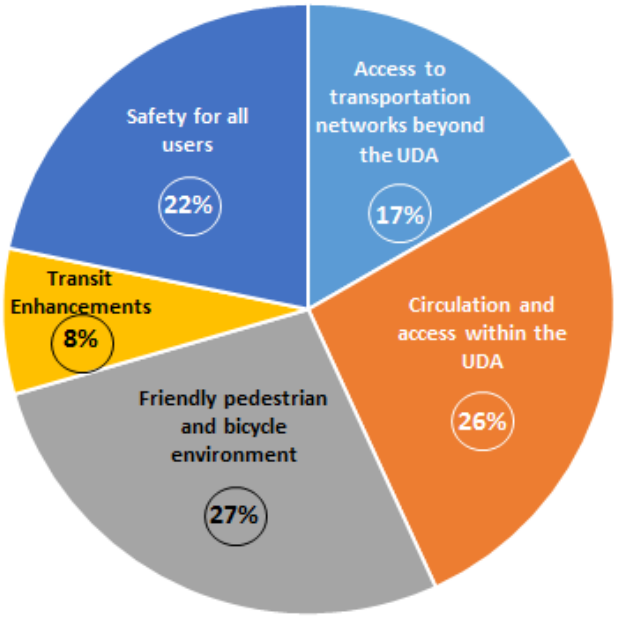


Urban Development Areas/Designated Growth Areas

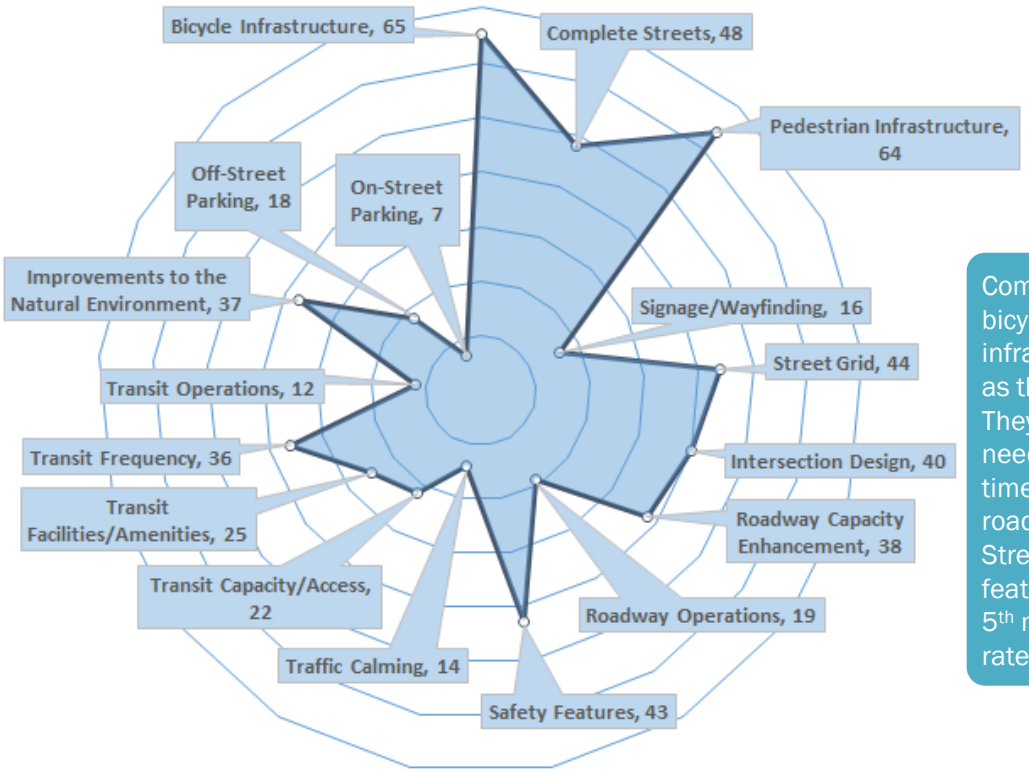
Overall Needs Summary

Varied Transportation Needs

General Top Needs – Each locality ranked general needs across five categories: access to transportation networks beyond the UDA, circulation and access within the UDA, friendly pedestrian and bicycle environment, transit enhancement, and safety for all users. The pie chart shows that more than half of the respondents identified a friendly pedestrian and bicycle environment and circulation and access within the growth area as their top transportation needs. Transit was the least frequent identified top need – the reason for this is attributed to the larger share of village and small town place types. While transit may not be identified as an existing need, as development occurs in these areas, transit may become a more prevalent need within these localities.



Specific Highest Rated Needs – Each locality identified its highest needs across a list of 17 multimodal transportation need categories. Needs related to the bicycle and pedestrian environment (including bicycle and pedestrian infrastructure, complete streets, street grid, and signage/wayfinding) were overall the most frequent response as a high rated need. Roadway capacity, operations, and safety needs (including intersection design) and transit related needs showed a similar frequency as a high need.



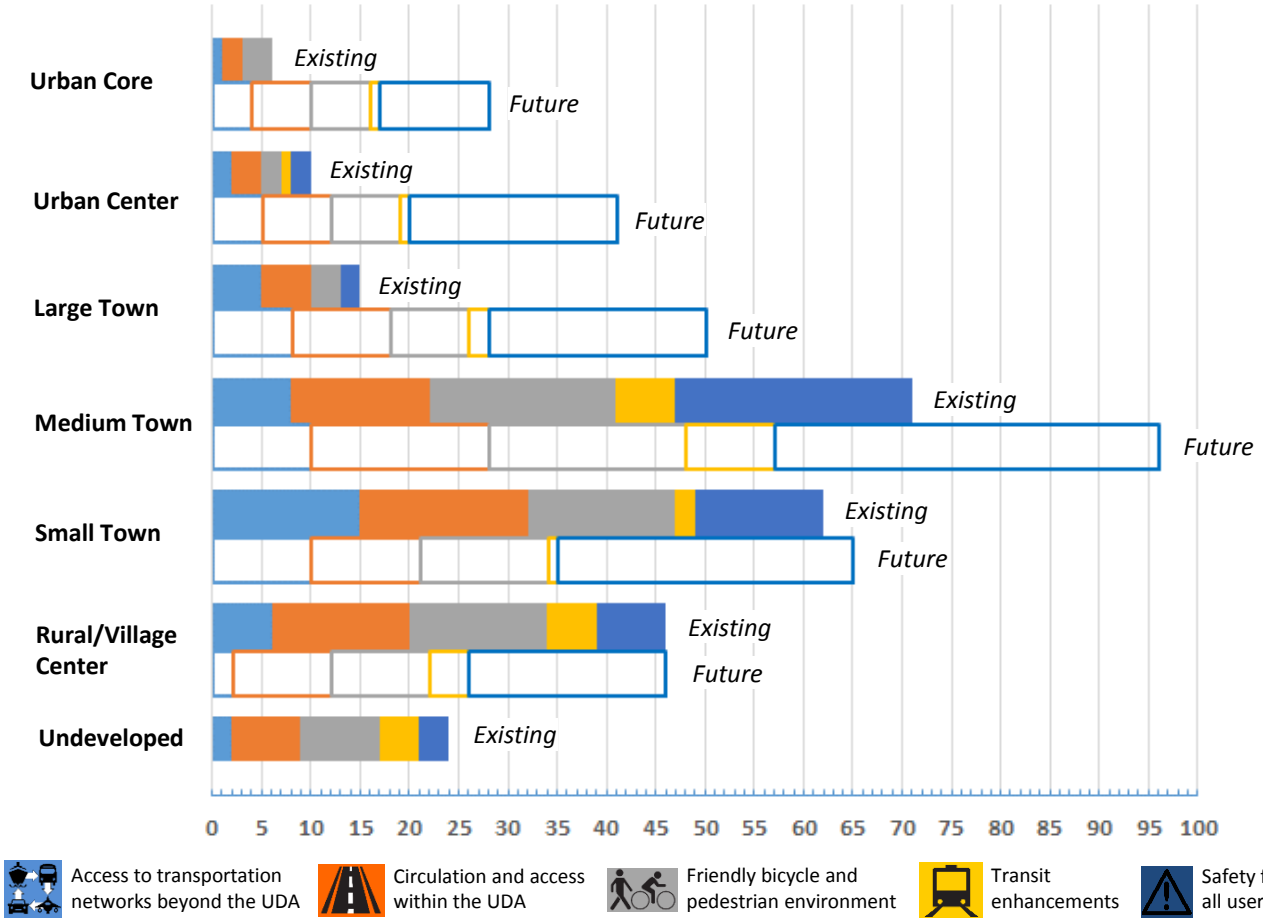
Complete streets and bicycle and pedestrian infrastructure were noted as the top three needs. They were rated as a top need on average 1.5 to 2 times as frequent as roadway or transit needs. Street grid and safety features were the 4th and 5th most frequent top rated needs.

Urban Development Areas/Designated Growth Areas

Needs by Place Type Summary

Unique Needs by Place

General Top Needs by Place Type – Needs by place type depict the relationship between existing and future development characteristics and transportation needs. For the lower density place types, typically the bicycle and pedestrian environment and circulation and access within the growth area appear more important. Note the change in the identified place type between the existing and future figures below.



Next Steps

Recommendations – OIPI, VDOT, and DRPT will work to identify best planning, design, and implementation practices to help localities meet the development goals and transportation needs of growth areas.

Scenario Planning – OIPI will work with state, regional, and local partners to develop statewide scenarios reflecting diverse economic, technological, social, and land use/transportation futures through 2040.

Continuing UDA Planning Grant Program – Details are forthcoming from OIPI on the continuation of this program into 2016.

STIP Development / HB2 – As next round of HB2 applications begin in summer 2016, OIPI will work again with local jurisdictions to help designate growth areas and identify needs.

ID	Jurisdiction	UDAs or DGAs (#)	VDOT District	Area sq. mi.	Year Designated	Existing Place Type	Planned Place Type	Highest Rated Overall Need	Internal UDA Specific Multimodal Transportation Needs (Highest Identified Need)
99	Town of Wise	Area 1	Bristol	0.1	2015	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Bicycle Infrastructure; Pedestrian Infrastructure; Safety Features; Improvements to the Natural Environment
1	Albemarle County	All UDAs in Jurisdiction (2)	Culpeper	1.3	2011	Place Type 2: Small Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Transit Operations; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Traffic Calming
9	Charlottesville	Downtown Extended Corridor/West Main Street	Culpeper	0.4	2010	Place Type 4: Large Town or Suburban Center	Place Type 6: Urban Core	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Traffic Calming; Improvements to the Natural Environment
10	Charlottesville	Preston Avenue	Culpeper	0.1	2010	Place Type 1: Rural or Village Center	Place Type 5: Urban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Bicycle Infrastructure; Complete Streets; Safety Features; Improvements to the Natural Environment
11	Charlottesville	Cherry Avenue	Culpeper	0.1	2010	Place Type 2: Small Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Bicycle Infrastructure; Complete Streets; Safety Features; Improvements to the Natural Environment
15	Fauquier County	All UDAs in Jurisdiction (2)	Culpeper	1.1	2014	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Pedestrian Infrastructure; Complete Streets
16	Fluvanna County	Zion Crossroads	Culpeper	3.2	2009	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Roadway Operations; Safety Features; Intersection Design; Signage/Wayfinding; Traffic Calming; Improvements to the Natural Environment
106	Fluvanna County	Columbia	Culpeper	0.18	2009	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Safety for all users	None listed
107	Fluvanna County	Scottsville	Culpeper	0.67	2009	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA	None listed
108	Fluvanna County	Fork Union	Culpeper	0.51	2009	Place Type 1: Rural or Village Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	None listed
109	Fluvanna County	Palmyra	Culpeper	<0.1	2009	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA	None listed
110	Fluvanna County	Lake Monticello	Culpeper	6.8	2009	Place Type 4: Large Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Safety Features; Intersection Design; Signage/Wayfinding; Traffic Calming
111	Greene County	All UDAs in Jurisdiction (3)	Culpeper	TBD	2010	Place Type 4: Large Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Safety Features; Intersection Design; Improvements to the Natural Environment

ID	Jurisdiction	UDAs or DGAs (#)	VDOT District	Area sq. mi.	Year Designated	Existing Place Type	Planned Place Type	Highest Rated Overall Need	Internal UDA Specific Multimodal Transportation Needs (Highest Identified Need)
8	Caroline County	Carmel Church Station	Fredericksburg	3.6	2010	Undeveloped (Greenfield/Grayfield)	Place Type 5: Urban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Capacity/Access; Transit Facilities/ Amenities; Pedestrian Infrastructure; Complete Streets; On-Street Parking Capacity; Off-Street Parking Capacity; Improvements to the Natural Environment
17	Fredericksburg	Fredericksburg City	Fredericksburg	10.5	2015	Place Type 5: Urban Center	Place Type 6: Urban Core	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Transit Frequency; Transit Operations; Bicycle Infrastructure; Pedestrian Infrastructure; Signage/Wayfinding; Improvements to the Natural Environment
19	Gloucester County	Gloucester Point - Hayes Village Development District	Fredericksburg	6.1	2011	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Access to transportation networks beyond the UDA; Circulation and access within the UDA	Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Signage/Wayfinding
20	Gloucester County	Gloucester Court House Village Area	Fredericksburg	7.6	2013	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA	Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Signage/Wayfinding; Traffic Calming; Improvements to the Natural Environment
35	King George County	Dahlgren Primary Settlement	Fredericksburg	3.1	2013	*To be determined through outreach with locality.*			
36	King William County	Central Garage	Fredericksburg	0.5	2012	Place Type 1: Rural or Village Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Improvements to the Natural Environment
57	Stafford County	Courthouse	Fredericksburg	0.9	2010	Place Type 2: Small Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
58	Stafford County	Southern Gateway	Fredericksburg	1.4	2010	Place Type 2: Small Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
59	Stafford County	George Washington Village	Fredericksburg	3.0	2010	Place Type 1: Rural or Village Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
60	Stafford County	Centreport	Fredericksburg	1.8	2010	Undeveloped (Greenfield/Grayfield)	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
61	Stafford County	Leeland Town Station	Fredericksburg	0.5	2010	Place Type 1: Rural or Village Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
62	Stafford County	Brooke Station	Fredericksburg	0.3	2010	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design

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63	Stafford County	Eskimo Hill	Fredericksburg	0.3	2010	Undeveloped (Greenfield/Grayfield)	Place Type 1: Rural or Village Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Transit Capacity/Access; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
24	James City County	Andersons Corner	Hampton Roads	0.1	2011	Undeveloped (Greenfield/Grayfield	Place Type 1: Rural or Village Center	Friendly pedestrian and bicycle environment; Transit enhancements	Bicycle infrastructure; Pedestrian Infrastructure; Transit Capacity/Access
25	James City County	Croaker Interchange	Hampton Roads	1.2	2011	Undeveloped (Greenfield/Grayfield)	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Transit Facilities/Amenities
26	James City County	Green Mount	Hampton Roads	0.1	2011	Undeveloped (Greenfield/Grayfield)	Place Type 2: Small Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Transit Frequency; Intersection Design
27	James City County	Lightfoot	Hampton Roads	0.5	2011	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Bicycle Infrastructure
28	James City County	New Town	Hampton Roads	1.0	2011	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Operations
29	James City County	Norge	Hampton Roads	0.1	2011	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Friendly bicycle and pedestrian environment	Transit Facilities/Amenities
30	James City County	Route 60/143/199 Interchange	Hampton Roads	0.4	2011	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Safety for all Users	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Transit Frequency; Intersection Design
31	James City County	Stonehouse	Hampton Roads	9.8	2011	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Transit Capacity/Access; Bicycle Infrastructure; Pedestrian Infrastructure; Intersection Design
32	James City County	Toano	Hampton Roads	0.4	2011	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Traffic Calming
33	James City County	Treyburn Drive	Hampton Roads	0.1	2011	Undeveloped (Greenfield/Grayfield)	Place Type 2: Small Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	None listed
34	James City County	Williamsburg Crossing	Hampton Roads	0.1	2011	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety (external to the UDA); Friendly pedestrian and bicycle environment	None listed
37	Isle of Wight County	Windsor	Hampton Roads	12.5	2011	*To be determined through outreach with locality.*			
38	Isle of Wight County	Camptown	Hampton Roads	10.8	2011	*To be determined through outreach with locality.*			
39	Isle of Wight County	Newport	Hampton Roads	11.1	2011	*To be determined through outreach with locality.*			
45	Norfolk	Downtown Character District	Hampton Roads	1.4	2013	Place Type 6: Urban Core	Place Type 6: Urban Core	Safety for all users; Circulation and access within the UDA	Transit Frequency; Bicycle Infrastructure
46	Norfolk	Broad Creek Transit Supportive Area	Hampton Roads	1.2	2013	Place Type 3: Medium Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Circulation and access within the UDA	Roadway Operations; Transit Frequency; Bicycle Infrastructure; Traffic Calming

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47	Norfolk	Military Highway Transit Supportive Area	Hampton Roads	0.6	2013	Place Type 3: Medium Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Operations; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Traffic Calming
48	Norfolk	Newtown Road Transit Supportive Area	Hampton Roads	0.2	2013	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Circulation and access within the UDA	Transit Frequency; Transit Operations; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Intersection Design
64	Virginia Beach	Pembroke SGA	Hampton Roads	2.0	2009	Place Type 3: Medium Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Operations; Transit Frequency; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Improvements to the Natural Environment
65	Virginia Beach	Newtown SGA	Hampton Roads	0.6	2009	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity; Roadway Operations; Transit Frequency/ Operations; Transit Capacity; Transit Facilities/ Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; On-Street Parking Capacity; Off-Street Parking; Intersection Design; Wayfinding/Signage; Improvements to the Natural Environment
66	Virginia Beach	Rosemont SGA	Hampton Roads	0.7	2009	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity Improvements; Roadway Operations; Transit Frequency; Transit Operations; Transit Capacity; Transit Facilities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Off-Street Parking; Intersection Design; Improvements to the Natural Environment
74	Hampton	Coliseum Central	Hampton Roads	4	2015	Place Type 3: Medium Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
75	Hampton	North King Street	Hampton Roads	2.4	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
76	Hampton	Downtown	Hampton Roads	1.7	2015	Place Type 3: Medium Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
77	Hampton	Kecoughtan	Hampton Roads	2.1	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
78	Hampton	Phoebus	Hampton Roads	1.3	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
79	Hampton	Buckroe	Hampton Roads	1.3	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment

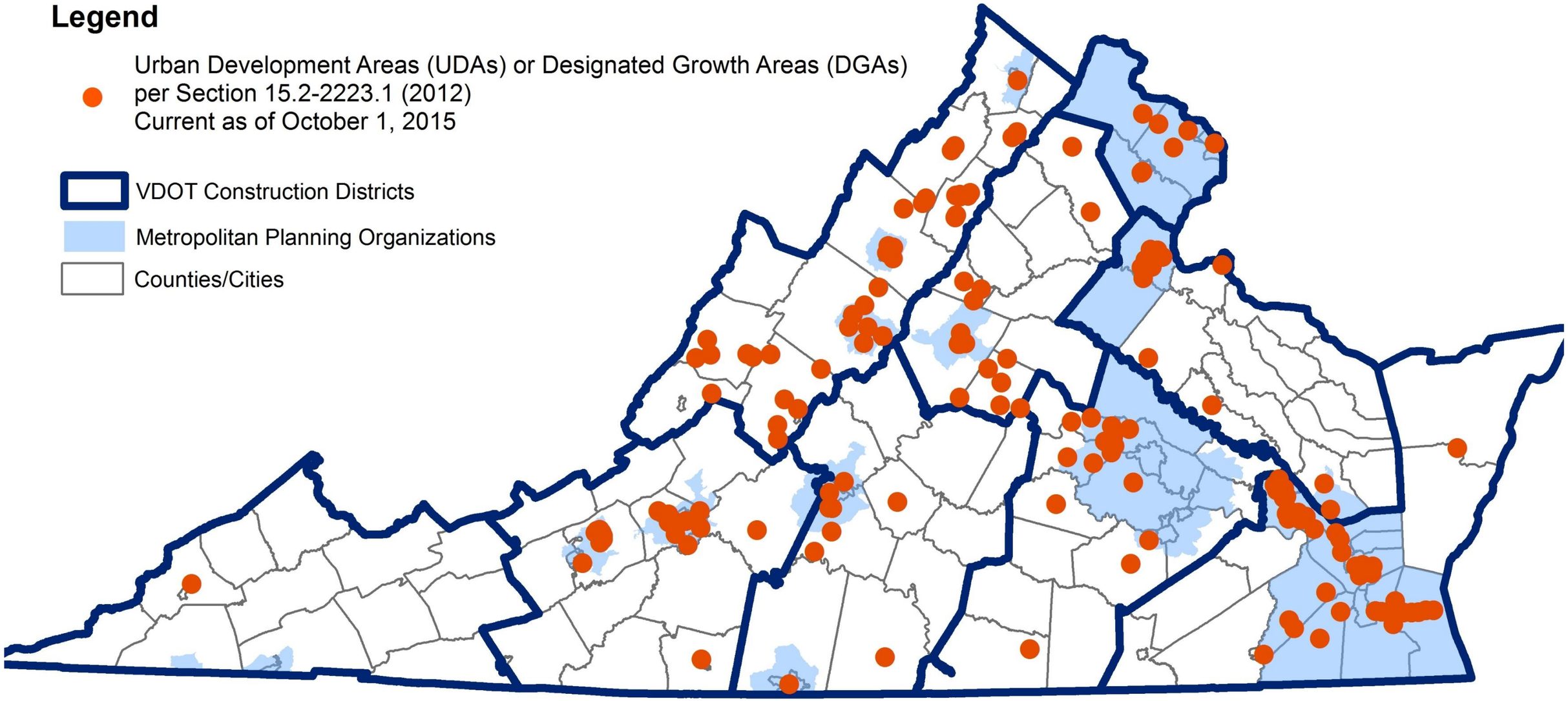
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80	Hampton	Fort Monroe	Hampton Roads	0.8	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Transit Frequency; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
85	Suffolk City	All DGAs in Jurisdiction (2)	Hampton Roads	74	2015	Place Type 5: Urban Center	Place Type 5: Urban Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity; Roadway Operations; Transit Frequency; Transit Operations; Transit Facilities; Intersection Design; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; On-Street Parking; Off-Street Parking
86	Williamsburg	High Street Mixed-Use / Residential Area	Hampton Roads	0.17	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity; Transit Frequency; Bicycle Infrastructure
87	Williamsburg	Midtown Planning Area	Hampton Roads	0.24	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Roadway Capacity; Transit Frequency; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Improvements to the Natural Environment; Intersection Design
88	Williamsburg	Northeast Triangle Planning Area	Hampton Roads	0.88	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Transit Frequency; Bicycle Infrastructure; Pedestrian Infrastructure; Safety Features; Intersection Design
89	Williamsburg	Quarterpath Mixed Use and Residential Area	Hampton Roads	0.55	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Roadway Capacity; Transit Frequency; Transit Capacity; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Off-Street Parking
90	York County	All DGAs in Jurisdiction (5)	Hampton Roads	3.8	2015	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Pedestrian Infrastructure; Transit Operations; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Off-Street Parking; Intersection Design; Improvements to the Natural Environment; Safety Features
100	Virginia Beach	Burton Station	Hampton Roads	1.5	2015	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Improvements to the Natural Environment
101	Virginia Beach	Resort	Hampton Roads	2.6	2015	Place Type 6: Urban Core	Place Type 6: Urban Core	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Transit Facilities/Amenities; Improvements to the Natural Environment; Safety Features
102	Virginia Beach	Lynnhaven	Hampton Roads	1.4	2015	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Improvements to the Natural Environment

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103	Virginia Beach	Hilltop	Hampton Roads	1.2	2015	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Improvements to the Natural Environment
104	Virginia Beach	Centerville	Hampton Roads	2.0	2015	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Improvements to the Natural Environment
105	Town of Exmore	Exmore UDA	Hampton Roads	TBD	2015	*To be determined through outreach with locality (refer to Town of Exmore Comprehensive Plan, July 2015 for more details).*			
3	Amherst County	Tyler Tract	Lynchburg	0.3	2013	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements
4	Appomattox County	Town of Appomattox	Lynchburg	2.2	2012	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA	Street Grid; Pedestrian Infrastructure; Intersection Design
7	Campbell County	All UDAs in Jurisdiction (4)	Lynchburg	2.2	2009	Place Type 1: Rural or Village Center	Place Type 2: Small Town or Suburban Center	Friendly pedestrian and bicycle environment; Transit enhancements	None listed
40	Lynchburg	City of Lynchburg	Lynchburg	49.2	2011	Place Type 4: Large Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Traffic Calming; Improvements to the Natural Environment
95	Danville	City of Danville	Lynchburg	43	2015	Place Type 5: Urban Center	Place Type 5: Urban Center	Friendly pedestrian and bicycle environment	Roadway capacity; Transit Capacity; Transit Facilities; Safety Features; Intersection Design; Improvements to the Natural Environment; Pedestrian Infrastructure; Bicycle Infrastructure
98	Town of South Boston	Area 1	Lynchburg	0.3	2015	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Bicycle Infrastructure; Complete Streets; Safety Features;
14	Fairfax County	Tysons Corner	Northern Virginia	3.4	2013	Place Type 6: Urban Core	Place Type 6: Urban Core	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Transit Frequency; Transit Operations; Bicycle Infrastructure; Pedestrian Infrastructure; Signage/Wayfinding; Improvements to the Natural Environment
23	Town of Herndon	Herndon Metrorail Station UDA	Northern Virginia	<0.1	2008	Place Type 3: Medium Town or Suburban Center	Place Type 6: Urban Core	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Transit Frequency; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Signage/Wayfinding; Traffic Calming; Improvements to the Natural Environment
41	Manassas	City of Manassas	Northern Virginia	9.9	2013	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Off-Street Parking Capacity; Intersection Design; Signage/Wayfinding; Improvements to the Natural Environment
71	Loudoun County	Suburban Policy Area	Northern Virginia	93.3	2011	Place Type 3: Medium Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Safety for all users; Access to transportation networks beyond the UDA	Roadway Capacity Improvements; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure

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82	Fairfax City	All DGAs in Jurisdiction (5)	Northern Virginia	0.35	2015	Place Type 2: Small Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Bicycle Infrastructure; Street Grid; Pedestrian Infrastructure; Complete Streets; Traffic Calming; Safety Features; On-Street Parking; Off-Street Parking; Intersection Design; Signage/Wayfinding; Improvements to the Natural Environment
92	Arlington County	All UDAs in Jurisdiction (7)	Northern Virginia	8	2011	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Friendly pedestrian and bicycle environment; Circulation and access within the UDA; Transit enhancements	Transit Frequency; Transit Operations; Transit Capacity; Transit Facilities; Bicycle Infrastructure; Pedestrian Infrastructure
2	Amelia County	Amelia Village	Richmond	1.4	2005	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Transit Frequency; Transit Operations; Transit Capacity/Access; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; On-Street Parking Capacity; Off-Street Parking Capacity; Intersection Design; Signage/Wayfinding
12	Dinwiddie County	Urban Area	Richmond	0.3	2012	Undeveloped (Greenfield/Grayfield)	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Complete Streets; Safety Features; Off-Street Parking Capacity; Improvements to the Natural Environment
13	Dinwiddie County	Dinwiddie Courthouse Area	Richmond	1.2	2012	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity/Infrastructure Improvements; Roadway Operations; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment
22	Henrico County	Innsbrook Area	Richmond	2.1	2010	Place Type 4: Large Town or Suburban Center	Place Type 5: Urban Center	Access to transportation networks beyond the UDA; Circulation and access within the UDA; Safety for all users	Street Grid
50	Powhatan County	Rt. 711 Village	Richmond	3.2	2010	Place Type 1: Rural or Village Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity; Bicycle Infrastructure; Pedestrian Infrastructure; Safety Features; Intersection Design; Signage/Wayfinding; Traffic Calming
51	Powhatan County	Rt. 60 Corridor East	Richmond	1.1	2010	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity; Intersection Design
52	Powhatan County	Courthouse Village	Richmond	5.2	2010	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Bicycle Infrastructure; Pedestrian Infrastructure; Signage/Wayfinding
56	Town of South Hill	E. Ferrell Street and Lombardy Street	Richmond	0.1	2012	Undeveloped (Greenfield/Grayfield)	Place Type 2: Small Town or Suburban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Roadway Capacity/Infrastructure Improvements; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; On-Street Parking Capacity; Off-Street Parking Capacity; Signage/Wayfinding; Improvements to the Natural Environment
81	Chesterfield County	All UDAs in Jurisdiction (8)	Richmond	23	2015	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Improvements to the Natural Environment; Roadway Capacity
83	Goochland County	All UDAs in Jurisdiction (6)	Richmond	32	2015	Place Type 1: Rural or Village Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity/Infrastructure Improvements; Pedestrian Infrastructure; Complete Streets; Intersection Design

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5	Bedford County	All UDAs in Jurisdiction (2)	Salem	2.7	2007	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Friendly pedestrian and bicycle environment; Transit enhancements	Roadway Capacity/Infrastructure Improvements; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design; Signage/Wayfinding; Improvements to the Natural Environment
6	Blacksburg Town	All UDAs in Jurisdiction (8)	Salem	1.3	2011	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Transit Facilities/Amenities; Bicycle Infrastructure; Pedestrian Infrastructure
42	Martinsville	All UDAs in Jurisdiction (2)	Salem	0.1	2011	Place Type 4: Large Town or Suburban Center	Place Type 4: Large Town or Suburban Center	Circulation and access within the UDA; Friendly pedestrian and bicycle environment	Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Traffic Calming; Improvements to the Natural Environment
43	Montgomery County	All UDAs in Jurisdiction (2)	Salem	1.3	2011	Undeveloped (Greenfield/Grayfield)	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Transit enhancements	Intersection Design
55	Salem	All UDAs in Jurisdiction (4)	Salem	1.8	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Transit enhancements	None listed
72	Roanoke	Roanoke City	Salem	41.9	2015	Place Type 5: Urban Center	Place Type 5: Urban Center	Circulation and access within the UDA; Transit enhancements	None listed
96	Roanoke County	All DGAs in Jurisdiction (6)	Salem	64	2015	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Safety for all users	Roadway Capacity; Roadway Operations; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Intersection Design
18	Frederick County	Frederick County Urban Development Area	Staunton	26.9	2011	Place Type 4: Large Town or Suburban Center	Place Type 5: Urban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Safety Features; Intersection Design
21	Harrisonburg	All UDAs in Jurisdiction (3)	Staunton	1.0	2011	Place Type 5: Urban Center	Place Type 5: Urban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Operations; Transit Facilities/Amenities; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; Off-Street Parking Capacity; Intersection Design; Traffic Calming; Improvements to the Natural Environment
44	Town of New Market	All UDAs in Jurisdiction (3)	Staunton	0.5	2012	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity; Pedestrian Infrastructure; Complete Streets; Improvements to the Natural Environment
49	Page County	All UDAs in Jurisdiction (7)	Staunton	1.1	2011	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Roadway Capacity/Infrastructure Improvements; Transit Frequency; Transit Operations; Bicycle Infrastructure; Pedestrian Infrastructure; Signage/Wayfinding; Improvements to the Natural Environment
53	Rockbridge County	All UDAs in Jurisdiction (6)	Staunton	12.6	2003	Place Type 3: Medium Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Friendly pedestrian and bicycle environment; Transit enhancements	None listed
54	Rockingham County	Port Republic Road/Stone Spring	Staunton	6.6	2010	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; Complete Streets; Safety Features; On-Street Parking Capacity
67	Warren County	Front Royal UDAs (3)	Staunton	1.1	2011	Undeveloped (Greenfield/Grayfield)	Place Type 2: Small Town or Suburban Center	Circulation and access within the UDA; Safety for all users	Roadway Capacity Improvements; Street Grid; Bicycle Infrastructure; Safety Features
68	Waynesboro	Waynesboro City	Staunton	15	2015	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Circulation and access within the UDA; Access to transportation networks beyond the UDA	Bicycle Infrastructure; Pedestrian Infrastructure; Signage/Wayfinding

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69	Town of Woodstock	Area 1	Staunton	0.2	2011	*To be determined through outreach with locality (refer to the Town of Woodstock Urban Development Areas Comprehensive Plan Amendment, Sept. 2011).*			
70	Town of Woodstock	Area 2	Staunton	0.2	2011	*To be determined through outreach with locality (refer to the Town of Woodstock Urban Development Areas Comprehensive Plan Amendment, Sept. 2011).*			
73	Town of Broadway	Town of Broadway	Staunton	0.3	2011	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity Improvements
84	Town of Luray	All UDAs in Jurisdiction (5)	Staunton	1.5	2015	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Friendly Pedestrian and Bicycle Environment; Safety for all users	Bicycle Infrastructure; Complete Streets; Improvements to the Natural Environment
91	Augusta County	All UDAs in Jurisdiction (4)	Staunton	56	2015	Place Type 2: Small Town or Suburban Center	Place Type 3: Medium Town or Suburban Center	Safety for all users; Circulation and access within the UDA	Roadway Capacity; Intersection Design
93	Bath County	All UDAs in Jurisdiction (5)	Staunton	33	2015	Place Type 1: Rural or Village Center	Place Type 1: Rural or Village Center	Safety for all users; Circulation and access within the UDA	None listed
94	Town of Clifton Forge	Town of Clifton Forge	Staunton	3	2015	Place Type 2: Small Town or Suburban Center	Place Type 2: Small Town or Suburban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment	Transit Capacity; Street Grid; Bicycle Infrastructure; Pedestrian Infrastructure; On-Street Parking; Signage/Wayfinding
97	Staunton	City of Staunton	Staunton	20	2015	Place Type 2: Small Town or Suburban Center	Place Type 5: Urban Center	Safety for all users; Circulation and access within the UDA; Access to transportation networks beyond the UDA; Friendly pedestrian and bicycle environment; Transit enhancements	Street Grid; Complete Streets; Safety Features; Off-Street Parking; Intersection Design; Signage/Wayfinding; Traffic Calming; Improvements to the Natural Environment


Legend
Urban Development Areas (UDAs) or Designated Growth Areas (DGAs)
per Section 15.2-2223.1 (2012)
Current as of October 1, 2015
VDOT Construction Districts
Metropolitan Planning Organizations
Counties/Cities

Urban Development Areas – Town of Wise

UDA Needs Profile

The Town of Wise designated one UDA in 2015, just east of US 23 and north of Norton Road. The area is currently undeveloped, and is zoned for future planned growth.

Location Characteristics

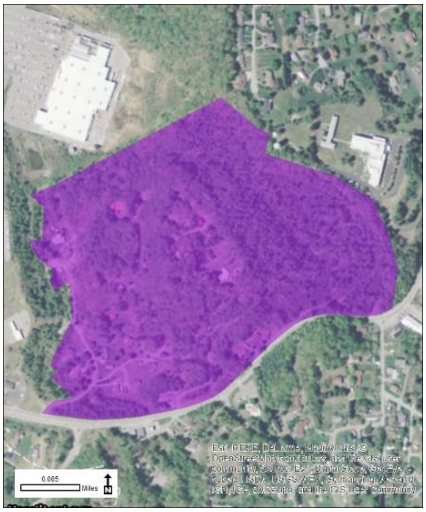
PDC - Lenowisco Planning District Commission

UDA Size – 0.10 square miles

Year Designated – 2015

Comprehensive Plan Detail - The Town of Wise designated a growth area pursuant to Code of Virginia Section §15.2-2223.1. The Planning Commission recommends that the Town Council of the Town of Wise, Virginia amend the 2015 Comprehensive Plan for the Town of Wise, Virginia along with the corresponding future land use and transportation mapping to include a designated growth area along Norton Road (US 23 Business) from Cherry Street to Hamilton Street.

Geographic Location



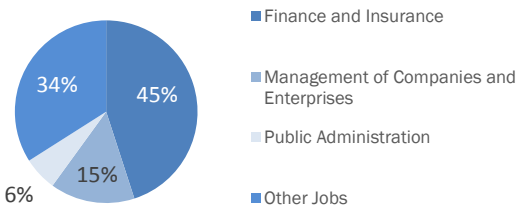
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

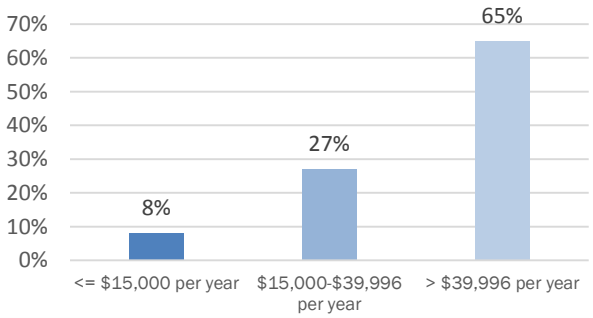
Total Population –289 persons

Total Primary Jobs – 10,477 jobs

Jobs by Industry



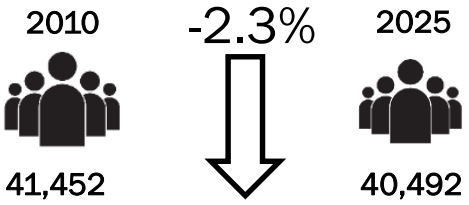
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
6,979
Working Age Population Within a 45 Minute Drive
18,710
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Town of Wise

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Complete Streets
- ✓ Intersection Design

External UDA Needs

High

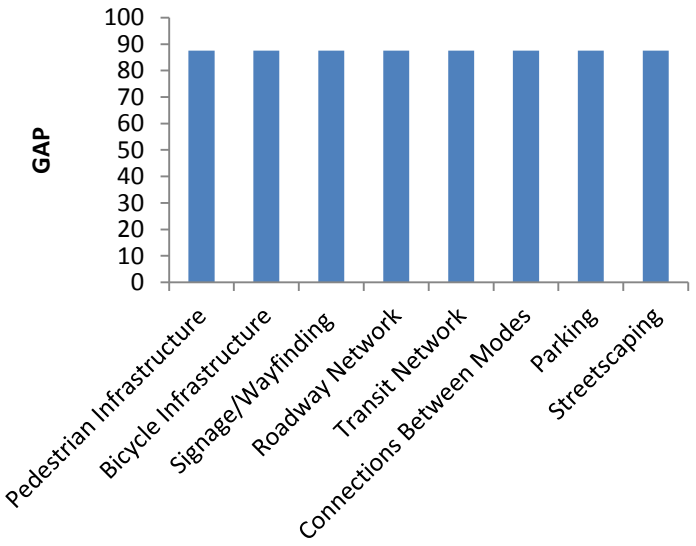
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



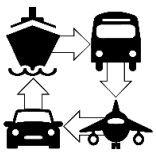
Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Access to transportation networks beyond the UDA

Urban Development Areas – Albemarle County

UDA Needs Profile: All UDAs

Albemarle County has two UDAs: the Pantops UDA located east of the Rivanna River and the City of Charlottesville, and Places 29 – South, located on U.S. 29 south of the Rivanna River.

Location Characteristics

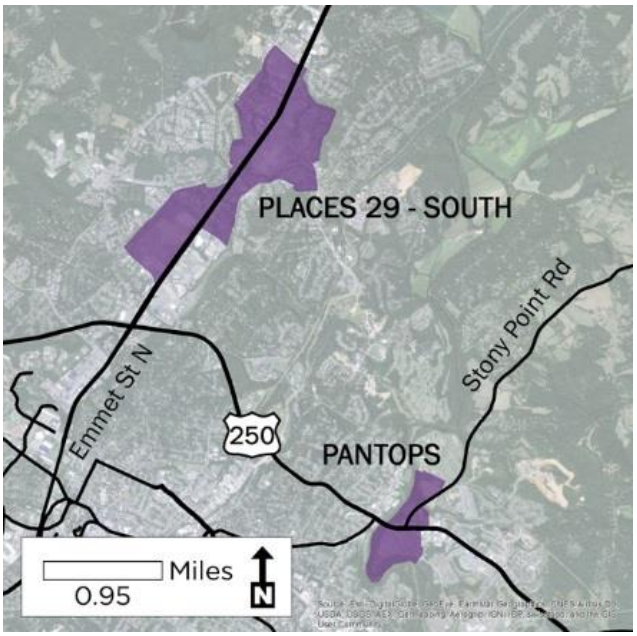
PDC – Thomas Jefferson Planning District Commission

UDA Size – 1.3 square miles

Year Designated – 2011

Comprehensive Plan Detail - Each of the Albemarle County UDAs – Pantops and Places 29 South – was previously established as a planning priority area, and has its own master plan. Albemarle County's UDAs are planned for high quality, mixed-use urban neighborhoods and employment centers that are walkable and adequately supported by services and facilities.

Geographic Location



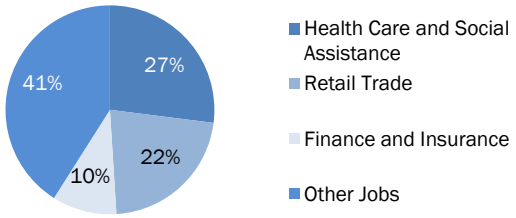
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

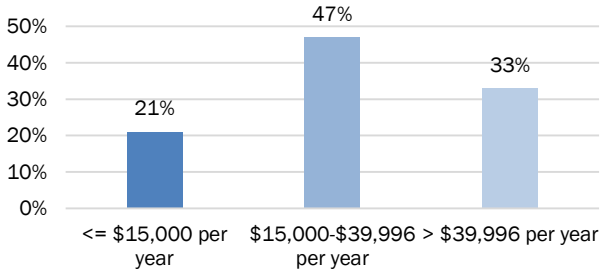
Total Population – 11,727 persons

Total Primary Jobs – 2,074 jobs

Jobs by Industry



Total Jobs by Earnings



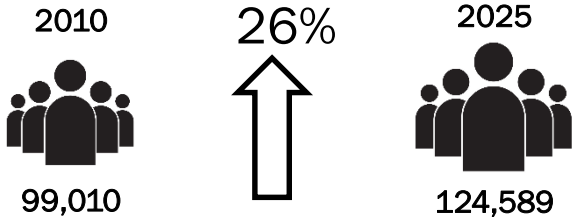
Jobs Within a 45 Minute Drive
14,470

Working Age Population Within a 45 Minute Drive
24,261

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Albemarle County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Intersection Design
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity /Access
- ✓ On-Street Parking Capacity
- ✓ Transit Frequency
- ✓ Signage/Wayfinding

External UDA Needs

High

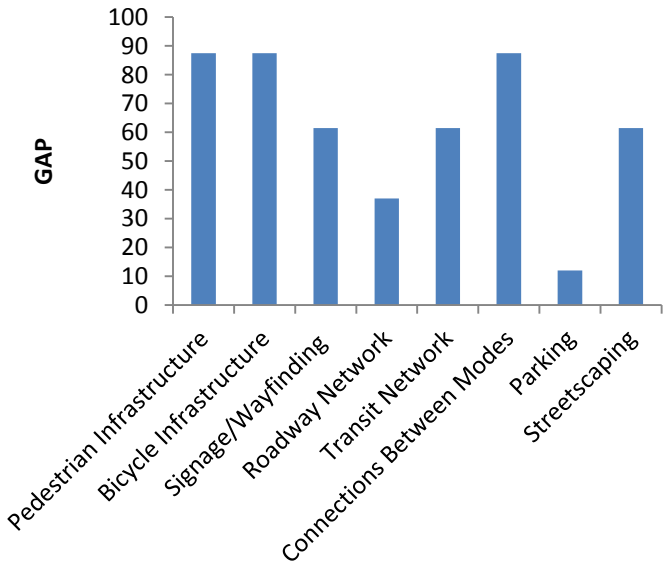
- ✓ Transit Operations
- ✓ Transit Capacity /Access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

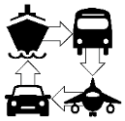


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access beyond UDA



Friendly pedestrian bicycle environment

Urban Development Areas – Charlottesville City

UDA Needs Profile: Downtown Corridor UDA

The Downtown Corridor UDA is located between Downtown and Main Street in the City of Charlottesville, along the Rivanna River.

Location Characteristics

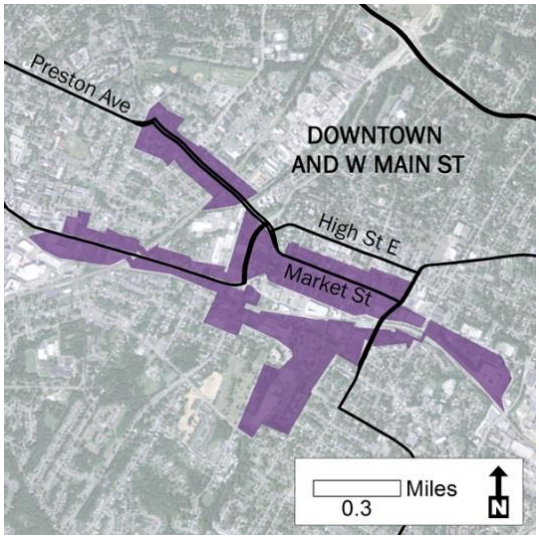
PDC – Thomas Jefferson Planning District Commission

UDA Size – 0.4 square miles

Year Designated – 2010

Comprehensive Plan Detail - The City of Charlottesville changed the designation of several mixed-use areas to UDAs, noting that more compact, dense development within the city's urban areas is better and more efficient than low density development. By identifying UDAs and confining urban development to those areas, the city will be able to determine where to direct special, intensive efforts at providing facilities and services. Charlottesville's UDAs were drawn primarily according to the existing development patterns, sewer facilities, and physical characteristics, and include Downtown Extended Corridor/West Main Street, Preston Avenue, and Cherry Avenue.

Geographic Location



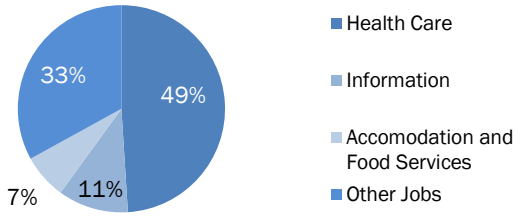
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

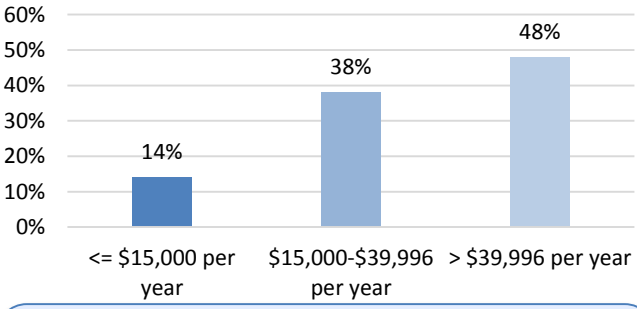
Total Population –2,400 persons

Total Primary Jobs – 10,992 jobs

Jobs by Industry



Total Jobs by Earnings



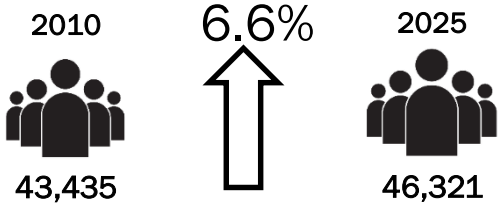
Jobs Within a 45 Minute Drive
33,946

Working Age Population Within a 45 Minute Drive
45,393

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Charlottesville City

Current Place Type - Large Town or Suburban Center



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking
- ✓ Improvements to Environment
- ✓ Intersection Design
- ✓ Traffic Calming

Moderate

- ✓ Transit Operations
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

External UDA Needs

High

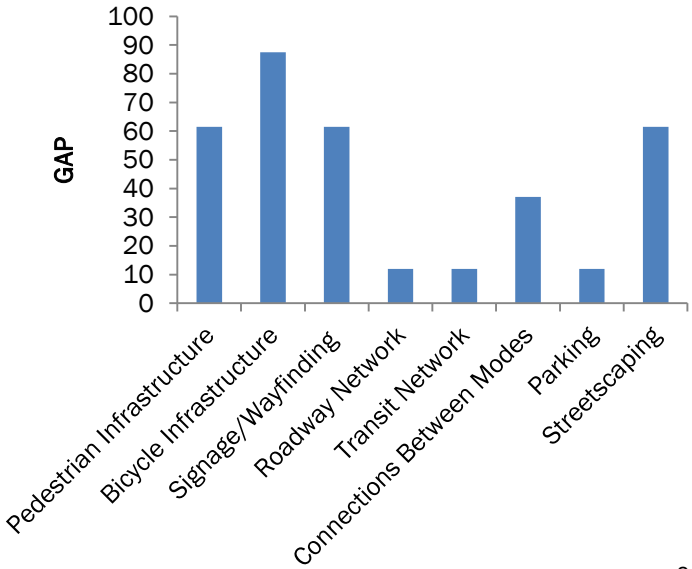
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to Natural Environment

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

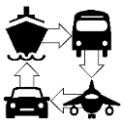


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Access to transportation networks beyond UDA

Urban Development Areas – Charlottesville City

UDA Needs Profile: Preston Avenue

Preston Avenue UDA is located within downtown Charlottesville, bounded by Route 250 to the West and Route 29 to the north.

Location Characteristics

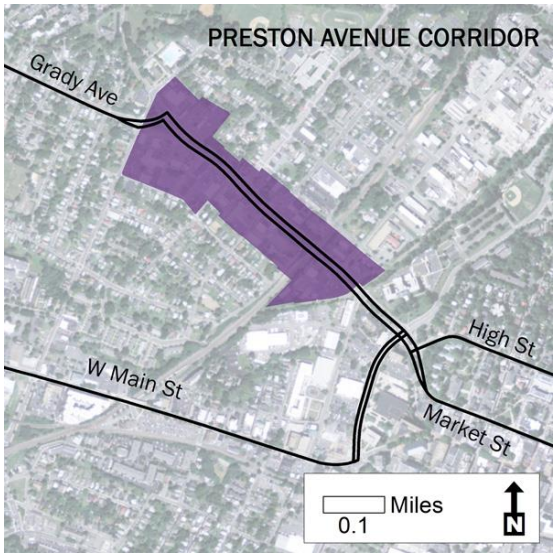
PDC – Thomas Jefferson Planning District Commission

UDA Size – 0.1 square miles

Year Designated – 2010

Comprehensive Plan Detail - The City of Charlottesville changed the designation of several mixed-use areas to UDAs, noting that more compact, dense development within the city's urban areas is better and more efficient than low density development; by identifying UDAs and confining urban development to those areas, the city will be able to determine where to direct special, intensive efforts at providing facilities and services. Charlottesville's UDAs were drawn primarily according to the existing development patterns, sewer facilities, and physical characteristics, and include Downtown Extended Corridor/West Main Street, Preston Avenue, and Cherry Avenue.

Geographic Location



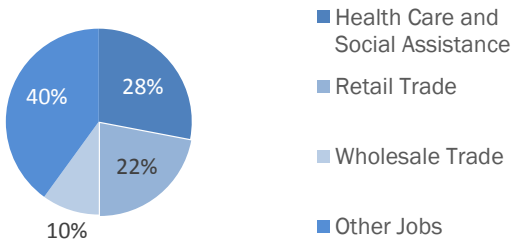
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

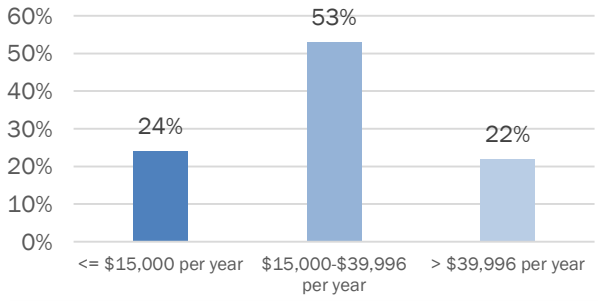
Total Population – 198 persons

Total Primary Jobs –427 jobs

Jobs by Industry



Total Jobs by Earnings



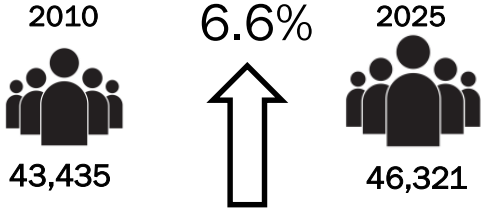
Jobs Within a 45 Minute Drive
2,780

Working Age Population Within a 45 Minute Drive
44,614

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Charlottesville City

Current Place Type - Small Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to Environment

Moderate

- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Signage/Wayfinding

External UDA Needs

High

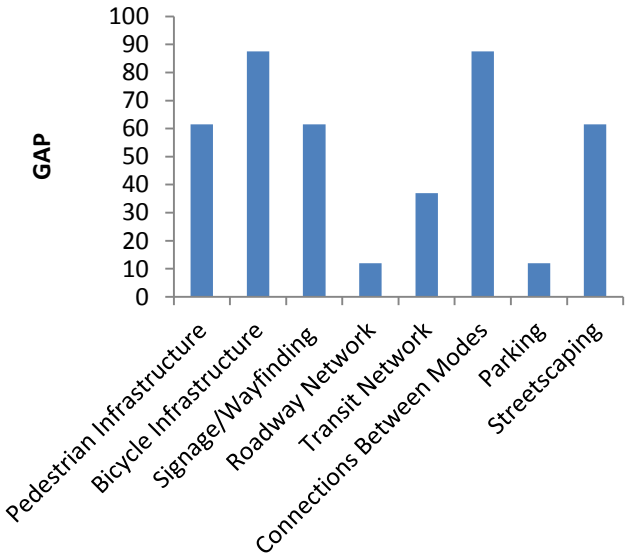
- ✓ Bicycle Infrastructure

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Access to transportation networks beyond the UDA

Urban Development Areas – Charlottesville City

UDA Needs Profile: Cherry Avenue

Cherry Avenue UDA is located within the City of Charlottesville, south of U.S. 29 and the Charlottesville Amtrak station.

Location Characteristics

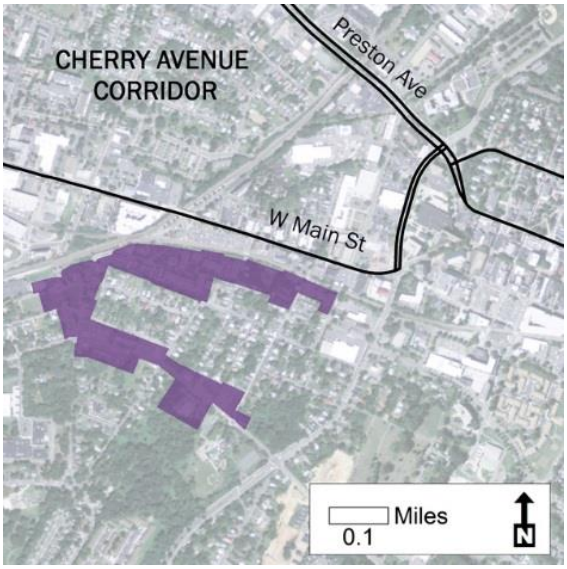
PDC – Thomas Jefferson Planning District Commission

UDA Size – 0.1 square miles

Year Designated – 2010

Comprehensive Plan Detail - The City of Charlottesville changed the designation of several mixed-use areas to UDAs, noting that more compact, dense development within the city's urban areas is better and more efficient than low density development; by identifying UDAs and confining urban development to those areas, the city will be able to determine where to direct special, intensive efforts at providing facilities and services. Charlottesville's UDAs were drawn primarily according to the existing development patterns, sewer facilities, and physical characteristics, and include Downtown Extended Corridor/West Main Street, Preston Avenue, and Cherry Avenue.

Geographic Location



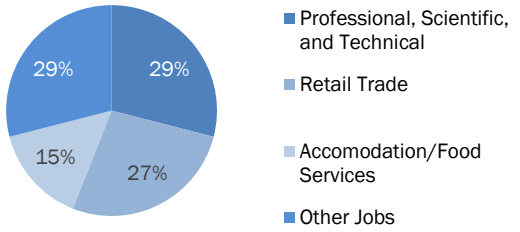
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

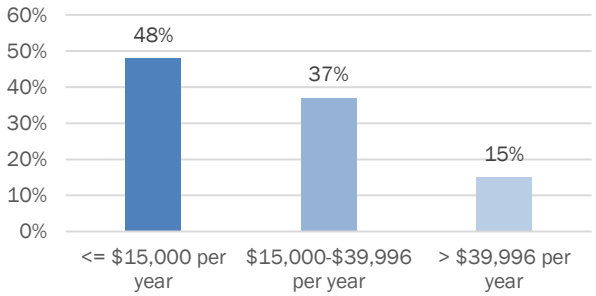
Total Population – 1,724 persons

Total Primary Jobs – 85 jobs

Jobs by Industry



Total Jobs by Earnings



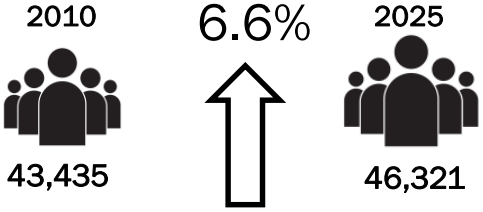
Jobs Within a 45 Minute Drive
2,160

Working Age Population Within a 45 Minute Drive
47,307

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Charlottesville City

Current Place Type - Small Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Improvements to Environment

Moderate

- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Signage/Wayfinding

External UDA Needs

High

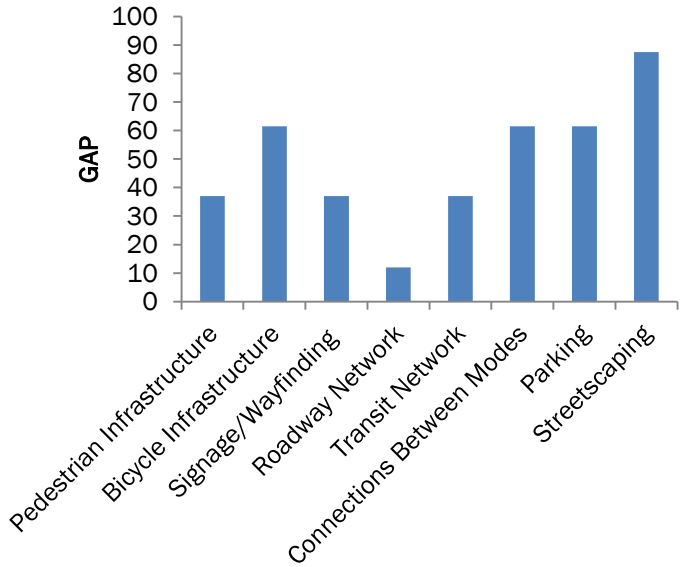
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Improvements to Environment

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

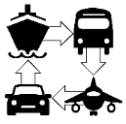


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Access to transportation networks beyond the UDA

Urban Development Areas – Fauquier County

UDA Needs Profile: All UDAs

Fauquier County has two UDAs: the Bealeton UDA located around the intersection of Route 28 and U.S. 17, and the Marshall UDA located near the I-66/U.S. 17 interchange.

Location Characteristics

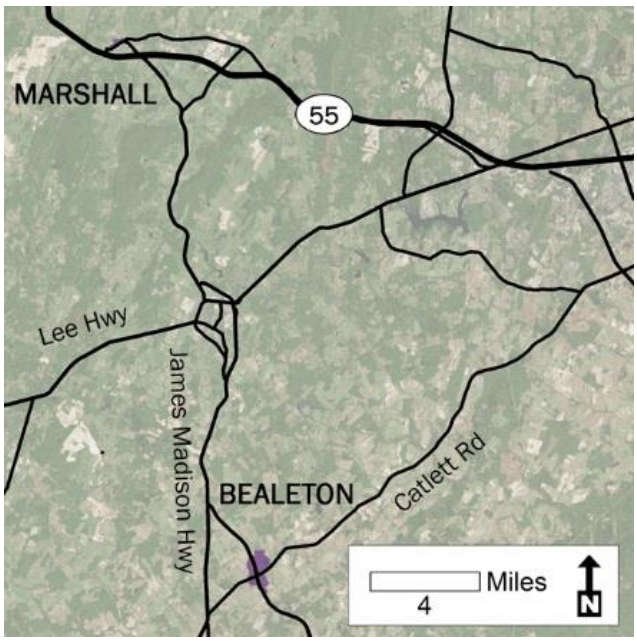
PDC – Rappahannock-Rapidan Regional Commission

UDA Size – 1.1 square miles

Year Designated – 2014

Comprehensive Plan Detail - The designation of Urban Development Areas is consistent with the land use plans for the town center core area of the Bealeton Service District and the downtown core (Main Street and Salem Avenue) of the Marshall Service District. Land uses within these two areas include mixed-use neighborhoods and a mix of housing types. The service district plans for Bealeton and Marshall provide specific guidance in the employment of traditional town design standards applicable to the designated UDAs.

Geographic Location



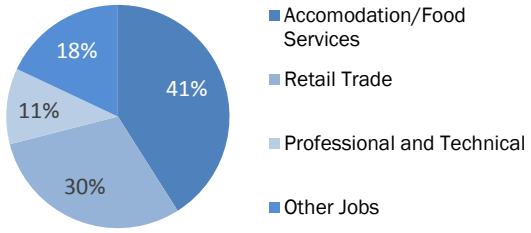
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

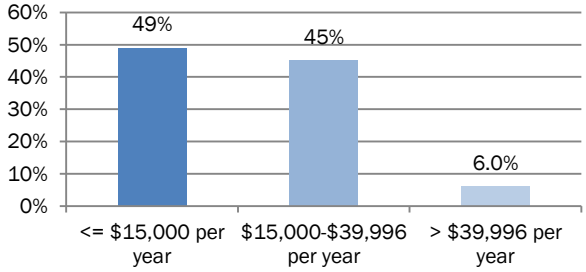
Total Population - 1,219 persons

Total Primary Jobs – 80 jobs

Jobs by Industry



Total Jobs by Earnings



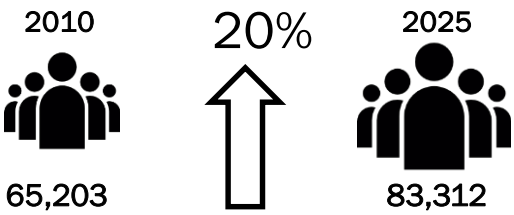
Jobs Within a 45 Minute Drive
26,398

Working Age Population Within a 45 Minute Drive
55,205

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fauquier County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Pedestrian infrastructure
- ✓ Complete streets improvements

Moderate

- ✓ Street grid (better street connectivity
- ✓ Bicycle infrastructure
- ✓ Safety features
- ✓ Intersection design improvements
- ✓ Signage/wayfinding
- ✓ Traffic calming features
- ✓ Improvements to the natural environment

External UDA Needs

High

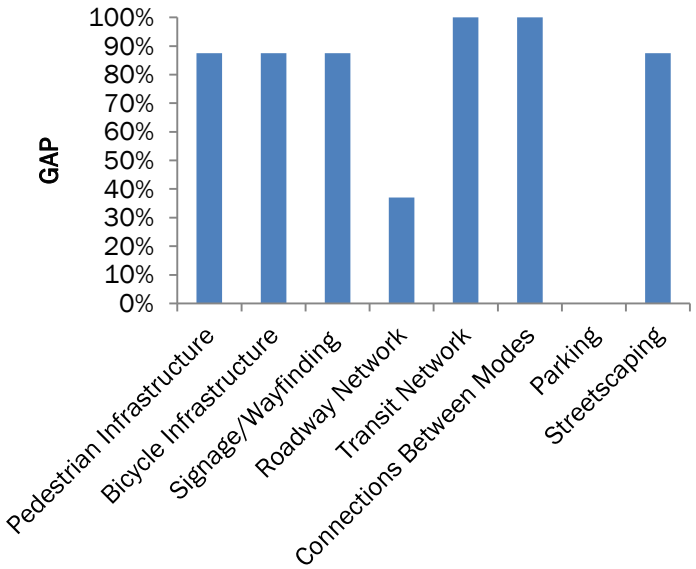
- ✓ Pedestrian infrastructure

Moderate

- ✓ Bicycle infrastructure
- ✓ Safety features
- ✓ Signage/wayfinding
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle environment

Urban Development Areas – Fluvanna County

UDA Needs Profile: Zion Crossroads

Fluvanna County contains a single UDA, located along the northern border of the county near I-64. The UDA serves as the gateway to Fluvanna County from I-64 via U.S. 15.

Location Characteristics

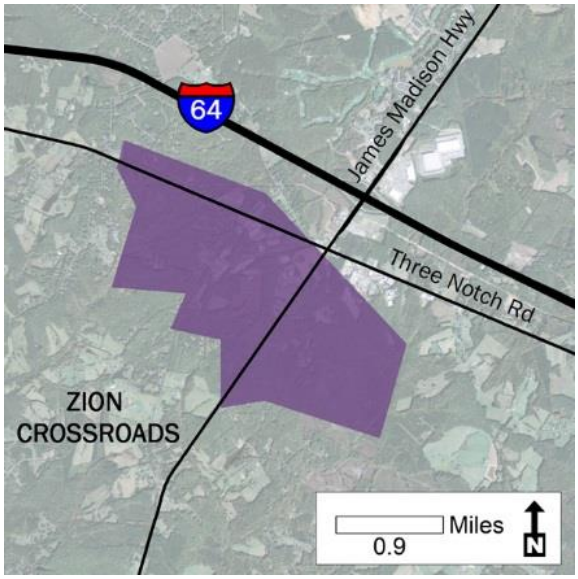
PDC – Thomas Jefferson Planning District Commission

UDA Size – 3.2 square miles

Year Designated – 2009

Comprehensive Plan Detail - Fluvanna County's 2009 Future Land Use Map designates Zion Crossroads as the County's Urban Development Area (UDA). This location was chosen because it correlates with the Zion Crossroads community planning area and the intersection of two existing major transportation networks. The County's strategy is very much in line with the intent and community development principles of UDAs: to encourage village-like development in select areas, while preserving the natural and agricultural character of outlying areas.

Geographic Location



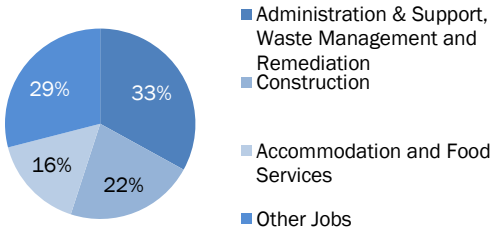
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

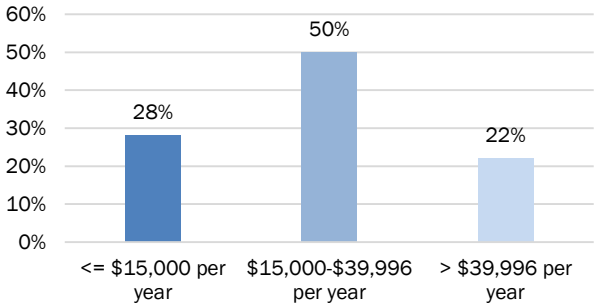
Total Population – 916 persons

Total Primary Jobs – 198 jobs

Jobs by Industry



Total Jobs by Earnings



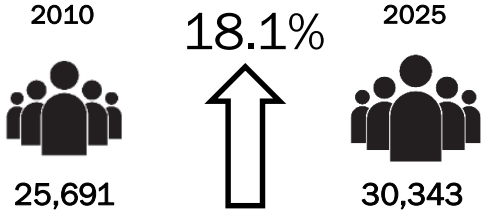
Jobs Within a 45 Minute Drive
9,920

Working Age Population Within a 45 Minute Drive
1,650

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Operations
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

External UDA Needs

High

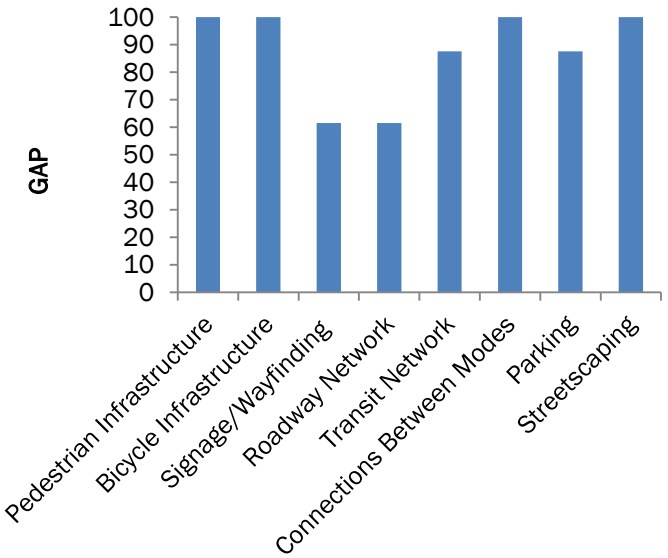
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Improvements to Natural Environment

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Fluvanna County

UDA Needs Profile: Columbia

Fluvanna County's 2009 Comprehensive Plan designates six Community Planning Areas (CPAs). The Columbia CPA is located in the northern center of the County, and in the future, existing rail lines along the northern bank of the Rivanna and James Rivers could be used for commuter and freight transportation.

Location Characteristics

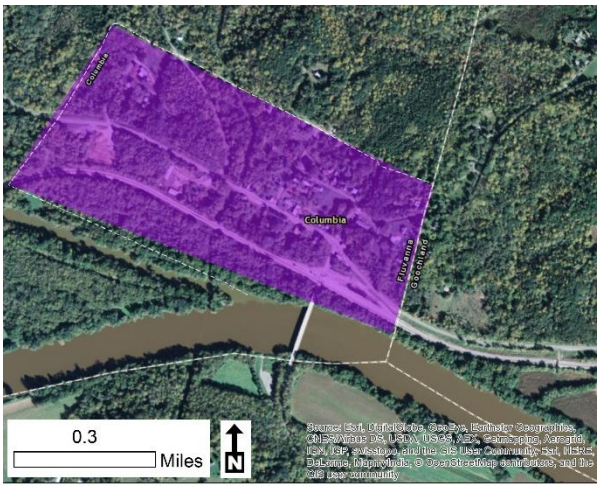
PDC – Thomas Jefferson Planning District

UDA Size –0.18 square miles

Year Designated – 2009

Comprehensive Plan Detail – In the Town of Columbia's future, the existing rail line along the northern bank of the Rivanna and James Rivers could be used for commuter transportation to Richmond, as well as increased freight. This historic town once relied heavily on the confluence of the rivers for commerce, and this feature can still be an excellent heritage and ecotourism destination, with the rail line serving as a commerce and commuter lifeline.

Geographic Location



Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

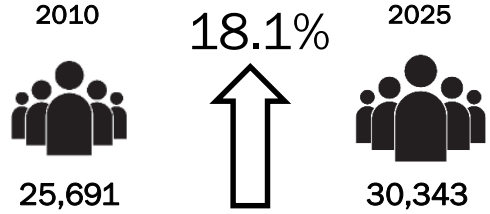
Total Population –258 persons

Total Primary Jobs – N/A

Jobs Within a 45 Minute Drive
11,633
Working Age Population Within a 45 Minute Drive
12,078
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ Safety Features
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

External UDA Needs

High

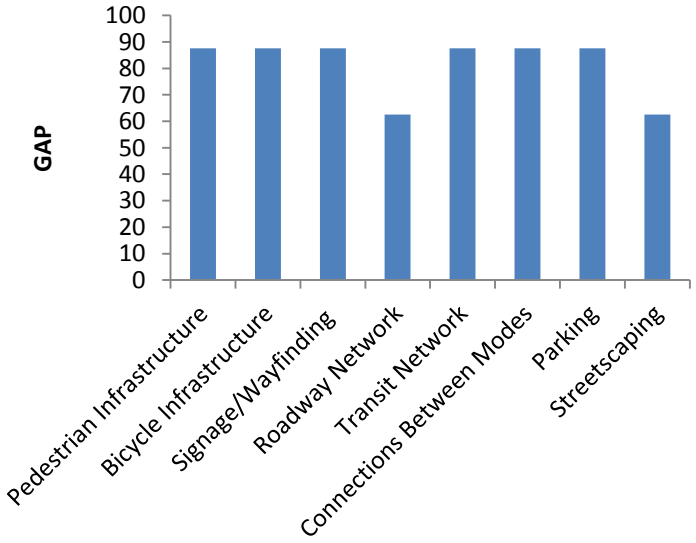
- ✓ None listed

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users

Urban Development Areas – Fluvanna County

UDA Needs Profile: Scottsville

Fluvanna County's 2009 Comprehensive Plan designates six Community Planning Areas (CPAs) within the County. The Scottsville CPA is the newest in the County, and has a historic nature that lends itself to neighborhood mixed-use development.

Location Characteristics

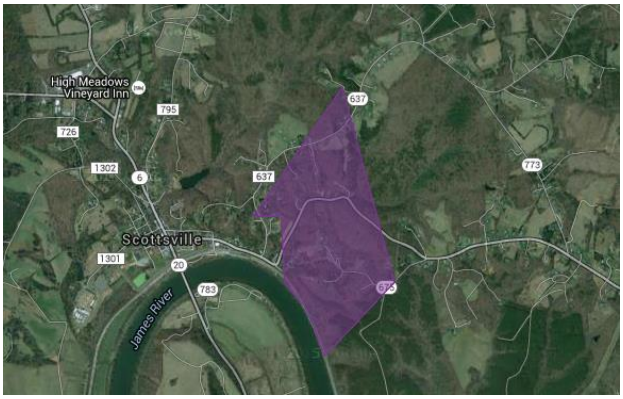
PDC- Thomas Jefferson Planning District Commission

UDA Size –0.67 square miles

Year Designated – 2009

Comprehensive Plan Detail – The county's newest community planning area, Scottsville is also a historic town that lends itself to well-planned neighborhood mixed-use development with some limited neighborhood residential on the periphery. All development should enhance the character of the area and reinforce the village-like atmosphere of the town. A mix of smaller-scale commercial businesses, and office and residential uses, forms a village- like neotraditional development or series of interconnected developments. Commercial and office structures do not exceed two stories, and residential density is up to four dwelling units per acre (4 du/ac). Density may be increased with incentives such as open space, affordable housing, or transfer of development rights, depending on the zoning district standards.

Geographic Location

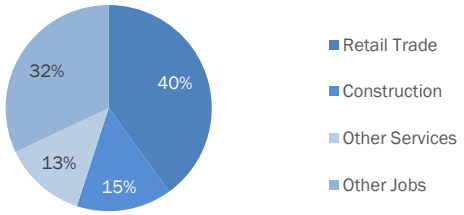


Socio-Economic Characteristics

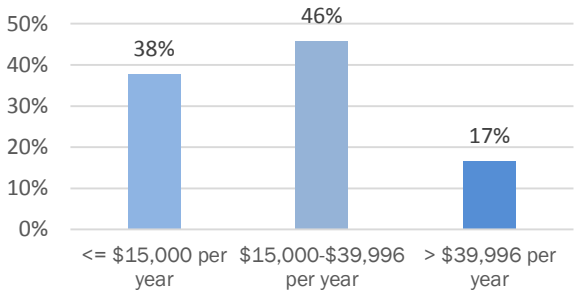
UDA Characteristics: (Source: LEHD, 2010)

Total Population – 591 persons
Total Primary Jobs – 151 jobs

Jobs by Industry



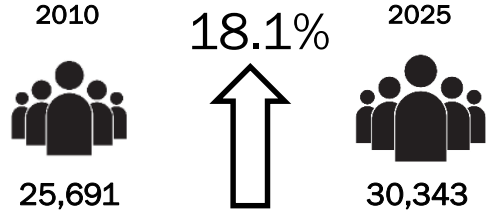
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
6,204
Working Age Population Within a 45 Minute Drive
11,939
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ Off-street parking
- ✓ Roadway operations
- ✓ Transit frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

External UDA Needs

High

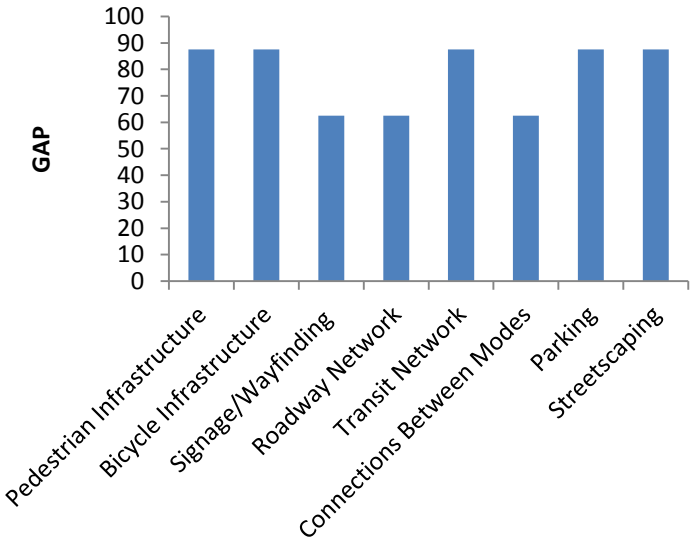
- ✓ None listed

Moderate

- ✓ Off-street parking
- ✓ Roadway operations
- ✓ Transit frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA

Urban Development Areas – Fluvanna County

UDA Needs Profile – Fork Union

Fluvanna County's 2009 Comprehensive Plan designates six Community Planning Areas (CPAs) within the County. The Fork Union CPA is located in the southeastern center of the County, including the villages of West Bottom, Thessalonia, Cloverdale, Weber City, and Dixie.

Location Characteristics

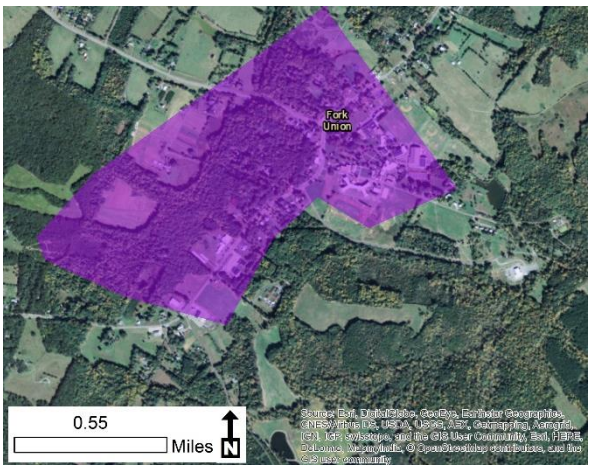
PDC- Thomas Jefferson Planning District Commission

UDA Size – 0.51 square miles

Year Designated – 2009

Comprehensive Plan Detail – Located in the southeastern center of Fluvanna County, the Fork Union CPA contains 3,366 residents. This includes the village of Fork Union as well as the surrounding areas such as West Bottom, Thessalonia, Cloverdale, Weber City, and Dixie. Fork Union is a designated growth area (established pursuant to the Code of Virginia, section §15.2-2223.1). This historic village area is home to the Fork Union Military Academy and has access to some of the academy's recreational amenities and open space. The area should remain a village, and surrounding growth should be a mixture of uses and residential dwelling types that serve a variety of incomes

Geographic Location

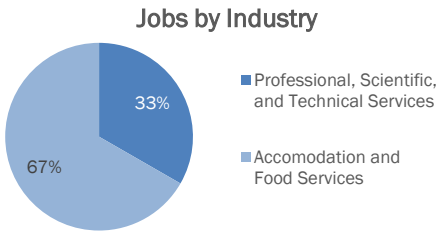


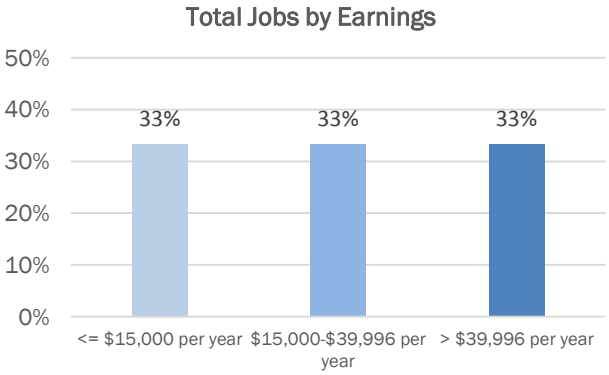
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 741 persons

Total Primary Jobs – 3 jobs

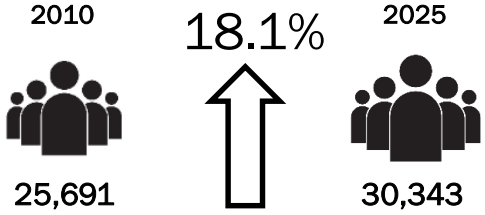




Jobs Within a 45 Minute Drive
5,468
Working Age Population Within a 45 Minute Drive
11,463
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Rural or Village Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ Off-street parking
- ✓ Roadway operations
- ✓ Transit frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

External UDA Needs

High

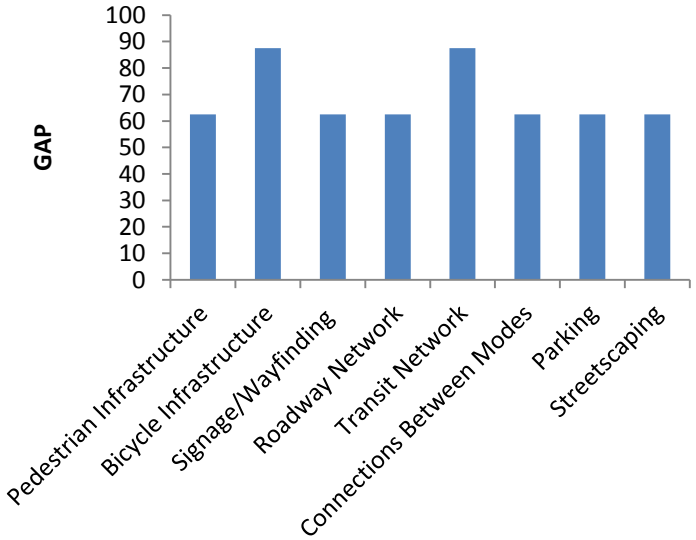
- ✓ None listed

Moderate

- ✓ Off-street parking
- ✓ Roadway operations
- ✓ Transit frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

None listed

Urban Development Areas – Fluvanna County

UDA Needs Profile – Palmyra

Fluvanna County's 2009 Comprehensive Plan designates six Community Planning Areas (CPAs) within the County. The Palmyra CPA is the historic county seat, straddling Routes 15 and 53, and is intended to be developed as a neighborhood mixed-use area.

Location Characteristics

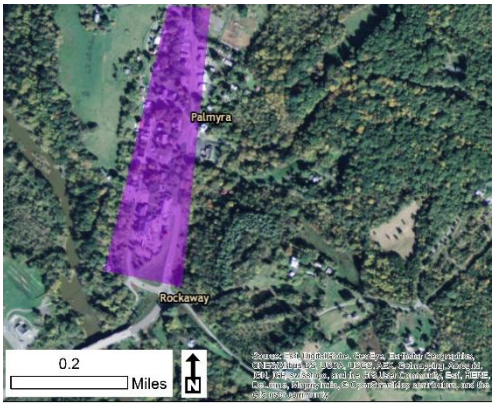
PDC- Thomas Jefferson Planning District Commission

UDA Size – 0.03 square miles

Year Designated – 2009

Comprehensive Plan Detail - Centrally located, Palmyra serves as the county seat and governmental center. The village has natural and social resources that form a village atmosphere. These include the historic courthouse, Old Stone Jail and Main Street residences and businesses, the county administrative offices and courthouse, and the businesses that front Routes 15 and 53. Palmyra is one of the county's designated growth areas (established pursuant to the Code of Virginia, section §15.2-2223.1). Commercial and neighborhood streets, along with rural roads, make up the transportation network, along with sidewalks, trails, and bicycle lanes. Open space includes Pleasant Grove, neighborhood parks, and greenways, along with the town square.

Geographic Location

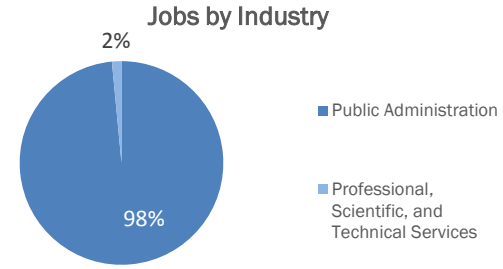


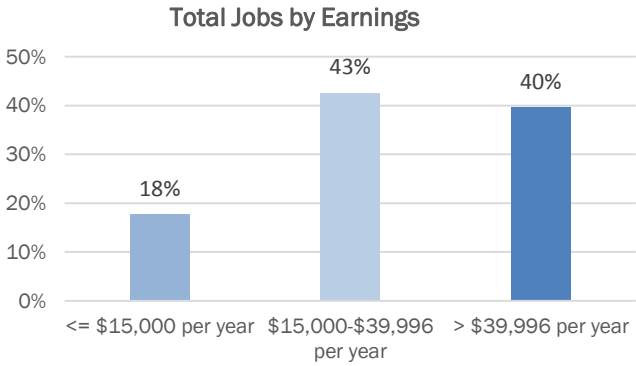
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 73 persons

Total Primary Jobs – 204 jobs

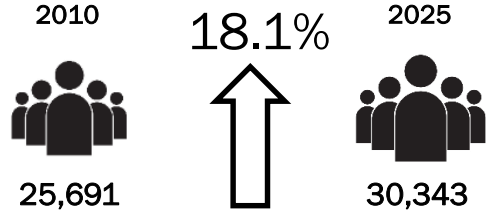




Jobs Within a 45 Minute Drive
8,017
Working Age Population Within a 45 Minute Drive
13,799
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ Off-street parking
- ✓ Roadway operations
- ✓ Transit frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

External UDA Needs

High

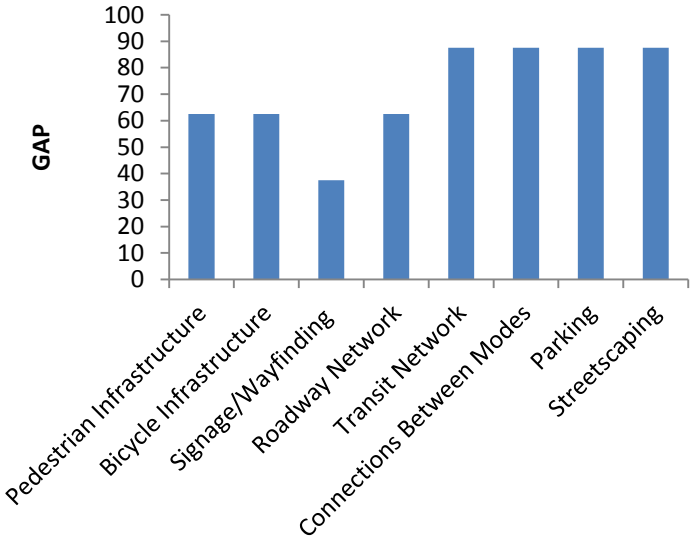
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Safety Features

Moderate

- ✓ Transit Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA

Urban Development Areas – Fluvanna County

UDA Needs Profile – Lake Monticello

Fluvanna County's 2009 Comprehensive Plan designates six Community Planning Areas (CPAs) within the County. The Lake Monticello CPA has grown rapidly in recent years, located around the Lake Monticello private community, is intended to be developed as a neighborhood mixed-use area.

Location Characteristics

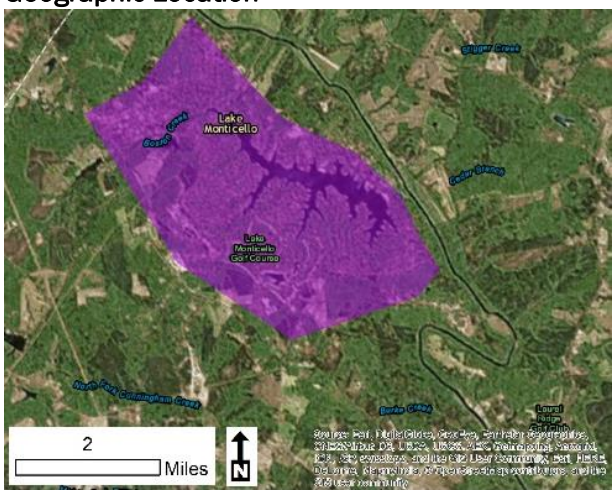
PDC- Thomas Jefferson Planning District Commission

UDA Size – 6.8 square miles

Year Designated – 2009

Comprehensive Plan Detail – Home to approximately half of the county's residents, largely in the Lake Monticello community, this community planning area (established pursuant to the Code of Virginia, section §15.2-2223.1) lies adjacent to the municipal services of the Palmyra area. Surrounding growth should be a mixture of uses and residential dwelling types that serve a variety of incomes. Neighborhood mixed-use is needed to help offset the volume of single-family residential development in this community. Additional services and infrastructure are needed to accommodate more growth. Open space includes access to Pleasant Grove, neighborhood parks, and greenways.

Geographic Location



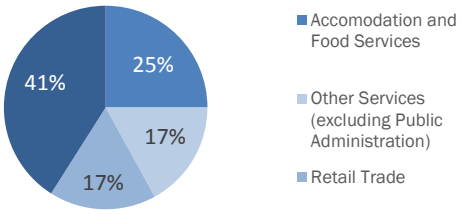
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

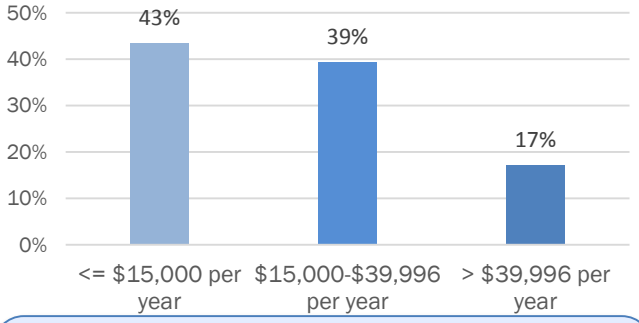
Total Population – 10,331 persons

Total Primary Jobs – 578 jobs

Jobs by Industry



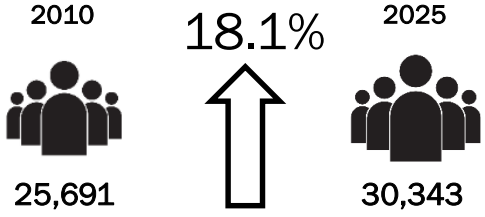
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
15,822
Working Age Population Within a 45 Minute Drive
30,187
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fluvanna County

Current Place Type - Large Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features

Moderate

- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-Street Parking Capacity
- ✓ Off-Street Parking Capacity

External UDA Needs

High

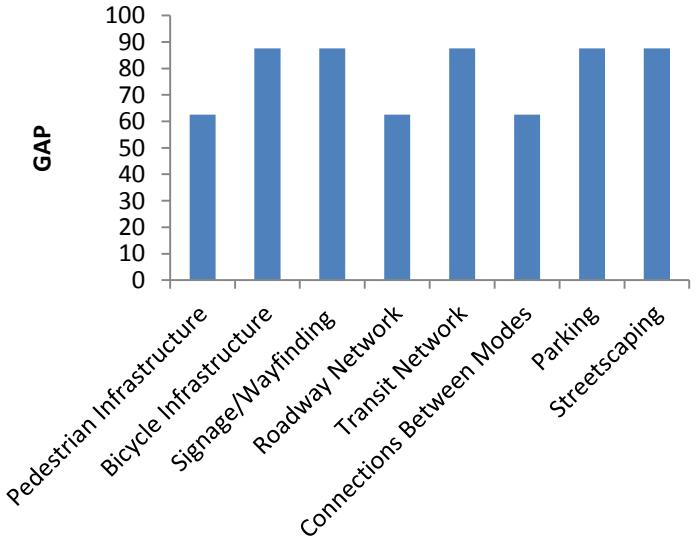
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Safety Features
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

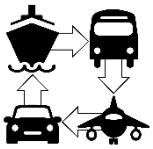
Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment



Circulation and access within the UDA



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment



Transit enhancements

Urban Development Areas – Caroline County

UDA Needs Profile: Carmel Church Station

Carmel Church is located adjacent to I-95 primarily between U.S. 1 and Route 652 and north of the North Anna River in Caroline County.

Location Characteristics

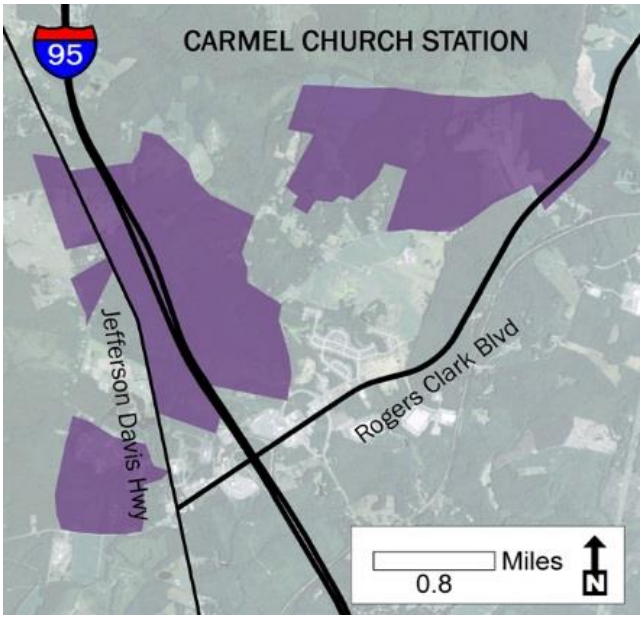
PDC – George Washington Regional Commission

UDA Size – 3.6 square miles

Year Designated – 2010

Comprehensive Plan Detail - In the Caroline County Comprehensive Plan (2010), Caroline County designates the areas defined as Planned Mixed Use (Village Core) in the Carmel Church Community Plan (2007) as a UDA. For the UDA, located between U.S. 1, VA-652, U.S. 207, and the North Anna River, the County foresees connected, self-sustaining communities that offer a mix of residential, commercial, and employment uses. The UDA design should fit with the County's surrounding rural area, and incorporate cluster development, conservation, new urbanism, and traditional neighborhood development criteria.

Geographic Location



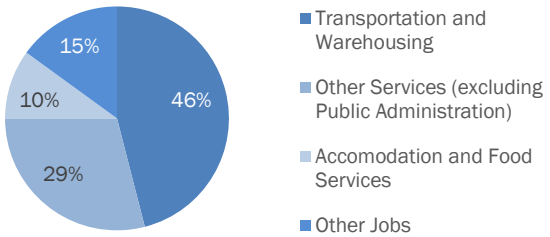
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

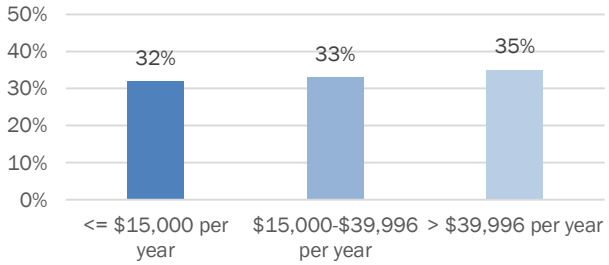
Total Population – 1,230 persons

Total Primary Jobs – 213 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
13,627

Working Age Population Within a 45 Minute Drive
24,644

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Caroline County

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Improvements to Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Safety Features

External UDA Needs

High

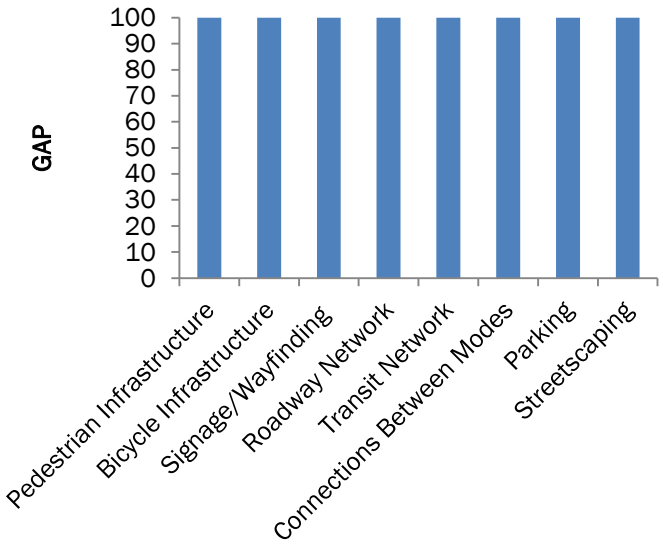
- ✓ Roadway Operations/Infrastructure
- ✓ Transit Operations
- ✓ Signage/Wayfinding

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly Pedestrian and Bicycle Environment

Urban Development Areas – Fredericksburg City

UDA Needs Profile: Fredericksburg City

The entire Fredericksburg city boundary is designated as a UDA.

Location Characteristics

PDC – George Washington Regional Commission

UDA Size – 10.5 square miles

Year Designated – 2015

Comprehensive Plan Detail - The City of Fredericksburg's Comprehensive Plan Update draft (2015) defines UDAs as places where projected growth can be accommodated through traditional neighborhood design, strategic growth areas where development is in close proximity to transportation facilities, and where utilities are available. In keeping with its designation as a UDA, the City's Comprehensive Plan Update draft mentions and encourages the principles of traditional neighborhood design, which include: pedestrian friendly road design, interconnection of streets, connectivity or road and pedestrian networks, preservation of natural areas, mixed use neighborhoods, and affordable housing.

Geographic Location



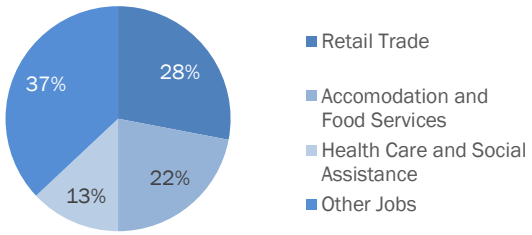
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

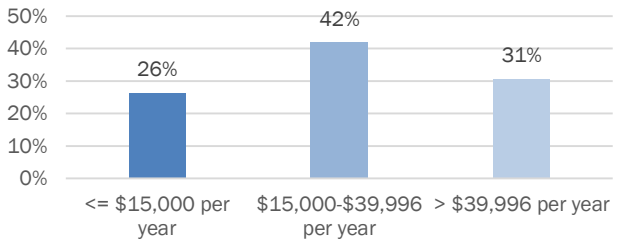
Total Population – 24,286 persons

Total Primary Jobs – 12,401 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
254,788

Working Age Population Within a 45 Minute Drive
1,199,333

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Fredericksburg City

Current Place Type - Urban Center



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Traffic Calming

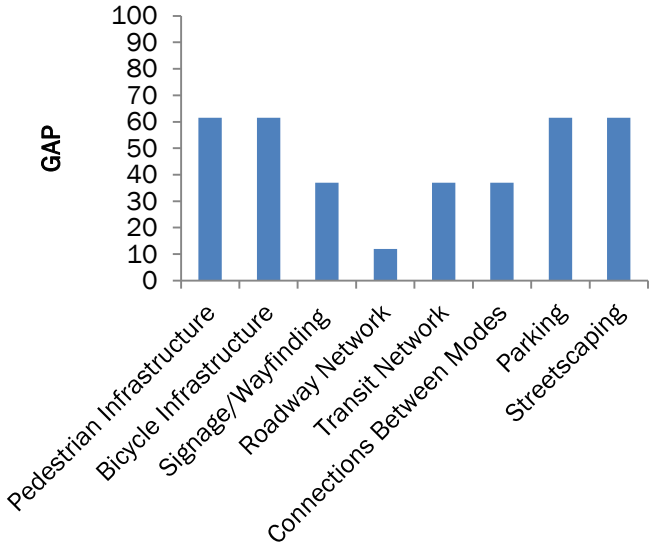
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency/Operations
- ✓ Transit Capacity/Access/Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle/Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Gloucester County

UDA Needs Profile: Hayes Village District

Gloucester Point/Hayes Village Development District is located at the southernmost end of Gloucester County along U.S. 17. It is a major population center and the most densely developed area of the County.

Location Characteristics

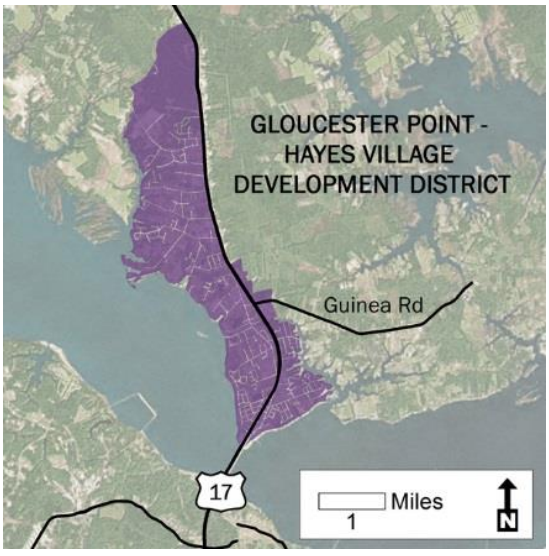
PDC – Hampton Roads Planning District Commission

UDA Size – 6.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - The Gloucester Point/Hayes Village Development Area consists of two main areas: the core area/village center and the transitional area. The village center should incorporate a mix of uses that include commercial, civic, residential, and recreational land uses. The transitional area will also include a mix of commercial uses, but at a lower commercial density than in the core area. This region consists of two main areas: the core area/village center and the transitional area. According to the plan, the village center should incorporate a mix of uses that include commercial, civic, residential, and recreational land uses. The village core should also include at least one civic gathering space.

Geographic Location



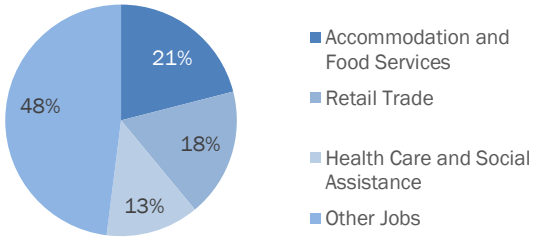
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

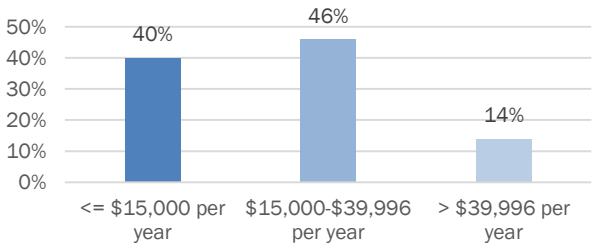
Total Population – 8,446 perons

Total Primary Jobs – 549 jobs

Jobs by Industry



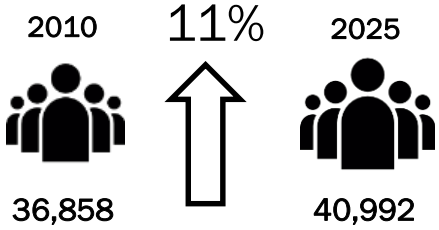
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
57,466
Working Age Population Within a 45 Minute Drive
170,042
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Gloucester County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features, Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Intersection Design
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

External UDA Needs

High

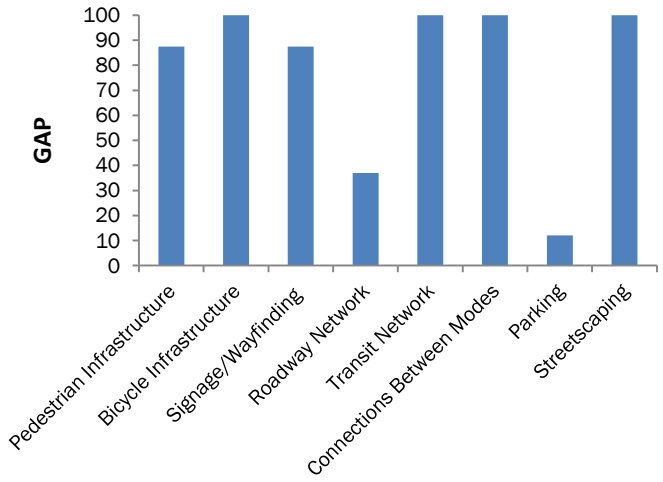
- ✓ Bicycle Infrastructure
- ✓ Intersection Design
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Capacity/ Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Circulation and access within the UDA

Urban Development Areas – Gloucester County

UDA Needs Profile: Court House Village

Gloucester Court House Village Area includes development along the Main Street corridor, U.S. 17 Bypass on the west and south, and Route 14 to the east.

Location Characteristics

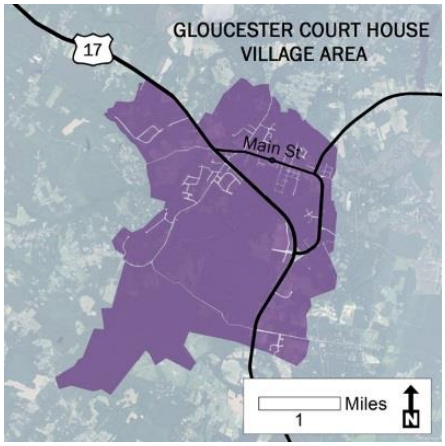
PDC – Hampton Roads Planning District Commission

UDA Size – 7.6 square miles

Year Designated – 2013

Comprehensive Plan Detail - The key goals of the vision for this region are to enhance the economic and social vitality of the Court House Village Sub-Area community while maintaining and enhancing its historic, small-town character, and walkable, mixed-use environment. Within the core of the Village (Main Street and contiguous), the County recommends promotion of carefully designed, human scale, infill development along and adjacent to Main Street. Adjacent to the core, the plan suggests a compact development pattern of mostly residential uses well connected to the core, with only incremental, small-scale and/or community centered commercial development. Finally, on the edge of the Village Sub-Planning Area, the County should maintain the current development district boundary for public water and sewer service.

Geographic Location



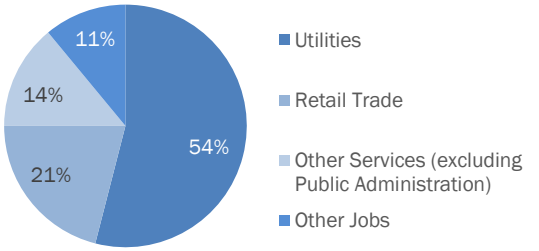
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

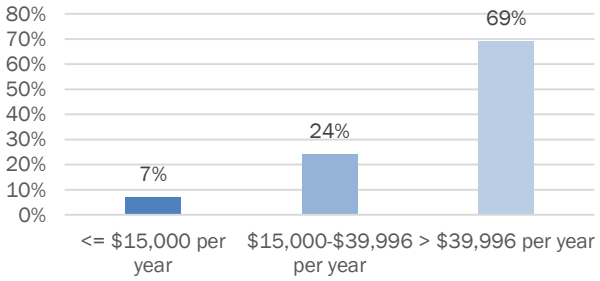
Total Population – 6,092 persons

Total Primary Jobs – 84 jobs

Jobs by Industry



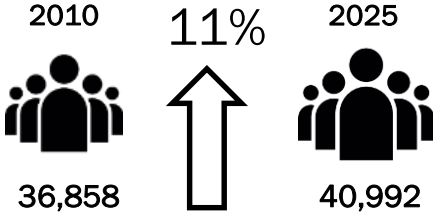
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
19,797
Working Age Population Within a 45 Minute Drive
39,607
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Gloucester County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Street Grid
- ✓ On-Street Parking Capacity

External UDA Needs

High

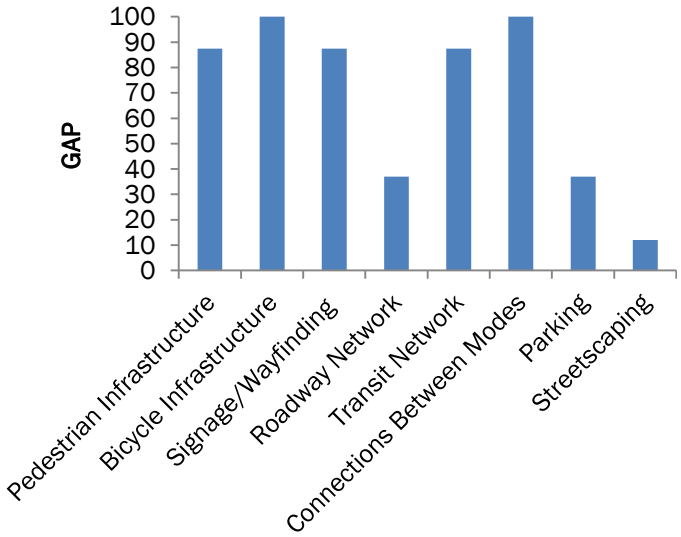
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Capacity
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Intersection Design

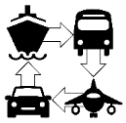
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA

Urban Development Areas – King George County

UDA Needs Profile: Dahlgren Primary Settlement

Within King George County, there is only one UDA: the Dahlgren Primary Settlement. Dahlgren is a primary location for future residential development and community facilities, located on the peninsula formed by Machodoc Creek and the Potomac River.

Location Characteristics

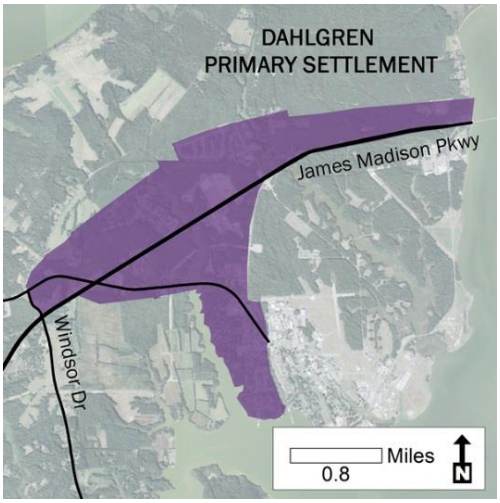
PDC – George Washington Regional Commission

UDA Size – 3.1 square miles

Year Designated – 2013

Comprehensive Plan Detail - The King George County Comprehensive Plan (2013) defines Primary Settlement Areas, one of two types of planning areas, as areas of the County served by public water and sewer systems. In the plan, the County encourages that the majority of residential and employment development be located in and around the Courthouse and the Dahlgren Primary Settlement Areas, each with a mix of land uses and densities. According to the plan, Dahlgren is one of the primary locations for future residential development and community facilities in the County, including the possibility for potential rezoning to more dense residential and mixed-use zoning districts. The proposed residential density for this area ranges from 1 dwelling unit per 1 to 5 acres in those areas without public utilities.

Geographic Location



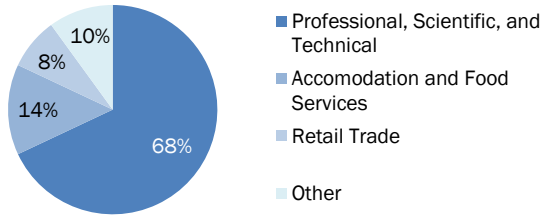
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

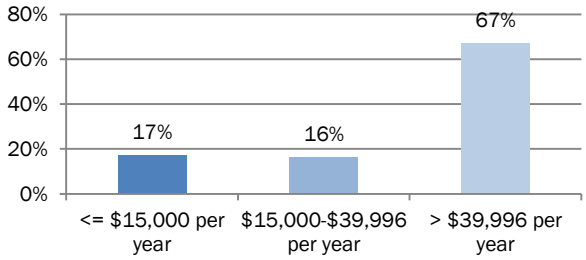
Total Population – 3,708 persons

Total Primary Jobs – 1,732 jobs

Jobs by Industry



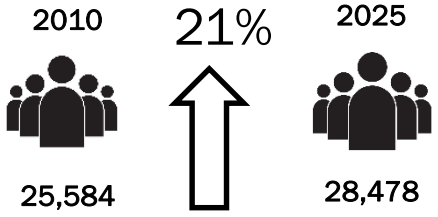
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
5,861
Working Age Population Within a 45 Minute Drive
12,608
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–King George County

Current Place Type - Rural or Village Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas – King William County

UDA Needs Profile: Central Garage

The only UDA in King William County, Central Garage, is located adjacent the Richmond-Tappahannock Highway (U.S. 360) and north of King William Road (Route 30).

Location Characteristics

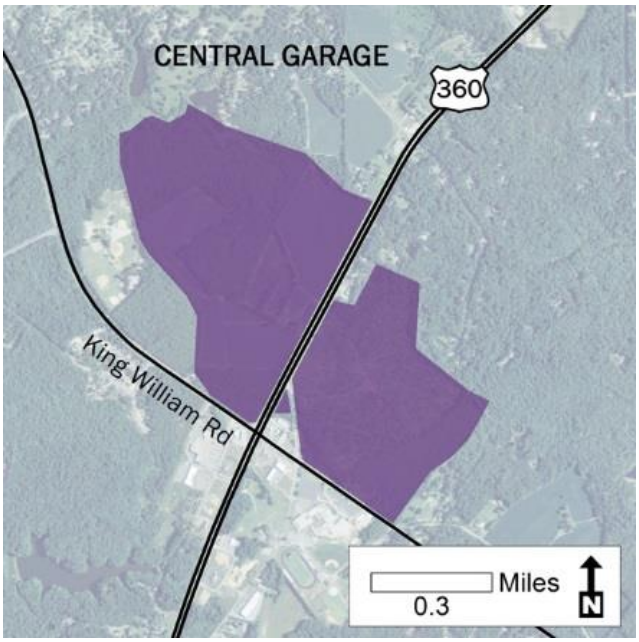
PDC – Middle Peninsula PDC

UDA Size – 0.5 square miles

Year Designated – 2012

Comprehensive Plan Detail - With access to Routes 30 and 360, existing public facilities, King William High School, and a concentration of existing development, Central Garage meets all of the criteria for carefully planned, more intense development than that which is desired in other areas of the County. In accordance with the State of Virginia's UDA requirements, Central Garage is slated to exemplify the principles of traditional neighborhood design, as well as infill development.

Geographic Location



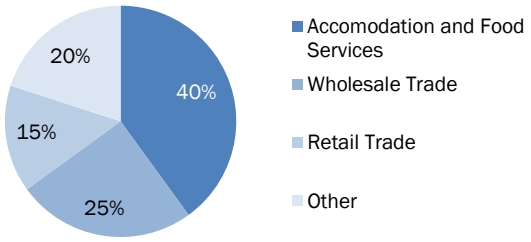
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

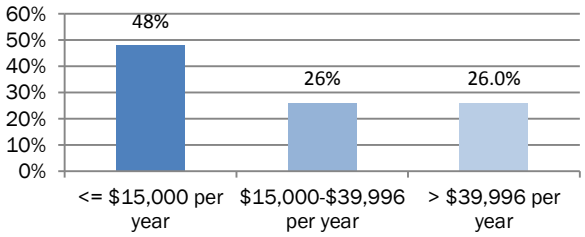
Total Population –311 persons

Total Primary Jobs – 100 jobs

Jobs by Industry



Total Jobs by Earnings



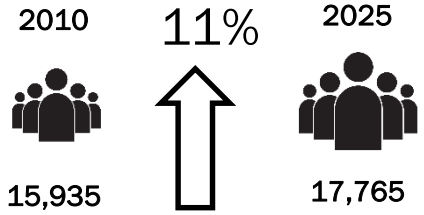
Jobs Within a 45 Minute Drive
12,911

Working Age Population Within a 45 Minute Drive
19,617

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–King William County

Current Place Type - Rural or Village Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Improvements to Natural Environment

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle/Pedestrian Infrastructure
- ✓ Complete Streets

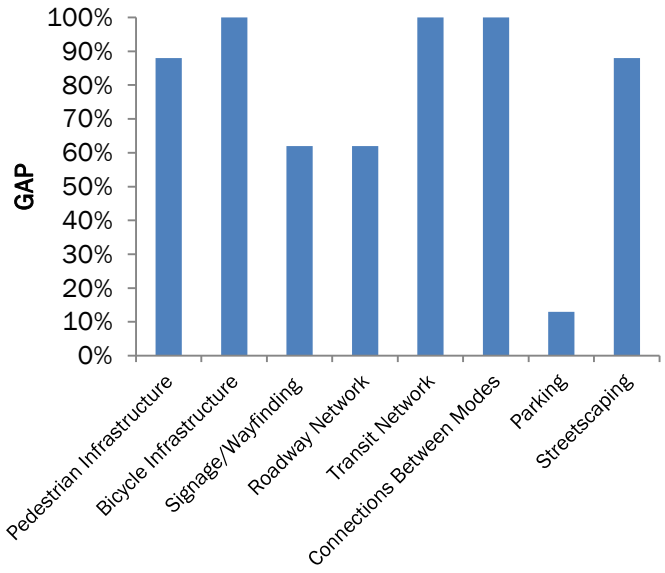
External UDA Needs

High

- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

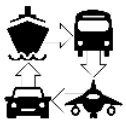


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment



Access to transportation networks beyond the UDA

Urban Development Areas – Stafford County

UDA Needs Profile: Courthouse

Courthouse UDA is one of seven UDAs in Stafford County. The Courthouse UDA is located east of I-95 and bisected by U.S. 1.

Location Characteristics

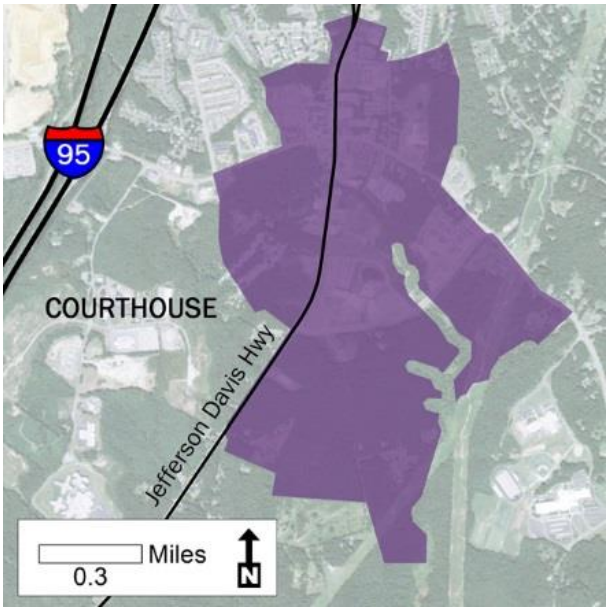
PDC – George Washington Regional Commission

UDA Size – 0.9 square miles

Year Designated – 2010

Comprehensive Plan Detail - The Courthouse UDA is planned to include 2,727,310 square feet of commercial development and 1,386 residential dwelling units. The roadway network in the Courthouse Area should be designed and developed to provide a hierarchical system of interconnected streets and recognize the dual purpose and functionality of Jefferson Davis Highway (U.S. 1). It is also recommended that the UDA include passive and active recreational uses, plazas and congregational spaces.

Geographic Location



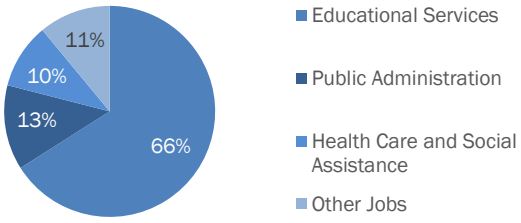
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

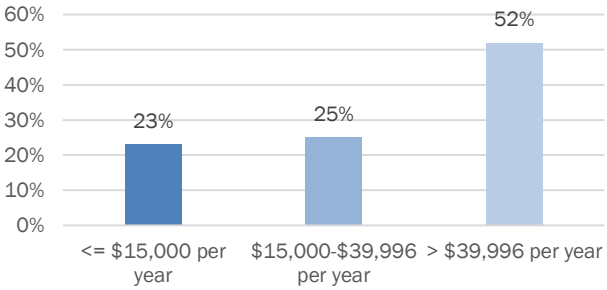
Total Population – 5,362 persons

Total Primary Jobs – 6,368 jobs

Jobs by Industry



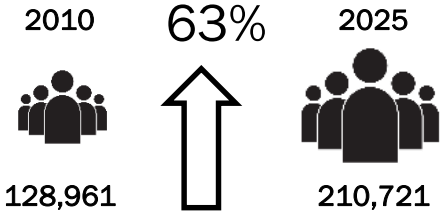
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
29,726
Working Age Population Within a 45 Minute Drive
53,007
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

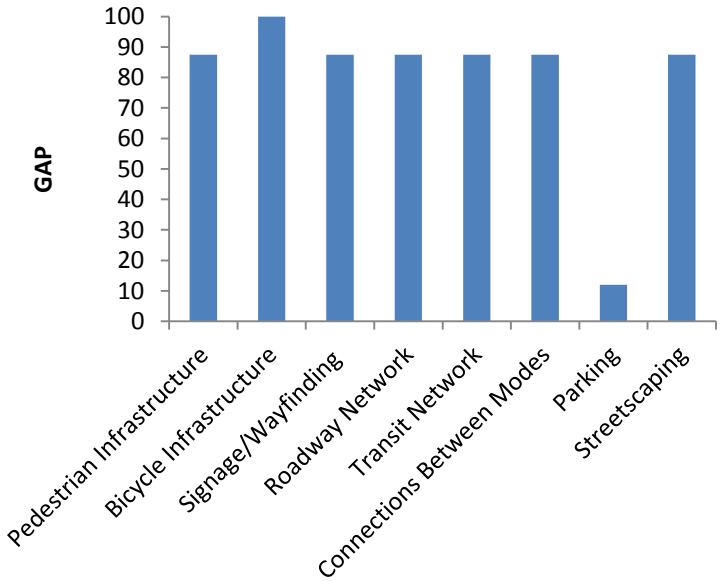
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: Southern Gateway

Southern Gateway is one of seven UDAs in Stafford County. Southern Gateway is centered around the interchange of I-95 and U.S. 17.

Location Characteristics

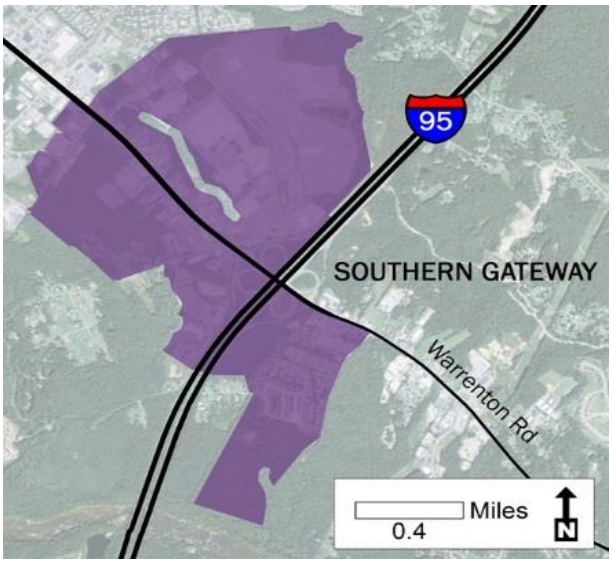
PDC – George Washington Regional Commission

UDA Size – 1.4 square miles

Year Designated – 2010

Comprehensive Plan Detail - The Southern Gateway UDA is planned to include 2,576 total dwelling units, including 938 condominiums and townhomes each, and 700 multi-family units on the Rappahannock Landing site. The roadway network in Southern Gateway should be designed and developed to provide a hierarchical system of interconnected streets and recognize the dual purpose and functionality of Warrenton Road (Route 17). It is also recommended that the UDA include passive and active recreational uses, plazas and congregational spaces. Finally, the UDA will warrant a new elementary school to meet new residential demand.

Geographic Location



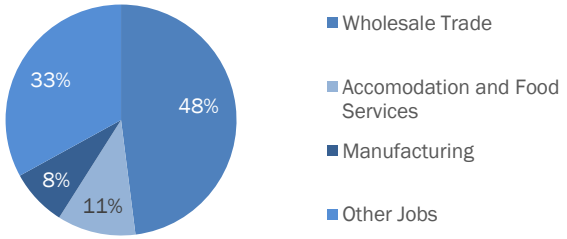
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

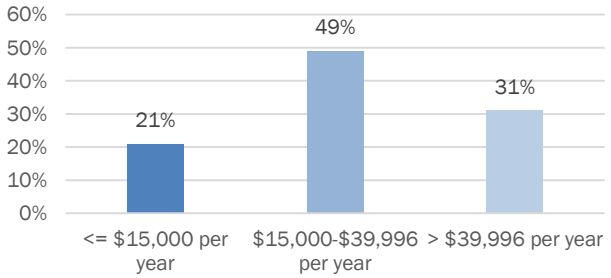
Total Population – 1,791 persons

Total Primary Jobs – 2,187 jobs

Jobs by Industry



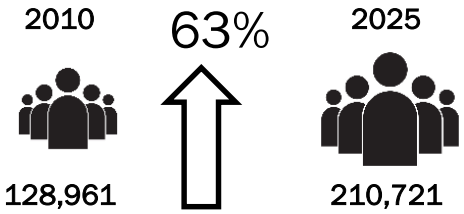
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
37,903
Working Age Population Within a 45 Minute Drive
73,078
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type – Small Town or Suburban Center



Planned Place Type - Large Town or Suburban Cente



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

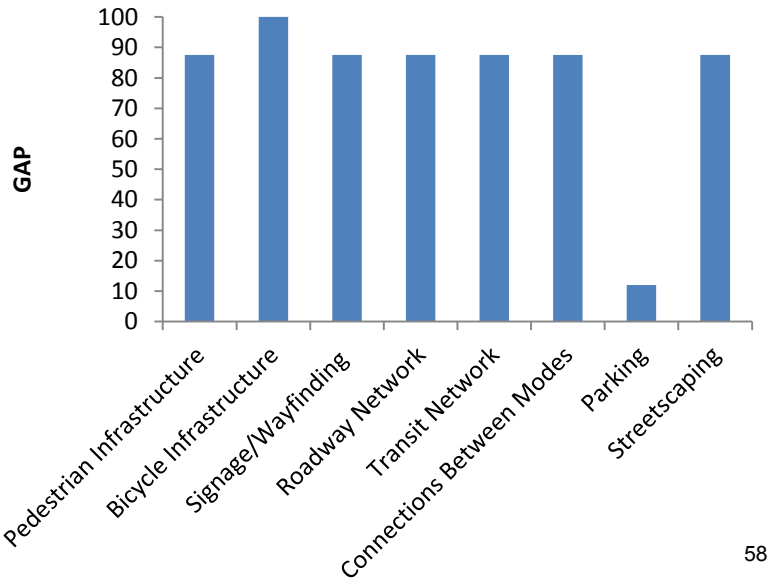
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: George Washington Village

George Washington Village is one of seven UDAs in Stafford County and is located west of I-95 in the area between Ramoth Church Rd. and Courthouse Rd.

Location Characteristics

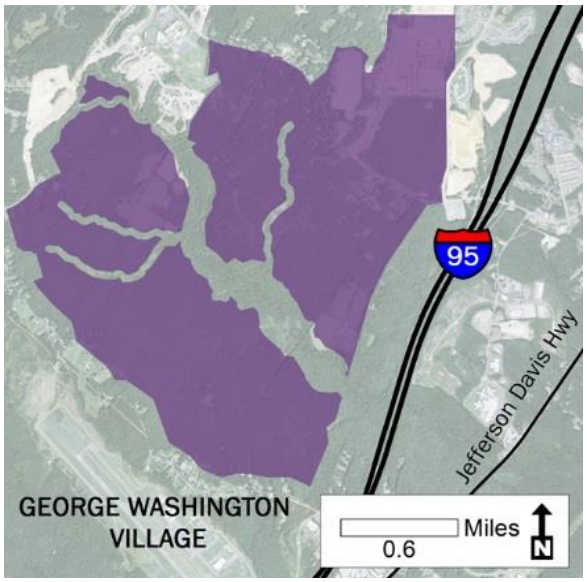
PDC – George Washington Regional Commission

UDA Size – 2.9 square miles

Year Designated – 2010

Comprehensive Plan Detail - The George Washington Village UDA will be centered around three nodes: GW Village North – Embrey Mill (a town center), GW Village South (a town center), and the GW Village Business Campus. Each of the town center UDAs is planned for a mix of commercial and residential land uses; the GW Village Business Campus is planned for a great deal of commercial office space. It is also recommended that the UDA include space for recreational uses, as well as new elementary and middle schools and two new fire and rescue stations.

Geographic Location



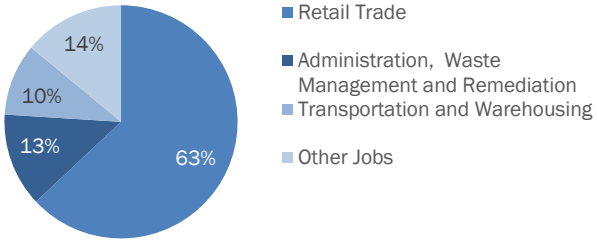
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

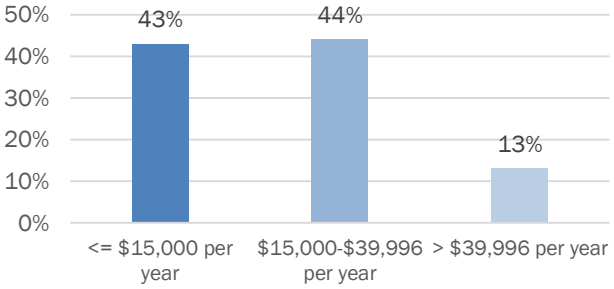
Total Population – 1,726 persons

Total Primary Jobs – 230 jobs

Jobs by Industry



Total Jobs by Earnings



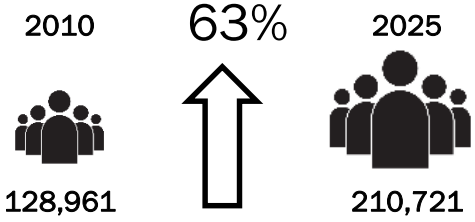
Jobs Within a 45 Minute Drive
53,950

Working Age Population Within a 45 Minute Drive
84,907

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Rural or Village Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

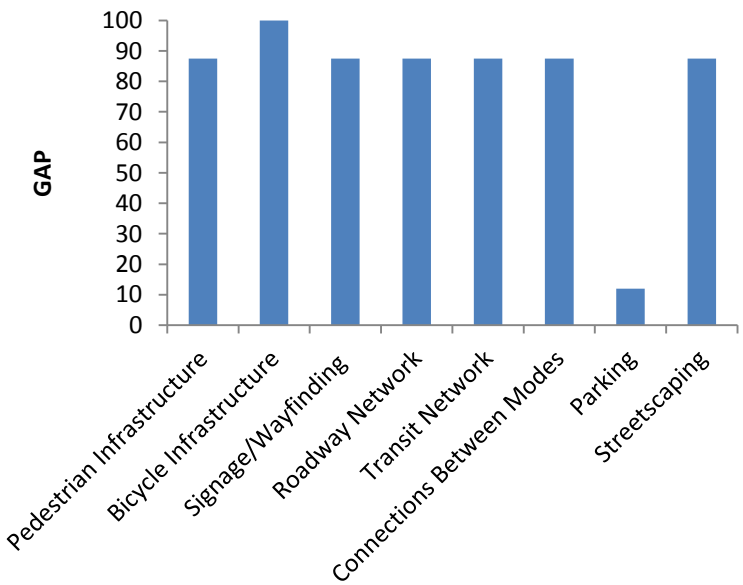
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: Centreport

Centerport is one of seven UDAs in Stafford County. Centreport is west of I-95, including areas adjacent to Centreport Parkway.

Location Characteristics

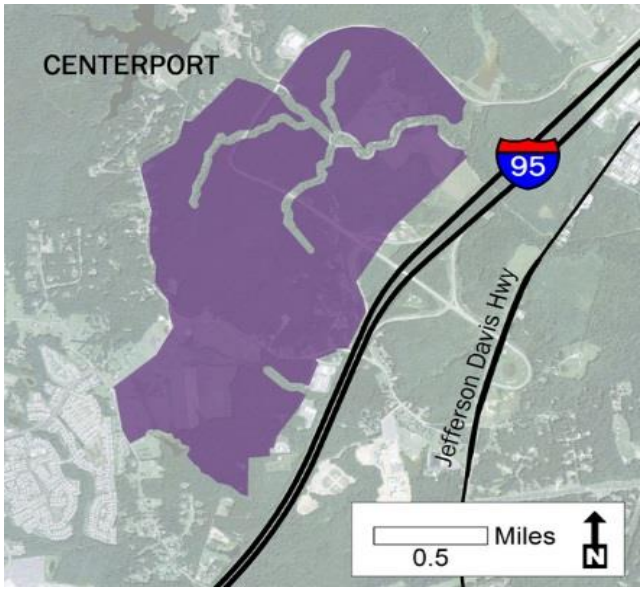
PDC – George Washington Regional Commission

UDA Size – 1.8 square miles

Year Designated – 2010

Comprehensive Plan Detail – The Centerport UDA will be a mixed use community consisting of approximately 3,770 dwelling units -- including condominiums, townhouses, and single family homes -- and 1,878,400 square feet of commercial retail and office space. The UDA is also planned for a new transit facility, indoor recreation center, several new schools, and a new fire and rescue station.

Geographic Location



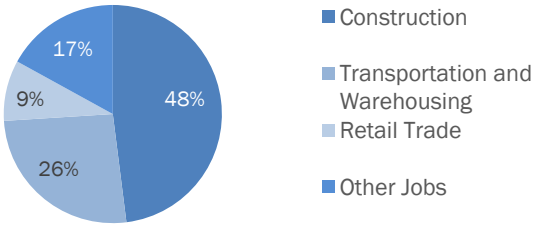
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

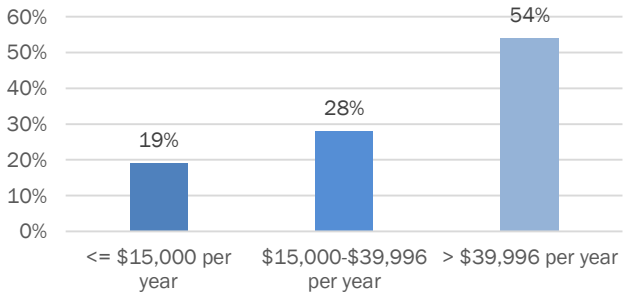
Total Population – 1,875 persons

Total Primary Jobs – 229 jobs

Jobs by Industry



Total Jobs by Earnings



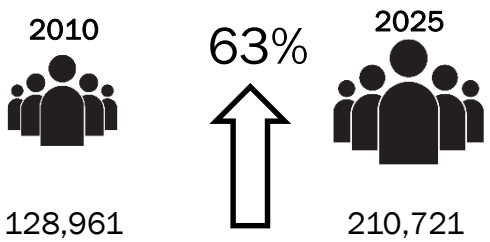
Jobs Within a 45 Minute Drive
28688

Working Age Population Within a 45 Minute Drive
57208

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Medium Town or Suburban Cente



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

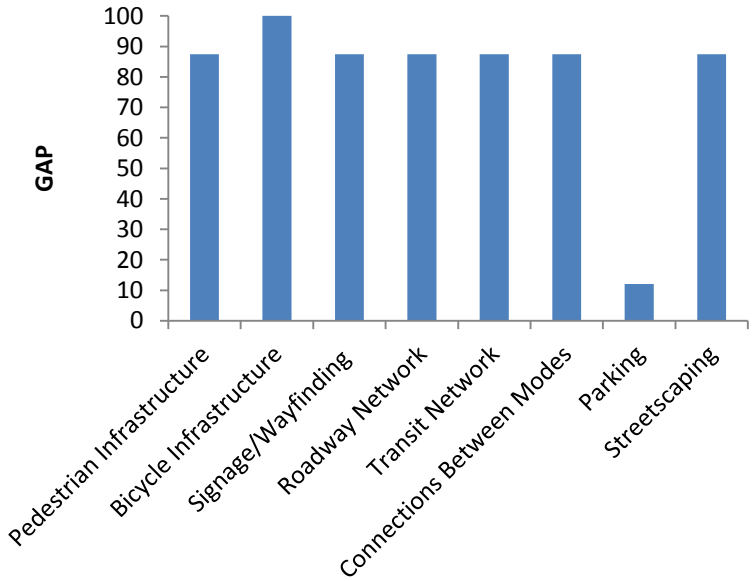
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: Leeland Town Station

Leeland Town Station is one of seven UDAs in Stafford County. The UDA is located east of U.S. 1 and Butler Road. Leeland Town features a mixed use community with easy access to the Virginia Railway Express Leeland Road Commuter Station.

Location Characteristics

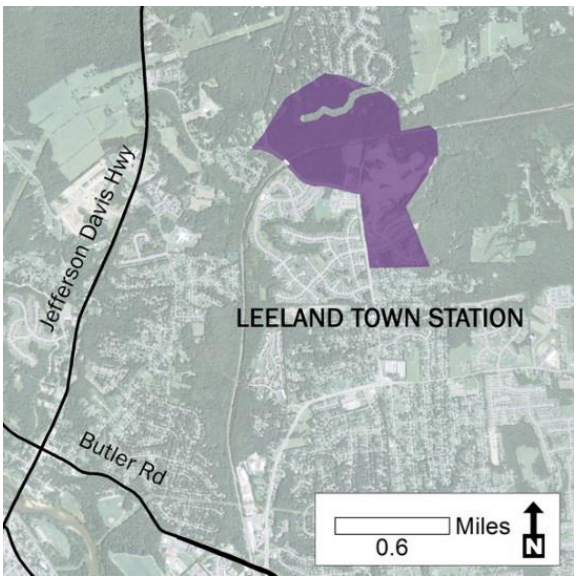
PDC – George Washington Regional Commission

UDA Size – 0.495 sq mi

Year Designated – 2010

Comprehensive Plan Detail - The Leeland Town Station UDA will be a mixed use community consisting of a mix of 750 condos and 50 townhomes with 1,500,000 square feet of commercial space. South of the core area would be a single-family neighborhood of 200 dwellings. The UDA is also planned for a new bus shelter at its VRE station, an indoor recreation facility, and a new fire and rescue station.

Geographic Location



Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

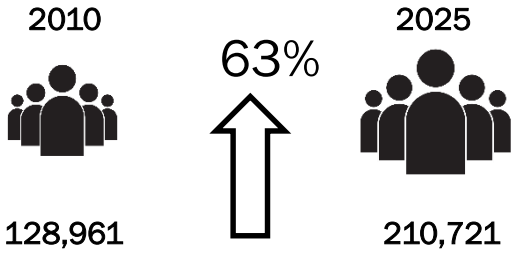
Total Population – 3,465 persons

Total Primary Jobs – Currently zero jobs per LEHD.

Jobs Within a 45 Minute Drive
25018
Working Age Population Within a 45 Minute Drive
52613
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Rural or Village Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

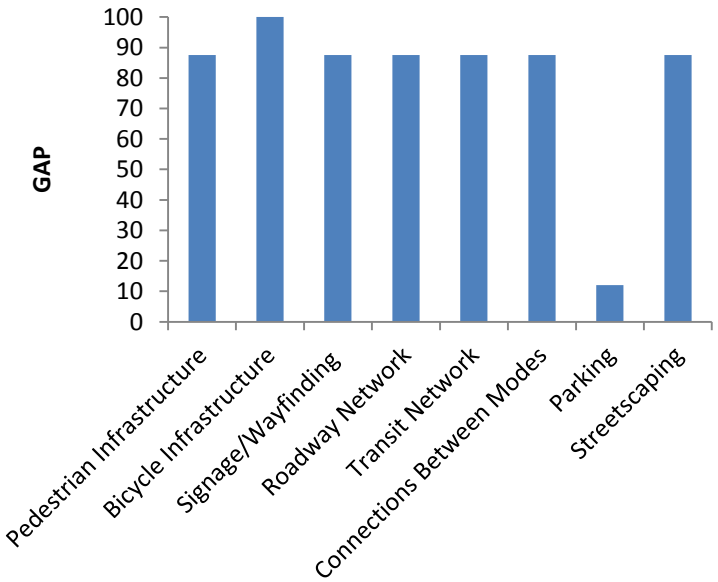
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: Brooke Station

Brooke Station is one of seven UDAs in Stafford County. The UDA is located east of U.S. 1 and I-95. Brooke Station features a mixed-use village with access to bus and rail at the Virginia Railway Express station.

Location Characteristics

PDC – George Washington Regional Commission

UDA Size –0.3 square miles

Year Designated – 2010

Comprehensive Plan Detail - The Brooke Station UDA is a planned mixed-use, new urbanist village consisting of approximately 174,240 square feet of commercial space and 120 condominiums. 300 townhomes and 450 single-family dwelling units would surround the UDA. The UDA is also planned for a new bus stop shelter at its VRE station, new parkland, and an upgraded fire and rescue station.

Geographic Location



Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

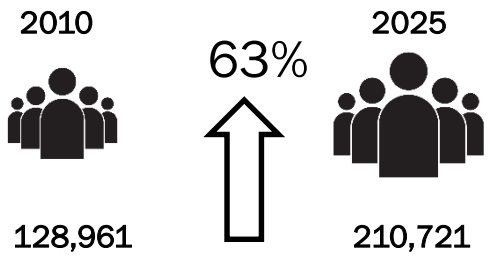
Total Population – 1,522

Total Primary Jobs – Currently zero jobs per LEHD.

Jobs Within a 45 Minute Drive
16,124
Working Age Population Within a 45 Minute Drive
34,650
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

External UDA Needs

High

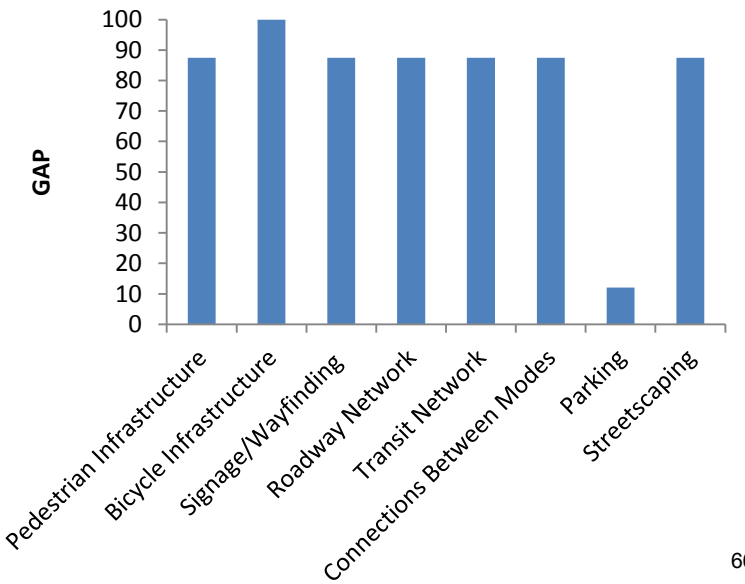
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – Stafford County

UDA Needs Profile: Eskimo Hill

Eskimo Hill is one of seven UDAs in Stafford County. The UDA is located east U.S. 1, 200 feet to the west of an existing Dominion Virginia power line easement, and on the south side of Eskimo Hill Road.

Location Characteristics

PDC – George Washington Regional Commission

UDA Size – 0.30 sq mi

Year Designated – 2010

Comprehensive Plan Detail - The Eskimo Hill will be a 200 acre mixed use community consisting of approximately 879 dwelling units and 588,000 square feet of commercial retail and office space in order to meet the density requirements for Urban Areas. The town center itself would be modeled using the principles of new urbanism with buildings three to four stories in height consisting of a mix of approximately 588,000 square feet of commercial space and 319 condos, and surrounded by 160 townhouses on 27 acres.

Geographic Location



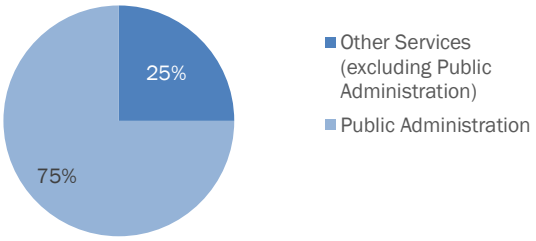
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

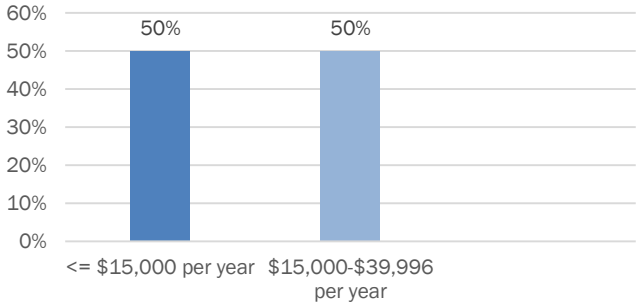
Total Population – 52

Total Primary Jobs – 4

Jobs by Industry



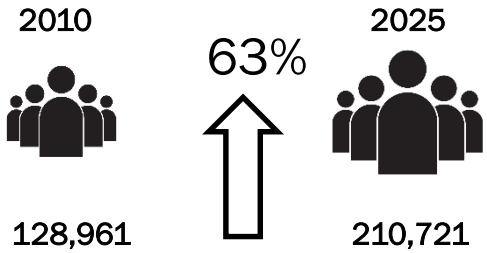
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
28,688
Working Age Population Within a 45 Minute Drive
57,208
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Stafford County

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit capacity and access
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Complete Streets
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

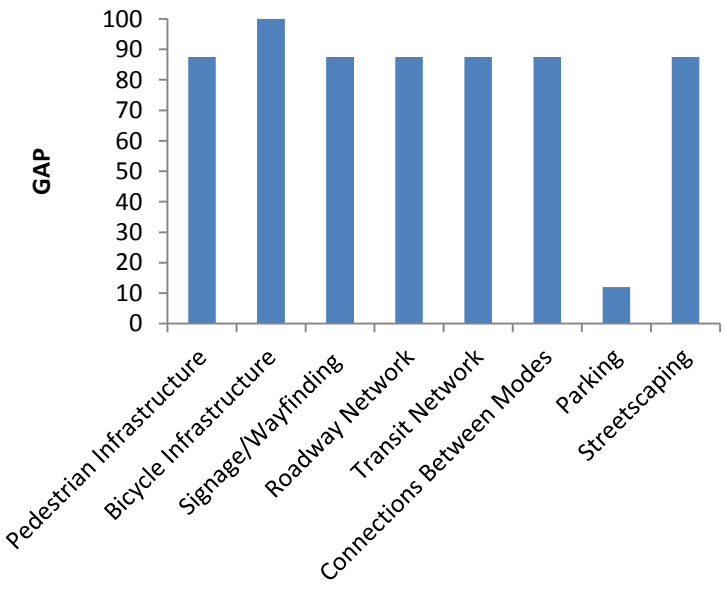
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities and amenities
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – James City County

UDA Needs Profile: Anderson's Corner

James City County has designated 11 UDAs within its boundaries, and the Anderson's Corner Mixed Use Area is located along Routes 60 and 30, home to agricultural vistas as well as the Whitehall Tavern, a notable historic site in the County.

Location Characteristics

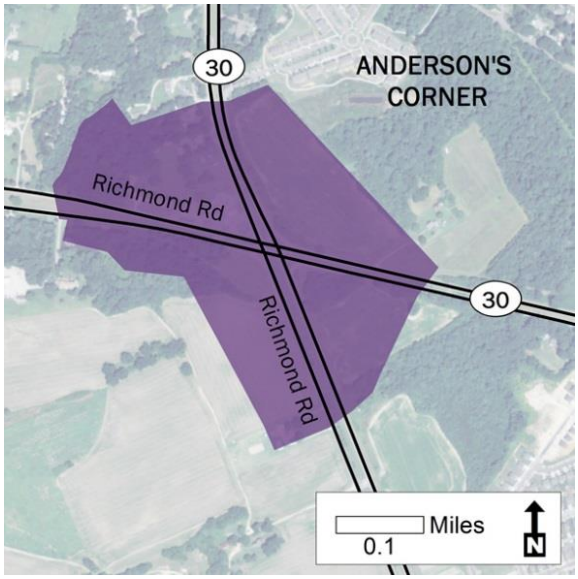
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). For the Anderson's Corner Mixed Use area, future development should occur in a manner that maintains an appropriate historic setting for the Whitehall Tavern and preserves the rural, historic character of the area. Suggested principal include are a balance of office and commercial, with limited residential when integration into the community is possible.

Geographic Location



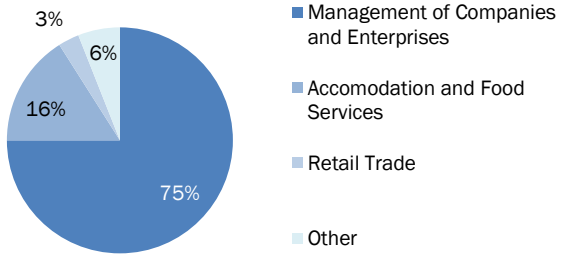
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

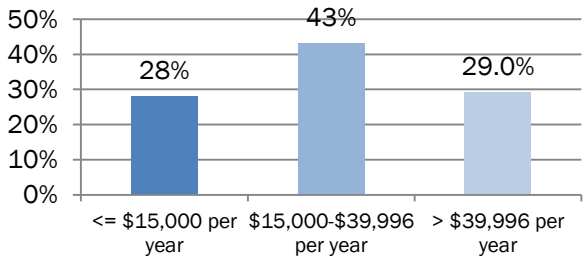
Total Population – 436 persons

Total Primary Jobs – 128 jobs

Jobs by Industry



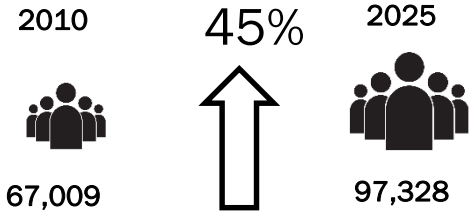
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
23,621
Working Age Population Within a 45 Minute Drive
43,892
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type – Undeveloped (Greenfield/Grayfield)

Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Moderate

- ✓ Improvements to Natural Environment

External UDA Needs

High

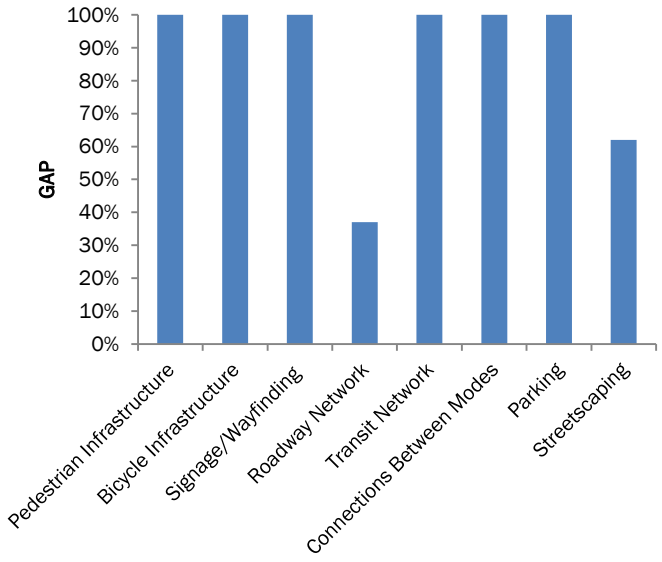
- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Intersection Design
- ✓ Improvements to Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Transit Enhancements



Friendly Pedestrian and Bicycle Environment

Urban Development Areas – James City County

UDA Needs Profile: Croaker Interchange

James City County has designated 11 UDAs within its boundaries. The Croaker Interchange Mixed Use area is located at Exit 231 of I-64.

Location Characteristics

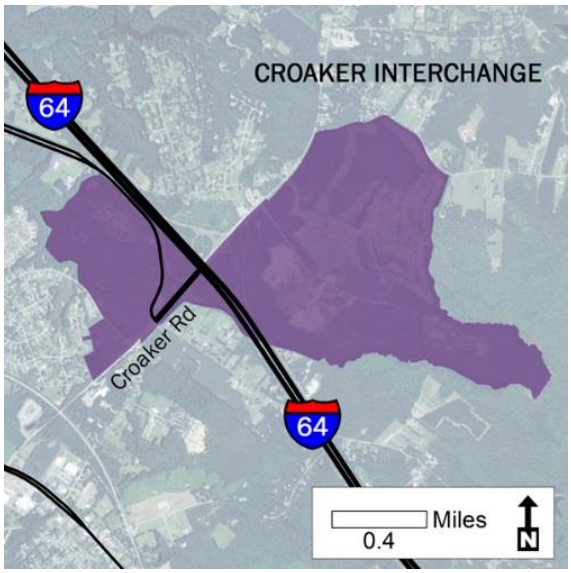
PDC – Hampton Roads PDC

UDA Size – 1.2 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. Within the Northwest Quadrant, principal suggested uses include commercial and office; secondary uses may include light industry and moderate density residential development. Within the Southeast Quadrant, principal suggested uses include light manufacturing and office; secondary uses (including commercial and limited residential) shall only be permitted where they do not preclude the development of the principal uses.

Geographic Location



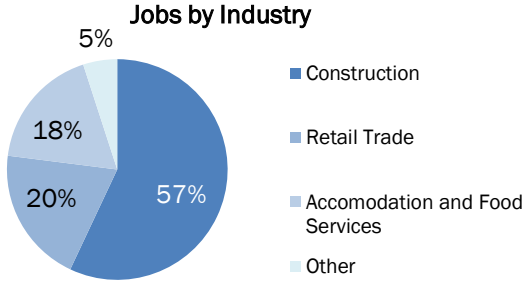
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

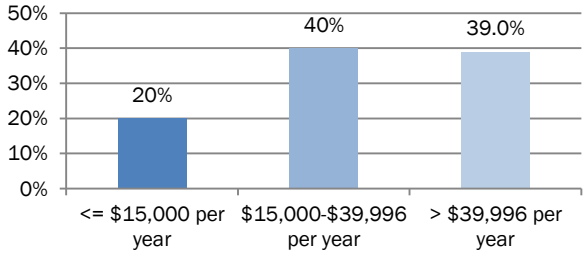
Total Population – 1,458 persons

Total Primary Jobs – 2,130 jobs

Jobs by Industry



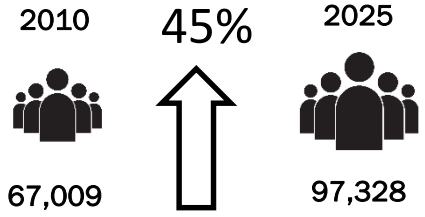
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
21,655
Working Age Population Within a 45 Minute Drive
40,077
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type – Undeveloped (Greenfield/Grayfield)

Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Transit Facilities/Amenities

Moderate

- ✓ Transit Frequency
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

External UDA Needs

High

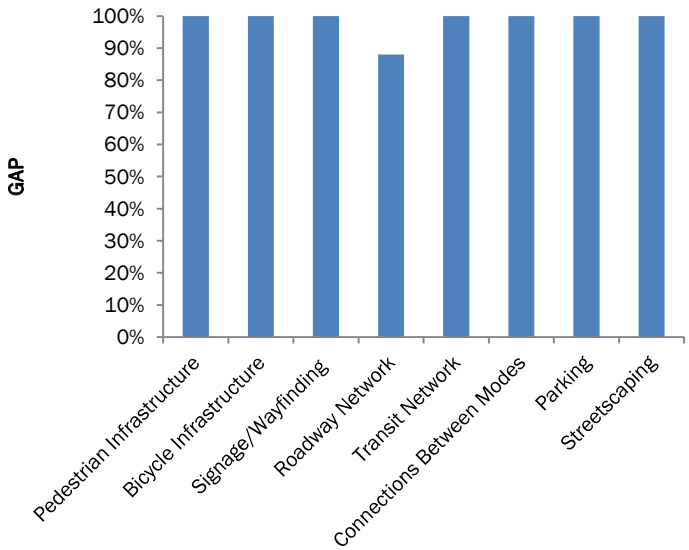
- ✓ Roadway Capacity/Infrastructure
- ✓ Transit Facilities/Amenities

Moderate

- ✓ Transit Frequency
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly Pedestrian and Bicycle Environment



Safety for all users

Urban Development Areas – James City County

UDA Needs Profile: Green Mount

James City County has designated 11 UDAs within its boundaries. The Green Mount Mixed Use Area is located in the vicinity of Pocahontas Trail (Route 60), where a balanced and integrated mixture of industrial, commercial, and residential uses is suggested

Location Characteristics

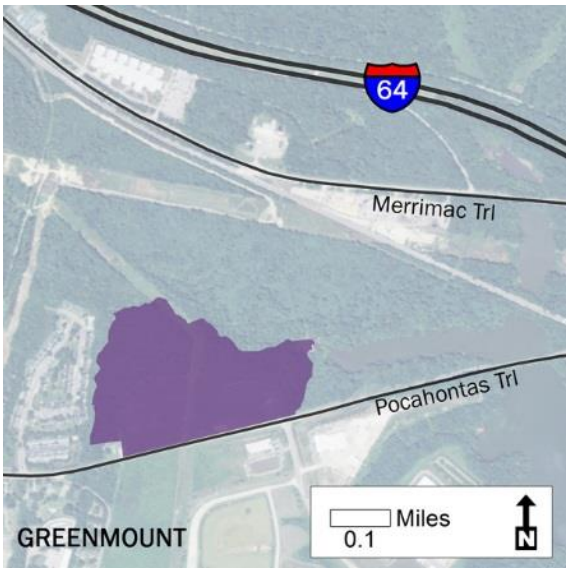
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - For the GreenMount Mixed Use area, principal suggested uses a balanced and integrated mixture of industrial, commercial, and residential. The combination of uses should complement the General Industry property surrounding it by concentrating on support uses and by leaving sufficient road and water capacity for the general industry uses to develop. The area should be designed and developed under a unified master plan that provides shared access and parking, compatible landscaping and architectural treatment, adequate buffering and screening, true mixed use concepts, and other measures that ensure it does not develop in a typical strip commercial fashion.

Geographic Location



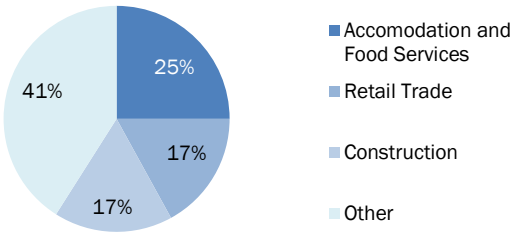
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

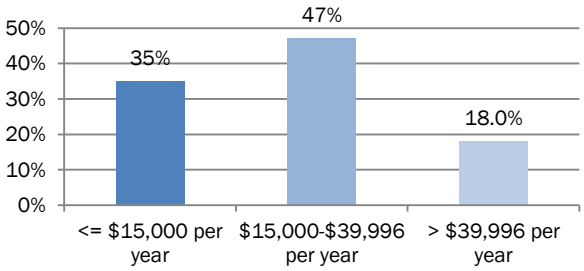
Total Population – 213 persons

Total Primary Jobs – 321 jobs

Jobs by Industry



Total Jobs by Earnings



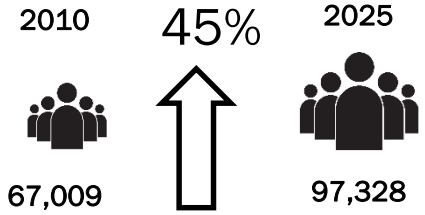
Jobs Within a 45 Minute Drive
20,769

Working Age Population Within a 45 Minute Drive
41,579

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type – Undeveloped (Greenfield/Grayfield)

Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities/Amenities
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features

External UDA Needs

High

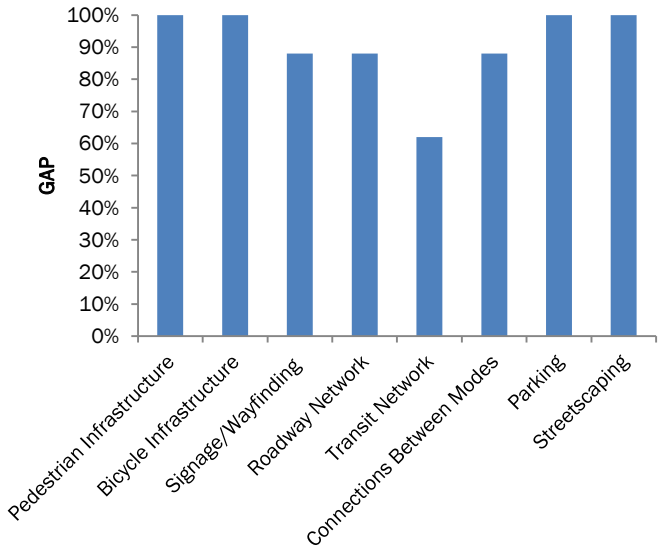
- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Safety Features

Moderate

- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment

Urban Development Areas – James City County

UDA Needs Profile: Lightfoot Mixed Use Area

James City County has designated 11 UDAs within its boundaries. The Lightfoot Mixed Use area, located at Route 60 adjacent to Liberty Crossing, can be divided into two sections: east and west of Richmond Road (Route 60).

Location Characteristics

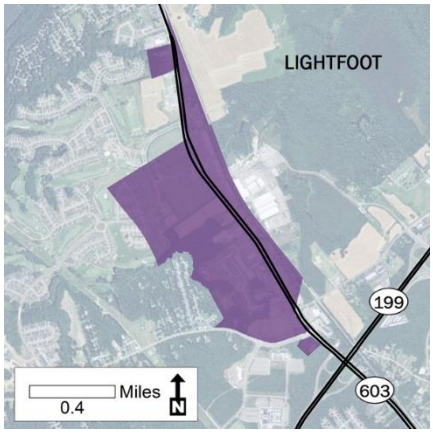
PDC – Hampton Roads PDC

UDA Size – 0.5 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). Were passenger or light rail to become available, the property, adjacent to a railroad, could potentially be suitable for a transit-oriented mixed use development with a mixture of limited industry, commercial, and moderate density housing. Uses should emphasize shared access and parking in order to mitigate traffic congestion as well as consistent treatment for landscaping and architecture. Uses in this area should complement the adjacent Economic Opportunity designated area to the extent possible.

Geographic Location



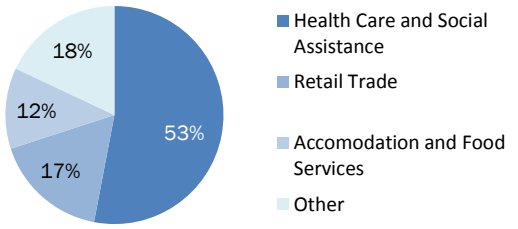
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

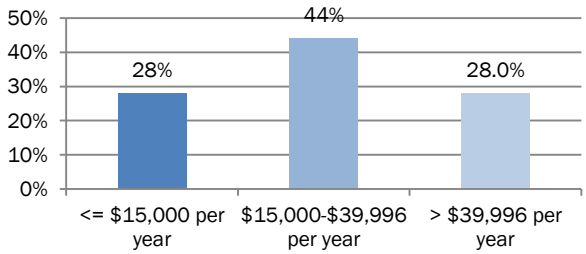
Total Population – 2,143 persons

Total Primary Jobs – 603 jobs

Jobs by Industry



Total Jobs by Earnings



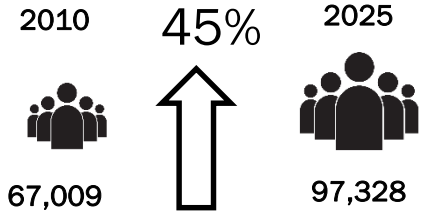
Jobs Within a 45 Minute Drive
24,393

Working Age Population Within a 45 Minute Drive
41,222

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Bicycle Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities

External UDA Needs

High

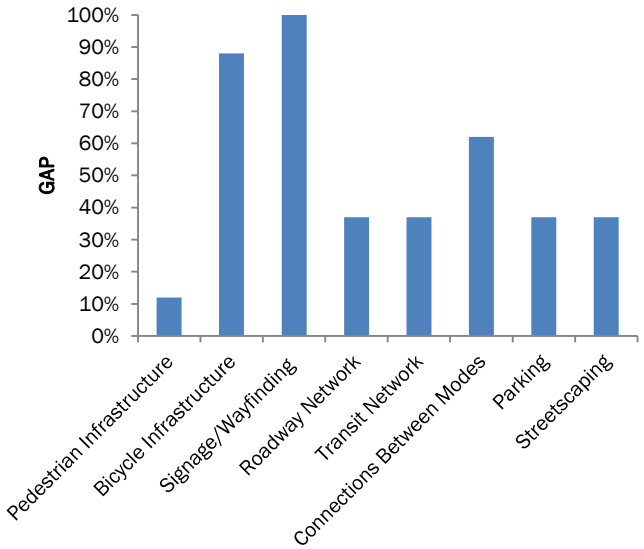
- ✓ Roadway Capacity/Infrastructure
- ✓ Bicycle Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – James City County

UDA Needs Profile: New Town

James City County has designated 11 UDAs within its boundaries. The New Town UDA is a largely undeveloped region slated for a mixture of commercial, office, and limited industrial with some residential as a secondary use.

Location Characteristics

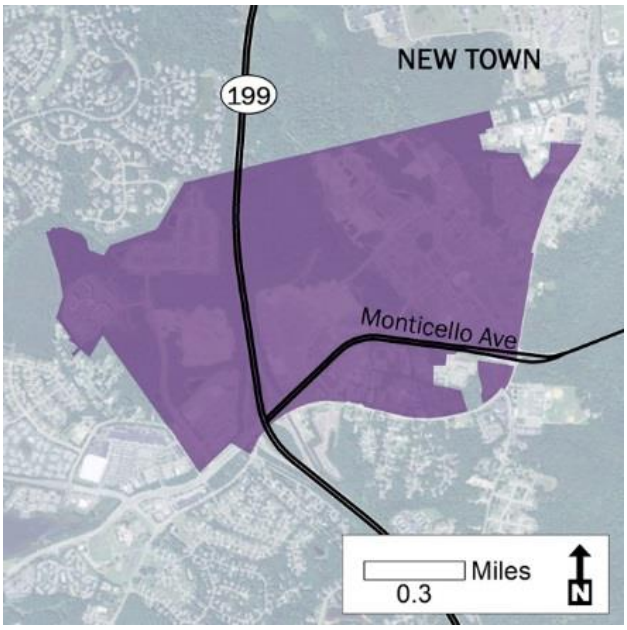
PDC – Hampton Roads PDC

UDA Size – 1.0 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. Along the west side of the Ironbound Road corridor, the expansion of existing businesses, or similar uses, is encouraged, with the added opportunity for mixed use structures that incorporate housing. Largely undeveloped, New Town's principal suggested uses are a mixture of commercial, office, and limited industrial with some residential as a secondary use.

Geographic Location –



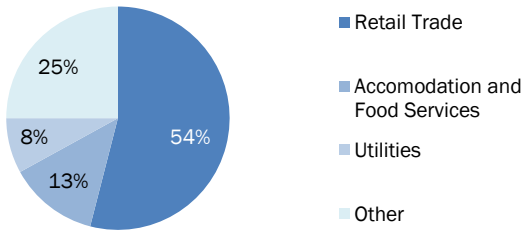
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

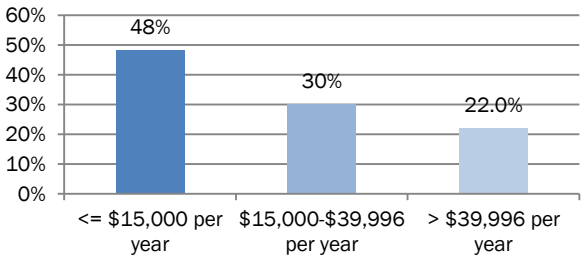
Total Population – 1,771 persons

Total Primary Jobs – 991 jobs

Jobs by Industry



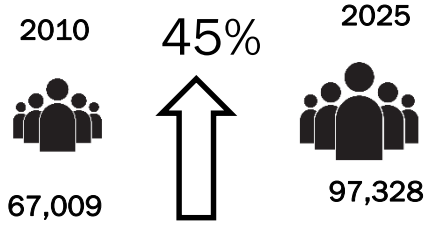
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
27,078
Working Age Population Within a 45 Minute Drive
46,570
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations

Moderate

- ✓ Transit Capacity/Access
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

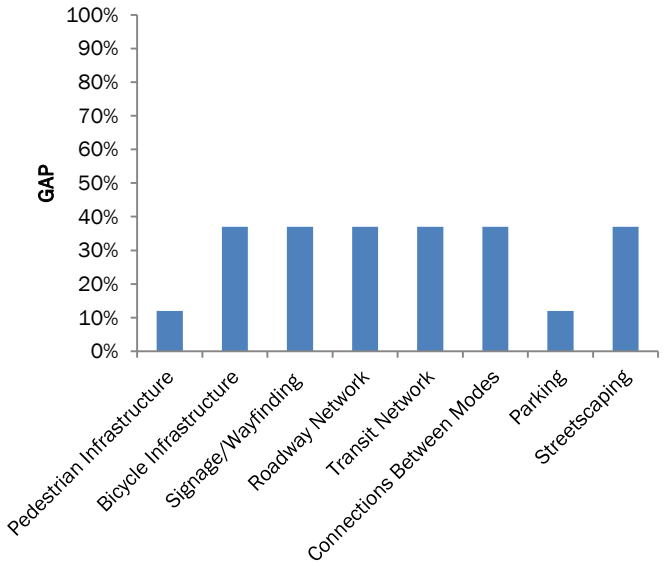
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Safety Features
- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – James City County

UDA Needs Profile: Norge

James City County has designated 11 UDAs within its boundaries. The Norge Mixed Use area is located at Croaker Road and Route 60.

Location Characteristics

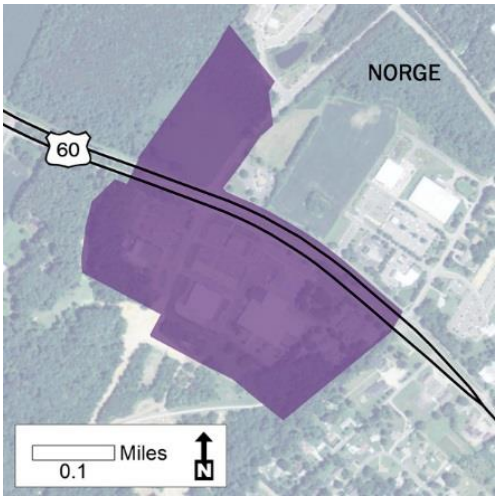
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. In the northeast section of the Norge Mixed Use area, the County recommends a balance of office uses and moderate density residential. On the north side of Cokes Lane east of the Massie, Inc. property and adjacent to the CSX railroad, the County recommends a balance of small offices and warehouses, with moderate density residential. Lastly, for lands southwest of the Croaker Road/Richmond Road intersection, primary suggested uses include commercial and office; secondary uses should consist of limited industry.

Geographic Location



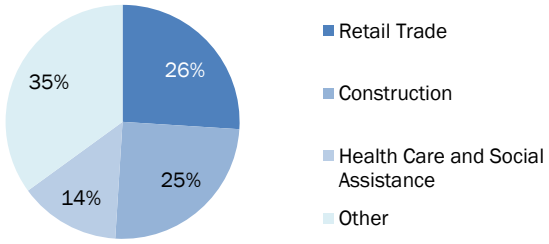
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

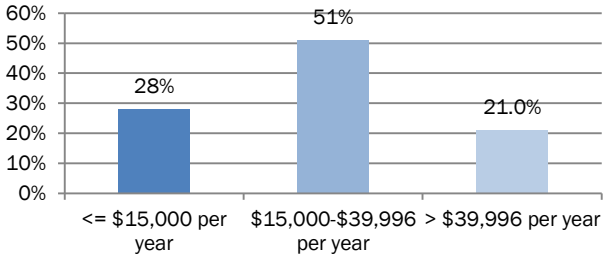
Total Population – 580 persons

Total Primary Jobs – 282 jobs

Jobs by Industry



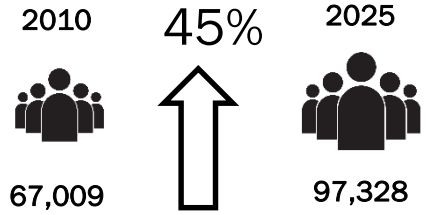
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
20,302
Working Age Population Within a 45 Minute Drive
37,037
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Facilities/Amenities

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Signage/Wayfinding

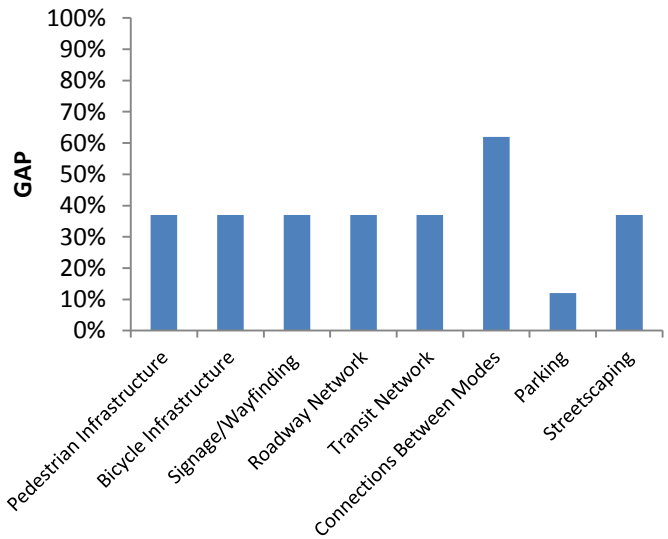
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ On-Street Parking Capacity

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment



Safety for all users

Urban Development Areas – James City County

UDA Needs Profile: Route 60/143/199 Interchange

James City County has designated 11 UDAs within its boundaries, with one being at the Interchange of Route 60, Route 143, and Route 199, to the west of I-64.

Location Characteristics

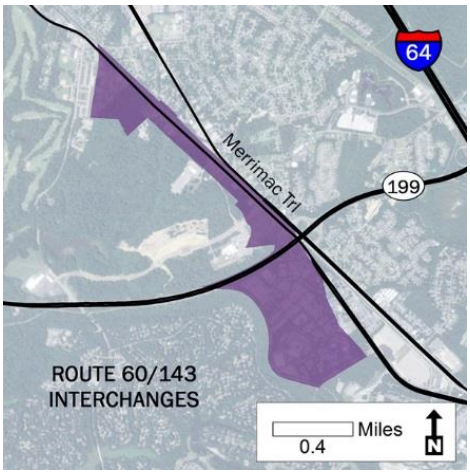
PDC – Hampton Roads PDC

UDA Size – 0.4 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). The principal suggested uses for the Route 60/143/199 UDA corridor from Routes 60/199 interchange to the City of Williamsburg line are commercial and office development, with moderate density residential development as a secondary use. Future development should be integrated with and complement the design guidelines and layout of development planned in the City, including uses, architecture, landscaping, and pedestrian amenities.

Geographic Location –



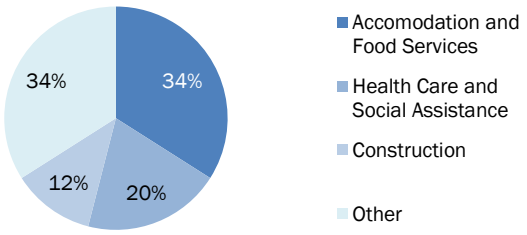
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

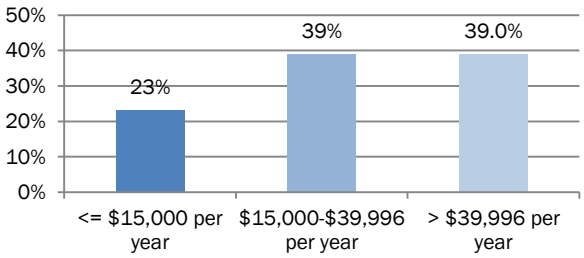
Total Population – 752 persons

Total Primary Jobs – 104 jobs

Jobs by Industry



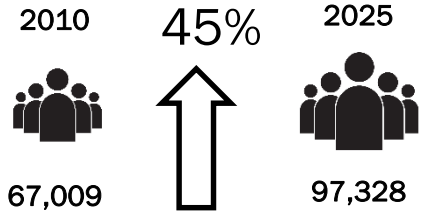
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
27,324
Working Age Population Within a 45 Minute Drive
47,081
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Intersection Design

Moderate

- ✓ Transit Facilities
- ✓ Complete Streets

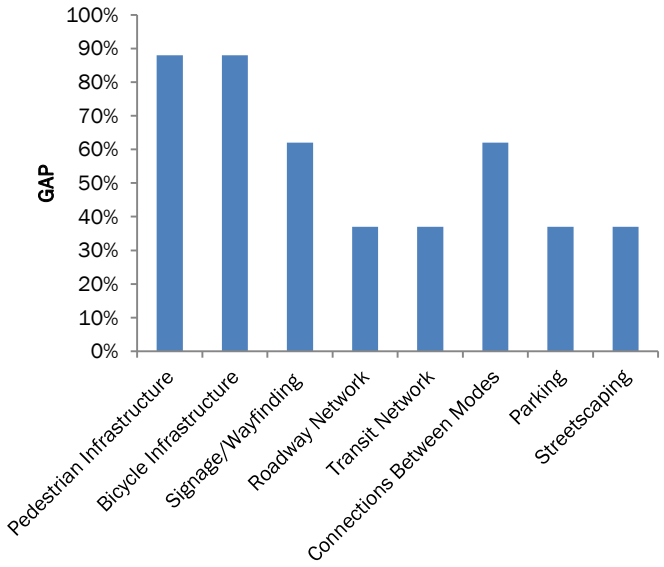
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Intersection Design
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Safety for all users

Urban Development Areas – James City County

UDA Needs Profile: Stonehouse

James City County has designated 11 UDAs within its boundaries. The Stonehouse Mixed Use area is located in the vicinity of Exit 226 off I-64.

Location Characteristics

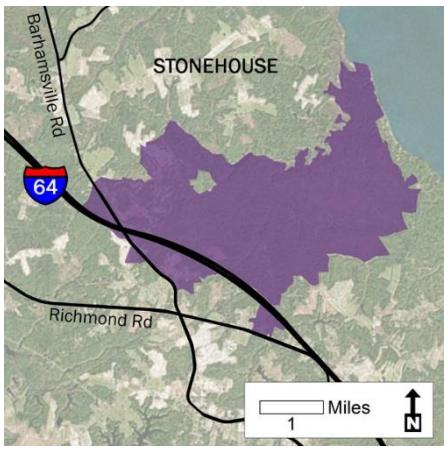
PDC – Hampton Roads PDC

UDA Size – 9.8 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). Suggested uses are light industrial and office business park; commercial uses should be secondary. Commercial development should be limited in scale, be oriented towards support services for Stonehouse area employees and residents, and be internally oriented with shared access to Route 30. Development in the Mixed Use area should also emphasize shared access and parking, consistent treatment for landscaping and architecture, and the preservation of environmental and cultural resources.

Geographic Location –

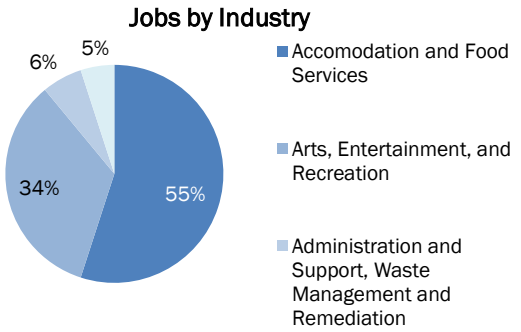


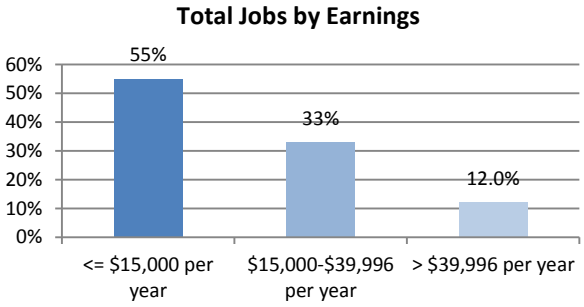
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 2,766 persons

Total Primary Jobs – 73 jobs

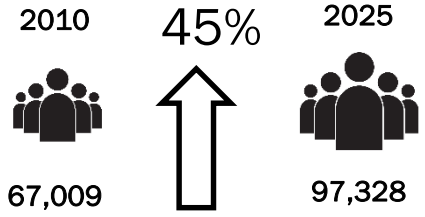




Jobs Within a 45 Minute Drive
17,509
Working Age Population Within a 45 Minute Drive
31,036
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Street Grid

External UDA Needs

High

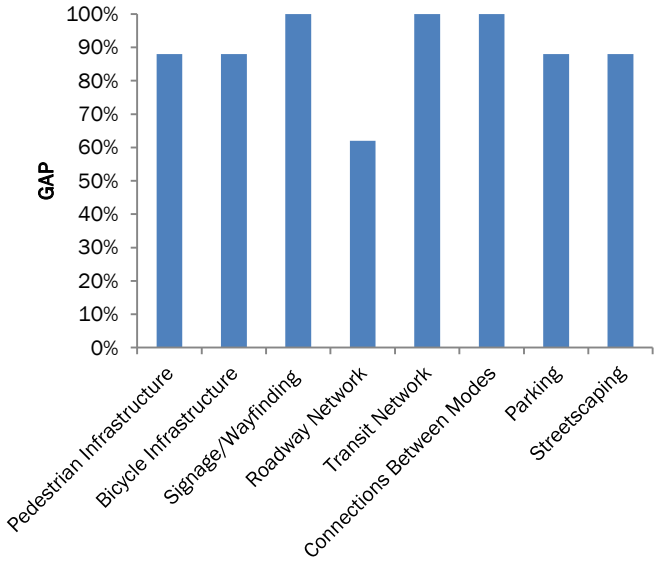
- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Street Grid

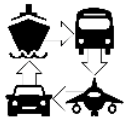
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – James City County

UDA Needs Profile: Toano

James City County has designated 11 UDAs within its boundaries. The Toano Mixed Use area is situated along Route 60, south of the CSX line. Currently development in the vicinity is composed of smaller retail, limited industrial, and moderate density residential.

Location Characteristics

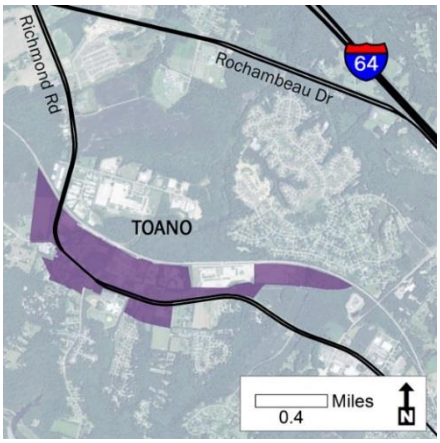
PDC – Hampton Roads PDC

UDA Size – 0.4 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. In general, Mixed Use developments are slated for compatible land uses, public amenities, pedestrian-friendly infrastructure, and community gathering spaces. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). For the Toano Mixed Use area, a County-designated Community Character Area (CCA), principal suggested uses include moderate density residential development, neighborhood scale commercial, and small office; secondary uses may include limited industrial under some circumstances. In other parts of Toano, principal uses may include general or limited industry.

Geographic Location –



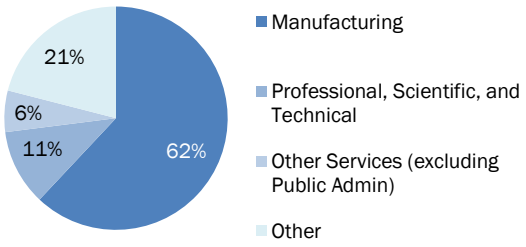
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

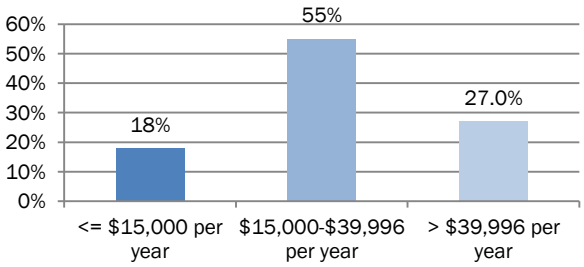
Total Population – 1,365 persons

Total Primary Jobs – 238 jobs

Jobs by Industry



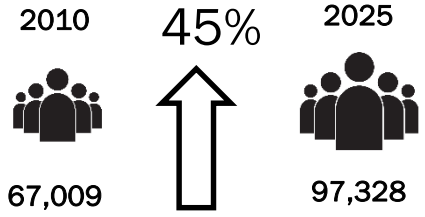
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
21,166
Working Age Population Within a 45 Minute Drive
39,022
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Street Calming

Moderate

- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Safety Features
- ✓ On-Street Parking Capacity
- ✓ Intersection Design

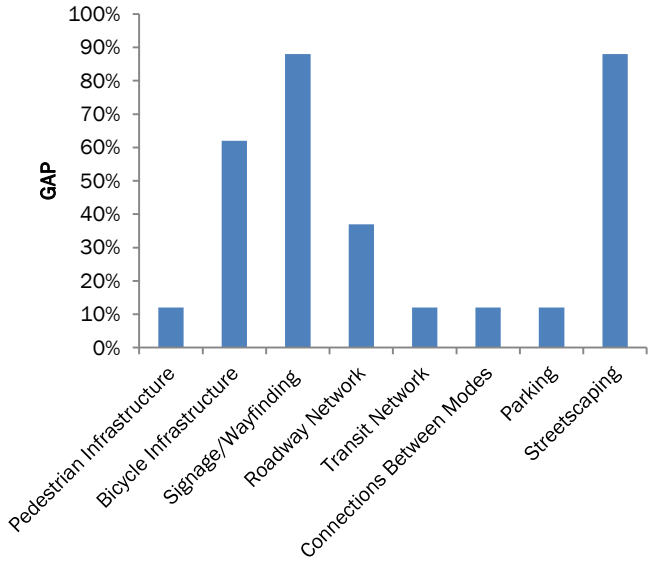
External UDA Needs

Moderate

- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment

Urban Development Areas – James City County

UDA Needs Profile: Treyburn Drive

James City County has designated 11 UDAs within its boundaries. The Treyburn Drive Mixed Use Area, located west of Treyburn drive and bounded by the City of Williamsburg/James City County line and Monticello Avenue, includes neighborhood-scale commercial establishments and small offices.

Location Characteristics

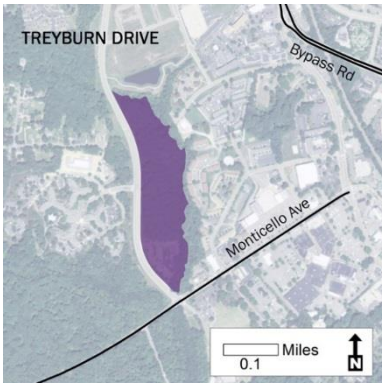
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. In general, Mixed Use developments are slated for compatible land uses, public amenities, pedestrian-friendly infrastructure, and community gathering spaces. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs).For the Treyburn Drive Mixed Use area, the County suggests neighborhood-scale commercial establishments and small offices (primary uses) and residential development in the form of integrated mixed use buildings (secondary uses). Overall, development should have a limited impact on adjacent residential areas especially in terms of visible parking area, lighting, signage, odor, noise, and hours of operation.

Geographic Location –



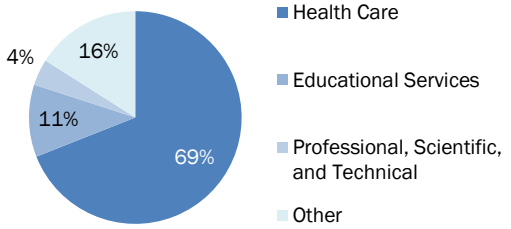
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

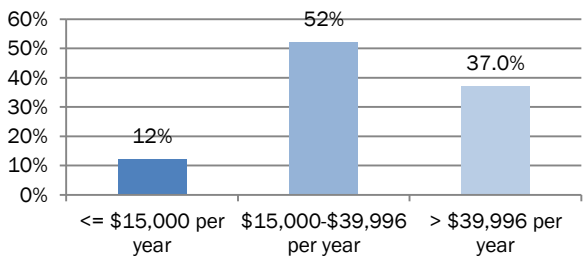
Total Population – 102 persons

Total Primary Jobs – 1,750 jobs

Jobs by Industry



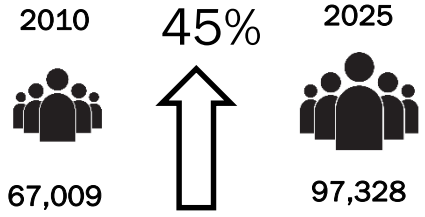
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
19,744
Working Age Population Within a 45 Minute Drive
36,866
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Undeveloped



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

Moderate

- ✓ On-Street Parking Capacity
- ✓ Off-Street Parking Capacity
- ✓ Bicycle Infrastructure

External UDA Needs

High

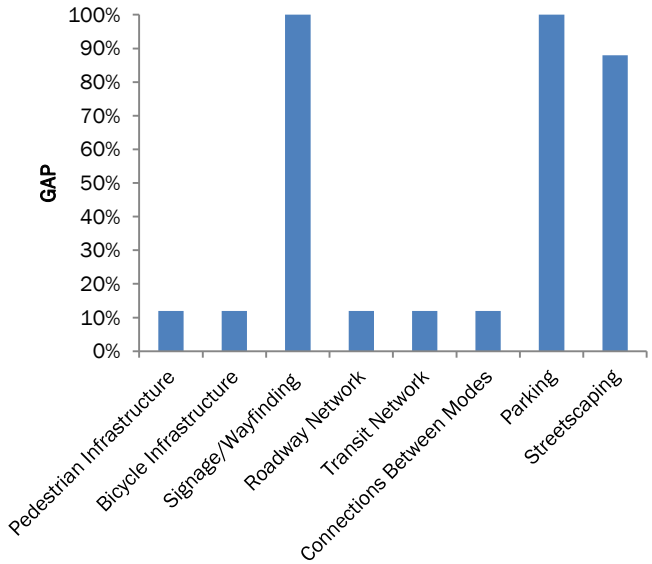
- ✓ Transit Facilities/Amenities

Moderate

- ✓ Transit Frequency
- ✓ Off-Street Parking Capacity

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment

Urban Development Areas – James City County

UDA Needs Profile: Williamsburg Crossing

James City County has designated 11 UDAs within its boundaries, and the Williamsburg Crossing Mixed Use area is located in the vicinity of the intersection at John Tyler Highway (Route 5) and Route 199.

Location Characteristics

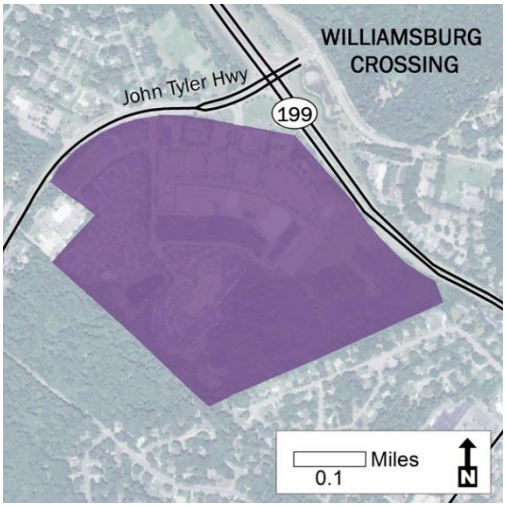
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - The James City County Comprehensive Plan (2009) designates several "Mixed Use" areas, centers within the County's Primary Service Area (PSA) where high density development and diverse land uses should be promoted. A 2011 James City County resolution designated Mixed Use areas as Urban Development Areas (UDAs). For the Williamsburg Crossing Mixed Use area, the County suggests that principal uses be commercial and office, and that moderate density residential be employed as a secondary use. The development of this area is limited to the portions of land in the southwest quadrant of the intersection of John Tyler Highway (Route 5) and Route 199 developed as part of Williamsburg Crossing Shopping Center and is subject to a binding master plan.

Geographic Location –



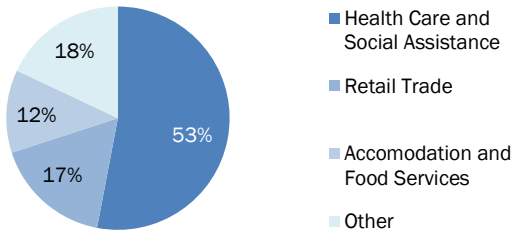
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

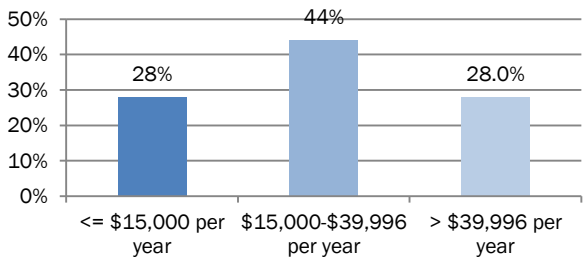
Total Population – 751 persons

Total Primary Jobs – 603 jobs

Jobs by Industry



Total Jobs by Earnings



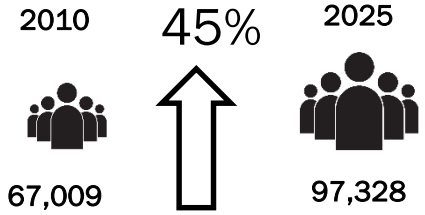
Jobs Within a 45 Minute Drive
26,422

Working Age Population Within a 45 Minute Drive
45,566

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – James City County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

Moderate

- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Complete Streets

External UDA Needs

High

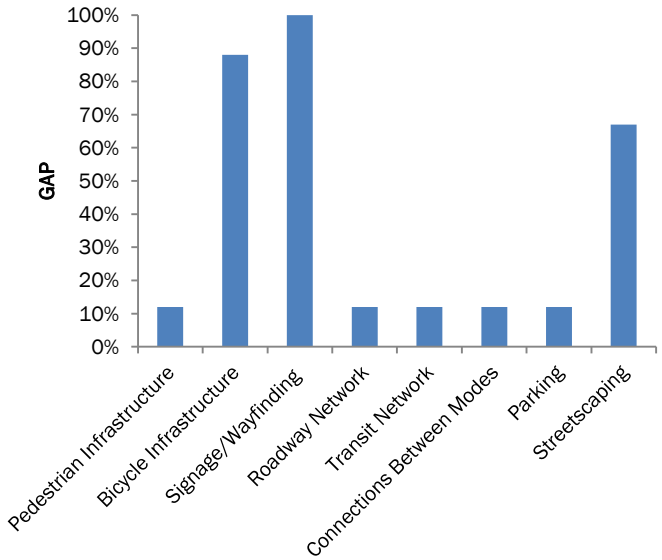
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and Access



Friendly Pedestrian and Bicycle Environment

Urban Development Areas–Isle of Wight County

UDA Needs Profile: Windsor UDA

The Isle of Wight County has designated three UDAs within their jurisdiction. The Windsor UDA is located around the intersection of Route 460 and Route 258 near Windsor.

Location Characteristics

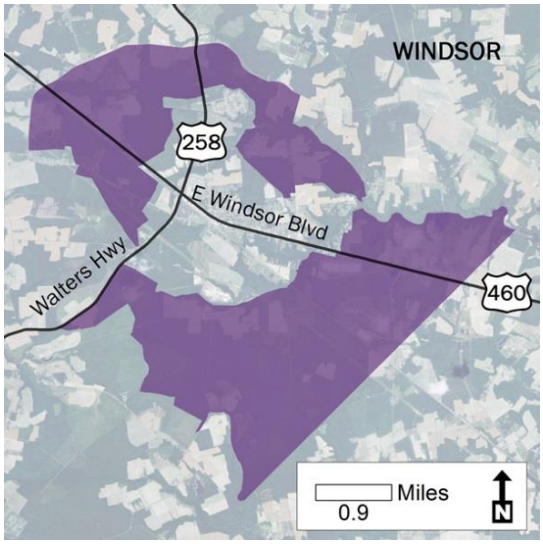
PDC – Hampton Roads PDC

UDA Size – 12.5 square miles

Year Designated – 2011

Comprehensive Plan Detail - According to the Isle of Wight County 2011 Annual Economic Development Report, the County designated its first two Urban Development Areas (UDAs) in the Camptown Development Service District (DSD) in August 2011. As defined in the County's Comprehensive Plan, DSDs correspond with the location of the major County transportation corridors and existing or planned future Hampton Roads Sanitation District (HRSD) sewer and water service areas. Areas designated DSDs generally have served and are expected to continue to serve as the principal residential, commercial and employment centers of the County. These areas comprise the most suitable locations for future growth and development.

Geographic Location –



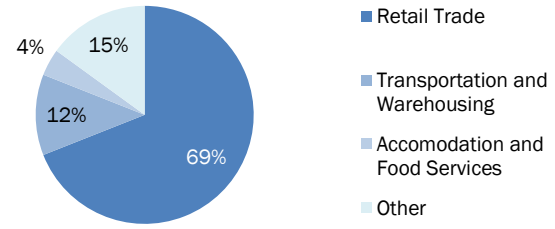
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

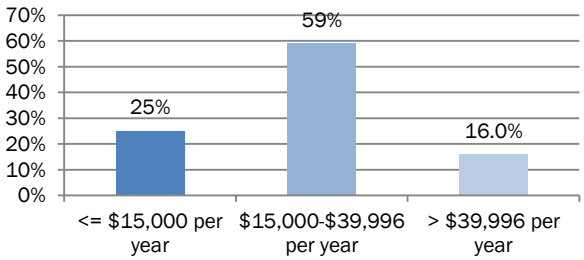
Total Population –551 persons

Total Primary Jobs – 252 jobs

Jobs by Industry



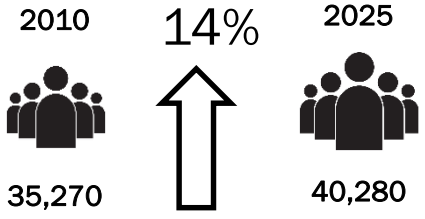
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
14,412
Working Age Population Within a 45 Minute Drive
27,553
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Isle of Wight County

Current Place Type -

TBD based on coordination with locality

Planned Place Type -

TBD based on coordination with locality

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas–Isle of Wight County

UDA Needs Profile: Camptown UDA

The Isle of Wight County has designated three UDAs within their jurisdiction. The Camptown Development Service District (DSD) includes several large tracts suitable for industrial and residential development.

Location Characteristics

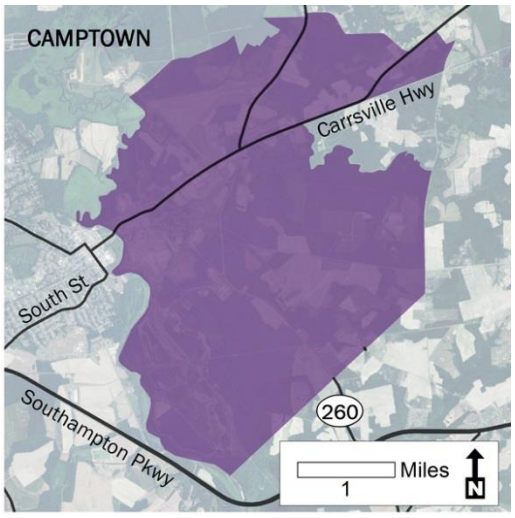
PDC – Hampton Roads PDC

UDA Size – 10.8 square miles

Year Designated – 2011

Comprehensive Plan Detail - According to the Isle of Wight County 2011 Annual Economic Development Report, the County designated its first two Urban Development Areas (UDAs) in the Camptown Development Service District (DSD) in August 2011. As defined in the County's Comprehensive Plan, DSDs correspond with the location of the major County transportation corridors and existing or planned future Hampton Roads Sanitation District (HRSD) sewer and water service areas. Areas designated DSDs generally have served and are expected to continue to serve as the principal residential, commercial and employment centers of the County. These areas comprise the most suitable locations for future growth and development.

Geographic Location –



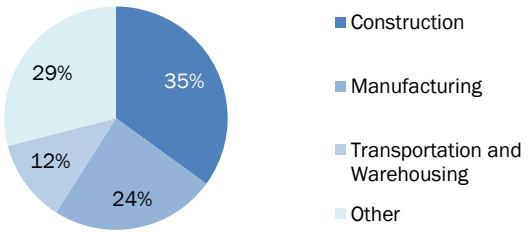
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

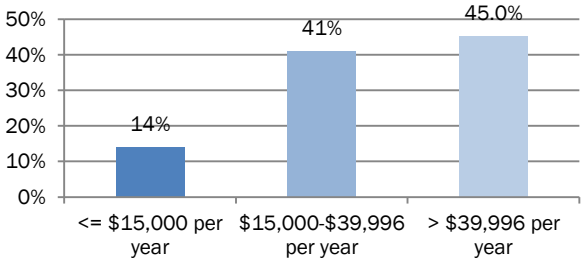
Total Population – 1,346 persons

Total Primary Jobs – 119 jobs

Jobs by Industry



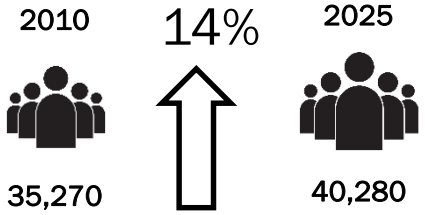
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
5,698
Working Age Population Within a 45 Minute Drive
13,589
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Isle of Wight County

Current Place Type -

TBD based on coordination with locality

Planned Place Type -

TBD based on coordination with locality

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas–Isle of Wight County

UDA Needs Profile: Newport UDA

The Isle of Wight County has designated three UDAs within their jurisdiction. The Newport UDA is located along Route 17 and Route 10 in the Newport area.

Location Characteristics

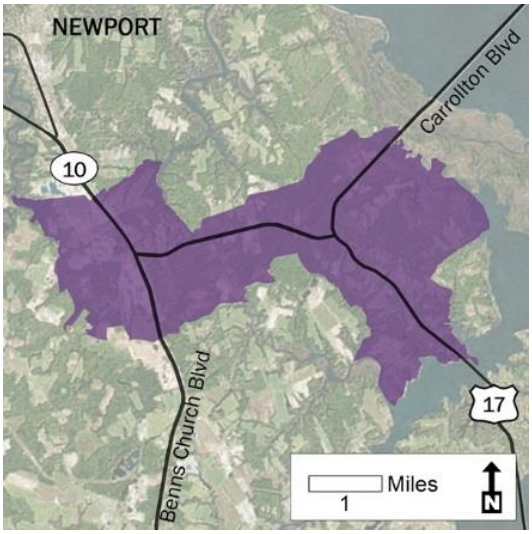
PDC – Hampton Roads PDC

UDA Size – 11.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - According to the Isle of Wight County 2011 Annual Economic Development Report, the County designated its first two Urban Development Areas (UDAs) in the Camptown Development Service District (DSD) in August 2011. As defined in the County's Comprehensive Plan, DSDs correspond with the location of the major County transportation corridors and existing or planned future Hampton Roads Sanitation District (HRSD) sewer and water service areas. Areas designated DSDs generally have served and are expected to continue to serve as the principal residential, commercial and employment centers of the County. These areas comprise the most suitable locations for future growth and development.

Geographic Location –



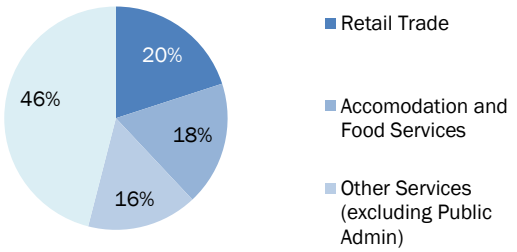
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

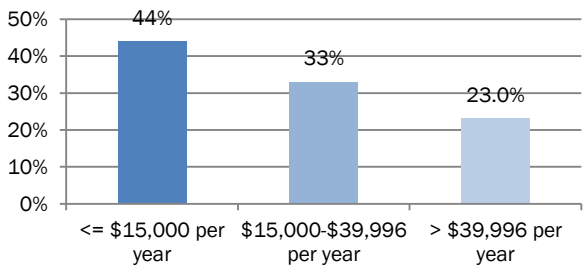
Total Population – 6,706 persons

Total Primary Jobs – 691 jobs

Jobs by Industry



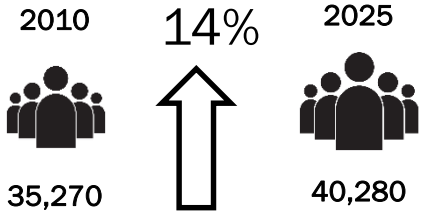
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
41,681
Working Age Population Within a 45 Minute Drive
75,971
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Isle of Wight County

Current Place Type -

TBD based on coordination with locality

Planned Place Type -

TBD based on coordination with locality

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas – City of Norfolk

UDA Needs Profile: Downtown Character District

Within the City of Norfolk, there are 4 UDAs. In the Downtown Character District, among other strategies, the City supports improving various pedestrian crossings, extending the esplanade, reconfiguring the Civic Plaza area, developing several existing properties, and the creation of an Arts District.

Location Characteristics

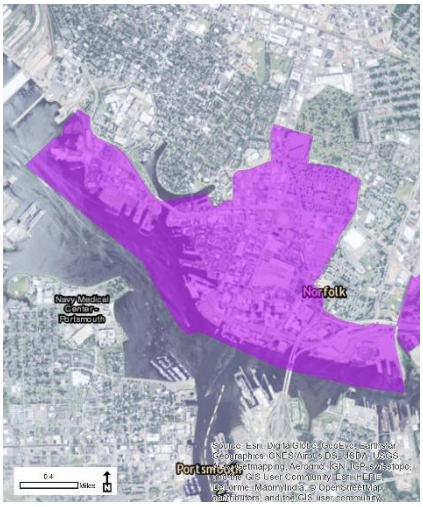
PDC – Hampton Roads PDC

UDA Size – 1.4 square miles

Year Designated – 2013

Comprehensive Plan Detail - The City of Norfolk's PlaNorfolk 2030 Plan (2013) describes actions for implementation in a series of different neighborhoods. In one such region, the Downtown area, the City prescribes a regimen of activities that includes improving various pedestrian crossings and extending the esplanade from Town Point Park to Harbor Park and ensuring that the design accommodates bicycles. The City also seeks to reconfigure the Civic Plaza area to include a new driveway, develop the new Col. Samuel Slover Norfolk Main Library, the new Courthouse Complex, and the Multi-Modal Transfer Station at Harbor Park, and to support the expansion of the Chrysler Museum along with the creation of an Arts District. Finally, parking regulations north of Brambleton Avenue should be revised.

Geographic Location



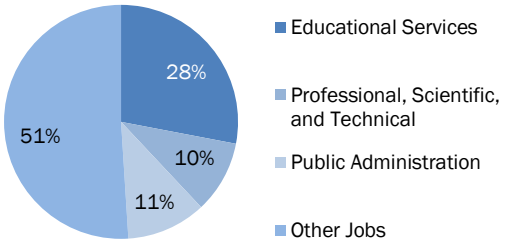
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

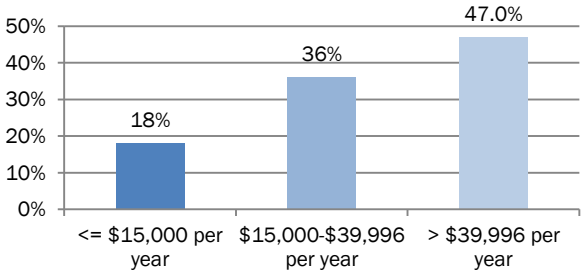
Total Population –7,358 persons

Total Primary Jobs – 32,862 jobs

Jobs by Industry



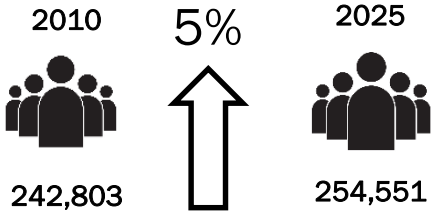
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
490,537
Working Age Population Within a 45 Minute Drive
515,071
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Norfolk

Current Place Type - Urban Core



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Bicycle Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Pedestrian Infrastructure

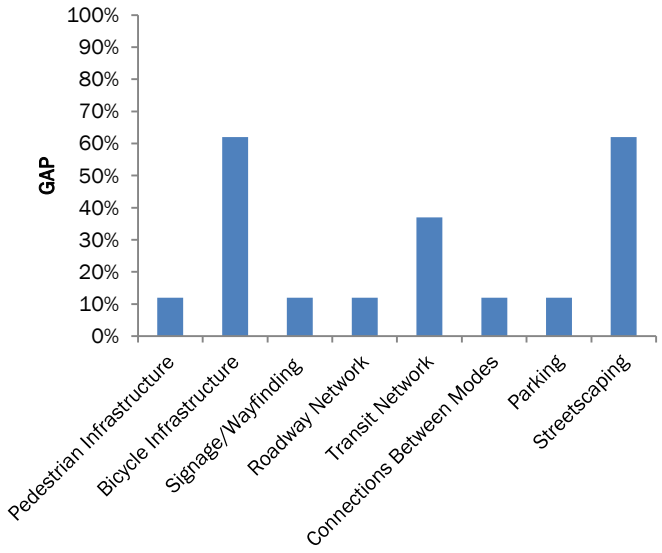
External UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Safety for all users

Urban Development Areas – City of Norfolk

UDA Needs Profile: Broad Creek TSA

The City of Norfolk has designated four UDAs within their jurisdiction. The Broad Creek TSA is located along both sides of I-264. south of Virginia Beach Blvd.

Location Characteristics

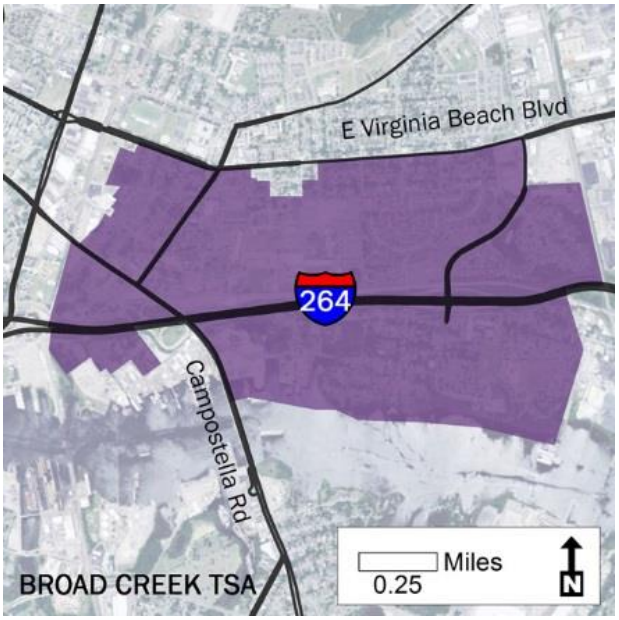
PDC – Hampton Roads PDC

UDA Size – 1.2 square miles

Year Designated – 2013

Comprehensive Plan Detail - The City of Norfolk's PlaNorfolk 2030 Plan (2013) describes actions for implementation in a series of different neighborhoods. For the Broad Creek area, the City pledges to support the Norfolk Redevelopment and Housing Authority's (NRHA) efforts to develop new rental and homeowner units as well as a redevelopment plan for Moton Circle. Norfolk also hopes to revitalize the Grandy Village neighborhood, develop a new library facility and community center, and acquire properties in the Douglas Park area to assist in the implementation of a future master plan.

Geographic Location



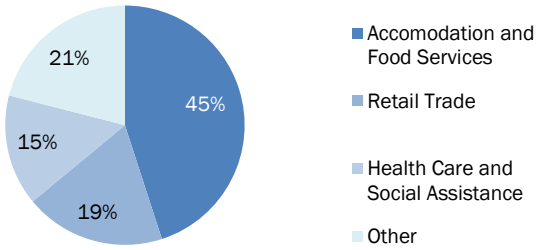
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

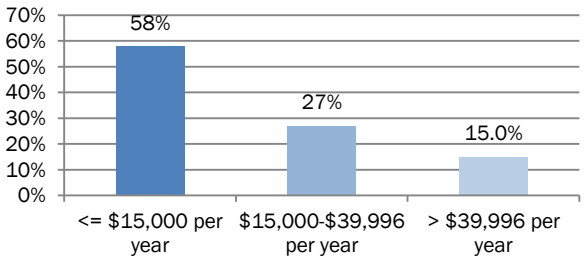
Total Population – 7,225 persons

Total Primary Jobs – 303 jobs

Jobs by Industry



Total Jobs by Earnings



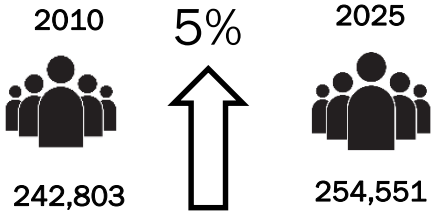
Jobs Within a 45 Minute Drive
327,793

Working Age Population Within a 45 Minute Drive
334,627

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Norfolk

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Bicycle Infrastructure
- ✓ Traffic Calming
- ✓ Improvements to Natural Environment

Moderate

- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities

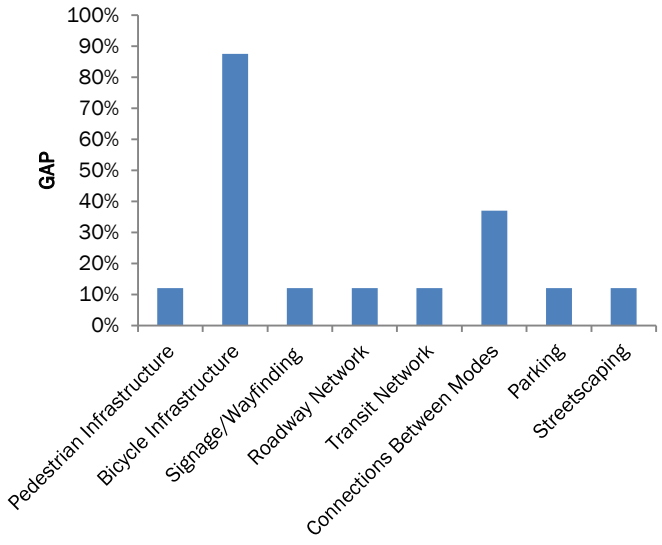
External UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Safety for all users

Urban Development Areas – City of Norfolk

UDA Needs Profile: Military Highway TSA

The City of Norfolk has designated four UDAs within their jurisdiction, and the Military Highway Transit Supportive Area (TSA) borders the intersection of I-264 and North Military Highway.

Location Characteristics

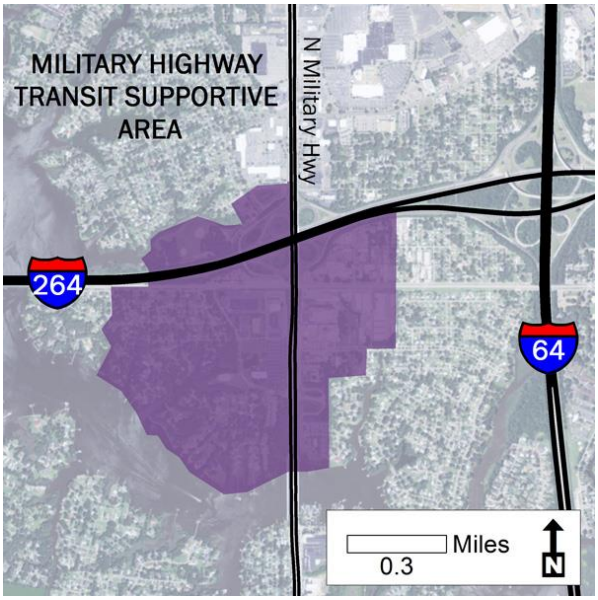
PDC – Hampton Roads PDC

UDA Size – 0.6 square miles

Year Designated – 2013

Comprehensive Plan Detail - The City of Norfolk's PlaNorfolk 2030 Plan (2013) describes actions for implementation in a series of different neighborhoods. For the Military Highway Corridor, the City suggests establishing a Military Highway Corridor District Task Force to guide future decisions along the corridor. Development priorities include the redevelopment of two shopping centers as well as of a flea market site The City should also develop a streetscape plan for the corridor, provide grant funding for aesthetic improvements of commercial properties and enhance buffering, landscaping, and parking standards for car sales and repair establishments.

Geographic Location



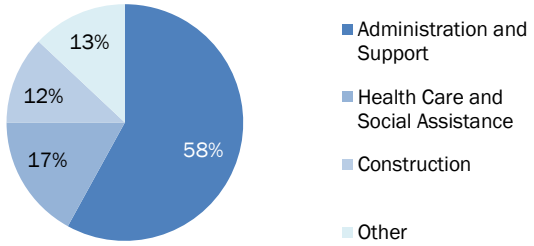
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

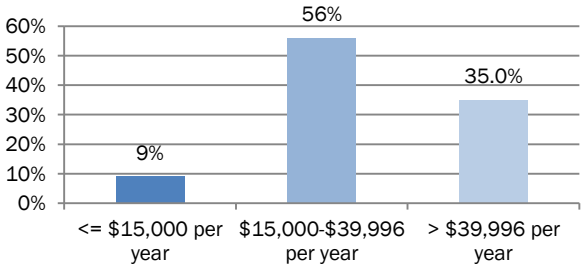
Total Population – 1,538 persons

Total Primary Jobs – 2,240 jobs

Jobs by Industry



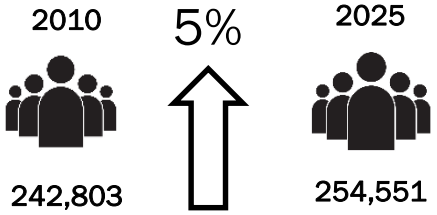
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
199,611
Working Age Population Within a 45 Minute Drive
355,857
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Norfolk

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Capacity & Operations

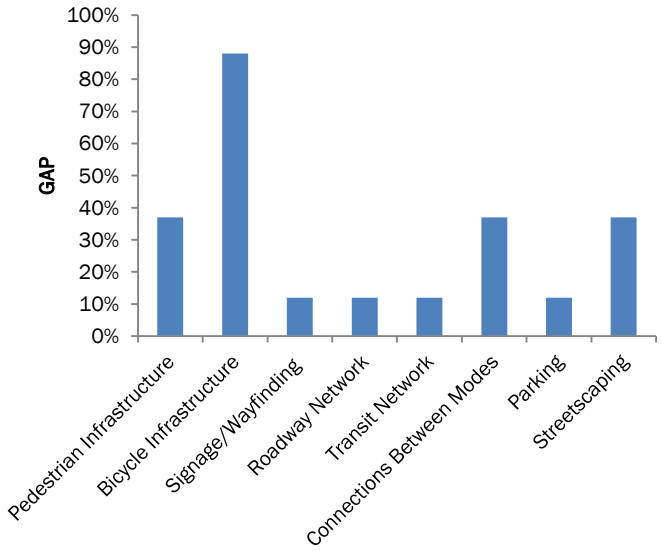
External UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle & Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Safety for all users

Urban Development Areas – City of Norfolk

UDA Needs Profile: Newtown Road TSA

The City of Norfolk has designated four UDAs within their jurisdiction, and the Newtown Road TSA focuses on the area surrounding the Newtown Road Light Rail Station just southeast of the I-64/I-264 intersection.

Location Characteristics

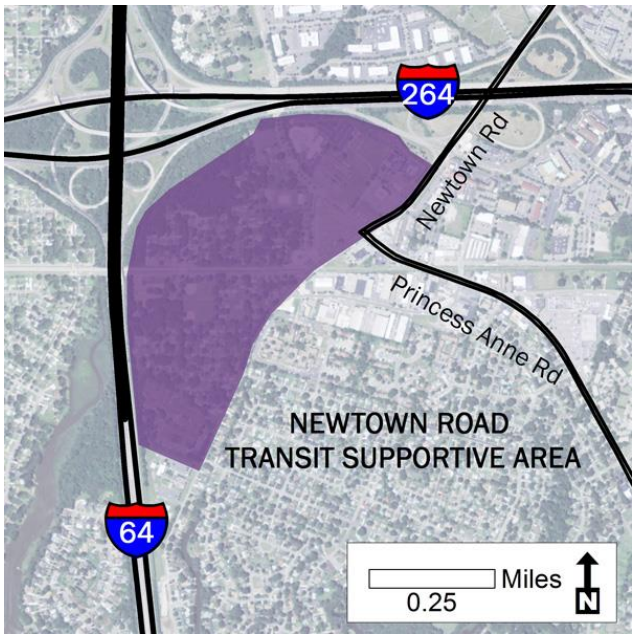
PDC – Hampton Roads PDC

UDA Size – 0.2 square miles

Year Designated – 2013

Comprehensive Plan Detail - The City of Norfolk's PlaNorfolk 2030 Plan (2013) describes actions for implementation in a series of different neighborhoods. A Transit Supportive Area should surround the Newtown Road light rail station in downtown Norfolk. General policies should encourage development, with increased intensities that support transit, near the station in order to create opportunities for a mix of employment and residential activity that promotes transit, bicycle, and pedestrian-oriented uses.

Geographic Location



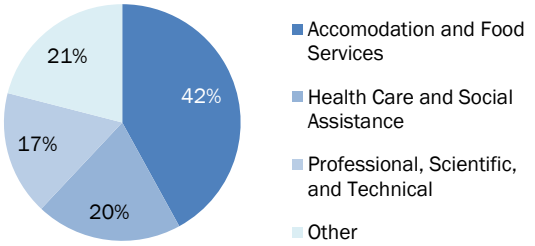
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

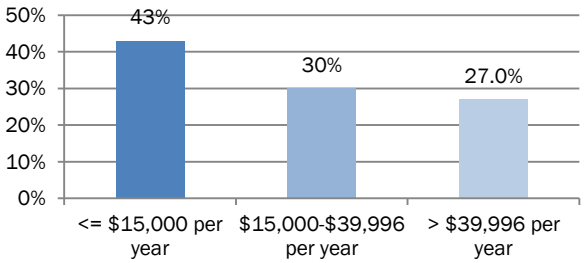
Total Population – 3,329 persons

Total Primary Jobs – 235 jobs

Jobs by Industry



Total Jobs by Earnings



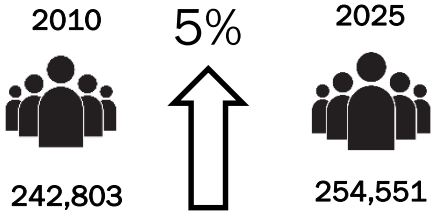
Jobs Within a 45 Minute Drive
104,172

Working Age Population Within a 45 Minute Drive
169,860

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Norfolk

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

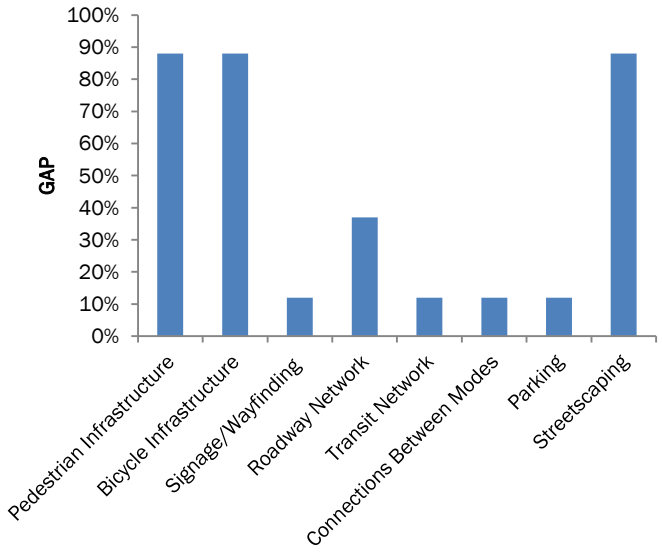
External UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Safety for all users

Urban Development Areas – Virginia Beach

UDA Needs Profile: Pembroke SGA

Pembroke SGA is bound by Thalia Creek, Jeanne and Broad Streets, Clearfield Avenue, and Bonney and Baxter Roads. Pembroke is divided into six subareas: Central Business District's Core Area, Bonney Area, Waterfront Area, Central Village District, Western Campus District, and Southern Corporate District.

Location Characteristics

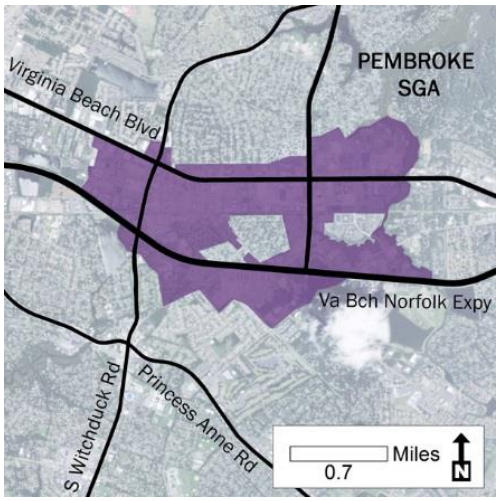
PDC – Hampton Roads Planning District Commission

UDA Size – 2.0 square miles

Year Designated – 2009

Comprehensive Plan Detail - The Pembroke SGA/UDA is planned for to serve as a central urban core with a vertical mix of urban uses, great streets, mobility and transit alternatives, urban gathering places, environmental and neighborhood preservation and enhancement, green buildings and infrastructure opportunities providing a variety of civic, commercial, artistic and ethnically diverse areas. Pembroke can be divided into six subareas: Central Business District's Core Area, Bonney Area, Waterfront Area, Central Village District, Western Campus District, and Southern Corporate District. Each of these areas contains its own recommendations, which include a diversity of land uses, pedestrian and transit connections, a vibrant waterfront, and signature office buildings.

Geographic Location



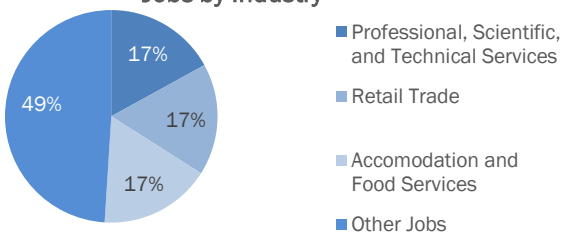
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

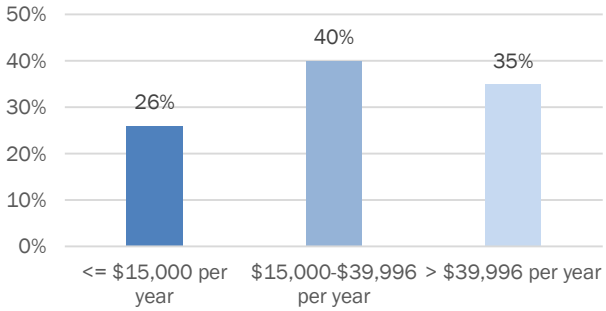
Total Population – 13,421 persons

Total Primary Jobs – 14,747 jobs

Jobs by Industry



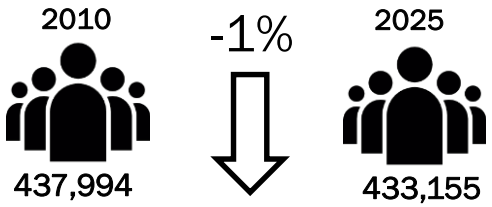
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
97,500
Working Age Population Within a 45 Minute Drive
167,508
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Medium Town or Suburban Cen



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid, Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Transit Operations
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design

External UDA Needs

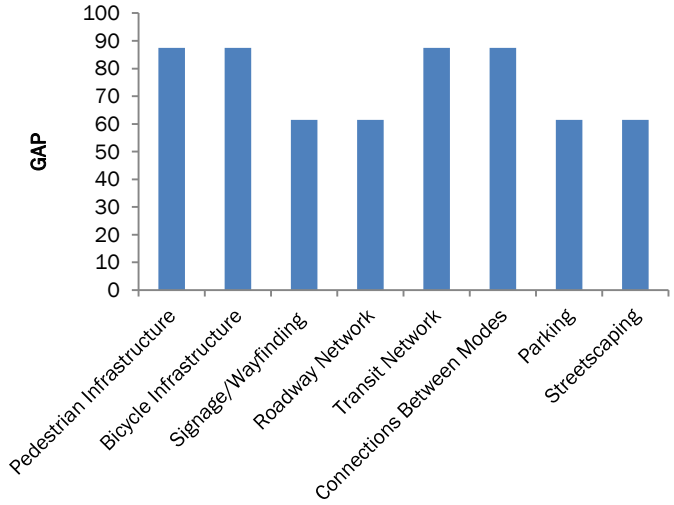
High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid, Complete Streets
- ✓ Improvements to the Natural Environment

Moderate

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

Safety for all users

Access to transportation networks beyond the UDA

Urban Development Areas – Virginia Beach

UDA Needs Profile: Newton SGA

The Newtown SGA, a western gateway to the City of Virginia Beach, is located just east of the crossroads of I-264 and I-64.

Location Characteristics

PDC – Hampton Roads Planning District Commission

UDA Size – 0.6 square miles

Year Designated – 2009

Comprehensive Plan Detail - The Newtown SGA/UDA is envisioned to serve as a gateway into Virginia Beach. The City envisions accomplishing this goal through interconnected pedestrian and street frameworks, a bicycle and trail system, parks and open spaces, mixed use, mixed income, transit-oriented development, and construction at a scale compatible with adjacent neighborhoods. Additionally, the City plans to coordinate transportation improvements, including light rail and various roadway modifications.

Geographic Location



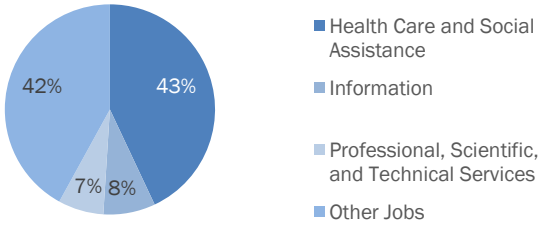
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

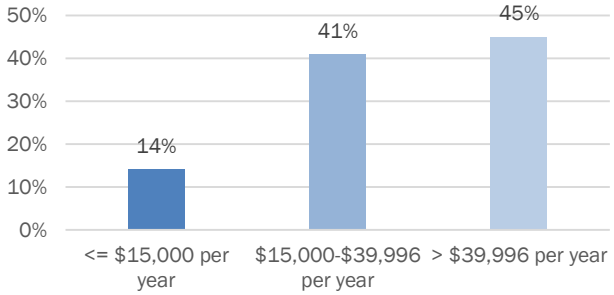
Total Population – 3,378 persons

Total Primary Jobs – 7,625 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
75,386
Working Age Population Within a 45 Minute Drive
126,651
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid, Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street and Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Signage/Wayfinding

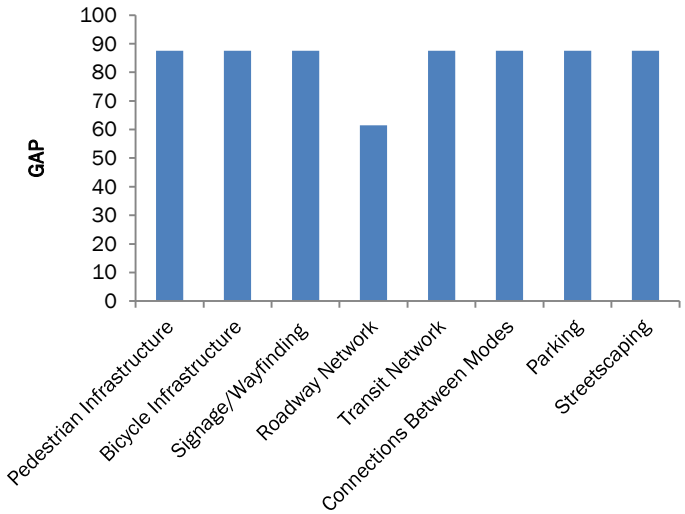
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid, Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-Street and Off-Street Parking Capacity

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Access to transportation networks beyond the UDA

Urban Development Areas – Virginia Beach

UDA Needs Profile: Rosemont SGA

The Rosemont SGA is located in the center of the city east of the Pembroke SGA and along the I-264/Virginia Beach Boulevard corridor.

Location Characteristics

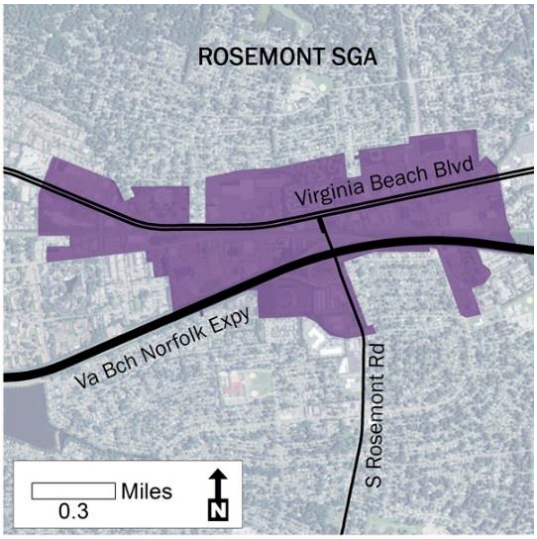
PDC – Hampton Roads Planning District Commission

UDA Size – 0.7 square miles

Year Designated – 2009

Comprehensive Plan Detail - The Rosemont SGA/UDA is planned to transition from an auto-oriented retail strip to a mixed-use transit-oriented neighborhood center at higher densities. Specific recommendations include the creation of an implementable series of projects that can be packaged together, redevelopment through building the Sentara Way fly-over and other new connections, the realignment of Bonney Road to create more regular development blocks and higher density development, and the humanization of Virginia Beach Boulevard through the development of a village core.

Geographic Location



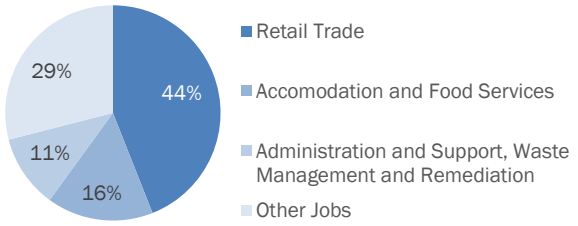
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

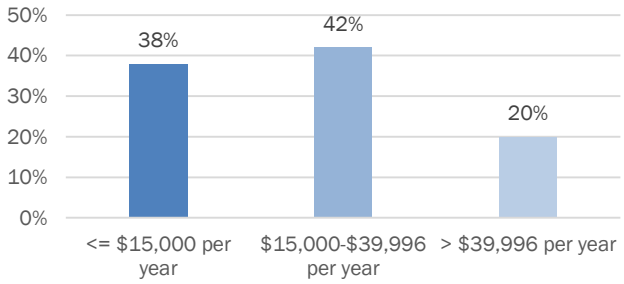
Total Population – 7,398 persons

Total Primary Jobs – 5,237 jobs

Jobs by Industry



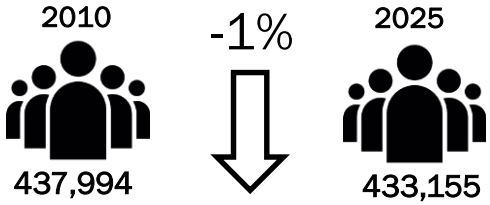
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
96,049
Working Age Population Within a 45 Minute Drive
165,212
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Intersection Design
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features

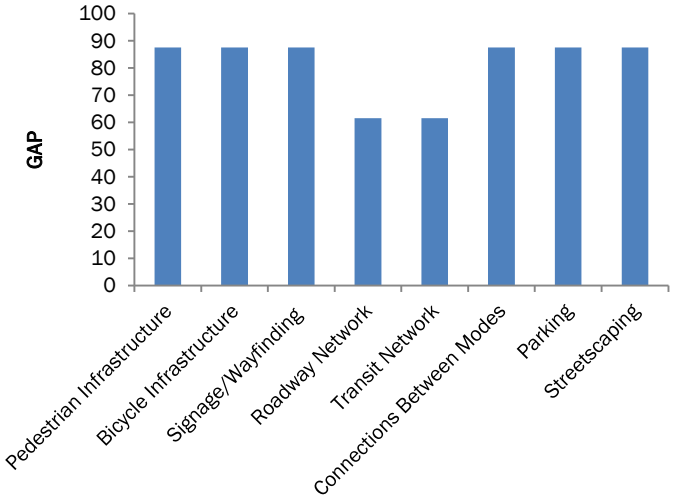
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Off-Street Parking
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Access to transportation networks beyond the UDA

Urban Development Areas – Hampton City

UDA Needs Profile: Coliseum Central

The City of Hampton has designated seven UDAs within their jurisdiction. This profile represents the characteristics and needs of Coliseum Central, located southwest of the Branch Back River and bisected by the I-64.

Location Characteristics

PDC – Hampton Roads Planning District Commission

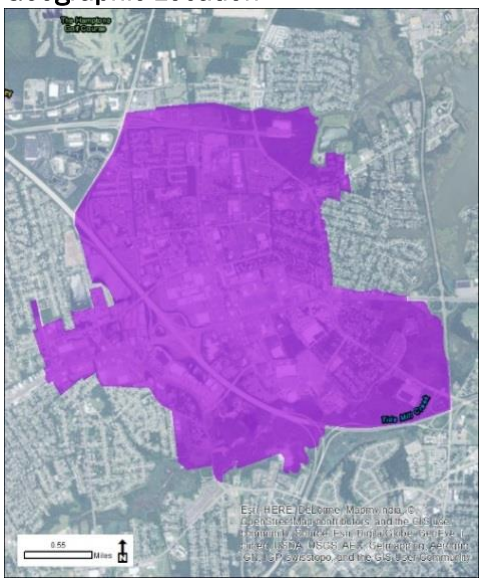
UDA Size – 4 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

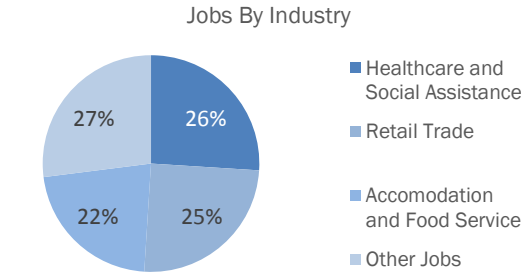


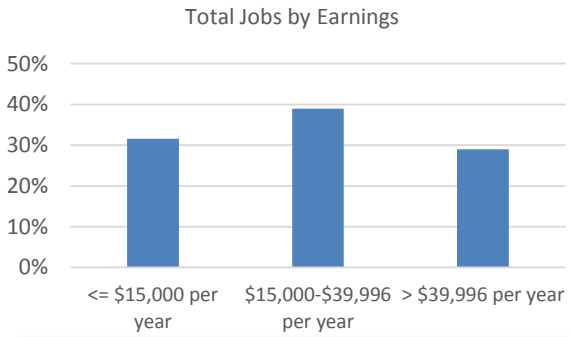
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 13,565 persons

Total Primary Jobs – 11,198 jobs





Jobs Within a 45 Minute Drive
51,382
Working Age Population Within a 45 Minute Drive
100,110
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features

External UDA Needs

High

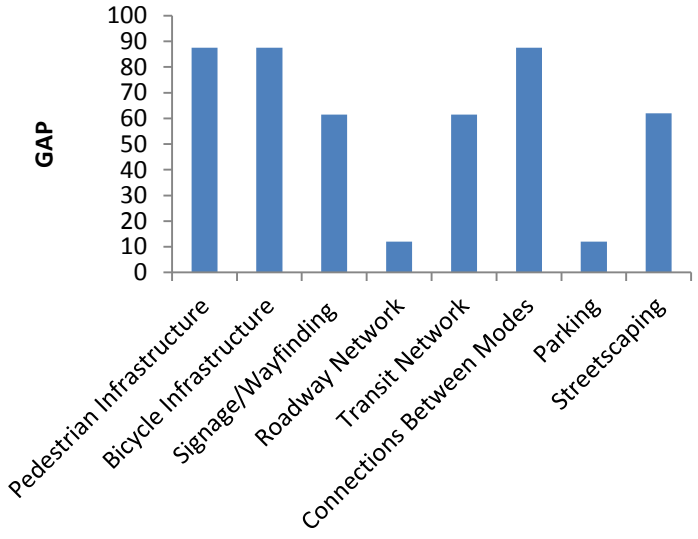
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas – Hampton City

UDA Needs Profile: North King Street

Hampton City designated seven UDAs within its jurisdiction. This profile represents the characteristics and needs of North King Street UDA, located east of the South West Branch Back River and bisected by Route 258.

Location Characteristics

PDC – Hampton Roads Planning District Commission

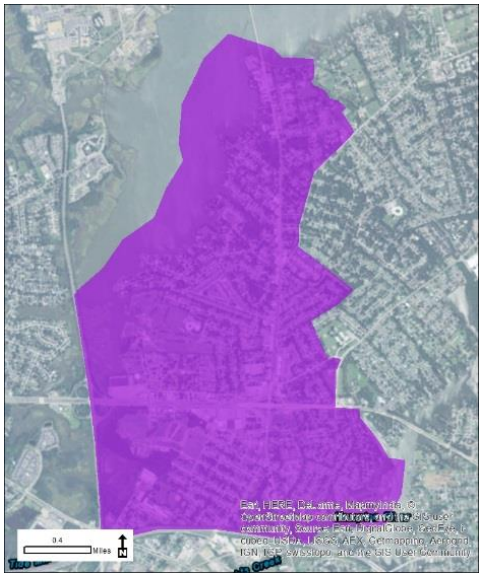
UDA Size – 2.4 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

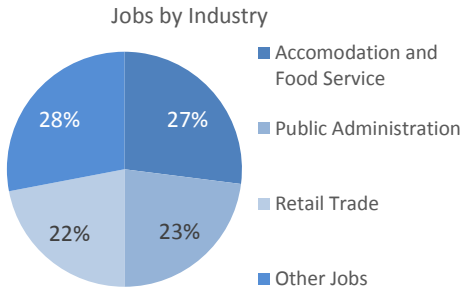


Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 10,230 persons

Total Primary Jobs – 1,179 jobs





Jobs Within a 45 Minute Drive
50,001
Working Age Population Within a 45 Minute Drive
96,783
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features

External UDA Needs

High

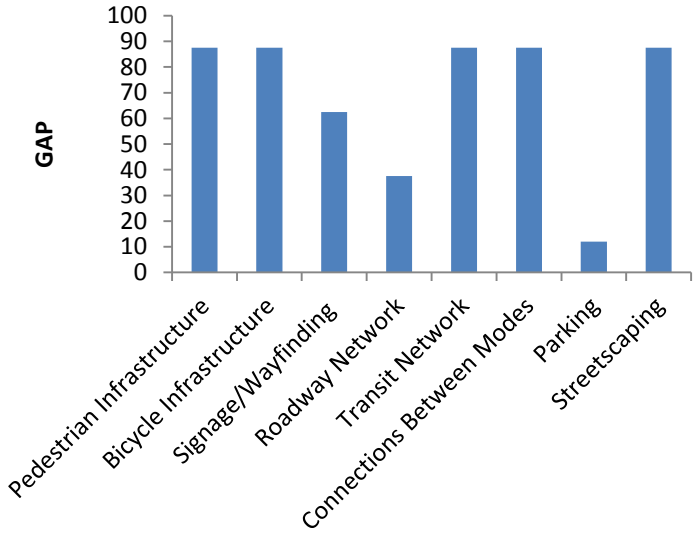
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas – Hampton City

UDA Needs Profile: Downtown

Hampton City designated seven UDAs within its jurisdiction. This profile represents the needs and characteristics of the Downtown UDA (the area west of the Hampton River and south of the I-64).

Location Characteristics

PDC – Hampton Roads Planning District Commission

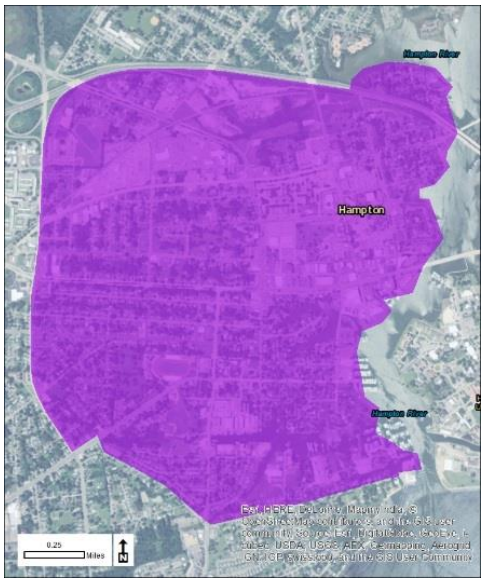
UDA Size – 1.7 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan (have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

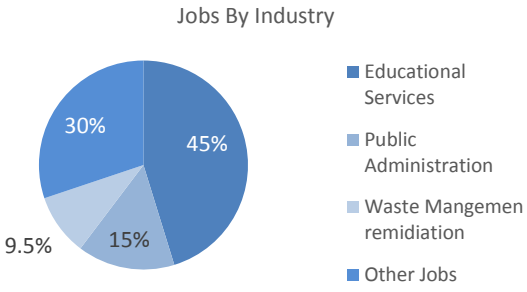


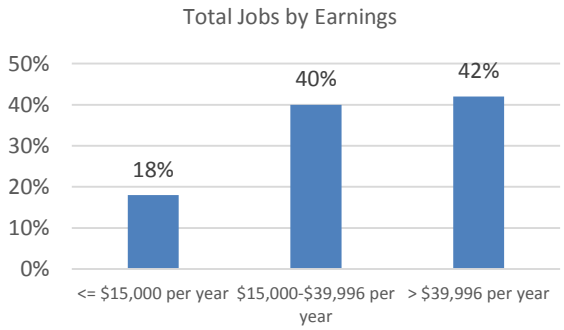
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 8,589 persons

Total Primary Jobs – 10,467 jobs





Jobs Within a 45 Minute Drive
72,902
Working Age Population Within a 45 Minute Drive
130,081
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Intersection Design

External UDA Needs

High

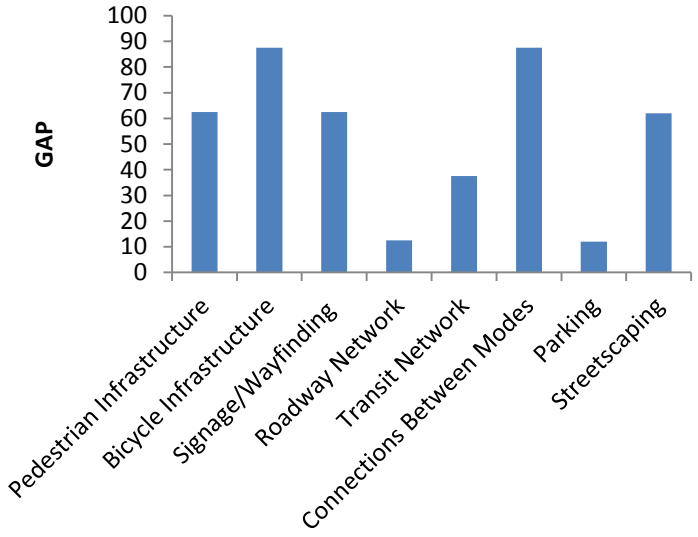
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding
- ✓ Street Grid

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas – Hampton City

UDA Needs Profile: Kecoughtan

Hampton City designated seven UDAs within its jurisdiction. The Kecoughtan UDA is located just south of Downtown Hampton, east of the I-664 and bisected by route 60.

Location Characteristics

PDC – Hampton Roads Planning District Commission

UDA Size – 2.1 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

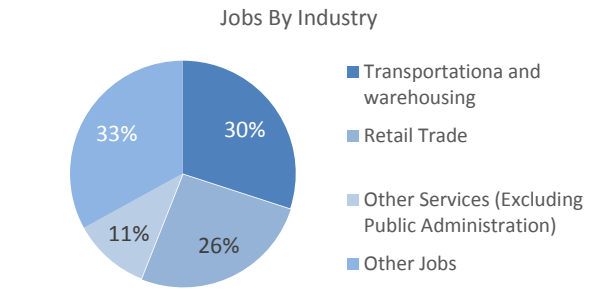


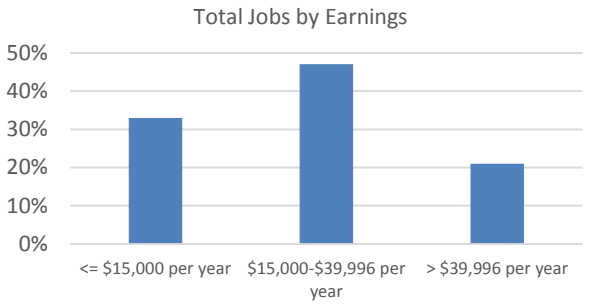
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 9,370 persons

Total Primary Jobs – 758 jobs





Jobs Within a 45 Minute Drive
62,686
Working Age Population Within a 45 Minute Drive
118,460
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Safety Features
- ✓ Transit Operations
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure

External UDA Needs

High

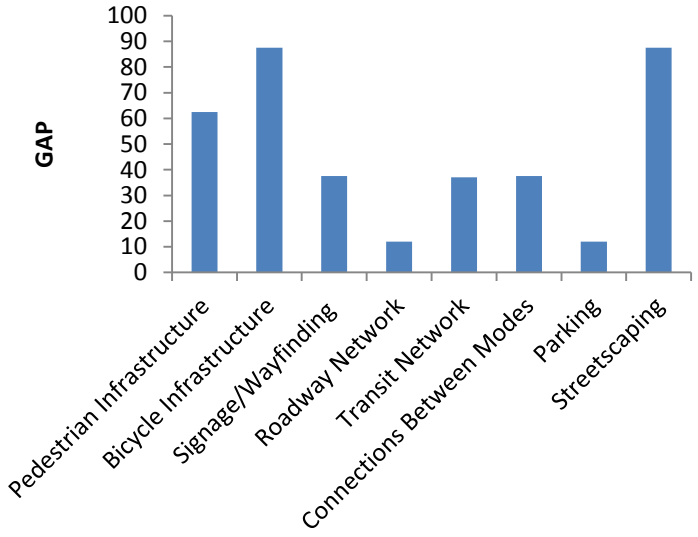
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas –Hampton City

UDA Needs Profile: Phoebus

Hampton City designated seven UDAs within its jurisdiction. This profile represents the characteristics and needs of Phoebus, located to the east of Downtown Hampton, north of I-64, bisected by route 169 and bounded by Mill Creek to the east.

Location Characteristics

PDC – Hampton Roads Planning District Commission

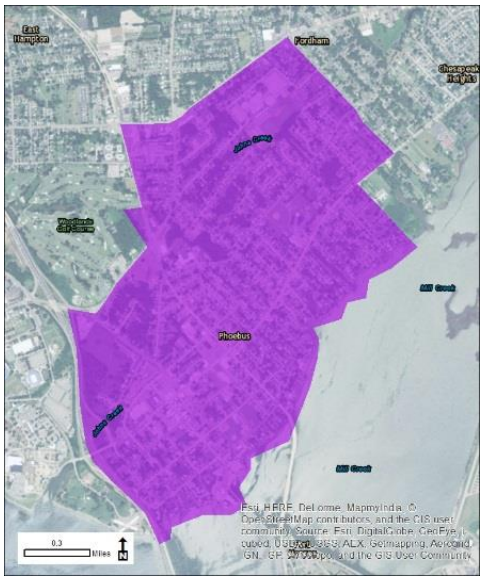
UDA Size – 1.3 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

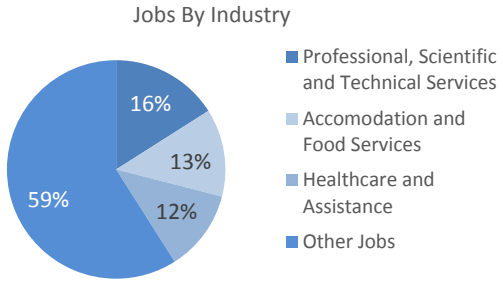


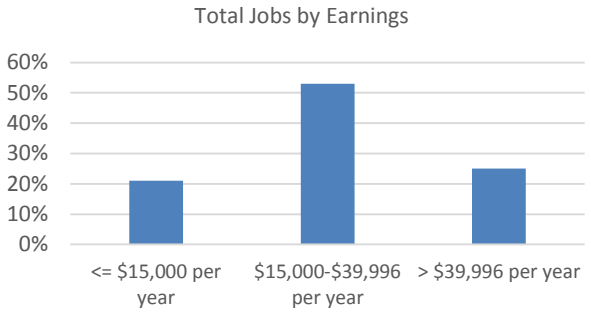
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –6,563 persons

Total Primary Jobs – 988 jobs





Jobs Within a 45 Minute Drive
70,527
Working Age Population Within a 45 Minute Drive
130,527
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas –Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Street Grid

External UDA Needs

High

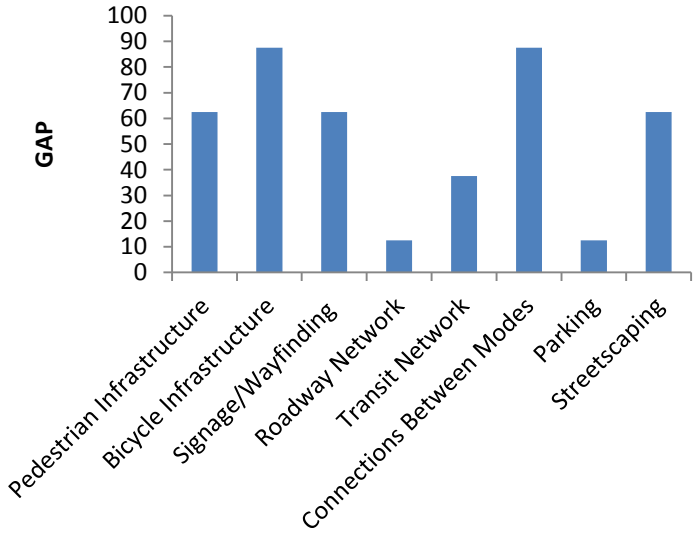
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas – Hampton City

UDA Needs Profile: Buckroe

Hampton City designated seven UDAs within its jurisdiction. This profile represents the characteristics and needs of Buckroe UDA, located to the north of Fort Monroe and bisected by route 169.

Location Characteristics

PDC – Hampton Roads Planning District Commission

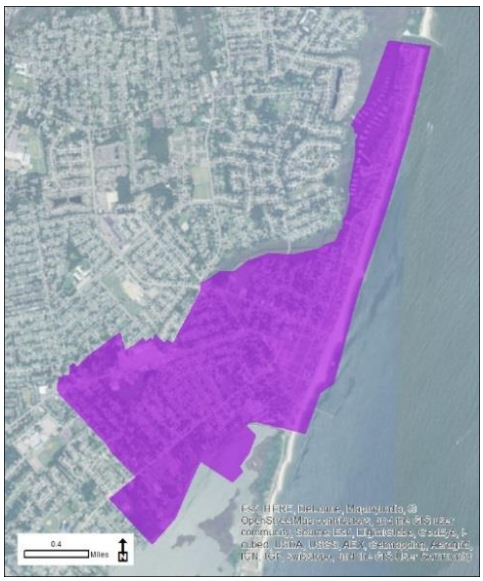
UDA Size – 1.3 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

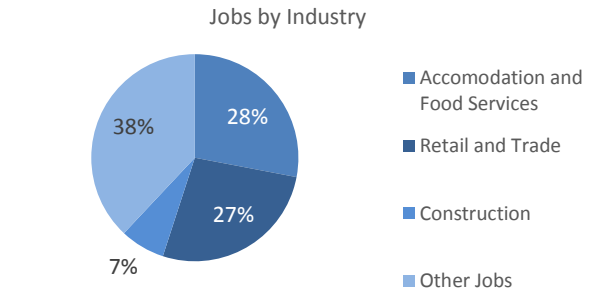


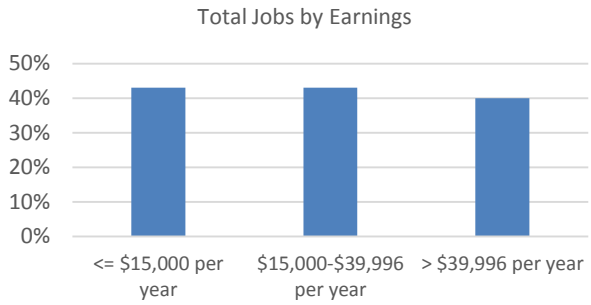
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 7,825 persons

Total Primary Jobs – 294 jobs





Jobs Within a 45 Minute Drive
58,870
Working Age Population Within a 45 Minute Drive
110,842
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Capacity

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Moderate
- ✓ Improvements to Natural Environment
- ✓ Safety Features

External UDA Needs

High

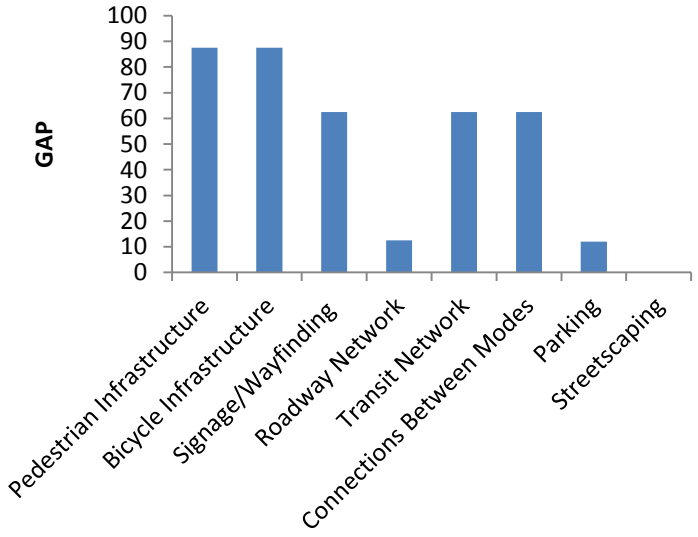
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas –Hampton City

UDA Needs Profile: Fort Monroe

Hampton City designated seven UDAs within its jurisdiction. This profile represents the characteristics and needs of Fort Monroe UDA, located at the southern tip of the Virginia Peninsula, bounded by Mill Creek to the West, I-64 the South and the Chesapeake Bay to the east.

Location Characteristics

PDC – Hampton Roads Planning District Commission

UDA Size – 0.8 square miles

Year Designated – 2015

Comprehensive Plan Detail -

The Strategic Investment Areas identified by the City in 2006 and adopted as part of the Hampton Community Plan have development principles consistent with the legislated definition of Urban Development Areas. The areas include: Downtown Hampton, Coliseum Central, Buckroe, Phoebus, Kecoughtan Corridor, and North King Street Corridor. Fort Monroe has been designated as a seventh Urban Development Area. While master planning efforts are still underway for Fort Monroe, planning goals and design standards closely align with the development principles of UDAs. These strategic areas meet the intent of 15.2-2223.1.

Geographic Location

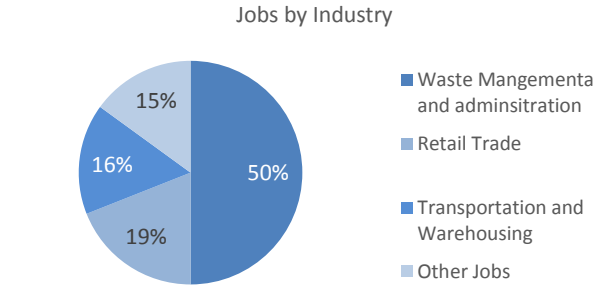


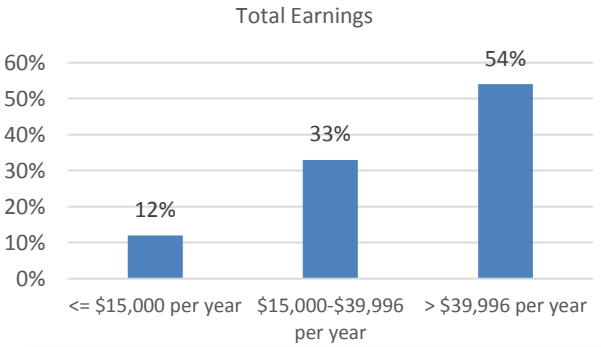
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –947 persons

Total Primary Jobs – 232 jobs

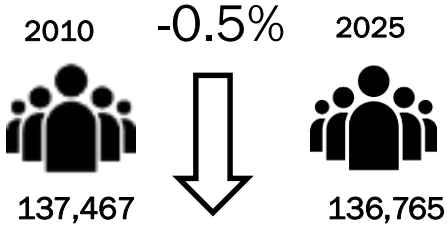




Jobs Within a 45 Minute Drive
56,203
Working Age Population Within a 45 Minute Drive
102,976
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas –Hampton City

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Safety Features

Moderate

- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Improvements to the Natural Environment

External UDA Needs

High

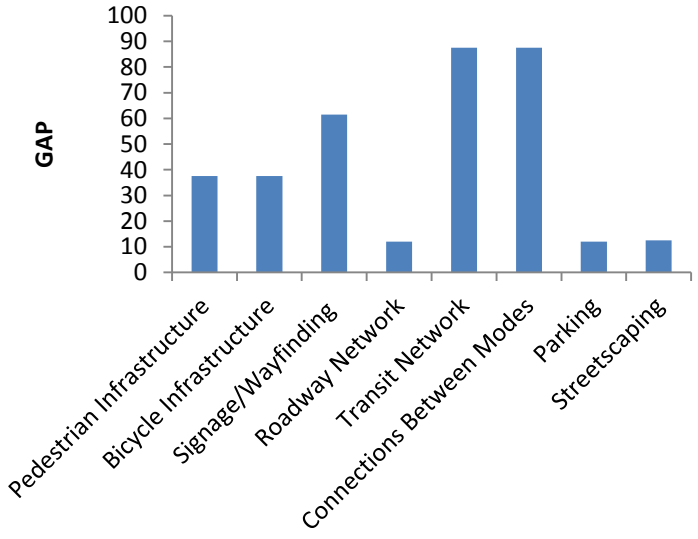
- ✓ Transit Frequency
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle network

Urban Development Areas – York County

UDA Needs Profile: All UDAs

York County designated five UDAs in 2015: Route 17/Fort Eustis Boulevard, Grafton Drive, Lightfoot, Keener-Cupp-Berrane Property, and Marquis and Vicinity, located between the York and James River in the eastern part of the Commonwealth.

Location Characteristics

PDC – Hampton Roads Planning District Commission

UDA Size – 3.8 square miles

Year Designated – 2015

Comprehensive Plan Detail - The York Comprehensive Plan designates growth areas through the establishment of a Mixed Use overlay. This overlay designation is intended to create well-designed communities in which people can live, work, and recreate by providing opportunities for a mix of retail, office, and residential within a single, relatively compact development under a unified, coherent master plan. Proposed uses should have a high degree of physical and functional integration with one another, including extensive pedestrian and bicycle connectivity.

Geographic Location

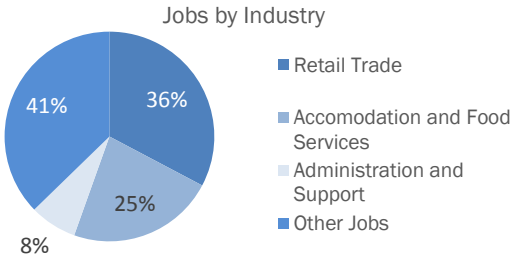


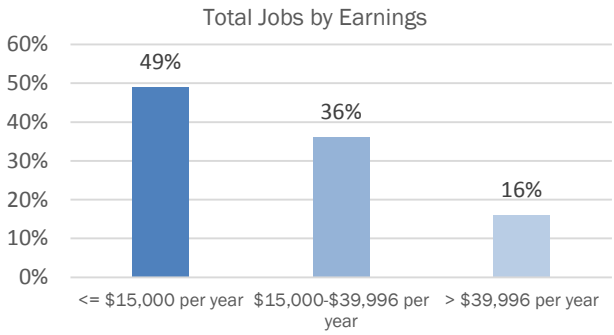
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 6,738 persons

Total Primary Jobs – 1,276 jobs

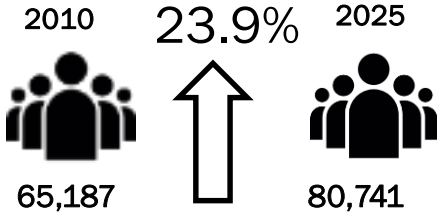




Jobs Within a 45 Minute Drive
33,902
Working Age Population Within a 45 Minute Drive
64,722
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – York County

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Pedestrian Infrastructure
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Roadway Capacity
- ✓ Safety Features
- ✓ On-street parking
- ✓ Signage/Wayfinding

External UDA Needs

High

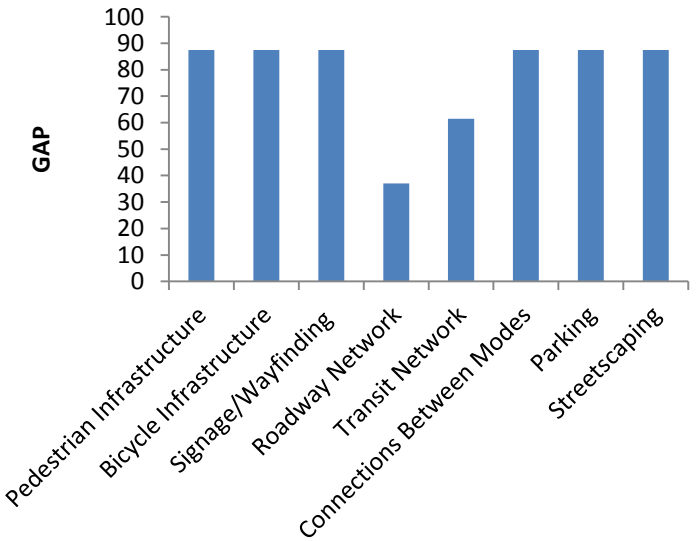
- ✓ Roadway Capacity
- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Signage/Wayfinding

Moderate

- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Suffolk City

UDA Needs Profile: All UDAs

The City of Suffolk designated two growth areas in 2015, the Central Growth Area, located around the historic City core, and the Northern Growth Area, which is focused around major regional transportation routes, including the I-664 and Route 135.

Location Characteristics

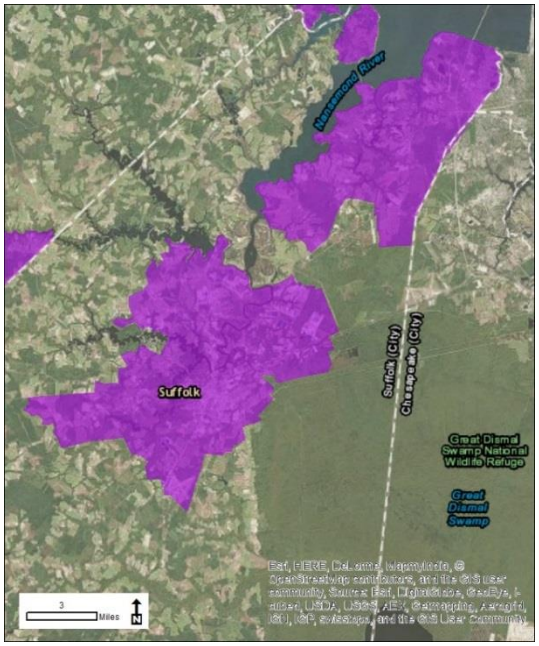
PDC – Hampton Roads Planning District Commission

UDA Size – 74 square miles

Year Designated – 2015

Comprehensive Plan Detail - The City of Suffolk Comprehensive Plan (2015) continues an approach to manage and direct growth toward existing communities – primarily the Central Growth Area and the Northern Growth area. Both of these growth areas include use districts with medium and high-density mixed use development, and promote enhanced multimodal connectivity. The development patterns and promotion of traditional neighborhood development in these areas are consistent with the intent of Virginia Code 15.2-2223.1

Geographic Location

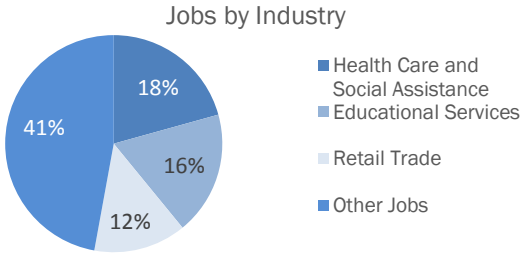


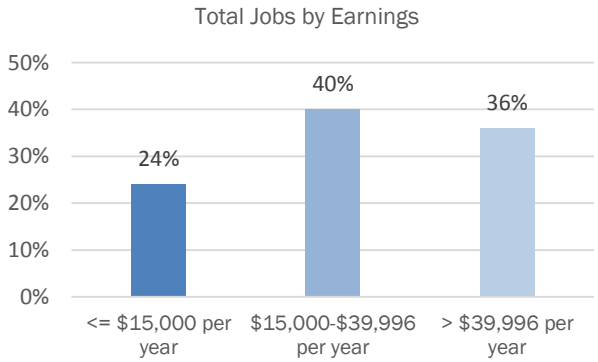
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 73,653 persons

Total Primary Jobs – 15,898 jobs

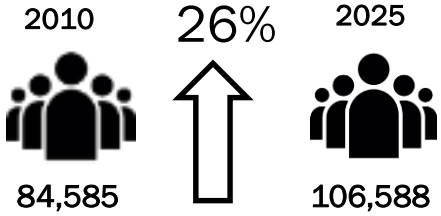




Jobs Within a 45 Minute Drive
285,531
Working Age Population Within a 45 Minute Drive
487,473
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Suffolk City

Current Place Type - Urban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Intersection Design
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking

Moderate

- ✓ Transit Capacity

External UDA Needs

High

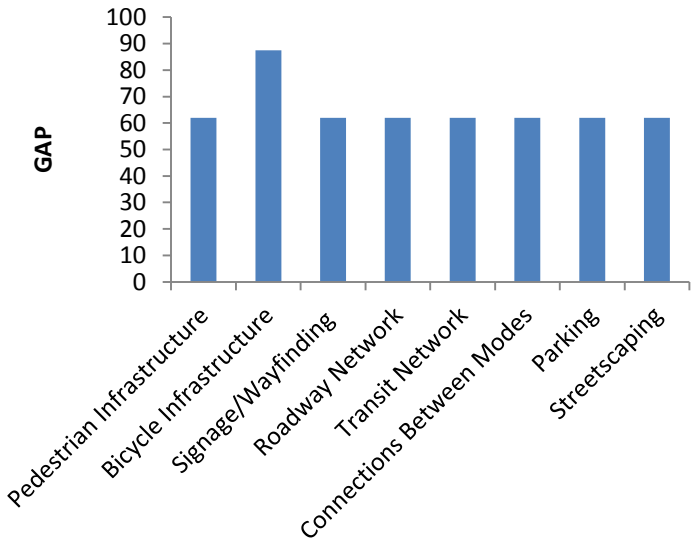
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Williamsburg

UDA Needs Profile: High Street Mixed-Use/Residential Area

The High Street Mixed Use and Residential area is one of four Designated Growth Areas located in the City Williamsburg. This growth area includes a 55 acre mixed-use development and High Density Multifamily Residential land use.

Location Characteristics

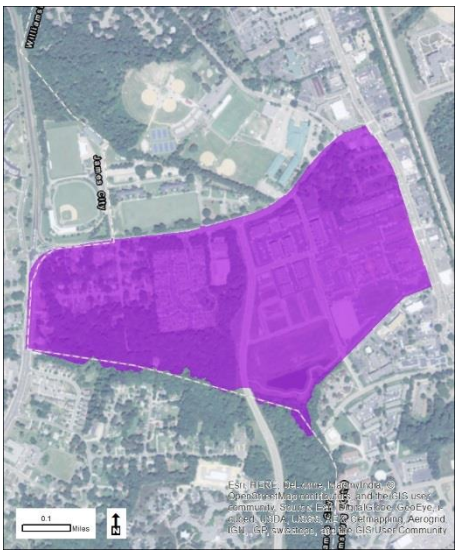
PDC – Hampton Roads Planning District Commission

UDA Size – 0.17 square miles

Year Designated – 2015

Comprehensive Plan Detail - The High Street/ Mixed-Use Planning area is adjacent to two small commercial areas designated as Corridor Commercial land use and zoned B-2 Corridor Business District; and the "Wales Area," consisting of a condominium development designated as High Density Multifamily Residential land use (14 dwelling units/net acre) and zoned RM-2 Multifamily Dwelling District, and a single family residential area designated as Medium Density Single Family Detached Residential land use, zoned RS-3 Single-Family Dwelling District and identified as a possible future site for higher density affordable housing at up to 14 dwelling units/net acre.

Geographic Location

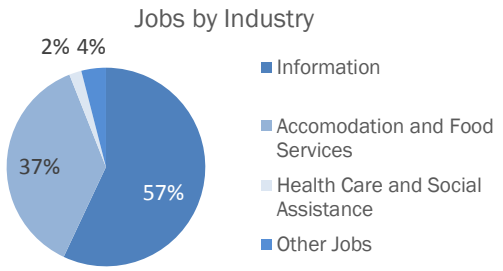


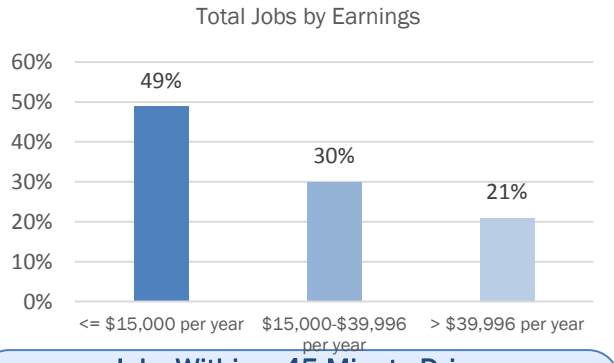
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 1,110 persons

Total Primary Jobs – 142 jobs

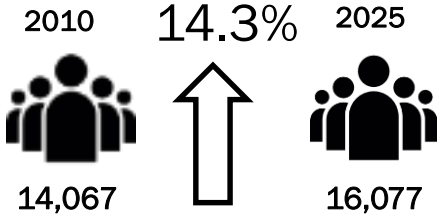




Jobs Within a 45 Minute Drive
25,594
Working Age Population Within a 45 Minute Drive
43,006
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Williamsburg

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Bicycle Infrastructure

Moderate

- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

External UDA Needs

High

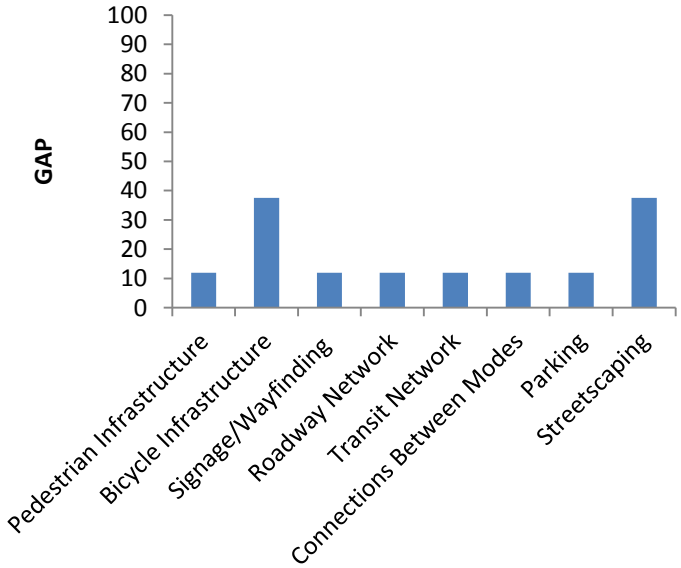
- ✓ Transit Frequency
- ✓ Bicycle Infrastructure

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Roadway Capacity
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

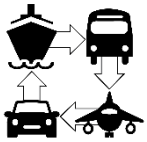
Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Williamsburg

UDA Needs Profile: Midtown Planning Area

The Midtown Planning Area is one of four Designated Growth Areas located in the City of Williamsburg. The Midtown Planning Area is located at the intersection of Richmond Road and Monticello Avenue, central entrance corridors for the City of Williamsburg.

Location Characteristics

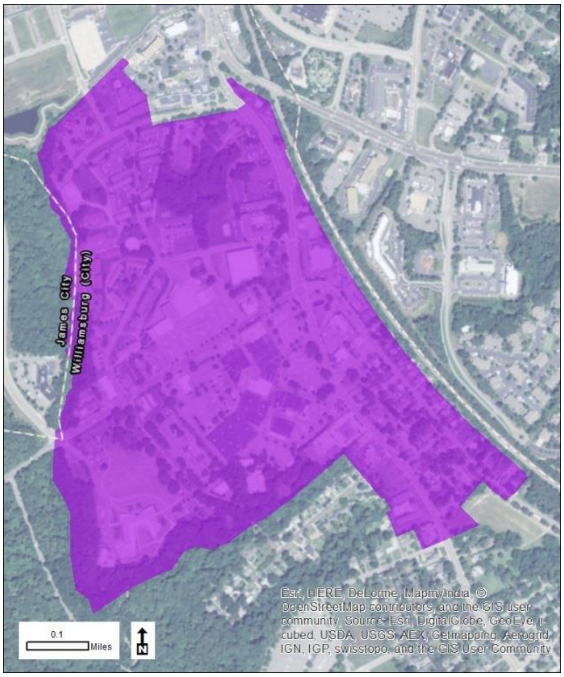
PDC – Hampton Roads Planning District Commission

UDA Size – 0.24 square miles

Year Designated – 2015

Comprehensive Plan Detail - This growth area is designated by the Comprehensive Plan as the Midtown Planning Area. and located at the intersection of two of the City's major entrance corridors- Richmond Road and Monticello Avenue. It is comprised of five major components: (1) Arts and Cultural District,; (2) Shopping Centers (3) Richmond Road Corridor, designated as Urban Commercial (14+ dwelling units/net acre) future land use and zoned B-3 Urban Business District; (4) Urban Residential Area, and (5) College Area.

Geographic Location

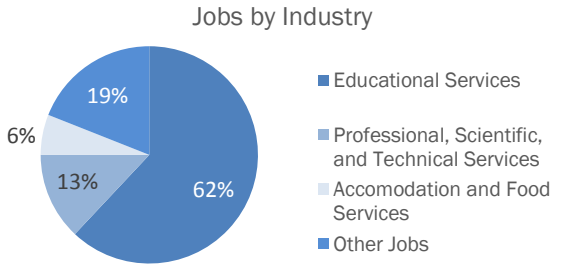


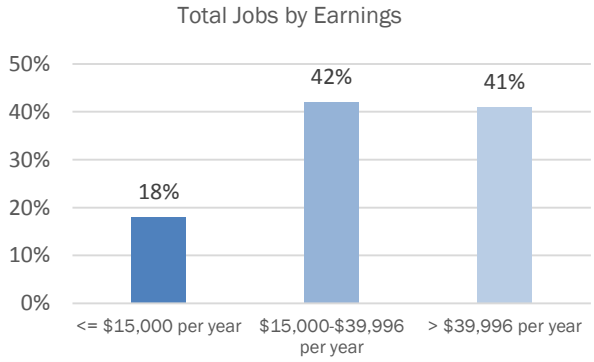
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 1,078 persons

Total Primary Jobs – 4,223 jobs

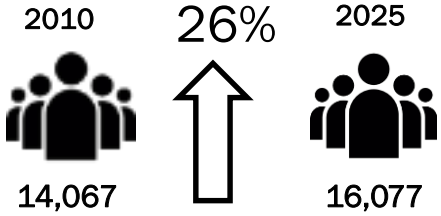




Jobs Within a 45 Minute Drive
28,071
Working Age Population Within a 45 Minute Drive
46,071
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Williamsburg

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Traffic Calming Features

External UDA Needs

High

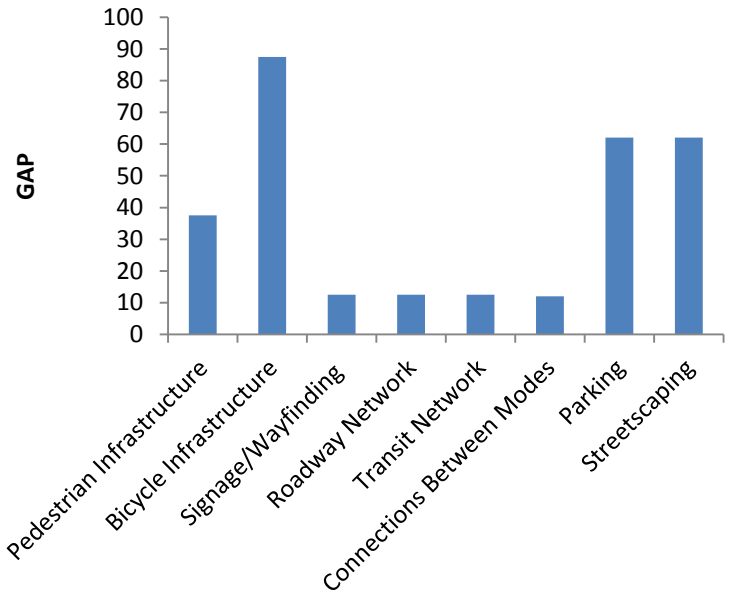
- ✓ Transit Frequency
- ✓ Bicycle Infrastructure

Moderate

- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Bicycle Infrastructure
- ✓ Roadway Capacity
- ✓ Roadway Operations

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Transit enhancements

Urban Development Areas – Williamsburg

UDA Needs Profile: Northeast Triangle Planning Area

The Northeast Triangle Planning Area is one of four Designated Growth Areas located in the City of Williamsburg, centered on Capitol Landing Road, Page and Second Street. This growth areas includes commercial uses, single-family detached dwellings, condominiums, apartments and townhouses.

Location Characteristics

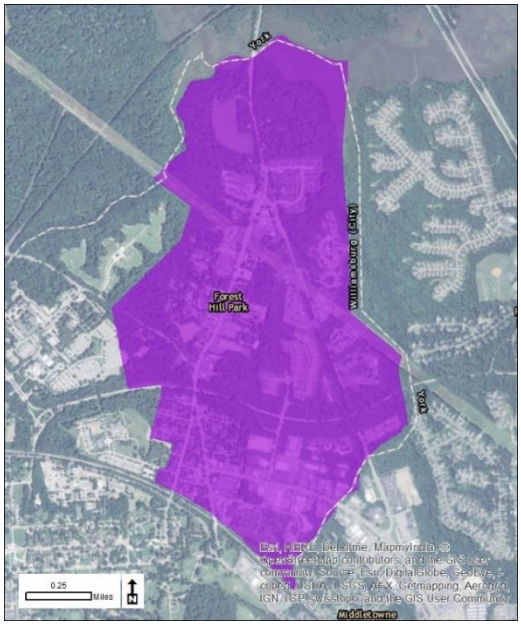
PDC – Hampton Roads Planning District Commission

UDA Size – 0.88 square miles

Year Designated – 2015

Comprehensive Plan Detail - This growth area is designated by the Comprehensive Plan as the Northeast Triangle Planning Area, and is a diverse area with concentrations of single-family detached dwellings, condominiums, apartments, townhouses and commercial uses, centered on Capitol Landing Road, Page Street and Second Street. The Northeast Triangle Planning Area is designated as a HUBZone, providing federal contracting opportunities for qualified small businesses and thereby providing financial and other incentives for development in this designated urban growth area.

Geographic Location

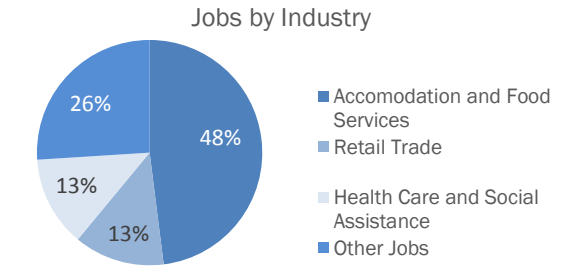


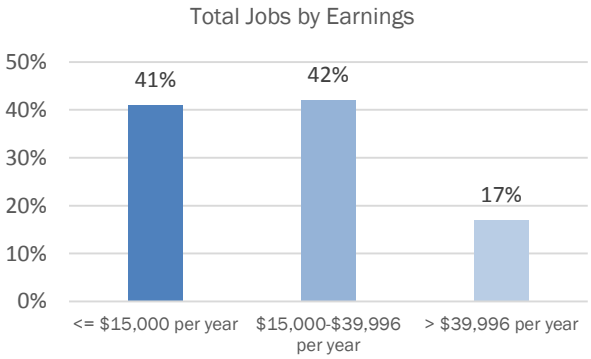
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 2,059 persons

Total Primary Jobs – 446 jobs

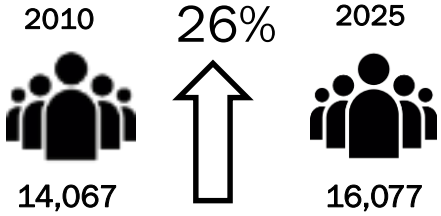




Jobs Within a 45 Minute Drive
28,014
Working Age Population Within a 45 Minute Drive
50,221
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Williamsburg

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Frequency
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features
- ✓ Intersection Design

Moderate

- ✓ Roadway Operation
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Improvements to the Natural Environment

External UDA Needs

High

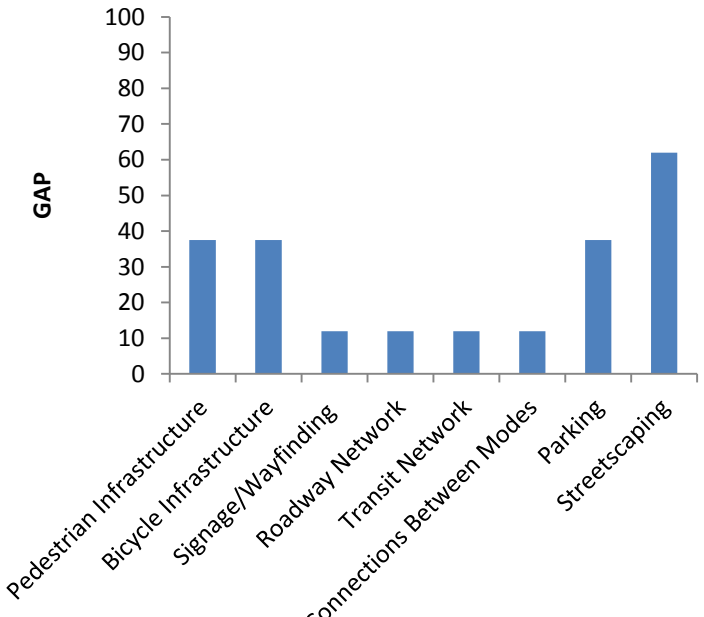
- ✓ Transit Frequency
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Transit enhancements

Urban Development Areas – Williamsburg

UDA Needs Profile: Quarterpath Mixed-Use and Residential Area

The Quarterpath at Williamsburg Mixed Use and Residential Area is one of four Designated Growth Areas in the City of Williamsburg. This area is located on the east side of Quarterpath Road and includes 362 acres of mixed use development, 227 of which are designated as Economic Development future land use.

Location Characteristics

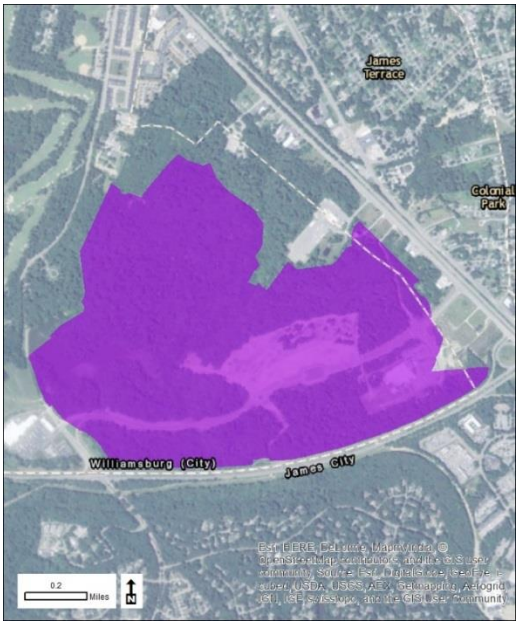
PDC – Hampton Roads Planning District Commission

UDA Size – 0.55 square miles

Year Designated – 2015

Comprehensive Plan Detail - The Quarterpath at Williamsburg Mixed Use and Residential Area has the potential for at least 500,000 square feet of medical, office and commercial floor area, as well as 894 dwelling units. The Single Family Residential Area (RS-2 zoning) has the potential for up to 468 dwelling units, and the Comprehensive Plan supports development as Planned Development Residential zoning (PDR) with a variety of housing types if an acceptable master plan is submitted. To date, development includes Doctor's Hospital, 227 apartments and 157 townhouses.

Geographic Location



Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

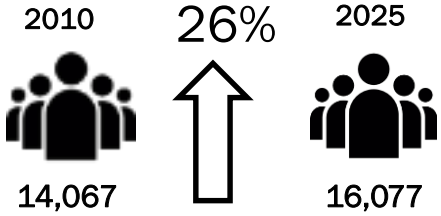
Total Population – 116 persons

Total Primary Jobs – N/A

Jobs Within a 45 Minute Drive
27,324
Working Age Population Within a 45 Minute Drive
47,081
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Williamsburg

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Off-Street Parking

Moderate

- ✓ Transit Operations
- ✓ Roadway Operations
- ✓ On-Street Parking
- ✓ Transit Facilities
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

External UDA Needs

High

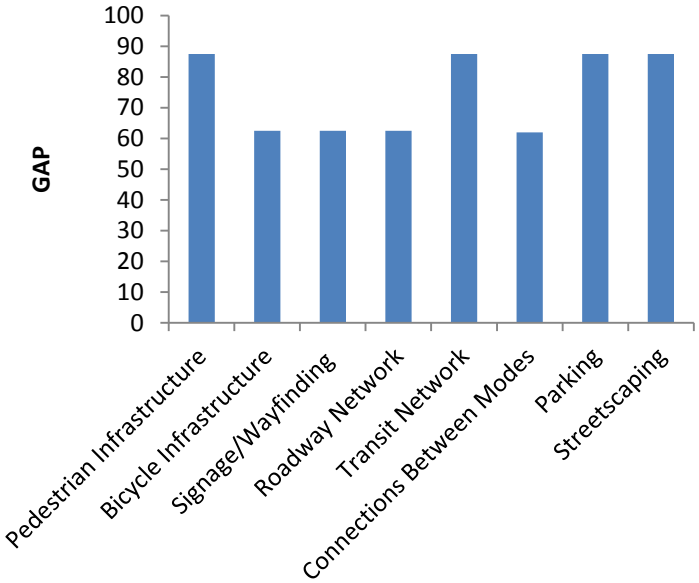
- ✓ Bicycle Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Transit Operations
- ✓ Roadway Capacity
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure
- ✓ Improvements to the Natural Environment

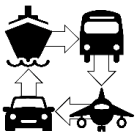
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Circulation and access within the UDA



Transit enhancements



Friendly pedestrian and bicycle environment

Urban Development Areas – Virginia Beach

UDA Needs Profile: Burton Station SGA

Virginia Beach has eight Strategic Growth Areas (SGAs), and the Burton Station SGA is generally located at the convergence of major highway, rail and airport facilities and benefits from nearby deep water ports and a major military installation.

Location Characteristics

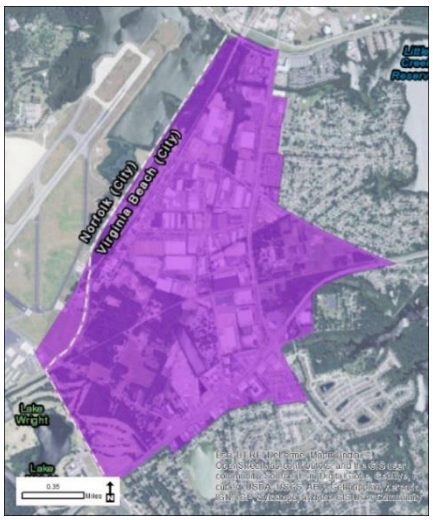
PDC – Hampton Roads PDC

UDA Size –1.5 square miles

Year Designated – 2015

Comprehensive Plan Detail – The vision for the Burton Station SGA is a revitalized Burton Station neighborhood that reflects its historic roots and is an integral part of a larger planned residential community with open space and employment opportunities. This primarily residential, low-density scheme provides for the needs and desires of current residents. The current alignment of Burton Station Road is respected, and small neighborhood services such as a corner shop and community center are provided. The area is predominantly industrial but also has significant tracts devoted to residential and commercial uses. It has a considerable amount of undeveloped land but lacks a good network of internal streets.

Geographic Location

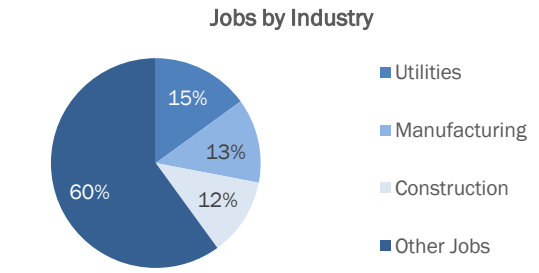


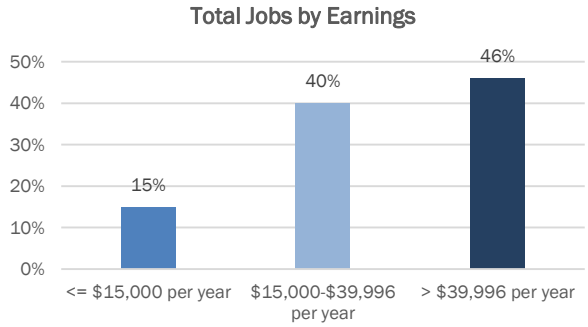
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 3,051 persons

Total Primary Jobs – 6,246 jobs

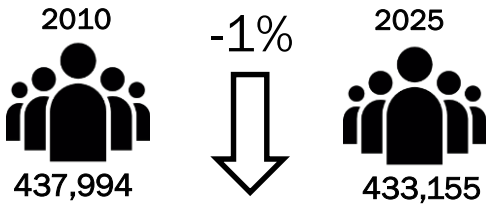




Jobs Within a 45 Minute Drive
201,057
Working Age Population Within a 45 Minute Drive
509,045
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Medium Town or Suburban Center



Planned Place Type – Large Town or Suburban Center



Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

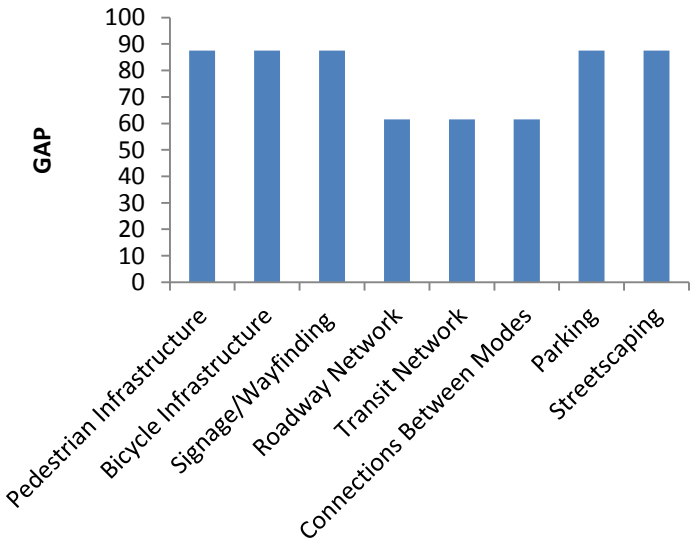
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access beyond UDA



Friendly pedestrian bicycle environment

Urban Development Areas – Virginia Beach

UDA Needs Profile: Resort SGA

Virginia Beach has eight Strategic Growth Areas (SGAs), and the Resort SGA is generally bound by 42nd Street, the Atlantic Ocean, Rudee Inlet and Birdneck Road. Revitalization efforts have transformed the Resort Area into a major activity center, strengthened neighborhoods, and increased economic growth.

Location Characteristics

PDC – Hampton Roads PDC

UDA Size –2.6 square miles

Year Designated – 2015

Comprehensive Plan Detail - The vision for the Resort Area is to create three distinct yet complementary districts at Laskin Gateway, Central Beach, and Rudee Marina. The area will be enhanced by extending the energy at the beach into these areas. This plan develops synergies between the cultural and commercial life, the recreational and natural life, and an overall focus on drawing residents and visitors into the area. The Resort Area Strategic Action Plan (RASAP) develops synergies between the cultural and commercial life, the recreational and natural life, and has an overall focus on drawing residents and visitors into the area.

Geographic Location

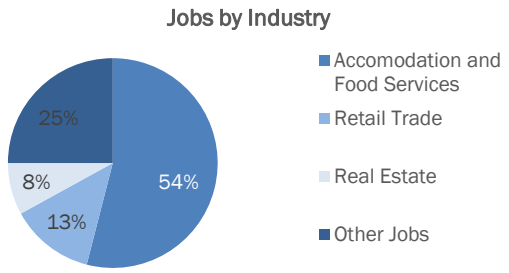


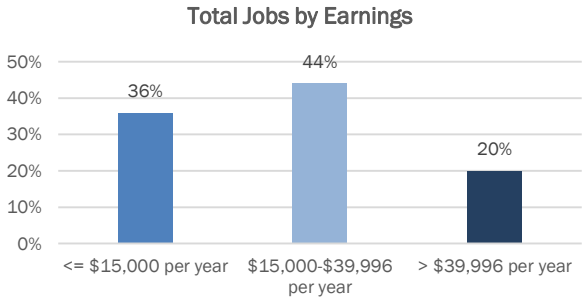
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 17,162 persons

Total Primary Jobs – 7,114 jobs

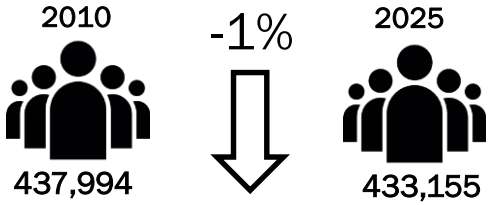




Jobs Within a 45 Minute Drive
160,724
Working Age Population Within a 45 Minute Drive
278,554
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Urban Core



Planned Place Type - Urban Core



Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid, Bicycle & Pedestrian Infrastructure
- ✓ Safety Features and Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features

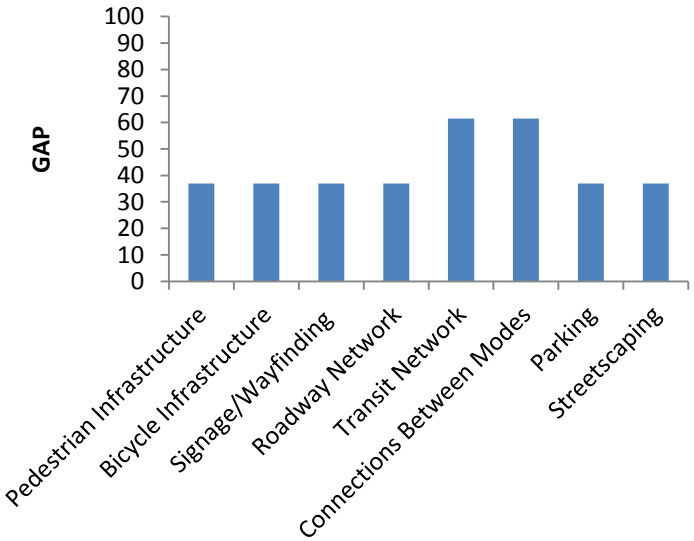
External UDA Needs

High

- ✓ Transit Facilities/Amenities
- ✓ Improvements to the Natural Environment
- ✓ Safety Features

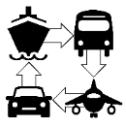
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access beyond UDA



Friendly pedestrian bicycle environment

Urban Development Areas – Virginia Beach

UDA Needs Profile: Lynnhaven SGA

Virginia Beach has eight Strategic Growth Areas (SGAs), and the Lynnhaven SGA surrounds a corridor near an I-264 interchange, including new on-off ramps to London Bridge Road, three major crossing arterial connections, and is under study for a potential future transit stop.

Location Characteristics

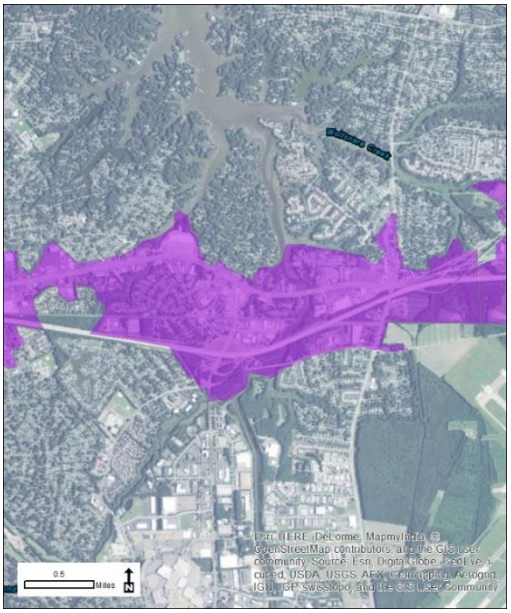
PDC – Hampton Roads PDC

UDA Size –1.4 square miles

Year Designated – 2015

Comprehensive Plan Detail - The vision of the Lynnhaven SGA is series of mixed-use and flexible developments along with targeted public infrastructure improvements. The under-performing commercial properties will have the opportunity to transform themselves into higher intensity uses to, in some cases, take advantage of the potential of transit, and, in other cases, to preserve and provide access to the Lynnhaven River. At the center of the redevelopment may be a new transit station that can provide park-and-ride, connection to nearby office uses, and transfer service to Lynnhaven Mall.

Geographic Location

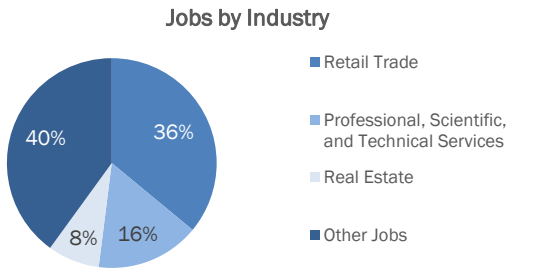


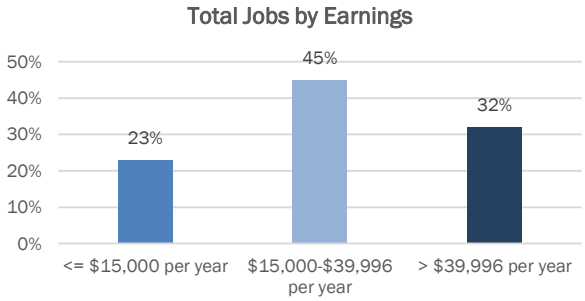
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 7,777 persons

Total Primary Jobs – 3,427 jobs

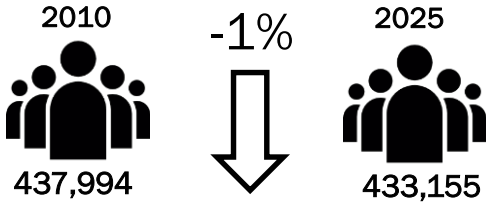




Jobs Within a 45 Minute Drive
159,704
Working Age Population Within a 45 Minute Drive
268,020
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Medium Town or Suburban Center



Planned Place Type – Large Town or Suburban Center



Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

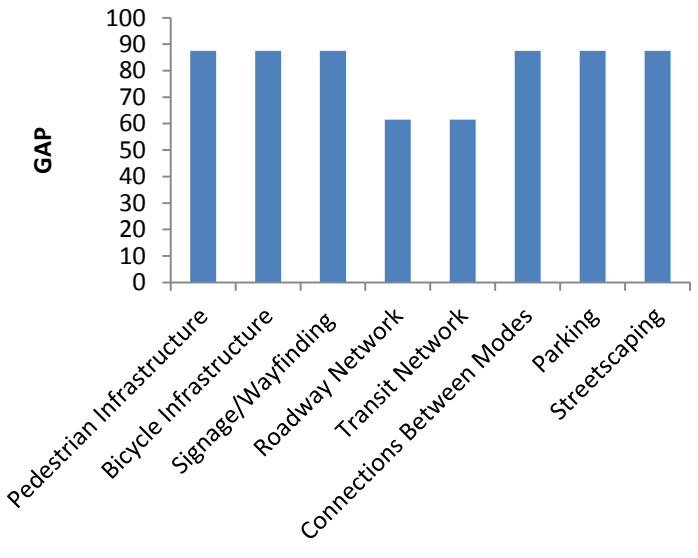
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

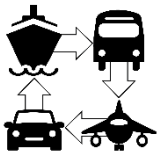


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Access to transportation networks beyond the UDA

Urban Development Areas – Virginia Beach

UDA Needs Profile: Hilltop SGA

Virginia Beach has eight Strategic Growth Areas (SGAs), and the Hilltop SGA is located along the Interstate 264/Virginia Beach Boulevard corridor, just west of the Resort Area SGA and east of the Lynnhaven SGA.

Location Characteristics

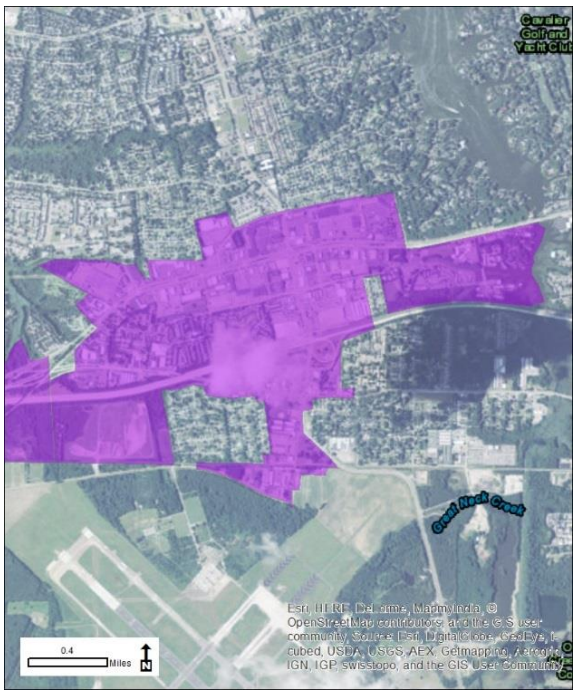
PDC – Hampton Roads PDC

UDA Size –1.2 square miles

Year Designated – 2015

Comprehensive Plan Detail - The vision for the Hilltop SGA is a convenient, regional retail destination that's within close proximity to the beach. This SGA is home to a wealth of local businesses with a variety of retail, restaurant, office, health, and recreational uses. Though this area is located within a high noise zone, it is a good candidate for redevelopment and reinvestment because of its existing commercial strength and its proximity to the Oceanfront Resort Area, NAS Oceana, and I-264 interchange.

Geographic Location

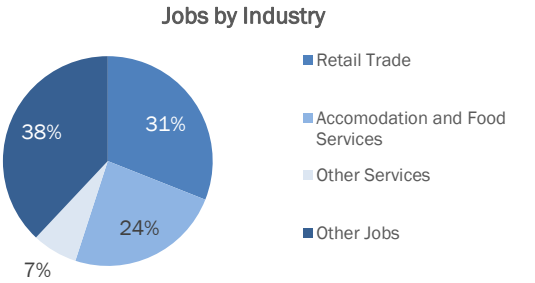


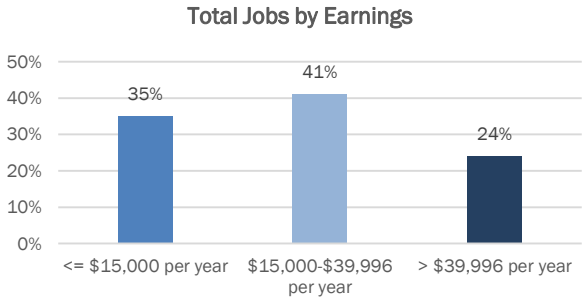
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 7,207 persons

Total Primary Jobs – 5,002 jobs

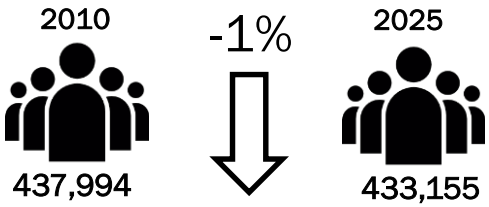




Jobs Within a 45 Minute Drive
154,883
Working Age Population Within a 45 Minute Drive
262,867
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Small Town or Suburban Center



Planned Place Type – Medium Town or Suburban Center



Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

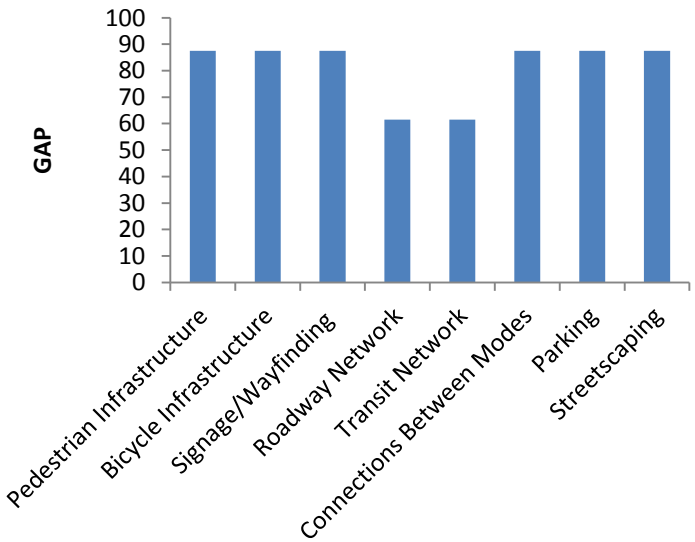
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

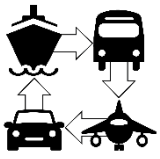


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Access to transportation networks beyond the UDA

Urban Development Areas – Virginia Beach

UDA Needs Profile: Centerville SGA

Virginia Beach has eight Strategic Growth Areas (SGAs), and the Centerville SGA is a large expanse of undeveloped land fronting I-64, with great economic development potential for future corporate office headquarters and expansion area for Regent University.

Location Characteristics

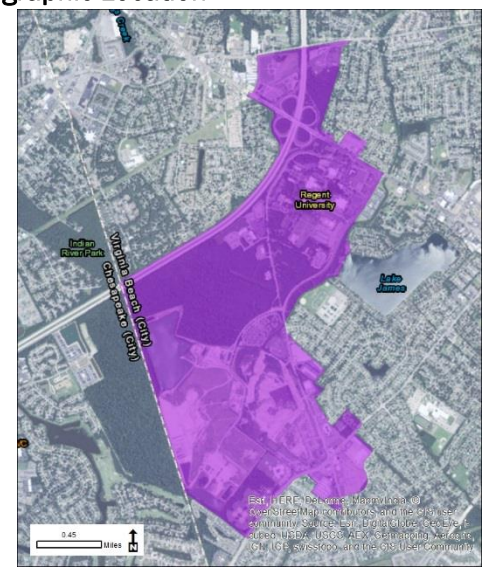
PDC – Hampton Roads PDC

UDA Size –0.5 square miles

Year Designated – 2015

Comprehensive Plan Detail - The Centerville SGA is unique from other SGAs because it consists of several large-scale ownership and single-use areas, such as the Christian Broadcasting Network (CBN), Regent University, the City Landfill, and a private landfill. The relationship between these uses and their impact on one another and surrounding residential neighborhoods deserves special consideration. The vision for the Centerville SGA is to become an education-oriented master-planned community, which capitalizes on the regional access and visibility provided by I-64 and the existing institutional anchors of CBN and Regent University.

Geographic Location

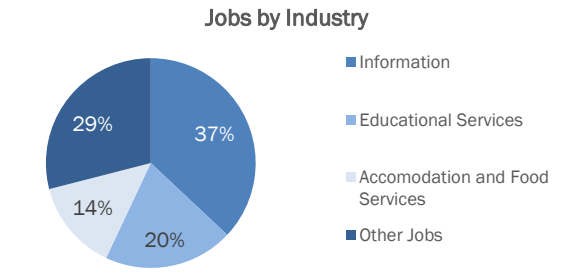


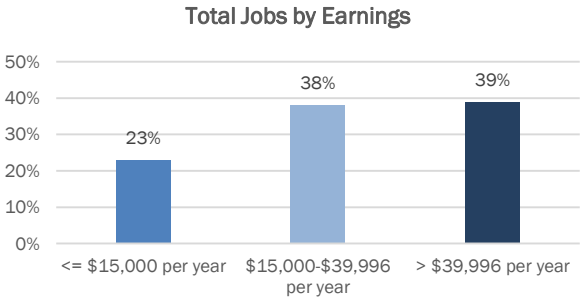
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 9,023 persons

Total Primary Jobs – 2,960 jobs

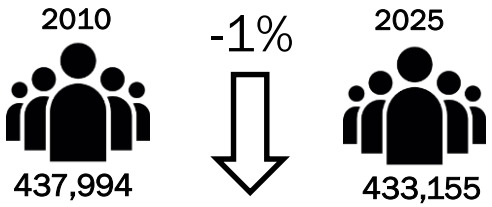




Jobs Within a 45 Minute Drive
186,267
Working Age Population Within a 45 Minute Drive
320,170
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



* Local projections show that the City of Virginia Beach will have an average 1.1% annual growth rate (16% cumulative growth by 2025).

Urban Development Areas – Virginia Beach

Current Place Type – Small Town or Suburban Center



Planned Place Type – Medium Town or Suburban Center



Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment

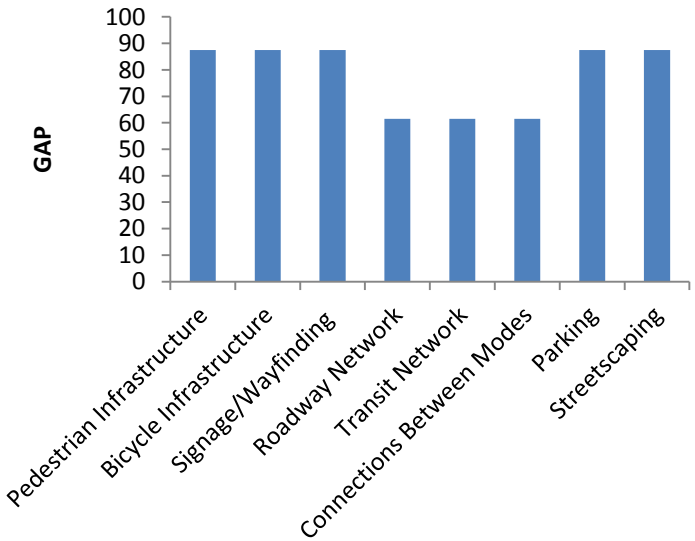
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

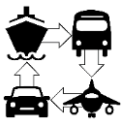
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access beyond UDA



Friendly pedestrian bicycle environment

Urban Development Areas – Amherst County

UDA Needs Profile: Tyler Tracts

Tyler Tracts is an Urban Development Area located in Amherst County, adjacent to U.S. 29 Business in Madison Heights.

Location Characteristics

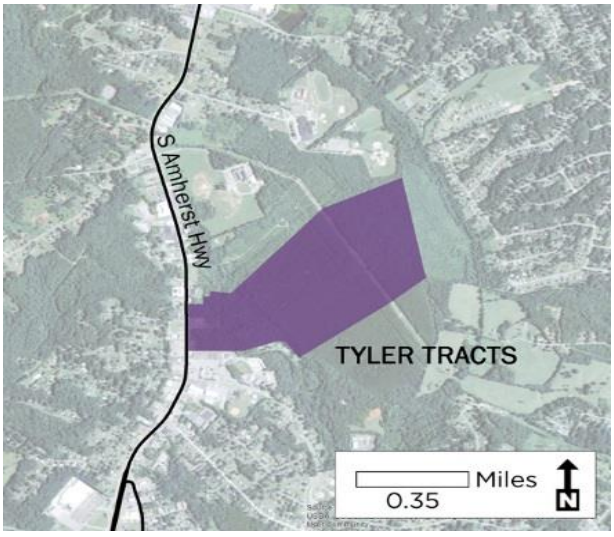
PDC – Virginia's Region 2000 Local Government Council

UDA Size – 0.3 square miles

Year Designated – 2013

Comprehensive Plan Detail - Amherst County has designated vacant land on Route 29 Business as an Urban Development Area (UDA). The area is located within the County's Designated Growth Area, in proximity to major transportation corridors, and has access to public water, sewer and line electric utilities. Financial and other incentives for development within the UDA are outlined in the comprehensive plan. Therefore, the County has elected to designate a UDA within the already-defined Designated Growth Area that provides for the development at the densities specified in the Virginia code related to UDAs.

Geographic Location

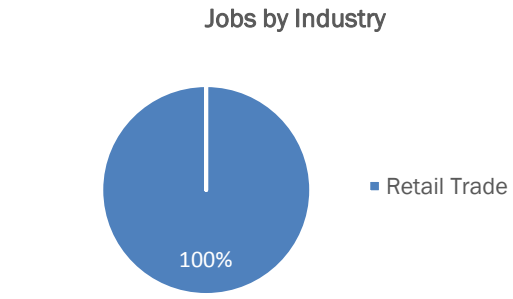


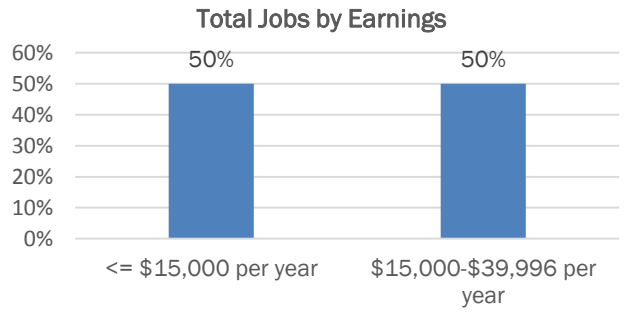
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 73 persons

Total Primary Jobs – 8 jobs

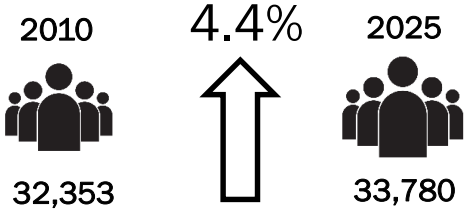




Jobs Within a 45 Minute Drive
7,864
Working Age Population Within a 45 Minute Drive
13,983
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Amherst County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines for details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements

Moderate

- ✓ None listed

External UDA Needs

High

- ✓ None listed

Moderate

- ✓ None listed

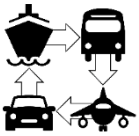
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality.

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to Transportation Networks beyond UDA



Friendly Bicycle and Pedestrian Environment

Urban Development Areas – Appomattox County

UDA Needs Profile: Town of Appomattox

The Town of Appomattox is located in central Virginia, adjacent to the Appomattox Court House National Historic Park, bisected by the Richmond Highway Route 460 and VA-131 Old Courthouse RD.

Location Characteristics

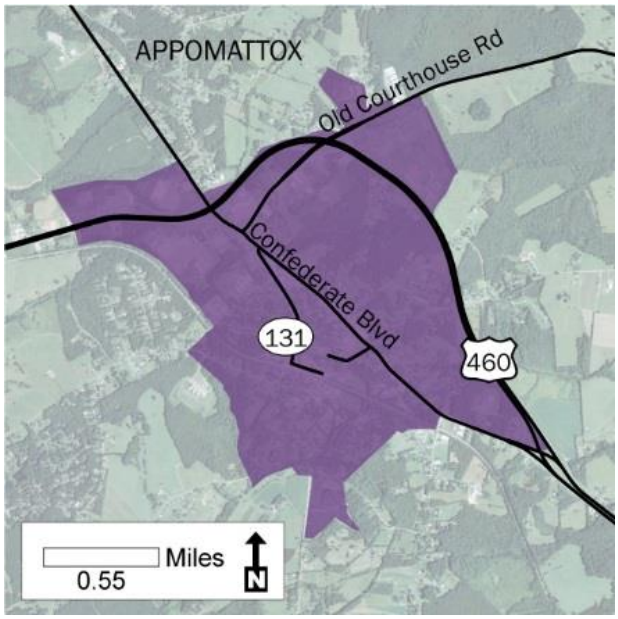
PDC – Virginia's Region 2000 Local Government Council

UDA Size – 2.2 sq mi

Year Designated – 2012

Comprehensive Plan Detail - Appomattox County has designated the Town of Appomattox as a "Village Center." The Appomattox County Zoning Code defines village centers as areas which will serve as the focal point for cultural and commercial activity for the rural service areas of the County, with a recommended density average between one and three units per acre.

Geographic Location

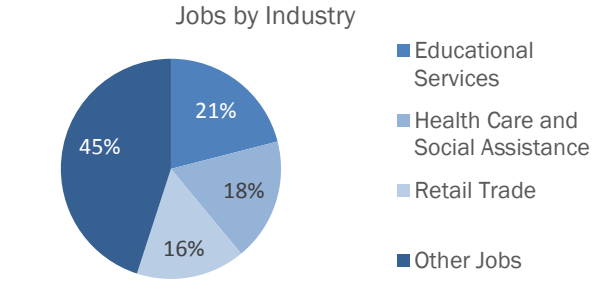


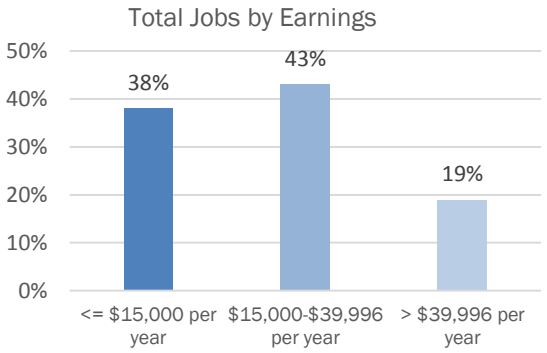
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –2,552 persons

Total Primary Jobs – 1887 Jobs

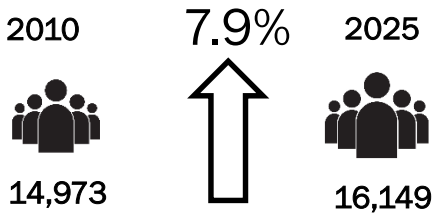




Jobs Within a 45 Minute Drive
6,484
Working Age Population Within a 45 Minute Drive
33,081
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Appomattox County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines for details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming

External UDA Needs

High

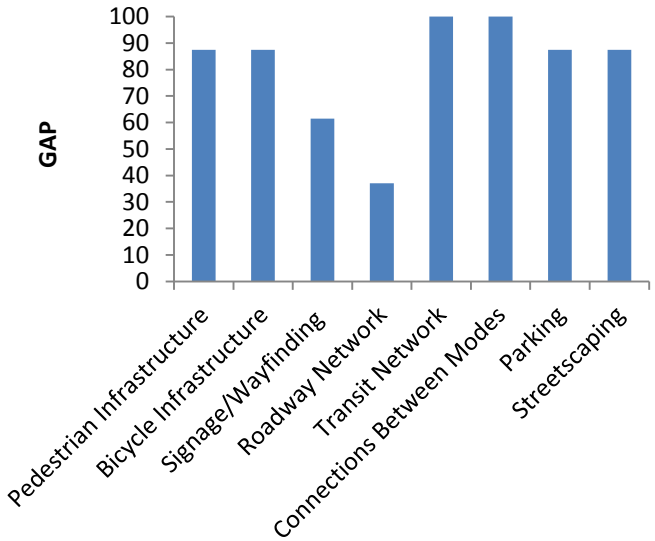
- ✓ None listed

Moderate

- ✓ None listed

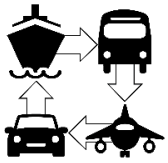
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to Transportation networks beyond UDA

Urban Development Areas – Campbell County

UDA Needs Profile: All UDAs

Campbell County has four UDAs: Liberty Ridge and the Airport Area, both located southeast of Lynchburg near the Route 29/Route 460 interchange; Dearing Ford located on Route 29 just north of AltaVista; and, Seneca Commerce Park on Route 29 south of Lynchburg.

Location Characteristics

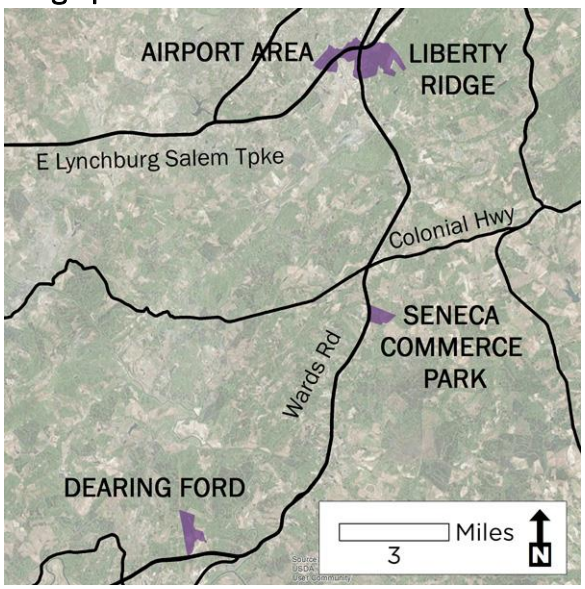
PDC – Region 2000 Local Government Council

UDA Size – 2.2 square miles

Year Designated – 2009

Comprehensive Plan Detail - Campbell County contains four UDAs: Liberty Ridge (Mixed Use Residential), Dearing Ford (Industrial Commercial), Seneca Commerce Park (Industrial/Commercial), and Airport Area (High Density commercial development). High density commercial areas are characterized by a well-developed network of streets and highways, as well as the availability of public utilities and other infrastructure. High density residential areas are characterized by residential uses on small lots or dense multi-family developments, a well-developed network of streets and highways, and availability of public utilities and other infrastructure.

Geographic Location



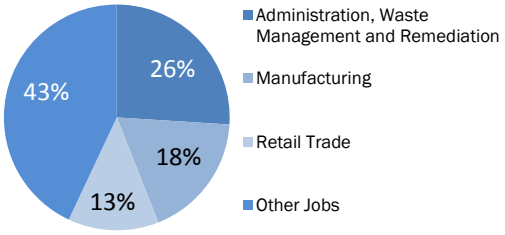
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

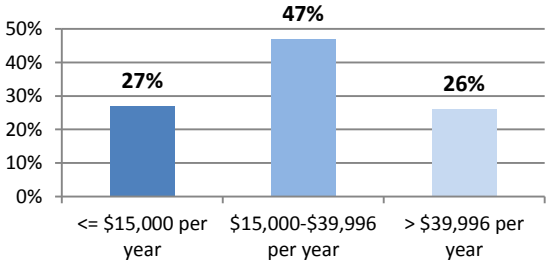
Total Population – 6,290 persons

Total Primary Jobs – 485 jobs

Jobs by Industry



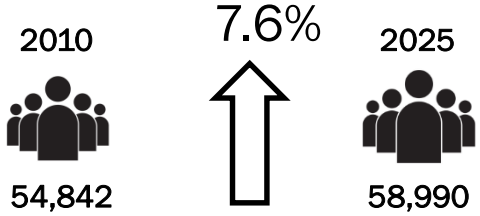
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
11,769
Working Age Population Within a 45 Minute Drive
23,633
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Campbell County

Current Place Type - Rural or Village Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines for details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ Roadway capacity and infrastructure
- ✓ Pedestrian infrastructure
- ✓ Safety features
- ✓ Off-street parking capacity
- ✓ Intersection design or other improvements
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

External UDA Needs

High

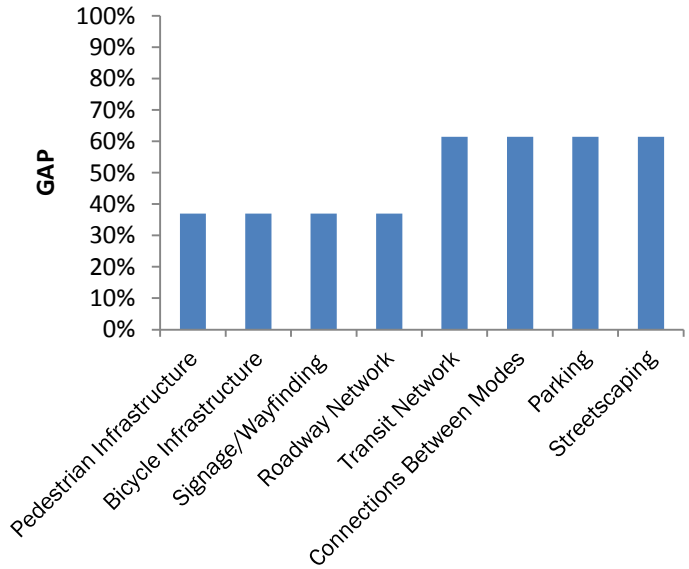
- ✓ None listed

Moderate

- ✓ Roadway capacity and infrastructure
- ✓ Safety features
- ✓ Off-street parking capacity
- ✓ Intersection design or other improvements
- ✓ Signage/Wayfinding
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly Pedestrian and Bicycle Environment



Transit Enhancements

Urban Development Areas – City of Lynchburg

UDA Needs Profile: All UDAs

The City of Lynchburg designated its entire City limits as a UDA during the original legislation in 2011.

Location Characteristics

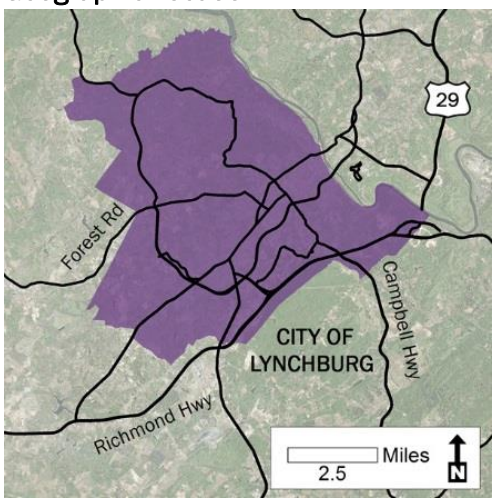
PDC – Virginia's Region 2000 Local Government Council

UDA Size – 49.2 square miles

Year Designated – 2011

Comprehensive Plan Detail - In 2011, the Lynchburg City Council affirmed the that City's Comprehensive Plan is consistent with Virginia state code requirements for Urban Development Areas (UDAs), due to all city's land use categories either meeting or exceeding the UDA state code requirements- single-family homes would be at a minimum of four units per acre, townhouses at a minimum of six, apartments or condos at a minimum of twelve units per acre and commercial space with a floor area ratio of 0.4. Lynchburg's Comprehensive Plan is consistent with Virginia state code requirements for Urban Development Areas (UDAs); all city land use categories either meet or exceed the UDA state code requirements.

Geographic Location



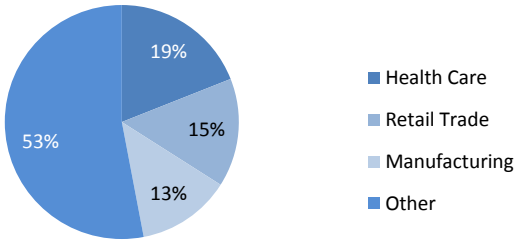
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

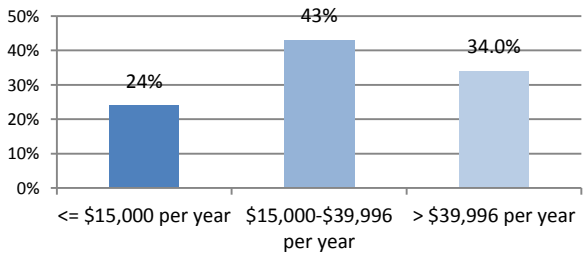
Total Population – 82,079 persons

Total Primary Jobs – 45,009 jobs

Jobs by Industry



Total Jobs by Earnings



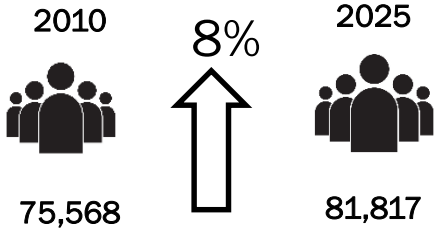
Jobs Within a 45 Minute Drive
172,493

Working Age Population Within a 45 Minute Drive
387,136

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Lynchburg

Current Place Type - Large Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines for details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Traffic Calming

Moderate

- ✓ Transit Operations
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Signage/Wayfinding

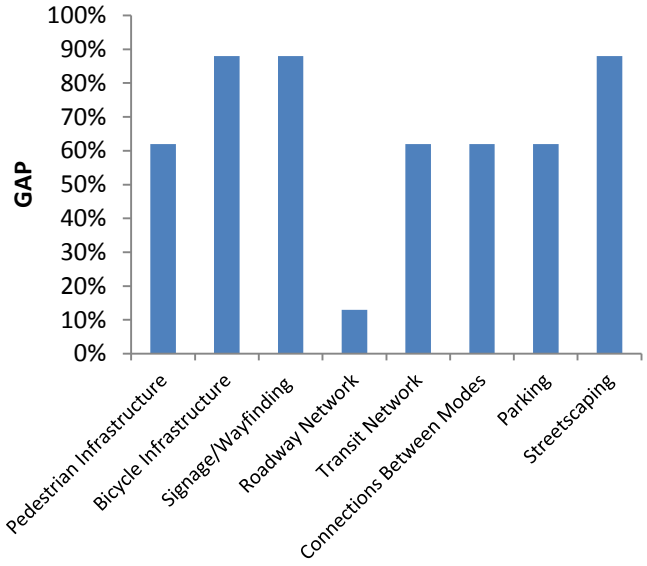
External UDA Needs

High

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

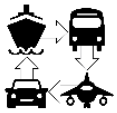


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Access to transportation networks beyond the UDA

Urban Development Areas – City of Danville

UDA Needs Profile

The City of Danville, located in the southern part of the Commonwealth, bounded by Pittsylvania County and Caswell County, designated its entire city boundaries as an Urban Development Area in 2015.

Location Characteristics

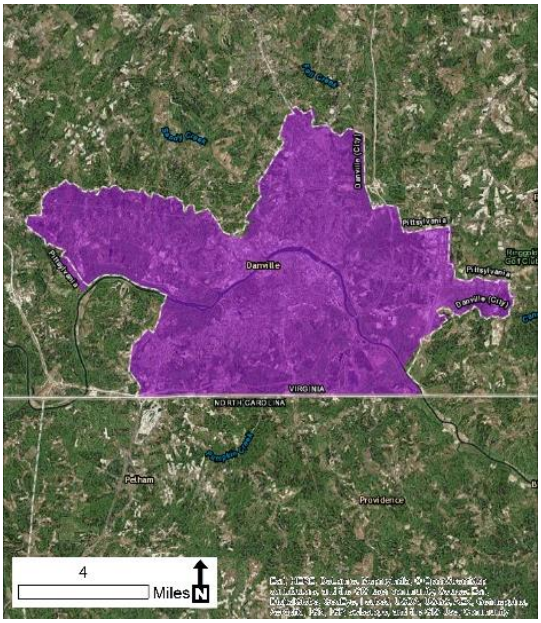
PDC – West Piedmont Planning District

UDA Size – 43 square miles

Year Designated – 2015

Comprehensive Plan Detail – In order to achieve a good balance of residential and non-residential uses in the city, the large planning areas with mixed use land recommendations should be developed with a 40/60 split between residential and office/retail uses. Long term sustainability of Danville depends on a balance of residents, services, and jobs that support each other. This Plan designates the entirety of the City of Danville as a Urban Development Area. The designated growth areas as discussed herein have been found to meet the intent of §15.2-2223.1.

Geographic Location



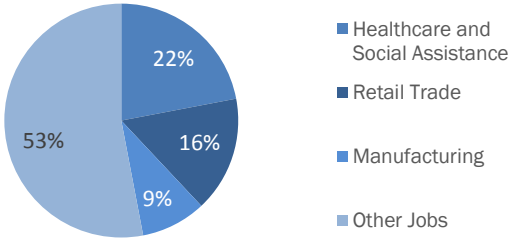
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

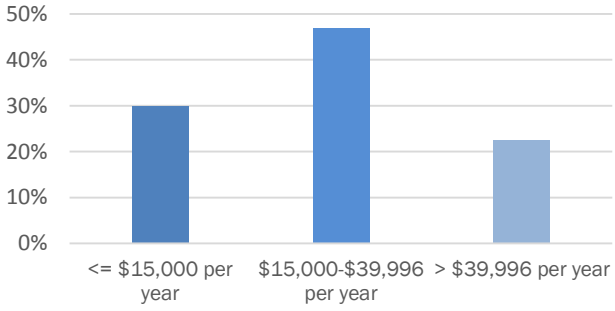
Total Population – 43,055 persons

Total Primary Jobs – 22,218 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
253,222
Working Age Population Within a 45 Minute Drive
233,476
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Danville

Current Place Type - Urban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Moderate

- ✓ Off-street parking

External UDA Needs

High

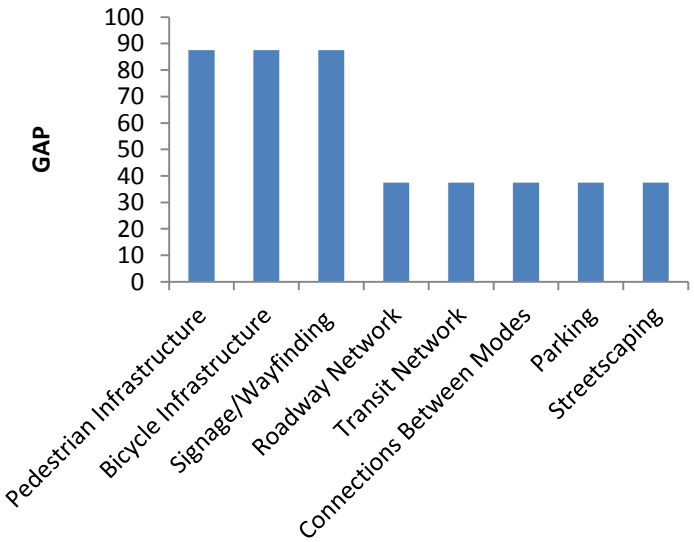
- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Off-Street Parking

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment

Urban Development Areas – South Boston

UDA Needs Profile

The Town of South Boston designated one UDA in 2015, centered in their downtown area, north of the Dan River and west of US 501. The area is currently developed.

Location Characteristics

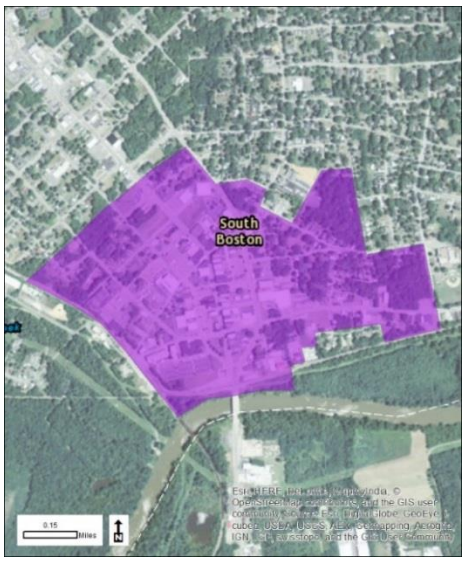
PDC – Southside Planning District Commission

UDA Size –0.30 square miles

Year Designated – 2015

Comprehensive Plan Detail – The existing urban fabric and gridded street network in downtown South Boston are intrinsically Traditional Neighborhood Design, and lend themselves well to concentrated, mixed-use development. Several commercial and institutional services, including Southern Virginia Higher Education Center, the Prizery, and Town Hall, as well as a wealth of redevelopment opportunities exist within the UDA boundary. These attributes, combined with the Town's preference for focused infill and redevelopment in the downtown, as designated in the Comprehensive Plan, made it a logical place to locate the UDA.

Geographic Location



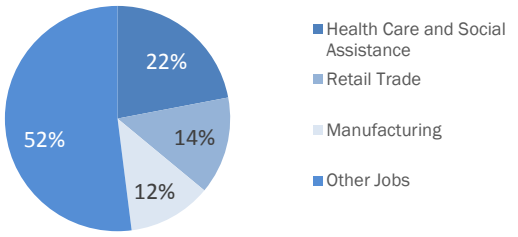
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

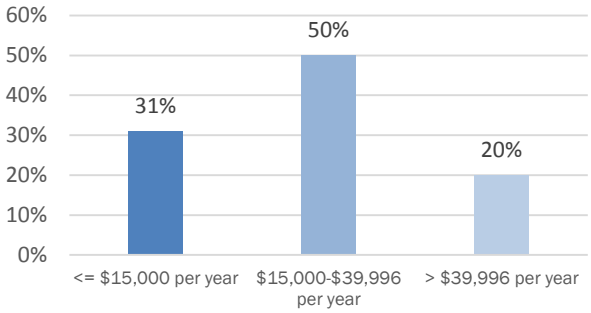
Total Population –660 persons

Total Primary Jobs – 519 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
6,639
Working Age Population Within a 45 Minute Drive
11,057
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



*Population projections are representative of Halifax County, VA

Urban Development Areas – South Boston

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Safety Features

Moderate

- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Off-Street Parking

External UDA Needs

High

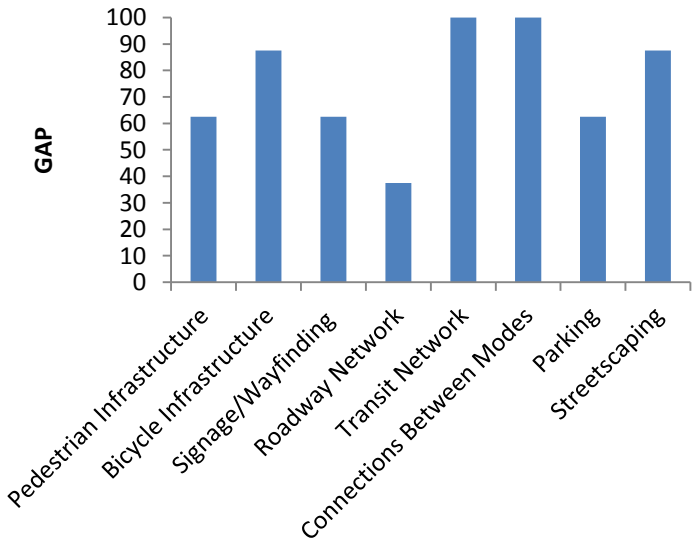
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Street Grid

Moderate

- ✓ Improvements to the Natural Environment
- ✓ Traffic Calming Features
- ✓ Off-Street Parking Capacity

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Fairfax County

UDA Needs Profile: Tysons Corner

Tysons Corner is located in Fairfax County, surrounded by the town of McLean to the east and Vienna on the west along I-495, the Dulles Toll Road, Route 7, and Route 123.

Location Characteristics

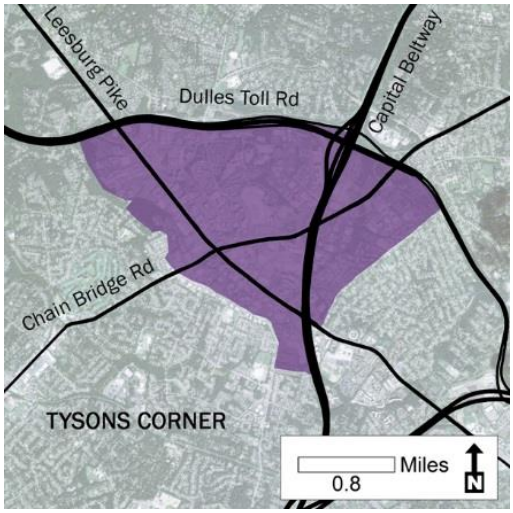
PDC – Northern Virginia Regional Commission

UDA Size – 3.4 square miles

Year Designated – 2013

Comprehensive Plan Detail - Tysons Corner is the Urban Development Area (UDA) for Fairfax County. The Tysons Corner land use plan is consistent with the UDA requirements for minimum densities and intensities for development, the appropriate planning horizon for Fairfax County, inclusion of principles of traditional neighborhood design, and incentives for development. The vision for Tysons is grounded in a set of guiding planning principles that includes transforming Tysons from a suburban office park and activity center into a 24/7 urban center marked by the diversity of residents and workers, as well as attracting mixed use transit-oriented development and private investment to Metrorail station areas and transit connection locations throughout Tysons.

Geographic Location



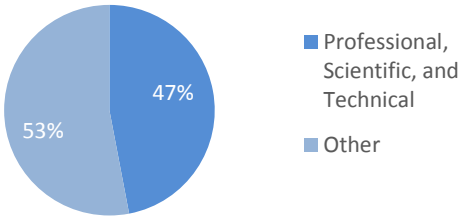
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

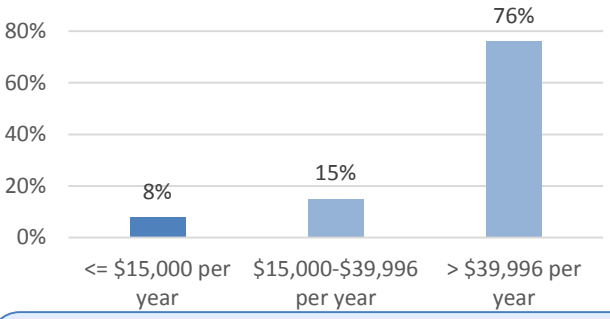
Total Population –19,184 persons

Total Primary Jobs – 93,484 jobs

Jobs by Industry



Total Jobs by Earnings



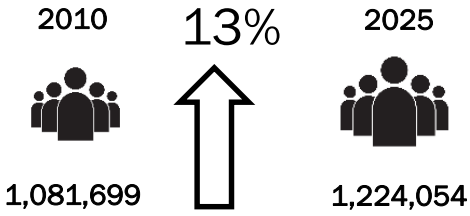
Jobs Within a 45 Minute Drive
985,444

Working Age Population Within a 45 Minute Drive
691,272

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fairfax County

Current Place Type - Urban Core



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

Moderate

- ✓ Traffic Calming

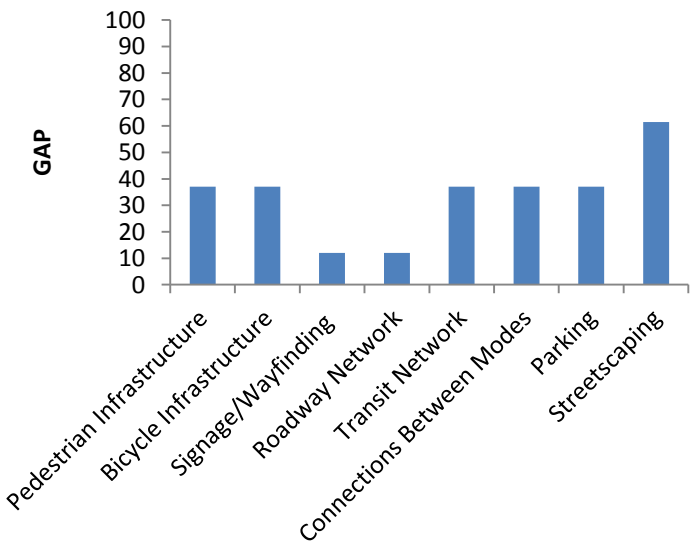
External UDA Needs

High

- ✓ Roadway Capacity/ Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

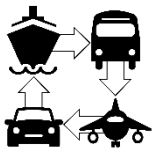
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Herndon Town

UDA Needs Profile: Herndon UDA

The Town of Herndon is located in Fairfax County, and, land within town's Regional Corridor Mixed Use area is designated as the Metrorail Urban Development Area (UDA).

Location Characteristics

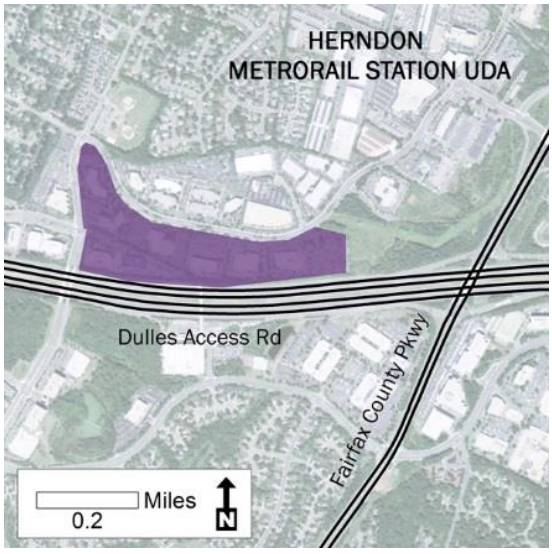
PDC – Northern Virginia Regional Commission

UDA Size – 0.1 square miles

Year Designated – 2008

Comprehensive Plan Detail - Herndon's 2012 Amended Comprehensive Plan designates land within town's Regional Corridor Mixed Use area as the Metrorail Urban Development Area (UDA). The UDA is part of the land included in the Dulles Corridor Metrorail Phase Two Transportation Improvement District for the Herndon Metrorail station, which will connect the area with both Washington, DC and Dulles Airport. The Metrorail Station UDA conforms to Virginia Code requirements concerning areas for growth with new urbanist development. The UDA identifies where higher density, transit oriented development is appropriate.

Geographic Location -



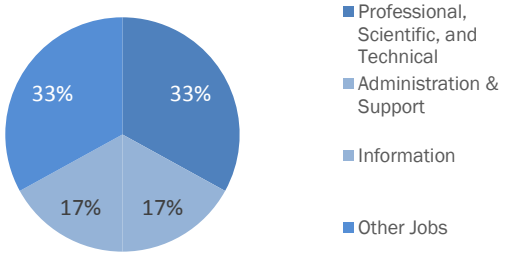
Socio-Economic Characteristics

UDA Characteristics: (Source: Town of Herndon Metrorail Station Area Study)

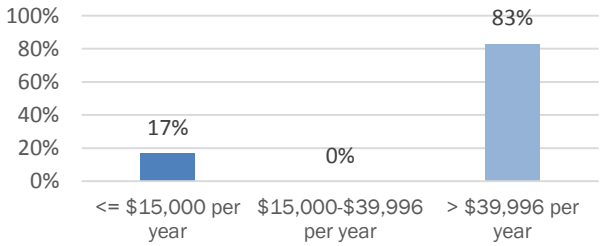
Total Population – 0 persons

Total Primary Jobs – 2,940 jobs

Jobs by Industry



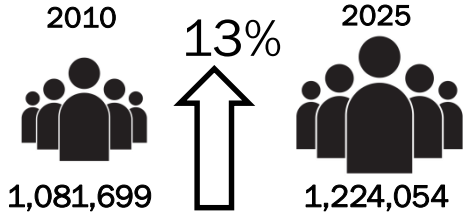
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
419,415
Working Age Population Within a 45 Minute Drive
232,361
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Herndon Town

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency/Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid/Intersection Design
- ✓ Bicycle/Pedestrian Infrastructure
- ✓ Complete Streets/Traffic Calming
- ✓ Safety Features/Signage/Wayfinding
- ✓ Off-Street Parking Capacity

Moderate

- ✓ Transit Operations
- ✓ On-Street Parking Capacity

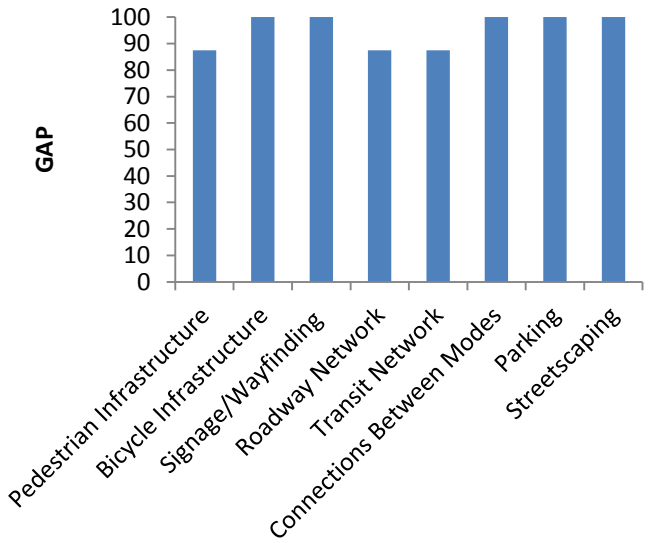
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency/Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid/Intersection Design
- ✓ Bicycle/Pedestrian Infrastructure
- ✓ Complete Streets/Traffic Calming
- ✓ Safety Features/Signage/Wayfinding
- ✓ Off-Street Parking Capacity

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

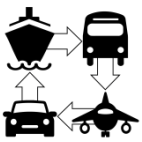
Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – City of Manassas

UDA Needs Profile

The City of Manassas designated its entire City limits as a UDA in 2013. Manassas is located adjacent to Prince William County and is served by I-66, U.S. 29, VA State Route 234 and 28.

Location Characteristics

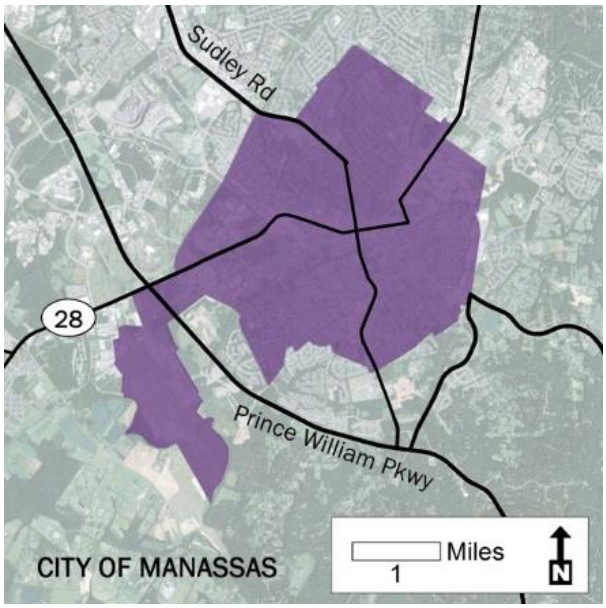
PDC – Northern Virginia Regional Commission

UDA Size – 9.9 square miles

Year Designated – 2013

Comprehensive Plan Detail - The Manassas 2013 Comprehensive Plan notes that it meets the requirements for Urban Development Areas (UDAs) including, but not limited to, the plans and policies set forth in the City's adopted Sector Plans. The plan's land use goal states that Manassas will maintain its existing pattern of residential, commercial, and open space land uses, emphasize improved design principles, promote mixed uses compatible with existing neighborhoods, accommodate high quality infill and redevelopment where appropriate, and reinforce the unique and positive qualities of diverse neighborhoods.

Geographic Location -



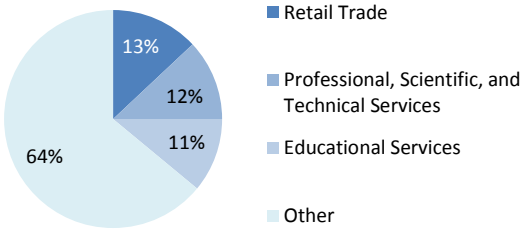
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

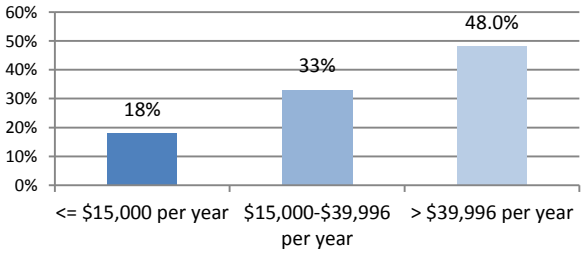
Total Population – 37,821 persons

Total Primary Jobs – 12,032 jobs

Jobs by Industry



Total Jobs by Earnings



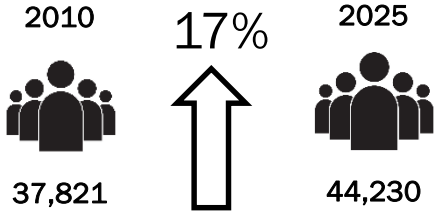
Jobs Within a 45 Minute Drive
98,834

Working Age Population Within a 45 Minute Drive
145,854

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Manassas

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to Natural Environment

Moderate

- ✓ Transit Facilities
- ✓ Safety Features

External UDA Needs

High

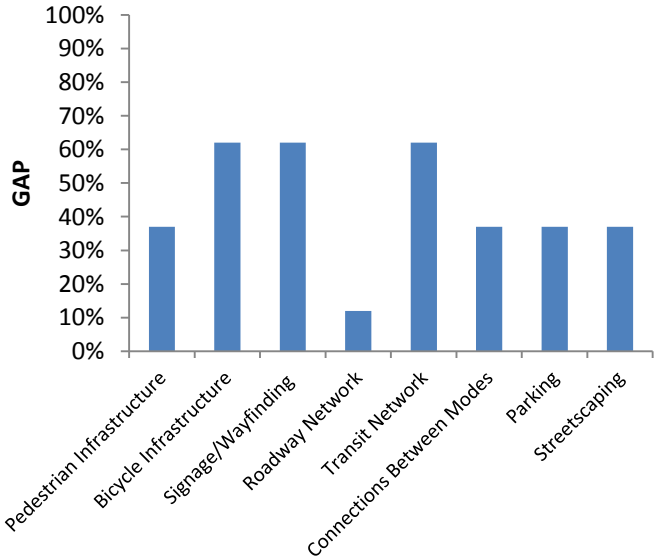
- ✓ Bicycle Infrastructure
- ✓ Complete Streets

Moderate

- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding
- ✓ Improvements to Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle environment

Urban Development Areas – Loudoun County

UDA Needs Profile: Suburban Policy Area

Loundoun County has one UDA, the Suburban Policy Area, located in the eastern part of the County. The area is defined on the north by the Potomac River and on the South by Braddock Road.

Location Characteristics

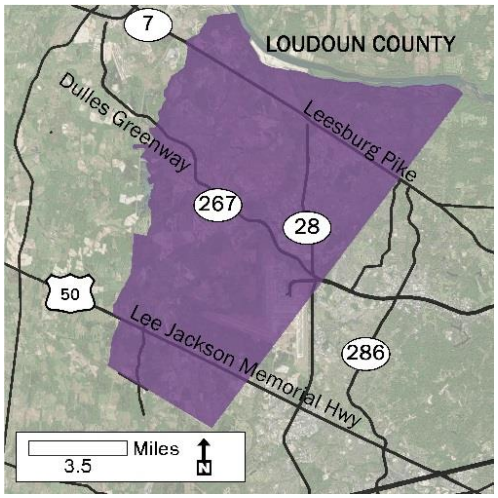
PDC- Northern Virginia Regional Commission

UDA Size –93.3 square miles

Year Designated – 2011

Comprehensive Plan Detail - As the primary location for suburban-scale residential and nonresidential development, the manner of growth and redevelopment in the Suburban Policy Area is of vital importance. The Plan anticipates that there will be four distinct communities within the Suburban Policy Area, separated from one another by associated Green Infrastructure components and major roads. The Plan introduces the concept of Community Plans that will guide the remaining build-out of Ashburn, Dulles, Potomac, and Sterling. The County's goal is that the principles of Smart Growth and revitalization will guide the build-out and revitalization of the Suburban Policy Area.

Geographic Location -

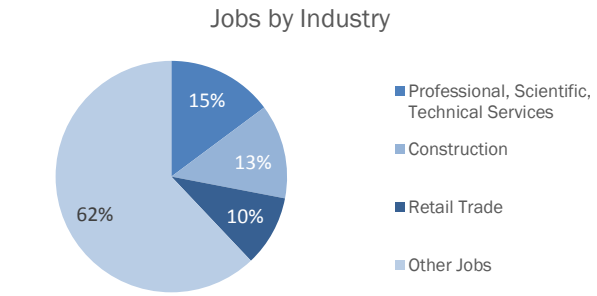


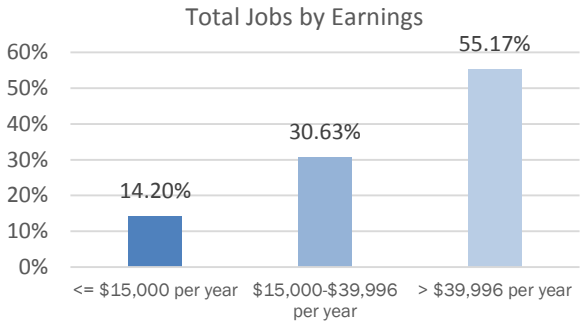
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 212,832 persons

Total Primary Jobs – 91,439 jobs

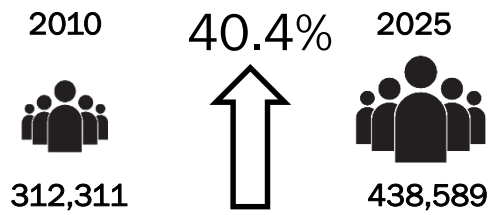




Jobs Within a 45 Minute Drive
75,422
Working Age Population Within a 45 Minute Drive
117,518
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Loudoun County

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Street Grid

Moderate

- ✓ Roadway Operations
- ✓ Complete Streets
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Pedestrian Infrastructure
- ✓ Traffic Calming
- ✓ Transit Operations
- ✓ Transit Frequency
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure
- ✓ Safety Features
- ✓ Intersection Design

External UDA Needs

High

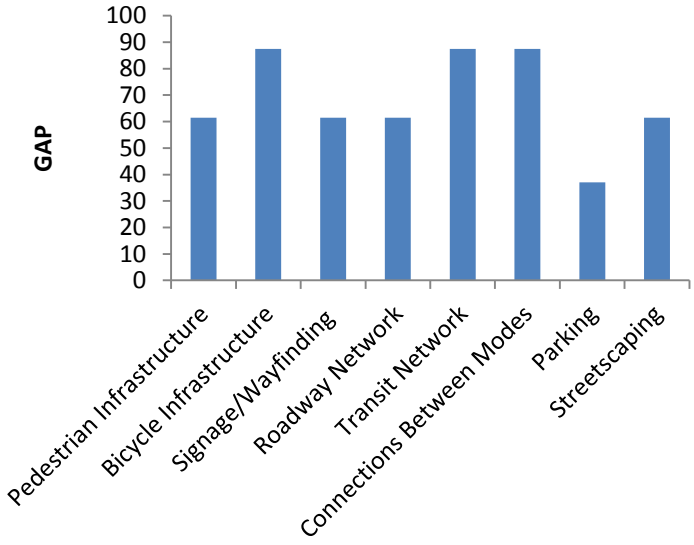
- ✓ Roadway Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Traffic Calming
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

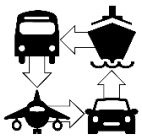


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Access to transportation networks beyond the UDA

Urban Development Areas – Fairfax City

UDA Needs Profile: All UDAs

The City of Fairfax designated areas shown as mixed use on the Comprehensive Plan Future Land Use Map as Designated Growth Areas. These areas include Old Town Fairfax and its immediate surroundings, and the "centers" along Fairfax Boulevard (Kamp Washington, Northfax, and Fairfax Circle).

Location Characteristics

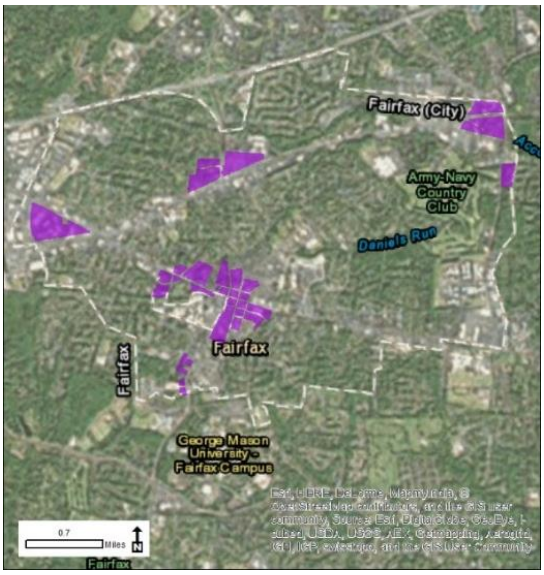
PDC- Northern Virginia Regional Commission

UDA Size – 0.35 square miles

Year Designated – 2015

Comprehensive Plan Detail - Areas of the City designated as mixed use on the Future Land Use map are found to meet the intent of the Code of Virginia, §15.2-2223. The mixed use category supports a combination of commercial, residential, and institutional development to be tailored to specific site conditions and transition needs. The capacity and functionality of the City's infrastructure are of critical importance to future land use. This infrastructure includes the vehicle and pedestrian networks as well as elements such as lighting, parks, public signage and storm water management facilities.

Geographic Location -

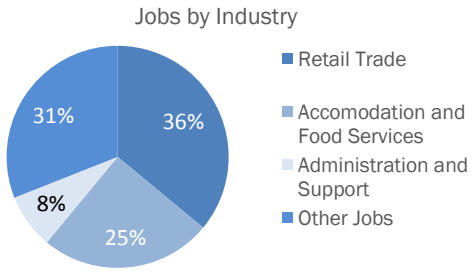


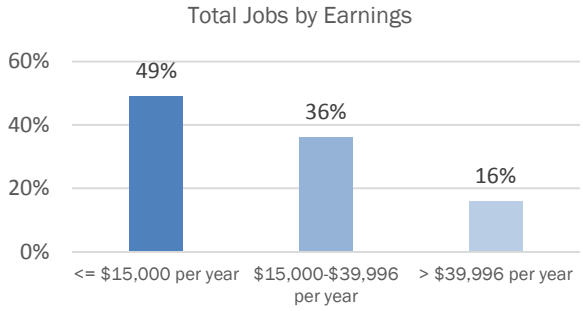
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –3,161 persons

Total Primary Jobs – 1,276 jobs

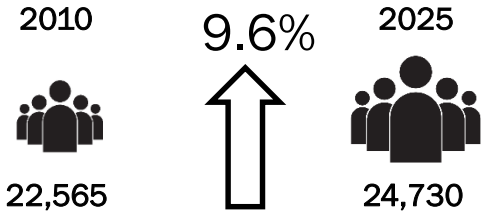




Jobs Within a 45 Minute Drive
898,543
Working Age Population Within a 45 Minute Drive
1,202,876
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Fairfax City

Current Place Type - Small Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Traffic Calming
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Operations
- ✓ Transit Facilities

External UDA Needs

High

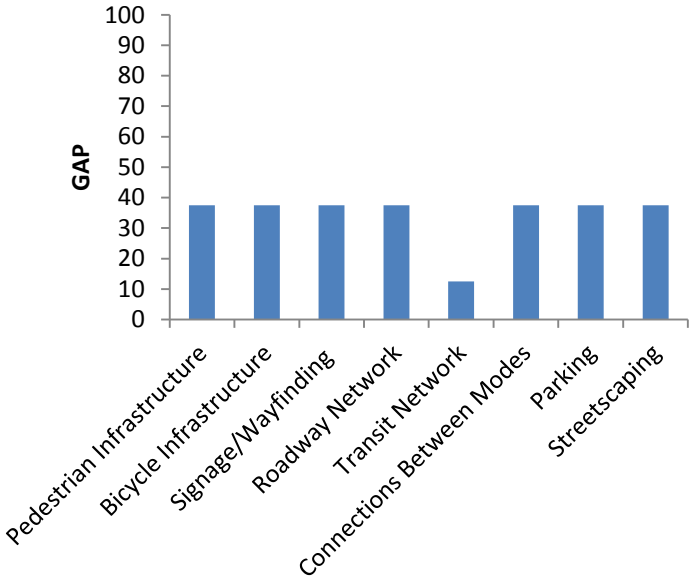
- ✓ Bicycle Infrastructure
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Traffic Calming
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Operations
- ✓ Transit Facilities

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Arlington County

UDA Needs Profile: All UDAs

Arlington County designated a total of seven UDAs in 2015, including Rosslyn-Ballston, Jefferson Davis corridor, Columbia Pike corridor, Lee Highway/Cherrydale Revitalization District, Shirlington Planned Development Site Plan, Nauck Village Center, and the East Falls Church Neighborhood Center District.

Location Characteristics

PDC- Northern Virginia Regional Commission

UDA Size –8 square miles

Year Designated – 2011

Comprehensive Plan Detail – The following areas in Arlington County's General Land Use Plan comply with Virginia Code §15.2-2223.1: Rosslyn-Ballston, Jefferson Davis and Columbia Pike corridors, Lee Highway/Cherrydale Revitalization District, Shirlington Planned Development Site Plan, Nauck Village Center, and Urban Development Areas PLA-6078 East Falls Church Neighborhood Center District.

Geographic Location



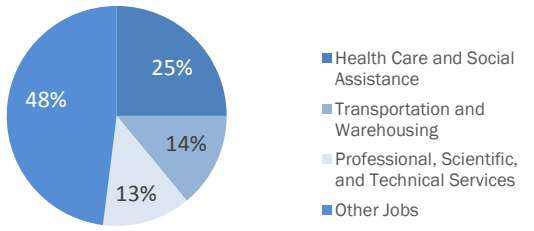
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

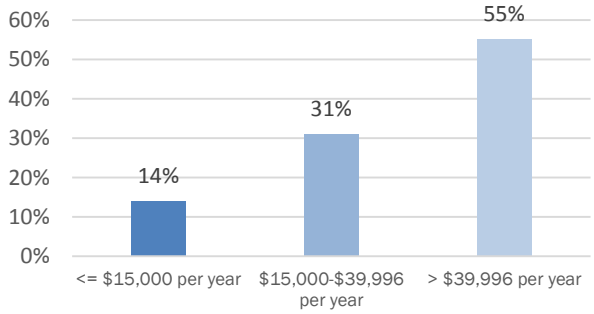
Total Population –160,683 persons

Total Primary Jobs – 14,858 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
338,860
Working Age Population Within a 45 Minute Drive
582,837
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)

2010 207,627 → -1.9% → 2025 203,757

*Current Weldon Cooper Center, Arlington County, and U.S. Census Bureau 2014 population estimates show continued growth in Arlington County. Local data projections, adopted as part of MWCOG Cooperative Forecast, show that Arlington County will have a population of 258,700 in 2025.

Urban Development Areas – Arlington County

Current Place Type - Urban Core



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities

Moderate

- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Complete Streets
- ✓ Safety features
- ✓ Traffic Calming

External UDA Needs

High

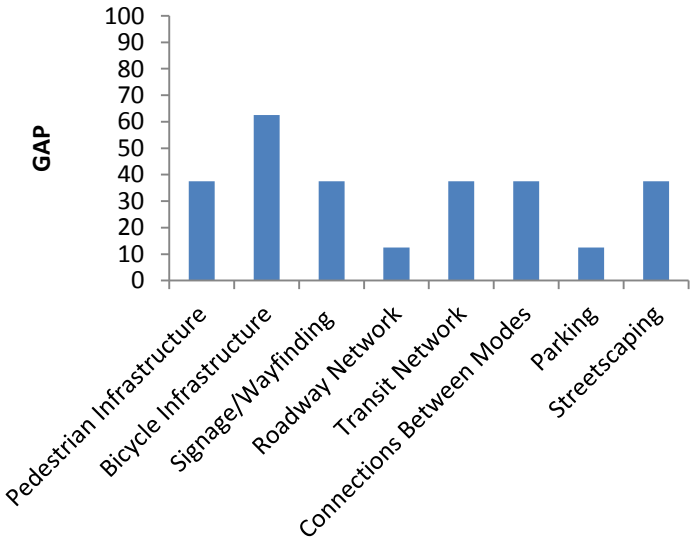
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity
- ✓ Transit Facilities

Moderate

- ✓ Safety Features
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Transit enhancements



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Amelia County

UDA Needs Profile: Amelia Courthouse

The Amelia Courthouse UDA is located at the junction of Business 360 and Route 28 in Amelia County.

Location Characteristics

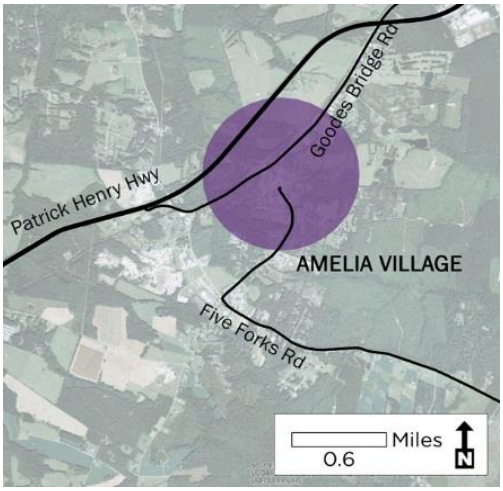
PDC – Richmond Regional PDC

UDA Size – 1.4 square miles

Year Designated – 2011

Comprehensive Plan Detail - The Amelia County Revised Comprehensive Plan (2005) designated the Amelia County Courthouse area as the county's primary Village Development Area. The County will make the Courthouse area its top priority for utility and other major infrastructure improvements in order to concentrate growth of major residential and commercial developments. In the plan, Village Development Areas are defined as lands which are either within a designated utility service area (for public water or sewer) of the village, or which are very close and convenient to a village proper. The Village Development Areas are generally appropriate for residential, business, and limited industrial development of medium and higher densities, in concert with available public utilities.

Geographic Location



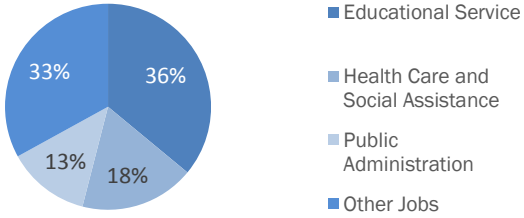
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

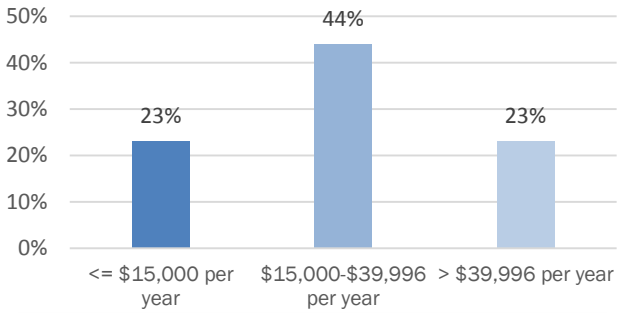
Total Population - 789 persons

Total Primary Jobs – 890 jobs

Jobs by Industry



Total Jobs by Earnings



Jobs Within a 45 Minute Drive
8,886
Working Age Population Within a 45 Minute Drive
17,778
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Amelia County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety
- ✓ Improvements to Natural Environment
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Capacity
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage

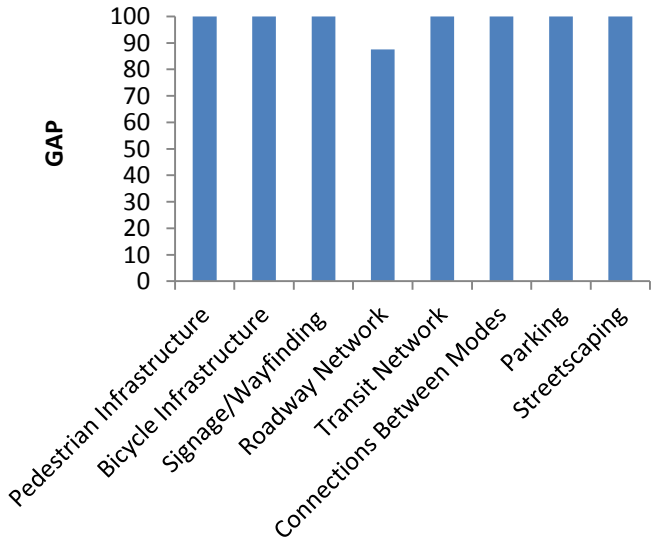
External UDA Needs

High

- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Signage
- ✓ Improvements to Natural Environment
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Safety

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Dinwiddie County

UDA Needs Profile: Urban Growth Area

The Urban Growth Area is one of two UDAs located in Dinwiddie County, located in the northeast quadrant of the county along the I-85 and US 1 corridors, southwest of the city of Petersburg.

Location Characteristics

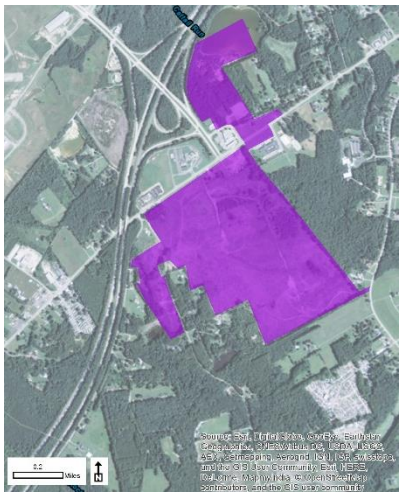
PDC – Crater Planning District Commission

UDA Size – 0.3 square miles

Year Designated – 2012

Comprehensive Plan Detail - Building on the urban development area concept, Dinwiddie County created a Mixed Use (MU) Zoning District. The MU is intended to promote compact, mixed use development within the county's urban and planned growth areas, as shown on the County's Comprehensive Plan, especially along major roadways and near major street intersections; traditional neighborhood design that integrates a mix of uses including commercial, residential, civic, and open space uses, including (i) a variety of housing types; (ii) a system of interconnected streets with sidewalks, bikeways, and transit accommodations and the connection of those streets to existing streets and developed areas; and (iii) higher density development.

Geographic Location

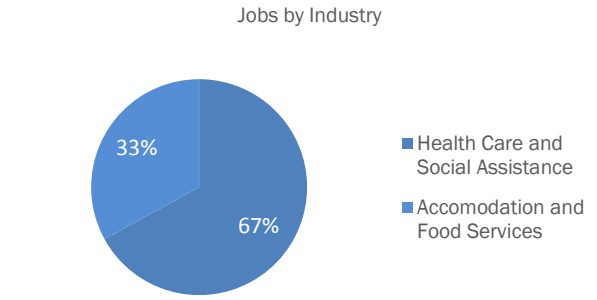


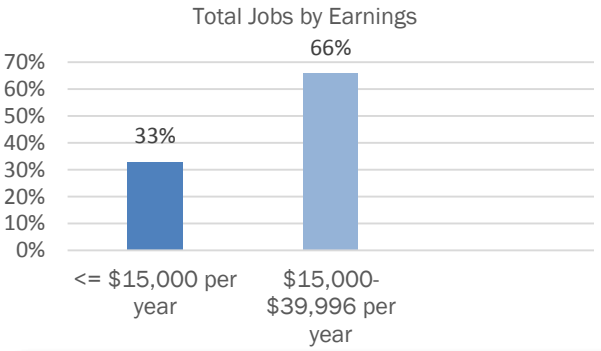
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –298 persons

Total Primary Jobs – 3 jobs





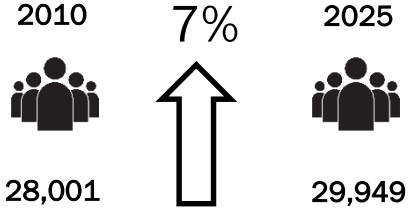
Jobs Within a 45 Minute Drive
14,063

Working Age Population Within a 45 Minute Drive
26,385

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Dinwiddie County

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Intersection Design
- ✓ Signage/Wayfinding

External UDA Needs

High

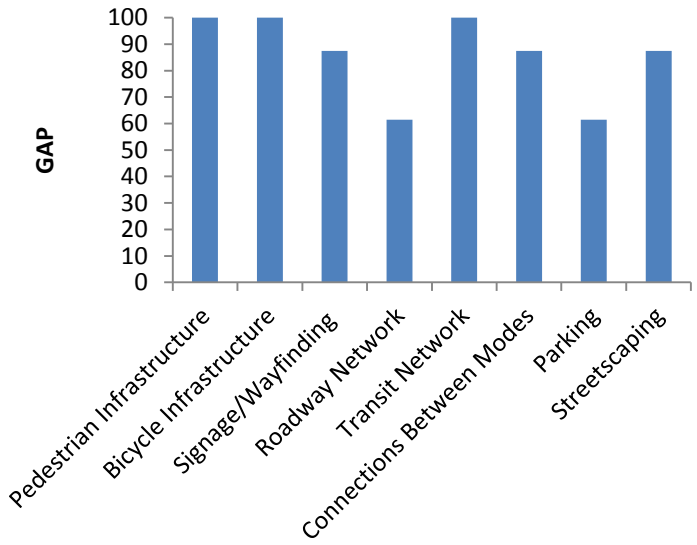
- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Improvements to the Natural Environment
- ✓ Off-street parking
- ✓ Complete Streets
- ✓ Safety Features

Moderate

- ✓ None listed

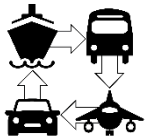
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Dinwiddie County

UDA Needs Profile: Courthouse Area

Courthouse Area is one of two UDAs in Dinwiddie County, located east of and adjacent to the I-85 and U.S. 1 in the center of Dinwiddie County.

Location Characteristics

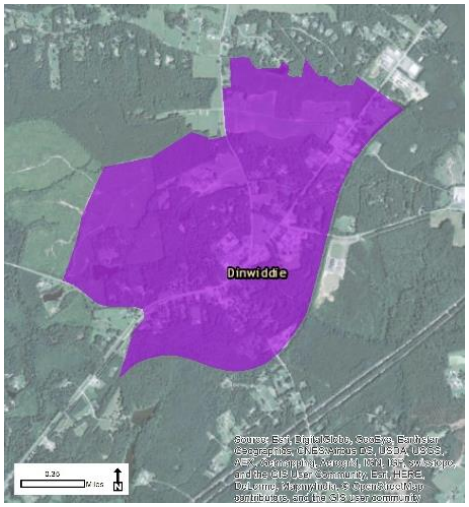
PDC – Crater Planning Commission District

UDA Size – 1.2 square miles

Year Designated – 2012

Comprehensive Plan Detail - Building on the urban development area concept, Dinwiddie County created a Mixed Use (MU) Zoning District. The MU is intended to promote compact, mixed use development within the county's urban and planned growth areas, as shown on the County's Comprehensive Plan, especially along major roadways and near major street intersections; traditional neighborhood design that integrates a mix of uses including commercial, residential, civic, and open space uses, including (i) a variety of housing types; (ii) a system of interconnected streets with sidewalks, bikeways, and transit accommodations and the connection of those streets to existing streets and developed areas; and (iii) higher density development.

Geographic Location

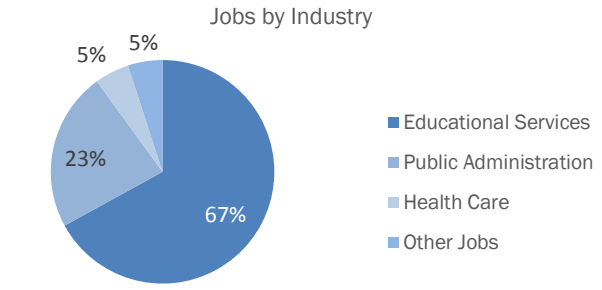


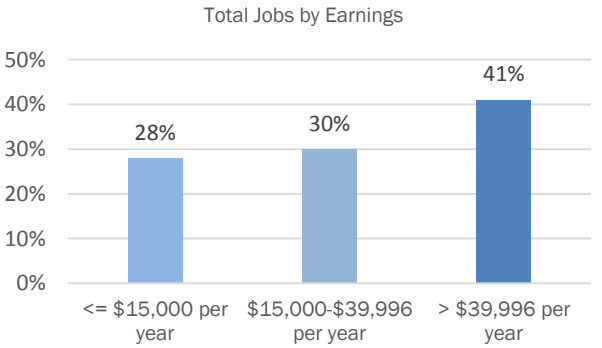
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 422 persons

Total Primary Jobs – 1,274 jobs

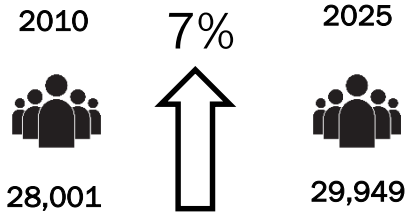




Jobs Within a 45 Minute Drive
8,324
Working Age Population Within a 45 Minute Drive
16,379
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Dinwiddie County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Off-Street Parking Capacity
- ✓ Signage/Wayfinding

External UDA Needs

High

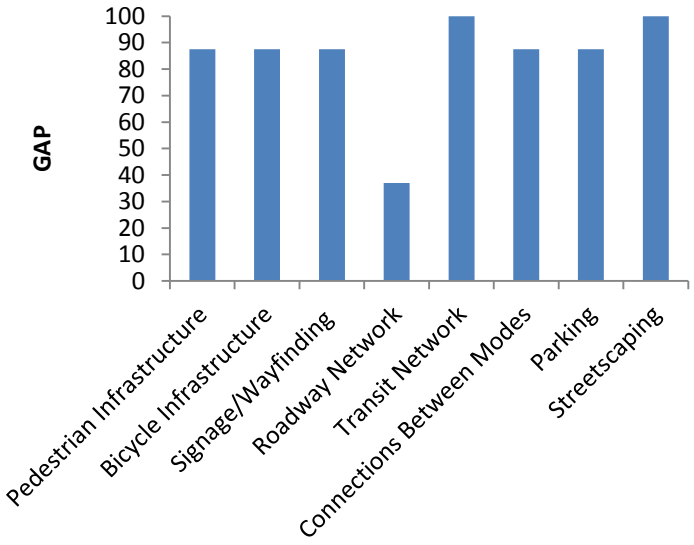
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Improvements to Environment
- ✓ Street Grid
- ✓ Off-Street Parking

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Henrico County

UDA Needs Profile: Innsbrook Area

Innsbrook is a census-designated place in Henrico County. The UDA area is bound by I-295 on the north-west, I-64 to the south, and the neighborhoods to the east bordered by Springfield Road

Location Characteristics

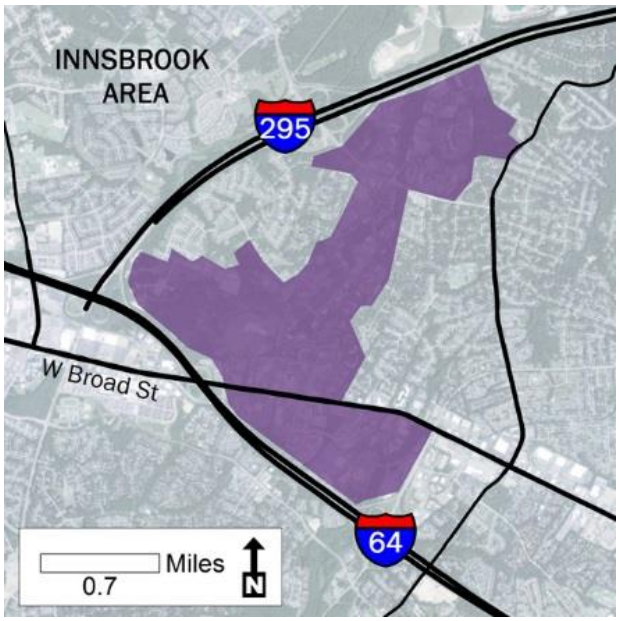
PDC – Richmond Regional PDC

UDA Size – 2.1 square miles

Year Designated – 2010

Comprehensive Plan Detail - Henrico County has designated the land northwest of Richmond known as the Innsbrook Area as an Urban Development Area (UDA). Several land use classifications could be appropriate for the desired development in this UDA, including multi-family residential, Traditional Neighborhood Development, Urban Mixed Use, commercial, and public uses.

Geographic Location

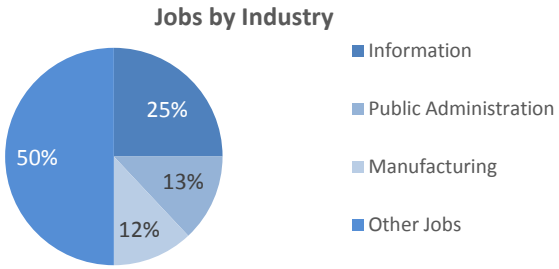


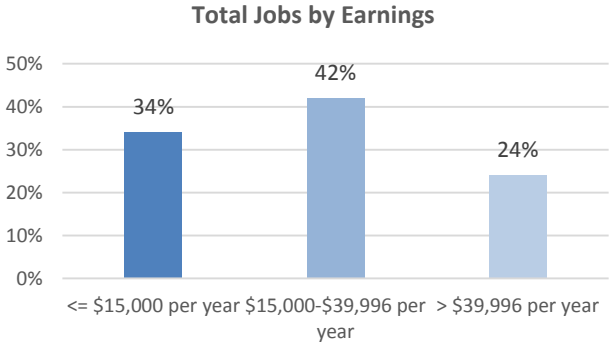
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 4,131 persons

Total Primary Jobs – 20,605 jobs

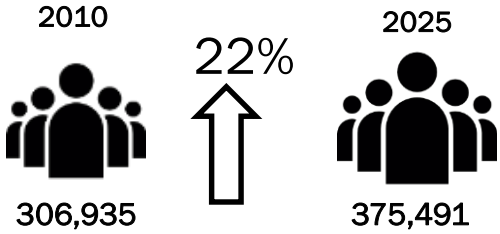




Jobs Within a 45 Minute Drive
182,267
Working Age Population Within a 45 Minute Drive
232,361
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Henrico County

Current Place Type - Large Town or Suburban Center



Planned Place Type - Urban Core



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Capacity/Access
- ✓ Bicycle Infrastructure
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design

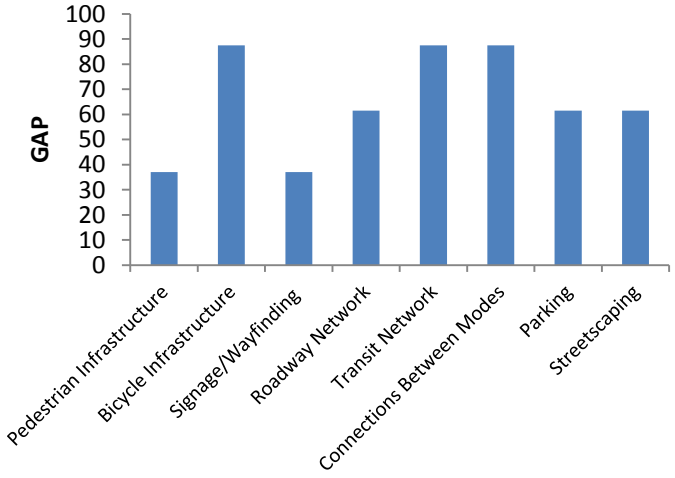
External UDA Needs

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding

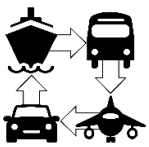
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Circulation and access within the UDA



Safety for all users

Urban Development Areas – Powhatan County

UDA Needs Profile: Route 711 Village

Within Powhatan County, there are three designated UDAs. The Route 711 Village is located to the east of Route 288.

Location Characteristics

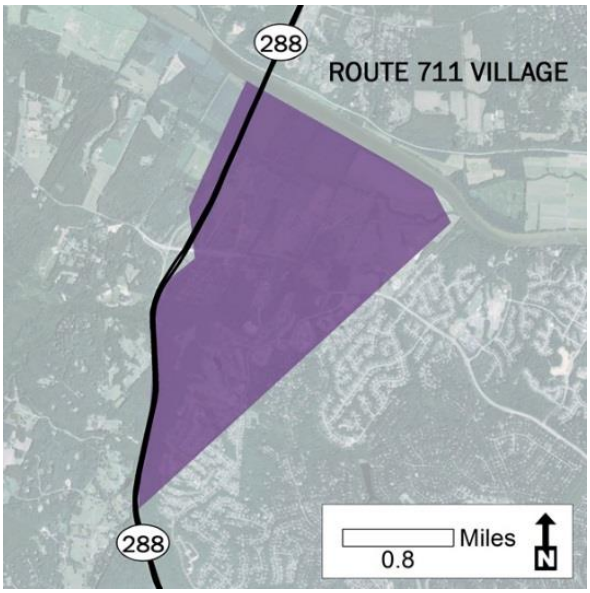
PDC – Richmond Regional PDC

UDA Size – 3.2 square miles

Year Designated – 2010

Comprehensive Plan Detail - The Powhatan County 2010 Comprehensive Plan designates three key locations as Urban Development Areas (UDAs). These locations - Route 711 Village, Route 60 East, and Courthouse Village - will accommodate the majority of future growth in a compact development pattern based on New Urbanist principles, while still maintaining the rural community character of Powhatan County. Transportation recommendations are coordinated with the land use to provide for improved connectivity standard and a road network that meets the requirements of these statutes as well as the local needs of the community.

Geographic Location -



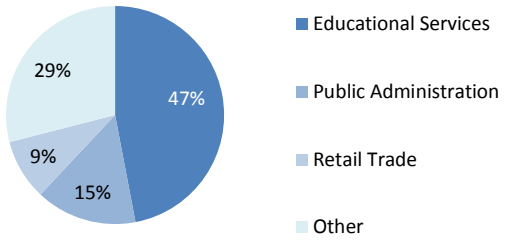
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

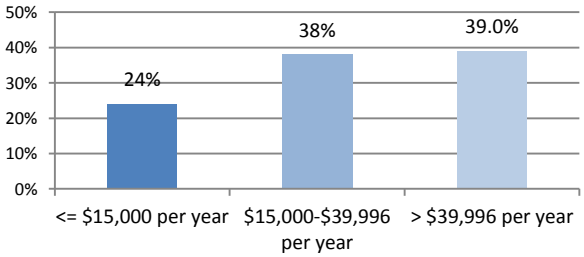
Total Population – 1,767 persons

Total Primary Jobs – 1,612 jobs

Jobs by Industry



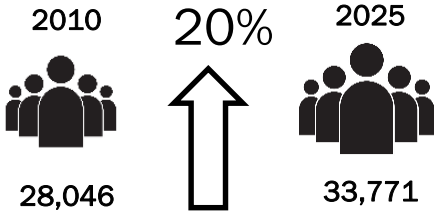
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
45,313
Working Age Population Within a 45 Minute Drive
67,955
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Powhatan County

Current Place Type - Rural or Village Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming

Moderate

- ✓ Roadway Operations
- ✓ Street Grid & Complete Streets
- ✓ Off-Street Parking Capacity
- ✓ Improvements to the Natural Environment

External UDA Needs

High

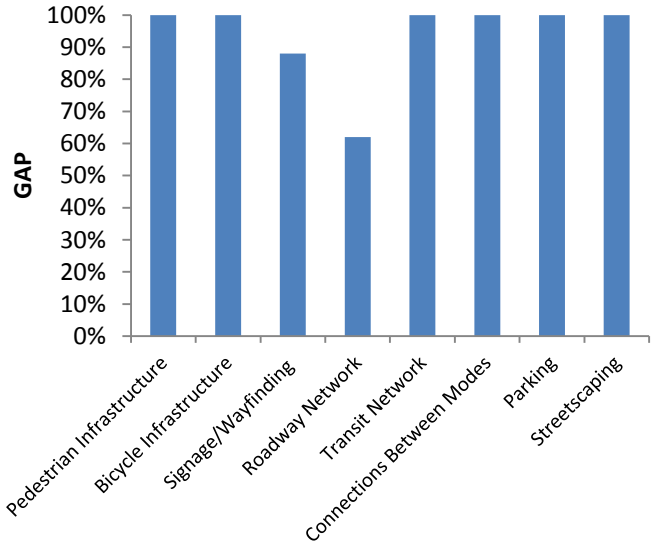
- ✓ Roadway Capacity

Moderate

- ✓ Roadway Operations
- ✓ Complete Streets
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming

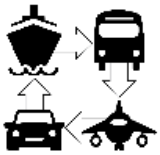
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Powhatan County

UDA Needs Profile: Route 60 Corridor East

The Route 60 Corridor East UDA is located in the eastern portion of the Powhatan County centered on Route 60, and extends southward along the Chesterfield County border and bounded by other natural features.

Location Characteristics

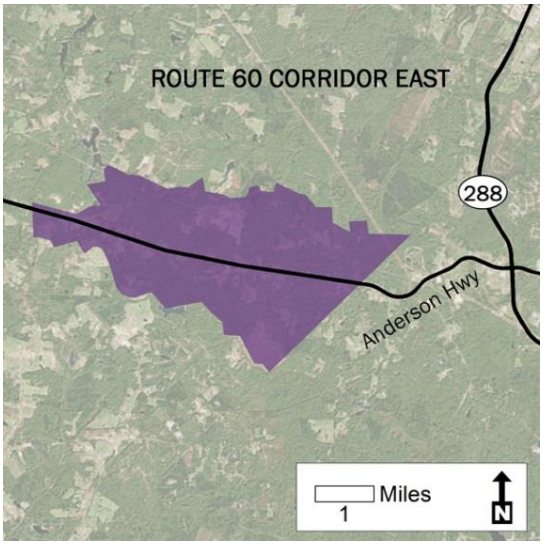
PDC – Richmond Regional Planning District Commission

UDA Size – 1.1 square miles

Year Designated – 2010

Comprehensive Plan Detail - Powhatan County has designated three key locations as Urban Development Areas (UDAs). These locations - Route 711 Village, Route 60 East, and Courthouse Village - will accommodate the majority of future growth in a compact development pattern based on New Urbanist principles, while still maintaining the rural community character of Powhatan County. These areas are in close proximity to services and offer the greatest opportunities for development. These locations are expected to accommodate higher density development than the rural areas, and offer support services and business growth opportunities within the County.

Geographic Location

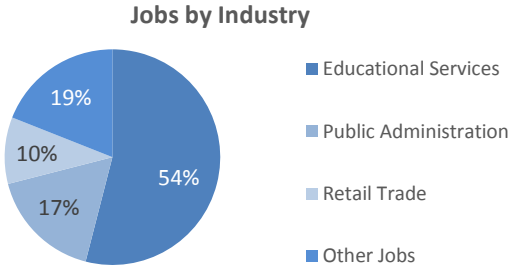


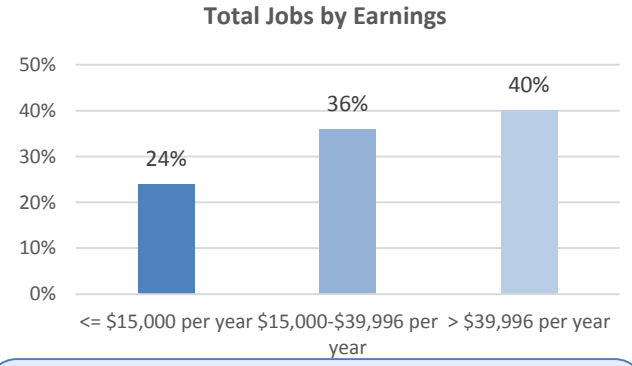
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 3, 053 persons

Total Primary Jobs – 1,374 jobs





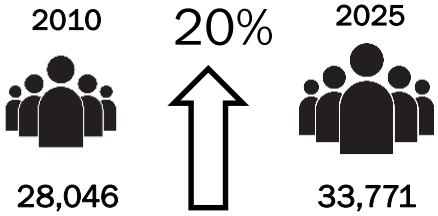
Jobs Within a 45 Minute Drive
24,772

Working Age Population Within a 45 Minute Drive
42,134

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Powhatan County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Safety Features

External UDA Needs

High

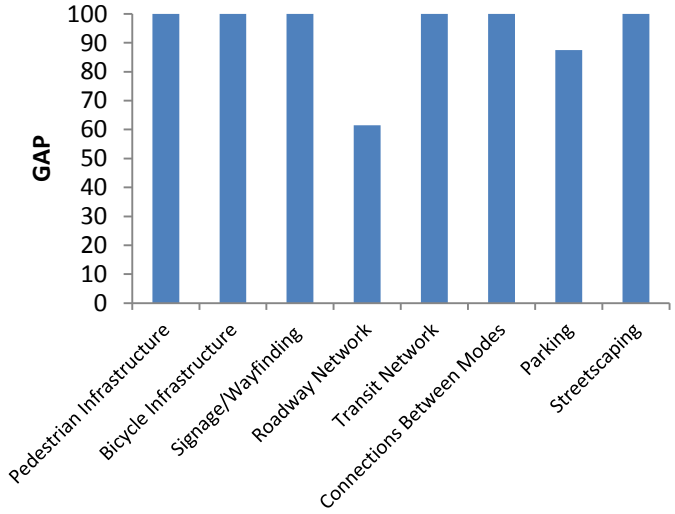
- ✓ Roadway Capacity

Moderate

- ✓ Intersection Design
- ✓ Signage/Wayfinding

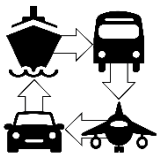
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Powhatan County

UDA Needs Profile: Courthouse Village

The Courthouse Village is both the historic and government center for the Powhatan County. The UDA, with village and commerce centers at major intersections along Route 60, serves as a natural civic-oriented village center for this area.

Location Characteristics

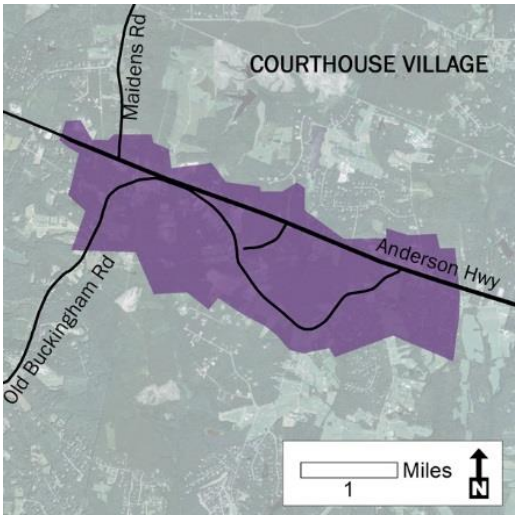
PDC – Richmond Regional Planning District Commission

UDA Size – 5.2 square miles

Year Designated – 2010

Comprehensive Plan Detail - Powhatan County has designated three key locations as Urban Development Areas (UDAs). These locations - Route 711 Village, Route 60 East, and Courthouse Village - will accommodate the majority of future growth in a compact development pattern based on New Urbanist principles, while still maintaining the rural community character of Powhatan County. These areas are in close proximity to services and offer the greatest opportunities for development. These locations are expected to accommodate higher density development than the rural areas, and offer support services and business growth opportunities within the County.

Geographic Location

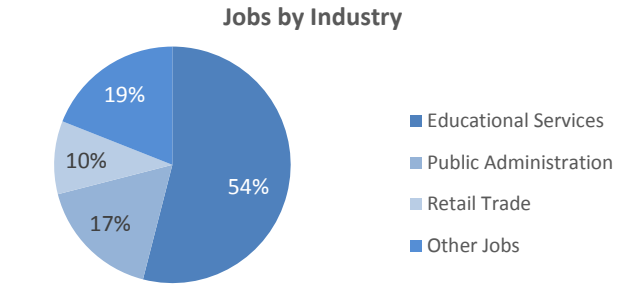


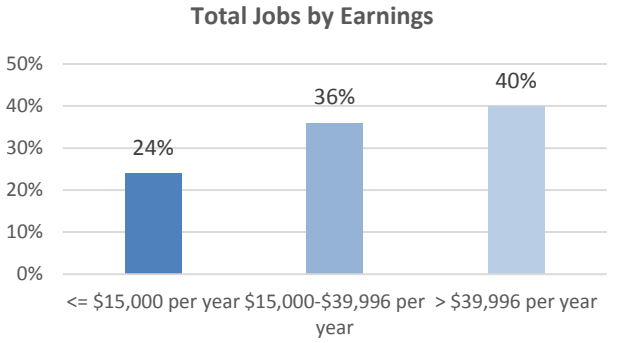
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 3,008 persons

Total Primary Jobs – 1,398 jobs

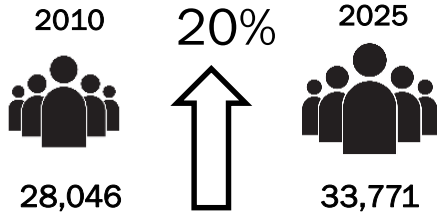




Jobs Within a 45 Minute Drive
2,717
Working Age Population Within a 45 Minute Drive
7,823
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Powhatan County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

Moderate

- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming

External UDA Needs

High

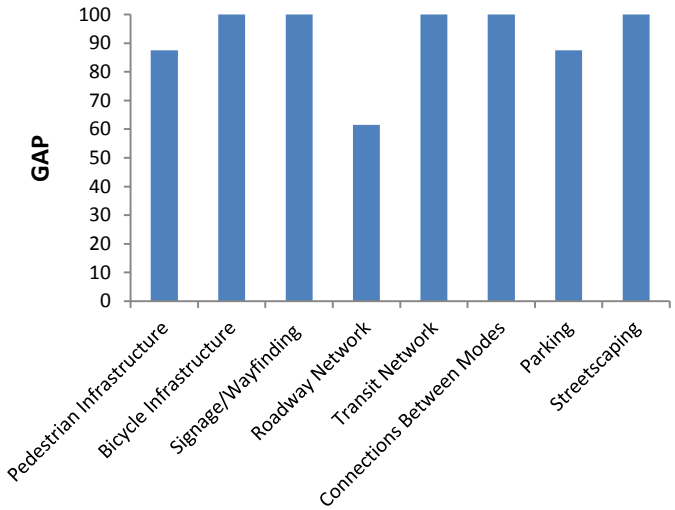
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

Moderate

- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming

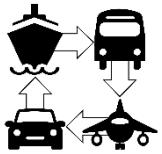
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – South Hill Town

UDA Needs Profile: South Hill

The South Hill Town UDA is close to downtown and major destinations, including the Community Memorial Health Center, and in close proximity to I-85 and Route 58

Location Characteristics

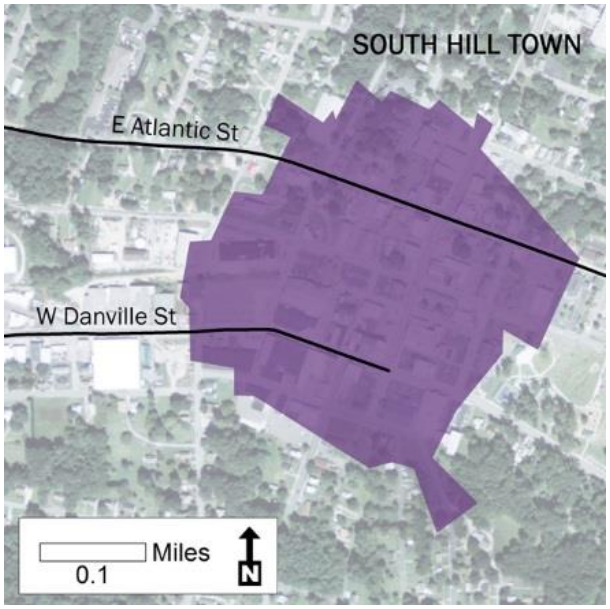
PDC – Southside Planning District Commission

UDA Size –0.1 square miles

Year Designated – 2012

Comprehensive Plan Detail - To accommodate Mecklenburg County's projected 20-year growth, the Town of South Hill has one UDA within the town. The UDA is close to downtown and major destinations, including the Community Memorial Health Center and Interstate 85. The character of development in the UDA will be consistent with the principles of Traditional Neighborhood Design.

Geographic Location

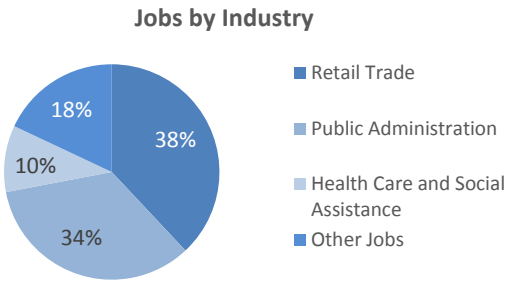


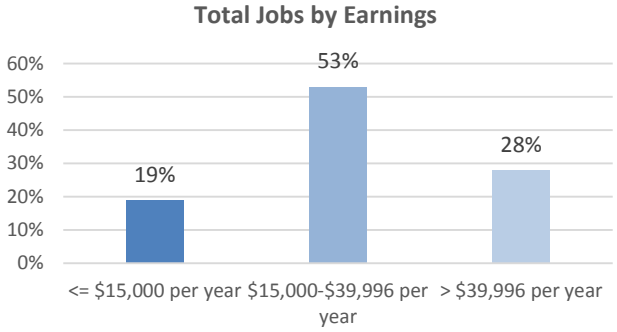
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 566 persons

Total Primary Jobs – 287 jobs





Jobs Within a 45 Minute Drive
5,451
Working Age Population Within a 45 Minute Drive
8,869
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – South Hill Town

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Street Grid, Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking Capacity
- ✓ Off-Street Parking Capacity
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Intersection Design
- ✓ Traffic Calming

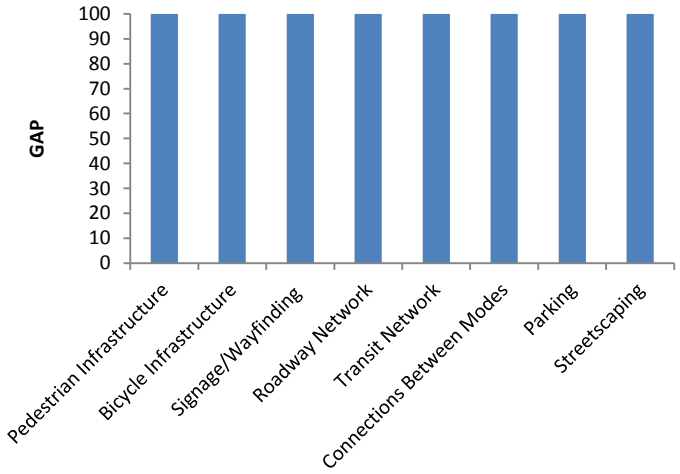
External UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking Capacity
- ✓ Off-Street Parking Capacity
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

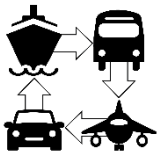
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Circulation and access within the UDA

Urban Development Areas – Goochland County

UDA Needs Profile: All UDAs

Goochland County designated six Designated Growth Areas in 2015: Goochland Courthouse Village, Oileville Village, Centerville Village, West Creek Area, Manakin Village, and River Road Communities all located east of the James River and bisected by the I-64.

Location Characteristics

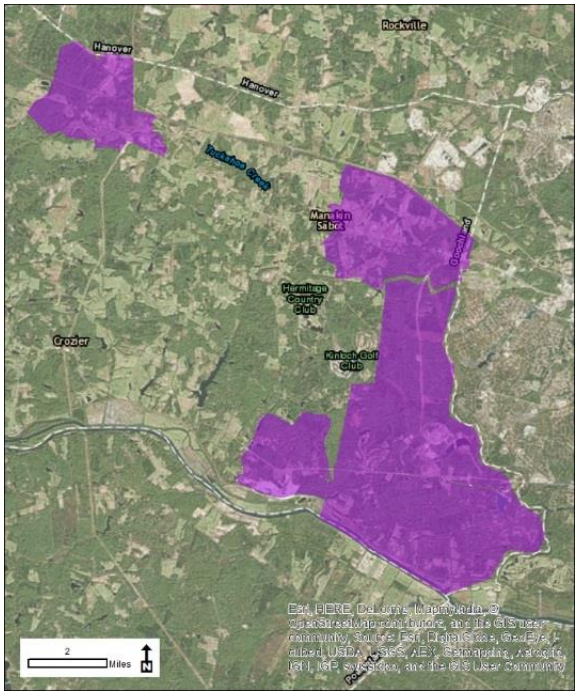
PDC – Richmond Regional PDC

UDA Size –32 square miles

Year Designated – 2015

Comprehensive Plan Detail - Designated Growth Areas located generally on the eastern end of the County and in the Courthouse Village. The Designated Growth Areas identify where commercial and residential development should be concentrated. The advantages of delineating such areas include proactively planning and coordinating growth, reducing pressure to develop in rural areas, supporting cost effectiveness by utilizing existing and planned infrastructure, and facilitating private sector investment in infrastructure.

Geographic Location



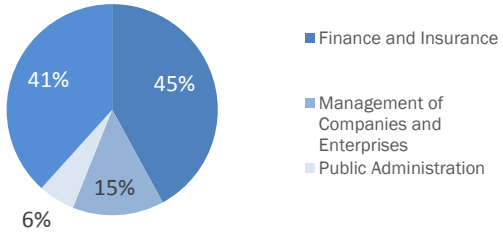
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

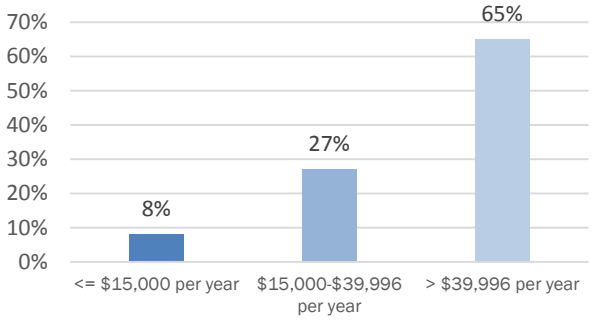
Total Population – 10,704 persons

Total Primary Jobs – 10,477 jobs

Jobs by Industry



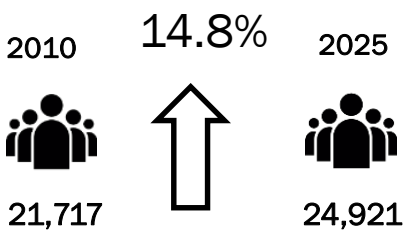
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
60,065
Working Age Population Within a 45 Minute Drive
71,524
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Goochland County

Current Place Type - Village Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Off-Street Parking
- ✓ On-Street Parking
- ✓ Traffic Calming Features

External UDA Needs

High

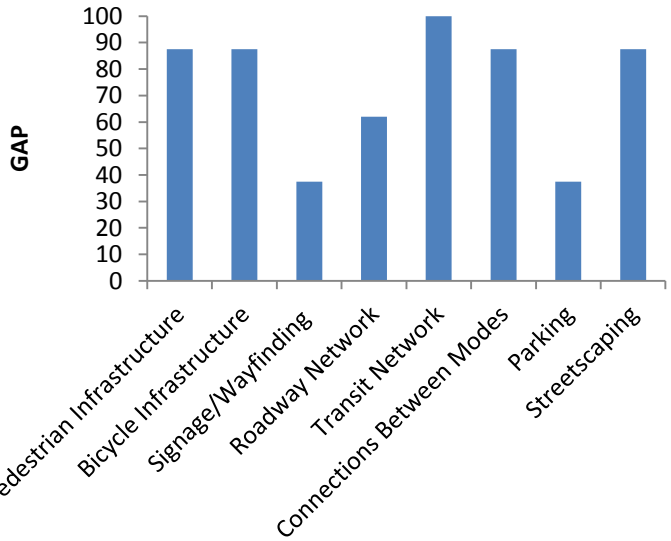
- ✓ Bicycle Infrastructure

Moderate

- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Improvements to the natural environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas–Chesterfield County

UDA Needs Profile: All UDAs

Chesterfield County designated several UDA-like areas in 2015. The UDA-like areas incorporate mixed-use neighborhoods, connectivity of road and pedestrian networks, and high density residential.

Location Characteristics

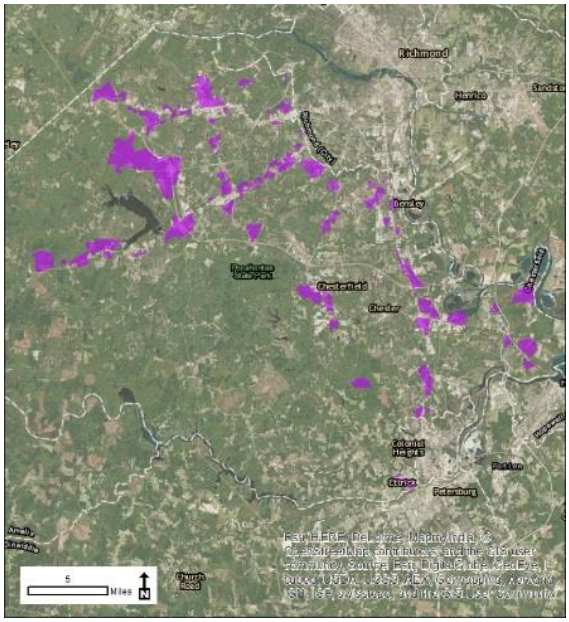
PDC – Richmond Regional PDC

UDA Size –23 square miles

Year Designated – 2015

Comprehensive Plan Detail - The Chesterfield County Comprehensive Plan (2012) includes land use categories in Chapter 10 which meet the intent of Section 15.2-2223.1 of the Code of Virginia, including Regional Mixed Use, Community Mixed Use, Residential Mixed Use, Medium-High Density Residential, and High Density Residential. These land use categories incorporate principles of traditional neighborhood design such as interconnection of new local streets to existing streets, connectivity of road and pedestrian networks, preservation of natural areas, and mixed-use neighborhoods including affordable housing.

Geographic Location



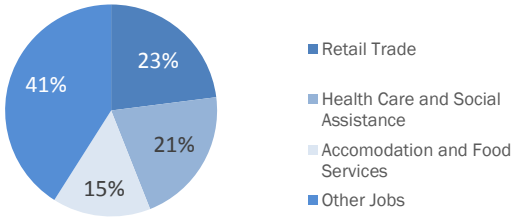
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

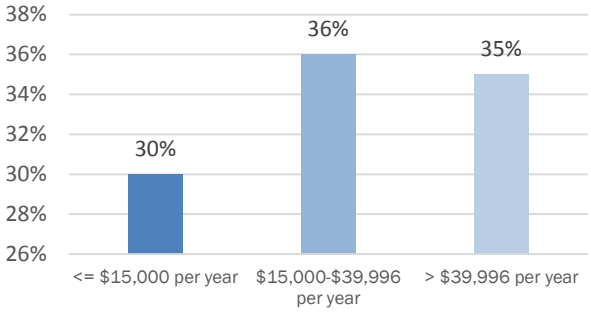
Total Population –81,909 persons

Total Primary Jobs –20,661 jobs

Jobs by Industry



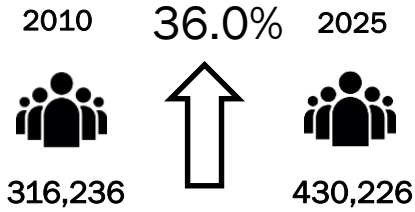
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
500,105
Working Age Population Within a 45 Minute Drive
783,266
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Chesterfield County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ Roadway Capacity

Moderate

- ✓ Roadway Operations
- ✓ Transit Capacity
- ✓ Transit Frequency
- ✓ Transit Facilities
- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming

External UDA Needs

High

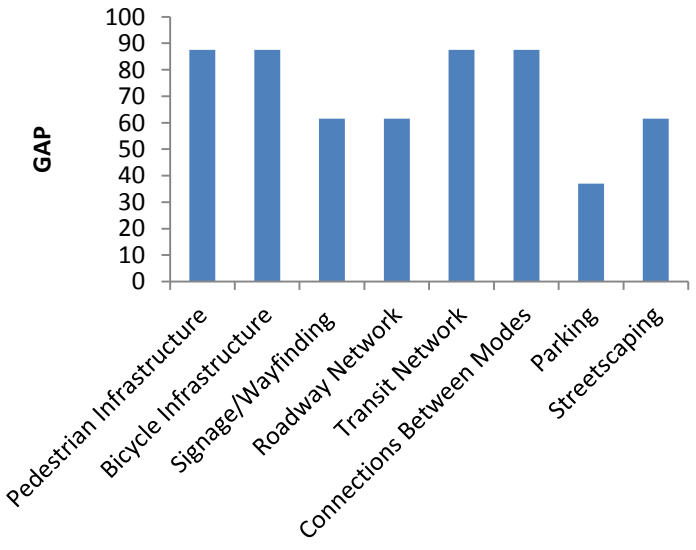
- ✓ Roadway Capacity
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Improvements to the Natural Environment
- ✓ Intersection Design

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Off-Street Parking
- ✓ Signage/Wayfinding
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Bedford County

UDA Needs Profile: All UDAs

Bedford County has designated two UDAs: areas just outside the Bedford City Limits (generally to the south and east of the city) and the Moneta UDA along Route 122.

Location Characteristics

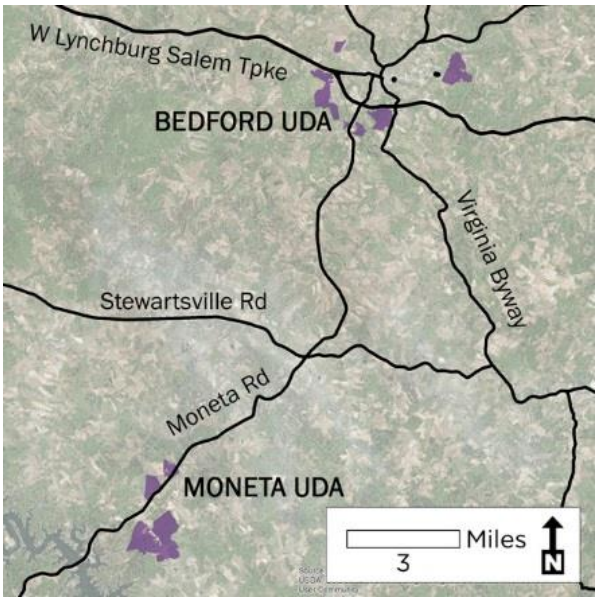
PDC – Virginia's Region 2000 Local Government Council

UDA Size – 2.7 square miles

Year Designated – 2007

Comprehensive Plan Detail - The 2007 Bedford County Comprehensive Plan designated two Urban Development Areas (UDAs) within the county's Urban Service Area, as identified in the Water and Sewer Master Plan. These areas consist of almost 1,500 vacant acres of vacant and underutilized land on the outskirts of the City of Bedford and in the Moneta area, which were identified as ideal locations for urban development areas based on physical characteristics, suitability for a mix of uses, and the application of traditional neighborhood design principles.

Geographic Location -

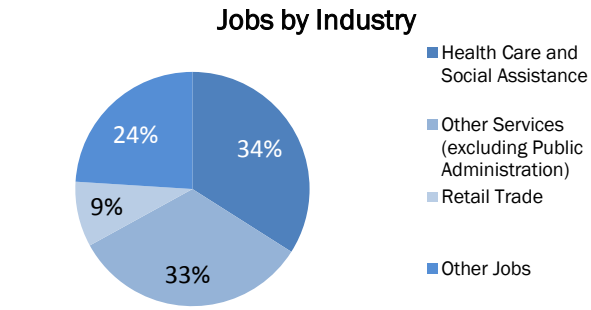


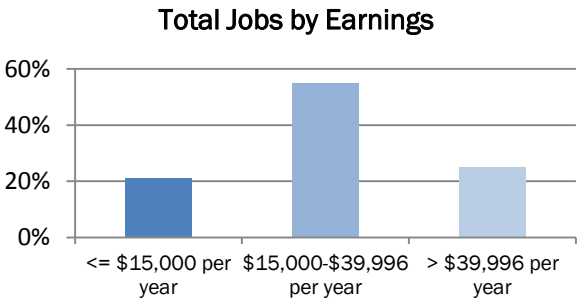
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 2,194 persons

Total Primary Jobs – 638 jobs

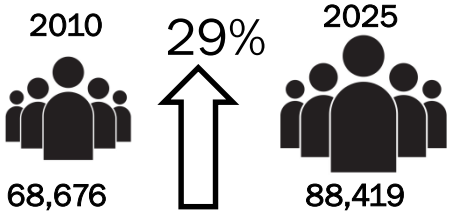




Jobs Within a 45 Minute Drive
27,702
Working Age Population Within a 45 Minute Drive
46,340
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Bedford County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Traffic Calming

External UDA Needs

High

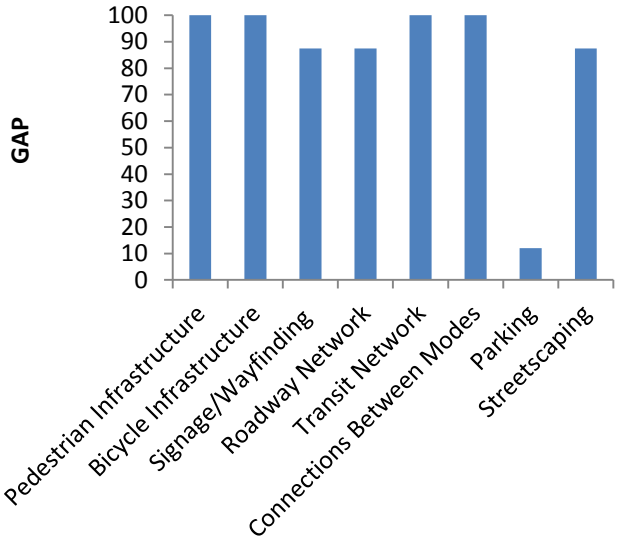
- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Traffic Calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment



Transit Enhancements

Urban Development Areas – Blacksburg Town

UDA Needs Profile: All UDAs

The Town of Blacksburg has designated eight UDAs all along U.S. 460 and Main Street and South Main Street.

Location Characteristics

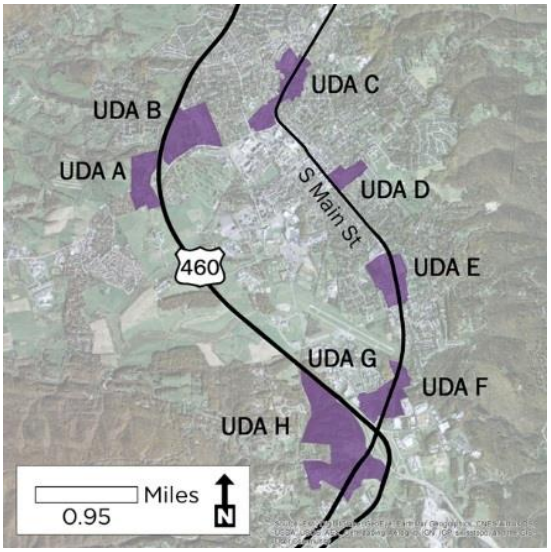
PDC – New River Valley Planning District Commission

UDA Size – 1.3 square miles total

Year Designated – 2011

Comprehensive Plan Detail - The Town of Blacksburg adopted eight UDAs in 2011. The Town's 2012 Comprehensive Plan Update notes that while the town's eight Urban Development Areas (UDAs) generally correspond with areas designated as mixed use on the Future Land Use Map, the boundaries are not synonymous. Designated UDAs are intended to be developed at urban densities and intensities. Compact, mixed uses are appropriate in UDAs, and development in these areas should be guided in part by the mixed use area guidelines detailed in the town's comprehensive plan, including access to mass transit stops.

Geographic Location



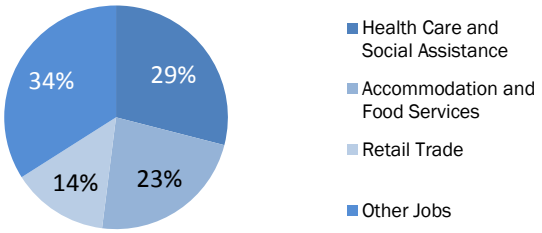
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

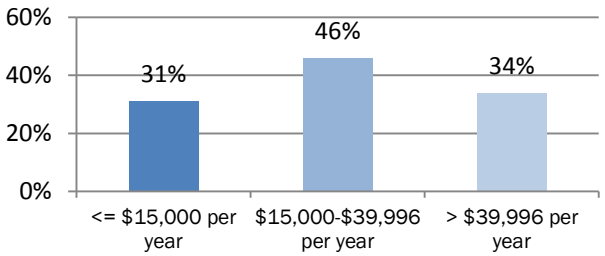
Total Population – 8,469 persons

Total Primary Jobs – 2,718 jobs

Jobs by Industry



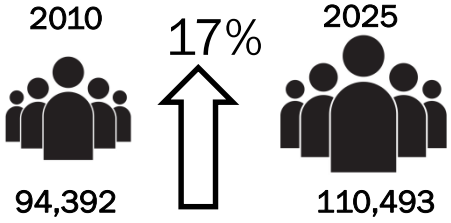
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
16,113
Working Age Population Within a 45 Minute Drive
27,784
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Blacksburg Town

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

Moderate

- ✓ Transit Capacity/Access
- ✓ Complete Streets
- ✓ Safety Features

External UDA Needs

High

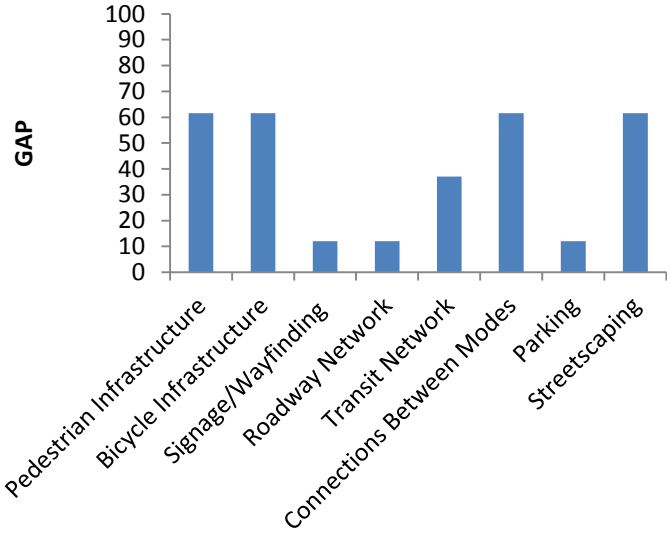
- ✓ Transit Facilities/Amenities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Improvements to Natural Environment

Moderate

- ✓ Transit Capacity/Access
- ✓ Complete Streets
- ✓ Safety Features

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

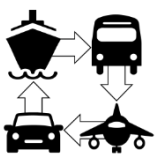


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Access to transportation networks beyond the UDA

Urban Development Areas – City of Martinsville

UDA Needs Profile: All UDAs

The City of Martinsville has designated two UDAs within their jurisdiction – the Baldwin Block and the Sara Lee facility, both located in downtown Martinsville and south of Commonwealth Boulevard and Jones Creek.

Location Characteristics

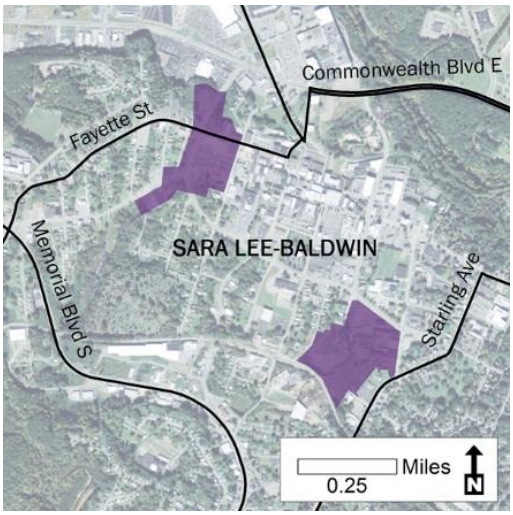
PDC – Hampton Roads PDC

UDA Size – 0.1 square miles total

Year Designated – 2011

Comprehensive Plan Detail - In a 2011 Amendment to its comprehensive plan, the City of Martinsville designated two Urban Development Areas (UDAs) - the Baldwin Block (a major uptown infill parcel that was empty at the time), and the Sara Lee facility (a large infill, redevelopment or adaptive reuse site near the Baldwin Block in Uptown Martinsville). The amendment notes that the Uptown area is at the geographic and historical heart of Martinsville, and is well-positioned to be a center of future dense, mixed-use growth - and that the City can save substantially on new water and sewer infrastructure costs by encouraging future developments with the UDA, rather than the edge of the City (which would require utility line extension).

Geographic Location -



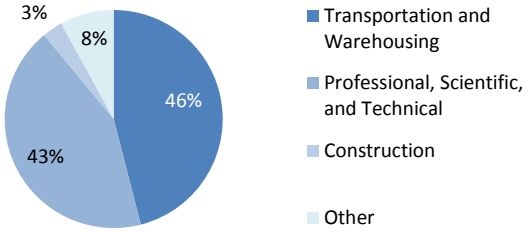
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

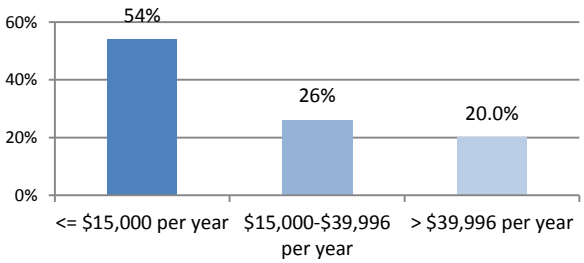
Total Population –310 persons

Total Primary Jobs – 35 jobs

Jobs by Industry



Total Jobs by Earnings



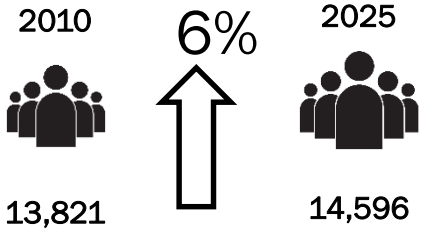
Jobs Within a 45 Minute Drive
18,787

Working Age Population Within a 45 Minute Drive
32,430

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – City of Martinsville

Current Place Type - Large Town or Suburban Center



Planned Place Type - Large Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming
- ✓ Improvements to Natural Environment

Moderate

- ✓ Street Grid
- ✓ On-Street Parking Capacity
- ✓ Off-Street Parking Capacity
- ✓ Signage/Wayfinding

External UDA Needs

High

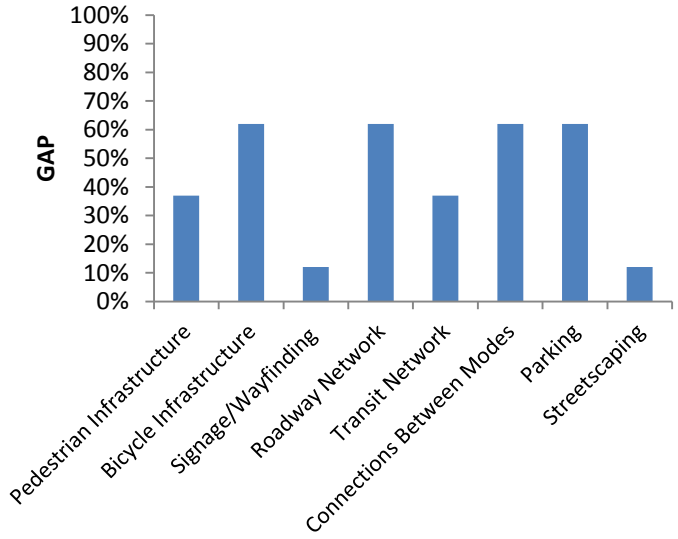
- ✓ Roadway Operations
- ✓ Bicycle & Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming
- ✓ Improvements to Natural Environment

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Street Grid
- ✓ On-Street and Off-Street Parking Capacity
- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas–Montgomery County

UDA Needs Profile: All UDAs

Montgomery County has designated two Urban Development Areas (UDAs) in the county: one along the Route 177 corridor, and another in the Mid-County area near Merrimac.

Location Characteristics

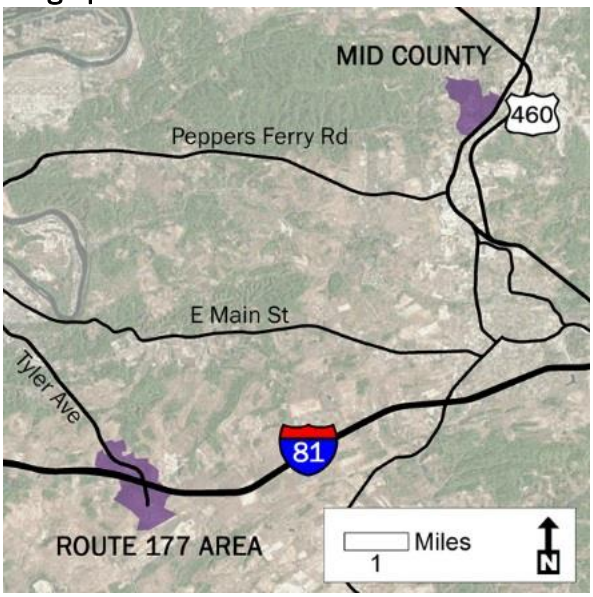
PDC – New River Valley PDC

UDA Size – 1.3 square miles total

Year Designated – 2011

Comprehensive Plan Detail - These UDAs are adjacent to the Town of Blacksburg, the Town of Christiansburg and the City of Radford, and are planned for compact, mixed use development at urban development densities and intensities. Development within the UDA must be compact, using Traditional Neighborhood Design principles, and designed to accommodate pedestrian and vehicular traffic with a full complement of services and amenities. Development in the UDA should also provide for transit facilities or stops. Urban Development Areas are served by or planned for central sewer and water service, and transportation infrastructure.

Geographic Location



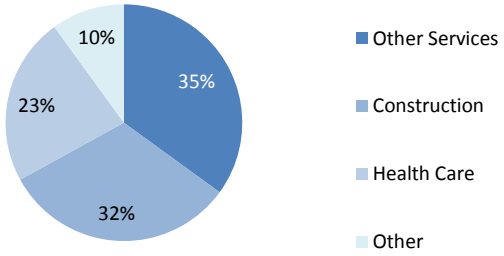
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

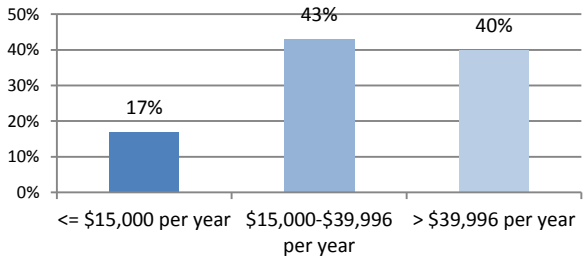
Total Population –2,141 persons

Total Primary Jobs – 135 jobs

Jobs by Industry



Total Jobs by Earnings



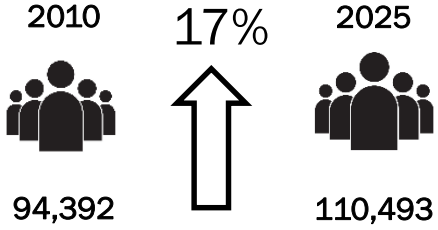
Jobs Within a 45 Minute Drive
2,617

Working Age Population Within a 45 Minute Drive
6,215

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Montgomery County

Current Place Type – Undeveloped (Greenfield)

Planned Place Type – Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Transit Frequency/Operations
- ✓ Transit Facilities/Capacity
- ✓ Street Grid
- ✓ Bicycle/Pedestrian Infrastructure
- ✓ Complete Streets/Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming

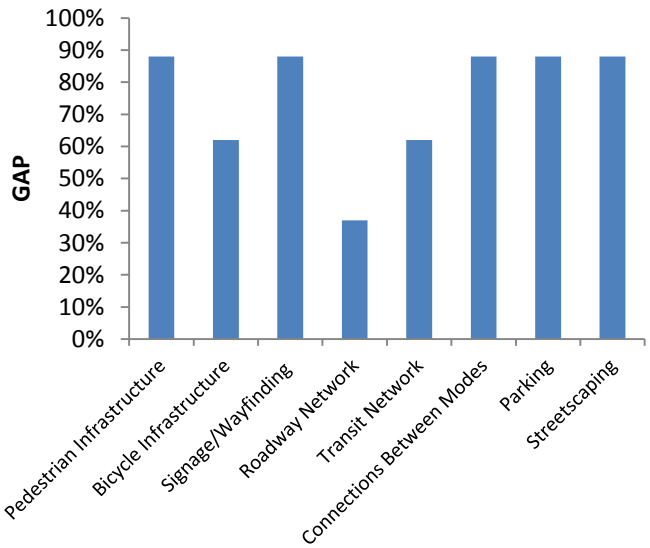
External UDA Needs

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming
- ✓ Improvements to Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Transit Enhancements

Urban Development Areas – Salem City

UDA Needs Profile: All UDAs

Salem City UDAs are located along Route 460 and Route 11 and bounded by I-81 to the north and VA 117 to the east.

Location Characteristics

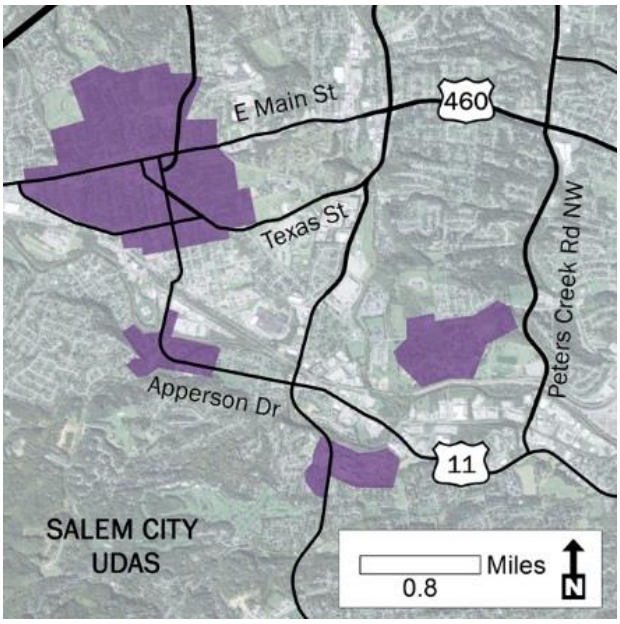
PDC – Roanoke Valley-Alleghany Regional Commission

UDA Size – 1.8 square miles

Year Designated – 2015

Comprehensive Plan Detail - The City of Salem is in the process of designating UDAs in four areas of the town, including Downtown, the Lewis-Gale Medical Center, the Salem Veterans Affairs Medical Center, and Apperson Drive. They will be designated by September 2015.

Geographic Location

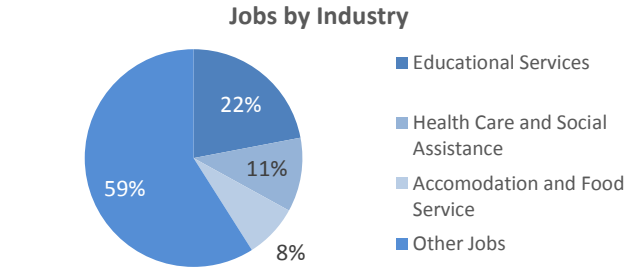


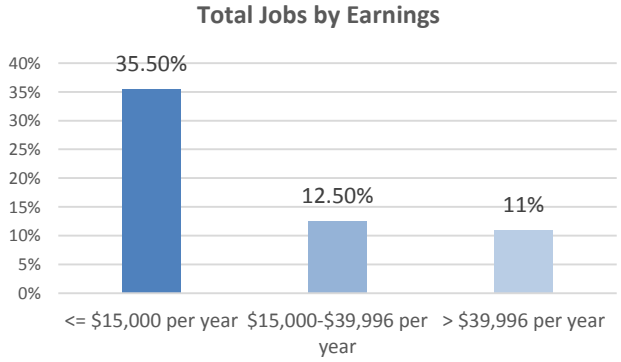
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 10,012 persons

Total Primary Jobs – 3,364 jobs

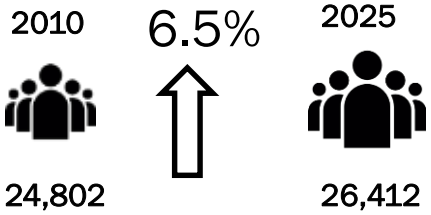




Jobs Within a 45 Minute Drive
35,012
Working Age Population Within a 45 Minute Drive
43,976
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Salem City

Current Place Type - Medium Town Center



Planned Place Type - Medium Town Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Transit Facilities
- ✓ Safety Features

External UDA Needs

High

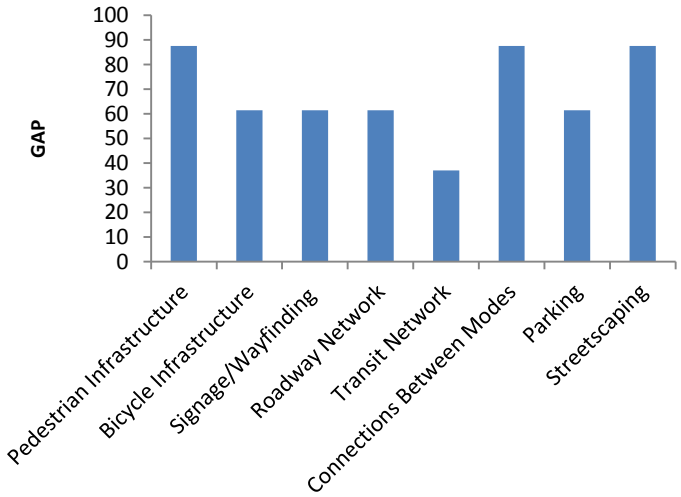
- ✓ Bicycle Infrastructure
- ✓ Complete Streets

Moderate

- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Pedestrian Infrastructure

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Transit Enhancements

Urban Development Areas – Roanoke City

UDA Needs Profile

The city of Roanoke designated its entire City limits as a UDA. Roanoke City is located in the Roanoke Valley, bisected by the Roanoke River and west of the Blue Ridge Parkway.

Location Characteristics

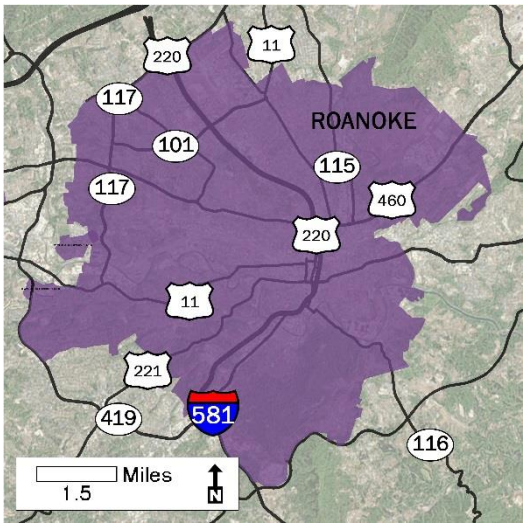
PDC –Roanoke Valley – Alleghany Regional Commission

UDA Size – 41.9 square miles

Year Designated – 2015

Comprehensive Plan Detail –The City of Roanoke designated its entire city boundaries as an Urban Development Area, with the exception of areas encumbered by a recorded conservation easement established pursuant to the Virginia Conservation Easement Act. The only existing conservation easements existing in Roanoke apply to portions of Mill Mountain and to the property located at 301 Tinker Creek Lane. The City's zoning ordinance and subdivision ordinance incorporate principles of traditional neighborhood design such as pedestrian-friendly street design, interconnected streets, preservation of natural areas, and mixed-use neighborhoods.

Geographic Location

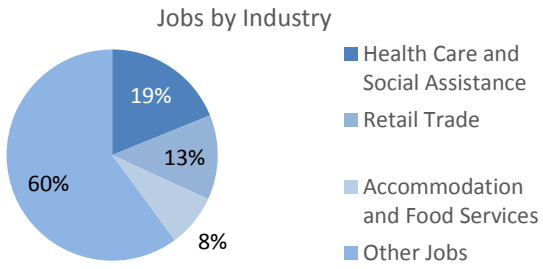


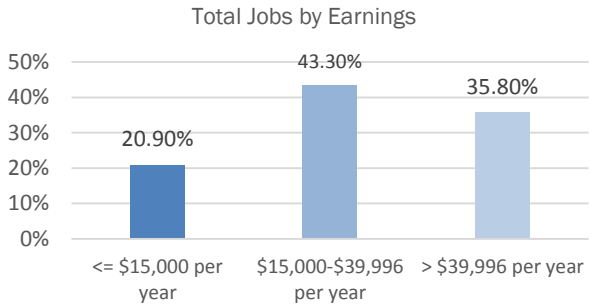
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 97,032 persons

Total Primary Jobs – 65,989 jobs

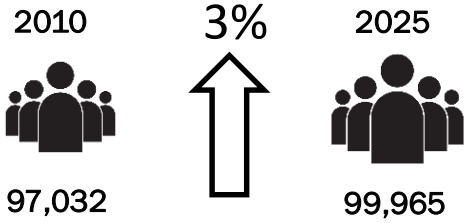




Jobs Within a 45 Minute Drive
152,980
Working Age Population Within a 45 Minute Drive
171,670
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Roanoke City

Current Place Type - Urban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit facilities
- ✓ Bicycle infrastructure
- ✓ Pedestrian infrastructure
- ✓ Complete Streets
- ✓ Transit Capacity

Moderate

- ✓ Transit Frequency
- ✓ Intersection Design
- ✓ On-street parking
- ✓ Traffic Calming
- ✓ Improvements to environment

External UDA Needs

High

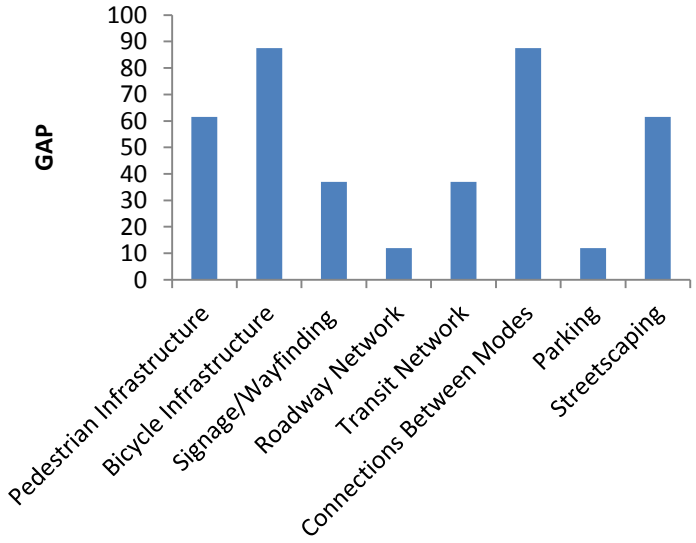
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ On-street Parking

Moderate

- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Traffic Calming
- ✓ Improvements to Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Friendly pedestrian and bicycle environment

Urban Development Areas – Roanoke County

UDA Needs Profile: All UDAs

Roanoke County identified six Designated Growth Areas, including Route 419/221/Cave Spring/Windsor Hills area, the Route 24/116/Vinton/Mount Pleasant area, the Route 220 South/Clearbrook area, the Village Centers area, the Route 460 East/Bonsack area, and the I-81/Glenvar/Hollins area.

Location Characteristics

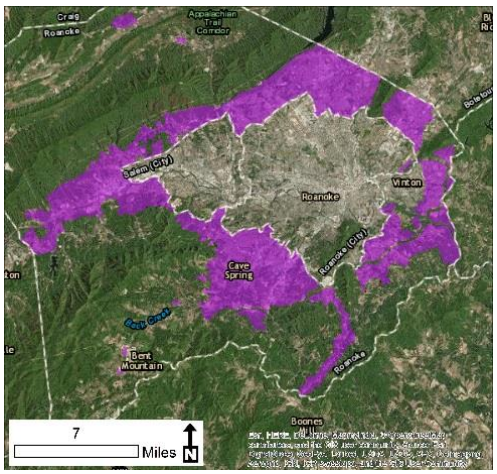
PDC- Roanoke Valley – Alleghany Regional Commission

UDA Size – 64 square miles

Year Designated – 2015

Comprehensive Plan Detail – Primary designated growth areas are currently served by public water and sewer where the majority of new growth should be encouraged. Future land use designations include: Principal Industrial, Core, Transition, Development, Neighborhood Conservation, Economic Opportunity, Suburban Village, University, Glenvar Village and Mixed Use. Future designated growth areas are adjacent to primary growth areas where outward growth over the next 5 years should be accommodated. Future land use designations include: Development, and to a limited extent, Village Center. These primary and future designated growth areas are consistent with the intent of 15.2-2223.1.

Geographic Location



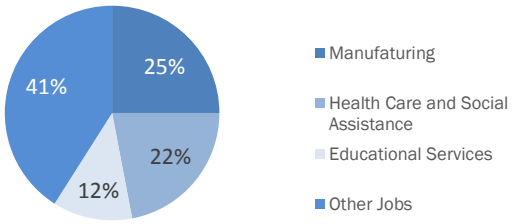
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

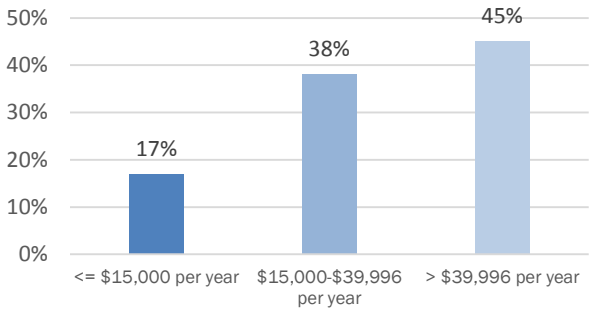
Total Population – 67,345 persons

Total Primary Jobs – 16,403 jobs

Jobs by Industry



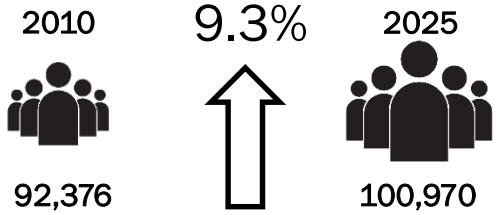
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
30,435
Working Age Population Within a 45 Minute Drive
88,453
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Roanoke County

Current Place Type - Medium Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Roadway Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design

Moderate

- ✓ Transit Frequency
- ✓ Transit Capacity
- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Signage/Wayfinding

External UDA Needs

High

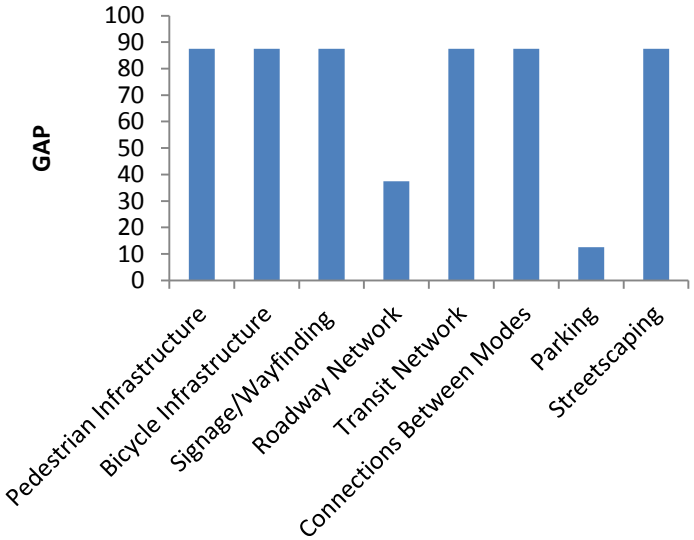
- ✓ None listed

Moderate

- ✓ Safety Features
- ✓ Intersection Design
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Frederick County

UDA Needs Profile: All UDAs

Frederick County, Virginia's northernmost county has two UDA's, surrounded by the City of Winchester and located adjacent to the I-81 corridor.

Location Characteristics

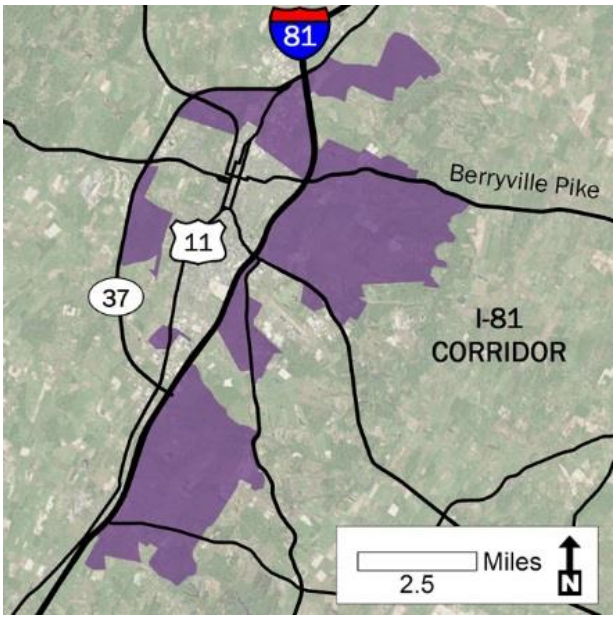
PDC – Northern Shenandoah Valley Regional Commission

UDA Size – 26.9 square miles

Year Designated – 2011

Comprehensive Plan Detail - Frederick County has designated two UDA locations - one located adjacent to Stephens City, and the other adjacent to the City of Winchester. Frederick County has identified its UDA as a location where more intensive forms of residential development will occur to accommodate the anticipated residential growth within the community. Neighborhood design policies will help transform areas within the UDA into walkable, mixed-used, interconnected focal points.

Geographic Location

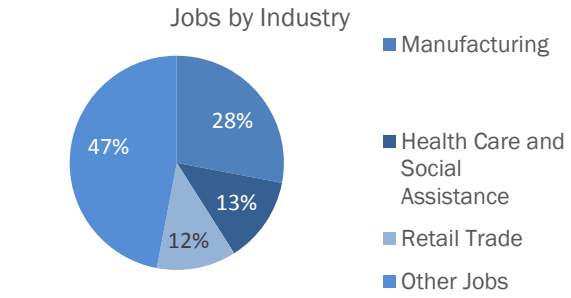


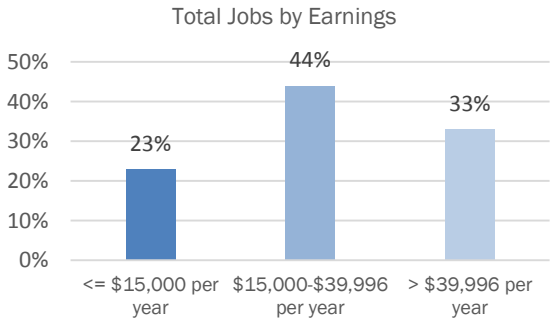
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 47,427 persons

Total Primary Jobs – 8,268 jobs





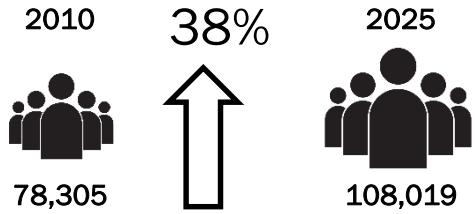
Jobs Within a 45 Minute Drive
32,870

Working Age Population Within a 45 Minute Drive
44,523

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Frederick County

Current Place Type - Large Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity/Infrastructure improvements
- ✓ Safety Features
- ✓ Intersection Design

Moderate

- ✓ Roadway Capacity/Infrastructure improvements
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets

External UDA Needs

High

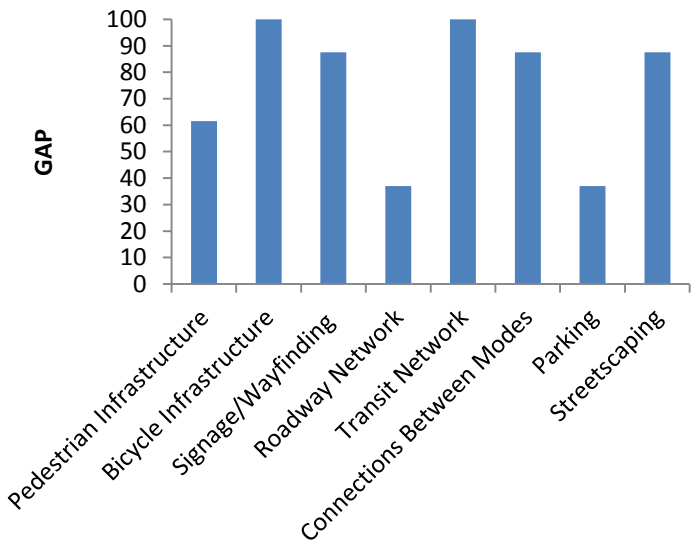
- ✓ Roadway Capacity/Infrastructure improvements
- ✓ Safety Features

Moderate

- ✓ Bicycle Infrastructure

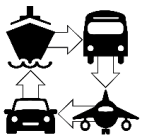
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Harrisonburg City

UDA Needs Profile: All UDAs

The City of Harrisonburg has designated three UDAs within its city boundaries. UDA one is located in downtown Harrisonburg. UDA two and three are located adjacent to I-81 and feature mixed use and high and medium density residential development.

Location Characteristics

PDC – Central Shenandoah Planning District Commission

UDA Size – 1.0 square miles

Year Designated – 2011

Comprehensive Plan Detail – The City of Harrisonburg's 2011 Comprehensive Plan Updates designates three Urban Development Area (UDA) locations within the city. The city's land use guide map designates the desired land uses for the UDA locations in Harrisonburg. One UDA - located in downtown Harrisonburg - is designated almost entirely for mixed use development or public uses. Another UDA - west of downtown, along I-81 - is primarily designated as a mixed use development and medium density mixed residential. The third - located in the southeast section of the city, along I-81 - is designated for high density residential and medium density mixed residential.

Geographic Location

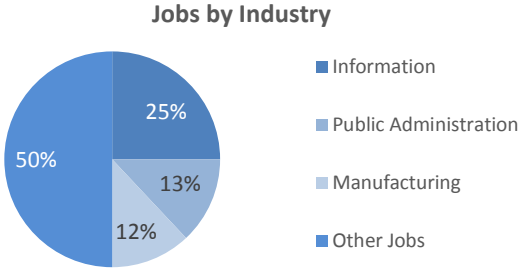


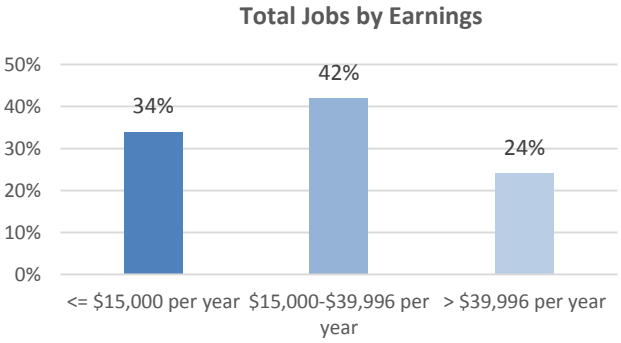
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 8,025 persons

Total Primary Jobs – 3,943 jobs

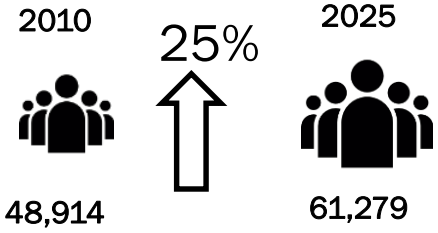




Jobs Within a 45 Minute Drive
37,771
Working Age Population Within a 45 Minute Drive
56,550
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Harrisonburg City

Current Place Type - Urban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Transit Frequency
- ✓ Transit Capacity/Access
- ✓ On-Street Parking Capacity

External UDA Needs

High

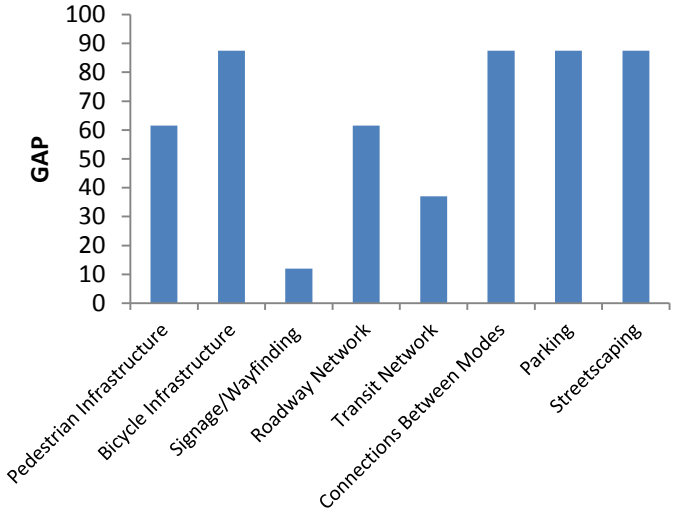
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations
- ✓ Transit Facilities
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking Capacity
- ✓ Intersection Design
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Transit Capacity/Access
- ✓ On-Street Parking Capacity
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Safety for all users

Urban Development Areas – New Market Town

UDA Needs Profile: All UDAs

The Town of New Market, located in Shenandoah County has designated three UDAs within their jurisdiction, all three situated east of the I-81.

Location Characteristics

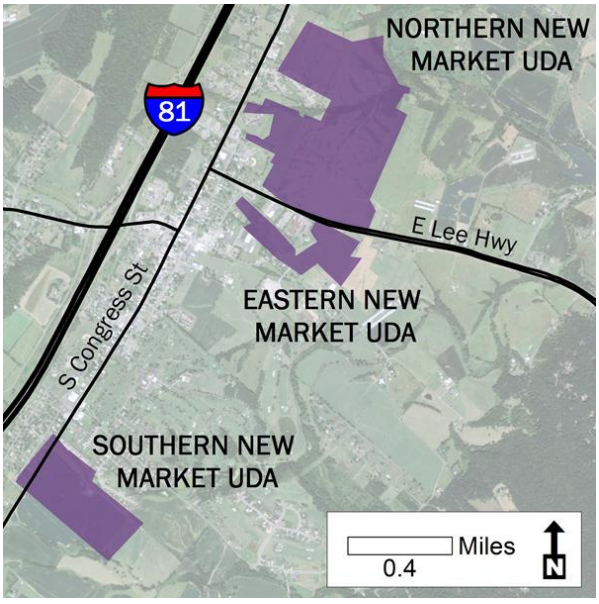
PDC – Northern Shenandoah Valley RC

UDA Size – 0.5 square miles

Year Designated – 2012

Comprehensive Plan Detail - New Market's 2012 Comprehensive Plan breaks the town's Urban Development Areas (UDAs) into three distinct sections: Northern, Eastern and Southern. The UDAs are split across the Shenandoah County growth area and the Town of New Market, and anticipated to be developed with a mix of residential and commercial uses in accordance with Virginia code related to UDAs. The UDAs contain approximately 166 acres in the Shenandoah County growth area and approximately 119 acres located within the Town of New Market.

Geographic Location -



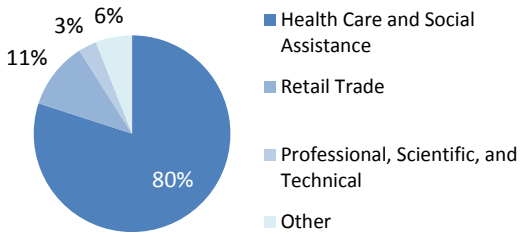
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

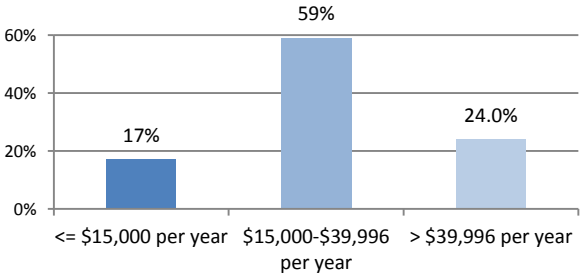
Total Population – 1,429 persons

Total Primary Jobs – 169 jobs

Jobs by Industry



Total Jobs by Earnings



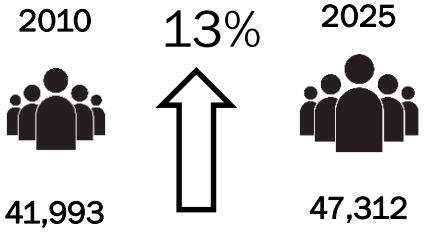
Jobs Within a 45 Minute Drive
4,144

Working Age Population Within a 45 Minute Drive
9,749

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – New Market Town

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Safety Features
- ✓ Off-street parking
- ✓ Intersection Design
- ✓ Safety Features

External UDA Needs

High

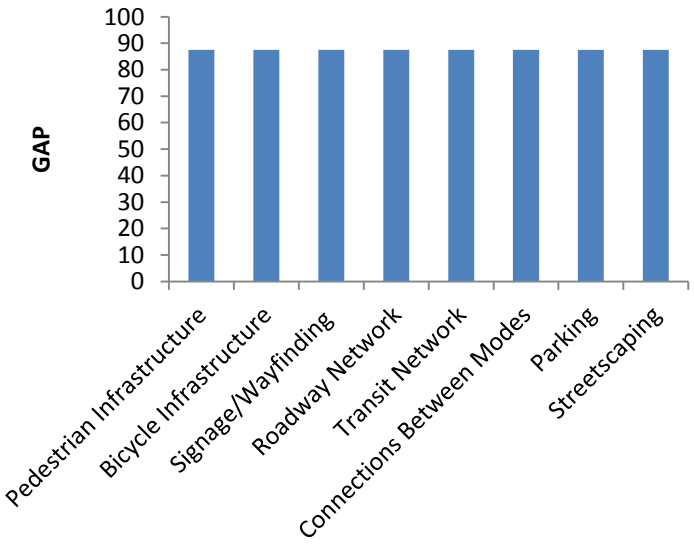
- ✓ None listed

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Page County

UDA Needs Profile: All UDAs

Page County has designated seven UDAs within their jurisdiction, five in the Town of Luray and two within the Town of Stanley.

Location Characteristics

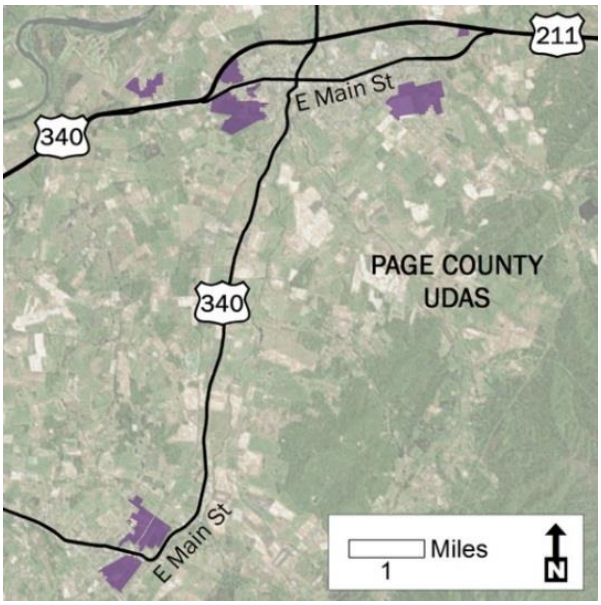
PDC – Northern Shenandoah Valley Planning District

UDA Size – 1.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - In a 2011 Amendment to its comprehensive plan, Page County designated seven Urban Development Areas (UDAs) within its jurisdiction in order to concentrate future growth in the Town of Luray (five UDAs) and the Town of Stanley (two UDAs). Compact site designs within the UDAs reduce the amount of land consumed by development, preserving Page County's rural landscape. The principles of traditional neighborhood design will be incorporated into the UDAs.

Geographic Location -

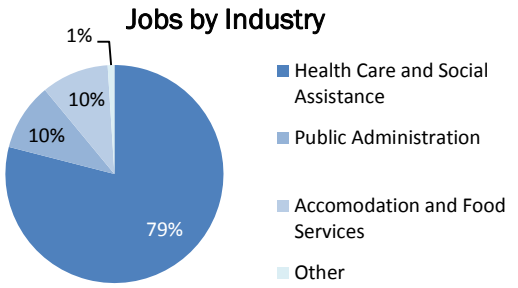


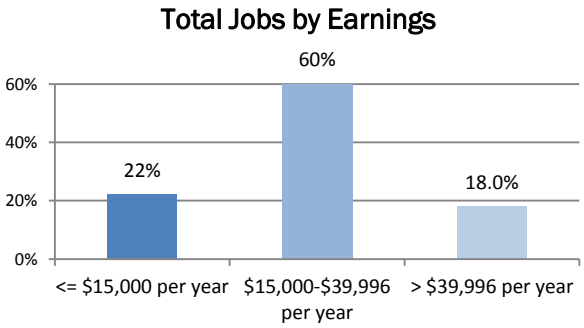
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 1,694 persons

Total Primary Jobs – 116 jobs

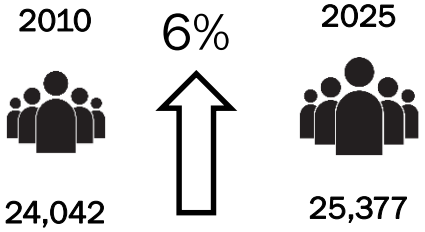




Jobs Within a 45 Minute Drive
4,141
Working Age Population Within a 45 Minute Drive
5,896
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Page County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking Capacity
- ✓ Signage/Wayfinding
- ✓ Improvements to Natural Environment

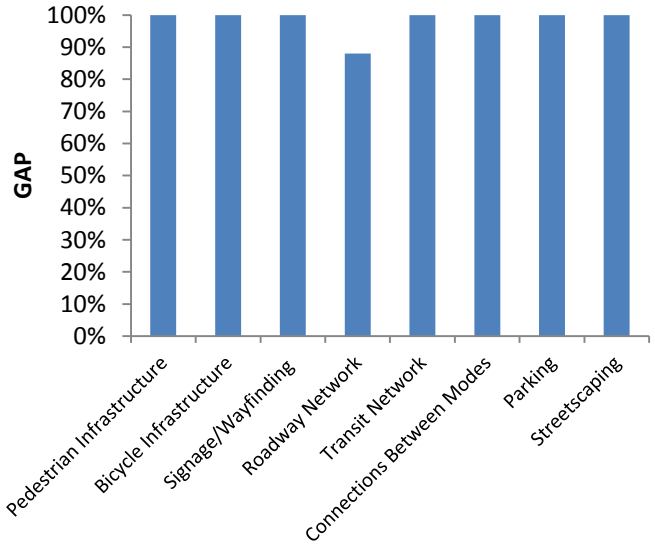
External UDA Needs

Moderate

- ✓ Roadway Capacity/Infrastructure
- ✓ Roadway Operations
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Signage/Wayfinding
- ✓ Improvements to Natural Environment

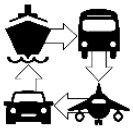
Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment

Urban Development Areas – Rockbridge County

UDA Needs Profile: All UDAs

Rockbridge County has six UDAs that are anchored around the I-64 and I-81 corridors, which bisect the County and parallel the Old Midland Trail (Rt 60) and the Valley Pike (Rt 11).

Location Characteristics

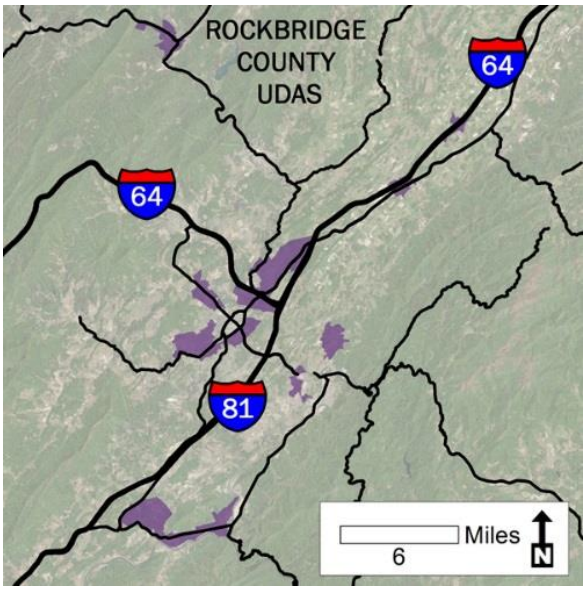
PDC – Central Shenandoah Planning District Commission

UDA Size – 12.6 square miles

Year Designated – 2003

Comprehensive Plan Detail - Rockbridge County has designated the defined County area around the City of Lexington, the Village of Natural Bridge, the Town of Glasgow and defined surrounding area, the County area around the City of Buena Vista, the Town of Goshen and defined surrounding area, the Village of Fairfield, and the Village of Raphine as Village Planning Areas. Village Planning Areas are defined in the land use plan as the more remote village areas characterized by the presence of existing development, accommodating road networks and existing or proposed access to public water and sewer services.

Geographic Location

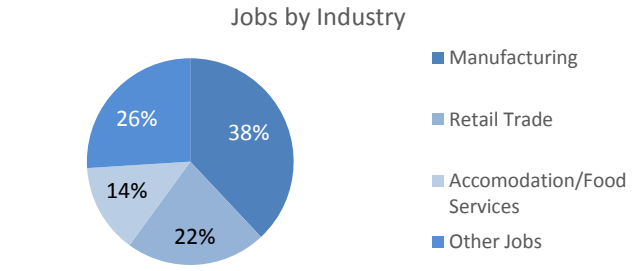


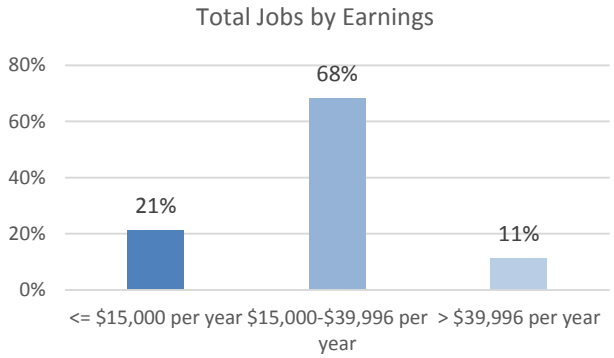
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 12,122 persons

Total Primary Jobs – 1,424 jobs





Jobs Within a 45 Minute Drive
27,216
Working Age Population Within a 45 Minute Drive
15,175
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Rockbridge County

Current Place Type - Medium Town Center



Planned Place Type - Medium Town Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

Moderate

- ✓ Roadway Operations
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

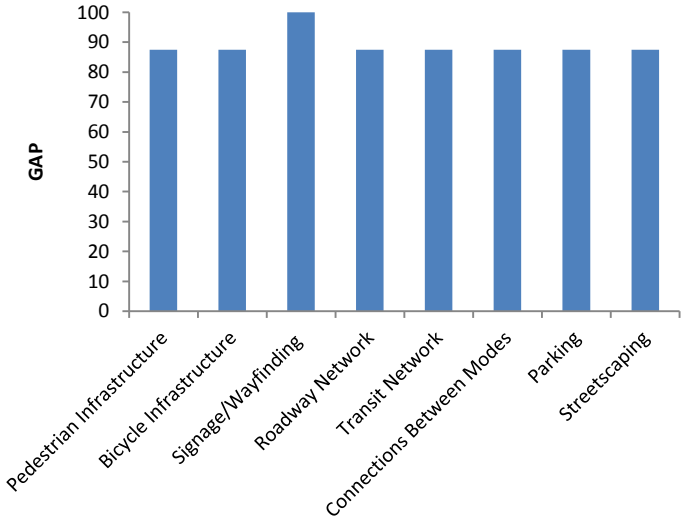
External UDA Needs

Moderate

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly pedestrian and bicycle environment



Transit Enhancements

Urban Development Areas–Rockingham County

UDA Needs Profile: Port Republic Road/Stone Spring

The Port Republic Road/Stone Spring UDA is just outside the southwest boundary of Harrisonburg, in the Port Republic Road corridor south of I-81.

Location Characteristics

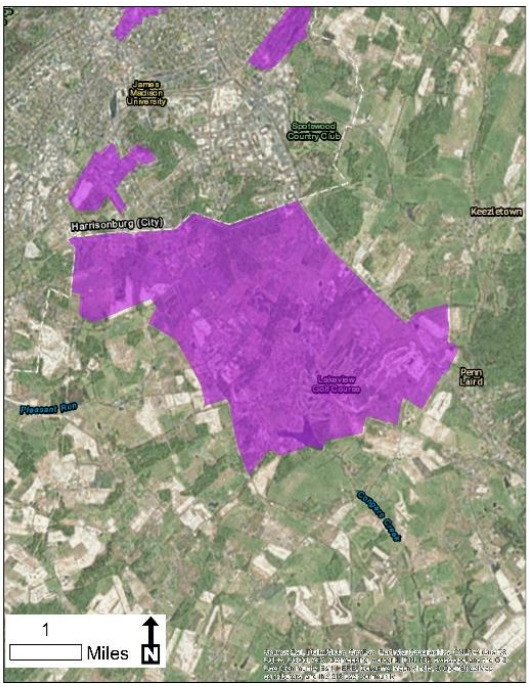
PDC – Central Shenandoah Planning District Commission

UDA Size – 6.5 square miles

Year Designated – 2010

Comprehensive Plan Detail - In a 2012 amendment in the Rockingham County Comprehensive Plan, the County designated an Urban Development Area (UDA) around the new Rockingham Memorial Hospital. The amendment included a new mixed use zoning district to allow the development of new neighborhoods that contain a mix of land uses and building types that are connected to a system of pedestrian-friendly streets.

Geographic Location

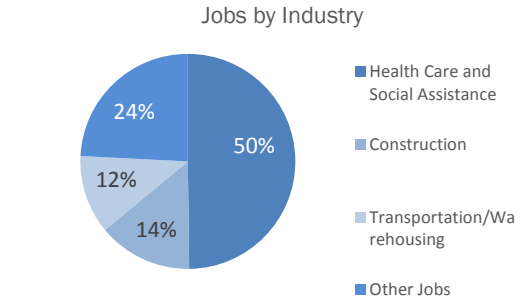


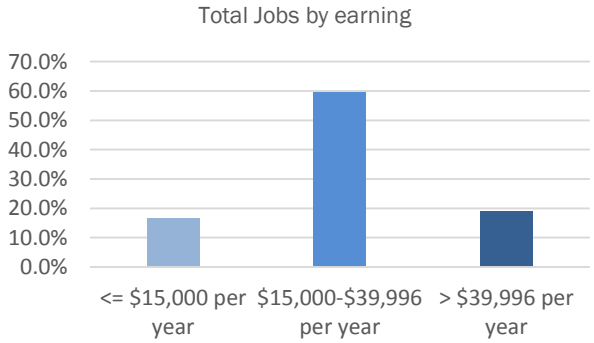
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 11,927 persons

Total Primary Jobs – 558 jobs





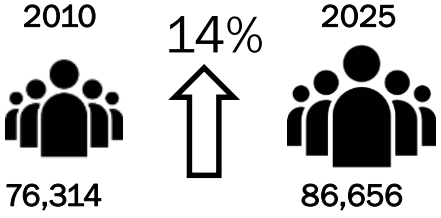
Jobs Within a 45 Minute Drive
14,840

Working Age Population Within a 45 Minute Drive
24,083

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas–Rockingham County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ On-Street Parking Capacity

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Intersection Design

External UDA Needs

High

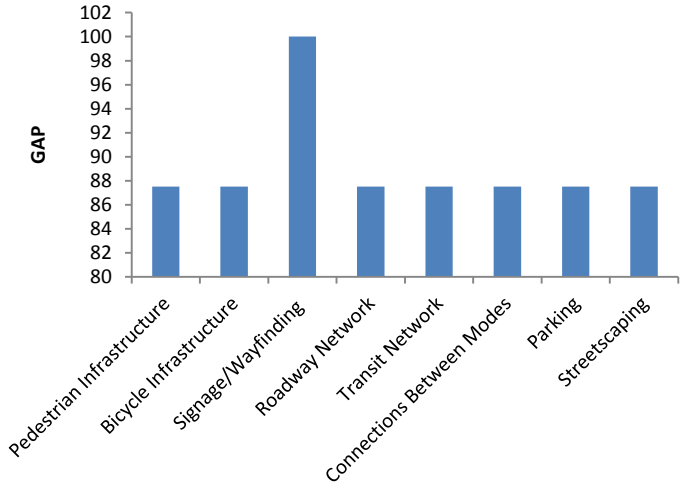
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features

Moderate

None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Access to transportation networks beyond the UDA



Friendly pedestrian and bicycle environment



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Warren County

UDA Needs Profile: Front Royal

Warren County and the Town of Front Royal designated three UDAs – Front Royal North, Leach Run, and Front Royal South. This profile represents the characteristics and needs of Front Royal North (the Happy Creek area to the east of downtown Front Royal).

Location Characteristics

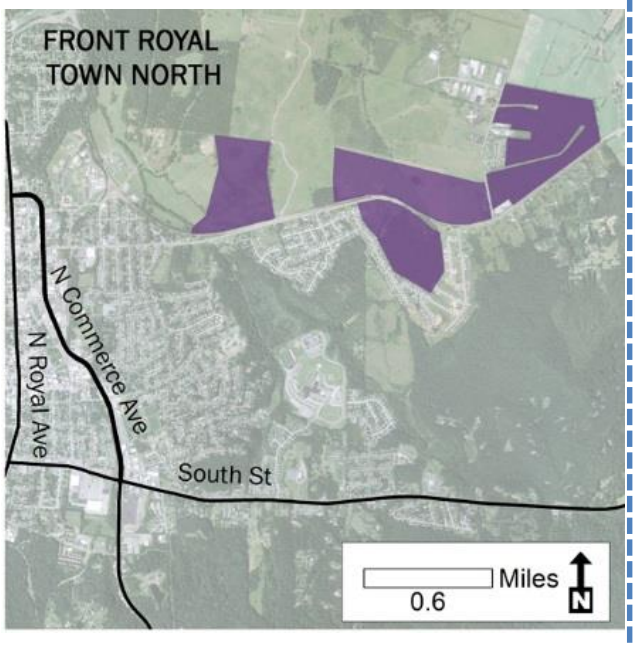
PDC – Northern Shenandoah Valley Regional Commission

UDA Size – 1.1 square miles

Year Designated – 2011

Comprehensive Plan Detail - Warren County has designated three Urban Development Areas (UDAs) - Front Royal Town - South, Front Royal Town - North, and Leach Run (also in the town of Front Royal). The County worked with the Town of Front Royal to identify the required acreage sufficient to satisfy projected residential and commercial growth of ten years. UDAs are required to incorporate principles of new urbanism and traditional neighborhood design.

Geographic Location

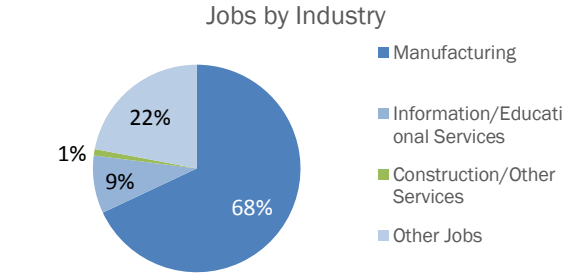


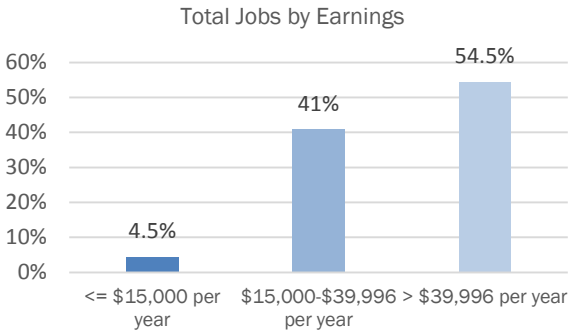
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 571 persons

Total Primary Jobs – 22 jobs





Jobs Within a 45 Minute Drive
4,729
Working Age Population Within a 45 Minute Drive
10,918
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Warren County

Current Place Type - Undeveloped (Greenfield/Grayfield)

Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway capacity and infrastructure
- ✓ Street grid
- ✓ Bicycle infrastructure
- ✓ Safety features

Moderate

- ✓ Roadway operations
- ✓ Transit facilities/amenities
- ✓ Pedestrian infrastructure
- ✓ Complete streets
- ✓ Off-street parking capacity
- ✓ Intersection design
- ✓ Signage/Wayfinding
- ✓ Traffic calming

External UDA Needs

High

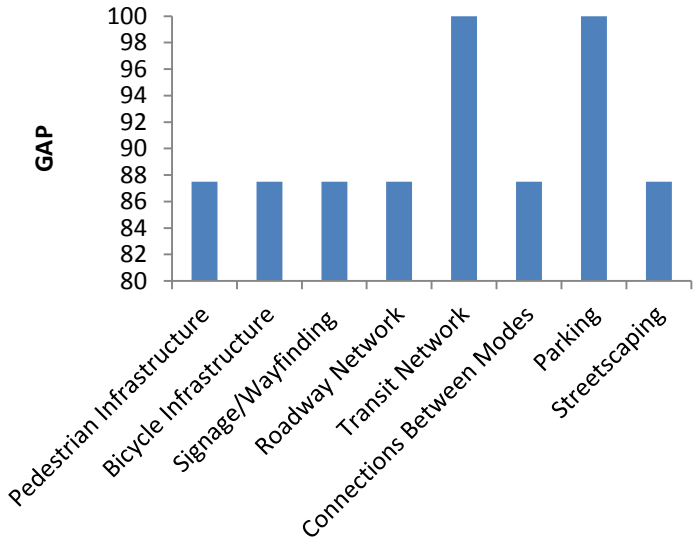
- ✓ Roadway capacity and infrastructure
- ✓ Street grid
- ✓ Bicycle infrastructure
- ✓ Safety features

Moderate

- ✓ Roadway operations
- ✓ Transit facilities/amenities
- ✓ Pedestrian infrastructure
- ✓ Complete streets
- ✓ Off-street parking capacity
- ✓ Intersection design
- ✓ Signage/Wayfinding
- ✓ Traffic calming

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Waynesboro City

UDA Needs Profile

The City of Waynesboro designated its entire city boundary as an Urban Development Area in 2015. Waynesboro is located in Shenandoah Valley, bisected by I-64 and bordered by the Shenandoah National Park to the north and the Blue Ridge Parkway to the south.

Location Characteristics

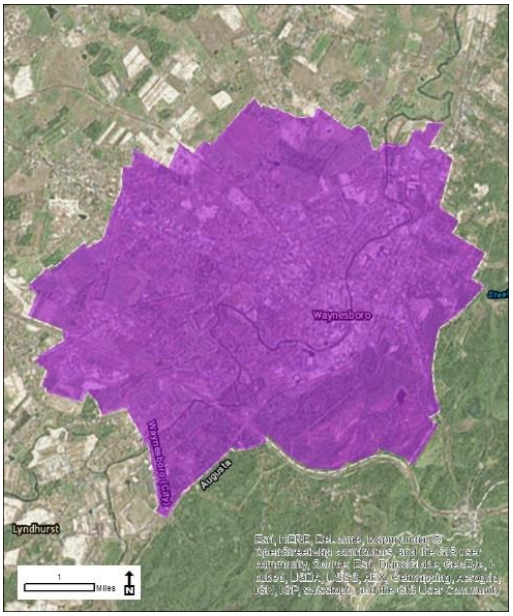
PDC – Central Shenandoah Planning District Commission

UDA Size –15 square miles

Year Designated – 2015

Comprehensive Plan Detail – Waynesboro's entire 15 square miles is served or could be served by public water and sewer. With regards to the density requirements, the entire City currently zoned for density thresholds that meet or exceed the State laws minimums, with the except of the RS-12 single family dwelling district. However, with a minimum lot size of 12,000 square feet (roughly 3.6 dwelling units per acre) and lot width of 100 feet, the RS-12 district is close to the intent of the UDA requirements.

Geographic Location



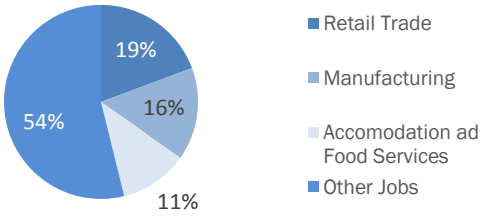
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

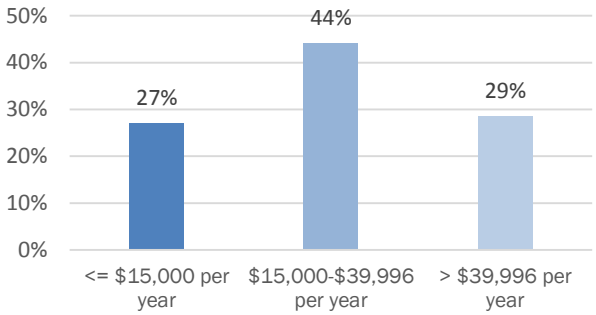
Total Population – 21,006 persons

Total Primary Jobs – 8,779 jobs

Jobs by Industry



Total Jobs by Earnings



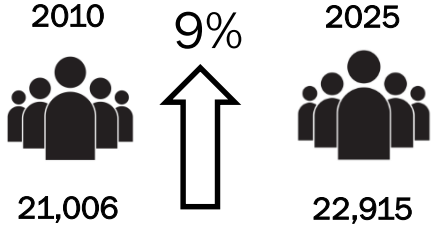
Jobs Within a 45 Minute Drive
131,099

Working Age Population Within a 45 Minute Drive
231,079

Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Waynesboro City

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations/Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Complete Streets
- ✓ Safety Features

External UDA Needs

High

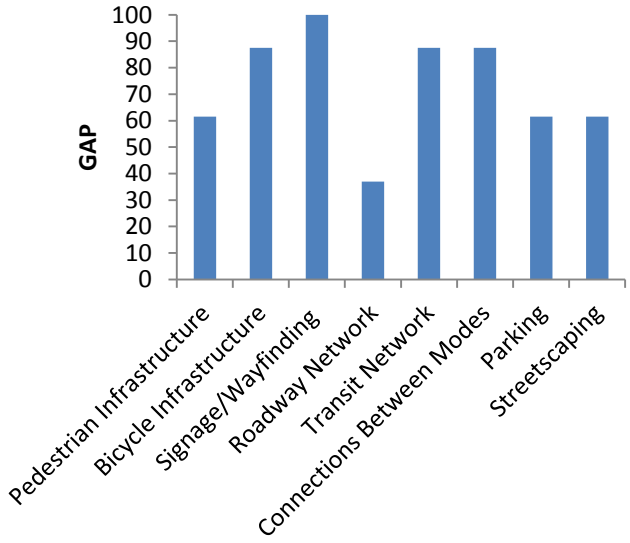
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Capacity/Infrastructure Improvements
- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Operations/Capacity/Access
- ✓ Transit Facilities/Amenities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure, Complete Streets
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

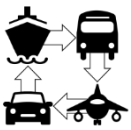


Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Circulation and access within the UDA



Access to transportation networks beyond the UDA

Urban Development Areas – Woodstock Town

UDA Needs Profile: Area 1

The Town of Woodstock has designated two UDAs within their jurisdiction. Area 1 UDA is located between Route 11 and the North Fork Shenandoah River, and east of the downtown district.

Location Characteristics

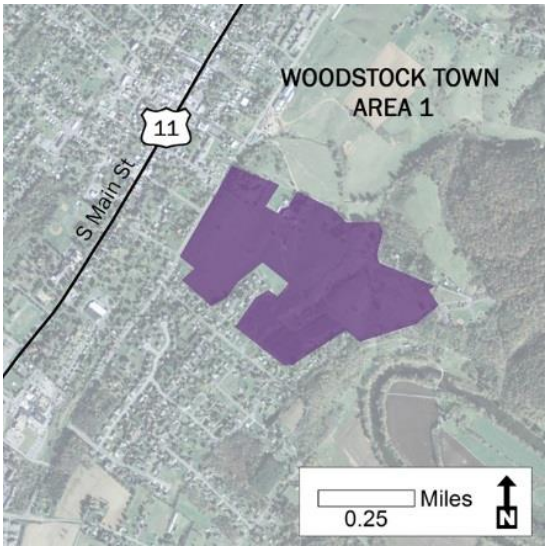
PDC – Northern Shenandoah Valley Regional Commission

UDA Size – 0.2 square miles

Year Designated – 2011

Comprehensive Plan Detail - Woodstock currently has two Urban Development Areas (UDAs). The first, located directly to the east of Woodstock's primary downtown district, is a critical location of undeveloped parcels that could be used for a variety of compact residential uses to support Woodstock's Main Street core. The second, located at the southeast edge of Woodstock, could be an ideal location for TND-style development that is transitional in nature, combining both village-scale residential and commercial opportunities.

Geographic Location



Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 197 persons

Total Primary Jobs – Currently no jobs per LEHD

Jobs Within a 45 Minute Drive
7,767
Working Age Population Within a 45 Minute Drive
13,703
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Woodstock Town

Current Place Type -

TBD based on coordination with locality

Planned Place Type -

TBD based on coordination with locality

Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

Moderate

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Moderate

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas – Woodstock Town

UDA Needs Profile: Area 2

The Town of Woodstock has designated two UDAs within their jurisdiction. Area 2 UDA is located at the southeast edge of Woodstock, adjacent to Route 11 and west of the North Fork Shenandoah River.

Location Characteristics

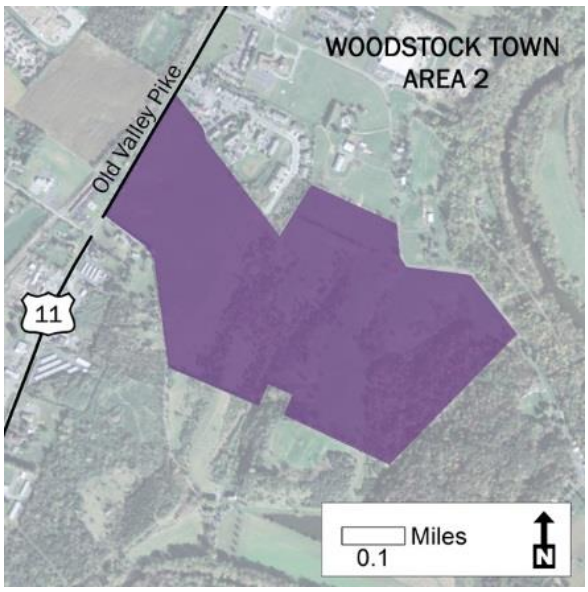
PDC – Northern Shenandoah Valley Regional Commission

UDA Size – 0.2 square miles

Year Designated – 2011

Comprehensive Plan Detail - Woodstock currently has two Urban Development Areas (UDAs). The first, located directly to the east of Woodstock's primary downtown district, is a critical location of undeveloped parcels that could be used for a variety of compact residential uses to support Woodstock's Main Street core. The second, located at the southeast edge of Woodstock, could be an ideal location for TND-style development that is transitional in nature, combining both village-scale residential and commercial opportunities.

Geographic Area

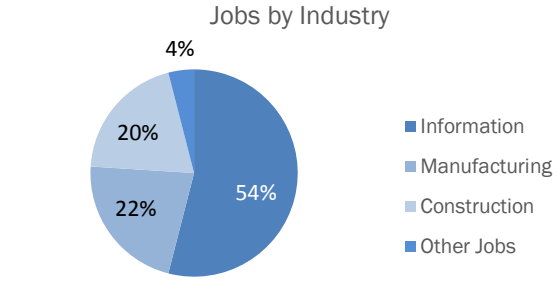


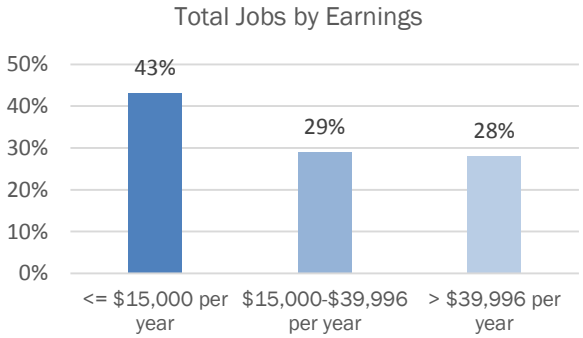
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 348 persons

Total Primary Jobs – 65 jobs

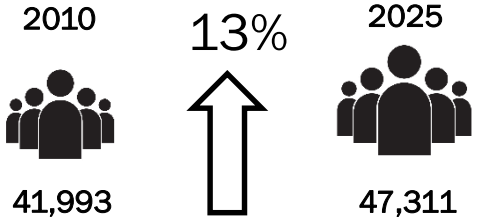




Jobs Within a 45 Minute Drive
7,691
Working Age Population Within a 45 Minute Drive
14,804
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Woodstock Town

Current Place Type -

TBD based on coordination with locality

Planned Place Type -

TBD based on coordination with locality

Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

TBD based on coordination with locality

Moderate

TBD based on coordination with locality

External UDA Needs

High

TBD based on coordination with locality

Moderate

TBD based on coordination with locality

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

TBD based on coordination with locality

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)

TBD based on coordination with locality

Urban Development Areas – Broadway Town

UDA Needs Profile: Broadway Town UDA

The Town of Broadway has one UDA, located east of Timber Way and the North Fork Shenandoah River. Planned development for the UDA includes an interconnected street network, mixed-use buildings, and targeted public investments in street lighting, street furniture and sidewalks.

Location Characteristics

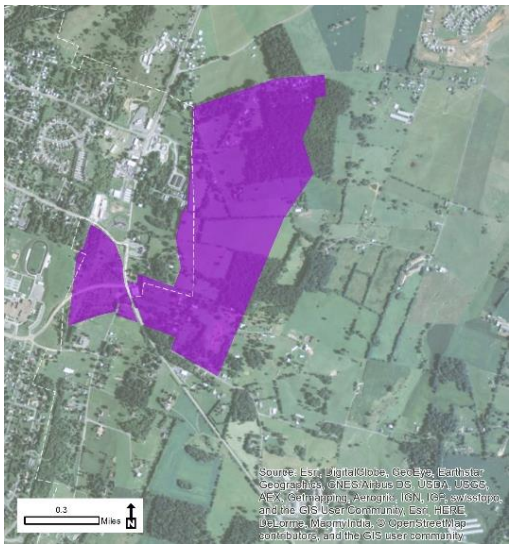
PDC – Northern Shenandoah Valley Regional Commission

UDA Size – 0.3 square miles

Year Designated – 2011

Comprehensive Plan Detail
Urban Development Areas are designated areas within the planned annexation area adjacent to the Town. It is planned for compact, mixed use development at urban development densities and intensities and intended to serve as a focal point for growth over the next 10-20 years. Development within the UDA must be compact, using Traditional Neighborhood Design principles, and designed to accommodate pedestrian and vehicular traffic with a full complement of services and amenities. Urban Development Areas are served by or planned for central sewer and water service, and transportation infrastructure.

Geographic Area

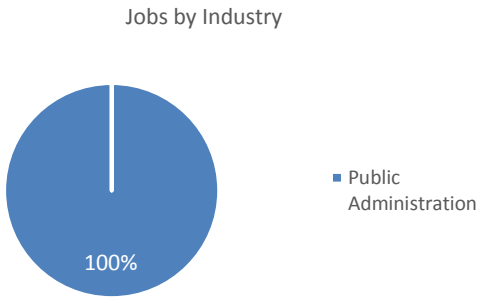


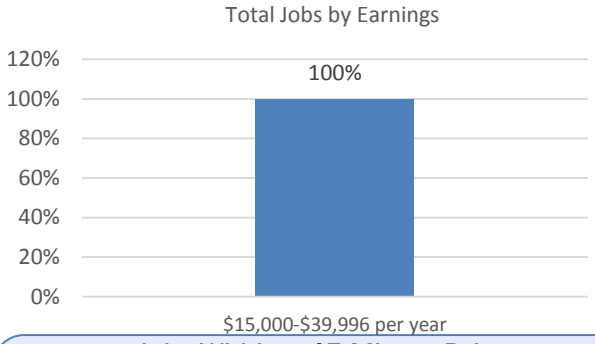
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population – 1,073 persons

Total Primary Jobs – 1 job

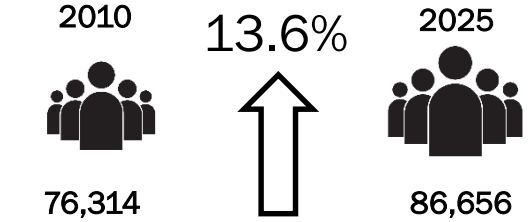




Jobs Within a 45 Minute Drive
6,713
Working Age Population Within a 45 Minute Drive
13,209
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Broadway Town

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway capacity and infrastructure

Moderate

None listed

External UDA Needs

High

None listed

Moderate

None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)

None listed

Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Town of Luray

UDA Needs Profile: All UDAs

The Town of Luray, located in the Shenandoah Valley, designated five UDAs, all permitting densities of four units per acre or more and projected to satisfy residential and commercial growth for a 10 to 20-year planning horizon.

Location Characteristics

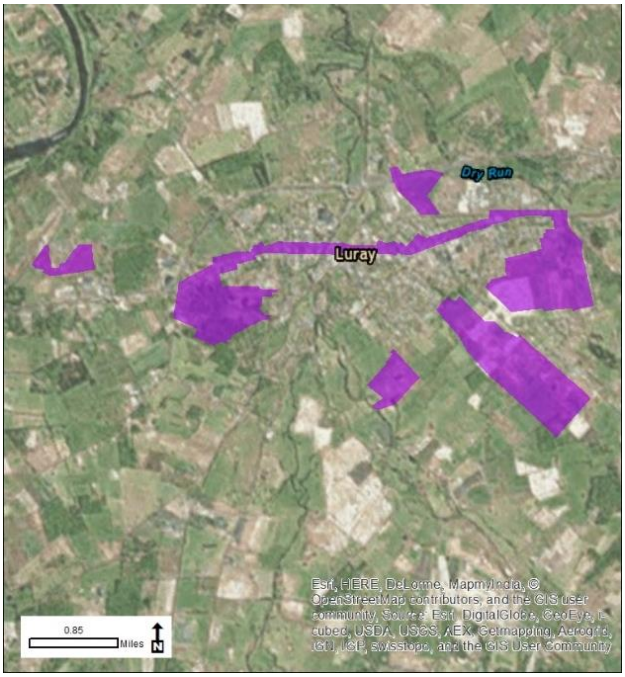
PDC – Central Shenandoah Planning District

UDA Size –1.5 square miles

Year Designated – 2015

Comprehensive Plan Detail – The Town of Luray's zoning and subdivision ordinance provide mechanisms for traditional neighborhood design such as pedestrian-friendly street design, interconnected streets, preservation of natural areas, mixed-use neighborhoods that include mixed housing types, shallow or no building setback requirements, and reduction of subdivision street widths and turning radii at subdivision street intersections.

Geographic Area



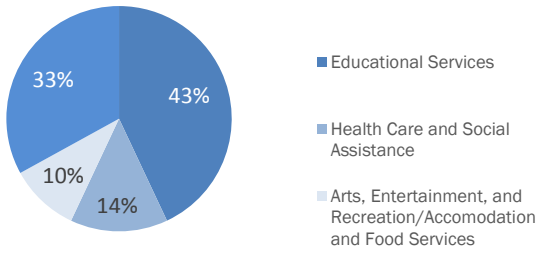
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

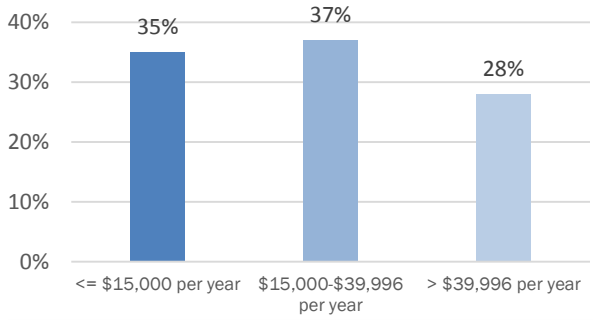
Total Population –2,635 persons

Total Primary Jobs – 1,486 jobs

Jobs by Industry



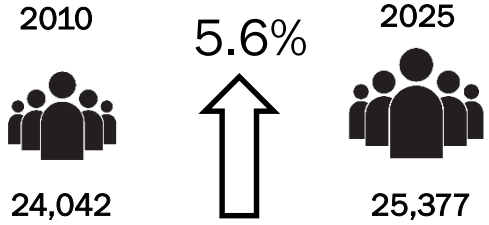
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
14,264
Working Age Population Within a 45 Minute Drive
32,803
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Town of Luray

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Bicycle Infrastructure
- ✓ Complete Streets
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Capacity
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Safety Features
- ✓ On-Street Parking
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming Features

External UDA Needs

High

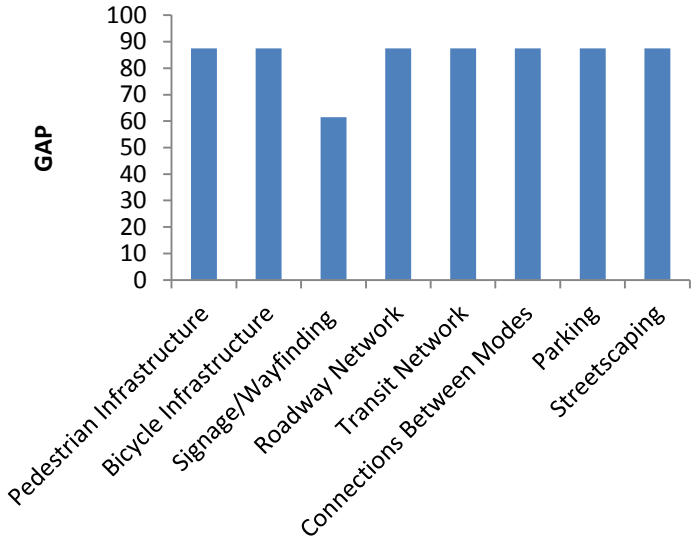
- ✓ Roadway Operations
- ✓ Transit Capacity
- ✓ Bicycle Infrastructure

Moderate

- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Intersection Design
- ✓ Improvements to the Natural Environment
- ✓ On-Street Parking
- ✓ Off-Street Parking

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Friendly Pedestrian and Bicycle Environment



Safety for all users

Urban Development Areas – Clifton Forge

UDA Needs Profile

The Town of Clifton Forge designated the entire town boundary as a UDA in 2015, along the Jackson River and straddling/to the south of US 60.

Location Characteristics

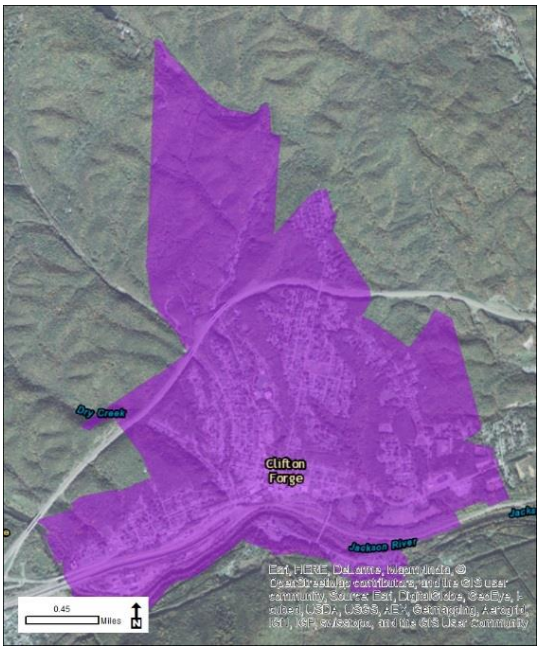
PDC- Roanoke Valley-Alleghany Regional Commission

UDA Size – 3 square miles

Year Designated – 2015

Comprehensive Plan Detail - In order to promote future growth in residential and commercial areas, the establishment of the entire town as an Urban Development Area (UDA) is proposed. In developing a town-wide UDA, the Town will be able to provide incentives for attracting new and infill development, and allow it to apply for state transportation projects which serve the UDA. A UDA is a tool for the coordination of transportation and land use—a way to grow smarter.

Geographic Location



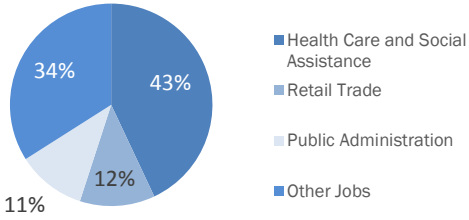
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

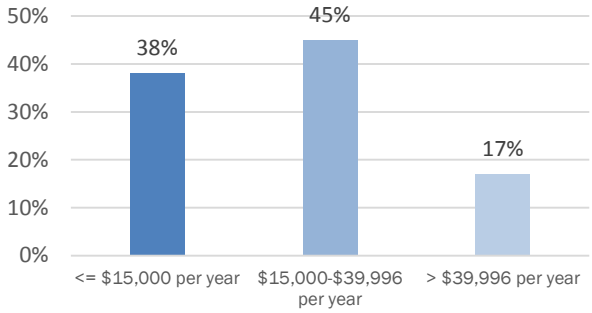
Total Population – 4,234 persons

Total Primary Jobs – 813 jobs

Jobs by Industry



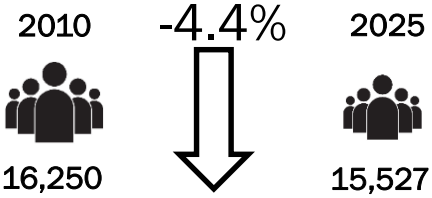
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
11,685
Working Age Population Within a 45 Minute Drive
24,846
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



*Population projections are representative of Alleghany County, VA

Urban Development Areas – Clifton Forge

Current Place Type - Small Town or Suburban Center



Planned Place Type - Small Town or Suburban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Transit Capacity
- ✓ Street Grid
- ✓ Pedestrian Infrastructure
- ✓ On-Street Parking
- ✓ Signage/Wayfinding

Moderate

- ✓ Roadway Capacity
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

External UDA Needs

High

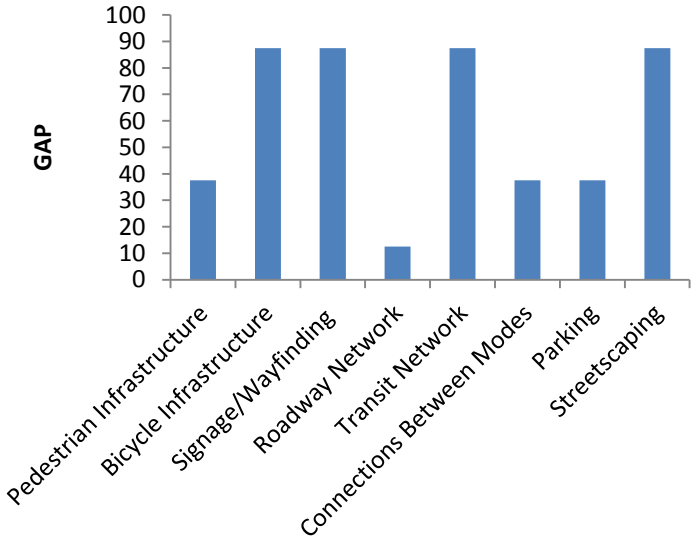
- ✓ Signage Wayfinding

Moderate

- ✓ Roadway Capacity
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



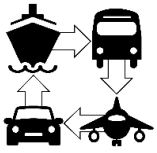
Safety for all users



Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Access to transportation networks beyond the UDA

Urban Development Areas – Bath County

UDA Needs Profile: All UDAs

Bath County designated a total of five UDAs in 2015. The UDAs are centered around the Millboro, Hot Springs, Bacova, and Warm Springs areas.

Location Characteristics

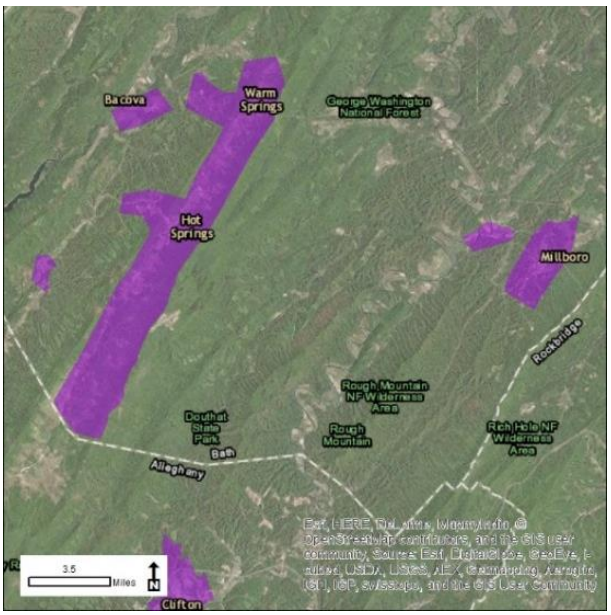
PDC- Central Shenandoah Planning District Commission

UDA Size – 33 square miles

Year Designated – 2015

Comprehensive Plan Detail – Bath County's most recently adopted Comprehensive Plan, identifies growth areas consistent with the definition of urban development areas in §15.2-2223.1. Designated Growth Areas in Bath County will encompass Smart Growth Principals and foster land uses that encourage "Village Type" growth models for business and residential areas as well as a mix of uses, and connectivity through a variety of transportation means including roads, bicycle routes and pedestrian trails.

Geographic Location



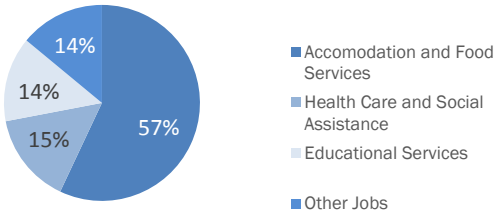
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

Total Population –3,664 persons*

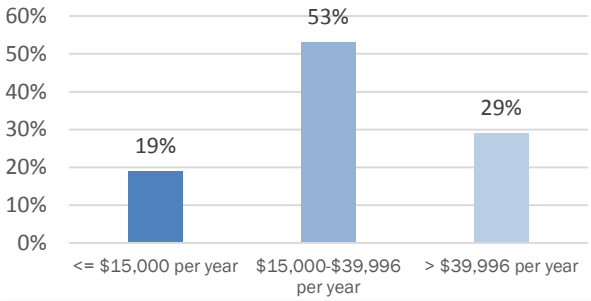
Total Primary Jobs – 1,520 jobs

Jobs by Industry



*Total population is representative of the five Urban Development Areas in Bath County

Total Jobs by Earnings



Jobs Within a 45 Minute Drive
2,039
Working Age Population Within a 45 Minute Drive
4,783
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)

2010	-0.1%	2025
4,731	↓	4,724

Urban Development Areas – Bath County

Current Place Type - Rural or Village Center



Planned Place Type - Rural or Village Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ None listed

Moderate

- ✓ On-Street Parking
- ✓ Off-Street Parking

External UDA Needs

High

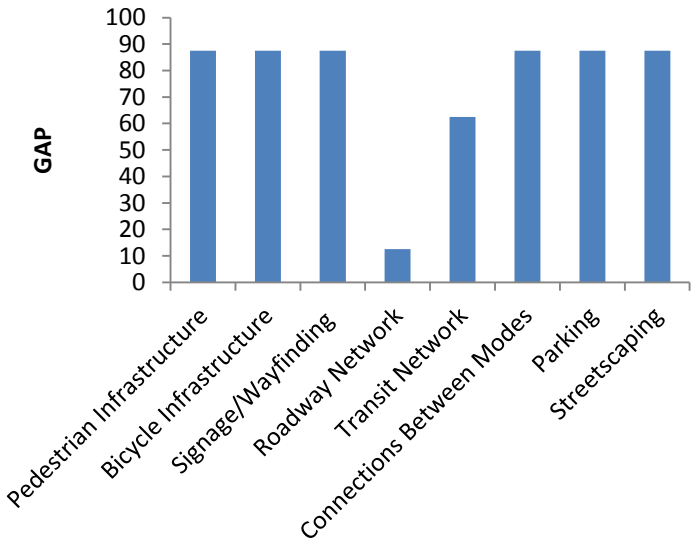
- ✓ None listed

Moderate

- ✓ Signage/Wayfinding

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Augusta County

UDA Needs Profile: All UDAs

Augusta County designated a total of five UDAs in 2015, centered around the Stuarts Draft, Fishersville, Verona, and Weyers Cave areas.

Location Characteristics

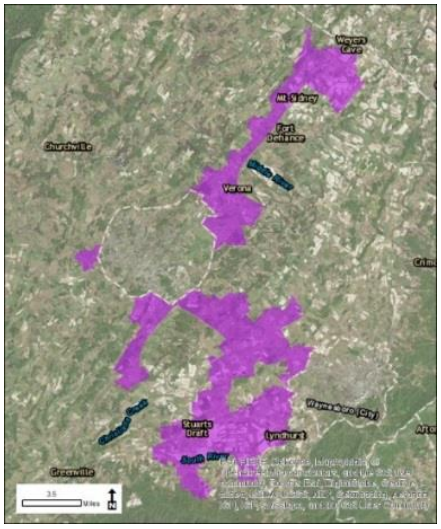
PDC- Central Shenandoah Planning District Commission

UDA Size – 56 square miles

Year Designated – 2015

Comprehensive Plan Detail – Augusta County expects to continue to see modest growth in population and employment over the next 20 years, especially in the four major designated Urban Service Areas. The Urban Service Areas of Fishersville, Staunton South and West, Stuarts Draft, Verona, and Weyers Cave promote the goals of urban development areas consistent with §15.2-2223.1. The County expects the majority of commercial development to occur in Fishersville, Stuarts Draft, Verona, and Weyers Cave (dependent on water and sewer upgrades). These Urban Service Areas are well-served by transportation and other public infrastructure.

Geographic Location



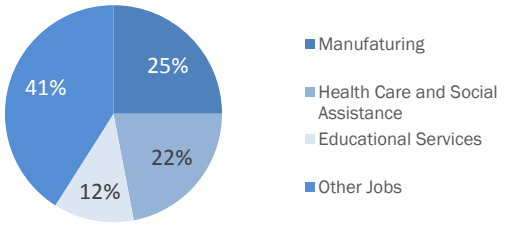
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

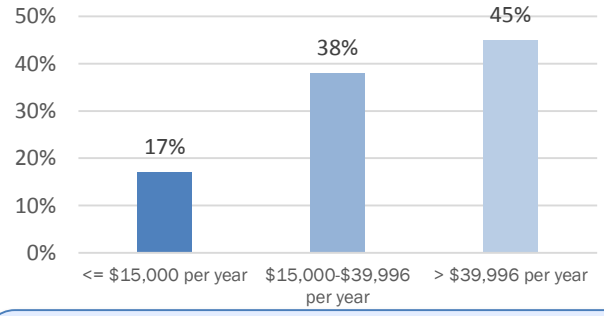
Total Population – 39,484 persons

Total Primary Jobs – 16,403 jobs

Jobs by Industry



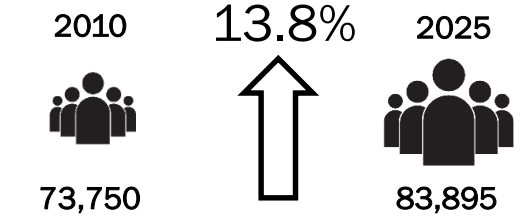
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
13,507
Working Age Population Within a 45 Minute Drive
24,873
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Augusta County

Current Place Type - Small Town or Suburban Center



Planned Place Type - Medium Town Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Roadway Capacity
- ✓ Transit Frequency
- ✓ Transit Facilities
- ✓ Intersection Design
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features

Moderate

- ✓ Roadway Operations
- ✓ Transit Frequency
- ✓ Transit Facilities
- ✓ Street Grid
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure
- ✓ Safety Features

External UDA Needs

High

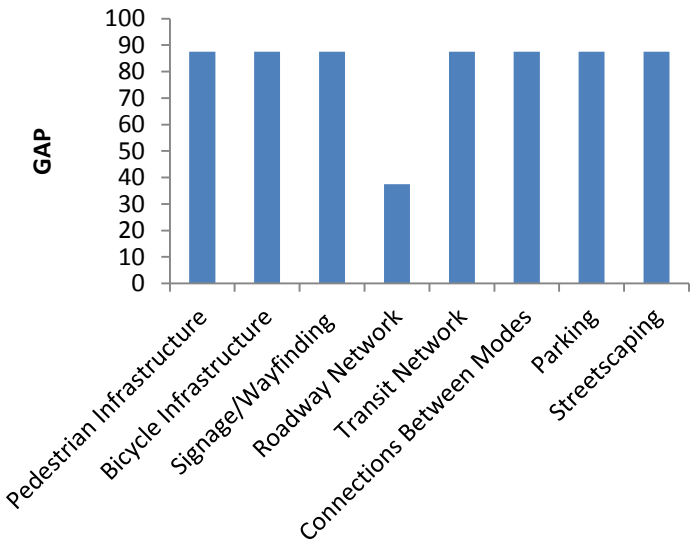
- ✓ Safety Features
- ✓ Roadway Capacity
- ✓ Transit Frequency

Moderate

- ✓ Roadway Capacity
- ✓ Safety Features
- ✓ Intersection Design

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



Circulation and access within the UDA

Urban Development Areas – Staunton City

UDA Needs Profile

The City of Staunton designated their entire boundaries as a UDA in 2015, centered around downtown Staunton and extending out.

Location Characteristics

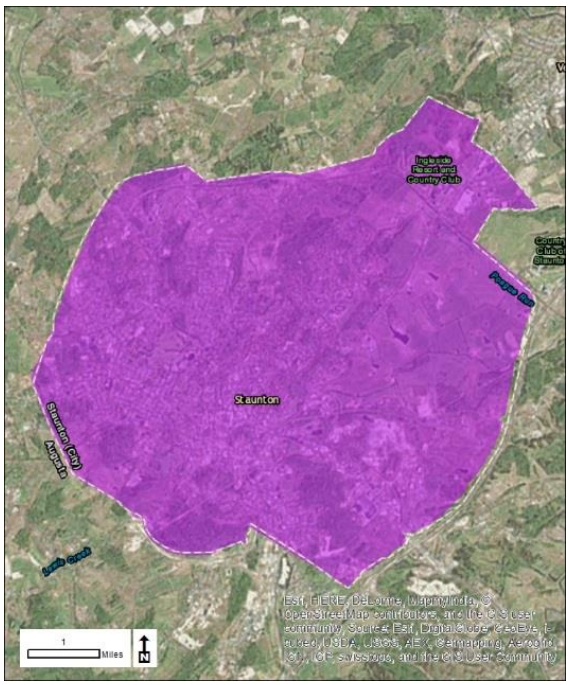
PDC- Central Shenandoah Planning District Commission

UDA Size – 20 square miles

Year Designated – 2015

Comprehensive Plan Detail - As a compact city with comprehensive transportation needs throughout the locality and with the presence of a multi-modal transportation system, including rail and intercity transit, the City of Staunton designated the entire City of Staunton as an Urban Development Area for purposes of improving transportation and land use coordination.

Geographic Location



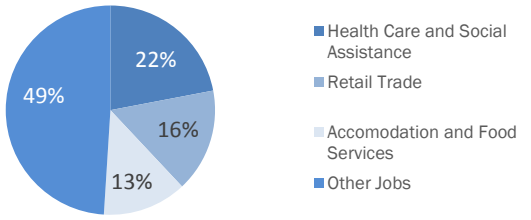
Socio-Economic Characteristics

UDA Characteristics: (Source: LEHD, 2010)

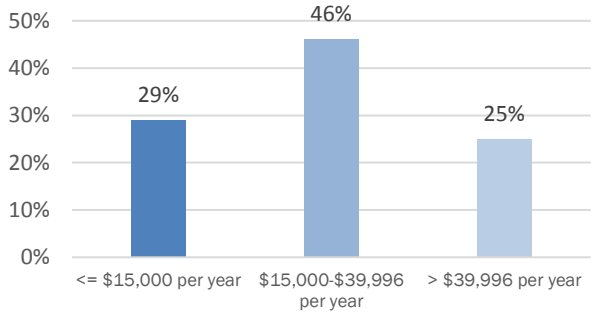
Total Population –29,102 persons

Total Primary Jobs – 10,866 jobs

Jobs by Industry



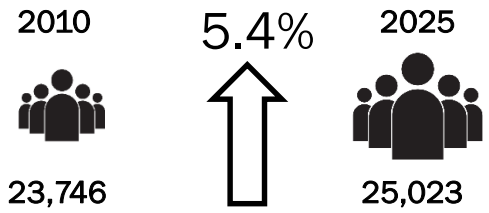
Total Jobs by Earnings



Jobs Within a 45 Minute Drive
123,612
Working Age Population Within a 45 Minute Drive
190,986
Source: EPA Smart Location Database (U.S. Census tract data)

Jurisdiction Characteristics:

Population Growth (Source: Weldon Cooper Center)



Urban Development Areas – Staunton City

Current Place Type - Small Town or Suburban Center



Planned Place Type - Urban Center



Refer to the DRPT Multimodal System Design Guidelines, Chapter 3, for more details.

Future Transportation Needs

Internal UDA Needs

High

- ✓ Street Grid
- ✓ Complete Streets
- ✓ Safety Features
- ✓ Off-Street Parking
- ✓ Intersection Design
- ✓ Signage/Wayfinding
- ✓ Traffic Calming
- ✓ Improvements to the Natural Environment

Moderate

- ✓ Roadway Operations
- ✓ Roadway Capacity
- ✓ Bicycle Infrastructure
- ✓ Pedestrian Infrastructure

External UDA Needs

High

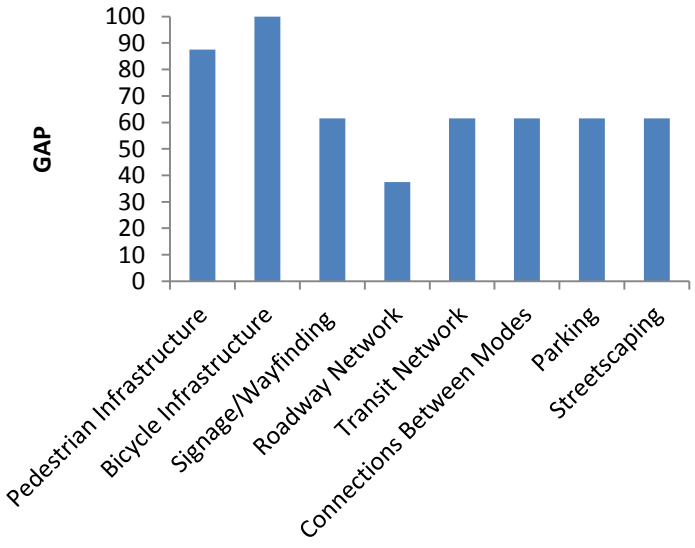
- ✓ None listed

Moderate

- ✓ None listed

Existing Internal Needs Gap (% shortfall)

Transportation system gap by need category (represents the gap to fully promote UDA)



Highest Rated Overall Needs within UDA

Localities ranked **transportation needs** within their UDAs (1 being the highest need, to 4 the lowest)



Safety for all users



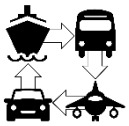
Circulation and access within the UDA



Friendly pedestrian and bicycle environment



Transit enhancements



Access to transportation networks beyond the UDA

VTrans 2040 Multimodal Transportation Plan

Regional Networks Needs Assessment

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KINGSPORT

NEW RIVER VALLEY

NORTHERN VIRGINIA

RICHMOND

ROANOKE

STAUNTON-AUGUSTA-WAYNESBORO

TRI-CITIES

WINCHESTER-FREDERICK

VMTP 2025 Needs Assessment

Regional Networks - Introduction

The Regional Network Needs Assessment focuses on intra-regional travel. The essential question of the Regional Networks analysis is: *How does each region need to prepare for its future economic needs?* The approach to the statewide multimodal transportation plan therefore assigns great importance to the economic drivers in each region and future trends in economic development in determining the intra-regional transportation needs. This approach looks at each region distinctly in terms of the existing economic profile, the existing transportation profile, and the future desired economy of the region. The transportation needs are defined by examining how to bridge the gap between the existing conditions and the desired future economy. This assessment relies on an understanding of economic-transportation linkages that was supported by current research on trends in economic development. The resulting approach does not rely on traditional transportation evaluation measures, but instead focuses on strategies to attract and retain the future workforce and support the goods movement needs of Virginia businesses as directed by the VTrans2040 Vision.

1. 2025 Needs Development Process

The Regional Network 2025 Needs were developed based on a six-step process as shown in Figure 1. Each step is described in brief in the paragraphs that follow. Throughout the process of developing the Needs Assessment, stakeholders were engaged to provide data, refine the study team's state and national data sets, and provide critical insights about each region essential to understanding existing conditions and future needs.



Figure 1: Regional Network Needs Development Approach

Step One: Defining Needs Analysis Areas

Regional Networks refer to the major economic regions of the Commonwealth and are based on the designated Metropolitan Planning Organization (MPO) areas in Virginia. MPOs are regions greater than 50,000 in urban area population and are considered the primary centers of Virginia's regional economies. The Regional Network Needs Assessment was based around the 15 current and former MPO areas in the Commonwealth. The initial needs analysis area for each region was defined as the MPO boundary, with the stipulation that if an MPO boundary includes only a portion of a county, the entire county will be included in the needs analysis area. Furthermore, where there is a clear link in a transportation need that supports the regional economy but is outside of the initial analysis area, it may be included for consideration in the regional Needs Assessment. The 15 regional networks and their needs analysis areas for the VMTP 2025 Regional Network Needs Assessment are shown in Table 1.

During the outreach process with each region, areas of unique economic importance were discussed and were considered in the Regional Network Needs Assessment where appropriate. If, for example, there is a particular employment center that is located outside the needs analysis area but is important to the regional economy; or, if a key corridor is located outside the needs analysis area but supports commuters or goods movement that are important to the regional economy, they may be included in the Needs Assessment for that region. Each individual regional profile document will provide additional details on areas that were considered in the Needs Assessment.

The Regional Network includes all transportation infrastructure and facilities inside the regional jurisdiction boundaries. Outside those boundaries, *only those facilities associated with a Regional Network Need that extends beyond the regional analysis area* is considered part of the Regional Network.

The map in Figure 2 shows the Regional Network Initial needs analysis areas as well as the geographies of the other two travel markets in the VMTP, Corridors of Statewide Significance (CoSS) and Urban Development Areas (UDAs).

Table 1: Regional Networks – Initial Needs Analysis Areas

Regional Network	Jurisdictions Included in Baseline Definition
Bristol Area	City of Bristol, City of Abingdon, Washington County
Central Virginia Area	Amherst, Bedford and Campbell Counties, City of Lynchburg
Charlottesville-Albemarle Area	City of Charlottesville, Albemarle County
Danville Area	City of Danville, Pittsylvania County
Fredericksburg Area	Stafford County, City of Fredericksburg, Spotsylvania County
Hampton Roads Area	Isle of Wight, Gloucester, and James-City Counties; Cities of Norfolk, Hampton, Newport News, Virginia Beach, Chesapeake and Suffolk
Harrisonburg-Rockingham Area	City of Harrisonburg and Rockingham County
Kingsport Area	Scott County
New River Valley Area	City of Radford, Montgomery County and Pulaski County
Northern Virginia	Arlington, Fairfax, Loudoun and Prince William Counties; Cities of Alexandria, Fairfax, Falls Church, Manassas and Manassas Park
Richmond Area	Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, and Powhatan Counties; City of Richmond

Regional Network	Jurisdictions Included in Baseline Definition
Roanoke Area	City of Roanoke, City of Salem, Roanoke County, Botetourt County
Staunton-Waynesboro-Augusta Area	Augusta County, City of Staunton and City of Waynesboro
Tri-Cities Area	Chesterfield, Dinwiddie and Prince George Counties; Cities of Colonial Heights, Hopewell and Petersburg
Win-Fred Area	Frederick County and City of Winchester

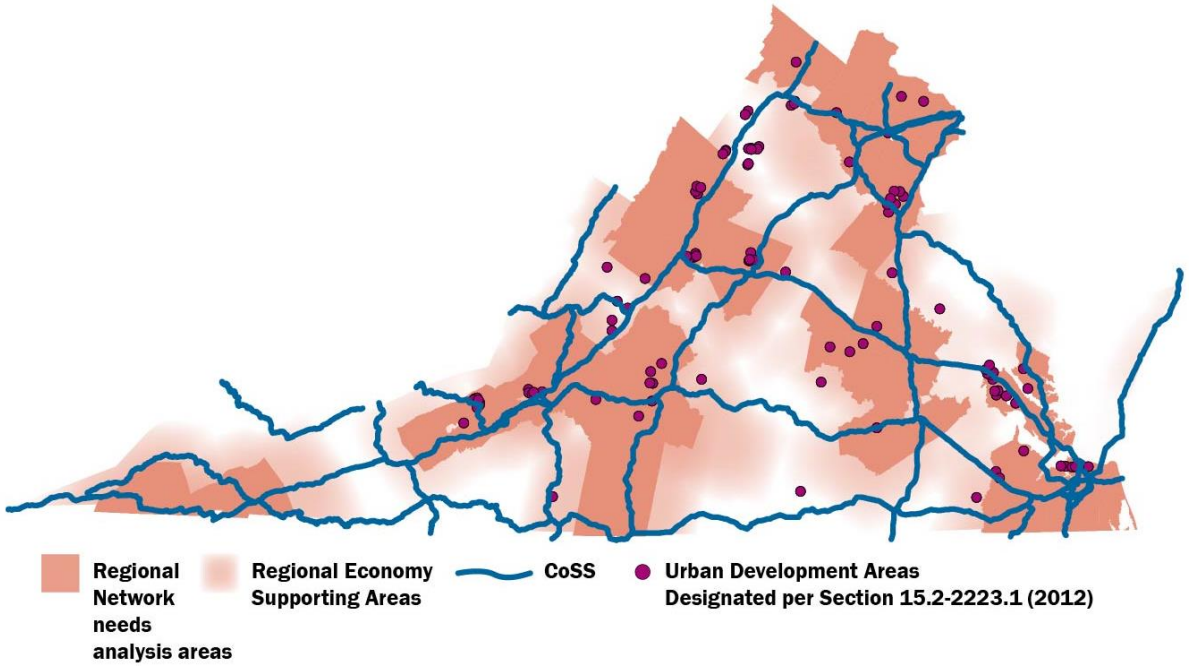


Figure 2: VMTP Travel Markets – Note that new Urban Development Areas have been designated or identified since the completion of this map.

Step Two: Assessing Current Economic Profile

In order to understand the workforce and goods movement needs in our metropolitan regions, the Needs Assessment includes an economic profile with essential information about the population, workers, and employers in the region. The arrangement of the jobs geographically, and particularly in terms of key activity centers, is also part of the economic profile to provide a spatial component that relates land use, economics and transportation.

The study team used available data from state and national sources, as well as input from each region's stakeholders, to identify an overall current economic profile for the region. The components of the current economic profiles layer together demographic and economic characteristics of the region. The Regional Profiles incorporate the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient

- Top Employers
- Activity Centers, their economic and travel characteristics (defined by existing centers of employment and modified by input from stakeholders in each region)

Step Three: Identifying Desired Future Economic Profile

For each region, a future economic profile was developed reflecting anticipated growth industries and targeted growth areas of the region. The study team provided 2025 forecasts of employment and output, and these were discussed with each region relative to existing economic development plans such as any Comprehensive Economic Development Strategy (CEDS) adopted for the region, or other local or regional economic plans. The future economic profile consists of the 2025 forecasts of growth in employment and output by industry, as well as regionally-provided information on initiatives and existing or future activity centers targeted for job growth.

Step Four: Assessing Transportation Conditions

The profile of transportation conditions in each region provides an understanding of existing facilities and services and their performance in serving the region's travel needs. The transportation conditions illustrate both constraints and opportunities to serving each region's future economic needs. The transportation profiles build upon baseline information about each region's roadway and transit networks, airports, ports and freight networks, and are assembled from US, state and regional data sources. They address the following characteristics:

- Commuting Patterns and Modes
    - Based on census data on commute times, jurisdictional commuting patterns, commute modes, and commute origins of workers in regional activity centers
- Multimodal Accessibility to Jobs
    - Based on a census block-group-level accessibility measurement tool that measures auto access to jobs, transit access to jobs, and walk access to jobs within a given travel time
- Freight Accessibility
    - Based on network travel times to the nearest highway interchange, freight airport and freight distribution centers for census block groups
- Highway Network Reliability and Congestion
    - Reliability is based on the buffer index which measures 90th percentile travel times (i.e. worst times occurring approximately 1 in every 10 days) in comparison to median peak period travel times for weekday commute times and peak weekend times using highway system travel time observations (INRIX data). Highway network congestion was measured based on average speed in peak periods and measures of delay using INRIX data.
- Freight Networks and Commodity Flows
    - Using TranSearch data on freight destinations, commodities traveling in and out of each region, and freight mode split.

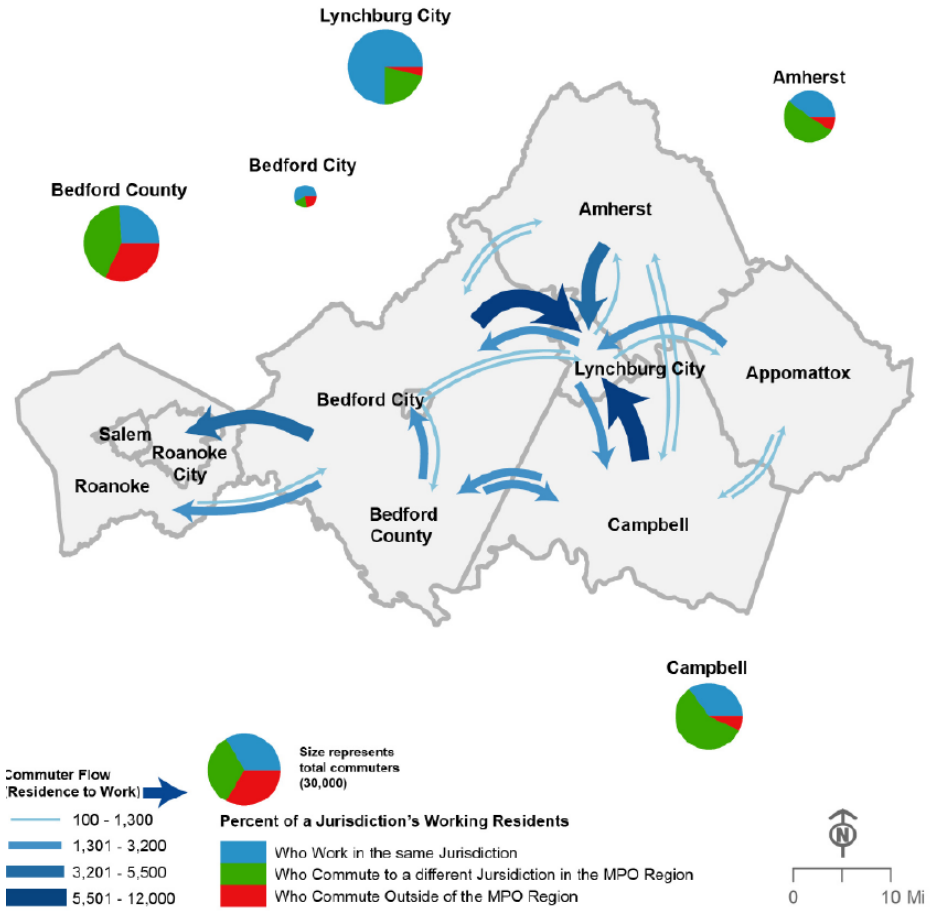


Figure 3: Example of Regional Network Commuting Patterns – Central Virginia Region
Source: US Census, American Communities Survey 2006 – 2010 Commuting Data

Step Five: Incorporating Economic-Transportation Linkages

The linkages between economics and transportation form the cornerstone of the Regional Network Needs Assessment. The research on economic development trends pointed to the importance of workforce attraction/availability and the emergence of placemaking as both a workforce attraction and economic development strategy. Additional economic-transportation linkages were derived by distinguishing between three major types of industry clusters that relate to workforce, goods movement, and transportation needs in some distinctive ways. These clusters are freight-based, knowledge-dependent, and local-serving. Section 2 of this chapter describes in more detail the research on economic development trends and the industry cluster approach that shaped the Needs Assessment.

The study team and stakeholders considered questions such as the following in order to explore and capture the economic-transportation linkages as they occur distinctly in each region.

- What type of transportation access is needed by different types of activity centers?
- How critical are Millennial workers to the future economy? Other key demographic groups?
- What regional workforce attraction/retention factors are key at work and also home locations?
- How will activity centers change over time, and how will that affect accessibility needs?
- Where are emerging activity centers located, and what economic clusters will be focused there?
- Looking at the activity centers:
    - Where are mode choice and walkability important?
    - Where is freight access important?
    - Where is auto access important?
    - What are the travel patterns of existing workers?

Step Six: Developing the Transportation Needs Assessment

The final step in the Regional Network Needs Assessment is a synthesis of all the preceding steps and information. Both the economic and transportation profiles were considered in the development of each region's needs. This process was iterative in nature – the data informed insights about transportation needs, stakeholders suggested and/or affirmed transportation needs based on the Regional Network framework, and stakeholder input was validated with the regional profile data to develop a suitable representation of each region's needs for the statewide plan. For example, the study team and stakeholders looked at the economic needs in comparison to the transportation conditions based on questions such as:

- Do the knowledge- and local- based activity centers have transit access?
- Do the freight- and local-based activity centers have appropriate highway access for freight?
- Are key commuting routes served by transit?
- Are key commuting and/or freight routes affected by bottlenecks?
- Are there reliability issues for commuters and/or freight?
- Are there conflicts between freight transportation and local travel needs?
- Are there barriers to active transportation modes that reduce their viability where they otherwise might be attractive/effective? (Active transportation encompasses all non-motorized transportation.)
- The types of intra-regional transportation needs were simplified into five categories, as shown in Table 2. The Study Team developed a map and a list of needs for each region using these categories. Safety, state of good repair, and other unique needs are also featured on an occasional basis where they are intrinsic to specific intra-regional capacity/operational needs. The needs list includes a brief statement of the economic and transportation profile attributes that are the basis for each Regional Network need, as shown in Table 3.

Transportation Need	General Description
Corridor Reliability / Congestion	Mitigate recurring inconsistency of travel times for passengers
	Reduce the impact of acute congestion points on the network
	Mitigate recurring inconsistency of travel times for freight
	Improve freight access to key destinations via desired travel modes
Network Connectivity	Enhance network connections to improve travel efficiency
Transportation Demand Management	Manage transportation demand to optimize transportation system performance while meeting user needs
Modal Choice	Increase the flexibility to choose alternative travel options
	Improve or establish access by transit to key destinations
	Improve the opportunity to make trips via walking and/or biking
Walkable & Bikeable Places	Enhance communities and activity centers to provide safe, sociable walking environments with a variety of destinations

Table 2: Types of Regional Network Transportation Needs. Source: Michael Baker International

E. Route 58/I-264 Corridor	
NEED	**The Route 58/I-264 Corridor is an important artery for the movement of commuters and connects multiple regional activity centers with knowledge based workforces. This corridor lacks transit access, bike access, transportation demand management programs, and has lower network connectivity. The I-264 corridor itself is a barrier to north-south movements.**
ECONOMIC	This corridor serves multiple knowledge-based and local-serving activity centers. Several are targeted future growth areas with plans for higher density, mixed-use development that can improve transportation efficiency through walk, bike and transit access.
TRANSPORT	The issues along this corridor include lack of connectivity for north-south movements, which puts pressure on the east-west routes and particularly the I-264 crossings and interchanges; and lack of mode choice for peak period trips and to avoid high traffic levels associated with beach access.

Table 3: Example of Regional Network Needs Detail. Source: Michael Baker International

2. Economic Factors Shaping Regional Transportation Needs

To understand and apply the linkages between transportation and the economy in the VMTP 2025 Regional Network Needs Analysis, the Study Team crafted an analytical framework to help relate economic characteristics to transportation at a regional level. The Study Team also used unique research prepared by the Southeastern Institute of Research (SIR) that captures emerging trends in economic development and these trends' implications for transportation.

Analytical Framework for Linking Economics and Transportation

The Regional Network Needs Assessment seeks to link economics and transportation in a way that is meaningful and appropriate for a statewide plan but, at the same time, can reflect each region's dynamics and priorities. The study team developed a framework that is broad enough to be applicable to statewide analysis, while providing a meaningful way to characterize the economic dynamics within each region. As with any set of generalizations, the framework has shortcomings and risks over-simplification. The Study Team was mindful of these pitfalls and attempted to use the best of the framework without over-simplifying the unique characteristics of each region.

The primary feature of the framework is a focus on core economic clusters as a basis for linking economy and transportation. Each economic cluster has the potential to be different in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to accessibility. The three industry clusters are:

- Knowledge-Based – those industries that tend to rely on skilled labor and serve a broader market than Virginia
- Local Serving – generally those industries that serve the local population
- Freight-Based – those industries for which the majority of industry output is dependent on freight transportation (also referred to as freight dependent)

Under this approach, a region with greater emphasis on manufacturing or warehousing (within the freight-based cluster) will have a greater focus on freight intermodal needs than a region with stronger knowledge-based service industries, where passenger intermodal needs would be a greater concern. Similarly, different clusters are concerned with different kinds of accessibility – both for employees and the businesses with which they interact. Figure 7 provides an illustration of the differences between these clusters.

In reality, there is more complexity to each cluster and there is definitely overlap between them as well. The Local Serving cluster in many ways is a hybrid of the other two – it has worker as well as customer accessibility concerns similar to the knowledge-based sector, but it also has goods movement concerns

that resemble many of the freight-based industries. In general, this cluster tends to grow in proportion to the regional population. The local-serving businesses are an important part of ensuring that the lifestyle and livability characteristics of a region (for example, entertainment, education and health care) are adequate to attract and retain workers and businesses. However, in some regions, the government or education employment might also in effect be an 'export' industry, such as a University town or military base, in which case the local serving cluster would have even more in common with the knowledge-based cluster. Table 3 provides the sorting of 2-digit North American Industry Classification System (NAICS) code industry classifications into the three industry clusters. This sorting is unique to Virginia in that data on the export vs local component of the sectors and their inter-dependence with other industries were considered in determining the classification of 2-digit industries into the three groupings.

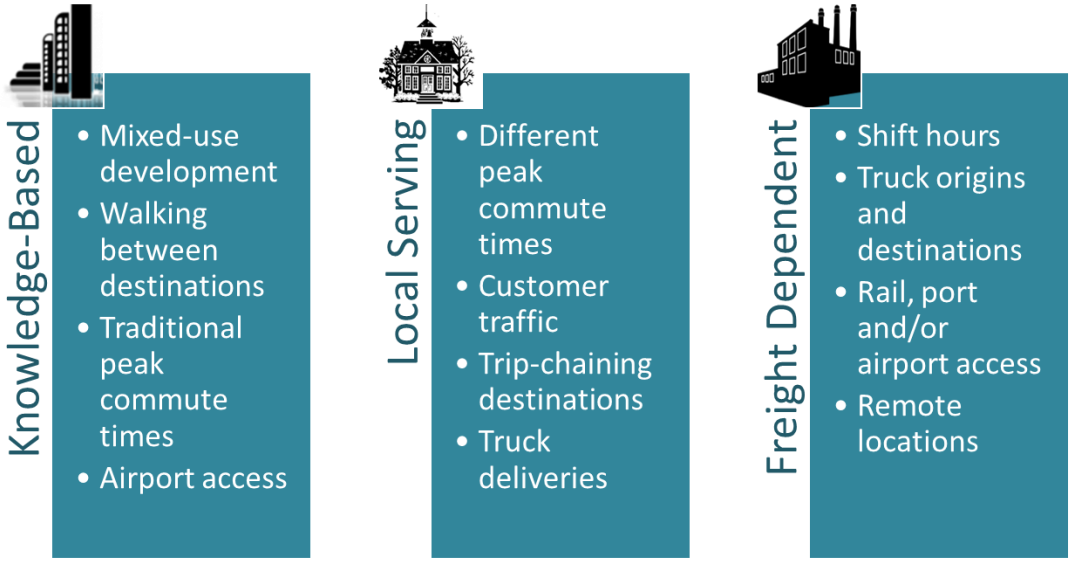


Figure 7: Illustration of the Three Industry Clusters in the VMTP Regional Network Analytical Framework

NAICS - 2DIGIT	Industry Name	Cluster
11	Agriculture, Forestry, Fishing and Hunting	Freight Dependent
21	Mining, Quarrying, and Oil and Gas Extraction	Freight Dependent
22	Utilities	Freight Dependent
23	Construction	Freight Dependent
31	Manufacturing	Freight Dependent
32	Manufacturing	Freight Dependent
33	Manufacturing	Freight Dependent
42	Wholesale Trade	Freight Dependent
44	Retail Trade	Local serving
45	Retail Trade	Local serving
48	Transportation and Warehousing	Freight Dependent
49	Transportation and Warehousing	Freight Dependent
51	Information	Knowledge
52	Finance and Insurance	Local serving
53	Real Estate and Rental and Leasing	Local serving
54	Professional, Scientific and Technical Services	Knowledge
55	Management of Companies and Enterprises	Knowledge
56	Administrative and Support and Waste Management and Remediation Services	Knowledge
61	Educational Services	Local serving
62	Health Care and Social Assistance	Local serving
71	Arts, Entertainment, and Recreation	Local serving
72	Accommodation and Food Services	Local serving
81	Other Services, except Public Administration	Local serving
92	Public Administration	Local serving

Table 3: Division of 2-Digit NAICS Code Industry Classifications into the Three "Buckets" of VMTP Industry Clusters Source: Economic Development Resource Group (EDR Group)

Economic Development Trends Research

Study Team partner Southeastern Institute of Research (SIR) conducted three phases of research on economic development trends that provided input to the regional network Needs Assessment. This research had the following objectives:

- Identifying key trends shaping the future of Virginia
- Understanding how the economic development industry views location decisions and the role of transportation and mobility
- Understanding how the business community views location decisions and the role of transportation and mobility

To fulfill these objectives, the research effort entailed the following:

1. Secondary Research – SIR identified, assessed and inventoried current studies, reports, whitepapers and articles on site selection practices and placemaking.

2. Qualitative Research – SIR conducted 40 in-depth interviews with leaders in site selection and economic development from across Virginia and the United States.
3. Quantitative Research – SIR conducted 15-minute online survey with 185 corporate site selection officials across the United States - *Site Selection* magazine readers.

Placemaking in Economic Development – The New Paradigm

The first phase of SIR's research revealed that a new paradigm is emerging in economic development. The traditional model for economic development focused on recruiting and attracting employers through site-based opportunities. While this model gave attention to a region's workforce, quality of life, and other factors, the idea was to create jobs first and attract workers second. The new paradigm focuses on attracting and retaining the workforce first, through community attractiveness that increasingly is known as placemaking. The new paradigm is summarized in Figure 3. (Note that the SIR report *Placemaking, Transportation and Economic Development: A Review of Secondary Research and Key Trends* is incorporated by reference and provides all detailed references discussed in the paragraphs that follow.)



Figure 3: New Paradigm for Economic Development. Source: Southeastern Institute of Research

Create a Great Place

The research refers to a Project for Public Spaces article "What Makes a Successful Place?" that identifies four key qualities of successful places:

1. They are accessible
2. People are engaged in activities there
3. The space is comfortable and has a good image
4. It is a sociable place

Placemaking, in turn, can be defined as, "A multi-faceted approach to the planning, design, and management of localities, regions, and public spaces. Placemaking capitalizes on a local community's assets, inspiration, and potential, with the intention of creating locations that promote people's health, happiness, and well-being."

People Will Come

Communities that have a focus on placemaking are achieving their desired result, with both younger and older workers (and in some cases, also retirees) seeking out places that achieve their values for livability. A generational lens is helpful to understanding these livability values. Specifically:

- Millennials desire to live in urban, rather than suburban, environments, particularly in light of their overall tendency to delay household formation (i.e., marriage and children)
    - An analysis published by City Observatory finds that young, highly educated Americans are increasingly moving to the close-in neighborhoods of the nation's large metropolitan areas.
    - Survey data highlighted in a Wall Street Journal article shows that 88% of Millennials want to be in an urban setting.
- Millennials do not rely on a car as their sole means of transportation.
    - A study conducted by the American Public Transportation Association found that communities that attract Millennials have a multitude of transportation choices.
    - Millennial research published by Michigan Future showed that 82% of respondents would prefer to commute to work by foot, bike, or public transportation.
- Boomers want to age in place
- Despite their age difference, Boomers and Millennials share some commonalities in what they want in a community. Chief among these common interests is the desire for more and better non-car transportation options.
    - Majorities of both groups say there are not enough transportation alternatives where they live (59% of Millennials and 58% of Boomers).
    - Both generations feel that affordable and convenient transportation alternatives to the car are at least somewhat important when deciding where to live and work (81% of Millennials and 77% of Boomers as reported in the *Investing in Place* report).

Jobs Will Follow

As the quantitative research described later in this section shows, employers increasingly seek a location that already has the workforce they need. Communities, in turn, are learning that making investments that attract workers does bear fruit in terms of jobs and economic growth. The *Chasing the Past* report presents a framework entitled the "New Economy" where the key strategy is focused on attracting and retaining talent, not companies. One of the most important elements of the New Economy is the idea that talented knowledge workers create jobs two ways: employers follow the talented, and talented entrepreneurs create new businesses.

Communities that understand these linkages also have an advantage in the coming battle for workers. SIR's analysis shows that from 2012 to 2022, the core of the workforce aged 25-54 will grow by only 1.9%, which falls short of the overall 5.5% increase in the labor force and could fall substantially short of anticipated economic growth. Only the pool of older workers, aged 55+ is anticipated to grow at a faster rate – 28.8% in this time period. The older workers are an important part of the talent pool, offering both wealth and entrepreneurial skills. Communities that have existing target worker groups will want to strategically retain them to avoid losses in the battle for workers. If communities want to grow by increasing the supply of younger workers, they will have to attract them from elsewhere. The competition will be fierce.

The Community Thrives

Economic success is a key outcome of the new paradigm, as evidenced in cities such as Denver, CO and Minneapolis, MN that are early adopters of this approach. There are success stories in smaller cities, too, including Chattanooga, TN and Asheville, NC. Placemaking can be linked to job creation, but it also brings a host of positive economic effects that are linked to transportation. Walkability and proximity to transit in particular have been shown to help areas perform better economically.

- Walkability is associated with increased office, residential, and retail rents, retail revenues, and for-sale residential values according to the Walk this Way report.
- Commercial real estate located in more walkable sites commands higher property values and is associated with a higher net operating income according to an academic paper.
- A report published by the American Public Transportation Association and the National Association of Realtors found that households in transit sheds had more resilient property values and lower average transportation costs that the region as a whole.

Views from Economic Development Professionals

The qualitative research that SIR conducted entailed a 'deep dive' with economic development professionals to understand successes, failures, emerging trends, and current issues in business attraction. Figure 4 presents a sampling of direct quotes that capture the insights relevant to VTrans. In summary, economic development professionals strongly supported the emerging paradigm of placemaking and the rising need to attract employers via an existing, talented pool of workers.

"COMPANIES EXPANDING OR RELOCATING KNOW THAT 85 PERCENT OR MORE OF THEIR WORKERS WILL COME FROM THE POPULATION ALREADY IN PLACE." - SITE SELECTION CONSULTANT

"LOCATION DECISIONS TODAY START—AND END—WITH, 'DO THEY HAVE THE PEOPLE WE WANT?'" - SITE SELECTION CONSULTANT

"THE PIPELINE OF WORKERS IS THE ULTIMATE DRIVING FORCE OF ALL RELOCATION DECISIONS TODAY."- SITE SELECTION CONSULTANT

"IF A COMMUNITY OR REGION DOESN'T HAVE CAPACITY OR ASSETS IN PLACE—THINGS LIKE ROADS AND BUILDINGS—THEN IT WON'T EVEN GET INTO THE INITIAL CONSIDERATION SET." - SITE SELECTION CONSULTANT

"WE KNOW WE ARE TEN YEARS BEHIND OTHER MARKETS OUR SIZE WHEN IT COMES TO TRANSIT, ESPECIALLY LIGHT RAIL. IT'S HOLDING US BACK, FOR SURE."- ECONOMIC DEVELOPMENT LEADER

Figure 4: Sample Quotes from Qualitative Research on Economic Development Trends. Source: SIR

Business Community Views on Location Decisions

The quantitative survey of business location specialists provides additional insight into the drivers of site selection. It also enables inferences about different attitudes and preferences along industry lines or other respondent characteristics. The survey respondents spanned a broad range of company sizes and types, with 53% reporting revenue of over $10 million, 68% with fewer than 5,000 employees, and 64% with facilities in more than one state. Over two-thirds of respondents are partially or primarily responsible for their company's site selection.

This phase of research strongly supports the insight from the preceding phases that workers are a key driver of business location decisions. While site selections may start with location basics, once those 'table stakes' are met, the key for any location decision across all industry clusters is the availability of workers now and in the future. As noted by one respondent, "The economics will work themselves out, but if you do not have a skilled workforce and it is not a location that is conducive to recruiting a skilled workforce, the site does not work."

Thus, the process of site selection today is actually site elimination. Site selection consultants identify a set of sites that meet the fundamental requirements of a potential location and then eliminate those that cannot deliver the desired workforce today or tomorrow. For regions, the workforce can be

'delivered' by retaining young workers who might otherwise outmigrate, attracting the mobile segment(s) of the workforce into the region, and/or retraining the existing workers in the region.

Top Drivers of Business Location Decisions

The survey asked several questions about the most important location factors and site selection attributes in order to determine patterns in the responses. Key findings are as follows:

- Three of four respondents identified workforce availability as either the single most important or second most important factor in site selection
- Current and future availability of the region's workforce rated highest among site selection attributes (rated 4 or 5 out of 5 in importance by over 80% of respondents)
- Connectivity formed the second tier of important site attributes, with telecom system availability ranking slightly higher than the quality of the overall transportation system (rated 4 out 5 by 73% and 70% of respondents, respectively)
- Government/Community partnership and quality of life ranked in the next tier, with over 60% of respondents rating these attributes 4 or 5 out of 5 in importance.
- Listed among specific location attributes, highway access was rated as important by 85% of respondents

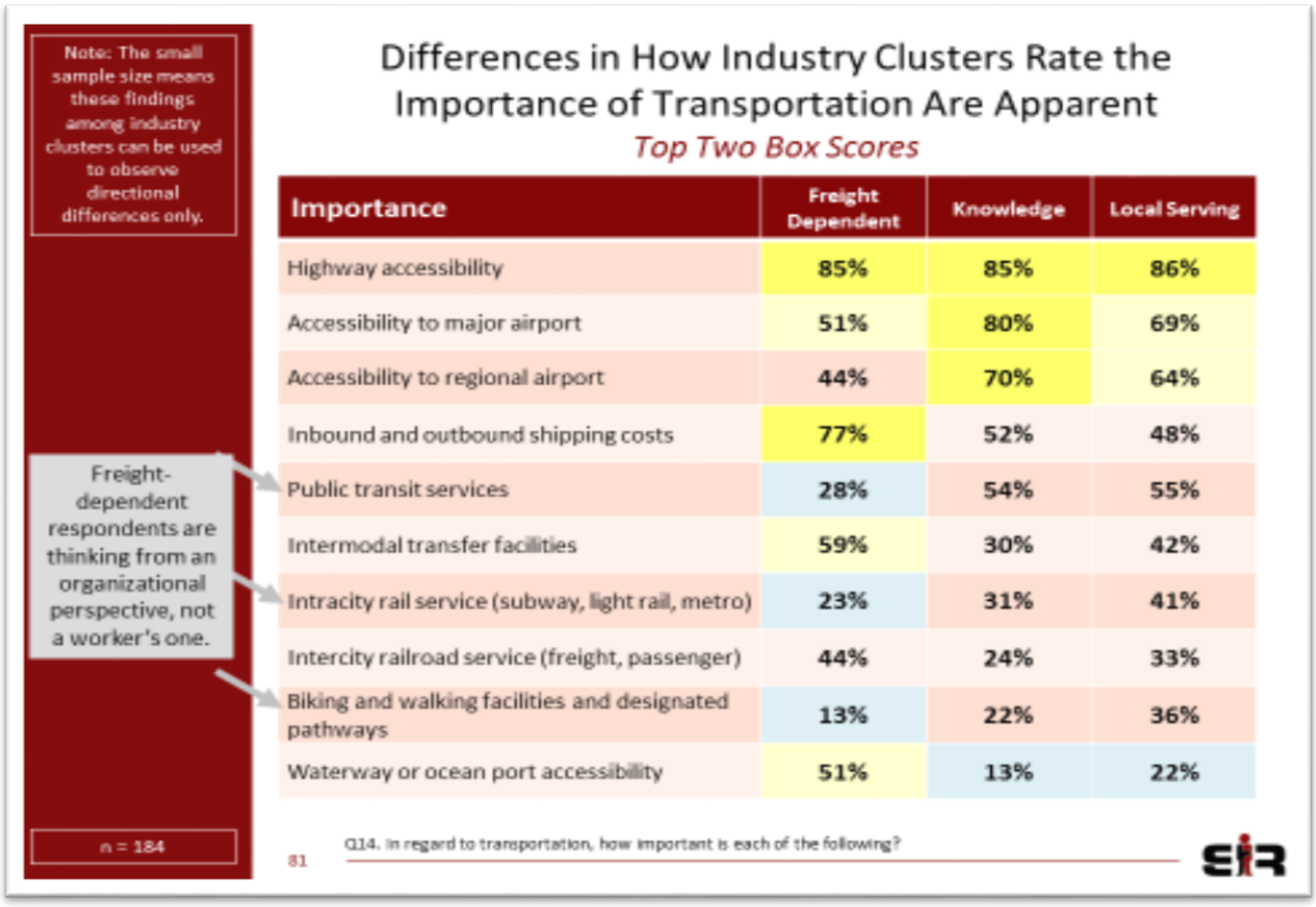
Transportation Factors in Business Location Decisions

Respondents were asked about the importance of a variety of transportation factors in their site selection decisions. Highway accessibility rated the highest, followed by airport and public transit accessibility. Biking and walking were rated lower. Those respondents that were familiar with the importance of placemaking for community attractiveness gave all transportation factors a higher importance rating, however, with particularly substantial differences in the reported importance of major airport, public transit, and biking/walking availability.

As discussed at the beginning of this section, understanding the differentiation in importance of transportation factors to different industry clusters is key to the economic-transportation linkages in the VMTP Regional Network Needs Assessment. The quantitative survey was designed to allow results to be analyzed by the same three industry clusters, and the results reveal appreciable differences in the rated importance of different transportation factors:

- After highway accessibility, which was rated highest by all sectors, inbound/outbound shipping costs were rated second by freight-dependent industries while accessibility to a major airport was rated second by knowledge-based industries
- Knowledge-based and local-serving industries rated Public Transit Services in the second tier of importance, while freight-dependent industries placed low importance on this factor
- Port accessibility was dramatically more important to freight-dependent industries than to the other sectors
- Generally speaking, the knowledge-based and local-serving sectors valued community-related transportation elements higher than freight-dependent industries, such as access to healthcare, recreational access, and mobility for older and physically challenged residents.

Figures 5 and 6 provide the survey responses to the key transportation questions, broken out by industry cluster.



Note: The small sample size means these findings among industry clusters can be used to observe directional differences only.

Freight-dependent respondents are thinking from an organizational perspective, not a worker's one.

n = 184

Differences in How Industry Clusters Rate the Importance of Transportation Are Apparent

Top Two Box Scores

Importance	Freight Dependent	Knowledge	Local Serving
Highway accessibility	85%	85%	86%
Accessibility to major airport	51%	80%	69%
Accessibility to regional airport	44%	70%	64%
Inbound and outbound shipping costs	77%	52%	48%
Public transit services	28%	54%	55%
Intermodal transfer facilities	59%	30%	42%
Intracity rail service (subway, light rail, metro)	23%	31%	41%
Intercity railroad service (freight, passenger)	44%	24%	33%
Biking and walking facilities and designated pathways	13%	22%	36%
Waterway or ocean port accessibility	51%	13%	22%

81 Q14. In regard to transportation, how important is each of the following?

SIR

Figure 5: Summary of Responses to SIR Survey Question #14 by Industry Cluster

Note: The small sample size means these findings among industry clusters can be used to observe directional differences only.

Different Ratings for Community-Related Transportation Elements Among Industry Clusters:

Top Two Box Scores

Transportation System That:	Freight Dependent	Knowledge	Local Serving
Makes businesses easily accessible for their clients	50%	65%	73%
Provides access to school and educational opportunities for all residents	53%	45%	53%
Provides access to medical services and healthcare for its residents	41%	49%	54%
Actively seeks ways to reduce or limit the negative impact of transportation on the environment	41%	43%	49%
Provides mobility for those without vehicles	34%	41%	38%
Makes recreation and entertainment opportunities easily accessible	22%	35%	49%
Ensures the mobility of those with physical limitations, such as older residents and those with physical challenges	25%	35%	47%

n = 164

Q39. How important is each of the following community-related transportation elements when evaluating a site?

83

SIR

Figure 6: Summary of Responses to SIR Survey Question #39by Industry Cluster

Additional Insights from Quantitative Research

The survey research explored several attitudes and perceptions on the part of site selection experts. One of the key insights, noted above, is that those site selection professionals who already appreciate the importance of placemaking also place a higher value on location factors related to transportation and also quality of life. One could infer that the respondents who did not rate these factors as highly are expecting others, such as community leaders, to determine what is needed to attract the workforce to an area – their primary concern is that the workforce is there. A final important insight from the research is that the survey respondents displayed a low awareness of the battle for workers discussed under the first phase of research. This low awareness presented in a national pool of businesses suggests that Virginia planners may have a competitive tool available: *Investing in making Virginia's quality of life tops in the nation for younger workers will keep the Commonwealth's 21st century economy moving.*

Summary of Findings

Combining the framework for the Regional Network analysis and the findings of the economic development research yields a set of insights regarding economic-transportation linkages for the VMTP.

These insights help provide overall direction for the Regional Network analysis. They also enable each region to be viewed through a lens that considers how its unique economic and transportation characteristics translate to a set of needs that will attract and retain the 21st century workforce and support the goods movement needs of Virginia businesses.

Applying the New Paradigm and Economic Development Trends to Regional Networks

The most important and consistent findings of the economic development research point to two key trends that will be critical to achieving Virginia's future desired economy:

1. Workforce is key to attracting businesses
2. Transportation investments that support placemaking will make regions more attractive to critical workforce segments, particularly the talented and entrepreneurial Millennials and Boomers

Each of these conclusions must be applied to Virginia's metropolitan regions with an eye toward the industry mix, land use patterns, transportation conditions, and the values unique to each area. The analytical framework and outreach process of the Regional Network Needs Assessment is designed to produce a customized interpretation of these key conclusions. For example, regions that are stronger in manufacturing and/or warehousing will prioritize goods movement overall and particularly in their freight activity centers, but they likely will still find opportunities to invest in placemaking in regional downtowns and high-tech activity centers that have the potential to attract Millennial workers and/or entrepreneurial Boomers.

Taking the two conclusions together, another important insight is that the battle for workers is a compelling reason to consider region-wide strategies to attract Millennials and Boomers with two key items they seek: *walkable places and modal choice*. Prosperous regions of the future will offer walkable places and modal choice to Millennials and Boomers. These strategies will work differently in regions with different land use densities, residential development patterns, and amenities such as outdoor recreation. However, it is vital to the overall VTrans Vision and Goals that Virginia regions recognize this emerging trend and apply it suitably in their regions. In the Regional Network analysis, the Study Team has shared the research insights with each region, discussed how the trends are emerging now in each region, and worked with stakeholders to identify areas where these strategies can be applied in the Needs Assessment.

Applying Detailed Research Findings in the Regional Network Approach

The detailed research findings provide important insights into the different values placed on types of transportation need by the three industry clusters. The Study Team held exercises to explore these differences in values and priorities with the Multimodal Advisory Committee and Freight Transportation Technical Advisory Committee and with stakeholder groups in many of the metropolitan regions as well. These discussions provided a general sense of the variations in importance placed on different transportation needs, and they provided insight into the economic-transportation linkages in the VMTP. For example, there was strong agreement that the knowledge sector industries place more value on multimodal transportation and public transit in particular because of their relationship to Millennials and, in many cases, their more urban or downtown locations. At the same time, the discussions about

how local serving and freight-based clusters might need public transit for customers and/or workers were also helpful and insightful for the Regional Network Needs Assessment.

The quantitative survey results, supported by the other phases of research and stakeholder input, yield a broad set of correlations between transportation needs and the industry clusters as shown in Table 4. These correlations are presented strictly as high, medium and low to convey the breadth of conditions that may occur in different industries within a given cluster and in different regional conditions. The table is useful as an overall guideline for relating the economic conditions and future desired economy of each region to the most important types of transportation needs. The correlations shaped many of the questions in the needs analysis as described in the Approach section, such as focusing on whether knowledge-based activity centers are walkable places, whether freight-dependent activity centers have strong access to freight transportation facilities, and whether local-serving activity centers have a choice of modes.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Table 1: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

In keeping with these findings, the Regional Network Needs Assessment links economic strategies with transportation needs through findings such as the following:

- Congested corridors that serve freight-based activity centers are the focus of "corridor reliability" needs in order to remove bottlenecks and improve travel time reliability for freight.

- Multimodal network connectivity is identified as a need in areas where knowledge and local-serving activity centers have physical barriers (water, railroads, highways) that hinder the opportunities for replacing car trips with walking or bicycling.
- In several regions, knowledge-based activity centers are the focus of "Walkable/Bikeable Places" needs, in keeping with the high value the knowledge industry cluster places on walkable places.
- Modal choice is identified as a need for knowledge and local-serving commuters in both corridors and activity centers that lack transit access to jobs.
- Freight-based activity centers that lack highway accessibility are the focus of network connectivity recommendations in several regions.

VMTP 2025 Needs Assessment

Regional Needs Profile



Bristol Region

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Bristol Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," which provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Bristol Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Bristol Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

The Bristol Region is defined as the City of Bristol and Washington County as the needs analysis area. However, the region also has a strong economic connection to Tennessee. As shown in the Needs Assessment, below, these areas beyond the Virginia border were considered in the Needs Assessment as well.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from Bristol stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from 44,765 to 54,226.

Table 1: Statewide Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, population growth is projected for the Bristol Region. Projections estimate 4,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Bristol Region Population Projections. Sources: Woods & Poole, Weldon Cooper.

Jurisdiction	Current Population (2012)	Weldon Cooper Projection (2025)	% Change
Region	72,852	76,911	6%
City of Bristol	17,662	19,144	8%
Washington County	55,190	57,766	5%

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise 19% (slightly less than the state average of 21%) from $30,374 to $36,065. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

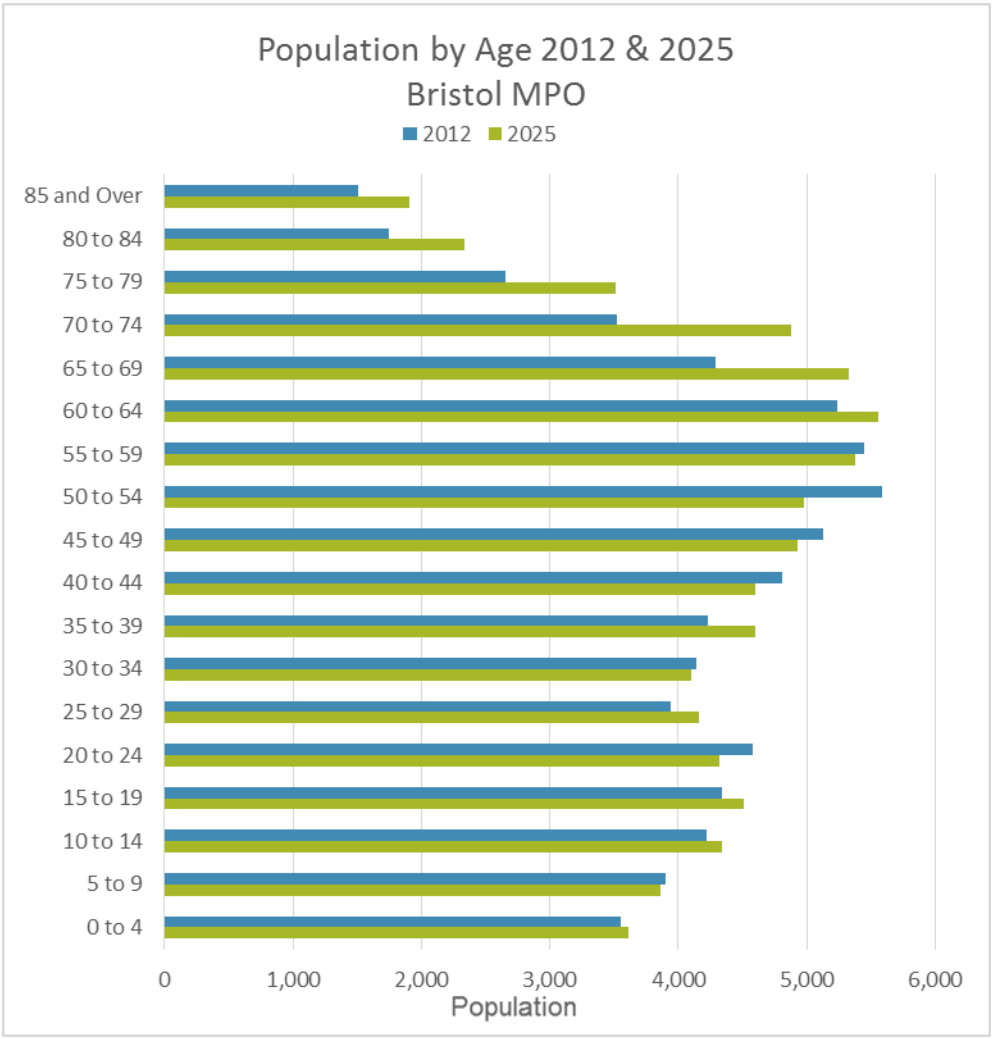


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Bristol Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These

different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Bristol Region, Figure 3 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

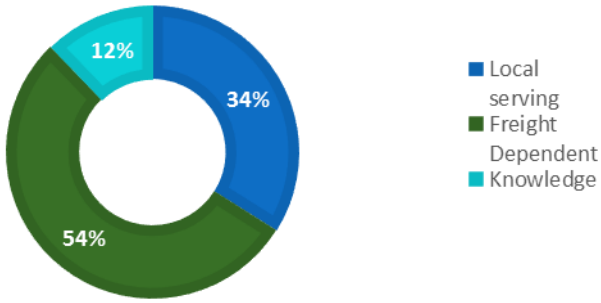


Figure 3 – Top Sectors by Output (2012). Source: IHS Global Insights

Source: IHS Global Insight, 2012.

The freight dependent cluster is clearly the strongest in this region, making up 54% of the economic output in the Bristol Region. Conversely, the local serving and knowledge clusters account for 34% and 12% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Manufacturing, utilities and real estate are the strongest industry sectors in the Bristol Region. Together, they make up over 50% of the economic output for the region. These industries can have a commuting pattern that deviates from the AM and PM peak travel times and also rely heavily on goods movement. (Refer to Table 3).

Table 3: Current Industries by Output. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Output
Manufacturing	31-33	24%
Utilities	22	17%
Real Estate	53	16%
Wholesale Trade	42	6%
Information	51	5%

Source: IHS Global Insight Data, 2012

Top Industries by Employment

In Bristol, health care, energy, retail trade, information and accommodation and food services are the top industries by employment. There is little overlap between the top industries by output and employment. In this case, the top industries by output such as manufacturing, utilities and wholesale trade typically have a high product value to employee ratio. Conversely, the top industries by employment, such as health care, retail trade, and accommodation and food services, are typically employment heavy industries. (Refer to Table 4).

Table 4: Current Top Industries by Employment. IHS Global Insight Data, 2012

Top Industries	% of Workforce
Health Care	14%
Energy	14%
Retail Trade	14%
Information	10%
Accommodation and Food Services	9%

Source: IHS Global Insight Data, 2012

The top employers in the region are indicative of the top industries outlined above. Employers such as Bristol Compressors, Universal Fibers, Boise Cascade Office Products and Strongwell fit with the top industries by output, whereas Mid – Mountain Foods fits with the top industries by employment.

Table 5: Current Top Employers. Source: InfoUSA, supplemented with VEDP, VEC, and local data.

Employers	Employees
Bristol Compressors	1,000 – 1,499
Mid – Mountain Foods	300 – 599
Boise Cascade Office Products Inc.	300 – 599
Strongwell	300 – 599
Universal Fibers, Inc.	300 - 599

Sources: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Bristol Region. The industries expressed in Table 4 have the highest LQ scores in the region. The score for corporate management, for example, can be inferred to mean that these services are more than five times more concentrated in the region than in the entire nation, on average.

Table 6: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Corporate Management	55	5.56
Mining	21	3.24
Other Services	81	1.37
Retail Trade	44-55	1.26
Accommodation and Food Services	72	1.24

Source: IHS Global Insight Data, 2012

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Centers such as this were instead affirmed by stakeholders who had a knowledge of the regional significance of the activity there, and then mapped accordingly. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles. Figure 2 below shows the activity centers as blue circles.

Bristol Activity Centers

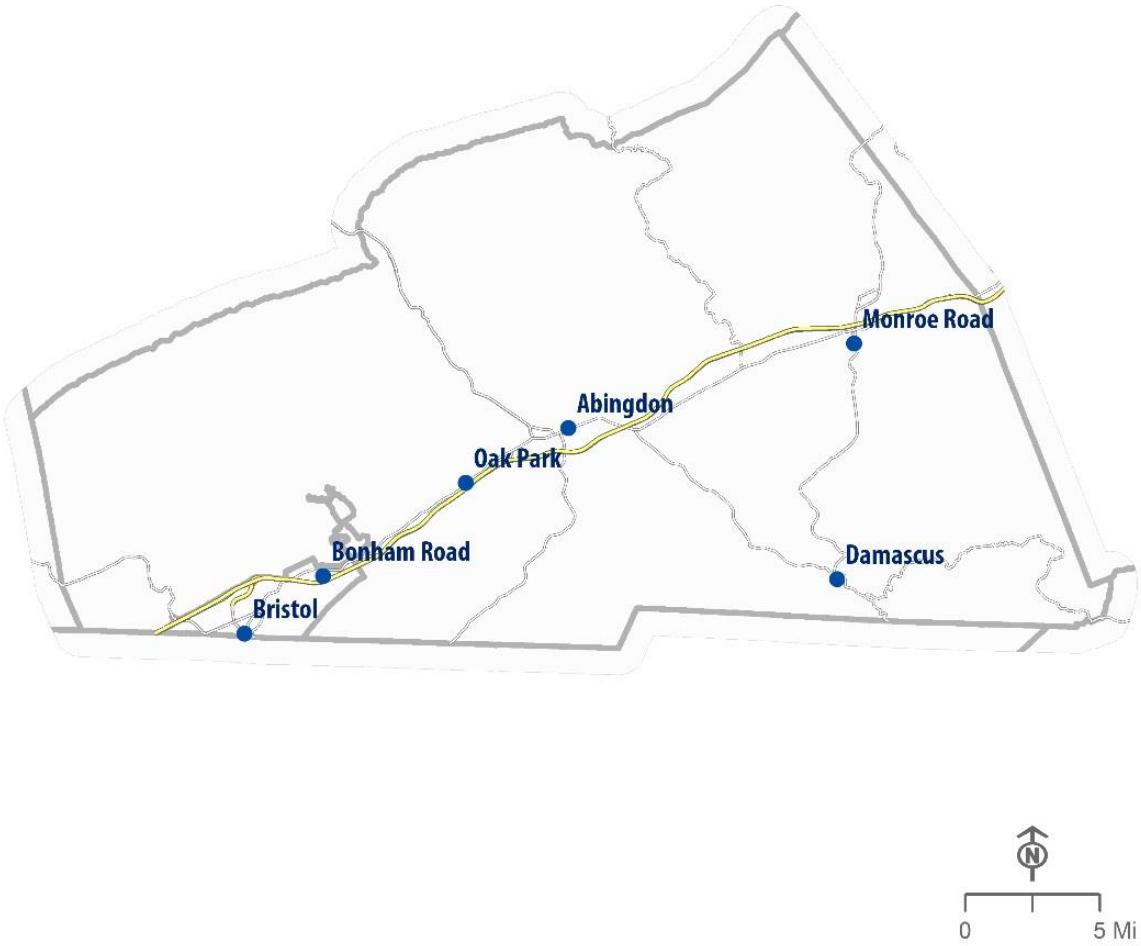


Figure 2: Map of Activity Centers based on Job Density and Stakeholder Input.

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 3 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

Figure 3 shows that most of the activity centers' economy relies on local serving industries. This suggests that these areas attract people and are places that serve the needs of local residents and guests.



Figure 3: Activity Center Employment by Industry Sector.
Source: InfoUSA, 2012.

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Bristol stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Bristol economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Bristol Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Modest growth is forecasted for the Bristol Region by 2025. According to statewide and national datasets used, the manufacturing and utilities industries will see the largest growth by output. Combined, they are expected to produce $2.2 billion more in 2025 than was produced in 2012.

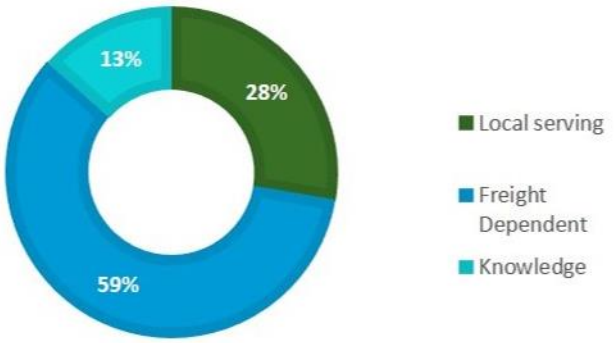


Figure 4: 2025 Industry Sectors by Output.
Source: IHS Global Insight Data, 2012

In 2025, the freight dependent cluster will continue to be the strongest industry sector in this region, making up 59% of the economic output in the Bristol Region. This is 5% higher than 2012. The knowledge sector will grow slightly, making up 13% of the regional output. Conversely, the local serving sector will be a smaller amount of the regional output, accounting for 28% of regional output.

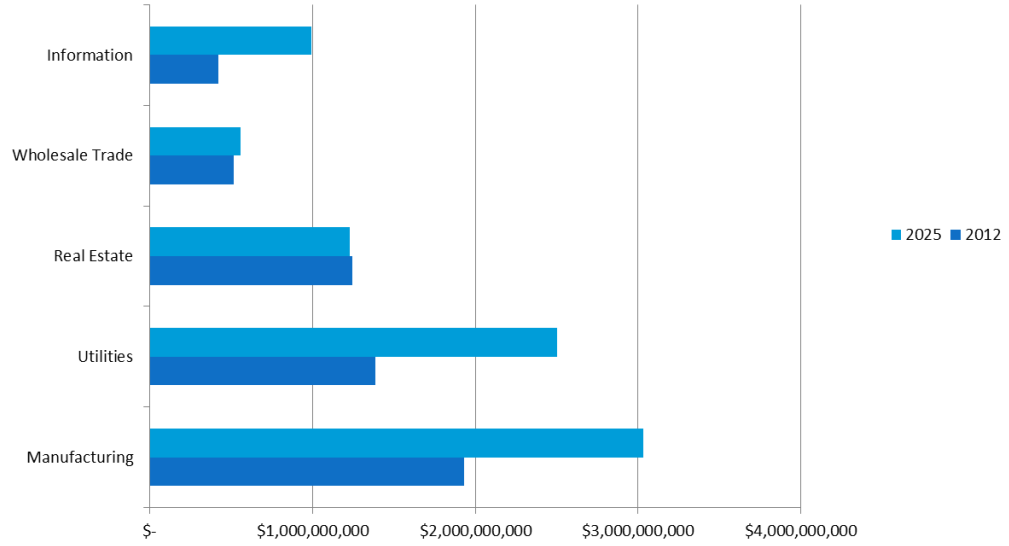


Figure 5: Top Industries by Output
Source: IHS Global Insight Data, 2012

The output for all the top industries in the region will grow, with the exception of the real estate industry. This industry is expected to stagnate in 2025. Economic output for all in Bristol industries combined is expected to increase by over $3.3 billion by 2025. (Refer to Figure 5.

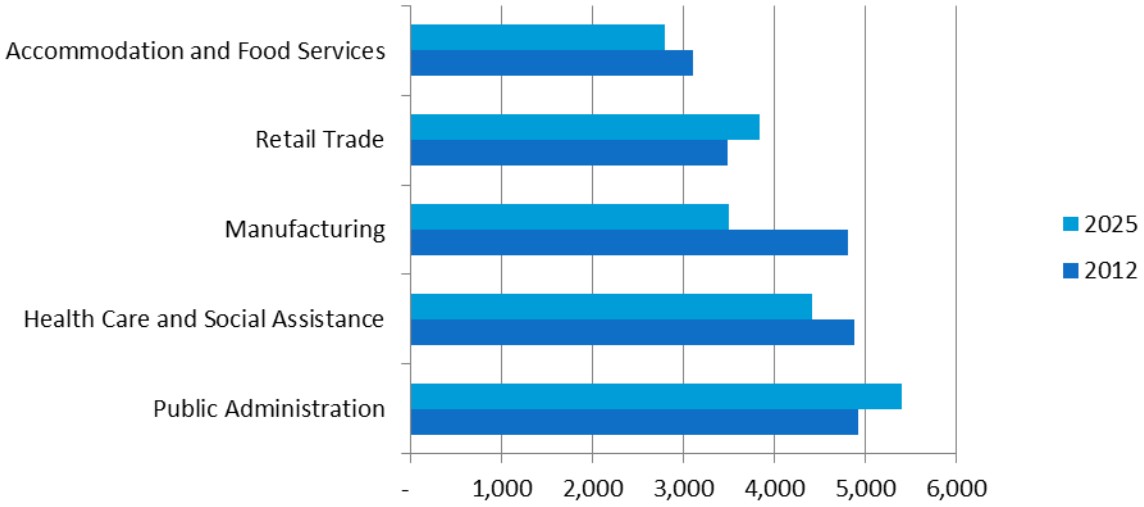


Figure 6: Top Industries by Employment.
Source: IHS Global Insight Data, 2012

The top industries of the Bristol Region will continue to grow in employment. The top industry by employment, health care and social assistance, will continue to be the region's top employer in 2025. However, the number of workers employed in that sector will shrink slightly. It is also estimated that employment in the manufacturing industry will decrease significantly by 2025.

The industry that is anticipated to have the highest percentage employment growth is construction, which will grow by 71% by 2025. This is followed by wholesale trade, transportation and warehousing, management of companies and enterprises, and educational services. (Refer to Table 7).

Table 7: Top Industries by Employment.

Top Industries	NAICS Code	% Change in Employment (2012-2025)
Construction	23	71%
Wholesale Trade	42	43%
Transportation and Warehousing	48-49	32%
Corporate Management	55	31%
Educational Services	61	27%

Source: IHS Global Insight Data, 2012

3. Transportation Profile

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in Bristol Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Bristol Region

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Bristol Region show that the City of Bristol is a major destination for workers in the region. Additionally, there is a significant number of workers commuting from Tennessee to Virginia and vice versa. As represented in Figure 7, a large number of workers commute outside of the state in both Washington County and the City of Bristol.

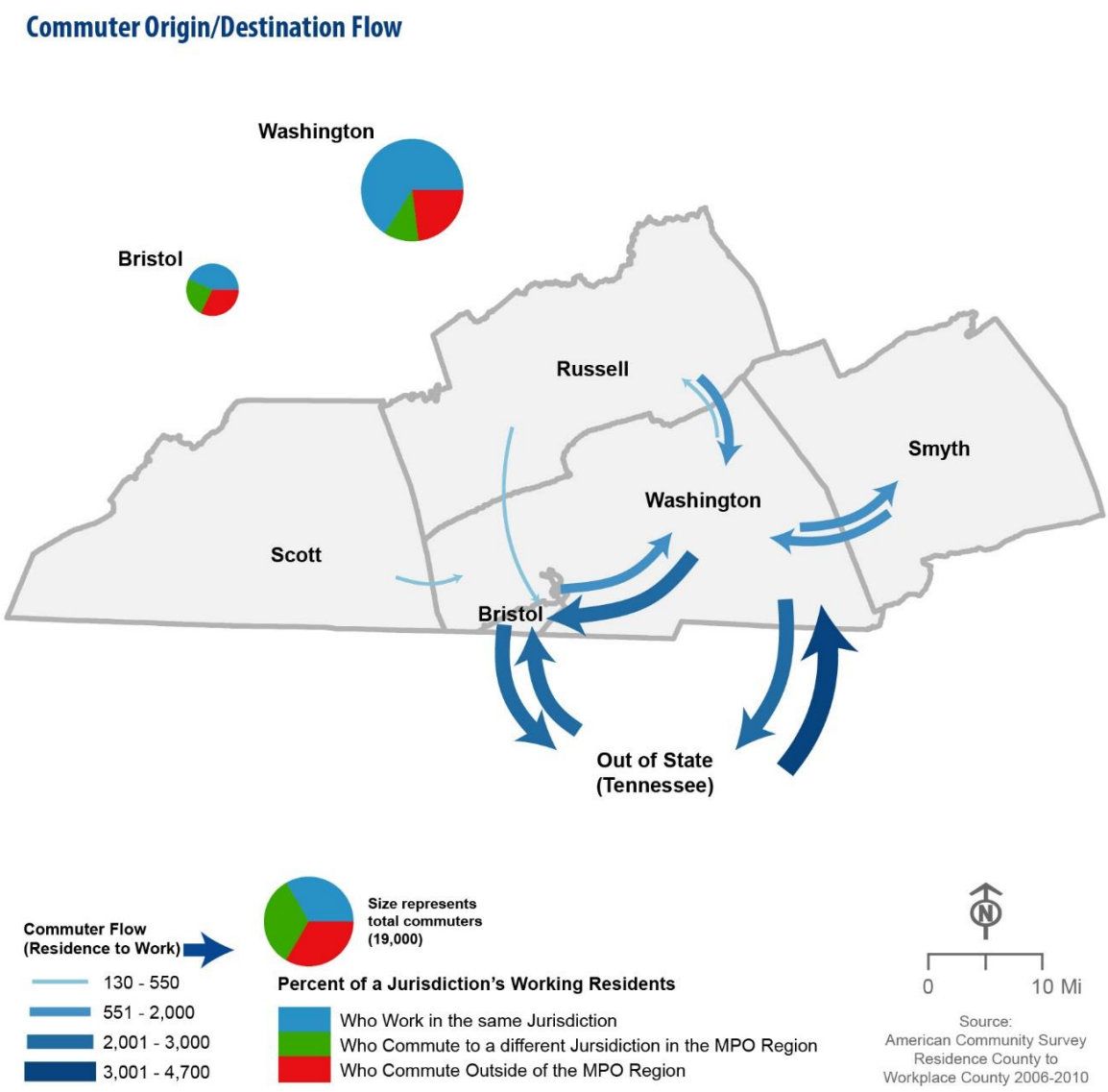


Figure 7: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for Bristol Region was the analysis of commuting patterns between activity centers. Figures 8 through 13 below provide insights into the commuting patterns for six of the activity centers in the Bristol Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map. As described further below, a majority of workers commuting to the region's activity centers originate in block groups in and around the I-81 corridor, highlighting the importance of the I-81 corridor to the region's economy.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, the origin of workers of the Abingdon activity center is centered on the I-81 corridor, with a fewer number of workers commuting from block groups in other areas of Washington County. (Refer to Figure 8).

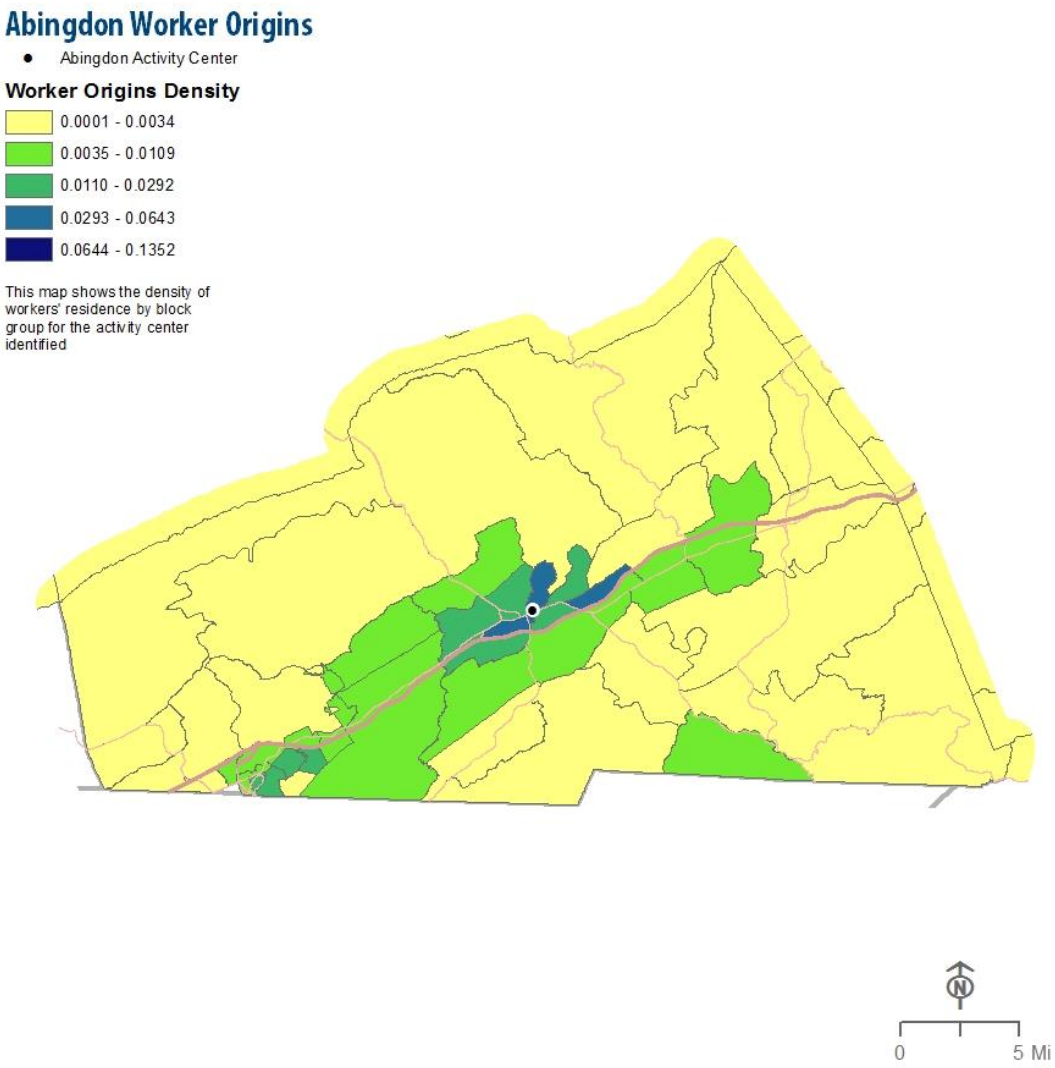


Figure 8: Commuting Patterns to Abingdon Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Bonham Road worker origins are concentrated in the City of Bristol. (Refer to Figure 9). Fewer commutes originate in Washington County.

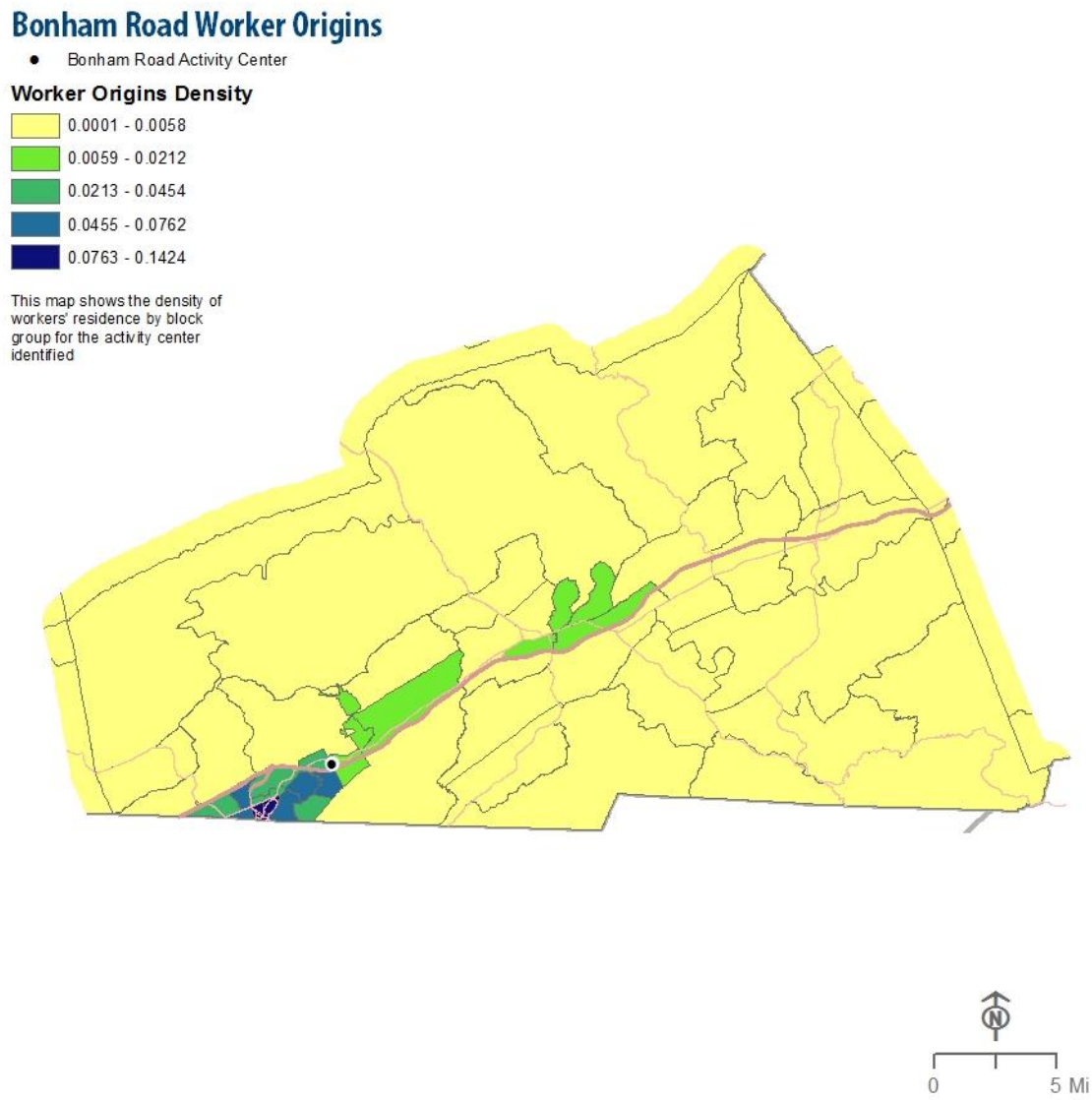


Figure 9: Commuting Patterns to Bonham Road Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the City of Bristol mostly originate from the City of Bristol itself or block groups along the I-81 corridor. Few commutes originate in other areas of Washington County. (Refer to Figure 9).

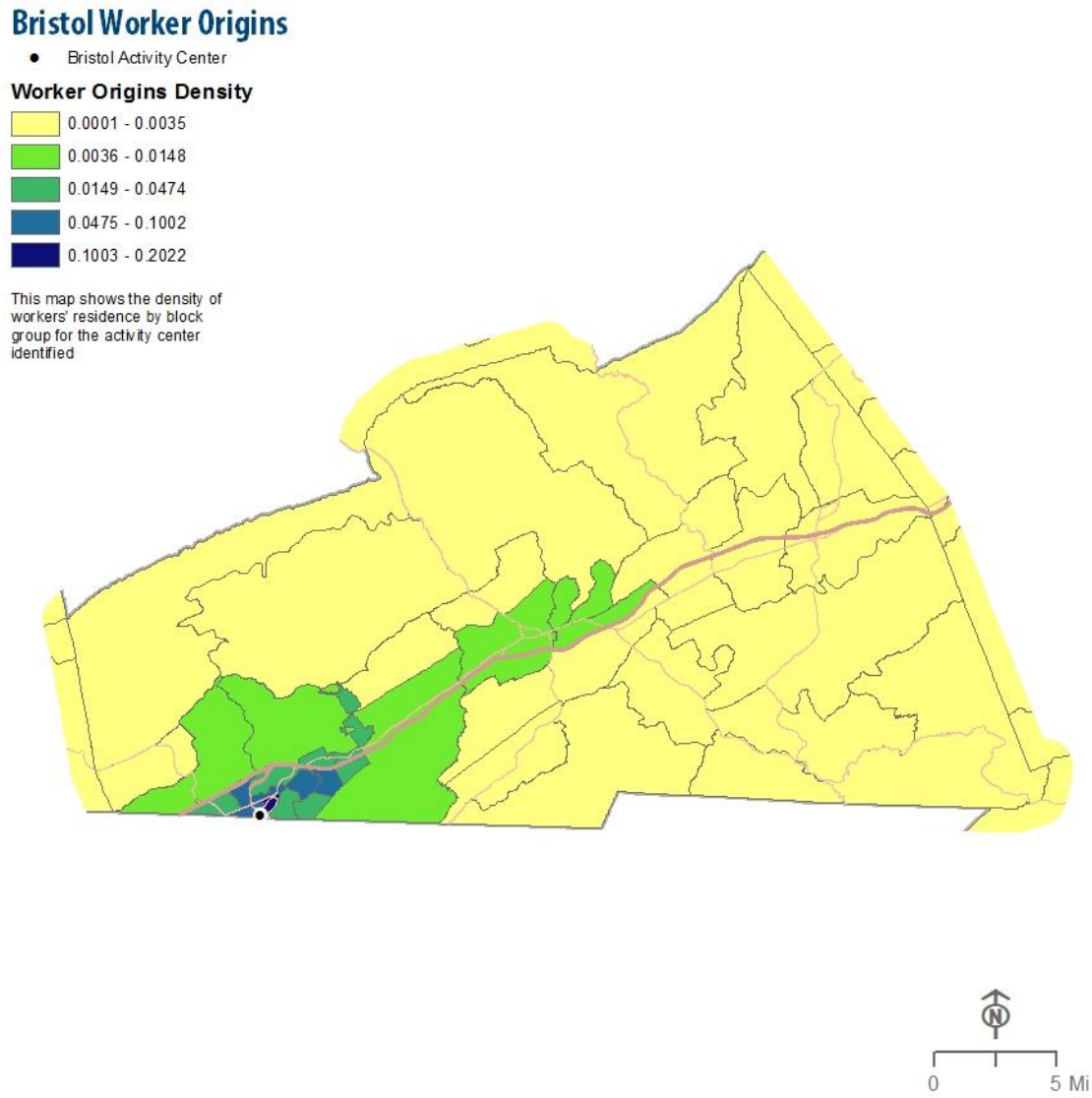


Figure 10: Commuting Patterns to the City of Bristol Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the Damascus activity center originate from many parts of the Bristol Region. These areas include block groups along the I-81 corridor, the City of Bristol, and block groups surrounding the activity center.

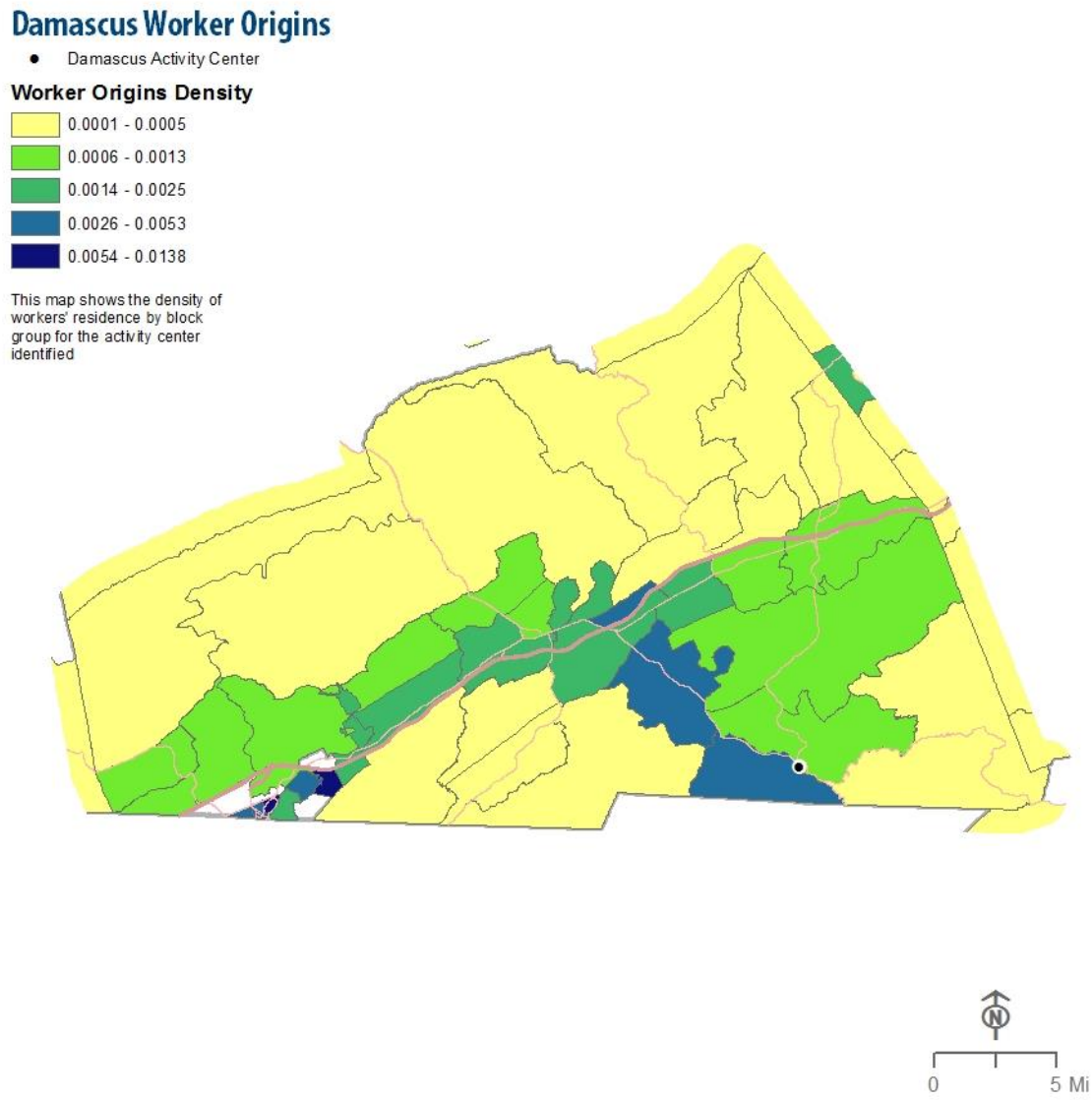


Figure 11: Commuting Patterns to Damascus Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The workers commuting to the Monroe Park activity center originate in block groups directly around the activity center and multiple block groups along the I-81 corridor.

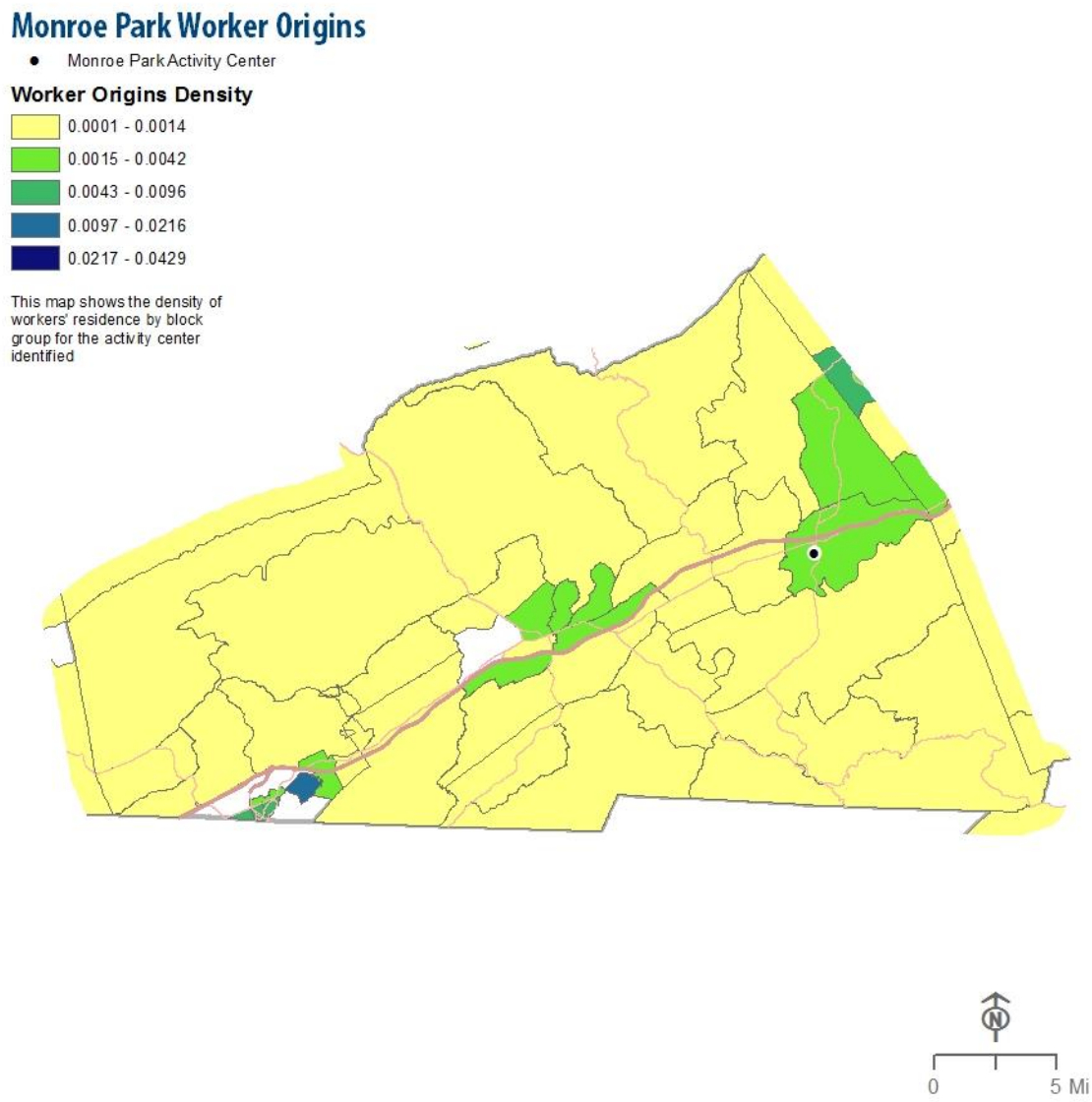


Figure 12: Commuting Patterns to Monroe Park Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The origins for most workers commuting to the Oak Park are concentrated along the I-81 corridor and in the block group in the southern parts of the region.

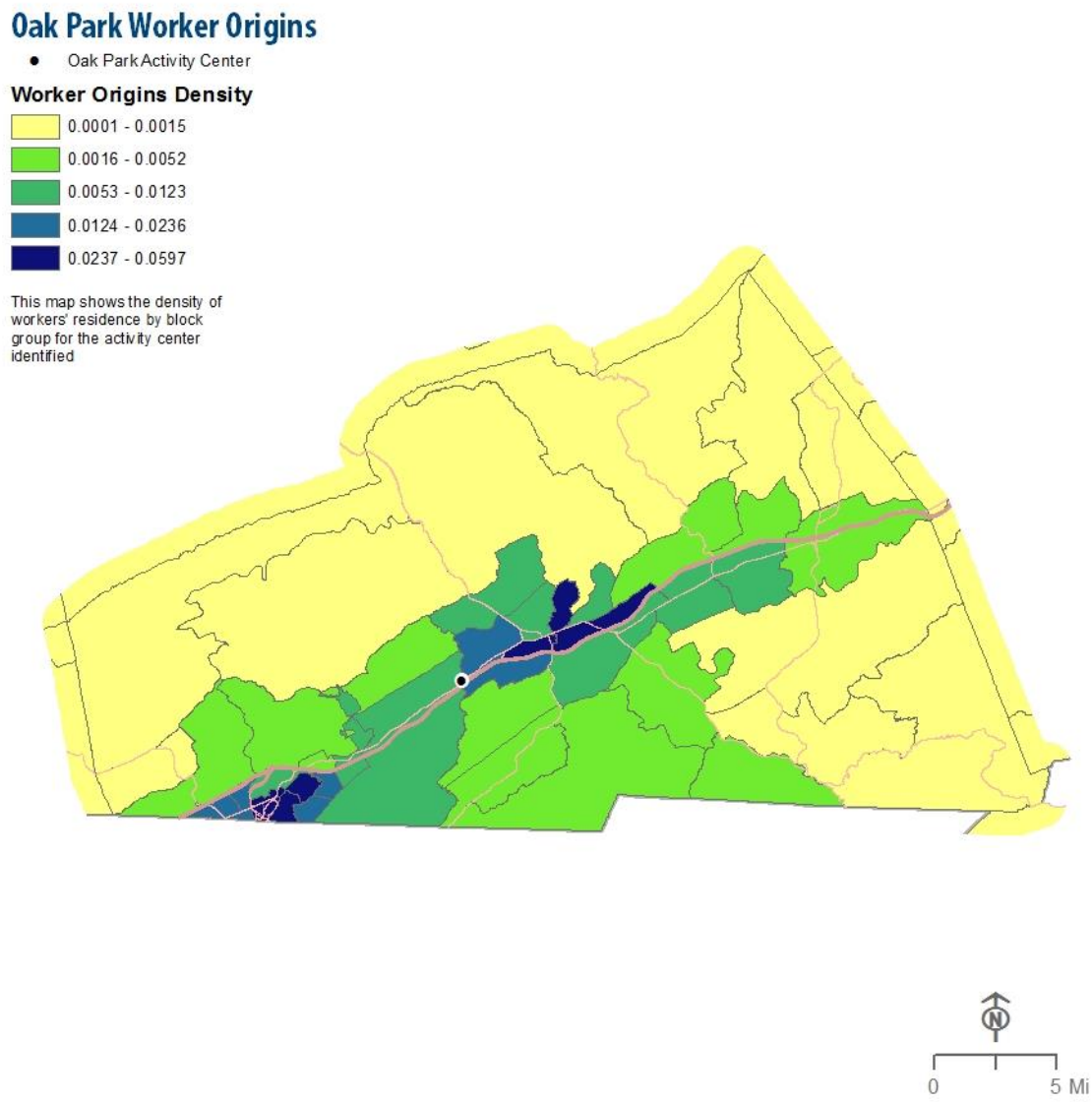
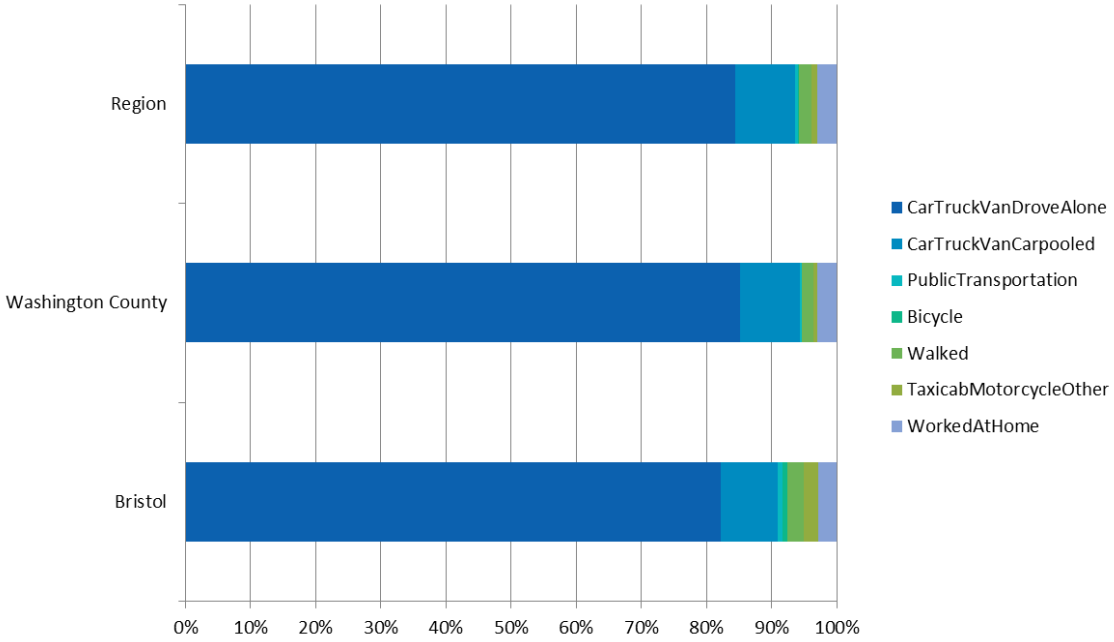


Figure 13: Commuting Patterns to Oak Park Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Bristol Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, single occupancy vehicles are used between 82% and 85% of commutes. For all jurisdictions, carpooling is the second most prevalent option, accounting for 9% of the regional mode share. Public transit use is highest in the City of Bristol, which has the only fixed-route transit system in the region. (Refer to Figure 14).

Figure 14: Mode Share Split by Jurisdiction.



Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Bristol Region, average commute times range from 19 to 25 minutes among the two jurisdictions. (Refer to Table 8). Due to its density and proximity to employment centers, the City of Bristol has the shortest average commute, while more rural areas in Washington County, have longer commutes on average.

Table 8: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
City of Bristol	19.0
Washington County	25.0

Source: ACS 2013 5-Year Estimates

Commutes of over 45 minutes make up 11% of commutes in the region. Washington County has the highest percentage of workers who commute over 45 minutes at 11%. However, this is only slightly higher than the City of Bristol, which (Refer to Figure 15).

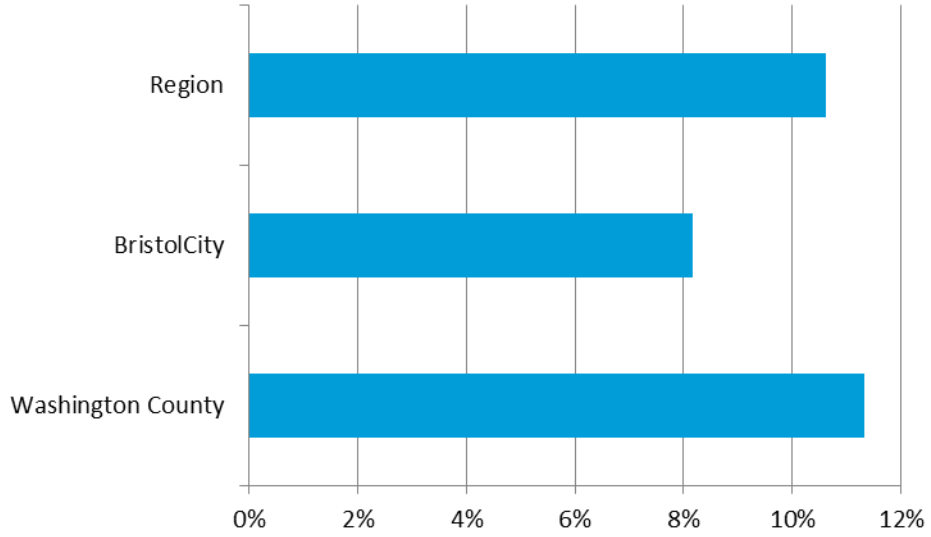


Figure 15: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 16 provides a closer look at where longer commutes originate. In both the City of Bristol and Washington County, the areas with lowest commute times are within the I-81 corridor. The block groups with the highest commute times were in the most eastern, western, and northern parts of Washington County. Commutes in these areas are nearly 150% longer than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

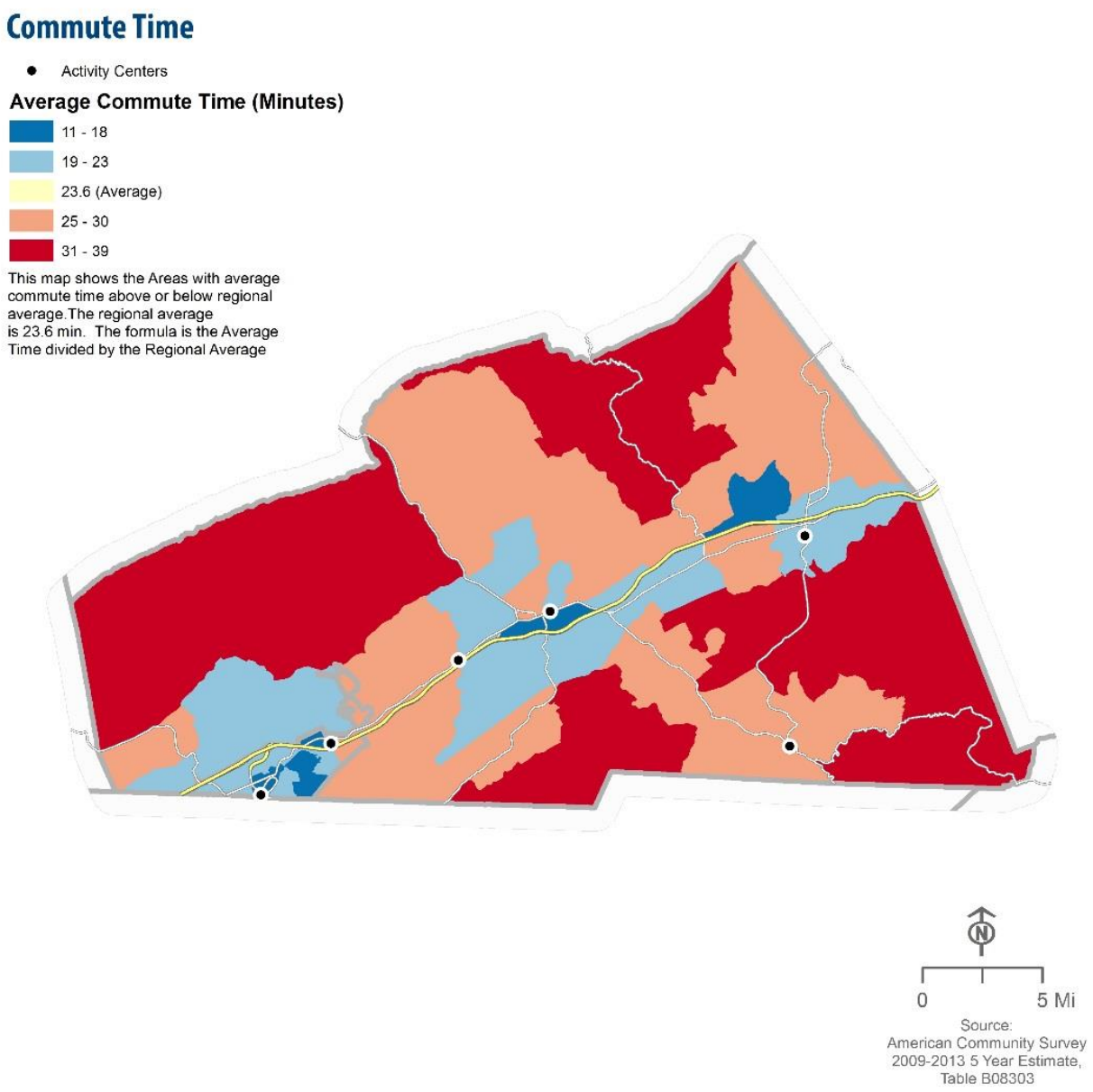


Figure 16: Bristol Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Bristol Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility is the City of Bristol and the areas of Washington County immediately adjacent to the City. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 17).

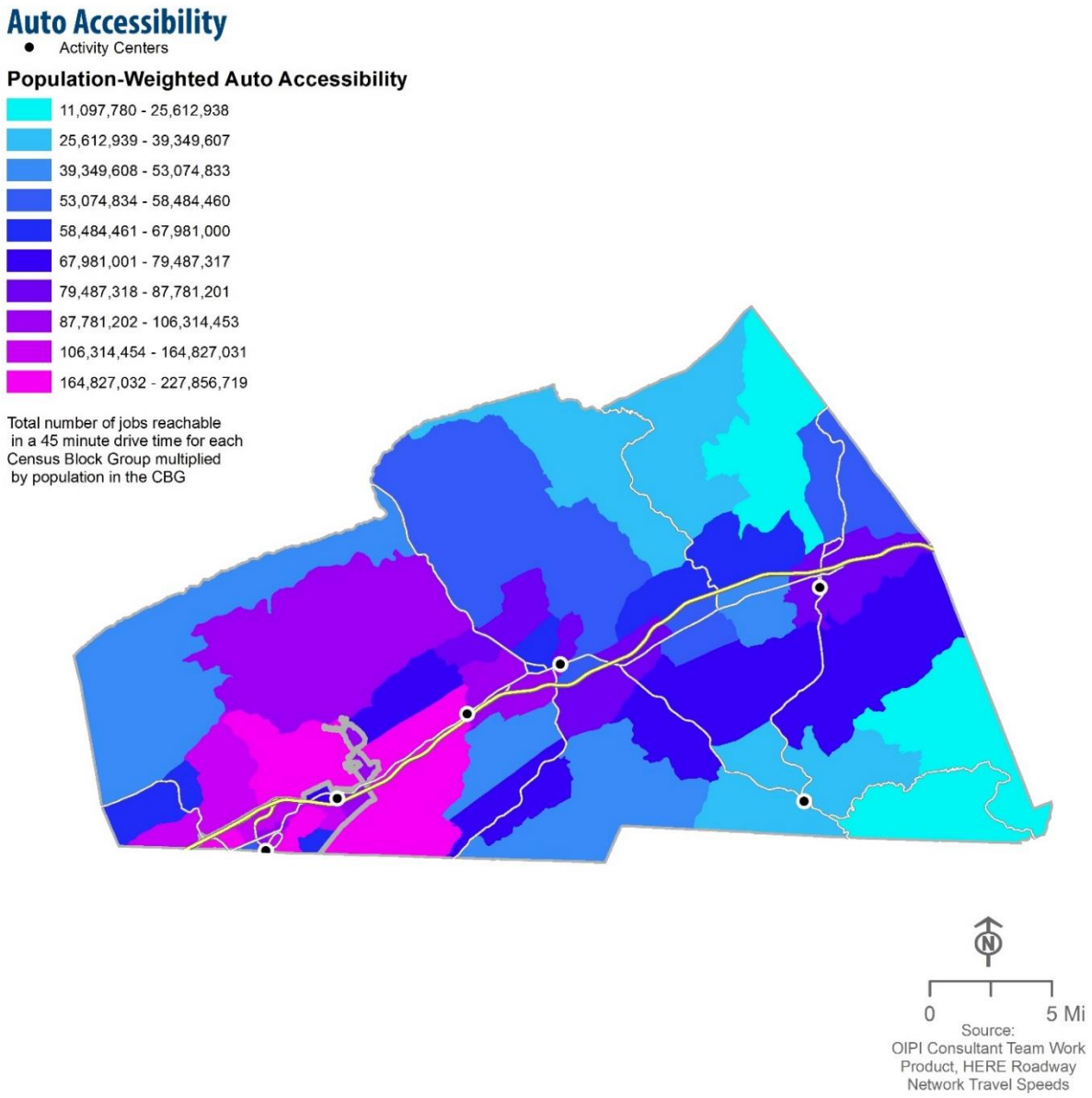


Figure 17: Auto Accessibility

Transit Accessibility

Outside of the City of Bristol, there are few fixed-route transit options in the Bristol Region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 18).

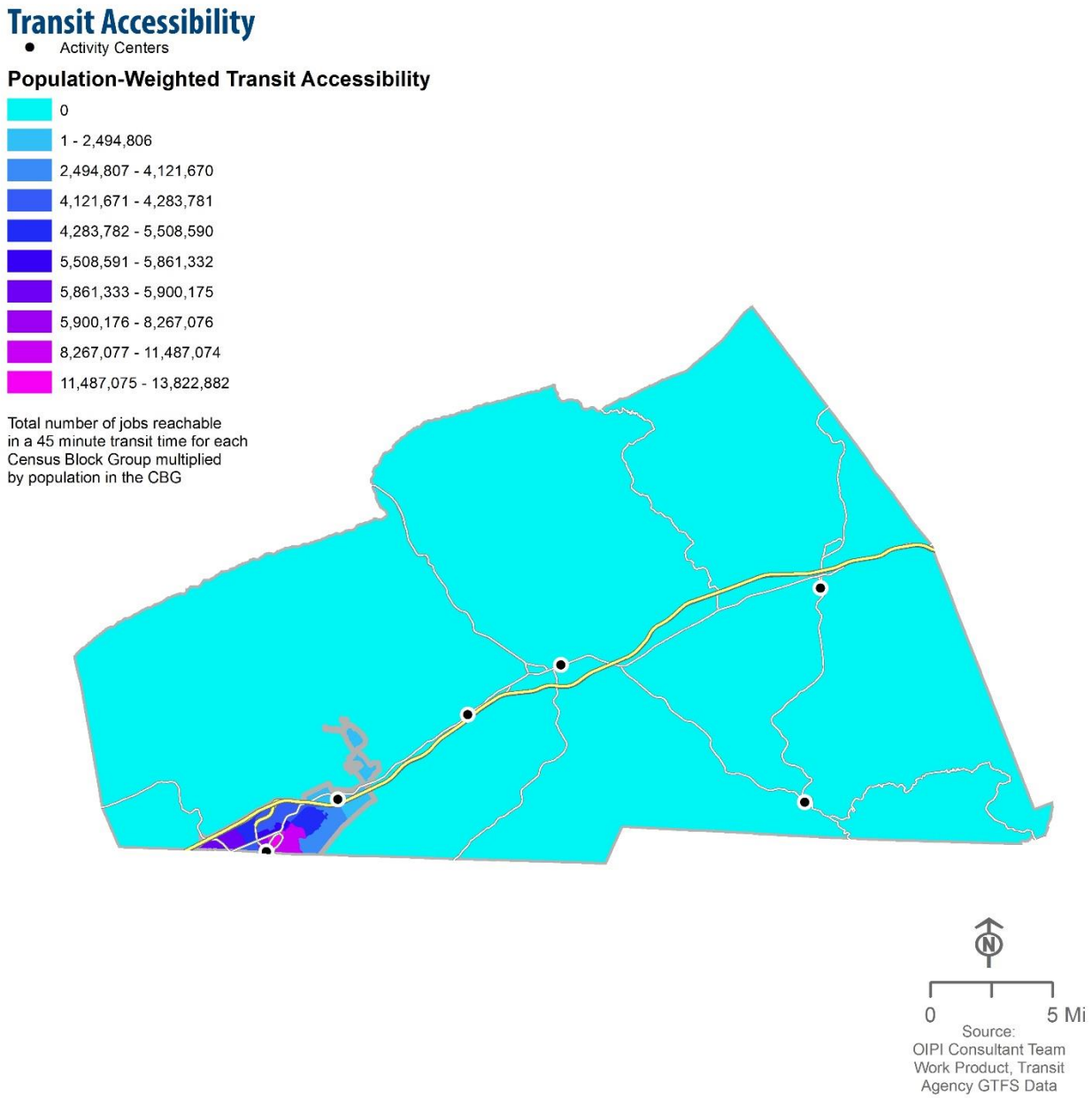


Figure 18: Transit Accessibility

Walk Accessibility

Walk accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. Areas scored the highest in walk accessibility are in communities along the I-81 corridor, with the highest scoring areas located within the City of Bristol. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 19).

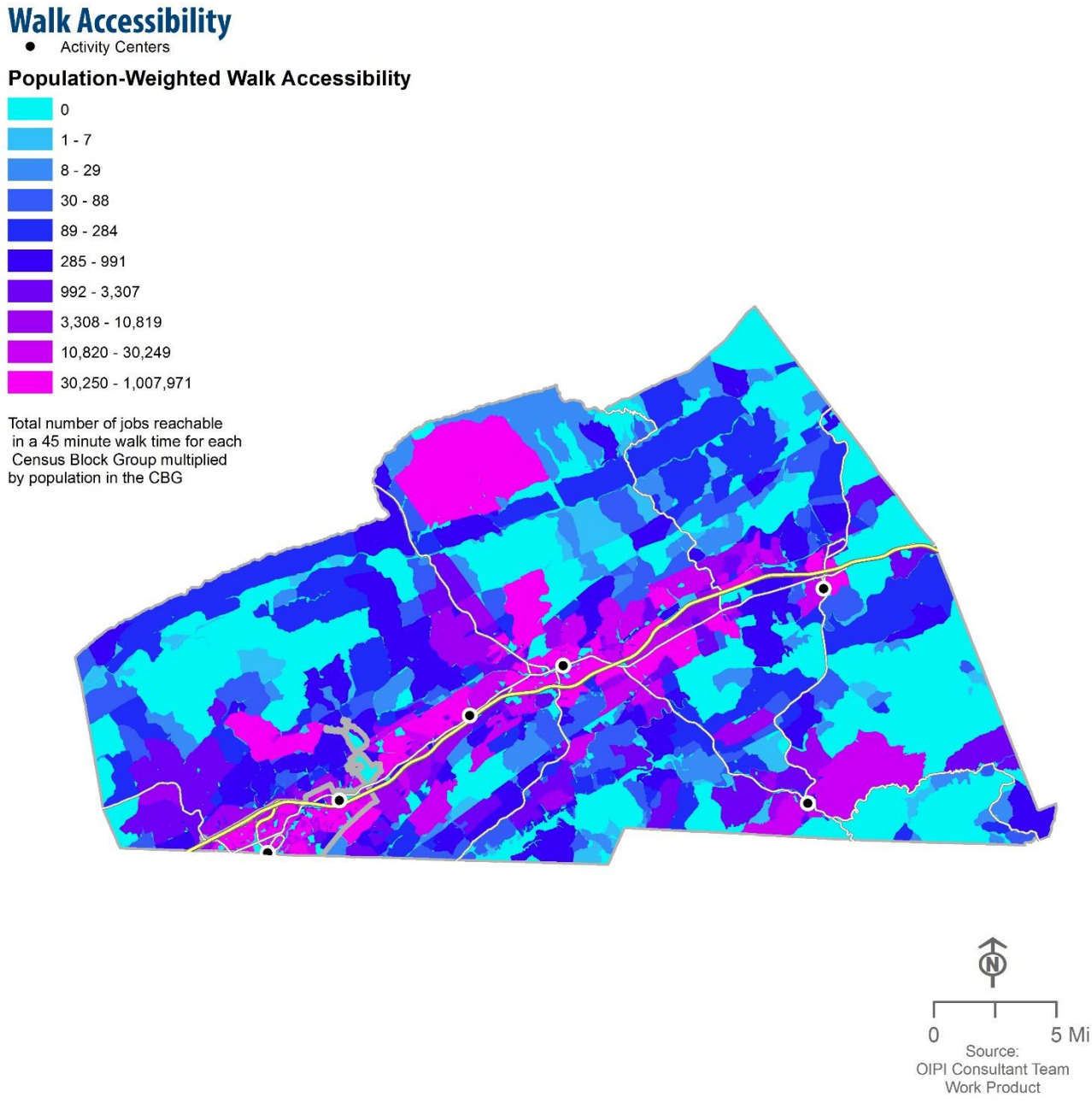


Figure 19: Walk Accessibility

Freight Accessibility

In addition to railways, I-81 is the major corridor for freight movement through the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within a four minute drive from a major arterial ramp. (Refer to Figure 20).

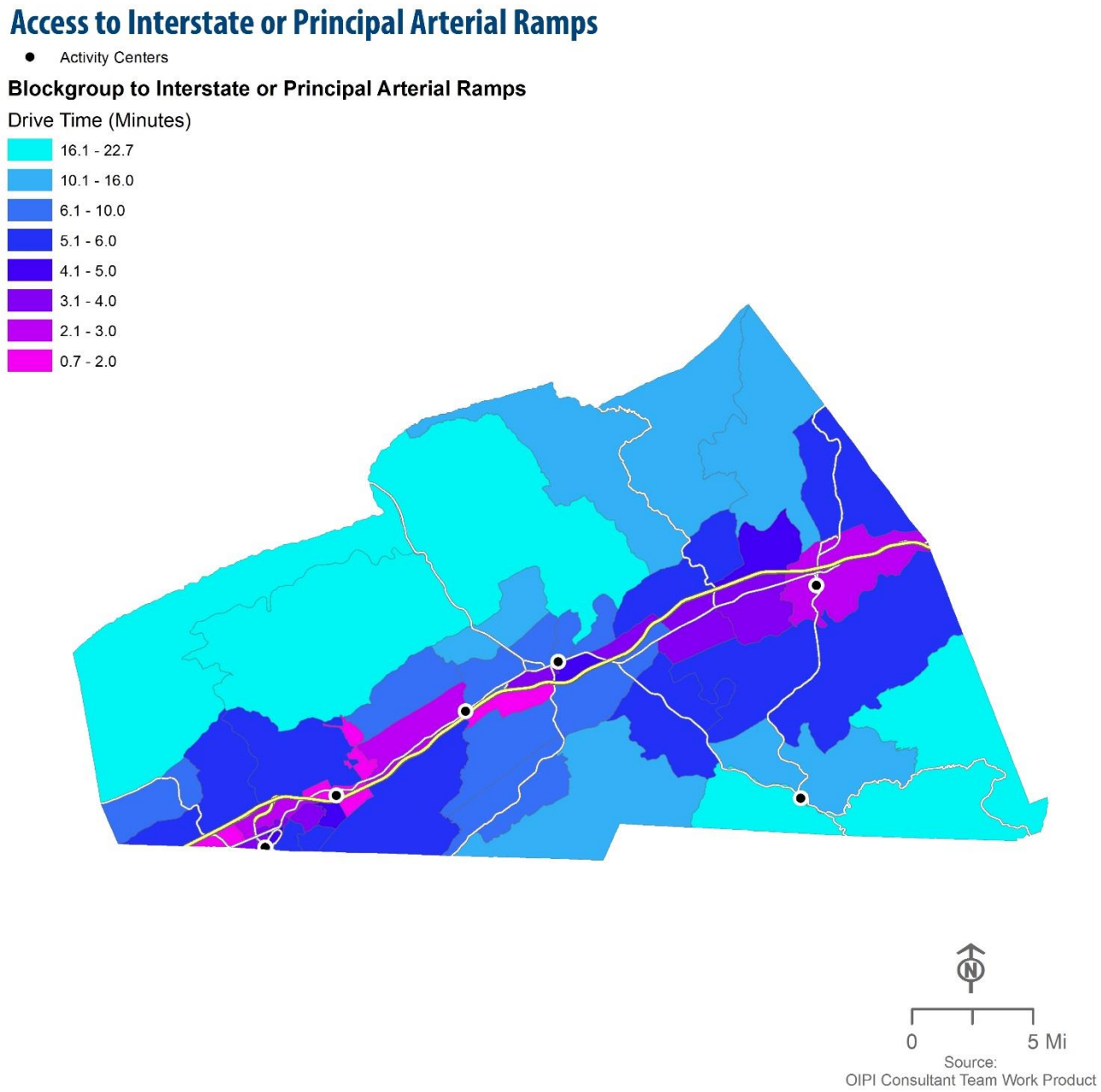


Figure 20: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Bristol Region are clustered around I-81 in Washington County. Most areas adjacent to the I-81 corridor have access to a warehouse or distribution center within a 14 minute drive. (Refer to Figure 21).

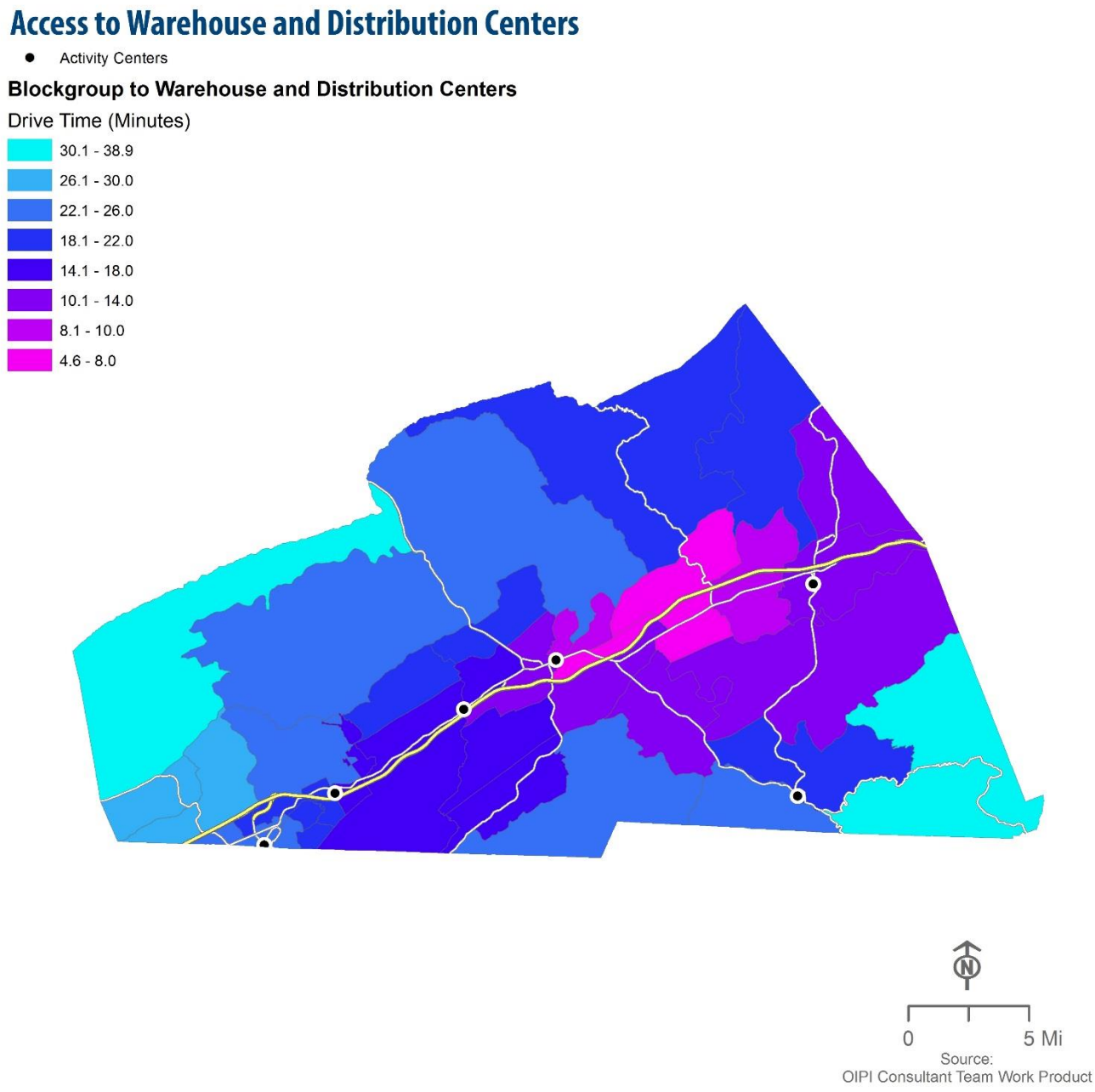


Figure 21: Access to Warehouses & Distribution Centers

Norfolk Southern operates freight rail lines that pass through Washington County and the City of Bristol. Roanoke Airport is the closest airport to the Bristol Region, just over a three hour drive for most of the region. (Refer to Figure 22).

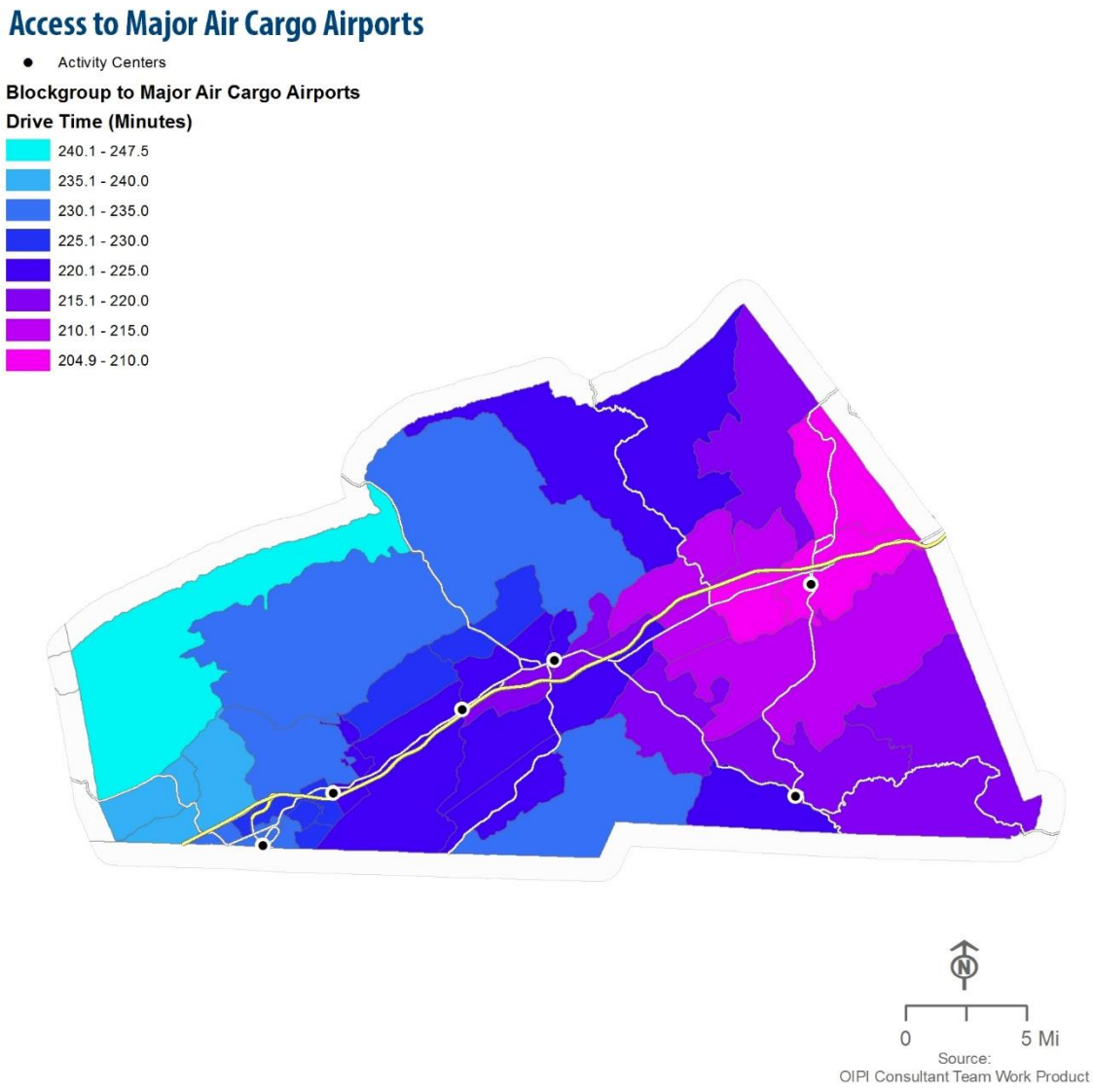


Figure 22: Access to Freight Airports

D. Roadway Measures

This assessment identified the transportation conditions in the Bristol Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 18 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data was available for multiple major roadways, including I-81/US Route 58, US Route 11/19, and US Route 421. Overall, scores on the travel time reliability index indicated high travel time reliability for both corridors. The reliability index scores are higher in several locations along US Route 11/19 near the City of Bristol and parallel to I-81/US Route 58, representing slightly lower levels of travel time reliability. There are, however, no areas of significant concern along either corridor. (Refer to Figure 23).

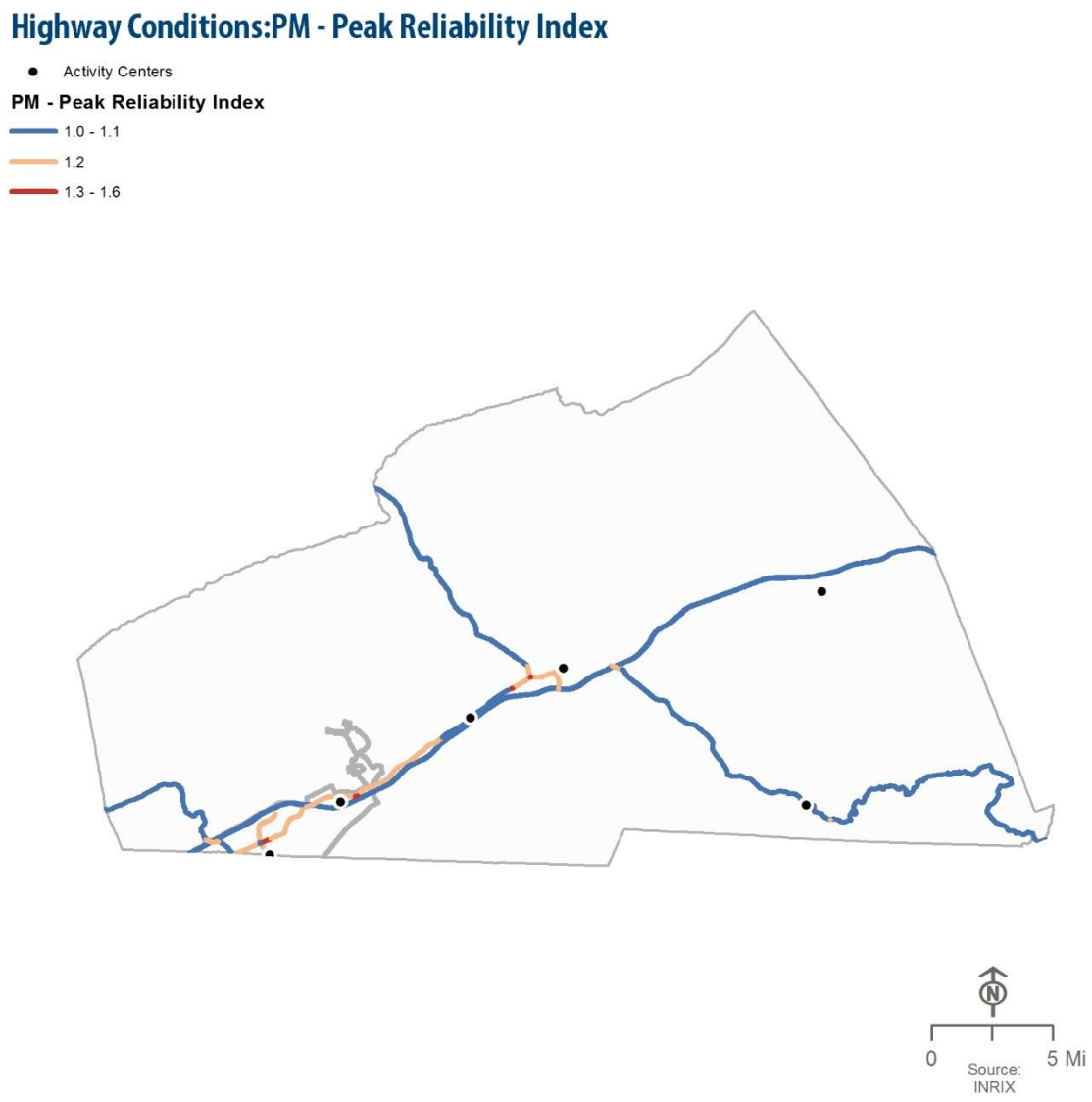


Figure 23: Travel Time Reliability

Note: The Reliability Index is based on a statewide scale which may skew the scores for the Bristol Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major roadways in the Bristol Region. According to the analysis, none of the major roadways in the region (including I-85/US Route 58) have major congestion problems in the Bristol Region. A few small portions of US Route 11/19 are congested between 5% and 18% of the time. Most roadways analyzed are congested less than 5% of the time. (Refer to Figure 24).

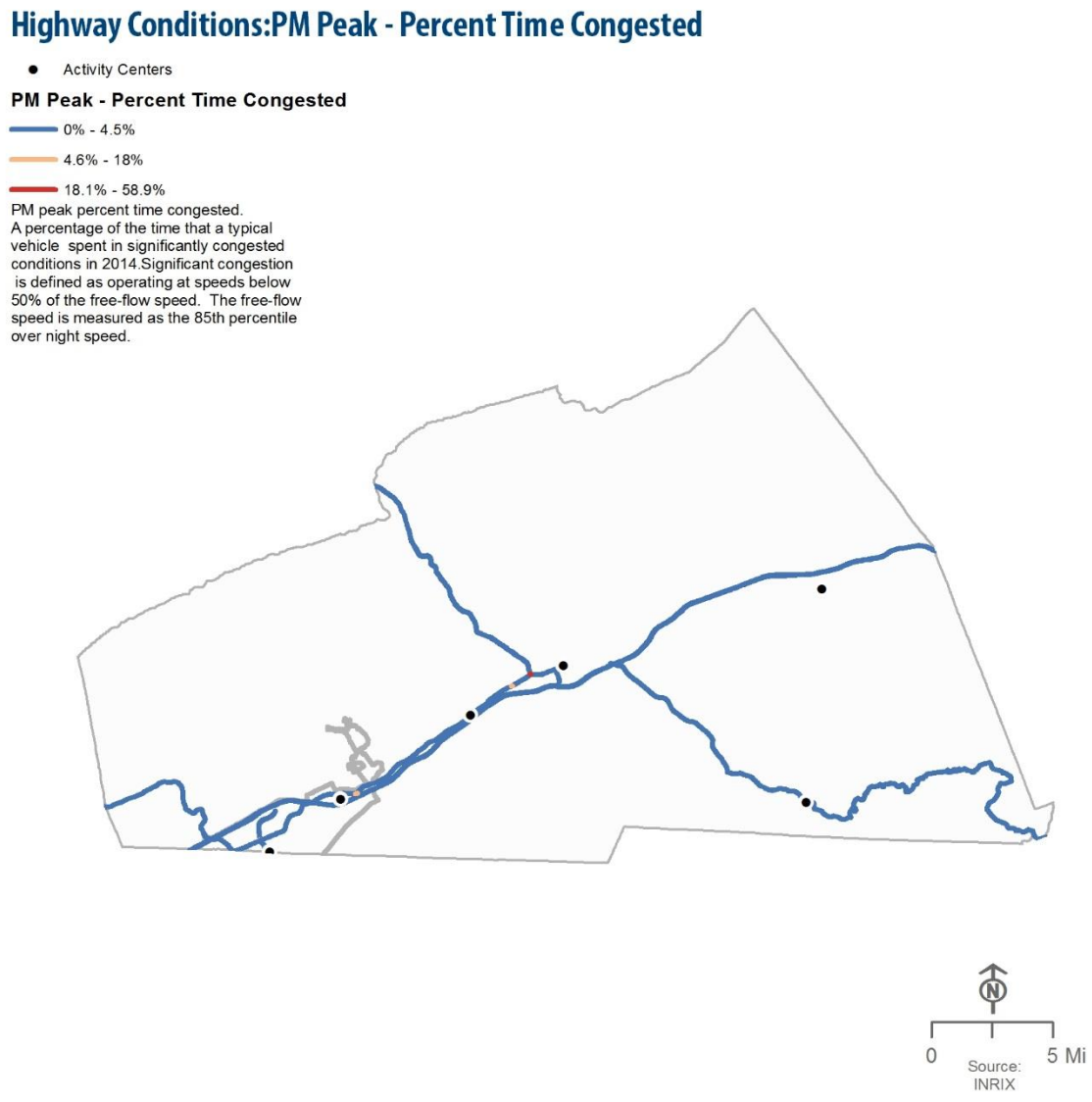


Figure 24: Percent of Time Congested

Travel Time Delay

Figure 26 displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit. In the Bristol Region, travel time delay is minimal on the Bristol Region's network, with the exception of US Route 58 in the southeastern area of the county. (Refer to Figure 25).

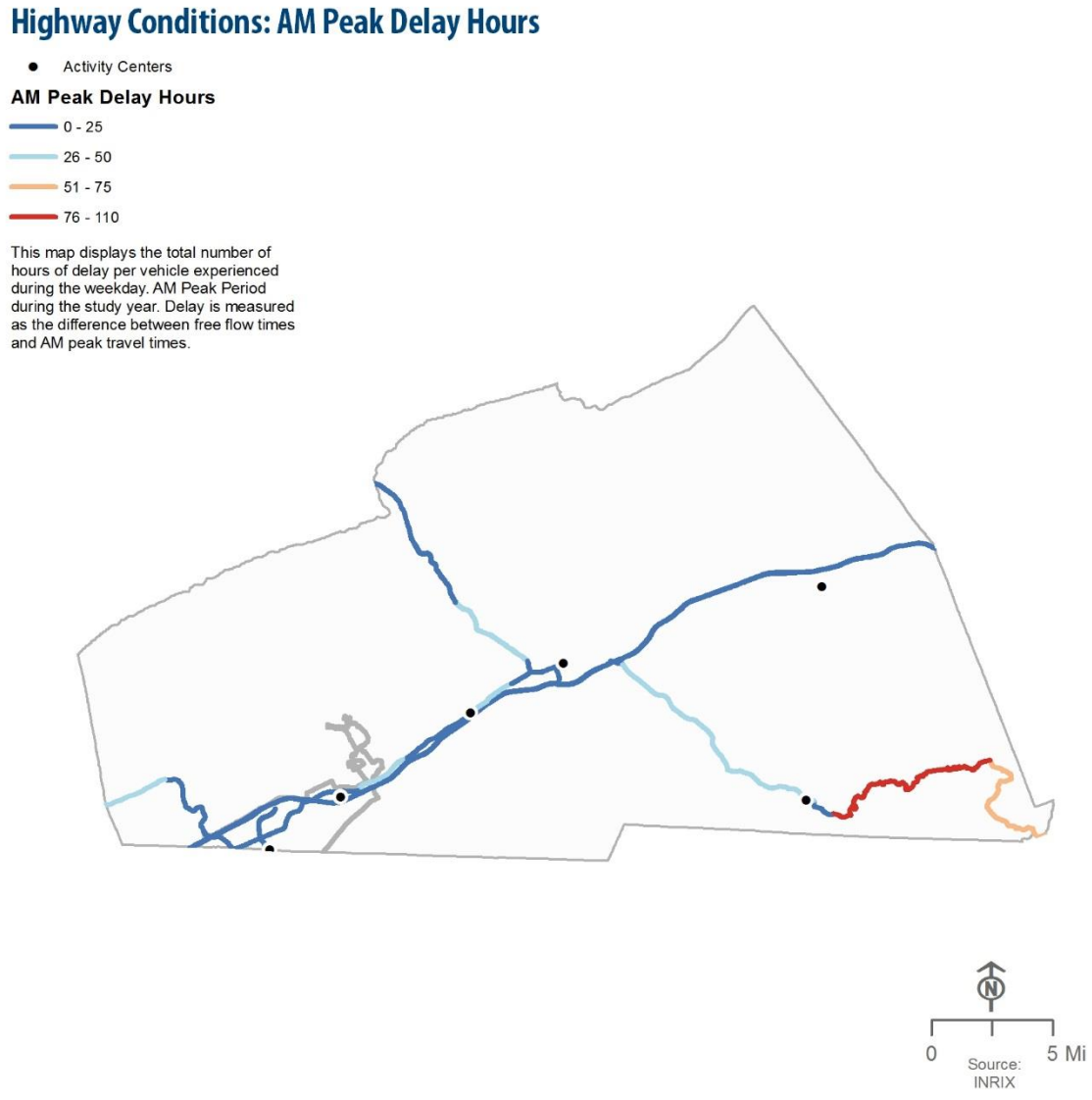


Figure 25: Travel Time Delay

Median Speeds

Figure 27 displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. Uncontrolled roadways, such as US Route 11/19, experienced a slower median speed between 31-45 mph. (Refer to Figure 26).

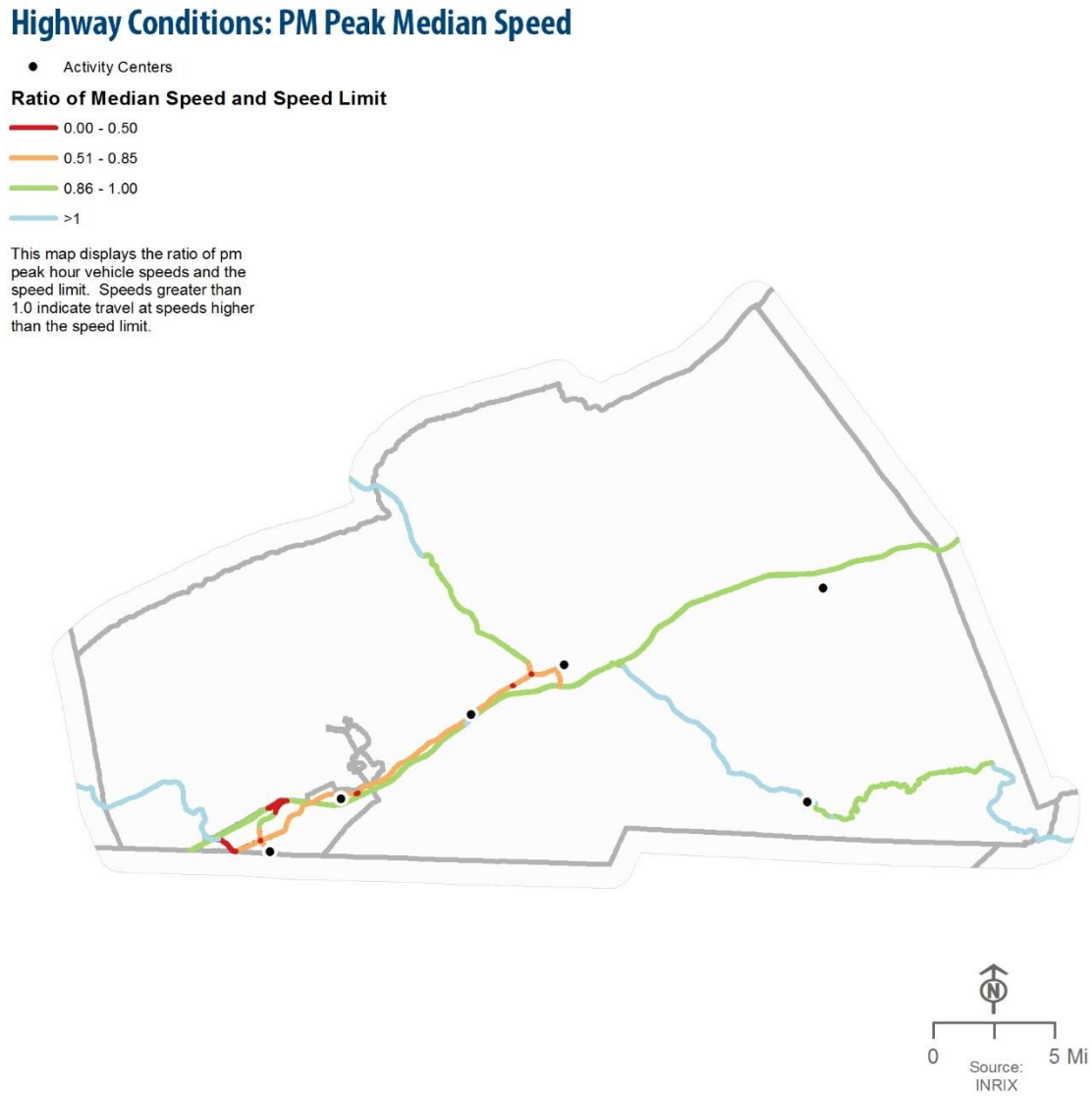


Figure 26: Median Speeds

E. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Hampton Roads Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Bristol Region, an average of over 98% of the dollar value of all goods that are moved through the region are moved by truck. Though rail is used to move goods in the region it is less dependent on that mode, carrying less than 2% of the total dollar value of goods. Both jurisdictions in the region, trucks are the primary means of moving goods. Other freight modes, such as pipeline, air, or water freight modes are not utilized in the Bristol Region. (Refer to Figure 27).

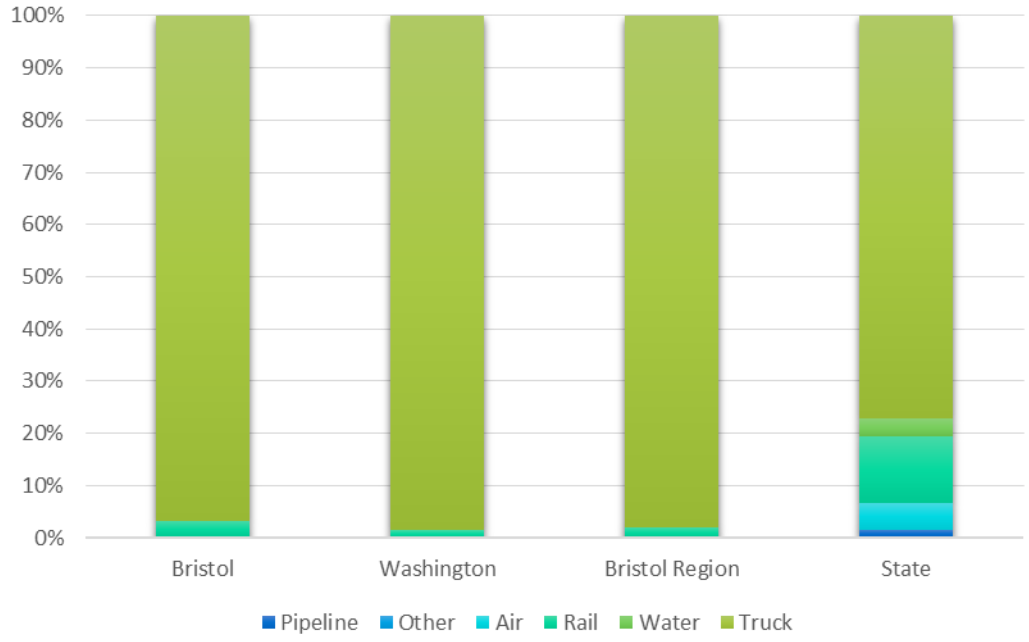


Figure 27: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location quotients are used to compare the prominence of freight modes between the Bristol Region, and the state as a whole. In comparison to the state, the Bristol Region is more dependent on trucking. The Bristol Region relies on trucks for freight movement 1.27 times more than does the state as a whole. Rail and air transportation for goods is more common for the state on average than it is for the Bristol Region. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the relatively large distance – over a five hour drive – to Richmond International Airport from the Bristol Region. (Refer to Figure 28).

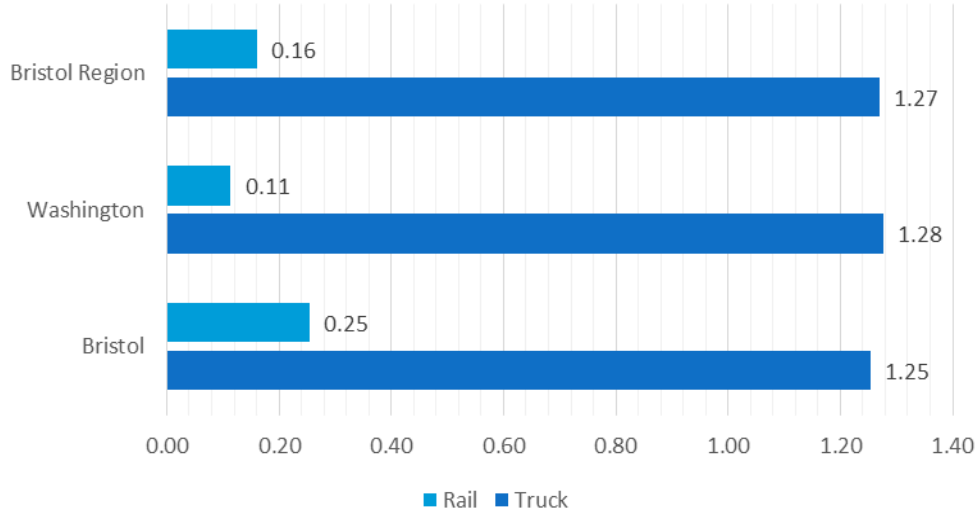


Figure 28: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

While to prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Other commodities account for more than two-thirds of value imported to the Bristol Region. Secondary Traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) is the second highest imported commodity by value. Textile mill products is the highest total value commodity exported, accounting for a third of export values. Overall, the Bristol Region imported over $2.2 billion worth of goods and exported $2.9 billion worth of goods, resulting in $700 million worth of exports. (Refer to Figures 29 and 30).

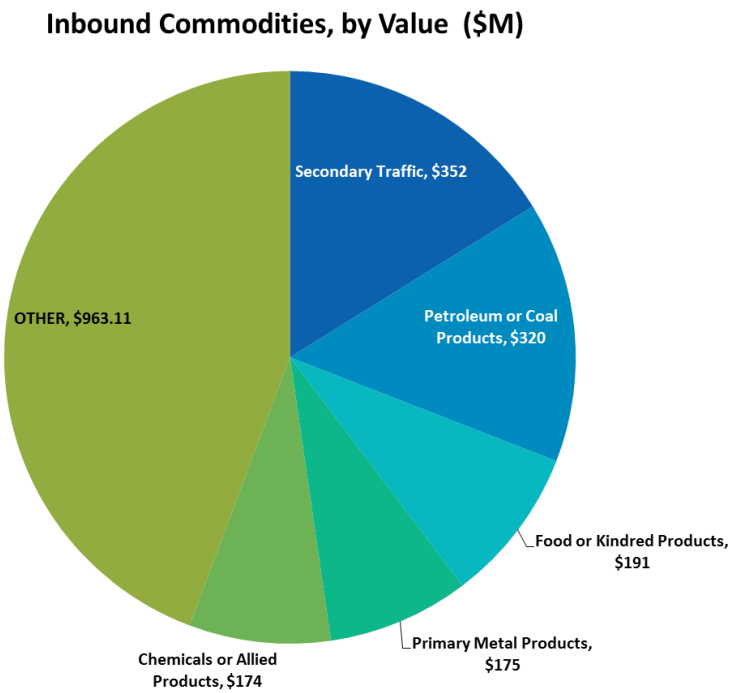


Figure 29: Top Freight Values by Commodities - Inbound.
Source: TranSearch, 2012

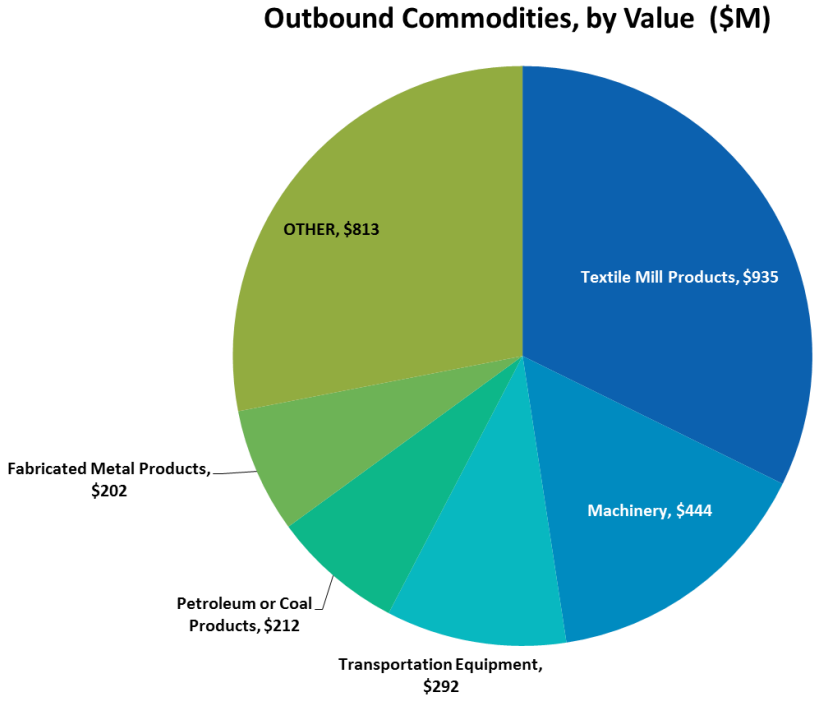


Figure 30: Top Freight Values by Commodities – Outbound
Source: TranSearch, 2012

The Southeast Region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Bristol Region based on dollar value. In 2012, $1.6 billion dollars of freight was exported to the Southeast from Bristol. The Mideast Region is the second most important destination for freight exported from the Bristol Region, with $354 million worth of goods exported to this region. (Refer to Figure 31).

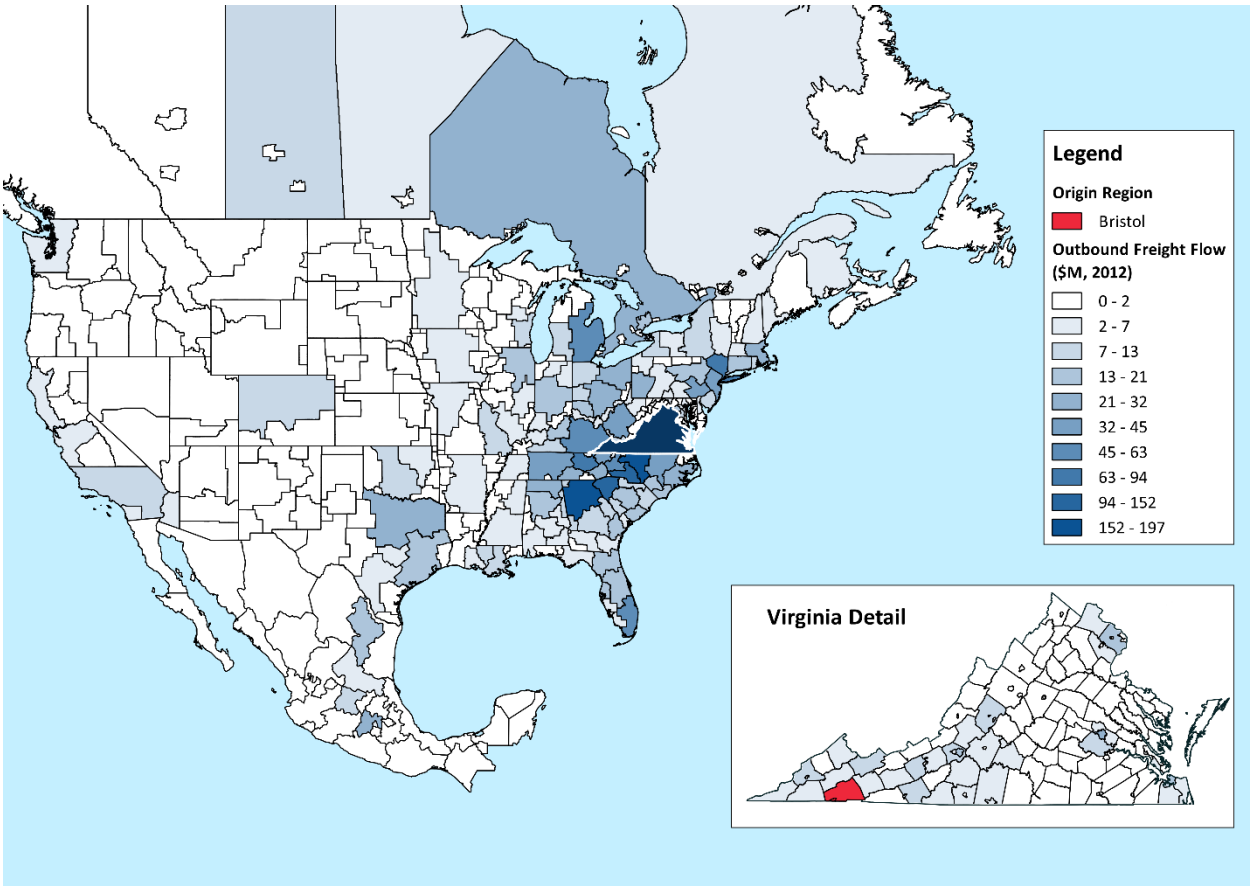


Figure 31: Top Freight Values by Region.
Source: TranSearch, 2012

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, low-value per ton goods came to the top. Nonmetallic minerals accounted for the highest inbound and outbound commodity by tonnage. This accounted for a third of total inbound commodities and almost half of outbound commodities for the entire region. (Refer to Figures 32 and 33).

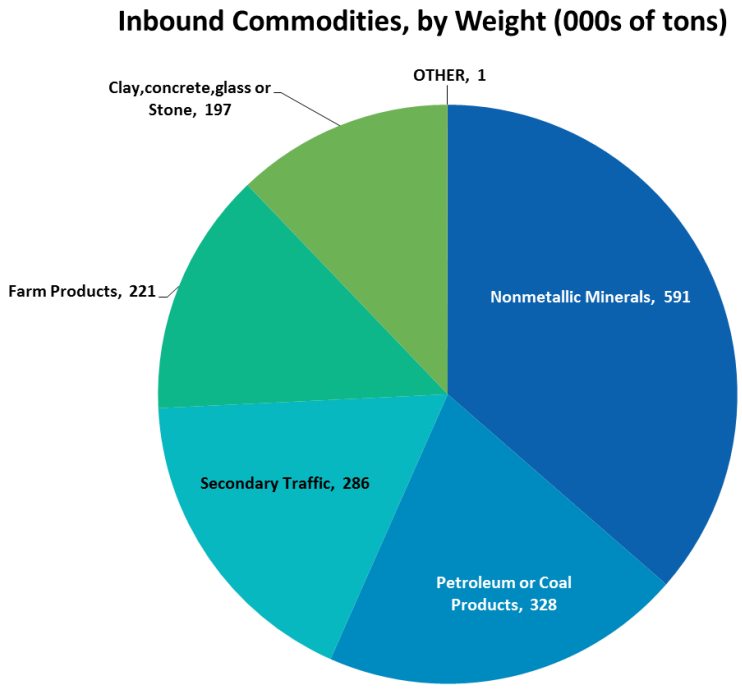


Figure 32: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

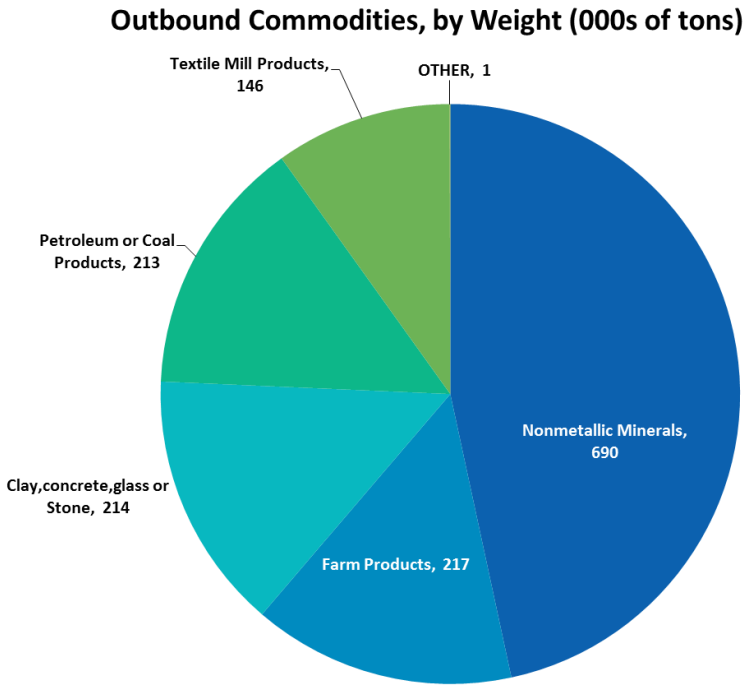


Figure 33: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional transportation needs in order to be able to compare proposed projects to those needs. The Needs Assessment also uses a spatial analysis for the region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential needs.

These needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-capacity needs (i.e. safety, operations and state of good repair needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed needs, these needs were included and documented. In addition, the OIPI team analyzed all the overall assembled data for each region in order to identify additional needs not identified in the Forum, to assemble a more complete picture of potential transportation needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 9: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Bristol Region, it showed a continued dominance of the freight sector (59% freight), with a smaller segments of the knowledge sector (13%) and the local serving sector (28%). As outlined in the Economic and Transportation Correlation above, the general Transportation Needs of these two dominant sectors (freight and local) are as follows:

The modest forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The economic and transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit in the region exists only in the City of Bristol. However, the expansion of knowledge-based sector and continued importance of the local-based sector would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The continued dominance of the freight sector in the Bristol Region makes current freight needs particularly important. Network connectivity and reliability are important for on-time freight deliveries. Many roads in the Bristol region are secondary roadways that are not designed for major freight traffic. There are also issues of reliability at major interstate interchanges which exacerbates existing connectivity issues.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

To assist with the understanding of the map and table of needs described below and the relationship of these needs to the Corridors of Statewide Significance and the Urban Development areas, please refer to the following legend of icons.

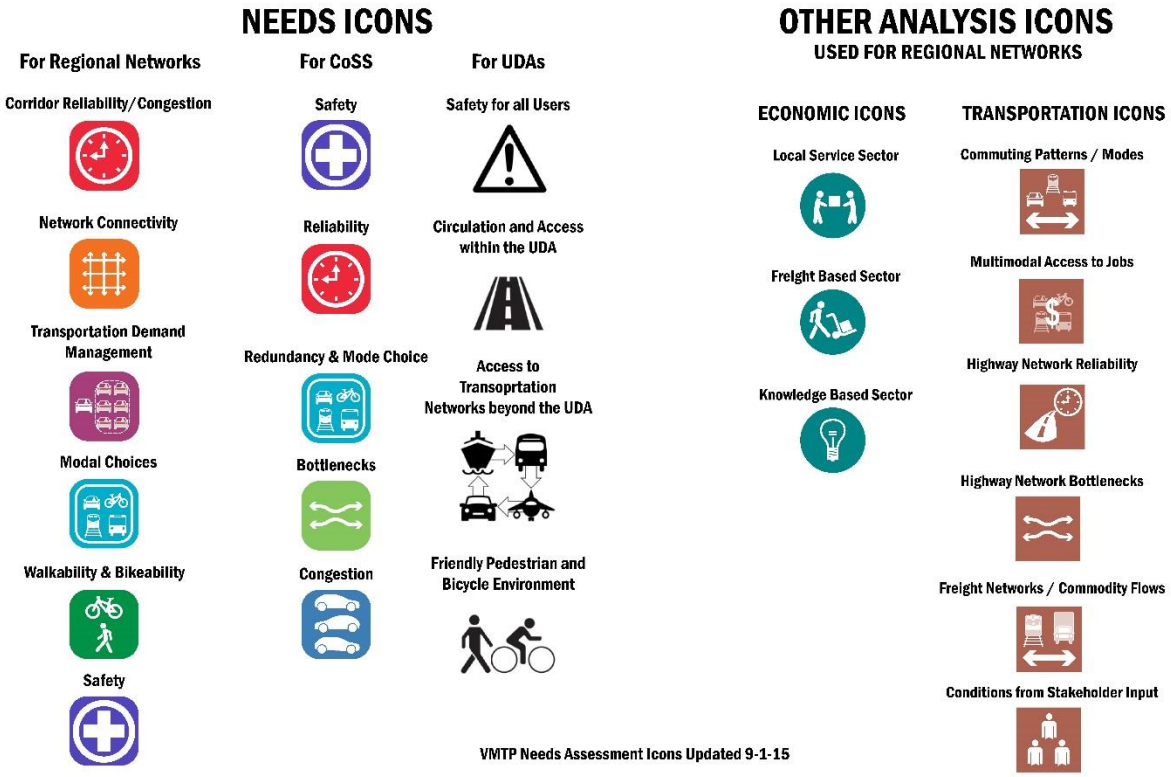


Figure 34. VMTP Needs Icons

Map of Needs

The map below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

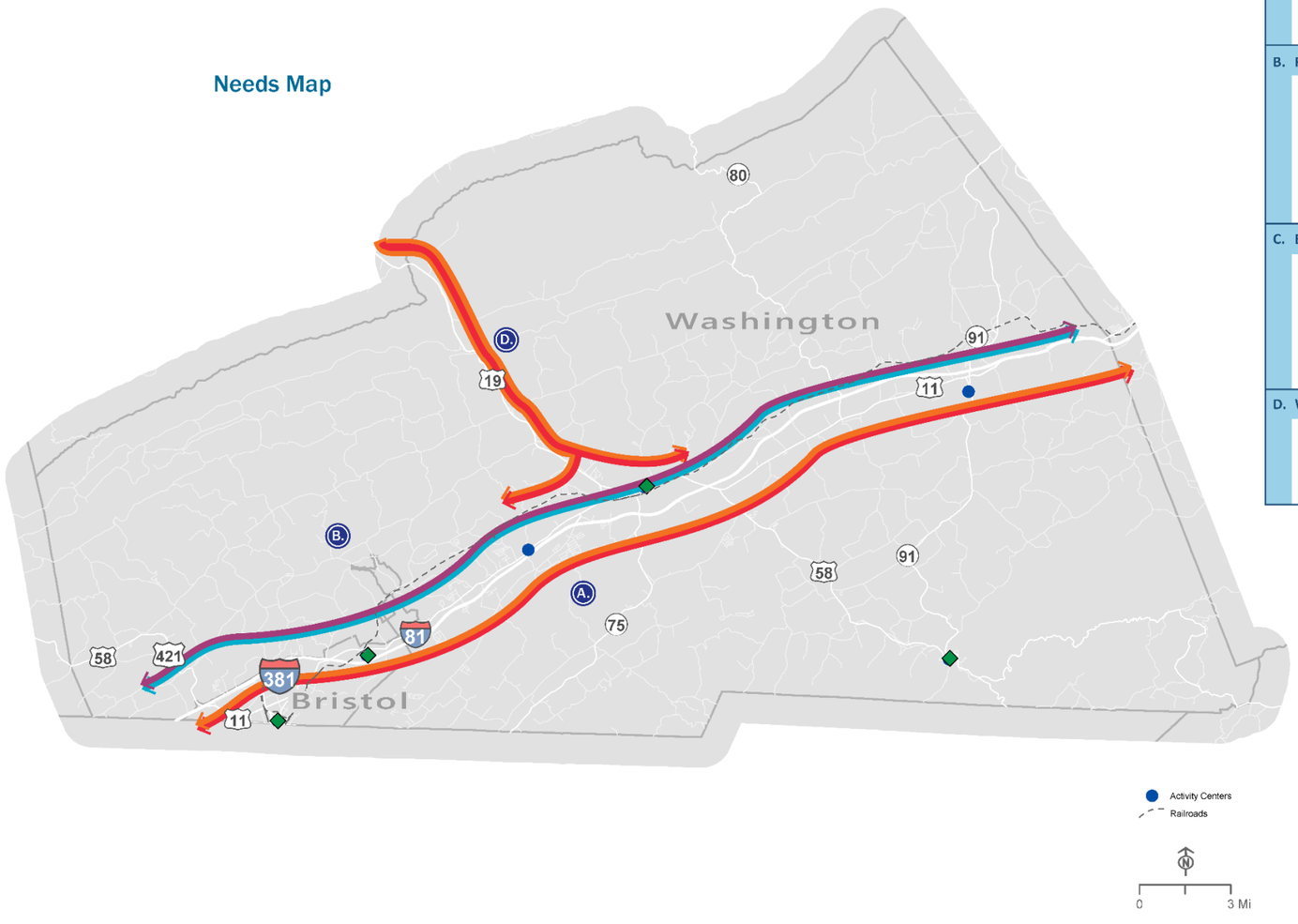
The table below lists each of the identified transportation needs in the region, and describes the basis for each need in terms of economic and transportation findings and data. The analysis of regional network transportation needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as needs, but only for supporting data to make an objective determination of need.

Bristol Region
Needs Summary

Needs Map



Needs Table

A. I-81/US 11 Corridor Reliability

The Interstate 81/US 11 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. The corridor currently lacks alternative and/or parallel network connectivity and passenger reliability at major interchanges.

B. Regional Transit Access

The region is served by Bristol Transit, which provides service in Bristol, and District Three Transit, which provides service in Abingdon. These services provide access to multiple activity centers, but provide limited regional access. There is a need to provide connector transit services and TDM programs between these existing services to provide greater connectivity to multiple activity centers and increase modal choices on the I-81/US 11 corridor.

C. Bikeable/Walkable Places

The Bristol region is largely autocentric and is generally underserved by alternative modes of transportation. However, the Creeper Trail and Downtown Bristol and Abingdon have proven to be major generators of bike and pedestrian travel. Improvements are needed to ensure connectivity and safe access for active transportation traveling to and within these activity centers.

D. Western Freight Connectivity

Route 19 is the only access point to the coal fields to the west and is a critical link for freight related traffic. There is a need to improve freight reliability to alleviate access issues.

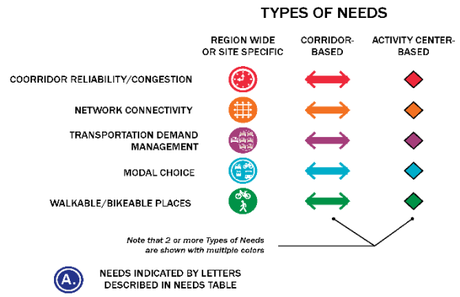


Figure 35: Summary Needs Map for Bristol Virginia

Table 10: Findings of Needs

A. I-81/US 11 Corridor Reliability

NEED

The Interstate 81/US 11 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. The corridor currently lacks alternative and/or parallel network connectivity and passenger reliability at major interchanges.

ECONOMIC

These corridors serve the major activity centers of Abingdon, Bristol, Bonham Road and others. These centers include local serving, knowledge based and freight dependent industries. As a result, peak traffic times include significant commuter traffic, mixed with freight and thru traffic.

TRANSPORT.

There are few congestion and delay issues in Bristol. However, there are a few bottlenecks along the I-81/US 11 corridor, including near the urban center in Bristol and near intersections/interchanges with major cross routes. Local input suggests that the lack of network redundancy creates significant issues during crashes and catastrophic events.

B. Regional Transit Access

NEED

The region is served by Bristol Transit, which provides service in Bristol, and District Three Transit, which provides service in Abingdon. These services provide access to multiple activity centers, but provide limited regional access. There is a need to provide connector transit services and TDM programs between these existing services to provide greater connectivity to multiple activity centers and increase modal choices on the I-81/US 11 corridor.

ECONOMIC

Connecting the two largest urban centers with multimodal transportation service will provide greater regional access and increase travel options for local and commuter oriented trips.

TRANSPORT.

Commuter origin/destination data and job accessibility mapping indicates a gap in multimodal transportation services between Bristol and Abingdon. In particular, the I-81 corridor manages the highest commuter flows in the region, making it a critical location for commuter oriented transit and TDM programs.

C. Bikeable/Walkable Places

NEED

The Bristol region is largely autocentric and is generally underserved by alternative modes of transportation. However, the Creeper Trail and Downtown Bristol and Abingdon have proven to be major generators of bike and pedestrian travel. Improvements are needed to ensure connectivity and safe access for active transportation traveling to and within these activity centers.

ECONOMIC

The Bristol, Abingdon, and Damascus activity centers include vital placemaking resources such as shops, restaurants, nationally renowned theaters, and the multi-use Creeper Trail. Making safe connections to and within these areas will attract new employment and support existing businesses.

TRANSPORT.

Commuter origin/destination data in the region indicates that many workers live relatively close to their work destinations. Many of the workers in each activity center, live adjacent to that respective activity center. As a result, making safe active transportation connections to the existing bike/walk infrastructure in activity centers is paramount to creating bikeable and walkable places in the Bristol region. In addition, the walk accessibility data highlights many areas throughout the region, even in populated areas, that have limited walkable access to jobs.

D. Western Freight Connectivity

NEED

Route 19 is the only access point to the coal fields to the west and is a critical link for freight related traffic. There is a need to improve freight reliability to alleviate access issues.

ECONOMIC

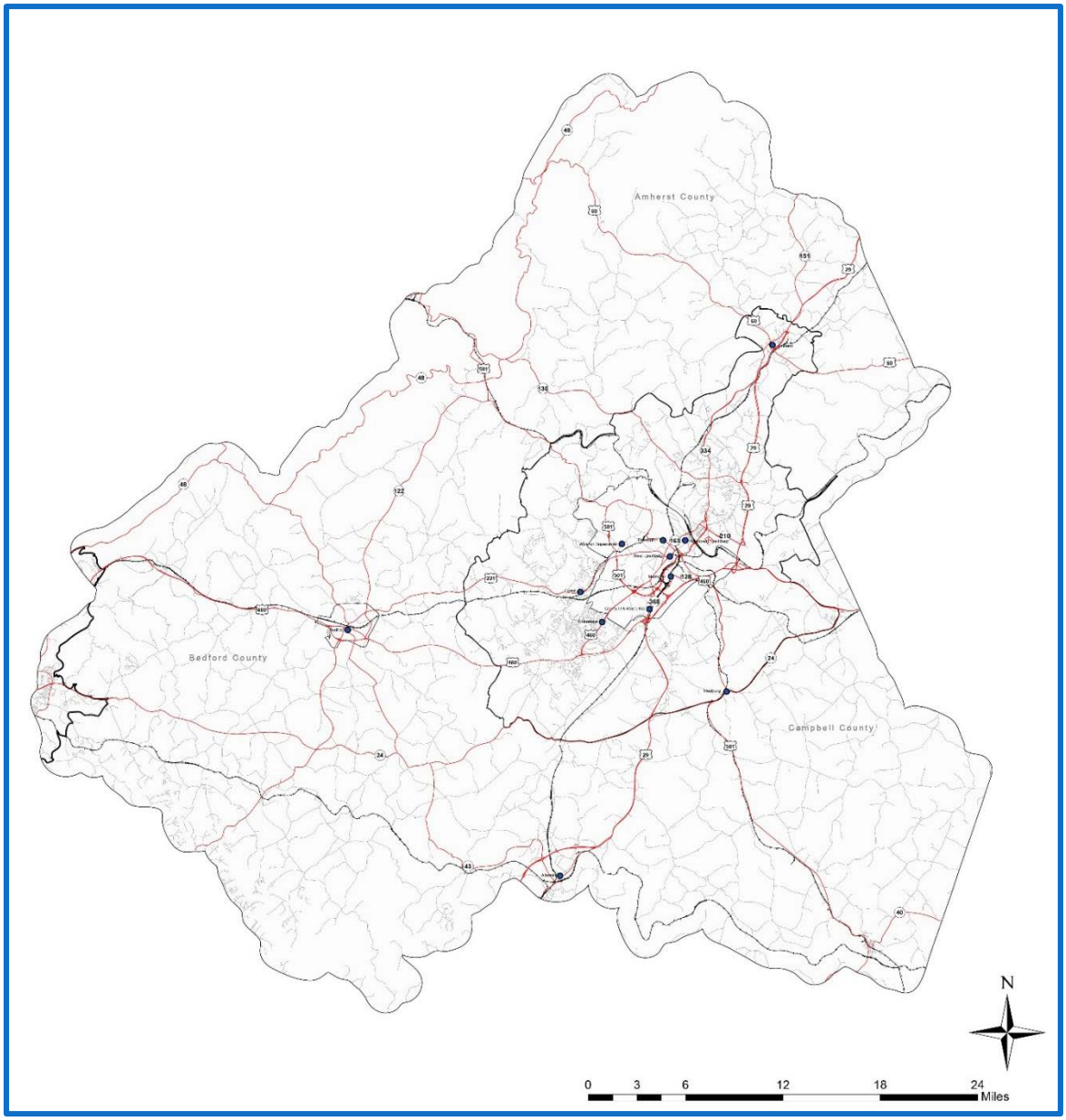
Network connectivity and reliable travel times is key to the freight dependent industries that access the Bristol region, and beyond, along the Route 19 corridor.

TRANSPORT.

With limited access to the west, the Route 19 corridor serves as a primary route for freight traffic. Despite its importance, freight accessibility data along the Route 19 corridor indicates some of the least freight accessible areas in the region. Highway data also indicates that Route 19 has some of the slowest speeds and frequent congestion issues, relative to the rest of the region.

VMTP 2025 Needs Assessment

Regional Needs Profile



Central Virginia Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans 2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Central Virginia Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Central Virginia Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the Transportation Needs and economic conditions is the basis for the findings in this report. The following sections outline the Central Virginia regional Economic Profile, regional Transportation Profile, and regional Transportation Needs.

Defining a Regional Network

This portion of the Needs Assessment deals with a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of each Regional Network has been developed as part of the outreach process in working with each region. Additional information about how the regional Networks were defined is referenced in the introductory document, "VMTP 2025 Needs Assessment: Regional Networks Introduction."

In the Central Virginia Region, the initial needs analysis area included the City of Lynchburg, Campbell County, Bedford County, the Town of Amherst, and Amherst County. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area were considered in the Needs Assessment as well. For example, in Central Virginia, corridors and activity centers in Appomattox are important to the local economy. Therefore portions of Appomattox County were considered in a number of quantitative and qualitative ways when developing the regional needs profile.

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging Transportation Needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from Central Virginia stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Weldon Cooper Center, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

Substantial population growth is projected for the Central Virginia Region. Projections range from 25,000 to 50,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Region 2000 Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
255,342	**279,156**	**300,663**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Central Virginia Region.

Table 3: County and City Population Projections

Jurisdiction	2010 Population	Weldon 2025 Projection	% Change
Amherst County	32,353	33,780	4.4%
Appomattox County	14,973	16,149	7.8%
Bedford County	68,676	88,419	28.7%
Campbell County	54,842	58,990	7.6%
Lynchburg City	75,568	81,817	8.3%

Source: US Census 2010 Demographic Profile; and Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

Population growth is also expected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60. Figure 1 shows the current and projected population in Central Virginia, broken down by age cohort. There is clear growth in the 60+, 25-45, and 0-14 age cohorts, while college- and middle-aged cohorts shrink, despite the presence of several universities.

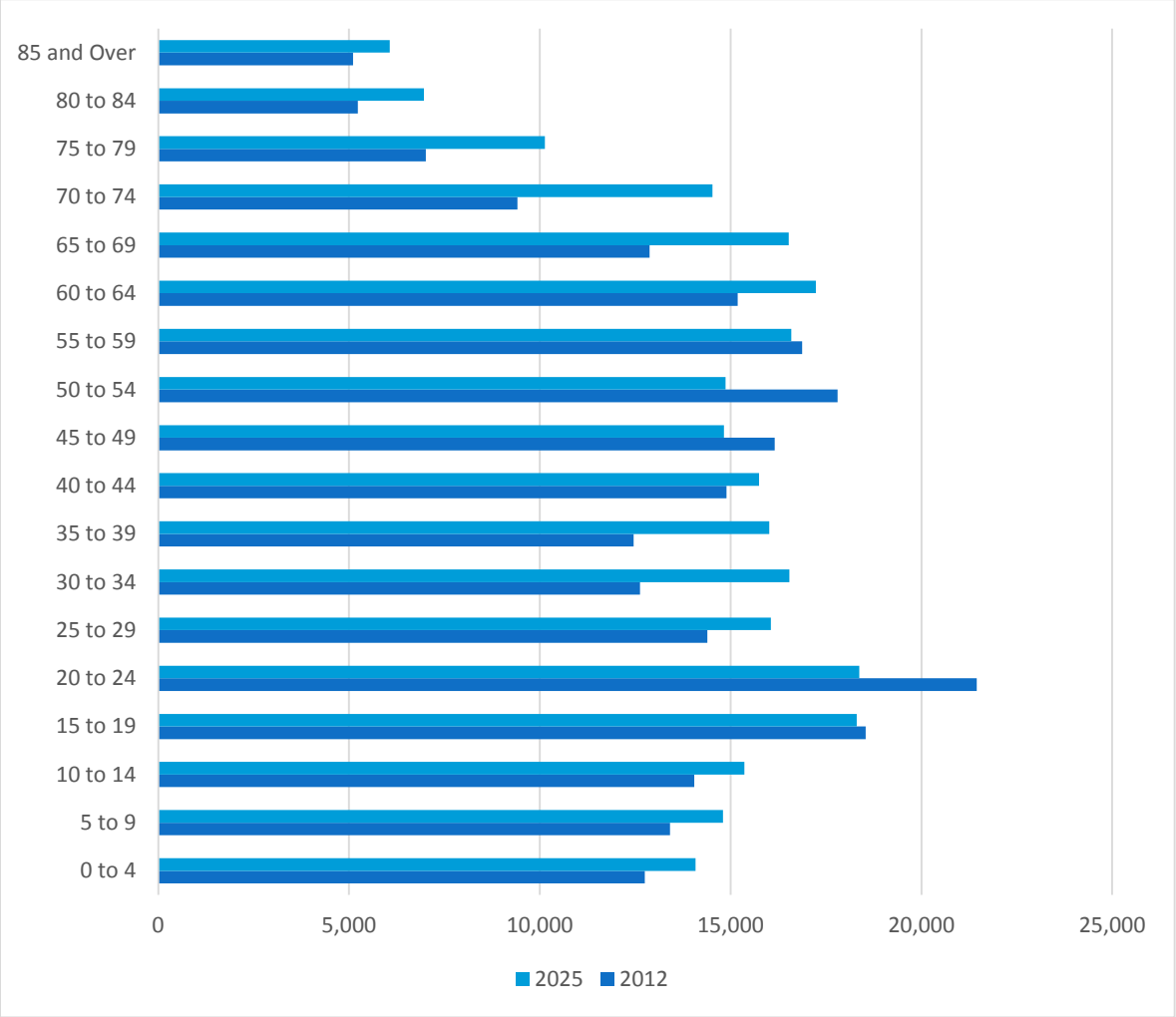


Figure 1: Population by Age in the year 2012 and Projected for the year 2025

Source: Woods & Poole Economics, Incorporated 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC. 2014. http://www.woodsandpoole.com. Accessed June 18, 2014.

In addition to growing population, regional income levels are also projected to rise. According to Woods and Poole Economics Inc., per-capita income for the region is expected to rise 18%, slightly less than the state average of 21%, from $32,661 to $38,425.

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in Central Virginia.

Top Industries by Output

Economic output is the total value of all goods and services produced in an economy within a given timeframe. Unlike Gross Domestic Product, it includes the value of salaries. It is a common indicator used in economic analysis to determine whether an economy is growing or contracting by comparing output during two different points in time. In the Central Virginia region, Manufacturing is currently the strongest industry when measured by economic output. This can be attributed to the high economic

value of goods produced in the nuclear and medical equipment industries, both of which fall under the broader Manufacturing category and are well represented in the region. The Real Estate industry comes in a close second, reflecting a recent increase in real estate transactions and new development. (Refer to Table 4).

Table 4: Current Industries by Output in the Region

Top Industries	% of Output
Manufacturing	21%
Real Estate	18%
Utilities	11%
Professional Services	7%
Wholesale Trade	7%

Source: IHS Global Insight Data, 2012

Economic Sectors

Economic profiles for all 15 regions in Virginia were developed using a breakdown of industry sectors developed by the Study Team[1]. Industry data on Output were aggregated into three broad economic sectors for each region, defined as Local, Knowledge and Freight sectors. Figure 2 below provides a summary of the predominance of each economic sector by output in the Central Virginia Region in 2012.

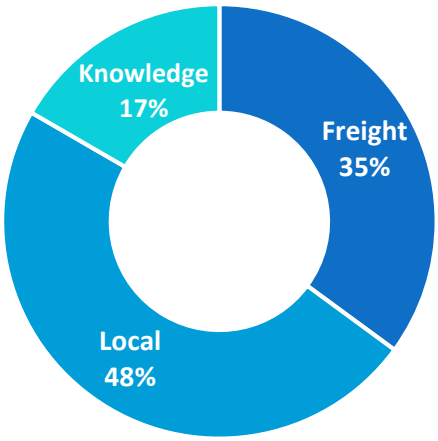


Figure 2: Top Sectors by Output (2012)

Source: IHS Global Insight

The Local Services sector is clearly the strongest in Central Virginia, making up 48% of the economic output for the region. Conversely, the Knowledge and Freight sectors account for 17% and 35% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as discussed in the Transportation section below.

[1] A more thorough explanation of the makeup of these sectors is provided in the separate document,, VMTP 2025 Needs Assessment: Regional Networks Introduction.

Top Industries by Employment

Textiles, nuclear technologies, and hospital and laboratory equipment manufacturers generate a large portion of the regional manufacturing jobs, which employ 14% of the regional workforce overall. (Refer to Table 5). B&W Nuclear Operations Group and Areva NP, Inc. are major regional employers in the nuclear industry with jobs in manufacturing, consulting and administration classifications. They are also two of the top 5 employers in the region by number of jobs. (Refer to Table 6).

Table 5: Current Top Regional Industries by Employment

Top Industries	% of Workforce
Manufacturing	14%
Public Administration	13%
Retail Trade	12%
Health Care	9%
Accom./Food Serv.	9%

Source: IHS Global Insight Data, 2012

The Educational Services industry is also very important to the Central Virginia region. Institutions of higher education such as Liberty University employ a large number of workers, and smaller colleges like Lynchburg College and Randolph College add to the strength of the industry in the region.

Table 6: Current Top Regional Employers

Employers	Employees
Liberty University	6,000
Centra Health	3,800
B & W Nuclear Operations Group	2,200
Central Virginia Training Center	1,500
Areva NP, Inc	1,500

Source: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares one region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Central Virginia region. The industries expressed in Table 7 have the highest LQ scores in the region. The score for Educational Services, for example, can be inferred to mean that these services are more than three times more concentrated in the region than in the nation as a whole, on average.

Table 7: Current Top Industries by Location Quotient

Top Industries	Location Quotient
Educational Services	3.17
Professional Services	2.07
Corporate Management	1.89

Construction	1.24
Accom./Food Services	1.18

Source: IHS Global Insight Data, 2012

Data Comparisons

A number of data sources were used to inform the analysis of industries in Central Virginia and other regions. Employment data was largely drawn from IHS Global Insight, and supplemented with data from the Virginia Employment Commission (VEC); Virginia Economic Development Partnership (VEDP); and the regional Comprehensive Economic Development Strategy (CEDS). Top Employers were identified using InfoUSA point data in GIS, and supplemented with the same statewide data sets. Each of these sources uses a different methodology to collect and categorize data. Some use different geographical analysis areas and, therefore, may arrive at slightly different conclusions about top employers or industries by certain measures. Table 8 shows some of the similarities and differences between these sources in how they determine "top industries" in the region.

Table 8: Comparisons of Employment Data from Sources Used in Developing the Central Virginia Regional Economic Profile

CEDS 2012		VEDP 2014		VEC 2014		IHS Global Insight 2012	
Top Industries	Rank	Top Industries	% of total Workforce	Top Industries	# of Employees	Top Industries	% of total Workforce
Other	1	Manufacturing	14.8%	Manufacturing	14,520	Manufacturing	14%
Health Care	2	Health Care	14.7%	Health Care	14,407	Public Admin.	13%
Manufacturing	3	Government	13.6%	Government	13,401	Retail Trade	12%
Retail	4	Retail	12.8%	Retail	12,629	Health Care	9%
Education	5	Unclassified	9.88%	Accom./Food Services	8,523	Accom./Food Services	9%

InfoUSA (not included in Table 8) maintains a proprietary database of 14 million businesses, and provided a uniform and geo-located dataset of jobs statewide that was used in the Needs Assessment[2]. As part of the Needs Assessment, InfoUSA jobs data was mapped and spatially analyzed for the 15 regions in the state of Virginia. This allowed analysts to identify the reported location of all individual work sites, as well as the number of employees that worked there. The shortcoming of this dataset is that many public sector jobs, including those at state universities, government offices, and federal employees/contractors, aren't captured. For this reason, VEC, VEDP, and CEDS data, along with input from local stakeholders, was used to supplement this dataset for the purposes of identifying top employers and activity centers. For Central Virginia, employers such as Liberty University and seasonally active centers, such as Smith Mountain Lake, were identified using these supplemental resources.

[2] In developing the InfoUSA database, 5,200 phone books, annual reports and other business directories are continuously reviewed to find information, public record data from county courthouse filings, SEC and 10k filings, and Secretary of State data are used, and every month the USPOS National Change of Address, ZIP+4 and Delivery Sequence file are matched to standardize and keep addresses current. The database is continuously updated from over 5,000 public sources and more than 20 million phone calls are made per year to verify and collect additional information.

IHS Global Insight is a 2012 data set categorized by The North American Industry Classification System (NAICS) codes, and was used to develop an initial regional economic profile for Central Virginia. This data was collected in a different year than that used in VEDP and VEC, which may have some effect on differences in the reported numbers of employees in each dataset.

Both VEC and VEDP report their figures using the same data source: the Quarterly Census of Employment and Wages (QCEW), and data used in this analysis was taken from the 3rd quarter of 2014. This source includes all workers covered by state unemployment insurance laws, and all workers covered by Federal insurance laws, but excludes self-employed workers and some agricultural workers. The difference between these sources lies in reporting. VEC uses number of employees to rank industries, while VEDP computes a percentage of total workforce. The resulting industry rankings, as reflected in Table 8, are the same.

Finally, Comprehensive Economic Development Strategy (CEDS) data is derived from a sample-based survey and, thus, is an estimate based on total population, rather than a full count of jobs. The CEDS ranks industries by their estimated number of employees. Note that government and public administration jobs are included in the "Other" category, which ranks first among top industries in the CEDS report (Refer to Table 8).

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level was the identification and evaluation of economic activity centers in each region. For the purposes of this analysis, Activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were then drawn for these areas using a one-mile-radius. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. In Central Virginia, centers of high economic or social activity such as Smith Mountain Lake weren't represented as areas of high job density through the InfoUSA jobs data that was used in the mapping exercise. Centers such as this were instead affirmed by stakeholders who had a knowledge of the regional significance of the activity there, and then mapped accordingly. Figure 3 below shows the InfoUSA job density color scale in shades of yellow, and the activity centers as blue circles.

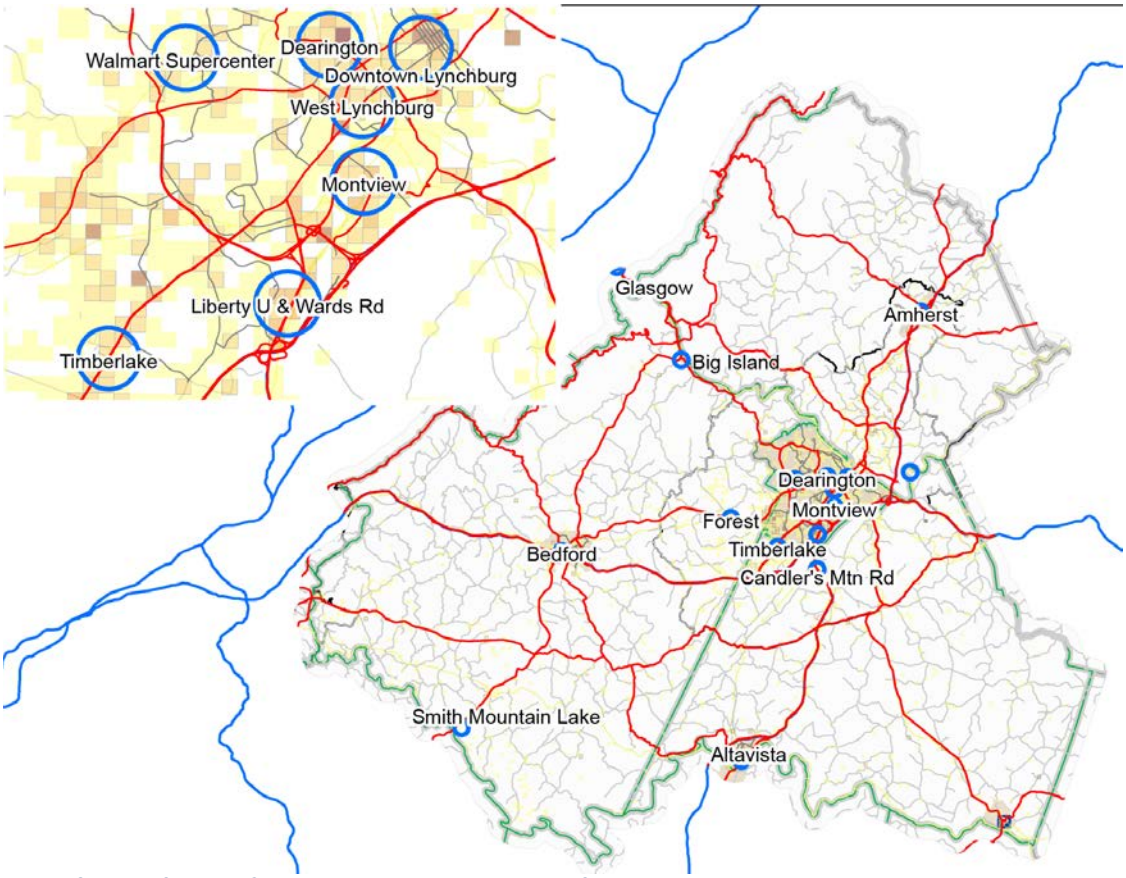


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input (Region view; Downtown view).

Once activity centers were identified, the Study Team analyzed the type and scale of economic activity that took place in those locations. Analysts developed pie charts for each activity center that represented the breakdown of employment by industry sector[3]. Charts were then scaled based on the number of jobs in each center relative to the other centers in the Region.

[3] Industry sectors are based on the categorization of jobs into the three economic clusters of Local, Freight, and Knowledge economies. Refer to separate document, VMTP 2025 Needs Assessment: Regional Networks Introduction.

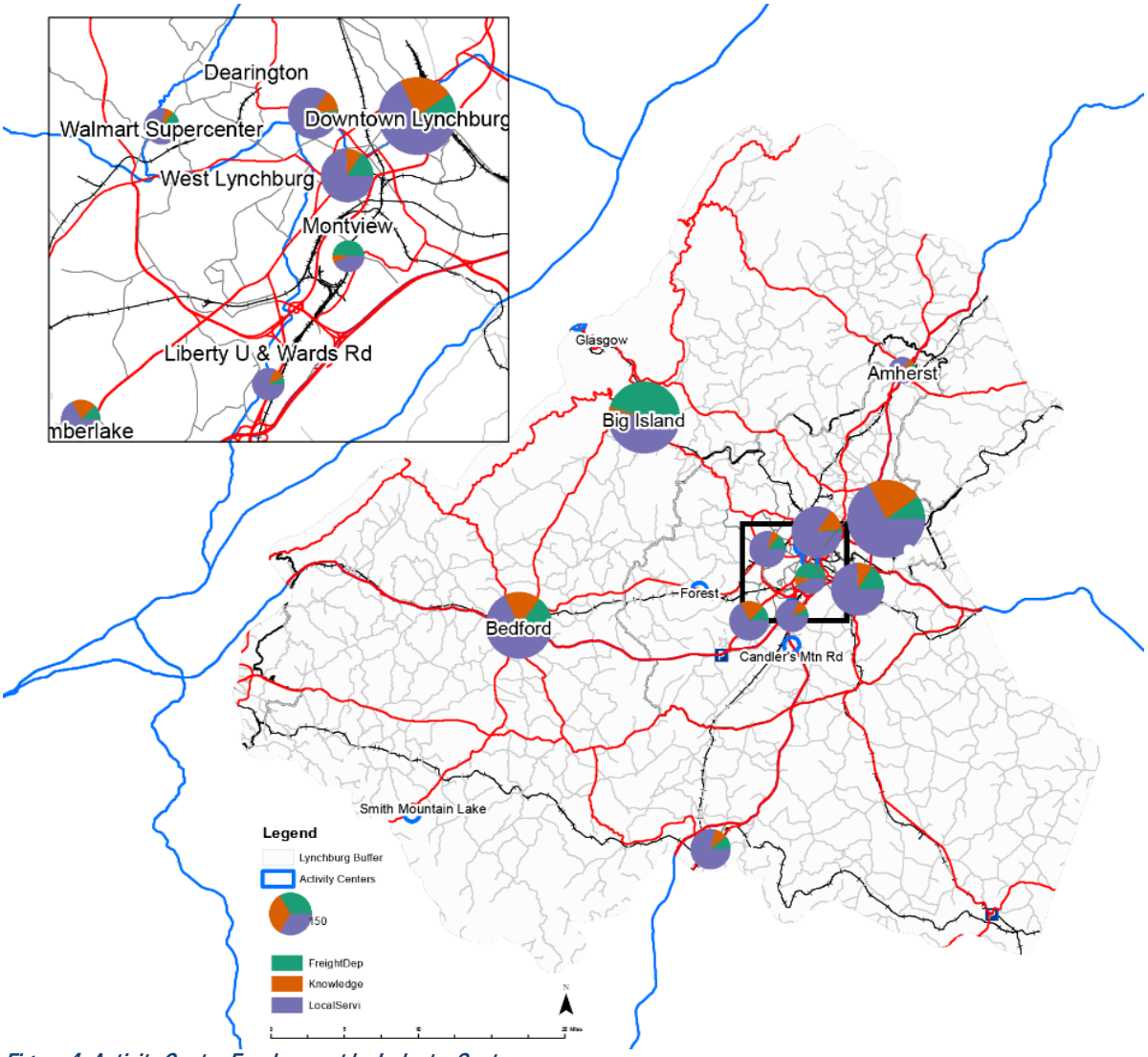


Figure 4: Activity Center Employment by Industry Sector

Figure 4 shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs. Due to some of the gaps in InfoUSA jobs data, some activity centers that were identified by local stakeholders (e.g. Candler's Mountain Road) do not have data-driven pie charts associated with them. In these cases, local feedback and data was used to supplement this mapping exercise and characterize the economic profile of activity centers.

E. Forecasted 2025 Industry Strengths

2025 forecasts of key industries by Region and activity center served as the primary data source for the Central Virginia future economic profile. The basic economic data that was used includes:

- Current Top Industries by Workforce, Output and Location Quotient
- 2025 Forecasted Economy by Output, Employment and Future Growth Industries

- Regional Economic Development Priorities from Stakeholder Input

The intent was not to presuppose the region's economic future, but to allow input from stakeholders to affirm or modify the basic economic forecast according to regional visions. To supplement economic forecasts for 2025, the Study Team collected input from stakeholders in a series of work sessions, and used this to confirm the basic future economic profile for the region. The future economic profile was then used as the basis for determining future transportation needs in the Central Virginia region.

Based on the data collected, substantial growth is expected for the Central Virginia region by the year 2025. Manufacturing and Retail Trade industries are forecasted to see the largest growth. Combined, these two industries are expected to produce $2.47 billion dollars more in 2025 than they produced in 2012. (Refer to Figure 5).

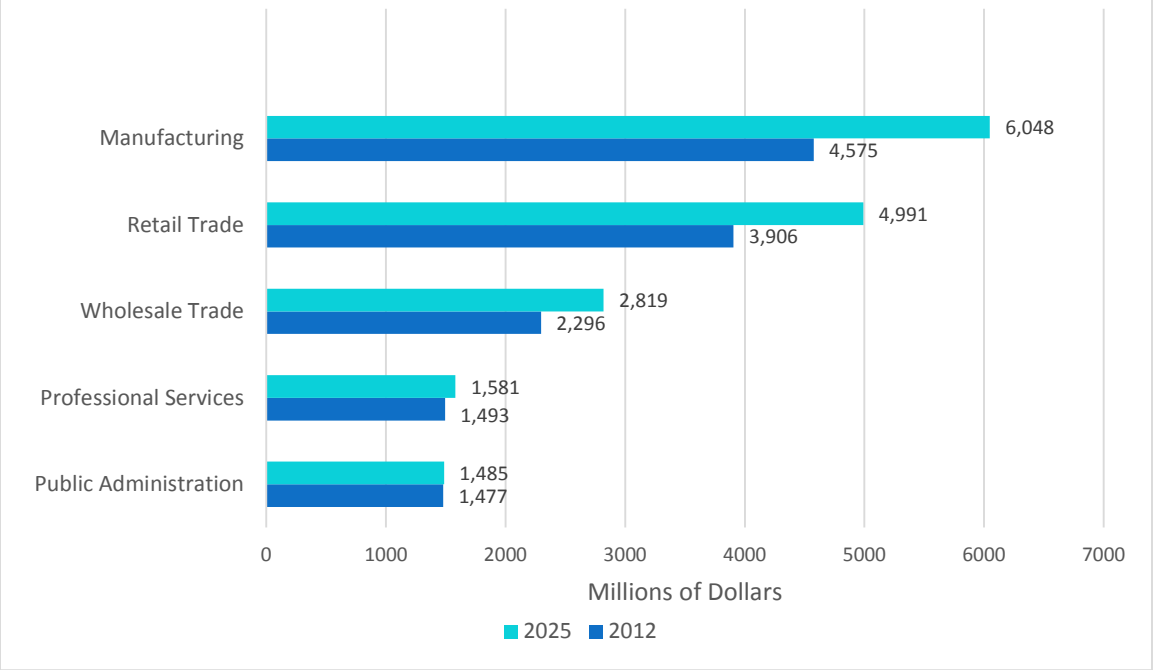


Figure 5: Top Industries by Output.
Source: IHS Global Insight, 2012

The only industries projected to produce lower levels of output in 2025 than in 2012 are Health Care and those industries categorized under "Other Services, not Public Administration"- a catch-all category that includes automobile and electronic repair and maintenance, social and religious organizations, and personal care services. In all industries combined, economic output in Central Virginia is expected to increase by $5.2 billion dollars by 2025.

Output by sector, as defined in the separate Introduction document, is not expected to change significantly. Only a slight shift from a freight-dependent regional economy to a local regional economy is projected. (Refer to Figure 6).

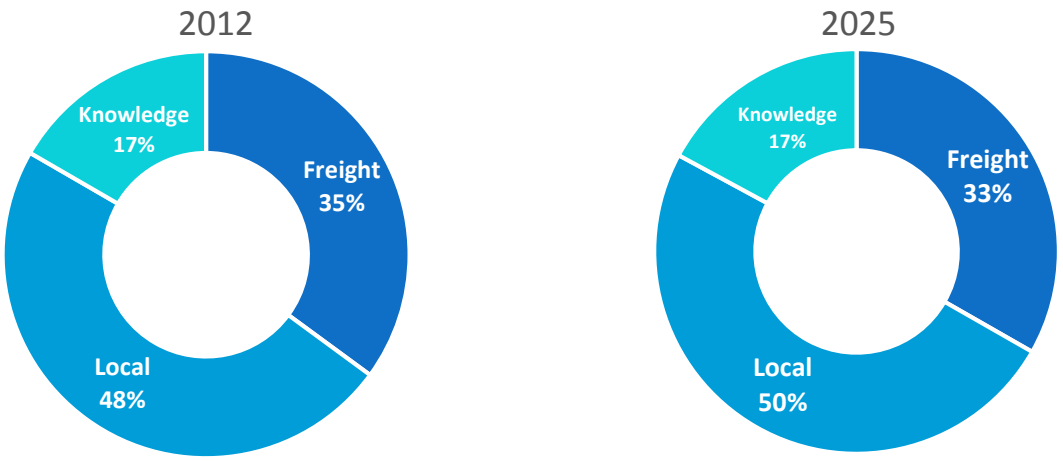


Figure 6: Current and Forecasted Output by Sector
Source: IHS Global Insight, 2012 & 2025

The most dramatic change in employment among major industries in Central Virginia is projected for the Educational Services industry, with more than 3,000 additional jobs to be added to the Region by the year 2025. (Refer to Figure 7).

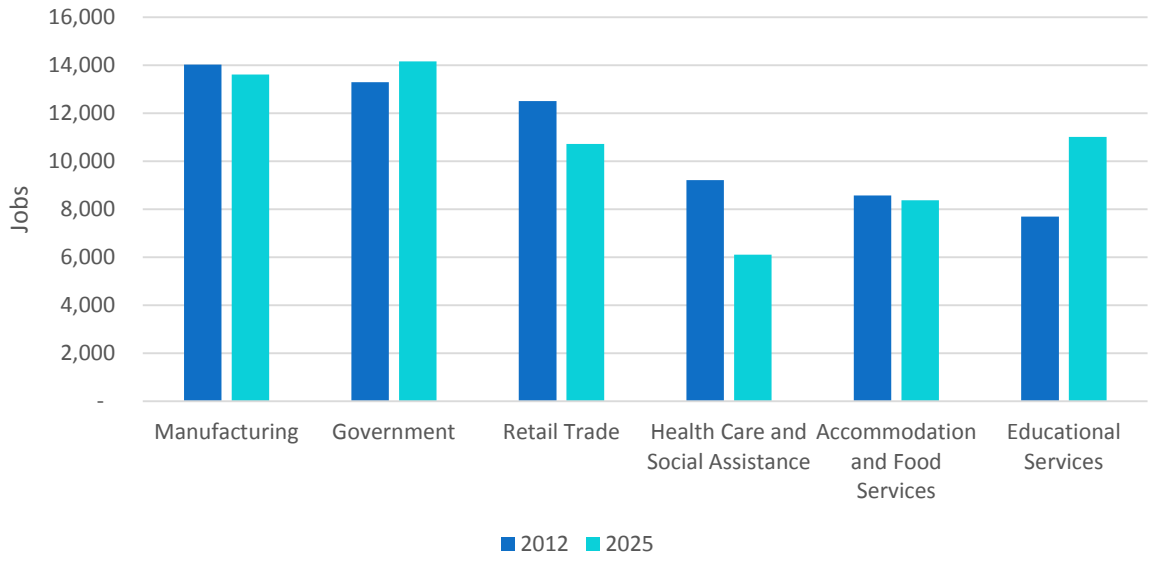


Figure 7: Employment in Major Industries.
Source: IHS Global Insight, 2012

Growth is also expected for the Government industry, whereas other prominent industries are projected to lose jobs by the year 2025. Industries such as Manufacturing, Retail, Health Care, and Accommodation Services are all industries which may cut or outsource jobs and increase efficiency while maintaining or growing output. For Central Virginia, Health Care is projected to cut the greatest number of jobs – more than 3,000 – by the year 2025.

3. Transportation Profile

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce and freight needs at a regional scale. This set of accessibility measures reflects regional transportation characteristics in Central Virginia such as typical commute times and overall travel reliability. The following are categories of performance metrics that were used to create a regional transportation profile for Central Virginia:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

Additional information on the methodology for the transportation profile can be found in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Central Virginia region show that the communities of Campbell, Amherst, and Bedford Counties all have a considerable number of residents who commute to the City of Lynchburg. According to the US Census, 11,954 residents of Campbell County commute to the City of Lynchburg, along with 5,436 from Amherst County and 8,418 from Bedford County. (Refer to Figure 8).

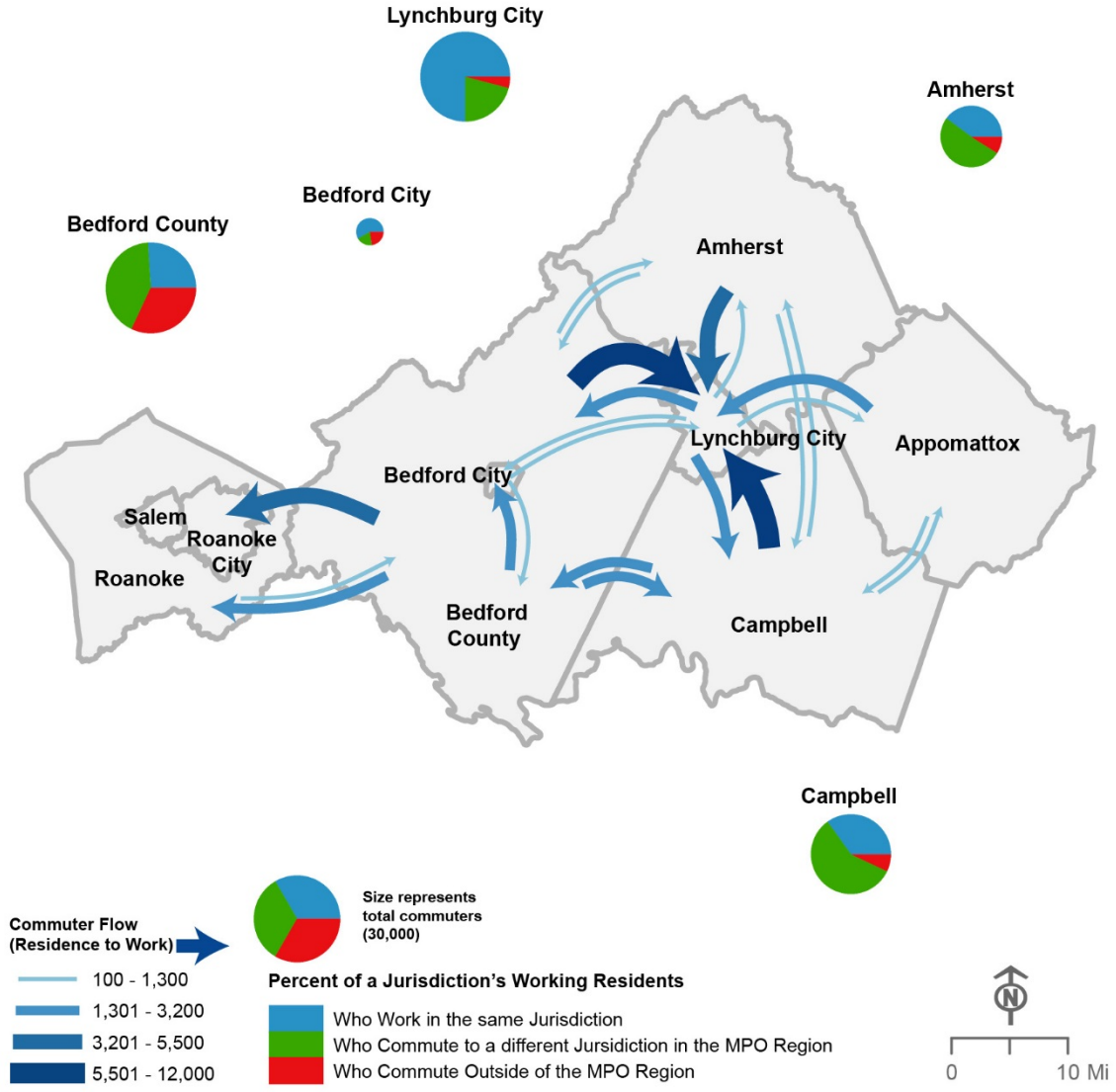


Figure 8: Regional Commuting Patterns
Source: US Census Longitudinal Employer-Household Dynamics (LEHD). 2006-2010.

Nearly a third of Bedford residents commute outside the Central Virginia region, with 7,436 to the Roanoke area alone. In all other jurisdictions, the vast majority of employees both live and work within the same jurisdiction, or commute to another jurisdiction within the MPO area.

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for Central Virginia was the analysis of commuting patterns between the most significant activity centers. Figures 9 through 11 below provide a summary of typical commuter origins for three of the activity centers in the Central Virginia region. Block groups are symbolized on a color scale from dark to light blue, with the darker

shades representing the block groups with the largest number of commuters to the respective activity center, as compared to other block groups in the Region.

Downtown Lynchburg sees a significant number of commuters from immediate area, especially the neighborhoods to the West of Downtown. (Refer to Figure 9).

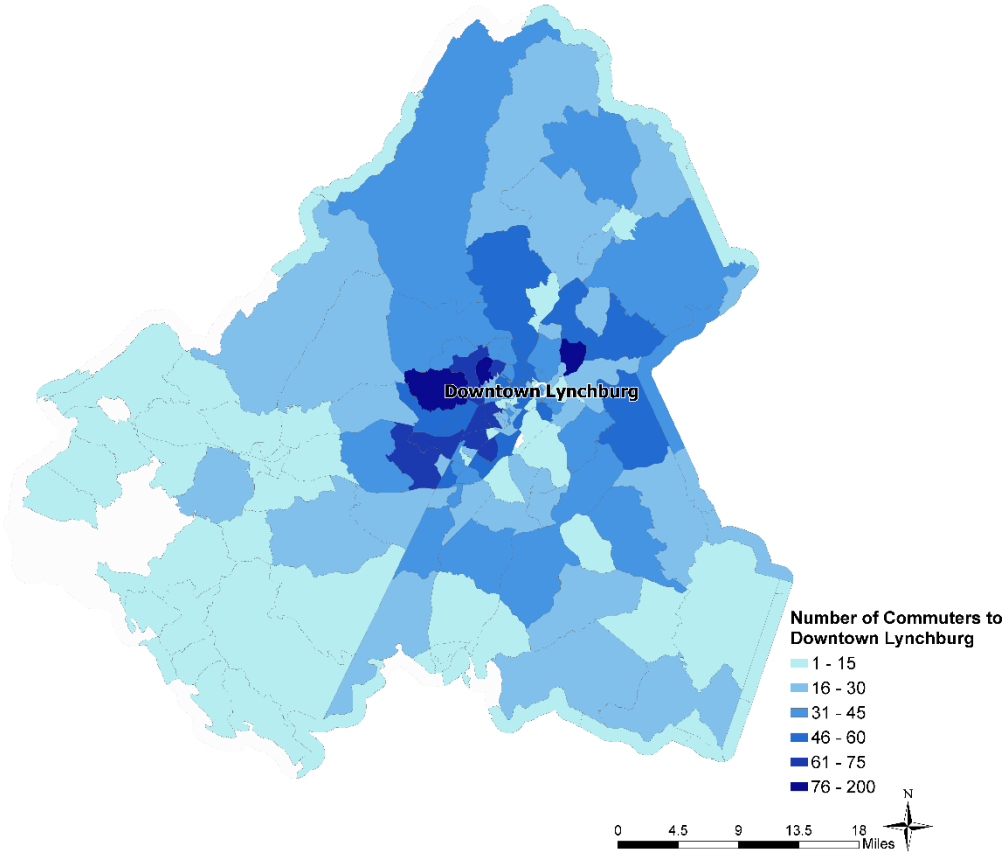


Figure 9: Commuting Patterns to Downtown Lynchburg Activity Center.
Source: LEHD

The Wards Road and Liberty University activity centers see fewer commuters from around the region, with the highest concentration coming from a neighborhood immediately west of the activity center (Refer to Figure 10). It should also be noted that one of the limitations of the data source used (US Census LEHD data) is that it doesn't account for many of the commuters to Liberty University. Therefore, the data for these activity centers may not be accurate, especially in terms of number of commuters.

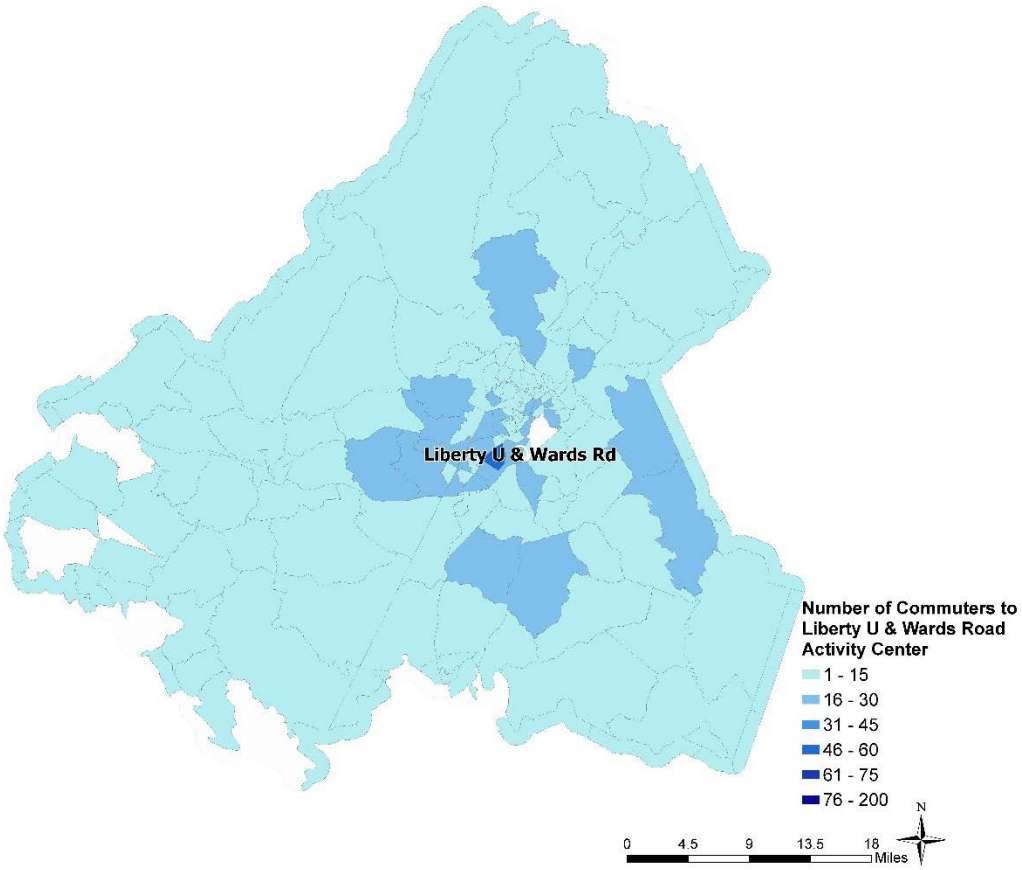


Figure 10: Commuting Patterns to Liberty University and Wards Road Activity Center.
Source: LEHD

The Bedford activity center, meanwhile, draws many commuters from the surrounding block groups, and low levels from those block groups located further away, towards Campbell County and Lynchburg. (Refer to Figure 11).

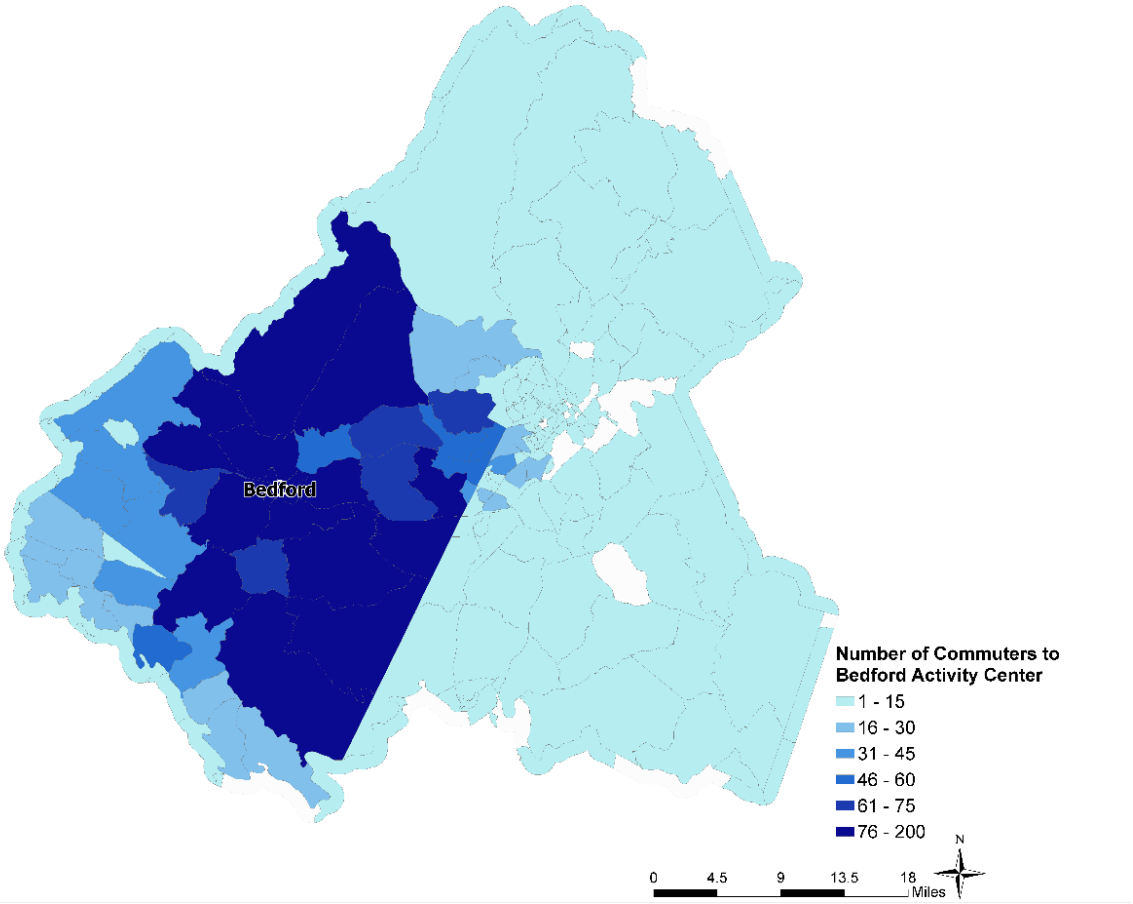


Figure 11: Commuting Patterns to Bedford Activity Center.
Source: LEHD

Mode Choice

In the Central Virginia Region, the majority of commuters drive alone to work. While there is slight variation in mode choice among jurisdictions, cars are used between 82% and 86% of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 9% to 14% of the mode share, depending on jurisdiction. Use of public transit is, as expected, highest in the City of Lynchburg, which has the most robust transit system in the region. (Refer to Figure 12).

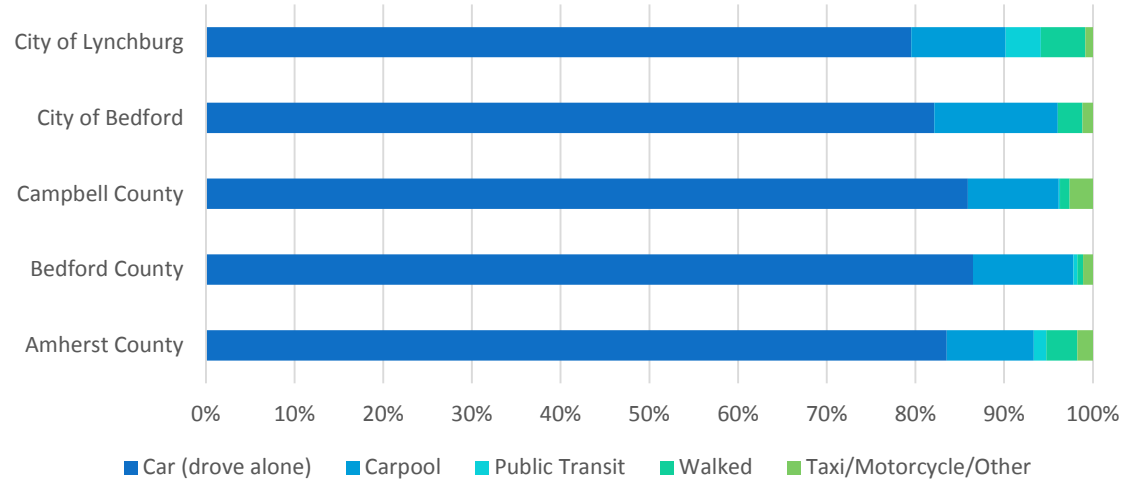


Figure 12: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Central Virginia Region, average commute times range from 17 to 28 minutes among the various jurisdictions. (Refer to Table 9). Due to its density and proximity to employment centers, the City of Lynchburg has the shortest average commute. Conversely, more rural areas such as Bedford and Amherst Counties have longer commutes, on average.

Table 9: Mean Commute Time by Jurisdiction

Jurisdiction	Mean Commute Time (Minutes)
Amherst County	23.1
Bedford County	27.6
Campbell County	22.1
City of Bedford	18.7
City of Lynchburg	16.9

Source: ACS 2013 5-Year Estimates

Commutes of over 45 minutes are rare in the Central Virginia Region. Bedford County has the highest percentage of workers who commute over 45 minutes, at nearly 16%. This is almost twice as high as the City of Bedford's share of commuters, and almost three times as high as the City of Lynchburg's. (Refer to Figure 13).

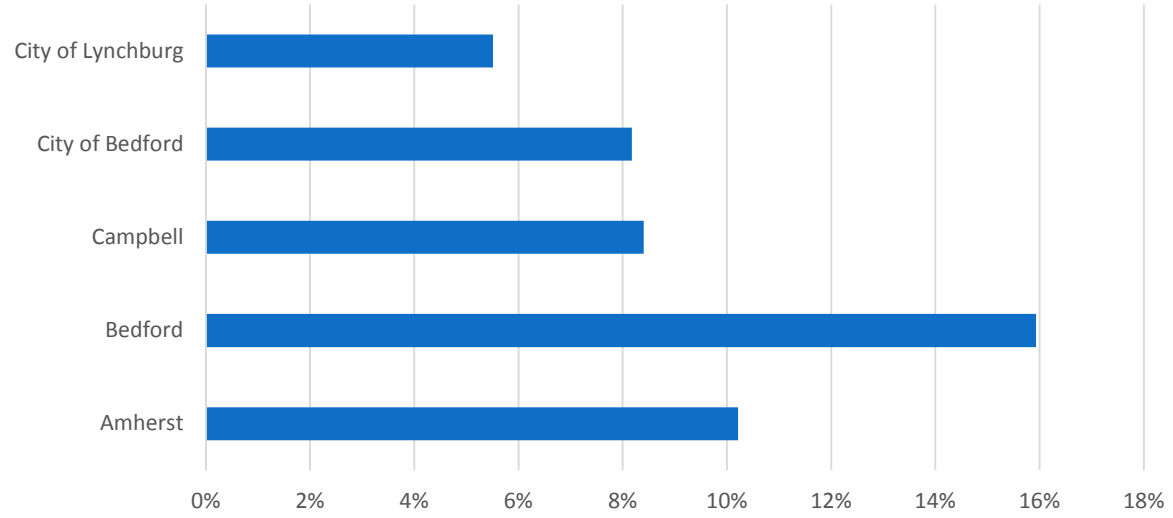


Figure 13: Percent of Commutes Long than 45 Minutes
Source: ACS 2013 5-Year Estimates

Figure 14 provides a closer look at where the longer commutes in the region originate. In the City of Lynchburg and around the City of Bedford, commute times are well below the regional median. Block Groups on the fringes of the region and in rural areas of Campbell, Amherst and Bedford counties have commute times that are up to four times longer than other areas, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

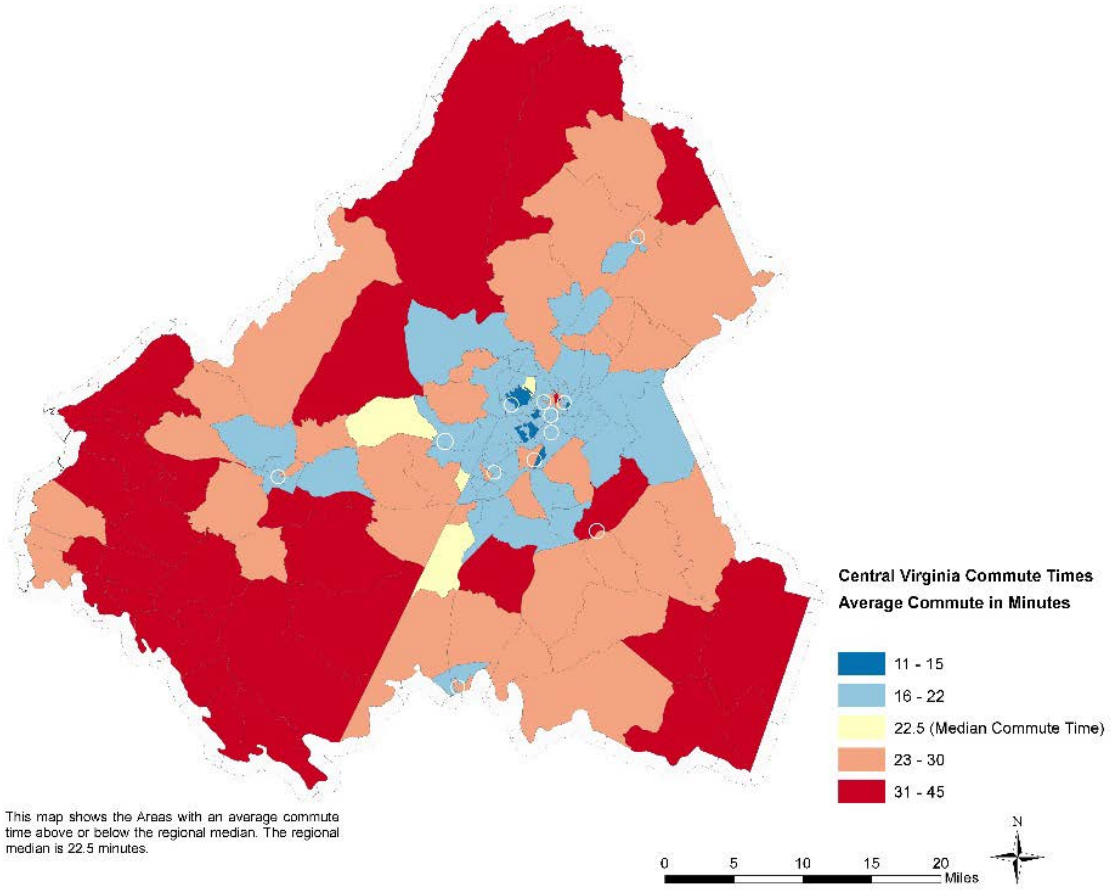


Figure 14: Central Virginia Commute Times
Source: ACS 2013, 5-Year Estimates.

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The Accessibility to employment measure was calculated using an accessibility model developed by the consultant team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

The accessibility maps show values ranging from highest to lowest in the region by travel mode, with the highest values in bright magenta and the lowest values in light blue color.

Auto Accessibility

Accessibility for auto travel in the region was measured as the number of jobs that can be reached from each census block group within a 45 minute drive, using actual travel speeds derived from FHWA HERE data, and decayed for distance. The areas with the highest level of auto accessibility were found around the City of Lynchburg, and in census block groups in western Bedford County that had good access to the outskirts of Roanoke. Census block groups in the region with high accessibility can reach between 80,000 and 95,000 distance-decayed[4] jobs within a 45 minute drive. The auto accessibility scores of activity centers without a large number of employment opportunities (e.g. Bedford and Amherst) were boosted by their proximity to major roadways, allowing commuters to reach more destinations within 45 minutes than commuters who start their trips further from major roadways. (Refer to Figure 15).

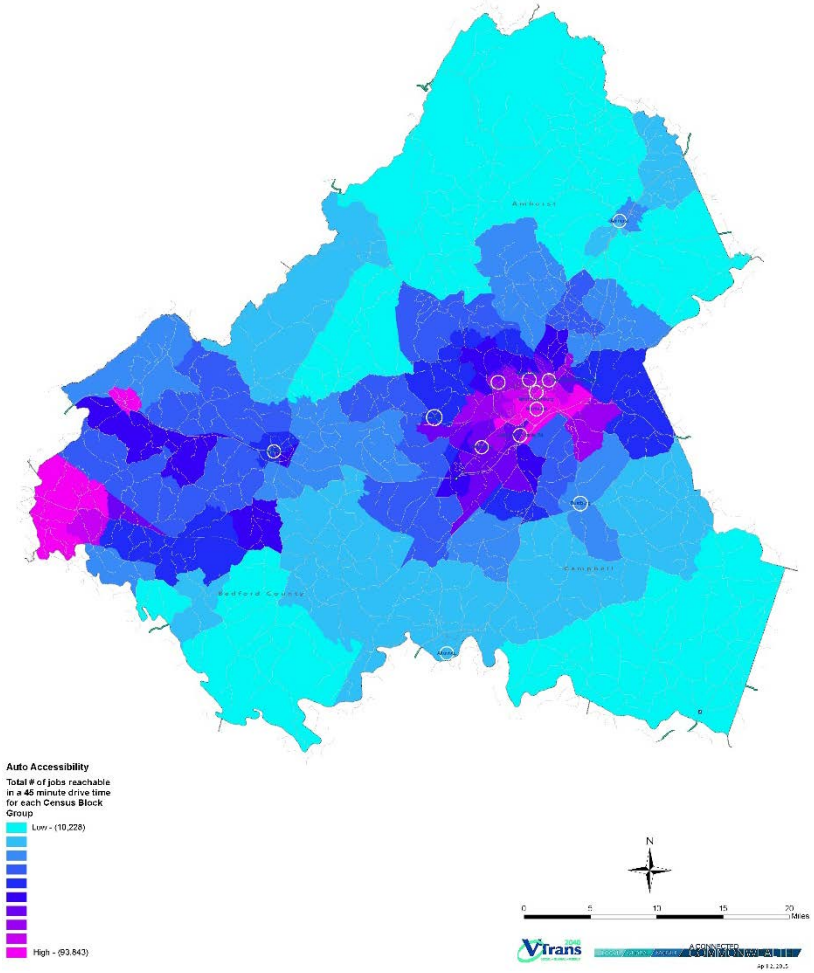


Figure 15: Auto Accessibility

[4] Household travel surveys show that the likelihood of accessing a destination declines with distance. Distance-decayed jobs reflect these findings, and assign closer opportunities a higher value than those farther away.

Transit Accessibility

Outside of the City of Lynchburg, there are few fixed-route transit options in the Central Virginia region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas[5]. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. In the highest scoring area for transit accessibility, commuters using transit can reach between 15,000 and 17,000 (distance decayed) jobs within a 45 minute travel time. (Refer to Figure 16).

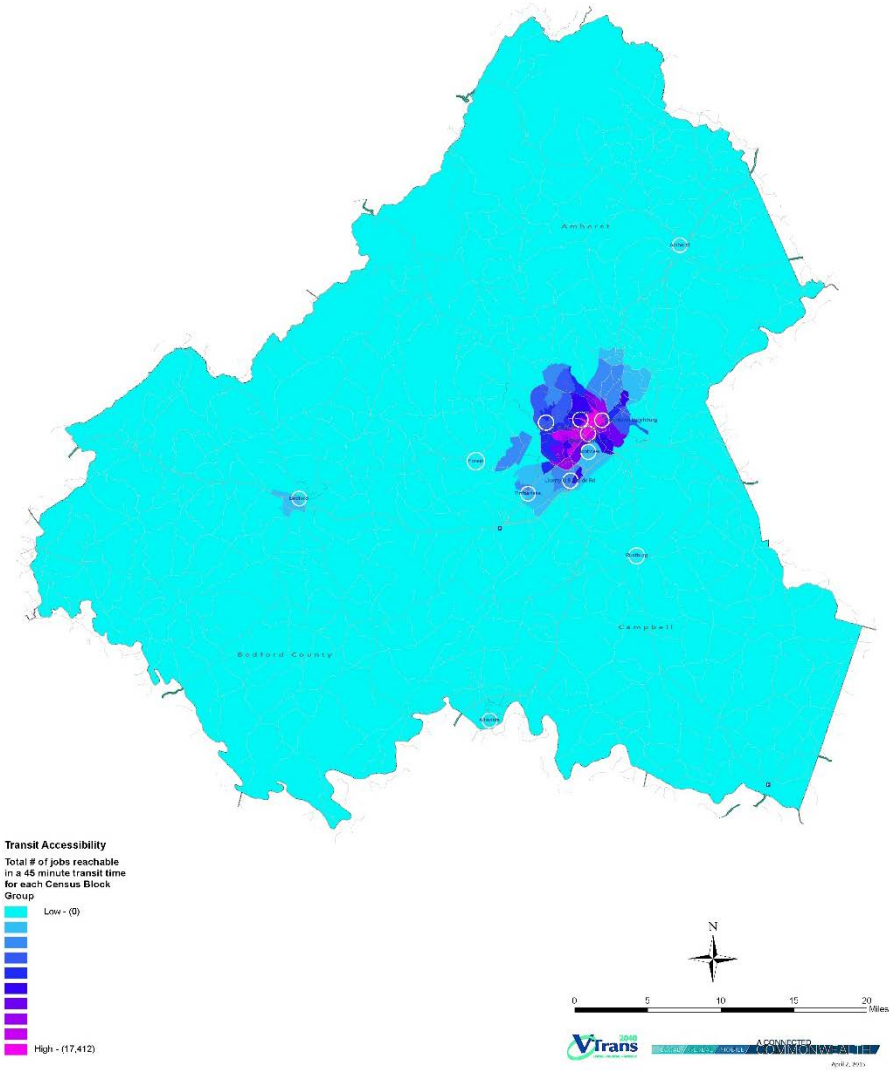


Figure 16: Transit Accessibility

[5] Note that the dataset used did not reflect the transit service in the Town of Altavista.

Walk Accessibility

Walk Accessibility in the area is largely determined by the density of employment closely surrounding the origin of each trip. Most of Lynchburg and towns and village areas in Central Virginia scored the highest, as expected, with the highest scoring areas located within the City of Lynchburg. These areas of high walk accessibility give pedestrians access to between 650 and 7,500 (distance decayed) jobs. The high variability within even the highest scoring areas reflects the significance of both network and job density in determining walk accessibility. (Refer to Figure 17).

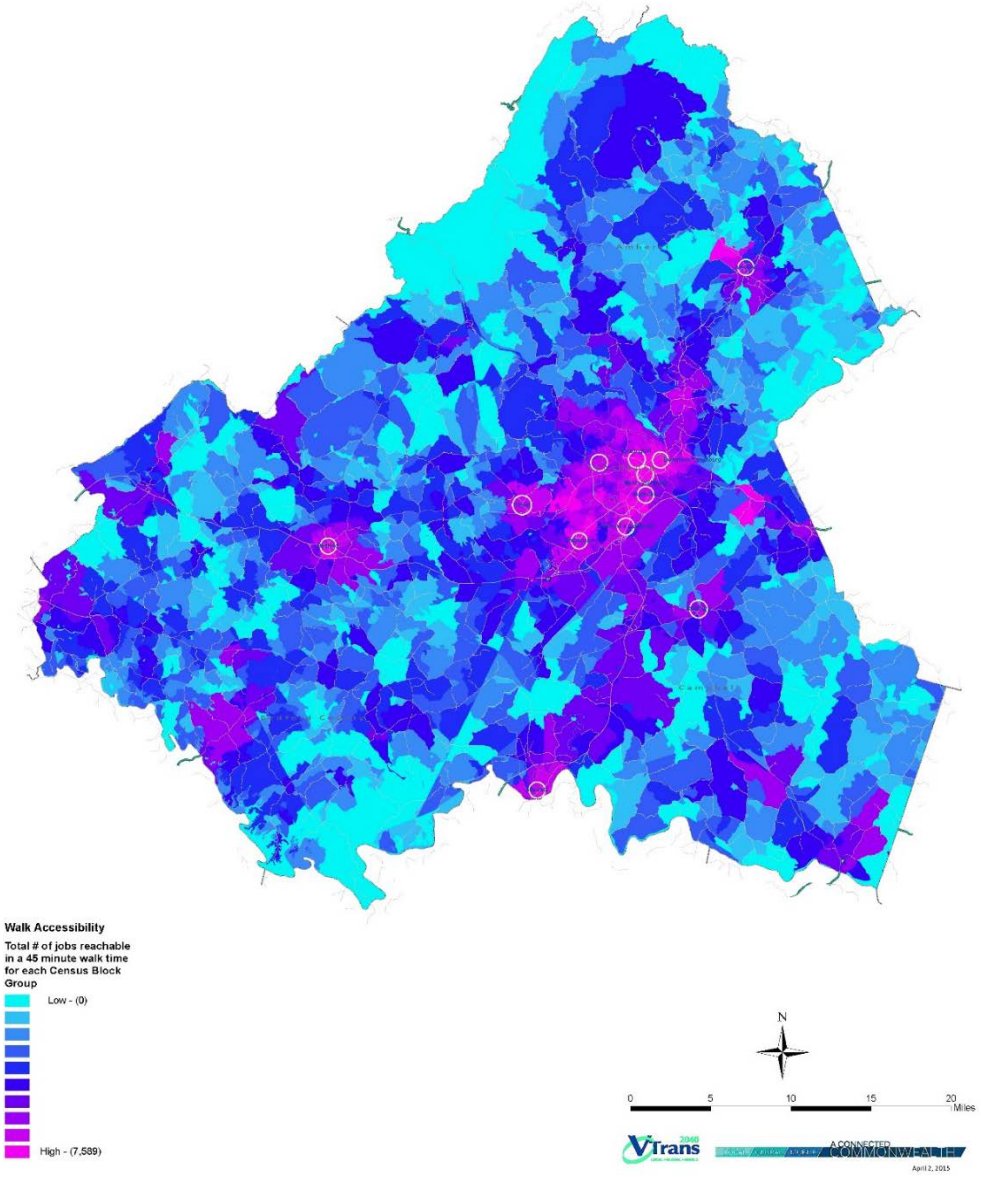


Figure 17: Walk Accessibility

Freight Accessibility

In addition to railways, US Route 460 and US Route 29 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent partly on the proximity of access to highway access ramps. Most activity centers in the region are within a six minute drive from a major arterial ramp. (Refer to Figure 18).

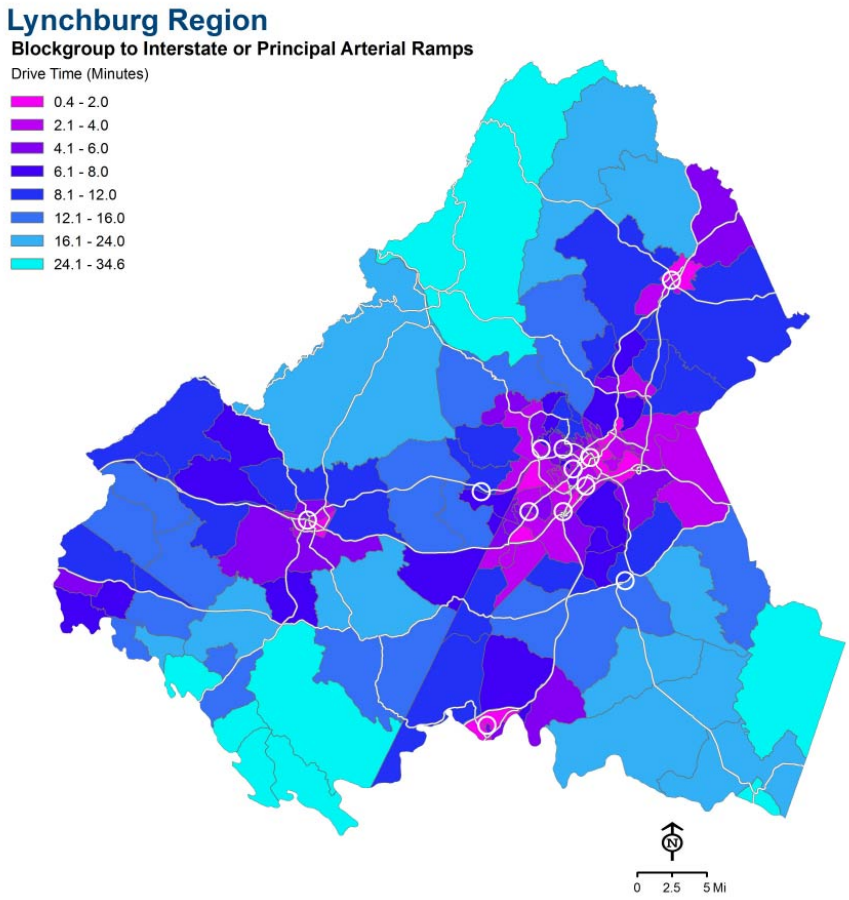


Figure 18: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in Central Virginia are clustered around US Route 29 outside of Lynchburg, and along US Route 460 to the South of Lynchburg. Most areas within the City of Lynchburg, and to the North and South of the city, have access to a warehouse or distribution center within a ten minute drive. (Refer to Figure 19).

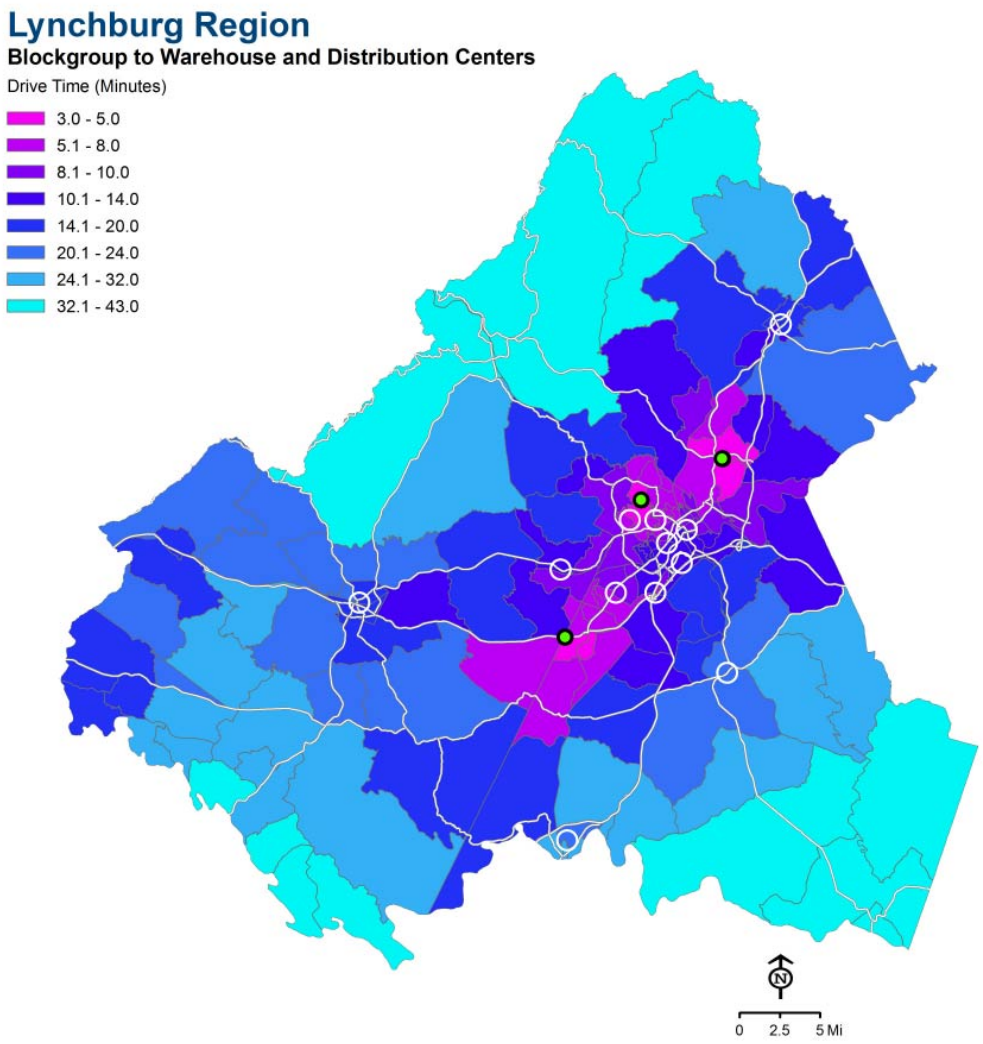


Figure 19: Access to Warehouses & Distribution Centers

Both CSX and Norfolk Southern operate freight rail lines that pass through the City of Lynchburg. These rail lines also pass through the Bedford, Altavista and Amherst. Richmond International Airport is the closest major airport that handles large quantities of freight. It is a two-hour drive to Richmond International Airport from the City of Lynchburg, and three hours from the Eastern portion of the region. (Refer to Figure 20).

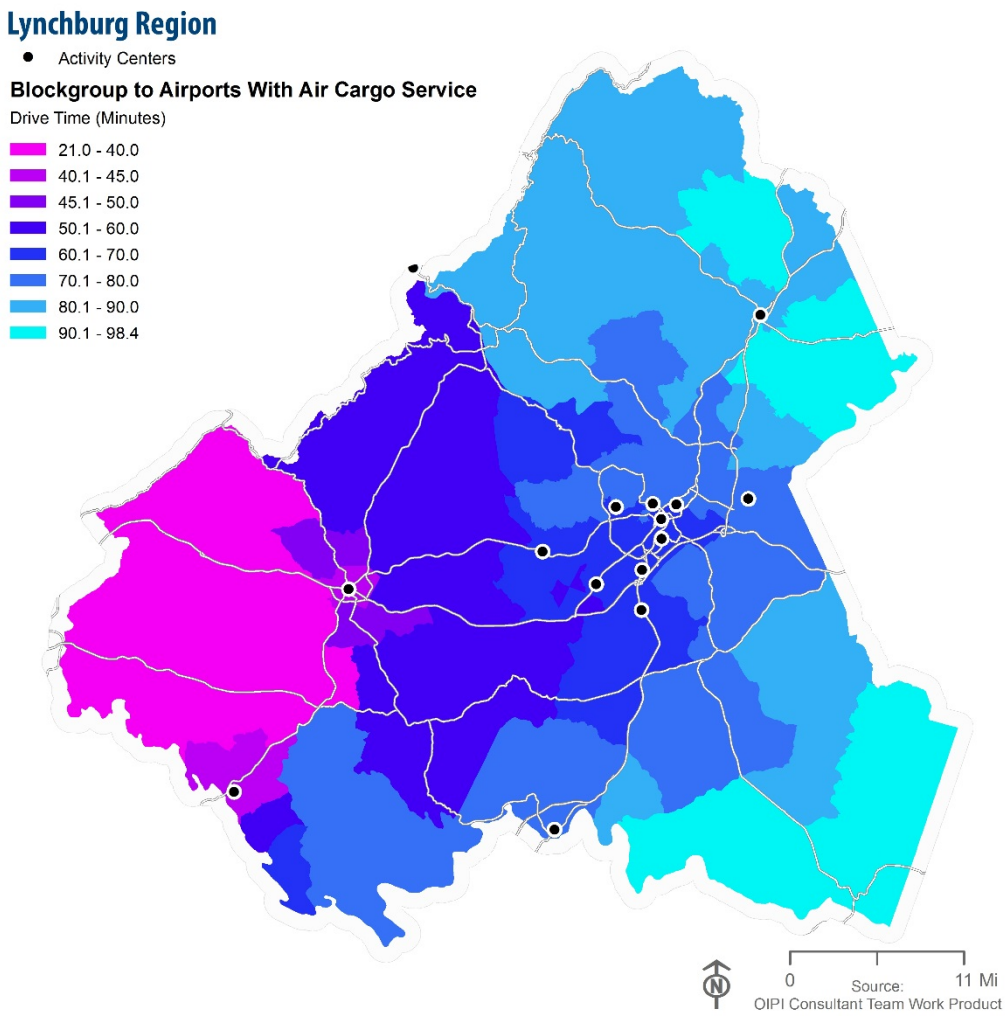


Figure 20: Access to Airports with Major Air Cargo Service

D. Roadway Measures

This assessment identified the transportation conditions in Central Virginia based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 21 below, is defined as the ratio of the median speed to the 90th percentile speed. The map below uses data from morning peak times for 2014. Major corridors and arterial roadways with heavy commuter traffic throughout the region were analyzed using INRIX data from VDOT. Overall, scores on the travel time reliability index indicate a high level of travel time reliability for the region. The only areas with higher reliability index scores, and thus a lower level of reliability, are directly surrounding urban centers and arterial ramps, or are explained by terrain and roadway characteristics unrelated to traffic. (Refer to Figure 21).

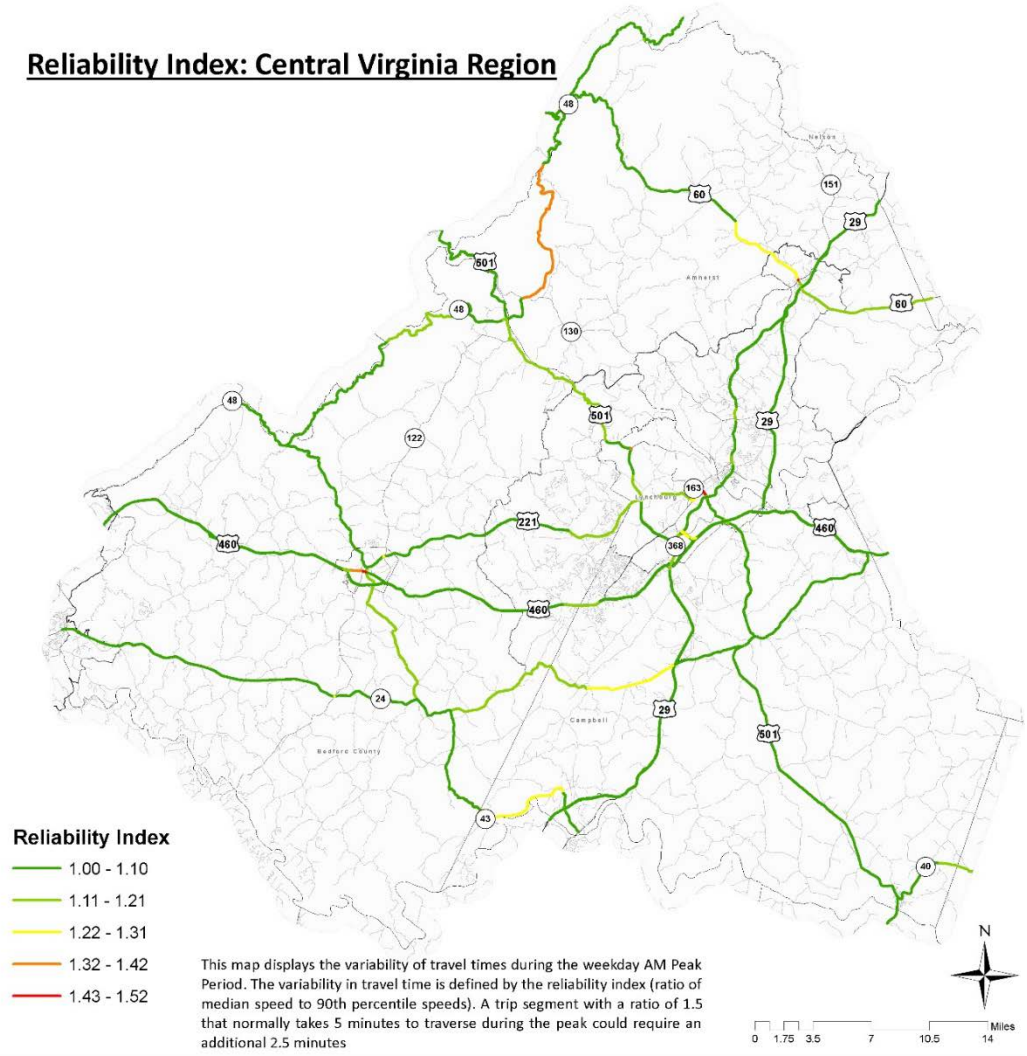


Figure 21: Travel Time Reliability

Percent of Time Congested

Congestion is an important determinant of roadway Level of Service. The percentage of time congested was calculated for morning peak times in 2014 using INRIX data. Roadways were considered significantly congested when they are operating at less than half the free-flow speeds. Free flow speed was defined as the 85th percentile of overnight speeds. According to the analysis, there are no major congestion problems in the Central Virginia region during morning peak times. Candlers Mountain Road from US Route 29 to US Route 460 has the highest level of relative congestion in the region. The majority of the other areas that show congestion are either ramps onto arterial roadways, or are roads with terrain and roadway characteristics that create the impression of congestion, such as the Blue Ridge Parkway. (Refer to Figure 22).

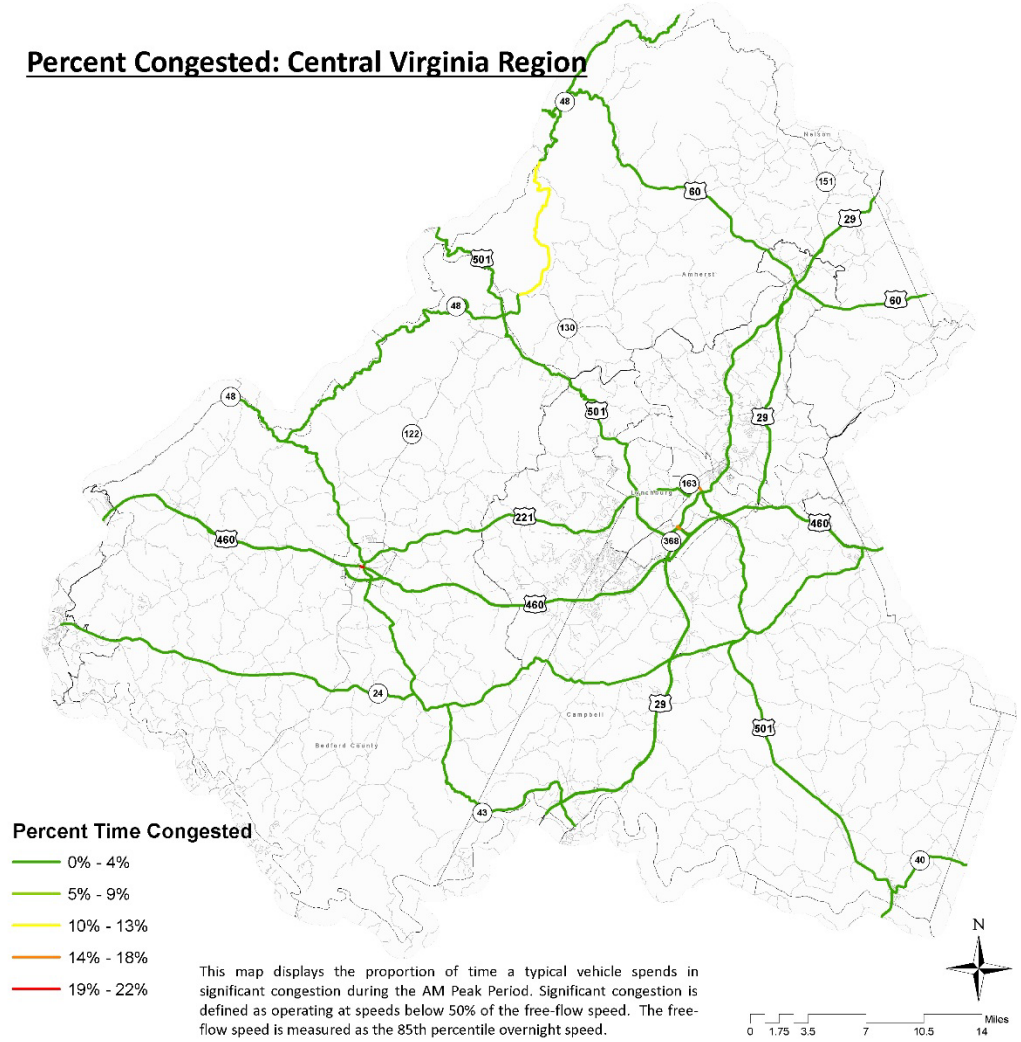


Figure 22: Percent of Time Congested

Travel Time Delay

Travel Time Delay was calculated for major corridors in the region. (Refer to Figure 23). The following map displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered to experience delay when travel speeds fall below the posted speed limit. In Central Virginia, the most significant delays occurred along US Route 460 to the east of Bedford, and on US Route 501 to the northwest of Lynchburg.

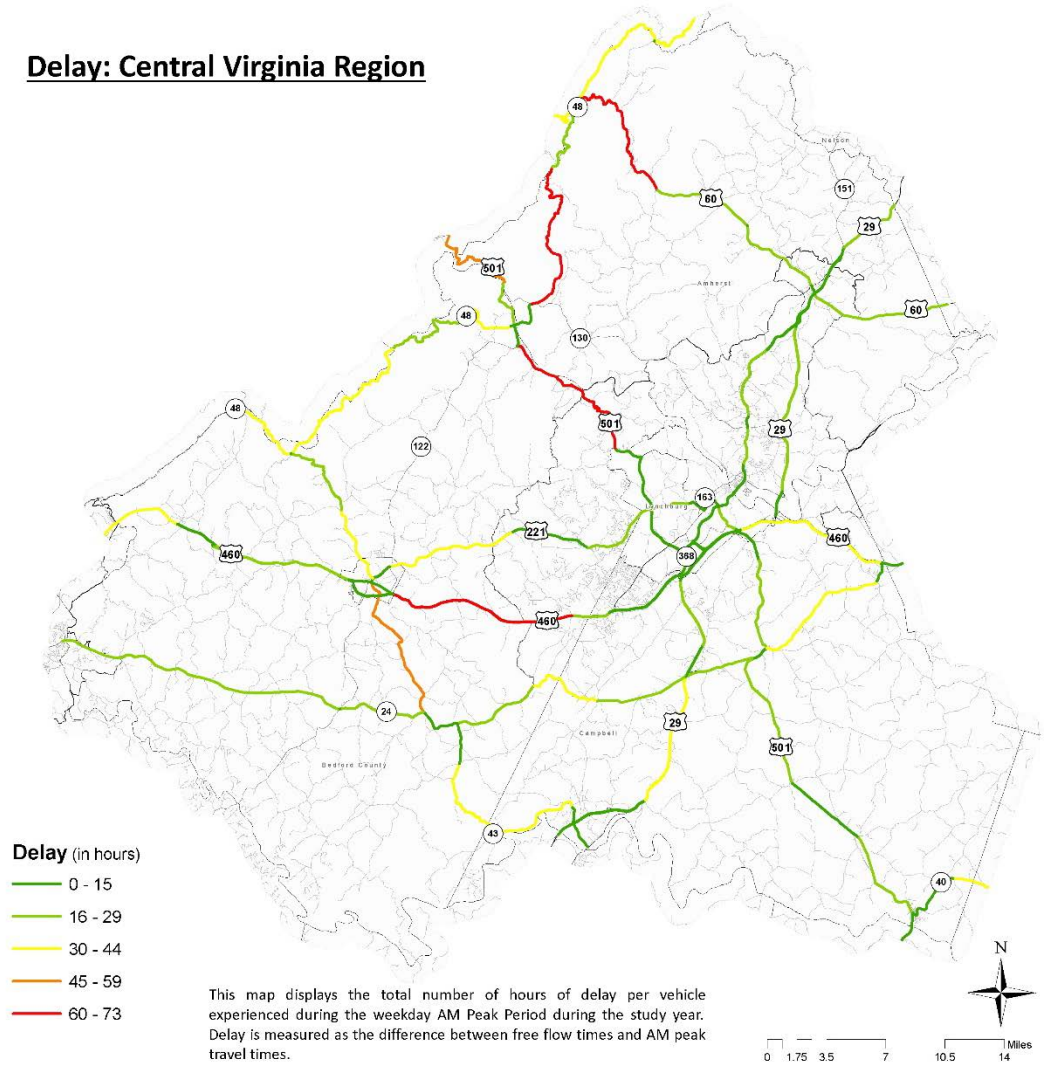


Figure 23: Travel Time Delay

Median Speeds

Median Speeds were calculated for major roadways in the region during afternoon peak hours in 2014. (Refer to Figure 24). The following map displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. Problem areas – where travel speeds are well below the speed limit – are in the Lynchburg city boundaries and in the City of Bedford.

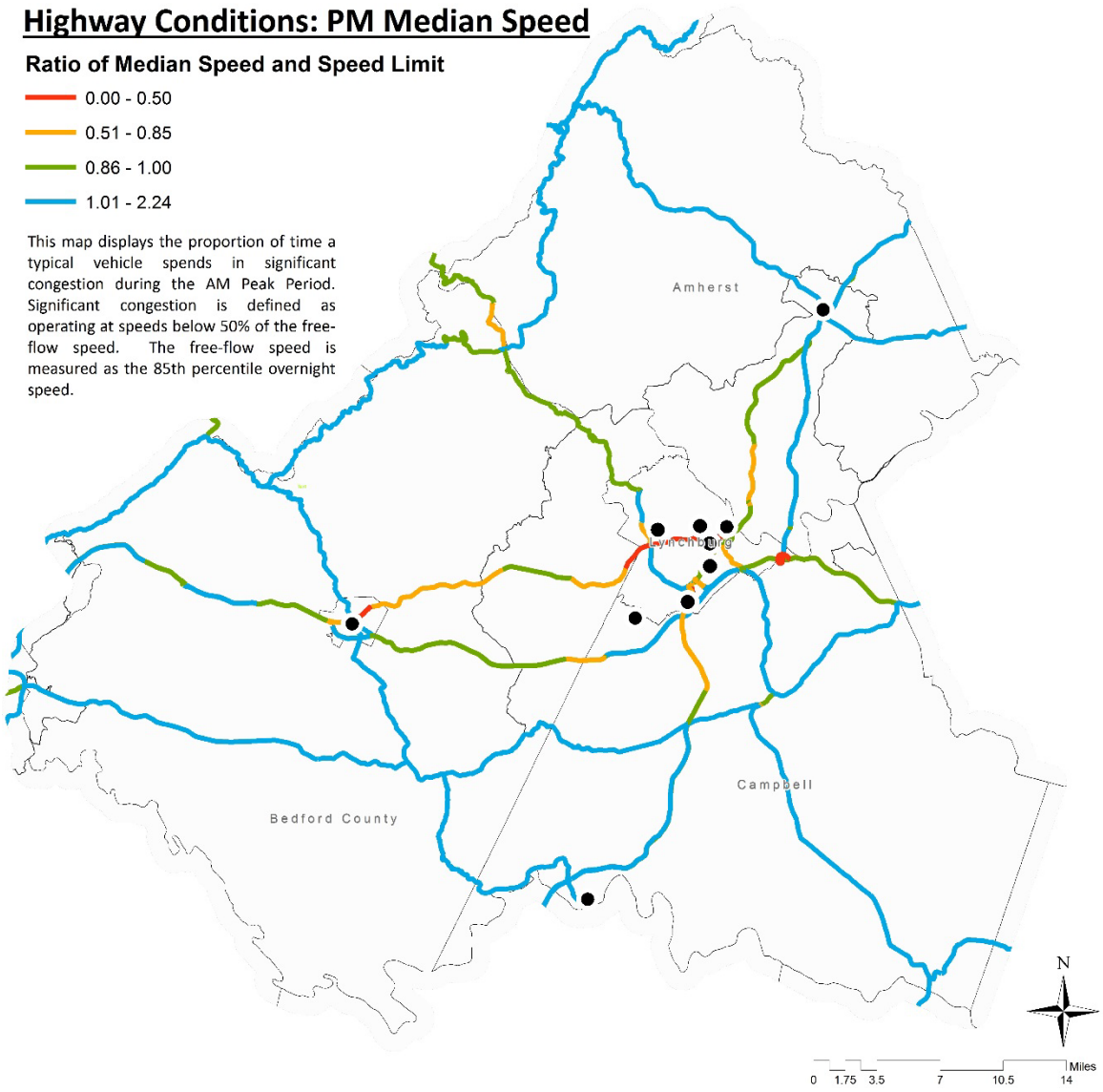


Figure 24: Median Speeds

E. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are the regional and local commodity flows in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the Central Virginia Region, an average of 90% of the dollar value of all goods that are moved through the region are moved by truck. Rail is the second most important mode, carrying around 9% of the total dollar value of goods. In comparison to the other jurisdictions in the region, Campbell and Amherst counties are more dependent on rail service, but overall throughout all jurisdictions in the region, trucks are the primary means of moving goods. (Refer to Figure 25).

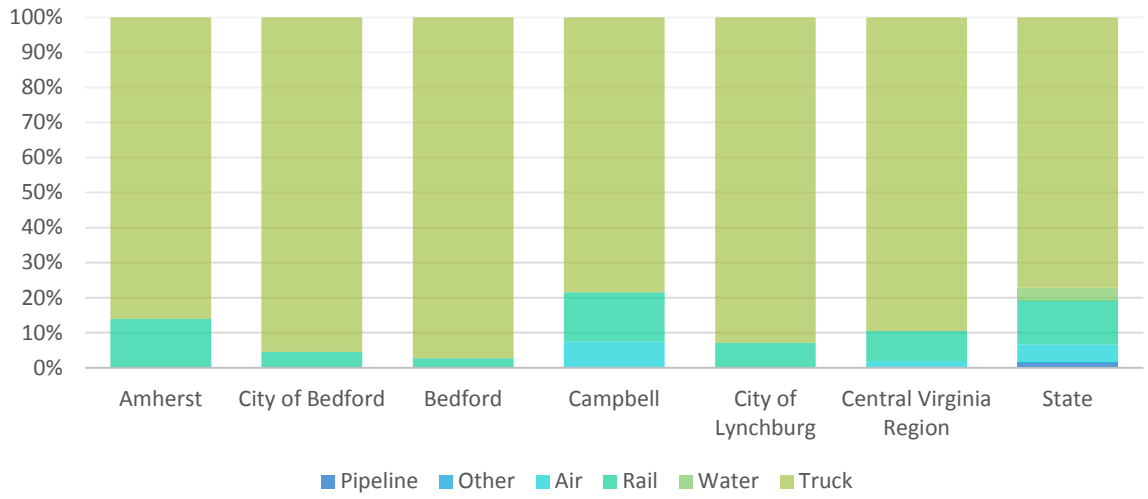


Figure 25: Comparison of Freight Modal Dependence

Location Quotients are used to compare the prominence of freight modes between the Central Virginia Region, and the State as a whole. The Central Virginia Region relies on trucks for freight movement 1.6 times more than the does the State as a whole. Rail and air transportation for goods is more common for the state on average than it is for the Central Virginia Region. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the relatively large distance – over a two hour drive – to Richmond International Airport from Central Virginia. (Refer to Figure 26).

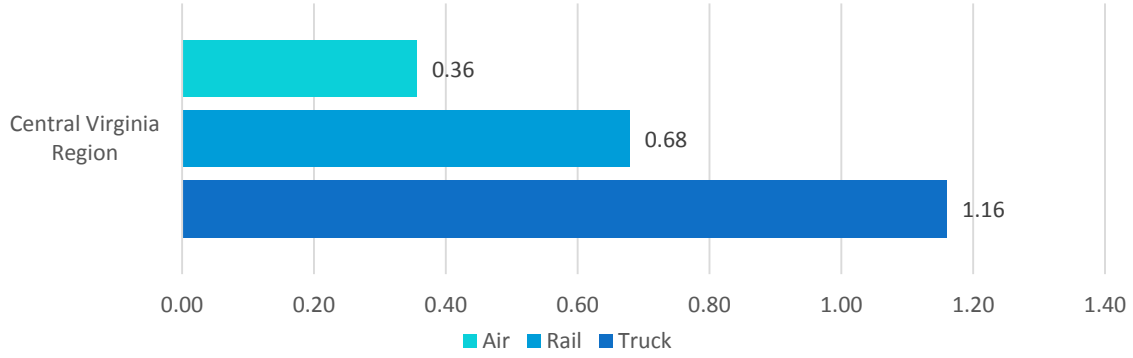


Figure 26: Location Quotient by Mode of Freight Travel

Top Commodities

Secondary Traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) accounts for the most valuable freight moving both to and from the Central Virginia Region. Chemical products are the next most valuable export from the Central Virginia Region. The Region exported $670 million more chemical and allied products than it imported in 2012. Coal and petroleum products are also important exports. Overall, the Central Virginia Region imported $5.33 billion dollars'

worth of goods and exported $7.8 billion dollars' worth of goods, resulting in $2.47 billion dollars of net exports in 2012. (Refer to Figure 27).

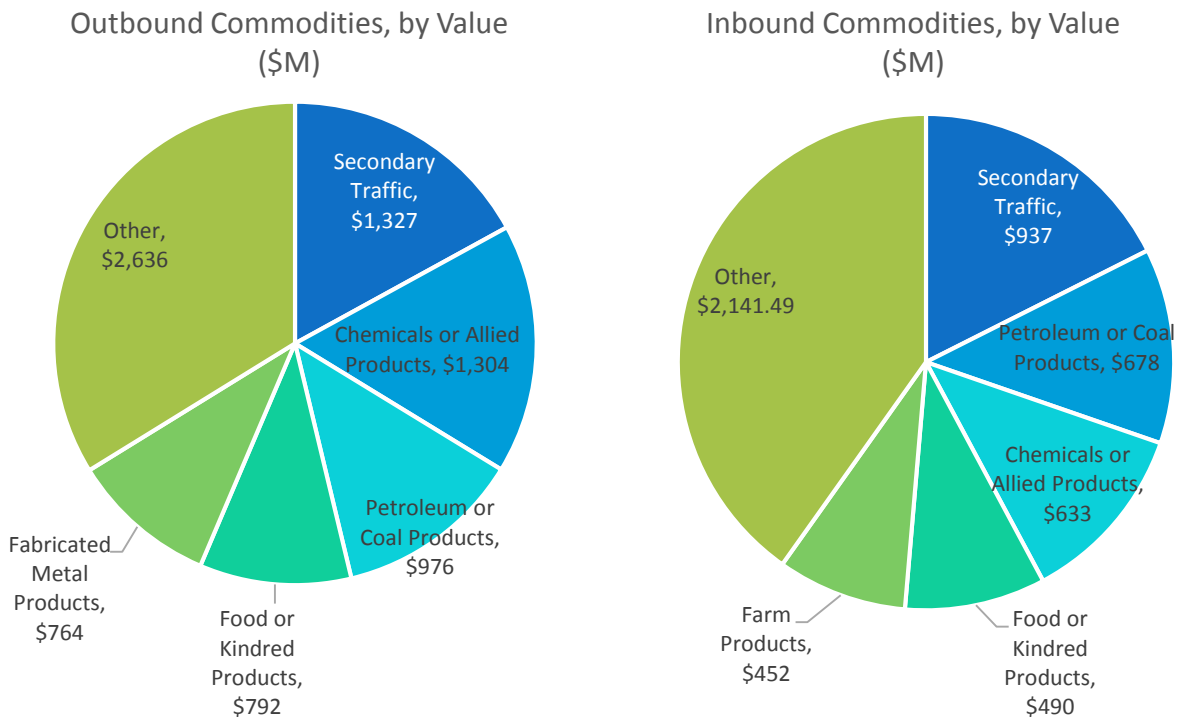


Figure 27: Top Freight Values by Commodities.
Source: TranSearch, 2012

The Southeast region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Central Virginia Region, and the Central Virginia Region also imports the highest value of goods from the Southeast region. In 2012, $2.5 billion dollars of freight was exported to the Southeast, while $1.7 billion dollars' worth of freight was imported to the Central Virginia Region. Freight movements within the state of Virginia are responsible for the next highest value. (Refer to Figure 28).

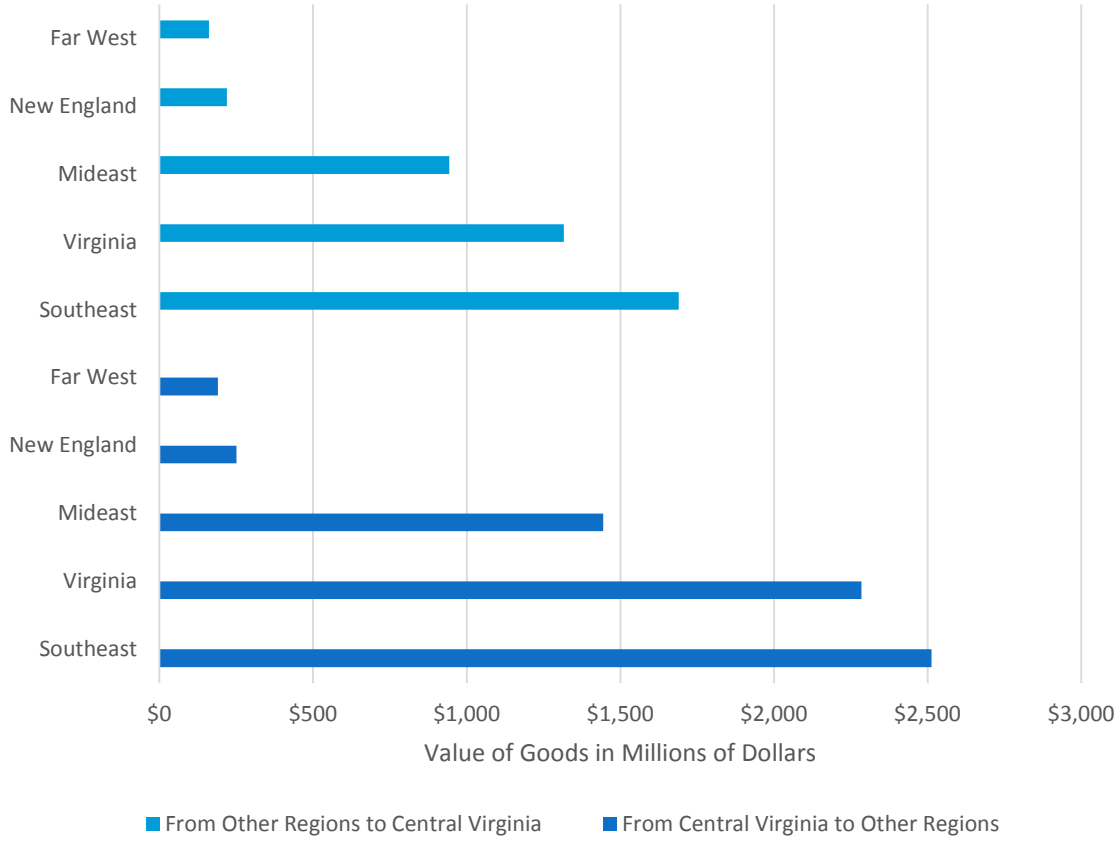


Figure 28: Top Freight Values by Region
Source: TranSearch, 2012

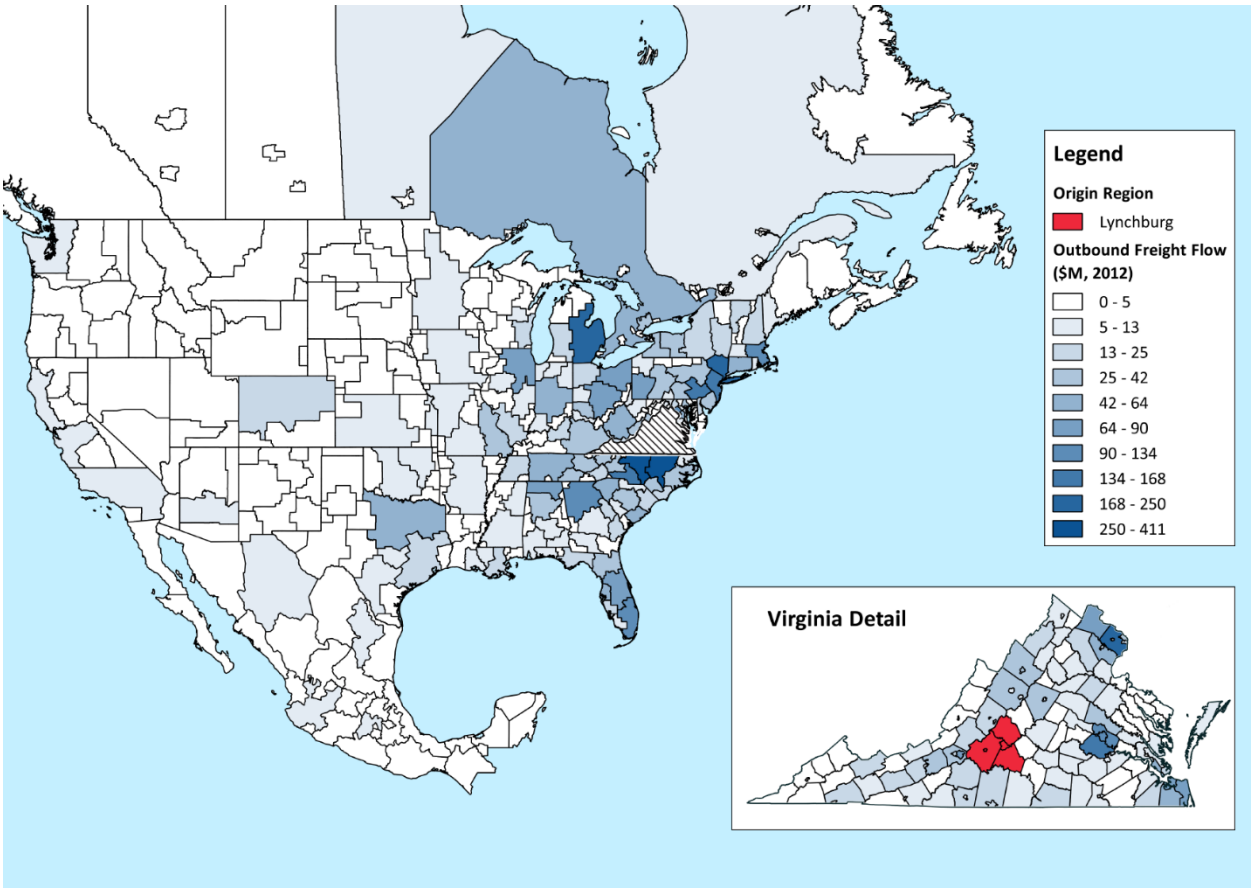


Figure 29: Outbound Freight Destinations
Source: TranSearch, 2012

Nationally, the majority of the freight exported from the New River Valley is shipped throughout the East side of the Mississippi. North Carolina, New York and New Jersey, and Michigan are important trading partners. (Refer to Figure 29.)

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs were identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. Key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described as Economic and Transportation Linkages, which are further discussed below and in the reference document, VMTP 2025 Needs Assessment: Regional Networks Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of broad regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also used spatial analysis for the Region to provide observations about needs for specific corridors, travel markets, and activity centers.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the draft transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs. These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity/Operations Needs (i.e. Safety and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the Study Team against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed and serving goods movement for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation.

Economic and Transportation Correlation Table			
	Local Sector	**Knowledge Sector**	**Freight Sector**
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Central Virginia Region, it showed a relatively equal distribution among the Freight and Local economic sectors (41.4% Freight and 39.6% Local), with a smaller segment of the Knowledge sector (19.0%). However, based on the industries that are forecast to have the greatest growth, the Knowledge sector is projected to have the greatest relative growth.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire in the region to continue to support the dominant manufacturing sector, particularly with respect to goods movement needs, but also to support the expected growth of the knowledge sector and its needs for reliable commuting and additional modal travel options. Using the correlation table in Section B, this translates into transportation needs such as freight accessibility and passenger reliability on the region's prime corridors, such as US Route 29 and US Route 460, and the passenger and freight rail corridors that generally parallel the highways. It also indicates the need for addressing any bottlenecks along these prime corridors to further support reliable travel for both commuters and goods movement. In addition, other key corridors that support activity centers in the region, such as VA Route 211 are important commuter routes and serve economic growth in downtown Lynchburg and emerging activity centers such as Forest and the Town of Bedford.

The forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit exists in the region only in the Lynchburg and Altavista centers. However, the expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These

Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs according to activity centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

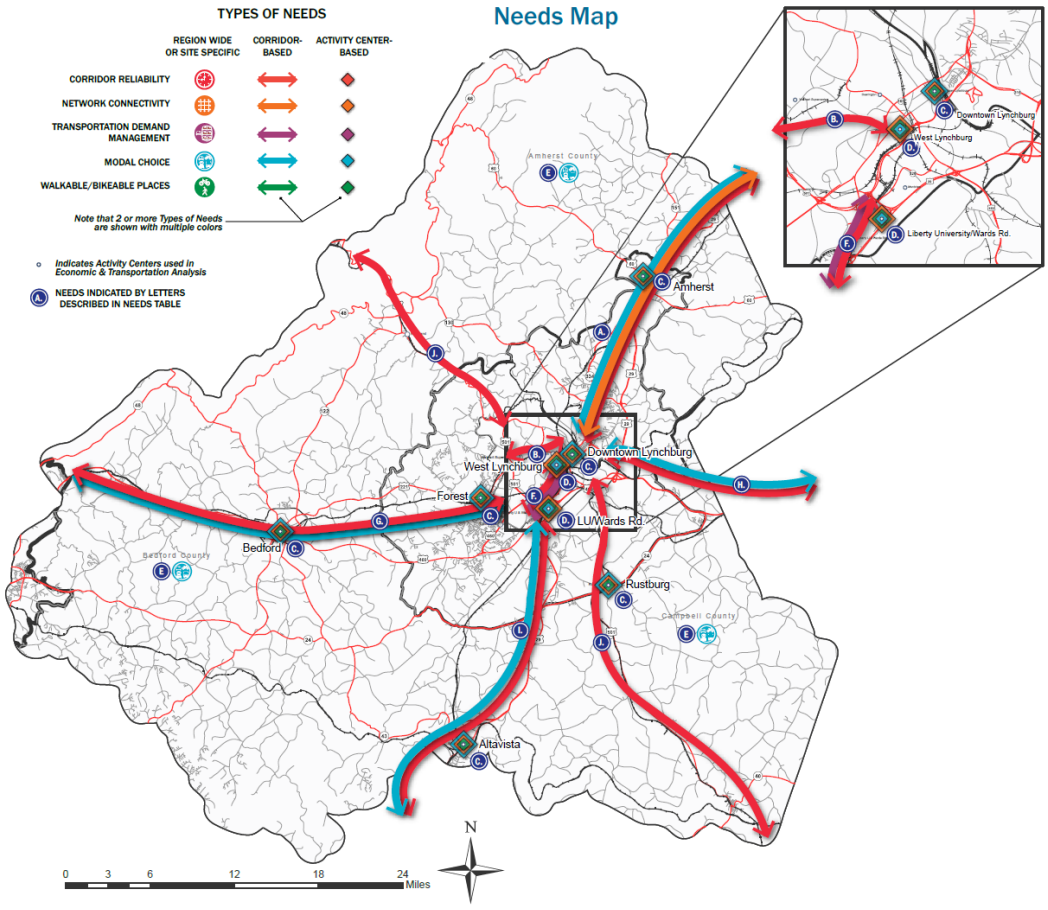


Figure 30: Summary Needs Map for Central Virginia

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need
2. General Description of Need

3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Table 11: Findings of Needs

A. Route 29 Modal Choice and Reliability

NEED	**Route 29 serves key inter- and intra-regional travel markets for freight and passengers. Ensuring long term transportation reliability is paramount to regional economic success.**
ECONOMIC	Route 29 serves major Knowledge- and Freight-based industries such as nuclear industries in the Lynchburg area and Local and education sectors, providing access to numerous activity centers, Madison Heights, the Lynchburg airport and Liberty University and other major employers.
TRANSPORT.	Route 29 has intermittent delay issues along portions that are not bypasses. Additional passenger train and reliable freight rail service to inter-regional markets is vital to supporting the regional economy.

B. Lakeside Drive / Lynchburg Expressway Area

NEED	**Lakeside Drive and Lynchburg Expressway are key connectors to support Knowledge based activity centers in Lynchburg such as colleges/university. They have reliability and bottleneck issues that should be addressed to aid in economic success.**
ECONOMIC	Supports major local and knowledge based sector as an arterial serving the City Lynchburg while allowing for greater regional connection. Connects Lynchburg College, Liberty University and downtown Lynchburg which are crucial to the education Sector.
TRANSPORT.	Major connector between several activity centers. They have reliability and delay issues due to road geometry and volumes, particularly at interchanges/intersections.

C. Walkability in Activity Centers

NEED	**Improved walkable connections serve as placemaking infrastructure that attract the 21st century workforce. Enhance regional walk-ability and bikeability by making last mile connections to regional trails and key activity centers.**
ECONOMIC	Enhancing walkable streetscapes has been shown to correlate to attracting workforce and building the economy, especially in the Knowledge sector. Downtown Lynchburg is seeing new workforce attracted to placemaking amenities such as walkable streets. Enhanced walkability is also needed in existing and emerging activity centers regionally
TRANSPORT.	The region has several historic villages/towns with good walkable networks - need to connect these to regional trails and need to enhance walkability and bikeability in the emerging employment centers in the region.

D. College and University Bike/Ped Enhancements

NEED

Improved trail and bike connections between and around Lynchburg-area colleges and University to strengthen Education sector

ECONOMIC

Good bike/ped access and recreational amenities show strong correlation to emerging workforce dynamics nationally. In addition, strong education sector and growing Knowledge sector in the region would be supported by improved hiker/biker networks. Improved access to downtown shopping also aids the Local services sector.

TRANSPORT.

The region has few regional trails, especially around educational institutions. Recent pedestrian improvements around Wards Road have led to improved pedestrian environment for student population. High traffic areas around schools would benefit from safer bike/ped access.

E. Rural Transit Service

NEED

Freight and Local industry sectors rely on workforces in rural areas, some with poor access to automobiles. Expansion of paratransit to connect rural workforces to activity centers is important in serving the regional economy overall

ECONOMIC

Increasing paratransit service could help car-less workers with daily commutes, supporting activity centers near the City of Lynchburg and boosting the regionally dominant Manufacturing industries (21% of Total Output) and the strong Local economic sectors, both of which hire transit dependent populations

TRANSPORT.

Approximately 18,000 workers commute from Campbell and Bedford Counties, and 5,400 commute from Amherst County to the City of Lynchburg - many from rural locations. While paratransit serves these areas, local plans have noted the need for expansion of paratransit in the region

F. Wards Road Area Reliability

NEED

Wards Road is a vital local connector that provides access between Lynchburg and Campbell County and connects the region to Liberty University and major retail and activity centers. Safety and delay issues as well as periodic bottlenecks create a need for long term corridor reliability

ECONOMIC

Wards Road provides regional accessibility between activity centers, Lynchburg and the larger region. Provides access to a major mall, retail centers and other Local economic sector businesses. Connects Liberty University supporting a major employment center and an important part of the Knowledge sector.

TRANSPORT.

Wards Road has numerous congestion and safety issues, with peak hour bottlenecks and operational and Travel Demand Management needs to improve reliability as a key corridor connecting to US 29 and major employment and retail centers in the region.

G. Rt. 221/Rt. 460 Corridor Reliability

NEED

Route 221 and Route 460 are key commuter connectors between the local activity centers of Forest and Bedford and also an interregional connection to Roanoke. Safety, delay and bottleneck issues identified locally affect the need for travel time reliability on the corridor. The proposed expansion of passenger rail service to Roanoke creates a need for Modal Choice along the corridor.

ECONOMIC

Connects Lynchburg with Forest and Bedford. Two activity centers exist on Route 221, primarily local service. However, Forest is considered a primary growth area in local plans and stakeholder comments.

TRANSPORT.

Prime corridor for commuting from Bedford County to Lynchburg (8,418 commuters per day). Local input identified traffic and safety concerns on Rt. 221 and Forest Road. Reducing bottlenecks on Route 221 would improve connectivity, supporting local sector growth.

H. Rt. 460 Corridor Reliability & Modal Choice

NEED

Rt. 460/Richmond Highway Travel Time Reliability & Modal Choice need for commuter connection to Appomattox to support workforce for multiple sectors

ECONOMIC

The town of Appomattox is within easy commuting distance of Liberty University and Downtown Lynchburg and is an important source of workers for the knowledge and local based sectors within the area.

TRANSPORT.

Moderate (1,892 per day) commute pattern from Appomattox to Lynchburg - Delay on Rt. 460 to Appomattox (250-300 hours of delay). No non-auto modes available currently for commuters.

I. Danville to Lynchburg Connections

NEED

The growing healthcare industry in Danville relies on workforce and transportation connections in the Lynchburg region and good reliability on Rt. 29 is needed as well as bus connections to the passenger rail service in Lynchburg.

ECONOMIC

The Danville region has a growing healthcare industry - both local and export-based, and relies on connections with the Central Virginia region for workforce and for rail/air connections to other markets and regions

TRANSPORT.

Route 29 has few congestion issues but needs to maintain good reliability in the future for growing workforce commuting needs. Regional bus service is not available but would both support commuters and increase access to the new passenger rail service from Lynchburg.

J. Rt. 501 Commuter Connections

NEED

Route 501 is a key commuter corridor leading to the Rustburg activity center and Campbell County workforce in the south, and to the Big Island activity center in the north. Freight traffic and commuting patterns create a need for long term travel time reliability to support the knowledge and local economic sectors for workforce travel and freight reliability

ECONOMIC

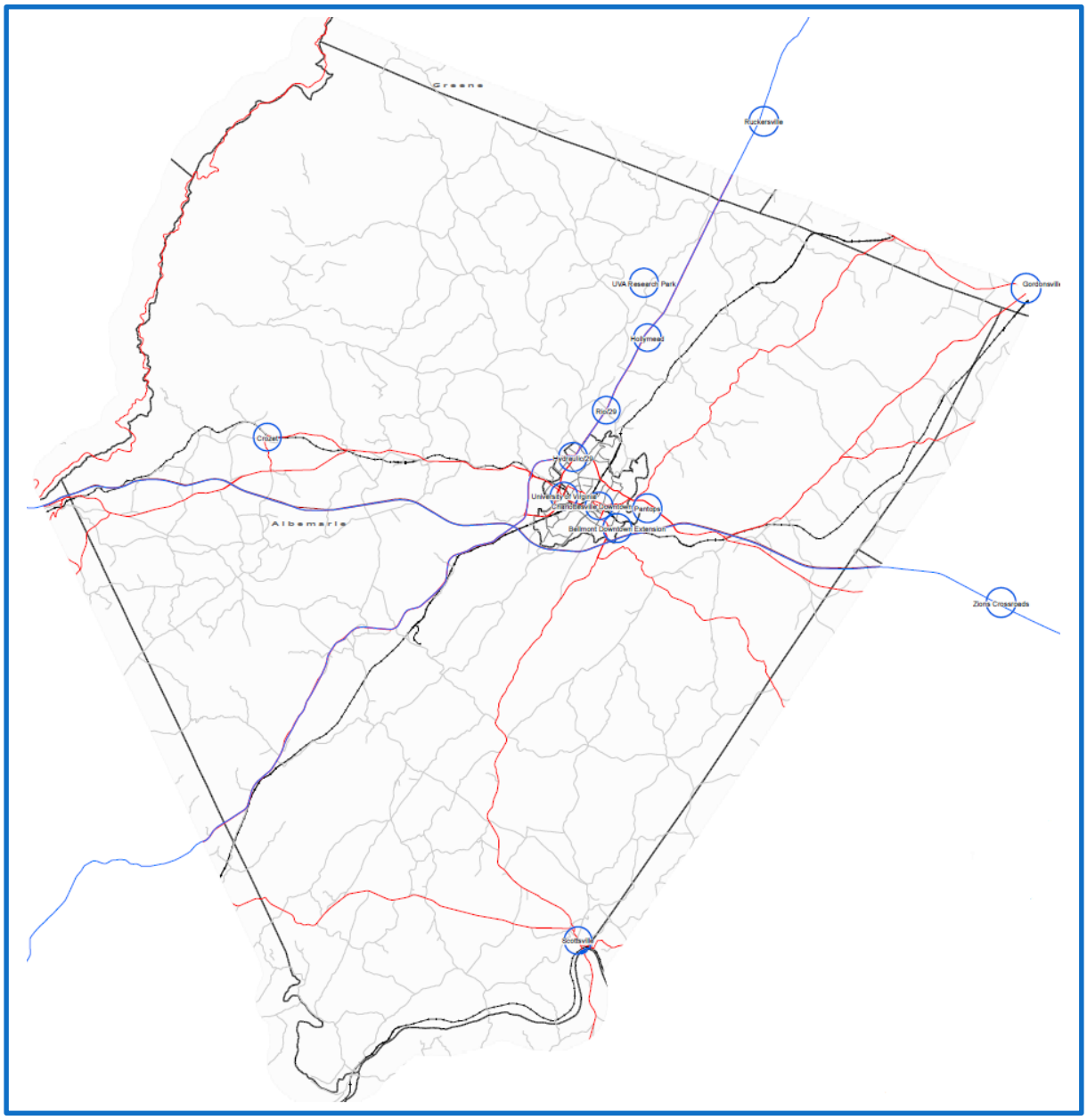
Significant knowledge sector employment (supported by local data/input) in the Rustburg activity center is important to the local economy. The Georgia-Pacific facilities in Campbell and Bedford county require freight reliability along the corridor. In addition, workforces in Campbell County support the strong local and growing knowledge sectors in Lynchburg.

TRANSPORT.

12,000 commuters travel daily from Campbell County to Lynchburg - one of the strongest commuter links in the region. Most commuters travel along Routes 501 and 29 in Campbell County. While the data show few current reliability issues, stakeholder input indicates safety issues and the need to assure long term travel time reliability in the corridor.

VMTP 2025 Needs Assessment

Regional Needs Profile



Charlottesville-Albemarle Region

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses. The purpose of this Transportation Needs Assessment to identify the Transportation Needs that are part of the Charlottesville-Albemarle Regional Network that would support regional industries and workforces.

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Charlottesville-Albemarle regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region. However, an initial needs analysis area for each region has been defined as the MPO boundary, with the stipulation that if an MPO boundary includes only a portion of a county, the entire county will be included in the needs analysis area. All transportation infrastructure within these defined boundaries is included within the regional network analysis. The determination of Transportation Needs will primarily be focused on this needs analysis area. However, each region is different and consideration needs to be given to the economic characteristics of each region. If, for example, there is a particular industry that is located outside the needs analysis area but is important to the regional economy; or, if a key corridor is located outside the needs analysis area but supports commuters or goods movement that are important to the regional economy, it may be included in the Needs Assessment for that region.

The Charlottesville-Albemarle Region is defined as City of Charlottesville and Albemarle County. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area, such as Fluvanna County, Greene County, Louisa County, Nelson County, and were considered in the Needs Assessment as well.

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on

understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from Charlottesville-Albemarle stakeholders to identify an overall current economic profile for the region. The current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Activity centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to Weldon Cooper, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Regional Demographics

As evident in Table 1, substantial population growth is projected for the Charlottesville-Albemarle Region. Projections range from 25,000 to nearly 50,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Charlottesville-Albemarle Region Population Projections[1]

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
239,202	**276,077**	**278,186**

Table 3 provides a closer look at population projections by jurisdiction within the Charlottesville-Albemarle Region.

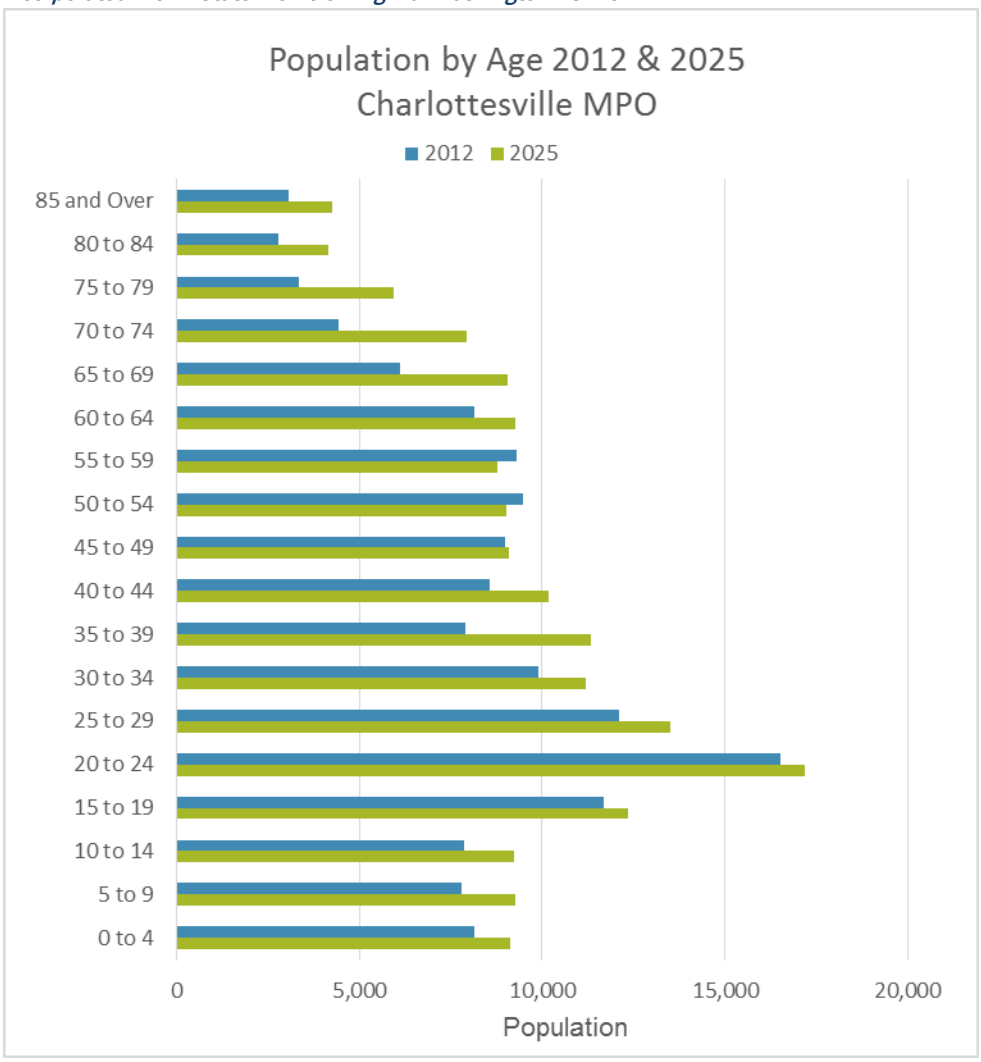
[1] These estimates include Albemarle County, the City of Charlottesville, and the Counties of: Fluvanna, Greene, Louisa, and Nelson.

Table 3: County and City Population Projections. Source: Weldon Cooper

Jurisdiction	Current population	Weldon 2025 Projection	% Change
City of Charlottesville	43,956	46,321	5%
Albemarle County	102,251	124,589	22%

According to Woods & Poole, population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60 (Figure 1).

Figure 1: Population of Region 2000 in the years 2012 and Projected for the year 2025. Source: Woods & Poole Economics, Incorporated. 2014 State Profile of Virginia. Washington DC. 2014.



Also according to Woods & Poole, per-capita income for the region is expected to rise 16% (slightly less than the state average of 21%) from $42,226 to $48,875. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Charlottesville-Albemarle region.

Top Industries by Output

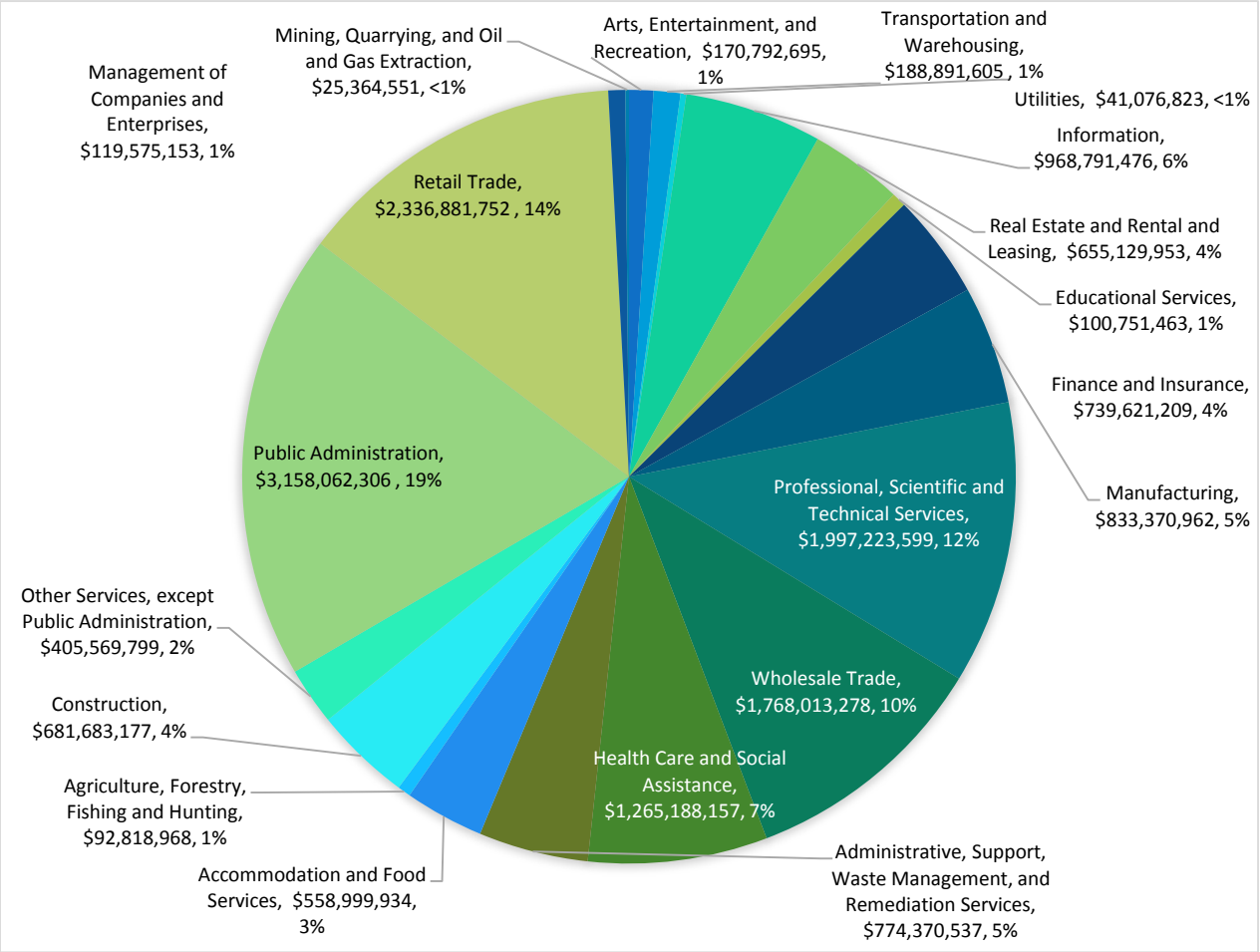
As shown in Table 4, public administration is the strongest industry in the region in terms of output, accounting for 19 percent. Retail trade; professional, scientific, and technical services; and wholesale trade all account for over 10 percent of the region's output (at 14, 12, and 10 percent, respectively). The fifth largest industry is health care and social assistance, which accounts for 7 percent of the region's output.

Table 4: Current Industries by Output. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Output
Public Administration	92	19%
Retail Trade	44	14%
Professional, Scientific, and Technical Services	54	12%
Wholesale Trade	42	10%
Health Care and Social Assistance	62	7%

Figure 2 below shows the breakdown of all output in the Charlottesville-Albemarle region by industry. Following the top five industries, the: information; manufacturing; administrative, support, waste management, and remediation services; finance and insurance; construction; and real estate and rental and leasing industries all account for between 4 and 6 percent of the region's output.

Figure 2: Breakdown of 2012 Output in the Charlottesville-Albemarle Region by Industry



Top Industries by Employment

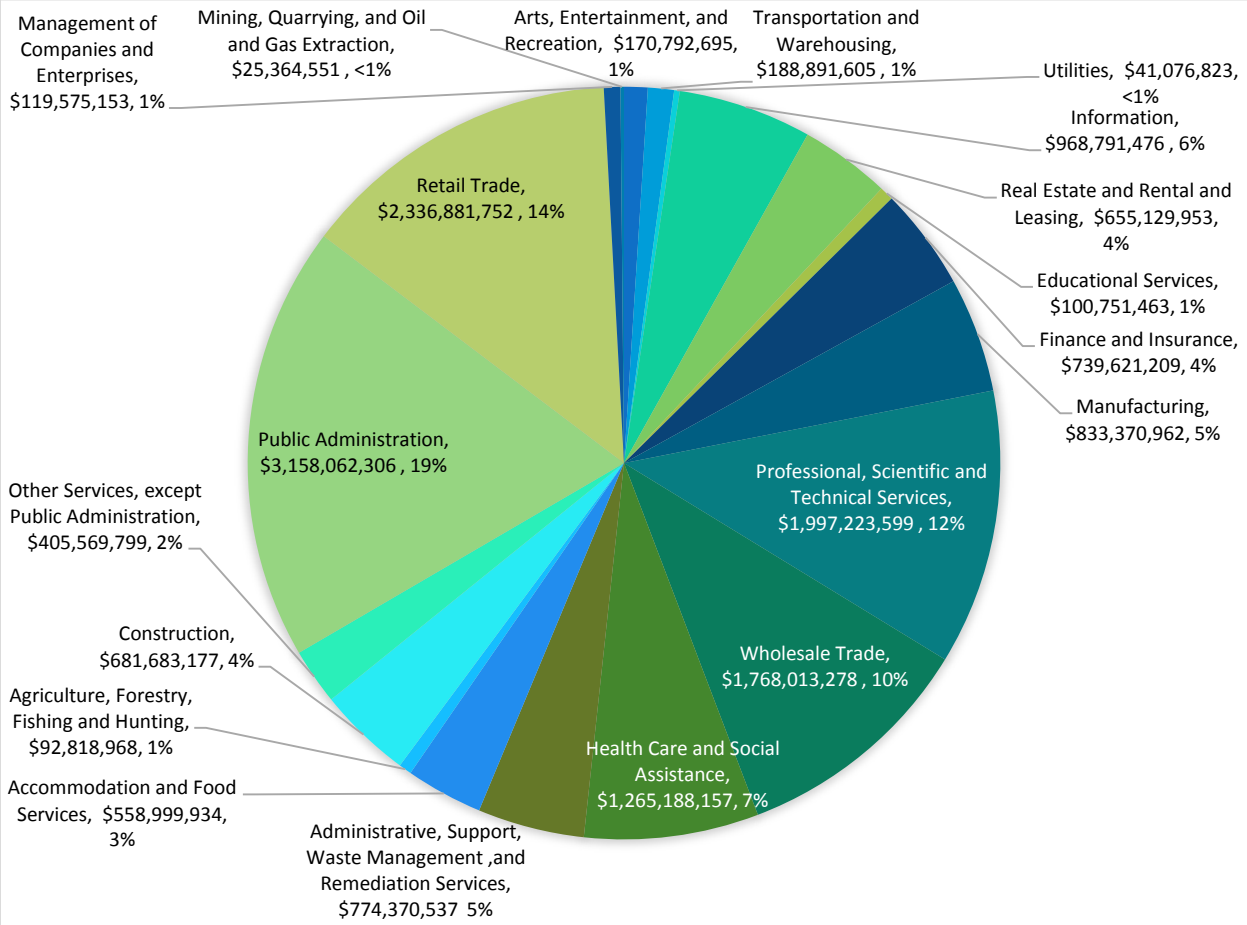
As shown in Table 5, the Charlottesville-Albemarle Region, public administration, health care and social assistance, accommodation and food services, retail trade, and professional, scientific, and technical services are the top industries by employment. Public administration, the largest industry by output, makes up an even larger share of the region's employment. Accommodation and food services is the only top five industry by employment that is not also in the top five for output (it accounts for just 3 percent of the region's output). Wholesale trade, which was a significant output-generator, is much lower in terms of its share of the region's employment.

Table 5: Current Top Industries by Employment. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Workforce
Public Administration	92	32%
Health Care and Social Assistance	62	11%
Accommodation and Food Services	72	10%
Retail Trade	44	9%
Professional, Scientific, and Technical Services	54	6%

Figure 3 below shows the breakdown of 2012 employment in the region by industry for the remaining 30 percent of employment (as well as those in the table above).

Figure 3: Breakdown of 2012 Employment in the Charlottesville-Albemarle Region by Industry



Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as

compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Charlottesville-Albemarle region (Table 6). The industries expressed in Table 4 have the highest LQ scores in the region. The score for Professional services, for example, can be inferred to mean that these services are more than 2 times more concentrated in the region than in the entire nation, on average.

Table 6: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Professional, Scientific, and Technical Services	54	2.21
Public Administration	92	1.99
Information	51	1.48
Arts and Entertainment	71	1.34
Accommodation and Food Services	72	1.33

Economic Sectors

The Study Team grouped the 20 industry sectors, as defined by The North American Industry Classification System (NAICS), into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These clusters are defined as the local-serving, knowledge-based, and freight-dependent economic sectors. Each economic sector has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-based service industries such as financial services, where passenger travel needs would be a greater concern. The three economic sector classifications considered for this analysis, and their respective transportation needs, are:

- **Knowledge-based industries**[2] sector, in which companies and entrepreneurs thrive on proximity to one another and to regional, national, and global markets. They need reliable, efficient multimodal accessibility for commuters traveling to and within the centers where they are located, particularly via transit, bicycle, and walking modes. Knowledge-based industries, particularly the information industry, are growing in this region.

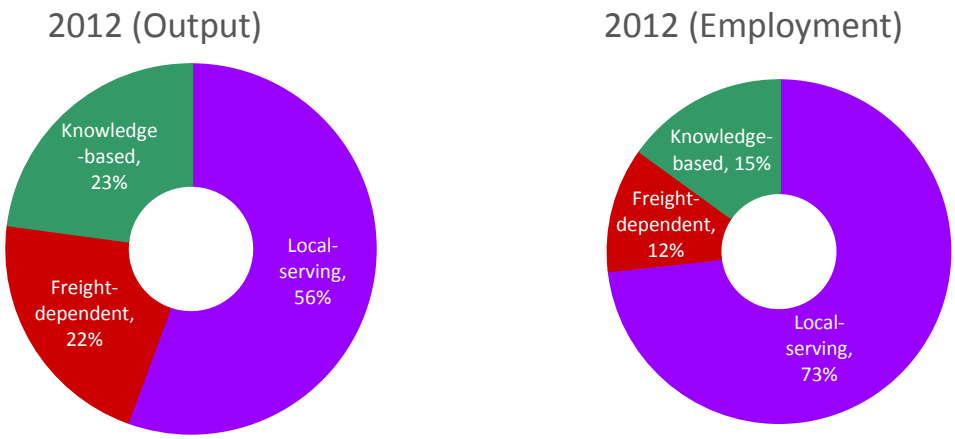
[2] NAICS codes in the knowledge-based category include: 51 Information; 54 Professional, Scientific, and Technical Services; 55 Management of Companies and Enterprises; and 56 Administrative, Support, Waste Management, and Remediation Services. Note: NAICS code 56 combines two types of employment: Code 561 includes a wide range of services including office administration, facilities support, and a variety of business support services related to employment and facilities management, security, cleaning, and meeting organization. Code 562 includes jobs in waste collection, disposal, and remediation services. In Northern Virginia, the largest revenue-generating industries within NAICS Code 56 (as of 2012) are Security Guards and Patrol Services (561612), Janitorial Services (561720), and Facilities Support Services (561210).

- **Local-serving industries**[3] depend upon multimodal accessibility to nearby residents and customers, and upon the ease with which goods providers can reach their doors. They generate trips by all modes throughout the day and night, made by employees, customers, students, and delivery professionals in automobiles, vans, trucks, buses, bicycles, and on foot.

- **Freight-dependent industries**[4] require accessibility for high-speed and/or long-distance travel by truck, rail vehicle, and air. They need reliable access to major highways, freight rail services, cargo ports, and warehousing and distribution centers.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Charlottesville-Albemarle Region, Figure 4 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the State. Each sector has different transportation needs; for example, the local-serving sector is typically characterized by different peak commute time, customer traffic, trip-chaining destinations, and truck deliveries.

Figure 4: Top Sectors by Output and Employment 2012). Source: IHS Global Insights



The Local Services cluster is clearly the strongest in this region. Local services make up 73% of the economic output in the Charlottesville Region. Conversely, the Knowledge and Freight-dependent clusters account for 15 and 12% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The Local Services economic

[3] NAICS codes in the local-serving category include: 44-45 Retail Trade; 52 Finance and Insurance; 53 Real Estate and Rental and Leasing; 61 Educational Services; 62 Health Care and Social Assistance; 71 Arts, Entertainment, and Recreation; 72 Accommodation and Food Services; 81 Other Services, except Public Administration; and 92 Public Administration.

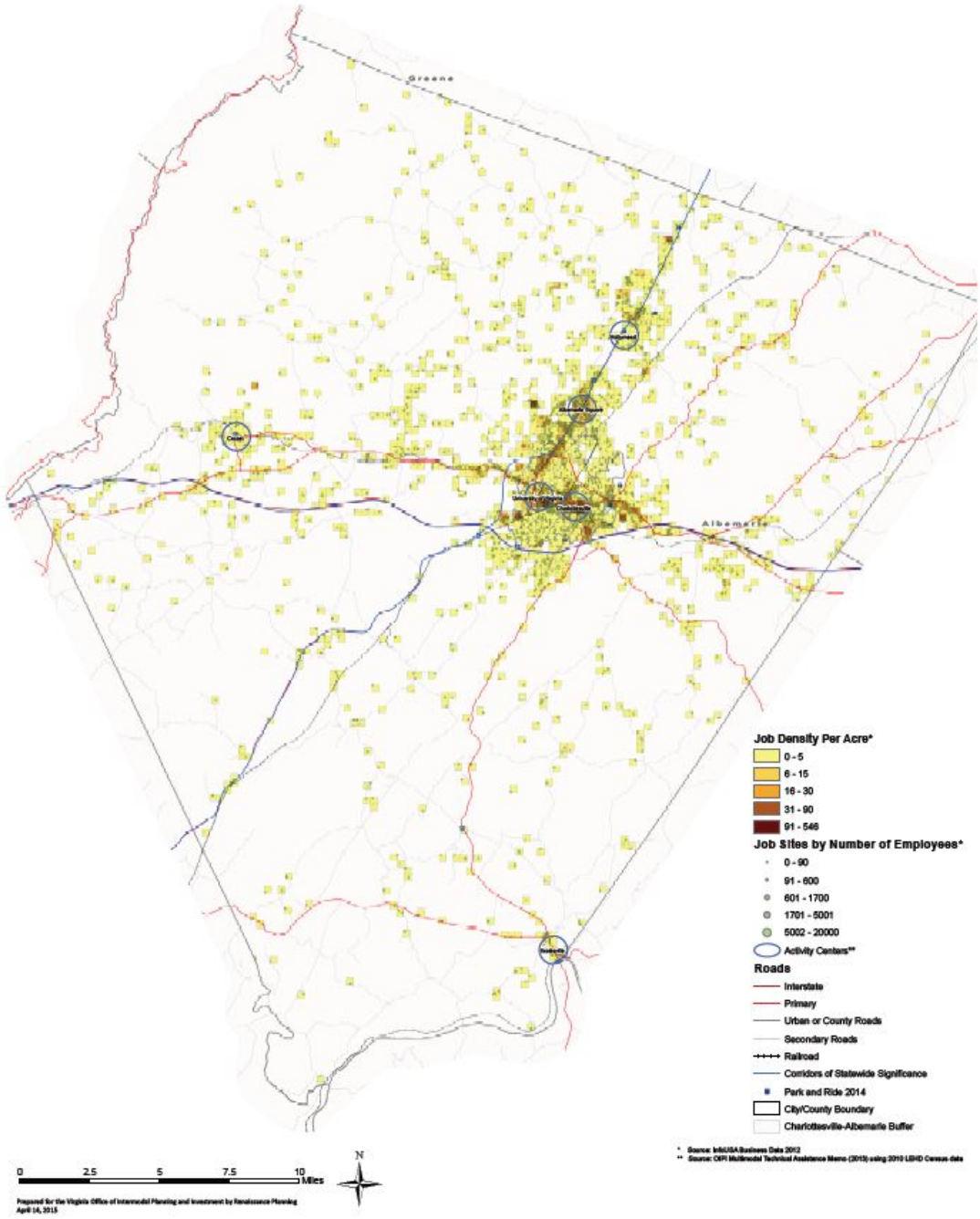
[4] NAICS codes in the freight-dependent category include: 11 Agriculture, Forestry, Fishing, and Hunting; 21 Mining, Quarrying, and Oil and Gas Extraction; 22 Utilities; 23 Construction; 31-33 Manufacturing; 42 Wholesale Trade; and 48-49 Transportation and Warehousing.

cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries

D. Activity Center Analysis

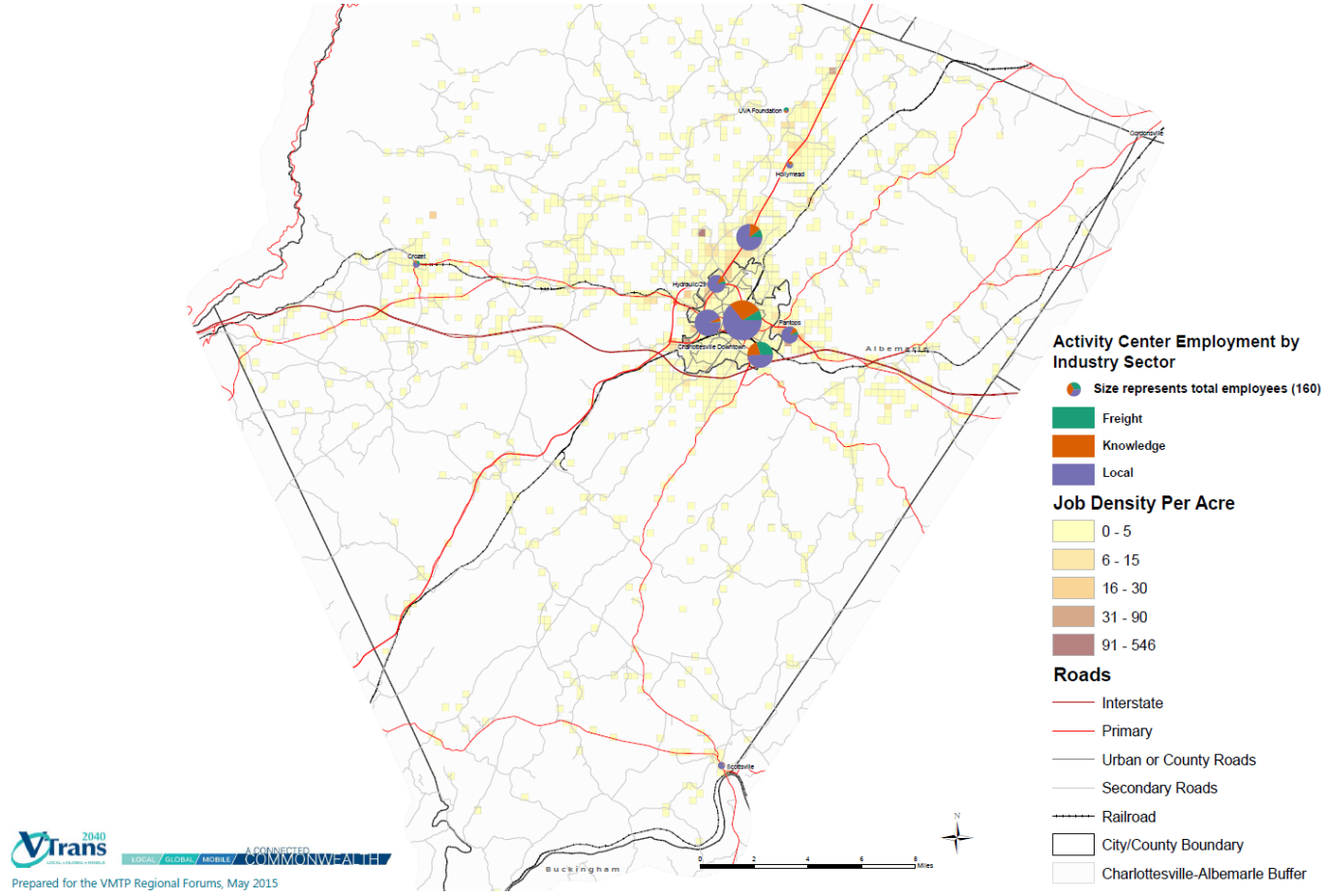
An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers, drawn with a 1-mile-radius, were then developed for these areas. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Centers were then affirmed by stakeholders with knowledge of the regional significance of the activity there and mapped accordingly. Figure 5 below shows the InfoUSA job density color scale in shades of yellow, and the activity centers as blue circles.

Figure 5: Map of Activity Centers based on Job Density and Stakeholder Input



Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local-serving, knowledge-based, and freight-dependent economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 6 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

Figure 6: Activity Center Employment by Industry Sector



E. Forecasted 2025 Industry Strengths

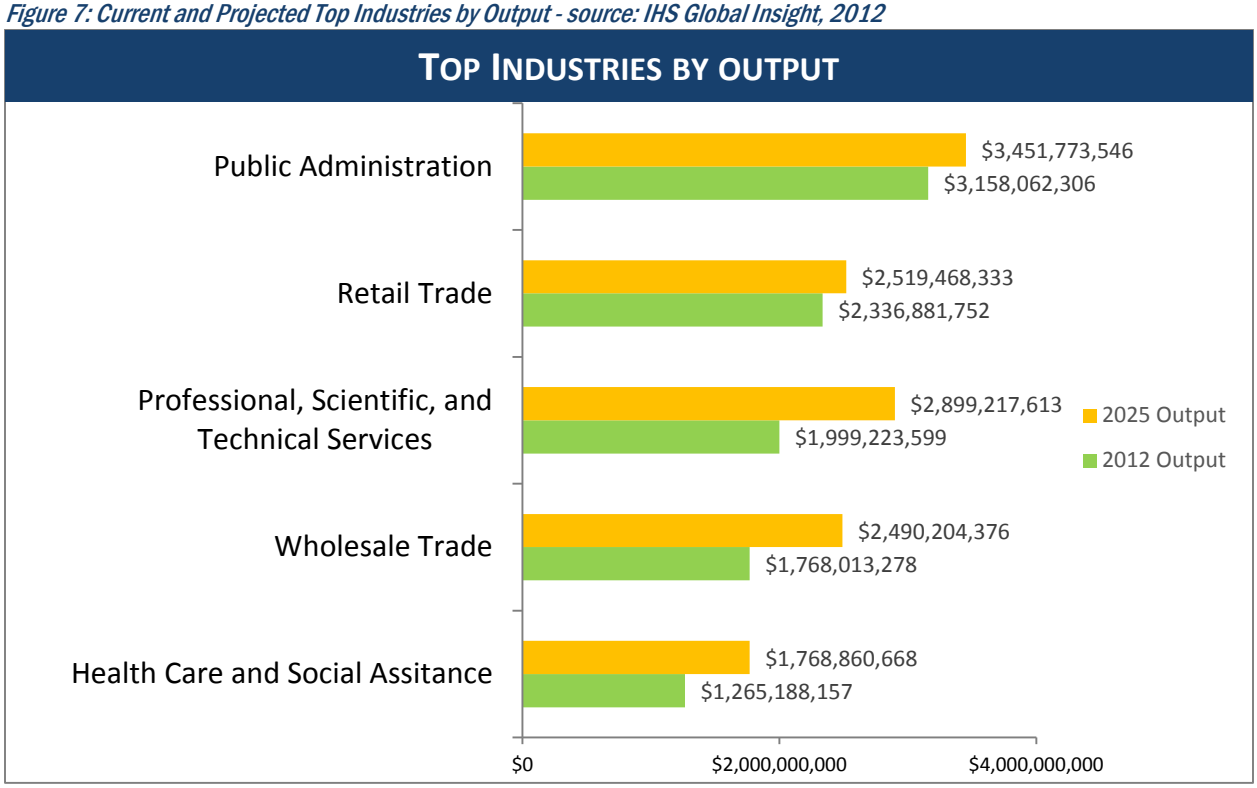
Through a series of work sessions with the Charlottesville-Albemarle stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. The 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Charlottesville-Albemarle's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Charlottesville-Albemarle region. The basic economic datasets that were compiled include:

- Current and Projected Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity center profiles
- Economic Development Priorities

Substantial growth is forecasted for the Charlottesville-Albemarle area by 2025 (Figure 7). According to statewide and national datasets used, the Manufacturing and Retail Trade industries will see the largest growth. Combined, they are expected to produce $2.47 billion more in 2025 than was produced in 2012.

Figure 7: Current and Projected Top Industries by Output - source: IHS Global Insight, 2012



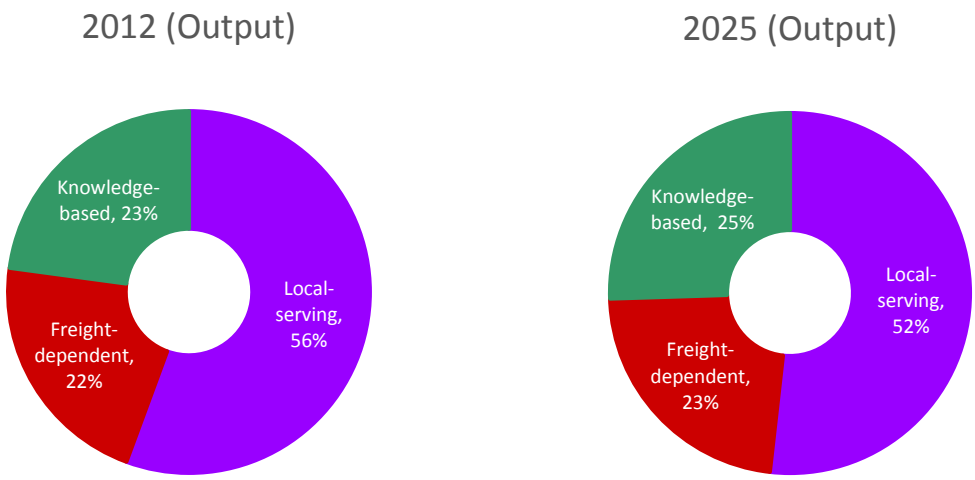
All of the top industries by output in the region are expected to grow between 2012 and 2025. As shown in Table 7, growth is expected to be largest in the Information industry, at 75 percent, while significant growth (40-45 percent) is also expected in: professional, scientific, and technical services; wholesale trade; and health care and social assistance.

Table 7: Top Industries by Output – Current and Projected (2025)

Industry	2012	2025	Change
Public Administration	$3,158,062,306	$3,451,773,546	9%
Professional, Scientific, Technical Services	$1,997,223,599	$2,899,217,613	45%
Retail Trade	$2,336,881,752	$2,519,468,333	8%
Wholesale Trade	$1,768,013,278	$2,490,204,376	41%
Health Care and Social Assistance	$1,265,188,157	$1,768,860,668	40%
Information	$ 968,791,476	$1,694,521,158	75%

Figure 8 shows the anticipated change in the distribution of the region's industries among the three economic sectors that is predicted to occur by 2025. The local-serving sector's relative importance is expected to decrease slightly, by 4 percent, while the relative size of the knowledge-based sector will increase by 2 percent and the freight-dependent sector's share of output will increase by 1 percent.

Figure 8: Economic Sectors by 2012 Output and Projected Output in 2025 - Source: IHS Global Insight



The region's expected fastest growing industries are shown in Table 8 below. Only two industries from the list of top industries – professional, scientific, and technical services, and information – are also high growth industries. Real Estate and Rental and Leasing, and Finance and Insurance both account for 4 percent of the region's output and employment, and they are also high growth industries.

Table 8: High Growth Industries by Projected 2025 Output

Industry	2012	2025	Change
Arts, Entertainment, and Recreation	$ 170,792,695	$ 322,618,194	89%
Transportation and Warehousing	$ 188,891,605	$ 349,292,314	85%
Utilities	$ 41,076,823	$ 74,728,291	82%
Information	$ 968,791,476	$1,694,521,158	75%
Real Estate and Rental and Leasing	$ 655,129,953	$1,080,105,199	65%
Educational Services	$ 100,751,463	$ 162,209,746	61%
Finance and Insurance	$ 739,621,209	$1,141,898,139	54%
Manufacturing	$ 833,370,962	$1,267,646,167	52%
Professional, Scientific, and Technical Services	$1,997,223,599	$2,899,217,613	45%

Forecasted 2025 Employment

Unlike most urban areas, where the local-serving cluster accounts for about half of all employment, the Charlottesville-Albemarle region's employment is dominated by the local-serving sector. This is relatively unsurprising, given the high level of employment in public administration, health care and social assistance, and accommodation and food services. The presence of the University of Virginia accounts for a significant portion of all three of these employment industries. In the Charlottesville-Albemarle region, the local-serving sector's share of employment will decrease by approximately 2 percent by 2025 (Figure 9). By 2025, the proportion of knowledge-based jobs is expected to increase from 15 to 16 percent of the region's employment, while freight-dependent employment will stay relatively flat (a decrease of less than 1 percent is expected).

Figure 9: Economic Sectors by 2012 Employment and Projected Employment in 2025 - Source: IHS Global Insight

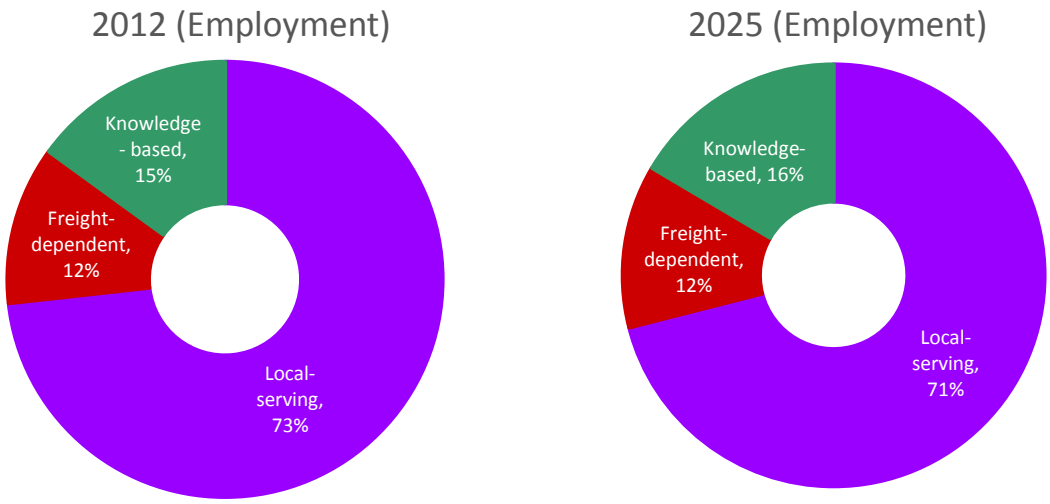


Figure 8 shows the expected change in the region's top employment sectors between 2012 and 2035. Among the region's current top industries in terms of employment, all are expected to grow significantly between 2012 and 2025 except for retail trade, which is expected to decrease by over 2,200 jobs. Public administration is expected to add over 3,000 jobs. Professional scientific, and technical services and health care and social assistance are expected to add nearly 1,500 jobs each. The growth in accommodation and food services will be modest; the industry is expected to add approximately 500 jobs over the same period.

Figure 10: Top Sectors by Employment in 2012 and Projected for 2025- Source: IHS Global Insight

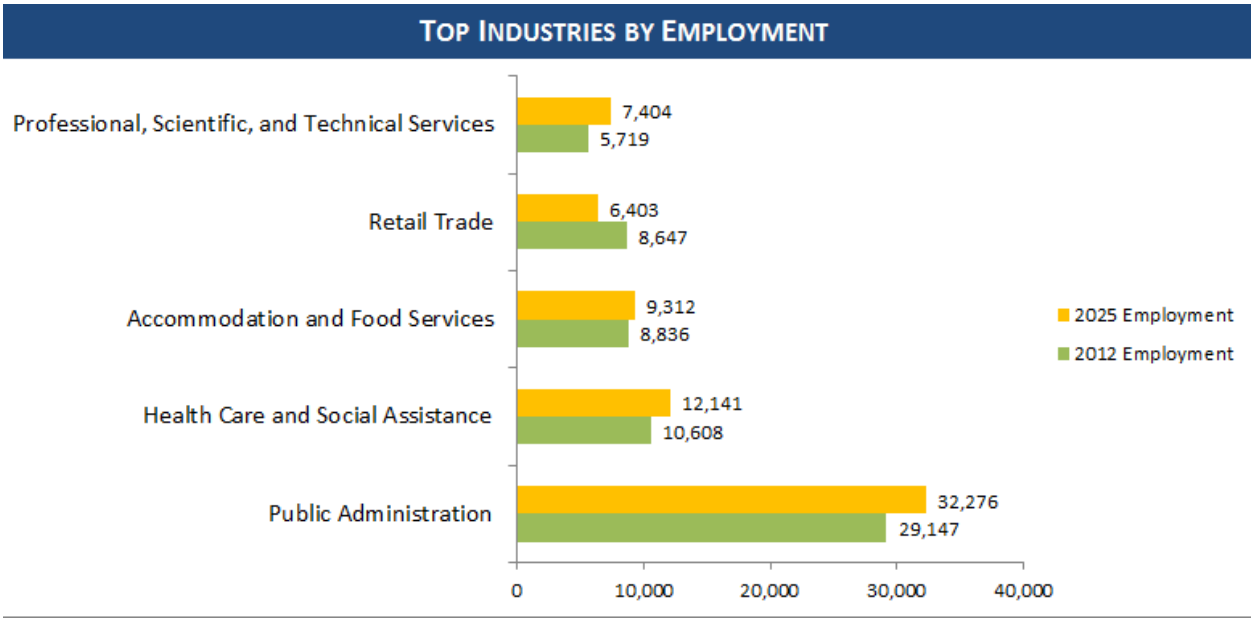


Table 9 shows the changes in employment from Figure 8 as percentages. The highest expected increase in employment (by percentage) is expected to come from professional, scientific, and technical services, at 29 percent, while retail trade is expected to decrease by 26 percent.

Table 9: Forecasted Employment by Top Industries - Source: IHS Global Insight

Industry	2012	2025	Change
Public Administration	29,147	32,276	11%
Health Care and Social Assistance	10,608	12,141	14%
Accommodation and Food Services	8,836	9,312	5%
Professional, Scientific, and Technical Services	5,719	7,404	29%
Retail Trade	8,647	6,403	-26%
Administrative, support, Waste Management, and Remediation Services	5,106	5,872	15%

The region's fastest-growing industries in terms of employment are shown in Table 10 below. Among the region's fastest-growing industries, only Professional, scientific, and technical services is also within the list of employers that account for the highest percentage of the region's jobs. Transportation and warehousing, Utilities, and Construction are the freight-dependent industries on the list. Information is knowledge-based, and the rest are local-serving. As such, the highest growth industries in the region are split across all three sectors.

Table 10: Highest Growth Industries by Projected 2025 Employment

Industry	2012	2025	Change
Transportation and Warehousing	878	1,335	52%
Arts, Entertainment, and Recreation	1,443	2,055	42%
Real Estate and Rental and Leasing	954	1,242	30%
Professional, Scientific, and Technical Services	5,719	7,404	29%
Utilities	62	80	29%
Construction	4,046	5,186	28%
Information	2,296	2,940	28%
Finance and Insurance	2,568	3,237	26%

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in Charlottesville-Albemarle such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for Charlottesville-Albemarle:

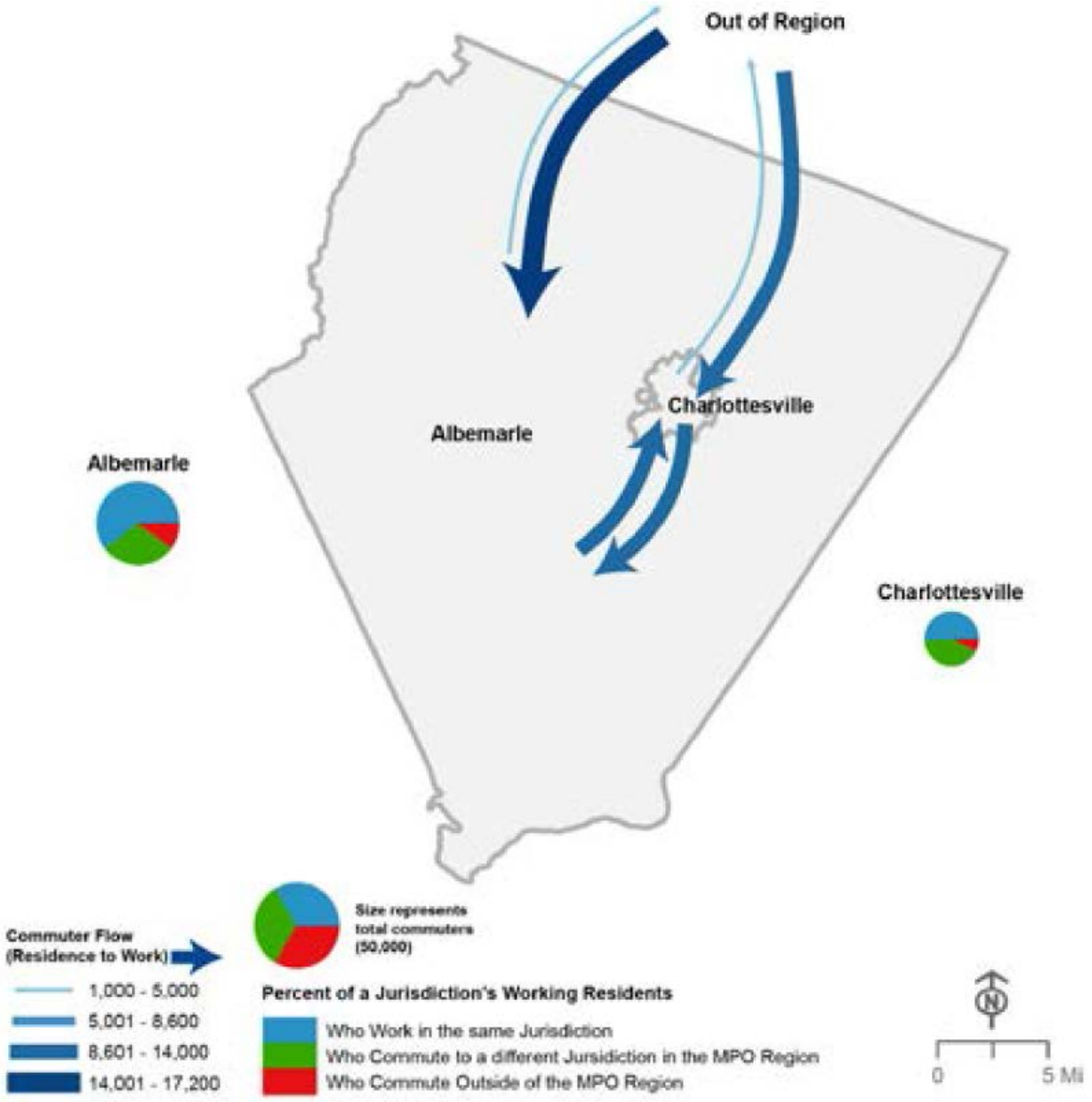
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

The map in Figure 11 summarizes commuting patterns within and among the localities in the Charlottesville region. In Charlottesville City, approximate half of commuters stay within the City, while a majority of those remaining commute to locations in Albemarle County. Only a very small percentage of Charlottesville City residents commute to locations outside of Albemarle County. Nearly two-thirds of Albemarle County residents stay within the County in commuting to their work locations, while most of those remaining commute to Charlottesville City (the only other jurisdiction within the region). A small portion of Albemarle County residents commute outside the region for work. Over 20,000 people commute from outside the region into Charlottesville City and Albemarle County for work.

Figure 11: Regional Commuting Patterns

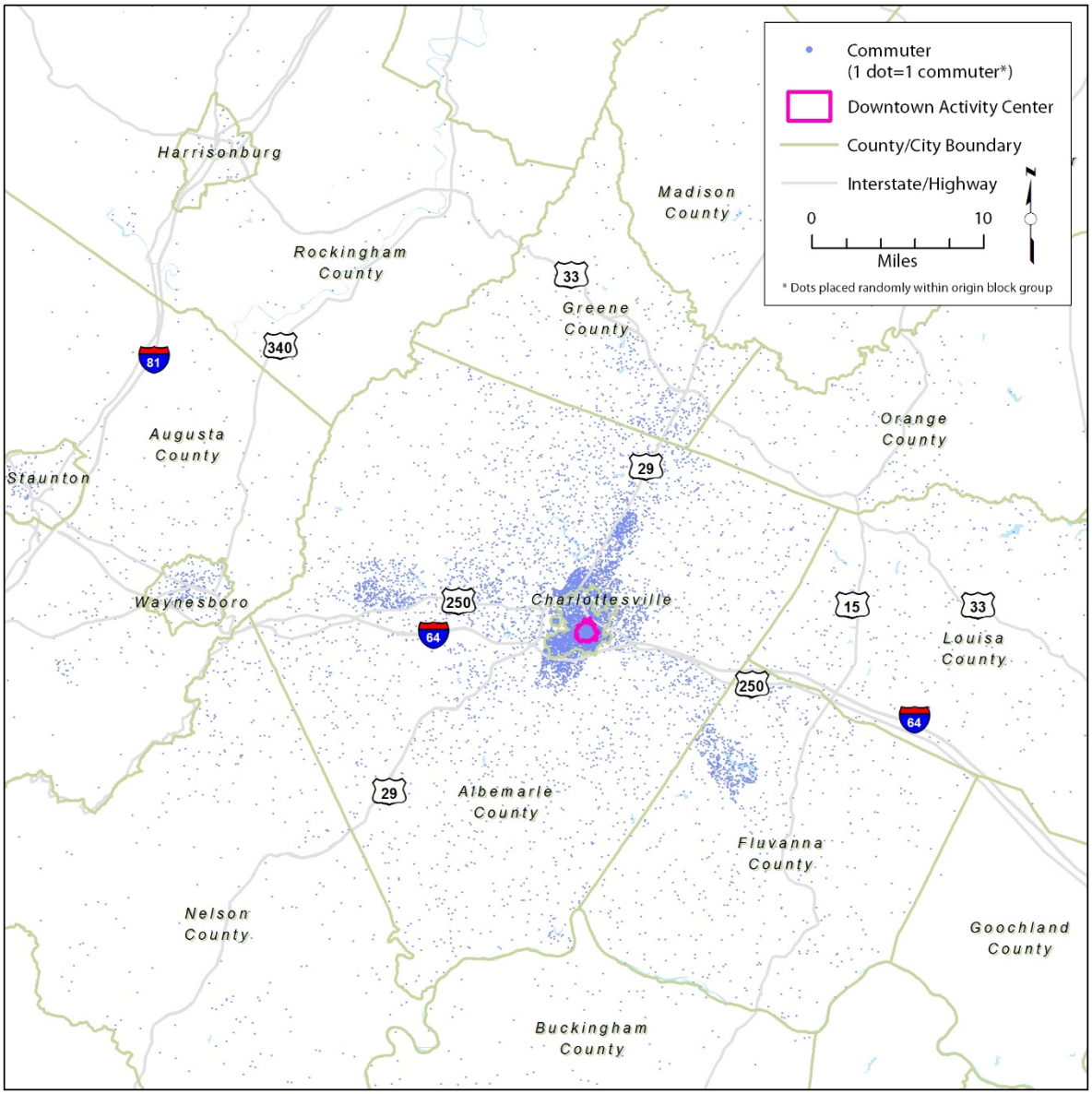


Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Charlottesville-Albemarle Region was the analysis of commuting patterns between activity centers. Figure 12 through Figure 15 provide insights into the commuting patterns for four of the activity centers in the region. Each purple dot on these maps represents a single commuter who travels into the activity center of interest (outlined in magenta) for work.

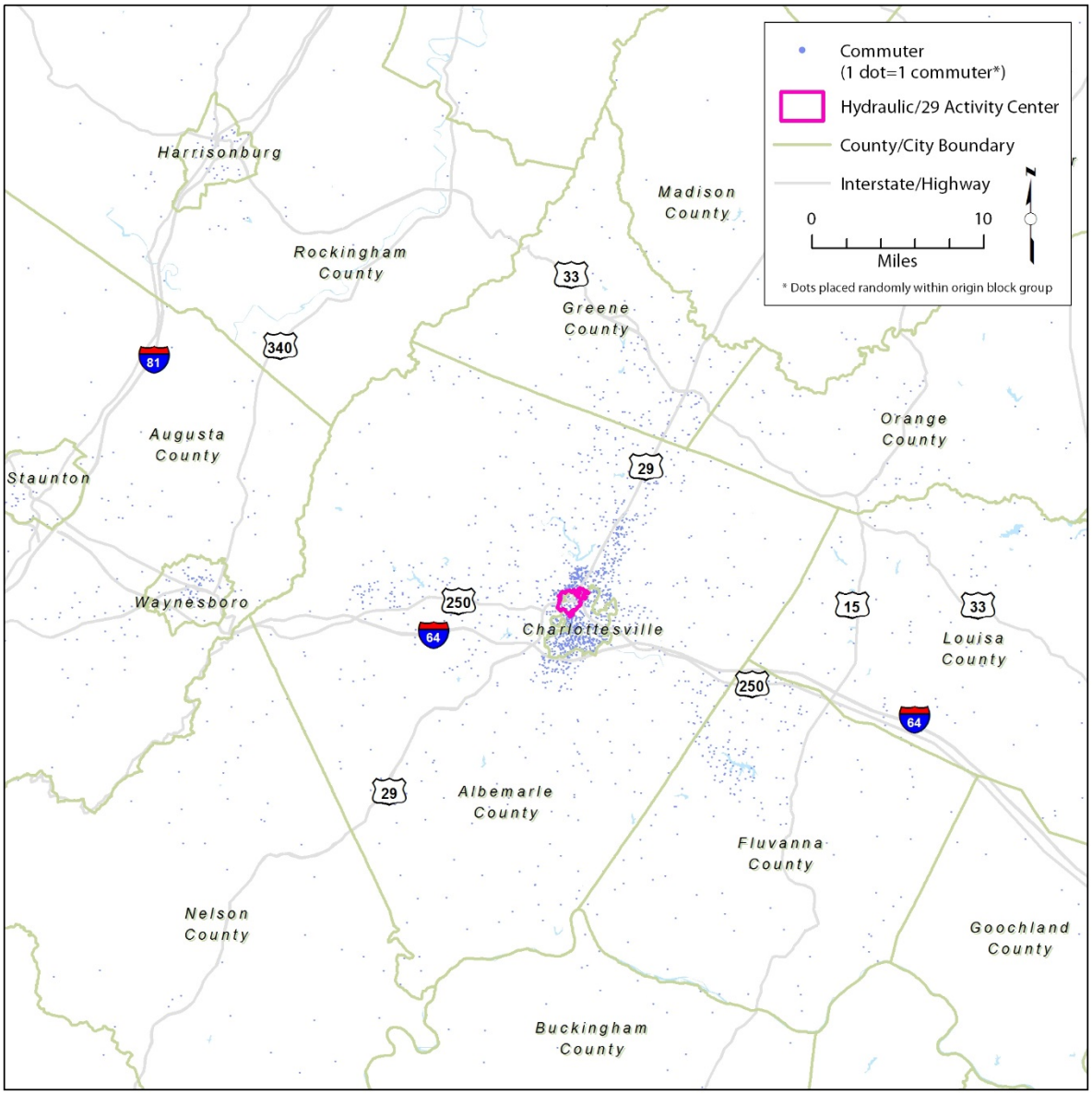
As shown on the map below (Figure 12), downtown Charlottesville sees a significant number of commuters from within the activity center and from other locations in Charlottesville City and Albemarle County. Smaller but still significant numbers of workers commute in from the surrounding jurisdictions, particularly Greene County, the Cities of Staunton and Waynesboro, and Fluvanna County.

Figure 12: Commuting Patterns to Downtown Charlottesville Activity Center. Source: LEHD



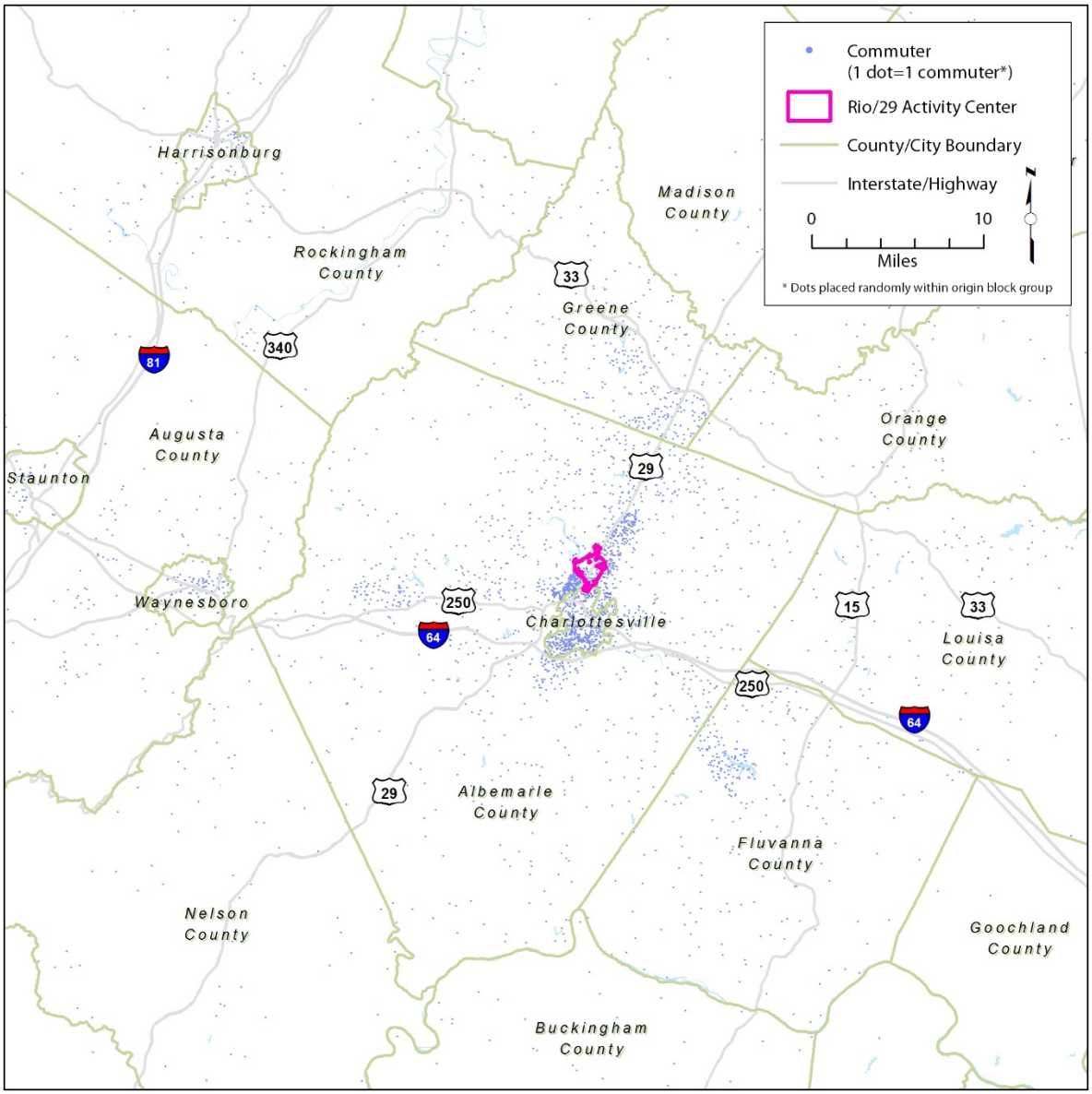
As shown in Figure 13, commuters into the Hydraulic/Route 29 activity center come primarily from locations within Charlottesville City, as well as Albemarle County. Additional clusters of commuters into the activity center are located in the Cities of Waynesboro and Harrisonburg, and Greene and Fluvanna Counties.

Figure 13: Commuting Patterns to Hydraulic/Route 29 Activity Center. Source: LEHD



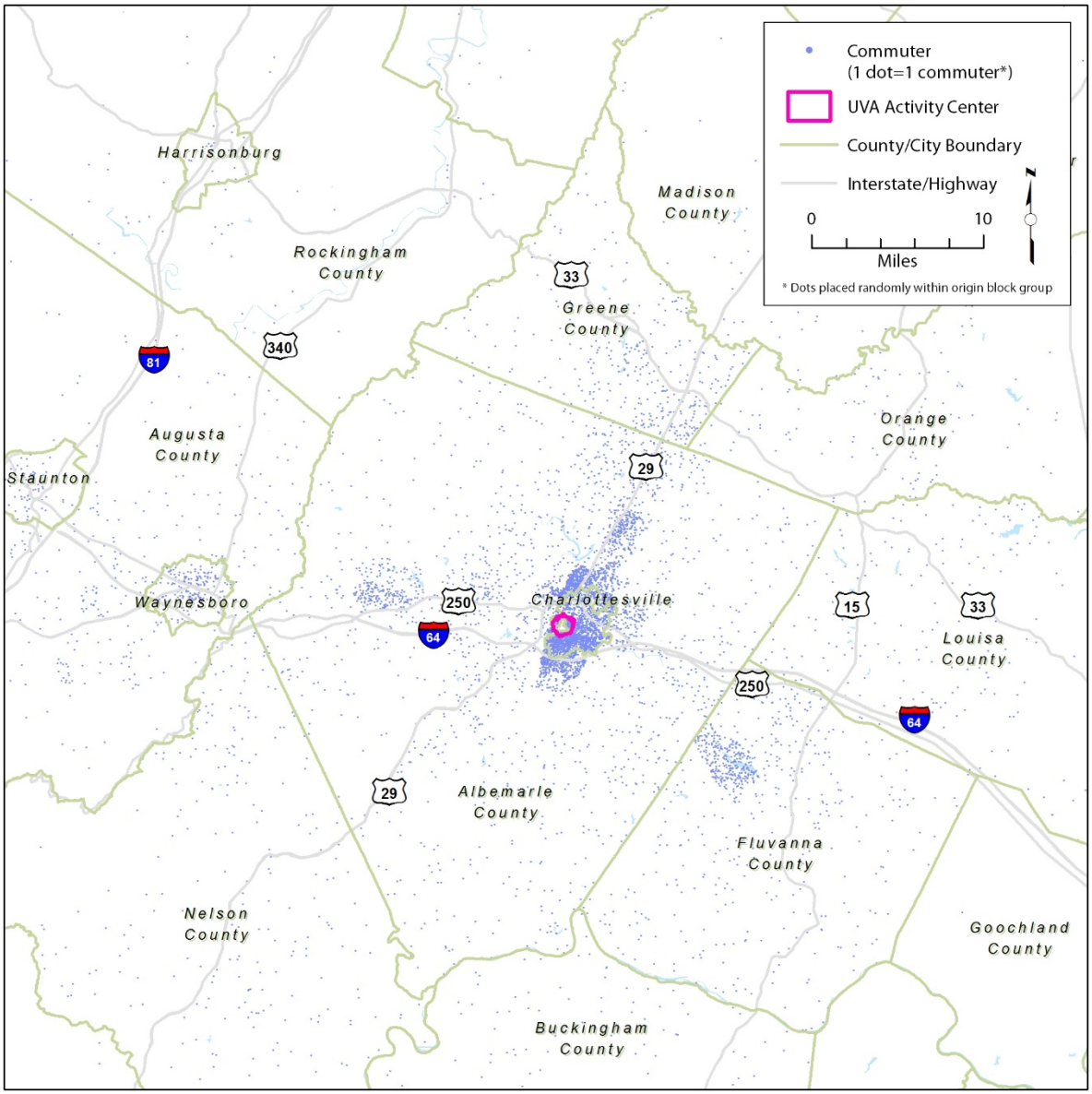
The Rio/Route 29 activity center receives the most commuters from Charlottesville City. Clusters of commuters also come in from Albemarle County, Greene County, Fluvanna County, and the City of Waynesboro. Smaller numbers of commuters travel in from the other surrounding jurisdictions, as shown in Figure 14.

Figure 14: Commuting Patterns to Rio/Route 29 Activity Center. Source: LEHD



The concentration of commuters into the UVA activity center from within the City of Charlottesville is particularly high. Additional clusters of commuters traveling in are located in Albemarle County (along Route 29 north and from the area around Crozet) and Waynesboro, Greene County, and Fluvanna County.

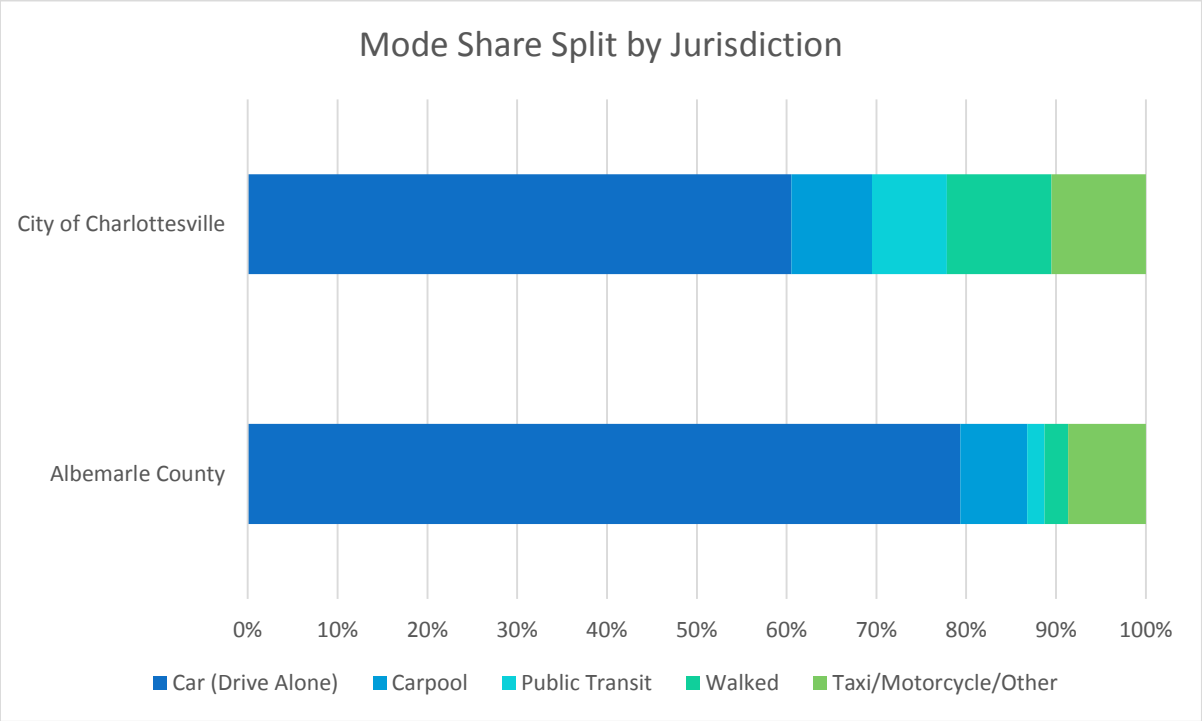
Figure 15. Commuting Patterns to UVA Activity Center. Source: LEHD



Mode Choice

In the Charlottesville-Albemarle, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 61% and 79% of the time. For Albemarle County, commuting by taxi/motorcycle/other is the second most popular option, accounting for 9% of the mode share. For the City of Charlottesville, walking is the second most popular option, accounting for 12% of the mode share. Public transit use is highest in the City of Charlottesville, which has the most robust transit system in the region. (Refer to Figure 16).

Figure 16: Mode Share Split by Jurisdiction. Source: ACS 2013 5-Year Estimates



Average Commute Times

As shown in Table 11, in the Charlottesville-Albemarle Region, average commute times range from 16 to 21 minutes among the various jurisdictions. Due to its density and proximity to employment centers, the City of Charlottesville has the shortest average commute, which is about four minutes shorter than the average for Albemarle County. Compared to other areas in Virginia, both of these averages are relatively low.

Table 11: Mean Commute Time by Jurisdiction. Source: ACS 2013 5-Year Estimates.

Jurisdiction	Mean Commute Time (Minutes)
Albemarle County	20.6
City of Charlottesville	16.4

Commutes of over 45 minutes are uncommon in the Charlottesville-Albemarle Region. Albemarle County has the highest percentage of workers who commute over 45 minutes at 7 percent, which is almost twice as high as the City of Charlottesville's rate of long commutes. (Refer to Figure 17).

Figure 17: Percent of Commutes Long than 45 Minutes. Source: ACS 2013 5-Year Estimates.

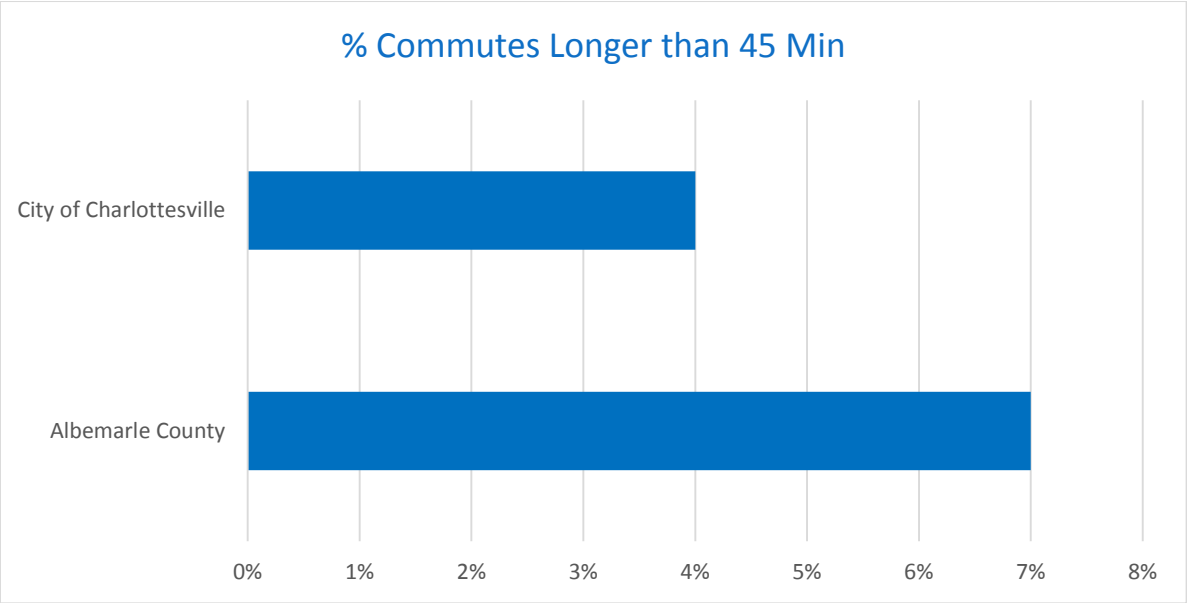
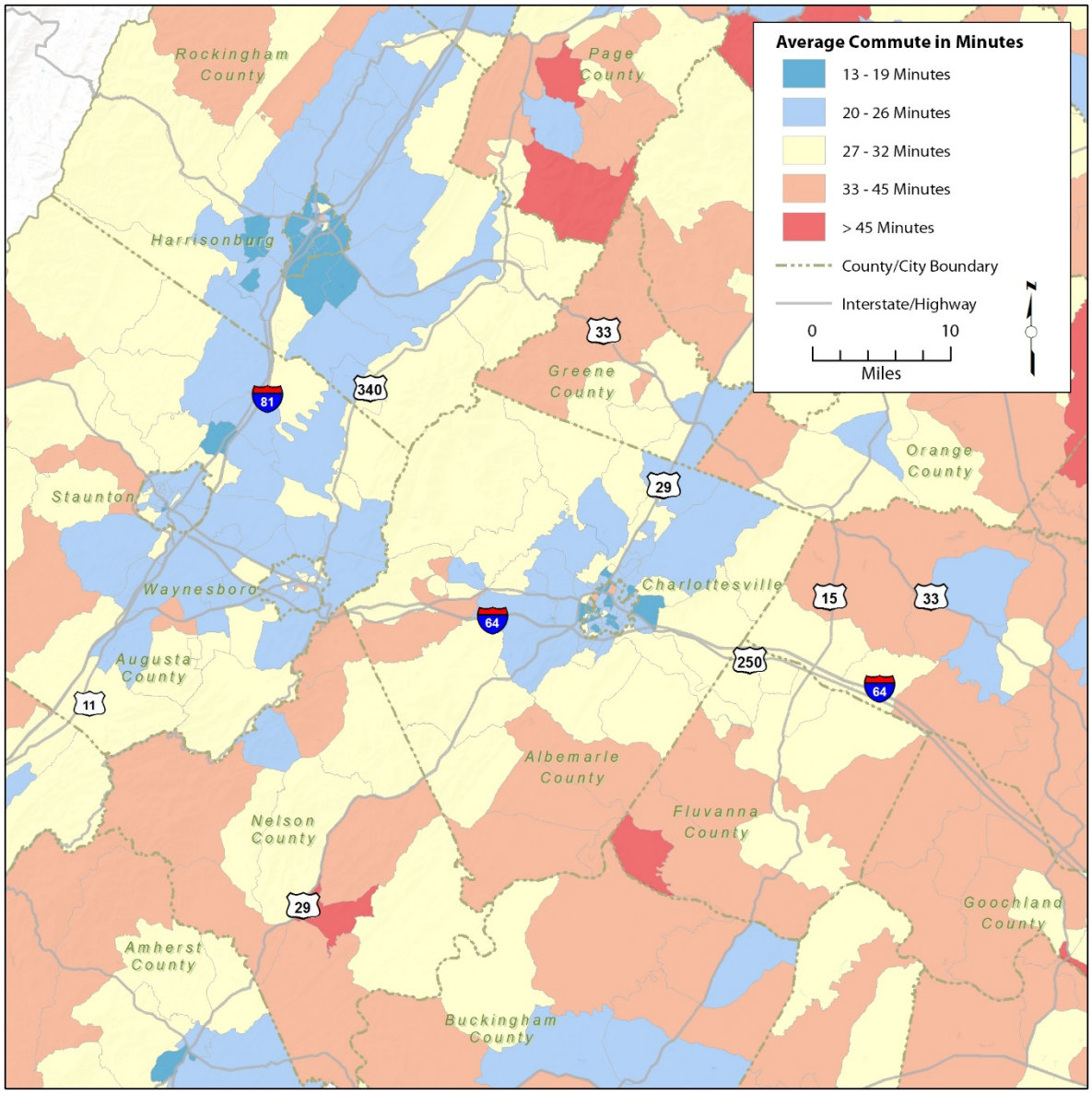


Figure 18 provides a closer look at where longer commutes originate. Unsurprisingly, commute times are the lowest close to employment centers in Charlottesville, as well as Harrisonburg and Waynesboro/Staunton (which are outside the region). As noted above, commute times longer than 45 minutes are uncommon, which results in a positive impact on quality of life.

Figure 18: Charlottesville-Albemarle Commute Times. Source: ACS 2013, 5-Year Estimates.



C. Accessibility to Employment

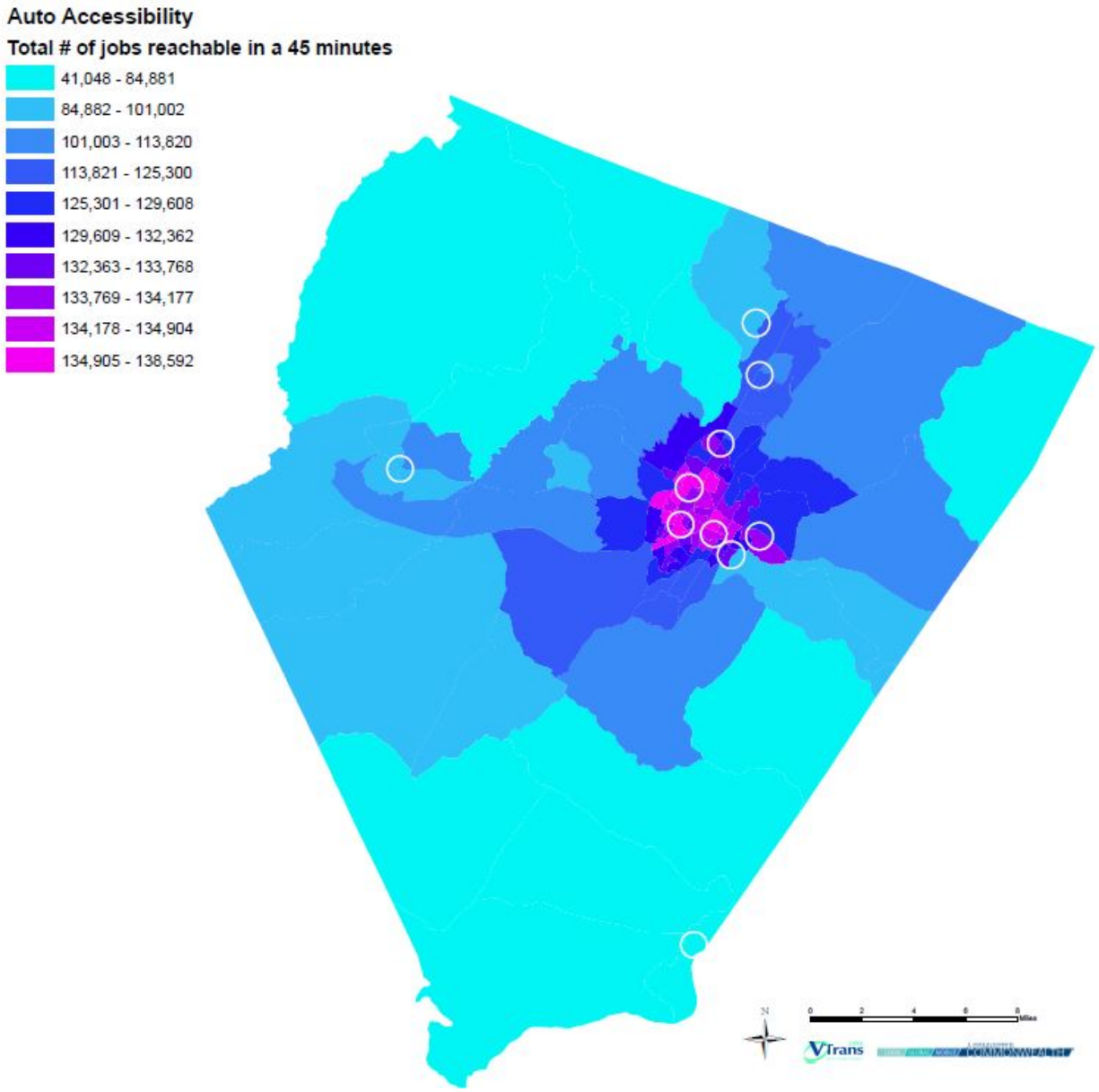
As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Charlottesville-Albemarle area is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. Unsurprisingly, as shown in Figure 19,

the areas with the highest level of auto accessibility exist in and around the City of Charlottesville. Auto accessibility to jobs decreases as one moves to the outer parts of the county, particularly to the north and south, with the exception of the areas along Route 29 going north out of Charlottesville. In the "least auto accessible" areas in the county, residents still have access to car to between 41,000 and 85,000 jobs.

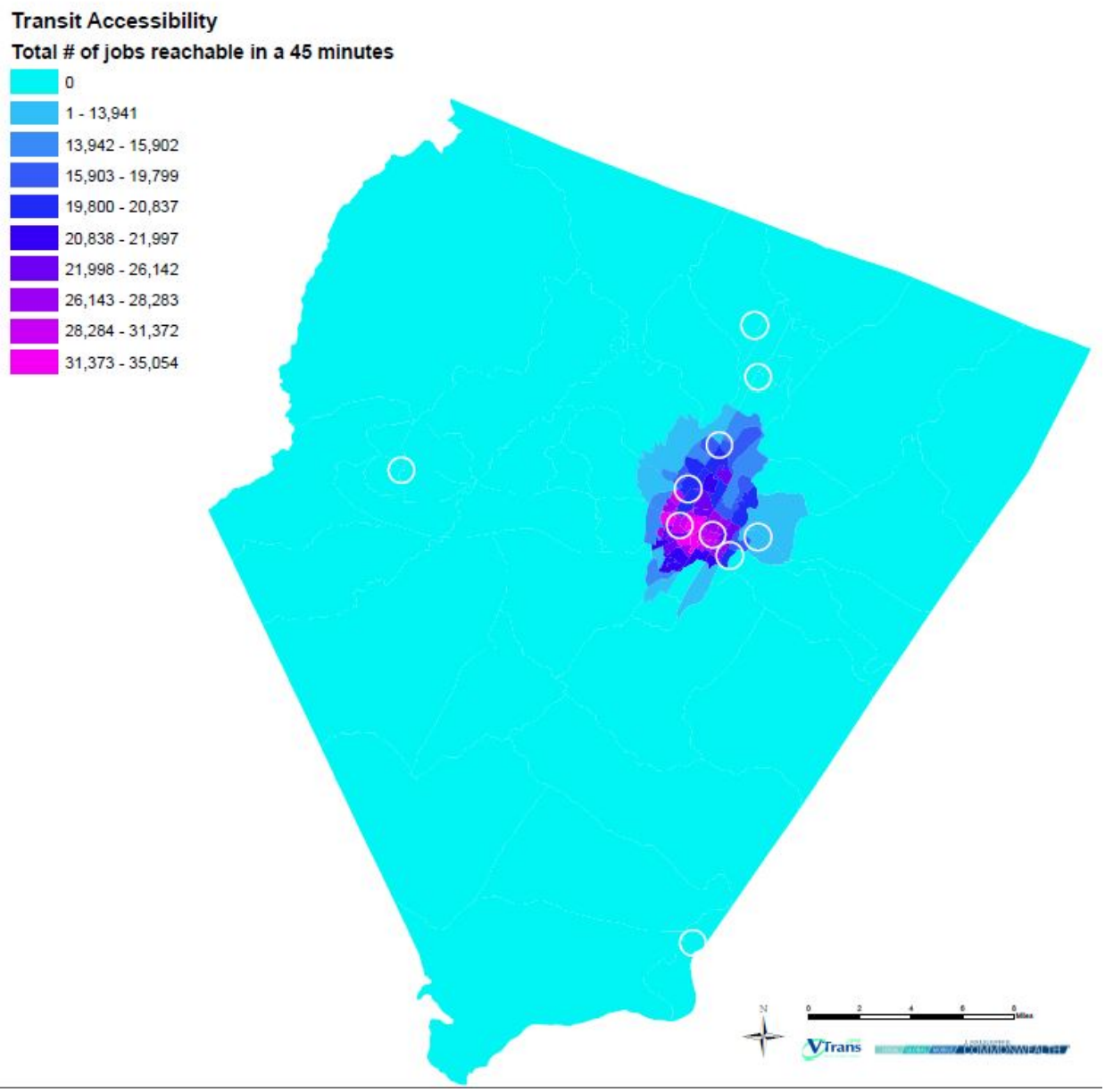
Figure 19: Auto Accessibility



Transit Accessibility

Outside of the City of Charlottesville, there are few fixed-route transit options, which is reflected in the number of jobs that can be reached by transit within 45 minutes being zero in many areas in Albemarle County. Many activity centers in the north of the County and near Crozet have no viable transit options for getting to employment locations. As shown in Figure 20, in the highest scoring areas, residents can reach over 35,000 jobs within a 45-minute transit trip.

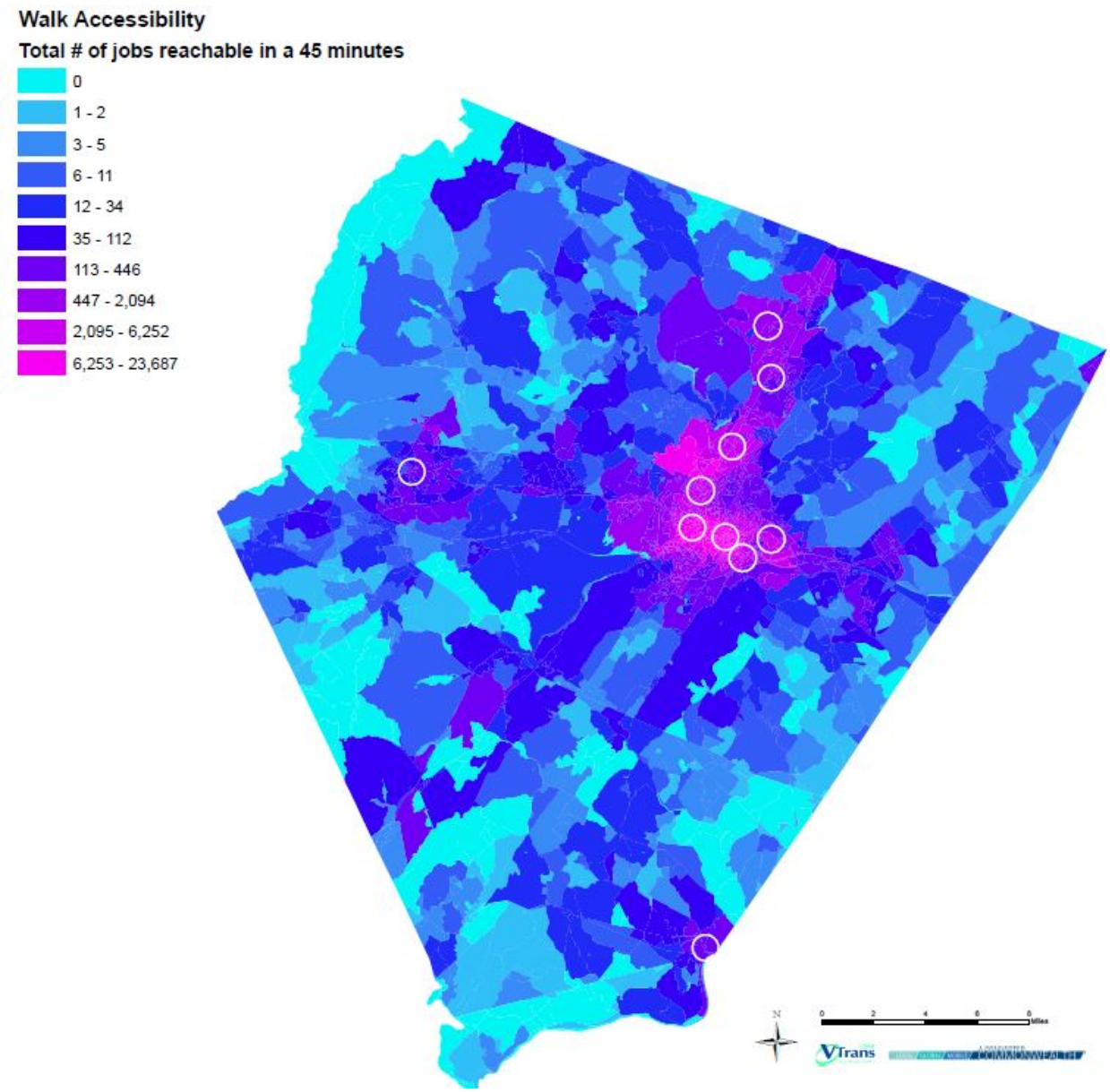
Figure 20: Transit Accessibility



Walk Accessibility

Walk Accessibility is largely determined by the mix of land use and density of development surrounding the origin of each trip. Charlottesville City, some areas on both sides of Route 29 north of the City, and Crozet have the highest walk accessibility, giving pedestrians access to up to 23,680 jobs. Walk accessibility is lowest on the edges of Albemarle County, as well as additional locations where no employment exists within walking distances of residential areas.

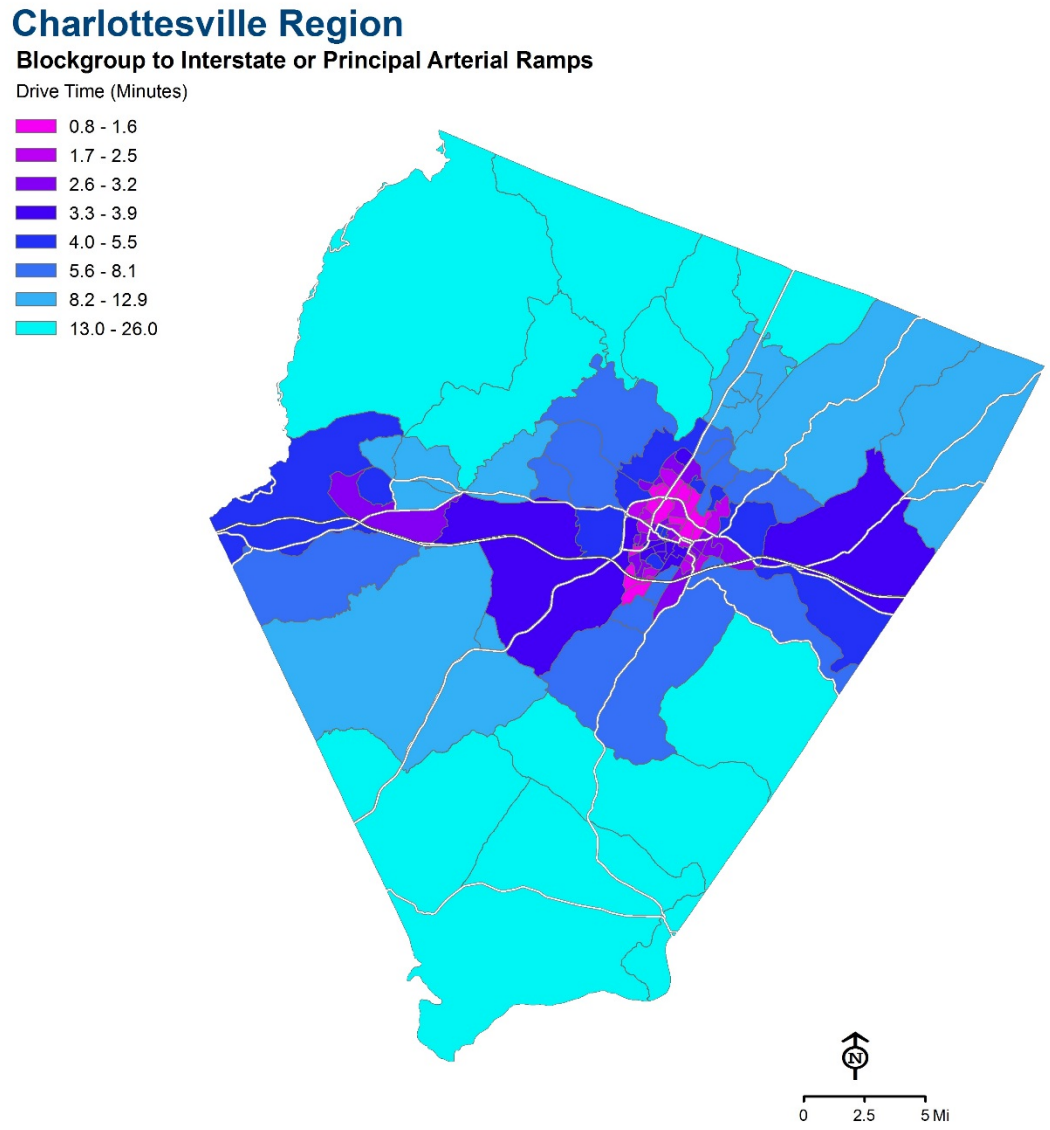
Figure 21: Walk Accessibility



Freight Accessibility

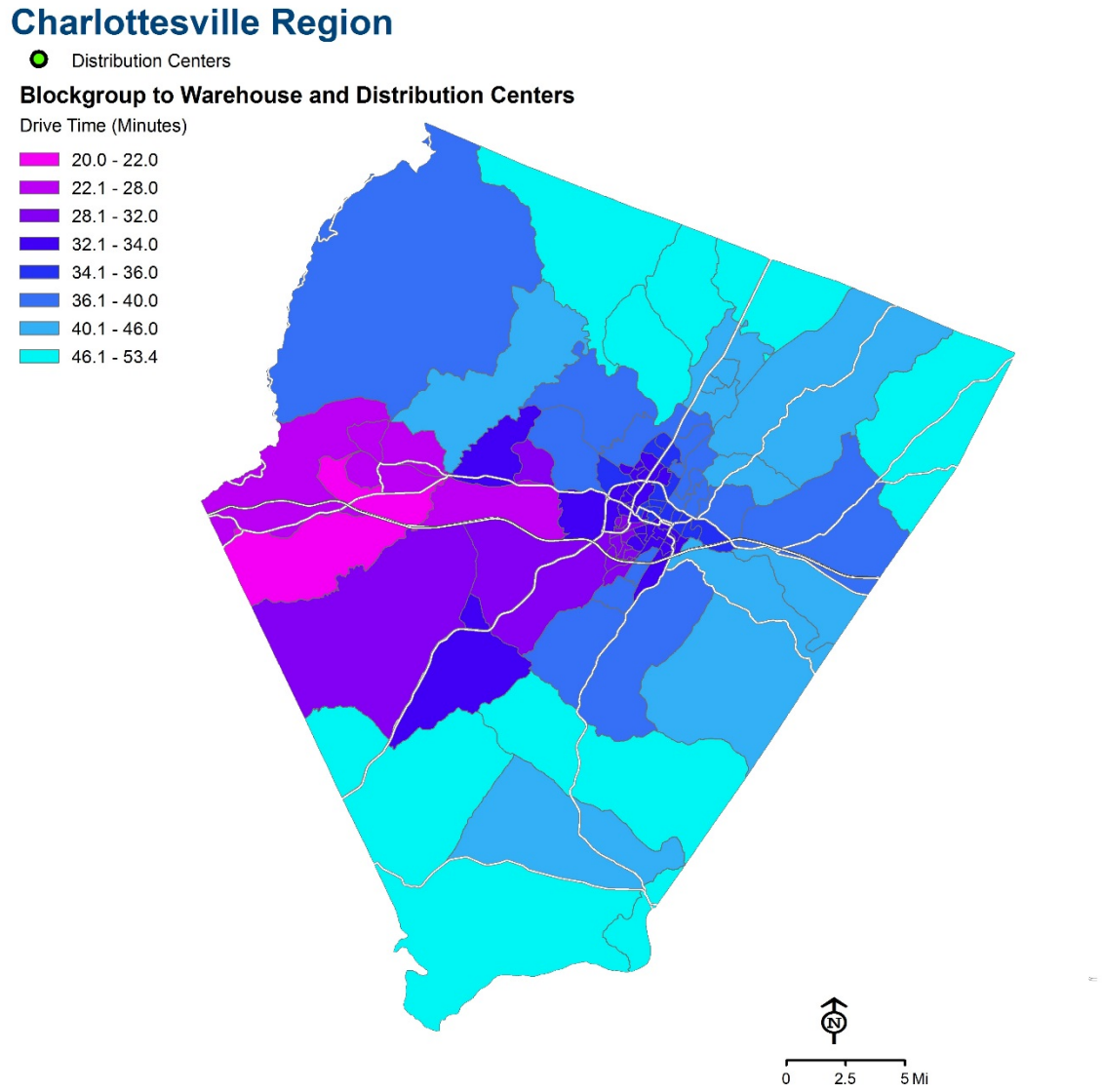
I-64 is the only Interstate that runs through the Charlottesville-Albemarle region. As such, accessibility to interstate and principal arterial ramps is highest in an east-to-west band that runs along I-64. As shown in Figure 22, areas in the north and south of the county are between a 13- and 26-minute drive from the nearest ramp. Most activity centers in the region, however, are within a 13-minute drive to the interstate.

Figure 22: Access to Interstate and Principal Arterial Ramps



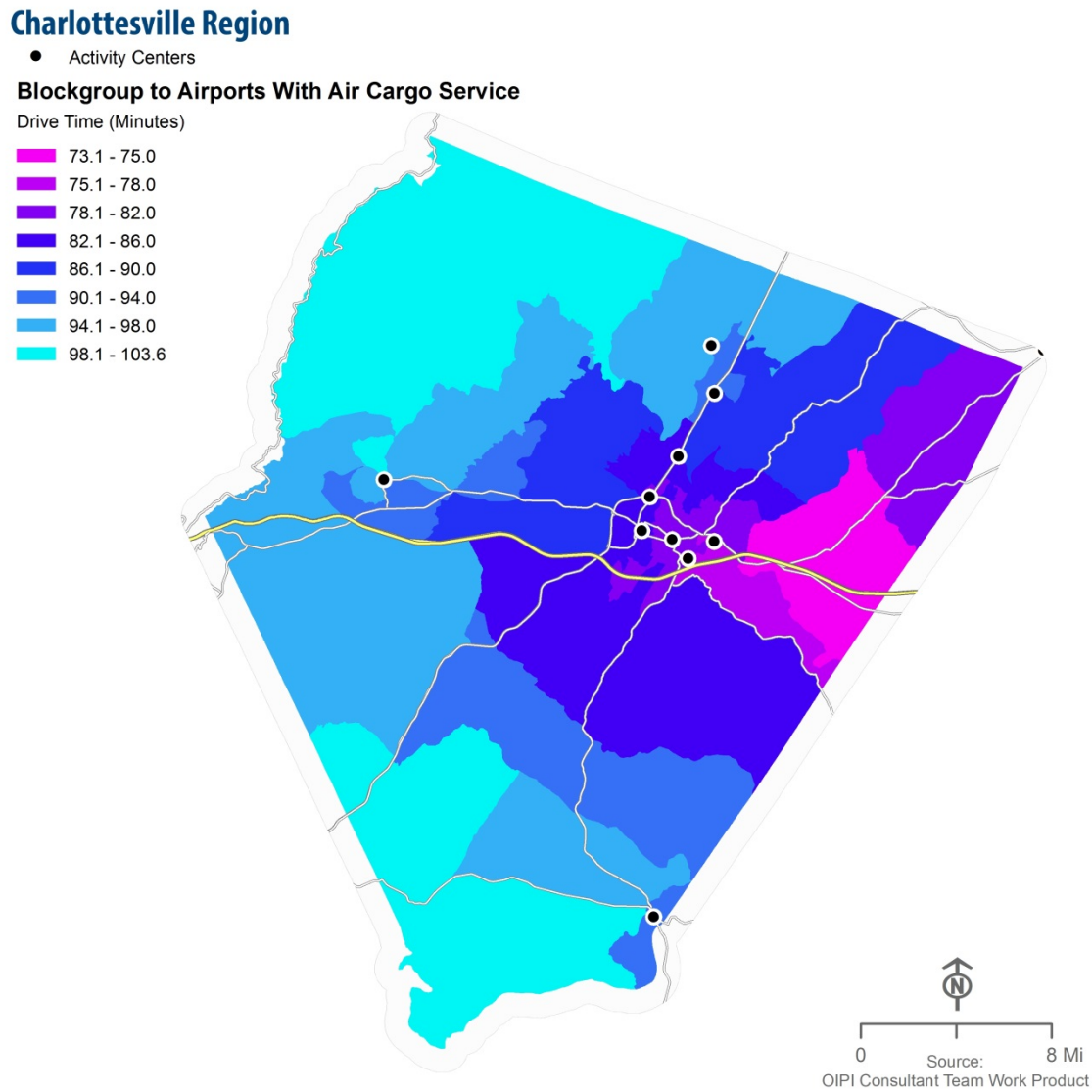
The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Figure 23 shows that most warehouses and distribution centers in the Charlottesville-Albemarle region are clustered along I-64 and US-250 in the western part of Albemarle County. There are no warehouse and distribution centers in the southern and northeastern parts of the County, resulting in driving times of up to 53 minutes to reach the nearest warehouses or distribution centers.

Figure 23: Access to Warehouses & Distribution Centers



Richmond International Airport, which is approximately 80 minute away from Downtown Charlottesville, is the closest major airport that handles significant quantities of freight. Unsurprisingly, the areas in the region to the east, closest to Richmond, have a shorter travel distance to the airport, as shown in Figure 24.

Figure 24: Access to International Airports



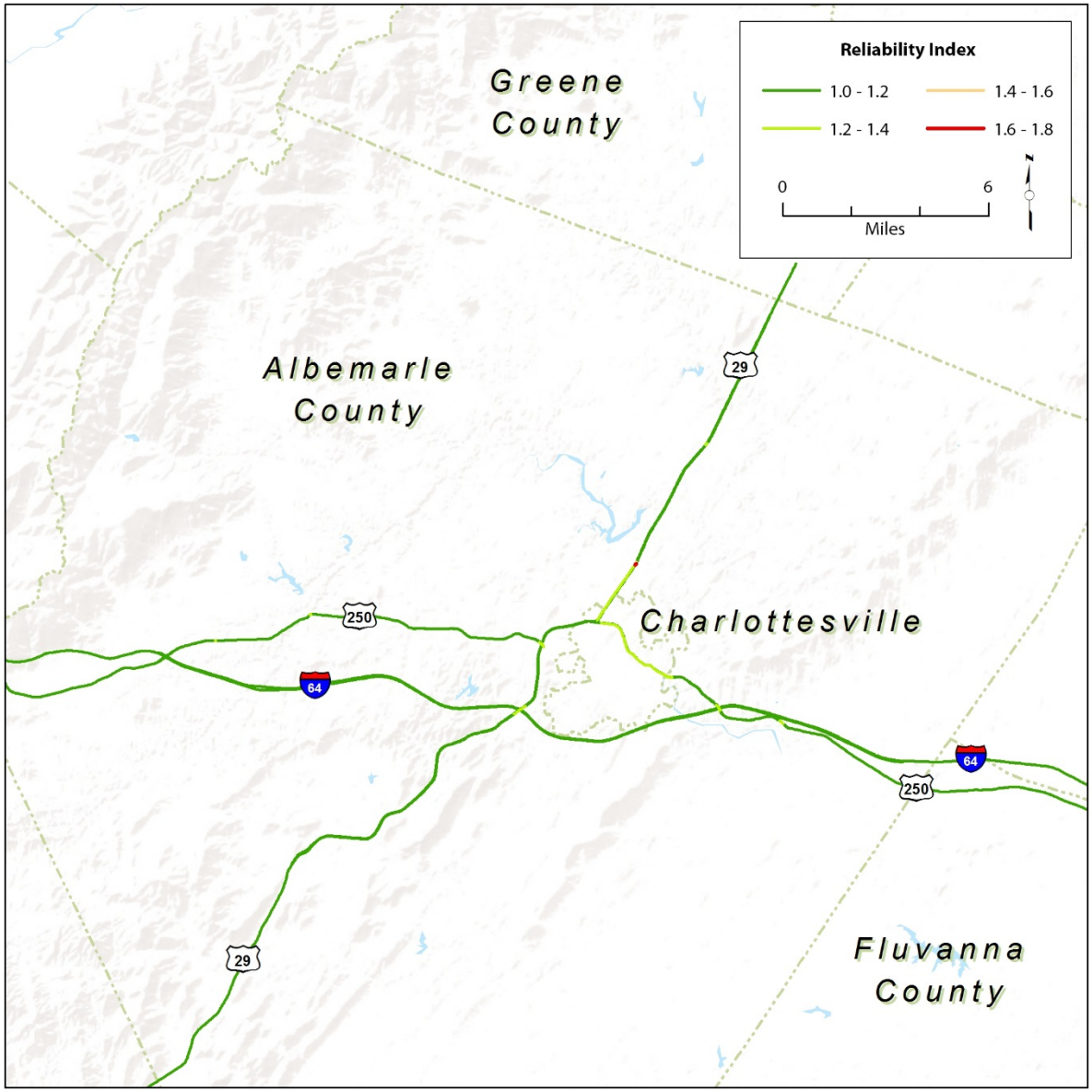
D. Roadway Measures

This assessment identified the transportation conditions in Charlottesville-Albemarle based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability (TTR) measures the frequency by which trips along a specified corridor are significantly delayed (Figure 26). Peak period[5] TTR is calculated the ratio of median speeds to the 90th percentile speeds. A higher the TTR score indicates that the network link is less reliable. TTR can be considered the additional time that might be required to travel across a roadway segment. For example, a trip segment with a ratio of 1.5 that normally takes 5 minutes to traverse during the peak could require an additional 2.5 minutes. In the Charlottesville region, reliability is quite good overall. There are some reliability issues along Route 29 north of Charlottesville City and on Route 250 going east from the intersection with Route 29 at The Meadows.

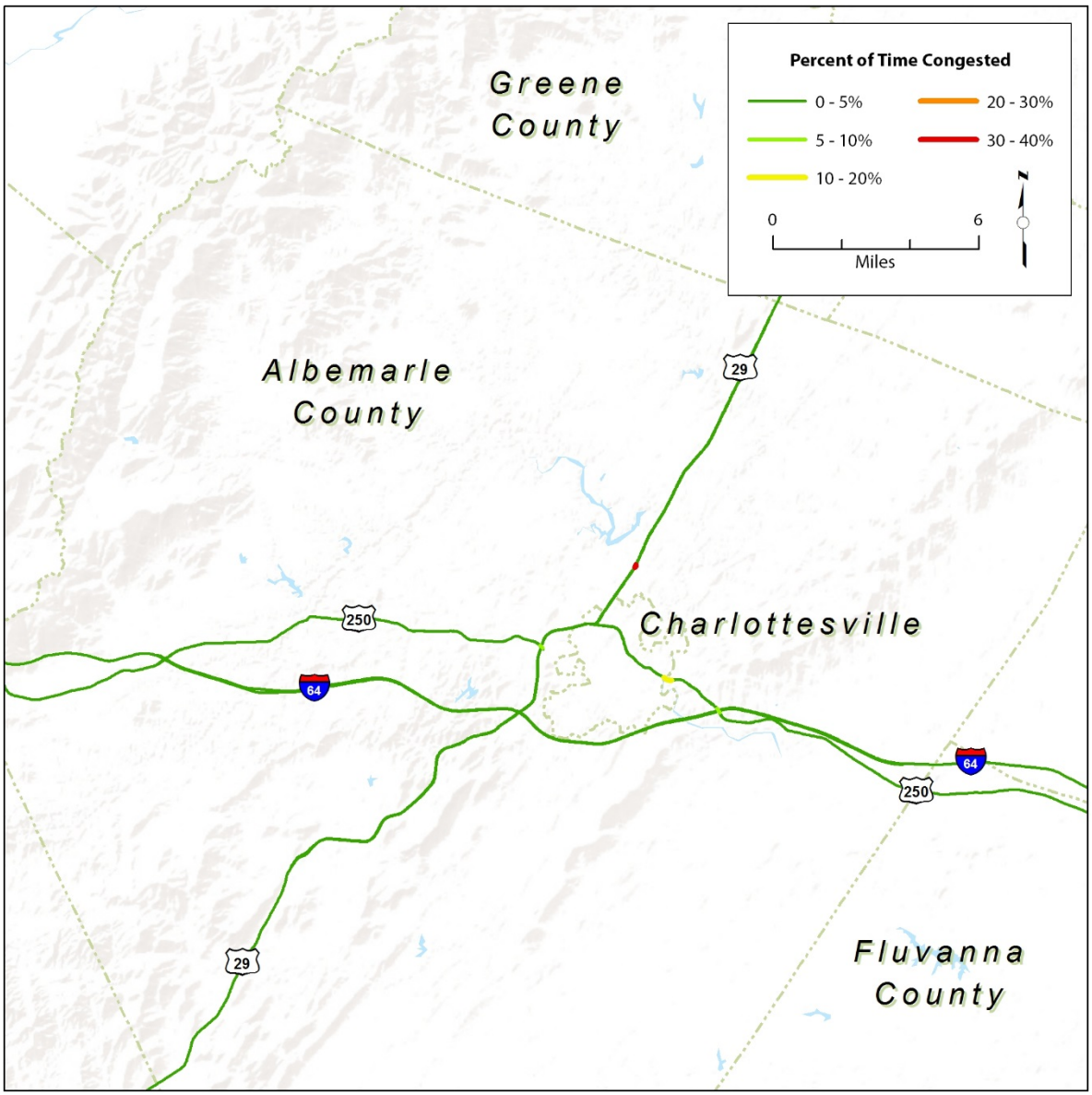
Figure 25: Travel Time Reliability



Percent of Time Congested

Figure 26 shows the AM and PM peak percent time congested. This represents the percentage of the time that a typical vehicle spends in significantly congested conditions. Significant congestion is defined as operating speeds below 50 percent of the free-flow speed. The free-flow speed is measured as the 85th percentile of overnight speed. In the Charlottesville region, there is relatively little peak period congestion, with the exception of the intersection of Route 29 with Route 631 (near the Albemarle Square Shopping Center) and at a few short points along Route 250 northeast of the City of Charlottesville.

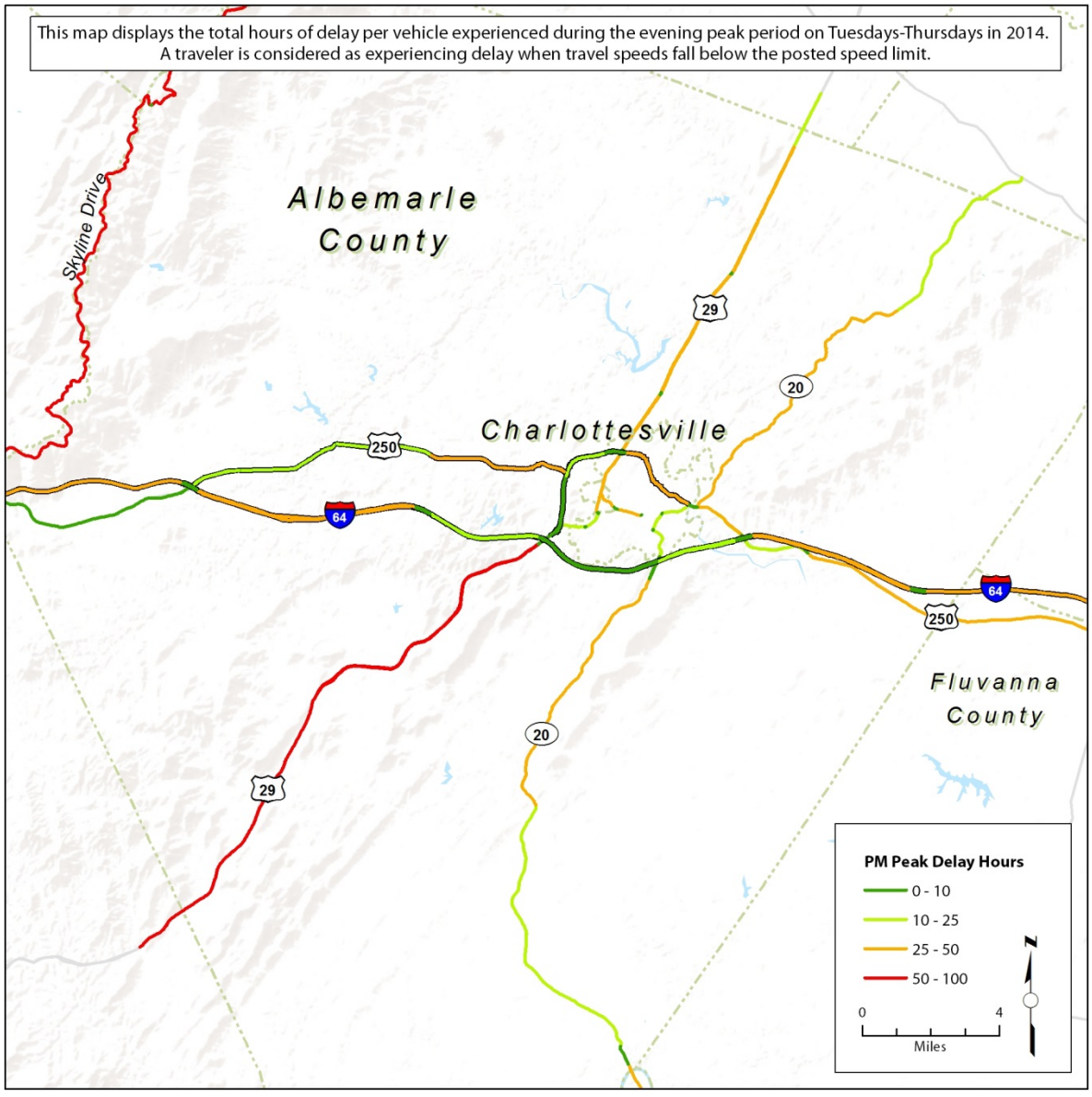
Figure 26: Percent of Time Congested



Travel Time Delay

Figure 27 shows total hours of delay per vehicle experienced during the evening peak period on Tuesday, Wednesdays, and Thursdays in 2014. A traveler is considered to be experiencing delay when travel speeds fall below the posted speed limit. It can also be thought of as delay per vehicle. Travel time delay is most severe on Route 29 south of Charlottesville City and on Skyline Drive. It is also problematic on Route 29 north of Charlottesville City and numerous segments on I-64, Route 250, and Route 20.

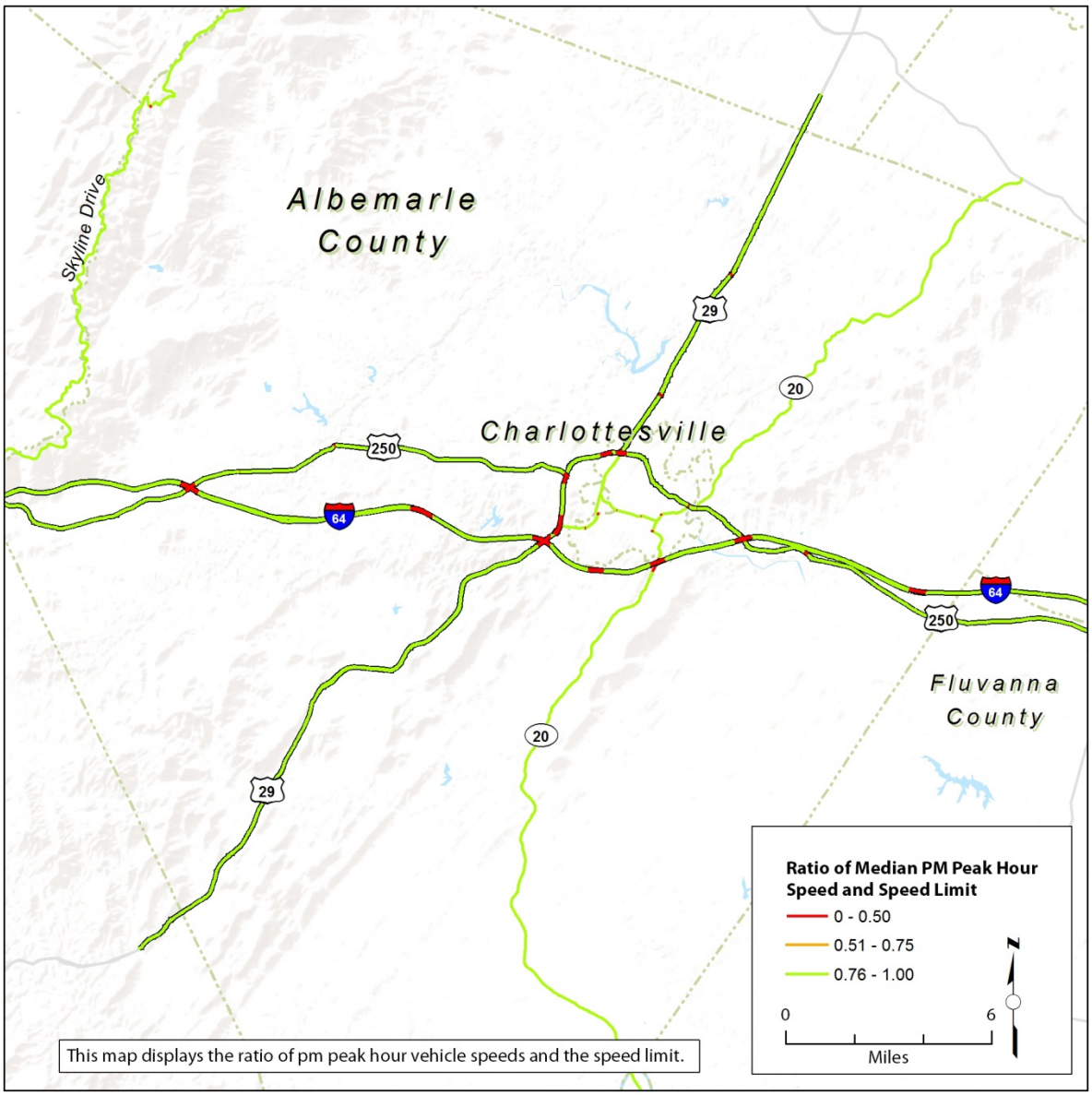
Figure 27: Travel Time Delay



Median Speeds

Figure 29 shows the ratio of evening peak hour vehicle speeds to the speed limit. Measuring median speeds evaluates typical conditions, while avoiding the undue influence of severe congestion events. If the median (50th percentile) is 30 miles per hour, for example, this means that half of all observations are above 30 miles per hour, and half are below 30 miles per hour. This map indicates that median evening peak speeds are generally at least three quarters of the speed limit, with the exceptions of some specific trouble spots along I-64 and Routes 250 and 29, particularly where they surround the City of Charlottesville and intersect with each other.

Figure 28: Median Speeds



D. Regional & Local Commodity Flows

An understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and into the Charlottesville-Albemarle region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss freight modal dependence of regional industries, as well as the top commodities moving into and out of the region by monetary value, geographic destination, and tonnage.

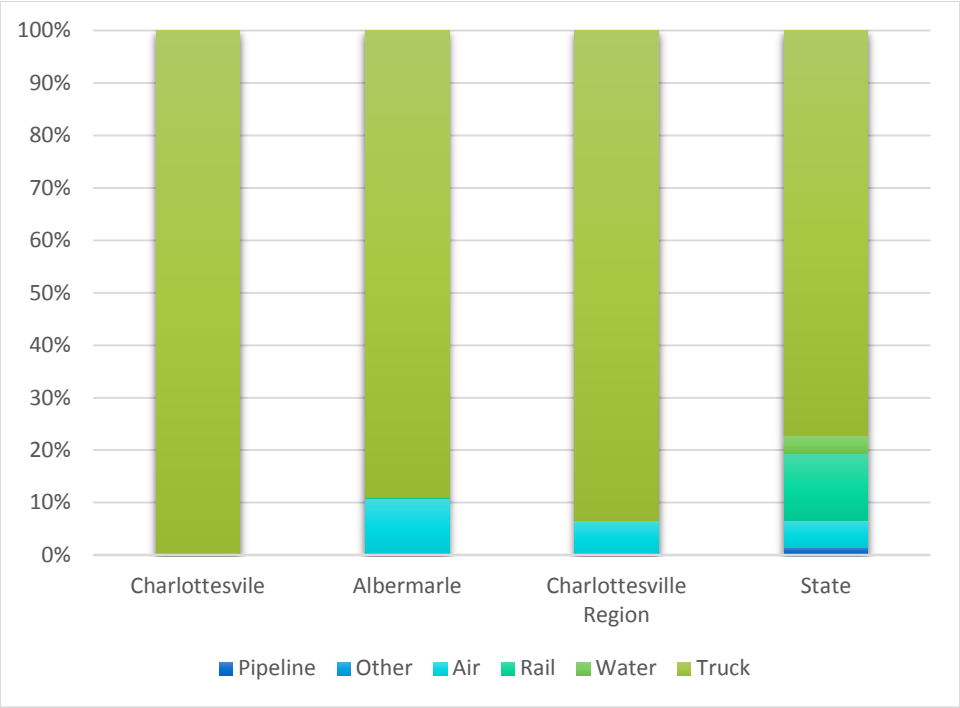
Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be dependent on freight, since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output.[5] In the Charlottesville Region, an average of 93 percent of the dollar value of all goods that are moved through the region are moved by truck. Air is the second most important mode, carrying around 6 percent of the total dollar value of goods. In comparison to the City of Charlottesville, Albemarle County is more dependent on air service, but overall throughout all jurisdictions in the region, trucks are the primary means of moving goods.

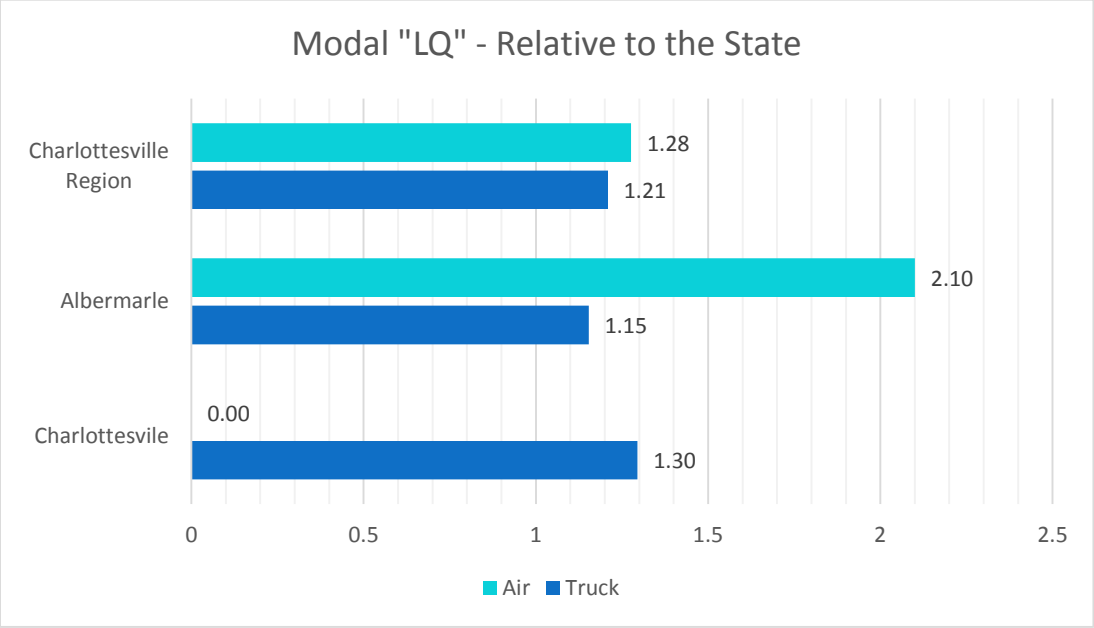
[5] Note that this approach is distinct from quantifying the dollar value of commodities moved by different modes. The relationship between commodities move and supported industry activity (as measured in output terms) is established by linking Transearch commodity flow data with input-output economic models.

Figure 29: Comparison of Freight Modal Dependence



Location Quotients by freight transportation mode are used to compare the prominence of freight modes between the region and the state as a whole (Figure 30). Industry activity, as measured by output, within the region is more dependent on both trucking and air as compared to the state as a whole. Albemarle County, in particular is dependent on air freight. The region does not depend at all on water or rail freight transport. Rail and water borne commodities tend to be bulky (with low value/volume ratios) and rail and water transportation have traditionally served industries that depend on bulk commodities (for either inputs or outputs or both) because these modes offer relatively low-cost transportation on a tonnage (ton-mile) basis. In general, the reliance of the Charlottesville-Albemarle region's industries on truck and air freight is consistent with an economy involved mostly in the production and use of higher-value commodities that require rapid and flexible shipments.

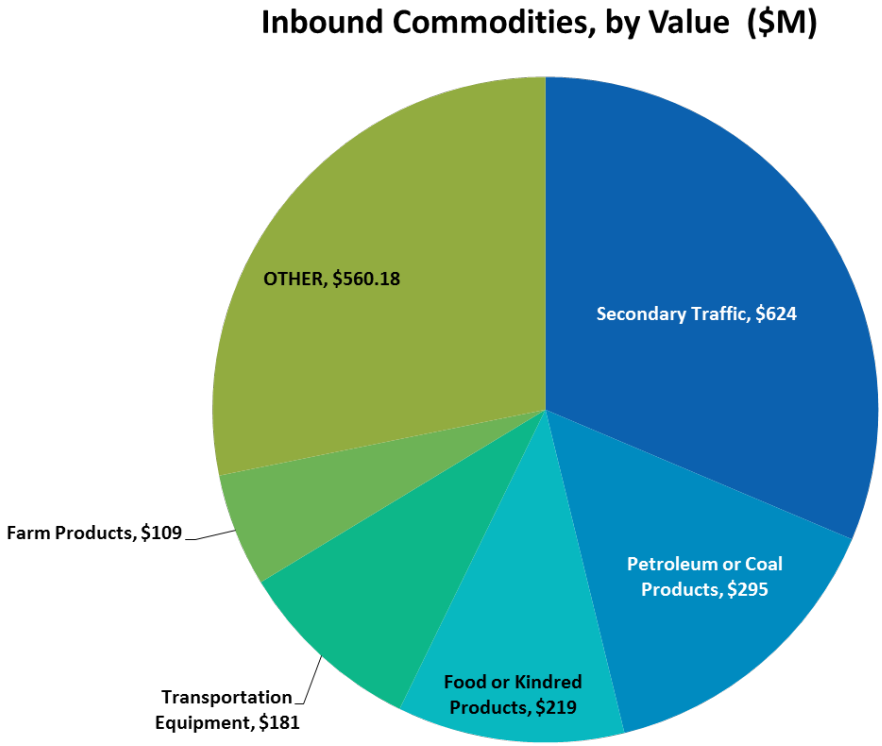
Figure 30: Location Quotient by Mode of Freight Travel

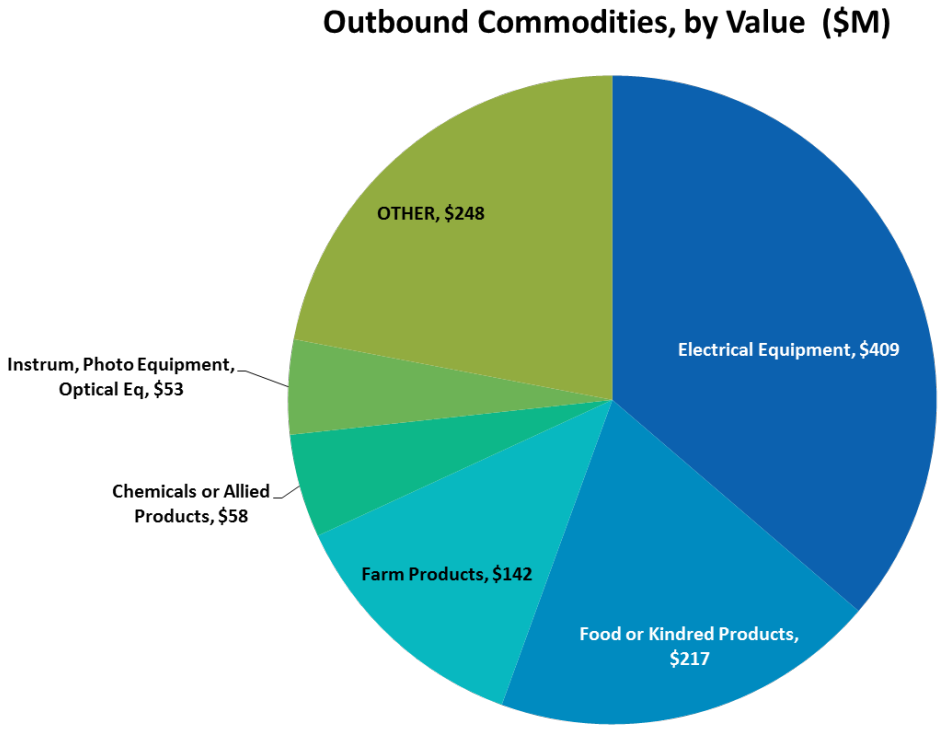


Top Commodities

The last section addressed freight modal dependence on the basis of industry output; this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. In total, approximately $2 billion of goods are brought into the Charlottesville region each year. As shown in Figure 31, Secondary traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) accounts for the largest share of freight value moving into the region. Other single categories of commodities that make up a large share of inbound quantity value are petroleum or coal products, food or kindred products, transportation equipment, and farm products. The “other” category of commodities, which makes u the second largest share, includes a variety of manufactured and agricultural products and natural resources (such as minerals). The largest outbound commodities by value include electrical equipment (approximately one third of the total), food or kindred products, farm products, chemicals or allied products, and instruments, photo and optical equipment. The “other” categories comprises approximately 20 percent of all outbound product value.

Figure 31: Top Freight Values by Commodities. Source: TranSearch, 2012





The Southeast and Mid-Atlantic regions, as defined by the Bureau of Economic analysis, are the most important destination for freight from the Charlottesville-Albemarle region. Additional receiving areas for the area's outbound freight include the northeast and Florida. Very few of the region's outbound products are destined for areas west of the Mississippi River, as shown in Figure 32.

Figure 32: Top Freight Values by Region. Source: TranSearch, 2012.

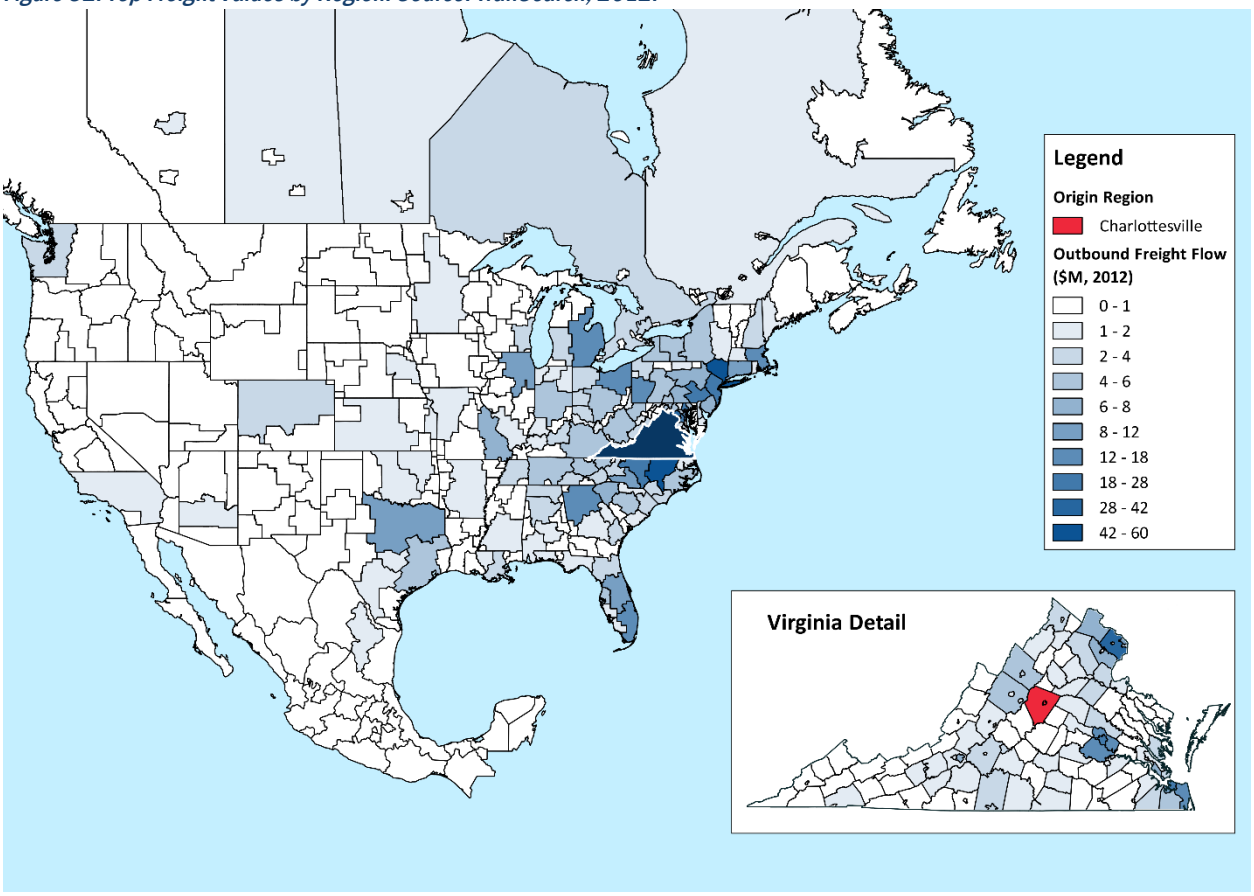
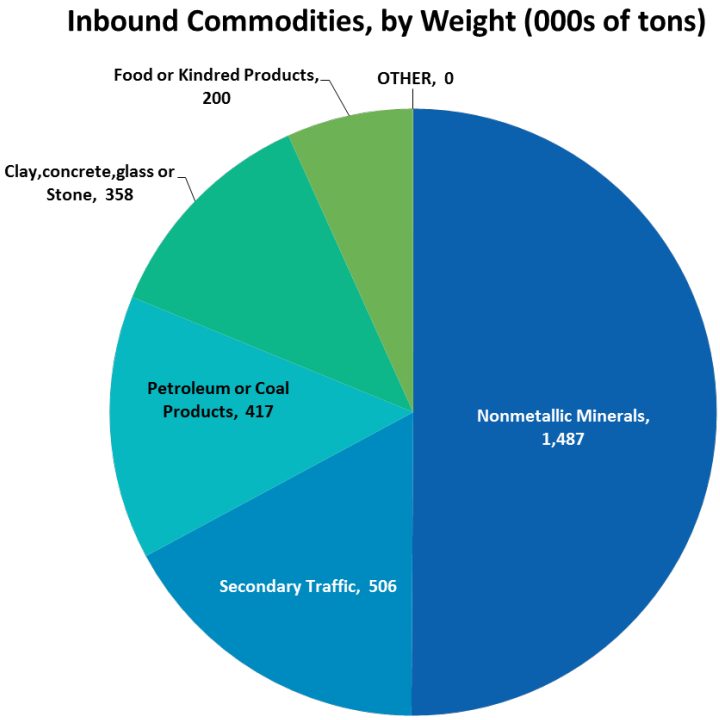
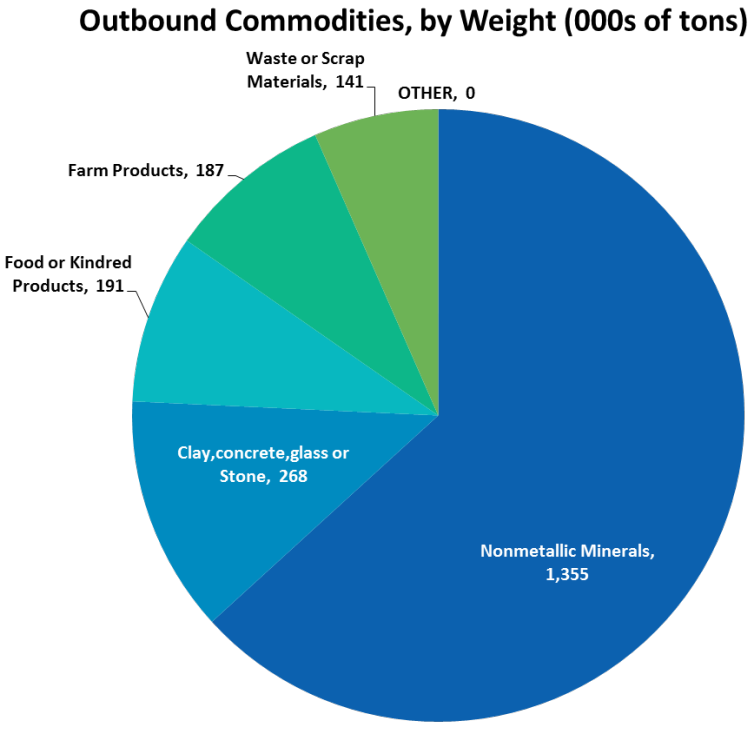


Figure 33 presents information on the top commodities moved into and out of the region based on their weight in tons. Consider freight movements in terms of tonnage provides a different perspective for transportation planning, as tonnage can serve as an indicator of likely wear and tear imposed on the transportation network by freight movement, while value relates most directly to economic activity. Non-metallic minerals, which have a relatively low value-per-ton, account for approximately half of the weight of inbound commodities and closer to two thirds of the weight of outbound commodities. Secondary traffic makes up a smaller by still significant share of inbound commodities by weight (vis-à-vis value), while the relative share of petroleum or coal products by value and weight are similar. Farm and food products both make up a significant share of outbound commodities by value and weight, although their shares of weight are lower.

Figure 33: Top Commodities by Weight





4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs are considered deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. The Needs have been categorized into a series of five very broad types of Capacity Needs (Corridor Reliability, Network Connectivity, Transportation Demand Management, Modal Choice, and Walkable and Bikeable Places). The Study Team assembled and described the Transportation Needs in each region with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, Table 12 outlines the key correlations between three broad industry sectors (local-serving, knowledge-based, and freight-dependent sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 12: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	3	3	3
Passenger Reliability	3	3	1
Bottleneck Relief	2	3	3
Freight Reliability	2	2	3
Freight Accessibility	1	2	3
Network Connectivity	3	2	1
Transportation Demand Management	1	2	2
Modal Choice	3	2	1
Transit Access	3	2	1
Active Transportation (Walk/Bike) Options	2	3	1
Walkable Places	2	3	1

Correlations:	
	3 = High Correlation to Transportation Need
	2 = Moderate Correlation to Transportation Need
	1 = Low Correlation to Transportation Need

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team

The table of correlations above was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Charlottesville-Albemarle Region, it showed relative stability in the distribution of output and employment across the three sectors, with both output and employment in the knowledge-based and local-serving sectors, respectively, to increase and decrease slightly. As outlined in the Economic and Transportation Correlation above, the top Transportation Needs of these two dominant sectors (local-serving and knowledge-based) include highway access, passenger reliability, bottleneck relief, network connectivity, modal choice, transit access, active transportation, and walkable places. Freight reliability and accessibility are of a relatively lower importance.

The forecasted growth in the knowledge-based economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge-based sector particularly point to improving modal choice, transit access and walkable places. The local-serving economic sector (which makes up the overwhelming majority of the region's employment) also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the

region's economic activity centers, and between the centers. In particular, there is a need for additional high capacity and high frequency transit service in the region. Further support for the knowledge-based sector would also come from additional walkable places and modal options for walking and biking in the region.

The discussion above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

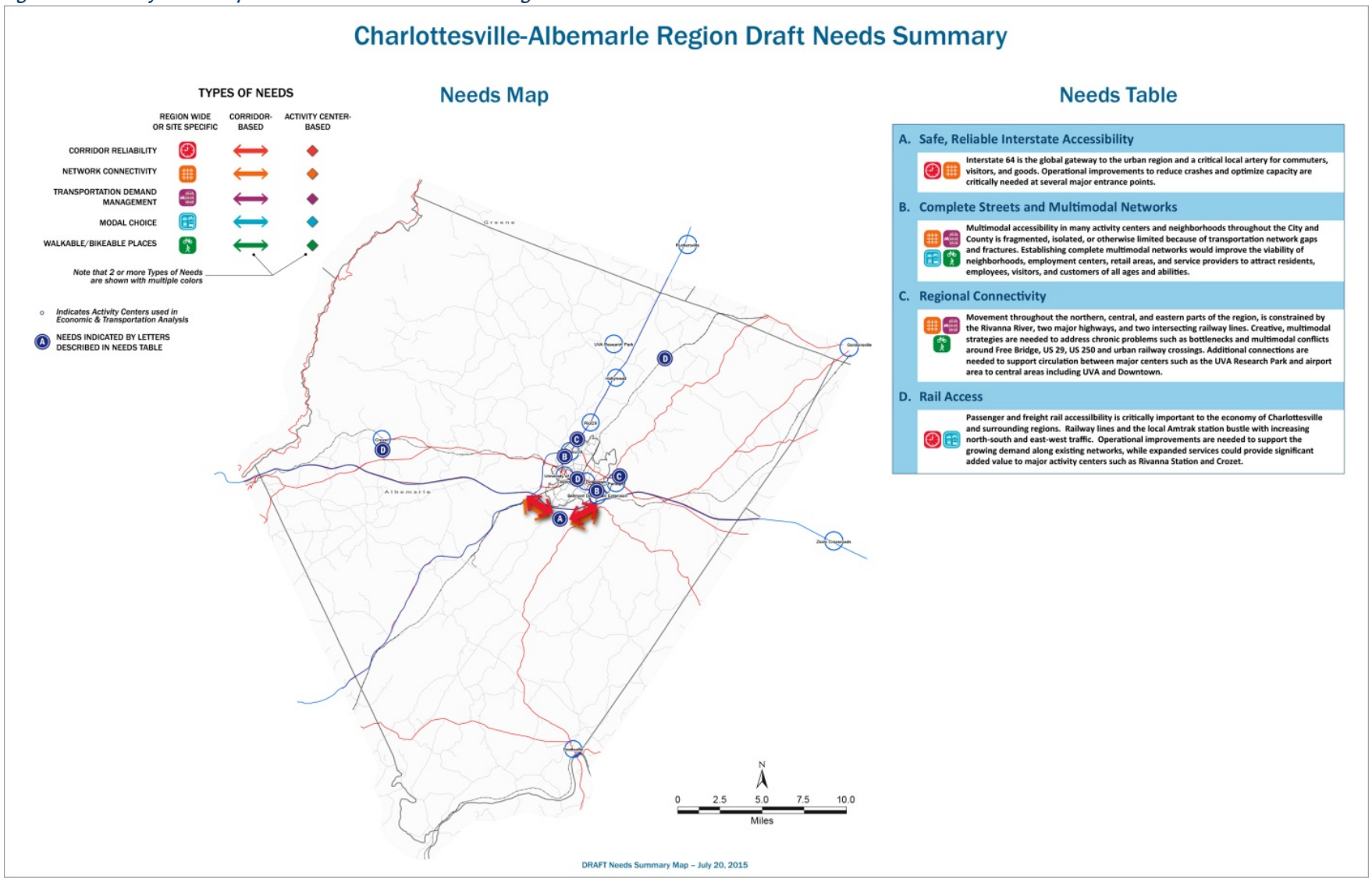
Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

Figure 34 summarizes the regional Transportation Needs according to activity centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Figure 34: Summary Needs Map for the Charlottesville-Albemarle Region



Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table (Table 13) that identifies the following findings of need:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Table 13: Findings of Needs

A.	**Safe, Reliable Interstate Accessibility**
NEED	**Interstate 64 is the gateway to the region's core areas. Currently, crash frequency and severity are high at key points where travelers enter and exit I-64. Poor reliability reduces the capacity at these points, causing delay and inhibiting access to the more central areas of the region. The need on I-64 is improvements at major entrance points to reduce crashes and improve reliability.**
ECONOMIC	Interstate 64 is a key artery for goods and people moving into and out of Charlottesville, the region's center and only major city. Workers from all sectors rely on the interstate to get to work, and the interstate is used by tourists, who have a significant role in the region's economy.
TRANSPORT.	Operational improvements are needed to improve safety and reduce crashes. In addition, improvements are critically needed to improve the flow of vehicles to optimize capacity at several major entrance points.
B.	**Complete Streets and Multimodal Networks**
NEED	**The ability to travel around Charlottesville and other areas in the region by bicycle, walking, and transit is critical for many residents' accessibility. The availability of multimodal transportation options alleviates potential congestion, and allows for more efficient movement of goods and people traveling longer distances. There is a need to strengthen and complete multimodal networks to support travel by all modes.**
ECONOMIC	Establishing complete and connected multimodal networks would improve the viability of neighborhoods, employment centers, retail areas, and service providers to attract residents, employees, visitors, and customers of all ages and abilities. Workers, particularly those in the knowledge and local-serving sectors, rely on access to bicycling and walking, which is a significant factor in many workers' decisions to locate in the region's communities. UVA is the city's largest economic anchor, and both students and faculty frequently travel around the region's core areas using modes other than driving.
TRANSPORT.	Multimodal accessibilty in many activity centers and neighborhoods throughout the City and County is fragmented, isolated, or otherwise limited because of transportation network gaps and fractures. There is a need to improve connections between existing facilities, as well as improve the quality of these facilities in key locations where they are most frequently used.

C. Regional Connectivity

NEED

Heavy reliance on a limited number of roadways and arterials results in chronic problems such as bottlenecks and modal conflicts throughout the northern, central, and eastern parts of the region. Improving street network connectivity and reducing modal conflicts at key points would improve travel by all modes throughout the Charlottesville-Albemarle region.

ECONOMIC

All three industry sectors rely on the frequency movement of people and goods. Given the constraints placed on movement by the Rivanna River, two major highways, and two intersecting railway lines, there is a need to improve connections to enhance connectivity and sustain the relatively low commute times that attract workers to the region.

TRANSPORT.

Chronic connectivity problems lead to bottlenecks and multimodal conflicts around Free Bridge, US 29, US 250 and urban railway crossings. These are key locations where improved connections can address this need.

D. Rail Access

NEED

Amtrak trains running through Charlottesville are regularly at capacity, and experience delays due to the freight rail services in the region, which are important for freight-dependent industries, as well as others that rely on timely goods deliveries. Expanded passenger and freight rail services and operational improvements are needed to support growing demand on existing networks.

ECONOMIC

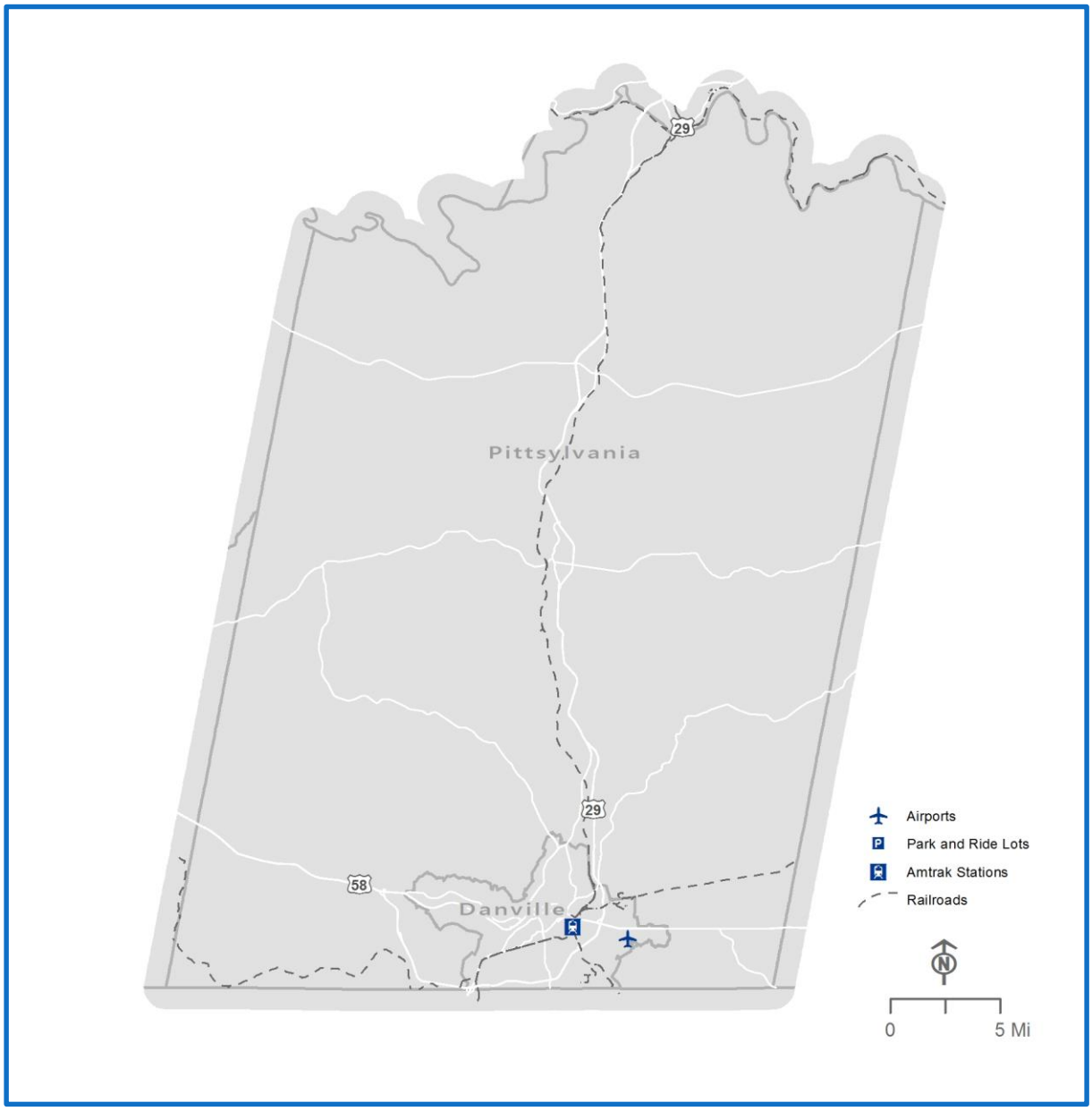
Passenger and freight rail accessilbility is critically important to the economy of Charlottesville and surrounding regions. Railway lines and the local Amtrak station bustle with increasing north-south and east-west traffic. Demand is growing along existing networks, and expanded services would add economic value to major activity centers such as Rivanna Station and Crozet. Many Charlottesville residents, particularly knowledge-sector workers, rely on rail to commute or travel to Northern Virginia and other areas throughout the state and region.

TRANSPORT.

The need for additional rail capacity along major north-south and east-west traffic roots to accommodate people and goods movement.

VMTP 2025 Needs Assessment

Regional Needs Profile



Danville Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses. The purpose of this Transportation Needs Assessment to identify the Transportation Needs that are part of the Danville Regional Network that would support regional industries and workforces.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Danville Region. There is a separate document entitled VMTP 2025 Needs Assessment: Regional Networks Introduction, which provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Danville Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Danville Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs Profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks was developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

In the Danville Region, the needs analysis area includes the City of Danville and Pittsylvania County. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area were considered in the Needs Assessment as well.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from the Danville Region's stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods and & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million and 1.5 million. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods & Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, population growth is projected for the Danville Region. Projections estimate 500 new residents in the region by the year 2025.

Table 2: Danville Region Population Projections.

Current Population - 2012	Weldon Cooper 2025 Projection
105,803	106,356

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Danville Region.

Table 3: County and City Population Projections.

Jurisdiction	2012 Population	Weldon 2025 Projection	% Change (2012-2025)
City of Danville	42,996	42,789	0%
Pittsylvania County	62,807	63,567	1%

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

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According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise by 22% (slightly more than the state average of 21%) from $29,515 to $34,644. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

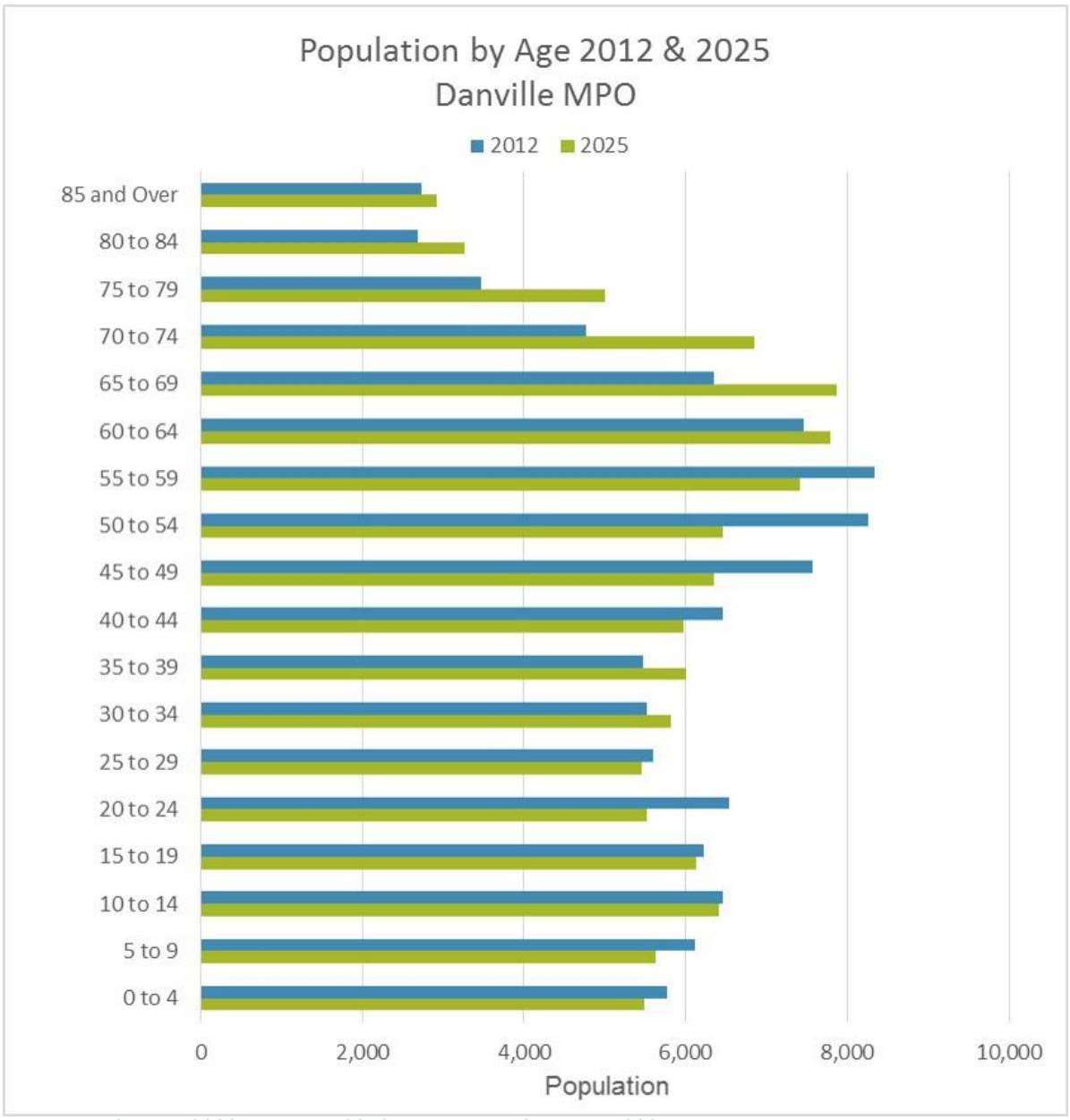


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The 20 two digit, economic sectors, as defined by The North American Industry Classification System (NAICS), were analyzed with the following economic measures were to assess the strength and characteristics of the current regional economy in the Danville Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, Knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

NAICS - 2DIGIT	Industry Name	Cluster
11	Agriculture, Forestry, Fishing and Hunting	Freight Dependent
21	Mining, Quarrying, and Oil and Gas Extraction	Freight Dependent
22	Utilities	Freight Dependent
23	Construction	Freight Dependent
31	Manufacturing	Freight Dependent
32	Manufacturing	Freight Dependent
33	Manufacturing	Freight Dependent
42	Wholesale Trade	Freight Dependent
44	Retail Trade	Local serving
45	Retail Trade	Local serving
48	Transportation and Warehousing	Freight Dependent
49	Transportation and Warehousing	Freight Dependent
51	Information	Knowledge
52	Finance and Insurance	Local serving
53	Real Estate and Rental and Leasing	Local serving
54	Professional, Scientific and Technical Services	Knowledge
55	Management of Companies and Enterprises	Knowledge
56	Administrative and Support and Waste Management and Remediation Services	Knowledge
61	Educational Services	Local serving
62	Health Care and Social Assistance	Local serving
71	Arts, Entertainment, and Recreation	Local serving
72	Accommodation and Food Services	Local serving
81	Other Services, except Public Administration	Local serving
92	Public Administration	Local serving

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Danville Region, Figure 3 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

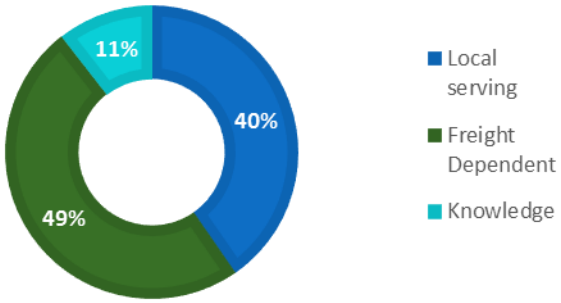


Figure 3 – Top Sectors by Output (2012).
Source: IHS Global Insight, 2012.

The freight dependent cluster is clearly the strongest in this region. Freight dependent industries make up 49% of the economic output in the Danville Region. Conversely, the knowledge and local serving sectors account for 11% and 40% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic sector, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Manufacturing is the strongest industry in the Danville region when measured by economic output. This is due, potentially, to the high economic value of goods produced in the nuclear and medical equipment industries, both of which fall under the broader manufacturing category, and are well represented in the region. The real estate industry comes in a close second, reflecting potentially an increase that the region has been seeing in real estate transactions and new development. Utilities, health care, and wholesale trade round out the top five industries in the region with the greatest economic output. Table 4 shows these top five industries and their percent of the regional economic output.

Table 4: Current Industries by Output.

Top Industries	NAICS Sector Code	% of Output
Manufacturing	31-33	23%
Real Estate	53	19%
Utilities	22	13%
Health Care	62	8%
Wholesale Trade	42	8%

Source: IHS Global Insight, 2012.

Top Industries by Employment

In the Danville Region, public administration, health care, manufacturing, retail trade, and accommodation and food services are the top industries by employment. Table 5 shows these top industries and their percent of the workforce in the Danville Region. There is consistency with the top industries by output, including health care and manufacturing, but also some variation with industries that typically have a high number of employees with relatively low output, such as public administration, food services, and retail trade.

Table 5: Current Top Industries by Employment. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Workforce
Public Administration	92	16%
Health Care	62	15%
Manufacturing	31-33	15%
Retail Trade	44-45	14%
Accommodation and Food Services	72	9%

Source: IHS Global Insight, 2012.

Table 6 shows that Goodyear Tire and Rubber and the Danville Regional Medical Center are the largest employers in the region. This is congruous with both the top industries by employment and output.

Table 6: Current Top Employers. Source: InfoUSA, supplemented with VEDP, VEC, and local data.

Employers	Employees
The Goodyear Tire & Rubber Co.	1,500 – 2,499
Danville Regional Medical Center	1,000 – 1,499

Source: IHS Global Insight, 2012.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Danville Region. The industries expressed in Table 7 have the highest LQ scores in the region. The score for the Administration Sector industry, for example, can be inferred to mean that these services are almost 1.5 times more concentrated in the region than in the entire nation, on average.

Table 7: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Administration Sector	56	1.44
Health Care	62	1.36
Retail Trade	44-45	1.27
Accommodation / Food Service	72	1.25
Real Estate	53	1.24

Source: IHS Global Insight, 2012.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers, drawn with a 1-mile-radius, were then developed for these areas. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles. Figure 2 below shows the activity centers as blue circles.

Danville Activity Centers



Figure 2: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 3 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

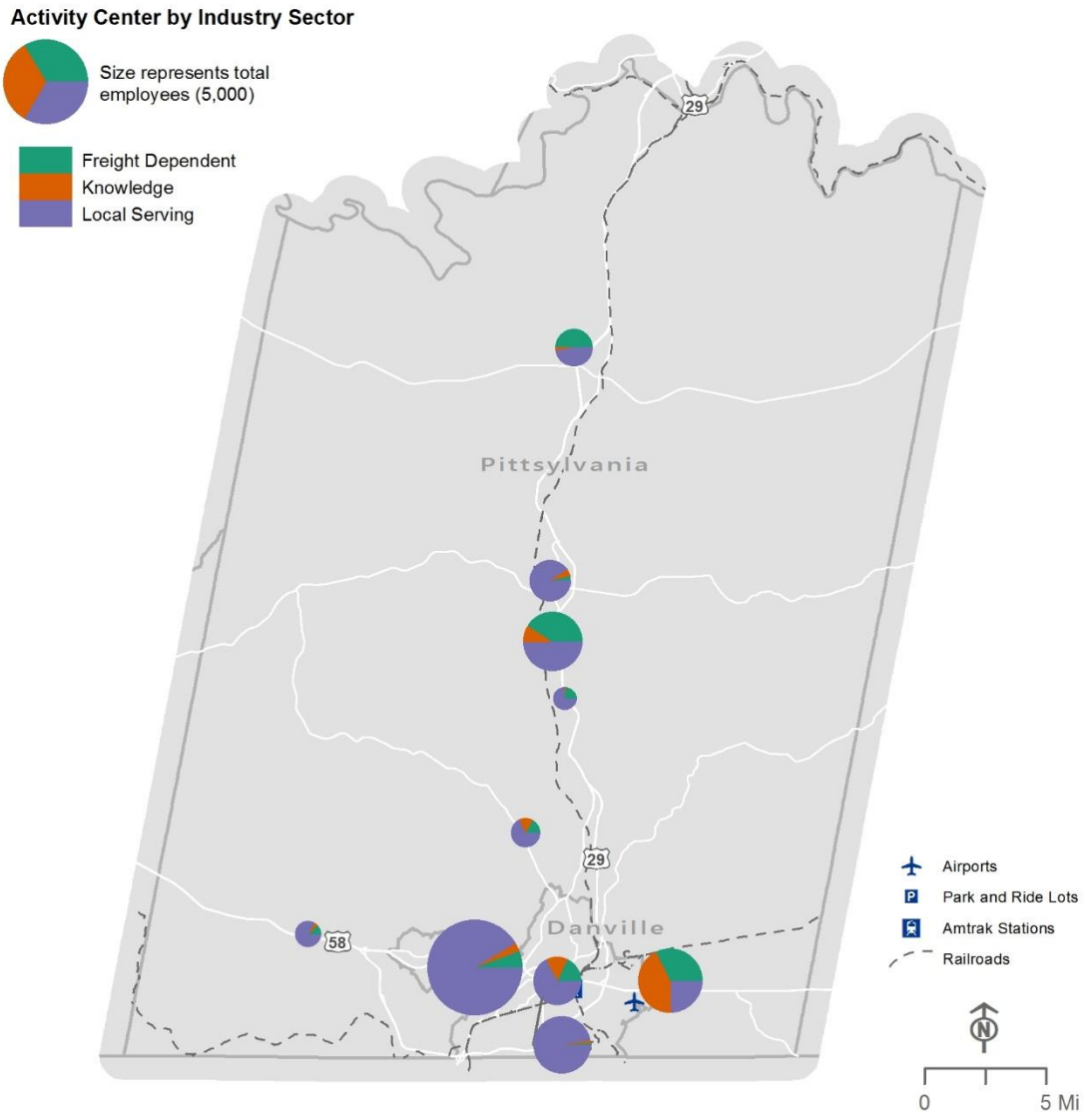


Figure 3: Activity Center Employment by Industry Sector.
Source: IHS Global Insight, 2012.

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Danville Region stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Danville Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Danville Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Substantial growth is forecasted for the Danville Region by 2025. According to statewide and national datasets used, the manufacturing and real estate industries will see the largest growth. Combined, they are expected to produce almost $1 billion more in 2025 than was produced in 2012.

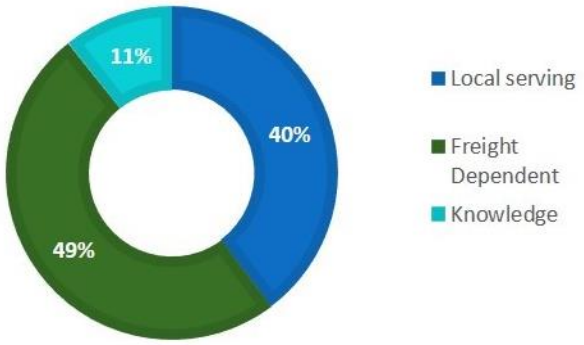


Figure 4: Top Sectors by Employment (2025).
Source: IHS Global Insight, 2012.

The freight dependent sector is clearly the strongest in this region and is anticipated to remain so. Freight dependent industries make up 49% of the economic output in the Danville Region. Conversely, the knowledge and local serving clusters account for 11% and 40% of economic output, respectively. There are not any anticipated shifts in the economy that would affect the future transportation network.

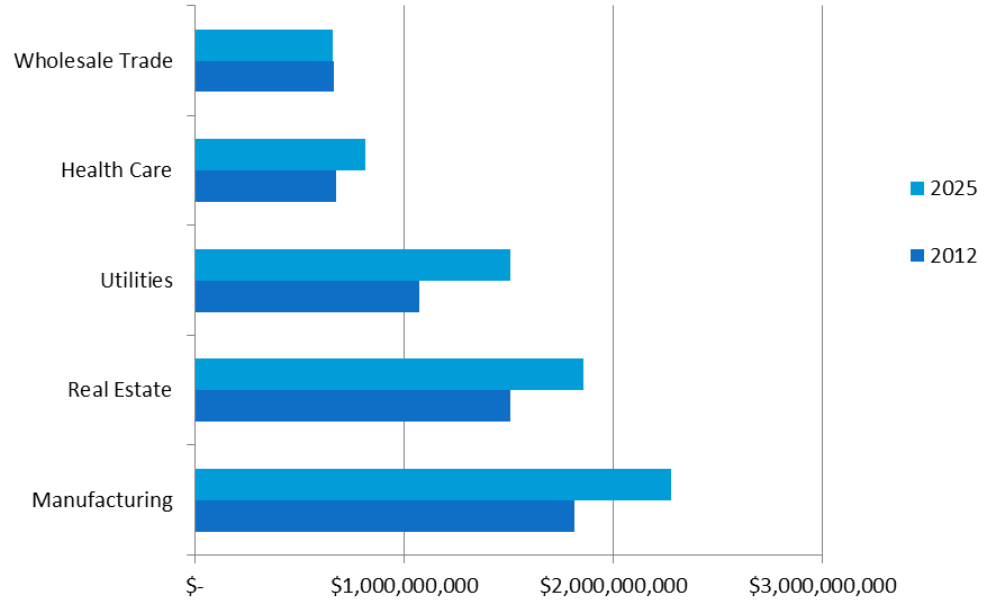


Figure 5: Top Industries by Output –
Source: IHS Global Insight, 2012.

The greatest growth by output is in the transportation industry, which is estimated to grow by 119% by 2025. The industry projected to have the greatest reduction of output in 2025 compared to 2012 is finance and insurance. This industry is expected to decrease in output by 13%. In all industries combined, economic output in the Danville Region is expected to increase by almost $2 billion by 2025. (Refer to Figure 6).

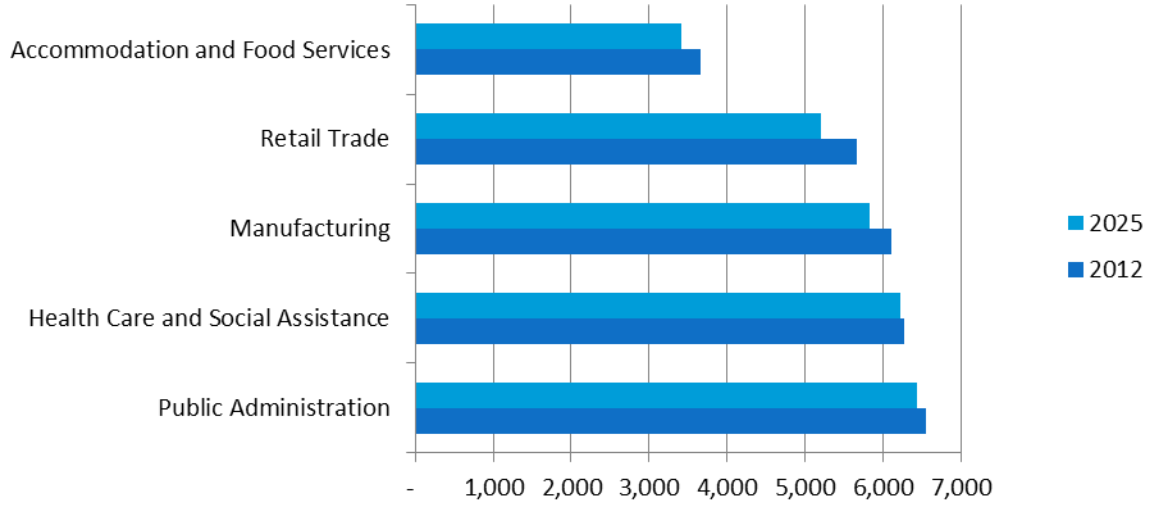


Figure 6: Top Industries by Employment.
Source: IHS Global Insight, 2012.

Employment for the aforementioned top industries is expected to decrease slightly by 2025. The top industries by employment will decrease from between 2% and 8%, with the greatest decrease is in the retail trade. However, multiple industries are anticipated to grow in employment (Refer to Table 8). The highest anticipated growth is in the utilities industry, which is expected to grow by 53%.

Table 8: Top Industries by Employment.

Top Industries	NAICS Code	% Change in Employment (2012-2025)
Utilities	22	53%
Mining, Quarrying, and Oil and Gas Extraction	21	50%
Educational Services	61	33%
Construction	23	31%
Real Estate and Rental and Leasing	53	18%

Source: IHS Global Insight, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Danville Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional Transportation Profile for the Danville Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Danville Region show that the City of Danville attracts workers not only from Pittsylvania County, but from jurisdictions surrounding the region as well as from North Carolina. As represented in Figure 5, the vast majority of workers both live and work within the same jurisdiction, or commute to another jurisdiction within the MPO area.

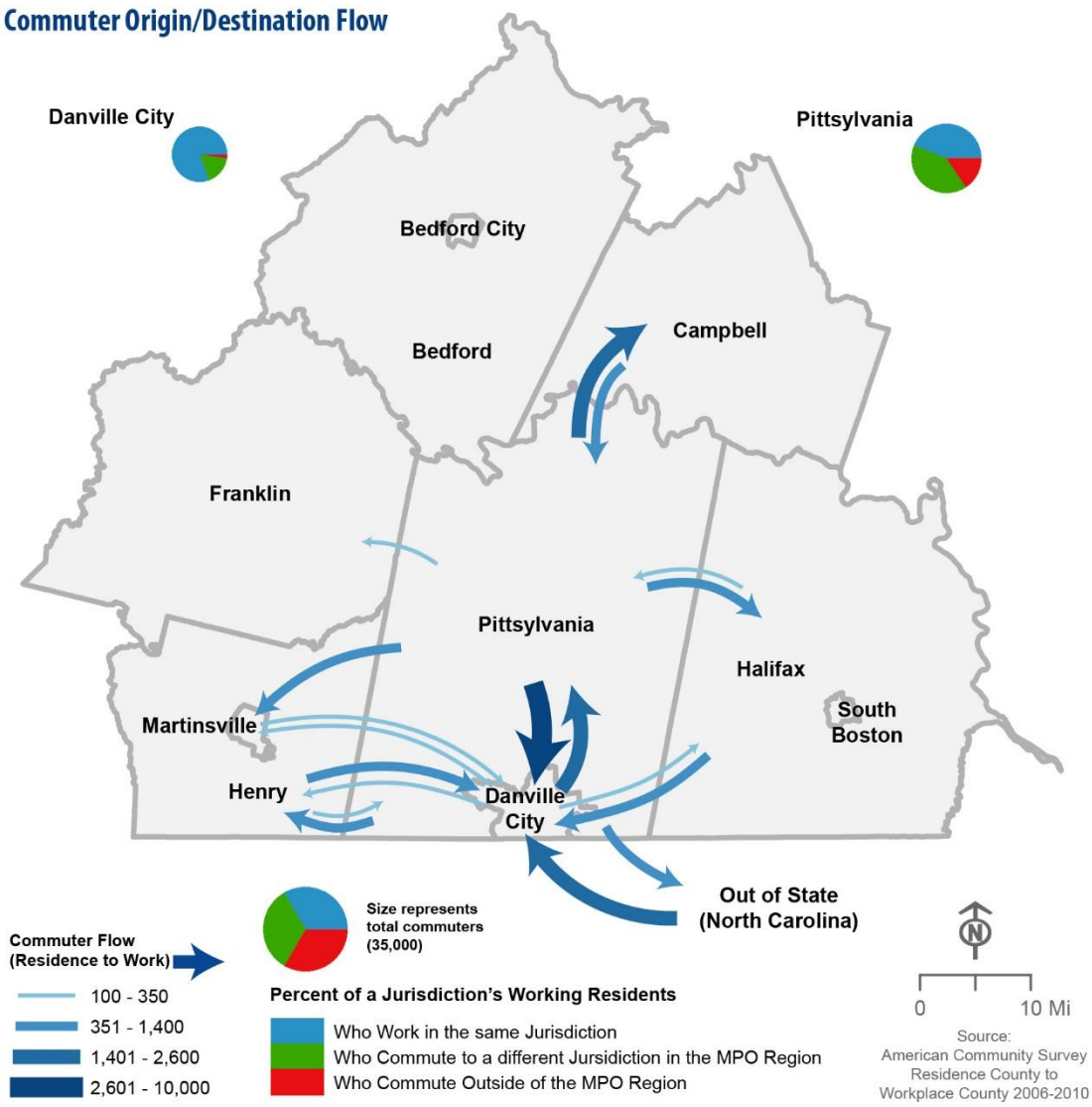


Figure 7: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional Transportation Profile for Danville Region was the analysis of commuting patterns between activity centers. Figures 8 through 12 below provide insights into the commuting patterns for five of the activity centers in the Danville Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file

provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, Downtown Danville sees a significant number of commuters from the surrounding area, especially in the City of Danville. (Refer to Figure 8).

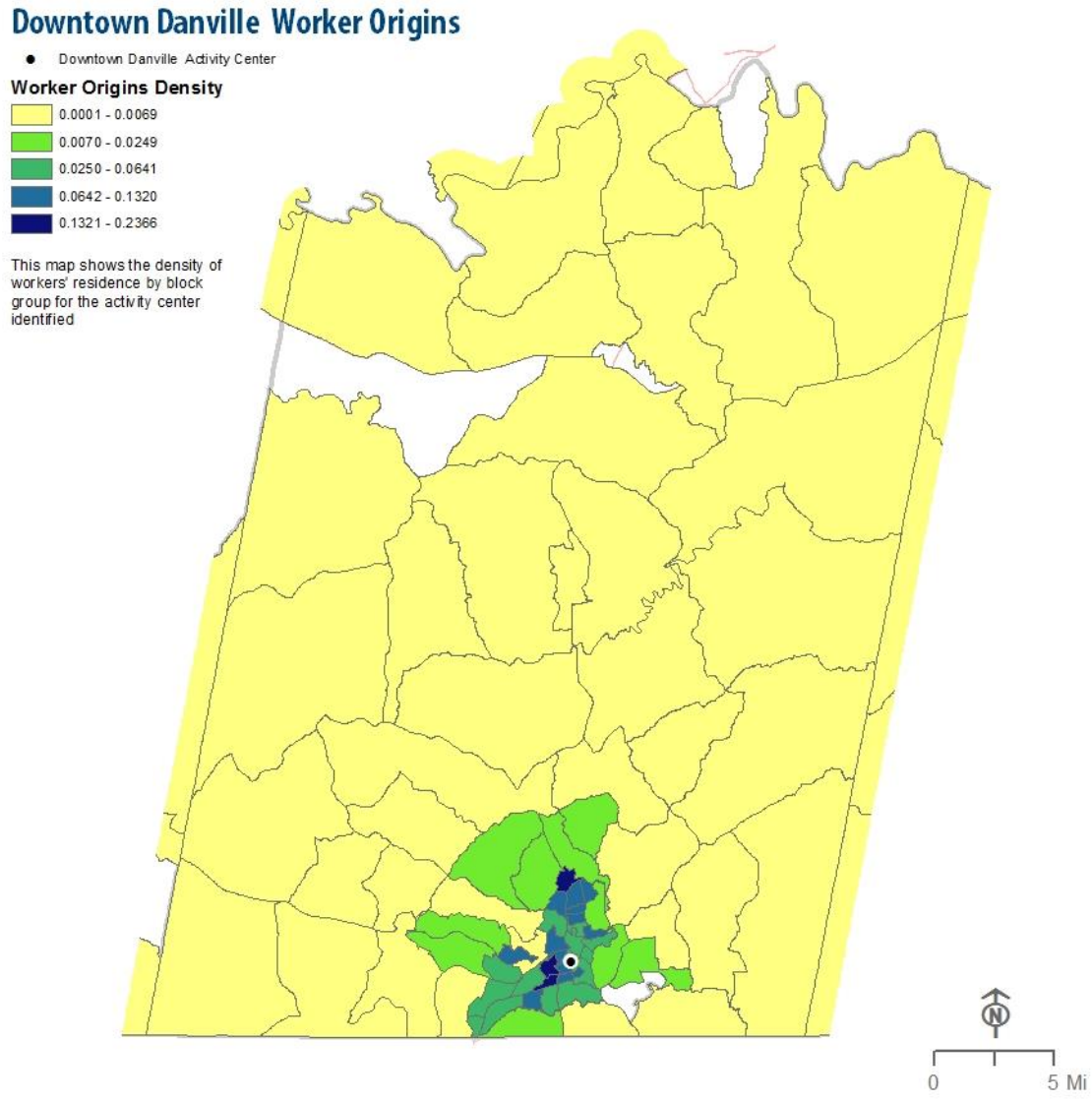


Figure 8: Commuting Patterns to Downtown Danville Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Cane Creek Boulevard is a modest draw for workers in the region, with commutes originating in most census block groups in the region. The highest concentration of workers in the census block groups in and adjacent to the City of Danville. (Refer to Figure 9).

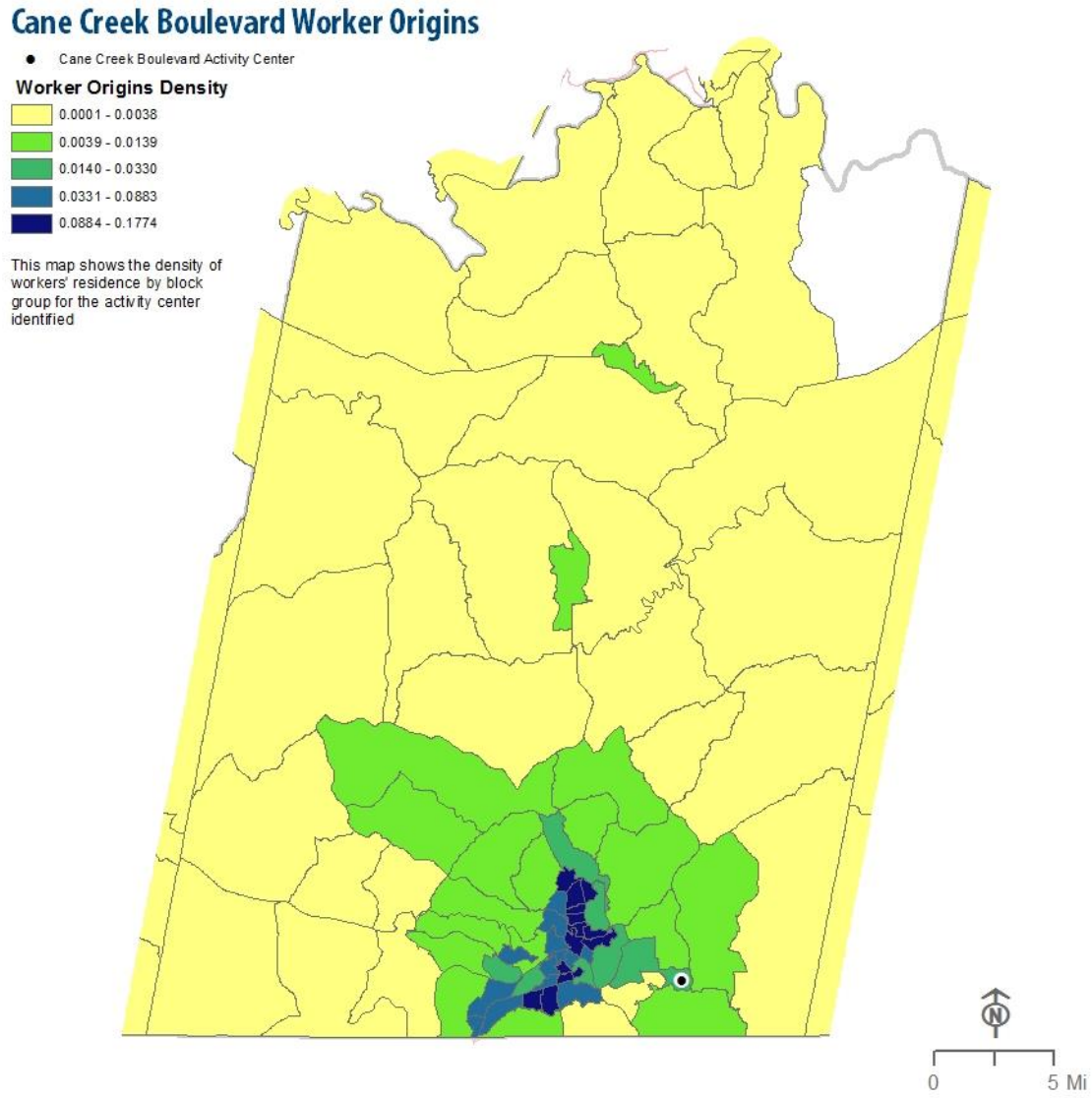


Figure 9: Commuting Patterns to Cane Creek Boulevard Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to Brosville originate in fewer block groups in the region than the aforementioned jurisdictions. Most commutes are centered in block groups around the activity center. (Refer to Figure 10).

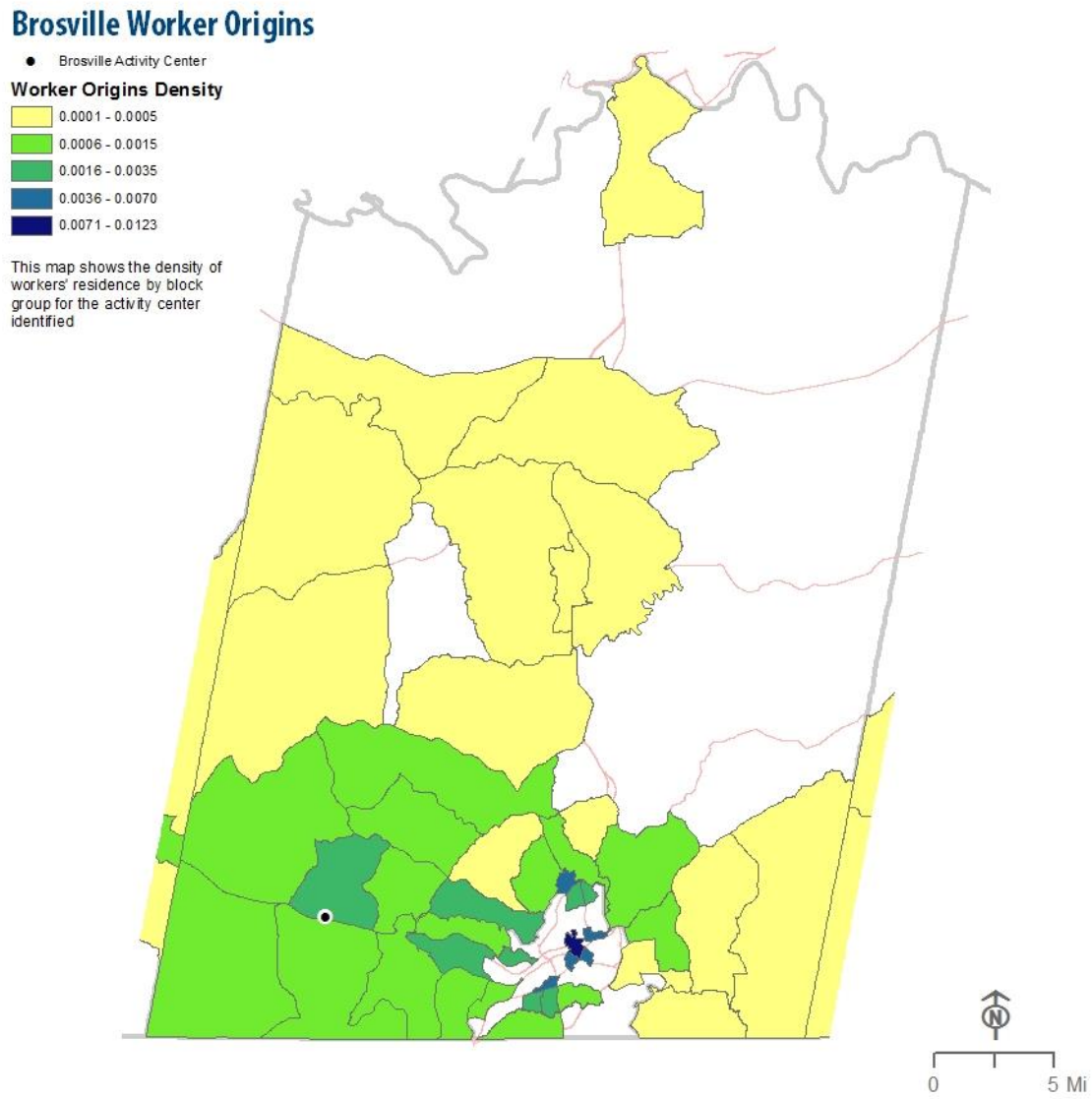


Figure 10: Commuting Patterns to Brosville Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commute to Tightsqueeze originate throughout the Danville Region. The block groups with the greatest density of worker origins are in the City of Danville and along the US Route 29 corridor. (Refer to Figure 11).

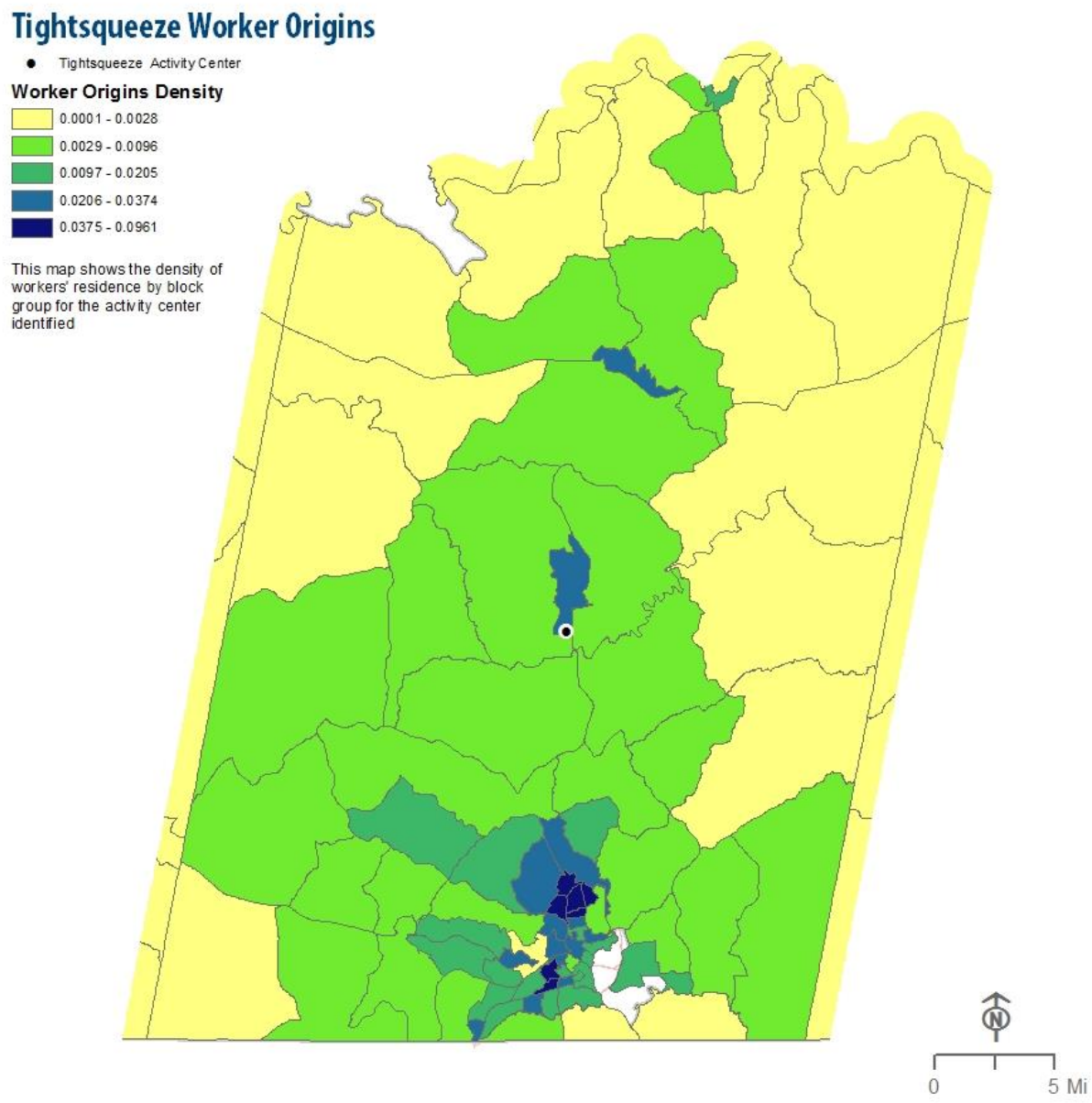


Figure 11: Commuting Patterns to Tightsqueeze Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Most commutes to the Gretna activity center originate in the block groups directly adjacent to the activity center. (Refer to Figure 12).

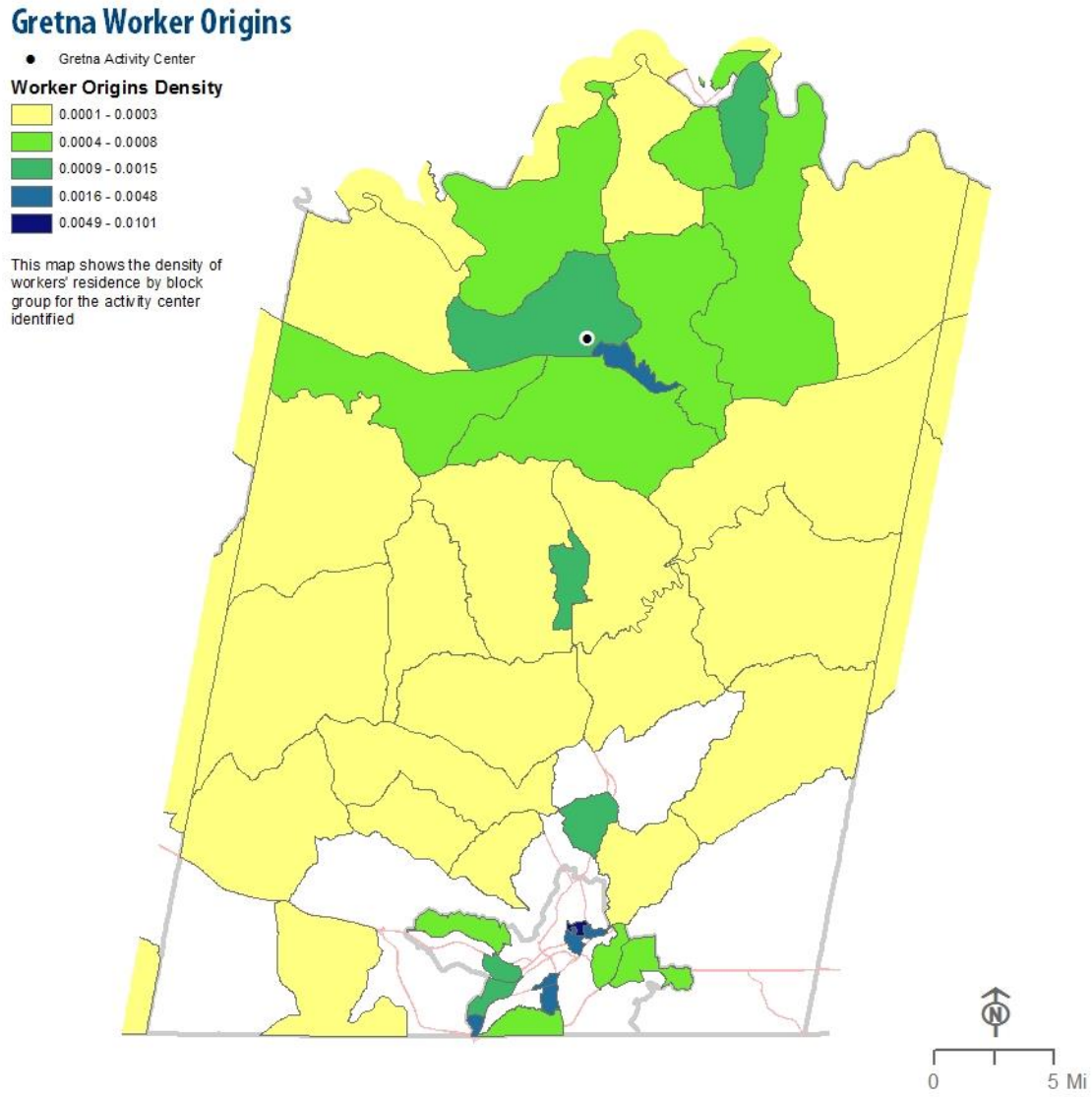


Figure 12: Commuting Patterns to Gretna Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Danville Region, the vast majority of commuters drive alone to work, making up 83% of commuter trips in the region. While there is some variation between jurisdictions, single occupancy vehicles are used between 79% and 85% of the time. For all jurisdictions, carpooling is the second most prevalent option, accounting for 11% of the regional mode share. Public transit use is highest in the City of Danville, which has the most robust transit system in the region. (Refer to Figure 13).

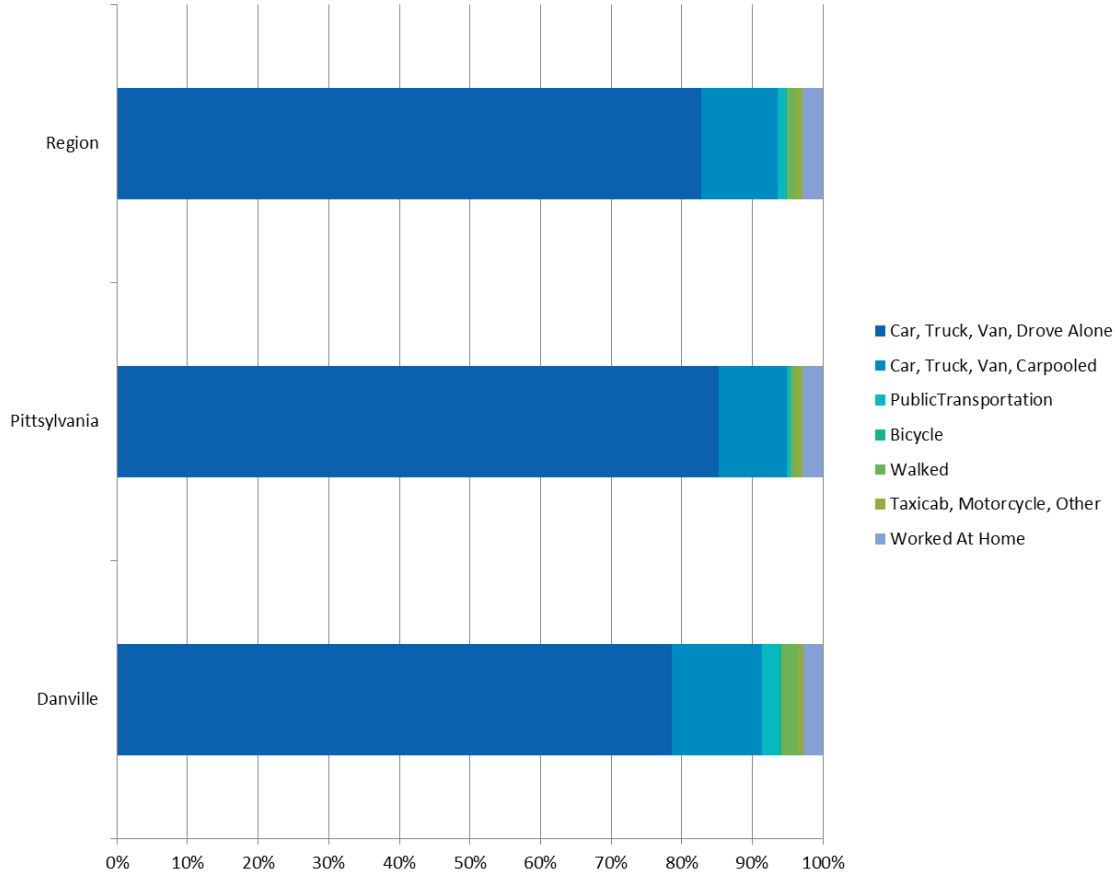


Figure 13: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Danville Region, average commute times range from 21 to 28 minutes among the various jurisdictions. (Refer to Table 9). Due to its density and proximity to employment centers, the City of Danville has the shortest average commute, while the more rural jurisdiction, Pittsylvania County, has a longer average commute time.

Table 9: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
Pittsylvania County	28
City of Danville	21

Source: ACS 2013 5-Year Estimates

Commutes of over 45 minutes make up only 12% of regional commutes. Pittsylvania County has the highest percentage of workers who commute over 45 minutes at 14%, this is twice as high as the City of Danville's rate of long commutes. (Refer to Figure 14).

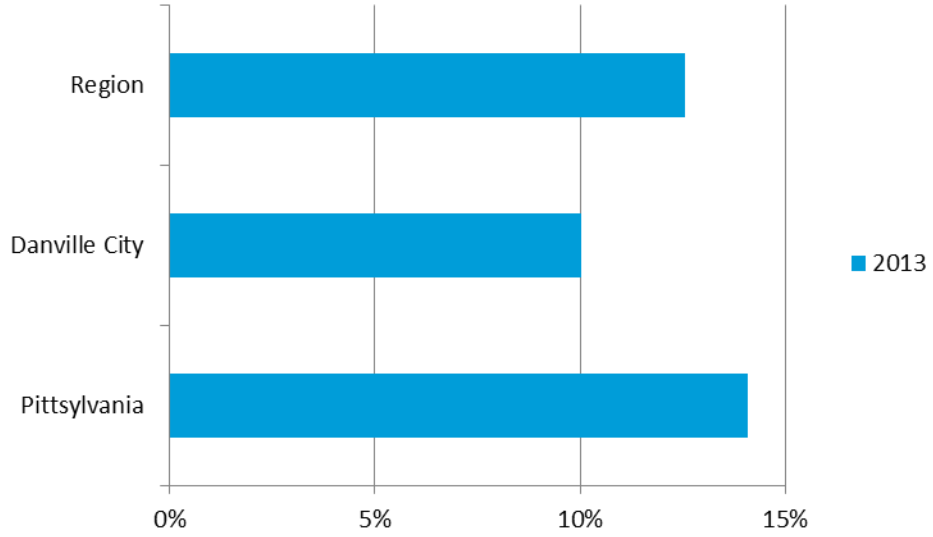


Figure 14: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 15 provides a closer look at where longer commutes originate. Commutes are shortest in the City of Danville and in Pittsylvania County along the US Route 29 and US Route 360 corridors. Block groups outside of these corridors in Pittsylvania County, have commute times that are nearly 150% longer than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

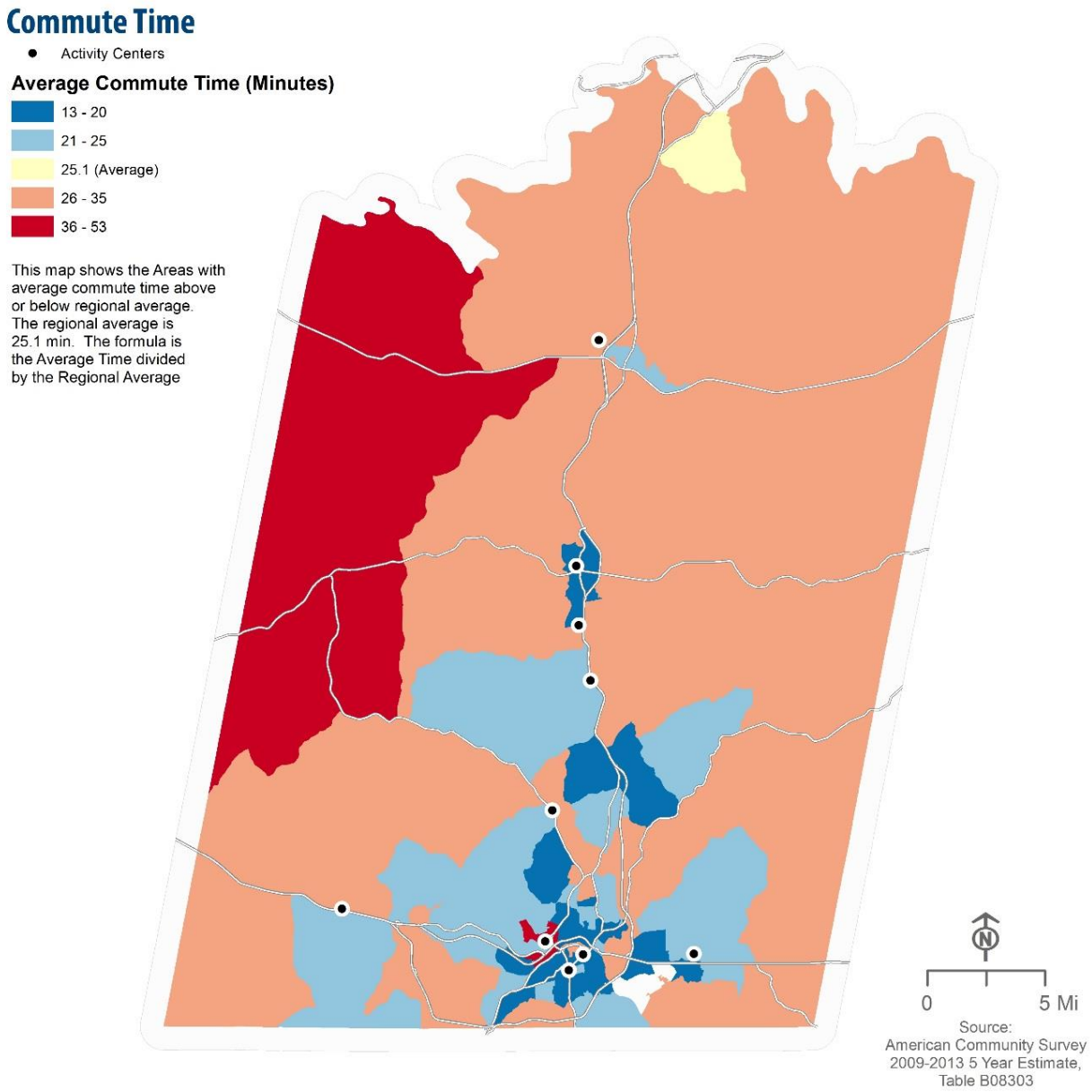


Figure 15: Danville Region Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto accessibility in the Danville Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility exist around the City of Danville, and in the US Routes 360, 58, and 29 corridors in Pittsylvania Counties. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 16).

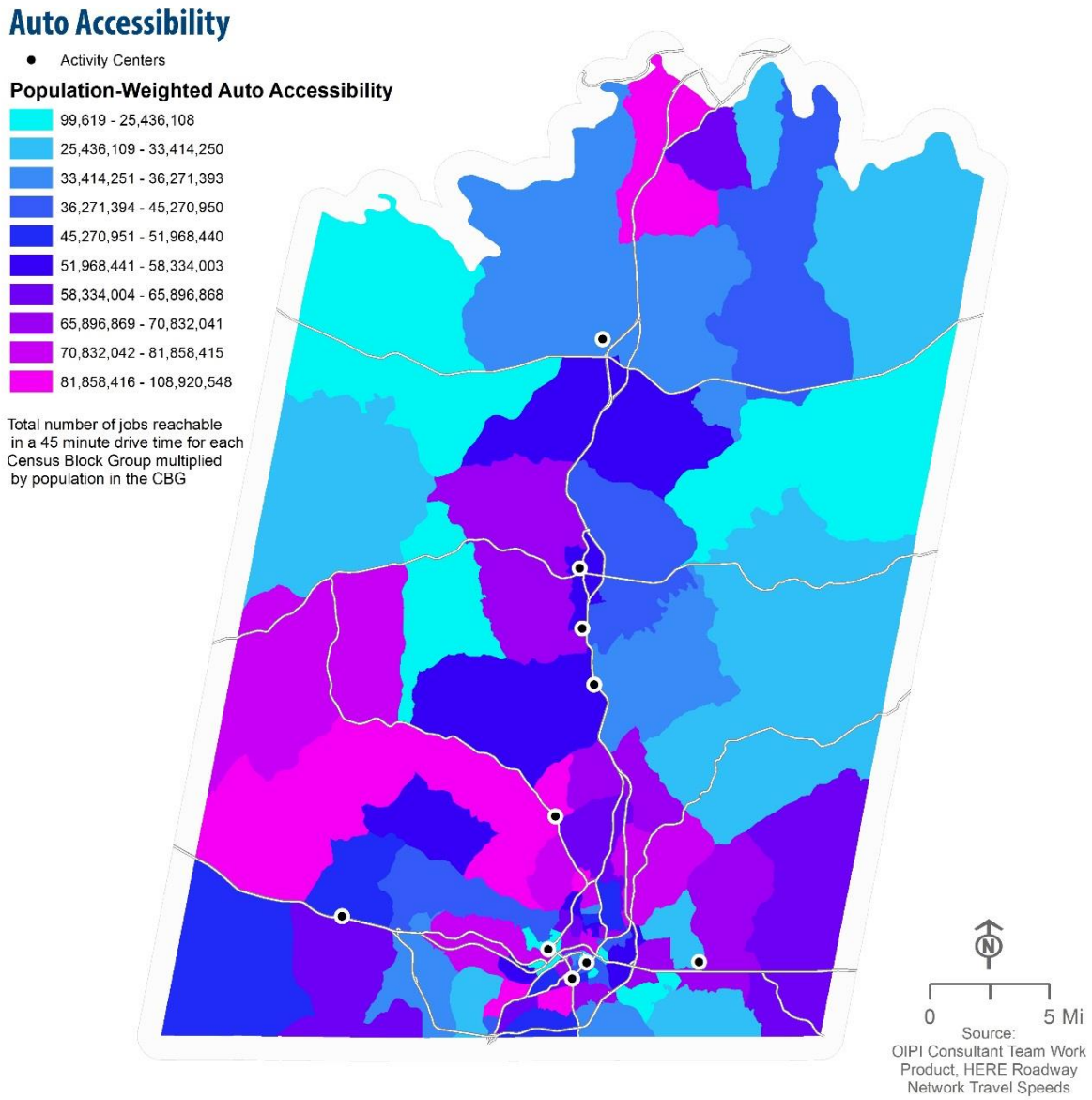


Figure 16: Auto Accessibility

Transit Accessibility

Outside of the City of Danville, there are few fixed-route transit options in the Danville Region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 17).

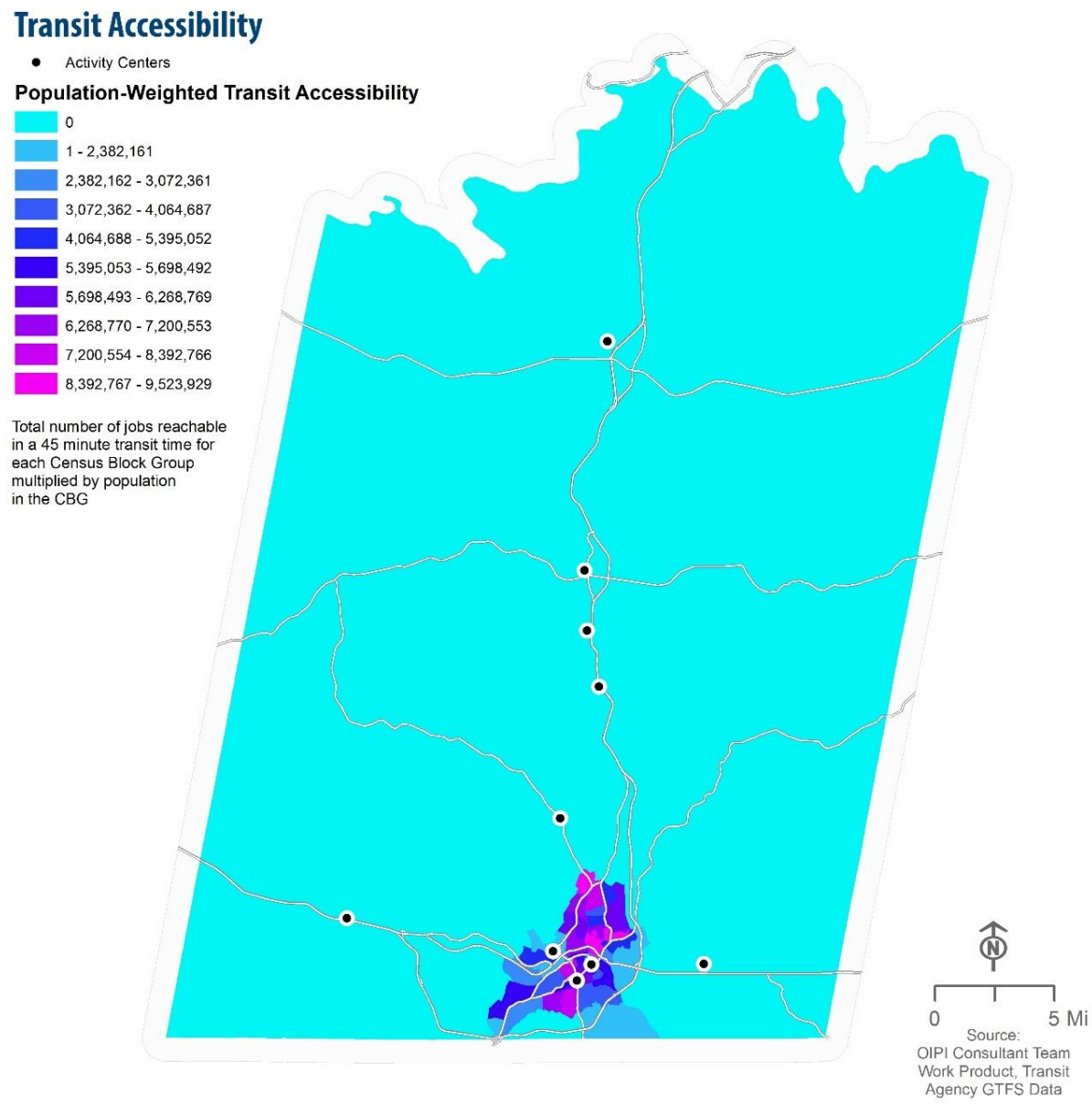


Figure 17: Transit Accessibility

Walk Accessibility

Walk accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. The highest scoring areas are located in and adjacent to the City of Danville. Areas in Pittsylvania County that scored high in walkability are US Route 360, US Route 58, US Route 29, and VA Route 41. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 18).

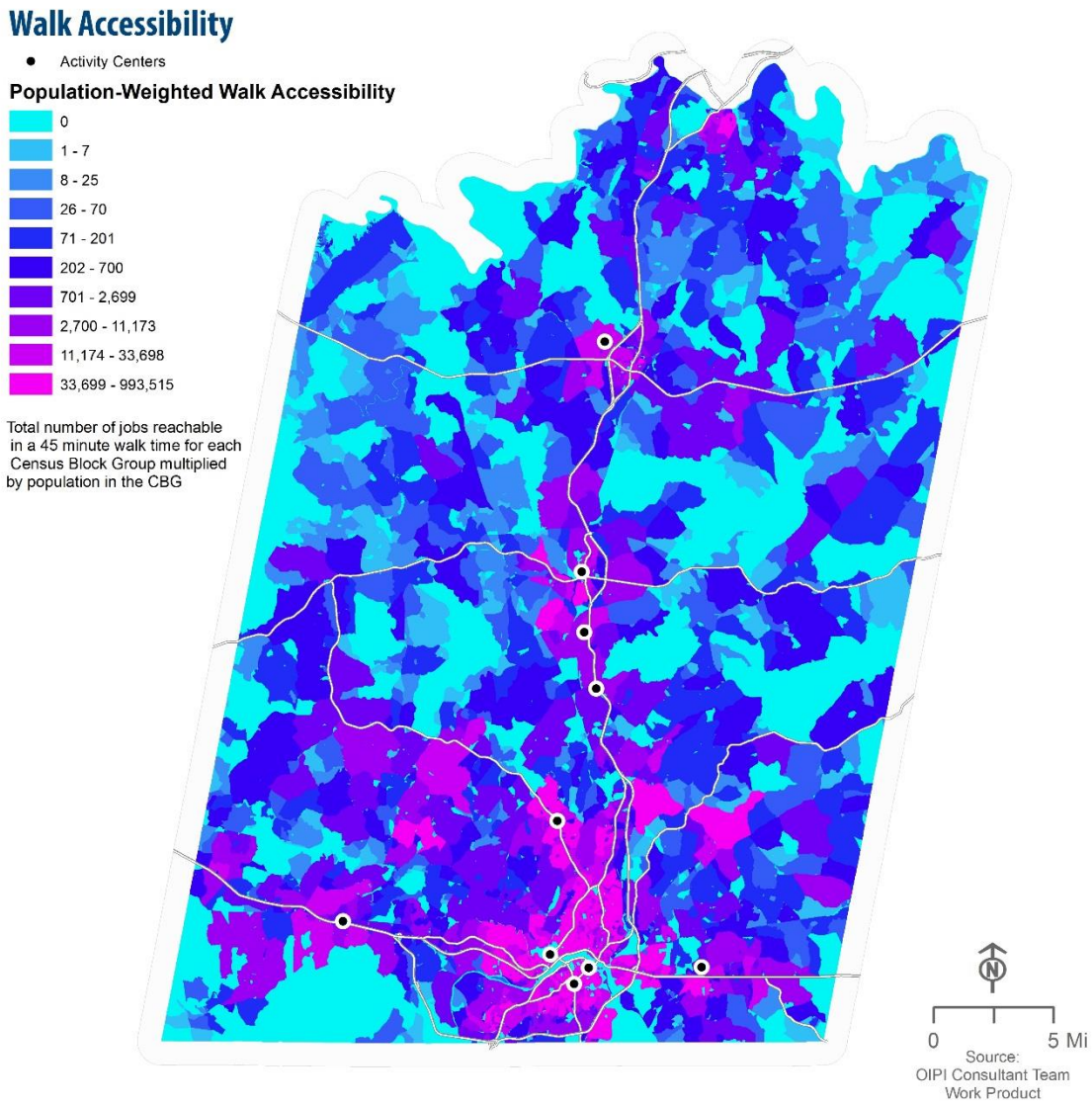


Figure 18: Walk Accessibility

Freight Accessibility

In addition to railways, US Routes 58, 29, and 360 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within a six minute drive from a major arterial ramp. (Refer to Figure 19).

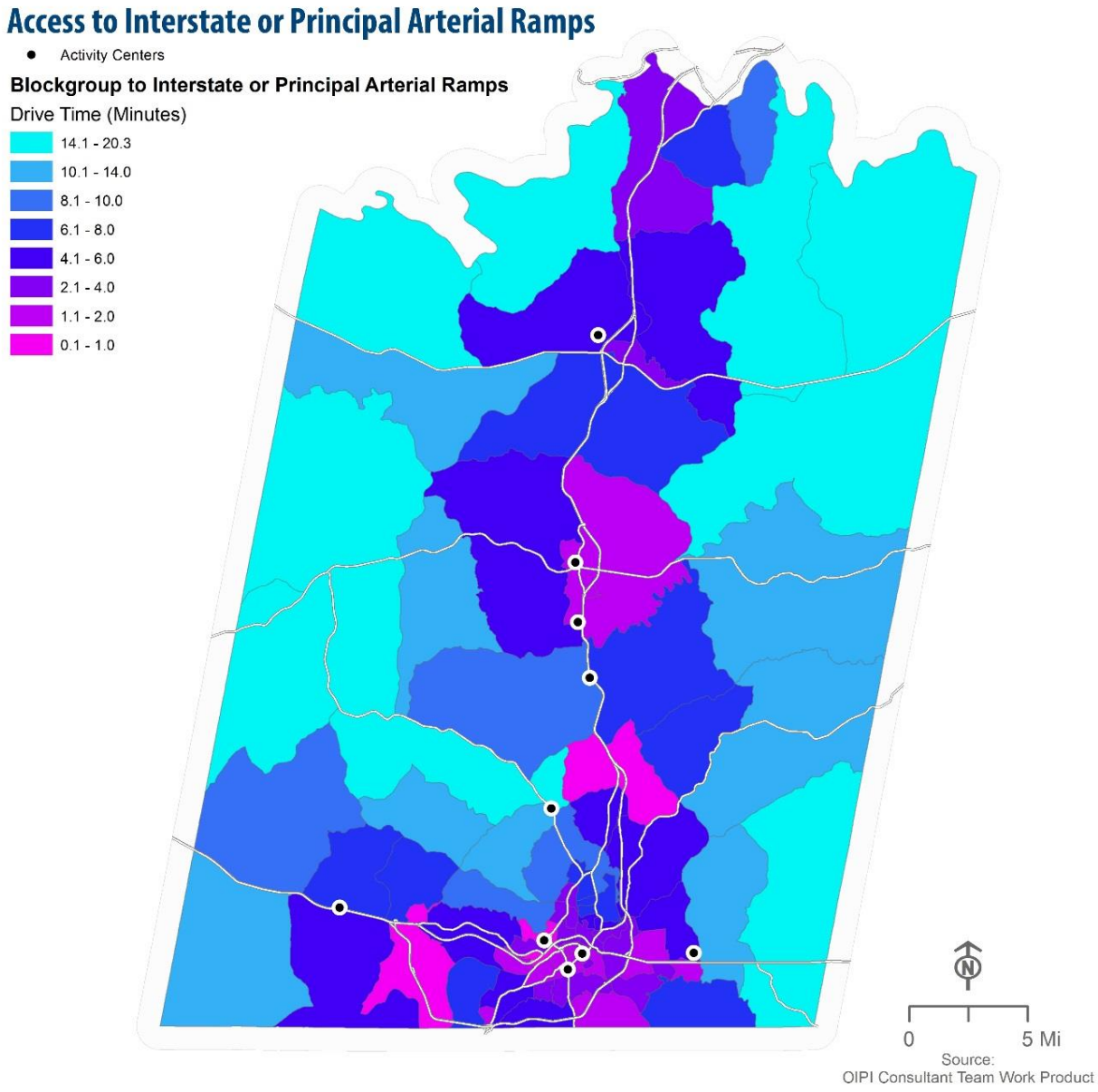


Figure 19: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Danville Region are clustered around US Route 29 north of the City of Danville, and along US Route 360/58 to the east and west of the City of Danville. Most areas within the City of Danville, and to the north, east, and west of the city, have access to a warehouse or distribution center within a ten minute drive. (Refer to Figure 20).

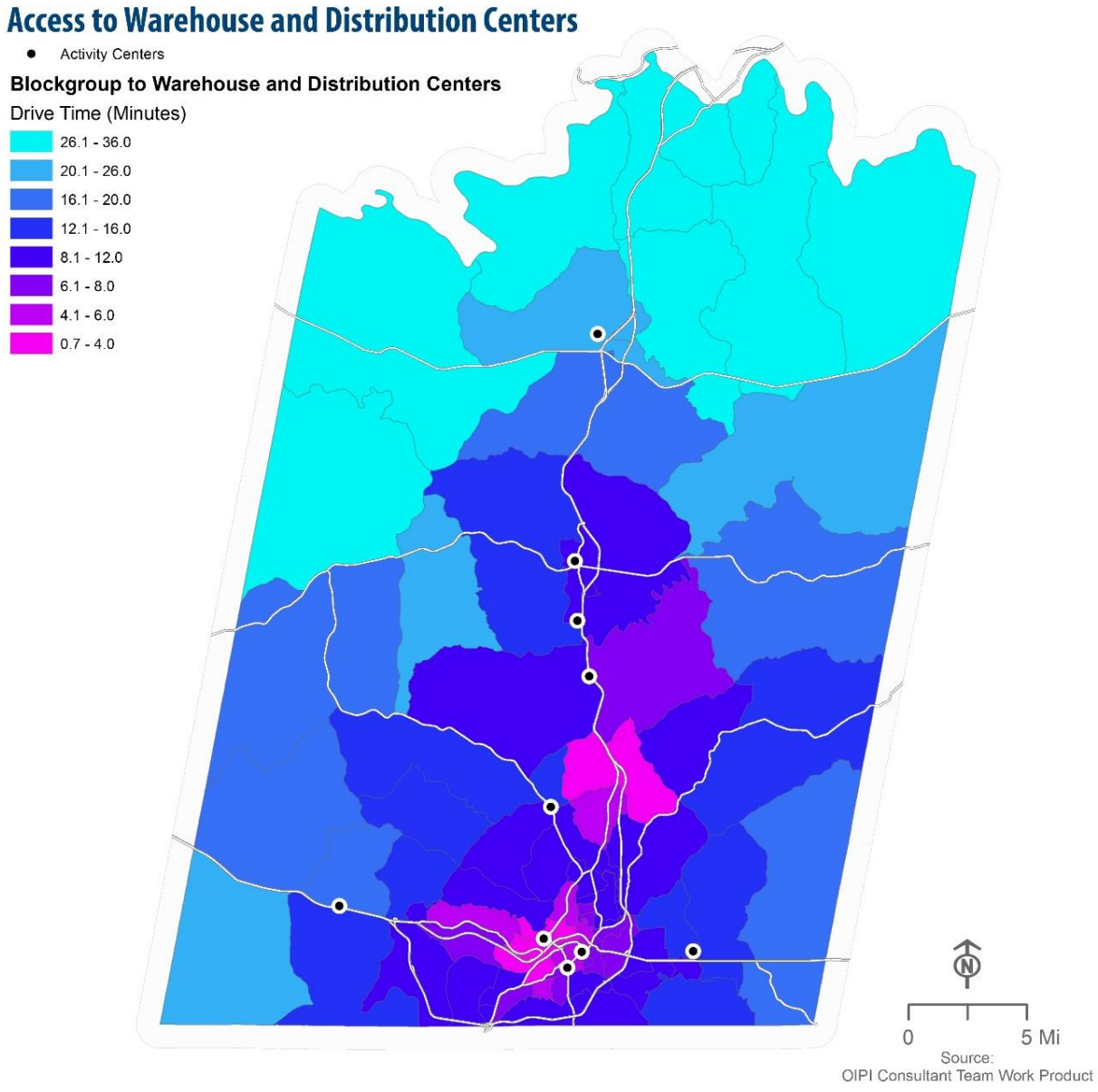


Figure 20: Access to Warehouses & Distribution Centers

Norfolk Southern operates freight rail lines that pass through the City of Danville and Pittsylvania County. The Roanoke-Blacksburg Regional Airport is the closest major airport that handles large quantities of freight. It is a little more than an hour and a half drive to the Roanoke-Blacksburg Regional Airport from most of the Danville Region. (Refer to Figure 21).

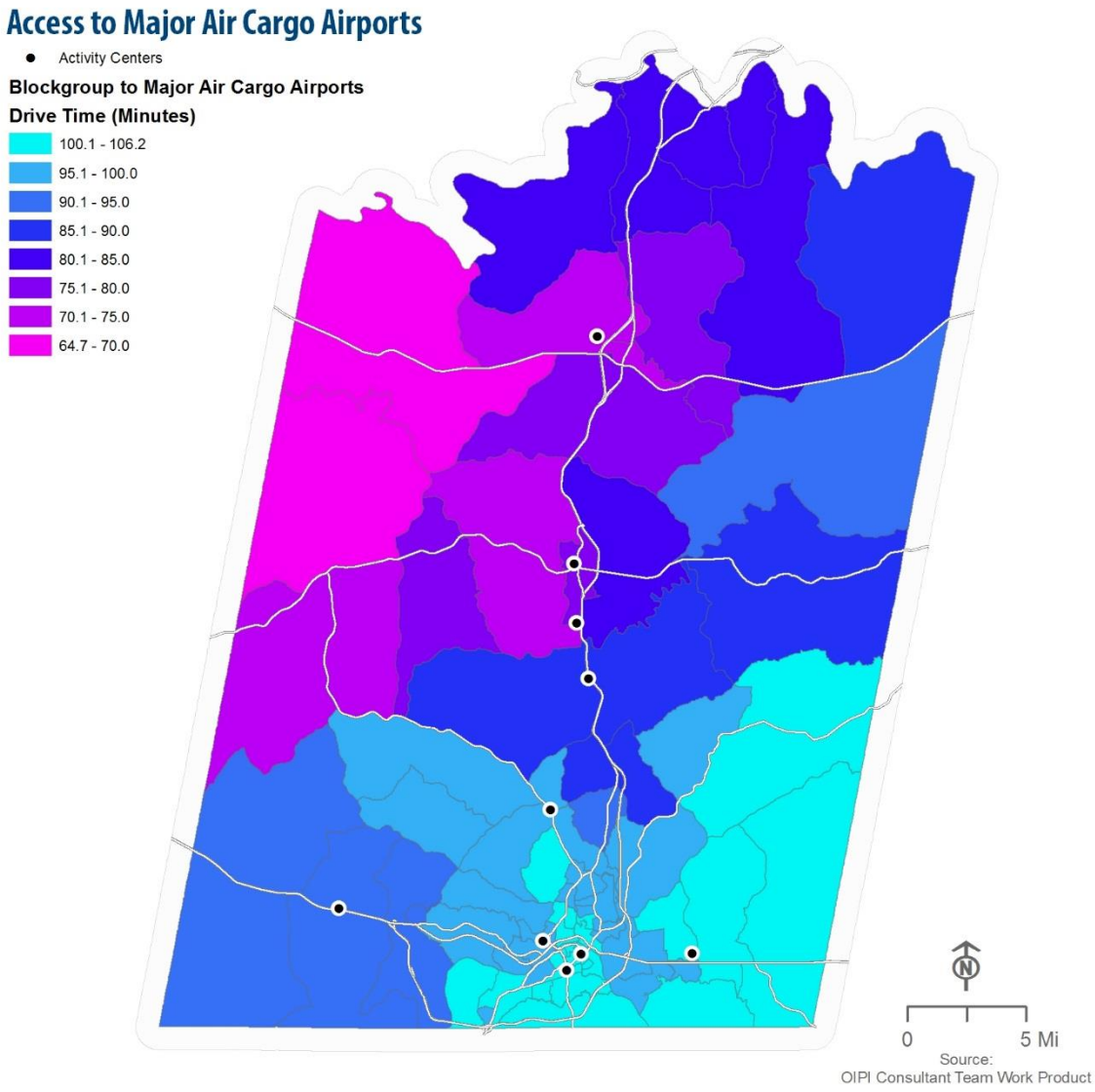


Figure 21: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in the Danville Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 20 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for major roadways were available for analysis in the Danville Region, as they are the major arterial roadways with heavy commuter traffic. Overall, many of these corridors scored well on the reliability index, with all of US Route 29, and US Route 58/360 in Pittsylvania County scoring as reliable. In the City of Danville US Route 58/360, US Business Route 29, and VA Route 293 have lower levels of travel time reliability. There are, however, no areas of significant concern along either corridor. (Refer to Figure 22).

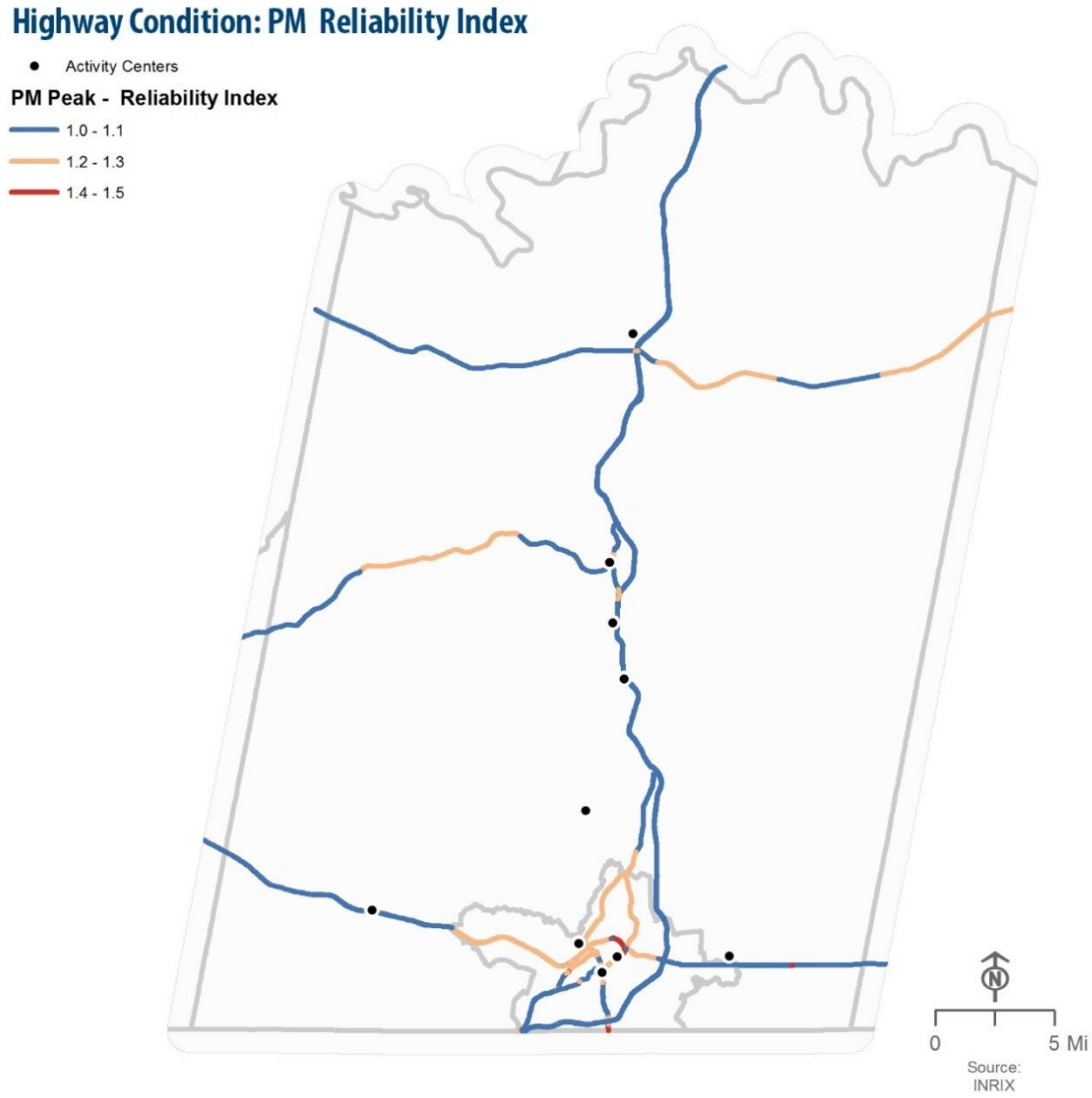


Figure 22: Travel Time Reliability

Note: the Reliability Index is based on a statewide scale which may skew the scores for the Danville Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major roadways in the region. According to the analysis, the major roadways did not have an issue with congestion. (Refer to Figure 23).

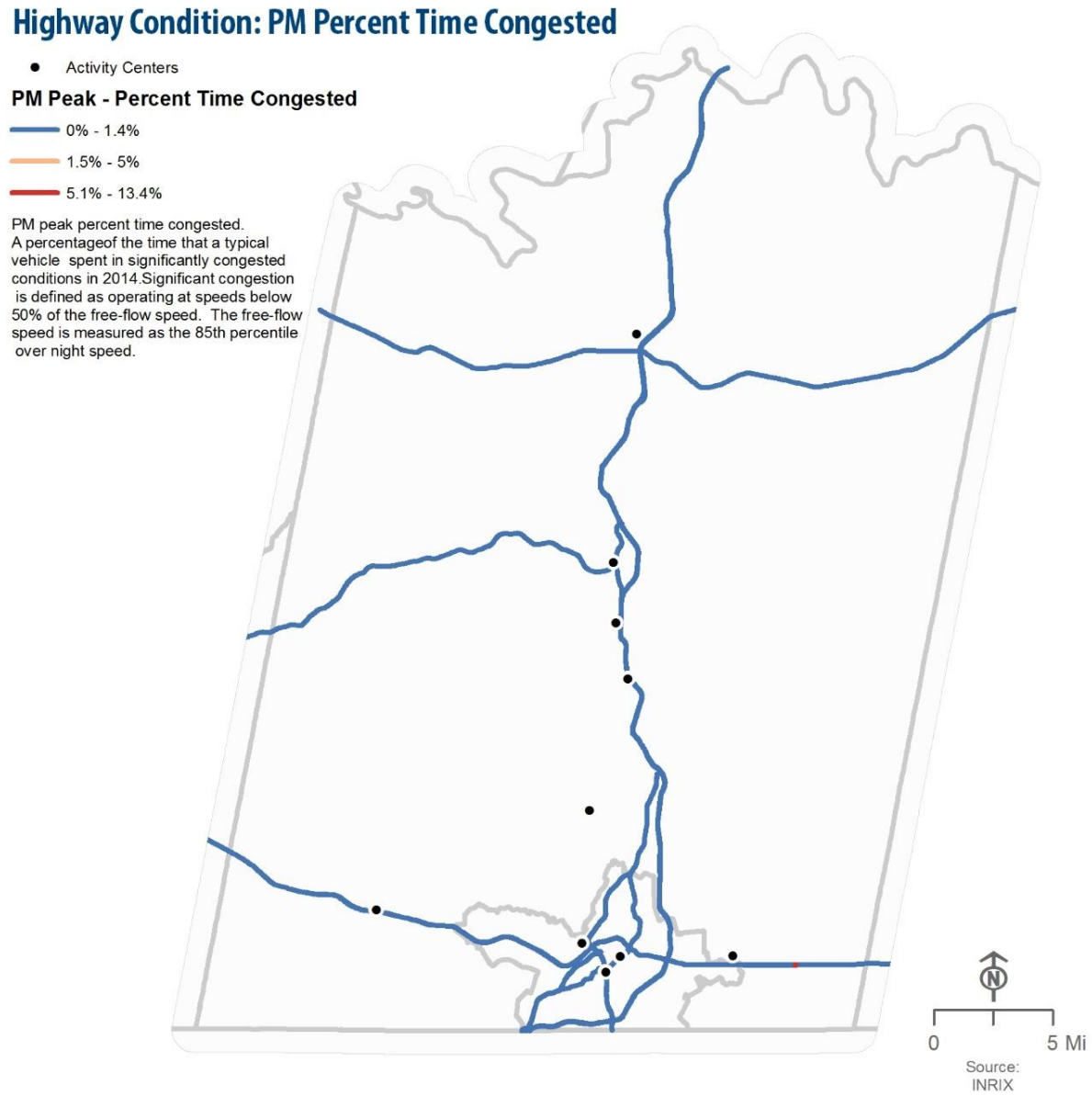


Figure 23: Percent of Time Congested

Travel Time Delay

Figure 24 displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit. Travel time delay on the Danville Regional Network is minimal, with slight delays occurring on segments of US Routes 29 and 58 in Pittsylvania C. (Refer to Figure 23).

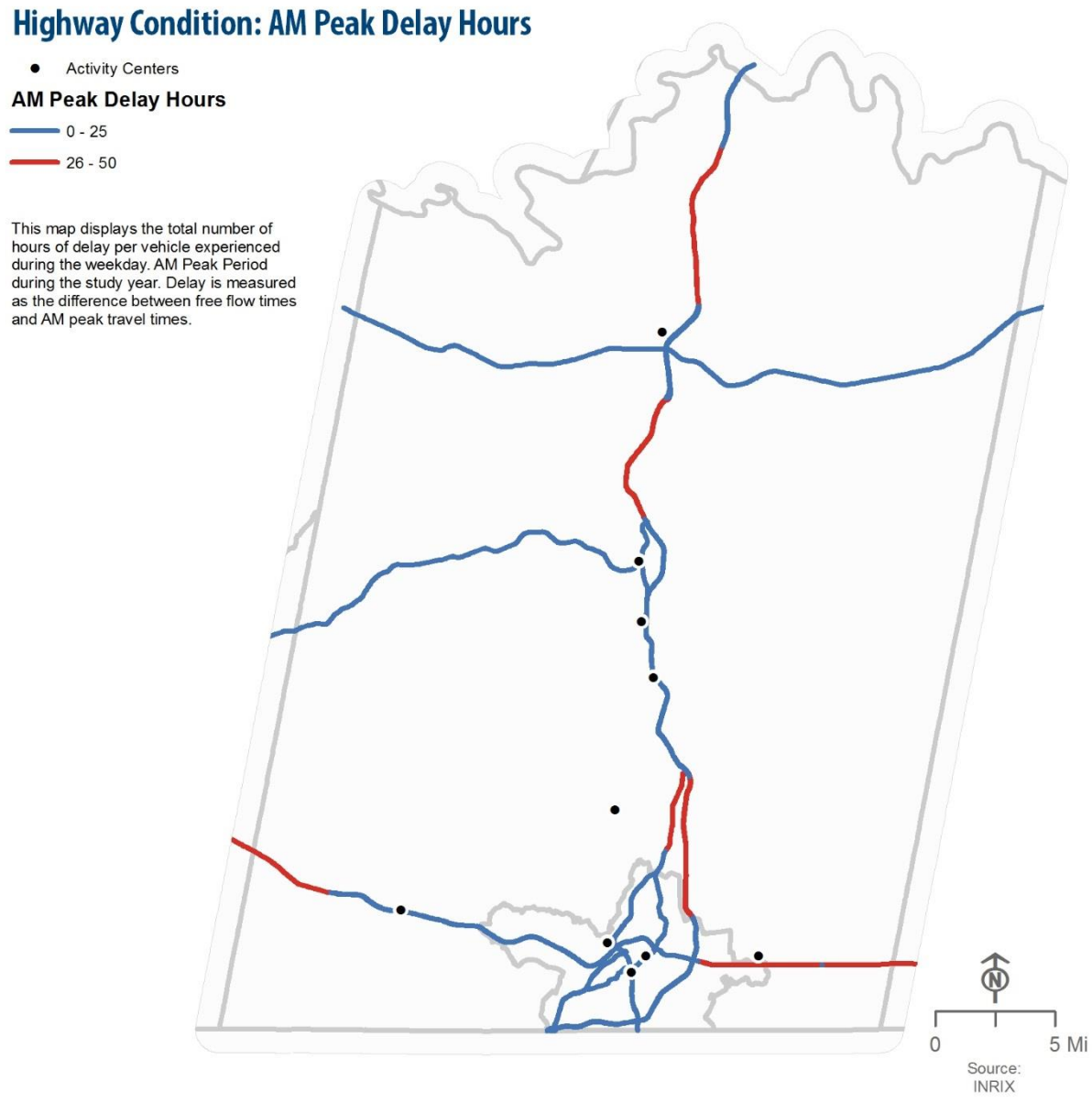


Figure 24: Travel Time Delay

Median Speeds

Figure 25 displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. (Refer to Figure 25).

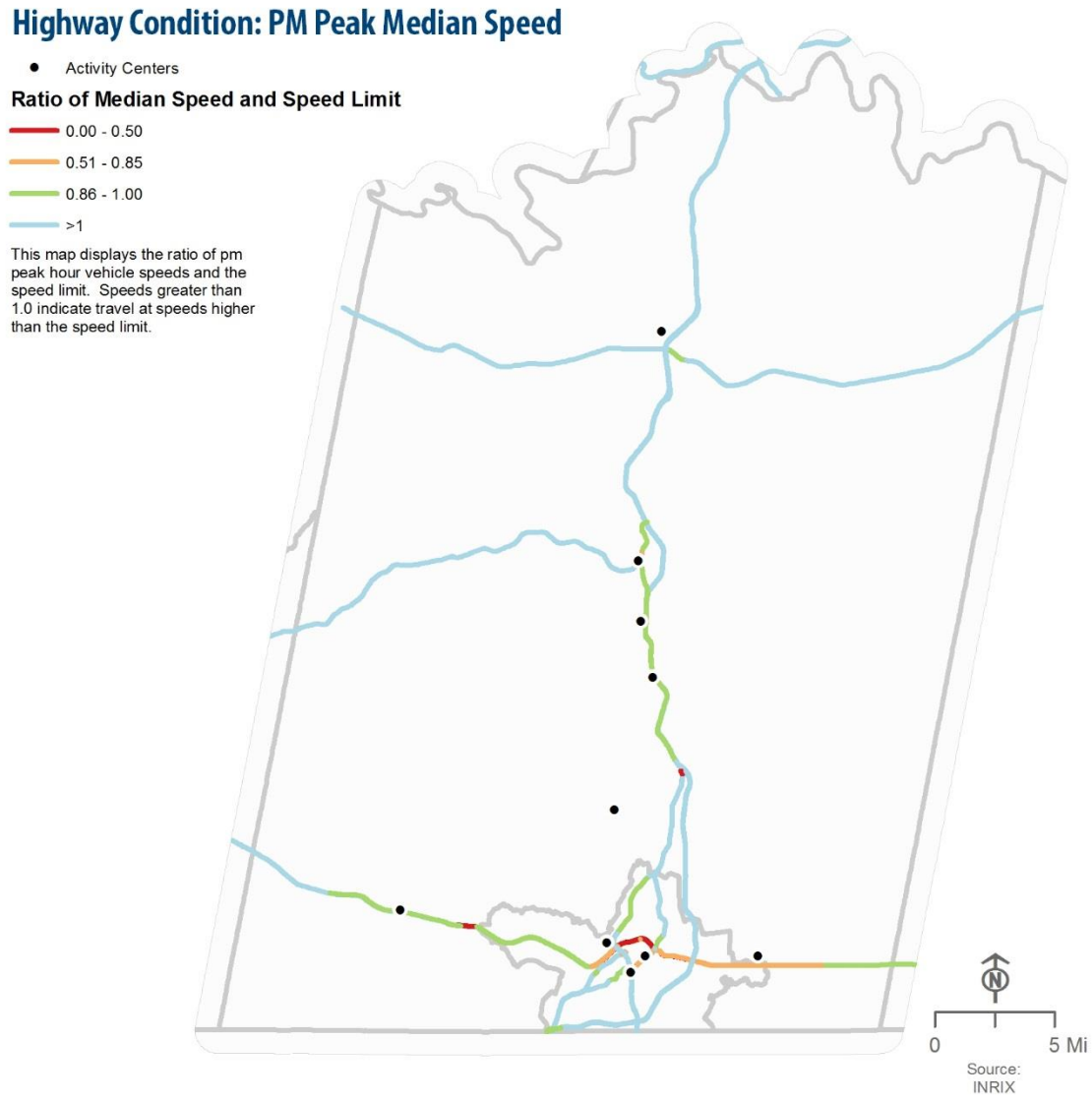


Figure 25: Median Speeds

E. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are specific to the regional and local commodity flows via the various freight corridors in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the Danville Region, an estimated 88% of the dollar value of all goods that are moved through the region are moved by truck. Rail is the second most important mode, carrying around 11% of the total dollar value of goods. For both jurisdictions in the region, trucks are the primary means of moving goods. (Refer to Figure 26).

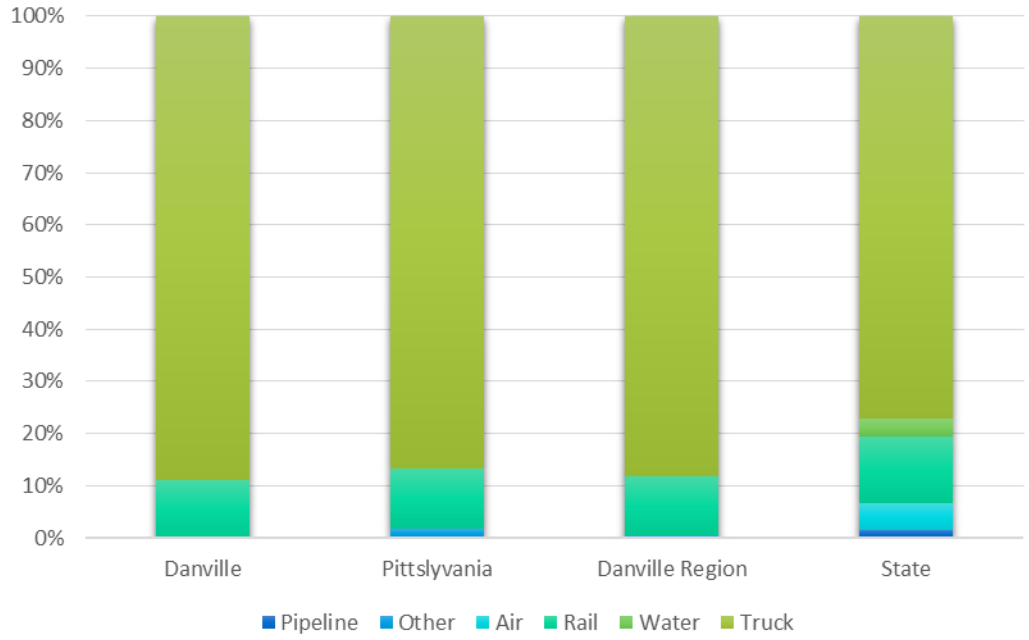


Figure 26: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location quotients are used to compare the prominence of freight modes between the Danville Region, and the state as a whole. The Danville Region relies on trucks for freight movement 1.14 times more than the does the state as a whole. Rail and air transportation for goods is more common for the state on average than it is for the Danville Region. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the relatively large distance – over a two hour drive – to Richmond International Airport from the Danville Region. (Refer to Figure 27).

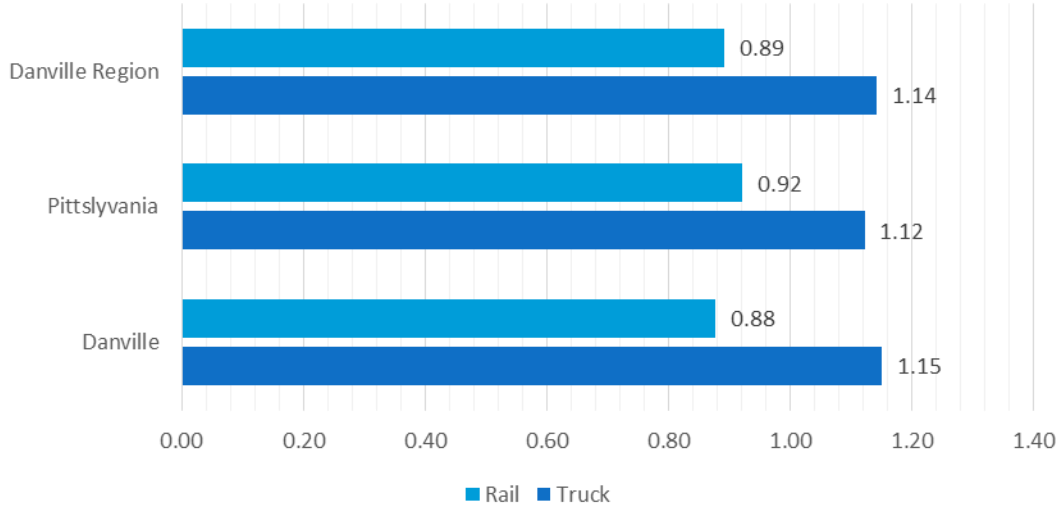


Figure 27: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

Other commodities accounts for the largest share of exported commodities, based on value, in the Danville Region. This accounts for over $1 billion in imports and $759 million exports for the Danville Region. Overall, the Danville Region imported $3 billion worth of goods and exported $2.8 billion worth of goods, resulting in $200 million dollars of net exports in 2012. (Refer to Figures 28 and 29).

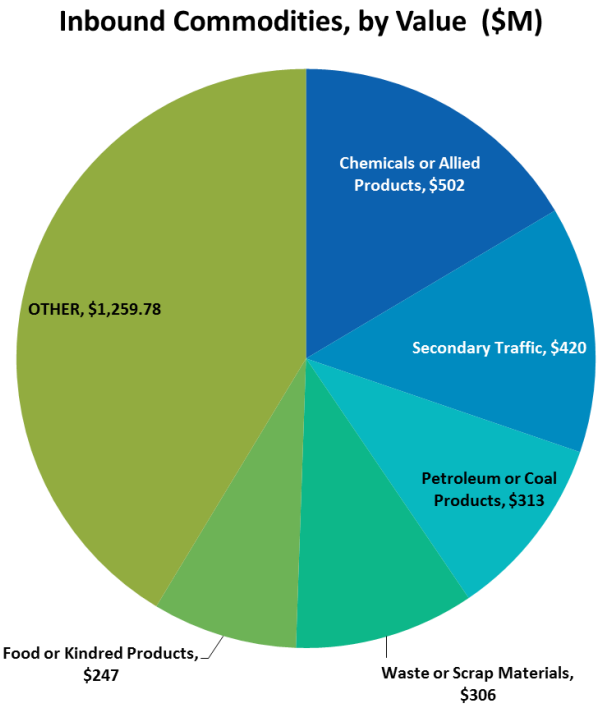


Figure 28: Top Freight Values by Commodities.
Source: TranSearch, 2012

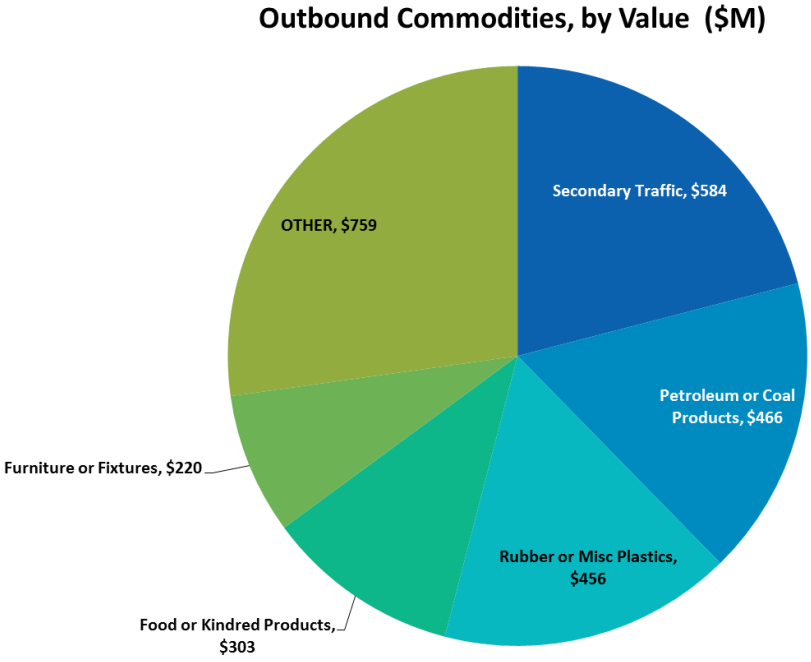


Figure 29: Top Freight Values by Commodities.
Source: TranSearch, 2012

The Southeast Region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Danville Region. In 2012, over $1 billion of freight was exported to the Southeast Region from the Danville Region. Freight movements to the Mideast Region are responsible for the next highest value, accounting for $383.5 million worth of goods. (Refer to Figure 30).

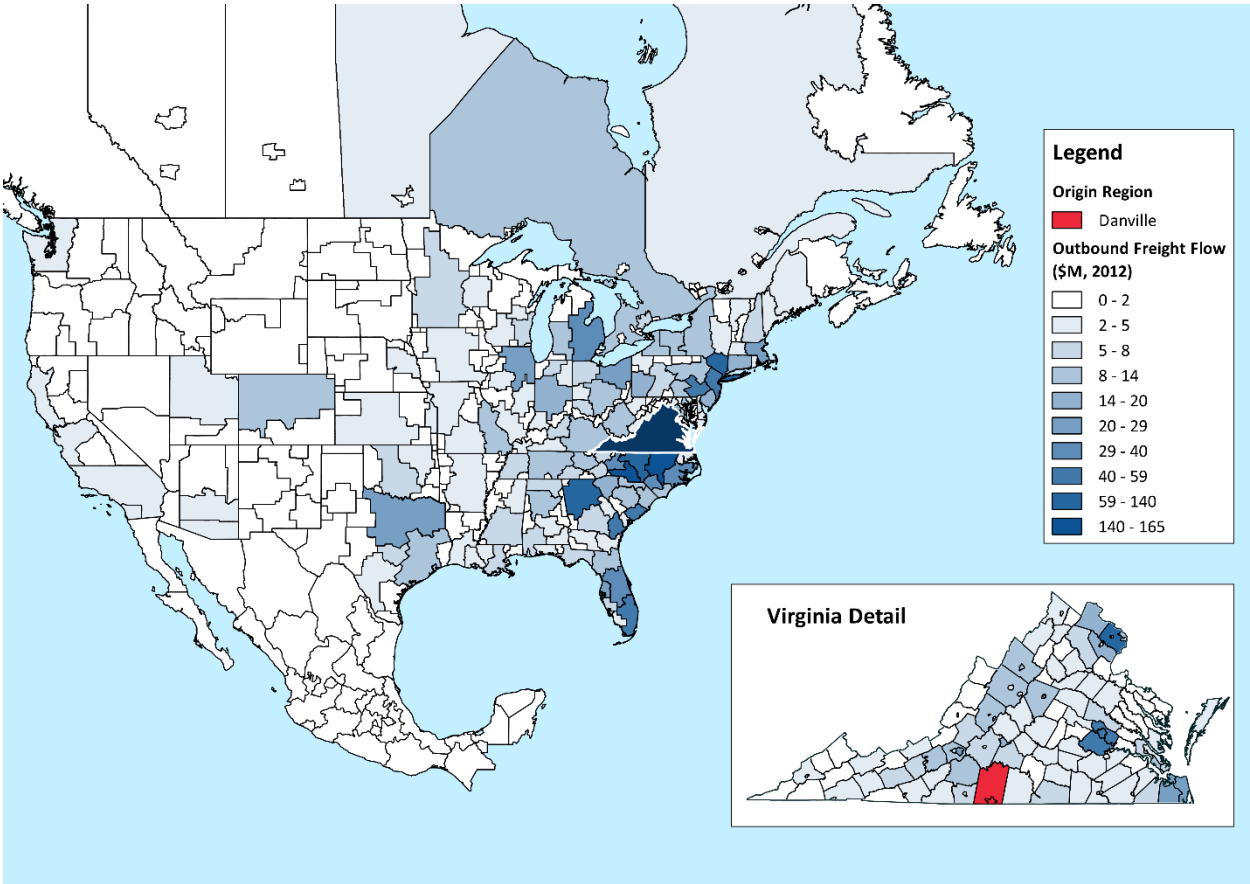


Figure 30: Top Freight Values by Region.
Source: TranSearch, 2012

When freight movements were analyzed by weight, waste or scrap materials was the largest share inbound tonnage for the region, accounting for over one million tons of inbound commodities. Secondary traffic accounts for the highest tonnage of outbound commodities. (Refer to Figure 31 and 32).

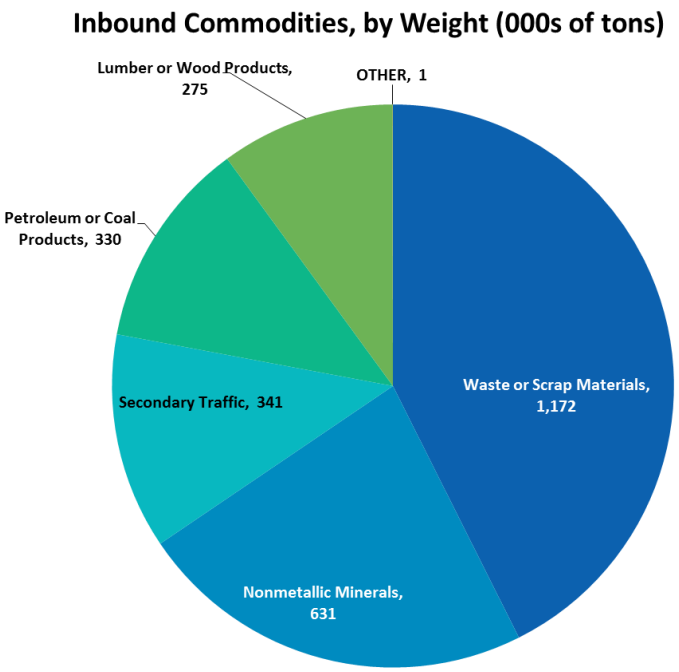


Figure 31: Top Commodities by Weight - Inbound.
Source: TranSearch, 2012

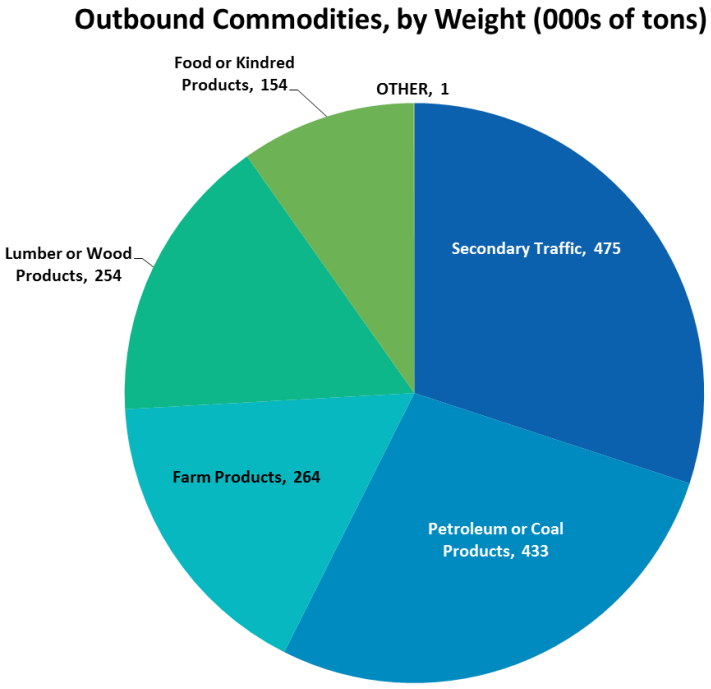


Figure 32: Top Commodities by Weight – Outbound.
Source: TranSearch, 2012

4. Needs PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.
These Needs were categorized into a series of five very broad types of Capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the OIPI team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile previously in this document, when the 2025 Future Economic Profile was estimated for the Danville Region, it showed a relatively equal distribution among the freight and local economic sectors (49% freight and 40% local), with a smaller segment of the knowledge sector (11%).

Since the sector shares of regional economic output are expected to remain unchanged in 2025, the focus is on improving current transportation issues. The economic and transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. The freight economic sector needs access to reliable modes of transportation to move goods quickly and on-time. Therefore, transportation needs should include expanding mode choice as well as corridor reliability.

The identified transportation need of expanding mode choice includes better transit access, both within the region's economic activity centers and between the centers. Fixed route transit exists in the region only in and around the City of Danville. However, the continued importance of the local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access.

Another identified transportation need is corridor reliability for major arteries in the region, namely US Route 58 and US Route 29. While congestion in the region is minimal, bottlenecks and limited network capability constrains the reliability which is detrimental for on time deliveries of goods. Freight movement is also inhibited in other parts of the region where freight traffic must rely on secondary roads that are not designed for this type of traffic.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential needs identified by stakeholders in the first Regional Forums, as well as new needs that emerged from the spatial analysis of the data. These needs were categorized into a series of very broad types of capacity needs as described above. The spatial analysis of needs consists of a map of needs, a table of identified Needs, and a findings of needs

that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

To assist with the understanding of the map and table of needs described below and the relationship of these needs to the Corridors of Statewide Significance and the Urban Development areas, please refer to the following legend of icons.

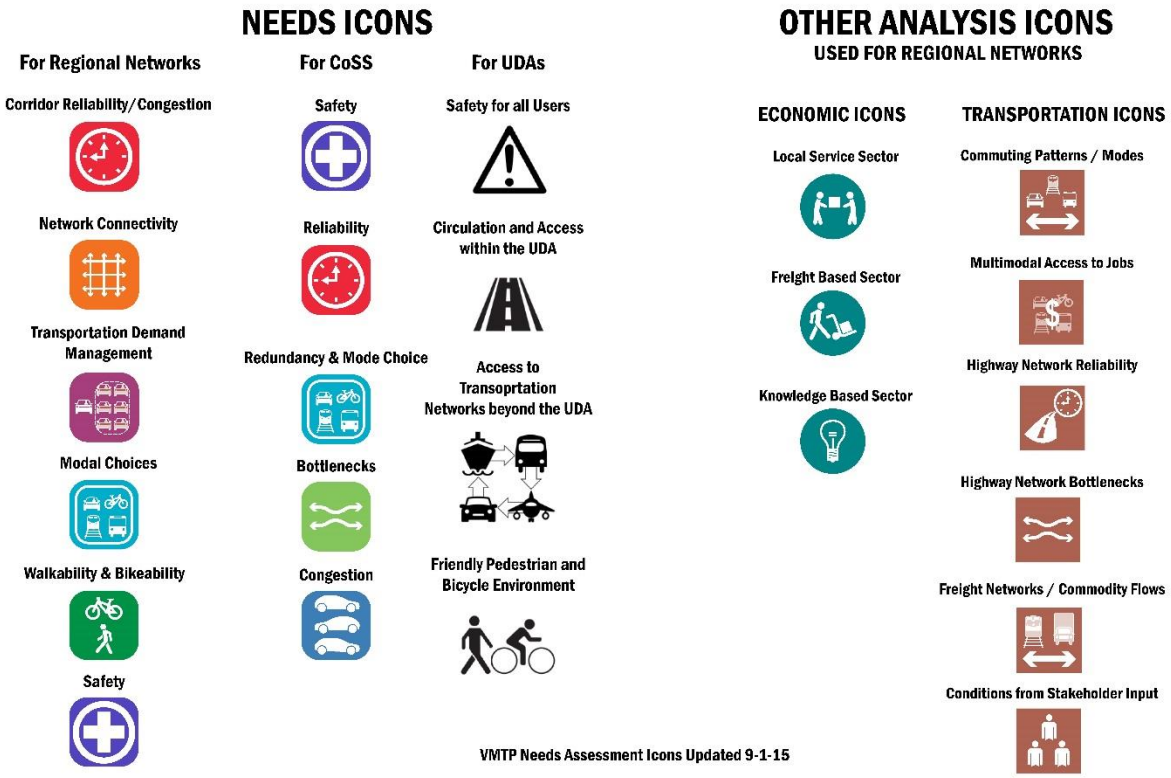


Figure 33. VMTP Needs Icons

Map of Needs

The map below summarizes the regional transportation needs according to activity centers and corridors. The needs are summarized and color coded by general category. Each of the needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified transportation needs in the region, and describes the basis for each need in terms of economic and transportation findings and data. The analysis of regional network transportation Needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need
2. General Description of Need

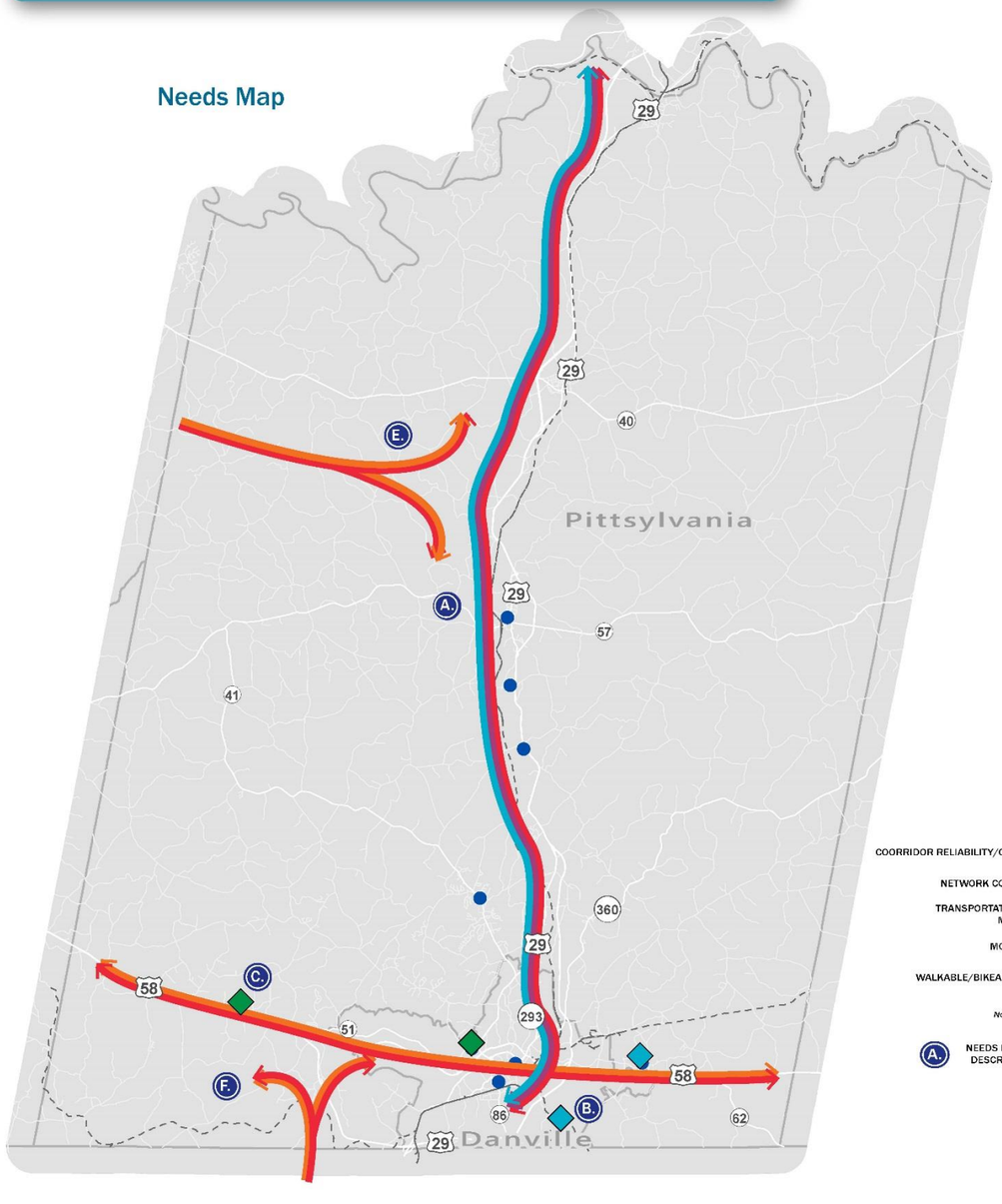
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as needs, but only for supporting data to make an objective determination of need.

Figure 34. Summary Needs Map for Danville Region

Danville Region Needs Summary

Needs Map



Needs Table

A. US 29 Corridor Reliability

The US 29 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. The corridor is currently underserved by transit, park-n-ride and transportation demand management programs.

B. Expand Modal Choices

The Danville Transit system currently serves the urban core of the region, covering areas on both sides of the Dan River, reaching multiple employment destinations, shopping centers, and medical and educational facilities. There are still a few major employers and activity centers that exist just beyond the reach of Danville Transit.

C. US 58 Corridor Reliability

The US 58 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. Compared to other parts of Virginia, congestion is not a major issue in the Danville region. However, there are network bottlenecks that create safety and operational concerns due to high traffic volumes and limited network capacity.

D. Walkable/Bikeable Places

The Danville region is largely auto-centric and is generally under-served by alternative modes of transportation. A lack of active transportation infrastructure creates safety concerns and reinforces reliance on vehicular travel.

E. Western Pittsylvania Network Connectivity

Freight traffic originated in western Pittsylvania County need greater network connectivity and reliable access to US 29 and Route 40. Freight traffic regularly use winding secondary roads to avoid busy intersections, which creates some safety and reliability issues. There is a need to improve freight reliability and network connectivity to alleviate these issues.

F. Southern Danville Freight and Interstate Network Connectivity

Local input and empirical evidence suggests that the Danville region is closely linked with both passenger and freight activity in North Carolina. Promoting network connectivity in the southern part of the region will ensure successful interstate traffic flows and economic competitiveness.

Table 11: Findings of Needs

A. US 29 Corridor Reliability

NEED

The US 29 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. The corridor is currently underserved by transit, park-n-ride and transportation demand management programs.

ECONOMIC

The corridor serves the major activity centers of Downtown Danville, Gretna, Chatham and others. These centers include local serving, knowledge based and freight dependent industries. As a result, peak traffic times include significant commuter traffic. Increased transit and TDM services can help provide multimodal options for commuters and increase reliability for all users.

TRANSPORT.

There are few congestion and delay issues in Danville. However, there are several bottlenecks along the US 29 corridor that create reliability issues, particularly in the PM peak period. This highlights the need for alternative travel options for commuters.

B. Expand Modal Choices

NEED

The Danville Transit system currently serves the urban core of the region, covering areas on both sides of the Dan River, reaching multiple employment destinations, shopping centers, and medical and educational facilities. There are still a few major employers and activity centers that exist just beyond the reach of Danville Transit.

ECONOMIC

Transit access supports local serving and knowledge based industries and regional activity centers. Some of the most notable locations just outside the operating limits of Danville Transit include the Cane Creek activity center and Goodyear, one of the region's largest employers.

TRANSPORT.

Transit accessibility data indicates that the urban core of the Danville region is served well by the existing transit system. However, outside of the urban core, accessibility to jobs via transit is lacking and commute times generally increase. Providing modal choices to commuters and residents increases regional accessibility and creates redundancies in the transportation network.

C. US 58 Corridor Reliability

NEED

The US 58 corridor serves as a major artery for the region. The corridor handles significant commute, thru, and freight traffic; serving multiple activity centers throughout the region. Compared to other parts of Virginia, congestion is not a major issue in the Danville region. However, there are network bottlenecks that create safety and operational concerns due to high traffic volumes and limited network capacity.

ECONOMIC

Connects several activity centers in the region, of all types; including Cane Creek, Danville Regional Medical Center, and Brosville.

TRANSPORT.

Some of the region's worst reliability hot spots and bottlenecks occur along US 58. Primarily, reliability issues as traffic enters and exits the urban center of Danville. Improved reliability is key to serving the multiple activity centers and employment destination along the corridor.

D. Walkable/Bikeable Places

NEED

The Danville region is largely auto-centric and is generally underserved by alternative modes of transportation. A lack of active transportation infrastructure creates safety concerns and reinforces reliance on vehicular travel.

ECONOMIC

The Brosville and Danville Mall activity centers include an elementary school and public library, and multiple shops, markets and restaurants.

TRANSPORT.

The major issues in these areas of the region are modal conflicts, safety concerns and congestion. Providing dedicated infrastructure for all users can alleviate these issues.

E. Western Pittsylvania Network Connectivity

NEED

Freight traffic originated in western Pittsylvania County need greater network connectivity and reliable access to US 29 and Route 40. Freight traffic regularly use winding secondary roads to avoid busy intersections, which creates some safety and reliability issues. There is a need to improve freight reliability and network connectivity to alleviate these issues.

ECONOMIC

Reliable access to major thru routes is of paramount importance to freight related industries.

TRANSPORT.

Regional input suggests that multiple freight movements originate in western Pittsylvania County. Regional data suggests that there is limited network connectivity and redundancy in this part of the region, as well as reliability and congestion issues on Route 57.

F. Southern Danville Freight and Interstate Network Connectivity

NEED

Local input and empirical evidence suggests that the Danville region is closely linked with both passenger and freight activity in North Carolina. Promoting network connectivity in the southern part of the region will ensure successful interstate traffic flows and economic competitiveness.

ECONOMIC

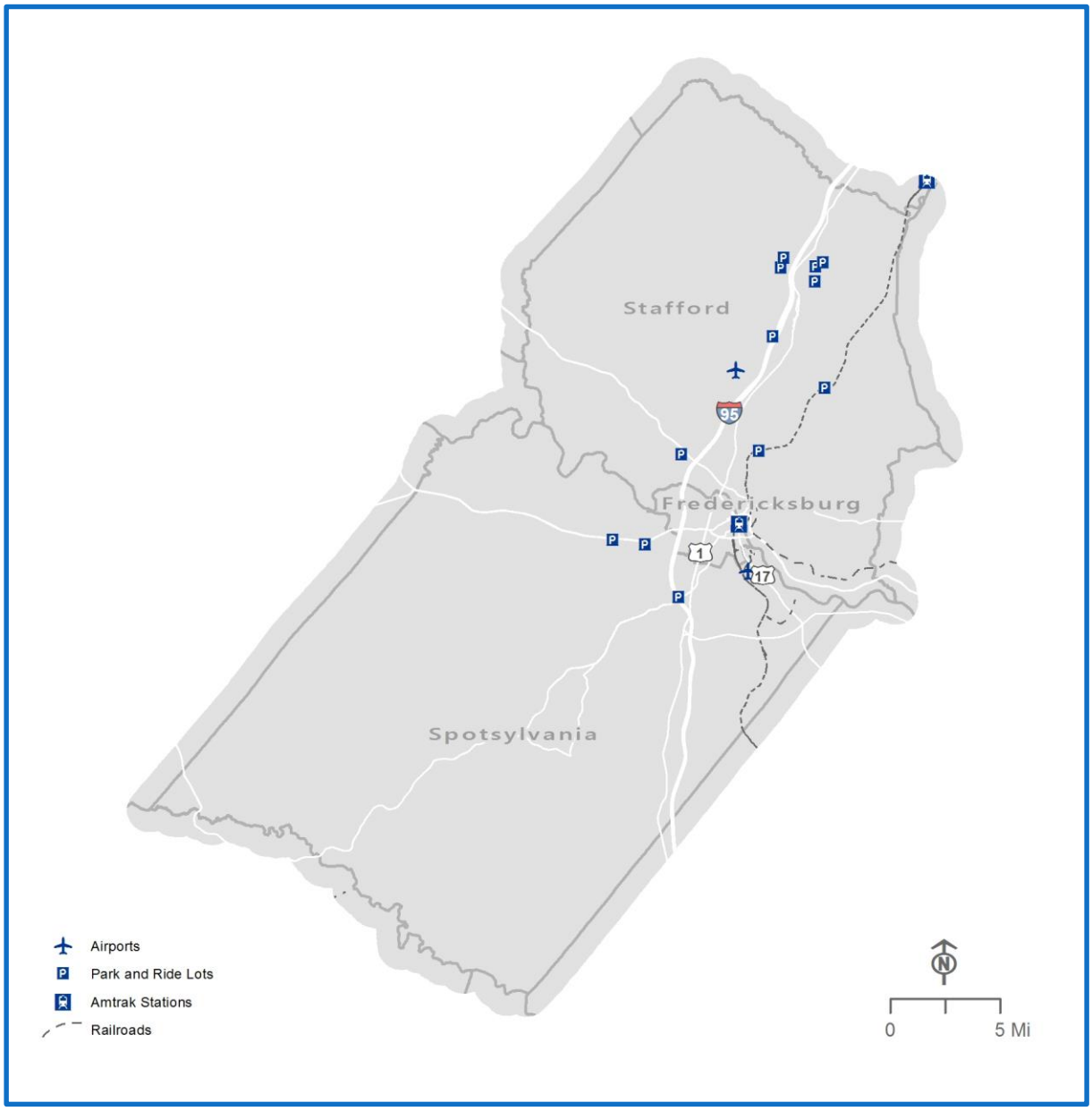
Reliable access for both freight and passenger movement across jurisdictional and state boundaries is vital to the success of local serving, freight dependent and knowledge based industries.

TRANSPORT.

Commuter origin/destination data shows significant passenger flows between Virginia and North Carolina; particularly inflow of workers from North Carolina to the urban core in Danville. Local input indicates that industrial development, such as along Berry Hill Road and points south, will rely heavily on the network for freight movements.

VMTP 2025 Needs Assessment

Regional Needs Profile



Fredericksburg Region

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Fredericksburg Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Fredericksburg Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the existing industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Fredericksburg Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

In the Fredericksburg Region, the Needs Analysis area includes the City of Fredericksburg, Stafford County, and Spotsylvania County.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on

understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from Fredericksburg Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million people. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Current Population - 2012	Weldon Cooper Projection (2025)	Woods & Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, substantial population growth is projected for the Fredericksburg Region. Projections estimate about 150,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Fredericksburg Region Population Projections. Sources: Woods & Poole, Weldon Cooper.

Current Population (2012)	Weldon Cooper Projection (2025)
287,343	432,724

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Fredericksburg Region.

Table 3: County and City Population Projections. Sources: Woods & Poole, Weldon Cooper.

Jurisdiction	Current Population (2012)	Weldon Cooper Projection (2025)	% Change
City of Fredericksburg	27,307	27,442	0%
Spotsylvania County	125,684	194,560	55%
Stafford County	134,352	210,721	57%

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise 15% (slightly less than the state average of 21%) from $38,862 to $44,833. Population growth is also projected to be across age demographics, with a higher percentage of the population under the age of 19.

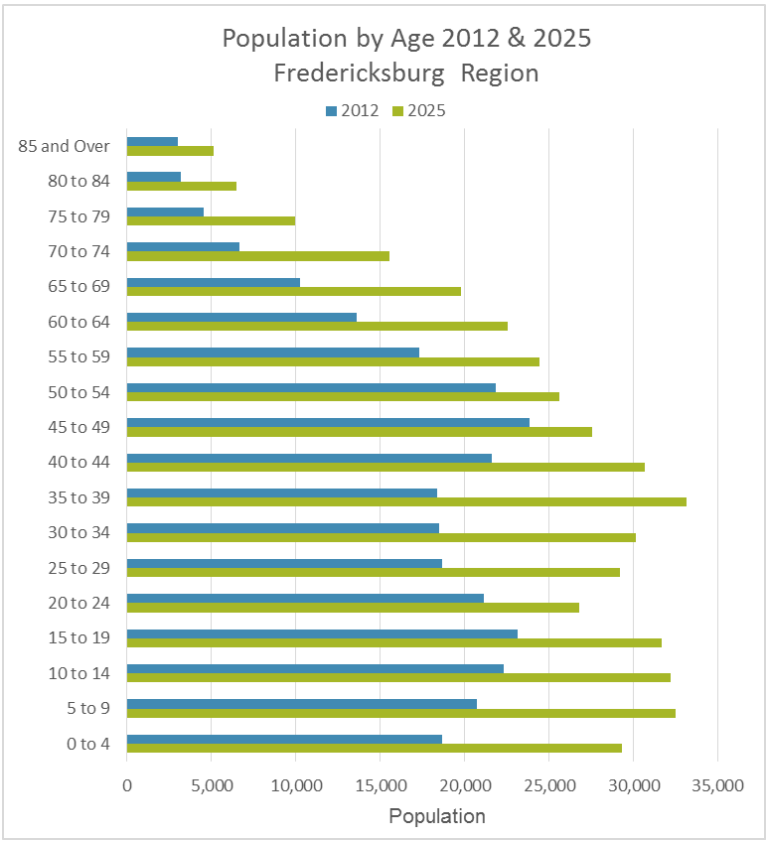


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Fredericksburg region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Fredericksburg Region, Figure 3 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

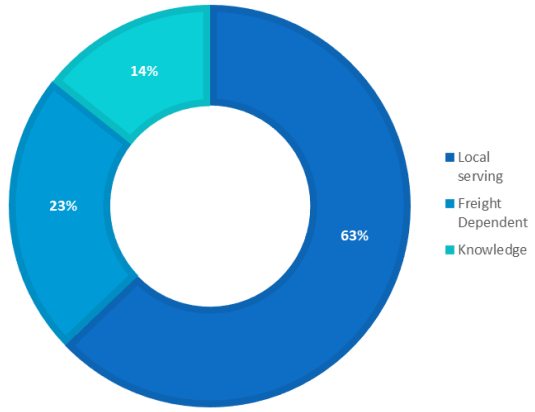


Figure 3 – Top Sectors by Output (2012).
Source: IHS Global Insight, 2012.

The local services cluster is clearly the strongest in this region. Local services make up 63% of the economic output in the Fredericksburg Region. Since a high percentage of persons in the region commute outside the region for work, the employment within the region tends to skew towards local

service based industries. This commuting pattern and occupational pattern is discussed in more detail below. Conversely, the knowledge and freight-dependent clusters account for 14% and 23% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Retail trade is the strongest industry in the Fredericksburg Region when measured by employment. The health care industry comes in a close second, reflecting the number of large health care facilities in the region. Wholesale trade, public administration, and finance/insurance round out the top five industries in the region with the greatest economic output. (Refer to Table 5). Again, with the large number of persons commuting out of the region, the top industries in the region by output tend to be in the locally serving sector of the economy.

Table 4: Current Industries by Output.

Top Industries	NAICS Code	% of Output
Retail Trade	44-45	22%
Health Care	62	16%
Wholesale Trade	42	11%
Public Admin.	92	9%
Finance / Insurance	52	7%

Source: IHS Global Insight, 2012.

Top Industries by Employment

In the Fredericksburg Region, public administration, retail trade, health care, accommodation/food services, and professional services are the top industries by employment. (Refer to Table 6). Again, with the large number of persons commuting out of the region, the four of the top five industries in the region by employment are in the locally serving sector of the economy.

Table 5: Current Top Industries by Employment.

Top Industries	NAICS Code	% of Workforce
Public Administration	92	20%
Retail Trade	44-45	17%
Health Care	62	13%
Accommodation / Food Service	72	11%
Professional Services	54	7%

Source: IHS Global Insight, 2012.

Top employers in the region include Marine Corps Base – Quanitco, GEICO Insurance and Mary Washington Hospital and College. Marine Corps Base employment is not fully captured in the analysis of industries above due to the difficulty of capturing military and federal employment in national employment statistics. GEICO and Mary Washington are major employers who by NAICS industry code would fall into local serving employment category. In the case of Mary Washington, though, it is likely more appropriate to consider them a knowledge-focused employer.

Table 6: Current Top Employers. Source: InfoUSA, supplemented with VEDP, VEC, and local data.

Employers	Employees
Marine Corps Base - Quantico	10,000 +
GEICO Insurance	2,500 – 4,999
Mary Washington Hospital	1,500 – 2,499
Mary Washington College	1,000 – 1,499

Source: IHS Global Insight, 2012.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Fredericksburg Region. The industries expressed in Table 4 have the highest LQ scores in the region. The score for professional services, for example, can be inferred to mean that these services are more than two times more concentrated in the region than in the entire nation, on average.

Table 7: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Professional Services	54	2.41
Accommodation / Food Service	72	1.52
Retail Trade	44-45	1.51
Other Services	81	1.41
Real Estate	53	1.29

Source: IHS Global Insight, 2012.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Activity centers such as Spotsylvania Courthouse were added through coordination with local stakeholders who had a knowledge of the regional significance of the activity in places were existing data sources had little information on employment. Figure 2 below shows the activity centers as blue circles. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles.



Figure 2: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 3 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

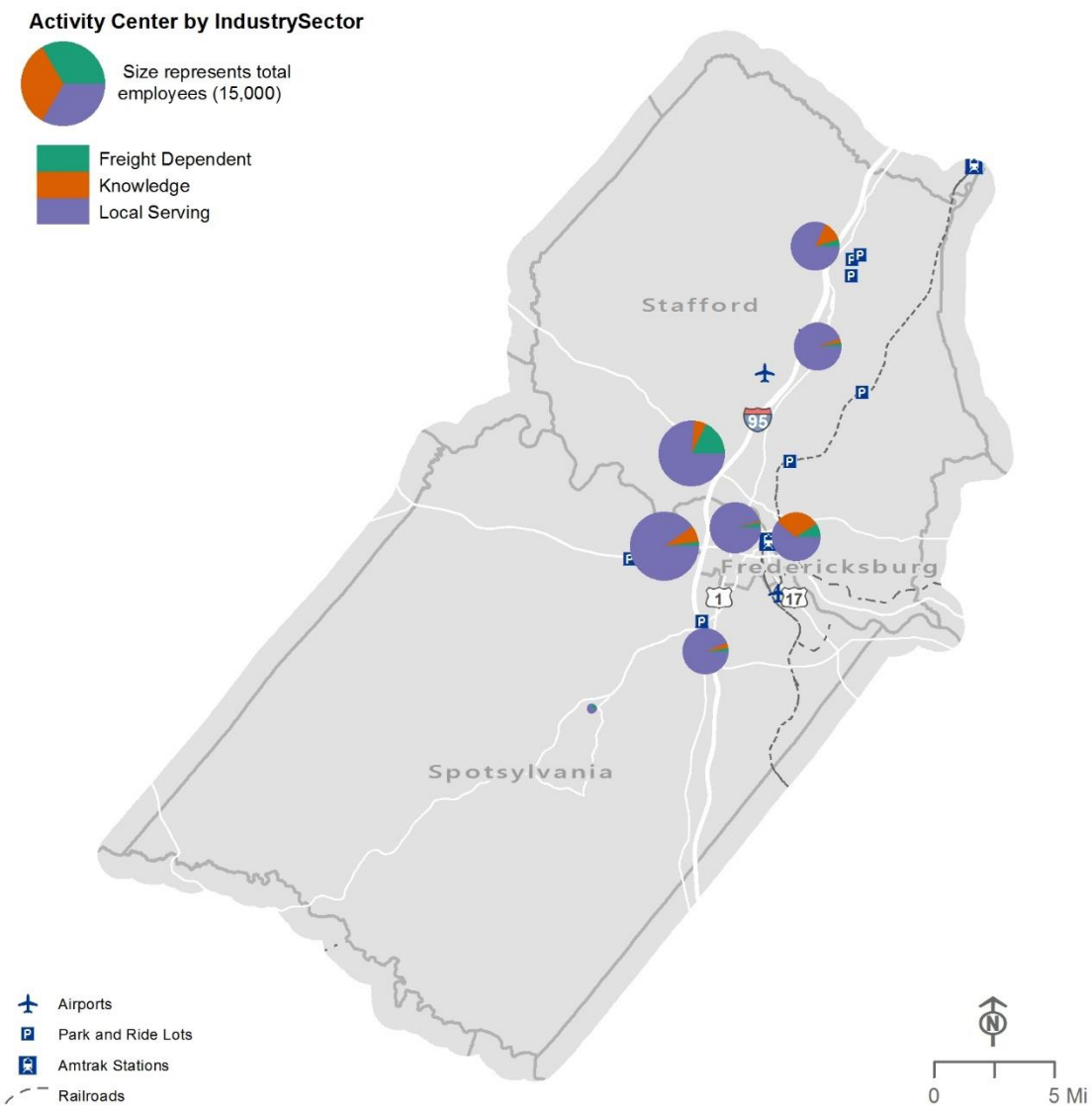


Figure 3: Activity Center Employment by Industry Sector.
Source: IHS Global Insight, 2012.

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E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Fredericksburg Region stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Fredericksburg Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Fredericksburg Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Substantial growth is forecasted for the Fredericksburg Region area by 2025. According to statewide and national datasets used, the administrative services and wholesale trade will see the largest growth. Combined, they are expected to produce $1.5 billion more in 2025 than was produced in 2012.

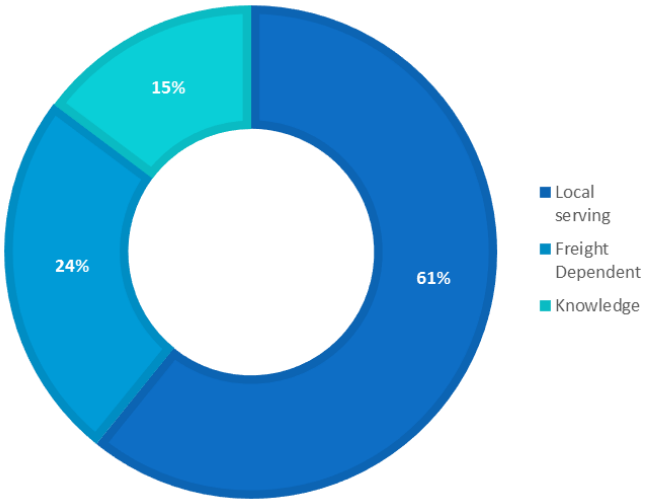


Figure 4: 2025 Industry Sectors by Output.
Source: IHS Global Insight, 2012.

The local services cluster will remain the dominant industry sector in 2025, however it is anticipated to be a slightly smaller share. Between 2012 and 2025, the local serving sector share of the regional industry will drop by 2%, making up 61% of the regional output. The knowledge and freight-dependent

clusters account for 15% and 25% of economic output, respectively. There are not any major changes in the regional economy that would influence the future transportation needs.

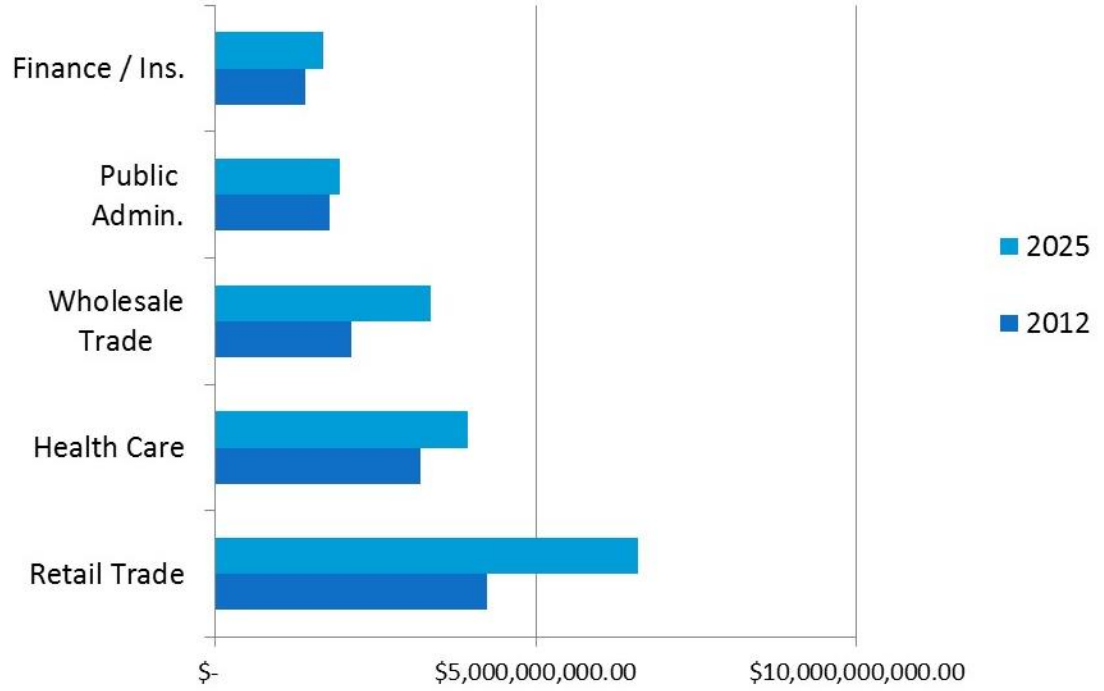


Figure 5: Top Industries by Output –
Source: IHS Global Insight, 2012.

Output for the major industries will continue to grow in 2025, with the industry with the largest output, retail trade, growing by 56%. In all industries combined, economic output in the Fredericksburg Region is expected to increase by $7 billion by 2025. (Refer to Figure 4).

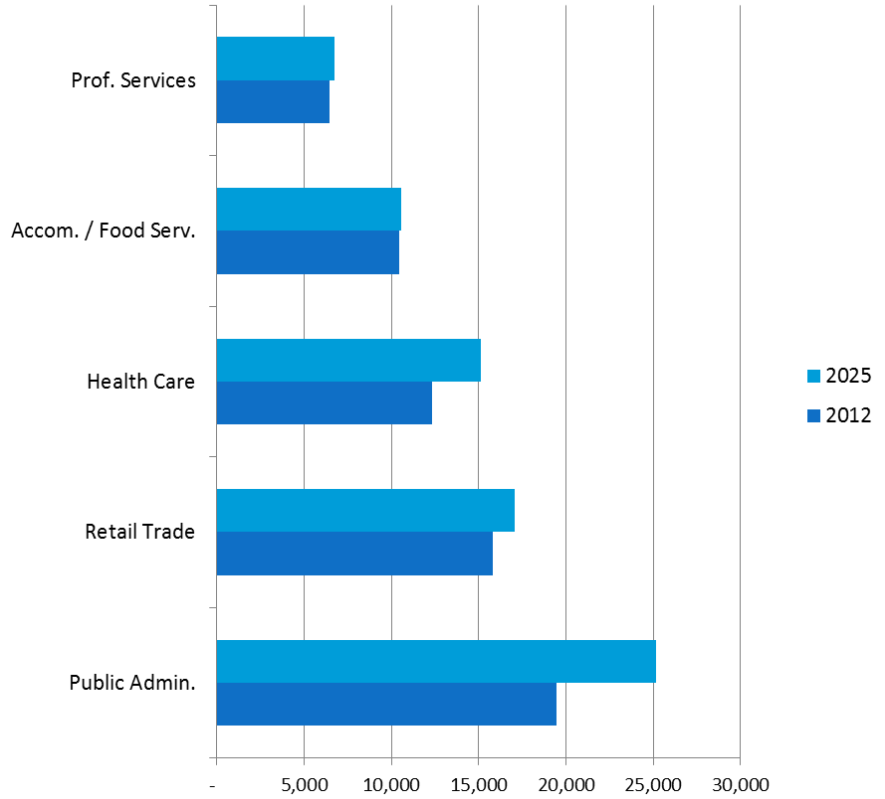


Figure 6: Top Industries by Employment.
Source: IHS Global Insight, 2012.

The highest growing industry by employment in the region is administrative sector, which will grow by 70% between 2012 and 2025. Other growth industries include wholesale trade, retail trade, transportation and warehousing, and mining. Many of the region's highest employment industries will continue to grow in 2025, especially in public administration and health care.

Table 8: Top Industries by Employment.

Top Industries	NAICS Code	% Change in Employment (2012-2025)
Administrative Sector	56	50%
Construction	23	42%
Transportation and Warehousing	48-49	34%
Public Administration	92	30%
Wholesale Trade	42	25%

Source: IHS Global Insight, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Fredericksburg Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Fredericksburg Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Fredericksburg Region show that a large number of workers commute outside the region. Figure 7 shows the breakdown of residential occupations versus worker occupations in the region, showing a significant gap in Administrative Support, Protective Services, Management Professionals, and Engineering and Computer Science occupations.

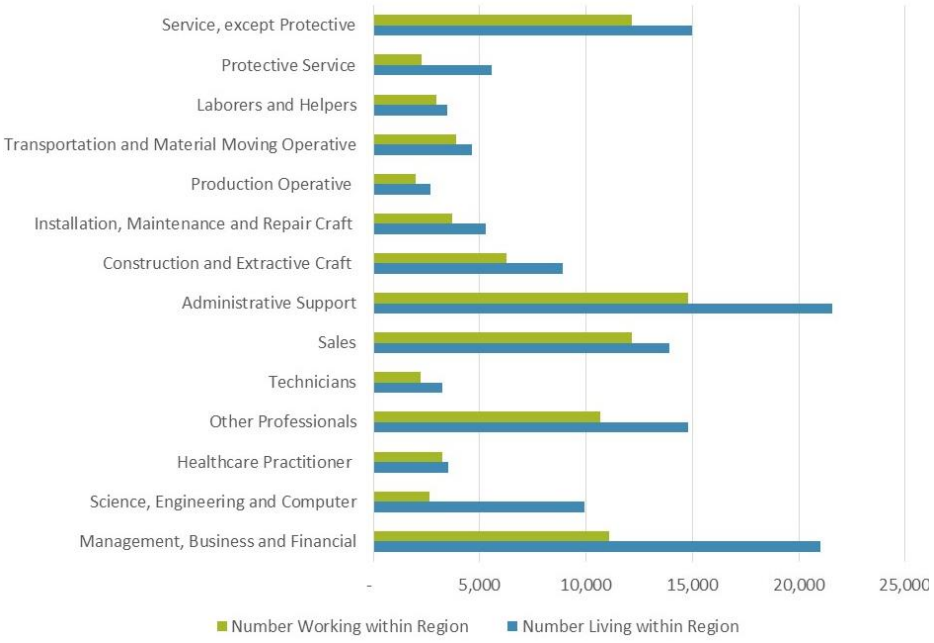


Figure 7: Comparison of Resident and Worker Occupations
Source: US Census Bureau, EEO Tabulations 2006-2010 (5 Yr ACS)

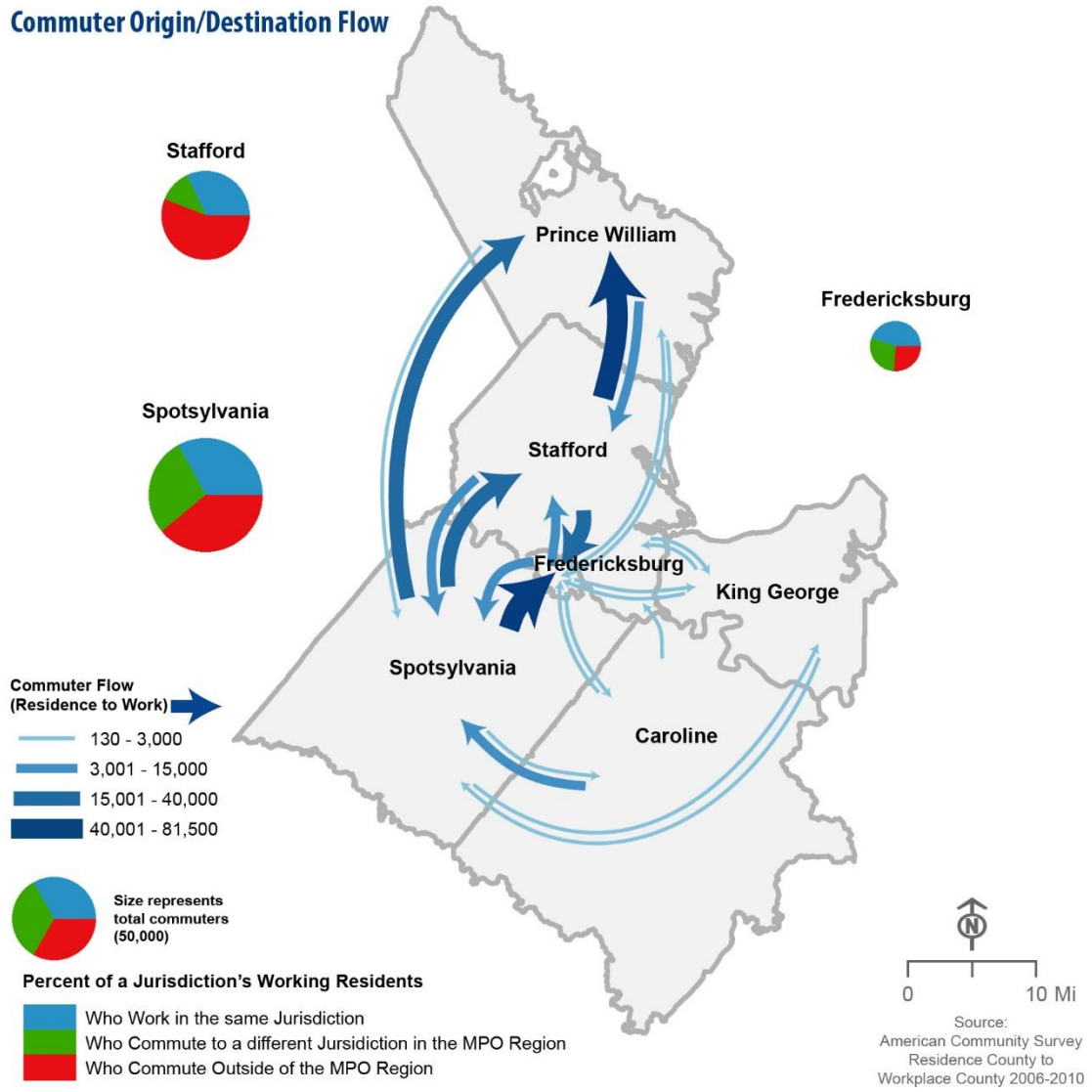


Figure 8: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

As represented in Figure 8, a third of Spotsylvania workers commute outside the Fredericksburg Region. More than half of Stafford workers commute outside the region. However, in the City of Fredericksburg a third of workers commute outside the region. Conversely to the rest of the region, almost half of workers in the City of Fredericksburg work in the same jurisdiction.

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for Fredericksburg Region was the analysis of commuting patterns between activity centers. Figures 9 through 14 below provide insights into the commuting patterns for three of the activity centers in the Fredericksburg Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown in Figure 9, Fredericksburg Downtown has a tight commuter shed, with most commutes originating in areas in and around the City of Fredericksburg. For these patterns, VA Routes 2 and 3 are important for workers commuting to Fredericksburg Downtown.

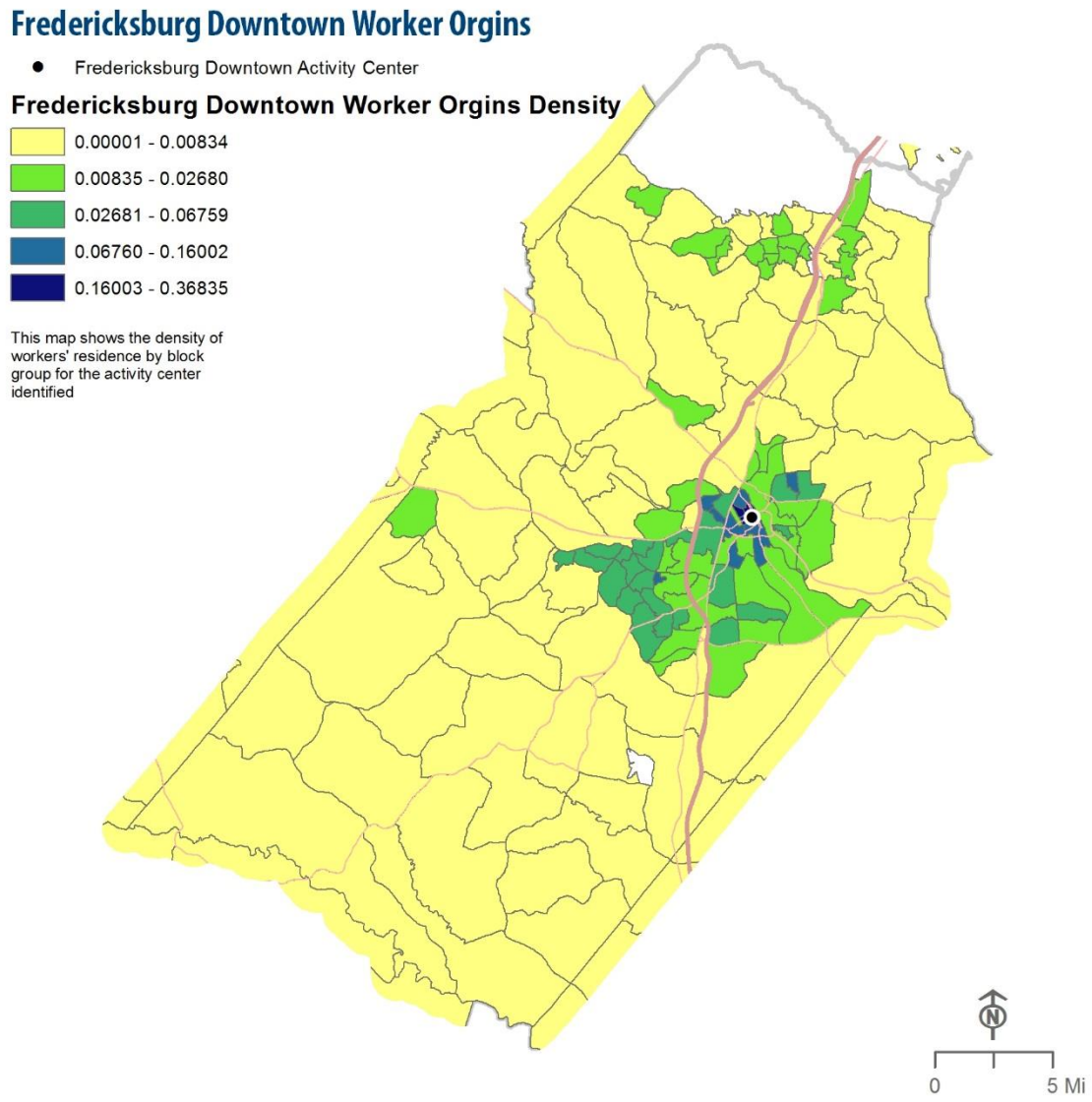


Figure 9: Commuting Patterns to Fredericksburg Downtown Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

As with Fredericksburg Downtown, the Garrisonville activity centers see most commutes originate in and around the activity center, with a modest portion of commutes originating from the City of Fredericksburg and Spotsylvania County. (Refer to Figure 10). Corridors important for this commuting pattern are I-95 and VA Route 610.

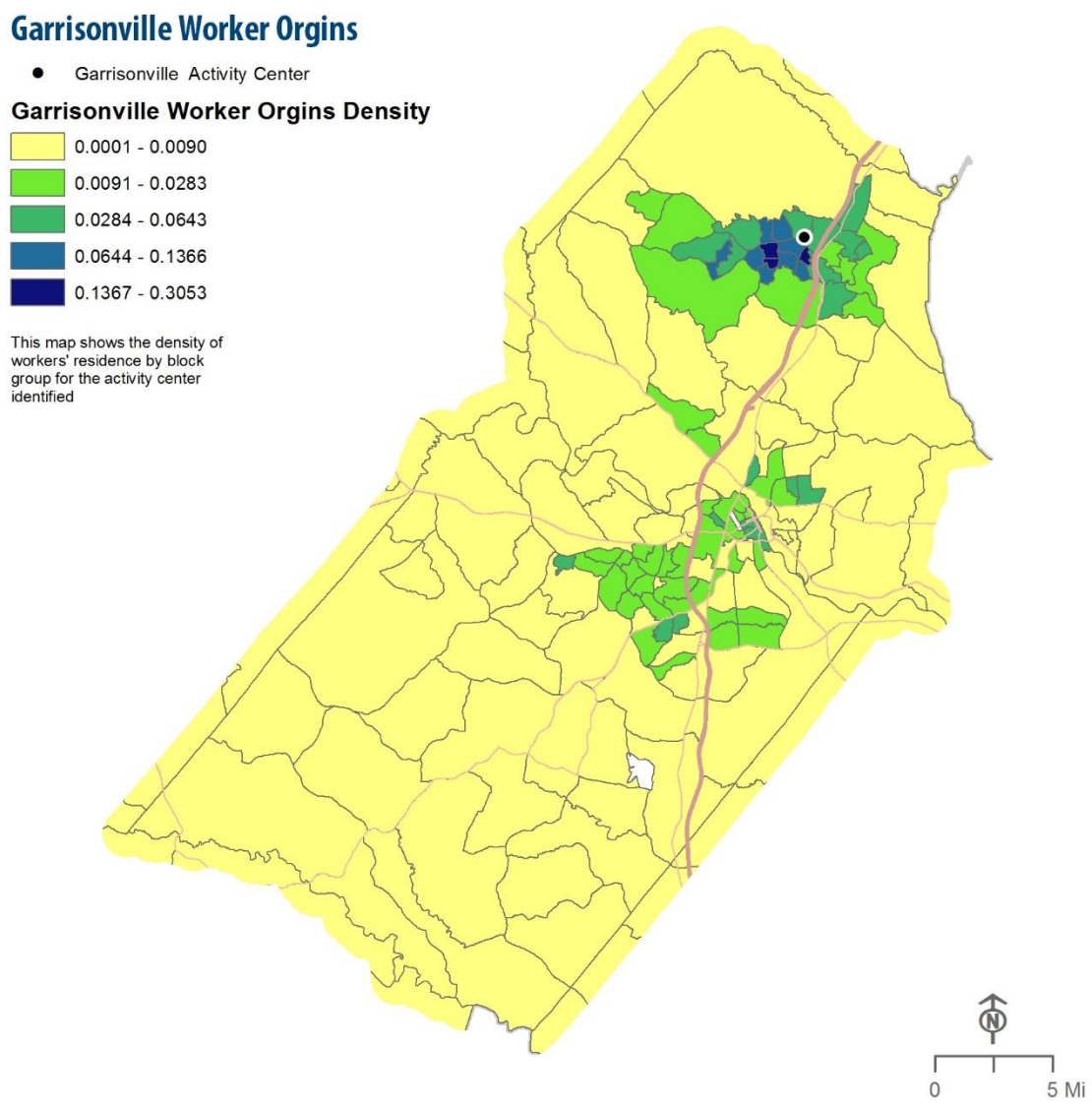


Figure 10: Commuting Patterns to Garrisonville Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the Mary Washington activity center mostly originate in the block groups surrounding the activity center, with a modest number of commutes originating in Stafford County. For these commuting patterns, I-95, VA Route 3, and US Route 1 are important of daily commutes to this activity center. (Refer to Figure 11).

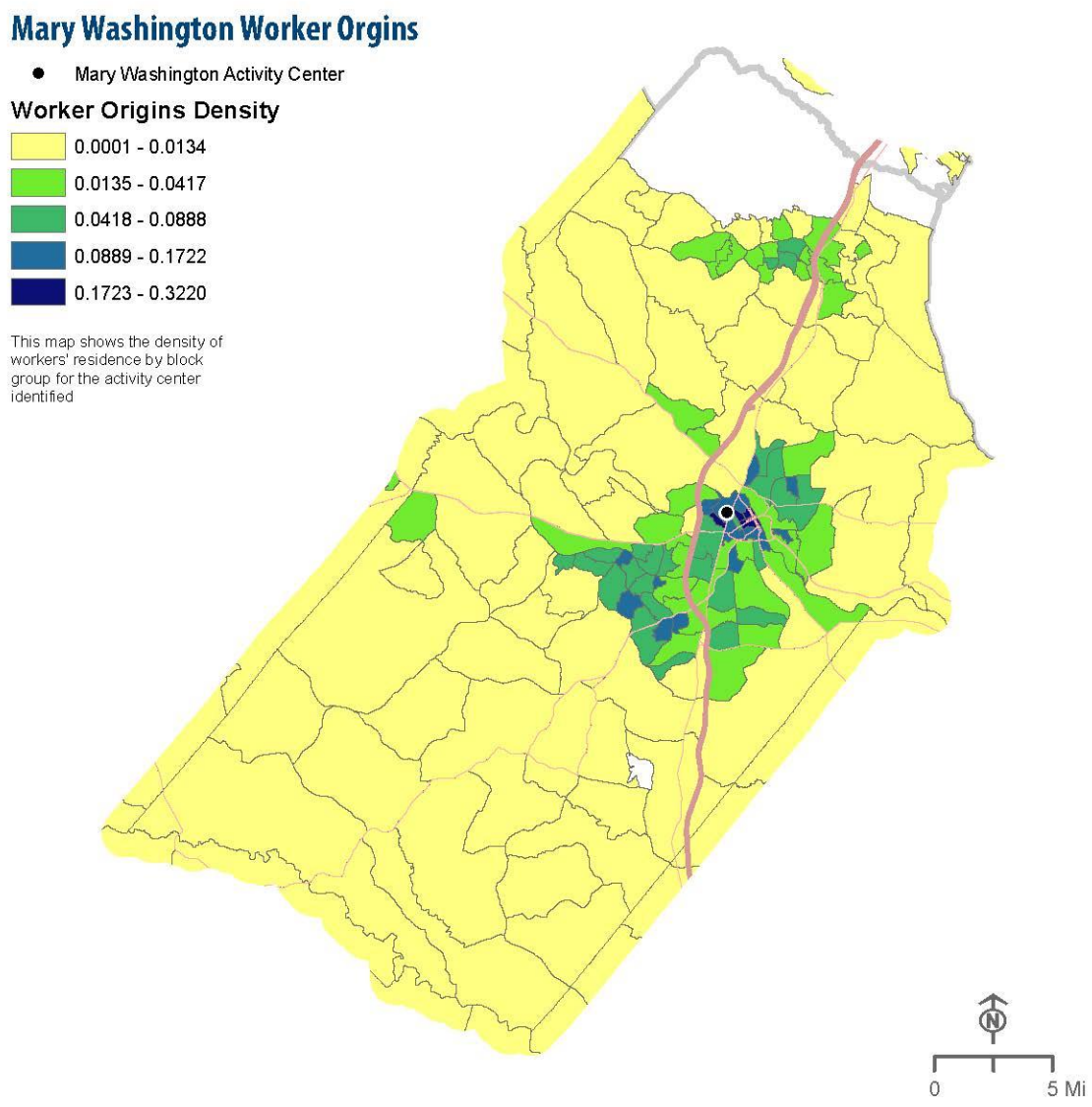


Figure 11: Commuting Patterns to Mary Washington Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The commuter shed for Spotsylvania County is tight, with most commutes originating in the surrounding block groups. A number of commutes originate in northern Stafford County. Important corridors for the Spotsylvania activity center are I-95 and US Route 1. (Refer to Figure 12).

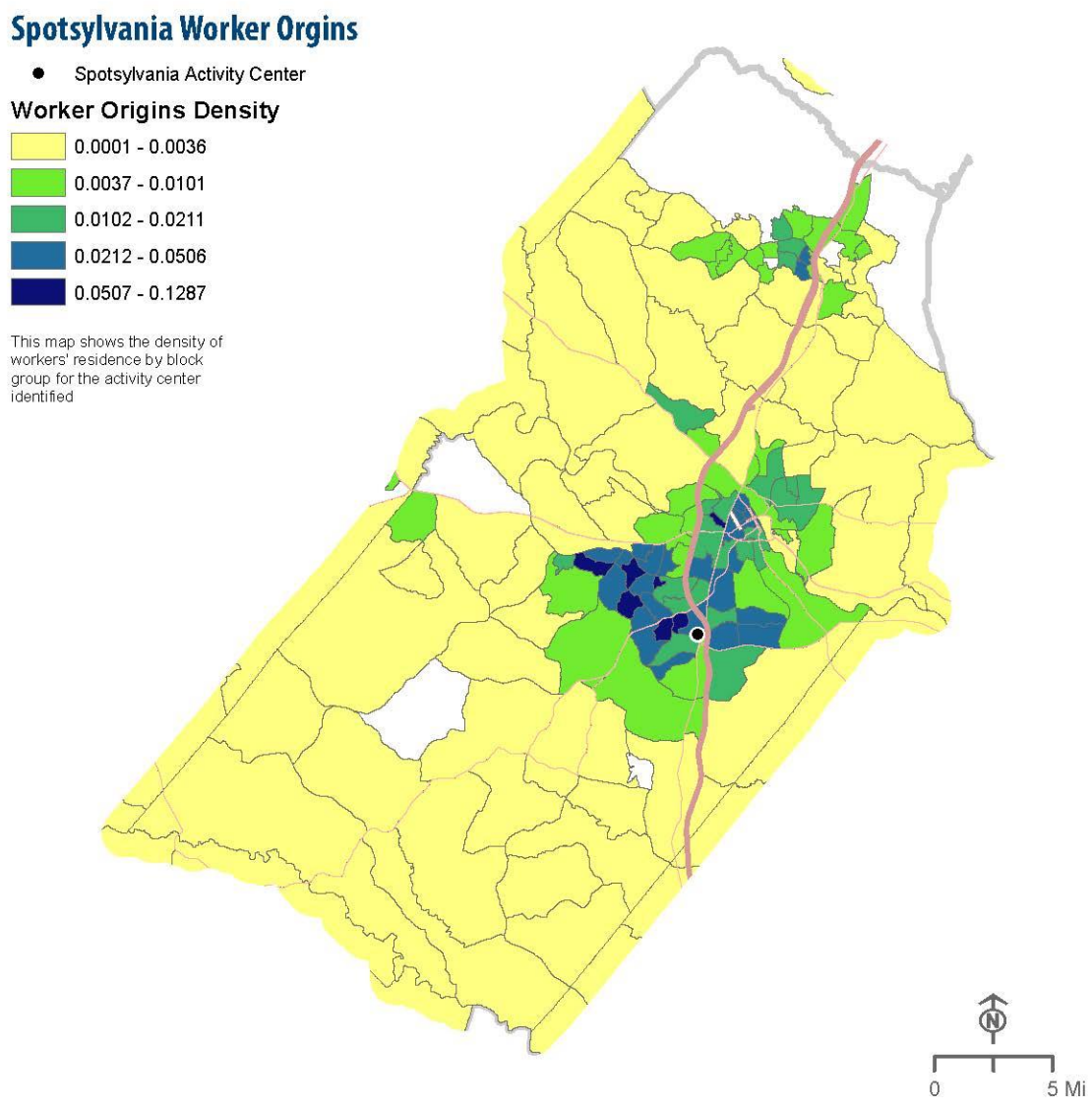


Figure 12: Commuting Patterns to Spotsylvania Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the Spring Knoll activity center originate throughout the region, but are densest along the I-95 corridor.

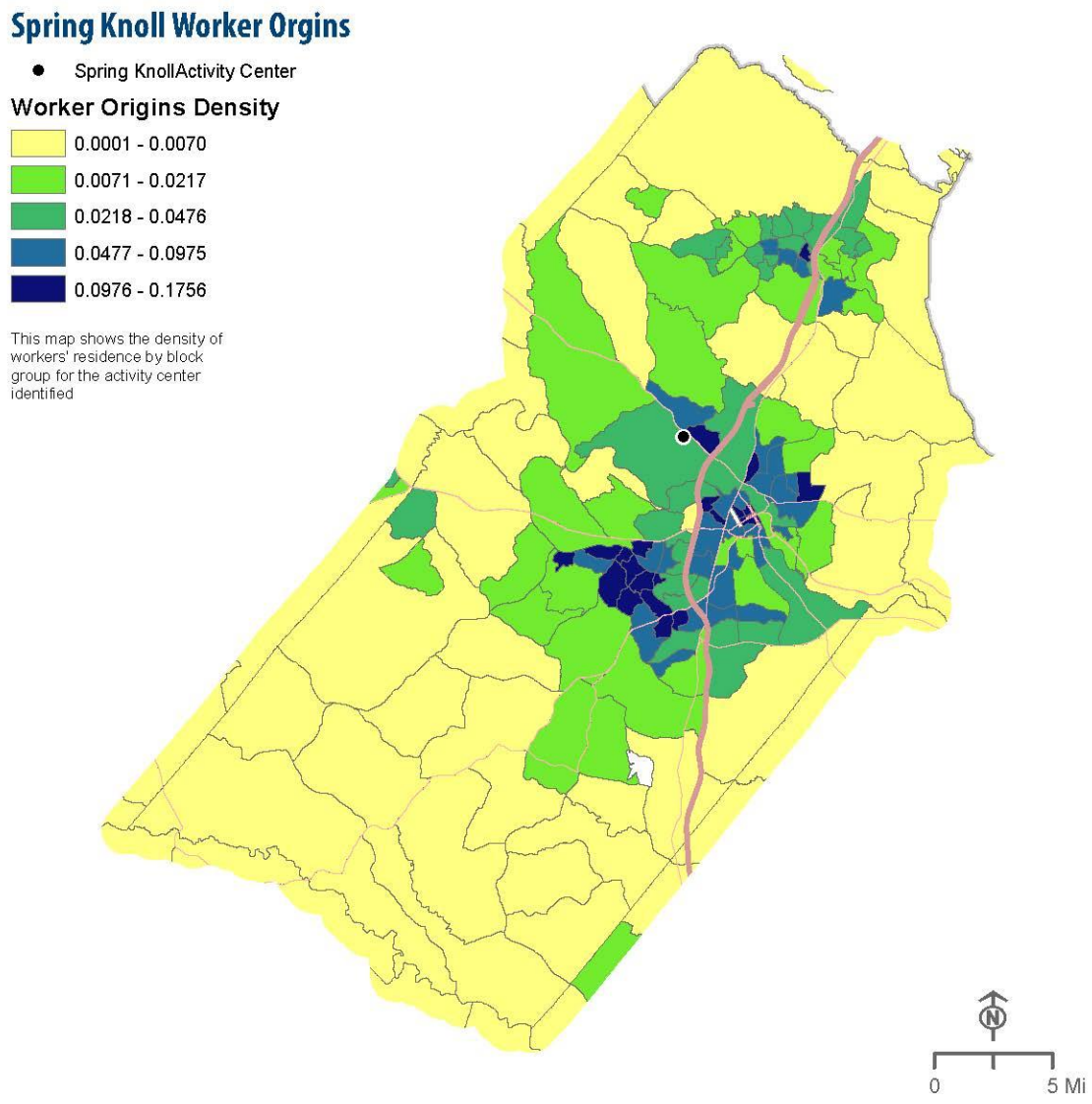


Figure 13: Commuting Patterns to Spring Knoll Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Stafford activity center has a similar commuter shed to the Spring Knoll activity center, however it covers a smaller part of the region. Commutes originate in all three jurisdictions in the region, but are densest in Stafford County, and is centered on the I-95 corridor.

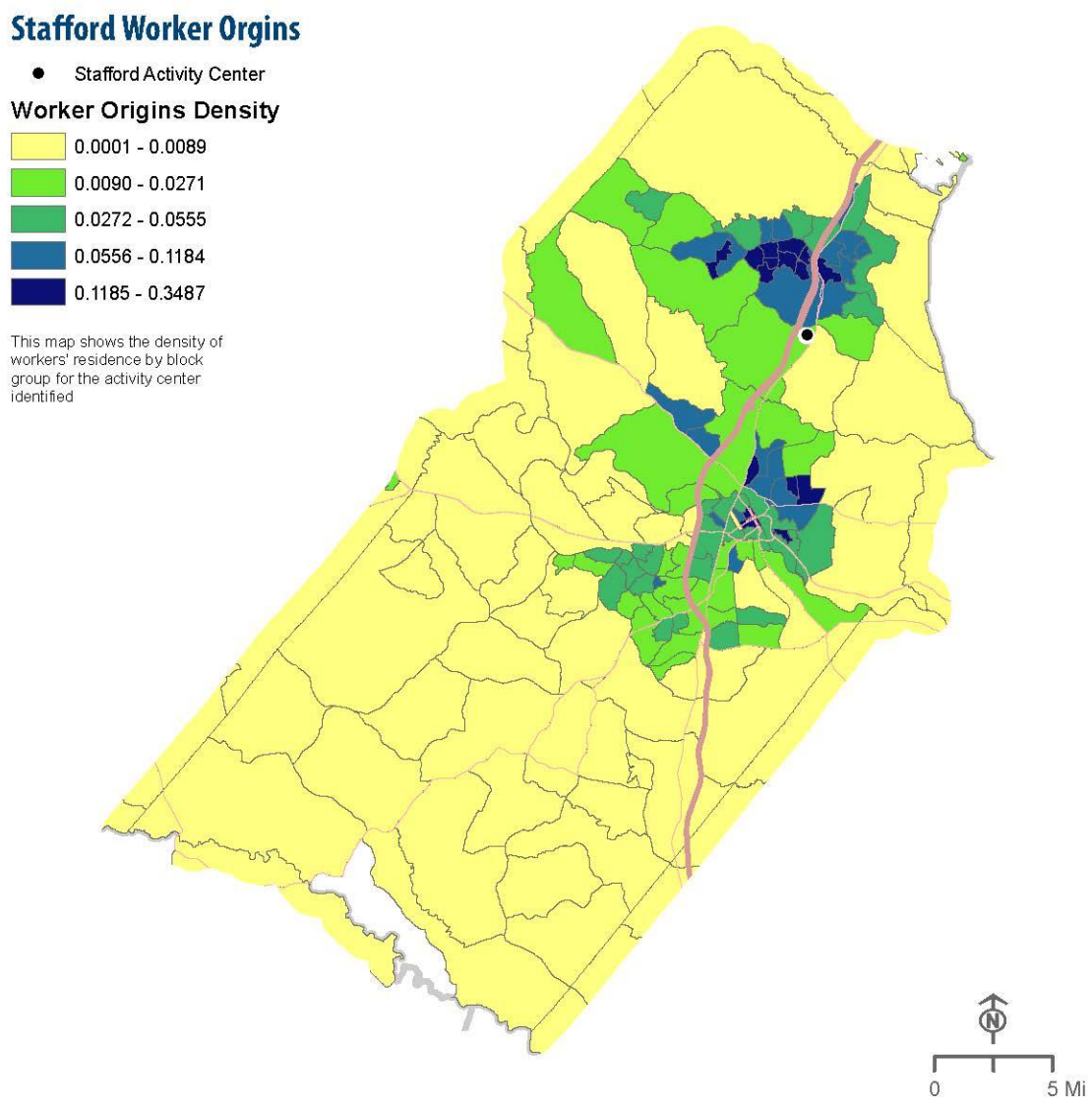


Figure 14: Commuting Patterns to Stafford Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Fredericksburg Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, single occupancy vehicles are used for 71-79% of commutes in the region. For all jurisdictions, carpooling is the second most popular option, accounting for 12% to 15% of the mode share. The prevalence of carpooling is most likely due to the high number of workers commuting long distances outside the region. Public transit use is low in the Fredericksburg Region, accounting for only 3% of regional commutes. (Refer to Figure 15).

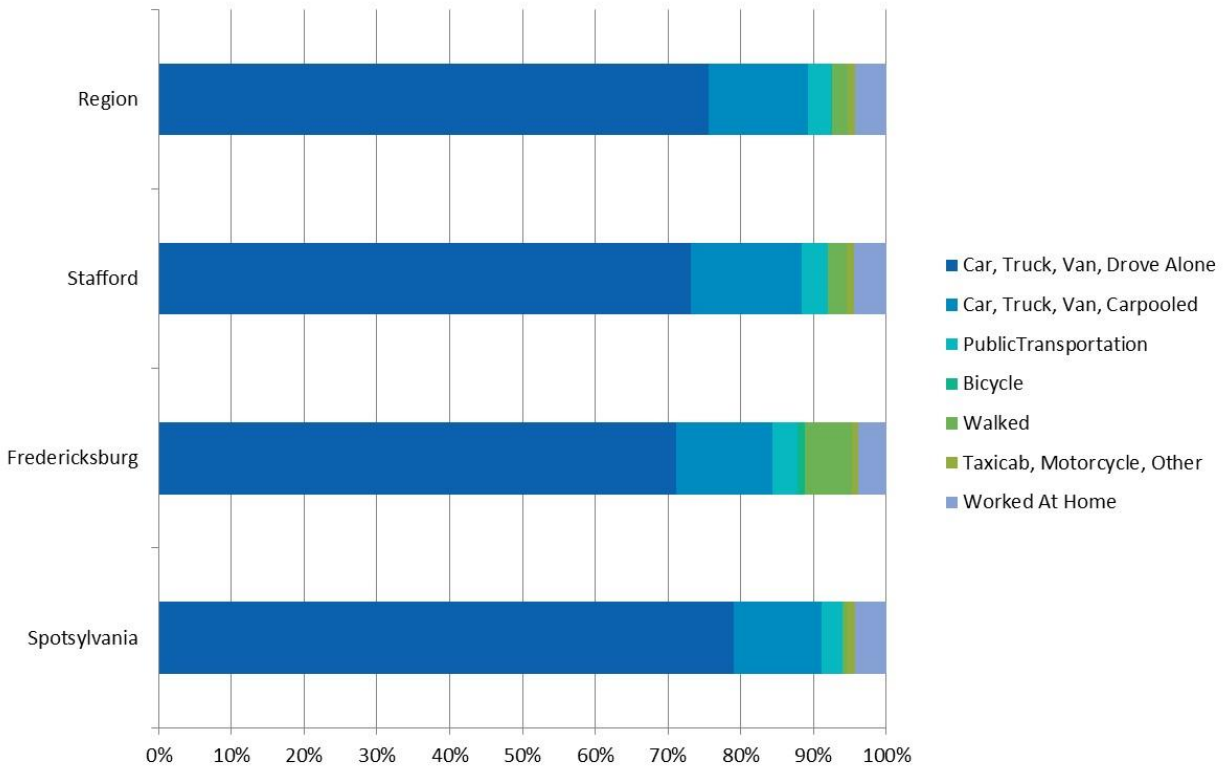


Figure 15: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Fredericksburg Region, average commute times range from 27 to 41 minutes among the various jurisdictions. (Refer to Table 9). Due to its density and proximity to employment centers, the City of Fredericksburg has the shortest average commute, while the surrounding counties of Spotsylvania and Stafford have significantly longer commute times. This is most likely due to the high number of workers that commute outside the region.

Table 9: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
City of Fredericksburg	27.2
Spotsylvania County	39.4
Stafford County	41.1

Source: ACS 2013 5-Year Estimates

Commutes of over 45 minutes are common in the Fredericksburg Region. Stafford County has the highest percentage of workers who commute over 45 minutes at nearly 39%, this is twice as high as the City of Fredericksburg's rate of long commutes. (Refer to Figure 16).

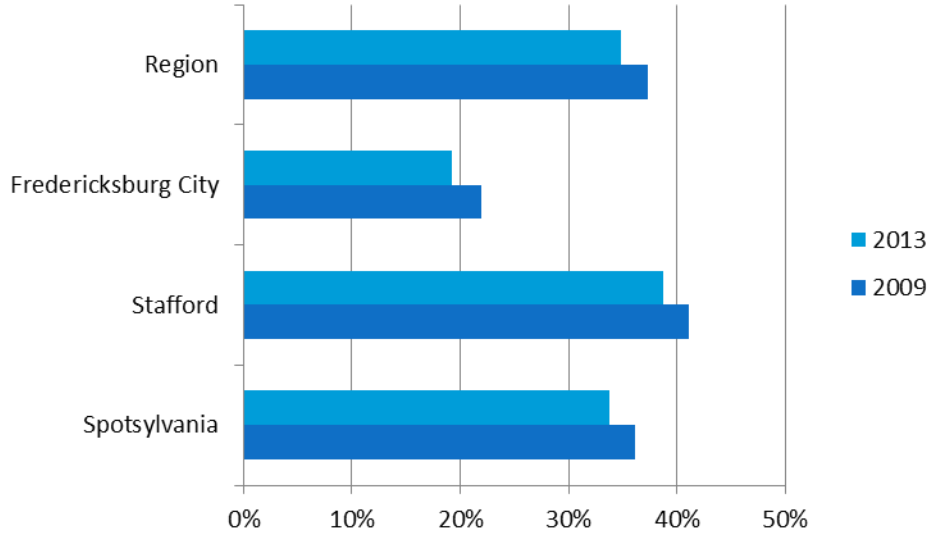


Figure 16: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 17 provides a closer look at where longer commutes originate. In the City of Fredericksburg and areas in the northern areas of Stafford County, commute times are well below average for the region as a whole. Block groups on the fringes of the region, and in rural areas of Stafford and Spotsylvania Counties have commute times that are nearly 150% longer than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

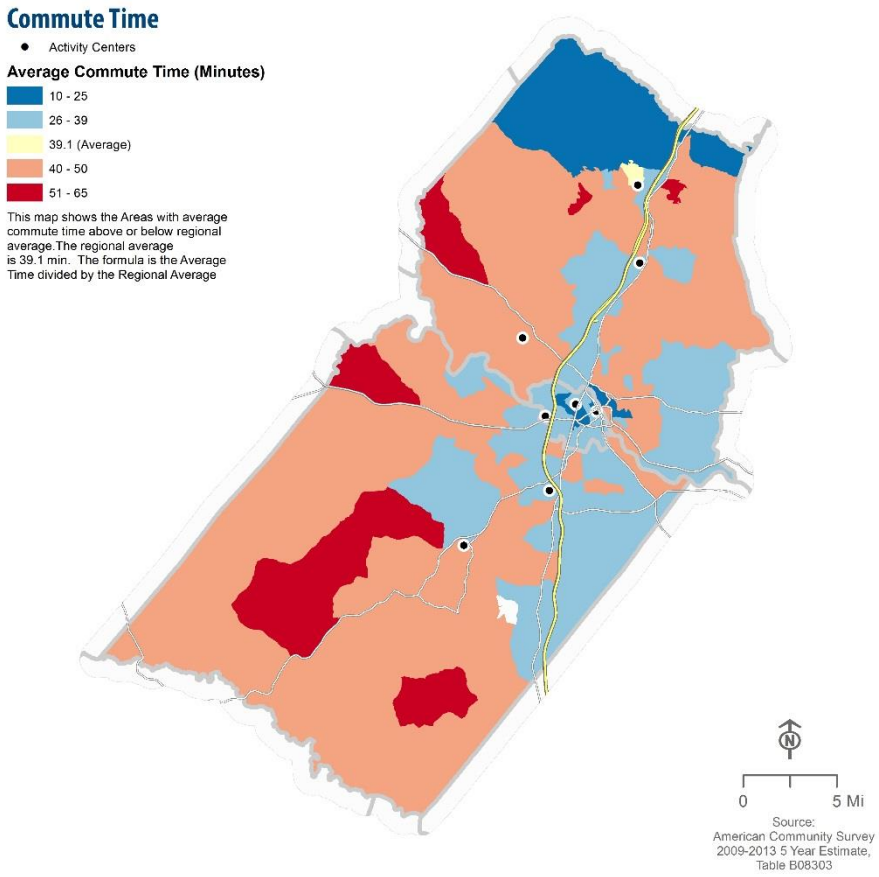


Figure 17: Fredericksburg Region Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Fredericksburg Region area is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility exist around the City of Fredericksburg, and areas adjacent to the I-95 corridor. The auto accessibility scores of activity centers without a large number of employment opportunities like Spotsylvania were boosted by their proximity to major roadways, allowing commuters to reach more

destinations within 45 minutes than commuters who start their trips further from major roadways. (Refer to Figure 18).

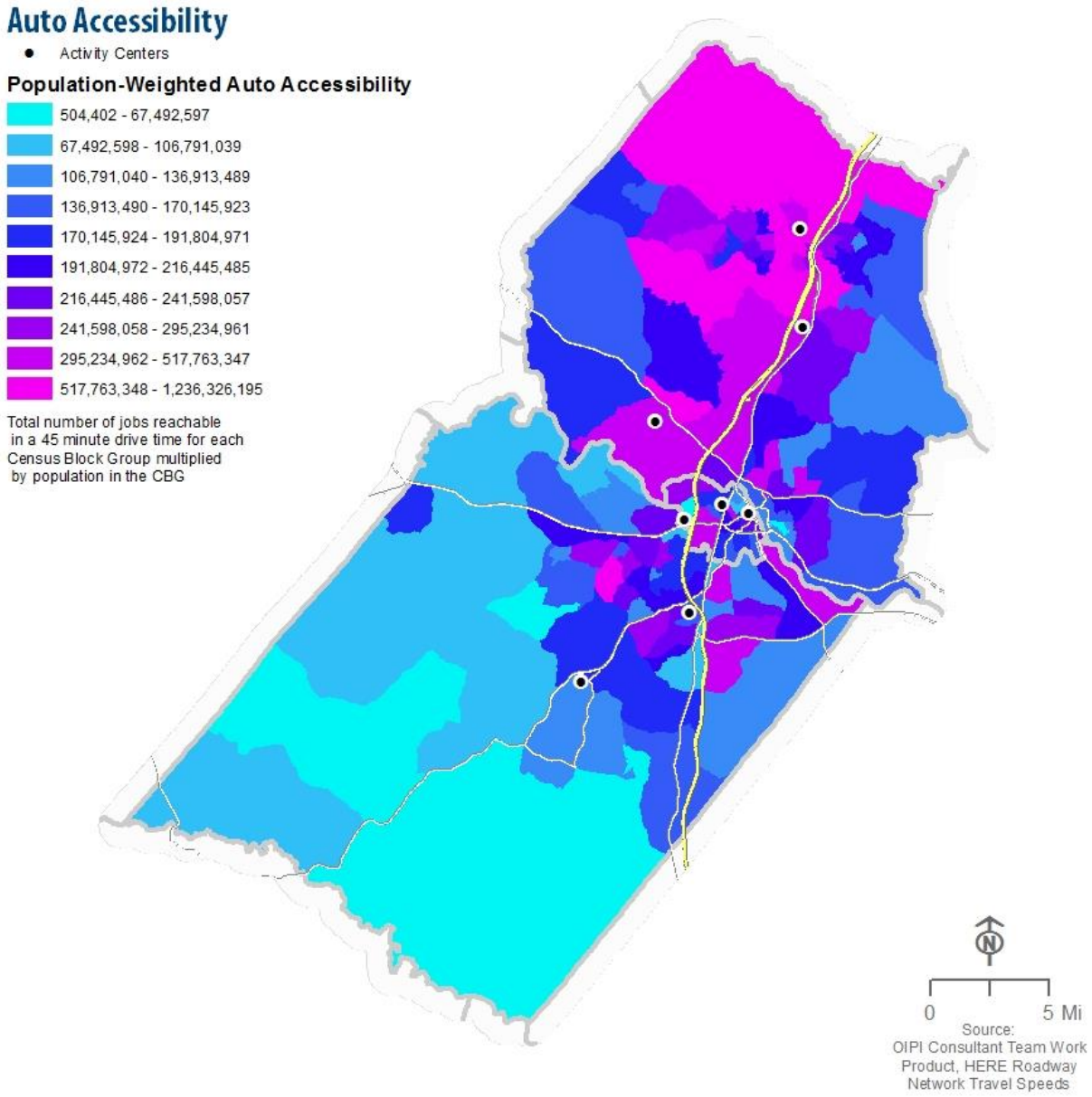


Figure 18: Auto Accessibility

Transit Accessibility

Outside of the US Route 1 corridor, there are few fixed-route transit options in the Fredericksburg Region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-jurisdictional transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 19).

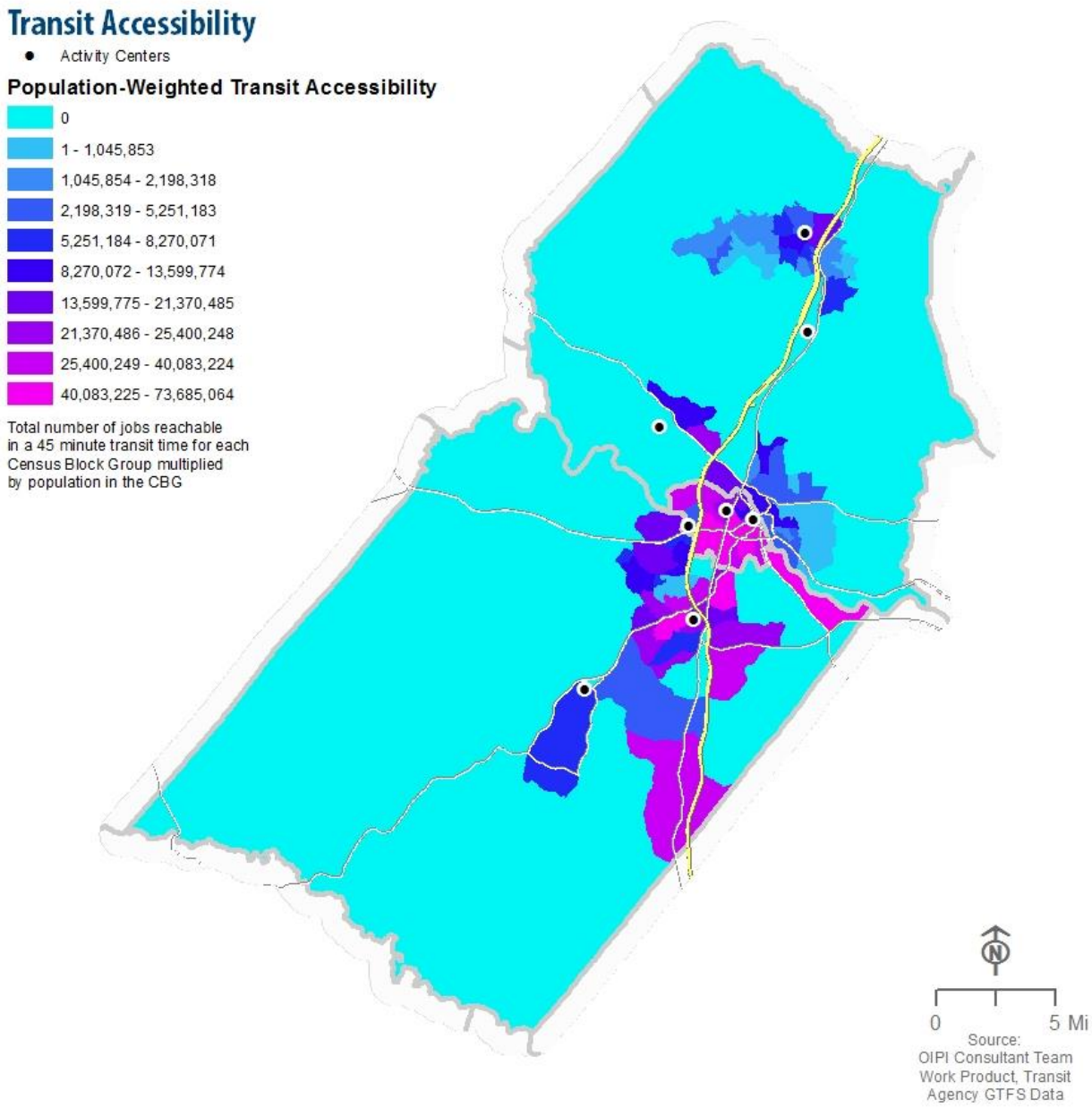


Figure 19: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. The City of Fredericksburg and areas surrounding major corridors scored the highest. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 20).

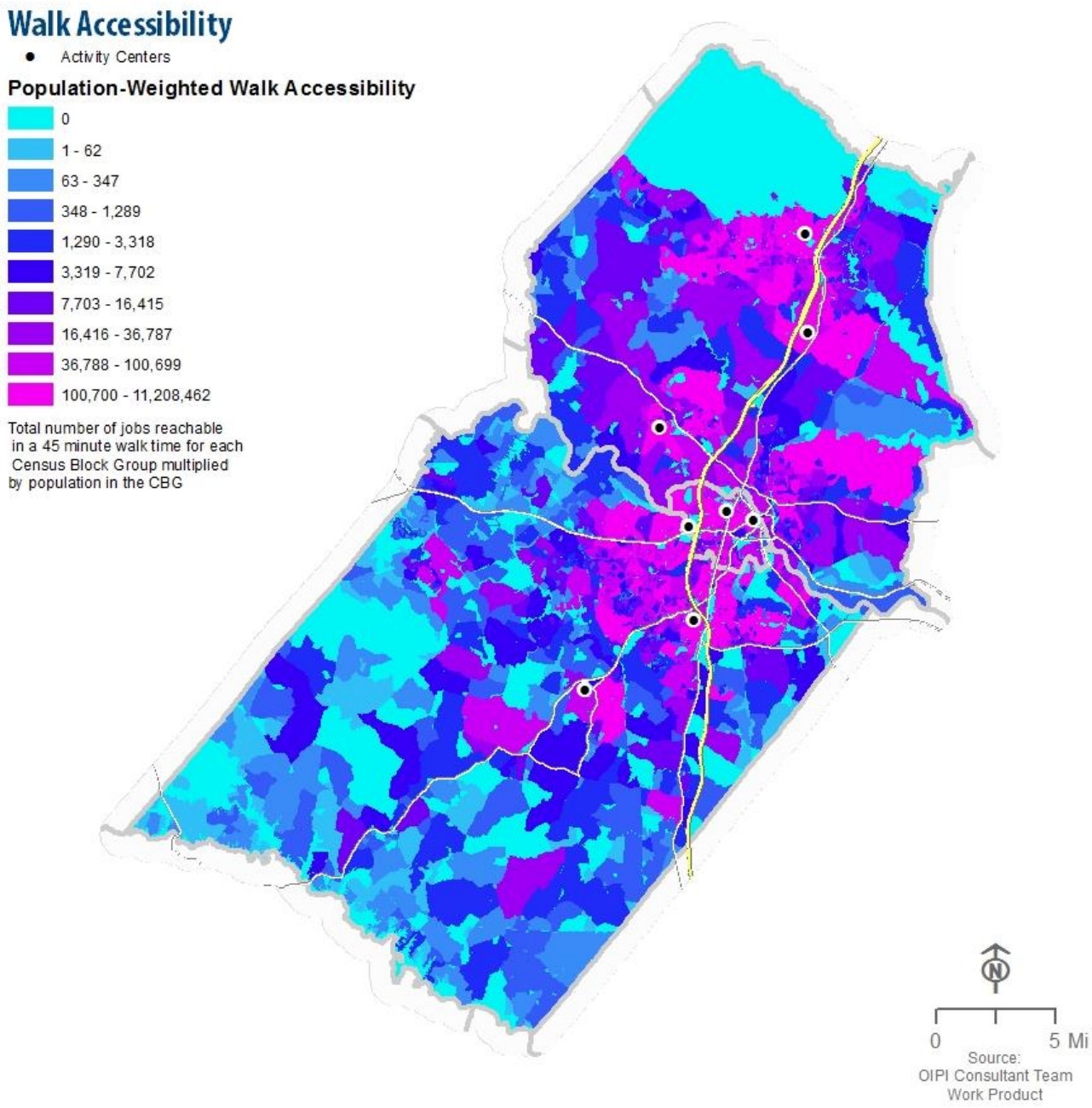


Figure 20: Walk Accessibility

Freight Accessibility

In addition to railways, US Route 1/I-95 corridor is the major corridor for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within an eight minute drive from a major arterial ramp. (Refer to Figure 21).

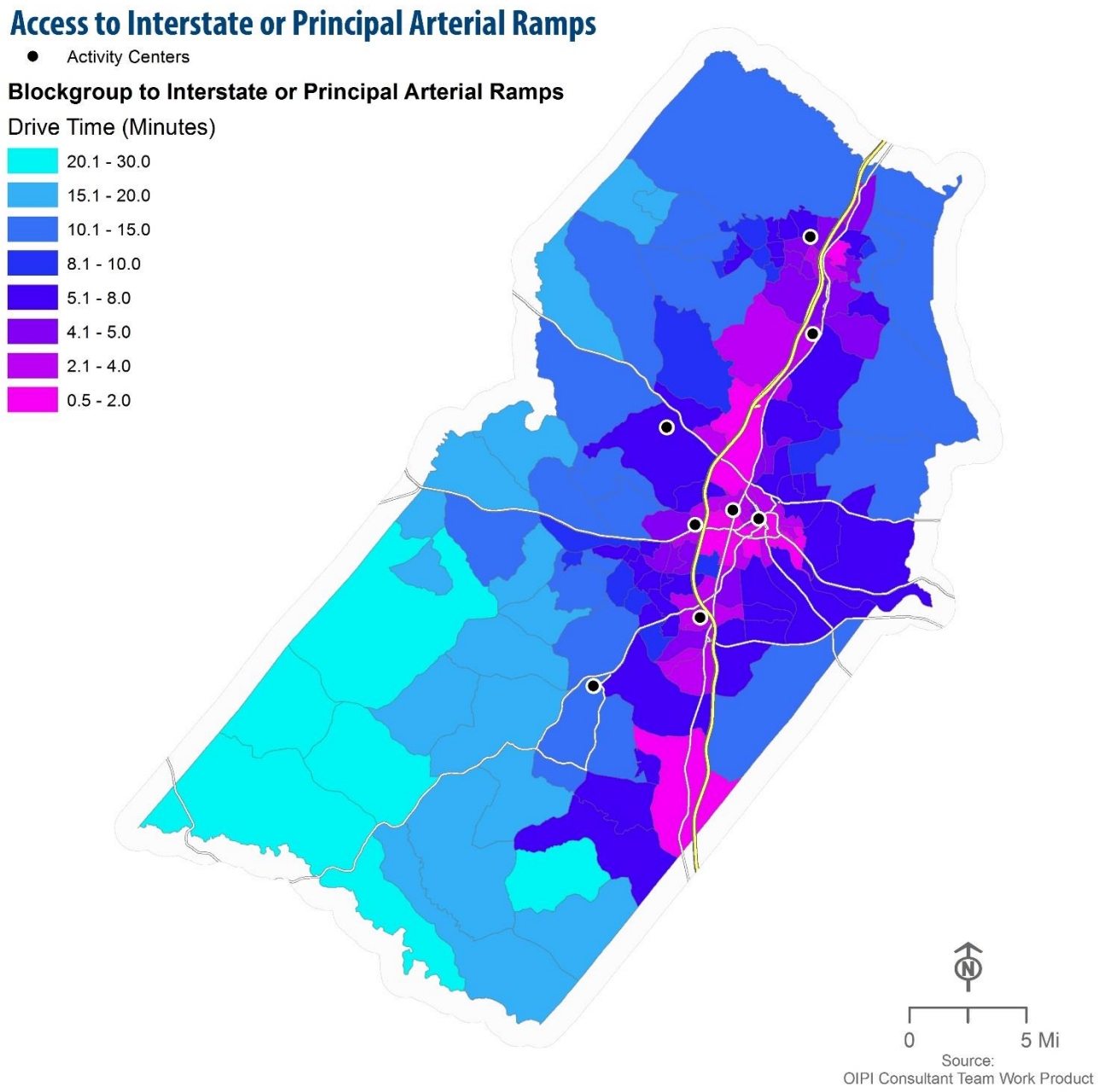


Figure 21: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Fredericksburg Region are clustered around the I-95/US Route 1 corridor in and around the City of Fredericksburg. Most areas adjacent to the I-95/US Route 1 corridor are within a 22 minute drive to warehouses and distribution centers. (Refer to Figure 22).

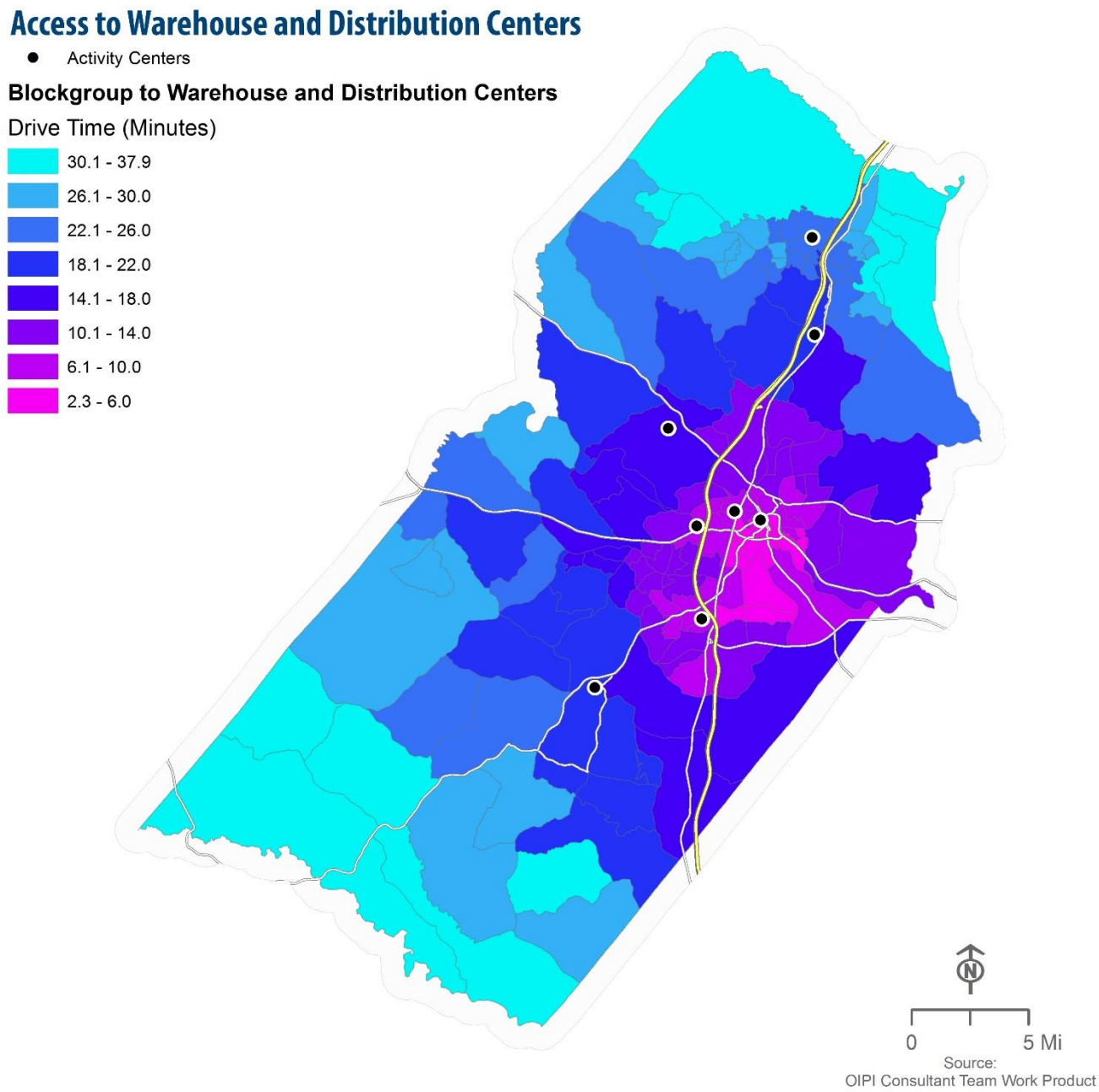


Figure 22: Access to Warehouses & Distribution Centers

CSX operates freight rail lines that pass through the City of Fredericksburg, Spotsylvania County, and Stafford County. The Fredericksburg Region is located within a one hour drive to three freight airports, Richmond International, Reagan National, and Dulles International. (Refer to Figure 23).

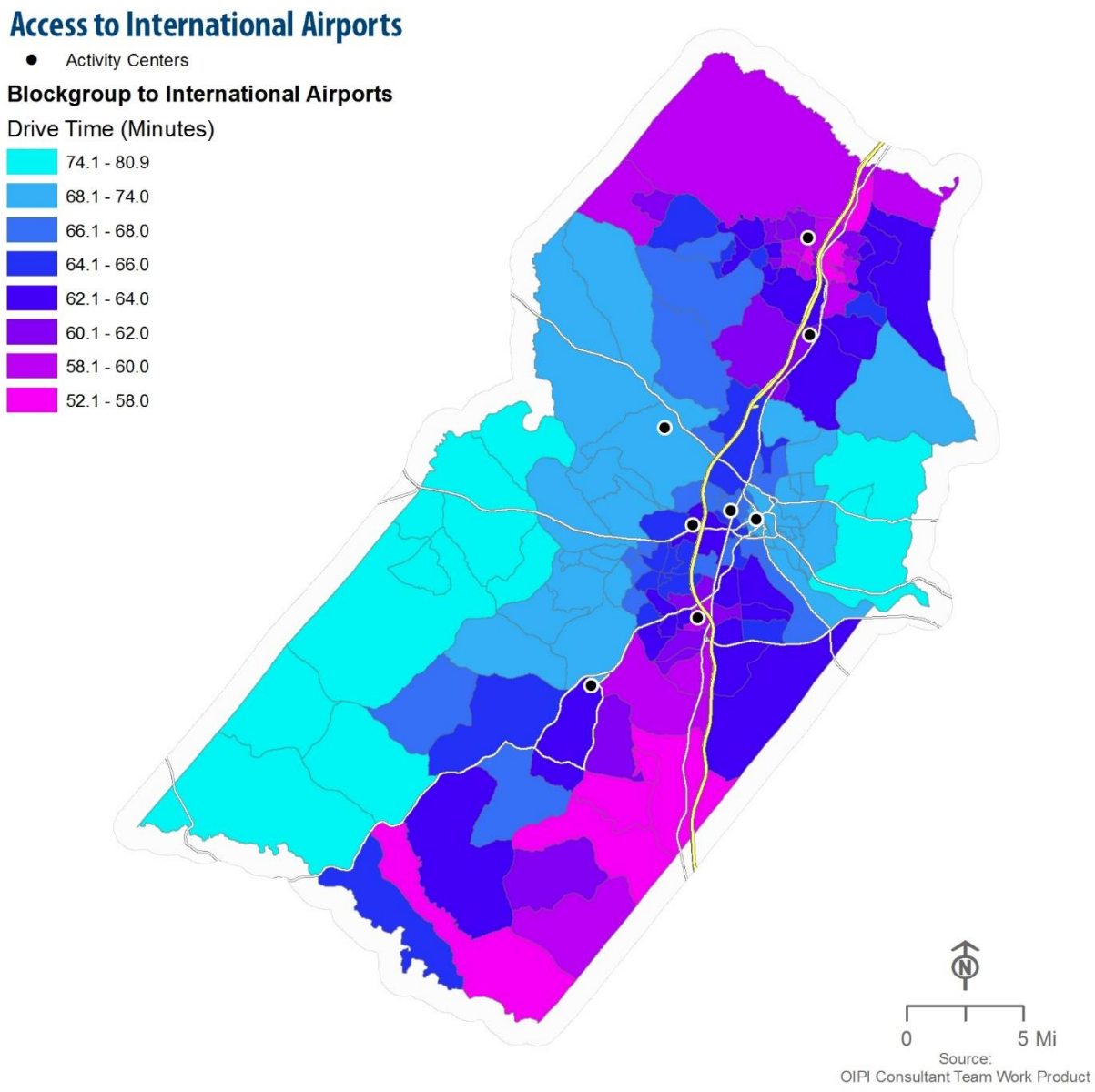


Figure 23: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in Fredericksburg Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 24 below, is defined as the ratio of the median speed

to the 90th percentile speed during the weekday AM peak period. Data for major roadways were available for analysis in the Fredericksburg Region. The reliability index analysis shows poor reliability on I-95, particularly north of VA 3. Other routes have moderated reliability problems in certain areas, such as US 1 near Quantico, US 17 near I-95 and VA 3 near I-95. However, other major roadways in the region, namely I-95 south of US 1, US 17 east of I-95, VA 3 east of Fredericksburg, VA Route 208, and VA Route 2 have high reliability. These patterns reflect the large number of workers commuting to the Northern Virginia Region via I-95. (Refer to Figure 24).

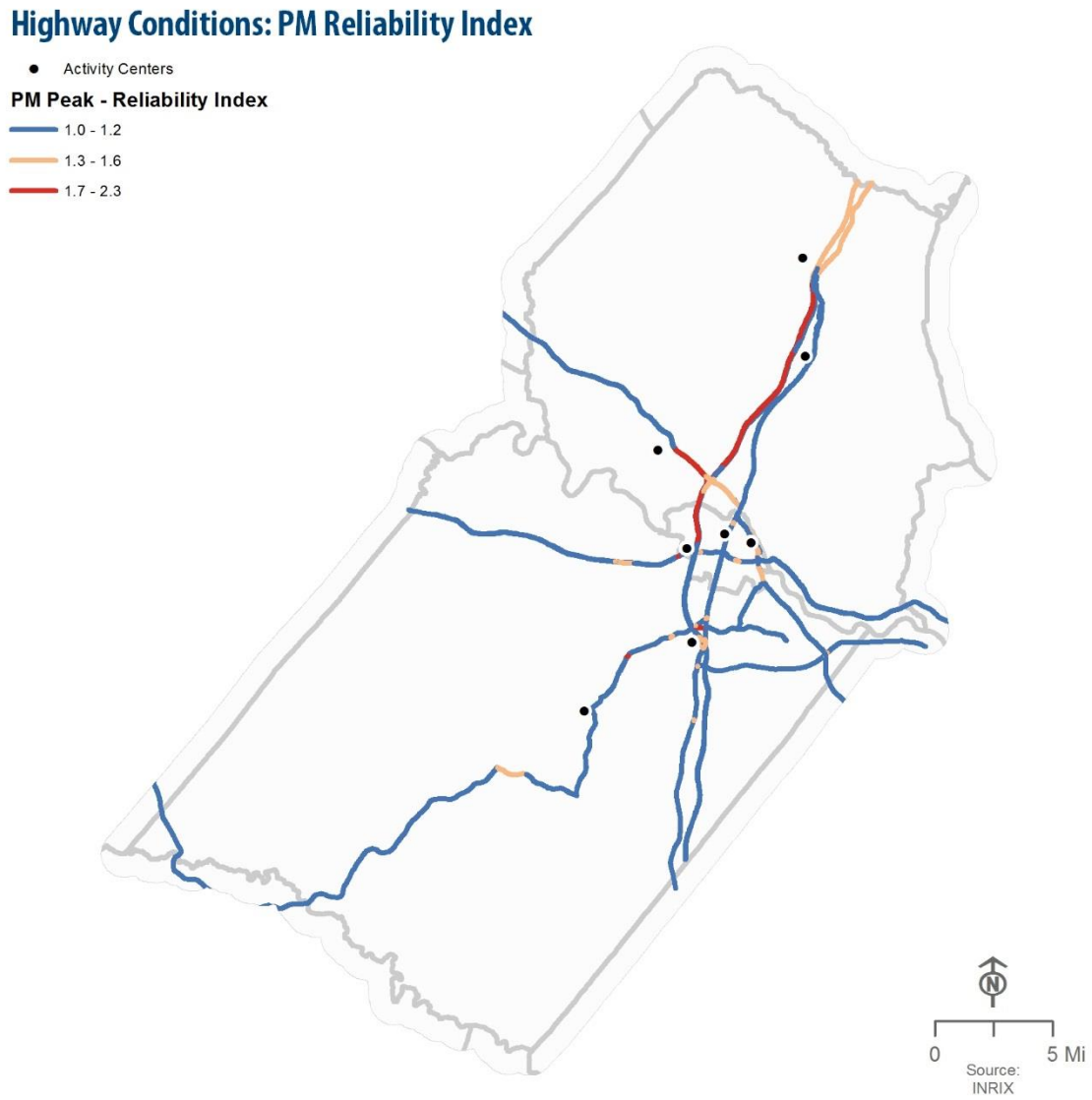


Figure 24: Travel Time Reliability

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major corridors in the Fredericksburg

Region. According to the analysis, major areas of congestion are the VA Route 3 corridor in Spotsylvania County and the City of Fredericksburg. This portion of I-95 is congested 5% – 19% of the time. The portion of roadway with the highest congestion score is US Route 17 adjacent to I-95. This area of US Route 17 is congested 19 – 42.3% of the time. The rest of the roadways analyzed are congested less than 5% of the time. (Refer to Figure 25).

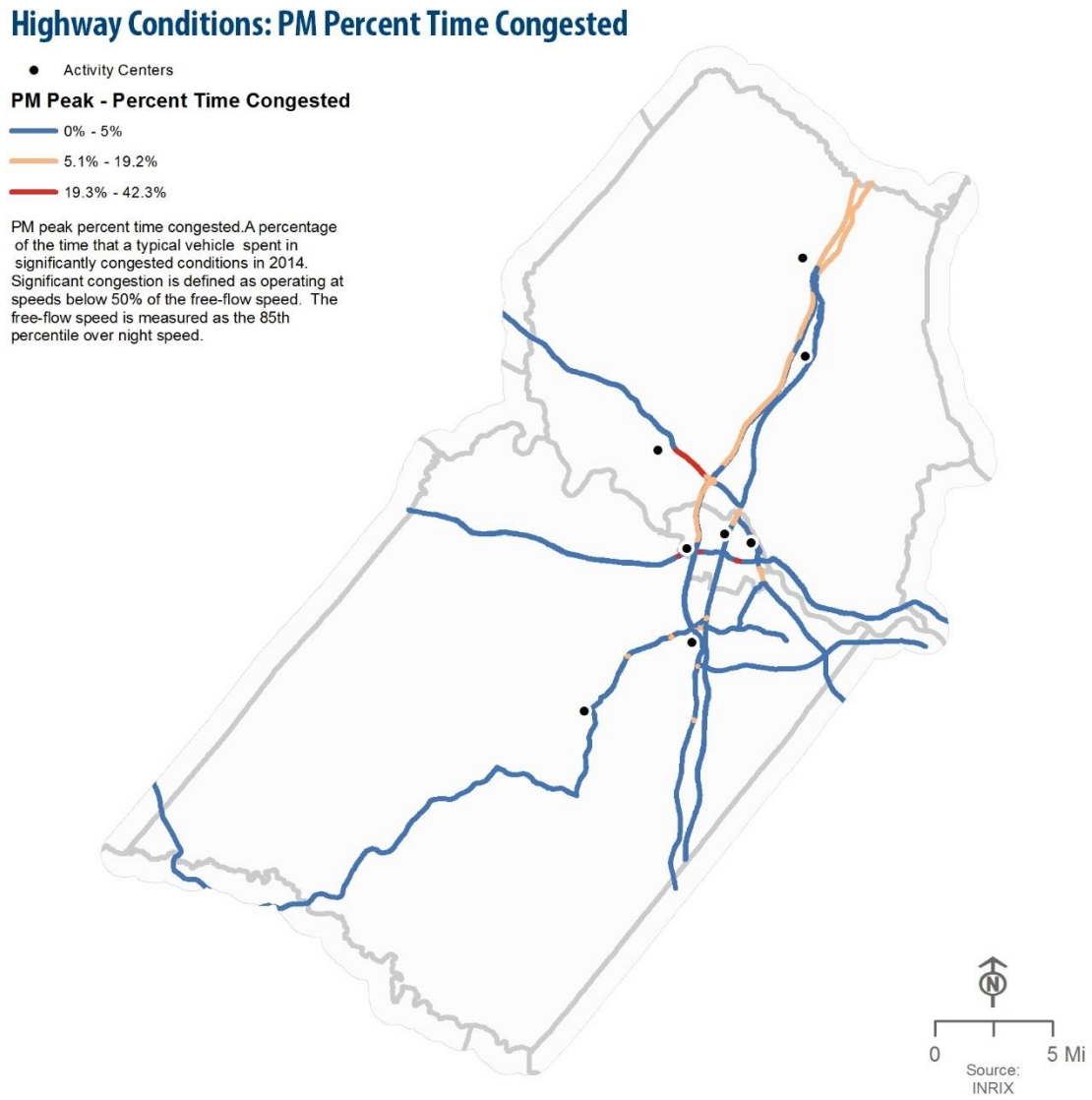


Figure 25: Percent of Time Congested

Median Speeds

Median speeds were calculated for major roadways in the region and are represented as the ratio of pm peak hour vehicle speeds and the speed limit for the PM peak period. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The ratio of median speed to speed limit shows problems in congested areas around the I-95/US 17 Interchange in Stafford, along I-95 at the Rappahannock Bridge

and generally north of Exit 126. Other areas with somewhat lower ratios include US 17 between VA 2 and US 1, VA 3 near the I-95 Interchange and US 1 in northern Stafford. (Refer to Figure 26).

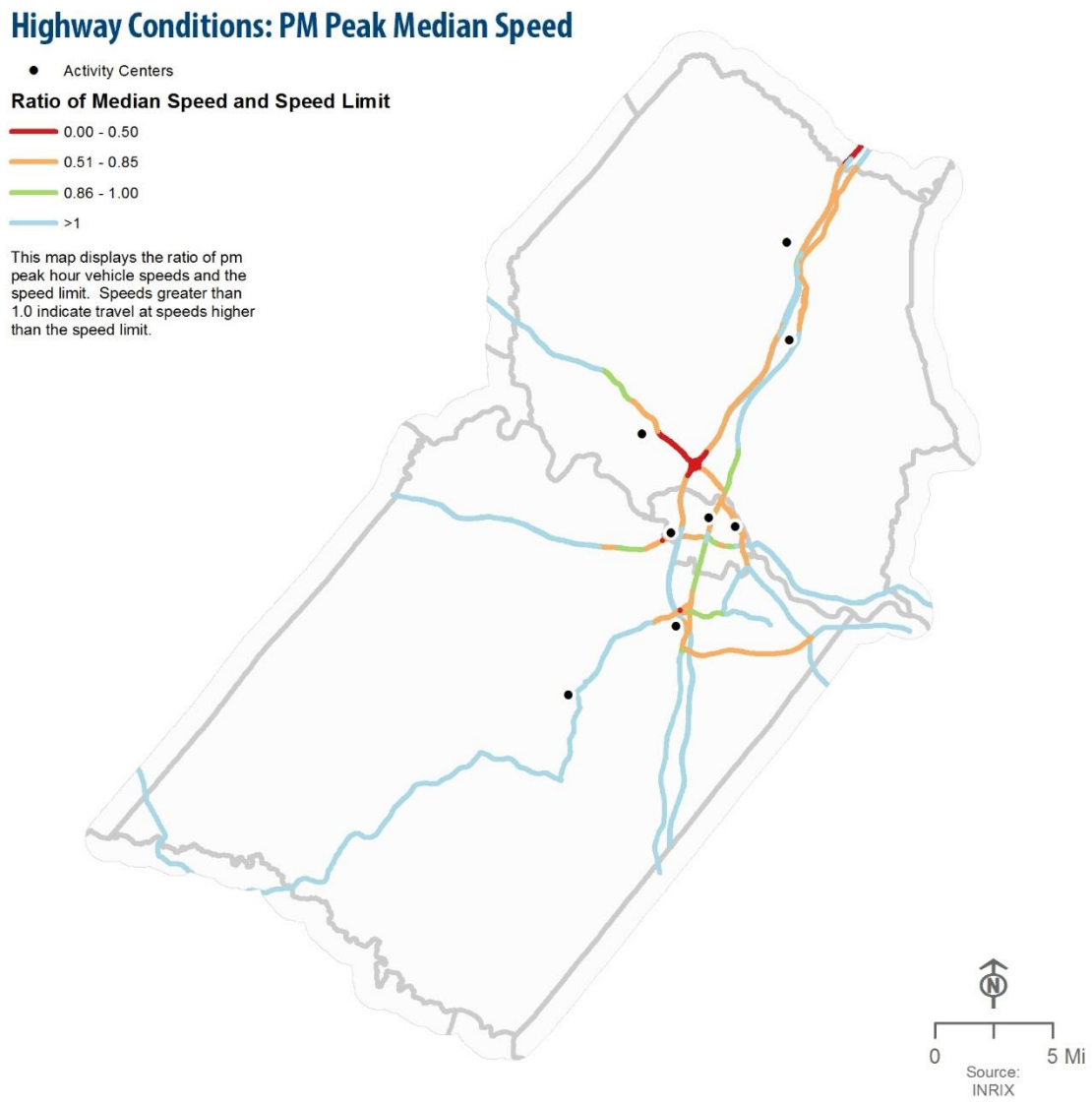


Figure 26: Median Speeds

D. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are specific to the regional and local commodity flows via the various freight corridors in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the Fredericksburg Region, an average of 98% of the dollar value of all goods that are moved through the region are moved by truck. Rail is used to move goods in the region, but only carry around 1% of the

total dollar value of goods. Overall, throughout all jurisdictions in the region, trucks are the primary means of moving goods. (Refer to Figure 27).

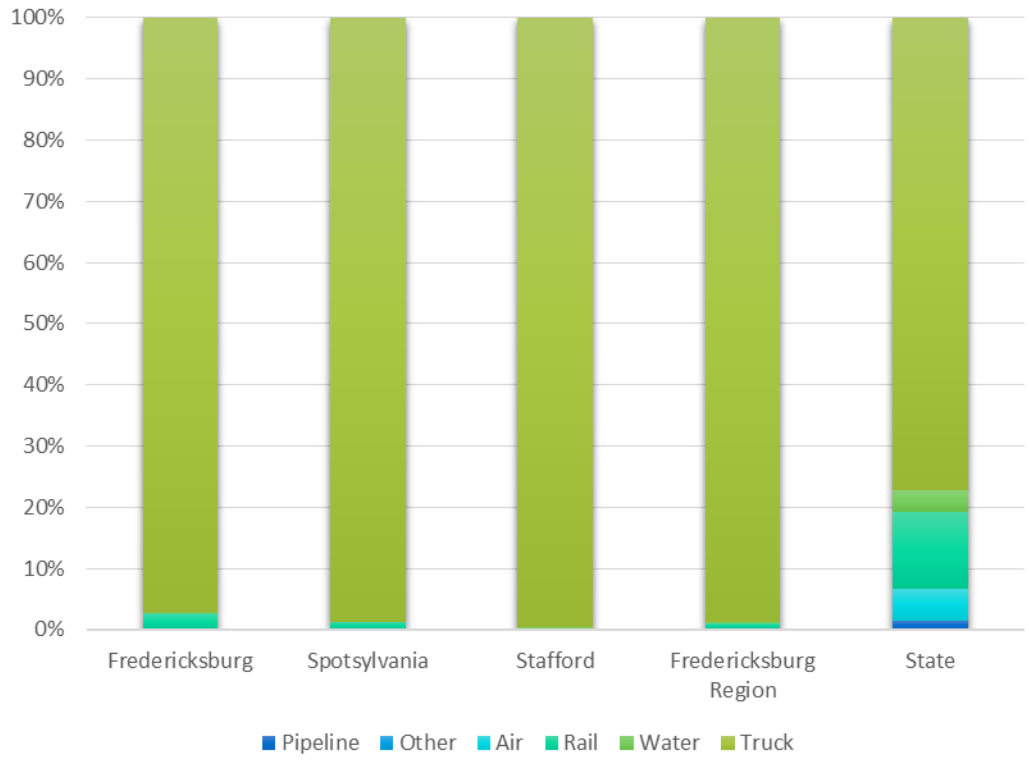


Figure 27: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location Quotients are used to compare the prominence of freight modes between the Fredericksburg Region, and the state as a whole. The Fredericksburg Region relies on trucks for freight movement 1.3 times more than the state as a whole. Rail and air transportation for goods is more common for the state on average than it is for the Fredericksburg Region. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the relative distance – over an hour drive – to Richmond International Airport and Dulles International airport from the Fredericksburg Region. (Refer to Figure 28).

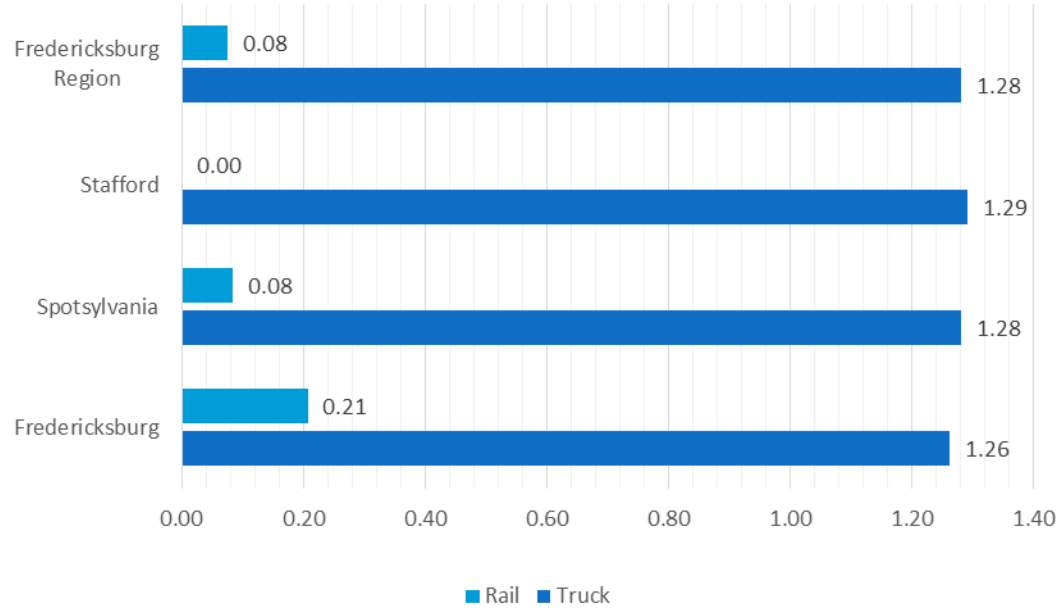


Figure 28: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

Secondary Traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) accounts for the most valuable freight moving both to and from the Fredericksburg Region. Other goods are the next most valuable export from the Fredericksburg Region. Overall, the Fredericksburg Region imported $3.3 billion worth of goods and exported $1.8 billion worth of goods, resulting in $1.5 billion of net imports in 2012. (Refer to Figures 29 and 30).

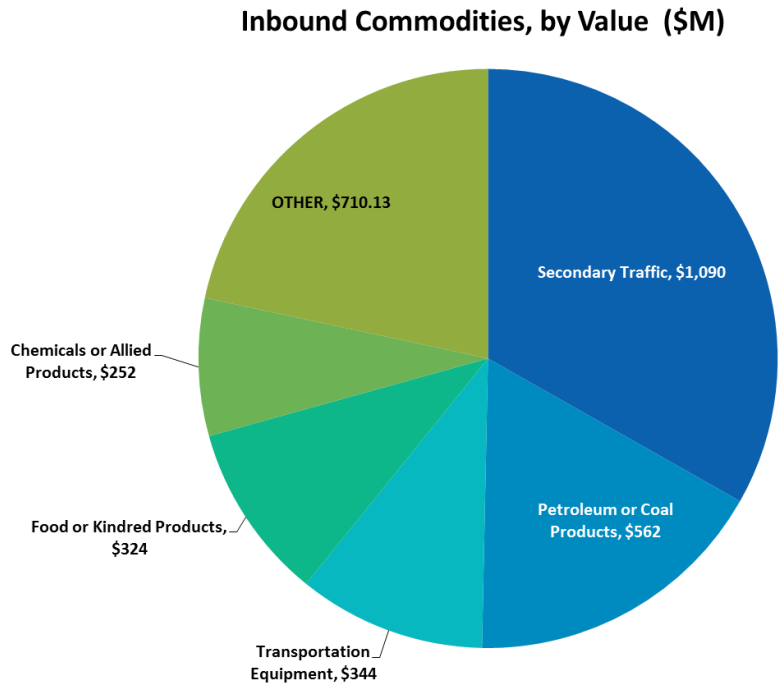


Figure 29: Top Freight Values by Commodities - Inbound.
Source: TranSearch, 2012

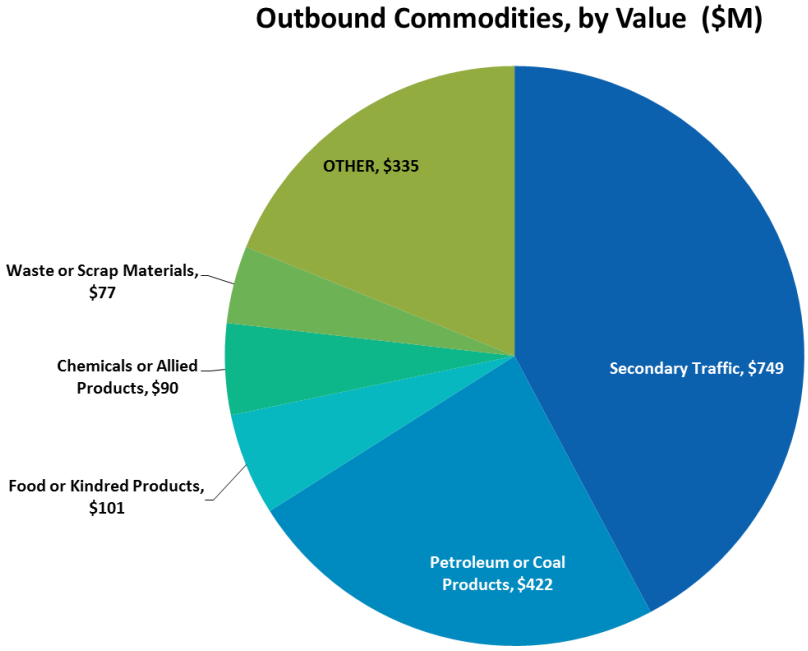


Figure 30: Top Freight Values by Commodities - Outbound.
Source: TranSearch, 2012

The Mideast Region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Fredericksburg Region. In 2012, $535 million of freight was exported to the Mideast Region. Freight movements to the Southeast and Hampton Roads Regions are the next most valuable freight export $199 million and $189 million respectively. (Refer to Figure 31).

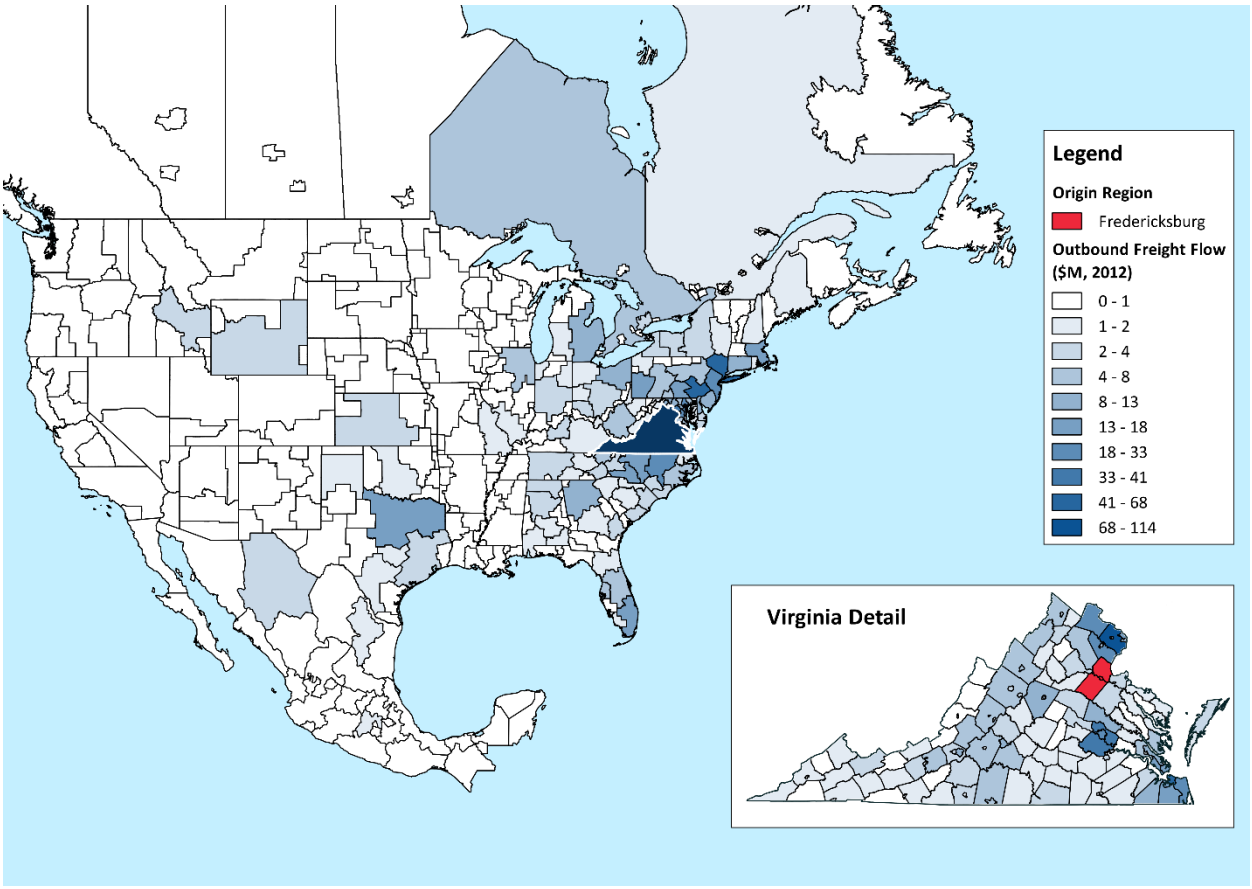


Figure 31: Top Freight Values by Region.
Source: TranSearch, 2012

When freight movements were analyzed by weight, nonmetallic minerals account for the largest tonnage of freight exported from the Fredericksburg Region. Overall, nonmetallic minerals account for a third of inbound commodities and two-third of outbound commodities. Other high tonnage commodities include secondary traffic and petroleum or coal products. (Refer to Figures 32 and 33).

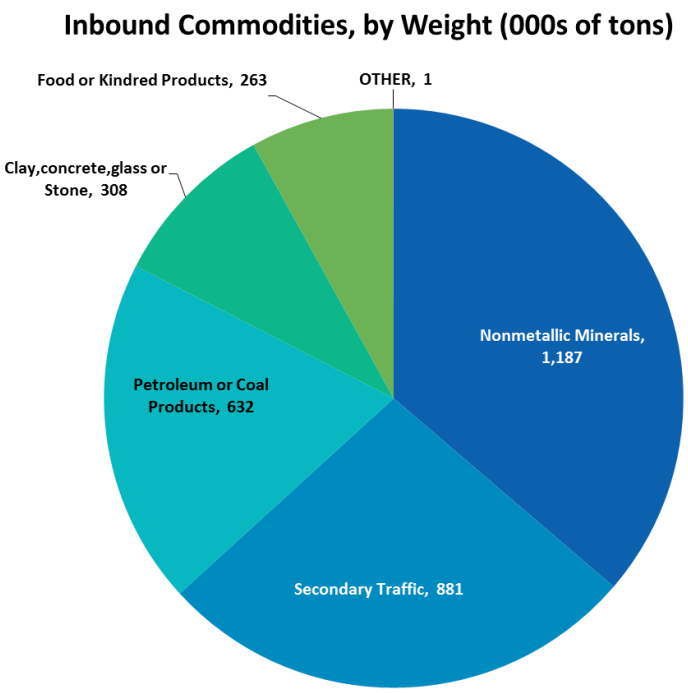


Figure 32: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

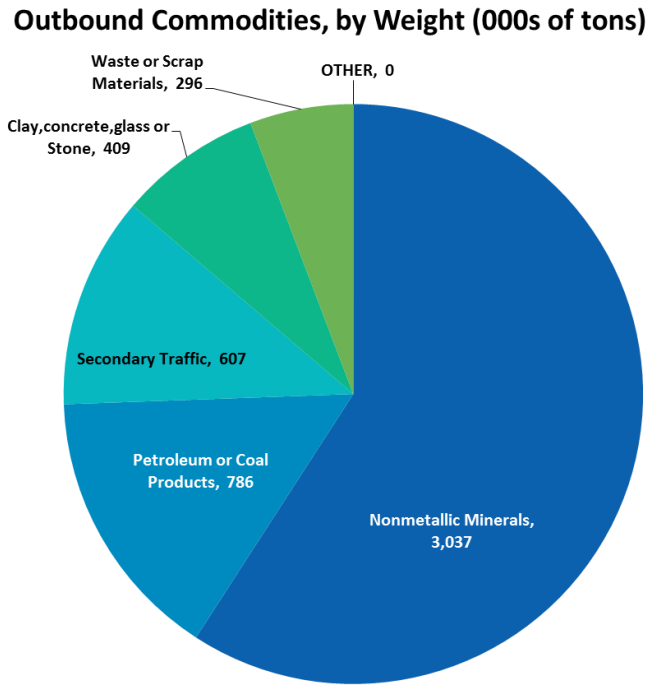


Figure 33: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs are identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.
These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (local, knowledge and freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Fredericksburg Region, it showed a continuation of the relatively local-serving heavy focus of the for the regional economy. Similarly, the output and employment forecasts show the highest growth in local serving industries such as retail trade, public administration and health care.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire in the region to try to expand the knowledge-focused sector of the economy and encourage the shifting of employment toward the Fredericksburg region. In addition, it is recognized that this transition is not likely to dramatically alter the commuting patterns for the region in the next 10 years. These desires and forecasts translates into transportation needs such as passenger reliability, mode choice and TDM needs on the region's prime corridors, such as I-95 and the VRE rail corridor to manage the high level of commuting into the Northern Virginia region.

The desire to capture some of the knowledge-focused sector jobs within the Fredericksburg region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit exists in the region primarily in and around the City of Fredericksburg and on the north-south axis of the I-95 and US 1 corridors. However, the expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs

that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

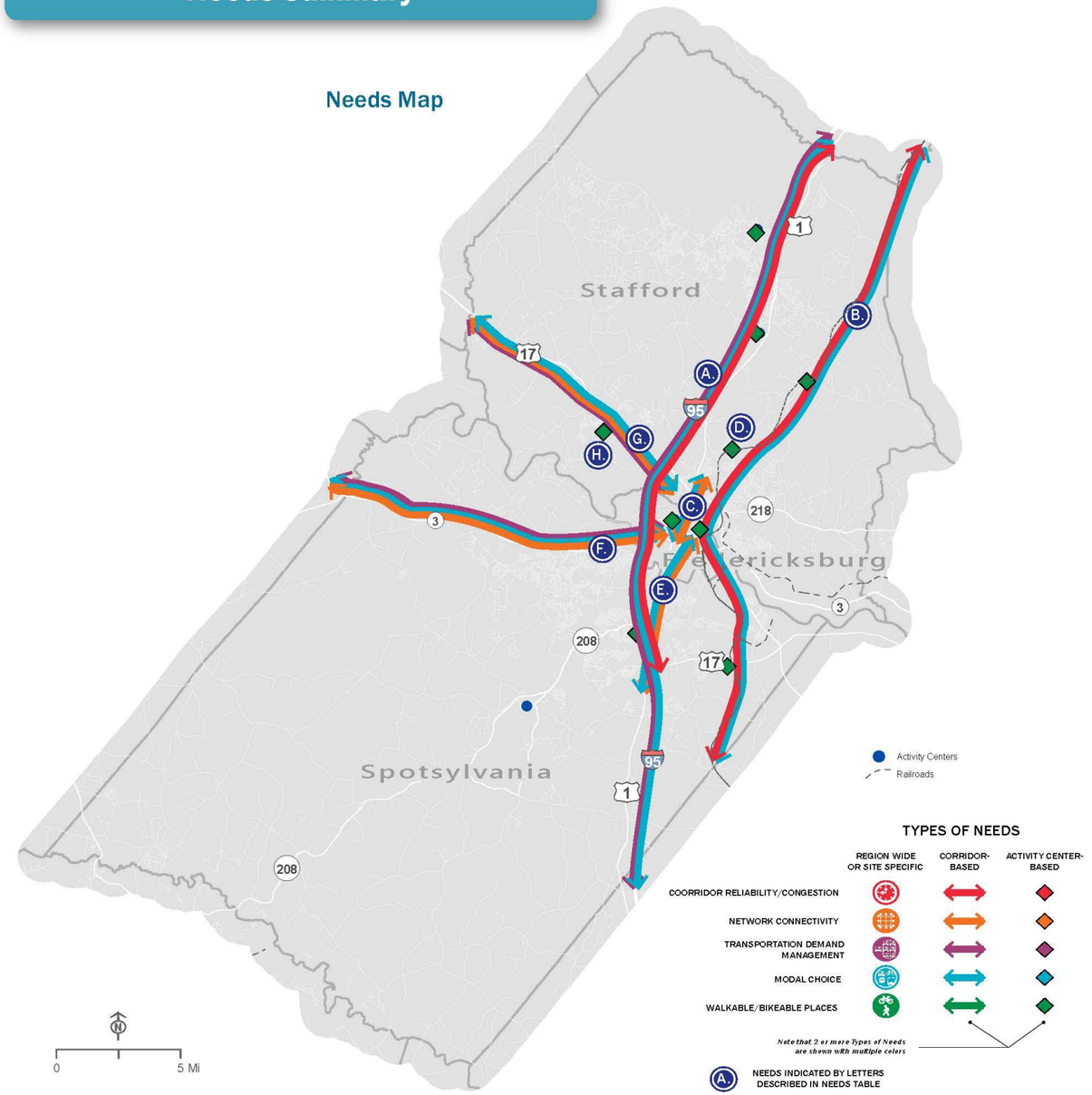
1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need

Figure 34: Summary Needs Map for Central Virginia

Fredericksburg Region Needs Summary

Needs Map



Needs Table

A. I-81/US 11 Corridor Reliability

The I-95 Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia, particularly connecting the workforce in Fredericksburg to Northern Virginia. Highway capacity and operational improvements, enhanced TDM and additional mode choice options are needed to maintain reasonable mobility and access along this corridor.

B. Regional Transit Access

The North-South CSX Rail Line through the region is a critical freight and passenger corridors for inter-regional movement and it suffers from congestion and unreliable travel times. Inter-city and commuter passenger rail service is critical to connecting the workforce in Fredericksburg to Northern Virginia. Improved commuter service would be valuable for reverse commute trips to help serve employment centers in Fredericksburg. Capacity and operational improvements to address reliable freight, commuter and inter-city passenger rail travel are needed.

C. Bikeable/Walkable Places

The Rappahannock River is a major asset to the region and a significant transportation barrier that funnels traffic to a few bridges, particularly the I-95 Bridge. Limited crossings and the limited mode choice at those crossings adds excess local traffic to I-95 and is a barrier to active transportation between points north and south of the river.

D. Western Freight Connectivity

The VRE stations in the region are critical connections in the regional multimodal system but many are disconnected from nearby activity centers and surrounding residential areas and have limited mode choice options. Improved mode choice options and bike and walk connectivity are needed to maximize the value of the region's commuter rail system.

E. I-81/US 11 Corridor Reliability

The US Route 1 and Lafayette Boulevard Corridors connect Fredericksburg and Spotsylvania activity centers as well as the adjacent commercial and residential areas. These corridors have limited mode choice for active transportation and have limited network connectivity. Better local network connectivity and active transportation options would enhance the attraction of these areas to businesses and workforce and connect key Knowledge activity centers to the surrounding residential areas and local service needs.

F. Regional Transit Access

The Route 3 Corridor is a critical corridor connecting the workforce in Spotsylvania County with activity centers in the region and beyond. The corridor currently has limited local network connectivity or active transportation options. Providing additional travel options is critical to maximizing efficiency of this corridor and attracting a strong workforce to this region.

G. Bikeable/Walkable Places

The Route 17 Corridor is a critical corridor connecting the workforce in Stafford County with activity centers in the region and beyond. The corridor currently has limited local network connectivity or active transportation options. Providing additional travel options is critical to maximizing efficiency of this corridor and attracting a strong workforce to this region.

H. Various Activity Centers - Walkable/Bikeable Places

There are multiple activity centers that have limited pedestrian facilities or need improved pedestrian environments. Walkable places improves appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.

I. Regional Need - TDM

A large portion of the regional workforce commutes to Northern Virginia and encouraging additional TDM measures across the region, such as park-and-ride, vanpools, slugging and telework is essential to maximizing the efficiency of the transportation system given the relatively long commutes of residents in the region.

Figure 35: VMTP Icon Key

NEEDS ICONS

Corridor Reliability and Congestion



Network Connectivity



Transportation Demand Management



Modal Choices



Walkable/Bikeable Places



ECONOMIC ICONS

Local Service Sector



Freight Based Sector



Knowledge Based Sector



TRANSPORTATION ICONS

Commuting Patterns / Modes



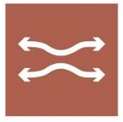
Multimodal Access to Jobs



Highway Network Reliability



Highway Network Bottlenecks



Freight Networks / Commodity Flows



Conditions from Stakeholder Input

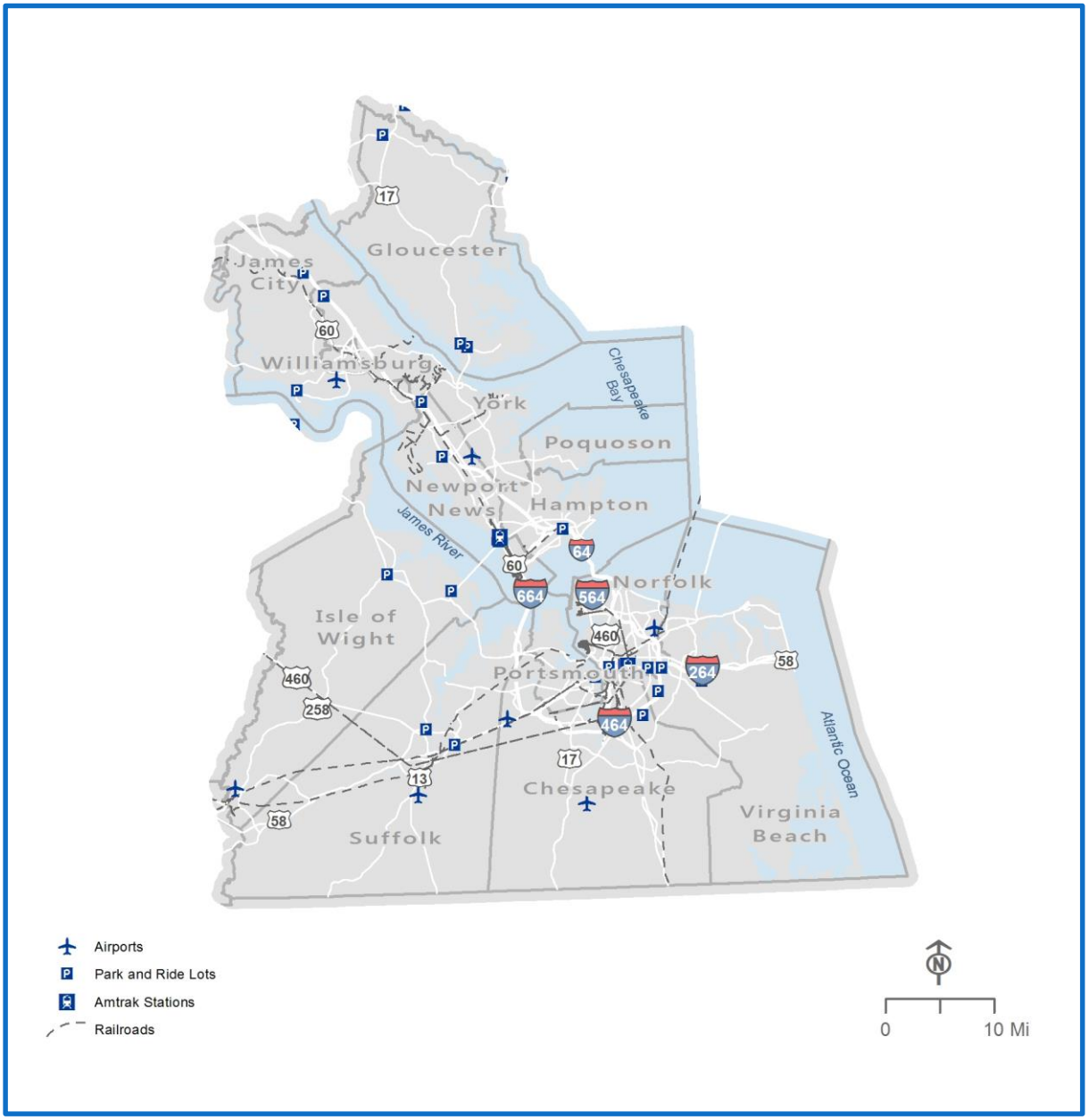


Table 11: Findings of Needs

A. I-95 Corridor Reliability	
	**The I-95 Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia, particularly connecting the workforce in Fredericksburg to Northern Virginia. Highway capacity and operational improvements, enhanced TDM and additional mode choice options are needed to maintain reasonable mobility and access along this corridor.**
B. North/South Rail Reliability	
	**The North-South CSX Rail Line through the region is a critical freight and passenger corridors for inter-regional movement and it suffers from congestion and unreliable travel times. Inter-city and commuter passenger rail service is critical to connecting the workforce in Fredericksburg to Northern Virginia. Improved commuter service would be valuable for reverse commute trips to help serve employment centers in Fredericksburg. Capacity and operational improvements to address reliable freight, commuter and inter-city passenger rail travel are needed.**
C. Rappahannock River Crossings	
	**The Rappahannock River is a major asset to the region and a significant transportation barrier that funnels traffic to a few bridges, particularly the I-95 Bridge. Limited crossings and the limited mode choice at those crossings adds excess local traffic to I-95 and is a barrier to active transportation between points north and south of the river.**
D. VRE Connectivity and Mode Choice	
	**The VRE stations in the region are critical connections in the regional multimodal system but many are disconnected from nearby activity centers and surrounding residential areas and have limited mode choice options. Improved mode choice options and bike and walk connectivity are needed to maximize the value of the region's commuter rail system.**
E. Fredericksburg to Spotsylvania Connectivity and Mode Choice	
	**The US Route 1 and Lafayette Boulevard Corridors connect Fredericksburg and Spotsylvania activity centers as well as the adjacent commercial and residential areas. These corridors have limited mode choice for active transportation and have limited network connectivity. Better local network connectivity and active transportation options would enhance the attraction of these areas to businesses and workforce and connect key Knowledge activity centers to the surrounding residential areas and local service needs.**
F. Route 3 Corridor Connectivity, TDM and Mode Choice	
	**The Route 3 Corridor is a critical corridor connecting the workforce in Spotsylvania County with activity centers in the region and beyond. The corridor currently has limited local network connectivity or active transportation options. Providing additional travel options is critical to maximizing efficiency of this corridor and attracting a strong workforce to this region.**
G. Route 17 Corridor Connectivity, TDM and Mode Choice	
	**The Route 17 Corridor is a critical corridor connecting the workforce in Stafford County with activity centers in the region and beyond. The corridor currently has limited local network connectivity or active transportation options. Providing additional travel options is critical to maximizing efficiency of this corridor and attracting a strong workforce to this region.**
H. Various Activity Centers - Walkable Places	
	**There are multiple activity centers that have limited pedestrian facilities or need improved pedestrian environments. Walkable places improves appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.**
I. Regional Need - TDM	
	**A large portion of the regional workforce commutes to Northern Virginia and encouraging additional TDM measures across the region, such as park-and-ride, vanpools, slugging and telework is essential to maximizing the efficiency of the transportation system given the relatively long commutes of residents in the region.**

VMTP 2025 Needs Assessment

Regional Needs Profile



Hampton Roads Region

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for Regional Networks that addresses the Needs Assessment for the Hampton Roads Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Hampton Roads Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the existing industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Hampton Roads regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks was developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

The Hampton Roads Region is defined as Gloucester County, Isle of Wight County, James City County, York County, Chesapeake City, Hampton City, Newport News, City of Norfolk, City of Poquoson, City of Portsmouth, Suffolk County, City of Virginia Beach, and the City of Williamsburg for the Needs Analysis.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on

understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from Hampton Roads Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layer together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, substantial population growth is projected for the Hampton Roads Region. Projections estimate 100,000 new residents in the region by the year 2025.

Table 2: Hampton Roads Region Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)
1,655,095	1,773,165

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Hampton Roads Region. Note that the projections by jurisdiction are less reliable than those at the regional level and should be regarded with some caution. These projections are for reference only and were not applied in the Needs Analysis.

Table 3: County and City Population Projections.

Jurisdiction	Current Population (2012)	Weldon Cooper Projection (2025)	% Change (2012 – 2025)
Gloucester County	36,886	40,992	11%
Isle of Wight County	35,399	40,280	14%
James City County	68,967	97,328	41%
York County	66,146	80,741	22%
City of Chesapeake	228,417	268,770	18%
City of Hampton	136,836	136,765	0%
City of Newport News	180,726	187,046	3%
City of Norfolk	245,782	254,551	4%
City of Poquoson	12,097	14,357	19%
City of Portsmouth	96,470	96,515	0%
City of Suffolk	85,181	106,588	25%
City of Virginia Beach	447,021	433,155	-3%
City of Williamsburg	15,167	16,077	6%

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise 21% (the same percentage as the state average) from $40,572to $49,197. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60. However, the Hampton Roads region's population has a strong component of young adults and will continue to do so, likely due to the presence of the military and universities in the region.

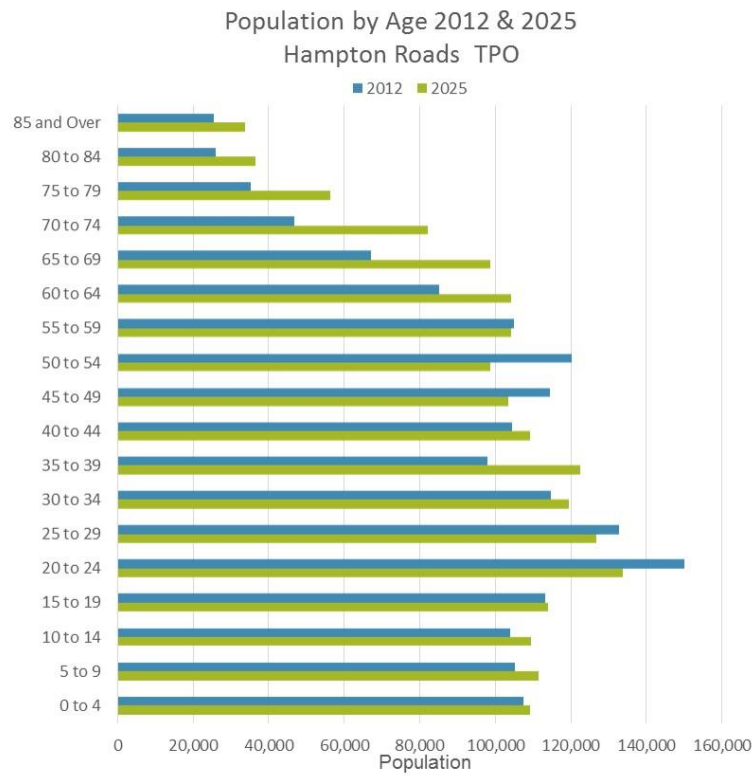


Figure 1: Population of Region 2000 in the years 2012 and 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in Hampton Roads.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger needs would be a greater concern.

Figure 2 provides a summary of the shares of each economic cluster in the Hampton Roads Region, as analyzed by the methodology developed by the Study Team and used in all regional analyses throughout

the state (see the Regional Network Needs Assessment Introduction for a full discussion of methodology).

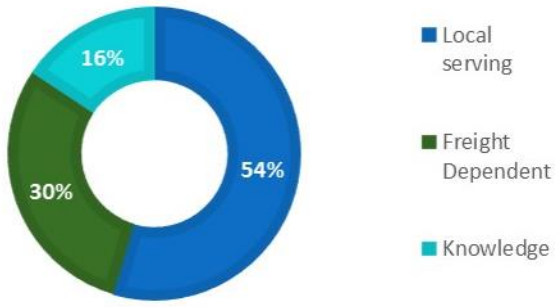


Figure 2: Top Sectors by Output (2012).
Source: IHS Global Insight, 2012.

The local services cluster is clearly the strongest in this region. Local services make up 54% of the economic output in the Hampton Roads Region. Conversely, the knowledge and freight-dependent clusters account for 16% and 30% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries. Also, note that while the relative share of the freight-dependent sector as measured in output is small, this does not necessarily reflect the amount of goods movement in the unique economy of the Hampton Roads Region. Shipping is a substantial activity, but for much of the freight volume there is no value added to the commodities as they enter and exit the region.

Top Industries by Output

Based on available employment data, health care and social assistance is the strongest industry in the Hampton Roads Region when measured by economic output. The real estate industry comes in a close second, reflecting the region's activity in real estate transactions and new development. Utilities, professional services, and wholesale trade round out the top five industries in the region with the greatest economic output. (Refer to Table 4).

Table 4: Current Industries by Output.

Top Industries	NAICS	% of Output
Health Care and Social Assistance	62	18%
Retail Trade	44-45	14%
Wholesale Trade	42	11%
Mining	21	10%
Public Administration	92	8%

Source: IHS Global Insight Data, 2012

Top Industries by Employment

In Hampton Roads, public administration, health care, retail trade, accommodation/food service, and manufacturing are the top industries by employment. (Refer to Table 5). Note that government employment, including the military, is included in public administration to the extent that these jobs are well documented by employment statistics.

Table 5: Current Top Industries by Employment.

Top Industries	NAICS	% of Workforce
Public Administration	92	20%
Health Care and Social Assistance	62	11%
Retail Trade	44-45	11%
Accommodation and Food Services	72	10%
Manufacturing	31-33	8%

Source: IHS Global Insight Data, 2012

The largest employer in the Hampton Roads Region is the U.S. Government, given that the Hampton Roads region hosts the largest naval base in the United States as well as several specialized military facilities such as Oceana and the Joint Expeditionary Base at Little Creek-Fort Story. Huntington Ingalls, the second largest employer in the region, is a major manufacturing company that specializes in building military ships. Sentara Healthcare, a non-profit multistate healthcare organization and the third largest employer, is headquartered in the City of Norfolk. In addition to its headquarters, Sentara Healthcare operates multiple healthcare facilities throughout the region.

Table 6: Current Top Employers.

Employers	Employees
United States Government	50,000+
Huntington Ingalls Industries	20,000
Sentara Healthcare	20,000
Norfolk Naval Shipyard	9,000

Sources: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Hampton Roads Region. The industries expressed in Table 7 have the highest LQ scores in the region. The scores for professional services and real estate, for example, can be inferred to mean that these services are more than two times more concentrated in the region than in the entire nation, on average. The high-location quotient industries include those related to tourism and also “other services’ which encompasses automobile and electronic repair and maintenance, social and religious organizations, and personal care services.

Table 7: Current Top Industries by Location Quotient.

Top Industries	NAICS	Location Quotient
Professional Services	54	2.24
Real Estate	53	2.16
Arts, Entertainment, and Recreation	71	1.43
Administration and Support	56	1.38
Other Services	81	1.35

Source: IHS Global Insight Data, 2012

Data Comparisons

Multiple data sources were used to inform the analysis of industries in Hampton Roads due to the region's unique employment composition. Due to the large number of government workers, specifically in defense, many datasets do not or cannot report government employment numbers. In order to capture this portion of regional employment, employment data was drawn from multiple sources: IHS Global Insight; InfoUSA; the Virginia Employment Commission (VEC); Virginia Economic Development Partnership (VEDP); Hampton Roads Economic Development Alliance; and the Hampton Roads Transportation Planning Organization's (HRTPO) 2040 Socio-Economic Forecast and TAZ Allocation used in the regional travel demand model. Each of these sources uses a different methodology to collect and categorize data – some use different geographical analysis areas and, therefore, they often arrive at slightly different conclusions about top employers or industries by certain measures.

In order to estimate the number of existing workers and their location the Study Team primarily utilized regional sources provided by the HRTPO, namely the 2040 Socio-Economic Forecast and TAZ Allocation. The socio-economic forecast is used for the HRTPO travel demand model to forecast travel patterns in the region. The dataset provides employment numbers from the base year (2009) for each transportation analysis zone (TAZ) in the region. Since most of the employment analysis is by block group, the Study Team overlaid the TAZ and block group files to preserve the location of the employment from the TAZ data. While these boundaries are not exact, many of the TAZs follow census boundaries and are close to the block groups.

Once the employment data from the TAZ was allocated the block group, the Study Team could estimate the number of employees by location. The HRTPO 2040 Socio-Economic Forecast and TAZ Allocation organized the employment data into four categories, retail, office, industrial, and other. Since the Needs Analysis used slightly different categories, (local serving, knowledge based, and freight dependent), the study team applied the HRTPO categories to the Needs Analysis categories. The categories are provided in Table 8.

Table 8: HRTPO and Needs Analysis Employment Category Conversion

HRTPO Employment Categories	Needs Analysis Employment Categories
Retail	Local Serving
Office	Knowledge Based
Industrial	Freight Dependent
Other	Local Serving

While the 2040 Socio-Economic Forecast and TAZ Allocation is the primary source for employment in the region, some areas of employment are not reported in accordance to Virginia Employment Commission regulations. Only one activity center in the Needs Analysis was affected by these regulations, the

Pembroke activity center. In this case, InfoUSA data supplemented the HRTPO 2040 Socio-Economic Forecast and TAZ Allocation.

InfoUSA data provides individual business records by name, location, county, latitude/longitude coordinates, and two-digit NAICS code for the year 2012. However, the InfoUSA dataset has been shown to have incomplete coverage of government entities which would greatly underrepresent the employment in the Hampton Roads Region. Therefore, it was used in the Needs Analysis only as a supplement when necessary, rather than as the main dataset.

The issue of government employment was encountered when identifying the top employers for the Hampton Roads Region. Since many of the datasets do not include government employment, it is difficult to ascertain the top employers in the region. The top employers are based on three datasets, VEC, VEDP, and the Hampton Roads Economic Development Alliance (HREDA).

Both VEC and VEDP report their figures using the same data source: the Quarterly Census of Employment and Wages (QCEW) from the 3rd quarter of 2014. This source includes all workers covered by state unemployment insurance laws, and all workers covered by federal insurance laws, but excludes self-employed workers and some agricultural workers. The difference between these sources comes in the way top industries are reported. VEC uses number of employees to rank industries, while VEDP computes a percentage of total workforce.

The Study Team used data from HREDA to supplement VEC and VEDP to identify top employers in the region. HREDA tracks various employment and economic indicators for the region. HREDA surveys the communities in the region to identify the top employers and estimate the number of employees. Unlike other sources, HREDA captures the number of government employees in the region.

IHS Global Insight is a city/county-level 2012 data set categorized by NAICS codes used for overall employment and output for the Needs Analysis. This data was collected in a different year than that used in VEDP and VEC, which may have some effect on the difference between the reported numbers of employees. Despite these differences, however, each reflects broadly similar trends in regional employment.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers, drawn based on contiguous census block groups, were then developed for these areas. The primary purpose of the activity center analysis was to identify large regional centers of employment so that the commuting and related travel markets could be analyzed in relation to these areas. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles.

Due to the complexity and scale of the Hampton Roads Region, both geographically and economically, the Study Team organized the activity centers into two different categories. These categories, the

regional activity centers and local activity centers differentiate whether the activity center is a major employment destination for the region or a smaller-scale center of activity, even though a smaller center could serve some regional purposes. The Study Team selected regional activity centers based on the existing regional share of employment and locations of economically strategic development (i.e. ports and military installations). Many of the future growth centers are not identified in this analysis as regional centers because they do not yet serve as major regional employment centers.

Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. In the Hampton Roads Region, centers of high economic or social activity such as Craney Island weren't represented as areas of high job density through the InfoUSA jobs data that was used in the mapping exercise. Centers such as this were instead affirmed by stakeholders who had a knowledge of the regional significance of the activity there, and then mapped accordingly. Figure 3 below shows the activity centers as blue circles. Figure 4 shows the area included in each activity center. This graphic addresses concerns by stakeholders that the dot location map of activity centers omits activity centers or shows them in incorrect locations – most in fact cover a fairly large area and in some cases represent multiple nearby employment sites such as Burton Station and the joint amphibious base at Little Creek in Virginia Beach. It is more effective in the Regional Network Analysis to combine these contiguous areas in order to analyze travel patterns and accessibility at the appropriate scale.

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Using the categorization of jobs into the three economic clusters (described previously) of local, freight, and knowledge-based, analysts developed charts that represent the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 5 below shows the mapping of each activity center broken down by industry sector and scaled by relative number of jobs.

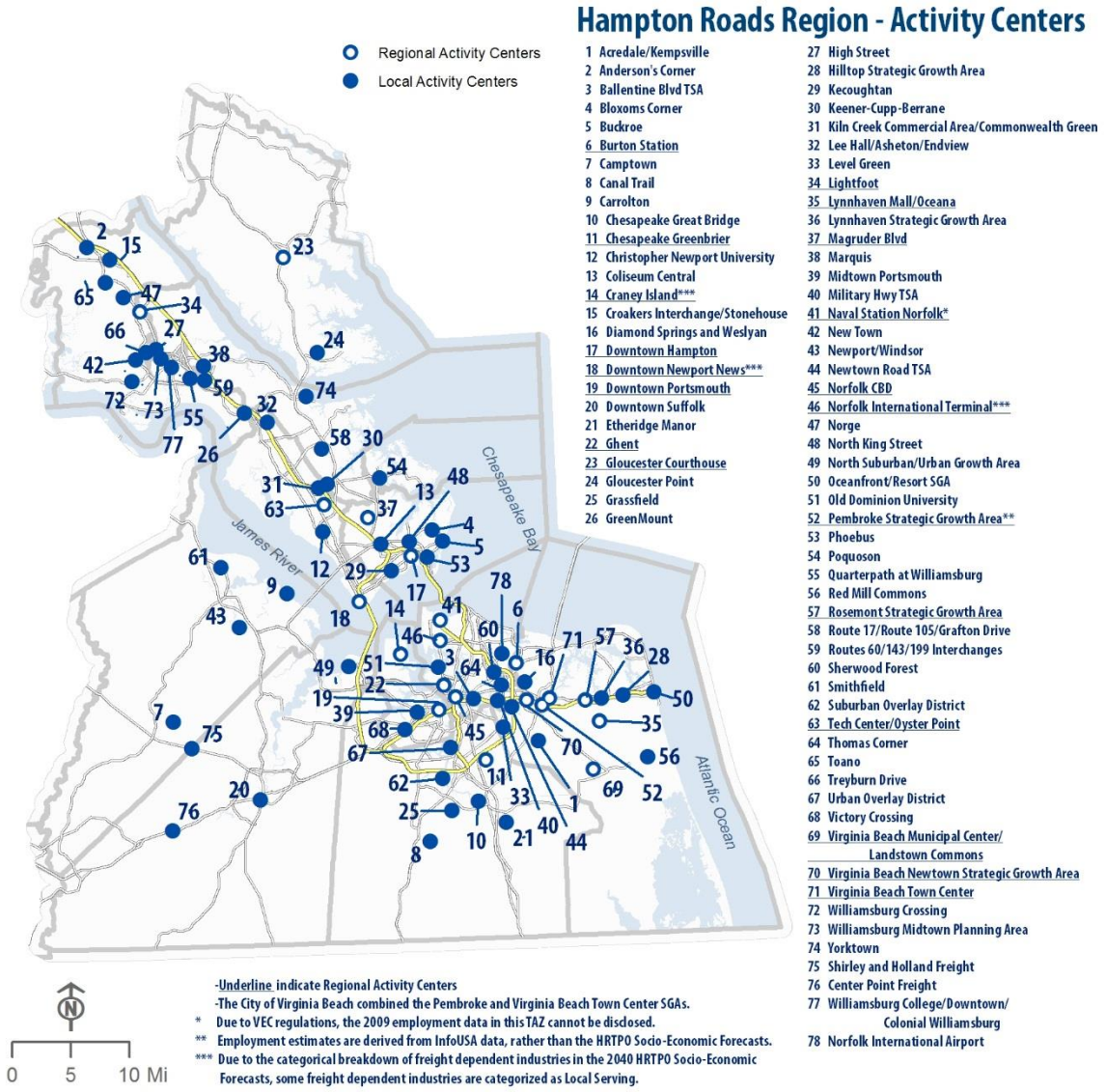
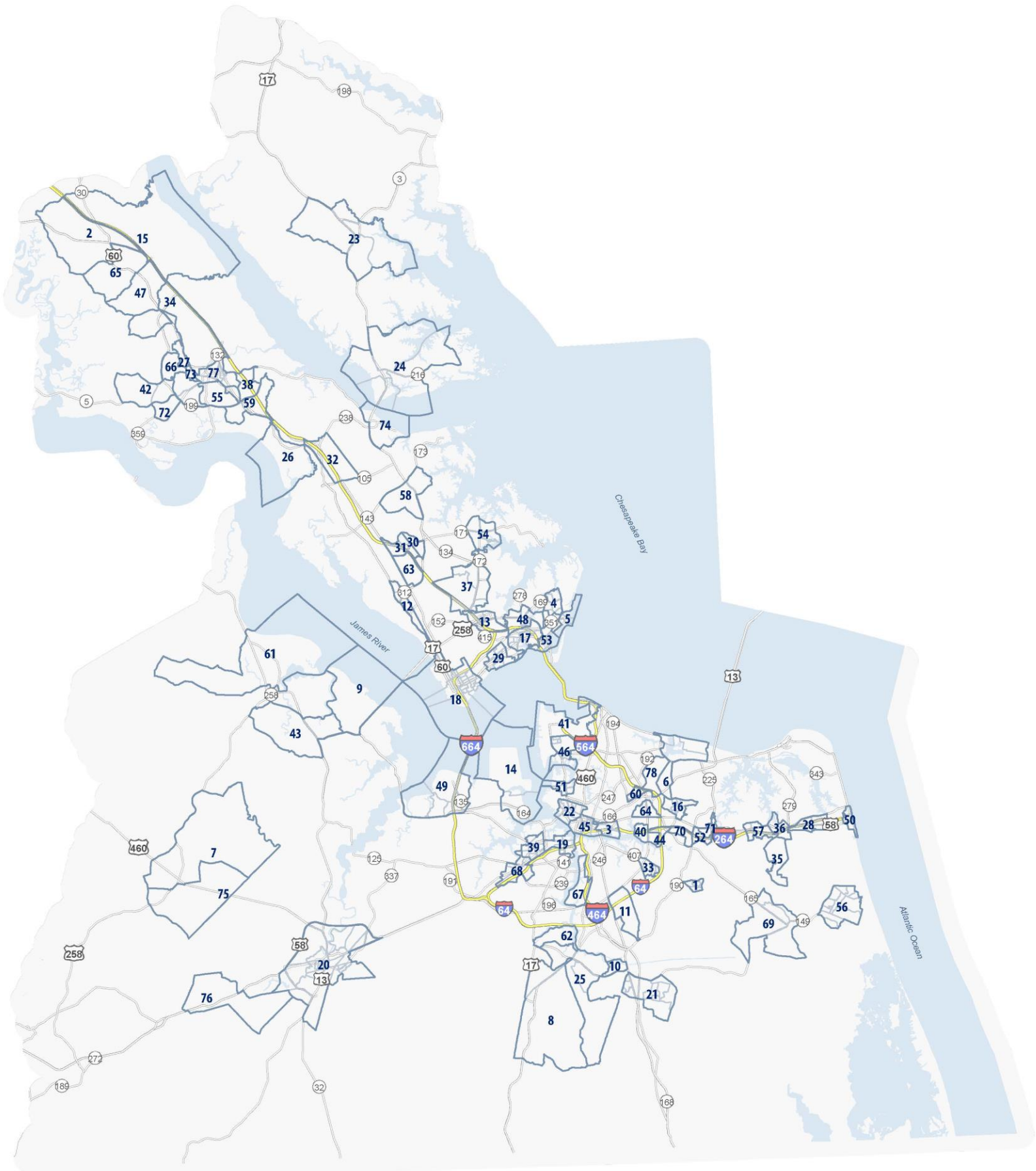


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Hampton Roads Region - Activity Centers



1	Acredale/Kempsville	21	Etheridge Manor	41	Naval Station Norfolk*	61	Smithfield
2	Anderson's Corner	22	Ghent	42	New Town	62	Suburban Overlay District
3	Ballentine Blvd TSA	23	Gloucester Courthouse	43	Newport/Windsor	63	Tech Center/Oyster Point
4	Bloxoms Corner	24	Gloucester Point	44	Newtown Road TSA	64	Thomas Corner
5	Buckroe	25	Grassfield	45	Norfolk CBD	65	Toano
6	Burton Station	26	GreenMount	46	Norfolk International Terminal***	66	Treyburn Drive
7	Camptown	27	High Street	47	Norge	67	Urban Overlay District
8	Canal Trail	28	Hilltop Strategic Growth Area	48	North King Street	68	Victory Crossing
9	Carrolton	29	Kecoughtan	49	North Suburban/Urban Growth Area	69	Virginia Beach Municipal Center/ Landstown Commons
10	Chesapeake Great Bridge	30	Keener-Cupp-Berrane	50	Oceanfront/Resort SGA	70	Virginia Beach Newtown Strategic Growth Area
11	Chesapeake Greenbrier	31	Kiln Creek Commercial Area/Commonwealth Green	51	Old Dominion University	71	Virginia Beach Town Center
12	Christopher Newport University	32	Lee Hall/Asheton/Endview	52	Pembroke Strategic Growth Area**	72	Williamsburg Crossing
13	Coliseum Central	33	Level Green	53	Phoebus	73	Williamsburg Midtown Planning Area
14	Craney Island***	34	Lightfoot	54	Poquoson	74	Yorktown
15	Croakers Interchange/Stonehouse	35	Lynnhaven Mall/Oceana	55	Quarterpath at Williamsburg	75	Shirley and Holland Freight
16	Diamond Springs and Weslyan	36	Lynnhaven Strategic Growth Area	56	Red Mill Commons	76	Center Point Freight
17	Downtown Hampton	37	Magruder Blvd	57	Rosemont Strategic Growth Area	77	Williamsburg: College/Downtown/ Colonial Williamsburg
18	Downtown Newport News***	38	Marquis	58	Route 17/Route 105/Grafton Drive	78	Norfolk International Airport
19	Downtown Portsmouth	39	Midtown Portsmouth	59	Routes 60/143/199 Interchanges		
20	Downtown Suffolk	40	Military Hwy TSA	60	Sherwood Forest		

Activity Center Boundaries

Activity Center Block Groups

-Underline indicate Regional Activity Centers

-The City of Virginia Beach combined the Pembroke and Virginia Beach Town Center SGAs.

* Due to VEC regulations, the 2009 employment data in this TAZ cannot be disclosed.

** Employment estimates are derived from InfoUSA data, rather than the HRTPO Socio-Economic Forecasts.

*** Due to the categorical breakdown of freight dependent industries in the 2040 HRTPO Socio-Economic Forecasts, some freight dependent industries are categorized as Local Serving.

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Figure 4: Activity Center Boundaries (Census Block Groups)

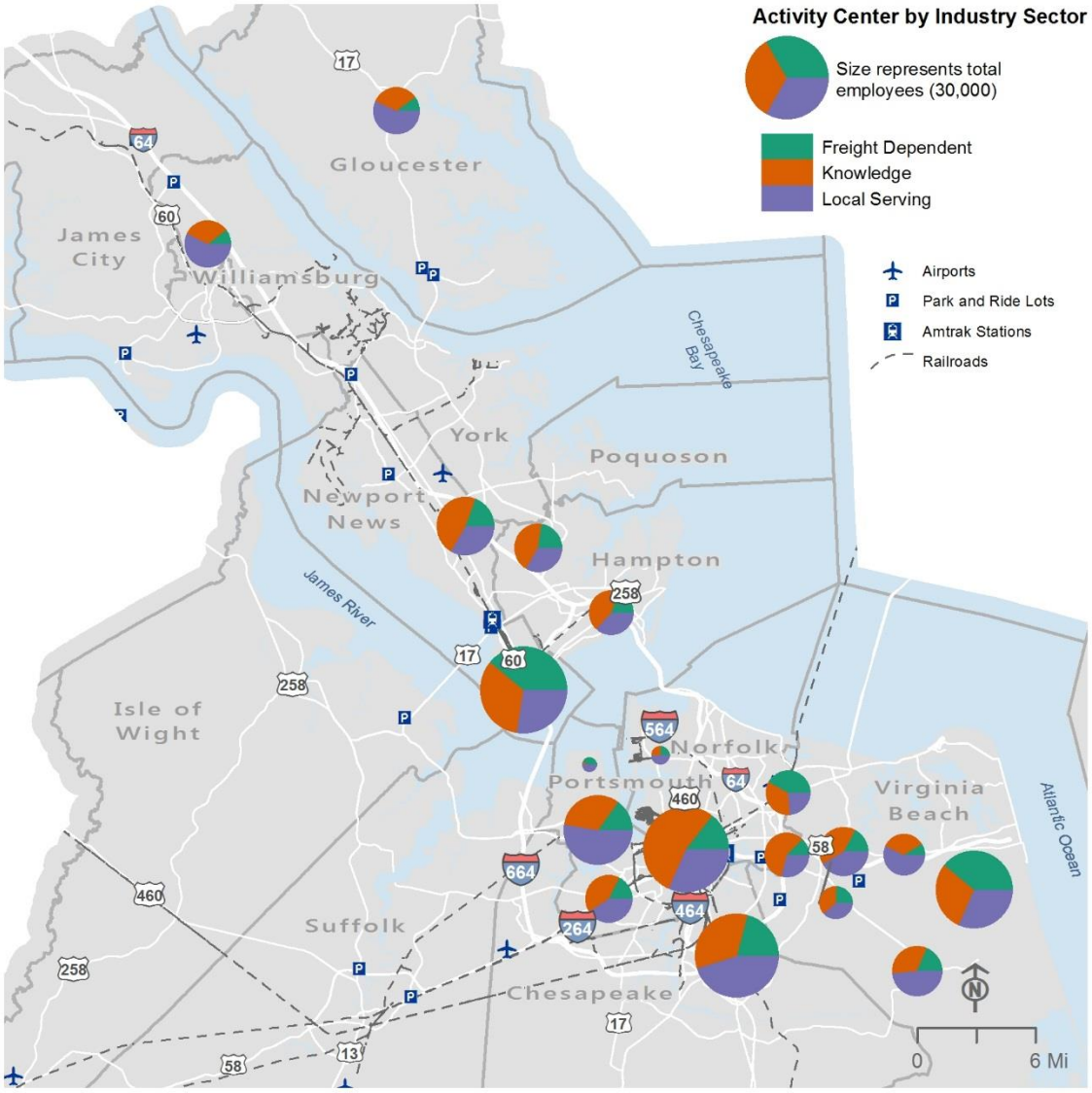


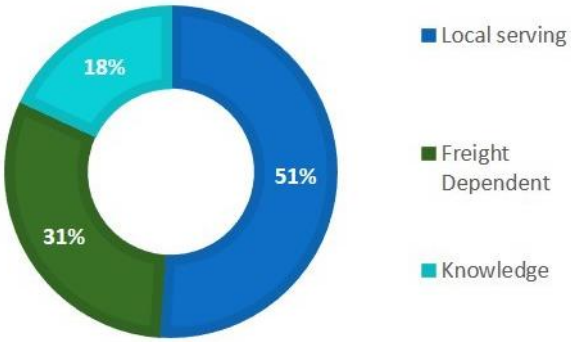
Figure 5: Activity Center Employment by Industry Sector,
Source: HRTPO 2040 Socio-Economic Forecasts augmented with InfoUSA data..

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Hampton Roads stakeholders, the Study Team used IHS Global Insight economic forecasts for 2025 and received input from stakeholders to determine the future desired economic profiles for each region. The 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Hampton Roads' economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires. The region's available economic plans, including the Comprehensive Economic Development Strategy, were reviewed and found to be highly consistent with the 2025 forecasts from IHS.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Hampton Roads Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities



The local services sector will continue to be the largest portion of regional output in 2025, estimated to make up 51% of the economic output in the Hampton Roads Region. The knowledge and freight-dependent sectors will both grow, accounting for 18% and 31% of regional economic output, respectively.

Figure 6: Top Sectors by Output (2025).
Source: IHS Global Insight Data, 2012

Substantial growth is forecasted for the Hampton Roads Region by 2025. According to statewide and national datasets used, the corporate management and the administrative sector industries will see the largest growth in output. Combined, they are expected to produce $7.4 billion more in 2025 than was produced in 2012.

The only industries projected to produce lower levels of output in 2025 than in 2012 is the health care industry. In all industries combined, economic output in Hampton Roads is expected to increase by $9.7 billion by 2025. Figure 8 shows the forecasted changes in employment for the largest economic sectors. While the health care industry will decrease slightly in output, it is nevertheless forecasted to grow in employment from 2012 to 2025. The highest amount of employment growth will occur in the health care sector, followed by the accommodations and food service sector.

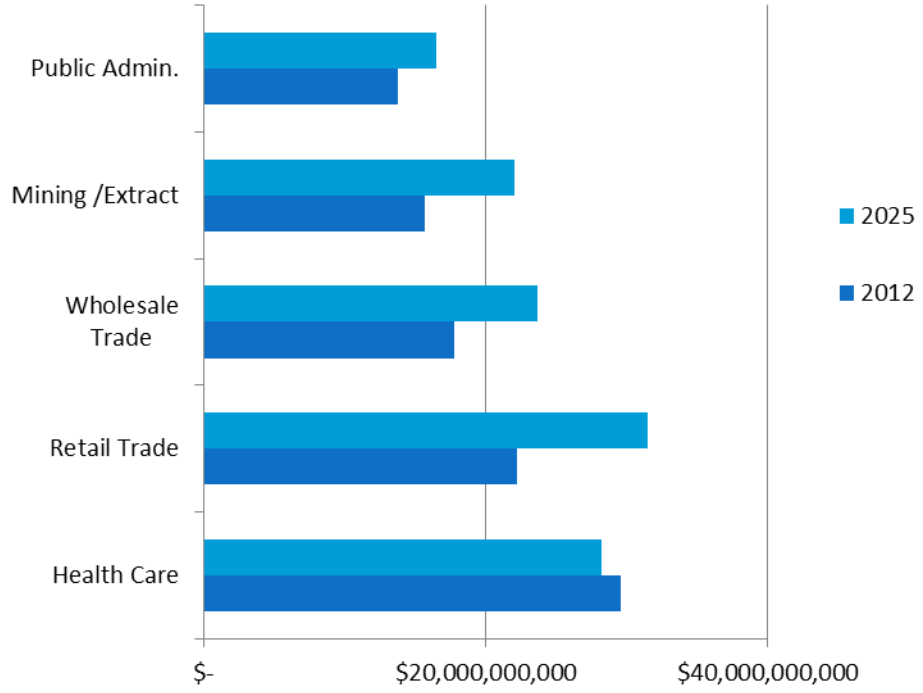


Figure 7: Top Industries by Output
Source: IHS Global Insight Data, 2012

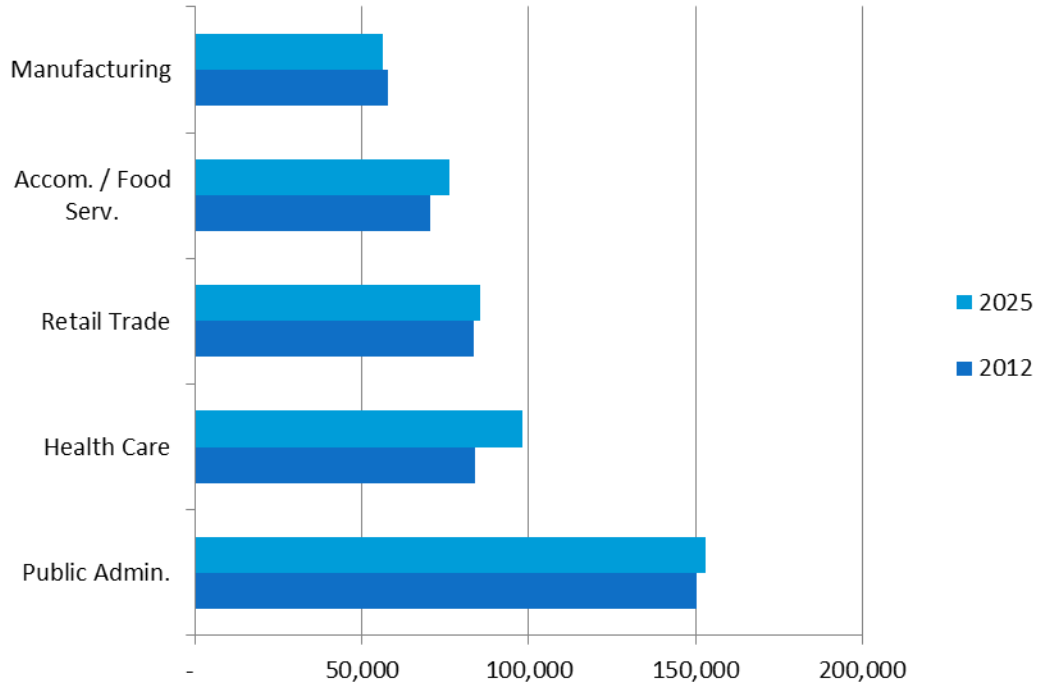


Figure 8: Top Industries by Employment.
Source: IHS Global Insight Data, 2012

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Hampton Roads region such as typical commute times and overall travel reliability. The following categories of performance metrics were used to create a regional transportation profile for the Hampton Roads Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Regional commuting patterns indicate that many workers do not cross major water bodies during their commutes. On the peninsula, patterns move toward the Cities of Newport News and Hampton. In the southern jurisdictions, major commuting destinations are the Cities of Norfolk, Virginia Beach, Portsmouth and Chesapeake. In all jurisdictions in the Hampton Roads Region, a small minority of workers work outside the region. For all jurisdictions, the Hampton Roads Region, a large majority of workers either live and work in the same jurisdiction or work in another jurisdiction in the region. (Refer to Figure 9).

Activity Center Commuting Patterns

An analysis of commuting patterns to activity centers provided further insight for the regional transportation profile. Figures 9 through 19 below provide the spatial commuting patterns for eleven of the activity centers in the Hampton Roads Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map. The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

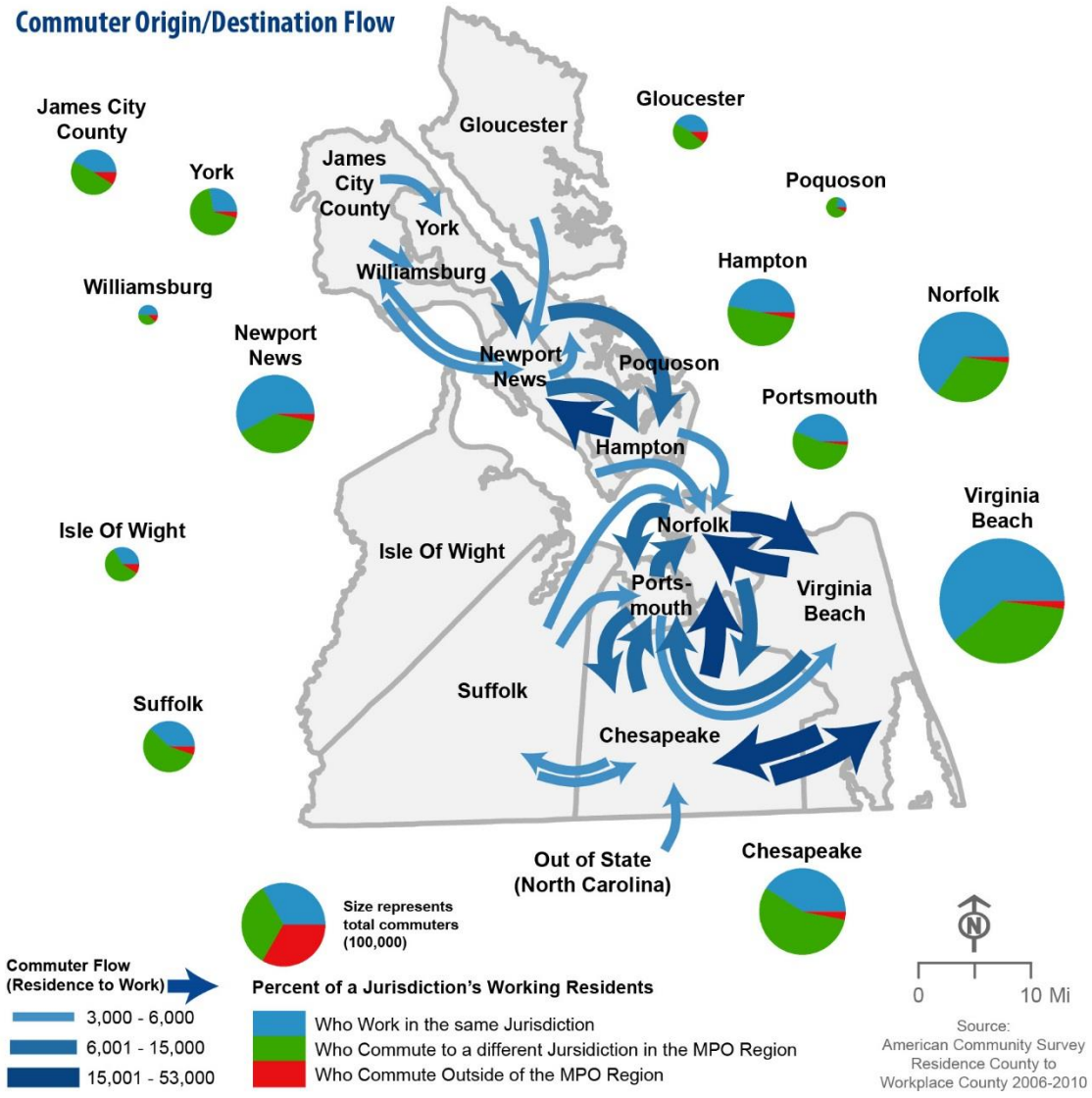


Figure 9: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

As shown on the map, the Ghent activity center sees a significant number of commuters from the surrounding area, especially in the Cities of Norfolk and Virginia Beach. Fewer commutes originate from the peninsula, which requires commuters to cross major waterbodies. (Refer to Figure 10). A more modest number of commutes originate within the Cities of Suffolk and Chesapeake.

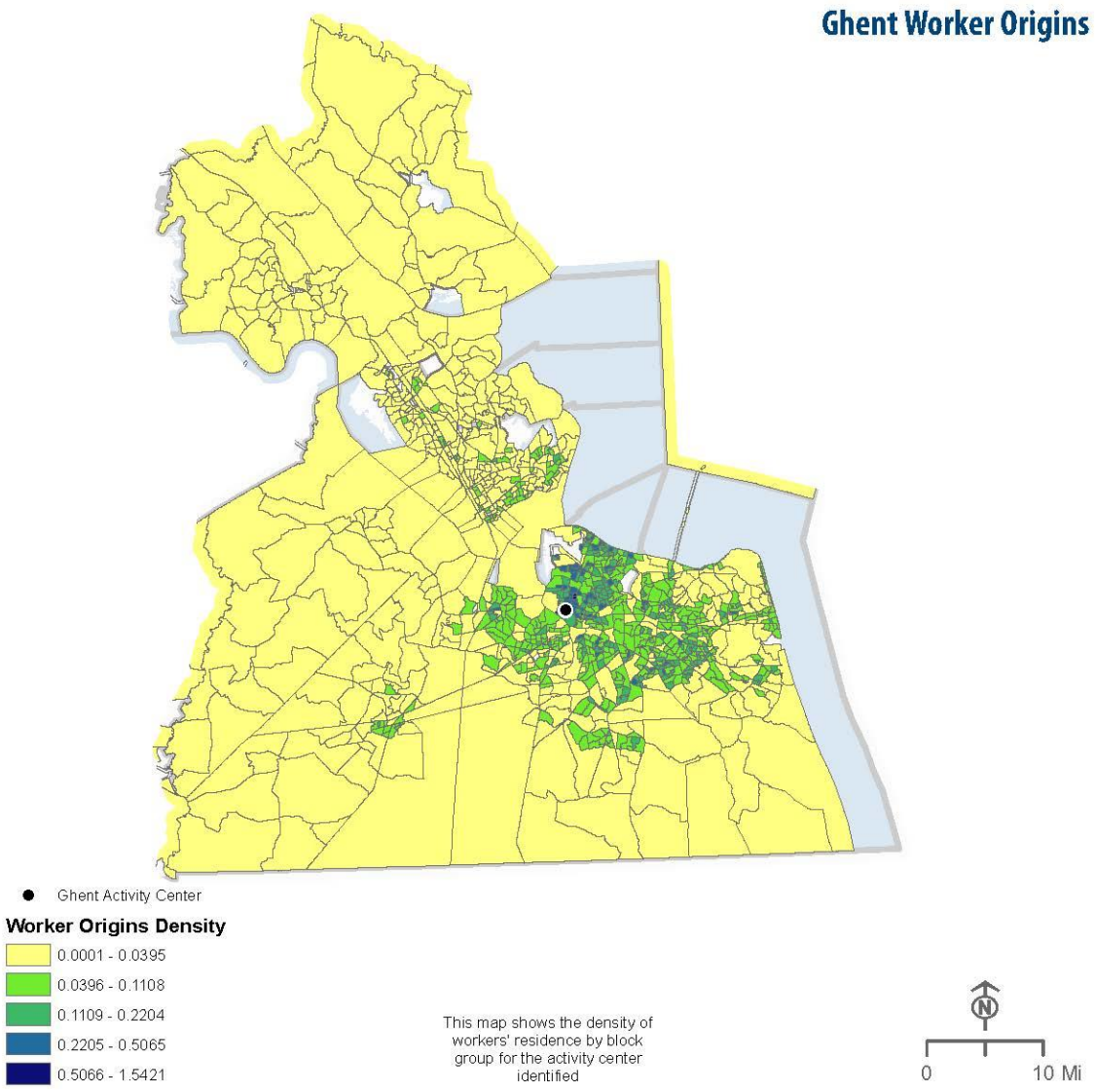


Figure 10: Commuting Patterns to Ghent Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commute origins for the Norfolk Central Business District (CBD) are concentrated in the Cities of Norfolk and Virginia Beach. (Refer to Figure 11). As with the Ghent activity center, fewer trips originate in the peninsula which requires crossing major water bodies.

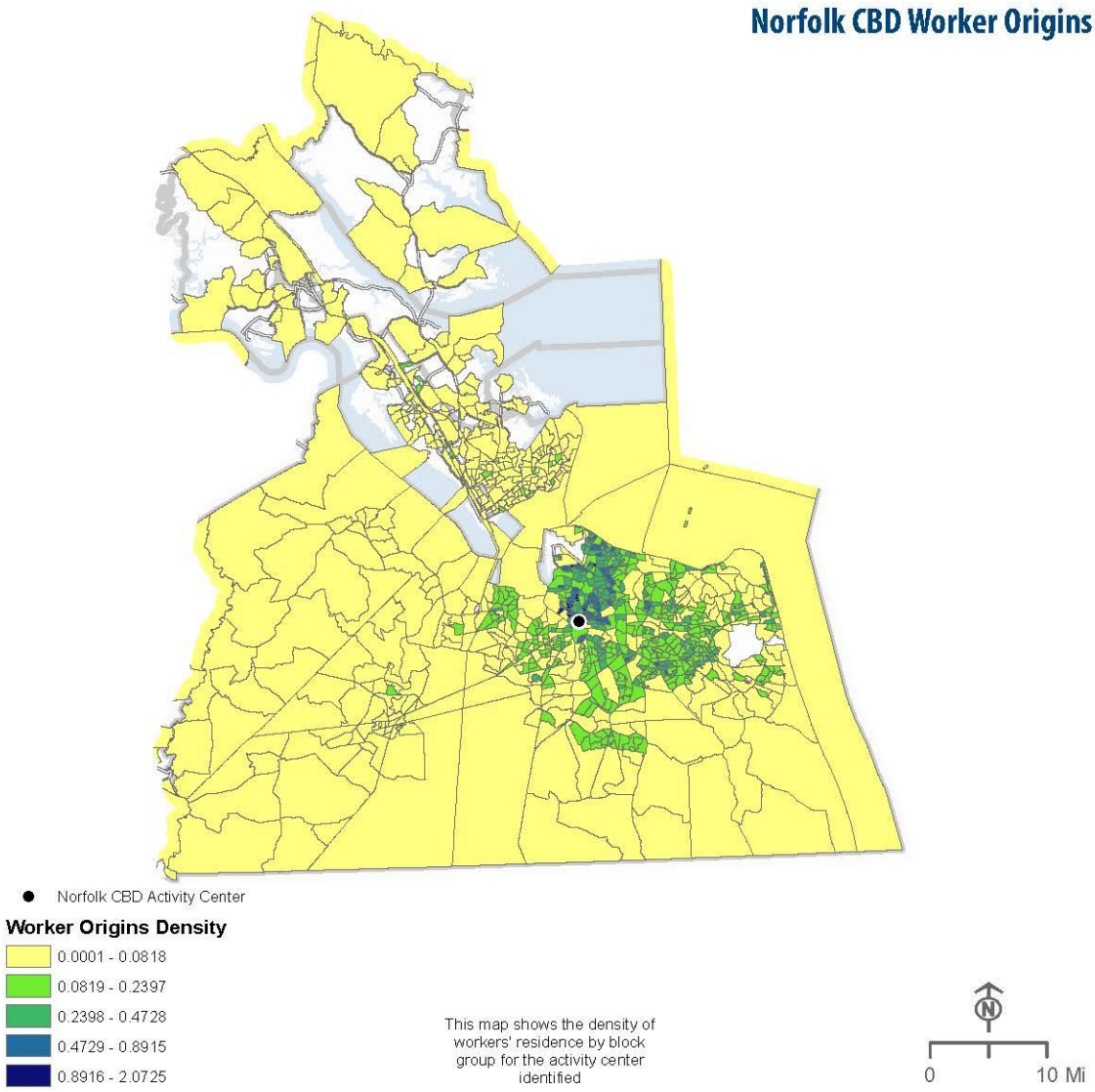


Figure 11: Commuting Patterns to Norfolk CBD Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Like other major activity centers in the City of Norfolk, many of the commutes to the Naval Station Norfolk activity center originate in the Cities of Norfolk and Virginia Beach. Overall, fewer commutes originate in the peninsula, which requires crossing major waterbodies. However, compared to other employment centers in Norfolk, there are clusters of workers in the peninsula that do cross major waterbodies to this employment center. (Refer to Figure 12).

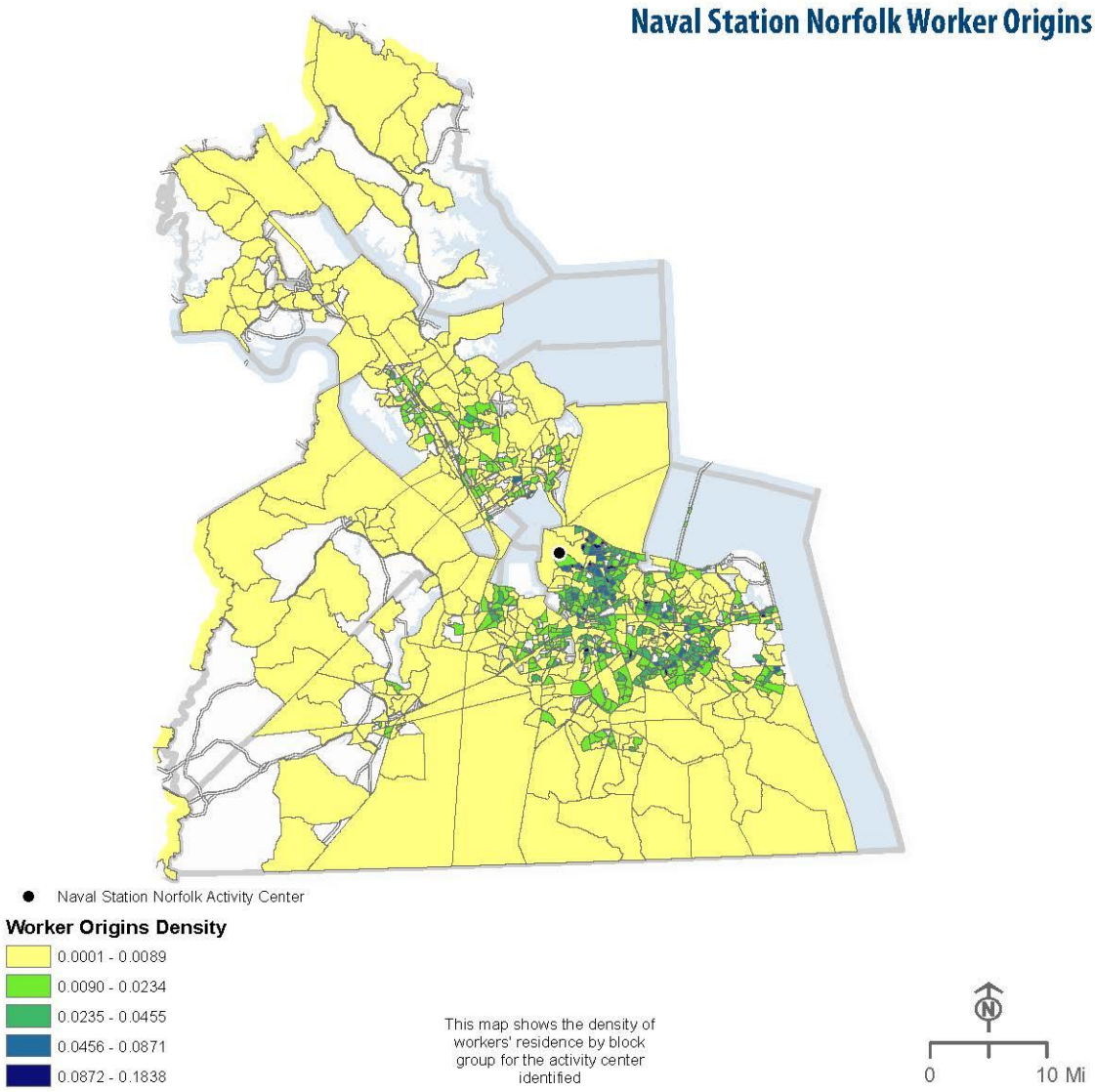


Figure 12: Commuting Patterns to Naval Station Norfolk Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The highest concentration of commutes for the Lynnhaven Mall/Oceana activity center originate in the City of Virginia Beach, with a lower density of commutes originating in the City of Norfolk and the City of Chesapeake. (Refer to Figure 13).

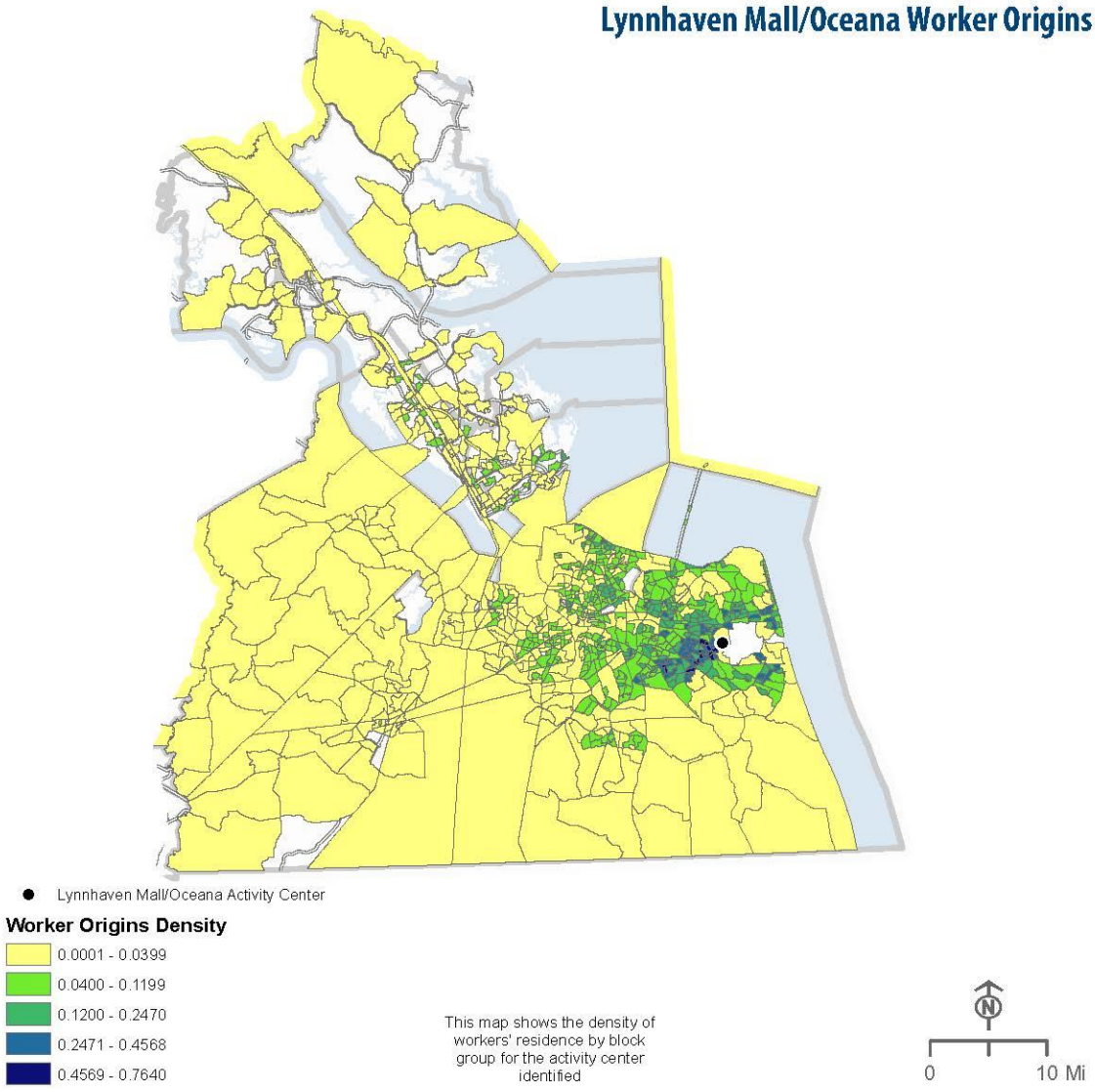


Figure 13: Commuting Patterns to Lynnhaven Mall/Oceana.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The origins of the commutes to the Pembroke SGA activity center are densest in the block groups closest to the activity center, mostly in the City of Virginia Beach and areas of the City of Norfolk. (Refer to Figure 14).

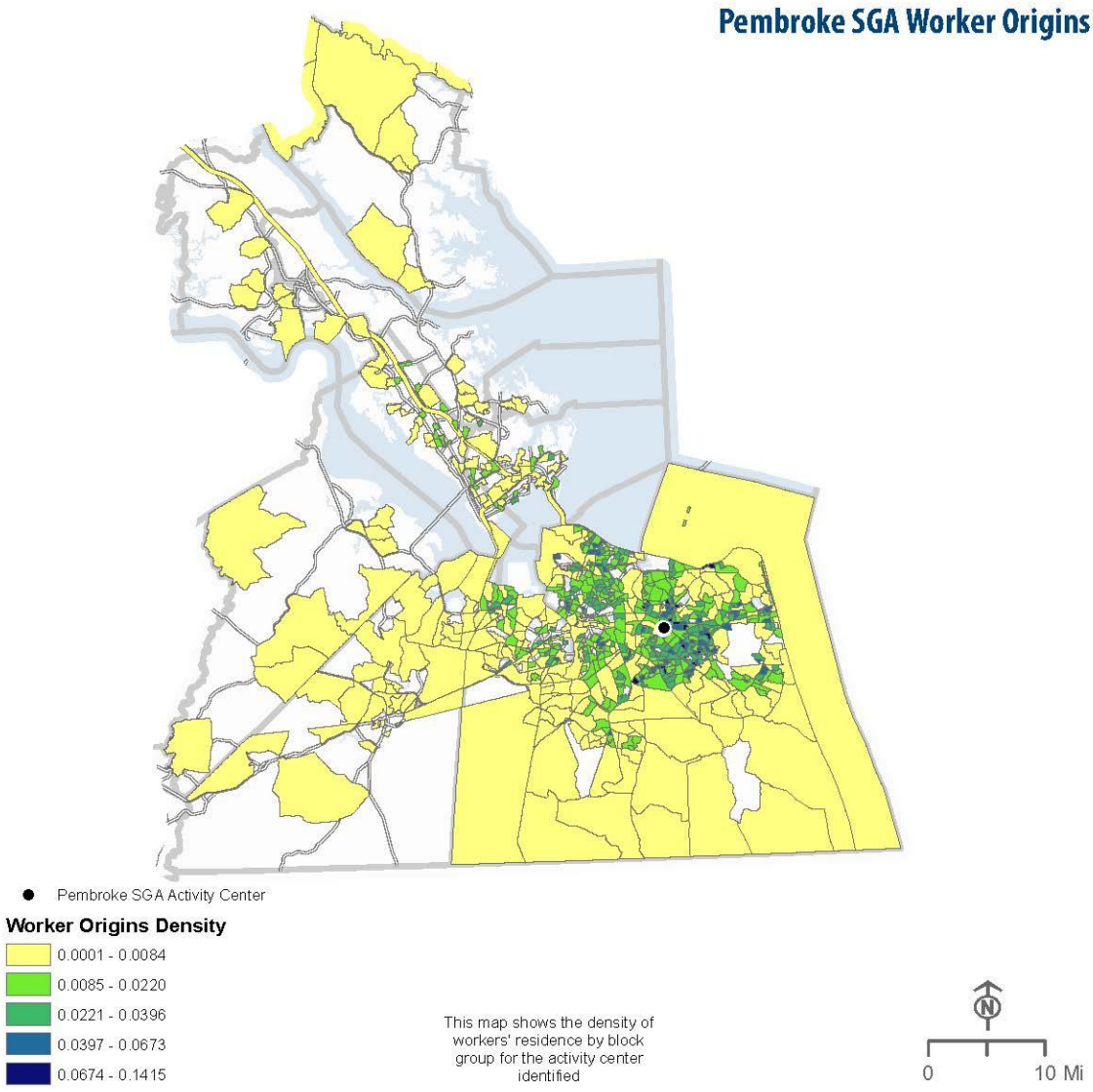


Figure 14: Commuting Patterns to Pembroke SGA.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

As with many of the activity centers discussed, many of the commutes to the Chesapeake Greenbrier activity center originate in census block groups closest to the activity center. The worker origins are densest in the Cities of Chesapeake, Virginia Beach, and Norfolk. Worker origins are least dense in the peninsula, which would require crossing major water bodies. (Refer to Figure 15).

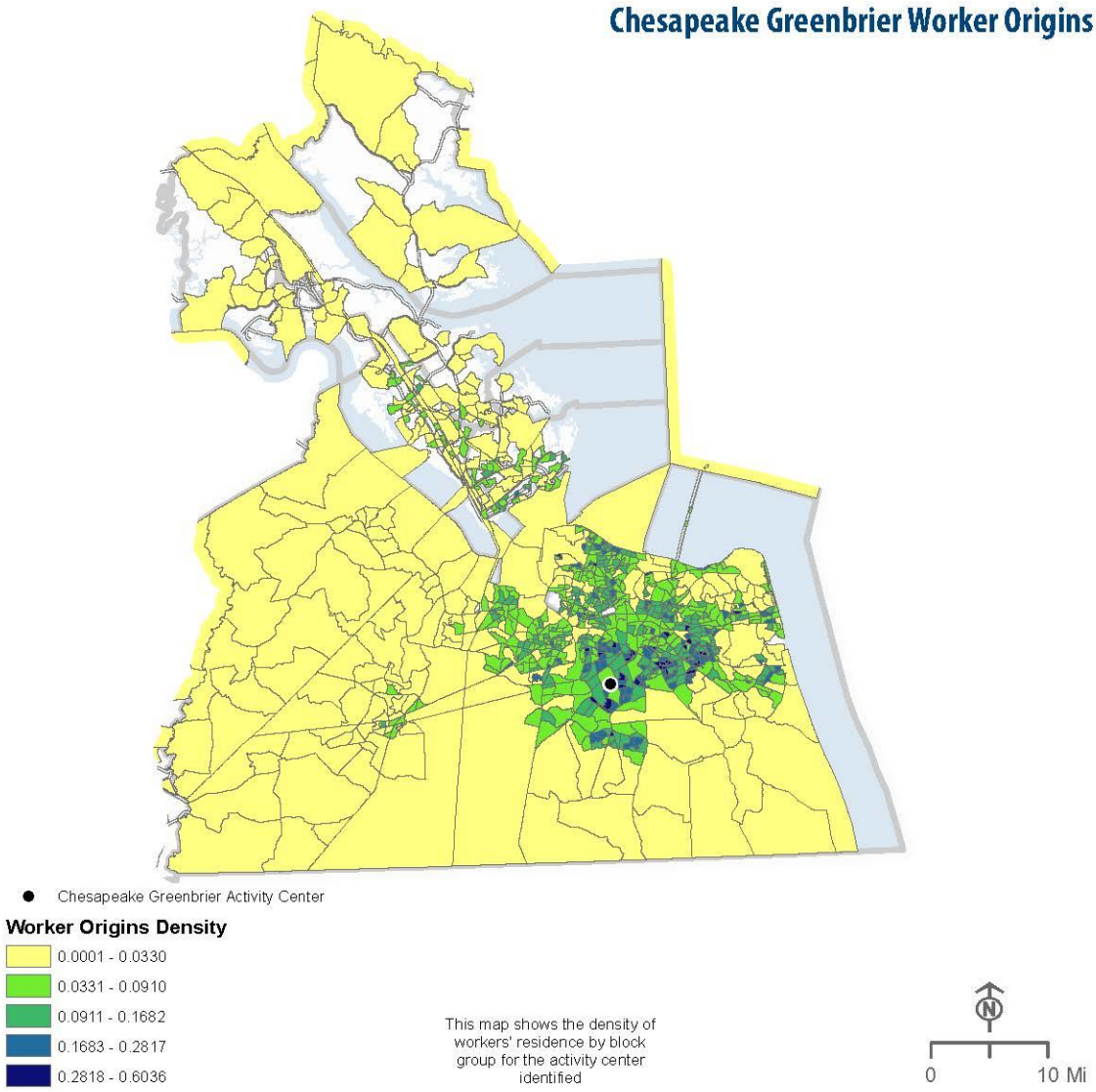


Figure 15: Commuting Patterns to Chesapeake Greenbrier.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commuting patterns to the Burton Station activity center mostly originate from the surrounding block groups in the Cities of Norfolk and Virginia Beach. Outside of these aforementioned jurisdictions, commute origins are sparse, especially in the peninsula jurisdictions as well as Isle of Wight County and the City of Suffolk. (Refer to Figure 16).

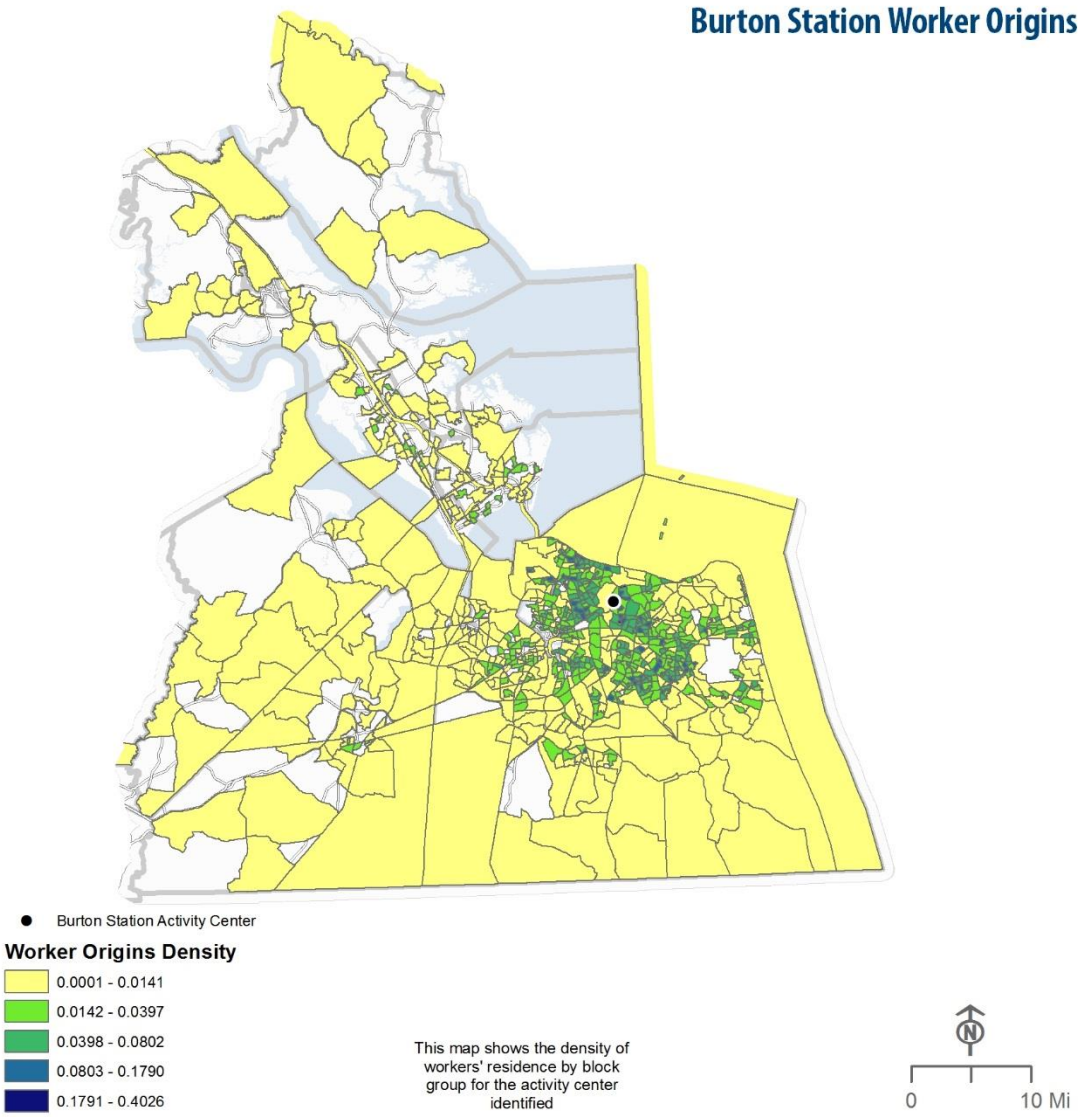


Figure 16: Commuting Patterns to Burton Station.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Worker origins for Downtown Portsmouth are densest in the City of Portsmouth, with a modest density of worker origins in the Cities of Norfolk and Virginia Beach. There are a modest number of commutes originating in the Cities of Suffolk and Chesapeake as well as along the I-64 corridor in the peninsula. However, commute origins are more scattered in the northern block groups of the peninsula. (Refer to Figure 17).

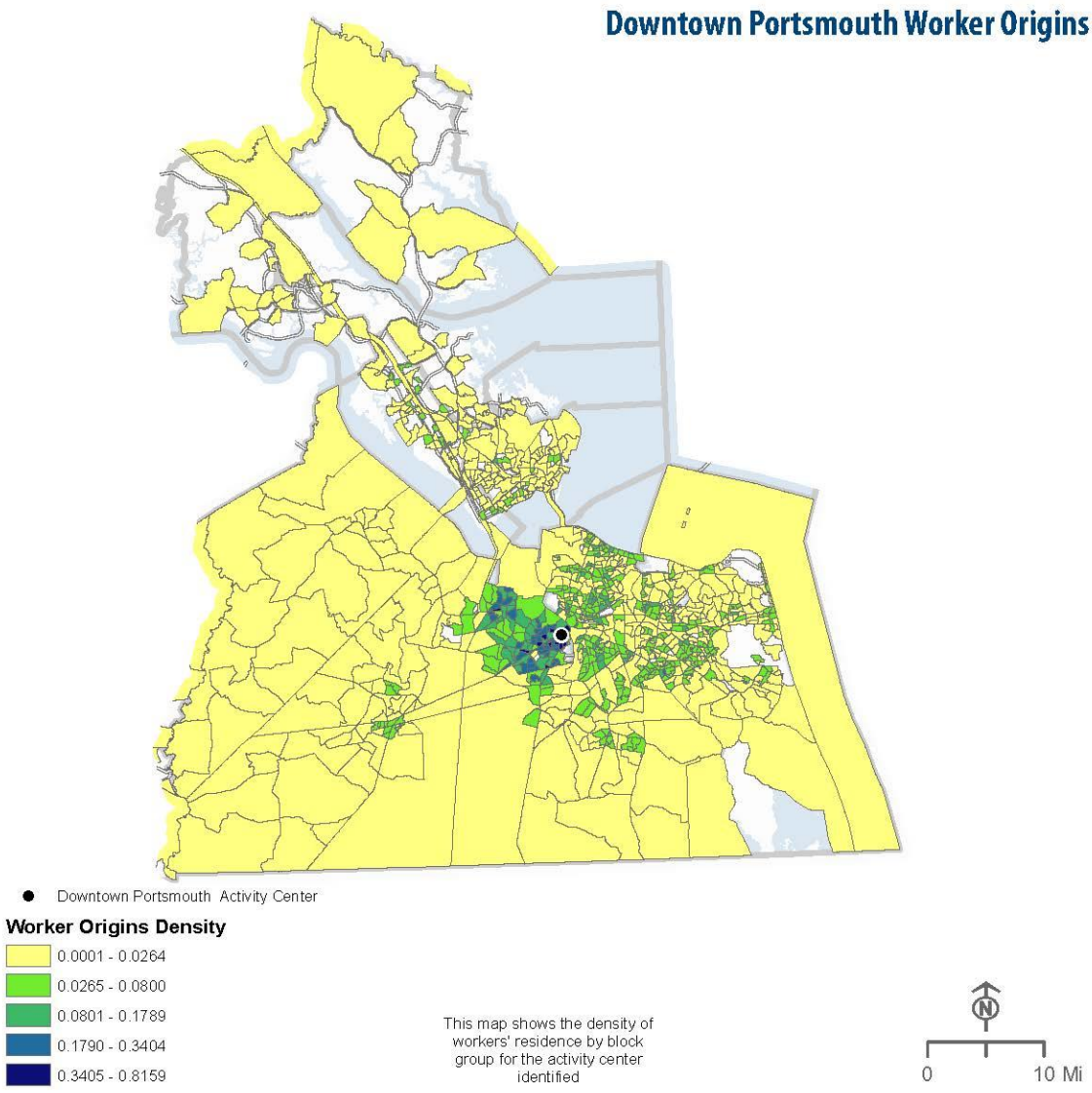


Figure 17: Commuting Patterns to Downtown Portsmouth.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commute origins to the Magruder Boulevard activity center are densest in areas the City of Newport News and the City of Hampton. While the density of worker origins is lower in the southside area of the region, there are widespread commuter origins destined for this activity center. (Refer to Figure 18).

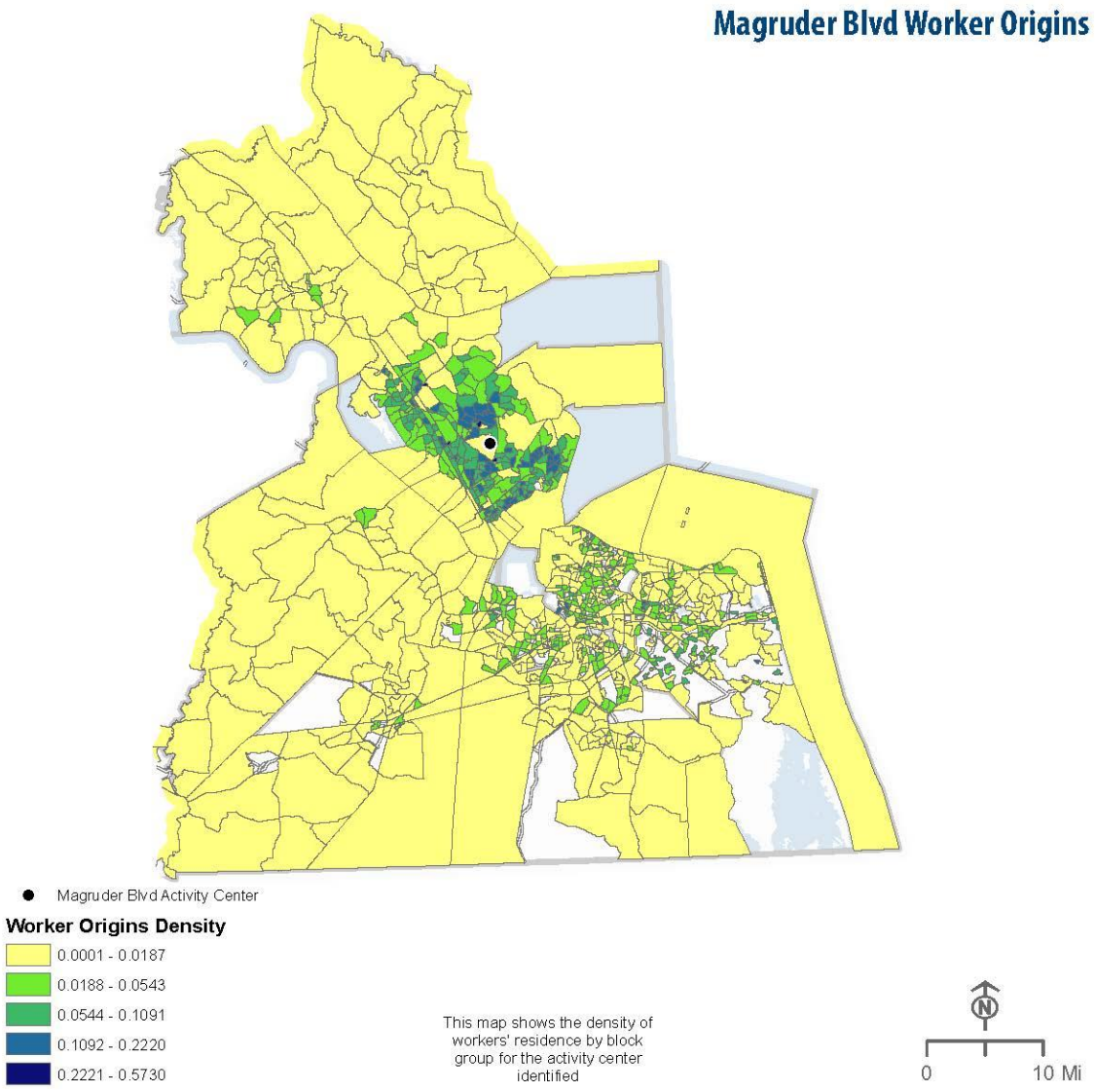


Figure 18: Commuting Patterns to Magruder Boulevard.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The commuting patterns to Tech Center/Oyster Point are concentrated in the Cities of Newport News and Hampton. A more modest density of commutes originate in the City of Williamsburg and James City County. Relatively few commuters cross the water from the southside for jobs in this activity center. (Refer to Figure 19).

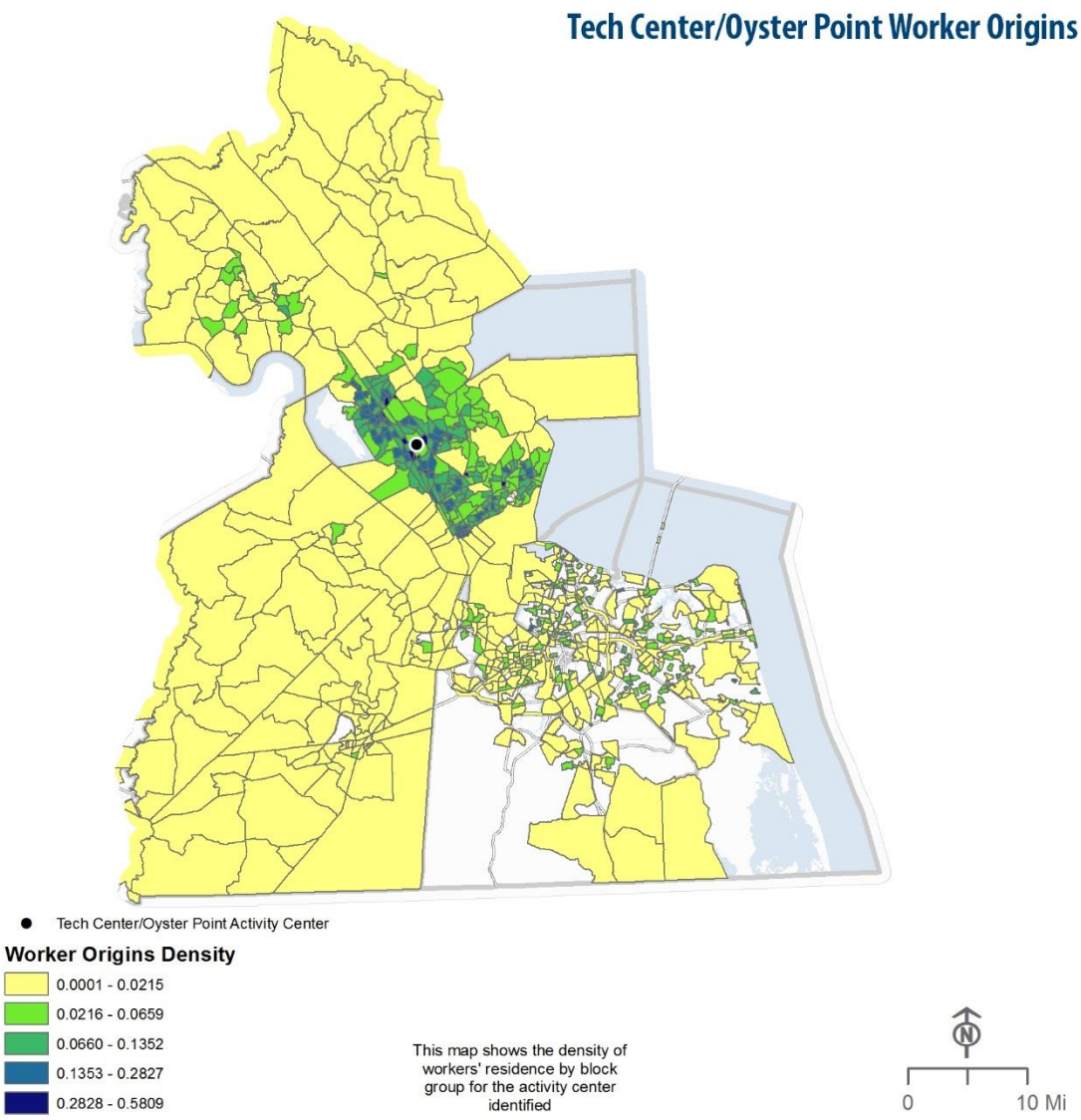


Figure 19: Commuting Patterns to Tech Center/Oyster Point.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

As with the other major activity center in the peninsula, a majority of commutes to Downtown Hampton originate in the Cities of Hampton and Newport News. However, a modest number of commutes originate in the southside jurisdictions. This makes water crossings more important than some other activity centers. Few commutes originate in the southern-most areas of the region. (Refer to Figure 20).

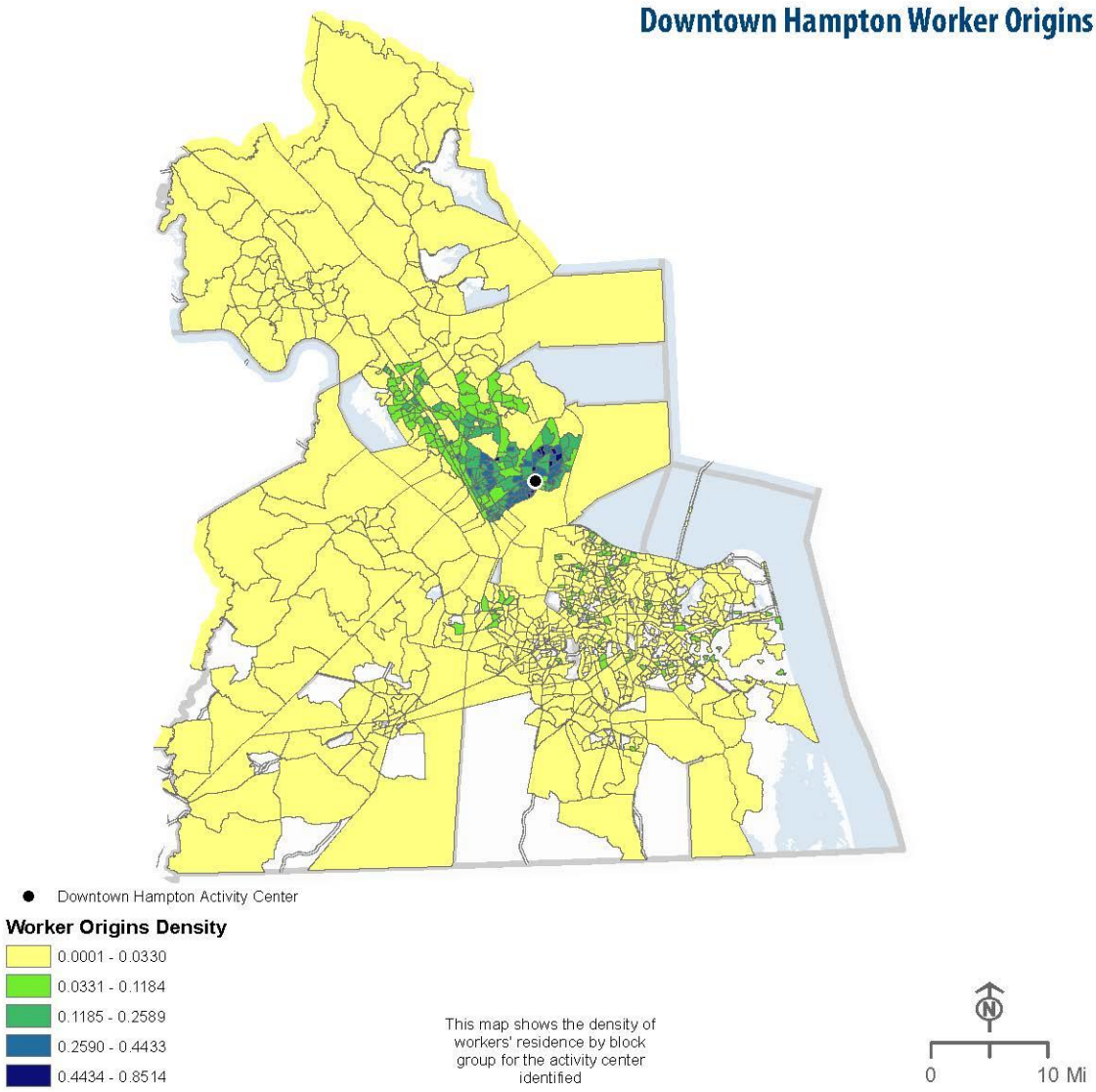


Figure 20: Commuting Patterns to Downtown Hampton.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Hampton Roads Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, 81% of all commuters in the region drive alone to work. Carpooling is the second most popular commuting option in the Hampton Roads Region, accounting for almost 9% of the mode share. Overall, only 2% of commuters in the region use public transportation. Less than 1% biked to work while 3% walk to work. More than 4% of people work at home and do not commute. (Refer to Figure 21).

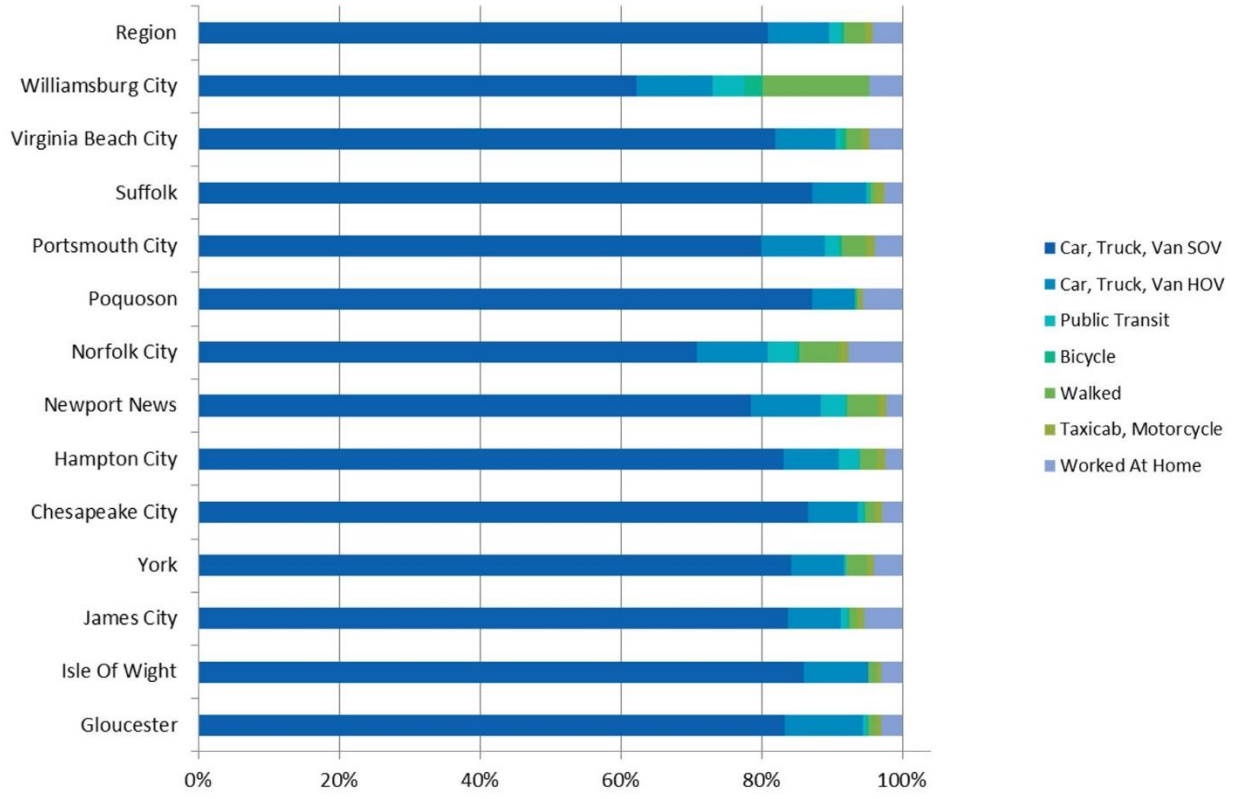


Figure 21: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Hampton Roads Region, average commute times range from 20 to 35 minutes among the various jurisdictions. (Refer to Table 9). The City of Williamsburg has the shortest average commute, while more rural areas, such as Isle of Wight and Gloucester Counties, have longer commutes on average.

Table 9: Mean Commute Time by Jurisdiction. Source: ACS 2013 5-Year Estimates.

Jurisdiction	Mean Commute Time (Minutes)
Chesapeake	26.1
Gloucester	35.4
Isle of Wight	30.7
James City	26.3
Newport News	24.3
Norfolk	23.4
Poquoson	24.9
Portsmouth	26.0
Suffolk	30.6
Virginia Beach	24.6
Williamsburg	20.6
York	23.4

Commutes of over 45 minutes are relatively rare in the Hampton Roads Region. Gloucester County has the highest percentage of workers who commute over 45 minutes at nearly 33%; this is three times as high as both the City of Norfolk and the City of Virginia Beach's rate of long commutes. (Refer to Figure 22).

Source: ACS 2013 5-Year Estimates

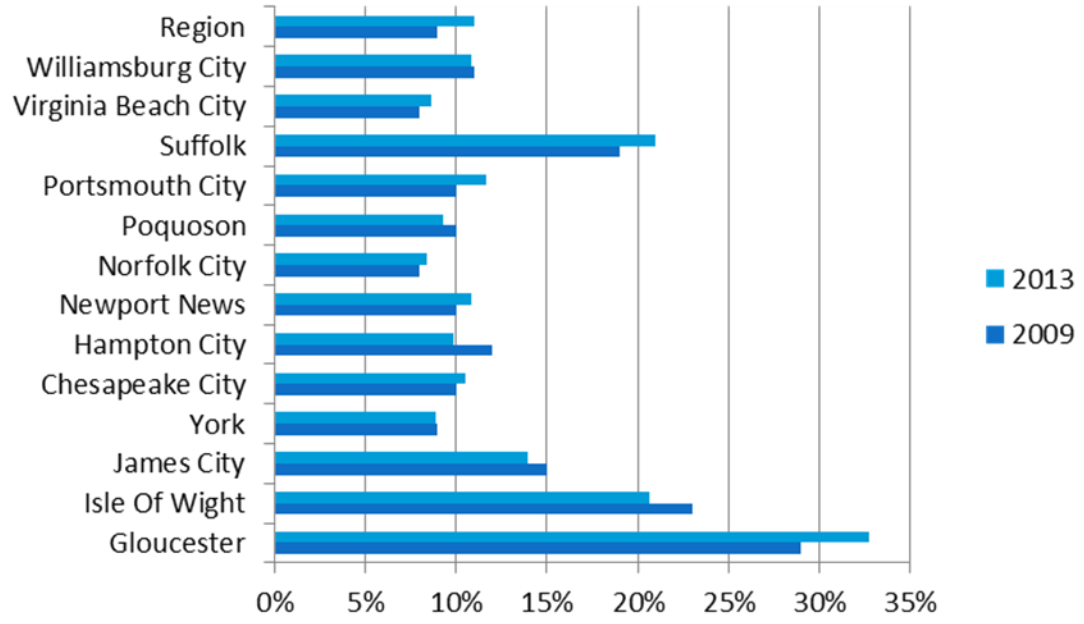


Figure 22: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 23 provides a closer look at where longer commutes originate. In the City of Williamsburg and around the Cities of Norfolk and Portsmouth, commute times are well below average for the region as a whole. Block Groups on the fringes of the region, and in rural areas of the City of Suffolk, Isle of Wight

and Gloucester Counties have commute times that are longer than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

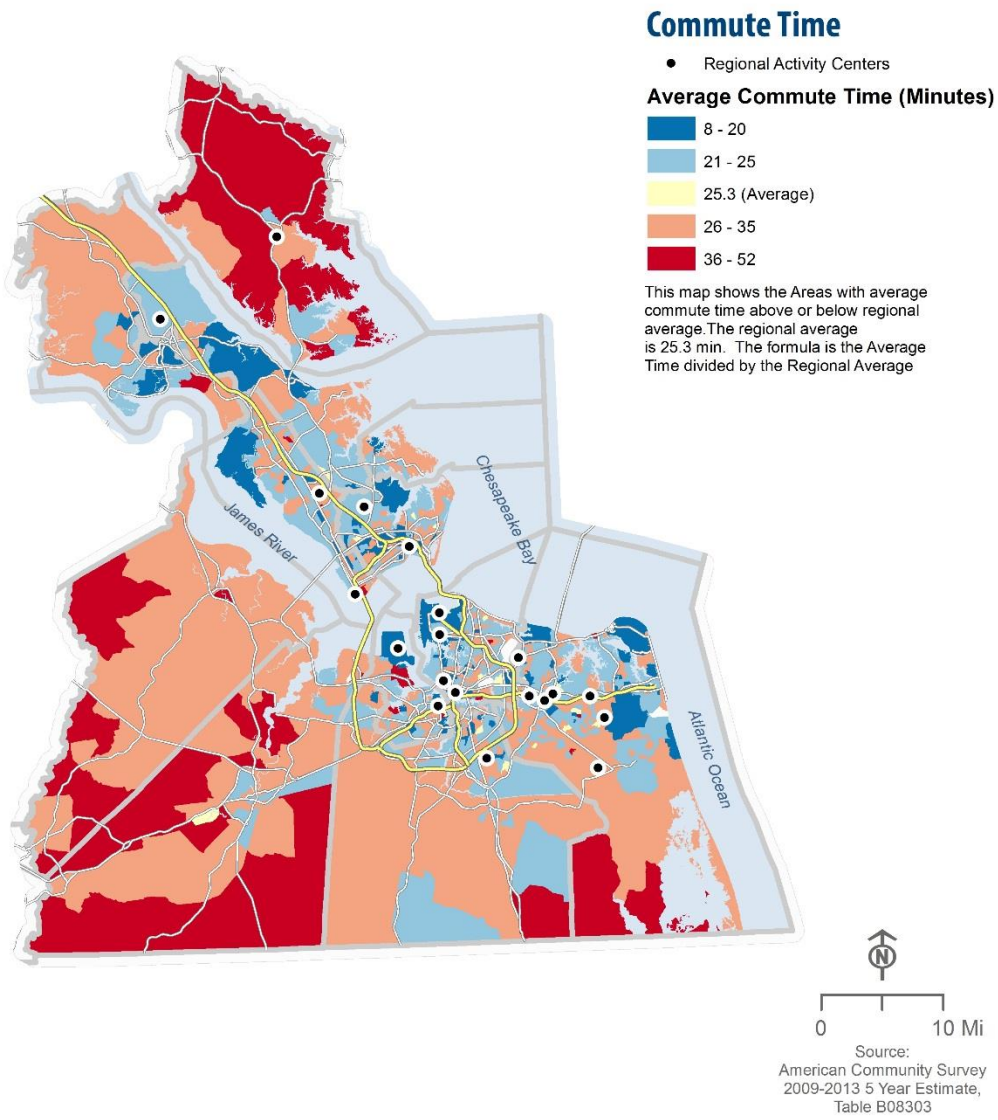


Figure 23: Hampton Roads Region Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The accessibility to employment measure was calculated using an accessibility model developed by the Study Team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is, the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

Auto Accessibility

Auto Accessibility in the Hampton Roads Region area is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45-minute drive. The areas with the highest level of auto accessibility exist around the Cities of Newport News, Norfolk, Portsmouth, and Virginia Beach. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 24).

Transit Accessibility

Transit accessibility varies greatly within the Hampton Roads Region. In the more urban areas of the region, transit accessibility is high. However, in the more rural parts of the region, there is low transit accessibility. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 25).

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. Urbanized areas in Hampton Roads scored the highest, as was expected, with the highest scoring areas located within the Cities of Newport News, Hampton, Norfolk, and Virginia Beach. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 26).

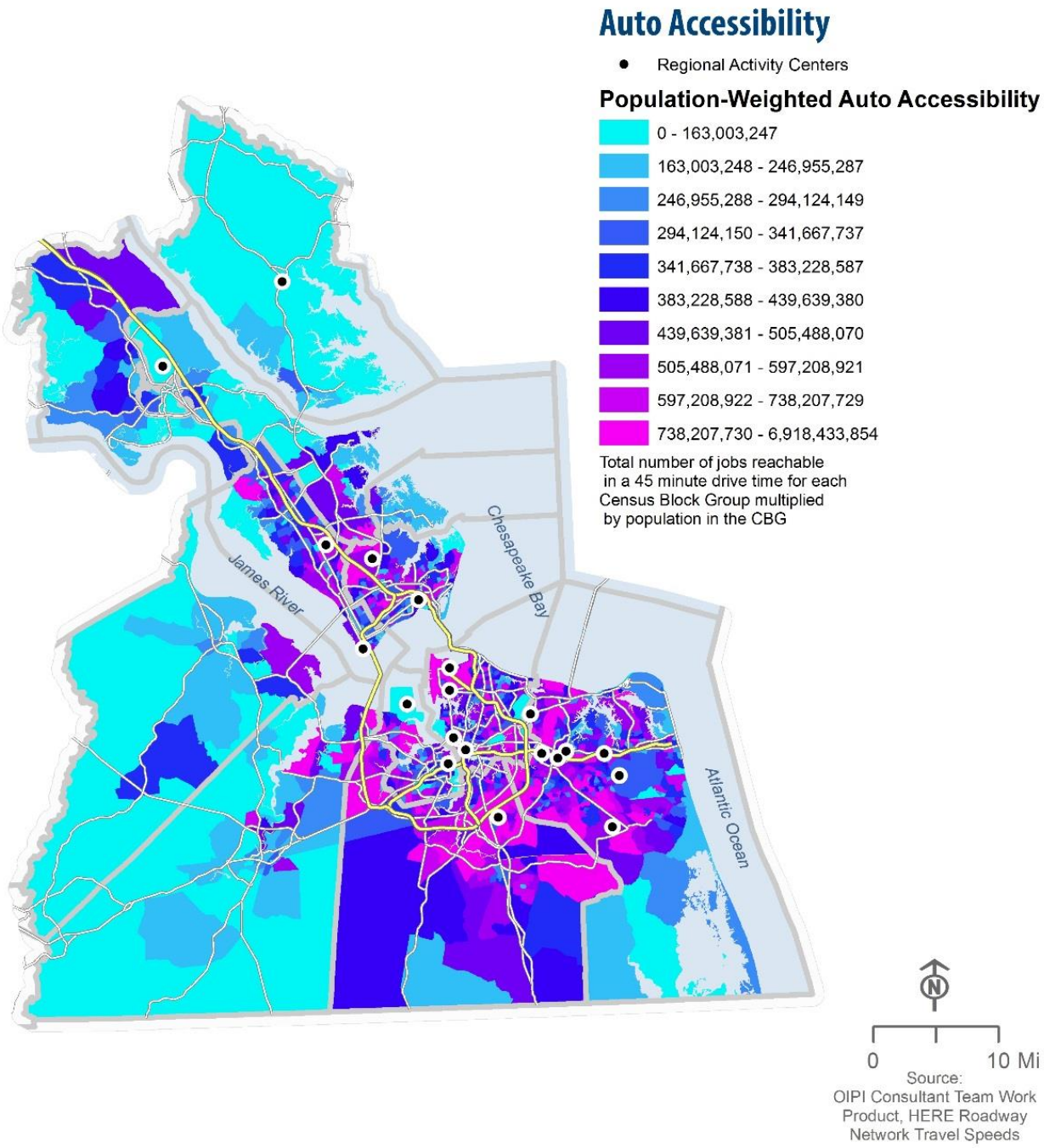


Figure 24: Auto Accessibility

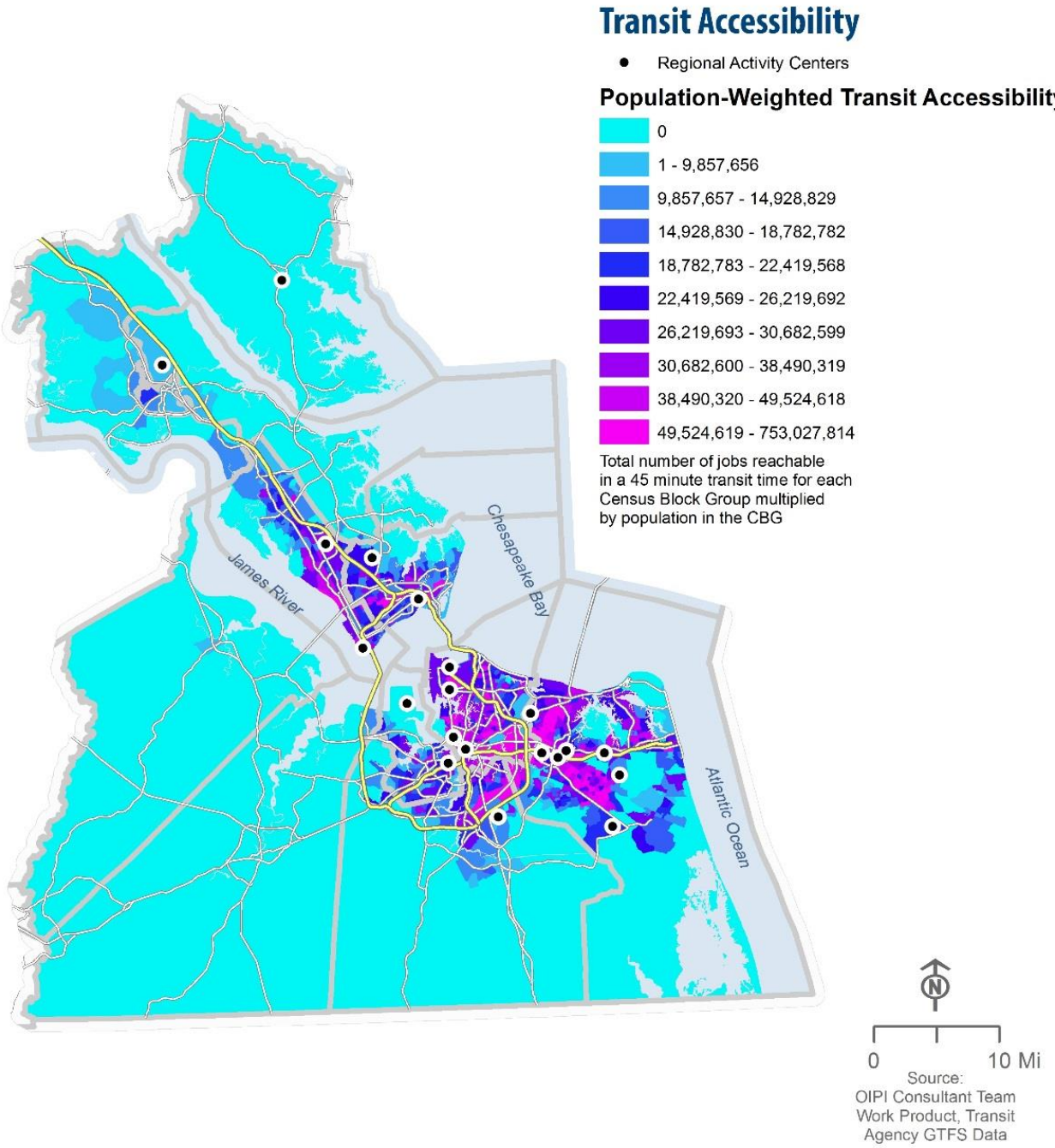


Figure 25: Transit Accessibility

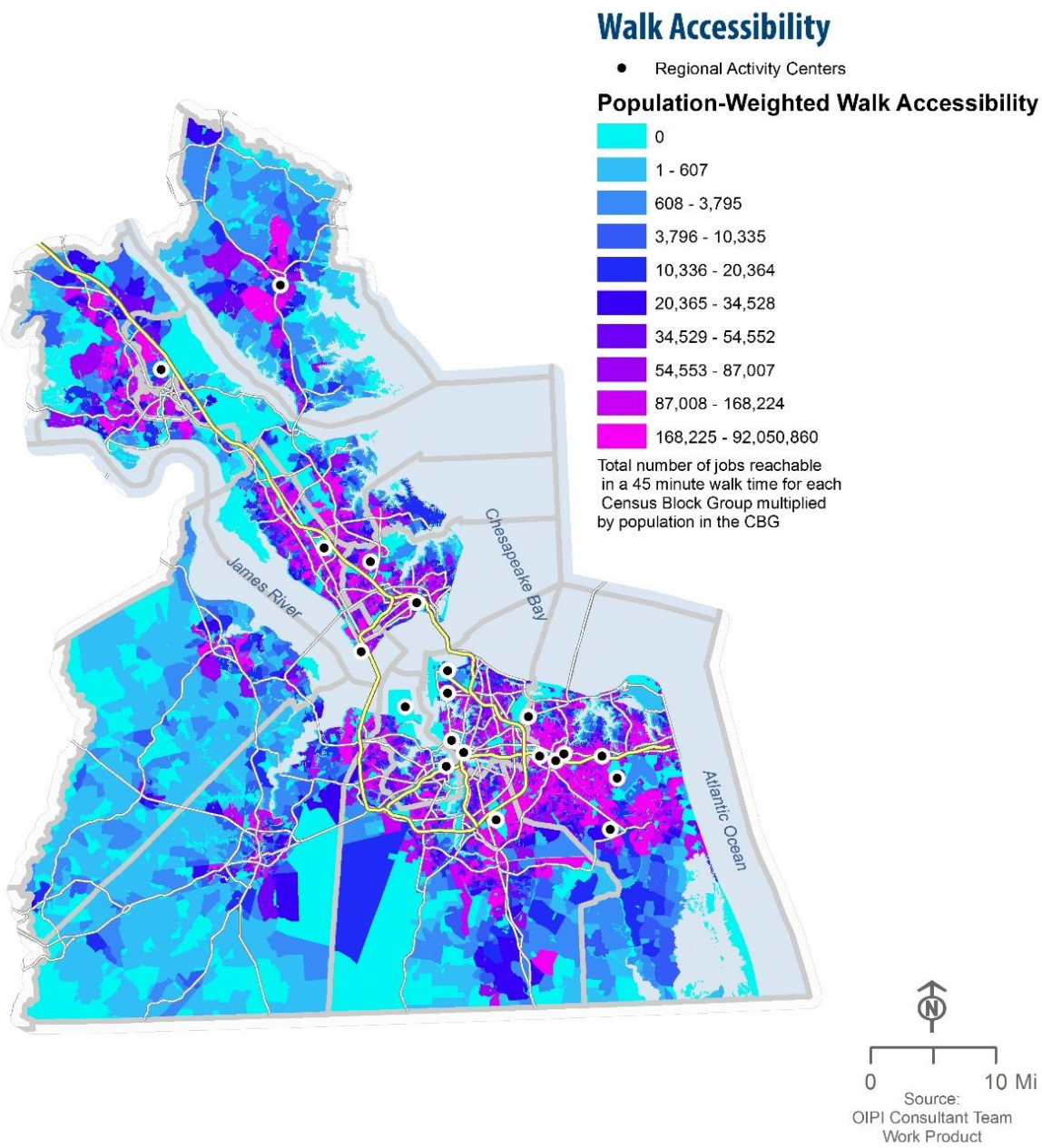


Figure 26: Walk Accessibility

Freight Accessibility

In addition to railways, I-64, US Route 13/58, US 460 and I-264 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most regional activity centers in the region are within a three minute drive from a major arterial ramp. (Refer to Figure 27).

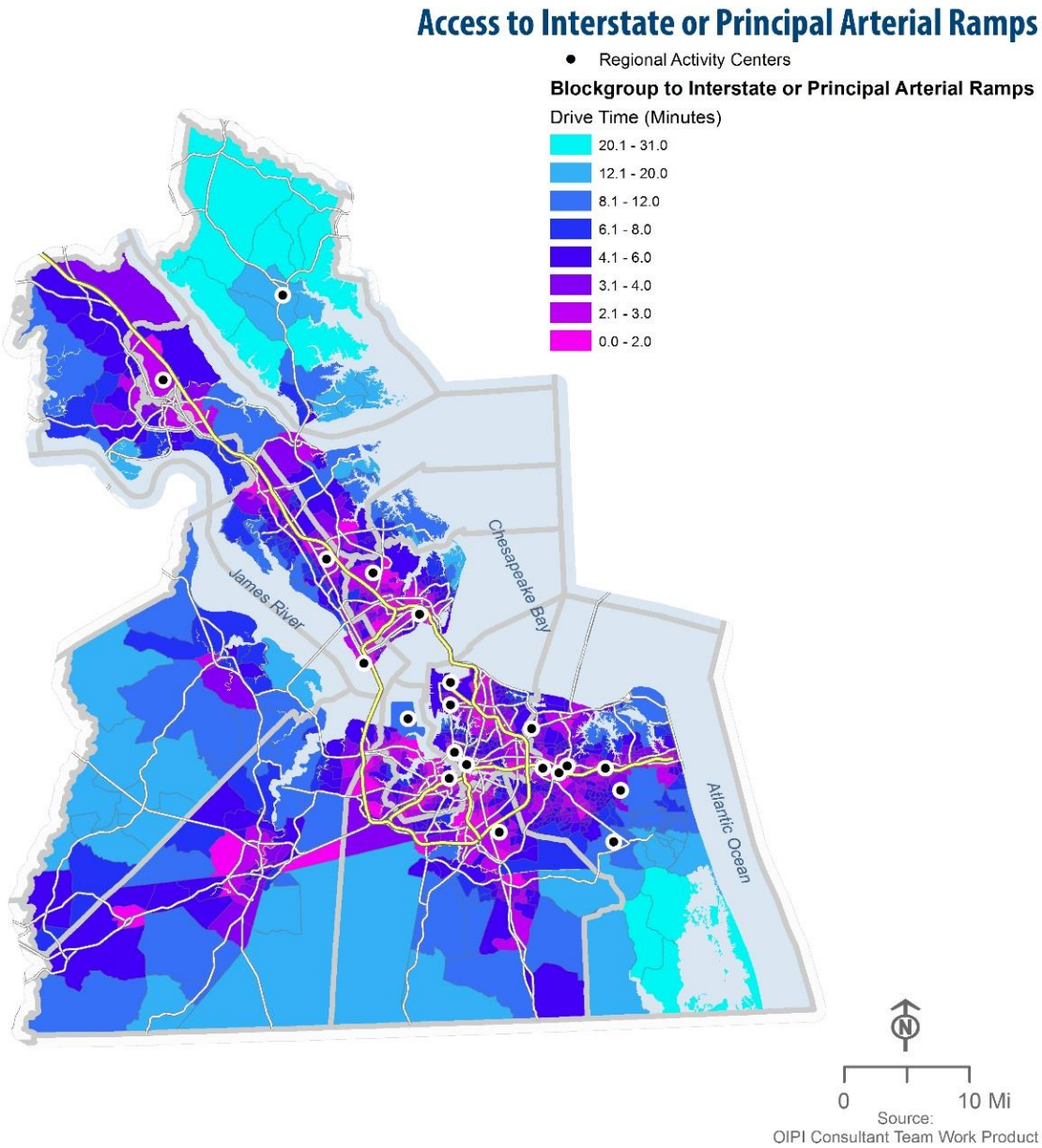


Figure 27: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in Hampton Roads are clustered around the port terminals in the Cities of Newport News, Portsmouth, and Norfolk. Most regional activity centers have access to a warehouse or distribution centers within a four minute drive, with the notable exception of some port facilities. (Refer to Figure 28).

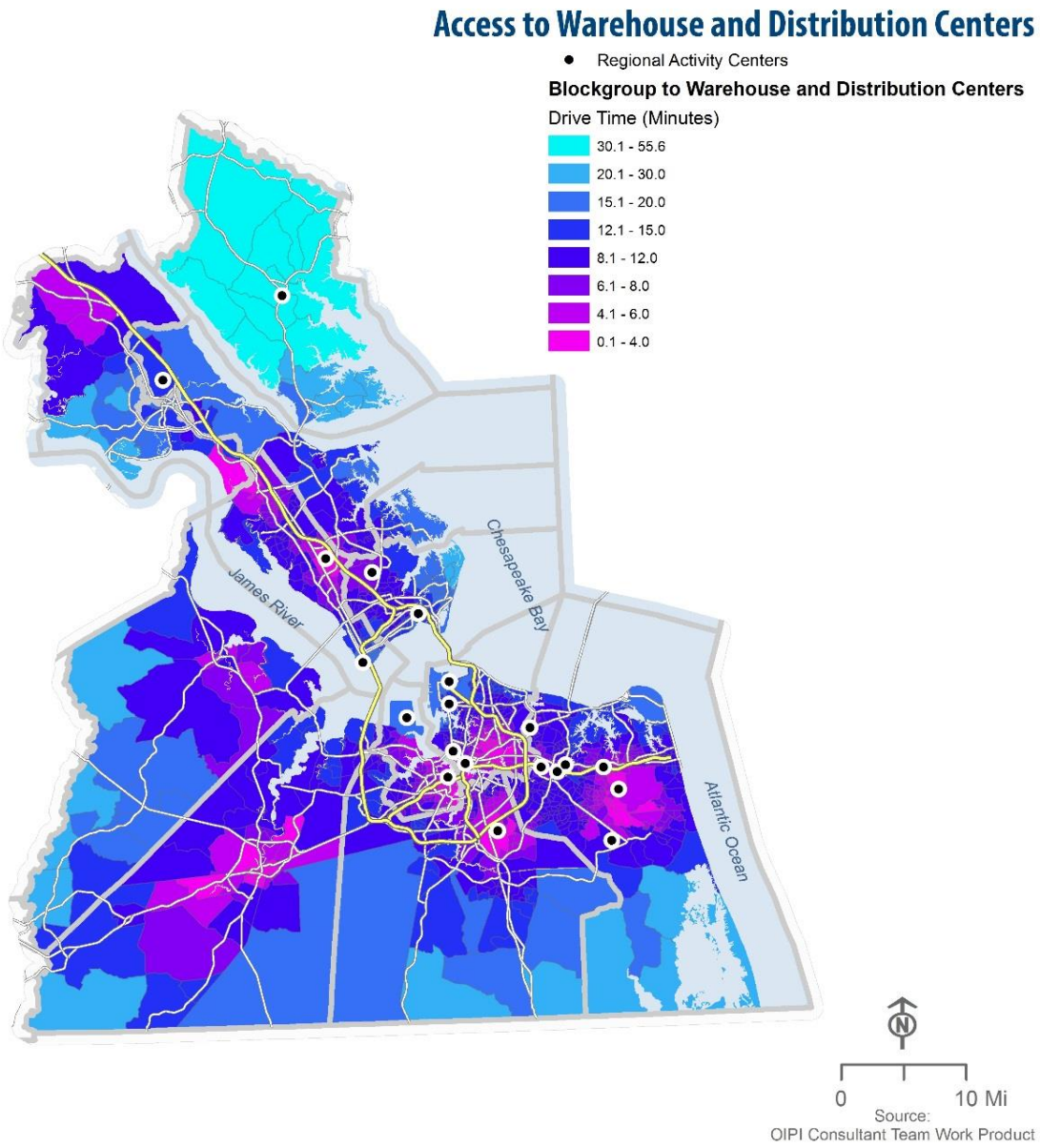


Figure 28: Access to Warehouses & Distribution Centers

Both CSX and Norfolk Southern operate freight rail lines that pass through multiple jurisdictions in the Hampton Roads Region. There is one major freight airport in the region, Norfolk International Airport. To the west, Richmond International Airport is the closest major airport that handles large quantities of freight. (Refer to Figure 29).

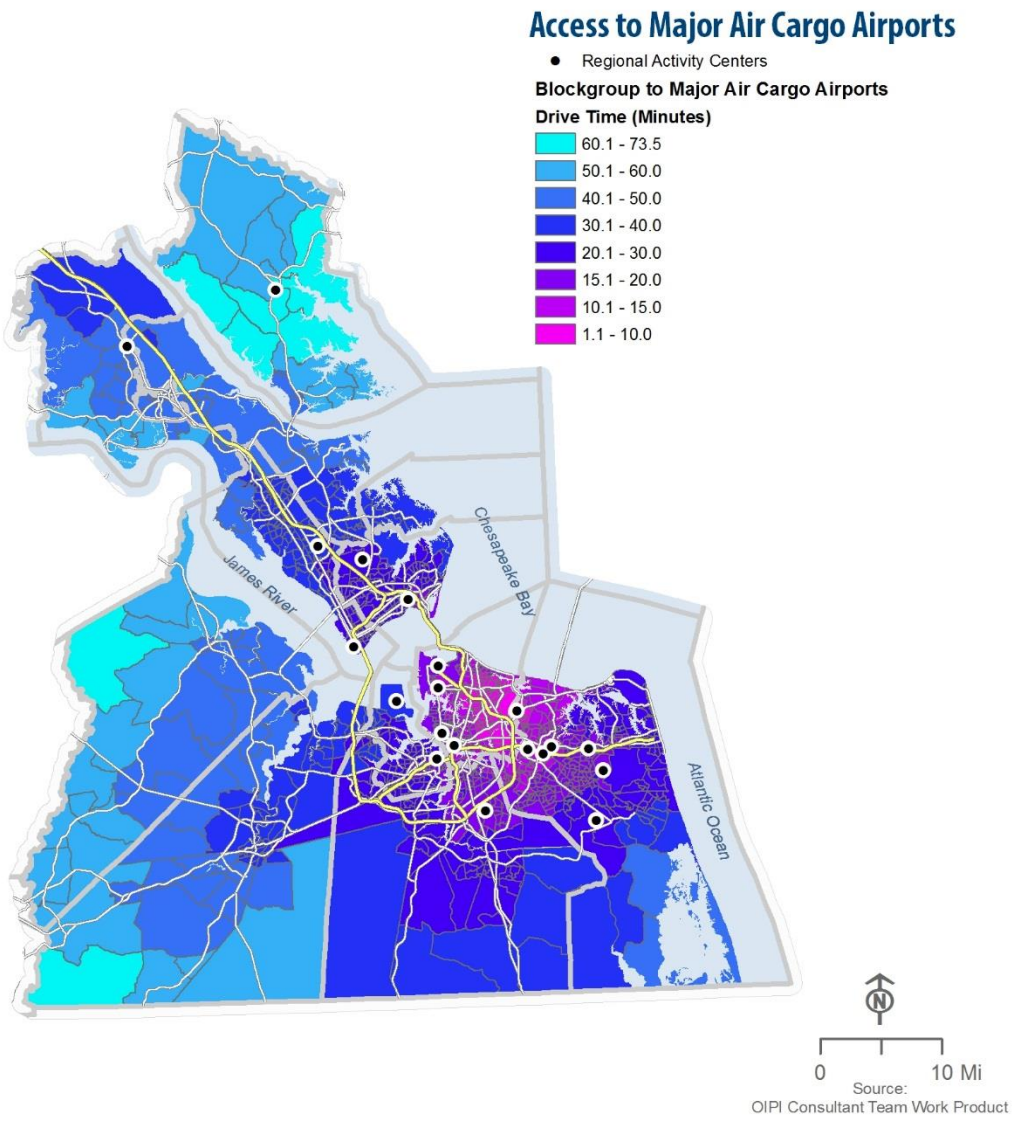


Figure 29: Access to Freight Airports

D. Roadway Measures

This assessment identified the transportation conditions in Hampton Roads based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 29 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for major corridors were available for analysis in the Hampton Roads Region. Overall, scores on the travel time reliability index indicated that reliability varies greatly throughout the region. The reliability index scores are higher in urbanized areas of the region, representing slightly lower levels of travel time reliability. These areas include the City of Virginia Beach, Norfolk, Portsmouth, Newport News, and Hampton. Rural areas of the region, such as Isle of Wight County, City of Suffolk, James City County, and Gloucester County have fewer reliability issues. (Refer to Figure 30).

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for morning peak times from 2013 to 2014 for major corridors in Hampton Roads. According to the analysis, congestion occurs at interchanges. These points, throughout the region, operate at 10.1% – 96% percent time congested. (Refer to Figure 31).

Median Speeds

This map displays the ratio of pm peak hour vehicle speeds and the speed limit for the PM peak period. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The ratio of median speed to speed limit shows problems in congested areas such as bridges/tunnels, interchanges, and also arterials that have many traffic signals. Note that the PM peak period has a distinct pattern in the I-64 corridor on the peninsula, which is different than AM congestion patterns. (Refer to Figure 32).

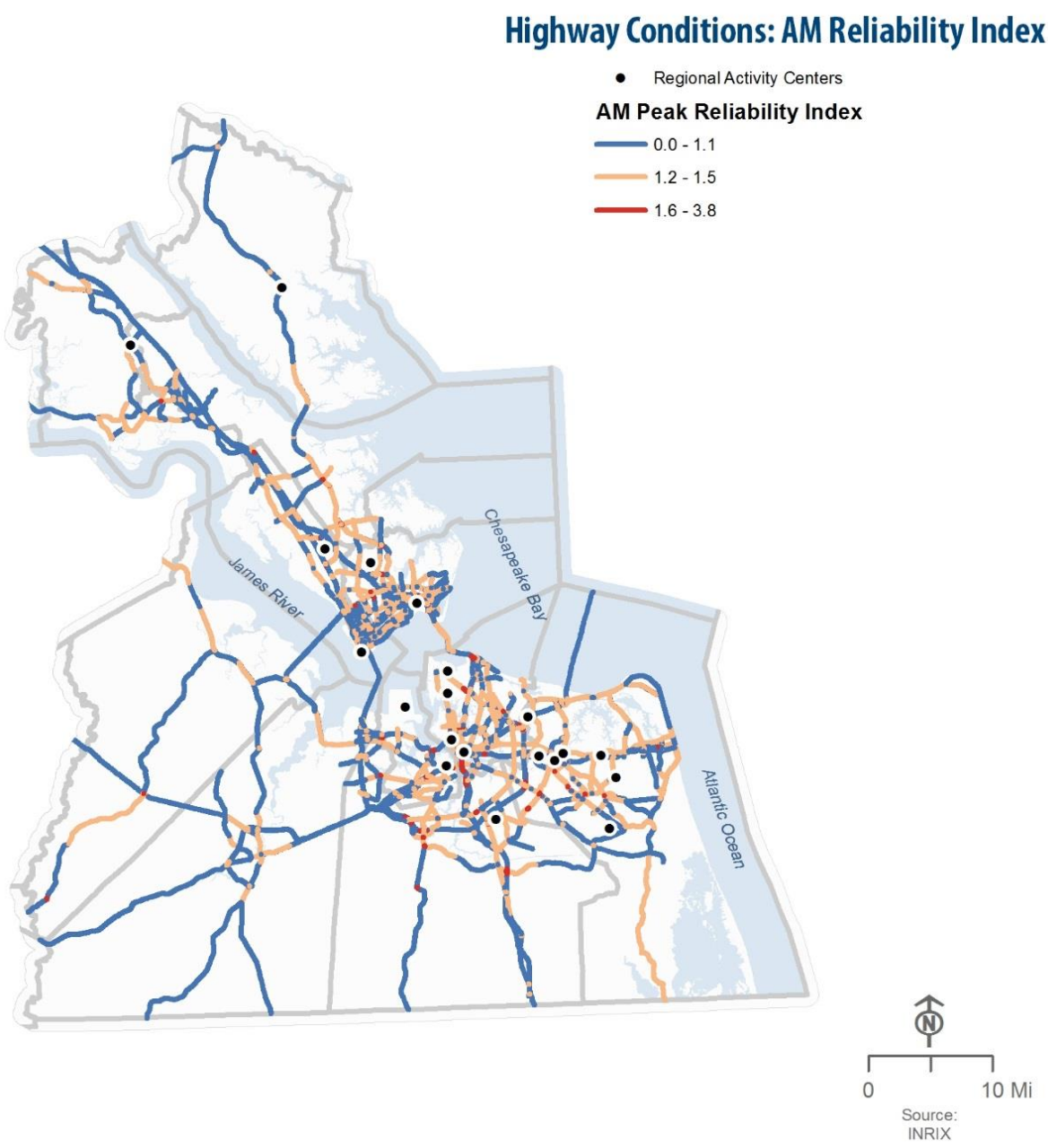


Figure 30: Travel Time Reliability

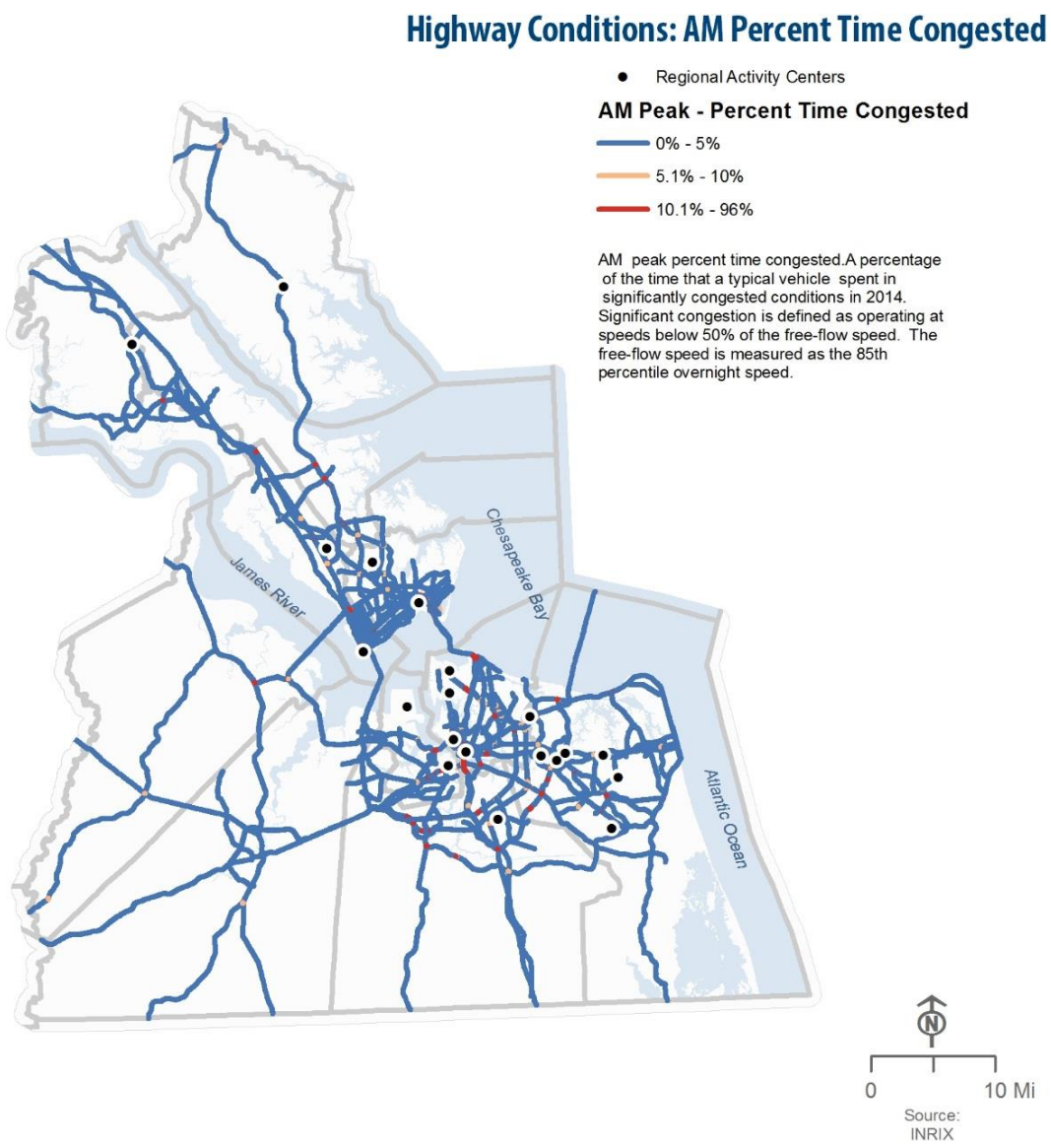


Figure 31: Percent of Time Congested

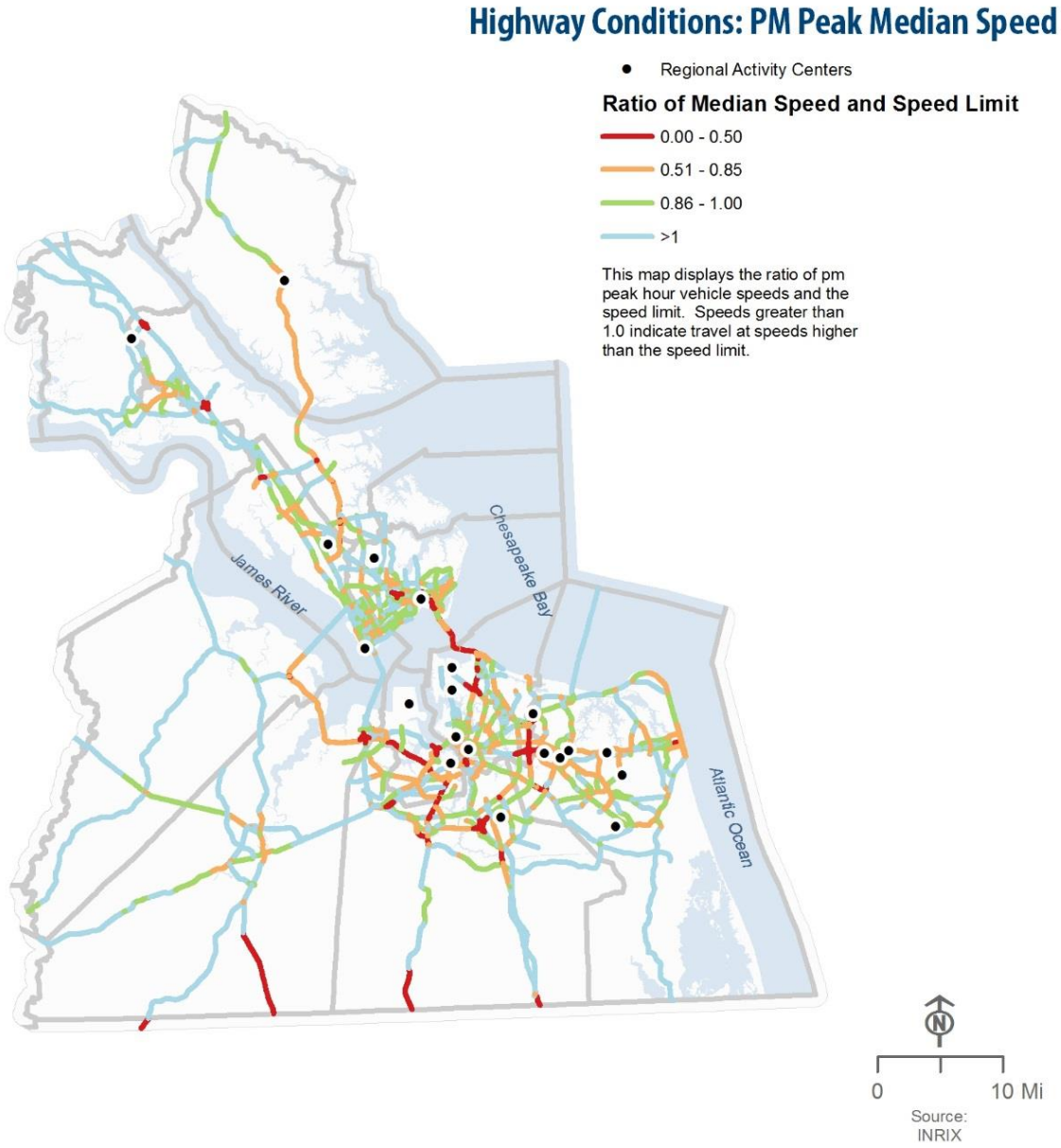


Figure 32: Median Speeds

D. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Hampton Roads Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Hampton Roads Region, an average of 88% of the dollar value of all goods that are moved through the region are moved by truck. Water is the second most important mode, carrying around 7% of the total dollar value of goods. In comparison to the other jurisdictions in the region, the Cities of Norfolk, Suffolk, Portsmouth, Virginia Beach, Williamsburg, and York County are more dependent on rail service than water service, but overall throughout all jurisdictions in the region, trucks are the primary means of moving goods. (Refer to Figure 33).

Location quotients are used to compare the prominence of freight modes between the Hampton Roads Region and the state as a whole. The Hampton Roads Region relies on water for freight movement almost two times more than the state as a whole. While rail and air are widely used for freight movement in the Hampton Roads Region, the region is less dependent on rail and air than the state as a whole. While a there is a freight airport in the region, Norfolk International Airport, the multiple port facilities are the dominant way of moving freight in Hampton Roads. Trucks are used only slightly more than the state, with a location quotient slightly greater than one. (Refer to Figure 34).

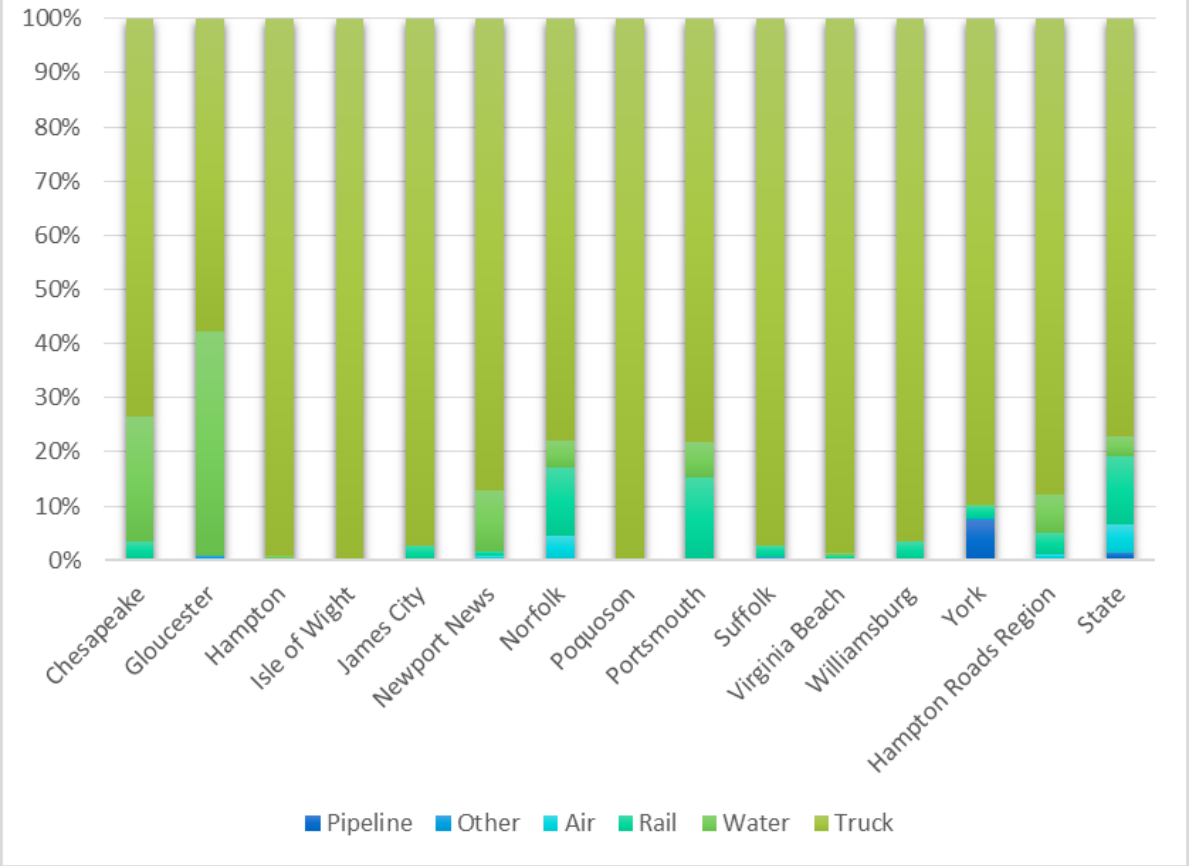


Figure 33: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

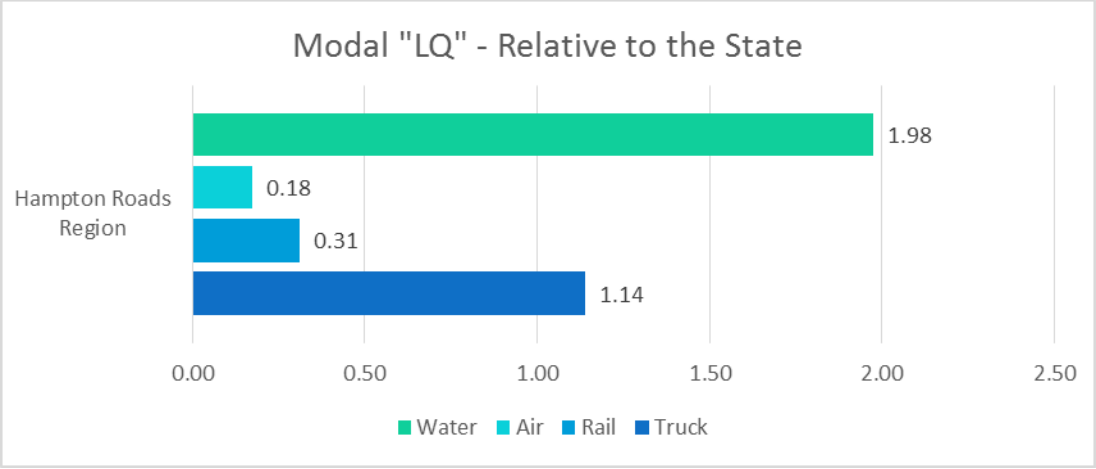


Figure 34: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

While the prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Other freight is the sector with the highest total dollar value imported and exported to the Hampton Roads Region. Secondary traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) was the second highest total dollar value imported to and exported from the region. Overall, the Hampton Roads Region imported $92 billion worth of goods and exported $85 billion worth of goods, resulting in $7 billion of net imports in 2012. (Refer to Figures 35 and 36).

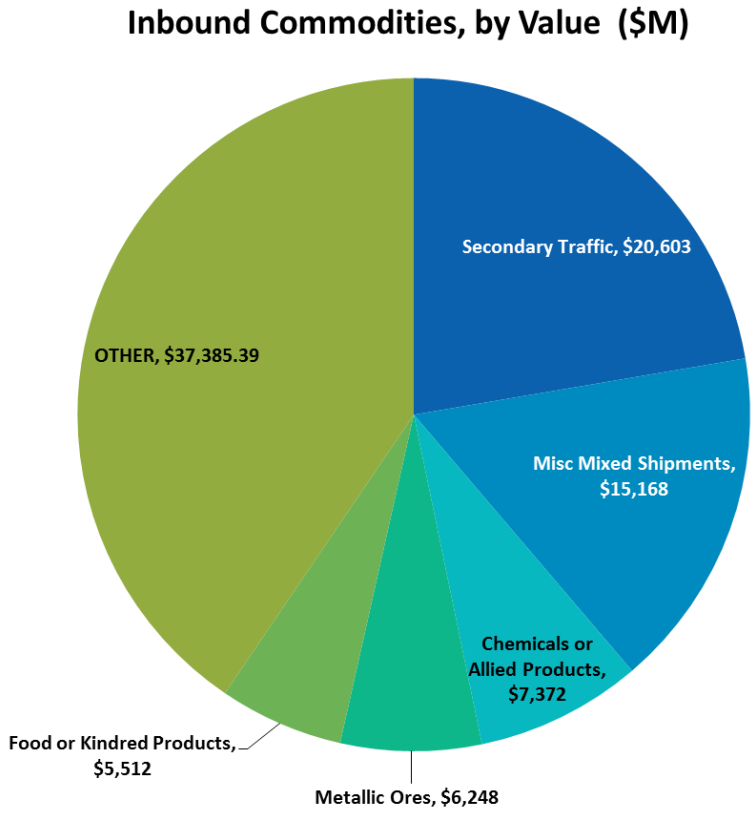


Figure 35: Top Freight Values by Commodities - Inbound.
Source: TranSearch, 2012

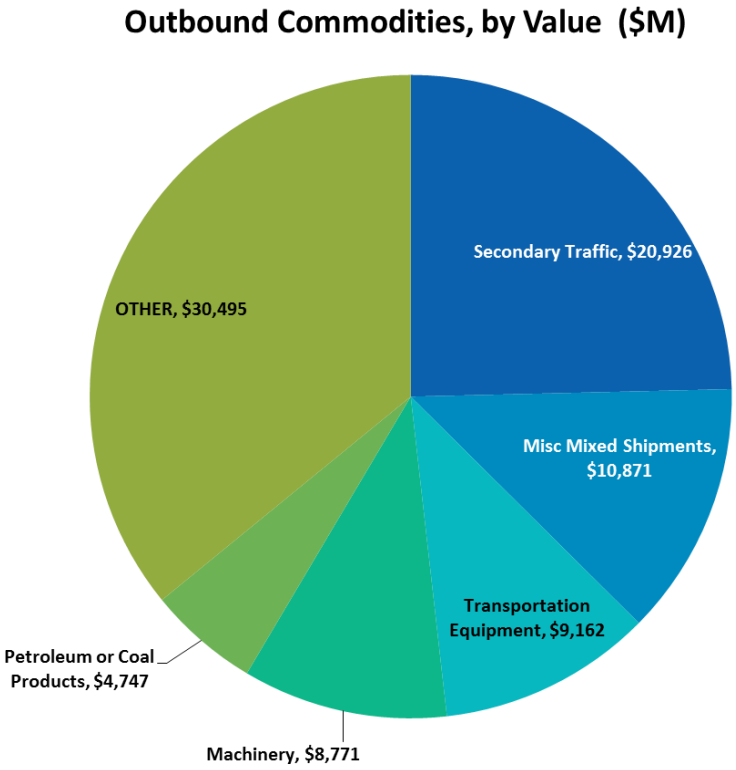


Figure 36: Top Freight Values by Commodities - Outbound.
Source: TranSearch, 2012

The Southeast Region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Hampton Roads Region in terms of value. In 2012, $16.6 billion of freight was exported to the Southeast. In terms of tonnage, the destination for the most tonnage is the Hampton Roads Region itself. Over 277,000 tons of freight was destined for the Hampton Roads Region. (Refer to Figure 37).

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, coal made up the highest total tonnage imported to the region, accounting for two-thirds of total tonnage imported to the Hampton Roads Region. This tonnage imported analysis includes any freight bound for the regional ports for export. It can be assumed that much of this coal is intended for export either internationally or domestically. Secondary traffic made up the highest total tonnage exported to the region, followed closely by petroleum and coal production. (Refer to Figures 38 and 39). The importance of secondary traffic is

consistent with the region's high levels of economic activity in freight movement and wholesale trade and with relatively high demand from end-consumers (e.g. retail trade and consumption by service sector industries).

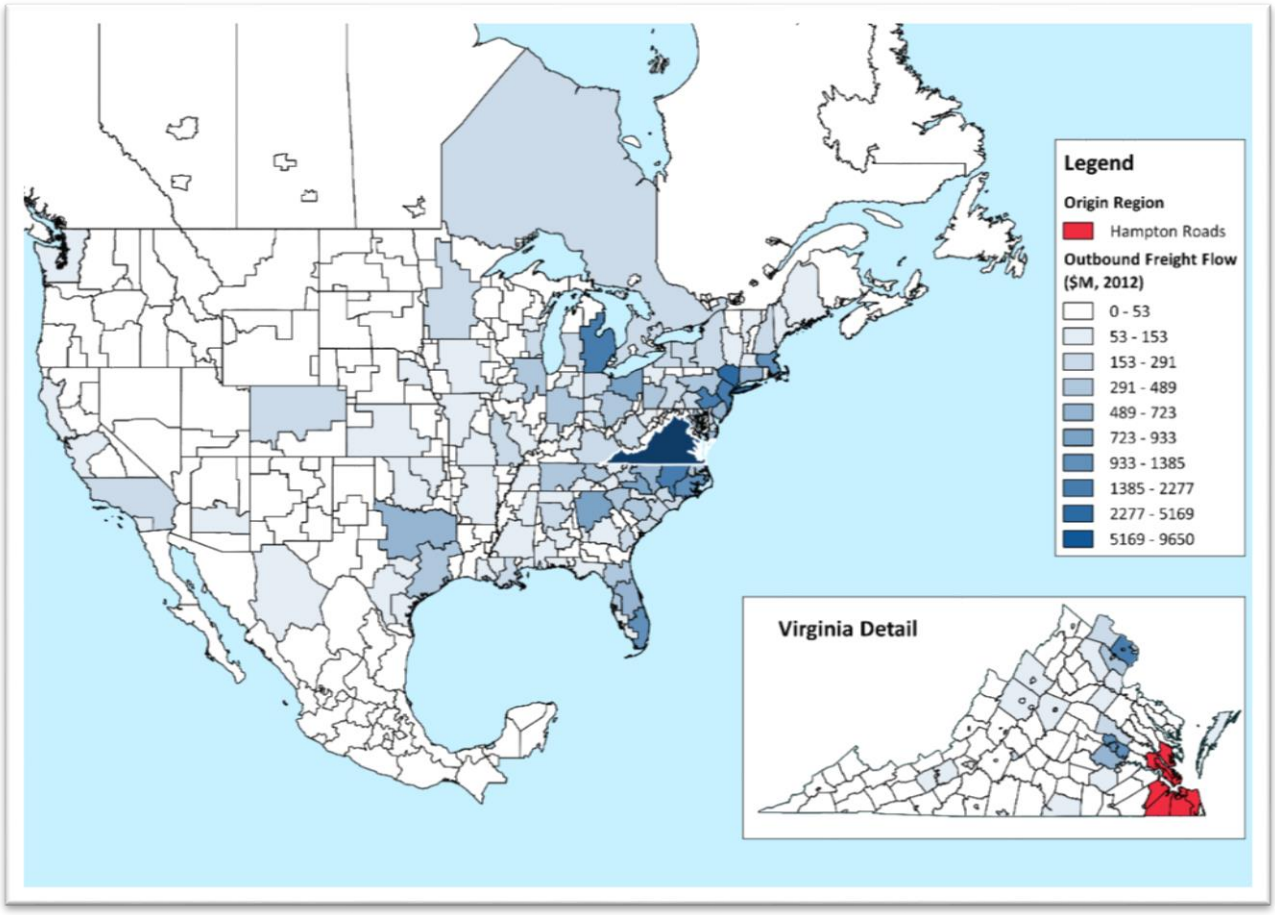


Figure 37: Top Freight Values by Region.
Source: TranSearch 2012

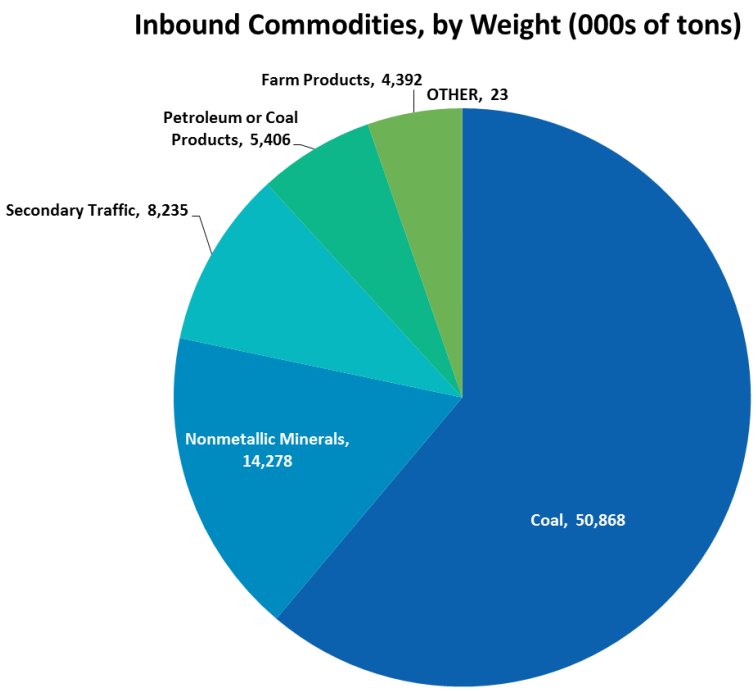


Figure 38: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

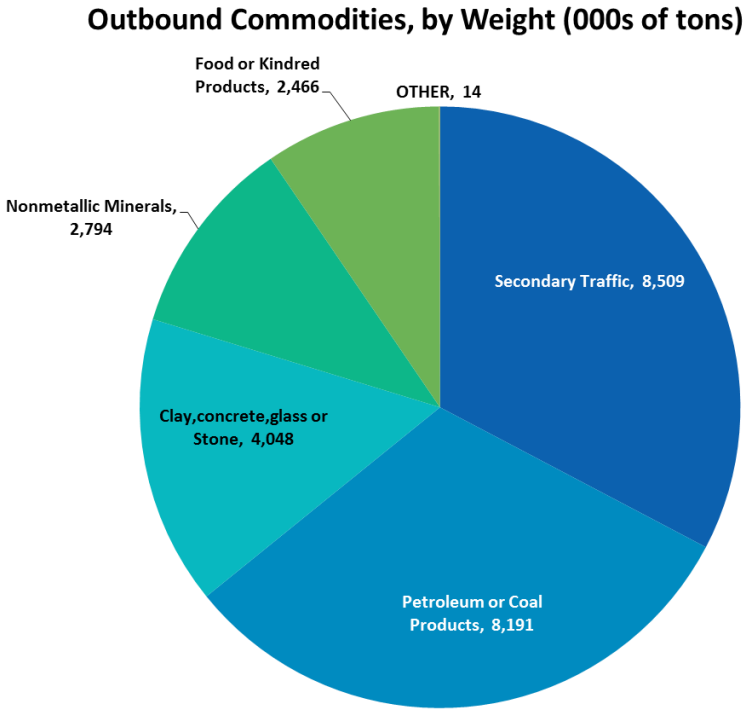


Figure 39: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs are identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding the areas within the region where some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.

These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity/Operations Needs (i.e. Safety and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential

Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research (SIR). Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (local, knowledge and freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Hampton Roads Region, it showed the local serving sector will make up 51% of regional economic output, a moderate portion in the freight dependent sector (31%), with a smaller segment of the knowledge sector (18%). However, the knowledge sector is projected to have the greatest relative growth.

As outlined in the economic and transportation correlation above, the general transportation needs of these two dominant sectors (freight and local) are as follows. The freight cluster emphasizes highway access and overall freight access, as well as freight reliability and bottleneck relief, as their most important transportation factors. Several key freight studies in the Hampton Roads Region, including the *Port of Virginia 2040 Master Plan* (2014), the Port of Virginia *Master Rail Plan* (2015), the HRTPO *Hampton Roads Regional Freight Study* (2012), and the HRTPO *Traffic Impact of an Inland Port* study (2011) all point to several key issues for freight movement in the region that are consistent with the correlation findings and add further insight:

- Ten freight gateways provide the critical highway access for freight to and from the region. Among the gateways, nearly half of the port traffic entering/exiting the region uses I-64, followed by Route 58 and Route 460.
- Highway bottlenecks are a chief concern, with substantial truck delay occurring in locations such as the Elizabeth River tunnel crossings, the convergence of routes to US 460 in the Bowers Hill area, the four-lane portion of I-64 on the peninsula, and much of the Interstate highway loop around the Hampton Roads including the Hampton Roads Bridge-Tunnel and the Monitor-Merrimac Memorial Bridge-Tunnel
- Increased mode-share for rail is helping to accommodate rapid growth in freight movement, but with the result that areas with at-grade rail crossings have heightened local safety and accessibility issues

The local-serving sector shows highest concern for highway access, network connectivity, and mode choice. The Needs Assessment for Hampton Roads highlights the importance of these issues for these employment centers, for example by examining where transit accessibility is lacking for major government centers in the region, and where barriers exist to mobility among activity centers and residential areas, such as the I-64 corridor on the peninsula and the I-264 corridor in Virginia Beach where the interstates form barriers to activity center accessibility.

The forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The economic and transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding

transit access, both within the region's economic activity centers, and between the centers. While the Hampton Roads Region is served by transit, connectivity between some activity centers is lacking and there are many obstacles to active transportation modes (walking and biking). The expansion of knowledge-based and local-based sectors would benefit from additional fixed route transit in the region, expanded rapid transit, and commuter services such as commuter buses and park-and-ride lots to improve mode choice in congested corridors as well as access to jobs region-wide. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the activity centers that feature these jobs. The discussion above represents general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were developed in part by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above in the introduction to this chapter. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs with reference to to Activity Centers and corridors, as well as overall regional needs. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need/Congestion
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

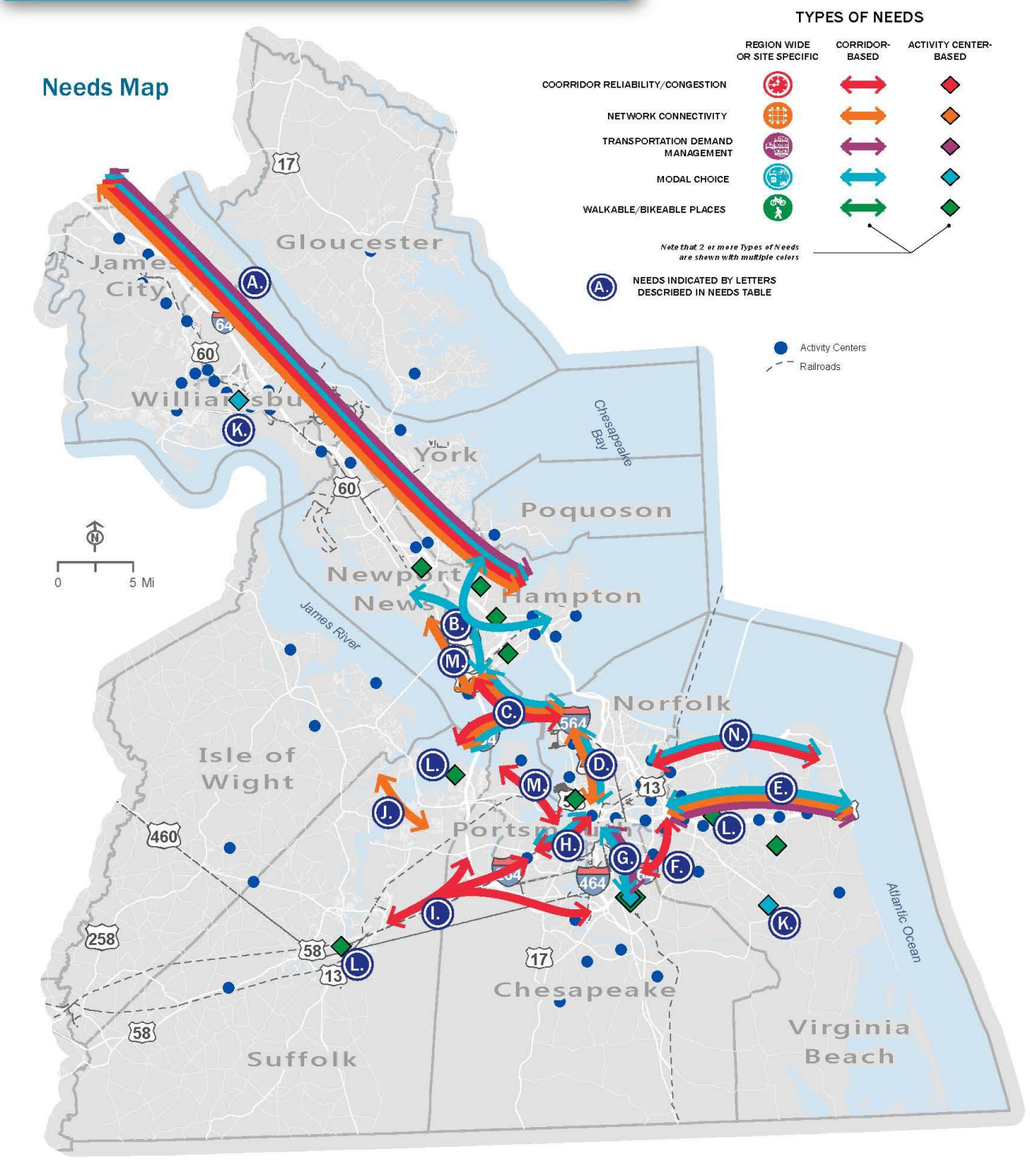
The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were

not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 40: Summary Needs Map for the Hampton Roads Region

Hampton Roads Region Needs Summary

Needs Map



Needs Table (Page 1)

A. I-64 Corridor Reliability

The I-64 Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting Hampton Roads to other parts of Virginia. There is a need for more capacity for freight and commuters, and more options for commuters such as passenger rail and transportation demand management, to better connect residents with destinations and ease congestion in the I-64 Corridor. The parallel roads in the corridor share the reliability issues, and improved connectivity across the peninsula is also needed to improve mobility and reduce congestion.

B. Newport News, Poquoson, and Hampton Activity Center Mode Choice

The regional activity centers of the lower peninsula currently lack efficient transit access. These routes would connect to other regional transit facilities and add to overall transit accessibility.

C. Peninsula - Southside Crossing

The region's major water bodies limit network connectivity. The limited connectivity is exacerbated by limited mode choice. The infrastructure connecting the peninsula and southside is critical for the region's freight movement as well as commuter and thru traffic. There is a need for transit options as well as enhancement of interchanges, bridges and tunnels.

D. Naval Station Norfolk and NIT Access and Safety

Naval Station Norfolk and Norfolk International Terminal generate complex traffic patterns. Currently, there is substantial congestion on the surrounding roadway network. Rail connectivity and rail crossing constraints affect freight movement and safety. The transportation system needs include improvements in network connectivity, increased multimodal/transit accessibility, and safety enhancements.

E. Route 58/I-264 Corridor

The Route 58/I-264 Corridor is an important artery for the movement of commuters and connects multiple regional activity centers with knowledge based workforces. This corridor lacks transit access, bike access, transportation demand management programs, and has lower network connectivity. The I-264 corridor itself is a barrier to north-south movements.

F. I-64 Interchanges

The I-64/Indian River Road Interchange and the I-64/I-264 interachange are points of congestion for commuter, freight, and thru traffic. The transportation network requires strategies to address bottlenecks and improve reliability in these areas.

G. I-464/Greenbrier to Norfolk

The I- 464 Corridor connects major activity centers Norfolk CBD and Chesapeake/Greenbrier, which are both knowledge based activity centers. The corridor has limited transit options, barriers to active transportation, and would benefit from enhanced transportation demand management programs.

H. Elizabeth River Crossings

The Elizabeth River is another waterbody that is a challenge for the movement of people and freight in the region. The bridge and tunnel crossings are often points of bottlenecks and congestion, making freight and passenger travel unreliable. Mode choices are very limited.

I. US 58/US 13/US 460, I-664/I-264 Corridor

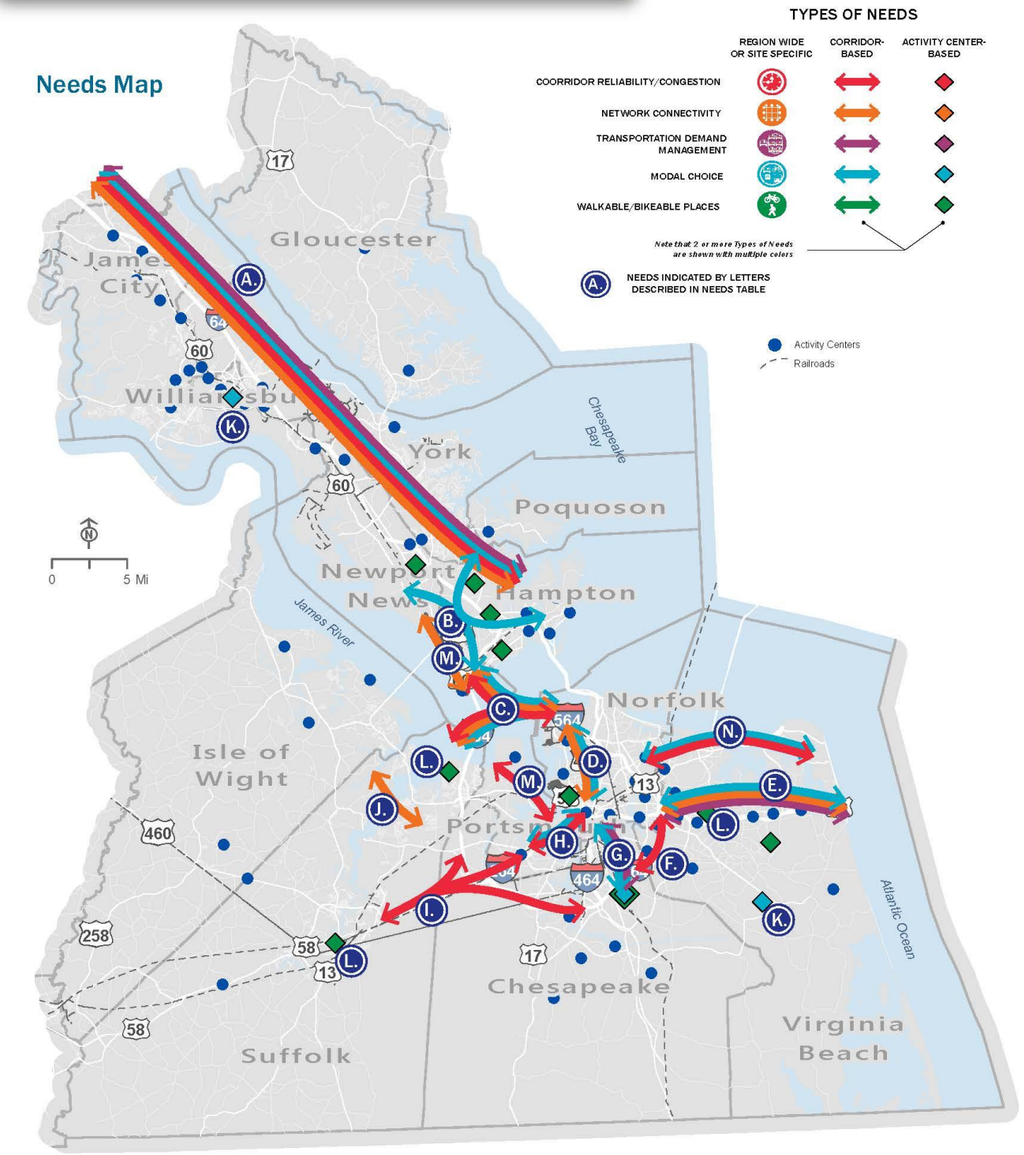
The US 58/13/460 and I-664/I-264 Corridors are a major freight gateway for the region, carrying freight in and out of the region from the southwest. The corridor is also an important artery for evacuation during extreme weather events. The corridor is in need of strategies to improve freight reliability, congestion and safe evacuation.

J. Nansemond River Crossings

Network connectivity in this area is hindered by deteriorating infrastructure and limited crossings. Currently, there is not a connection between Nansemond Parkway and Godwin Boulevard, causing circuitous travel patterns.

Hampton Roads Region Needs Summary

Needs Map



Needs Table (Page 2)

K. Various Activity Centers - Mode Choice

Key regional activity centers featuring government centers in the area have inadequate transit accessibility. These activity centers are in need of enhanced transit for both employees and customers.

L. Various Activity Centers - Walkable/Bikeable Places

There are multiple activity centers that have limited pedestrian facilities. Walk/bike-ability appeals to the future workforce, attracts knowledge-based industries and reduces the reliance on vehicular travel.

M. Freight Terminals

The corridors between freight terminals experience truck bottlenecks that impede goods movement and affect the surrounding community's safety and mobility.

N. US 60/Burton-Little Creek Accessibility

The roads along the Chesapeake Bay in this area serve major employment centers, the shoreline tourist attractions, the Chesapeake Bay Bridge-Tunnel and local residents. The constraints of the corridor and its many users create reliability and safety concerns. Bicycle and pedestrian accommodations are lacking, particularly to cross the corridor. Access management should be preserved but multimodal access parallel to and across the corridor should be improved.

O. Regional Need - Modal Choice

To support active transportation, water crossings of all scales need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips of unsurmountable obstacles. Other barriers include railroads and interstate highway corridors.

P. Regional Need - Corridor Reliability from Modal Conflicts

Increasing freight rail traffic radiating from port terminals will affect at-grade rail crossings throughout the region with longer/more frequent closings, increasing delays for other travel modes and raising safety concerns.

Q. Regional Need - Corridor Reliability for Freight Gateways

The region's ten freight gateways are (clockwise): I-64 West, US 17 North, US 13 North, VA 168 South, US 17 South, US 13 South, US 58 West, US 258 West, US 460 West, and VA 10 West. These routes are critical to moving to and from the ports and affect intra-regional travel where bottlenecks occur.

Figure 41: VMTP Icon Key

NEEDS ICONS

Corridor Reliability and Congestion



Network Connectivity



Transportation Demand Management



Modal Choices



Walkable/Bikeable Places



ECONOMIC ICONS

Local Service Sector



Freight Based Sector



Knowledge Based Sector



TRANSPORTATION ICONS

Commuting Patterns / Modes



Multimodal Access to Jobs



Highway Network Reliability



Highway Network Bottlenecks



Freight Networks / Commodity Flows



Conditions from Stakeholder Input



Table 11: Findings of Needs for the Hampton Roads Region

A. I-64 Corridor Reliability

NEED: **The I-64 Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting Hampton Roads to other parts of Virginia. There is a need for more capacity for freight and commuters, and more options for commuters such as passenger rail and transportation demand management, to better connect residents with destinations and ease congestion in the I-64 Corridor. The parallel roads in the corridor share the reliability issues, and improved connectivity across the peninsula is also needed to improve mobility and reduce congestion.**

ECONOMIC: Supports major regional activity centers not only on the peninsula but throughout the region. The corridor is an essential and high-priority corridor for the ports and freight movement. It connects activity centers of all types and supports tourism.

TRANSPORT.: Bottlenecks and congestion hinder the reliability of the corridor, which is a freight gateway corridor. Multimodal access to jobs is lacking. The interstate corridor is a barrier to movement within the Peninsula.

B. Newport News, Hampton, and Poquoson, Activity Centers Mode Choice

NEED: **The regional activity centers of the lower peninsula currently lack efficient transit access. These routes would connect to other regional transit facilities and add to overall transit accessibility.**

ECONOMIC: Supports major local and knowledge-based regional activity centers including Tech Center/Oyster Point, Magruder Boulevard, and Downtown Hampton, while enhancing access to local centers such as Poquoson.

TRANSPORT.: Existing connections between activity centers are not efficient, involving low speeds, many stops and transfers. More efficient point-to-point transit would improve mobility and travel choices in the lower peninsula.

C. Peninsula - Southside Crossing

NEED: **The region's major water bodies limit network connectivity. The limited connectivity is exacerbated by limited mode choice. The infrastructure connecting the peninsula and southside is critical for the region's freight movement as well as commuter and thru traffic. There is a need for transit options as well as enhancement of interchanges, bridges and tunnels.**

ECONOMIC: Connects all of the activity centers in the region, of all types. The connections are critical to the ports and freight movement, to tourism, and to many commuters.

TRANSPORT.: Some of the region's worst reliablity hot spots and bottlenecks occur along the access to existing water crossings. The existing crossings lack dedicated transit access and connection to regional transit networks. Additional transit options such as light rail, bus rapid transit, and/or rapid ferry are needed.

D. Naval Station Norfolk and NIT Access and Safety

NEED: **Naval Station Norfolk and Norfolk International Terminal generate complex traffic patterns. Currently, there is substantial congestion on the surrounding roadway network. Rail connectivity and rail crossing constraints affect freight movement and safety. The transportation system needs include improvements in network connectivity, increased multimodal/transit accessibility, and safety enhancements.**

ECONOMIC: Naval Station Norfolk is a regional activity center, a major regional employer, and an important military installation for the United States Navy. The Norfolk International Terminal is one of the major ports in the region, served by intensive rail facilities as well as trucks.

TRANSPORT.: The major issues in this busy area of the region are modal conflicts for freight, local congestion, and lack of multimodal access for passengers.

E. Route 58/I-264 Corridor

NEED: **The Route 58/I-264 Corridor is an important artery for the movement of commuters and connects multiple regional activity centers with knowledge based workforces. This corridor lacks transit access, bike access, transportation demand management programs, and has lower network connectivity. The I-264 corridor itself is a barrier to north-south movements.**

ECONOMIC: This corridor serves multiple knowledge-based and local-serving activity centers. Several are targeted future growth areas with plans for higher density, mixed-use development that can improve transportation efficiency through walk, bike and transit access.

TRANSPORT.: The issues along this corridor include lack of connectivity for north-south movements, which puts pressure on the east-west routes and particularly the I-264 crossings and interchanges; and lack of mode choice for peak period trips and to avoid high traffic levels associated with beach access.

F. I-64 Interchanges

NEED: **The I-64/Indian River Road Interchange and the I-64/I-264 interachange are points of congestion for commuter, freight, and thru traffic. The transportation network requires strategies to address bottlenecks and improve reliability in these areas.**

ECONOMIC: This area serves diverse traffic including major commuter movements, freight traffic, and traffic accessing the activity centers that straddle I-64, including Acredale and Level Green.

TRANSPORT.: This area appears to be a pinch-point for travelers between Chesapeake and Virginia Beach and also those avoiding the congested Elizabeth River tunnel crossings. The I-64/I-264 interchange is a significant point of truck delay in the region.

G. I-464/Greenbrier to Norfolk

NEED: **The I- 464 Corridor connects major activity centers Norfolk CBD and Chesapeake/Greenbrier, which are both knowledge based activity centers. The corridor has limited transit options, barriers to active transportation, and would benefit from enhanced transportation demand management programs.**

ECONOMIC: These major employment centers have significant knowledge-based and local-serving workers as well as the customers that are attracted to major retail and service centers.

TRANSPORT.: This is an important commuter and freight route, with congestion focused in interchange areas. Transit access to jobs is lacking along the corridor despite the large amount of employment at the ends of the corridor, and barriers to walk/bike modes further inhibit mode choice.

H. Elizabeth River Crossings

NEED: **The Elizabeth River is another waterbody that is a challenge for the movement of people and freight in the region. The bridge and tunnel crossings are often points of bottlenecks and congestion, making freight and passenger travel unreliable. Mode choices are very limited.**

ECONOMIC: This area serves diverse traffic accessing the major regional activity centers on both sides of the river, including Portsmouth, Norfolk CBD and Ghent. It is a significant east-west route for freight traffic.

TRANSPORT.: According to the 2013 HRTPO Freight Plan, the worst freight delays in terms of hours of delay occur in this corridor. The limitations of the Elizabeth River tunnels create reliability issues for freight and commuters. Note that major improvements to both the Downtown and Midtown Tunnels are underway. Modal alternatives to the tunnels could include roll-on/roll-off (RORO) ferries.

I. US 58/US 13/US 460, I-664/I-264 Corridor - Bowers Hill

NEED

The US 58/13/460 and I-664/I-264 Corridors are a major freight gateway for the region, carrying freight in and out of the region from the southwest. The corridor is also an important artery for evacuation during extreme weather events. The corridor is in need of strategies to improve freight reliability, congestion and safe evacuation.

ECONOMIC

The corridor is of particular importance to freight-dependent industries, but also serves both local-serving and knowledge-based activity centers in the surrounding area.

TRANSPORT.

This corridor has classic bottlenecks where multiple routes feed into a single segment of roadway and branch out again on the other side. This produces reliability and safety issues. Capacity and operations for evacuation is a particular safety concern.

J. Nansemond River Crossings

NEED

Network connectivity in this area is hindered by deteriorating infrastructure and limited crossings. Currently, there is not a connection between Nansemond Parkway and Godwin Boulevard, causing circuitous travel patterns.

ECONOMIC

The corridors affected serve a variety of activity centers and form critical linkages within the south side area of the region.

TRANSPORT.

This corridor is currently experiencing a lack of capacity and access, which is reflected in the reliability measure in particular.

K. Various Activity Centers - Mode Choice

NEED

Key regional activity centers featuring government centers in the area have inadequate transit accessibility. These activity centers are in need of enhanced transit for both employees and customers.

ECONOMIC

Government centers have diverse constituents from all parts of the general public. They need to compete for young, well-educated workers and also effectively serve all income groups.

TRANSPORT.

The measure of transit access to jobs is the prime indicator of this need. Many government centers in the region appear to have good or reasonable transit accessibility; this need addresses those that are lacking in this regard.

L. Various Activity Centers - Walkable/Bikeable Places

NEED

There are multiple activity centers that have limited pedestrian facilities. Walk/bike-ability appeals to the future workforce, attracts knowledge-based industries and reduces the reliance on vehicular travel.

ECONOMIC

Knowledge and local serving centers compete for the workforce segment that prioritizes walk and bike commutes and amenities.

TRANSPORT.

In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need affects the mobility of non-drivers who desire access to these areas.

M. Freight Terminals

NEED

The corridors between freight terminals experience truck bottlenecks that impede goods movement and affect the surrounding community's safety and mobility.

ECONOMIC

This need affects the freight activity centers, but it is also a concern that it creates a conflict between the freight centers and surrounding communities.

TRANSPORT.

This need is a function of terminal operations, which are becoming increasingly 'pulsed' with larger ships accessing deep water ports. The resulting peaks in truck traffic are reflected in the reliability measures.

N. US 13/60 Burton-Little Creek Accessibility

NEED

The roads along the Chesapeake Bay in this area serve major employment centers, the shoreline tourist attractions, the Chesapeake Bay Bridge-Tunnel and local residents. The constraints of the corridor and its many users create reliability and safety concerns. Bicycle and pedestrian accommodations are lacking, particularly to cross the corridor. Access management should be preserved but multimodal access parallel to and across the corridor should be improved.

ECONOMIC

Employment centers in the area include a large joint amphibious base at Little Creek, Norfolk International Airport and industrial development adjacent to the airport. The corridor also serves residential developments and resorts.

TRANSPORT.

Reliability issues occur along the corridor during commute times and weekends. The transportation network is limited by extensive wetlands, streams and inlets, leaving few alternatives in times of incidents and daily congestion.

O. Regional Need - Modal Choice

NEED

To support active transportation, water crossings of all scales need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips of unsurmountable obstacles. Other barriers include railroads and interstate highway corridors.

ECONOMIC

All activity centers with employees seeking a bicycle commute may be affected by this need. Knowledge and local serving centers appear the most likely to be affected, as they compete for the workforce segment that prioritizes walk and bike commutes and amenities.

TRANSPORT.

In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need particularly affects the mobility of non-drivers in the region. It also affects recreational walking and bicycling in the region.

P. Regional Need - Corridor Reliability from Modal Conflicts

NEED

Increasing freight rail traffic radiating from port terminals will affect at-grade rail crossings throughout the region with longer/more frequent closings, increasing delays for other travel modes and raising safety concerns.

ECONOMIC

This issue can affect activity centers, neighborhoods and other areas, but its economic impact is a loss of productivity due to the increased frequency of at-grade crossing closures.

TRANSPORT.

Freight analysis shows that the region's investment in rail infrastructure will generate a substantial rise in goods movement by rail. While there will be congestion and other benefits from increased rail freight mode share, there are local impacts to mobility. In addition to being a safety concern, the increased at-grade crossing closures will create localized bottlenecks and hamper mobility by all modes of transportation.

Q. Regional Need - Corridor Reliability for Freight Gateways

NEED

The region's ten freight gateways are (clockwise): I-64 West, US 17 North, US 13 North, VA 168 South, US 17 South, US 13 South, US 58 West, US 258 West, US 460 West, and VA 10 West. These routes are critical to moving to and from the ports and affect intra-regional travel where bottlenecks occur.

ECONOMIC

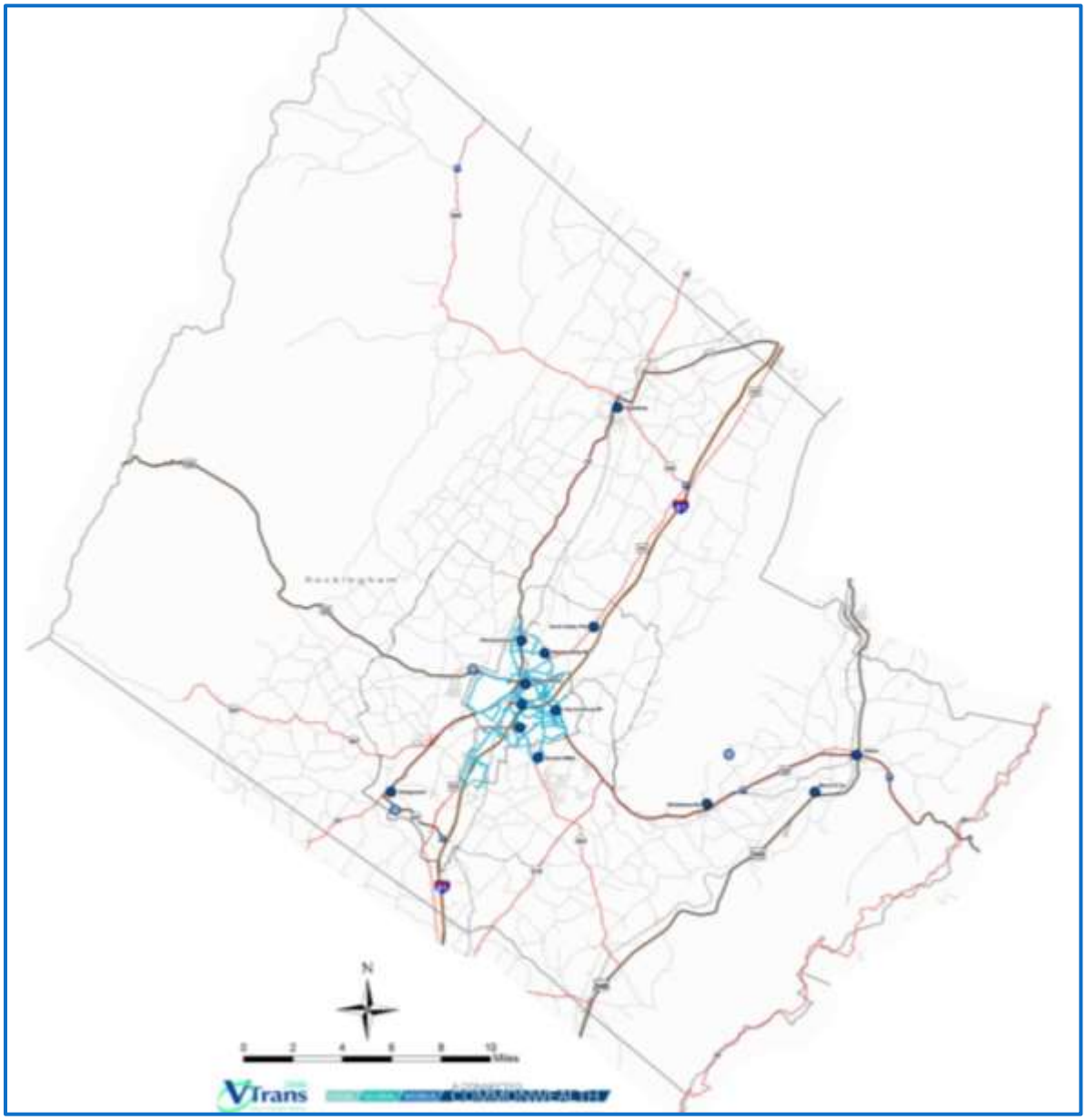
Freight movement is critical as this region serves as a gateway not only for Virginia, but for points beyond, via the ports.

TRANSPORT.

As documented in the Port of Virginia Master Plan and the HRTPO Freight Plan and confirmed by the VMTP profile data, many of the 10 gateways are affected by congestion and reliability issues or other forms of connectivity challenges. In addition to the corridor-specific recommendations in this plan, all of the gateways should have consideration for improvements that enhance truck movements and reduce incident-related delays.

VMTP 2025 Needs Assessment

Regional Needs Profile



Harrisonburg-Rockingham Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans 2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Harrisonburg-Rockingham (HR) Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the HR Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the Transportation Needs and economic conditions is the basis for the findings in this report. The following sections outline the HR regional Economic Profile, regional Transportation Profile, and regional Transportation Needs.

Defining a Regional Network

This portion of the Needs Assessment deals with a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of each Regional Network has been developed as part of the outreach process in working with each region. Additional information about how the regional Networks were defined is referenced in the introductory document, "VMTP 2025 Needs Assessment: Regional Networks Introduction."

The HR Region is defined as the City of Harrisonburg and Rockingham County. However economic generators, economic attractors and commuting corridors located outside of but adjacent to this region that influence the economy or travel market of the HR Region were considered in the development of the Regional Needs Profile. These include:

- **Economic Generators:** Page County (VA), Shenandoah County (VA), Charlottesville-Albemarle Region (VA), Pendelton County (WV), and Hardy County (WV)
- **Economic Attractors:** Page County (KVK Precision Specialists), Shenandoah County (New Market Poultry, Bowman Andros), and Charlottesville-Albemarle Region
- **Regional Commuting Corridors:** US 33 (From US 220 in Franklin, WV to US 29 in Ruckersville, VA), US 340 (From Waynesboro to Luray), US 11 (From Winchester to Staunton), US 42 within Rockingham, SR 259 (From I-81 near Broadway to US 48 in Baker WV)

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of analyzing emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The study team used available data from state and national sources, as well as input from HR Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layer together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Weldon Cooper Center, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21 percent from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population – 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012; and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia.

Regional Demographics

The HR Region is forecasted to experience steady population growth over the next decade. The county as a whole may experience an increase in population by almost 12 percent by 2025 (**Table 2**) whereas the City of Harrisonburg is projected to have an increase in population by over 20 percent.

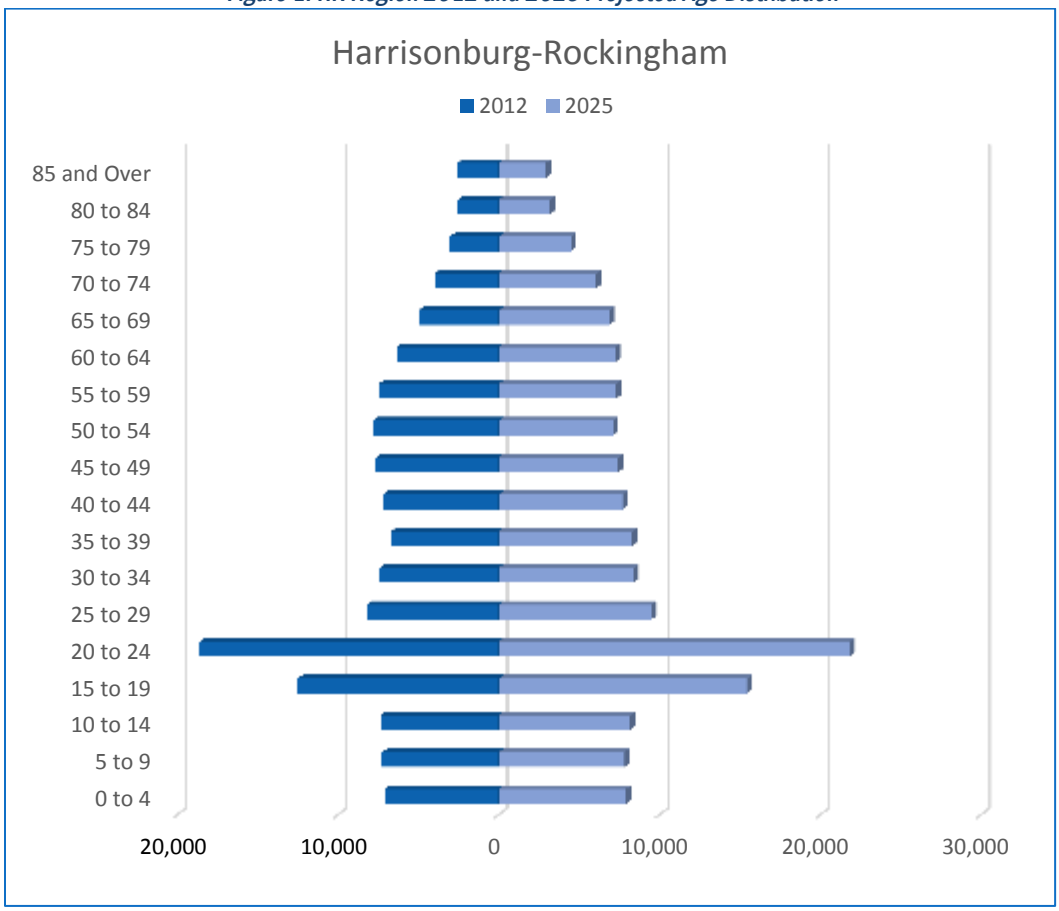
Table 2: HR Region County and City Population Projections

Jurisdiction	2012	2025	% Change (2012-2025)
Rockingham County	77,391	86,656	12.0%
City of Harrisonburg	50,981	61,279	20.2%

Source: US Census Bureau. Weldon Cooper Center for Public Service, Demographics Research Group; Intercensal Estimates for Virginia, Counties, and Cities: 2010-2012, Charlottesville, Virginia, January 27, 2014, www.coopercenter.org; Accessed between January-August, 2014.

Figure 1 illustrates the age distribution for the HR Region in 2012 and the projected age distribution for 2025. The age distribution for this region has a high proportion of college age cohorts, most likely due to the number of higher educational institutions in the region. Population growth is projected to not be accompanied by a demographic shift compared to 2012.

Figure 1: HR Region 2012 and 2025 Projected Age Distribution



Source: Woods & Poole Economics, Incorporated. 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC. 2014.http://www.woodsandpoole.com. Accessed June 18, 2014.

C. Current Industry Strengths

Economic drivers in the HR Region are predominantly centered on freight-dependent industries. These include agriculture, forestry, fishing and hunting; manufacturing; wholesale trade; transportation and warehousing; mining, quarrying, and oil and gas extraction; utilities; and construction. However, James Madison University, a knowledge-based industry, is a major employer in the region. The following economic measures were used to analyze the strength and characteristics of the current regional economy in the HR Region.

Top Industries by Output

Manufacturing is the strongest industry by economic output (**Table 3**). The Retail Trade industry is the second strongest with 15 percent of the region's output.

Table 3: HR Region Current Industries by Output, 2012

Top 5 Industries	Output ($M)	% of Output
Manufacturing	$3,747	26%
Retail Trade	$2,112	15%
Wholesale Trade	$1,903	13%
Public Administration	$1,154	8%
Health Care	$721	5%

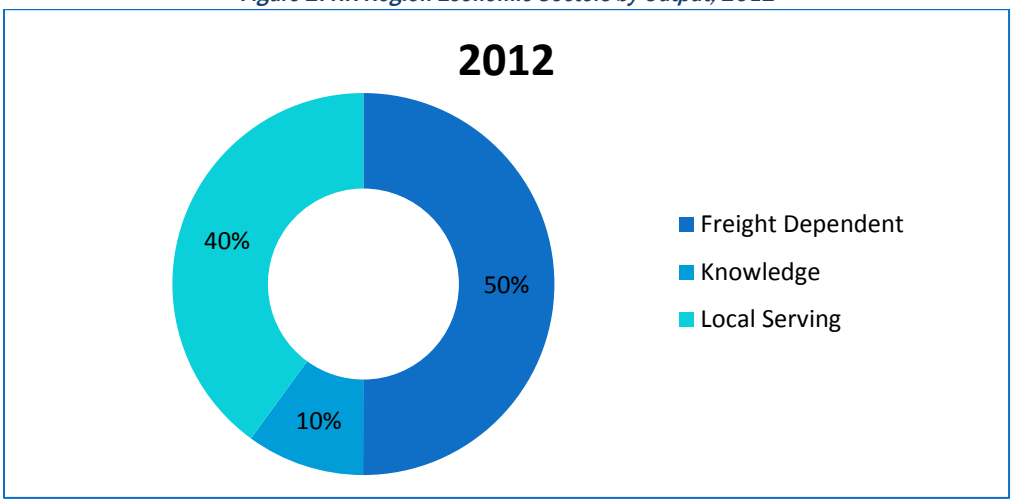
Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as Local Economic Sectors, Knowledge-based Economic Sectors, and Freight-based Economic Sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. **Figure 2** illustrates the summary of each economic cluster in the HR Region. In 2012, the freight dependent industries were the predominant economic sector by output in the region at 50 percent. Each economic sector has different transportation characteristics and needs. The Freight Dependent economic cluster, for example, is typically characterized by shift hours, truck origins and destinations, and access to rail, highways, ports and airports.

Figure 2: HR Region Economic Sectors by Output, 2012



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Top Industries by Employment

In the HR Region, the top industries by employment are Public Administration, Manufacturing, Accommodation/Food Service, Retail Trade, and Health Care (**Table 4**).

Table 4: HR Region Top Industries by Employment, 2012

Top 5 Industries	Number of Jobs	% of Workforce
Public Administration	11,562	17%
Manufacturing	10,737	16%
Accommodation/Food Service	7,628	12%
Retail Trade	6,891	10%
Health Care	6,795	10%

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Table 5 lists the current top employers in the HR Region. James Madison University is the largest employer in the region followed closely by Sentara RMH Medical Center and Rockingham Public Schools. These local serving and knowledge-based industry employers serve many workers that rely on the local transportation system.

Table 5: HR Region Current Top Employers

Employers	Employees
James Madison University	2,652
Sentara RMH Medical Center	2,123
Rockingham Public Schools	2,000
Cargill, Inc.	1,283
RR Donnelley	1,100

Source: 2012 InfoUSA data, supplemented with 2014 HR MPO data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how

concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average. The HR Region's employment in Educational Services is more than triple the national average (**Table 6**). The HR Region is home to many diverse options for higher education and technical training including James Madison University (JMU), Eastern Mennonite University (EMU), Bridgewater College, Blue Ridge Community College, and Massanutten Technical Center.

Table 6: HR Region Current Top Industries by Location Quotient, 2012

Top Industries	Location Quotient
Educational Services	3.22
Corporate Management	1.62
Accommodation/Food Service	1.51
Real Estate	1.44
Transportation/Warehousing	1.39

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

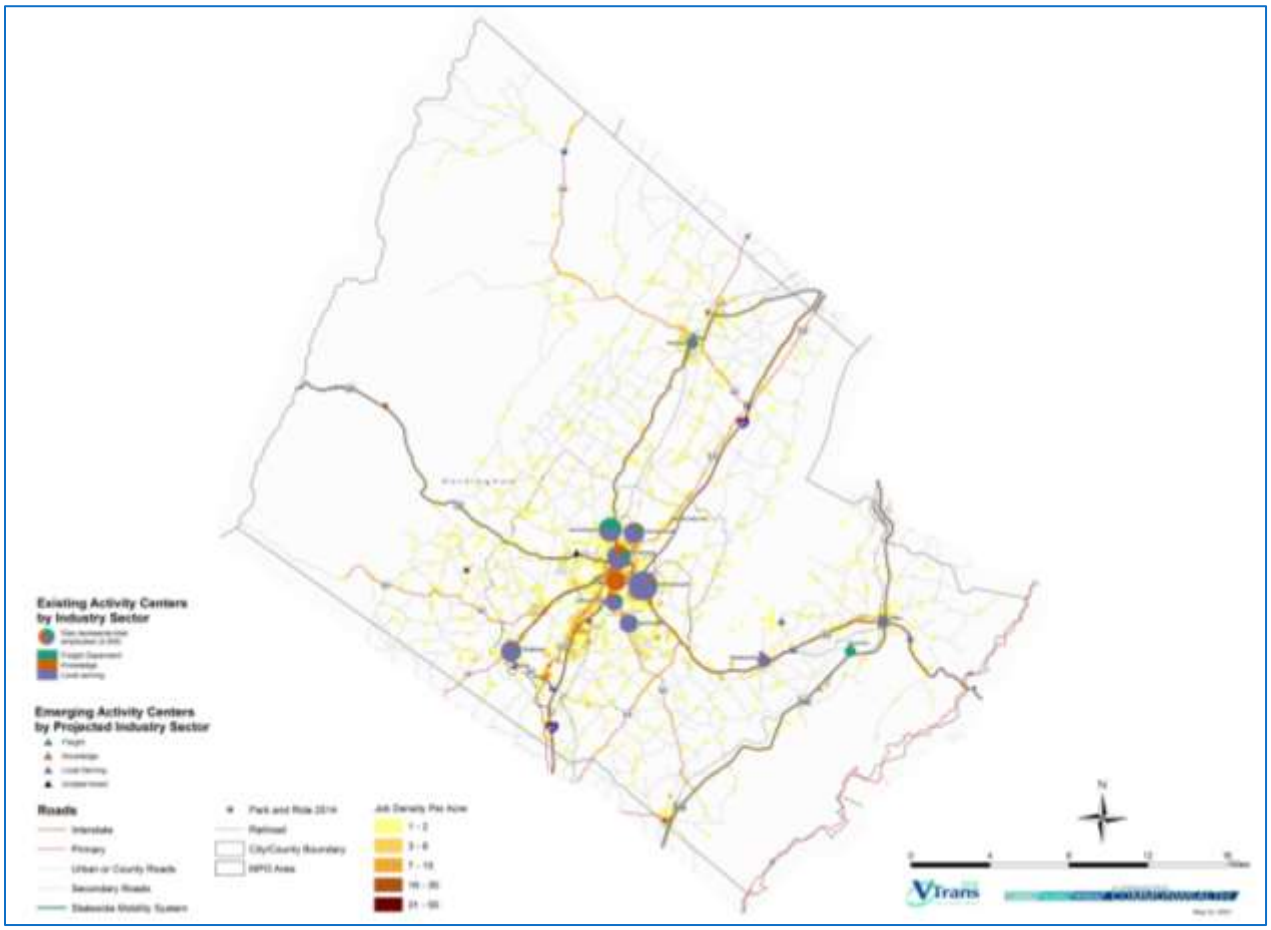
D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, Activity Centers are defined as areas of regional importance that have a high density of economic and social activity. Activity Centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity Centers, drawn with a 1-mile-radius, were then developed for these areas. The Activity Centers were then revised, refined, or amended after discussing economic conditions with regional stakeholders. **Figure 3** below shows the job density per acre in a color range from yellow to dark brown.

Once the Activity Centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of Local Serving, Freight Dependent, and Knowledge-Based economies, analysts developed charts that represented the breakdown of employment by industry sector in each Activity Center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region (**Figure 3**).

Regional stakeholders also identified locations where emerging activity centers are projected to develop over the next ten years and provided feedback on which economic cluster is anticipated. These are depicted on the **Figure 3** as triangles.

Figure 3: HR Region Existing and Emerging Activity Center Employment by Industry Sector



Source: InfoUSA data, Regional Stakeholder Input

E. Forecasted 2025 Industry Strengths

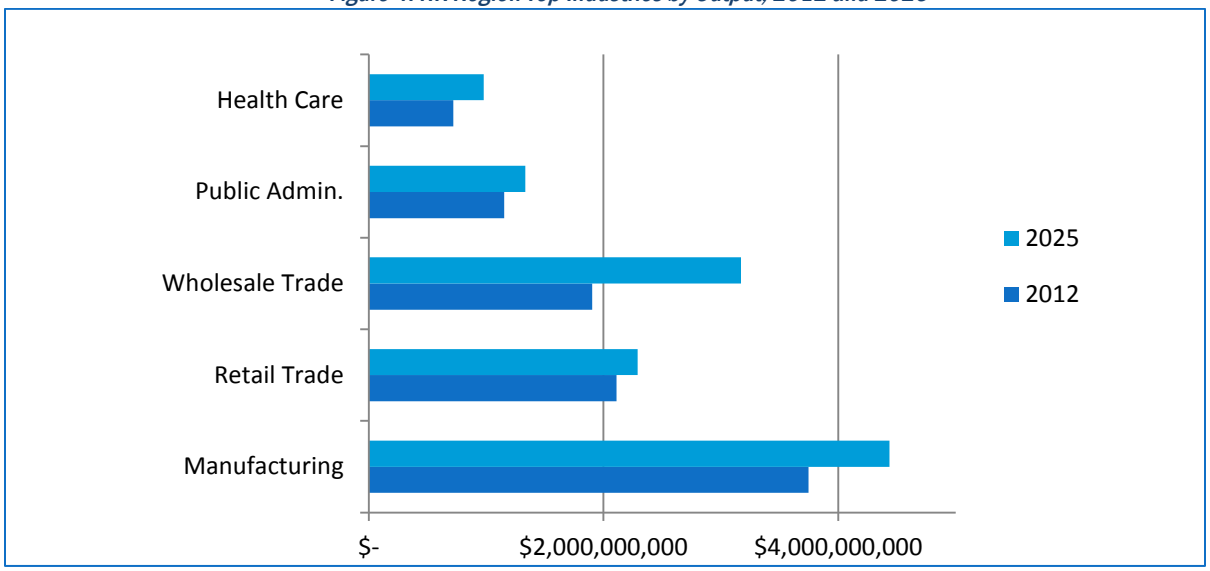
Through a series of work sessions with the HR Region stakeholders, OIPI consultants used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose the HR Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the HR Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Figure 4 compares the top five industries by economic output in 2012 with forecasted growth by 2025. Three of the five top industries by output are within the local-serving industry sectors, the other two being freight-dependent. Manufacturing is expected to continue to dominate the region's output during the coming decade. Wholesale trade is expected to increase by almost 30 percent. Though none of the major output generators are listed as the top five fast-growth employment sectors, they play a critical role in the region's current and future economic productivity.

Figure 4: HR Region Top Industries by Output, 2012 and 2025

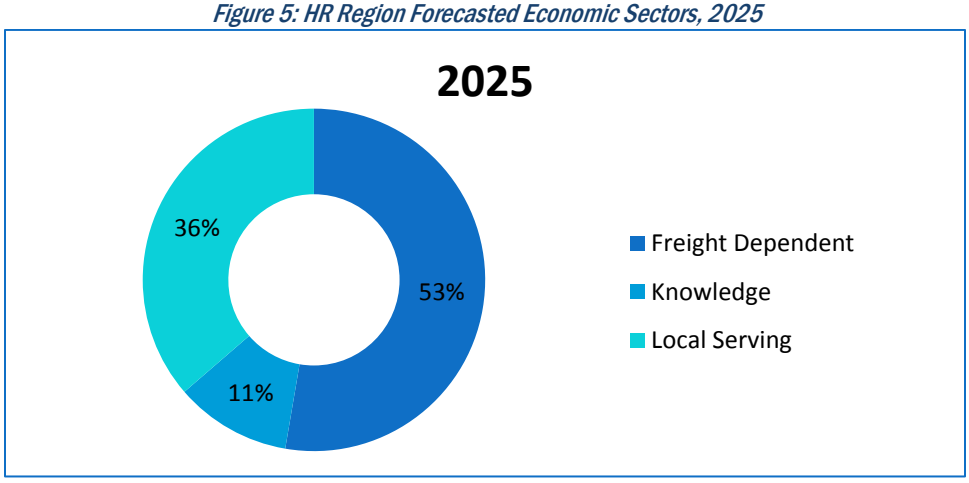


Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Economic Sectors

Figure 5 illustrates the summary of the forecasted economic clusters in the HR Region for 2025. Freight Dependent industries will still be the predominant economic sector by output in the region at 53 percent.

Figure 5: HR Region Forecasted Economic Sectors, 2025



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Industries by Employment

Forecasted top industries by employment for the region are listed in **Table 7**. Health Care, a local serving industry, is expected to be the dominant industry with approximately 18 percent of the workforce followed by the freight dependent Mining/Extraction industry at 14 percent of the workforce.

Table 7: HR Region Forecasted Top Industries by Employment, 2025

Top 5 Industries	Number of Jobs	% of Workforce
Health Care	13,244	18%
Mining/Extraction	10,447	14%
Accommodation/Food Service	8,291	11%
Information	7,449	10%
Construction	5,343	7%

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the HR Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for HR Region:

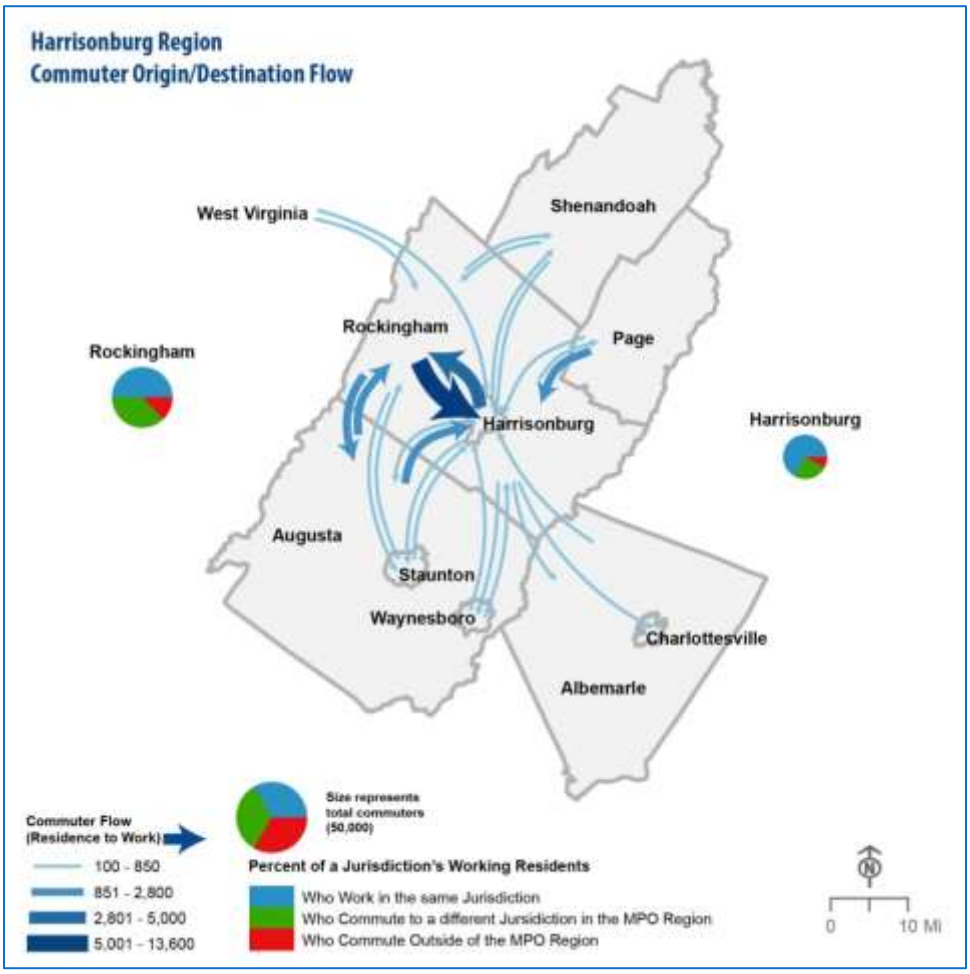
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Figure 6 illustrates the commuting patterns within and among the HR Region localities between 2009 and 2013. The pie charts indicate that the vast majority of the region's working residents either work within the same jurisdiction that they live or commute to a different jurisdiction within the MPO region. A significant portion of Rockingham County residents commute within the County or to the City of Harrisonburg – and likewise for City of Harrisonburg residents. For those commuting outside of the region, the majority are going either to or from Augusta County or Page County.

Figure 6: HR Region Commuting Patterns



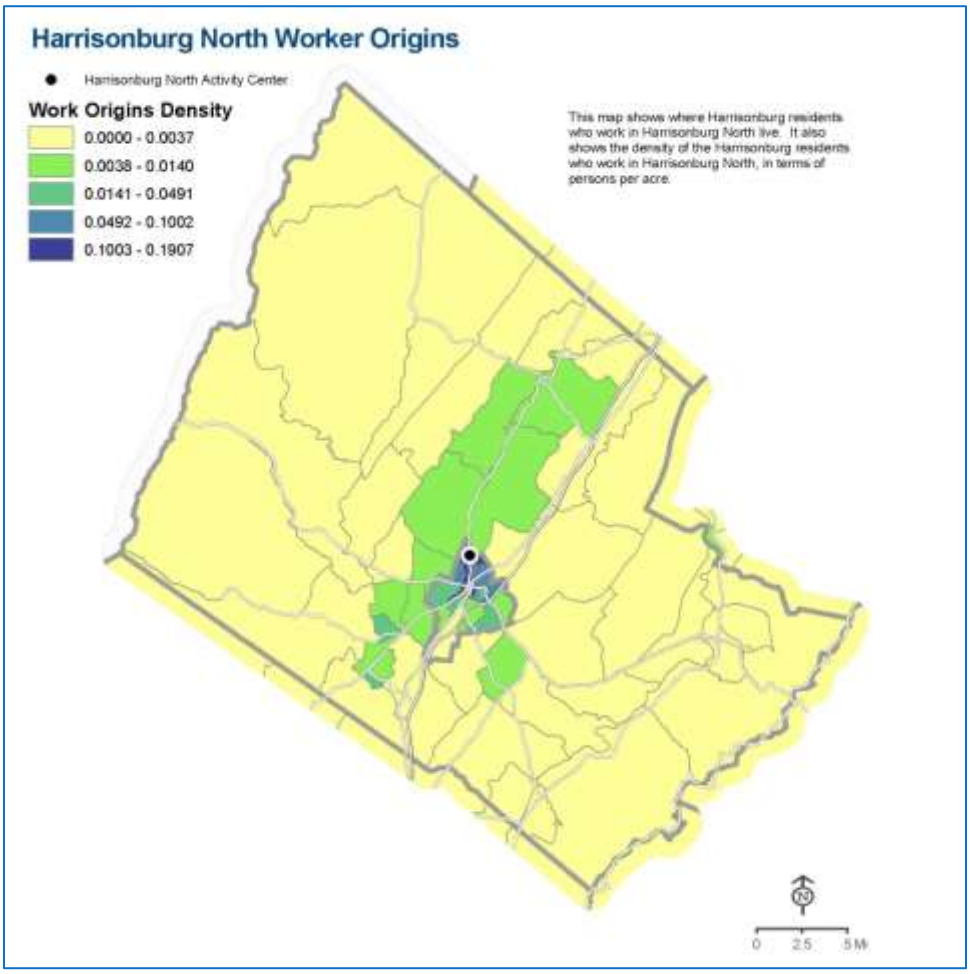
Source: American Community Survey: Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Residence Geography: 2006-2010.

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the HR Region was the analysis of commuting patterns between Activity Centers. **Figures 7, 8 and 9** below provide insights into the commuting patterns for three of the Activity Centers in the HR Region. Block groups are symbolized on a color scale from light beige to dark blue, with the darker shades representing the block groups with the largest number of commuters to the Activity Center analyzed within that map.

As shown on **Figure 7**, northern Harrisonburg receives commuters mostly from within the City and along the VA 42 corridor.

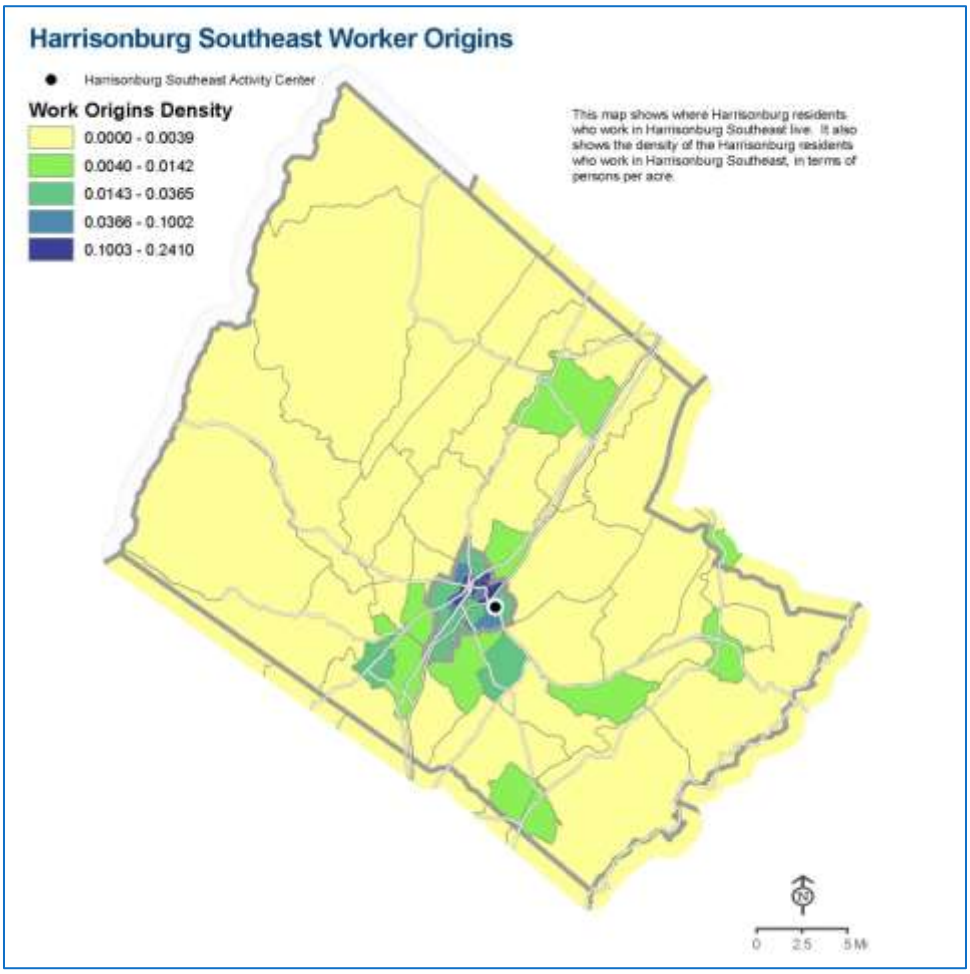
Figure 7: Commuting Patterns to Harrisonburg North Activity Center



Source: Longitudinal Employer-Household Dynamics (LEHD) program which uses Unemployment Insurance earnings data and the Quarterly Census of Employment and Wages (QCEW) data to create statistics on employment, earnings, and job flows at detailed levels of geography and industry and partially synthetic data on workers' residential patterns, http://lehd.ces.census.gov/.

The Harrisonburg Southeast activity center receives most of its commuters from the surrounding area but some come from various areas around the region (**Figure 8**).

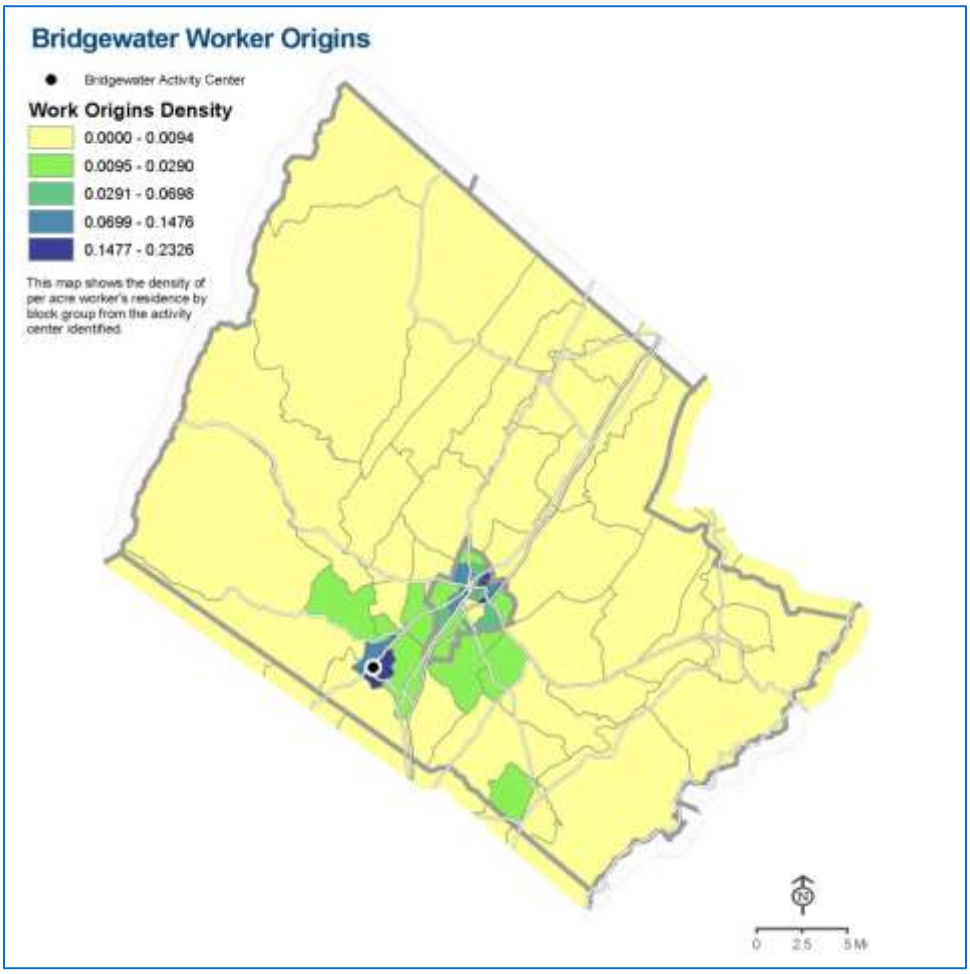
Figure 8: Commuting Patterns to Harrisonburg Southeast Activity Center



Source: LEHD, http://lehd.ces.census.gov/.

Figure 9 shows that a majority of commuters to the Bridgewater activity center originate from the City of Harrisonburg or areas adjacent to it.

Figure 9: Commuting Patterns to Bridgewater Activity Center

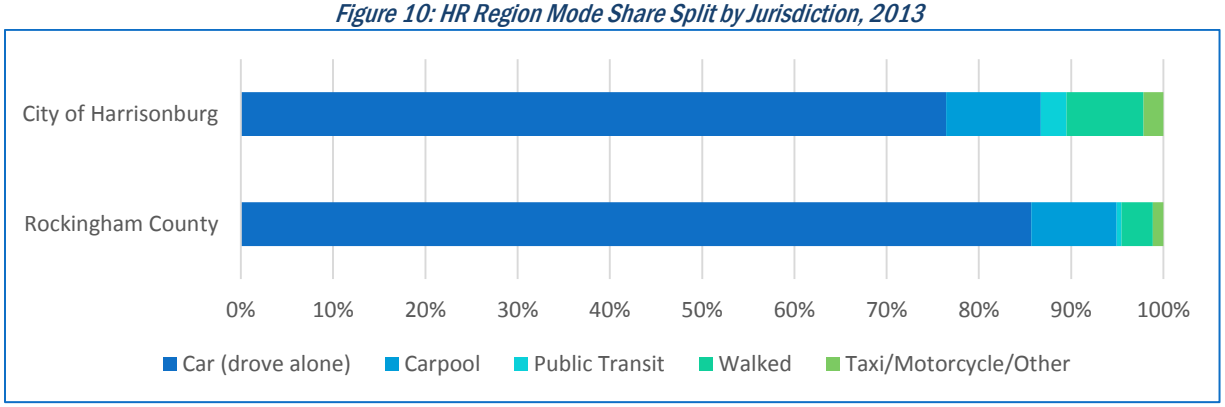


Source: LEHD, http://lehd.ces.census.gov/.

Mode Choice

In the HR Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 74 and 81 percent of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 8 to 10 percent of the mode share. Walking is the highest in the City of Harrisonburg at 8 percent (**Figure 10**).

Figure 10: HR Region Mode Share Split by Jurisdiction, 2013



Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Average Commute Times

The average commute time in the HR Region ranges from 15 to 22 minutes among the three jurisdictions (**Table 7**).

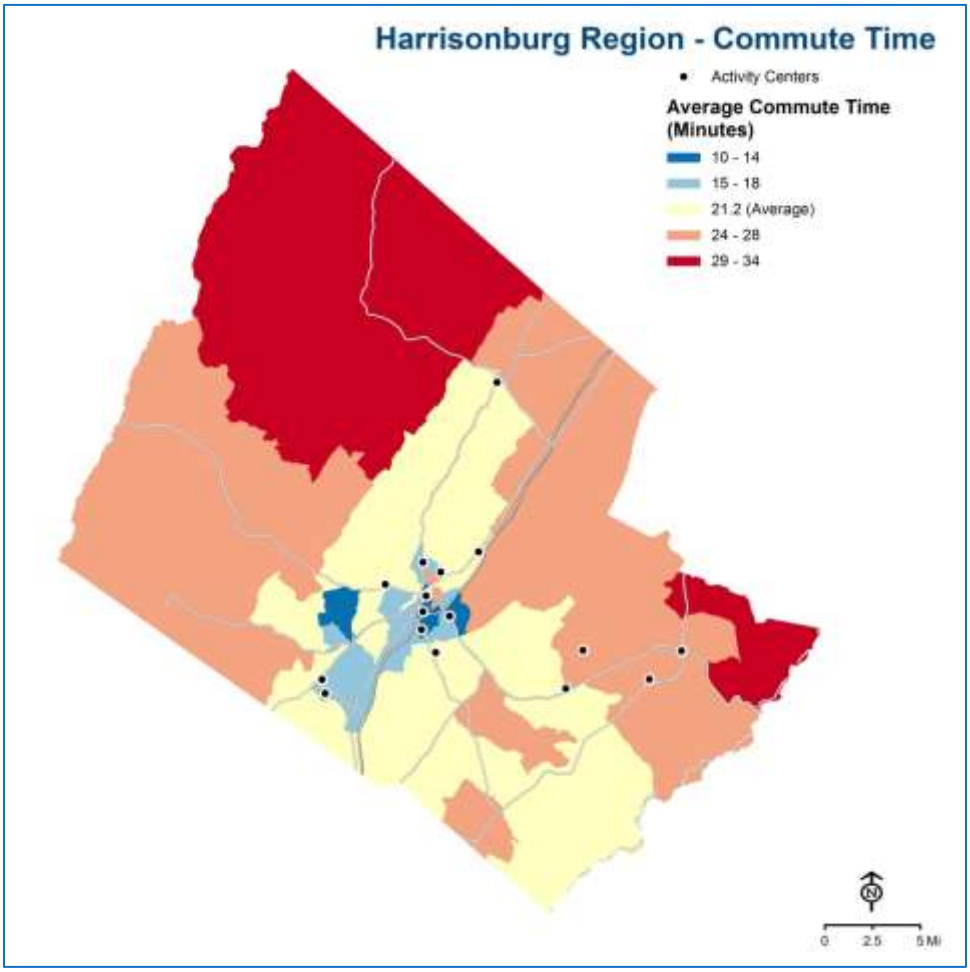
Table 8: HR Region Mean Commute Time, 2013

Jurisdiction	Mean Commute Time (Minutes)
City of Harrisonburg	15.7
Rockingham County	22.1

Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Figure 11 provides a closer look at where longer commutes originate. In the areas within and south of the City of Harrisonburg, commute times are below average for the region as a whole. Block Groups in rural areas of Rockingham County have commute times that are above the regional average of 21.2 minutes, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

Figure 11: HR Region Average Commute Times, 2013



Source: US Census Bureau, American Community Survey 2013, 5-Year Estimates.

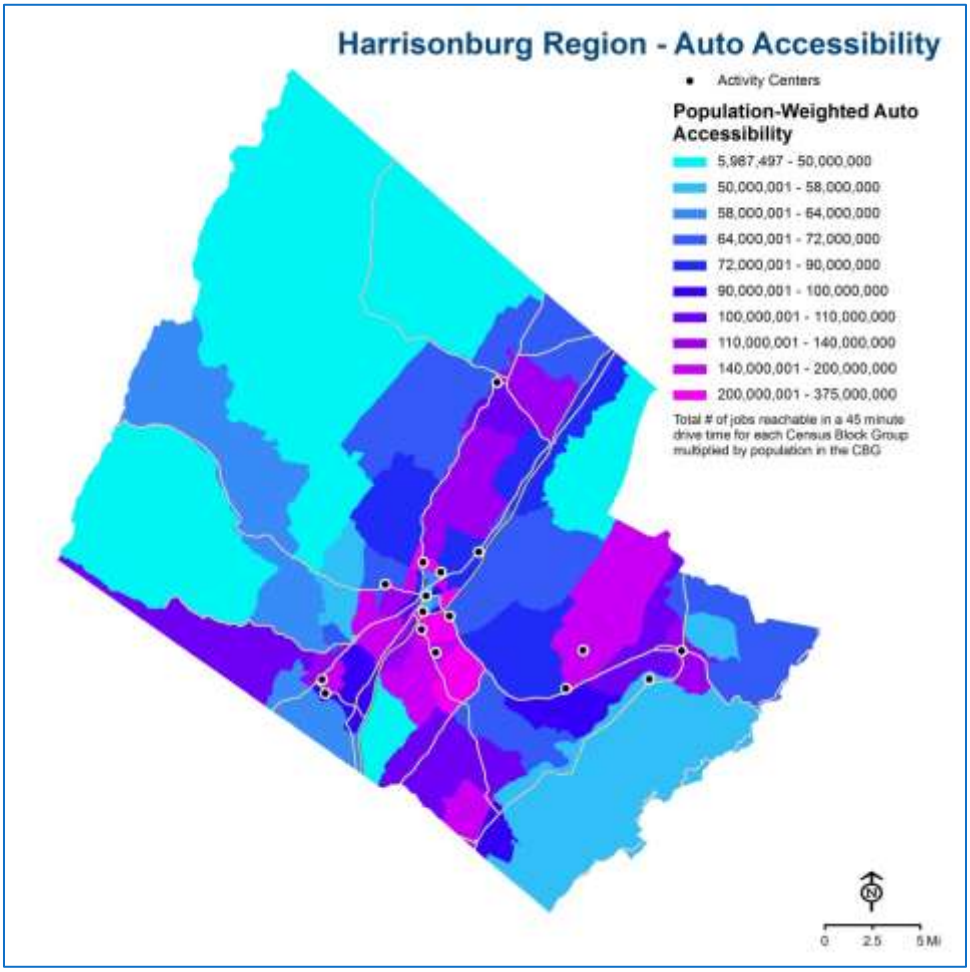
C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between Activity Centers.

Auto Accessibility

Auto Accessibility in the HR Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. Closer jobs and higher density census block groups are weighted more than jobs further away and less dense census block groups. The areas with the highest level of auto accessibility exist within the City of Harrisonburg (**Figure 12**). Even the most rural areas of the region are within a 45 minute drive of jobs.

Figure 12: HR Region Auto Accessibility

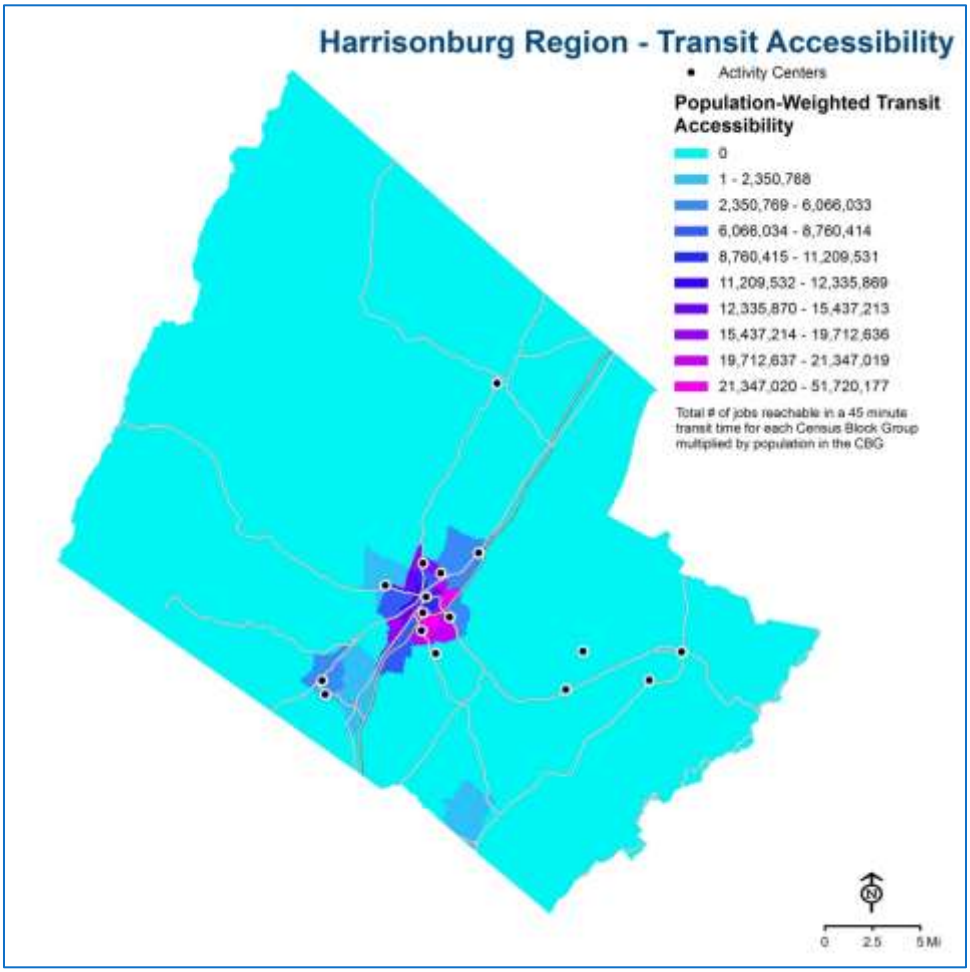


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway speeds developed from FHWA HERE data. InfoUSA Business Data, 2012 was used to calculate employment locations.

Transit Accessibility

Figure 13 illustrates the total number of jobs reachable in a 45 minute transit time for each census block group multiplied by population within that census block group. The fixed-route transit options in the HR Region are limited to within the City of Harrisonburg. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs.

Figure 13: HR Region Transit Accessibility

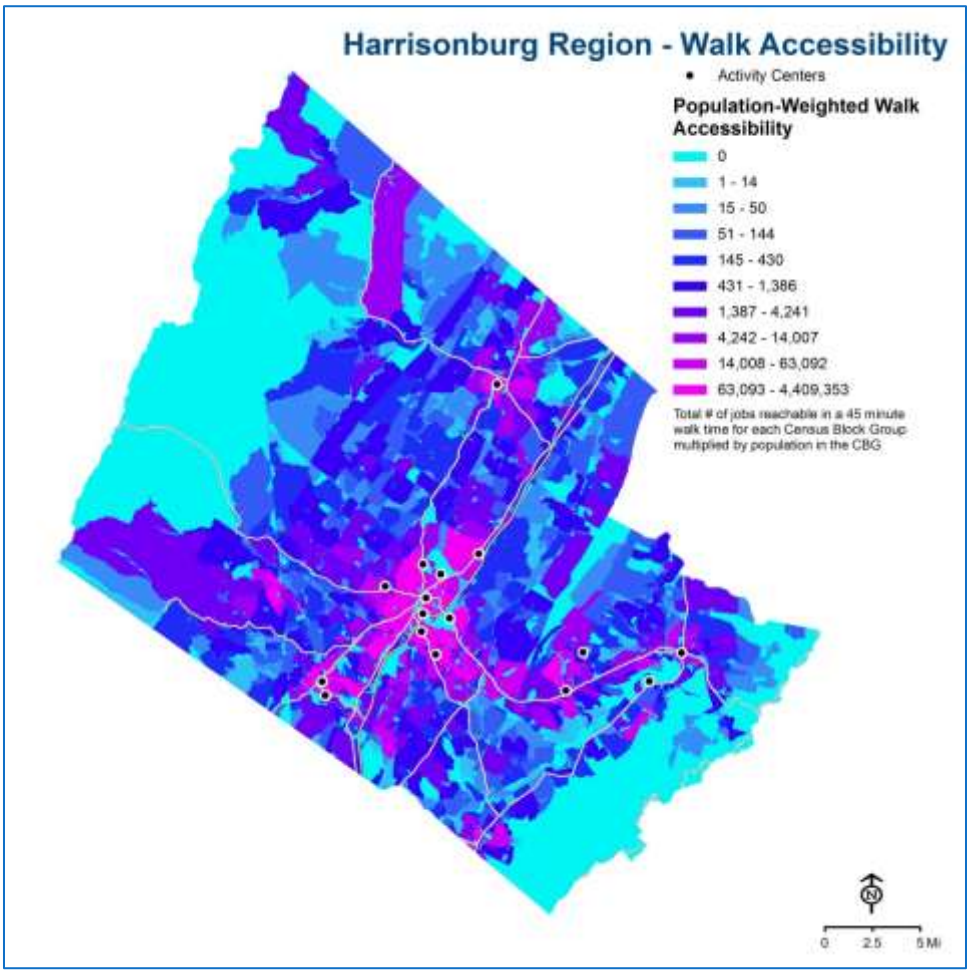


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using General Transit Feed Specification (GTFS) transit data and including walk time to and from stations. InfoUSA Business Data, 2012 was used to calculate employment locations.

Walk Accessibility

Figure 14 reveals a regional pattern of mixed use development in communities where residents live within walking distance of thousands of jobs and/or the services represented by those jobs. The areas within and surrounding the City of Harrisonburg scored the highest, as was expected. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility.

Figure 14: HR Region Walk Accessibility

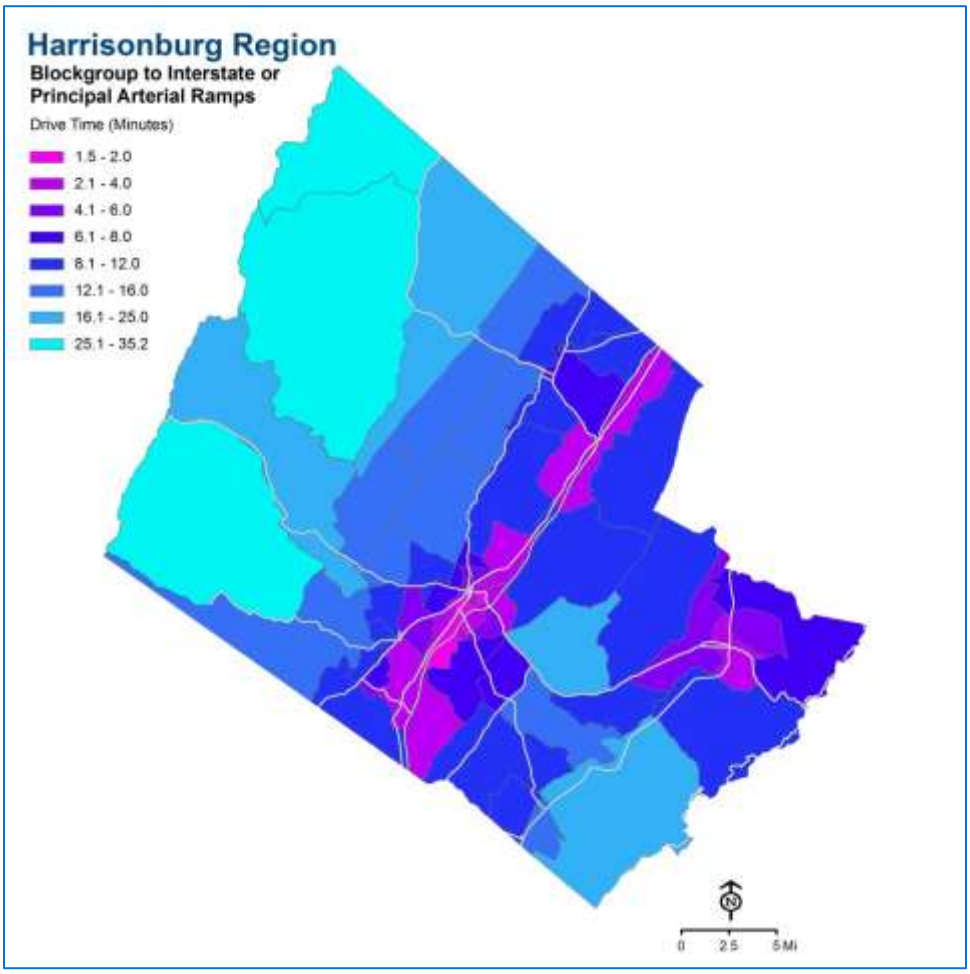


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway characteristic data to interpolate walkability. InfoUSA was used to calculate employment locations.

Freight Accessibility

In addition to railways, I-81 is the major corridor for freight movement throughout the region. Accessibility of freight origins to this interstate is dependent primarily on the proximity of the origin to highway access ramps. In the region the shortest drive times are found along I-81 and where US 33 and US 340 meet in Elkton. Even the most rural parts of the region are within a 35 minute drive of a highway interchange (**Figure 15**).

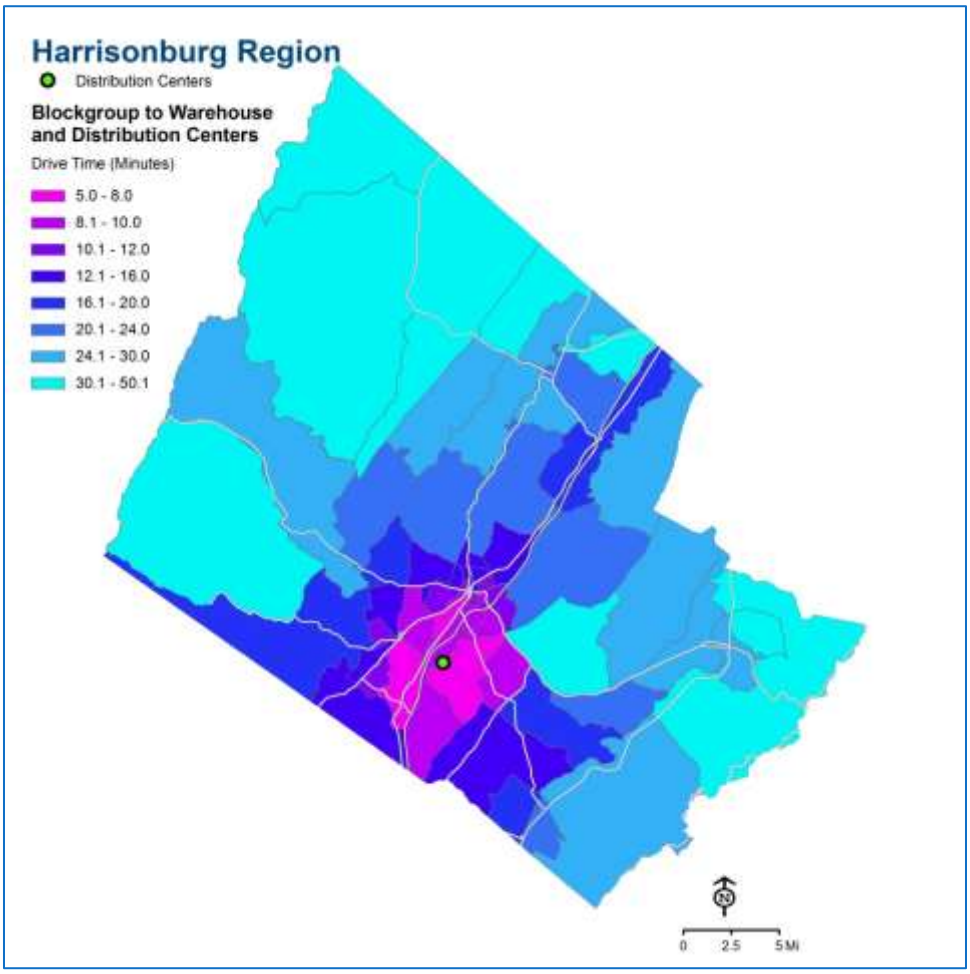
Figure 15: HR Region Access to Interstate and Principal Arterial Ramps



Source: GIS analysis conducted using US Census Boundary Files, ramps from Navteq database.

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. There is one warehouse or distribution center located off of US 11 and US 340. Access to it is the greatest within the south-central portion of the region, averaging less than a 10 minute drive (**Figure 16**).

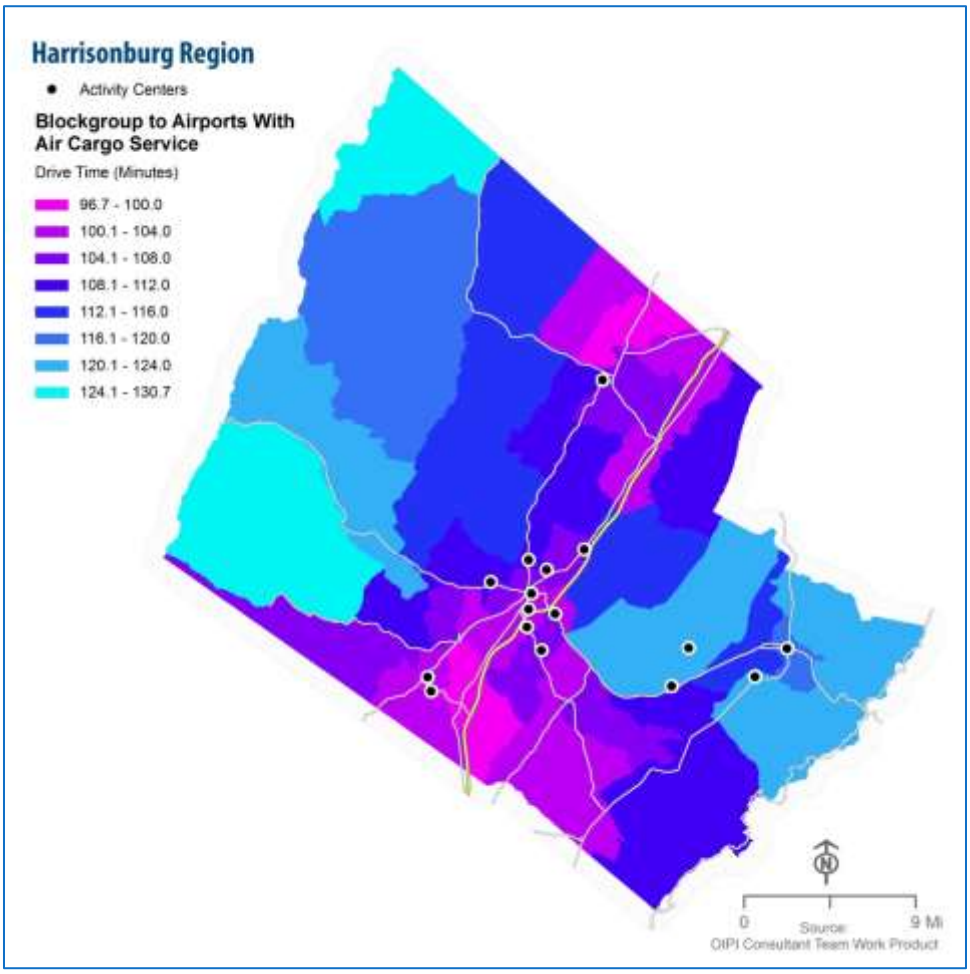
Figure 16: HR Region Access to Warehouses & Distribution Centers



Source: GIS analysis conducted using US Census Boundary Files and Virginia Office of Intermodal Planning and Investment data on Warehouse and Distribution Center Locations.

Figure 17 displays proximity to commercial service airports that handle air cargo, which is important for some types of freight distribution. In general, the HR Region is within a 90 minute to 2 hour drive to the closest airport that handles air cargo.

Figure 17: HR Region Access to Airports with Air Cargo Service



Source: GIS analysis conducted using US Census Boundary Files and location of airports with air cargo service.

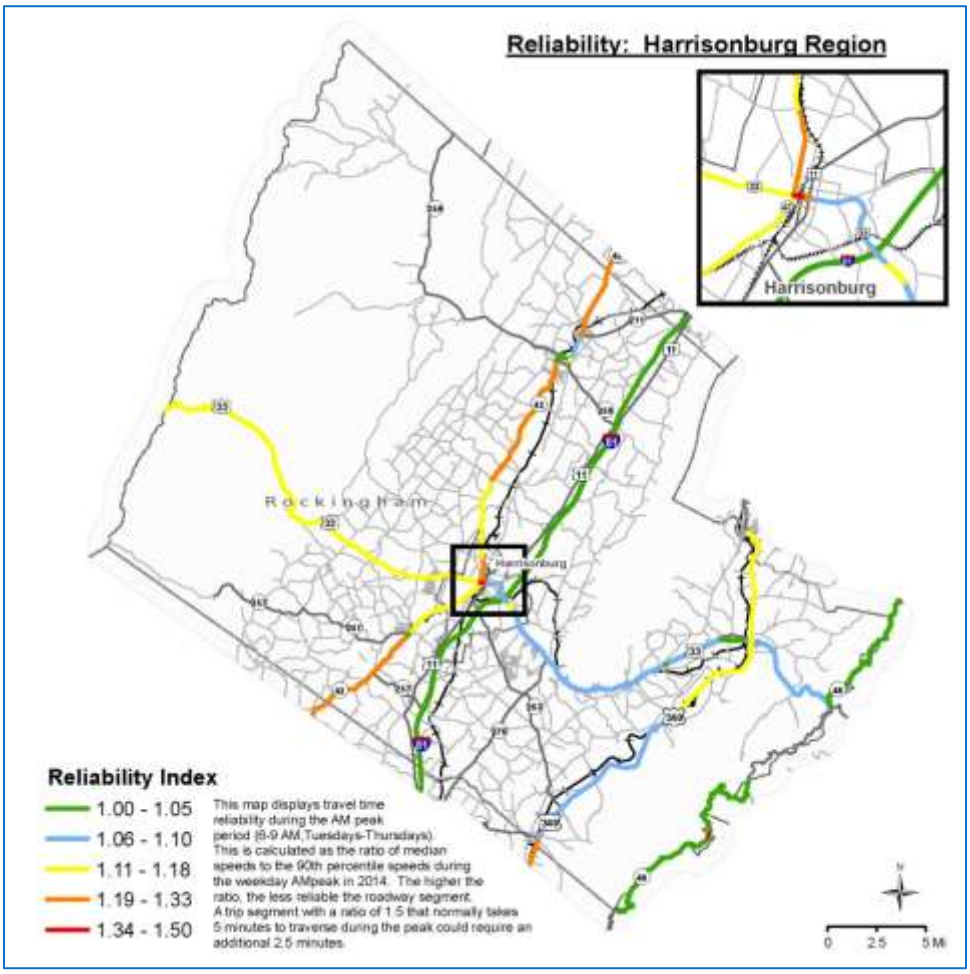
D. Roadway Measures

This assessment identified the transportation conditions in the HR Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in **Figure 18** below, is defined as the ratio of the 80th percentile travel time during the weekday AM peak period in 2014. Overall, scores indicate that travel time is very reliable for the corridors with available data. The VA 42 corridor has a slightly higher travel time reliability index compared with the other corridors analyzed, however, it equates to a few minutes of additional travel time.

Figure 18: HR Region Travel Time Reliability

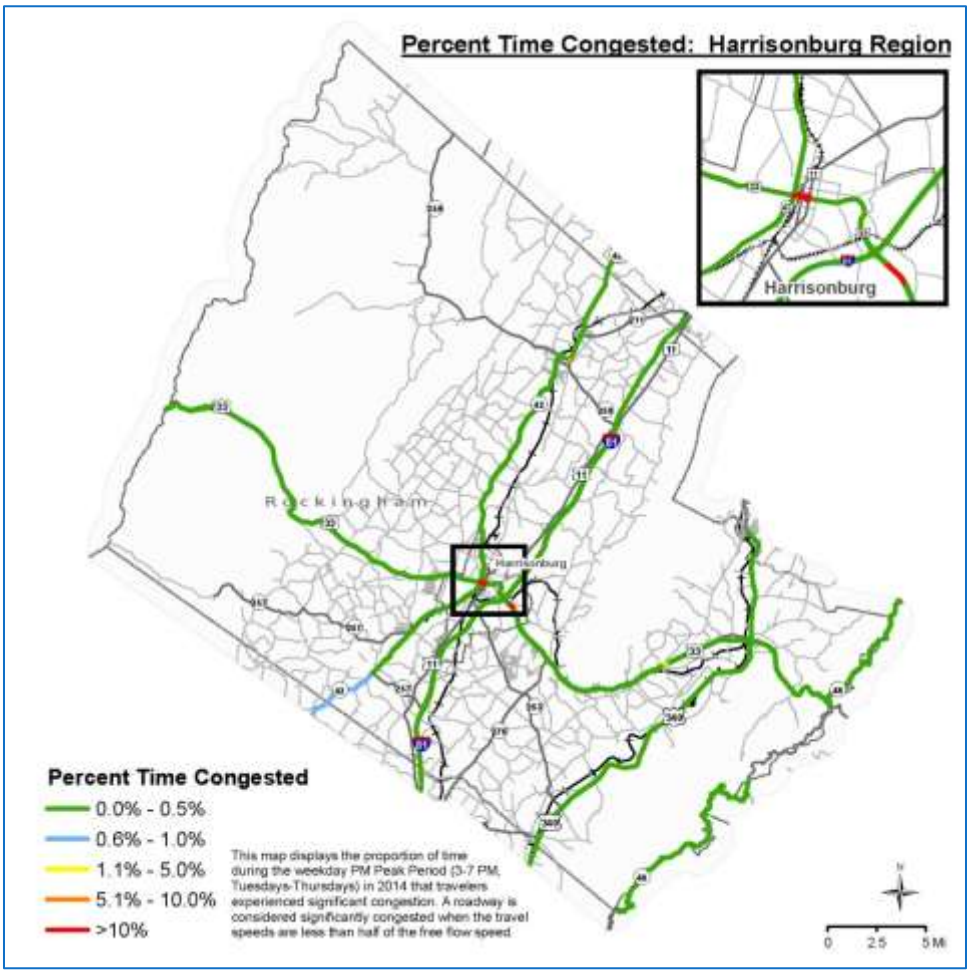


Source: INRIX Data and Virginia Department of Transportation
Note: the Reliability Index is based on a statewide scale which may skew the scores for the HR Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Percent of time congested is an important determinant of roadway Level of Service. The percentage of time congested was calculated for evening peak times in 2014. According to the analysis, a majority of the corridors analyzed are congested less than 0.5 percent of the time (**Figure 19**). A few intersections on US 33 and VA 42 experience slight congestion.

Figure 19: HR Region Percent of Time Congested

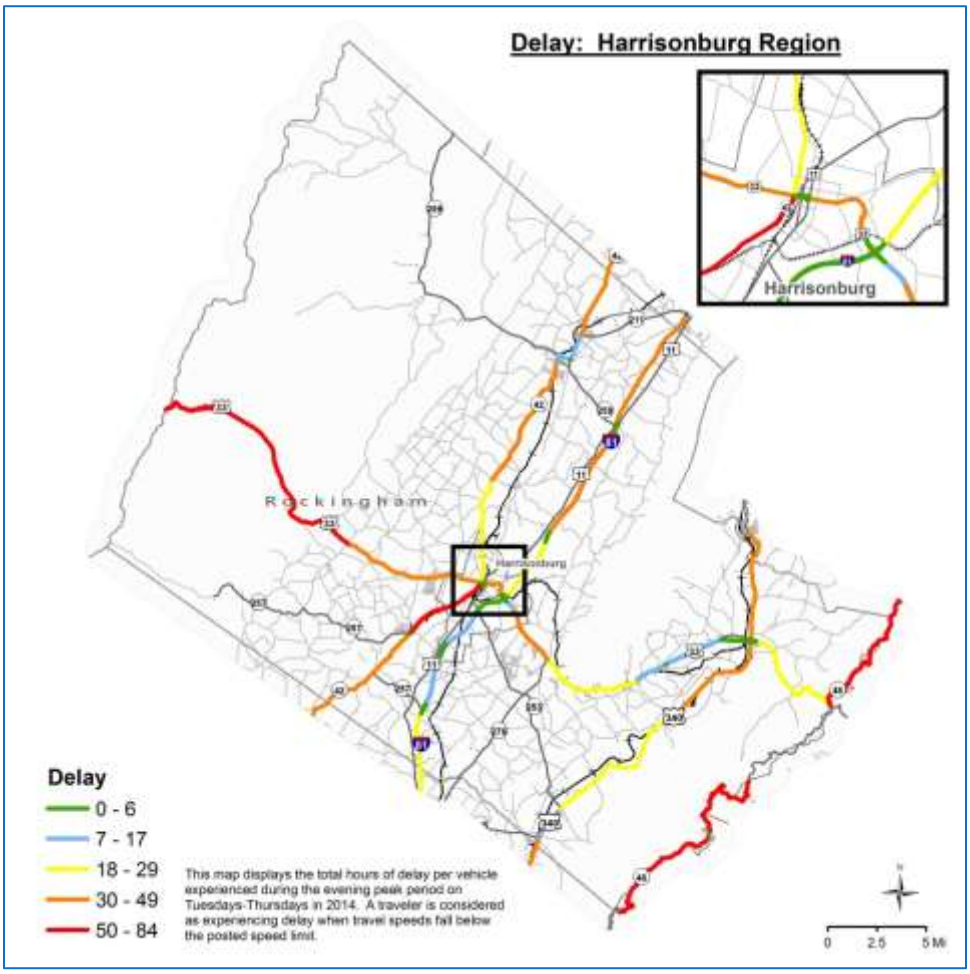


Source: INRIX Data and Virginia Department of Transportation.

Travel Time Delay

Travel time delay is defined as the total hours of delay per vehicle during weekday evening peak times in 2014. If travel speeds fall below the posted speed limit, a trip is considered delayed. In the HR Region, the most significant delays occurred along portions of US 33, VA 48, and VA 42 (**Figure 20**).

Figure 20: HR Region Travel Time Delay

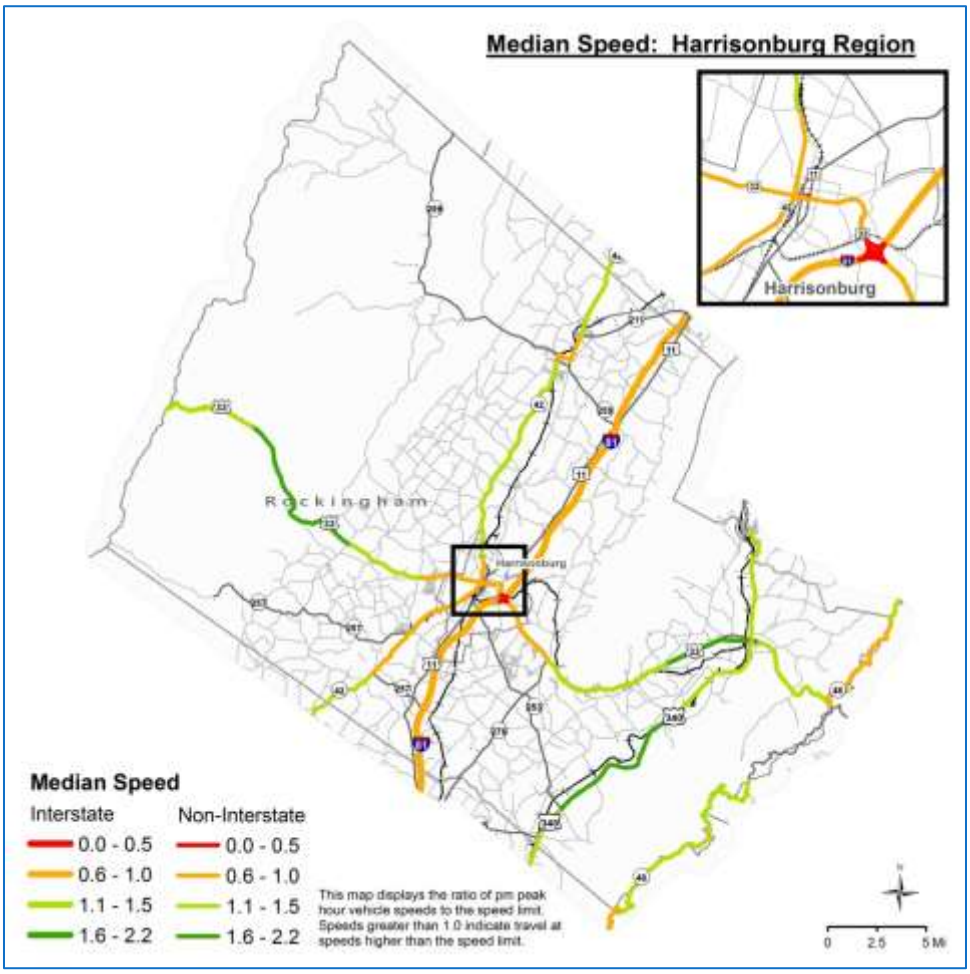


Source: INRIX Data and Virginia Department of Transportation.

Median Speeds

The median speed map (**Figure 21**) displays the ratio of pm peak hour vehicle speeds to the speed limit for both interstate and non-interstate corridors in 2014. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The I-81 corridor and a portion of the US 11 corridor south of US 33 experience median speeds of less than 1.0.

Figure 21: HR Region Median Speeds



Source: INRIX Data and Virginia Department of Transportation.

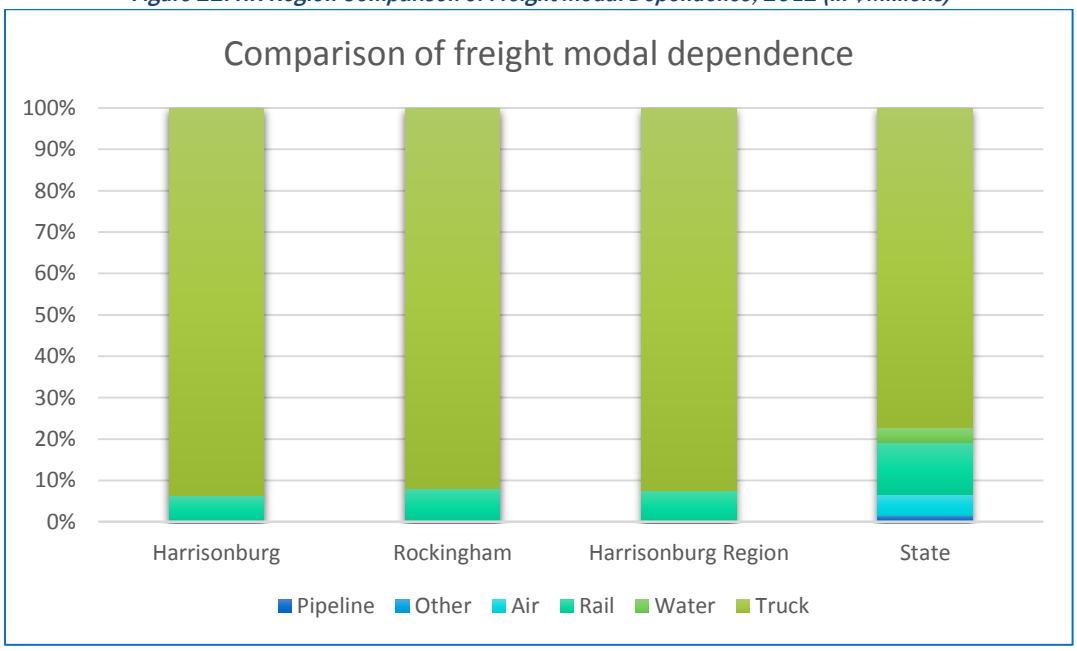
D. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are specific to the regional and local commodity flows via the various freight corridors in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the HR Region, about 92 percent of the dollar value of all goods that are moved through the region are moved by truck (**Figure 22**). The region does not utilize pipeline, air, or water freight modes. The region uses rail, but is just over half as dependent on rail as the state as a whole.

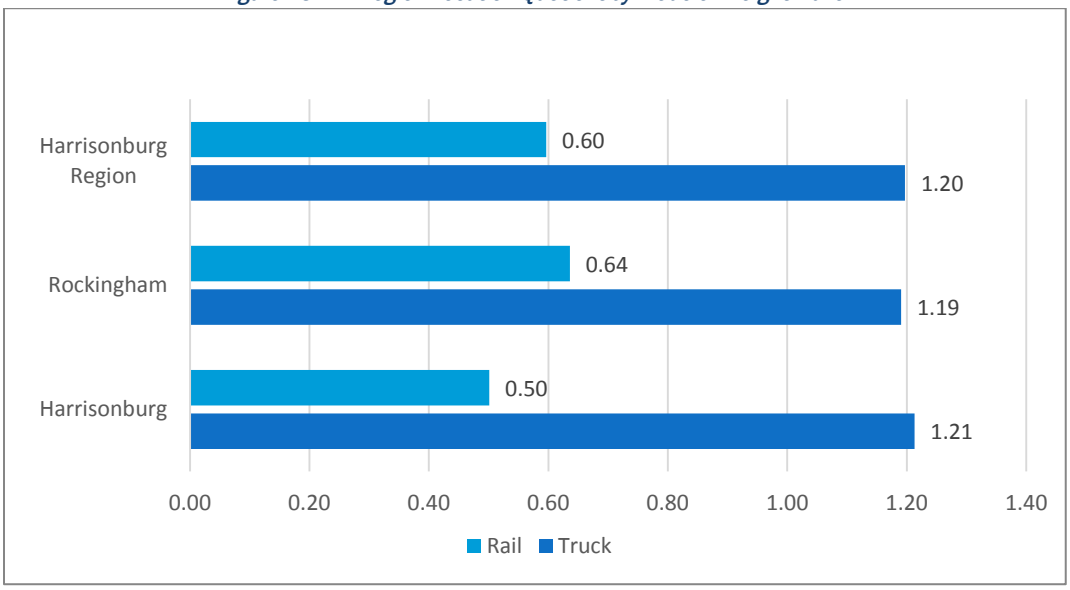
Figure 22: HR Region Comparison of Freight Modal Dependence, 2012 (in $Millions)



Source: TranSearch, 2012

Location Quotients are used to compare the prominence of freight modes between the HR Region, and the State as a whole. The HR Region relies on rail for freight movement only 0.60 times and on trucks for freight movement 1.20 times more than the State does as a whole (**Figure 23**).

Figure 23: HR Region Location Quotient by Mode of Freight Travel

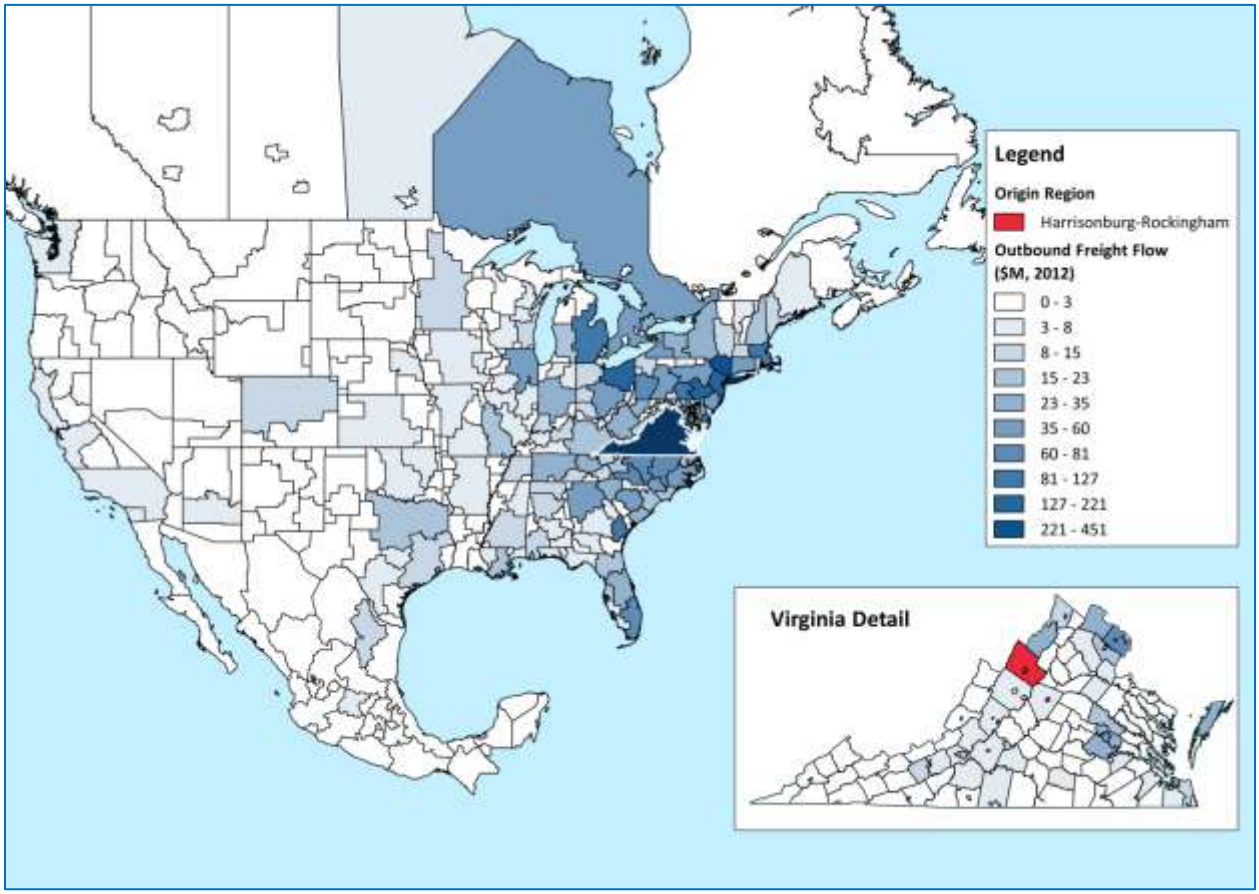


Source: Transearch, 2012

Top Commodities

Outbound locations for freight by value from the HR Region in 2012 are shown in **Figure 24**. A majority of the freight in terms of value originating in the region is destined for states along the eastern seaboard.

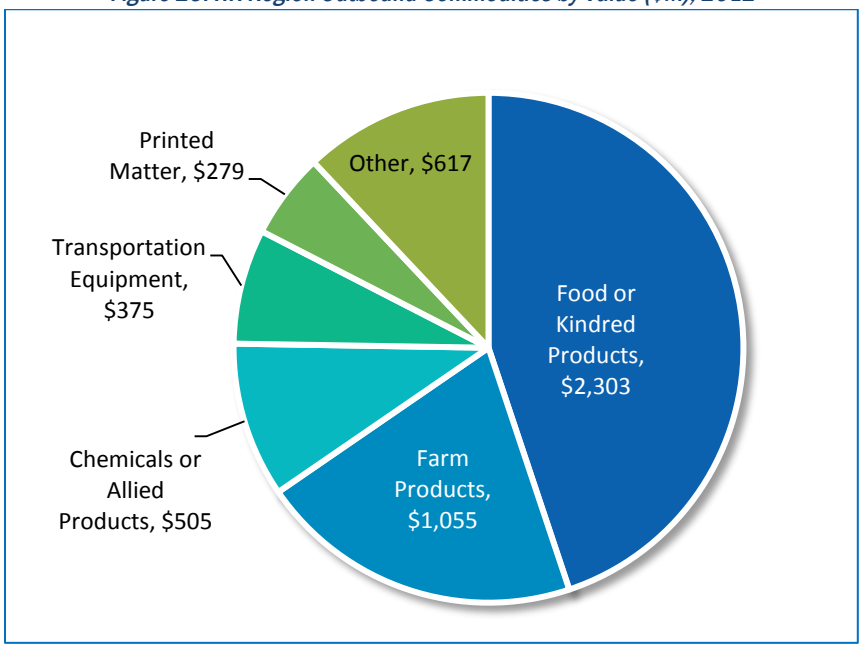
Figure 24: Outbound Freight Flow from the HR Region, 2012



Source: Transearch, 2012

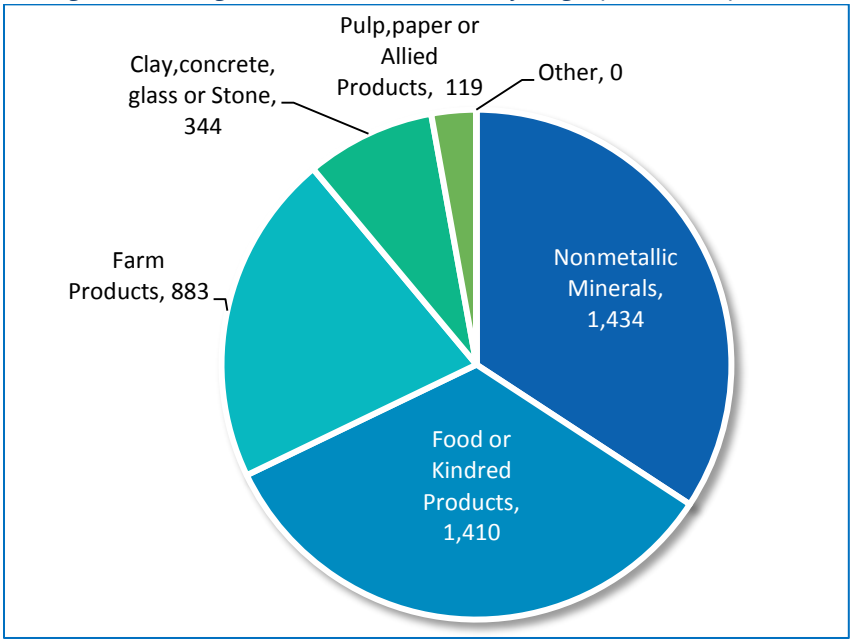
Figures 25 and 26 summarize the value and tonnage of commodities that originated in the HR Region in 2012. Over 65 percent of the outbound commodities in terms of value are food and agriculture related products. The largest commodity by weight was nonmetallic minerals followed closely by food products.

Figure 25: HR Region Outbound Commodities by Value ($M), 2012



Source: Transearch, 2012

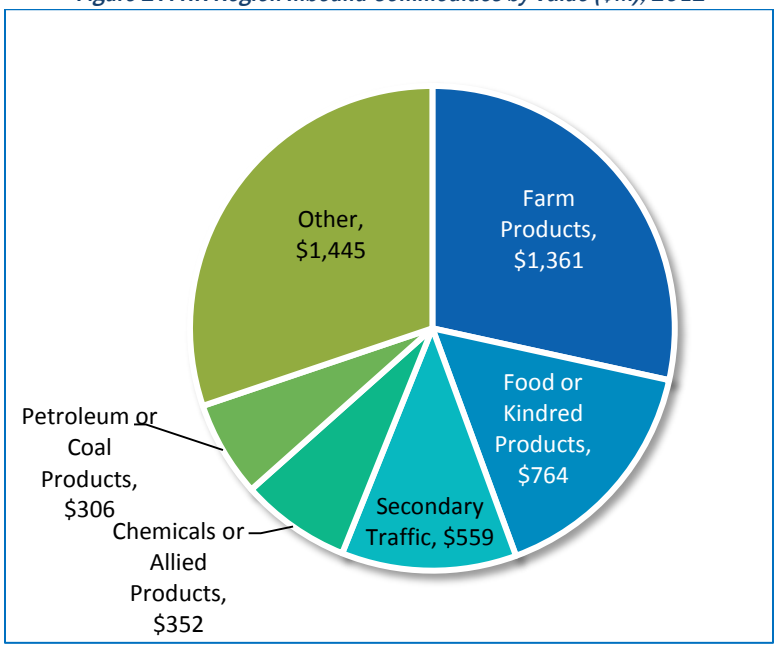
Figure 26: HR Region Outbound Commodities by Weight (000s of Tons), 2012



Source: Transearch, 2012

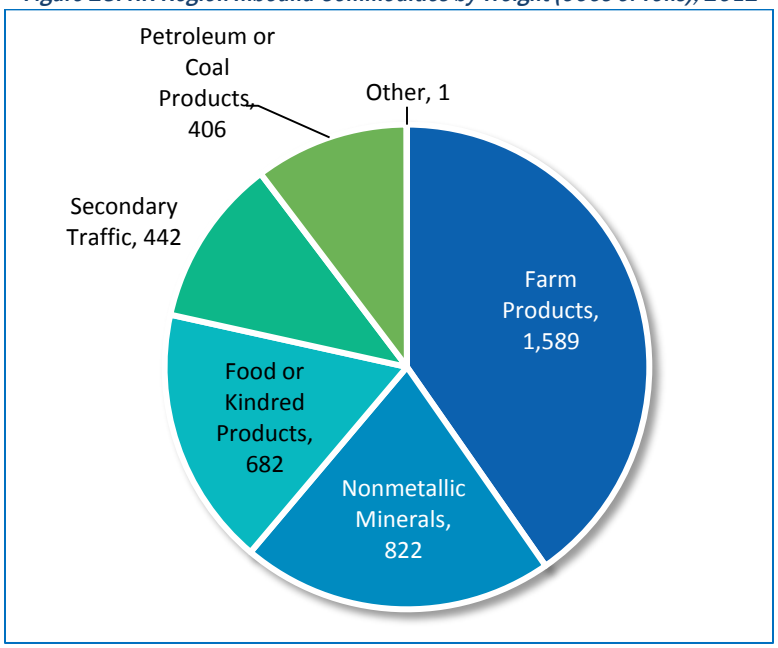
Figures 27 and 28 summarize the value and tonnage of commodities that were destined for the HR Region in 2012. Almost 59 percent of commodities in terms of value were farm and other products. The largest commodity by weight was farm products.

Figure 27: HR Region Inbound Commodities by Value ($M), 2012



Source: Transearch, 2012

Figure 28: HR Region Inbound Commodities by Weight (000s of Tons), 2012



Source: Transearch, 2012

4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the HR Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs. These Needs were categorized into a series of five very broad types of capacity Needs (Passenger and Freight Reliability, Bottleneck Relief, Modal Choice and Walkability), as well as general Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs). The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the OIPI team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The OIPI consultant team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge, and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and **Table 9** only represents

where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 9: Economic and Transportation Correlation

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the HR Region, it showed a predominance among the Freight Dependent economic sector at 53 percent. The Local Serving economic sector accounts for about a third of the economy with Knowledge-based industries accounting for 11 percent of the economic output. As outlined in the Economic and Transportation Correlation table above, the Freight Dependent sector priority transportation needs include highway access, bottleneck relief, freight reliability, and freight accessibility.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire to continue to support the industrial, commercial and agricultural industries, particularly with respect to goods movement needs, but also to support the expected growth of the health care, high tech and tourism industries with the need for reliable commuting and additional modal travel options.

This translates into transportation needs such as freight and passenger reliability on the region's key corridor, such as I-81, US 250 and US 11. It also indicates the need for addressing any bottlenecks along these corridors to further support reliable travel for both commuters and goods movement as well as provide improved modal choices and transportation demand management for commuters. In addition, the US 33, US 340, VA 42, VA 253, VA 259, and VA 211 corridors support multiple existing and emerging activity centers in the region, are important freight and commuter routes, and serve economic growth in the City of Harrisonburg.

The forecasted growth in the Freight Depending economic sector for this region brings the potential for additional transportation needs such as freight reliability and accessibility, as well as access to the interstate to support the movement of goods while minimizing conflict with passenger travel. Transportation needs in the region should also include supporting the existing Local and Knowledge-Based economic sectors which drive many of the existing activity centers. These activity centers would benefit from improved access to modal options and additional transportation demand management programs to provide better workforce access. Further support for the Local Serving sector would also come from enhanced walkable and bikeable places.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

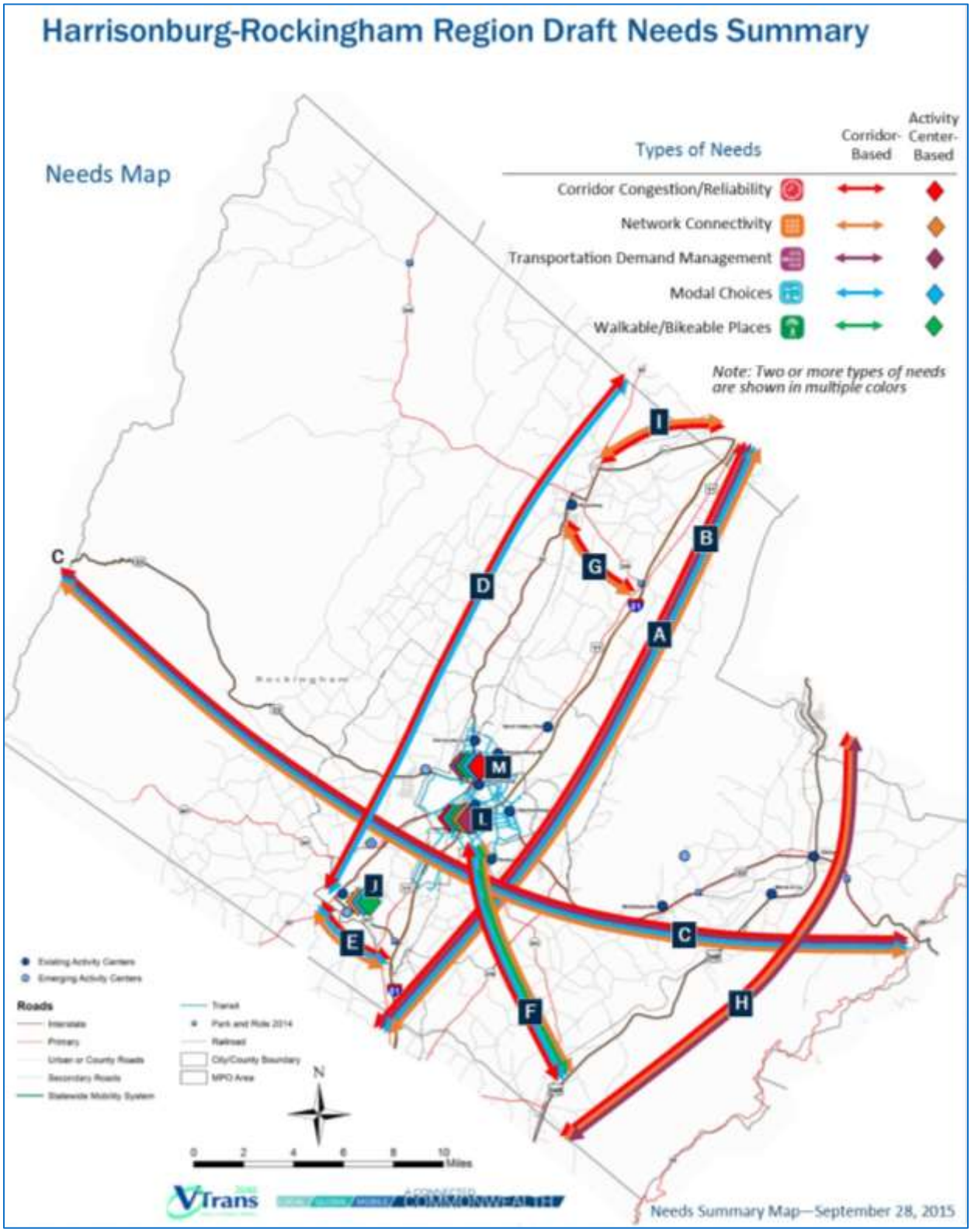
Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

Figure 29 below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Figure 29: Summary Needs Map for the HR Region



Findings of Needs

Table 10 below lists each of the identified Transportation Needs in the Region and describes the basis for each Need in terms of economic and transportation findings and data:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized in the economic and transportation profiles. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 30: Transportation Icons for Needs Assessment



Table 10: Findings of Needs for the HR Region

A.	I-81 Corridor and Interchanges
Need	 **The I-81 corridor is the principal high volume, high mobility artery in the region and serves interstate, regional and local travel. It accommodates demand from both commuter and freight traffic, and connects Rockingham County to other parts of Virginia. There is a need to mitigate inconsistent travel times at Exits 245 and 247. Transportation demand management services and modal choices within the corridor to improve commutes and access to recreational and tourist destinations are needed. I-81 bisects the City of Harrisonburg and James Madison University Campus and is a barrier to local network connectivity.**
Economic	 A number of existing and emerging activity centers along the I-81 corridor serve local, freight dependent, and knowledge-based industries for both goods movement and commuter traffic. The corridor is an essential and high-priority corridor for freight movement. It connects activity centers of all types and supports tourism.
Transportation	 I-81 has intermittent passenger and freight reliability and bottleneck issues at several interchanges in the region. Additional modal choices for passenger service to inter-regional markets are vital to supporting the regional economy. Multimodal access to jobs is lacking. I-81 accommodates high volumes of through freight traffic.

B.	US 11 Corridor
Need	 **The US 11 corridor is a north/south artery in the region, parallel to I-81, that provides access to local destinations. Multiple existing and emerging activity centers serving both passengers and freight are located near the corridor. Improved passenger and freight reliability, modal choices, network connectivity, and transportation demand management services are needed.**
Economic	 A number of existing and emerging activity centers along the US 11 corridor serve local, freight dependent, and knowledge-based industries for both freight and commuter traffic.
Transportation	 US 11 is a major connector between activity centers in the HR Region and an alternative travel corridor when I-81 is congested due to incidents. Multimodal access to jobs is lacking. This is a freight corridor. Vehicular safety is a concern along portions of the corridor.

C. US 33 Corridor

Need



The US 33 corridor is an east/west artery in the region connecting passengers and freight with West Virginia and Greene County. Improved modal choices, corridor reliability, transportation demand management services, and network connectivity are needed.

Economic



Multiple existing local serving activity centers are located along US 33 between downtown Harrisonburg and Elkton.

Transportation



The US 33 corridor is the primary east/west connector in the region, a commute corridor from West Virginia, and lacks safe bicycling and pedestrian facilities. The section of the corridor between the City of Harrisonburg and US 340 needs improved freight and passenger reliability. A regional park is located along US 33.

D. VA 42 Corridor

Need



The VA 42 corridor is a north/south artery in the region connecting the City of Harrisonburg to the local serving Bridgewater activity center. There is a need to mitigate congestion from freight traffic along the northern part of VA 42 between Broadway and the City of Harrisonburg, as well as the southern portion of VA 42 through Bridgewater. There is a lack of east-west connectors from VA 42 to I-81.

Economic



VA 42 supports passenger and freight traffic between the Broadway, Harrisonburg, and Bridgewater activity centers which serve mostly freight-dependent and local serving industries.

Transportation



VA 42 lacks modal options including transit, bicycling and pedestrian facilities along portions of the corridor. Improved reliability for both passenger and freight traffic is needed.

E. VA 257 Corridor

Need



The VA 257 corridor serves as an east/west local connector in the region connecting the local serving Bridgewater activity center with I-81. There is also a need to mitigate congestion from freight traffic coming off of I-81 headed to various industrial, commercial, and agricultural facilities in the region.

Economic



VA 257 supports the local serving Bridgewater activity center as well as freight traffic connecting from I-81 to various agricultural, industrial, and educational facilities in the region.

E. VA 257 Corridor

Transportation



This corridor runs through the Bridgewater College campus and lacks modal options including transit, bicycling and pedestrian facilities. Connectivity between VA 42 north of Bridgewater and VA 257 east of Bridgewater is lacking. The corridor experiences intermittent congestion from the influx of local traffic and pedestrian activity as it enters the Town of Bridgewater.

F. VA 253 Corridor

Need



The VA 253 corridor connects the City of Harrisonburg southeast to US 340 with the Sentara RMH Medical Center local serving activity center as well as the Massanetta Springs residential area located along the corridor. There is a need for improved modal choices, improved passenger reliability, network connectivity and enhanced walkable/bikeable places in the Massanetta Springs area.

Economic



VA 253 supports the local serving and knowledge-based industries in Harrisonburg with the predominantly local serving activity center near Sentara RMH Medical Center, a regional hospital.

Transportation



This corridor serves the Massanetta Springs residential area which lacks modal options including transit, bicycling, and pedestrian facilities. The corridor between Harrisonburg experiences intermittent congestion.

G. VA 259 Corridor

Need



The VA 259 corridor is a local connector in the northern part of the region between I-81, VA 42 and West Virginia. From West Virginia to I-81, the corridor serves regional freight traffic and some commuters. The section of VA 259 between I-81 and Broadway serves more local passenger and freight traffic. Improved passenger and freight reliability is needed as well as network connectivity.

Economic



VA 259 supports the freight dependent and local serving Broadway activity center.

Transportation



This corridor experiences intermittent congestion and improved freight and passenger reliability is needed.

H. US 340 Corridor

Need

The US 340 corridor is a north/south connector in the eastern part of the region that serves commuters and freight traffic. There is a need for improved corridor reliability, transportation demand management services, modal choices and network connectivity as activity centers near the corridor continue to grow.

Economic

There are a number of existing and emerging activity centers along the US 340 corridor that serve local and freight dependent industries for both freight and commuter traffic. Two of the region's largest industrial employers Merck and Miller Coors are located along the corridor.

Transportation

Regional connector between activity centers and commute destinations outside the region. The corridor lacks multimodal access to jobs and handles some through freight traffic.

I. VA 211 Corridor

Need

The VA 211 corridor is a local connector in the northern part of the region between I-81, VA 42 just north of Broadway. The corridor serves local passenger and freight traffic. Improved passenger and freight reliability is needed as well as network connectivity.

Economic

VA 211 supports the freight dependent and local serving Broadway activity center.

Transportation

This corridor experiences intermittent congestion and improved freight and passenger reliability is needed.

J. Emerging Local Serving Activity Center

Need

Improved network connectivity is needed to support the emerging local serving activity center along VA 257 near Bridgewater as well as improved opportunities for transit, bicycle and pedestrian facilities.

Economic

The emerging local activity center is anticipated to be the future home of a satellite facility of Sentara RMH Medical Center which is the second largest employer in the region.

Transportation

The emerging activity center is expected to be a major employment area in the region and will need improved network connectivity as well as access to modal options, including transit, bicycling and pedestrian facilities.

K. Various Activity Centers

Need



Multiple existing and emerging activity centers serving local industries as well as regional outdoor recreation destinations lack connectivity to transit, pedestrian and bicycle facilities. Access to transit in the region is limited to within the City of Harrisonburg and east to Sentara RMH Medical Center area. Improved network connectivity is needed in the northeastern part of the City of Harrisonburg and surrounding area, specifically alternatives to US 11; near the Belmont residential area; and in the Massanetta Springs area between US 33 and VA 253.

Economic



Activity centers support local serving and knowledge-based industries in multiple emerging and existing activity centers in the region.

Transportation



Existing connections between and within activity centers lack efficient modal choices. Improved walkable and bikeable places would enhance existing communities. Regional transit and transportation demand management for commuters are needed.

L. James Madison University Activity Center

Need



There is a need to improve the network connectivity into the JMU activity center and alternative access to I-81, improve modal choices, and enhance the activity center as a walkable/bikeable place. Freight trains regularly move through the activity center blocking roadways. Improved passenger and freight reliability and transportation demand management services are needed.

Economic



The knowledge- based James Madison University activity center is the largest employer in the region. A freight rail corridor moves through the campus.

Transportation



The lack of network connectivity around the JMU campus and periodic congestion from freight rail moving through the activity center impacts passenger reliability. As a college based activity center, there is a need to enhance the community as a bikeable/walkable place with improved modal options to transit, biking and walking.

M. Downtown Harrisonburg Activity Center

Need

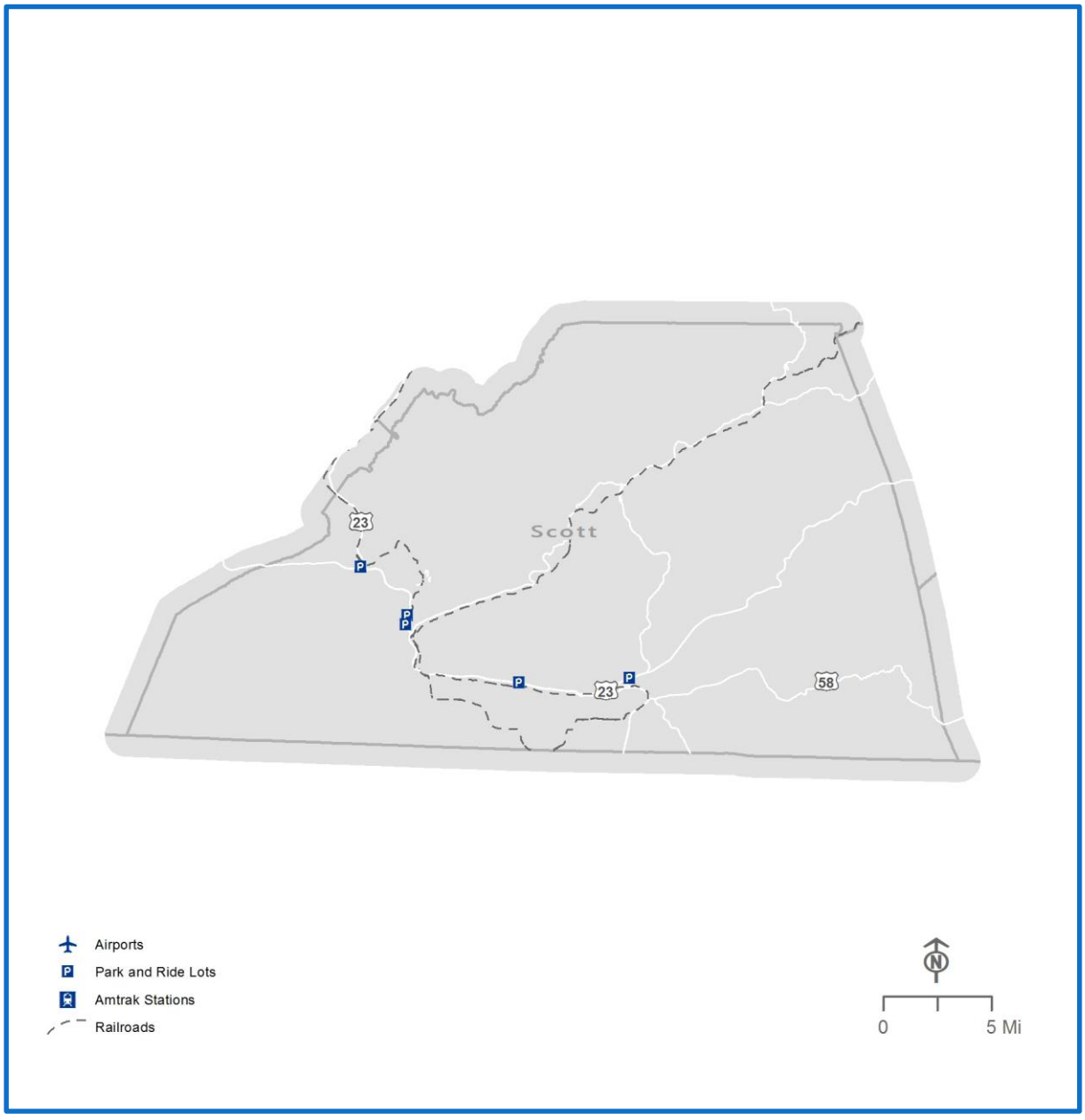


The Downtown Harrisonburg activity center is predominantly local serving. There is a need to improve modal choices and enhance the activity center as a walkable/bikeable place. Freight trains regularly move through the activity center blocking roadways. Improved passenger and freight reliability and transportation demand management services are needed.

M.	Downtown Harrisonburg Activity Center	
Economic		Supports the predominantly local serving industries. A freight rail corridor moves through the downtown.
Transportation		Periodic congestion from freight rail moving through the activity center impacts passenger reliability. As a local serving activity center, there is a need to enhance the community as a bikeable/walkable place with improved options for transit, biking and walking.

VMTP 2025 Needs Assessment

Regional Needs Profile



Kingsport Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Kingsport Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Kingsport Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Kingsport Region Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Hampton Roads regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

In the Kingsport Region, the Needs Analysis area is Scott County.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from the Kingsport Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods and & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million and 1.5 million people. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Geography	Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)	% Change (2012 – 2025)
Virginia	8,185,867	9,203,977	9,740,553	12%
Kingsport Region	22,781	22,843	-	< 1%

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, population growth is projected for the Kingsport Region. Projections estimate 100 new residents in the region by the year 2025.

According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise 20% (slightly less than the state average of 21%) from $29,182 to $35,014. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

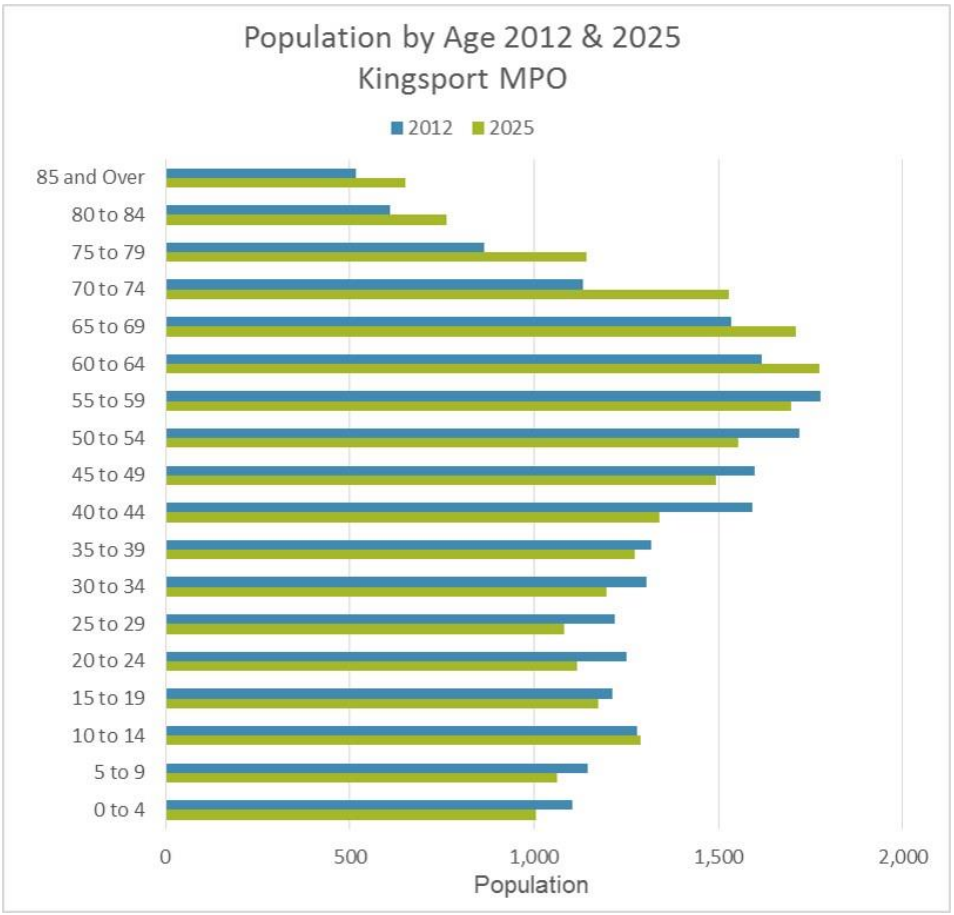


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Kingsport Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Kingsport Region, Figure 3 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

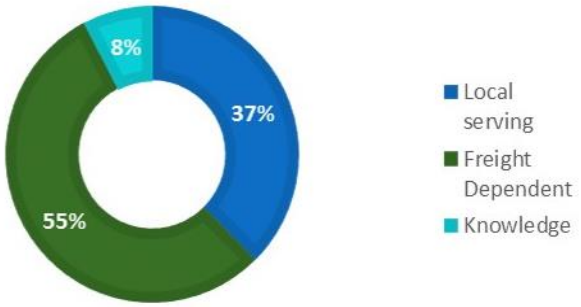


Figure 2. Top Sectors by Output (2012)
Source: IHS Global Insight, 2012.

The freight dependent cluster is clearly the strongest in this region. Freight-dependent services make up 55% of the economic output in the Kingsport Region. This suggests that the Kingsport region is highly dependent on goods movement to support economic activity, which also corresponds with some of the top industries in the region, including manufacturing and agriculture. Conversely, the knowledge and local serving clusters account for 8% and 37% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services

economic cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Real Estate is the strongest industry by output in the Kingsport Region when measured by economic output and the manufacturing industry is the second largest industry. This may reflect a shift in the traditional manufacturing based economy and highlight the recent increase in land development. Wholesale trade, agriculture, and utilities round out the top five industries in the region with the greatest economic output. (Refer to Table 2).

Table 2: Current Industries by Output.

Top Industries	NAICS Code	% of Output
Real Estate	44-45	20%
Manufacturing	31-33	14%
Wholesale Trade	42	13%
Agriculture	11	12%
Utilities	22	8%

Source: IHS Global Insight, 2012.

Top Industries by Employment

In the Kingsport Region, the top industries by employment include agriculture, public administration, health care and social assistance, manufacturing, and retail trade. (Refer to Table 6). Manufacturing and agriculture were also included in the top five industries by output. More localized services such as public administration, health care and social assistance and retail trade are typically employment intensive industries, which may be a reason why these industries are in the top five by employment, but not by output.

Table 3: Current Top Industries by Employment.

Top Industries	NAICS Sector Code	% of Workforce
Agriculture	11	22%
Public Administration	92	21%
Health Care and Social Assistance	62	12%
Manufacturing	31-33	12%
Retail Trade	44-45	11%

Source: IHS Global Insight, 2012.

Many of the top employers in the region are manufacturing based and freight dependent industries. This corresponds appropriately with the top industries by output, employment and with the regional economic profile of Scott County.

Table 4: Current Top Employers.

Employers	Employees
Joy Technologies Inc.	100 - 299
KVAT	100 – 299
Tempur – Pedic	100 – 299
VFP Inc.	100 - 299

Source: IHS Global Insight, 2012.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Kingsport Region. The industries expressed in Table 7 have the highest LQ scores in the region. The score for mining, for example, can be inferred to mean that these services are more than six times more concentrated in the region than in the entire nation, on average.

Table 5: Current Top Industries by Location Quotient.

Top Industries	NAICS Sector Code	Location Quotient
Mining	21	6.08
Agriculture	11	3.80
Public Administration	92	1.34
Other Services	81	1.10
Health Care and Social Assistance	62	1.05

Source: IHS Global Insight, 2012.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Centers such as this were instead affirmed by stakeholders who had a knowledge of the regional significance of the activity there, and then mapped accordingly. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles. Figure 2 below shows activity centers as blue circles.

Kingsport Activity Centers

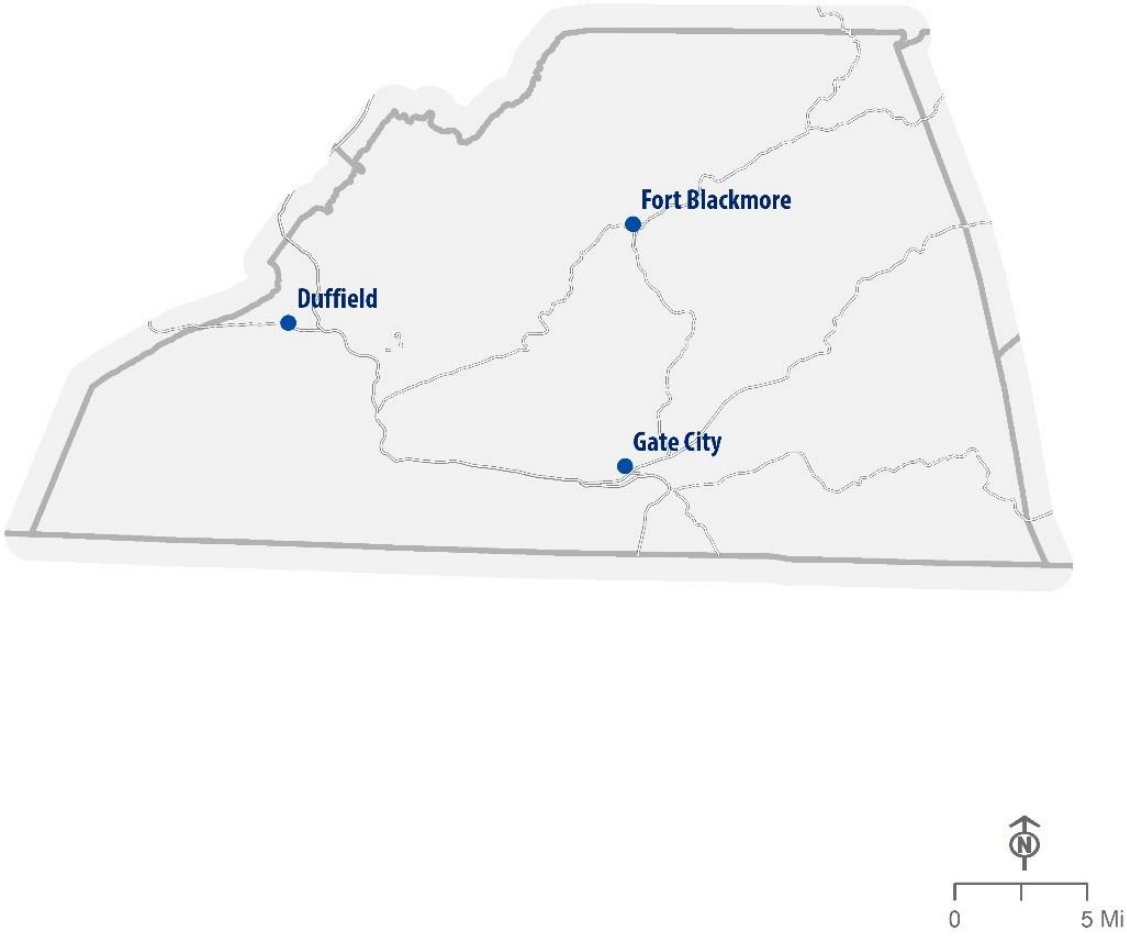


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 3 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

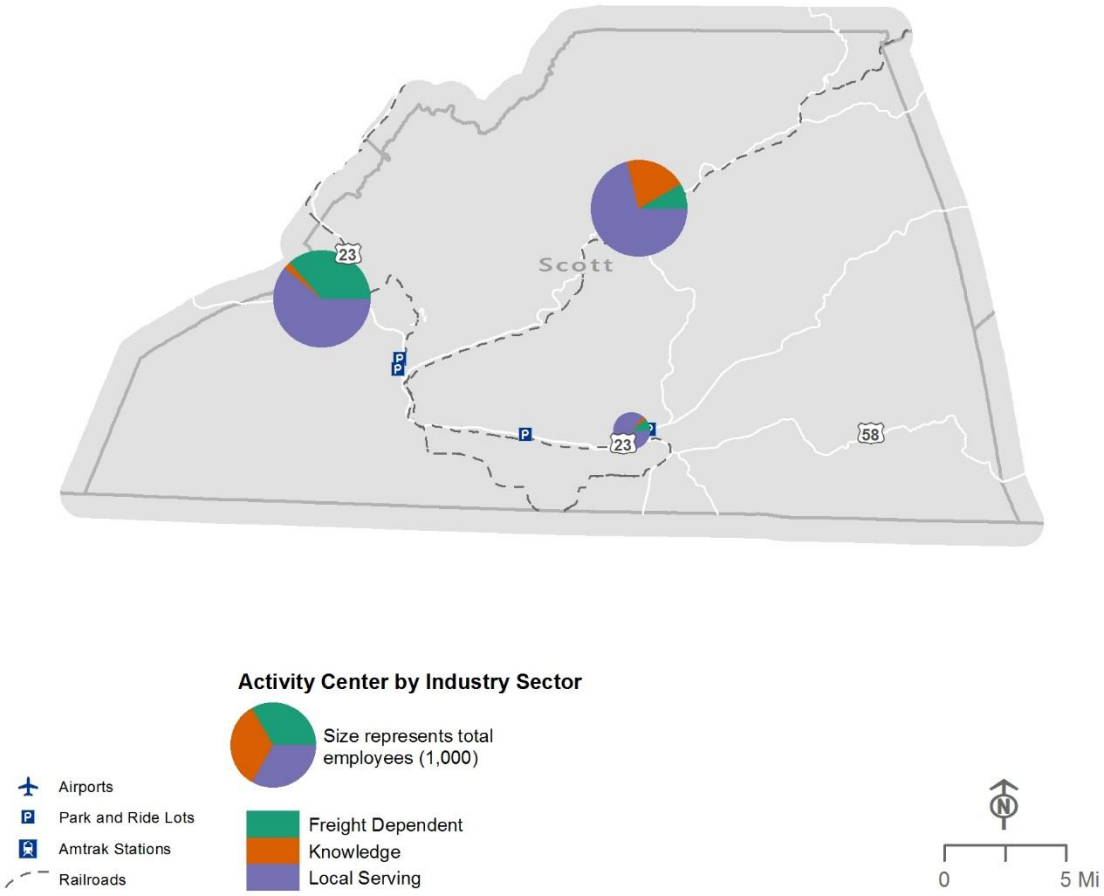


Figure 4: Activity Center Employment by Industry Sector.
Source: IHS Global Insight, 2012.

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Kingsport stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Kingsport's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Kingsport Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Substantial growth is forecasted for the Kingsport Region by 2025. According to statewide and national datasets used, the public administration and information industries will see the highest percentage growth. Combined, they are expected to produce almost $120 million more in 2025 than was produced in 2012.

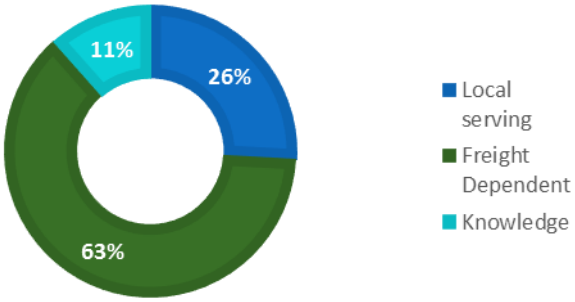


Figure 5: 2025 Industry Sectors by Output.
Source: IHS Global Insight, 2012.

Freight-dependent sectors will continue to dominate economic sector, making up 63% of the economic output in the Kingsport Region in 2025. The knowledge sector is also anticipated to grow from 8% of output to 11% of output. Local serving sectors is anticipated to reduce its share of the regional economy, from 37% in 2012 to 26% in 2025.

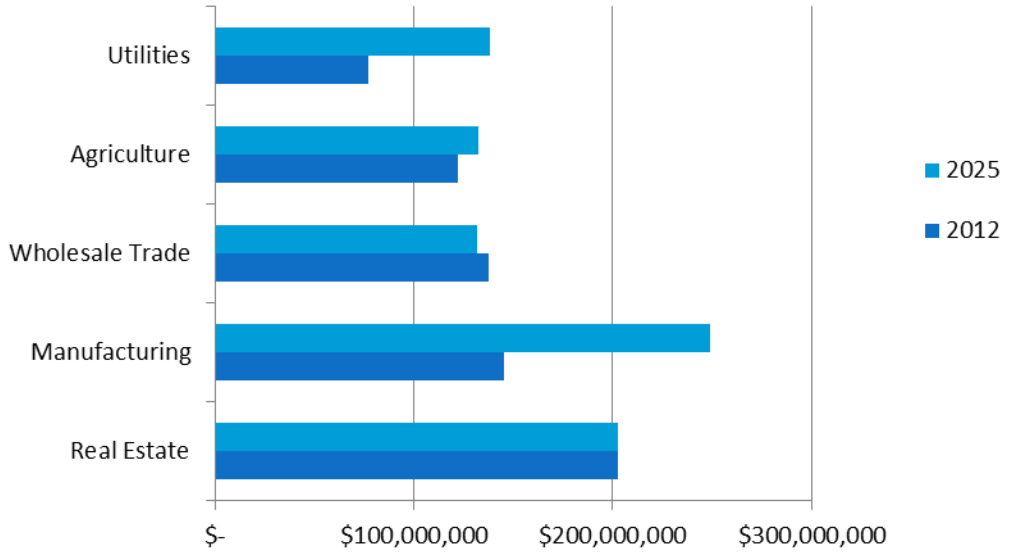


Figure 6: Top Industries by Output
Source: IHS Global Insight, 2012.

The top industries by output in the Kingsport Region are anticipated to either stagnate or grow between 2012 and 2025. The only exception is wholesale trade, which will decrease slightly in output by 2025. In all industries combined, economic output in the Kingsport Region is expected to increase by nearly $330 million by 2025. (Refer to Figure 5).

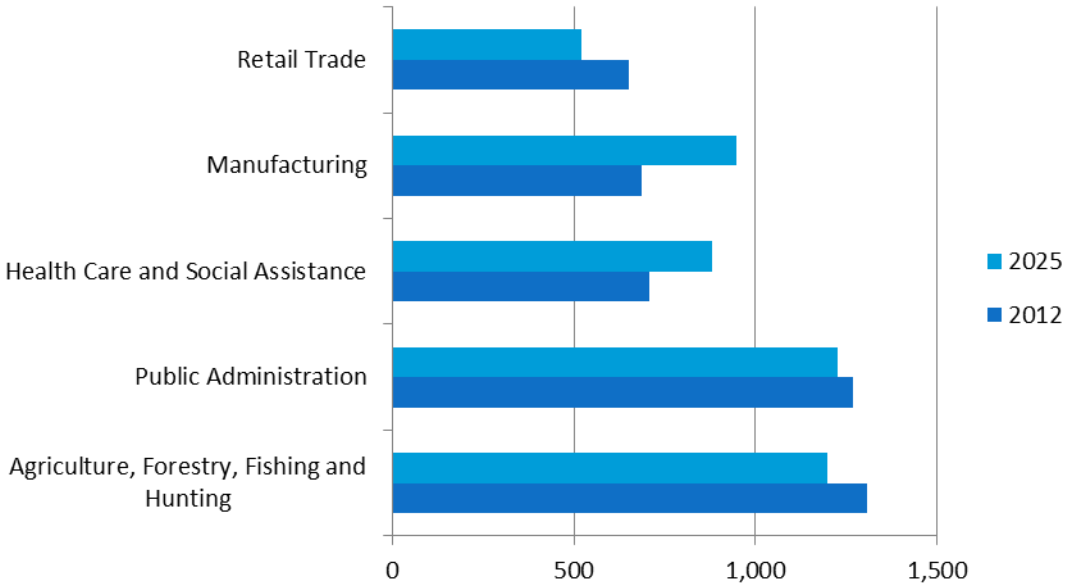


Figure 7: Top Industries by Employment.
Source: IHS Global Insight, 2012.

The future state of employment in the current industries with the highest employment in the region varies. Industries such as health care and social assistance and manufacturing will continue to grow. However, retail trade, public administration, and agriculture is expected to decline slightly from the

present number of workers. The industries with the greatest percentage of employment growth are real estate, construction, information, wholesale trade, and professional services.

Table 6: Top Industries by Employment.

Top Industries	NAICS Sector Code	% Change in Employment (2012-2025)
Real Estate	53	171%
Construction	23	129%
Information	51	52%
Wholesale Trade	42	42%
Professional Services	54	39%

Source: IHS Global Insight, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Kingsport Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Kingsport Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Kingsport Region show that there is a large amount of commutes from Virginia to Tennessee and vice versa. As represented in Figure 7, about two thirds of workers in the Kingsport Region travel across the state line. This is, in part, due to the fact that the City of Kingsport is located in Tennessee, which attracts workers from the surrounding area and generates significant economic activity.

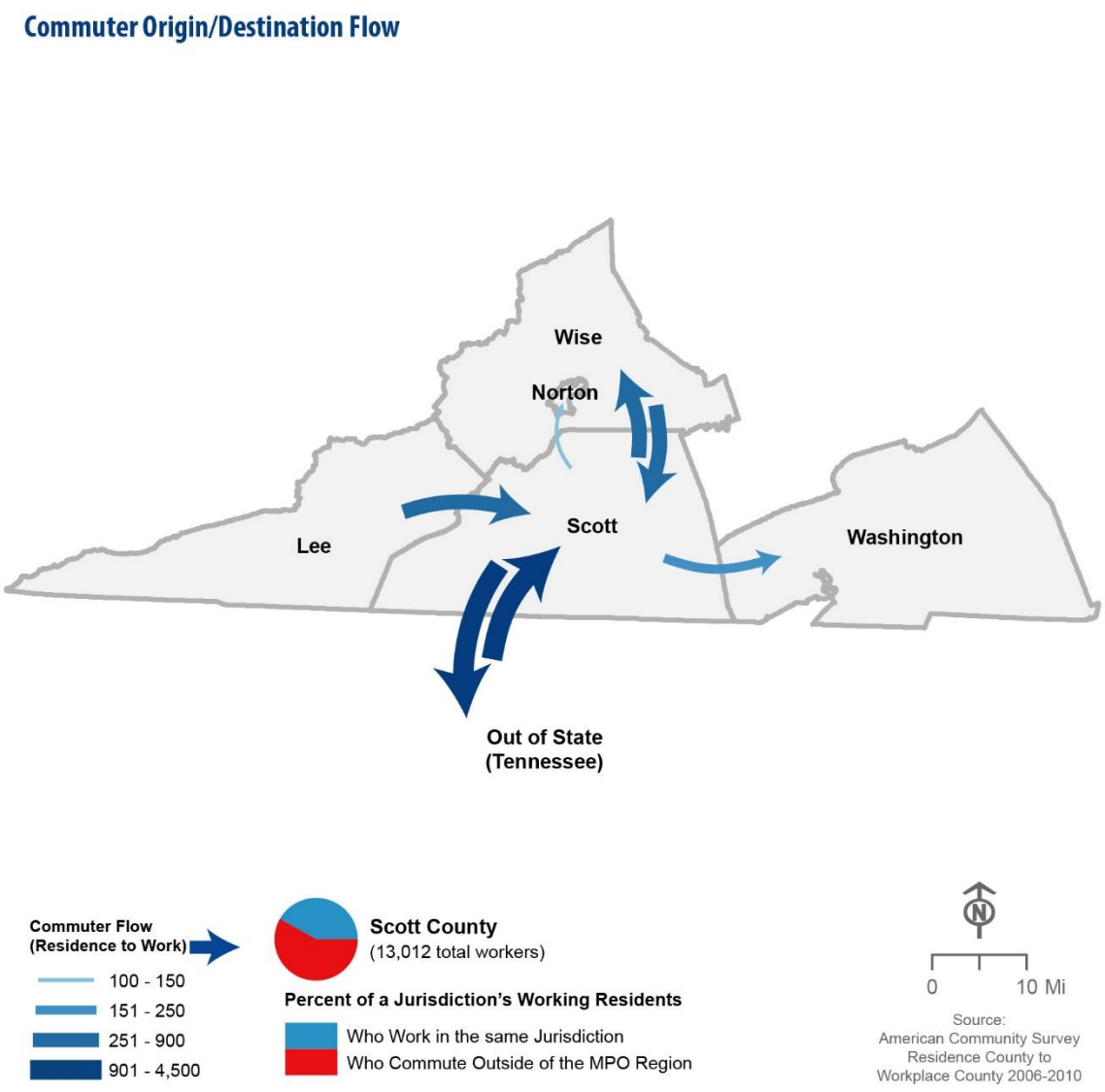


Figure 8: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Kingsport Region was the analysis of commuting patterns between activity centers. Figures 8 through 10 below provide insights into the commuting patterns for three of the activity centers in the Kingsport Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and

Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, Duffield sees a significant number of commuters from the surrounding area, especially the block groups in the western parts of the region. (Refer to Figure 8).

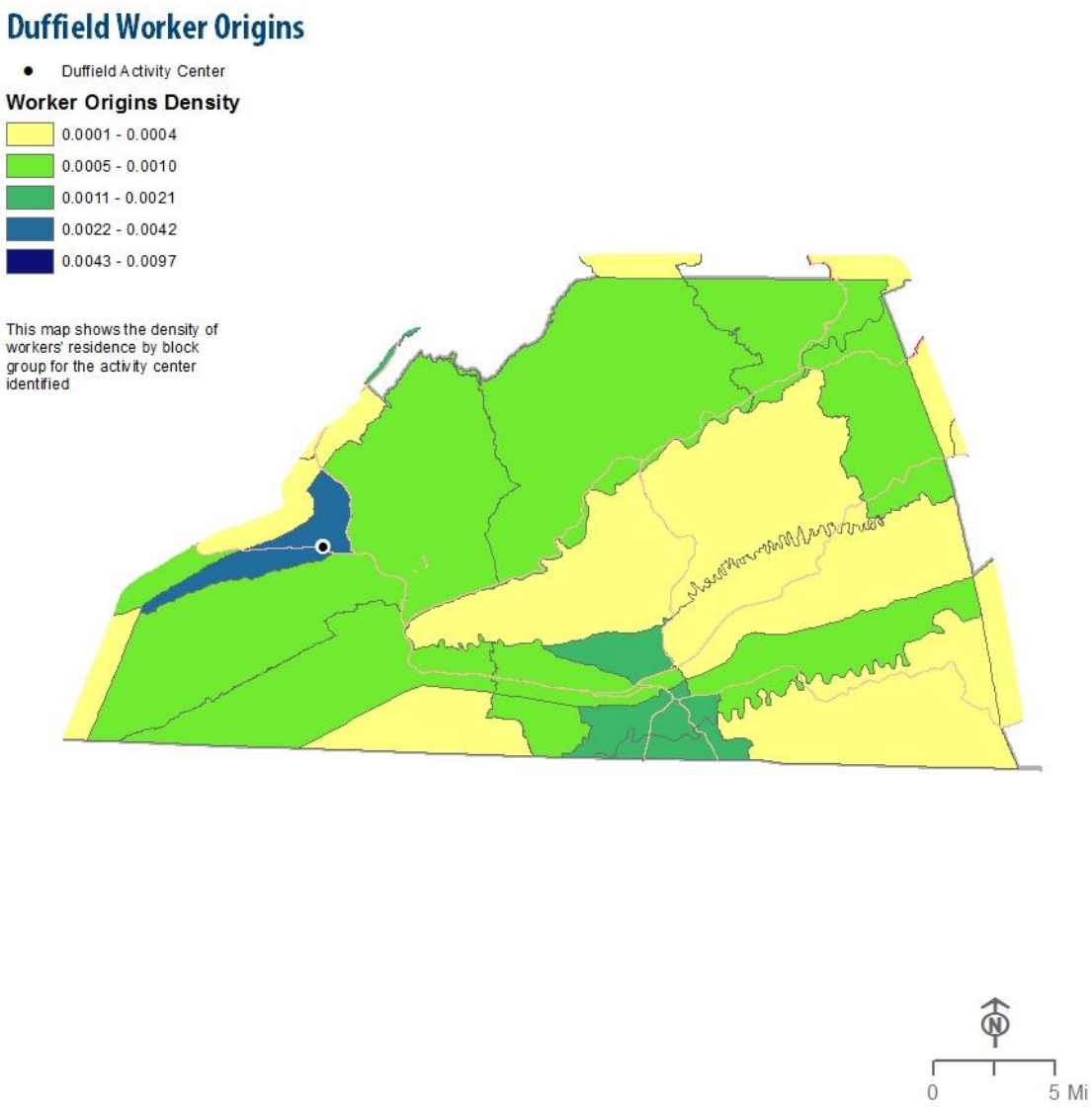


Figure 9: Commuting Patterns to Duffield Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the Fort Blackmore activity center are limited to block groups in the northern part of the Kingsport Region. (Refer to Figure 9). Commutes are not originating from the southern parts of the region bordering Tennessee.

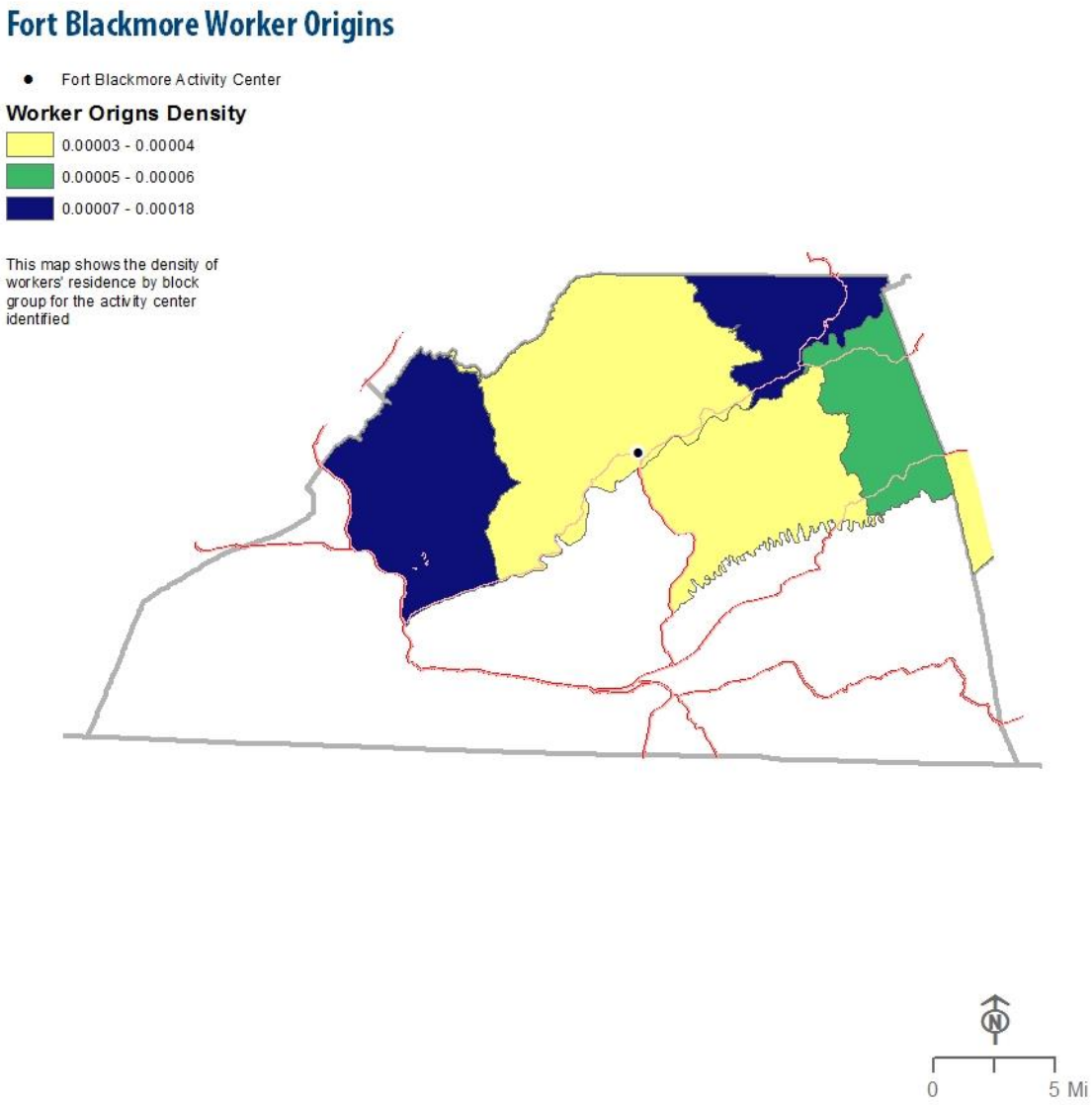


Figure 10: Commuting Patterns to Fort Blackmore Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Gate City activity center is a significant destination for workers in the Kingsport region. Commutes originate from all block groups in the Kingsport Region, but most of the trips originate from block groups in and around Gate City. (Refer to Figure 10).

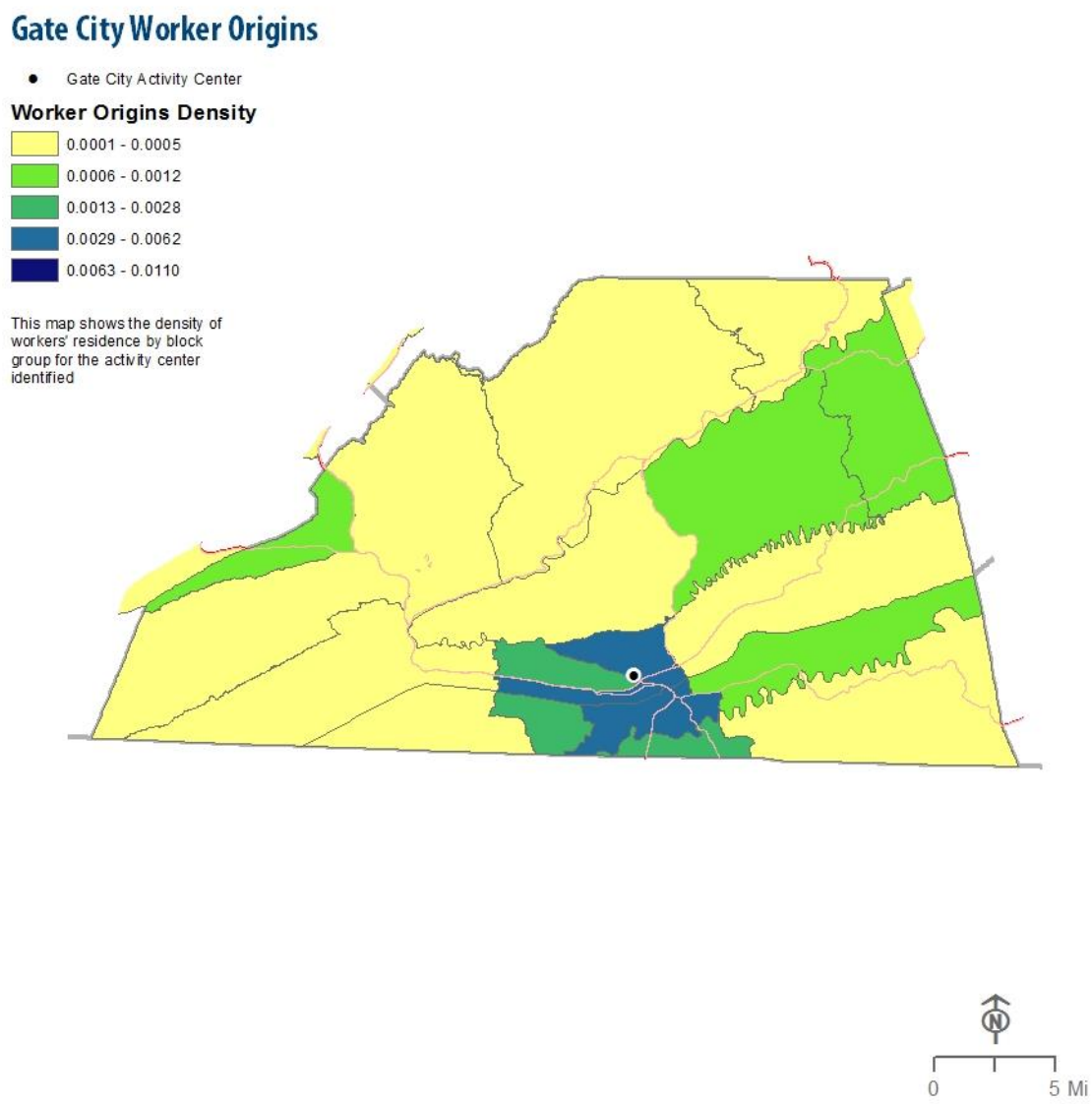


Figure 11: Commuting Patterns to Gate City Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Kingsport Region, the majority of commuters drive alone to work, accounting for 84% of commutes. Carpooling is the second most prevalent option, accounting for 11% of commutes. Public transit use for commute trips is nonexistent, as there is not a fixed transit service in the area. Transit use is limited to demand response, typically for medical and recreational trips. (Refer to Figure 11).

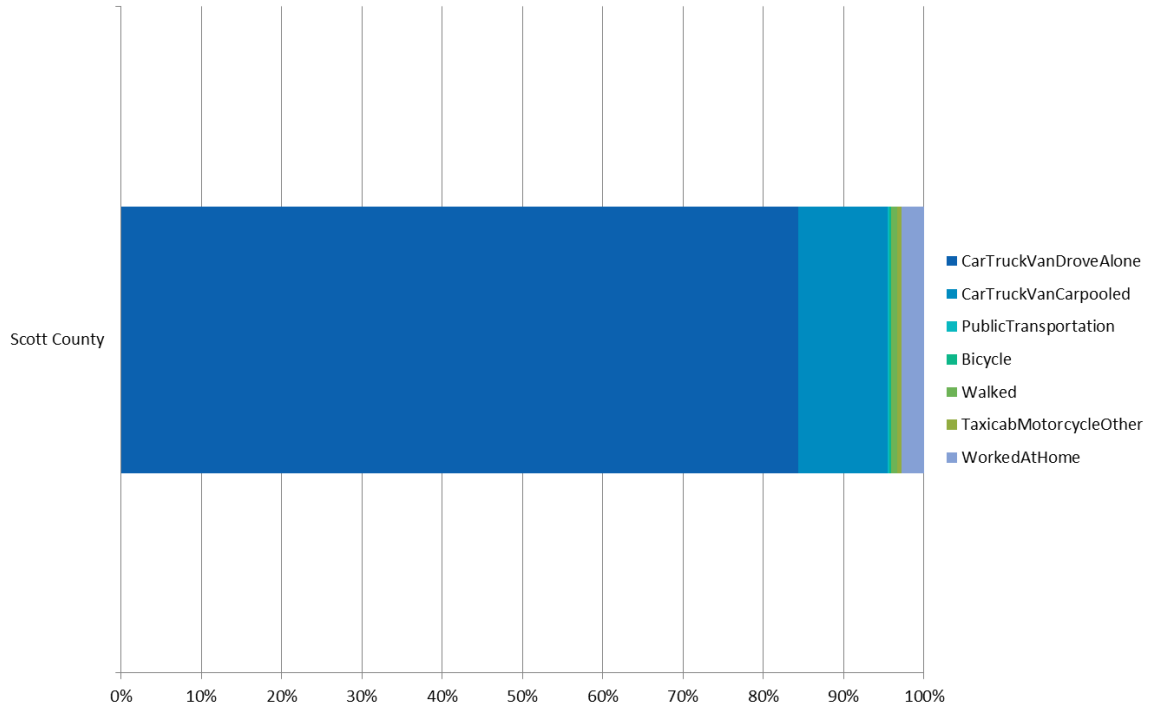


Figure 12: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Kingsport Region, average commute time is 30.6 minutes in Scott County. (Refer to Table 7). This is partially due to the fact that the City of Kingsport is located in Tennessee, which encourages longer driving distances to reach the urban center.

Table 7: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
Scott County	30.6

Source: ACS 2013 5-Year Estimates

As a result, commutes of over 45 minutes make up almost a quarter of the commutes in the Kingsport Region. (Refer to Figure 12).

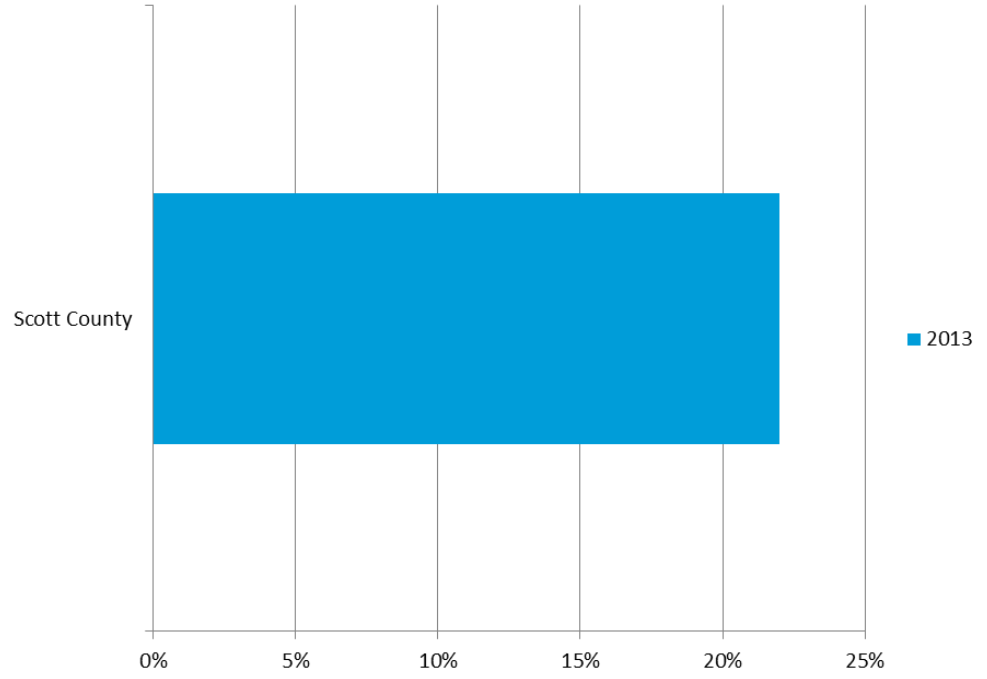


Figure 13: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 13 provides a closer look at where longer commutes originate. In the Kingsport Region, the shortest commutes originate in the block groups directly adjacent to the Tennessee border. The average commute time increases the further the block group is located from the Tennessee border.

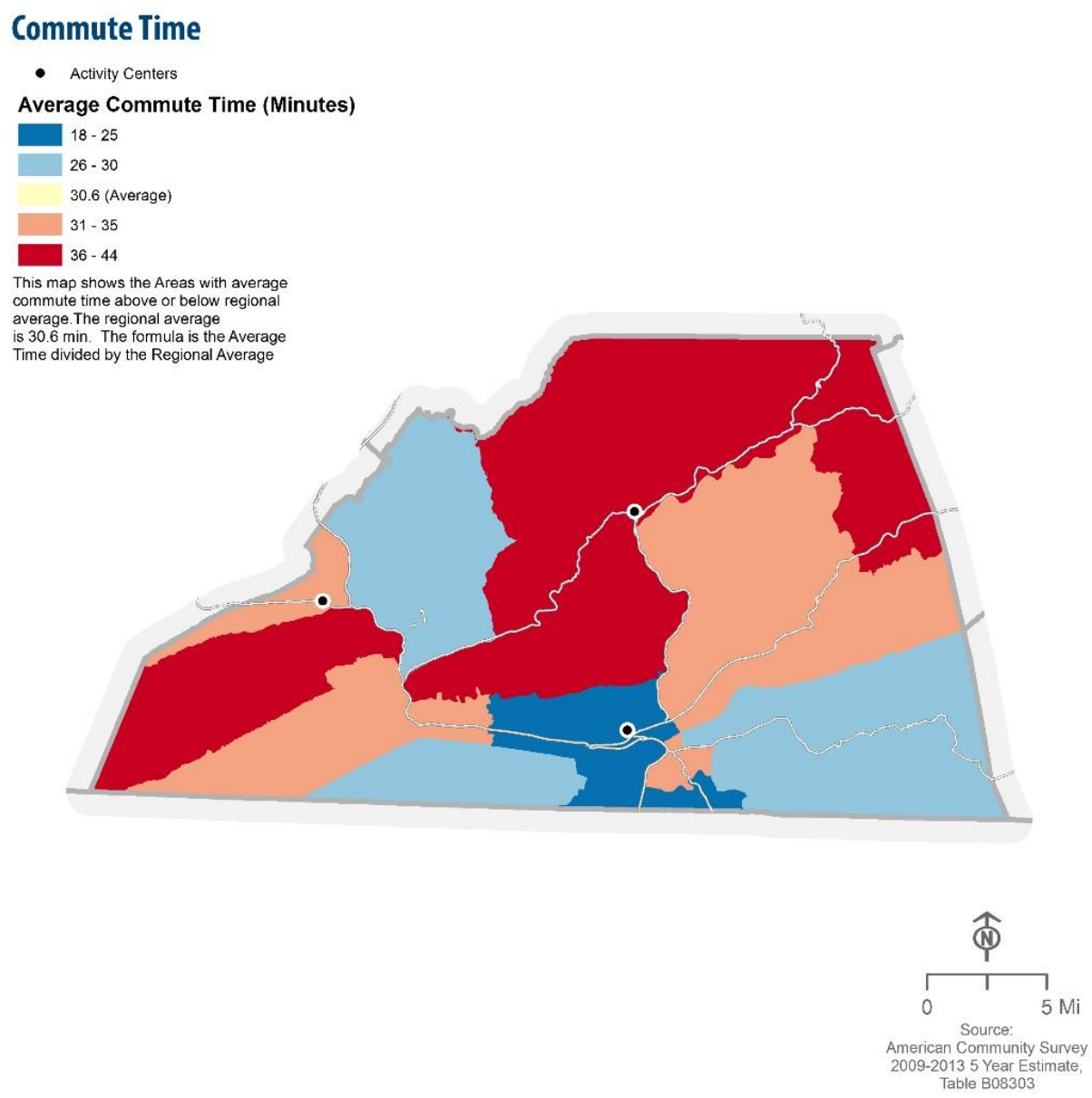


Figure 14: Kingsport Region Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Kingsport Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility are along the Tennessee border near the Gate City activity center, near the convergence of US Routes 23, 58, and 421. However, auto accessibility is low for most areas of the region, especially in the northern and eastern areas of the region. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 14).

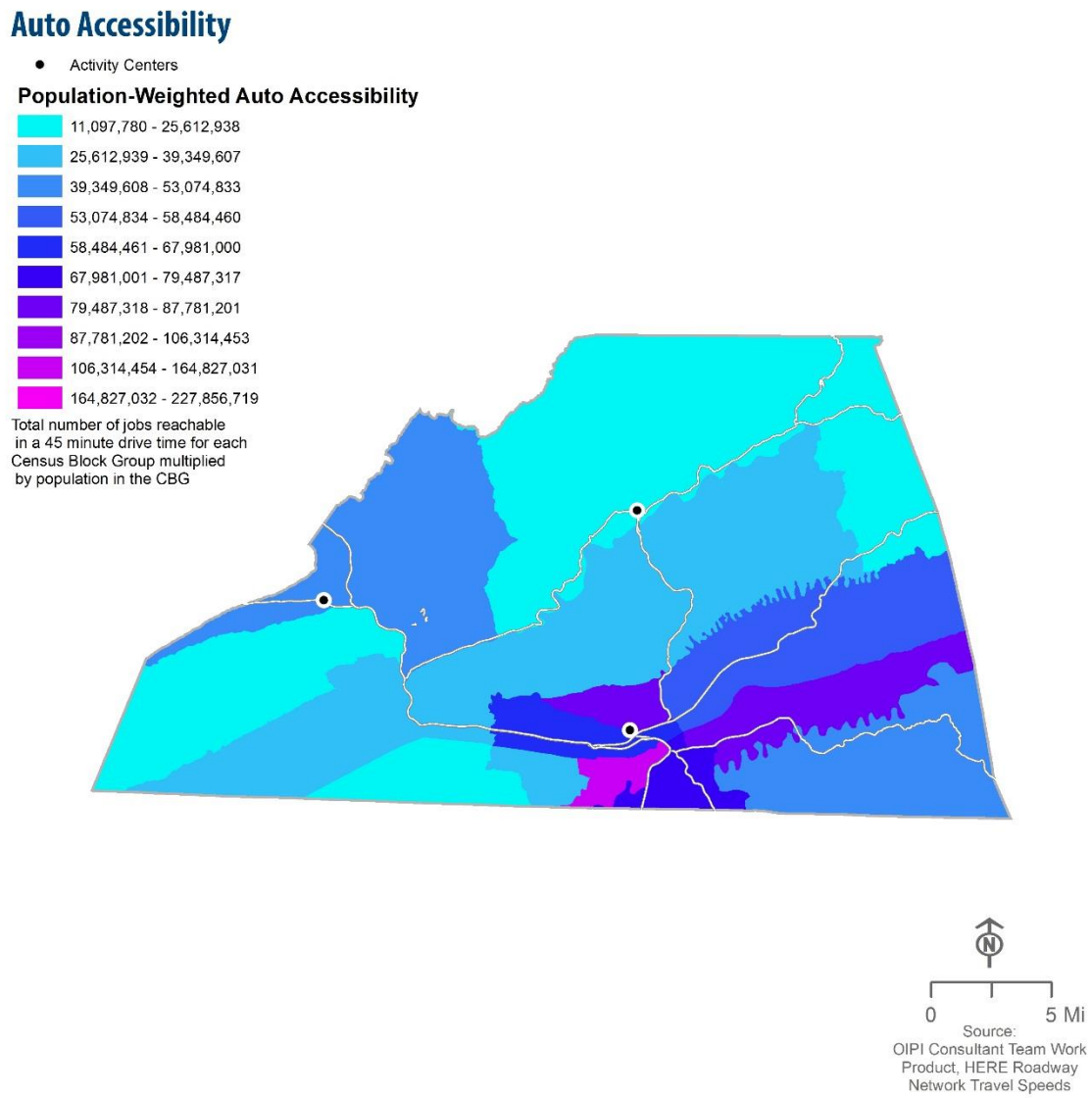


Figure 15: Auto Accessibility

Transit Accessibility

While Kingsport, Tennessee does have fixed-route transit service, it does not extend into the Virginia portion of the region. This is reflected not only in the low (fixed route) transit accessibility scores for the region, but also limits the jobs accessible by transit in Tennessee. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 15).

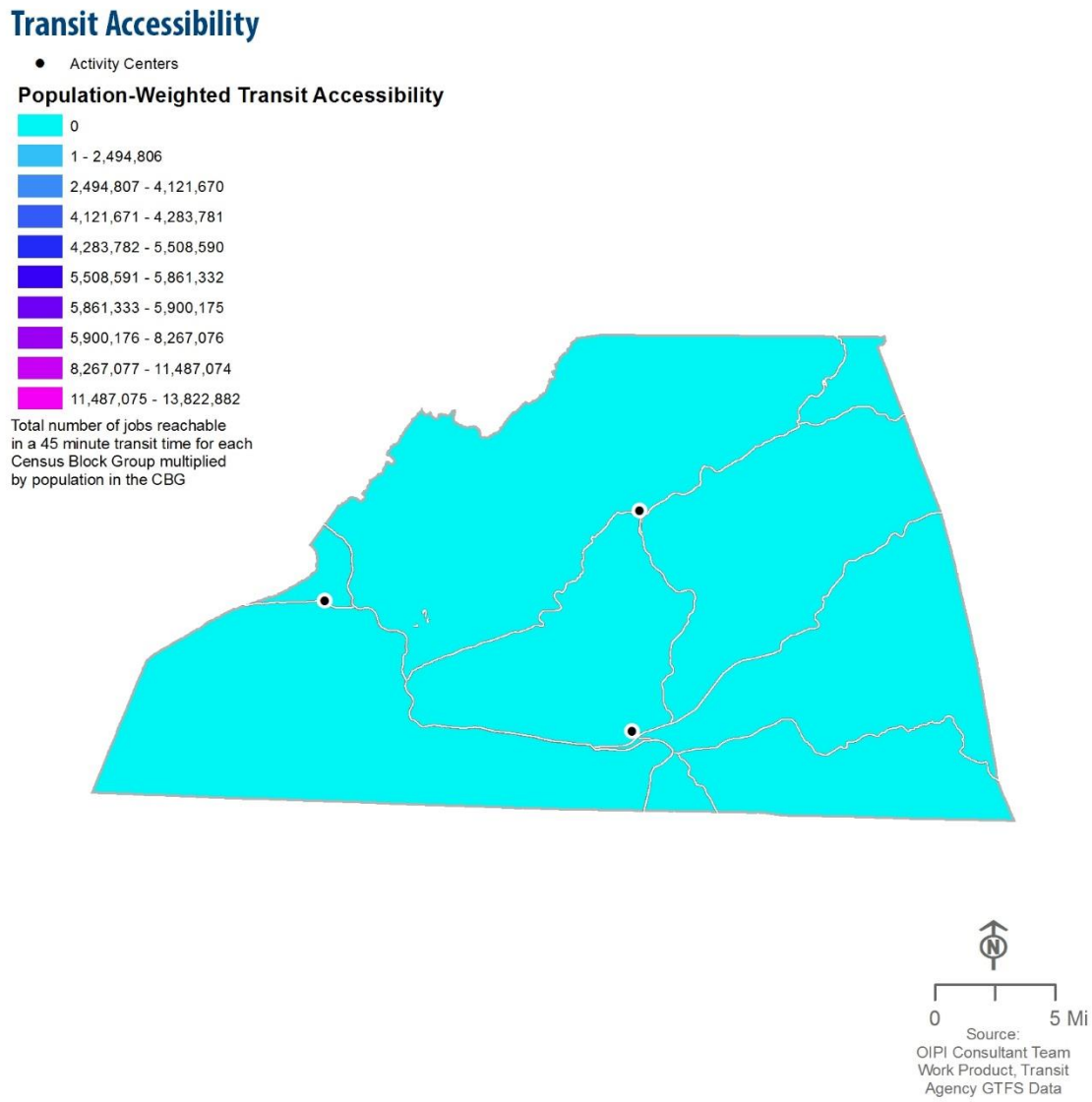


Figure 16: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. Gate City and towns and village areas in the Kingsport Region scored the highest, as was expected, with the highest scoring areas located within the Gate City activity center. (Refer to Figure 16).

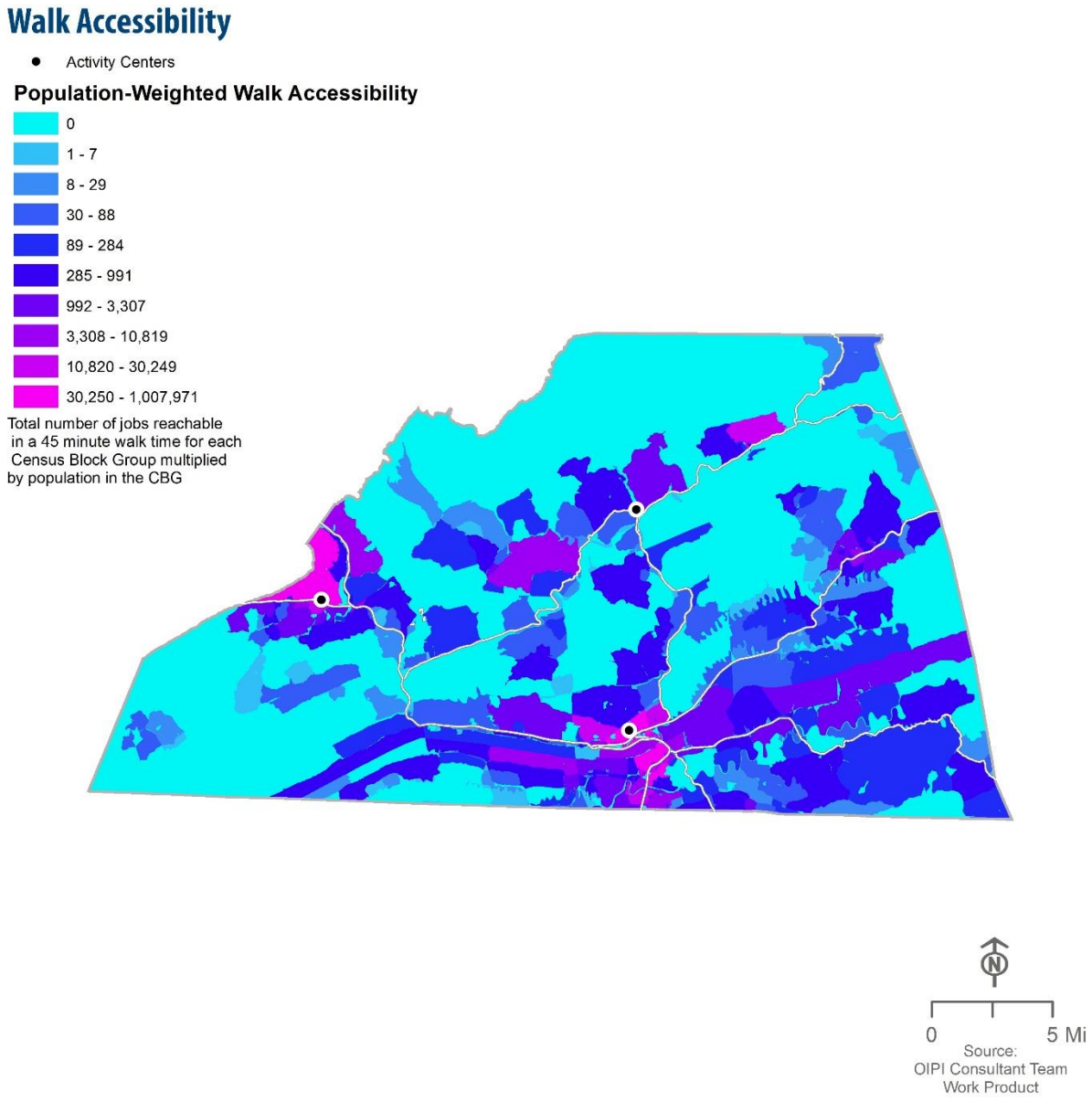


Figure 17: Walk Accessibility

Freight Accessibility

In addition to railways, US Route 23 and 58 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region do not have immediate access to an interstate. The exception to this is Gate City, which has the highest interstate accessibility in the region. (Refer to Figure 17).

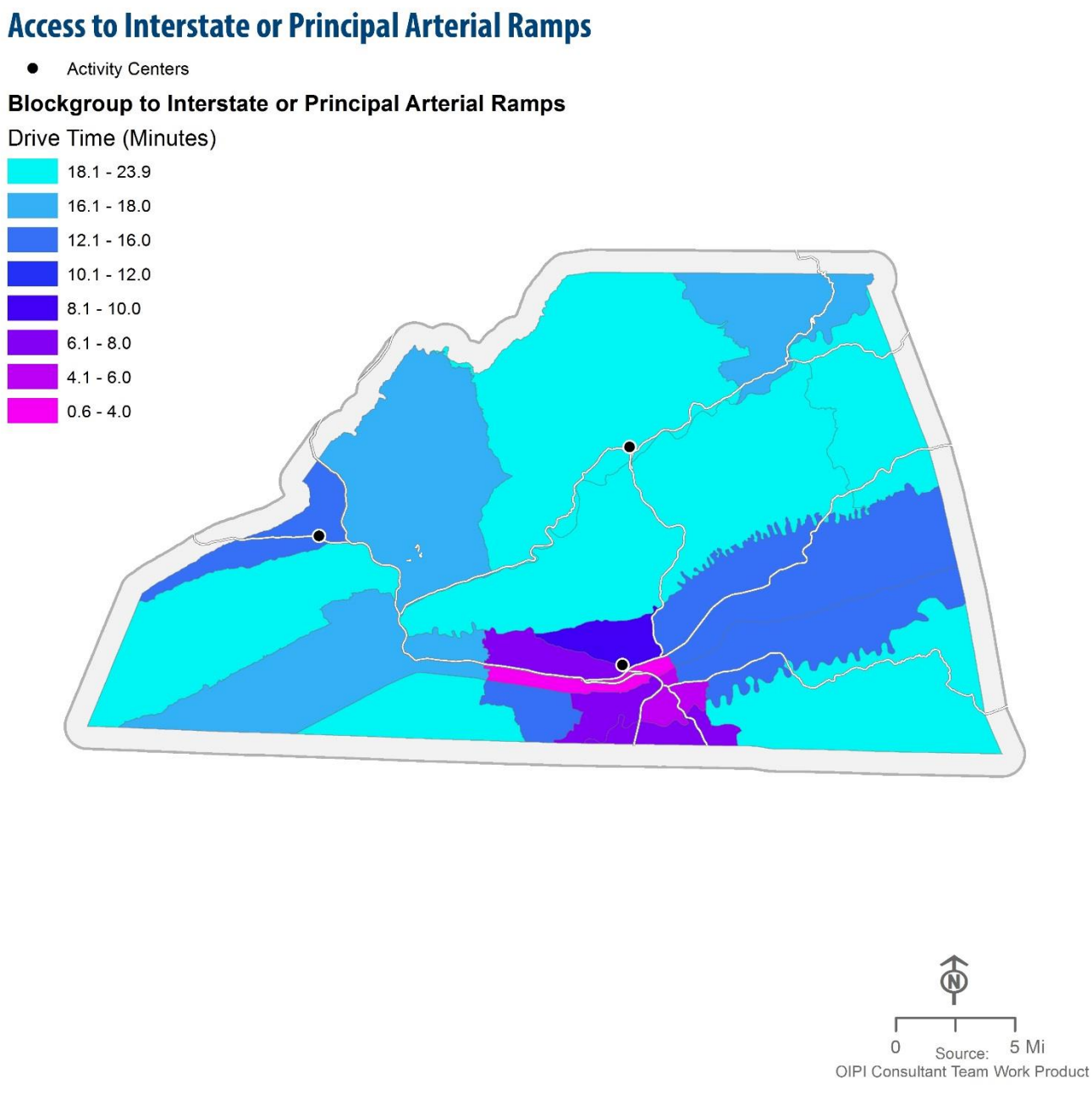


Figure 18: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. The eastern areas of the Kingsport Region are most accessible to warehouse and distribution centers. However, even in the most accessible areas of the region, the nearest warehouse and/or distribution center is a 43 minute drive. In some areas of the region, the drive time to the nearest warehouse and/or distribution centers is 82 minutes. (Refer to Figure 18).

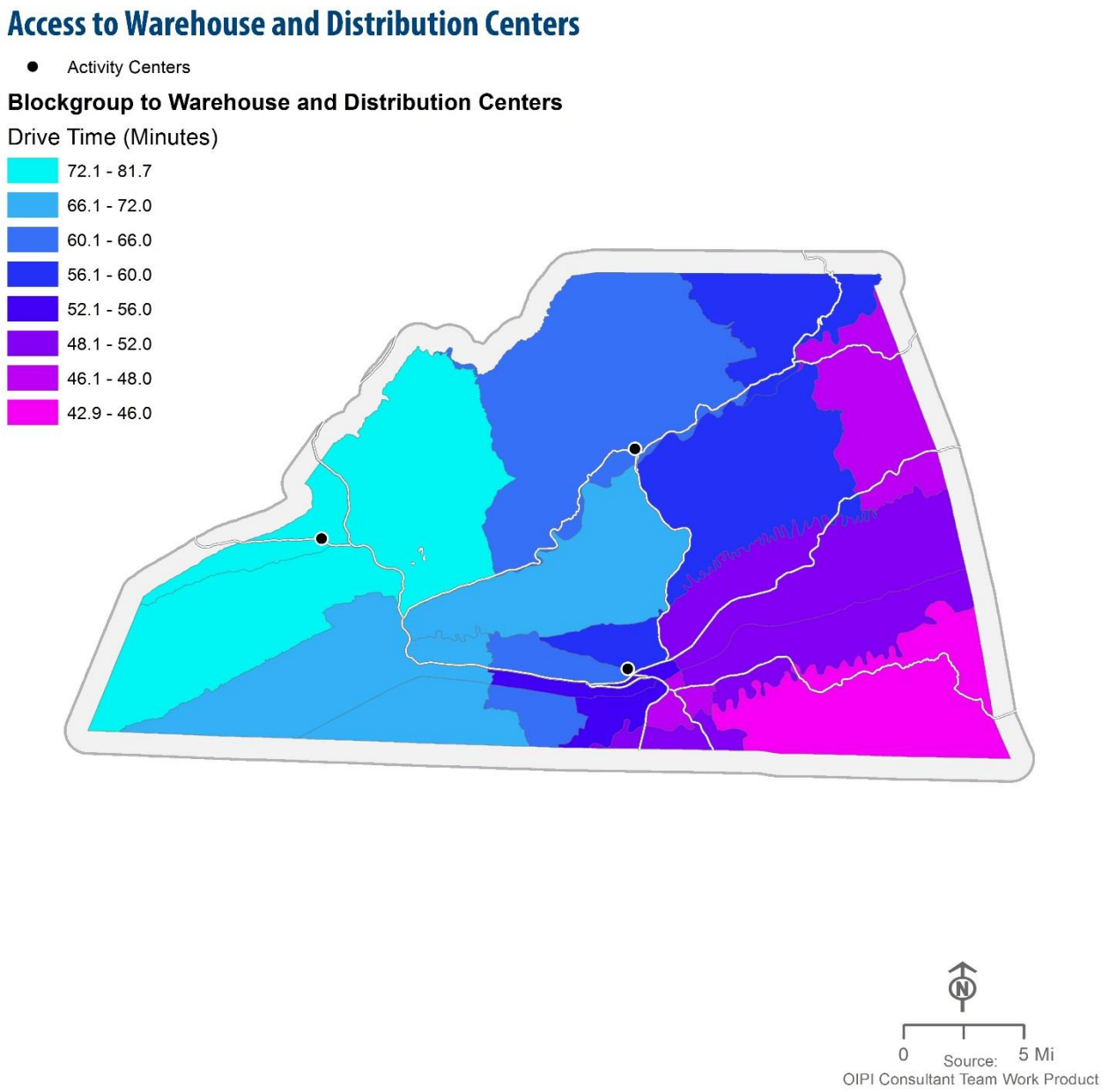


Figure 19: Access to Warehouses & Distribution Centers

Norfolk Southern operates freight rail lines that pass through Scott County. Clinchfield Railroad rail lines run through the region as well, and are operated by CSX. Roanoke-Blacksburg Regional Airport is the closest major airport to the Kingsport Region in Virginia that handles large quantities of freight. It is over a five-hour drive to Roanoke-Blacksburg Regional Airport from the Kingsport Region. (Refer to Figure 19).

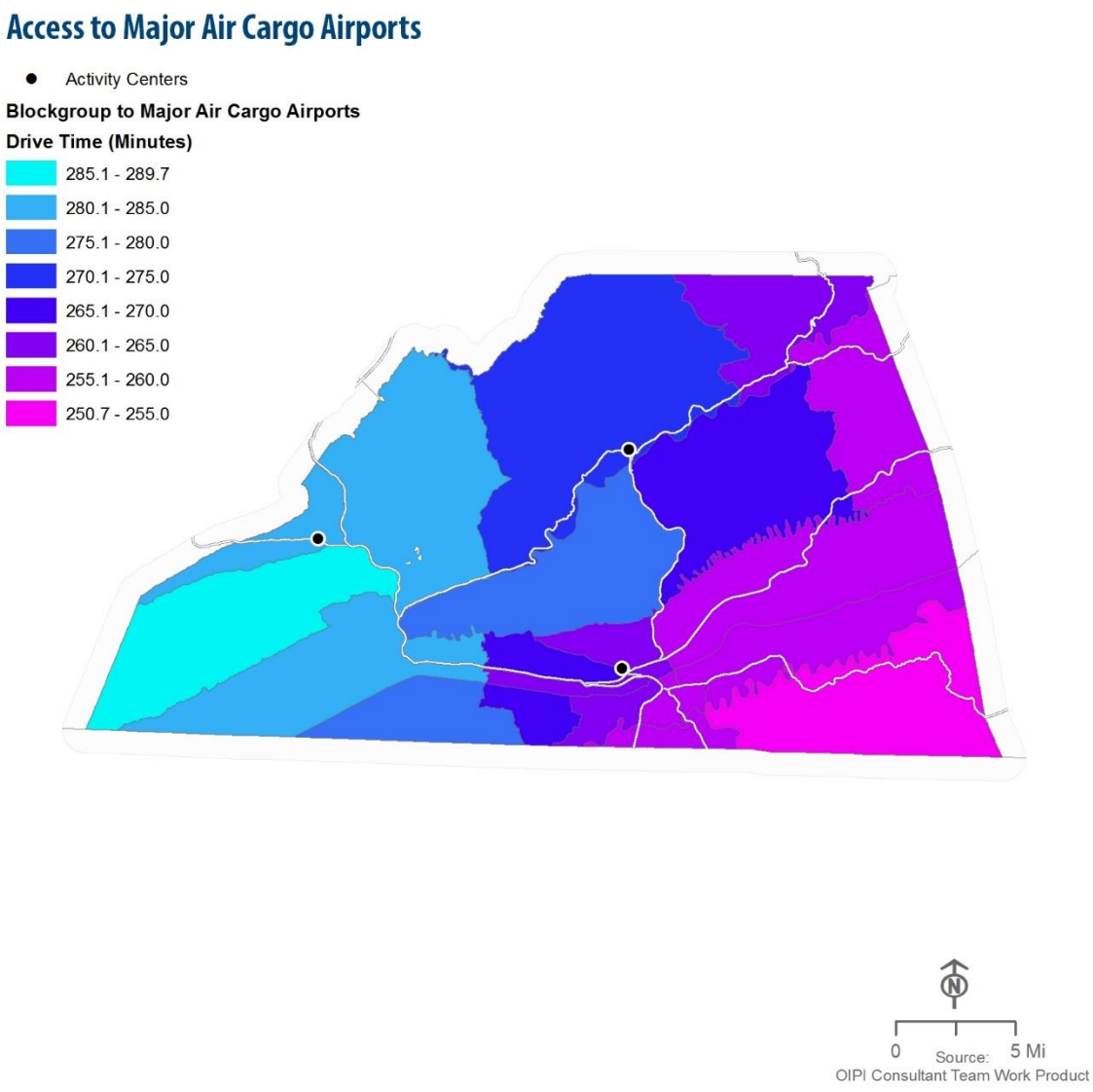


Figure 20: Access to Freight Airports

D. Roadway Measures

This assessment identified the transportation conditions in Kingsport Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 18 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for US Route 23 and US Route 58 were available for analysis in the Kingsport Region, as they are the major arterial roadways with heavy commuter traffic. Overall, scores on the travel time reliability index indicated high travel time reliability for both corridors. The reliability index scores are higher in several locations along US Route 58 near both the eastern and western borders, as well as near the Gate City activity center. These areas represent lower levels of travel time reliability. There are, however, no areas of significant concern along either corridor. (Refer to Figure 20).

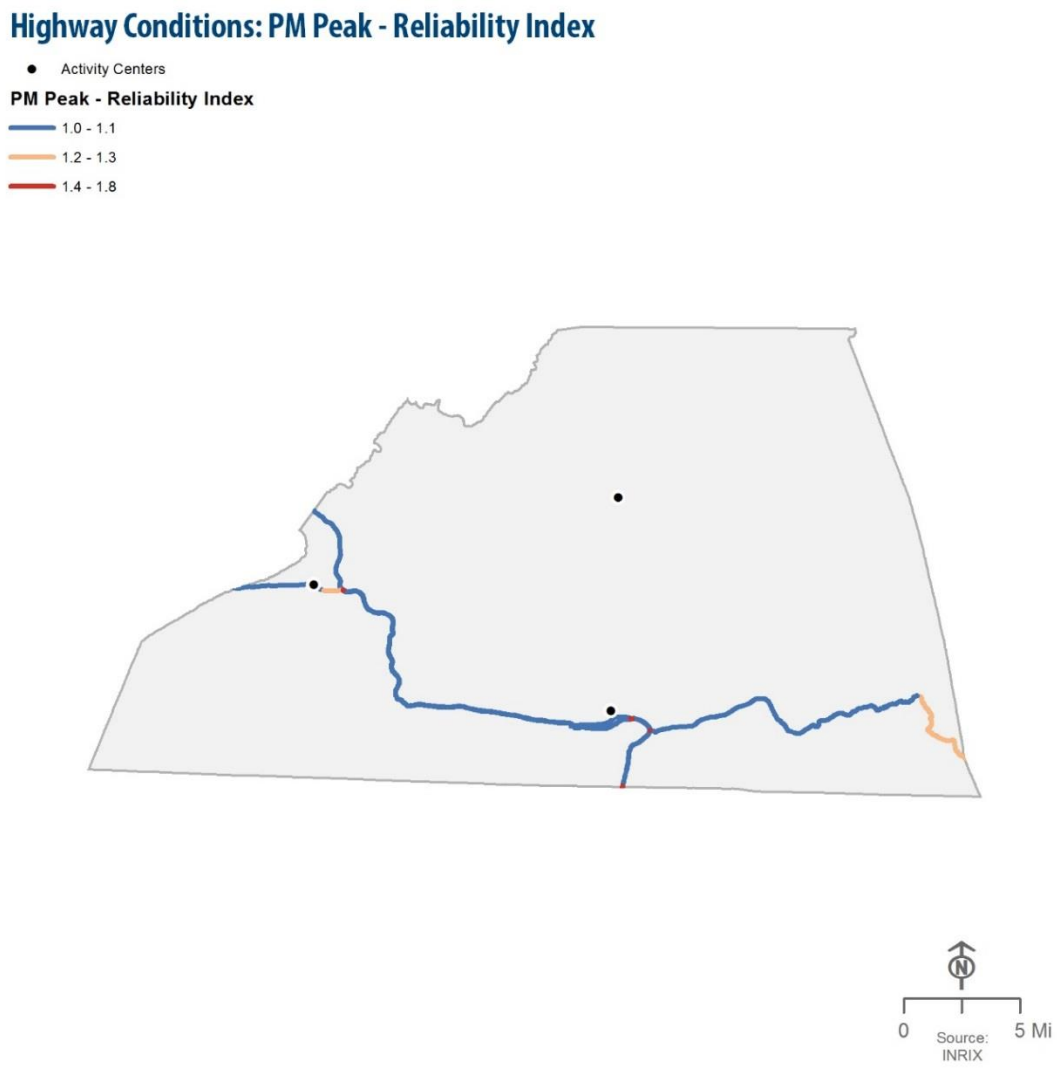


Figure 21: Travel Time Reliability

Note: the Reliability Index is based on a statewide scale which may skew the scores for the Kingsport Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for US Route 23 and US Route 58. According to the analysis, neither US Route 23 nor US Route 58 have major congestion problems in the Kingsport Region. All roadways analyzed are congested less than 5% of the time. (Refer to Figure 21).

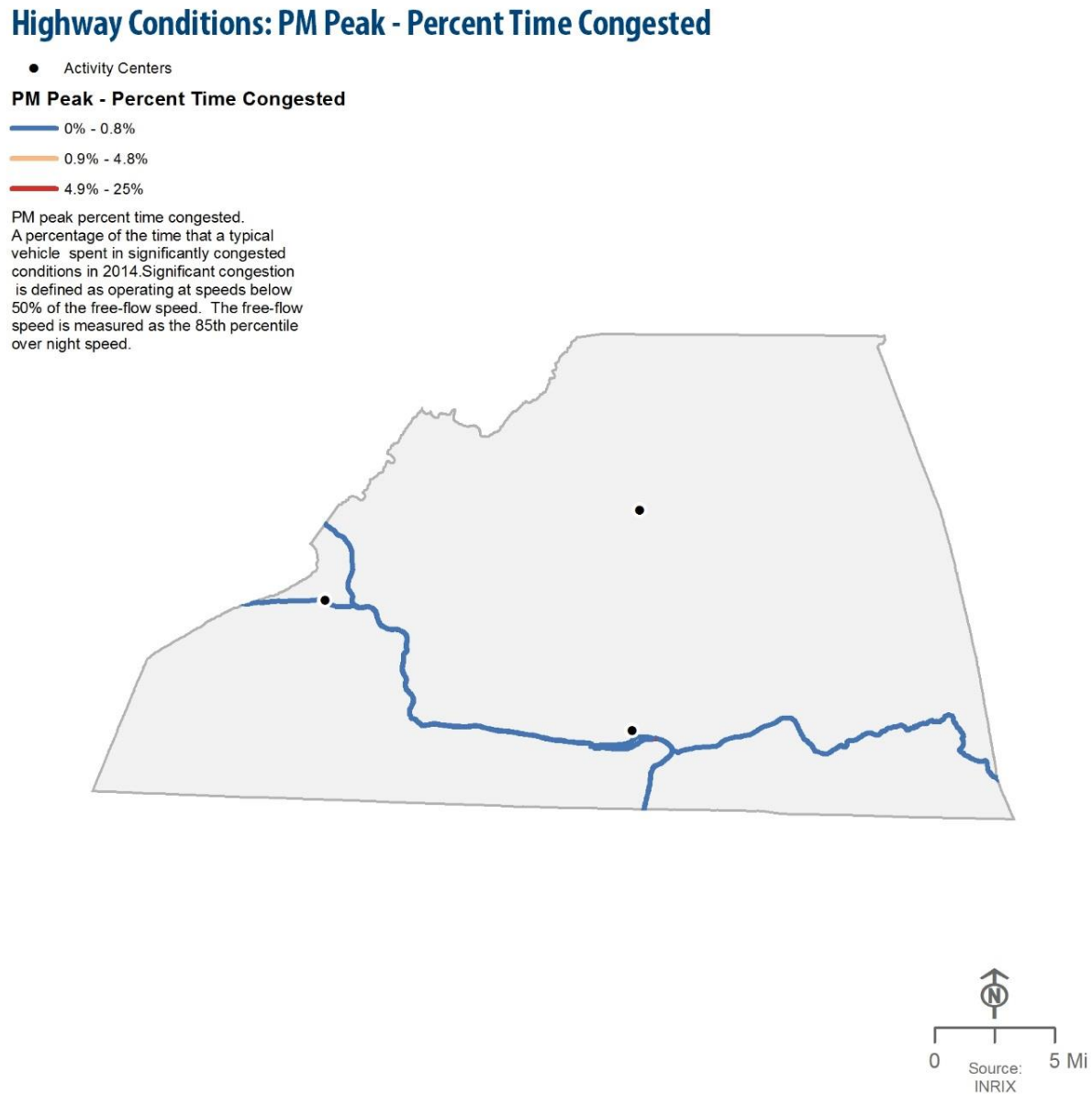


Figure 22: Percent of Time Congested

Travel Time Delay

Figure 22 displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit.

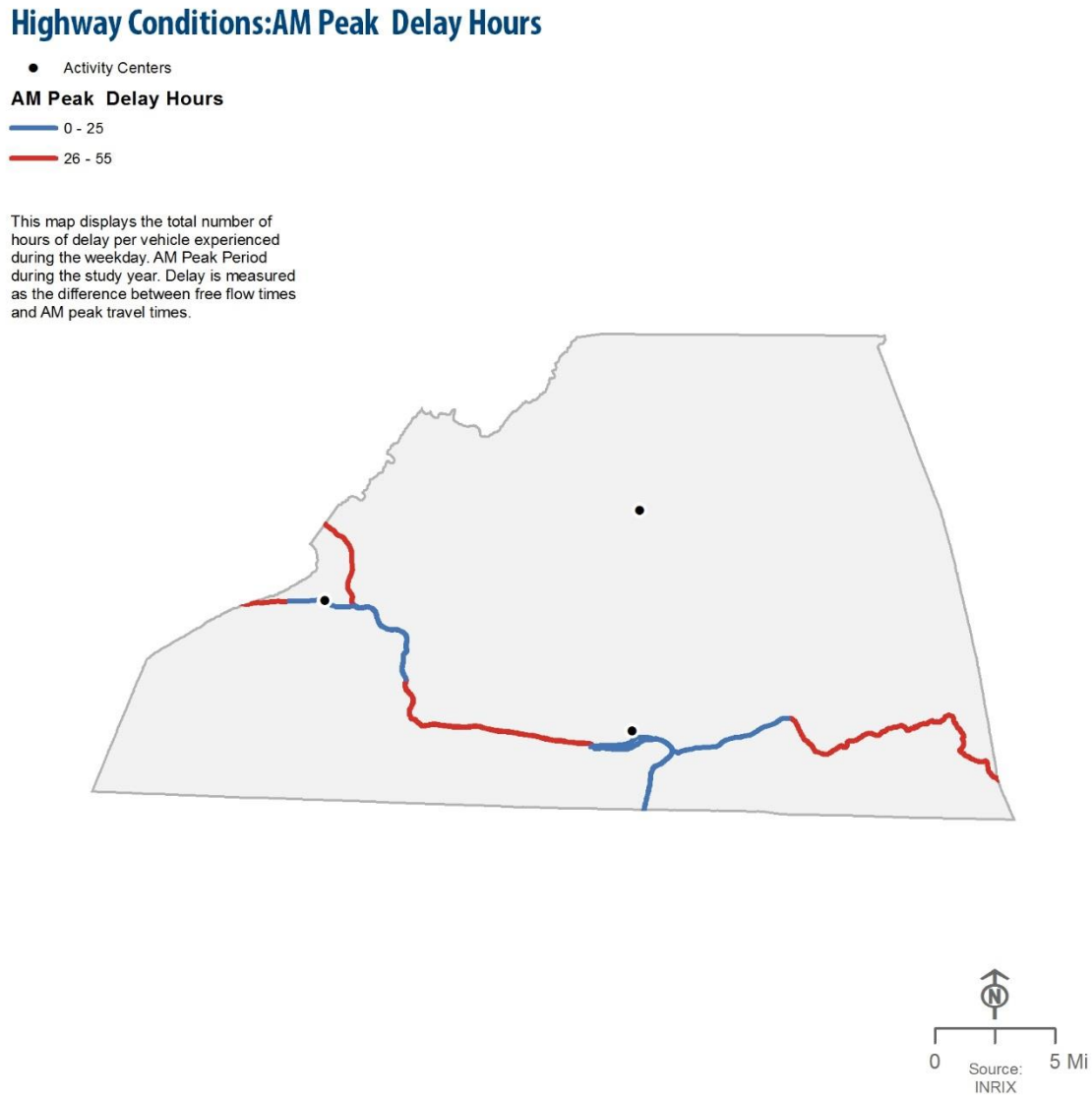


Figure 23: Travel Time Delay

Median Speeds

Figure 23 displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. However, most of US Route 58 east of the Gate City activity center operates at an average speed between 41 – 50 mph. during the evening peak period. West of the Gate City activity center US Route 23/58 operates at a median speed between 51 – 60 mph. (Refer to Figure 22).

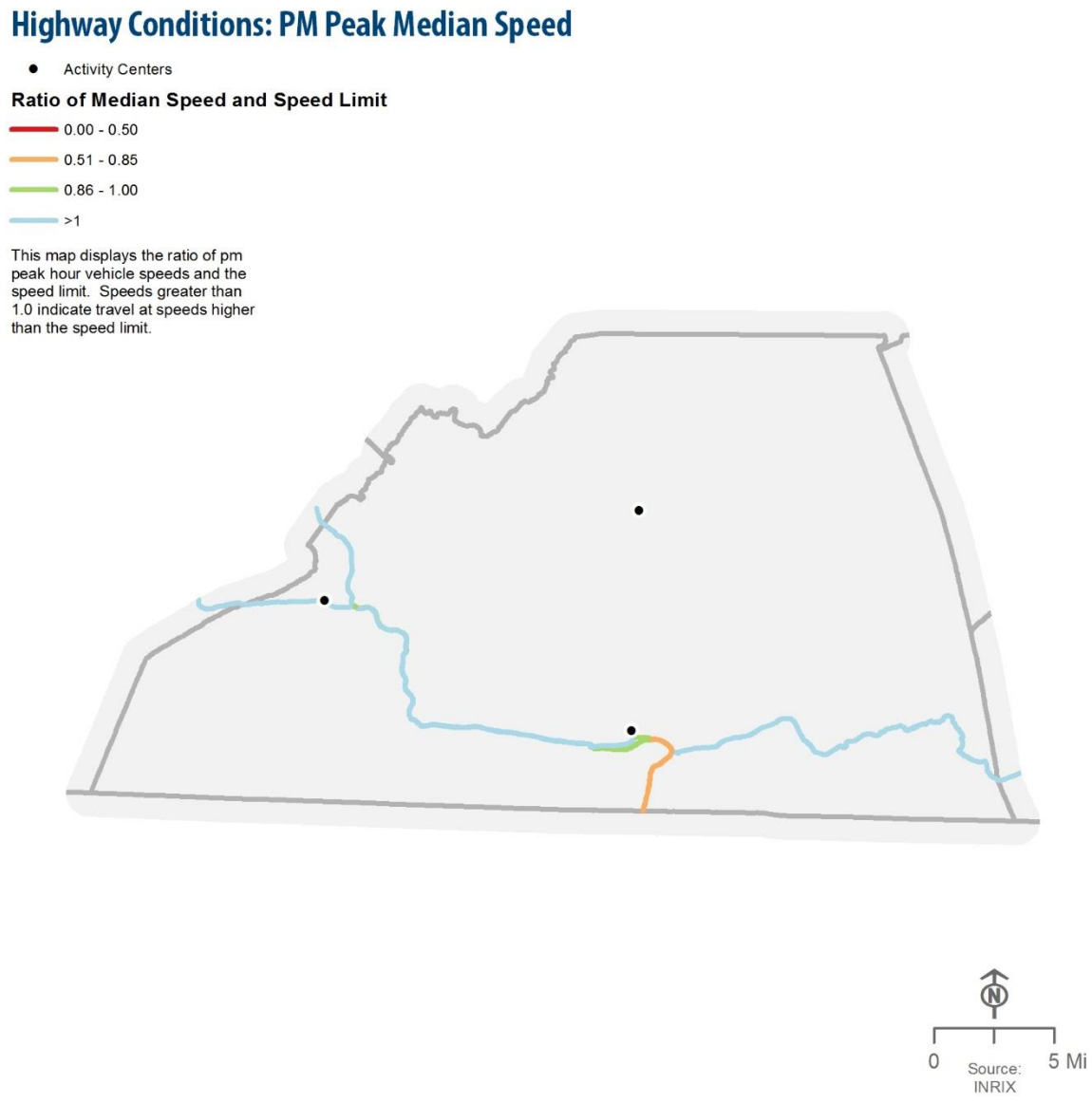


Figure 24: Median Speeds

D. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Hampton Roads Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Kingsport Region, an average of 89% of the dollar value of all goods that are moved through the region are moved by truck. Other modes is the second most important mode, carrying around 10% of the total dollar value of goods. The Kingsport Region does not utilize pipeline, air or water freight modes and has minimal rail dependence. (Refer to Figure 23).

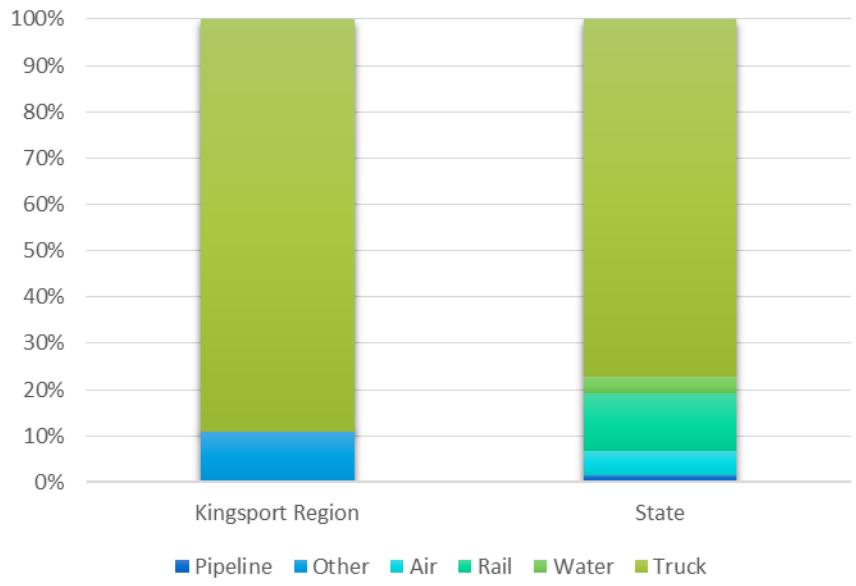


Figure 25: Comparison of Freight Modal Dependence

Location quotients are used to compare the prominence of freight modes between the Kingsport Region, and the state as a whole. The Kingsport Region relies on trucks for freight movement 1.15 times more than the state does as a whole. Rail and air transportation for goods is more common for the state

on average than it is for Kingsport Region. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the relatively large distance – over a five hour drive – to Richmond International Airport from the Kingsport Region. (Refer to Figure 24).

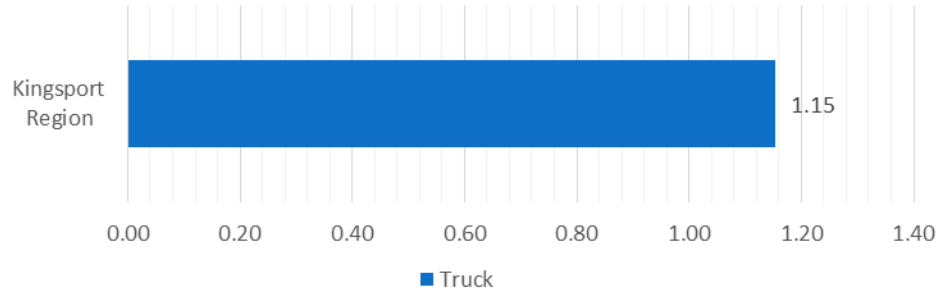


Figure 26: Location Quotient by Mode of Freight Travel

Top Commodities

While to prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Secondary Traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) accounts for the highest total dollar value of freight imported to the Kingsport Region. Petroleum or coal products are the highest total value export from and second highest value import to the Kingsport Region. Overall, the Kingsport Region imported $307 million worth of goods and exported $472.7 million of goods, resulting in about $165 million dollars of net exports in 2012. (Refer to Figures 26 and 27).

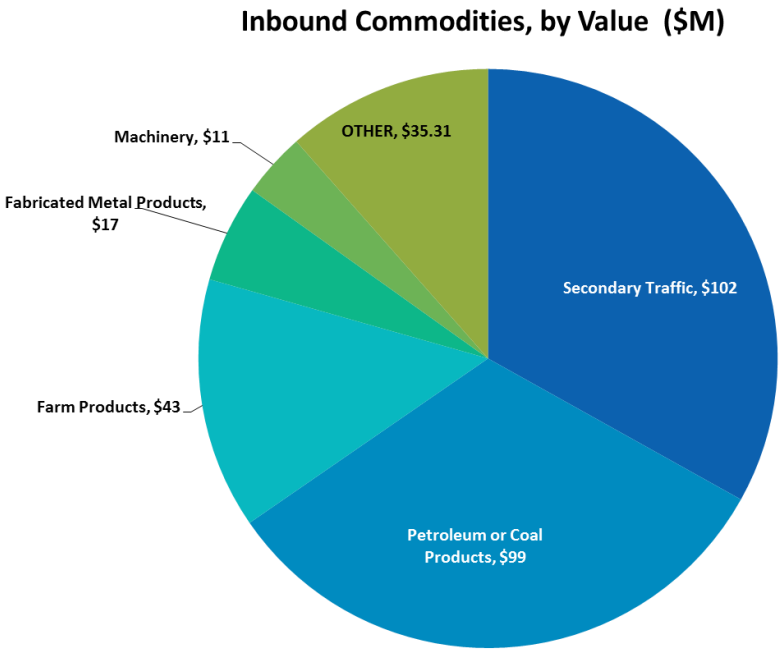


Figure 27: Top Freight Values by Commodities.

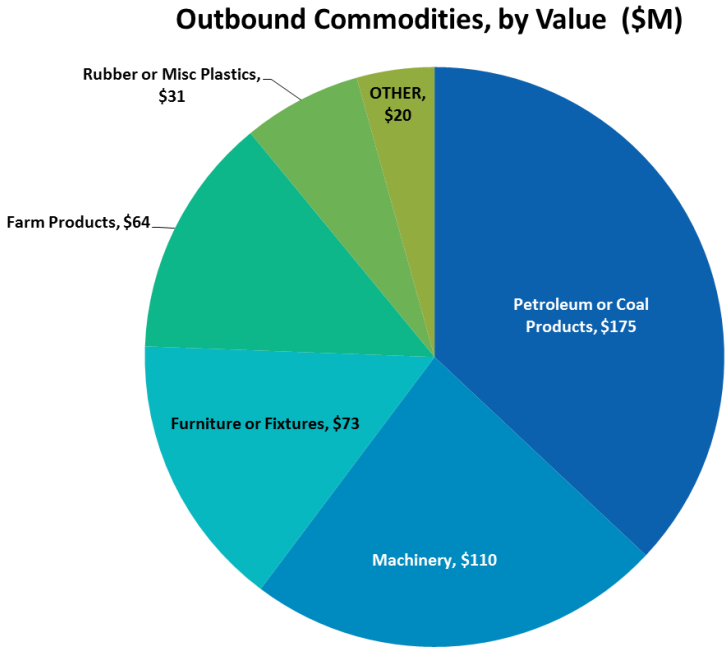


Figure 28: Top Freight Values by Commodities.

The Southeast region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the Kingsport Region, in terms of both value and tonnage. In 2012, almost $270 million of freight was exported to the Southeast Region from the Kingsport Region. The Southwest region is the second highest destination for freight in terms of both value and tonnage. (Refer to Figure 28).

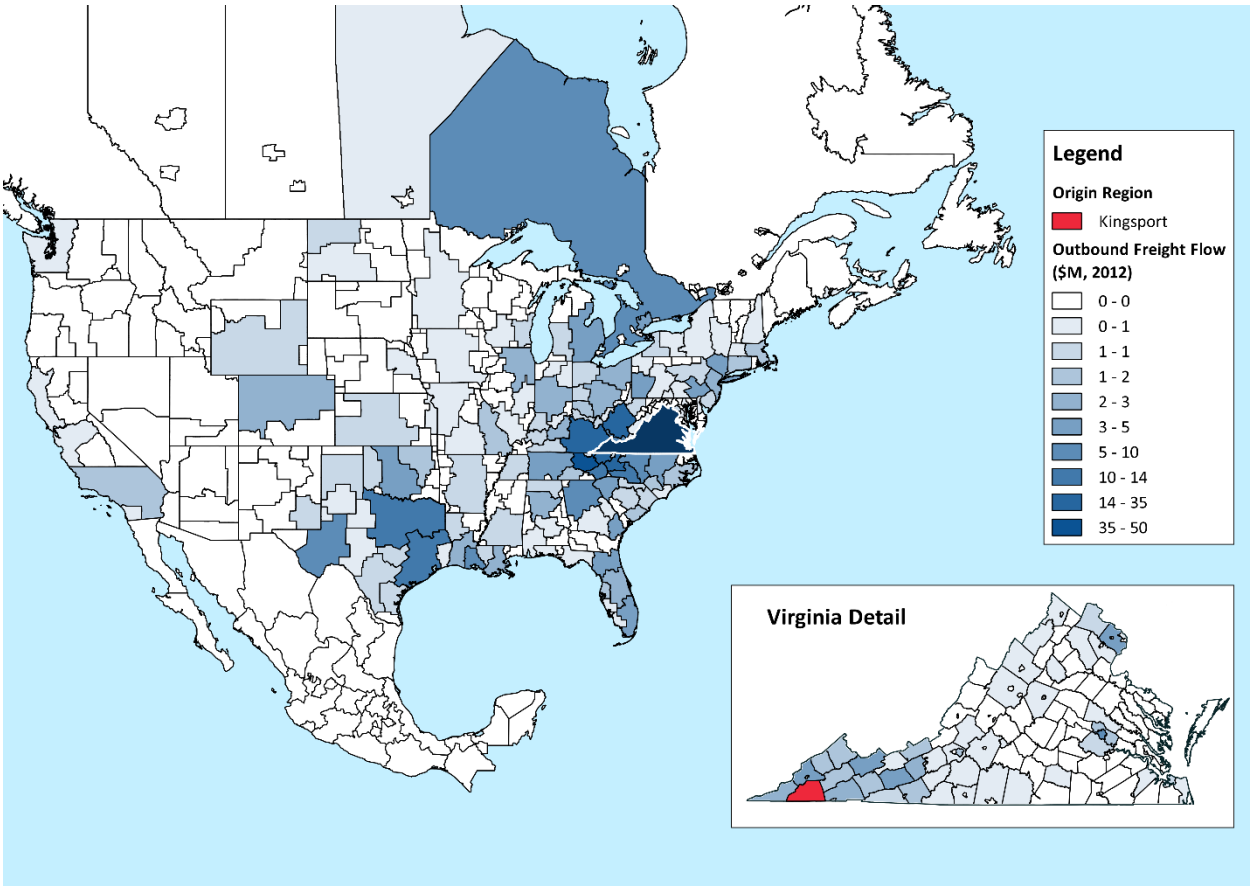


Figure 29: Top Freight Values by Region.

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, petroleum and coal products was the highest amount of total tonnage for both imports and exports. The second highest tonnage for export and import were nonmetallic minerals and secondary traffic respectively. (Refer to Figures 29 and 30).

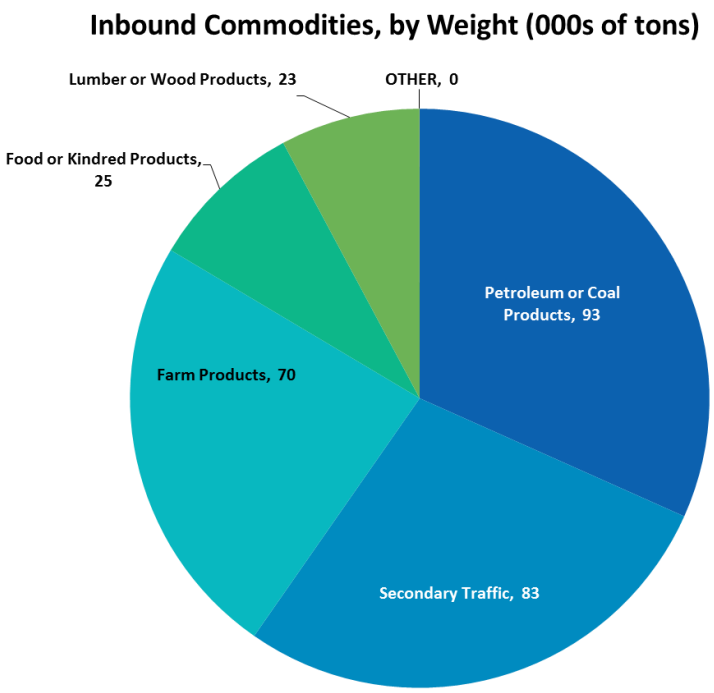


Figure 30: Top Commodities by Weight – Inbound.

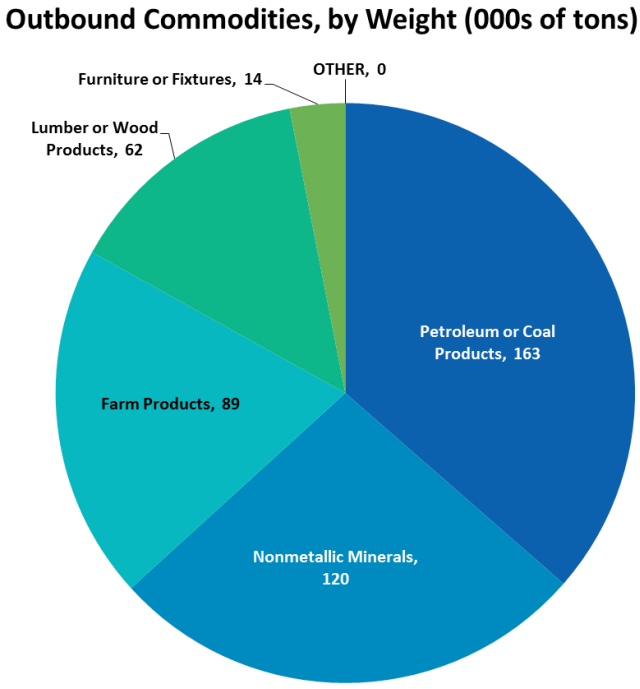


Figure 31: Top Commodities by Weight - Outbound.

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional transportation needs in order to be able to compare proposed projects to those needs. The Needs Assessment also uses a spatial analysis for the region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.

These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-capacity needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 8: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of transportation needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Kingsport Region, it showed that over 66% of the economy will be made up of freight dependent industries. The knowledge based sector is anticipated to grow by 3%, from 8% to 11%. Conversely, the local serving sector will shrink to 26% of regional output.

The forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The economic and transportation correlations for the knowledge industry sector particularly point to improving freight access, network connectivity, and modal choice. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit is limited to the Tennessee portion of the region. However, the expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These needs were categorized into a series of very broad types of capacity needs as described above. The spatial analysis of needs consists of a map of needs, a table of identified needs, and a findings of needs that summarizes the economic and transportation findings to support each identified need. Each of these is summarized below.

To assist with the understanding of the map and table of needs described below and the relationship of these needs to the Corridors of Statewide Significance and the Urban Development areas, please refer to the following legend of icons.

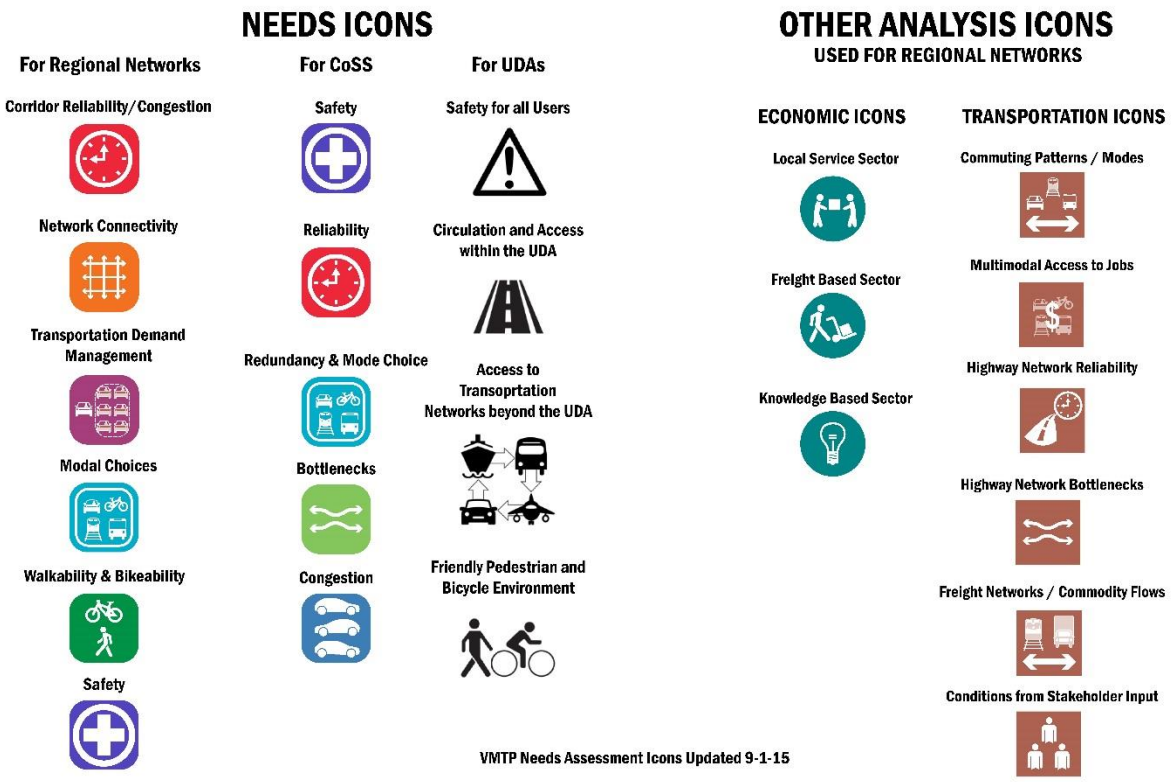


Figure 32. VMTP Needs Icons

Map of Needs

The map below summarizes the regional transportation needs according to activity centers and corridors. The needs are summarized and color coded by general category. Each of the needs is also numbered and keyed to the finding of needs table.

Findings of Needs

The table below lists each of the identified transportation needs in the region, and describes the basis for each need in terms of economic and transportation findings and data. The analysis of regional network transportation needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

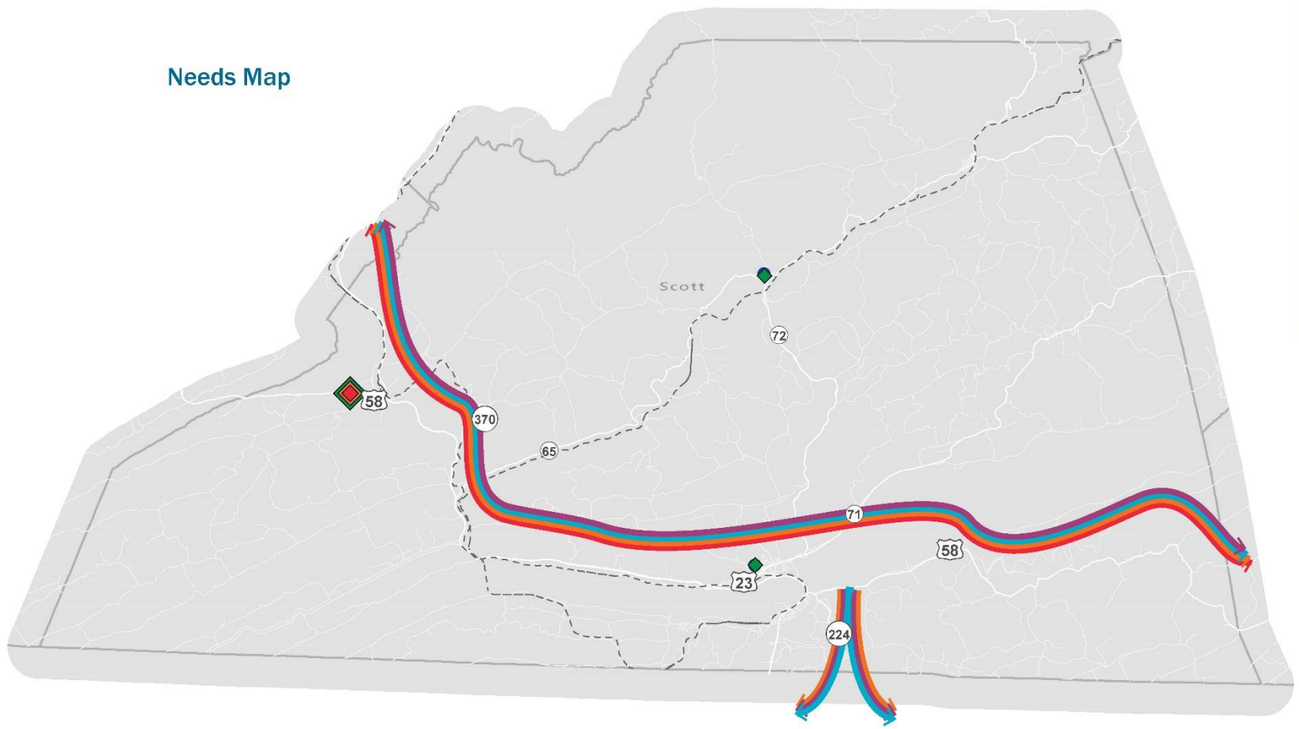
The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide

data is not of a fine enough grain or level of detail to accurately determine a need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as needs, but only for supporting data to make an objective determination of need.

Figure 33: Summary Needs Map

Kingsport Region Needs Summary

Needs Map



Needs Table

A. US 58/23 Corridor Reliability	
	The US 58 and 23 serve as major thru-corridors in the region. These corridors handle significant freight and commuter traffic, serving multiple activity centers. There are currently limited alternative choices to driving single occupancy vehicles on these corridors. Redundancy in choice and network connections are needed.
B. Network Connectivity and Mode Choice to Kingsport	
	The most significant commuter movement in the region is across the state line, including both in-flow and out-flow from Scott County. With high volumes, access management issues, and various bottlenecks, passenger reliability is key to the economic vitality of the region.
C. Duffield Freight Connectivity	
	The Duffield activity center has the highest concentration of freight related industries and employment. Freight access is key to the economic vitality of this activity center.
D. Walkable/Bikeable Places	
	The Kingsport region is largely autocentric and is generally under-served by alternative modes of transportation. A lack of active transportation infrastructure creates safety concerns and reinforces reliance on vehicular travel.

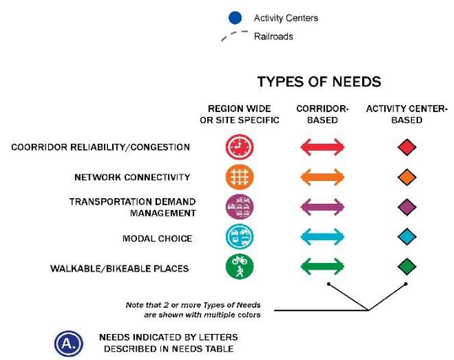


Table 9: Findings of Needs

A. US 58/23 Corridor Reliability

NEED

The US 58 and 23 serve as major thru-corridors in the region. These corridors handle significant freight and commuter traffic, serving multiple activity centers. There are currently limited alternative choices to driving single occupancy vehicles on these corridors. Redundancy in choice and network connections are needed.

ECONOMIC

These corridor serves the major activity centers of Duffield, Fort Blackmore and Gate City. These centers include local serving, knowledge based and freight dependent industries. As a result, peak traffic times include significant commuter traffic. Increased transit and TDM services can help provide multimodal options for commuters and increase reliability for all users.

TRANSPORT.

There are few congestion and delay issues in Danville. However, there are a few bottlenecks, including near the Gate City activity center where US 58 and 23 merge, and near the Duffield activity centers where these roads separate. Creating redundancy in the network through transit, TDM and increased network connectivity will increase reliability for all users.

B. Network Connectivity and Mode Choice to Kingsport

NEED

The most significant commuter movement in the region is across the state line, including both in-flow and out-flow from Scott County. With high volumes, access management issues, and various bottlenecks, passenger reliability is key to the economic vitality of the region.

ECONOMIC

The urban core of the region is Kingsport, Tennessee. Connectivity across the state line is vital for the businesses and activity centers in Scott County to thrive and grow.

TRANSPORT.

Commuter origin/destination data and job accessibility mapping shows the highest commuter flows across the state line. The few network bottlenecks in the region are located along the major corridors connecting Virginia and Tennessee. Local input also suggests that the rural on-demand transit services are heavily oriented to bringing Scott County residents to the medical facilities and shopping opportunities in Kingsport.

C. Duffield Freight Connectivity

NEED

The Duffield activity center has the highest concentration of freight related industries and employment. Freight access is key to the economic vitality of this activity center.

ECONOMIC

Duffield activity center already includes significant freight oriented business. Local input indicates that two additional freight related businesses will be locating in Duffield by 2025.

TRANSPORT.

Despite having some of the highest percentage of freight related industries, freight accessibility measures show that Duffield has is one of the least freight accessible areas in the region.

D. Walkable/Bikeable Places

NEED

The Kingsport region is largely autocentric and is generally underserved by alternative modes of transportation. A lack of active transportation infrastructure creates safety concerns and reinforces reliance on vehicular travel.

ECONOMIC

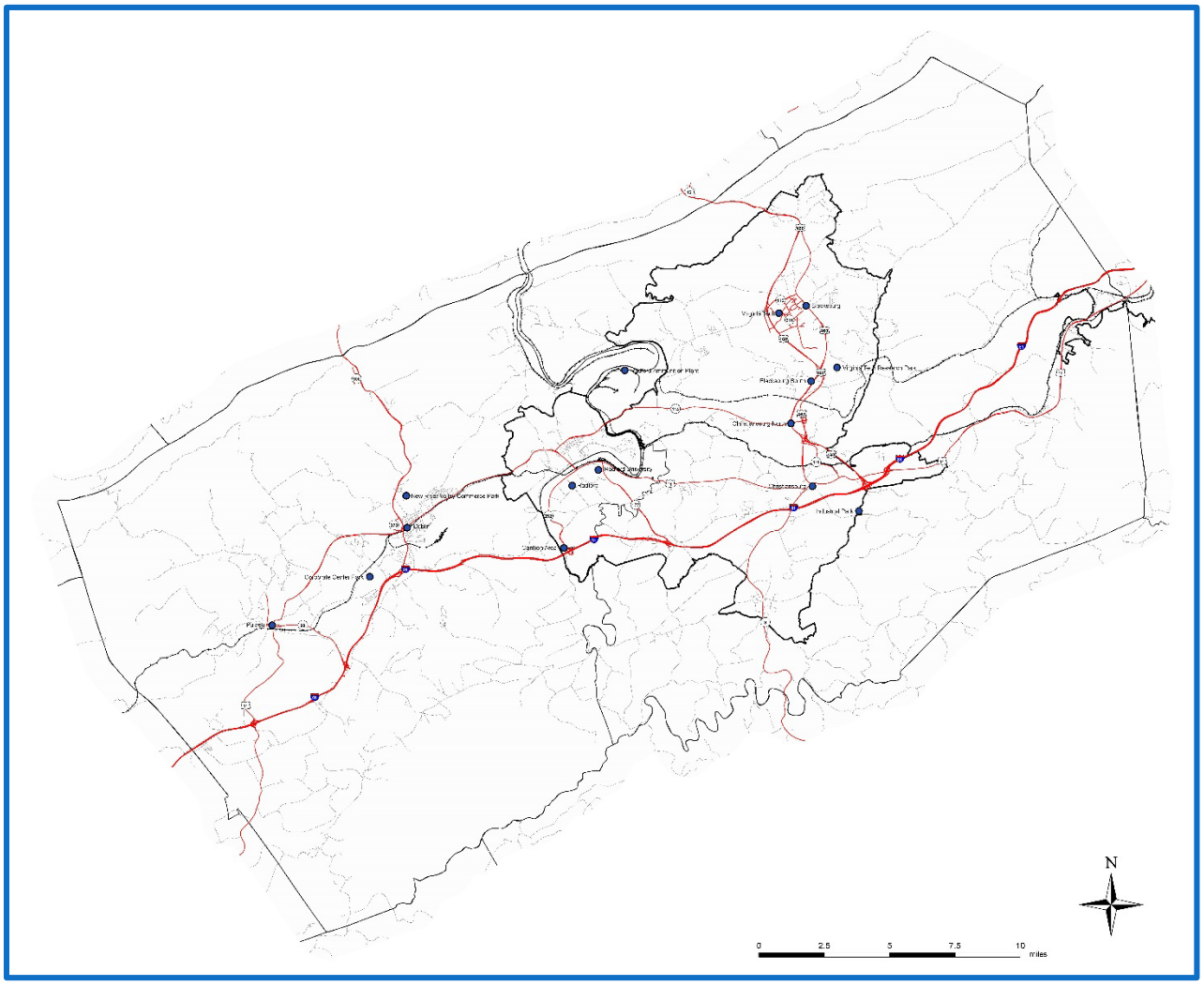
The Gate City, Fort Blackmore and Duffield activity centers includes schools, libraries, and multiple shops, markets and restaurants.

TRANSPORT.

The major issues in these areas of the region are modal conflicts, safety concerns and congestion. Providing dedicated infrastructure for all users can alleviate these issues.

VMTP 2025 Needs Assessment

Regional Needs Profile



New River Valley Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans 2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the New River Valley Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the New River Valley Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the Transportation Needs and economic conditions is the basis for the findings in this report. The following sections outline the New River Valley regional Economic Profile, regional Transportation Profile, and regional Transportation Needs.

Defining a Regional Network

This portion of the Needs Assessment deals with a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of each Regional Network has been developed as part of the outreach process in working with each region. Additional information about how the Regional Networks were defined is referenced in the introductory document, "VMTP 2025 Needs Assessment: Regional Networks Introduction."

In the New River Valley Region, the initial needs analysis area included Montgomery County, Pulaski County, and the City of Radford. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area were considered in the Needs Assessment as well. For example, in New River Valley, this included passenger markets, such as Lynchburg to the East, and freight markets to the North via Interstate 81. These areas were considered in a number of quantitative and qualitative ways when developing the regional needs profile.

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging Transportation Needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from New River Valley stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Weldon Cooper Center, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

Substantial population growth is projected for the New River Valley Region. Projections range from 14,000 to 20,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: New River Valley Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
178,933	**198,428**	**192,470**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia.

Table 3 provides a closer look at population projections by jurisdiction within the New River Valley Virginia Region.

Table 3: County and City Population Projections.

Jurisdiction	2010 Population	Weldon 2025 Projection	% Change
Montgomery County	94,392	110,492	17.1%
Pulaski County	34,872	36,021	3.3%
City of Radford	16,408	17,844	8.6%

Source: US Census 2010 Demographic Profile; and Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

Population growth is also expected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60. Figure 1 shows the current and projected population in the New River Valley Region, broken down by age cohort. There is clear growth in the 60+ and 15-24 age cohorts.

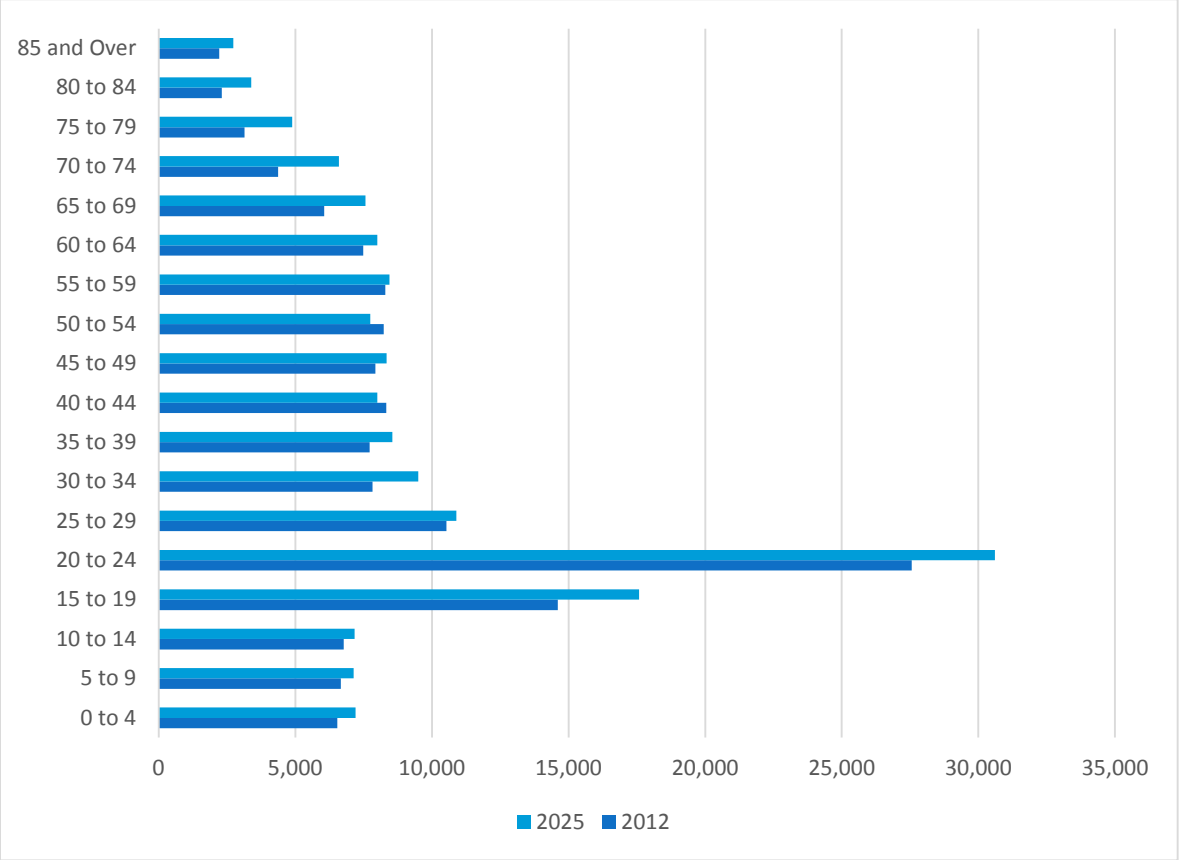


Figure 1: Population by Age in the year 2012 and Projected for the year 2025

Source: Woods & Poole Economics, Incorporated. 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC. 2014. http://www.woodsandpoole.com. Accessed June 18, 2014.

In addition to growing population, regional income levels are also projected to rise. According to Woods & Poole Economics Inc., per-capita income for the region is expected to rise 17%, slightly less than the state average of 21%, from $28,843 to $33,878.

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the New River Valley area.

Top Industries by Output

Economic output is the total value of all goods and services produced in an economy within a given timeframe. Unlike Gross Domestic Product, it includes the value of salaries. It is a common indicator used in economic analysis to determine whether an economy is growing or contracting by comparing output during two different points in time. Manufacturing is the strongest industry in the New River Valley region when measured by economic output. This can be attributed to the high economic value of goods produced in the transportation, and electric industries, both of which fall under the broader Manufacturing category and are well represented in the region. Public Administration, also called Government by some data sources, is the second most prominent industry by output. (Refer to Table 4).

Table 4: Current Industries by Output.

Top Industries	% of Output
Manufacturing	26%
Public Administration	17%
Retail	15%
Professional Services	9%
Wholesale Trade	8%

Source: IHS Global Insight Data, 2012

Economic Sectors

Economic profiles for all 15 regions in Virginia were developed using a breakdown of industry sectors developed by the Study Team[1]. Industry data on Output were aggregated into three broad economic sectors for each region, defined as Local, Knowledge and Freight sectors. Figure 2 below provides a summary of the predominance of each economic sector by output in the New River Valley area in 2012.

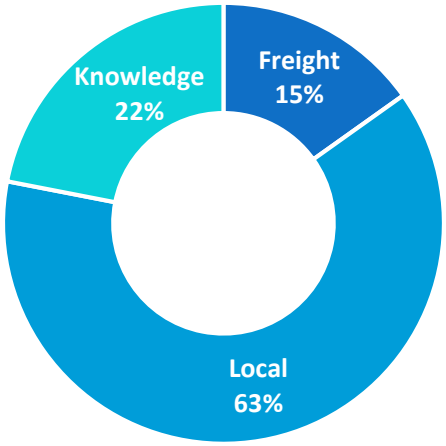


Figure 2: Top Sectors by Output (2012)
Source: IHS Global Insight

The Local Services sector is clearly the strongest in the New River Valley area, making up 63% of the economic output for the region. Conversely, the Knowledge and Freight sectors account for 15 and 22% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as discussed in the Transportation section below.

Top Industries by Employment

Manufacturing, Educational, and Retail Trade sectors generate a large portion of the total employment in the New River Valley area. (Refer to Table 5). Virginia Tech is the largest employer in the area, and Radford University is third (Refer to Table 6). Many of these jobs are classified as Government industry jobs by IHS Global Insight, supporting the ranking of this industry in Table 5 below.

[1] A more thorough explanation of the makeup of these sectors is provided in the separate document on Regional Networks Introduction.

Table 5: Current Top Regional Industries by Employment.

Top Industries	% of Workforce
Government	34%
Manufacturing	14%
Retail	11%
Accom./Food Serv.	10%
Health Care/Social Ass.	8%

Source: IHS Global Insight Data, 2012

Volvo, Moog Components, Moog Components, and Kollmorgen Group are the largest employers in the Manufacturing industry, making vehicles, motion control and electronic components, and motion systems and servos, respectively. They are also some of the largest employers in the region. (Refer to Table 6).

Table 6: Current Top Employers.

Employers	Employees
Virginia Polytechnic Institute & State University	7,448
Volvo Group N. America Inc., (assembly plant)	2,600
Radford University	2,375
Moog Components Group Inc.	1,000+
Kollmorgen Group	600

Source: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares one region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the New River Valley region. The industries expressed in Table 7 have the highest LQ scores in the region. The score for Public Administration, for example, can be inferred to mean that these services are more than two times more concentrated in the region than in the nation as a whole, on average.

Table 7: Current Top Industries by Location Quotient.

Top Industries	Location Quotient
Public Administration	2.12
Professional Services	1.76
Real Estate	1.43
Accom./Food Serv.	1.34
Manufacturing	1.09

Source: IHS Global Insight Data, 2012

Data Comparisons

A number of data sources were used to inform the analysis of industries in New River Valley and other regions. Employment data was largely drawn from IHS Global Insight, and supplemented with data from

the Virginia Employment Commission (VEC); Virginia Economic Development Partnership (VEDP); and the regional Comprehensive Economic Development Strategy (CEDS). Top Employers were identified using InfoUSA point data in GIS, and supplemented with the same statewide data sets. Each of these sources uses a different methodology to collect and categorize data. Some use different geographical analysis areas and, therefore, may arrive at slightly different conclusions about top employers or industries by certain measures. Table 8 shows some of the similarities and differences between these sources in how they determine "top industries" in the region.

Table 8: Comparisons of Employment Data from Sources Used in Developing the New River Valley Regional Economic Profile

CEDS 2012		VEDP 2014		VEC 2014		IHS Global Insight 2012	
Top Industries	**Rank**	**Top Industries**	**% of total Workforce**	**Top Industries**	**Number of Employees**	**Top Industries**	**% of total Workforce**
Business/ Financial	1	Government	27.9%	Government	18,818	Government	34%
Energy	2	Manufacturing	16.8%	Manufacturing	11,308	Manufacturing	14%
Health Care	3	Retail	12.2%	Retail	8,118	Retail Trade	11%
IT Telecom	4	Accom./Food Services	9.9%	Accom./Food Services	6,642	Accom./Food Services	10%
Advanced Materials	5	Health Care	9.7%	Health Care	6,506	Health Care/Social Services	8%

InfoUSA (not included in Table 8) maintains a proprietary database of 14 million businesses, and provided a uniform and geo-located dataset of jobs statewide that was used in the Needs Assessment.[2] As part of the Needs Assessment, InfoUSA jobs data was mapped and spatially analyzed for the 15 regions in the state of Virginia. This allowed analysts to identify the reported location of all individual work sites, as well as the number of employees that worked there. The shortcoming of this dataset is that many public sector jobs including those at state universities, government offices, and federal employees/contractors, aren't captured. For this reason, VEC, VEDP, and CEDS data, along with input from local stakeholders, was used to supplement this dataset for the purposes of identifying top employers and activity centers. For the New River Valley, employers such as Virginia Tech and Radford University were identified using these supplemental resources.

IHS Global Insight is a 2012 data set categorized by The North American Industry Classification System (NAICS) codes, and was used to develop an initial regional economic profile for the New River Valley region. This data was collected in a different year than that used in VEDP and VEC, which may have some effect on differences in the reported numbers of employees in each dataset.

Both VEC and VEDP report their figures using the same data source: the Quarterly Census of Employment and Wages (QCEW), and data used in this analysis was taken from the 3rd quarter of 2014. This source includes all workers covered by state unemployment insurance laws, and all workers covered by Federal insurance laws, but excludes self-employed workers and some agricultural workers. The difference between these sources lies in reporting. VEC uses number of employees to rank

[2] In developing the database 5,200 phone books, annual reports and other business directories are continuously reviewed to find information, public record data from county courthouse filings, SEC and 10k filings, and Secretary of State data are used, and every month the USPOS National Change of Address, ZIP+4 and Delivery Sequence file are matched to standardize and keep addresses current. The database is continuously updated from over 5,000 public sources and more than 20 million phone calls are made per year to verify and collect additional information.

industries, while VEDP computes a percentage of total workforce. The resulting industry rankings, as reflected in Table 8, are the same.

Finally, Comprehensive Economic Development Strategy (CEDS) data is derived from a cluster analysis performed by the Southern Rural Development Center. The CEDS then ranks industries by their estimated number of employees, as reflected in Table 8. Note that retail and university/college jobs were not included in this analysis.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level was the identification and evaluation of economic activity centers in each region. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were then drawn for these areas using a one-mile radius. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. In the New River Valley region, centers of high economic or social activity such as the Radford Army Ammunition Plant, or the New River Valley Commerce Park, weren't represented as areas of high job density through the InfoUSA jobs data that was used in the mapping exercise. Centers such as this were instead affirmed by stakeholders who had a knowledge of the regional significance of the activity there, and then mapped accordingly. Figure 3 below shows the InfoUSA job density color scale in shades of yellow, and the activity centers as blue circles.

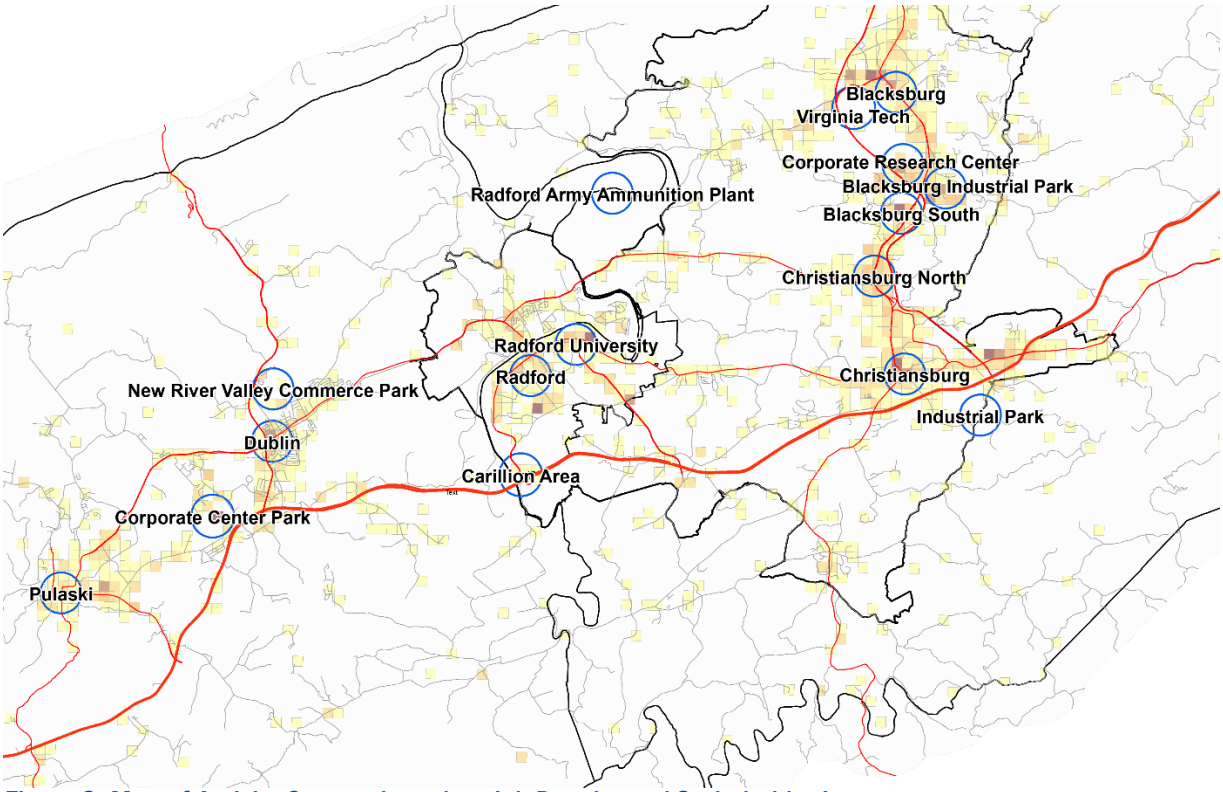


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the Study Team analyzed the type and scale of economic activity that took place in those locations. Analysts developed pie charts for each activity center that represented the breakdown of employment by industry sector[3]. Charts were then scaled based on the number of jobs in each center relative to the other centers in the Region.

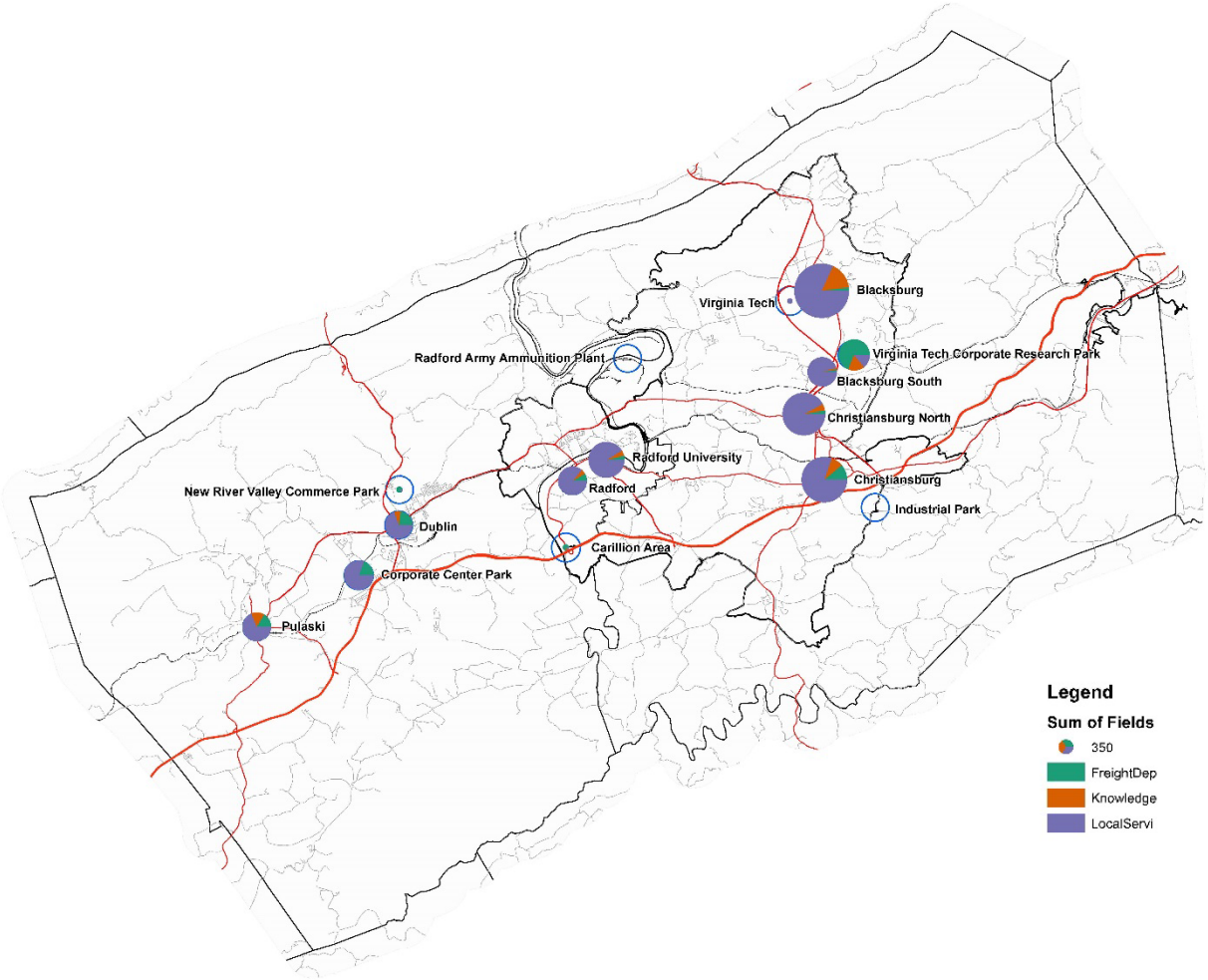


Figure 4: Activity Center Employment by Industry Sector

Figure 4 shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs. Due to some of the gaps in InfoUSA jobs data, some activity centers that were identified by local stakeholders (e.g. Radford Army Ammunition Plant) do not have data-driven pie charts associated with them. In these cases, local feedback and data was used to supplement this mapping exercise and characterize the economic profile of activity centers.

E. Forecasted 2025 Industry Strengths

2025 forecasts of key industries by Region and activity center served as the primary data source for the New River Valley future economic profile. The basic economic data that were used include:

[3] Industry sectors are based on the categorization of jobs into the three economic clusters of Local, Freight, and Knowledge economies. Refer to separate document, VMTP 2025 Needs Assessment: Regional Networks Introduction.

- Current Top Industries by Workforce, Output and Location Quotient
- 2025 Forecasted Economy by Output, Employment, and Future Growth Industries
- Regional Economic Development Priorities from Stakeholder Input

The intent was not to presuppose the region's economic future, but to allow input from stakeholders to affirm or modify the basic economic forecast according to regional visions. To supplement economic forecasts for 2025, the Study Team collected input from stakeholders in a series of work sessions, and used this to confirm the basic future economic profile for the region. The future economic profile was then used as the basis for determining future transportation needs in the New River Valley region.

Based on the data collected, substantial growth is expected for the New River Valley region by the year 2025. Manufacturing, Wholesale Trade, and Retail Trade industries are forecasted to see the largest growth for top industries. Combined, they are expected to produce $3.9 billion dollars more in 2025 than was produced in 2012. (Refer to Figure 5).

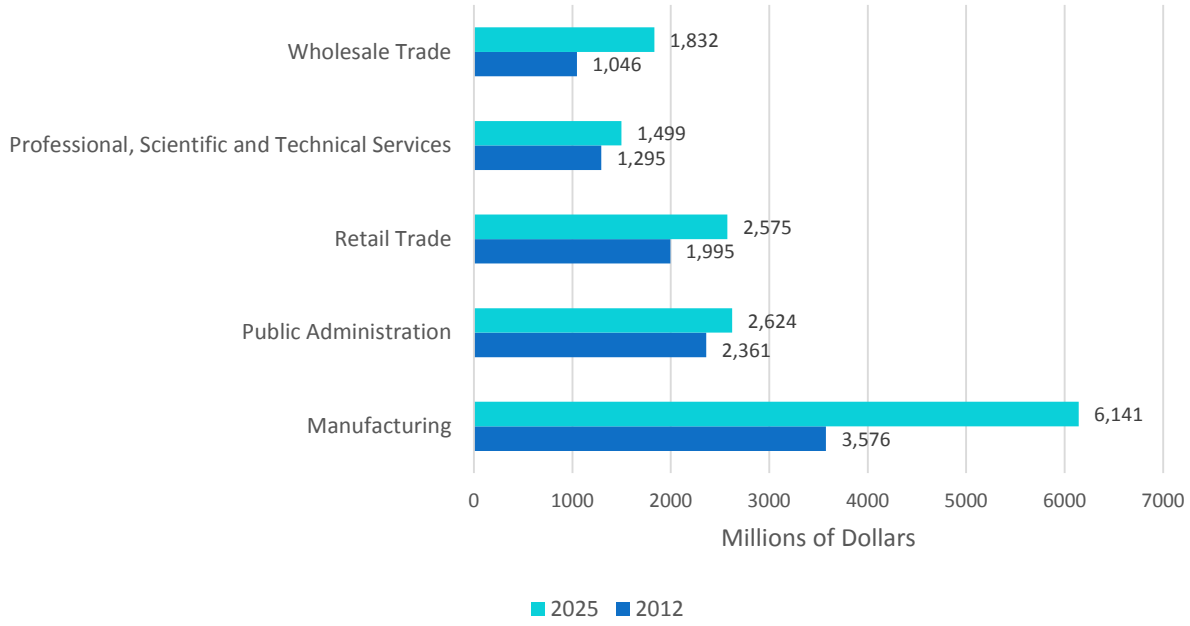


Figure 5: Top Industries by Output
Source: IHS Global Insight, 2012

The only industries projected to produce lower levels of output in 2025 than in 2012 are the Management of Companies and Enterprises, and Mining, Quarrying, Oil and Gas Extraction industries. In all industries combined, economic output in the New River Valley region is expected to increase by $ 5.6 billion dollars by 2025.

Output by sector, as defined in the separate Introduction document, is not expected to change significantly. Only a small increase in the Freight sector, and a corresponding decrease in the Local sector is projected. (Refer to Figure 6).

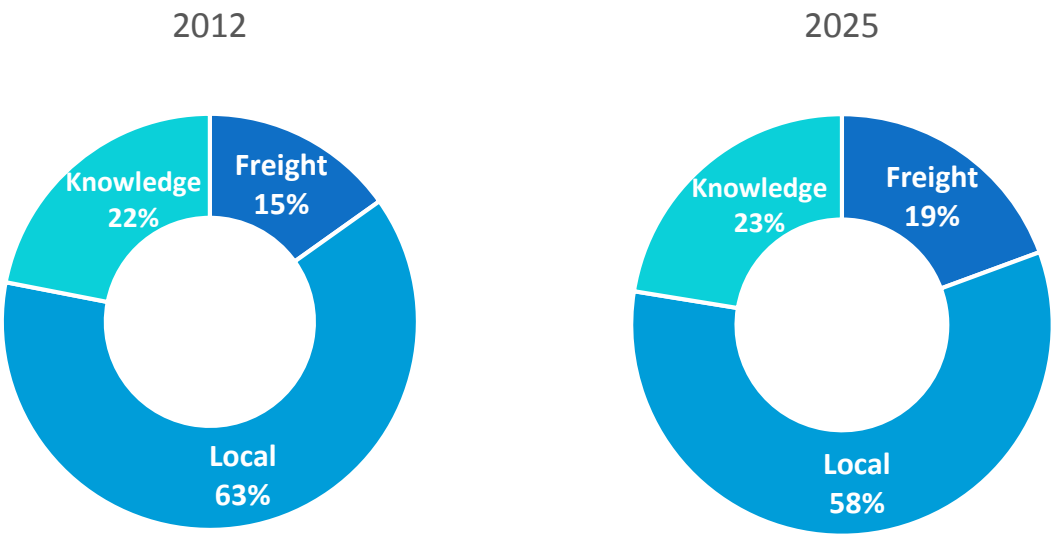


Figure 6: Current and Forecasted Output by Sector
Source: IHS Global Insight, 2012 & 2025

The most dramatic change in employment among major industries in the New River Valley region is projected for the Government sector, with more than 2,500 additional jobs to be added to the Region by the year 2025. The manufacturing sector is projected to lose 1,250 jobs by, this could be the result of cutting or outsourcing jobs due to further automation in order to increase efficiency while maintaining or growing output. Most other major industries in the region are projected to keep employment numbers relatively steady through 2025. (Refer to Figure 7).

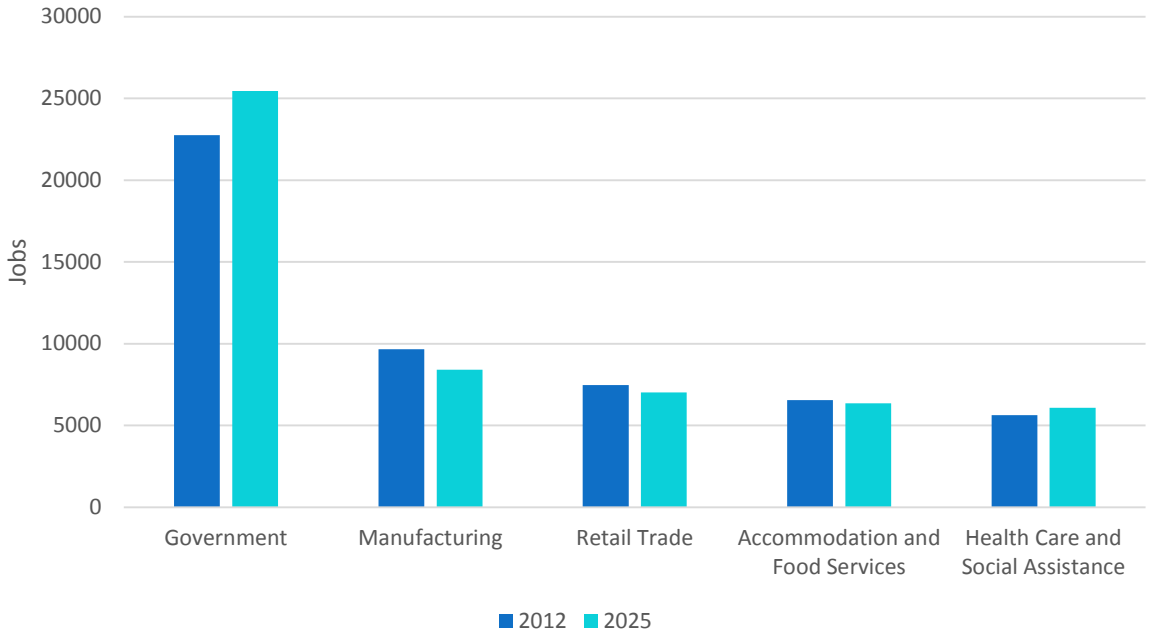


Figure 7: Employment in Major Industries
Source: IHS Global Insight, 2012

3. Transportation Profile

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce and freight needs at a regional scale. This set of accessibility measures reflects regional transportation characteristics in the New River Valley area such as typical commute times and overall travel reliability. The following are categories of performance metrics that were used to create a regional transportation profile for the New River Valley region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

Additional information on the methodology for the transportation profile can be found in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction

B. Commuting Patterns

Regional Commuting Patterns

Patterns in the New River Valley region show a high level of commuting between localities. Over a third of Pulaski County workers commute to either the City of Radford or Montgomery County, while more than half of all workers in Radford commute to either Montgomery County or Pulaski County. The Roanoke area is the most common destination for commuters from Montgomery County, with over 4,000 trips to the area. Over 3,400 commuters from Pulaski County, and 2,300 from the City of Radford commute to Montgomery County: the most popular destination for both jurisdictions. (Refer to Figure 8).

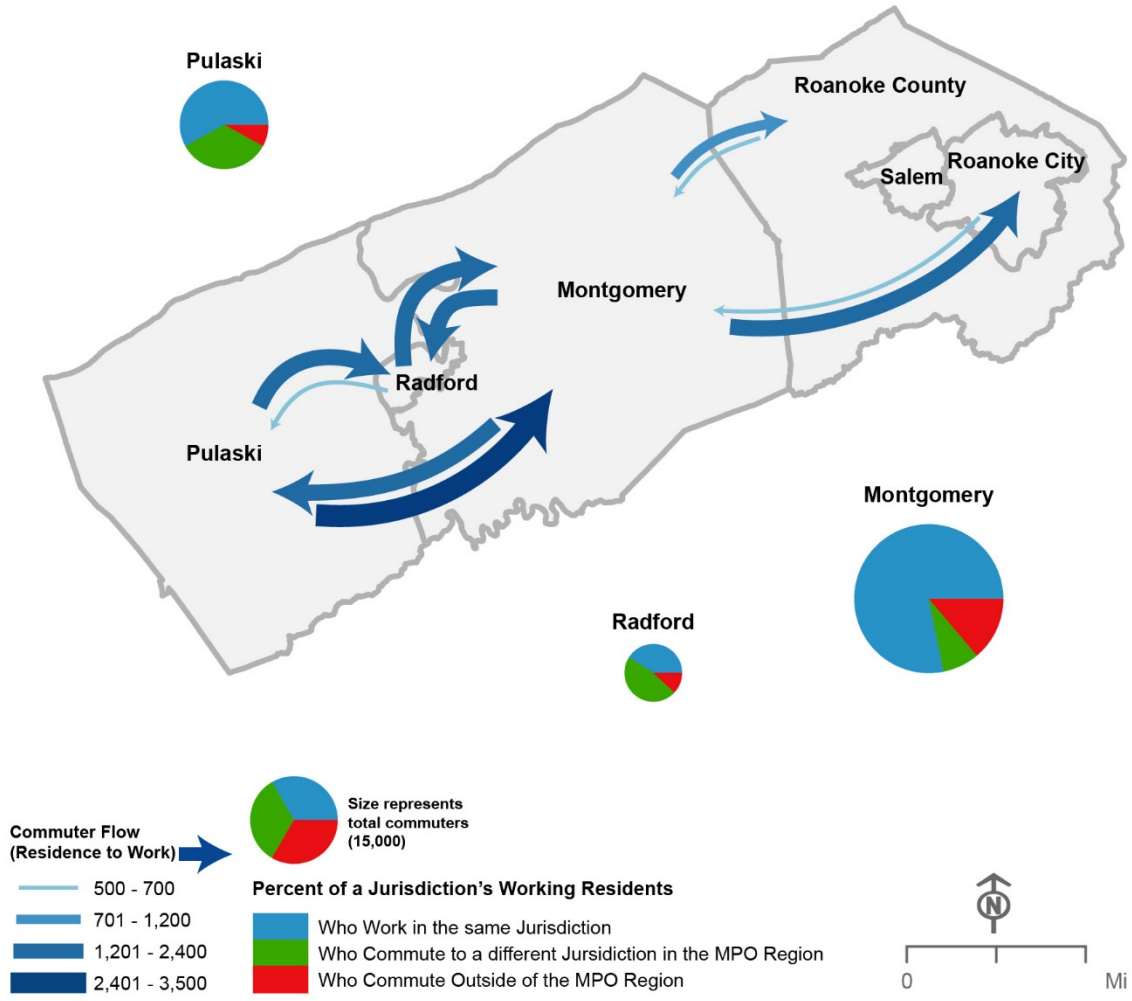


Figure 8: Regional Commuting Patterns

Source: US Census Longitudinal Employer-Household Dynamics (LEHD). 2006-2010. http://lehd.ces.census.gov/data/

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the New River Valley Region was the analysis of commuting patterns between the most significant activity centers. Figures 9 through 12 below provide a summary of typical commuter origins for four of the activity centers in the New River Valley region. Block groups are symbolized on a color scale from dark to light blue, with the darker shades representing the block groups with the largest number of commuters to the respective activity center, as compared to other block groups in the Region.

The Blacksburg activity center attracts a large number of commuters from the surrounding block groups as compared to other activity centers in the region. Virginia Tech and downtown Blacksburg, are major destinations for commuters throughout the region. (Refer to Figure 9).

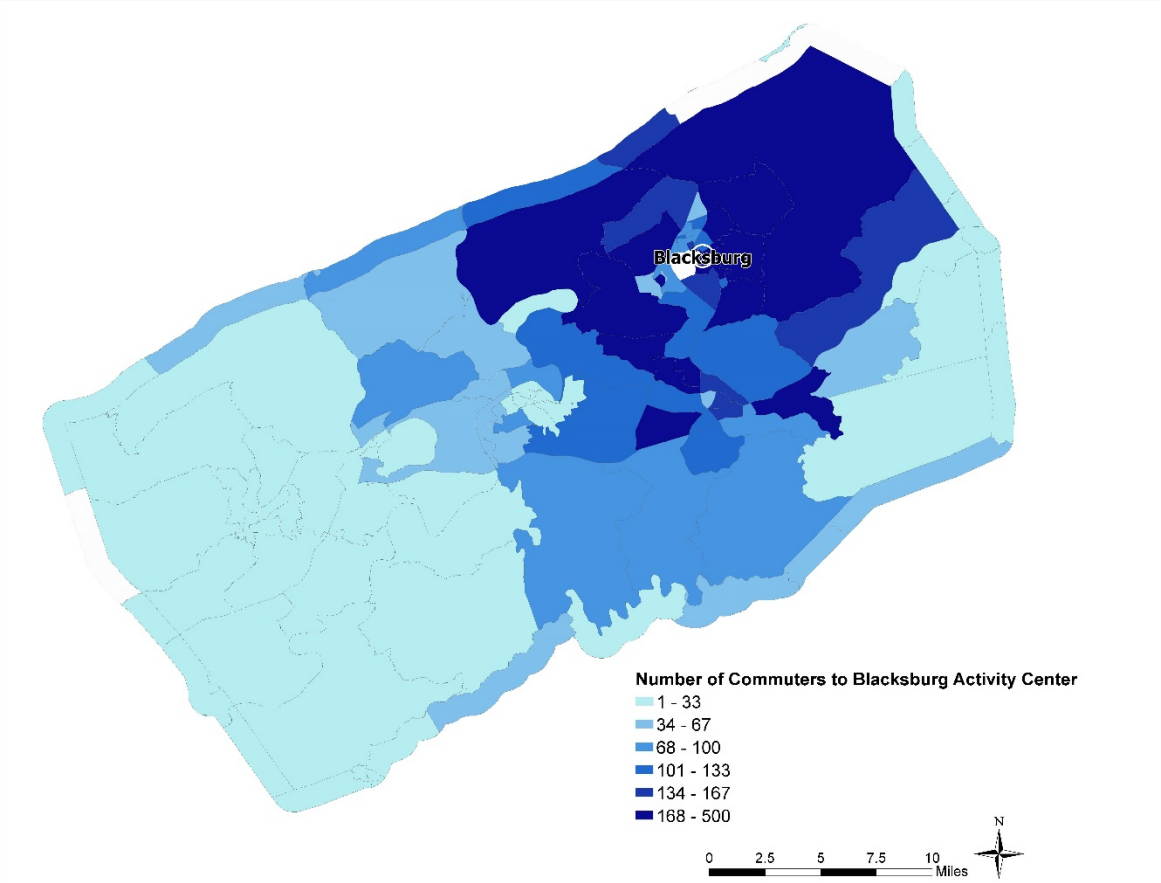


Figure 9: Commuting Patterns to Blacksburg Activity Center.
Source: LEHD

Commuting patterns to the Christiansburg activity center are similar to Blacksburg, though with a slightly lower total number of commuters. Government centers, and retail outlets and other local serving industries attract commuters from around the region. (Refer to Figure 10).

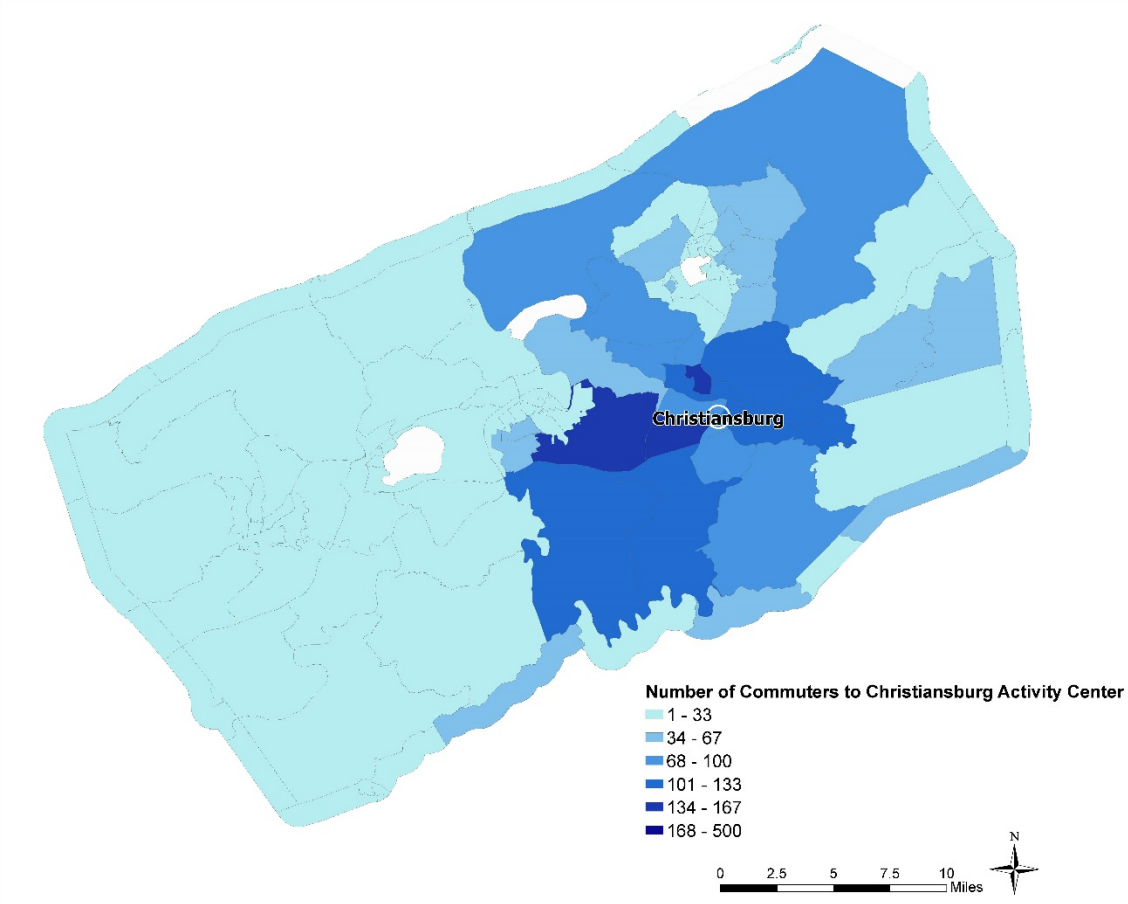


Figure 10: Commuting Patterns to Christiansburg Activity Center.
Source: LEHD

In the Radford area, most commuters originate from block groups that lie directly adjacent to the Radford activity center. This center does not attract many commuters from further distances throughout the region. (Refer to Figure 11).

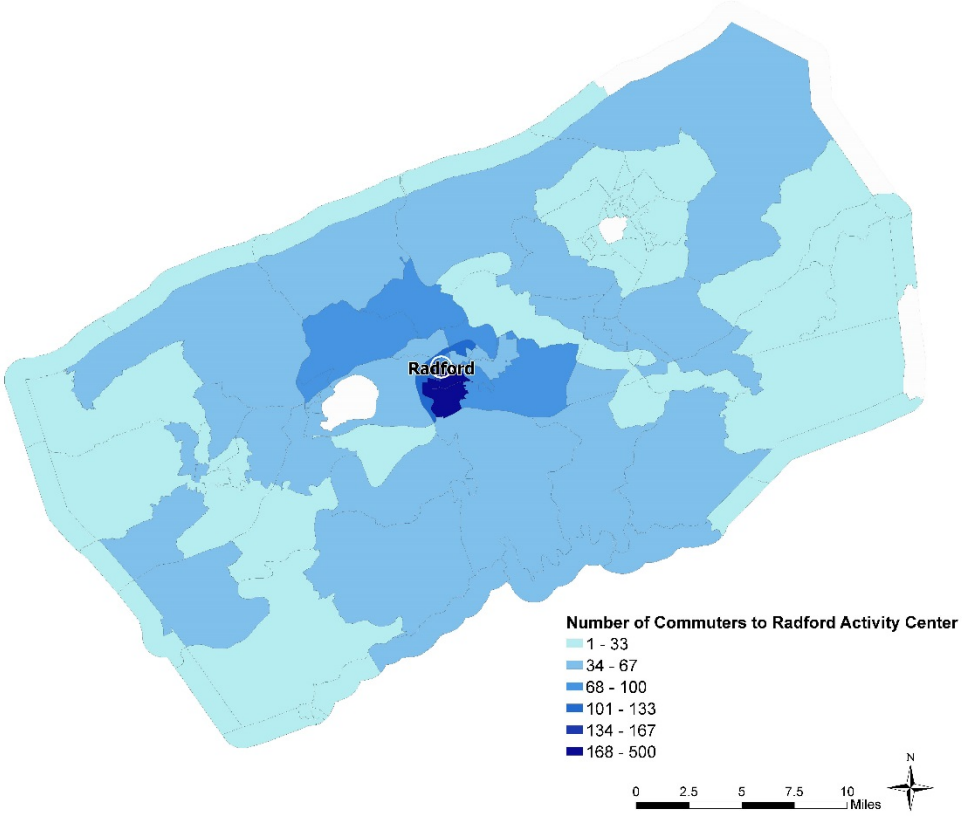


Figure 11: Commuting Patterns to Radford Activity Center.
Source: LEHD

The Pulaski activity center, meanwhile, has the lowest level of commuting of the jurisdictions in the New River Valley area, overall. Most commuters that complete their trips at the Pulaski activity center originate from the town of Pulaski itself, or the surrounding rural areas. (Refer to Figure 12).

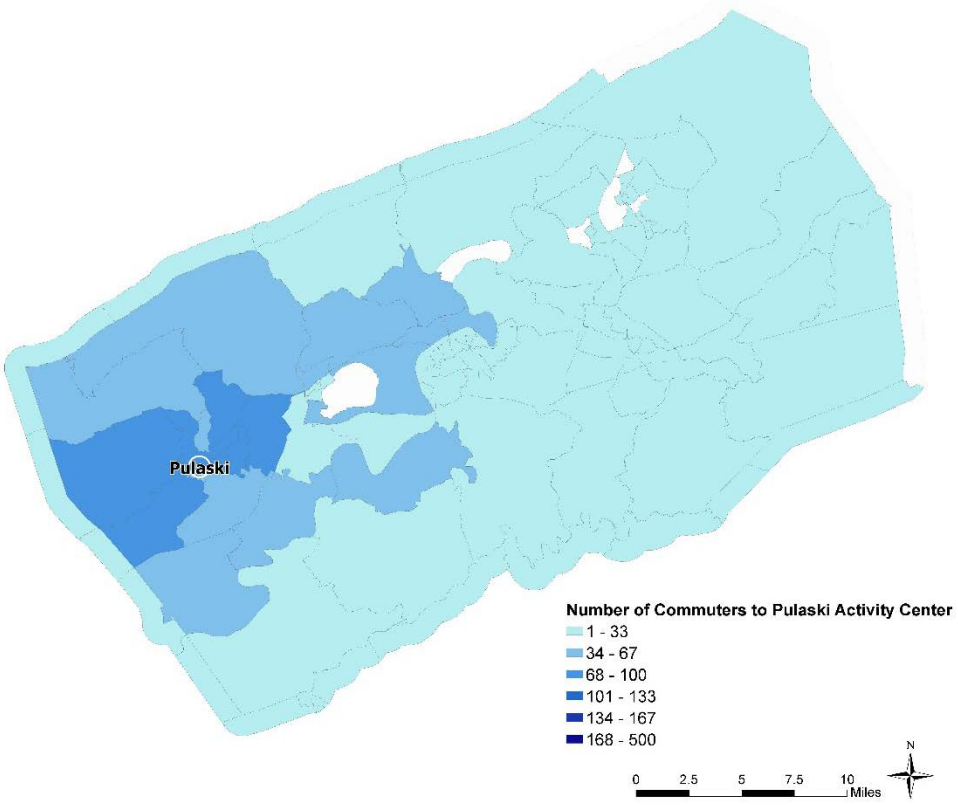


Figure 12: Commuting Patterns to Pulaski Activity Center.
Source: LEHD

Mode Choice

In the New River Valley Region, the majority of commuters drive alone to work. While there is some variation in mode choice among jurisdictions, cars are used between 75% and 83% of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 9% to 11% of the mode share depending on jurisdiction. Use of public transit is, as expected, highest in Montgomery County, which has the most robust transit system in the region. (Refer to Figure 13).

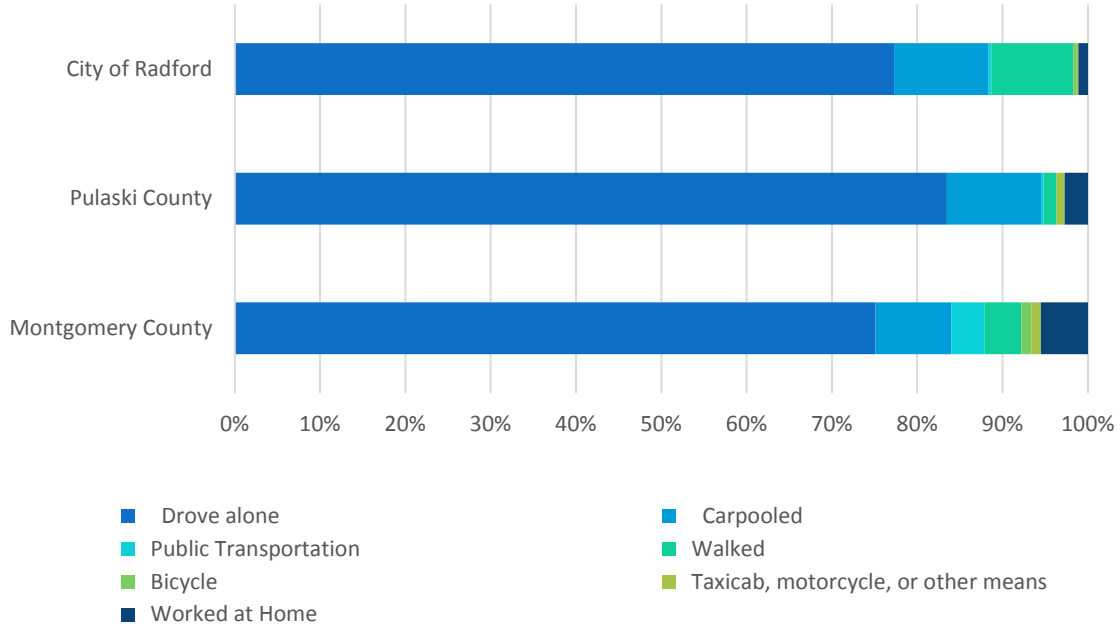


Figure 13: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the New River Valley Region, average commute times range from 18 to 23 minutes among the various jurisdictions. (Refer to Table 9). Due to its proximity to employment centers, Montgomery County has the shortest average commute. Conversely, more rural areas, like Pulaski County have longer commutes, on average.

Table 9: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
Montgomery County	17.8
Pulaski County	22.9
City of Radford	18.7

Source: ACS 2013 5-Year Estimates.

Commutes of over 45 minutes are rare in the New River Valley region. Pulaski County has the highest percentage of workers who commute over 45 minutes at nearly 10%.Montgomery County has the lowest level of commutes over 45 minutes at 5.9%. This is due in part to the proximity to major arterial roads that offer easy connection to other destinations in the region, and the high density of employment opportunities within the county. (Refer to Figure 14).

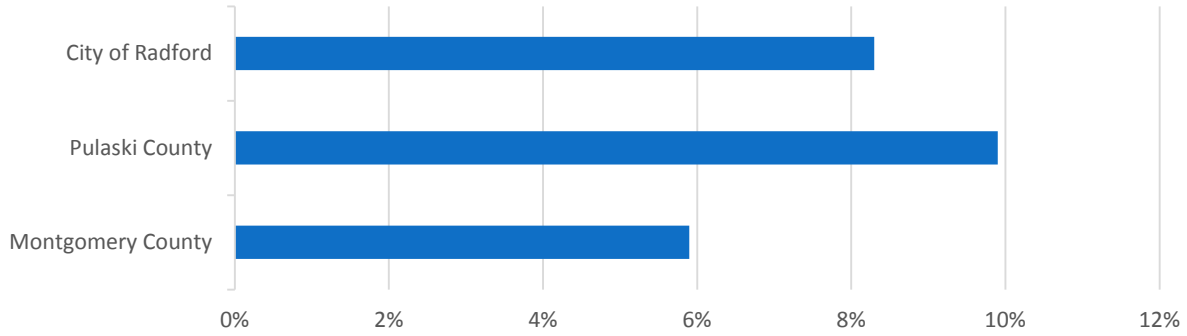


Figure 14: Percent of Commutes Longer than 45 Minutes.
Source: ACS 2013 5-Year Estimates.

Figure 15 provides a closer look at where the longer commutes in the region originate. Throughout the region there is a correlation between distance from activity centers, and longer commute times. The areas with the longest average commute times, up to 17 minutes longer than the median, are in block groups in rural areas, outside of major activity centers. These areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

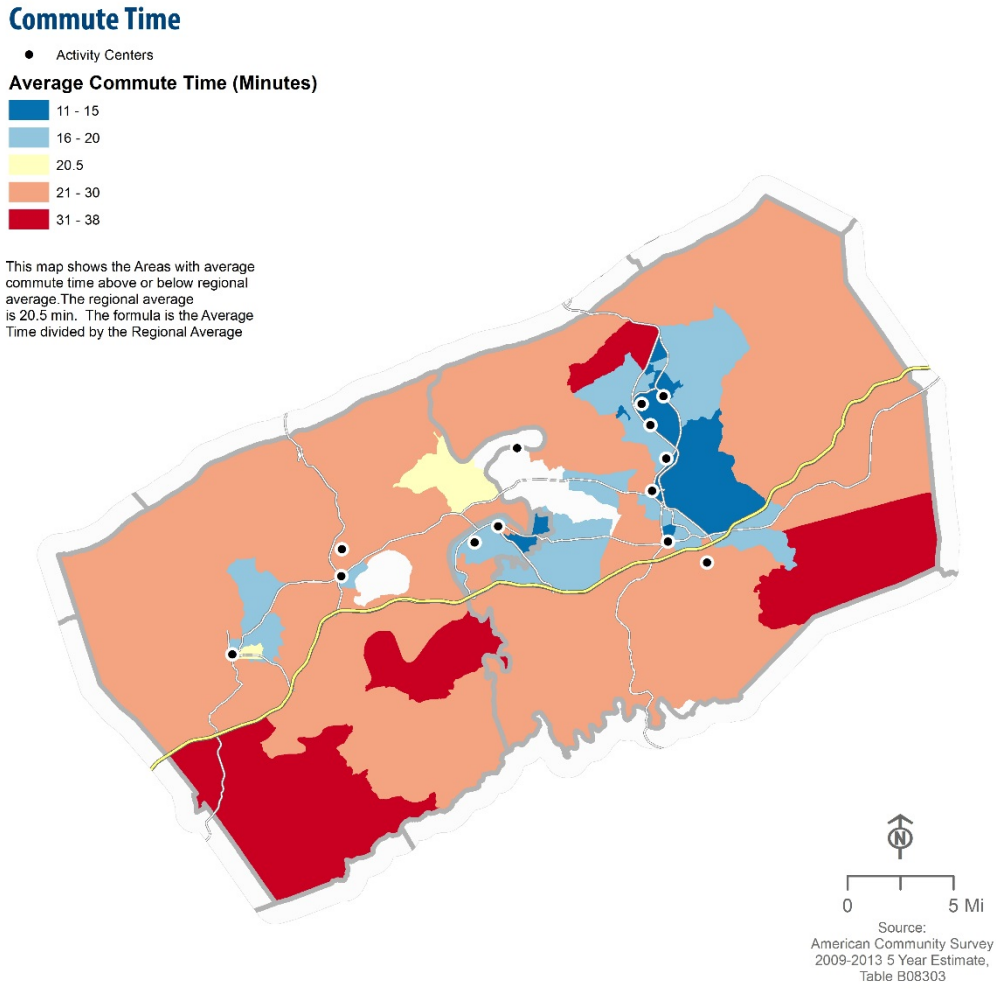


Figure 15: New River Valley Commute Times.
Source: ACS 2013, 5-Year Estimates.

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The Accessibility to employment measure was calculated using an accessibility model developed by the consultant team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

The accessibility maps show values ranging from highest to lowest in the region by travel mode, with the highest values in bright magenta and the lowest values in light blue color.

Auto Accessibility

Accessibility for auto travel in the region was measured as the number of jobs that can be reached from each census block group within a 45 minute drive, using actual travel speeds derived from FHWA HERE data, and decayed for distance. The areas with the highest level of auto accessibility were found around Christiansburg and Blacksburg. Areas in the region with high accessibility can reach between 79,767 and 101,337 jobs within a 45 minute drive. As expected, auto accessibility scores were lower in the western part of the region, which has fewer employment opportunities. Census block groups closest to New River Valley activity centers and highways, as well as the Roanoke region, had the highest auto accessibility. (Refer to Figure 16).

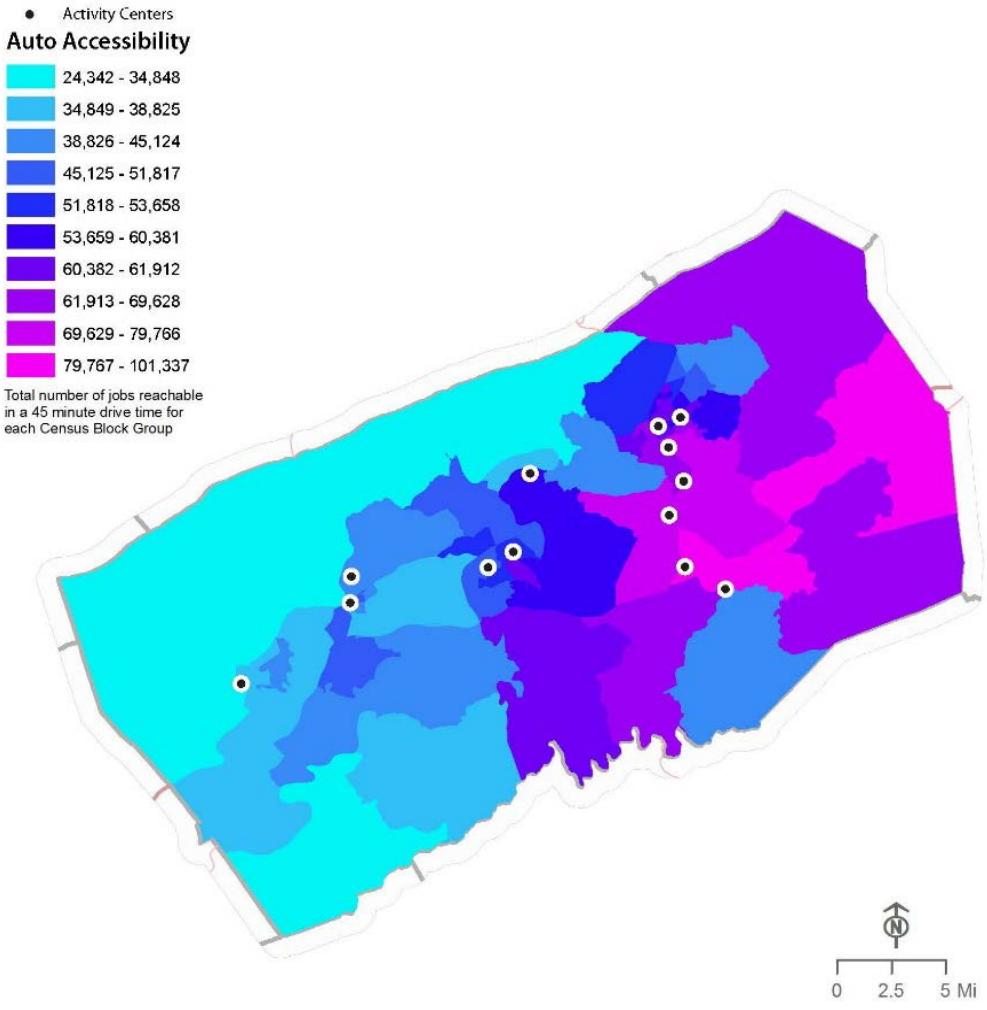


Figure 16: Auto Accessibility

Transit Accessibility

Outside of the Blacksburg and Christiansburg areas activity centers, there are few fixed-route transit options in the New River Valley area. While there is limited service in the City of Radford, many activity centers in the area lack transit service entirely. This is reflected not only in the low transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. In the highest scoring area for transit accessibility, commuters using transit can reach between 6,933 and 8,400 jobs within a 45 minute travel time. (Refer to Figure 17).

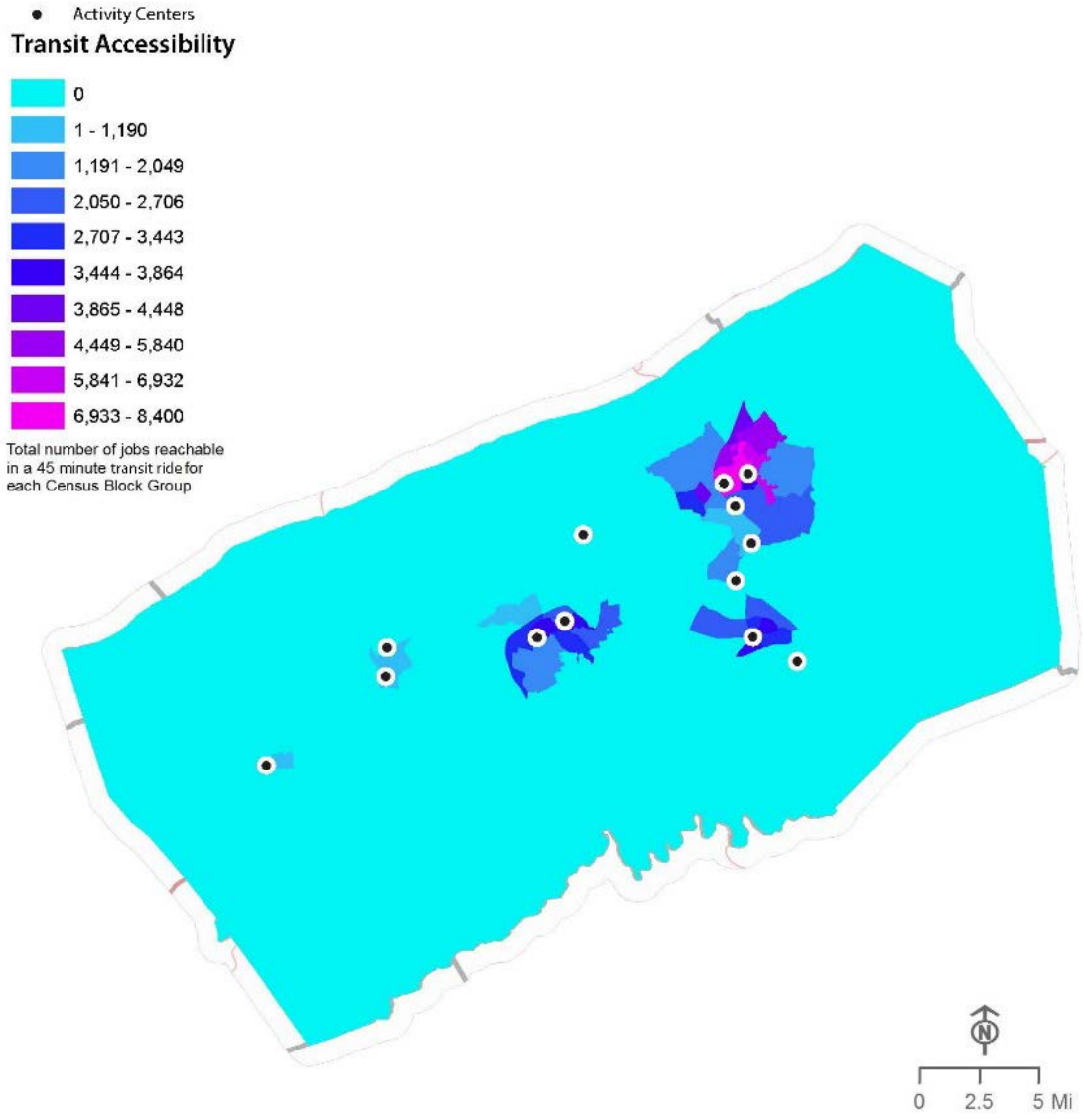


Figure 17: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the density of employment closely surrounding the origin of each trip. Areas surrounding activity centers, especially the Blacksburg and Christiansburg areas, scored the highest. These areas of high walk accessibility give pedestrians access to between 1,357 and 5,447 jobs. The high variability within even the highest scoring areas reflects the significance of both pedestrian transportation networks and job density in creating higher walk accessibility. (Refer to Figure 18).

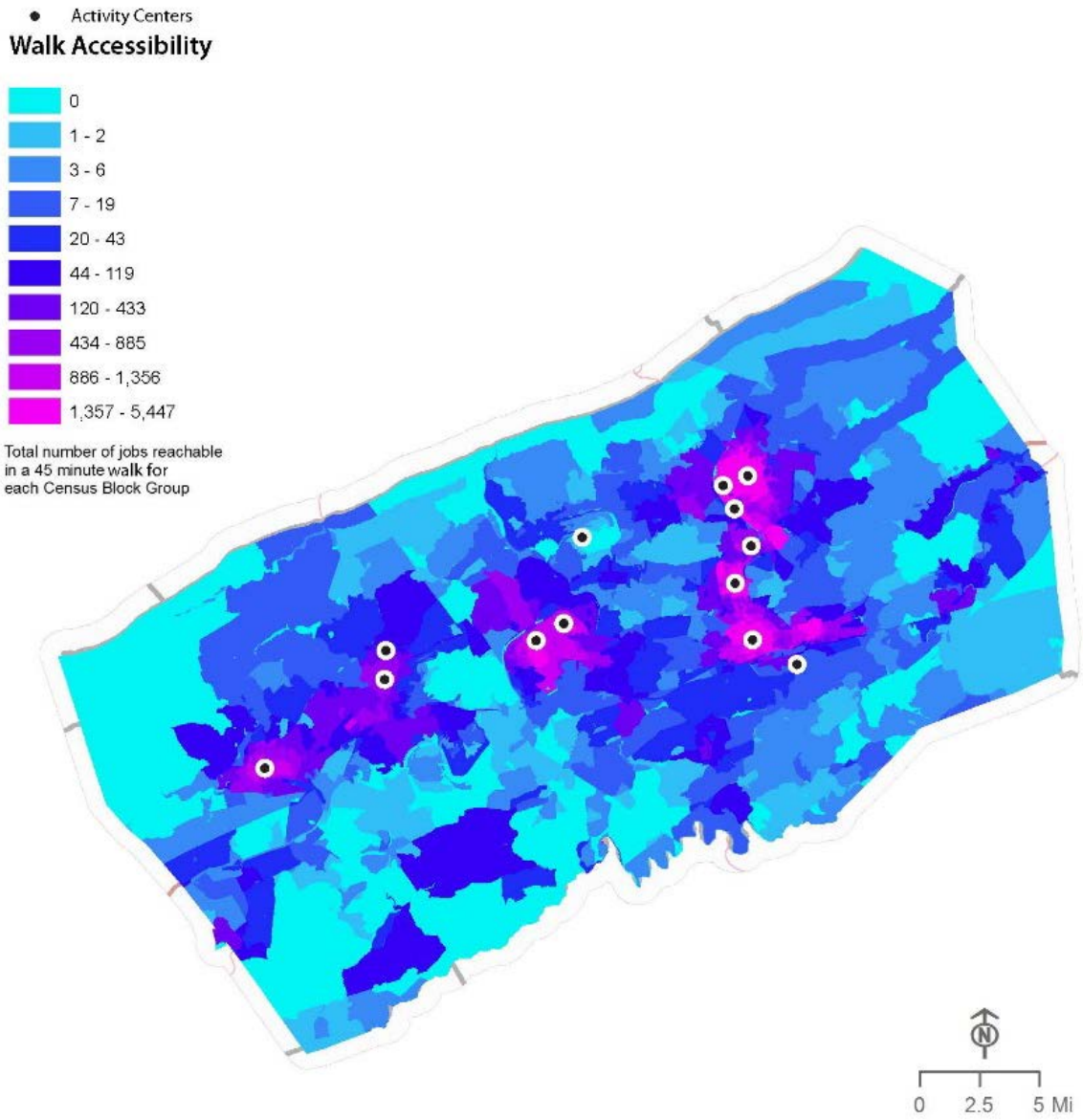


Figure 18: Walk Accessibility

Freight Accessibility

Interstate 81 and US Route 460 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent partly on the proximity of access to highway access ramps. Most activity centers in the region are within a five minute drive from a major arterial ramp. (Refer to Figure 19).

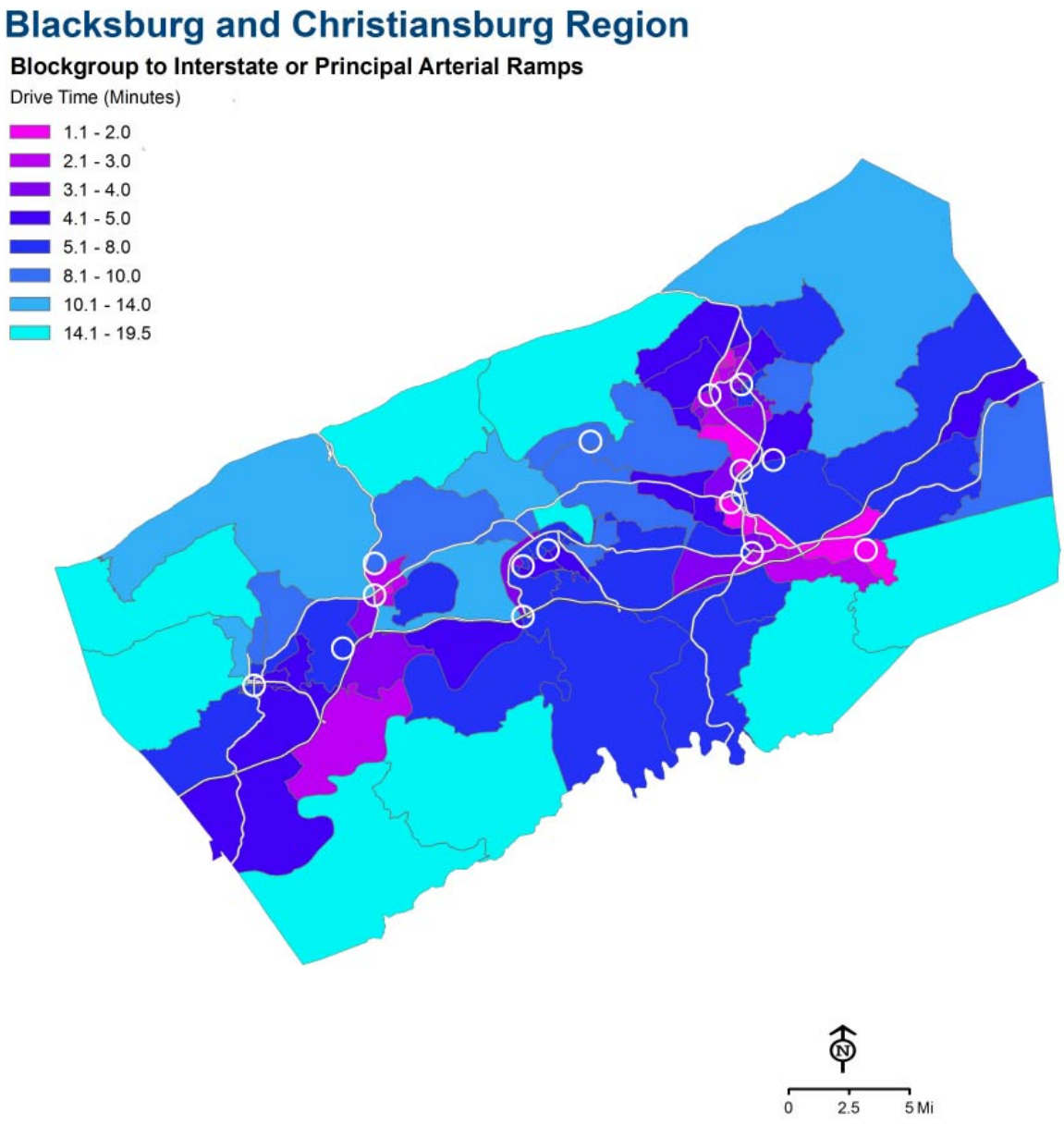


Figure 19: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the New River Valley area are

located near Interstate 81 or US Route 460. Most urban areas in the region have access to a warehouse or distribution center within an eight minute drive. (Refer to Figure 20).

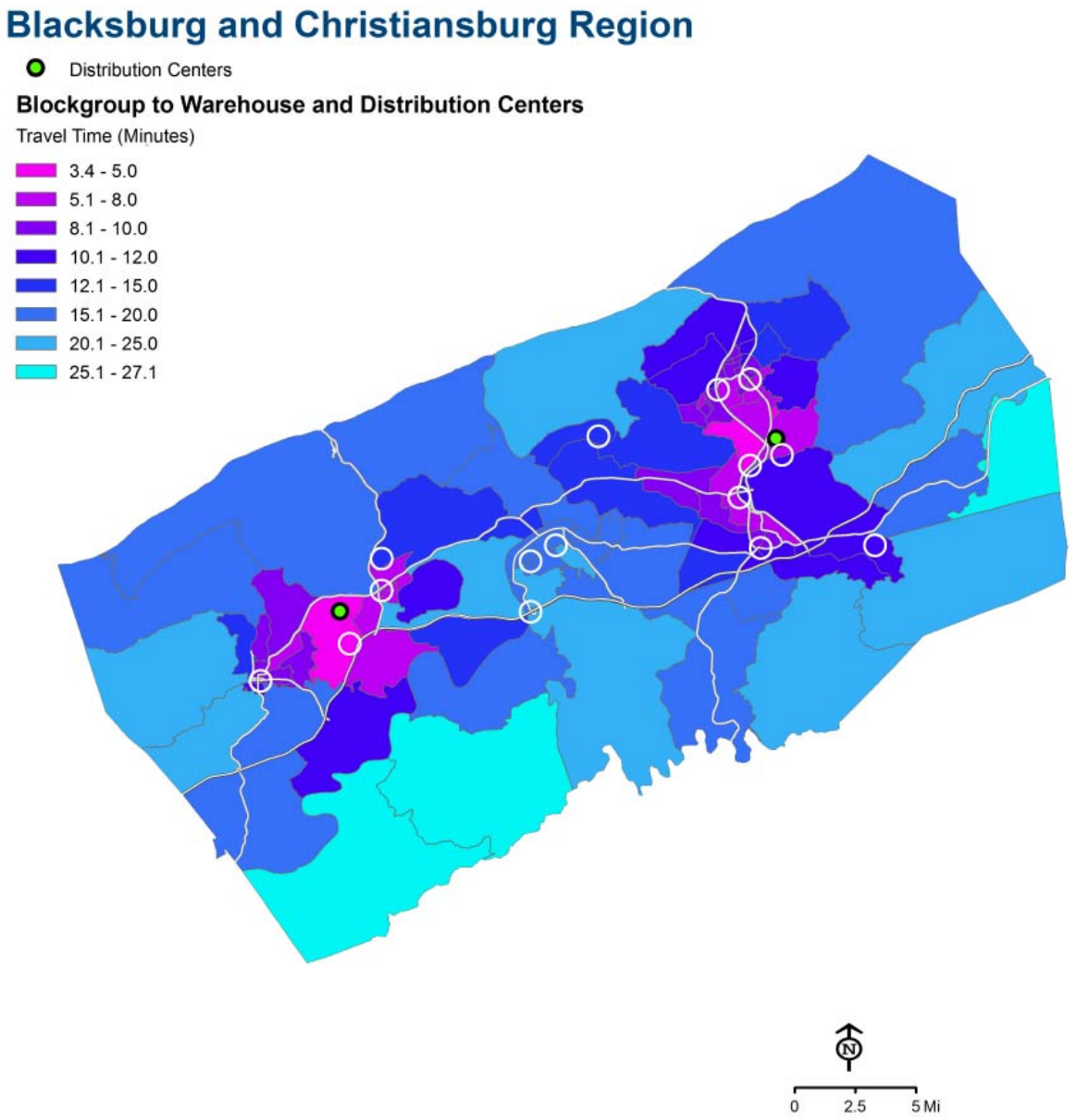


Figure 20: Access to Warehouses & Distribution Centers

Norfolk Southern's Heartland and Crescent Rail corridors run through the New River Valley area. These rail lines pass through Christiansburg, Radford, and the town of Pulaski. Richmond International Airport is the closest major airport in Virginia that handles large quantities of freight. It is a three and a half hour drive to Richmond International Airport from Blacksburg, and five hours from the Eastern portion of the region. However, Piedmont Triad International Airport in Greensboro is a two hour 15 minute drive from Blacksburg while Charlotte Douglas International Airport is 2 hours 45 minutes. (Refer to Figure 21).

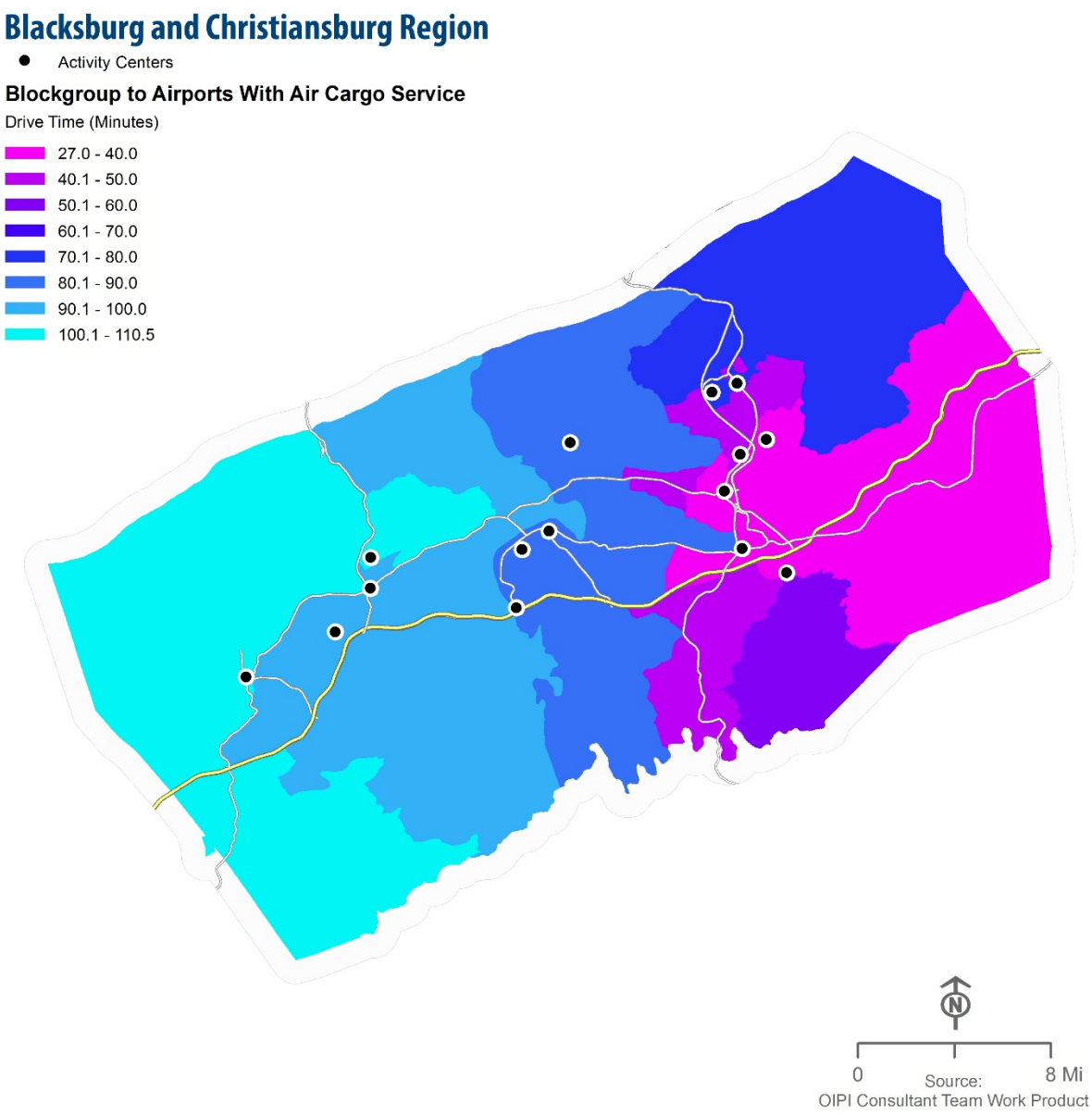


Figure 21: Access to Airports with Major Air Cargo Service

D. Roadway Measures

This assessment identified the transportation conditions in the New River Valley region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 22 below, is defined as the ratio of the median speed

to the 90th percentile speed. The map below uses data from morning peak times for 2014. Major corridors and arterial roadways with heavy commuter traffic throughout the region were analyzed using INRIX data from VDOT. Overall, scores on the travel time reliability index indicate a high level of travel time reliability for the region. The reliability index scores are higher in several locations along US Route 460 near Blacksburg, representing slightly lower levels of travel time reliability. There are, however, no areas of significant concern in the region. (Refer to Figure 22).

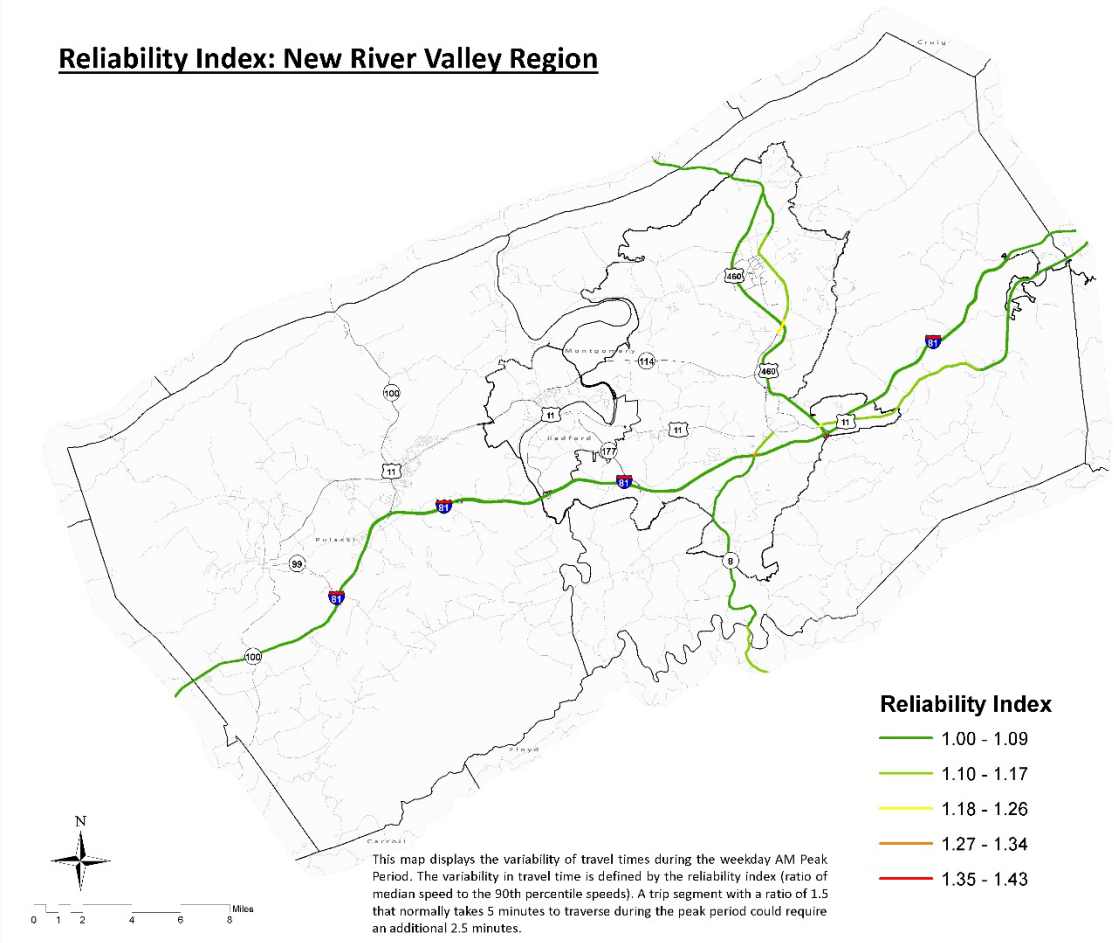


Figure 22: Travel Time Reliability

Percent of Time Congested

Congestion is an important determinant of roadway Level of Service. The percentage of time congested was calculated for morning peak times in 2014 using INRIX data. Roadways were considered significantly congested when they are operating at less than half the free-flow speeds. Free flow speed was defined as the 85th percentile of overnight speeds. According to the analysis, there are no major congestion problems in the New River Valley region during morning peak times. (Refer to Figure 23).

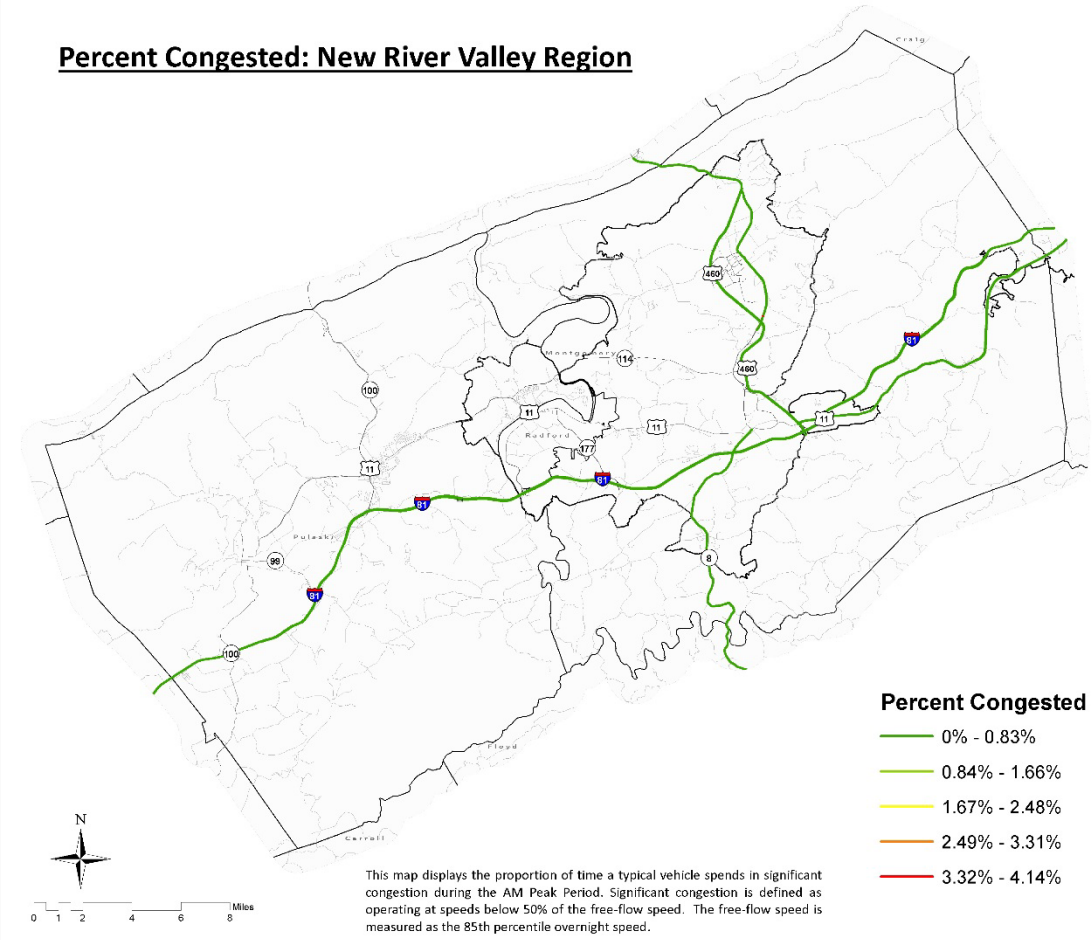


Figure 23: Percent of Time Congested

Travel Time Delay

Travel Time Delay was calculated for major corridors in the region. (Refer to Figure 24). The following map displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit. The areas with the most significant delay In the New River Valley occurred along Interstate 81, and along US Route 460 to the north of Blacksburg.

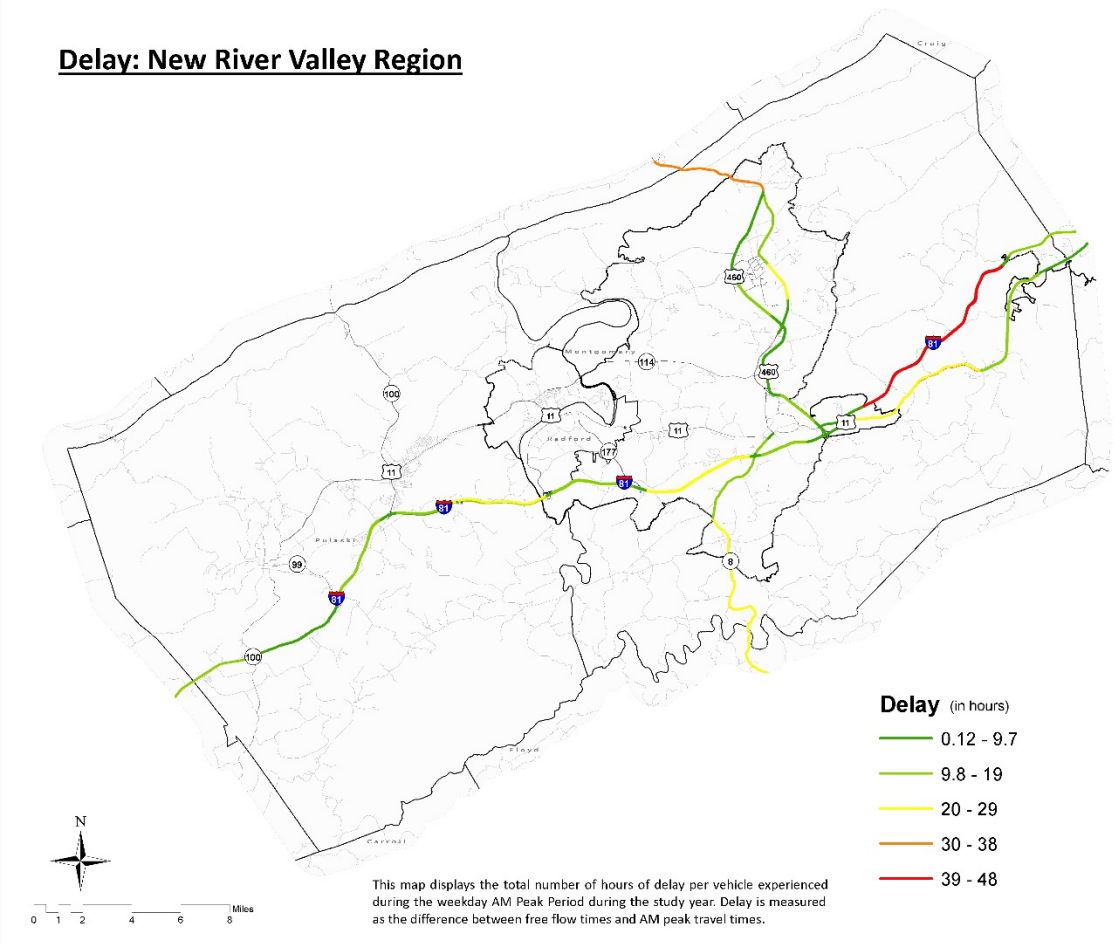


Figure 24: Travel Time Delay

Median Speeds

Median Speeds were calculated for major roadways in the region during afternoon peak hours in 2014. (Refer to Figure 25). The following map displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. Travel speeds fall below the speed limit in areas largely along route 460.

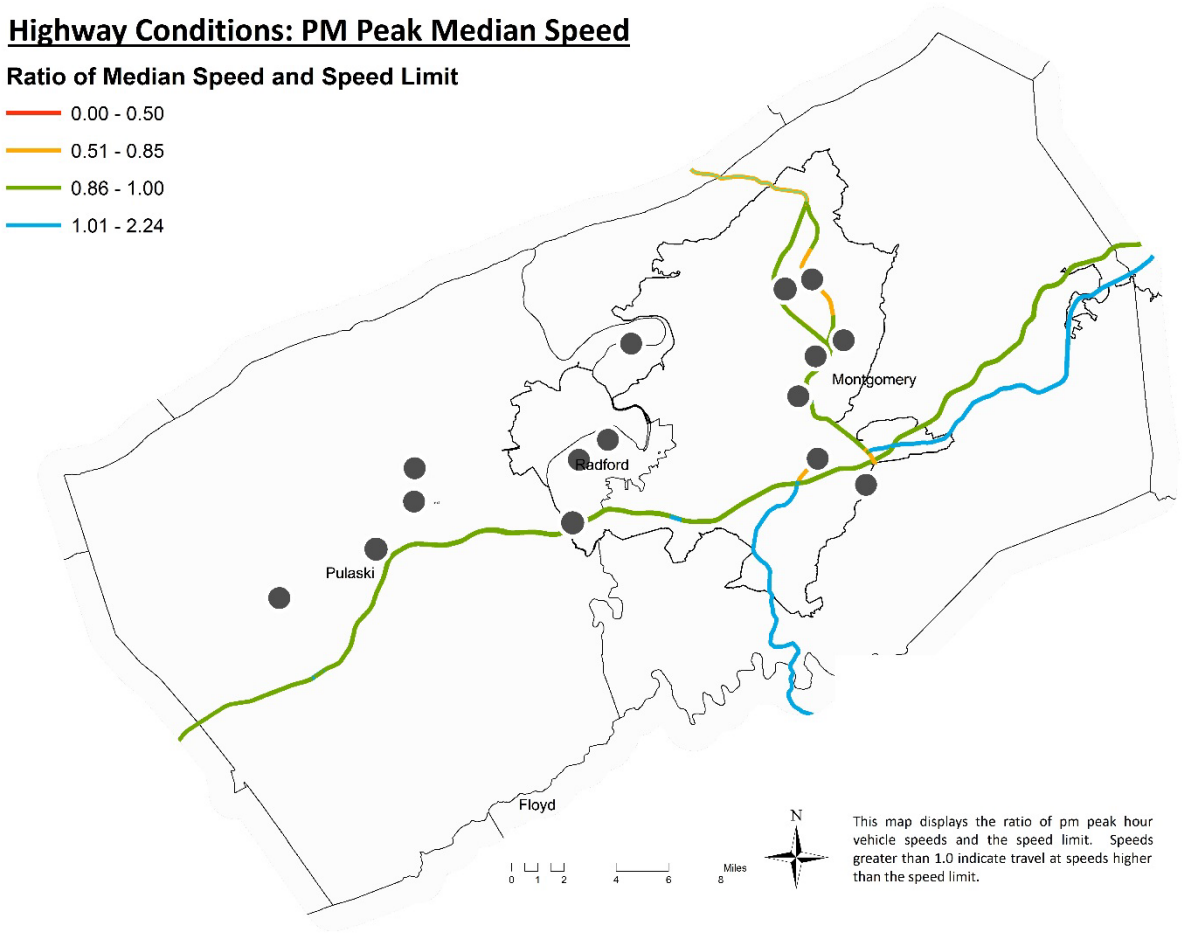


Figure 25: Median Speeds

E. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are the regional and local commodity flows in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the New River Valley Region, an average of 99% of the dollar value of all goods that are moved through the region are moved by truck. Rail is the only other mode routinely used to move freight through the region. The City of Radford uses rail to move freight for 2% of goods, the most of any jurisdiction in the region. But overall throughout all jurisdictions in the region, trucks are the primary means of moving goods. (Refer to Figure 26).

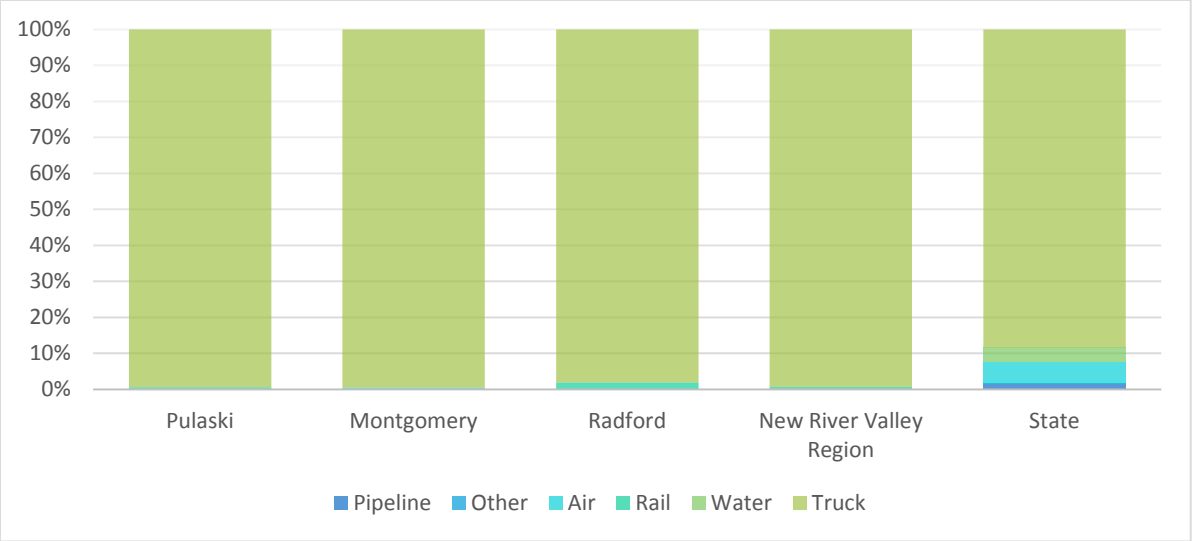


Figure 26: Comparison of Freight Modal Dependence

Location Quotients are used to compare the prominence of freight modes between the New River Valley Region, and the State as a whole. The New River Valley Region relies on trucks for freight movement 1.2 times more than the does the State as a whole. Rail and air transportation for goods is more common for the state on average than it is for the New River Valley Region. This is due in part to the proximity of I-81, allowing for easy truck-based freight movement. It also reflects the relatively large distance from the New River Valley area to major airports with air cargo service. (Refer to Figure 27).

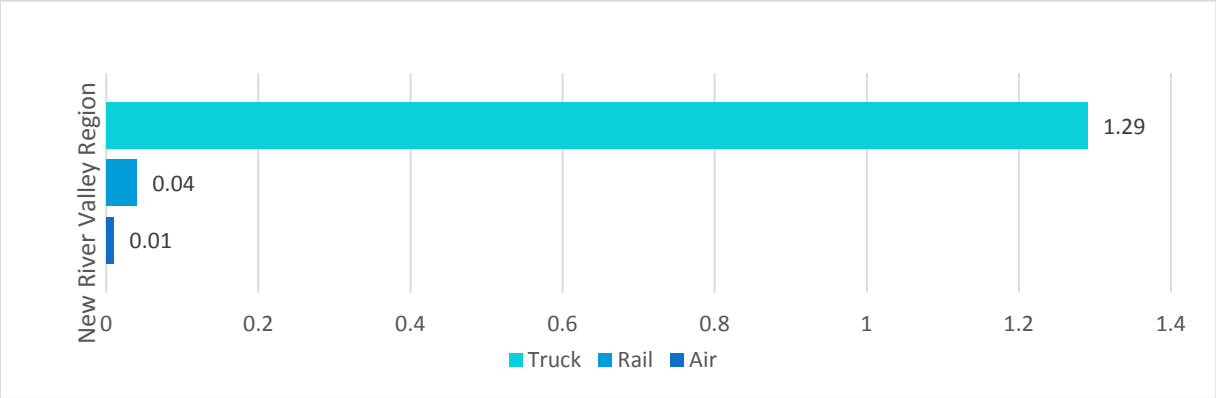


Figure 27: Location Quotient by Mode of Freight Travel

Top Commodities

Transportation equipment (a STCC category, which includes all types of vehicles as well as engine and vehicle) accounts for the most valuable freight moving both to and from the New River Valley Region. Other manufactured goods like electrical equipment, chemical products, and machinery make up the other most important types of freight moving throughout the region. The Region exported $1.6 billion more transportation equipment products than it imported in 2012. Overall, the New River Valley region

imported $4.1 billion dollars' worth of goods and exported $5.23 billion dollars' worth of goods, resulting in $1.13 billion dollars of net exports in 2012. (Refer to Figure 28).

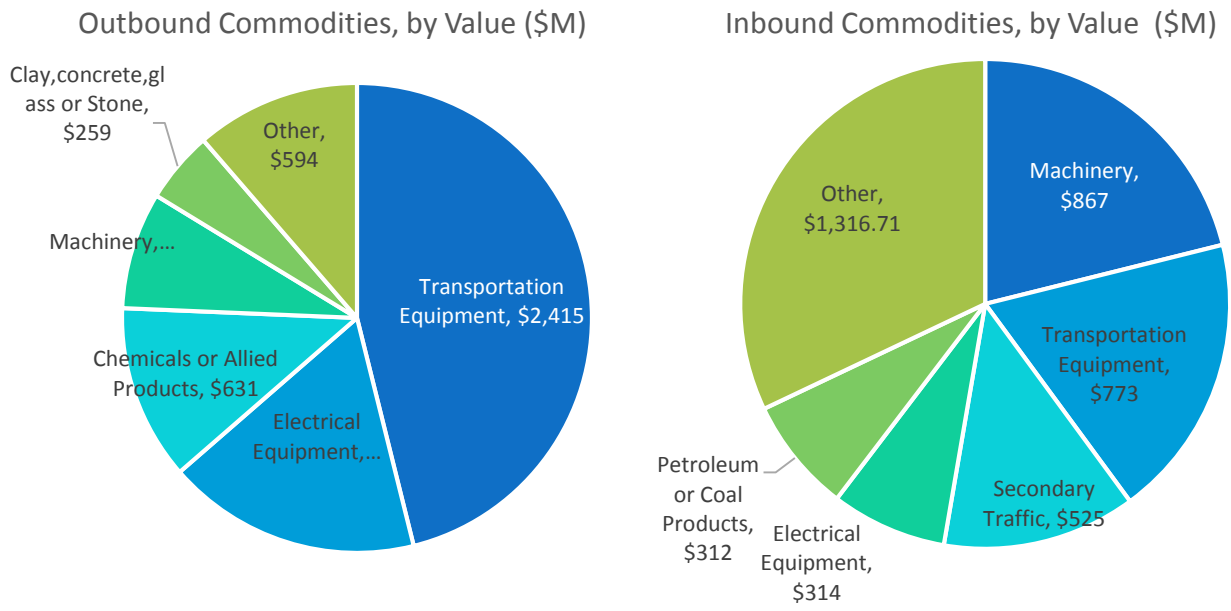


Figure 28: Top Freight Values by Commodities.
Source: TranSearch, 2012

The Southeast region, as defined by the Bureau of Economic analysis, is the most important destination for freight from the New River Valley, and the New River Valley region imports the highest value of goods from the Southeast region. In 2012, $2 billion dollars of freight was exported to the Southeast, while $1.8 billion dollars' worth of freight was imported to the New River Valley Region. (Refer to Figure 29).

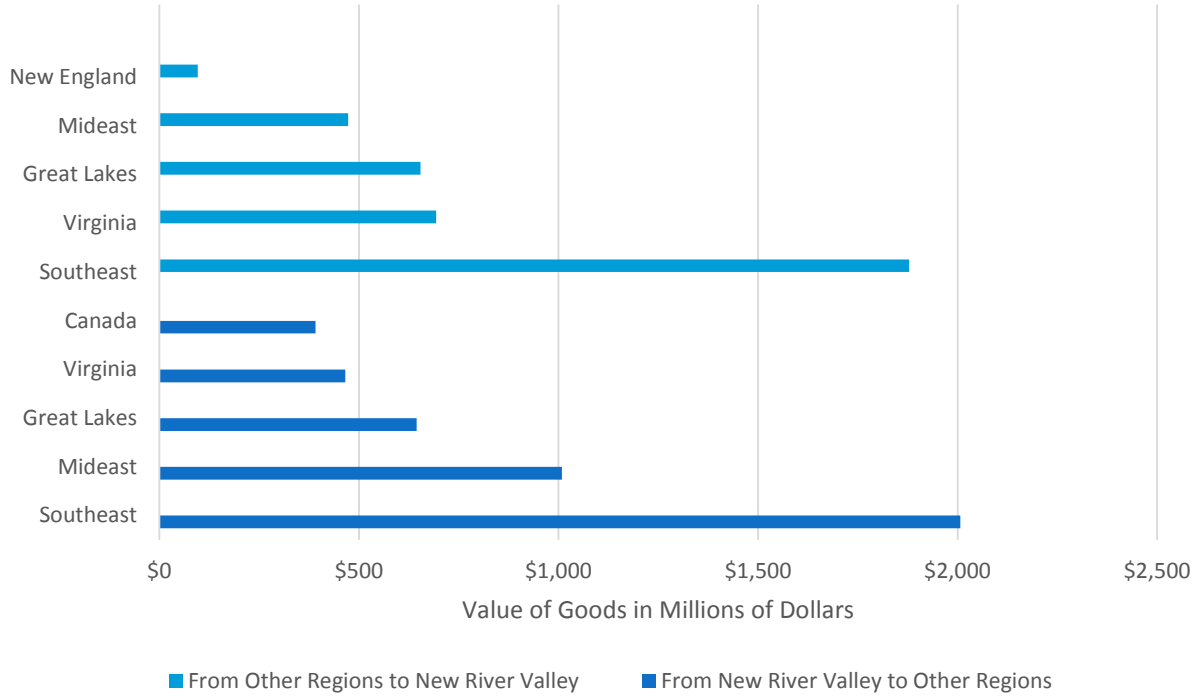


Figure 29: Top Freight Values by Region.
Source: TranSearch, 2012

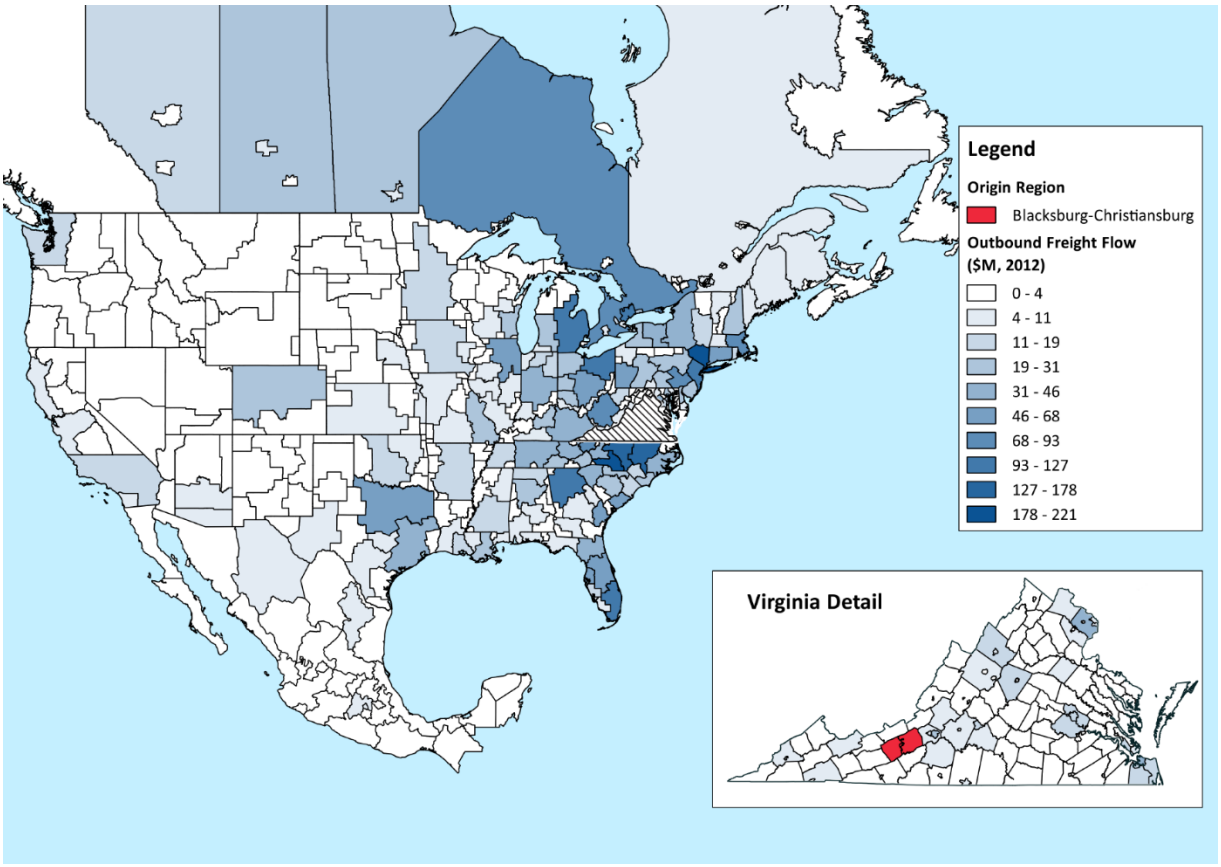


Figure 30: Outbound Freight Destinations
Source: TranSearch, 2012

Nationally, the majority of the freight exported from the New River Valley is shipped throughout the East side of the Mississippi. North Carolina, New York and New Jersey, and Ohio are important trading partners. (Refer to Figure 30.)

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs were identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. Key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described as Economic and Transportation Linkages, which are further discussed below and in the reference document, VMTP 2025 Needs Assessment: Regional Networks Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of broad regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also used a spatial analysis for the Region to provide observations about needs for specific corridors, travel markets, and activity centers.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the draft transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs. These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability
2. Network Connectivity
3. Transportation Demand Management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity/Operations Needs (i.e. Safety and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the Study Team against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce Needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the New River Valley, it showed a strong Local sector equating to 58% of economic activity, and smaller

distributions for both the freight and knowledge sector, at 19% and 23% respectively. However, based on the industries that are forecast to have the greatest growth, the Freight sector is projected to have the greatest relative growth.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire in the region to continue to support the dominant manufacturing sector, particularly with respect to goods movement needs, but also to support the expected growth of the knowledge sector and its needs for reliable commuting and additional modal travel options. Using the correlation table in Section B, this translates into transportation needs such as freight accessibility and passenger reliability on the region's prime corridors, such as Interstate 81 and US Route 460, and the Crescent and Heartland freight rail corridors. It also indicates the need for addressing any bottlenecks along these prime corridors to further support reliable travel for both commuters and goods movement. In addition, other key corridors that support activity centers in the region, such as US Route 11 are important commuter routes that serve economic growth and connect activity centers in Pulaski, Dublin, Radford, and Christiansburg.

The forecasted growth in the freight economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the freight dependent sector particularly point to improving highway access, freight accessibility and reliability, and addressing bottlenecks. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers in rural areas. Fixed route transit exists in the region only in Montgomery County, and the City of Radford. However, the expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector, which is driven primarily by educational institutions like Virginia Tech and Radford College, would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs

that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs according to activity centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

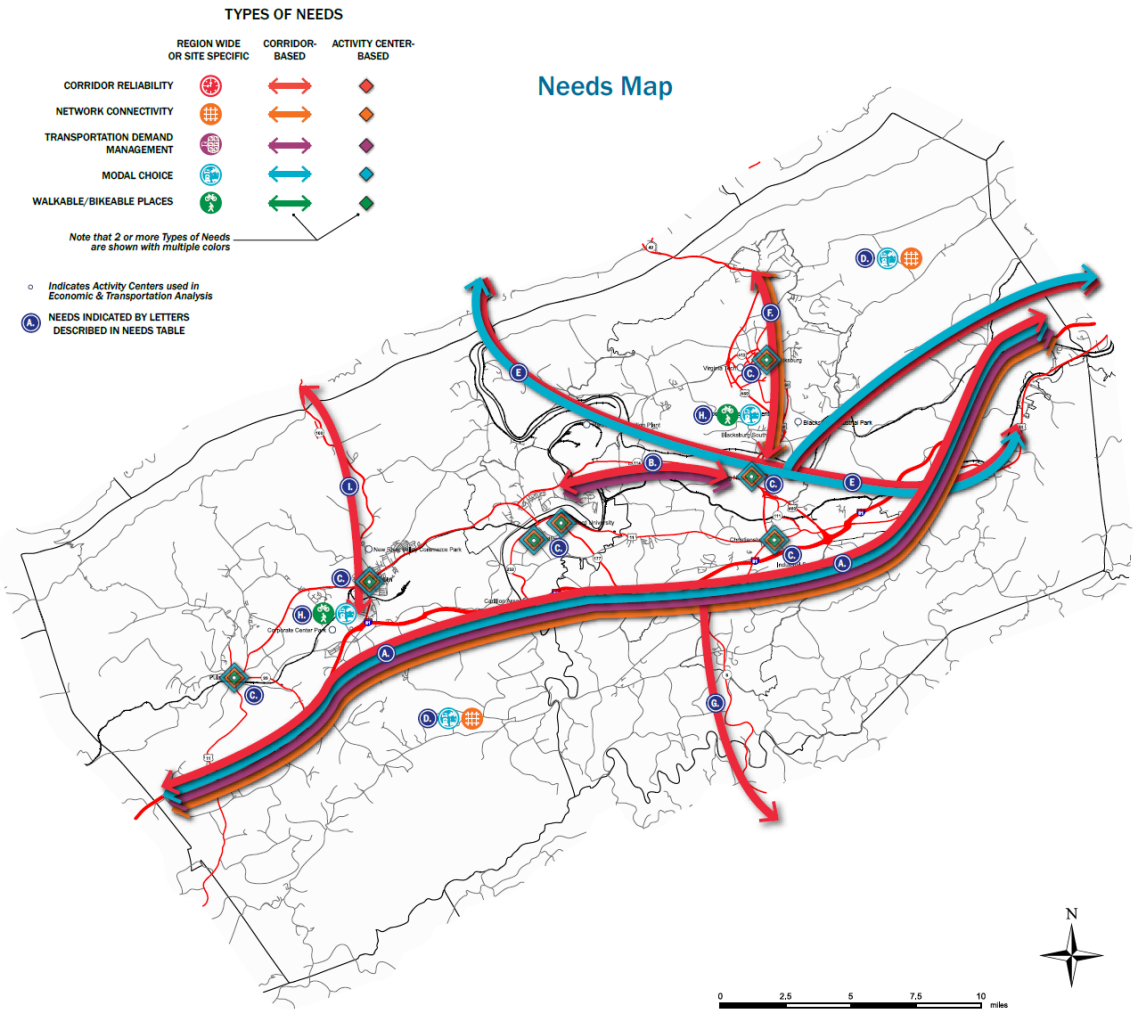


Figure 31: Summary Needs Map for the New River Valley Region

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

1. Category of Need

2. General Description of Need
3. Economic findings to support Need
4. Transportation findings to support Need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Table 11: Findings of Needs

A. I-81 Corridor Reliability	
NEED	**Interstate 81 is a vital regional connector within the region and to markets outside the region. Safety and intermittent delay issues due to incidents, as well as bottlenecks created by freight traffic create reliability issues that are also linked to regional needs for parallel connectivity, transportation demand management and modal choices.**
ECONOMIC	The corridor gives inter- and intra-regional access to multiple activity centers and is of vital importance for the regional economy through its role in carrying freight, commuter, tourist and local travel markets to and through the region.
TRANSPORT.	There are several areas showing delay on the I-81 corridor which is potentially influenced by the proportion of truck traffic (24% truck vehicles from local data sources). Lack of parallel network in the area also contributes to incident delays. Lack of modal choice in the region makes the corridor carry proportionally large commuter volumes.
B. Pepper's Ferry / North Christiansburg Reliability	
NEED	**Regional commuter patterns and roadway measures show a need for a higher level of travel time reliability between Activity Centers in Christiansburg and Radford to encourage local sector growth.**
ECONOMIC	Pepper's Ferry Road is a primary connector between Montgomery and Pulaski Counties, linking activity centers in Radford and Christiansburg. Improving travel time reliability and reducing bottlenecks along the roadway would support local and knowledge sector growth in the area.
TRANSPORT.	Between 6,000 and 10,000 people commute between Montgomery County, the City of Radford, and Pulaski County every day, with Pepper's Ferry Rd as a major commute corridor. Although statewide data shows few delay or reliability issues, local data indicates bottlenecks due to safety and intermittent congestion issues.

C. Walkability in Activity Centers

NEED

Improved walkable connections serve as placemaking infrastructure that attract the 21st century workforce. Enhance regional walk-ability and bikeability by making last mile connections to regional trails and key activity centers.

ECONOMIC

Enhancing walkable streetscapes has been shown to correlate to attracting workforce and building the economy, especially in knowledge sector. Downtown portions of Blacksburg and Radford are seeing new workforce attracted to placemaking amenities such as walkable streets - enhanced walkability is needed in existing and emerging activity centers regionally

TRANSPORT.

The region has several historic village/town centers (Radford, Dublin, Pulaski, etc.) with good walkable networks - need to connect these to regional trails and need to enhance walkability and bikeability in the emerging employment centers in the region.

D. Regional Modal Choice

NEED

The low level of transit accessibility throughout the region creates a need for expanded transit service in Activity Centers. Developing inter-city bus connections between jurisdictions in the region would foster local and knowledge sector growth.

ECONOMIC

Good bike/ped and transit access and recreational amenities show strong correlation to emerging workforce dynamics nationally. In addition, strong education sector and growing knowledge sector in the region would be supported by improved hiker/biker networks and expanded transit service. Improved access to town and village center shopping also aids the local services sector.

TRANSPORT.

Regional bus service between Roanoke and Blacksburg/Christiansburg has helped serve important commuter travel markets. Additional regional bus service is lacking to connect important commuter, health care and educational centers

E. Rail Reliability and Modal Choice

NEED

Congestion along the Crescent and Heartland corridors require corridor reliability enhancements to ensure freight reliability. Expanding passenger rail service can increase modal choice for knowledge sector workforce

ECONOMIC

Norfolk Southern's Heartland and Crescent rail corridors intersect in the region and provide major freight economic benefits. The growing regional knowledge sector lacks good modal choice for passenger rail to major markets.

TRANSPORT.

According to local studies, 30% of surveyed freight generators use rail as part of their freight movement operations. The region also shows very strong surveyed support for passenger rail connections to major markets. Freight corridor bottleneck improvements could shift a portion of truck shipments from I-81 to these rail corridors

F. Rt. 460 Blacksburg / Christiansburg / Main Street Area Reliability

NEED

Rt. 460 through the Blacksburg/Christiansburg area provide critical 'last mile' linkages from the surrounding region to major employment centers. Preserving reliability and enhancing network connectivity are critical to continued economic strength in the region.

ECONOMIC

An increase in accessibility for the workforce in Northern Christiansburg can support local sector growth. Rt. 460 provides regional accessibility between activity centers and the larger region. Provides access to a major mall, retail centers and other local economic sector businesses. Connects Virginia tech supporting a major employment center and an important part of the Knowledge sector.

TRANSPORT.

Some delay issues were present in the statewide data on Rt. 460 and Main Street, reinforced by local stakeholder input on congestion and need for parallel capacity on these corridors.

G. Floyd County Commuter reliability

NEED

Ensuring good reliability for the local sector workforce in areas to the south of the Christiansburg and Blacksburg employment centers by addressing delay issues on Route 8 as a primary commuter corridor.

ECONOMIC

The local sector workforce in the North Christiansburg and Blacksburg activity centers rely heavily on rural workforces and Route 8 is a prime connector to workforces to the south.

TRANSPORT.

According to local data, a significant segment of the workforce commutes from Floyd County to activity centers in the region and Route 8, the primary commuter corridor shows some delay issues on statewide datasets.

H. Regional Trail Connectivity

NEED

Strengthening the regional trail network by connecting the New River trail to the Huckleberry Trail and regional trail systems would increase network connectivity and offer more modal choices important for the growing knowledge sector

ECONOMIC

National findings show that greenways and walkable networks help attract key sectors of the 21st century workforce, supporting the growing regional knowledge-based economy. A regional greenway network also supports recreation and tourism, generating local sector growth.

TRANSPORT.

Much of the region outside the historic village and town centers, has relatively low walk accessibility. Local information shows strong demand for greater walkability and recreational opportunities in the region.

I. Giles County Freight & Commuter reliability

NEED

ECONOMIC

TRANSPORT.

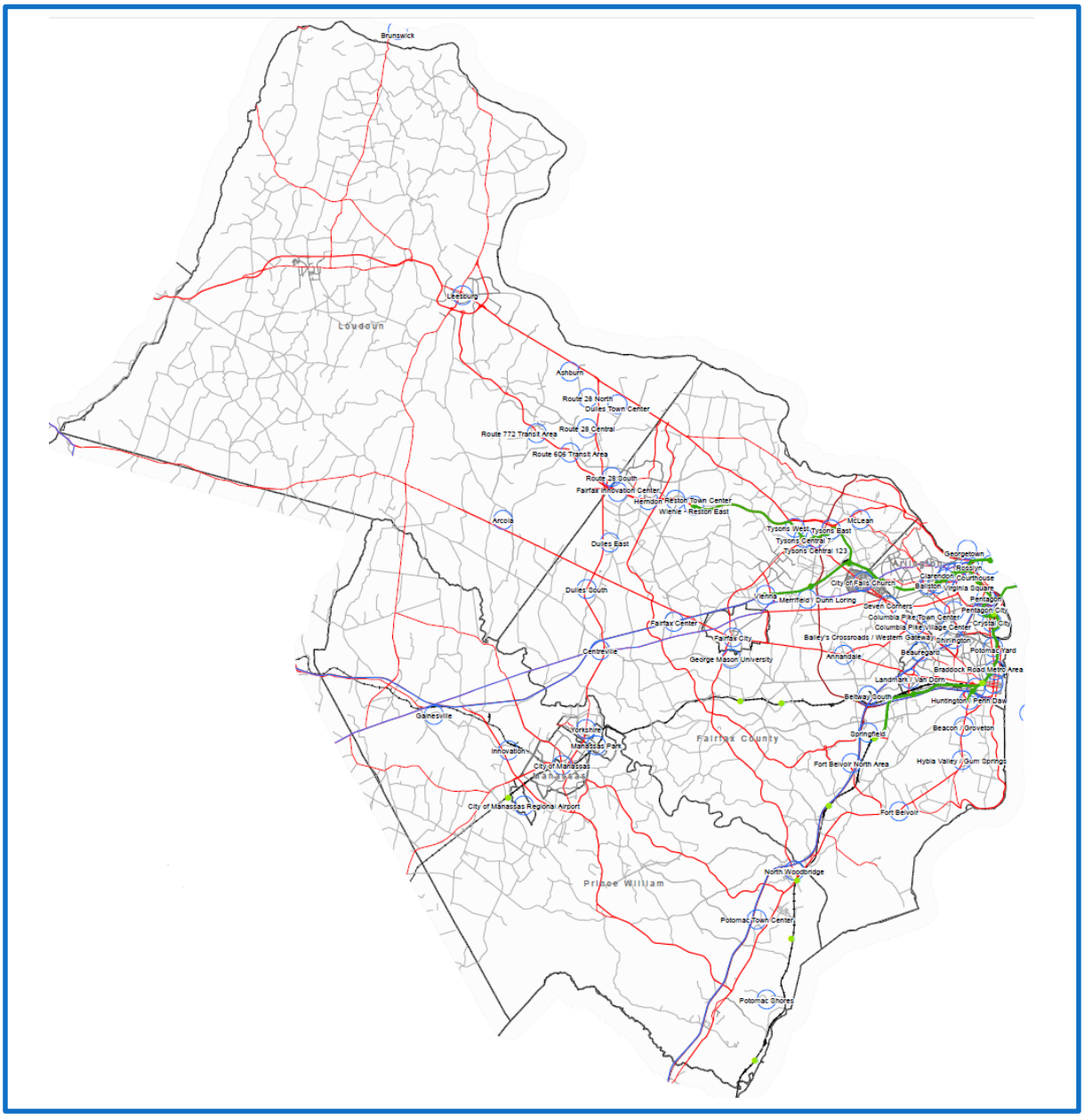
Ensuring good reliability for the freight-dependent workforce travelling between Giles County and Dublin by addressing delay issues on Route 100 as a primary commuter corridor.

Freight-dependent transactions between Celanese Corporation / the Industrial Park in Giles County and Volvo in Dublin rely heavily on the reliability of commutes along Route 100.

According to local stakeholders, a significant segment of the workforce commutes between Dublin and Giles County, and Route 100, the primary commuter corridor, has reports of reliability issues.

VMTP 2025 Needs Assessment

Regional Needs Profile



Northern Virginia

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses. The purpose of this Transportation Needs Assessment to identify the Transportation Needs that are part of the Northern Virginia Regional Network that would support regional industries and workforces.

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Northern Virginia regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region. However, an initial needs analysis area for each region has been defined as the MPO boundary, with the stipulation that if an MPO boundary includes only a portion of a county, the entire county will be included in the needs analysis area. All transportation infrastructure within these defined boundaries is included within the regional network analysis. The determination of Transportation Needs will primarily be focused on this needs analysis area. However, each region is different and consideration will be given to the economic characteristics of each region. If, for example, there is a particular industry that is located outside the needs analysis area but is important to the regional economy; or, if a key corridor is located outside the needs analysis area but supports commuters or goods movement that are important to the regional economy, it may be included in the Needs Assessment for that region.

The Northern Virginia Region is defined as Arlington County, Fairfax County, Loudoun County, Prince William County, City of Alexandria, City of Fairfax, City of Falls Church, City of Manassas, and City of Manassas Park for the needs analysis.

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennial generation. In addition, goods movements will be critical to supporting Virginia's current and emerging businesses in the future. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on

understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from Northern Virginia stakeholders to identify an overall current economic profile for the region. The components of the current economic profile layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Activity centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, the Study Team analyzed research regarding basic demographics as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report inform and support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to Weldon Cooper, the current population in the state of Virginia is 8,185,867 (Table 1). By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 and 1.6 million residents. Statewide per capita incomes are expected to rise 2 percent, from $44,765 to $54,226.

Table 1: Statewide Population Projections for Virginia

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Regional Demographics

As shown in Table 2, substantial population growth is projected for the Northern Virginia Region. Projections range from approximately 295,000 to 722,000 new residents in the region by the year 2025.

Table 2: Northern Virginia Region Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
2,346,221	**2,641,728**	**3,068,306**

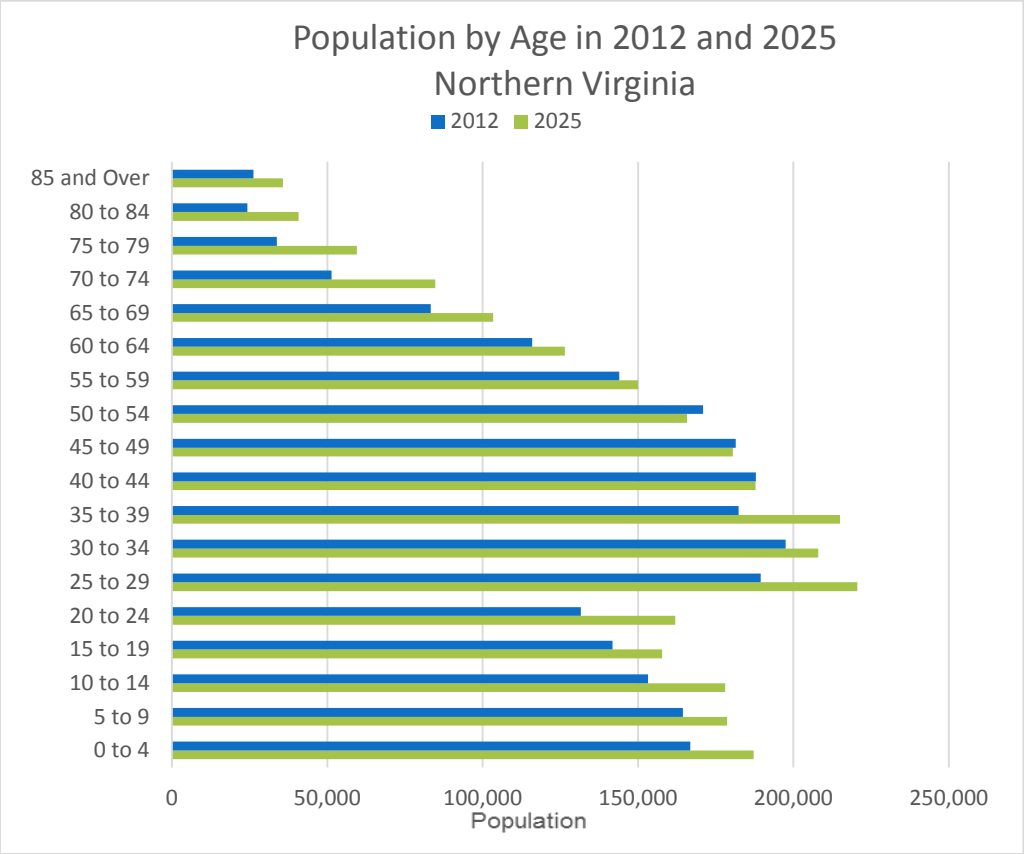
Table 3 provides a closer look at population projections by jurisdiction within the Northern Virginia Region. All of the region's jurisdictions are expected to grow, with the largest growth expected in the more remote areas of the region – Loudoun and Prince William Counties. Still, growth is expected to be strong in more "inner" jurisdictions as well, including Arlington County, the City of Alexandria, and the City of Falls Church.

Table 3: County and City Population Projections from Metropolitan Washington Council of Governments – Round 8.3 Cooperative Forecasting, 2014

Jurisdiction	2010 Population	Projected 2025 Population	Change
Arlington County	207,600	248,700	20%
Fairfax County	1,081,700	1,212,500	12%
Loudoun County	312,300	452,200	45%
Prince William County	402,000	530,700	32%
City of Alexandria	140,000	167,100	19%
City of Fairfax	22,700	26,400	16%
City of Falls Church	12,300	15,500	26%
City of Manassas	37,800	43,100	14%
City of Manassas Park	14,300	15,900	11%

According to Woods & Poole, per capita income for the region is expected to rise 19 percent (slightly less than the state average of 21 percent) from $62,403 to $74,090 (Figure 1). This income growth may be lower than the state average due to a higher proportion of the region's residents living on (often fixed) retirement incomes, and/or slower expected growth in federal employment. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

Figure 1: Comparison of 2012 and Projected 2025 Population of the Northern Virginia Region per Woods & Poole Economics, Incorporated, 2014 State Profile



C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in Northern Virginia.

Top Industries by Output

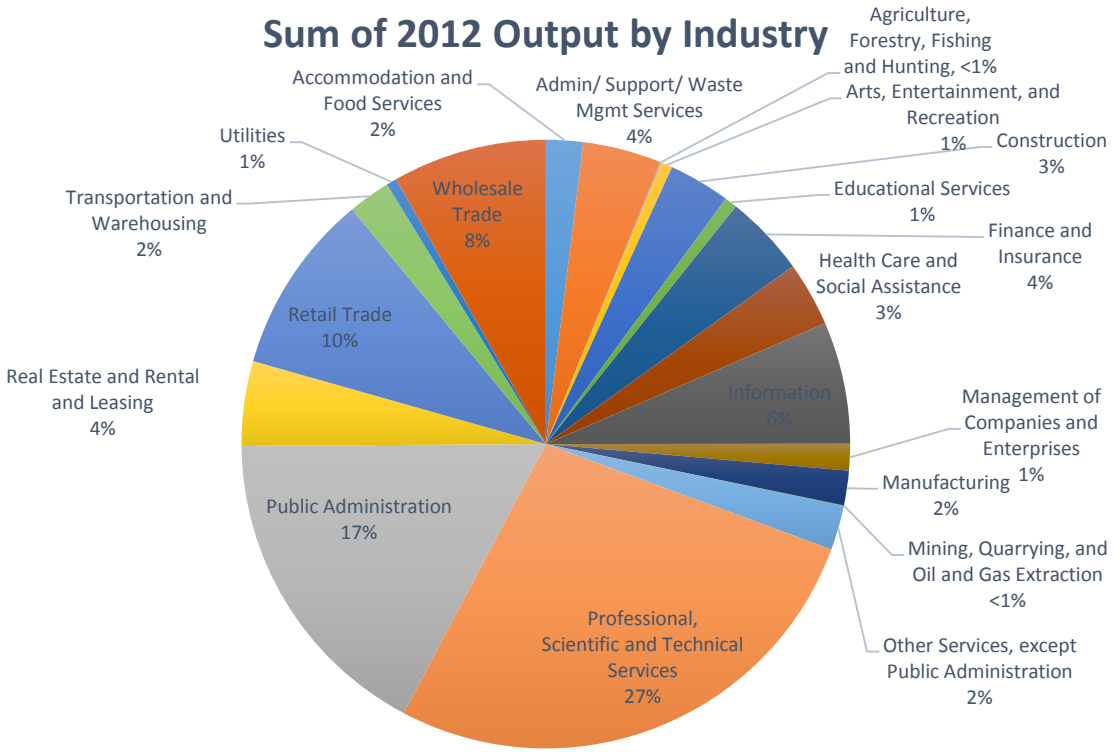
As shown in Table 4, professional, scientific, and technical services is the strongest industry in the Northern Virginia region in terms of economic output. This is due largely to the presence of many large and small firms that provide services to the federal government and other organizations located in the region due to the federal government's presence. For similar reasons, public administration comes in second, reflecting the large number of professionals employed by the Federal government. Retail trade, wholesale trade, and information round out the top five industries in the region with the greatest economic output. Many workers in these sectors serve the local economy and the workers in the region's driving industries. The top five industries accounted for approximately 70 percent of all the Region's output in 2012.

Table 4: Current Industries by Output per IHS Global Insight Data, 2012

Top Industries	2-Digit NAICS Code	% of Output
Professional, Scientific, and Technical Services	54	27
Public Administration	92	17
Retail Trade	44	10
Wholesale Trade	42	8
Information	51	6

Figure 2 below shows the region's output by industry for all industries. The remaining 30 percent of of the region's 2012 output is divided among many smaller sectors.

Figure 2: Breakdown of 2012 Output in the Northern Virginia Region by Industry



Top Industries by Employment

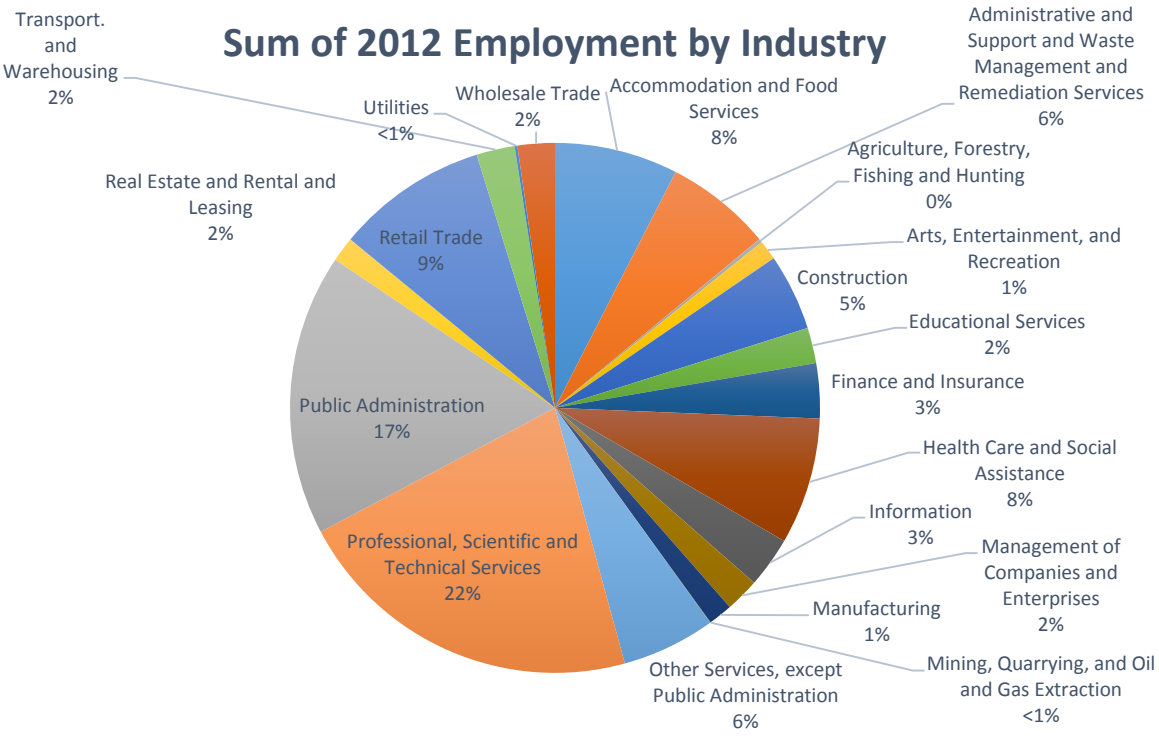
As shown in Table 5, professional, scientific, and technical services, public administration, transportation and warehousing, health care and social assistance, and accommodation and food services are the top five industries by employment. The top two industries for employment – professional, scientific, and technical services and public administration – also make up the largest shares of the region's output, while the following three top employment industries do not fall in the top five industries in terms of output, which is due in part to their relatively higher labor intensity.

Table 5: Current Top Industries by Employment per IHS Global Insight, 2012

Top Industries	2-Digit NAICS Code	% of Workforce
Professional, Scientific, and Technical Services	54	22
Public Administration	92	17
Transportation and Warehousing	48-49	9
Health Care and Social Assistance	62	8
Accommodation and Food Services	72	8

Regional economic drivers in Northern Virginia are predominantly centered around knowledge-based industries (professional services, information services, corporate management, etc.) and local-serving industries (health care, retail trade, real estate, etc.), as shown in Figure 3. Freight-dependent industries such as wholesale trade and utilities may employ fewer people than other industries, but contribute significantly to regional output.

Figure 3: Breakdown of 2012 Employment in the Northern Virginia Region by Industry



Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Northern Virginia region. The industries shown in Table 6 have the highest LQ scores in the region. The score for Professional Services, for example, can be inferred to mean that these services are more than nearly 8 times more

concentrated in the region than in the entire nation, on average. The region has twice as many jobs in corporate management compared to the nation as a whole.

Table 6: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Professional, Scientific, and Technical Services	54	7.68
Corporate Management	55	2.06
Real Estate	53	1.85
Information	51	1.84
Other Services	81	1.59

Economic Sectors

The Study Team grouped the 20 industry sectors, as defined by The North American Industry Classification System (NAICS), into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These clusters are defined as the local-serving, knowledge-based, and freight-dependent economic sectors. Each economic sector has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-based service industries such as financial services, where passenger travel needs would be a greater concern. The three economic sector classifications considered for this analysis are:

- **Knowledge-based industries**[1] sector, in which companies and entrepreneurs thrive on proximity to one another and to regional, national, and global markets. They need reliable, efficient multimodal accessibility for commuters traveling to and within the centers where they are located, particularly via transit, bicycle, and walking modes. Knowledge-based industries, particularly the information industry, are growing fast in this region.

- **Local-serving industries**[2] depend upon multimodal accessibility to nearby residents and customers, and upon the ease with which goods providers can reach their doors. They generate

[1] NAICS codes in the knowledge-based category include: 51 Information; 54 Professional, Scientific, and Technical Services; 55 Management of Companies and Enterprises; and 56 Administrative, Support, Waste Management, and Remediation Services. Note: NAICS code 56 combines two types of employment: Code 561 includes a wide range of services including office administration, facilities support, and a variety of business support services related to employment and facilities management, security, cleaning, and meeting organization. Code 562 includes jobs in waste collection, disposal, and remediation services. In Northern Virginia, the largest revenue-generating industries within NAICS Code 56 (as of 2012) are Security Guards and Patrol Services (561612), Janitorial Services (561720), and Facilities Support Services (561210).

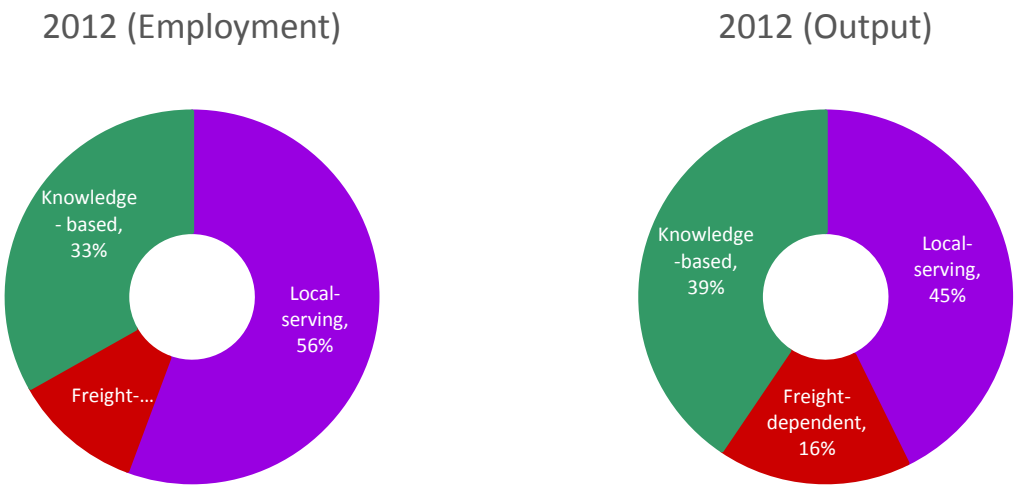
[2] NAICS codes in the local-serving category include: 44-45 Retail Trade; 52 Finance and Insurance; 53 Real Estate and Rental and Leasing; 61 Educational Services; 62 Health Care and Social Assistance; 71 Arts, Entertainment, and Recreation; 72 Accommodation and Food Services; 81 Other Services, except Public Administration; and 92 Public Administration.

trips by all modes throughout the day and night, made by employees, customers, students, and delivery professionals in automobiles, vans, trucks, buses, bicycles, and on foot.

- **Freight-dependent industries**[3] require accessibility for high-speed and/or long-distance travel by truck, rail vehicle, and air. They need reliable access to major highways, freight rail services, cargo ports, and warehousing and distribution centers. In Northern Virginia, many freight-oriented companies manufacture sophisticated technology such as equipment for the aerospace industry. Thus, there is a strong interplay between the freight-dependent and knowledge-based sectors in this region. Additionally, products shipped by freight-dependent industries in this region may generate smaller tonnage rates than those of other regions, but much higher comparative value.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in Northern Virginia, Figure 4 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the State. Each sector has different transportation needs; for example, the local-serving sector is typically characterized by different peak commute time, customer traffic, trip-chaining destinations, and truck deliveries.

Figure 4: Top Economic Sectors in the Northern Virginia Region by Employment and Output in 2012. Source: IHS Global Insight



The local-serving economic sector is the strongest in the Northern Virginia region, making up 56 percent of the employment but just 45 percent of output. The knowledge-based and freight-dependent economic sectors account for 33 and 11 percent of employment and 39 and 16 percent of output, respectively; these industries' larger share of output than employment is likely due to their relatively higher dependency on technology and automation for producing goods and services.

[3] NAICS codes in the freight-dependent category include: 11 Agriculture, Forestry, Fishing, and Hunting; 21 Mining, Quarrying, and Oil and Gas Extraction; 22 Utilities; 23 Construction; 31-33 Manufacturing; 42 Wholesale Trade; and 48-49 Transportation and Warehousing.

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity and/or are expected to accommodate a large share of the region's future growth. In the Northern Virginia Region, the Study Team adopted the Metropolitan Washington Council of Government's (MWCOG) designated activity centers in Virginia (from the MWCOG Place + Opportunity Study)[4] as those for the region, rather than conducting a GIS-based analysis to select activity centers based on density of jobs. MWCOG undertook an extensive and collaborative process to identify the activity centers where future growth will be concentrated to further the area's *Region Forward* vision. The activity center list had already been reviewed, commented upon, and approved by the local jurisdictions, so this was the logical choice for identification of economic activity centers. The activity centers include existing urban centers, priority growth areas, traditional towns, and transit hubs and most accurately reflect the locations where growth makes most sense from an economic, transportation, and social perspective. Figure 5 below shows these activity centers.

[4] http://www.mwcog.org/planning/planning/activitycenters/

Figure 5: Map of MWCOG-Designated Activity Centers

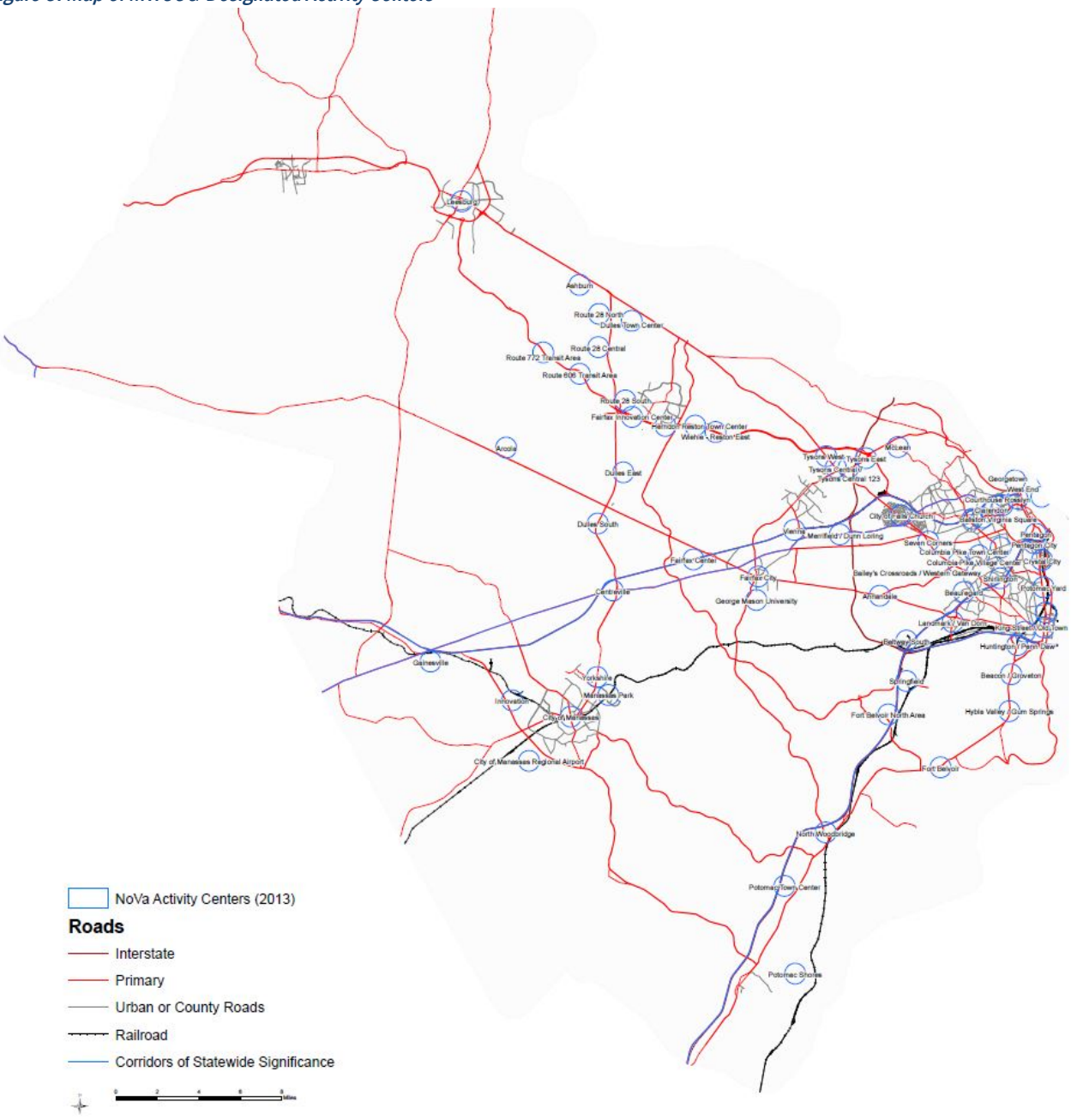
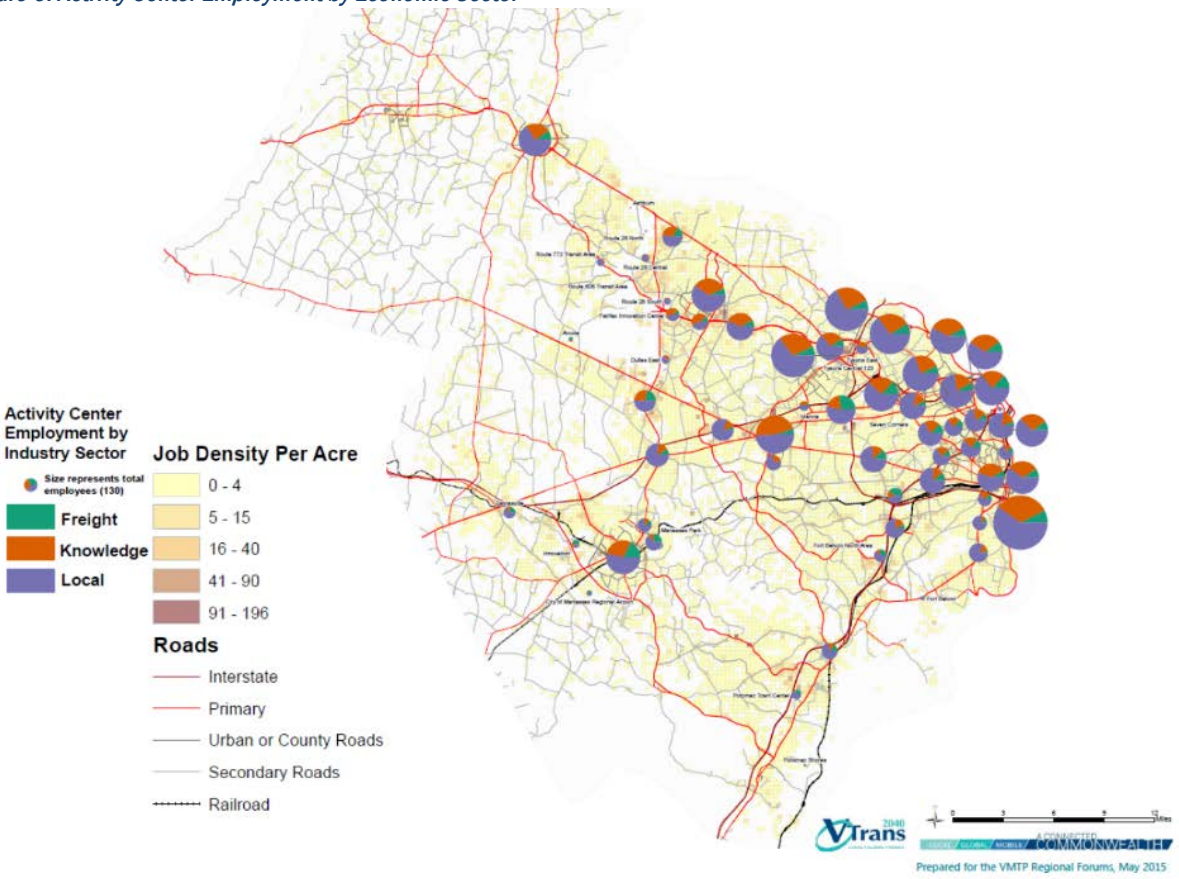


Figure 6 below shows the mapping of each activity center broken down by the three economic sectors, and scaled by relative number of jobs.

Figure 6: Activity Center Employment by Economic Sector

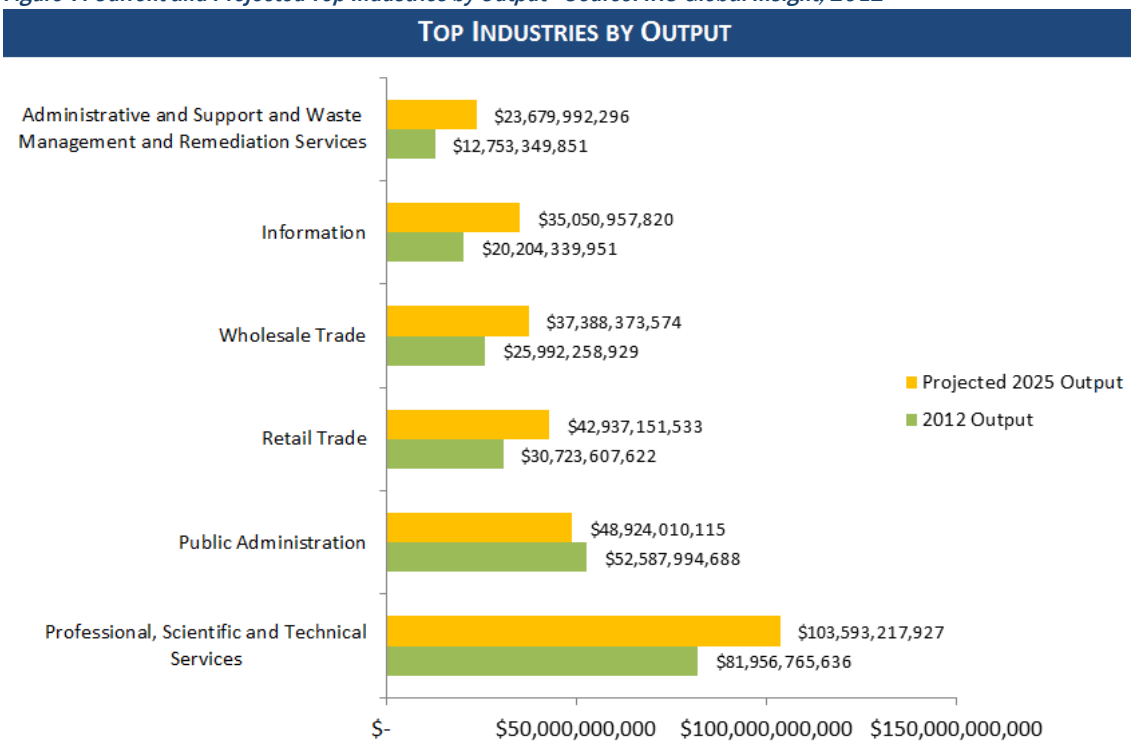


E. Forecasted 2025 Industry Strengths

Through a series of work sessions with the Northern Virginia stakeholders, the Study Team used economic forecasts for 2025 and solicited input from stakeholders to determine the future desired economic profile for the region. The 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Northern Virginia's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires. The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Northern Virginia region.

Substantial growth is forecasted for the Northern Virginia area by 2025 (Figure 7). According to statewide and national datasets used, the already-dominant professional, scientific, and technical services industry will see the largest growth; it is expected to produce $21.6 billion more output in 2025 than it produced in 2012. The only industry projected to produce lower levels of output in 2025 than in 2012 is public administration. Across all industries, economic output in Northern Virginia is expected to increase by $96.6 billion by 2025.

Figure 7: Current and Projected Top Industries by Output - Source: IHS Global Insight, 2012



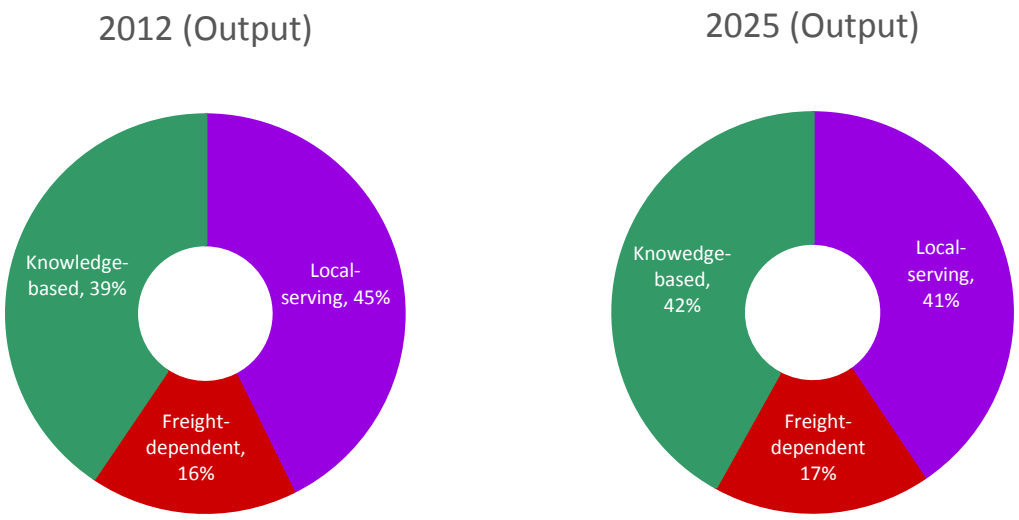
As Table 7 indicates, more than 80 percent of the region's output is generated by eight industries. As also indicated above, the top generator, accounting for a quarter of the region's output, is professional, scientific, and technical services (a knowledge-based industry), followed by local-serving industries public administration and retail trade. Of the remaining top industries, the only freight-dependent industry is wholesale trade, which generates nearly 10 percent of the region's output. Across the top eight industries, economic output is expected to increase by $74.5 billion by 2025.

Table 7: Top Eight Industries by Output – Current and Projected (2025)

Industry	2012 Output	2025 Output	% of Total (2012)	% of Total (2025)
Professional, Scientific, and Technical Services	$ 81,729,213,510	$ 103,272,543,519	27	26
Public Administration	$ 51,752,139,700	$ 48,023,224,368	17	12
Retail Trade	$ 28,998,949,452	$ 40,870,400,982	10	10
Wholesale Trade	$ 24,699,145,257	$ 35,739,924,738	8	9
Information	$ 19,555,549,578	$ 33,645,450,855	6	8
Real Estate, Rental, Leasing	$ 13,542,678,044	$ 18,747,264,171	4	5
Finance and Insurance	$ 13,069,803,572	$ 16,685,099,875	4	4
Administrative, Support, Waste Management, Remediation Services	$ 12,594,558,034	$ 23,463,230,618	4	6
Total Top Eight Industries	**$245,942,037,147**	**$320,447,139,126**	**82**	**81**

Figure 8 shows the anticipated change in the distribution of the region's industries among the three economic sectors that is predicted to occur by 2025. The local-serving sector's relative importance is expected to decrease slightly, while the relative size of the knowledge-based sector will increase by 3 percent and the freight-dependent sector's share of output will increase by 1 percent.

Figure 8: Economic Sectors by 2012 Output and Projected Output in 2025 - Source: IHS Global Insight



The region's fastest growing industries are shown in Table 8 below.

Only half of the fastest-growing industries in terms of output are among the region's largest industries. Collectively, however, the top eight high-growth industries represent well over a third of the region's total output in 2012, and their presence is expected to grow to more than 41 percent of the region's economic output by the year 2025.

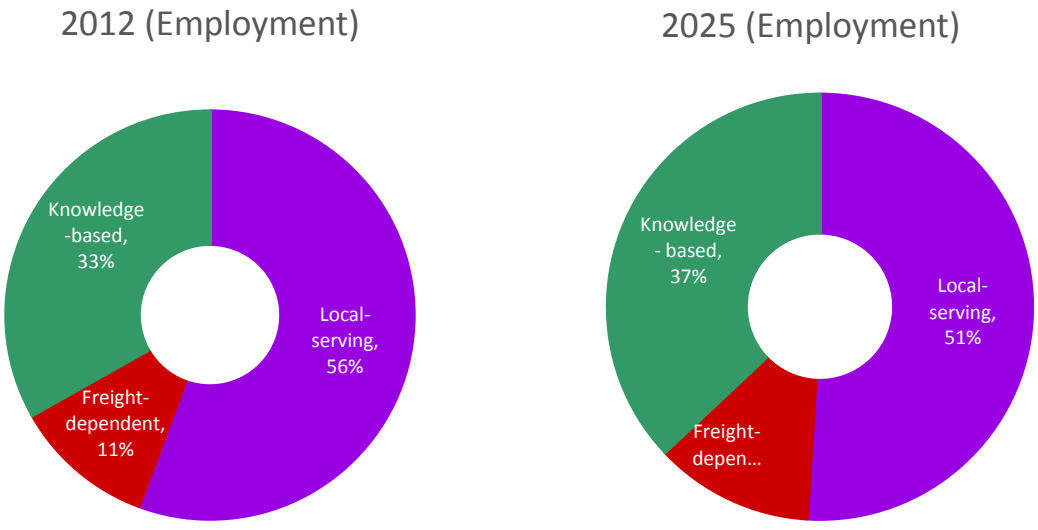
Table 8: High Growth Industries by Projected 2025 Output

Industry	2012 Output	2025 Output	% of Region's Output (2012)	% of Region's Output (2025)	Change in Total Output
Administrative, Support, Waste Management, and Remediation Services	$12,594,558,034	$23,463,230,618	4	6	86%
Manufacturing	$5,530,754,297	$9,910,798,750	2	2	79%
Information	$19,555,549,578	$33,645,450,855	6	8	72%
Arts, Entertainment, and Recreation	$ 1,774,763,755	$2,759,852,005	1	1	56%
Management of Companies and Enterprises	$4,252,600,498	$6,493,527,321	1	2	53%
Accommodation and Food Services	$5,919,573,999	$8,995,685,166	2	2	52%
Wholesale Trade	$24,699,145,257	$35,739,924,738	8	9	45%
Retail Trade	$28,998,949,452	$40,870,400,982	10	10	41%
Total Top 8 Industries	**$103,325,894,870**	**$161,878,870,43**	**34**	**41**	**57%**

Forecasted 2025 Employment

As in most urban areas, the local-serving cluster accounts for about half of all employment in the Northern Virginia region; the local-serving sector's share of employment will decrease by approximately 5 percent by 2025 (Figure 9). Over the coming decade, the proportion of knowledge-based jobs is expected to increase from 33 to 37 percent of the region's employment, while freight-dependent employment will inch up from 11 to 12 percent.

Figure 9: Economic Sectors by 2012 Employment and Projected Employment in 2025 - Source: IHS Global Insight



As shown in Table 9, the top employers in the region in 2012 were nearly all knowledge-based or local-serving industries, with the exception of the construction trade, which is freight-dependent. Together, the top eight employment industries in the Northern Virginia region account for over 80 percent of all employment, and employment in all these industries is expected to increase by 2025, though the magnitude of projected increase varies significantly by industry. Increases are projected to be much higher in administrative, support, waste management, and remediation services and construction than in any other industries. Projected employment growth in public administration and retail trade is expected to be very modest.

Table 9: Top Industries by Employment – Current and Projected (2025)

Industry	Employment		% of Total		Change in Total Employment (2012 to 2025)
	2012	2025	2012	2025	
Professional, Scientific, Technical	266,250	324,710	22	22	22%
Public Administration	212,906	220,793	17	15	4%
Retail Trade	114,666	116,896	9	8	2%
Health Care, Social Assistance	95,797	112,546	8	8	17%
Accommodation, Food Services	93,166	112,865	8	8	21%
Admin, Support, Waste Management, Remediation Services	80,449	135,884	6	9	69%
Other Services, except Public	70,788	75,650	6	5	7%
Construction	57,875	88,628	5	6	53%
Total Top 8 Industries	**991,897**	**1,187,972**	**80**	**81**	**20%**

The region's fastest-growing industries in terms of employment are shown in Table 10 below. Among the region's fastest-growing industries, only professional, scientific, and technical services and accommodate and food services are also within the list of employers that account for the highest percentage of the region's jobs. Other than the freight-dependent construction industry, all the fast-growing industries are in the knowledge-based and local-serving sectors. Only the administrative, support, waste management, and remediation services industry is expected to considerably increase its share of the region's employment, from 6 percent today to 9 percent in 2025.

Table 10: Highest Growth Industries by Projected 2025 Employment

Industry	Employment		% of Total		Change in Total Employment (2012 to 2025)
	2012	2025	2012	2025	
Administrative, Support, Waste Management, Remediation	80,449	135,884	6	9	69%
Construction	57,875	88,628	5	6	53%
Management	25,642	34,329	2	2	34%

Professional, Scientific, and	266,250	324,710	22	22	22%
Accommodation and Food	93,166	112,865	8	8	21%
Arts, Entertainment, and	14,941	17,554	1	1	17%
Health Care and Social Assistance	95,797	112,546	8	8	17%
Information	38,268	44,957	3	3	17%
Total top eight high-growth industries for employment	**672,388**	**871,473**	**54%**	**60%**	**30%**

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in Northern Virginia such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for Northern Virginia:

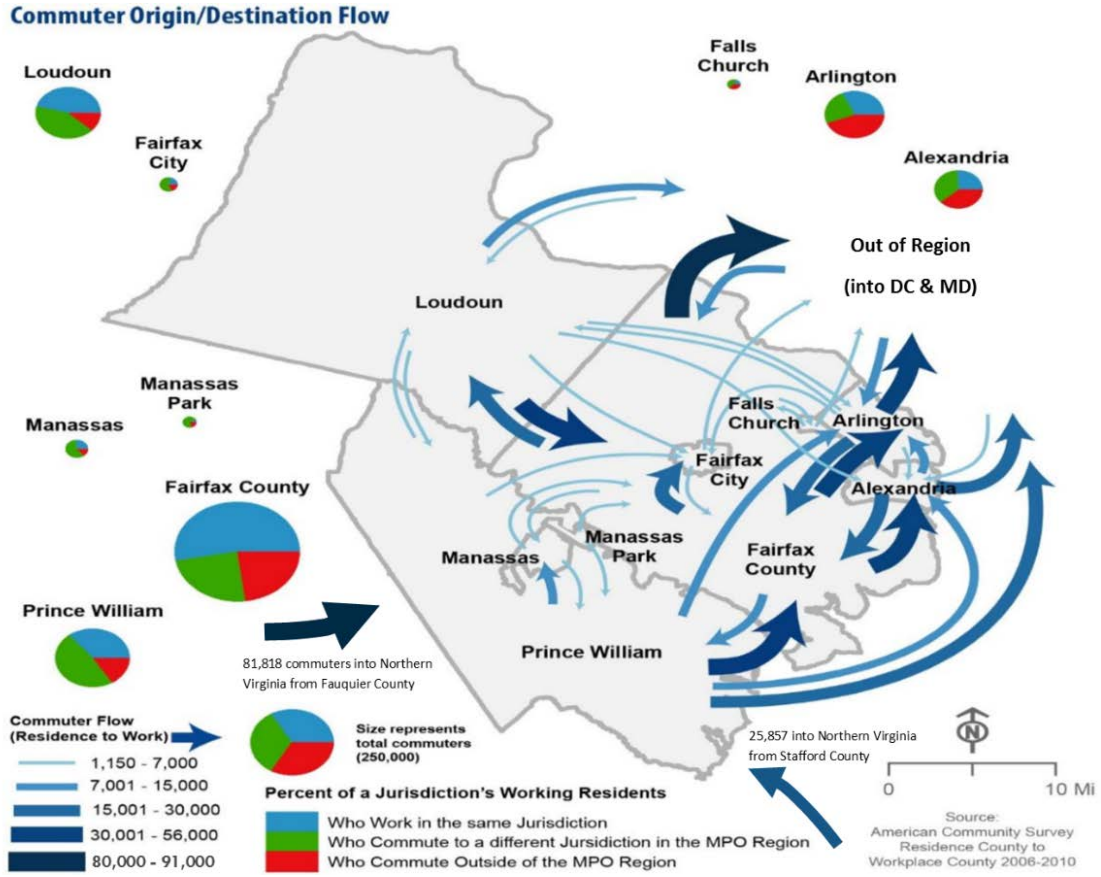
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

The map in Figure 10 map summarizes commuting patterns within and among Northern Virginia localities between 2009 and 2013. The pie charts indicate that the majority of workers commute beyond their home locality every day. Fairfax and Loudoun are the only jurisdictions where as many as half of the local residents work within their county of residence. The arrows indicate that commuter travel occurs in virtually every direction throughout the region. While a quarter to a third of most residents in each locality commute outside the region (presumably most of whom work in the urban core of Washington, DC), a large portion of each locality's workers travel to another Northern Virginia locality. Much of the regional highway and transit network was built during an era when commuting patterns were centered in the metropolitan core, but the economic conditions have shifted to a point where commuter travel is spread broadly throughout the entire region.

Figure 10: Regional Commuting Patterns

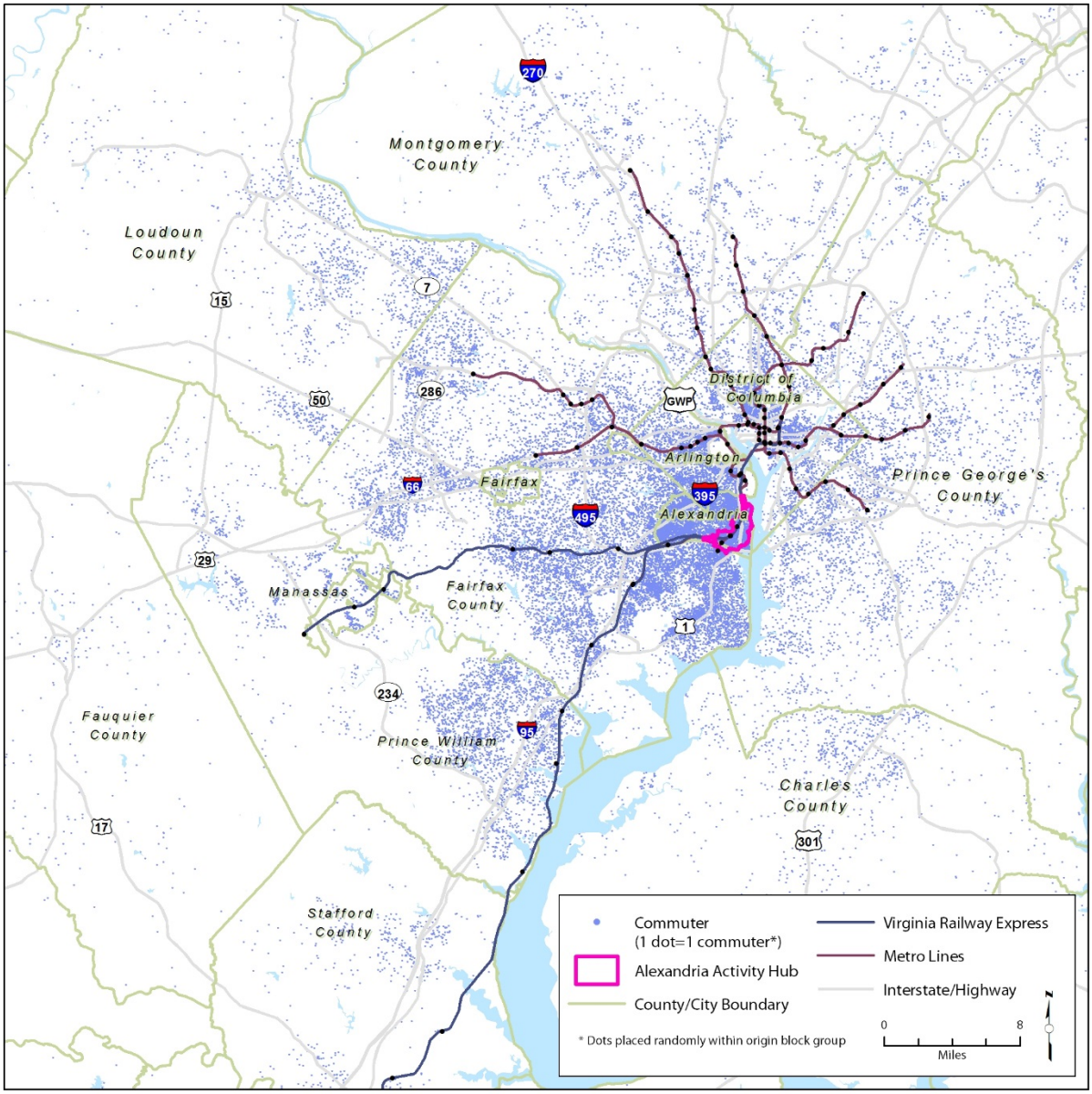


Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for Northern Virginia was the analysis of commuting patterns between activity centers. Figure 11 through Figure 16 below provide insights into the commuting patterns for six employment "hubs" (clusters of activity centers) in the Northern Virginia region. Each dot on the maps represents a single commuter's origin jurisdiction to the hub outlined in pink. It is important to note that the docs are randomly placed within each Census block group; as such, the worker origin locations are approximate, not exact.

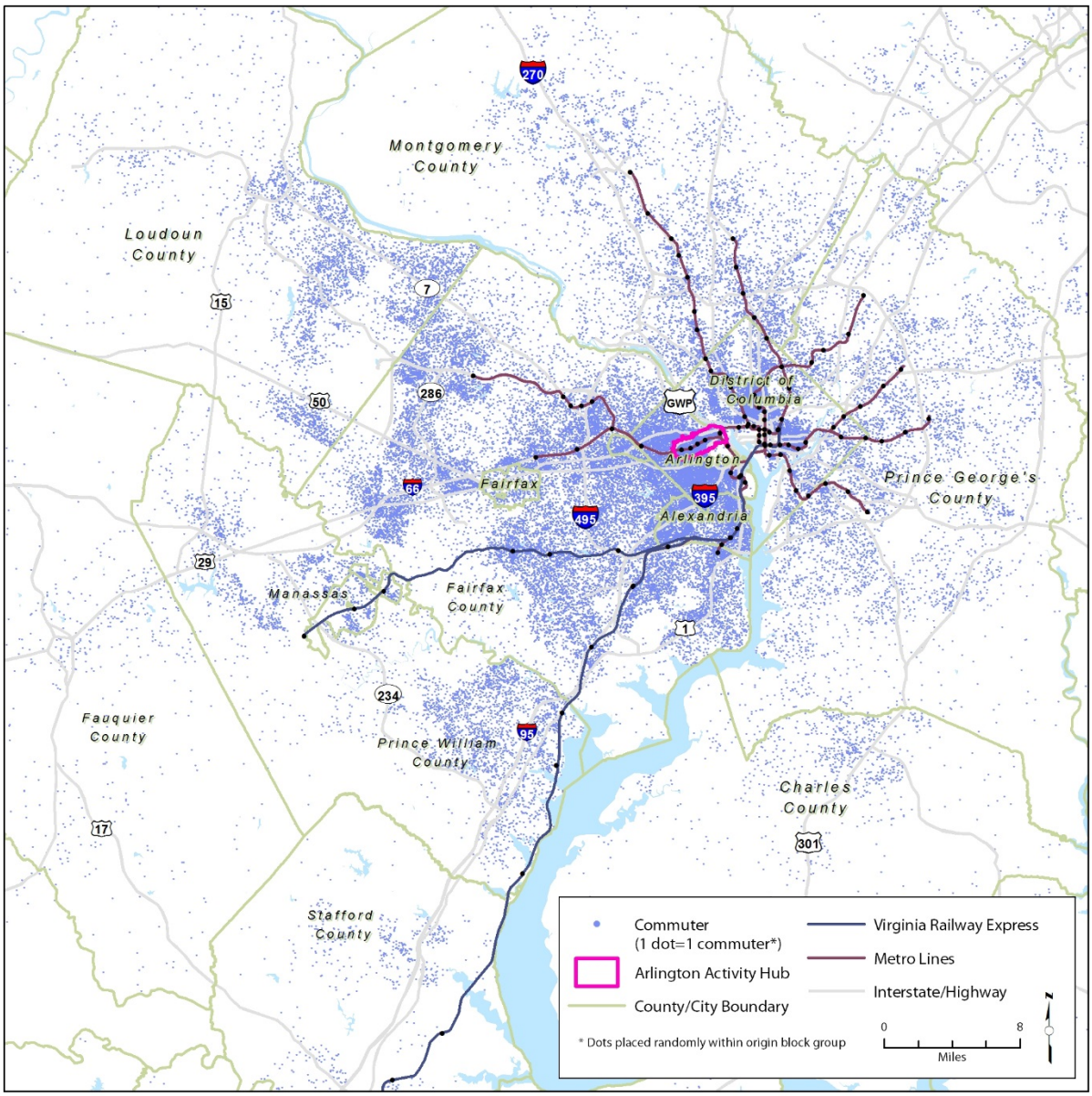
As shown on the map in Figure 11, the City of Alexandria receives a significant number of commuters from within the City, as well as from neighboring and more far-flung locations both in Northern Virginia, as well as the District of Columbia and Maryland.

Figure 11: Commuting Patterns to Alexandria Activity Hub. Source: LEHD



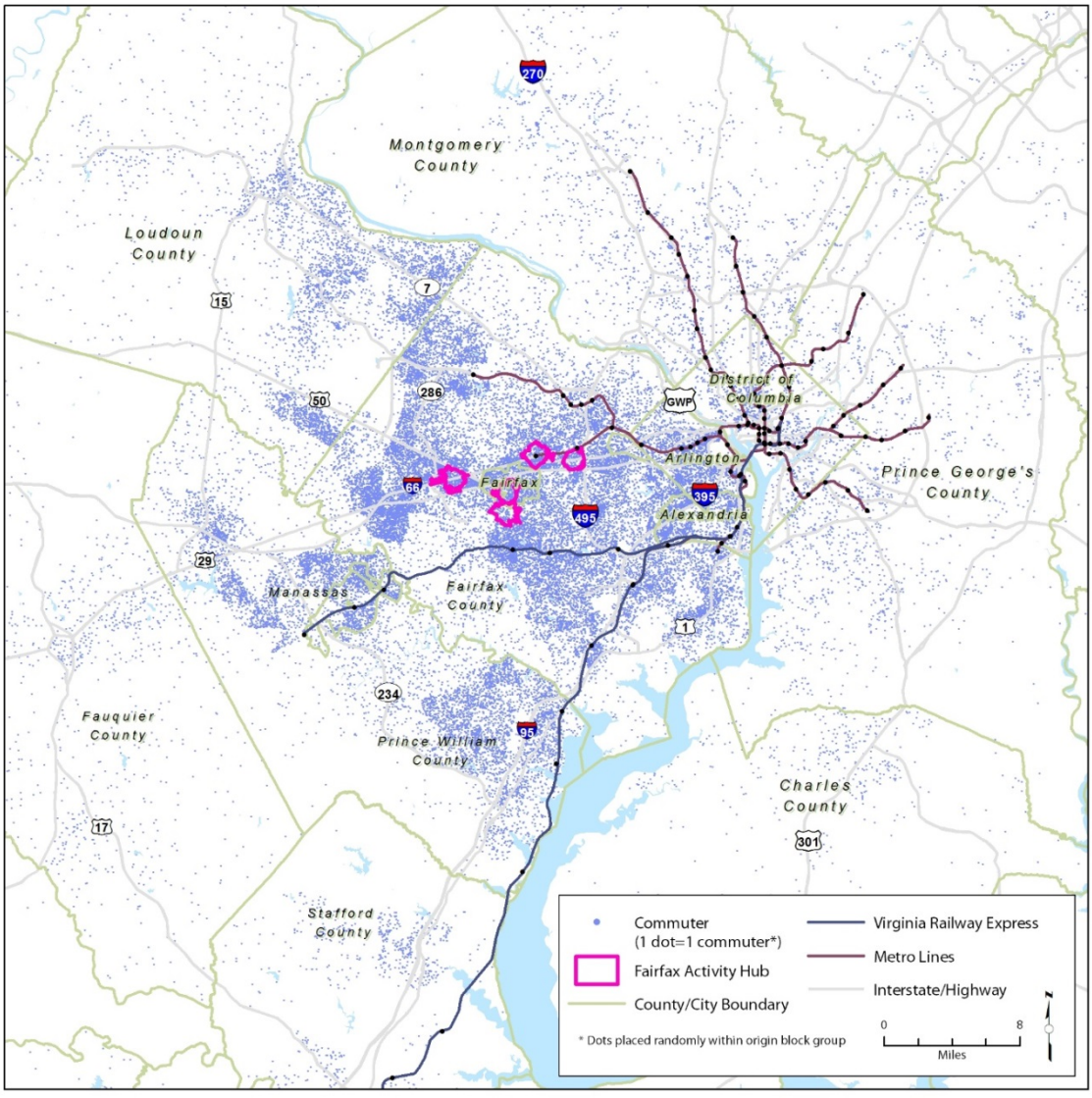
The Arlington activity hub (Figure 12), along the Rosslyn-Ballston Corridor has an extremely high concentration of jobs, receiving thousands of employees from throughout the DC region. The largest concentrations of workers in the hub seem to come from within Arlington County and the City of Alexandria.

Figure 12: Commuting Patterns to Arlington Activity Hub. Source: LEHD



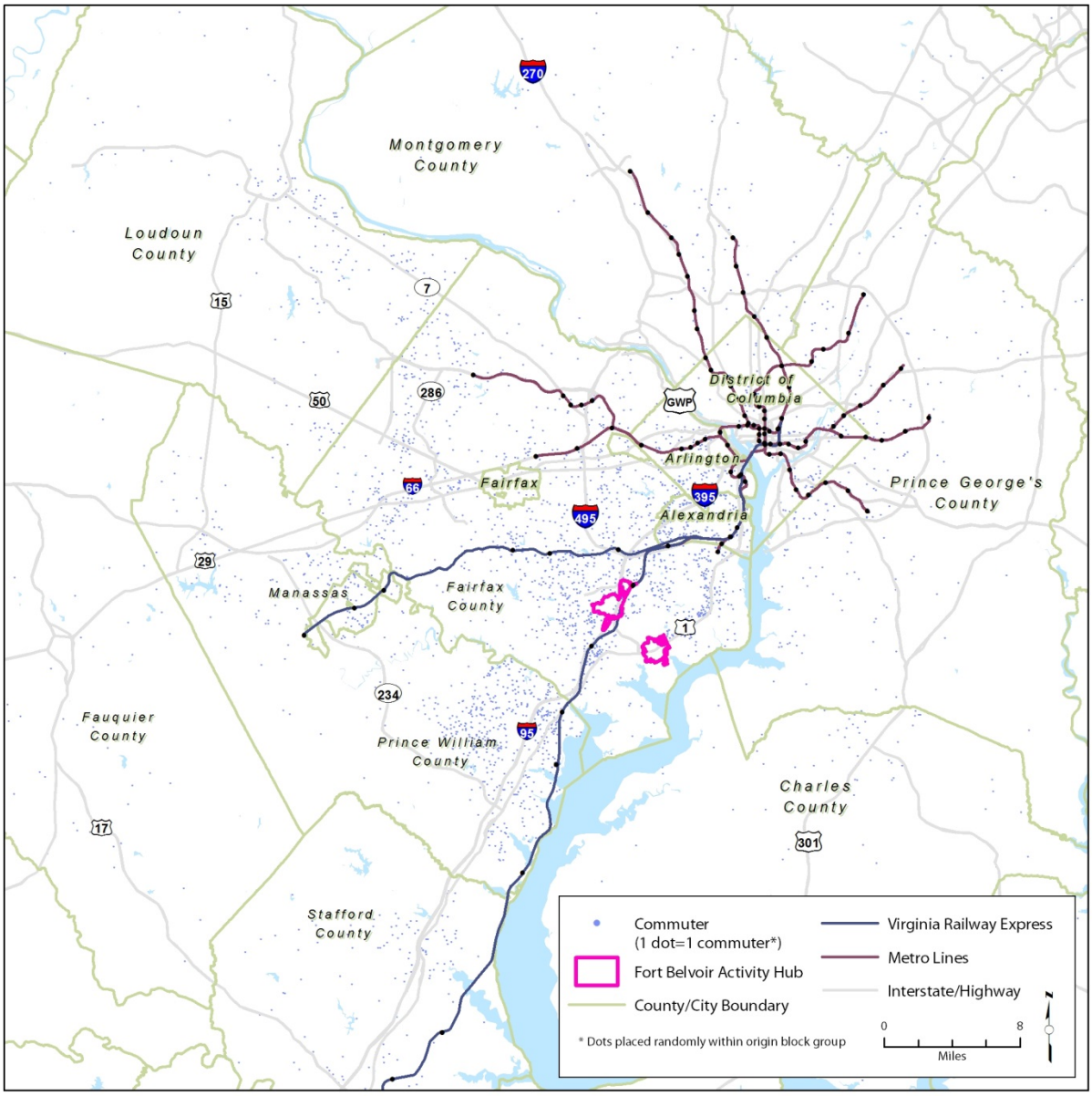
The employment hub that includes various locations near the Orange line and George Mason University in Fairfax County (Figure 13) receives high levels of commuters from within Fairfax County, as well as from Loudoun and Prince William Counties. Given its location farther from the region's core, it is not surprising that fewer residents of the District of Columbia and Maryland commute to this employment hub.

Figure 13: Commuting Patterns to Fairfax Activity Hub. Source: LEHD



The Fort Belvoir hub (Figure 14) receives commuters primarily from Fairfax County, Prince William County, Arlington, Alexandria, and the Manassas area.

Figure 14: Commuting Patterns to Fort Belvoir Activity Hub. Source: LEHD



Unsurprisingly, the Pentagon activity hub (Figure 15) has a commute shed similar to those of Arlington and Alexandria. The highest concentrations of workers in the hub come from Arlington and Alexandria, with many also commuting in from Fairfax, Prince William, and Loudoun Counties. A significant number of workers commute to the Pentagon hub from the District of Columbia and Maryland locations throughout the larger DC region as well.

Figure 15: Commuting Patterns to Pentagon Activity Hub. Source: LEHD

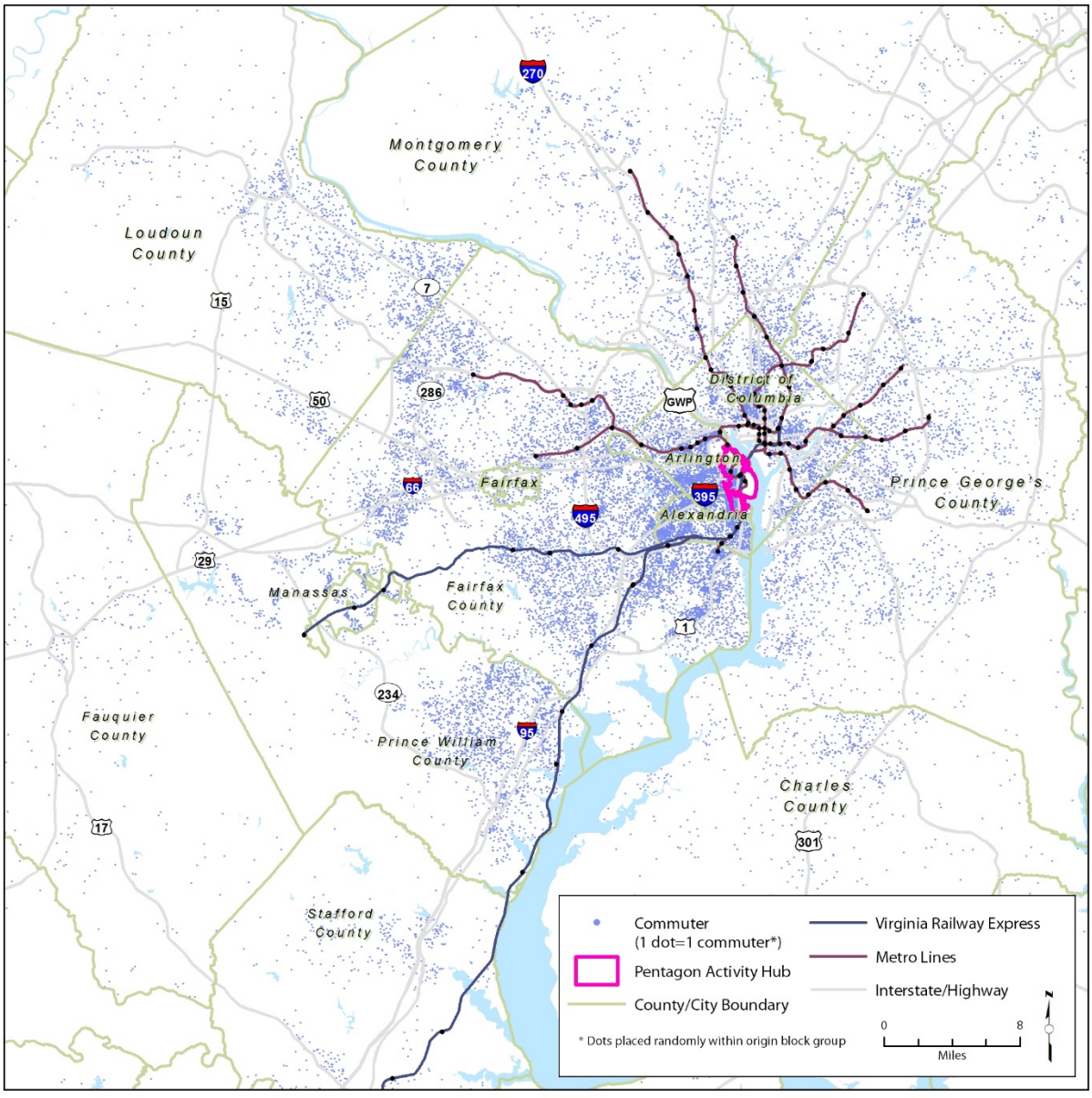
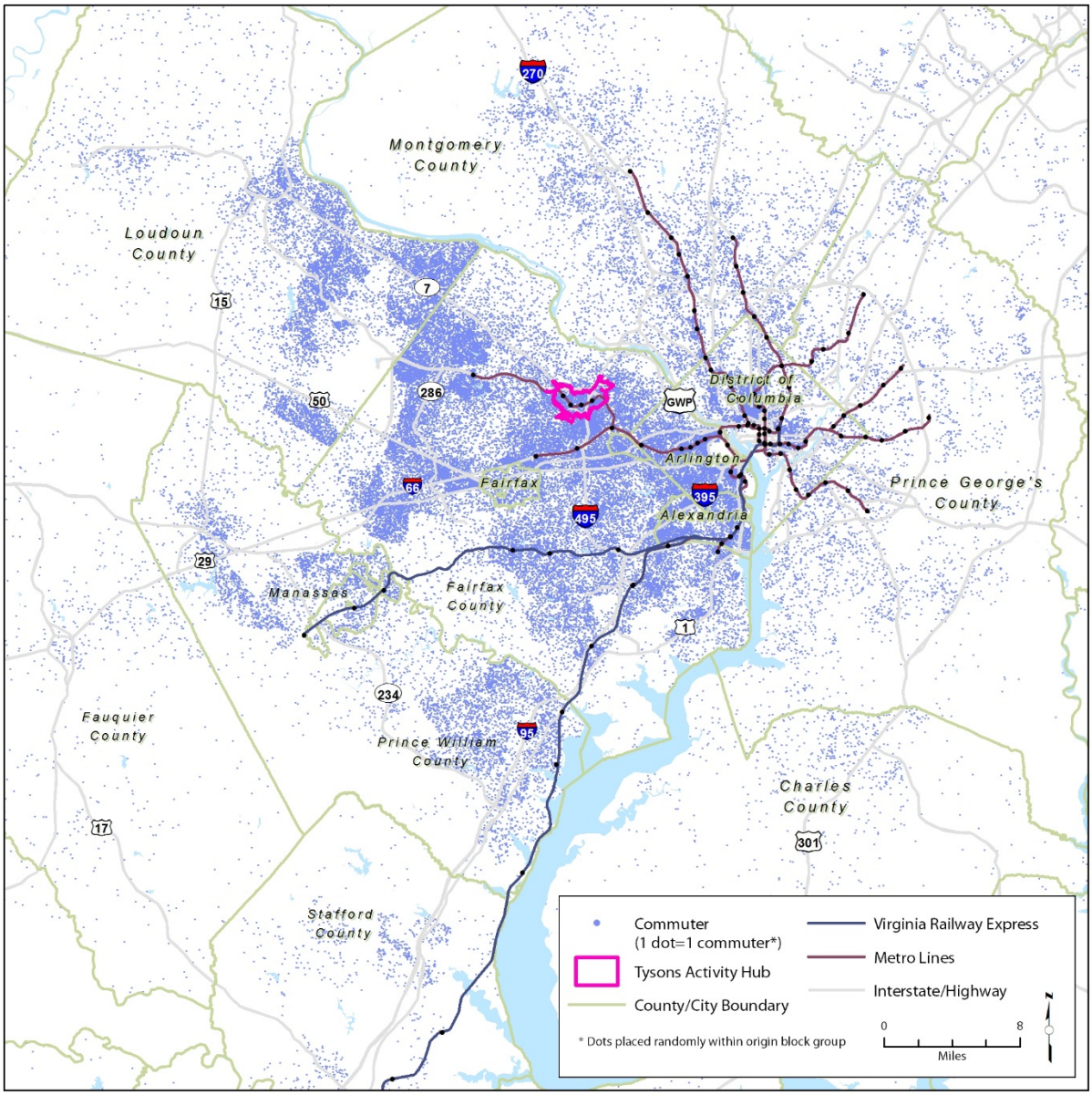


Figure 16 shows the Tysons area's importance for employment across the entire region. Over 100,000 people work in the Tysons area, and heavy concentrations of commuters into the area exist in nearly every jurisdiction in the region.

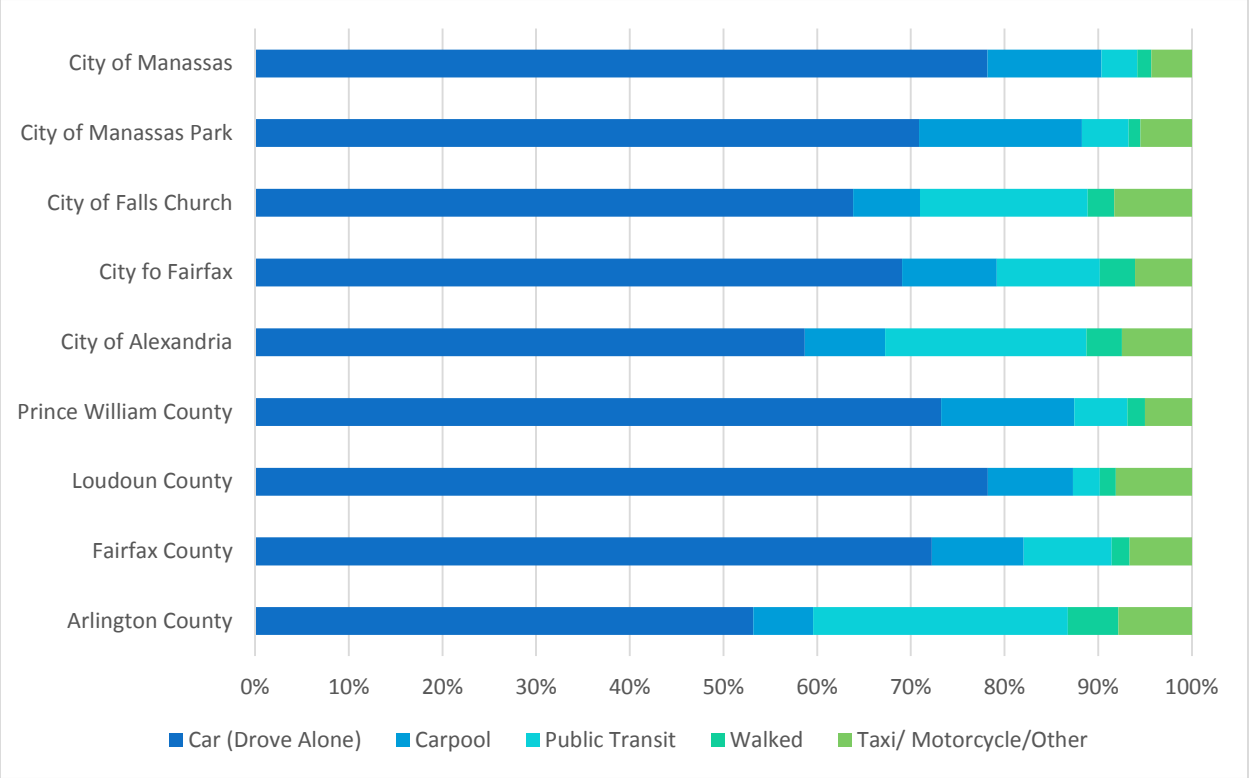
Figure 16: Commuting Patterns to Tysons Activity Hub. Source: LEHD



Mode Choice

In the Northern Virginia Region, the majority of commuters drive alone to work (Figure 17). While there is some variation between jurisdictions, commuters drive alone between 53 and 78 percent of the time. For just over half of the jurisdictions, carpooling is the second most popular option, accounting for 6 to 14 percent of the mode share. Public transit use is highest in Arlington County, which has a high concentration of transit-supportive development patterns.

Figure 17: Mode Share Split by Jurisdiction. Source: ACS 2013 5-Year Estimates



Average Commute Times

In the Northern Virginia Region, average commute times range from 27 to 40 minutes among the various jurisdictions (Table 11). Largely due to density and proximity to employment centers, the Cities of Arlington and Falls Church have the shortest average commute times, while more remote areas such as Prince William County, have longer commutes on average.

Table 11: Mean Commute Time by Jurisdiction. Source: ACS 2013 5-Year Estimates.

Jurisdiction	Mean Commute Time (Minutes)
Arlington County	27.3
Fairfax County	32.0
Loudoun County	33.1
Prince William County	39.2
City of Alexandria	30.5
City of Fairfax	31.7
City of Falls Church	27.3
City of Manassas	33.8
City of Manassas Park	40.8

Only a minority of commuters travel more than 45 minutes in the Northern Virginia Region (Figure 18). Prince William County, at 42 percent, has the highest percentage of workers who commute over 45 minutes; Prince William's percentage is over twice as high as those of the City of Falls Church and Arlington County.

Figure 18: Percentage of Commutes Longer than 45 Minutes. Source: ACS 2013 5-Year Estimates.

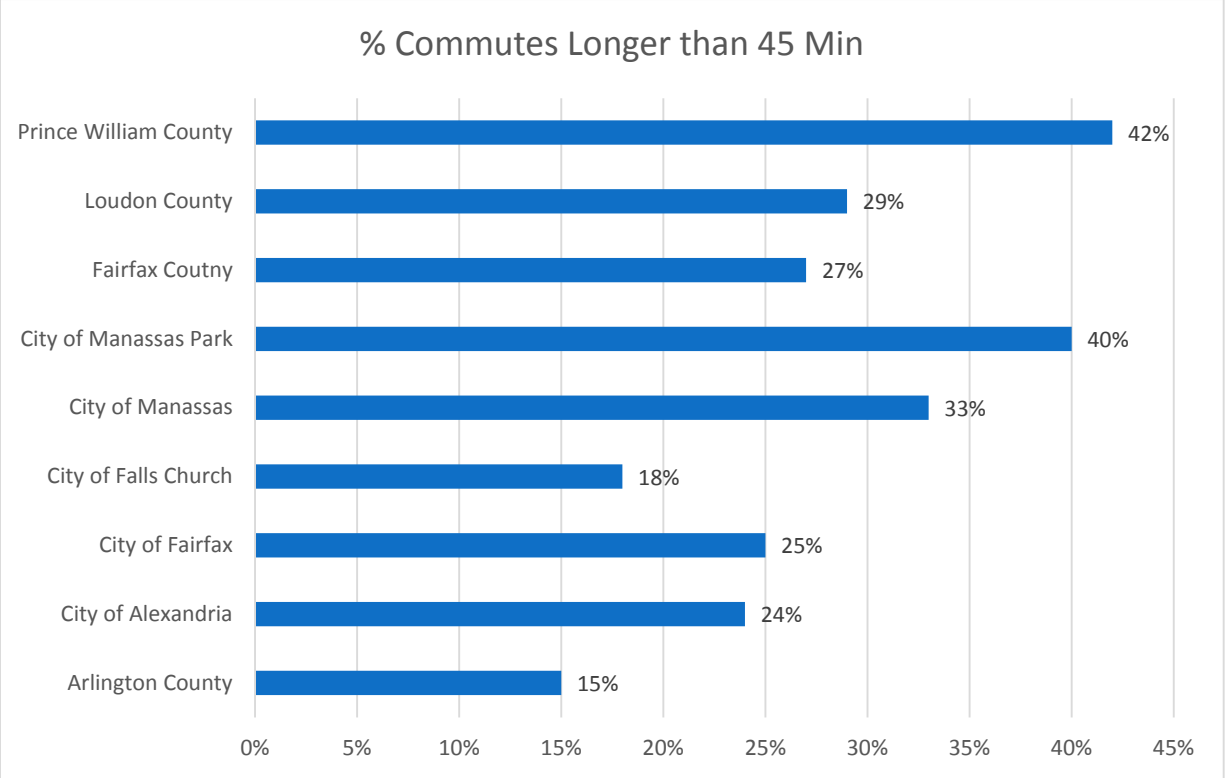
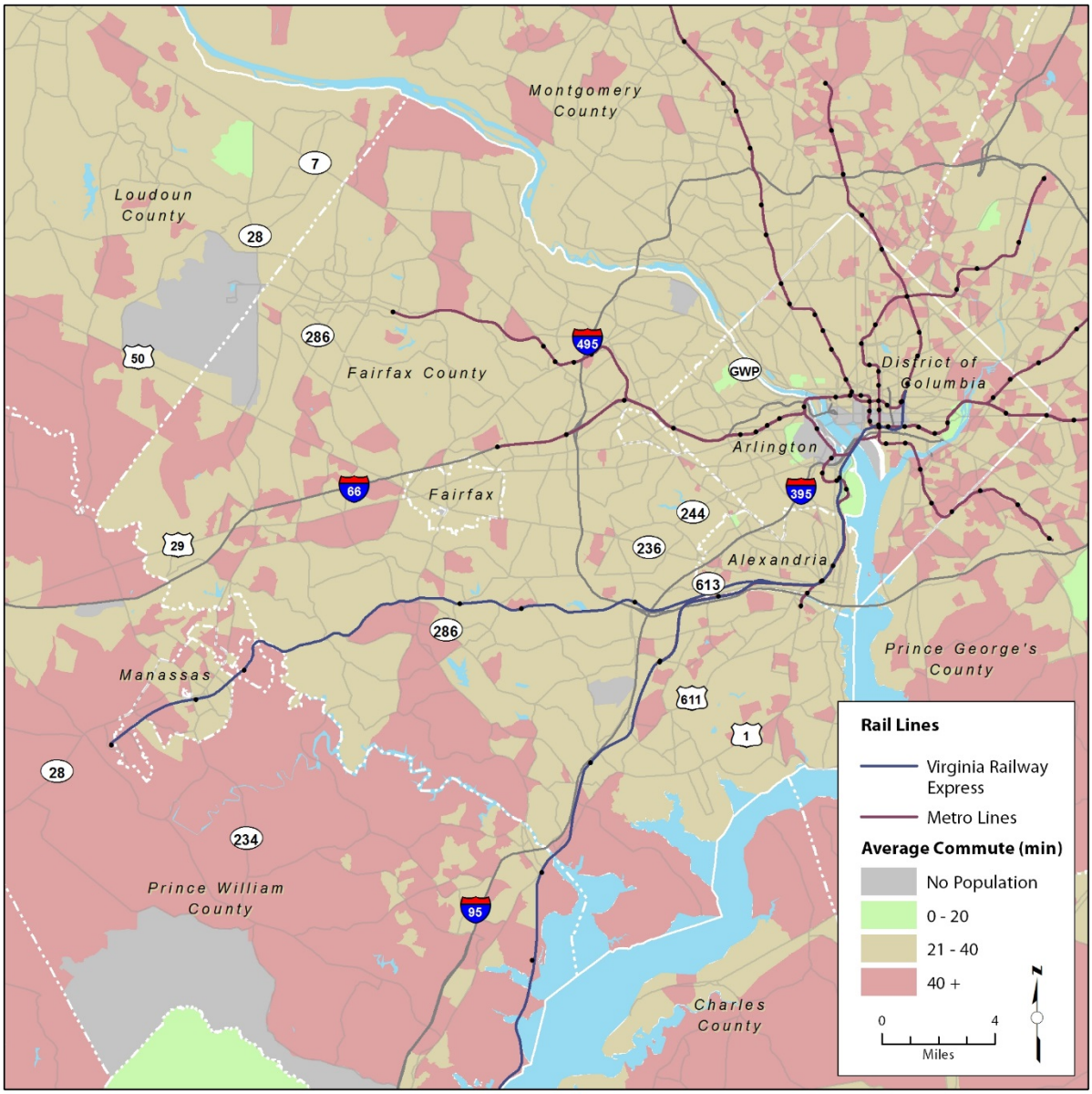


Figure 19 provides a closer look at where longer commutes originate. Unsurprisingly, the prevalence of long commute times is much higher in the more remote parts of the region such as Prince William County. In addition to location, this is likely due to the County's relatively high concentration of residential development vis-à-vis available jobs.

Figure 19: Northern Virginia Commute Times. Source: ACS 2013, 5-Year Estimates.



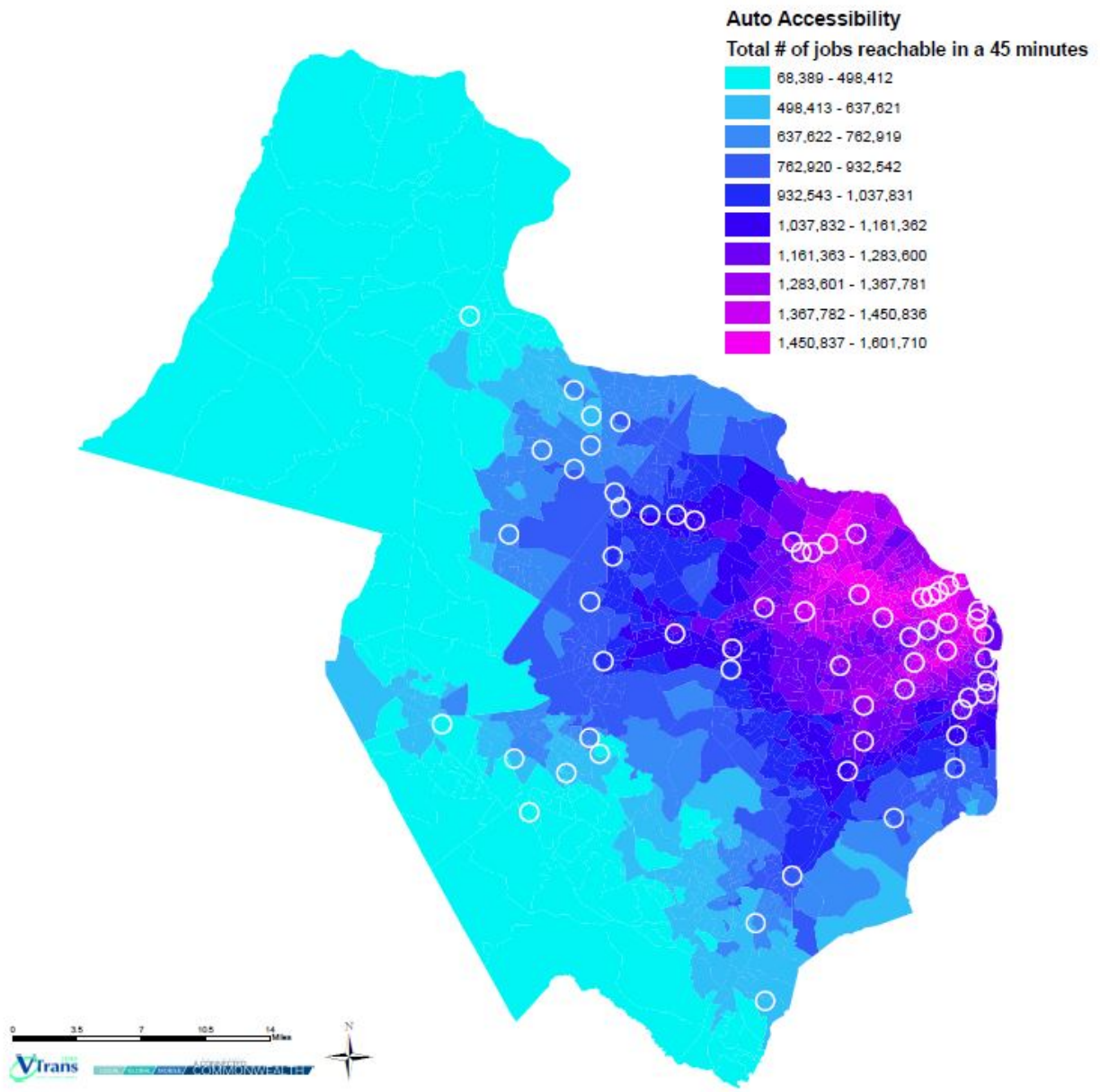
C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Northern Virginia Region, as in other regions, is driven by two main factors: distance from activity centers, and distance from major arterial roadways (Figure 20). Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. While this map indicates the potential for relatively long commutes by automobile for people who live in outer suburbs and rural areas (principally in Loudon and Prince William Counties) it is worth noting that even these "far flung" areas are within a 45 minute drive of tens or hundreds of thousands of jobs. The jobs in the map legend are "distance-weighted," meaning that jobs closer are weighted more than jobs located farther away.

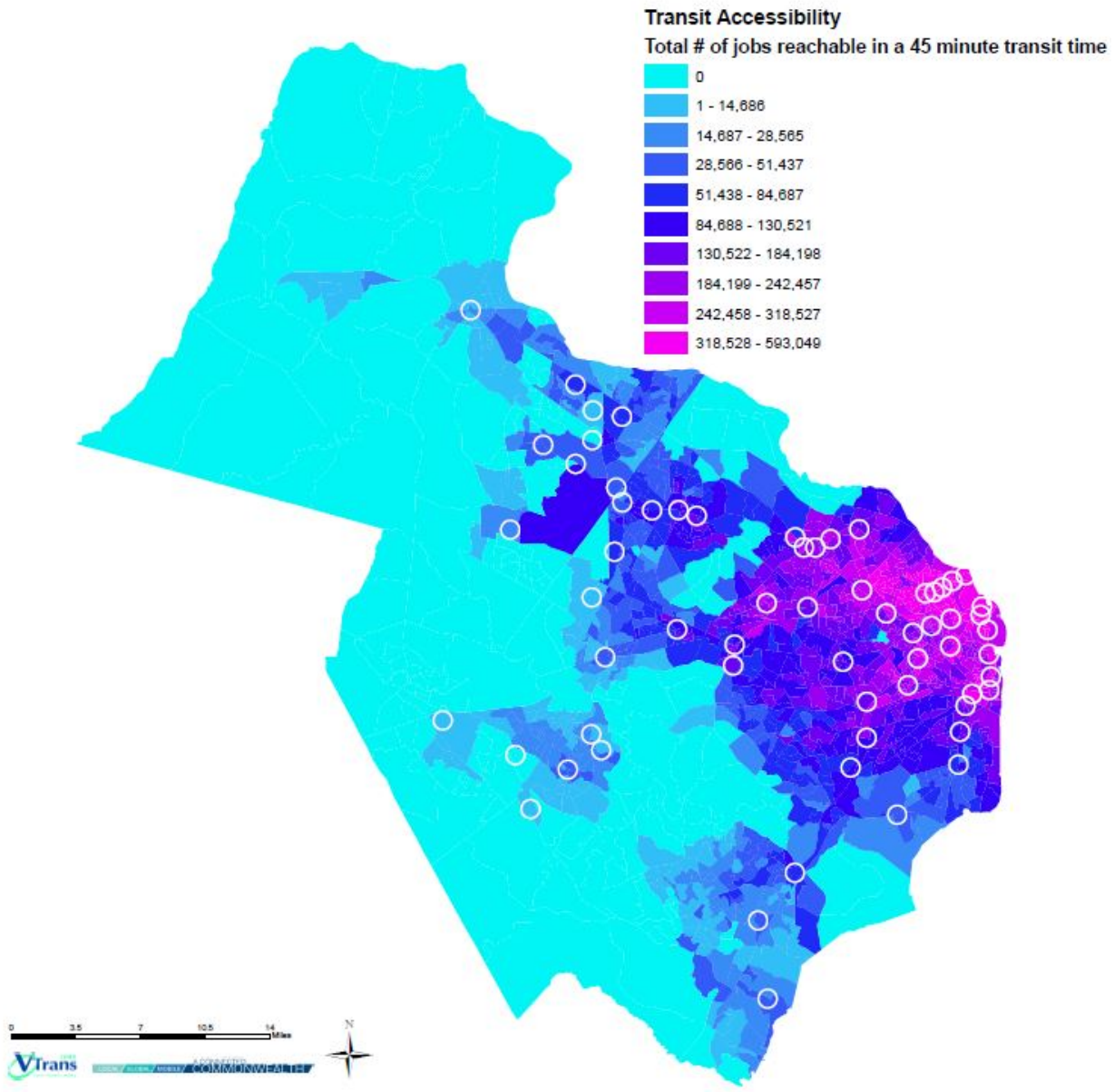
Figure 20: Auto Accessibility



Transit Accessibility

There is a significant difference between the number of jobs accessible by transit versus automobile in Northern Virginia (Figure 21). While residents in even the most rural areas of the region can access tens of thousands of jobs by car within 45 minutes, this map reveals that transit access to jobs is nonexistent in many suburban and rural parts of the region, though this might be slightly exaggerated because data from smaller suburban and rural transit services may be missing. Even in the core suburban areas, the number of jobs within a 45 minute transit ride is just a little over half a million, compared to 1.6 million jobs available within a 45 minute drive.

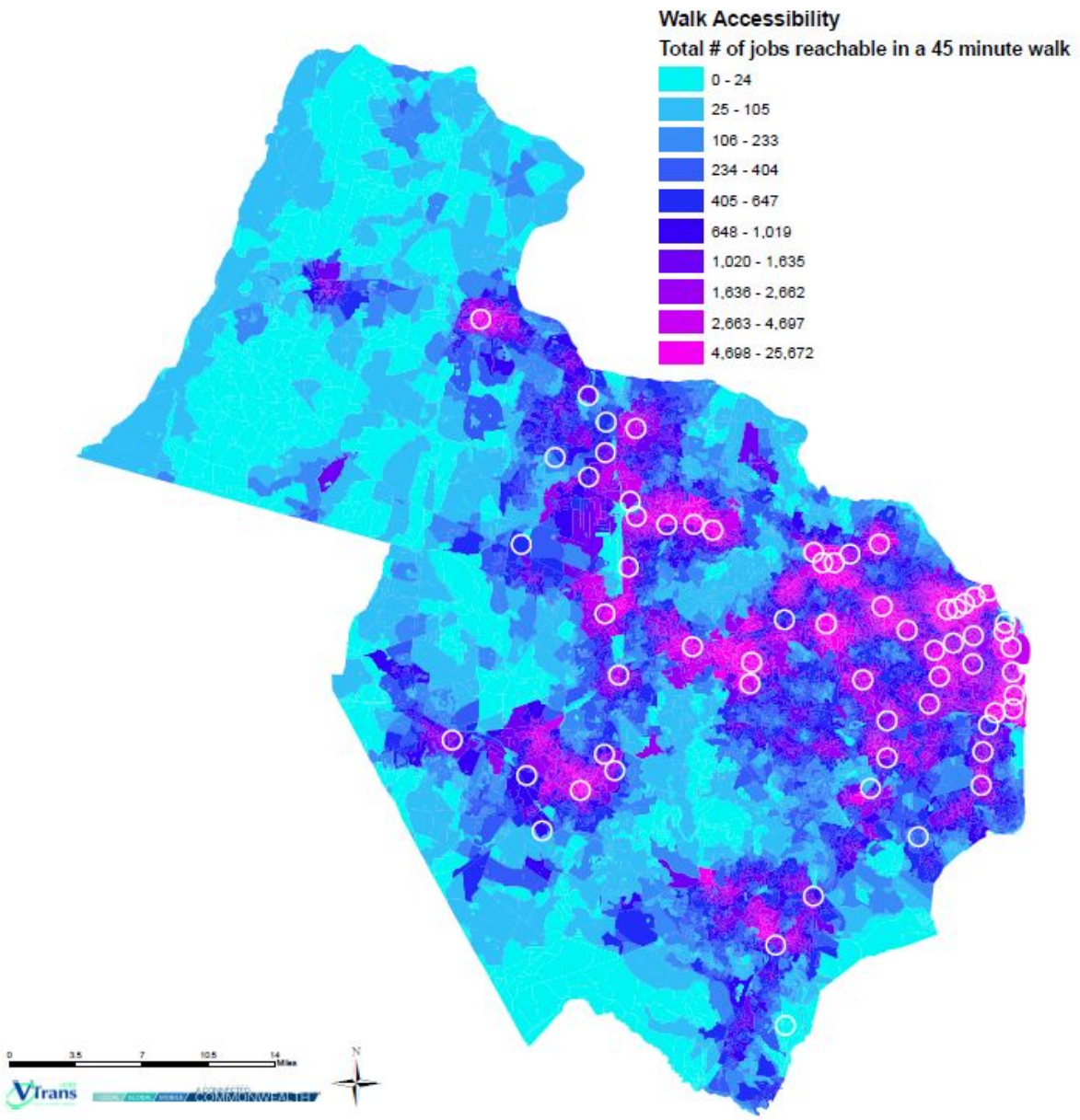
Figure 21: Transit Accessibility



Walk Accessibility

The Walk Accessibility map in Figure 22 reveals a regional pattern of mixed use development in communities where residents live within walking distance of thousands of jobs and/or the services represented by those jobs (ranging from about 5,000 to 25,000). These centers are not limited to the areas just outside of the region's core, but can be found throughout the central areas of the region, loosely strung along key corridors, such as I-66, I-95, and major US routes such as 50,7,28, and 29. It is important to note, however, that the close proximity to jobs and housing does not, in and of itself, mean that walking is a viable commuting choice; walkability depends upon accessibility to nearby activities via safe, convenient pedestrian networks.

Figure 22: Walk Accessibility



Freight Accessibility

The map in Figure 23 measures drive time to access-controlled highway interchanges and on-ramps, which is an important element of freight movement. Not surprisingly, drive time is lowest within close proximity to Interstates 95 and 66, but even the most rural parts of the region are still within a 25-minute drive of a highway interchange.

Figure 23: Access to Interstate and Principal Arterial Ramps

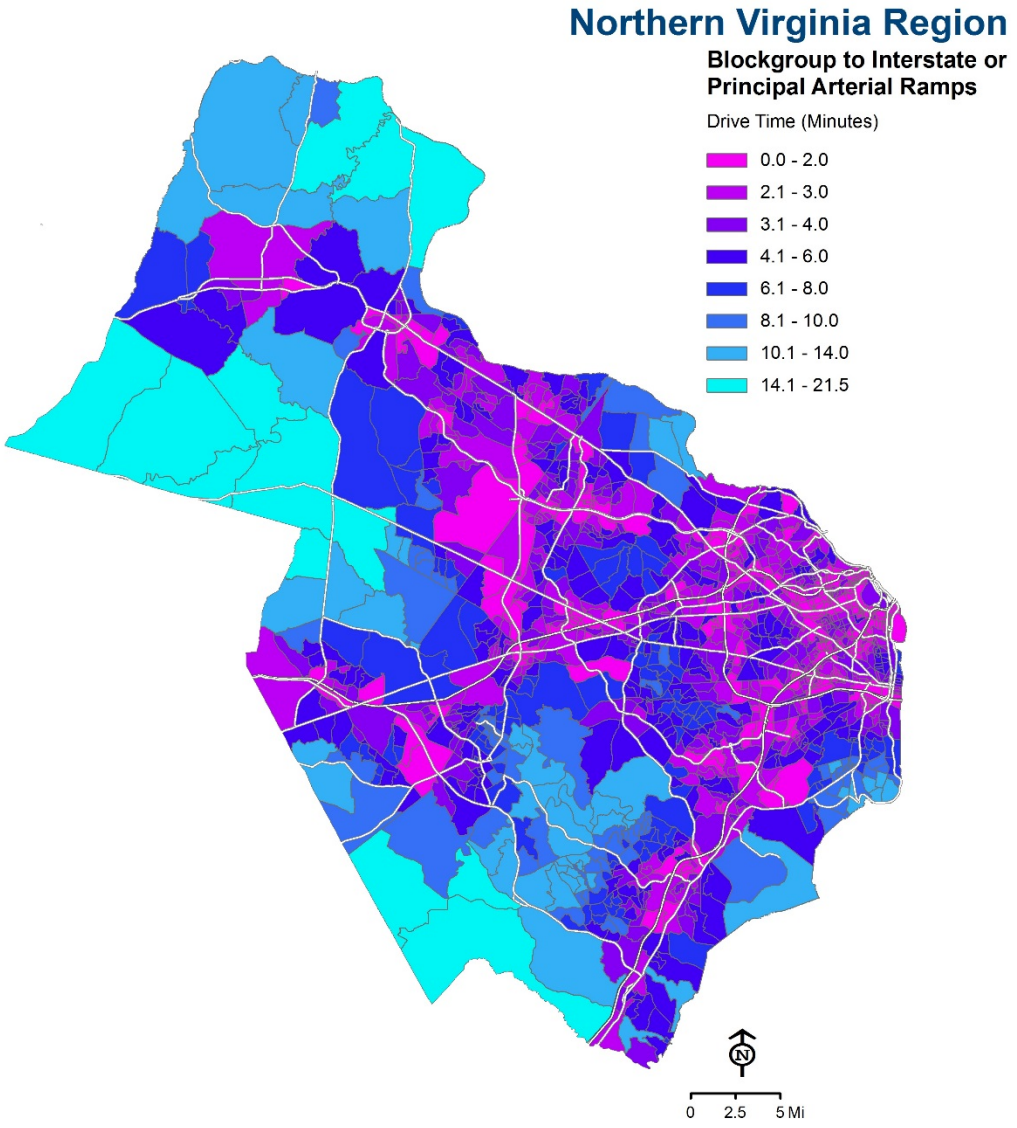


Figure 24 shows that access to warehouses and distribution centers is lowest around the urban ring of the region. But even in the most accessible areas of the region, the drive time to these types of facilities can be a half hour or more.

Figure 24: Access to Warehouses & Distribution Centers

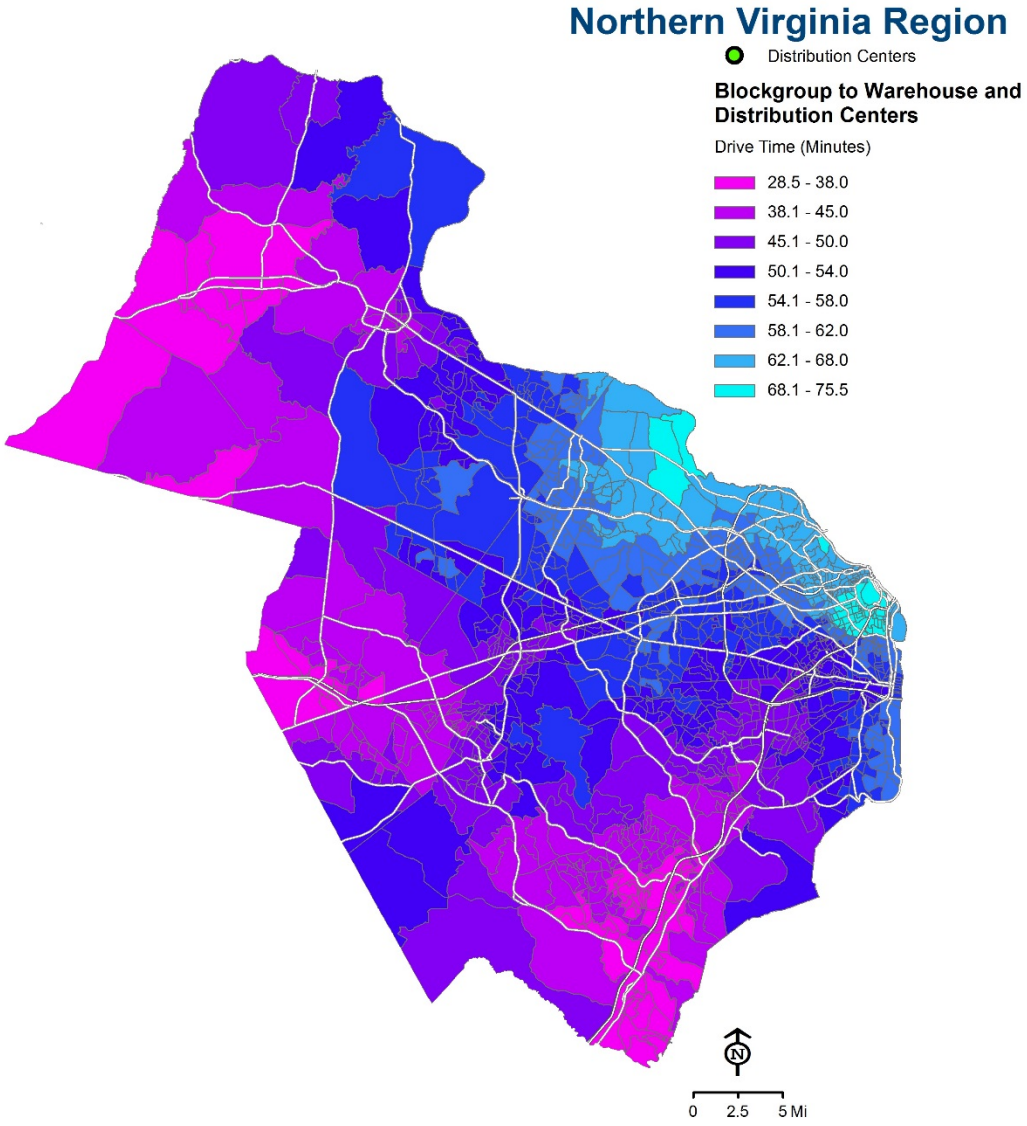
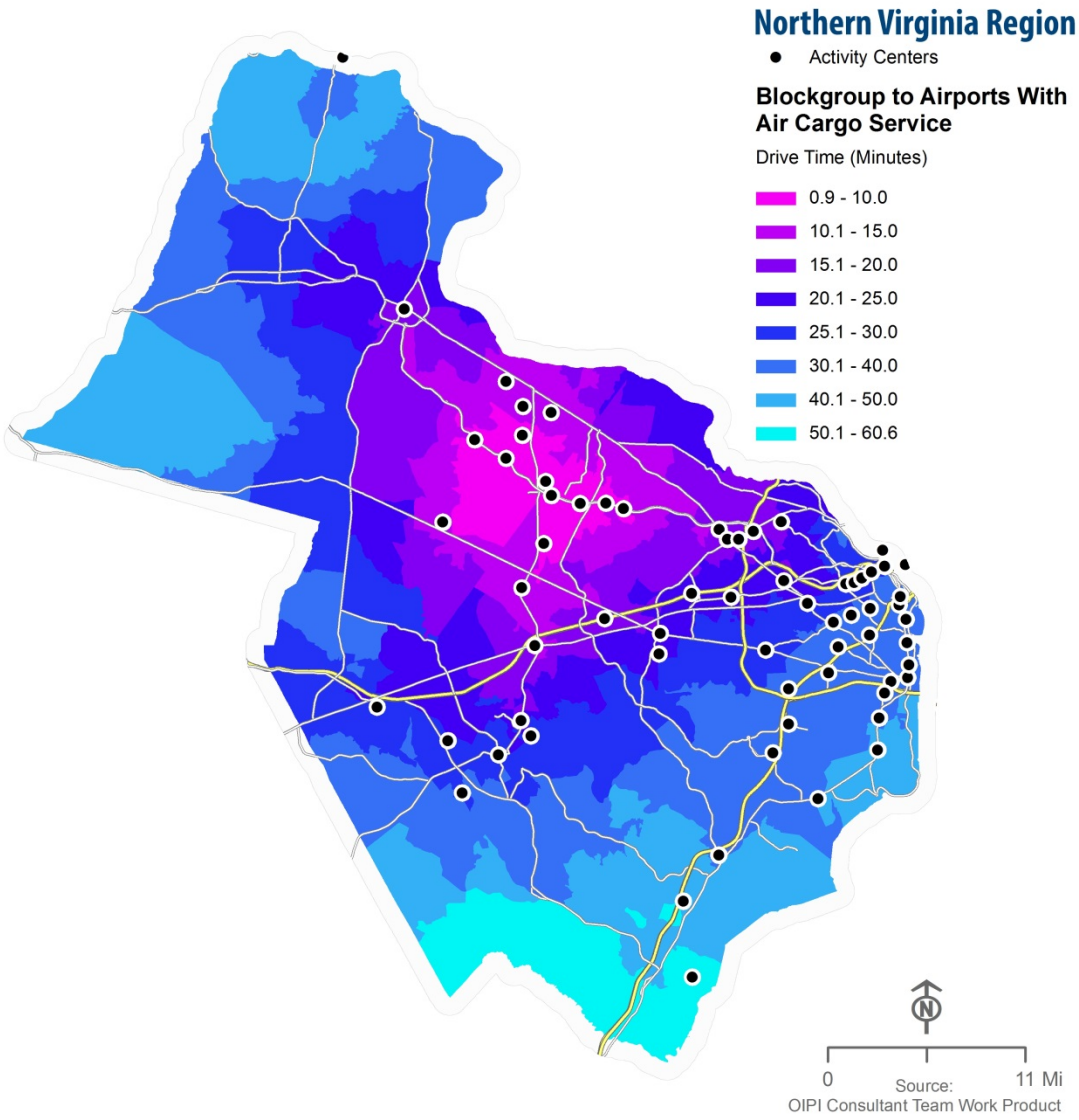


Figure 25 displays proximity to international airports that can handle significant levels of cargo, which is important for some types of freight distribution. For the most part, the airport that serves this purpose for Northern Virginia businesses is Dulles International.

Figure 25: Access to International Airports



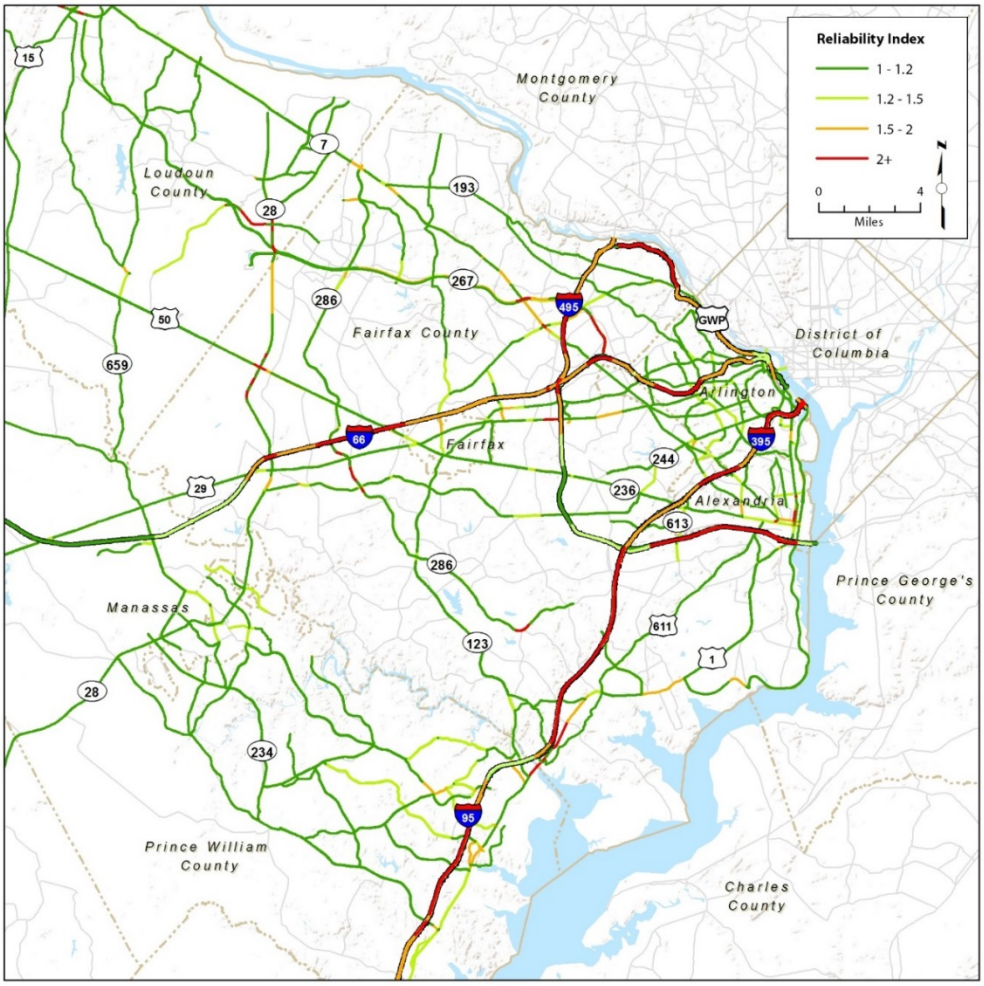
D. Roadway and Local Rail Transit Conditions

This assessment identified the transportation conditions in Northern Virginia based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people, freight, and transit vehicles.

Travel Time Reliability

Travel Time Reliability (TTR) measures the frequency by which trips along a specified corridor are significantly delayed (Figure 26). Peak period[5] TTR is calculated the ratio of median speeds to the 90th percentile speeds. A higher the TTR score indicates that the network link is less reliable. TTR can be considered the additional time that might be required to travel across a roadway segment. For example, a trip segment with a ratio of 1.5 that normally takes 5 minutes to traverse during the peak could require an additional 2.5 minutes. In Northern Virginia, reliability issues are most profound along the interstates (I-66, I-95, I-395, and I-495) and on a few portions of key corridors. The impact of this unreliability is felt both by commuters suffering lost productivity and reduced quality of life, and also by trucking companies and freight-dependent businesses under pressure to deliver goods quickly and consistently.

Figure 26: Travel Time Reliability. Source: INRIX



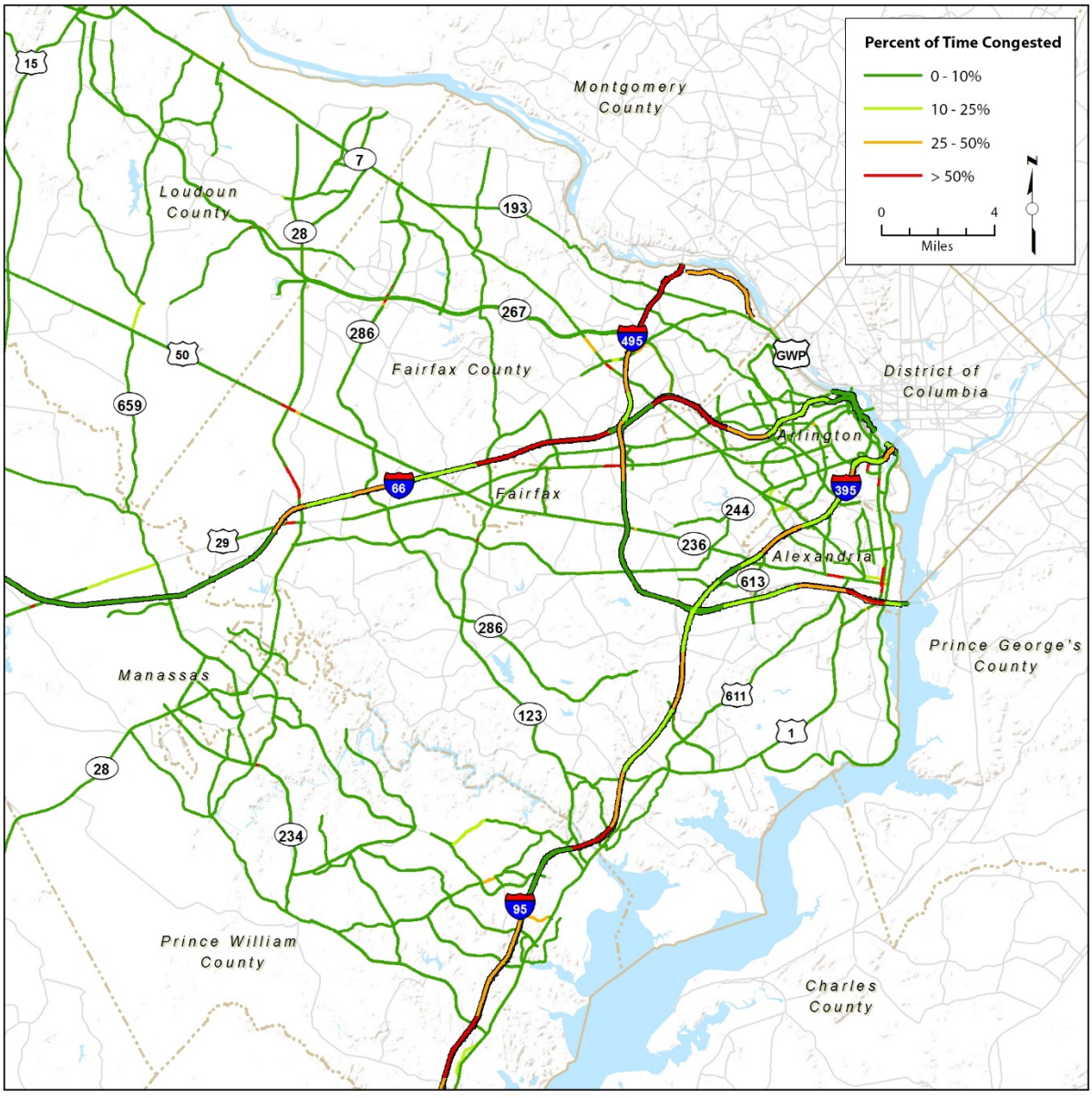
Percent of Time Congested

Figure 27 shows the AM and PM peak percent time congested. This represents the percentage of the time that a typical vehicle spends in significantly congested conditions. Significant congestion is defined

[5] The AM and PM peak periods are defined as 6-9am and 3-7pm, respectively.

as operating at speeds below 50 percent of the free-flow speed. The free-flow speed is measured as the 85th percentile of overnight speed. Within Northern Virginia, travelers experience long periods of congestion (30 percent of travel time) on a few segments of major corridors such as I-95 and I-66. On many other major corridors, drivers routinely experience significant congestion 15-20 percent of their travel time, with the percentage dropping to 5-15 percent on the outskirts of the urban core.

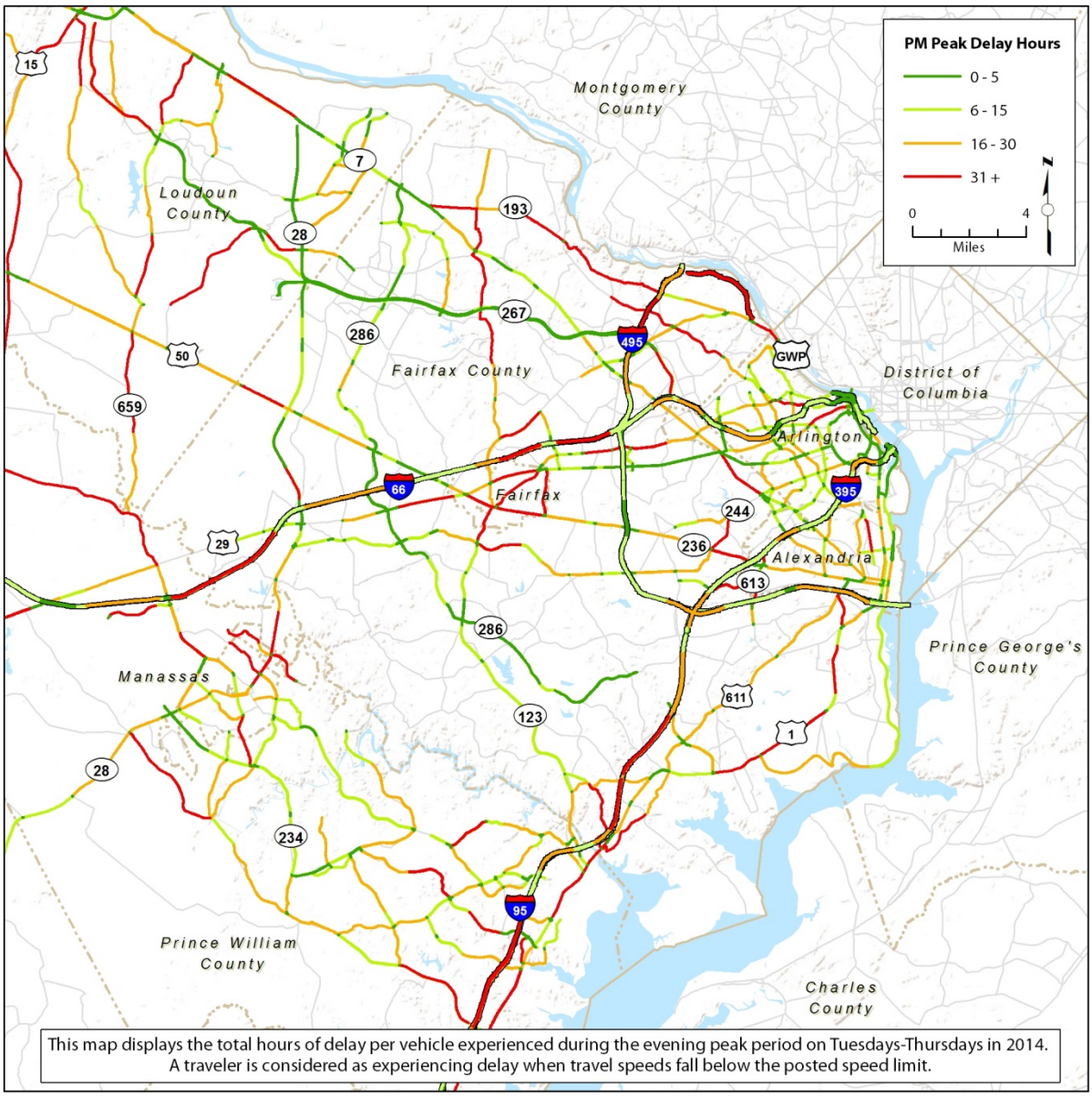
Figure 27: Percent of Time Congested. Source: INRIX



Travel Time Delay

Figure 28 shows total hours of delay per vehicle experienced during the evening peak period on Tuesday, Wednesdays, and Thursdays in 2014. A traveler is considered to be experiencing delay when travel speeds fall below the posted speed limit. It can also be thought of as delay per vehicle. Along many major highways in the Northern Virginia region, commuters spend at least 31 hours per year driving at less than 90 percent of free-flow speeds. Delay is particularly severe along much of I-95 and several stretches of I-66, I-495, and the George Washington Parkway, as well as along portions of other major US Routes.

Figure 28: Travel Time Delay. Source: INRIX

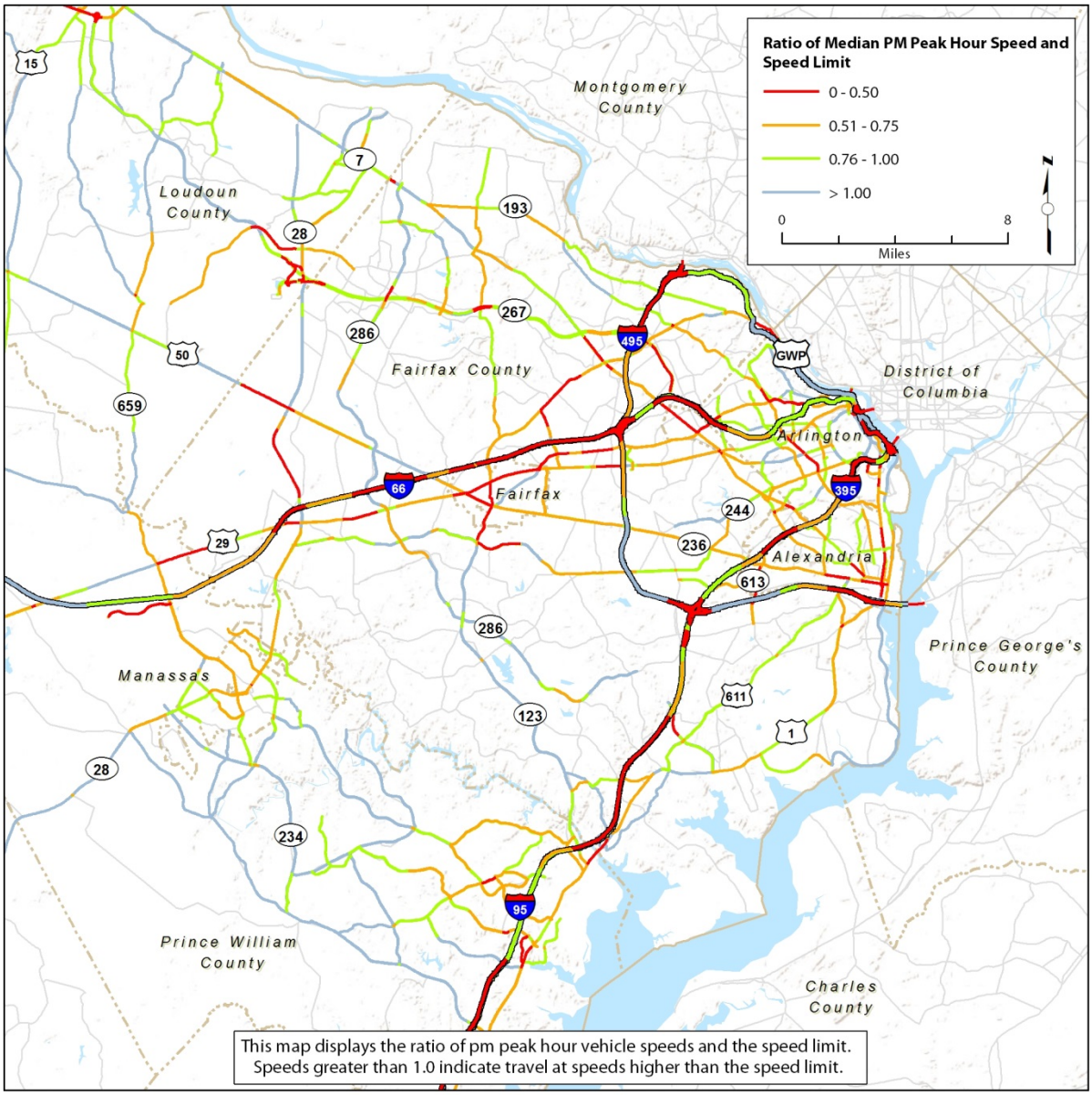


This map displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit.

Median Speeds

Figure 29 shows the ratio of evening peak hour vehicle speeds to the speed limit. Measuring median speeds evaluates typical conditions, while avoiding the undue influence of severe congestion events. If the median (50th percentile) is 30 miles per hour, for example, this means that half of all observations are above 30 miles per hour, and half are below 30 miles per hour. In Northern Virginia, evening traffic moves at less than 50 percent of the speed limit along interstate corridors 66 and 95 throughout much of the Northern Virginia region, and along many sections of primary routes such as Routes 50 and 28.

Figure 29: Median Speeds. Source: INRIX



Transit Capacity Challenges

The transportation profile must also consider the capacity and demand for transit services through the year 2025. The Washington Metropolitan Area Transit Authority's (WMATA's) strategic plan, *Momentum*, identifies the historic growth patterns and the likely needs for the system by 2025 to accommodate demand. Without significant new investments, the system will be over capacity by 2025. This is particular significant considering the benefits that the Metrorail system brings both to riders and to the region more generally. Without Metrorail service, across the entire Washington, DC metropolitan region, there would be a 25 percent increase in congestion and the region would have to accommodate 1 million more automobile trips per day. It is self-evident that the Metrorail system plays a critical role in alleviating roadway congestion. It is also important to note that transit vehicles are almost always subject to the same traffic delays as vehicles, and would benefit from reductions in roadway congestion and reliability improvements.

D. Regional Commodity Flows

An understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and into the Northern Virginia region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss freight modal dependence of regional industries, as well as the top commodities moving into and out of the region by monetary value, geographic destination, and tonnage.

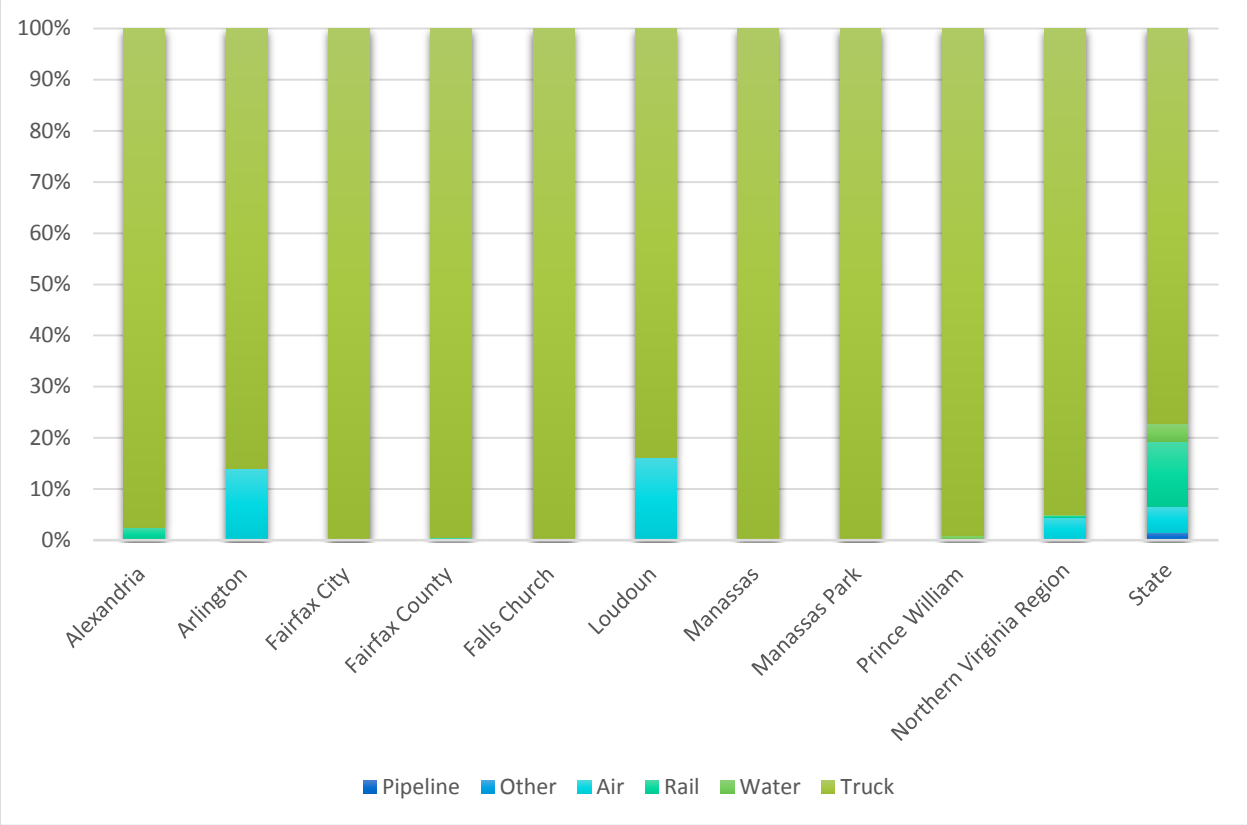
Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be dependent on freight, since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output.[6] In the Northern Virginia region, the overwhelming majority of all freight-dependent business output, 95 percent, is reliant on truck transportation (Figure 30). Air is the second most important mode, supporting around 4 percent of the total freight-dependent industry output in the region. In comparison to the other jurisdictions in the region, Arlington and Loudoun counties are more dependent on air service, due to the presence of airports in each jurisdiction. According to Transearch, the top two commodities moved by air (in both dollar value and tonnage terms) are consolidated freight shipments (called FAK or Freight of All Kinds) and drugs, with the former being by far the largest commodity category. The types of industries typically supported by air freight in the region are wholesale trade, along with sectors that rely on or produce high-value products such as high-tech manufacturing, research and development, the medical sector, and in some cases food establishments.

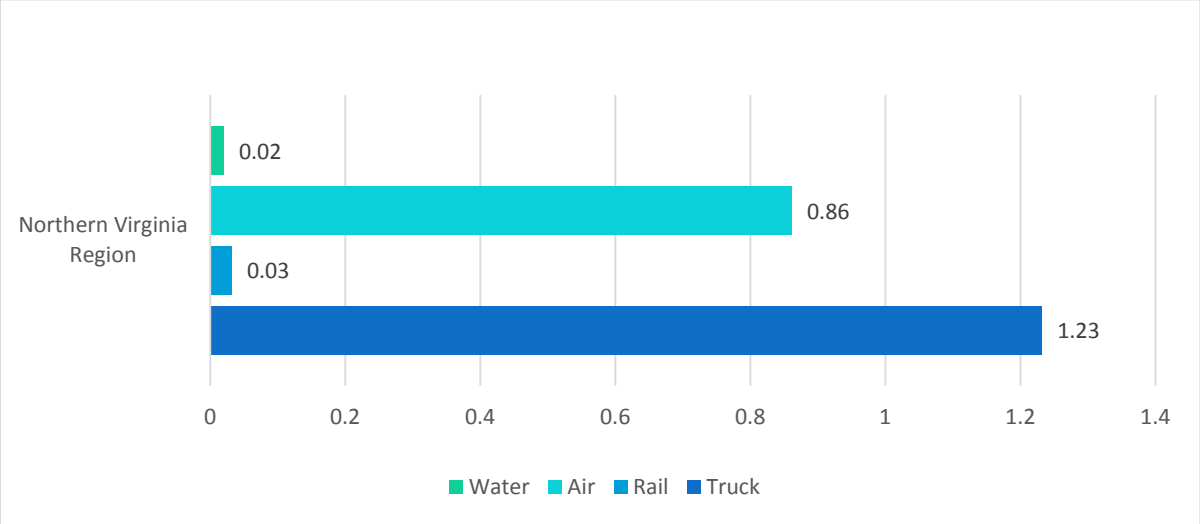
[6] Note that this approach is distinct from quantifying the dollar value of commodities moved by different modes. The relationship between commodities moved and supported industry activity (as measured in output terms) is established by linking Transearch commodity flow data with input-output economic models.

Figure 30: Comparison of Freight Modal Dependence of Industry Output. Source: TREDIS fueled by Transearch, 2012



Location Quotients by freight transportation mode are used to compare the prominence of freight modes between the Northern Virginia region and the state as a whole (Figure 31). Industry activity, as measured by output, within the region is slightly more dependent on trucking compared to the state is as a whole. Additionally, the region approaches the statewide average for air freight. Northern Virginia has a very marginal industry dependence on water and rail freight modes. While some other urban areas in Virginia do approach the statewide level of rail dependence (the Tri-Cities region, for example, has a rail location quotient of 0.91), dependence on water and rail freight is generally higher in rural regions of the state. Rail and water borne commodities tend to be bulky (with low value/volume ratios) and rail and water transportation have traditionally served industries that depend on bulk commodities (for either inputs or outputs or both) because these modes offer relatively low-cost transportation on a tonnage (ton-mile) basis. In general, the reliance of Northern Virginia industries on truck and air freight is consistent with an economy involved mostly in the production and use of higher-value commodities that require rapid and flexible shipments. Nevertheless, bulk commodity shipments are important for certain sectors within the region: construction industries often depend on rail and/or water freight for inputs such as aggregate and concrete. Therefore, while these modes play a small role Northern Virginia's economy, they can have important implications for the cost of infrastructure and housing.

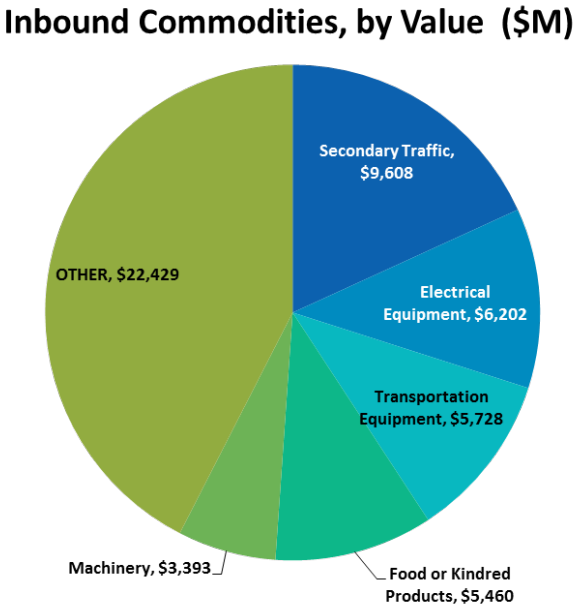
Figure 31: Location Quotient by Mode of Freight Travel (calculated on the basis of freight-dependent industry output). Source: TREDIS fueled by Transearch, 2012.



Top Commodities

The last section addressed freight modal dependence on the basis of industry output; this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. In total, $52.8 billion of goods are brought into the Northern Virginia region each year. As shown in Figure 32, secondary traffic, electrical equipment, transportation equipment, food or kindred products, and machinery (in that order) are the largest single categories of commodities brought into the region. The "other" category of commodities includes a variety of manufactured and agricultural products and natural resources (such as ore, coal, and petroleum).

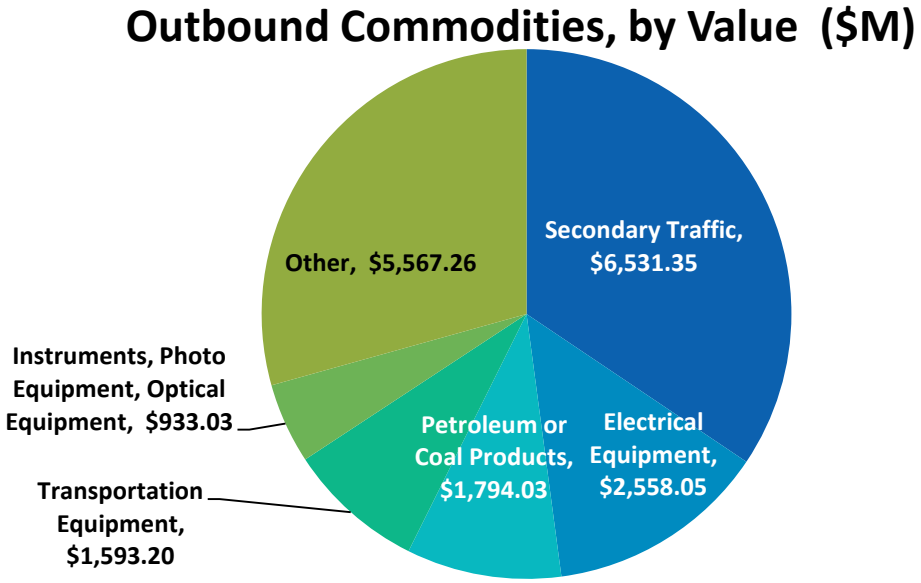
Figure 32: Top Freight Values by Inbound Commodities. Source: Transearch, 2012



Secondary Traffic (freight that is made up of goods being transferred between warehouses or retail centers as well as drayage – short term transport – to rail or air terminals) accounts for the most

valuable freight moving out of the Northern Virginia region. The importance of secondary traffic is consistent with the region's high levels of economic activity in wholesale trade and with relatively high demand from end-consumers (e.g. retail trade and consumption by service sector industries). After secondary traffic, the largest single categories of outbound commodities include electrical equipment, petroleum or coal products, transportation equipment, and instruments, and photo and optical equipment. The outbound movement of electrical equipment corresponds to the largest manufacturing sector within Northern Virginia, Computer & Electronics Manufacturing, which, according to IHS Global Insight data, accounted for just over $2 billion of business output in 2012. Transportation equipment shipments are associated with the third largest manufacturing sector in the region, transportation equipment manufacturing, which accounted for $756 million in output in 2012. The "other" category of outbound commodities includes a variety of manufactured and agricultural products and natural resources (such as ore, coal, and petroleum). Figure 33 Indicates that the region is a net receiver of commodities.

Figure 33: Top Freight Values by Outbound Commodities. Source: Transearch, 2012



The Mid-Atlantic region (as defined by the Bureau of Economic analysis) is the most important destination for freight from the Northern Virginia region. Figure 34 shows the other regions throughout the United States that receive a significant amount of the region's outbound freight. These national destinations of outbound freight are typically other population centers or major ports of exit for international trade. For goods-producing businesses within Virginia, access to these broader markets is critical to their economic competitiveness.

Figure 34: Top Freight Values by Region. Source: TranSearch, 2012.

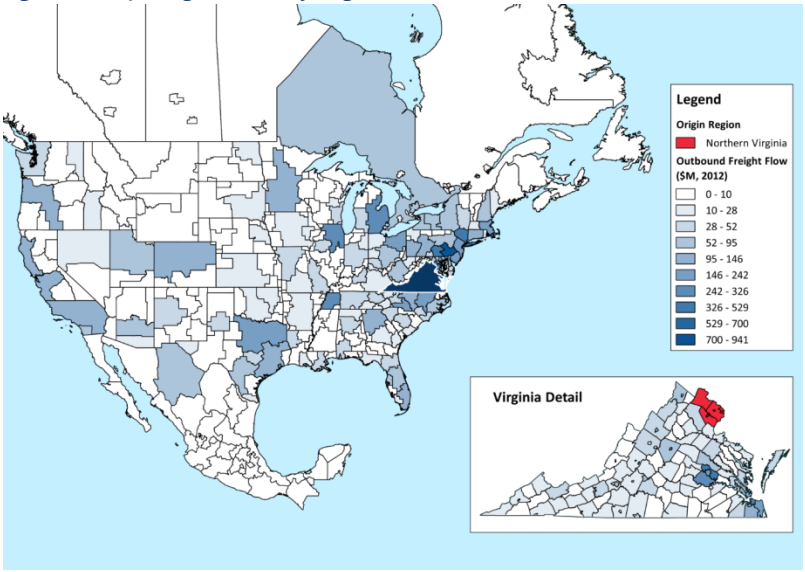


Figure 35 and Figure 36 present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. Non-metallic minerals account for approximately half of the weight of both inbound and outbound commodities.

Figure 35: Top Inbound Commodities by Weight

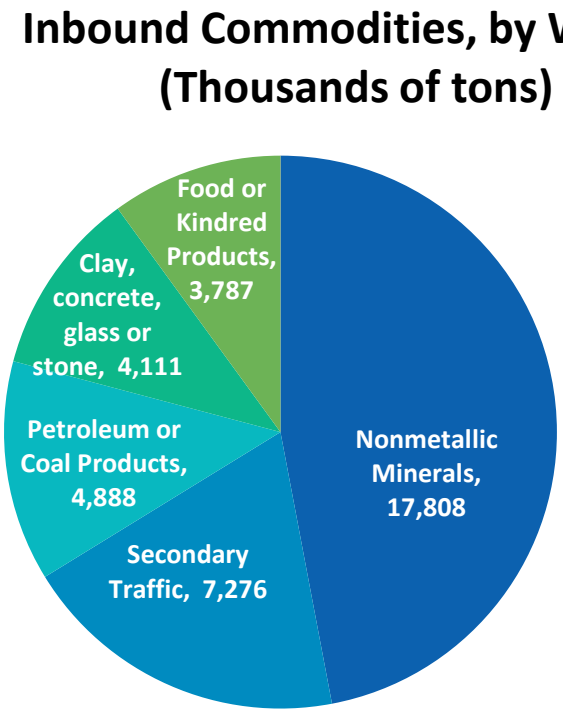
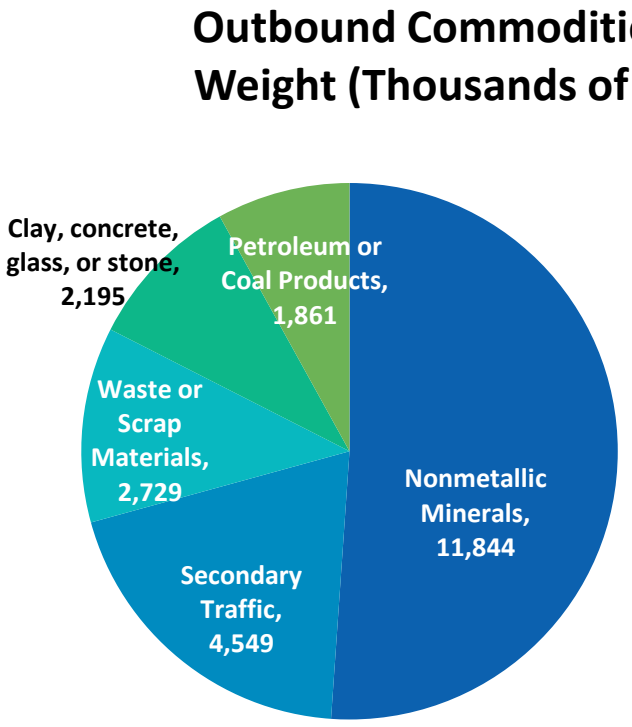


Figure 36: Top Outbound Commodities by Weight



4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs are considered deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. The Needs have been categorized into a series of five very broad types of Capacity Needs (Corridor Reliability, Network Connectivity, Transportation Demand Management, Modal Choice, and Walkable and Bikeable Places). The study team assembled and described the Transportation Needs in each region with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, Table 12 outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 12: Economic and Transportation Correlation. Source: Summary Correlations Based on National Research and Survey of National Industry Site Selection Professionals Conducted by the Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	3	3	3
Passenger Reliability	3	3	1
Bottleneck Relief	2	3	3
Freight Reliability	2	2	3
Freight Accessibility	1	2	3
Network Connectivity	3	2	1
Transportation Demand Management	1	2	2
Modal Choice	3	2	1
Transit Access	3	2	1
Active Transportation (Walk/Bike) Options	2	3	1
Walkable Places	2	3	1

Correlations:	
	3 = High Correlation to Transportation Need
	2 = Moderate Correlation to Transportation Need
	1 = Low Correlation to Transportation Need

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Northern Virginia region, it showed a heavy focus on the local-serving and knowledge-based economic sectors (83 percent of output and 88 percent of employment, combined), with a smaller segment of the freight-dependent sector. The relative importance of each economic sector in the Northern Virginia region is expected to remain largely similar to 2012 conditions over the next decade, with the local-serving sector expected to decrease slightly. As outlined in the Economic and Transportation Correlation above, the top Transportation Needs of these two dominant sectors (local-serving and knowledge-based) (Table 12) including highway access, passenger reliability, bottleneck relief, network connectivity, modal choice, transit access, active transportation, and walkable places. Freight reliability and accessibility are of a relatively lower importance.

The forecasted growth in the knowledge-based economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge-based sector particularly point to improving modal choice, transit access and walkable places. The local-serving economic sector also has important correlations with transit accessibility to support workforce

access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. In particular, there is a need for additional high capacity and high frequency transit service in the region. Further support for the knowledge-based sector would also come from additional walkable places and modal options for walking and biking in the region.

The discussion above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need.

It is important to note that two key existing Plans in the Northern Virginia region must be taken into account in understanding and interpreting the Needs in this Assessment. *TransAction 2040* plan, the region's long range transportation plan developed pursuant to Sections 33.2-2500 and 33.2-2508 of the Virginia Code, should be considered a key and authoritative source of information about the region's challenges and needs. The plan's vision as follows:

> *In the 21st century, Northern Virginia will develop and sustain a multimodal transportation system that supports our economy and quality of life. It will be fiscally sustainable, promote areas of concentrated growth, manage both demand and capacity, and employ the best technology, joining rail, roadway, bus, air, water, pedestrian, and bicycle facilities into an interconnected network.*

The *TransAction 2040* plan is currently undergoing an update; when the new plan is approved, it will be the region's official long range plan.

In addition, the Washington Metropolitan Area Transit Authority (WMATA) has developed a strategic plan for the year 2025, *Momentum*, which identifies the key challenges and needs of the Metrorail system, as well as a strategic set of planned system improvements. These include the use of eight-car trains during peak travel periods, core station improvements, a Metrobus Priority Corridor Network (PCN), new Blue Line connections, next generation communications, bus fleet expansion, and pocket tracks.

Findings of Needs

Table 13 lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

1. Category/ies of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need
5. Locations that exemplify this need[7]

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

[7] Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

Table 13: Findings of Needs

A. Enhance multimodal access around transit access points such as existing and emerging rail stations, high capacity bus stops, and intermodal transfer centers

NEED

There is a need for improved connections for those walking, biking, and using "feeder" transit services to make transit a more viable option for travel within the region, particularly around current and future station areas and other activity centers. In some cases, it would be possible to reduce traffic congestion by improving multimodal linkages among activity centers.

ECONOMIC

The ability of communities around transit stations (particularly the areas within 1-2 miles of the stations and other travel hubs) to attract residents and skilled workers and grow businesses can be enhanced by building safe, convenient walking and bicycling networks and facilities, and by providing high-frequency transit services throughout the day. A robust array of travel choices for commuting and local trips is a critical asset for attracting workers and businesses. Employers' abilities to access skilled workers is a top concern, and 21st century workers seek to live and work in locations they can reach via multiple travel modes.

TRANSPORTATION

Increased multimodal access to transit would benefit all of the region's current and future rail station areas and other key transit hubs, such as those with high-capacity and high-frequency bus services. Enhancements to address this Need would help to solve "last mile" challenges for commuters. Extra priority should be placed on investments in and around activity centers, as they have higher average residential densities and are expected to contain a significant portion of the region's new housing development and economic activity. Because of higher densities, improvements near transit hubs have the potential to serve and benefit large numbers of residents in a cost-effective way. In some cases, improvements are needed to Metrorail stations themselves to increase capacity and improve safety.

EXAMPLE LOCATIONS

Areas surrounding the WAMATA Orange and Silver Line stations (Dunn Loring, Wiehle Avenue, Spring Hill), Blue/Yellow stations (Franconia-Springfield, Huntington, Eisenhower), VRE stations, and intermodal transit hubs (e.g. Shirlington, Seven Corners). This also applies to areas preparing for Metro expansion, such as the stations planned for Loudoun County and Herndon station, and the Gainesville-Haymarket area of Prince William County, where a VRE extension is planned for construction.

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

B. Increase equity in access to high quality transportation facilities

NEED

A fundamental factor in access to economic opportunity, multimodal transportation accessibility is urgently needed in communities with high concentrations of economically disadvantaged residents. Strategic multimodal transportation investments can yield equity benefits. Improvements to facilities of all types used by disadvantaged residents, and increased awareness and availability of affordable travel options, such as through TDM and other programs, are needed.

ECONOMIC

Improving service workers' and other residents' access to jobs and services provides both social and economic benefits. This need is especially important for the region's economically disadvantaged and transit-dependent residents. Many of the region's low- and moderate-income workers provide essential goods and services to residents, visitors, and businesses, which strengthens the attractiveness of the region to prospective employers, tourists, and other generators of economic activity. In addition, multimodal access to health service centers, which contribute significantly to the region's economic activity, is critical for people with disabilities, veterans, and older adults who rely upon demand response transit services, and for residents who use transit and/or bike and walk to work and other destinations.

TRANSPORTATION

There is a need to enhance the operations and affordability of key commuting facilities, both roadways and transit, to improve accessibility from and for communities with high concentrations of low- and moderate-income residents to jobs and services, which are often located in communities with higher-cost housing. Bus transportation is sometimes the only affordable and readily accessible mode of transportation for many service workers and residents in the region. Higher-frequency, higher-capacity, and more efficient transit services can produce benefits for the region's workforce. Pedestrian and bicycle facilities can improve transportation conditions at very low cost to both the government and user. There is a need for enhanced availability and awareness of affordable commuting options to expand travel options, and the effective capacity of the transportation system, for all residents. A lack of ADA-compliant facilities in strategic locations creates "broken links" in multimodal networks, which render entire areas inaccessible to low-mobility residents. As such, ensuring ADA compliance is a cost effective way to serve the disabled community.

EXAMPLE LOCATIONS

Toll roadway facilities, activity centers, non-ADA-compliant facilities, communities with concentrations of disadvantaged residents, transit routes on arterial roads, and sidewalks and bikeways.

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

C. There is a need for corridor safety and operational improvements to alleviate bottlenecks and reduce acute congestion, thereby expanding effective capacity for travel by all modes, along key corridors in the region.

NEED

The Northern Virginia region suffers from the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to current and potential residents, workers, and businesses. Actions are needed throughout the region to address ongoing congestion issues, which affect travel by all modes along key corridors. While congestion is common throughout the region, crashes and breakdowns in numerous roadway "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the entire travel network for passenger vehicles, trucks, and buses. In addition, many of the region's passenger rail facilities are already at capacity, and are expected to experience more severe overcrowding by 2025. As such, safety improvements to reduce the frequency of crashes and breakdowns, operational improvements to improve accessibility for emergency vehicles to enhance efficiency of incidence clearance, and improvements that increase physical and/or effective capacity on all modes have significant potential to alleviate impacts.

ECONOMIC

Severe congestion and subsequent lost productivity and freight movement results in economic losses that are borne by the region's residents and businesses. Increased congestion and travel times on all modes make the area less attractive to current and prospective residents and, consequently, the businesses that want their skills. In particular, lack of reliability for freight can have profoundly negative economic impacts. In particular, congestion on key routes leading to cargo and transport hubs (e.g. Dulles Airport, National Airport, Union Station) results in lost economic productivity.

TRANSPORTATION

Recurring and non-recurring acute congestion events present major challenges to roadway users in all types of motorized vehicles, as well as for those traveling by foot, motorcycle, public or private buses, truck, and bicycle. Particularly on corridors that support pedestrians and cyclists, motorized traffic congestion also threatens safety and efficiency for non-motorized travelers. Roadway safety and operational improvements, and improvements that would enhance the efficiency with which emergency vehicles can clear roadways after accidents, are urgently needed throughout the entire region. This is particularly urgent on routes that lead to the airports and train stations that provide interregional transportation for people and goods. In some cases, improving signal timing, access management, and integration and implementation of more "intelligent" technologies can could be cost-effective ways to alleviate roadway and transit congestion and thereby enhance effective corridor capacity. In other cases, physical roadway and transit enhancements may also need to be considered. In particular, improvements are needed on many of the facilities identified by NVTA as corridors of regional importance.*

EXAMPLE LOCATIONS

NVTA multimodal Corridors*; I-66; I-95 south of the Springfield interchange; I-495; Route 1 corridor between Fort Belvoir and Washington, DC; Route 7; Route 15; Route 28; Route 29; Route 50; Route 123; Prince William County Parkway; other corridors providing airport access; Columbia Pike; Dale Boulevard; Glebe Road; Minnieville Road; Pentagon-Beauregard Corridor; activity centers in Prince William County (Gainesville, Innovation center, Potomac Communities); WMATA lines throughout the Metrorail system that are experiencing overcrowding

* NVTA Corridors: Virginia Route 7 and Dulles Toll Road Corridor, including the future WMATA Silver Line; Loudoun County Parkway/Tri-County Parkway/Belmont Ridge Road/Gum Springs Road Corridor; Virginia Route 28 Corridor; Prince William Parkway Corridor; Fairfax County Parkway Corridor; I-66/U.S. Route 29/U.S. Route 50 Corridor, including the WMATA Orange Line; Beltway (I-495) Corridor; and I-95/I-395/U.S. Route 1 Corridor, including the VRE and WMATA Blue and Yellow Lines

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

D. Expand and improve multimodal accessibility to existing and emerging hubs of economic activity

NEED

This Need specifically focuses on enhancing multimodal access to economic activity centers. Improving multimodal facilities and programs that serve existing and emerging centers of jobs, commerce, services, tourism, mixed-use development, and other economic generators - particularly those already served or to be served in the future by high capacity transit - can improve the economic viability of these areas, while also expanding travel choices and reducing congestion. Continued actions to focus growth and development around activity centers established through the MWCOG-led process will be highly supportive of this strategy.

ECONOMIC

Activity centers' desirability is highly correlated with the presence of multimodal travel options. Jurisdictions throughout the region have identified activity centers where they will encourage a higher concentration of future residential, commercial, and office development. These activity centers need adequate transportation facilities to support their growth and prosperity. In addition, existing activity centers need enhanced modal choices. The defense industry, for example, is a significant economic driver in the region. Current and anticipated military expansion and relocation sites, many of which are located in areas already experiencing heavy highway and transit congestion, have critical modal enhancement needs.

TRANSPORTATION

Activity centers need multimodal travel improvements to ensure safe, reliable movement for workers, consumers, and the goods and services they need. Enhancing networks to allow access to workplaces and services via walking, biking, and transit is necessary, and expanding the frequency and capacity of transit services can make non-SOV travel a more viable option. In particular, gaps in walking and bicycling networks pose significant barriers to using these modes, while the bottlenecks caused by limited capacity in the Rosslyn Metrorail Tunnel limit any frequency increases of Metrorail trains running into and out of DC. Other rail and transit bottlenecks are also critical challenges. Further, there is a need for enhanced transit services that operate frequently throughout the day and evening, including during non-peak hours, to make transit a more viable travel option for those with non-traditional work schedules (possibly including the use of 8-car trains through the Rosslyn Tunnel, as well as other strategies). Intelligent transportation and transit technologies could be considered for addressing this Need, as they can be cost-effective tools to enhance accessibility through a number of different mechanisms (e.g. reducing the roadway congestion that negatively impacts the on-time performance of buses).

EXAMPLE LOCATIONS

Activity centers and Urban Development Areas (UDAs) throughout the region such as Tysons, Rosslyn-Ballston Corridor, the Pentagon, and Seven Corners, as well as emerging activity centers such as Gainesville, Innovation Park, and the City of Manassas. Multimodal options are needed along key travel routes including but not limited to I-66 outside the Beltway, Columbia Pike, Route 1, Route 7, and Route 29.

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

E. Improve bicycle and pedestrian facilities and networks to provide additional uninterrupted connections for bicyclists and pedestrians within and between activity centers

NEED

The percentage of residents traveling to work and other destinations by bike and foot continues to increase in the region. In addition, bicycle and pedestrian trips are often made for the purpose of accessing transit. However, gaps in existing bicycle and pedestrian networks, as well as capacity challenges on some existing facilities, limit the viability of biking and walking. Walking and biking are both affordable and healthy travel options, and can help alleviate roadway congestion and transit capacity challenges. Increasing the mode share of bicyclists and pedestrians among commuters and everyday travelers could help to reduce the rising rates of automobile congestion, even while the region continues to attract residents and jobs.

ECONOMIC

The ability to bike and walk for all types of trips is seen as a highly desirable asset among 21st century workers and others seeking to locate in work-live communities. Easily navigable bike and walking routes for people of all ages and abilities are also essential assets for attracting tourists, who contribute significantly to the region's economy, and for helping communities retain lifelong residents.

TRANSPORTATION

Many of the region's residents regularly bicycle and walk to work and other destinations along popular recreational trails and other facilities that make up the region's bike and pedestrian networks. Congestion and conflicts among different types of users (such as fast-moving cyclists and runners versus child cyclists and walkers) has become an increasing safety concern along many multi-use trails and facilities. Expanding the capacity, availability, and connectivity of trails, while minimizing conflicts between bicyclists and pedestrian users, will make bicycling and walking even more viable travel options. Expanded bicycle and pedestrian facilities are needed at many transit stations to improve intermodal connections. Improvements are also needed along roadway corridors to eliminate gaps in bicycle and pedestrian networks and improving accessibility at pedestrian crossings to provide uninterrupted connections for non-motorized modes.

EXAMPLE LOCATIONS

Custis Trail, Mount Vernon Trail, Woodrow Wilson Bridge Trail, locations where pedestrian and bicycle facilities do not provide complete and continuous connections between activity centers and other hubs (for example, the Custis Trail does not provide connections to the Ballston activity center).

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

F. Improve multimodal connectivity among existing and emerging activity centers

NEED

Many key roadways and bicycle and transit networks in the region were designed to provide routes for commuters into and out of the District of Columbia and "first-tier" suburbs, which historically contained most of the region's employment centers. But employment and residential growth patterns have changed over the years, to the point that high concentrations of jobs and services and residential communities are located in a wide range of areas throughout Northern Virginia. Today, the volume of residents traveling between activity centers in non-core areas ("suburb to suburb") and from suburban residential areas to activity centers, is higher than the planned capacity on many roadway and bicycle networks. Connectivity improvements, combined with more sustainable development patterns in and around activity centers, can improve the efficiency of travel throughout the Northern Virginia region and may thereby reduce congestion on routes leading into the region's core areas.

ECONOMIC

Improving multimodal accessibility and connectivity to and within existing and emerging activity centers can improve their attractiveness and economic prospects. The need is particularly urgent in areas where private investors and local governments have developed partial multimodal networks and mixed-use communities. In these cases, filling in multimodal network gaps would maximize the return on investment and strengthen the ability of localities to attract the planned balance of residents and workers.

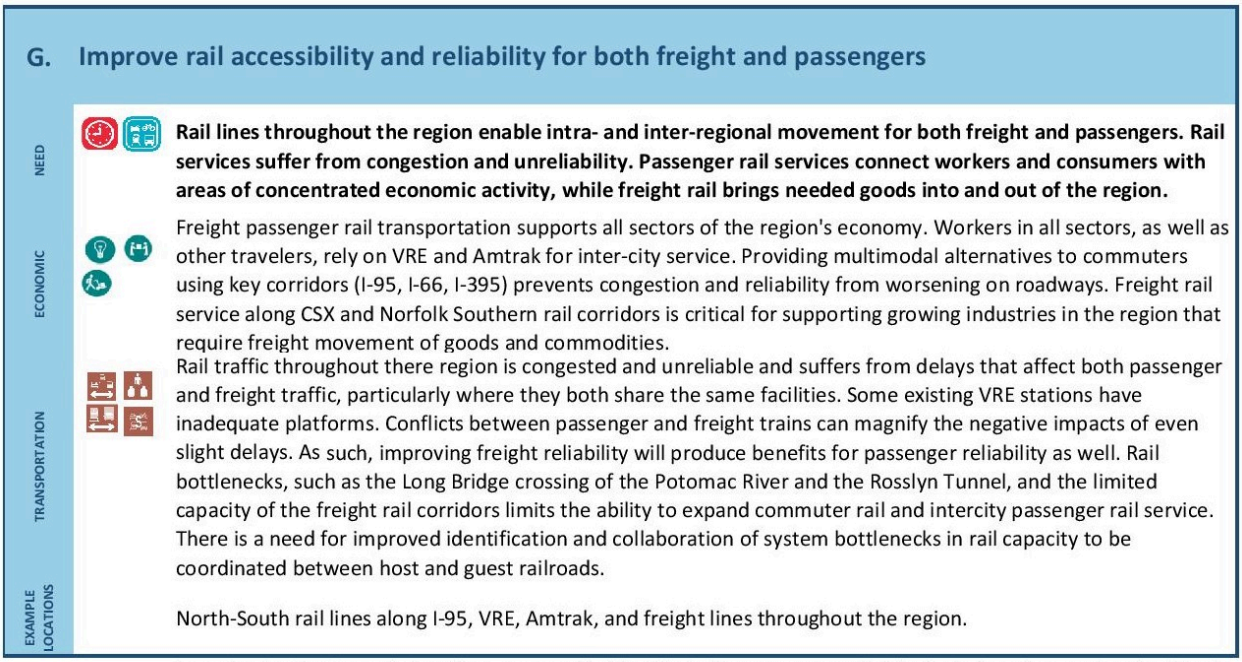
TRANSPORTATION

In many areas, completion of "missing links" to transportation system networks could enhance accessibility for travelers using all modes. Disconnected roadway, transit, bicycle and pedestrian networks force travelers to take circuitous routes, resulting in neighborhood congestion and air quality issues. Lack of connections also discourages travelers from choosing to walk or bike for short trips. Making suburban activity centers more transit-accessible would further help to alleviate or reduce traffic congestion by enabling communities to add jobs and workers that generate fewer vehicle trips than the number of trips that area associated with automobile-oriented growth.

EXAMPLE LOCATIONS

Accessibility between activity centers such as those in Arlington; Alexandria; Tysons; Reston; Springfield; Merrifield; Baileys Crossroads; Columbia Pike; Reston; Herndon Seven Corners; Fairfax Center, and other areas with high concentrations of economic activity and high travel volumes, as well as emerging activity centers such as Gainesville, Innovation, and the City of Manassas.

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.



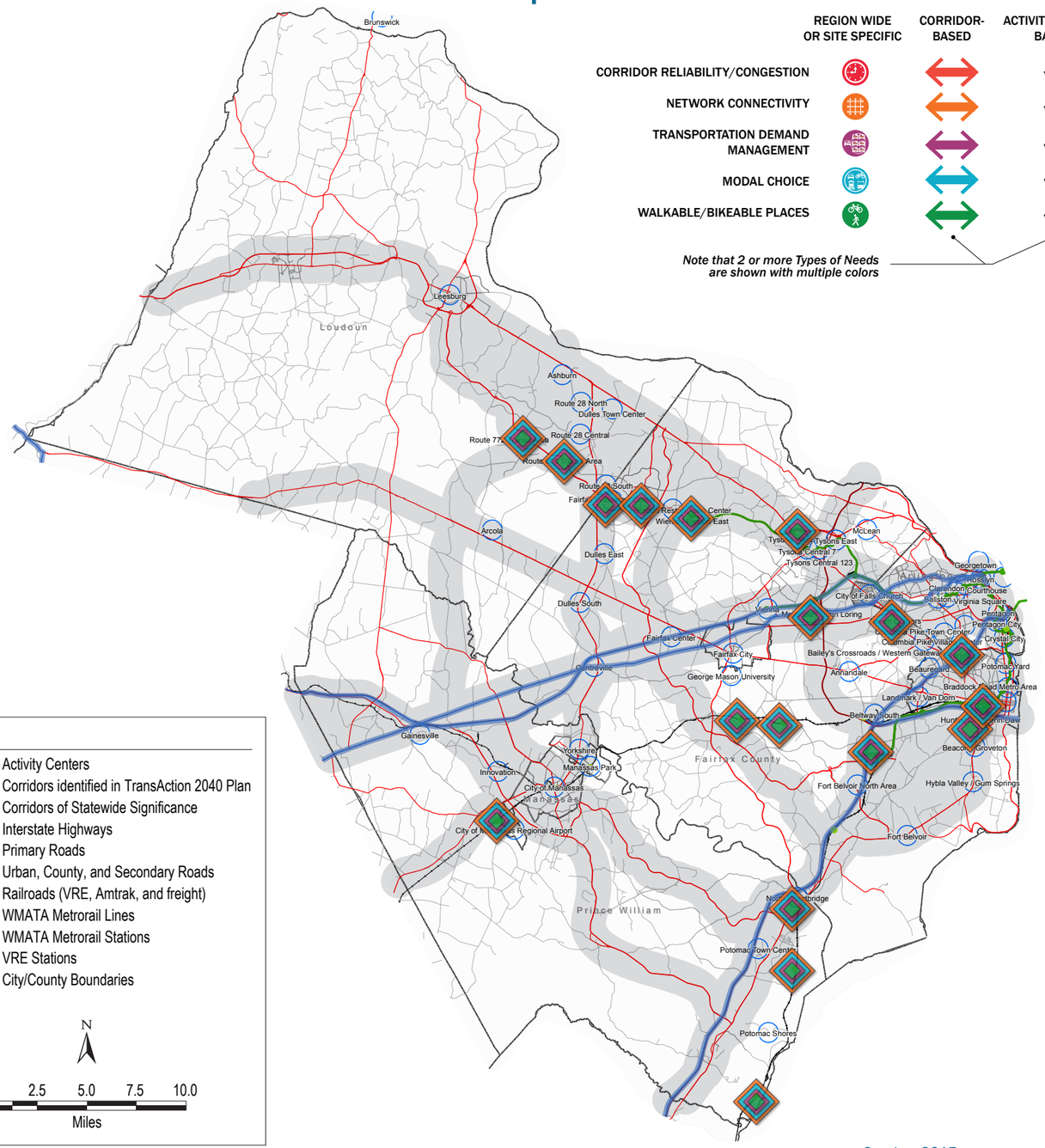
Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

Maps of Needs

Maps illustrating Northern Virginia's Transportation Needs are shown below. The example locations shown in the maps are provided for illustrative purposes only, and their depiction should not be interpreted to indicate or suggest that areas not depicted are not included in this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need A



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

A Enhance multimodal networks and facilities around transit access points such as existing and emerging rail stations, high capacity bus stops, and intermodal transfer centers

NEED

There is a need for improved multimodal networks that include walking, biking, and "feeder" transit services and facilities to make transit a more viable option for travel within the region, particularly around current and future station areas and other activity centers. In some cases, traffic congestion can be reduced by improving multimodal linkages among activity centers.

ECONOMIC

The ability of communities around transit stations (particularly the areas within 1-2 miles of the stations and other travel hubs) to attract skilled workers and grow businesses can be enhanced by building safe, convenient walking and bicycling networks and facilities and providing high-frequency transit services throughout the day. A robust array of travel choices for commuting and local trips is a critical asset for attracting workers and businesses. Employers' abilities to access skilled workers is a top concern, and 21st century workers seek to live and work in locations they can reach via multiple travel modes.

TRANSPORTATION

Multimodal enhancements would benefit all of the region's current and future rail station areas and other key transit hubs, such as those with high-capacity and high-frequency bus services. Multimodal enhancements would help to solve "last mile" challenges for commuters. Extra priority should be placed on enhancements in and around activity centers, as they have higher average residential densities and are expected to contain a significant portion of the region's new housing development and economic activity. Because of higher densities, improvements near transit hubs have the potential to serve and benefit the large numbers of residents in a cost-effective way. In some cases, improvements are needed to Metrorail stations themselves to increase capacity and improve safety.

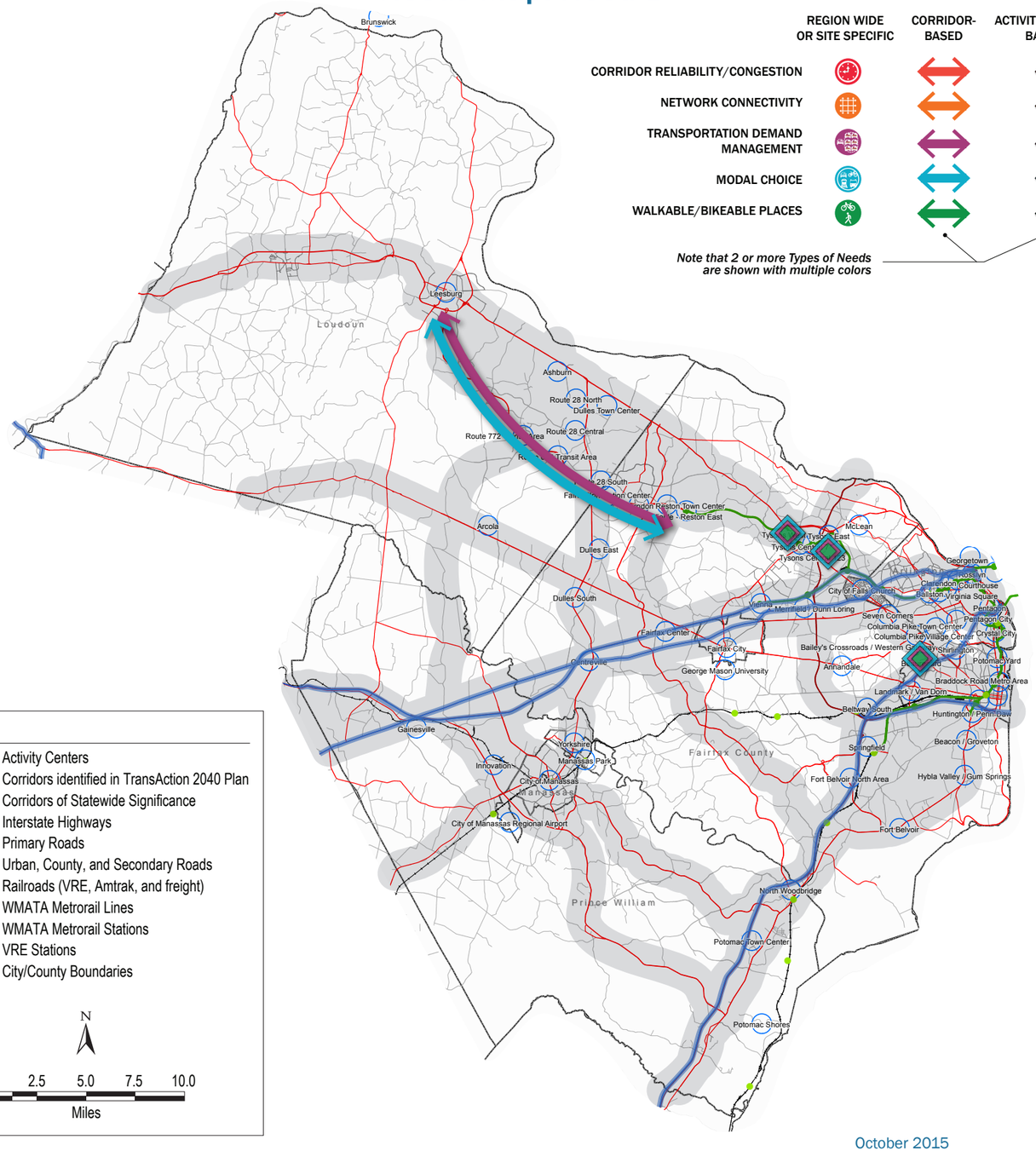
EXAMPLE LOCATIONS*

Areas surrounding Orange and Silver Line stations (Dunn Loring, Wiehle Avenue, Spring Hill), Blue/Yellow stations (Franconia-Springfield, Huntington, Eisenhower), VRE stations, and intermodal transit hubs (e.g. Shirlington, Seven Corners). This also applies to areas preparing for Metro expansion, such as the stations planned for Loudoun County.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need B



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

B Increase equity in access to high quality transportation facilities

NEED

A fundamental factor in economic advancement, multimodal transportation accessibility is most urgently needed in communities with high concentrations of economically disadvantaged residents. Strategic multimodal transportation investments can yield equity benefits. Improvements to facilities of all types used by disadvantaged residents, and increased awareness and availability of affordable travel options through TDM and other programs, are needed.

ECONOMIC

Improving service workers' and disadvantaged residents' access to jobs and services provides both social and economic benefits. Many of the region's low- and moderate-income workers provide essential goods and services to residents, visitors, and businesses, which strengthens the attractiveness of the region to prospective employers, tourists, and other generators of economic activity. In addition, multimodal access to health service centers, which contribute significantly to the region's economic activity, is critical for people with disabilities and older adults who rely upon demand response transit services, and for employees who use transit and/or bike and walk to work.

TRANSPORTATION

There is a need to enhance the operations and affordability of key commuting facilities, roadways and transit, to improve accessibility from communities with high concentrations of low- and moderate-income residents to jobs and services, which are often located in communities with higher-cost housing. Bus transportation is sometimes the only affordable and readily accessible mode of transportation for many service workers in the region. Higher-frequency, higher-capacity, and more efficient transit services would produce benefits for the region's workforce. Stronger TDM programs could enhance availability and awareness of affordable commuting options to expand travel options for all residents. A lack of ADA-compliant facilities in strategic locations creates "broken links" in multimodal networks, which render entire areas inaccessible to low-mobility residents.

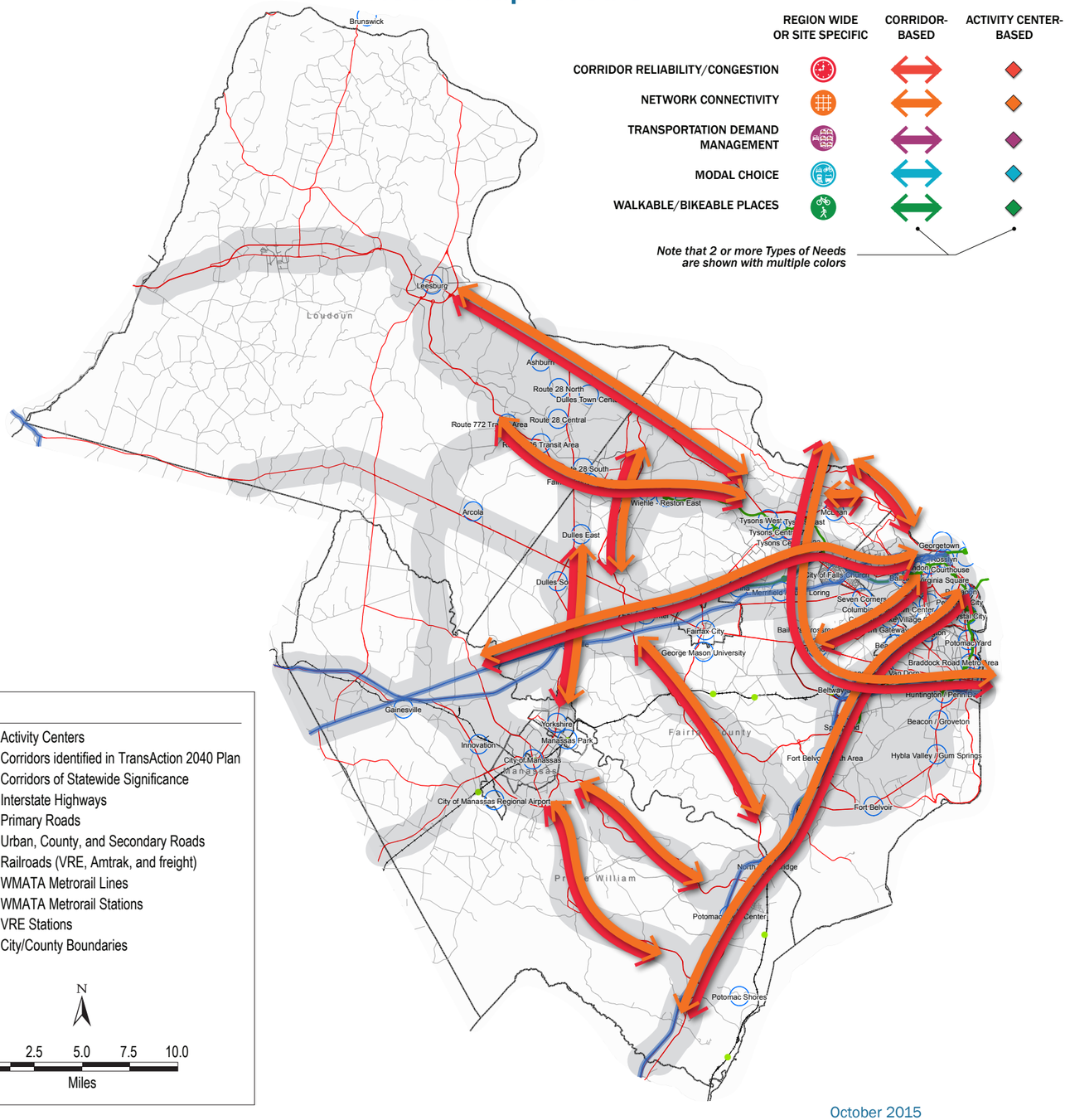
EXAMPLE LOCATIONS *

Toll roadway facilities, activity centers, non-ADA-compliant facilities, and communities with heavy concentrations of disadvantaged residents.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need C



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

C — **Make roadway safety and operational improvements to alleviate bottlenecks and reduce acute congestion, including "hot spots" with frequent but unpredictable (non-recurring) congestion**

NEED

The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.

ECONOMIC

Severe congestion and subsequent lost productivity and freight movement results in economic losses that are borne by the region's residents and businesses. Increased congestion and travel times on all modes make the area less attractive to current and prospective residents and, consequently, the businesses that want their skills. In particular, lack of reliability for freight can have profoundly negative economic impacts. Congestion on key routes leading to cargo and transport hubs (e.g. Dulles Airport, National Airport, Union Station) results in lost economic productivity.

TRANSPORTATION

Recurring and non-recurring acute congestion events present major challenges to roadway users in all types of motorized vehicles, from passenger cars and motorcycles to buses and trucks. On corridors that support pedestrians and cyclists, motorized traffic congestion also threatens safety and efficiency for non-motorized travelers. Roadway safety and operational improvements, and improvements that would enhance the efficiency with which emergency vehicles can clear roadways after accidents, are urgently needed throughout the entire region. This is particularly urgent on routes that lead to the airports and train stations that provide interregional transportation for people and goods. In some cases, improving signal timing, access management, and integration of more "intelligent" technologies can be cost-effective ways to alleviate congestion. In particular, improvements are needed on many of the facilities identified by NVTA as corridors of regional importance.*

EXAMPLE LOCATIONS**

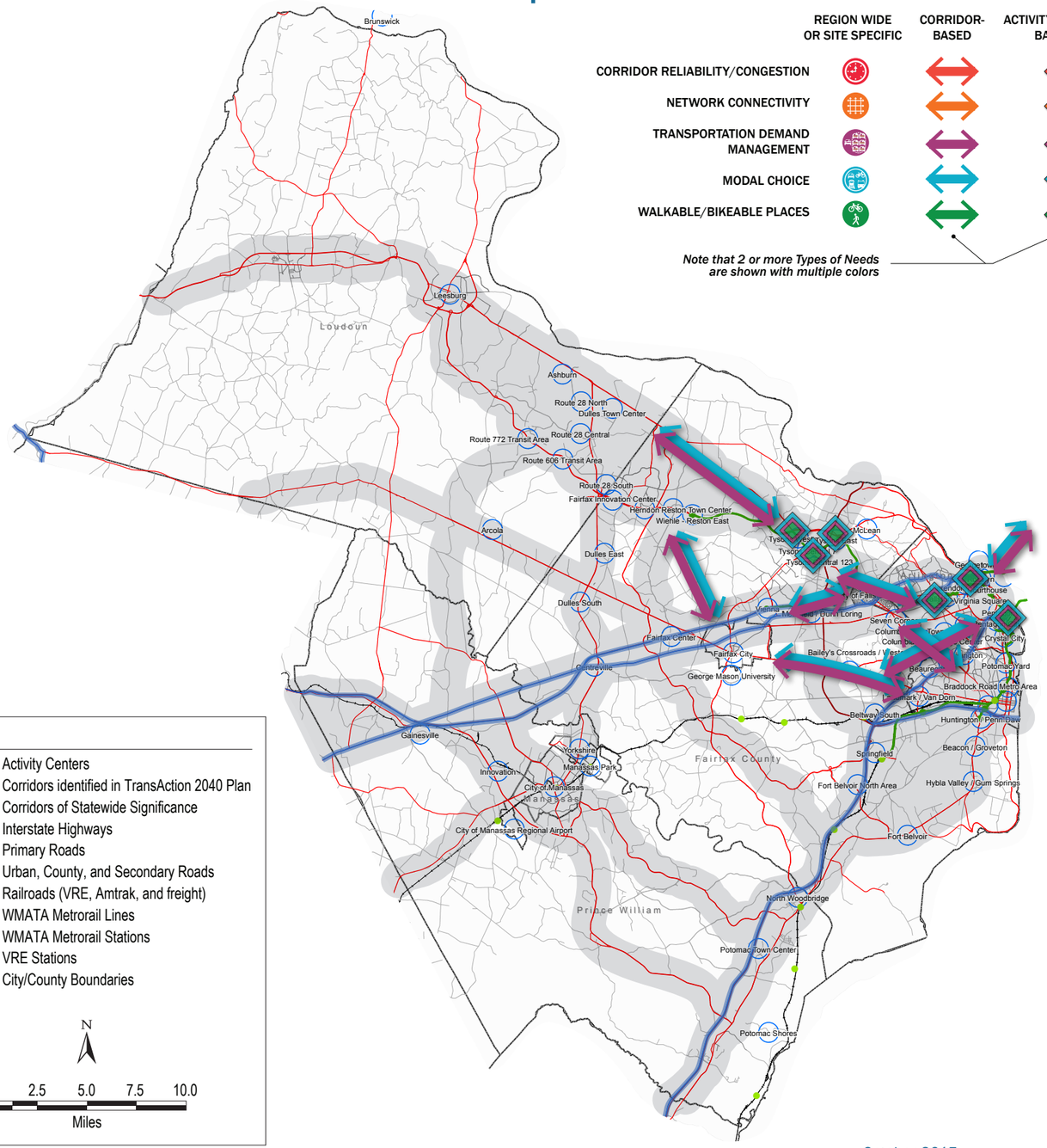
I-66; I-95 south of the Springfield interchange; I-495; Route 1 corridor between Fort Belvoir and Washington, DC; Route 7; Route 15; Route 28; Route 29; Route 50; Route 123; Prince William County Parkway; other corridors providing airport access; Columbia Pike; Dale Boulevard; Glebe Road; Minnieville Road; Pentagon-Beauregard Corridor; activity centers in Prince William County (Gainesville, Innovation center, Potomac Communities.

* NVTA Corridors:
Virginia Route 7 and Dulles Toll Road Corridor, including the future Metrorail Silver Line
Loudoun County Parkway/Tri-County Parkway/Belmont Ridge Road/Gum Springs Road Corridor
Virginia Route 28 Corridor
Prince William Parkway Corridor
Fairfax County Parkway Corridor
I-66/U.S. Route 29/U.S. Route 50 Corridor, including the Metrorail Orange Line
Beltway (I-495) Corridor
I-95/I-395/U.S. Route 1 Corridor, including the VRE and Metrorail Blue and Yellow Lines.

** Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need D



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

D Expand and improve multimodal accessibility to existing and emerging hubs of economic activity

NEED

The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.

ECONOMIC

Activity centers' viability and desirability is highly correlated with the presence of multimodal travel options. Jurisdictions throughout the region have identified activity centers where they will encourage a higher concentration of future residential, commercial, and office development. These activity centers need adequate transportation facilities to support their growth and prosperity. In addition, existing activity centers need enhanced modal choices. The defense industry, for example, is a significant economic driver in the region. Current and anticipated military expansion and relocation sites, many of which are located in areas already experiencing heavy highway and transit congestion, have critical modal enhancement needs.

TRANSPORTATION

Activity centers need multimodal travel improvements to ensure safe, reliable movement for workers, consumers, and the goods and services they need. Enhancing networks to allow access to workplaces and services via walking, biking, and transit is necessary, while expanding the frequency and capacity of transit services can make non-SOV travel a more viable option. In particular, gaps in walking and bicycling networks pose significant barriers to using these modes, while the bottlenecks caused by limited capacity in the Rosslyn Metrorail Tunnel limit any frequency increases of Metrorail cars running into and out of DC. Further, there is a need for enhanced transit services that operate frequently throughout the day and evening, including during non-peak hours, to make transit a more viable travel option for those with non-traditional work schedules.

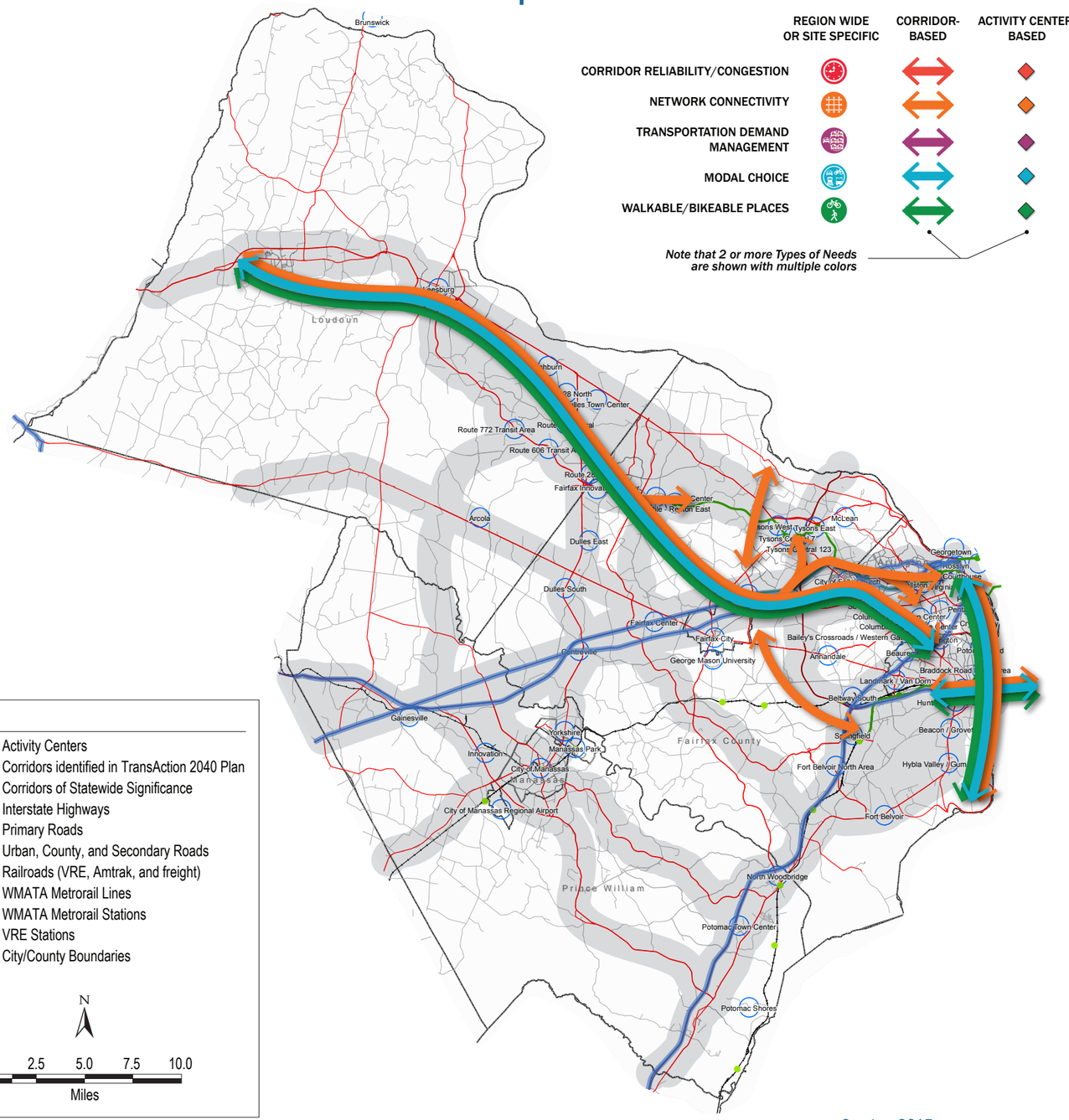
EXAMPLE LOCATIONS *

Activity centers throughout the region such as Tysons, the Rosslyn-Ballston Corridor, and the Pentagon. Multimodal options are needed along key travel routes including but not limited to Columbia Pike, Route, Route 7, and Route 29.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need E



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Needs Table

E — **Improve bicycle and pedestrian facilities and networks to provide additional and uninterrupted connections for bicyclists and pedestrians within and between activity centers**

NEED

The percentage of workers commuting by bike and foot continues to increase in the region. However, gaps in existing bicycle and pedestrian networks, as well as capacity challenges on some existing facilities, limit the viability of biking and walking. Walking and biking are both affordable and healthy travel options, and can help alleviate roadway congestion and transit capacity challenges. Increasing the mode share of bicyclists and pedestrians among commuters and everyday travelers could help to reduce the rising rates of automobile congestion, even while the region continues to attract residents and jobs.

ECONOMIC

The ability to bike and walk for all types of trips is seen as a highly desirable asset among 21st century workers seeking to locate in work-live communities. Easily navigable bike and walking routes for people of all ages and abilities are also essential assets for attracting tourists, who contribute significantly to the region's economy, and for helping communities to attract and retain lifelong residents.

TRANSPORTATION

Many of the region's residents regularly bicycle and walk to work and other destinations along popular trails and other facilities that make up the region's bike and pedestrian networks. Congestion and conflicts among different types of users (such as fast-moving cyclists and runners versus child cyclists and walkers) has become an increasing safety concern along many multi-use trails and facilities. Expanding the capacity, availability, and connectivity of trails will make bicycling and walking more viable travel options. Expanded bicycle and pedestrian facilities are needed at many transit stations to improve intermodal connections. Improvements such as eliminating gaps in bicycle and pedestrian networks and improving accessibility at pedestrian crossings are also needed along roadway corridors.

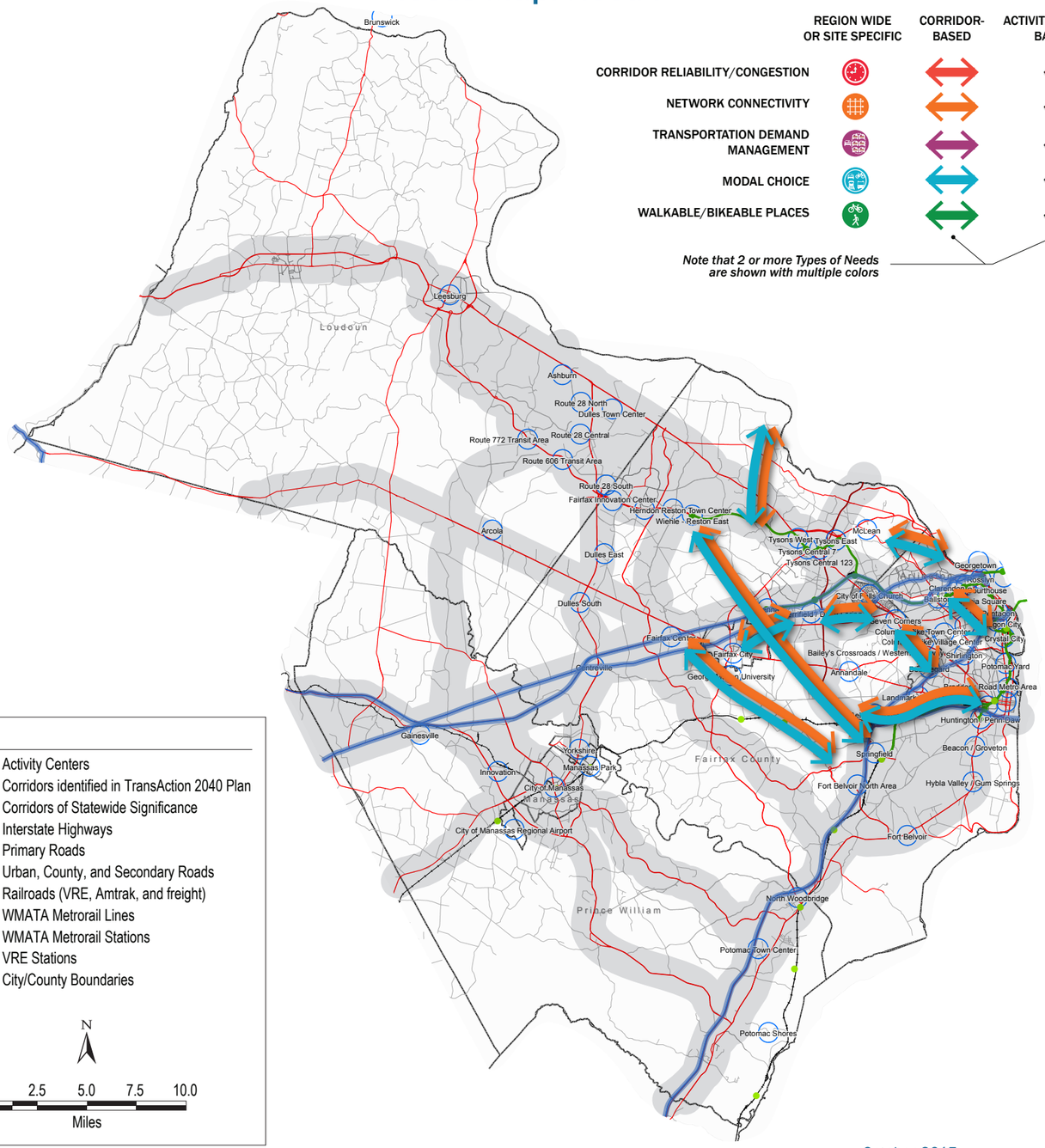
EXAMPLE LOCATIONS*

Custis Trail, Mount Vernon Trail, Woodrow Wilson Bridge Trail, locations where pedestrian and bicycle facilities do not provide complete and continuous connections between activity centers and other hubs (e.g. the Custis Trail does not provide connections to the Ballston activity center).

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need F



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	◆	◆
NETWORK CONNECTIVITY	●	◆	◆
TRANSPORTATION DEMAND MANAGEMENT	●	◆	◆
MODAL CHOICE	●	◆	◆
WALKABLE/BIKEABLE PLACES	●	◆	◆

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

F Improve multimodal connectivity among existing and emerging activity centers

NEED

Many key roadways and bicycle and transit networks in the region were designed to provide routes for commuters into and out of the District of Columbia and "first-tier" suburbs, which historically contained most of the region's employment centers. But employment and residential growth patterns have changed over the years, to the point that high concentrations of jobs and services as well as residential communities are located in a wide range of areas throughout Northern Virginia. Today, the volume of residents traveling between activity centers in non-core areas ("suburb to suburb") is higher than the planned capacity on many roadway and bicycle networks. Connectivity improvements can improve the efficiency of travel throughout the Northern Virginia region and may thereby reduce congestion on routes leading into the region's core areas.

ECONOMIC

Improving multimodal accessibility to and within existing and emerging activity centers can improve their attractiveness and economic prospects. The need is particularly urgent in areas where private investors and local governments have developed partial multimodal networks and mixed-use communitie. In these cases, filling in multimodal network gaps would maximize the return on investment and strengthen the ability of localities to attract the planned balance of residents and workers.

TRANSPORTATION

In many areas, completion of "missing links" to planned transportation system networks will enhance accessibility for travelers using all modes. Disconnected roadway, transit, bicycle and pedestrian networks force travelers to take circuitous routes, resulting in neighborhood congestion and air quality issues. Lack of connections also discourages travelers from choosing to walk or bike for short trips. Making suburban activity centers more transit-accessible can further help to alleviate or reduce traffic congestion by enabling communities to add jobs and workers that generate fewer vehicle trips than the number of trips that area associated with automobile-oriented growth.

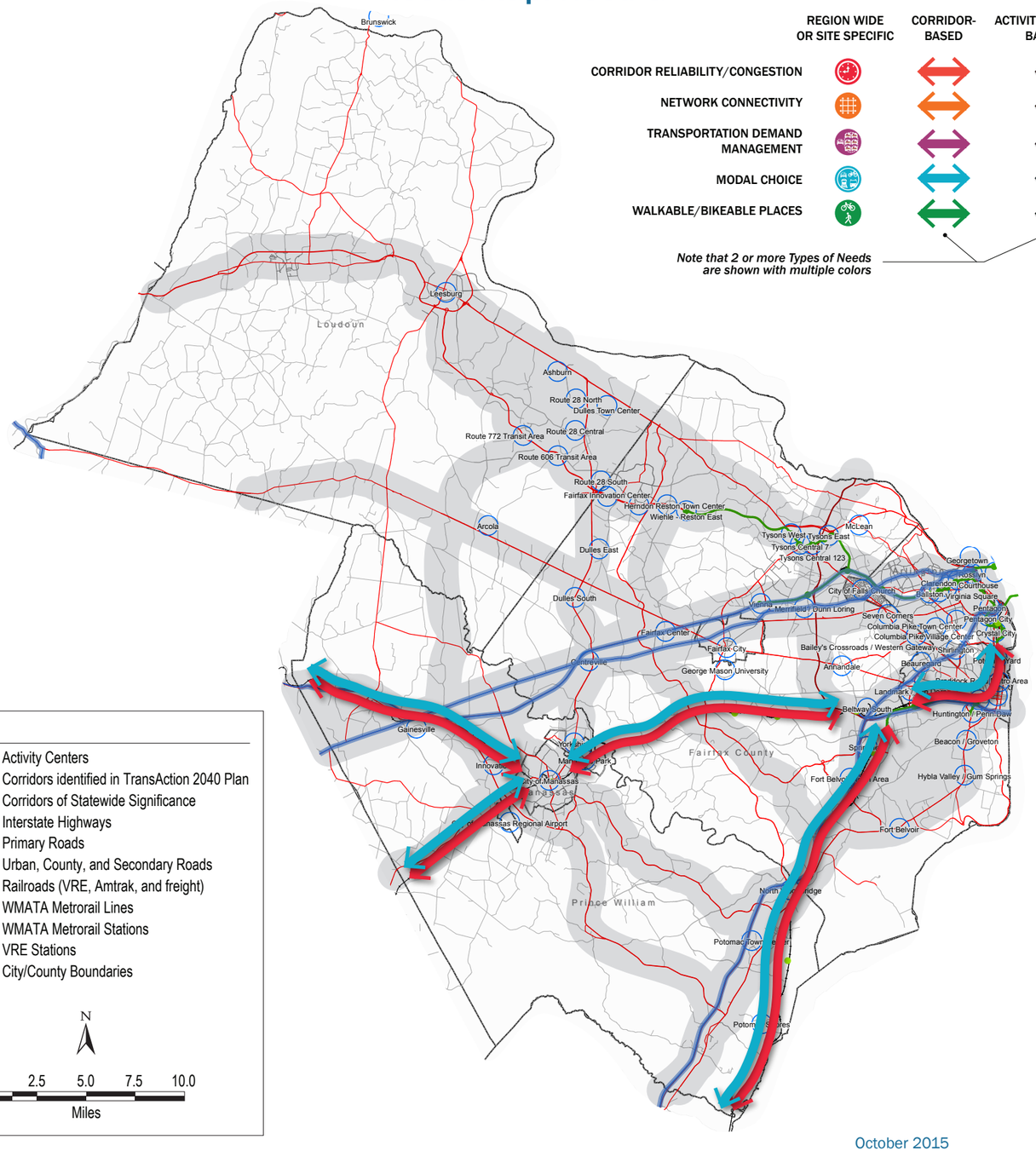
EXAMPLE LOCATIONS*

Accessibility between activity centers such as those in Arlington; Alexandria; Tysons; Reston; Springfield; Merrifield; Baileys Crossroads; Columbia Pike; Seven Corners; Fairfax Center, and other areas with high concentrations of economic activity and high travel volumes.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need G



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	◆	◆
NETWORK CONNECTIVITY	●	◆	◆
TRANSPORTATION DEMAND MANAGEMENT	●	◆	◆
MODAL CHOICE	●	◆	◆
WALKABLE/BIKEABLE PLACES	●	◆	◆

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

G Improve rail accessibility and reliability for both freight and passengers

NEED

Rail lines throughout the region enable inter-regional movement for both freight and passengers. Rail services suffer from congestion and unreliability. Passenger rail services connect workers and consumers with areas of concentrated economic activity, while freight rail brings needed goods into and out of the region.

ECONOMIC

Freight and passenger rail transportation supports the region's economy. Workers in all sectors rely on VRE and Amtrak for inter-city service. Providing multimodal alternatives to commuters using key corridors (I-95, I-66, I-395) prevents congestion and reliability from worsening on roadways.

TRANSPORTATION

Rail traffic throughout the region is congested and suffers from delays that affect passenger and freight traffic. Some existing VRE stations have inadequate platforms. Conflicts between passenger and freight trains can magnify the negative impacts of even slight delays.

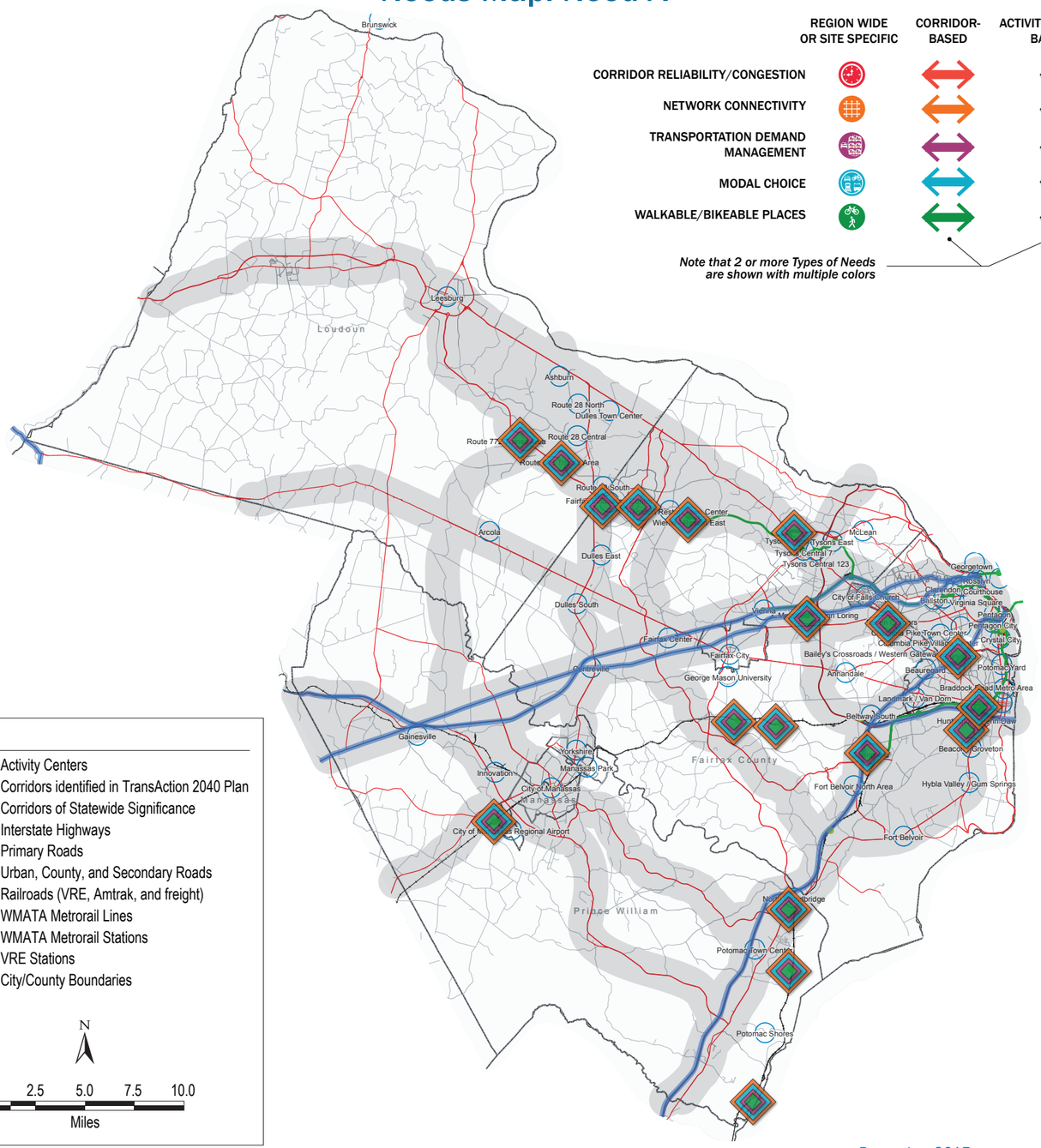
EXAMPLE LOCATIONS*

North-South rail lines along I-95, VRE, Amtrak, and freight lines throughout the region.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need A



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

A Enhance multimodal networks and facilities around transit access points such as existing and emerging rail stations, high capacity bus stops, and intermodal transfer centers

NEED

There is a need for improved multimodal networks that include walking, biking, and "feeder" transit services and facilities to make transit a more viable option for travel within the region, particularly around current and future station areas and other activity centers. In some cases, traffic congestion can be reduced by improving multimodal linkages among activity centers.

ECONOMIC

The ability of communities around transit stations (particularly the areas within 1-2 miles of the stations and other travel hubs) to attract skilled workers and grow businesses can be enhanced by building safe, convenient walking and bicycling networks and facilities and providing high-frequency transit services throughout the day. A robust array of travel choices for commuting and local trips is a critical asset for attracting workers and businesses. Employers' abilities to access skilled workers is a top concern, and 21st century workers seek to live and work in locations they can reach via multiple travel modes.

TRANSPORTATION

Multimodal enhancements would benefit all of the region's current and future rail station areas and other key transit hubs, such as those with high-capacity and high-frequency bus services. Multimodal enhancements would help to solve "last mile" challenges for commuters. Extra priority should be placed on enhancements in and around activity centers, as they have higher average residential densities and are expected to contain a significant portion of the region's new housing development and economic activity. Because of higher densities, improvements near transit hubs have the potential to serve and benefit the large numbers of residents in a cost-effective way. In some cases, improvements are needed to Metrorail stations themselves to increase capacity and improve safety.

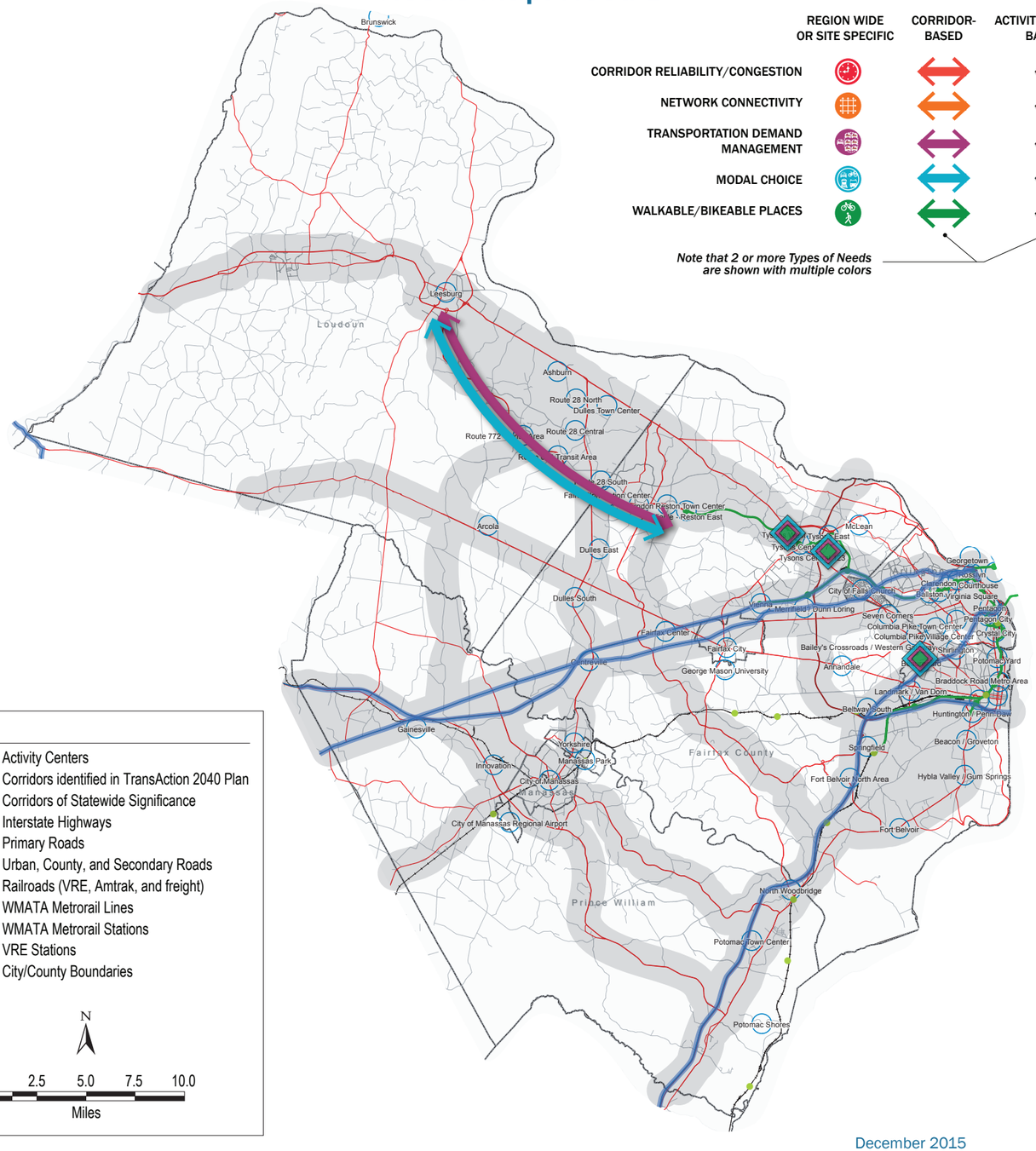
EXAMPLE LOCATIONS*

Areas surrounding Orange and Silver Line stations (Dunn Loring, Wiehle Avenue, Spring Hill), Blue/Yellow stations (Franconia-Springfield, Huntington, Eisenhower), VRE stations, and intermodal transit hubs (e.g. Shirlington, Seven Corners). This also applies to areas preparing for Metro expansion, such as the stations planned for Loudoun County.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need B



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

B Increase equity in access to high quality transportation facilities

NEED

A fundamental factor in economic advancement, multimodal transportation accessibility is most urgently needed in communities with high concentrations of economically disadvantaged residents. Strategic multimodal transportation investments can yield equity benefits. Improvements to facilities of all types used by disadvantaged residents, and increased awareness and availability of affordable travel options through TDM and other programs, are needed.

ECONOMIC

Improving service workers' and disadvantaged residents' access to jobs and services provides both social and economic benefits. Many of the region's low- and moderate-income workers provide essential goods and services to residents, visitors, and businesses, which strengthens the attractiveness of the region to prospective employers, tourists, and other generators of economic activity. In addition, multimodal access to health service centers, which contribute significantly to the region's economic activity, is critical for people with disabilities and older adults who rely upon demand response transit services, and for employees who use transit and/or bike and walk to work.

TRANSPORTATION

There is a need to enhance the operations and affordability of key commuting facilities, roadways and transit, to improve accessibility from communities with high concentrations of low- and moderate-income residents to jobs and services, which are often located in communities with higher-cost housing. Bus transportation is sometimes the only affordable and readily accessible mode of transportation for many service workers in the region. Higher-frequency, higher-capacity, and more efficient transit services would produce benefits for the region's workforce. Stronger TDM programs could enhance availability and awareness of affordable commuting options to expand travel options for all residents. A lack of ADA-compliant facilities in strategic locations creates "broken links" in multimodal networks, which render entire areas inaccessible to low-mobility residents.

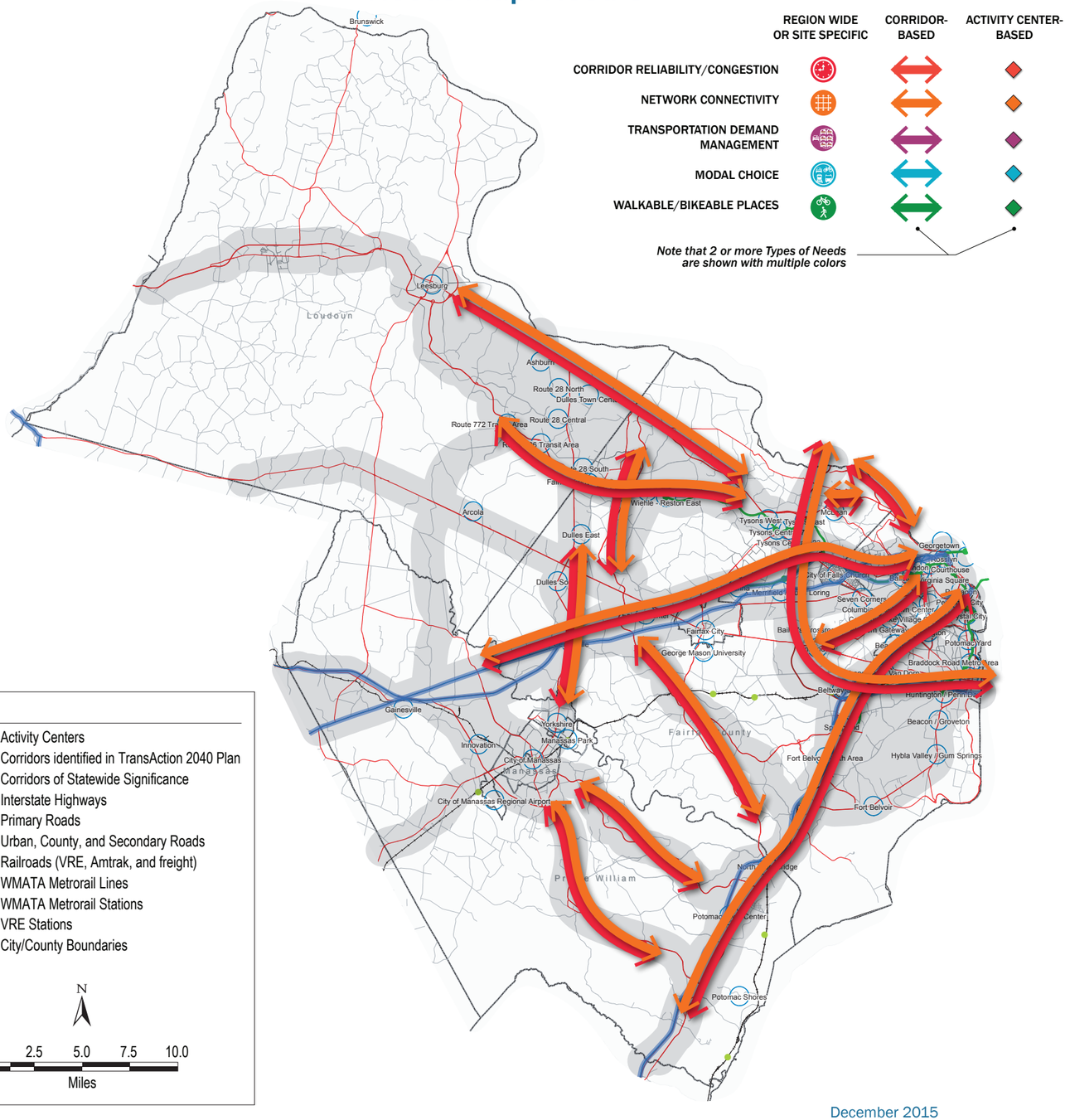
EXAMPLE LOCATIONS *

Toll roadway facilities, activity centers, non-ADA-compliant facilities, and communities with heavy concentrations of disadvantaged residents.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need C



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

C — **Make roadway safety and operational improvements to alleviate bottlenecks and reduce acute congestion, including "hot spots" with frequent but unpredictable (non-recurring) congestion**

NEED

The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.

ECONOMIC

Severe congestion and subsequent lost productivity and freight movement results in economic losses that are borne by the region's residents and businesses. Increased congestion and travel times on all modes make the area less attractive to current and prospective residents and, consequently, the businesses that want their skills. In particular, lack of reliability for freight can have profoundly negative economic impacts. Congestion on key routes leading to cargo and transport hubs (e.g. Dulles Airport, National Airport, Union Station) results in lost economic productivity.

TRANSPORTATION

Recurring and non-recurring acute congestion events present major challenges to roadway users in all types of motorized vehicles, from passenger cars and motorcycles to buses and trucks. On corridors that support pedestrians and cyclists, motorized traffic congestion also threatens safety and efficiency for non-motorized travelers. Roadway safety and operational improvements, and improvements that would enhance the efficiency with which emergency vehicles can clear roadways after accidents, are urgently needed throughout the entire region. This is particularly urgent on routes that lead to the airports and train stations that provide interregional transportation for people and goods. In some cases, improving signal timing, access management, and integration of more "intelligent" technologies can be cost-effective ways to alleviate congestion. In particular, improvements are needed on many of the facilities identified by NVTA as corridors of regional importance.*

EXAMPLE LOCATIONS**

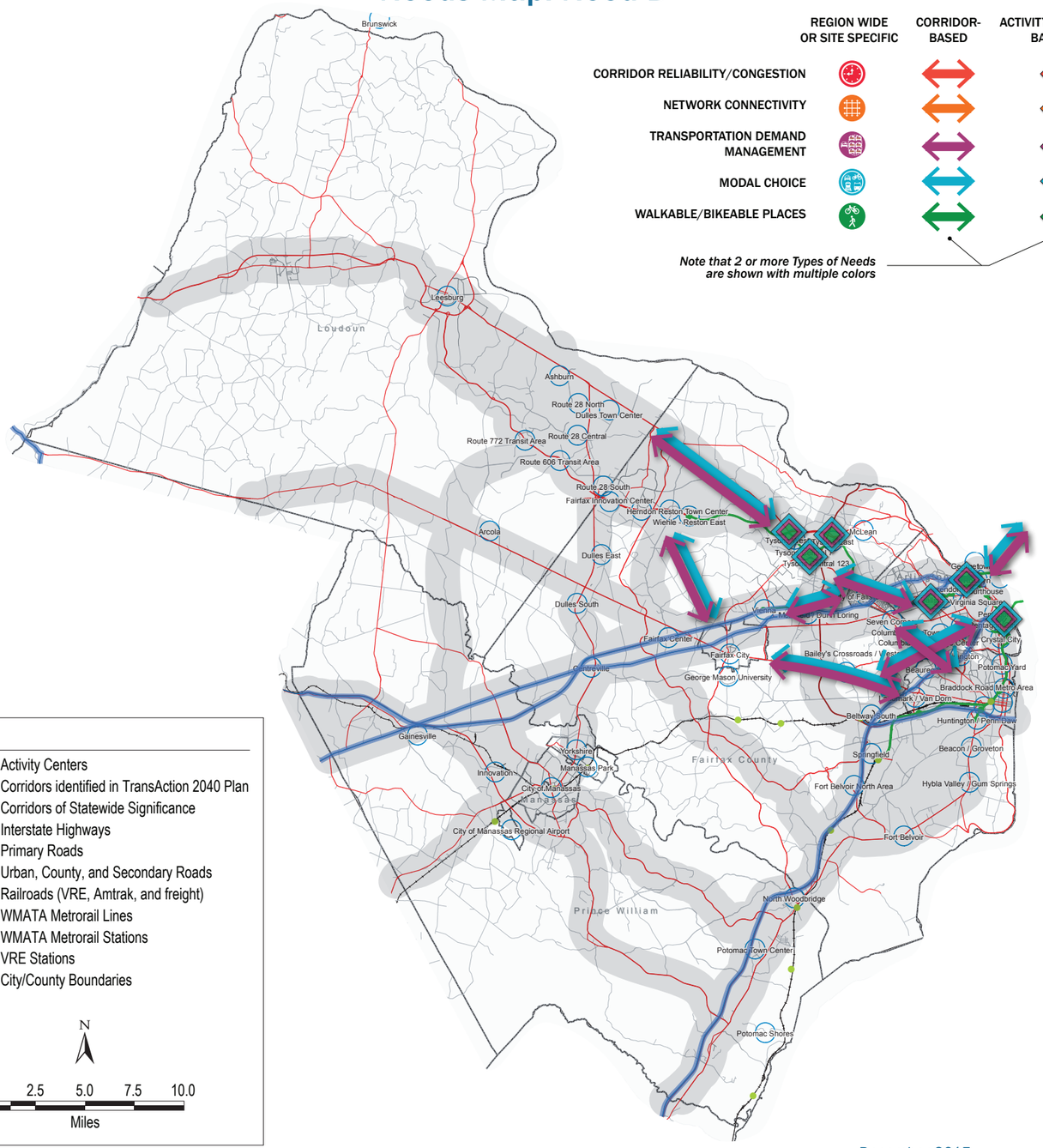
I-66; I-95 south of the Springfield interchange; I-495; Route 1 corridor between Fort Belvoir and Washington, DC; Route 7; Route 15; Route 28; Route 29; Route 50; Route 123; Prince William County Parkway; other corridors providing airport access; Columbia Pike; Dale Boulevard; Glebe Road; Minnieville Road; Pentagon-Beauregard Corridor; activity centers in Prince William County (Gainesville, Innovation center, Potomac Communities.

* NVTA Corridors:
Virginia Route 7 and Dulles Toll Road Corridor, including the future Metrorail Silver Line
Loudoun County Parkway/Tri-County Parkway/Belmont Ridge Road/Gum Springs Road Corridor
Virginia Route 28 Corridor
Prince William Parkway Corridor
Fairfax County Parkway Corridor
I-66/U.S. Route 29/U.S. Route 50 Corridor, including the Metrorail Orange Line
Beltway (I-495) Corridor
I-95/I-395/U.S. Route 1 Corridor, including the VRE and Metrorail Blue and Yellow Lines.

** Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need D



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	◆	◆
NETWORK CONNECTIVITY	●	◆	◆
TRANSPORTATION DEMAND MANAGEMENT	●	◆	◆
MODAL CHOICE	●	◆	◆
WALKABLE/BIKEABLE PLACES	●	◆	◆

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

D Expand and improve multimodal accessibility to existing and emerging hubs of economic activity

NEED

The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.

ECONOMIC

Activity centers' viability and desirability is highly correlated with the presence of multimodal travel options. Jurisdictions throughout the region have identified activity centers where they will encourage a higher concentration of future residential, commercial, and office development. These activity centers need adequate transportation facilities to support their growth and prosperity. In addition, existing activity centers need enhanced modal choices. The defense industry, for example, is a significant economic driver in the region. Current and anticipated military expansion and relocation sites, many of which are located in areas already experiencing heavy highway and transit congestion, have critical modal enhancement needs.

TRANSPORTATION

Activity centers need multimodal travel improvements to ensure safe, reliable movement for workers, consumers, and the goods and services they need. Enhancing networks to allow access to workplaces and services via walking, biking, and transit is necessary, while expanding the frequency and capacity of transit services can make non-SOV travel a more viable option. In particular, gaps in walking and bicycling networks pose significant barriers to using these modes, while the bottlenecks caused by limited capacity in the Rosslyn Metrorail Tunnel limit any frequency increases of Metrorail cars running into and out of DC. Further, there is a need for enhanced transit services that operate frequently throughout the day and evening, including during non-peak hours, to make transit a more viable travel option for those with non-traditional work schedules.

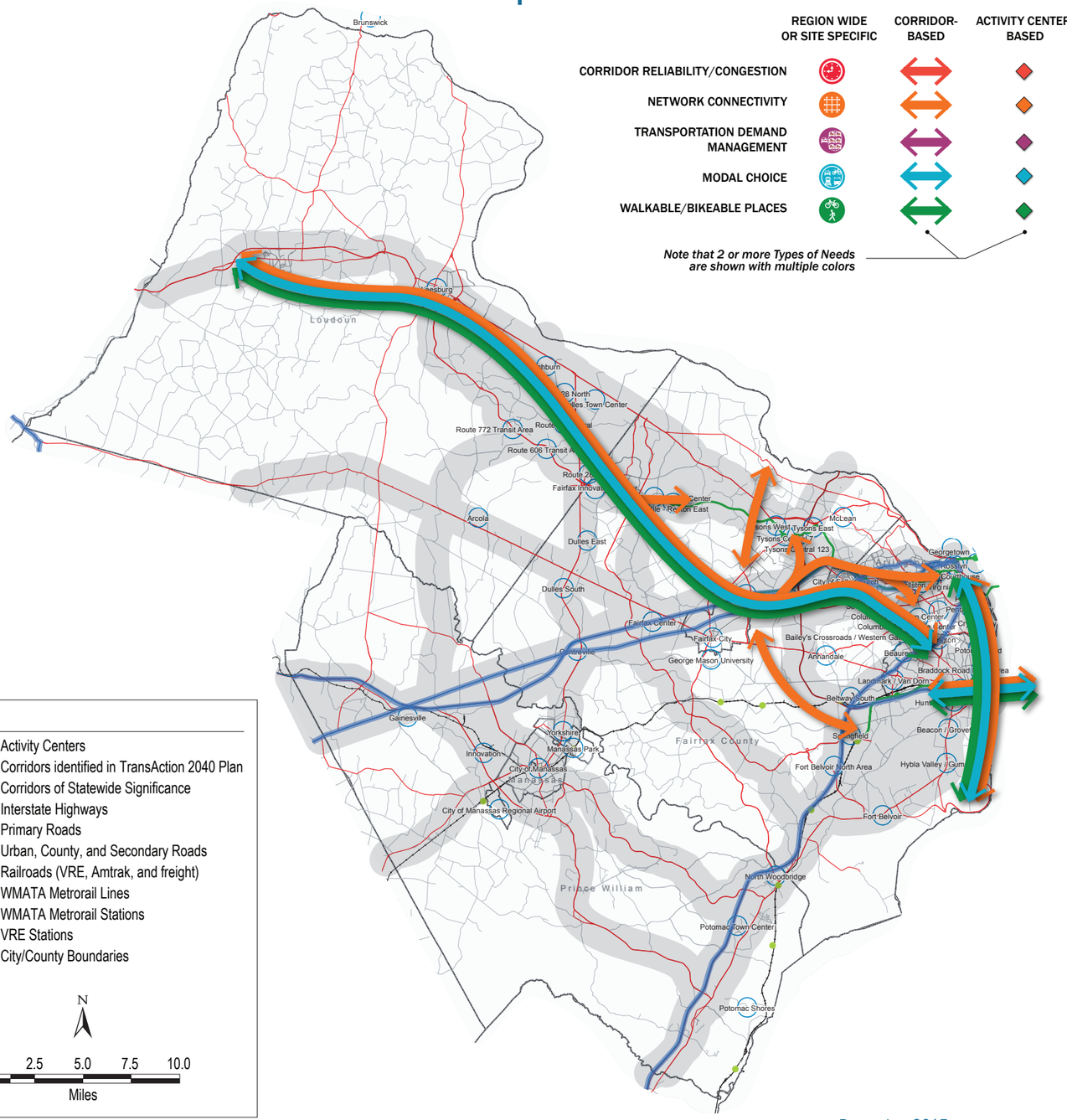
EXAMPLE LOCATIONS *

Activity centers throughout the region such as Tysons, the Rosslyn-Ballston Corridor, and the Pentagon. Multimodal options are needed along key travel routes including but not limited to Columbia Pike, Route, Route 7, and Route 29.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need E



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	●	●
NETWORK CONNECTIVITY	●	●	●
TRANSPORTATION DEMAND MANAGEMENT	●	●	●
MODAL CHOICE	●	●	●
WALKABLE/BIKEABLE PLACES	●	●	●

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

E **Improve bicycle and pedestrian facilities and networks to provide additional and uninterrupted connections for bicyclists and pedestrians within and between activity centers**

NEED

The percentage of workers commuting by bike and foot continues to increase in the region. However, gaps in existing bicycle and pedestrian networks, as well as capacity challenges on some existing facilities, limit the viability of biking and walking. Walking and biking are both affordable and healthy travel options, and can help alleviate roadway congestion and transit capacity challenges. Increasing the mode share of bicyclists and pedestrians among commuters and everyday travelers could help to reduce the rising rates of automobile congestion, even while the region continues to attract residents and jobs.

ECONOMIC

The ability to bike and walk for all types of trips is seen as a highly desirable asset among 21st century workers seeking to locate in work-live communities. Easily navigable bike and walking routes for people of all ages and abilities are also essential assets for attracting tourists, who contribute significantly to the region's economy, and for helping communities to attract and retain lifelong residents.

TRANSPORTATION

Many of the region's residents regularly bicycle and walk to work and other destinations along popular trails and other facilities that make up the region's bike and pedestrian networks. Congestion and conflicts among different types of users (such as fast-moving cyclists and runners versus child cyclists and walkers) has become an increasing safety concern along many multi-use trails and facilities. Expanding the capacity, availability, and connectivity of trails will make bicycling and walking more viable travel options. Expanded bicycle and pedestrian facilities are needed at many transit stations to improve intermodal connections. Improvements such as eliminating gaps in bicycle and pedestrian networks and improving accessibility at pedestrian crossings are also needed along roadway corridors.

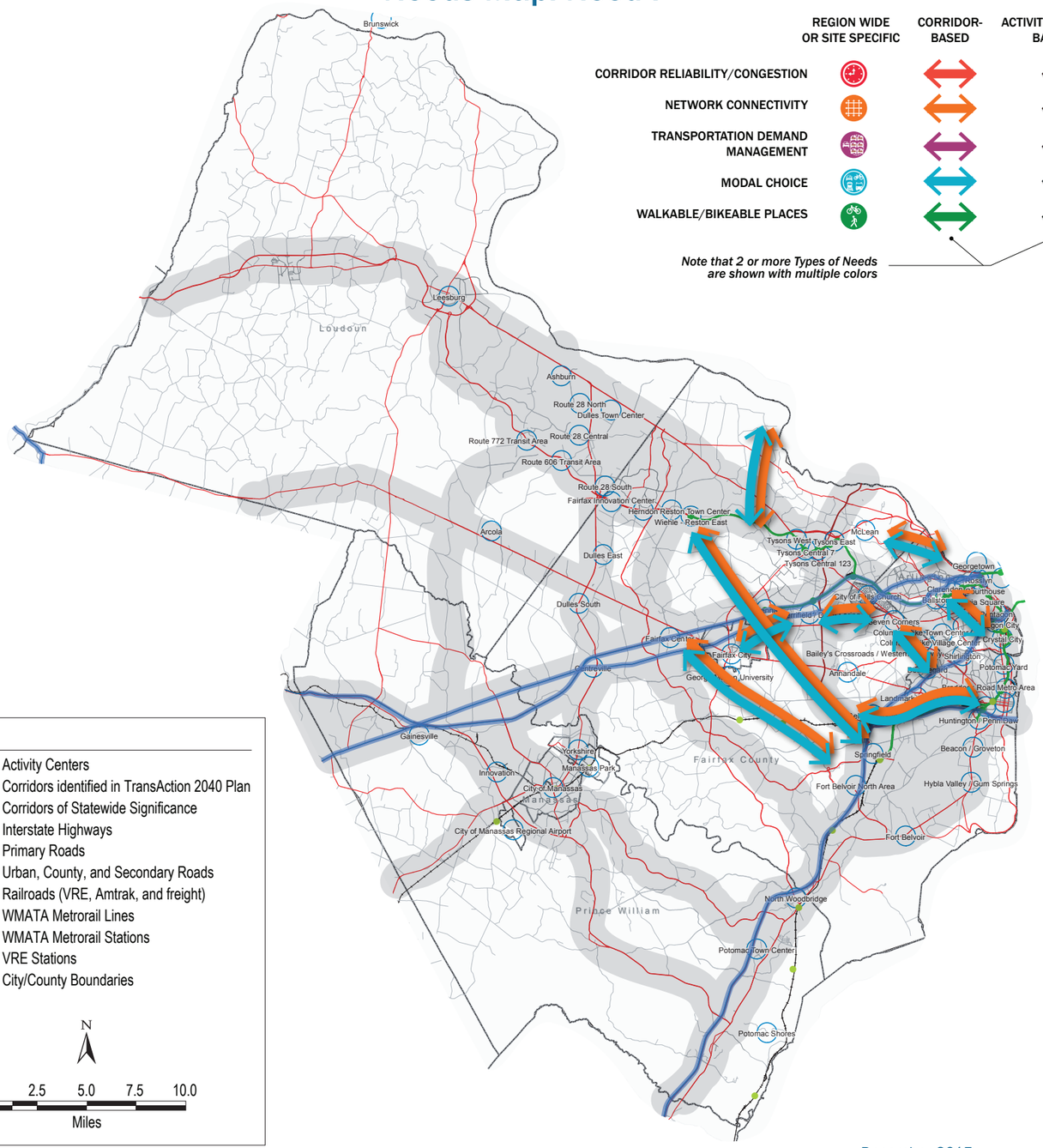
EXAMPLE LOCATIONS*

Custis Trail, Mount Vernon Trail, Woodrow Wilson Bridge Trail, locations where pedestrian and bicycle facilities do not provide complete and continuous connections between activity centers and other hubs (e.g. the Custis Trail does not provide connections to the Ballston activity center).

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Northern Virginia Region Needs Summary

Needs Map: Need F



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	◆	◆
NETWORK CONNECTIVITY	●	◆	◆
TRANSPORTATION DEMAND MANAGEMENT	●	◆	◆
MODAL CHOICE	●	◆	◆
WALKABLE/BIKEABLE PLACES	●	◆	◆

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

F Improve multimodal connectivity among existing and emerging activity centers

NEED

Many key roadways and bicycle and transit networks in the region were designed to provide routes for commuters into and out of the District of Columbia and "first-tier" suburbs, which historically contained most of the region's employment centers. But employment and residential growth patterns have changed over the years, to the point that high concentrations of jobs and services as well as residential communities are located in a wide range of areas throughout Northern Virginia. Today, the volume of residents traveling between activity centers in non-core areas ("suburb to suburb") is higher than the planned capacity on many roadway and bicycle networks. Connectivity improvements can improve the efficiency of travel throughout the Northern Virginia region and may thereby reduce congestion on routes leading into the region's core areas.

ECONOMIC

Improving multimodal accessibility to and within existing and emerging activity centers can improve their attractiveness and economic prospects. The need is particularly urgent in areas where private investors and local governments have developed partial multimodal networks and mixed-use communitie. In these cases, filling in multimodal network gaps would maximize the return on investment and strengthen the ability of localities to attract the planned balance of residents and workers.

TRANSPORTATION

In many areas, completion of "missing links" to planned transportation system networks will enhance accessibility for travelers using all modes. Disconnected roadway, transit, bicycle and pedestrian networks force travelers to take circuitous routes, resulting in neighborhood congestion and air quality issues. Lack of connections also discourages travelers from choosing to walk or bike for short trips. Making suburban activity centers more transit-accessible can further help to alleviate or reduce traffic congestion by enabling communities to add jobs and workers that generate fewer vehicle trips than the number of trips that area associated with automobile-oriented growth.

EXAMPLE LOCATIONS*

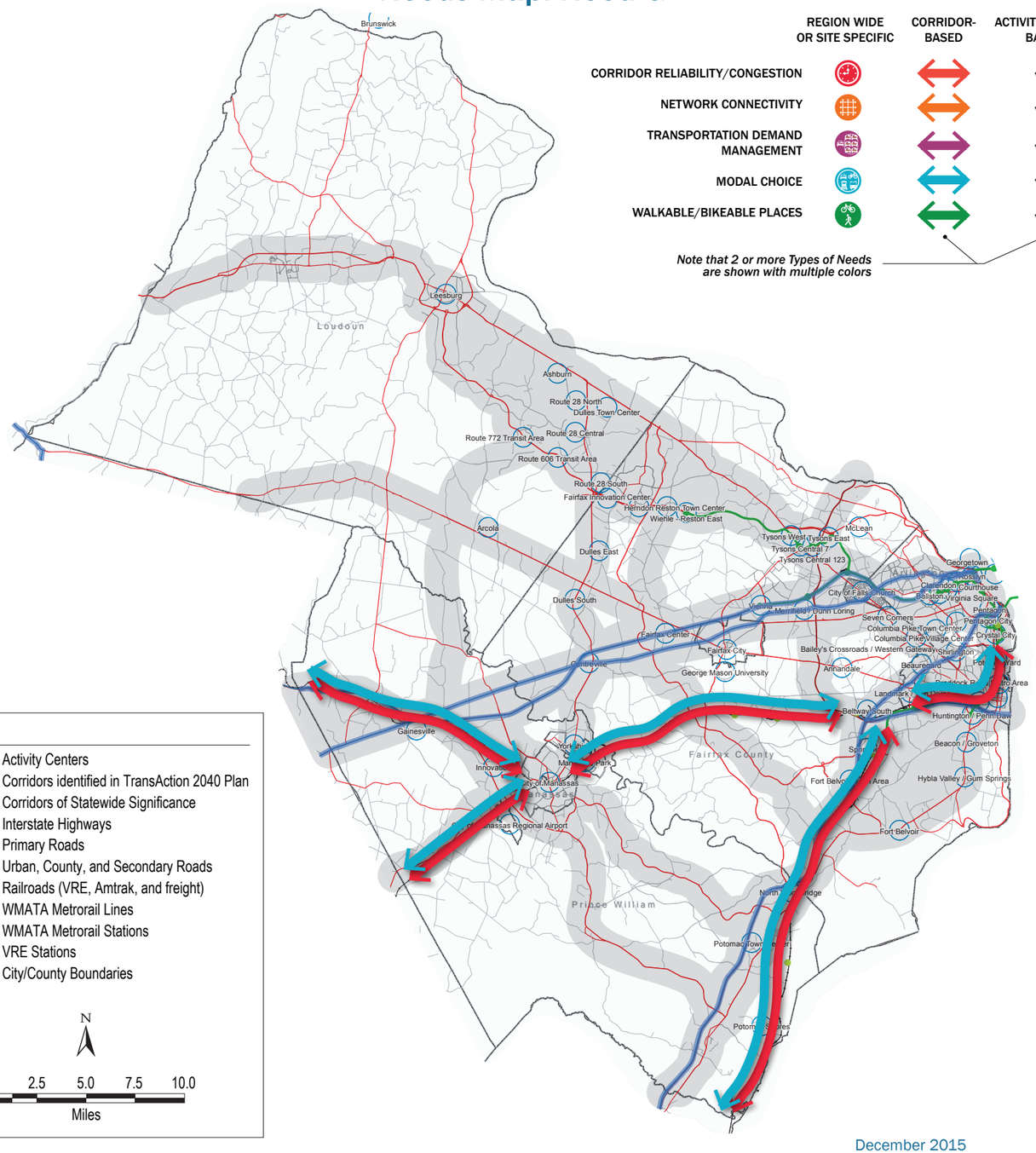
Accessibility between activity centers such as those in Arlington; Alexandria; Tysons; Reston; Springfield; Merrifield; Baileys Crossroads; Columbia Pike; Seven Corners; Fairfax Center, and other areas with high concentrations of economic activity and high travel volumes.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

December 2015

Northern Virginia Region Needs Summary

Needs Map: Need G



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION	●	◆	◆
NETWORK CONNECTIVITY	●	◆	◆
TRANSPORTATION DEMAND MANAGEMENT	●	◆	◆
MODAL CHOICE	●	◆	◆
WALKABLE/BIKEABLE PLACES	●	◆	◆

Note that 2 or more Types of Needs are shown with multiple colors

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
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- Primary Roads
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- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0

Miles

Needs Table

G Improve rail accessibility and reliability for both freight and passengers

NEED

Rail lines throughout the region enable inter-regional movement for both freight and passengers. Rail services suffer from congestion and unreliability. Passenger rail services connect workers and consumers with areas of concentrated economic activity, while freight rail brings needed goods into and out of the region.

ECONOMIC

Freight and passenger rail transportation supports the region's economy. Workers in all sectors rely on VRE and Amtrak for inter-city service. Providing multimodal alternatives to commuters using key corridors (I-95, I-66, I-395) prevents congestion and reliability from worsening on roadways.

TRANSPORTATION

Rail traffic throughout the region is congested and suffers from delays that affect passenger and freight traffic. Some existing VRE stations have inadequate platforms. Conflicts between passenger and freight trains can magnify the negative impacts of even slight delays.

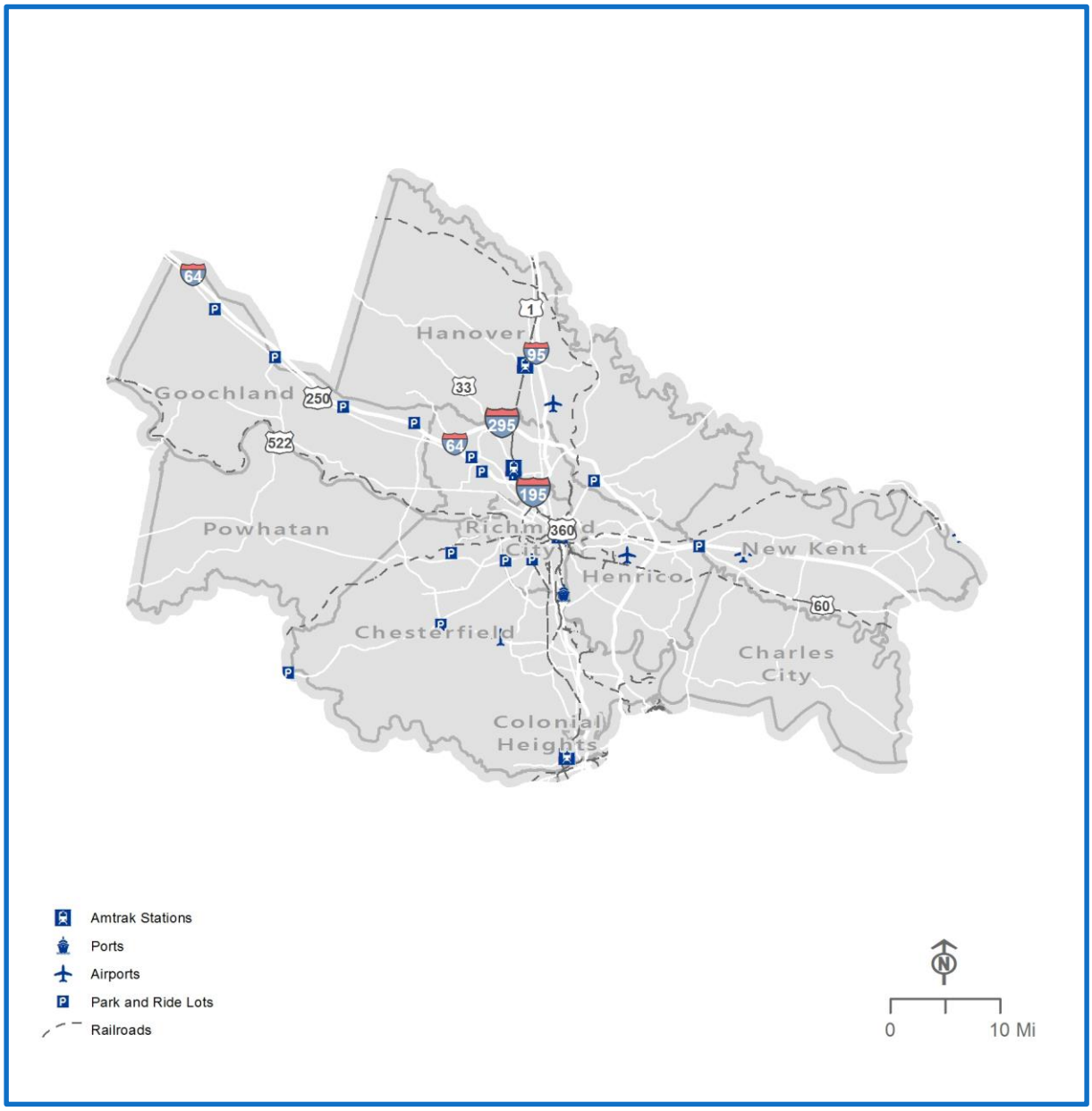
EXAMPLE LOCATIONS*

North-South rail lines along I-95, VRE, Amtrak, and freight lines throughout the region.

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

VMTP 2025 Needs Assessment

Regional Needs Profile



Richmond Region

December 2015

1. Needs Assessment Purpose

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Richmond Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Richmond Regional Network, and that would support regional industries and workforces.

Defining a Regional Network

Transportation needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the existing industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Richmond Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks was developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

The Richmond Region is defined as the City of Richmond, Chesterfield County, Henrico County, Charles City County, Powhatan County, Goochland County, Hanover County, and New Kent County for the needs analysis. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area were considered in the Needs Assessment as well.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future

economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from Richmond Region's stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

According to the Woods & Poole *2014 State Profile*, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to Woods & Poole, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million people. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, substantial population growth is projected for the Richmond Region. Projections estimate about 200,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Bristol Region Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)
1,025,561	1,229,842

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Richmond Region.

Table 3: County and City Population Projections.

Jurisdiction	Current Population (2012)	Weldon 2025 Projection	% Change in Population
Charles City County	7,157	8,072	13%
Chesterfield County	323,856	430,226	33%
Goochland County	21,347	24,921	17%
Hanover County	100,668	128,227	27%
Henrico County	314,932	375,491	19%
New Kent County	19,169	22,013	15%
Powhatan County	28,123	33,771	20%
Richmond City	210,309	207,120	-2%

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

According to the Woods & Poole *2014 State Profile*, per-capita income for the region is expected to rise 19% (slightly less than the state average of 21%) from $43,051 to $51,400. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population between 25 and 39.

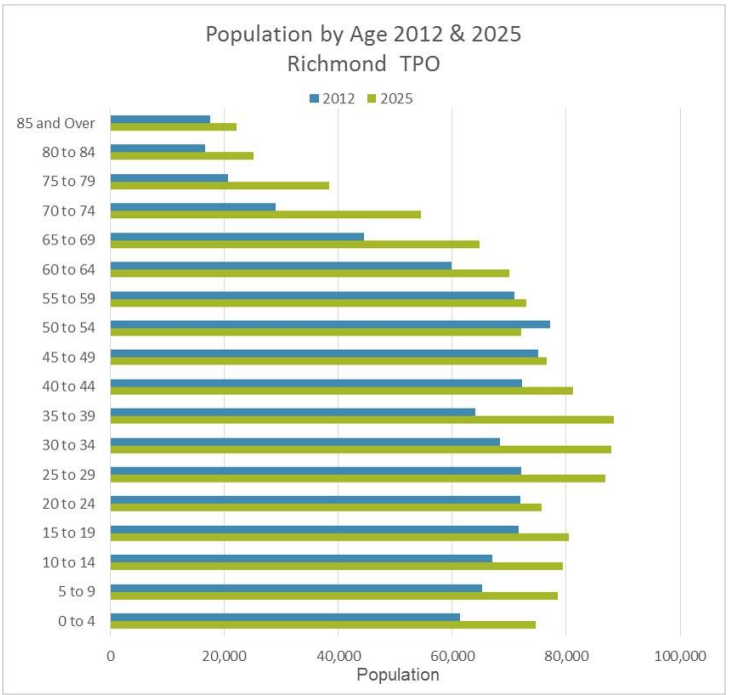


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Richmond Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Richmond Region, Figure 2 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

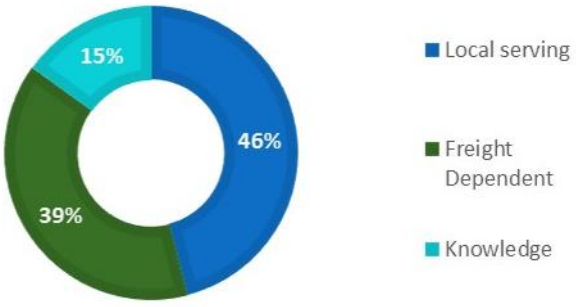


Figure 2: Top Sectors by Output
Source: IHS Global Insight, 2012.

The local services cluster is clearly the strongest in this region. Local services make up 46% of the economic output in the Richmond Region. The knowledge and freight-dependent clusters account for 15% and 39% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic cluster, for example,

is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Wholesale trade is the strongest industry in the Richmond Region when measured by both economic output and employment. Retail Trade is the second largest industry in the region. Mining, healthcare, and finance and insurance round out the top five industries in the region with the greatest economic output. (Refer to Table 4).

Table 4: Current Industries by Output.

Top Industries	NAICS Code	% of Output
Wholesale Trade	42	17%
Retail Trade	44 – 45	12%
Mining	21	11%
Healthcare	62	9%
Finance and Insurance	52	9%

Source: IHS Global Insight Data, 2012

Top Industries by Employment

In the Richmond Region, public administration, healthcare, mining, and finance and insurance are the top industries by employment. (Refer to Table 5). As the capital region, the high percentage of Public Administration employment is unsurprising.

Table 5: Current Top Industries by Employment.

Top Industries	NAICS Code	% of Workforce
Public Administration	92	**16%**
Healthcare	62	**12%**
Mining	21	**10%**
Accommodation & Food Services	72	**8%**
Finance and Insurance	52	**7%**

Source: IHS Global Insight Data, 2012

The list of top employers in the region shows a diversified economy in the Richmond Region. Capital One and Wells Fargo show that Finance is a critical industry to the Richmond Region, while VCU shows the importance of higher education and healthcare. Altria is representative of the importance of corporate management to the region while Wal-Mart is indicative of the importance of local services such as retail. WellPoint Inc. shows the importance of insurance and corporate management to the regional economy.

Table 6: Current Top Employers.

Employers	Employees
Capital One Financial Corp.	5,000 – 9,999
Virginia Commonwealth University	5,000 – 9,000
Wal – Mart Stores, Inc.	5,000 – 9,999
Altria Group	2,500 – 4,999
WellPoint Inc.	2,500 – 4,999
Wells Fargo & Company	2,500 – 4,999

Sources: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Richmond Region. The industries expressed in Table 7 have the highest LQ scores in the region. The score for corporate management, for example, can be inferred to mean that these services are almost four times more concentrated in the region than in the entire nation, on average.

Table 7: Current Top Industries by Location Quotient.

Top Industries	NAICS Code	Location Quotient
Corporate Management	55	3.82
Professional Services	54	2.34
Real Estate	53	1.87
Administrative Sector	56	1.58
Other Services	81	1.42

Source: IHS Global Insight Data, 2012

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were then developed for these areas using Census block boundaries. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Activity centers such as Meadowville were added through coordination with local stakeholders who had a knowledge of the regional significance of the activity in places were existing data sources had little information on employment. Figure 3 below shows the activity centers as blue circles. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles.

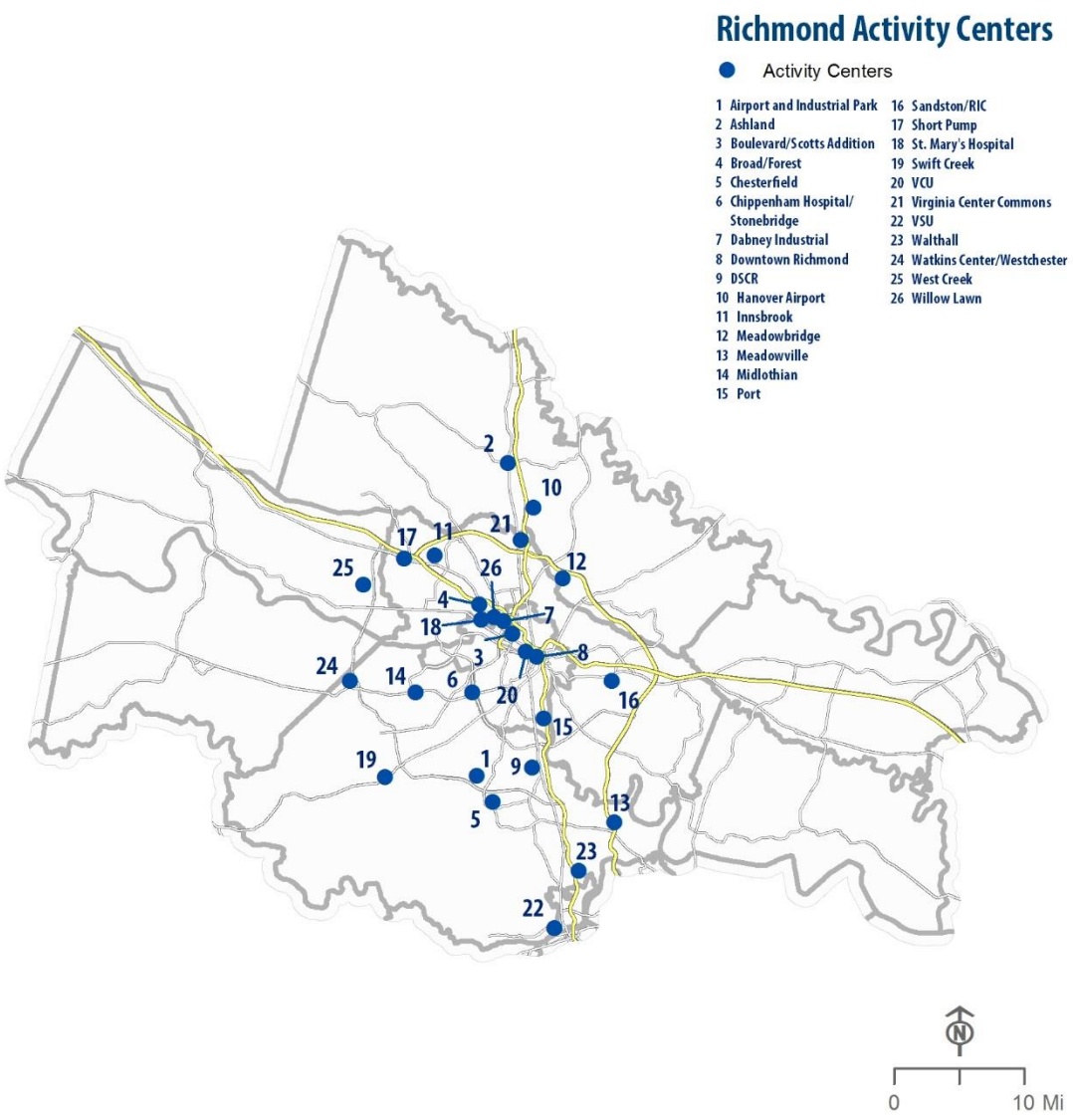


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 4 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

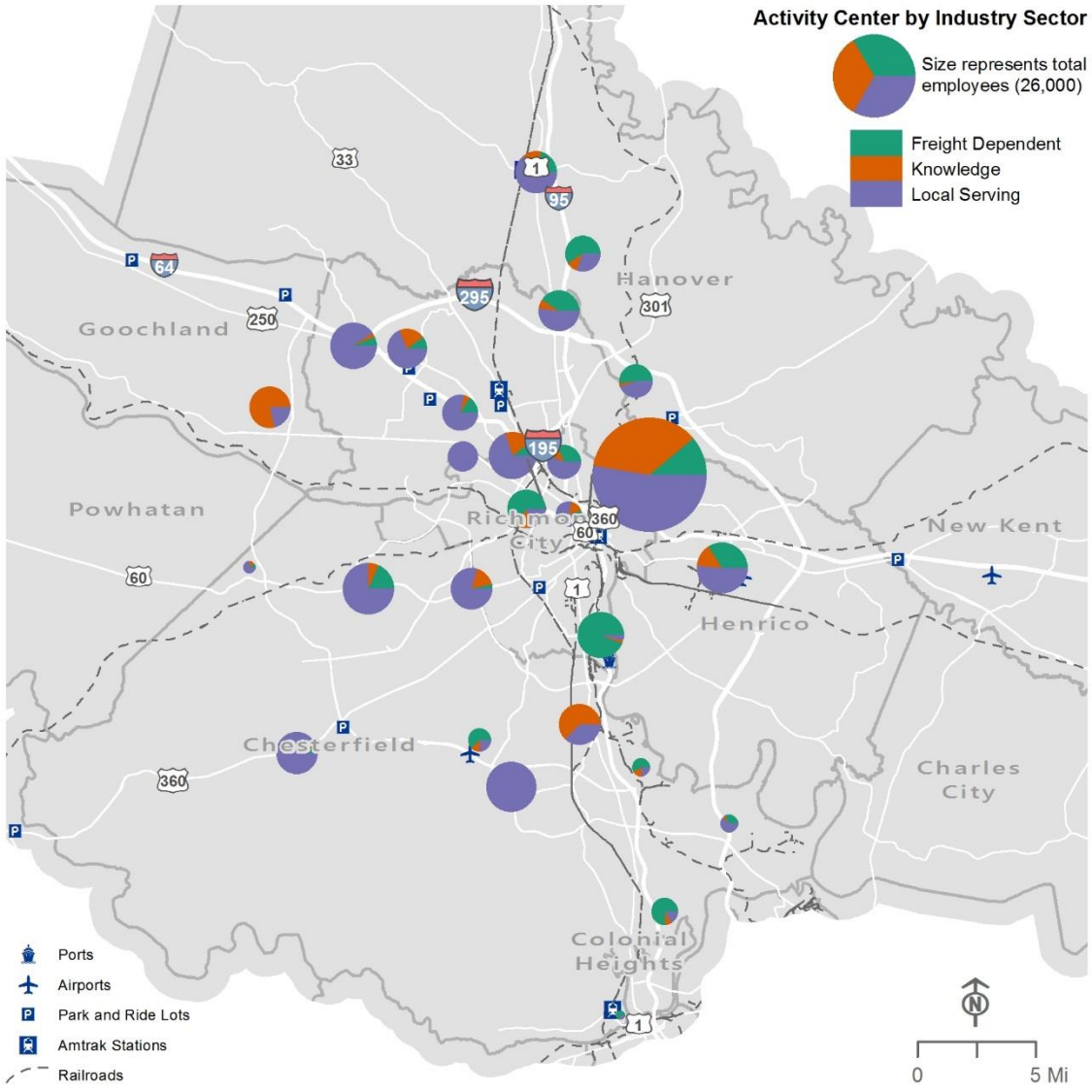


Figure 4: Activity Center Employment by Industry Sector.
Source: IHS Global Insight Data, 2012

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Richmond Region's stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Richmond Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Richmond Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Substantial growth is forecasted for the Richmond Region area by 2025. According to statewide and national datasets used, the corporate management and arts, entertainment, and recreation industries will see the largest growth. Combined, they are expected to produce $5 billion more in 2025 than was produced in 2012.

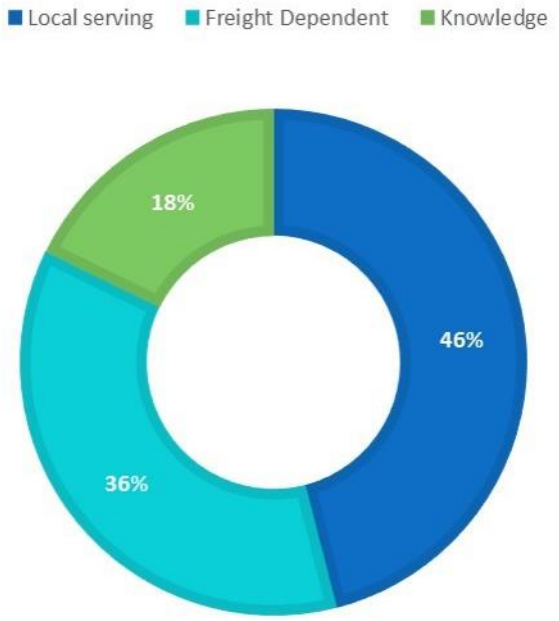


Figure 5: 2025 Industry Sectors by Output.
Source: IHS Global Insight Data, 2012

The local services cluster will remain the strongest sector in this region in 2025. Local services make up 46% of the economic output in the Richmond Region. The knowledge sector is expected to grow from 15% of regional output to 18% in 2025. The share of freight in the regional output is anticipated to decline from 39% to 36% in 2025.

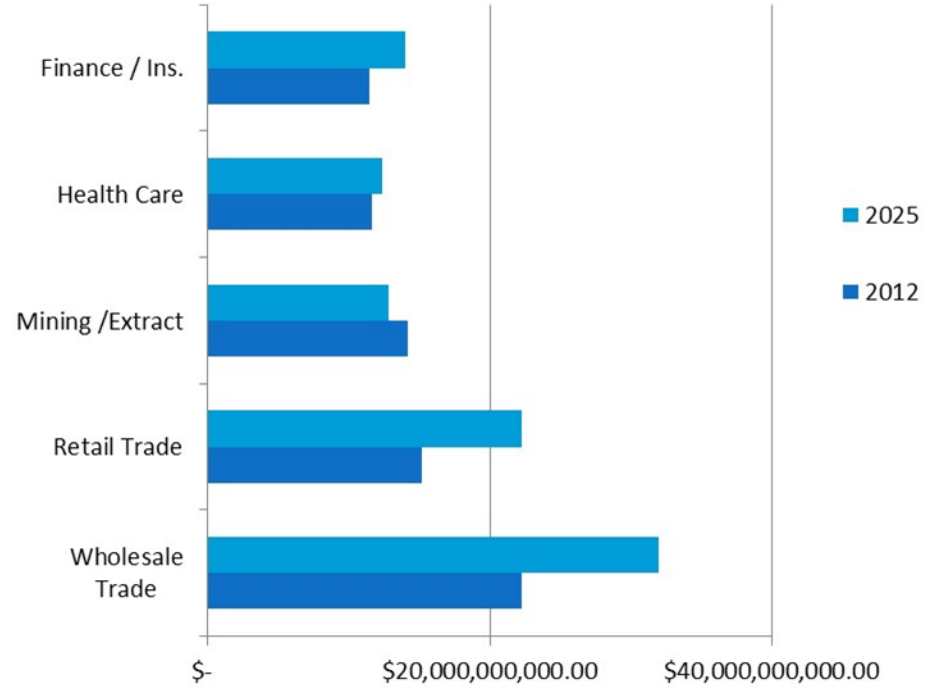


Figure 6: Top Industries by Output
Source: IHS Global Insight Data, 2012

All the top industries by output in the region will continue to grow in 2025, with the exception of mining. The administrative sector is anticipated to grow the most, in terms of employment, and will employ 52% more workers in 2025. In all industries combined, economic output in the Richmond Region is expected to increase by more than $38 billion by 2025. (Refer to Figure 6).

Table 8: Top Industries by Employment.

Top Industries	NAICS Sector Code	% Change in Employment (2012-2025)
Administrative Sector	56	52%
Construction	23	46%
Arts, Entertainment, and Recreation	71	37%
Health Care and Social Assistance	62	20%
Information	51	19%

Source: IHS Global Insight Data, 2012

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Richmond Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Richmond Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Richmond Region show that there is a number of workers commuting to the City of Richmond, Henrico County, and Chesterfield County. As represented in Figure 7, the vast majority of workers both live and work within the same jurisdiction or commute to another jurisdiction within the MPO area. The only jurisdiction that stands as the exception is New Kent County, where many workers commute to the Hampton Roads Region.

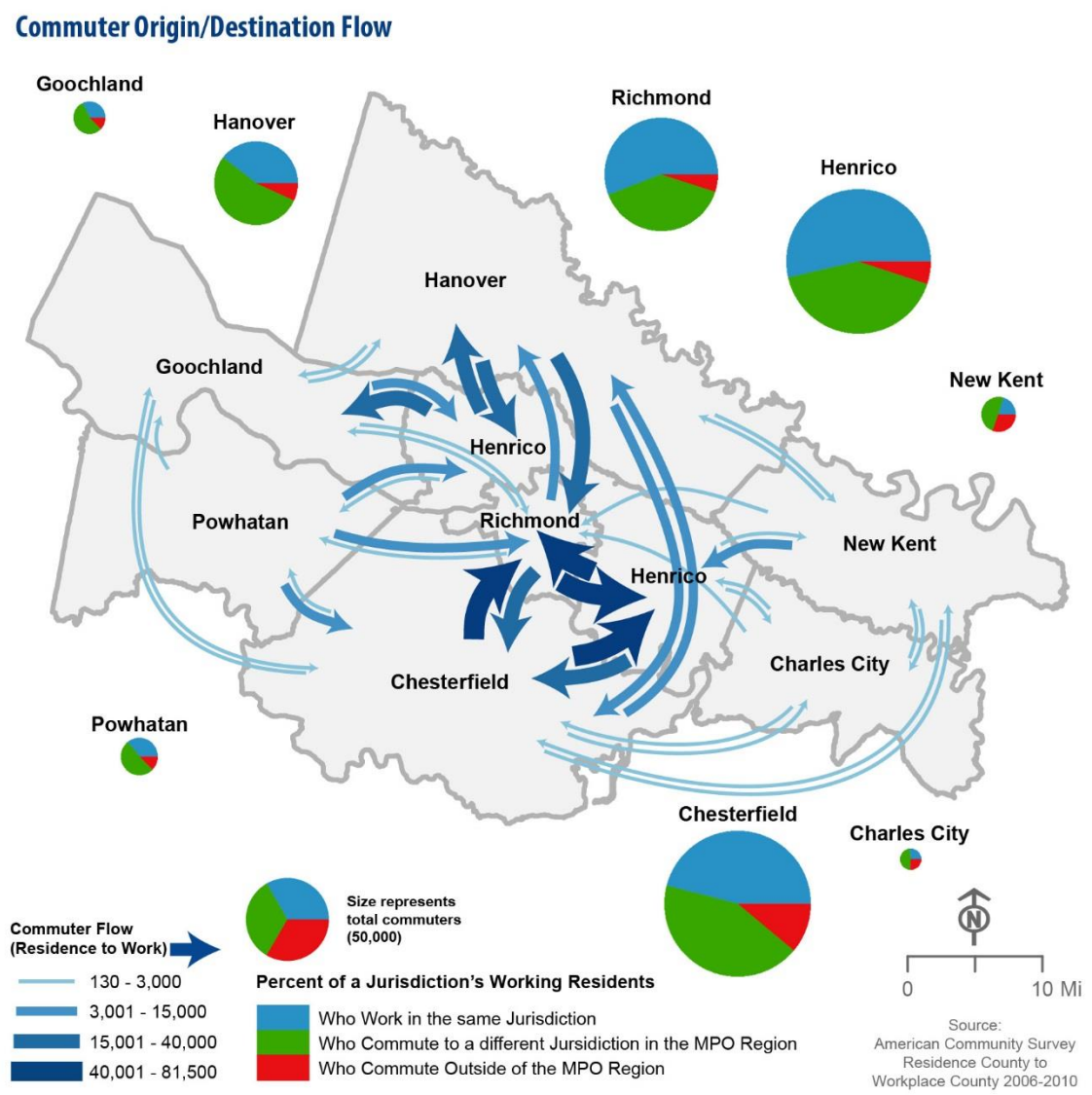


Figure 7: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Richmond Region was the analysis of commuting patterns between activity centers. Figures 8 through 15 below provide insights into the commuting patterns for eleven of the activity centers in the Richmond Region. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and

Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, Downtown Richmond worker origins indicates a strong pattern of commutes from the western neighborhoods of the City of Richmond and western Henrico. Based on these patterns, key corridors for commutes to Downtown Richmond include I-64, West Broad Street, and Patterson Avenue. (Refer to Figure 8).

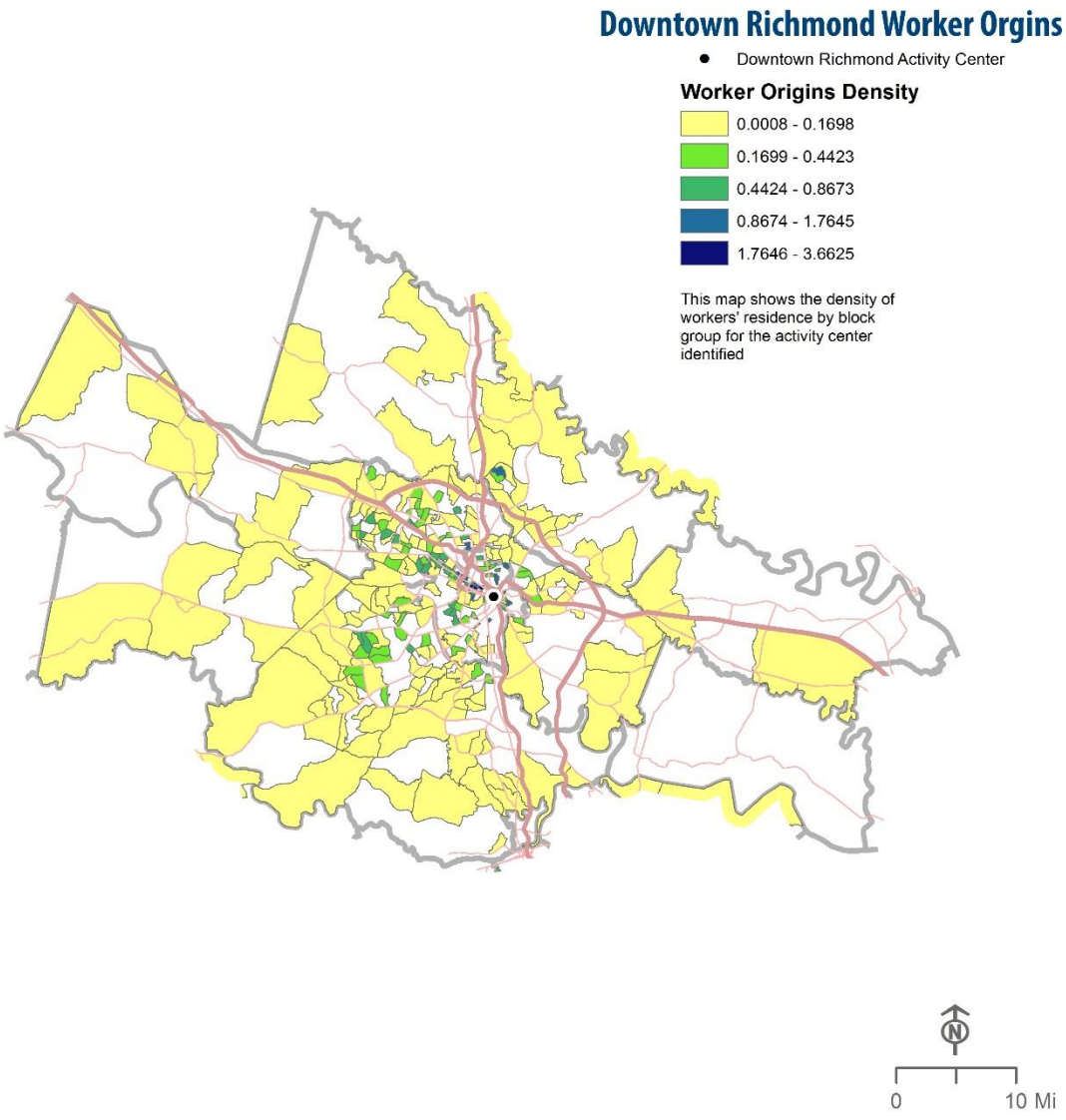


Figure 8: Commuting Patterns to Downtown Richmond Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Data indicates commutes to the Virginia Commonwealth University (VCU) activity center follow a similar pattern to Downtown Richmond. (Refer to Figure 9). Many commutes originate in the western portions of the City of Richmond and Henrico County, making I-64, West Broad Street, and Patterson Avenue important corridors for work bound trips.

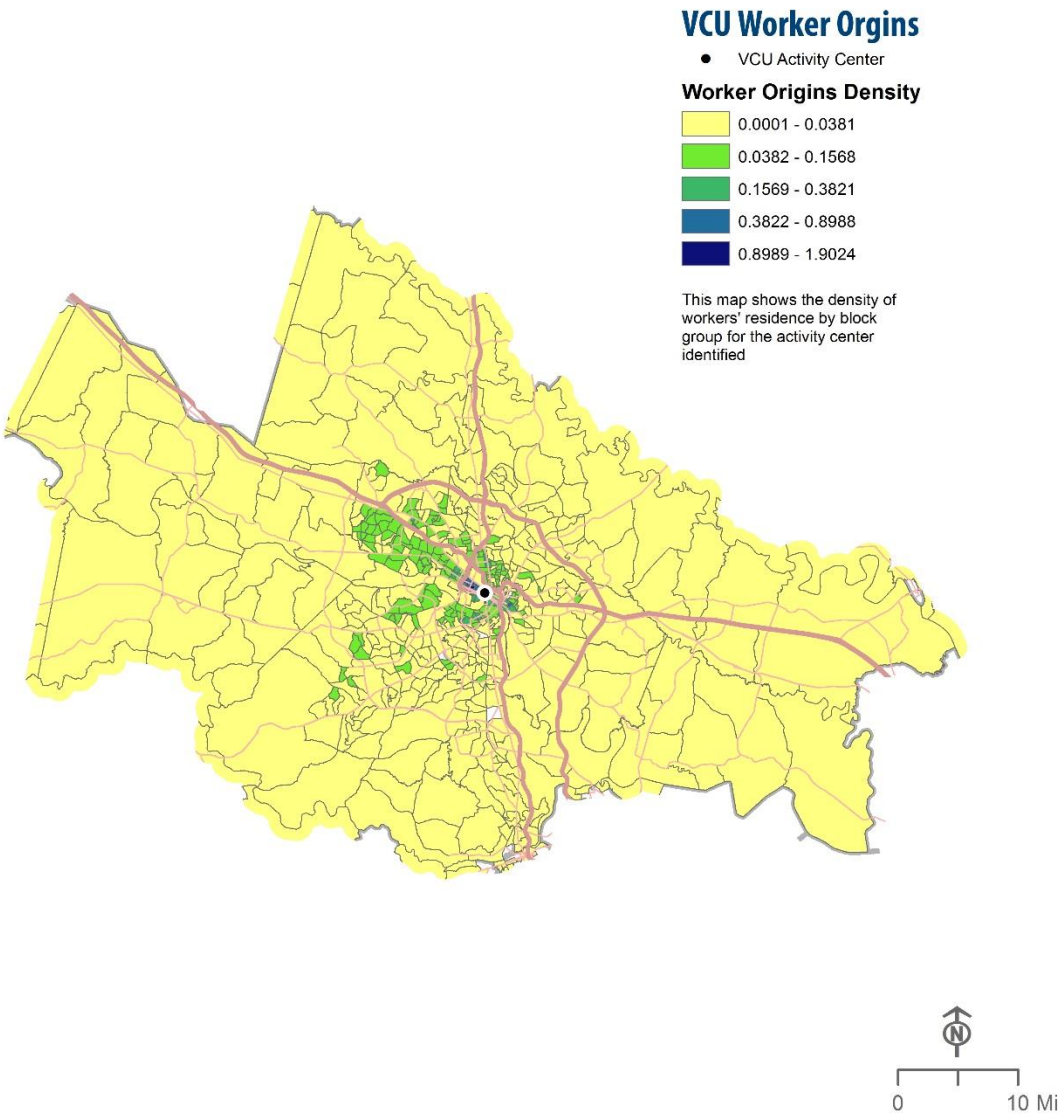


Figure 9: Commuting Patterns to VCU Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Most commutes to the Midlothian activity center originate in surrounding block groups in Chesterfield County and western Henrico County. (Refer to Figure 10). However, a significant number of commute originate western Henrico County, making reliable river crossing critical for many workers along with I-64 and I-195.

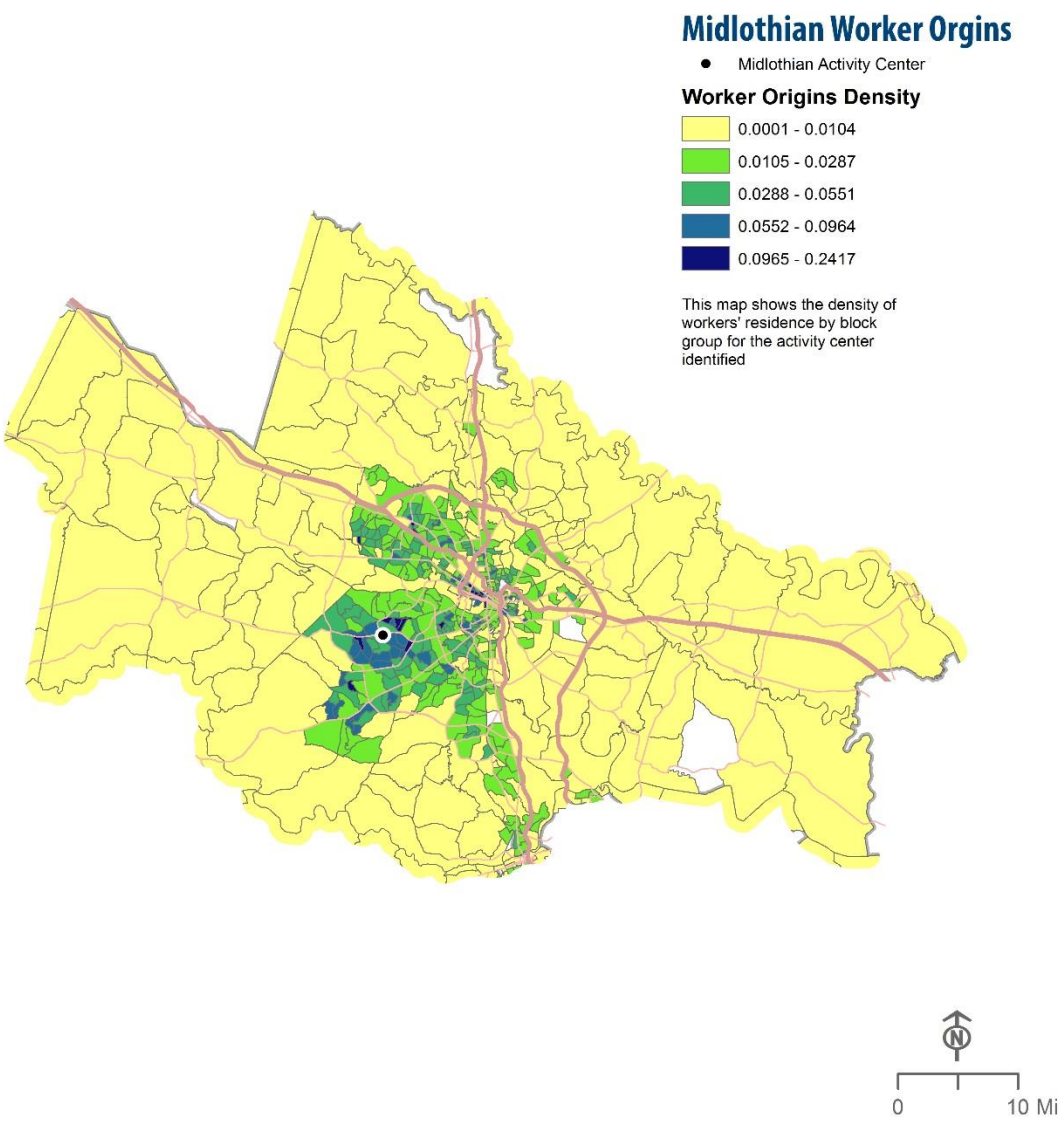


Figure 10: Commuting Patterns to Midlothian Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commute origins for the Swift Creek activity center are similar to Midlothian activity center, with most commutes originate in the surrounding block groups in Chesterfield County. As with the Midlothian activity center, a significant number of commute originate western Henrico County, making reliable river crossing critical for many workers.

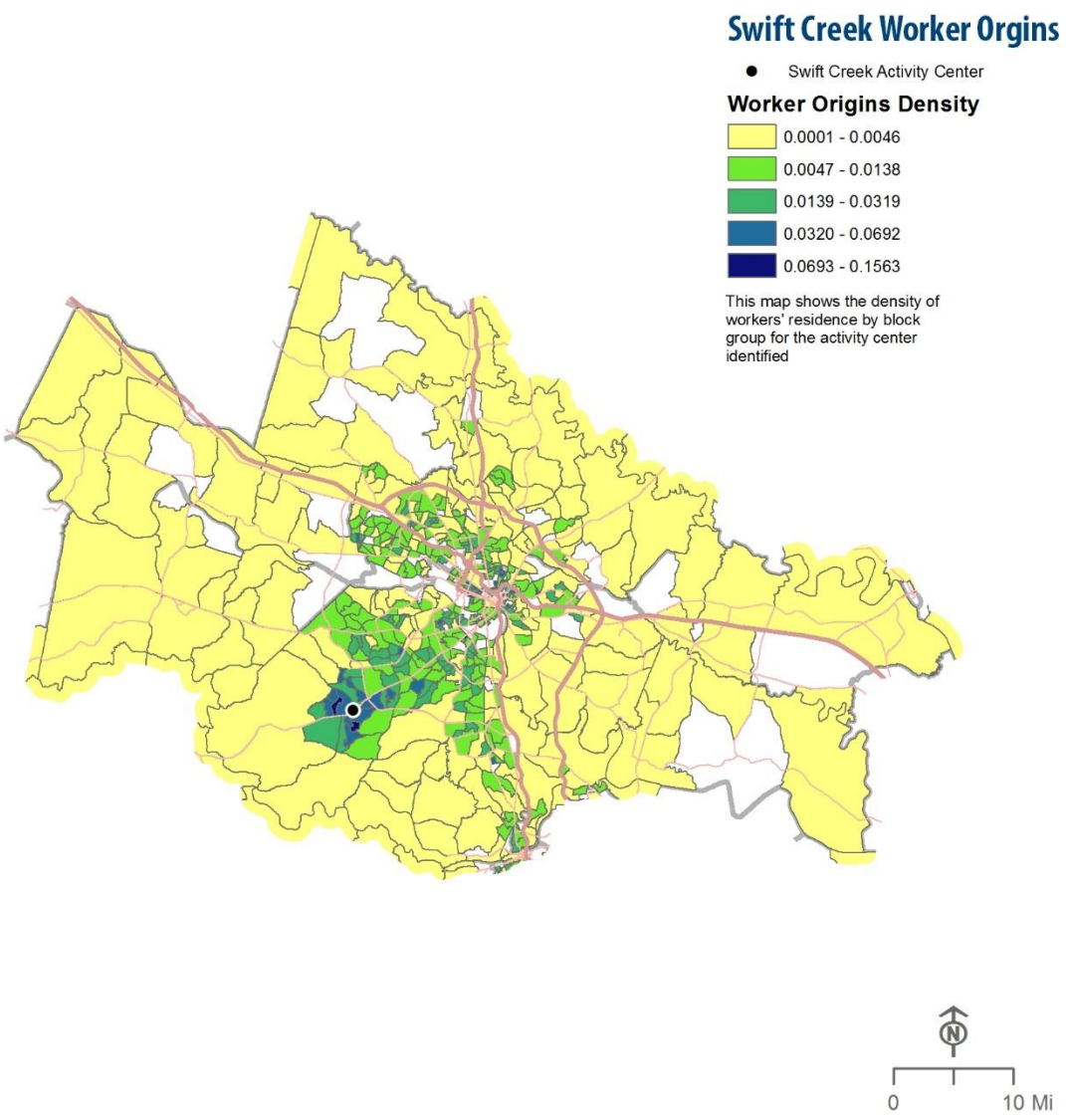


Figure 11: Commuting Patterns to the Swift Creek Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Most commutes to the Innsbrook activity center originate mostly in western Henrico County in the surrounding block groups and the western neighborhoods in the City of Richmond. There is also a smaller concentration of commutes originating in northern Chesterfield County. This makes the river crossings, West Broad Street, and I-64 important for commuting patterns to the Innsbrook activity center.

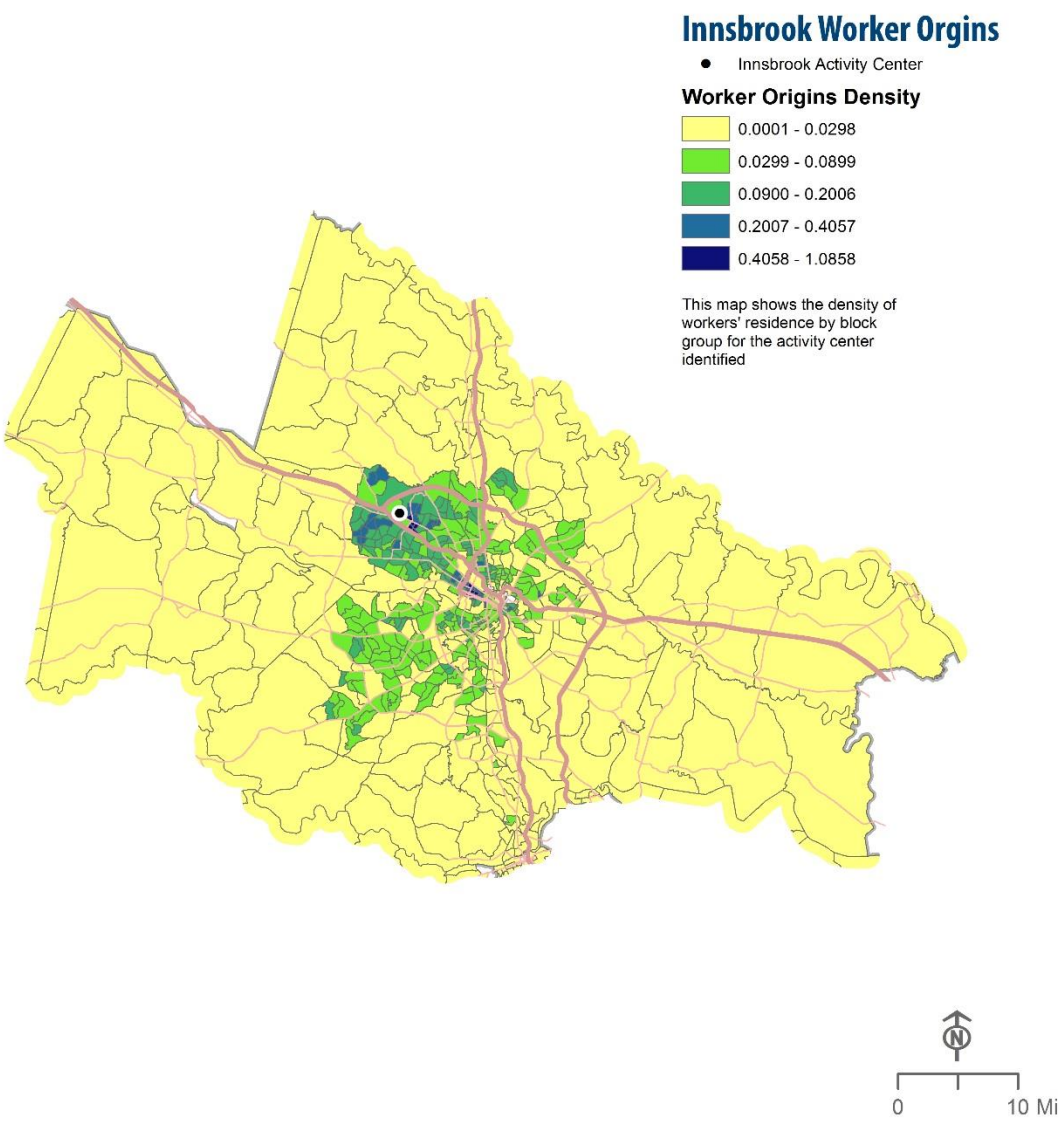


Figure 12: Commuting Patterns to Innsbrook Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commuting patterns for the Short Pump activity center are similar to the Innsbrook activity center, with most commutes originating in western Henrico County in the surrounding block groups and the western neighborhoods in the City of Richmond. This makes West Broad Street and I-64 important for commuting patterns to the Innsbrook activity center. However, fewer commutes originate in northern Chesterfield County for this activity center than the Innsbrook activity center. Therefore, the river crossings are less important in commuting patterns to Short Pump.

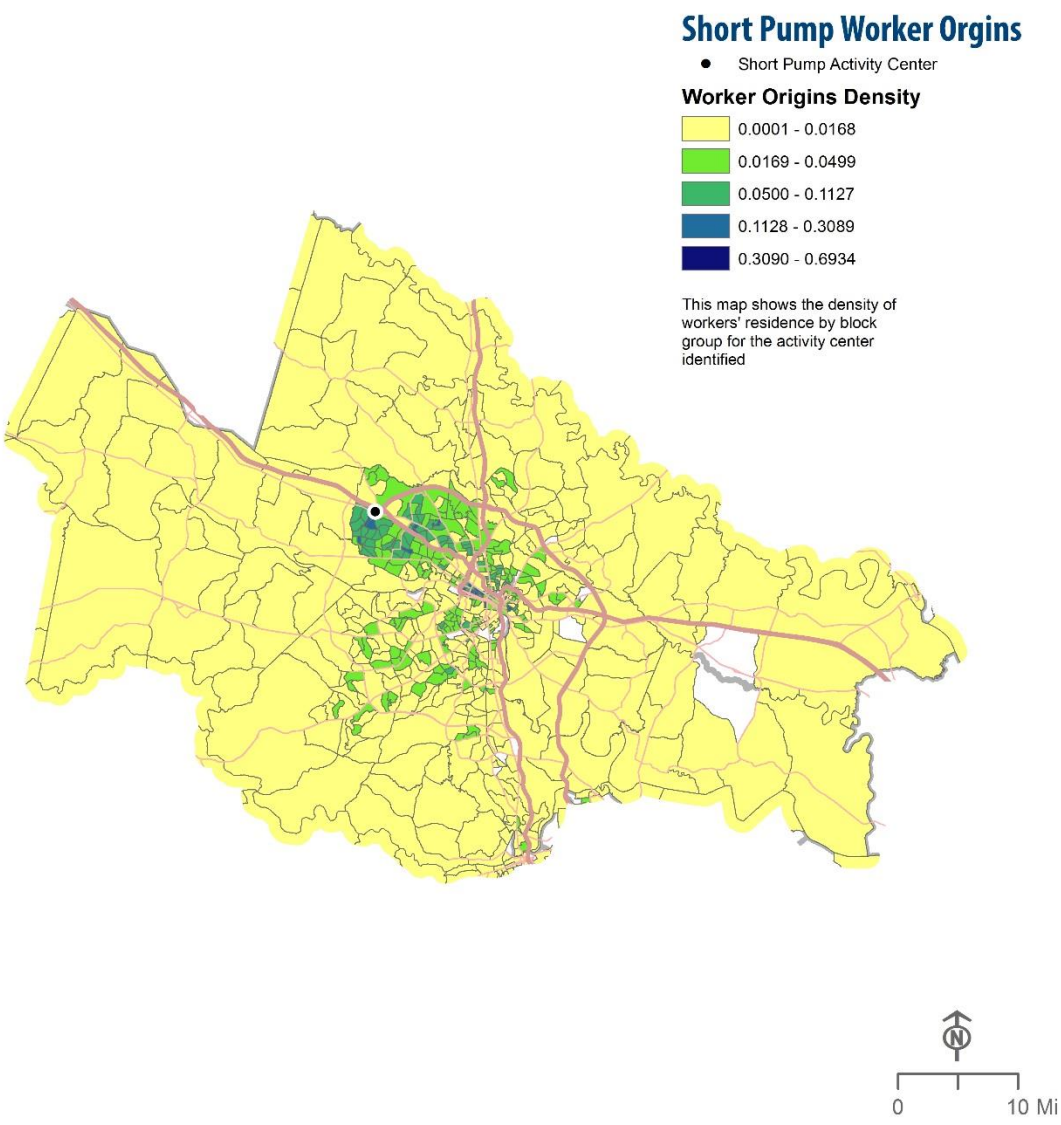


Figure 13: Commuting Patterns to Short Pump Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Similarly to the nearby activity centers of Innsbrook and Short Pump, commutes to the West Creek activity center originate mostly in western Henrico County in the surrounding block groups the western neighborhoods in the City of Richmond. As with the Innsbrook activity center, there is a smaller concentration of commutes originating in northern Chesterfield County. This makes the river crossings, West Broad Street, and I-64 important for commuting patterns to the Innsbrook activity center.

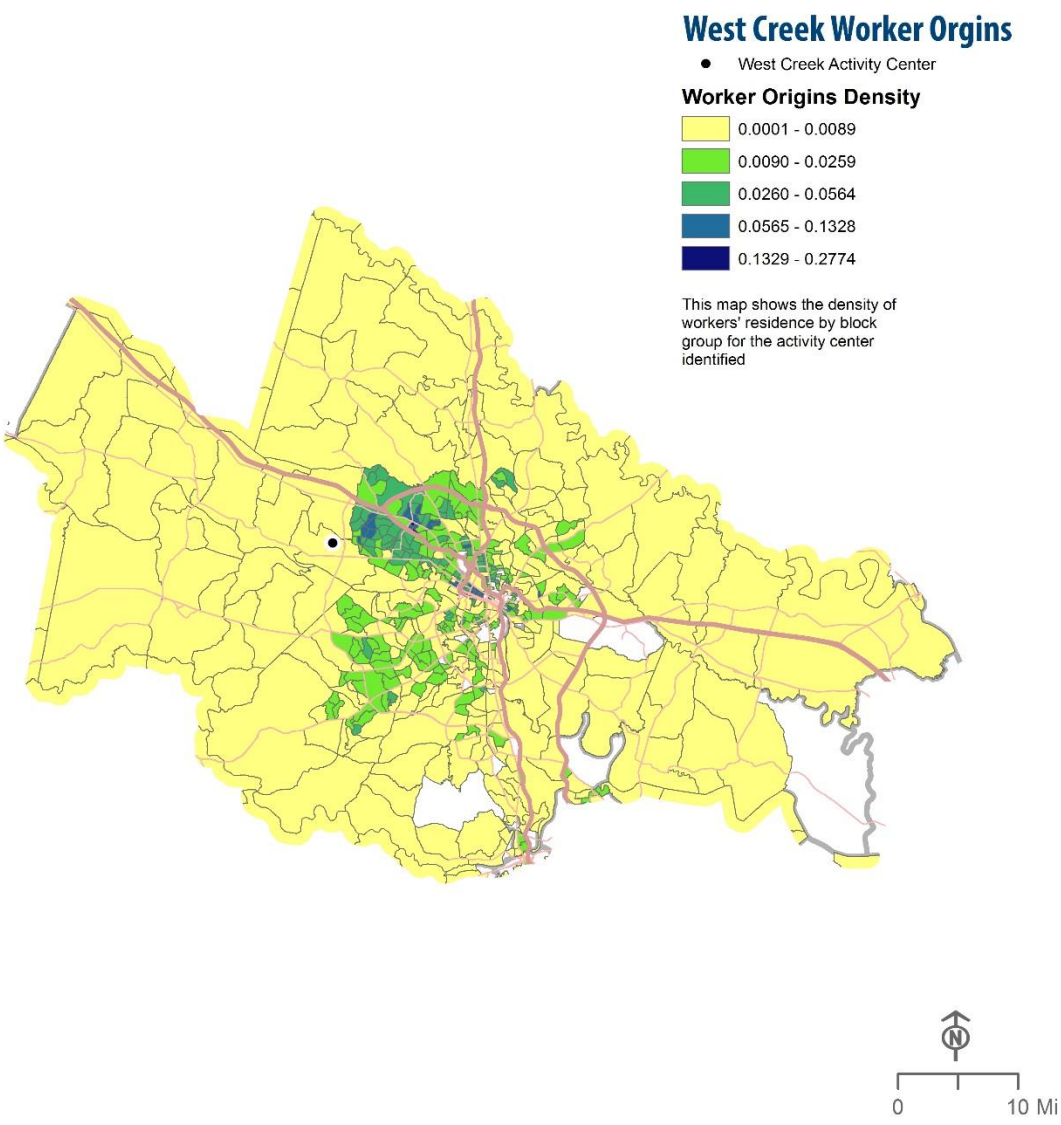


Figure 14: Commuting Patterns to West Creek Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to Ashland originate in a variety of places in the region, but are densest in the City of Richmond, Henrico County, and Hanover County. These commuting patterns indicate a reliability on I-95 for workers traveling to Ashland.

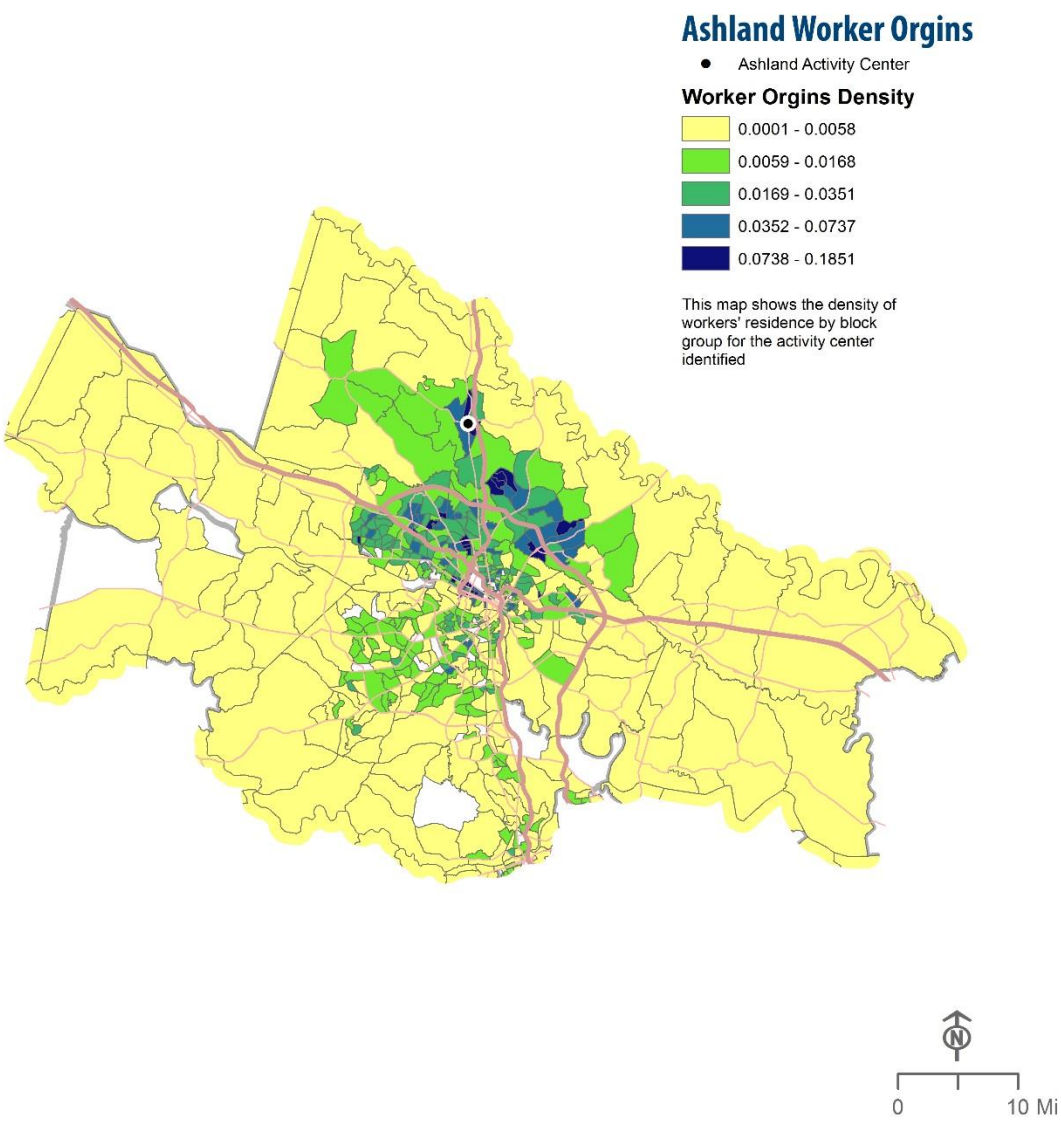


Figure 15: Commuting Patterns to Ashland Activity Center
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Richmond Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 70% and 86% of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 7% to 11% of the mode share. Public transit use is highest in the City of Richmond, which has the most robust transit system in the region. (Refer to Figure 16).

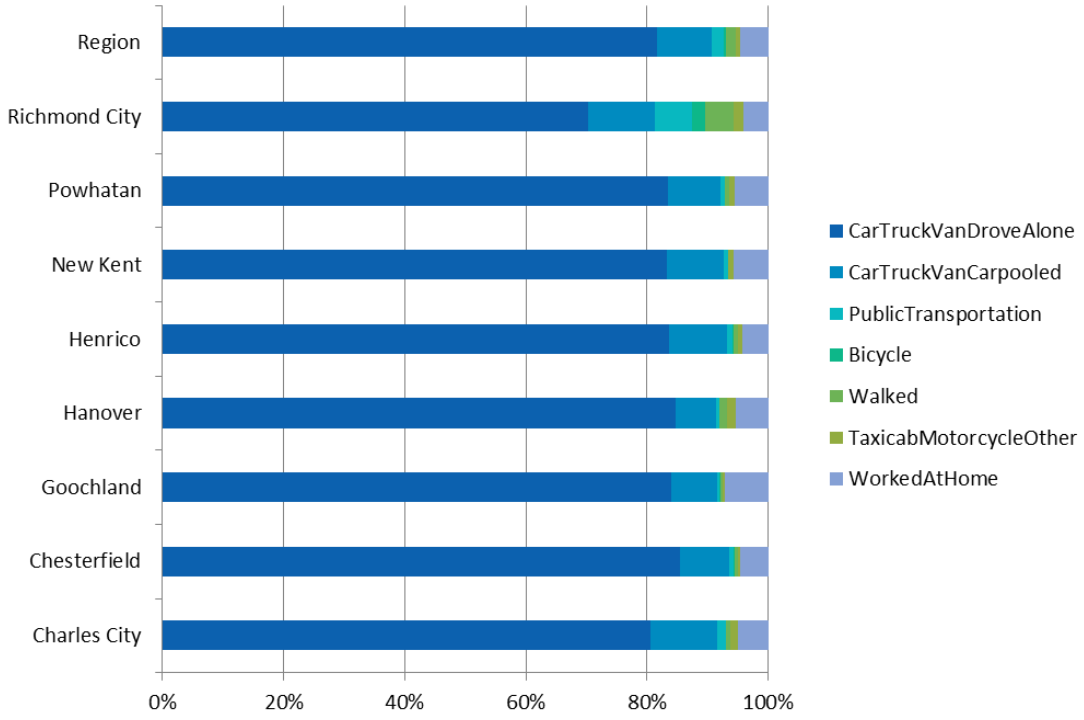


Figure 16: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Richmond Region, average commute times range from 23 to 36 minutes among the various jurisdictions. (Refer to Table 9). Due to its density and proximity to employment centers, the City of Richmond and Henrico County have the shortest average commute, while more rural areas, like Charles City County, have longer commutes on average.

Table 9: Mean Commute Time by Jurisdiction. Source: ACS 2013 5-Year Estimates.

Jurisdiction	Mean Commute Time (Minutes)
Charles City	36.8
Chesterfield	27.0
Goochland	32.4
Hanover	26.6
Henrico	23.3
New Kent	33.4
Powhatan	34.9
Richmond City	23.3

Source: ACS 2013 5-Year Estimates

Commutes of over 45 minutes make up a small percentage of regional commutes, with only 9% of workers reporting a commute longer than 45 minutes. Charles City County has the highest percentage of workers who commute over 45 minutes at nearly 37%, this is three times as high as both the City of Richmond's and Henrico County's rate of long commutes. (Refer to Figure 17).

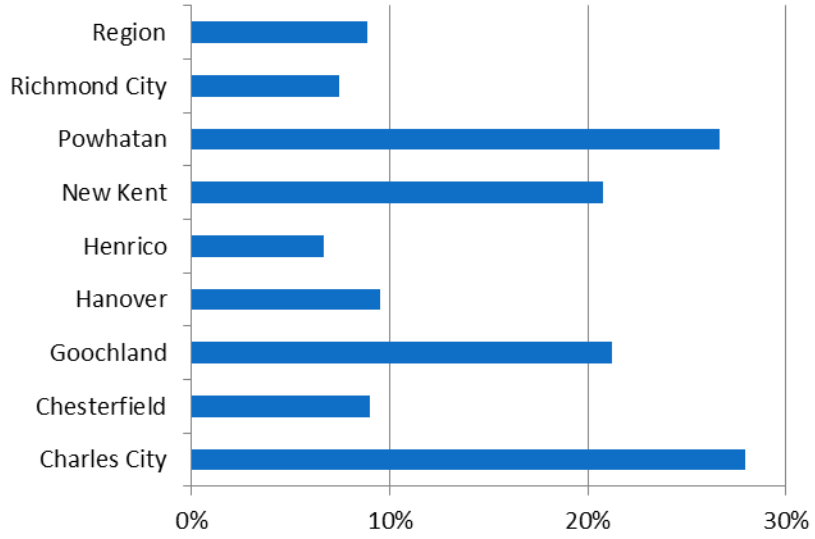


Figure 17: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 18 provides a closer look at where longer commutes originate. In the City of Richmond, western Henrico, and northern Chesterfield commute times are well below average for the region as a whole. Block groups on the fringes of the region, and in rural areas of Goochland, Hanover, New Kent and Charles City counties have commute times that are nearly 150% - 240% longer than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

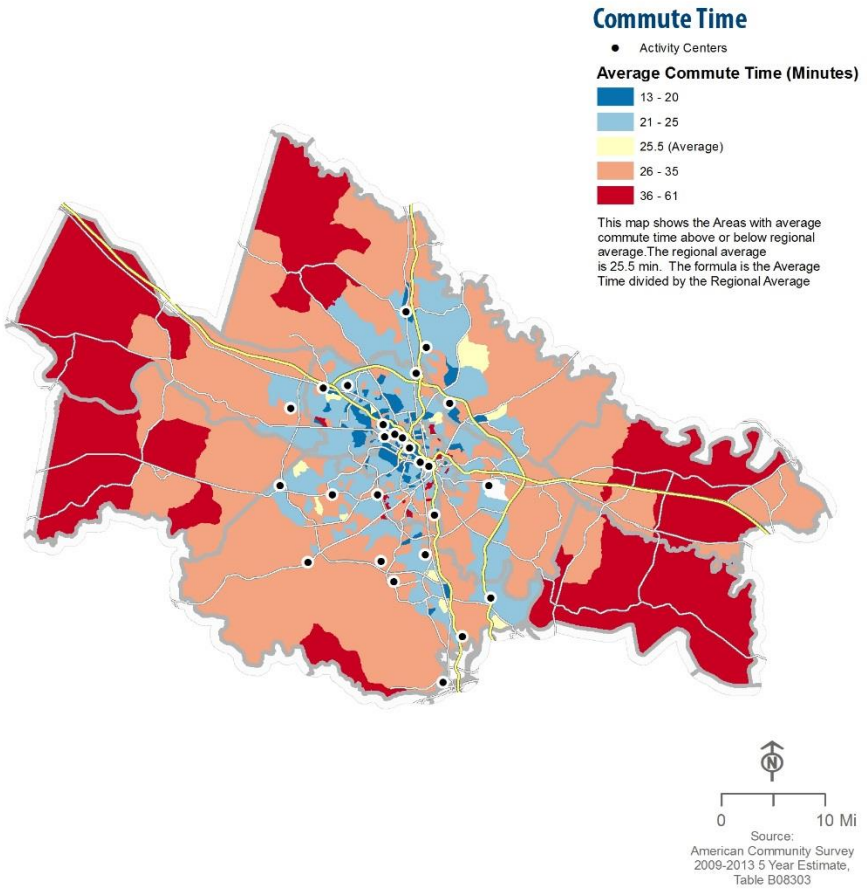


Figure 18: Richmond Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The accessibility to employment measure was calculated using an accessibility model developed by the consultant team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

Auto Accessibility

Auto Accessibility in the Richmond Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility

exist around the City of Richmond, western Henrico, and Chesterfield. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 19).

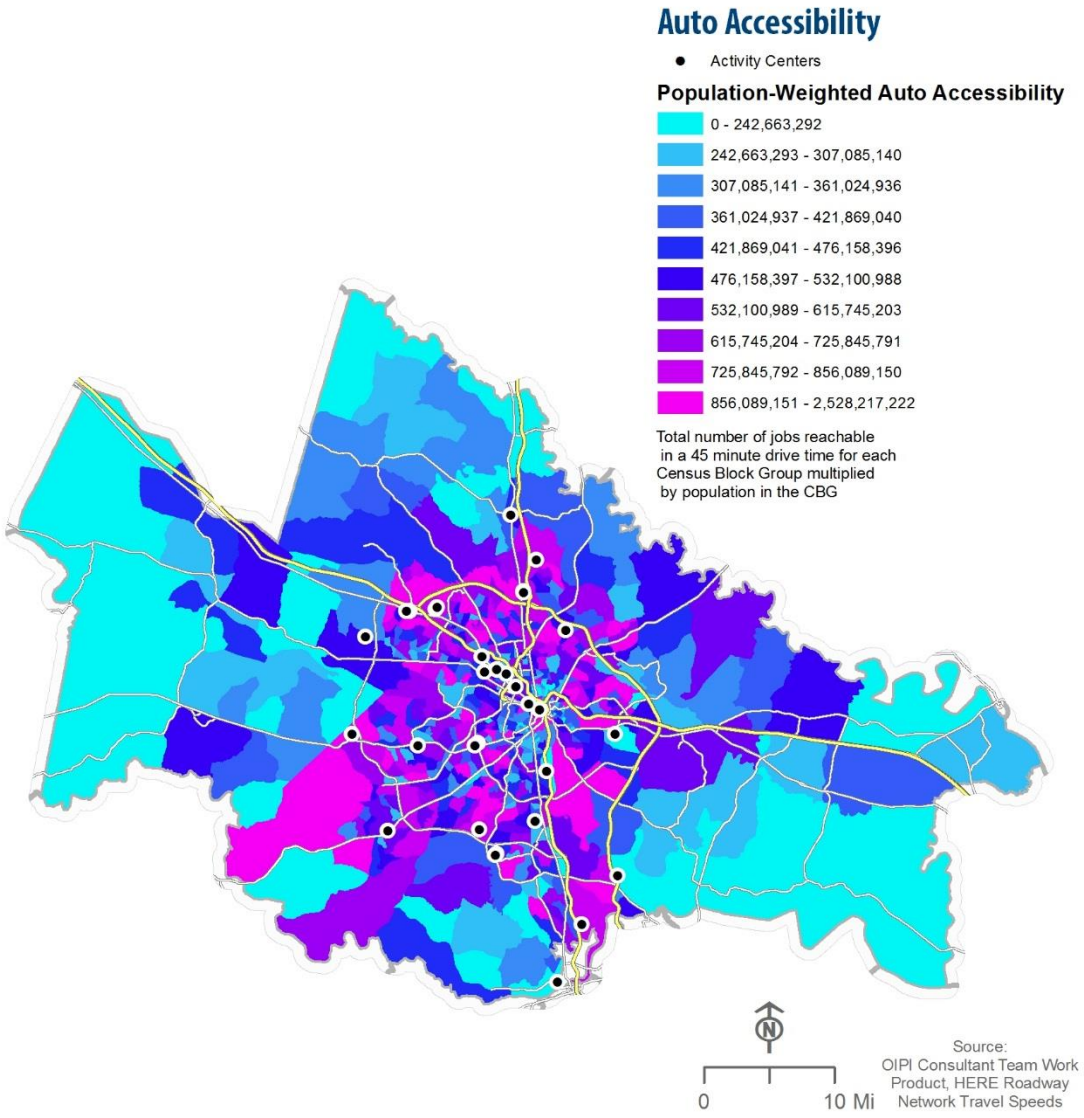


Figure 19: Auto Accessibility

Transit Accessibility

Outside of the City of Richmond, there are few fixed-route transit options in the region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Only a few select areas outside the City of Richmond are served by transit, namely northern Chesterfield County and western and northeastern portions of Henrico County. A number of the activity centers have little or no transit accessibility. (Refer to Figure 20).

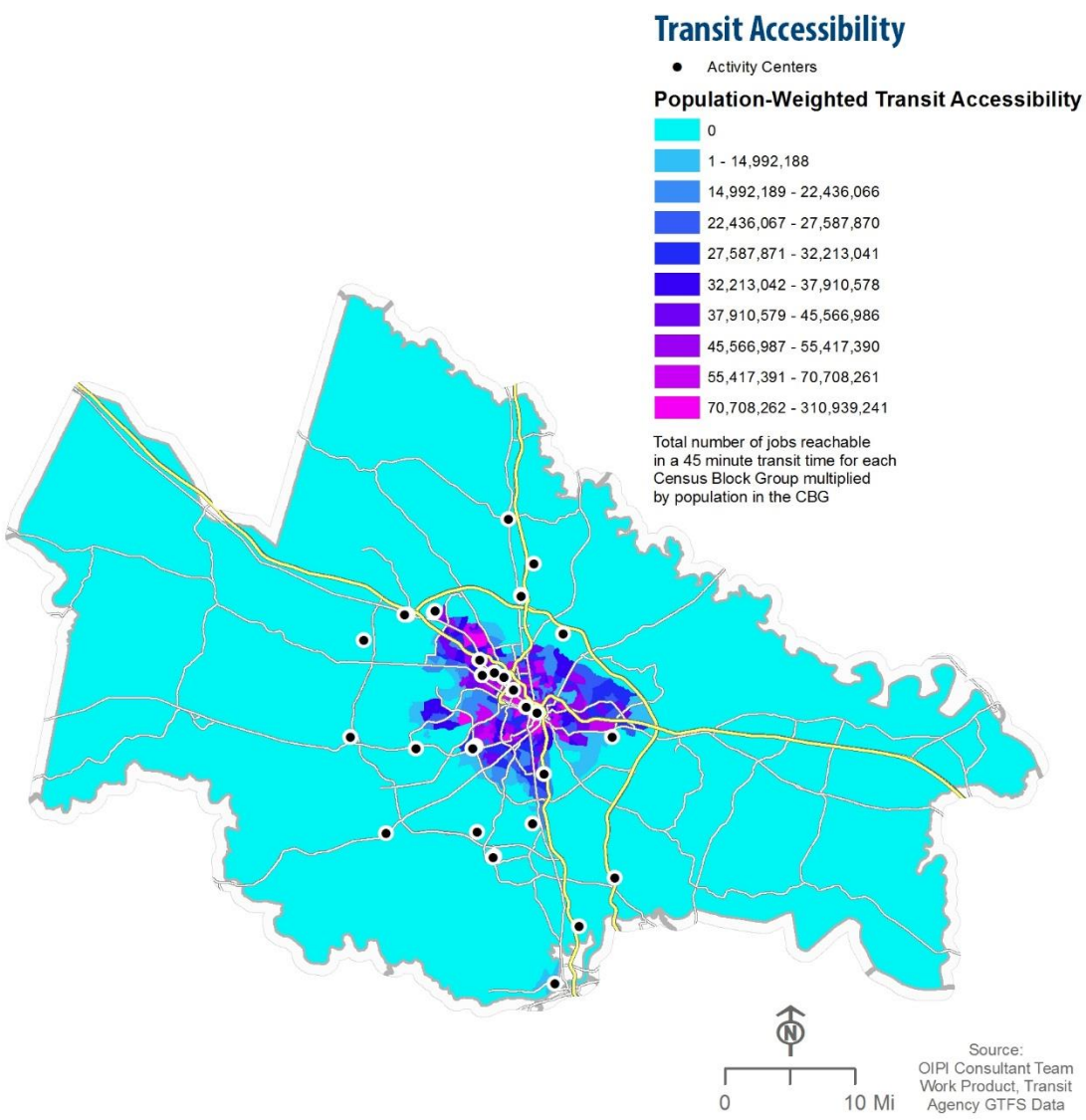


Figure 20: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. Richmond City and areas of the county adjacent to the city scored the highest, as was expected, with the highest scoring areas located within the City of Richmond. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 21).

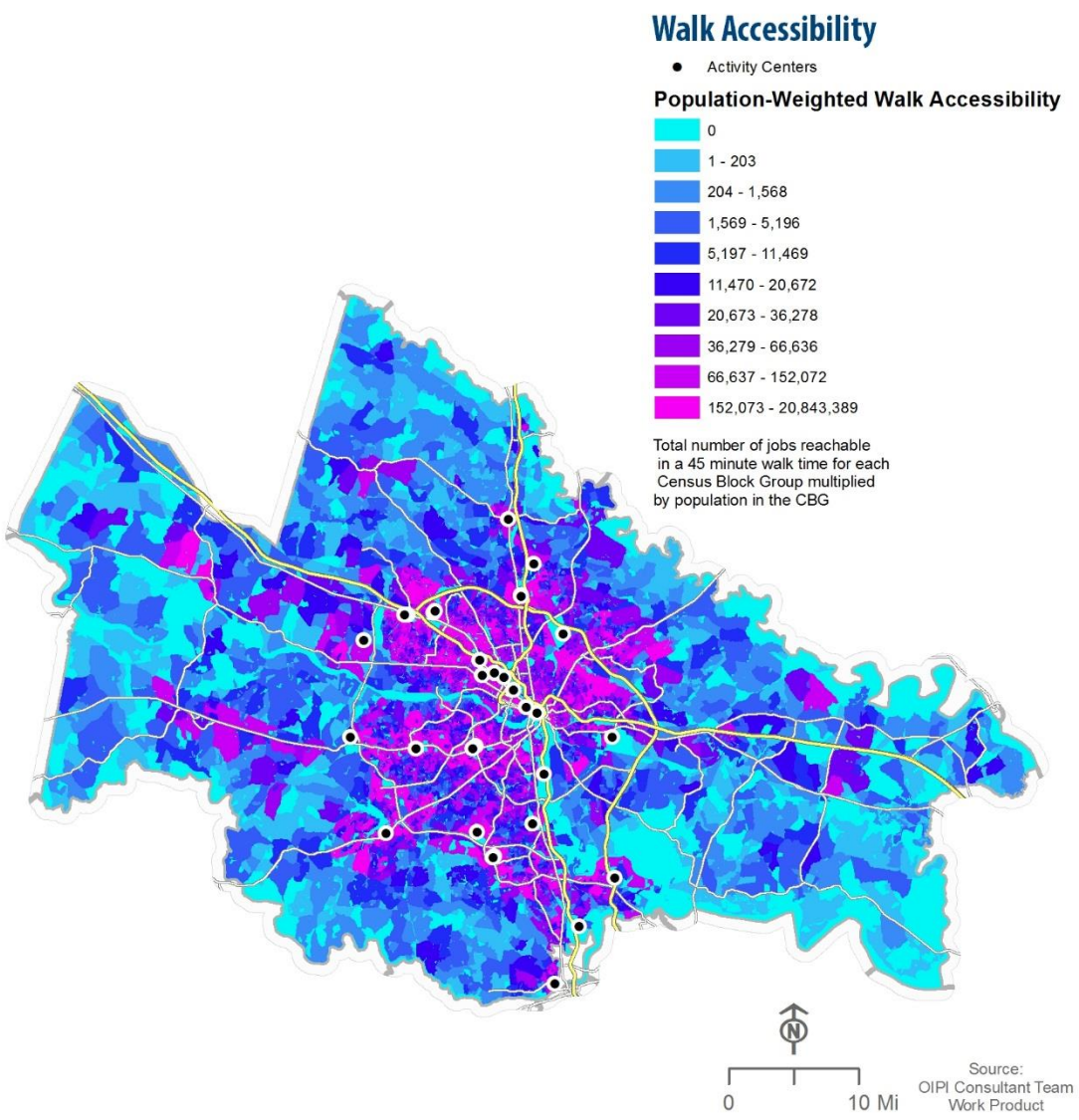


Figure 21: Walk Accessibility

Freight Accessibility

In addition to railways, I-95 and I-64 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within a two minute drive from a major arterial ramp. (Refer to Figure 22).

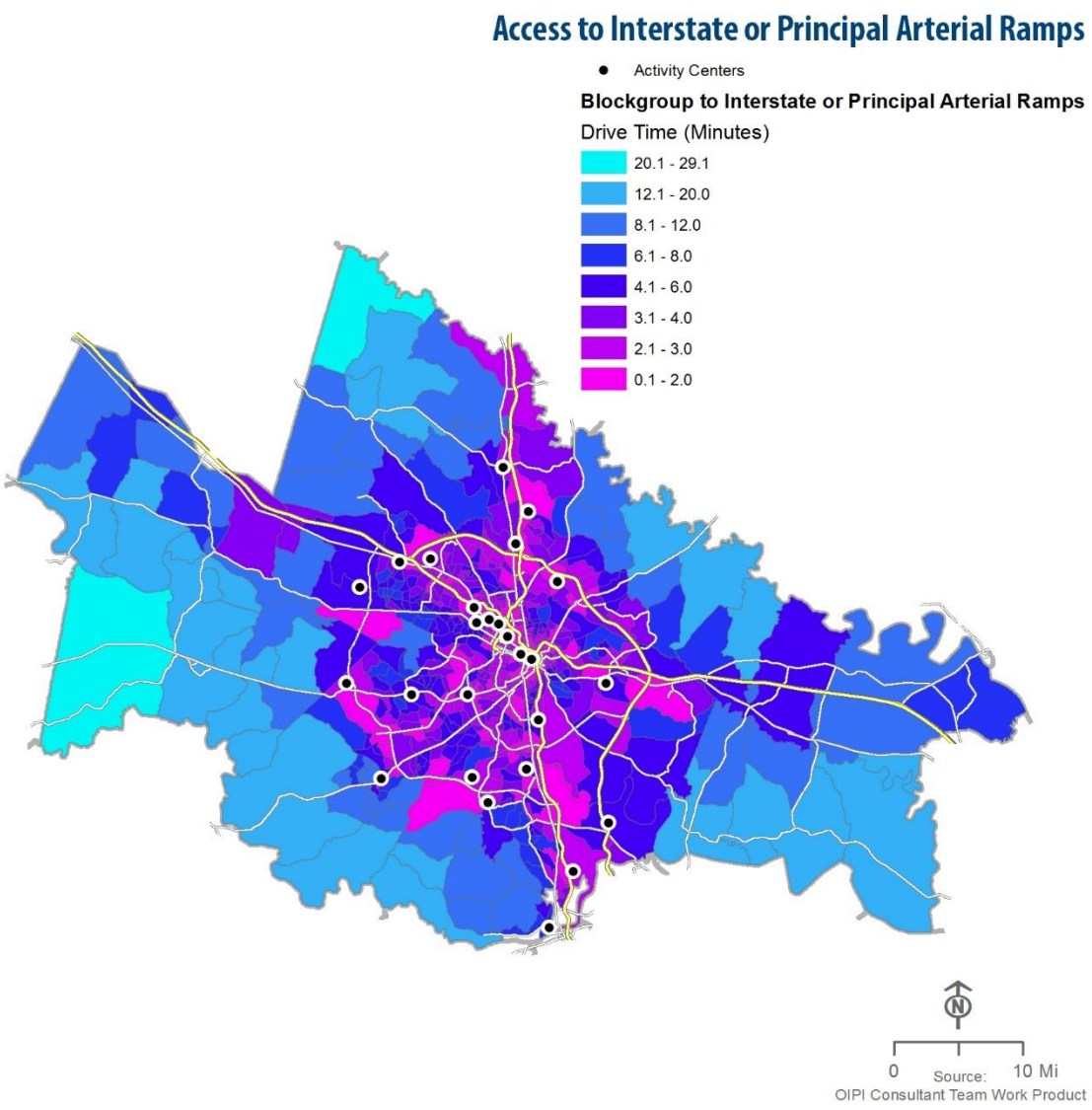


Figure 22: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Richmond Region are clustered around I-95 and I-65 in and around the City of Richmond. Most areas within the City of Richmond, and to the north and south of the city, have access to a warehouse or distribution center within a ten minute drive. (Refer to Figure 23).

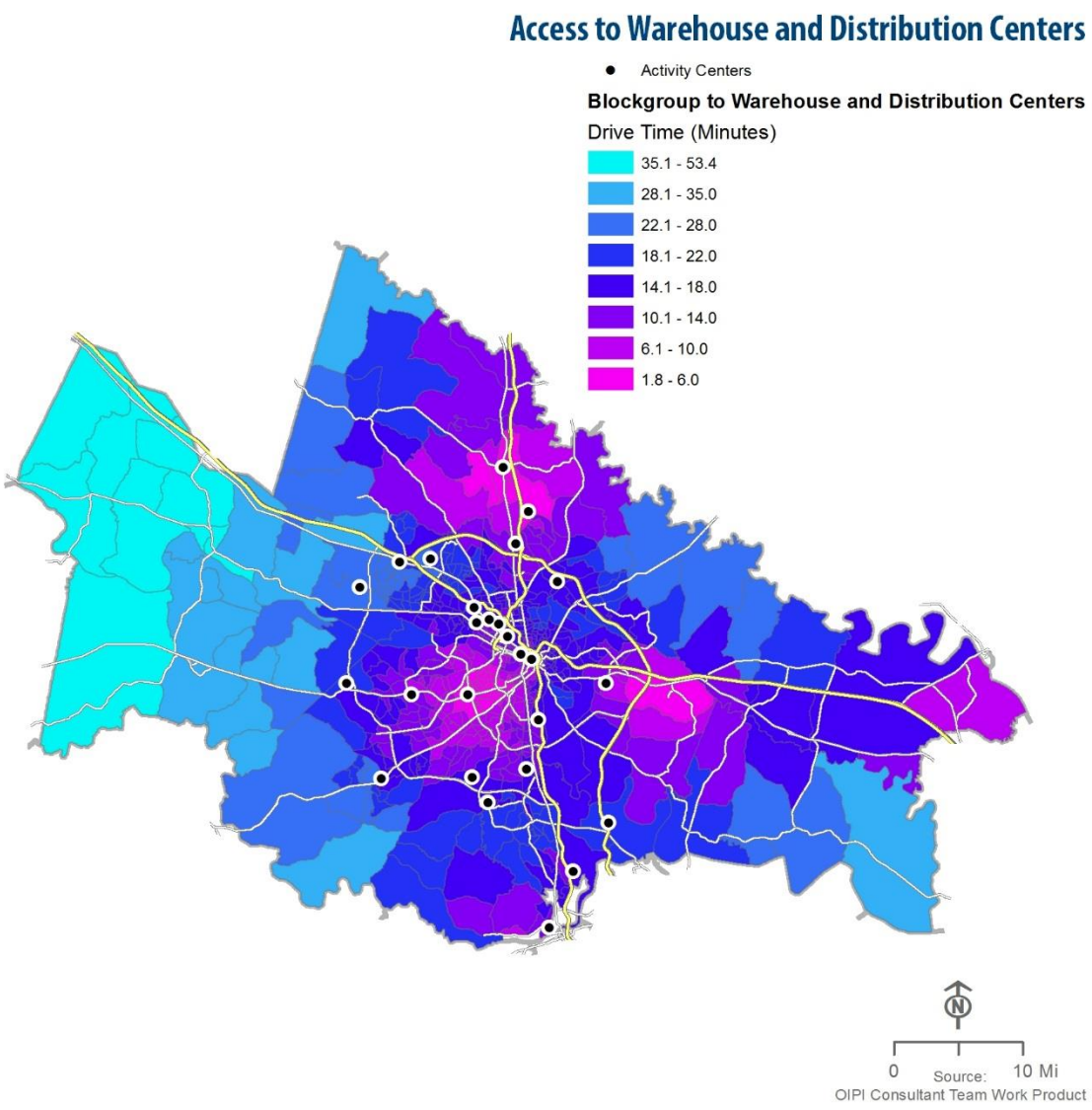


Figure 23: Access to Warehouses & Distribution Centers

Both CSX and Norfolk Southern operate freight rail lines that pass through the City of Richmond. CSX rail lines run both north-south and east-west through Chesterfield County, Henrico County, Charles City County, New Kent, and Hanover County in addition to the City of Richmond. Norfolk Southern run east-west in the Richmond Region through New Kent, Henrico County, and Chesterfield County. Richmond International Airport is the closest major airport that handles large quantities of freight. Richmond International Airport, located in eastern Henrico County, is within a 14 minute drive of most activity centers in the region. (Refer to Figure 24).

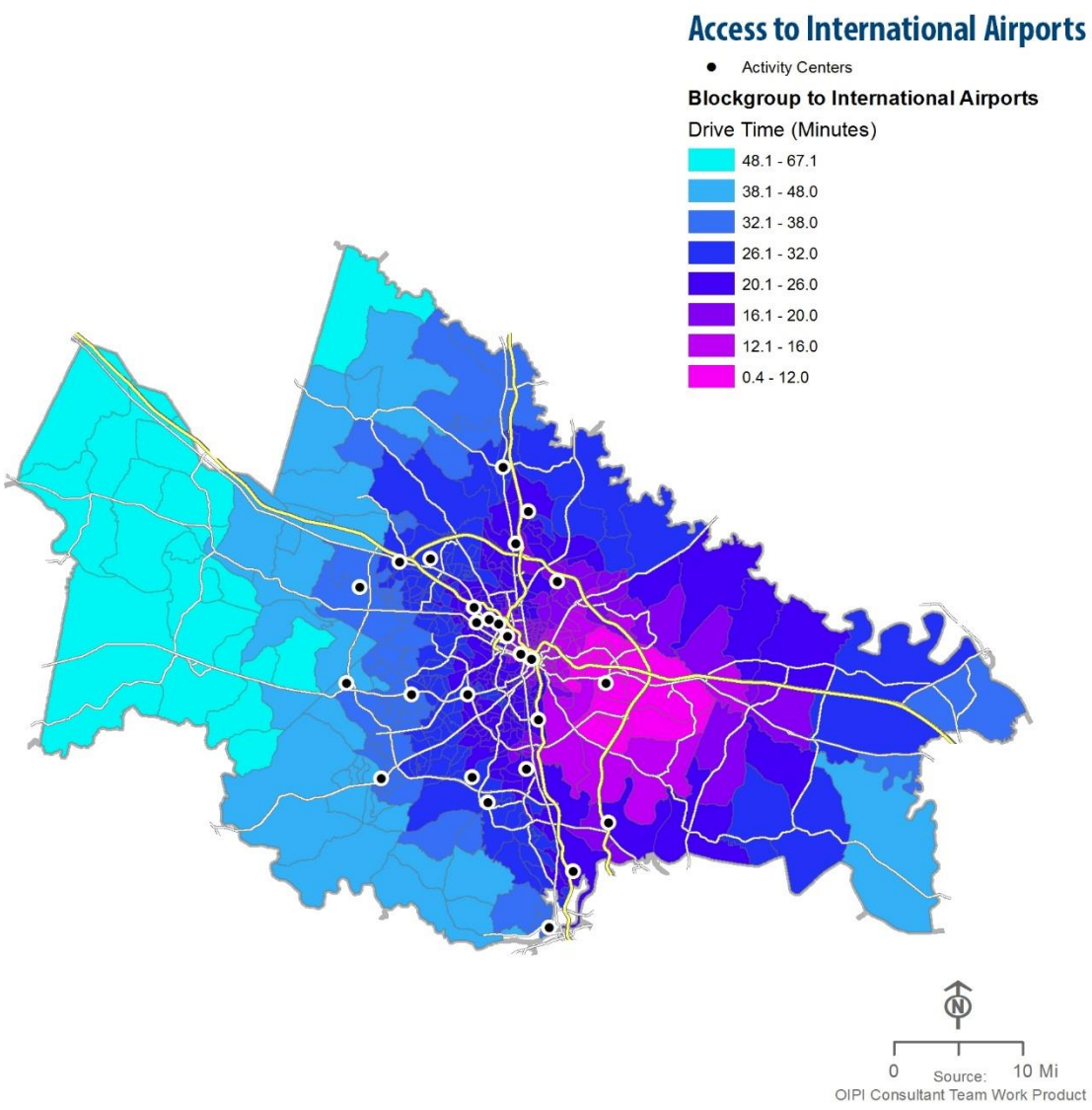


Figure 24: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in the Richmond Region are based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 18 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for major roadways in the Richmond Region were available for analysis, as they are the major arterial roadways with heavy commuter traffic. Overall, scores on the travel time reliability index indicated high travel time reliability

for most corridors. The reliability index scores are higher in certain areas of the region, representing slightly lower levels of travel time reliability. These areas include western Henrico County, the central business district of the City of Richmond, and parts of eastern Henrico. There are, however, no areas of significant concern along most corridors in the region. (Refer to Figure 25).

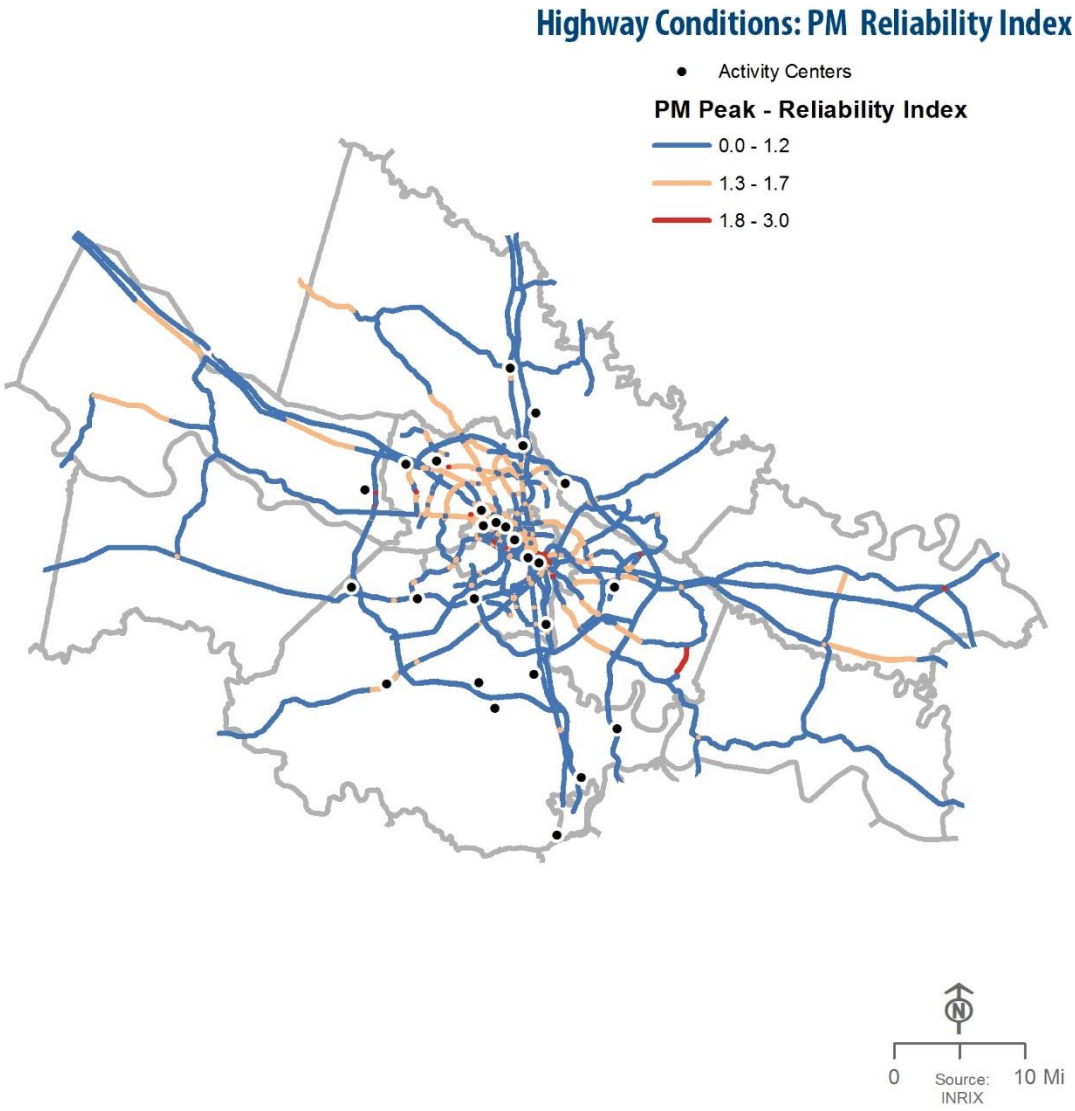


Figure 25: Travel Time Reliability

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major roadway in the Richmond Region. According to the analysis, congestion only occurs in small areas in the Richmond Region. Most roadways analyzed are congested less than 5% of the time. (Refer to Figure 26).

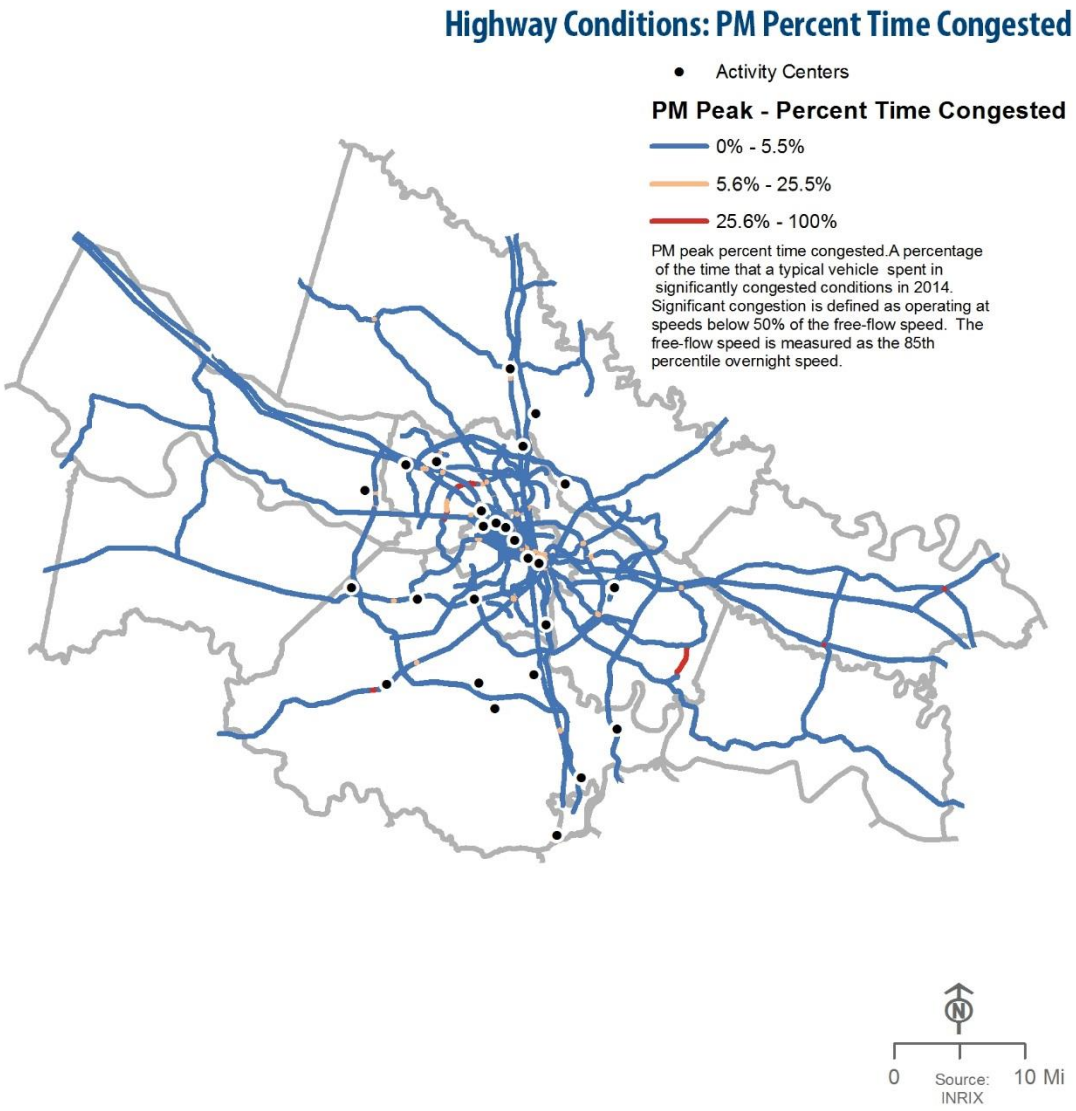


Figure 26: Percent of Time Congested

Median Speeds

Median speeds were calculated for major roadways in the region and are represented as the ratio of pm peak hour vehicle speeds and the speed limit for the PM peak period. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The ratio of median speed to speed limit shows problems in congested areas along I-64 and I-95 in Richmond and Henrico, congestion at the I-64/I-295 Interchange in eastern Henrico, congestion at the I-95/I-295 Interchange in northern Henrico and other key interchanges around the region. (Refer to Figure 27).

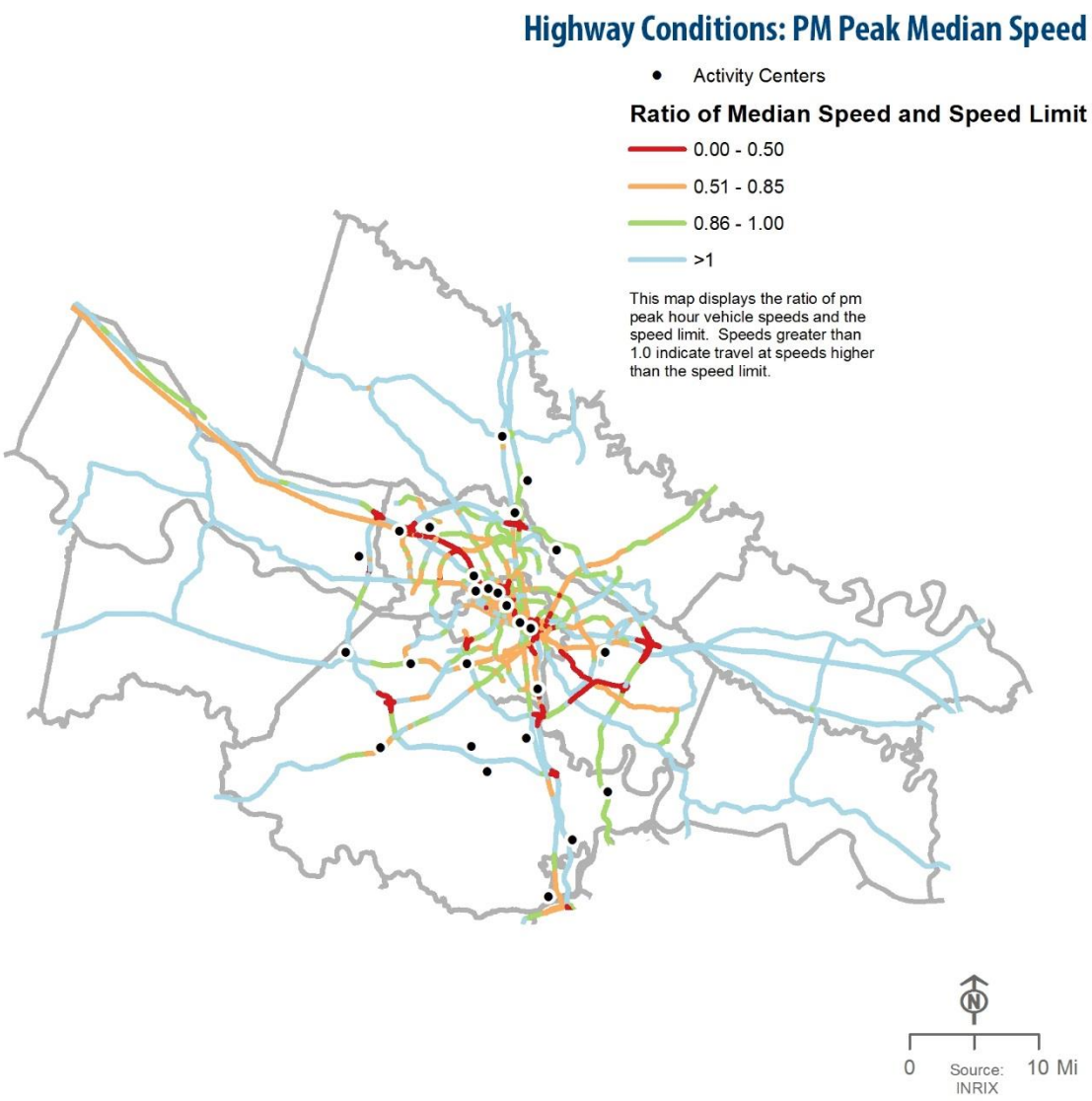


Figure 27: Median Speeds

D. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Richmond Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production

locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Richmond Region, an average of 86% of the dollar value of all goods that are moved through the region are moved by truck. Air is the second most important mode, carrying around 6% of the total dollar value of goods. Other modes of goods movement used in the Richmond Region includes rail and water, however trucks remain the dominant mode of freight movement. (Refer to Figure 28).

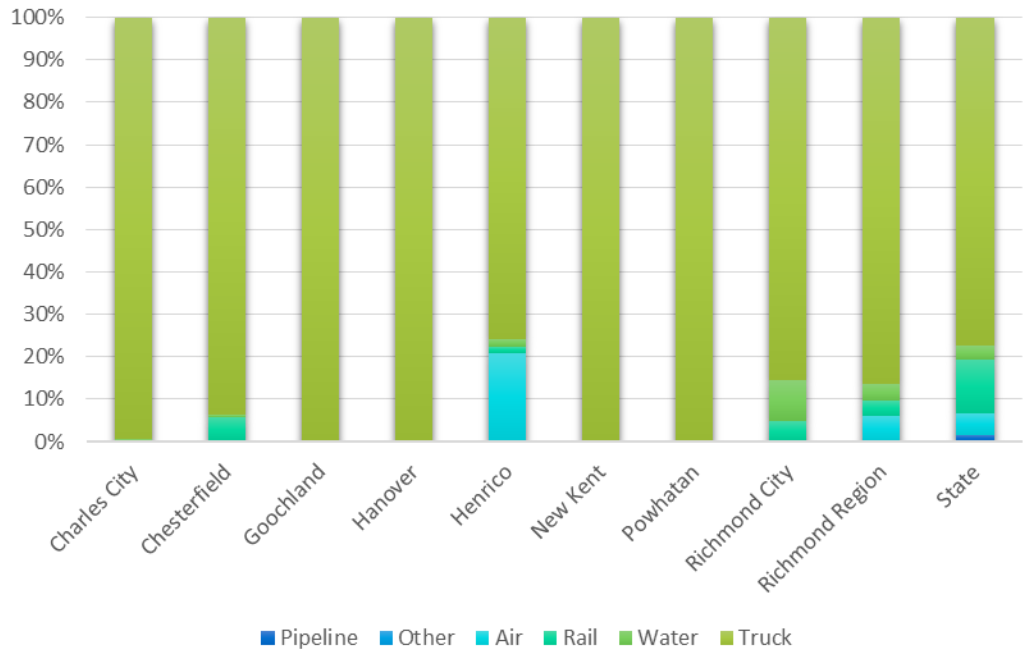


Figure 28: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location quotients are used to compare the prominence of freight modes between the Richmond Region, and the state as a whole. The Richmond Region relies on trucks for freight movement 1.12 times more than the does the state as a whole. Water and air transportation for goods are more prevalent in the Richmond Region on average than it is for the rest of the state. This reflects the greater density of freight rail lines in other portions of the state. It also reflects the importance of the Richmond International Airport in freight movement for the region. (Refer to Figure 29).

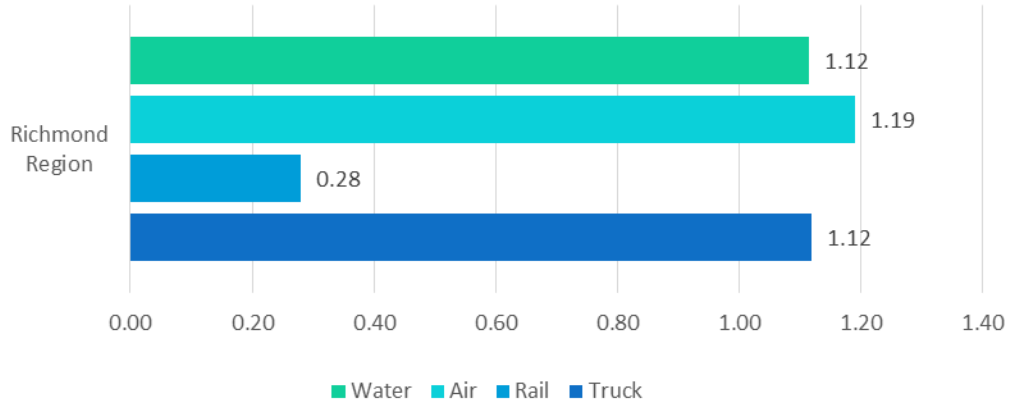


Figure 29: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

While the prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Other goods account for most of the total value of freight imported to the Richmond Region, accounting for about half of the total value of freight imported. Other goods also represented the highest dollar amount of goods exported from the region, followed closely by tobacco products. Overall, the Richmond Region imported $26 billion worth of goods and exported $30.7 billion worth of goods, resulting in $4.7 billion of net exports in 2012. (Refer to Figures 30 and 31).

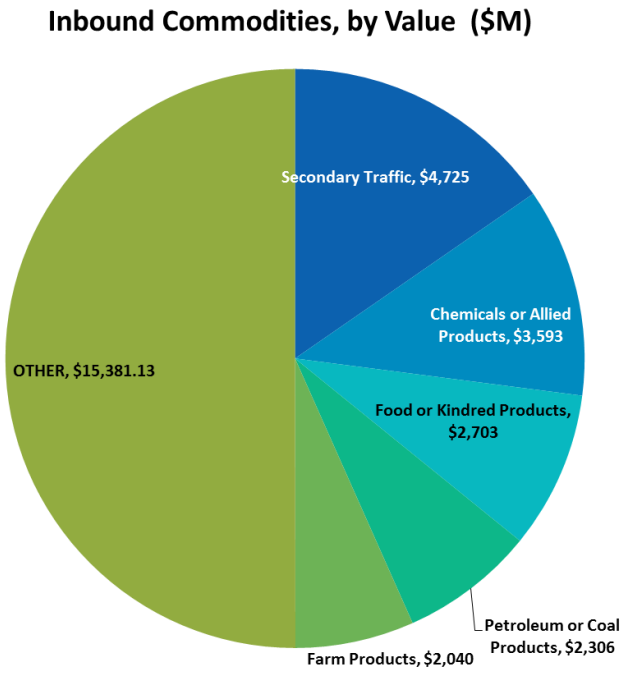


Figure 30: Top Freight Values by Commodities.
Source: TranSearch, 2012

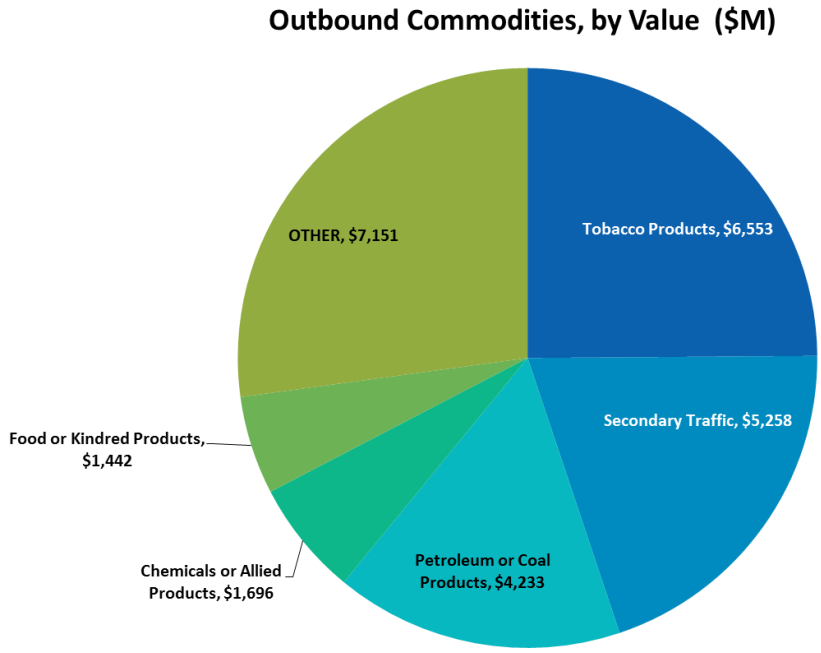


Figure 31: Top Freight Values by Commodities.
Source: TranSearch, 2012

The Southeast Region, as defined by the Bureau of Economic analysis, is the destination for the highest amount of freight by value and total tonnage from the Richmond Region. In 2012, $7.8 billion and over ten million tons of freight was exported to the Southeast Region. The second highest destination for both value and tonnage is the Mideast Region, accounting for almost $6.8 billion and over seven million tons of freight. (Refer to Figure 32).

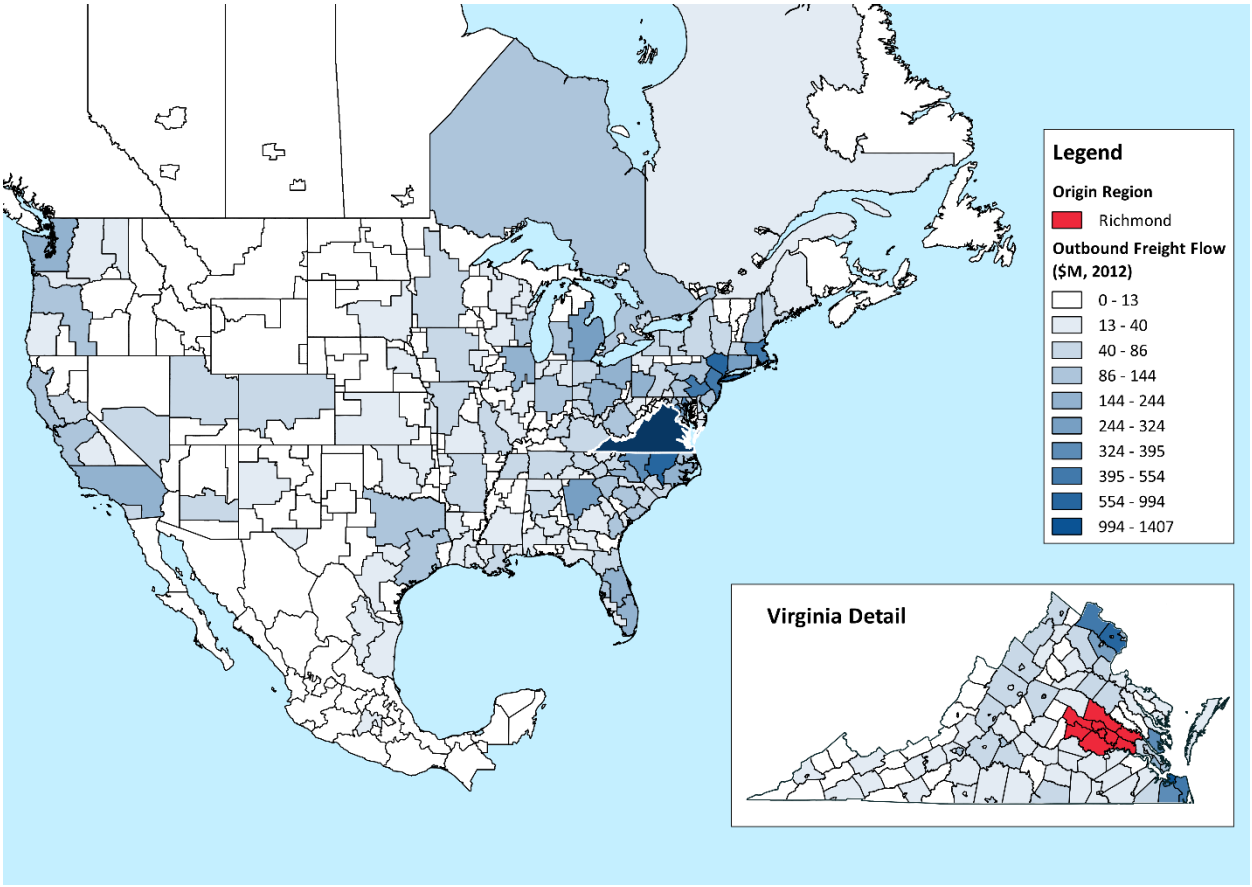


Figure 32: Top Freight Values by Region.
Source: TranSearch, 2012

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, nonmetallic minerals made up the highest weight of freight imported and exported to the Richmond Region. Nonmetallic minerals accounted for half of freight exports and a third of freight imports to the region. (Refer to Figures 33 and 34).

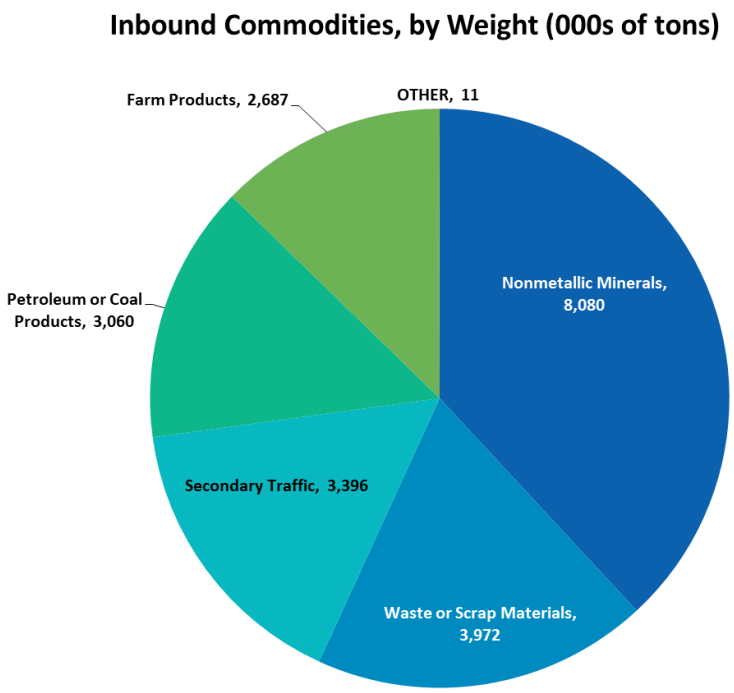


Figure 33: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

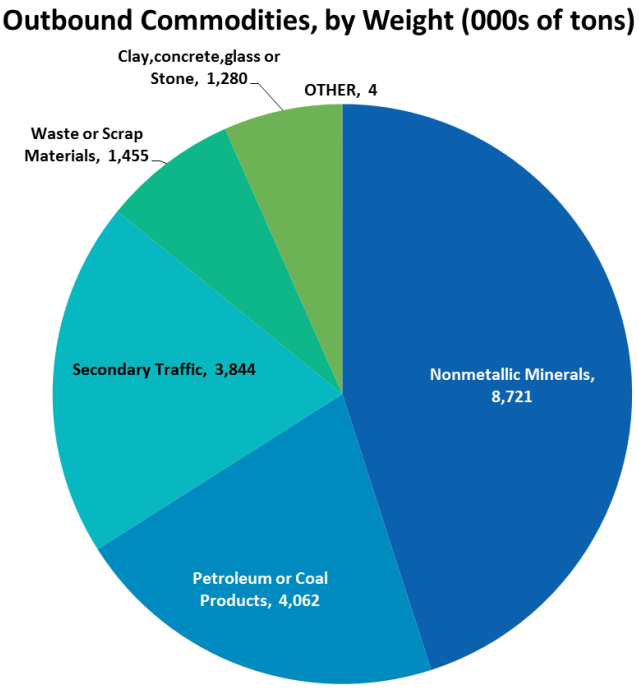


Figure 34: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.
These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (local, knowledge and freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Richmond Region, the knowledge-based sector is projected to grow as a share of output (15% to 18%) while the freight-based sector is expected to decline slightly (39% to 36%). Nevertheless, freight-based industries such as Wholesale Trade are expected to see significant increases in output by 2025.

The local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire in the region to continue to support the manufacturing, wholesale and light industrial sectors in the region, particularly with respect to goods movement needs and also to support the expected growth of the knowledge sector and its needs for reliable commuting and additional modal travel options. There is a strong emphasis from stakeholders to supporting the industrial needs of the areas along the I-95 corridor, particularly in the area of the Port and south toward Meadowville Technology Park. In addition there is a strong desire to maintain and expand the knowledge-based sectors that are key to the region's economy.

This translates into transportation needs such as freight accessibility and passenger reliability on the region's prime corridors, such as I-95, I-295, I-64 and the passenger and freight rail corridors that generally parallel the highways. It also indicates the need for addressing any bottlenecks along these prime corridors to further support reliable travel for both commuters and goods movement. In addition, other key corridors that support activity centers in the region, such as VA 288, US 360 and US 60 are important commuter routes and serve economic growth in Downtown, West Creek, Swift Creek, Midlothian, and emerging activity centers such as Watkins Center.

The forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit exists in the region but has limited service to a number of significant local-based and knowledge-based centers. The expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

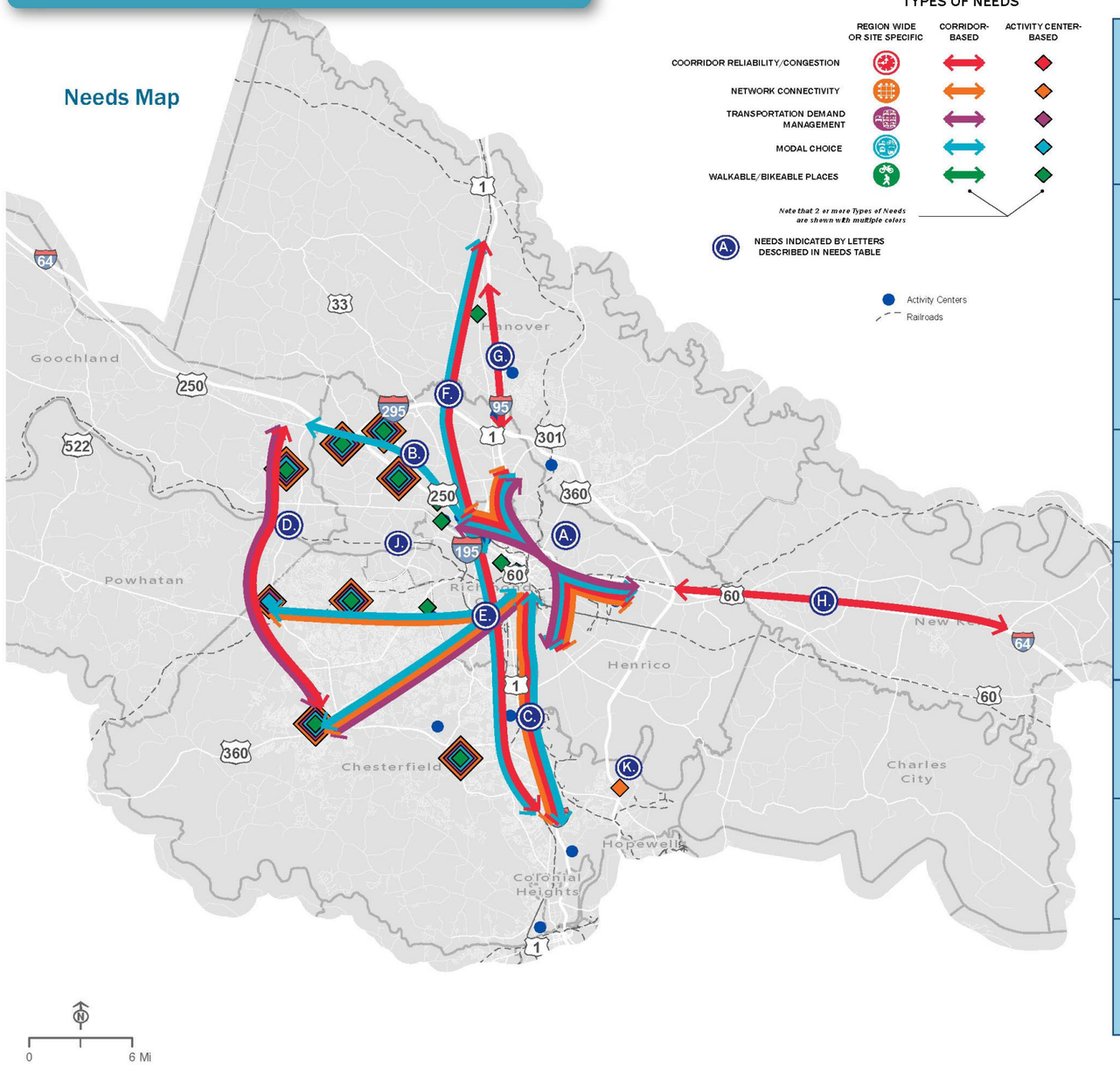
1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 35: Summary Needs Map for the Richmond Region

Richmond Region Needs Summary

Needs Map



Needs Table (Page 1)

A. I-95 & 64 Corridor Reliability

The I-95 & 64 Overlap Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. There is a need for improved access at many older interchanges and more options for commuters such as transit, passenger rail and transportation demand management, to better connect residents with destinations and ease congestion. The issues for this corridor extend to the interchanges at each end, along the I-95 corridor to the James River and along the I-64 corridor to Mechanicsville Turnpike.

B. Downtown Richmond to West End Mode Choice

The regional activity centers along the US 250 and I-64 Corridors from Downtown Richmond to West Creek are key Knowledge Sector employment centers and Local Service centers. Transit access is limited west of Willow Lawn. Extending and improving transit access along the entire corridor would improve transit accessibility for the region substantially.

C. I-95 Southside Connectivity and Mode Choice

Along the I-95 Corridor from the James River Bridge to VA Route 10 are key Freight activity centers such as the Port of Richmond and Meadowville. Numerous factors such as insufficient vertical clearances and older interchange designs limit the accessibility of trucks and other freight modes to some of these centers. Improving the accessibility of freight to these centers will improve goods movement for many business in these centers.

D. VA 288 Corridor Reliability and TDM

VA 288 is a key corridor connecting activity centers such as Innsbrook and West Creek to major workforce residential areas in Chesterfield and serves as an important bypass around the region. There are some key bottlenecks with reliability issues and limited TDM options currently serving this corridor.

E. US 60 & 360 Connectivity and Mode Choice

The US Route 60 and 360 Corridors are important arteries for the movement of commuters and connects a sizeable portion of the regional workforce with key activity centers. These corridors lack transit access west of Chippenham Parkway, they have limited bike access and suffer from limited network connectivity creating bottlenecks as users have no other option to travel between destinations, even locally.

F. North/South Rail Reliability and Connectivity

The North-South CSX Rail Lines through the region are critical freight and passenger corridors for inter-regional movement and suffer from congestion and unreliability. Passenger rail service is not well connected to the region as the main train station for the region is not well connected to regional multimodal options and is distant from major activity centers.

G. I-95 Corridor Reliability

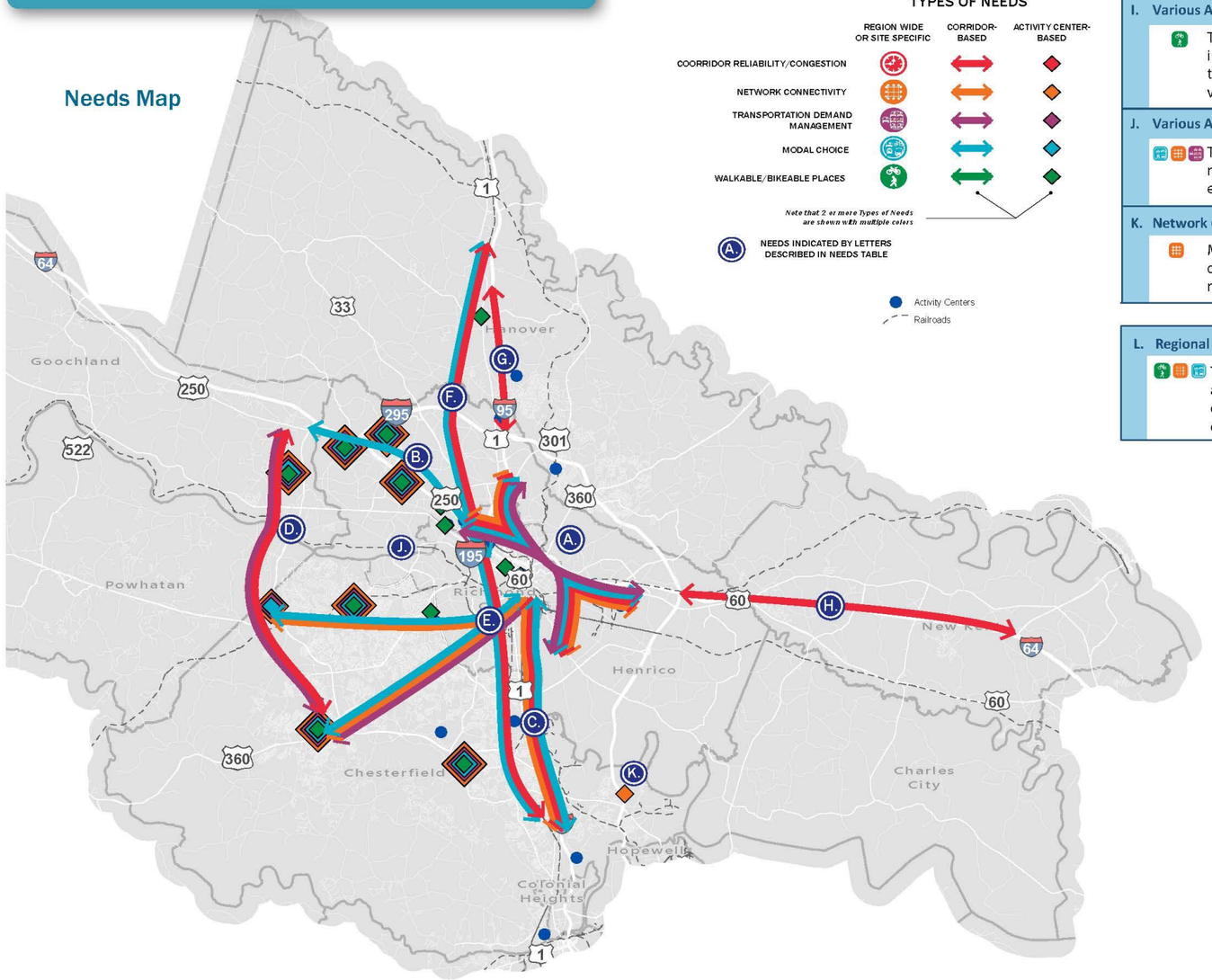
The I-95 corridor north of I-295 is a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. Congestion is very unreliable, particularly in the bottleneck between I-295 and Ashland. The corridor would benefit from operational and capacity improvements to reduce the unreliable travel times.

H. I-64 Corridor Reliability

The I-64 Corridor east of I-295 is a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. Congestion is very unreliable and the corridor would benefit from operational and capacity improvements to reduce the unreliable travel times.

Richmond Region Needs Summary

Needs Map



TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
COORRIDOR RELIABILITY/CONGESTION	●	↔	◆
NETWORK CONNECTIVITY	●	↔	◆
TRANSPORTATION DEMAND MANAGEMENT	●	↔	◆
MODAL CHOICE	●	↔	◆
WALKABLE/BIKEABLE PLACES	●	↔	◆

Note that 2 or more Types of Needs are shown with multiple colors

A. NEEDS INDICATED BY LETTERS DESCRIBED IN NEEDS TABLE

Activity Centers
Railroads

Needs Table (Page 2)

I. Various Activity Centers - Walkable Places

There are multiple activity centers that have limited pedestrian or bicycle facilities or need improved pedestrian or bicycle environments. Walkable and bikeable places improve the appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.

J. Various Activity Centers - TDM, Network Connectivity and Mode Choice

There are multiple activity centers with a knowledge and local service employment focus that need to develop adequate network connectivity, mode choice options and TDM strategies to ensure an efficient transportation system develops as they grow.

K. Network Connectivity and Access for Meadowville

Meadowville Technology Park is expected to be a major office, industrial, warehousing and distribution center and will need to ensure that it has adequate access to both I-95 and I-295 to maintain its economic potential.

L. Regional Need - Modal Choice

To support active transportation, crossings of major barriers such as the James River, Interstates and railroads need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips and sometimes unsurmountable obstacles. One example is that no crossing of the James River has dedicated bicycle lanes.

Figure 36: VMTP Icon Key

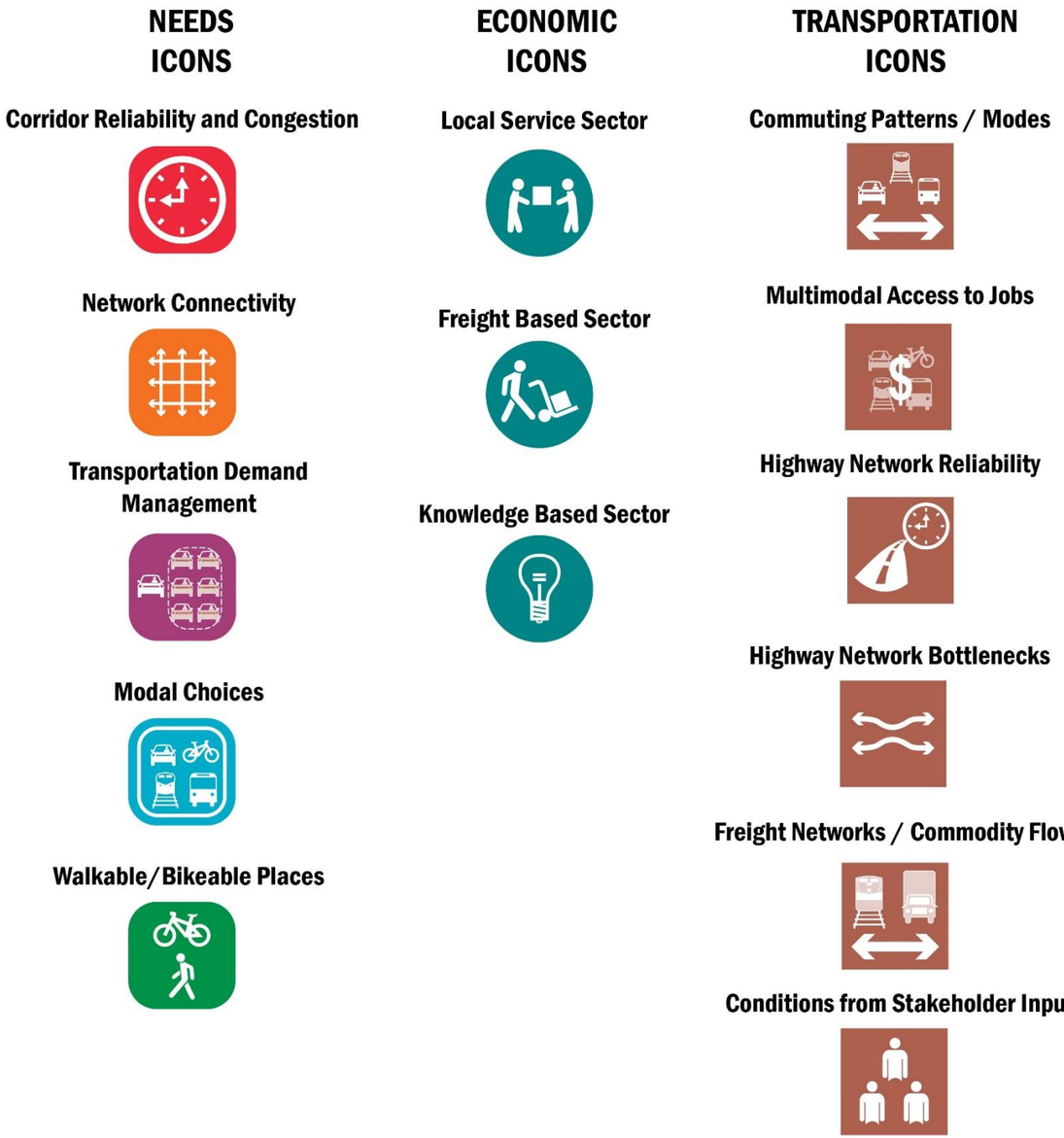


Table 11: Findings of Needs

A. I-95/64 Overlap Corridor Reliability

NEED: **The I-95 & 64 Overlap Corridor serves as a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. There is a need for improved access at many older interchanges and more options for commuters such as transit, passenger rail and transportation demand management, to better connect residents with destinations and ease congestion. The issues for this corridor extend to the interchanges at each end, along the I-95 corridor to the James River and along the I-64 corridor to Mechanicsville Turnpike.**

ECONOMIC: Supports major regional activity centers throughout the region and particularly Downtown Richmond and VCU. The corridor is an essential and high-priority corridor for activity centers of all types throughout the region and supports tourism. Ensuring adequate access to this corridor is essential for Downtown and VCU activity centers.

TRANSPORT.: Bottlenecks and congestion hinder the reliability of the corridor, modal alternatives are limited and older designs limit access to and from this corridor. Parallel facilities (such as US 1, US 250 and US 360) have bottlenecks and limitations that limit the ability to absorb overflow traffic, particularly during traffic incidents.

B. Downtown Richmond to West End Mode Choice

NEED: **The regional activity centers along the US 250 and I-64 Corridors from Downtown Richmond to West Creek are key Knowledge Sector employment centers and Local Service centers. Transit access is limited west of Willow Lawn. Extending and improving transit access along the entire corridor would improve transit accessibility for the region substantially.**

ECONOMIC: Supports major local and knowledge-based regional activity centers including Downtown Richmond, VCU, Innsbrook and West Creek, while enhancing access to local centers such as Willow Lawn.

TRANSPORT.: Existing connections between activity centers are not efficient, involving low speeds and many stops. Transit access west of Willow Lawn is limited and somewhat disconnected from the rest of the regional transit system.

C. I-95 Southside Connectivity and Mode Choice

NEED: **Along the I-95 Corridor from the James River Bridge to VA Route 10 are key Freight activity centers such as the Port of Richmond and Meadowville. Numerous factors such as insufficient vertical clearances and older interchange designs limit the accessibility of trucks and other freight modes to some of these centers. Improving the accessibility of freight to these centers will improve goods movement for many business in these centers.**

ECONOMIC: Connects major freight activity centers for the region and addresses insufficient access issues for multiple modes. The connections are critical to the port and freight movement and to many commuters. Key freight activity centers such as the Port, Meadowville and the UPS/Tranlin area are served by this corridor.

TRANSPORT.: Insufficient vertical clearances and older interchange designs limit the accessibility of trucks and other freight modes in numerous places along this critical corridor including issues with truck access along parallel and connecting primary and secondary routes in the corridor. Parallel facilities (such as US 1) have bottlenecks and limitations that limit the ability to absorb overflow traffic, particularly during traffic incidents.

D. VA 288 Corridor Reliability and TDM

NEED: **VA 288 is a key corridor connecting activity centers such as Innsbrook and West Creek to major workforce residential areas in Chesterfield and serves as an important bypass around the region. There are some key bottlenecks with reliability issues and limited TDM options currently serving this corridor.**

ECONOMIC: Innsbrook and West Creek are key regional Knowledge focused activity centers and some of the largest employment centers in the region and a sizeable portion of their workforce commutes from Chesterfield County via VA 288. Along VA 288 are key local service activity centers serving the surrounding residential populations.

TRANSPORT.: The major issues along this corridor are the bottlenecks at key interchanges and the lack of TDM or other alternative mode choice options which reduces the efficiency of the corridor and the surrounding transportation system.

E. US 60 & 360 Connectivity and Mode Choice

NEED: **The US Route 60 and 360 Corridors are important arteries for the movement of commuters and connect a sizeable portion of the regional workforce with key activity centers. These corridors lack transit access west of Chippenham Parkway, they have limited bike access and suffer from limited network connectivity creating bottlenecks as users have no other option to travel between destinations, even locally.**

ECONOMIC: These corridors connect key workforce residential locations with key knowledge and local service activity centers. Providing more modal options and improving the efficiency and quality of these corridors is critical to attracting and retaining the regional workforce.

TRANSPORT.: These corridors do not suffer significant reliability problems but they do have localized bottlenecks due to the lack of continuous parallel roadway network options. These corridors also have limited transit service.

F. North/South Rail Reliability and Connectivity

NEED: **The North-South CSX Rail Lines through the region are critical freight and passenger corridors for inter-regional movement and suffer from congestion and unreliability. Passenger rail service is not well connected to the region as the main train station for the region is not well connected to regional multimodal options and is distant from major activity centers.**

ECONOMIC: Reliable freight movement along this corridor is critical to certain freight industries in the region. High-quality and reliable inter-city passenger service is critical to knowledge sector industries in the region.

TRANSPORT.: The CSX line from Richmond to DC is identified as a key chokepoint in the freight and passenger rail system in the Virginia Statewide Multimodal Freight Study due to the heavy train traffic and limited capacity.

G. I-95 Corridor Reliability

NEED: **The I-95 corridor north of I-295 is a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. Congestion is very unreliable, particularly in the bottleneck between I-295 and Ashland. The corridor would benefit from operational and capacity improvements to reduce the unreliable travel times.**

ECONOMIC: The I-95 corridor connects Richmond to critical markets to the northeast and therefore is a key connecting for freight and knowledge industries. It is also a significant commuter corridor for workforce coming from Hanover County and Ashland and is a major access corridor to reach Virginia Center Commons, Hanover Airport and Ashland activity centers. Highway access is essential for all three, but is particularly critical for freight focused activity centers like Hanover Airport.

TRANSPORT.: The I-95 Corridor in this area has a key bottleneck at the I-295 interchange due to weaving from the adjacent interchange at VA 656 and suffers from significant reliability issues, particularly on weekends. Parallel facilities (such as US 1 and US 301) have bottlenecks and limitations that limit the ability to absorb overflow traffic, particularly during traffic incidents.

H. I-64 Corridor Reliability

NEED: **The I-64 Corridor east of I-295 is a major artery for the region, handling commuter and freight traffic as well as connecting the region to other parts of Virginia. Congestion is very unreliable and the corridor would benefit from operational and capacity improvements to reduce the unreliable travel times.**

ECONOMIC: The I-64 corridor a key connection for freight industries in the region as it is the most direct route to the Port of Virginia.

TRANSPORT.: The I-64 corridor in this area suffers from significant reliability issues, particularly on weekends. Parallel facilities (such US 60) have bottlenecks and limitations that limit the ability to absorb overflow traffic, particularly during traffic incidents.

I. Various Activity Centers - Bikeable/Walkable Places

NEED	**There are multiple activity centers that have limited pedestrian or bicycle facilities or need improved pedestrian or bicycle environments. Walkable and bikeable places improve the appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.**
ECONOMIC	Knowledge and local serving centers compete for the workforce segment that prioritizes walk and bike commutes and amenities.
TRANSPORT.	In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need affects the mobility of non-drivers who desire access to these areas.

J. Various Activity Centers - TDM, Network Connectivity and Mode Choice

NEED	**There are multiple activity centers with a knowledge and local service employment focus that need to develop adequate network connectivity, mode choice options and TDM strategies to ensure an efficient transportation system develops as they grow.**
ECONOMIC	Fast growing knowledge and local serving centers need to prioritize adquate network connectivity, mode choice options and TDM strategies to compete for a quality workforce and maintain good access to the region's workforce.
TRANSPORT.	This need will help maintain the effeciency of the transportation system as these activity centers grow and expand.

K. Network Connectivity and Access for Meadowville

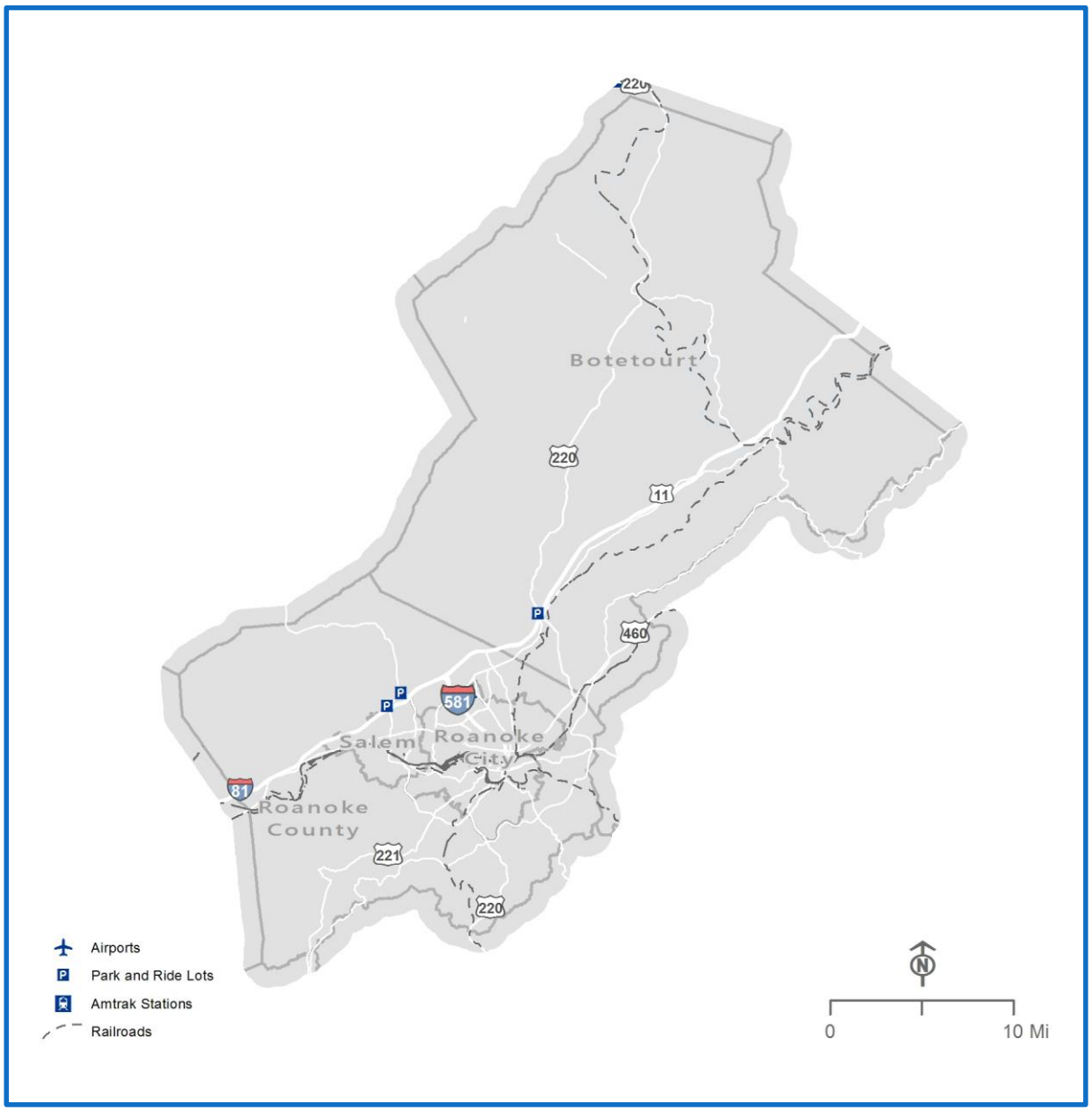
NEED	**Meadowville Technology Park is expected to be a major office, industrial, warehousing and distribution center and will need to ensure that it has adequate access to both I-95 and I-295 to maintain its economic potential.**
ECONOMIC	Meadowville Technology Park is expected to be a major office, industrial, warehousing and distribution center and needs adequate highway access to maintain adequate goods movement and workforce access.
TRANSPORT.	This need will help maintain the effeciency of the transportation system and access to this key activity center as this activity centers grows and expands.

L. Regional Need - Modal Choice

NEED	**To support active transportation, crossings of major barriers such as the James River, Interstates and railroads need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips and sometimes unsurmountable obstacles. One example is that no crossing of the James River has dedicated bicycle lanes.**
ECONOMIC	All activity centers with employees seeking a bicycle commute may be affected by this need. Knowledge and local serving centers appear the most likely to be affected, as they compete for the workforce segment that prioritizes walk and bike commutes and amenities.
TRANSPORT.	In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need particularly affects the mobility of non-drivers in the region. It also affects recreational walking and bicycling in the region.

VMTP 2025 Needs Assessment

Regional Needs Profile



Roanoke Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Hampton Roads Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Roanoke Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Roanoke Regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

The Roanoke Region, as defined in the needs analysis, includes Botetourt County, Roanoke County, the City of Roanoke, and the City of Salem.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from the Roanoke Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to Woods & Poole, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million people. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, substantial population growth is projected for the Roanoke Region. Projections range from 25,000 to 40,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Roanoke Region Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
332,119	356,341	369,958

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Roanoke Region.

Table 3: County and City Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
Botetourt County	33,154	33,154
Roanoke County	92,901	92,901
City of Roanoke	97,469	97,469
City of Salem	24,970	24,970

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

According to the Woods and & Poole 2014 State Profile, per-capita income for the region is expected to rise 19% (slightly less than the state average of 21%) from $37,474 to $44,490. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

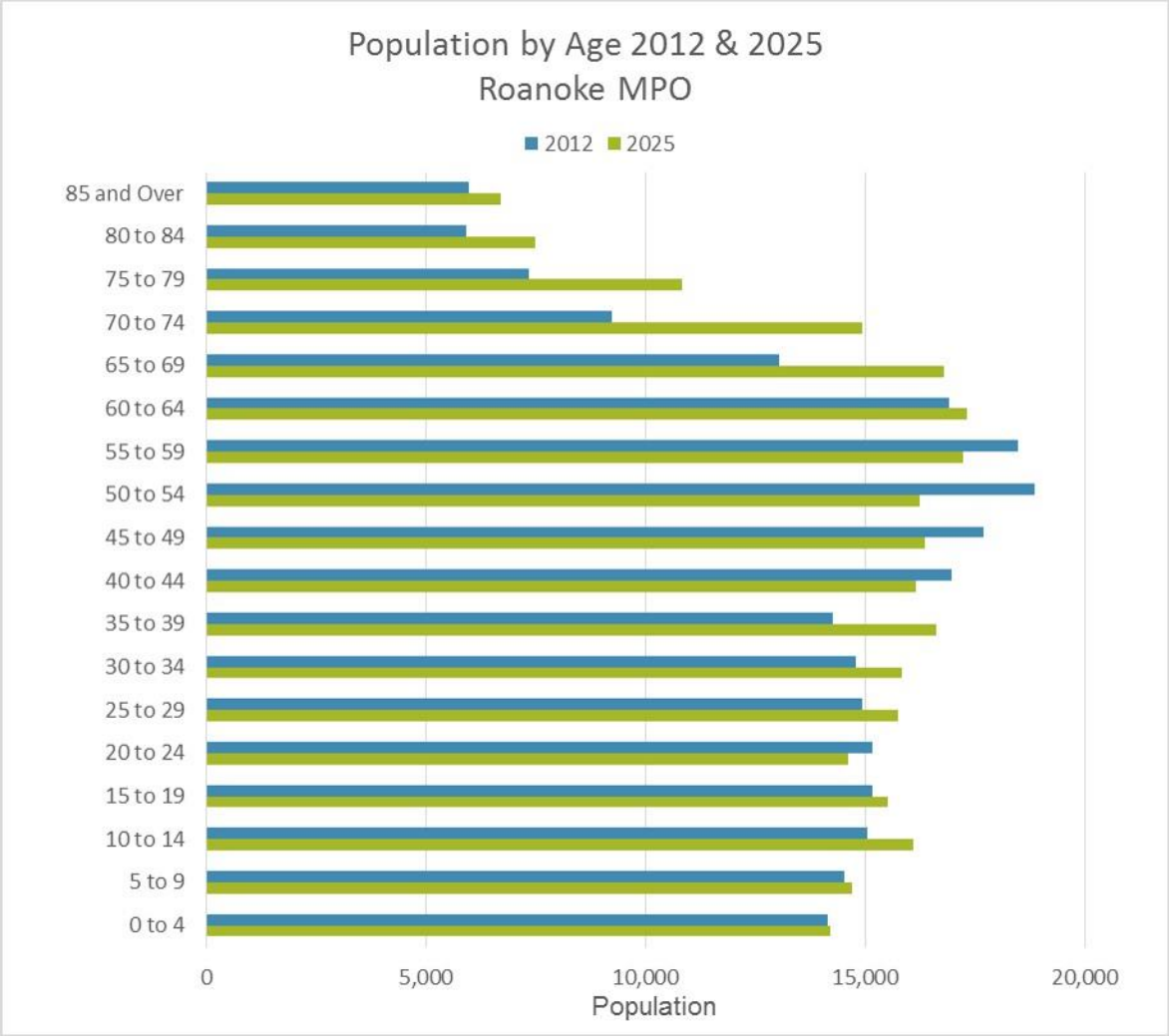


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Roanoke Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with

greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Roanoke Region, Figure 2 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

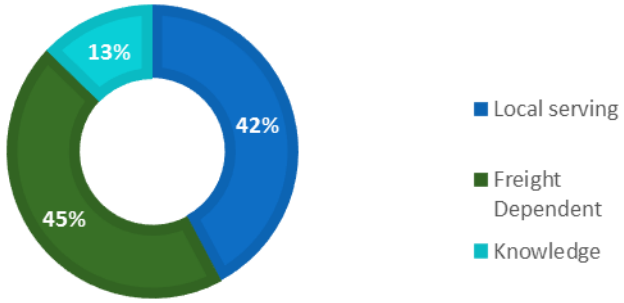


Figure 2: Top Sectors by Output (2012).
Source: IHS Global Insight, 2012.

The freight sector is the strongest in the Roanoke Region, making up 45% of the economic output, with the local serving sector close behind with 42% of the overall economic output. These industry clusters can have a less traditional commute pattern, where freight dependent industries are heavily reliant on goods movement and the local services economic cluster is typically characterized by off-peak commute times; customer traffic; trip-chaining destinations; and truck deliveries. The knowledge sector, which often relies heavily on traditional commuter access during peak travel periods, accounts for only 13% of the economic output for the region.

Top Industries by Output

Wholesale Trade is the strongest industry in the Roanoke Region with 18% of the economic output. Retail trade and manufacturing follow closely behind with 15% and 13% of economic output respectively. These three industry sectors account for slightly less than half of the economic output for the region. This suggests that goods movement is of critical importance to the region. Public administration, and transportation and warehousing round out the top five industries in the region with the greatest economic output. (Refer to Table 4).

Table 4: Current Industries by Output.

Top Industries	NAICS Code	% of Output
Wholesale Trade	42	18%
Retail Trade	44-45	15%
Manufacturing	31-33	13%
Public Administration	92	9%
Transportation and Warehousing	48-49	7%

Source: IHS Global Insight Data, 2012

Top Industries by Employment

Many of the top output industries listed above typically include high value goods, but are not employee intense operations. Conversely, Health Care and Social Assistance, Public Administration, Accommodation and Food Services, and in some cases Retail Trade, are employee intense industries. These industries, in addition to Manufacturing, make up the top five industries by employment in the Roanoke Region, and account for over 50% of the employment in the region. (Refer to Table 5).

Table 5: Current Top Industries by Employment.

Top Industries	NAICS Code	% of Workforce
Health Care and Social Assistance	62	14%
Public Administration	92	13%
Retail Trade	44-45	12%
Manufacturing	31-33	9%
Accommodation and Food Services	72	8%

Source: IHS Global Insight Data, 2012

The top employers in the region have significant overlap with the top industries by both output and employment referenced above. The top employers listed in the table below include companies involved in health care, retail and wholesale trade, manufacturing, and food services. However, companies such as Wells Fargo Bank and Allstate Insurance Company are included in the knowledge based sector, which is a limited portion of the economic output for Roanoke. As a result, these companies could be considered the backbone of the knowledge based sector in Roanoke.

Table 6: Current Top Employers.

Employers	Employees
Carilion Health System	10,000+
Kroger	1,000 - 2,999
Wells Fargo Bank	1,000 – 2,999
Advanced Auto	1,000 – 2,999
MeadWestvaco	1,000 – 2,999
Ply Gem Windows	1,000 – 2,999
HCA Virginia Health System	1,000 – 2,999
Norfolk Southern	1,000 – 2,999
Allstate Insurance Company	1,000 – 2,999

Sources: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Roanoke Region. The industries expressed in Table 4 have the highest LQ scores in the region. The score for management of companies and enterprises, for example, can be inferred to mean that these services are more than five times more concentrated in the region than in the entire nation, on average.

Table 7: Current Top Industries by Location Quotient.

Top Industries	NAICS Code	Location Quotient
Management of Companies and Enterprises	55	5.22
Transportation and Warehousing	48-49	1.56
Other Services, except Public Administration	81	1.33
Professional Services	54	1.31

Source: IHS Global Insight Data, 2012

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles.

The activity centers in the Roanoke Region were established in a three step process. First, in a previous effort, the Roanoke MPO established Multimodal Centers for the region. Following the Multimodal Design Guidelines, as produced by the Department of Rail and Public Transportation, Roanoke MPO staff identified multimodal centers based on the activity density – residential and employment density per acre – throughout the region. These centers were further refined through stakeholder outreach lead by MPO staff. Second, the Study Team conducted a GIS-based spatial analysis comparing the existing multimodal centers to the relative density of jobs in the region. This comparison confirmed the multimodal centers as appropriate activity centers for the VMTP needs analysis. Lastly, step three, included revision, refinement and amendment to these activity centers through an OIPI consultant led outreach effort with Roanoke MPO staff and regional stakeholders. Figure 3 below shows the activity centers as blue circles.

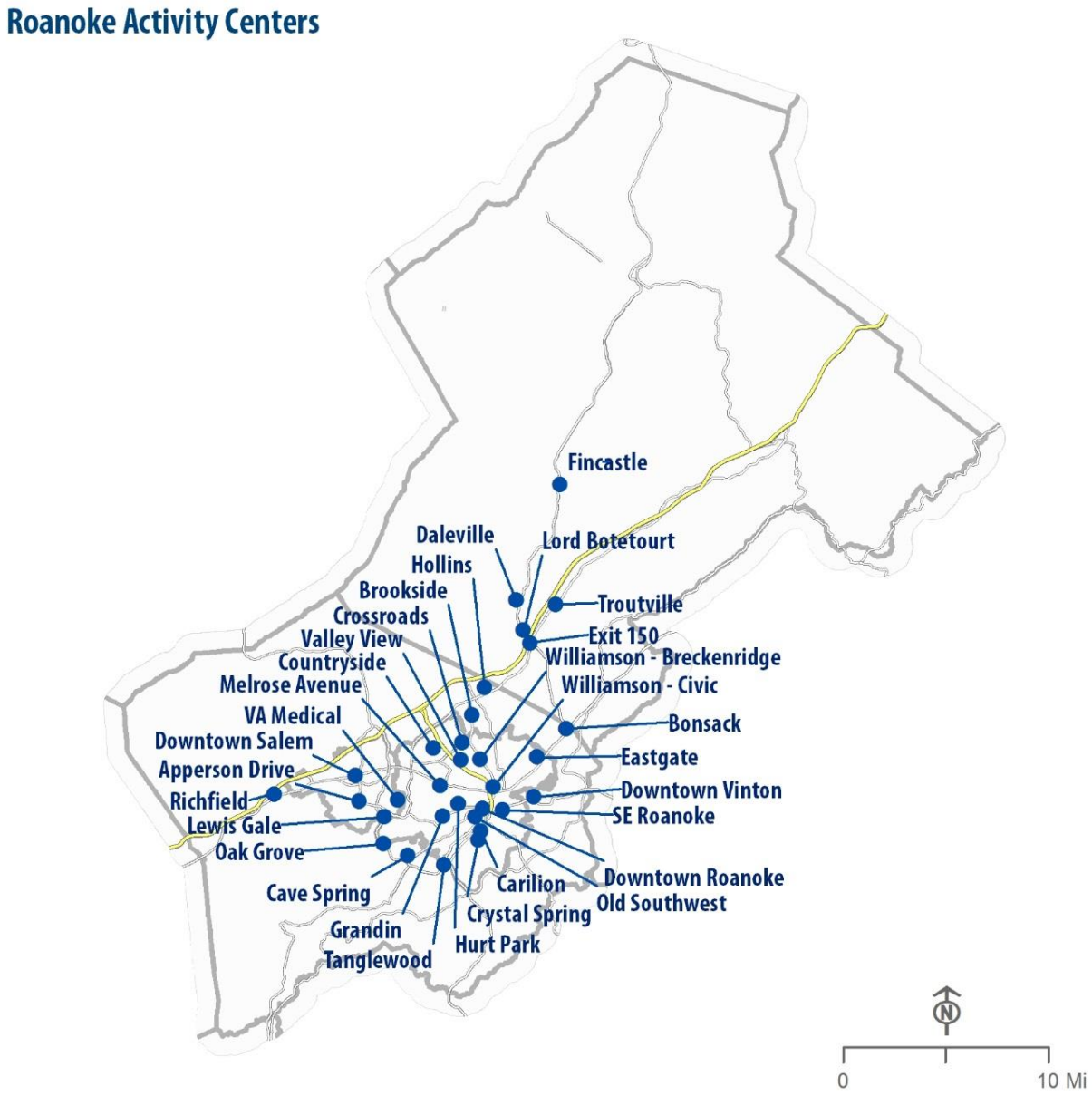


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 4 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

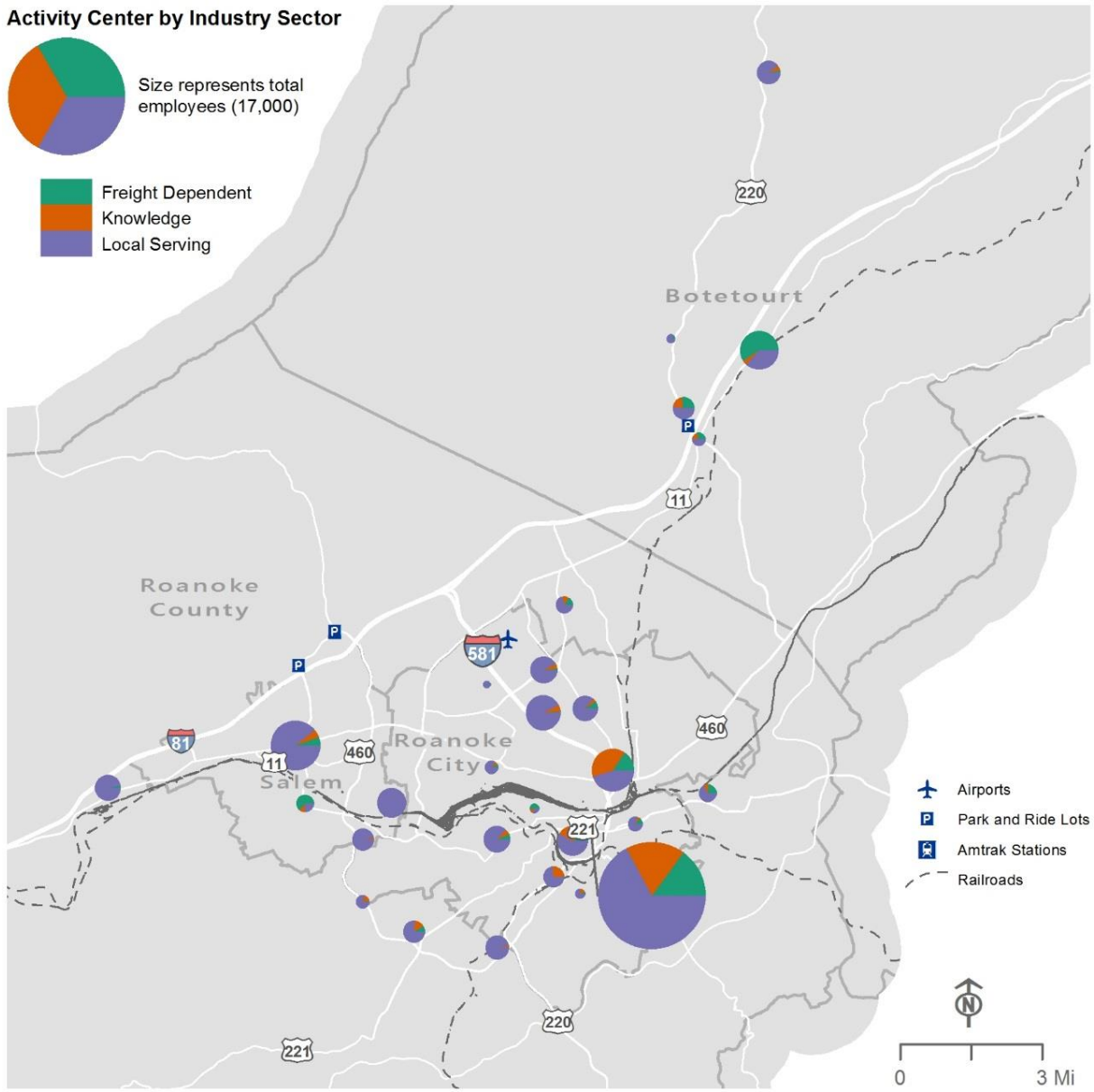


Figure 4: Activity Center Employment by Industry Sector.
Source: IHS Global Insight Data, 2012

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Roanoke Region's stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose the Roanoke Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Roanoke Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Modest growth is forecasted for the Roanoke Region area by 2025. According to statewide and national datasets used, the transportation and warehousing and wholesale trade industries will see the largest growth. Combined, they are expected to produce $2.5 billion more in 2025 than was produced in 2012.

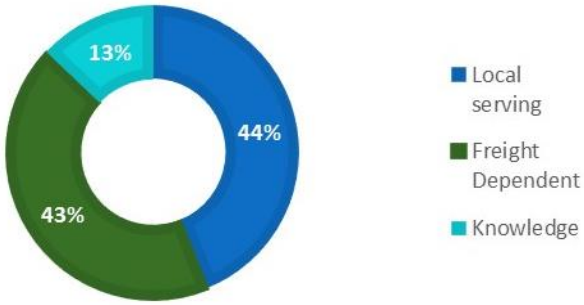


Figure 5: 2025 Industry Sectors by Output.
Source: IHS Global Insight Data, 2012

In 2025, the local services sector will become the largest share of economic output in this region. Local services is estimated to make up 44% of the economic output in the Roanoke Region in 2025. The knowledge and freight-dependent sectors will account for 13% and 43% of economic output, respectively.

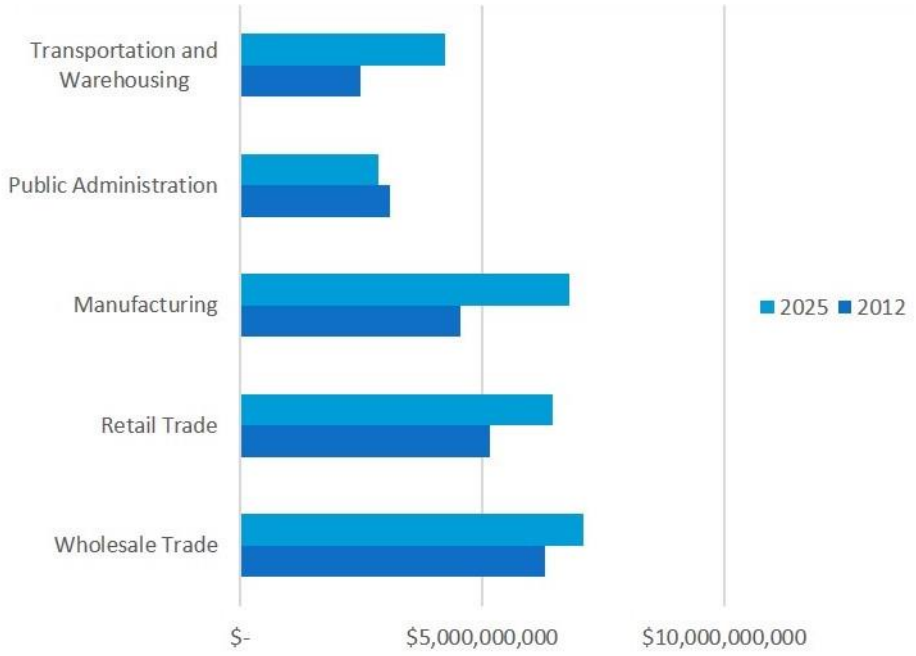


Figure 6: Top Industries by Output
Source: IHS Global Insight Data, 2012

All the top industries by output in the Roanoke Region are expected to grow by 2025, with the exception of public administration. In all industries combined, economic output in the Roanoke Region is expected to increase by $9.7 billion by 2025. (Refer to Figure 6).

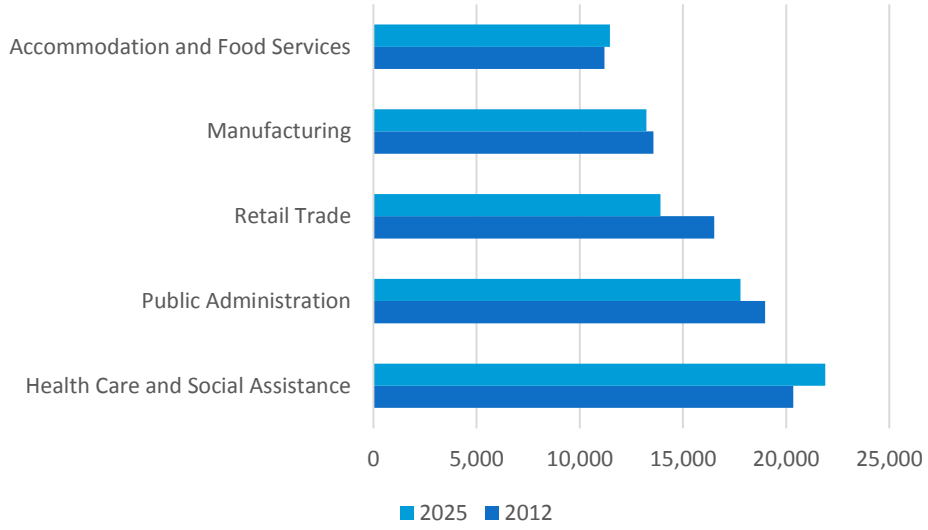


Figure 7: Top Industries by Employment.
Source: IHS Global Insight Data, 2012

The 2025 outlook of the largest employment industries varies. Some industries, such as public administration, retail trade, and manufacturing, are expected to decline in employment by 2025. Conversely, industries such as accommodation and food service and health care and social assistance

will grow in employment. The mining industry anticipated to grow the most in employment by 2025, by 61%. Other major growth industries include corporate management, educational services, retail trade, and finance and insurance. (Refer to Table 8).

Table 8: Top Industries by Employment.

Top Industries	NAICS Code	Location Quotient
Mining	21	61%
Corporate Management	55	33%
Educational Services	61	16%
Retail Trade	44-45	16%
Finance and Insurance	52	12%

Source: IHS Global Insight Data, 2012

The balance of industry types, both in output and employment, remains somewhat constant for the Roanoke Region with the local serving and freight dependent sectors dominating the economic landscape. These industry clusters can have a less traditional commute pattern, where freight dependent industries are heavily reliant on goods movement and the local services economic cluster is typically characterized by off-peak commute times; customer traffic; trip-chaining destinations; and truck deliveries. Therefore, improving transportation choices and options in the region will be key in serving economic sectors that have such varying needs.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Roanoke Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Roanoke Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Roanoke Region show that the City of Roanoke is the destination for workers not only within the Roanoke Region, but for workers in surrounding regions as well. As represented in Figure 8, almost two-third of workers in the City of Roanoke both live and work within the City. The City of Roanoke is a large draw for residents of the other jurisdictions in the Roanoke Region and for residents outside the region as well.

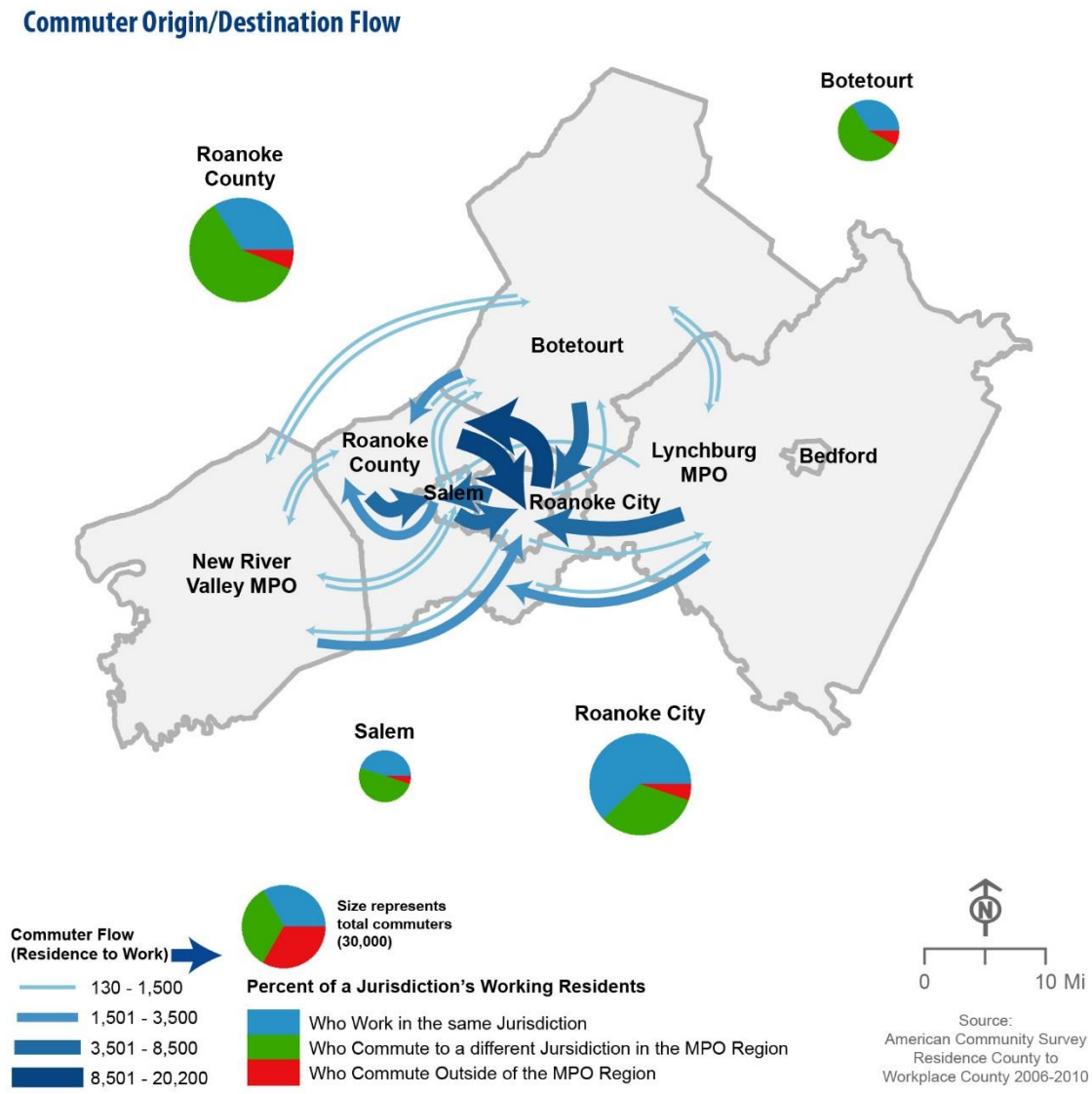


Figure 8: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Roanoke Region was the analysis of commuting patterns between activity centers. Figures 9 through 15 below provide insights into the commuting patterns for nine of the activity centers in the Roanoke Region. These nine activity centers were chosen to represent the various characteristics of the region, including multiple activity centers in each of the four jurisdictions. The maps indicate, by Census block group, the origin of workers for each activity center. Block groups are symbolized on a color scale from dark blue to yellow, with the darker shades of blue representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, Troutville sees a significant number of commuters from block groups immediately adjacent to the activity center. Other areas or worker origin include areas of the City of Roanoke, and most of the block groups in Botetourt County. (Refer to Figure 9).

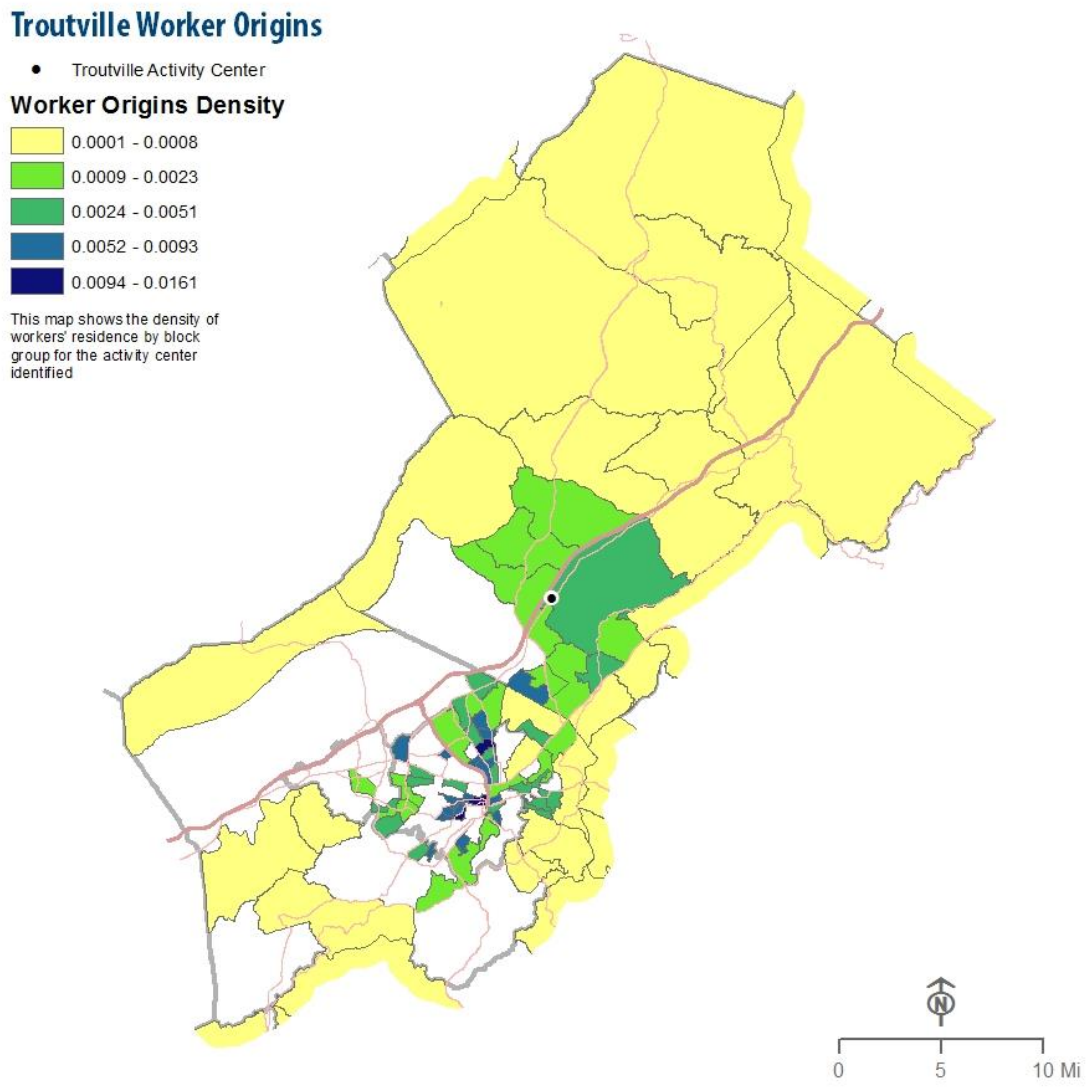


Figure 9: Commuting Patterns to Troutville District Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Downtown Roanoke activity center is a major destination for workers in the Roanoke Region, with commutes originating from every block group in the region. However, a majority of workers origin in the urban core of the region. (Refer to Figure 10).

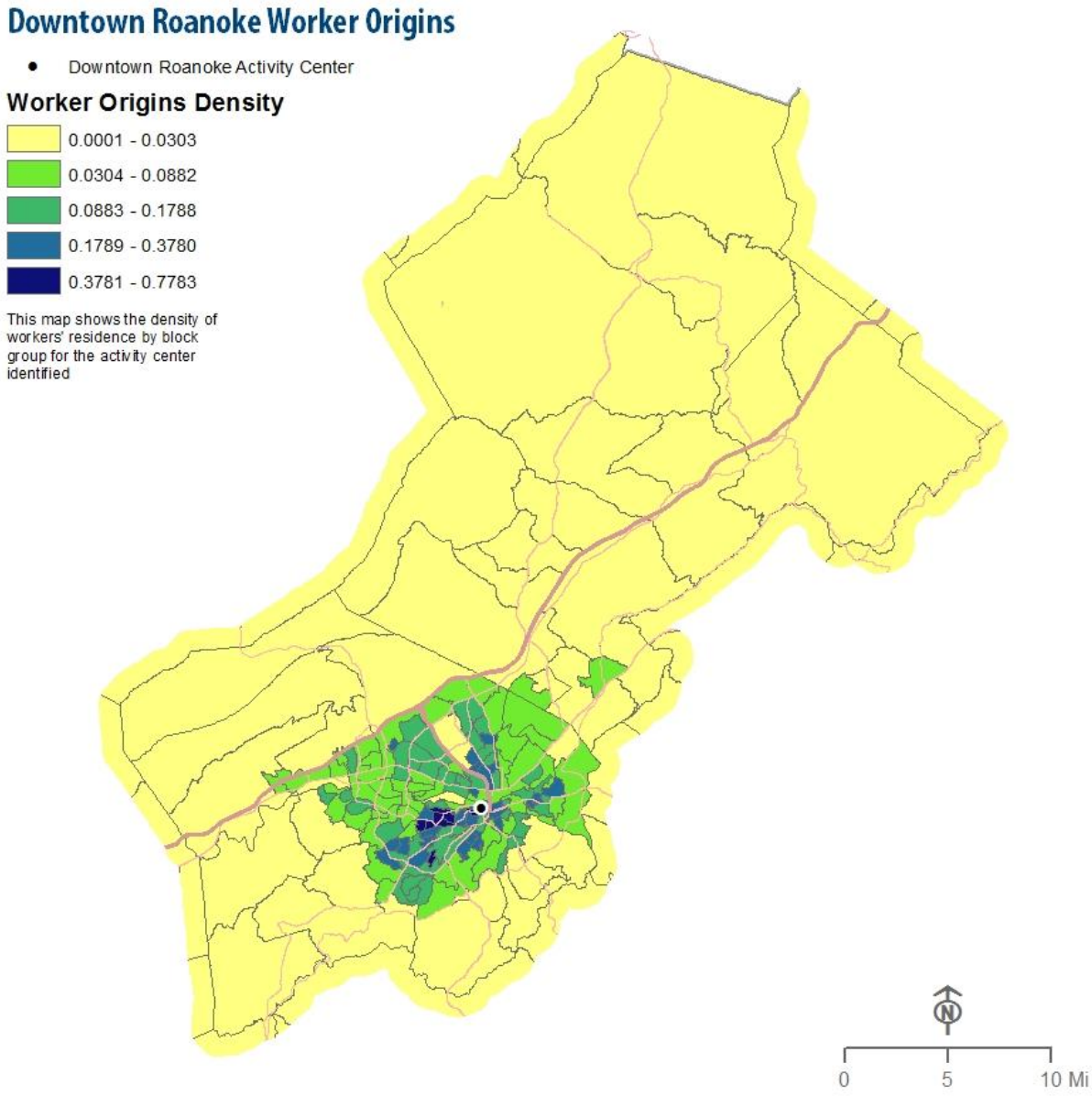


Figure 10: Commuting Patterns to Downtown Roanoke Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Downtown Salem activity center also attracts workers from nearly every corner of the region. The highest levels of commuting are adjacent areas in the Cities of Salem and Roanoke, but low levels from further out towards Roanoke and Botetourt Counties. (Refer to Figure 11).

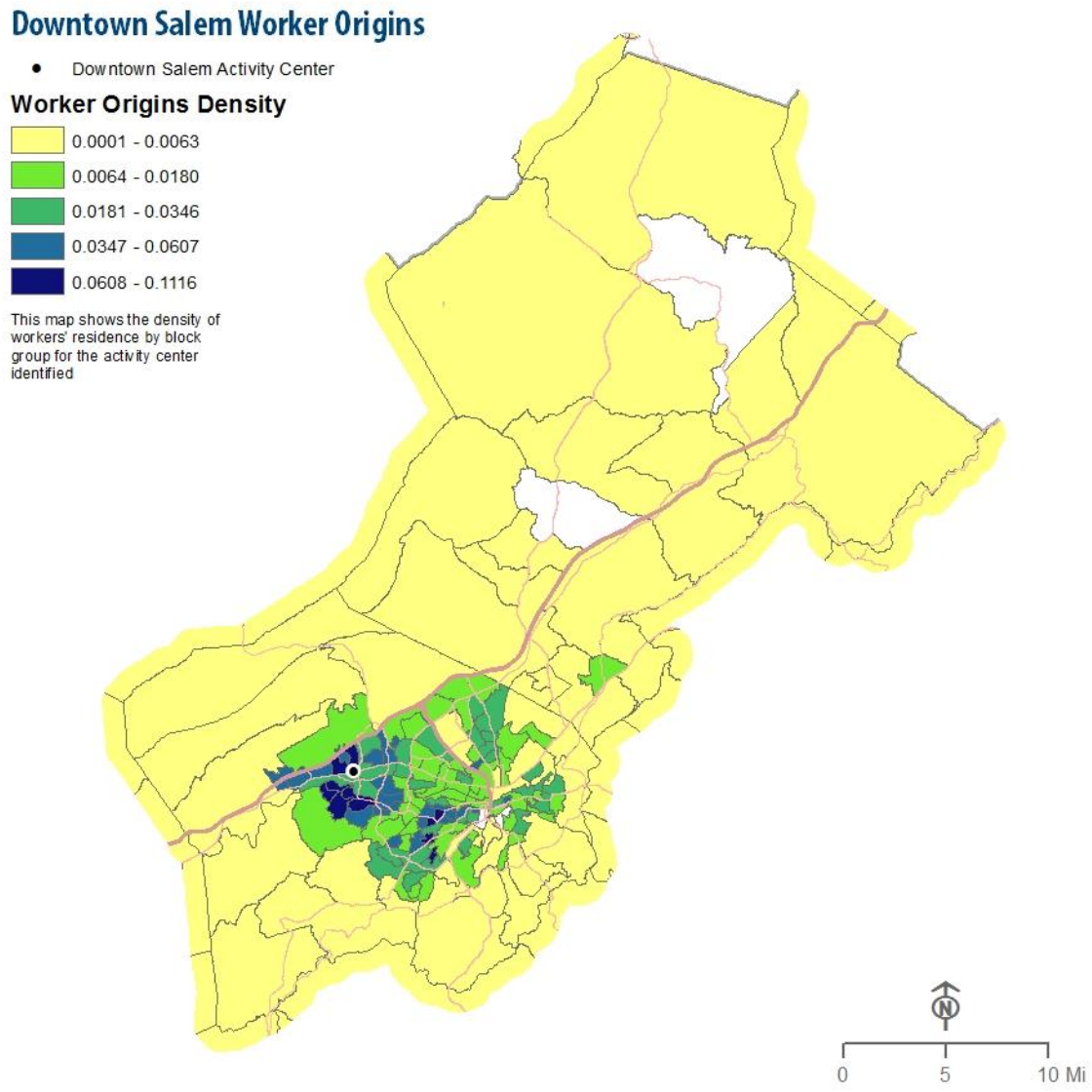


Figure 11: Commuting Patterns to Downtown Salem Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The VA Medical Center is a major destination for workers in the region. Workers are commuting from all block groups in Botetourt and Roanoke Counties and almost all block groups in the Cities of Roanoke and Salem.

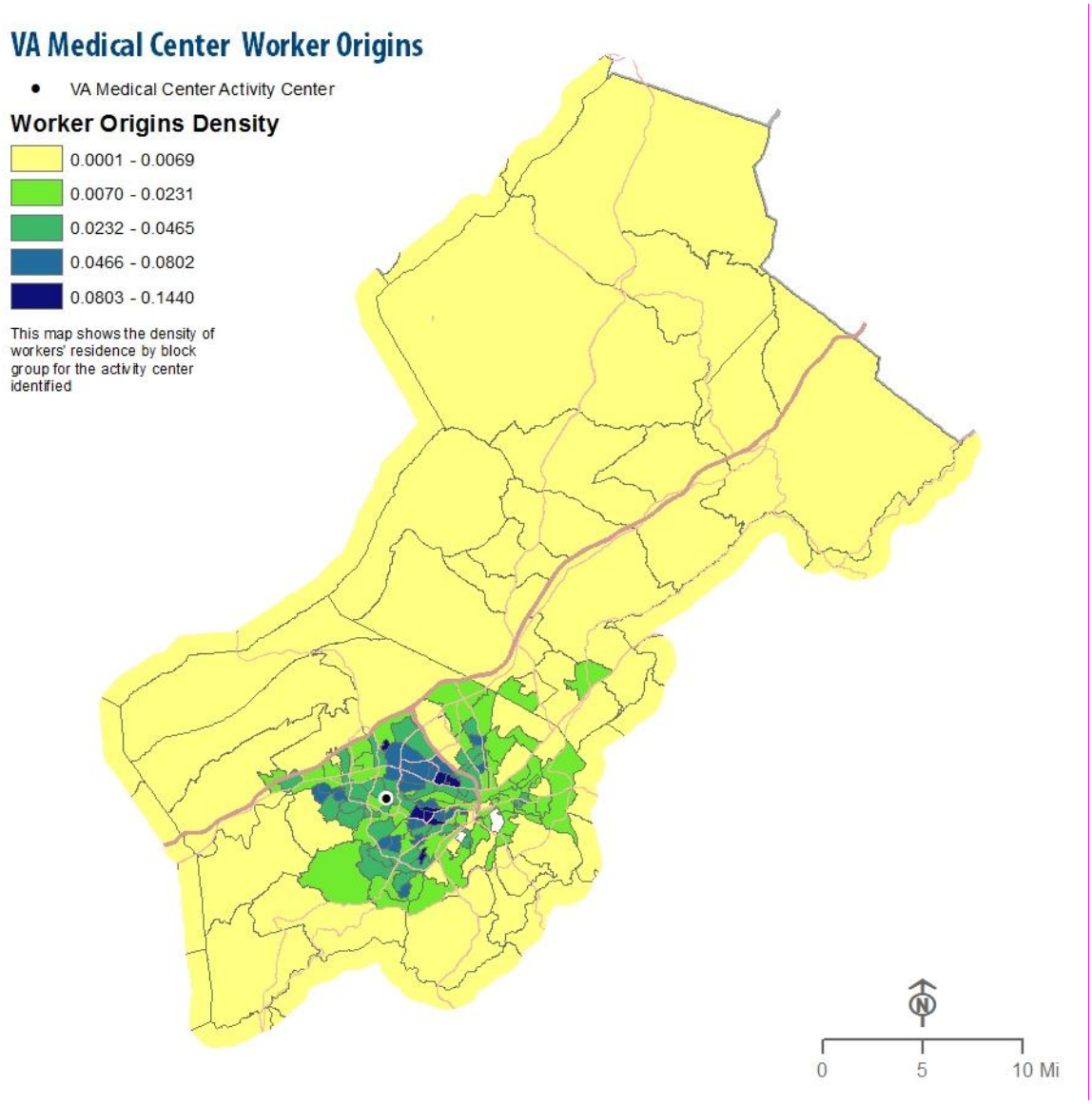


Figure 12: Commuting Patterns to the VA Medical Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Tanglewood activity center attracts workers from fewer origin block groups. Most commutes originate in the City of Roanoke, with a fewer number of commutes originating in the City of Salem and Roanoke County. The fewest number of commutes originate in Botetourt County.

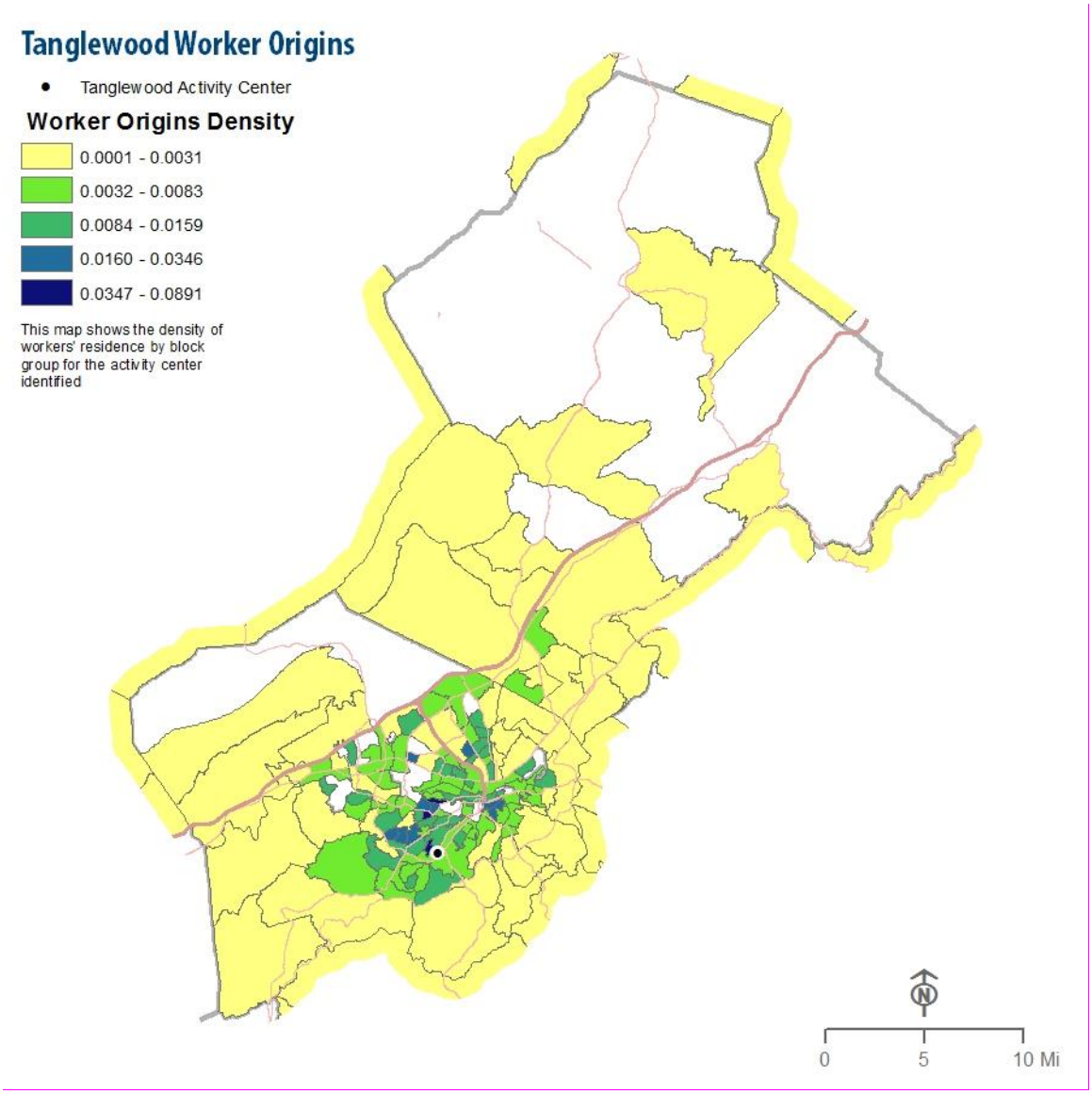


Figure 13: Commuting Patterns to Tanglewood Activity Center
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes to the Valley View activity center originate in every jurisdiction in the region, however most commutes originate in the City of Roanoke.

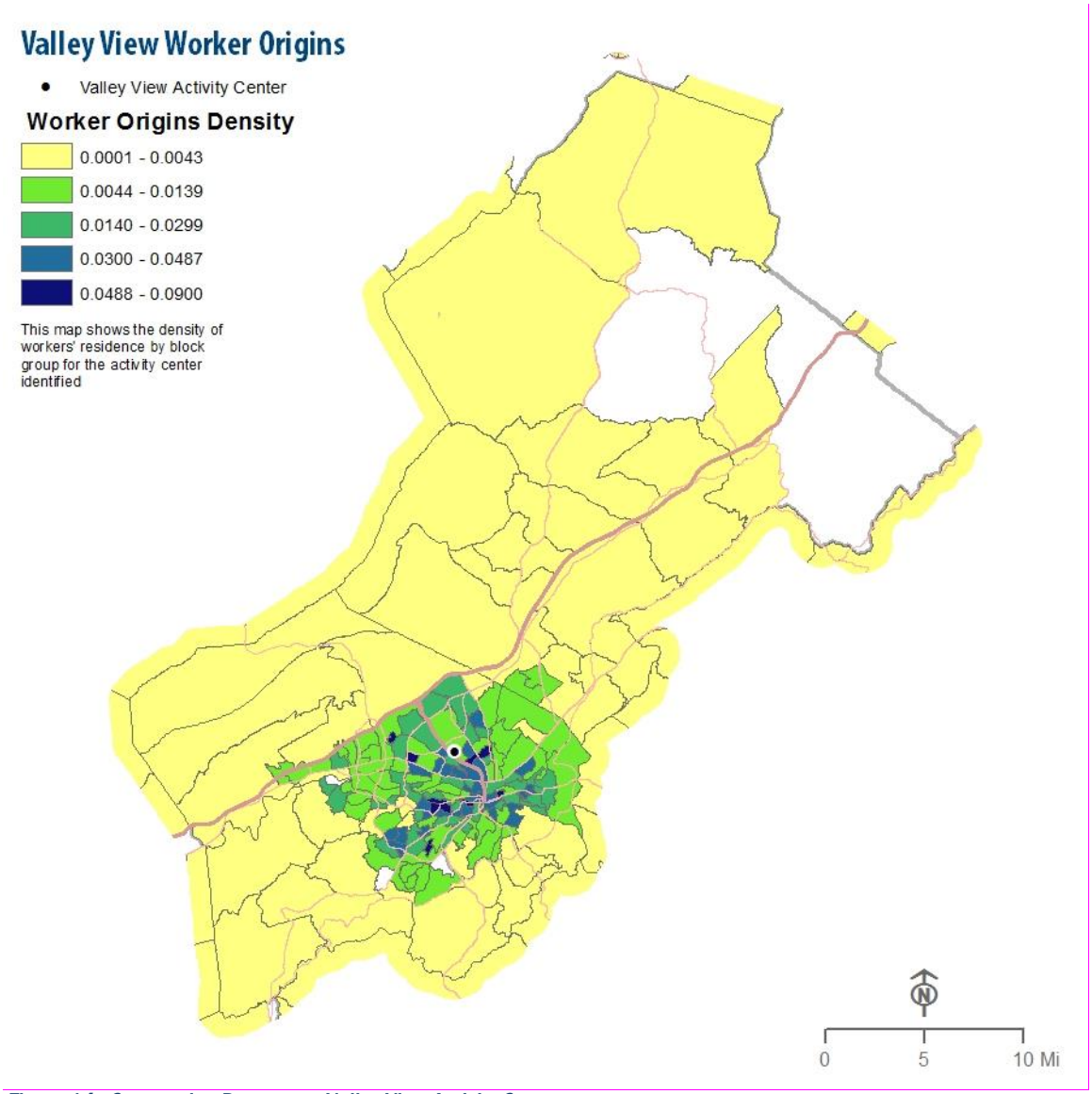


Figure 14: Commuting Patterns to Valley View Activity Center
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Richfield activity center is a more modest draw in regards to worker origins, and there are fewer commutes originating in Botetourt County, the City of Roanoke, and Roanoke County. Most commutes originate in the City of Salem.

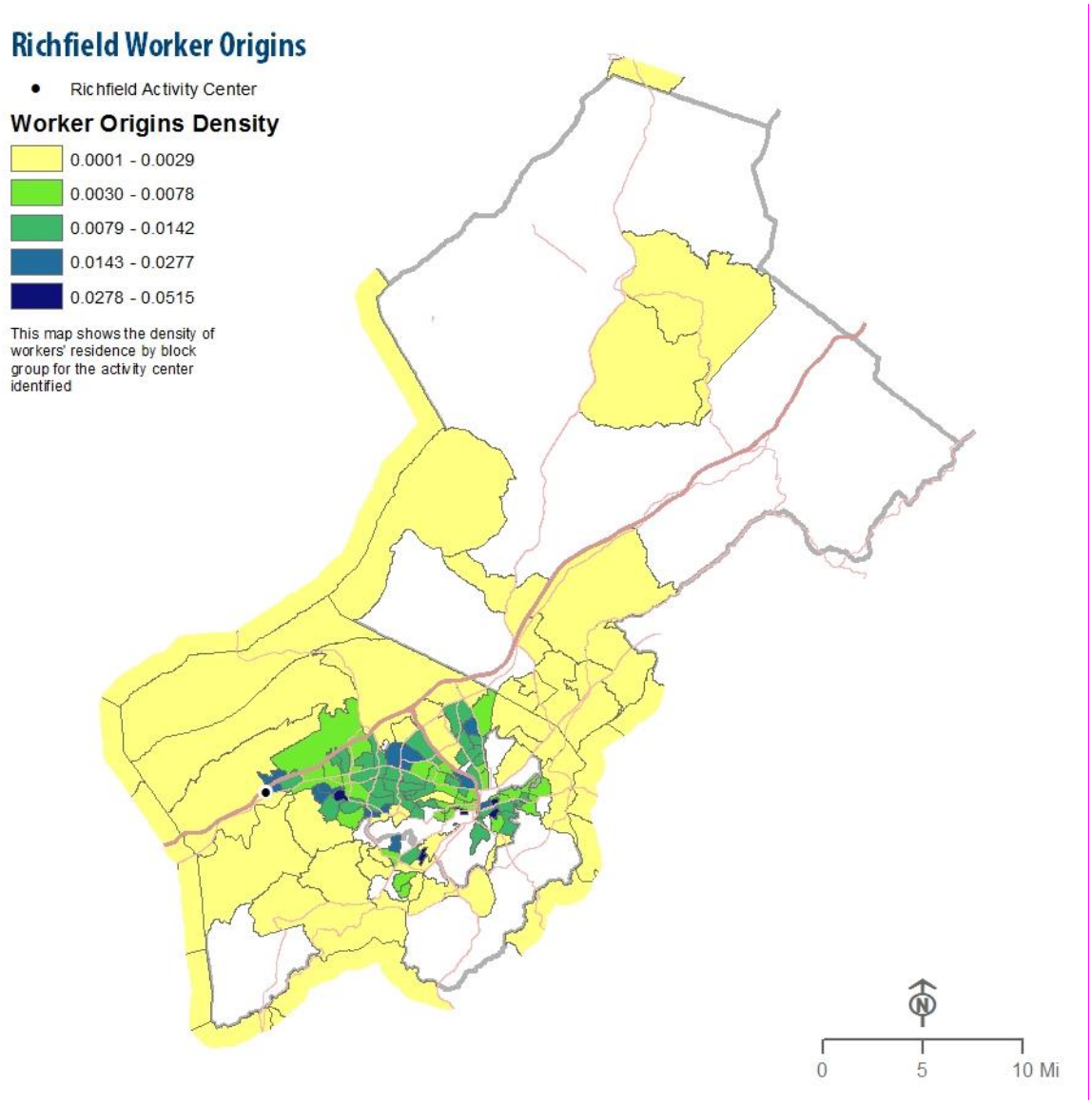


Figure 15: Commuting to Richfield Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Roanoke Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, single occupancy vehicles are used for commuting over 80% of the time. For all jurisdictions, carpooling is the second most prevalent option, accounting for 6% to 9% of the mode share. Public transit use is highest in the City of Roanoke, which has the most robust transit system in the region. (Refer to Figure 16).

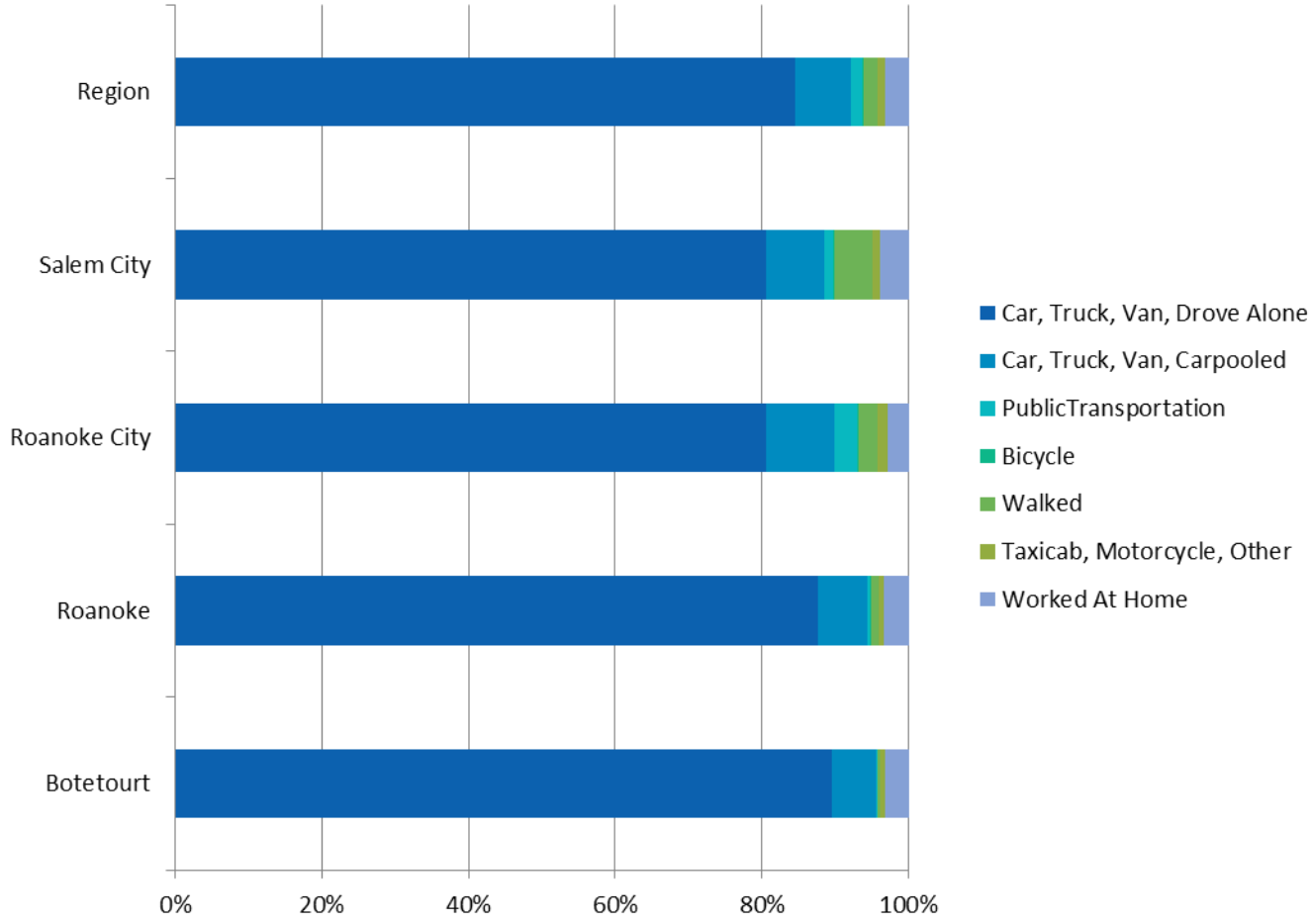


Figure 16: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

Average Commute Times

In the Roanoke Region, average commute times range from 19 to 28 minutes among the various jurisdictions. (Refer to Table 9). Due to their density and proximity to employment centers, the Cities of Roanoke and Salem have the shortest average commute, while more rural areas, like Botetourt County have longer commutes on average.

Table 9: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
Botetourt County	27.6
Roanoke County	21.8
City of Roanoke	19.9
City of Salem	19.0

Source: ACS 2013 5-Year Estimates

Commutes over 45 minutes in duration are relatively rare in the Roanoke Region. Botetourt County has the highest percentage of workers who commute over 45 minutes at nearly 10%, this is almost twice as high as the regional average of just under 6%. (Refer to Figure 17).

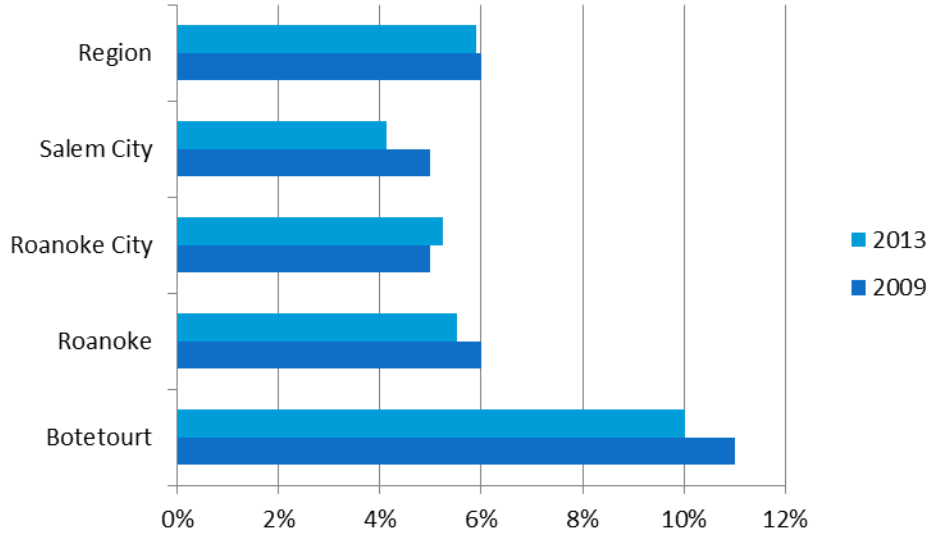


Figure 17: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

Figure 18 provides a closer look at where longer commutes originate. In much of the Cities of Roanoke and Salem, commute times are well below average for the region as a whole. Block groups on the fringes of the region, and in rural areas of Roanoke and Botetourt Counties have commute times that are greater than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

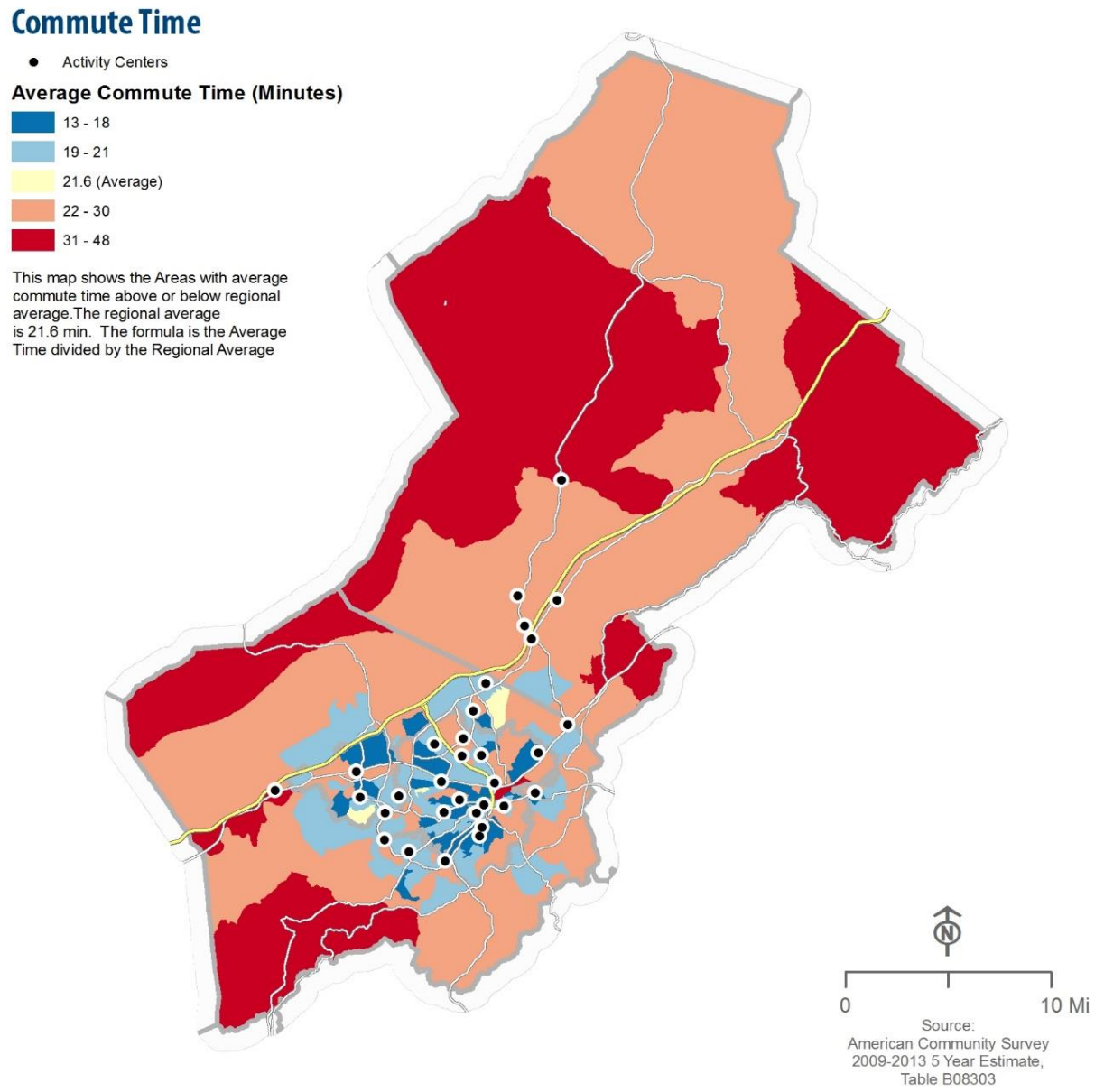


Figure 18: Roanoke Region Commute Times.
Source: ACS 2013 5-Year Estimates

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The accessibility to employment measure was calculated using an accessibility model developed by the consultant team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

Auto Accessibility

Auto Accessibility in the Roanoke Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility exist in and around the Cities of Roanoke and Salem, and near the outskirts of Lynchburg in the east. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 19).

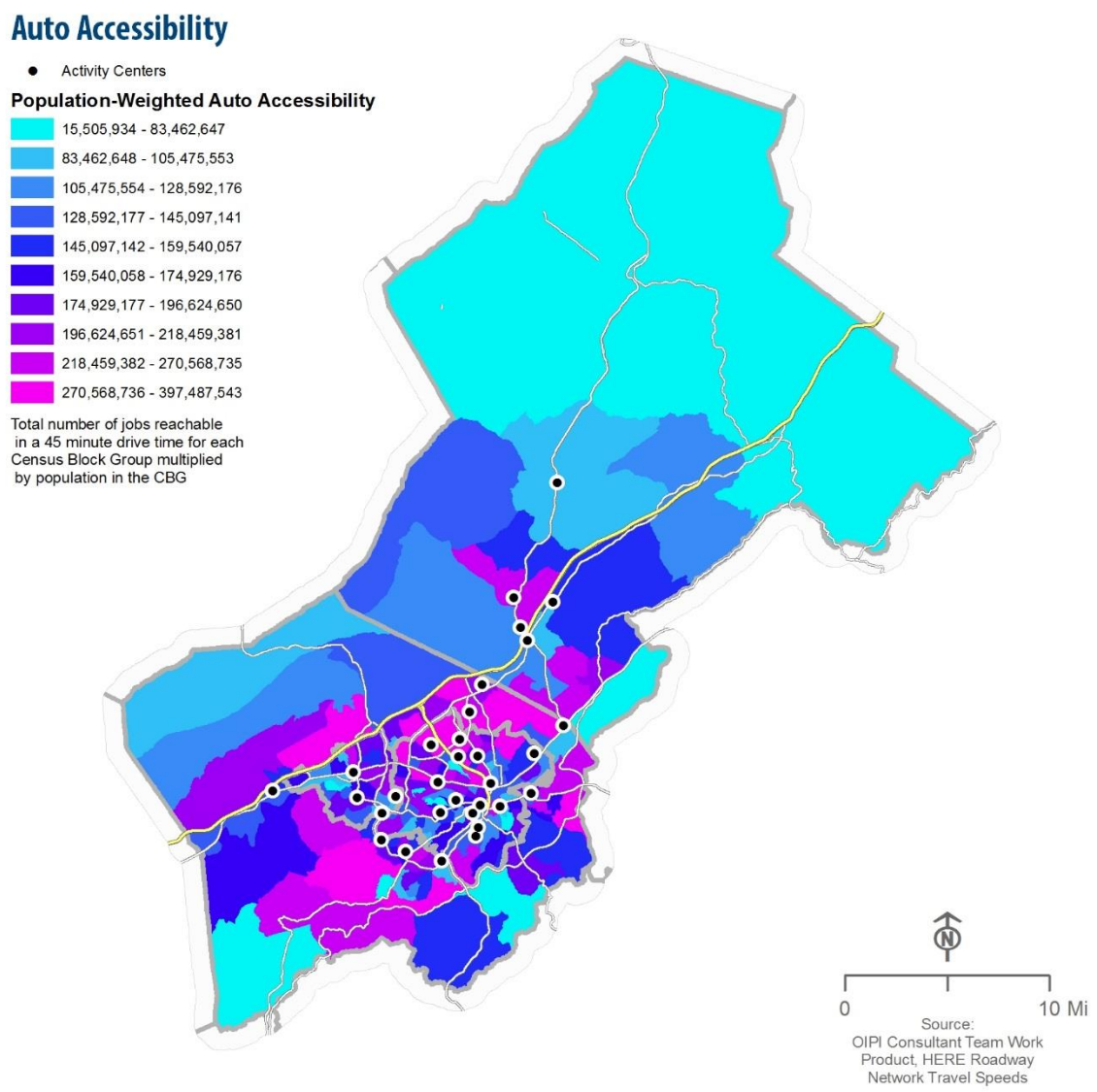


Figure 19: Auto Accessibility

Transit Accessibility

The urban core of the region, including the City of Roanoke and the City of Salem is served by Valley Metro, a hub-and-spoke fixed route transit system. Outside of the urban core, there are few fixed-route transit options in the Roanoke Region. As a result, there is a stark contrast between the transit accessibility in the urban core and the surrounding suburban and rural areas. This is reflected in the low (fixed route) transit accessibility scores for large parts of the region. Also, due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 20).

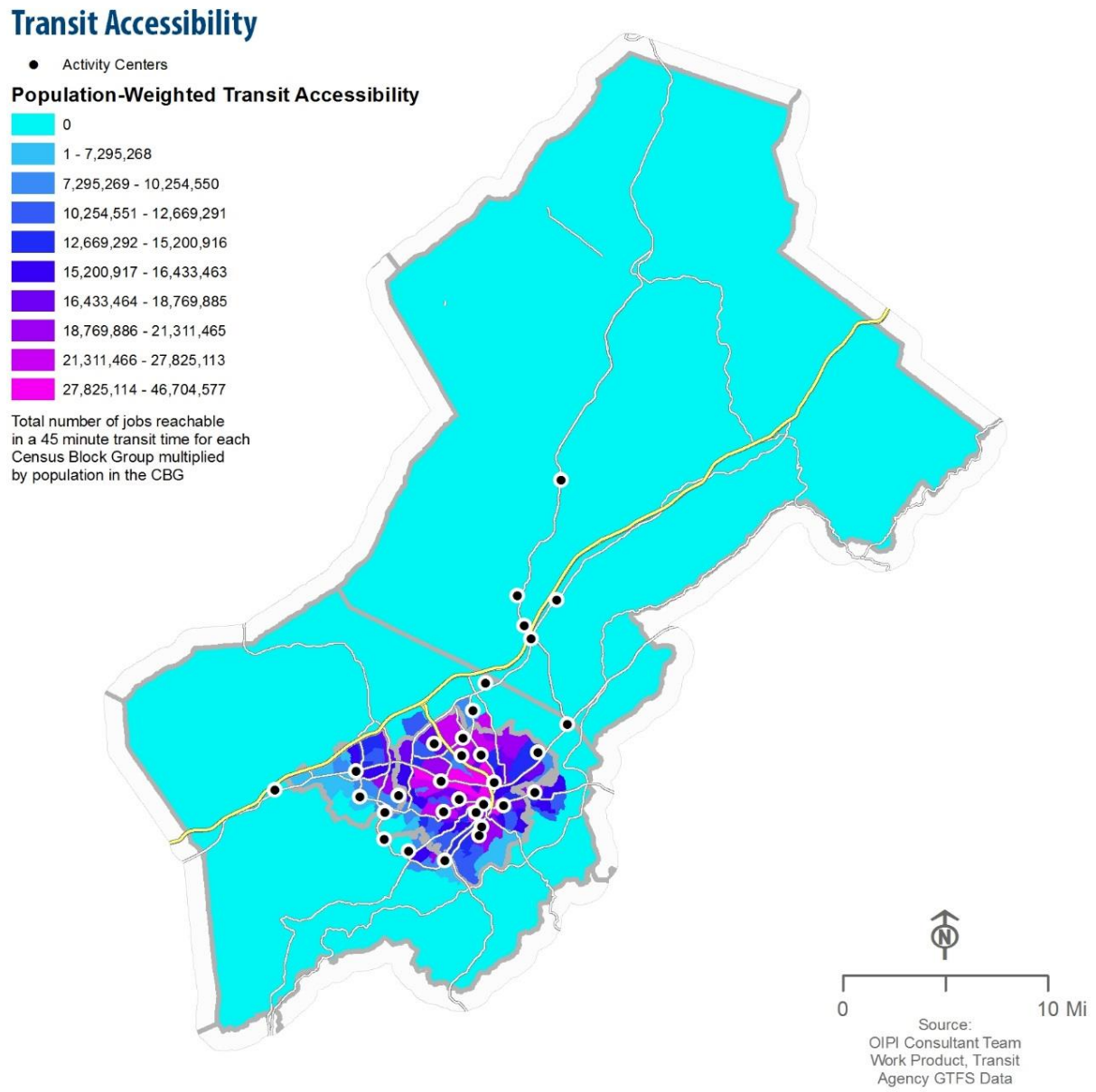


Figure 20: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. Areas in and around the Cities of Salem and Roanoke in the Roanoke Region scored the highest, as was expected, with the highest scoring areas located within the City of Roanoke. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 21).

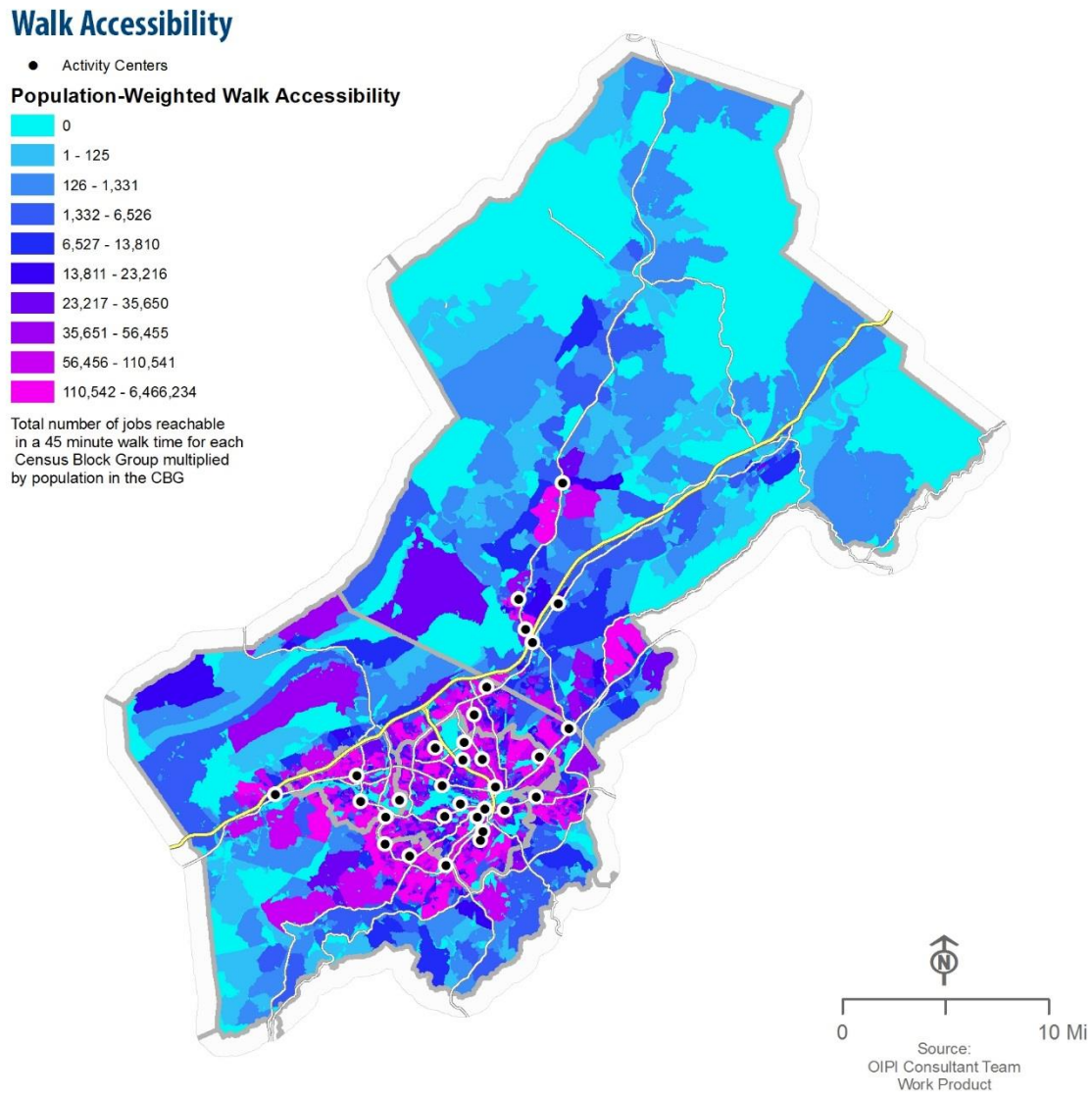


Figure 21: Walk Accessibility

Freight Accessibility

In addition to railways, I-81, US Route 460, and US Route 11 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within a six minute drive from a major arterial ramp. (Refer to Figure 22).

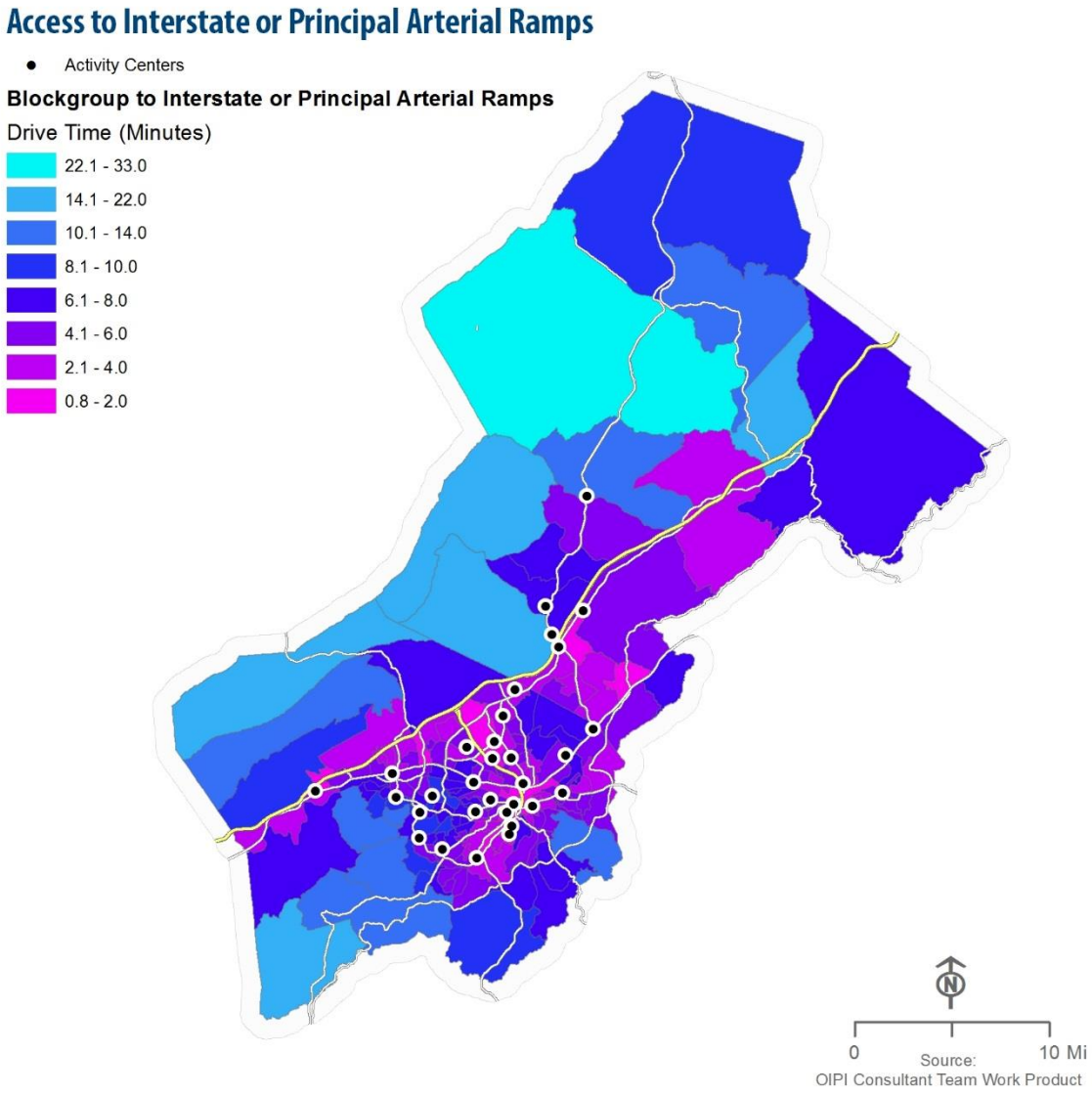


Figure 22: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Roanoke Region are clustered around US Route 460 in and around the City of Roanoke, and along US Route 11 north of Roanoke City. Most areas within the City of Roanoke, and along I-81 corridor, have access to a warehouse or distribution center within a 20 minute drive. (Refer to Figure 23).

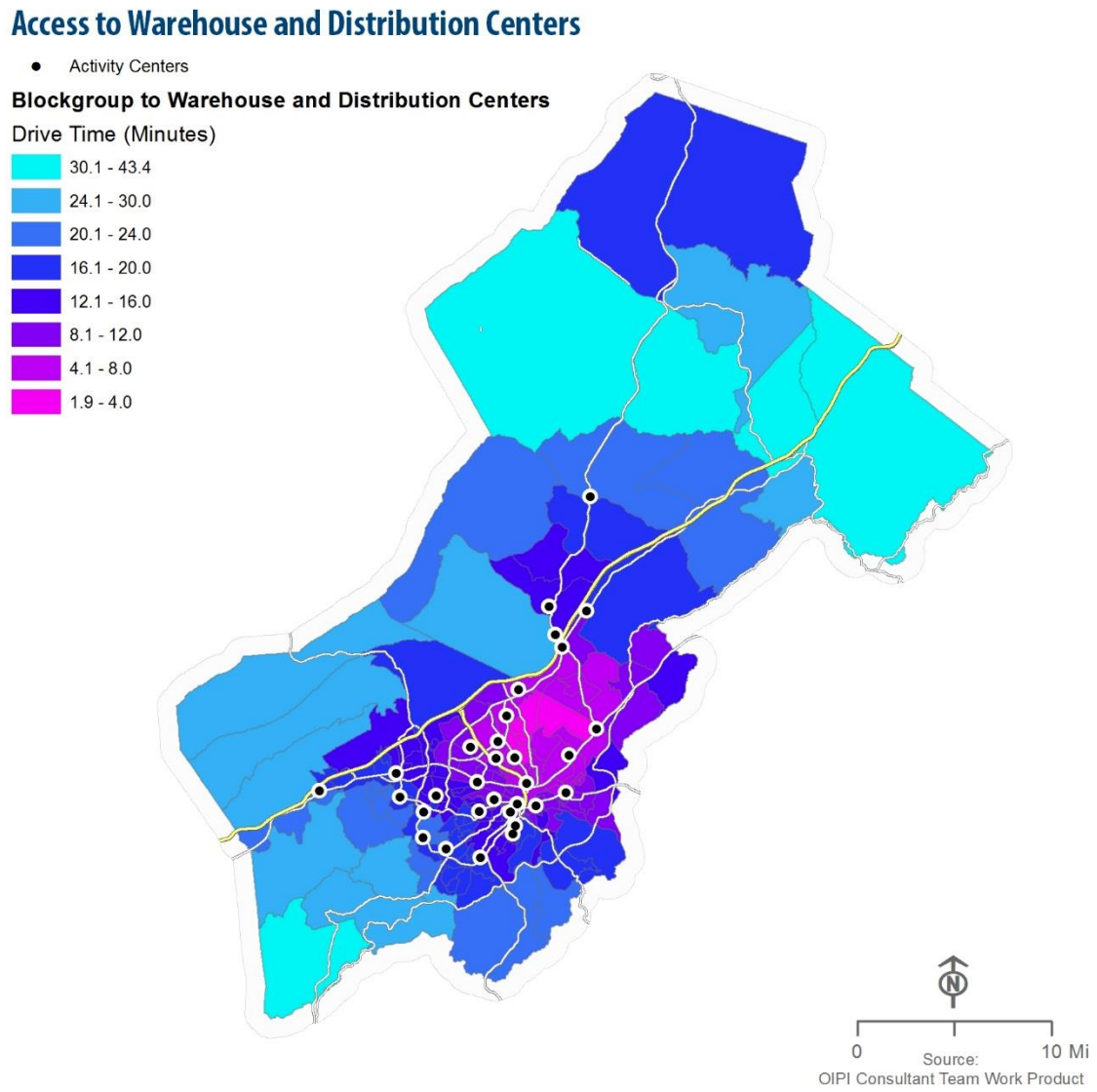


Figure 23: Access to Warehouses & Distribution Centers

Norfolk Southern operates freight rail lines that pass through all the jurisdictions in the Roanoke Region. Air freight is accessible within the region at the Roanoke-Blacksburg Regional Airport. Most areas of the region are within a half hour driving distance from a freight airport. (Refer to Figure 24).

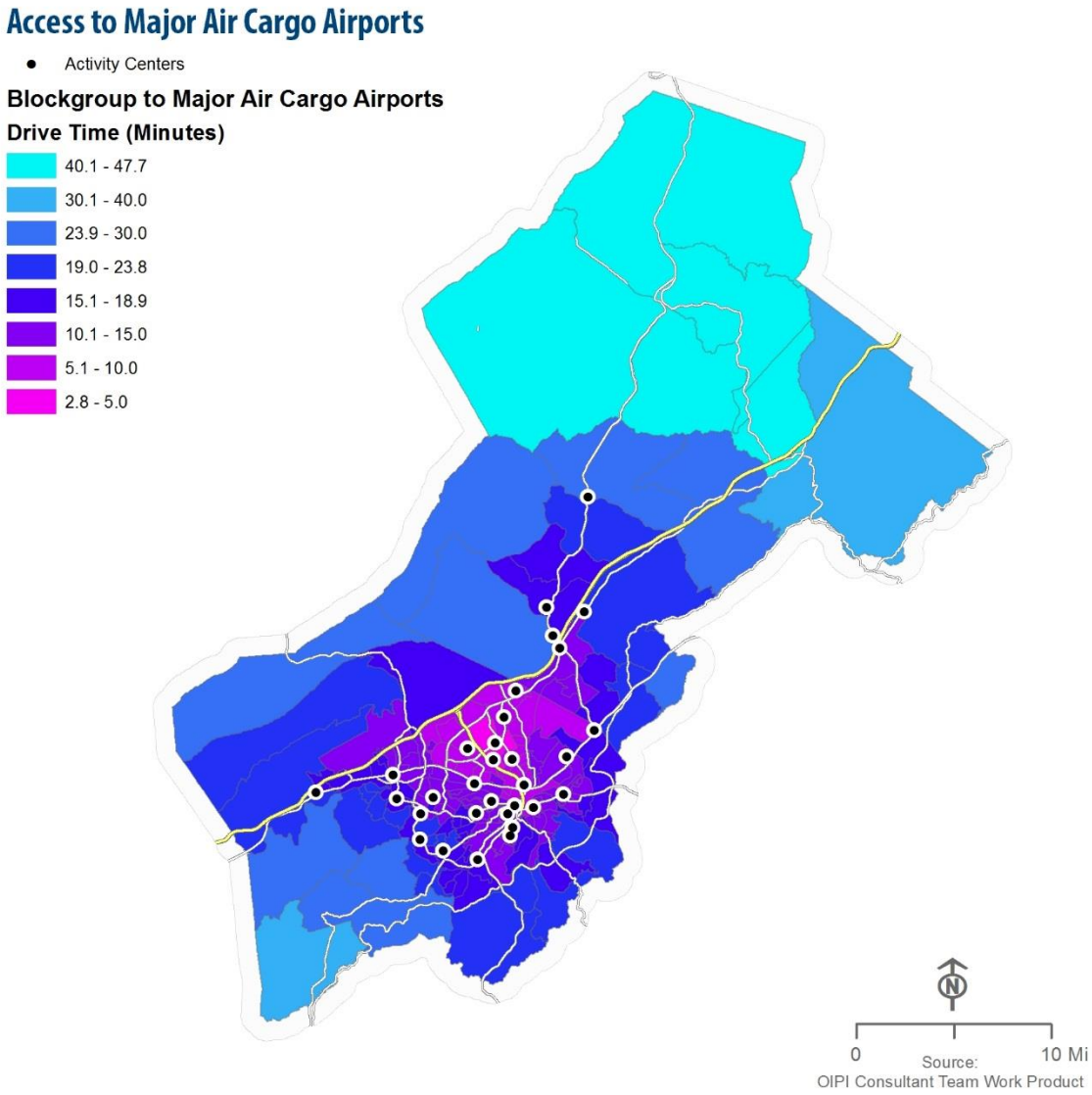


Figure 24: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in the Roanoke Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 18 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for major roadways in the Roanoke Region were available for analysis. Overall, scores on the travel time reliability index indicated high travel time reliability for both corridors. The reliability index scores are higher in several locations within the City of Roanoke and Roanoke County, representing slightly lower levels of travel time reliability. There are, however, no areas of significant concern along any of the corridors. (Refer to Figure 25).

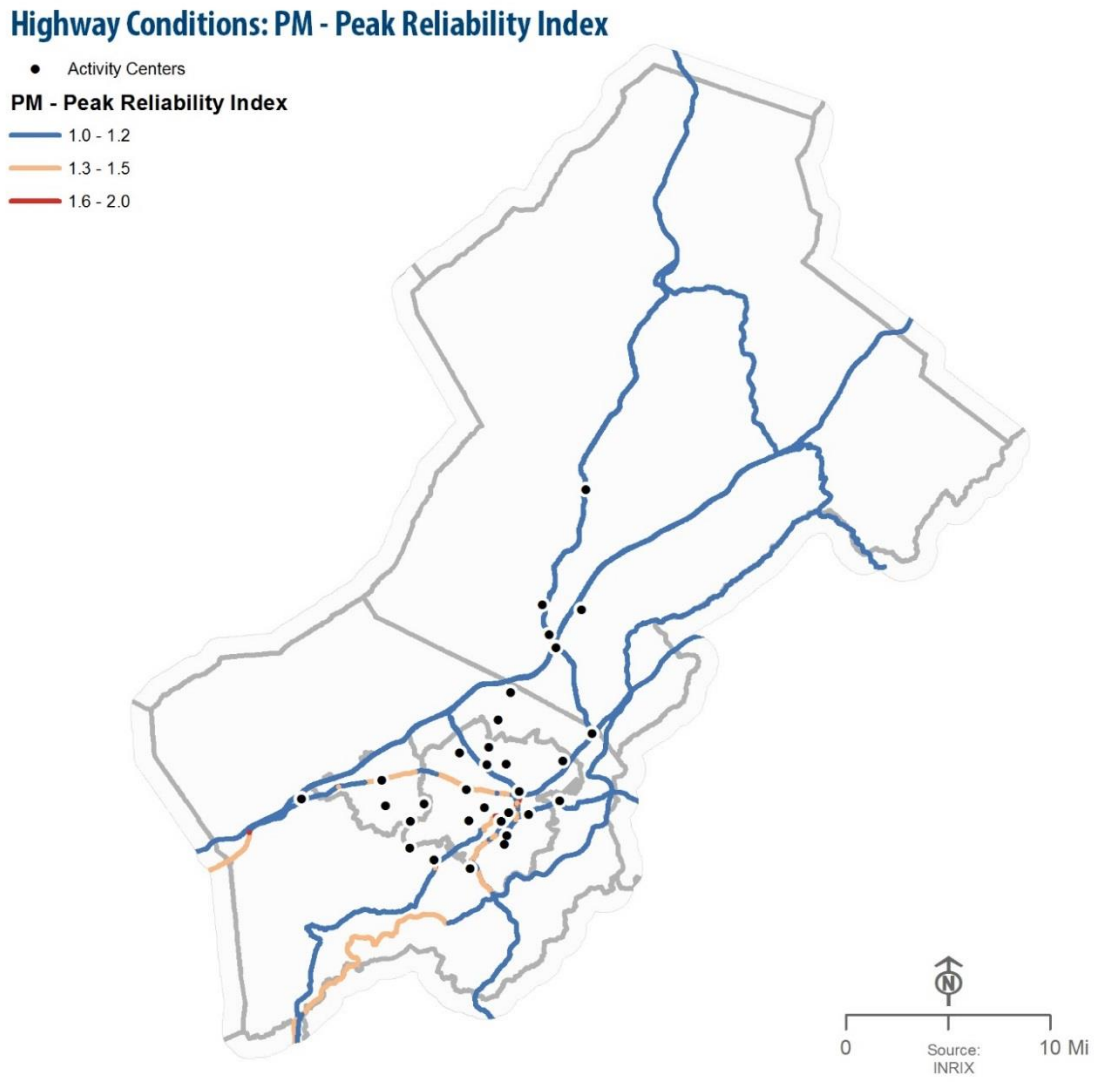


Figure 25: Travel Time Reliability

Note: The Reliability Index is based on a statewide scale which may skew the scores for the Roanoke Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major corridors in the region. According to the analysis, the major roadways of the Roanoke Region do not have major congestion problems. The typical roadways analyzed are congested less than 5% of the time. (Refer to Figure 26).

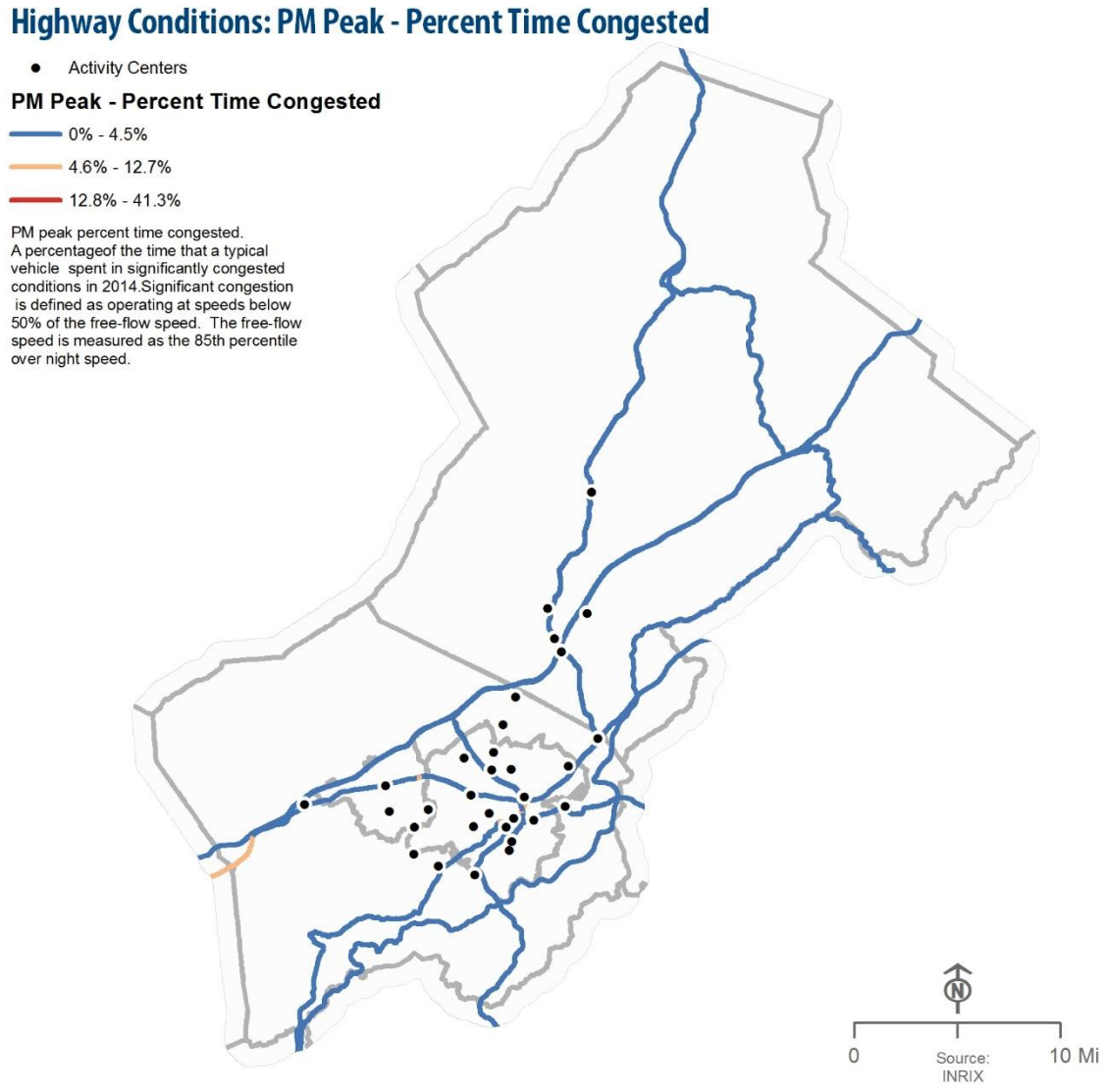


Figure 26: Percent of Time Congested

Travel Time Delay

Figure 27 displays the total hours of delay per vehicle experienced during the evening peak period on Tuesdays-Thursdays in 2014. A traveler is considered as experiencing delay when travel speeds fall below the posted speed limit. In the Roanoke Region, the greatest delay occurs on the Blue Ridge Parkway and US Route 11. (Refer to Figure 27).

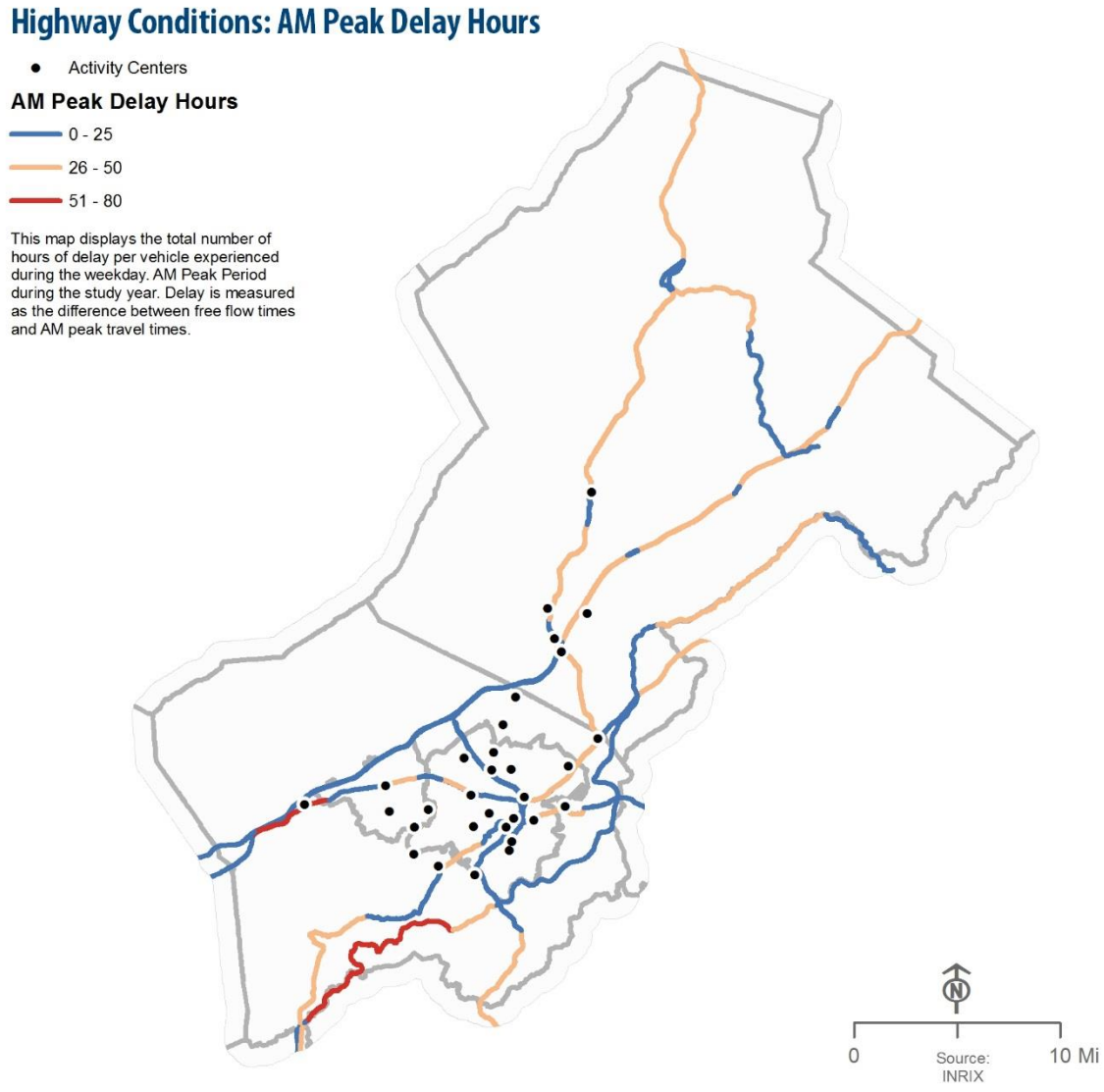


Figure 27: Travel Time Delay

Median Speeds

Figure 28 displays the ratio of pm peak hour vehicle speeds and the speed limit. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The median speeds were highest on I-81, which operated on a median speed between 61 and 70 mph. The slowest median speeds occurred in the Cities of Roanoke and Salem, which operated at a median speed between 13 and 30 mph. Most major roadways in Botetourt and Roanoke Counties operate between 46 and 60 mph. The exception to this are VA Route 43 in Botetourt County, and US Routes 221 and 11 in Roanoke County, and the Blue Ridge Parkway in both the aforementioned counties. For the most part, the lower median speeds seen in the region are the results of lower speed limits and increased number of traffic lights as these major through routes traverse the urban areas of the region with an increased number of access points. (Refer to Figure 28).

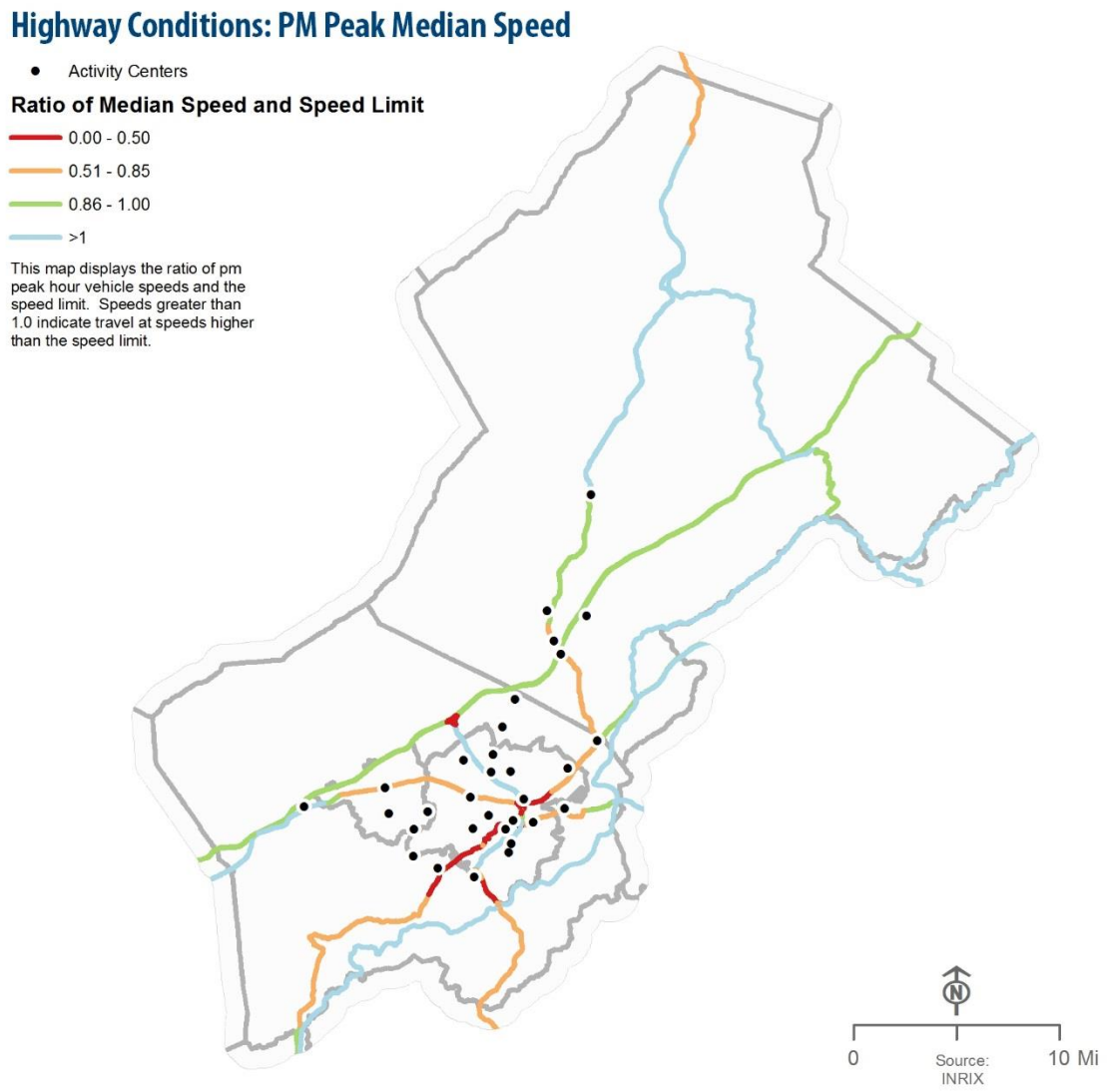


Figure 28: Median Speeds

D. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Hampton Roads Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Roanoke Region, an average of 87% of the dollar value of all goods that are moved through the region are moved by truck. Air is the second most important mode, accounting for 7% of dollar value of goods movement. Rail is slightly less prevalent than air movement, accounting for 6% of dollar value of goods movement. (Refer to Figure 29).

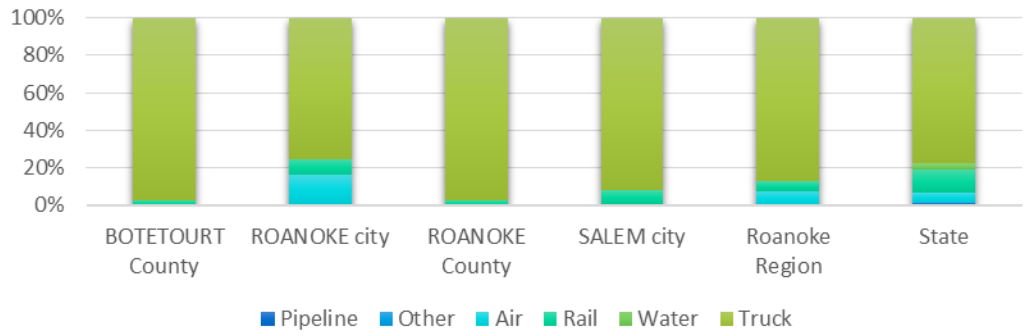


Figure 29: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location quotients are used to compare the prominence of freight modes between the Roanoke Region, and the state as a whole. The Roanoke Region relies on trucks for freight movement 1.13 times more than the does the state as a whole. Rail transportation for goods is more common for the state on average than it is for the Roanoke Region. This reflects the greater density of freight rail lines in other portions of the state. Use of air transportation in freight movement is used 1.38 more times in the Roanoke Region than it is in the rest of the state. This indicates that the Roanoke Regional Airport is an important part of freight movement in the region. (Refer to Figure 30).

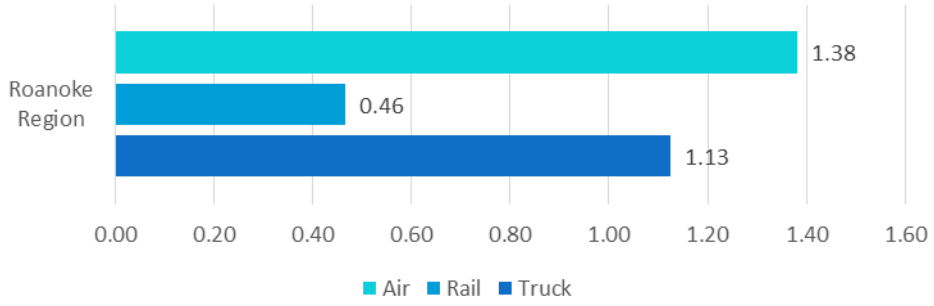


Figure 30: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

While to prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Other freight accounts for the most valuable freight imported to the Roanoke Region. This accounted for almost half of the total value of freight imported to the region. Other freight products also accounted for over two-third of value of freight exported from the freight region. Overall, the Roanoke Region imported almost $8 billion worth of goods and exported $8.4 billion worth of goods, resulting in $300 million of net exports in 2012. (Refer to Figures 31 and 32).

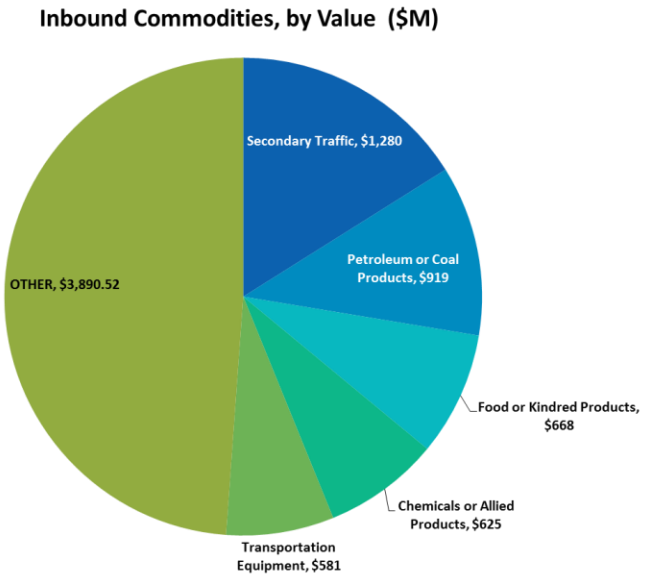


Figure 31: Top Freight Values by Commodities.
Source: TranSearch, 2012

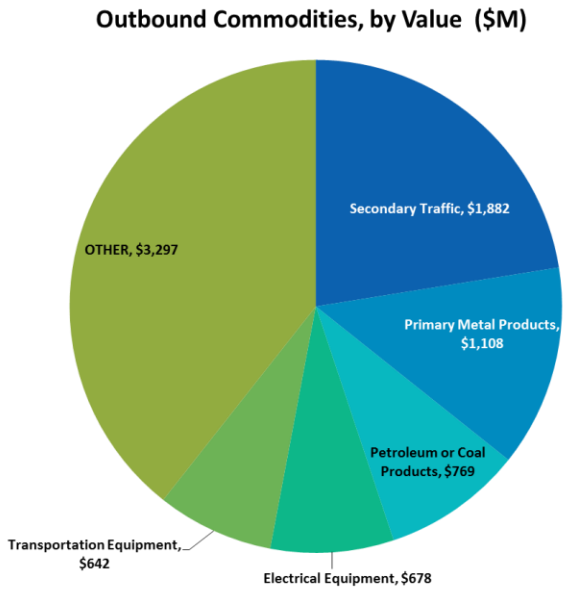


Figure 32: Top Freight Values by Commodities.
Source: TranSearch, 2012

The Southeast region, as defined by the Bureau of Economic analysis, is the destination for the most freight from the Roanoke Region, based on both value and tonnage. In 2012, $3 billion of freight was exported to the Southeast Region. In total tonnage, over three million tons of freight moved from the Roanoke Region to the Southeast Region. The Mideast Region accounts for the second highest amount of both freight value and tonnage measures. Over $1 billion and almost one and a half million tons of freight moved to the Mideast Region from Roanoke. (Refer to Figure 33).

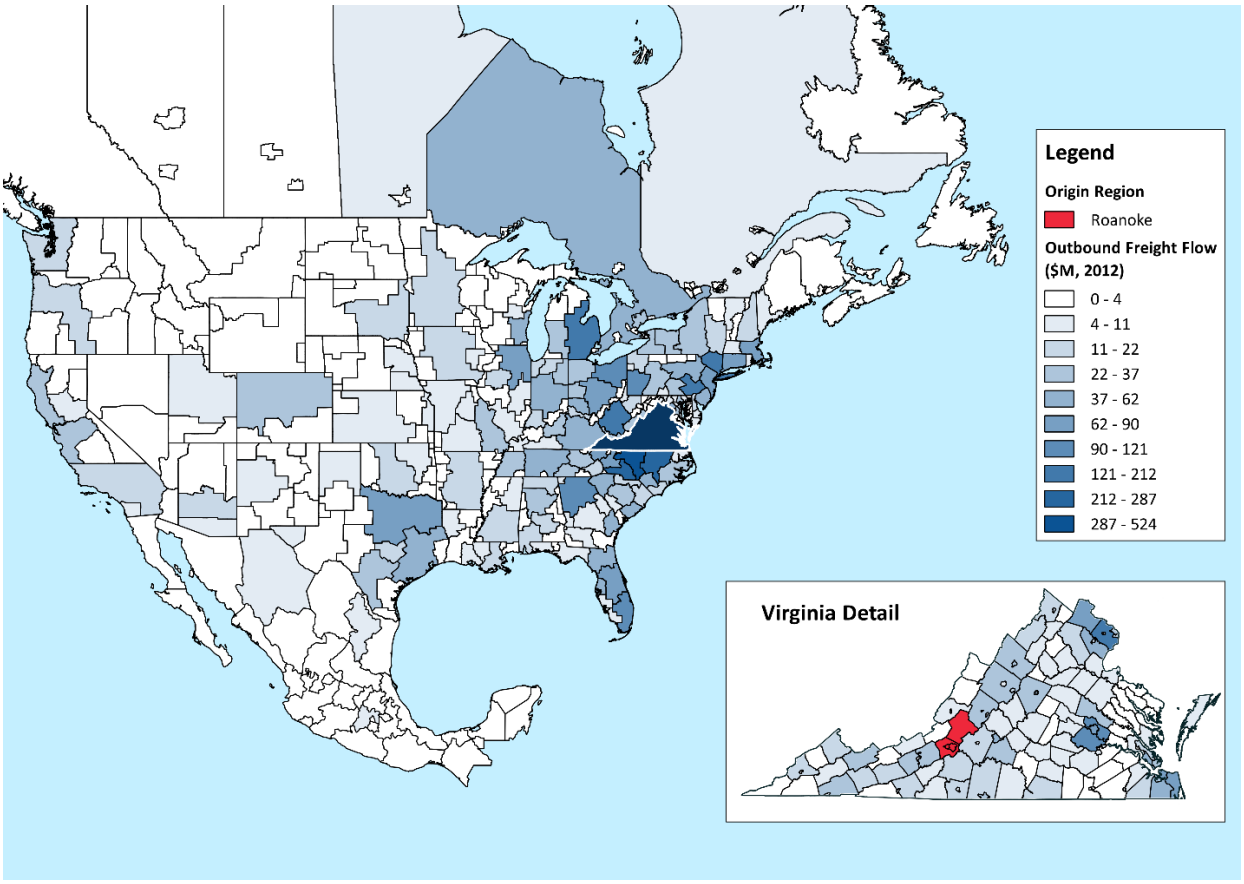


Figure 33: Top Freight Values by Region.
Source: TranSearch, 2012

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, low-value per ton goods came to the top. Nonmetallic minerals and clay, concrete, glass, or stone products account for the largest tonnage of freight exported from the Roanoke Region, while nonmetallic minerals and petroleum and coal products represent the heaviest imports. (Refer to Figures 34 and 35).

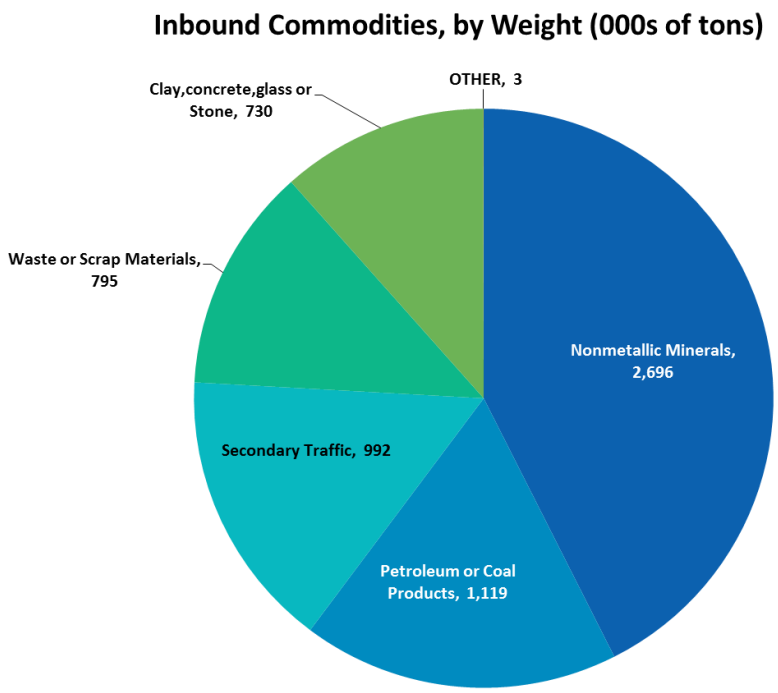


Figure 34: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

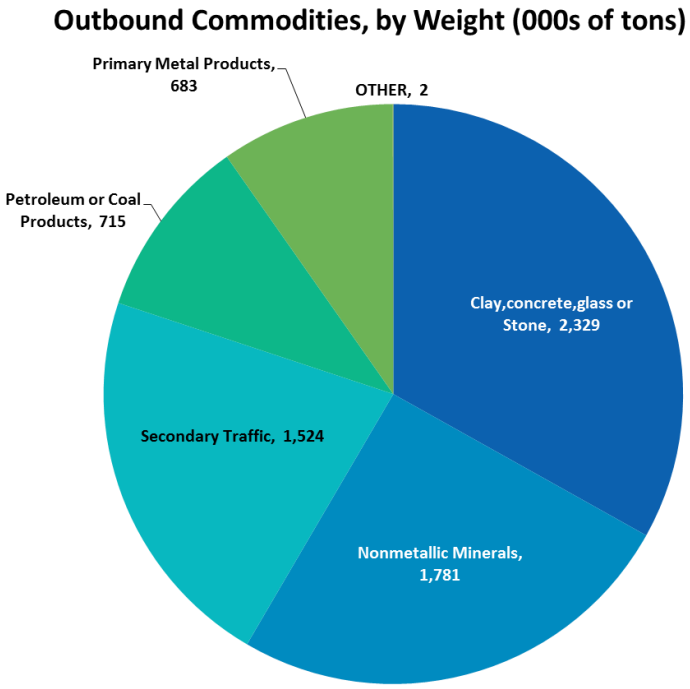


Figure 35: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above. Economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.

These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (local, knowledge and freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Roanoke Region, it showed that nearly 90% of the economic output would be in the Freight and Local economic sectors, which account for 43% and 44% of economic output respectively. This is a shift in proportion, where today the Roanoke Region's economic output is 45% Freight and 42% local. This shift may highlight the need for additional transportation services as outlined in the Economic and Transportation Correlation above.

The forecasted growth in the local economic sector for this region brings the potential for additional transportation needs. The economic and transportation correlations of the local economic sector has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Further, support for the local sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

To assist with the understanding of the map and table of needs described below and the relationship of these needs to the Corridors of Statewide Significance and the Urban Development areas, please refer to the following legend of icons.

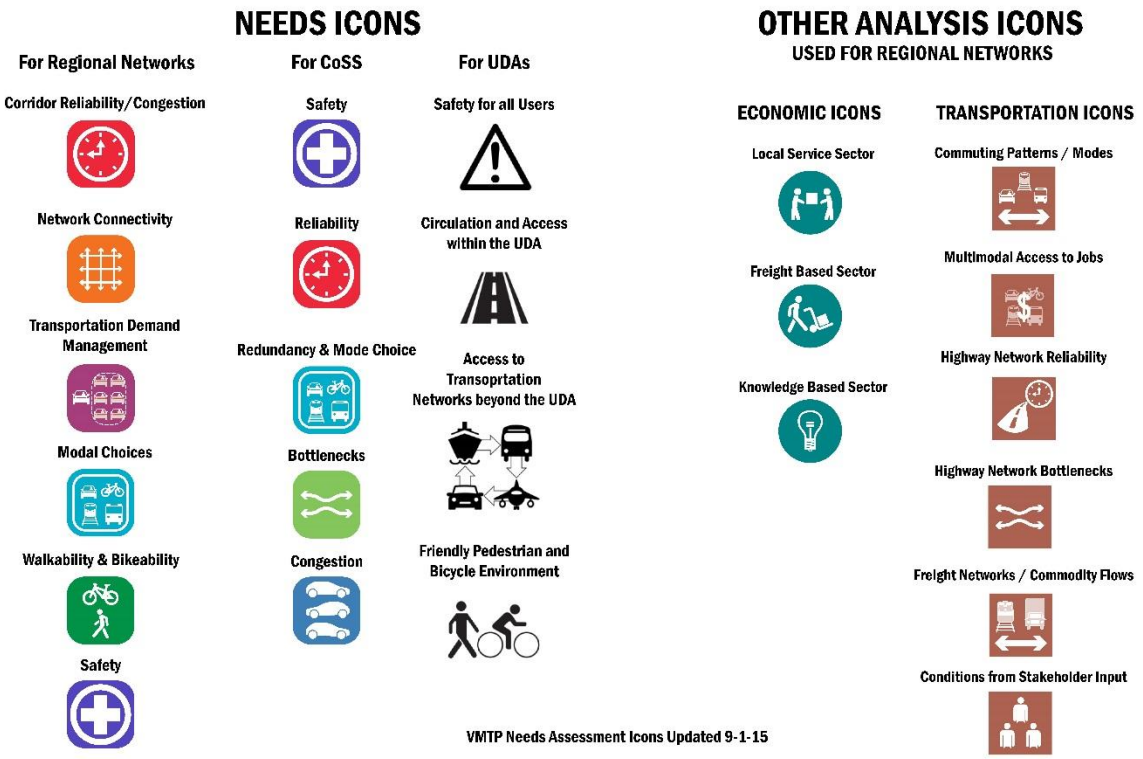


Figure 36. VMTP Needs Icons

Map of Needs

The map below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

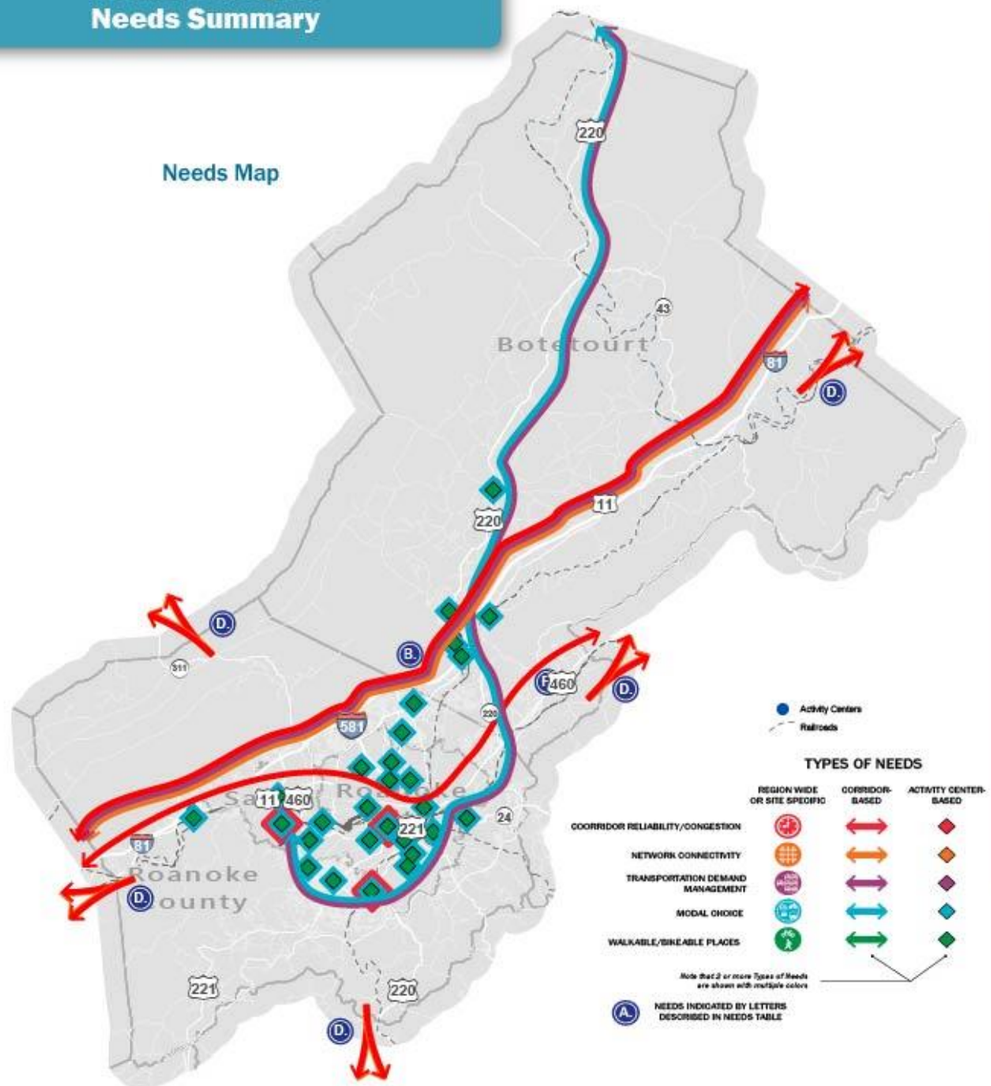
1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 37: Summary Needs Map for Central Virginia

Roanoke Region Needs Summary

Needs Map



Needs Table

A. Walkable/Bikeable Places

Enhance regional walkability and bikeability at regional activity centers; in particular, focus on completing the regional greenway network and make last mile connections to existing and future greenways.

B. I-81/US 11 Reliability

The I-81/US 11 corridor and connected facilities serve as a major artery for regional freight and passenger movement. Ensuring reliability on the corridor is paramount to regional economic success.

C. Regional TDM

The Roanoke region includes park-n-ride access and TDM programs and services. However, multiple activity centers and commuter oriented corridors would benefit from TDM programs that can help reduce the number of vehicles on the network and the individual burden of a long or congested commute.

D. Inter-Regional Network Connectivity

Roanoke's economy, and therefore passenger and freight movement, is closely linked to surrounding regions such as Lynchburg and Blacksburg/Christiansburg. Increasing network connectivity between regions ensures local economic success.

E. Regional Mode Choice

Multiple activity centers in the region are underserved by transit. Providing multiple connections between major activity centers provides travel choices and improves regional connectivity. In particular, making multimodal connections with future Amtrak service will be key to the success of the region and to the new passenger rail service.

F. US 460 Reliability and Bottleneck Relief

There aren't major congestion issues in Roanoke, in relation to the rest of Virginia. However, bottlenecks do occur where some of the major arteries in the region converge; particularly relating to the US 460 corridor, parrallel rail network, and the downtown and Tanglewood Mall activity centers. Addressing these bottlenecks is key to regional mobility and network fluidity.

Table 11: Findings of Needs

A. Walkable/Bikeable Places

NEED

Enhance regional walkability and bikeability at regional activity centers; in particular, focus on completing the regional greenway network and make last mile connections to existing and future greenways.

ECONOMIC

Greenway facilities serve as placemaking infrastructure that attract the 21st century workforce. The Roanoke River Greenway is located throughout the urban core of the region and includes connectivity to many activity centers that are primarily local and knowledge based industries. Local serving industries rely on foot traffic and tourism more than other industry sectors and would benefit greatly from last mile connectivity with the greenway. Similarly, knowledge based industries rely on transportation infrastructure, such as greenways, that create a lively, healthy and sociable environments that attract a 21st century workforce.

TRANSPORT.

Data analysis on multimodal access to jobs, network congestion, reliability and delay, and commuting patterns suggest that the highest level of network activity, and the greatest access to jobs in the region is within the urban core. Making last mile connections for bikers and walkers will improve access to jobs, provide commuter options and meet local desires for an active lifestyle.

B. I-81/US 11 Reliability

NEED

The I-81/US 11 corridor and connected facilities serve as a major artery for regional freight and passenger movement. Ensuring reliability on the corridor is paramount to regional economic success.

ECONOMIC

Based on nationwide research conducted by the Southeastern Institute of Research, both freight related and knowledge based industries highly value access to reliable highway networks. In order to attract and retain these businesses it is crucial to ensure reliability on I-81 and associated/supporting facilities such as US 11.

TRANSPORT.

The I-81/US 11 corridor handles significant passenger and freight traffic to and through the Roanoke region. Highway reliability data suggests that during significant traffic events, such as crashes, the lack of redundancy in the network to provide relief causes a catastrophic failure of passenger and freight truck movements, sometimes lasting several hours.

C. Regional TDM

NEED

The Roanoke region includes park-n-ride access and TDM programs and services. However, multiple activity centers and commuter oriented corridors would benefit from TDM programs that can help reduce the number of vehicles on the network and the individual burden of a long or congested commute.

ECONOMIC

Research indicates that the retiring baby boom generation and the emerging millennial workforce prefer to live in places that provide multiple travel options.

TRANSPORT.

TDM access exists throughout much of the Roanoke regional network. Several corridors such as the I-81/US 11 corridor includes some of the longer commuter trips in the region and would benefit from carpool and vanpool programs that would consolidate single occupancy vehicles and alleviate stress on the network. The route 419 and 220 corridors also include several activity centers that have limited transportation options; connecting these activity centers and corridors through TDM programs will improve network capacity and provide choices for commuters.

D. Inter-Regional Network Connectivity

NEED

Roanoke's economy, and therefore passenger and freight movement, is closely linked to surrounding regions such as Lynchburg and Blacksburg/Christiansburg. Increasing network connectivity between regions ensures local economic success.

ECONOMIC

Roanoke is the largest urban area outside of Virginia's 'urban crescent' and therefore serves as a major hub for the greater region. Roanoke's largest businesses, such as banking and healthcare, serve as regional centers that draw customers and resources from within as well as outside the region. Roanoke also serves as a major freight hub, including regional headquarters for multiple freight/shipping companies. Ensuring connectivity between internal and external resources will ensure success of these major business hubs.

TRANSPORT.

Based on commuter flow mapping analysis, there is significant cross commuting between Roanoke and the New River Valley and between Roanoke and Lynchburg. In addition, some of the major routes between these regions such as US 460 and 220 have the most significant reliability and congestion issues. FHWA data indicates that, during weekday PM peak periods, multiple sections along US 460 and 220 have slower median speeds and travelers spend a higher percentage of time in congestion.

E. Regional Mode Choice

NEED

Multiple activity centers in the region are underserved by transit. Providing multiple connections between major activity centers provides travel choices and improves regional connectivity. In particular, making multimodal connections with future Amtrak service will be key to the success of the region and to the new passenger rail service.

ECONOMIC

Research indicates that the retiring baby boom generation and the emerging millennial workforce prefer to live in places that provide multiple travel options.

TRANSPORT.

Transit access exists throughout much of the urban core within the Roanoke regional network. Several activity centers, such as Fincastle, Troutville, and others in Botetourt County, have no access to transit and would benefit from connector services to the urban core. Likewise the Route 419 corridor would benefit from improved transit service as it currently includes multiple activity centers, but only limited transit access.

F. US 460 Reliability and Bottleneck Relief

NEED

There aren't major congestion issues in Roanoke, in relation to the rest of Virginia. However, bottlenecks do occur where some of the major arteries in the region converge; particularly relating to the US 460 corridor, parrallel rail network, and the downtown and Tanglewood Mall activity centers. Addressing these bottlenecks is key to regional mobility and network fluidity.

ECONOMIC

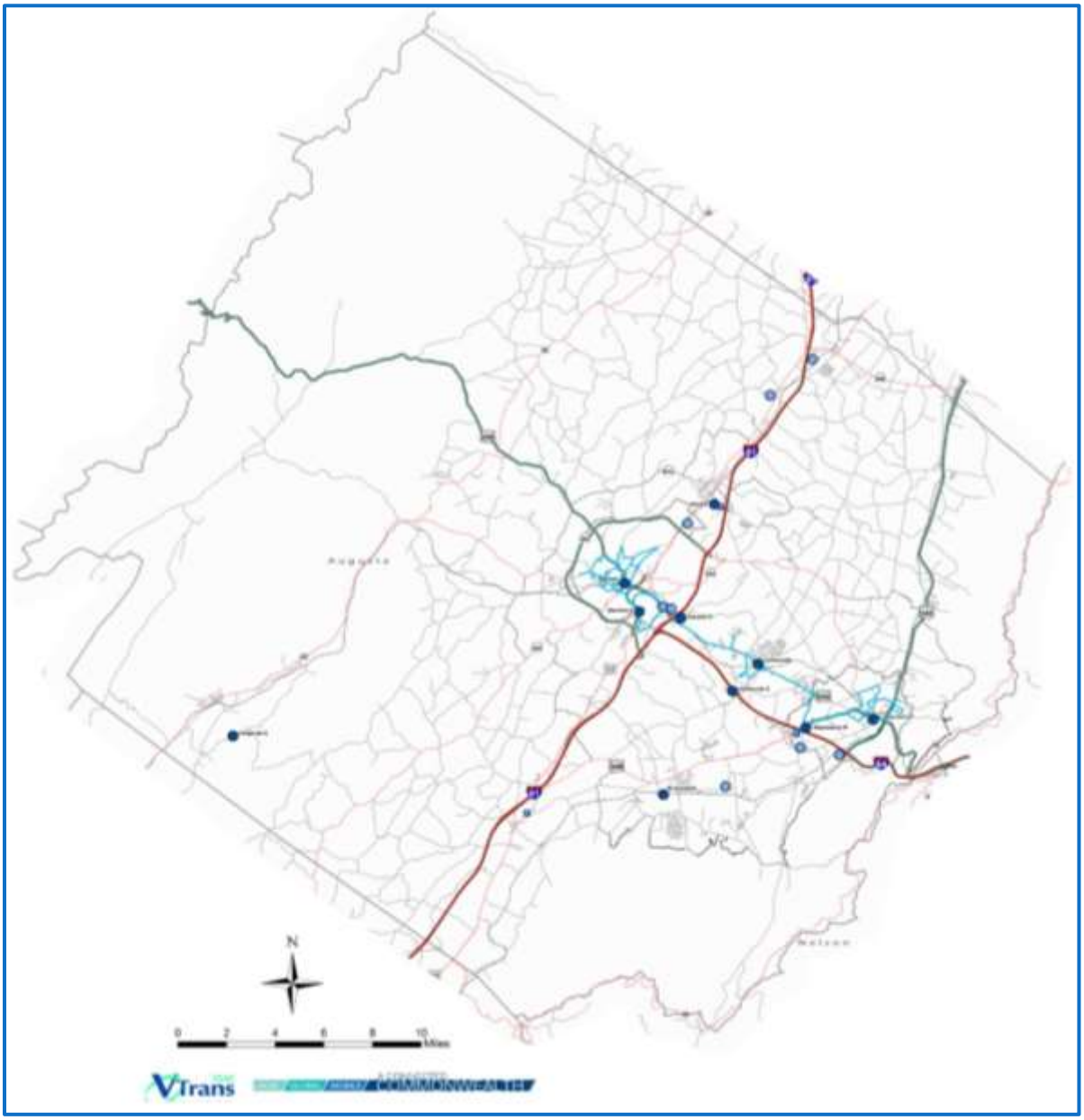
The 460 corridor, including the parallel rail network, Tanglewood Mall and downtown Roanoke handles a nexus of all types of economic activity. In particular, with the introduction of passenger rail to this corridor, the region can expect improved economic growth. There is a need to balance passenger, freight and local traffic to successful serve all businesses in the region.

TRANSPORT.

Some reliability issue exist along the 460 corridor, especially in downtown Roanoke and the more urbanized areas of the corridor. Tanglewood Mall and the nexus of many major regional routes is also a chokepoint for the region. These ares handle many types of users, including passengers, freight, commuters, local trips and longer haul movements; ensuring reliability is key to the success of the region.

VMTP 2025 Needs Assessment

Regional Needs Profile



Staunton-Augusta-Waynesboro Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans 2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Staunton-Augusta-Waynesboro (SAW) Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the SAW Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the Transportation Needs and economic conditions is the basis for the findings in this report. The following sections outline the SAW regional Economic Profile, regional Transportation Profile, and regional Transportation Needs.

Defining a Regional Network

This portion of the Needs Assessment deals with a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of each Regional Network has been developed as part of the outreach process in working with each region. Additional information about how the regional Networks were defined is referenced in the introductory document, "VMTP 2025 Needs Assessment: Regional Networks Introduction."

The SAW Region is defined as the City of Staunton, City of Waynesboro and Augusta County. However, economic generators, economic attractors and commuting corridors located outside of but adjacent to this region that influence the economy or travel market of the SAW region were considered in the Needs Assessment as well. These include:

- **Outside Economic Generators:** Lexington, Buena Vista, Monterey (Highland County), Bath County, Glasgow, and Rockbridge County
- **Outside Economic Attractors:** Lexington (Washington and Lee University, VMI, Virginia Horse Center, Devils Backbone), Glasgow (Mohawk Industries), Natural Bridge, Hot Springs in Bath County (The Homestead Resort), Buena Vista (Southern Virginia University), Bath County, and Wintergreen Resort in Nelson County
- **Regional Commuting Corridors:** US 250, VA 39, VA 42, US 60, US 501, and US 11

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of analyzing emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

OIPI consultants used available data from state and national sources, as well as input from SAW Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layer together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Weldon Cooper Center, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21 percent from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population – 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012; and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia.

Regional Demographics

The SAW Region is forecasted to experience steady population growth over the next decade. Augusta County as a whole may experience an increase in population by almost 14 percent by 2025 (**Table 2**). The Cities of Staunton and Waynesboro however are projected to see slower population growth.

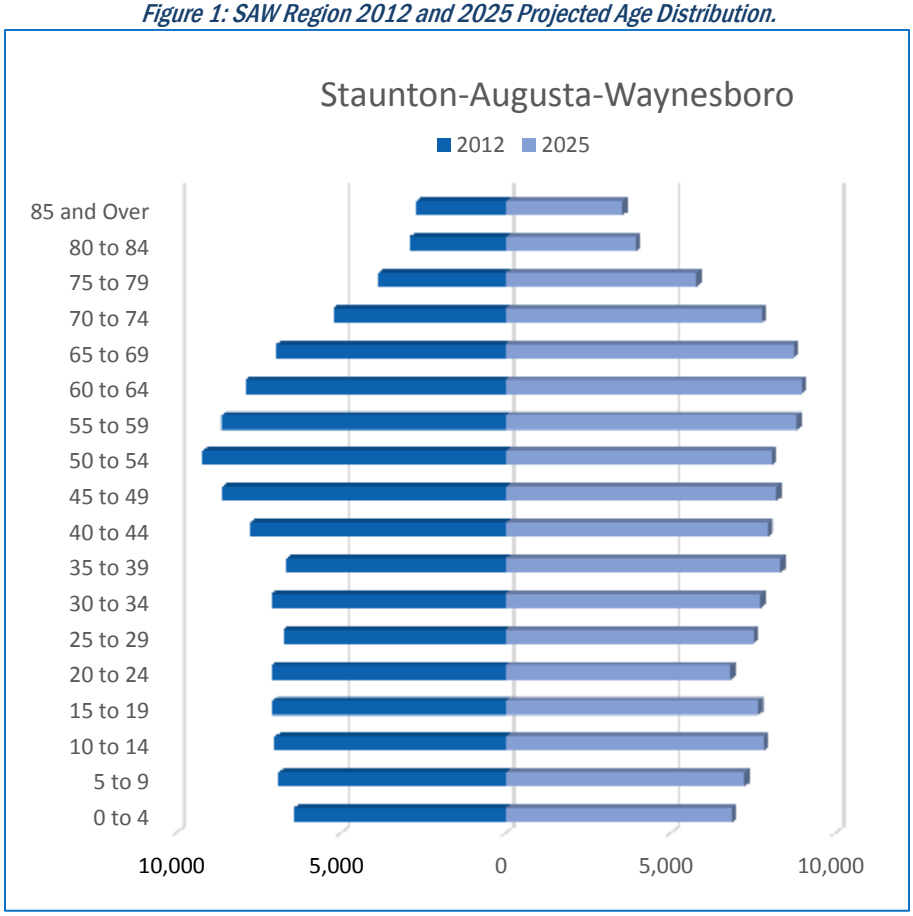
Table 2: SAW Region County and City Population Projections

Jurisdiction	2012	2025	% Change (2012-2025)
Augusta County	73,658	83,895	13.9%
City of Staunton	23,921	25,023	4.6%
City of Waynesboro	21,107	22,915	8.6%

Source: US Census Bureau. Weldon Cooper Center for Public Service, Demographics Research Group; Intercensal Estimates for Virginia, Counties, and Cities: 2010-2012, Charlottesville, Virginia, January 27, 2014, www.coopercenter.org; Accessed between January-August, 2014.

Figure 1 illustrates the age distribution for the SAW Region in 2012 and the projected age distribution for 2025. Population growth is projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 55.

Figure 1: SAW Region 2012 and 2025 Projected Age Distribution.



Source: Woods & Poole Economics, Incorporated. 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC. 2014. http://www.woodsandpoole.com. Accessed June 18, 2014.

C. Current Industry Strengths

Economic drivers in the region are predominantly centered on local-serving industries. These include health care, retail trade, public administration and other services (e.g. personal care services like barbershops and salons; and religious, grant making, civic, and professional organizations like churches and social advocacy groups). However, manufacturing – a freight-dependent industry – is a major employer in the region, as well as the most significant contributor to the region's output. The following economic measures were used to analyze the strength and characteristics of the current regional economy in the SAW Region.

Top Industries by Output

Manufacturing is the strongest industry by economic output (**Table 3**). The Retail Trade industry comes in a close second.

Table 3: SAW Region Current Industries by Output, 2012

Top 5 Industries	Output ($M)	% of Output
Manufacturing	$2,202	20%
Retail Trade	$1,725	16%
Wholesale Trade	$1,293	12%
Health Care	$950	9%
Public Administration	$836	8%

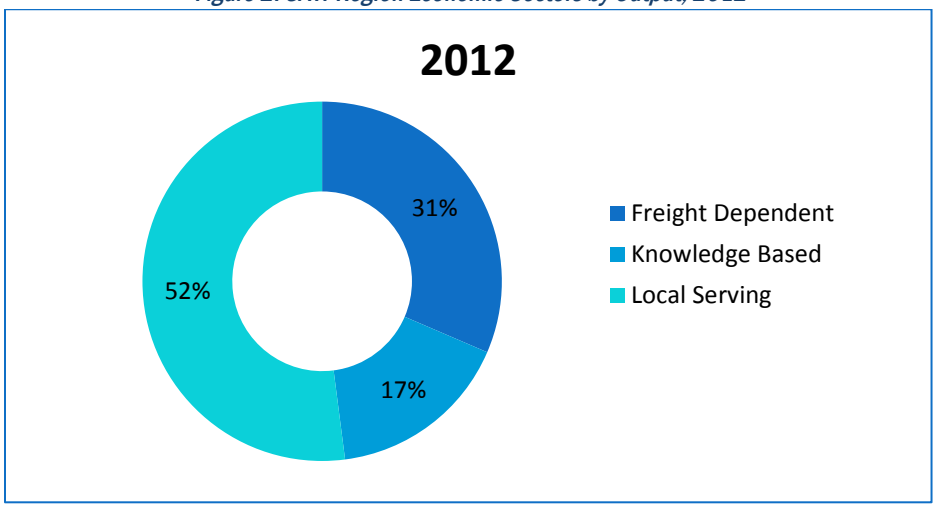
Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as Local Economic Sectors, Knowledge-based Economic Sectors, and Freight-based Economic Sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the SAW Region, **Figure 2** provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the OIPI consultants and used in all regional analyses throughout the State. In 2012, the local serving industries were the predominant industries by output in the region at over 50 percent. In terms of transportation characteristics and needs the Local Services economic cluster is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Figure 2: SAW Region Economic Sectors by Output, 2012



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Top Industries by Employment

In the SAW Region, the top industries by employment are Public Administration, Health Care, Manufacturing, and Retail Trade (**Table 4**).

Table 4: SAW Region Top Industries by Employment, 2012

Top 5 Industries	Number of Jobs	% of Workforce
Public Administration	8,539	16%
Health Care	8,314	15%
Manufacturing	6,807	13%
Retail Trade	5,959	11%
Other Services	3,914	7%

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Table 5 lists the current top employers in the SAW Region. In the Health Care industry, Augusta Health and Western State Hospital combine to employ nearly 1,550 workers with Augusta Health as the largest employer in the SAW Region. Manufacturing industry employers round out the remaining top five employers with 2,250 workers.

Table 5: SAW Region Current Top Employers

Employers	Employees
Augusta Health	1,000
Hershey Foods of Virginia	750
McKee Foods	750
Target Corporation	750
Western State Hospital	550

Source: 2012 InfoUSA data, supplemented with 2014 SAW MPO data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as

compared to the nation, and can reveal what makes a particular region unique in comparison to the national average. The SAW Region's employment in Other Services is more than double the national average (**Table 6**). Examples of Other Services include automobile repair and maintenance, personal services, and religious and civic organizations.

Table 6: SAW Region Current Top Industries by Location Quotient, 2012

Top Industries	Location Quotient
Other Services	2.00
Transportation/Warehousing	1.47
Health Care	1.35
Agriculture	1.15
Information	1.10

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

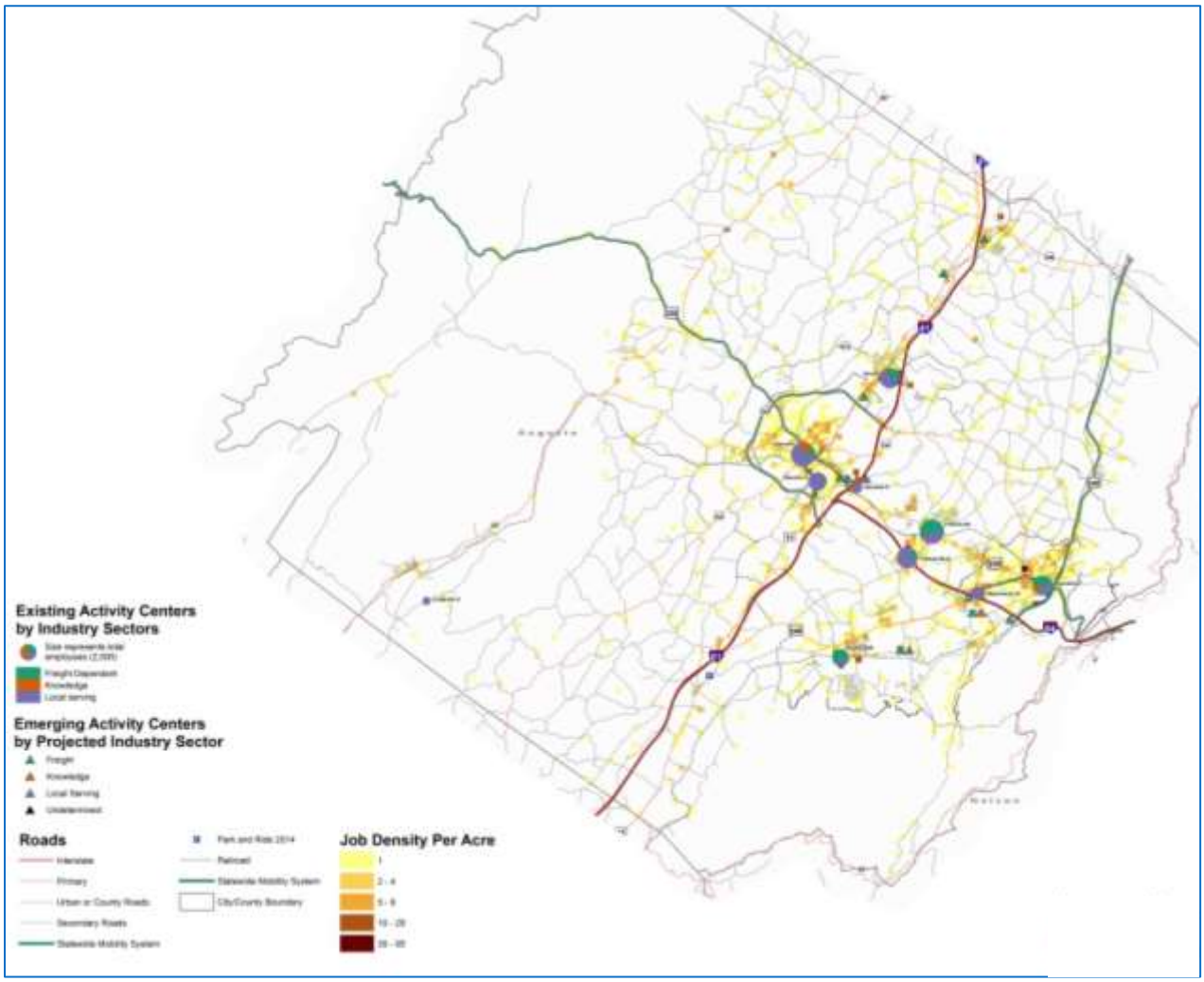
D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, Activity Centers are defined as areas of regional importance that have a high density of economic and social activity. Activity Centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity Centers, drawn with a 1-mile-radius, were then developed for these areas. The Activity Centers were then revised, refined, or amended after discussing economic conditions with regional stakeholders. **Figure 3** below shows the job density per acre in a color range from yellow to dark brown.

Once the Activity Centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of Local Serving, Freight Dependent, and Knowledge-Based economies, analysts developed charts that represented the breakdown of employment by industry sector in each Activity Center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region (**Figure 3**).

Regional stakeholders also identified locations where emerging activity centers are projected to develop over the next ten years and provided feedback on which economic cluster is anticipated. These are depicted on the **Figure 3** as triangles.

Figure 3: SAW Region Existing and Emerging Activity Center Employment by Industry Sector



Source: InfoUSA data, Regional Stakeholder Input

E. Forecasted 2025 Industry Strengths

Through a series of work sessions with the SAW Region stakeholders, OIPI consultants used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose the SAW Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

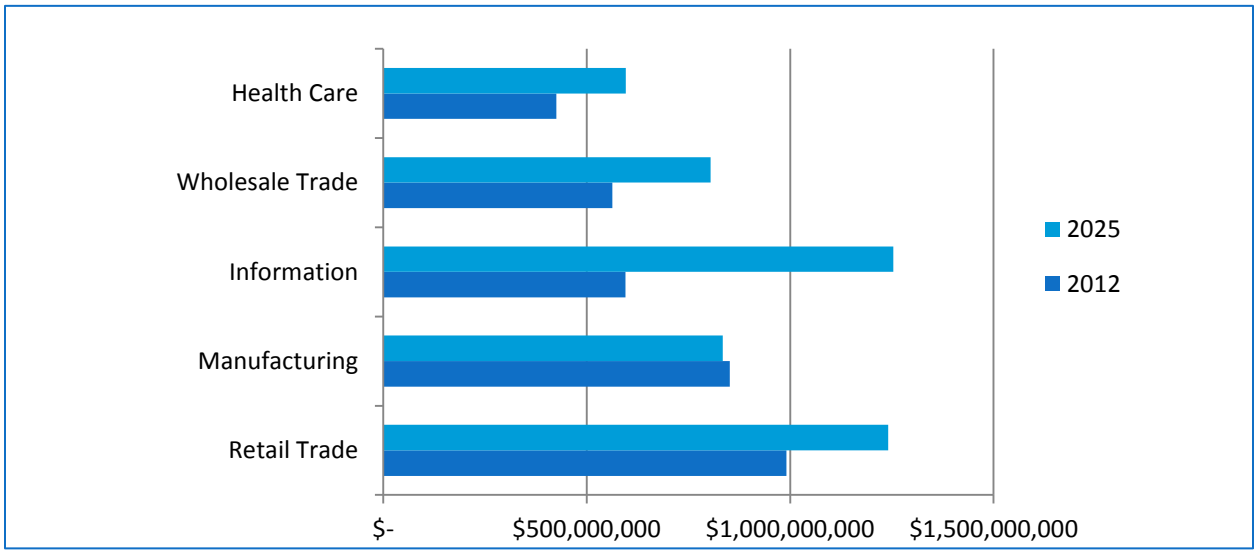
The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the SAW Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles

- Top Employers and Locations
- Economic Development Priorities

Figure 4 compares the top five industries by economic output in 2012 with forecasted growth by 2025. Most of the forecasted high-growth in economic output is in local serving and knowledge-based industries. The Information industry refers to producing and distributing information and cultural products (online newspapers, television programs), providing means to transit or distribute these products (book publishers, video distribution, video exhibition, radio networks, etc.). The Information industry is the top growth industry (by revenue generated) in the region, followed by Health Care and Educational Services. Though each of these industries are growing, only Health Care is a high revenue-generating industry within the region and is projected to remain so through 2025. Manufacturing and Retail Trade are expected to continue to dominate the region's economic output in the years to come.

Figure 4: SAW Region Top Industries by Output, 2012 and 2025

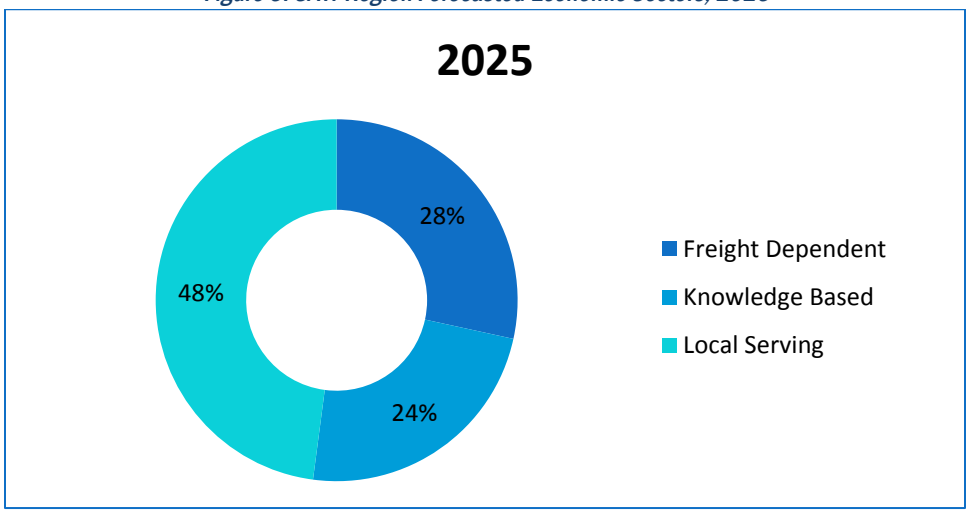


Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Economic Sectors

Figure 5 illustrates the summary of the forecasted economic clusters in the SAW Region for 2025. Local Serving industries will still be the predominant economic sector by output in the region at 48 percent.

Figure 5: SAW Region Forecasted Economic Sectors, 2025



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Industries by Employment

Forecasted top industries by employment for the region are listed in **Table 7**. Health Care is expected to be the dominant industry with 21 percent of the workforce. Of the top five industries by employment, 46 percent of the workforce is local serving industries and 18 percent of the workforce is freight dependent industries.

Table 7: Forecasted Top Industries by Employment, 2025

Top 5 Industries	Number of Jobs	% of Workforce
Health Care	12,037	21%
Public Administration	9,085	16%
Manufacturing	6,651	11%
Retail Trade	5,199	9%
Agriculture	4,159	7%

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the SAW Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for SAW Region:

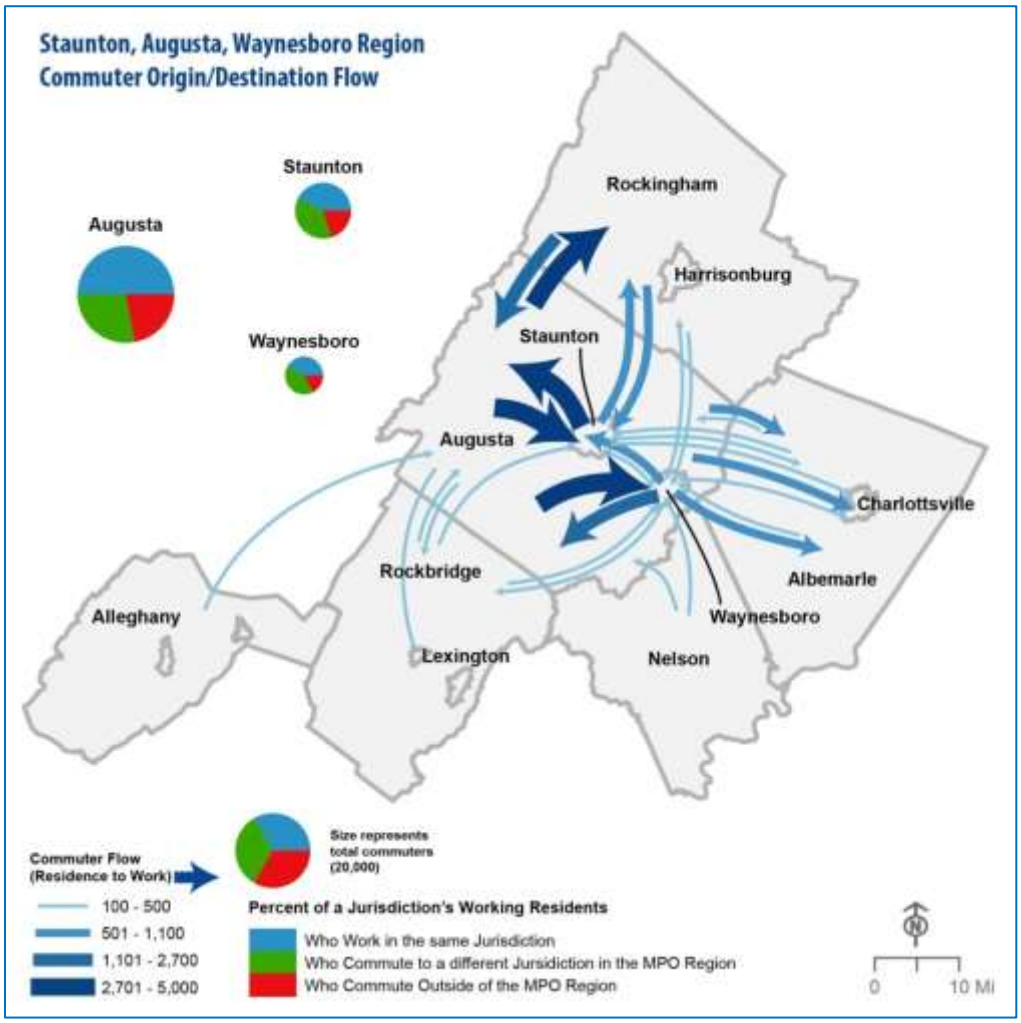
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Figure 6 illustrates the commuting patterns within and among the SAW Region localities between 2009 and 2013. A significant portion of Augusta County residents commute within the county, to the City of Staunton, or to the City of Waynesboro. For those commuting outside of the region, the majority are going to Rockingham County, Albermarle County or the City of Charlottesville. The pie charts indicate that almost half of each jurisdiction's working residents work in the same jurisdiction. Over 25 percent of each jurisdiction's working residents are commuting to jurisdictions within the SAW Region.

Figure 6: SAW Region Commuting Patterns



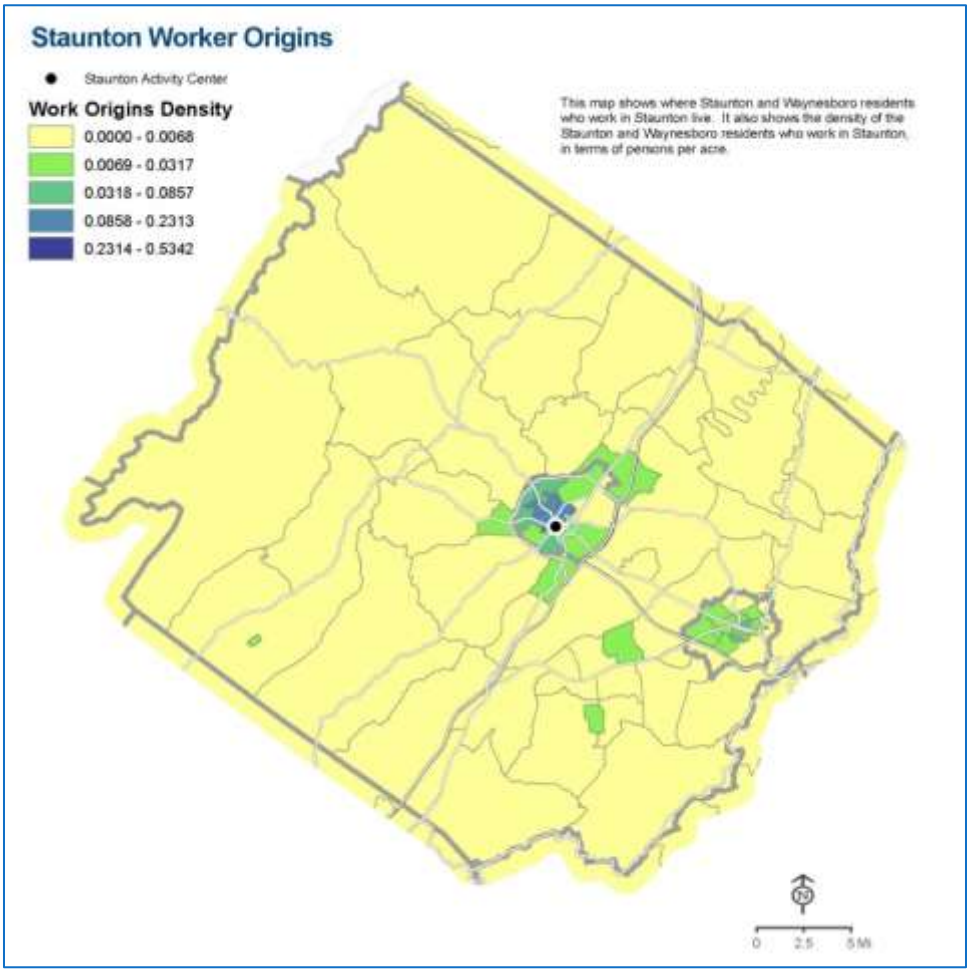
Source: American Community Survey: Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Residence Geography: 2006-2010.

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the SAW Region was the analysis of commuting patterns between Activity Centers. **Figures 7, 8 and 9** below provide insights into the commuting patterns for three of the Activity Centers in the SAW Region. Block groups are symbolized on a color scale from dark to light blue, with the darker shades representing the block groups with the largest number of commuters to the Activity Center analyzed within that map.

As shown on **Figure 7**, Staunton receives commuters mostly from within the Cities of Staunton and Waynesboro.

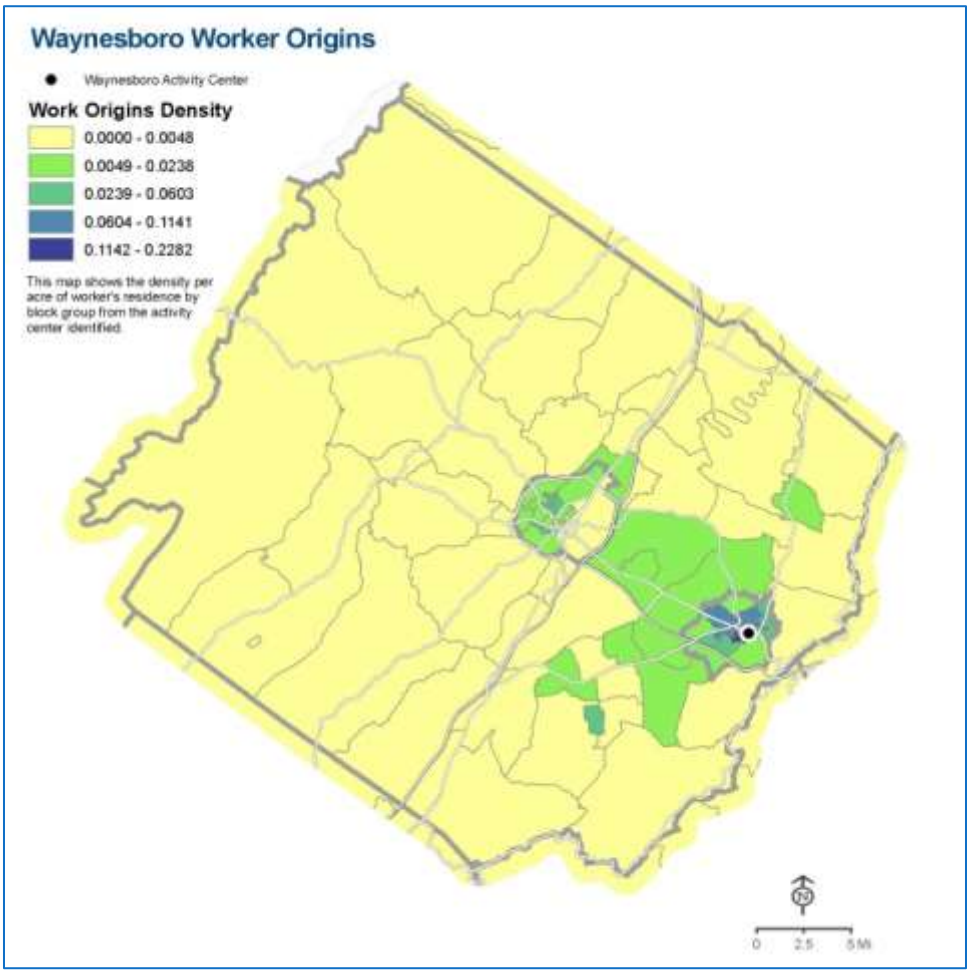
Figure 7: Commuting Patterns to Staunton Activity Center. Source: LEHD



Source: Longitudinal Employer-Household Dynamics (LEHD) program which uses Unemployment Insurance earnings data and the Quarterly Census of Employment and Wages (QCEW) data to create statistics on employment, earnings, and job flows at detailed levels of geography and industry and partially synthetic data on workers' residential patterns, http://lehd.ces.census.gov/.

The Waynesboro activity center receives most of its commuters from both the Cities of Waynesboro and City of Staunton as well as along US 250 between the two cities (**Figure 8**).

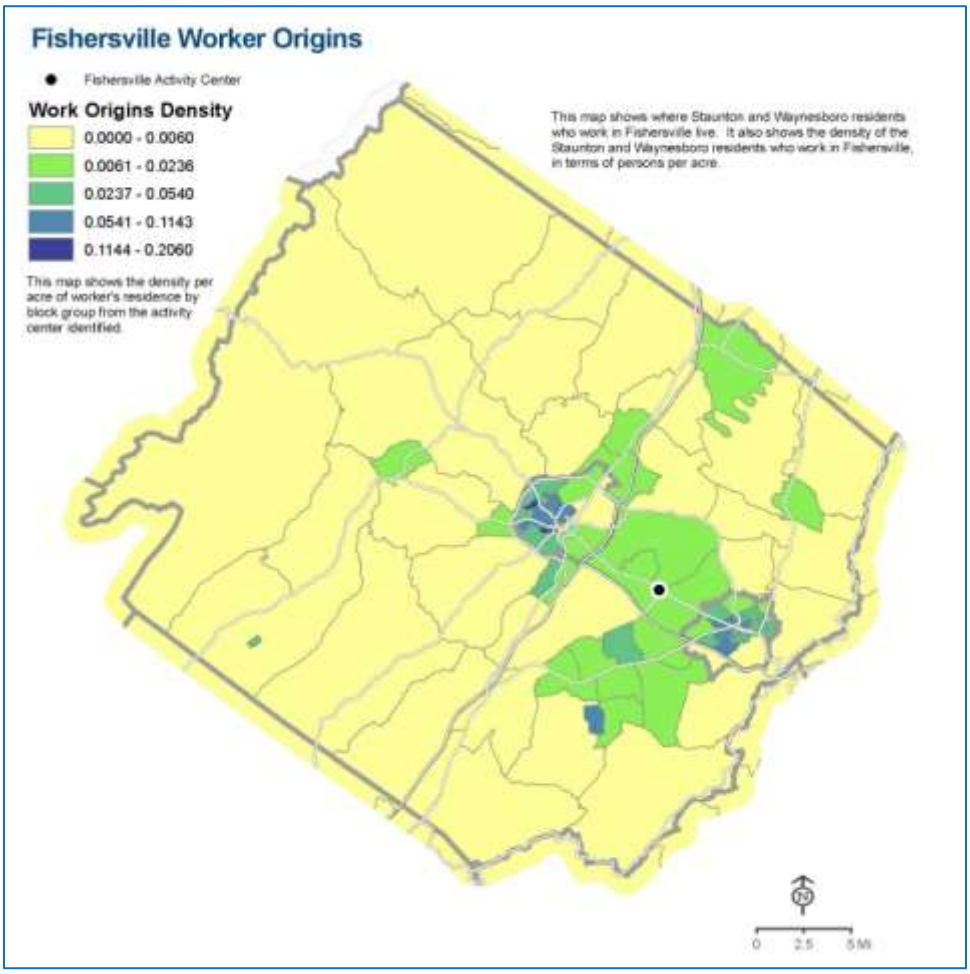
Figure 8: Commuting Patterns to Waynesboro Activity Center



Source: LEHD, http://lehd.ces.census.gov/.

Figure 9 shows that a majority of commuters to the Fishersville activity center originate from the Cities of Waynesboro and Staunton and along US 250 in between the two cities.

Figure 9: Commuting Patterns to Fishersville Activity Center

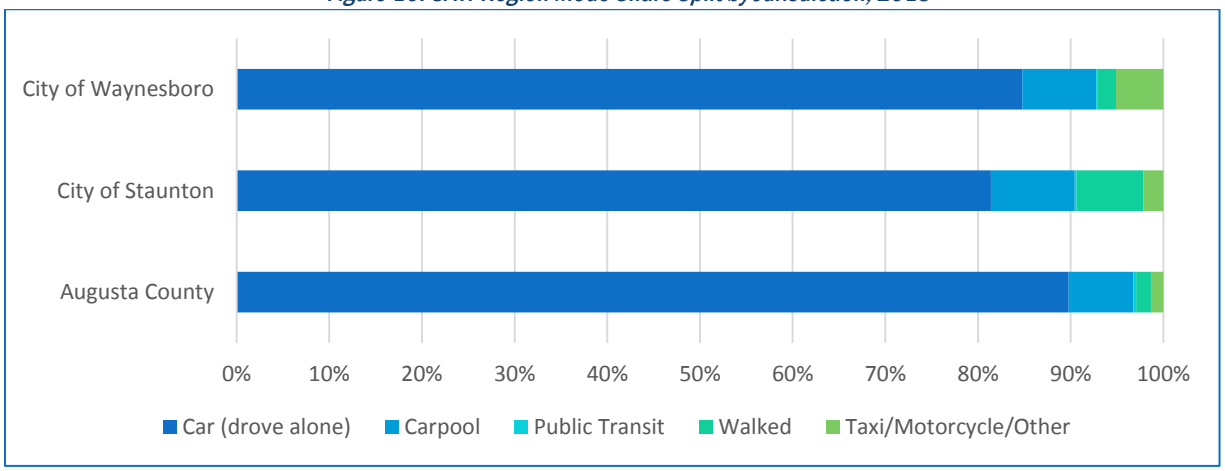


Source: LEHD, http://lehd.ces.census.gov./

Mode Choice

In the SAW Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 79 and 86 percent of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 6 to 8 percent of the mode share. Walking is the highest in the City of Staunton at 7 percent (**Figure 10**).

Figure 10: SAW Region Mode Share Split by Jurisdiction, 2013



Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Average Commute Times

The average commute time in the SAW Region ranges from 19 to 23 minutes among the three jurisdictions (**Table 8**).

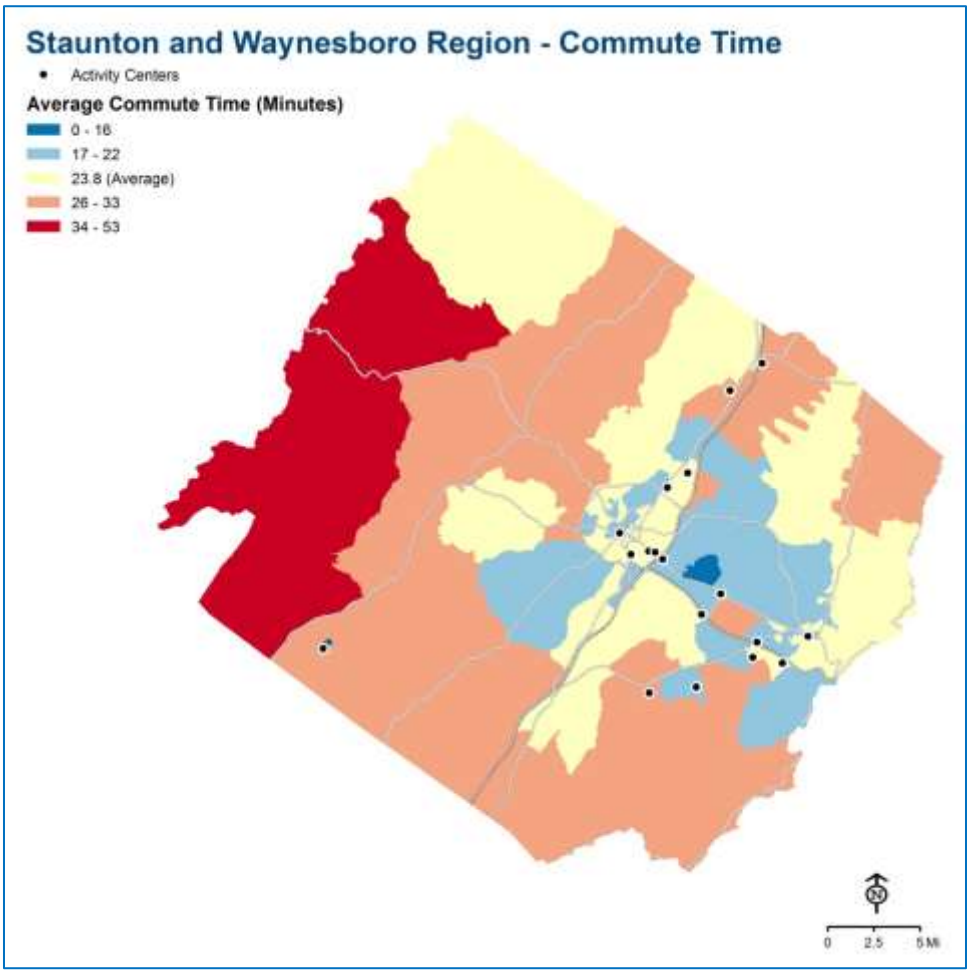
Table 8: SAW Region Mean Commute Time by Jurisdiction, 2013

Jurisdiction	Mean Commute Time (Minutes)
City of Waynesboro	19.5
City of Staunton	19.3
Augusta County	23.6

Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Figure 11 provides a closer look at where longer commutes originate. In the areas outside the cities of Staunton and Waynesboro as well as the area between them, commute times are below average for the region as a whole. Block Groups in rural areas of Augusta County have commute times that are almost double the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

Figure 11: SAW Region Average Commute Times, 2013



Source: US Census Bureau, American Community Survey 2013, 5-Year Estimates.

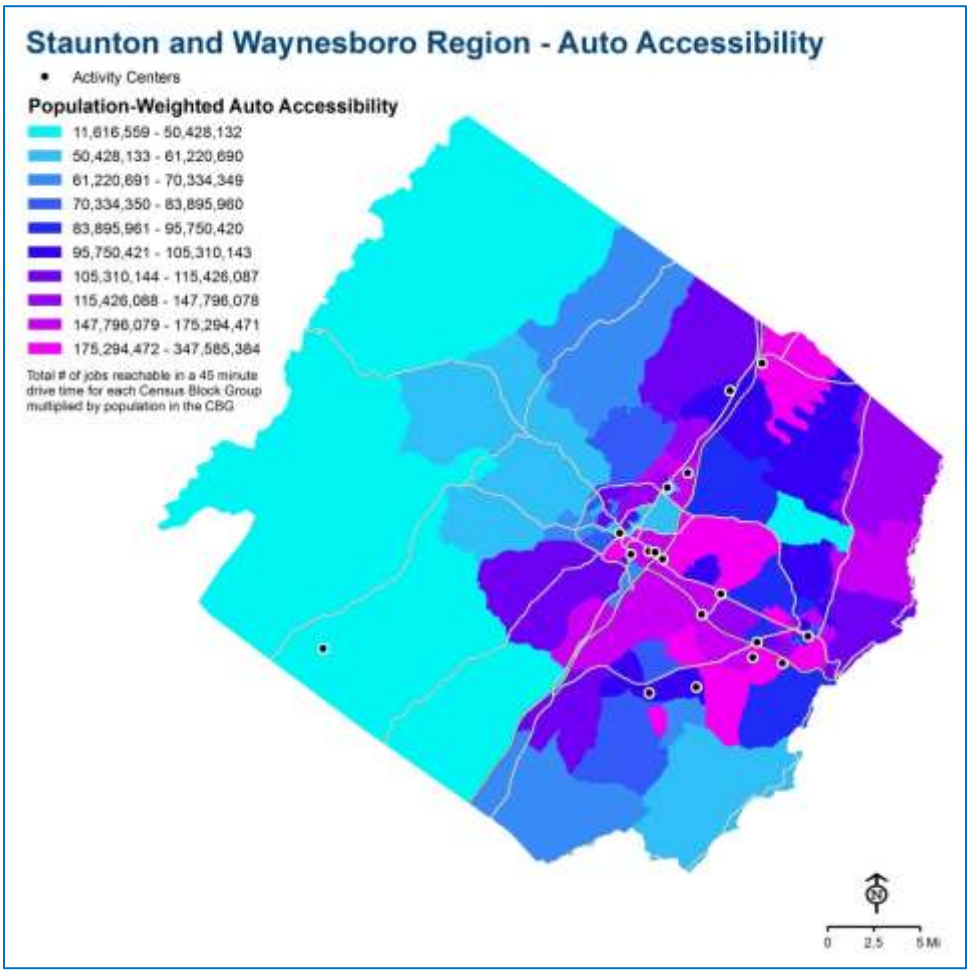
C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between Activity Centers.

Auto Accessibility

Auto Accessibility in the SAW Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. Closer jobs and higher density census block groups are weighted more than jobs further away and less dense census block groups. The areas with the highest level of auto accessibility exist between the cities of Staunton and Waynesboro around the I-64 and US 250 corridors (**Figure 12**). Even the most rural areas of the region are within a 45-minute drive of jobs.

Figure 12: SAW Region Auto Accessibility

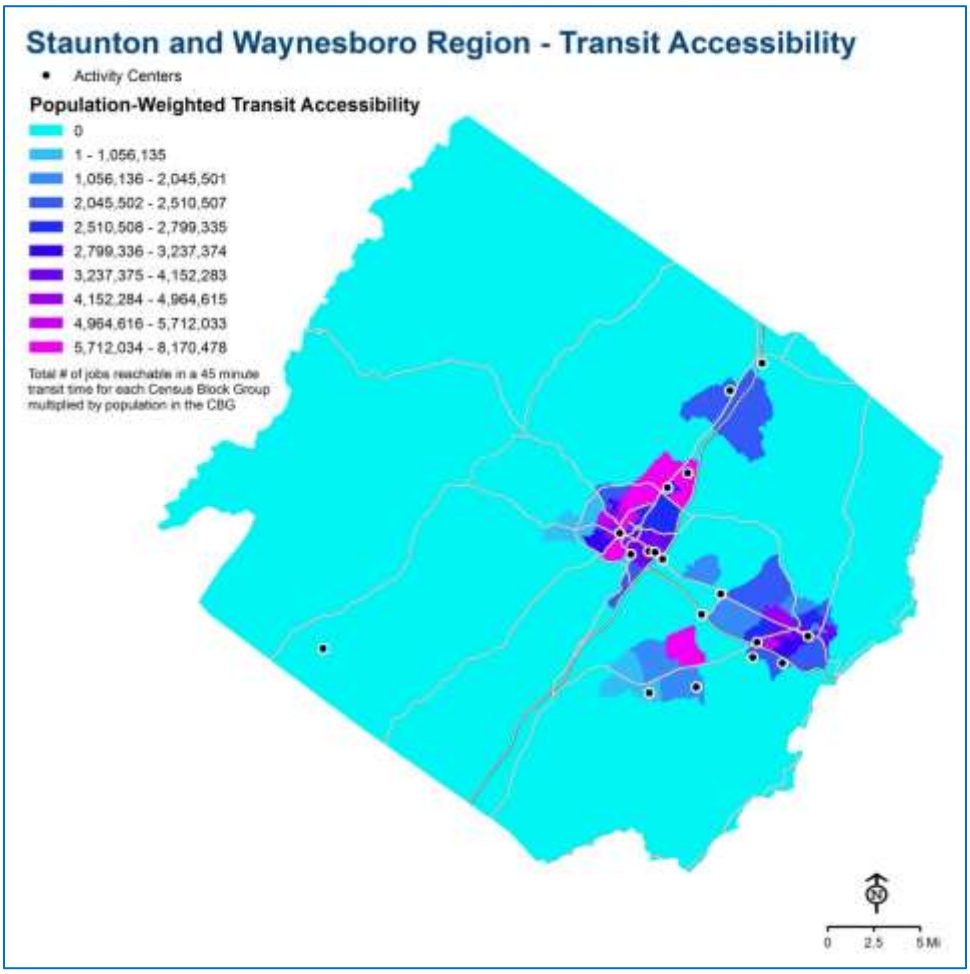


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway speeds developed from FHWA HERE data. InfoUSA Business Data, 2012 was used to calculate employment locations.

Transit Accessibility

Figure 13 illustrates the total number of jobs reachable in a 45-minute transit time for each census block group multiplied by population within that census block group. The fixed-route transit options in the SAW Region are limited to within and between the cities of Staunton and Waynesboro. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs.

Figure 13: SAW Region Transit Accessibility

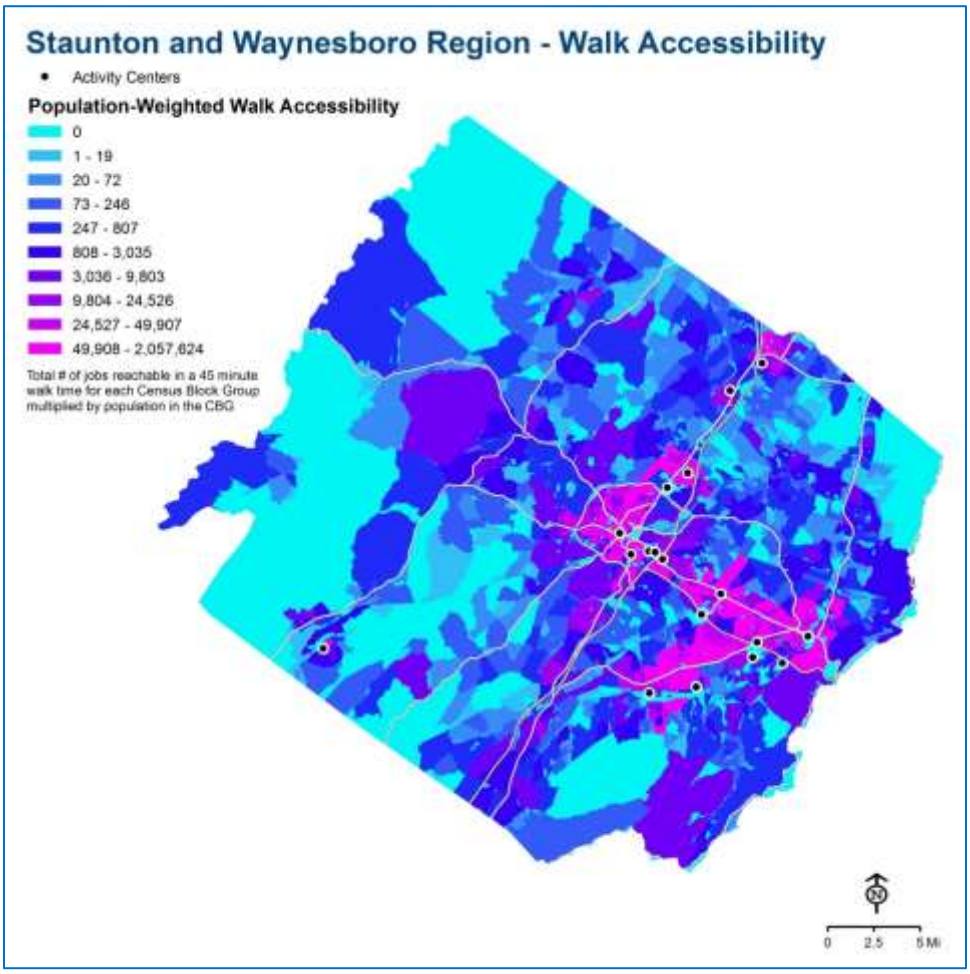


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using General Transit Feed Specification (GTFS) transit data and including walk time to and from stations. InfoUSA Business Data, 2012 was used to calculate employment locations.

Walk Accessibility

Figure 14 reveals a regional pattern of mixed use development in communities where residents live within walking distance of thousands of jobs and/or the services represented by those jobs. The cities of Staunton and Waynesboro as well as the corridors of US 250 and US 340 scored the highest, as was expected. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility.

Figure 14: SAW Region Walk Accessibility

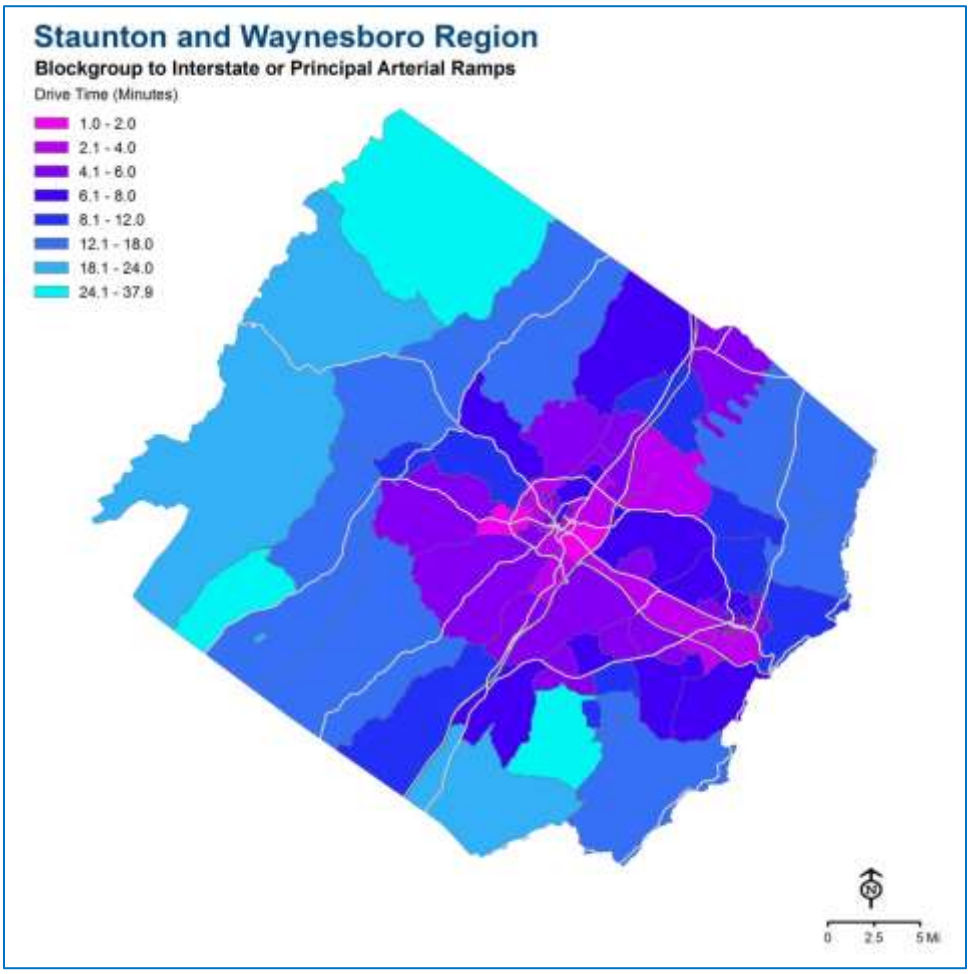


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway characteristic data to interpolate walkability. InfoUSA was used to calculate employment locations.

Freight Accessibility

In addition to railways, I-81 and I-64 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most Activity Centers in the region are within an eight minute drive from a major arterial ramp (**Figure 15**).

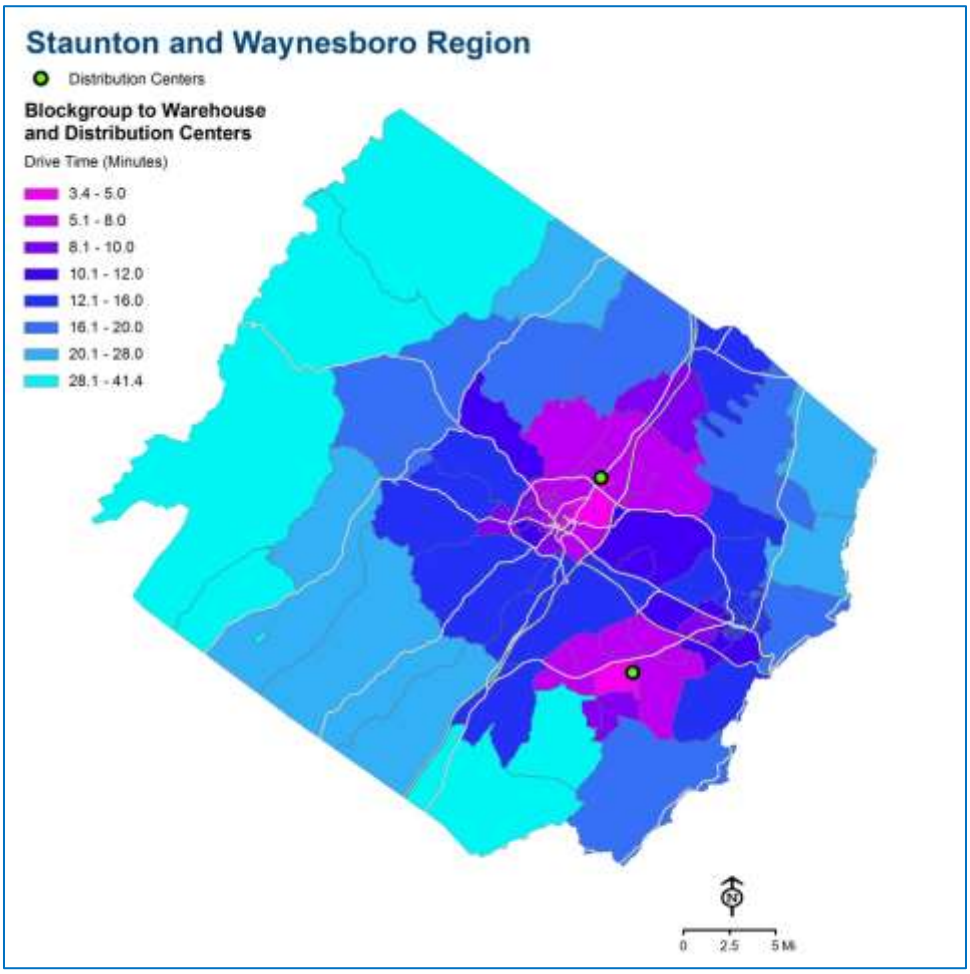
Figure 15: SAW Region Access to Interstate and Principal Arterial Ramps



Source: GIS analysis conducted using US Census Boundary Files, ramps from Navteq database.

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. The warehouses and distribution centers are located off of US 11 and US 340. About half of the region, specifically the areas near the cities of Staunton and Waynesboro, has access to a warehouse or distribution center within a 16 minute drive (**Figure 16**).

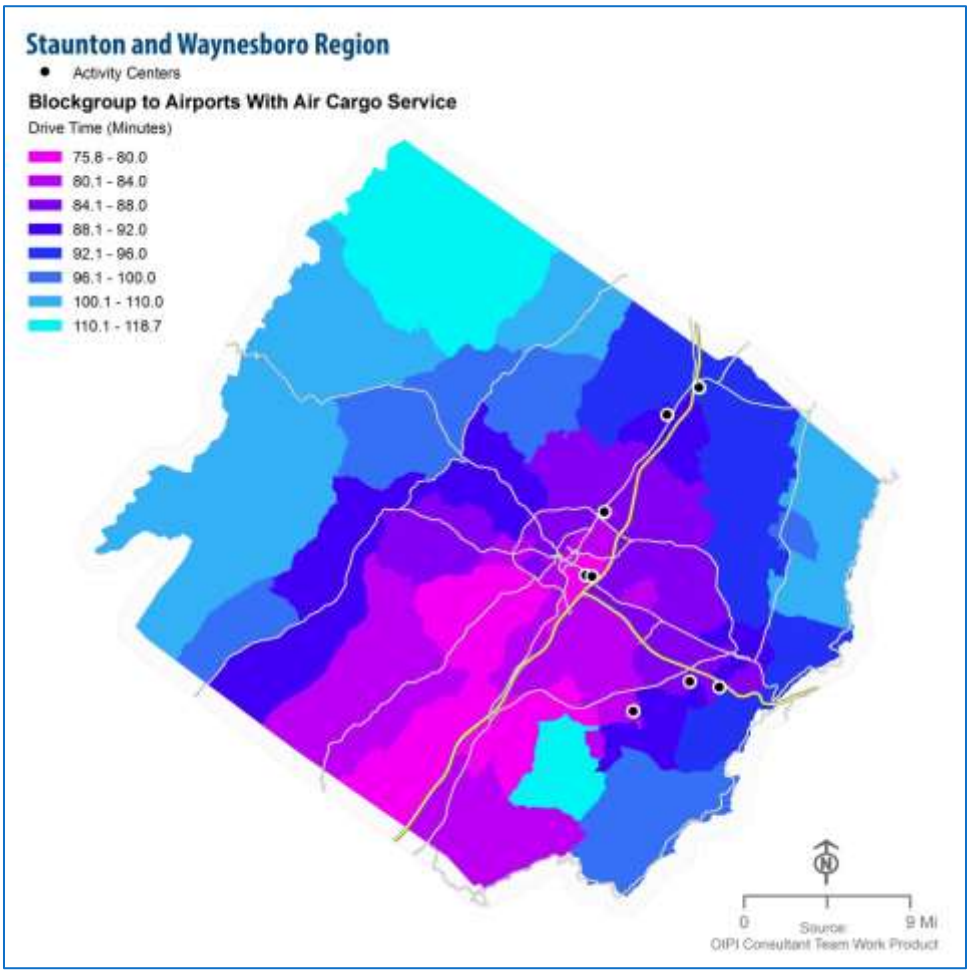
Figure 16: SAW Region Access to Warehouses & Distribution Centers



Source: GIS analysis conducted using US Census Boundary Files and Virginia Office of Intermodal Planning and Investment data on Warehouse and Distribution Center Locations.

Figure 17 displays proximity to commercial service airports that handle air cargo, which is important for some types of freight distribution. In general, the SAW Region is within a 75 minute to 2 hour drive to the closest airport that handles air cargo.

Figure 17: SAW Region Access to Airports with Air Cargo Service



Source: GIS analysis conducted using US Census Boundary Files and location of airports with air cargo service.

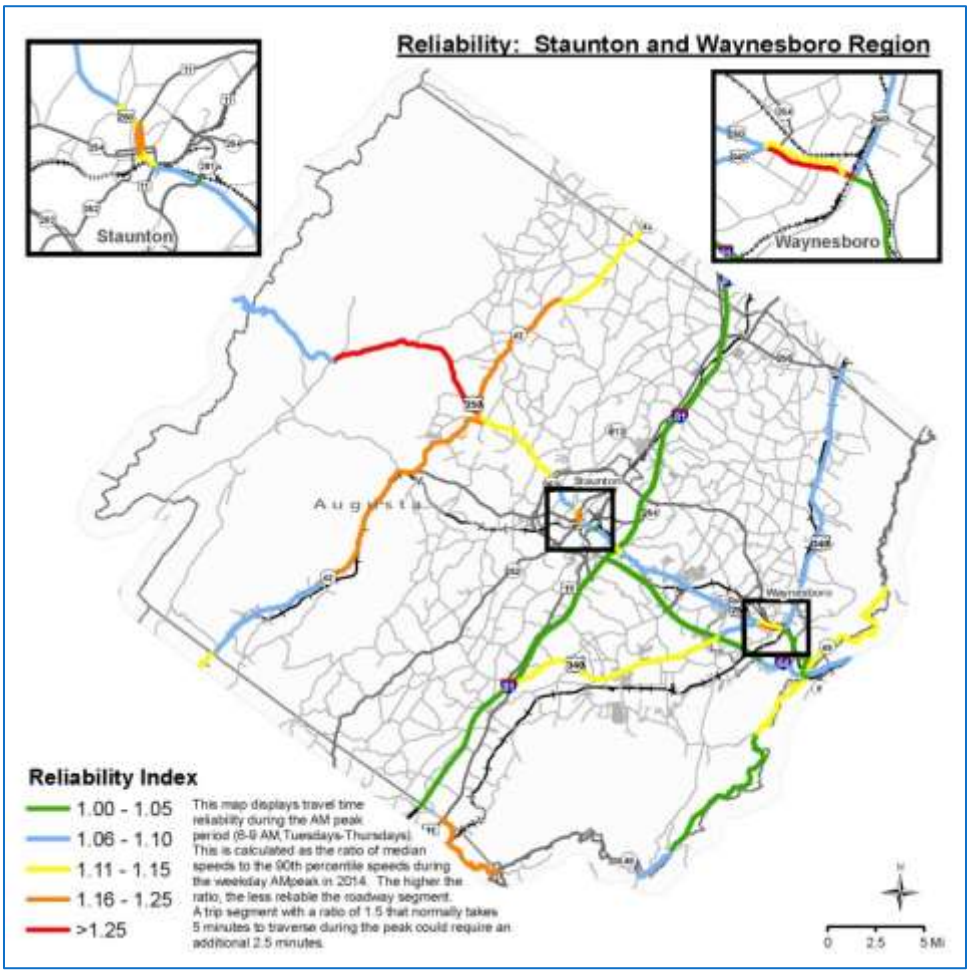
D. Roadway Measures

This assessment identified the transportation conditions in the SAW Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in **Figure 18** below, is defined as the ratio of the 80th percentile travel time during the weekday AM peak period in 2014. Overall, scores indicate that travel time is very reliable for the corridors with available data. The US 250 corridor west of VA 42 has a slightly higher travel time reliability index compared with the other corridors analyzed, however, it equates to a few minutes of additional travel time.

Figure 18: SAW Region Travel Time Reliability

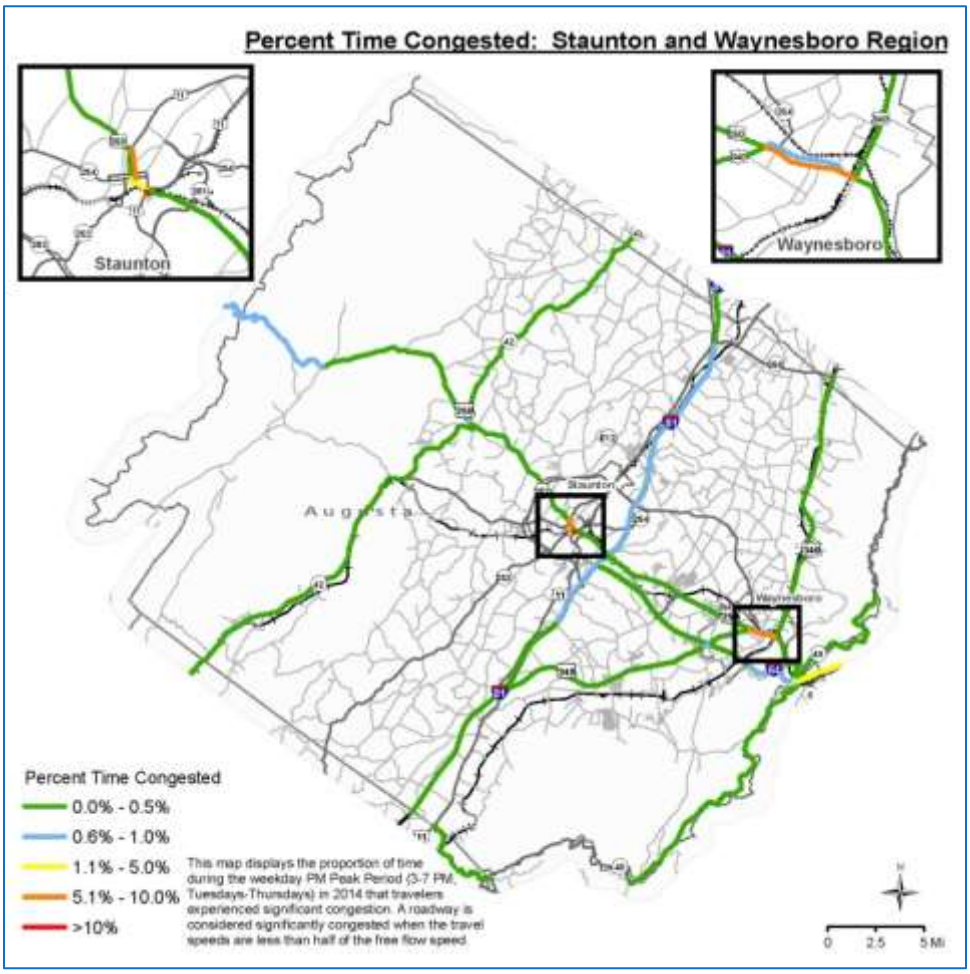


Source: INRIX Data and Virginia Department of Transportation
Note: the Reliability Index is based on a statewide scale which may skew the scores for the SAW Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Percent of time congested is an important determinant of roadway Level of Service. The percentage of time congested was calculated for evening peak times in 2014. According to the analysis, a majority of the corridors analyzed are congested less than 0.5 percent of the time (**Figure 19**). A few intersections on US 250 within the Cities of Staunton and Waynesboro experience slight congestion.

Figure 19: SAW Region Percent of Time Congested

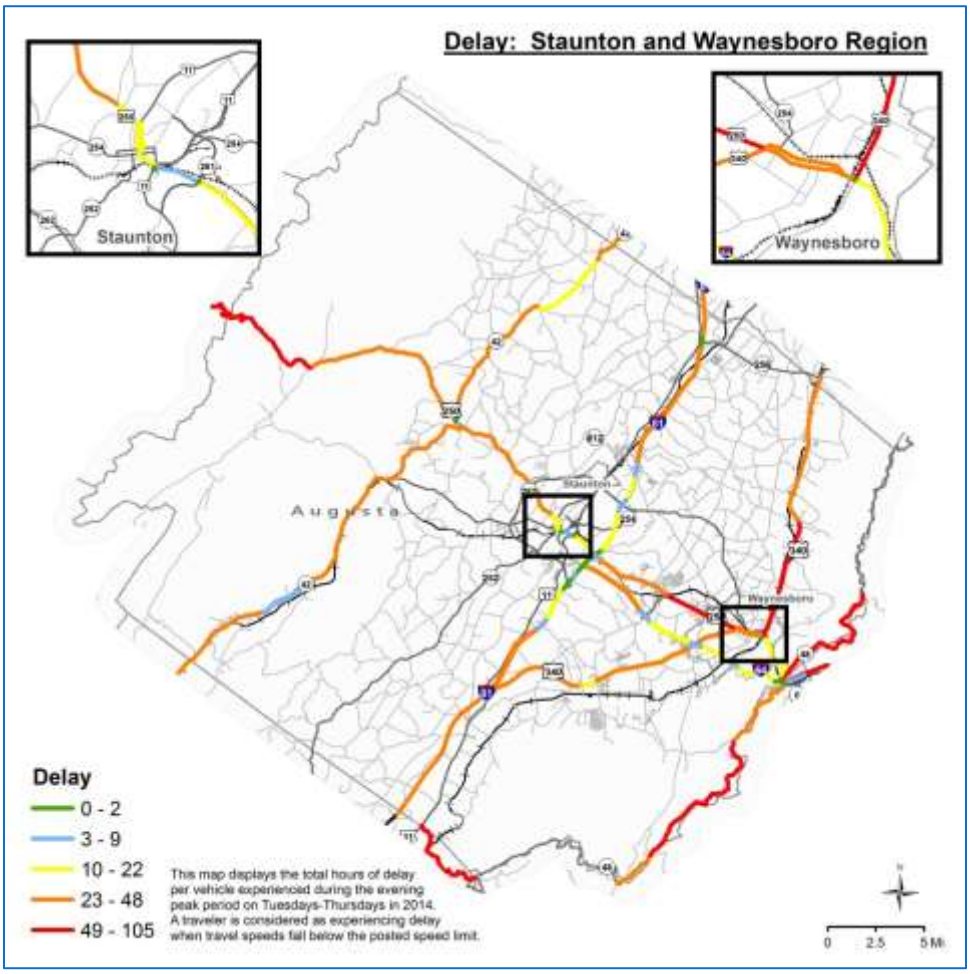


Source: INRIX Data and Virginia Department of Transportation

Travel Time Delay

Travel time delay is defined as the total hours of delay per vehicle during weekday evening peak times in 2014. If travel speeds fall below the posted speed limit, a trip is considered delayed. In the SAW Region, the most significant delays occurred along portions of US 250, US 340, and VA 48 (**Figure 20**).

Figure 20: SAW Region Travel Time Delay

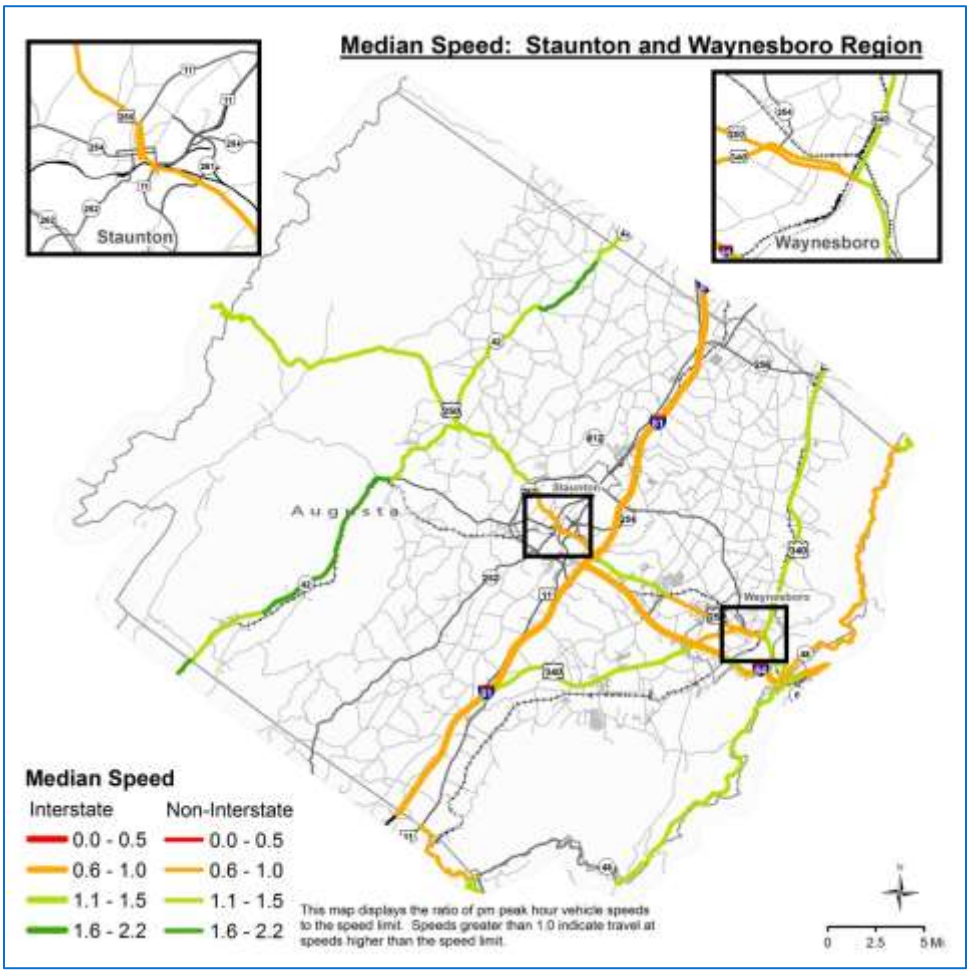


Source: INRIX Data and Virginia Department of Transportation.

Median Speeds

The median speed map (**Figure 21**) displays the ratio of pm peak hour vehicle speeds to the speed limit for both interstate and non-interstate corridors in 2014. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The I-81 corridor and portions of the I-64 corridor, US 250 corridor, and VA 48 experience median speeds of less than 1.0.

Figure 21: SAW Region Median Speeds



Source: INRIX Data and Virginia Department of Transportation.

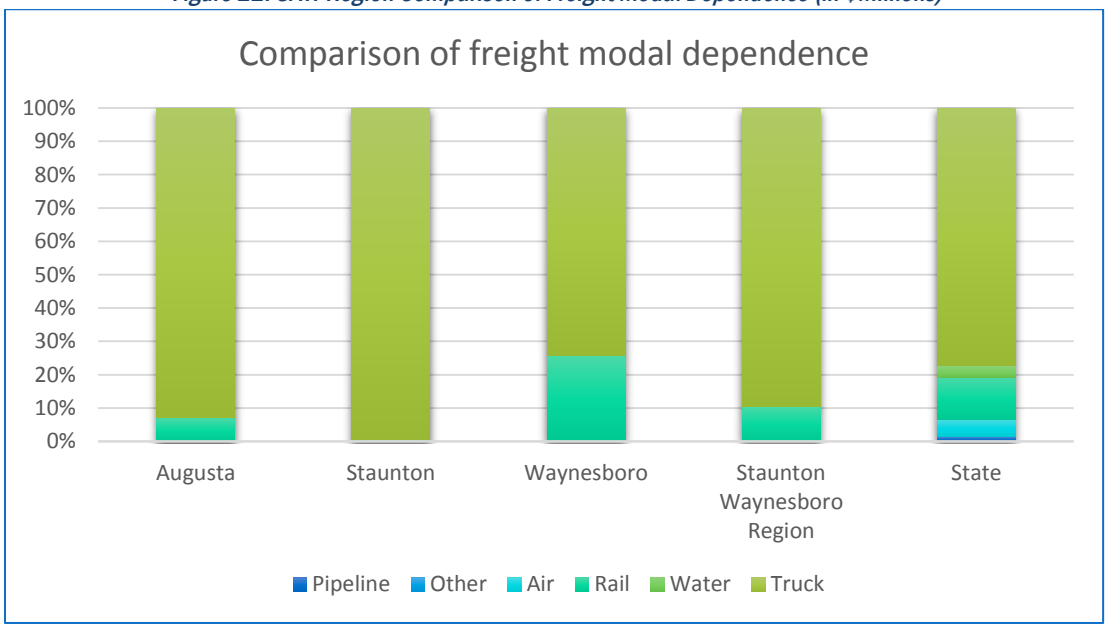
D. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are specific to the regional and local commodity flows via the various freight corridors in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the SAW Region, about 90 percent of the dollar value of all goods that are moved through the region are moved by truck (**Figure 22**). The region does not utilize pipeline, air, or water freight modes. In comparison to the other jurisdictions in the region, the City of Waynesboro has the largest dependence on rail service at nearly 25 percent, but the region as a whole is not nearly as dependent on rail service.

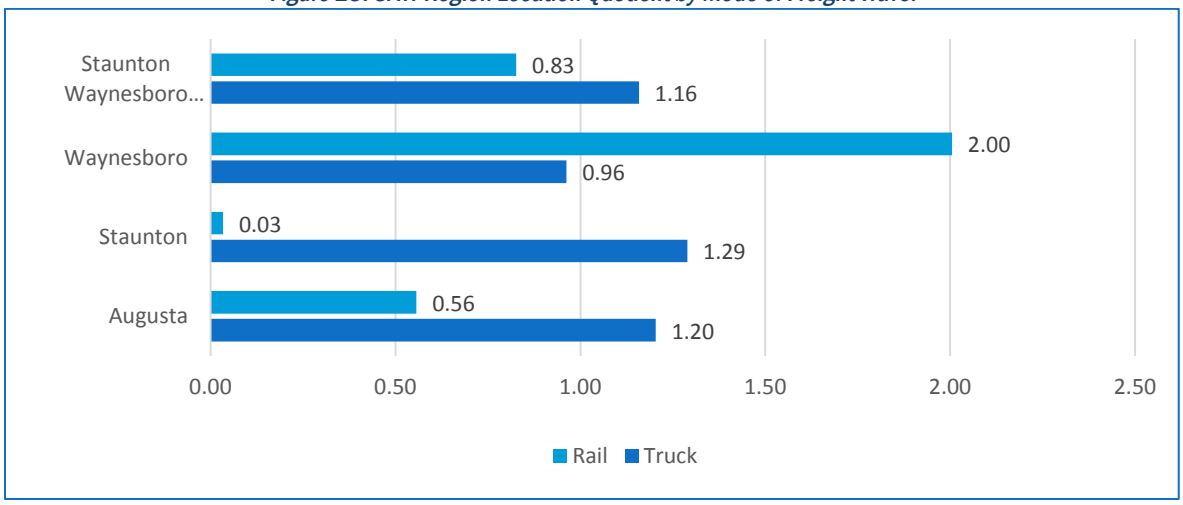
Figure 22: SAW Region Comparison of Freight Modal Dependence (in $Millions)



Source: TranSearch, 2012

Location Quotients are used to compare the prominence of freight modes between the SAW Region, and the State as a whole. The SAW Region relies on rail for freight movement only 0.83 times and on trucks for freight movement 1.16 times more than the State does as a whole. The City of Waynesboro however relies on trucks for freight movement 2.0 times more than the State does as a whole (**Figure 23**).

Figure 23: SAW Region Location Quotient by Mode of Freight Travel

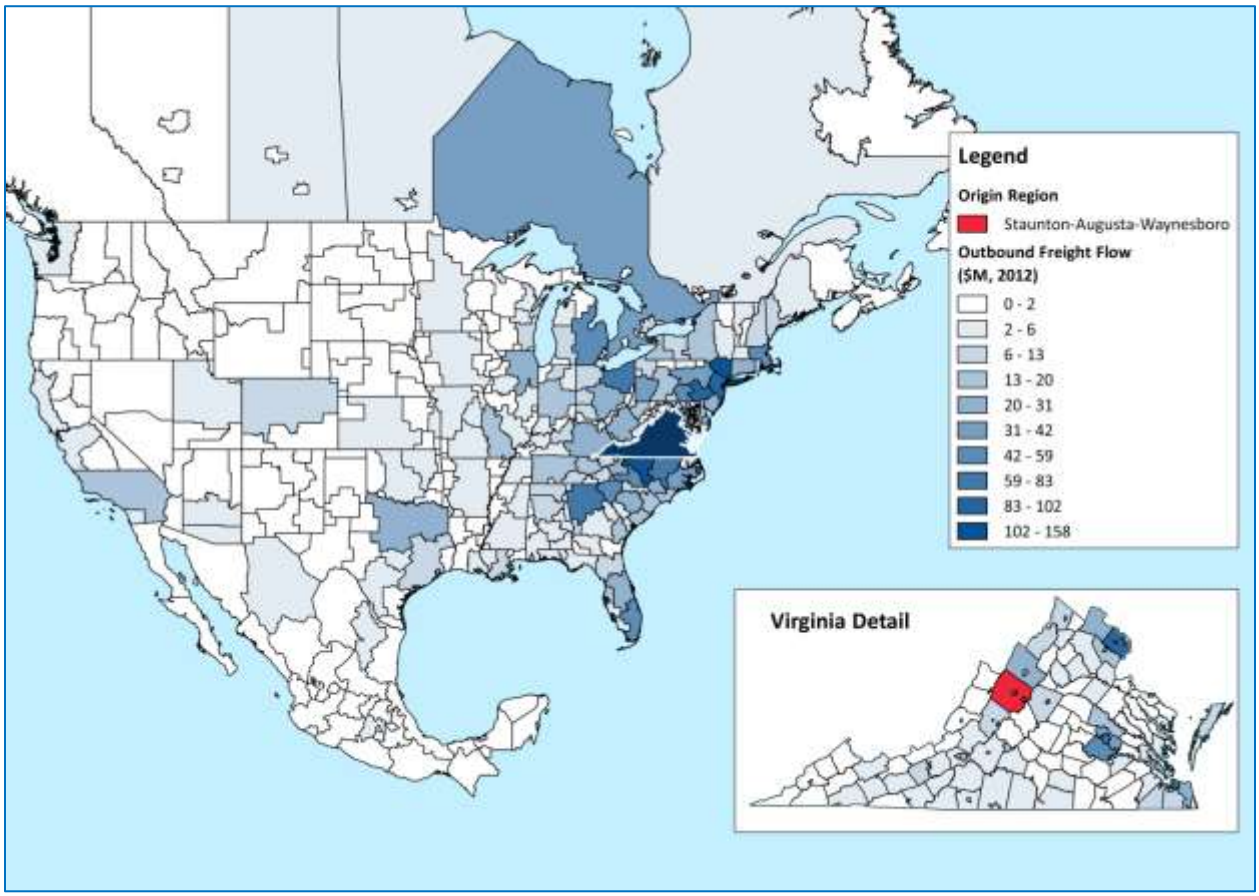


Source: TranSearch, 2012

Top Commodities

Outbound locations for freight by value from the SAW Region in 2012 are shown in **Figure 24**. A majority of the freight in terms of value originating in the region is destined for counties in Virginia and states along the eastern seaboard.

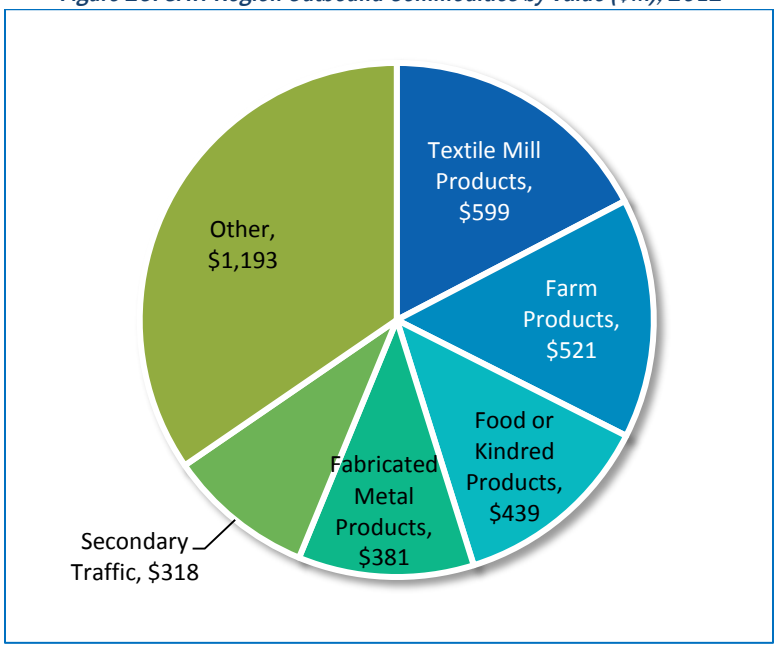
Figure 24: Outbound Freight Flow from the SAW Region, 2012



Source: TranSearch, 2012

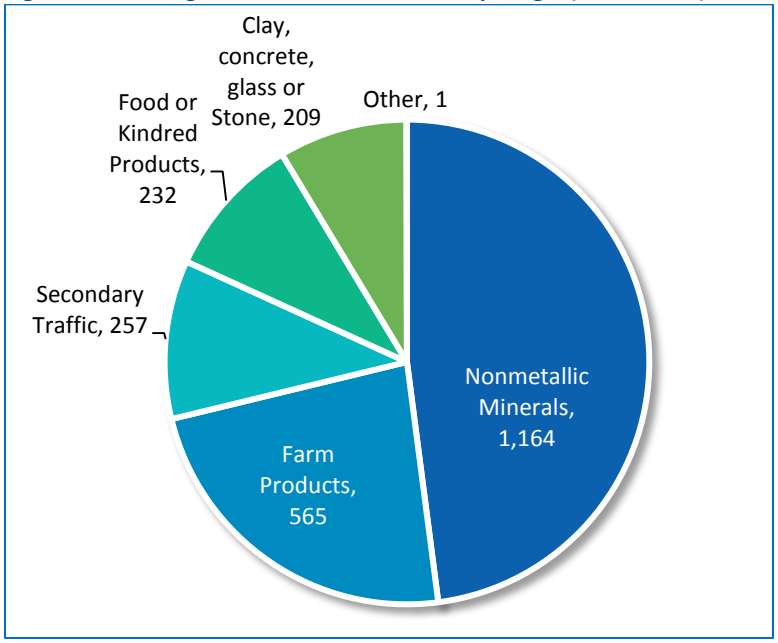
Figures 25 and 26 summarize the value and tonnage of commodities that originated in the SAW Region in 2012. The largest commodity in terms of value is textile mill products. The other category includes all the remaining commodities less than the top five shown in **Figure 25** so it does not accurately represent the largest commodity. The largest commodity by weight was nonmetallic minerals at almost 38 percent of the total commodities by weight.

Figure 25: SAW Region Outbound Commodities by Value ($M), 2012



Source: TranSearch, 2012

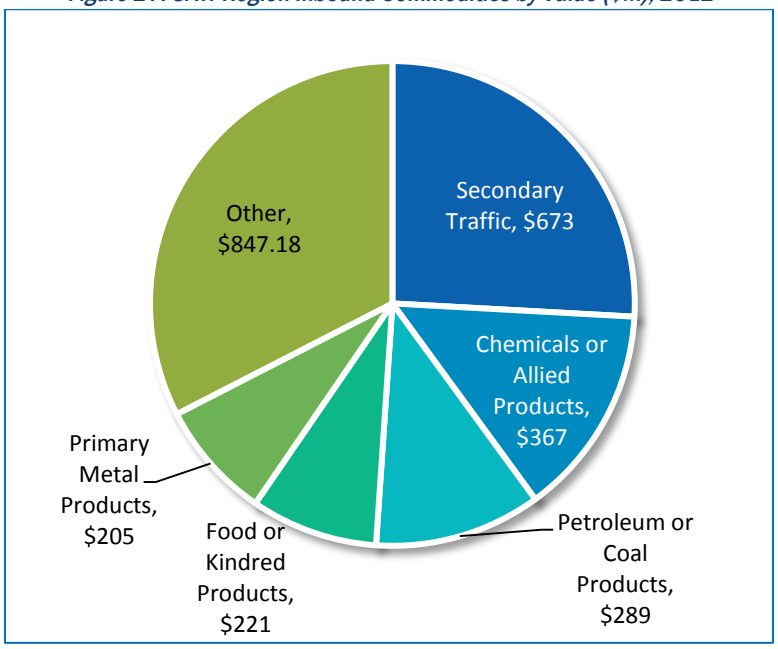
Figure 26: SAW Region Outbound Commodities by Weight (000s of Tons), 2012



Source: TranSearch, 2012

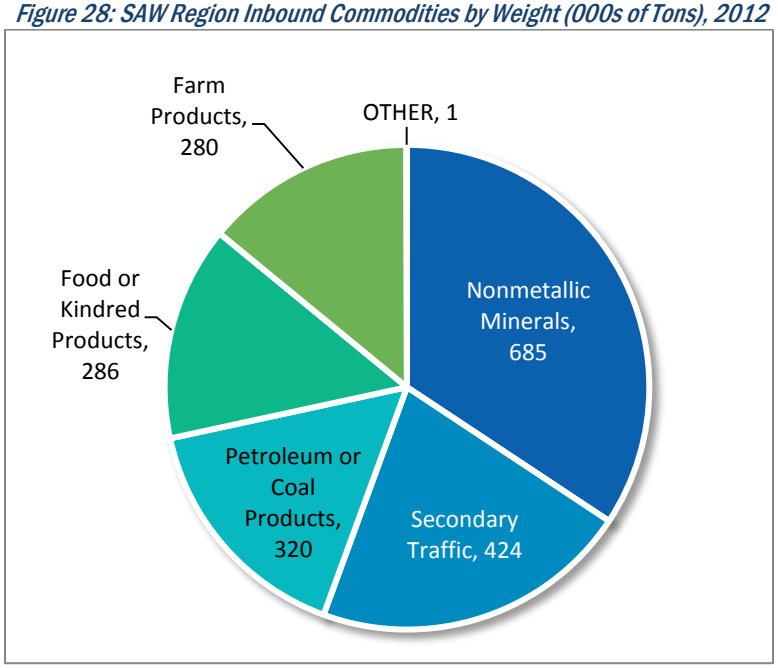
Figures 27 and 28 summarize the value and tonnage of commodities that were destined for the SAW Region in 2012. The largest commodity in terms of value is secondary traffic at over 25 percent. Secondary traffic includes warehouse and distribution center, rail intermodal drayage to and from ramp, and air freight drayage to and from airport. The largest commodity by weight was nonmetallic minerals.

Figure 27: SAW Region Inbound Commodities by Value ($M), 2012



Source: Transearch, 2012.

Figure 28: SAW Region Inbound Commodities by Weight (000s of Tons), 2012



Source: Transearch, 2012.

4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the SAW Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs. These Needs were categorized into a series of five very broad types of capacity Needs (Passenger and Freight Reliability, Bottleneck Relief, Modal Choice and Walkability), as well as general Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs). The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the OIPI team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The OIPI consultant team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and **Table 9** only represents

where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 9: Economic and Transportation Correlation

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the SAW Region, it showed a predominance among the Local Serving economic sector at 48 percent with a relatively equal distribution among the Freight Dependent and Knowledge-Based economic sectors for the remainder (28 percent Freight Dependent and 24 percent Knowledge-Based). As outlined in the Economic and Transportation Correlation table above, the Local sector priority transportation needs include highway access, passenger reliability, network connectivity, access to transit and modal choice.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire to continue to support the dominant manufacturing sector, particularly with respect to goods movement

needs, but also to support the expected growth of the health care, high tech and tourism industries with the need for reliable commuting and additional modal travel options.

This translates into transportation needs such as freight and passenger reliability on the region's primary corridors, such as I-81 and I-64. It also indicates the need for addressing any bottlenecks along these corridors to further support reliable travel for both commuters and goods movement as well as provide improved modal choices and transportation demand management for commuters. In addition, key corridors US 250 and US 11 support multiple existing and emerging activity centers in the region as important commuter routes and serve economic growth in the Cities of Staunton and Waynesboro.

The forecasted growth in the Local Serving economic sector for this region brings the potential for additional transportation needs such as walking, bicycling and transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding modal choices, both within the region's economic activity centers, and between the centers. Fixed route transit exists in the region within the Cities of Staunton and Waynesboro as well as along US 11 and US 250. However, the expansion of the local serving industries would benefit from both additional fixed route transit in the region and additional transportation demand management programs to provide better workforce access. Further support for the Local Serving sector would also come from enhanced walkable and bikeable places.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

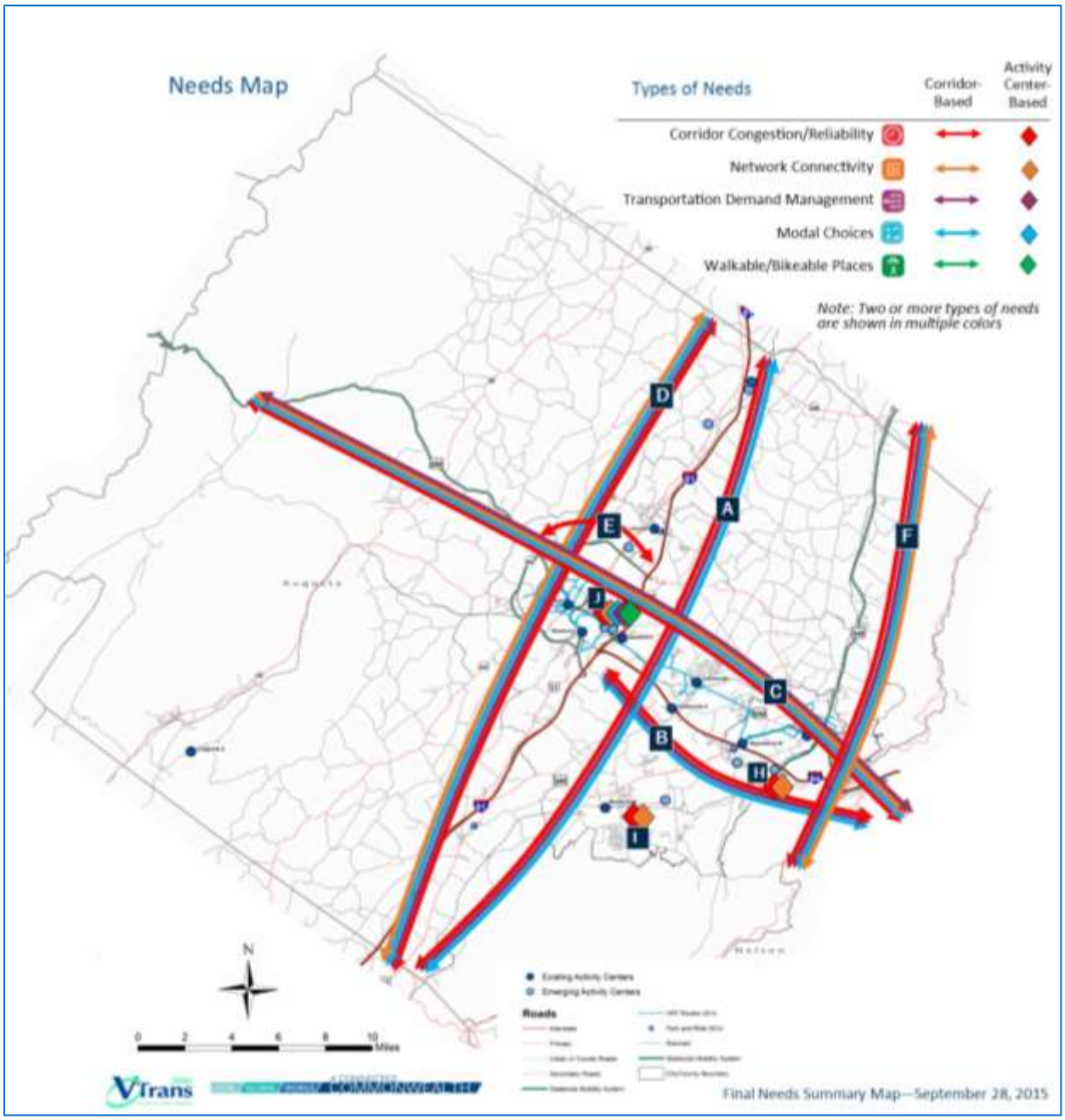
Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below (**Figure 29**) summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Figure 29: Summary Needs Map for the SAW Region



Findings of Needs

Table 10 below lists each of the identified Transportation Needs in the Region and describes the basis for each Need in terms of economic and transportation findings and data:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized in the economic and transportation profiles. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 30: Transportation Icons for Needs Assessment



Table 10: Findings of Needs for the SAW Region

A.	**I-81 Corridor and Interchanges**	
Need		**The I-81 corridor serves as a major north/south artery in the region and the state handling both commuter and freight traffic and connects Augusta County to other parts of Virginia. There is a need to mitigate inconsistent travel times for passengers and freight. There is also a need for transportation demand management services and modal choices within the corridor to improve commutes and access to residential and tourist destinations.**
Economic		There are a number of existing and emerging activity centers along the I-81 corridor that serve local, freight dependent, and knowledge-based industries for both goods movement and commuter traffic. The corridor is an essential and high-priority corridor for freight movement. It connects activity centers of all types and supports tourism.
Transportation		I-81 has intermittent passenger and freight reliability and bottleneck issues at several interchanges in the region. The lack of reliability is due to frequent incidents, rather than persistent congestion. Additional modal choices for passenger service to inter-regional markets are vital to supporting the regional economy. Multimodal access to jobs is lacking. I-81 accommodates high volumes of through freight traffic. Studies from VDOT have identified the I-81/I-64 interchange to have safety concerns. Exit 235 is anticipated to experience future congestion/reliability concerns as the emerging Weyers Cave activity center develops in the future.

B.	**I-64 Corridor and Interchanges**	
Need		**The I-64 corridor is a major east/west artery in the region connecting I-81 to destinations to the east, and accommodates high volumes of commuter and freight traffic. There is a need to improve connections to work, recreational and tourism destinations outside of the region. There is also a need to address the acute congestion experienced near Waynesboro. Transportation demand management services, improved access to modal choice and spot capacity improvements can improve mobility on this corridor.**
Economic		There are a number of existing and emerging activity centers along the I-64 corridor that serve local, freight dependent, and knowledge-based industries for both goods movement and commuter traffic. The corridor is an essential and high-priority corridor for freight movement. It connects activity centers of all types and supports tourism.
Transportation		I-64 has intermittent passenger and freight reliability and bottleneck issues at multiple interchanges in the region. Additional modal choices for passenger service to inter-regional markets are vital to supporting the regional economy. Multimodal access to jobs is lacking. Studies from VDOT have identified the I-81/I-64 interchange to have safety concerns.

C. US 250 Corridor

Need



The US 250 corridor is an east/west artery in the region and is parallel to I-64 in the eastern part of the region. Multiple existing and emerging activity centers located along the corridor serve both passengers and freight traffic. There is a need for improved network connectivity, improved reliability for freight and passengers, transportation demand management services and additional modal choices in this corridor.

Economic



There are a number of existing and emerging activity centers along the US 250 corridor that serve local, freight dependent, and knowledge-based industries for both freight and commuter traffic.

Transportation



Major connector between several activity centers and an alternative travel corridor when there are incidents on I-64. US 250 also serves as a commuting corridor from West Virginia and Highland County into Augusta County. The corridor lacks multimodal access to jobs and handles some through freight traffic.

D. US 11 Corridor

Need



The US 11 corridor is a north/south artery, parallel to I-81, that serves as an alternative to I-81. Several existing and emerging passenger and freight activity centers are located along or near the corridor. There is a need for improved passenger and freight reliability, improved opportunities for alternative mode choices and improved transportation demand management.

Economic



There are a number of existing and emerging activity centers along the US 11 corridor that serve local, freight dependent, and knowledge-based industries for both freight and commuter traffic.

Transportation



Major connector between several activity centers and alternative travel corridor when I-81 is congested due to incidents. The corridor lacks multimodal access to jobs and handles some through freight traffic.

E. VA 262 Corridor

Need



The VA 262 corridor accommodates passenger and freight traffic in the Staunton area. There is a need to mitigate acute congestion points along the corridor from I-81 to US 250.

Economic



Provides access to the activity centers in Staunton as well as the Verona activity center.

Transportation



Incident reliability and bottleneck issues due to industrial growth and intersection safety at VA 613.

F. US 340 Corridor

Need



The US 340 corridor is a north/south connector in the eastern part of the region that serves commuters and freight traffic. There is a need for improved corridor reliability, transportation demand management services, modal choices and network connectivity as activity centers near the corridor continue to grow.

Economic



There are a number of existing and emerging activity centers along the US 340 corridor that serve local, freight dependent, and knowledge-based industries for both freight and commuter traffic.

Transportation



Regional connector between activity centers and commute destinations outside the region. The corridor lacks multimodal access to jobs and handles some through freight traffic.

G. Various Activity Centers in the Region

Need



There are bus transit services within the Cities of Staunton and Waynesboro and along US 250 between the two as well as along US 11 between the City of Harrisonburg and City of Staunton. However, multiple existing and emerging activity centers serving local industries as well as regional outdoor recreation destinations in the region lack connectivity to transit, pedestrian and bicycle facilities. Improved network connectivity is needed as these activity centers grow and expand.

G. Various Activity Centers in the Region

Economic



Supports local serving, freight-dependent, and knowledge-based industries in existing activity centers, including but not limited to, the Staunton, Staunton South, Fisherville, Fisherville South, Verona, Weyers Cave, and Waynesboro activity centers. It also supports the various emerging activity centers.

Transportation



Existing connections between and within activity centers lack efficient modal choices. Improved walkable and bikeable places would enhance existing communities. Transportation demand management services could also assist commuters with access to jobs.

H. Emerging Activity Centers at VA 340/Delphine

Need



Freight dependent and local serving activity centers are emerging near the intersection of VA 340 and Delphine. There is a potential need for improved freight access and network connectivity to accommodate anticipated growth in freight movement and passenger travel.

Economic



Supports freight dependent and knowledge-based emerging activity centers.

Transportation



The emerging activity centers will need efficient access for both passengers and freight to travel corridors.

I. Stuarts Draft Activity Centers

Need



The freight dependent Stuarts Draft activity center lacks network connectivity and would benefit from improved freight access to US 340. There is also a need for improved passenger reliability in the area.

Economic



Supports an existing freight dependent activity center.

Transportation



The freight dependent activity center lacks network connectivity for efficient freight access to US 340 which would improve freight and passenger reliability in the area.

J. Staunton Crossing Emerging Activity Center

Need



The Staunton Crossing activity center is expected to grow in the next 10 years in freight dependent, local serving and knowledge-based industries. There is a need for improved freight access with a railroad siding as well as improved passenger reliability. The emerging activity center would be enhanced by incorporating access to walking, biking and transit.

Economic



Supports an emerging freight dependent, local serving, and knowledge-based activity center.

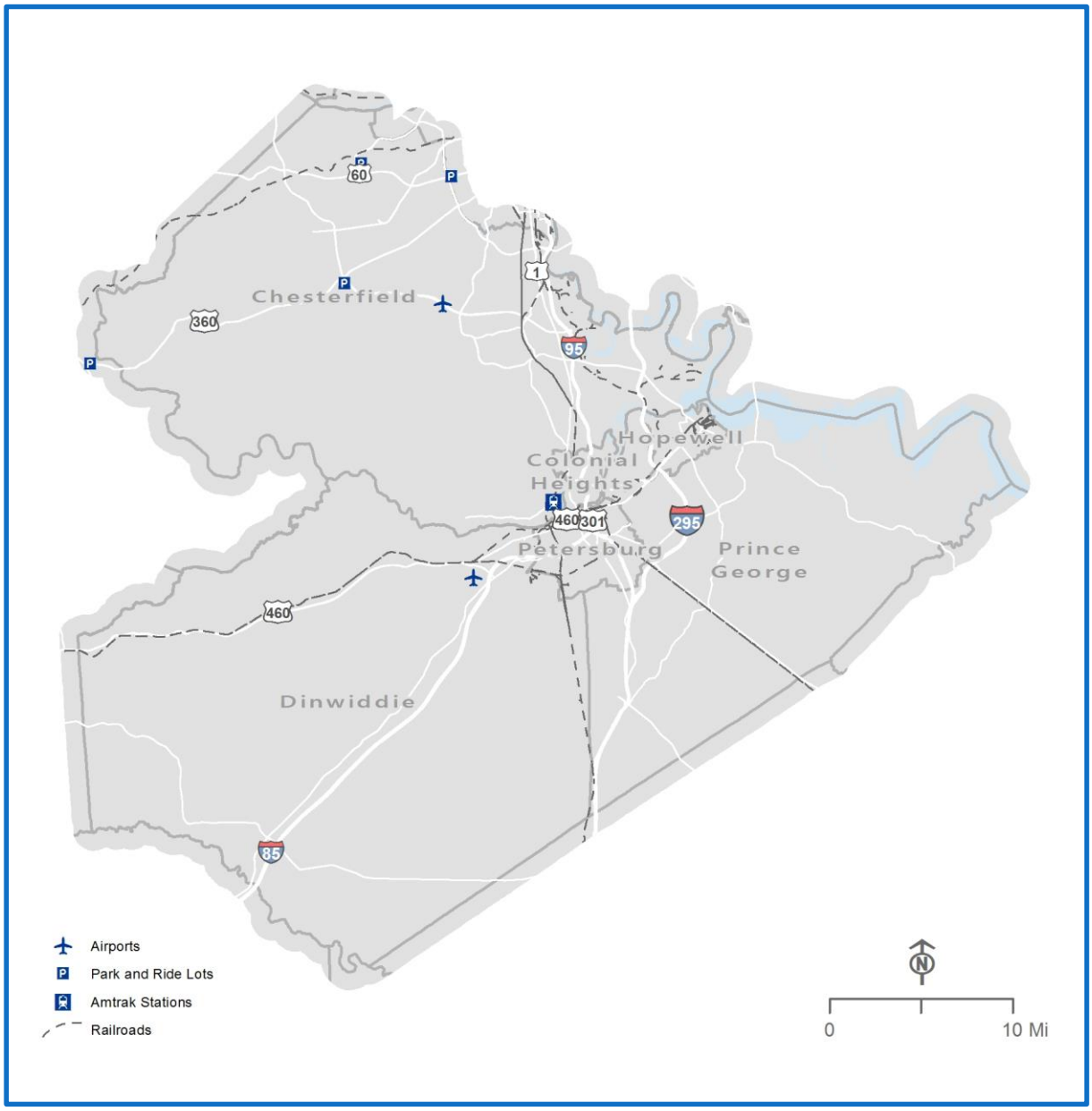
Transportation



The emerging activity center is expected to be a major retail, freight and tourism destination for the region. Network connectivity in the area would benefit new freight and passenger traffic movements. Modal choices and supporting transportation demand management would benefit access to jobs in the activity center.

VMTP 2025 Needs Assessment

Regional Needs Profile



Tri-Cities Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. Based on the VTrans2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Tri-Cities Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the Tri-Cities Regional Network, and that would support regional industries and workforces.

Defining a Regional Network

Transportation needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Tri-Cities regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

This portion of the VMTP 2025 Needs Assessment is for a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of Regional Networks will be developed as part of the outreach process in working with each region, as explained in the Regional Network Needs Assessment Introduction.

For the purpose of the needs analysis, the Tri-Cities Region consists of the City of Petersburg, the City of Hopewell, the City of Colonial Heights, the Dinwiddie County, Prince George County, and Chesterfield County.

2. Economic Profile

A. Introduction

The trends analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape transportation needs.

The Study Team used available data from state and national sources, as well as input from Tri-Cities stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the Woods & Poole *2014 State Profile*, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million people. Statewide per-capita incomes are expected to rise 21%, from $44,765 to $54,226.

Table 1: Statewide Population Projections. Sources: Woods & Poole, Weldon Cooper.

Current Population (2012)	Weldon Cooper Projection (2025)	Woods &Poole Projection (2025)
8,185,867	9,203,977	9,740,553

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Regional Demographics

As evident in Table 2, substantial population growth is projected for the Tri-Cities Region. Projections estimate 8,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Bristol Region Population Projections.

Current Population (2012)	Weldon Cooper Projection (2025)
136,735	144,764

Sources: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012, and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC

Table 3 provides a closer look at population projections by jurisdiction within the Tri-Cities Region.

Table 3: County and City Population Projections.

Jurisdiction	Current Population (2012)	Weldon Cooper Projection (2025)	% Change (2012 – 2025)
Dinwiddie County	27,994	29,949	7%
Prince George County	36,941	38,497	4%
City of Colonial Heights	17,479	19,187	10%
City of Hopewell	22,348	24,209	8%
City of Petersburg	31,973	32,922	3%

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

According to the Woods and & Poole *2014 State Profile*, per-capita income for the region is expected to rise 18% (slightly less than the state average of 21%) from $34,836 to $41,135. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

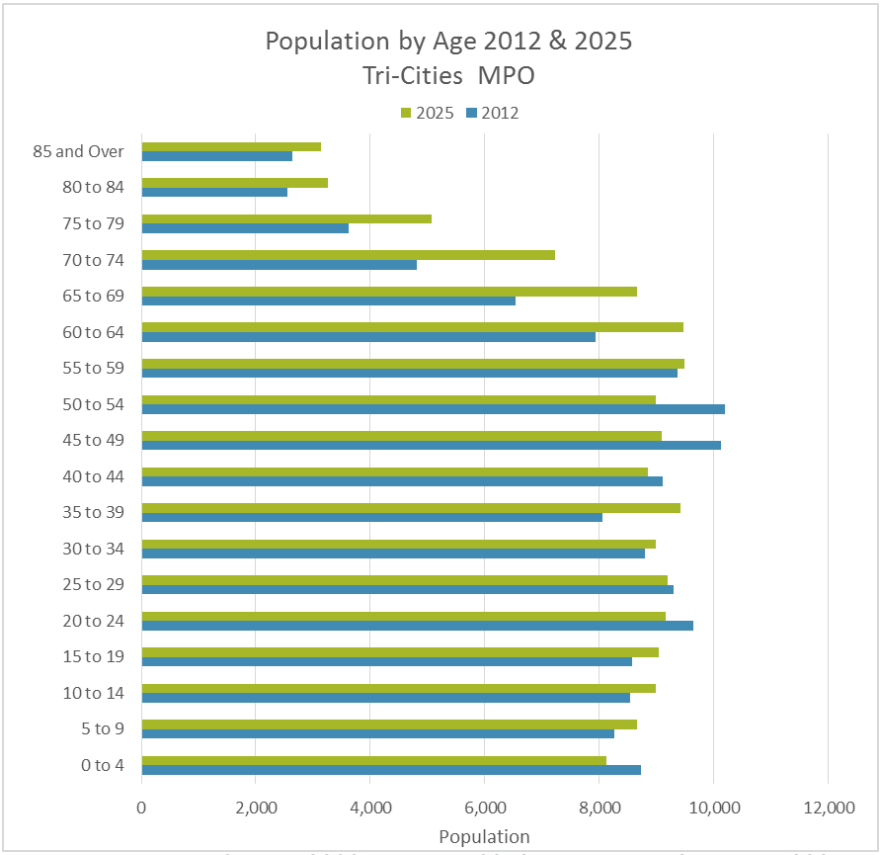


Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Tri-Cities Region.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as local economic sectors, knowledge-based economic sectors, and freight-based economic sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in Tri-Cities Region, Figure 2 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the state.

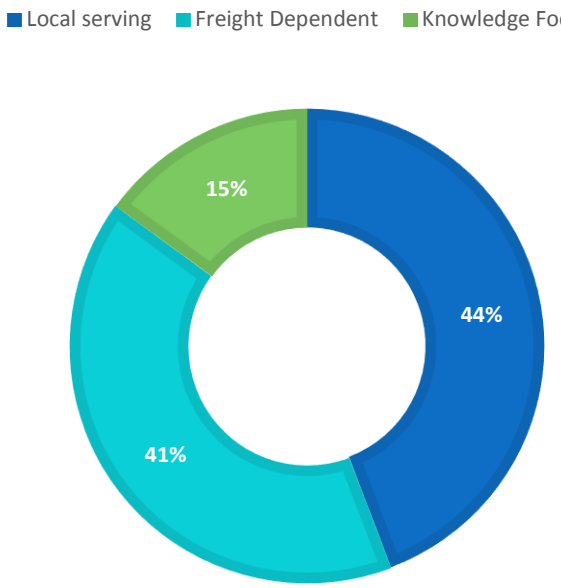


Figure 2: Top Sectors by Output (2012)
Source: IHS Global Insight, 2012.

The local services cluster is clearly the strongest in this region. Local services make up 65% of the economic output in the Tri-Cities Region. Conversely, the knowledge and freight-dependent clusters account for 13 and 22% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The local services economic cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Top Industries by Output

Wholesale trade is the strongest industry in the Tri-Cities region when measured by economic output. This is due, potentially, to the significant warehousing and distribution activity in the region that may involve much wholesale trade. Retail Trade is the second largest industry by output. Mining, finance and insurance, and health care round out the top five industries in the region with the greatest economic output. (Refer to Table 4).

Table 4: Current Industries by Output.

Top Industries	NAICS Code	% of Output
Wholesale Trade	42	16%
Retail Trade	44 – 45	10%
Mining	21	9%
Finance and Insurance	52	8%
Health Care	62	8%

Source: IHS Global Insight Data, 2012

Top Industries by Employment

In the Tri-Cities Region, public administration, retail trade, health care, accommodation and food services, and manufacturing are the top industries by employment. (Refer to Table 5). The predominance of local serving industries as four of the top five industries suggests that the regional economy is predominantly a local service economy. One caveat to this is that government employment, such as Fort Lee, would fall under Public Administration. The employees at Fort Lee, however, are not involved in a local service activity.

Table 5: Current Top Industries by Employment.

Top Industries	NAICS Sector	% of Workforce
Public Administration	92	27%
Retail Trade	44-45	26%
Health Care	62	12%
Accommodation and Food Services	72	8%
Manufacturing	31-33	7%

Source: IHS Global Insight Data, 2012

Fort Lee is the largest employer in the region, with the Defense General Supply Center as the third largest employer, indicating the importance of logistics and supply chain management to the local economy. Likewise, the presence of Amazon and UPS in the top employers reinforces the importance of logistics, warehousing and distribution activity in the regional economy. DuPont is representative of the importance of large manufacturing in the region, which is also represented by other major manufactures such as Rolls-Royce and Honeywell.

Table 6: Current Top Employers.

Employers	Employees
Fort Lee Army Base	10,000 +
Amazon	2,500 – 4,999
Defense General Supply Center	2,500 – 4,999
DuPont	2,500 – 4,999
United Parcel Service	1,500 – 2,499

Sources: InfoUSA, supplemented with VEDP, VEC, and local data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how

concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Tri-Cities Region. The industries listed in Table 7 have the highest LQ scores in the region. The score for professional services, for example, can be inferred to mean that these services are almost two times more concentrated in the region than in the entire nation, on average.

Table 7: Current Top Industries by Location Quotient

Top Industries	NAICS Sector	Location Quotient
Professional Services	54	1.82
Real Estate	53	1.60
Construction	23	1.46
Arts, Entertainment, and Recreation	71	1.31
Public Administration	92	1.26

Source: IHS Global Insight Data, 2012

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers were then developed for these areas using Census block boundaries. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Activity centers such as Walthall, Crosspointe and Dinwiddie Airport were added through coordination with local stakeholders who had a knowledge of the regional significance of the activity in places were existing data sources had little information on employment. Figure 3 below shows the activity centers as blue circles. The activity centers are a tool in the development of each regional profile and do not have standing in the statewide planning and programming process such as Urban Development Areas; therefore the activity center definitions have no significance other than as a reference tool within the economic profiles.

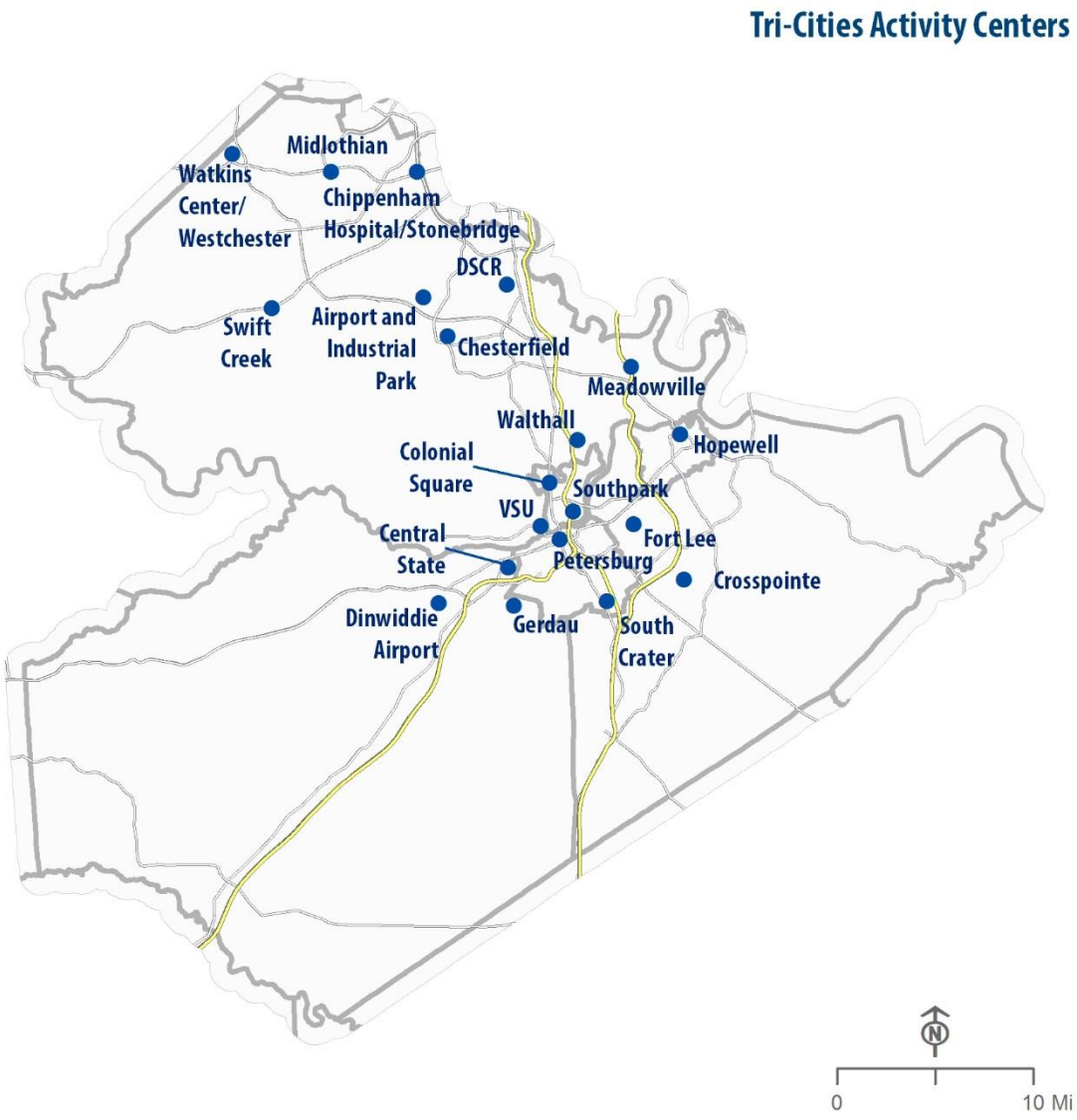


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input

Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local, freight, and knowledge economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 4 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

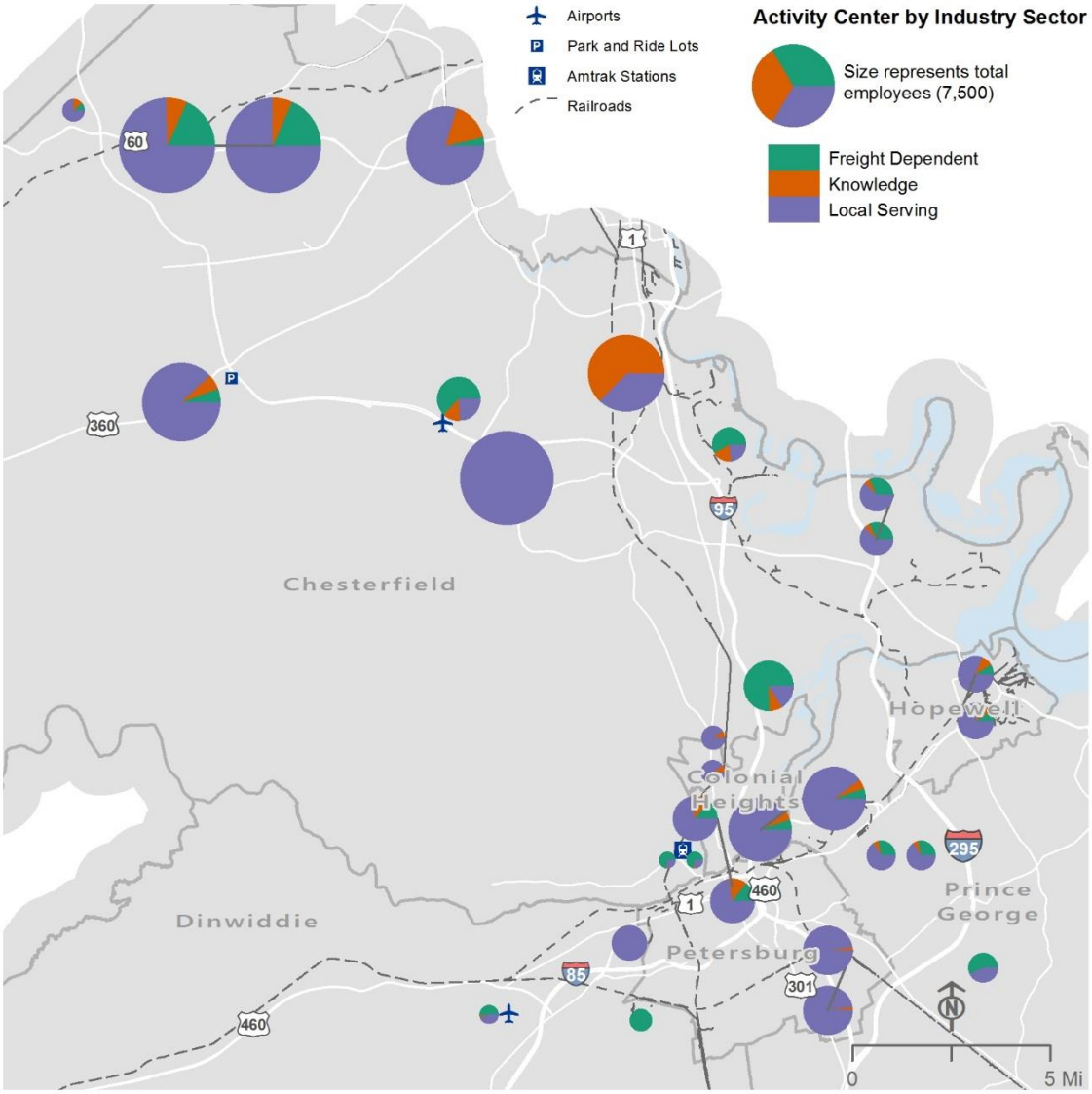


Figure 4: Activity Center Employment by Industry Sector.
Source: IHS Global Insight Data, 2012

E. Forecasted 2025 Industry and Employment Strengths

Through a series of work sessions with the Tri-Cities Region stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Tri-Cities' economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Tri-Cities Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles
- Top Employers and Locations
- Economic Development Priorities

Substantial growth is forecasted for the Tri-Cities Region by 2025. According to statewide and national datasets used, the arts and entertainment and corporate management industries will see the highest percentage growth. Combined, they are expected to produce almost $5 billion more in 2025 than was produced in 2012.

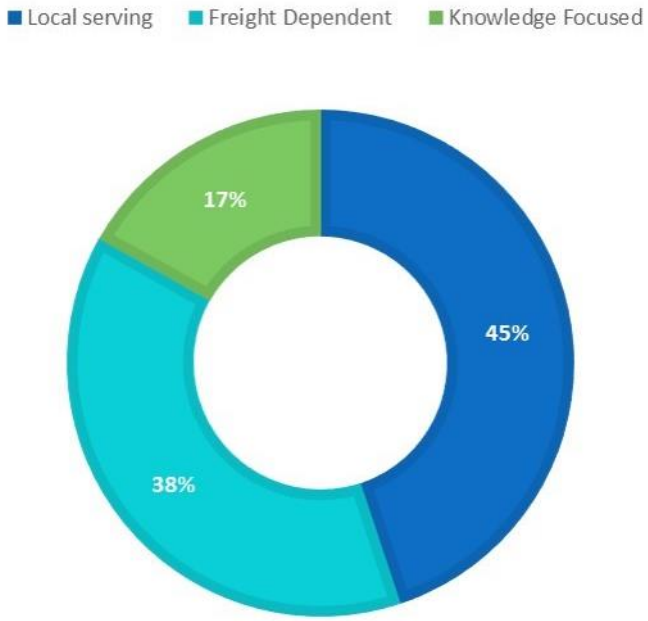


Figure 5: 2025 Industry Sectors by Output.
Source: IHS Global Insight Data, 2012

The local services sector will continue to be the largest portion of regional output, but is will be a smaller portion than it was in 2012. Local services will remain relatively unchanged in 2025, increasing from 44% to 45% of regional output. The knowledge sector will increase slightly from 15% of economic output in 2012 to 17% in 2025. Conversely, the freight-dependent clusters will account for a slightly smaller portion of the regional output, accounting for 38% of economic output.

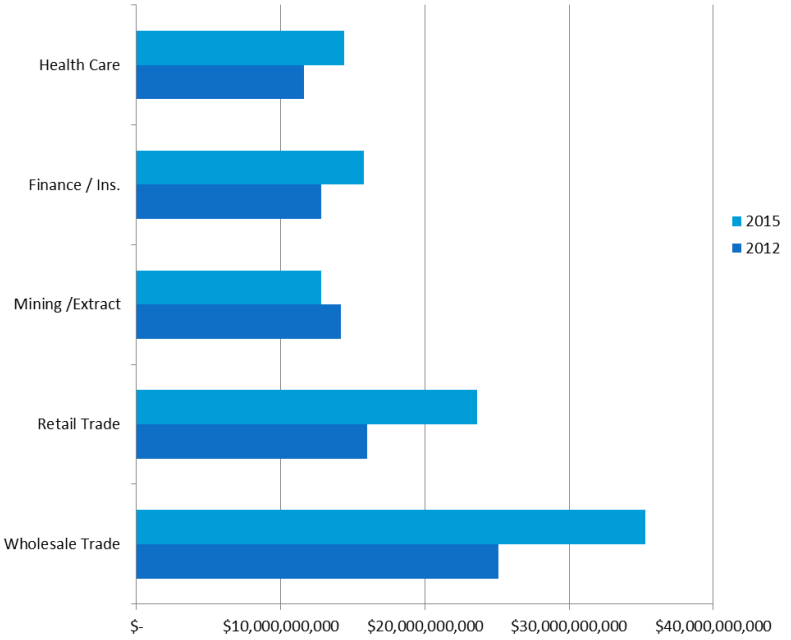


Figure 6: Top Industries by Output
Source: IHS Global Insight Data, 2012

The industries with the greatest share of regional output will continue to grow in 2025, with the exception of mining. In all industries combined, economic output in the Tri-Cities Region is expected to increase by $48.7 billion by 2025. (Refer to Figure 6).

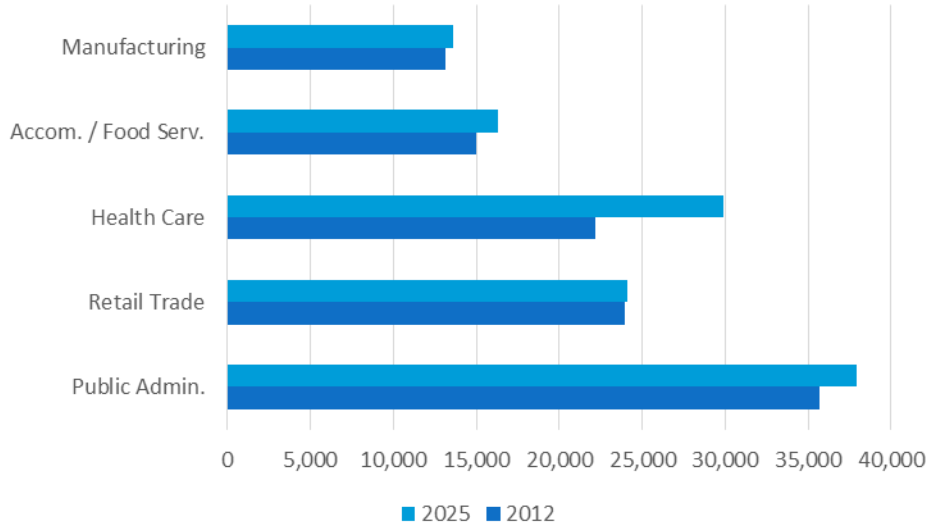


Figure 7: Top Industries by Employment.
Source: IHS Global Insight Data, 2012

The outlook for all the top industries by employment are expected to grow by 2025. Retail trade and manufacturing will grow only slightly while health care and social assistance will grow by 27%. Other industries with a high percentage of employment growth are construction, professional services, and the administrative sector.

Table 8: Top Industries by Employment.

Top Industries	NAICS Sector	% Change in Employment (2012-2025)
Health Care and Social Assistance	62	27%
Construction	23	26%
Professional Services	54	9%
Administrative Sector	56	9%
Public Administration	92	8%

Source: IHS Global Insight Data, 2012

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the Tri-Cities Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the Tri-Cities Region:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Commuting patterns in the Tri-Cities region show that there are large amounts of commuting between jurisdictions. As represented in Figure 5, a majority of workers in the Cities of Colonial Heights, Hopewell, and Petersburg and Dinwiddie County commute to a different jurisdiction within the Tri-Cities Region. The first jurisdiction that is an exception, Chesterfield County, the majority of workers either work within the County or commute to either the City of Richmond or Henrico County. The other exception in the region, Prince George County, a majority of workers commute either within the County or in another jurisdiction within the Tri-Cities Region.

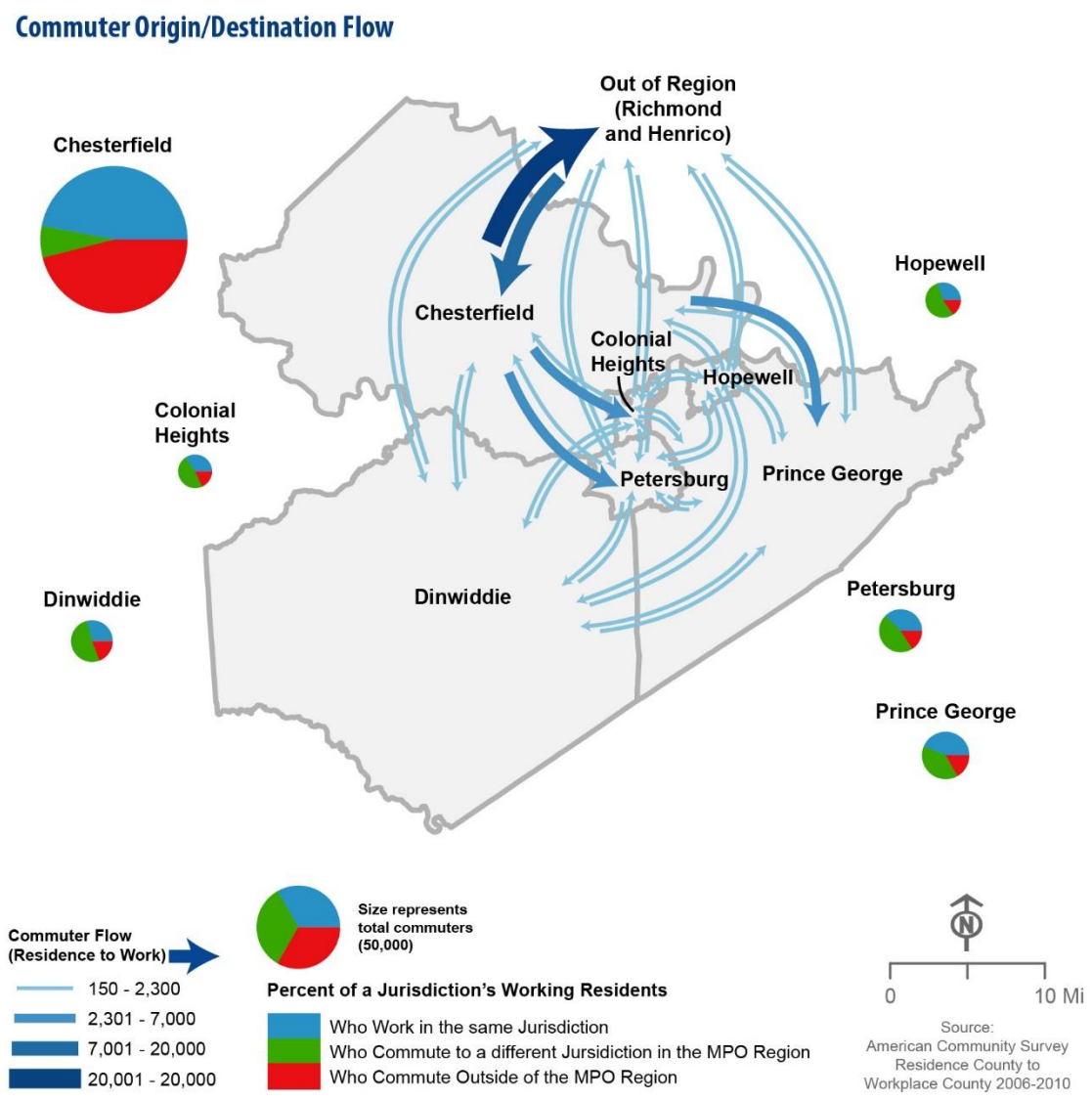


Figure 8: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Tri-Cities Region was the analysis of commuting patterns between activity centers. Figures 9 through 14 below provide insights into the commuting patterns for three of the activity centers in the Tri-Cities Region. Block groups are symbolized on a color scale from dark to light blue, with the darker shades representing the block groups with the largest number of commuters to the activity center analyzed within that map.

The data source used to analyze the origin of workers in activity centers was the LEHD Origin-Destination Employment Statistics (LODES) data from the United States Census Bureau. The data file provided the Census Block of the home and work locations for all persons working in the state of Virginia in 2011 based on Unemployment Insurance earnings data and Quarterly Census of Employment and

Wages (QCEW) data. The LODES data is not perfectly accurate as job and home locations can be misreported through the original data sources. In addition, the Census Bureau uses noise infusion and synthetic data methods to ensure confidentiality in the publically released data. For these reasons, the data have been aggregated and reported at the Census Block Group level in the following analysis.

As shown on the map, commutes to Crosspointe originate throughout the region, ranging from Prince George County to northern Chesterfield County. However, many of the trips originate along the I-95 and I-85 corridors. (Refer to Figure 89.

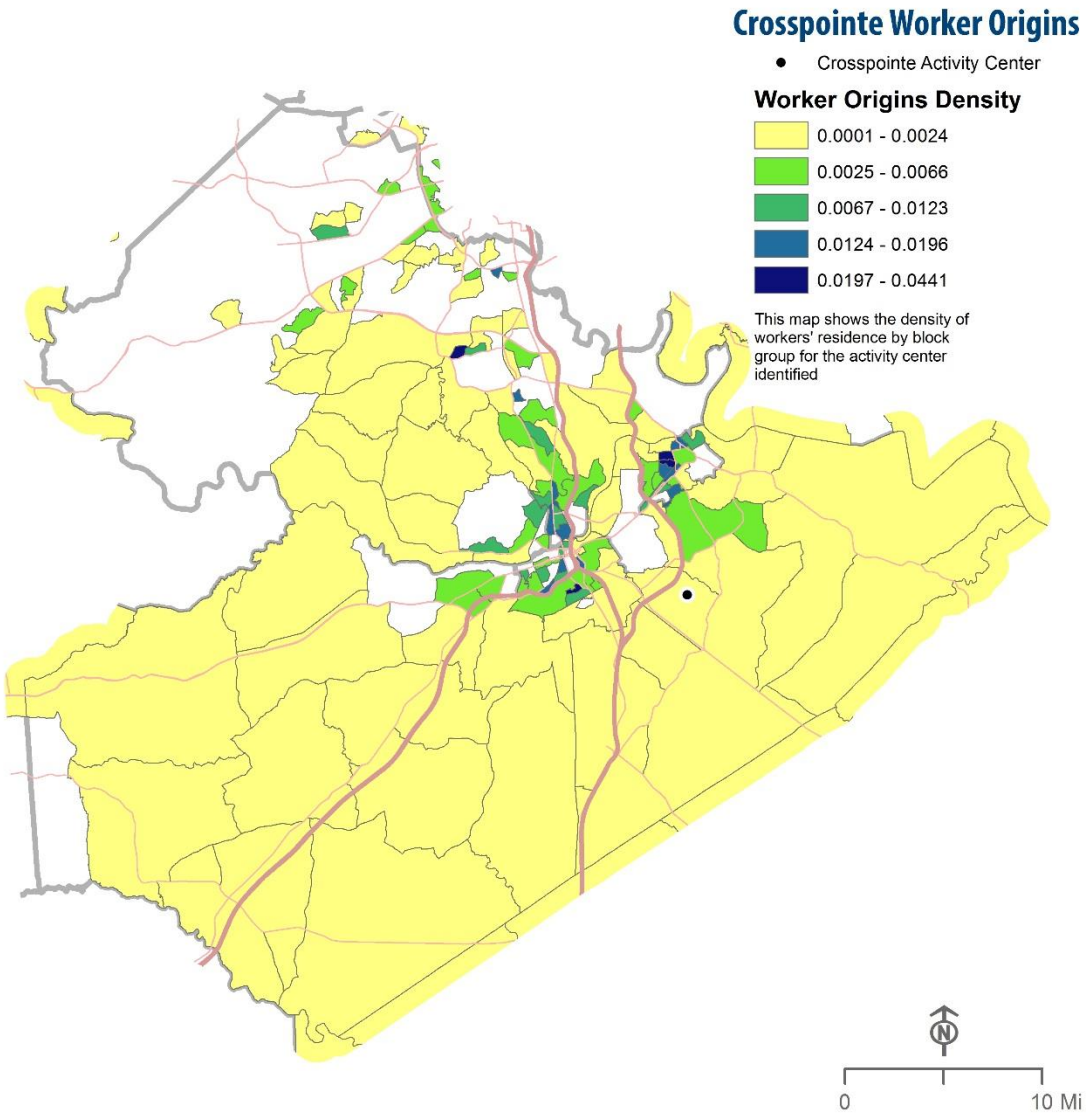


Figure 9: Commuting Patterns to Crosspointe Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Similarly to the Crosspointe activity center, commutes to the Dinwiddie Airport originate throughout the region. (Refer to Figure 10). However, the commute patterns are strongly tied to I-95 and I-85.

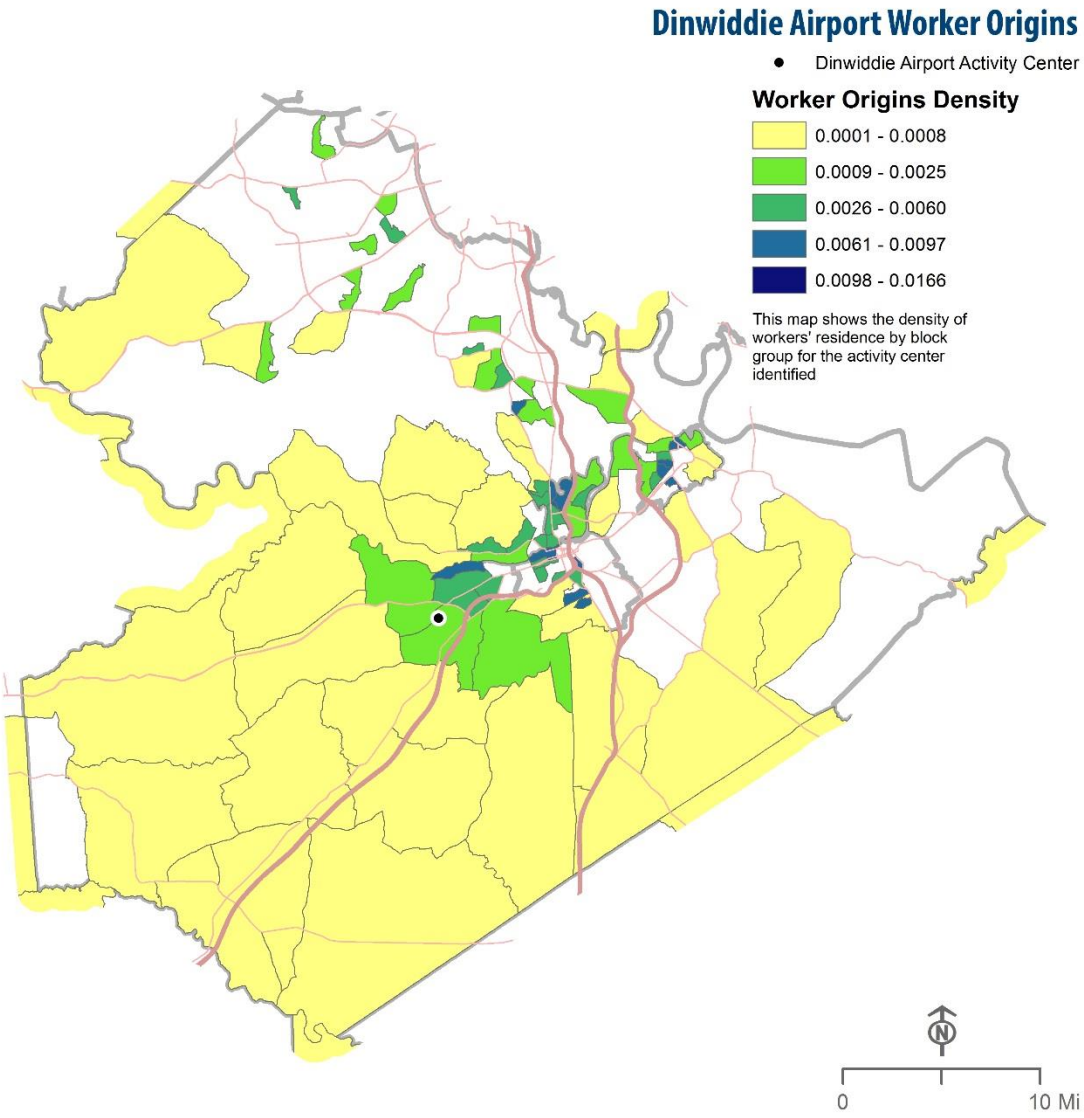


Figure 10: Commuting Patterns to Dinwiddie Airport Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Fort Lee commute origins are concentrated around the activity center and northern Chesterfield. For these commuting patterns, I-95 and VA Route 288 are important for worker movements. (Refer to Figure 11).

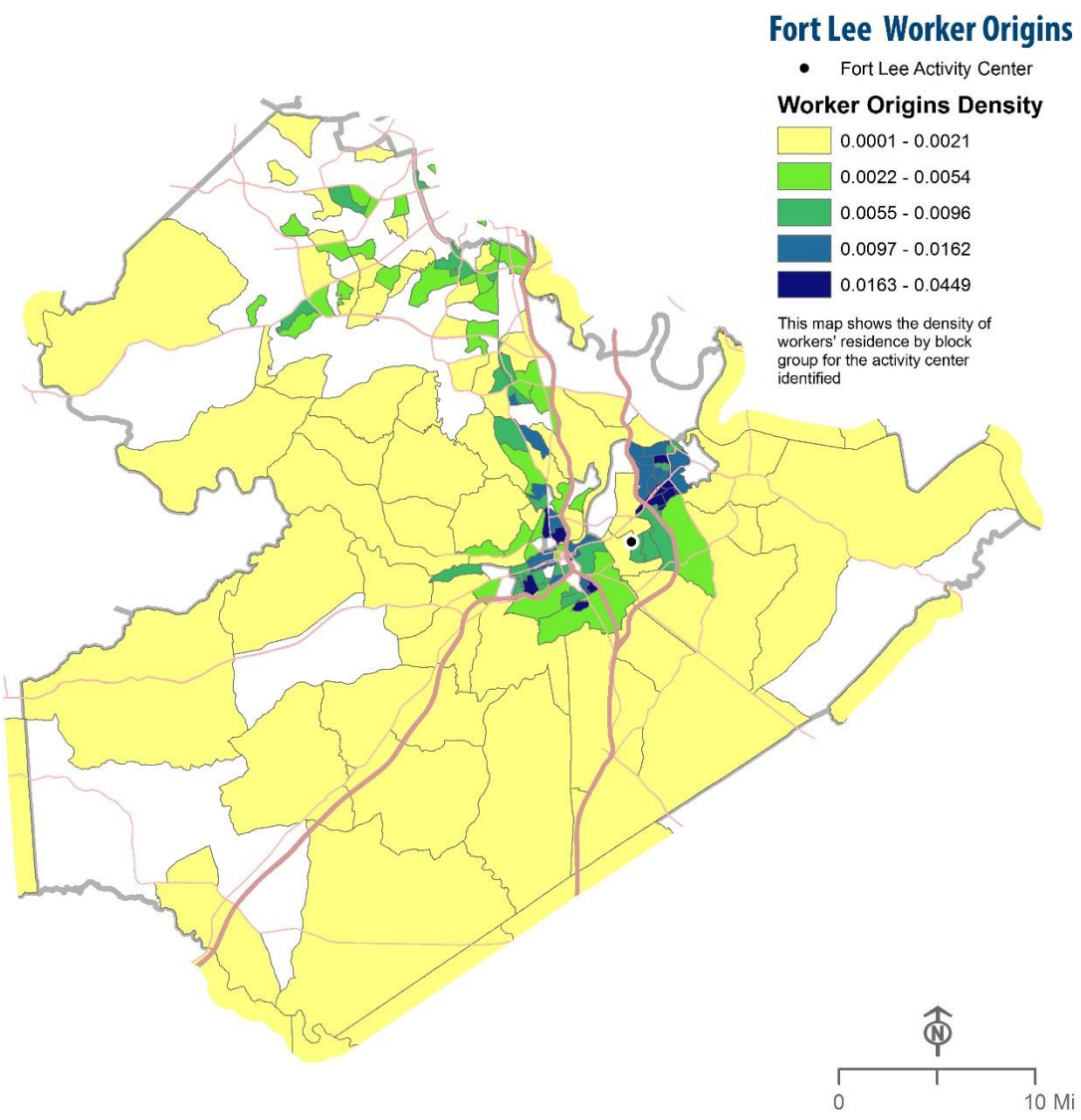


Figure 11: Commuting Patterns to Fort Lee Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commute origins to the Meadowville activity center, similarly to the aforementioned activity centers, are dispersed throughout the region. However, commutes are densest along I-95, I-295, and VA Route 288. (Refer to Figure 12).

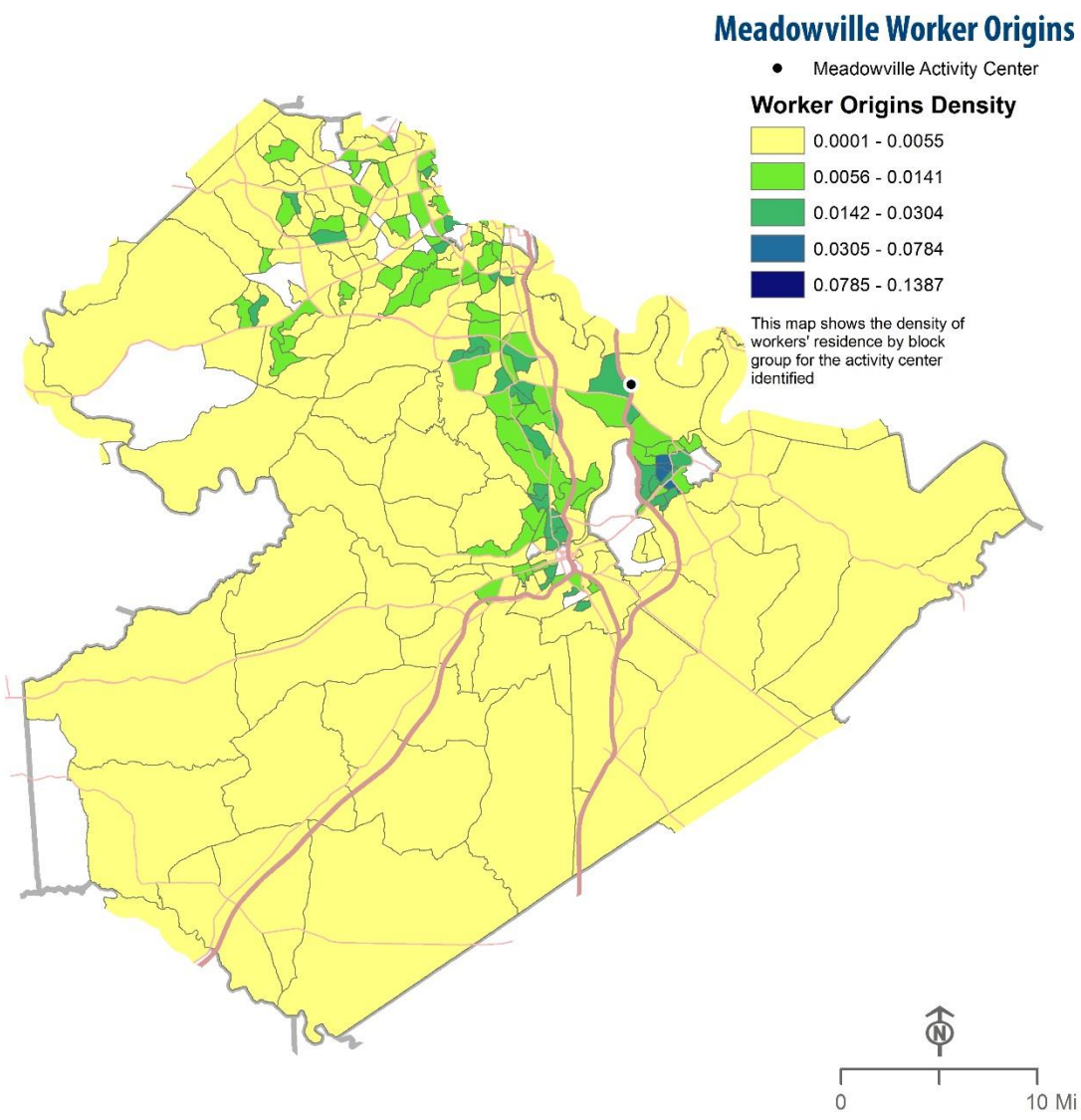


Figure 12: Commuting Patterns to Meadowville Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The commute origins to the Petersburg activity center are heavily concentrated in the Cities of Petersburg, Colonial Heights, and Hopewell.

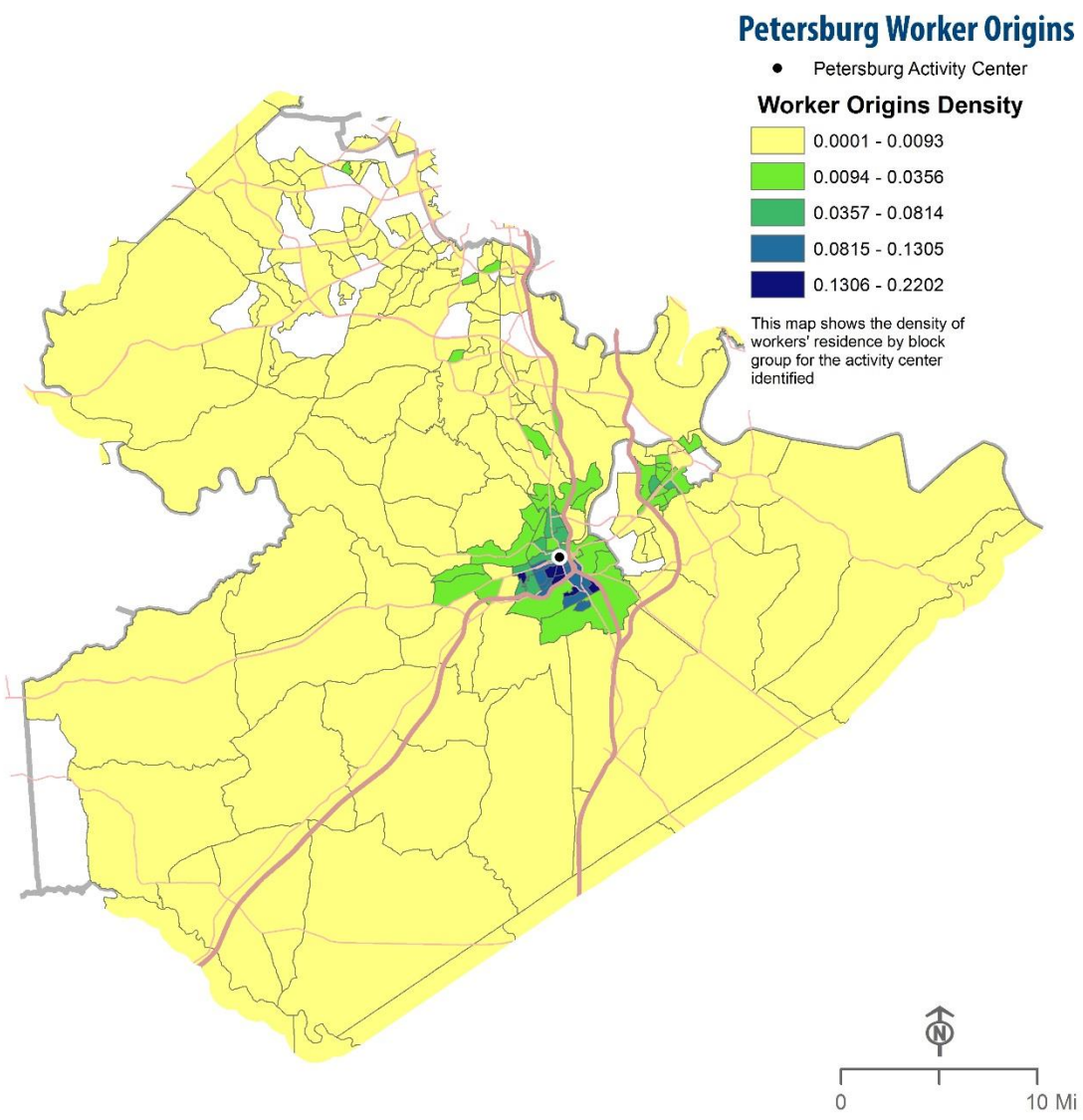


Figure 13: Commuting Patterns to Petersburg Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Following a similar pattern to the Petersburg activity center, the commutes to the South Crater activity center are heavily concentrated in the Cities of Petersburg, Hopewell, and Colonial Heights. Conversely from the Petersburg activity center, there are a modest number of commutes originating in Chesterfield County.

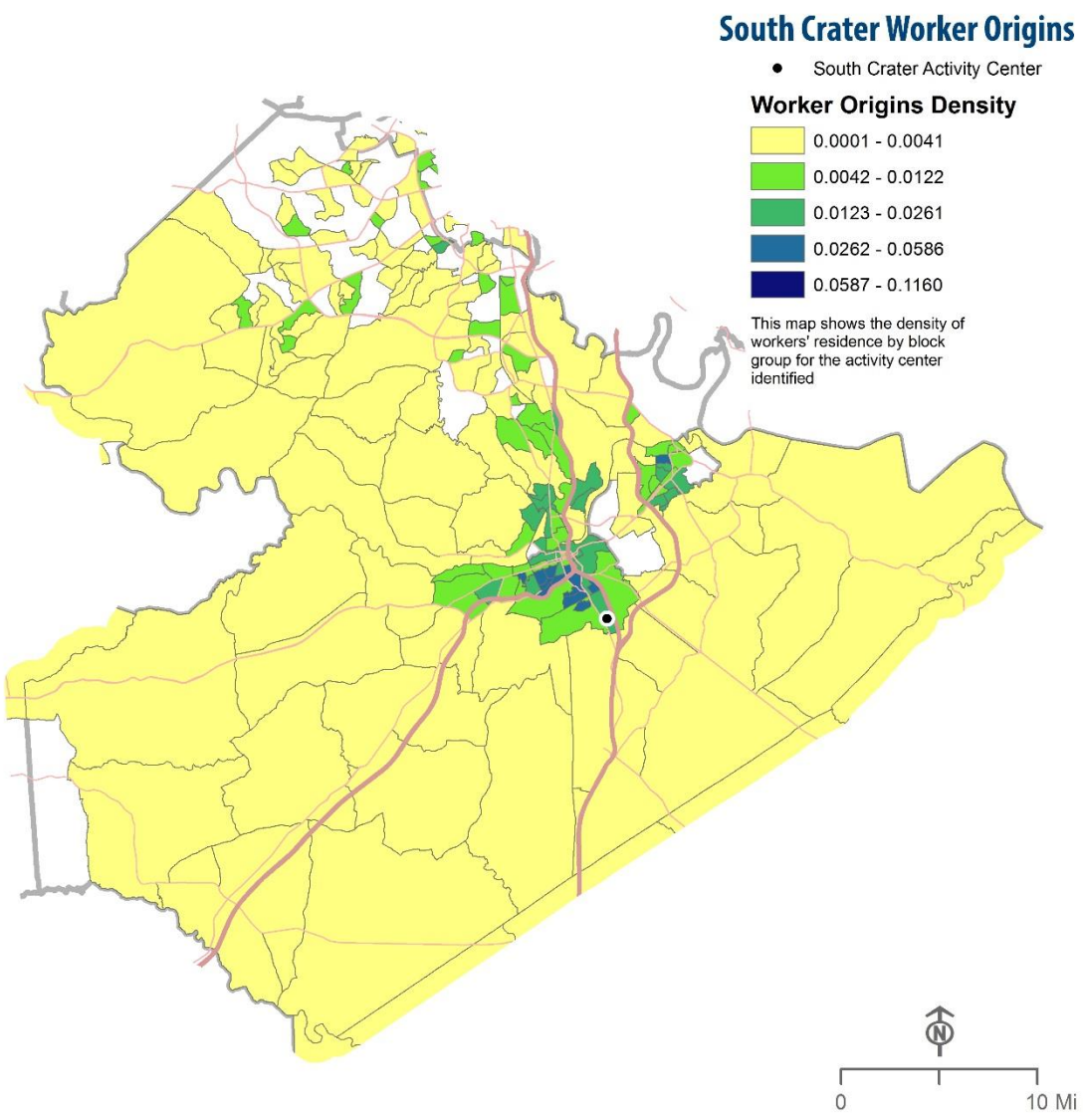


Figure 14: Commuting Patterns to South Crater Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Mode Choice

In the Tri-Cities Region, the 85% of workers drive alone to work. For all jurisdictions in the region, carpooling is the second most prevalent option, accounting for 8% of the mode share. Public transit and walking accounted for 1% of the regional modal share. (Refer to Figure 15).

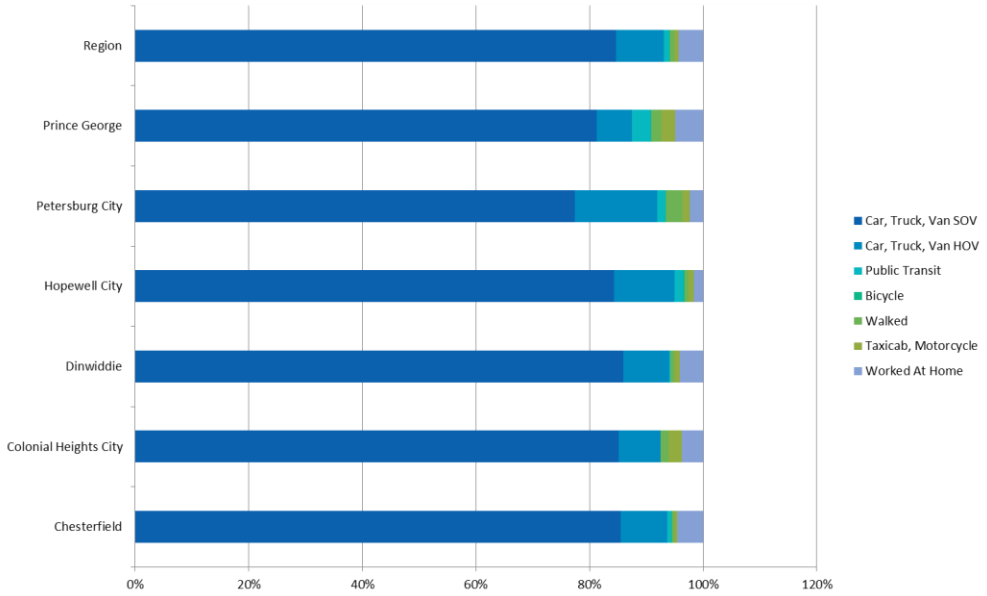


Figure 15: Mode Share Split by Jurisdiction.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Average Commute Times

In the Tri-Cities Region, average commute times range from 22 to 30 minutes among the various jurisdictions. (Refer to Table 9). Due to its density and proximity to employment centers, the City of Hopewell has the shortest average commute, while more rural areas, like Dinwiddie County, have longer commutes on average.

Table 9: Mean Commute Time by Jurisdiction.

Jurisdiction	Mean Commute Time (Minutes)
Chesterfield	27.0
City of Colonial Heights	22.4
Dinwiddie	30.2
City of Hopewell	23.4
City of Petersburg	23.9
Prince George County	24.1

Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Commutes of over 45 minutes account for 9% of regional commutes. Dinwiddie County has the highest percentage of workers who commute over 45 minutes at nearly 17%, this is twice as high as both the City of Colonial Heights and the City of Hopewell's rate of long commutes. (Refer to Figure 16).

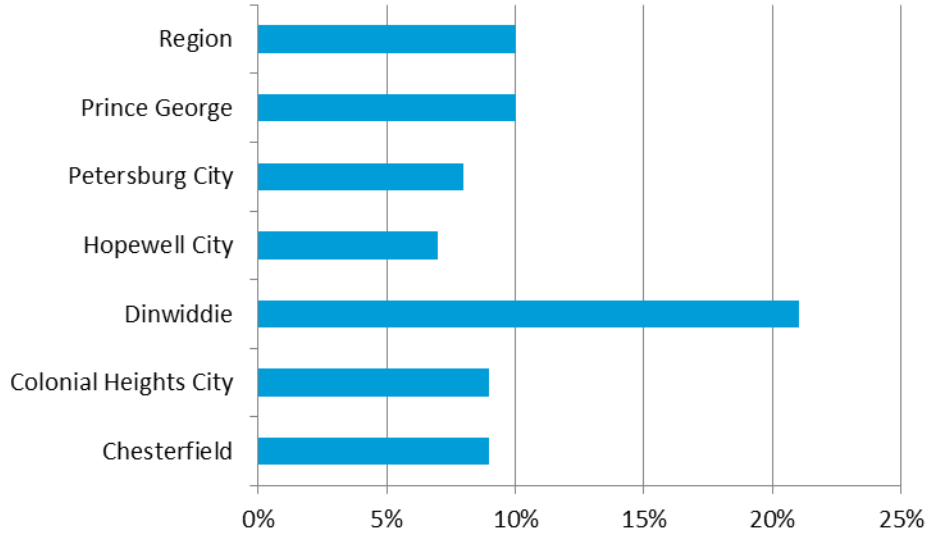


Figure 16: Percent of Commutes Long than 45 Minutes.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

Figure 16 provides a closer look at where longer commutes originate. In the Cities of Hopewell, Petersburg, and Colonial Heights, commute times are below average for the region. Block groups on the rural fringes of the region, have much longer commutes than the regional average, as these areas have fewer jobs in close proximity, and less access to transportation networks than more developed areas.

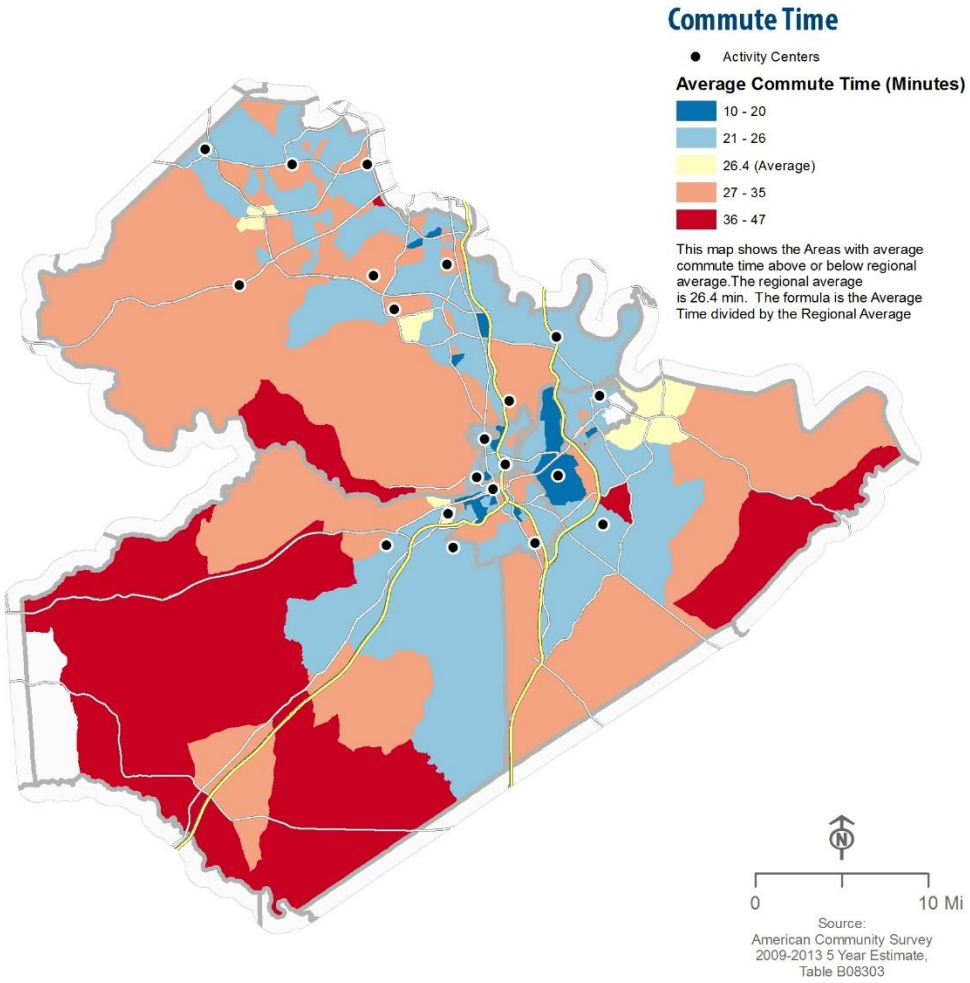


Figure 17: Tri-Cities Region Commute Times.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were developed to assess the workforce and freight accessibility at the general regional scale. This set of performance measures reflects regional characteristics such as travel times and the availability of multimodal transportation between activity centers. The accessibility to employment measure was calculated using an accessibility model developed by the consultant team that measures the number of jobs reachable in a given travel time, using actual travel times on a network, whether highway, transit or pedestrian. The total number of jobs accessible was also "distance decayed," that is the value of each job was decayed by a factor based on how long it took to travel to it. The distance decay factors were developed from traveler surveys that reflect actual preferences for travel to employment based on the length of the trip.

Auto Accessibility

Auto Accessibility in the Tri-Cities Region area is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. The areas with the highest level of auto accessibility exist in Chesterfield County and the City of Colonial Heights. The auto accessibility scores were much lower in Prince George County, Dinwiddie County, the City of Petersburg, and the City of Hopewell. The accessibility to jobs is weighted by the population affected to provide further insight into the relative degree of access to employment for residents among areas of the region. (Refer to Figure 18).

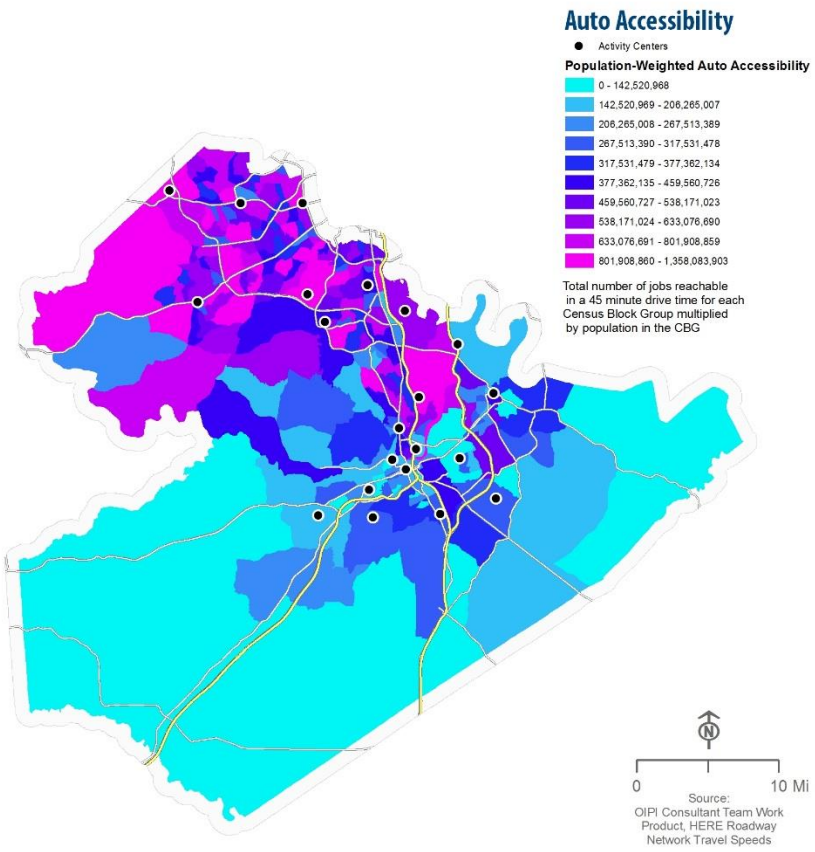


Figure 18: Auto Accessibility

Transit Accessibility

Outside of the City of Petersburg and northern Chesterfield County, there are few fixed-route transit options in the Tri-Cities Region. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs. (Refer to Figure 19).

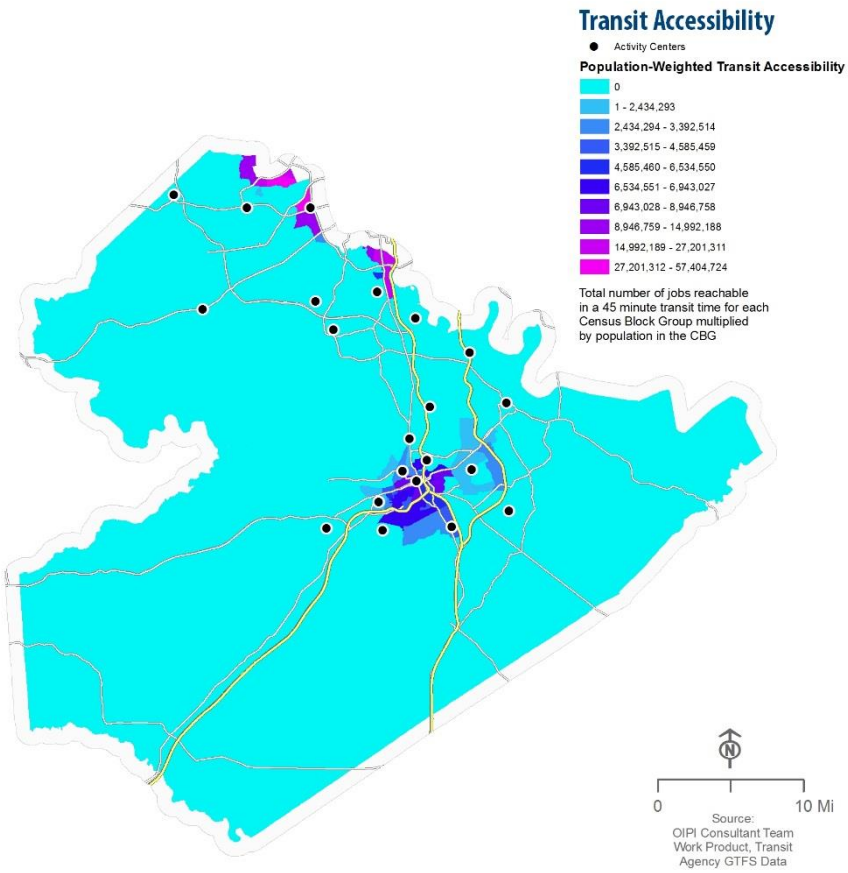


Figure 19: Transit Accessibility

Walk Accessibility

Walk Accessibility in the area is largely determined by the mix of land use and density of development surrounding the origin of each trip. The areas of the Tri-Cities Region with the highest walk accessibility are north and central Chesterfield County, the City of Petersburg, the City of Hopewell, and the City of Colonial Heights. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility. (Refer to Figure 20).

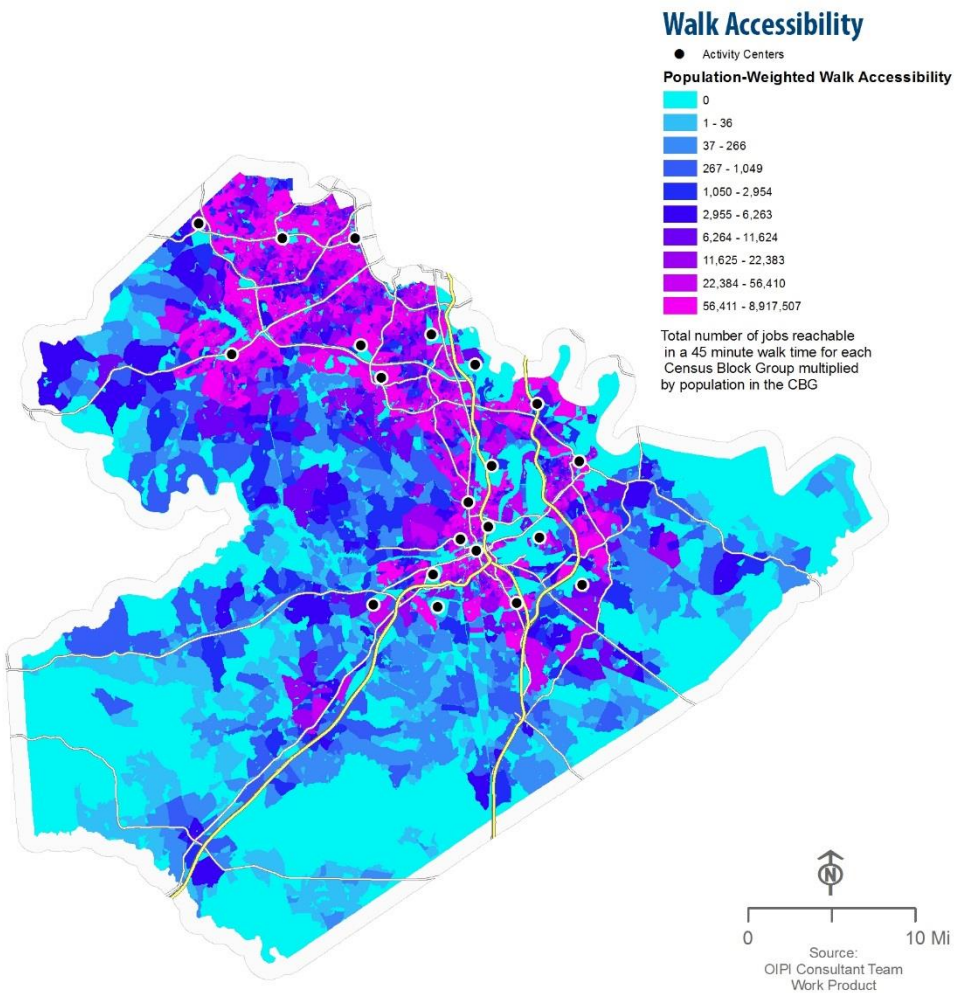


Figure 20: Walk Accessibility

Freight Accessibility

In addition to railways, US Route 460, I-95, I-85 and I-295 are the major corridors for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. Most activity centers in the region are within an eight minute drive from a major arterial ramp. (Refer to Figure 21).

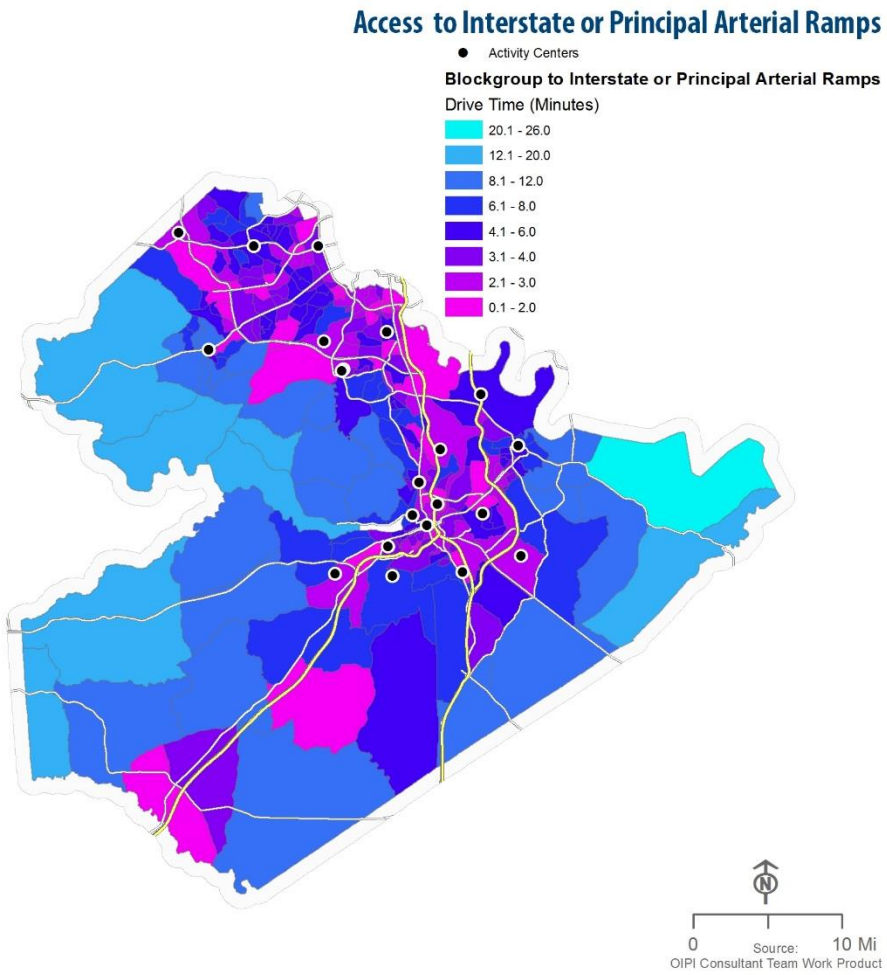


Figure 21: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Most warehouses and distribution centers in the Tri-Cities Region are clustered around I-295, I-95, and US Route 460. Most areas within the Cities of Petersburg, Colonial Heights, and Hopewell, as well as Prince George County, have access to a warehouse or distribution center within a ten minute drive. (Refer to Figure 22).

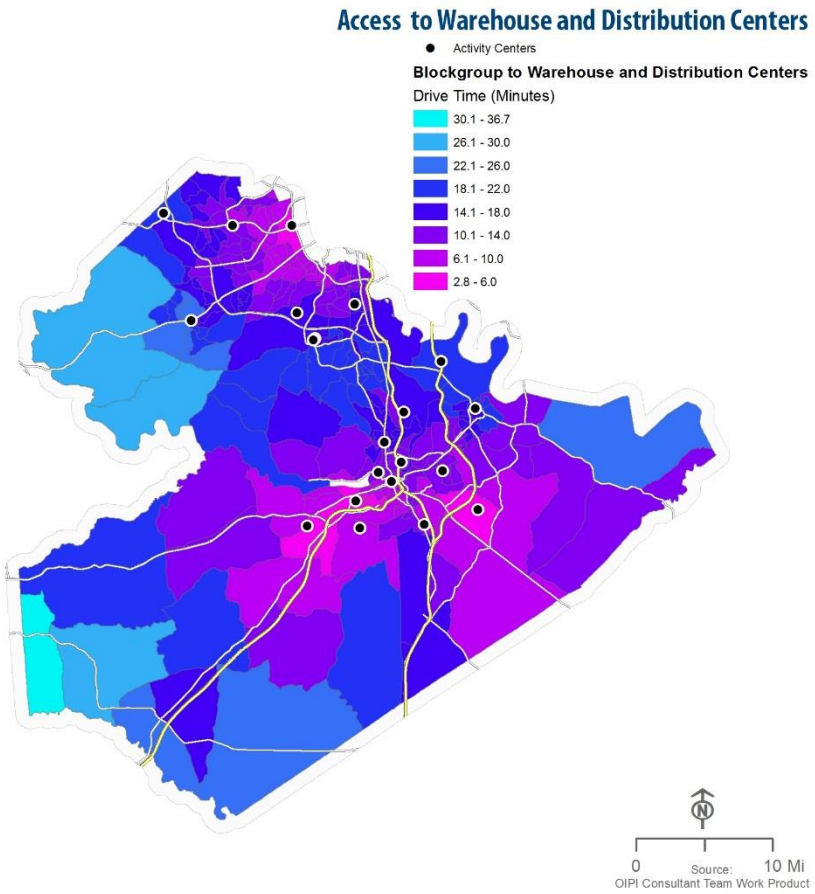


Figure 22: Access to Warehouses & Distribution Centers

Both CSX and Norfolk Southern operate freight rail lines that pass through the much of the Tri-Cities Region, including the City of Petersburg, Chesterfield County, and the City of Hopewell. Prince George County is served by Norfolk Southern only and the City of Colonial Heights is served by CSX only. Richmond International Airport is the closest major airport that handles large quantities of freight. It less than an hour drive to Richmond International Airport from most areas of the Tri-Cities Region. (Refer to Figure 23).

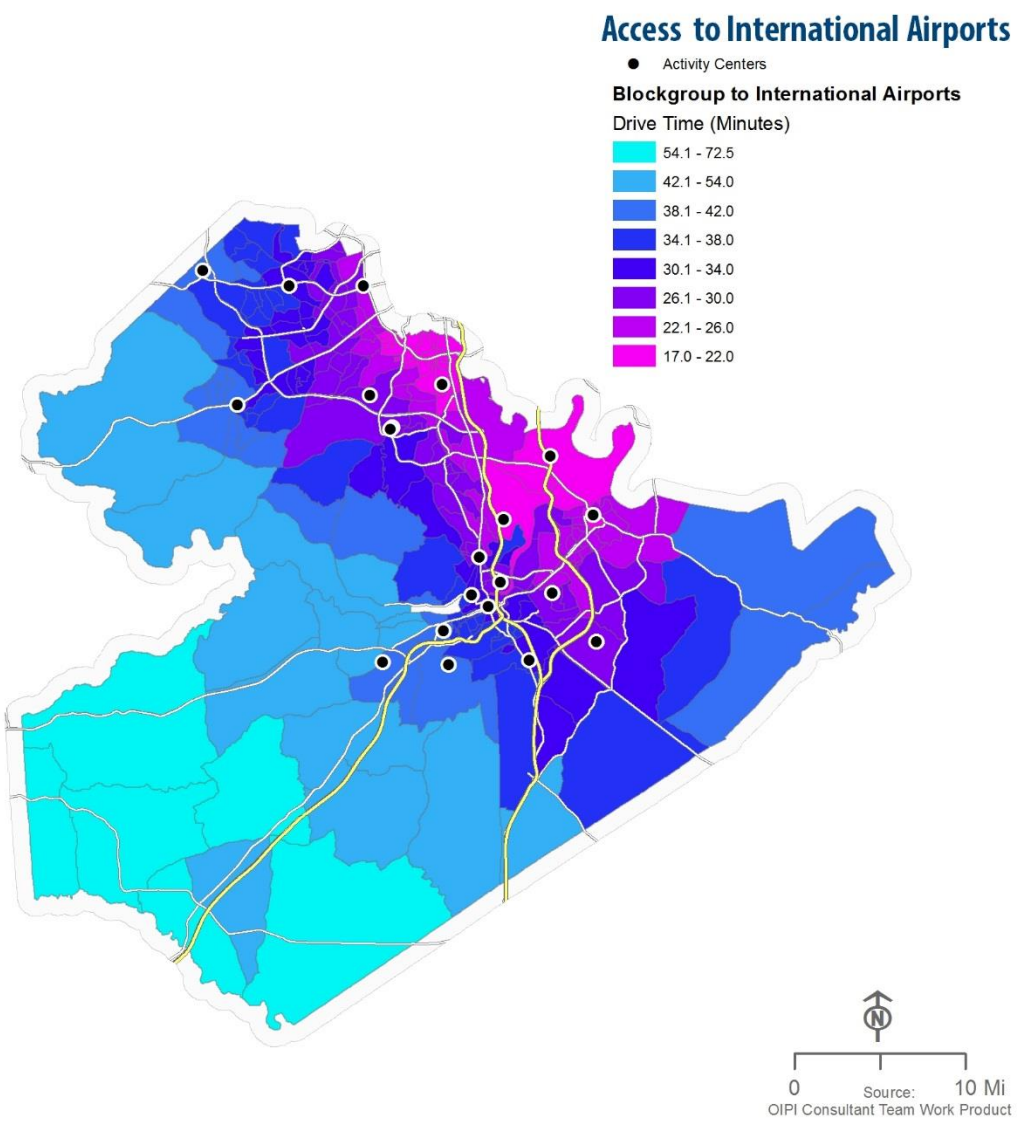


Figure 23: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in Tri-Cities Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in Figure 18 below, is defined as the ratio of the median speed to the 90th percentile speed during the weekday AM peak period. Data for major roadways in the Tri-Cities Region were available for analysis. Overall, scores on the travel time reliability index indicated high travel time reliability for both corridors. The reliability index scores are higher in several locations along

US Route 1 in Dinwiddie County and various roadways in Chesterfield County, representing slightly lower levels of travel time reliability. There are, however, no areas of significant concern in either of the aforementioned areas. (Refer to Figure 24).

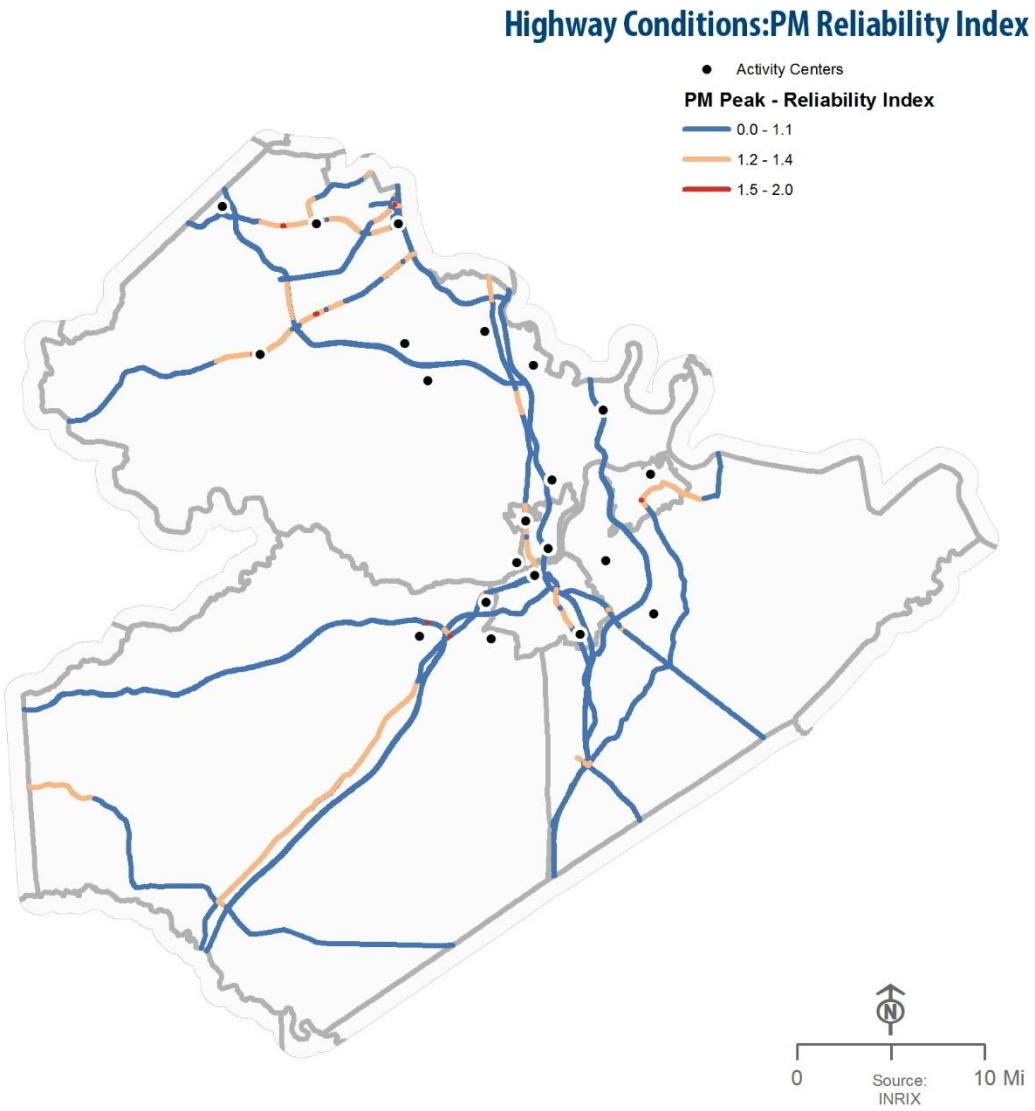


Figure 24: Travel Time Reliability

Percent of Time Congested

Congestion is an important determinant of roadway level of service. The percentage of time congested was calculated for evening peak times from 2013 to 2014 for major corridors in the region. According to the analysis, the major roadways do not have congestion issues. All major roadways analyzed are congested less than 5% of the time. (Refer to Figure 25).

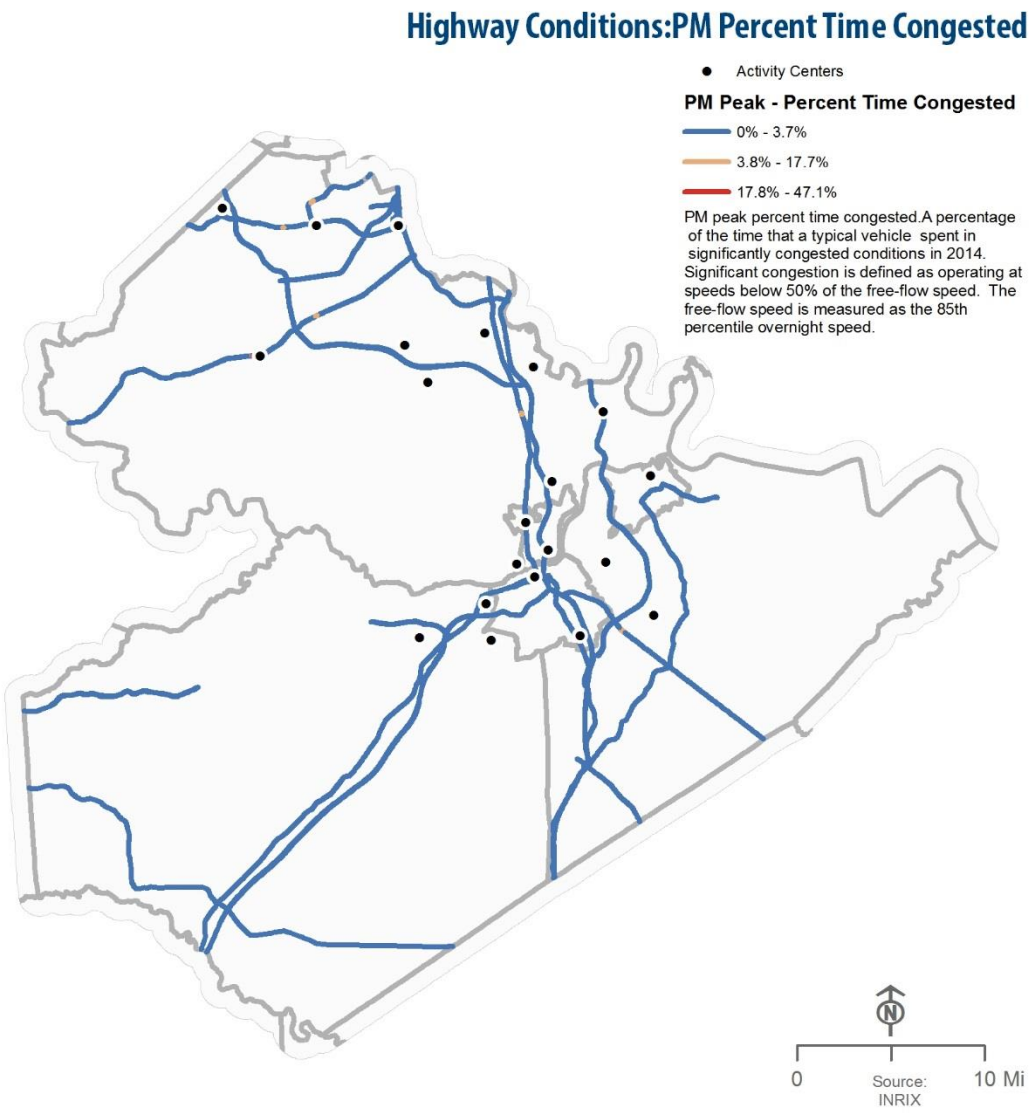


Figure 25: Percent of Time Congested

Median Speeds

Median speeds were calculated for major roadways in the region and are represented as the ratio of pm peak hour vehicle speeds and the speed limit for the PM peak period. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The ratio of median speed to speed limit shows problems in congested areas like the I-95/I-85 Interchange and US 460 between I-95 and I-295. (Refer to Figure 26).

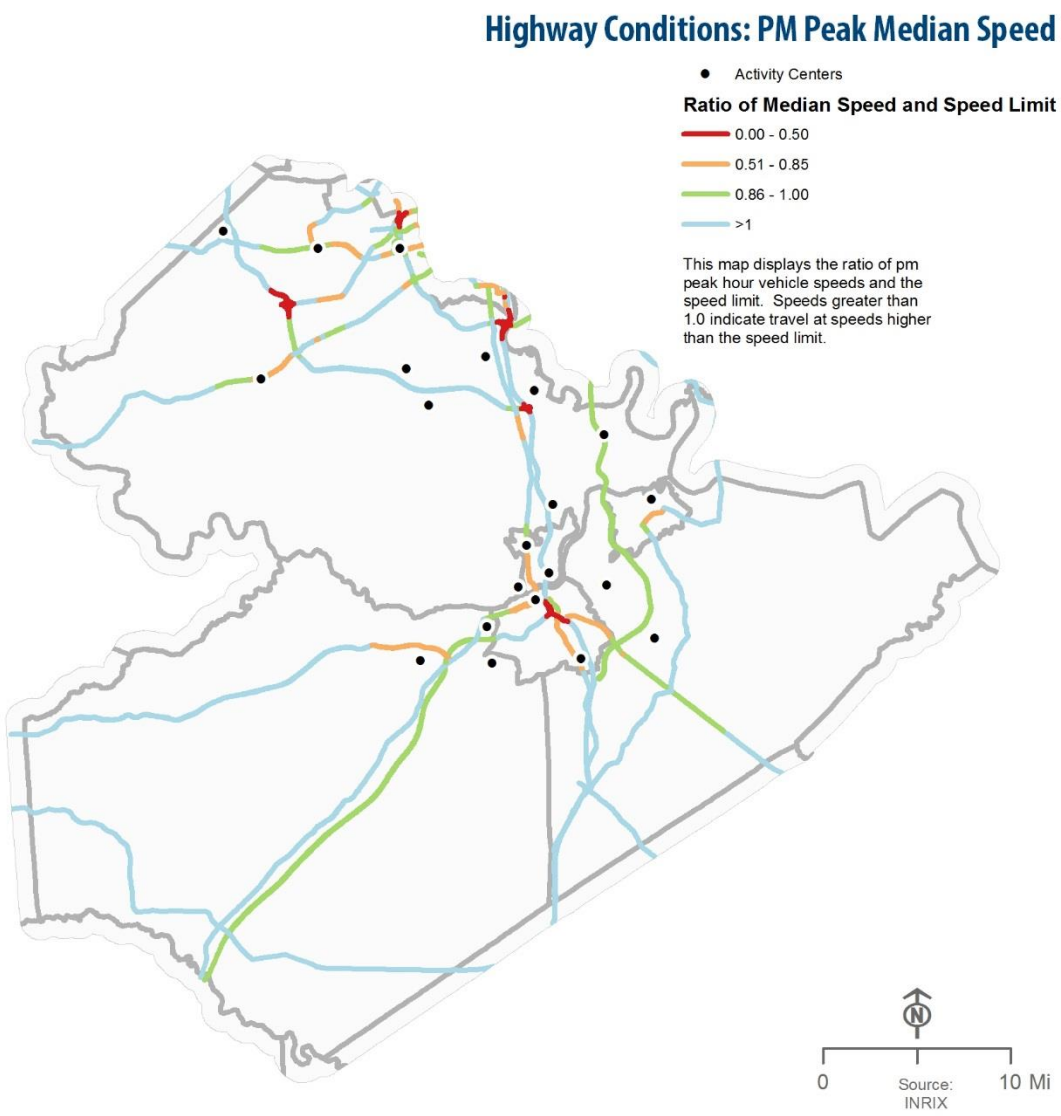


Figure 26: Median Speeds

D. Regional & Local Commodity Flows

Although not strictly an intra-regional issue, an understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and to the Tri-Cities Region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry

output (sales) in this context can be considered to be "dependent on freight," since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output. In the Tri-Cities Region, an average of 88% of the dollar value of all goods that are moved through the region are moved by truck. Rail is the second most prevalent mode, carrying around 12% of the total dollar value of goods. Other modes of freight movement account for less than 1% of total dollar value goods. (Refer to Figure 27).

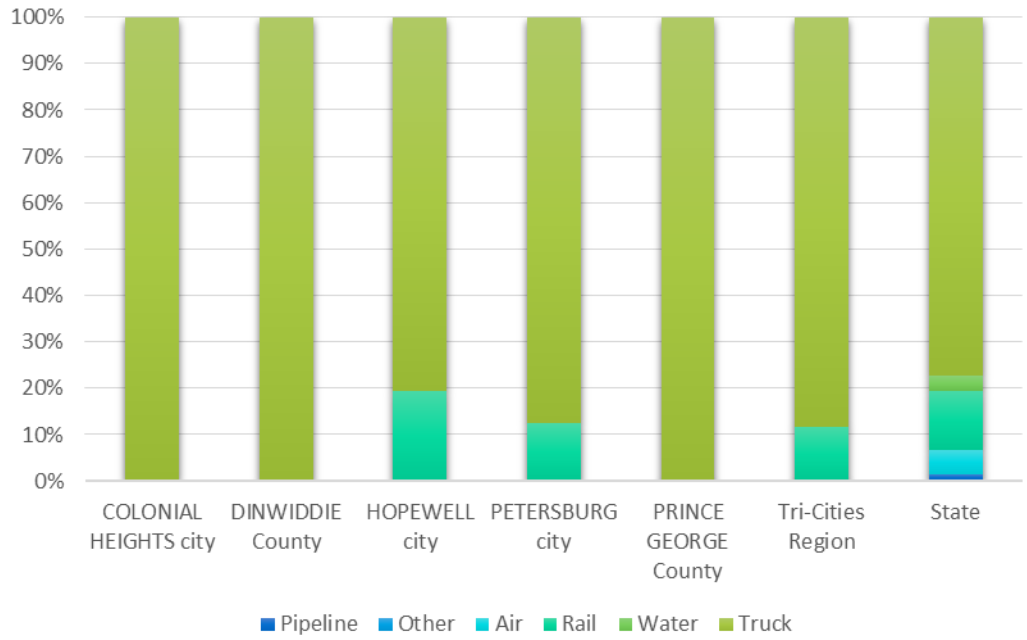


Figure 27: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

Location quotients are used to compare the prominence of freight modes between the Tri-Cities Region, and the state as a whole. The Tri-Cities Region relies on trucks for freight movement 1.15 times more than the does the state as a whole. Rail and air transportation for goods is more common for the state on average than it is for the Tri-Cities Region. This reflects the greater density of freight rail lines in other portions of the state. Although the Tri-Cities Region is relatively close to the Richmond International Airport, about a half hour drive, air is not a common way of moving goods in the region. (Refer to Figure 28).

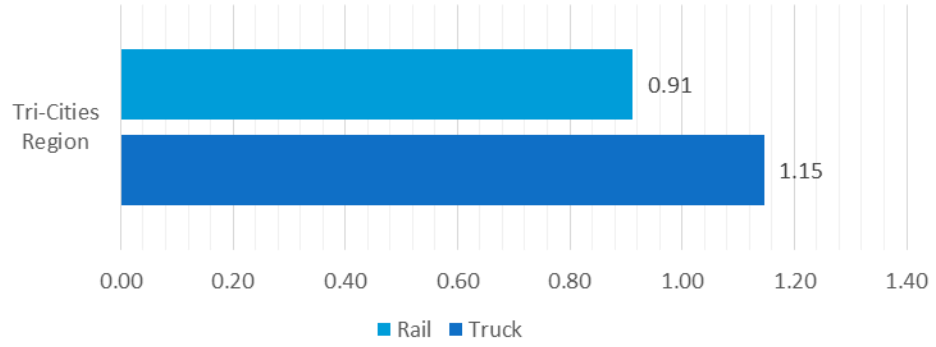


Figure 28: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

Top Commodities

While the prior section addressed freight modal dependence on the basis of industry output, this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. Transportation equipment accounts for the most valuable freight moving into the Tri-Cities Region. Chemical products are the most valuable export from the Tri-Cities Region, accounting for over $2 billion worth of exports. Overall, the Tri-Cities Region imported over $5.4 billion worth of goods and exported $4.7 billion worth of goods, resulting in $7 million of net imports in 2012. (Refer to Figures 29 and 30).

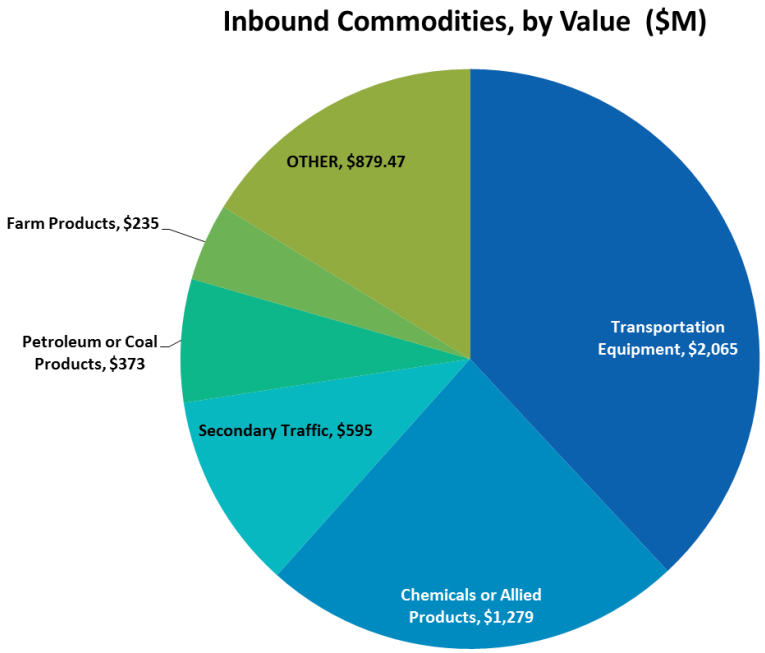


Figure 29: Top Freight Values by Commodities.
Source: TranSearch, 2012

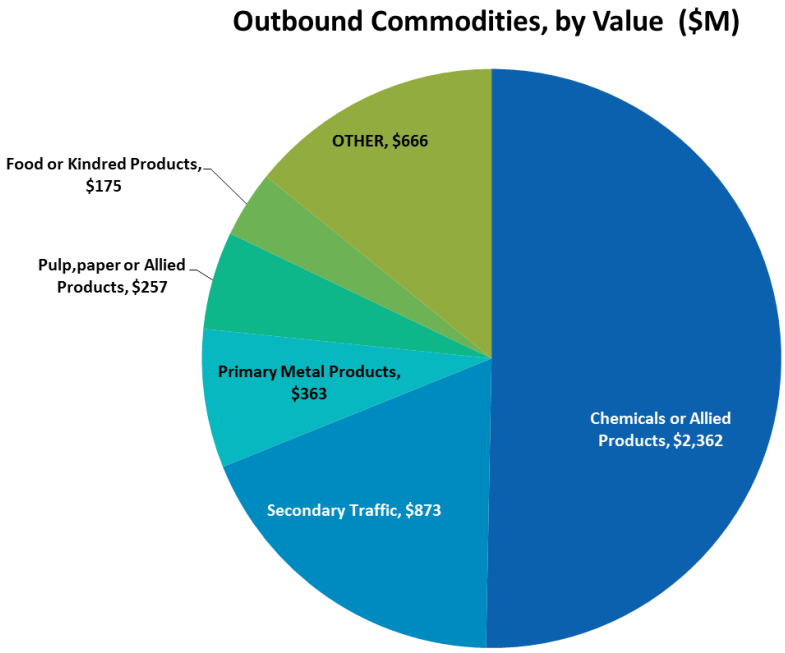


Figure 30: Top Freight Values by Commodities.
Source: TranSearch, 2012

In terms of both value and tonnage, the Tri-Cities Region exported more to the Southeast Region than any other region in the United States. In 2012, almost $1.2 billion dollars, or 1.8 million tons, of freight was exported to the Southeast. (Refer to Figure 31).

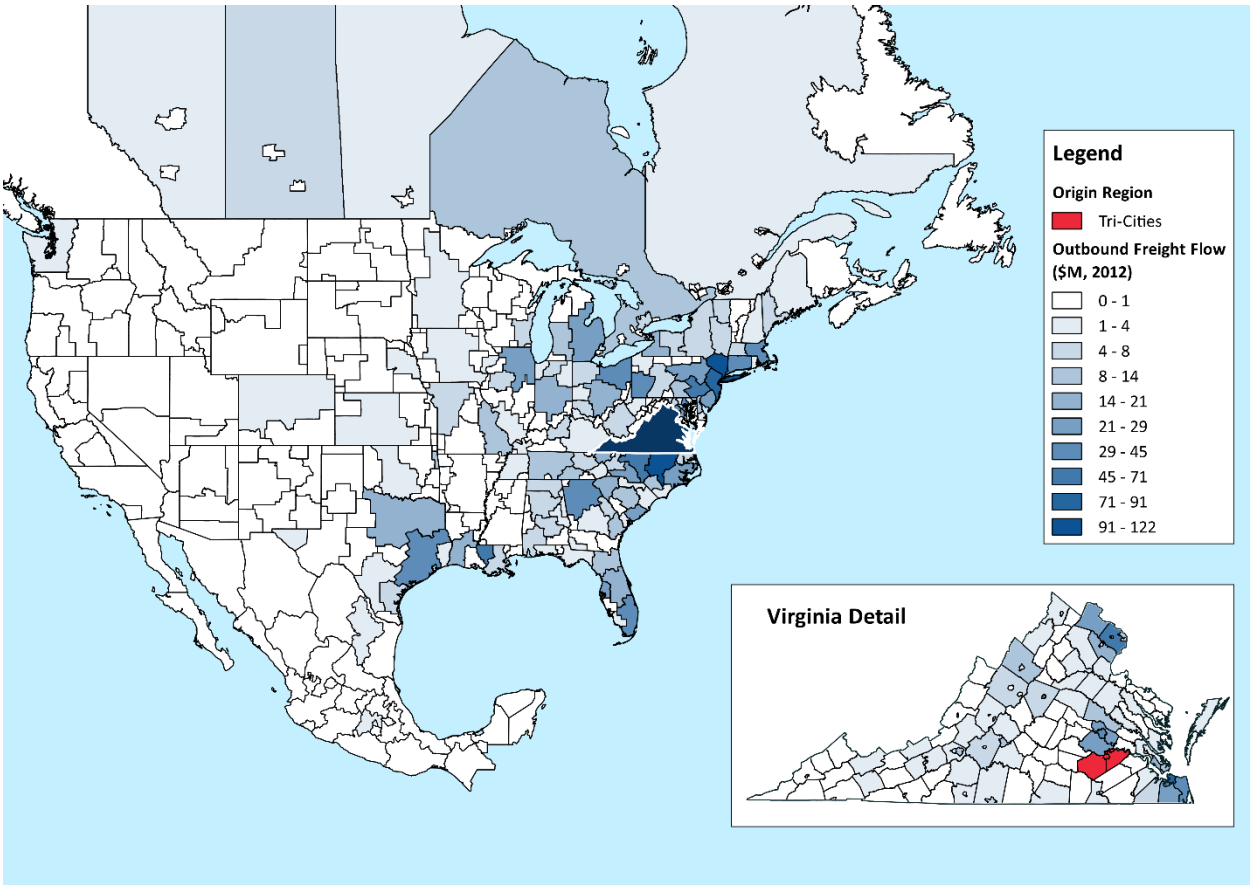


Figure 31: Top Freight Values by Region.
Source: TranSearch, 2012

The next figures present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. When freight movements were analyzed by weight, nonmetallic minerals accounted for the largest share of freight movements imported into the region. Nonmetallic minerals and chemical or allied products account for the largest tonnage of freight exported from the Tri-Cities Region. (Refer to Figures 32 and 33).

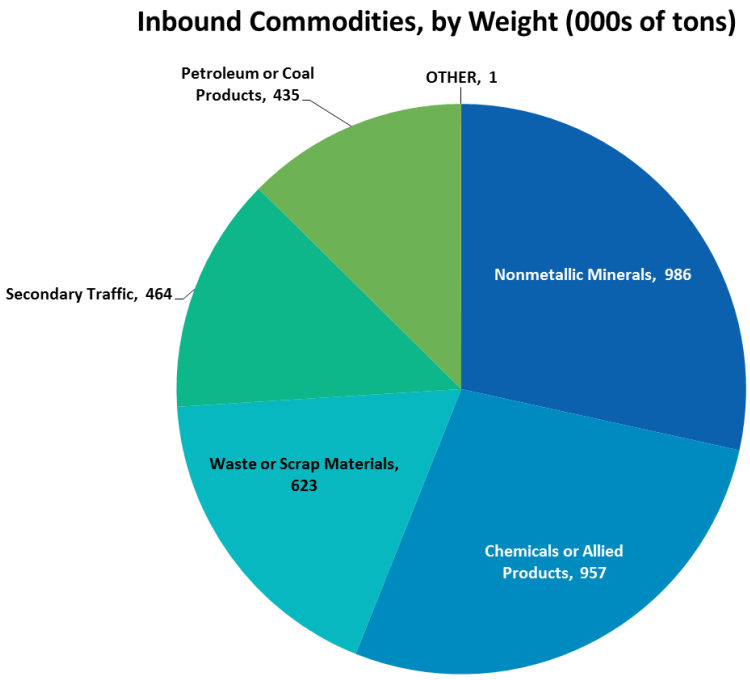


Figure 32: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

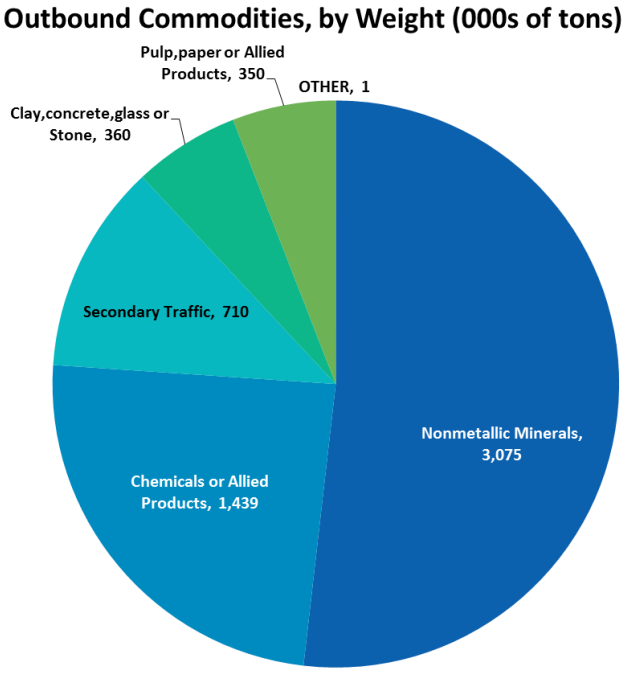


Figure 33: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries, with an emphasis on attracting and retaining the future workforce and supporting Virginia businesses' goods movement needs. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above economic and transportation linkages are discussed at length in the Regional Network Needs Assessment Introduction.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May, 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs.
These Needs were categorized into a series of five very broad types of capacity Needs:

1. Corridor Reliability/Congestion
2. Network Connectivity
3. Transportation Demand management
4. Modal Choice
5. Walkable/Bikeable Places

Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs) were also recorded when they were identified from stakeholder input, although these were not the focus of the Regional Networks Needs Assessments. The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the Study Team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs, as described further in the introductory document, VMTP 2025 Needs Assessment: Regional Networks Introduction. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 10: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Tri-Cities Virginia Region, it showed an expected decline in the share of output coming from freight-based sector and an increase for the knowledge-based sector. Furthermore, the healthcare sector is expected to see significant employment growth by 2025.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire in the region to support the burgeoning advanced manufacturing and logistics sector, particularly with respect to goods movement needs, but also to support the expected growth of the knowledge sector and its needs for reliable commuting and additional modal travel options. This translates into transportation needs such as freight accessibility and passenger reliability on the region's prime corridors, such as I-95, I-85 and US 460, and the passenger and freight rail corridors that generally parallel the highways. It also indicates the need for addressing any bottlenecks along these prime corridors to further support reliable travel for both commuters and goods movement. In addition, other key corridors that support activity centers in the region, such as Route 36 are important commuter routes and serve economic growth in Fort Lee, downtown Petersburg.

The forecasted growth in the knowledge economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge industry sector particularly point to improving modal choice, transit access and walkable places. The local economic sector also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region's economic activity centers, and between the centers. Fixed route transit exists in the region primarily within the City of Petersburg only. However, the expansion of knowledge-based and local-based sectors would benefit from both additional fixed route transit in the region and additional demand-response rural transit to provide better workforce access. Further support for the knowledge sector would also come from additional walkable places and modal options for walking and biking in the region.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table that identifies the following findings of need:

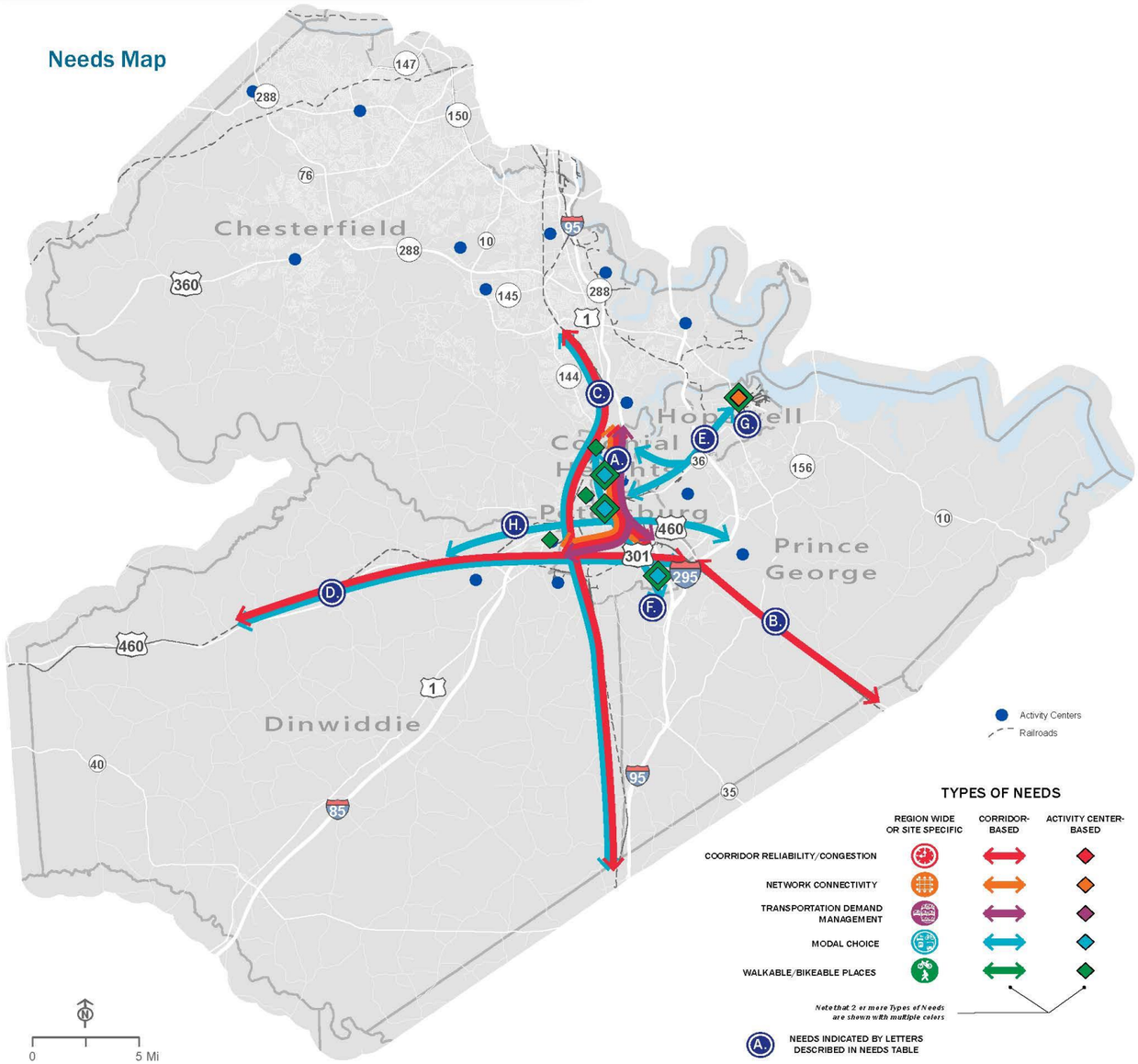
1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 34: Summary Needs Map for the Tri-Cities Region

Tri-Cities Region Needs Summary

Needs Map



Needs Table

A. I-95 & 85 Corridor Reliability & Connectivity

The I-95 & 85 Corridors are key regional arteries for the region and they handle commuter and freight traffic as well as connect the region to other parts of Virginia. Poor design characteristics and deficient access at the 95/85 interchange and adjacent interchanges causes reliability issues and limits access to the surrounding area including key activity centers like Downtown Petersburg and Fort Lee.

B. US 460 Corridor Reliability

US 460 is a key freight corridor connecting the region to the Port of Virginia and ensuring reliable freight movement on this corridor is key to ensuring that key activity centers like Crosspointe remain competitive.

C. North/South Rail Reliability and Connectivity

The North-South CSX Rail Lines through the region are critical freight and passenger corridors for inter-regional movement and suffer from congestion and unreliability. Passenger rail service is not well connected to the region as the main train station for the region is not well connected to regional multimodal options and is distant from major activity centers. Major rail yards have insufficient access to highways, limiting the potential for intermodal freight movement.

D. East/West Rail Reliability and Connectivity

The East-West NS Rail Line through the region is a critical freight and passenger corridor for inter-regional movement and suffers from congestion and unreliability. Rail yards have insufficient access to highways, limiting the potential for intermodal freight movement.

E. Mode Choice connecting Petersburg, Fort Lee and Hopewell

The Route 36 Corridor and parallel routes are key links connecting Downtown Petersburg with Fort Lee and Hopewell, some of the largest employment centers in the region. Expaning transit access along this corridor or parallel routes will better connect the most Knowledge heavy activity center in the region (Downtown Petersburg) to one of the largest employers in the region (Fort Lee) and to key workforce residential areas in Petersburg and Hopewell.

F. North/South Corridors Mode Choice

Three key activity centers (Downtown Petersburg, Southpark Mall and South Crater) are along a key north/south axis and better connecting these and other activity centers along this axis will connect key Knowledge activity centers and Local Service centers to key workforce residential areas in Petersburg and Colonial Heights.

G. Freight Access for Hopewell

Hopewell is home to major manufacturing and other freight-focused industries and therefore freight truck access is a critical requirement for continued economic competitiveness.

H. Mode Choice to and from Prince George and Dinwiddie

There are limited mode choice options for workforce living in Prince George and Dinwiddie to reach other activity centers in the region and likewise there is limited mode choice for workers to reach emerging activity centers in these counties from adjacent jurisdictions.

I. Various Activity Centers - Walkable Places

There are multiple activity centers that have limited pedestrian facilities or need improved pedestrian environments. Walkable places improves appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.

J. Regional Need - Modal Choice

To support active transportation, crossings of major barriers such as the Appomatox River, Interstates and railroads need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips and sometimes unsurmountable obstacles. One example is that no crossing of the Appomatox River has dedicated bicycle lanes.

Figure 35: VMTP Icon Key

NEEDS ICONS

Corridor Reliability and Congestion



Network Connectivity



Transportation Demand Management



Modal Choices



Walkable/Bikeable Places



ECONOMIC ICONS

Local Service Sector



Freight Based Sector



Knowledge Based Sector



TRANSPORTATION ICONS

Commuting Patterns / Modes



Multimodal Access to Jobs



Highway Network Reliability



Highway Network Bottlenecks



Freight Networks / Commodity Flows



Conditions from Stakeholder Input



Table 11: Findings of Needs

A. I-95 & 85 Corridor Reliability & Connectivity

NEED: **The I-95 & I-85 Corridors are key regional arteries for the region and they handle commuter and freight traffic as well as connect the region to other parts of Virginia. Poor design characteristics and deficient access at key interchanges along I-95 & I-85 causes reliability issues and limits access to the surrounding area including key activity centers like Downtown Petersburg and Fort Lee.**

ECONOMIC: The 95/85 interchange and surrounding interchange are critical to connecting nearly all activity centers in the region.

TRANSPORT.: The interchanges in this area are of poor design, leading to bottlenecks, limited access to surrounding activity centers and to safety problems.

B. US 460 Corridor Reliability

NEED: **US 460 is a key freight corridor connecting the region to the Port of Virginia and ensuring reliable freight movement on this corridor is key to ensuring that key activity centers like Crosspointe remain competitive.**

ECONOMIC: The Tri-Cities region has significant distribution and manufacturing that is reliant on good access to the Port of Virginia via US 460.

TRANSPORT.: The US 460 Corridor provides connectivity to I-295, I-95 and I-85 for key activity centers in the southwest portion of the region.

C. North/South Rail Reliability and Connectivity

NEED: **The North-South CSX Rail Lines through the region are critical freight and passenger corridors for inter-regional movement and suffer from congestion and unreliability. Passenger rail service is not well connected to the region as the main train station for the region is not well connected to regional multimodal options. Major rail yards have insufficient access to highways, limiting the potential for intermodal freight movement.**

ECONOMIC: Reliable freight movement and access to intermodal freight options along this corridor is critical to freight industries in the region. High-quality, reliable and accessible inter-city passenger service is critical to knowledge sector industries in the region.

TRANSPORT.: The CSX line in Virginia is identified as a key chokepoint in the freight and passenger rail system in the Virginia Statewide Multimodal Freight Study due to the heavy train traffic and limited capacity.

D. East/West Rail Reliability and Connectivity

NEED: **The East-West NS Rail Line through the region is a critical freight and passenger corridor for inter-regional movement and suffers from congestion and unreliability. Rail yards have insufficient access to highways, limiting the potential for intermodal freight movement.**

ECONOMIC: Reliable freight movement and access to intermodal freight options along this corridor is critical to freight industries in the region. High-quality, reliable and accessible inter-city passenger service is critical to knowledge sector industries in the region.

TRANSPORT.: The NS Heartland Corridor in Virginia is identified as a key chokepoint in the freight rail system in the Virginia Statewide Multimodal Freight Study due to the heavy train traffic and limited capacity.

E. Mode Choice connecting Petersburg, Colonial Heights, Fort Lee and Hopewell

NEED: **The Routes 36 & 144 Corridors and parallel routes are key links connecting Downtown Petersburg, Colonial Heights, Fort Lee and Hopewell, some of the largest employment centers in the region. Expanding transit access along this corridor or parallel routes will better connect the most Knowledge heavy activity center in the region (Downtown Petersburg) to one of the largest employers in the region (Fort Lee) and to key workforce residential areas in Petersburg and Hopewell.**

ECONOMIC: Supports major local and knowledge-based regional activity centers including Petersburg and Fort Lee, while enhancing access to local centers such as Hopewell and connecting workforce in Prince George and areas surrounding Fort Lee.

TRANSPORT.: Existing transit service between these activity centers is limited in frequency, service area and span of service.

F. North/South Corridors Mode Choice

NEED: **Three key activity centers (Downtown Petersburg, Southpark Mall and South Crater) are along a key north/south axis and better connecting these and other activity centers along this axis will connect key Knowledge activity centers and Local Service centers to key workforce residential areas in Petersburg and Colonial Heights.**

ECONOMIC: Supports major local and knowledge-based regional activity centers including Petersburg, while enhancing access to local centers such as South Crater and South Park and connecting workforce in surrounding areas to Petersburg.

TRANSPORT.: Existing transit service between these activity centers is limited in frequency, service area and span of service.

G. Freight Access for Hopewell

NEED: **Hopewell is home to major manufacturing and other freight-focused industries and therefore freight truck access is a critical requirement for continued economic competitiveness.**

ECONOMIC: The Hopewell activity center has significant distribution and manufacturing that is reliant on good highway access to reach I-295, I-95 and I-85.

TRANSPORT.: Last-mile access to freight-focused industries in Hopewell is an essential transportation issue in the area.

H. Mode Choice to and from Prince George and Dinwiddie

NEED: **There are limited mode choice options for workforce living in Prince George and Dinwiddie to reach other activity centers in the region and likewise there is limited mode choice for workers to reach emerging activity centers in these counties from adjacent jurisdictions.**

ECONOMIC: Supports major local and knowledge-based regional activity centers including Petersburg, while enhancing access to local centers such as South Crater and South Park and connecting workforce in surrounding areas to Petersburg. Also enhances workforce access to emerging activity centers in Prince George and Dinwiddie such as Crosspointe and Dinwiddie Airport.

TRANSPORT.: Existing transit service between these activity centers is limited in frequency, service area and span of service.

I. Various Activity Centers - Walkable Places

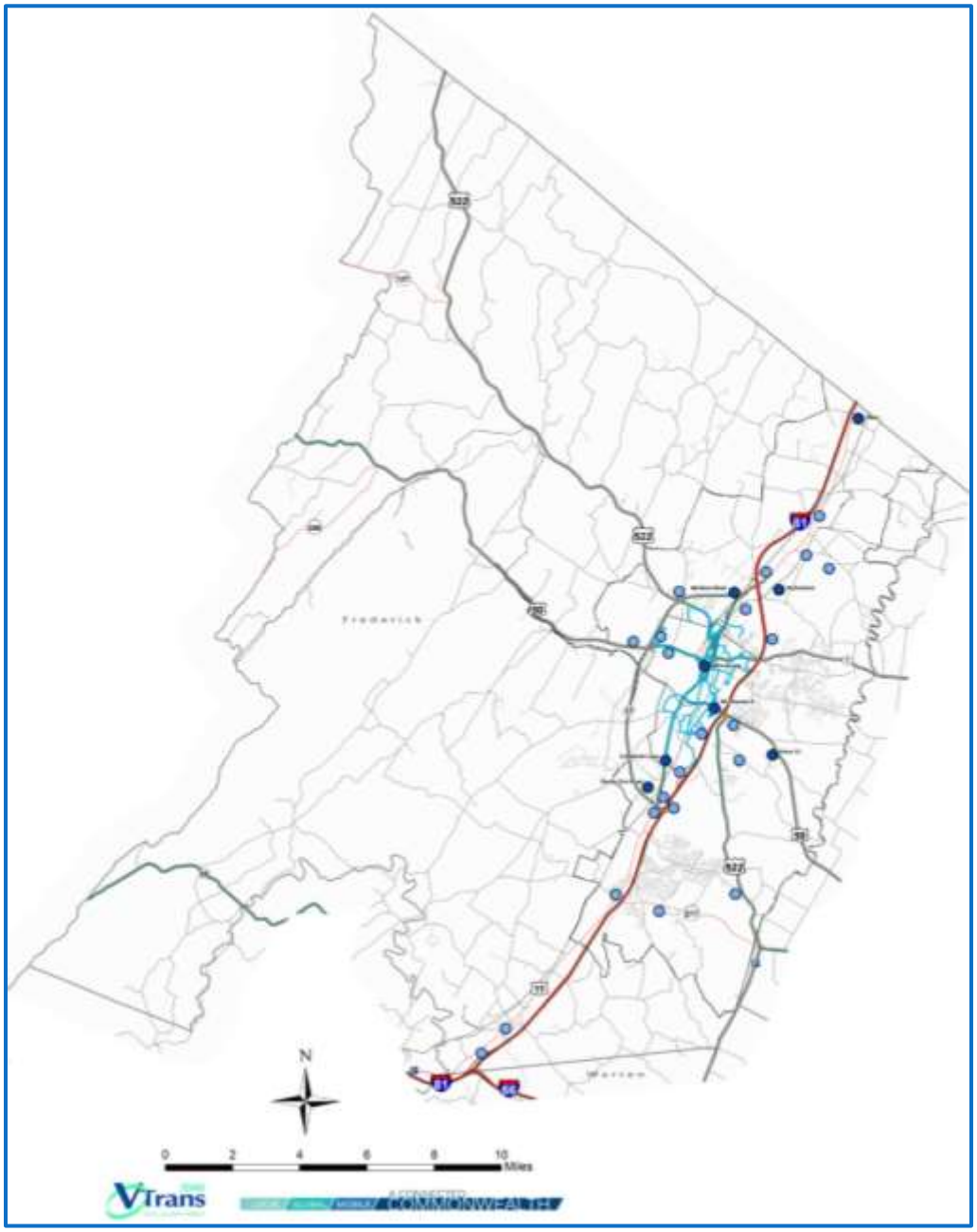
NEED	**There are multiple activity centers that have limited pedestrian facilities or need improved pedestrian environments. Walkable places improves appeal to the future workforce, attraction for knowledge-based industries and reduces the reliance on vehicular travel.**
ECONOMIC	Knowledge and local serving centers compete for the workforce segment that prioritizes walk and bike commutes and amenities.
TRANSPORT.	In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need affects the mobility of non-drivers who desire access to these areas.

J. Regional Need - Modal Choice

NEED	**To support active transportation options, crossings of major barriers such as the Appomattox River, Interstates and railroads need to accommodate bicycles and pedestrians. Constraints are widespread and create circuitous trips and sometimes unsurmountable obstacles. One example is that no crossing of the Appomattox River has dedicated bicycle lanes or pedestrian accommodations.**
ECONOMIC	All activity centers with employees seeking a bicycle commute may be affected by this need. Knowledge and local serving centers appear the most likely to be affected, as they compete for the workforce segment that prioritizes walk and bike commutes and amenities.
TRANSPORT.	In addition to inhibiting transportation mode choice for trips that might otherwise be made by car, this need particularly affects the mobility of non-drivers in the region. It also affects recreational walking and bicycling in the region.

VMTP 2025 Needs Assessment

Regional Needs Profile



Winchester-Frederick Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment is an essential element of the overall VTrans2040 Statewide Transportation Plan for Virginia. Based on the VTrans 2040 Vision and policy directives from the Governor's office, the VMTP 2025 Needs Assessment is based on two principal objectives of transportation policy with the aim of enhancing economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses.

This document is one portion of the overall Needs Assessment for regional Networks that deals with the Needs Assessment for the Winchester-Frederick (WinFred) Region. There is a separate document entitled "VMTP 2025 Needs Assessment: Regional Networks Introduction," that provides an overall introduction into the background and methodology of the Needs Assessments. In this document, details are provided on the 2025 Needs development process, as well as the economic factors shaping regional Transportation Needs. This introductory document provides a foundation for the regional needs described here. The focus of this Transportation Needs Assessment is to identify the Transportation Needs that are part of the WinFred Regional Network, and that would support regional industries and workforces.

Defining Transportation Needs

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the Transportation Needs and economic conditions is the basis for the findings in this report. The following sections outline the WinFred regional Economic Profile, regional Transportation Profile, and regional Transportation Needs.

Defining a Regional Network

This portion of the Needs Assessment deals with a Regional Network. For the purposes of the VMTP Needs Assessment, the final determination of each Regional Network has been developed as part of the outreach process in working with each region. Additional information about how the regional Networks were defined is referenced in the introductory document, "VMTP 2025 Needs Assessment: Regional Networks Introduction."

The WinFred Region is defined as the City of Winchester and Rockingham County. However economic generators, economic attractors and commuting corridors located outside of but adjacent to this region that influence the economy or travel market of the WinFred Region were considered in the development of the Regional Needs Profile. These include:

- **Outside Economic Generators:** Virginia Inland Port (VIP), 7685 Winchester Road, Front Royal
- **Outside Economic Attractors:** Shenandoah, Warren, Fairfax and Loudoun Counties
- **Regional Commuting Corridors:** I-81 from Harrisonburg to Hagerstown, MD; I-66 from I-81 Jct to I-495 Jct; VA 7 from Winchester to Alexandria; US 522 from Berkeley Springs, WV to Front Royal; and US 50 from Romney, WV to Winchester

2. Economic Profile

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of analyzing emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

OIPI consultants used available data from state and national sources, as well as input from WinFred Region stakeholders to identify an overall current economic profile for the region. The components of the current economic profiles layer together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Top Employers
- Activity Centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to the US Census, the current population in the state of Virginia is 8,185,867 (**Table 1**). By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21 percent from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population – 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	**9,203,977**	**9,740,553**

Source: Weldon Cooper Center for Public Service, Demographic Research Group, Intercensal Estimates for Virginia, Counties and Cities: 2010-2012; and Woods and Poole Economics, Incorporated, 2014 State Profile District of Columbia, Maryland, and Virginia.

Regional Demographics

The WinFred Region is forecasted to experience steady population growth over the next decade. The county as a whole may experience an increase in population by 34 percent by 2025 (**Table 2**) where as the City of Winchester is projected to have a slight increase in population of only 6 percent by 2025.

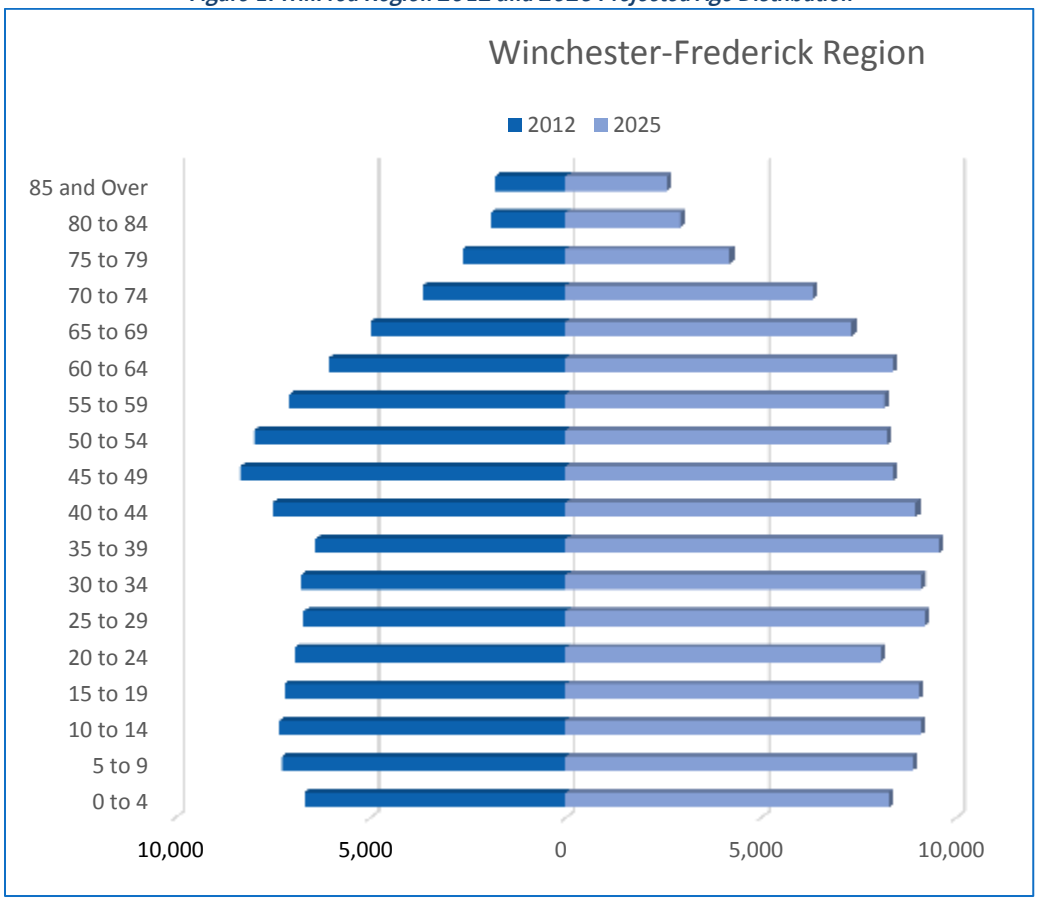
Table 2: WinFred Region County and City Population Projections

Jurisdiction	2012	2025	% Change (2012-2025)
Frederick County	80,317	108,019	34.5%
City of Winchester	26,881	28,632	6.5%

Source: US Census Bureau. Weldon Cooper Center for Public Service, Demographics Research Group; Intercensal Estimates for Virginia, Counties, and Cities: 2010-2012, Charlottesville, Virginia, January 27, 2014, www.coopercenter.org; Accessed between January-August, 2014.

Figure 1 illustrates the age distribution for the WinFred Region in 2012 and the projected age distribution for 2025. Population growth is projected to be accompanied by a demographic shift, with a higher percentage of the population between the ages of 25 and 44.

Figure 1: WinFred Region 2012 and 2025 Projected Age Distribution



Source: Woods & Poole Economics, Incorporated. 2014 State Profile District of Columbia, Maryland, and Virginia. Washington DC. 2014.http://www.woodsandpoole.com. Accessed June 18, 2014.

C. Current Industry Strengths

Economic drivers in the region are predominantly centered on local-serving industries. These include health care, retail trade, public administration and other services (e.g. personal care services like barbershops and salons; and religious, grant making, civic, and professional organizations like churches and social advocacy groups). However, manufacturing – a freight-dependent industry – is a major employer in the region, as well as the most significant contributor to the region's output. The following economic measures were used to analyze the strength and characteristics of the current regional economy in the WinFred Region.

Top Industries by Output

Public Administration is the strongest industry by economic output (**Table 3**) followed closely by the Manufacturing industry.

Table 3: WinFred Region Current Industries by Output, 2012

Top 5 Industries	Output ($M)	% of Output
Public Administration	$2,483	19%
Manufacturing	$2,205	17%
Retail Trade	$2,034	15%
Wholesale Trade	$1,917	15%
Health Care	$1,067	8%

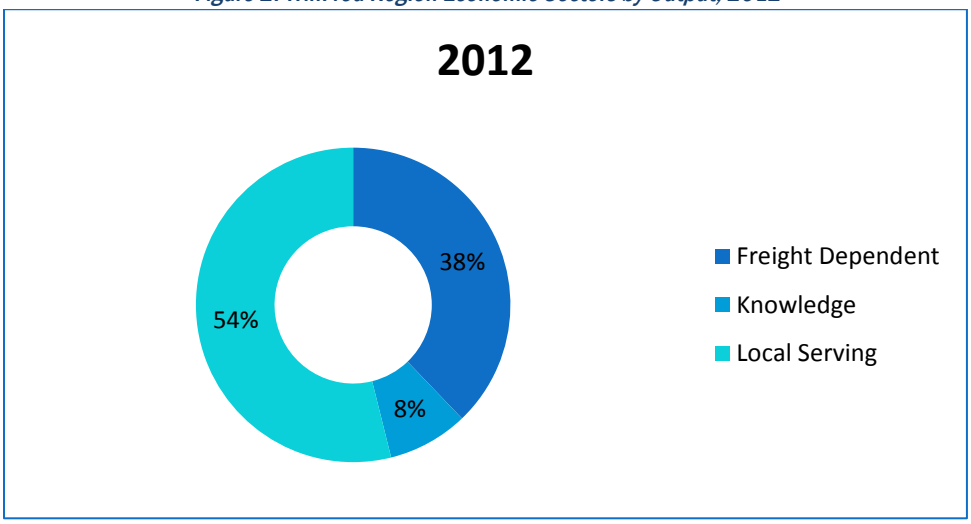
Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Economic Sectors

The 20 industry sectors, as defined by The North American Industry Classification System (NAICS), have been grouped into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These economic clusters are defined as Local Economic Sectors, Knowledge-based Economic Sectors, and Freight-based Economic Sectors. Each economic cluster has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-type service industries such as financial services, where passenger intermodal needs would be a greater concern.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the WinFred Region, **Figure 2** provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the OIPI consultants and used in all regional analyses throughout the State. In 2012, the local serving industries were the predominant industries by output in the region at over 54 percent. In terms of transportation characteristics and needs the Local Services economic cluster is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries.

Figure 2: WinFred Region Economic Sectors by Output, 2012



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Top Industries by Employment

In the WinFred Region, the top industries by employment are Health Care, Retail Trade and Manufacturing (**Table 4**).

Table 4: WinFred Region Top Industries by Employment, 2014

Top 5 Industries	Number of Jobs	% of Workforce
Health Care	8,484	16%
Retail Trade	7,794	15%
Manufacturing	6,691	13%
Educational Services	4,832	9%
Accommodation/Food Service	4,822	9%

Source: JobsEQ, 2014 courtesy of Frederick County Economic Development Authority.

Table 5 lists the current top employers in the WinFred Region. The Frederick County School Board is the largest employer in the region with 2,100 workers followed by Winchester Medical Center at 1,800 workers.

Table 5: WinFred Region Current Top Employers

Employers	Employees
Frederick County School Board	2,100
Winchester Medical Center	1,800
Rubbermaid Commercial Products	1,300
Wal-Mart	865
Frederick County	800

Source: 2012 InfoUSA data, supplemented with 2014 WinFred MPO data.

Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as

compared to the nation, and can reveal what makes a particular region unique in comparison to the national average. The WinFred Region's employment in Manufacturing is 1.41 times the nation the national average (**Table 6**).

Table 6: WinFred Region Current Top Industries by Location Quotient, 2014

Top Industries	Location Quotient
Manufacturing	1.42
Retail Trade	1.31
Utilities	1.18
Transportation/Warehousing	1.13
Health Care	1.11

Source: JobsEQ, 2014 courtesy of Frederick County Economic Development Authority.

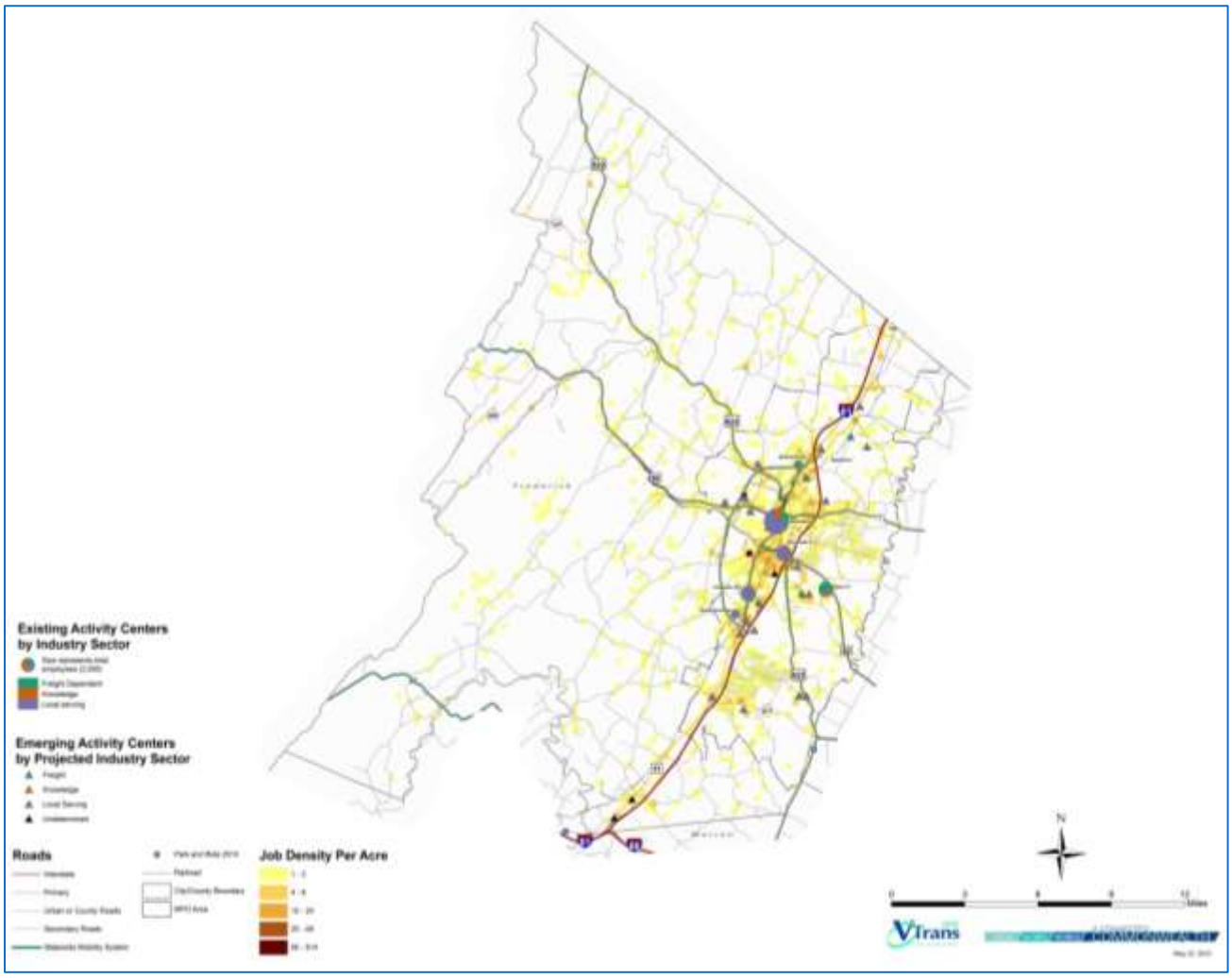
D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, Activity Centers are defined as areas of regional importance that have a high density of economic and social activity. Activity Centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity Centers, drawn with a 1-mile-radius, were then developed for these areas. The Activity Centers were then revised, refined, or amended after discussing economic conditions with regional stakeholders. **Figure 3** below shows the job density per acre in a color range from yellow to dark brown.

Once the Activity Centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of Local Serving, Freight Dependent, and Knowledge Based economies, analysts developed charts that represented the breakdown of employment by industry sector in each Activity Center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region (**Figure 3**).

Regional stakeholders also identified locations where emerging activity centers are projected to develop over the next ten years and provided feedback on which economic cluster is anticipated. These are depicted on the **Figure 3** as triangles.

Figure 3: WinFred Region Existing and Emerging Activity Center Employment by Industry Sector



Source: InfoUSA data, Regional Stakeholder Input.

E. Forecasted 2025 Industry Strengths

Through a series of work sessions with the WinFred Region stakeholders, OIPI consultants used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose the WinFred Region's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

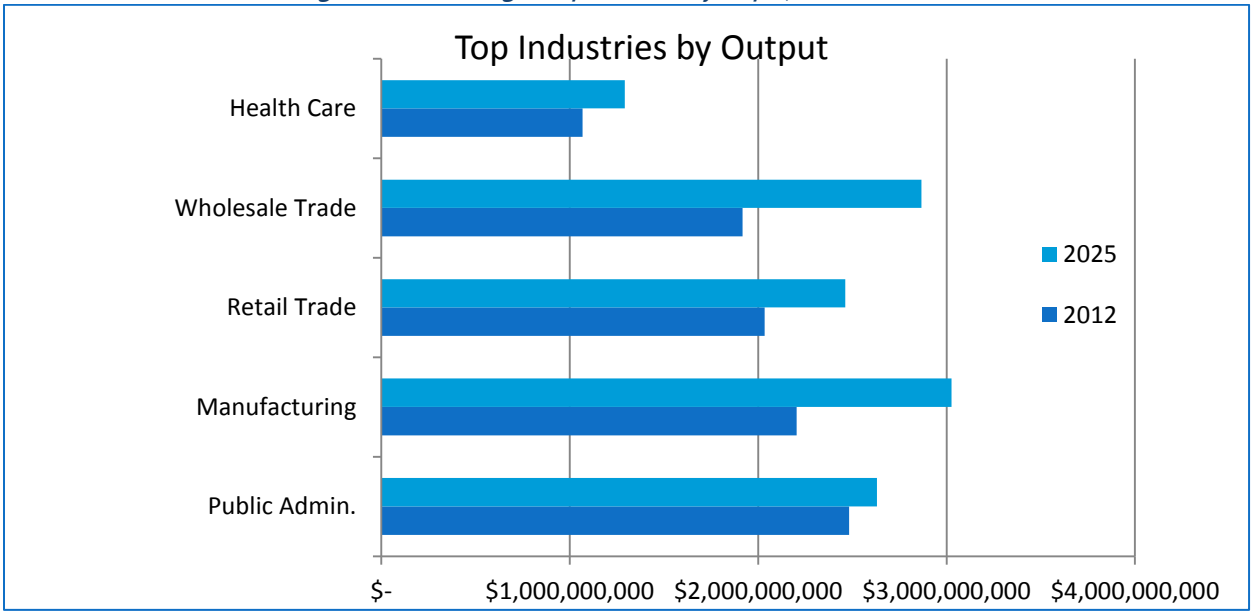
The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the WinFred Region. The basic economic datasets that were compiled include:

- Current Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity Center profiles

- Top Employers and Locations
- Economic Development Priorities

Figure 4 compares the top five industries by economic output in 2012 with forecasted growth by 2025. Most of the forecasted high-growth in economic output is in freight dependent industries, Wholesale Trade and Manufacturing. The remaining three top industries are local serving and are forecasted to see moderate growth through 2025.

Figure 4: WinFred Region Top Industries by Output, 2012 and 2025

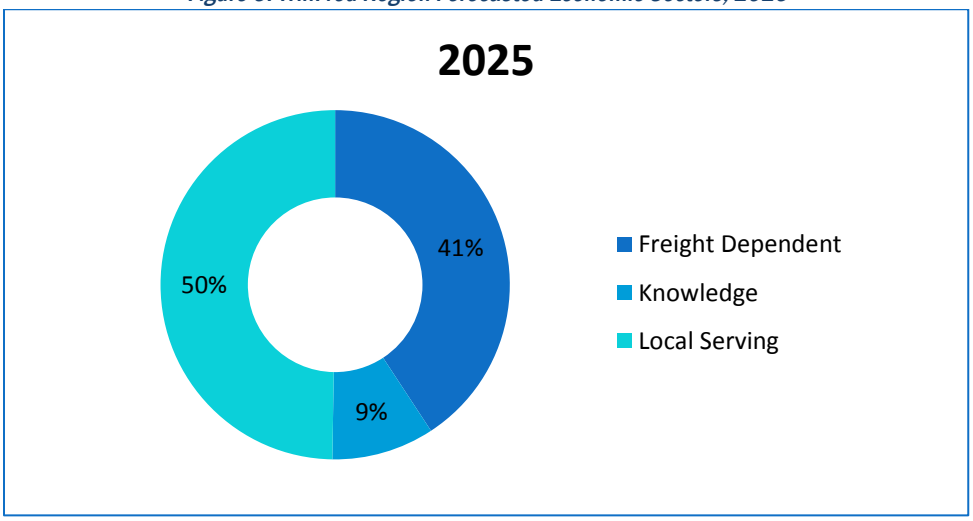


Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Economic Sectors

Figure 5 illustrates the summary of the forecasted economic clusters in the WinFred Region for 2025. Local serving industries will still be the predominant economic sector by output in the region at 50 percent.

Figure 5: WinFred Region Forecasted Economic Sectors, 2025



Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

Forecasted Industries by Employment

Forecasted top industries by employment for the region are listed in **Table 7**. Public Administration is expected to be the dominant industry with 18 percent of the workforce. Of the top five industries by employment, 64 percent of the workforce are for local serving industries and 10 percent of the workforce is for the freight dependent Manufacturing industry.

Table 7: WinFred Forecasted Top Industries by Employment, 2025

Top 5 Industries	Number of Jobs	% of Workforce
Public Administration	11,397	18%
Health Care	9,508	15%
Retail Trade	6,823	11%
Manufacturing	6,401	10%
Accommodation/Food Service	6,029	10%

Source: IHS Global Insight Business Market Insights (BMI) Data & Forecasts, 2012.

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in the WinFred Region such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for the WinFred Region:

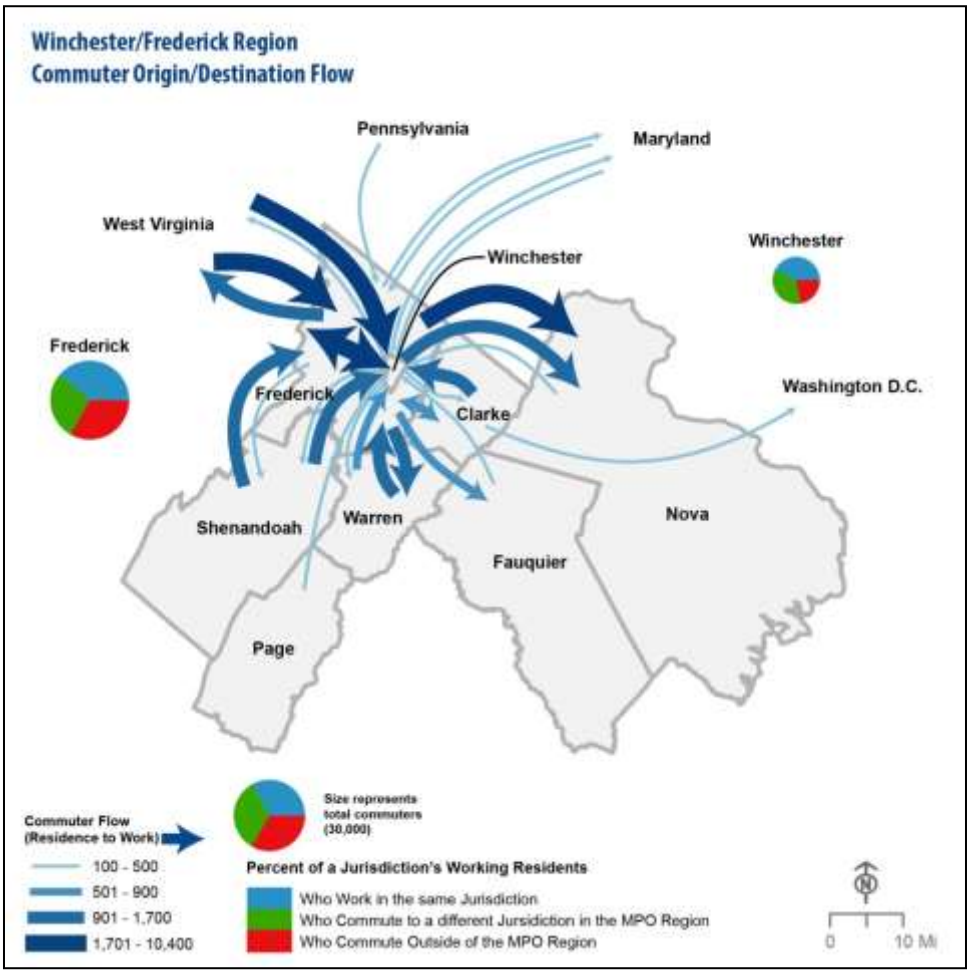
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

Figure 6 illustrates the commuting patterns within and among the WinFred Region localities between 2009 and 2013. The WinFred Region is a net exporter of workers. While Frederick County itself is the biggest attractor of locally-originated work trips, Fairfax and Loudoun counties to the east are the second and third largest, respectively. The remainder of commuters working in Frederick County live in surrounding rural counties in Virginia and West Virginia, with the largest origin being Berkeley County, WV, followed by Shenandoah and Warren Counties in Virginia. The pie charts indicate that about a third of Frederick County's working residents work outside the region.

Figure 6: WinFred Region Commuting Patterns



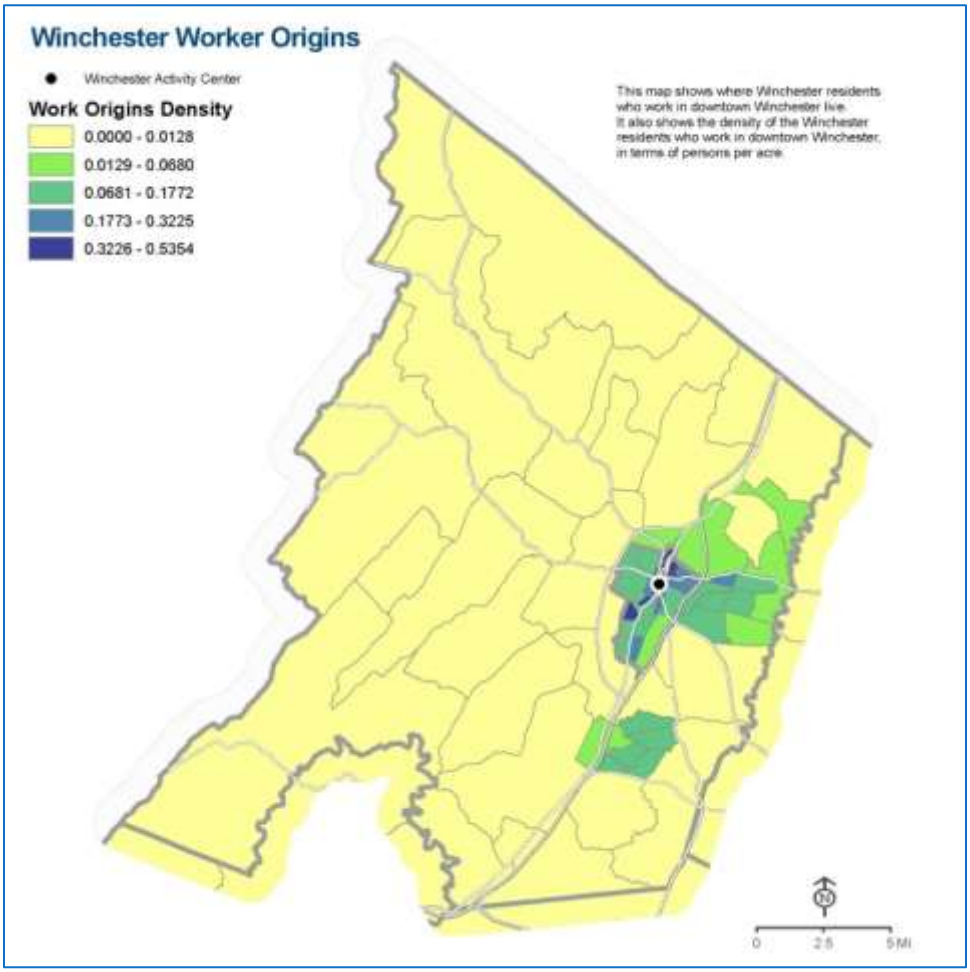
Source: American Community Survey: Residence County to Workplace County Flows for the United States and Puerto Rico Sorted by Residence Geography: 2006-2010.

Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the WinFred Region was the analysis of commuting patterns between Activity Centers. **Figures 7, 8 and 9** below provide insights into the commuting patterns for three of the Activity Centers in the WinFred Region. Block groups are symbolized on a color scale from dark to light blue, with the darker shades representing the block groups with the largest number of commuters to the Activity Center analyzed within that map.

As shown on **Figure 7**, Winchester receives commuters mostly from within the City of Winchester and along VA 7.

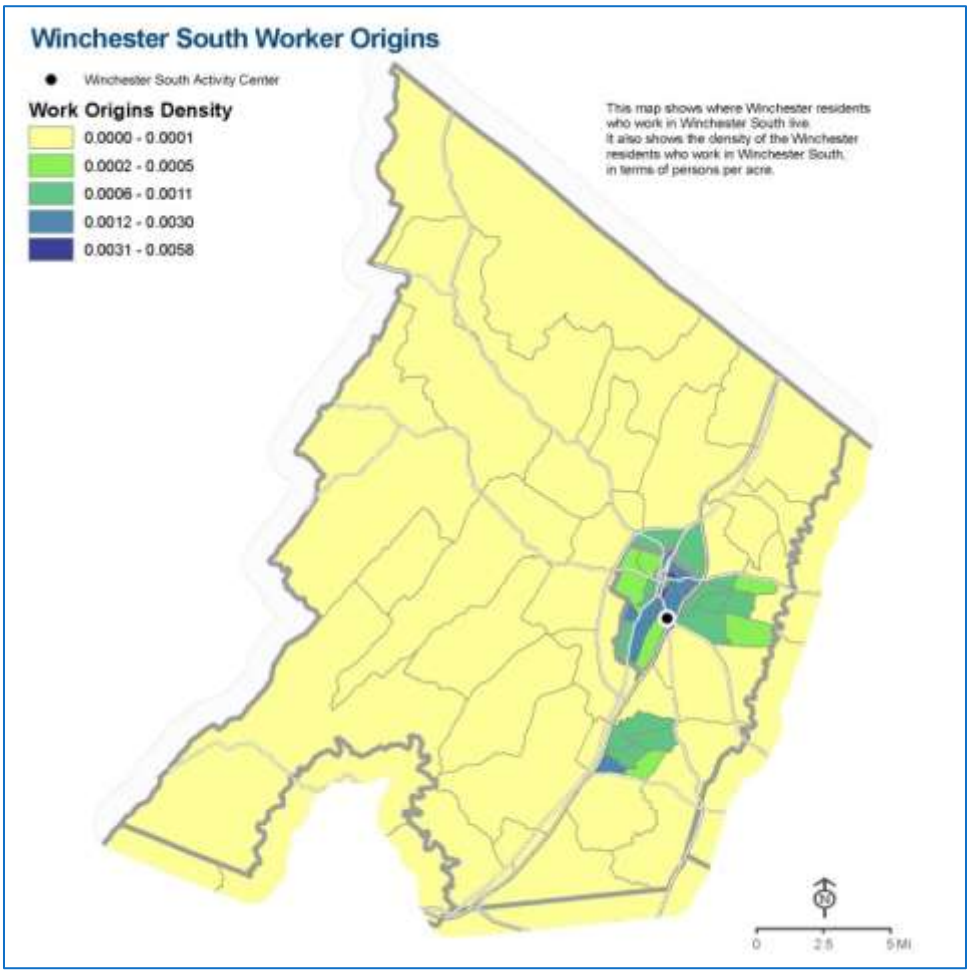
Figure 7: Commuting Patterns to Winchester Activity Center



Source: Longitudinal Employer-Household Dynamics (LEHD) program which uses Unemployment Insurance earnings data and the Quarterly Census of Employment and Wages (QCEW) data to create statistics on employment, earnings, and job flows at detailed levels of geography and industry and partially synthetic data on workers' residential patterns, http://lehd.ces.census.gov/.

The Winchester South activity center receives most of its commuters from the City of Winchester as well as in between VA 7 and US 50 east of I-81 and the interchange of I-81 and VA 277 (**Figure 8**).

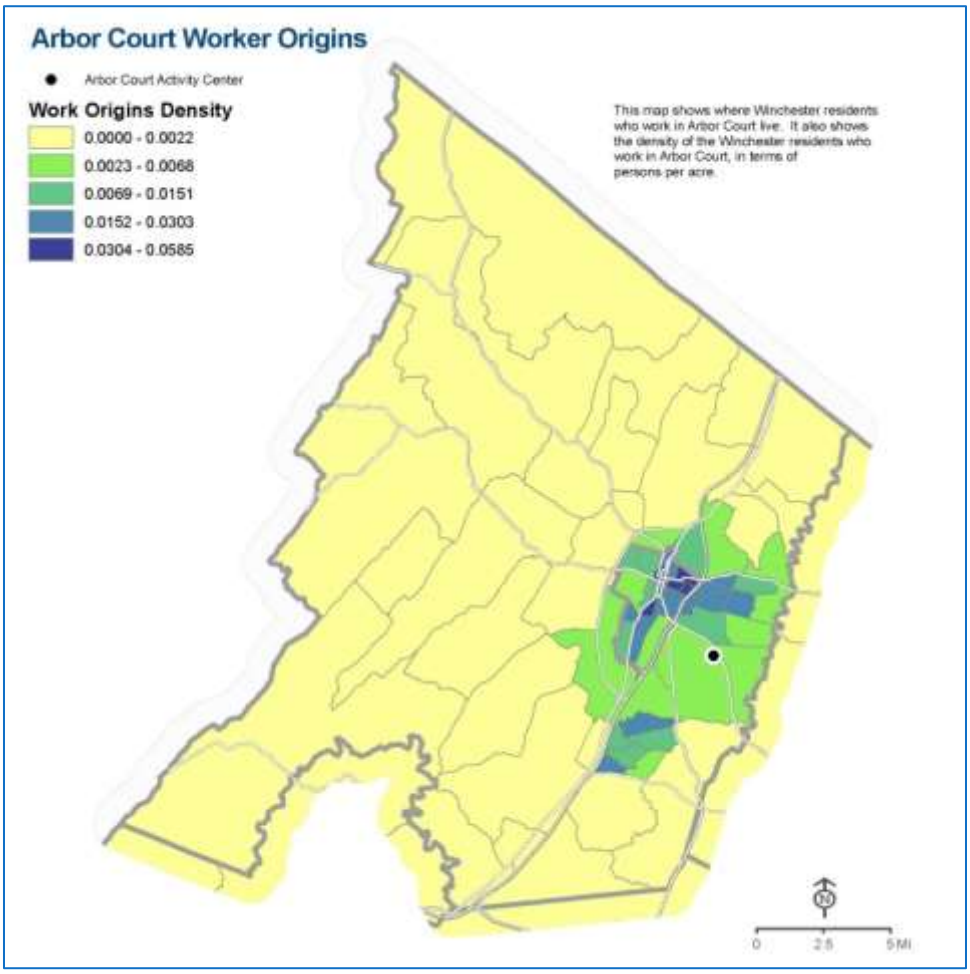
Figure 8: Commuting Patterns to Winchester South Activity Center



Source: LEHD, http://lehd.ces.census.gov/.

Figure 9 shows that a majority of commuters to the Arbor Court activity center originate from the City of Winchester as well as in between VA 7 and US 50 east of I-81 and the interchange of I-81 and VA 277.

Figure 9: Commuting Patterns to Arbor Court Activity Center

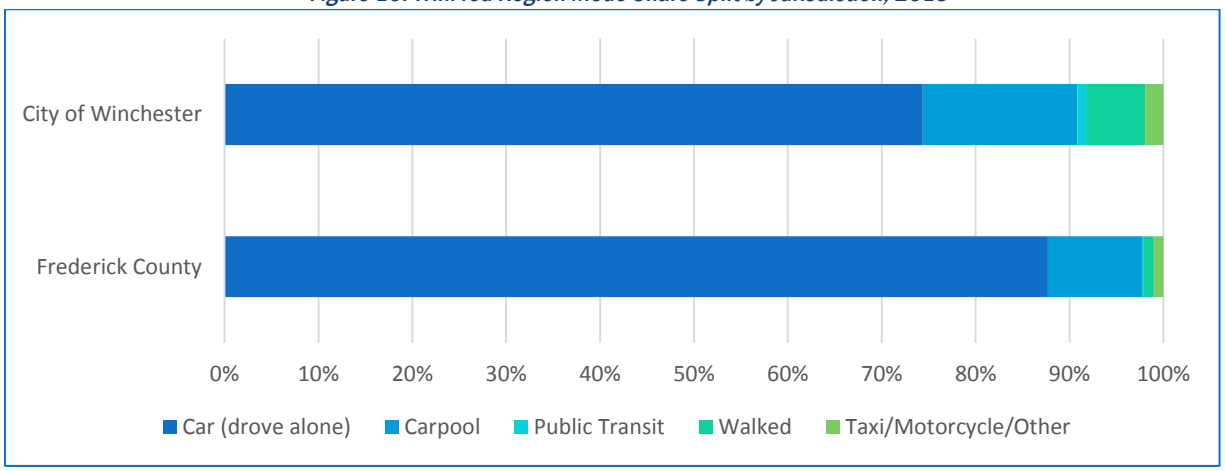


Source: LEHD, http://lehd.ces.census.gov/.

Mode Choice

In the WinFred Region, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 72 and 84 percent of the time. For all jurisdictions, carpooling is the second most popular option, accounting for 9 percent in Frederick County and 16 percent for the City of Winchester (**Figure 10**).

Figure 10: WinFred Region Mode Share Split by Jurisdiction, 2013



Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Average Commute Times

The average commute time in the WinFred Region ranges from 22 to 30 minutes among the two jurisdictions (**Table 8**).

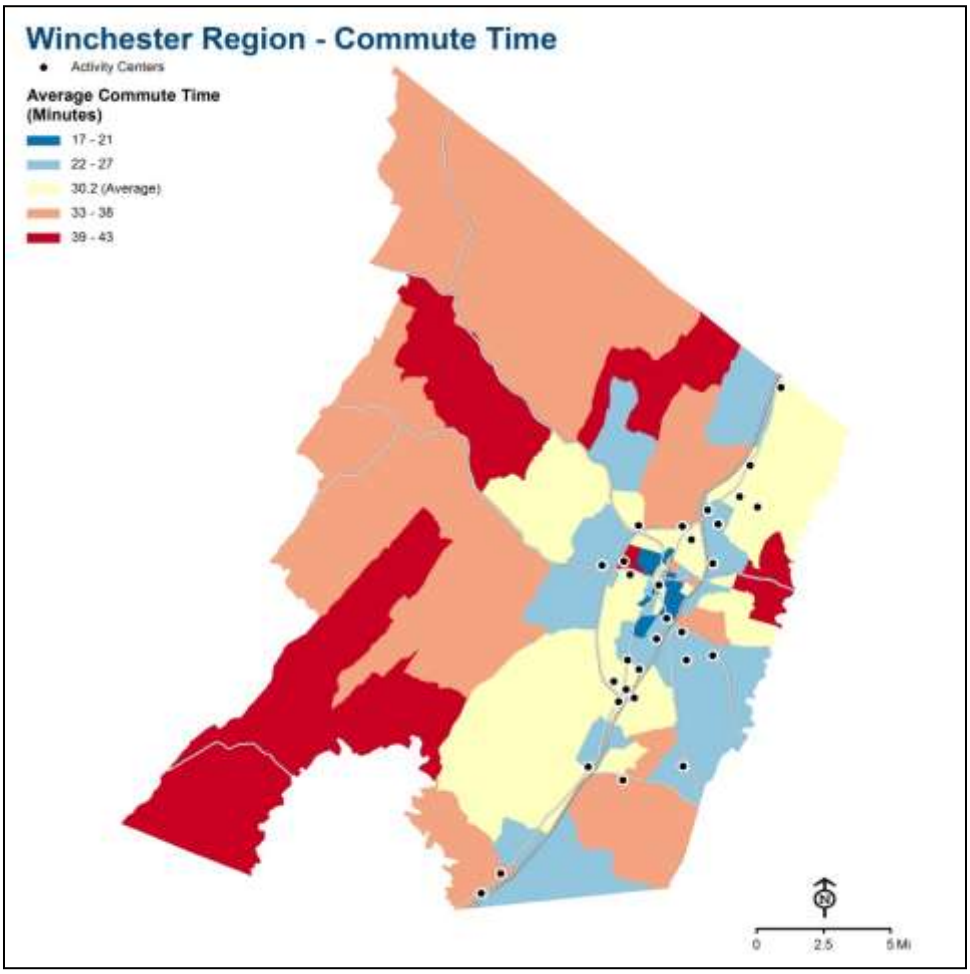
Table 8: WinFred Region Mean Commute Time by Jurisdiction, 2013

Jurisdiction	Mean Commute Time (Minutes)
City of Winchester	22.3
Frederick County	30.3

Source: US Census Bureau, 2009-2013 American Community Survey 5-Year Estimates.

Figure 11 provides a closer look at where longer commutes originate. In the rural areas of the county, commute times are above average for the region as a whole, as these areas have fewer jobs in close proximity and less access to transportation networks than more developed areas. The average commute time is 30 minutes which isn't surprising as the region is a net exporter of commuters.

Figure 11: WinFred Region Average Commute Times, 2013



Source: US Census Bureau, American Community Survey 2013, 5-Year Estimates.

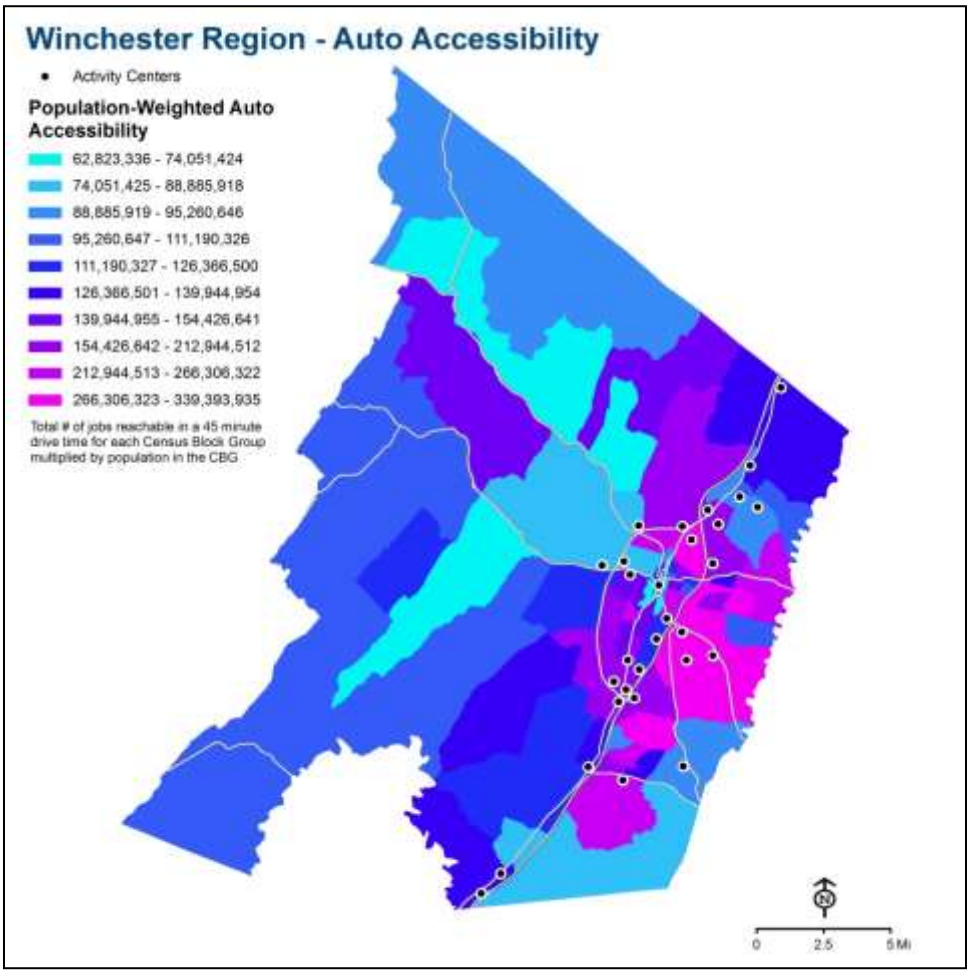
C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between Activity Centers.

Auto Accessibility

Auto Accessibility in the WinFred Region is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. Closer jobs and higher density census block groups are weighted more than jobs further away and less dense census block groups. The areas with the highest level of auto accessibility exist to the east of I-81 and the City of Winchester (**Figure 12**). Even the most rural areas of the region are within a 45-minute drive of jobs.

Figure 12: WinFred Region Auto Accessibility

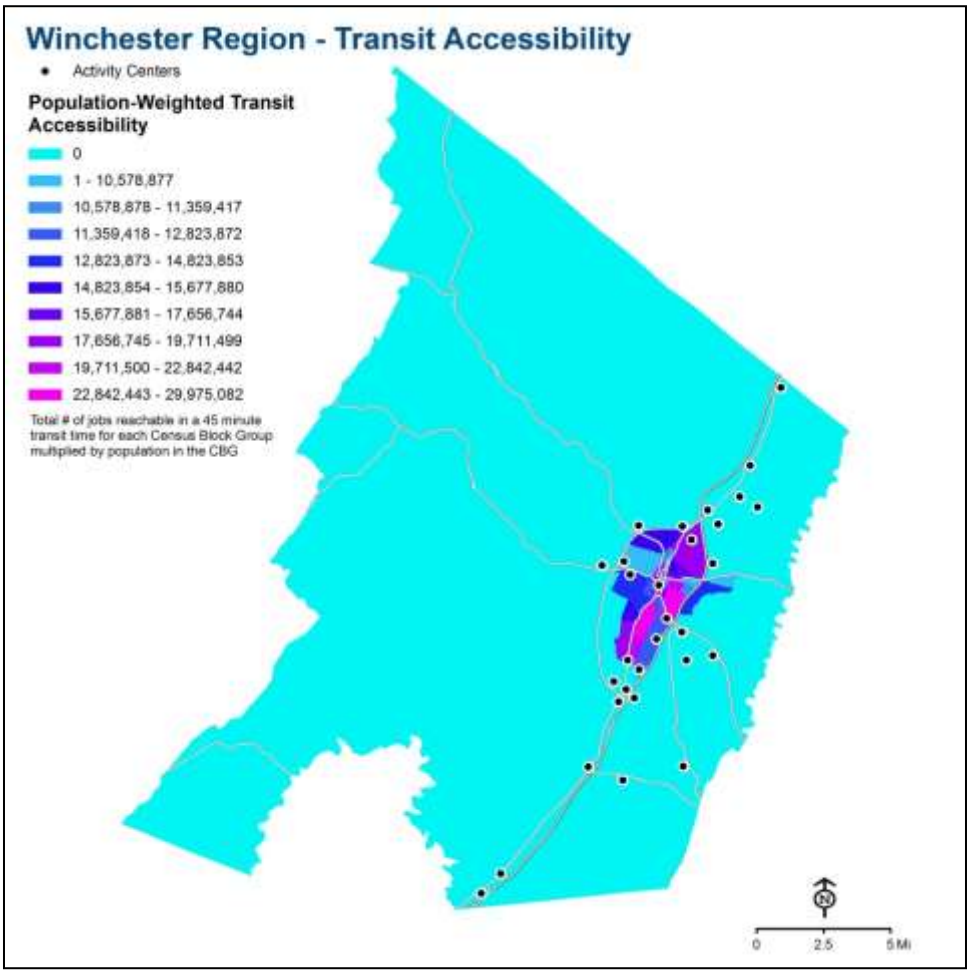


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway speeds developed from FHWA HERE data. InfoUSA Business Data, 2012 was used to calculate employment locations.

Transit Accessibility

Figure 13 illustrates the total number of jobs reachable in a 45-minute transit time for each census block group multiplied by population within that census block group. The fixed-route transit options in the WinFred Region are limited to within the City of Winchester. This is reflected not only in the low (fixed route) transit accessibility scores for large parts of the region, but also the low number of jobs accessible from the high scoring areas. Due to the lack of inter-city transit options in the region (other than demand response services), commuters using transit are restricted in their ability to reach regional jobs.

Figure 13: WinFred Region Transit Accessibility

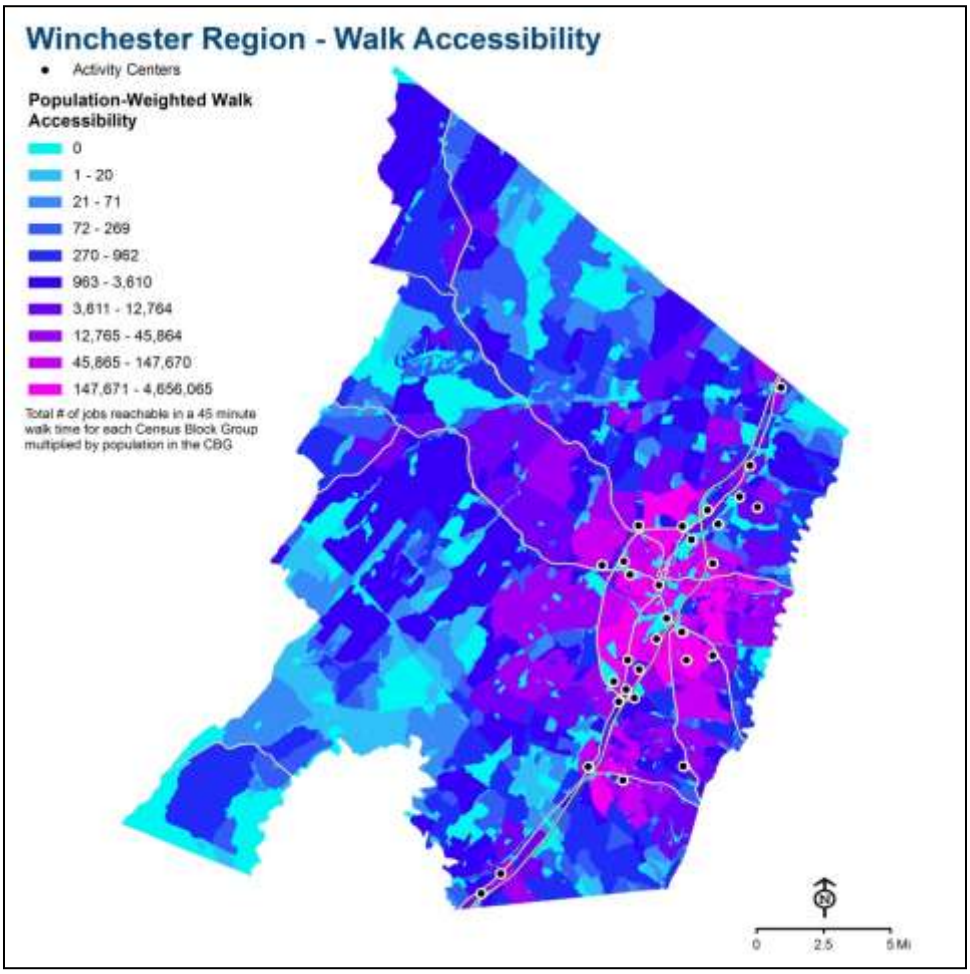


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using General Transit Feed Specification (GTFS) transit data and including walk time to and from stations. InfoUSA Business Data, 2012 was used to calculate employment locations.

Walk Accessibility

Figure 14 reveals a regional pattern of mixed use development in communities where residents live within walking distance of thousands of jobs and/or the services represented by those jobs. The City of Winchester scored the highest, as was expected. The high variability within even the highest scoring areas reflects the significance of land use and job density in determining walk accessibility.

Figure 14: WinFred Region Walk Accessibility

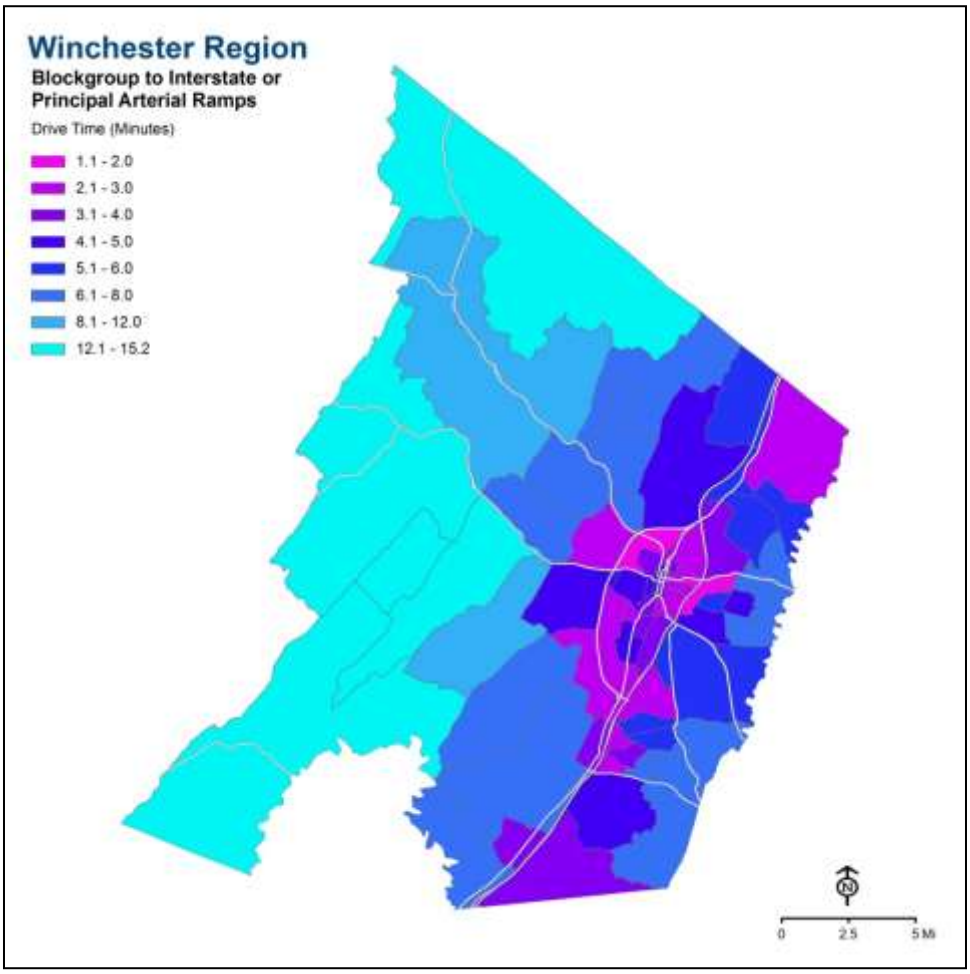


Source: GIS Network analysis of the distance-weighted employment accessible from each census block group along a Navteq roadway network using roadway characteristic data to interpolate walkability. InfoUSA was used to calculate employment locations.

Freight Accessibility

In addition to railways, I-81 is the major corridor for freight movement throughout the region. Accessibility of freight origins to these roadways is dependent primarily on the proximity of the origin to highway access ramps. In the WinFred Region the shortest drive times are found along I-81, US 11, US 50 and VA 57. Even the most rural parts of the region are within a 15-minute drive of a highway interchange (**Figure 15**).

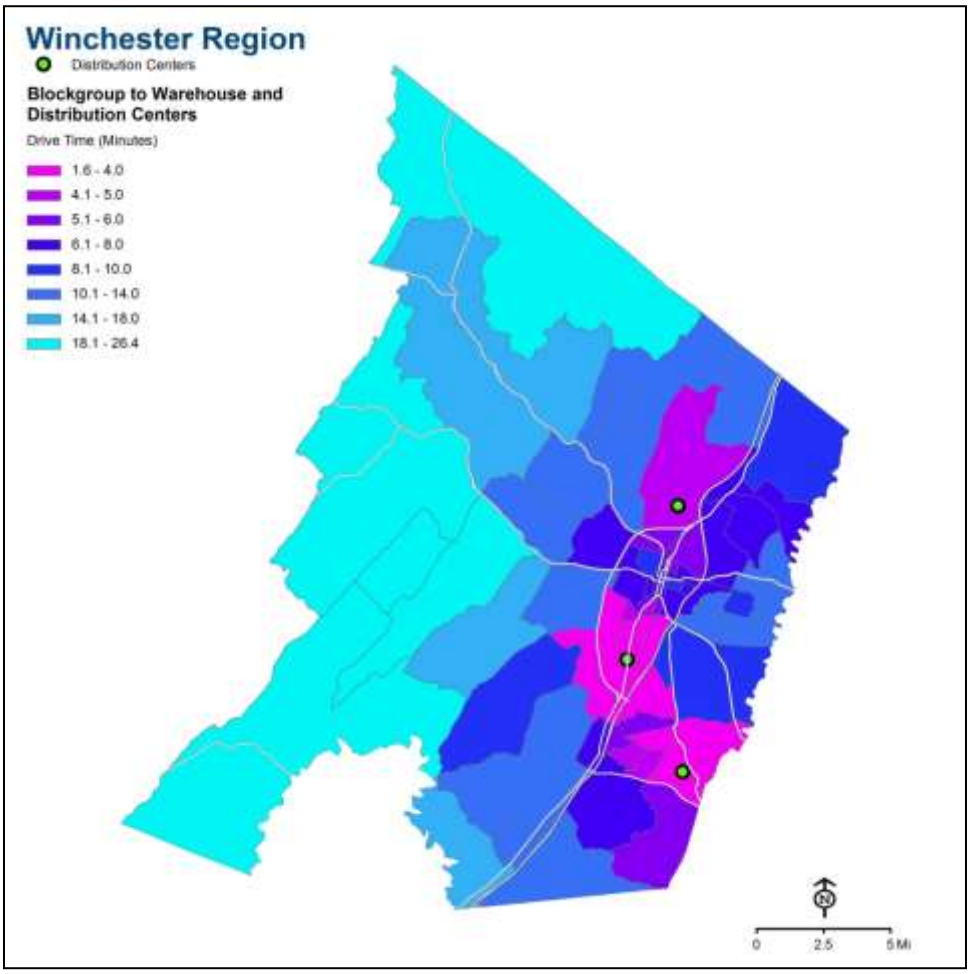
Figure 15: WinFred Region Access to Interstate and Principal Arterial Ramps



Source: GIS analysis conducted using US Census Boundary Files, ramps from Navteq database.

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Access to warehouse and distribution centers is greatest within the southern portion of Winchester and southeast of the city around VA 37, along I-81 and US 522 (**Figure 16**).

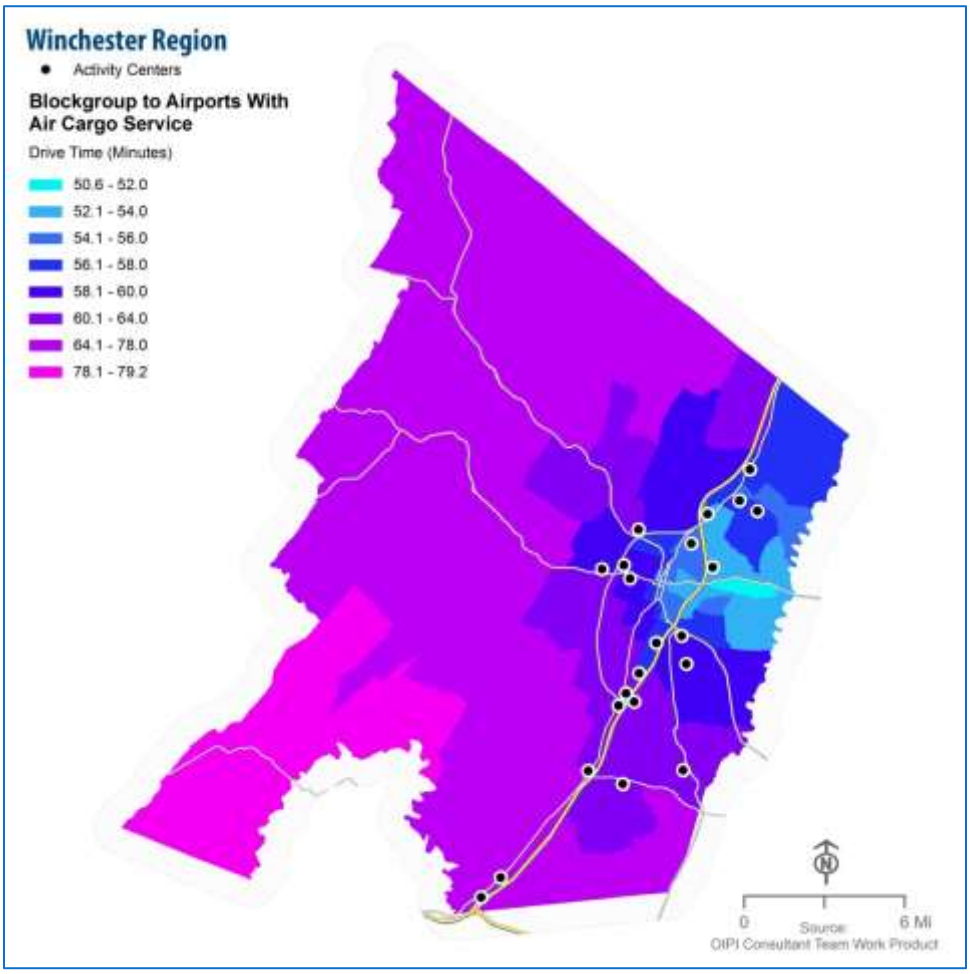
Figure 16: WinFred Region Access to Warehouses & Distribution Centers



Source: GIS analysis conducted using US Census Boundary Files and Virginia Office of Intermodal Planning and Investment data on Warehouse and Distribution Center Locations.

Figure 17 displays proximity to commercial service airports that handle air cargo, which is important for some types of freight distribution. In general, the WinFred Region is within a 50 minute to 80 minute drive to the closest airport that handles air cargo.

Figure 17: WinFred Region Access to Airports with Air Cargo Service



Source: GIS analysis conducted using US Census Boundary Files and location of airports with air cargo service.

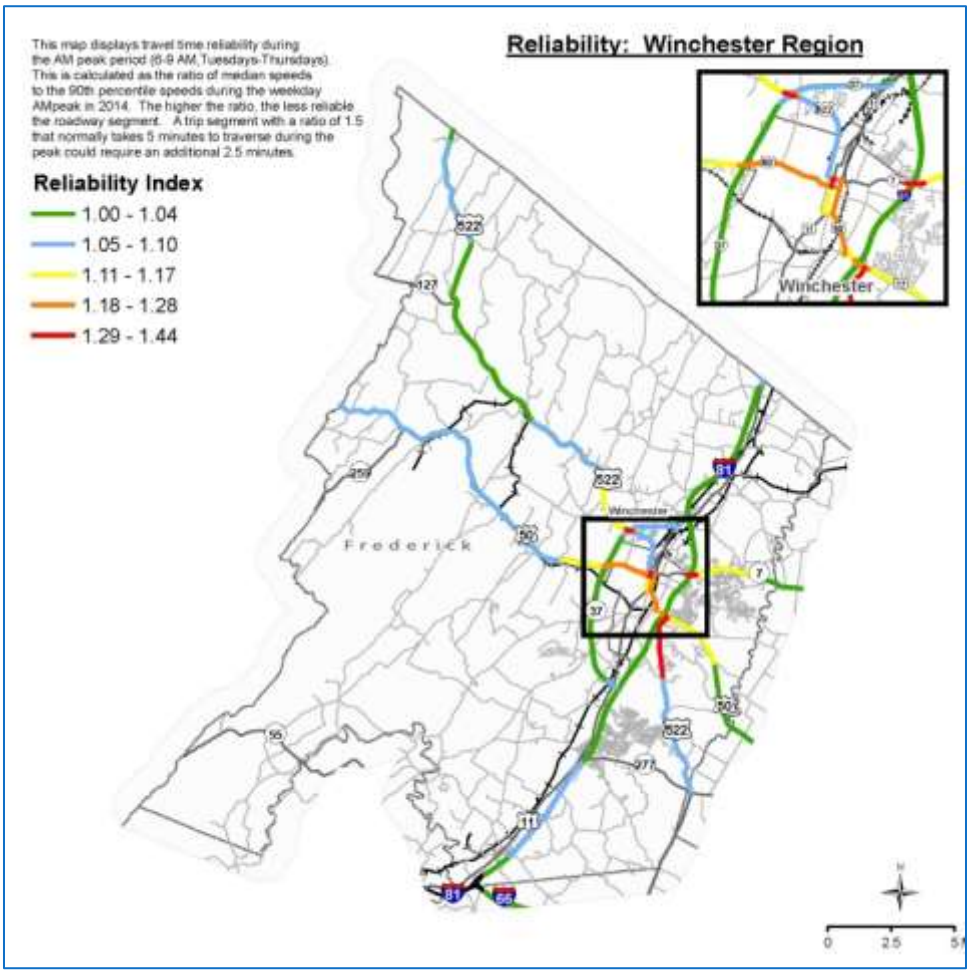
D. Roadway Measures

This assessment identified the transportation conditions in the WinFred Region based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel time reliability measures the frequency by which trips along a specified corridor are significantly delayed. The Reliability Index, as shown in **Figure 18** below, is defined as the ratio of the 80th percentile travel time during the weekday AM peak period in 2014. Overall, scores indicate that travel time is very reliable for the corridors with available data. A portion of US 522 south of the city has a slightly higher travel time reliability index compared with the other corridors analyzed, however, it equates to a few minutes of additional travel time.

Figure 18: WinFred Region Travel Time Reliability

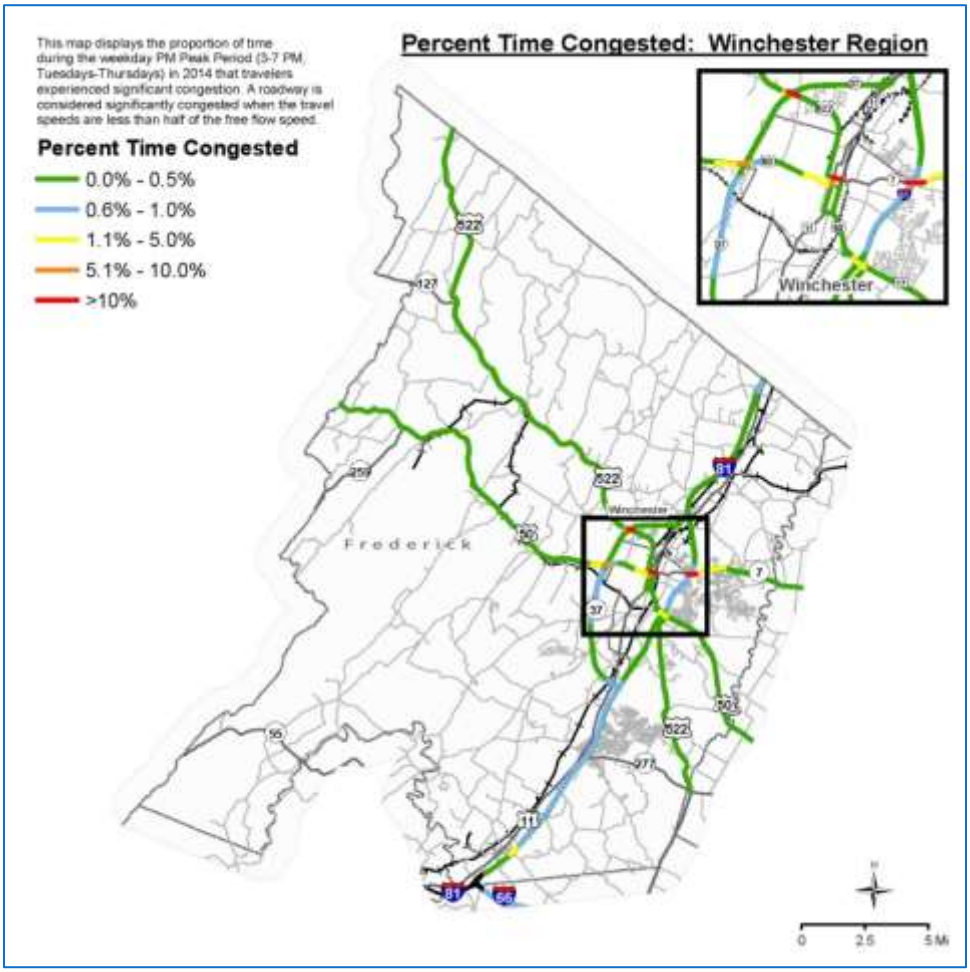


Source: INRIX Data and Virginia Department of Transportation
Note: the Reliability Index is based on a statewide scale which may skew the scores for the WinFred Region based on the travel time reliability in other regions throughout the state.

Percent of Time Congested

Percent of time congested is an important determinant of roadway Level of Service. The percentage of time congested was calculated for evening peak times in 2014. According to the analysis, a majority of the corridors analyzed are congested less than 1 percent of the time (**Figure 19**). A few intersections along US 50/VA 7 and US 522 experience slight congestion.

Figure 19: WinFred Region Percent of Time Congested

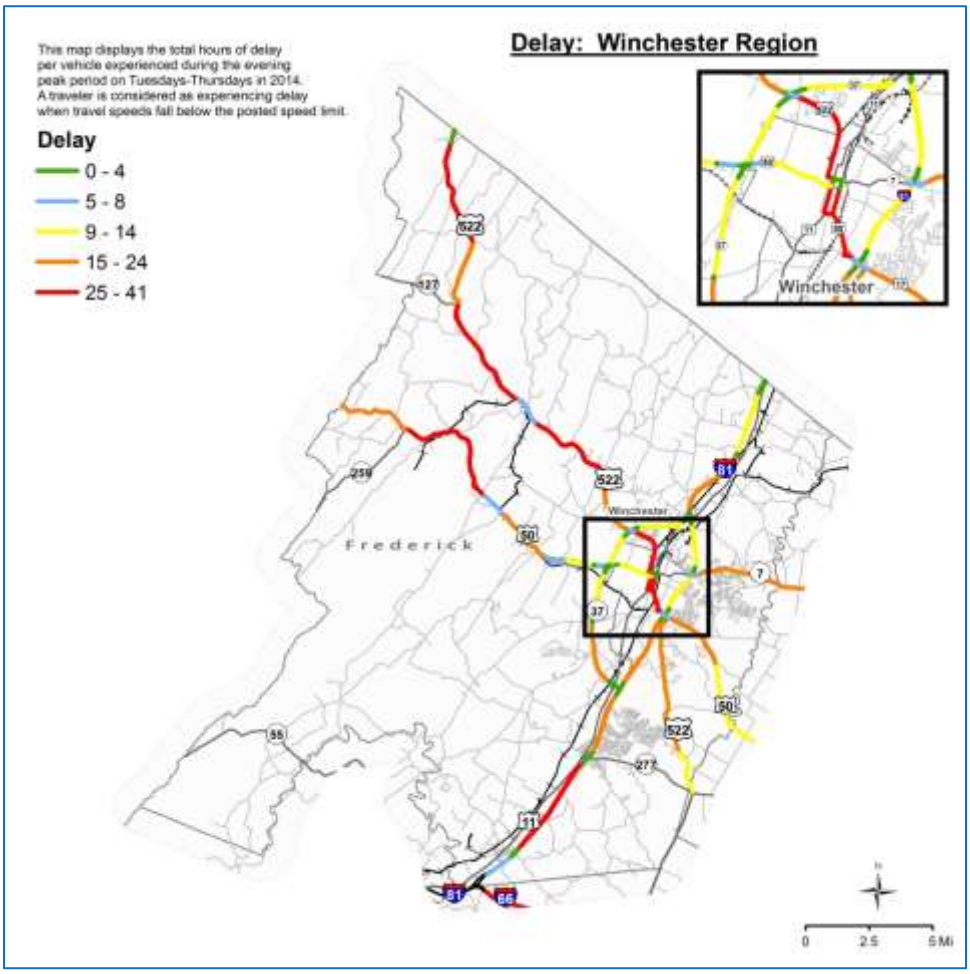


Source: INRIX Data and Virginia Department of Transportation.

Travel Time Delay

Travel time delay is defined as the total hours of delay per vehicle during weekday evening peak times in 2014. If travel speeds fall below the posted speed limit, a trip is considered delayed. In the WinFred Region, the most significant delays occurred along portions of I-81, US 522, and US 50 (**Figure 20**).

Figure 20: WinFred Region Travel Time Delay

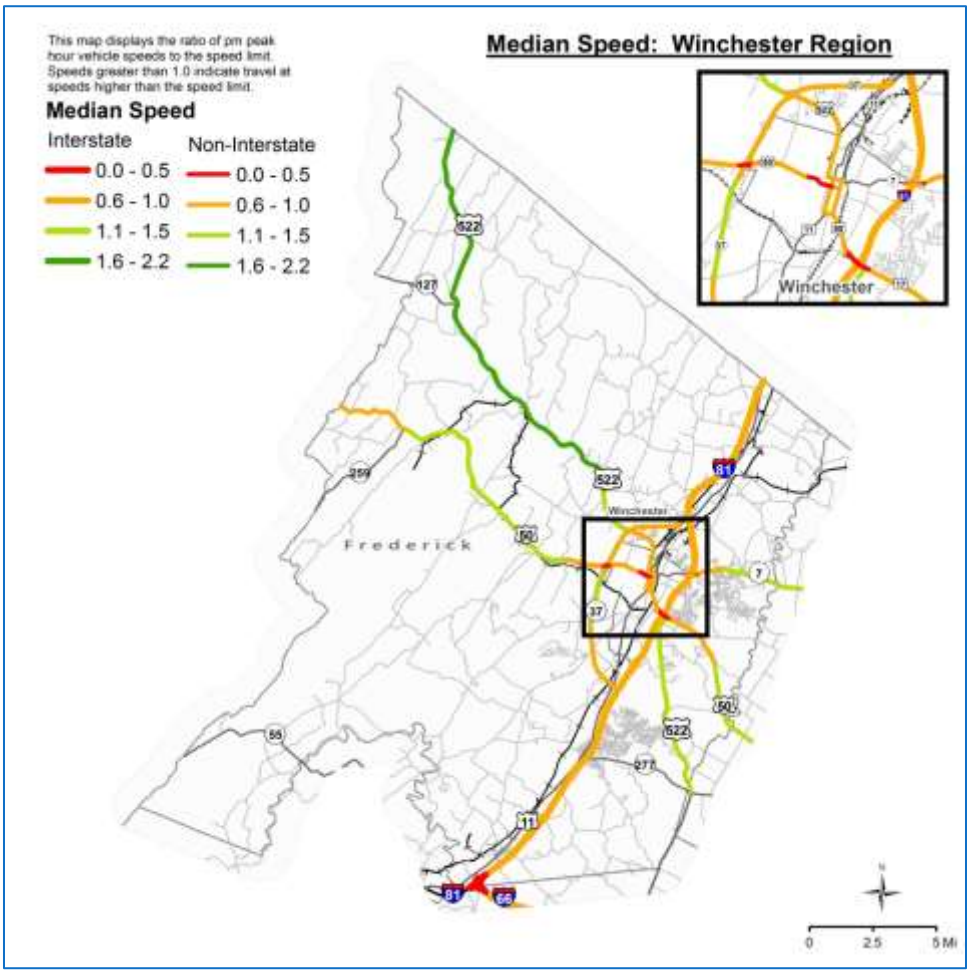


Source: INRIX Data and Virginia Department of Transportation

Median Speeds

The median speed map (**Figure 21**) displays the ratio of pm peak hour vehicle speeds to the speed limit for both interstate and non-interstate corridors in 2014. Speeds greater than 1.0 indicate travel at speeds higher than the speed limit. The I-81 corridor and portions of US 50 and VA 37 experience median speeds of less than 1.0.

Figure 21: WinFred Region Median Speeds



Source: INRIX Data and Virginia Department of Transportation

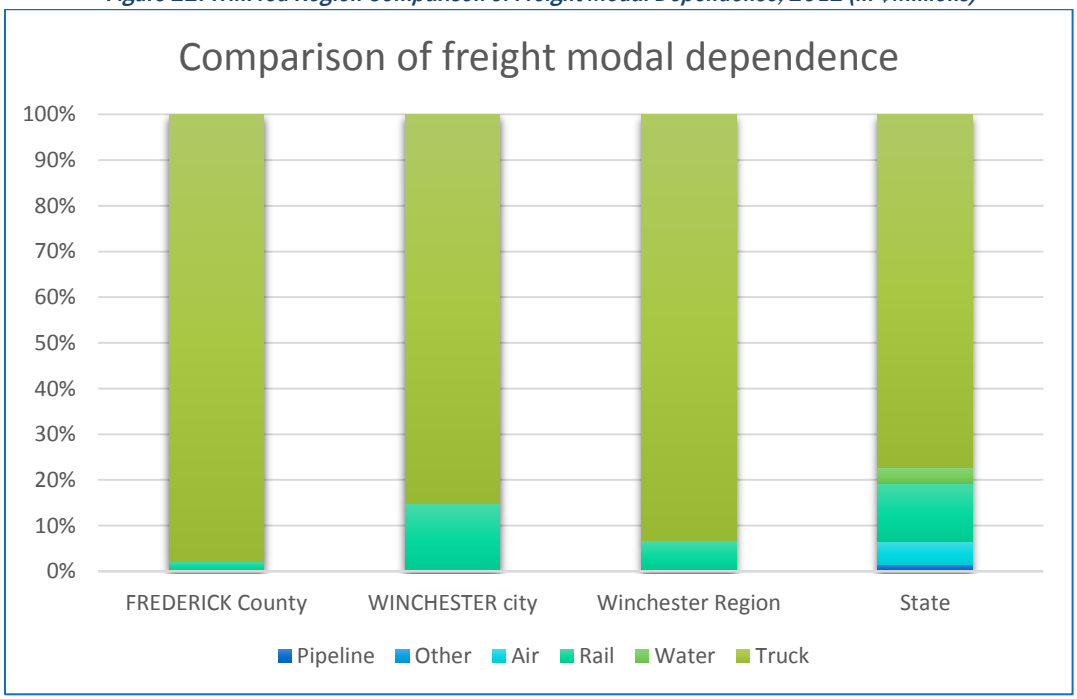
D. Regional & Local Commodity Flows

Another set of measures vital to the regional transportation profile are specific to the regional and local commodity flows via the various freight corridors in the region. The measures below discuss modal dependence of freight commodities, as well as the top commodities in the region by monetary value, geographic destination, and tonnage.

Modal Dependence

In the WinFred Region, over 90 percent of the dollar value of all goods that are moved through the region are moved by truck (**Figure 22**). The region does not utilize pipeline, air, or water freight modes. In comparison to Frederick County, the City of Winchester has the larger dependence on rail service at over 10 percent, but the region as a whole is not nearly as dependent on rail service.

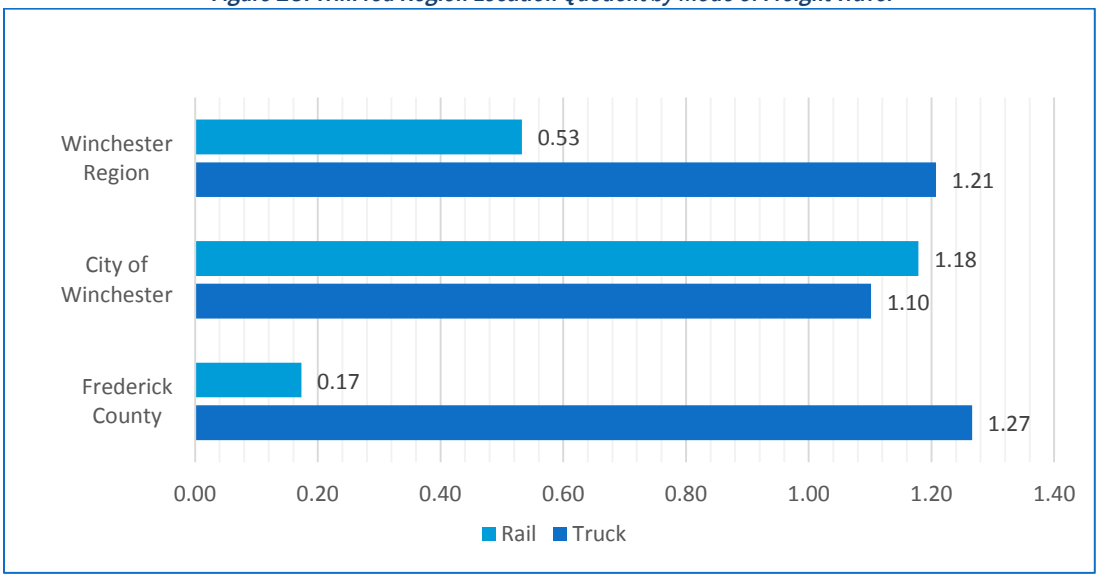
Figure 22: WinFred Region Comparison of Freight Modal Dependence, 2012 (in $Millions)



Source: TranSearch, 2012.

Location Quotients are used to compare the prominence of freight modes between the WinFred Region, and the State as a whole. The WinFred Region relies on rail for freight movement only 0.53 times and on trucks for freight movement 1.21 times more than the State does as a whole (**Figure 23**).

Figure 23: WinFred Region Location Quotient by Mode of Freight Travel

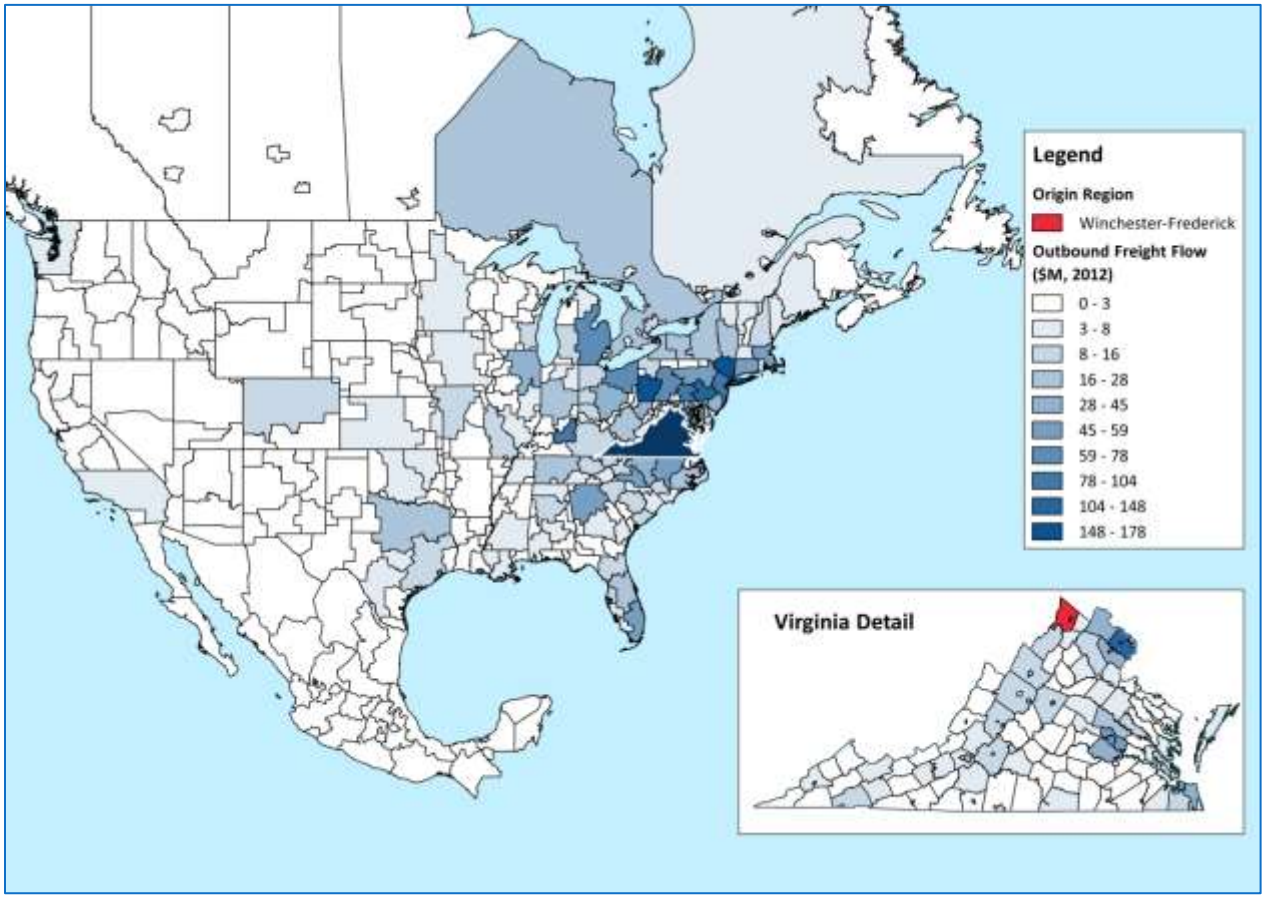


Source: Transearch, 2012.

Top Commodities

Outbound locations for freight by value from the WinFred Region in 2012 are shown in **Figure 24**. A majority of the freight in terms of value originating in the region is destined for counties in West Virginia and Pennsylvania.

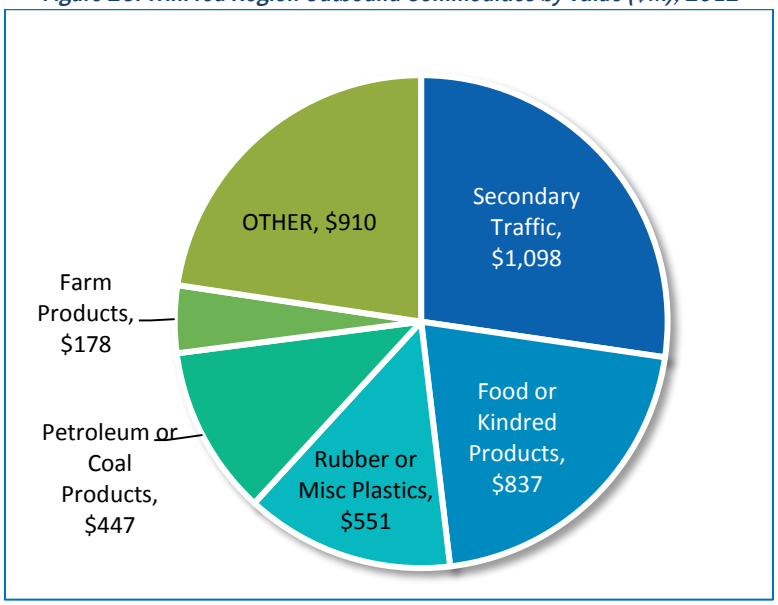
Figure 24: Outbound Freight Flow from the WinFred Region, 2012



Source: Transearch, 2012.

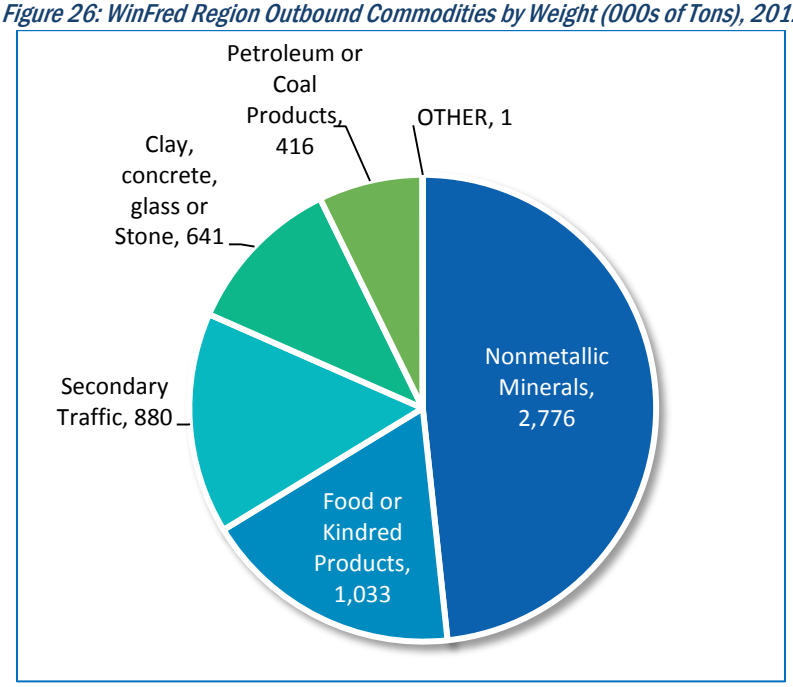
Figures 25 and 26 summarize the value and tonnage of commodities that originated in the WinFred Region in 2012. The largest commodity in terms of value is secondary traffic products. The other category includes all the remaining commodities less than the top five shown in **Figure 25** so it does not accurately represent one of the largest commodity. The largest commodity by weight was nonmetallic minerals at 42 percent of the total commodities by weight.

Figure 25: WinFred Region Outbound Commodities by Value ($M), 2012



Source: Transearch, 2012.

Figure 26: WinFred Region Outbound Commodities by Weight (000s of Tons), 2012

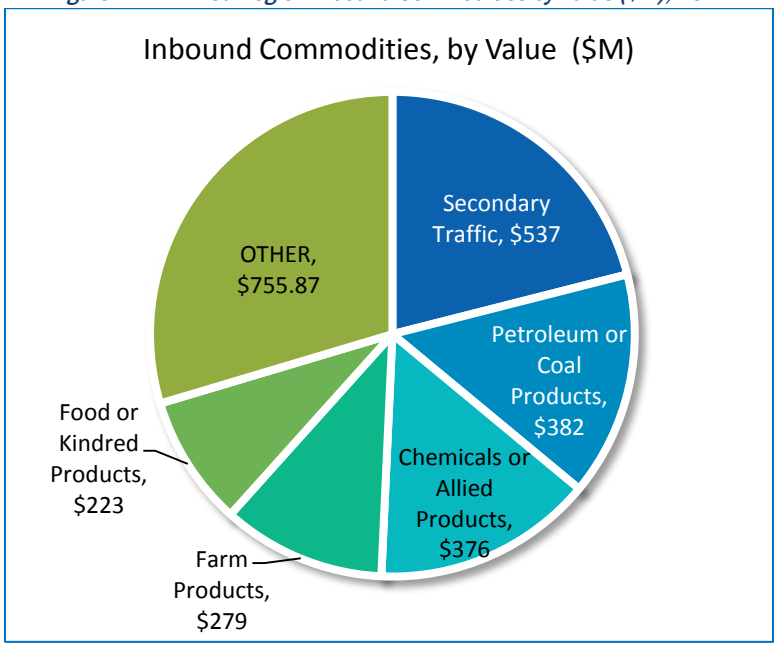


Source: Transearch, 2012.

Figures 27 and 28 summarize the value and tonnage of commodities that were destined for the WinFred Region in 2012. The largest commodity in terms of value is secondary traffic at over 25 percent. Secondary traffic includes warehouse and distribution center, rail intermodal drayage to and from ramp,

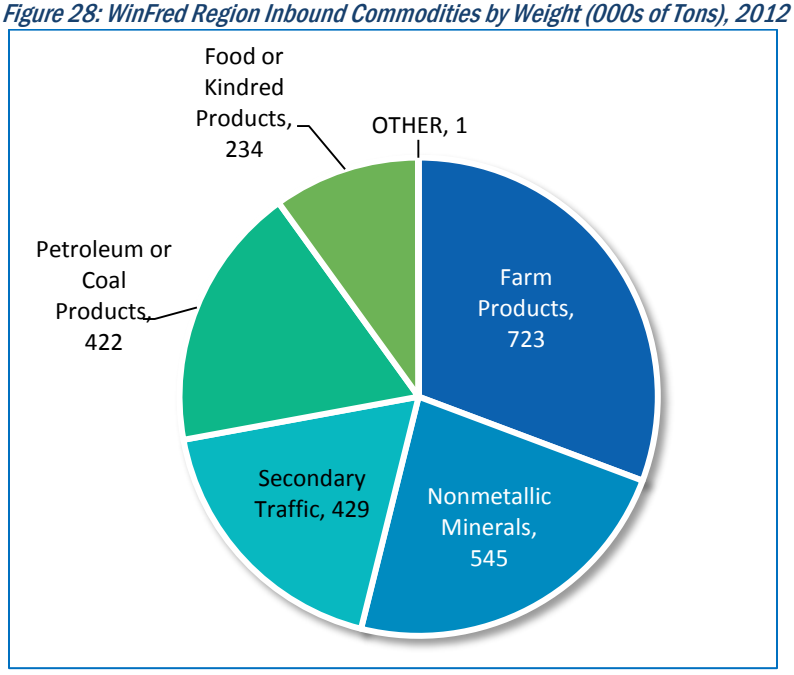
and air freight drayage to and from airport. The largest commodity by weight was farm products at 23 percent.

Figure 27: WinFred Region Inbound Commodities by Value ($M), 2012



Source: Transearch, 2012.

Figure 28: WinFred Region Inbound Commodities by Weight (000s of Tons), 2012



Source: Transearch, 2012.

4. Needs Profile

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs will be identified as deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the WinFred Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. In the first round of Regional Forums, held in May 2015, the transportation and economic conditions were presented to groups of regional stakeholders. Following this, a discussion was held with the stakeholders to connect the transportation conditions to desired economic futures and begin identifying potential Needs. These Needs were categorized into a series of five very broad types of capacity Needs (Passenger and Freight Reliability, Bottleneck Relief, Modal Choice and Walkability), as well as general Non-Capacity Needs (i.e. Safety, Operations and State of Good Repair Needs). The potential Needs identified in the first Forum were analyzed by the OIPI teams against the economic and transportation data that was assembled for each region and, where data was found to support the proposed Needs, these Needs were included and documented. In addition, the OIPI team analyzed all the overall assembled data for each region in order to identify additional Needs not identified in the Forum, to assemble a more complete picture of potential Transportation Needs in each region, with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The OIPI consultant team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, the following table outlines the key correlations between three broad industry sectors (Local, Knowledge and Freight sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and **Table 9** only represents

where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 9: Economic and Transportation Correlation

Economic and Transportation Correlation Table			
	Local Sector	Knowledge Sector	Freight Sector
Highway Access	HIGH	HIGH	HIGH
Passenger Reliability	MED	HIGH	MED
Bottleneck Relief	MED	HIGH	HIGH
Freight Reliability	MED	MED	HIGH
Freight Accessibility	MED	LOW	HIGH
Network Connectivity	HIGH	HIGH	MED
Transportation Demand Management	LOW	MED	MED
Modal Choice	HIGH	HIGH	MED
Transit Access	MED	HIGH	MED
Active Transportation Options	MED	MED	LOW
Walkable Places	MED	HIGH	LOW

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team.

The above table of correlations was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the WinFred Region, it showed a predominance among the Local Serving economic sector at 50 percent. The Freight Depending economic sector accounts for 41 percent of the economy with Knowledge-based industries accounting for 9 percent of the economic output. As outlined in the Economic and Transportation Correlation table above, the Local sector priority transportation needs include highway access, passenger reliability, network connectivity, access to transit and modal choice.

In addition, the local input received in the outreach to regional stakeholders and in local plans such as the Comprehensive Economic Development (CEDS) plan for the region indicate a strong desire to continue to support the manufacturing sector, particularly with respect to goods movement needs, but also to support the expected growth of the health care, high tech and tourism industries with the need for reliable commuting and additional modal travel options.

This translates into transportation needs such as freight and passenger reliability on the region's primary corridors, I-81, US 522, US 340, and US 11. It also indicates the need for addressing any bottlenecks along these corridors to further support reliable travel for both commuters and goods movement as well as provide improved modal choices and transportation demand management for commuters. In addition, key corridors US 11, US 522, and US 50 support multiple existing and emerging activity centers in the region as important commuter routes and serve economic growth in the City of Winchester.

The forecasted growth in the Local Serving economic sector for this region brings the potential for additional transportation needs such as walking, bicycling and transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding modal choices, both within the region's economic activity centers, and between the centers. The expansion of the residential communities and local serving industries would benefit from both intraregional and interregional fixed route transit as well as additional transportation demand management programs to provide better workforce access. Further support for the Local Serving sector would also come from enhanced walkable and bikeable places.

The above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

D. Spatial Analysis of Regional Network Needs

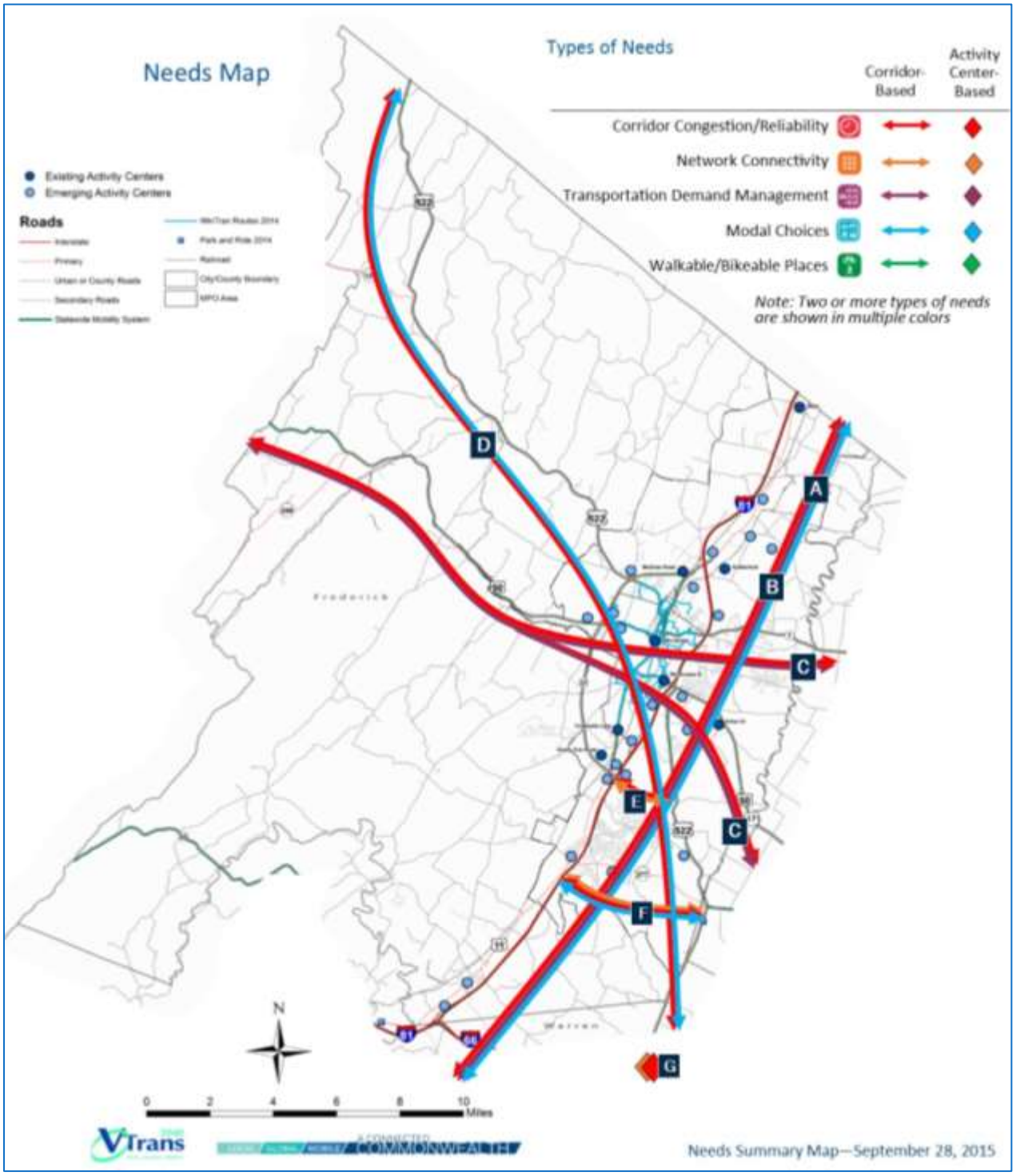
Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

The map below (**Figure 29**) summarizes the regional Transportation Needs according to Activity Centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Figure 29: Summary Needs Map for the WinFred Region



Findings of Needs

Table 10 below lists each of the identified Transportation Needs in the Region and describes the basis for each Need in terms of economic and transportation findings and data:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized in the economic and transportation profiles. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Figure 30: Transportation Icons for Needs Assessment



Table 10: Findings of Needs for the WinFred Region

A.	**I-81 Corridor and Interchanges**	
Need		**The I-81 corridor is the principal high volume, high mobility artery in the region and serves interstate, regional and local travel. It accommodates demand from both commuter and freight and connects West Virginia to other parts of Virginia. There is a need for to mitigate inconsistent travel times for passengers and freight near interchanges at exits 323, 317, 315, 313, 310 and 307. Transportation demand management services and modal choices are needed within the corridor to improve commutes and access to recreational and tourist destinations.**
Economic		There are a number of existing and emerging activity centers along the I-81 corridor that serve local, freight dependent, and knowledge based industries for both goods movement and commuter traffic. The corridor is an essential and high-priority corridor for freight movement. It connects activity centers of all types and supports tourism.
Transportation		I-81 has intermittent passenger and freight reliability and bottleneck issues at multiple interchanges in the region. Additional modal choices for passenger service for inter-regional travel markets are vital to support the regional economy. Multimodal access to jobs is lacking. This is a freight gateway corridor.

B.	**US 11 Corridor**	
Need		**The US 11 corridor is a north/south artery running parallel to I-81. Multiple passengers and freight-serving activity centers are located along and near the corridor. Improved passenger and freight reliability, modal choices and transportation demand management services are needed. Transit is also needed between the areas south of Winchester to Middletown.**
Economic		There are a number of existing and emerging activity centers along the US 11 corridor that serve local, freight dependent, and knowledge based industries for both freight and commuter traffic.
Transportation		Major connector between several activity centers and alternative travel corridor when I-81 is congested due to incidents. Multimodal access to jobs is lacking. This is a freight corridor.

C. US 50/US 17/VA 7 Corridor

Need



The US 50/US 17/VA 7 corridor is an east/west artery connecting towns in West Virginia to the Cities of Winchester and Leesburg. US 50/US17 south of I-81 connects the City of Winchester to Waterloo. Improved passenger and freight reliability is need along the corridor. Transportation demand management services for commuters from West Virginia to the WinFred Region and for commuters from the WinFred Region to Fairfax County are also needed.

Economic



Connects the local serving existing activity centers in Winchester, freight dependent Arbor Court activity center, and several emerging activity centers.

Transportation



There is intermittent congestion along the corridor. As a commuting corridor, there is a need for transportation demand management.

D. US 522/US 340 Corridor

Need



The US 522/US 340 corridor is a north/south artery connecting towns in West Virginia to the City of Winchester, Front Royal and the Virginia Inland Port (VIP). Improved passenger and freight reliability is needed along the corridor. The northern portion of US 522 from the City of Winchester accommodates high volumes of freight traffic bound for West Virginia and the mid-west from other parts of Virginia as well as commuters from WV bound for the WinFred region. The southern portion of the corridor from the city serves a high volume of freight traffic to and from the VIP and inter-regional commuter traffic.

Economic



Supports the local serving existing activity centers in Winchester and serves as a freight corridor to the Virginia Inland Port.

Transportation



There is a lack of multimodal access to jobs and intermittent backups causing congestion. Passenger and freight reliability is needed in the corridor.

E. Extension of VA 37 to US 522

Need



The extension of VA 37 to US 522 is a priority project in Frederick County's long range transportation plan. The partially-funded project would increase access to the Virginia Inland Port, by creating an additional connection and an alternative to I-81 Exit 313. It would also serve the emerging local serving Crosspoint activity center. Improved passenger and freight reliability as well as network connectivity are needed.

E. Extension of VA 37 to US 522

Economic



Supports the freight generating Virginia Inland Port as well as the emerging local serving Crosspoint activity center.

Transportation



Will relieve the truck traffic headed north on US 522 through the City of Winchester. There is a lack of connectivity in the area for the emerging activity center near Crosspoint. Need is identified in the Frederick County Long Range Transportation Plan.

F. VA 277 Corridor

Need



The VA 277 corridor serves as an east/west connector from I-81 to US 522. It provides access to the Virginia Inland Port as well as a regional high school, a regional recreation park, a regional shopping destination, and an emerging activity center. Improved freight and passenger reliability, modal choices, and network connectivity are needed.

Economic



Supports freight access to the Virginia Inland Port. A regional high school, regional recreation park and primary retail shopping area are located along the corridor.

Transportation



There are modal conflicts for freight, local congestion, and lack of multimodal access for passengers along the corridor.

G. Virginia Inland Port

Need



The VIP is a freight generator located just outside the Win-Fred Region in Warren County. Improved network connectivity is needed from the port to the freight dependent activity centers in the region and beyond.

Economic



The VIP is a large freight generator outside of the WinFred Region that relies on freight corridors within the WinFred Region such as US 522/US 340 and VA 277.

Transportation



Improved network connectivity in the region will improve the mobility as well as passenger and freight reliability in the southeastern portion of the region.

H. Various Activity Centers

Need



Access to transit in the region is limited to within the City of Winchester. Multiple existing and emerging activity centers serve local industries as well as regional outdoor recreation destinations and lack connectivity to transit, pedestrian and bicycle facilities. Improved modal choices, transportation demand management services, network connectivity, corridor reliability, and enhanced walkable/bikeable places are needed.

Economic



Supports local serving and knowledge based industries in major activity centers such as Winchester, Winchester South, and Creekside Lane; as well as multiple emerging local serving activity centers in the region.

Transportation



Existing connections between and within activity centers lack efficient modal choices. Improved walkable and bikeable places would enhance existing communities. Improved transit access and transportation demand management services for commuters are needed.

I. Various Freight Dependent Activity Centers

Need



The emerging freight dependent activity centers in the region will need improved passenger and freight reliability on nearby travel corridors.

Economic



Supports existing and emerging freight dependent activity centers.

Transportation



Existing connections between and within existing and emerging freight dependent activity centers lack efficient freight access.

J. Regional Transit Access and Transportation Demand Management

Need



Increased opportunities for regional transit and transportation demand management services are needed for commuters to and from West Virginia and neighboring counties.

Economic



Supports multimodal access to jobs within and outside the region.

Transportation



Approximately 30 percent of commute trips from the City of Winchester and Frederick County travel to areas outside the region, while approximately 35 percent of commute trips ending in the City of Winchester and Frederick County originate from outside the region. Opportunities for regional transit access and transportation demand management services for inter-regional commuters are needed.

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Office of INTERMODAL Planning and Investment

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Southside Corridor (J)

Washington to North Carolina Corridor (K)

Western Mountain Corridor (L)

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

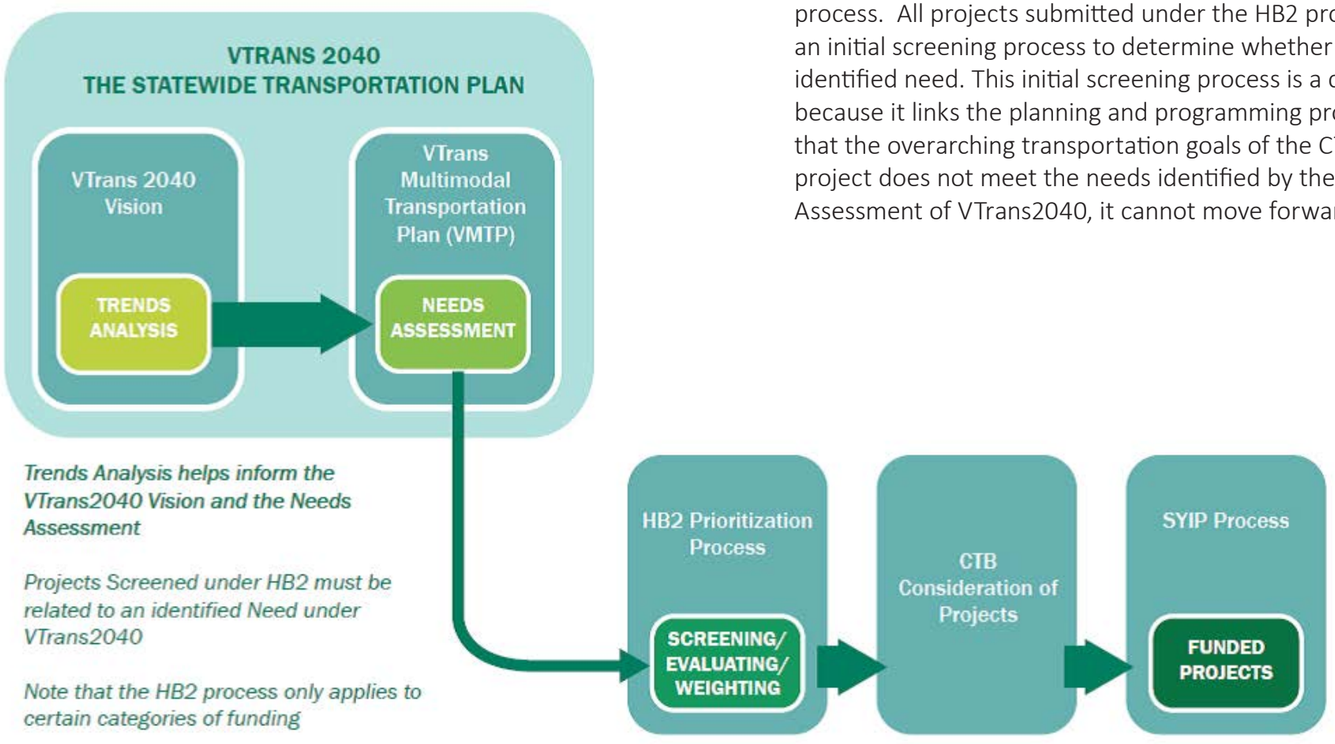
Executive Summary and Methodology

PURPOSE

The Virginia General Assembly, through new legislation, has directed the Commonwealth Transportation Board (CTB) to coordinate the development of a Statewide Transportation Needs Assessment. This Transportation Needs Assessment is conducted under the Office of Intermodal Planning and Investment (OIPI) as part of the Statewide Transportation Plan (VTrans2040) and the process of its development and implementation is a component of the VTrans Multimodal Transportation Plan (VMTP). The VMTP and the VTrans Vision Plan make up the overall VTrans2040. One of the key purposes of the Needs Assessment is to serve as a screening mechanism for projects applying for consideration under the House Bill 2 (2014) (HB2) prioritization process. All projects submitted under the HB2 process undergo an initial screening process to determine whether they relate to an identified need. This initial screening process is a critical component because it links the planning and programming processes to ensure that the overarching transportation goals of the CTB are advanced. If a project does not meet the needs identified by the Transportation Needs Assessment of VTrans2040, it cannot move forward in the HB2 process.

The Transportation Needs Assessment evaluates the State's transportation needs at three scales, listed below, and includes a statewide assessment of safety needs:

- Corridors of Statewide Significance (CoSS)- Interregional travel market
- Regional Networks (RN)- Intraregional travel market
- Urban Development Areas (UDA)- Local activity center market



INTRODUCTION TO CORRIDORS OF STATEWIDE SIGNIFICANCE NEEDS ASSESSMENT

Corridors of Statewide Significance:

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (VA 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Needs Assessment Metrics:

	Redundancy and Mode Choice
	Safety
	Congestion and Bottlenecks
	Reliability

The VTrans2035 plan, as adopted by the Commonwealth Transportation Board (via a resolution dated December 17, 2009), initially designated 11 CoSS; a 12th corridor was subsequently added (via a CTB resolution dated May 18, 2011). The designation and study of these multimodal corridors is a responsibility of the Commonwealth Transportation Board in accordance with the Code of Virginia §33.2-353. The official definition of a CoSS as defined in VTrans2035 is:

"An integrated, multimodal network of transportation facilities that connect major centers of activity within and through the Commonwealth and promote the movement of people and goods essential to the economic prosperity of the state."

To be considered a CoSS, a corridor must meet all four of the following criteria:

1. Multimodal – must involve multiple modes of travel or must be an extended freight corridor.
2. Connectivity – must connect regions, states, and/or major activity centers.
3. High Volume – must involve a high volume of travel.
4. Function – must provide a unique statewide function and/or address statewide goals.

Corridor Components

Components of the CoSS are those facilities and services which comprise the multimodal network connecting major centers of activity (RNs and UDAs) and accommodate inter-city travel between these centers as well as inter-state traffic. CoSS component facilities include a primary facility (generally an Interstate or US Highway Route) and the major facilities/services (typically within approximately five miles of the primary highway) that provide multiple modes and parallel routes connecting major centers of activity along the corridor. The component facilities included in each CoSS are outlined in the table on Page 5.

For analysis purposes, each CoSS is divided into segments which are identified by points where major transportation facilities enter or exit a corridor, areas affected by similar types of transportation issues, and locations where geometric or socio-economic conditions change substantially. Thirty-nine segments were identified on the 12 CoSS, as shown in the Map on Page 4. Due to the overlap of route and freeway designations, it is possible for a facility to be included in multiple CoSS segments.

Needs Assessment Report Format

The CoSS Needs Assessment included data-driven analysis and stakeholder feedback to develop quantitative and qualitative performance measures to identify needs on the corridors. Each corridor has an individual Needs Assessment Report. Corridor and segment profiles in each report provide a snapshot of demand and travel patterns for various modes of passenger and freight travel. These profiles illustrate the connection between regional economics and transportation and provide segment-specific context to the subsequent analysis of needs.

The reports are organized as follows:

- Corridor Overview – Describes the corridor and details the transportation facilities comprising the corridor. Demographics, economic trends and corridor travel patterns are also described.
- Segment Profile – Describes the segment and details the transportation facilities comprising the segment along with future capacity and safety-related projects. Travel demand is also detailed for the segment.
- Segment Needs – Details performance measures for four categories of needs: redundancy and mode choice, safety, congestion, and reliability. A summary of needs for each segment outlines issues identified from the performance measures and incorporates comments received during regional forums held across the state during the months of May and July 2015.

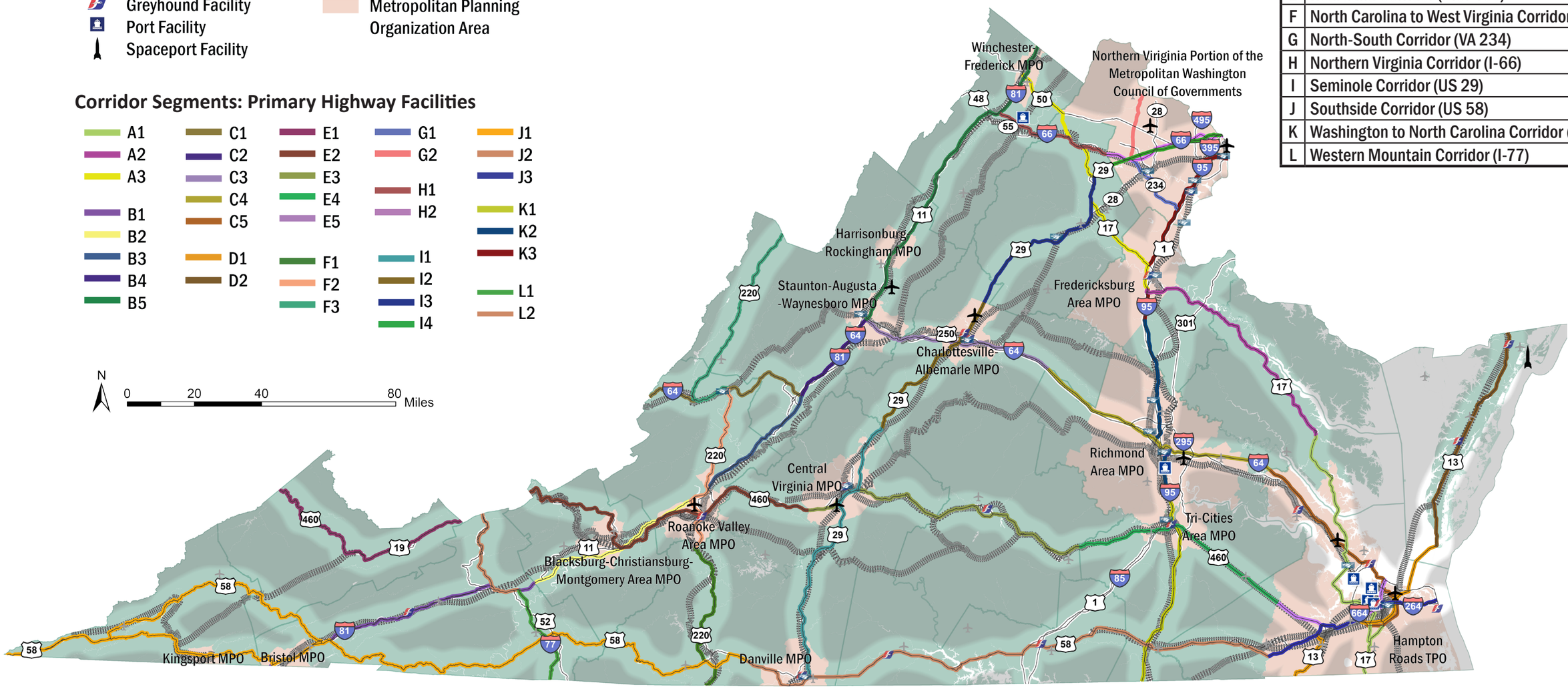
INTRODUCTION TO CORRIDORS OF STATEWIDE SIGNIFICANCE NEEDS ASSESSMENT

- Airport Facility
- Amtrak Facility
- Greyhound Facility
- Port Facility
- Spaceport Facility
- Railroad
- Corridor Component Road
- Metropolitan Planning Organization Area

Corridor Segments: Primary Highway Facilities

A1	C1	E1	G1	J1
A2	C2	E2	G2	J2
A3	C3	E3	H1	J3
B1	C4	E4	H2	K1
B2	C5	E5	I1	K2
B3	D1	F1	I2	K3
B4	D2	F2	I3	L1
B5		F3	I4	L2

N
0 20 40 80 Miles



Corridors of Statewide Significance:

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (U.S. 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (VA 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

INTRODUCTION TO CORRIDORS OF STATEWIDE SIGNIFICANCE NEEDS ASSESSMENT

A - Coastal Corridor

Segment A1 US 17, Port of Virginia, Norfolk Southern Heartland Corridor, Norfolk Southern Coal Corridor, CSX National Gateway Corridor, CSX Coal Corridor, Amtrak, Norfolk International Airport, Newport News/Williamsburg International Airport

Segment A2 US 17, Rappahannock River

Segment A3 US 17

B - Crescent Corridor

Segment B1 I-81, US 11, I-381, Norfolk Southern Crescent Corridor, Short Line Railroads

Segment B2 I-81, US 11, I-581, Norfolk Southern Crescent Corridor, Short Line Railroads, Roanoke Regional Airport

Segment B3 I-81, US 11, Norfolk Southern Crescent Corridor

Segment B4 I-81, US 11, Norfolk Southern Crescent Corridor

Segment B5 I-81, US 11, Virginia Inland Port, Norfolk Southern Crescent Corridor, Short Line Railroads, Shenandoah Valley Regional Airport

C - East-West Corridor

Segment C1 I-64, US 60, Amtrak, CSX Coal Corridor

Segment C2 I-64, US 11, Amtrak, Norfolk Southern Coal Corridor

Segment C3 I-64, US 250, Route 60, Charlottesville-Albemarle Airport, Amtrak, Norfolk Southern Coal Corridor

Segment C4 I-64, US 250, US 60, Port of Richmond, James River, Amtrak, CSX Coal Corridor, Norfolk Southern Coal Corridor, Richmond International Airport

Segment C5 I-64, US 60, I-664, I-564, I-264, I-464, Port of Virginia, York River, James River, CSX Coal Corridor, Norfolk Southern Coal Corridor, Amtrak, Norfolk International Airport, Newport News/Williamsburg International Airport

D - Eastern Shore Corridor

Segment D1 US 13, Port of Virginia, Bay Coast Railroad and Barge, Norfolk Southern, CSX, Amtrak, Norfolk International Airport, Newport News/Williamsburg International Airport

Segment D2 US 13, Bay Coast Railroad and Barge

E - Heartland Corridor

Segment E1 US 460, Coalfields Expressway, Norfolk Southern Heartland Corridor

Segment E2 US 460, Norfolk Southern Heartland Corridor, Roanoke Regional Airport

Segment E3 US 460, Norfolk Southern Heartland Corridor, Lynchburg Regional Airport

Segment E4 US 460, James River, Norfolk Southern Heartland Corridor, Amtrak, Richmond International Airport

Segment E5 US 460, Port of Virginia, James River, Norfolk Southern Heartland Corridor, Amtrak, Norfolk International Airport, Newport News/Williamsburg International Airport

F - North Carolina to West Virginia Corridor

Segment F1 US 220, Norfolk Southern

Segment F2 US 220, Norfolk Southern, Roanoke Regional Airport

Segment F3 US 220

G - North – South Corridor

Segment G1 VA 234, Prince William County Parkway

Segment G2 VA 234 and 659, Bi-County Parkway, Northstar Boulevard, Washington Dulles International Airport

H - Northern Virginia Corridor

Segment H1 I-66, US 50 and VA 55, Virginia Inland Port, Norfolk Southern Crescent Corridor

Segment H2 I-66, US 50, WMATA Orange Line, Virginia Railway Express, Amtrak, Washington Dulles International Airport, Ronald Reagan Washington National Airport

I - Seminole Corridor

Segment I1 US 29, Norfolk Southern Crescent Corridor, Amtrak, Lynchburg Regional Airport

Segment I2 US 29, Norfolk Southern Crescent Corridor, Amtrak Charlottesville Albemarle Airport

Segment I3 US 29 and VA 28, Norfolk Southern Crescent Corridor, Amtrak

Segment I4 US 29, US 50 and VA 28, WMATA Orange Line, Virginia Railway Express, Amtrak, Washington Dulles International Airport

J - Southside Corridor

Segment J1 US 58, CSX National Gateway

Segment J2 US 58

Segment J3 US 58, Port of Virginia, CSX National Gateway, Norfolk International Airport, Newport News/Williamsburg International Airport

K - Washington to North Carolina Corridor

Segment K1 I-95, I-85, US 1 and US 301, CSX National Gateway Corridor

Segment K2 I-95, I-195, I-295, US 1 and US 301, Port of Richmond, James River, CSX National Gateway Corridor, Amtrak, Richmond International Airport

Segment K3 I-95, I-395, I-495, US 1, WMATA Blue and Yellow Lines, Virginia Railway Express, Port of Alexandria, CSX National Gateway Corridor, Amtrak, Ronald Reagan Washington National Airport

L - Western Mountain Corridor

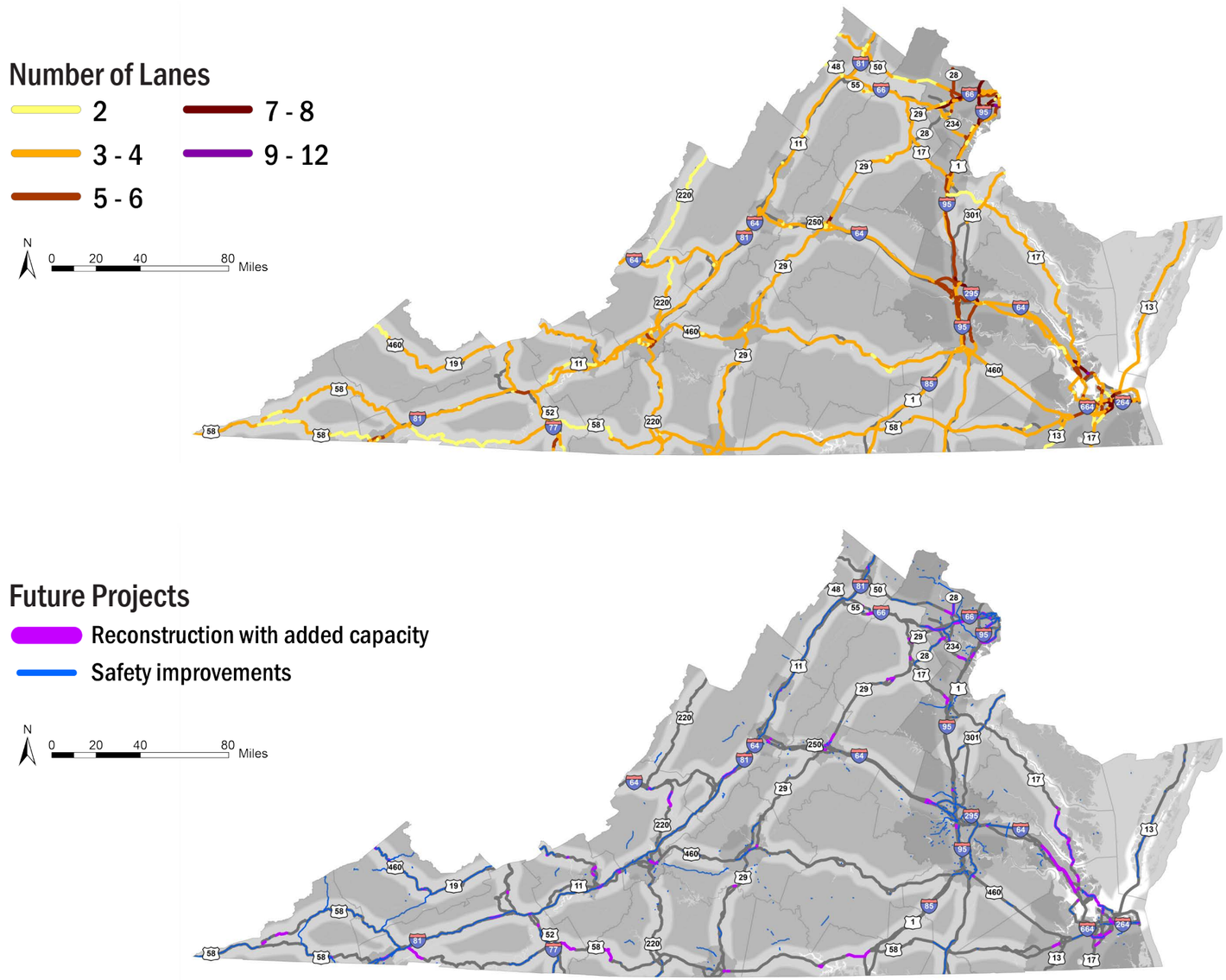
Segment L1 I-77, US 52

Segment L2 I-77, US 52 and US 11

Roadway Characteristics

The Virginia Department of Transportation (VDOT) provided data on the existing roadway facilities that have been identified as CoSS components. The map to the right shows the number of lanes (in both directions) in each CoSS component roadway facility in the Commonwealth. As shown, the widest roadways are located primarily in and near major urban areas.

The segment profiles also outline some of the significant planned safety or capacity improvements identified in VDOT's Six-Year Improvement Program, these locations are highlighted in the map to the right.



Demographics and Economic Trends

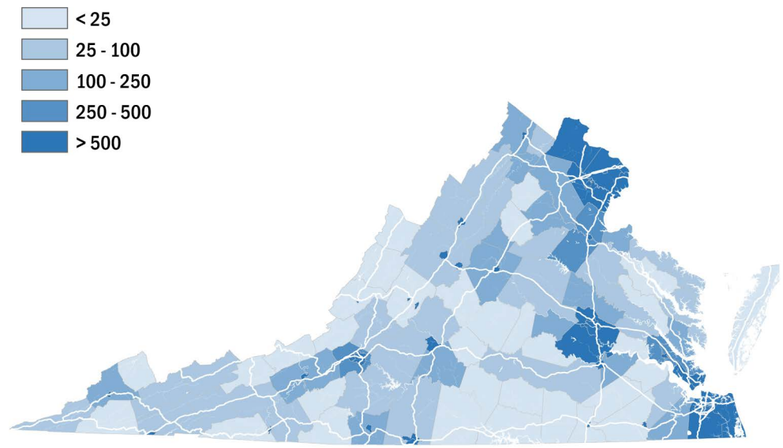
Population

Existing and future demographics are based on Intercensal Estimates from the Weldon Cooper Center for Public Service, Demographics Research Group. The data show a 2012 total population of 8,185,867 residents, and a 2025 total population of 9,203,977 residents, for a growth of approximately 12.4 percent. Projected growth varies significantly by jurisdiction, with the highest growth occurring near Fredericksburg (Stafford and Spotsylvania Counties show growth over 50 percent) while other counties are projected to decrease in population by 2025.

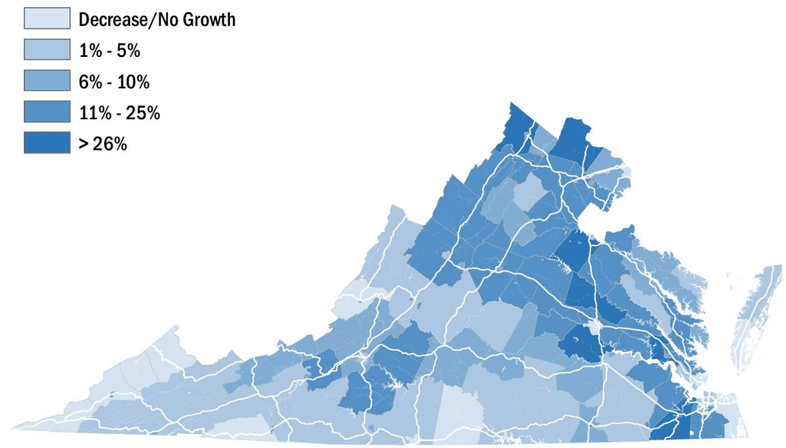
Employment

Existing and future employment data were developed based on national data available from IHS Global Insight. In 2012, the Commonwealth included approximately 3,787,000 jobs. By 2025, this number is forecast to increase by over 12 percent to a total of 4,246,000. As shown in the map, employment growth is projected to vary considerably across the Commonwealth - some jurisdictions are projected to lose jobs, while others are projected to grow by more than 50 percent. Additional details about demographic and economic trends in each of the regions of Virginia can be found in the appropriate Regional Networks Needs Assessment Reports.

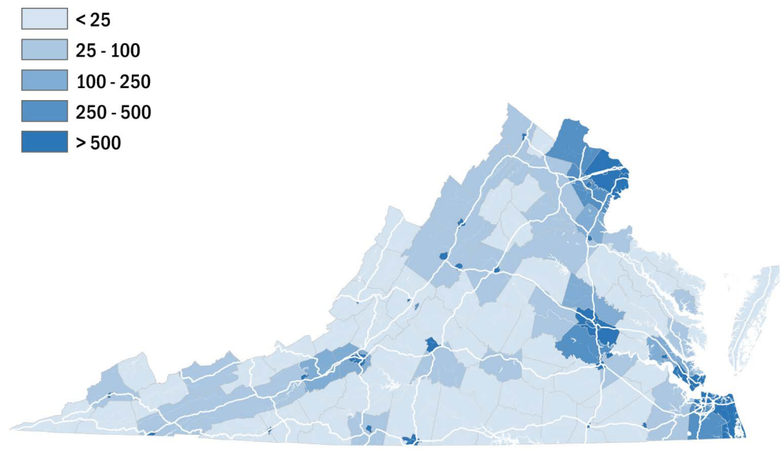
2012 Population Density (Persons / Square Mile)



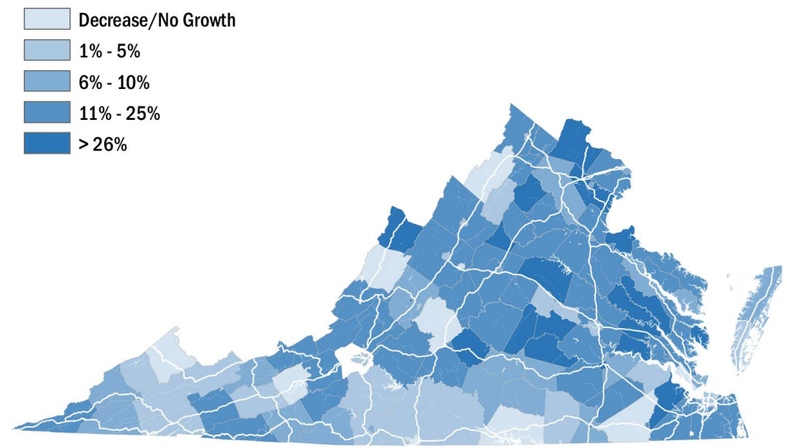
Population Growth (2012 - 2025 Percent Change)



2012 Employment Density (Jobs / Square Mile)



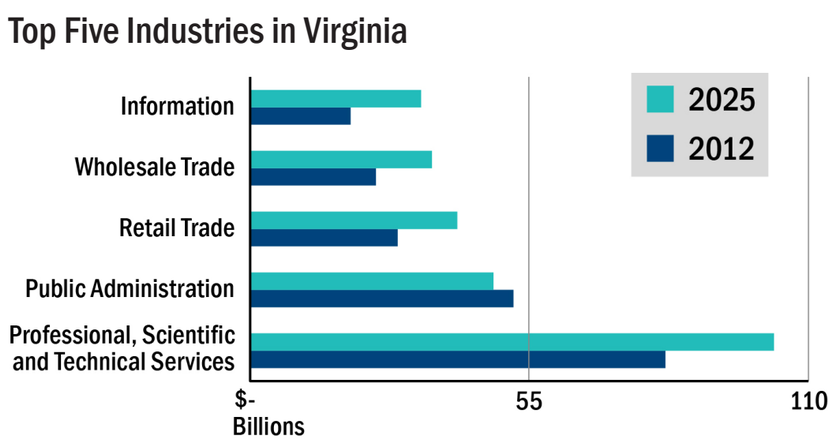
Employment Growth (2012 - 2025 Percent Change)



METHODOLOGY, DATA SOURCES, AND PROFILES

Economic Output

Economic Output is the total value of all goods and services produced in an economy within a given timeframe. It is a common indicator used in economic analysis to determine whether an economy is growing or contracting by comparing output during two different points in time. Unlike Gross Domestic Product, it includes the value of salaries. The total Economic Output of the Commonwealth is expected to increase by more than 31 percent between 2012 and 2025, representing a growth of almost $270 billion in annual economic output. The graph highlights the top five industries in the Commonwealth by their Economic Output based on data from IHS Global Insight. In 2012, Government was the largest single contributor to Virginia's Economic Output; however, by 2025, this industry will be overtaken by Profession, Scientific and Technical Services, Retail Trade, and Wholesale Trade. Additional data about individual regions can be found in the appropriate Regional Networks Needs Assessment Reports.



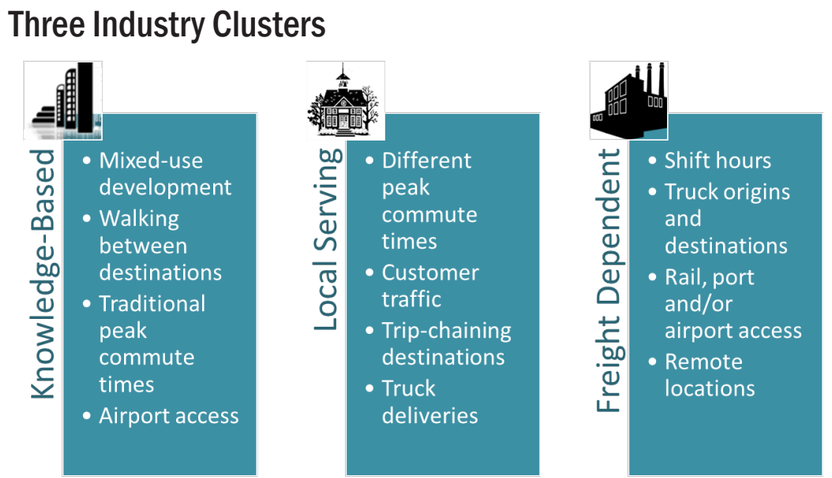
Industry Clusters

A framework to generally categorize core economic clusters is included as a meaningful and appropriate way to link economics and transportation for a statewide plan. The economic output by industry cluster for individual MPO areas along each corridor are detailed in each CoSS report.

The three industry clusters are:

- Knowledge-Based – those industries that tend to rely on skilled labor and serve a broader market than Virginia
- Local Serving – generally those industries that serve the local population
- Freight-Based – those industries for which the majority of industry output is dependent on freight transportation (also referred to as freight dependent)

Additional data about the industry clusters can be found in the appropriate Regional Networks Needs Assessment Reports.



Passenger Demand

Passenger demand for the VMTP Needs Assessment for the CoSS was focused on demand for intercity travel. The travel that occurs within cities and urban areas is covered primarily by the Needs Assessment developed for each of the Commonwealth's 15 Regional Networks. The analysis conducted for the CoSS is focused on identifying the current demand for intercity travel, and the locations where there may be significant overlap between that demand and more localized traffic. This analysis was developed based on a relatively new type of data, which quantifies demand based on location data collected from millions of mobile devices instead of relying on the more traditional methods of periodically surveying residents and drivers. This more accurate "big data" analysis captures a wider range of trips within the Commonwealth, including infrequent trips that might be overlooked by traditional survey methods. The dataset was collected and developed by StreetLightData based on personal travel in February, April, June, and September of 2014, with a focus on trips in Virginia and several of the surrounding states. It is important to note that through traffic for trips from further afield (i.e. Florida to Massachusetts) are not included in this dataset. Also, this dataset only provides relative demand, not an accurate total number of trips.

Quantifying Inter-City Travel

Personal travel demand data were aggregated to the MPO areas in Virginia to quantify the relative demand between each of Virginia's 15 major urban areas. This allowed for the identification of the highest demand origin-destination pairs within the Commonwealth, as shown in the trip table on this page. For the purposes of this analysis, the entire Metropolitan Washington Region was considered as a single urban area.

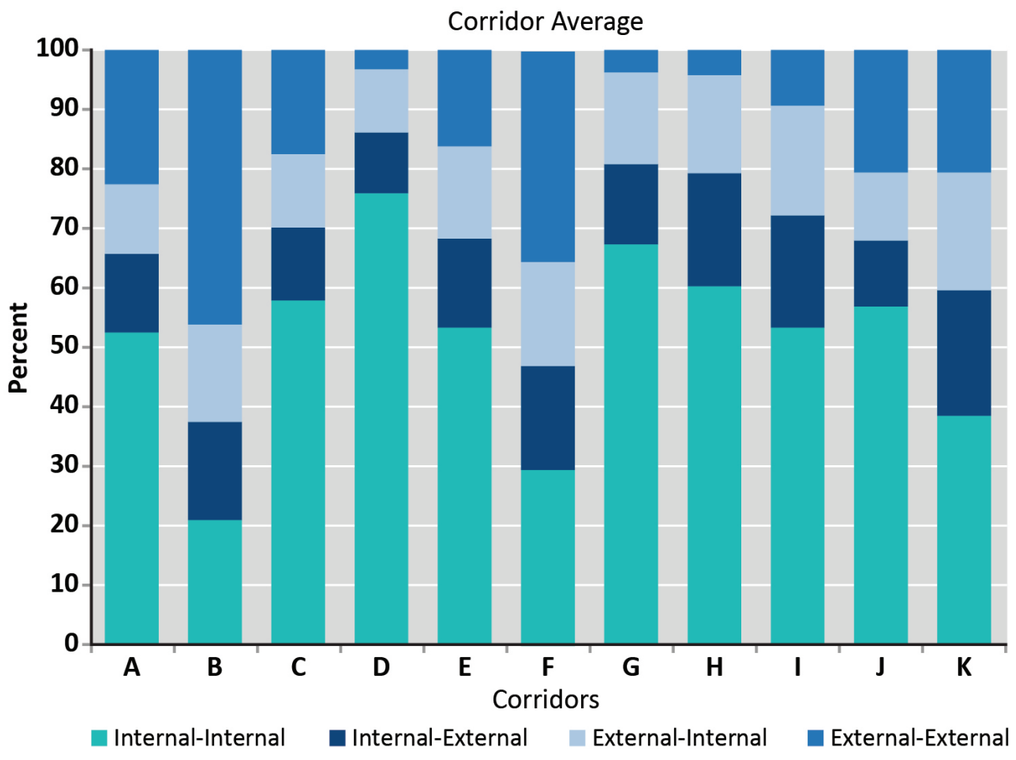
Based on this analysis, the highest demand origin-destination pairs in Virginia are all within the "urban crescent" and include:

- Fredericksburg Area – Metropolitan Washington Region: 17.6 percent of statewide passenger demand
- Tri-Cities Area – Richmond Area: 11.3 percent of statewide passenger demand
- Richmond Area – Hampton Roads Area: 9.3 percent of statewide passenger demand
- Richmond Area – Metropolitan Washington Region: six percent of statewide passenger demand
- Hampton Roads Area – North Carolina: 4.3 percent of statewide passenger demand
- Richmond Area – Fredericksburg Area: 4.2 percent of statewide passenger demand

Origin \ Destination	Metro Washington Region	Bristol Area	Danville Area	Hampton Roads Area	Central Virginia Area	Fredericks-burg Area	Kingsport Area	Harrisonburg-Rockingham Area	Richmond Area	Tri-Cities Area	Winchester-Frederick Area	Roanoke Valley Area	New River Valley Area	Staunton-Augusta-Waynesboro Area	Charlottesville-Albemarle Area	North Carolina	Tennessee	Kentucky	West Virginia	Maryland	Delware	Pennsyl-vania
Metropolitan Washington Region			0.01%	0.84%	0.11%	9.07%		0.28%	3.04%	0.38%	1.65%	0.05%	0.03%	0.14%	0.43%	0.25%	0.01%		1.89%			
Bristol Area	<0.01%				<0.01%		0.02%	0.01%	<0.01%		<0.01%	0.04%	0.01%	<0.01%		0.02%	0.84%	<0.01%	0.02%	0.01%		
Danville Area	0.01%			0.03%	0.18%	<0.01%		0.01%	0.03%	0.01%	<0.01%	0.08%	0.01%	0.01%	0.02%	0.30%	0.01%		<0.01%	<0.01%		<0.01%
Hampton Roads Area	0.86%		0.04%		0.05%	0.42%		0.04%	4.62%	0.62%	0.01%	0.02%	0.01%	0.07%	0.16%	2.20%	0.01%		0.02%	0.39%	0.09%	<0.01%
Central Virginia Area	0.11%	<0.01%	0.18%	0.06%		0.01%		0.07%	0.31%	0.04%	0.02%	0.69%	0.05%	0.11%	0.31%	0.15%	0.01%		0.04%	0.03%	<0.01%	<0.01%
Fredericksburg Area	8.52%		<0.01%	0.51%	0.02%			0.02%	2.18%	0.20%	0.10%	0.01%	0.01%	0.04%	0.19%	0.19%	<0.01%		0.05%	0.73%	0.04%	0.02%
Kingsport Area		0.02%														<0.01%	0.29%	0.01%	<0.01%			<0.01%
Harrisonburg-Rockingham Area	0.28%	<0.01%	0.01%	0.03%	0.07%	0.03%			0.15%	0.01%	0.15%	0.14%	0.03%	0.59%	0.15%	0.06%	0.03%		0.11%	0.13%	0.01%	0.04%
Richmond Area	3.04%	<0.01%	0.03%	4.66%	0.31%	1.97%		0.18%		5.65%	0.07%	0.14%	0.03%	0.32%	0.94%	0.76%	0.01%		0.05%	0.70%	0.04%	0.02%
Tri-Cities Area	0.32%		0.01%	0.68%	0.07%	0.17%		0.02%	5.63%		0.01%	0.02%	<0.01%	0.03%	0.03%	0.31%	<0.01%		0.01%	0.15%	0.03%	0.01%
Winchester-Frederick Area	1.46%	0.01%	<0.01%	0.02%	0.03%	0.07%		0.16%	0.09%	0.01%		0.05%	0.01%	0.08%	0.02%	0.03%	0.02%		0.38%	0.25%	0.01%	0.06%
Roanoke Valley Area	0.07%	0.02%	0.09%	0.03%	0.70%	<0.01%		0.16%	0.15%	0.01%	0.04%		1.03%	0.20%	0.05%	0.22%	0.05%	<0.01%	0.12%	0.02%	<0.01%	0.01%
New River Valley Area	0.01%	0.01%	0.01%	<0.01%	0.06%	0.01%		0.04%	0.03%		<0.01%	0.94%		0.05%	0.01%	0.06%	0.02%		0.06%	0.01%		<0.01%
Staunton-Augusta-Waynesboro Area	0.15%		0.01%	0.07%	0.10%	0.03%		0.62%	0.36%	0.02%	0.06%	0.19%	0.05%		0.90%	0.05%	0.01%		0.05%	0.04%	<0.01%	0.01%
Charlottesville-Albemarle Area	0.46%		0.02%	0.12%	0.27%	0.16%		0.20%	0.84%	0.03%	0.01%	0.08%	0.02%	0.92%		0.04%	<0.01%		0.03%	0.04%	<0.01%	<0.01%
North Carolina	0.28%	0.01%	0.29%	2.13%	0.16%	0.14%	0.01%	0.05%	0.67%	0.29%	0.03%	0.26%	0.07%	0.05%	0.04%			<0.01%	0.05%	0.19%	0.04%	0.02%
Tennesse	0.02%	0.87%	<0.01%	<0.01%	<0.01%	<0.01%	0.31%	0.02%	0.02%	<0.01%	<0.01%	0.04%	0.01%	0.01%	<0.01%			0.04%	0.02%	0.02%		0.01%
Kentucky		<0.01%					0.02%					0.01%				<0.01%	0.04%					
West Virginia	1.73%	0.01%	<0.01%	0.01%	0.03%	0.05%	<0.01%	0.11%	0.07%	0.02%	0.41%	0.13%	0.06%	0.05%	0.02%	0.04%	0.02%			0.60%	0.01%	0.04%
Maryland		<0.01%	0.01%	0.38%	0.05%	0.74%		0.12%	0.71%	0.14%	0.28%	0.02%	0.01%	0.05%	0.06%	0.17%	0.01%	<0.01%	0.65%			
Delware			<0.01%	0.13%	0.01%	0.06%		0.01%	0.05%	0.03%	0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.04%	<0.01%		0.01%			
Pennsylvania				<0.01%	0.01%	0.01%		0.05%	0.02%	<0.01%	0.06%	0.01%	<0.01%	0.01%	<0.01%	0.01%	0.01%		0.04%			

METHODOLOGY, DATA SOURCES, AND PROFILES

Internal and External Passenger Demand



Together, these six origin-destination pairs account for more than half of the total intercity passenger demand in Virginia. The individual CoSS reports provide analysis of the major destinations for travel originating in each of the MPO areas, particularly highlighting the portion of that passenger demand that might use each of the CoSS segments.

Intercity and Local Traffic

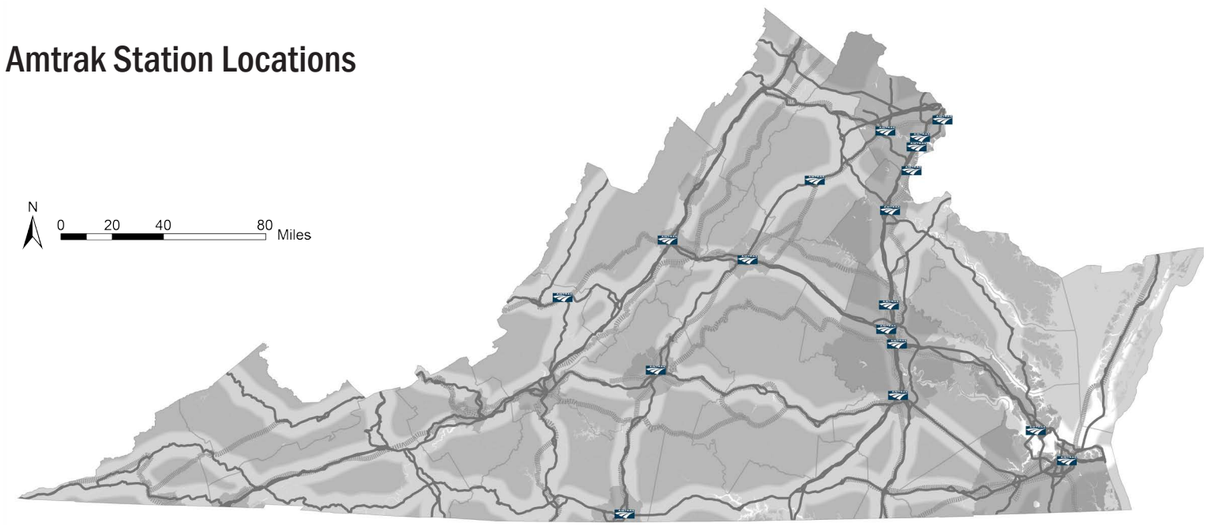
The majority of the CoSS pass through major urban areas at some point along their length. At these locations, intercity traffic is likely to conflict with local traffic, especially during peak periods and in areas with high levels of congestion. The same StreetLight data were used to analyze the traffic on the CoSS component roadways within the urban areas to determine the relative proportions of intercity and local traffic served by the facilities.

Traffic on the CoSS component facilities was divided into four categories:

- Internal-Internal: local trips with both start and end point inside the MPO Area
- Internal-External: trips with a starting point in the MPO Area, but destined for somewhere outside the MPO Area
- External-Internal: trips starting outside the MPO Area and destined for the MPO Area
- External-External: through trips with neither start nor end point in the MPO Area

Of these four categories, only the last is strictly through traffic which passes through the MPO area solely because it represents the shortest path to the ultimate destination. The individual CoSS reports provide analysis of the types of traffic found on the CoSS component roadways in each MPO area. Generally speaking, roadways in the larger MPO areas (such as the Hampton Roads Area and Northern Virginia) carry a larger proportion of local traffic. In addition, Interstates tend to carry more through traffic than other types of facilities. The graph below shows the category averages for each CoSS, and includes traffic in all of the MPO Areas along a CoSS (Western Mountain Corridor (Corridor L) is not included because it does not pass through any MPO Areas). As shown, Crescent Corridor (Corridor B) and North Carolina to West Virginia Corridor (Corridor F) include the highest portion of through traffic.

Amtrak Station Locations



Amtrak Station Annual Boardings, 2014

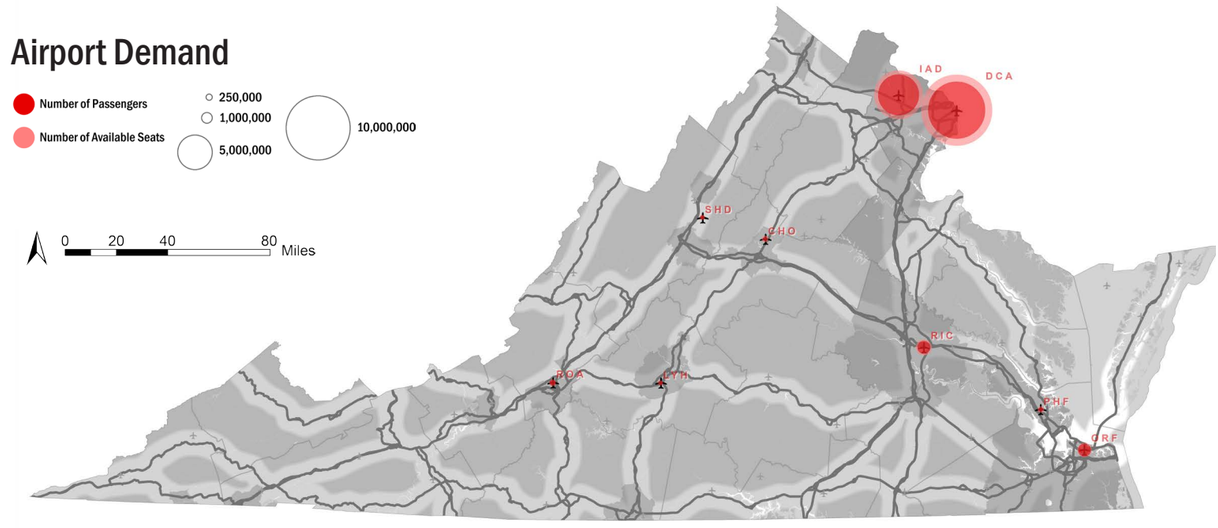
Station	Annual Boardings + Alightings
Alexandria	180,409
Ashland	27,977
Burke Centre	5,535
Charlottesville	132,410
Clifton Forge	2,432
Culpeper	14,257
Danville	7,741
Fredericksburg	111,999
Lorton	274,445
Lynchburg	86,302
Manassas	29,104
Newport News	112,661
Norfolk	41,843
Ettrick (Petersburg)	29,383
Quantico	36,976
Richmond Main Street	40,834
Richmond Staples Mill	358,615
Staunton	6,823
Williamsburg	61,074
Woodbridge	29,418
Total Virginia Station Usage	**1,590,238**

Rail Passenger Demand

Annual passenger rail demand at Amtrak stations throughout the Commonwealth is shown in the table below. These values represent annual boardings, by station, in 2014. As indicated, the top five stations account for approximately two-thirds of the passenger rail boardings and alightings in Virginia.

Airport Passenger Demand

Passenger data for Virginia airports are based on the number of boardings (enplanements) at each airport, as well as the available number of seats for flights originating at each airport, as reported in the United States Department of Transportation's T100 Domestic Segment dataset for 2014. According to this data, there were 17.6 million boardings, out of a total 22.1 million available seats, at Virginia's commercial service airports. Ronald Reagan Washington National Airport serves nearly half of the air passengers in the Commonwealth and has the largest number of available seats. Four out of every five passengers using airports in Virginia utilize either Dulles International Airport or Ronald Reagan Washington National Airport; four out of every five available seats on flights from Virginia are provided at these two airports, as well.



Freight Demand

Rail Freight Origin-Destination Pairs

Origin \ Destination	Virginia	Other States
Virginia	14% / 13%	10% / 10%
Other States	47% / 46%	30% / 32%

Percentages represent 2012 / 2025 values.

Truck Freight Origin-Destination Pairs

Origin \ Destination	Virginia	Other States
Virginia	10% / 10%	21% / 21%
Other States	23% / 24%	46% / 45%

Percentages represent 2012 / 2025 values.

		2012		2025	
Corridor	Corridor Name	Tonnage (in millions)	Value (in Billions)	Tonnage (in millions)	Value (in Billions)
A	Coastal Corridor (US 17)	--	--	--	--
B	Crescent Corridor (I-81)	70	$47	78	$61
C	East-West Corridor (I-64)	44	$5	46	$7
D	Eastern Shore Corridor (US 13)	23	$14	23	$17
E	Heartland Corridor (US 460)	62	$47	70	$61
F	North Carolina to WV Corridor (US 220)	3	$1	3	$1
G	North-South Corridor (VA 234)	--	--	--	--
H	North Virginia Corridor (I-66)	1	$1	1	$2
I	Seminole Corridor (US 29)	53	$39	63	$51
J	Southside Corridor (US 58)	34	$26	36	$32
K	Washington to NC Corridor (I-95)	53	$25	59	$32
L	Western Mountain Corridor (I-77)	--	--	--	--

		2012		2025	
Corridor	Corridor Name	Tonnage (in millions)	Value (in Billions)	Tonnage (in millions)	Value (in Billions)
A	Coastal Corridor (US 17)	119	$181	163	$265
B	Crescent Corridor (I-81)	160	$264	213	$383
C	East-West Corridor (I-64)	149	$246	208	$393
D	Eastern Shore Corridor (US 13)	34	$51	51	$80
E	Heartland Corridor (US 460)	80	$89	108	$130
F	North Carolina to WV Corridor (US 220)	85	$163	113	$262
G	North-South Corridor (VA 234)	4	$2	5	$4
H	North Virginia Corridor (I-66)	26	$30	34	$45
I	Seminole Corridor (US 29)	33	$32	42	$45
J	Southside Corridor (US 58)	92	$147	125	$226
K	Washington to NC Corridor (I-95)	122	$172	170	$252
L	Western Mountain Corridor (I-77)	117	$225	158	$334

METHODOLOGY, DATA SOURCES, AND PROFILES

Truck and Rail Freight

Truck and rail freight travel demand for Virginia's highways and railroads were obtained from IHS Transearch data from 2012 and 2025. Freight flows between jurisdictions were assigned to specific corridors using the Transearch network (for truck freight) and the ORNL network (for rail freight). These assignments included 12 corridors with truck facilities and nine corridors with freight rail facilities. Freight traveling along a particular corridor for any leg of its trip is counted toward the total corridor tonnage and value; freight value and tonnage can therefore be included in multiple categories. For this analysis, freight flows were summarized by state outside of Virginia and by County/City within the Commonwealth. Based on these summaries, a number of important statistics were calculated including the total amount of freight on a corridor (by value and tonnage), the average value per ton, and the amount of freight with an origin or destination along each Corridor segment. In addition, this analysis identified the major origins, destinations, and origin-destination pairs for freight on each Corridor segment.

More than 1.3 billion tons of freight worth over $1.8 trillion was transported along the CoSS in 2012. The vast majority of this freight is carried by truck (89 percent by value and 74 percent by tonnage). By 2025, these totals are expected to increase to almost 1.8 billion tons worth $2.7 trillion, representing increases of 28 and 50 percent, respectively. The proportion to be carried by truck is forecast to be even higher in 2025 than under the current conditions. On average, truck freight is 2.5 times more valuable per ton than rail freight. The Crescent Corridor (Corridor B) carries the largest amount of freight by both rail and truck, although truck freight is forecast to increase to similar levels on the East-West Corridor (Corridor C) by 2025.

A large portion of both rail and truck freight is through traffic, with both its origin and destination in another state. This represents almost one-third of rail freight and almost half of truck freight traveling on the CoSS. Rail freight also includes a large portion of freight destined for Virginia, led particularly by freight destined for the port facilities in the Cities of Norfolk, Newport News, and Chesapeake. The only Virginia jurisdiction that produces a significant portion of rail freight on the CoSS is Wise County, a coal producing area.

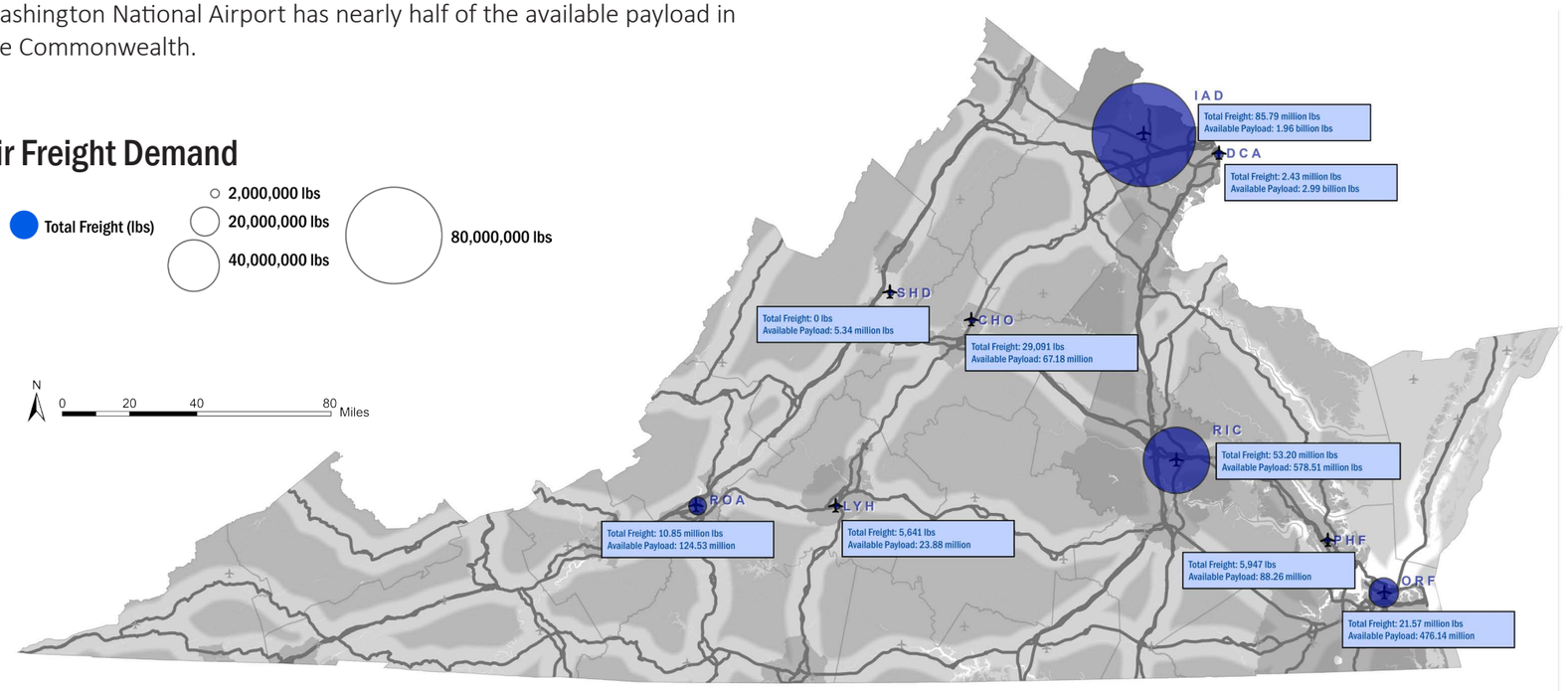
Air Freight

Freight data for Virginia airports include freight and mail tonnage originating at each airport, as well as the available payload for trips originating at each airport, as reported in the United States Department of Transportation's T100 Domestic Segment dataset for 2014. According to this data, there are 173.9 million pounds of freight, including mail, departing from Virginia's commercial service airports, utilizing 6.3 billion pounds of available payload. Nearly half of the air freight in Virginia passes through Dulles International Airport, while Ronald Reagan Washington National Airport has nearly half of the available payload in the Commonwealth.

Port Freight

According to the Virginia Port Authority, The Port of Virginia handled 67.3 million tons of cargo worth $71.5 billion in 2014 . This cargo passes through one of six facilities: the Newport News Marine Terminal, the Norfolk International Terminals, the Portsmouth Marine Terminals, the Virginia International Gateway, the Port of Richmond, and the Virginia Inland Port. Approximately two-thirds of the freight passing through The Port of Virginia travels by truck, with approximately one-third of freight traveling by rail.

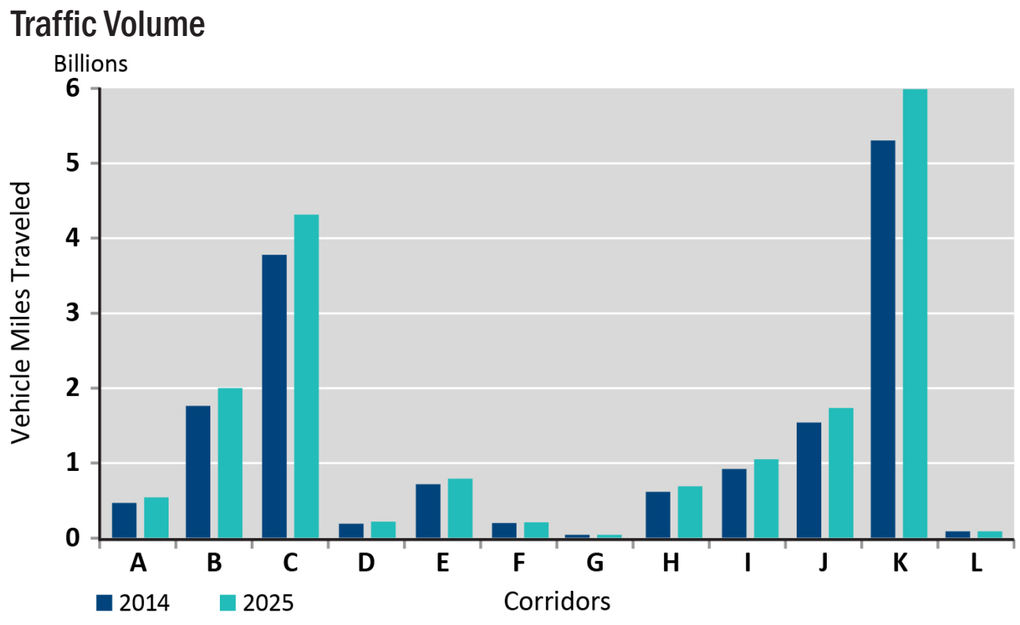
Air Freight Demand



Traffic Conditions

Traffic Volume and AADT

In 2014, there were approximately 15.5 billion vehicle miles traveled (VMT) on the CoSS component roadways on an average weekday. By 2025, VDOT predicts that this number will increase by approximately 14 percent to over 17.6 billion VMT daily. As shown, The Washington to North Carolina Corridor (Corridor K) has the highest existing and future VMT and accounts for over one-third of the CoSS VMT in Virginia. While the highest total growth in VMT is forecast to occur on Corridor K, the highest percentage growth is forecast to occur on the North-South Corridor (Corridor G); this percentage growth is indicative of the fact that construction of primary facilities in Corridor G has not yet been completed. As shown on the Change in Traffic Volume map, the largest increases in traffic volume are forecast to occur near the urban areas.



VDOT also provided data regarding the percentage of heavy truck traffic on CoSS facilities throughout the Commonwealth. As shown on the Percent Trucks map, the highest percentages of truck traffic occur primarily in the western portions of the state, especially along Corridor K and the Western Mountain Corridor (Corridor L).

Traffic Distribution

Detailed traffic counts from VDOT's Traffic Monitoring System (TMS) of continuous traffic counting stations were provided for the year 2014. The TMS counts provide 15-minute traffic counts on major roadway facilities throughout the year. The counts from TMS stations on the CoSS component roadways (198 count stations) were used for analysis and each station had counts for at least 200 days in the year 2014. These count stations were each assigned to a CoSS segment, and profiles of traffic levels – both for all traffic and heavy truck traffic – were produced. Two types of profiles were developed and analyzed for each segment: a time of day distribution which identified peaking periods throughout an average day, and a monthly profile which identified peak periods throughout the year.

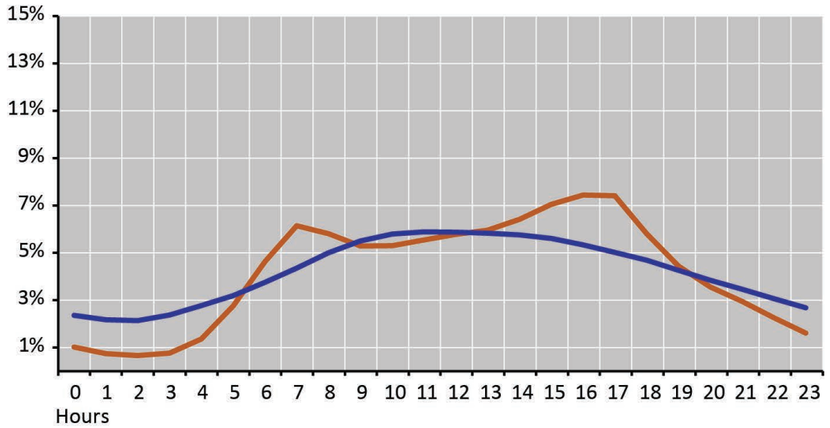
The statewide averages of these profiles are highlighted in the graphs. Weekday traffic in the state shows two distinct peak periods: an evening peak beginning at 4 p.m. and a less-busy morning peak beginning at 7 a.m. While this pattern was observed in many CoSS segments, it was not true in all areas, especially in those that included high levels of truck traffic and/or were located far from a major urban area. Truck traffic on average and throughout the state tended to show a single midday peak; on average, the peak hour for weekday truck traffic in Virginia begins at 10 a.m. Weekend traffic for both general traffic and trucks shows a single midday peak, and often has very stable levels throughout the afternoon hours. On the weekends, truck traffic tends to peak earlier in the day than general traffic.

On average, weekday traffic varies by as much as 29 percent throughout the year. The high point for general traffic generally occurs during the summer, with August being the highest traffic month on average. Throughout the Commonwealth, traffic tends to be at its lowest levels in January. Truck traffic tends to vary somewhat less than general traffic with a high point in the summer (June is the highest month on average), and the lowest volumes in January. Weekend traffic follows similar peaking patterns across the year, with a summer high point (June, on average) and a January low. Weekend truck traffic is somewhat less predictable, with an average variation of 24 percent between the peak in June and the low point in July.

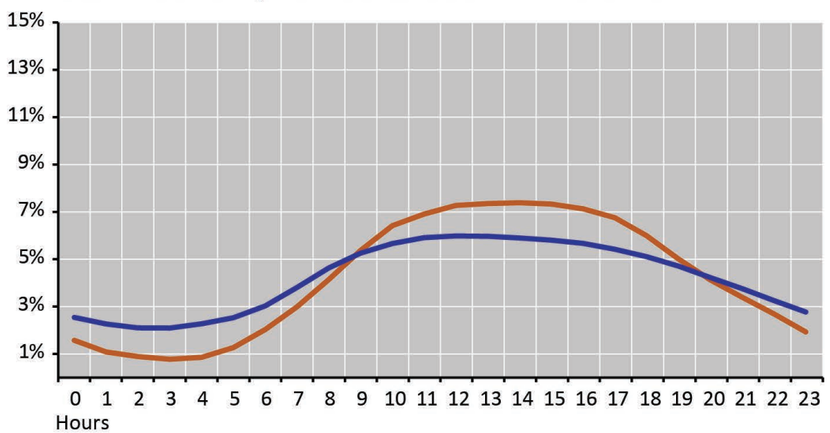
METHODOLOGY, DATA SOURCES, AND PROFILES

Time of Day Traffic Distribution

Statewide Hourly Traffic Distribution – Weekdays

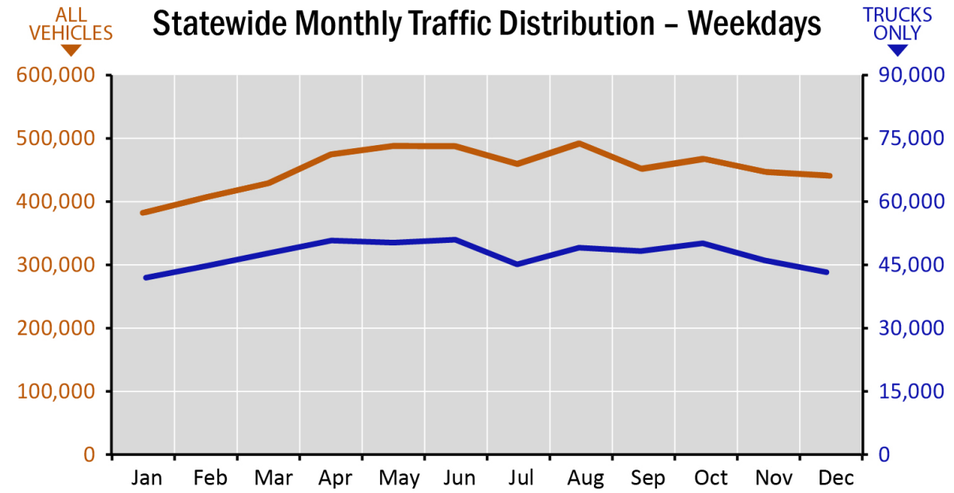


Statewide Hourly Traffic Distribution – Weekends

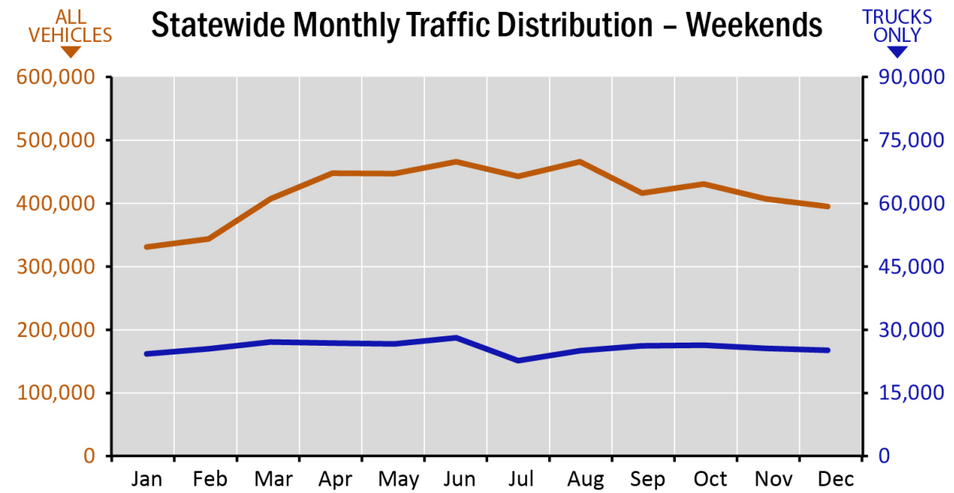


Monthly Traffic Distribution

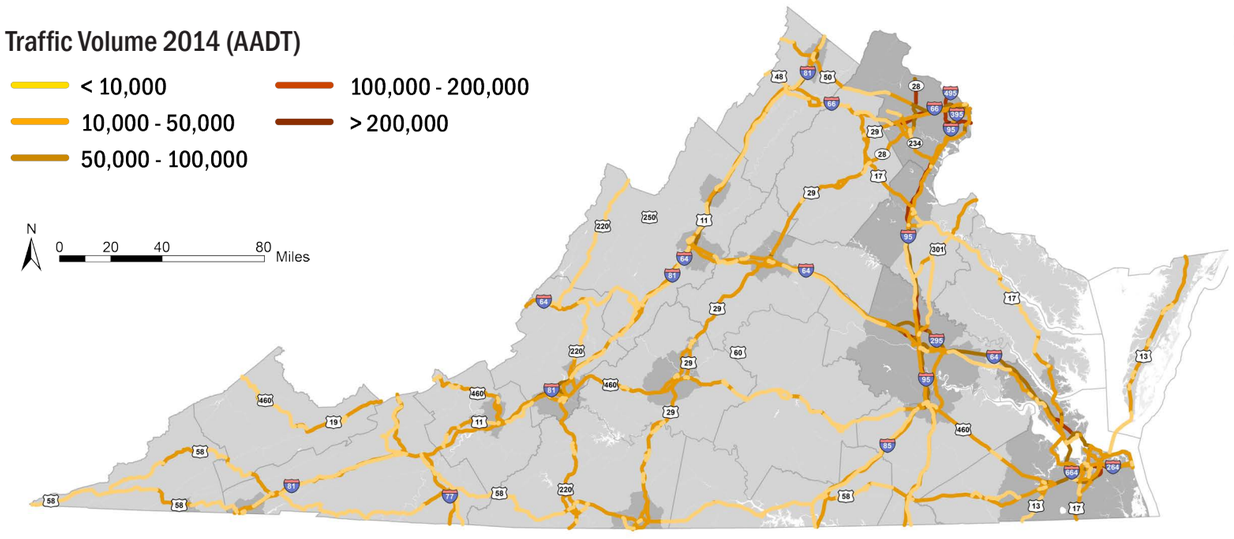
Statewide Monthly Traffic Distribution – Weekdays

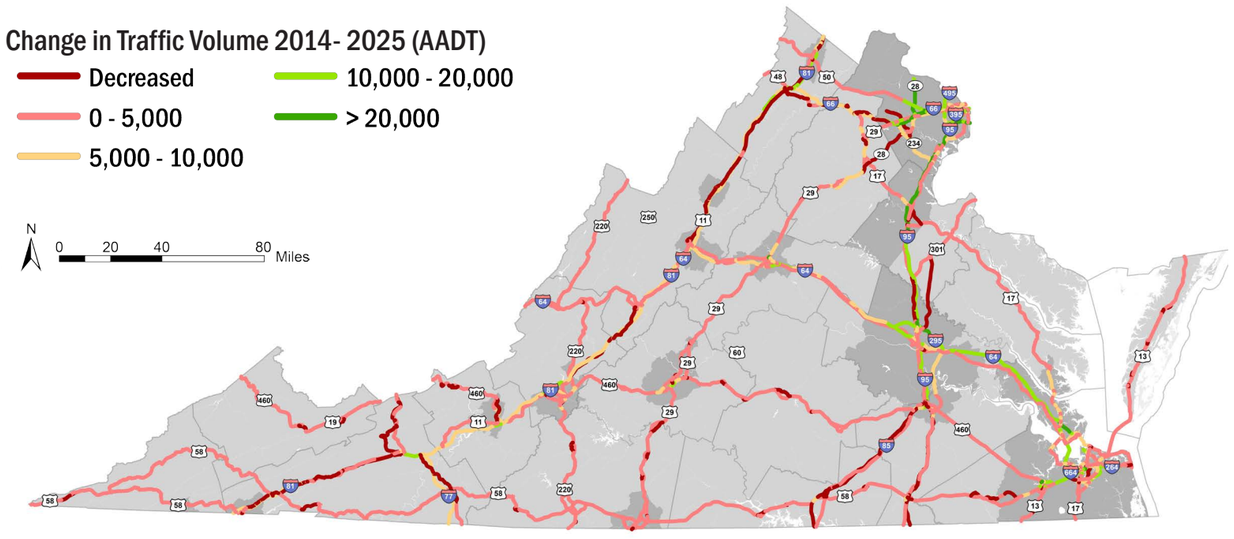


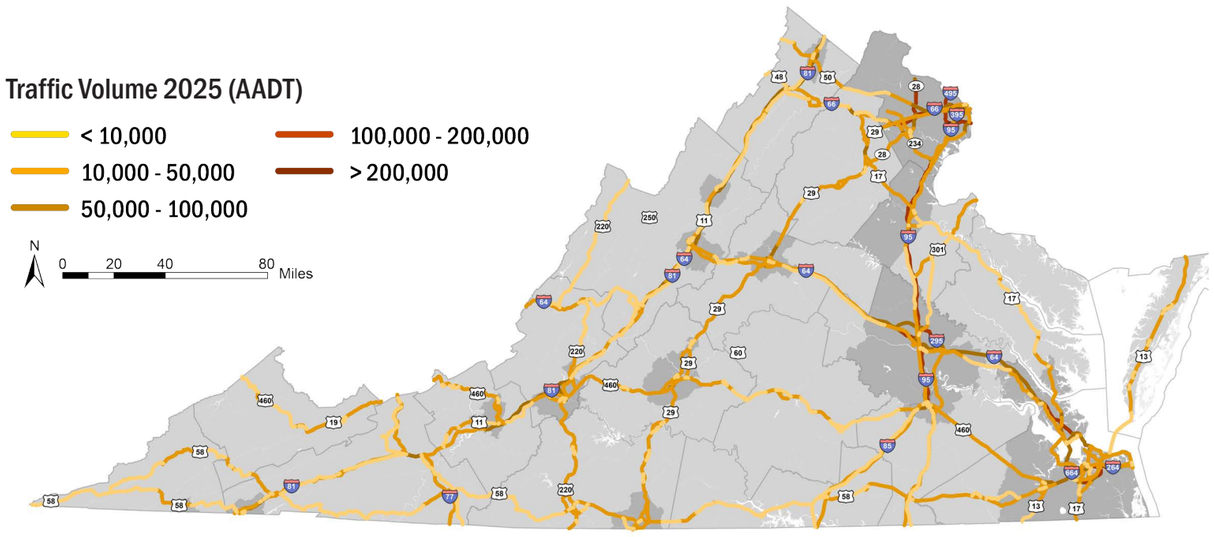
Statewide Monthly Traffic Distribution – Weekends

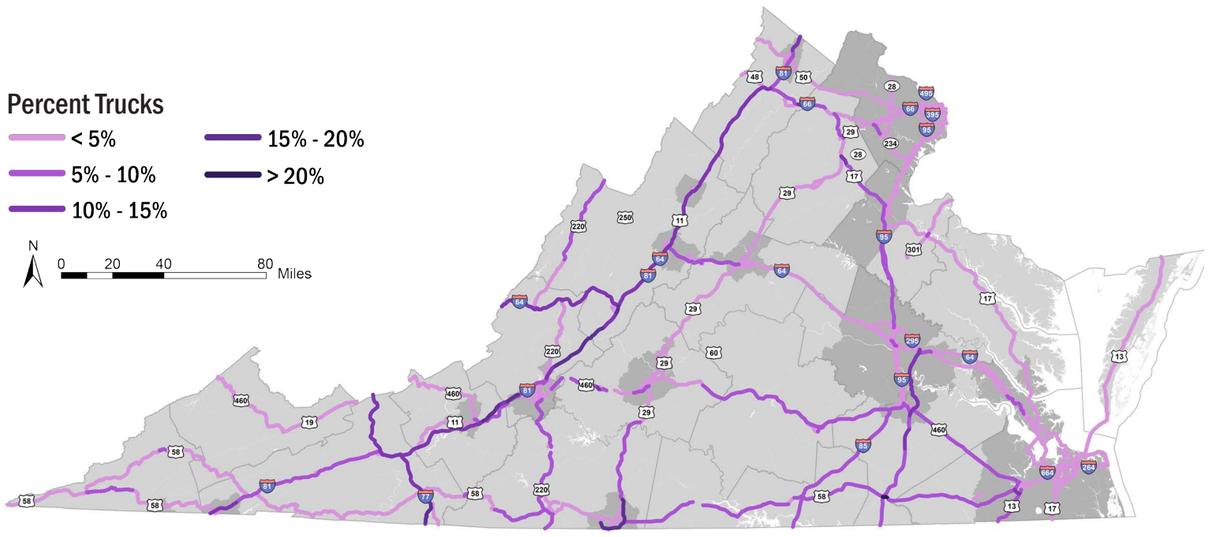


METHODOLOGY, DATA SOURCES, AND PROFILES









Redundancy and Mode Choice Needs

Redundancy

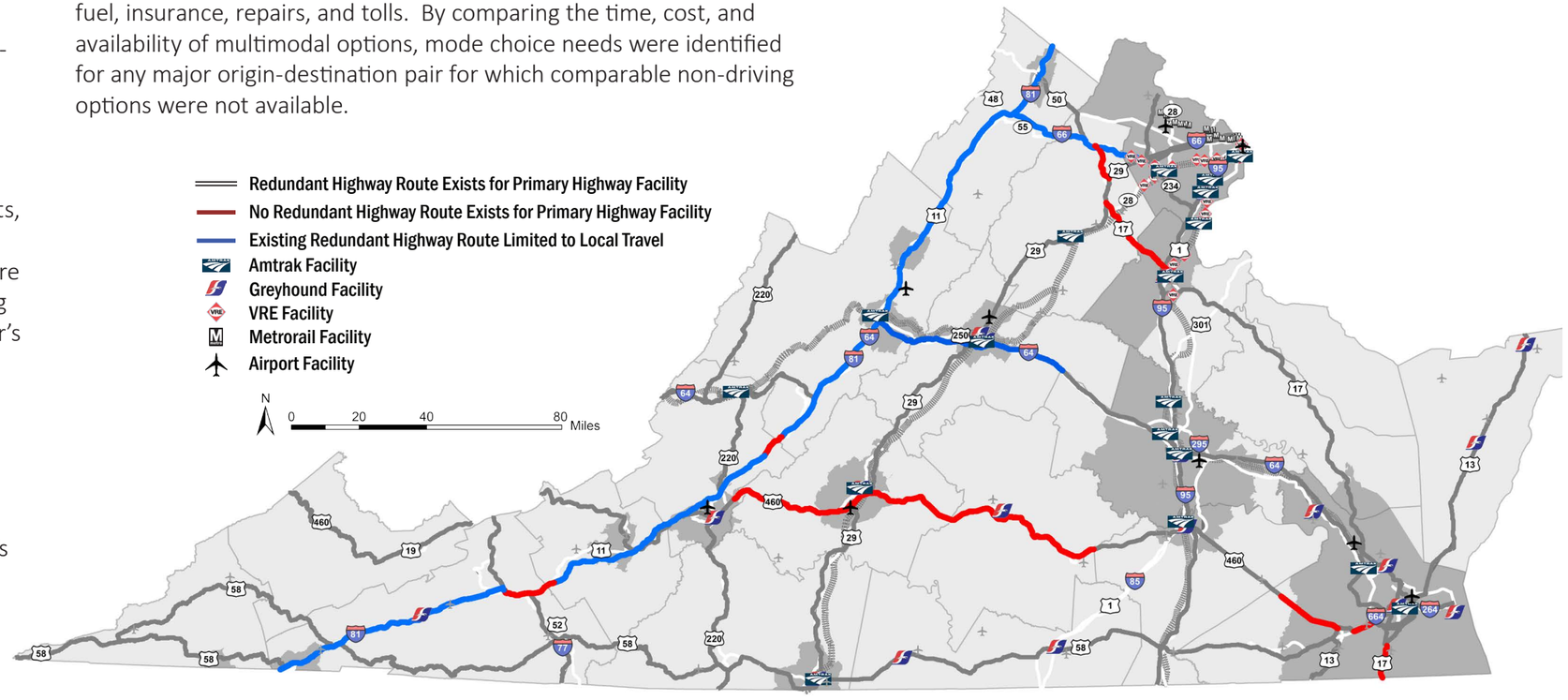
Needs for redundant paths were identified between major centers of activity based on the level of demand between each origin-destination pair. Any origin-destination pair that accounts for at least one percent of the inter-city passenger travel (bi-directional) in the Commonwealth (as shown on Page 8) was identified as having high enough statewide demand to consider a redundant highway path as a need. Those segments that met this demand threshold and did not already have a redundant highway path were identified as having a need in this category. In some cases, a parallel route did exist, but did not provide comparable travel times to the primary route or served significantly more local travel than intercity travel making the route unlikely to support significant intercity travel. In these cases, availability of a redundant path was noted as limited to local travel or use as a short-distance detour for incidents causing temporary congestion on the primary route.

Mode Choice

Available mode choice was compared through travel times, fare costs, and frequency of intercity bus, train, and air service for the major origin-destination pairs served by each segment. These services were compared to a similar automobile trip using the same segment along the primary route and, where available, a similar trip using a corridor's parallel facility. Travel times, fare costs, and service frequency for intercity bus and train service were obtained through the online booking websites offered by Megabus, Greyhound, and Amtrak, as well as the websites of transit services operating commuter buses between major activity centers. While these bus services were used as a sample dataset, this measure does not include all long-haul bus services offered in Virginia. This dataset is representative of Virginia's long-haul bus services, but may not be fully accurate for any given time or location due to the variability in services offered. Travel times, fare costs, and service frequency for air travel was based on a one-way trip and obtained through the travel search engine Kayak in June 2015. For intercity bus, train, and air service, all sample trips were based on the same day, Wednesday, August 19, 2015. Travel times for automobiles were based on routing information for one-direction travel available on Google Maps, using uncongested times to avoid any temporary congestion issues. Travel costs for automobile trips were based on the 2014 federal standard mileage rates for business miles, 56 cents per mile, as defined by the Internal Revenue Service. This mileage rate includes fixed and variable costs for automobile operation, including fuel, insurance, repairs, and tolls. By comparing the time, cost, and availability of multimodal options, mode choice needs were identified for any major origin-destination pair for which comparable non-driving options were not available.

Park-and-Ride

Park-and-ride needs were identified using data collected over 18 months from March 2011 to December 2012 as part of VDOT's 2013 Park and Ride Lot Inventory and Usage Study. The Park-and-Ride Lot Inventory and Usage Study data included capacity and utilization data for 292 park-and-ride lots throughout the Commonwealth, including some unofficial lots. Transit access to each park-and-ride lot was noted in this study as well. Utilization of the park-and-ride lots was aggregated to the county level and compared to the overall park-and-ride utilization rate for the Commonwealth (76 percent) to identify jurisdictions where park-and-ride capacity was constrained.

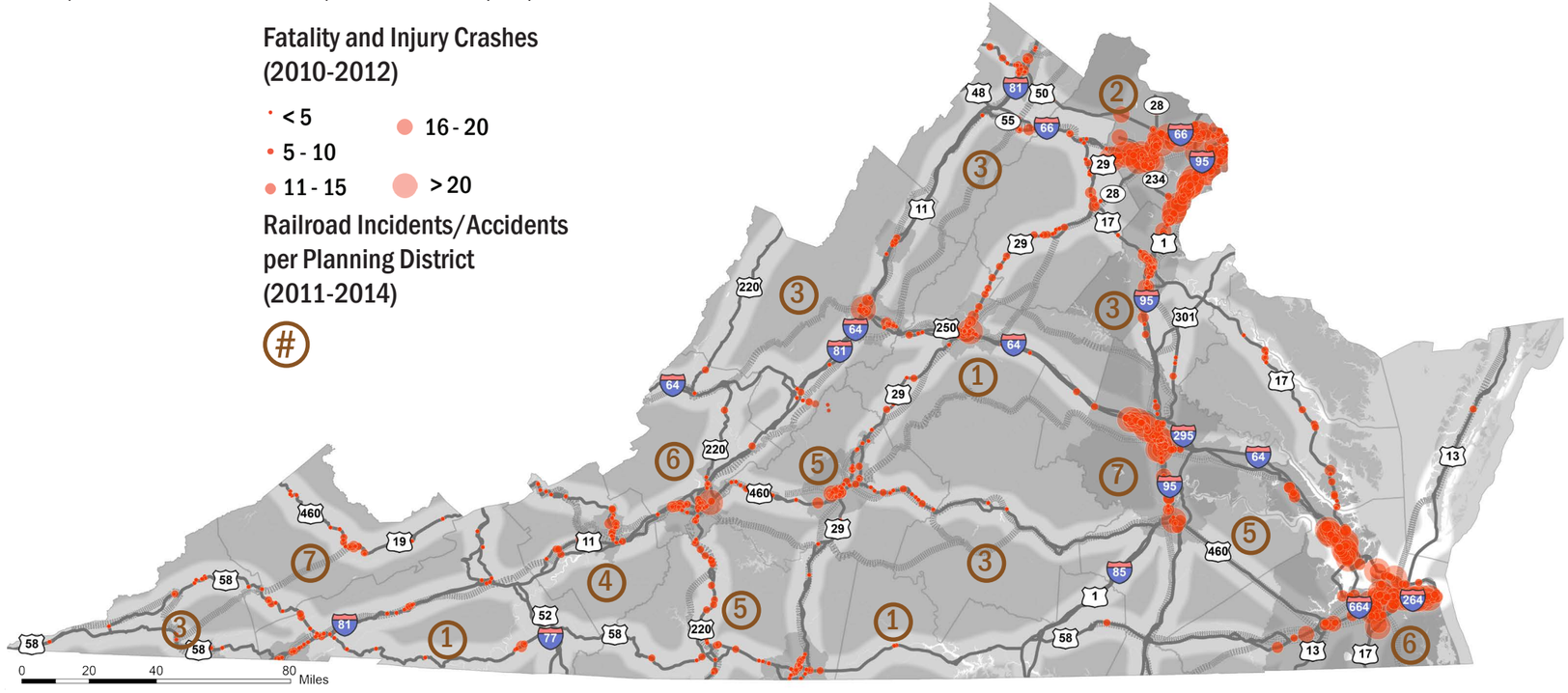


Safety Needs

All highway safety data were provided by VDOT's Traffic Engineering Division and are based on the most recent STARS analysis. Using methodology outlined in the Highway Safety Manual, each roadway segment and intersection was ranked based on its potential for safety improvement (PSI) based on the number of fatal and injury crashes observed between 2010 and 2012. The top 100 segments and top 100 segments in each VDOT district were included for analysis as part of this Needs Assessment. Segments and intersections on the CoSS component roadways were identified, and clusters of crashes were identified. These locations were identified as having Safety Needs, although the threshold for number of crashes varied based on observed conditions on each Segment.

Two specific roadway safety metrics were calculated for each segment: total number of crashes (including all fatal and injury crashes), and the number of crashes per vehicle miles travelled (VMT, in millions). While the former metric gives an idea of the scale of the safety issues on a given segment, the latter normalizes for differences in traffic levels and length between individual segments. As shown in the table, The Washington to North Carolina Corridor (Corridor K) has the highest total number of fatal and injury crashes, while the North-South Corridor (Corridor G) has by far the highest rate of crashes. If these crash rates remain constant over time, the total number of crashes in each corridor will likely increase based on predictions of increased VMT in each of the CoSS. Based on these assumptions, an additional 1,253 crashes would be expected on the CoSS component roadways by 2025.

Corridor	Crashes (2010-2012)	Crashes per million VMT	2025 Crashes (assuming constant crash rate)
A	763	1.65	889
B	643	0.37	734
C	1,423	0.38	1,624
D	156	0.85	179
E	802	1.14	901
F	185	1.00	204
G	286	9.06	349
H	546	0.91	618
I	1,454	1.60	1,669
J	920	0.60	1,039
K	1,704	0.32	1,926
L	14	0.19	16
Total	**8,896**	**0.57**	**10,149**



Rail Safety

Rail crash data were obtained from the Federal Railroad Administration Office of Safety Analysis and include all incidents except those occurring in a rail yard for the years 2011 to 2014. Rail crash data are displayed by jurisdiction to identify areas where rail safety issues are substantial.

Congestion Needs

Delay Measure	Statewide Threshold	Statewide Total Delay
Person-Hours per Mile	>100	176,048 person-hours
Freight Ton-Hours per Mile	>250,000	451,605478 ton-hours

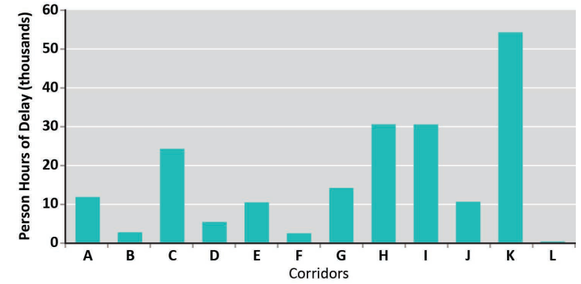
Congestion was identified using two performance measures designed to capture the effects of congestion as experienced by roadway users. Using the same speed data as in the reliability measures, the total daily person-hours of delay (for passengers) and ton-hours of delay (for freight) were calculated for CoSS component roadways in the Commonwealth. The actual speed data for 2014 were provided by INRIX for most locations on the CoSS component facilities.

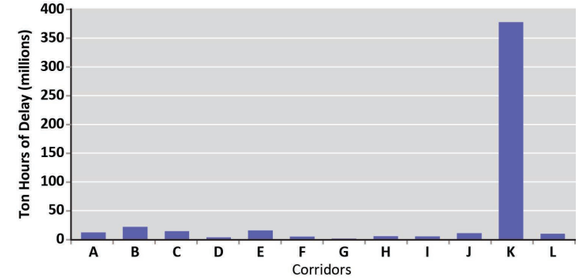
On each link, delay was calculated for each weekday hour by comparing the average travel time to the travel time when traveling at the reference speed for that link (comparable, although not identical, to the speed limit). The delay was then multiplied by the number of people or freight-tons traveling on that link during that hour and then summed to a daily total. A statewide-average auto occupancy of 1.1 was assumed for passenger vehicles. More detailed analysis of freight travel patterns was used to calculate accurate tons-per-truck values for each CoSS segment. Because longer links, by definition, will have a higher total delay than a similarly-congested short link, the total person-hours and ton-hours calculated were divided by the link length in order to calculate the final performance measures.

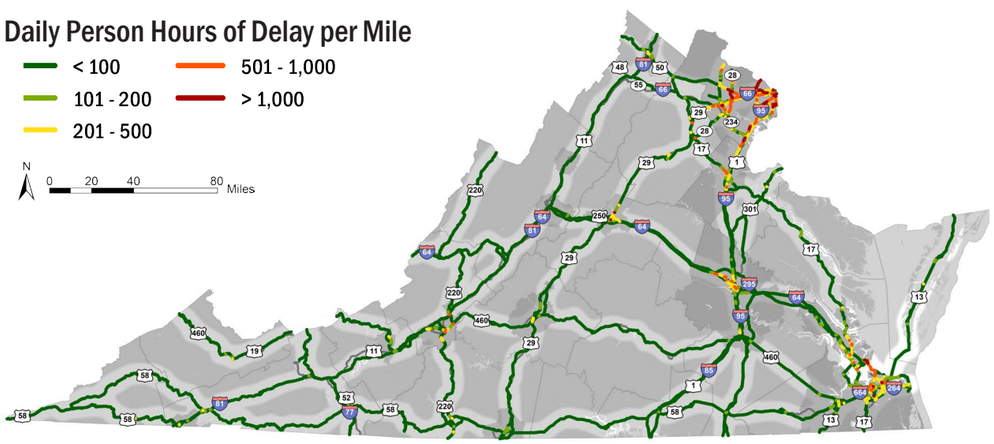
After reviewing the results as shown in the maps, statewide thresholds for passenger and freight congestion were identified. Any location with values above these statewide thresholds was identified as having Congestion Needs.

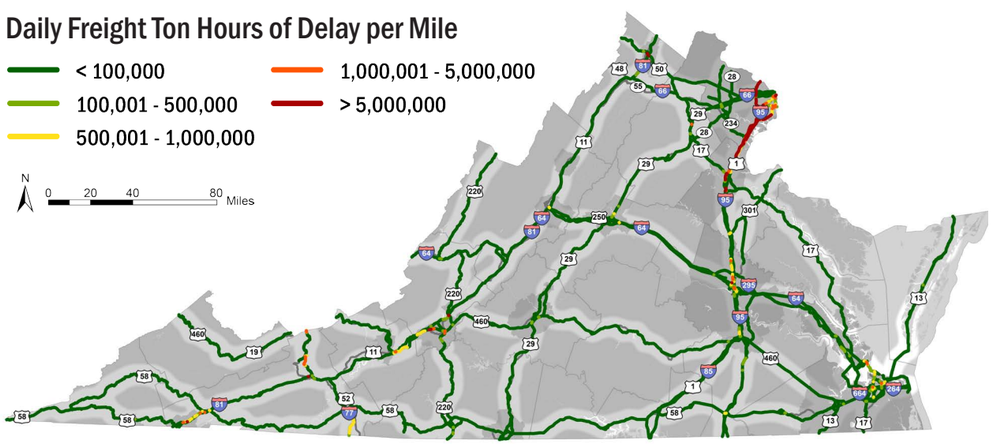
As shown in the maps, many of the areas with Congestion Needs are in the major urban areas including Northern Virginia, Hampton Roads, and Richmond (similar to Reliability Needs). Other areas that were identified as having Congestion Needs include Charlottesville (primarily passenger congestion), the Crescent Corridor (Corridor B) near Roanoke and Blacksburg/Christiansburg, near Bristol and Abingdon, and around the Inland Port near Winchester (all primarily freight delay). The graphs show the total delay by corridor. As shown, The Washington to North Carolina Corridor (Corridor K) experiences the greatest congestion delay, by far, for both passengers and freight.

In addition, a small subset of bottleneck needs was identified based purely on railway geometric constraints. These included railroad segments with physical limitations such as height restrictions limiting double-stacking, tunnels, bridges.









Reliability Needs

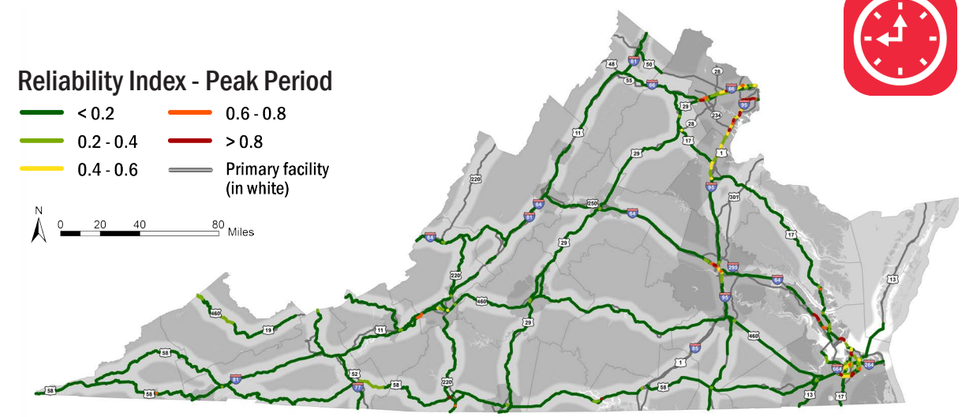
Roadway reliability was calculated based on actual speed data for 2014 as provided by INRIX. These data covered most locations on the CoSS component facilities and provide speed for 15-minute increments throughout the day for all of 2014. Reliability was calculated for each roadway link (as defined by INRIX) by direction, based on the 90th percentile travel time. Based on this assumption, only events that occur at least ten percent of the time would be identified as reliability issues. A buffer index was calculated independently for each weekday and weekend hour according to the formula below:

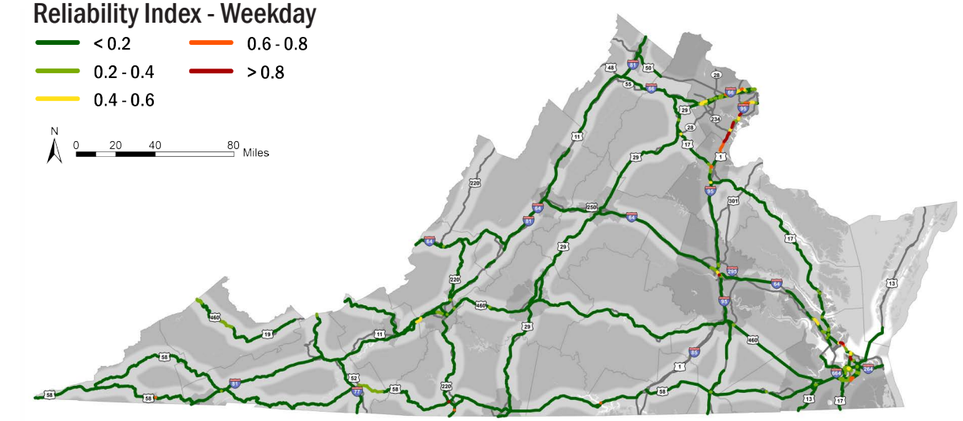
$$\frac{\text{(90th\% Travel Time)-(Median Travel Time)}}{\text{(Median Travel Time)}}$$

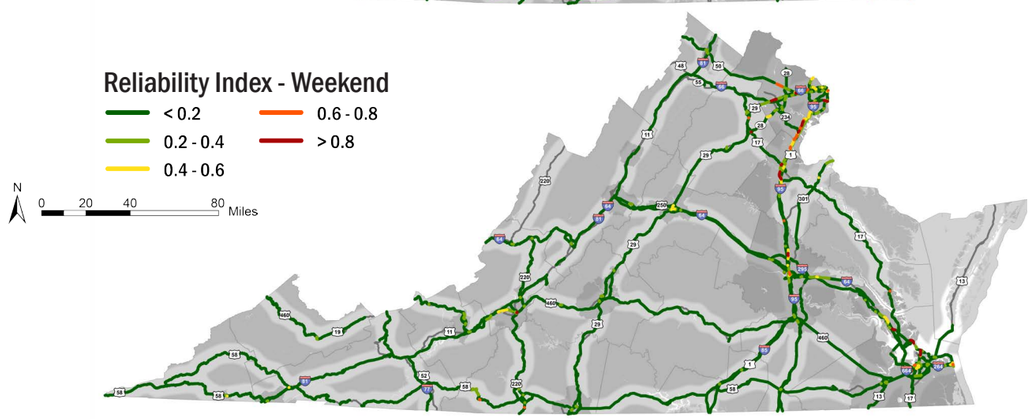
This number effectively calculates the percent of additional time that a driver should include in trip planning in order to arrive punctually 90 percent of the time. For example, a buffer index with a value of 0.4 indicates that for a trip that usually takes 20 minutes, an additional 40 percent, or eight minutes should be planned. This calculation produced 48 buffer indices for each CoSS component link (24 for weekday, 24 for weekend). By initially computing the buffer indices separately for each hour of the day, the effects of recurring congestion were effectively removed from this analysis as much as possible (Congestion was measured separately using a different set of performance measures). These hourly buffer indices were then aggregated using a weighted average (weighted based on the portion of traffic occurring during each of the included hours) to calculate three Reliability Indices:

These three Reliability Indices were calculated for all CoSS components for which the required data were available. Based on a review of the results, separate thresholds were identified for each Reliability Index; locations with Reliability Index values above these statewide thresholds were identified as having Reliability Needs. As shown on the maps, the majority of the Reliability Needs are identified in the major urban areas including Northern Virginia, Hampton Roads, and Richmond although some were identified in other areas such as near Roanoke, Charlottesville, and Danville.

Reliability Index	Hours Included	Statewide Threshold
Weekday Peak	Weekday, 7–9 a.m. and 5–7 p.m.	0.80
Weekday	All Weekday hours (M–F)	0.40
Weekend	All Weekend hours (Sat & Sun)	0.60







METHODOLOGY, DATA SOURCES, AND PROFILES

Passenger Rail Reliability

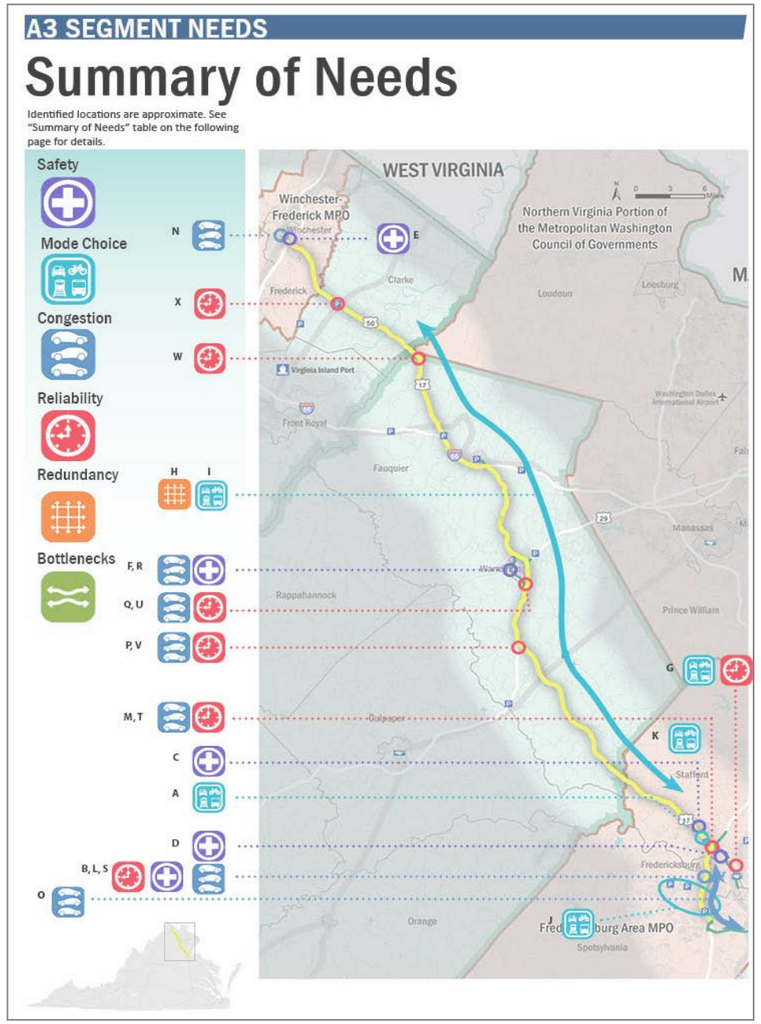
Departure delays at Amtrak were calculated from data available for 2014 in the Amtrak Status Maps Archive Database (ASMAD). ASMAD is not affiliated with Amtrak, but does archive status data from www.amtrak.com daily. Total delay by station was calculated by multiplying the average departure delay by the number of passengers using a station annually. An average delay of 25 minutes is experienced at Amtrak stations statewide, accumulating over 270,000 hours of delay annually. While Clifton Forge Station has the highest average delay in the Commonwealth, the Staples Mill Station in the Richmond area has the highest levels of total delay.

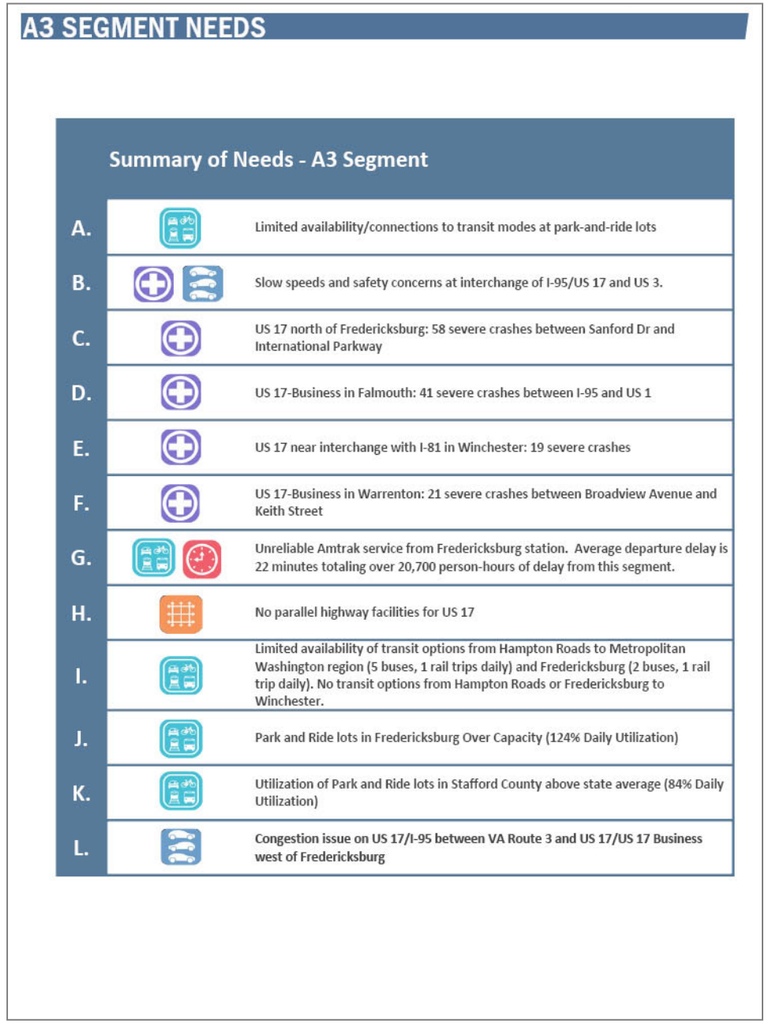
Station	Average Departure Time Delay (mins)	Total Annual Hours of Delay
Alexandria	23	35,169
Ashland	20	4,704
Burke Centre	14	641
Charlottesville	32	35,522
Clifton Forge	74	1,496
Culpeper	31	3,686
Danville	34	2,225
Fredericksburg	34	8,282
Lorton	22	20,724
Lynchburg	8	19,249
Manassas	23	16,208
Newport News	31	7,413
Norfolk	2	1,557
Ettrick (Petersburg)	1	216
Quantico	21	6,462
Richmond Main Street	26	9,015
Richmond Staples Mill	27	79,571
Staunton	73	4,151
Williamsburg	23	11,530
Woodbridge	15	3,748
Total Virginia Station Usage	**25**	**271,568**

Summary of Needs

CoSS Needs for each Corridor segment were developed using the methodologies outlined in this report. All of the identified needs for each Corridor segment are outlined and summarized in a Summary of Needs, which highlights each of the CoSS Needs categories using a distinct color. These summaries (example shown at right) include both a map and a list with text descriptions of each need. The map and list are tied together through the use of a unique identifier for each need. The approximate location of each need is shown on the Summary of Needs Map along with the icons associated with each of the CoSS Needs categories. More information about each need, including a more detailed and specific geographic location can be found in the Summary of Needs list under the appropriate identifier. For needs that address a larger geographic area or an entire segment, appropriately colored lines were used to denote the scale of the need. These lines do not represent specific facilities or construction projects, and are only meant to convey the need as a segment-wide concern. These Summaries of Needs outline the intercity travel needs that should be addressed by the Commonwealth's transportation network. As such, projects applying for consideration under HB2 must demonstrate that they can meet one or more of these needs.

Sample "Summary of Needs" Pages

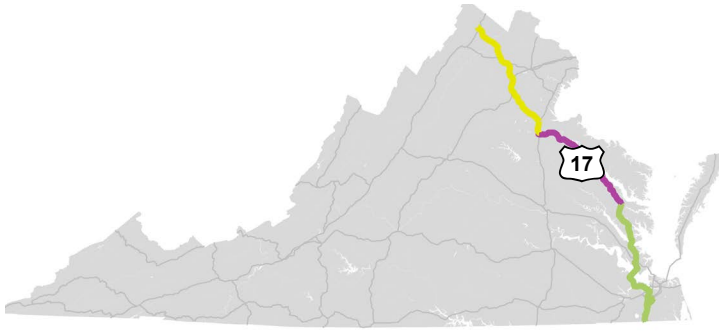




VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Coastal Corridor (A)



Office of INTERMODAL Planning and Investment

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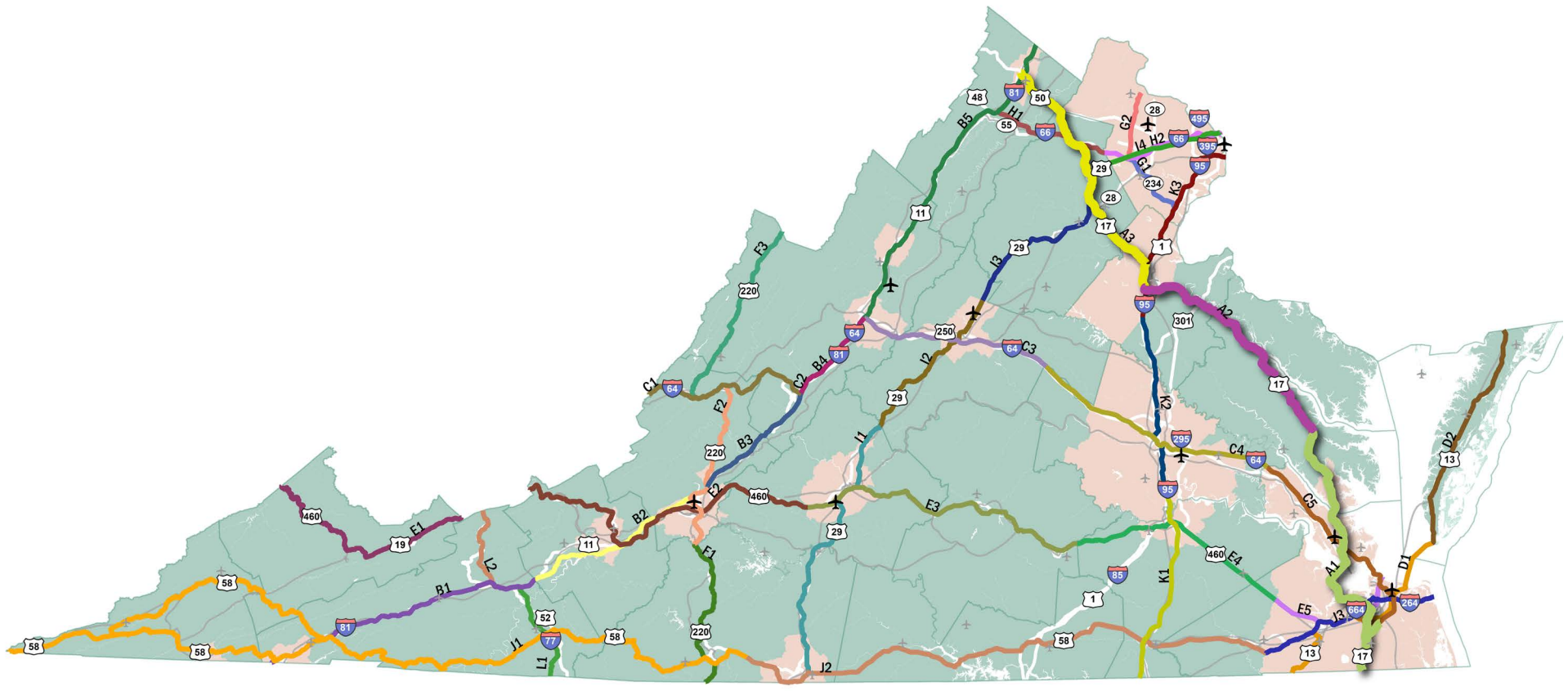
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

The Coastal Corridor (Corridor A) is primarily defined by US 17, which runs from north to south in the eastern United States for nearly 1,200 miles. US 17 is known as the "Coastal Highway" because it is located near the Atlantic coast for much of its length. In the Commonwealth of Virginia, US 17 does not parallel the coast the way it does in other states, although it runs close to the coast in its southern sections, especially in the Hampton Roads area. In addition to serving local communities, the Coastal Corridor serves an alternative to using I-95 and I-64 between Fredericksburg and the Hampton Roads area.

Passengers in the Coastal Corridor have several travel options in addition to driving, including the following:

- Multiple Park-and-Ride lots, available along the Coastal Corridor between Winchester and the Hampton Roads Area, providing commuting options to Washington, DC, Fredericksburg, and the Hampton Roads region;
- Four Greyhound bus stations in the Hampton Roads area, as well as a station in Fredericksburg, near the Coastal Corridor;
- The Fredericksburg Virginia Railway Express line, available in Fredericksburg;
- Amtrak stations in Fredericksburg, Norfolk, Newport News, and Williamsburg, providing access to various Amtrak routes throughout the state and the eastern United States; and
- Twelve airports, including two providing commercial service, within the Coastal Corridor. Although it is not located directly along US 17, the Newport News-Williamsburg Airport can be easily accessed via I-64, and US 17 provides indirect access to Norfolk International Airport. Two reliever facilities are also accessible in the Hampton Roads Area, including Chesapeake Regional Airport, which is located directly along US 17 just north of the state line. US 17 also provides access to two other reliever facilities and multiple general aviation facilities.

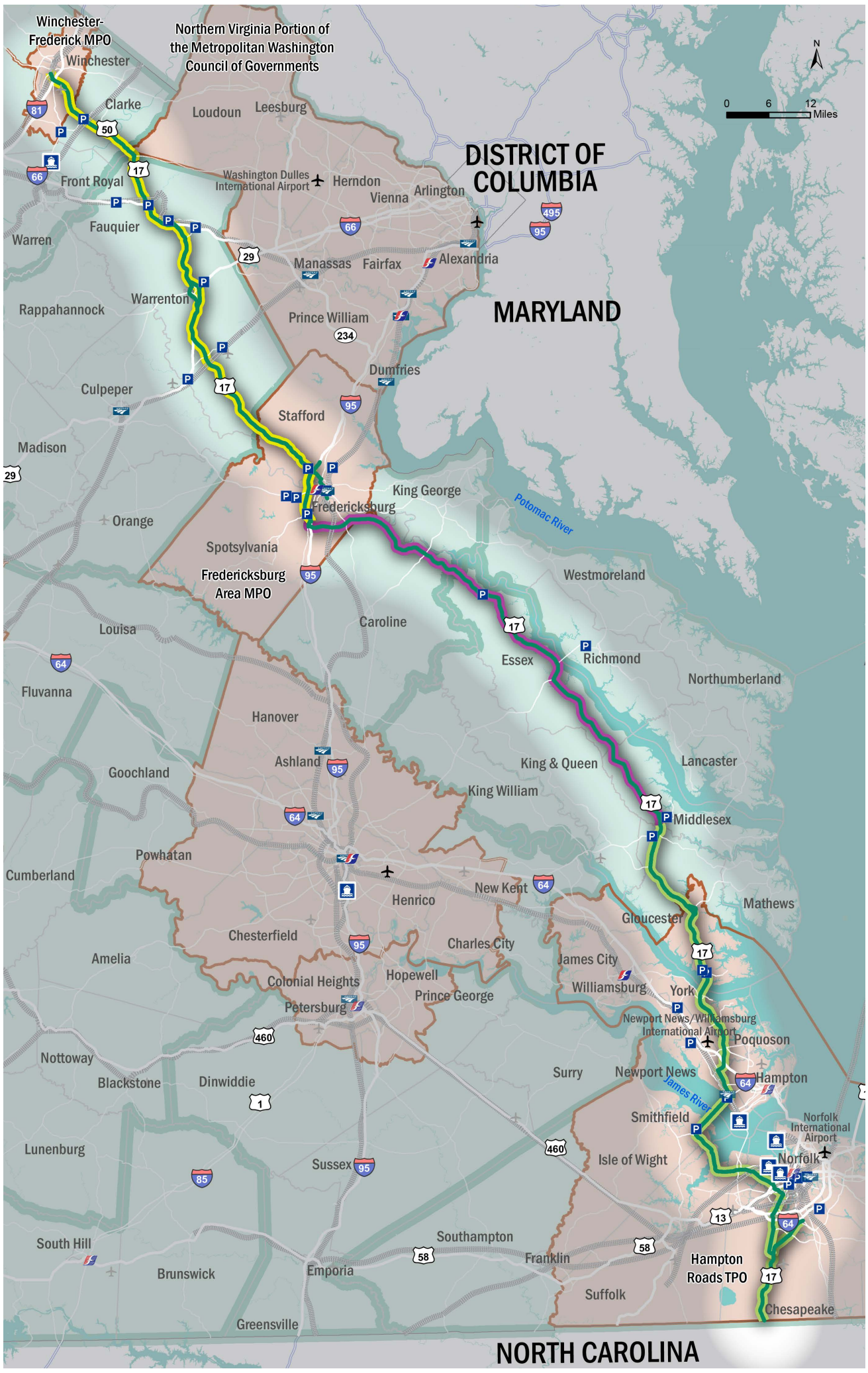
US 17 does not directly access the Port of Virginia's facilities located in the Hampton Roads Area, but it provides indirect access to those ports from southern Virginia through the Hampton Roads Area. In addition, US 17 provides access to the Rappahannock River navigational channels, located between the Northern Neck and Middle Peninsula. No rail line runs directly along the Coastal Corridor, although access to numerous Norfolk Southern and CSX lines is available at certain locations.

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor Components

Highway Facilities	
Primary Facility	• US 17
Other Highway Facilities	• US 17 Business
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• CSX National Gateway Corridor • CSX Coal Corridor • Norfolk Southern Heartland Corridor • Norfolk Southern Coal Corridor
Port Facilities	
	• Newport News Marine Terminal • Norfolk International Terminal • Portsmouth Marine Terminal • Virginia International Gateway
Airport Facilities	
	• Norfolk International Airport • Newport News/ Williamsburg International Airport

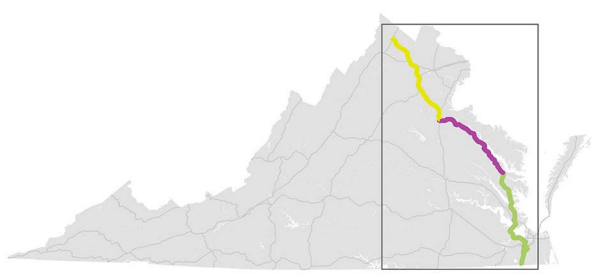


Corridor Segments:

- A1
- A2
- A3

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



Demographics and Economic Trends

Along Corridor A, the primary population centers with greater than 500 persons per square mile are currently found in Norfolk, Hampton, Newport News, Fredericksburg, and Winchester. Essex County has the lowest population density along the corridor, with less than 50 persons per square mile. The most densely populated segment along the corridor is Segment A1 in the Hampton Roads Area.

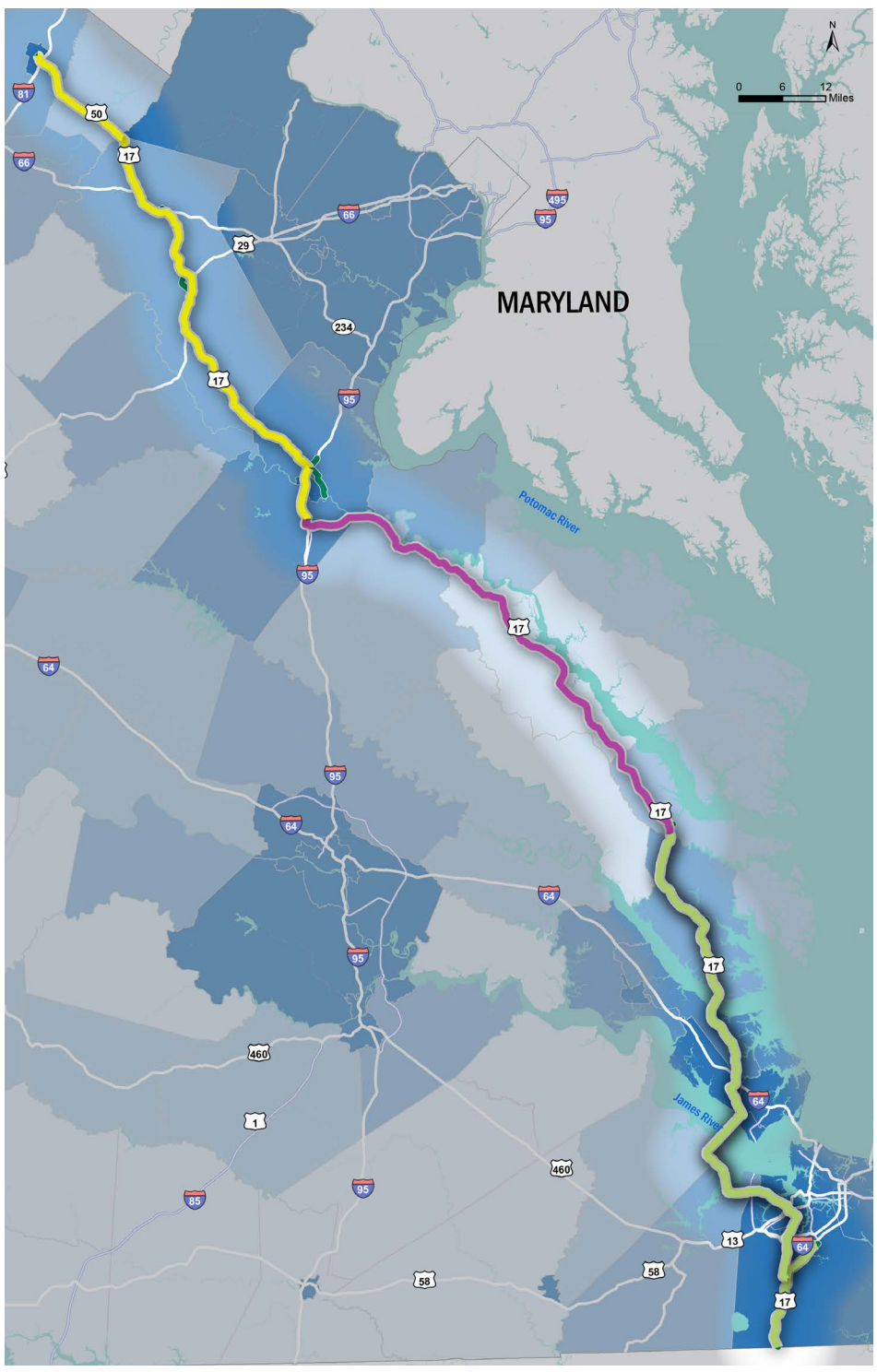
Between 2012 and 2025, the City of Suffolk, Spotsylvania County, and Frederick County are anticipated to see the largest population growth - greater than 25 percent - among the jurisdictions along the corridor. The Cities of Chesapeake and Poquoson and Gloucester, Middlesex, Caroline, King George, and Fauquier Counties are also anticipated to have significant population increases, with growth between 11 and 25 percent. The already densely-populated Cities of Norfolk and Newport News are expected to see the lowest growth, while the population of Hampton is expected to decline. However, overall population along the corridor is expected to grow significantly.

Current employment centers follow a similar pattern to those exhibited by the population centers. Employment growth also tracks a similar pattern along the corridor; however, Newport News is the only city within Corridor A where the employment levels are anticipated to decline.

Corridor A passes through three MPO areas and is also adjacent to the Northern Virginia region. Some of the largest industry sectors in the MPO Areas along this corridor include professional/ scientific/ technical Services, public administration, and retail trade.

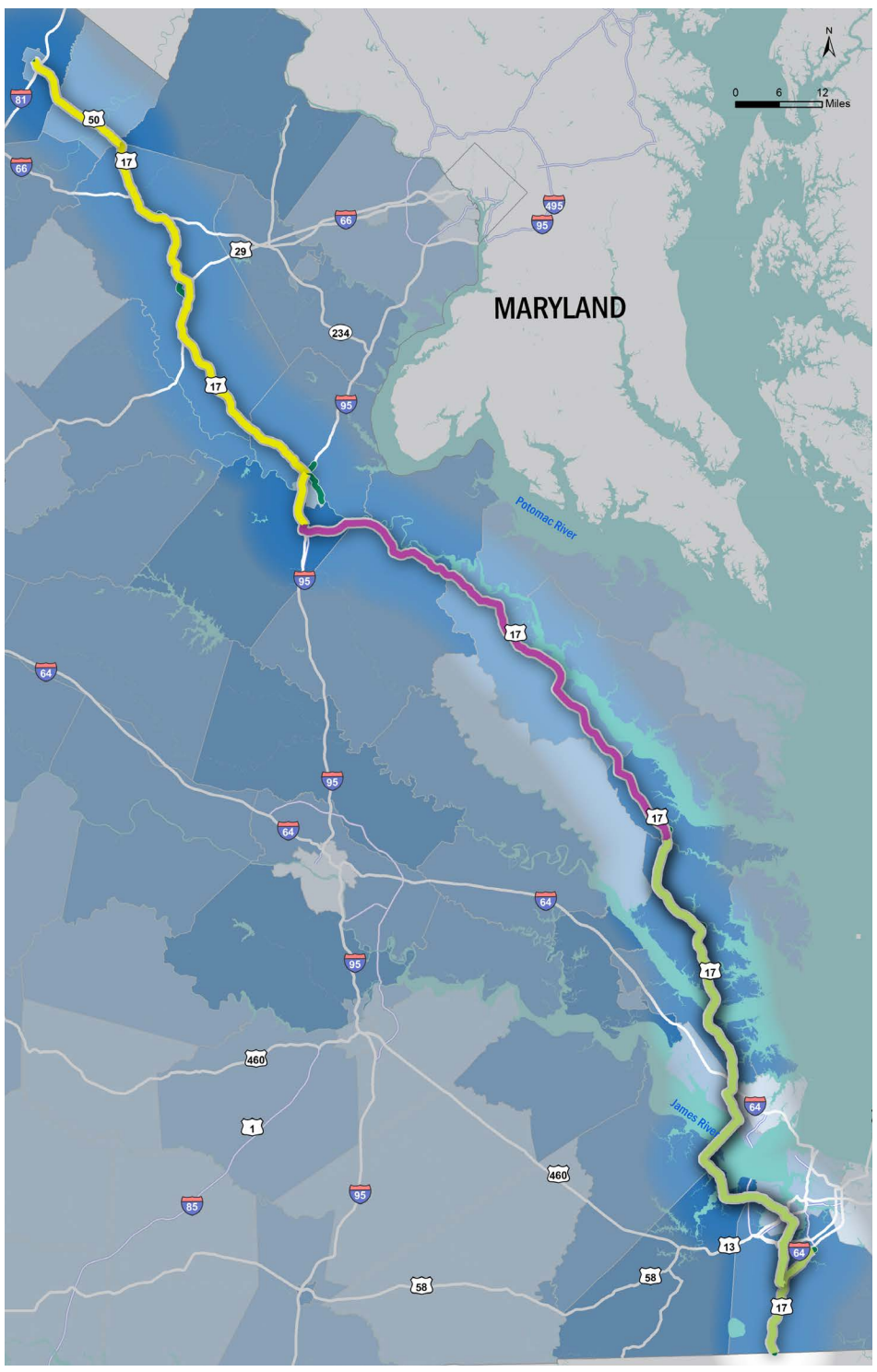
2012 Population Density Persons / Square Mile

- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



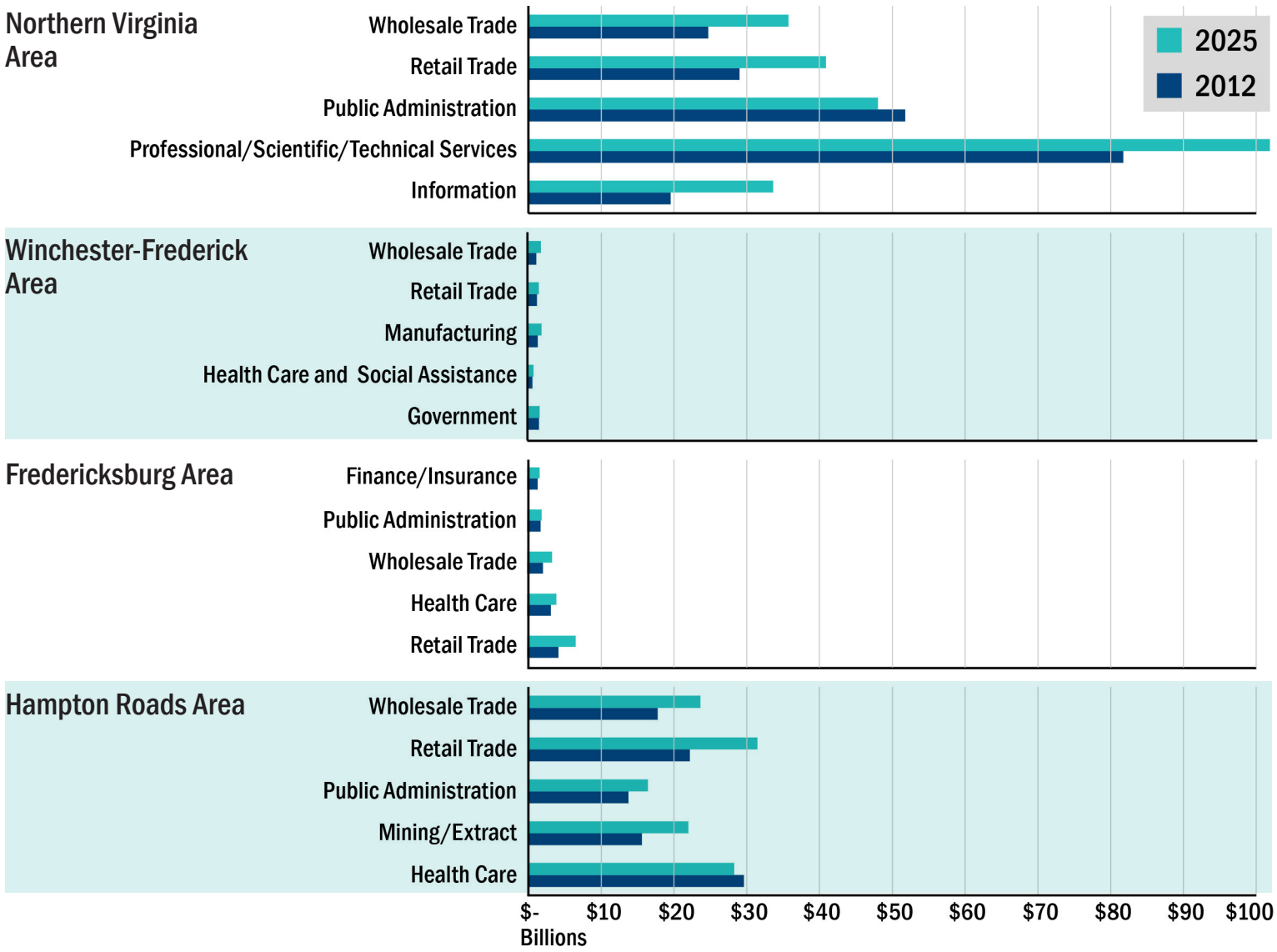
Population Growth (2012-2025 Percent Change)

- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%



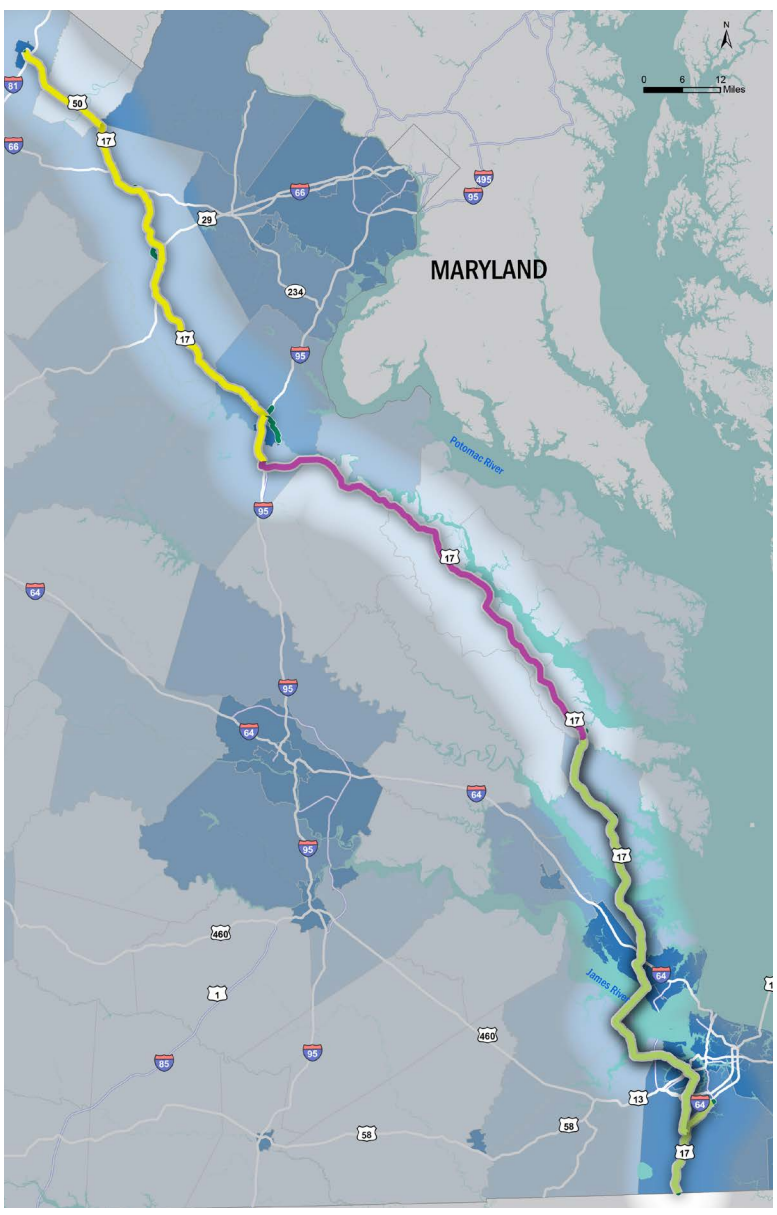
CORRIDOR A OVERVIEW

Top Industries (GDP)



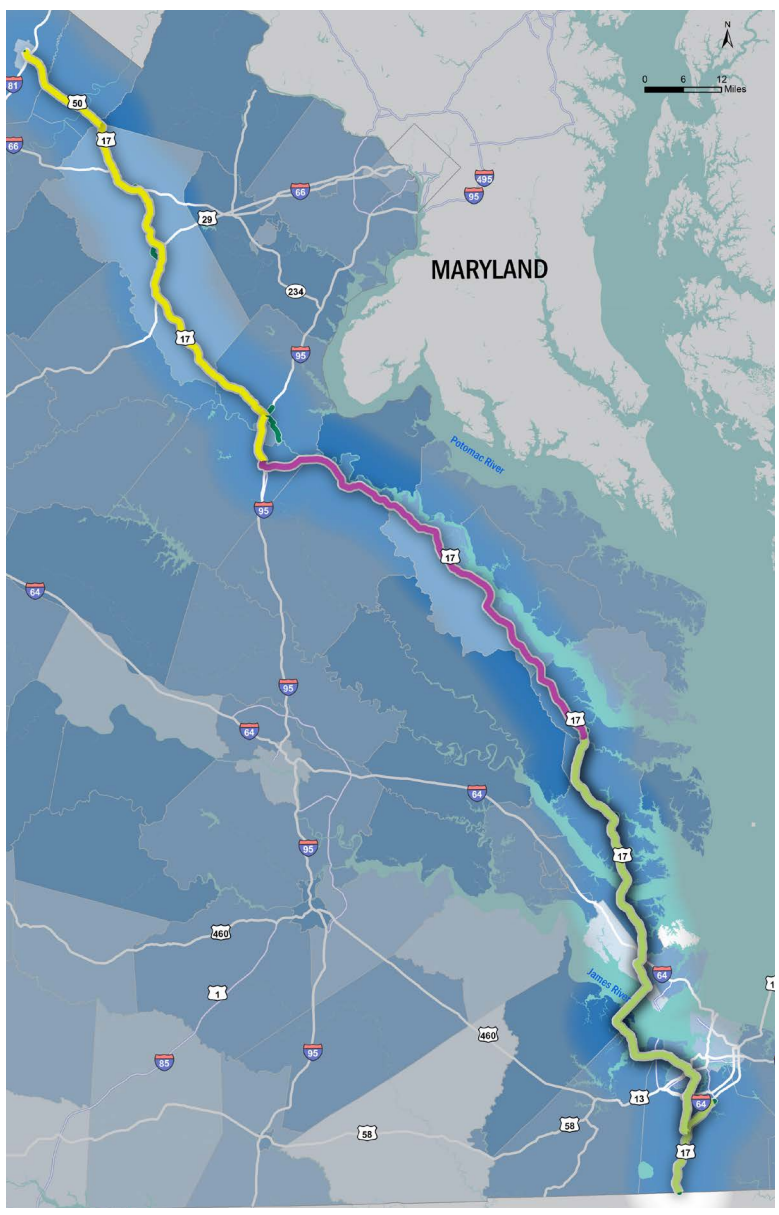
2012 Employment Density Jobs / Square Mile

< 25
25 - 100
100 - 250
250 - 500
> 500

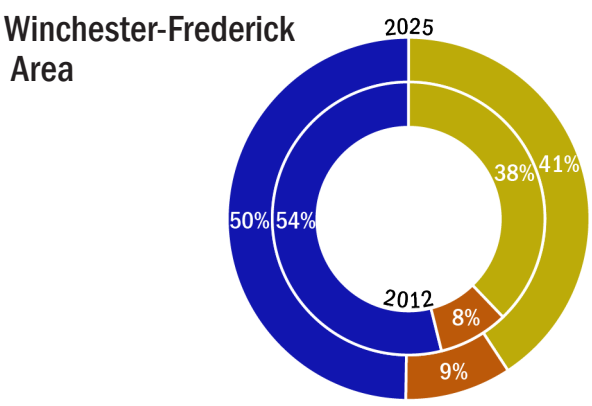


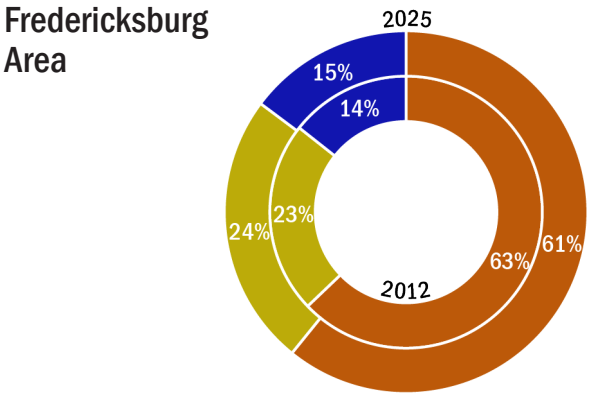
Employment Growth (2012-2025 Percent Change)

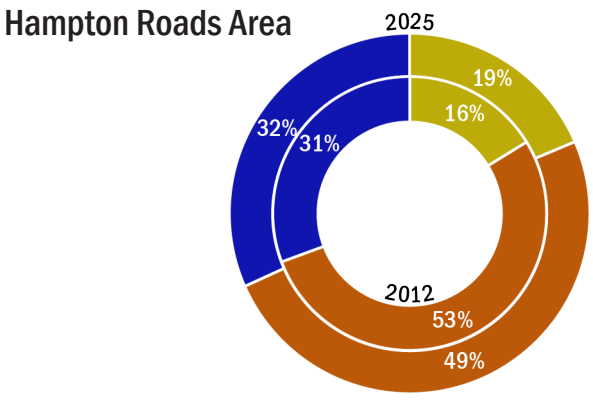
-7% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 69%



Corridor Travel Patterns







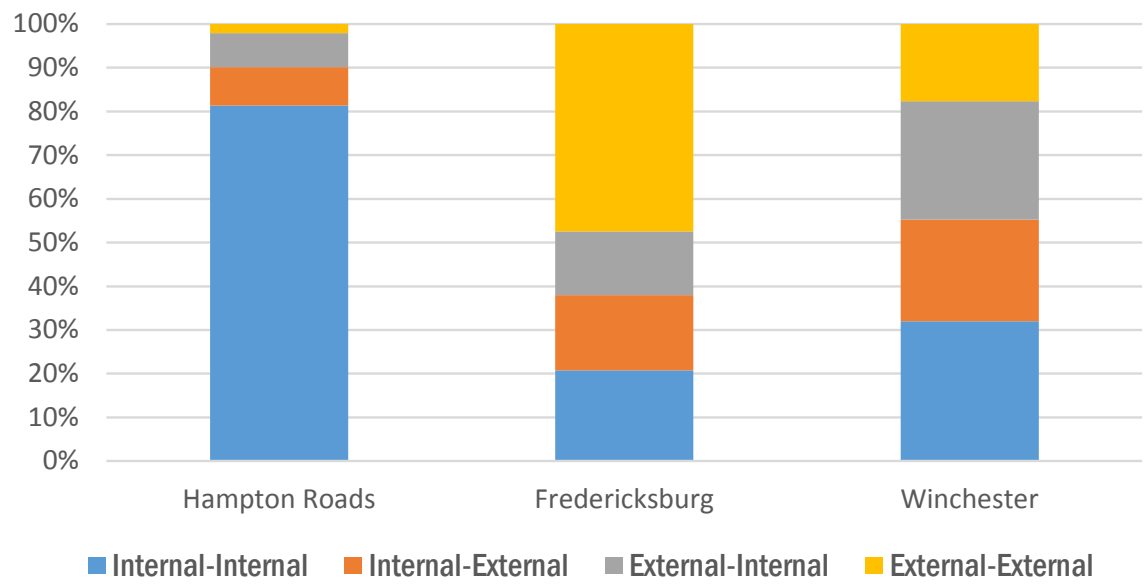
GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Passenger

Corridor A passes through three MPO areas - Hampton Roads, Fredericksburg, and Winchester-Frederick - and provides a connection to North Carolina. In the Hampton Roads Area, traffic on the corridor is predominantly local and internal traffic comprises more than 80 percent of the vehicle traffic on Corridor A. By contrast, in the Fredericksburg Area, much more of the traffic (47 percent) is pass-through traffic which has neither its origin nor destination in the MPO Area. Only 20 percent of the traffic along the corridor in this Area is internal traffic. In the Winchester-Frederick Area, traffic is much more evenly distributed between internal and external traffic; through-traffic accounts for 18 percent of the passenger traffic and local internal traffic accounts for 32 percent.

Distribution of Internal and External Travel



Freight

By truck, Corridor A carried 119 million tons of freight worth $181 billion in 2012, and is estimated to carry 163 million tons of freight worth $265 billion in 2025. The major truck freight flows in Corridor A are interstate through traffic, accounting for approximately 60 percent of truck freight tonnage and over 75 of truck freight value in the corridor in 2012 and 2025. The major travel patterns on Corridor A are similar to those on Corridor K, as US 17 (Segment A3) runs concurrently with I-95 (Segment K3) near Fredericksburg. Interstate truck freight traffic passing though Virginia accounts for over 40 percent of the total tonnage and 60 percent of the total freight value for both 2012 and 2025. Most of the major truck freight travel patterns on Corridor A are between the Middle Atlantic and Southeastern regions.

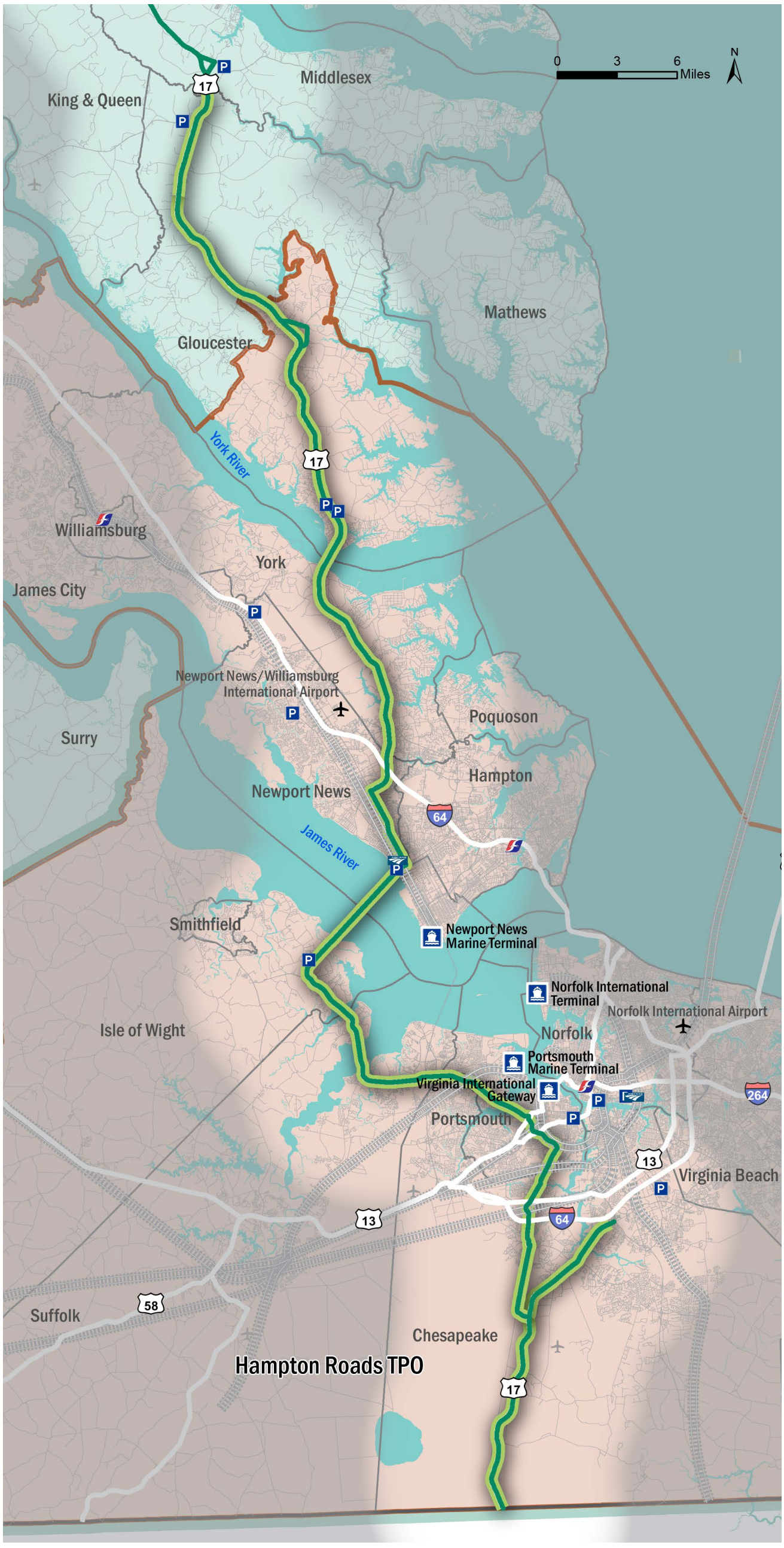
Truck Freight

	2012	2025
Truck Freight Value	$181 Billion	$265 Billion
Truck Freight Tonnage	119 Million Tons	163 Million Tons
Freight Value per Ton	$1517	$1626
Corridor Tonnage Passing Through	43%	42%

II. Segment A1

Corridor Segment A1 Components

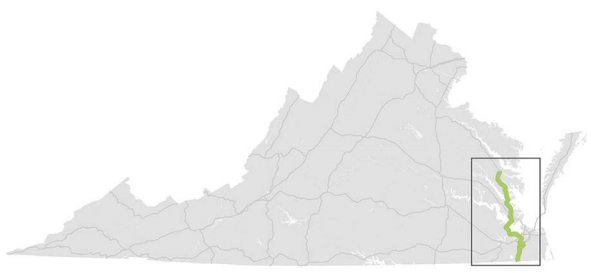
- US 17 and US 17 Business
- Newport News Marine Terminal
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- Norfolk Southern Heartland Corridor
- Norfolk Southern Coal Corridor
- CSX National Gateway Corridor
- CSX Coal Corridor
- Amtrak
- Norfolk International Airport
- Newport News/Williamsburg International Airport
- Intercity Bus



Segment A1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



A1 SEGMENT PROFILE

Segment A1 begins at the North Carolina border and progresses north to the Middlesex County Line, traversing the area of the Hampton Roads Transportation Planning Organization (TPO). This segment serves Isle of Wight, York, and Gloucester Counties, as well as the Cities of Suffolk, Chesapeake, Portsmouth, Newport News, and Norfolk.

Segment A1 functions as an alternative connection to Washington DC from the Port of Virginia facilities in the Hampton Roads region and, due to its general lack of rail facilities, is an important highway facility for freight. Segment A1 also provides tourists with access between the Middle Peninsula and destinations in Hampton Roads.

Highway Facilities: US 17 is primarily a four-lane facility throughout Segment A1, although it has a six-lane cross-section where it runs concurrently with Route 143 in the City of Newport News. Along the more urbanized areas of US 17, there is significant out-of-state freight and passenger travel. However, in the more rural areas, US 17 serves both through and local commuting traffic. No parallel highway facilities follow US 17, though US 17 does serve as an alternative route to I-95 and I-64 for traffic between Hampton Roads and Northern Virginia. Many alternatives are available through the Hampton Roads region.

Transit Service: In this area, the corridor is served by the Hampton Roads Transit (HRT) system, as well as several Park-and-Ride facilities. In addition, Greyhound and Amtrak each provide service that operates along the corridor with stations in Newport News, Hampton, and Norfolk. Other private intercity bus services also operate in the segment.

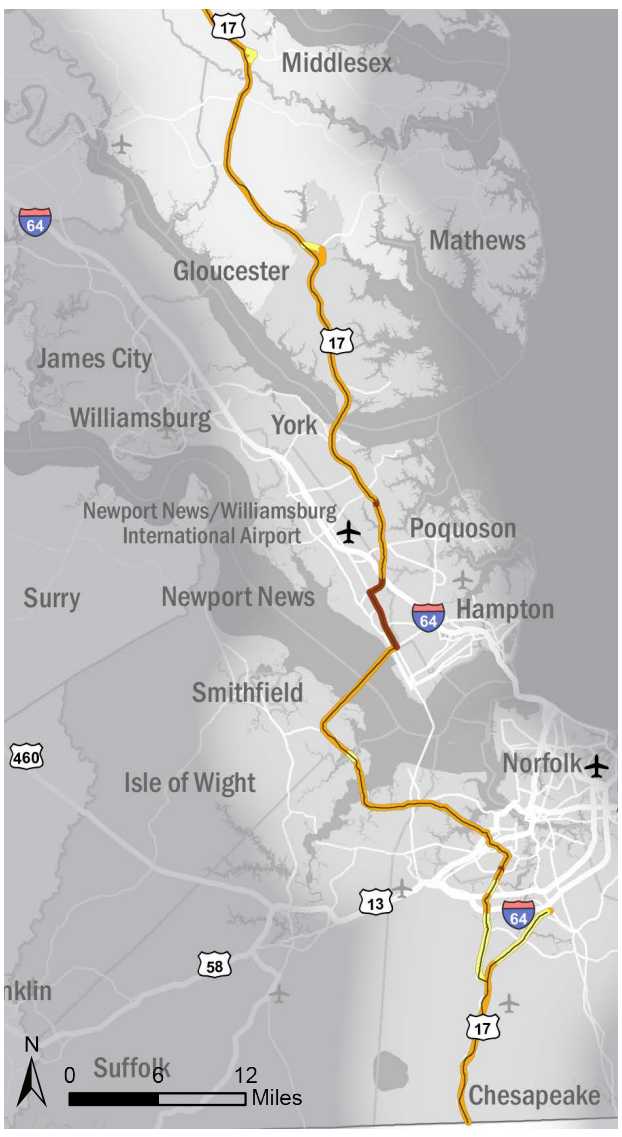
Port Facilities: The Newport News Marine Terminal, Norfolk International Terminal, Portsmouth Marine Terminal, and Virginia International Gateway port facilities lie within this segment.

Rail Facilities: There are no rail lines that run directly along this corridor segment, although access to Norfolk Southern and CSX lines is available at certain locations.

Airport Facilities: The Newport News-Williamsburg International Airport and the Chesapeake Regional Airport lie within this segment. Additionally, the Norfolk International Airport is within close proximity to the corridor.

Major planned and future projects include:

- Rehabilitation and replacement of electrical and mechanical systems of the James River Bridge
- Addition of two through lanes in York County
- Addition of left turn lanes at Route 619 in Gloucester County
- Implementation of the Route 17 Corridor Crossover Study
- Rehabilitation of pavement in Isle of Wight County
- Addition of a south-bound left turn lane and pedestrian infrastructure at Deep Creek Boulevard in Portsmouth
- Upgrade of traffic signals in Gloucester County
- Installation of a raised median in Gloucester County



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

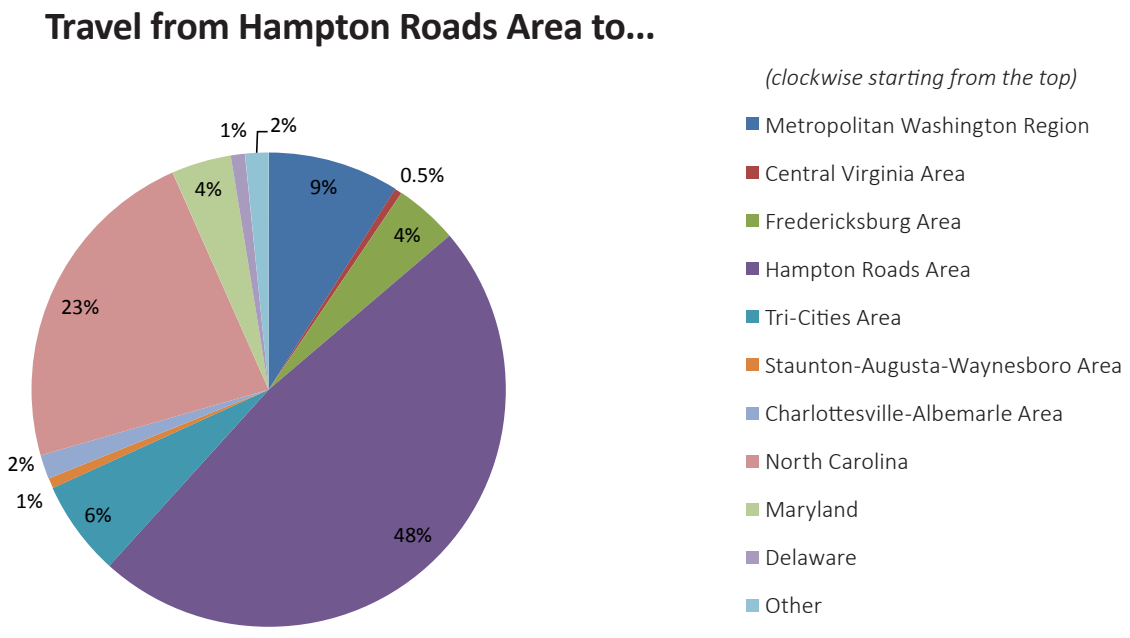
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

Passenger Demand

The southernmost segment of Corridor A is entirely within the Hampton Roads TPO area and accommodates large amounts of traffic local to the region in addition to providing a route to North Carolina. Travel between the Hampton Roads region and North Carolina accounts for more than four percent of the intercity passenger traffic in the Commonwealth, and a portion of this traffic will use Segment A1, although other options are available depending on the specific locations of the origins and destinations.

Of the intercity passenger travel originating in the Hampton Roads Area, almost one-quarter (23 percent) is destined for North Carolina. Other notable markets that are likely to use Segment A1 include travel to the Metropolitan Washington region (nine percent) and the Fredericksburg area (four percent).



A1 SEGMENT PROFILE

Freight Demand

By truck, Segment A1 carried three million tons of freight worth $8 billion in 2012, and is estimated to carry four million tons of freight worth $12 billion in 2025. The major travel patterns on Corridor A are similar to those on Corridor K, as US 17 (Segment A3) runs concurrent with I-95 (Segment K3) near Fredericksburg. Interstate truck freight traffic passing though Virginia accounts for over 40 percent of the total tonnage and 60 percent of the total freight value for both 2012 and 2025. In terms of tonnage, North Carolina is the largest source of truck freight on Corridor A and Maryland is the largest destination outside of the Commonwealth. In terms of value, Florida is the largest destination for truck freight on Corridor A. Most of the major truck freight travel patterns on Corridor A are between the Middle Atlantic and Southeastern regions. Around 11 percent of the total truck freight value in Corridor A originates in the jurisdictions adjacent to Segment A1, with nearly eight percent of the total truck freight destined for those jurisdictions. The port facilities at Norfolk, Portsmouth, and Newport News, located near Segment A1, all serve as major origins and destinations for truck freight in Corridor A. Much of the freight traveling to and from these areas originates from or is destined for Maryland and Pennsylvania.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (34% / 35%)
2. North Carolina (15% / 14%)
3. Pennsylvania (10% / 10%)
4. Maryland (8% / 8%)
5. Florida (6% / 5%)

Corridor Tonnage Originating in Segment A1: 7% / 8%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
City of Norfolk* and North Carolina
City of Chesapeake and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (34% / 36%)
2. Maryland (13% / 13%)
3. North Carolina (9% / 9%)
4. Pennsylvania (9% / 8%)
5. New York (8% / 7%)

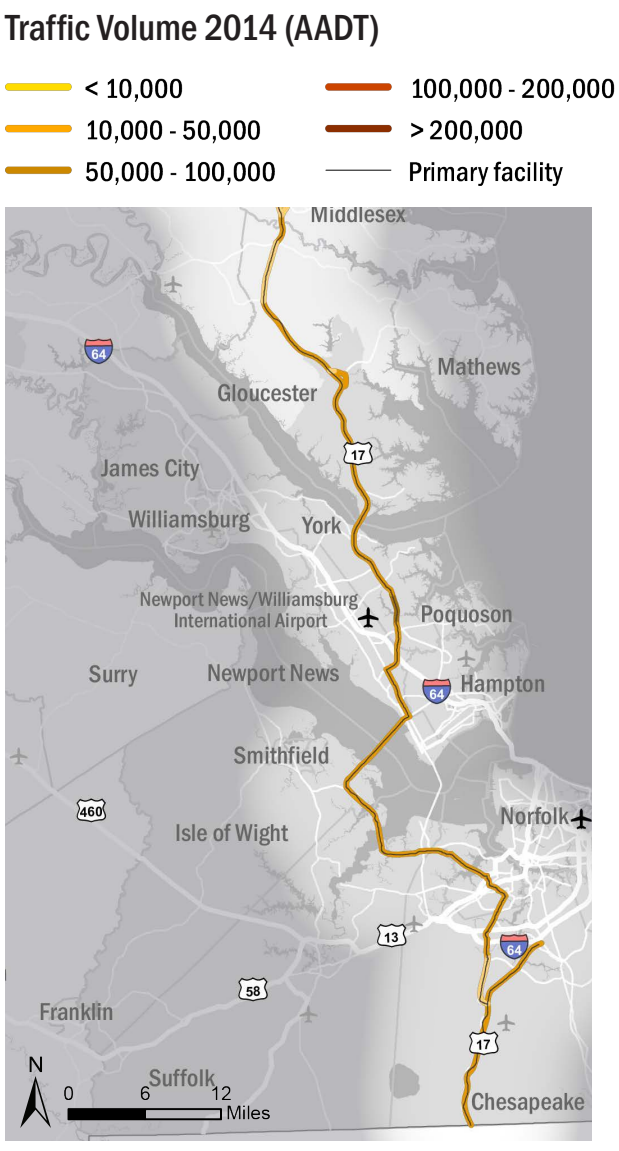
Corridor Tonnage Destined for Segment A1: 9% / 10%

Traffic Conditions

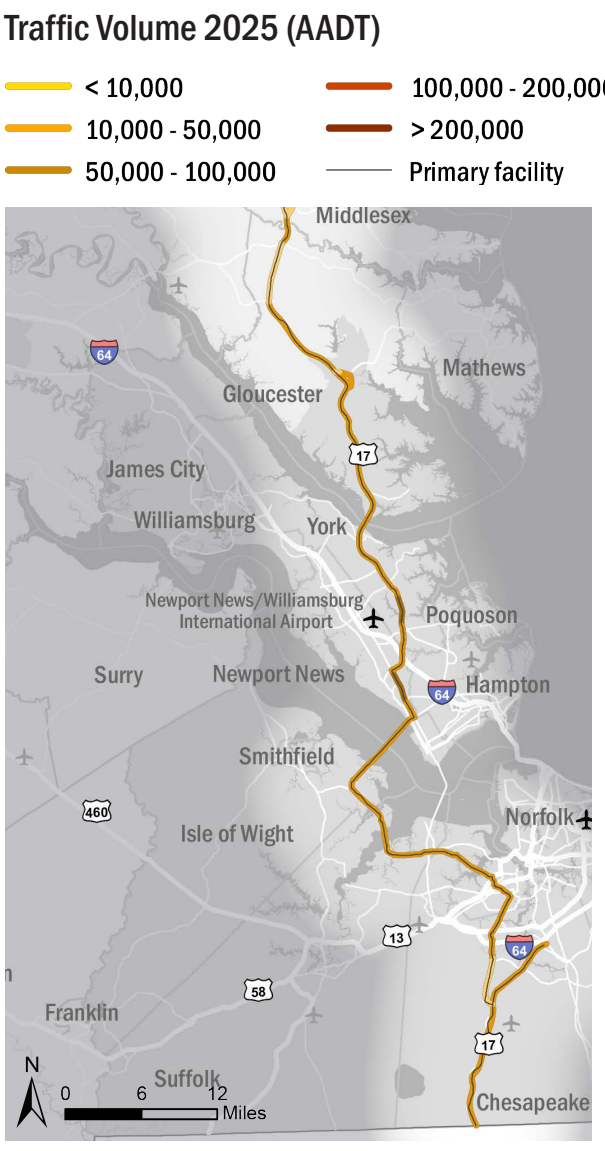
Traffic Volume and AADT

Traffic volume on Segment A1 is high relative to traffic volumes on the other segments in Corridor A. Along US 17 from southern Chesapeake to Newport News, traffic volumes range from 12,000 to 34,000 vehicles per day, with the highest traffic volumes occurring near the junction with I-664. The highest traffic volumes in the corridor occur just north of Route 171 in York County. By 2025, traffic volume is projected to increase on most portions of Segment A1 by less than 5,000 vehicles per day, with the highest projected increases occurring between I-64 and US 13 in the City of Chesapeake (14,000 additional vehicles per day). On the southern portion of Segment A1, traffic volumes in 2025 are projected to range from 13,000 to 39,000 vehicles per day, with the highest traffic volumes occurring near the junction with I-664. North of the James River, average daily traffic volumes in 2025 are projected to range from 30,000 to 59,000 vehicles per day with the highest volumes occurring in Newport News and York County.

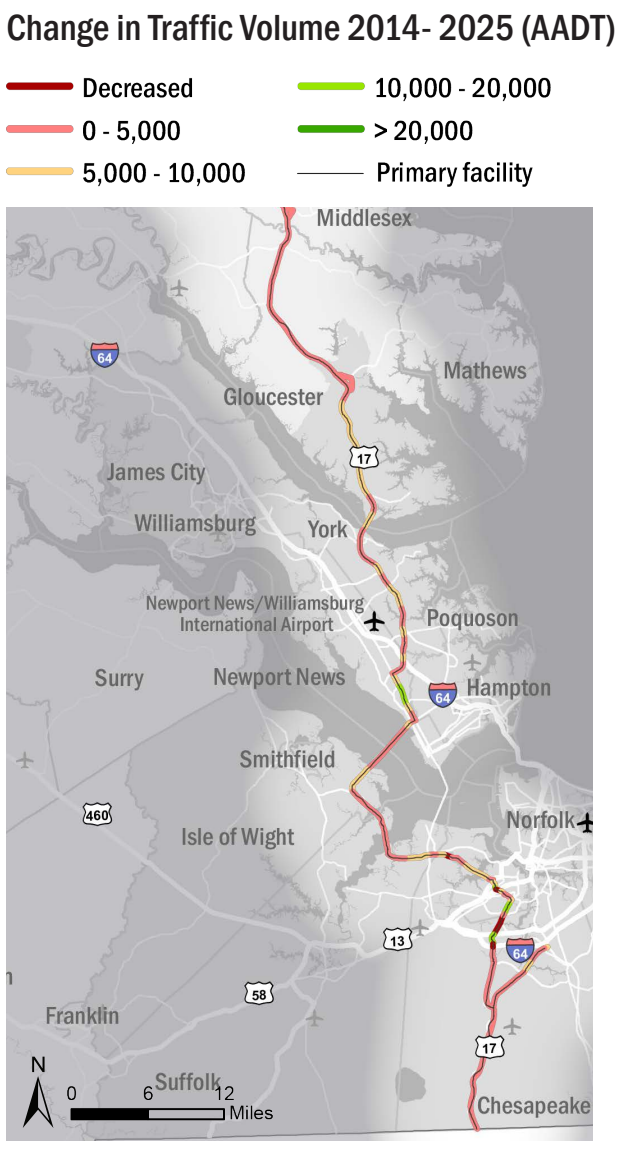
Traffic Volume 2014 (AADT)

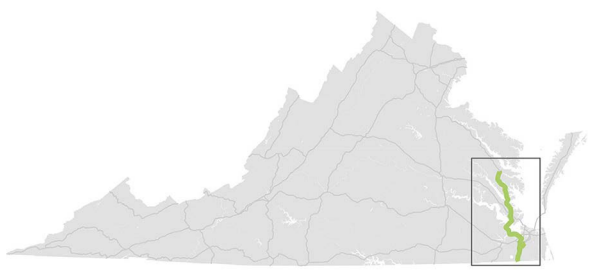


Traffic Volume 2025 (AADT)

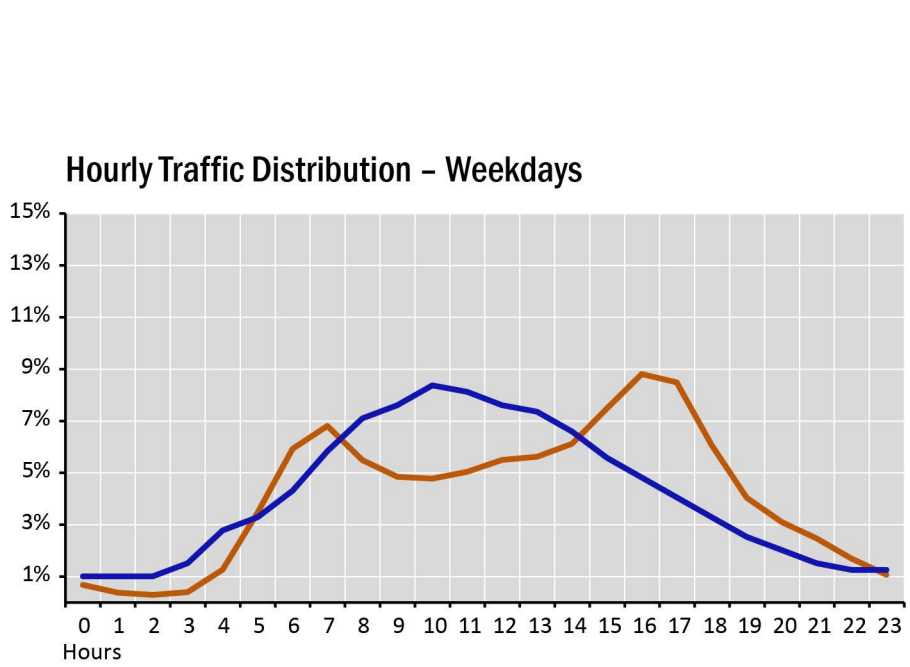


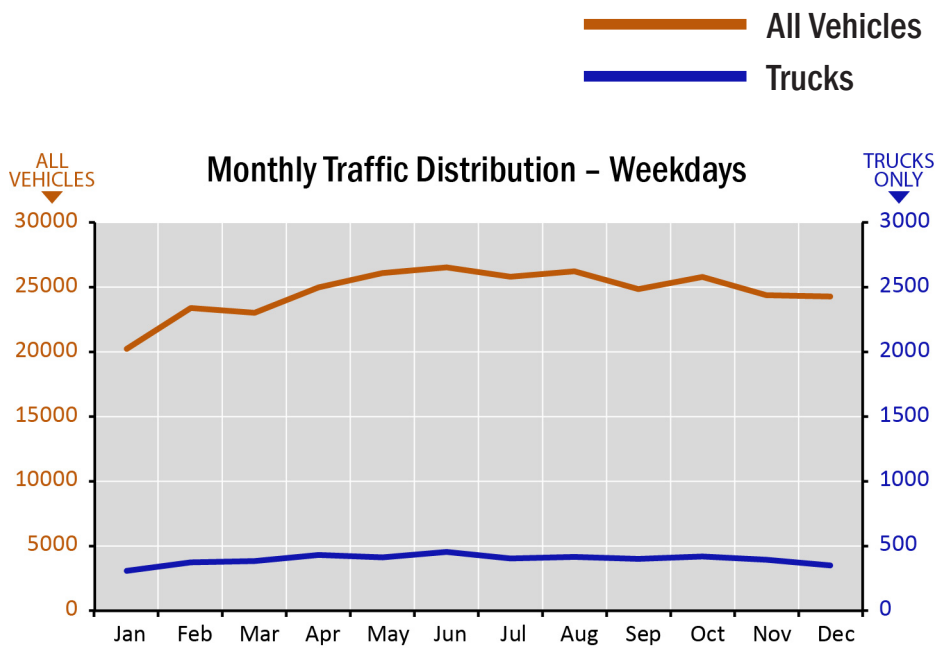
Change in Traffic Volume 2014- 2025 (AADT)

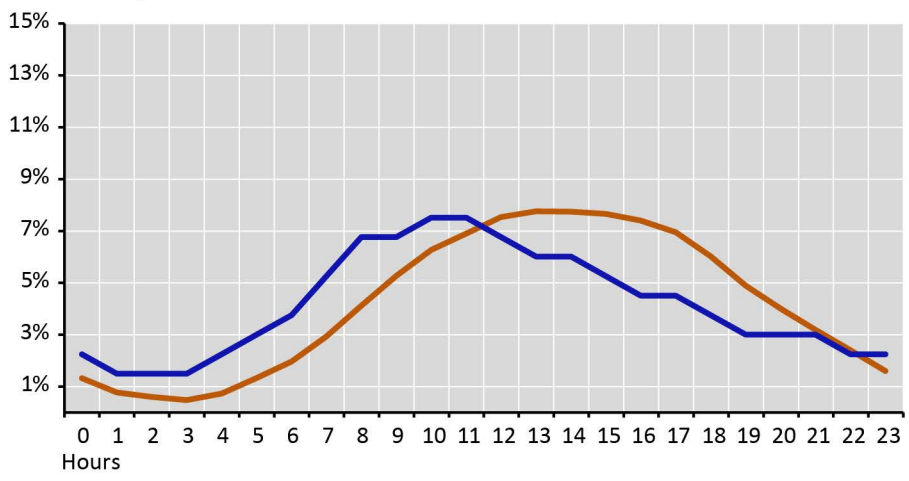


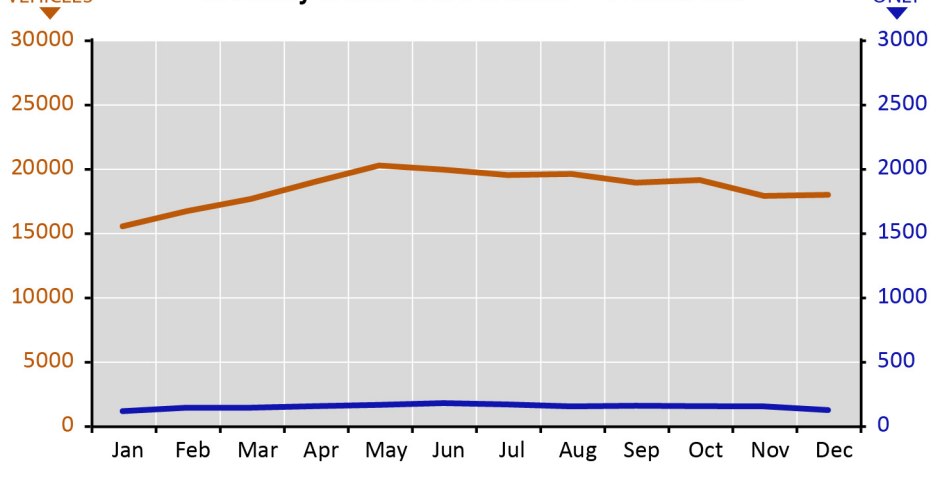


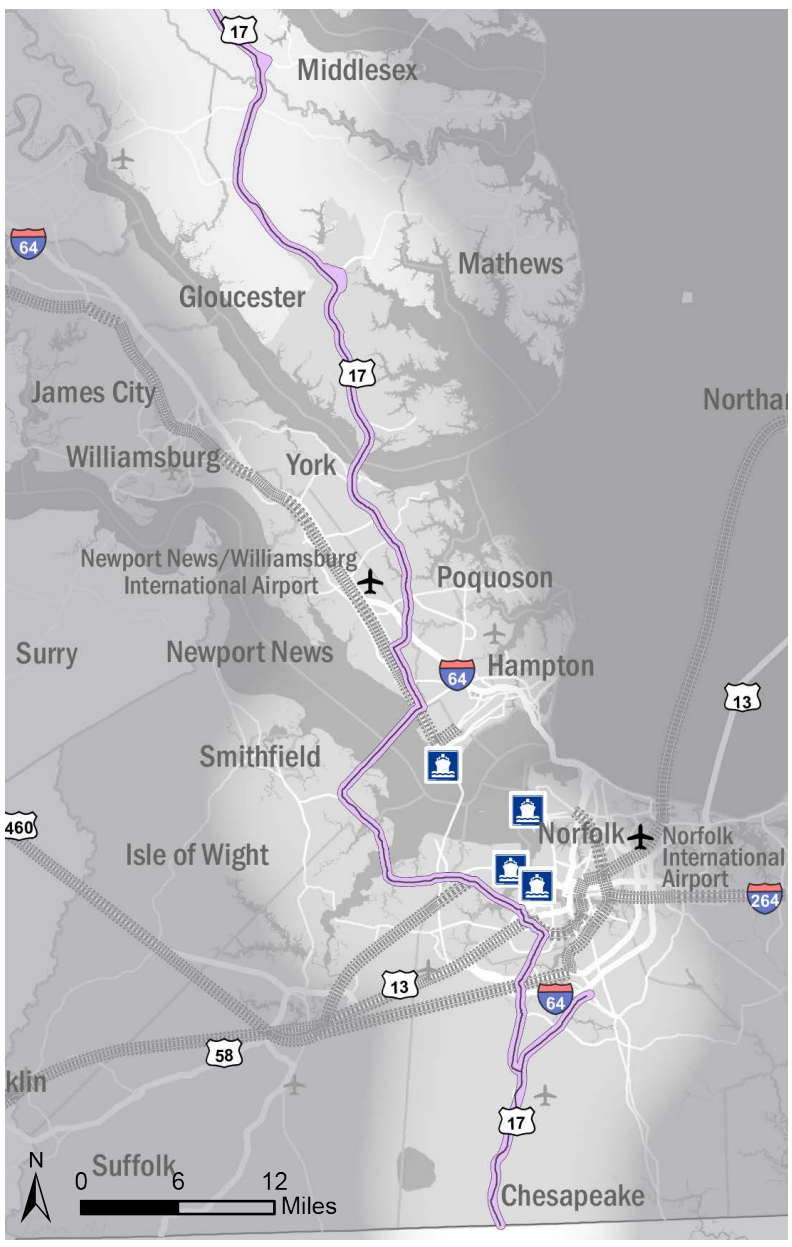
A1 SEGMENT PROFILE











Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

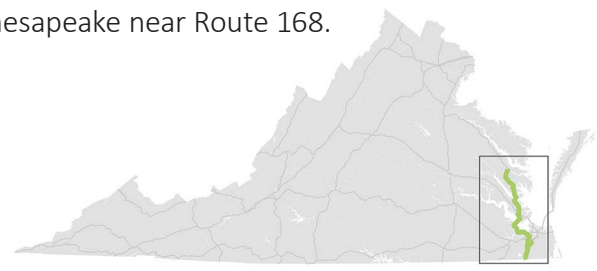
Traffic Distribution

On average, traffic on Segment A1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 8.8 percent of daily traffic. The morning peak hour is less busy, occurring between 7 and 8 a.m. accounting for 6.8 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic, with a significant portion of truck traffic (over 45 percent of daily truck traffic) occurring between 9 a.m. to 2 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing even distribution of traffic during the middle of the day, with the highest percentage of hourly traffic occurring between 1 p.m. to 2 p.m. (7.7 percent of daily traffic) for all traffic, and 11 a.m. to 1 p.m. (7.5 percent of daily traffic in each hour) for truck traffic.

Weekday traffic volumes on Segment A1 vary by as much as 31 percent throughout the year, with the highpoint in June (around 27,000 vehicles per day) and the low point in January (around 20,000 vehicles per day). Truck volumes vary somewhat more than passenger volumes throughout the year, with the June high being 47 percent higher than the January low. Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 20,000 vehicles per day) are 31 percent higher than January levels (around 15,000 vehicles per day). Weekend truck traffic is more variable than all vehicle traffic, with the June high being 65 percent higher than the January low. Since truck volumes account for a relatively very small portion of traffic on Segment A1 (less than two percent of overall daily traffic for weekdays and weekends), traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

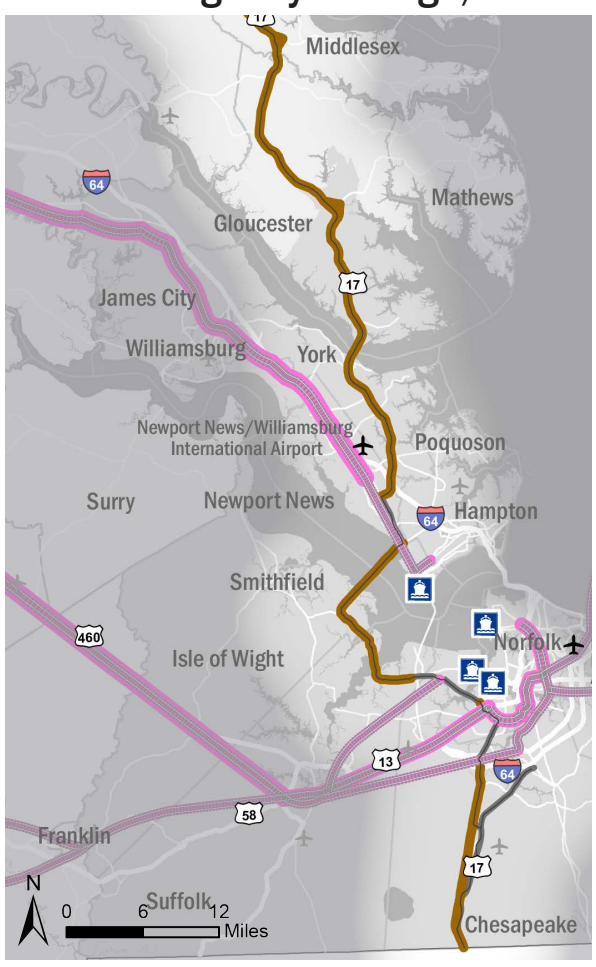
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment A1 is low compared to the other segments in Corridor A. Throughout Segment A1, heavy trucks comprise less than four percent of total traffic. Heavy trucks comprise the highest percent of total traffic along US 17 in Chesapeake near Route 168.



A1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012



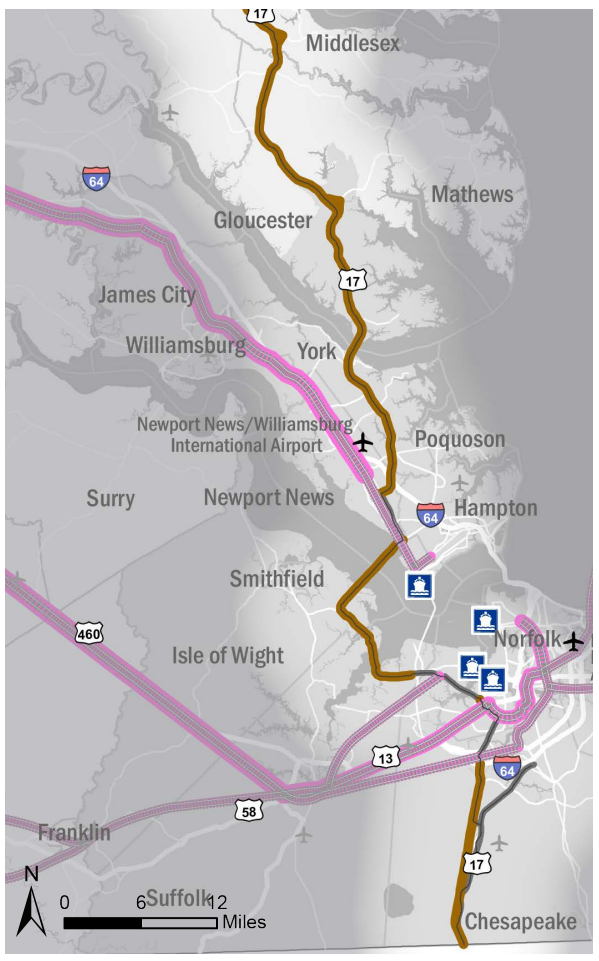
Freight Flows

In Segment A1 of the Coastal Corridor, proximity to the Port of Virginia influences whether freight is moved by truck or rail. While no rail facility exists that directly parallels US 17 throughout the segment, in the Hampton Roads Area other rail facilities that are components of other CoSS carry significant amounts of freight.

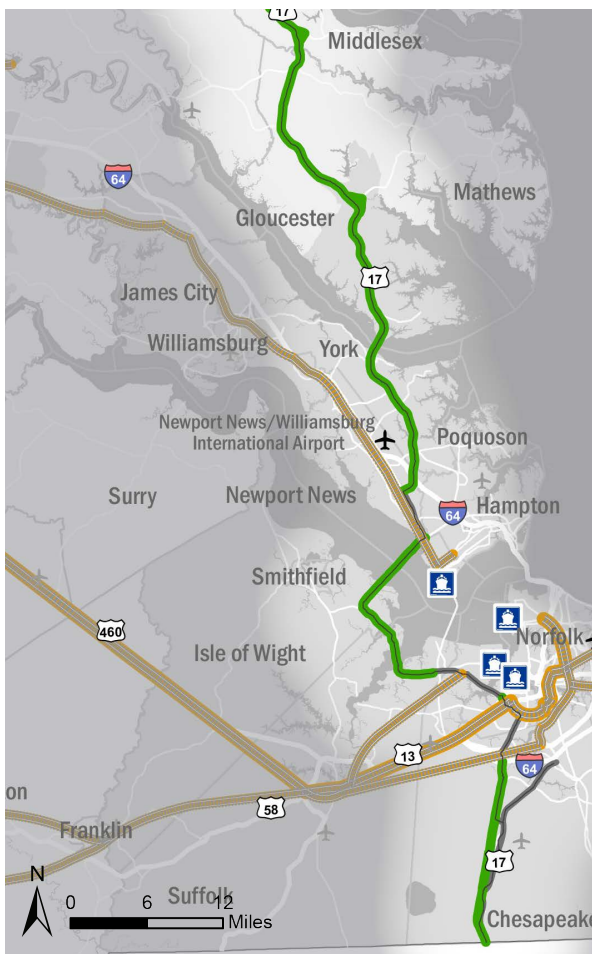
In the York County and Newport News section of Segment A1, freight is moved primarily by truck, in terms of both tonnage and value. In total, 1.2 million tons (83 percent) of freight is moved through this section of Segment A1 by truck, compared to 243,000 tons by rail (although these rail facilities are part of other CoSS). By value, the difference is even starker, with $3 billion (99.9 percent) of freight value traveling by truck, compared to $2 million by rail. On average, a ton of freight traveling through this section of Segment A1 by truck is worth $2,537 while a ton of freight traveling by rail is worth only $9. In 2025, both rail and truck freight tonnages and total values in the York County and Newport News area are expected to increase, but the percentages of tonnage and value moved by truck, and the values per ton on truck and rail, are expected to remain nearly the same.

In Portsmouth, near two of the Port of Virginia facilities, freight movements rely more heavily on rail, in terms of both tonnage and value (although these rail facilities are part of other CoSS). Only 2.5 million tons (ten percent) of freight travels through the Portsmouth section of Segment A1 by truck, compared to 22.5 million tons by rail. A higher portion of freight value than in the York County and Newport News section travels by truck, $8 billion (36 percent), although the majority of freight value through Portsmouth, $14 billion, travels by rail. Both truck freight and rail freight have higher value per ton than in the section of Segment A1 that travels through York County and Newport News, with $3,121 by truck and $616 by rail. In 2025, both rail and truck freight tonnages and total values in the Portsmouth area are expected to increase, and the percentage of freight traveling by truck is expected to increase slightly to 14 percent by tonnage and 41 percent by value. Values per ton on both truck and rail in 2025 are expected to remain nearly the same.

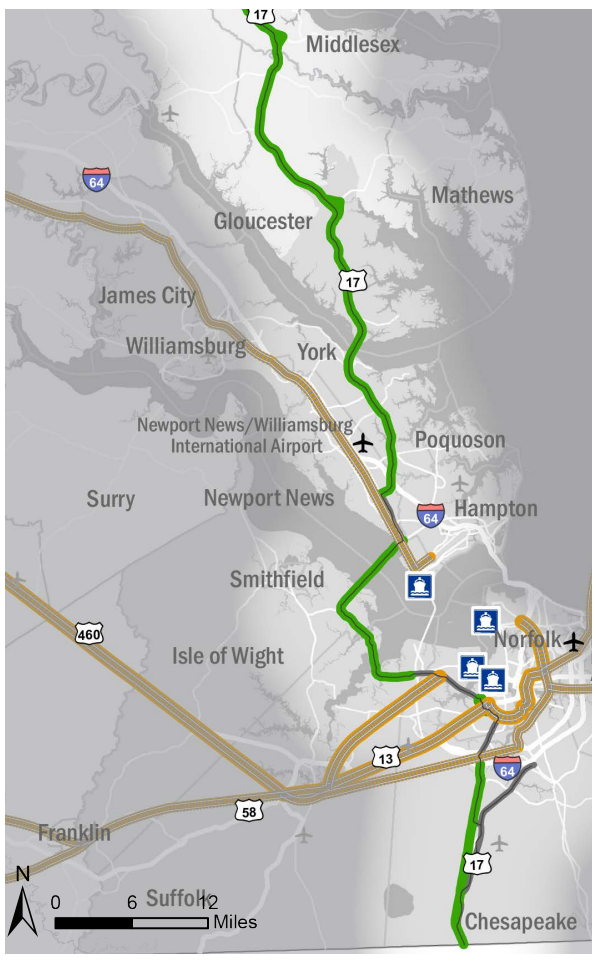
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight Value

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight Value

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Comparable Travel Options

Hampton Roads (Norfolk) to DC

Inter-City Bus	*Train*	*Air*
5 Trips per Day 5:30 Travel Time $18 Est. Cost	1 Trips per Day 4:45 Travel Time $42 Est. Cost	4 Trips per Day 1:05 Travel Time $115 Est. Cost

Auto

Via US 17: 3:45 Travel Time $117 Est. Cost
Via I-64/I-95: 3:10 Travel Time $109 Est. Cost

Hampton Roads (Norfolk) to Fredericksburg

Inter-City Bus	*Train*
2 Trips per Day 5:40 Travel Time $22 Est. Cost	1 Trips per Day 3:10 Travel Time $38 Est. Cost

Auto

Via US 17: 2:45 Travel Time $82 Est. Cost
Via I-64/I-95: 2:30 Travel Time $81 Est. Cost

Hampton Roads (Norfolk) to Winchester

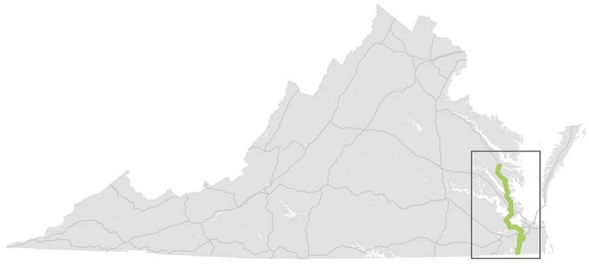
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

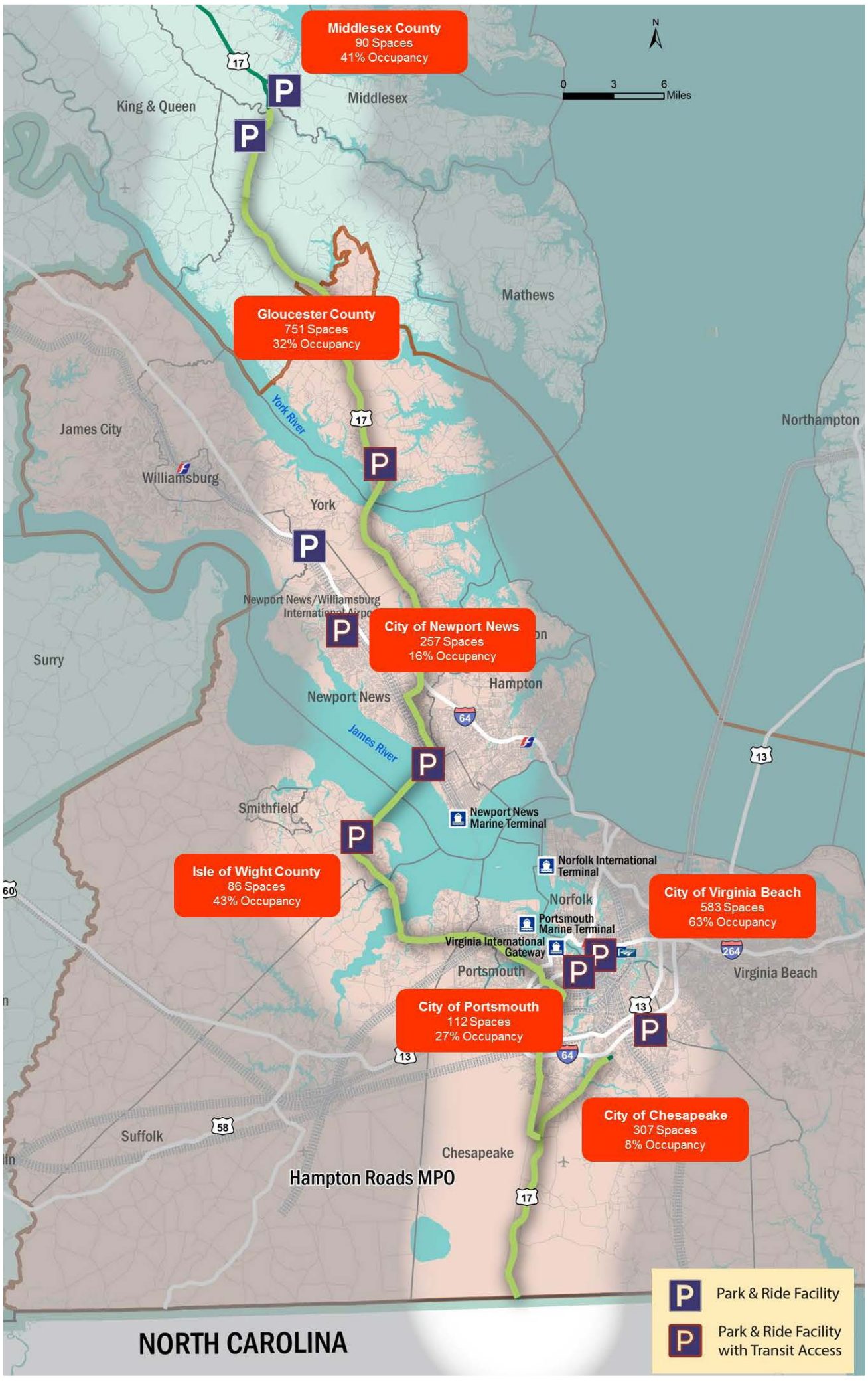
Via US 17: 4:20 Travel Time $132 Est. Cost
Via I-64/I-95/US 17: 4:00 Travel Time $125 Est. Cost

Park-and-Ride

Within Segment A1, commuters can utilize many Park-and-Ride locations, as well as commuter bus service from Hampton Roads Transit. Gloucester County provides the highest number of Park-and-Ride spaces and Park-and-Ride locations, while the City of Virginia Beach has the highest utilization rate of spaces available in the region. However, no county or city within the Segment A1 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



Passenger trips on Segment A1 of the Coastal Corridor have a wide range of travel options, both in terms of travel path and mode choice. While US 17 does not have a parallel facility, passengers traveling from Hampton Roads to Northern Virginia and Washington DC can make the trip in similar time using I-64 and I-95. However, applying the 2014 federal standard mileage rate of 56 cents per mile, trips to Fredericksburg or Washington, DC would be more expensive by automobile than by other available modes. The alternate modes, including bus, rail, and air, are all limited by the frequency of service. Trips from Hampton Roads to areas west of I-95, including Winchester, can only be made by automobile.



A1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	454
Severe Crashes/Million VMT	1.7
Number of Railroad Crashes	2

Segment A1 experienced the highest number of severe crashes (454) between 2010 and 2014 along the Coastal Corridor. One of the largest concentrations of severe crashes in Segment A1 of the Coastal Corridor occurred along approximately 6.8 miles of US 17 in Newport News. From Old Oyster Point Road to River Road, there were 205 severe crashes on US 17. Specifically, at the intersection of US 17 (J. Clyde Morris Boulevard) and Old Oyster Point Road, east of I-64, 23 crashes occurred. In a span of approximately 0.9 miles of US 17 (J. Clyde Morris Boulevard) between Forrest Drive and Constance Drive), there were 68 crashes, with 34 of those crashes occurring at the intersection of US 17 and Constance Drive, just outside of the Newport Square Shopping Center. Over a span of about four miles on US 17 (Jefferson Avenue) between Route 312 (J. Clyde Morris Boulevard) and US 258 (West Mercury Boulevard) there were 100 crashes.

Another large concentration of severe crashes occurred along US 17 in the City of Portsmouth. There were 89 crashes along US 17 between Airline Boulevard and Victory Boulevard, 23 of which occurred at the intersection of US 17 (George Washington Highway) and Route 239 (Victory Boulevard). On US 17 (Frederick Boulevard), there were 21 crashes in the 0.51 miles between Airline Boulevard and Turnpike Road.

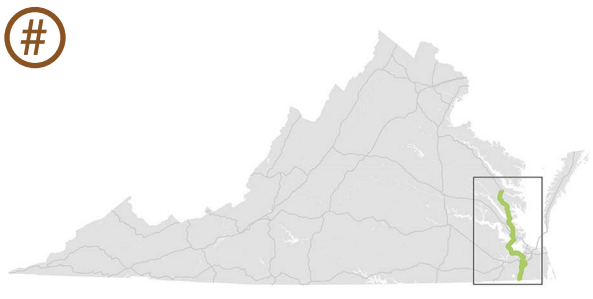
Another high-concentration crash area is located in the City of Chesapeake where 41 crashes occurred over a span of approximately one mile. Of the 41 crashes, 22 were located at the intersection of US 17 and Route 165. The remaining incidents occurred along US 17 north of its intersection with Route 165.

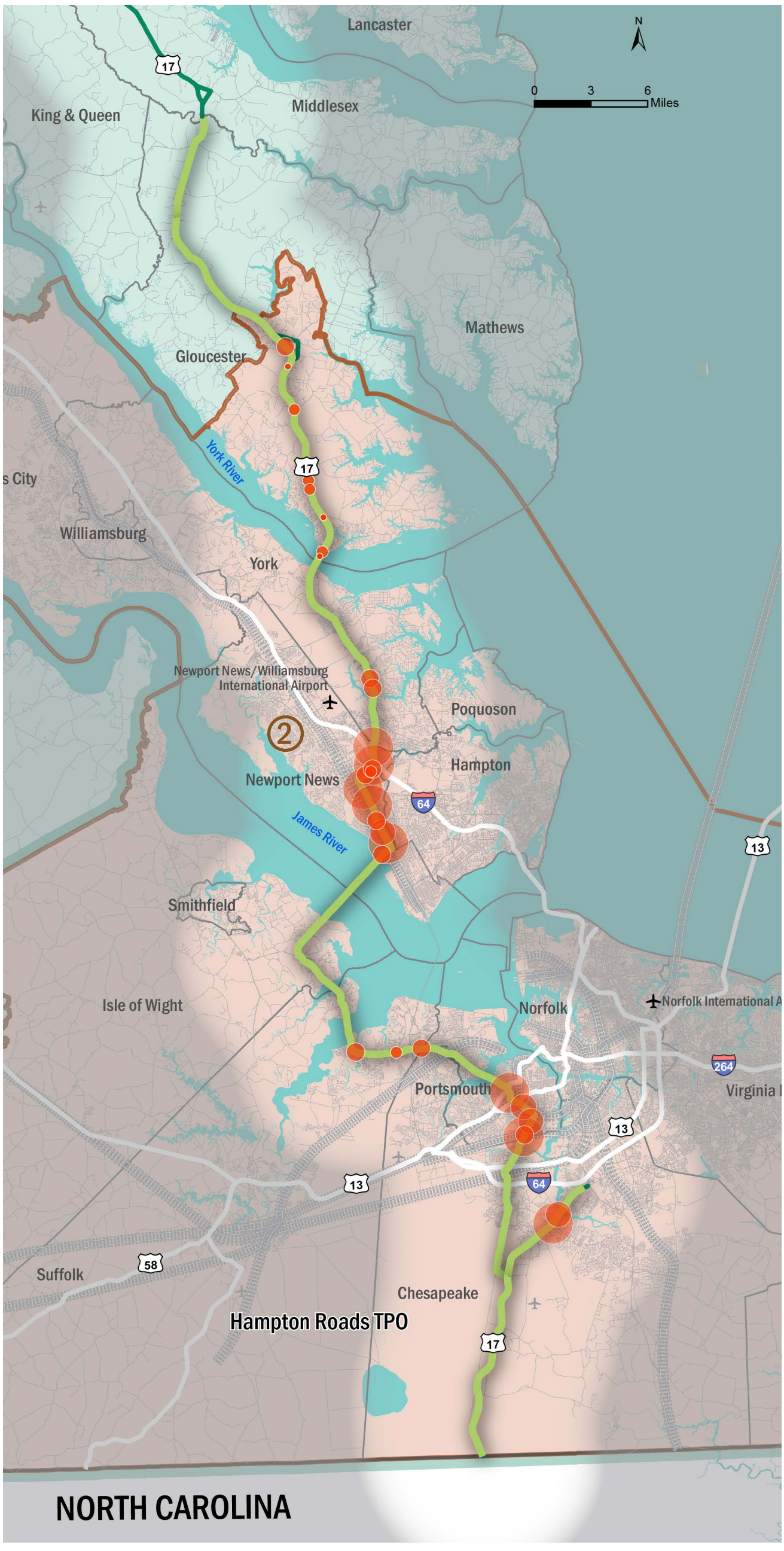
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#





Congestion

Performance Metrics

Person Hours of Delay per Mile	35
Freight Ton Hours of Delay per Mile	1.8K

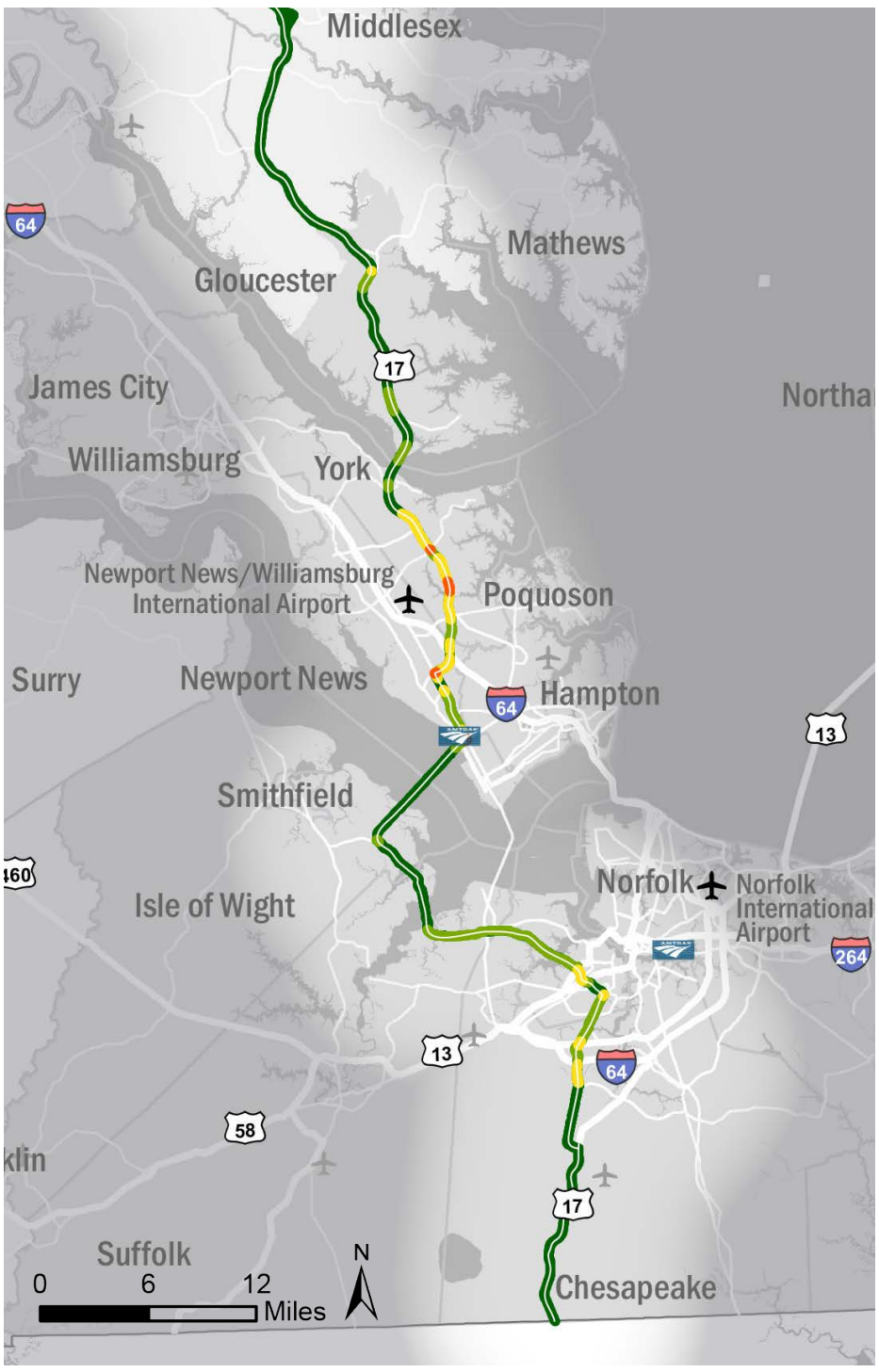
Passenger Delays

Segment A1 covers the sections of the Coastal Corridor (Corridor A) with the most congestion for passenger travel, with 6,400 person-hours of delay. The busiest parts of this segment are those passing through Portsmouth and on the peninsula between the James and York Rivers, with daily passenger delays reaching 400 person-hours per mile. Passenger delays along Segment A1 during the peak period (defined as 7 to 10 a.m. and 3 to 6 p.m.) account for 52 percent of daily congestion, a larger share than the average peak-period share of congestion on the CoSS segments.

Freight Delays

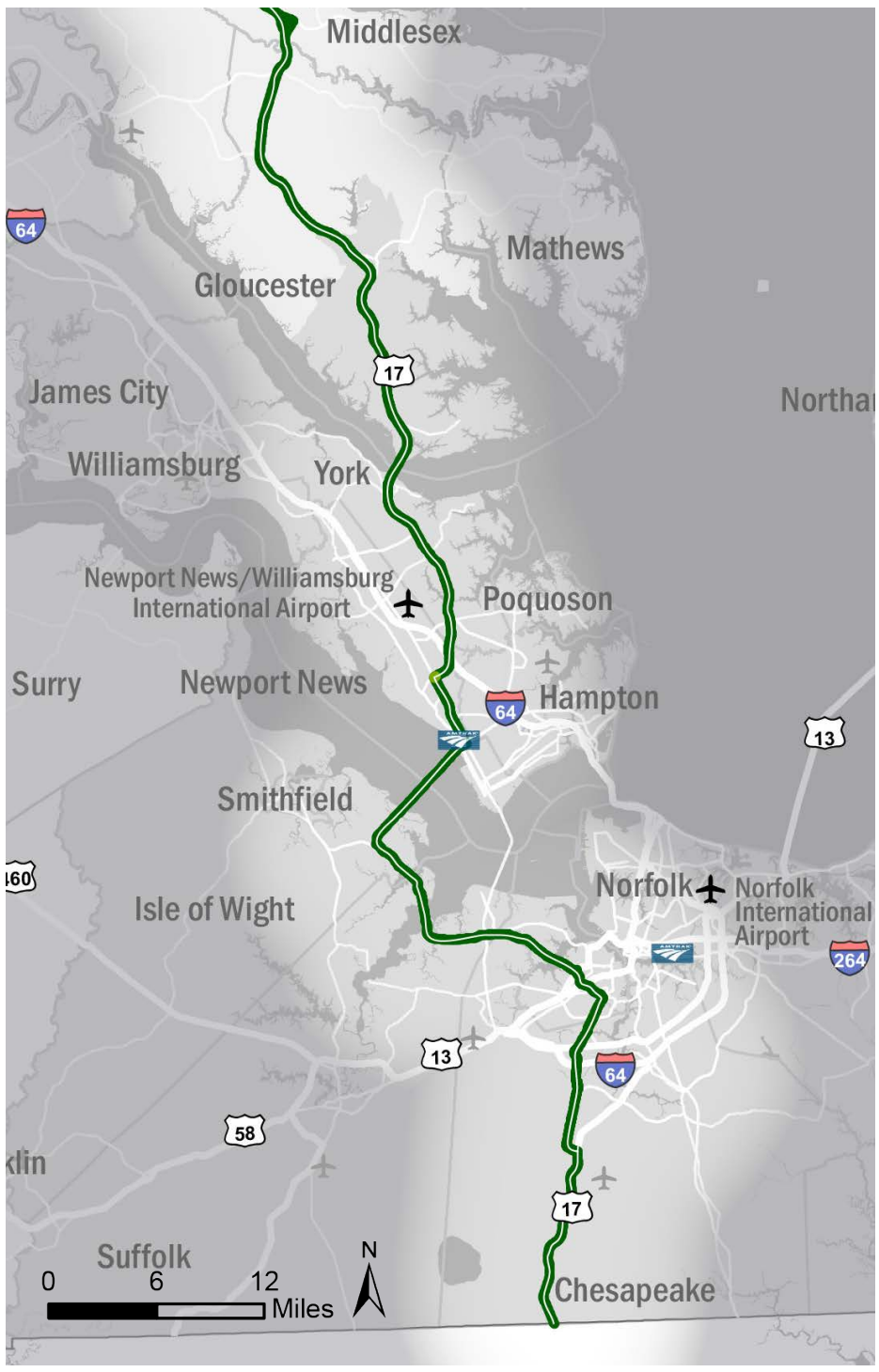
Although passenger delays along Segment A1 are significant, freight delays are not. Overall freight delays per mile along Segment A1 are among the lowest of the CoSS segments, possibly because I-64 carries most of the freight in the region. Peak-period freight delays account for about 44 percent of daily congestion, which is more than the average peak-period contribution to congestion along the CoSS segments.

Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment A1 ranges from 0.02 to 0.79 in terms of reliability index, with an average value of 0.15. While this segment does have a peak period reliability index higher than average for the CoSS segments statewide, none of the locations along Segment A1 have reliability index values exceeding the statewide threshold.

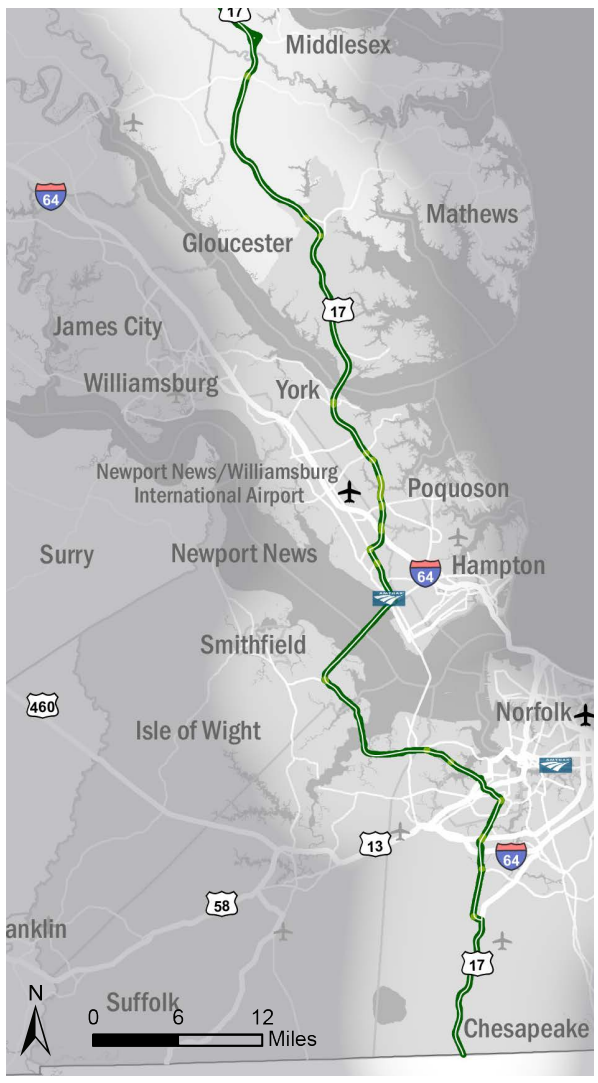
Weekday

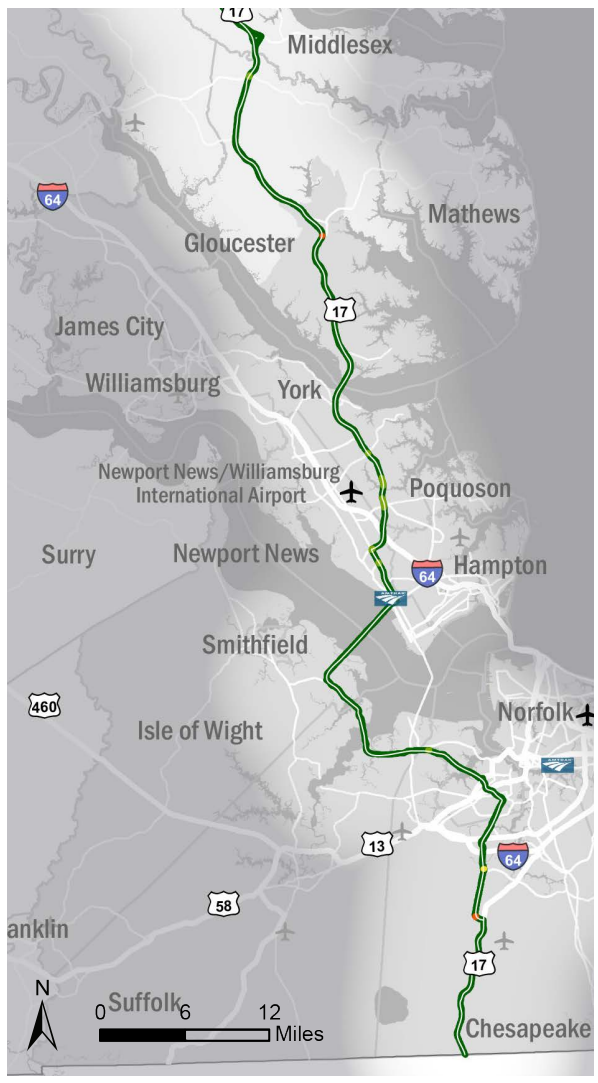
Reliability of travel on Segment A1 during a typical weekday ranges from 0.01 to 0.38 in terms of reliability index, with an average value of 0.13. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, none of the locations along Segment A1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.01 to 0.77 in terms of reliability index, with an average value of 0.12. Overall, Segment A1 has a higher weekend reliability index than average for the CoSS segments statewide. Two segments have weekend reliability indices over the statewide threshold: a short portion on US 17 Business in the City of Chesapeake and a short segment of US 17 near US 17 Business in Gloucester. A higher reliability index during weekends compared to weekdays suggests that weekend travel times are more unpredictable than weekday travel times.





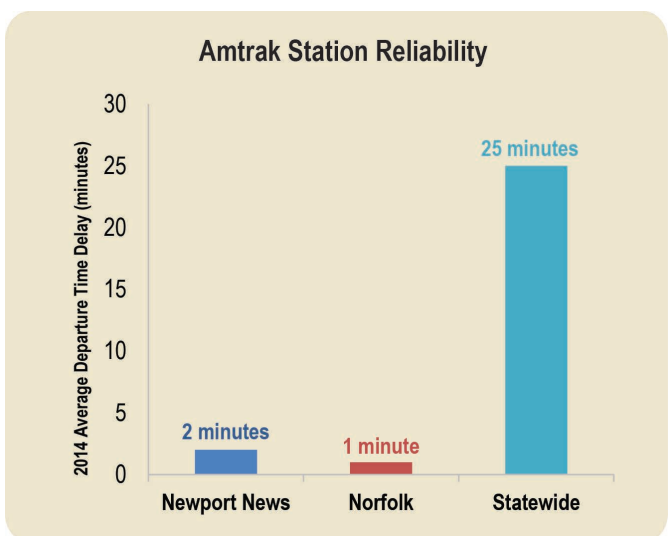


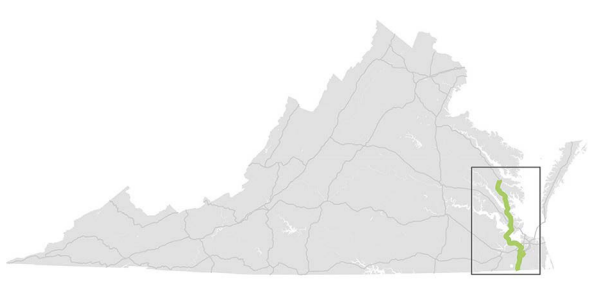
Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60





A1 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

Mode Choice

Safety

Congestion

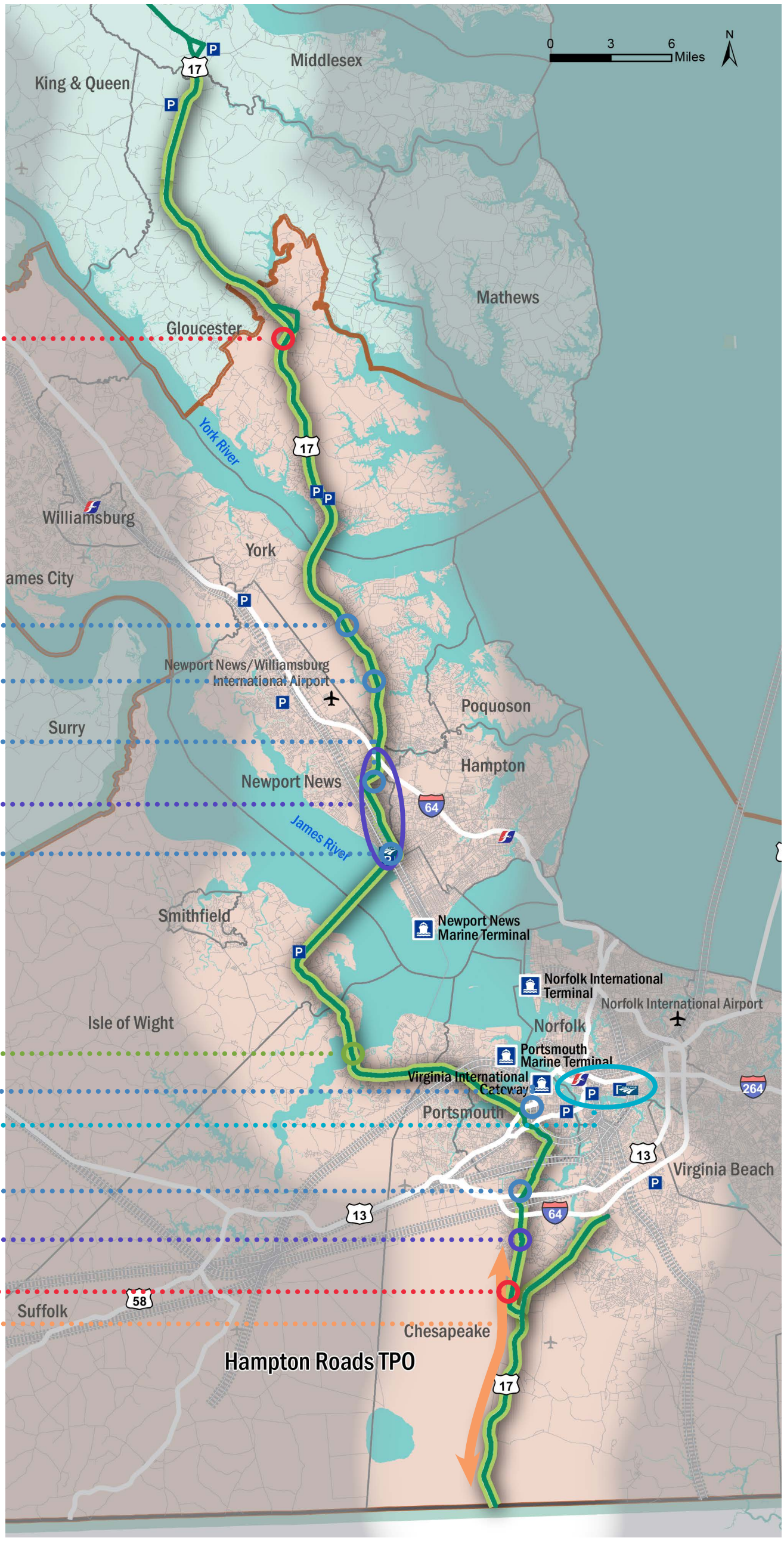
Bottlenecks

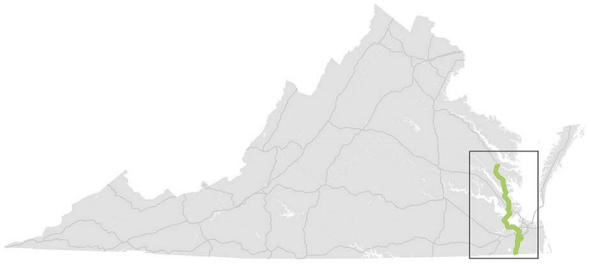
Reliability

O P

N M K, L B J

A H, I D G C, F Q E

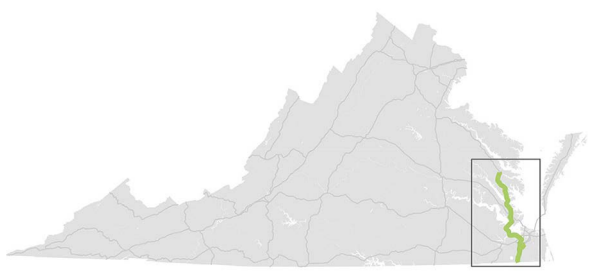




A1 SEGMENT NEEDS

Summary of Needs - A1 Segment

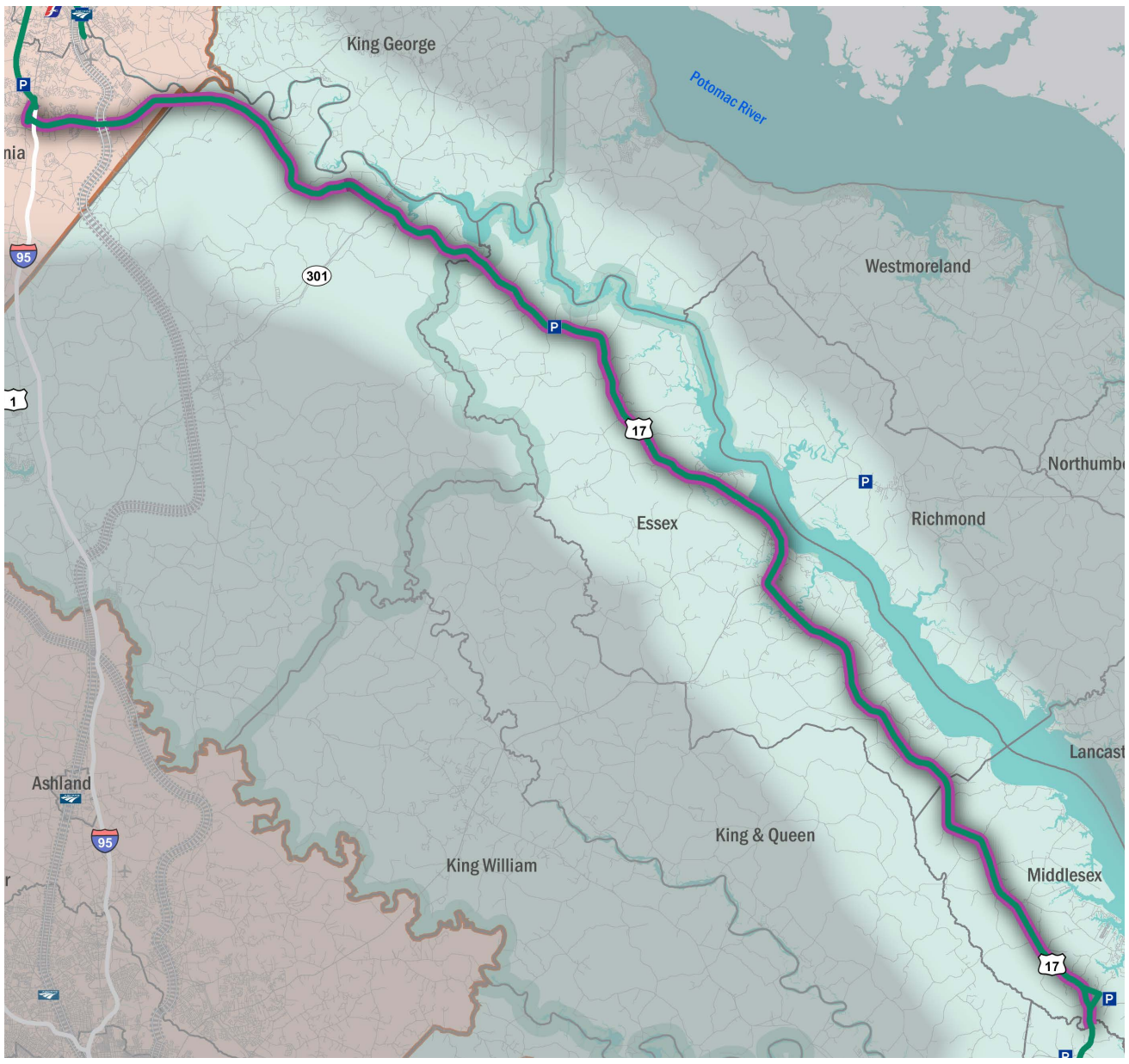
A.	Mills Godwin Bridge on US 17: Bottleneck to 2-lane roadway, remainder of US 17 is 4-lane facility
B.	US 17 Old Oyster Point Rd to River Rd: 205 severe crashes including: 23 severe crashes at intersectionof US 17 and Old Oyster Point Rd, 34 severe crashes at US 17 and Constance Drive
C.	US 17 in Chesapeake near intersection with Route 165: 41 severe crashes
D.	Limited availability of transit options from Hampton Roads to Metropolitan Washington region (5 buses, 1 rail trips daily) and Fredericksburg (2 buses, 1 rail trip daily). No transit options from Hampton Roads to Winchester.
E.	No parallel highway facilities for US 17
F.	Congestion issue on US 17 Business between VA Route 165 and I-64
G.	Congestion issue at US 17 and US 460 intersection in Chesapeake
H.	Congestion issue at US 17 and VA Route 141 intersection in Portsmouth
I.	Congestion issue on US 17 between I-264 and US 58 in Portsmouth
J.	Congestion issue at US 17 (Mercury Boulevard) and US 17/VA Route 143 (Jefferson Avenue) in Newport News
K.	Congestion issue at US 17/VA Route 143 (Jefferson Avenue) and Harpersville Road intersection in Newport News
L.	Congestion issue on US 17 from US 17/VA Route 143 (Jefferson Avenue) to I-64 in Newport News
M.	Congestion issue on US 17 from Harperville Road to Wolf Trap Road in York County
N.	Congestion issue on US 17 from VA Route 173 (Goodwin Neck Road) to north of Cook Road in York County
O.	Congestion issue at US 17 and US 17 Business intersection south of Gloucester Courthouse
P.	Reliability issue at US 17 and US 17 Business intersection south of Gloucester Courthouse
Q.	Reliability issue at US 17 Business and Great Dismal Swamp Canal Trail



III. Segment A2

Corridor Segment A2 Components

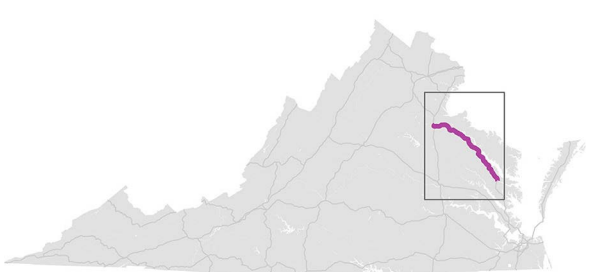
- US 17 and US 17 Business
- Rappahannock River



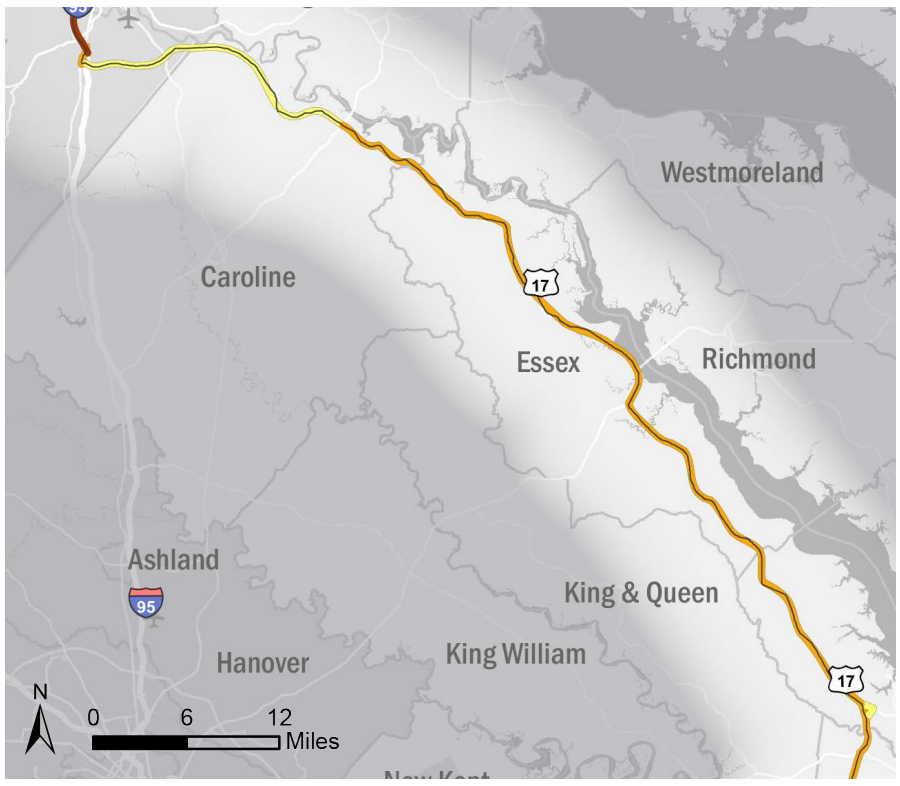
Segment A2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

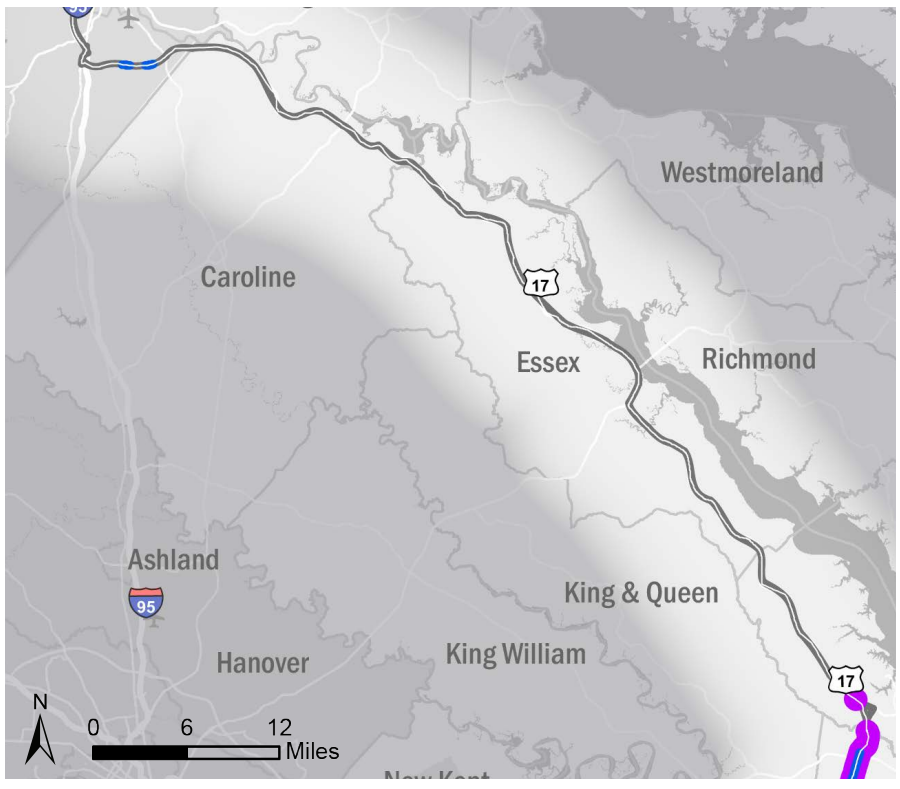


A2 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Segment A2 begins in Middlesex County and progresses north, serving Essex, Caroline, and Spotsylvania Counties. The segment ends in the Fredericksburg Area at exit 126 from I-95, where I-95, US 1, and US 17 intersect.

Highway Facilities: US 17 is primarily a four-lane facility through Middlesex and Essex Counties. Further north, US 17 narrows to a two-lane roadway until its intersection with US 1. Along US 17, there is significant out-of-state freight and passenger traffic that travels along the highway. US 17 serves both through and local commuting traffic in rural areas. There are no parallel highway facilities that follow US 17, though US 17 does serve as an alternative route to I-64 and I-95 for traffic between Hampton Roads and Northern Virginia. Segment A2 also provides access to the Middle Peninsula and Northern Neck.

Transit Service: There is no line-haul transit, Amtrak, or Greyhound service available in Segment A2. There are several Park-and-Ride locations available in this segment.

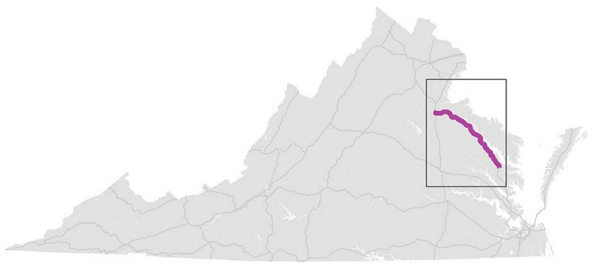
Rail Facilities: A short rail line runs directly along US 17 from CSX's National Gateway Corridor to Sealston on the Northern Neck.

Port Facilities: US 17 provides access to the Rappahannock River navigational channels.

Airport Facilities: No commercial air service is available in Segment A2; however, four general aviation airports are present.

Major planned and future projects include:

- Lengthening the right turn lane at Route 616
- Constructing left turn lanes and installation of traffic signals at Route 609
- Constructing left turn lanes at Route 608

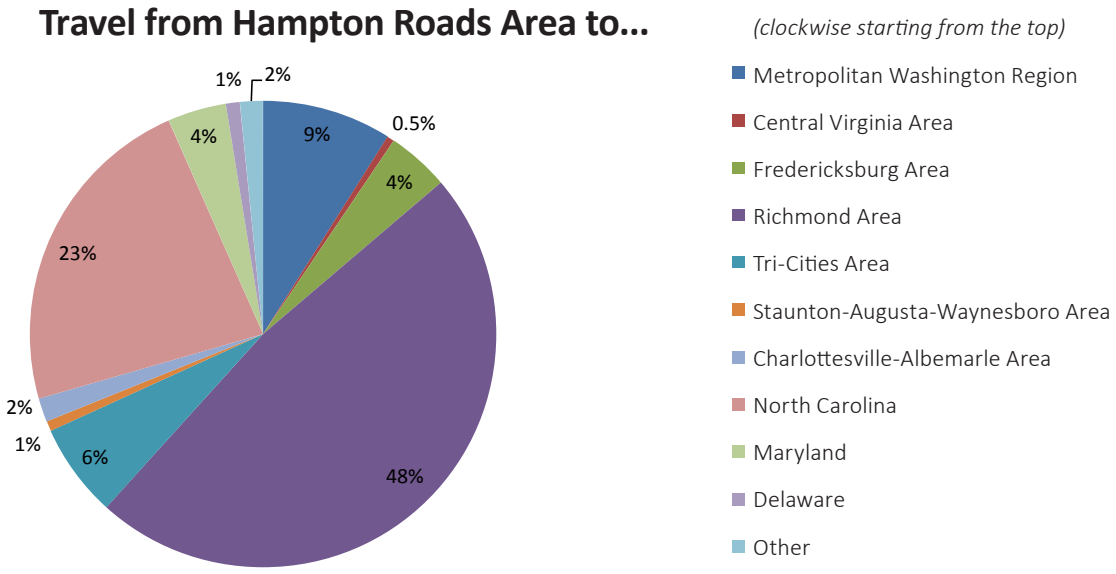


Travel Demand

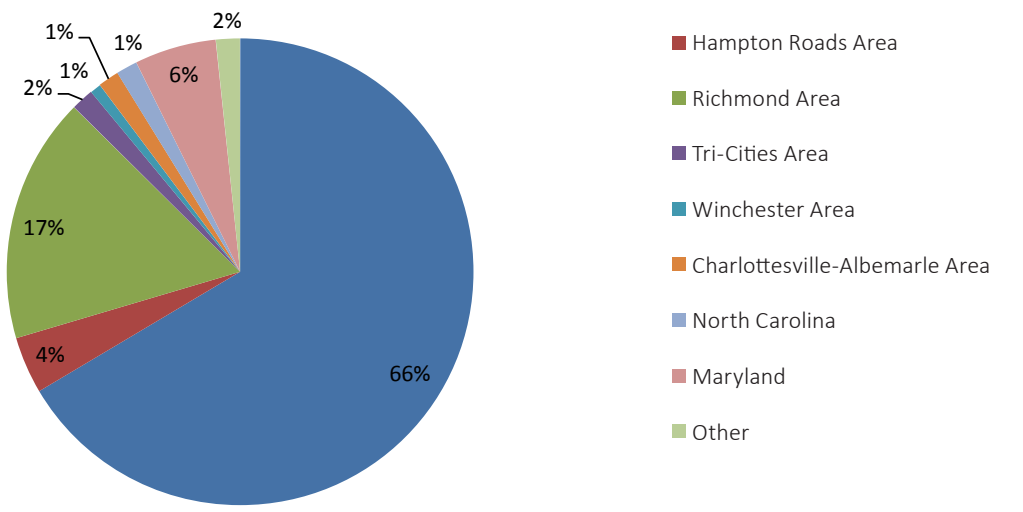
Passenger Demand

Segment A2 connects the Hampton Roads Area to the Fredericksburg Area. Of the intercity passenger travel originating in the Hampton Roads Area, nine percent is destined for the Metropolitan Washington region and an additional four percent is destined for the Fredericksburg Area. Since most of the intercity passenger traffic originating in Fredericksburg is oriented north towards Northern Virginia, only small portions of this traffic will use Segment A2. Four percent of Fredericksburg traffic is destined for the Hampton Roads Area and will likely use this segment.

Travel from Hampton Roads Area to... *(clockwise starting from the top)*



Travel from Fredericksburg Area to... *(clockwise starting from the top)*



A2 SEGMENT PROFILE

Freight Demand

By truck, Segment A2 carried 1.4 million tons of freight worth $740 million in 2012, and is estimated to carry 2 million tons of freight worth $1.0 billion in 2025. The major travel patterns on Corridor A are similar to those on Corridor K, as US 17 (Segment A3) runs concurrently with I-95 (Segment K3) near Fredericksburg. Interstate truck freight traffic passing though Virginia on Corridor A accounts for more than 40 percent of the total tonnage in both 2012 and 2025, as well as 60 percent of the total freight value for both years. In terms of tonnage, North Carolina is the largest source of truck freight on Corridor A and Maryland is the largest destination outside of the Commonwealth. In terms of value, Florida is the largest destination for truck freight on Corridor A. Most of the major truck freight travel patterns on Corridor A are between the Middle Atlantic and Southeastern regions. Only three percent of the corridor's truck freight tonnage, representing around one percent of the total freight value, originates from or is destined for the jurisdictions adjacent to Segment A2.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (34% / 35%)
2. North Carolina (15% / 14%)
3. Pennsylvania (10% / 10%)
4. Maryland (8% / 8%)
5. Florida (6% / 5%)

Corridor Tonnage Originating in Segment A2: 3% / 3%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
City of Norfolk* and North Carolina
City of Chesapeake and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (34% / 36%)
2. Maryland (13% / 13%)
3. North Carolina (9% / 9%)
4. Pennsylvania (9% / 8%)
5. New York (8% / 7%)

Corridor Tonnage Destined for Segment A2: 3% / 3%

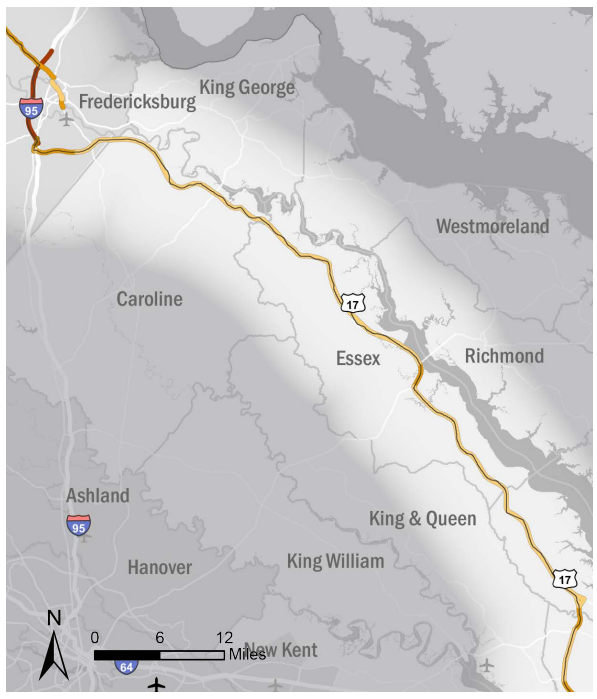
Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment A2 is low relative to traffic volumes throughout the rest of Corridor A. The highest traffic volume in Segment A2 occurs on the section south of Fredericksburg where US 17 runs concurrently with US 1, with an average daily traffic volume of over 50,000 vehicles. The section in Tappahannock where US 17 runs concurrently with US 360 sees daily traffic of more than 21,000 vehicles. On almost all other sections of Segment A2, average daily traffic volumes range from 5,000 to 13,000 vehicles. Traffic volumes are expected to increase minimally (by less than 5,000 vehicles per day) by 2025 along almost all of Segment A2, except the small portion where US 17 runs concurrently with US 1 near Fredericksburg where increases are expected to be much higher.

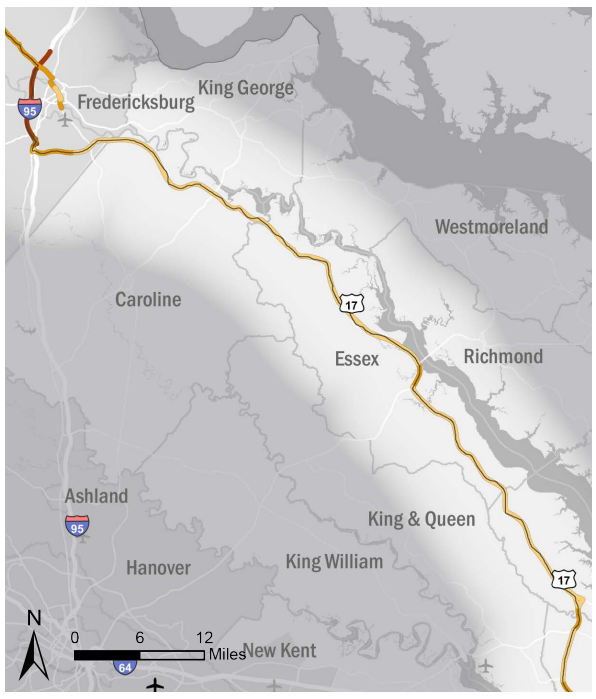
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



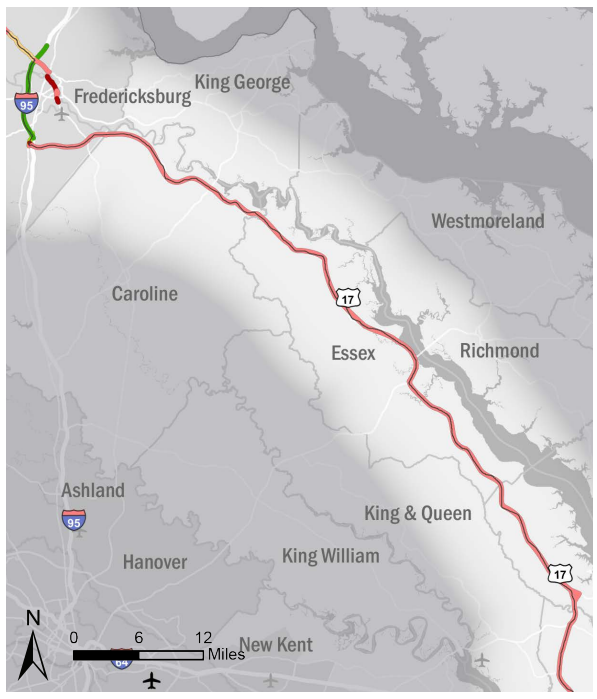
Traffic Volume 2025 (AADT)

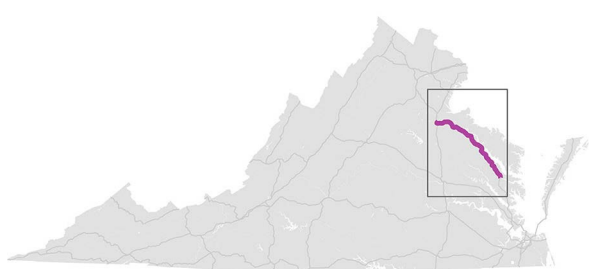
- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



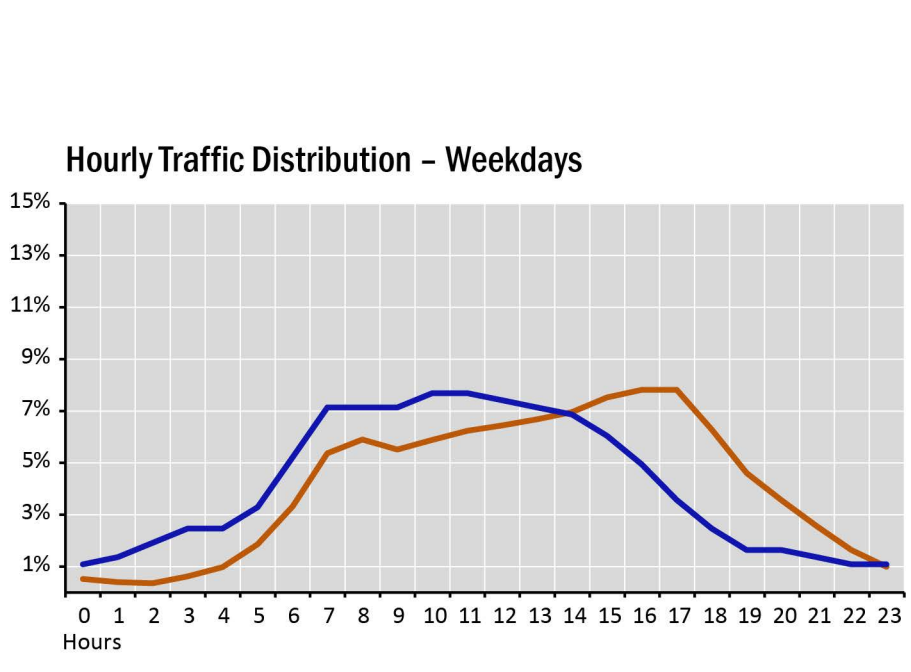
Change in Traffic Volume 2014- 2025 (AADT)

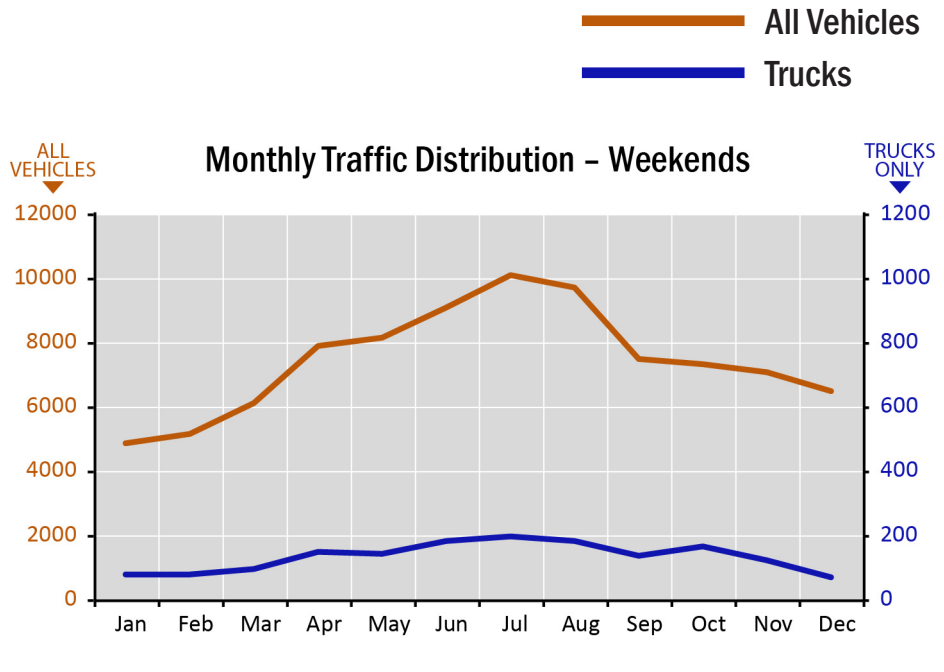
- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility

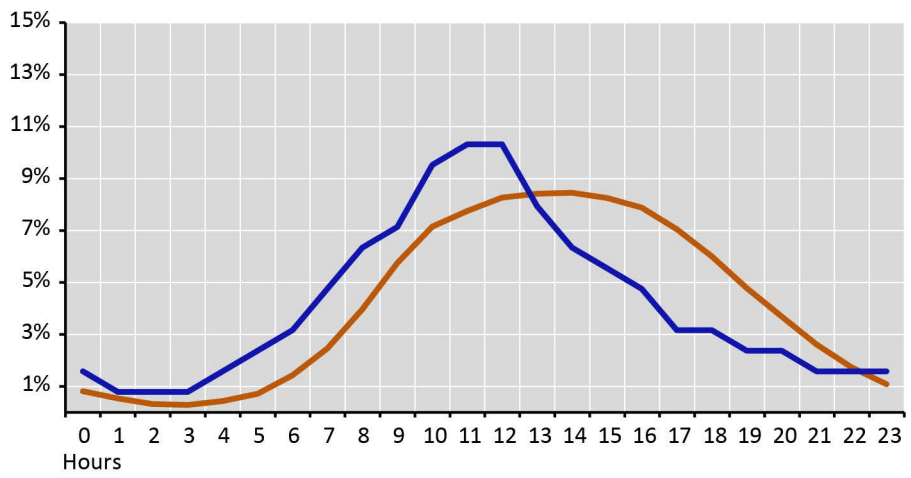


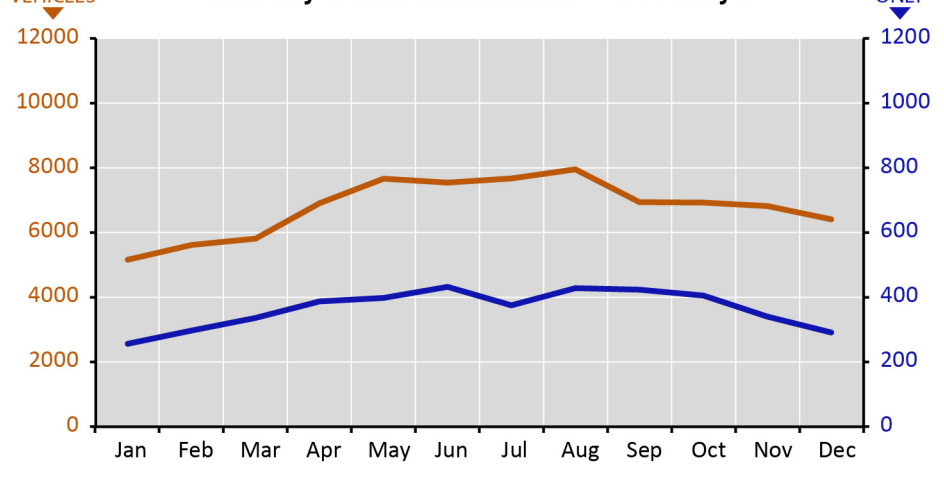


A2 SEGMENT PROFILE









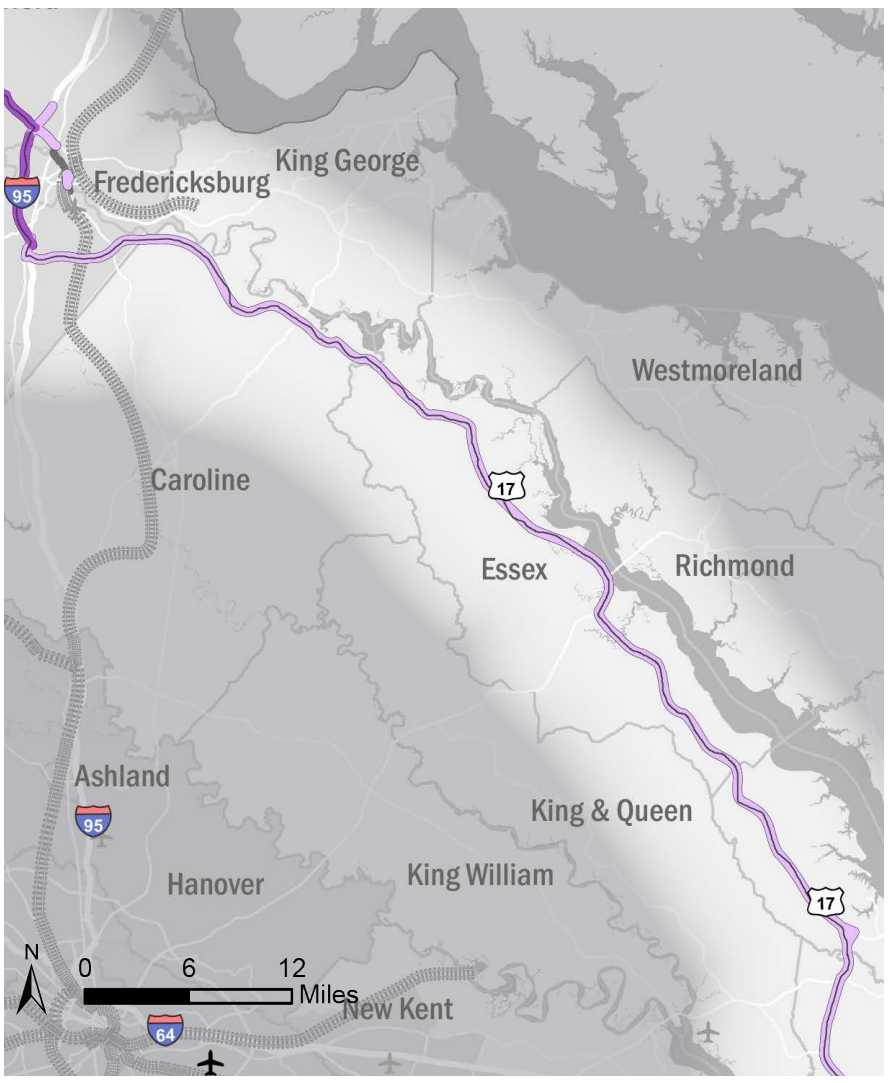
Traffic Distribution

On average, traffic on Segment A2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a steady increase in the flow from 7 a.m. to 5 p.m., which is quite different from the typical commute pattern. The highest hourly traffic occurs between 4 and 6 p.m. which each account for 7.8 percent of daily traffic. A slight morning peak is visible from 8 a.m. to 9 a.m. accounting for 5.9 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for almost 50 percent of total daily traffic. Peaking patterns for truck traffic are different from general traffic, with a relatively steady flow of trucks between 8 a.m. and 3 p.m., and a peak hourly flow of 7.6 percent of daily truck traffic between 10 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing a distribution of traffic that peaks during the middle of the day, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (8.4 percent of daily traffic) for all traffic, and a more distinct peak for truck traffic between 11 a.m. and noon (10.3 percent of daily traffic in each hour) for truck traffic.

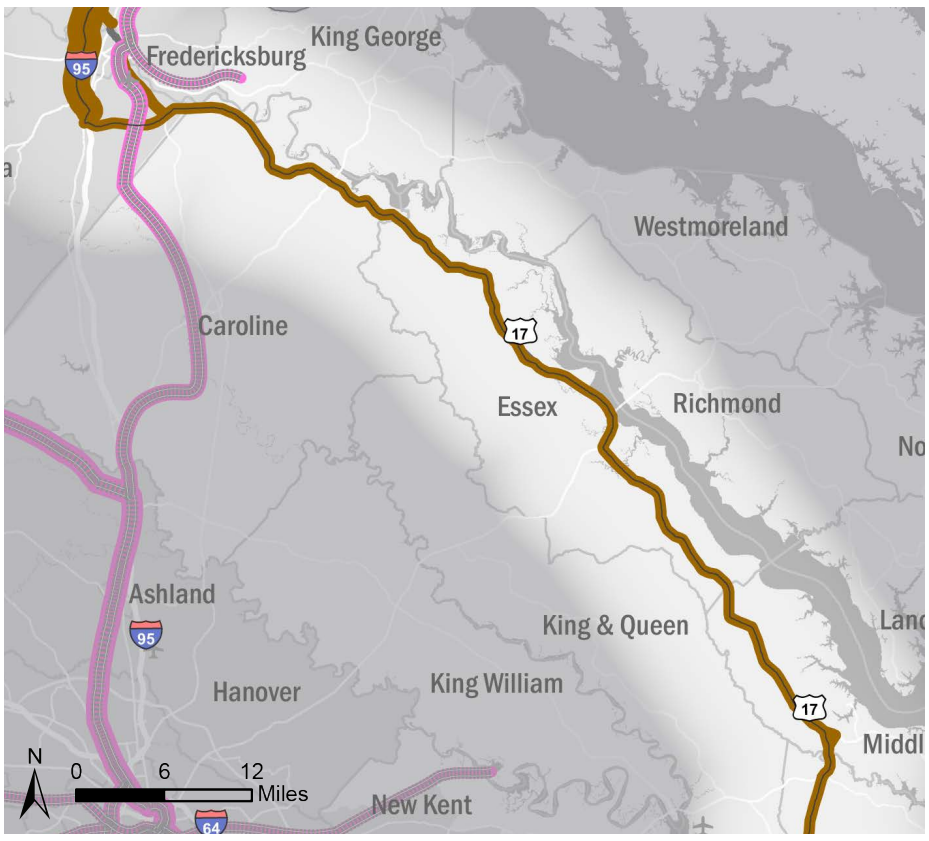
Weekday traffic volumes on Segment A2 vary by as much as 54 percent throughout the year, with the highpoint in August (around 8,000 vehicles per day) and the low point in January (around 5,000 vehicles per day). Truck volumes vary more than passenger volumes, with the June high being 69 percent higher than the January low. Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (July, around 10,000 vehicles per day) are 109 percent higher than January levels (around 5,000 vehicles per day), highlighting the severe seasonal peaking that occurs during the weekends on this segment. Since truck volumes account for a relatively small portion of traffic on Segment A2, five percent of daily traffic for weekdays and two percent of daily traffic weekends, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volume

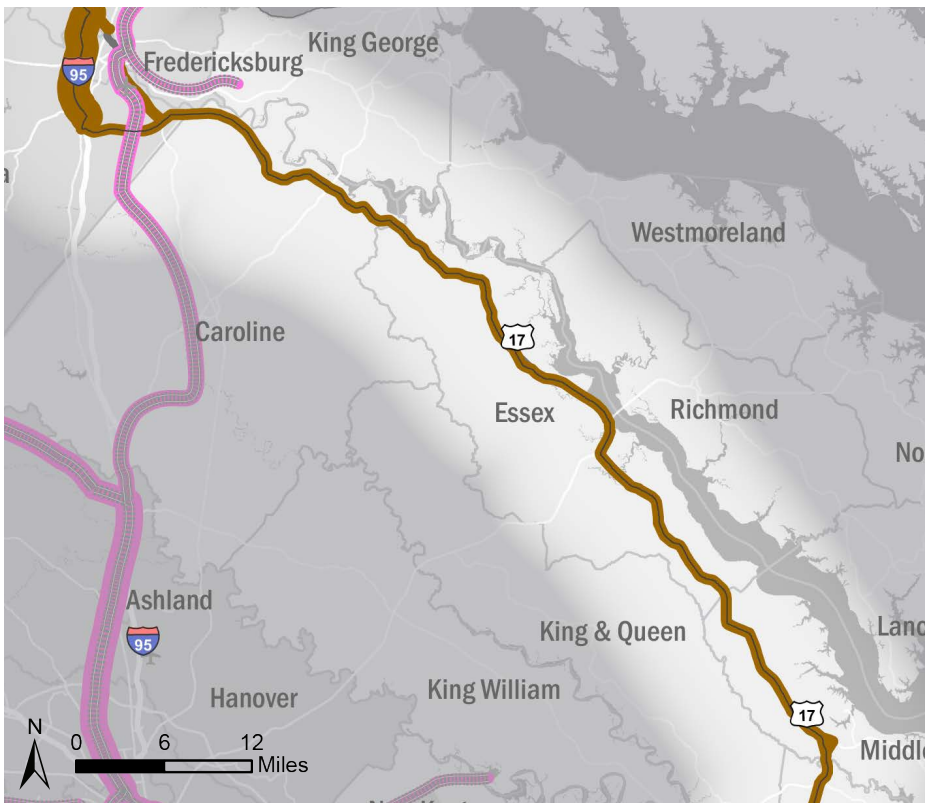
The percent of average daily traffic comprised of heavy trucks on Segment A2 is low relative to other parts of Corridor A. Heavy trucks account for 3 percent or less of total traffic throughout Segment A2. Heavy trucks comprise about 3 percent of total traffic in Segment A2 in central to northern Essex County and in Spotsylvania County.



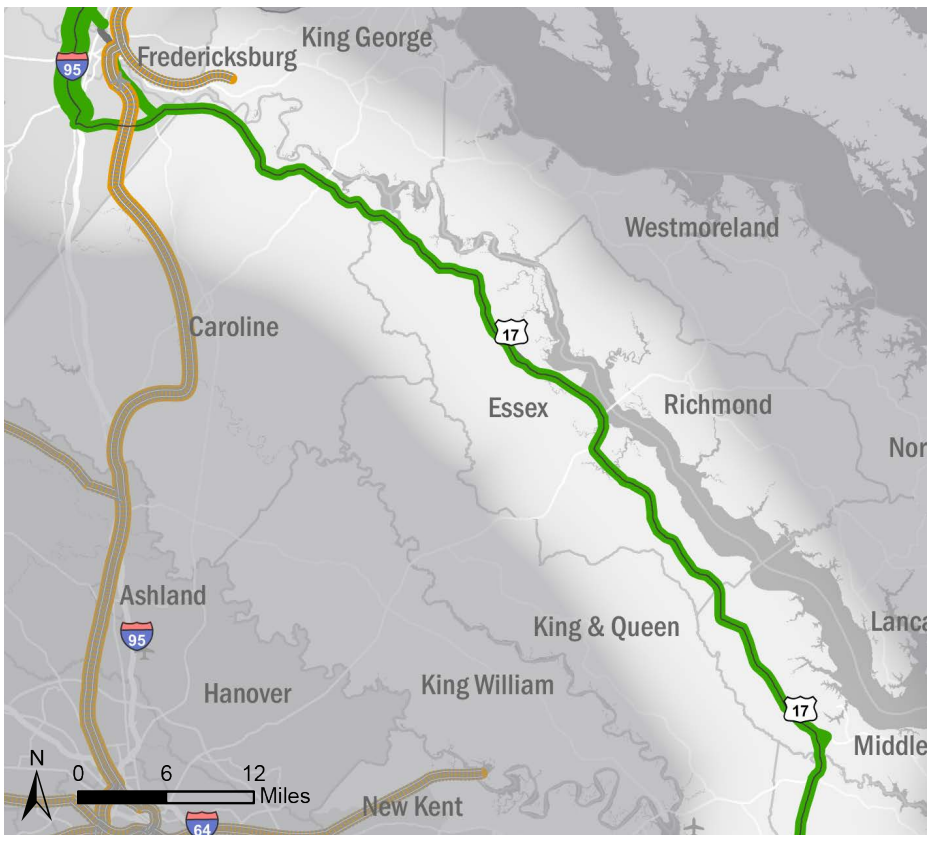
A2 SEGMENT PROFILE



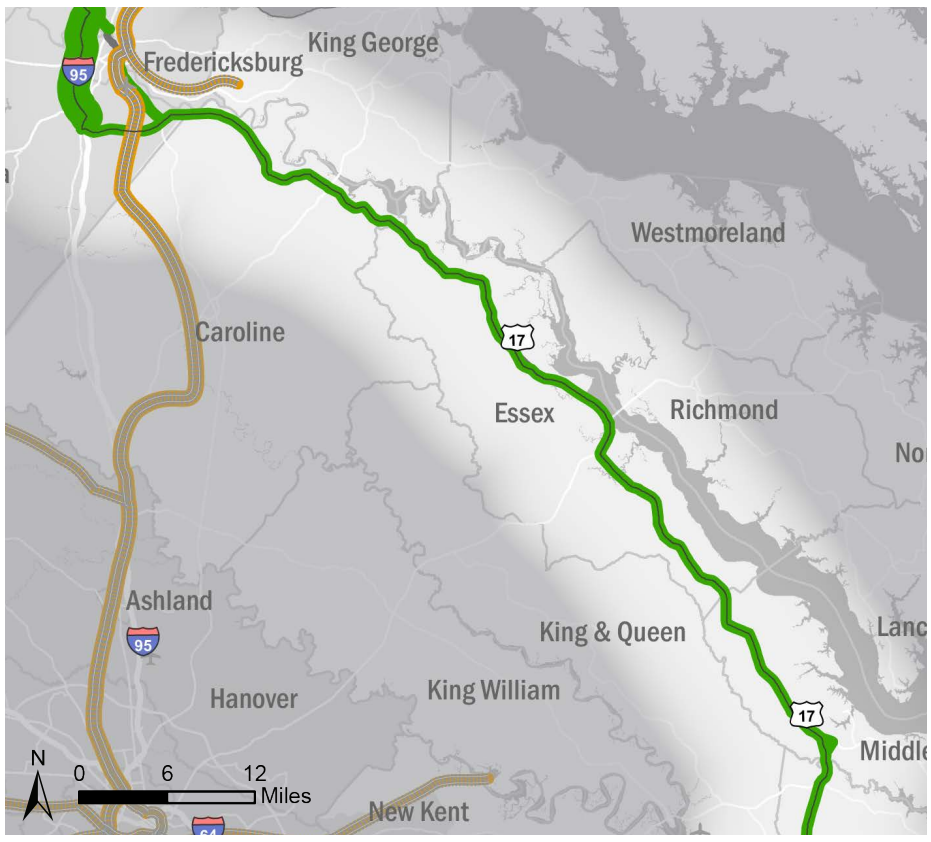
Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025

Freight Flows

Although rail does not run parallel to US 17 for the entire length of Segment A2, a short branch owned by CSX, the Sealston Branch, does connect industries on the western end of the Northern Neck to Fredericksburg. In this area east of Fredericksburg, the majority of freight still moves by truck, in terms of both tonnage and value. In total, 1.3 million tons (65 percent) of freight travels through this section of Segment A2 by truck, compared to 751,000 tons by rail. By value, the difference is even starker, with $740 million (79 percent) of freight value traveling by truck, compared to $195 million by rail. On average, a ton of freight traveling through this section of Segment A2 by truck is worth $533 while a ton of freight traveling by rail is worth $259. In 2025, both rail and truck freight tonnages and total values in Segment A2 are expected to increase, and the percentage of freight traveling by truck is expected to increase slightly to 72 percent by tonnage and 80 percent by value. Value per ton on trucks is expected to slip to $429, while value per ton on rail should remain nearly the same, at $267.

Truck Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Comparable Travel Options

Hampton Roads (Norfolk) to DC

Inter-City Bus	*Train*	*Air*
5 Trips per Day 5:30 Travel Time $18 Est. Cost	1 Trips per Day 4:45 Travel Time $42 Est. Cost	4 Trips per Day 1:05 Travel Time $115 Est. Cost

Auto

Via US 17: 3:45 Travel Time $117 Est. Cost
Via I-64/I-95: 3:10 Travel Time $109 Est. Cost

Hampton Roads (Norfolk) to Fredericksburg

Inter-City Bus	*Train*
2 Trips per Day 5:40 Travel Time $22 Est. Cost	1 Trips per Day 3:10 Travel Time $38 Est. Cost

Auto

Via US 17: 2:45 Travel Time $82 Est. Cost
Via I-64/I-95: 2:30 Travel Time $81 Est. Cost

Fredericksburg to Winchester

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

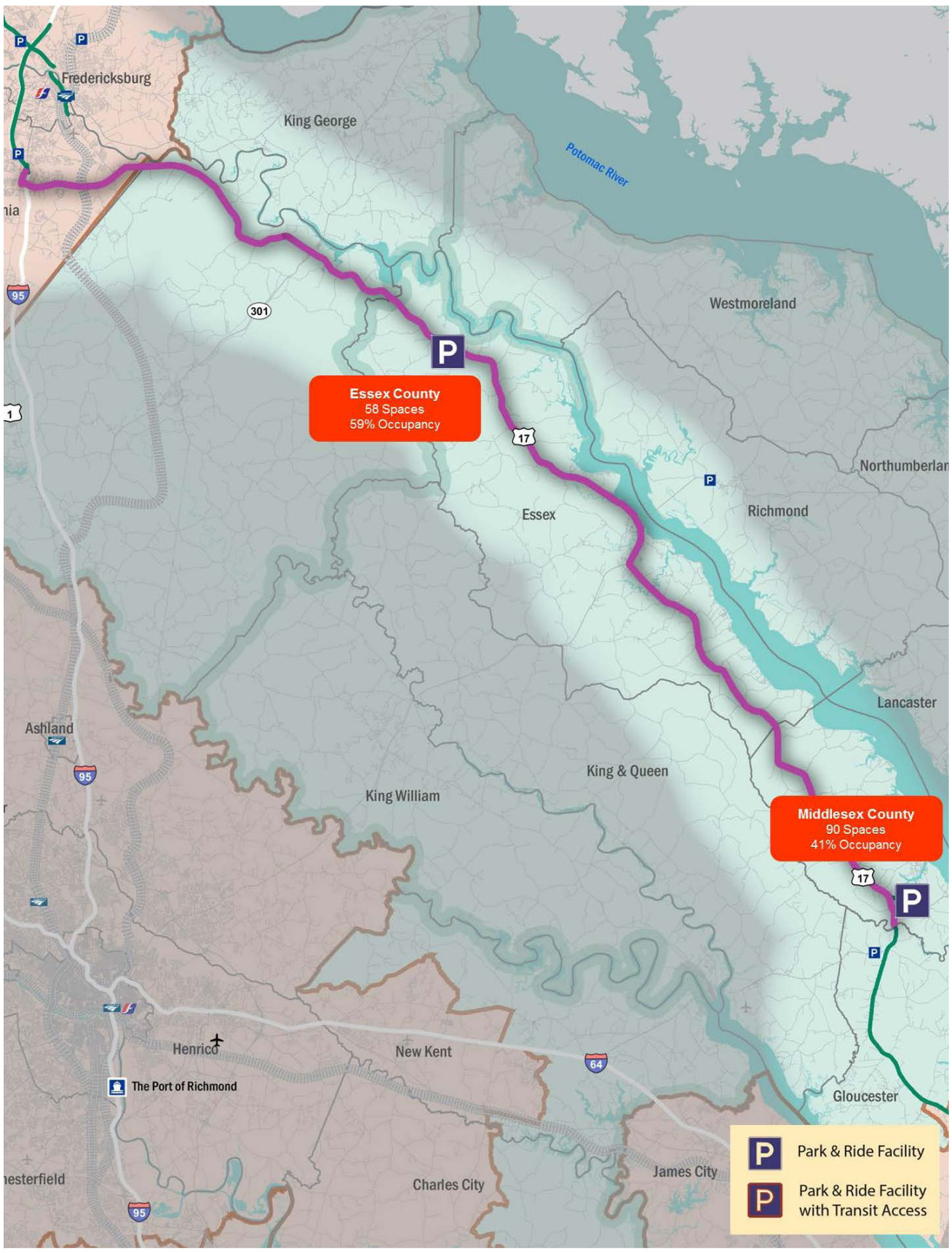
Auto

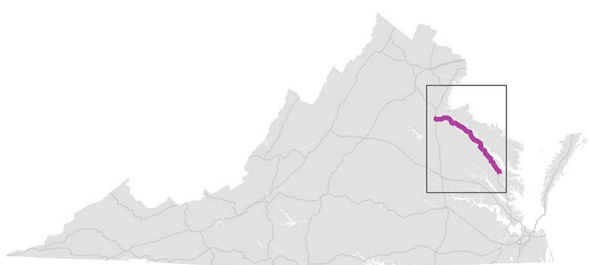
Via US 17: 1:35 Travel Time $45 Est. Cost

Passenger trips on Segment A2 of the Coastal Corridor have few travel options, both in terms of travel path and mode choice. While US Highway 17 does not have a parallel facility, passengers traveling from Hampton Roads to Northern Virginia and Washington DC can make the trip in similar time using I-64 and I-95. However, applying the 2014 federal standard mileage rate of 56 cents per mile, trips from Hampton Roads to Fredericksburg or Washington DC would be more expensive by automobile than by the other available modes. Trips from Hampton Roads to areas west of I-95, including Winchester, can only be made by automobile.

Park-and-Ride

Within Segment A2, commuters can utilize several Park-and-Ride locations. Mathews County provides the highest number of Park-and-Ride spaces and locations, while Essex County has the highest utilization rate of spaces available in the region. However, no county or city within the Segment A2 area has a rate higher than the statewide average for Park and Ride utilization, which is 76 percent.





A2 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	85
Severe Crashes/Million VMT	2.5
Number of Railroad Crashes	1

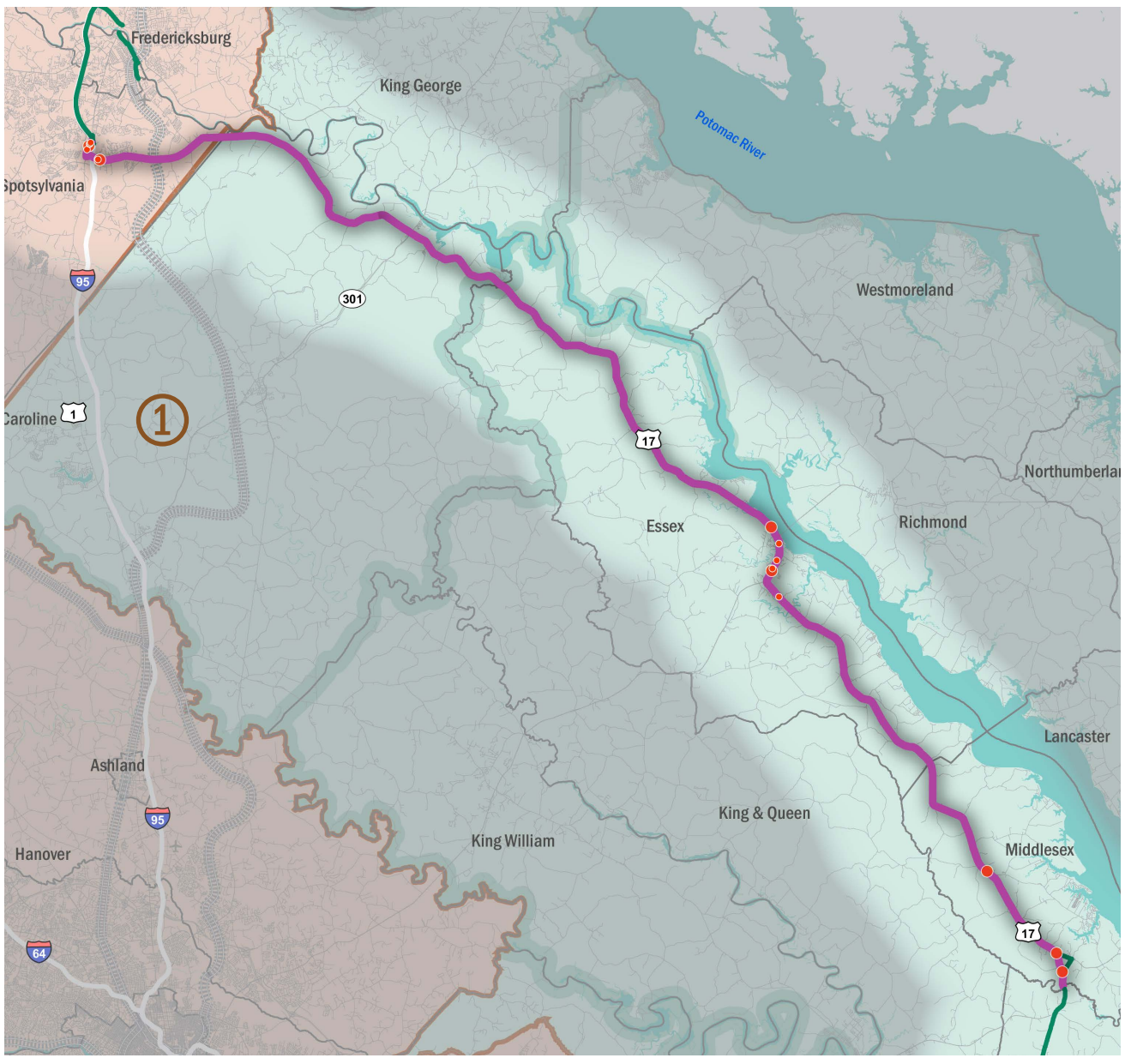
While only 85 severe crashes occurred on Segment A2 between 2010 and 2012, this result is the highest crash rate in the corridor (2.5 crashes per million VMT). There are few areas with high concentrations of severe crashes in Segment A2. In one area, 22 crashes occurred over about 2.5 miles of US 17 in the Town of Tappahannock. All incidents along this span occurred at intersections between Airport Road and Ball Street.

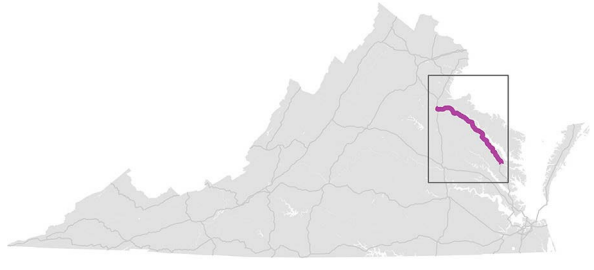
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/ Accidents per County (2011-2014)

#





Congestion

Performance Metrics

Person Hours of Delay per Mile	6
Freight Ton Hours of Delay per Mile	4.1K

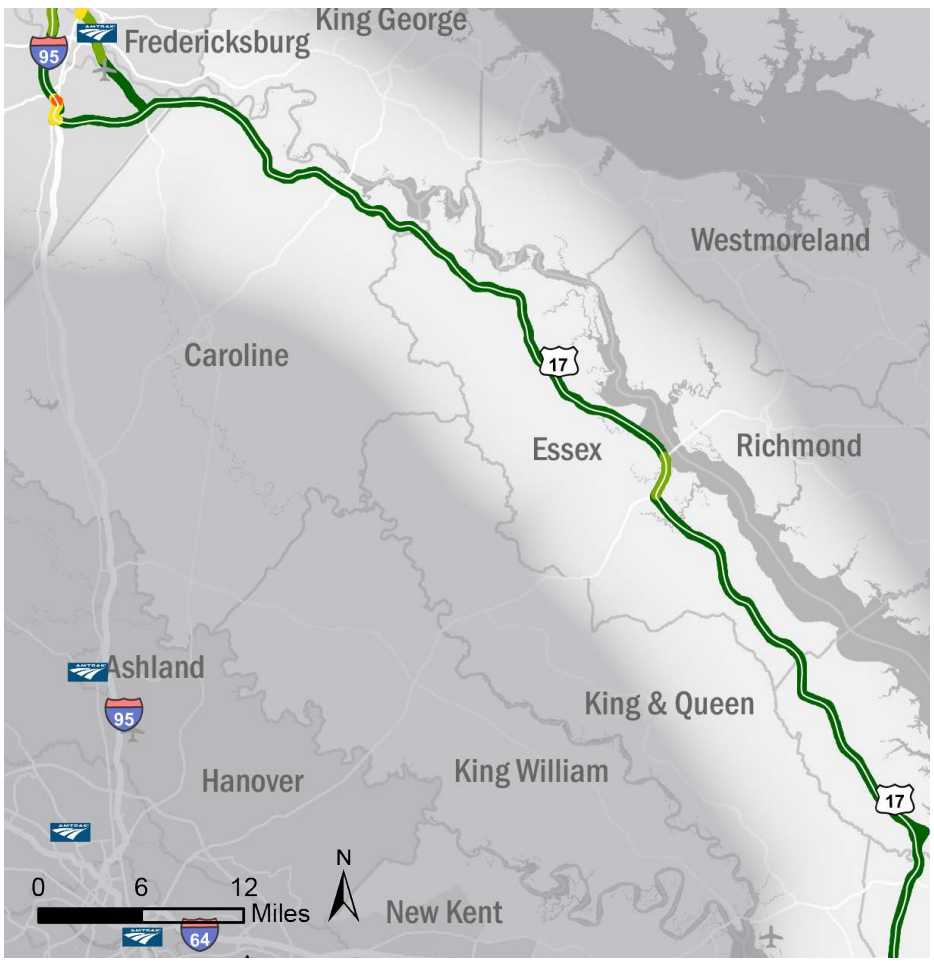
Passenger Delays

Segment A2 covers the sections of the Coastal Corridor (Corridor A) with the least congestion for passenger travel, with only 920 person-hours of delay. Passenger delay throughout most of the segment is less than 50 person-hours per mile. The only portion of Segment A2 with passenger congestion issues is an area where US 17 runs concurrently with US 1 south of Fredericksburg, where congestion reaches almost 170 person-hours of delay. Peak-period passenger delays account for 46 percent of daily congestion.

Freight Delays

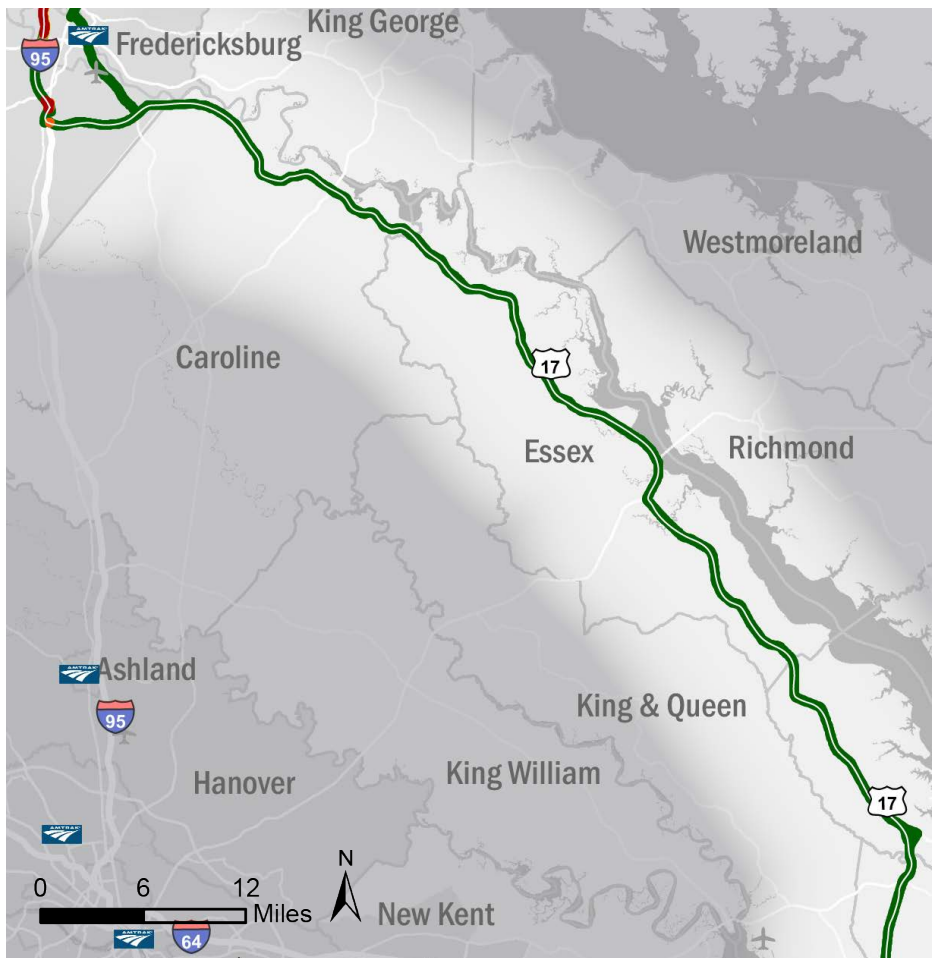
Freight delays along Segment A2 are higher than Segment A1, although the ton-hours of delay per mile are significantly less than the CoSS statewide average. Freight delays throughout most of the segment are less than 100,000 ton-hours per mile. The only portion of Segment A2 with freight congestion issues is an area where US 17 runs concurrently with US 1 south of Fredericksburg, where congestion reaches almost 900,000 ton-hours of delay. Peak-period freight delays account for about 45 percent of daily congestion, more than the average peak-period contribution to congestion along CoSS segments.

Daily Person Hours of Delay Per Mile

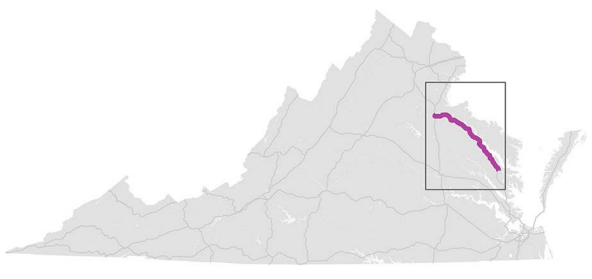


< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

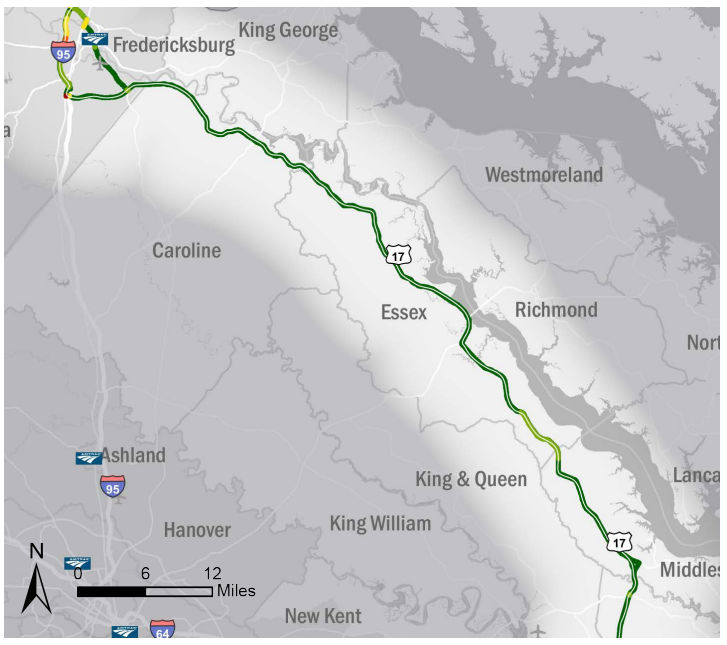


A2 SEGMENT NEEDS

Reliability

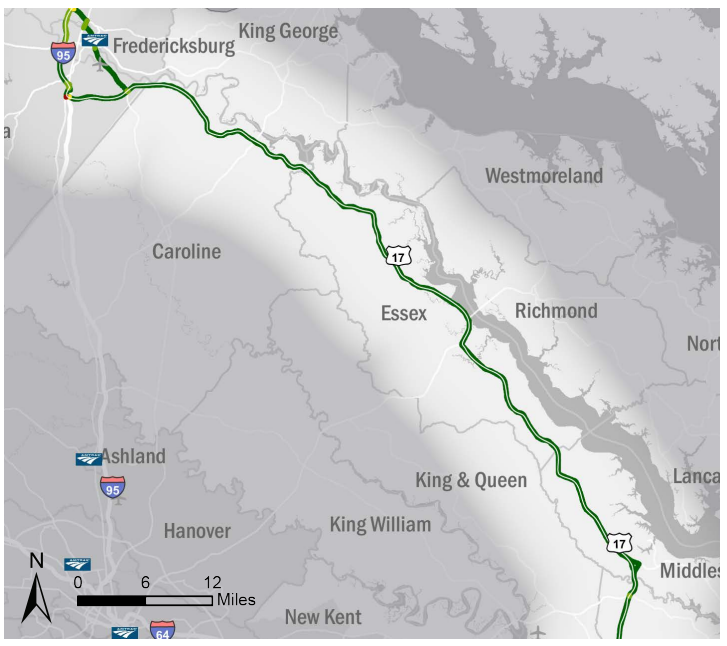
Weekday Peak Period

Reliability of travel during the peak period on a typical weekday on Segment A2 ranges from 0.00 to 0.93 in terms of reliability index, with an average value of 0.12. While this segment has an average level peak period reliability index, only a short segment where US 17 runs concurrently with US 1 in Spotsylvania County has a reliability index value exceeding the statewide threshold. Higher peak period reliability index values indicate that peak period travel (often related specifically to commuter traffic) is the most unpredictable.



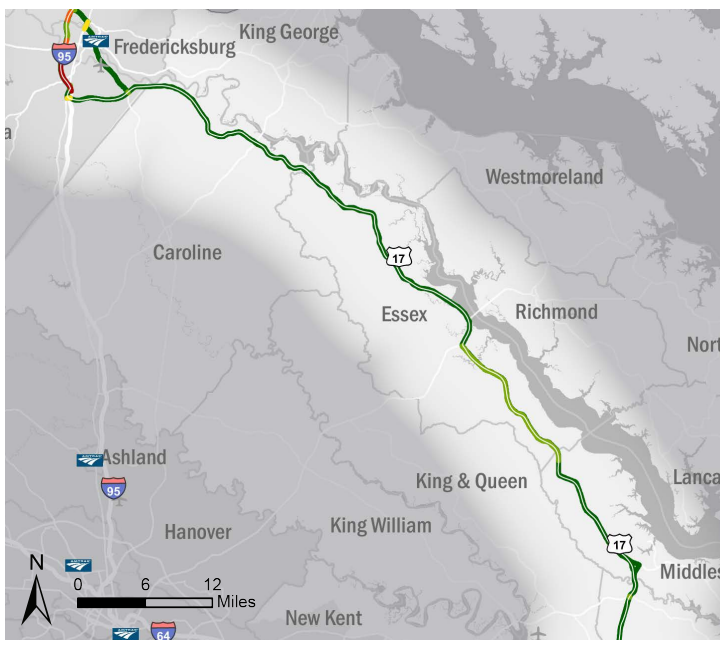
Weekday

Reliability of travel during a typical weekday ranges from 0.02 to 0.84 in terms of reliability index, with an average value of 0.1. While this segment has an average level weekday reliability index, only a short segment at the intersection with US 1 in Spotsylvania County has a reliability index value exceeding the statewide threshold. Higher weekday reliability index values indicate that daily weekday traffic is more unpredictable than weekend traffic.



Weekend

Reliability of travel during a typical weekend ranges from 0.03 to 0.52 in terms of reliability index, with an average value of 0.13. While this segment does have a weekend reliability index higher than average for the CoSS segments statewide, none of the locations along Segment A2 have reliability index values exceeding the statewide threshold.

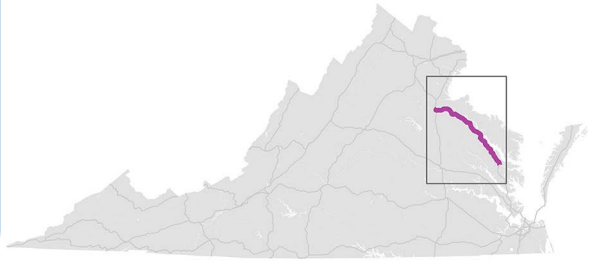


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



A2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

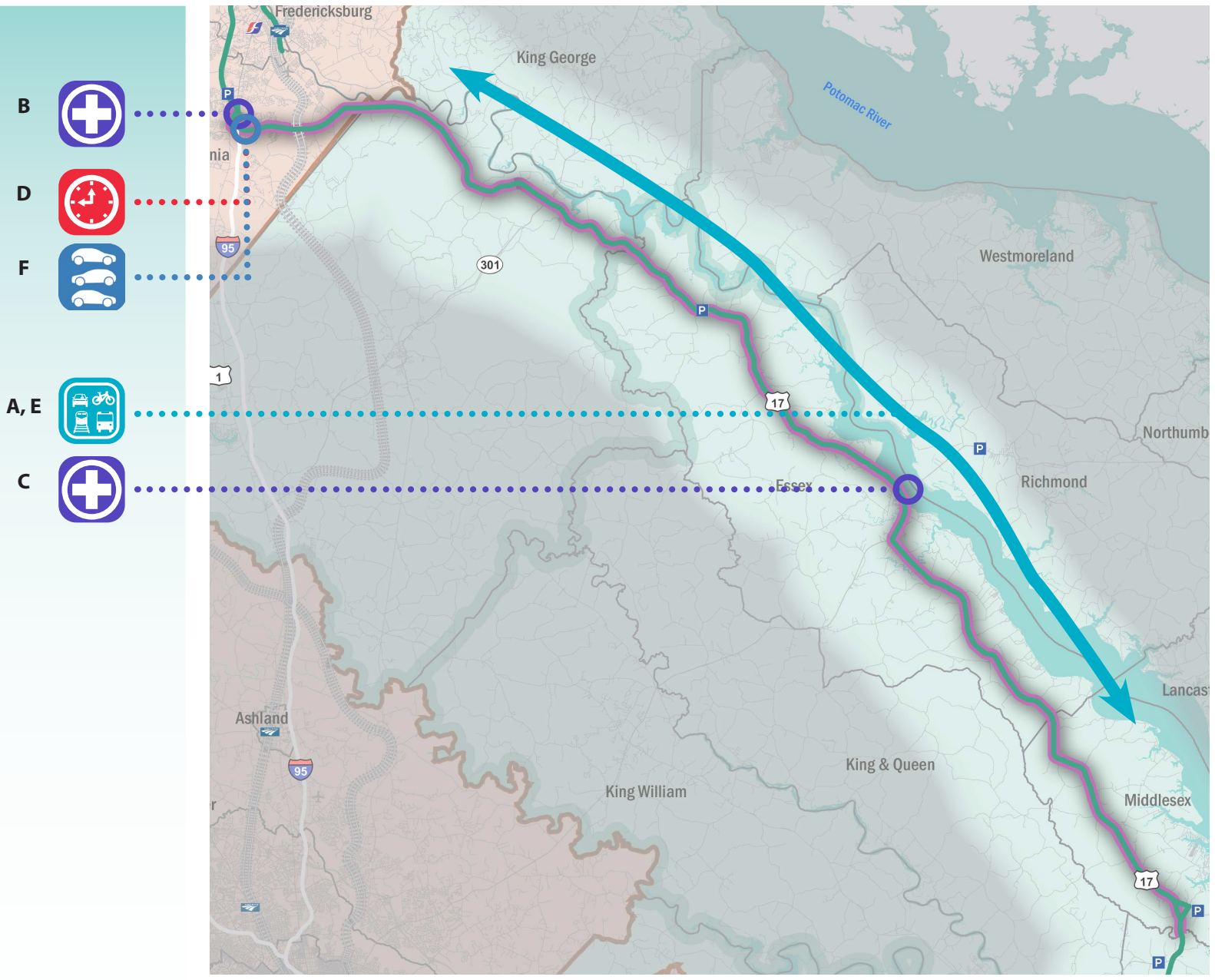
Mode Choice

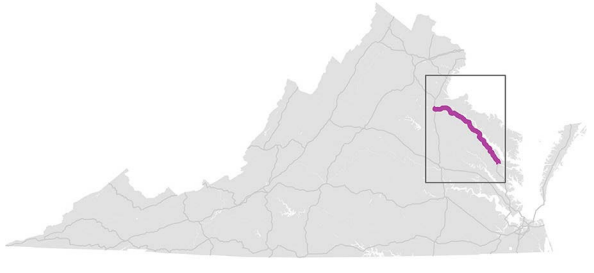
Safety

Congestion

Bottlenecks

Reliability

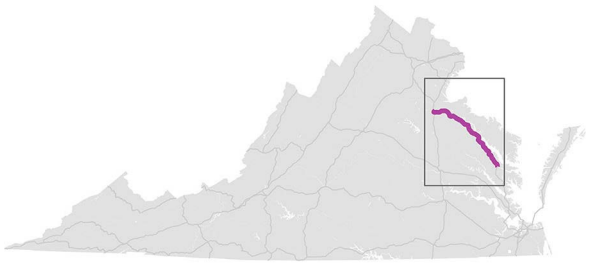




A2 SEGMENT NEEDS

Summary of Needs - A2 Segment

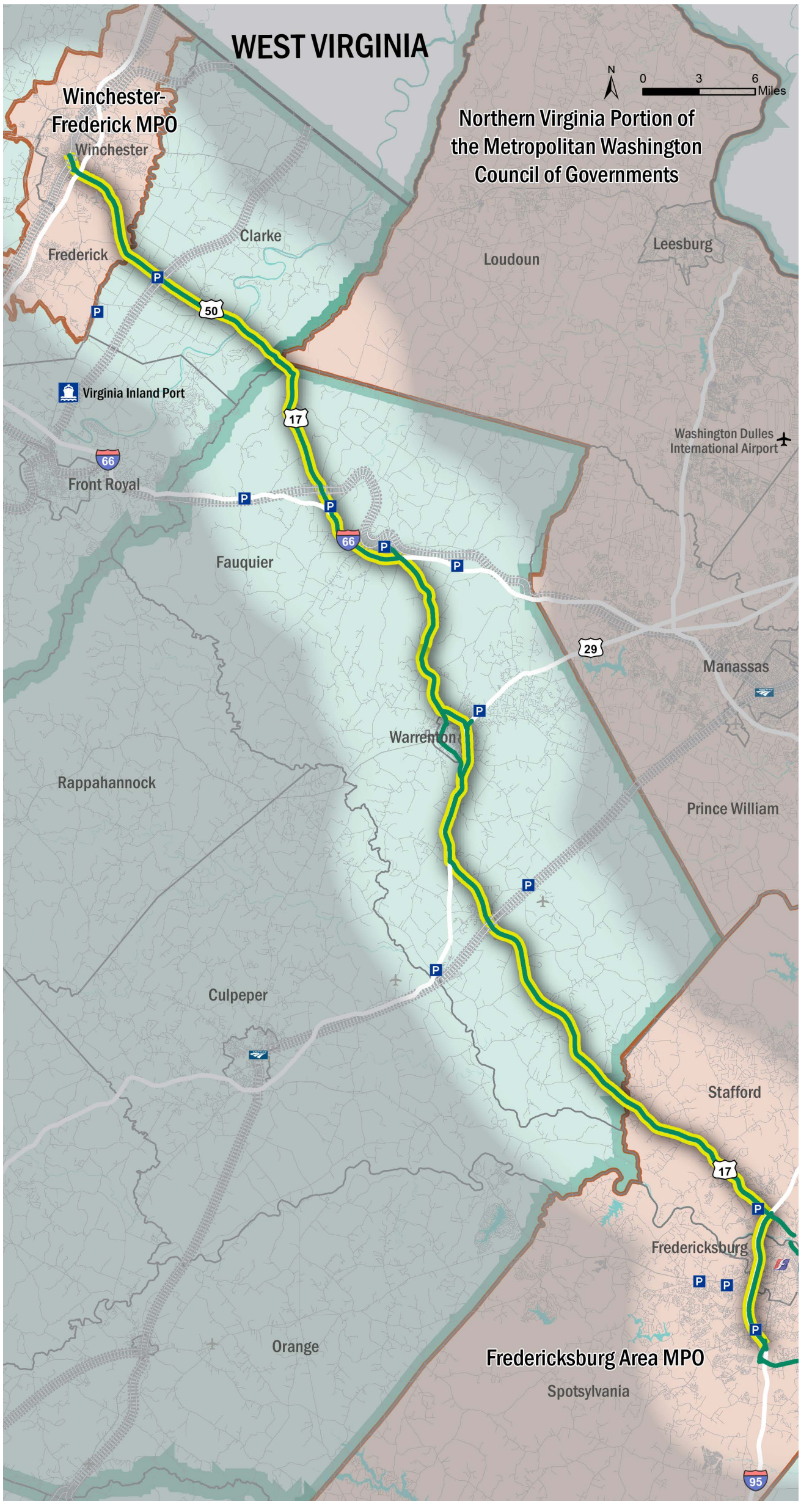
A.		Limited multi-modal commute options along US 17 in the Northern Neck and Middle Penninsula north to Fredericksburg/DC regions
B.		Safety issues at interchange of US 17/US 1/I-95
C.		US 17 in Tappahannock: 22 severe crashes at intersections
D.		Reliability issue at US 17 and I-95 south of Fredericksburg
E.		Limited availability of transit options from Hampton Roads to Metropolitan Washington region (5 buses, 1 rail trips daily) and Fredericksburg (2 buses, 1 rail trip daily). No transit options from Hampton Roads to Winchester.
F.		Congestion issue on US 17 between US 1 and I-95 south of Fredericksburg



IV. Segment A3

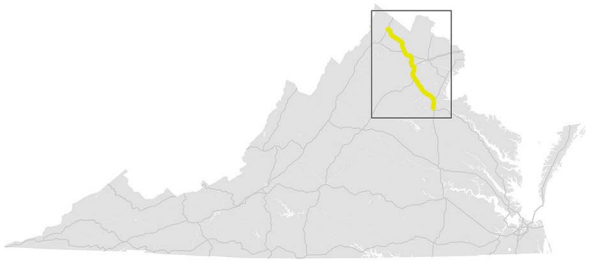
Corridor Segment A3 Components

- US 17 and US 17 Business

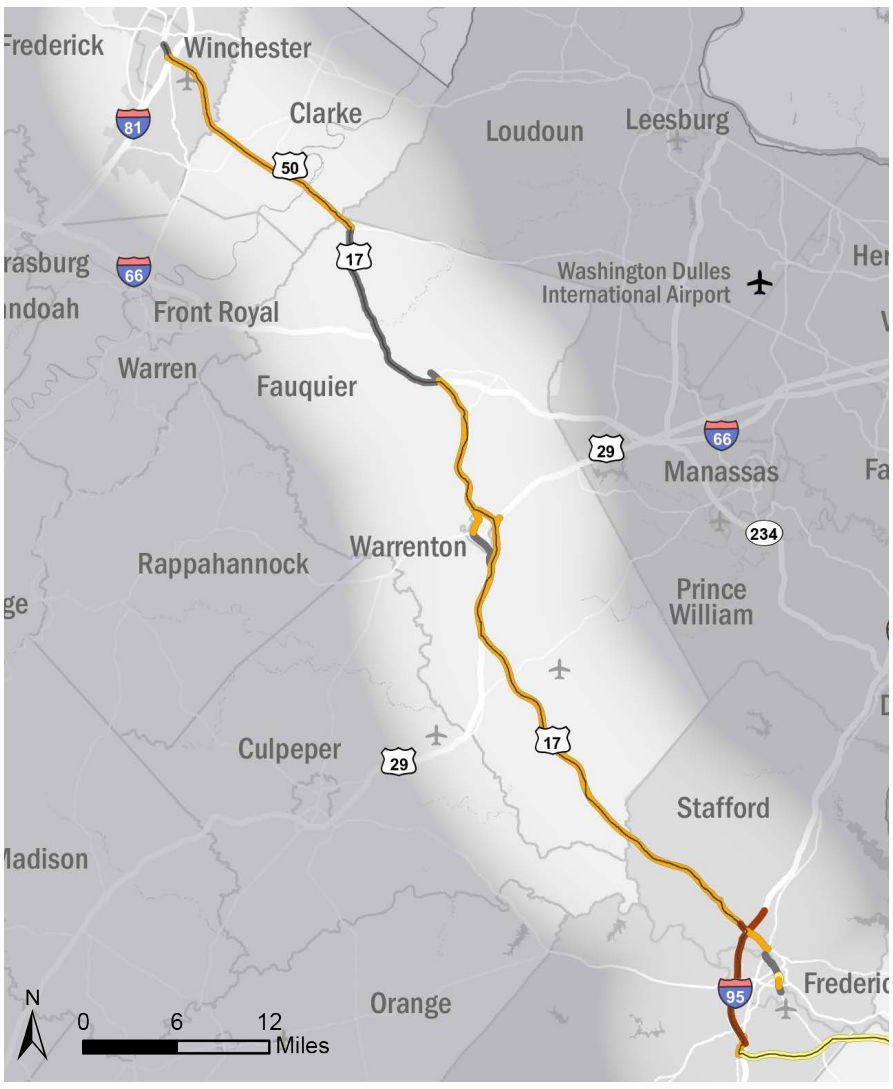


A3
Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

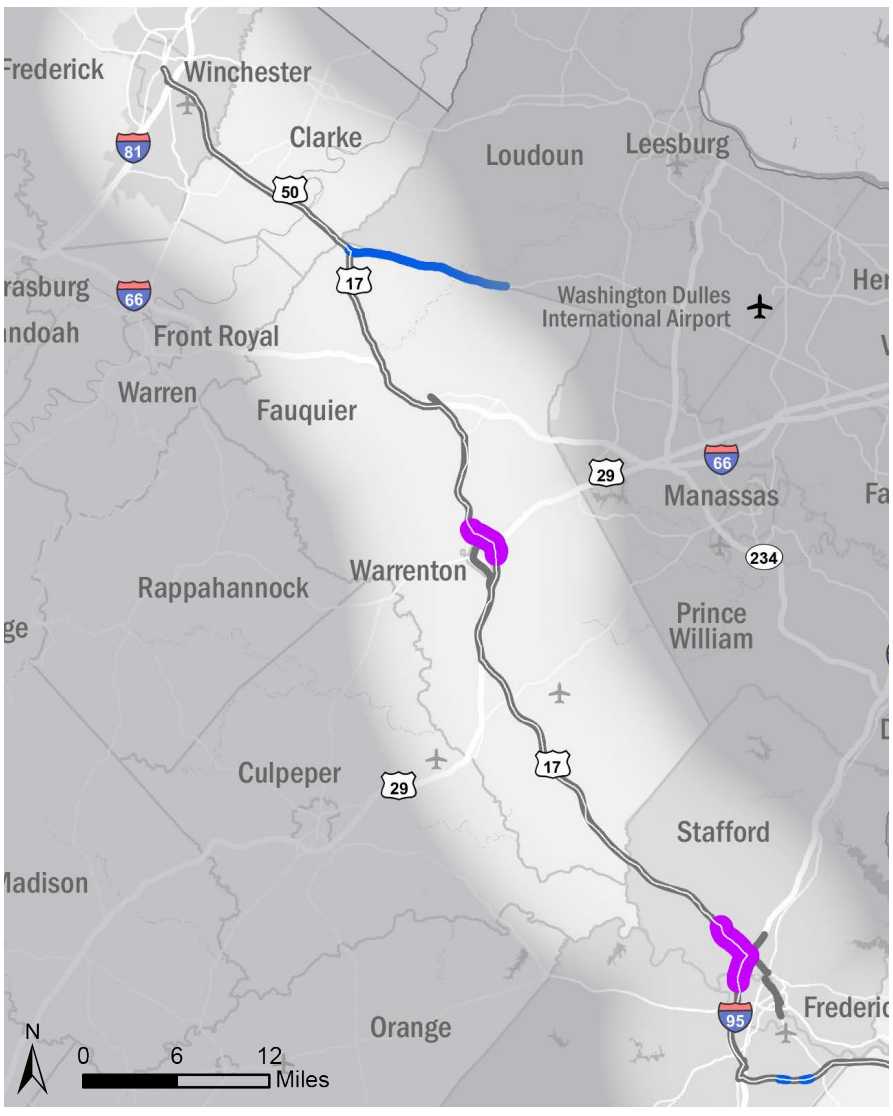


A3 SEGMENT PROFILE



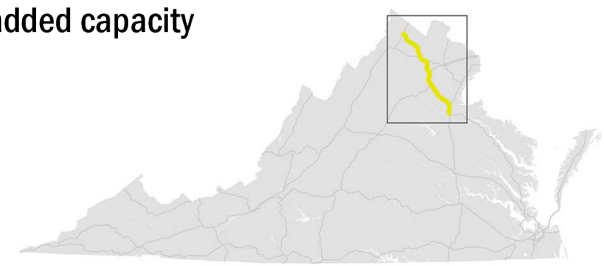
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



Segment A3 begins in Spotsylvania County, where US 17 joins I-95, and progresses north, leaving I-95 north of Fredericksburg, and serves Stafford, Fauquier, Clarke and Frederick Counties, as well as the Cities of Fredericksburg and Winchester. The segment travels through the Fredericksburg Area and the Winchester Area. The segment includes portions that overlap with I-66, I-95, US 1, US 29, and US 50.

Highway Facilities: US 17 is primarily a four-lane facility throughout its length, although it is a six-lane facility where it runs concurrently with I-95. Along US 17, there is significant out-of-state freight and passenger traffic that travels along the roadway. US 17 serves both through and local commuting traffic in rural areas. There are no parallel highway facilities that follow US 17. Segment A3 functions as an alternative connection from I-95 to I-81 and the Virginia Inland Port. Restrictions on US 17 between I-66 and US 50 prohibit through tractor trailers.

Transit Service: Transit services provide connections from Segment A3 to Northern Virginia and Washington DC, including Virginia Railway Express (VRE) service at Fredericksburg and commuter bus services throughout the segment. Amtrak and Greyhound provide service from Fredericksburg, and Park-and-Ride locations are available, especially near Fredericksburg.

Rail Facilities: Rail facilities parallel Segment A3 in the area where US 17 runs concurrently with I-95 and travel parallel to CSX's National Gateway Corridor.

Port Facilities: US 17 provides a connection to the Virginia Inland Port via I-66.

Airport Facilities: No commercial air service is available in Segment A3, though two reliever airports and two general aviation airports are present.

Major planned and future projects include:

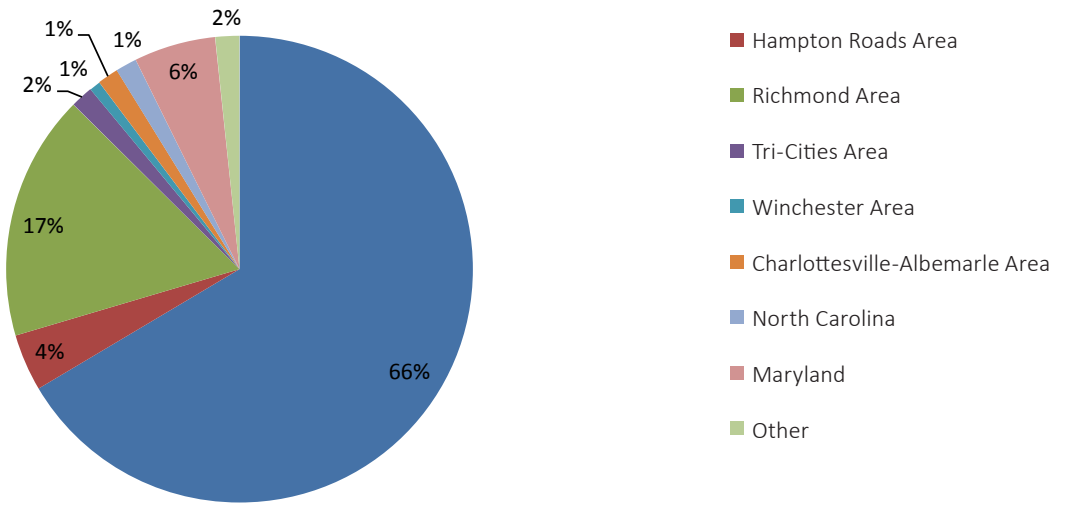
- Ramp improvements of I-95 at Exit 133 (US 17)
- Addition of two through-lanes in Stafford County

Travel Demand

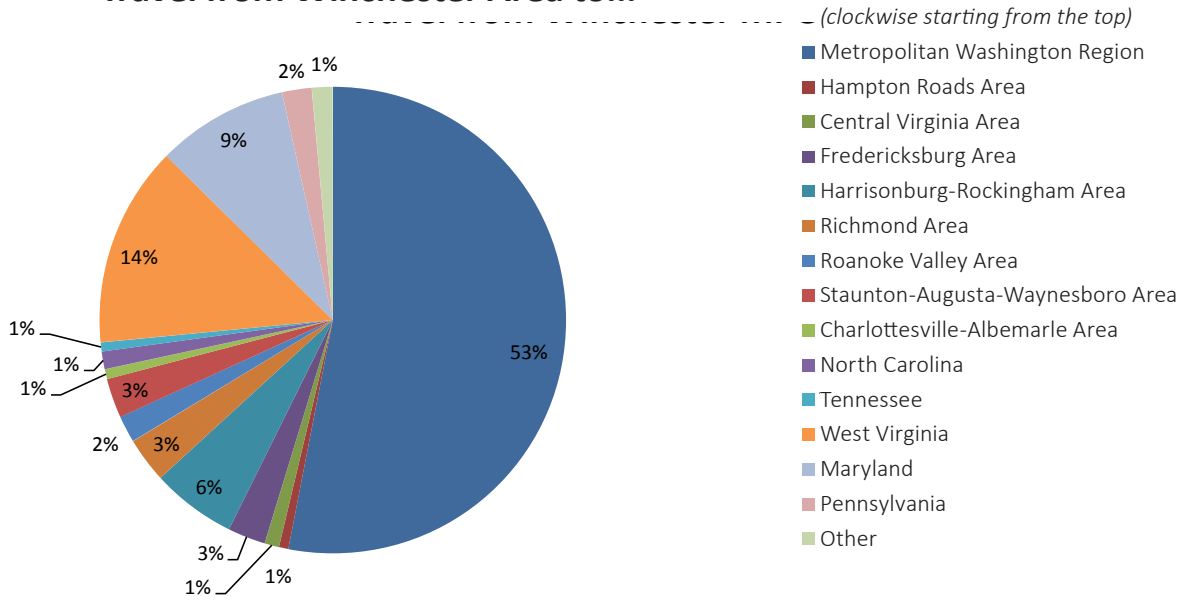
Passenger Demand

The northernmost segment of Corridor A connects the Fredericksburg Area with the Winchester area in the far northwest portion of the state. Travel between Winchester and the Metropolitan Washington region, which would likely use a portion of Segment A3, accounts for just over three percent of the intercity passenger travel in the Commonwealth. Of the intercity passenger traffic originating in the Fredericksburg Area, only a very small portion (the one percent destined for Winchester) is likely to use this segment. More of the intercity passenger travel originating in Winchester is likely to use Segment A3, including the 53 percent destined for the Metropolitan Washington region and the three percent destined for Fredericksburg.

Travel from Fredericksburg Area to...



Travel from Winchester Area to...



A3 SEGMENT PROFILE

Freight Demand

By truck, Segment A3 carried 103 million tons of freight worth $160 billion in 2012, and is estimated to carry 143 million tons of freight worth $236 billion in 2025. The major travel patterns on Corridor A are similar to those on Corridor K, as US 17 (Segment A3) runs concurrently with I-95 (Segment K3) near Fredericksburg. Interstate truck freight traffic passing though Virginia on Corridor A accounts for more than 40 percent of the total tonnage in both 2012 and 2025, as well as 60 percent of the total freight value for both years. In terms of tonnage, North Carolina is the largest source of truck freight on Corridor A and Maryland is the largest destination outside of the Commonwealth. In terms of value, Florida is the largest destination for truck freight on Corridor A. Most of the major truck freight travel patterns on Corridor A are between the Middle Atlantic and Southeastern regions. Approximately five to six percent of freight on Corridor A originates from the jurisdictions adjacent to Segment A3, representing only around one percent of the total corridor truck freight value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (34% / 35%)
2. North Carolina (15% / 14%)
3. Pennsylvania (10% / 10%)
4. Maryland (8% / 8%)
5. Florida (6% / 5%)

Corridor Tonnage Originating in Segment A3: 6% / 5%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
City of Norfolk* and North Carolina
City of Chesapeake and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (34% / 36%)
2. Maryland (13% / 13%)
3. North Carolina (9% / 9%)
4. Pennsylvania (9% / 8%)
5. New York (8% / 7%)

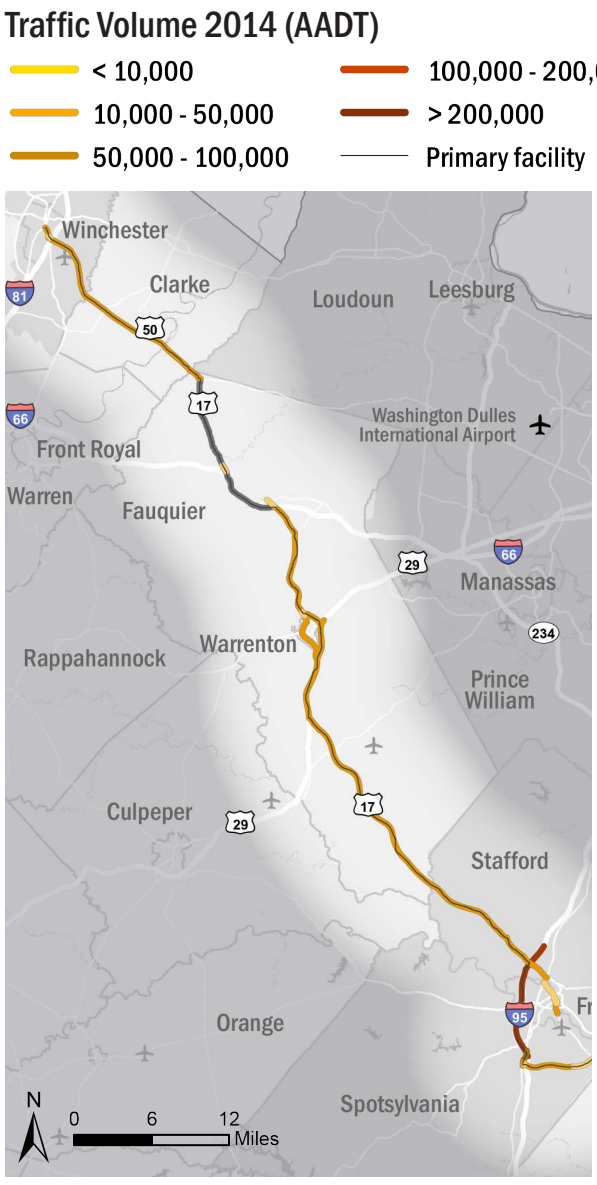
Corridor Tonnage Destined for Segment A3: 3% / 3%

Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment A3 is moderate relative to traffic volumes on the other segments of Corridor A. The highest levels of traffic in 2014 occurred on the portion where US 17 runs concurrently with I-95, where daily volumes reached over 140,000 vehicles per day. Elsewhere along the segment, 2014 volumes are less than 45,000 vehicles per day. The concurrent portion of I-95/US 17 is projected to have the highest growth in traffic volumes by 2025 (more than 25,000 additional vehicles per day) and will continue to have the highest traffic volumes of anywhere on Segment A3. The segment of US 17 that runs concurrently with US 29 south of Warrenton is projected to experience traffic volumes greater than 50,000 vehicles per day by 2025.

Traffic Volume 2014 (AADT)

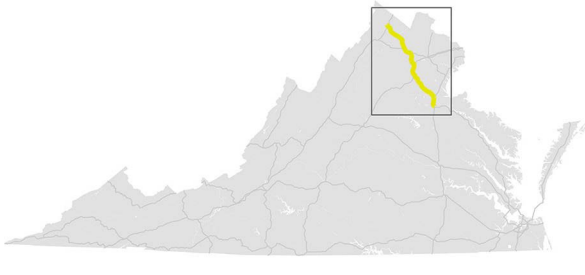


Traffic Volume 2025 (AADT)

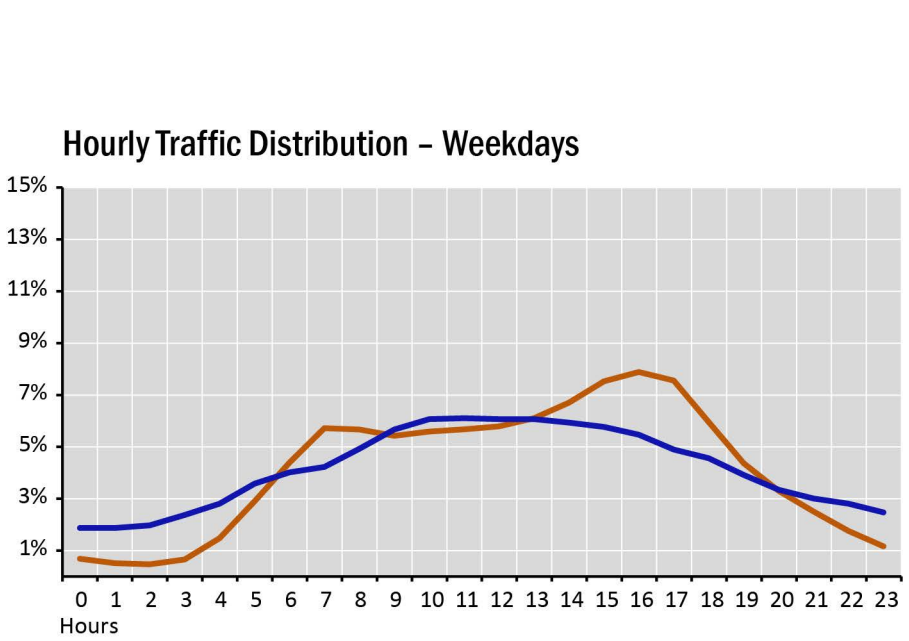


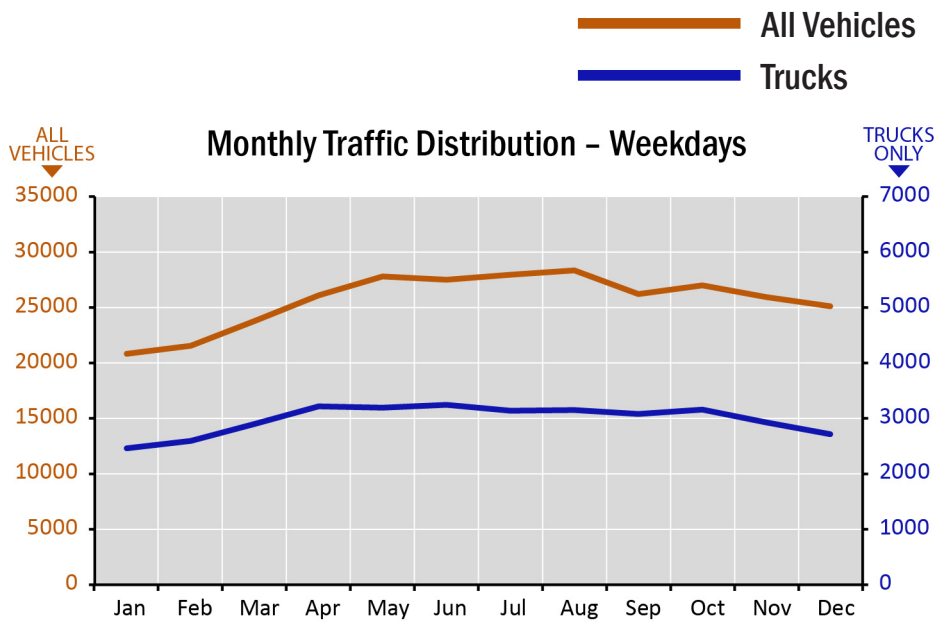
Change in Traffic Volume 2014- 2025 (AADT)

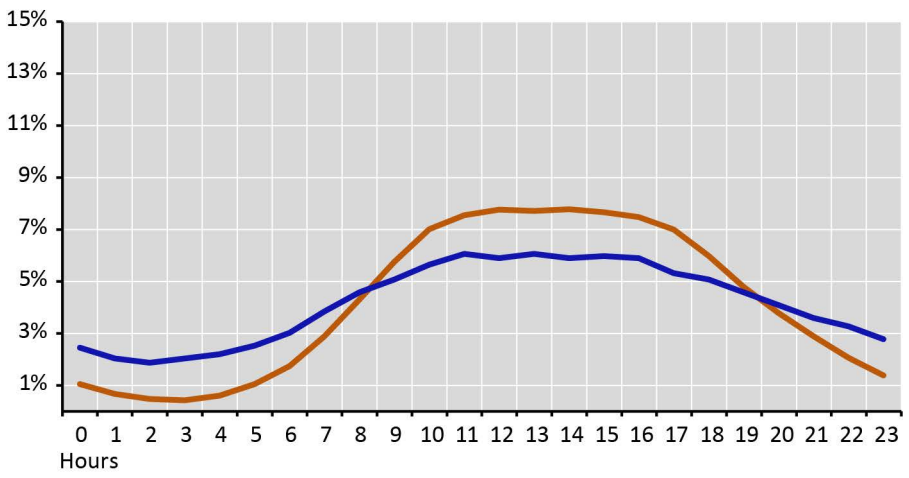


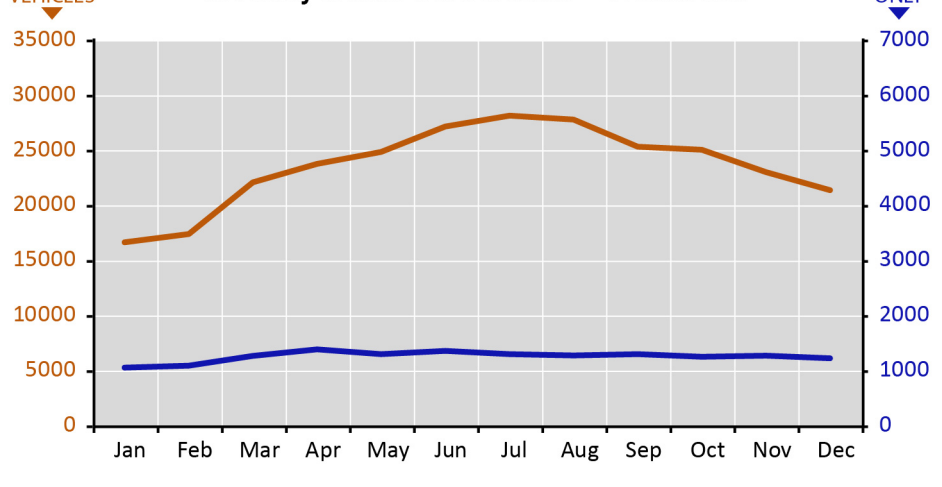


A3 SEGMENT PROFILE









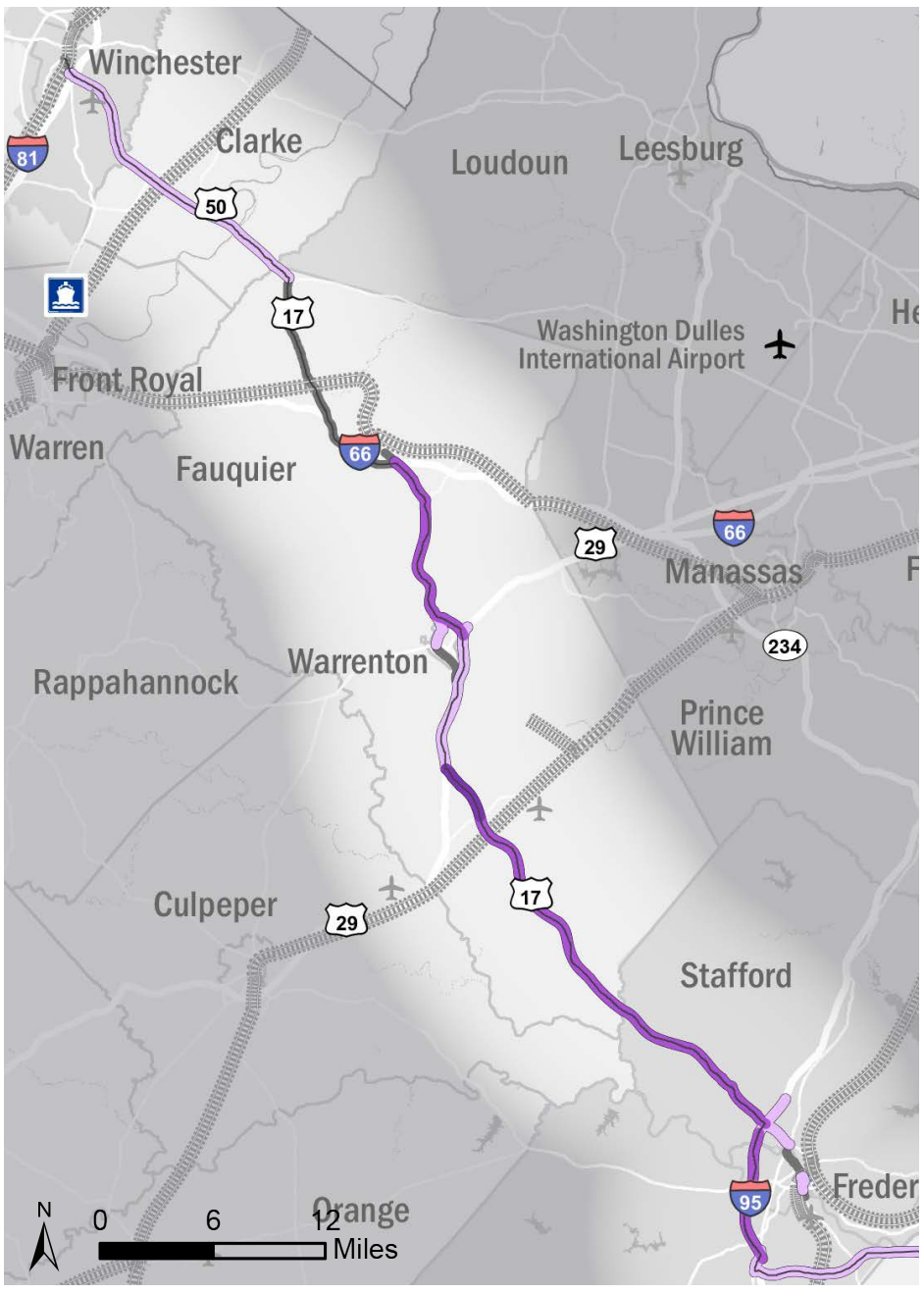
Traffic Distribution

On average, traffic on Segment A3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, although traffic levels remain relatively high throughout the middle of the day. The highest hourly traffic occurs between 4 and 5 p.m. and accounts for 7.8 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 5.7 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 50 percent of total daily traffic. Patterns for truck traffic are different from passenger traffic, with a smaller midday peak between 10 a.m. and 4 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day, between 11 a.m. and 6 p.m., which accounts for over 60 percent of daily traffic. Weekend truck traffic peaks between 11 a.m. and 5 p.m.

Weekday traffic volumes on Segment A3 vary by as much as 36 percent throughout the year, with the highpoint in August (around 28,000 vehicles per day) and the low point in January (around 21,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the June high (around 3,200 vehicles per day) being 32 percent higher than the January low (around 2,500 vehicles per day). Weekend traffic levels vary even more, and the highest levels of weekend traffic (July, around 28,000 vehicles per day) are 70 percent higher than January levels (around 16,000 vehicles per day), indicating significant seasonal traffic variation on this segment. Weekend truck traffic is highest in April and 32 percent higher than the January low. Traffic conditions on Segment A3 are much more responsive to variations in automobile traffic than truck traffic, as truck traffic accounts for only five percent of daily traffic.

Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment A3 is high relative to other segments in Corridor A. On I-95/US 17 in Segment A3, heavy trucks make up seven percent of total traffic. To the north, between I-95 and US 29, heavy trucks along US 17 comprise 8 to 11 percent of total traffic. North of Warrenton, heavy vehicles account for less than six percent of total vehicle traffic on US 17.

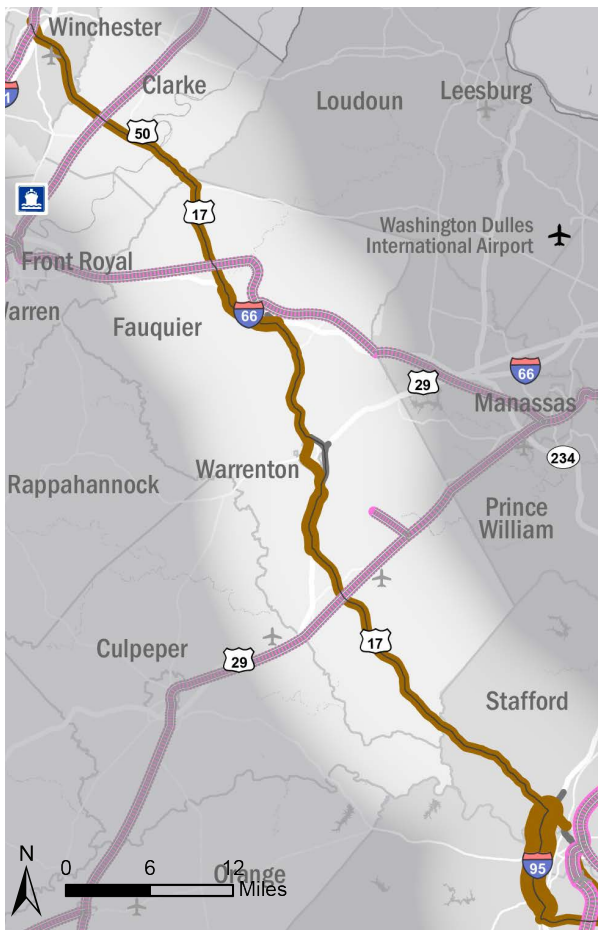


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

A3 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

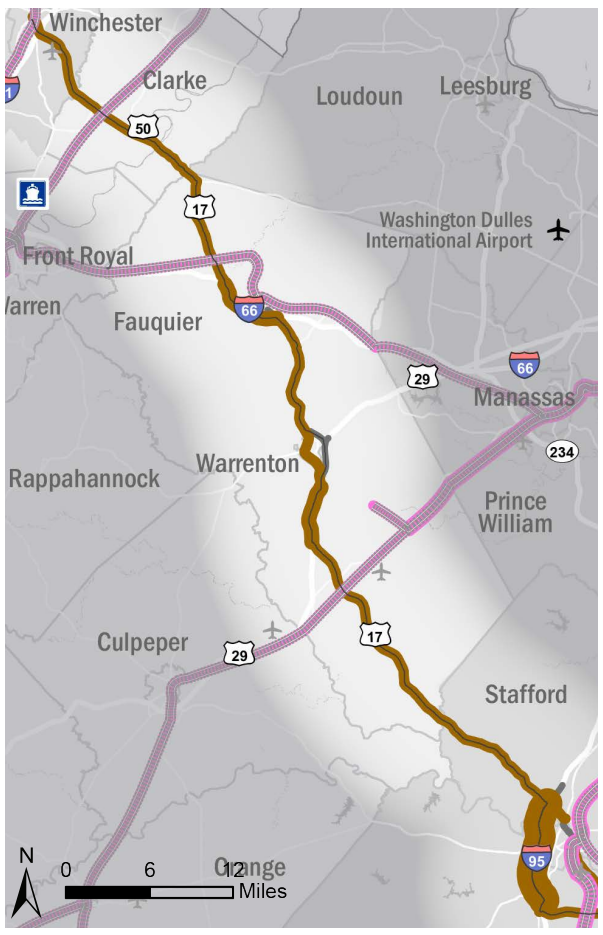


Freight Flows

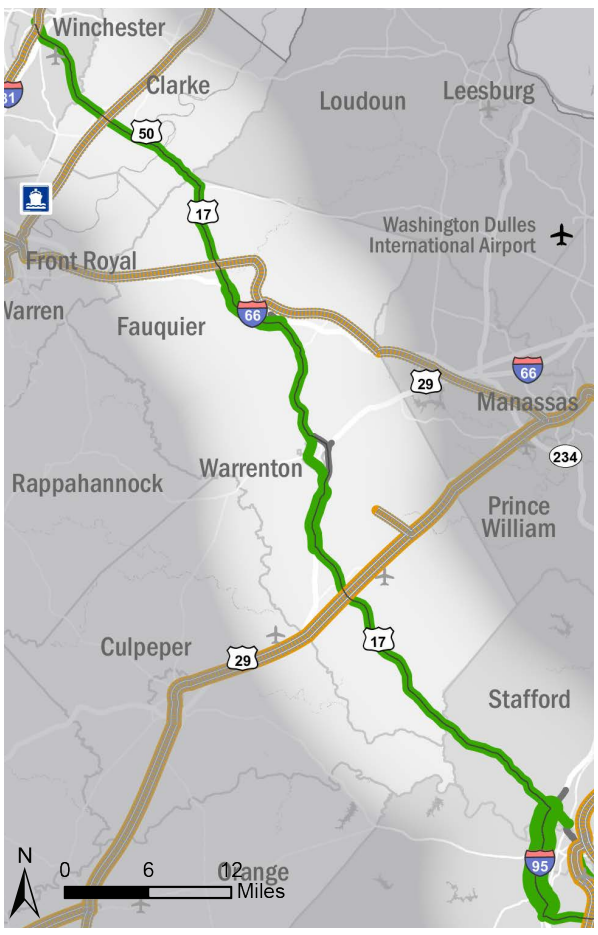
In the Fredericksburg area, where Segment A3 runs concurrently with I-95, freight is moved primarily by truck, in terms of both tonnage and value. In total, 103 million tons (87 percent) of freight travels through this section of Segment A3 by truck, compared to 16 million tons by rail. By value, the difference is even starker, with $160 billion (90 percent) of freight value traveling by truck, compared to $18 billion by rail. On average, a ton of freight traveling through the Fredericksburg section of Segment A3 by truck is worth $1,553 while a ton of freight traveling by rail is worth $1,129. In 2025, both rail and truck freight tonnages and total values in the Fredericksburg area are expected to increase, but the percentages of tonnage and value moved by truck, and the values per ton on truck and rail, are expected to remain nearly the same.

Similarly, in Fauquier County where Segment A3 runs concurrently with I-66, freight is moved primarily by truck, in terms of both tonnage and value, but the value per ton on rail is higher than the value on truck. 10 million tons (96 percent) of freight travels through this section of Segment A3 by truck, compared to 478,000 tons by rail. By value, truck is still the primary carrier of freight, with $13 billion (92 percent) traveling by truck, compared to $1.1 billion by rail. On average, a ton of freight traveling through this section of Segment A3 by truck is worth $1,241 while a ton of freight traveling by rail is worth $2,378. In 2025, both rail and truck freight tonnages and total values in this section of Segment A3 are expected to increase, but the percentages of tonnage and value moved by truck, and the values per ton on truck and rail, are expected to remain nearly the same.

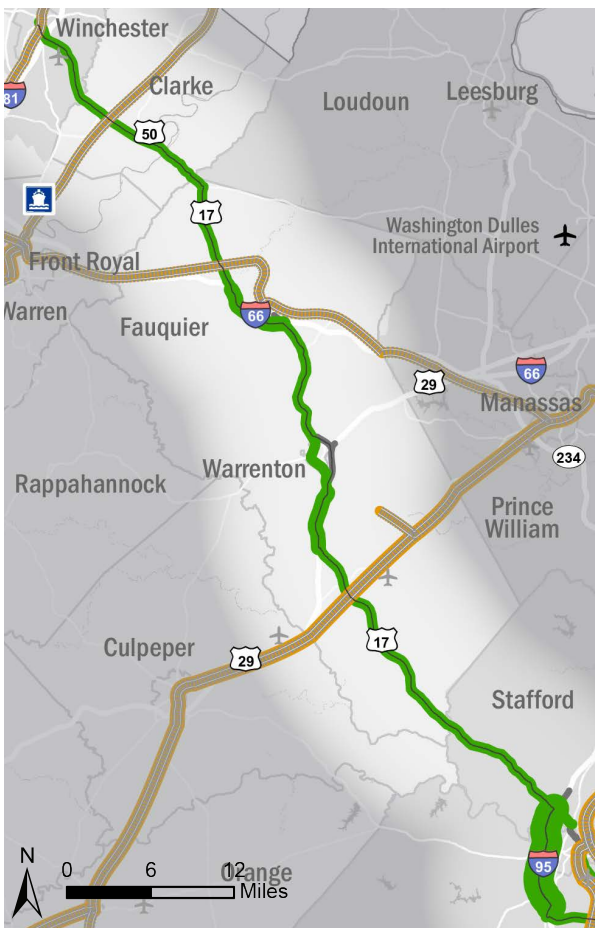
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight Value

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight Value

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment A3 of the Coastal Corridor have few travel options, both in terms of travel path and mode choice. Near Fredericksburg, there are an ample number and variety of mode choices, but those options are related to trips to Northern Virginia and Washington, DC, not following US 17 as it travels northwest towards Winchester. For trips from Fredericksburg to Washington, DC, automobile trips are cost-competitive with the alternate modes, although bus and rail trips occur with far more frequency than in other regions. Trips from the Hampton Roads Area and Fredericksburg to areas west of I-95, including Winchester, can only be made by automobile.

Comparable Travel Options

Fredericksburg to Winchester

Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Auto
Via US 17: 1:35 Travel Time $45 Est. Cost

Hampton Roads (Norfolk) to Winchester

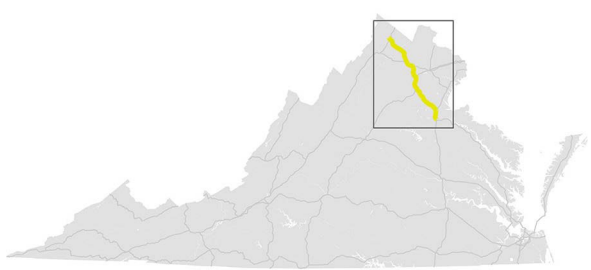
Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

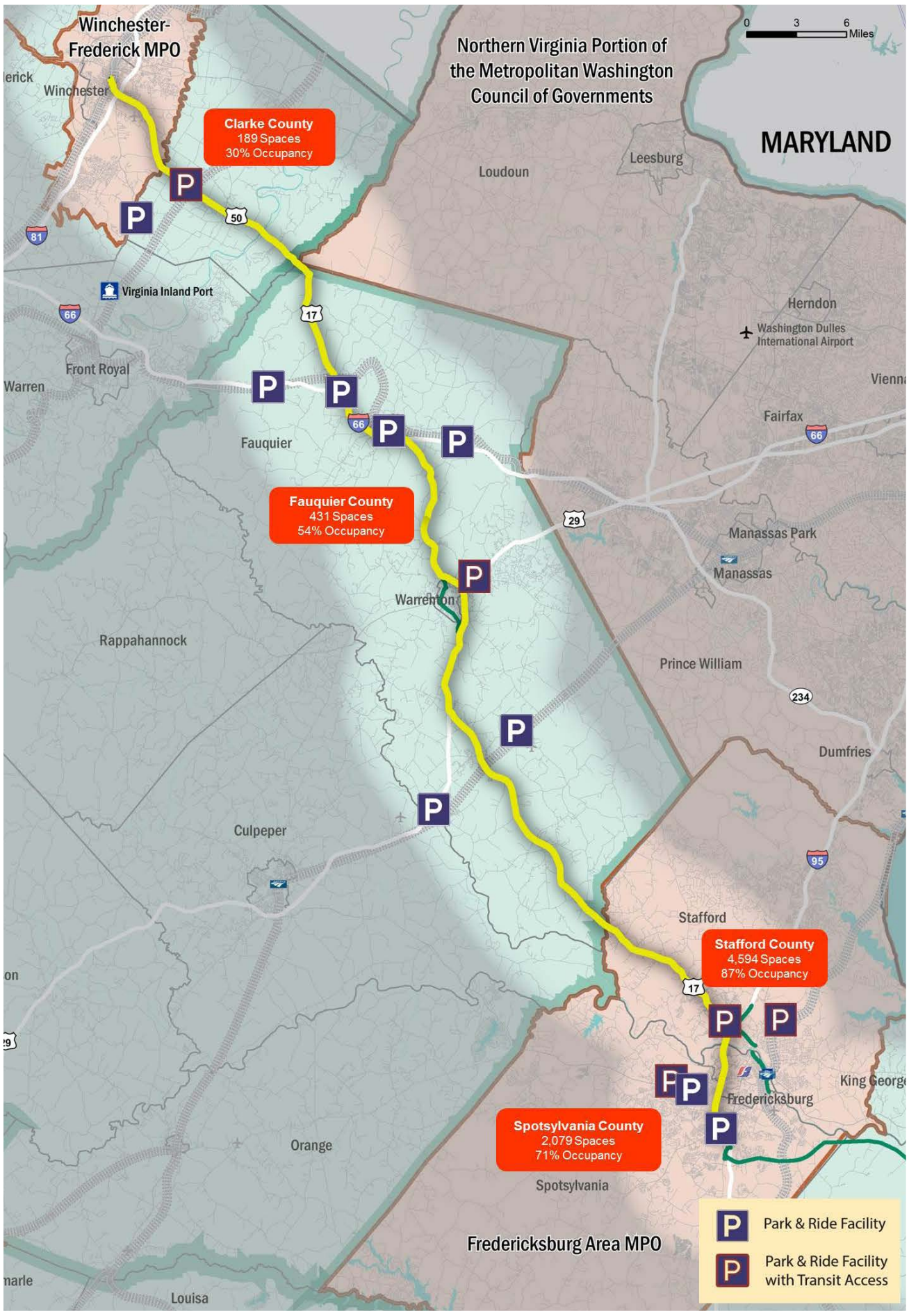
Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Auto
Via US 17: 4:20 Travel Time $132 Est. Cost
Via I-64/I-95/US 17: 4:00 Travel Time $125 Est. Cost

Park-and-Ride

Within Segment A3, commuters can utilize many Park-and-Ride locations, especially near Fredericksburg. Stafford County provides the highest number of Park-and-Ride spaces and locations, while the City of Fredericksburg has the highest utilization rate of spaces available in the Commonwealth. Stafford County and the City of Fredericksburg both have higher rates for Park-and-Ride utilization (87 percent and 124 percent, respectively) than the statewide average, which is 76 percent.





A3 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	224
Severe Crashes/Million VMT	1.3
Number of Railroad Crashes	5

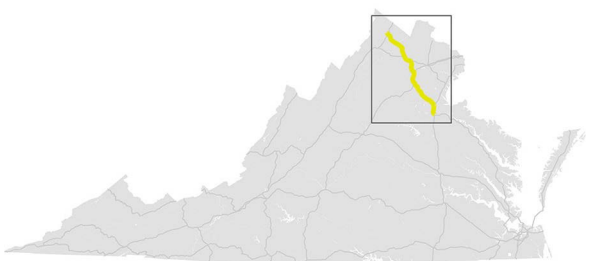
Between 2010 and 2012, 224 severe crashes occurred on Segment A3, resulting in the lowest crash rate (1.3 crashes per million VMT) on the Coastal Corridor. The largest concentration of severe crashes occurred on US 17 (Warrenton Road) just north of I-95, north of Fredericksburg, over a span of about 1.6 miles. Between Sanford Drive and International Parkway, there were 58 crashes. Of the 58 crashes, 11 occurred at the intersection with International Parkway and 12 occurred at the intersection with Sanford Drive. Another area with a high concentration of crashes is along approximately 1.5 miles of Warrenton Road/US 17 Business in Falmouth. There were 41 crashes along the span between I-95 and US 1, of which 14 occurred at the intersection with Washington Street. Another high-crash area is a 0.9-mile span along US 17 (Millwood Pike) near the intersection with I-81 in Winchester. North of I-81, 14 crashes occurred at the intersection of US 17 with Pleasant Valley Road. South of I-81, another five crashes occurred, totaling 19 severe crashes in a span of less than one mile. Additionally, in Warrenton, on US 17 Business, there were 21 crashes over 1.65 miles between Broadview Avenue and Keith Street.

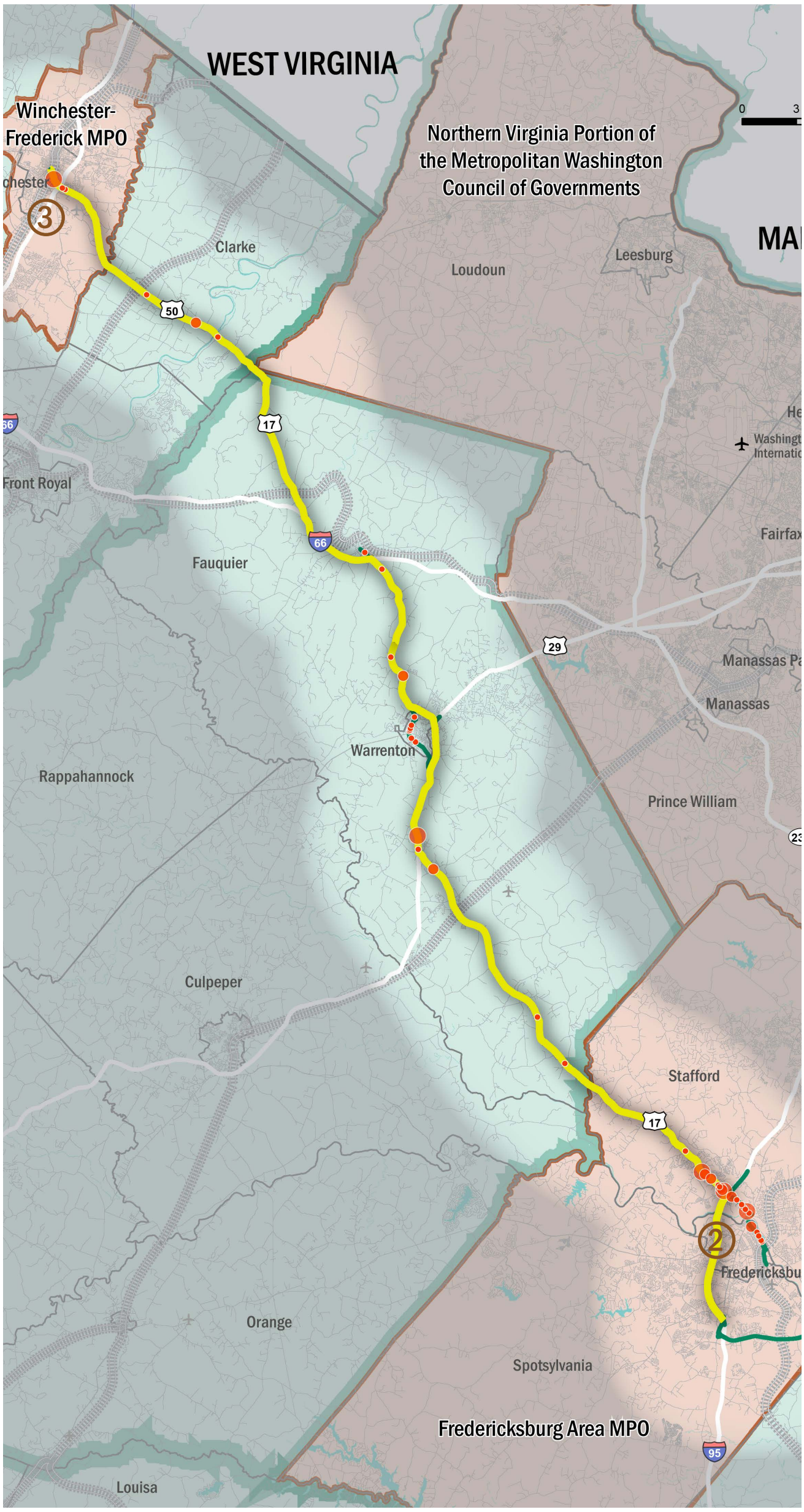
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/ Accidents per County (2011-2014)

#





A3 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	22
Freight Ton Hours of Delay per Mile	56K

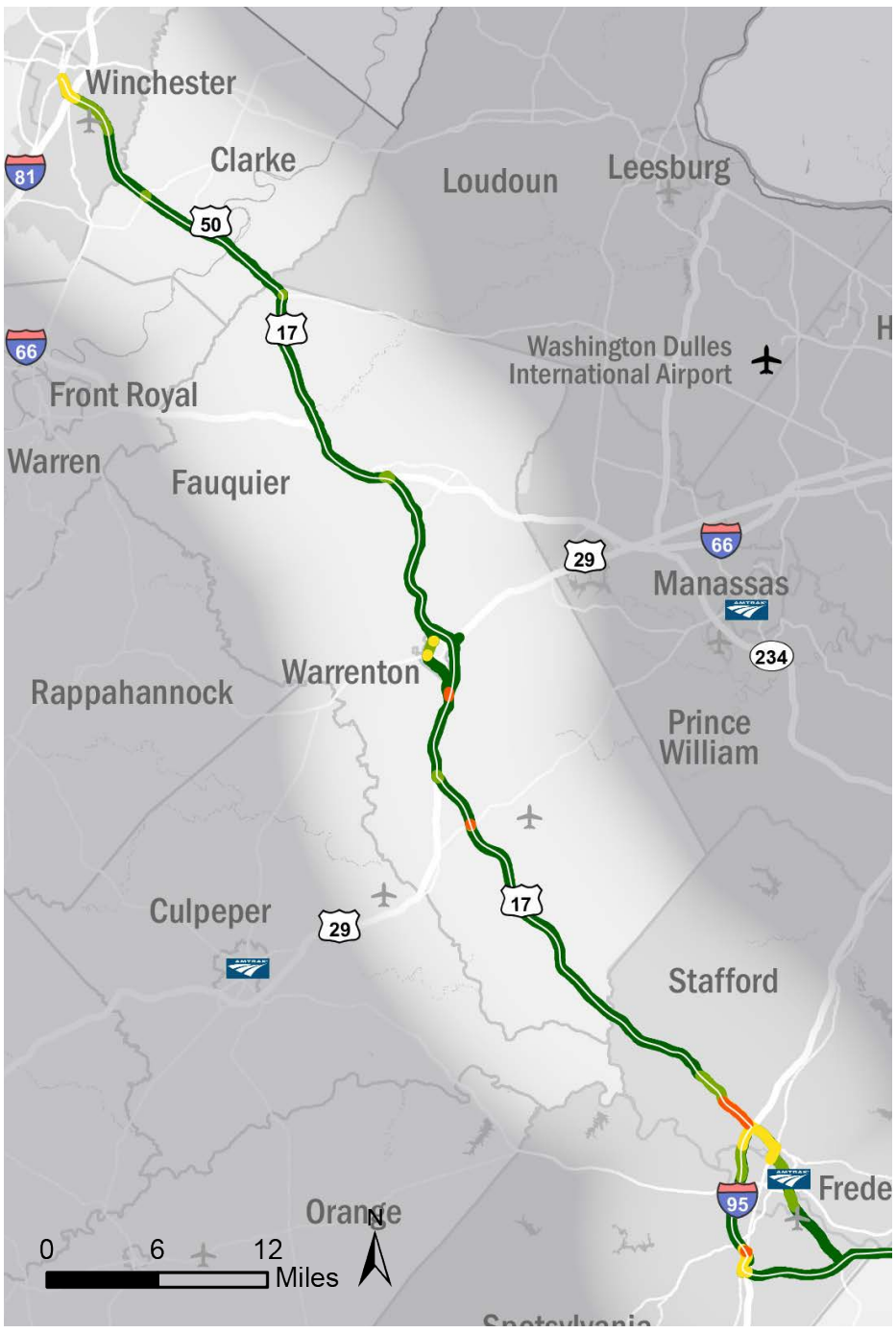
Passenger Delays

Because Segment A3 passes through Fredericksburg and includes a portion where US 17 runs concurrently with I-95, delays along this segment are greater than along Segment A2, for a total of almost 4,500 person-hours of delay. Overall congestion is not as severe as along Segment A1, although parts of Segment A3 through Fredericksburg are as congested as Segment A1. Areas with significant person-hours of delay include US 17 in Winchester, US 17 Business near Warrenton, US 17 south of I-95 in Spotsylvania County, and I-95 north of Fredericksburg, US 1, US 17, and US 17 Business in Stafford County. Peak-period passenger delays account for slightly more than half of daily congestion, similar to Segment A1.

Freight Delays

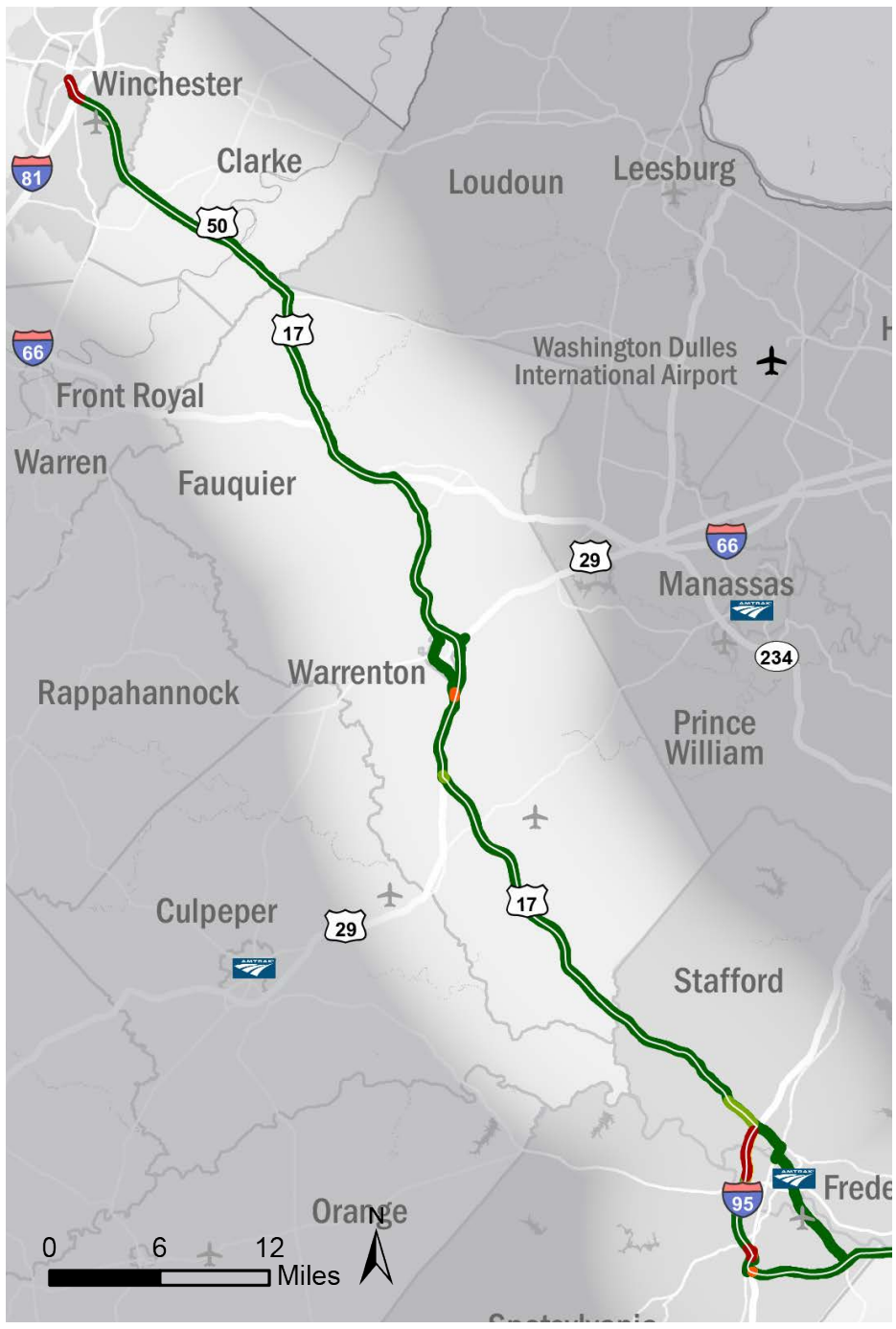
Freight congestion along Segment A3 is among the most severe freight congestion in Virginia, with over 11 million ton-hours of delay, although it is not as significant in terms of ton-hours of delay per mile. The areas of Segment A3 with the highest levels of freight delay include the area where US 17 runs concurrently with I-95 in and near Fredericksburg, US 17 in Winchester, US 17/US 29 at US 17 Business near Warrenton, and the ramps at the interchange between I-95 and US 1/17 in Spotsylvania County. Peak-period freight delays along Segment A3 account for about 51 percent of daily congestion, more than along Segments A1 and A2, and are fairly high for CoSS segments.

Daily Person Hours of Delay Per Mile

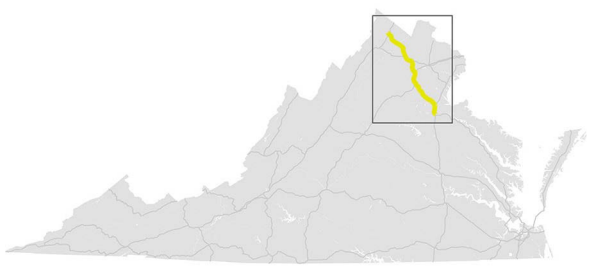


< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



A3 SEGMENT NEEDS

Reliability

Weekday Peak Period

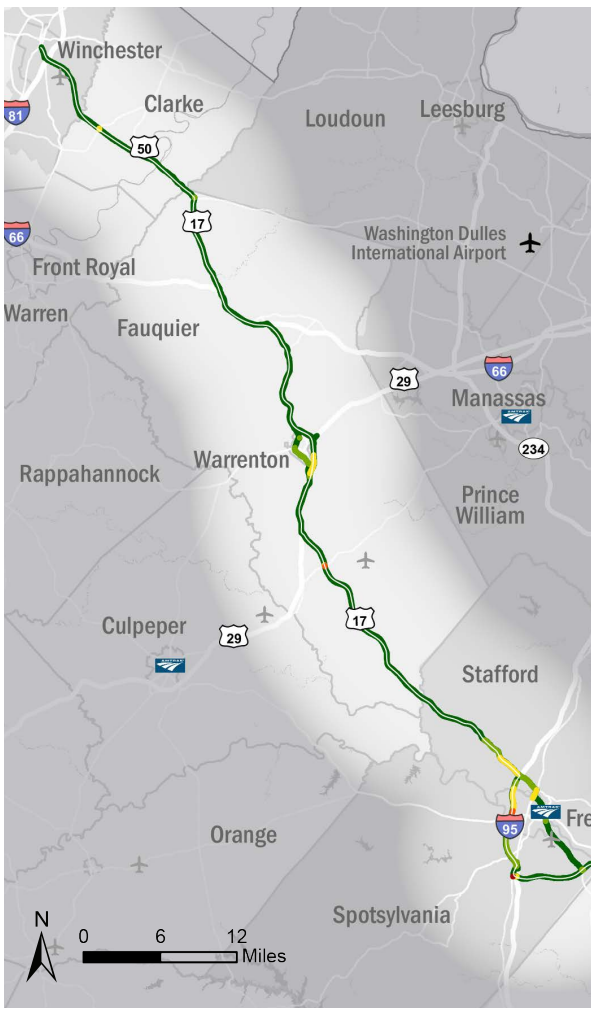
Reliability of travel during the peak period on a typical weekday on Segment A3 ranges from 0.0 to 0.77 in terms of reliability index, with an average value of 0.13. While this segment does have a peak period reliability index higher than average for the CoSS segments statewide, none of the locations along Segment A3 have reliability index values exceeding the statewide threshold.

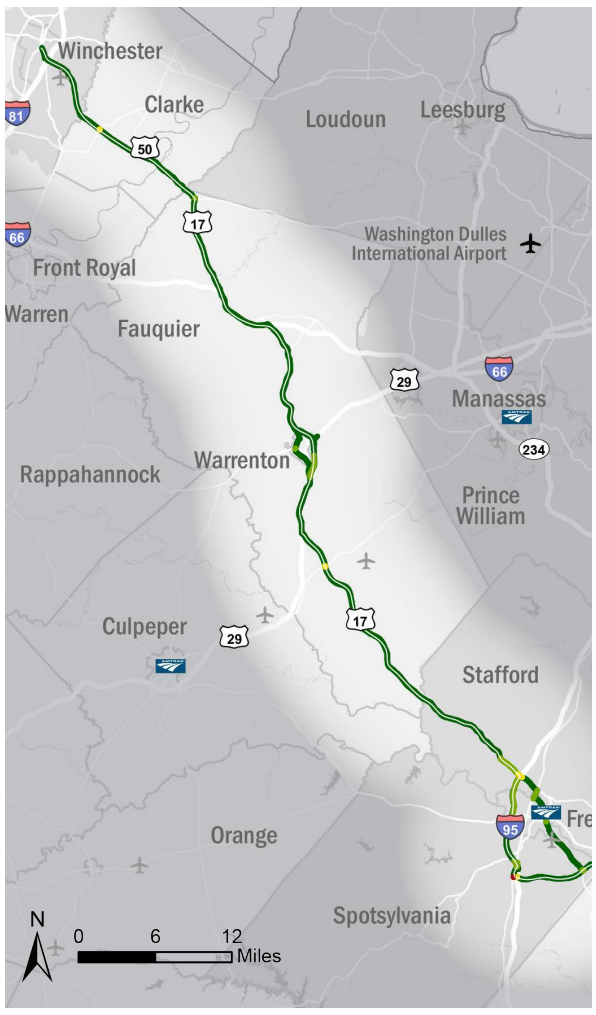
Weekday

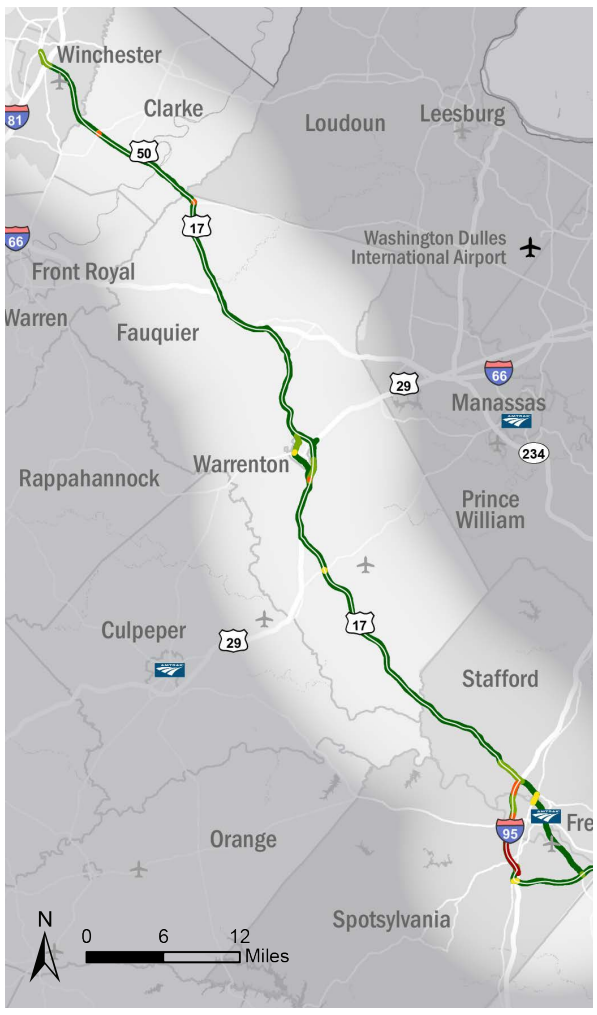
Reliability of travel during a typical weekday ranges from 0.00 to 0.49 in terms of reliability index, with an average value of 0.11. Locations where the weekday reliability index exceeds the statewide threshold include US 17 at Route 28 in Bealton, US 17/US 50 at US 340 in Clarke County, and US 17 at I-95 north of Fredericksburg.

Weekend

Reliability of travel during a typical weekend ranges from 0.0 to 1.07 in terms of reliability index, with an average value of 0.15. The maximum and average weekend reliability indices along Segment A3 are in the top five among the CoSS segments. Areas in which the weekend reliability index exceeds the statewide threshold include the portion of US 17 that runs concurrently with I-95, US 17/US 50 at US 340 in Clarke County, US 17/US 29 at US 17 Business south of Warrenton, and US 17 near US 50 in Fauquier County.





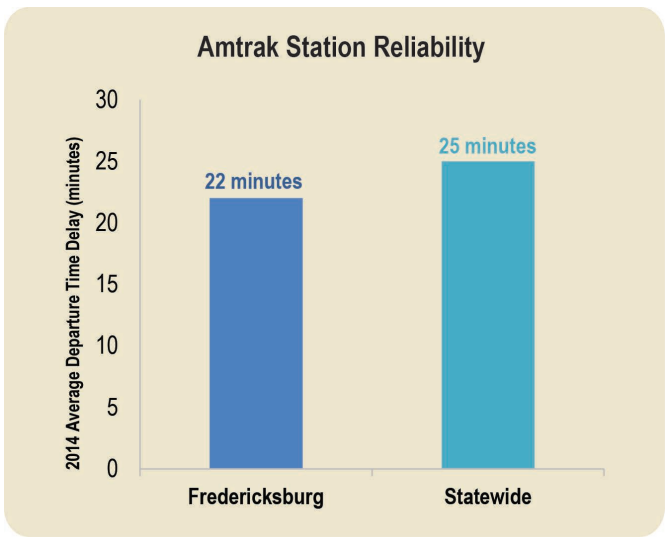


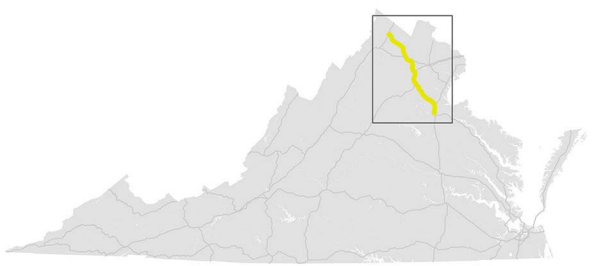
Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

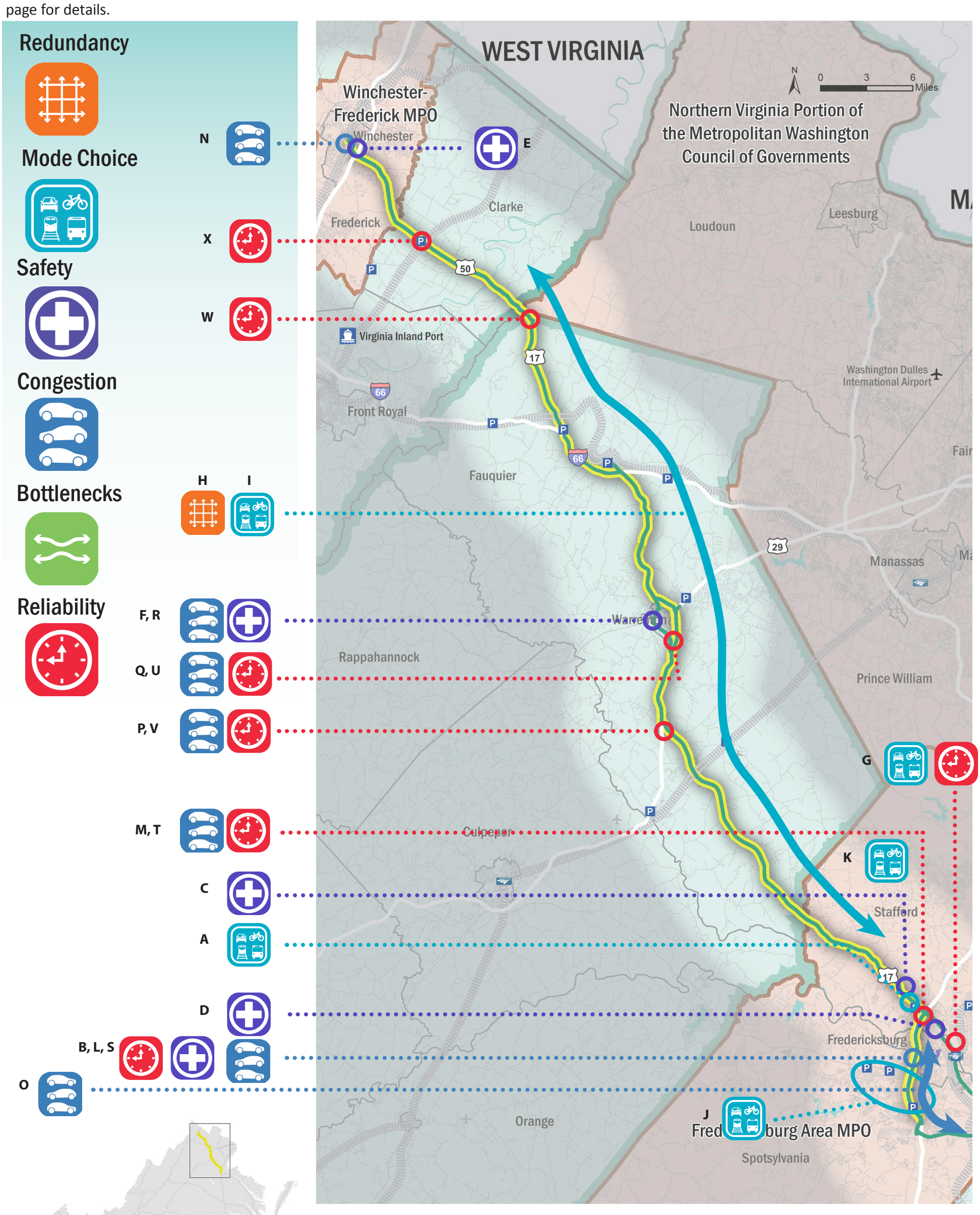




A3 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



A3 SEGMENT NEEDS

Summary of Needs - A3 Segment

A.	Limited availability/connections to transit modes at park-and-ride lots
B.	Slow speeds and safety concerns at interchange of I-95/US 17 and US 3.
C.	US 17 north of Fredericksburg: 58 severe crashes between Sanford Dr and International Parkway
D.	US 17-Business in Falmouth: 41 severe crashes between I-95 and US 1
E.	US 17 near interchange with I-81 in Winchester: 19 severe crashes
F.	US 17-Business in Warrenton: 21 severe crashes between Broadview Avenue and Keith Street
G.	Unreliable Amtrak service from Fredericksburg station. Average departure delay is 22 minutes totaling over 20,700 person-hours of delay from this segment.
H.	No parallel highway facilities for US 17
I.	Limited availability of transit options from Hampton Roads to Metropolitan Washington region (5 buses, 1 rail trips daily) and Fredericksburg (2 buses, 1 rail trip daily). No transit options from Hampton Roads or Fredericksburg to Winchester.
J.	Park and Ride lots in Fredericksburg Over Capacity (124% Daily Utilization)
K.	Utilization of Park and Ride lots in Stafford County above state average (84% Daily Utilization)
L.	Congestion issue on US 17/I-95 between VA Route 3 and US 17/US 17 Business west of Fredericksburg

A3 SEGMENT NEEDS

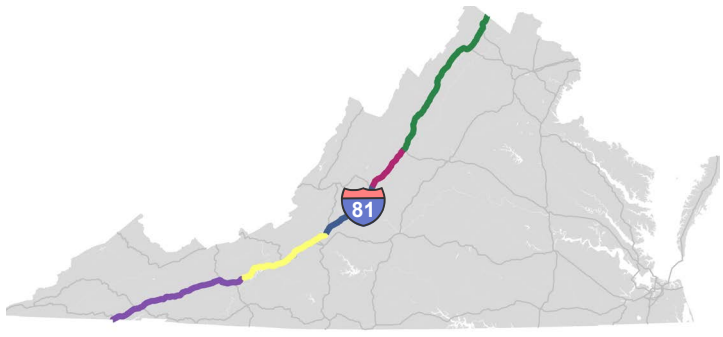
Summary of Needs - A3 Segment

M.		Congestion issue on US 17/US 17 Business between Celebrate Virginia Parkway and Rappahannock River north of Fredericksburg
N.		Congestion issue on US 17 west of I-81 in Winchester
O.		Congestion issue on US 17/US 1 between US 17 and I-95 south of Fredericksburg
P.		Congestion issue at US 17 and VA Route 28 in Bealton
Q.		Congestion issue at US 17/US 29 and US 17-Business south of Warrenton
R.		Congestion issue at US 17 Business and US 211 in Warrenton
S.		Reliability issue on I-95 from US 17 south of Fredericksburg to VA Route 3
T.		Reliability issue on I-95 from the Rappahannock River to US 17 north of Fredericksburg
U.		Reliability issue at US 17/US 29 and US 17-Business south of Warrenton
V.		Reliability issue at US 17 and VA Route 28
W.		Reliability issue at US 17 and US 50 east of Paris
X.		Reliability issue at US 17/US 50 and US 340 in Waterloo

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Crescent Corridor (B)



Office of INTERMODAL Planning and Investment

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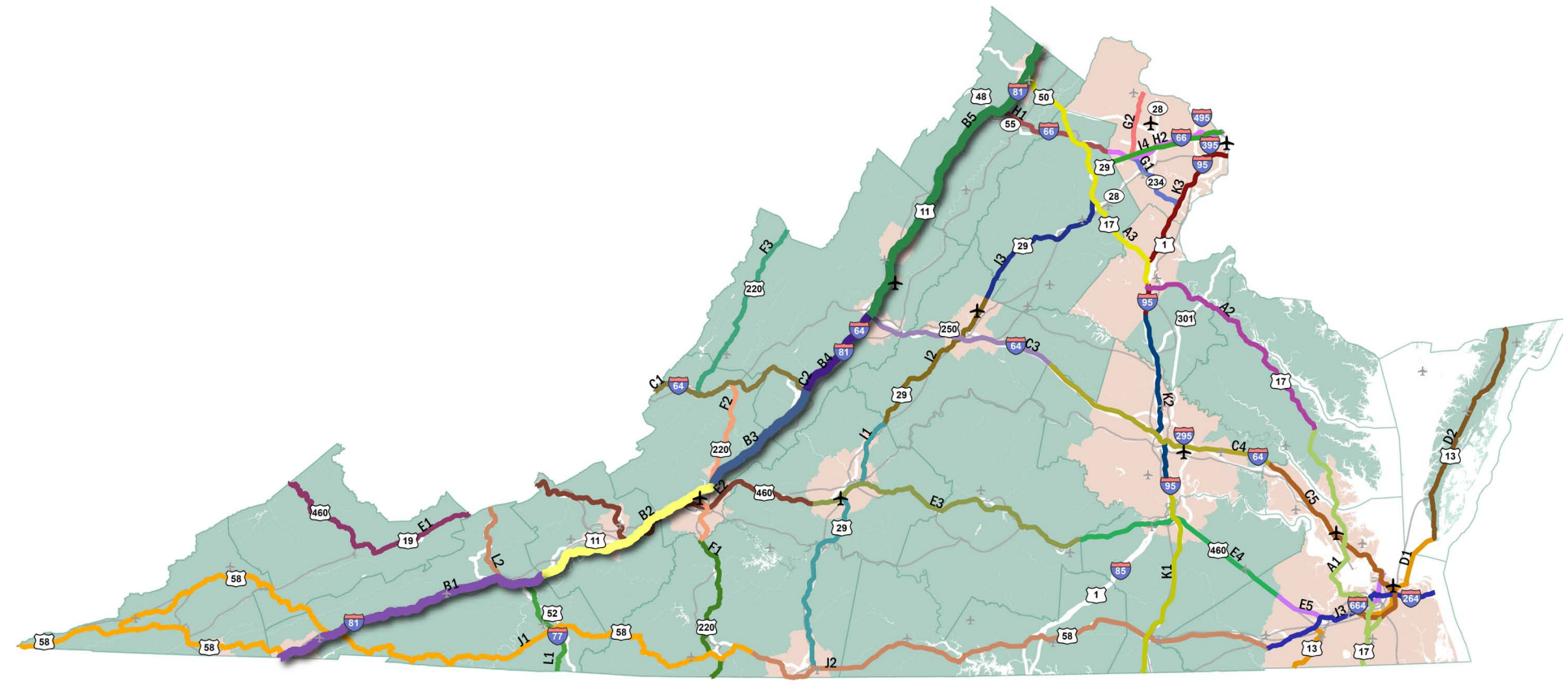
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

The Crescent Corridor (Corridor B) runs along the Appalachian Mountains in western Virginia and is generally defined by I-81. The Crescent Corridor includes two auxiliary routes for I-81: I-381, a very short spur into the City of Bristol, and I-581, a longer spur into the City of Roanoke. I-81 is a multi-lane interstate highway that stretches from Tennessee to New York, with a large portion paralleling the Appalachian Mountains in Virginia. The interstate serves as a major trucking and freight corridor along the East Coast and is one of the top eight truck routes in the United States. I-81 traverses approximately 325 miles of Virginia, making it the state's longest interstate highway. The southern terminus of I-81 in Virginia lies near Bristol, at the Tennessee border, and its northern terminus is located north of Winchester, at the West Virginia state line.

I-81 is primarily a rural highway through Virginia, although it provides access to some urban areas in addition to a large number of educational facilities and recreational tourist areas. It connects Winchester and Harrisonburg to the north with Roanoke, Blacksburg/Christiansburg, and Bristol to the south. I-81 is used primarily as a long-distance throughway to and from points north and south of Virginia, and is the most heavily-used trucking corridor in Virginia. It is used somewhat as a commuting corridor, especially between some of the closely-spaced urban areas like Roanoke and Blacksburg/ Christiansburg and Staunton and Harrisonburg.

US 11 parallels I-81 for its entire length, although it runs concurrently with I-81 for several stretches. Other US and interstate highways that run concurrently with parts of I-81 include I-64, I-77, US 52, US 58, and US 220.

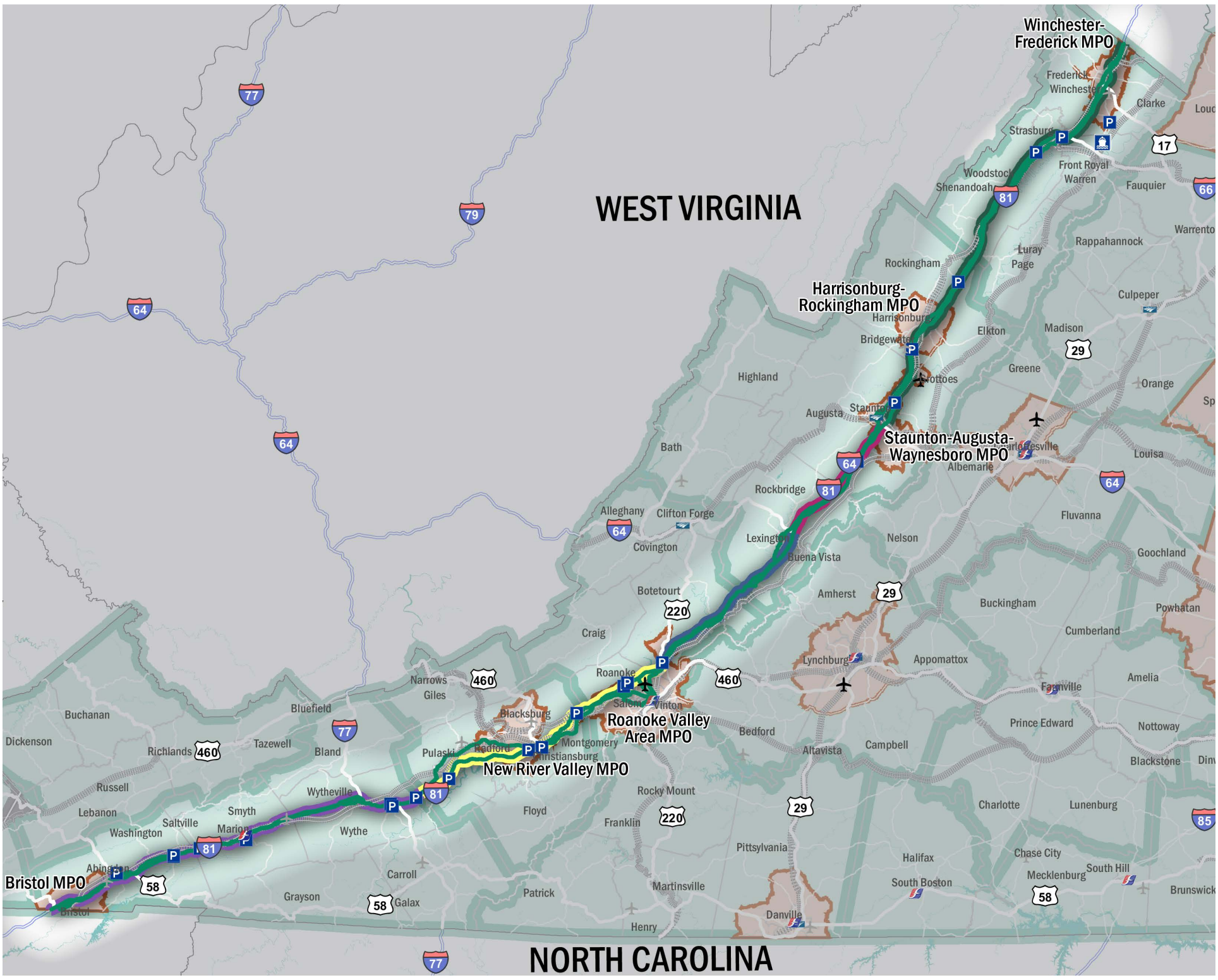
Passenger travel along the Crescent Corridor is accomplished primarily via the highway facilities. Other travel options include:

- Numerous Park-and-Ride facilities, available up and down the corridor, most serving the Blacksburg and Roanoke areas;
- Limited transit options, typically express bus services connecting larger urban areas, such as the Smartway Bus that offers service between Blacksburg and Roanoke;
- A major national bike route, US Bike Route 76, that traverses the Crescent Corridor;
- Greyhound bus service along the Crescent Corridor, with stops in Marion in Smyth County and in Wytheville in Wythe County;
- Amtrak passenger rail service, which does not run along the Crescent Corridor, although the station in Staunton allows passengers to connect with east-west rail service along the Cardinal Route, which runs from Chicago to New York City; and
- Two airports offering commercial service (Shenandoah Valley and Roanoke), and an additional nine general aviation facilities that are present along the corridor.

The Crescent Corridor provides access to the Virginia Inland Port. Norfolk Southern rail lines run along the entire corridor, supporting its role as a major freight corridor. Three short-line railroads also support freight movement in the corridor: the Shenandoah Valley Railroad, the Chesapeake Western Railroad, and the Winchester and Western Railroad.

Corridors of Statewide Significance

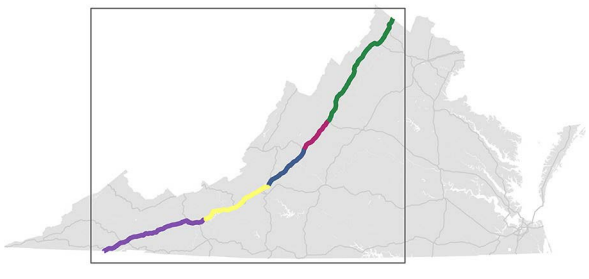
A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)



Corridor Segments:
- B1
- B2
- B3
- B4
- B5

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



Corridor Components

Highway Facilities	
Primary Facility	• I-81
Other Highway Facilities	• I-381 • I-581 • US 11 • US 11 Alt
Transit Services	
	• Intercity bus service
Rail Facilities	
	• Norfolk Southern Crescent Corridor
Port Facilities	
	• Virginia Inland Port
Airport Facilities	
	• Roanoke Regoinal Airport • Shenandoah Valley Regional Airport

Demographics and Economic Trends

Small pockets with populations greater than 500 persons per square mile lie along Corridor B. These population centers are found in the Cities of Bristol, Radford, Salem, Lexington, Buena Vista, Staunton, Harrisonburg, and Winchester. The City of Roanoke is the largest densely-populated area along the corridor with a population of 250 to 500 persons per square mile. Rockbridge County has the lowest population density along the route with less than 50 persons per square mile. The most densely-populated segment along the corridor is Segment B2 which passes through the Cities of Roanoke, Radford, Blacksburg, Christiansburg, and Salem.

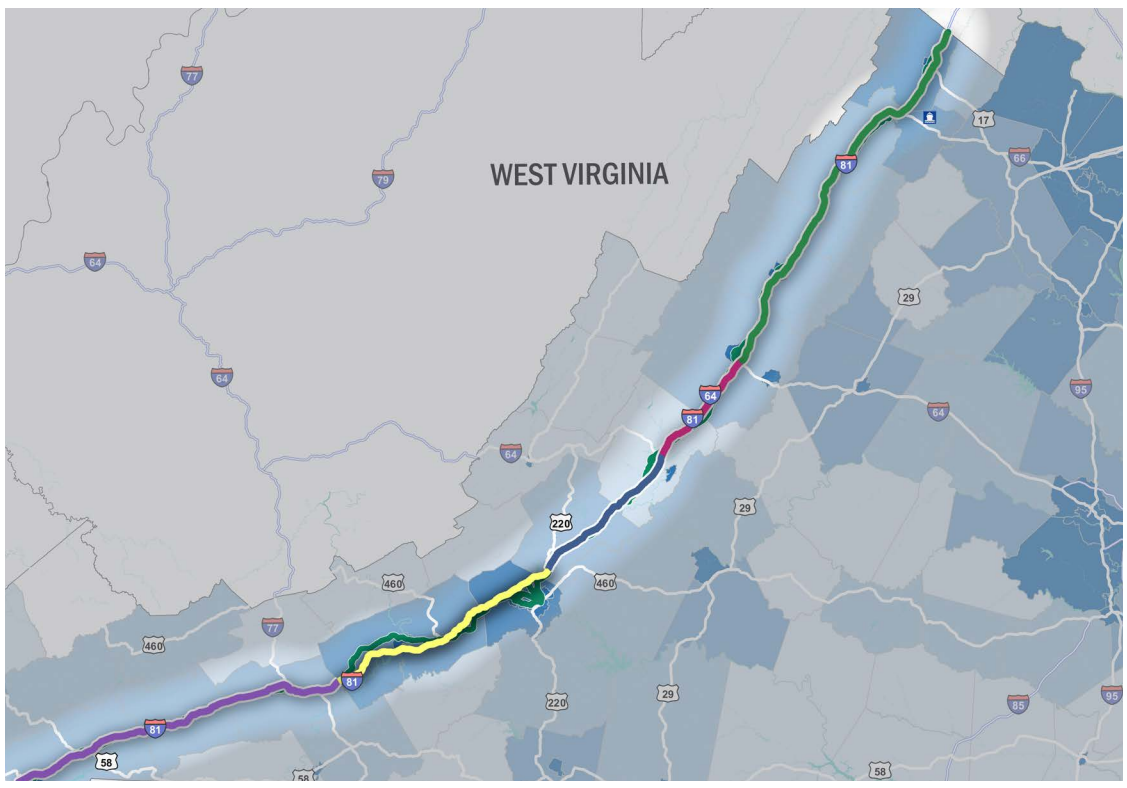
Between 2012 and 2025, Frederick County is anticipated to experience the largest population growth (greater than 25 percent) of counties along the corridor. Montgomery County, due to its proximity to Roanoke and Blacksburg, and Augusta, Rockingham, and Shenandoah Counties, is anticipated to have the next highest population growth (between 11 and 25 percent). Washington, Smyth, Rockbridge, Wythe, and Pulaski Counties, in the south, are expected to show the lowest growth. Overall, population along Segments B4 and B5 is expected to increase significantly.

Current employment centers follow a pattern similar to the population centers. In general, employment growth tracks a similar pattern along the corridor, but employment levels are anticipated to decrease in Pulaski and Shenandoah Counties.

Corridor B passes through six Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Roanoke Valley Transportation Planning Organization (TPO) Area has the highest Gross Domestic Product (GDP) of any of the MPO areas in the corridor. The largest industry sectors in the corridor include manufacturing, public administration, and retail trade.

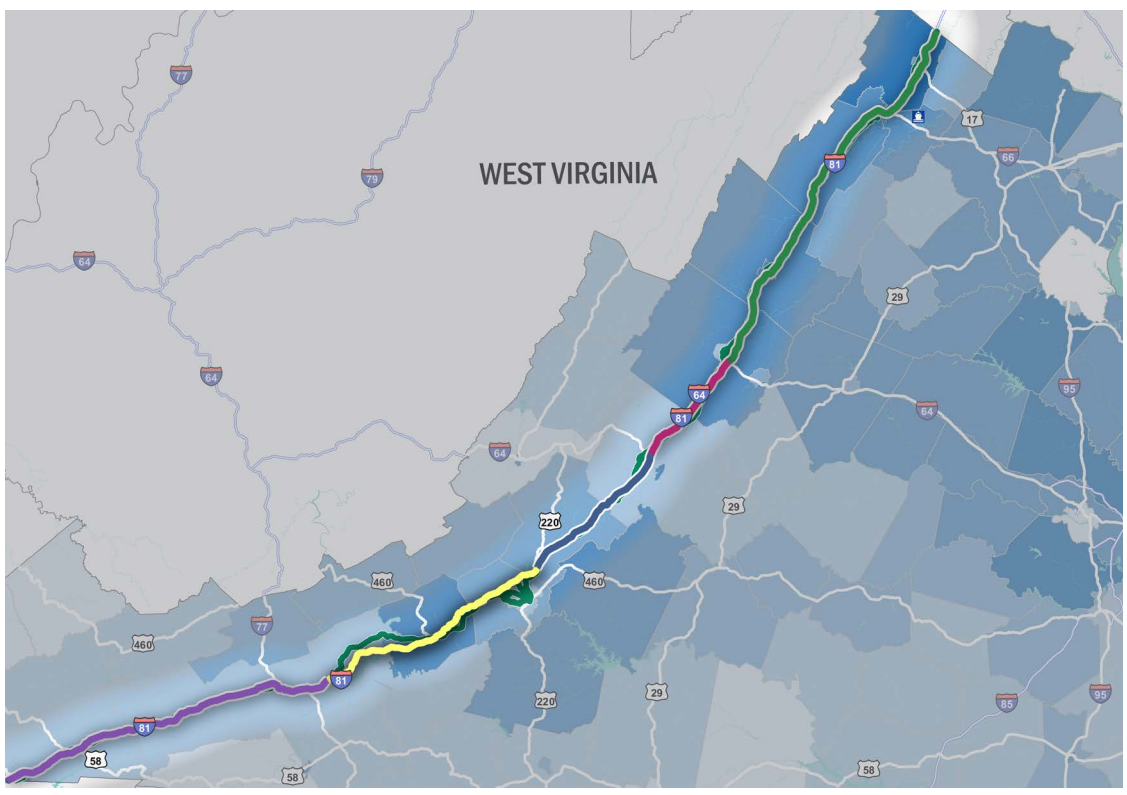
2012 Population Density Persons / Square Mile

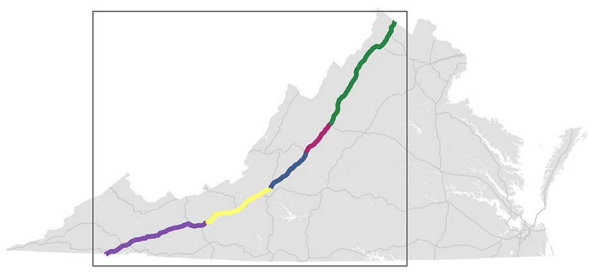
- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



Population Growth (2012-2025 Percent Change)

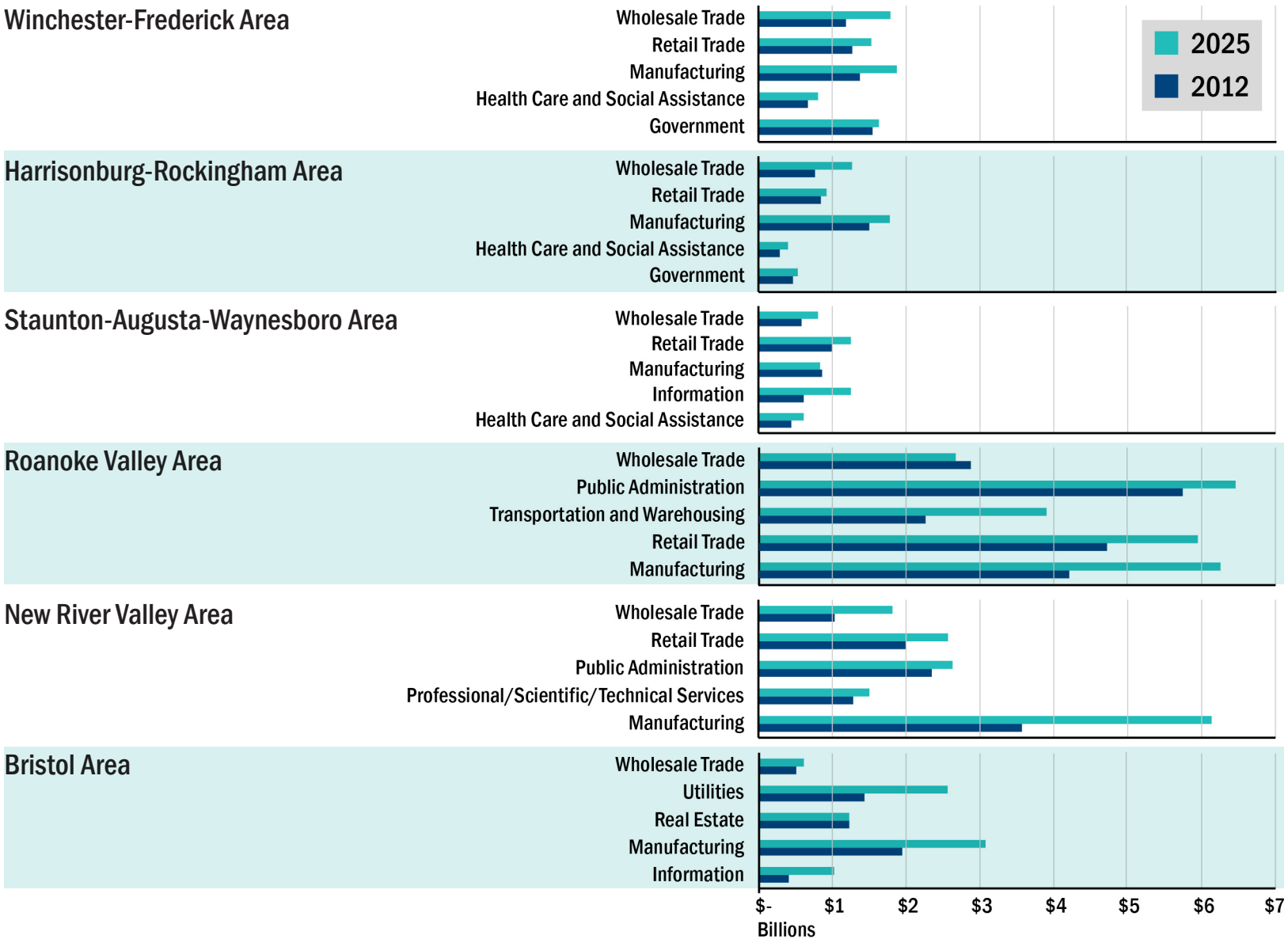
- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%





CORRIDOR B OVERVIEW

Top Industries (GDP)

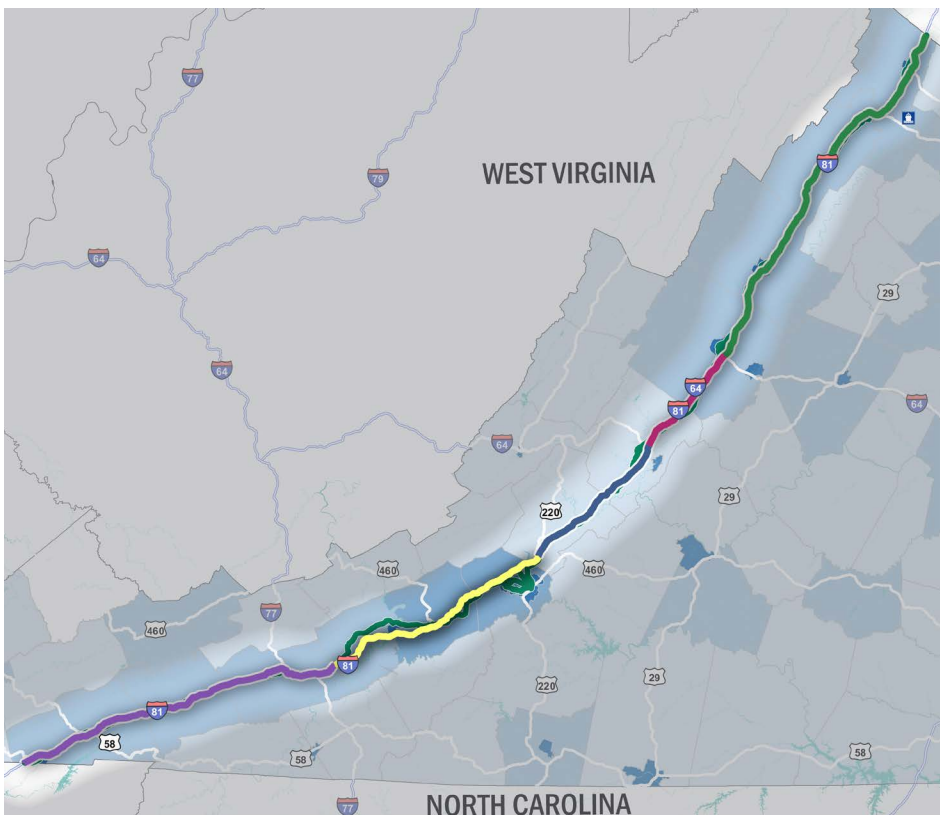


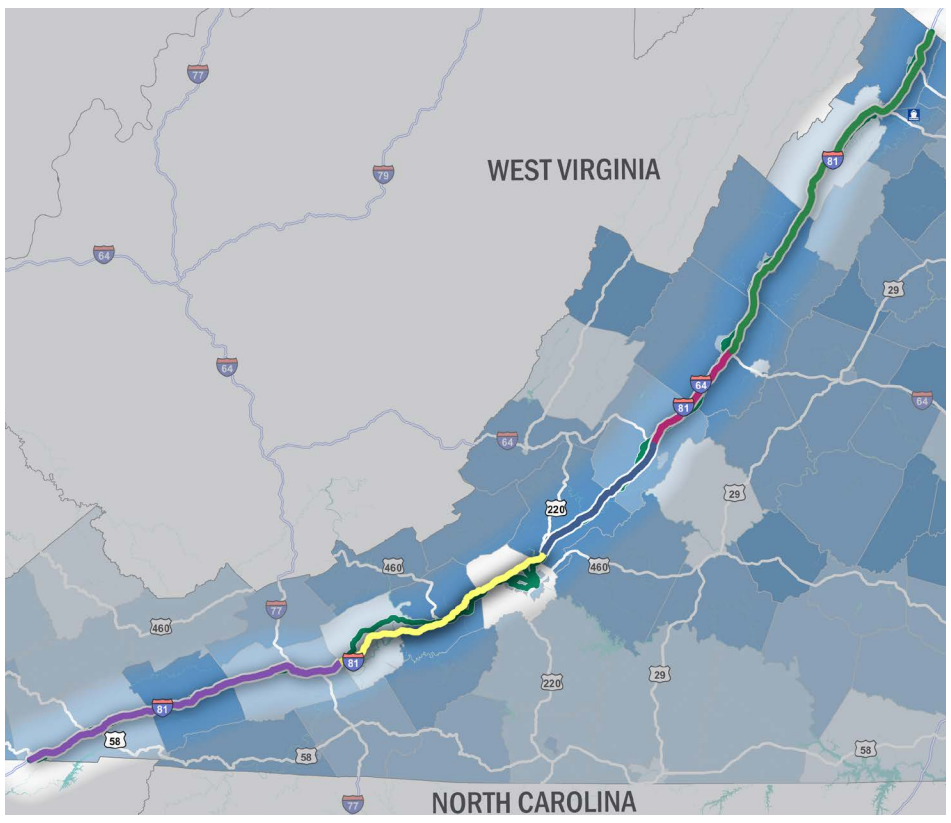
2012 Employment Density Jobs / Square Mile

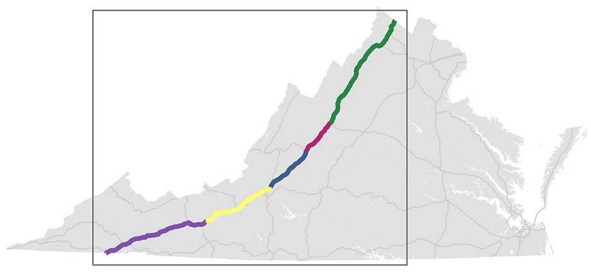
- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500

Employment Growth (2012-2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



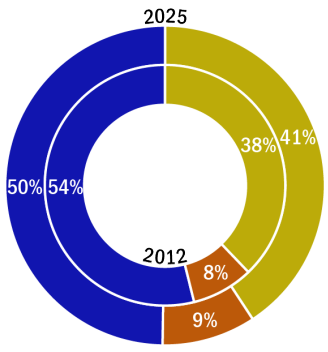




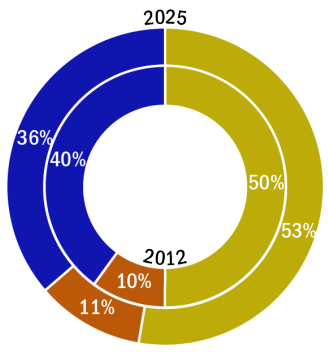
CORRIDOR B OVERVIEW

Corridor Travel Patterns

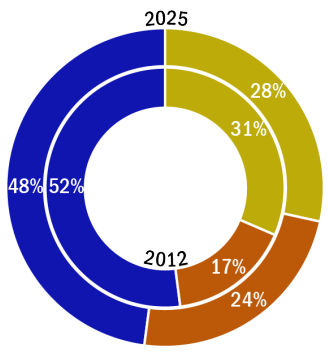
Winchester-Frederick Area



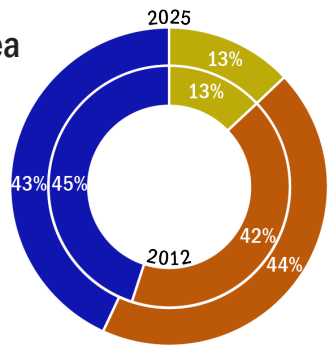
Harrisonburg-Rockingham Area



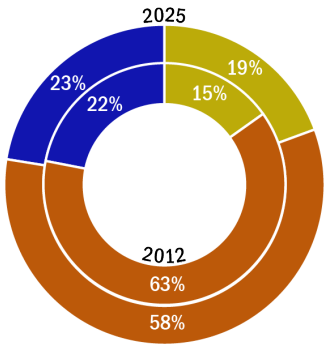
Staunton-Augusta-Waynesboro Area



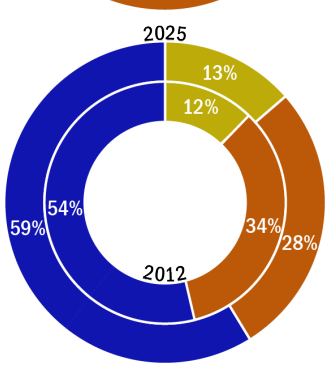
Roanoke Valley Area



New River Valley Area



Bristol Area



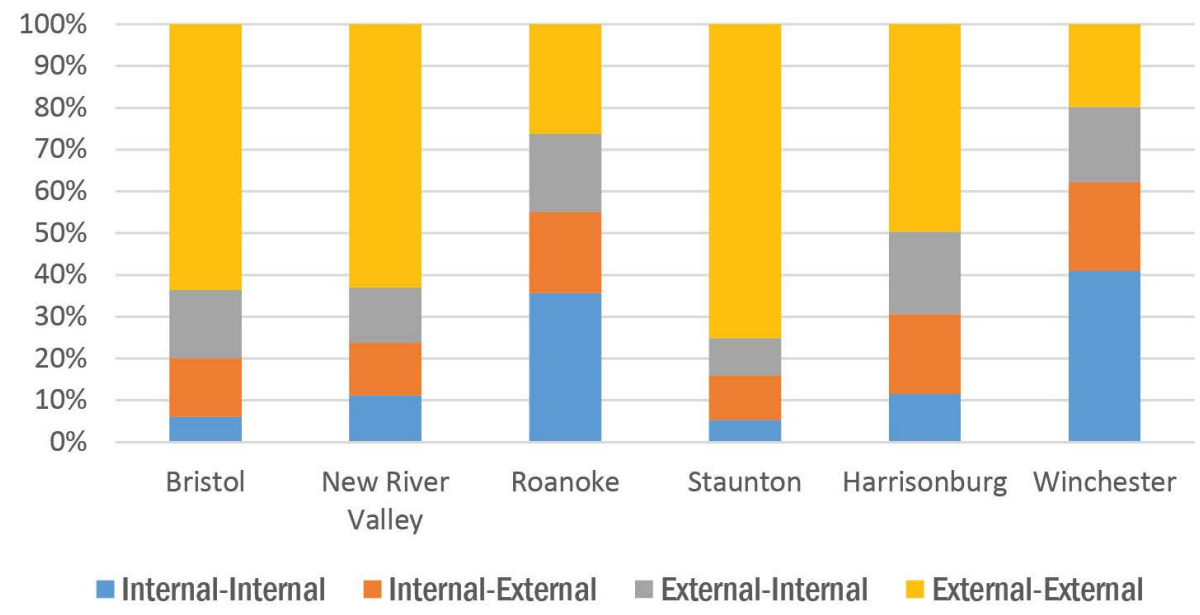
GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Passenger

Corridor B connects Tennessee to West Virginia and passes through six MPO Areas along its route: Bristol, New River Valley, Roanoke Valley, Staunton-Augusta-Waynesboro, Harrisonburg-Rockingham, and Winchester-Frederick. Throughout most of its length, traffic along Corridor B is dominated by pass-through trips, with the exception of the Roanoke Valley and Winchester-Frederick Areas. In the Bristol and the New River Valley Areas, more than 60 percent of the traffic is related to pass-through trips, and only small portions are related to local internal trips. In the Roanoke Valley Area, travel patterns are more evenly split between local and pass-through traffic, with 36 percent attributed to local internal trips, and an additional 38 percent of the trips beginning or ending inside the Area. Corridor B in the Staunton-Augusta-Waynesboro Area has the highest percentage of pass-through traffic in the corridor (more than 70 percent) and the lowest percentage of local internal trips (five percent). Through the Harrisonburg-Rockingham Area, Corridor B has approximately 50 percent pass-through traffic, and a significant portion of trips that begin or end in the MPO area. The Winchester-Frederick Area has the highest proportion of local internal trips within the entire Corridor B (40 percent), and the smallest proportion of pass-through traffic (20 percent). In all six MPO Areas, the percentage of pass-through traffic is much higher on the primarily facility (I-81) than on the parallel US 11.

Distribution of Internal and External Travel



Freight

By truck, Corridor B carried 160 million tons of freight worth $264 billion in 2012, and is estimated to carry 213 million tons of freight worth $383 billion in 2025. The major truck freight flows in Corridor B are interstate through traffic, accounting for approximately 60 percent of truck freight tonnage and over 75 percent of truck freight value in the corridor in 2012 and 2025. By rail, Corridor B carried 70 million tons of freight worth $46 billion in 2012, and is estimated to carry 78 million tons of freight worth $78 billion in 2025. Interstate through traffic also accounts for a major portion of rail freight traffic, representing 45 percent of rail freight tonnage in 2012, and 47 percent of rail freight tonnage in 2025.

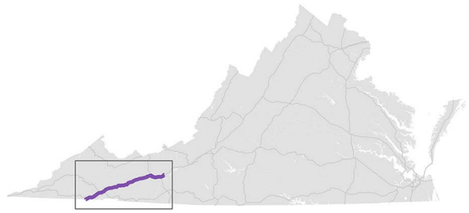
Truck Freight

2012	2025
Truck Freight Value	
$264 Billion	$383 Billion
Truck Freight Tonnage	
160 Million Tons	213 Million Tons
Freight Value per Ton	
$1643	$1803
Corridor Tonnage Passing Through	
59%	61%

Rail Freight

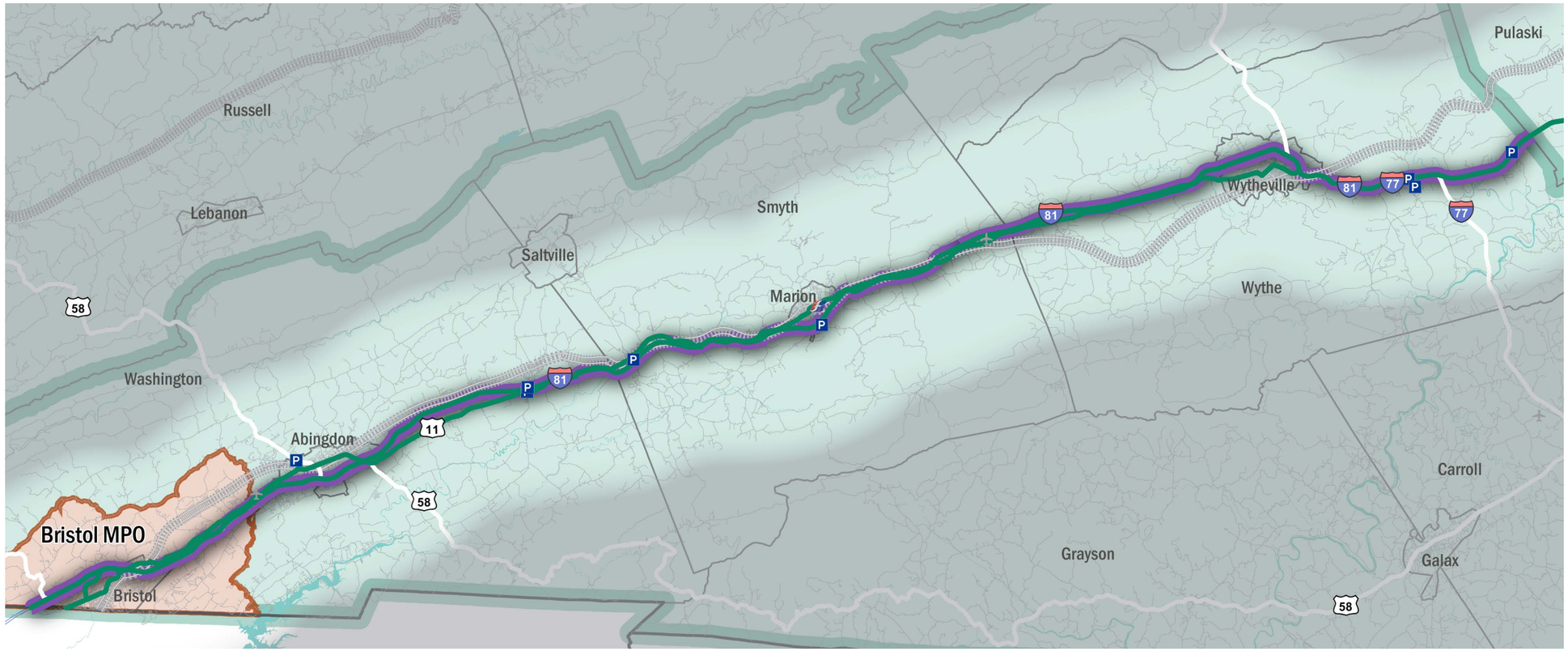
2012	2025
Rail Freight Value	
$47 Billion	$61 Billion
Rail Freight Tonnage	
70 Million Tons	78 Million Tons
Freight Value per Ton	
$653	$774
Corridor Tonnage Passing Through	
46%	47%

II. Segment B1



Corridor Segment B1 Components

- I-81
- US 11
- I-381
- Norfolk Southern Crescent Corridor



- Segment B1
- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- MPO Area
- Planning District Area

B1 SEGMENT PROFILE

Segment B1 begins at the Tennessee border and progresses north, serving Washington, Smyth, and Wythe Counties, as well as the City of Bristol. The segment travels through the Bristol Area. The segment includes portions of and overlaps with I-77, US 11, US 52, and US 58. Segment B1 acts as a major corridor for through-freight travel in Virginia and also connects smaller urban areas, such as Wytheville and Bristol, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-81 is primarily a rural four-lane highway in Segment B1, although six-lane cross sections can be found in the City of Bristol and in Wythe County where I-81 runs concurrently with I-77. I-381, a spur of I-81, serves the City of Bristol. US 11 runs parallel to I-81 in Segment B1 except for west of the interchange with I-77 in Wytheville where US 11 runs concurrently with I-77/I-81.

Transit Service: Greyhound offers service from stations in Marion and Wytheville. Several Park-and-Ride locations are in close proximity to I-81, with multiple locations near Glade Spring and Fort Chiswell.

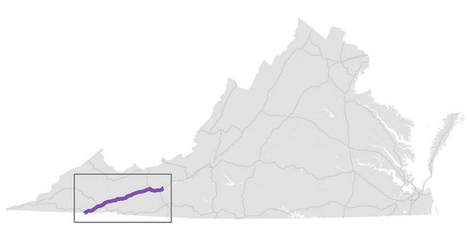
Rail Facilities: Norfolk Southern rail lines pass through Segment B1 connecting locations south and west of the Virginia Inland Port, near Corridor B south of Winchester.

Port Facilities: No port facilities are located directly adjacent to Segment B1, but the Crescent Corridor does provide direct access to the Virginia Inland Port south of Winchester.

Airport Facilities: No commercial air service is available in Segment B1, though two general aviation facilities do exist.

Major planned and future projects include:

- Upgrade the sign panels and sign structure along I-81 in Bristol;
- Widen existing US 11 (Lee Highway) just north of junction with I-81 from two to four lanes;
- Widen and add center two-way left turn lane on US 11 (Lee Highway);
- Reconstruction with added capacity on Lee Highway (US 11) between Linden Drive and Old Airport Road to improve traffic flow on Old Airport Road at I-81;
- Reconstruction with added capacity on Lee Highway (US 11) between Old Airport Road and Resting Tree Drive;
- Widen Lee Highway (US 11) between Mount Vernon Drive and F-310 to include raised median, sidewalks, and bike path; and
- Reconstruction with added capacity on I-81 from 0.23 miles to 1.2 miles east of off-ramp at Route 121 (just west of the I-77 interchange).



Number of Lanes (both directions)

2 | 3 - 4 | 5 - 6 | 7 - 8 | 9 - 12 | Primary facility



Future Projects

Reconstruction with added capacity | Safety improvements | Primary facility

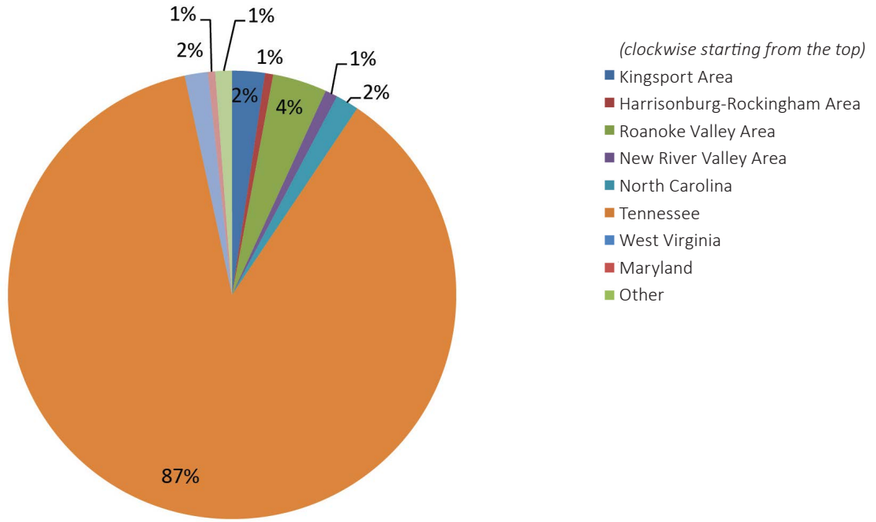


Travel Demand

Passenger Demand

The southernmost segment of the Crescent Corridor (Corridor B) connects Tennessee and the Bristol Area to the New River Valley Area. The vast majority (87 percent) of intercity travel originating in the Bristol Area is destined for locations in Tennessee. Many of the other major destinations for intercity travel from Bristol are located along Corridor B, including Roanoke (four percent) and smaller portions of travel to the New River Valley Area, Harrisonburg-Rockingham Area, and even farther north in Maryland. Travel from the New River Valley Area to the Bristol Area accounts for only one percent of intercity traffic originating in the New River Valley Area.

Travel from Bristol Area to...



B1 SEGMENT PROFILE

Freight Demand

By truck, Segment B1 carried 55 million tons of freight worth $107 billion in 2012, and is estimated to carry 77 million tons of freight worth $167 billion in 2025. The major truck freight flows in Corridor B are interstate through traffic, accounting for approximately 60 percent of truck freight tonnage and over 75 of truck freight value in the corridor in 2012 and 2025. There is significant truck freight traffic along Corridor B between North Carolina and Ohio, accounting for four percent of the total corridor freight tonnage and value. Pennsylvania and Tennessee are also significant generators of truck freight tonnage along Corridor B. Around eight percent of the total truck freight on Corridor B, by value, is destined for New York, while another six to eight percent of truck freight on Corridor B is destined for non-US North American destinations. The jurisdictions adjacent to Segment B1 are not major generators or attractors of truck freight, as only two percent of Corridor B's total truck freight value originates along Segment B1 and only one percent is destined for this segment.

By rail, Segment B1 carried six million tons of freight worth $11 billion in 2012, and is estimated to carry eight million tons of freight worth $16 billion in 2025. In terms of tonnage, the largest rail freight flows in Corridor B consist of low-value freight traveling between West Virginia and North Carolina, accounting for between 18 and 22 percent of the total rail freight corridor tonnage in 2012 and 2025, respectively. The City of Norfolk (including its Port facility) is a major destination for rail freight on Corridor B, accounting for between 18 and 20 percent of the total corridor tonnage, with these rail freight flows originating mainly from West Virginia, Wise County, and Buchanan County. In terms of value, freight rail flows between Illinois and the Cities of Norfolk and Portsmouth (including their Port facilities) account for more than 20 percent of the total rail freight value in the corridor. The jurisdictions adjacent to Segment B1 are not major generators or attractors of rail freight, with one or less than one percent of the total corridor value and tonnage either originating from or destined for this corridor segment.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (25% / 23%)
2. North Carolina (13% / 12%)
3. Pennsylvania (8% / 8%)
4. Ohio (6% / 7%)
5. Tennessee (6% / 6%)

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
North Carolina and Indiana

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (22% / 22%)
2. North Carolina (14% / 15%)
3. Pennsylvania (8% / 8%)
4. New York (6% / 6%)
5. Tennessee (4% / 5%)

Corridor Tonnage Originating in Segment B1: 3% / 3%

Corridor Tonnage Destined for Segment B1: 3% / 4%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (31% / 28%)
2. West Virginia (30% / 26%)
3. Wise County (12% / 10%)
4. Illinois (8% / 10%)
5. Ohio (6% / 8%)

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Ohio and North Carolina
Illinois and North Carolina

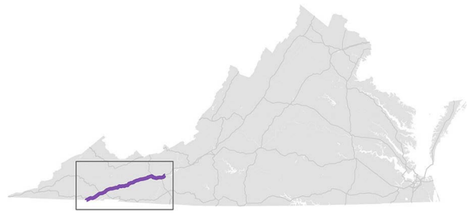
Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (38% / 37%)
2. North Carolina (35% / 35%)
3. City of Norfolk* (20% / 17%)
4. Tennessee (4% / 3%)
5. Georgia (3% / 3%)

Corridor Tonnage Originating in Segment B1: <1% / <1%

Corridor Tonnage Destined for Segment B1: <1% / 1%

Traffic Conditions



Traffic Volume and AADT

Traffic volume on Segment B1 is generally less compared other segments of Corridor B. Average daily traffic volumes vary somewhat by section, with daily volumes on I-81 ranging from 25,000 to 50,000 vehicles, and the highest volumes near Bristol and the shared I-77/I-81 section in Wythe County. Volumes on US 11 are lower throughout the corridor, and are less than 20,000 vehicles per day except for a few short portions in Abingdon. By 2025, the greatest traffic volume increases in Segment B1 are forecasted to occur on I-81 on the I-77/I-81 shared section in Wythe County, with a projected increase of 10,000 vehicles by 2025. Little to no increase in traffic is forecast for US 11 in Segment B1. By 2025, daily traffic volumes on I-81 are forecasted to be over 50,000 vehicles between Bristol and Abingdon and 60,000 vehicles on the I-77/I-81 shared section. In other sections along I-81 between Abingdon and I-77, daily traffic volumes are forecasted to range from 25,000 to 40,000 vehicles by 2025.

Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



B1 SEGMENT PROFILE

Traffic Distribution

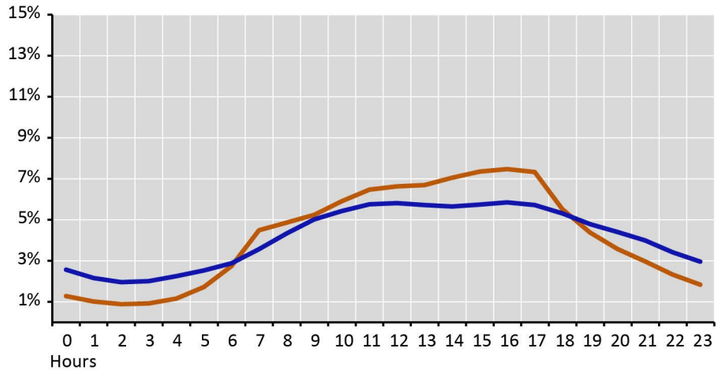
On average, traffic on Segment B1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows steady increase in the flow from 8 a.m. to 5 p.m., indicating that traffic levels on this segment are not controlled by the standard commute patterns typical in many areas. The highest hourly traffic occurs between 4 and 5 p.m. which accounts for 7.4 percent of daily traffic. The combined weekday traffic in this period (from 8 a.m. to 5 p.m.) accounts for 70 percent of total daily traffic. Peaking patterns for truck traffic show a fairly steady peak that lasts from 9 a.m. to 6 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day, with the highest percentage of hourly traffic occurring between 1 p.m. and 2 p.m. (7.8 percent of daily traffic) for all traffic, and 2 p.m. to 3 p.m. (6.4 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment B1 vary by as much as 43 percent throughout the year, with the highpoint in July (around 25,000 vehicles per day) and the low point in January (around 17,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the October high (around 5,700 trucks per day) 18 percent higher than the January low (around 4,800 vehicles per day). Weekend traffic levels also show a distinct peak in the summer months; volumes in July (around 26,000 vehicles per day) are 77 percent higher than February levels (around 14,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high (around 4,500 vehicles per day) only 14 percent higher than the May low (around 4,000 vehicles per day). Truck volumes account for a significant portion of traffic on Segment B1 (25 percent of overall daily traffic for weekdays and 21 percent for weekends); as a result truck traffic has a significant impact on overall traffic conditions.

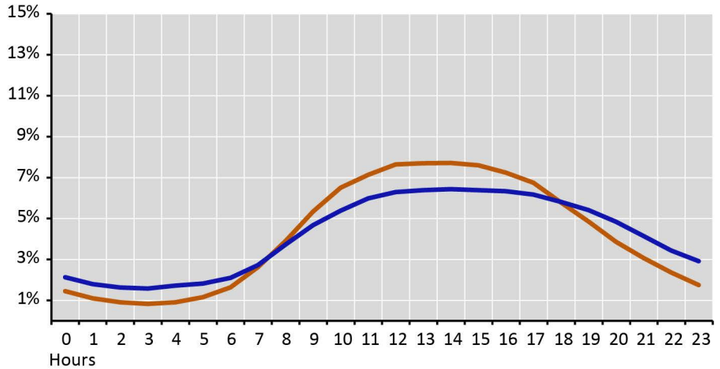
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment B1 is lower compared to most other segments throughout Corridor B. On I-81 throughout Segment B1, heavy trucks comprise 10 to 13 percent of daily traffic, with the highest levels west of I-77 in Wytheville and Wythe County. Heavy trucks comprise a much smaller portion of daily traffic on US 11 - less than two percent - in Segment B1.

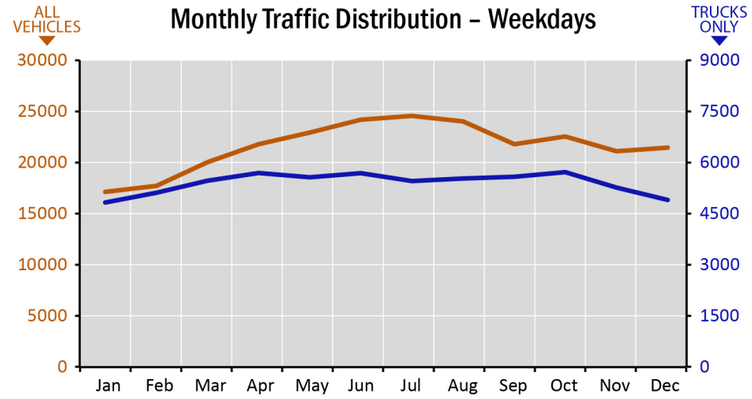
Hourly Traffic Distribution – Weekdays



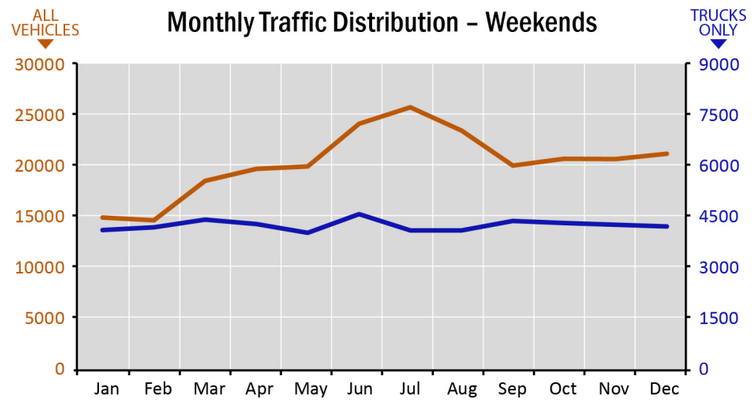
Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekdays



Monthly Traffic Distribution – Weekends

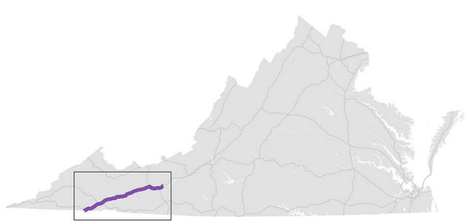


All Vehicles
Trucks

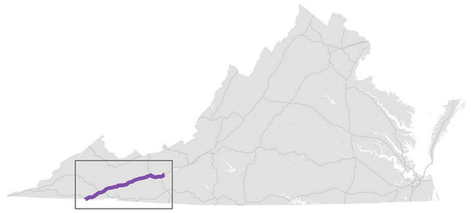


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



B1 SEGMENT PROFILE



Freight Flows

Near Abingdon, freight is moved primarily by truck, in terms of both tonnage and value. In total, 55 million tons (90 percent) of freight is moved through Segment B1 of the Crescent Corridor by truck, compared to 6 million tons by rail. By value, the difference is the same, with $107 billion (90 percent) of freight value traveling by truck, compared to $11 billion by rail. On average, a ton of freight traveling through Segment B1 by truck is worth $1,966 while a ton of freight traveling by rail is worth $1,939. In 2025, both rail and truck freight tonnages and total values are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Values per ton of freight on trucks are expected to increase to $2,209 in 2025, while rail values per ton will remain nearly the same, at $1,949.

Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

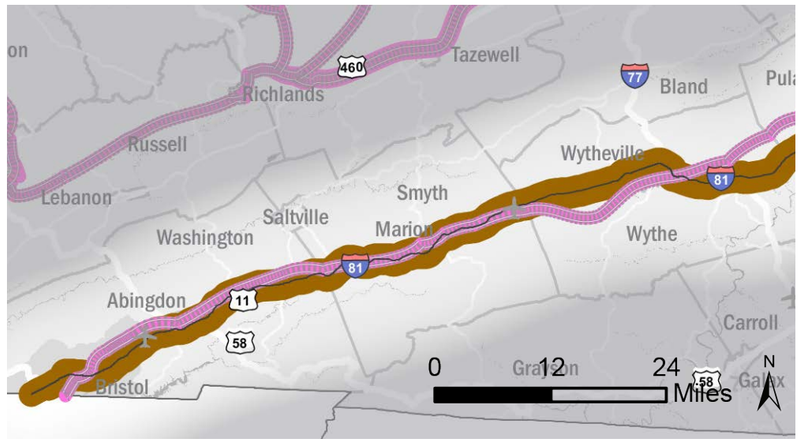
Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

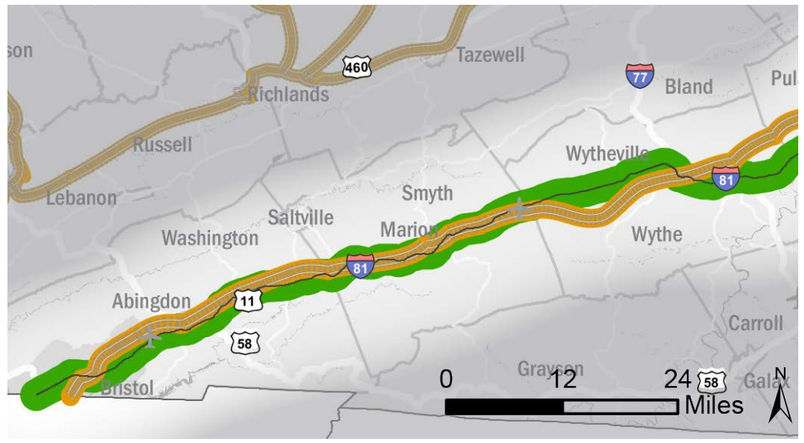
Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

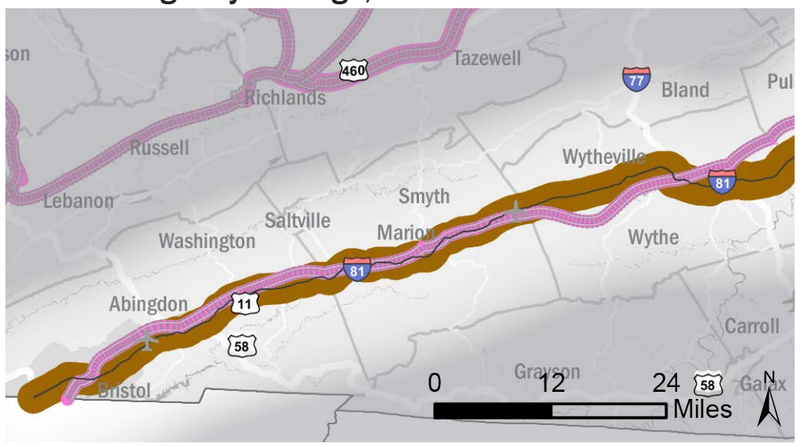
Annual Freight by Tonnage, 2012



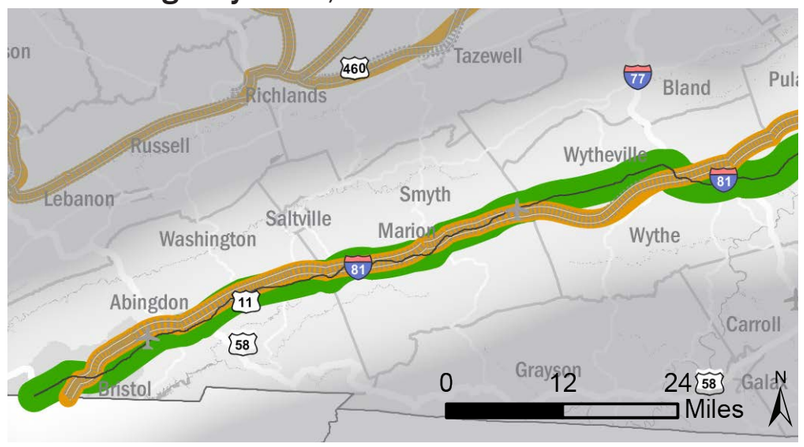
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025

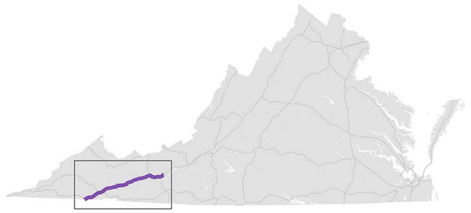


Annual Freight by Value, 2025



Redundancy and Mode Choice

Passenger trips on Segment B1 of the Crescent Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long range travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and for bypassing incidents causing congestion on sections of I-81. Greyhound service is offered at Wytheville and Fort Chiswell, but no alternate mode choices are available for trips along the corridor.



Park-and-Ride

Within Segment B1, commuters can utilize several Park-and-Ride locations. Washington County provides the highest number of Park-and-Ride spaces and the highest utilization rate of spaces available in the region, while Wythe County has the most Park-and-Ride locations. Washington County matches the 76 percent statewide average for Park-and-Ride utilization.

Comparable Travel Options

Bristol to Roanoke

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 2:24 Travel Time $81 Est. Cost

Bristol to Harrisonburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 3:59 Travel Time $136 Est. Cost

Bristol to Blacksburg / Christiansburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

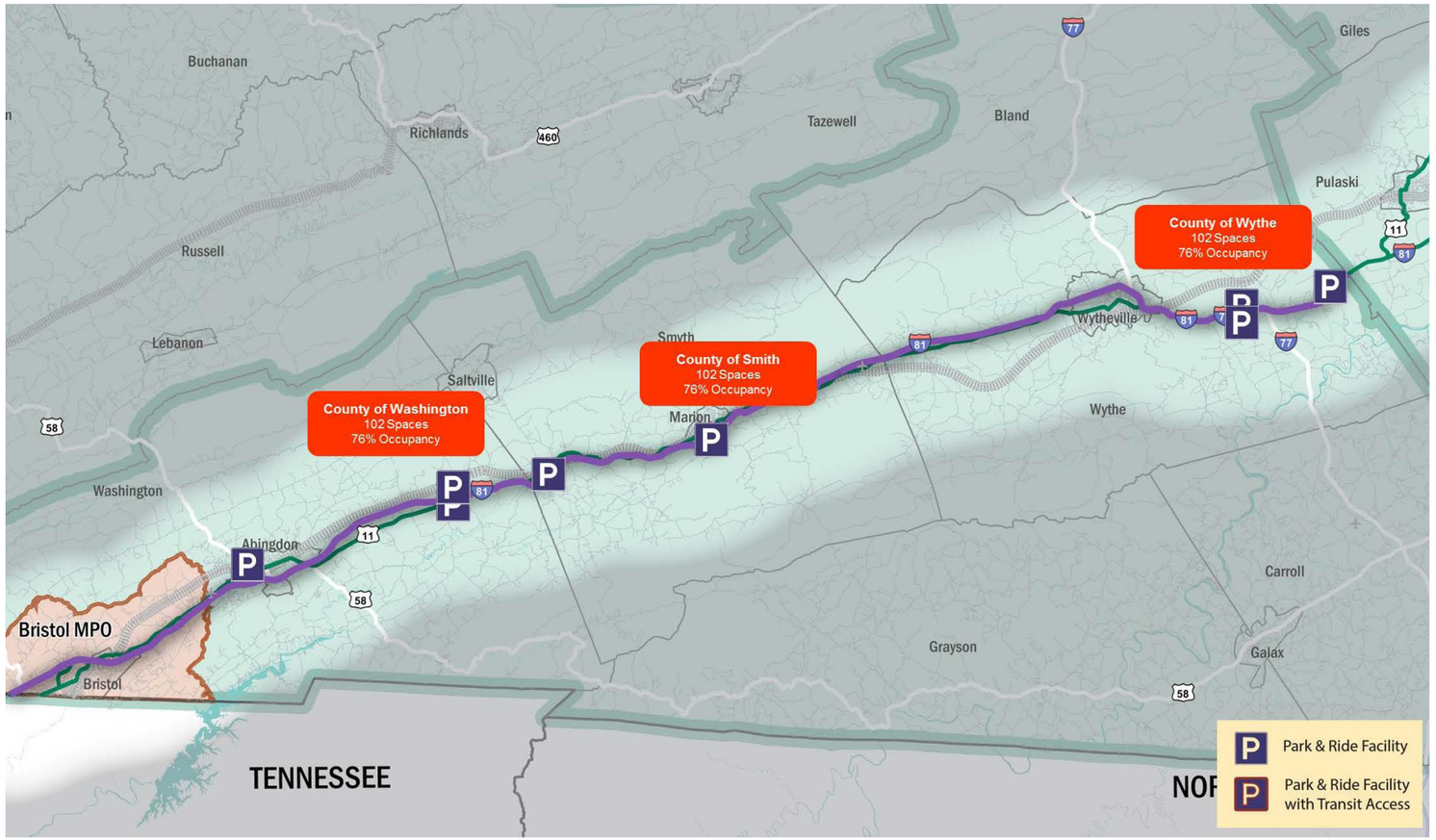
Via I-81: 1:50 Travel Time $70 Est. Cost

Bristol to Winchester

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

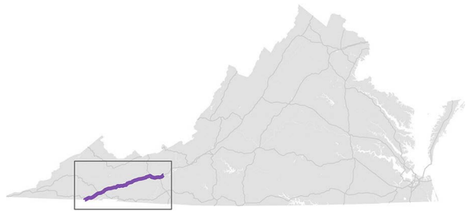
Via I-81: 4:30 Travel Time $176 Est. Cost



B1 SEGMENT NEEDS

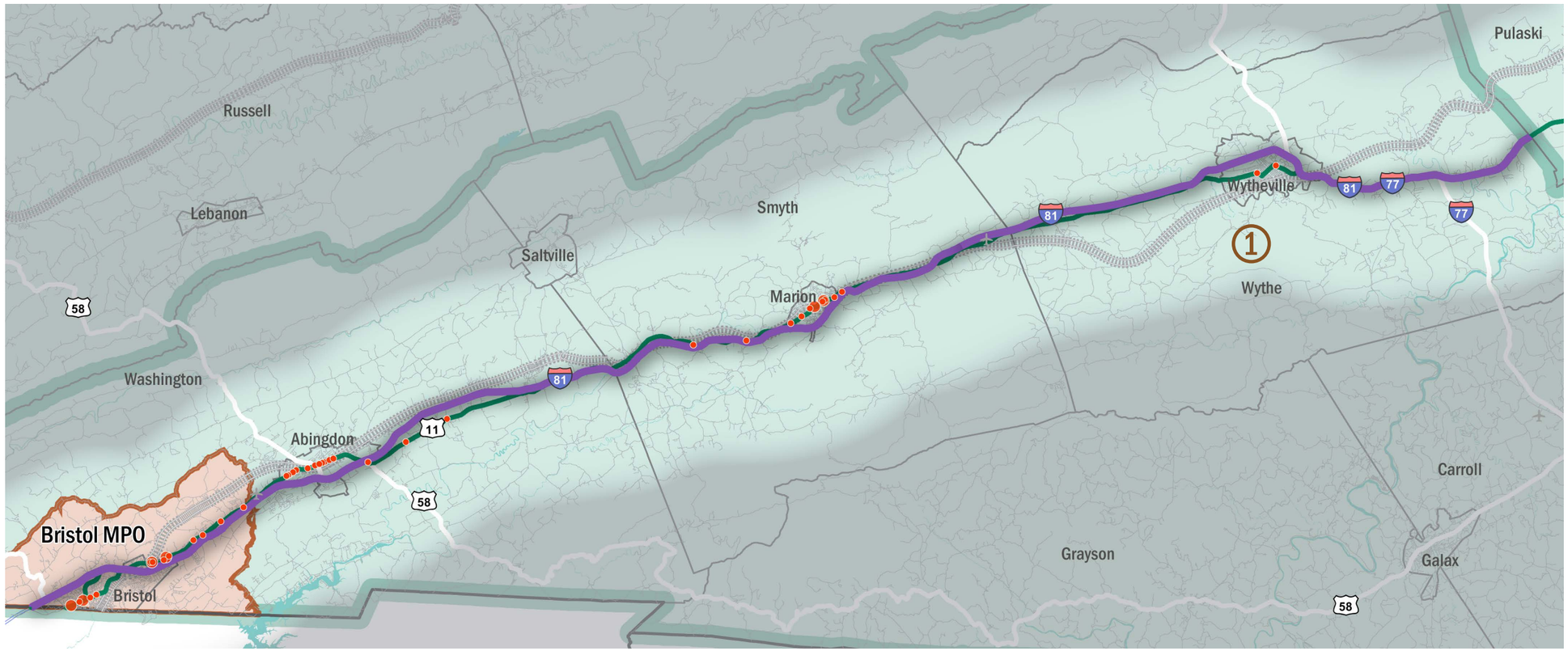
Safety

Between 2010 and 2012, 180 severe crashes occurred on Segment B1, the second highest total on the Crescent Corridor. There are several areas along Segment B1 which have experienced high concentrations of severe crashes. In the southernmost portion of Segment B1, a 1.9 mile portion of US 11 (Euclid Avenue) had 28 collisions between Chester Street and West State Street in Bristol. An approximately 1.3-mile stretch of US 11 (Lee Highway) in Bristol, between Underpass Road and Resting Tree Drive, experienced 31 crashes. Along US 11 (Main Street) in Abingdon, there were 39 incidents that occurred along a span of approximately 2.8 miles between Virginia Highlands Community College and Trigg Street. In Marion, along US 11 (Main Street), 38 collisions occurred over a distance of about 3.5 miles between Washington Avenue and Rifton Drive; of the 38 collisions, eight occurred at the intersection with Route 16 (Park Boulevard). No large concentrations of crashes were recorded along I-81 in Segment B1.



Performance Metrics

Number of Severe Crashes	180
Severe Crashes/Million VMT	0.4
Number of Railroad Crashes	1



Fatality and Injury Crashes (2010 - 2012)

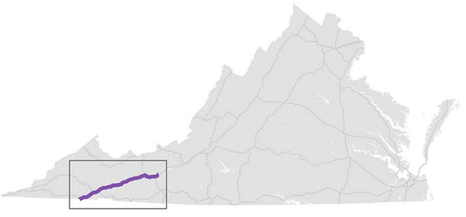
- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

B1 SEGMENT NEEDS

Congestion



Performance Metrics

Person Hours of Delay per Mile	4
Freight Ton Hours of Delay per Mile	30K

Passenger Delays

Passenger delays along Segment B1 are generally quite minimal, with approximately 750 person-hours of delay for the entire segment. Areas experiencing significant levels of congestion for passengers include I-381 in the City of Bristol and on US 11 near Abingdon. Peak-period passenger delays account for 44 percent of daily congestion, which is close to the average for the peak-period share of congestion on other CoSS segments.

Freight Delays

Unlike for passenger traffic, there is significant freight delay along Segment B2 with nearly 6.5 million ton-hours of delay experienced on the segment, although delays per mile are lower than average for CoSS segments. The majority of the corridor segment has minimal freight delays, but significant delays occur along several portions of US 11 between Bristol and Abingdon. In particular, freight delays approach 1,390,000 ton-hours per mile at the intersection of US 11 and Route 659 in Bristol. Peak-period freight delays account for about 38 percent of daily congestion, which is just about average for the peak-period share of congestion on other CoSS segments.

Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment B1 ranges from 0.00 to 0.39 in terms of reliability index, with an average value of 0.05. None of the locations along Segment B1 have reliability index values exceeding the statewide threshold.

Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.49 in terms of reliability index, with an average value of 0.05. A short stretch of US 11 in Bristol (less than one-tenth of a mile) has a reliability index value exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.56 in terms of reliability index, with an average value of 0.05. None of the locations along Segment B1 have reliability index values exceeding the statewide threshold.





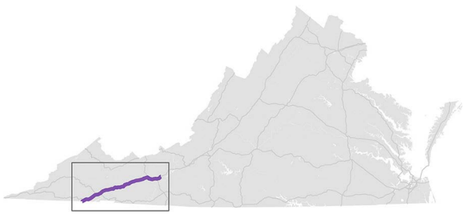


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliabile. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

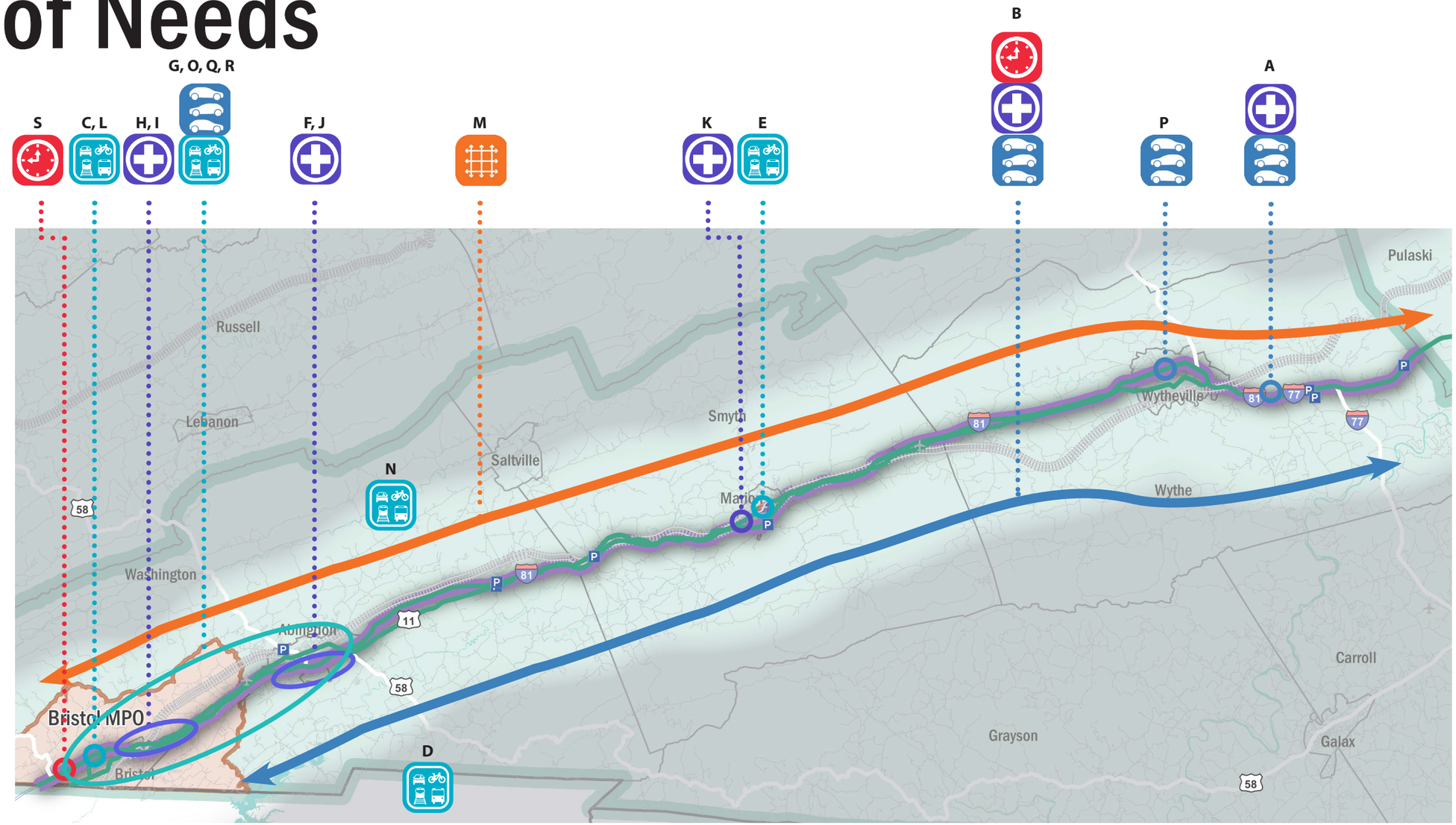
Mode Choice

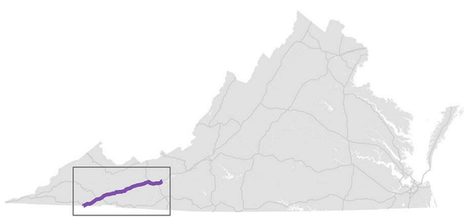
Safety

Congestion

Bottlenecks

Reliability



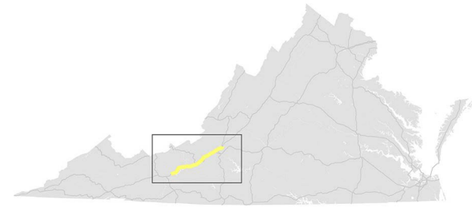


B1 SEGMENT NEEDS

Summary of Needs - B1 Segment

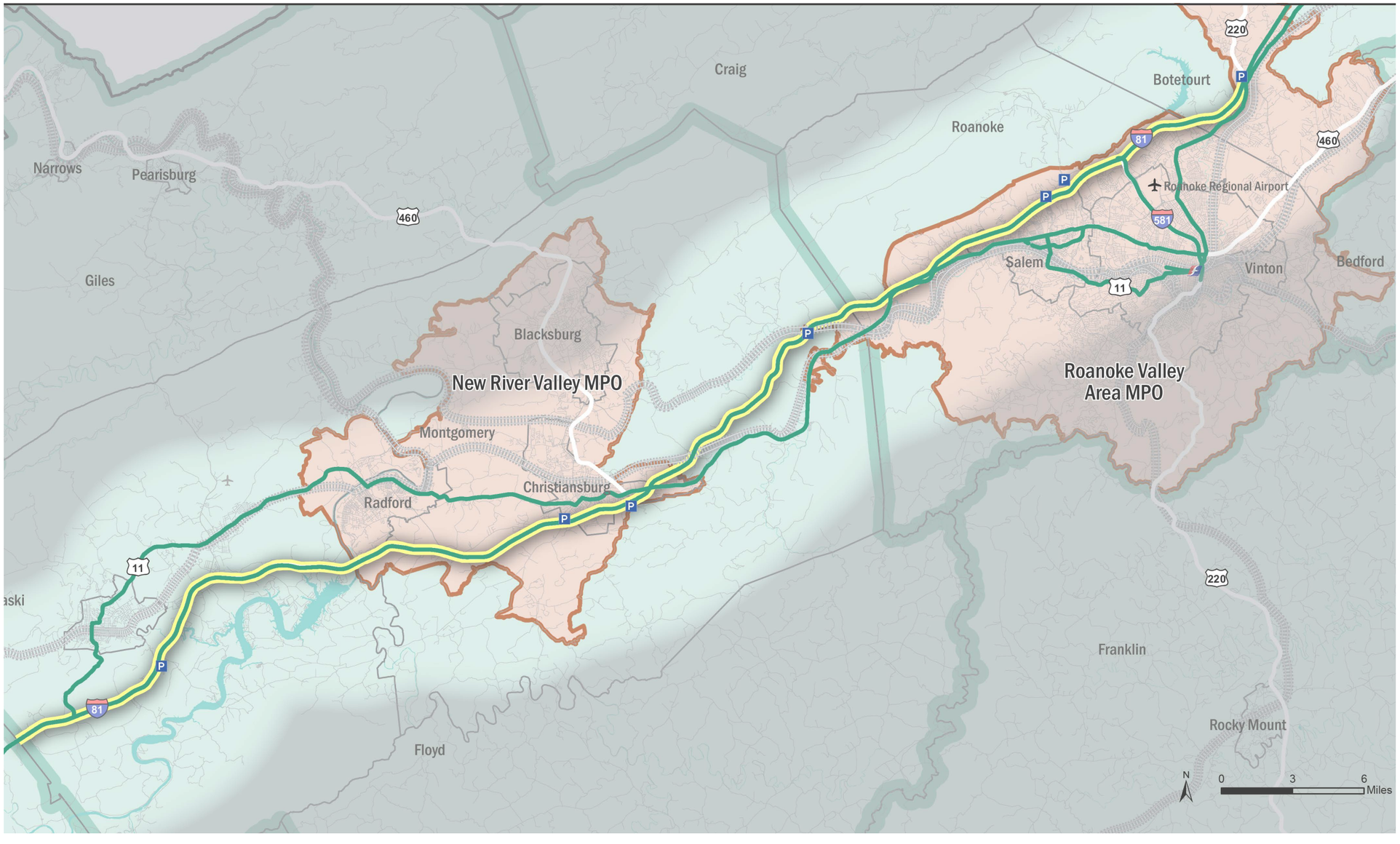
A.	Inadequate climbing lanes for trucks on I-81 through Wytheville can cause backups
B.	High levels of truck traffic can cause congestion, safety, and reliability concerns along entire segment. No intermodal freight facilities located in this area make rail freight less comparable as a mode choice.
C.	No passenger rail connections north (to Roanoke) or south (to Atlanta) from Bristol
D.	Tri-Cities Airport (in Tennessee) is the commercial airport for the entire region but has few flight options
E.	Transit in the region has limited range and limited operating hours.
F.	Safety concerns on I-81 at Exits 14-19 in Abingdon
G.	Lack of commuter park-and-ride lots in both VA and TN near Bristol and Abingdon.
H.	US 11 between Chester Street and West State Street in Bristol: 28 severe crashes
I.	US 11 between Underpass Road and Resting Tree Drive in Bristol: 31 severe crashes
J.	US 11 in Abingdon: 39 severe crashes
K.	US 11 in Marion: 38 severe crashes, especially between Washington Avenue and Rifton Drive
L.	No bus or rail service available from Bristol to other cities in the corridor
M.	Ability for US 11 to serve as a parallel highway facility limited by speed and capacity
N.	Park and Ride locations in Washington County match statewide average for utilization
O.	Congestion issue on US 11 between I-81 in Bristol and Abingdon
P.	Congestion issue at I-81 Exit 70 (US 52/US 21)
Q.	Congestion issue at I-81 Exit 14 (Old Jonesboro Road)
R.	Congestion issue at US 11 and VA Route 381 (Commonwealth Avenue) in Bristol
S.	Reliability issue at US 11 and Clear Creek Road/Old Airport Road in Bristol

III. Segment B2



Corridor Segment B2 Components

- I-81
- US 11
- US 11 Alt
- I-581
- Norfolk Southern Crescent Corridor
- Roanoke Regional Airport



Segment B2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

B2 SEGMENT PROFILE

Segment B2 begins at the boundary of Wythe County and progresses north through the Cities of Radford, Salem, and Roanoke, and Pulaski, Montgomery, and Roanoke Counties, and ends in Botetourt County at the interchange with US 220. The segment travels through the Roanoke Valley Area and the New River Valley Area. The segment includes and overlaps with portions of Route 100, US 11, US 11-Alt, US 220, and US 460. Segment B2 acts as a major corridor for through freight travel in Virginia and also connects smaller urban areas, such as Radford, Christiansburg, Salem, and Roanoke, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-81 is primarily a four-lane rural highway in Segment B2. I-581, a spur of I-81, serves the City of Roanoke with a six-lane cross section. When not running concurrently with I-81 for short distances, US 11 runs parallel to I-81 throughout the corridor as a two or four lane roadway.

Transit Services: The Smartway Bus provides transit service between Blacksburg and Roanoke. Greyhound offers service from Roanoke and Megabus offers service from Christiansburg. Several Park-and-Ride locations are in close proximity to I-81, with multiple locations near Christiansburg and Roanoke.

Rail Facilities: Norfolk Southern rail lines pass through Segment B2 connecting locations south and west of the Virginia Inland Port, near Corridor B south of Winchester. Several short line railroads also provide service to Segment B2.

Port Facilities: No port facilities are located directly adjacent to Segment B2, but the Crescent Corridor does provide direct access to the Virginia Inland Port south of Winchester.

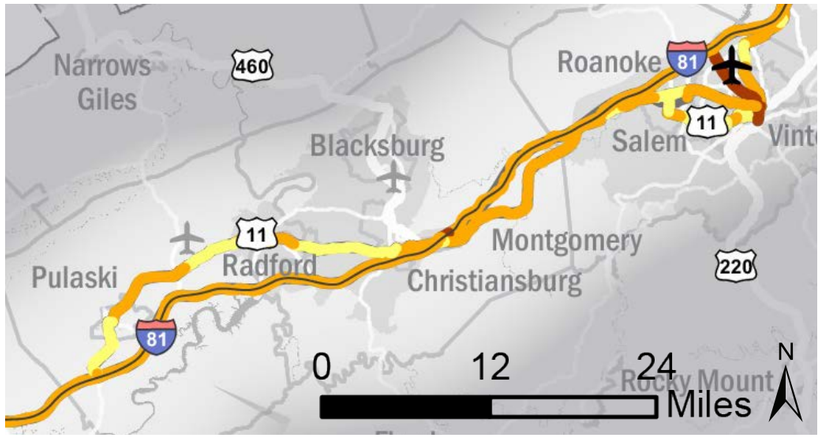
Airport Facilities: Commercial air service is available at the Roanoke Regional Airport. Two general aviation facilities are also present near Segment B2.

Major planned and future projects include:

- Widening Route 603 (North Fork Rd) between I-81 and Route 11/460 (which runs south of the segment) to improve connectivity.

Number of Lanes (both directions)

2
3 - 4
5 - 6
7 - 8
9 - 12
Primary facility



Future Projects

Reconstruction with added capacity
Safety improvements
Primary facility



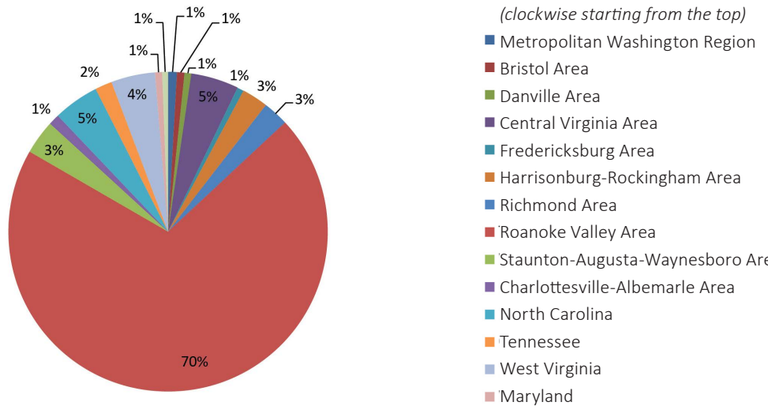


Travel Demand

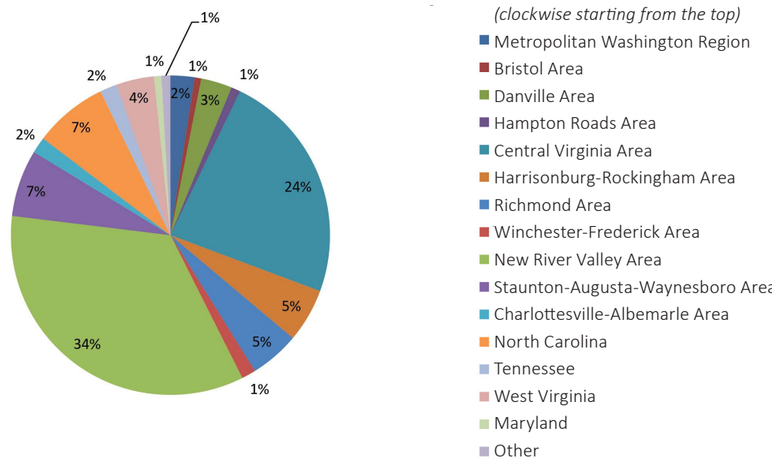
Passenger Demand

Segment B2 connects the New River Valley and Roanoke Valley Areas. Travel between these MPO Areas accounts for approximately two percent of intercity travel in the state and the majority of intercity travel originating in both of these MPO Areas. As shown, travel from the New River Valley Area to the Roanoke Area accounts for 70 percent of New River Valley's intercity travel, while Lynchburg accounts for another five percent. Similarly, 34 percent of the intercity traffic originating in the Roanoke Area is destined for the New River Valley Area.

Travel from New River Valley Area to...



Travel from Roanoke Valley Area to...



B2 SEGMENT PROFILE

Freight Demand

By truck, Segment B2 carried 79 million tons of freight worth $151 billion in 2012, and is estimated to carry 105 million tons of freight worth $226 billion in 2025. The major truck freight flows in Corridor B are interstate through-traffic, accounting for approximately 60 percent of truck freight tonnage in the corridor and over 75 percent of the total truck freight value. There is significant truck freight traffic along Corridor B between North Carolina and Ohio, accounting for four percent of the total truck corridor freight tonnage and value. By tonnage, Pennsylvania and Tennessee are also significant generators of truck freight along Corridor B. Around eight percent of the total truck freight on Corridor B, by value, is destined for New York, while another six to eight percent of truck freight heads to non-U.S. North American destinations. In terms of tonnage, between five and six percent of the total truck freight on Corridor B either originates from or is destined for jurisdictions adjacent to Segment B2. Freight traveling from North Carolina to Pulaski County accounts for nearly one percent of the total truck freight tonnage in the corridor The City of Roanoke, also located adjacent to Segment B2, attracts one percent of the total truck freight value on Corridor B, with a large proportion of that truck freight arriving from Pennsylvania and Ohio.

By rail, Segment B2 carried 51 million tons of freight worth $40 billion in 2012, and is estimated to carry 57 million tons of freight worth $53 billion in 2025. In terms of tonnage, the largest rail freight flows in Corridor B consist of low-value freight traveling from West Virginia to North Carolina, accounting for between 18 and 22 percent of the total rail freight corridor tonnage in 2012 and 2025, respectively. The City of Norfolk and its port facility is a major destination of rail freight in Corridor B, accounting for between 18 and 20 percent of the total corridor tonnage, with major rail freight flows originating in West Virginia, Wise County, and Buchanan County. In terms of value, rail freight flows between Illinois and the Cities of Norfolk and Portsmouth (and their port facilities) are the largest in Corridor B, accounting for more than 20 percent of the total rail freight value in the corridor. The City of Roanoke is a major attractor of rail freight in Segment B2, accounting for one percent of the total corridor value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (25% / 23%)
2. North Carolina (13% / 12%)
3. Pennsylvania (8% / 8%)
4. Ohio (6% / 7%)
5. Tennessee (6% / 6%)

Corridor Tonnage Originating in Segment B2: 5% / 5%

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
North Carolina and Indiana

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (22% / 22%)
2. North Carolina (14% / 15%)
3. Pennsylvania (8% / 8%)
4. New York (6% / 6%)
5. Tennessee (4% / 5%)

Corridor Tonnage Destined for Segment B2: 5% / 6%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (31% / 28%)
2. West Virginia (30% / 26%)
3. Wise County (12% / 10%)
4. Illinois (8% / 10%)
5. Ohio (6% / 8%)

Corridor Tonnage Originating in Segment B2: 1% / 2%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Ohio and North Carolina
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (38% / 37%)
2. North Carolina (35% / 35%)
3. City of Norfolk* (20% / 17%)
4. Tennessee (4% / 3%)
5. Georgia (3% / 3%)

Corridor Tonnage Destined for Segment B2: 2% / 2%

Traffic Conditions

Traffic Volume and AADT

Some of the highest traffic volumes in Corridor B are in sections of Segment B2 along I-81 and I-581 in Roanoke. In Roanoke County along I-81, average daily traffic volumes range from 48,000 to 67,000 vehicles while volumes on I-81 in Pulaski and Montgomery Counties range from 37,000 to 48,000 vehicles. In the City of Roanoke along I-581, average daily traffic volumes range from 46,000 to 77,000 vehicles, with the sections with the highest volumes located near the I-581/US 11 interchange. Average daily volumes on US 11/US 460 in Roanoke and Roanoke County typically range from 12,000 to 18,000 vehicles, and are typically between 7,000 and 16,000 vehicles on US 11 in Pulaski and Montgomery Counties. Traffic volumes on Segment B2 are forecasted to increase by 2025, with the largest increases in average daily traffic volumes occurring along I-81 near Roanoke. By 2025, almost all sections of I-81 in Montgomery and Roanoke Counties are forecasted to carry more than 50,000 vehicles per day. By 2025, the section of I-81 just south of the I-81/I-581 interchange is forecasted to have an average daily traffic volume of 80,000 vehicles.

Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



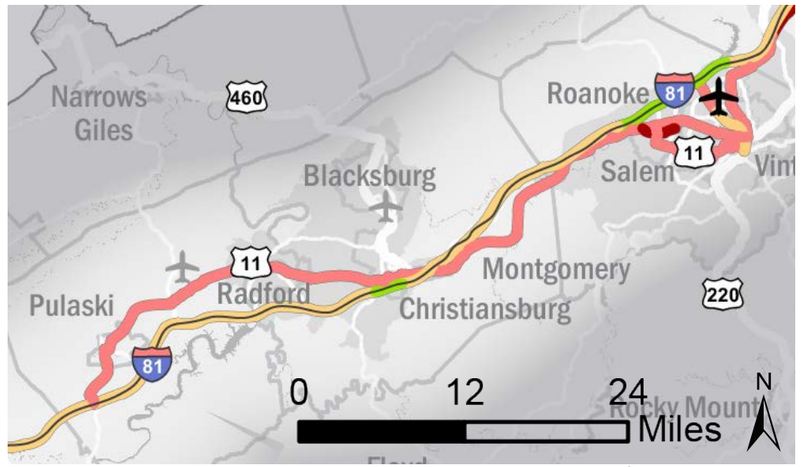
Traffic Volume 2025 (AADT)

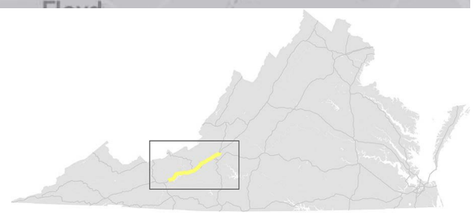
- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility





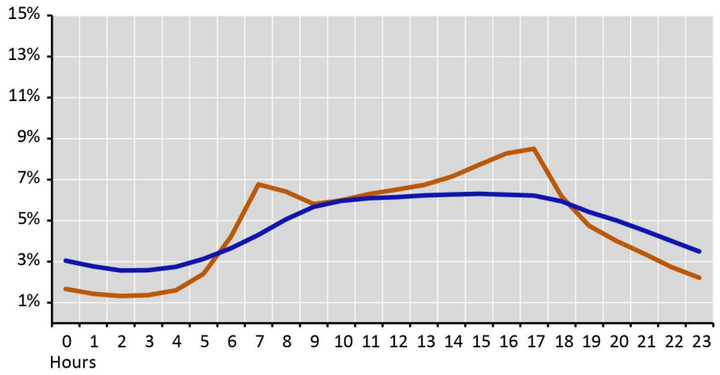
B2 SEGMENT PROFILE

Traffic Distribution

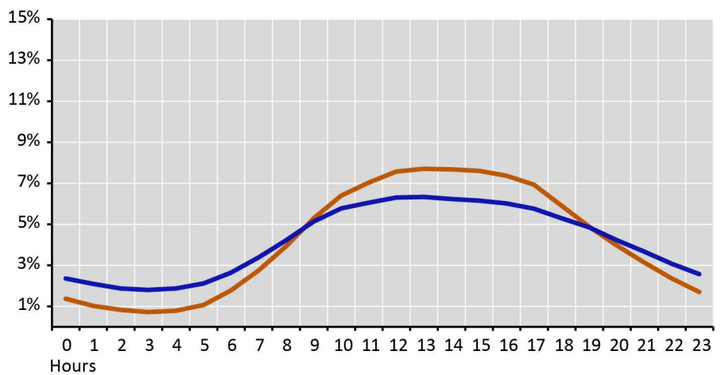
On average, traffic on Segment B2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 7.9 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 6.2 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 49 percent of total daily traffic. Peaking patterns for truck traffic are different from general traffic, with a relatively steady flow of trucks during the midday period between 9 a.m. and 6 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing a single midday peak between 11 a.m. and 6 p.m., with the highest percentage of hourly traffic occurring between noon and 1 p.m. (7.7 percent of daily traffic) for all traffic, and noon to 2 p.m. (6.3 percent of daily traffic per hour) for truck traffic.

Weekday traffic volumes on Segment B2 vary by as much as 32 percent throughout the year, with the highpoint in August (around 65,000 vehicles per day) and the low point in January (around 49,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the June high (around 12,400 vehicles per day) being 19 percent higher than the January low (around 10,400 vehicles per day). Weekend traffic levels also vary over the course of the year, with a marked decrease during the winter months (41 percent lower in February than August). Weekend truck traffic is marginally more steady than all vehicle traffic, and includes a marked dip during July. Truck volumes account for a significant portion of traffic on Segment B2 (20 percent of overall daily traffic for weekdays and 17 percent of overall daily traffic for weekends); as a result, truck traffic has a significant impact on overall traffic conditions.

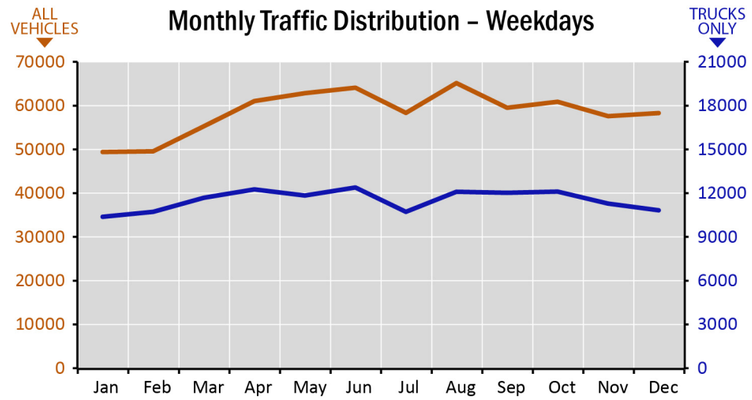
Hourly Traffic Distribution – Weekdays



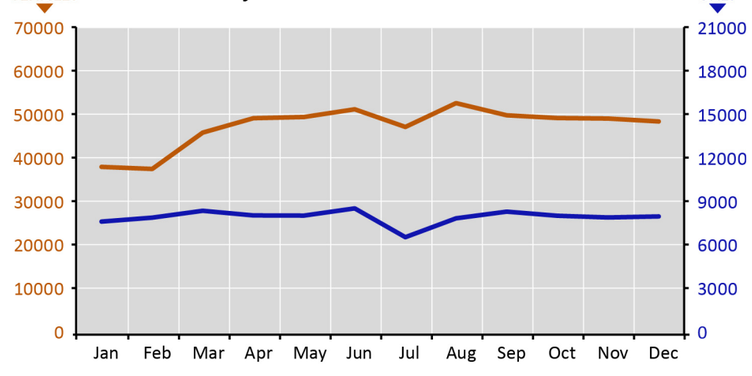
Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekdays



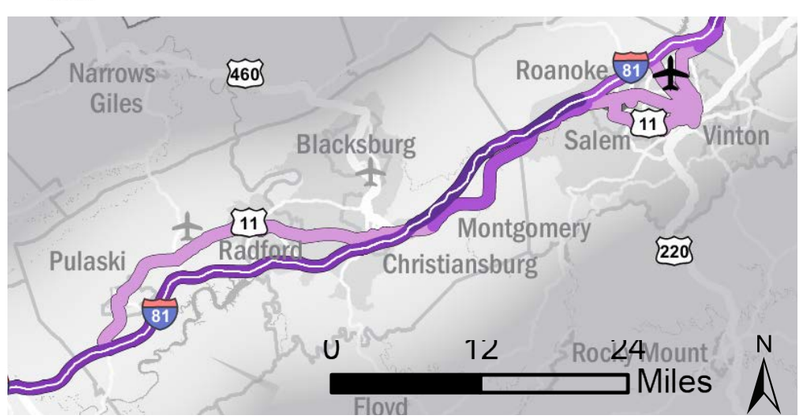
Monthly Traffic Distribution – Weekends



All Vehicles
Trucks

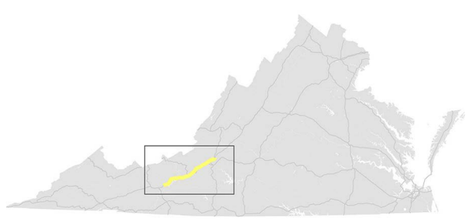
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment B2 is high relative to other segments in Corridor B and in the Commonwealth as a whole. Heavy trucks comprise 9 to 18 percent of total vehicle traffic on I-81, with the highest truck percentages occurring between Christiansburg and Salem. Trucks comprise less than nine percent of daily traffic on US 11, with the highest percentage occurring on US 11 in Botetourt County.



Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

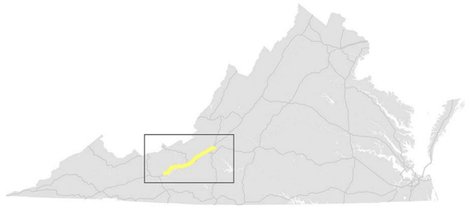


B2 SEGMENT PROFILE

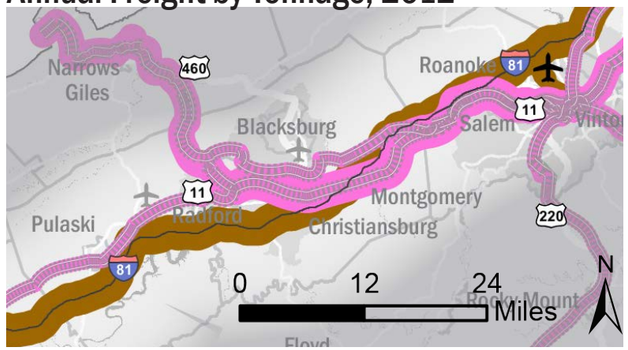
Freight Flows

Near Christiansburg, the majority of freight moves by truck, in terms of both tonnage and value. In total, 75 million tons (60 percent) of freight travel through the Christiansburg section of Segment B2 by truck, compared to 51 million tons by rail. By value, the difference is even starker, with $146 billion (78 percent) of freight value traveling by truck, compared to $40 million by rail. On average, a ton of freight traveling through this section of Segment B2 by truck is worth $1,949 while a ton of freight traveling by rail is worth $793. In 2025, both rail and truck freight tonnages and total values in the Christiansburg area are expected to increase, and the percentage of the freight that travels by truck is expected to increase slightly to 64 percent by tonnage and 81 percent by value. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,174 per ton on trucks and $935 on rail.

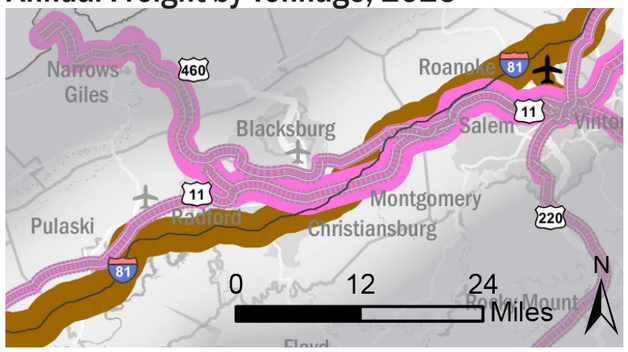
At the northern end of Segment B2, north of Roanoke, freight is also moved primarily by truck, in terms of both tonnage and value. In total, 78.5 million tons (96 percent) of freight is moved through this section of Segment B2 by truck, compared to four million tons by rail. By value, the difference is the same, with $151 billion (96 percent) of freight value traveling by truck, compared to $7 billion by rail. On average, a ton of freight traveling through this section of Segment B2 by truck is worth $1,926 while a ton of freight traveling by rail is worth $1,923. In 2025, both rail and truck freight tonnages and total values in the northern end of Segment B2 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Values per ton of freight on trucks are expected to increase to $2,139 in 2025, while rail values per ton will drop slightly to $1,867.



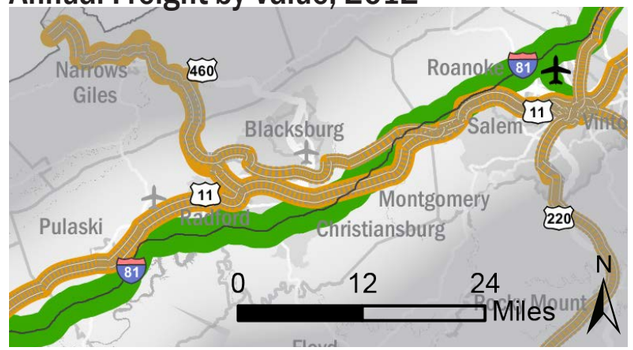
Annual Freight by Tonnage, 2012



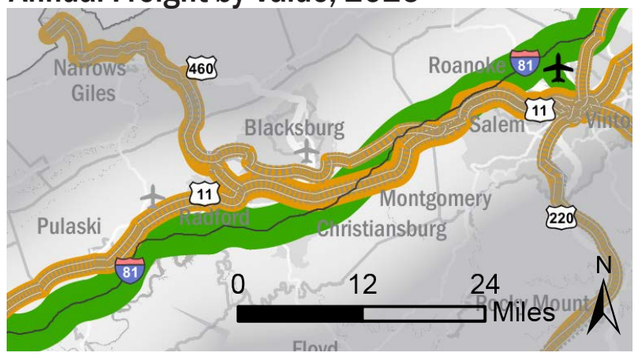
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

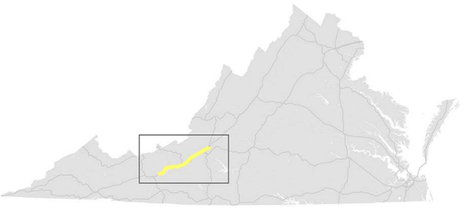
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

B2 SEGMENT NEEDS

Redundancy and Mode Choice



Passenger trips on Segment B2 of the Crescent Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long-range travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and bypassing incidents causing congestion on sections of I-81. Greyhound offers service from Roanoke and Megabus offers service from Christiansburg. The Smartway Bus provides transit service between Blacksburg and Roanoke, although it takes 67 percent longer than driving (in uncongested conditions).

Comparable Travel Options

Roanoke to Harrisonburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:53 Travel Time $61 Est. Cost

Blacksburg / Christiansburg to Roanoke

Inter-City Bus	*Train*
13 Trips per Day 1:15 Travel Time $4 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 0:45 Travel Time $24 Est. Cost

Roanoke to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:20 Travel Time $49 Est. Cost

Bristol to Roanoke

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 2:24 Travel Time $81 Est. Cost

Blacksburg / Christiansburg to Staunton

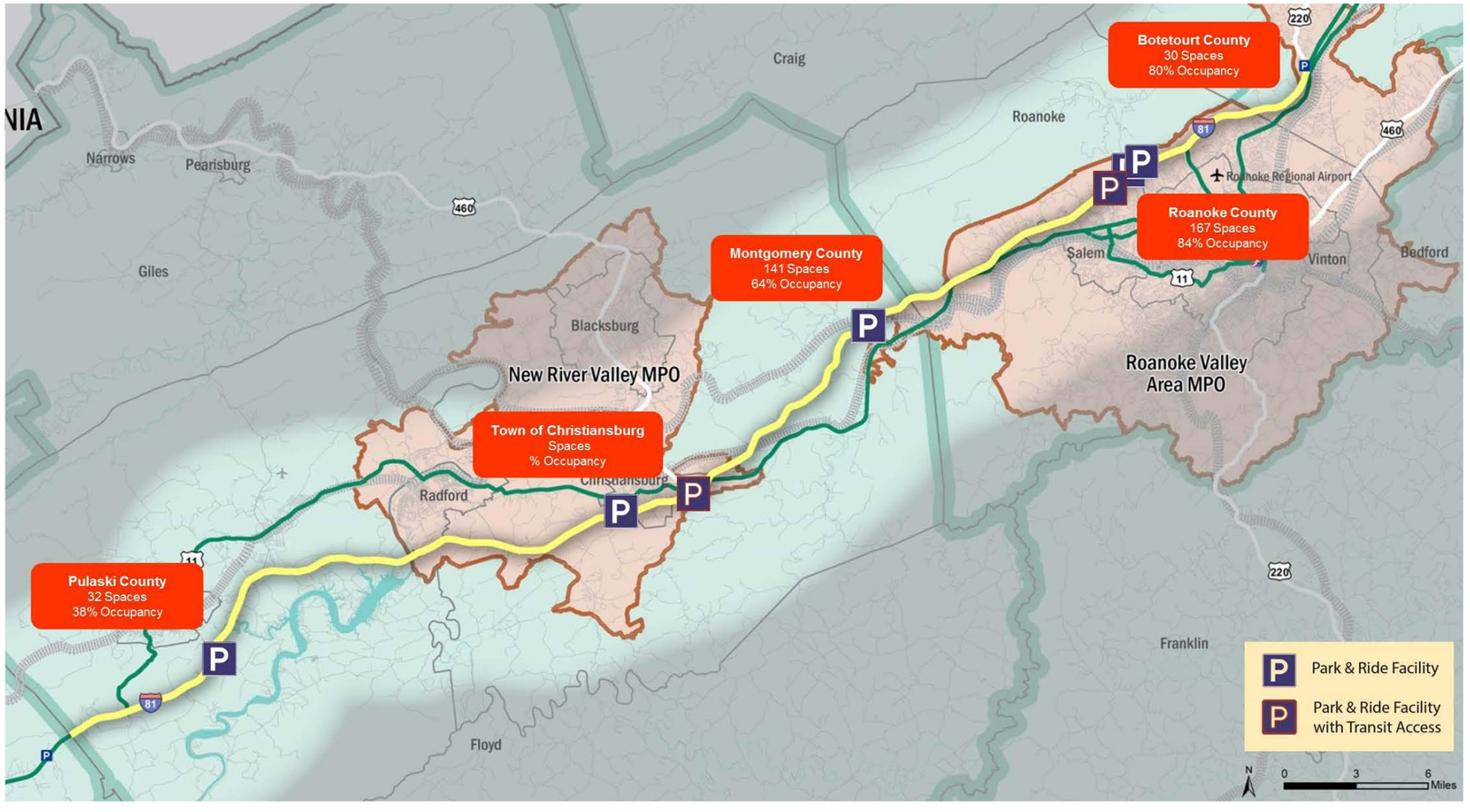
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 2:05 Travel Time $66 Est. Cost

Park-and-Ride

Within Segment B2, commuters can utilize several Park-and-Ride locations. Roanoke County provides the highest number of Park-and-Ride spaces and the highest utilization rate of spaces in the region, while Montgomery County has the most Park-and Ride-locations. Roanoke County and Botetourt County both have higher utilization rates (84 percent and 80 percent, respectively) than the statewide average of 76 percent for Park-and-Ride utilization.



B2 SEGMENT NEEDS

Safety

Segment B2 experienced the highest number of severe crashes (293) between 2010 and 2014 resulting in the highest crash rate along the Coastal Corridor. In Radford, along US 11, 36 collisions took place within approximately 2.9 miles between Route 114 and Burlington Street, with 15 of these occurring at the intersection of US 11 (Lee Highway) and Route 114 (Peppers Ferry Boulevard). Along US 11/US 460 in Salem, 72 crashes occurred along a 1.6 mile stretch between Texas Hollow Road and Green Street (as noted for Segment E2). Of the 72 crashes, 12 crashes happened at the intersection with Route112 and 12 crashes occurred at the intersection with Mill Lane. Along US 11 in the City of Roanoke, 56 collisions took place along about 2.9 miles between Hawthorne Road NW and Pocahontas Avenue NE.

Performance Metrics

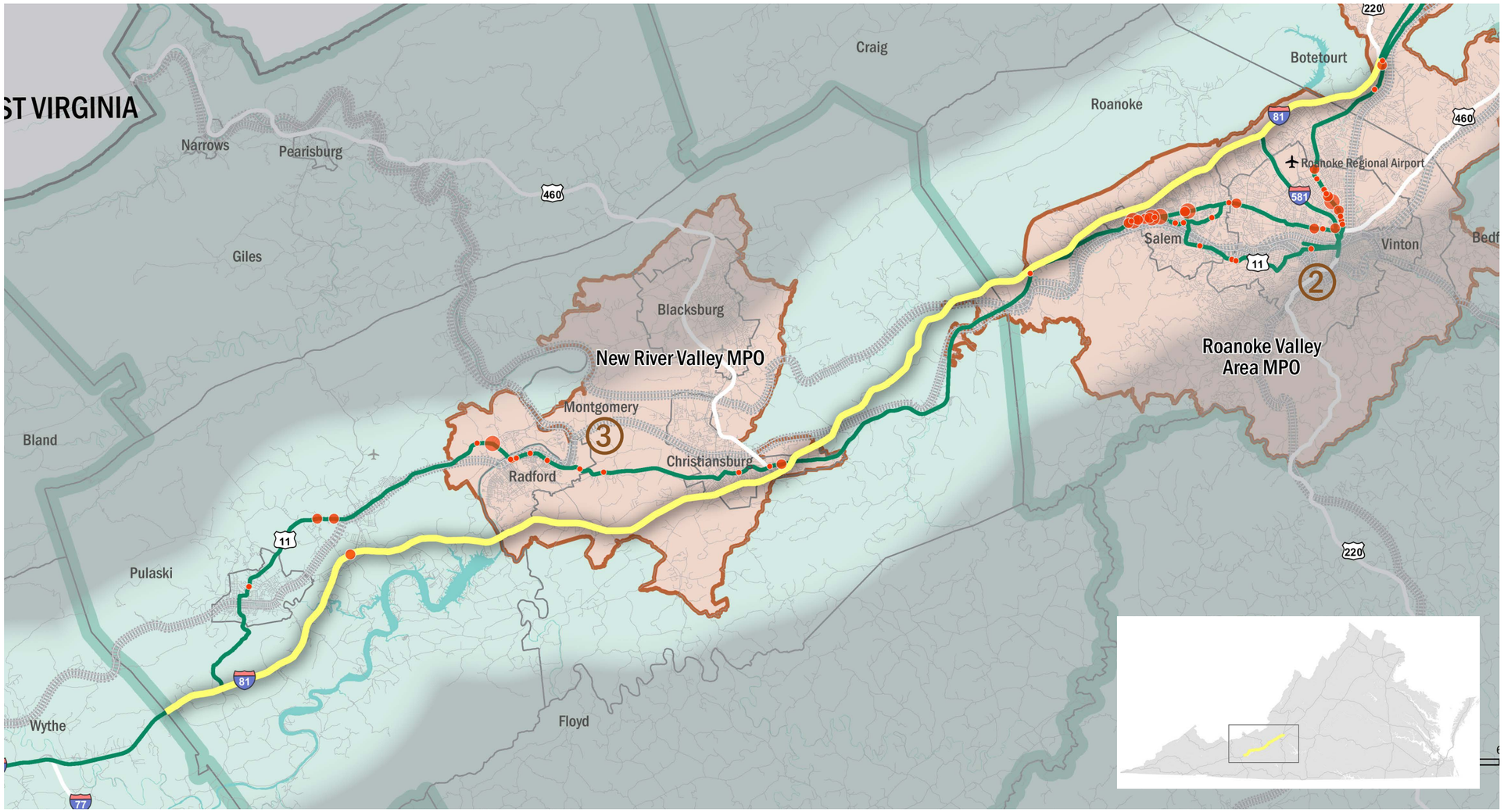
Number of Severe Crashes	293
Severe Crashes/Million VMT	0.6
Number of Railroad Crashes	5

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics

Person Hours of Delay per Mile	9
Freight Ton Hours of Delay per Mile	68K

Passenger Delays

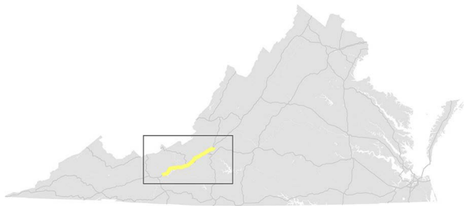
Segment B2 experiences the most passenger traffic congestion of any segment in the Crescent Corridor, with over 1,800 person-hours of passenger delay. However, congestion is not severe compared with other segments on other CoSS. Significant person-hours of delay per mile occur on portions of US 11 and US 11-Alt near downtown Roanoke, and on US 11 in the City of Salem. Peak-period passenger delays account for a little more than half of daily congestion, considerably more than the average peak-period share of congestion on other CoSS segments.

Freight Delays

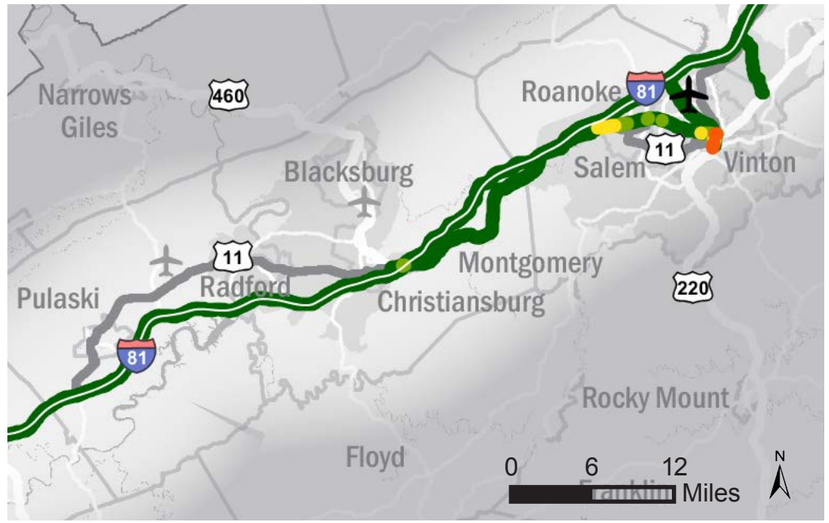
As with passenger congestion, Segment B2 experiences the most freight traffic congestion of all Corridor B segments, with over 13.8 million ton-hours. On a per-mile basis, the segment ranks third among all CoSS segments with congestion averaging nearly 68,000 ton-hours per mile. Areas with significant levels of freight delay include:

- US 11 between Christiansburg and Shawsville in Montgomery County;
- US 11 in Roanoke County west of Salem;
- On US 11 in the City of Salem, where freight delays approach 1,110,000 ton-hours per mile near downtown; and
- Portions of US 11 and US 11-Alt near downtown Roanoke.

Peak-period freight delays account for about 39 percent of daily congestion, close to the average for the peak-period share of congestion on other CoSS segments.

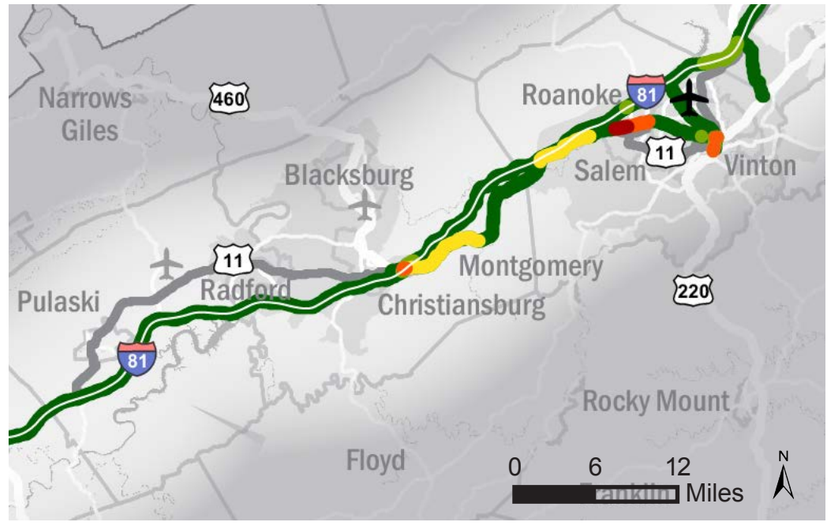


Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

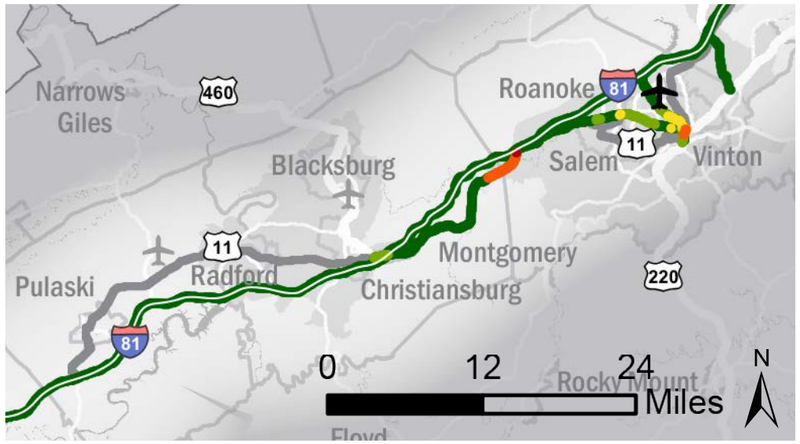
Reliability of travel during the peak period on a typical weekday on Segment B2 ranges from 0.00 to 1.0 in terms of reliability index, with an average value of 0.12. The reliability along Segment B2 is the worst among Corridor B segments. While the average weekday peak reliability index for this segment is approximately average for the state, only a short segment on US 11 at the intersection with Route 647 in Roanoke County has a reliability index value exceeding the statewide threshold.

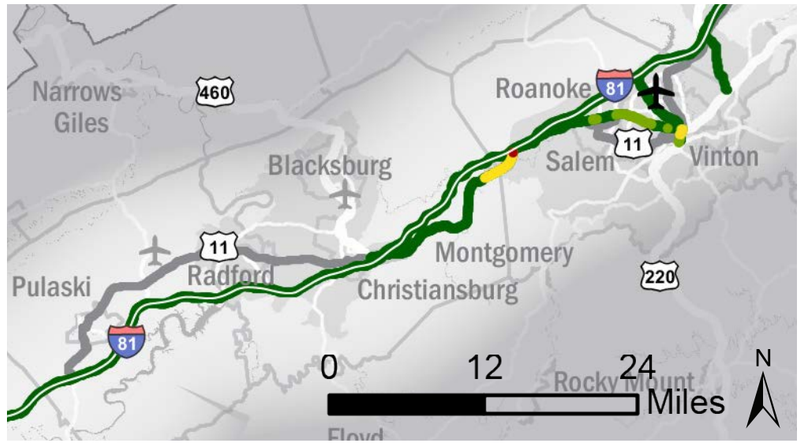
Weekday

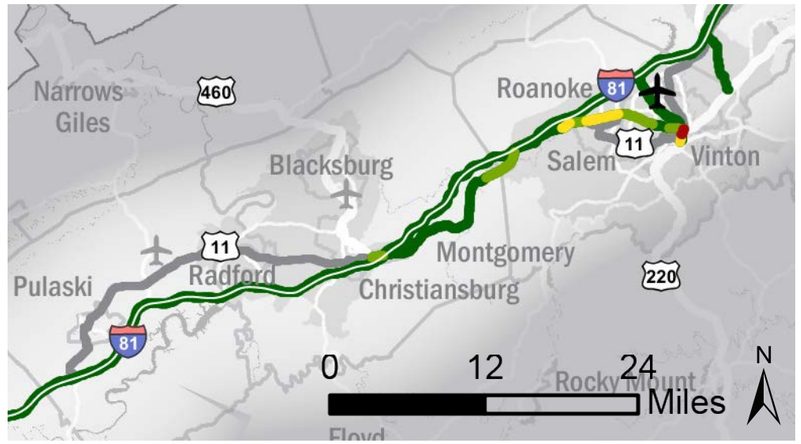
Reliability of travel during a typical weekday ranges from 0.01 to 0.89 in terms of reliability index, with an average value of 0.09. Locations where the weekday reliability index exceeds the statewide threshold include a portion of US 11 between Route 647 and Route 603 in Roanoke and Montgomery Counties and a segment on US 11 near I-581 in the City of Roanoke.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.95 in terms of reliability index, with an average value of 0.10. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, only one location has a weekend reliability index over the statewide threshold: a short segment on US 11 near I-581 in the City of Roanoke.





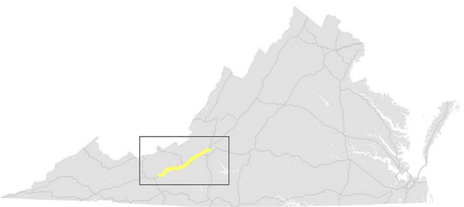


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliabile. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

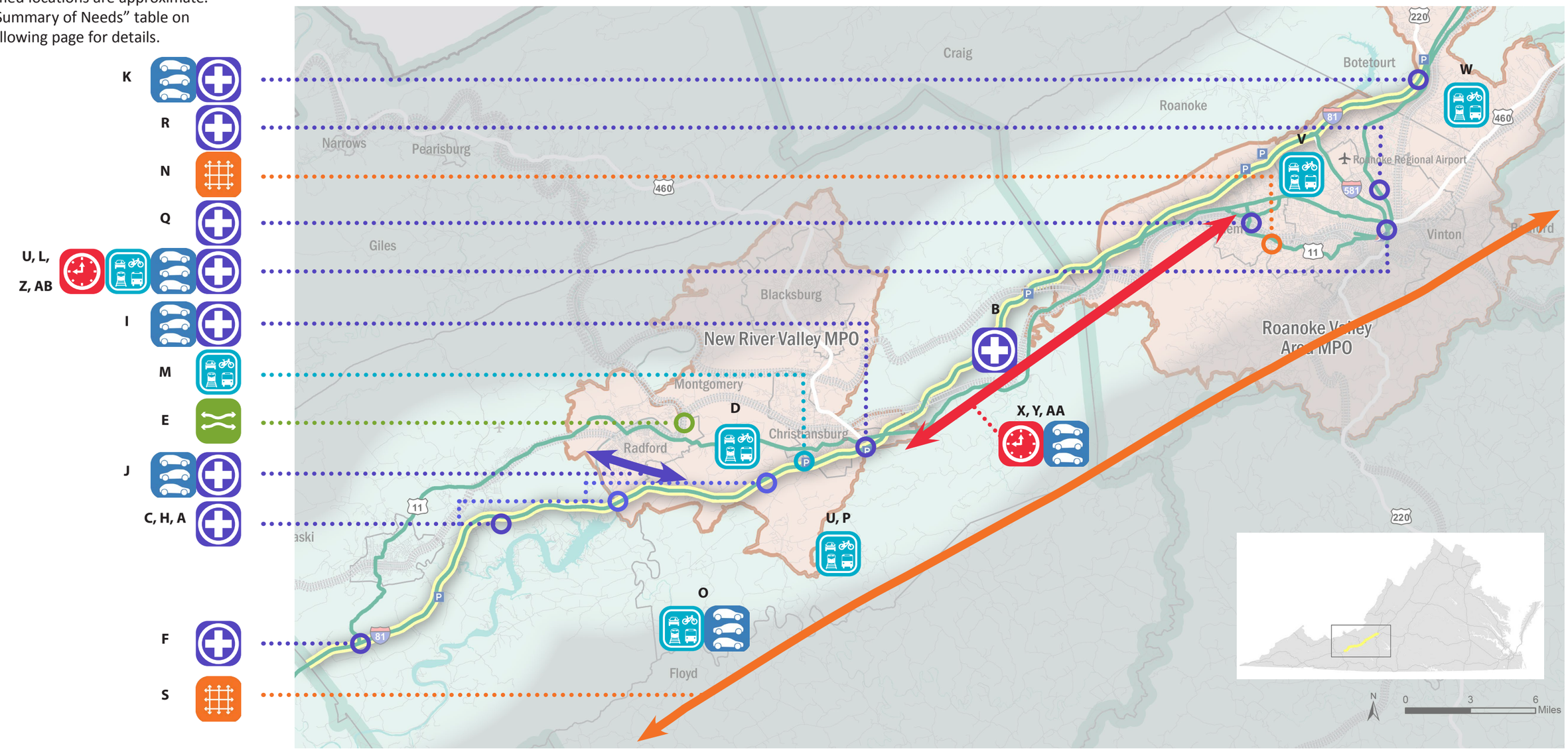


B2 SEGMENT NEEDS

Summary of Needs

Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability

Identified locations are approximate.
See "Summary of Needs" table on
the following page for details.



B2 SEGMENT NEEDS

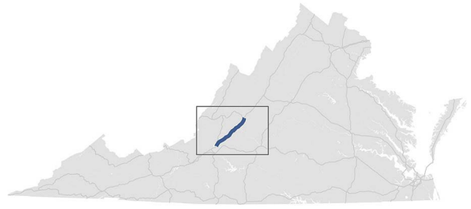
Summary of Needs - B2 Segment

A.	Inadequate climbing lanes for trucks on I-81 Northbound
B.	Inadequate climbing lanes for trucks on I-81 Northbound
C.	Poor acceleration/decceleration lanes on I-81 near exit 98 results in slow traffic and safety conflicts with trucks
D.	Lack of year-round transit options between Pulaski/Dublin and Radford
E.	Rail capacity (single track) at intersection of NS Heartland and Crescent corridors will be insufficient to accommodate future demand
F.	Poor acceleration/decceleration lanes on I-81 near exit 89 (US 11) results in slow traffic and safety conflicts with trucks
G.	Poor acceleration/decceleration lanes on I-81 near exit 94 results in slow traffic and safety conflicts with trucks
H.	Poor acceleration/decceleration lanes on I-81 bridge near exit 105 results in slow traffic and safety conflicts with trucks
I.	Poor acceleration/decceleration lanes on I-81 near exit 114 results in slow traffic and safety conflicts
J.	US 11 through Radford: Frequent driveways and access points result in slow moving traffic; 36 severe crashes between Route 114 and Burlington St
K.	I-81 between Exits 146 and 150: Poor acceleration/decceleration lanes near truck weigh station; significant freight ton-hours of delay
L.	I-581 at Orange Avenue: Structurally deficient bridges on I-581, congestion related to weaving movements from ramps to Elm Avenue
M.	Informal park-and-ride on VA 8 near I-81 indicates need for additional park-and-ride facility in this location
N.	Travelers using US 11 as an alternative to I-81 can cause congestion issues on Main Street in Salem

Summary of Needs - B2 Segment

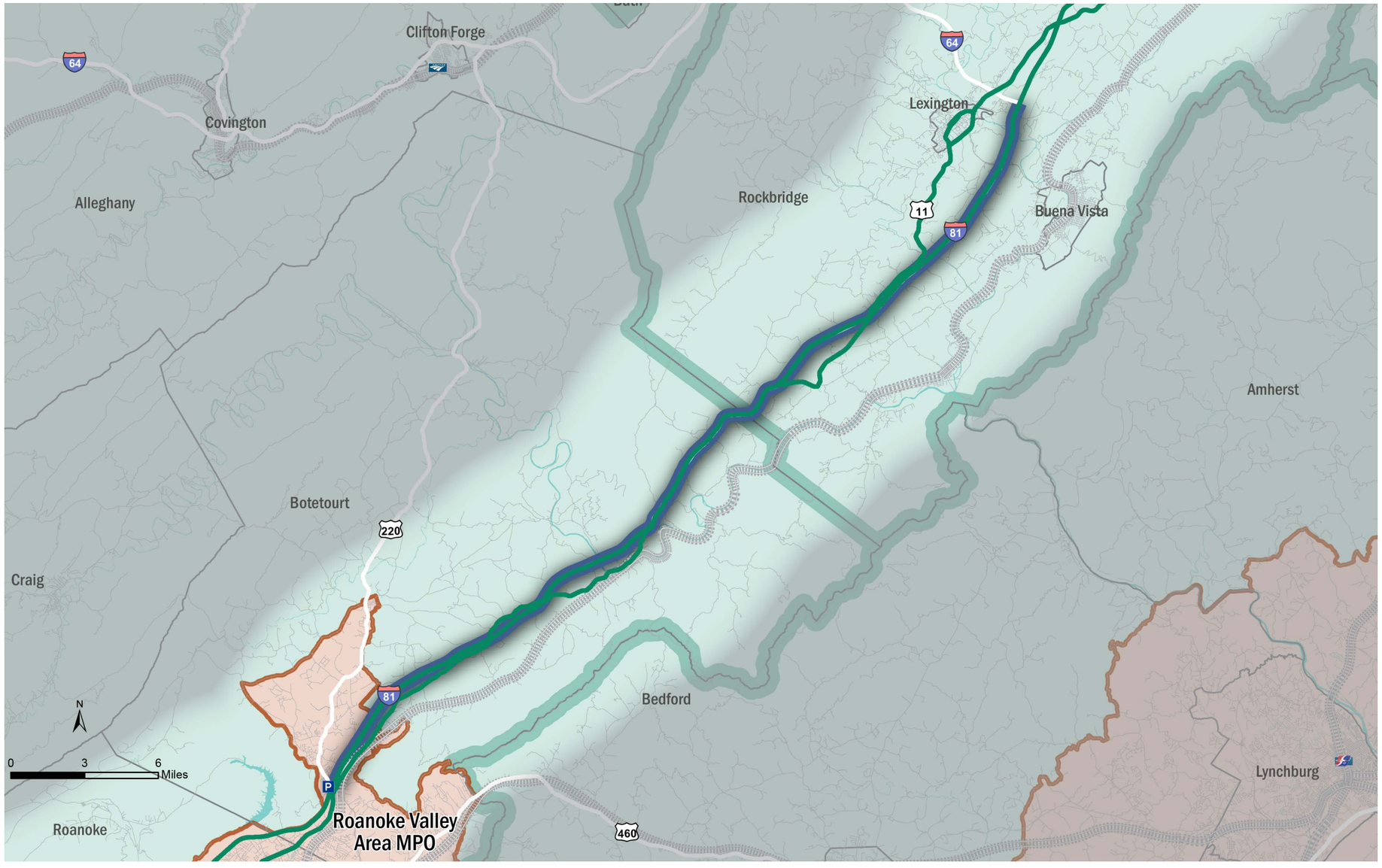
O.	Heavy truck traffic along I-81; no intermodal transfer facility available in Montgomery County to transfer freight from truck to rail.
P.	No passenger rail connection from Blacksburg/Christiansburg
Q.	US 11/460 in Salem between Texas Hollow Rd and Green St: 72 severe crashes
R.	US 11 in Roanoke between Hawthorne Road NW and Pocahantas Ave NE: 56 severe crashes
S.	Ability for US 11 to serve as a parallel highway facility limited by speed and capacity
T.	No passenger rail service from Roanoke to other cities in the corridor, bus service between cities in corridor is limited to Roanoke and Blacksburg/Christiansburg
U.	No passenger rail service from Blacksburg/Christiansburg to other cities in the corridor, bus service between cities in corridor is limited to Roanoke and Blacksburg/Christiansburg
V.	Park and Ride lots in Roanoke County have higher utilization rates than statewide average
W.	Park and Ride lots in Botetourt County have higher utilization rates than statewide average
X.	Congestion issue on US 11/US 460 between Dow Hollow Road (VA Route 647) and South Electric Road (US 11-Alt) in Salem
Y.	Congestion issue on US 11 /US 460 between I-81 in Christiansburg and Alleghany Spring Road in Shawsville
Z.	Congestion issue on VA Route 116 between I-581/US 220 and US 11-Alt in Roanoke
AA.	Reliability issue on US 11/US 460 between North Fork Road (VA Route 603) and Dow Hollow Road (VA Route 647)
AB.	Reliability issue on VA Route 116 between I-581/US 220 and US 11-Alt in Roanoke

IV. Segment B3



Corridor Segment B3 Components

- I-81
- US 11
- Norfolk Southern Crescent Corridor



Segment B3

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

B3 SEGMENT PROFILE

Segment B3 begins at the junction of I-81 and US 220 and progresses north to the junction of I-64/I-81 in Rockbridge County. This segment serves Botetourt and Rockbridge Counties, as well as the City of Lexington. The segment travels through some of the area covered by the Roanoke Valley Area MPO. Segment B3 acts as a major corridor for through freight travel in Virginia and also connects smaller urban areas, such as Roanoke and Lexington, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-81 is primarily a rural highway with four lanes in Segment B3. When not running concurrently with I-81 for short distances, US 11 runs parallel to I-81 throughout the corridor.

Transit Services: There are no line-haul transit services or Park-and-Ride facilities within Segment B3.

Rail Facilities: Norfolk Southern rail lines pass through Segment B3 connecting locations south and west of the Virginia Inland Port, near Corridor B south of Winchester.

Port Facilities: No port facilities are located directly adjacent to Segment B3, but the Crescent Corridor does provide direct access to the Virginia Inland Port south of Winchester.

Airport Facilities: The Roanoke-Blacksburg Regional Airport provides commercial air service in Segment B3.

Major planned and future projects include: There are no major planned projects to improve safety or increase capacity at this time.

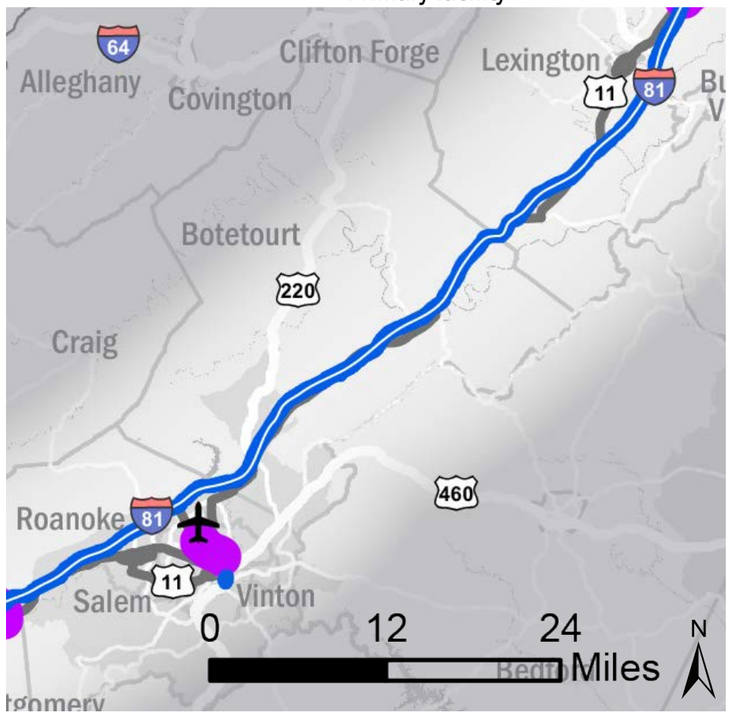
Number of Lanes (both directions)

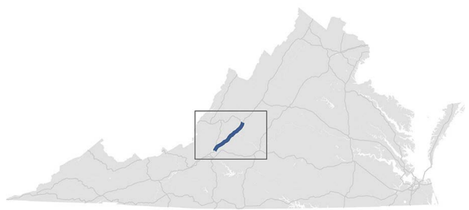
- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



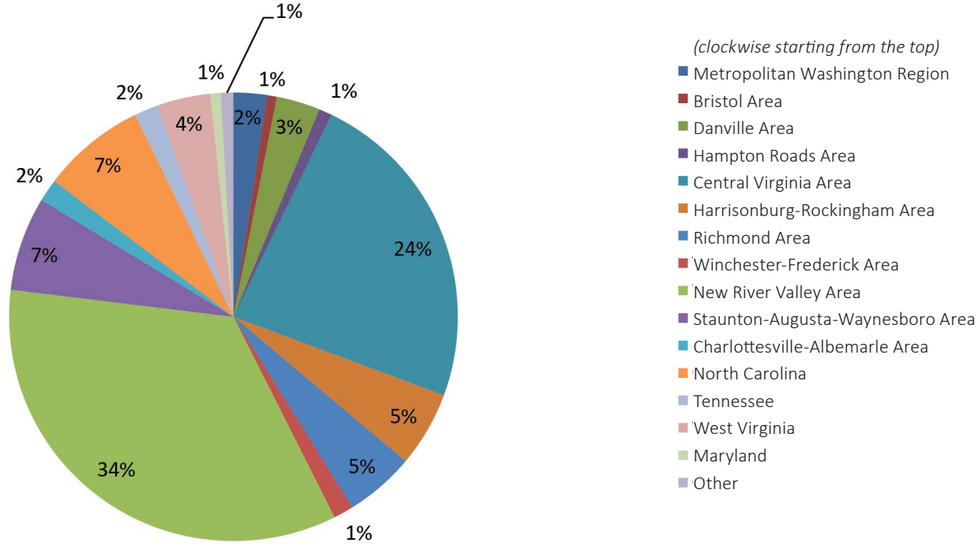


Travel Demand

Passenger Demand

Segment B3 runs from the northern edge of the Roanoke Valley Area towards the Cities of Lexington and Buena Vista. Of the intercity travel originating in Roanoke, several notable markets use Segment B3, including Staunton (seven percent), Harrisonburg (five percent), and points farther north including Winchester, the Metropolitan Washington region, and destinations in Maryland.

Travel from Roanoke Valley Area to...



B3 SEGMENT PROFILE

Freight Demand

By truck, Segment B3 carried 74 million tons of freight worth $147 billion in 2012, and is estimated to carry 99 million tons of freight worth $220 billion in 2025. The major truck freight flows in Corridor B are interstate through-traffic, with approximately 60 percent of truck freight tonnage in the corridor and more than 75 percent of the total truck freight value passing through Virginia. There is significant truck freight traffic along Corridor B between North Carolina and Ohio, accounting for four percent of the total truck freight tonnage and value on the corridor. In terms of tonnage, Pennsylvania and Tennessee are also significant generators of truck freight along Corridor B. Around eight percent of the total corridor truck freight, by value, is destined for New York, while another six to eight percent of truck freight on the corridor heads to non-US North American destinations. Three percent of the total corridor truck freight tonnage originates in the jurisdictions adjacent to Segment B3. The largest generator of truck freight along Segment B3 is Botetourt County, with the majority of this freight destined for North Carolina and Pennsylvania.

By rail, Segment B3 carried six million tons of freight worth $7 billion in 2012, and is estimated to carry seven million tons of freight worth $10 billion in 2025. In terms of tonnage, the largest rail freight flows in Corridor B consist of low-value freight traveling from West Virginia to North Carolina, accounting for between 18 and 22 percent of the total rail freight corridor tonnage in 2012 and 2025. The City of Norfolk (and its port facility) is a major destination for rail freight on Corridor B, accounting for between 18 and 20 percent of the total corridor rail freight tonnage, with major rail freight flows originating from West Virginia, Wise County, and Buchanan County. In terms of value, the largest rail freight flows on Corridor B are between Illinois and the Cities of Norfolk and Portsmouth (and their port facilities), accounting for more than 20 percent of the total rail freight value. The jurisdictions adjacent to Segment B3 are not major generators of rail freight trips. There is a minor movement of low-value rail freight between North Carolina and Botetourt County, located along Segment B3, accounting for one percent of the total rail freight corridor tonnage.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (25% / 23%)
2. North Carolina (13% / 12%)
3. Pennsylvania (8% / 8%)
4. Ohio (6% / 7%)
5. Tennessee (6% / 6%)

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
North Carolina and Indiana

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (22% / 22%)
2. North Carolina (14% / 15%)
3. Pennsylvania (8% / 8%)
4. New York (6% / 6%)
5. Tennessee (4% / 5%)

Corridor Tonnage Originating in Segment B3: 3% / 3%

Corridor Tonnage Destined for Segment B3: 3% / 3%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (31% / 28%)
2. West Virginia (30% / 26%)
3. Wise County (12% / 10%)
4. Illinois (8% / 10%)
5. Ohio (6% / 8%)

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Ohio and North Carolina
Illinois and North Carolina

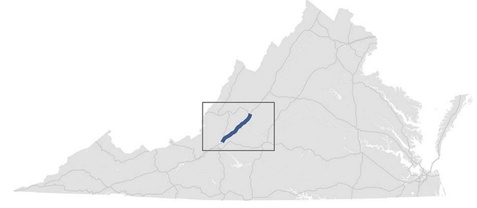
Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (38% / 37%)
2. North Carolina (35% / 35%)
3. City of Norfolk* (20% / 17%)
4. Tennessee (4% / 3%)
5. Georgia (3% / 3%)

Corridor Tonnage Originating in Segment B3: 1% / 2%

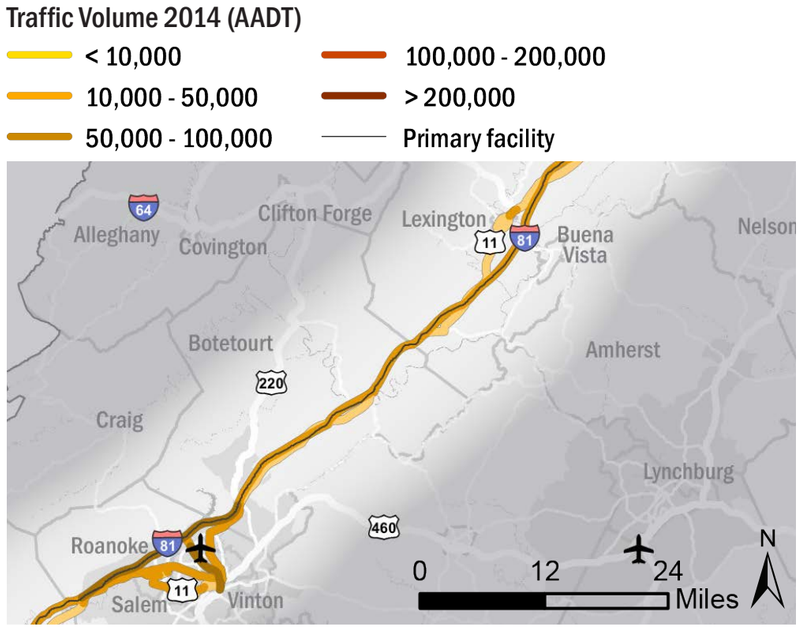
Corridor Tonnage Destined for Segment B3: 1% / 1%

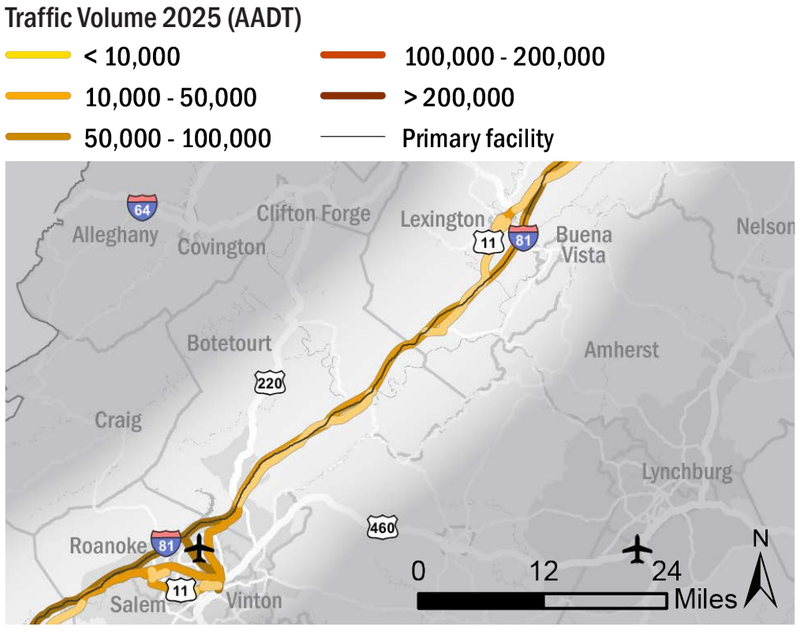
Traffic Conditions

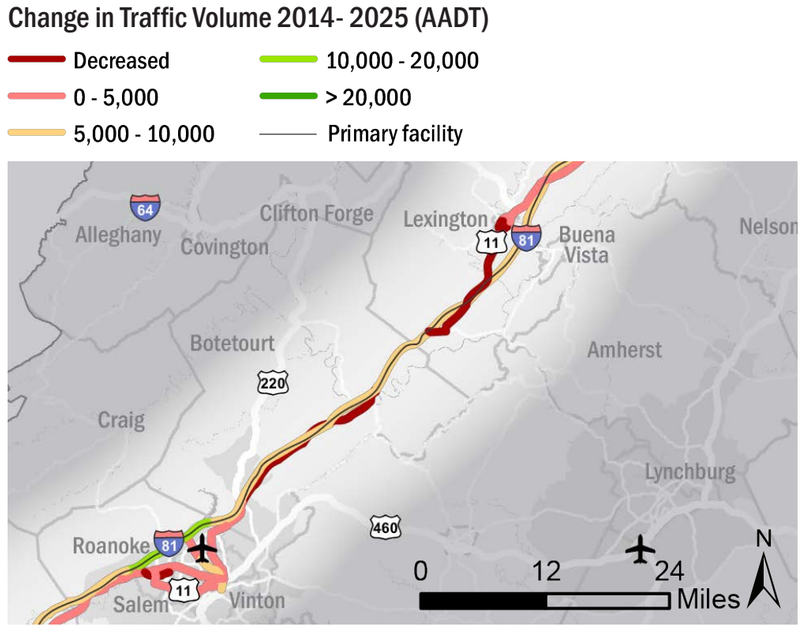


Traffic Volume and AADT

Traffic volume on Segment B3 is generally less than traffic volumes on most sections of Corridor B. I-81 carries between 32,000 to 40,000 vehicles per day on average. Traffic levels on US 11 are significantly lower, and average between 8,000 and 22,000 vehicles per day in the City of Lexington, and less than 7,000 vehicles per day elsewhere in the segment. By 2025, average daily traffic volumes along I-81 in Segment B3 are forecasted to increase by approximately 6,000 vehicles, for average daily traffic volumes between 41,000 and 46,000 vehicles per day. Traffic growth on US 11 is only forecast in and around the City of Lexington, with 2025 traffic volumes increasing by as much as 3,000 vehicles per day.







B3 SEGMENT PROFILE

Traffic Distribution

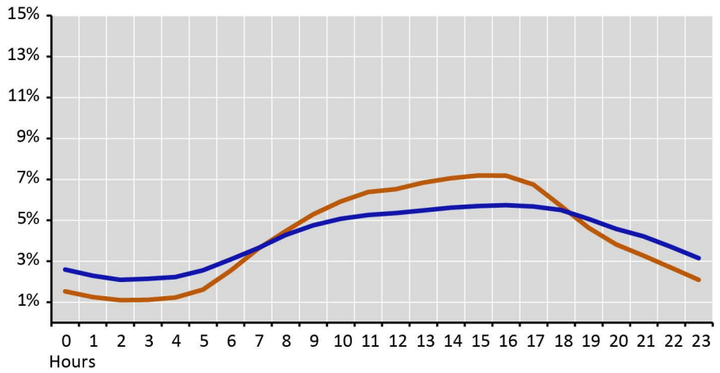
On average, traffic on Segment B3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a single midday peak between 10 a.m. and 7 p.m. The highest hourly traffic occurs between 4 and 5 p.m. which accounts for 7.2 percent of daily traffic. Peaking patterns for truck traffic show the same relatively steady flow of trucks during the midday period between 10 a.m. and 7 p.m., with a peak hourly flow of 5.6 percent from 5 p.m. to 6 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing even distribution of traffic during the middle of the day between 11 a.m. and 5 p.m.

Weekday traffic volumes on Segment B3 vary by as much as 71 percent throughout the year, with the highpoint in August (around 40,000 vehicles per day) and the low point in February (around 24,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the October high (around 12,000 vehicles per day) being 33 percent higher than the January low (around 9,000 vehicles per day). Weekend traffic levels also vary over the course of the year, with a marked decrease during the winter months (81 percent lower in February than in August). Weekend truck traffic is more steady than all vehicle traffic, with the June high (around 8,500 vehicles per day) 33 percent higher than the July low (around 6,400 vehicles per day). Truck volumes account for a significant portion of traffic on Segment B3 (32 percent of overall daily traffic for weekdays and 23 percent of overall daily traffic for weekends); as a result truck traffic has a significant impact on overall traffic conditions.

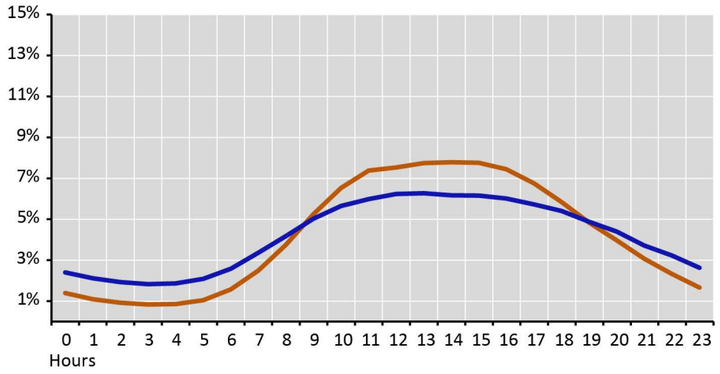
Truck Volume

The percent of daily traffic comprised of heavy trucks on Segment B3 is higher relative to most other segments in Corridor B. On I-81, trucks comprise 15 to 16 percent of total traffic. US 11 shows fewer heavy trucks, comprising less than two percent of daily traffic.

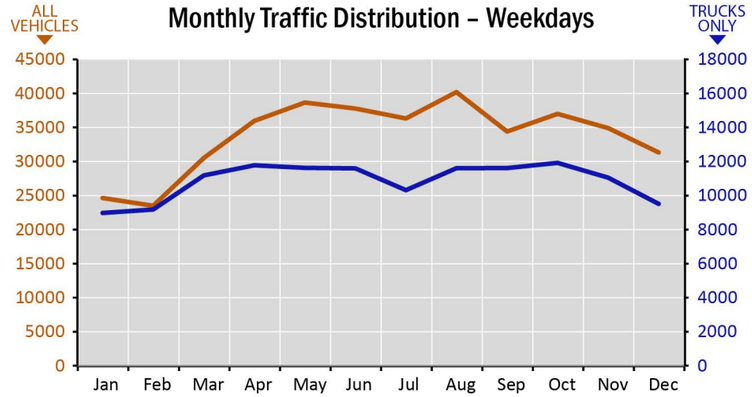
Hourly Traffic Distribution – Weekdays



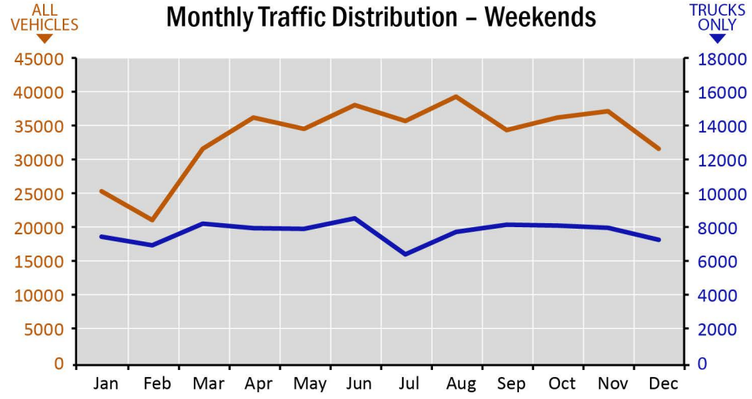
Hourly Traffic Distribution – Weekends



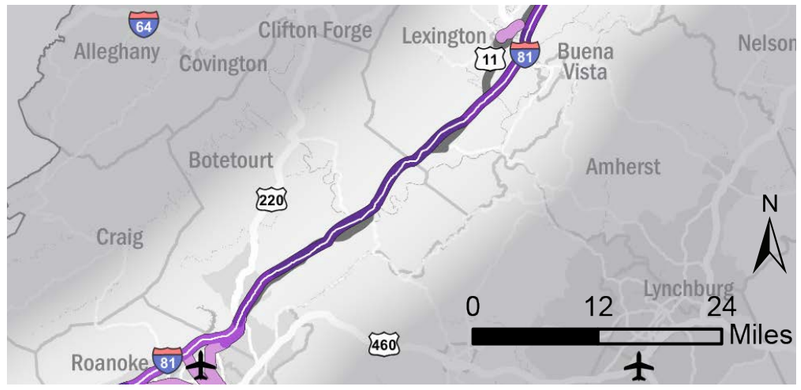
Monthly Traffic Distribution – Weekdays



Monthly Traffic Distribution – Weekends

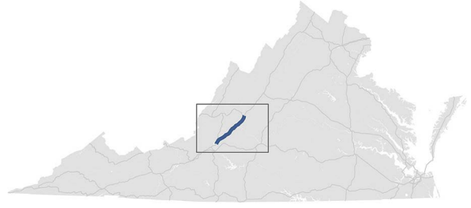


All Vehicles
Trucks



Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

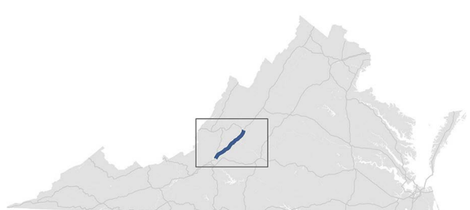


B3 SEGMENT PROFILE

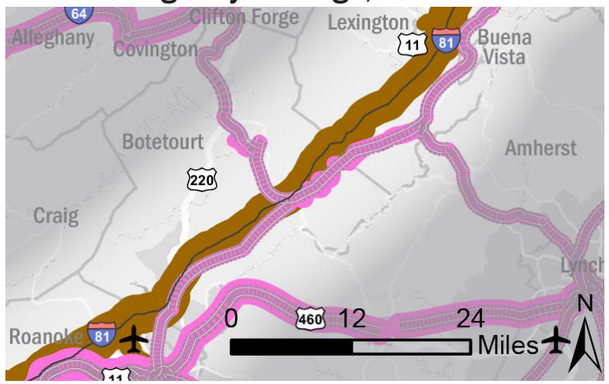
Freight Flows

At the southern end of Segment B3, south of Buchanan, freight is moved primarily by truck in terms of both tonnage and value. In total, 72.5 million tons (95 percent) of freight is moved through this section of Segment B3 by truck, compared to four million tons by rail. By value, the difference is the same, with $147 billion (95 percent) of freight traveling by truck, compared to $7 billion by rail. On average, a ton of freight traveling by truck through this section of Segment B2 is worth $2,021 while a ton of freight traveling by rail is worth $1,923. In 2025, both rail and truck freight tonnages and total values in the southern end of Segment B3 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Values per ton of freight on trucks are expected to increase to $2,246 in 2025, while rail values per ton will drop slightly to $1,867.

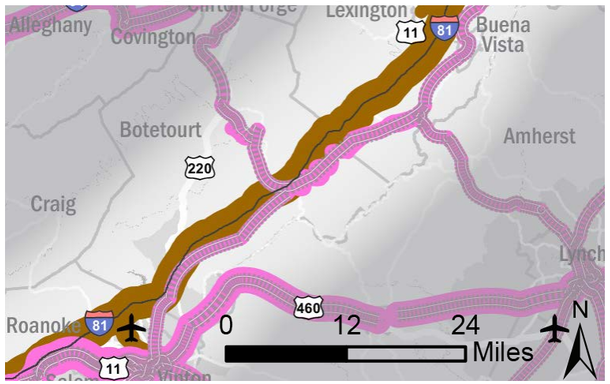
At the northern end of Segment B3, south of Lexington, freight is also moved primarily by truck in terms of both tonnage and value. In total, 74 million tons (92 percent) of freight is moved through this section of Segment B3 by truck, compared to 6 million tons by rail. By value, trucks are favored even more, with $147 billion (95 percent) of freight traveling by truck, compared to $7.5 billion by rail. On average, a ton of freight traveling by truck through this section of Segment B3 is worth $1,992 while a ton of freight traveling by rail is worth $1,221. In 2025, both rail and truck freight tonnages and total values in the northern end of Segment B3 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on both trucks and rail is expected to grow by 2025 with an average of $2,209 per ton on trucks and $1,396 on rail.



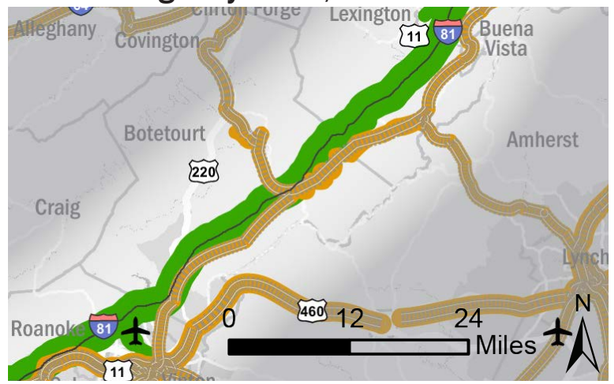
Annual Freight by Tonnage, 2012



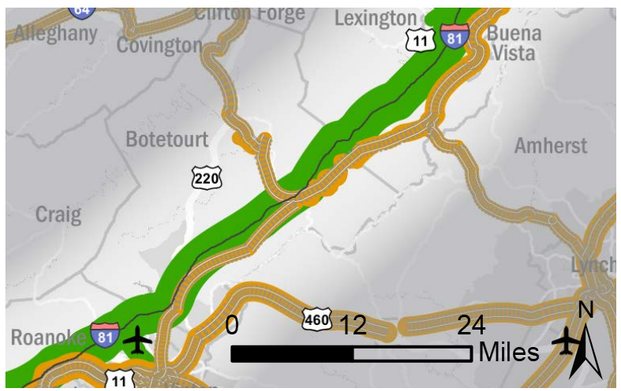
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment B3 of the Crescent Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long-range travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and for bypassing incidents causing congestion on sections of I-81. No alternate modes are available along Segment B3.

Comparable Travel Options

Roanoke to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:20 Travel Time $49 Est. Cost

Blacksburg / Christiansburg to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 2:05 Travel Time $66 Est. Cost

Roanoke to Harrisonburg

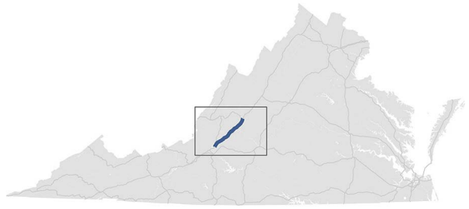
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

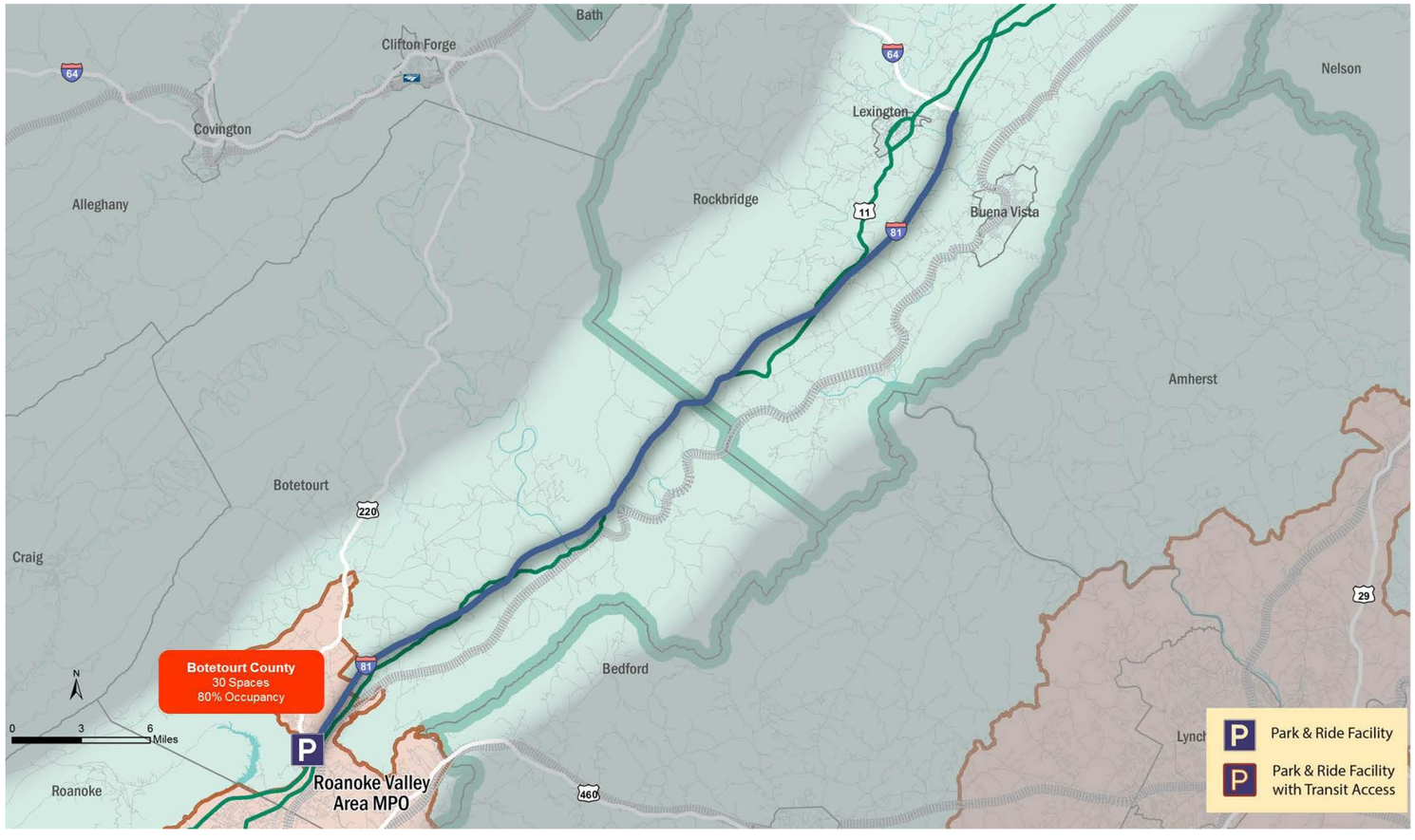
Auto

Via I-81: 1:53 Travel Time $61 Est. Cost

Park-and-Ride

Within Segment B3, commuters do not have direct access to Park-and-Ride locations; however, two Park-and-Ride locations are available in Botetourt County with a utilization rate of 80 percent, which is higher than the statewide average of 76 percent.





B3 SEGMENT NEEDS

Safety

Performance Metrics:

Number of Severe Crashes	21
Severe Crashes/Million VMT	0.3
Number of Railroad Crashes	1

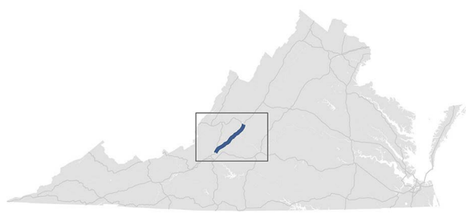
Between 2010 and 2012, only 21 severe crashes were recorded in Segment B3, one of the lowest totals for any CoSS segment. Along I-81, ten crashes occurred near mile marker 167 in Buchanan and seven crashes happened near Lexington around exit 188. On US 11 in Lexington, four incidents occurred approximately 0.5 miles south of I-64.

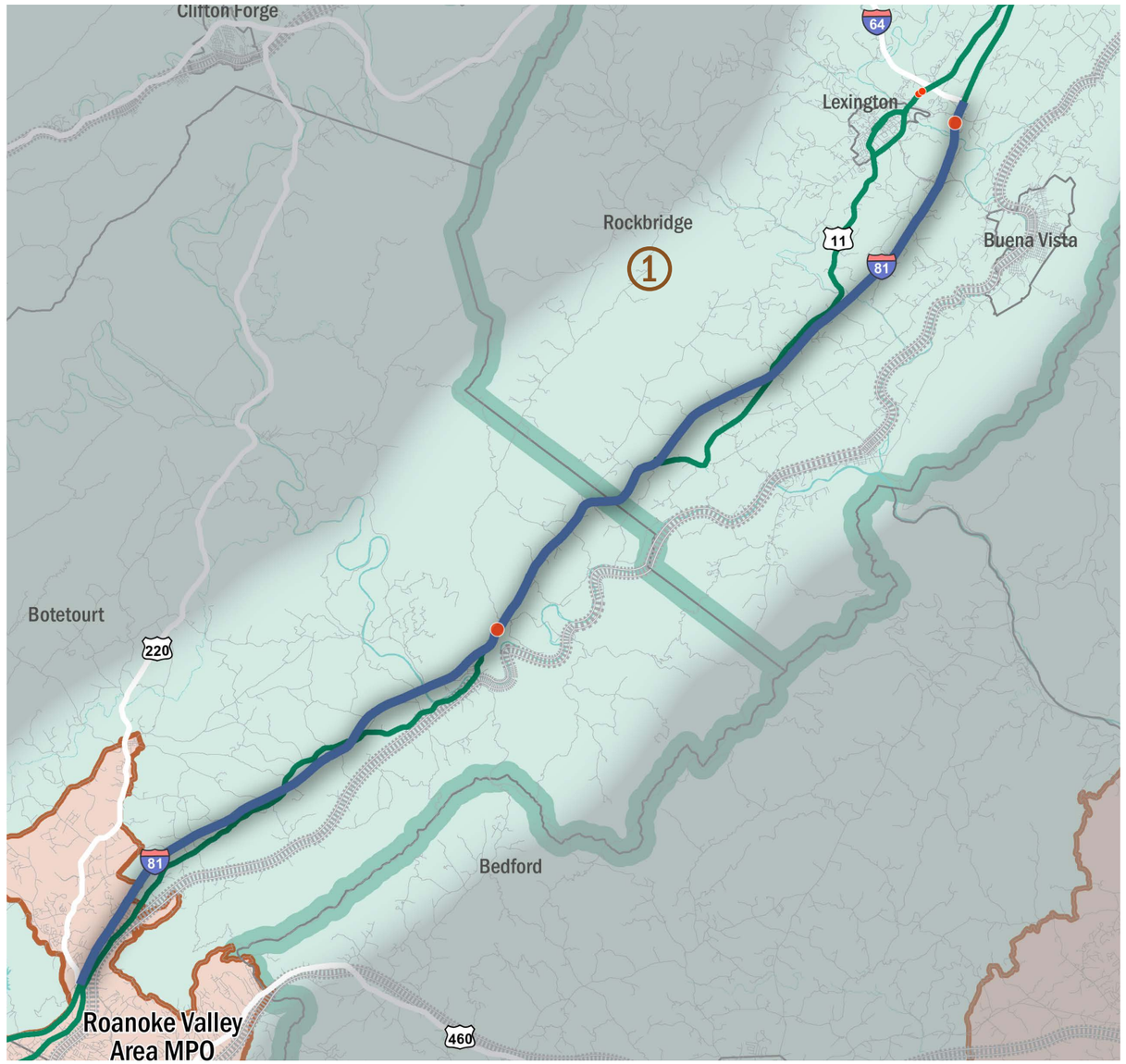
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

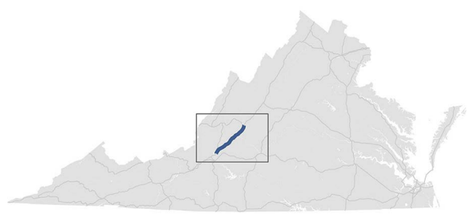




Congestion

Performance Metrics:

Person Hours of Delay per Mile	0
Freight Ton Hours of Delay per Mile	1.3K



Passenger Delays

Segment B3 experiences some of the lowest passenger traffic congestion in the state with only negligible daily passenger delays. As such, there are no locations of significant passenger delay along Segment B3.

Freight Delays

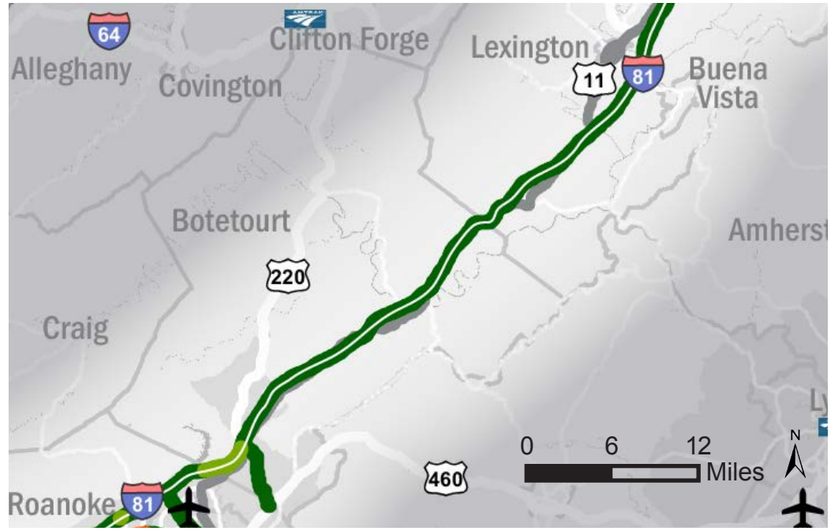
As with passenger congestion, Segment B3 experiences some of the lowest freight delays in the state, with only 110,000 ton-hours of delay. On a per-mile basis, Segment B3 experiences just two percent of the delays present along Segment B2. There are no locations of freight delay exceeding 250,000 ton-hours per mile along Segment B3. Peak-period freight delays account for only six percent of daily congestion.

Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

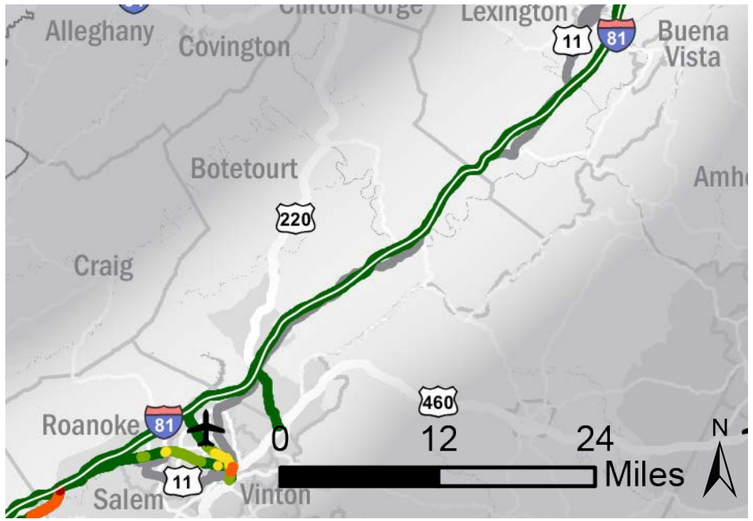
Reliability of travel during the peak period on a typical weekday on Segment B3 ranges from 0.00 to 0.04 in terms of reliability index, with an average value of 0.02. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B3 have reliability index values exceeding the statewide threshold.

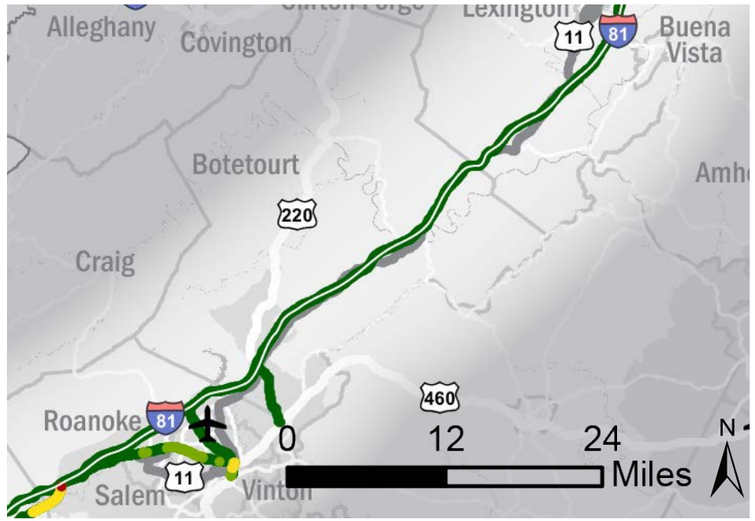
Weekday

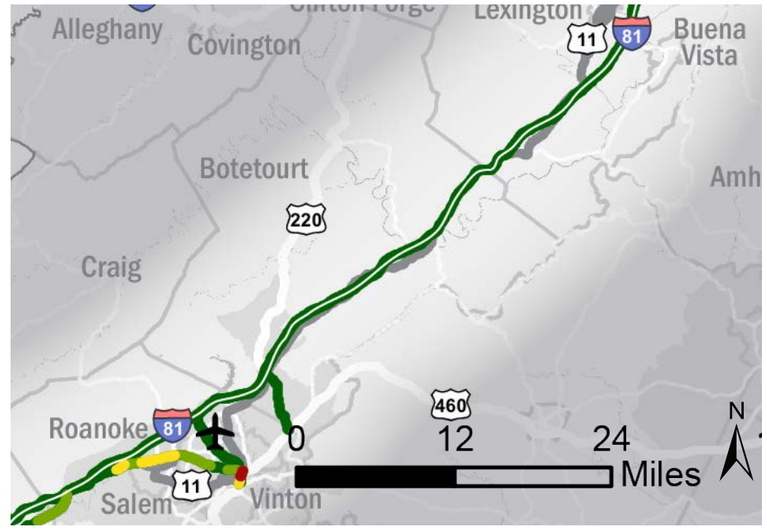
Reliability of travel during a typical weekday ranges from 0.01 to 0.04 in terms of reliability index, with an average value of 0.02. This segment has a weekday reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B3 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.05 in terms of reliability index, with an average value of 0.02. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and. none of the locations along Segment B3 have reliability index values exceeding the statewide threshold.







Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliabile. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

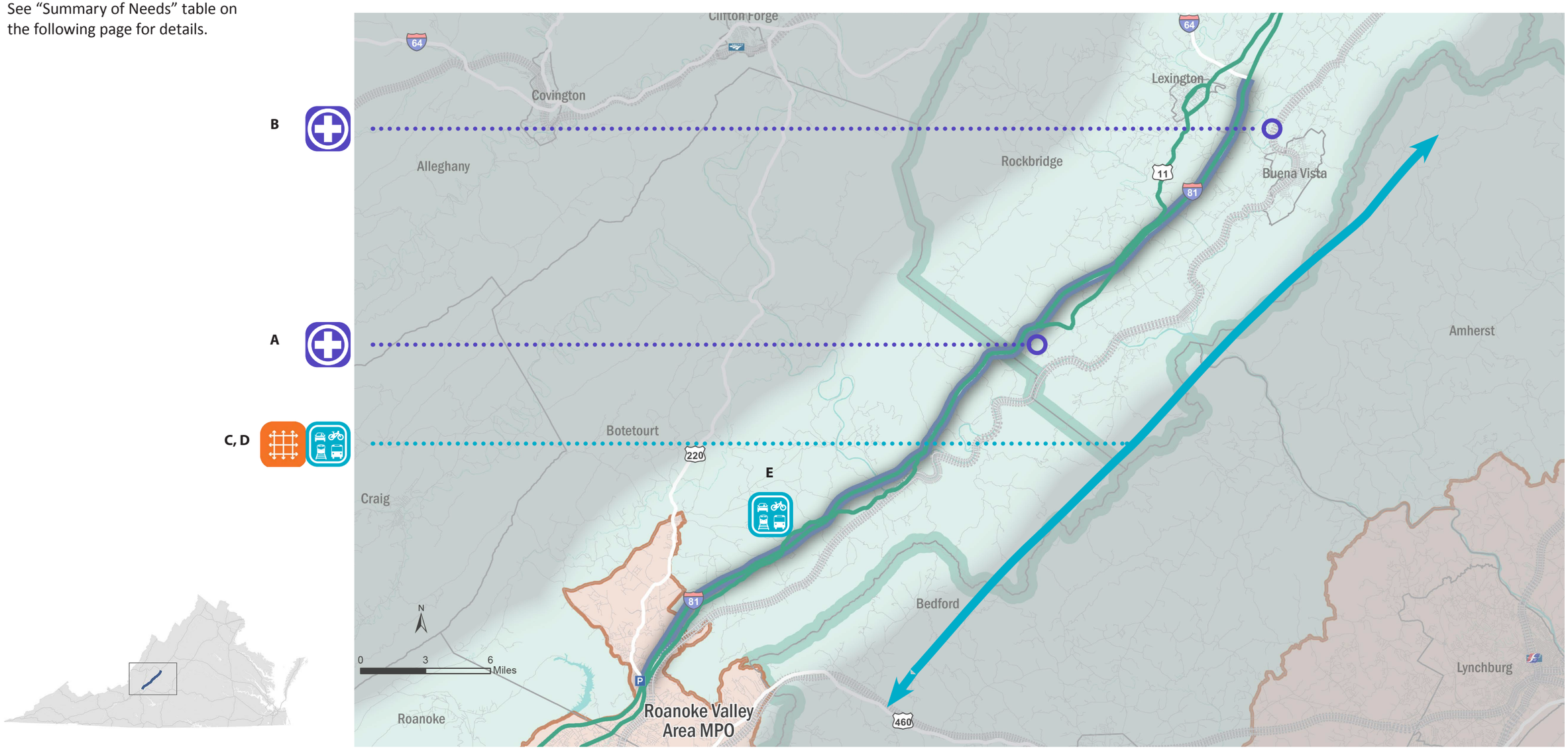


B3 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability



B3 SEGMENT NEEDS

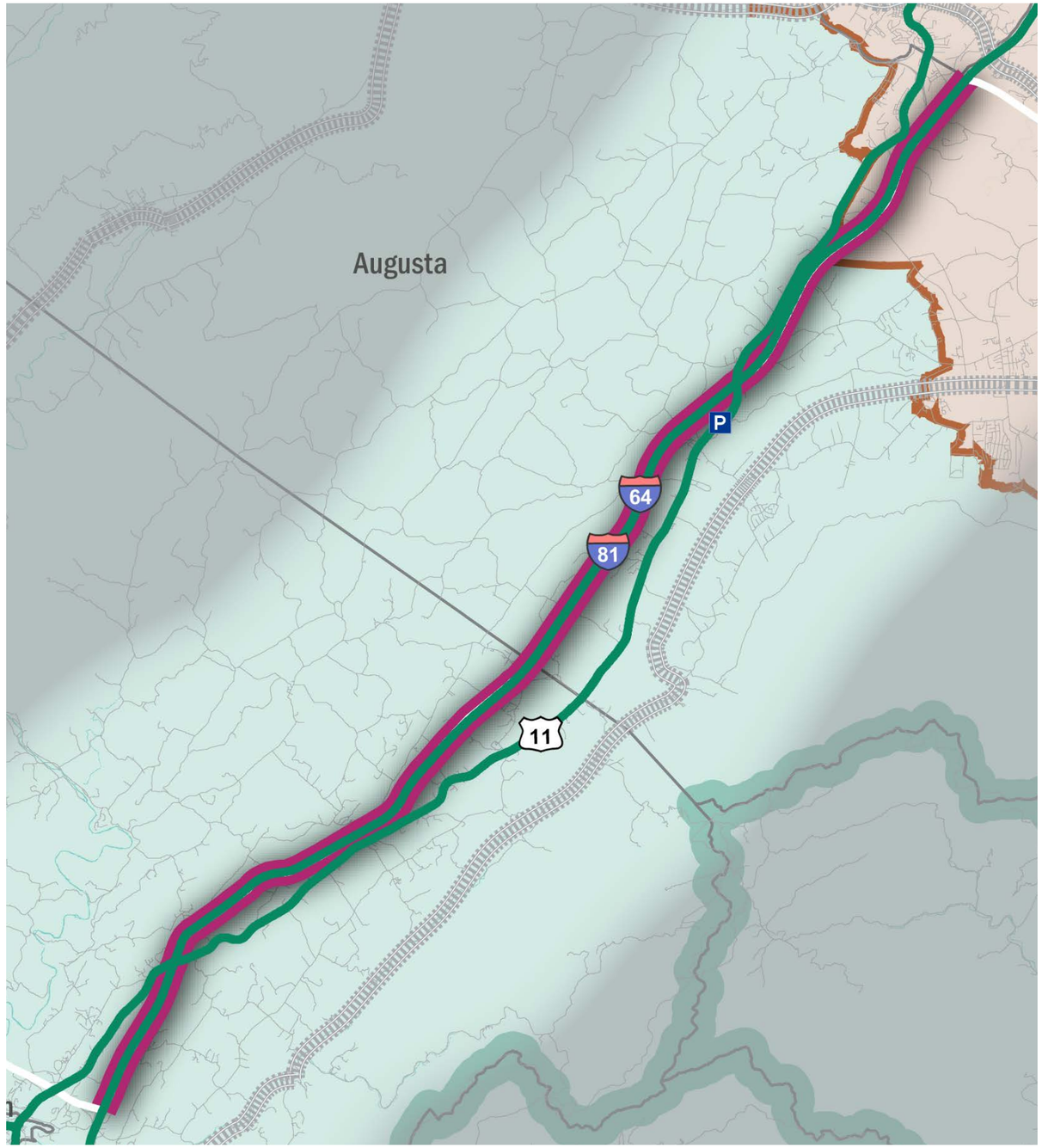
Summary of Needs - B3 Segment

A.		Safety concerns on I-81 at mile marker 167 related to S-curve geometry: 10 severe crashes
B.		I-81 around Exit 188 near Lexington: seven severe crashes
C.		Ability for US 11 to serve as a parallel highway facility limited by speed and capacity
D.		No bus or rail service is available in the segment
E.		Park and Ride lots in Botetourt County have higher utilization rates than statewide average

V. Segment B4

Corridor Segment B4 Components

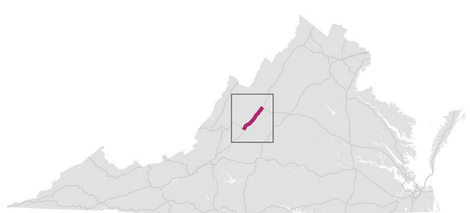
- I-81
- US 11
- Norfolk Southern Crescent Corridor



Segment B4

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



B4 SEGMENT PROFILE

Segment B4 begins at the junction of I-64/I-81 north of Lexington and progresses north to the junction of I-64/I-81 near Staunton. This segment serves Rockbridge and Augusta Counties and a portion of the Staunton-Augusta-Waynesboro MPO Area. I-64 runs concurrently with I-81 through the entire segment (as Segment C2). The segment also includes US 11. Segment B4 acts as a major corridor for through freight travel in Virginia and also connects smaller urban areas, such as Lexington and Staunton, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-81 is primarily a rural highway with four lanes in Segment B4. US 11 runs parallel to I-81 throughout the segment.

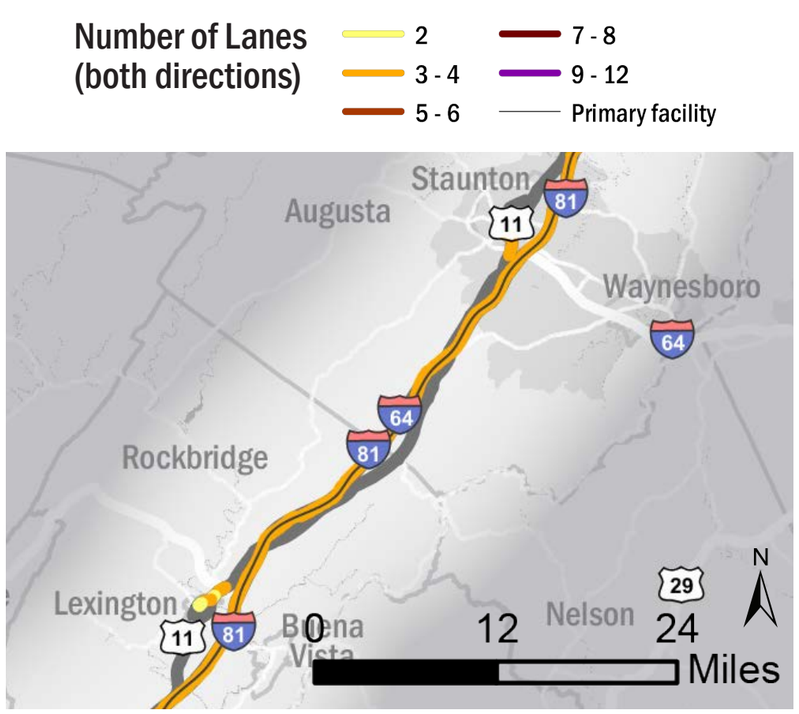
Transit Services: There is no line-haul transit service within Segment B4. There is one Park-and-Ride facility near I-81 in Greenville.

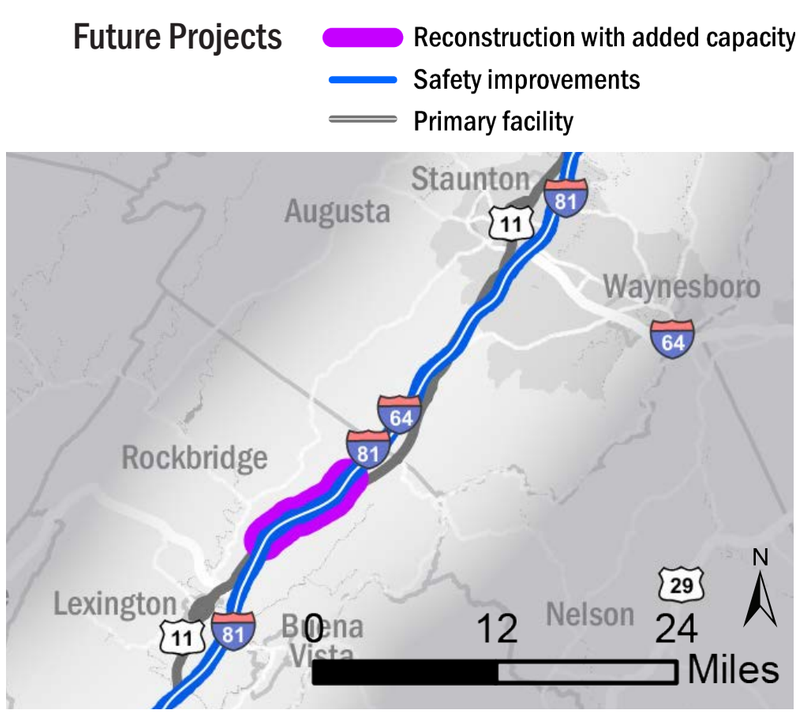
Rail Facilities: Norfolk Southern rail lines pass through Segment B4 connecting locations south and west of the Virginia Inland Port, near Corridor B south of Winchester.

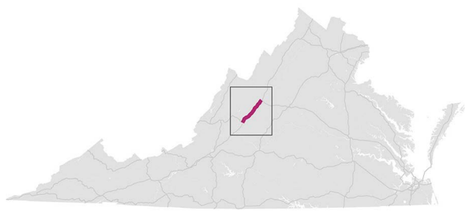
Port Facilities: No port facilities are located directly adjacent to Segment B4, but the Crescent Corridor does provide direct access to the Virginia Inland Port south of Winchester.

Airport Facilities: There are no commercial airports in this segment.

Major planned and future projects include: There are no major planned projects to improve safety or increase capacity at this time.





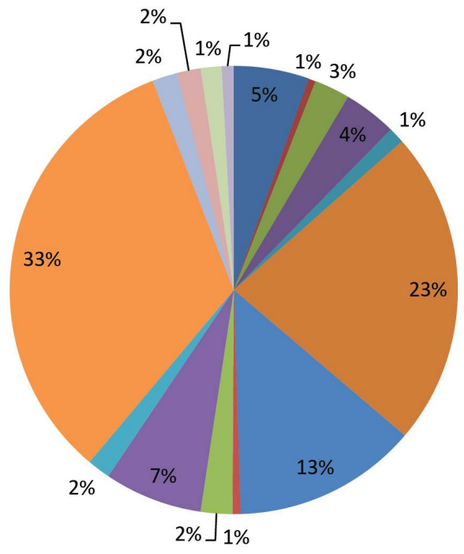


Travel Demand

Passenger Demand

Segment B4 is concurrent with Segment C2 and connects the two discrete sections of I-64 between Lexington and Staunton. Intercity travel from the Staunton-Augusta-Waynesboro MPO Area is distributed to a large number of regions in the state, mostly regions to the north and east that do not require the use of Segment B4. Of the intercity passenger traffic originating in Staunton, approximately seven percent is destined for the Roanoke Valley Area and an additional two percent is destined for the New River Valley Area.

Travel from Staunton-Augusta-Waynesboro Area to...



(clockwise starting from the top)

- Metropolitan Washington Region
- Danville Area
- Hampton Roads Area
- Central Virginia Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Tri-Cities Area
- Winchester-Frederick Area
- Roanoake Valley Area
- New River Valley Area
- Charlottesville-Albemarle Area
- North Carolina
- West Virginia
- Maryland
- Other

B4 SEGMENT PROFILE

Freight Demand

By truck, Segment B4 carried 83 million tons of freight worth $167 billion in 2012, and is estimated to carry 113 million tons of freight worth $270 billion in 2025. The major truck freight flows in Corridor B are interstate through-traffic, with approximately 60 percent of truck freight tonnage in the corridor and more than 75 percent of the total truck freight value, passing through Virginia. There is significant truck freight traffic along Corridor B between North Carolina and Ohio, accounting for four percent of the total corridor freight tonnage and value. Pennsylvania and Tennessee are also significant generators of truck freight tonnage along Corridor B. Around eight percent of the total truck freight on Corridor B, by value, is destined for New York, while another six to eight percent of truck freight on Corridor B is destined for non-US North American destinations. The area adjacent to Segment B4 is not a major generator or attractor of truck freight on Corridor B. Less than one percent of the total corridor truck freight value originates or is destined for this segment.

By rail, Segment B4 carried six million tons of freight worth $7 billion in 2012, and is estimated to carry seven million tons of freight worth $10 billion in 2025. In terms of tonnage, the largest rail freight flows in Corridor B consist of low-value freight traveling from West Virginia to North Carolina, accounting for between 18 and 22 percent of the total rail freight corridor tonnage in 2012 and 2025, respectively. The City of Norfolk and its port facility is a major destination of rail freight in Corridor B, accounting for between 18 and 20 percent of the total corridor tonnage, with major rail freight flows originating in West Virginia, Wise County, and Buchanan County. In terms of value, rail freight flows between Illinois and the Cities of Norfolk and Portsmouth (and their port facilities) are the largest in Corridor B, accounting for more than 20 percent of the total rail freight value in the corridor. The jurisdictions adjacent to Segment B4 are not major generators or attractors of rail freight, accounting for less than one percent of both total corridor value and tonnage in 2012 and 2025.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (25% / 23%)
2. North Carolina (13% / 12%)
3. Pennsylvania (8% / 8%)
4. Ohio (6% / 7%)
5. Tennessee (6% / 6%)

Corridor Tonnage Originating in Segment B4: 1% / 1%

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
North Carolina and Indiana

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (22% / 22%)
2. North Carolina (14% / 15%)
3. Pennsylvania (8% / 8%)
4. New York (6% / 6%)
5. Tennessee (4% / 5%)

Corridor Tonnage Destined for Segment B4: 1% / 1%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (31% / 28%)
2. West Virginia (30% / 26%)
3. Wise County (12% / 10%)
4. Illinois (8% / 10%)
5. Ohio (6% / 8%)

Corridor Tonnage Originating in Segment B4: <1% / <1%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Ohio and North Carolina
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

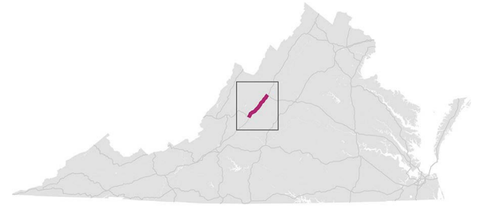
Major Destinations (by Tonnage)
1. Virginia (38% / 37%)
2. North Carolina (35% / 35%)
3. City of Norfolk* (20% / 17%)
4. Tennessee (4% / 3%)
5. Georgia (3% / 3%)

Corridor Tonnage Destined for Segment B4: <1% / <1%

Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment B4 is moderate relative to traffic volume on other segments in Corridor B. On I-81, average daily traffic volumes range from 43,000 to 47,000 vehicles throughout the segment, except directly south of the split with I-64 in Staunton where volumes reach 60,000 vehicles per day. By 2025, average daily traffic volumes on I-81 are projected to increase by about 7,000 vehicles to a range of 50,000 to 55,000 vehicles per day. Traffic volumes on US 11 are much lower, and range between 3,500 and 7,500 vehicles per day. Only minimal traffic growth is projected for US 11 by 2025.









B4 SEGMENT PROFILE

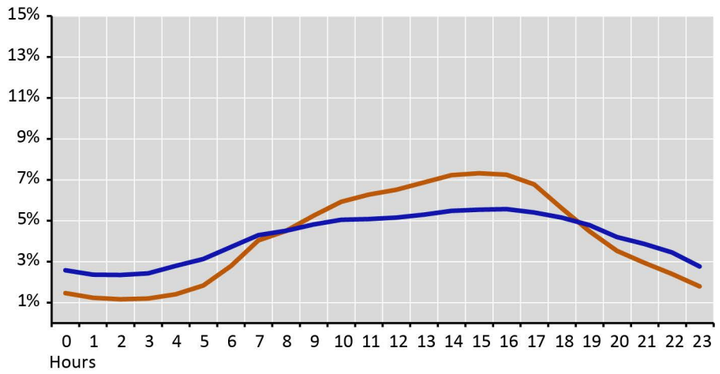
Traffic Distribution

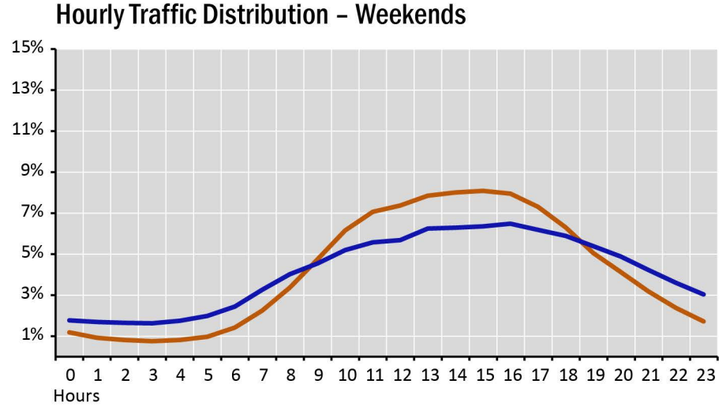
On average, traffic on Segment B4 is distributed throughout the day as shown in the graphs below. Weekday traffic shows steady increase in the flow from 7 a.m. to 5 p.m., with the peak hour starting at 3 p.m. and accounting for 7.3 percent of daily traffic. Peaking patterns for truck traffic show a relatively steady flow of trucks during the midday period between 10 a.m. and 7 p.m., and a peak hour flow of 5.5 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day between 11 a.m. and 6 p.m., with the highest percentage of hourly traffic occurring between 3 and 4 p.m. (8.1 percent of daily traffic) for all traffic, and 4 to 5 p.m. (6.5 percent of daily traffic) for truck traffic.

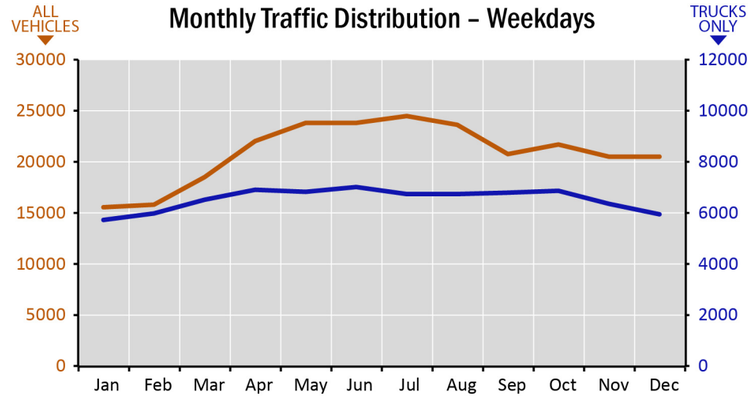
Weekday traffic volumes on Segment B4 vary by as much as 57 percent throughout the year, with the highpoint in July (around 24,000 vehicles per day) and the low point in January (around 15,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the June high (around 7,000 vehicles per day) being 23 percent higher than the January low (around 5,700 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (July, around 27,000 vehicles per day) are 84 percent higher than February levels (around 15,000 vehicles per day), showing a distinct seasonal peak during the spring and summer months. Weekend truck traffic is marginally steadier than all vehicle traffic, with the June high (around 5,200 vehicles per day) only 17 percent higher than the May low (around 4,500 vehicles per day). Truck volumes account for a significant portion of traffic on Segment B4 (32 percent of overall daily traffic for weekdays and 22 percent of overall daily traffic for weekends); as a result truck traffic has a significant impact on overall traffic conditions.

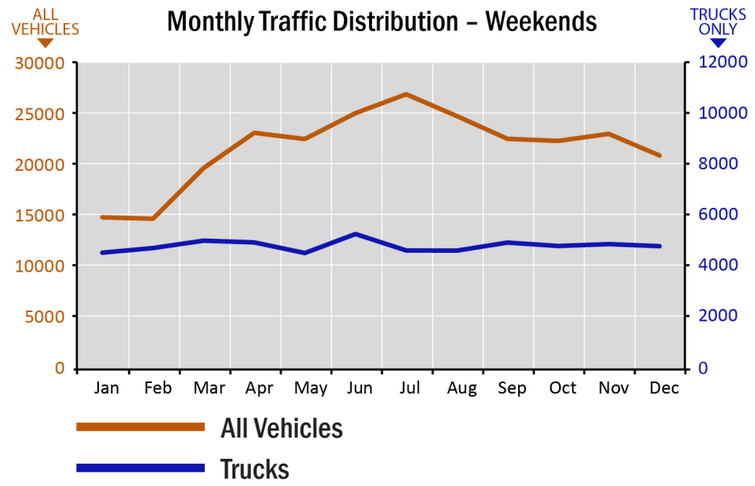
Truck Volume

Daily traffic on Segment B4 is comprised of 14 percent heavy trucks. This is high relative to most other segments in the Commonwealth.





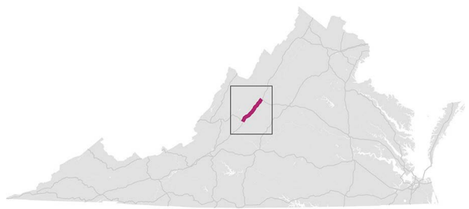






Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

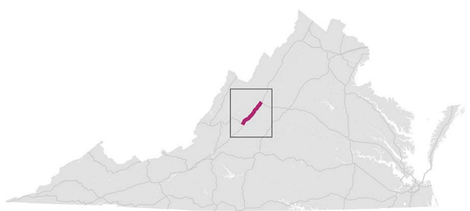


B4 SEGMENT PROFILE

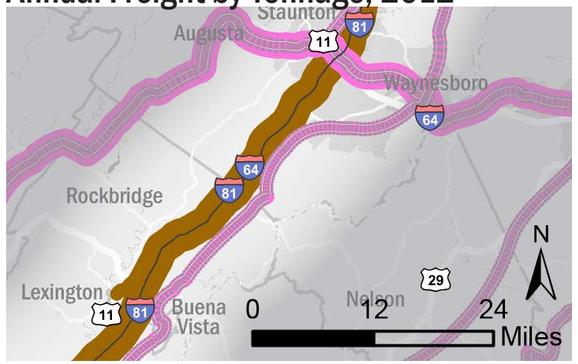
Freight Flows

At the southern end of Segment B4, north of Lexington, freight is moved primarily by truck, in terms of both tonnage and value. In total, 74 million tons (92 percent) of freight is moved through this section of Segment B4 by truck, compared to 6 million tons by rail. By value, trucks are favored even more, with $147 billion (95 percent) of freight traveling by truck, compared to $7.5 billion by rail. On average, a ton of freight traveling by truck through this section of Segment B4 is worth $1,991 while a ton of freight traveling by rail is worth $1,219. In 2025, both rail and truck freight tonnages and total values in the southern end of Segment B4 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on both trucks and rail is expected to grow by 2025 with an average of $2,209 per ton on trucks and $1,393 on rail.

At the northern end of Segment B4, south of Staunton, freight is also moved primarily by truck, in terms of both tonnage and value. In total, 83 million tons (93 percent) of freight is moved through this section of Segment B4 by truck, compared to 6 million tons by rail. By value, trucks are favored even more, with $167 billion (96 percent) of freight value traveling by truck, compared to $7.5 billion by rail. On average, a ton of freight traveling by truck through this section of Segment B4 is worth $2,003 while a ton of freight traveling by rail is worth $1,217. In 2025, both rail and truck freight tonnages and total values in the northern end of Segment B4 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on both trucks and rail is expected to grow by 2025 with an average of $2,382 per ton on trucks and $1,396 on rail.



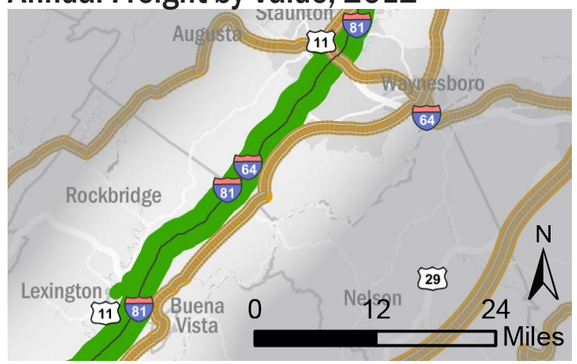
Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment B4 of the Crescent Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long-range travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and for bypassing incidents causing congestion on sections of I-81. No alternate modes are available along Segment B4.

Park-and-Ride

Within Segment B4, commuters can utilize one Park-and-Ride location in Augusta County. This location, near Greenville, has only 11 spaces and a 27 percent utilization rate, which is far below the statewide average of 76 percent for Park-and-Ride utilization.

Comparable Travel Options

Bristol to Winchester

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 4:30 Travel Time $176 Est. Cost

Roanoke to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:20 Travel Time $49 Est. Cost

Blacksburg / Christiansburg to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

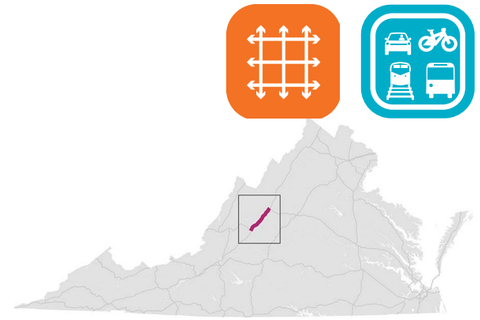
Via I-81: 2:05 Travel Time $66 Est. Cost

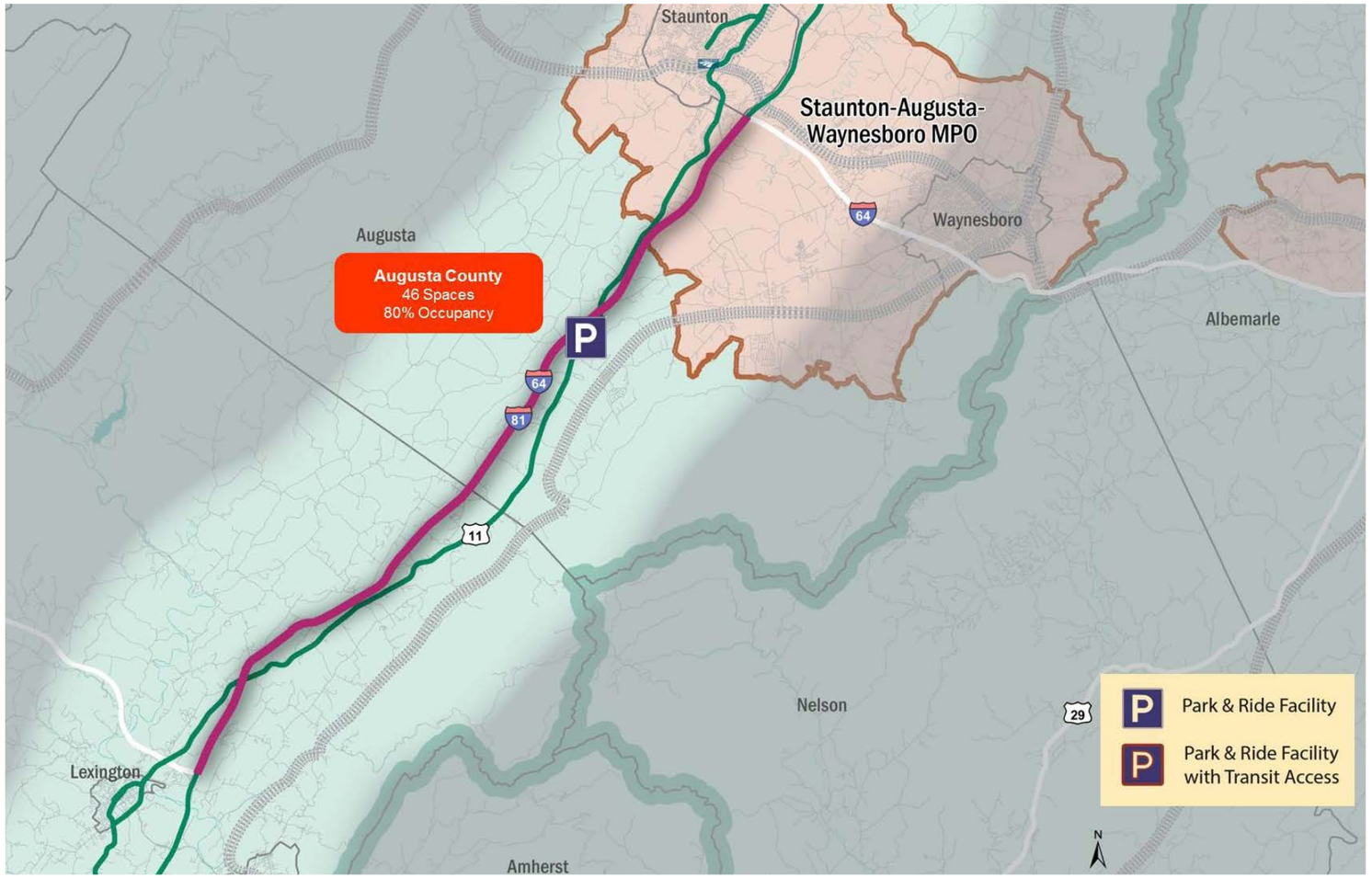
Roanoke to Harrisonburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:53 Travel Time $61 Est. Cost





Safety

Performance Metrics:

Number of Severe Crashes	4
Severe Crashes/Million VMT	0.1
Number of Railroad Crashes	2

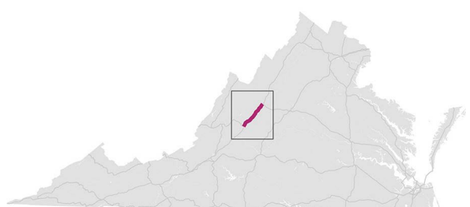
Only four severe crashes occurred on Segment B4 between 2010 and 2012, resulting in one of the lowest accident rates on CoSS segments statewide. All of these crashes occurred over a 1.4 mile stretch of US 11 (Lee Highway) between Fairfield and Vesuvius, approximately 2.6 miles south of Route 56 (Raphine Road).

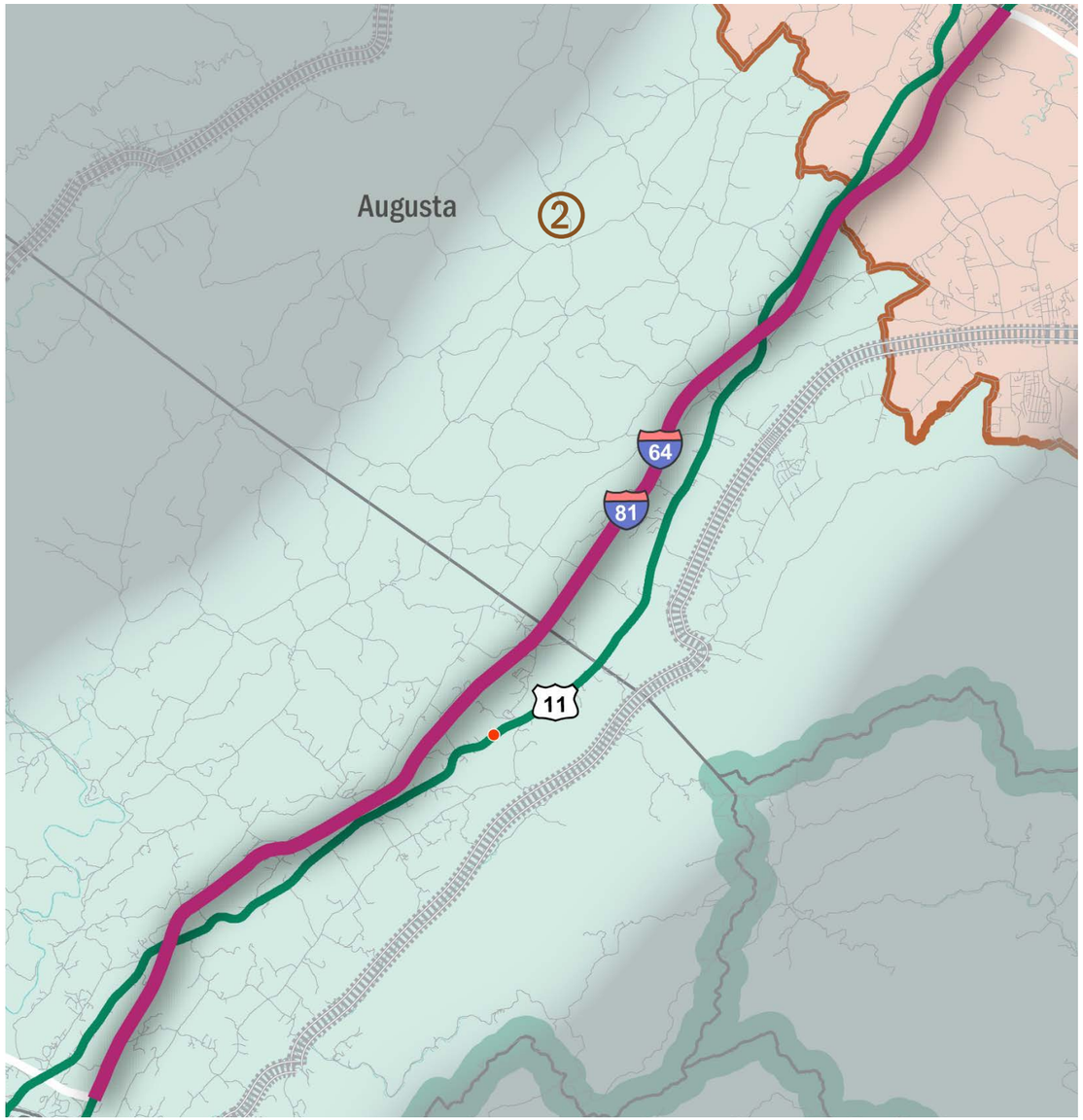
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



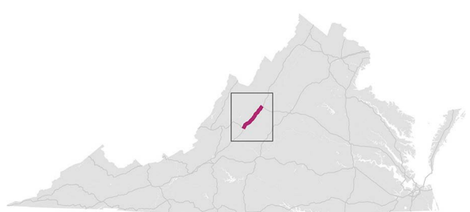


B4 SEGMENT NEEDS

Congestion

Performance Metrics:

Person Hours of Delay per Mile	0
Freight Ton Hours of Delay per Mile	7



Passenger Delays

Segment B4 experiences almost no passenger delays. Overlapping with Segment C2, this segment has the lowest passenger congestion among all CoSS segments, with no locations along the segment where passenger delays exceed 100 person-hours per mile.

Daily Person Hours of Delay per Mile

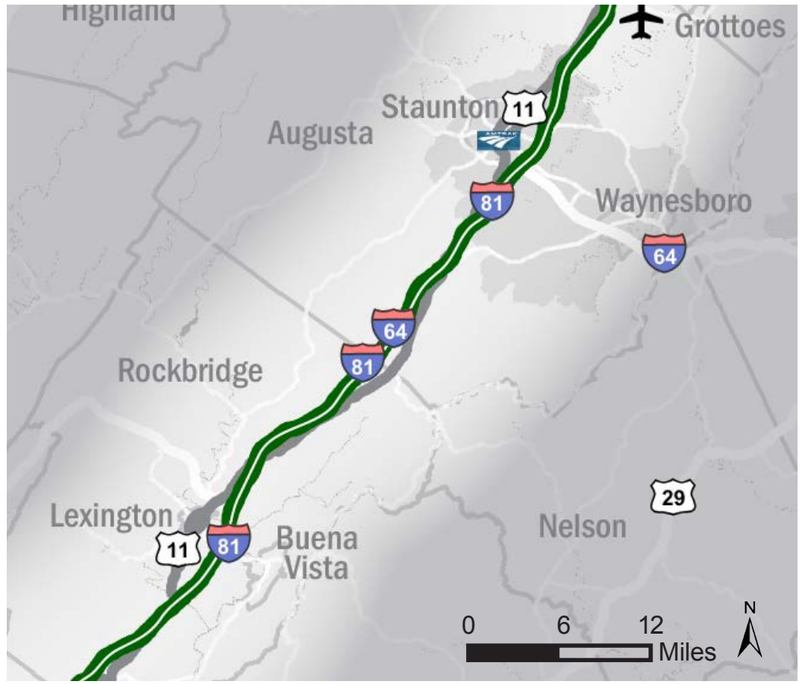


- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

Freight Delays

As with passenger congestion, Segment B4 experiences the lowest freight delays among CoSS segments, with only 400 ton-hours of delay daily. As such, there are no locations along Segment B4 where the freight delays exceed 250,000 ton-hours per mile.

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000

B4 SEGMENT NEEDS

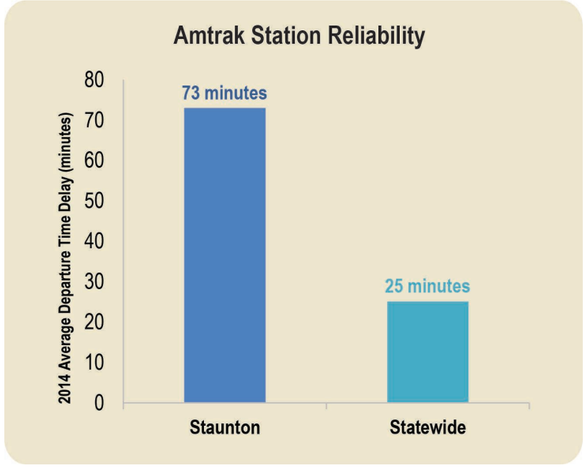
Reliability

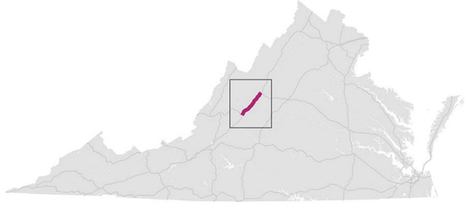
Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

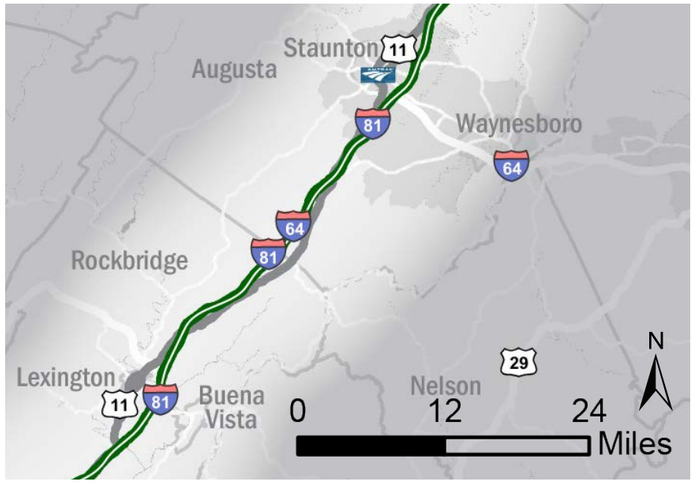
Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliabile. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60





Weekday Peak



Reliability of travel during the peak period on a typical weekday on Segment B4 ranges from 0.01 to 0.04 in terms of reliability index, with an average value of 0.02. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B4 have reliability index values exceeding the statewide threshold.

Weekday



Reliability of travel during a typical weekday ranges from 0.02 to 0.04 in terms of reliability index, with an average value of 0.03. This segment has a weekday reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B4 have reliability index values exceeding the statewide threshold.

Weekend



Reliability of travel during a typical weekend ranges from 0.01 to 0.04 in terms of reliability index, with an average value of 0.03. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B4 have reliability index values exceeding the statewide threshold.

Summary of Needs

Identified locations are approximate.
See “Summary of Needs” table on
the following page for details.

Redundancy

Mode Choice

Safety

Congestion

Bottlenecks

Reliability



B4 SEGMENT NEEDS

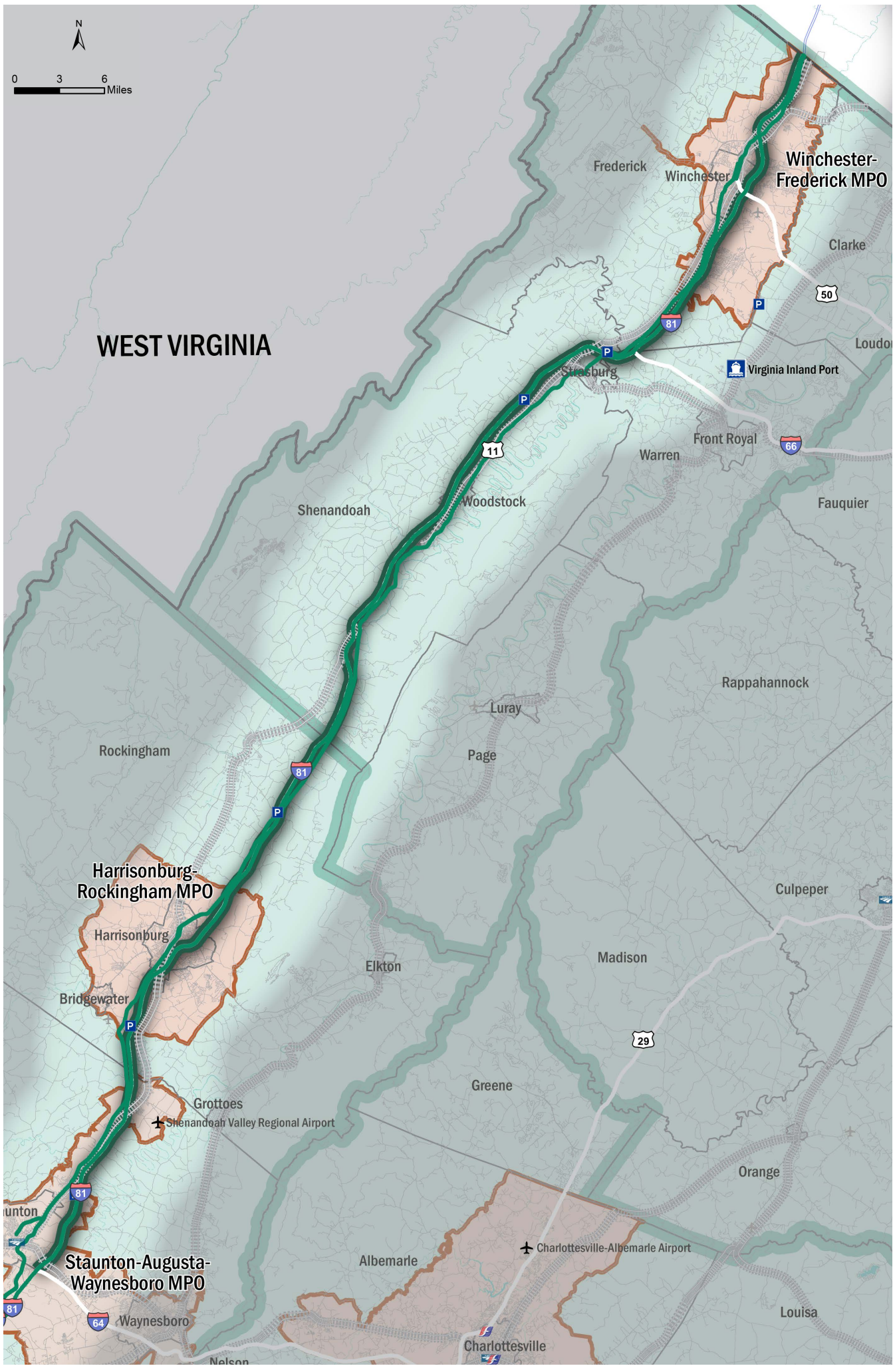
Summary of Needs - B4 Segment

A.	Redundancy issues along Corridor B: US 11 not able to handle overflow when incident occurs on I-81 resulting in signifcant delays
B.	US 11 south of Raphine Rd in Rockbridge County: 4 severe crashes
C.	No bus or rail service is available in the segment

VI. Segment B5

Corridor Segment B5 Components

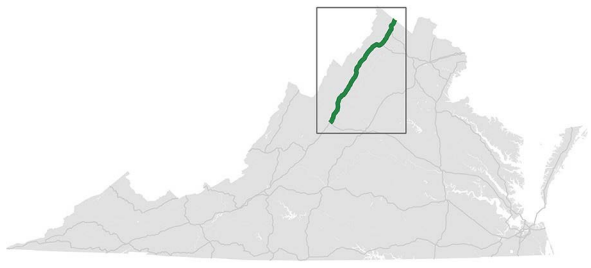
- I-81
- US 11
- Virginia Inland Port
- Norfolk Southern Crescent Corridor
- Shenandoah Valley Regional Airport



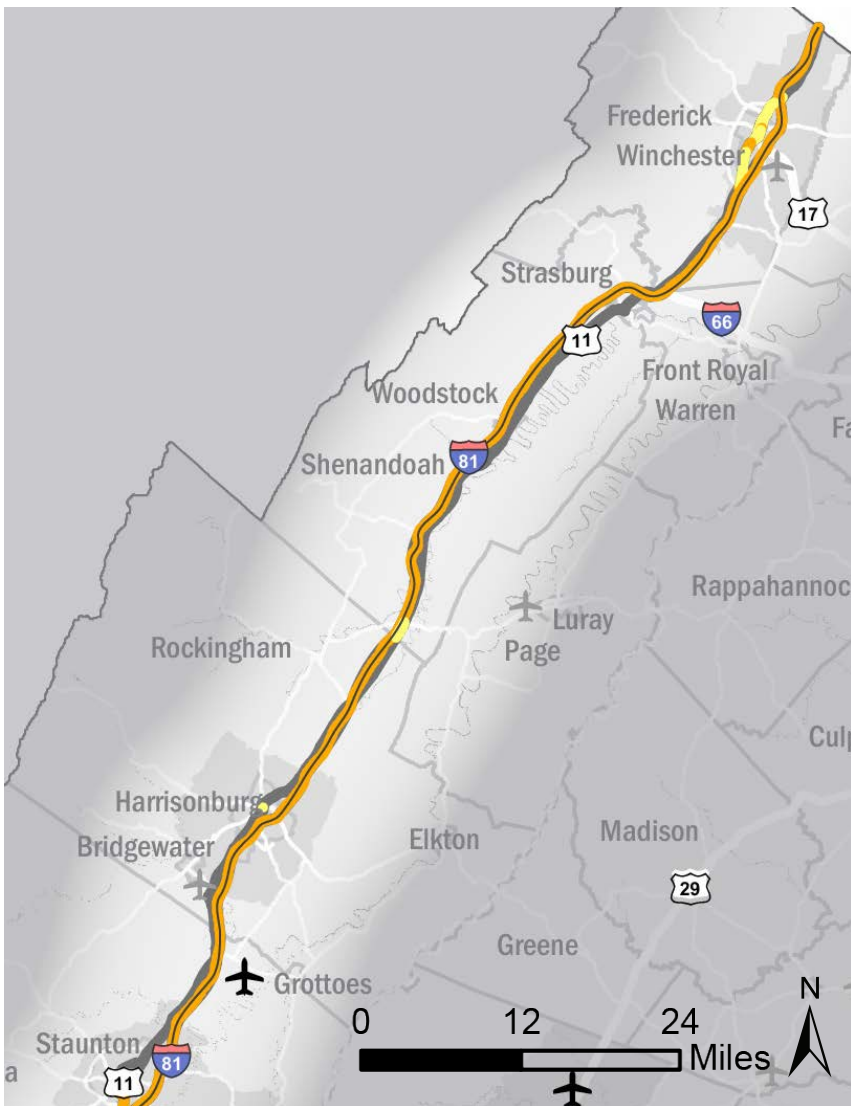
Segment B5

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



B5 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment B5 begins at the junction of I-64/I-81 near Staunton and progresses north to the West Virginia border. This segment serves Augusta, Rockingham, Shenandoah, and Frederick Counties, as well as the Cities of Staunton, Harrisonburg, and Winchester. The segment travels through the areas covered by the Staunton-Augusta-Waynesboro MPO, the Harrisonburg-Rockingham MPO and the Winchester-Frederick MPO. The segment also includes US 11. Segment B5 acts as a major corridor for through freight travel in Virginia and also connects smaller urban areas, such as Staunton, Harrisonburg, and Winchester, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-81 is primarily a rural highway with four lanes in Segment B5. US 11 runs parallel to I-81 throughout the corridor.

Transit Services: Amtrak service is available at Staunton, serving the east-west Cardinal Route. Shuttle buses connect Blue Ridge Community College in Weyers Cave to Staunton and Harrisonburg. There are five Park-and-Ride facilities near I-81.

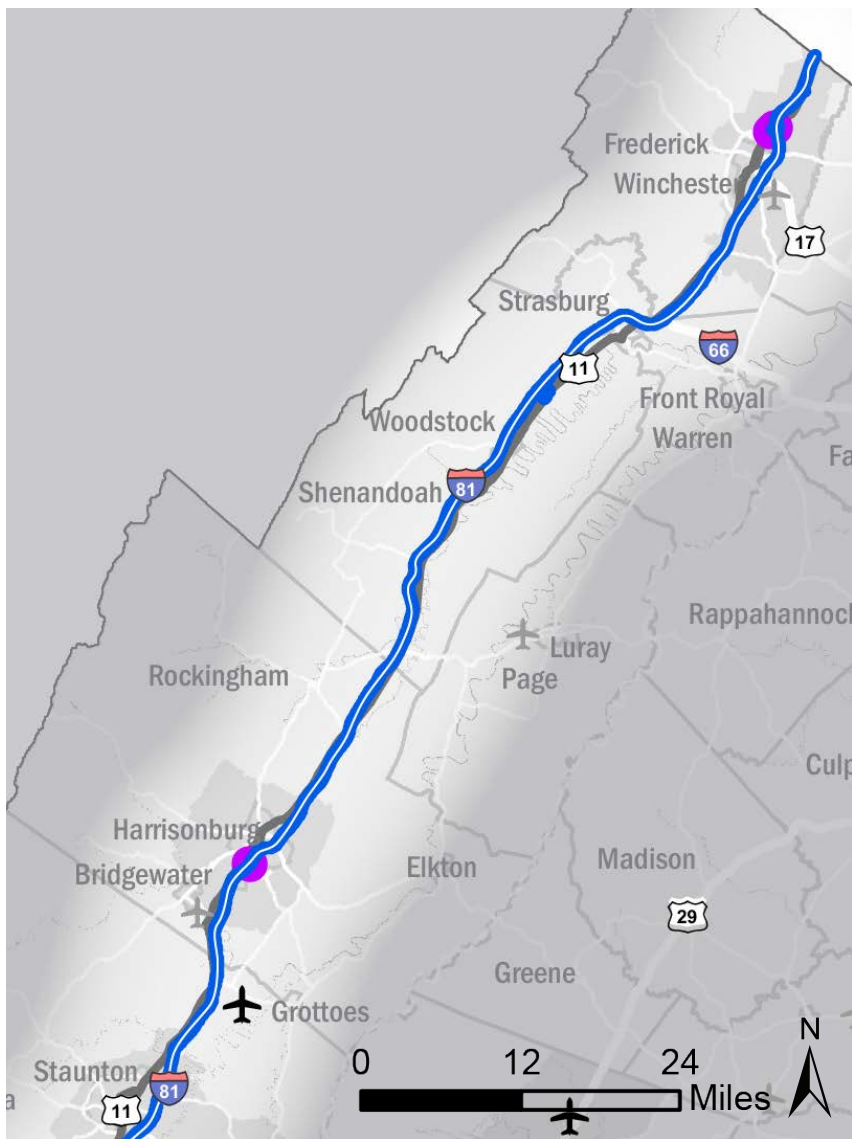
Rail Facilities: Norfolk Southern's Crescent Corridor rail lines pass through Segment B5 and also connect to the Virginia Inland Port. Several short line railroads also provide service to Segment B5.

Port Facilities: I-81 provides access to the Virginia Inland Port, which is located near Winchester. This port receives cargo from state-owned ports in the Hampton Roads Area.

Airport Facilities: The Shenandoah Valley Regional Airport is the only commercial airport in this segment.

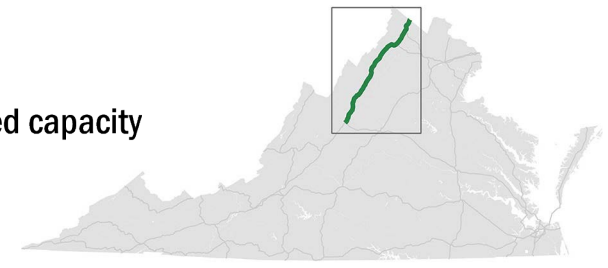
Major planned and future projects include:

- Widening of Route 277 (Fairfax Pike) to five lanes between the northbound I-81 ramps and Double Church Road
- Adding a left turn lane and increasing capacity on Martinsburg Pike just east of the interchange with I-81



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



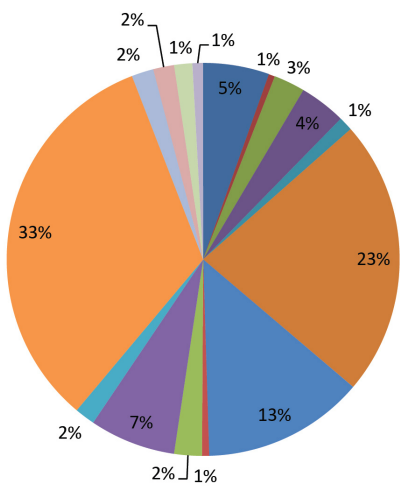
Travel Demand

Passenger Demand

The northernmost segment of Corridor B is a long segment that connects three MPO Areas—Staunton-Augusta-Waynesboro, Harrisonburg-Rockingham, and Winchester-Frederick—before entering West Virginia in the far north. Traffic between the Staunton-Augusta-Waynesboro Area and the two MPO areas to the north accounts for approximately 1.5 percent of the total intercity passenger travel in the state.

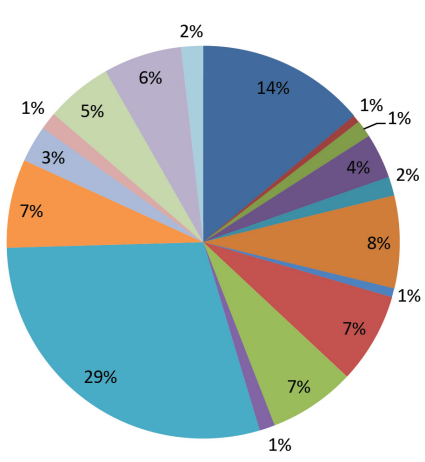
Of the intercity passenger traffic originating in the Staunton area, 23 percent is destined for the Harrisonburg-Rockingham Area farther north in Segment B5. An additional five percent is destined for the Metropolitan Washington region and may use this segment as well. Almost all intercity travel originating in the Harrisonburg-Rockingham Area is likely to use Segment B5 because of the Area's geographic location near its center. Of this travel, 29 percent is destined for the Staunton-Augusta-Waynesboro Area, while another 14 percent is destined for the Washington Metropolitan area. Other notable destinations for intercity travel from Harrisonburg include Richmond (eight percent), Winchester (seven percent), Roanoke (seven percent), and Charlottesville (seven percent). The Winchester-Frederick Area is also located such that a large portion of intercity travel originating in the region is likely to use Segment B5. More than half of the intercity traffic originating in Winchester is destined for the Washington Metropolitan area, for which several potential paths exist. An additional 14 percent of intercity traffic is destined for neighboring West Virginia, while nine percent is ultimately destined for the State of Maryland.

Travel from Staunton-Augusta-Waynesboro Area to...



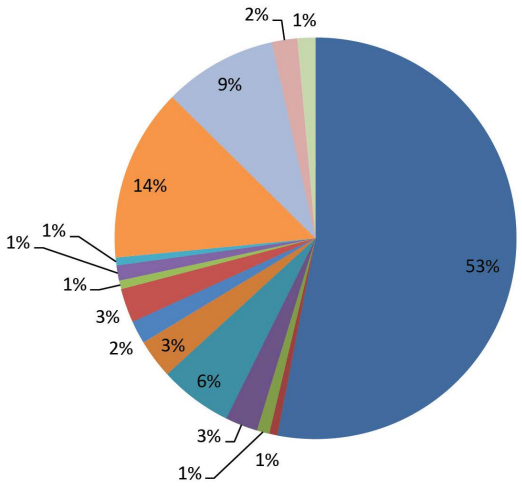
(clockwise starting from the top)
- Metropolitan Washington Region
- Danville Area
- Hampton Roads Area
- Central Virginia Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Tri-Cities Area
- Winchester-Frederick Area
- Roanoake Valley Area
- New River Valley Area
- Charlottesville-Albemarle Area
- North Carolina
- West Virginia
- Maryland
- Other

Travel from Harrisonburg-Rockingham Area to...



(clockwise starting from the top)
- Metropolitan Washington Region
- Danville Area
- Hampton Roads Area
- Central Virginia Area
- Fredericksburg Area
- Richmond Area
- Tri-Cities Area
- Winchester-Frederick Area
- Roanoake Valley Area
- New River Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- Tennessee
- West Virginia
- Maryland
- Pennsylvania

Travel from Winchester-Frederick Area to...



(clockwise starting from the top)
- Metropolitan Washington Region
- Hampton Roads Area
- Central Virginia Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Roanoake Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- Tennessee
- West Virginia
- Maryland
- Pennsylvania
- Other

B5 SEGMENT PROFILE

Freight Demand

By truck, Segment B5 carried 71 million tons of freight worth $138 billion in 2012, and is estimated to carry 96 million tons of freight worth $205 billion in 2025. The major truck freight flows in Corridor B are interstate through-traffic, with approximately 60 percent of truck freight tonnage in the corridor and more than 75 percent of the total truck freight value, passing through Virginia. There is significant truck freight traffic along Corridor B between North Carolina and Ohio, accounting for four percent of the total corridor freight tonnage and value. Pennsylvania and Tennessee are also significant generators of truck freight tonnage along Corridor B. Around eight percent of the total truck freight on Corridor B, by value, is destined for New York, while another six to eight percent of truck freight on Corridor B is destined for non-US North American destinations. Frederick and Rockingham Counties are both significant generators of truck freight along Segment B5, each accounting for between one and two percent of freight tonnage, with most of the truck freight destined for the Middle Atlantic region. Rockingham and Shenandoah Counties, along with Harrisonburg, are significant attractors of truck freight along Segment B5, with major truck freight movements originating from North Carolina and Pennsylvania.

By rail, Segment B5 carried 1.1 million tons of freight worth $380 million in 2012, and is estimated to carry 1.6 million tons of freight worth $520 million in 2025. In terms of tonnage, the largest rail freight flows in Corridor B consist of low-value freight traveling from West Virginia to North Carolina, accounting for between 18 and 22 percent of the total rail freight corridor tonnage in 2012 and 2025, respectively. The City of Norfolk and its port facility is a major destination of rail freight in Corridor B, accounting for between 18 and 20 percent of the total corridor tonnage, with major rail freight flows originating in West Virginia, Wise County, and Buchanan County. In terms of value, rail freight flows between Illinois and the Cities of Norfolk and Portsmouth (and their port facilities) are the largest in Corridor B, accounting for more than 20 percent of the total rail freight value in the corridor. There is a major rail freight movement from the Port of Virginia to the Virginia Inland Port in Warren County, adjacent to Segment B5, accounting for two percent of the total rail freight value in the corridor.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (25% / 23%)
2. North Carolina (13% / 12%)
3. Pennsylvania (8% / 8%)
4. Ohio (6% / 7%)
5. Tennessee (6% / 6%)

Corridor Tonnage Originating in Segment B5: 7% / 6%

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
North Carolina and Indiana

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (22% / 22%)
2. North Carolina (14% / 15%)
3. Pennsylvania (8% / 8%)
4. New York (6% / 6%)
5. Tennessee (4% / 5%)

Corridor Tonnage Destined for Segment B5: 4% / 4%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (31% / 28%)
2. West Virginia (30% / 26%)
3. Wise County (12% / 10%)
4. Illinois (8% / 10%)
5. Ohio (6% / 8%)

Corridor Tonnage Originating in Segment B5: 1% / 2%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Ohio and North Carolina
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (38% / 37%)
2. North Carolina (35% / 35%)
3. City of Norfolk* (20% / 17%)
4. Tennessee (4% / 3%)
5. Georgia (3% / 3%)

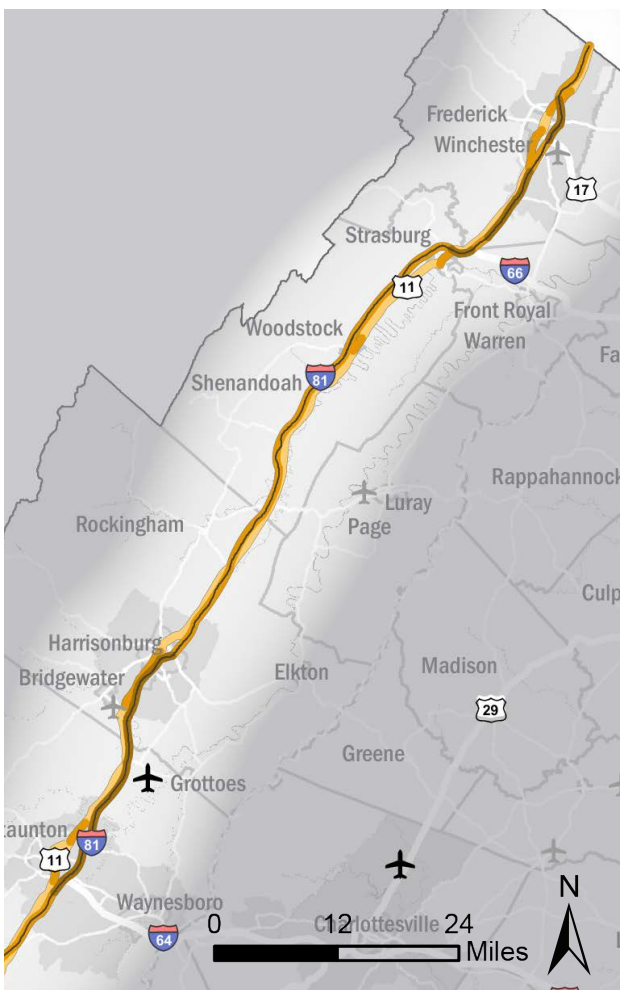
Corridor Tonnage Destined for Segment B5: 3% / 4%

Traffic Conditions

Traffic Volume and AADT

Segment B5 contains some of the heaviest trafficked sections of highway in Corridor B. From Staunton to Harrisonburg along I-81, average daily traffic volumes range from 50,000 to 56,000 vehicles. North of Harrisonburg on I-81, average daily traffic volumes range from 37,000 to 50,000 vehicles. The highest traffic levels occur in and around the City of Winchester, with average daily traffic greater than 60,000 vehicles per day in some locations. Traffic volumes along I-81 are projected to increase by 2025 throughout Segment B5 by 6,000 to 13,000 vehicles per day, with sections along I-81 east of Winchester forecasted to experience the greatest volume increases. By 2025, traffic volumes between Staunton and Harrisonburg are projected to average about 60,000 vehicles per day, and volumes along I-81 in Frederick County and Winchester are projected to range from 51,000 to 75,000 vehicles per day, with the most trafficked sections along I-81 just east of Winchester. Traffic volumes on US 11 are generally much lower than on I-81 although through the Cities of Winchester and Harrisonburg, traffic levels reach 40,000 and 20,000 vehicles per day, respectively. Traffic on US 11 outside of the urbanized areas is generally less than 14,000 vehicle per day. Little growth in traffic is projected for most of US 11 by 2025.

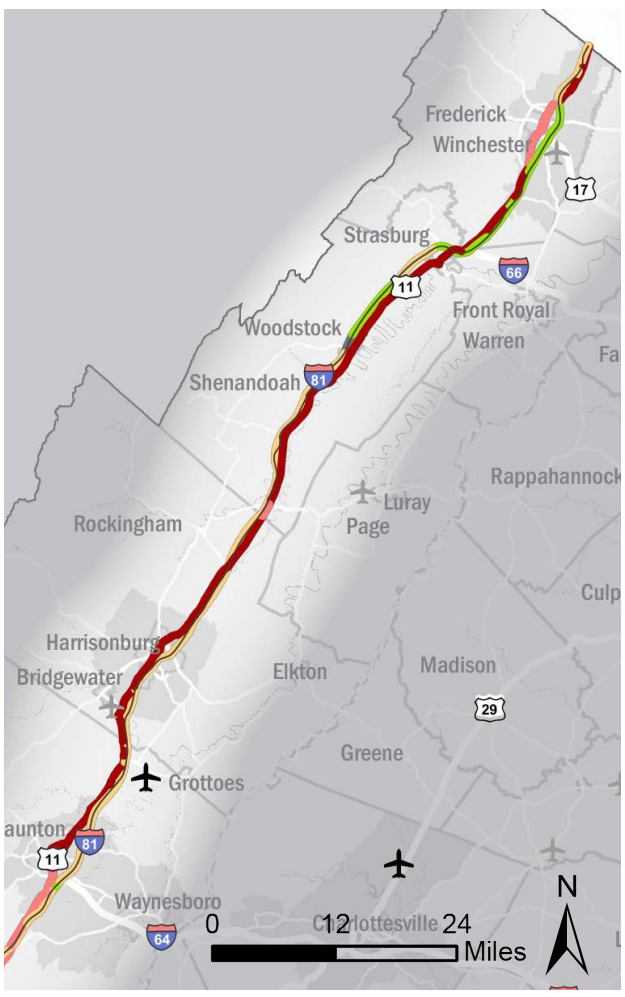
Traffic Volume 2014 (AADT)

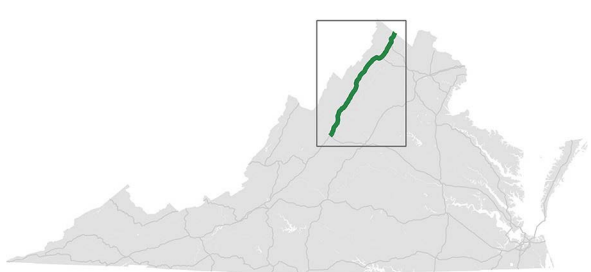


Traffic Volume 2025 (AADT)



Change in Traffic Volume 2014- 2025 (AADT)

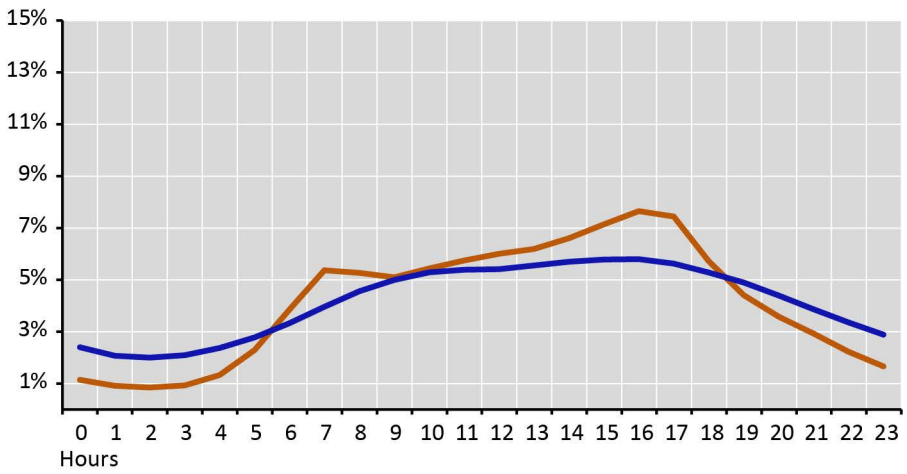




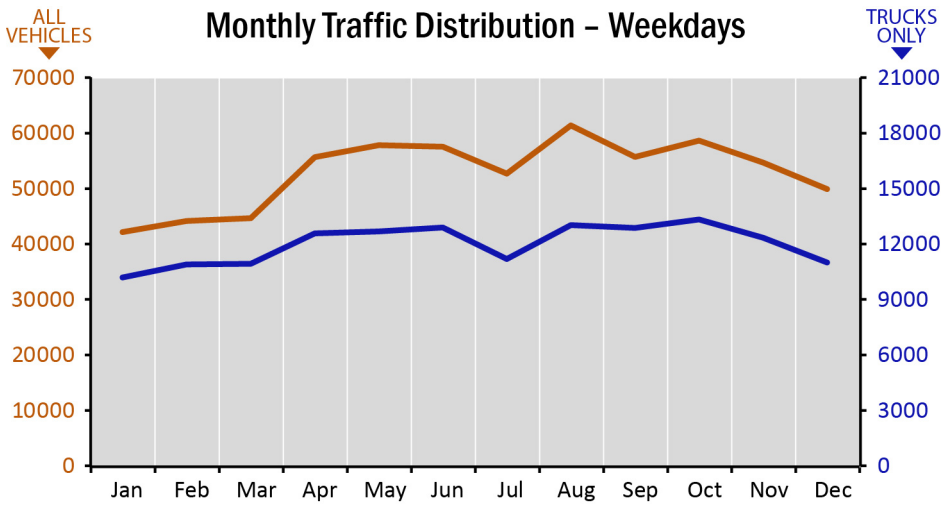
B5 SEGMENT PROFILE

All Vehicles
Trucks

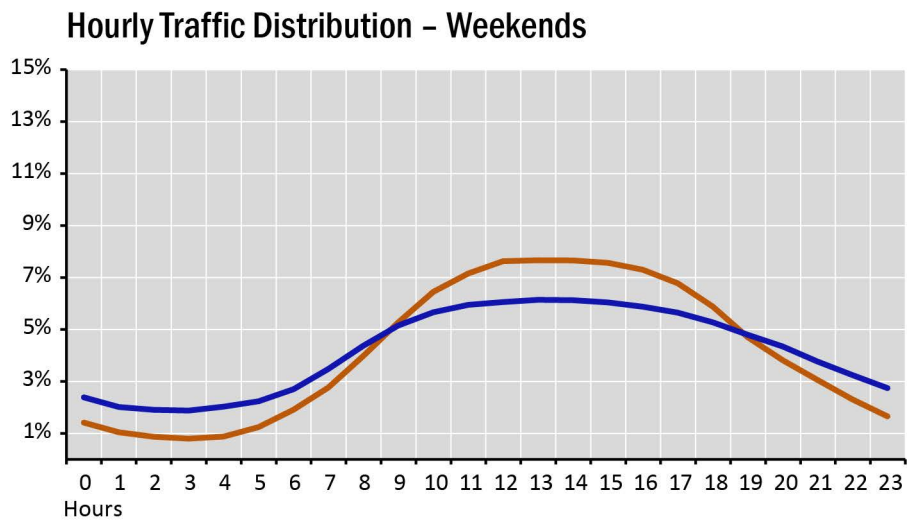
Hourly Traffic Distribution – Weekdays



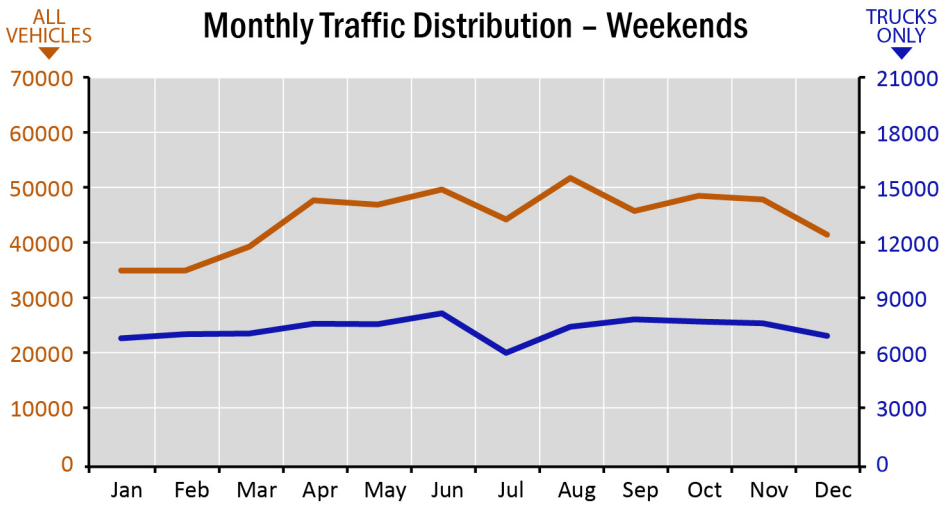
Monthly Traffic Distribution – Weekdays

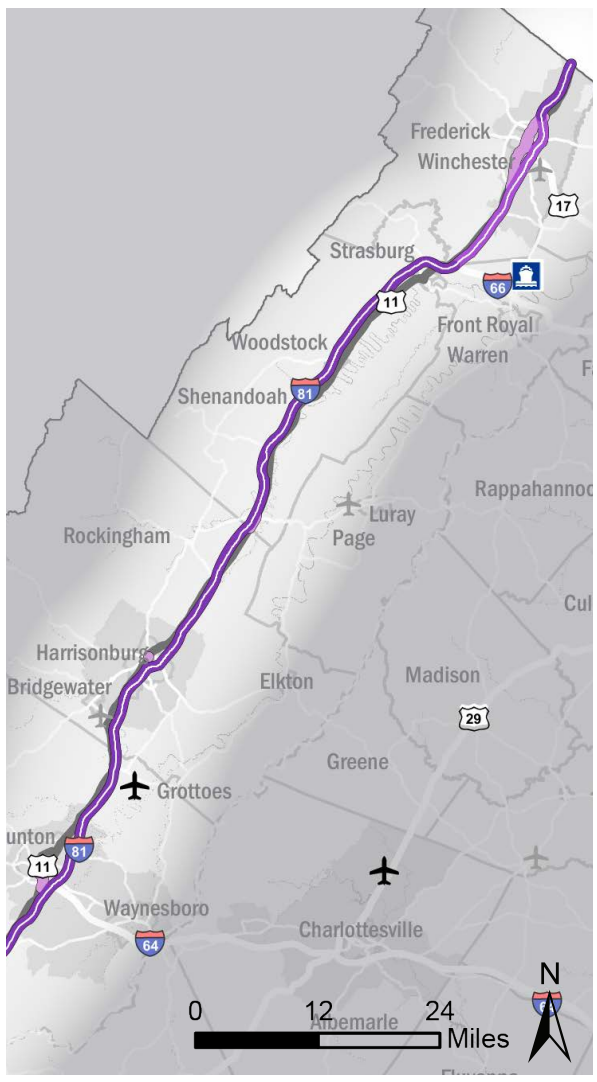


Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

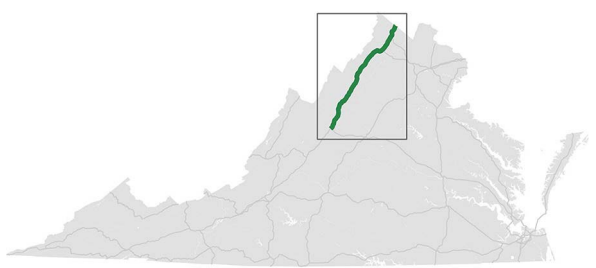
Traffic Distribution

On average, traffic on Segment B5 is distributed throughout the day as shown in the graphs below. Weekday traffic shows the typical morning and evening peak periods. The highest hourly traffic occurs between 4 and 5 p.m., which accounts for 7.6 percent of daily traffic, and a less busy morning peak hour from 7 to 8 a.m., accounting for 5.4 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 48 percent of total daily traffic. Peaking patterns for truck traffic show a relatively steady flow of trucks during the midday period between 10 a.m. and 6 p.m. Weekend traffic patterns are different from the typical commute patterns, showing a single peak during the middle of the day, with the highest percentage of hourly traffic occurring between noon and 1 p.m. (7.6 percent of daily traffic) for all traffic, and 2 to 3 p.m. (6.1 percent of daily traffic) for truck traffic.

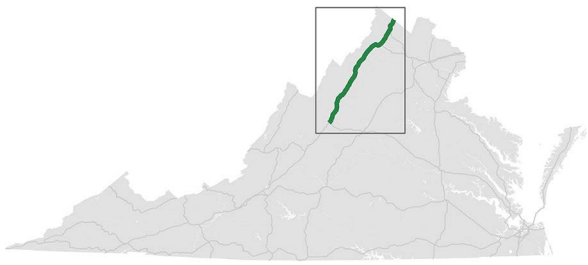
Weekday traffic volumes on Segment B5 vary by as much as 46 percent throughout the year, with the highpoint in August (around 61,000 vehicles per day) and the low point in January (around 42,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the October high (around 13,000 vehicles per day) 31 percent higher than the January low (around 10,000 vehicles per day). Weekend traffic levels also vary over the course of the year, with a significant decrease during the winter months; August volumes are 48 percent higher than January volumes. Weekend truck traffic is somewhat more steady than all vehicle traffic, with the June high (around 8,000 vehicles per day) 36 percent higher than the July low (around 6,000 vehicles per day). Truck volumes account for a significant portion of traffic on Segment B5 (23 percent of overall daily traffic for weekdays and 16 percent of overall daily traffic for weekends); as a result, truck traffic has a significant impact on overall traffic conditions.

Truck Volume

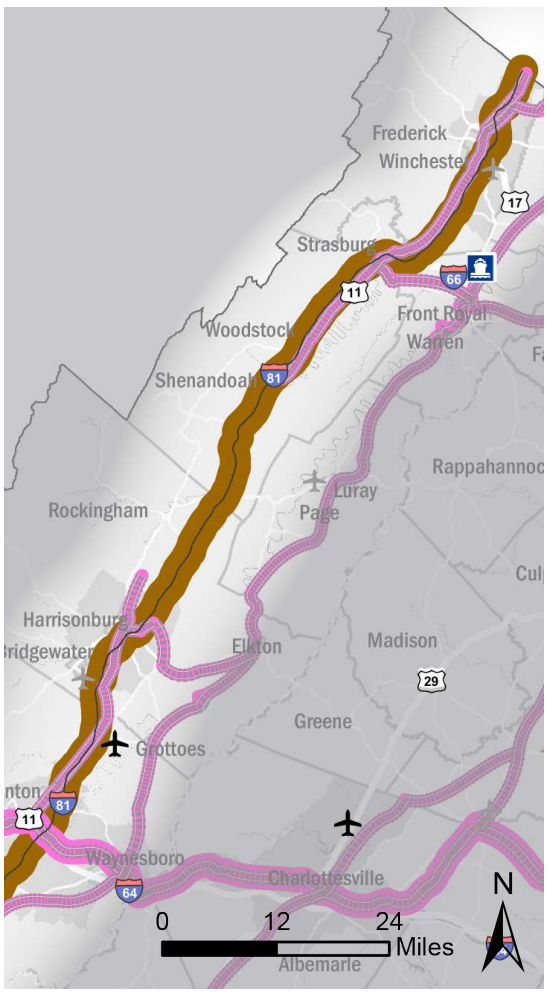
The percent of daily traffic comprised of heavy trucks on Segment B5 is lower relative to most other segments in Corridor B. On I-81, trucks comprise between 10 and 13 percent of daily traffic. On US 11, trucks make up a much smaller portion of traffic, accounting for four percent or less in the urbanized areas along the segment.



B5 SEGMENT PROFILE



Annual Freight by Tonnage, 2012

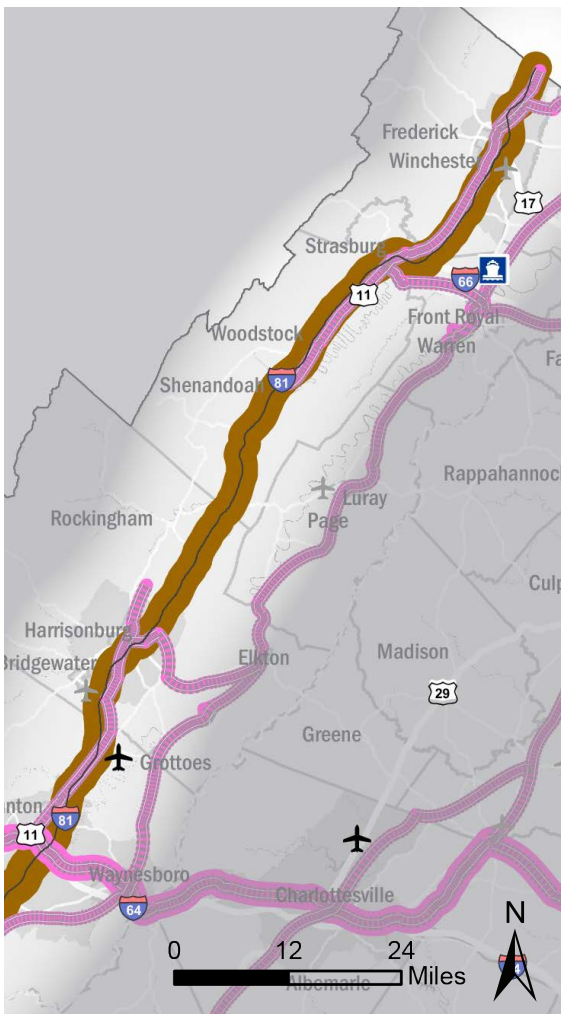


Freight Flows

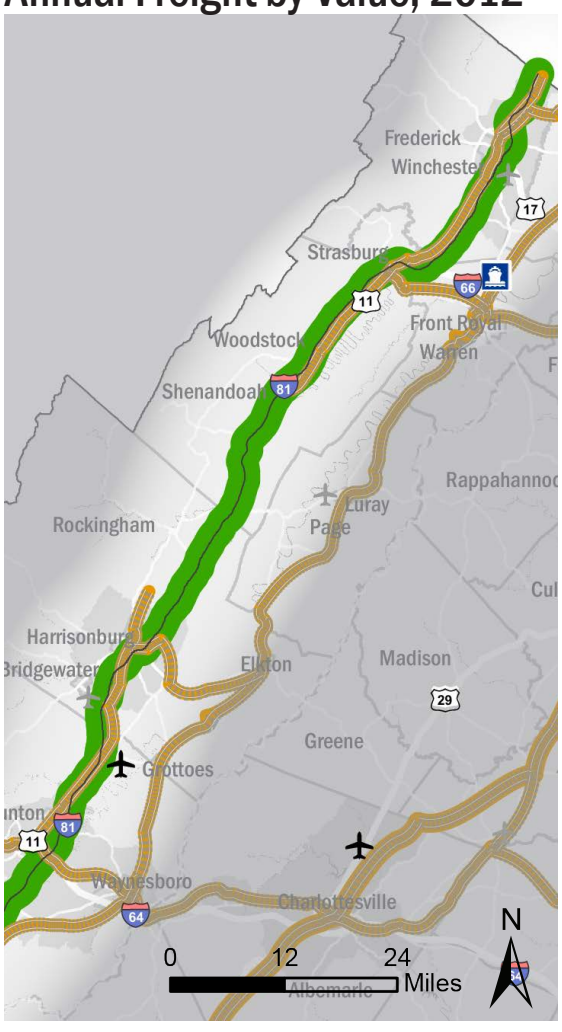
At the southern end of Segment B5, south of Harrisonburg, freight is moved primarily by truck, in terms of both tonnage and value. In total, 71 million tons (99 percent) of freight is moved through this section of Segment B5 by truck, compared to 839,000 tons by rail. By value, trucks are favored even more, with $138 billion (99.8 percent) of freight value traveling by truck, compared to $386 million by rail. On average, a ton of freight traveling by truck through this section of Segment B5 is worth $1,936 while a ton of freight traveling by rail is worth $460. In 2025, both rail and truck freight tonnages and total values in the southern end of Segment B5 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Values per ton of freight on trucks are expected to increase to $2,124 in 2025, while rail values per ton will remain nearly the same, at $458.

At the northern end of Segment B5, north of Winchester, freight is also moved primarily by truck, in terms of both tonnage and value. In total, 71 million tons (98 percent) of freight is moved through this section of Segment B5 by truck, compared to 1 million tons by rail. By value, trucks are favored even more, with $132 billion (99.7 percent) of freight value traveling by truck, compared to $379 million by rail. On average, a ton of freight traveling by truck through this section of Segment B5 is worth $1,864 while a ton of freight traveling by rail is worth $334. In 2025, both rail and truck freight tonnages and total values in the northern end of Segment B5 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Values per ton of freight on trucks are expected to increase to $2,053 in 2025, while rail values per ton will remain nearly the same, at $330.

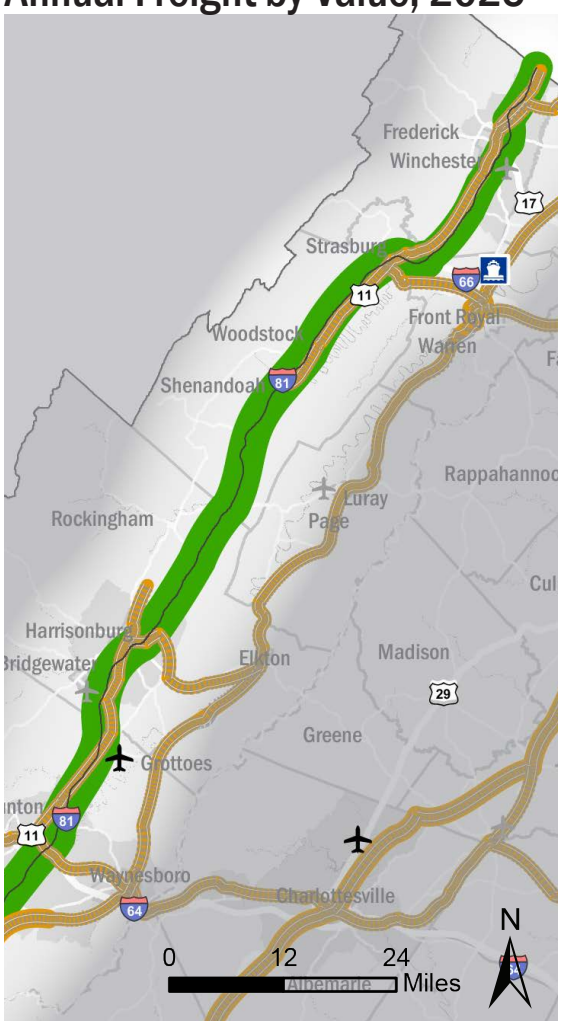
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Comparable Travel Options

Staunton to Harrisonburg

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 0:35 Travel Time $16 Est. Cost

Roanoke to Harrisonburg

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:53 Travel Time $61 Est. Cost

Staunton to Winchester

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 1:37 Travel Time $54 Est. Cost

Staunton to DC

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	2 Trips per Day 3:56 Travel Time $26 Est. Cost

Auto

Via I-81: 2:41 Travel Time $88 Est. Cost

Harrisonburg to Richmond

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-81: 2:28 Travel Time $75 Est. Cost

Harrisonburg to Charlottesville

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

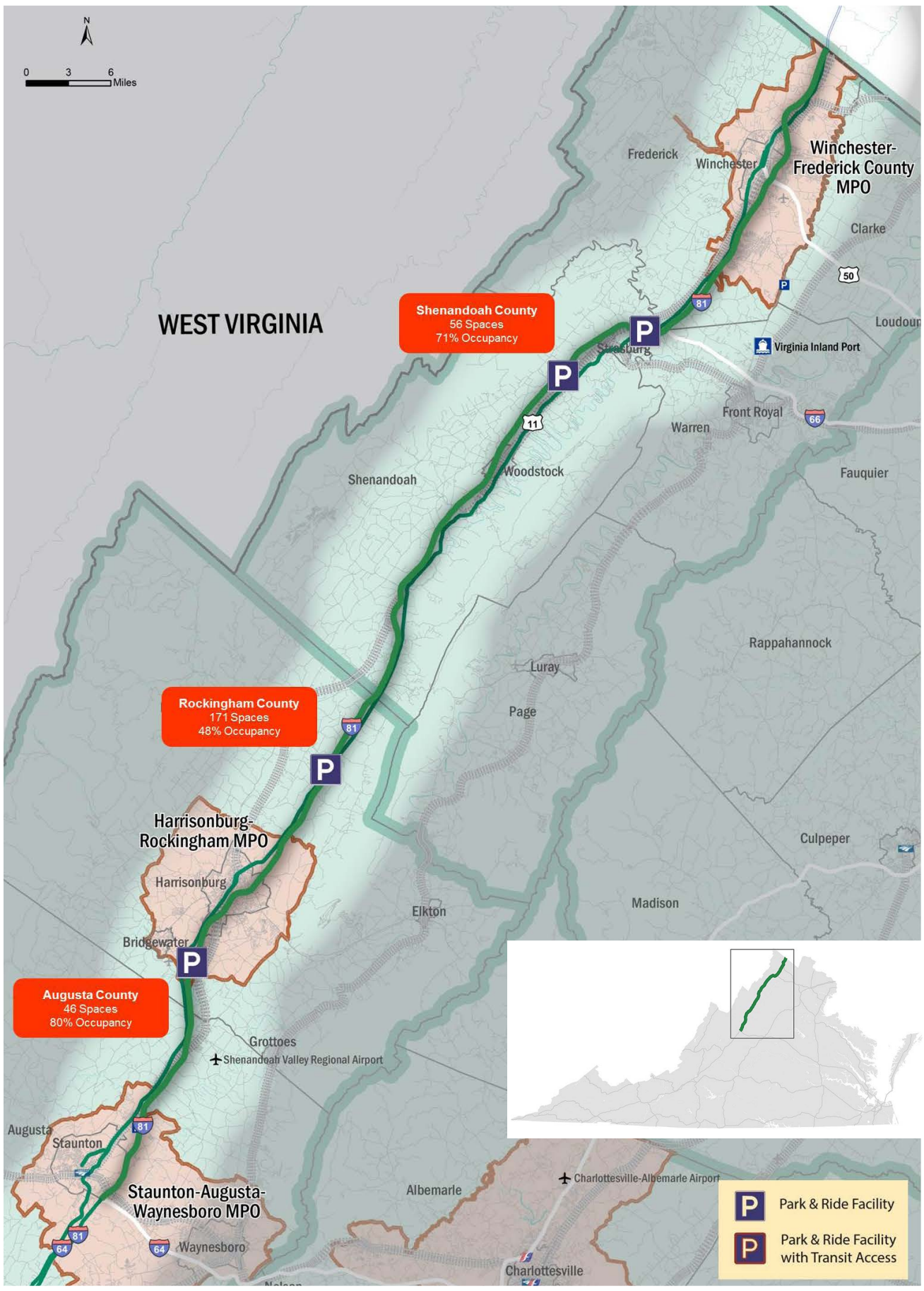
Auto

Via I-81: 1:05 Travel Time $35 Est. Cost

Passenger trips on Segment B5 of the Crescent Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long-range travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and for bypassing incidents causing congestion on sections of I-81. Amtrak service is available at Staunton, but it does not provide a connection to any other locations in the corridor. Shuttle buses connect Blue Ridge Community College in Weyers Cave to Staunton and Harrisonburg.

Park-and-Ride

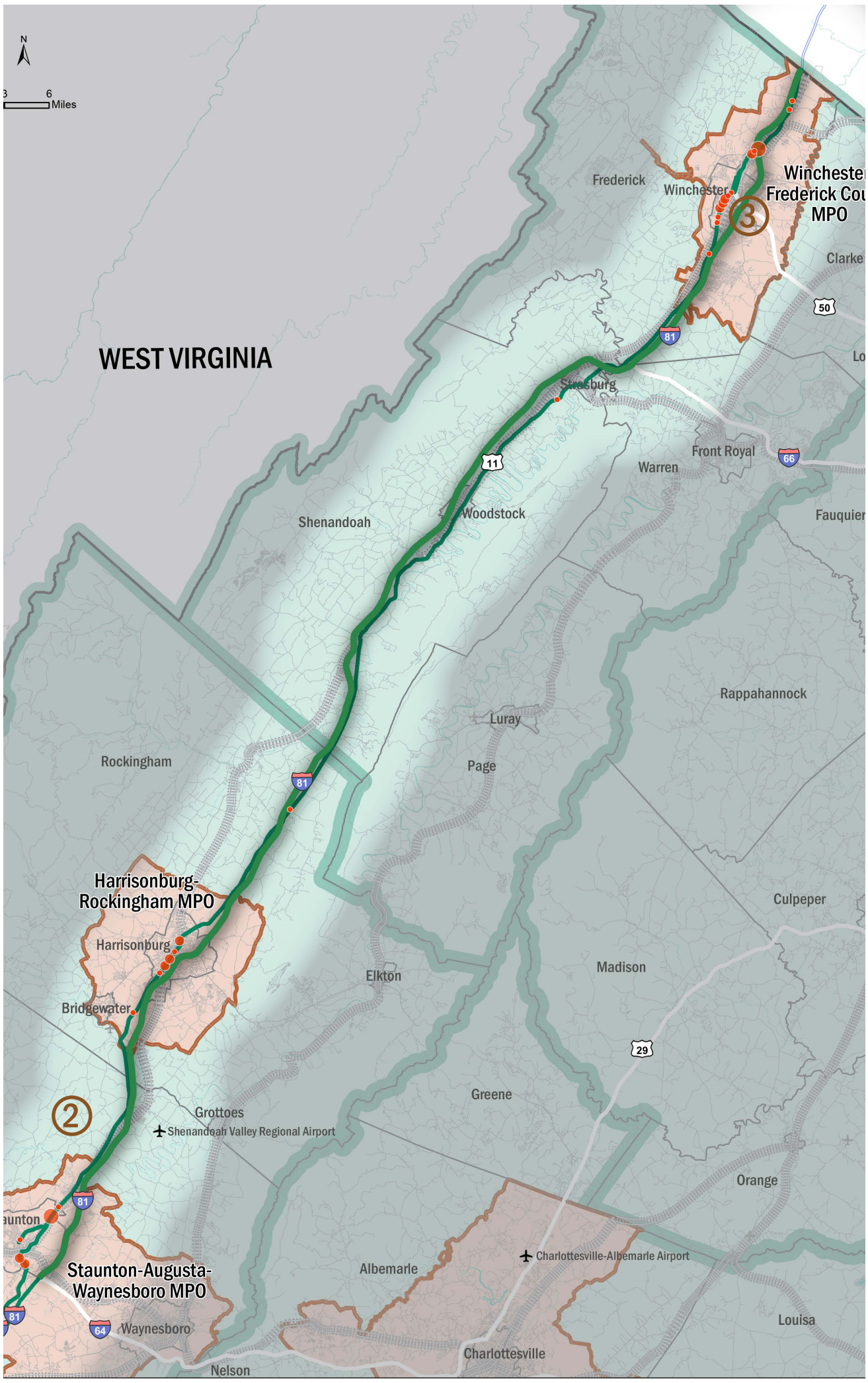
Within Segment B5, commuters can utilize several Park-and-Ride locations. Rockingham County provides the highest number of Park-and-Ride spaces and locations, while Augusta County has the highest utilization rate of spaces available in the region. Augusta and Botetourt Counties both have a utilization rate of 80 percent, which is higher than the statewide average of 76 percent for Park-and-Ride utilization.



B5 SEGMENT NEEDS

Safety

Between 2010 and 2012, 145 severe crashes occurred on Segment B5, and several areas along the segment have high concentrations of severe collisions. In Staunton along US 11, there were 16 crashes within approximately one mile between West Village Drive and Mary Gray Lane (as noted for C2), and there were 11 crashes at the intersection of US 11 and Route 262. In Harrisonburg, along US 11, 30 incidents occurred over 2.6 miles between Pointe Drive and West Market Street, with ten of the 30 incidents occurring at the intersection of South Liberty Street and West Market Street and nine occurring at South Main Street and Pleasant Hill Road. In Winchester, along US 11, there were 37 crashes that took place over a 2.3 mile span between Armour Dale and West Bond Street with the highest number (nine) occurring at the intersection of Middle Road and Valley Avenue outside of the Ward Plaza Shopping Center. Another concentrated area of crashes in Winchester is around the interchange of I-81 and US 11. Along US 11, there were 24 collisions that took place over a distance of 0.6 miles between the US 11 intersections with Route 37 and Redbud Road.



Performance Metrics:

Number of Severe Crashes 145

Severe Crashes/ Million VMT 0.2

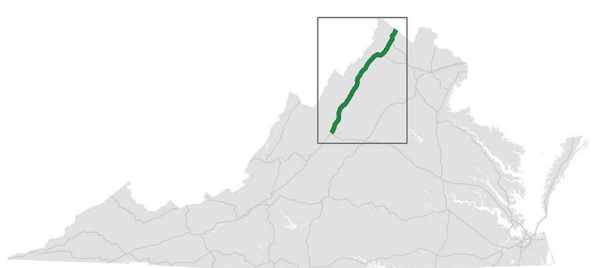
Number of Railroad Crashes 5

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	0
Freight Ton Hours of Delay per Mile	5.3K

Passenger Delays

Segment B5 experiences some of the lowest passenger traffic congestion delays in the state, with only 100 person-hours delay daily. As such, there are no locations along the segment where passenger delays exceed 100 person-hours per mile. The peak-period passenger delay percentage is slightly above the average on other CoSS segments, although the total passenger delay is minimal for this corridor segment.

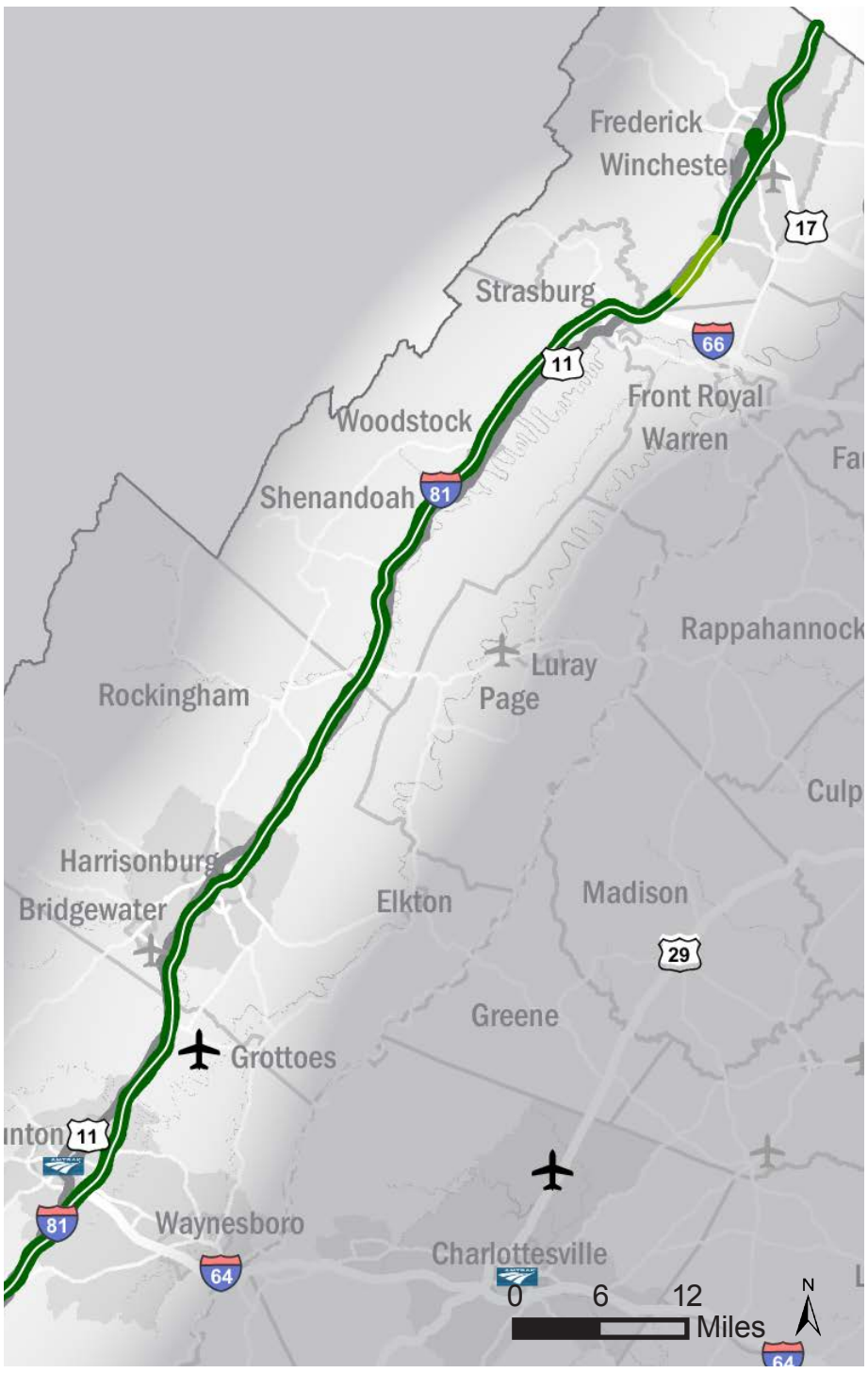
Freight Delays

As with passenger congestion, Segment B5 experiences minimal freight delays with daily delays totaling around 1.1 million ton-hours. The location with the highest level of freight congestion corresponds with trucks accessing the Inland Port from I-81 south of Winchester, but there are no locations along the corridor segment that exceed 250,000 ton-hours per mile of freight delay. The peak-period freight delay accounts for only five percent of the total freight delay on the segment - well below the average on other CoSS segments - suggesting that freight traffic is not concentrated during peak hours.

Daily Person Hours of Delay per Mile



Daily Freight Ton Hours of Delay per Mile



B5 SEGMENT NEEDS

Reliability

Weekday Peak

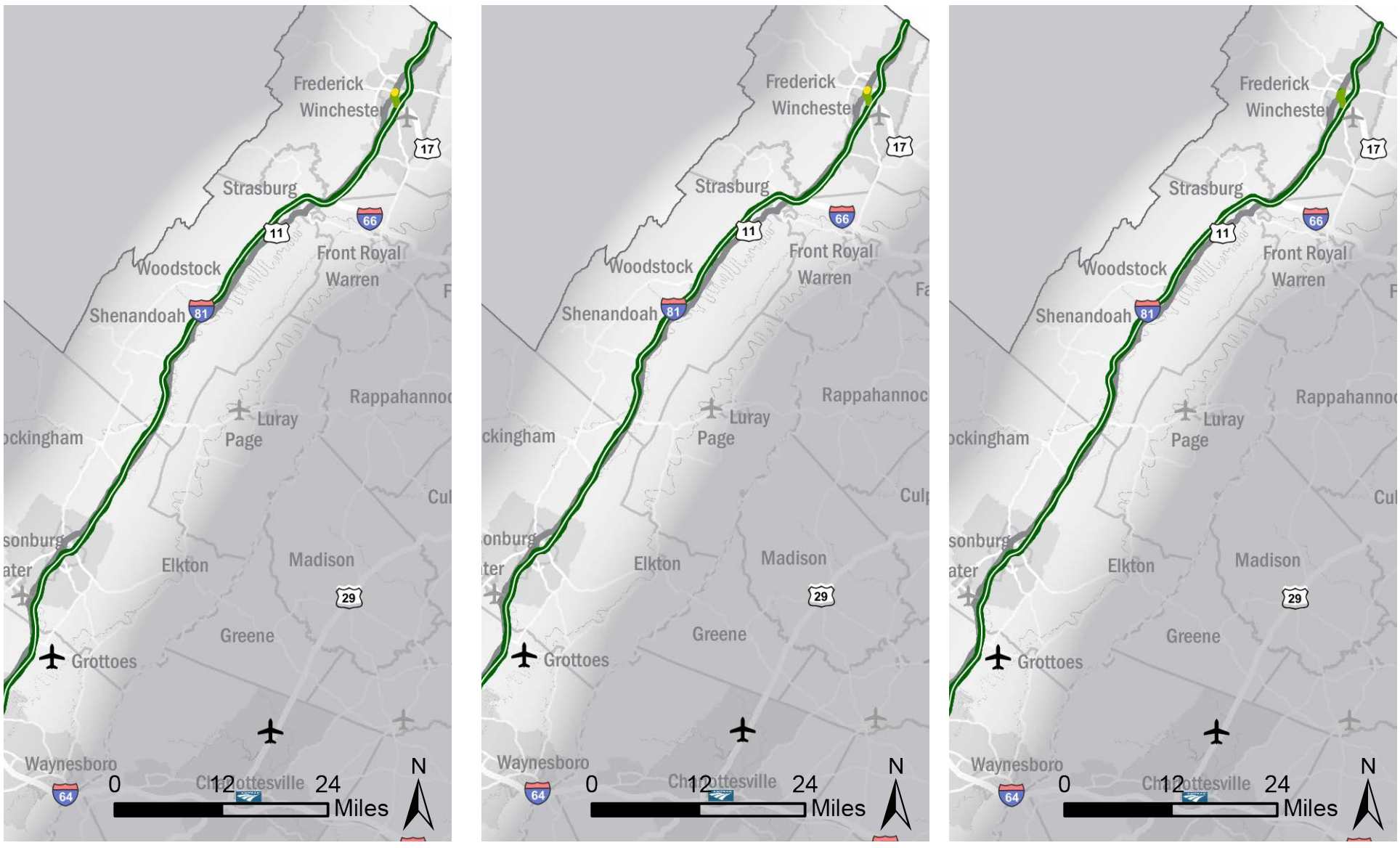
Reliability of travel during the peak period on a typical weekday on Segment B5 ranges from 0.00 to 0.43 in terms of reliability index, with an average value of 0.03. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B5 have reliability index values exceeding the statewide threshold.

Weekday

Reliability of travel during a typical weekday ranges from 0.01 to 0.43 in terms of reliability index, with an average value of 0.03. While the average weekday reliability index for this segment is well below the average for CoSS segments statewide, a short segment of US 11, near US 50 in downtown Winchester, has a reliability index value exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.31 in terms of reliability index, with an average value of 0.03. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment B5 have reliability index values exceeding the statewide threshold.

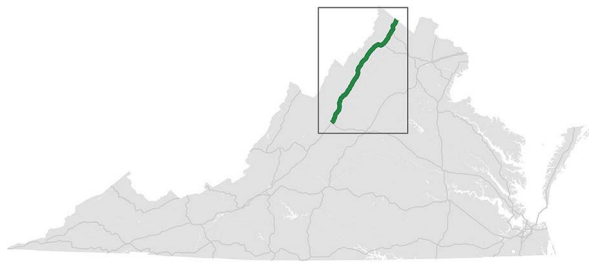


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliabile. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

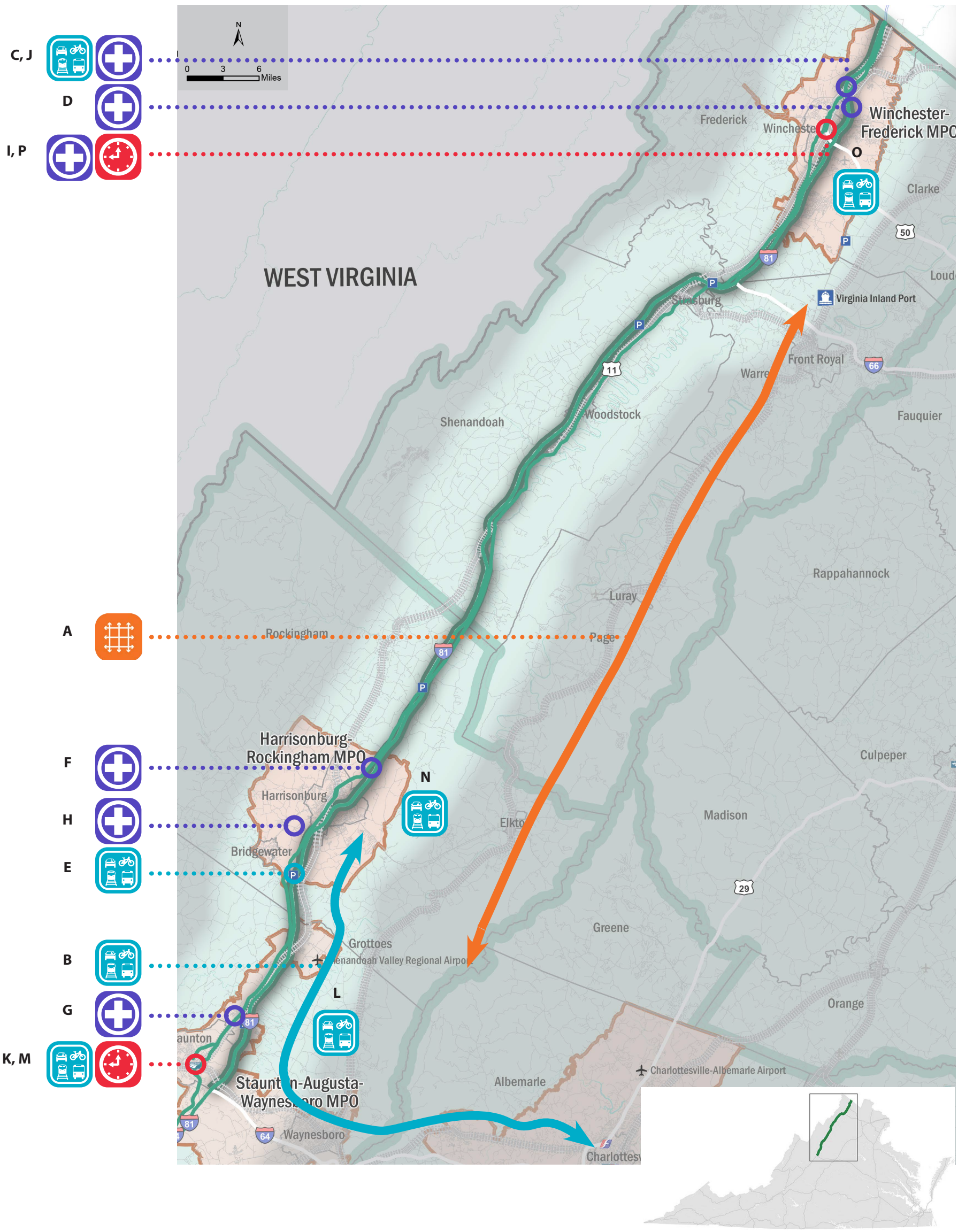


B5 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability



B5 SEGMENT NEEDS

Summary of Needs - B5 Segment

A.	US 11 not able to handle overflow when incident occurs on I-81 resulting in signifcant delays
B.	Lack of intercity transit service between Staunton, Waynesboro, Charlottesville, and Harrisonburg
C.	Park-and-Ride facilities at capacity
D.	Safety concerns on I-81 Bridge at Exit 313 (US 50) related to structural condition and ability to handle amount of heavy truck traffic
E.	Park-and-Ride facilities at capacity
F.	Safety concerns along I-81 between Exits 243-251
G.	US 11 in Staunton between West Village Dr and VA 262: 27 severe crashes
H.	US 11 in Harrisonburg between Pointe Drive and West Market Street: 30 severe crashes
I.	US 11 between Armour Dale and West Bond Street in Winchester: 37 crashes
J.	US 11 near northern interchange with I-81 north of Winchester: 24 severe crashes
K.	Unreliable Amtrak service from Staunton. Average departure delay is 73 minutes totaling over 4,100 person-hours of delay from this segment.
L.	Park and Ride lots in Augusta County have a higher utilization rate than the statewide average
M.	No bus or rail service is available from Staunton to cities on the corridor
N.	No bus or rail service is available from Harrisonburg to cities on the corridor
O.	No bus or rail service is available from Winchester to cities on the corridor
P.	Reliability issue at US 11 and South Braddock Street in Winchester

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

East-West Corridor (C)



Office of INTERMODAL Planning and Investment

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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview

Corridors of Statewide Significance

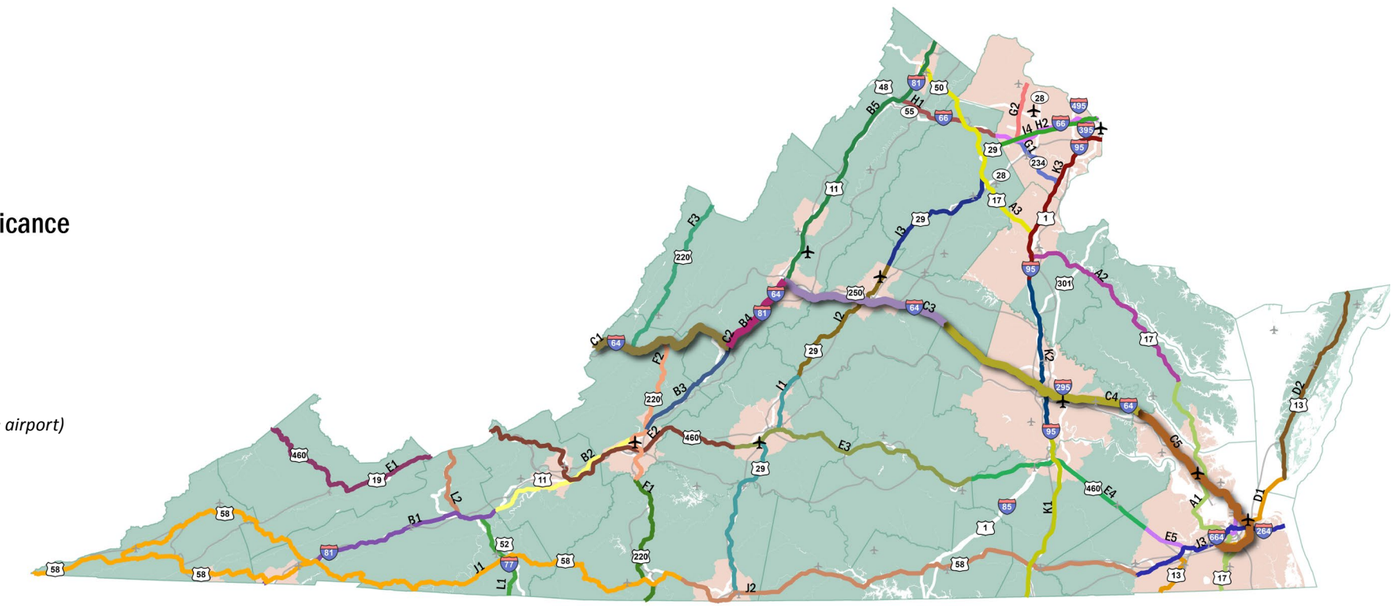
A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area



The East-West Corridor (Corridor C) is primarily defined by I-64, a multi-lane interstate highway that runs from Virginia to Missouri. The western terminus of I-64 is located near St. Louis, Missouri, although the roadway is under construction to connect with I-70 west of this location. The eastern terminus lies in the Hampton Roads Area, where the East-West Corridor includes the Hampton Roads Beltway (I-64 and I-664) and the I-264 spur to Virginia Beach. I-64 traverses approximately 300 miles of Virginia, with its western terminus located west of Covington, at the West Virginia state line.

In urbanized areas such as Richmond, Hampton Roads, and Charlottesville, I-64 serves as a major commuter route. The East-West Corridor also provides access to educational facilities, such as the University of Virginia, the College of William and Mary, and multiple institutions in the Richmond and Hampton Roads Areas. I-64 provides an important route over the mountains of western Virginia and is an important corridor for both freight and passenger rail. In addition, I-64 connects to the important I-81 and I-95 freight corridors.

Several parallel roadways are included in the East-West Corridor, including US 60 and US 250. US 60 runs along the East-West Corridor east of the City of Richmond and into Hampton Roads. US 250 acts as the major local-access roadway between Staunton and Richmond. For the portion running concurrently with I-81 between Staunton and Lexington, US 11 acts as the main parallel roadway and provides local access. West of Lexington, US 60 is the main parallel highway facility and local access road for the East-West Corridor.

Passengers in the East-West Corridor have several travel options in addition to driving. These include:

- Numerous Park-and-Ride facilities, especially around Charlottesville and Richmond, and between the two cities;
- High-occupancy vehicle (HOV) facilities in the Hampton Roads Area along portions of I-64 and I-264;
- Three Greyhound bus stations that operate in the Hampton Roads Area, one each in Norfolk, Hampton, and Virginia Beach; stations are also available in Williamsburg, Richmond, and Charlottesville;
- Amtrak service, available from eight stations within the corridor;
- Multiple airports, including four providing commercial service, operating within the East-West Corridor; and
- A number of line-haul transit routes that provide intercity service along the East-West Corridor:
  - The Alleghany Highlands Mountain Express is a deviated, fixed-route service that connects Iron Gate, Clifton Forge, and Covington;
  - The Greater Richmond Transit Company (GRTC) operates peak-hour commuter routes that travel the corridor, connecting residents of Henrico County to downtown Richmond; and
  - Hampton Roads Transit provides commuter routes called the Metro Area Express (MAX). These routes travel portions of the East-West Corridor providing connections between Newport News, Hampton, Norfolk, Virginia Beach, Chesapeake, and Portsmouth.

CSX operates rail lines along the length of the corridor, which are used for both freight and passenger rail. The CSX Coal Corridor runs along I-64 between Hampton Roads and Charlottesville before traveling south toward Lynchburg. It parallels I-64 again west of Clifton Forge into West Virginia and the coal fields there. Two short-line railroads also run along the East-West Corridor for short distances in the Hampton Roads Area. In addition, Norfolk Southern's Crescent Corridor parallels I-64 where it runs concurrently with I-81 between Lexington and Staunton (Segment C2).

The East-West Corridor serves as a major freight route. I-64 provides direct access to other major East Coast freight corridors, including I-81 and I-95. I-64 is the only interstate that accesses the Hampton Roads Area, where multiple Port of Virginia facilities are located. I-64 also provides access to the James River and York River navigational channels for moving freight farther inland via barge. The corridor also provides access from the rest of the state to the military facilities located in that area. In addition, all lanes of I-64, including HOV lanes, are reversible in the event of an emergency evacuation.

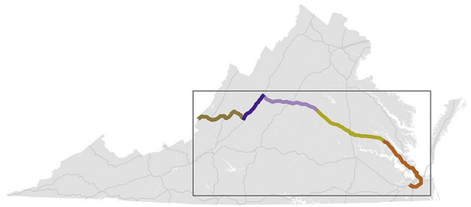
Corridor Components

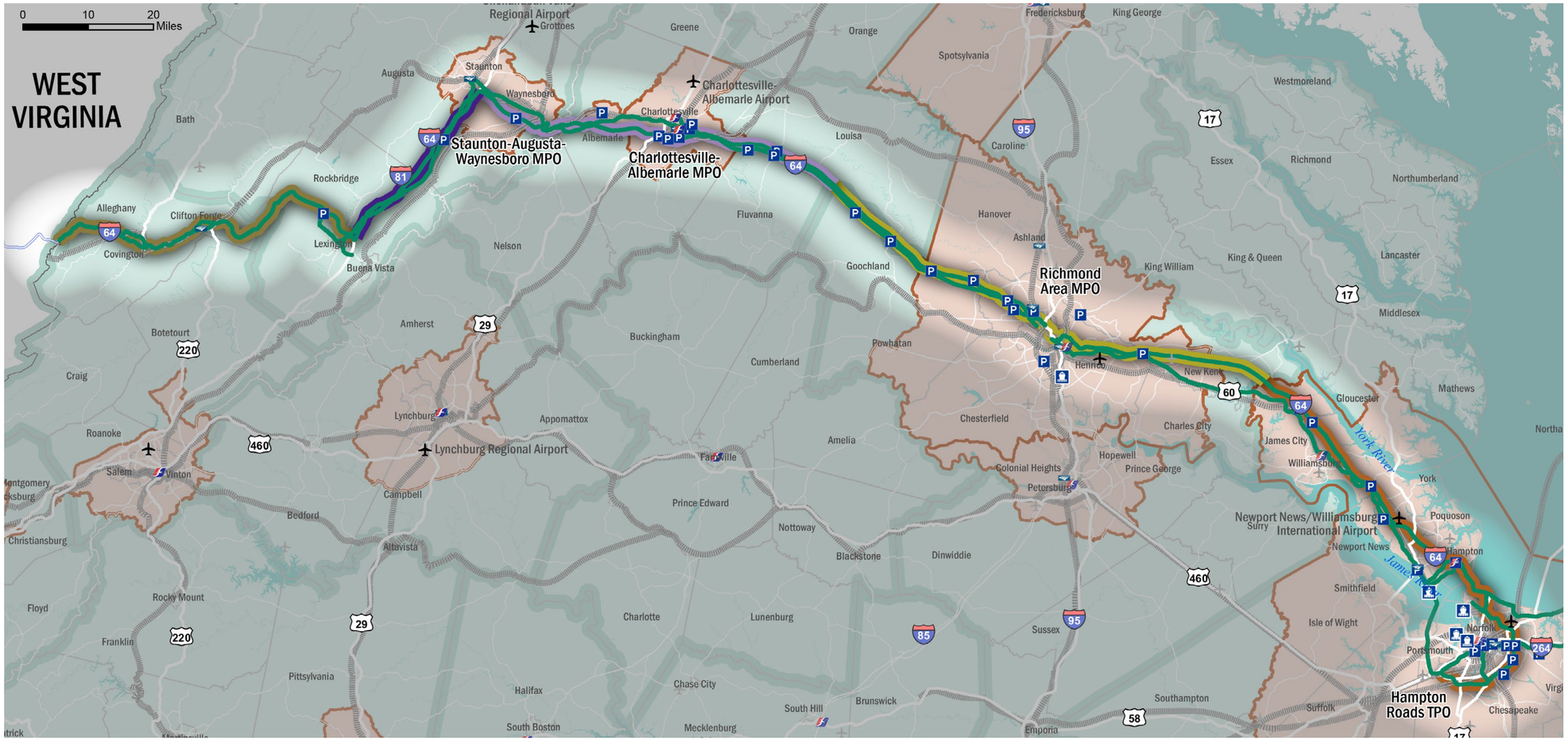
Highway Facilities	
Primary Facility	• I-64
Other Highway Facilities	• I-664 • I-564 • I-464 • I-264 • US 60 • US 60 Business • US 250 • US 250 Business • US 11
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• CSX Coal Corridor • Norfolk Southern Crescent Corridor
Port Facilities	
	• Port of Richmond • Newport News Marine Terminal • Norfolk International Terminal • Portsmouth Marine Terminal • Virginia International Gateway
Airport Facilities	
	• Norfolk International • Newport News/ Williamsburg International • Richmond International • Charlottesville-Albemarle Airport

Corridor Segments
- C1
- C2
- C3
- C4
- C5

- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area

- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ridge Facility
- Airport Facility





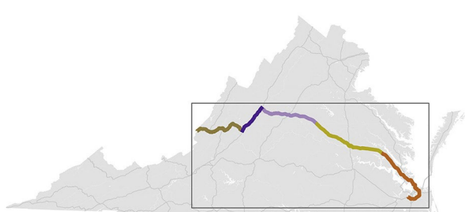
Demographics and Economic Trends

The primary population centers with greater than 500 persons per square mile along Corridor C are currently found in the City of Richmond and adjoining Henrico and Chesterfield Counties, as well as Norfolk, Hampton, and Newport News in the Hampton Roads Area. Alleghany and Rockbridge Counties have the lowest population density along the route with less than 50 persons per square mile. The most densely-populated segments along the corridor are Segments C4, around Richmond, and C5, in the Hampton Roads Area.

Between 2012 and 2025, James City and Hanover Counties are anticipated to see the largest population growth (greater than 25 percent) among counties along the corridor. Population is expected to decline in Alleghany County and the already densely-populated cities of Richmond, Hampton, and Virginia Beach. Overall, population is expected to grow except along the western end of the corridor.

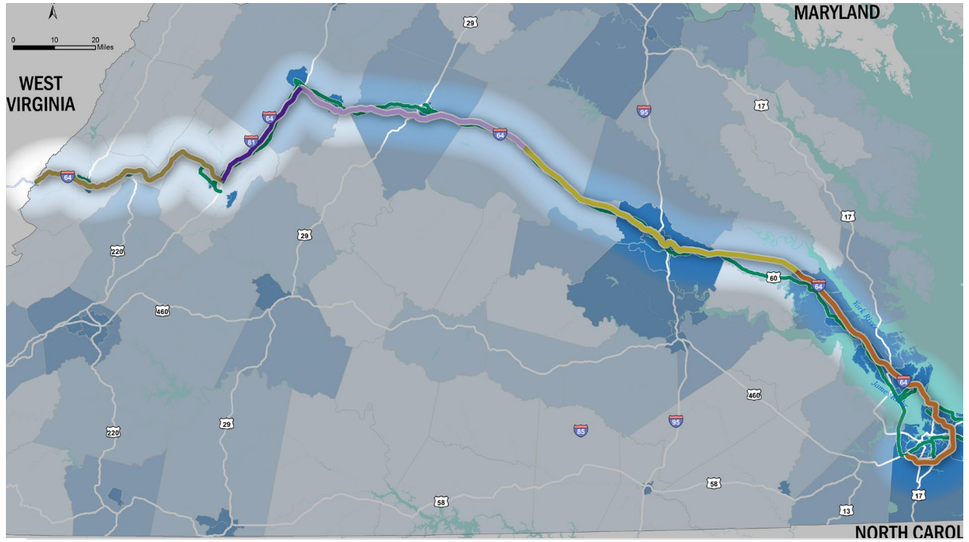
Current employment centers follow patterns similar to those of the population centers, with employment highly concentrated in the more urbanized areas. Employment growth tracks a similar pattern along the corridor, except in Alleghany County, where employment increases while population decreases. Military employment is substantial in the Hampton Roads Area.

Corridor B passes through four Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Hampton Roads Transportation Planning Organization (TPO) Area has the highest gross domestic product (GDP) of any of the MPO areas in the corridor. The largest industry sectors in the corridor include wholesale trade, retail trade, and health care.



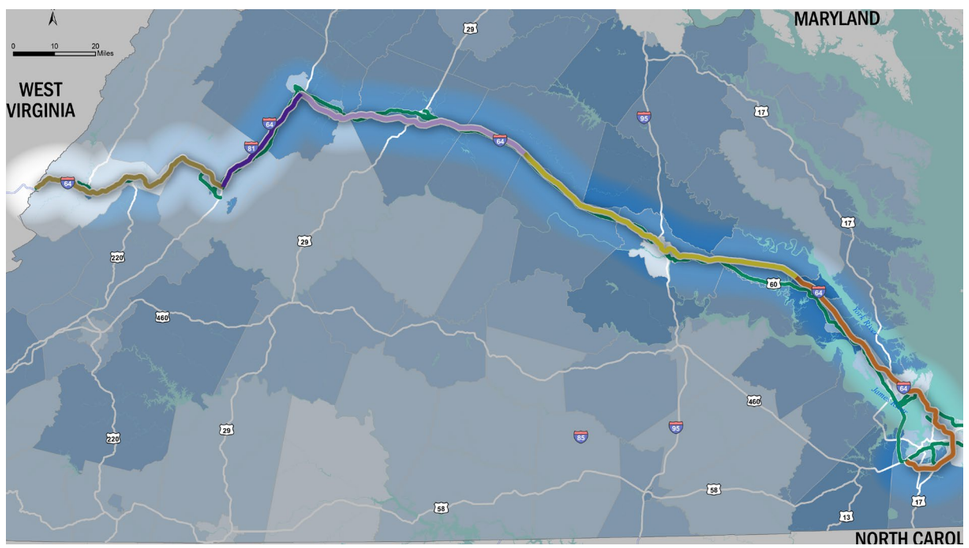
2012 Population Density Persons / Square Mile

- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



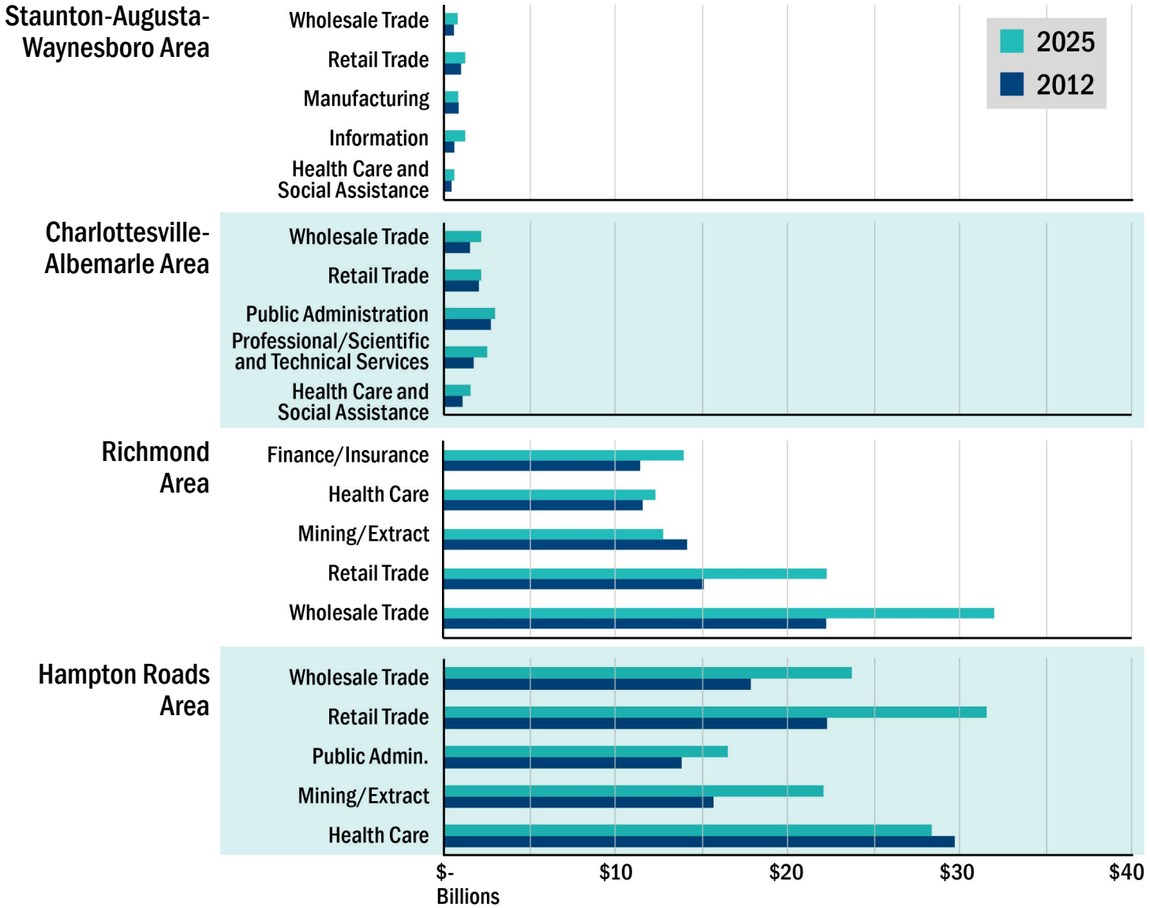
Population Growth (2012-2025 Percent Change)

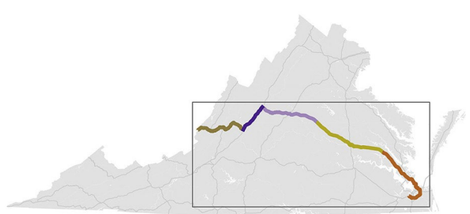
- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%



CORRIDOR C OVERVIEW

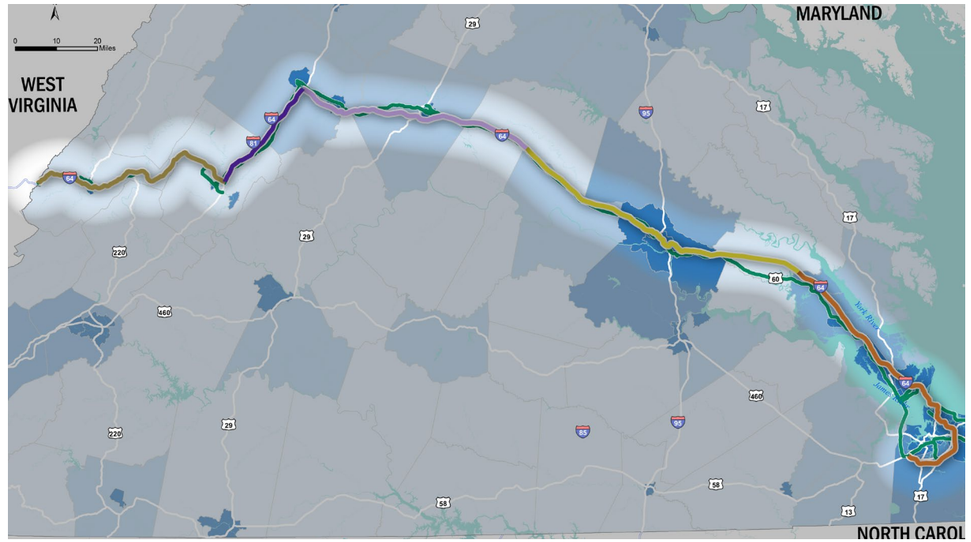
Top Industries (GDP)





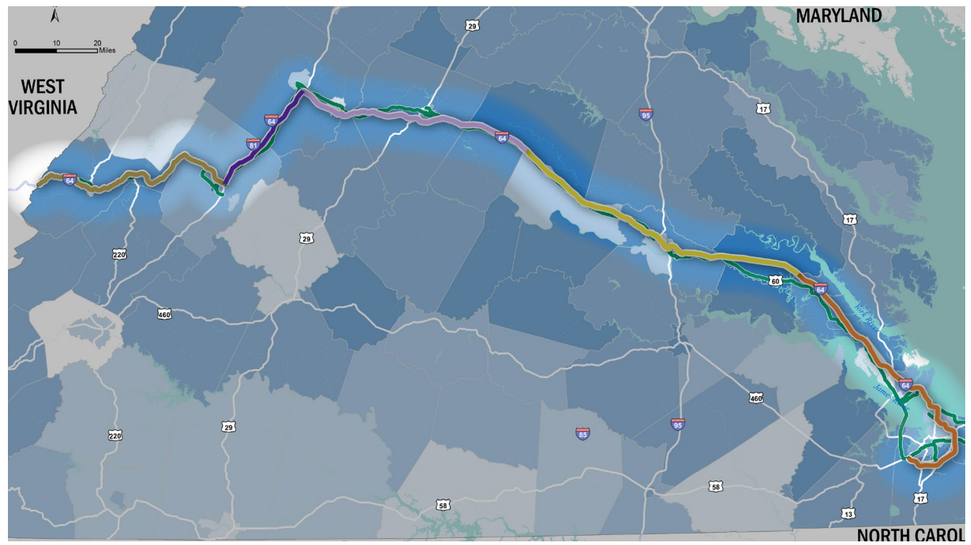
2012 Employment Density Jobs / Square Mile

- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500



Employment Growth (2012-2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%

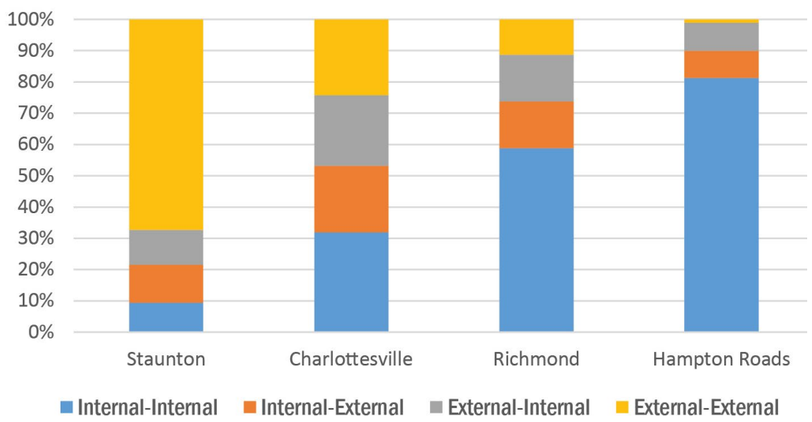


Corridor Travel Patterns

Passenger

Corridor C connects to West Virginia and passes through four MPO areas from west to east: Staunton-Augusta-Waynesboro, Charlottesville-Albemarle, Richmond, and Hampton Roads. Within the Staunton-Augusta-Waynesboro Area, Corridor C is dominated by through traffic, with more than 70 percent of the personal traffic on the corridor having both an origin and destination outside the MPO Area. The percentage of through traffic is much higher on the interstates, as the parallel facilities (US 11 and US 250) accommodate more than 50 percent local traffic. Traffic along Corridor C through Charlottesville is less dominated by through traffic (only 24 percent) while over 30 percent is entirely local traffic with both origins and destinations inside the MPO Area. The percentage of local traffic is much higher on the parallel facility (US 250) than on the interstate. Traffic along Corridor C in the Richmond Area is dominated by local traffic, which comprises more than 60 percent of traffic. Through traffic accounts for only 11 percent of the traffic on these facilities. In the Hampton Roads Area, through traffic along Corridor C is minimal, and the vast majority of traffic (approximately 80 percent) is comprised of internal trips occurring within the MPO Area.

Distribution of Internal and External Travel



Freight

By truck, Corridor C carried 149 million tons of freight worth $246 billion in 2012, and is estimated to carry 208 million tons of freight worth $393 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value, passes through Virginia. Between three and four percent of the total truck freight tonnage travels along Corridor C between Pennsylvania and North Carolina. Besides this through traffic, a significant portion of the truck freight on Corridor C originates from (around 13 percent) or is destined for (between 13 and 18 percent) Norfolk and Portsmouth and their port facilities.

By rail, Corridor C carried 44 million tons of freight worth $5 billion in 2012, and is estimated to carry 46 million tons of freight worth $7 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travel eastbound from West Virginia and Kentucky to the marine terminal located at Newport News.

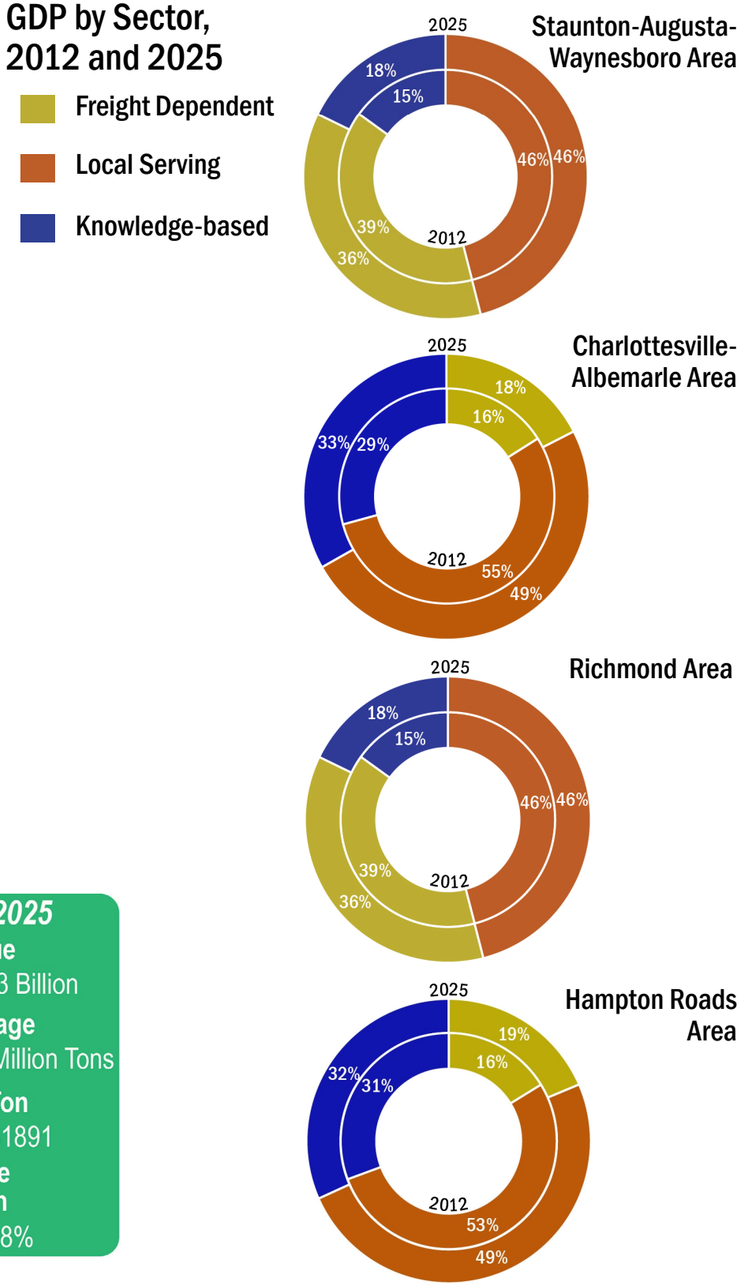
Truck Freight

	2012	2025
Rail Freight Value	$5 Billion	$7 Billion
Rail Freight Tonnage	44 Million Tons	46 Million Tons
Freight Value per Ton	$121	$146
Corridor Tonnage Passing Through	1%	1%

Rail Freight

	2012	2025
Truck Freight Value	$246 Billion	$393 Billion
Truck Freight Tonnage	149 Million Tons	208 Million Tons
Freight Value per Ton	$1648	$1891
Corridor Tonnage Passing Through	40%	38%

GDP by Sector, 2012 and 2025



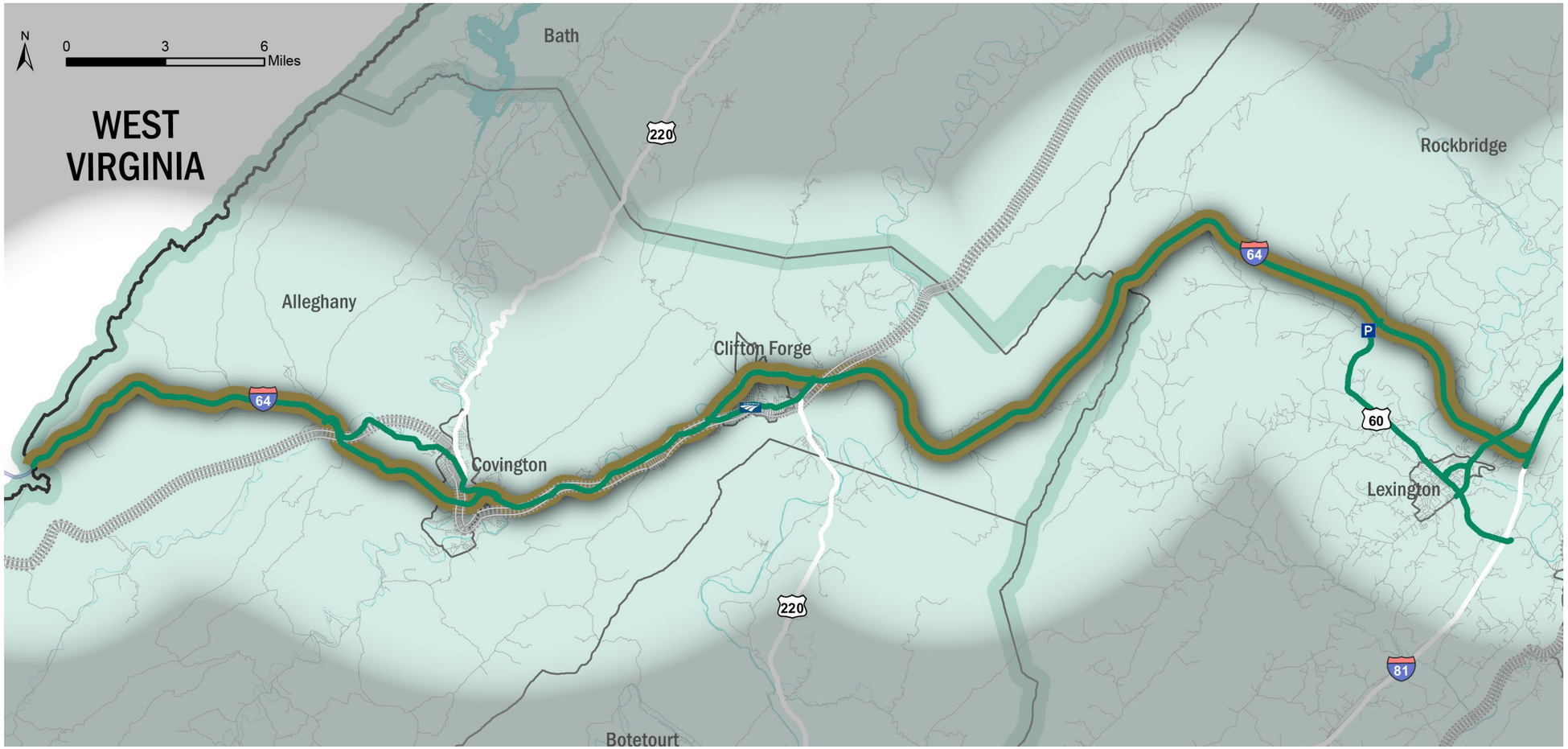
II. Segment C1

- C1
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility



Corridor Segment C1 Components

- I-64
- US 60
- US 60 Business
- Amtrak
- CSX Coal Corridor



C1 SEGMENT PROFILE

Segment C1 begins at the West Virginia border and progresses east to the junction of Interstates I-64 and I-81. This segment serves Alleghany and Rockbridge Counties, as well as the Cities of Covington and Lexington. The segment does not travel through any area covered by an MPO. The segment includes portions of US 60 and runs concurrently with a portion of US 220. Segment C1 acts as a major corridor for through freight travel in Virginia, providing access to the mountains and areas west. Segment C1 also connects smaller urban areas, such as Clifton Forge and Covington, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-64 is primarily a rural highway with four lanes in Segment C1. When not running concurrently with I-64, US 60 (in Covington and Lexington) and US 60 Business (in Clifton Forge) run parallel to I-64 in the urbanized areas within the segment.

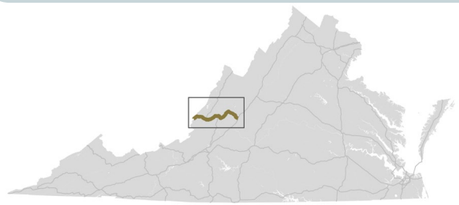
Transit Services: Amtrak offers service at Clifton Forge in Segment C1. RADAR, a non-profit transit agency based in the Roanoke Valley, operates the Mountain Express, which provides a transit connection between Covington and Clifton Forge. There is one Park-and-Ride location within close proximity to I-64 northwest of Lexington.

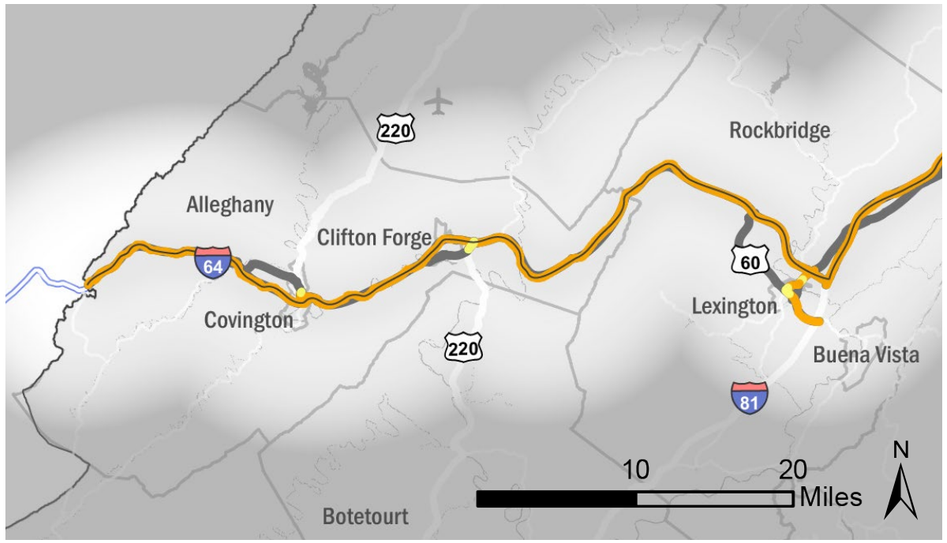
Rail Facilities: CSX's Coal Corridor runs through Segment C1.

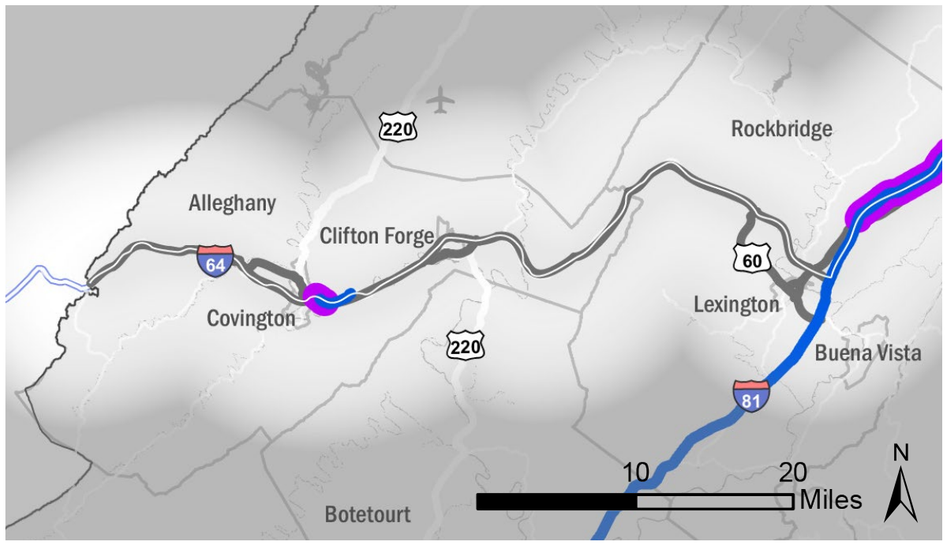
Port Facilities: Although there are no port facilities located directly adjacent to Segment C1, CSX's Coal Corridor does provide connections to multiple Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: There are no commercial airports in this segment.

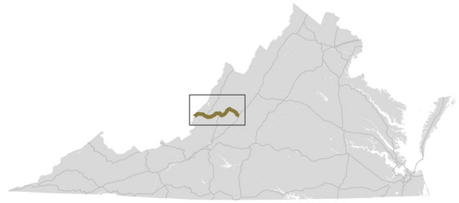
Major planned and future projects include: There are no major planned projects to improve safety or increase capacity on this segment at this time.







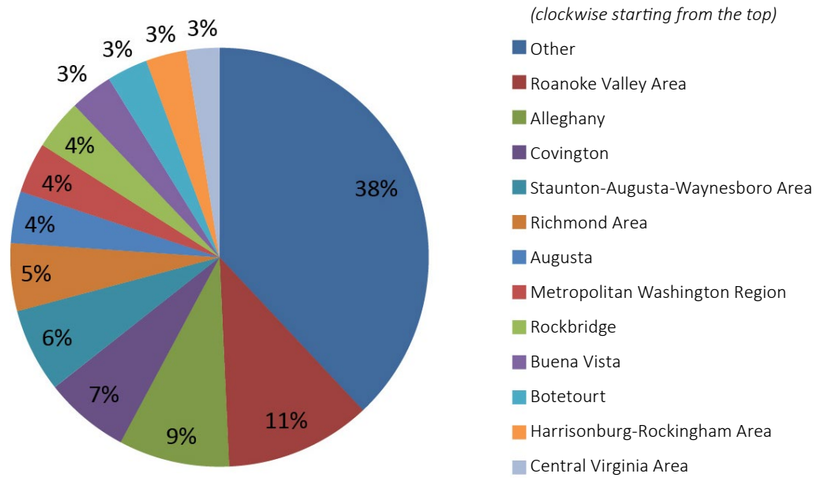
Travel Demand



Passenger Demand

The westernmost segment of Corridor C stretches from the West Virginia border to the intersection with I-81 through Alleghany County via Covington and through Rockbridge County via Lexington, and includes a portion that is concurrent with Segment F3. Intercity passenger travel from these jurisdictions accounts for a small percentage of the total intercity travel in the Commonwealth (approximately 1.2 percent). However, major markets in this segment include travel between Covington and Lexington (22 percent total), the Roanoke area (11 percent), and the Richmond area (five percent), all of which may use portions of Segment C1. Travel to West Virginia represents a surprisingly small portion of travel from these jurisdictions, at only two percent.

Travel from Jurisdictions along Segment C1 to...



C1 SEGMENT PROFILE

Freight Demand

By truck, Segment C1 carried 11 million tons of freight worth $21 billion in 2012, and is estimated to carry 16 million tons of freight worth $52 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value, passes through Virginia. Besides this through-traffic, a significant proportion of the truck freight on Corridor C originates from (around 13 percent) or is destined for (between 13 and 18 percent) Norfolk and Portsmouth. Another major truck freight movement on Corridor C is between Nevada and the ports in the Hampton Roads Area, which accounts for 4,000 tons of freight worth $5 billion in 2012 and is expected to increase significantly in value to $28 billion in 2025, corresponding with only a modest gain in the freight tonnage to 4,300 tons. Truck freight originating from or destined for counties adjacent to Segment C1 accounts for just a small percentage of the total freight tonnage and value on Corridor C. Botetourt County, located near Segment C1, is the largest generator of truck freight along the corridor segment, producing around one percent of the total truck freight tonnage in both 2012 and estimated for 2025.

By rail, Segment C1 carried 38 million tons of freight worth $3 billion in 2012, and is estimated to carry 39 million tons of freight worth $4 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travels eastbound from West Virginia and Kentucky to the marine terminal located at Newport News. The City of Covington, adjacent to Segment C1, is a significant attractor of rail freight for the corridor, accounting for between six and nine percent of the total rail freight value in 2012 and 2025, with much of this freight arriving from Pennsylvania and the Carolinas.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (36% / 37%)
2. North Carolina (15% / 13%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (6% / 6%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment C1: 2% / 2%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (40% / 41%)
2. North Carolina (10% / 10%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (7% / 7%)
5. New York (7% / 6%)

Corridor Tonnage Destined for Segment C1: 2% / 2%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (74% / 71%)
2. Virginia (9% / 11%)
3. Kentucky (8% / 8%)
4. Dickenson County (3% / 3%)
5. Hanover County (2% / 3%)

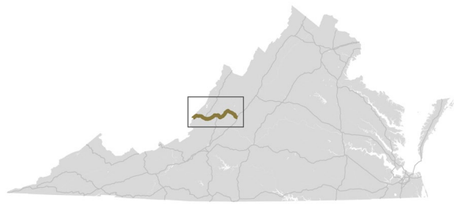
Corridor Tonnage Originating in Segment C1: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Norfolk* and West Virginia
City of Newport News* and Kentucky
Dickenson County and City of Newport News*
Hanover County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (96% / 95%)
2. City of Newport News* (73% / 71%)
3. City of Norfolk* (11% / 10%)
4. City of Covington (2% / 2%)
5. Rockingham County (1% / 2%)

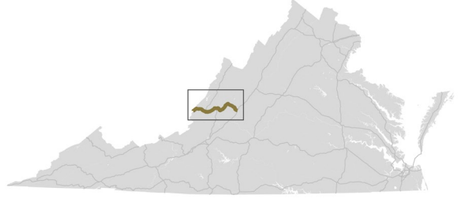
Corridor Tonnage Destined for Segment C1: 2% / 3%



Traffic Conditions

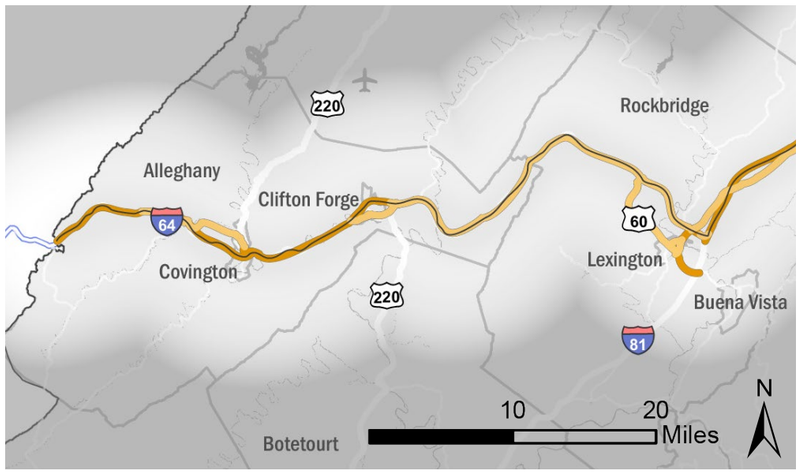
Traffic Volume and AADT

Traffic volume on Segment C1 is the lowest compared to traffic volumes on other segments of Corridor C. Average traffic volumes on I-64 are less than 18,000 vehicles per day throughout Segment C1, and are generally higher west of Clifton Forge. Traffic on the parallel facilities in the urban areas is much lower, with volumes below 7,000 vehicles per day throughout Segment C1. Minimal traffic growth is forecast for Segment C1 by 2025, with traffic increases of no more than 2,000 vehicles per day, except on US 60 in Lexington. By 2025, traffic volumes along I-64 between the West Virginia border and Clifton Forge are projected to range from 11,000 to 19,000 vehicles per day. By 2025, traffic volumes along I-64 east of Clifton Forge are projected to range from 8,000 to 11,000 vehicles per day.



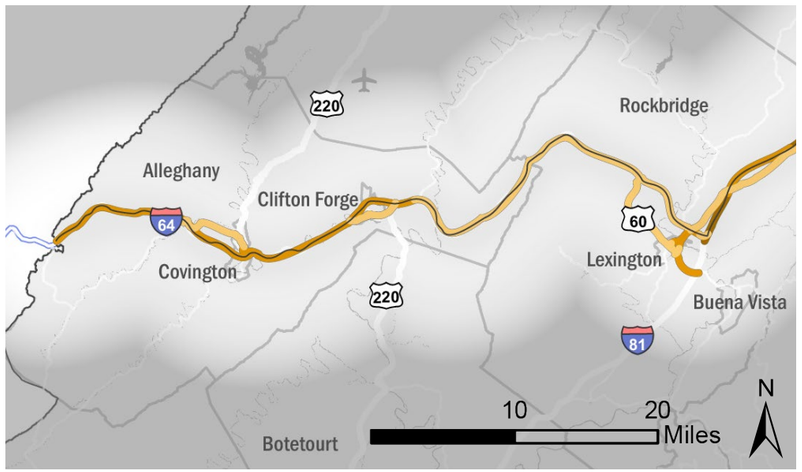
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



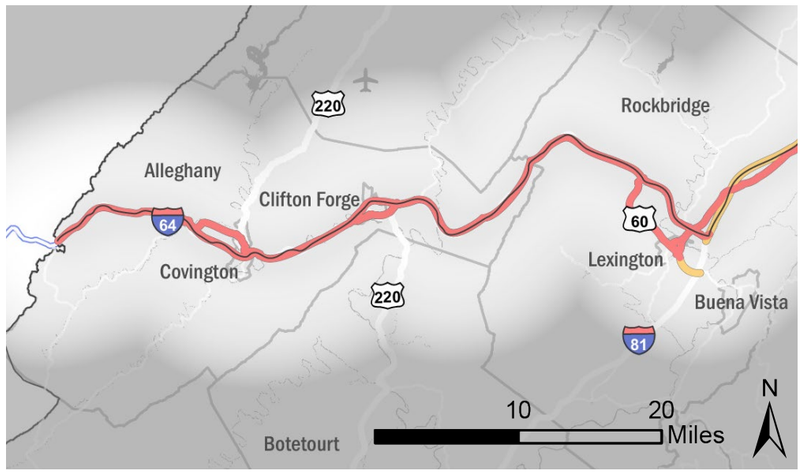
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



C1 SEGMENT PROFILE

Traffic Distribution

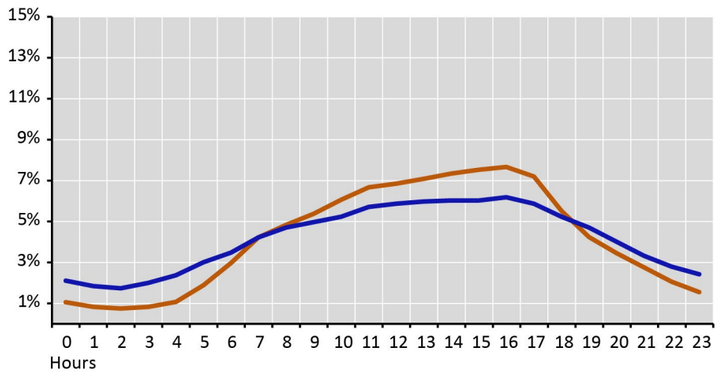
On average, traffic on Segment C1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows steady increase in the flow throughout the day, peaking between 4 and 5 p.m. The combined weekday traffic between 7 a.m. and 7 p.m. accounts for 76 percent of the total daily traffic. Peaking patterns for truck traffic show a relatively steady flow of trucks during the midday period between 11 a.m. and 5 p.m., with a peak hourly flow of 6.2 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (8.3 percent of daily traffic) for all traffic, and 3 to 4 p.m. (6.4 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment C1 vary by as much as 58 percent throughout the year, with the highpoint in August (around 10,000 vehicles per day) and the low point in January (around 6,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the September high (around 2,000 vehicles per day) 20 percent higher than the January low (around 1,700 vehicles per day). Weekend traffic levels show a distinct peaking pattern in the late Spring over the course of the year, and the highest levels of weekend traffic (June, around 10,000 vehicles per day) are 113 percent higher than February levels (around 5,000 vehicles per day). Weekend truck traffic is much more steady than all vehicle traffic, and the September high is only 21 percent higher than the July low. Truck volumes account for a significant portion of traffic on Segment C1 (24 percent of overall daily traffic for weekdays and 14 percent of overall daily traffic for weekends); as a result, truck traffic has an impact on overall traffic conditions.

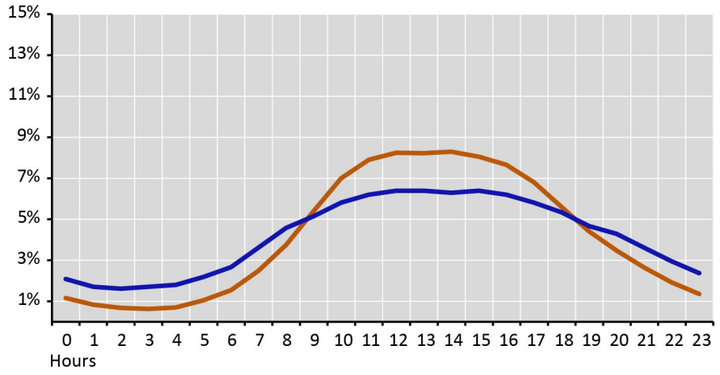
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment C1 is high compared to most other segments of Corridor C. On average, heavy trucks on I-64 comprise 11 percent of total traffic throughout Segment C1. Trucks comprise a smaller proportion of daily traffic on the parallel facilities.

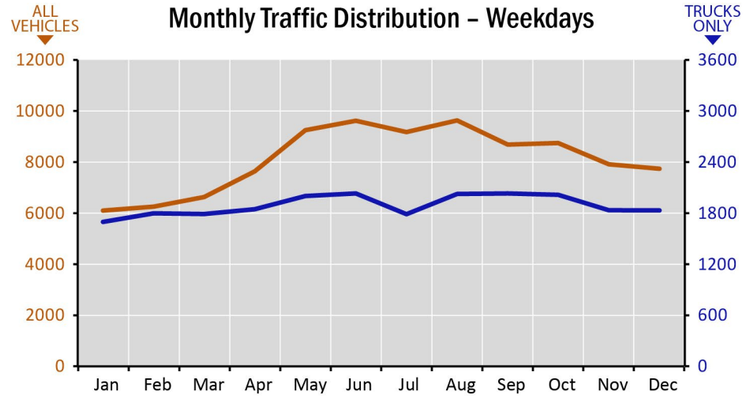
Hourly Traffic Distribution – Weekdays



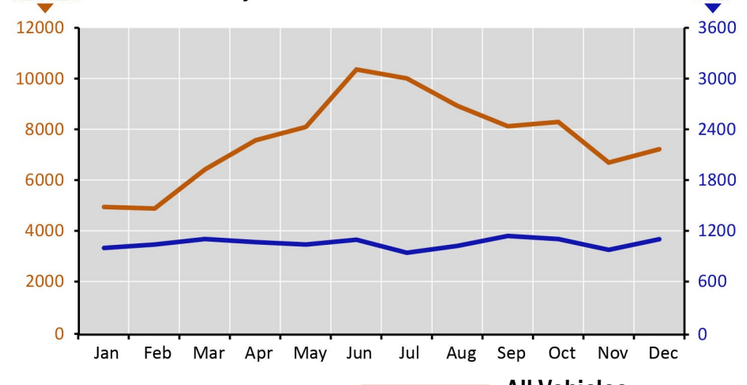
Hourly Traffic Distribution – Weekends

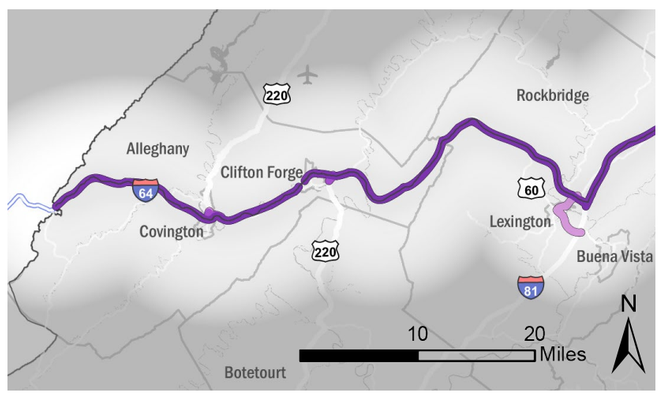


Monthly Traffic Distribution – Weekdays



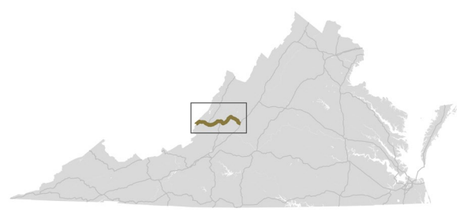
Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

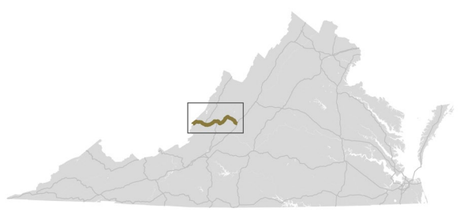
- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



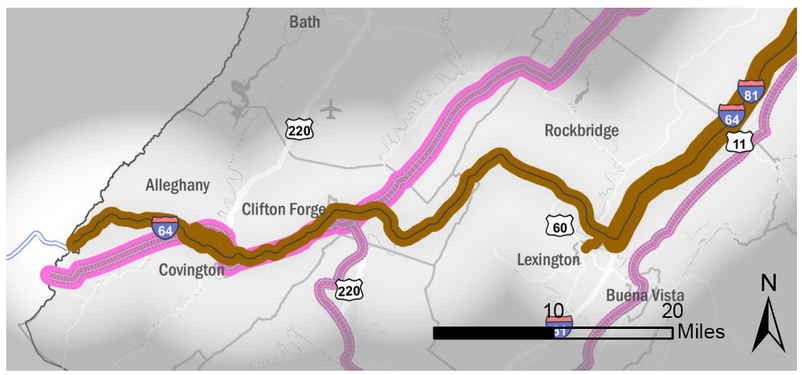
C1 SEGMENT PROFILE

Freight Flows

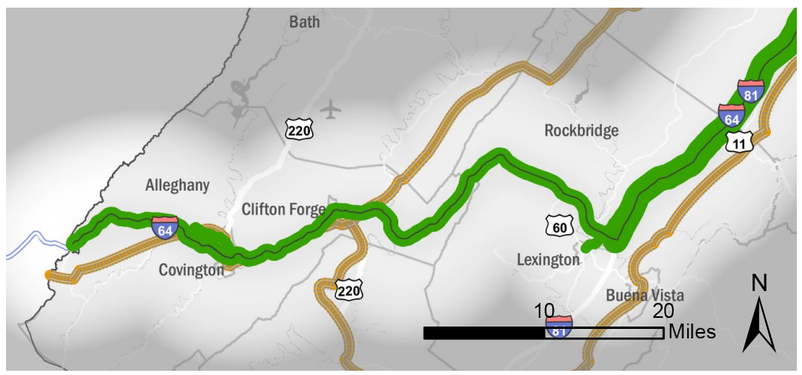
Near Covington and Clifton Forge, freight is moved primarily by rail in terms of tonnage but not value. In total, 11 million tons (22 percent) of freight is moved through Segment C1 of the East-West Corridor by truck, compared to 38 million tons by rail. By value, the difference is nearly the opposite, with $21 billion (86 percent) of freight value traveling by truck, compared to $3.5 billion by rail. This contrast is probably due to the fact that the corridor carries large amounts of coal. On average, a ton of freight traveling through Segment C1 by truck is worth $1,946 while a ton of freight traveling by rail is worth $90. In 2025, both rail and truck freight tonnages and total values in Segment C1 are expected to increase, and the percentage of the freight traveling by truck is expected to increase to 29 percent by tonnage and 93 percent by value. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $3,277 per ton on trucks and $102 per ton on rail.



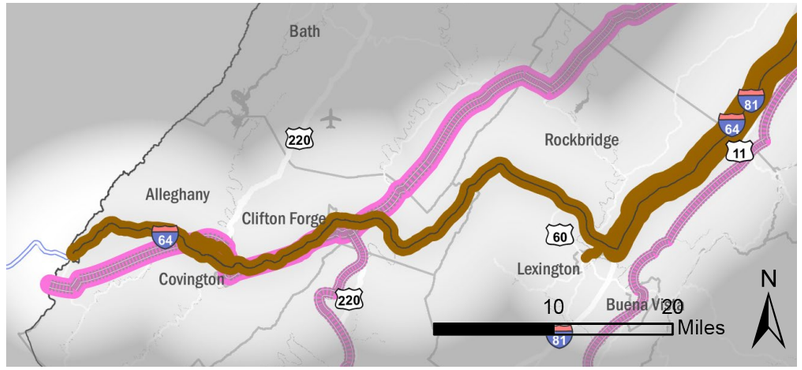
Annual Freight by Tonnage, 2012



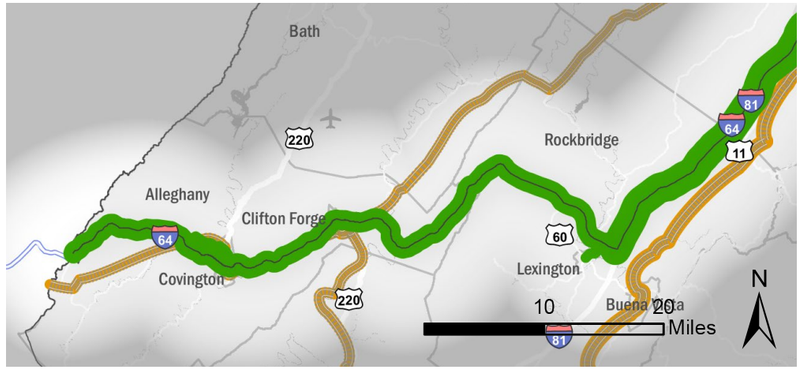
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment C1 of the East-West Corridor have limited travel options, both in terms of travel path and mode choice. While US 60 does serve as a parallel facility in the urban areas, its use for long-range travel is limited in this segment. Amtrak offers once-per-day service to the rest of the corridor from Clifton Forge. Within Segment C1, RADAR, a non-profit transit agency based in the Roanoke Valley, operates the Mountain Express, providing a transit connection between Covington and Clifton Forge.

Park-and-Ride

Within Segment C1, commuters can utilize one Park-and-Ride location in Rockbridge County. This location, northwest of Lexington, has only 12 spaces and a 25 percent utilization rate, which is far below the statewide average of 76 percent for Park-and-Ride utilization.

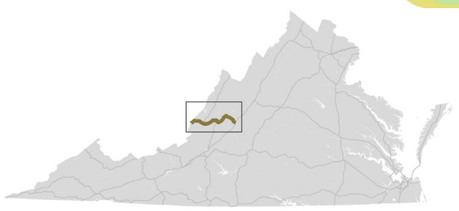
Comparable Travel Options

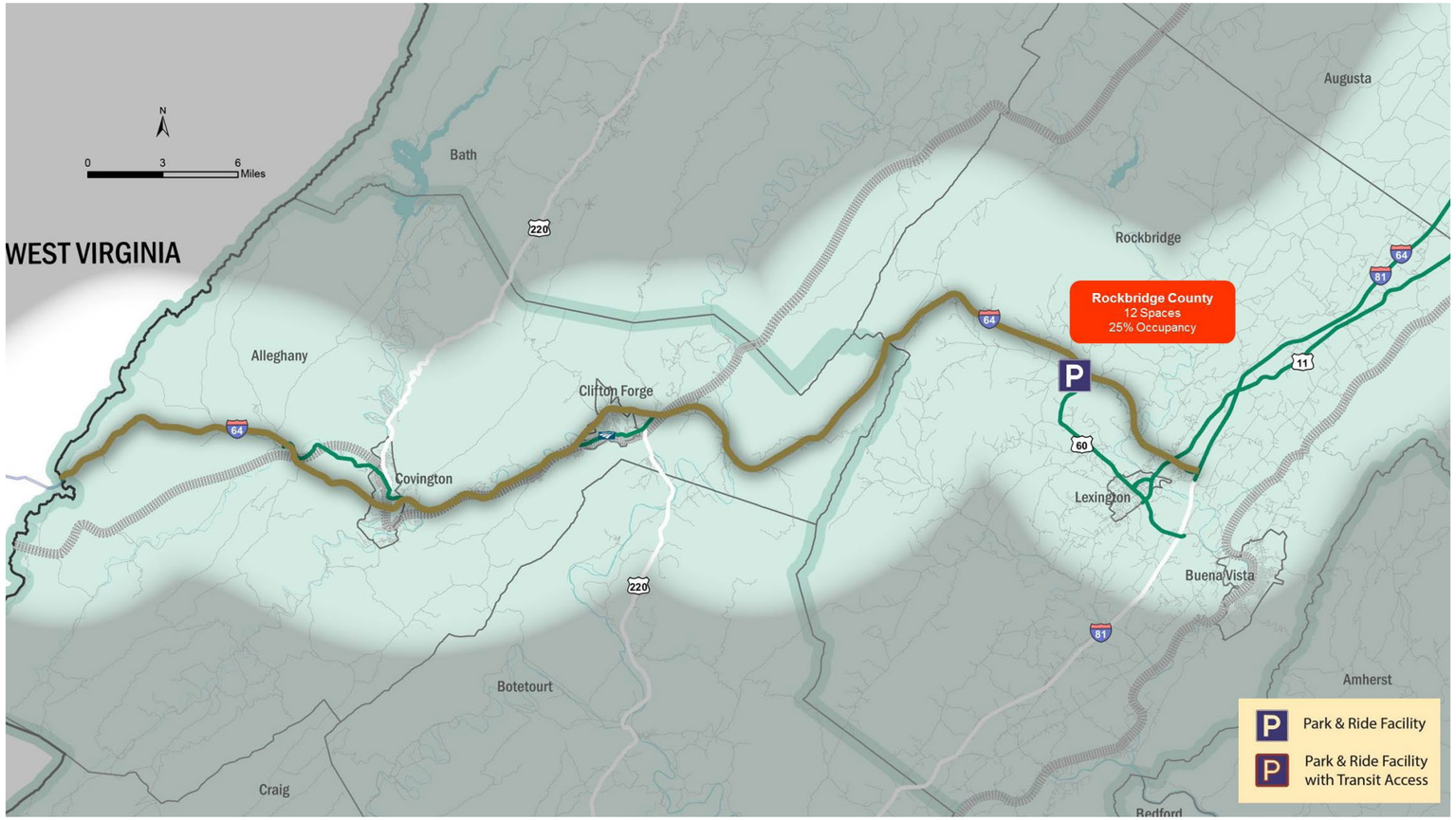
Staunton to Clifton Forge / Covington

Inter-City Bus	*Train*
0 Trips per Day	1 Trips per Day
0:00 Travel Time	1:19 Travel Time
$0 Est. Cost	$18 Est. Cost

Auto

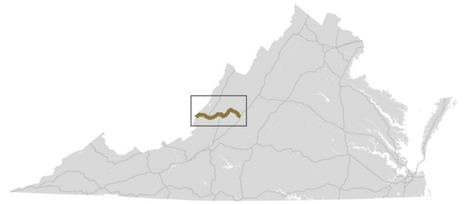
Via I-64: 1:00 Travel Time $36 Est. Cost
Via Rt. 11 / I-64: 1:10 Travel Time $36 Est. Cost





Safety

Between 2010 and 2012, only 12 severe crashes occurred on Segment C1; this is one of the lowest totals in the Commonwealth. Only one area along Segment C1 experienced a clustering of severe crashes. On US 60 (East Madison Street) in Covington between South Carolton Drive and Miller Street, four collisions occurred.



Performance Metrics:

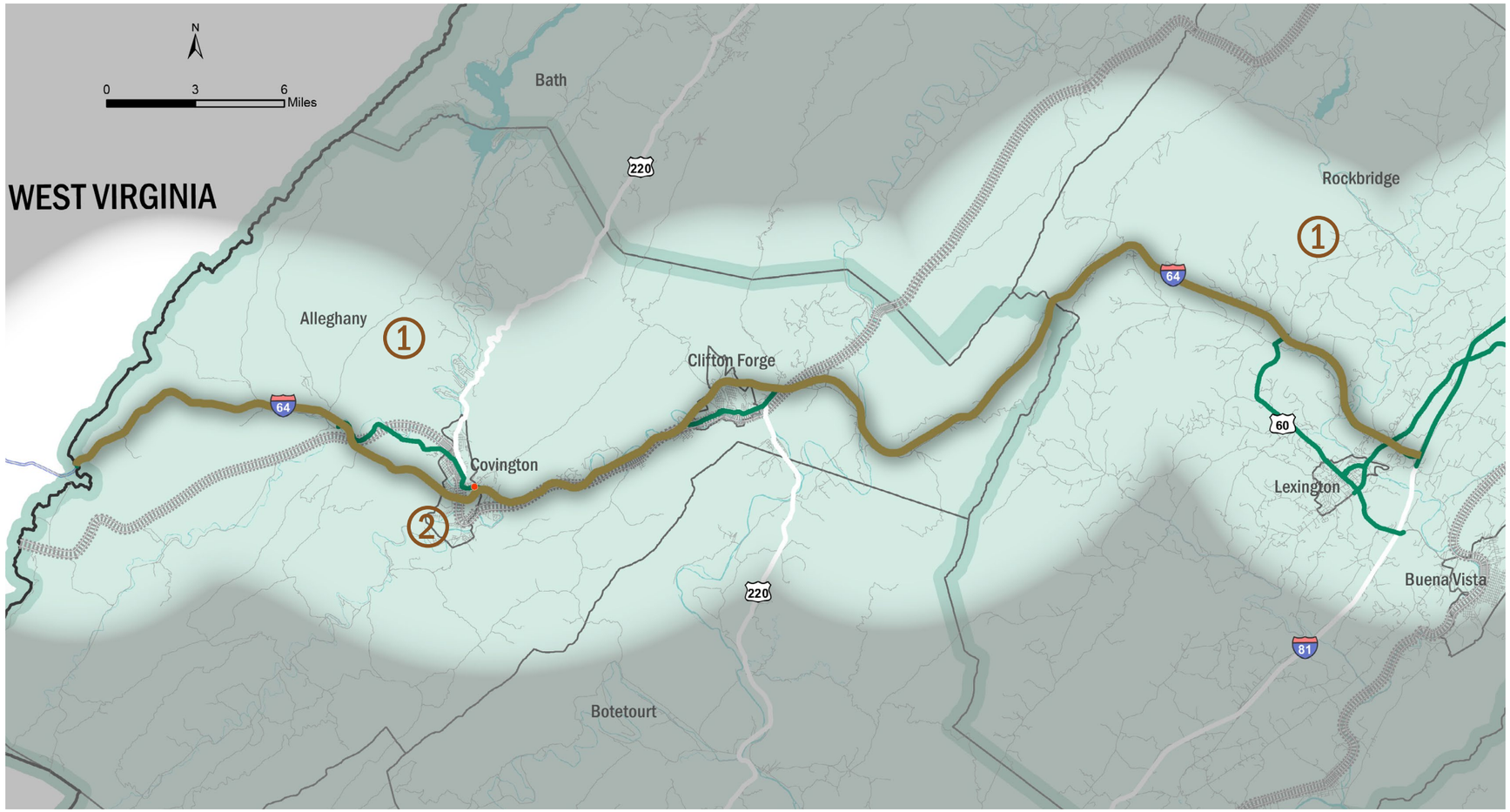
Number of Severe Crashes	4
Severe Crashes/Million VMT	0.0
Number of Railroad Crashes	5

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	2
Freight Ton Hours of Delay per Mile	4.6K

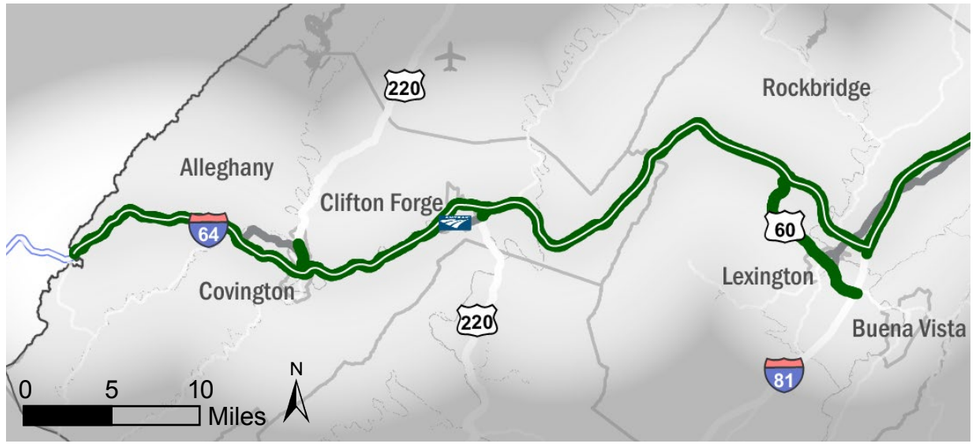
Passenger Delays

Segment C1 does not experience substantial passenger congestion - with only around 270 person-hours of delay along the entire segment, it represents one of the lowest totals for CoSS segments. As such, there are no locations along the segment where passenger delays exceed 100 person-hours per mile. While there are not many delays throughout the day, peak-period passenger delays do account for about 40 percent, which is average for the peak-period share of congestion on other CoSS segments.

Freight Delays

Similar to passenger traffic, significant freight traffic congestion does not occur along Segment C1, with only around 630,000 ton-hours of delay daily. As such, there are no locations of significant freight delay exceeding 250,000 ton-hours per mile along Segment C1. Peak-period freight delays account for little more than one-third of the daily congestion.

Daily Person Hours of Delay per Mile

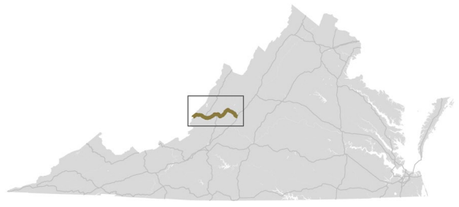


< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



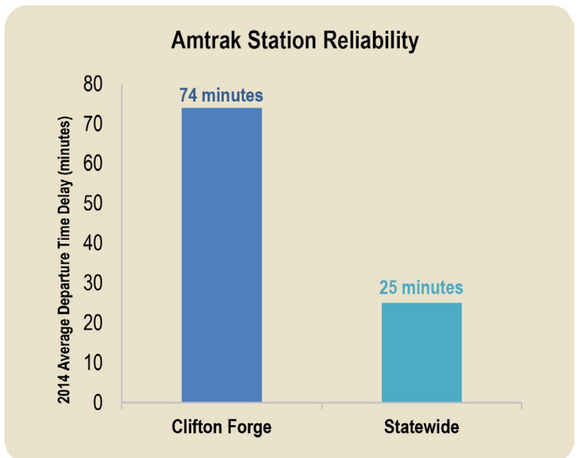
Reliability

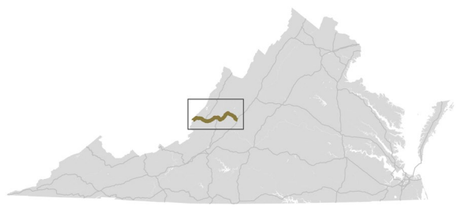
Reliability Index

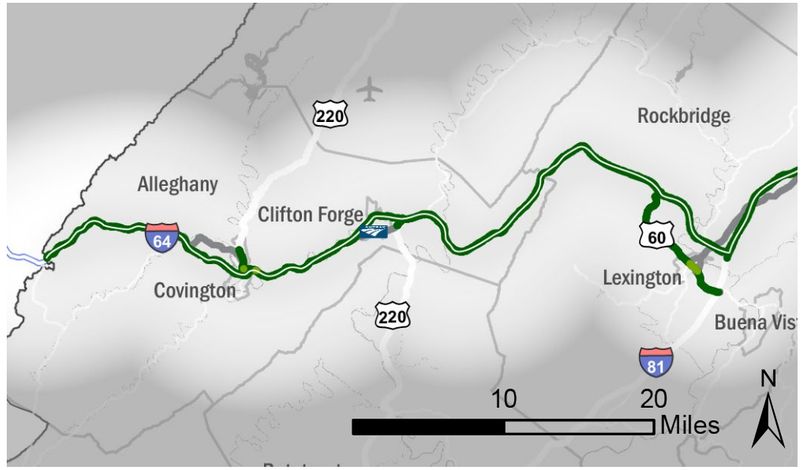
- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

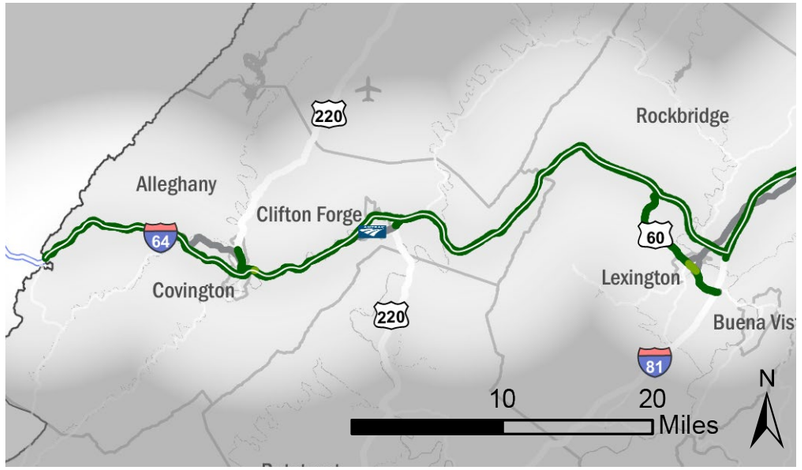






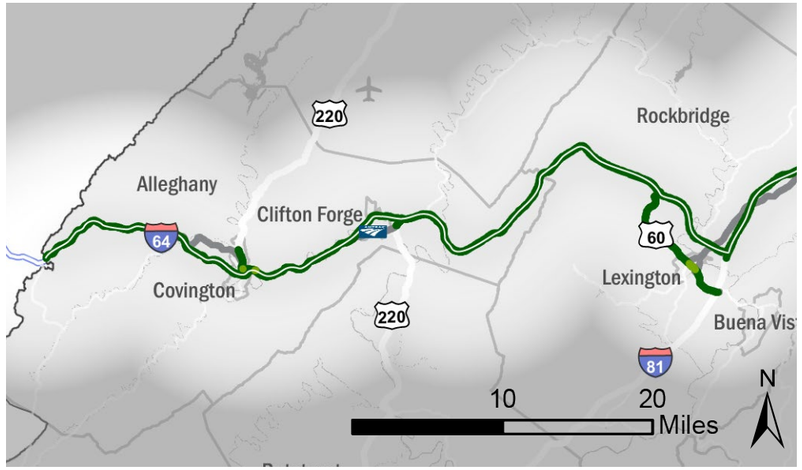
Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment C1 ranges from 0.01 to 0.40 in terms of reliability index, with an average value of 0.06. This segment has a weekday peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment C1 have reliability index values exceeding the statewide threshold.



Weekday

Reliability of travel during a typical weekday ranges from 0.02 to 0.26 in terms of reliability index, with an average value of 0.06. This segment has a weekday reliability index lower than average for the CoSS segments statewide, and none of the locations along Segment C1 have reliability index values exceeding the statewide threshold.



Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.25 in terms of reliability index, with an average value of 0.04. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment C1 have reliability index values exceeding the statewide threshold.

Summary of Needs

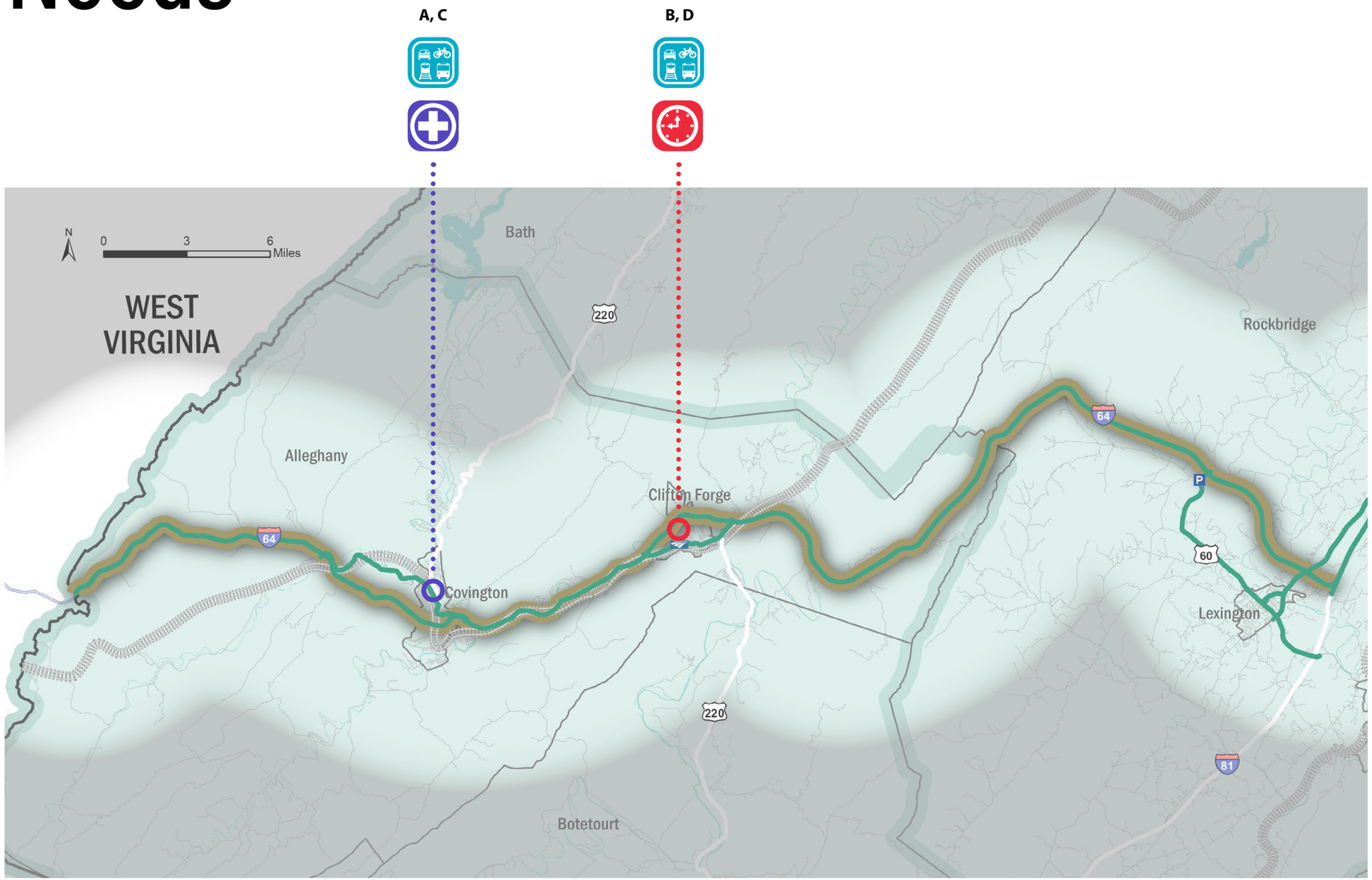
Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

Safety

Congestion

Reliability



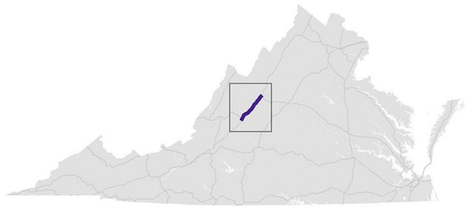
C1 SEGMENT NEEDS

Summary of Needs - C1 Segment

A.		**US 60 in Covington: four severe crashes**
B.		**Unreliable Amtrak service from Clifton Forge station. Average departure delay is 74 minutes (highest in the State) totaling almost 1,500 person-hours of delay from this segment.**
C.		**No passenger rail service from Covington to other cities in the corridor, bus service between cities in corridor is limited to Clifton Forge**
D.		**Passenger rail service from Clifton Forge is limited to once per day, bus service between cities in corridor is limited to Clifton Forge**

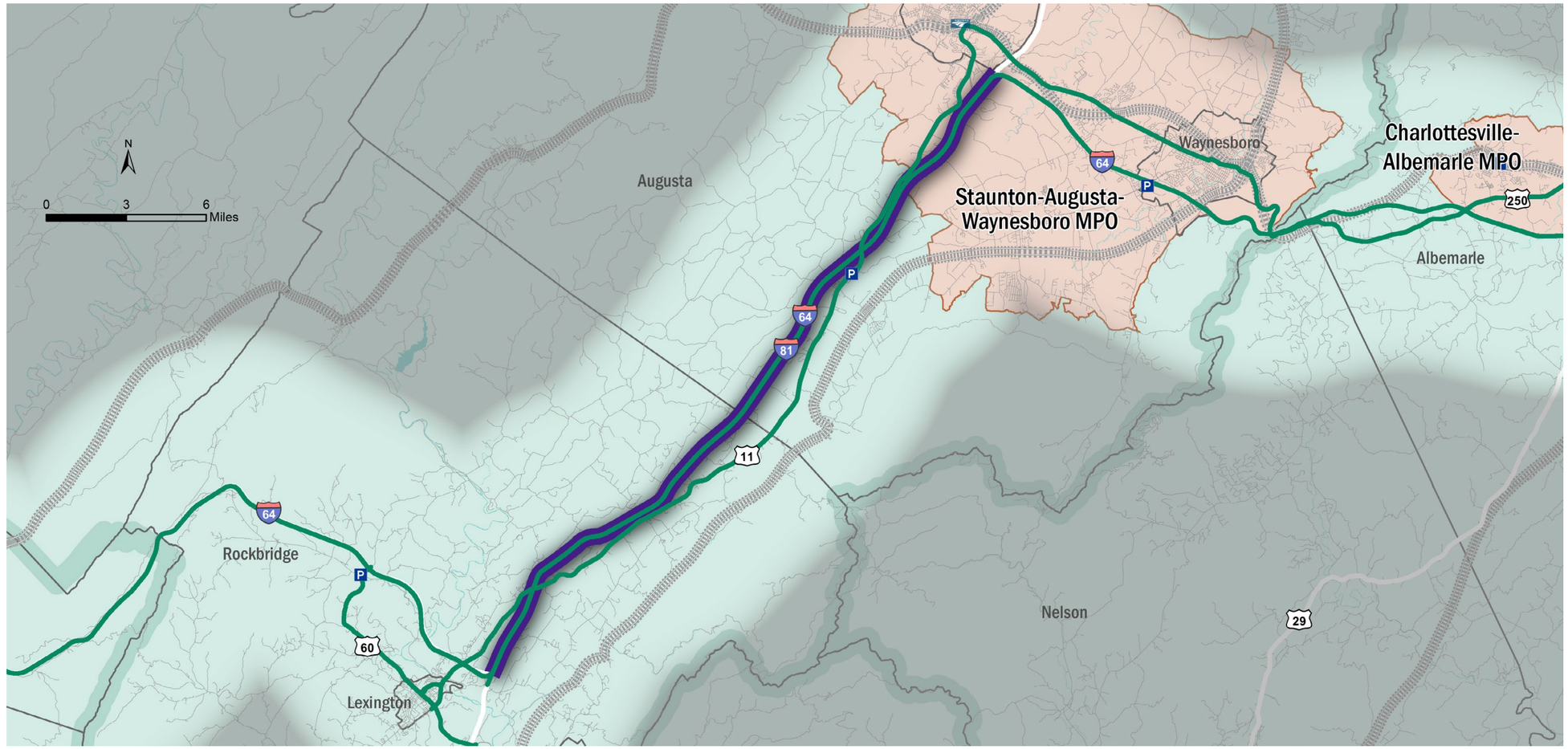
III. Segment C2

- C2
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility



Corridor Segment C2 Components

- I-64
- US 11
- Amtrak
- Norfolk Southern Crescent Corridor



C2 SEGMENT PROFILE

Segment C2 begins at the junction of I-64 and I-81 and north of Lexington and progresses north to the junction of I-64 and I-81 near Staunton. This segment serves Rockbridge and Augusta Counties and serves a portion of the Staunton-Augusta-Waynesboro Area. I-64 runs concurrently with I-81 through the entire segment (as Segment B4). The segment also includes US 11. Segment C2 acts as a major corridor for through freight travel in Virginia and also connects smaller urban areas, such as Lexington and Staunton, as well as multiple natural, historical, and cultural resources.

Highway Facilities: I-64 is primarily a rural highway with four lanes in Segment B4. US 11 runs parallel to I-64 throughout the segment.

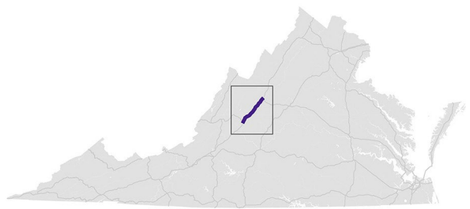
Transit Services: There is no line-haul transit service within Segment B4. There is one Park-and-Ride facility near I-64 in Greenville.

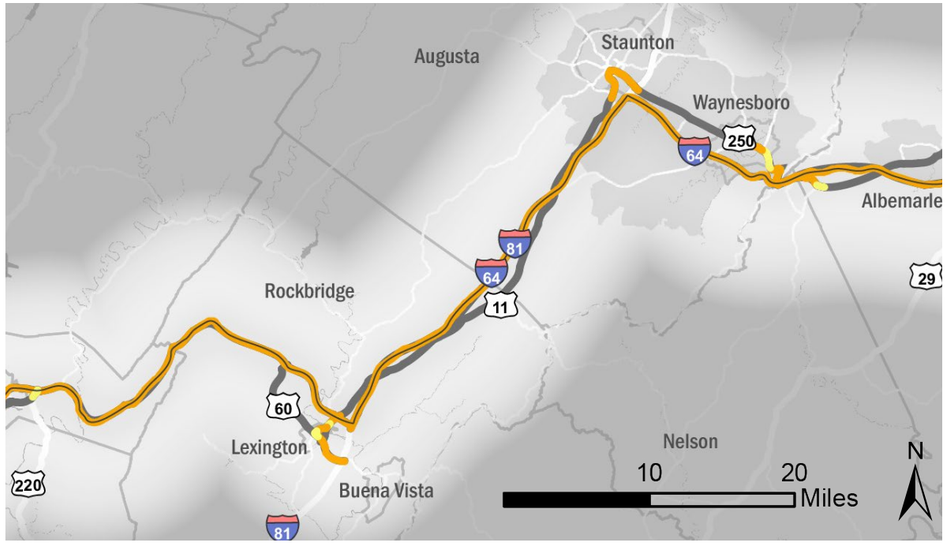
Rail Facilities: Norfolk Southern's Crescent Corridor rail lines pass through Segment C2 connecting locations south and west of the Virginia Inland Port, near Corridor B south of Winchester.

Port Facilities: No port facilities are located directly adjacent to Segment C2, but the Crescent Corridor does provide direct access to the Virginia Inland Port south of Winchester.

Airport Facilities: There are no commercial airports in this segment.

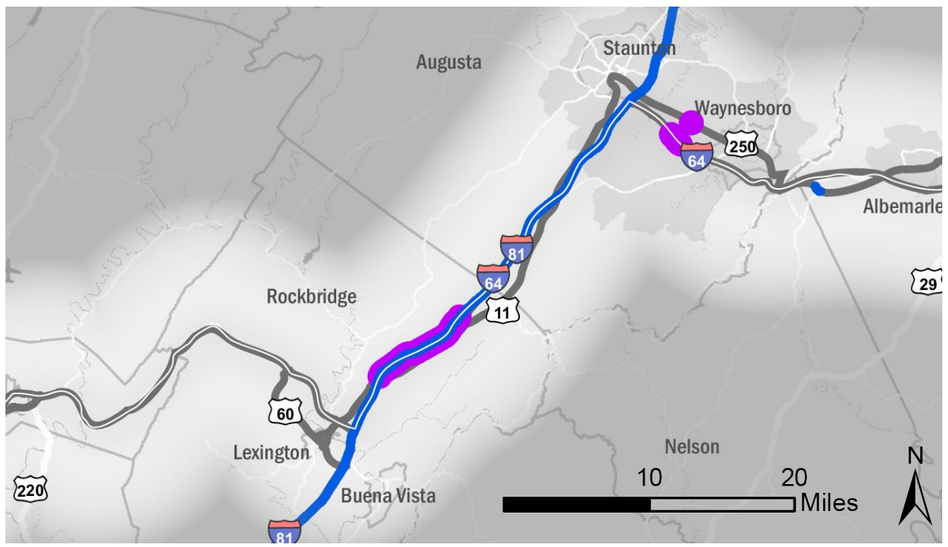
Major planned and future projects include: There are no major planned projects to improve safety or reliability in this segment at this time.





Number of Lanes (both directions)

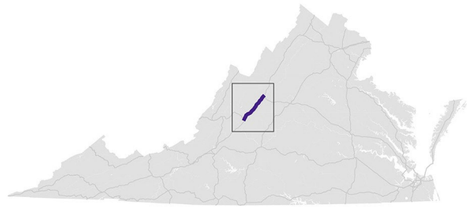
- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

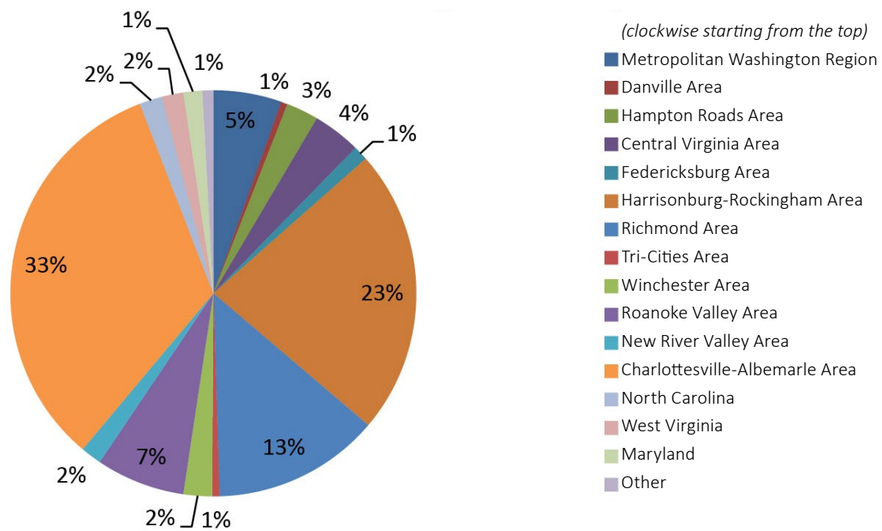
Travel Demand



Passenger Demand

Segment C2 is concurrent with Segment B4 and connects the two discrete sections of I-64 between Lexington and Staunton. Intercity travel from the Staunton-Augusta-Waynesboro Area is distributed to a large number of regions in the state, mostly regions to the north and east that do not require use of Segment C2. Of the intercity passenger traffic originating in Staunton, approximately seven percent is destined for the Roanoke Valley Area and an additional two percent is destined for the New River Valley Area.

Travel from Staunton-Augusta-Waynesboro Area to...



C2 SEGMENT PROFILE

Freight Demand

By truck, Segment C2 carried 83 million tons of freight worth $167 billion in 2012, and is estimated to carry 113 million tons of freight worth $270 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value passes through Virginia. Between three and four percent of the total truck freight tonnage travels along Corridor C between Pennsylvania and North Carolina, almost entirely on Segment C2, which runs concurrently with I-81 (Segment B4). The jurisdictions adjacent to Segment C2 are not significant generators or attractors of truck freight on Corridor C.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (36% / 37%)
2. North Carolina (15% / 13%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (6% / 6%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment C2: 1% / 1%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (40% / 41%)
2. North Carolina (10% / 10%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (7% / 7%)
5. New York (7% / 6%)

Corridor Tonnage Destined for Segment C2: 1% / 1%

By rail, Segment C2 carried six million tons of freight worth $7 billion in 2012, and is estimated to carry seven million tons of freight worth $10 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travel eastbound from West Virginia and Kentucky to the marine terminal located at Newport News. Less than one percent of the total rail freight tonnage on Corridor C originates in the counties adjacent to Segment C2. However, Augusta County accounts for around three percent of the total value of rail freight arriving in the corridor, with major freight movements originating in Missouri, Maryland, and Illinois.

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (74% / 71%)
2. Virginia (9% / 11%)
3. Kentucky (8% / 8%)
4. Dickenson County (3% / 3%)
5. Hanover County (2% / 3%)

Corridor Tonnage Originating in Segment C2: 0% / <1%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Norfolk* and West Virginia
City of Newport News* and Kentucky
Dickenson County and City of Newport News*
Hanover County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (96% / 95%)
2. City of Newport News* (73% / 71%)
3. City of Norfolk* (11% / 10%)
4. City of Covington (2% / 2%)
5. Rockingham County (1% / 2%)

Corridor Tonnage Destined for Segment C2: <1% / <1%



Traffic Conditions

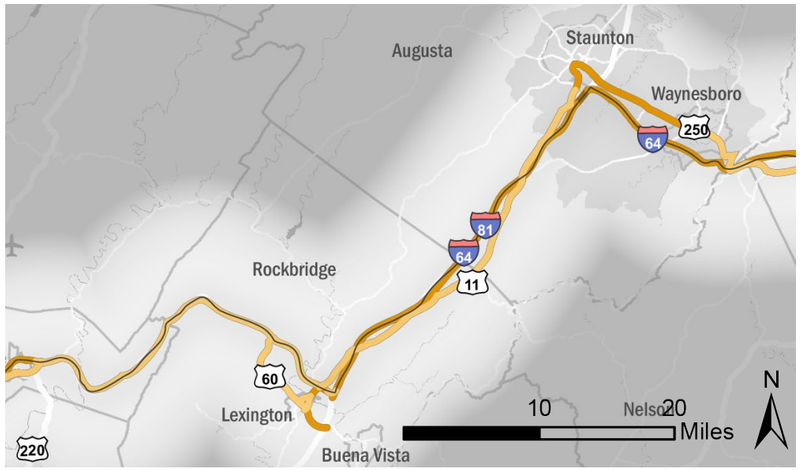
Traffic Volume and AADT

Traffic volume on Segment C2 is high compared with other segments in the western half of Corridor C and low compared to segments in the eastern half of Corridor C. On I-64, average daily traffic volumes range from 43,000 to 47,000 vehicles throughout the segment, except directly south of the split with I-64 in Staunton where volumes reach 60,000 vehicles per day. By 2025, average daily traffic volumes on I-64 are projected to increase by about 7,000 vehicles to a range of 50,000 to 55,000 vehicles per day. Traffic volumes on US 11 are much lower, and range between 3,500 and 7,500 vehicles per day. Only minimal traffic growth is projected for US 11 by 2025.



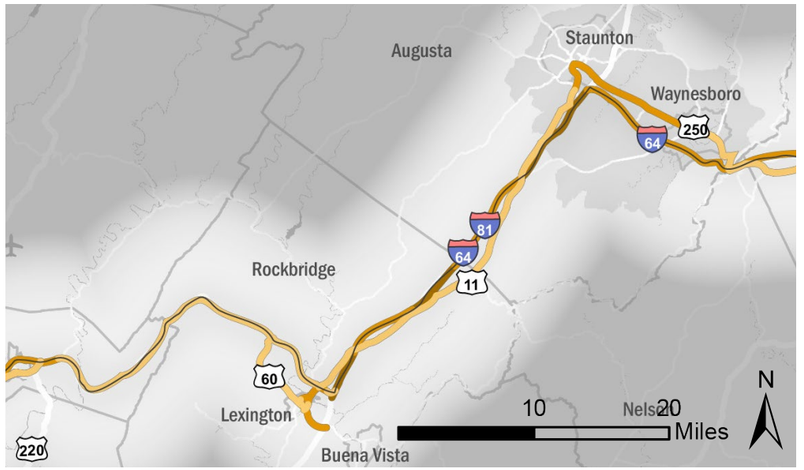
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



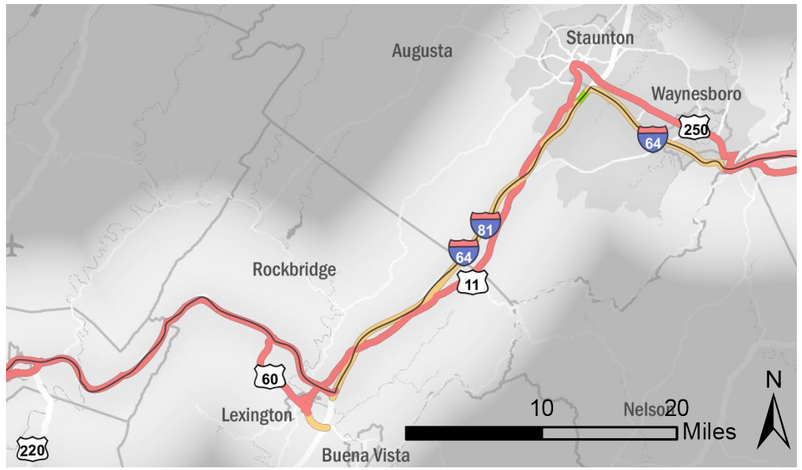
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



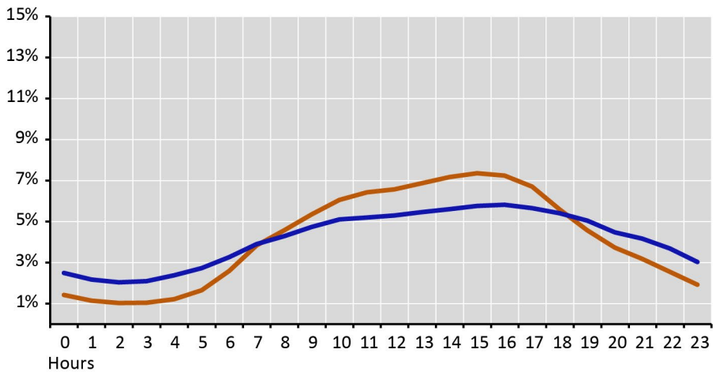
C2 SEGMENT PROFILE

Traffic Distribution

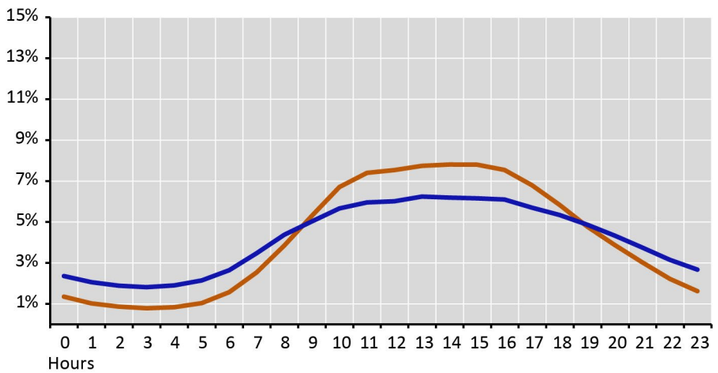
On average, traffic on Segment C2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a steady increase in the flow from 7 a.m. to 3 p.m., which is quite different from the typical commute patterns. The highest hourly traffic occurs between 3 and 4 p.m., which accounts for 7.4 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 74 percent of total daily traffic. Peaking patterns for truck traffic show a relatively steady flow of trucks during the midday period between 10 a.m. and 7 p.m., with a peak hourly flow of 5.8 percent of daily traffic. Weekend traffic shows a single peak during the midday period, and the highest percentage of hourly traffic occurring between 2 and 3 p.m. (7.8 percent of daily traffic) for all traffic, and 1 to 2 p.m. (6.2 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment C2 vary by as much as 54 percent throughout the year, with the highpoint in August (around 49,000 vehicles per day) and the low point in February (around 32,000 vehicles per day). Truck volumes vary less than passenger volumes, with the June high (around 14,000 vehicles per day) 21 percent higher than the January low (around 11,000 vehicles per day). Weekend traffic levels also vary over the course of the year and are significantly lower during January and February than during the rest of the year. The highest levels of weekend traffic (June, around 48,000 vehicles per day) are 86 percent higher than January levels (around 26,000 vehicles per day). Weekend truck traffic is more steady than all vehicle traffic, with the June high 33 percent higher than the July low. Truck volumes account for a significant portion of traffic on Segment C2 (30 percent of overall daily traffic for weekdays and 21 percent of overall daily traffic for weekends); as a result truck traffic has an impact on overall traffic conditions.

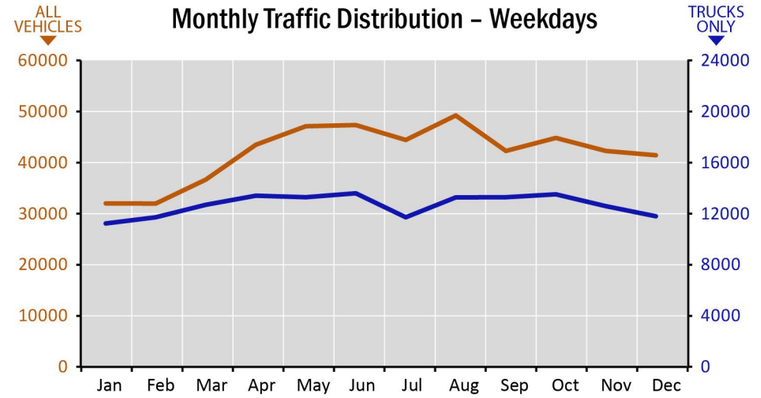
Hourly Traffic Distribution – Weekdays



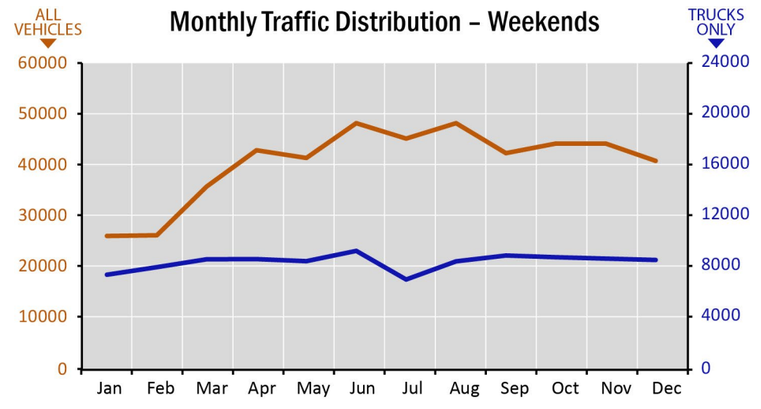
Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekdays



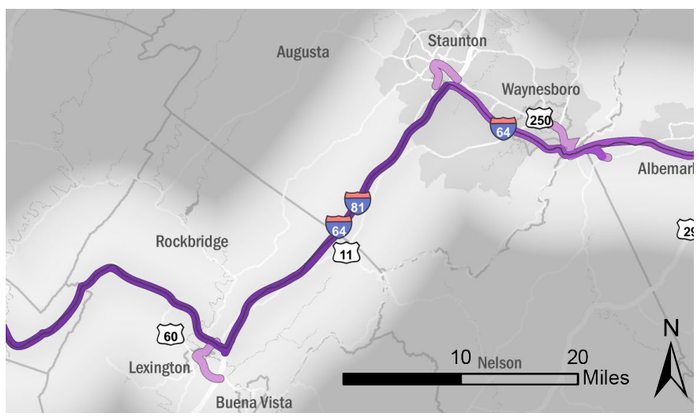
Monthly Traffic Distribution – Weekends



All Vehicles
Trucks

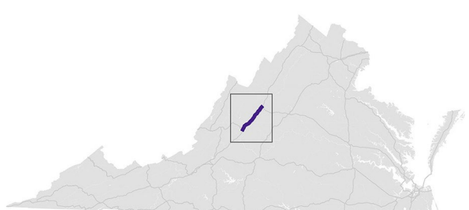
Truck Volumes

On Segment C2, 14 percent of the daily traffic consists of heavy trucks. This is high relative to most other segments in the Commonwealth.



Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

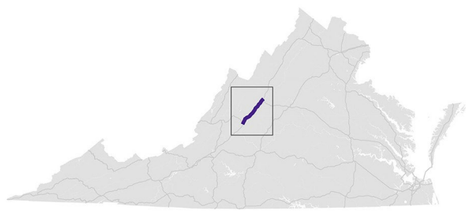


C2 SEGMENT PROFILE

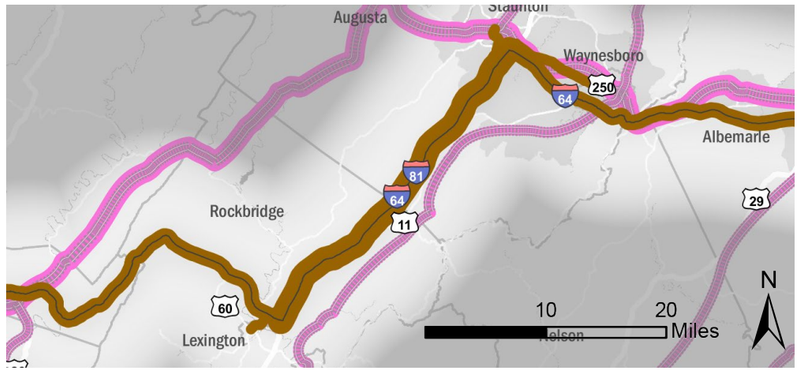
Freight Flows

At the southern end of Segment C2, north of Lexington, freight is moved primarily by truck, in terms of both tonnage and value. In total, 74 million tons (92 percent) of freight is moved through this section of Segment C2 by truck, compared to 6 million tons by rail. By value, trucks are favored even more, with $147 billion (95 percent) of freight traveling by truck, compared to $7.5 billion by rail. On average, a ton of freight traveling through this section of Segment C2 by truck is worth $1,991 while a ton of freight traveling by rail is worth $1,219. In 2025, both rail and truck freight tonnages and total values in the southern end of Segment C2 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,209 per ton on trucks and $1,393 on rail.

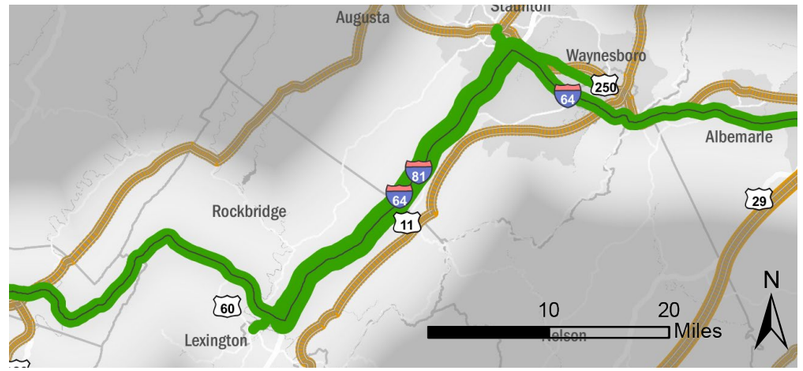
At the northern end of Segment C2, south of Staunton, freight is also moved primarily by truck, in terms of both tonnage and value. In total, 83 million tons (93 percent) of freight is moved through this section of Segment C2 by truck, compared to 6 million tons by rail. By value, trucks are favored even more, with $167 billion (96 percent) of freight value traveling by truck, compared to $7.5 billion by rail. On average, a ton of freight traveling through this section of Segment C2 by truck is worth $2,003 while a ton of freight traveling by rail is worth $1,217. In 2025, both rail and truck freight tonnages and total values in the northern end of Segment C2 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,382 per ton on trucks and $1,396 on rail.



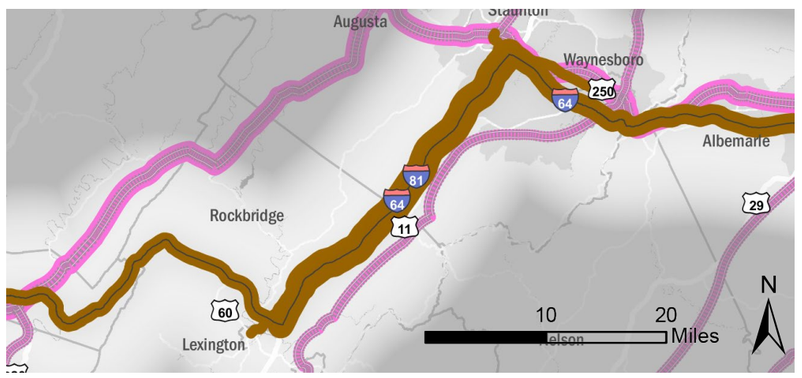
Annual Freight by Tonnage, 2012



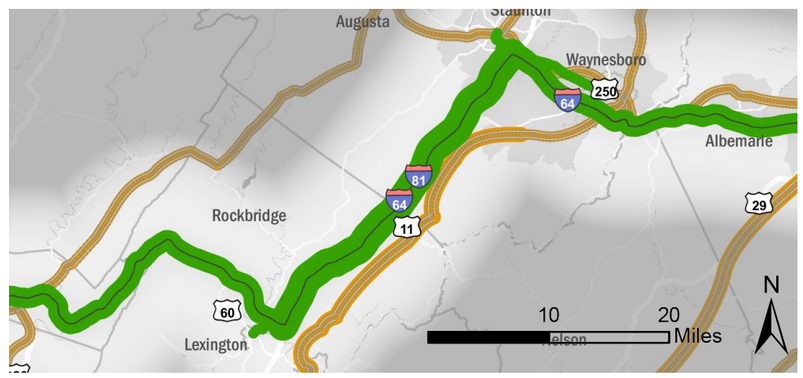
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

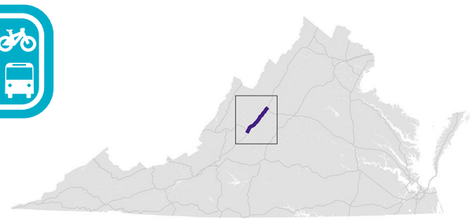
Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice



Passenger trips on Segment C2 of the East-West Corridor have few travel options, both in terms of travel path and mode choice. While US 11 does serve as a parallel facility, its use for long-range travel is limited by speed and capacity and its use as a parallel facility is primarily local access and for bypassing incidents causing congestion on sections of I-64/I-81. No alternate modes are available along Segment C2.

Park-and-Ride

Within Segment C2, commuters can utilize one Park-and-Ride location in Augusta County. This location, near Greenville, has only 11 spaces and a 27 percent utilization rate, which is far below the statewide average of 76 percent for Park-and-Ride utilization.

Comparable Travel Options

Staunton to Lexington

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

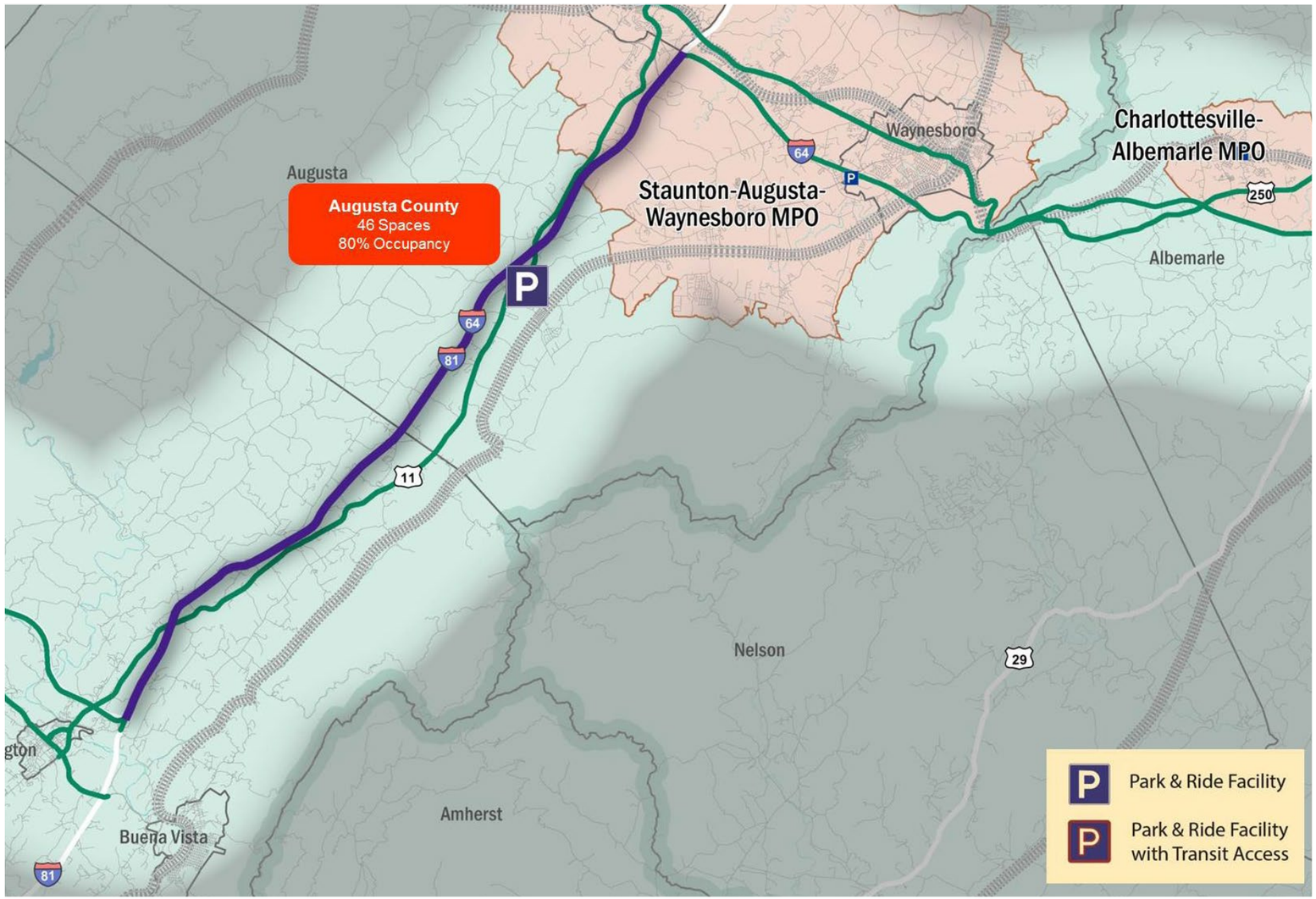
Via I-64: 0:40 Travel Time $22 Est. Cost
Via Rt. 11: 0:55 Travel Time $20 Est. Cost

Staunton to Clifton Forge / Covington

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	1 Trips per Day 1:19 Travel Time $18 Est. Cost

Auto

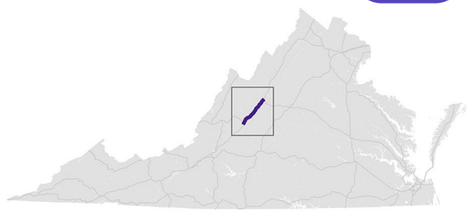
Via I-64: 1:00 Travel Time $36 Est. Cost
Via Rt. 11 / I-64: 1:10 Travel Time $36 Est. Cost



C2 SEGMENT NEEDS

Safety

Between 2010 and 2012, 24 severe crashes occurred on Segment C2, in three different geographic areas. On US 11 (North Lee Highway) in East Lexington, there were four collisions between Greenhouse Road and Hunter Hill Road. On US 11, between Fairfield and Vesuvius, four incidents occurred over a 1.4 mile stretch approximately 2.6 miles south of Route 56 (Raphine Road). In Staunton, along US 11, there were 16 collisions that took place within approximately one mile between W. Village Drive and Mary Gray Lane (as also noted for Segment B5).



Performance Metrics:

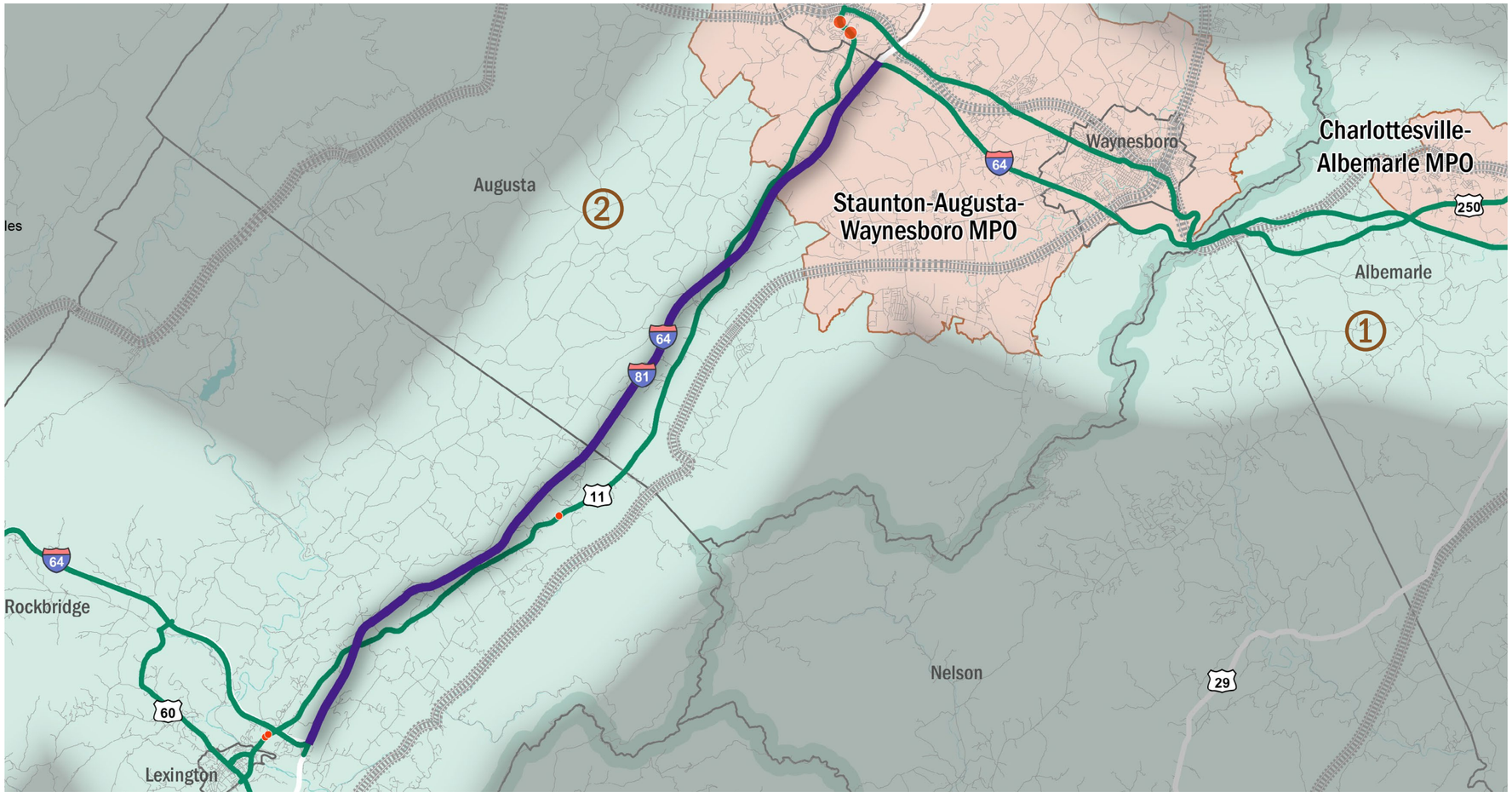
Number of Severe Crashes	24
Severe Crashes/Million VMT	0.5
Number of Railroad Crashes	3

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

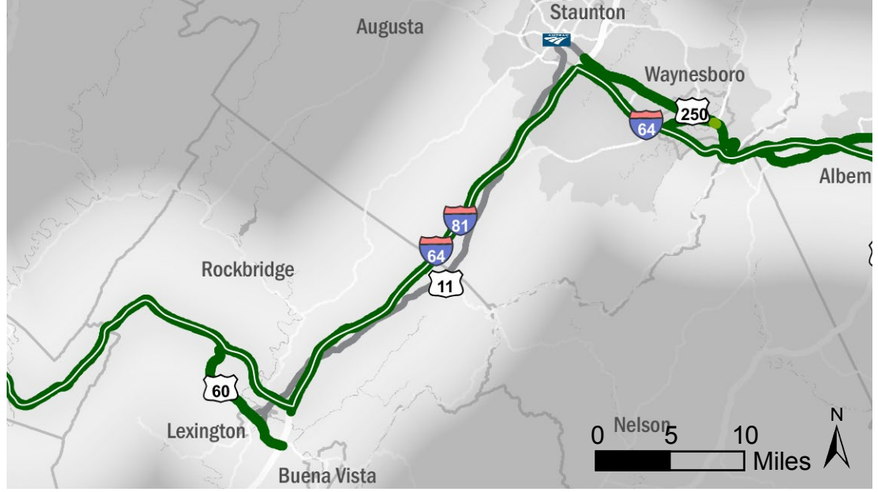
Performance Metrics:

Person Hours of Delay per Mile	0
Freight Ton Hours of Delay per Mile	7

Passenger Delays

Segment C2 experiences almost no passenger delays. Overlapping with Segment B4, this segment has the lowest passenger congestion among all CoSS segments, with no locations along the segment where passenger delays exceed 100 person-hours per mile.

Daily Person Hours of Delay per Mile



- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

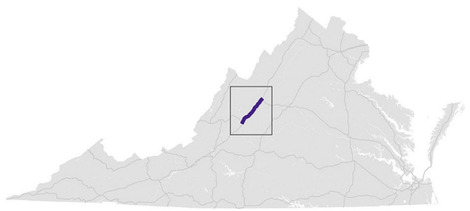
Freight Delays

As with passenger congestion, Segment C2 experiences the lowest freight delays among CoSS segments, with only 400 ton-hours of delay daily. As such, there are no locations along Segment C2 where the freight delays exceed 250,000 ton-hours per mile.

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000



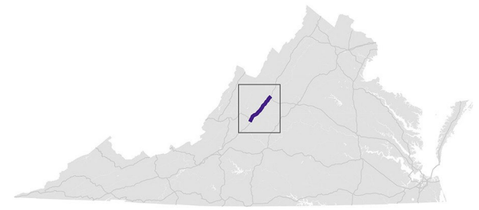
Reliability

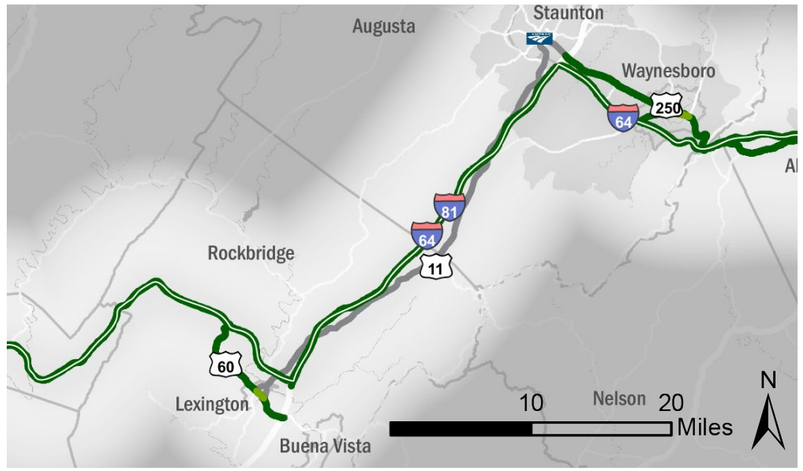
Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

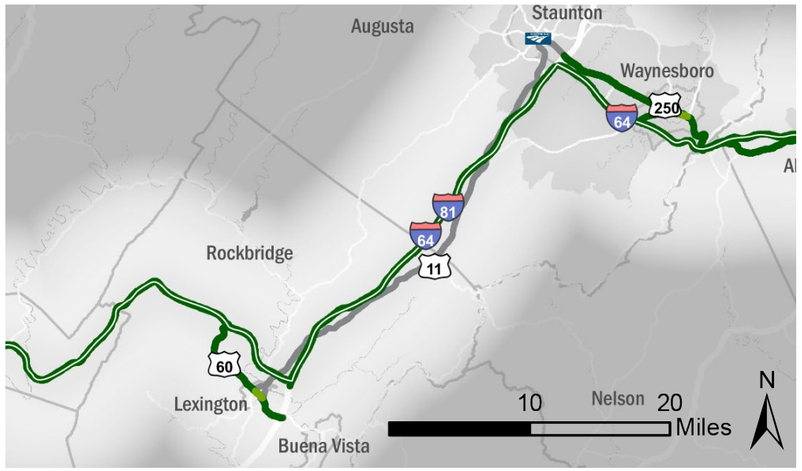
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60





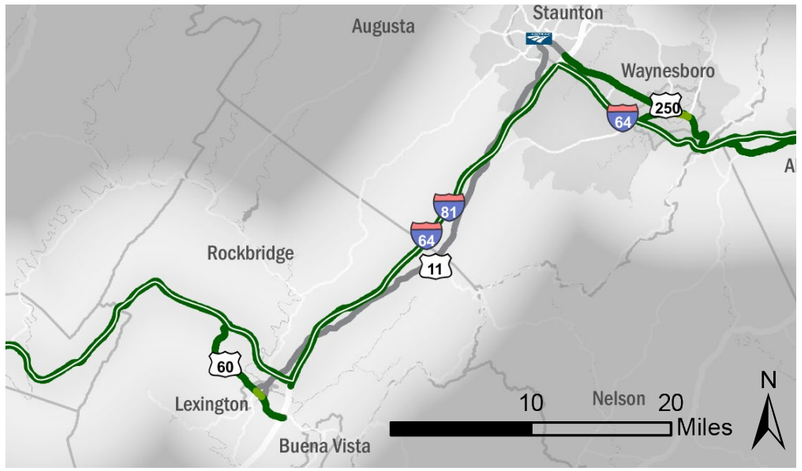
Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment C2 ranges from 0.01 to 0.04 in terms of reliability index, with an average value of 0.02. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment C2 have reliability index values exceeding the statewide threshold.



Weekday

Reliability of travel during a typical weekday ranges from 0.02 to 0.04 in terms of reliability index, with an average value of 0.03. This segment has a weekday reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment C2 have reliability index values exceeding the statewide threshold.



Weekend

Reliability of travel during a typical weekend ranges from 0.01 to 0.04 in terms of reliability index, with an average value of 0.03. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment C2 have reliability index values exceeding the statewide threshold.

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

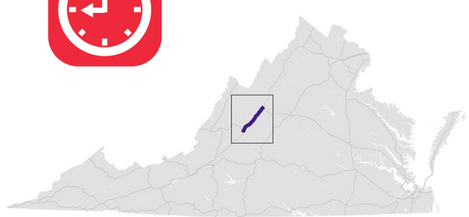
Redundancy

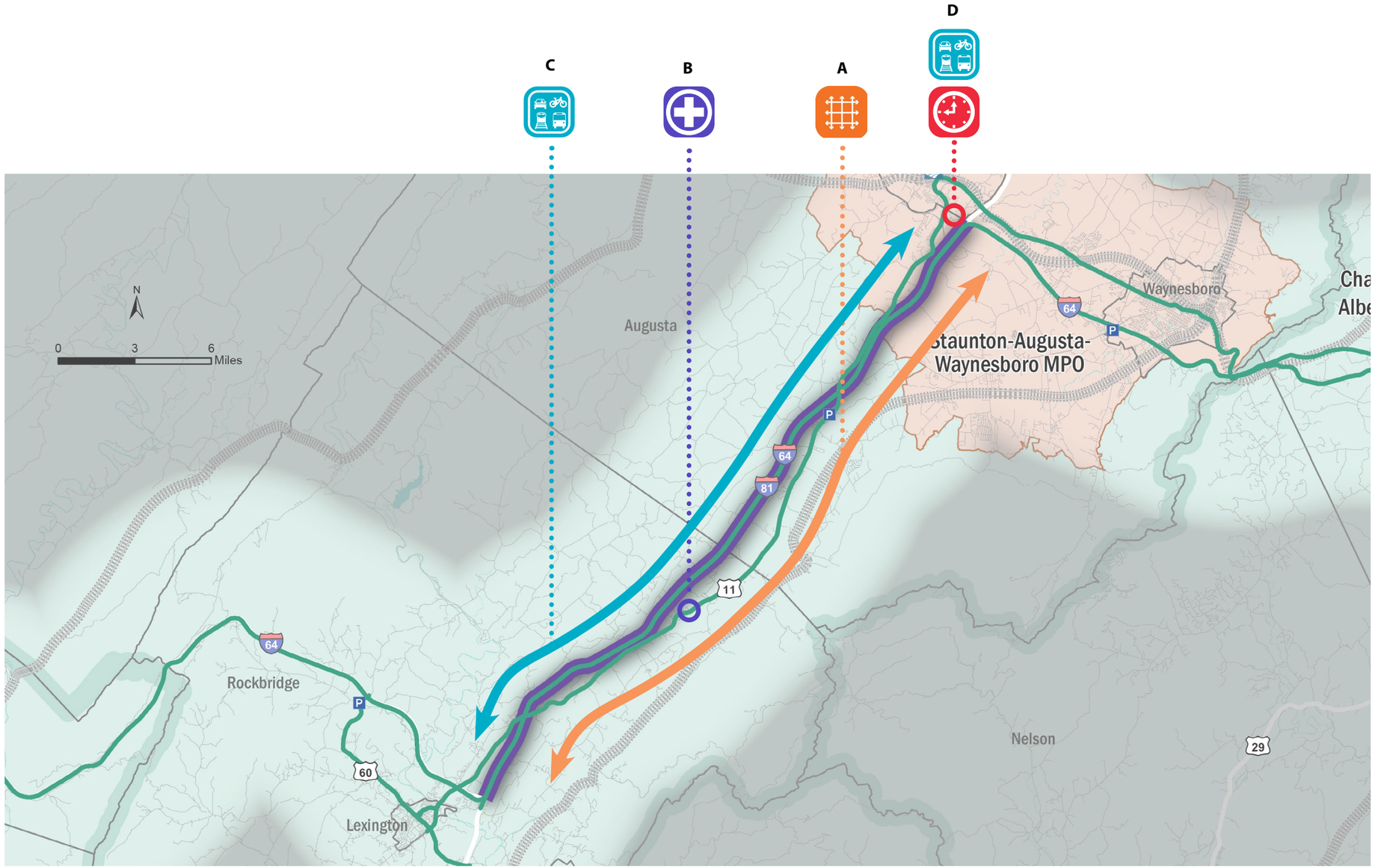
Mode Choice

Safety

Congestion

Reliability

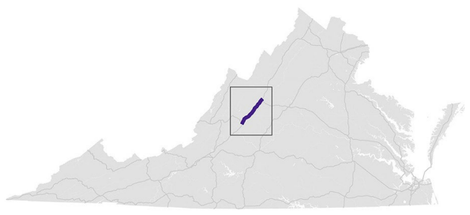




C2 SEGMENT NEEDS

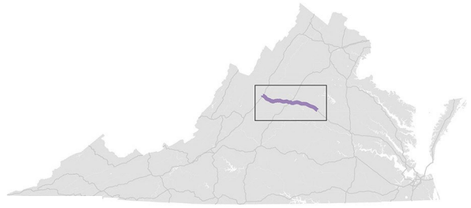
Summary of Needs - C2 Segment

A.		Redundancy issues along Corridor C: US 11 not able to handle overflow when incident occurs on I-81 resulting in signifcant delays
B.		US 11 south of Raphine Rd in Rockbridge County: 4 severe crashes
C.		No bus service is available in the segment
D.		Unreliable Amtrak service from Staunton station. Average departure delay is 73 minutes totaling over 4,100 person-hours of delay from this segment.



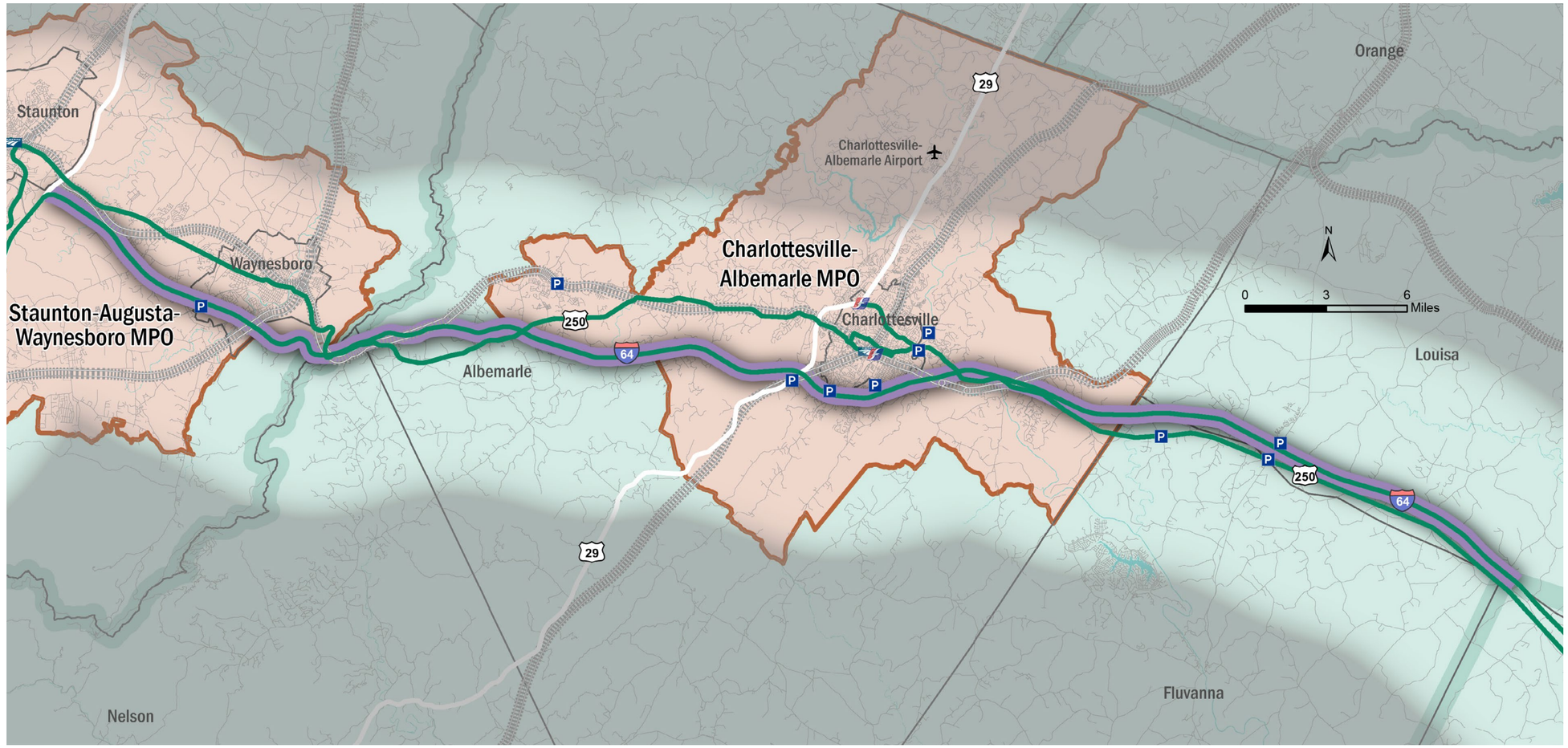
IV. Segment C3

- C3
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility

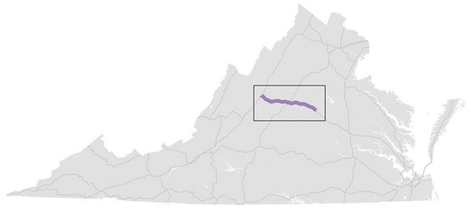


Corridor Segment C3 Components

- I-64
- US 250
- Charlottesville-Albemarle Airport
- Amtrak
- CSX Coal Corridor



C3 SEGMENT PROFILE



Segment C3 begins at I-81 near Staunton and progresses east to the boundary of the Richmond Regional Planning District. This segment serves Augusta, Albemarle, Fluvanna, and Louisa Counties, as well as the Cities of Waynesboro and Charlottesville. The segment travels through the Charlottesville-Albemarle Area. The segment also includes portions of US 250. Segment C3 acts as a major corridor for through freight travel in Virginia. Within urbanized areas the segment serves as a commuter route, connecting Staunton, Waynesboro, and Charlottesville, in addition to surrounding rural communities. Segment C3 also provides a connection to the University of Virginia, as well as multiple natural, historical, and cultural resources in the region.

Highway Facilities: I-64 is primarily a rural highway with four lanes in Segment C3. US 250 is a two- to four-lane roadway that runs parallel to I-64 throughout the segment.

Transit Services: In Segment C3, Amtrak and Greyhound both have stations in Charlottesville. Amtrak provides service within the corridor from Charlottesville along its Cardinal Route, as well as north-south along its Crescent Route. There are several Park-and-Ride facilities near I-64, with the largest number clustered in and around Charlottesville.

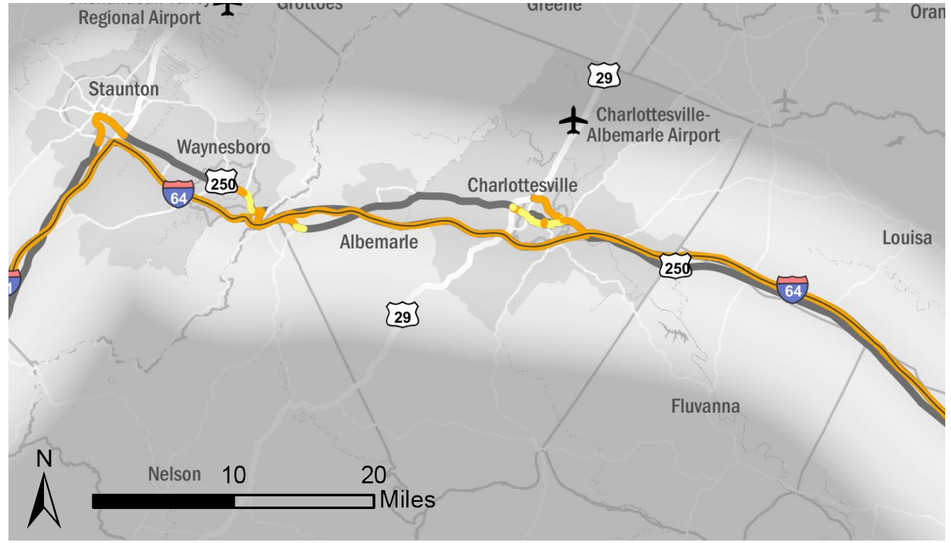
Rail Facilities: CSX's Coal Corridor rail lines pass through Segment C3 connecting locations west to the Port of Virginia facilities in the Hampton Roads Area. Norfolk Southern's Crescent Corridor also intersects the segment providing connections to the north and south.

Port Facilities: Although there are no port facilities located directly adjacent to Segment C3, CSX's Coal Corridor does provide connections to multiple Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: Charlottesville-Albemarle Airport is the only commercial airport in this segment.

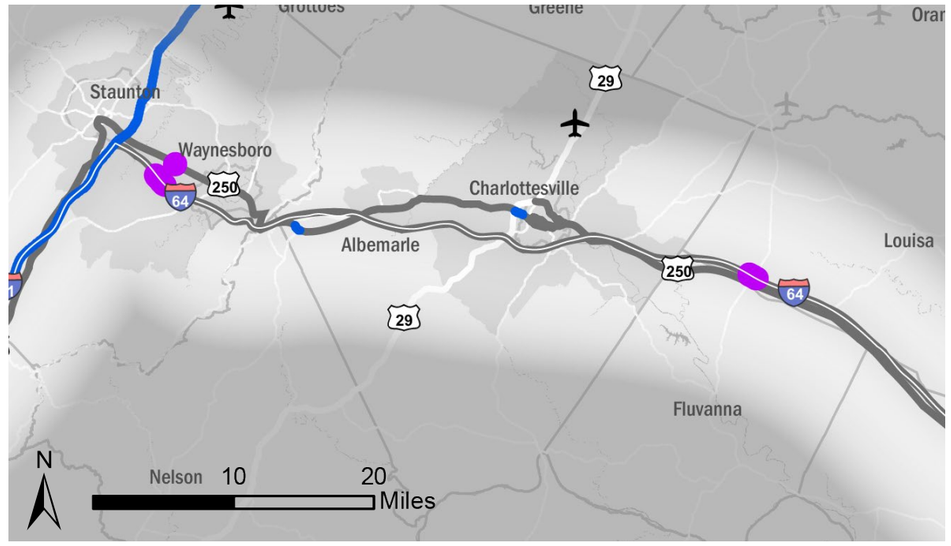
Major planned and future projects include:

- Widening the bridge portion of I-64 from 0.465 to 0.494 miles west of Route 285 in Augusta County.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

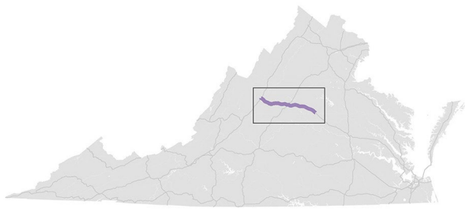
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

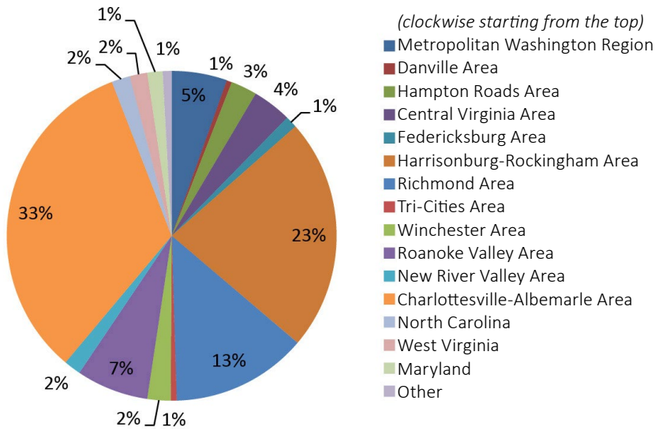
Passenger Demand

Segment C3 connects the Staunton-Augusta-Waynesboro Area in the west to the Richmond Area in the east, via the Charlottesville-Albemarle Area. Travel between these three Areas accounts for approximately 4.2 percent of intercity passenger travel within the Commonwealth, with notable levels of daily travel between Staunton and Charlottesville.

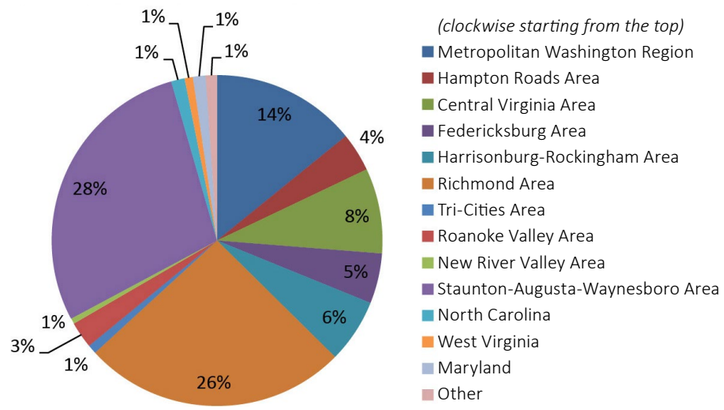
Intercity travel from the Staunton-Augusta-Waynesboro Area is distributed to a large number of regions in the state, many of which are likely to use Segment C3 including one third of intercity passenger trips destined for Charlottesville, 13 percent of trips destined for Richmond, and three percent of trips destined for the Hampton Roads Area. Intercity passenger travel from the Charlottesville-Albermarle Area is also dominated by trips using Segment C3 including 28 percent destined for the Staunton-Augusta-Waynesboro Area and 26 percent destined for the Richmond Area. Travel from the Richmond Area is more distributed along other segments, and the largest market using Segment C3 is intercity passenger travel destined for Charlottesville (five percent).



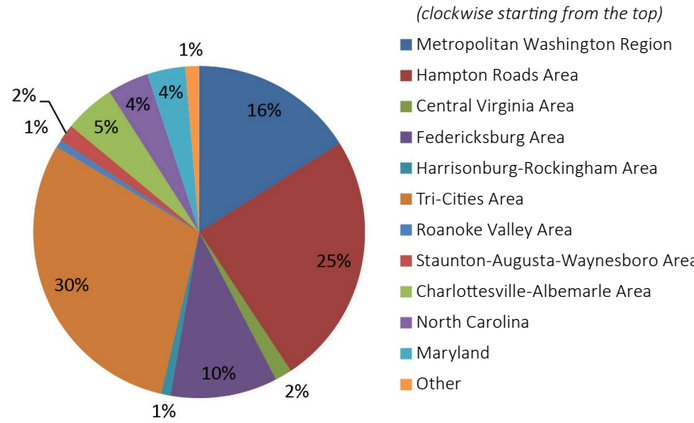
Travel from Staunton-Augusta-Waynesboro Area to...



Travel from Charlottesville-Albamarle to...



Travel from Richmond Area to...



C3 SEGMENT PROFILE

Freight Demand

By truck, Segment C3 carried 21 million tons of freight worth $37 billion in 2012, and is estimated to carry 29 million tons of freight worth $76 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value, passes through Virginia. Besides this through traffic, a significant portion of the truck freight on Corridor C originates from (around 13 percent) or is destined for (between 13 and 18 percent) Norfolk and Portsmouth and their port facilities. Another major truck freight movement on Corridor C is between Nevada and the maritime terminals in the Hampton Roads Area, which accounts for 4,000 tons of freight worth $5 billion in 2012 and is expected to increase significantly in value to $28 billion in 2025, corresponding with only a modest gain in the freight tonnage to 4,300 tons. The jurisdictions adjacent to Segment C3 are not major producers or attractors of truck freight traffic on this corridor. There is a significant volume of truck freight traveling from North Carolina to the City of Waynesboro, located near Segment C3. The tonnage for this origin-destination pair is estimated to significantly increase from 2012 (32,000 tons) to 2025 (1.8 million tons).

By rail, Segment C3 carried 32 million tons of freight worth $3 billion in 2012, and is estimated to carry 33 million tons of freight worth $3 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travels eastbound from West Virginia and Kentucky to the marine terminal located at Newport News. The counties adjacent to Segment C3 do not produce a significant amount of rail freight, accounting for less than one percent of the Corridor C rail freight tonnage and value. However, the City of Harrisonburg is a minor attractor of rail freight near the corridor, accounting for three percent of rail freight value, most of which arrives from the Midwest.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (36% / 37%)
2. North Carolina (15% / 13%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (6% / 6%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment C3: 3% / 3%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (40% / 41%)
2. North Carolina (10% / 10%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (7% / 7%)
5. New York (7% / 6%)

Corridor Tonnage Destined for Segment C3: 2% / 2%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (74% / 71%)
2. Virginia (9% / 11%)
3. Kentucky (8% / 8%)
4. Dickenson County (3% / 3%)
5. Hanover County (2% / 3%)

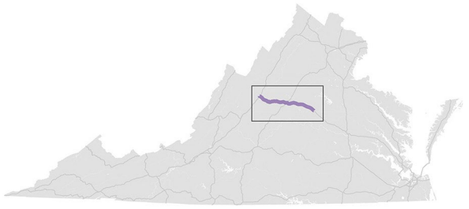
Corridor Tonnage Originating in Segment C3: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Norfolk* and West Virginia
City of Newport News* and Kentucky
Dickenson County and City of Newport News*
Hanover County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (96% / 95%)
2. City of Newport News* (73% / 71%)
3. City of Norfolk* (11% / 10%)
4. City of Covington (2% / 2%)
5. Rockingham County (1% / 2%)

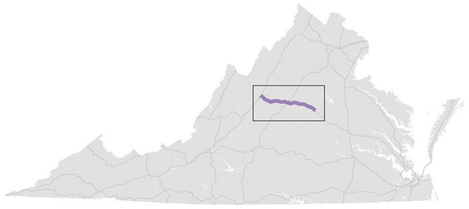
Corridor Tonnage Destined for Segment C3: 1% / 1%



Traffic Conditions

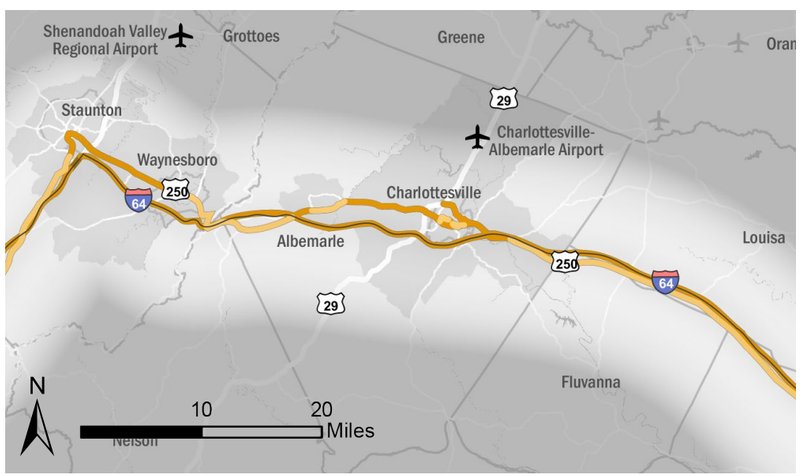
Traffic Volume and AADT

Traffic volume on Segment C3 is generally less than traffic volumes on most other sections of Corridor C. Average daily traffic volumes along I-64 in Segment C3 typically range from 33,000 to 39,000 vehicles, with average daily volumes greater than 44,000 vehicles on a short section of I-64 south of Charlottesville. Traffic on US 250 is generally lower, with volumes as low as 1,500 vehicles per day in Fluvanna County, but greater than 35,000 vehicles per day in the City of Charlottesville. Traffic volumes are projected to increase by 2025 throughout Segment C3, with the greatest increase projected to be about 12,000 additional vehicles per day on I-64 southeast of Charlottesville, and more than 5,000 additional vehicles per day on US 250 in Charlottesville. By 2025, typical traffic volumes on I-64 are projected to range from 34,000 to 49,000 vehicles per day.



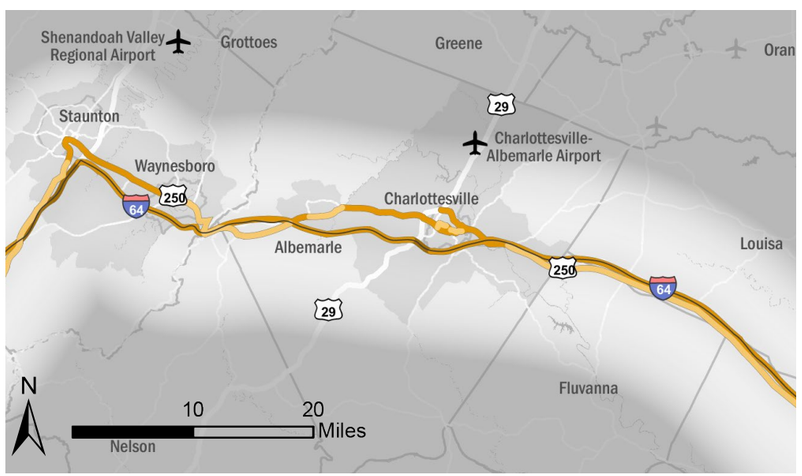
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



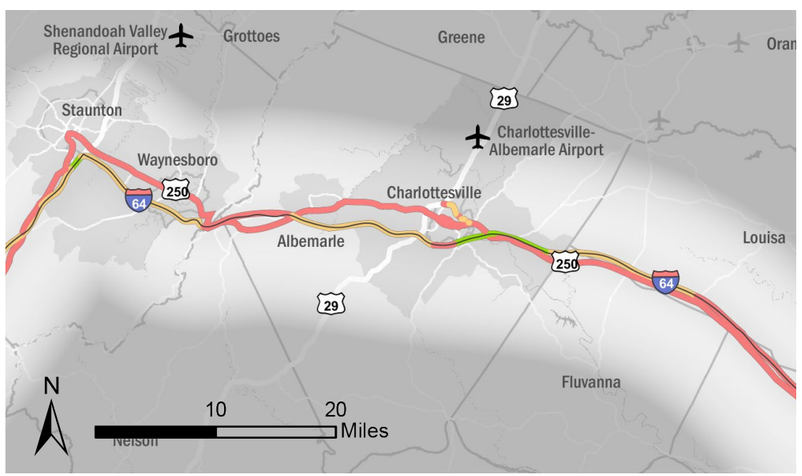
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



C3 SEGMENT PROFILE

Traffic Distribution

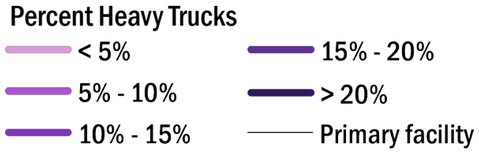
On average, traffic on Segment C3 is distributed throughout the day as shown in the graphs below.

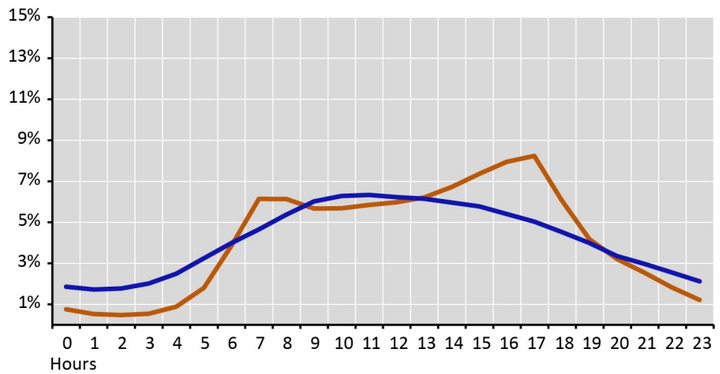
Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 8.2 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 6.1 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 52 percent of total daily traffic. Peaking patterns for truck traffic show a single peak during the midday period, with a peak hourly flow of 6.3 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, with the highest percentage of hourly traffic occurring between 3 and 4 p.m. (7.9 percent of daily traffic) for all traffic, and 1 to 2 p.m. (5.9 percent of daily traffic) for truck traffic.

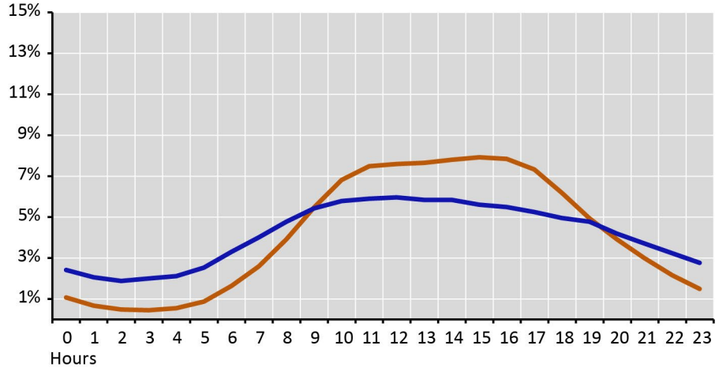
Weekday traffic volumes on Segment C3 vary by as much as 30 percent throughout the year, with the highpoint in August (around 38,000 vehicles per day) and the low point in January (around 29,000 vehicles per day) with a notable lull during July. Truck volumes vary similarly throughout the year, with the June high (around 4,000 vehicles per day) 30 percent higher than the July low (around 3,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 39,000 vehicles per day) are 57 percent higher than January levels (around 25,000 vehicles per day). Weekend truck traffic is more steady than all vehicle traffic, with the June high 40 percent higher than the July low. Since truck volumes account for a relatively small portion of traffic on Segment C3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

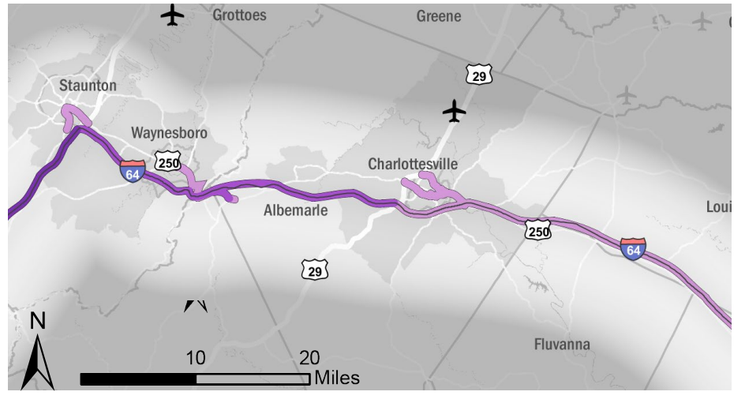
Truck Volumes

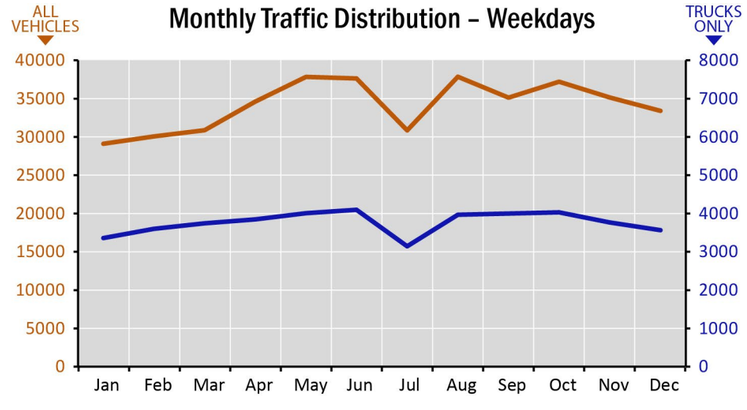
The percent of daily traffic comprised of heavy trucks on Segment C3 is moderate relative to most other segments in Corridor C. From Staunton to Charlottesville along I-64, heavy trucks comprise eight to nine percent of total daily traffic. To the east of Charlottesville, heavy trucks comprise only five percent of total daily traffic on I-64. Trucks comprise a lower percentage of daily traffic on US 250 – typically less than five percent – except for the portion crossing Afton Mountain east of Waynesboro.

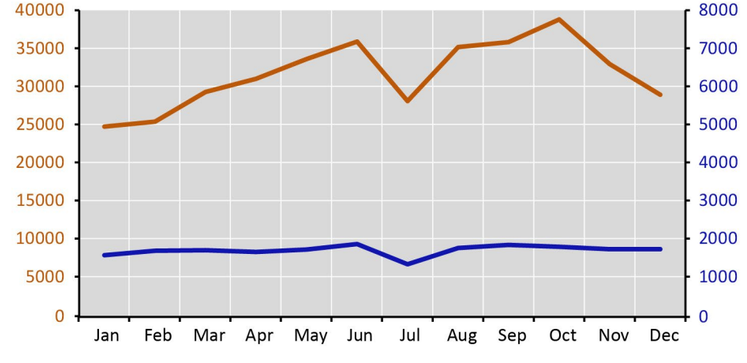




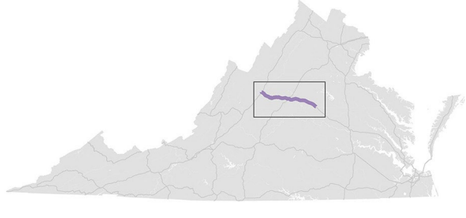








All Vehicles
Trucks

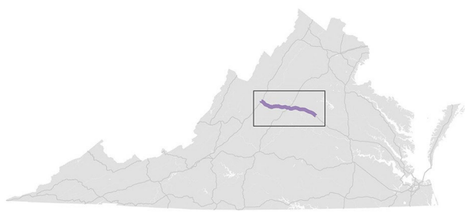


C3 SEGMENT PROFILE

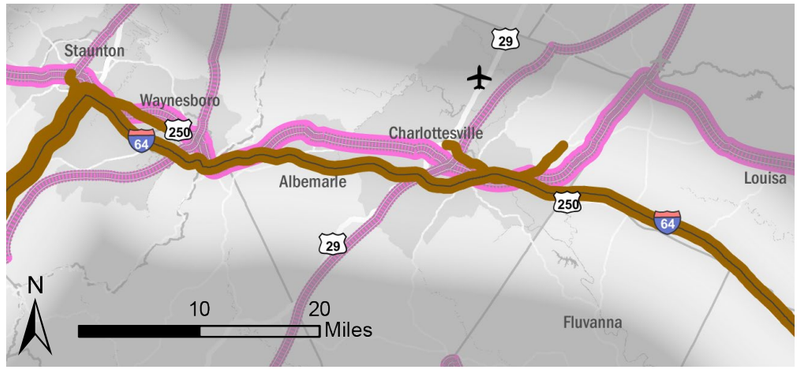
Freight Flows

At the western end of Segment C3, east of Staunton, freight is moved primarily by rail in terms of tonnage but not value. In total, 21.5 million tons (40 percent) of freight is moved through this section of Segment C3 by truck, compared to 32 million tons by rail. By value, trucks are carrying far more freight, with $37 billion (93 percent) of freight value traveling by truck, compared to $3 billion by rail. This contrast is probably due to the fact that the corridor carries large amounts of coal. On average, a ton of freight traveling through this section of Segment C3 by truck is worth $1,727 while a ton of freight traveling by rail is worth $91. In 2025, both rail and truck freight tonnages and total values in the western end of Segment C3 are expected to increase, and the percentage of the freight that travels by truck is expected to increase to 47 percent by tonnage and 96 percent by value. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,592 per ton on trucks and $101 on rail.

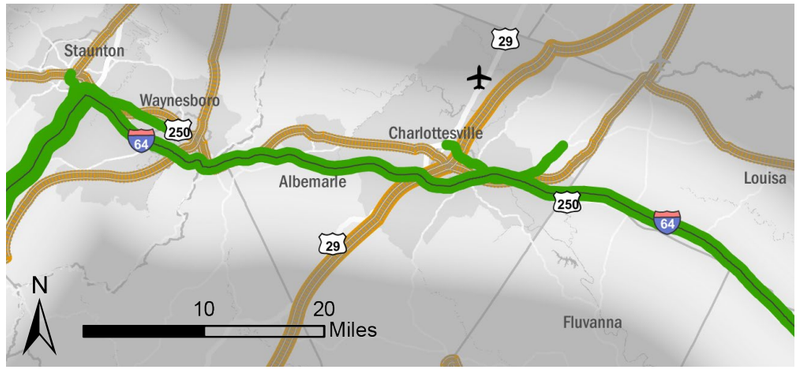
East of Afton Mountain, west of Charlottesville, freight is similarly moved primarily by rail in terms of tonnage but not value. In total, 19 million tons (37 percent) of freight is moved through this section of Segment C3 by truck, compared to 32 million tons by rail. By value, trucks are carrying far more freight, with $34 billion (92 percent) of freight value traveling by truck, compared to $3 billion by rail. This contrast is probably due to the fact that the corridor carries large amounts of coal. On average, a ton of freight traveling through this section of Segment C3 by truck is worth $1,836 while a ton of freight traveling by rail is worth $87. In 2025, both rail and truck freight tonnages and total values in this section of Segment C3 are expected to increase, and the percentage of the freight traveling by truck is expected to increase to 44 percent by tonnage and 96 percent by value. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,797 per ton on trucks and $96 on rail.



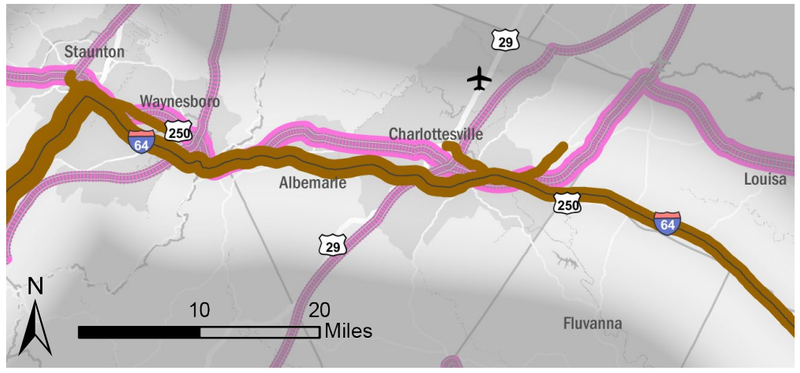
Annual Freight by Tonnage, 2012



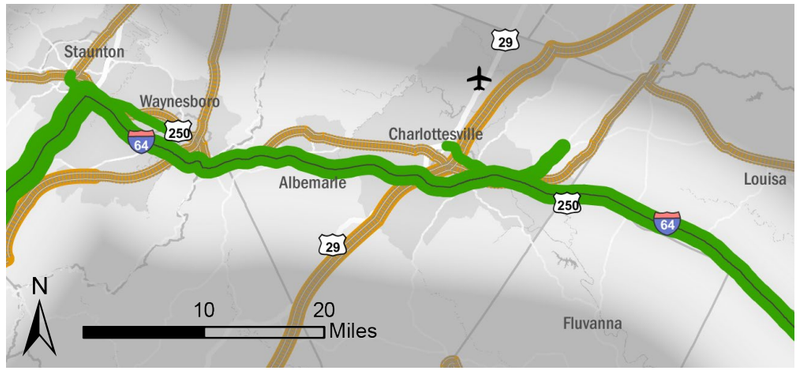
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment C3 of the East-West Corridor have a limited range of travel options in terms of mode choice, although a parallel highway facility (US 250) is available the entire length of the segment. Based on the 2014 federal standard mileage rate of 56 cents per mile, trips between Staunton, Charlottesville, and Richmond would be more expensive by automobile than by the other available modes. The alternate modes, including bus and rail, are all limited by the frequency of service and have longer travel times than the typical automobile trip. Amtrak provides service along the corridor from Staunton and Charlottesville. Greyhound also serves Charlottesville.

Comparable Travel Options

Richmond to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	3 Trips per Day 3:29 Travel Time $42 Est. Cost

Auto

Via I-64: 1:38 Travel Time $60 Est. Cost
Via Rt. 250 / I-64: 2:16 Travel Time $62 Est. Cost

Charlottesville to Harrisonburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-64: 1:00 Travel Time $36 Est. Cost
Via Rt. 250 / I-81: 1:30 Travel Time $37 Est. Cost

Richmond to Charlottesville

Inter-City Bus	*Train*
3 Trips per Day 1:51 Travel Time $13 Est. Cost	9 Trips per Day 1:45 Travel Time $28 Est. Cost

Auto

Via I-64: 1:10 Travel Time $40 Est. Cost
Via Rt. 250: 1:44 Travel Time $41 Est. Cost

Charlottesville to Staunton

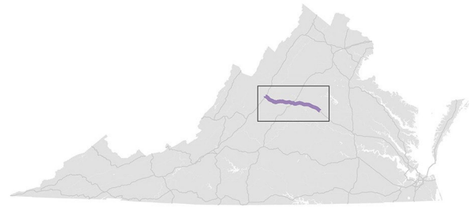
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	1 Trip per Day 1:02 Travel Time $15 Est. Cost

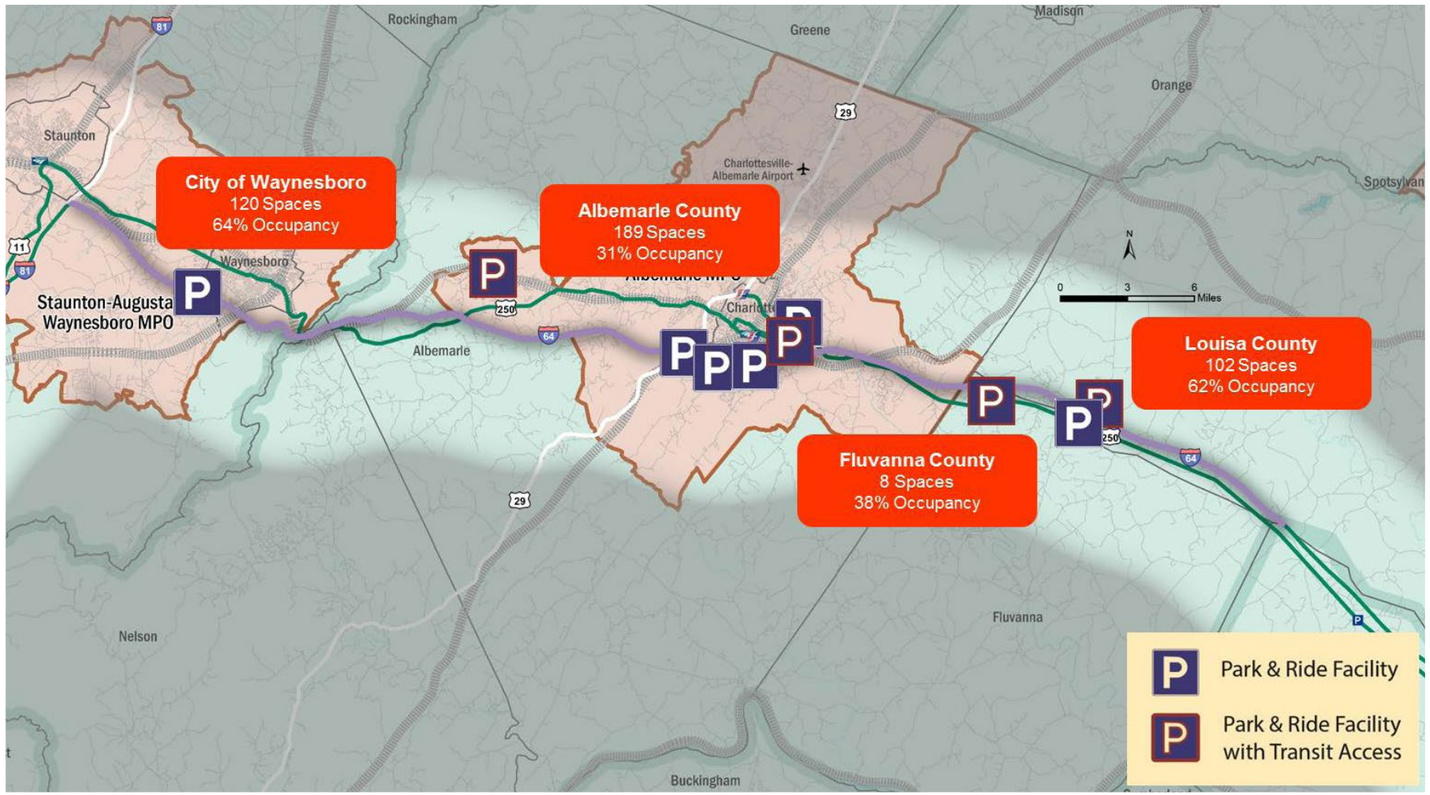
Auto

Via I-64: 0:40 Travel Time $22 Est. Cost
Via Rt. 250: 1:01 Travel Time $23 Est. Cost

Park-and-Ride

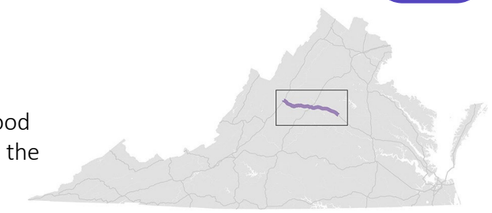
Within Segment C3, commuters can utilize many Park-and-Ride locations. Albemarle County provides the highest number of Park-and-Ride spaces and locations, while Augusta County has the highest utilization rate of spaces available in the region. At 80 percent, only Augusta County has a rate higher than the statewide average of 76 percent for Park-and-Ride utilization.





Safety

Between 2010 and 2012, 302 severe crashes occurred in Segment C3. Several areas exhibit high concentrations of severe collisions along the segment. On US 250 (Richmond Avenue) in Staunton, 66 crashes occurred over a distance of approximately 1.4 miles between Statler Boulevard and I-81. Of these, 22 crashes were at the intersection with Statler Boulevard and 14 were at the intersection with Frontier Drive. On US 250 (Main Street) in Waynesboro, 39 incidents occurred along a one mile stretch between Lew Dewitt Boulevard and Hopeman Parkway. Of the 39 incidents, 13 incidents were at the Lew Dewitt Boulevard intersection and seven were at the Vedette Avenue intersection. On US 250 Business (High Street/West Main Street) in Charlottesville, 36 crashes took place between Jefferson Park Avenue and 7th Street NE. Of these, 19 crashes occurred near the intersection of West Main Street and 7th Street SW. Also in Charlottesville, there were 48 collisions along a stretch approximately 2.8 miles long on US 250 Bypass between Birdwood Road and Peter Jefferson Parkway; 24 of the 48 crashes were at the intersection of US 250 Business and McIntire Road.



Performance Metrics:

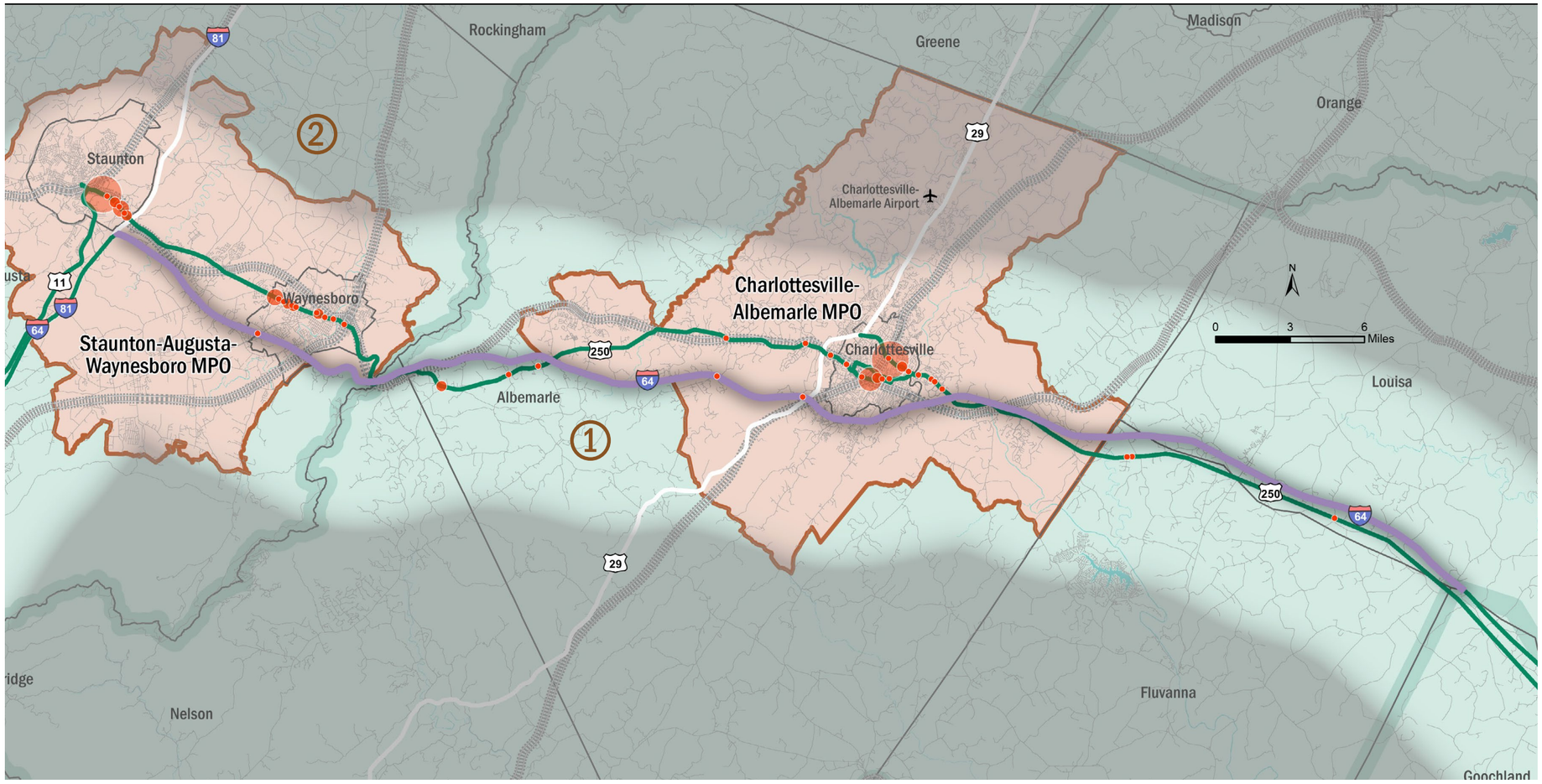
Number of Severe Crashes	262
Severe Crashes/Million VMT	0.5
Number of Railroad Crashes	3

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	11
Freight Ton Hours of Delay per Mile	6.9K

Passenger Delays

There is moderate passenger congestion along Segment C3, with around 2,600 person-hours delay daily. Locations where passenger delays exceed 100 person-hours per mile include:

- US 250 between I-64 in Albemarle County (east of Charlottesville) and US 29 Business in Charlottesville; and
- US 250 Business near the University of Virginia at US 29 Business.

About half of passenger delays along Segment C3 occur during the peak period, which is above the average peak period share of congestion for CoSS.

Freight Delays

Segment C3 has relatively minor freight congestion, accounting for around 1.7 million ton-hours of delay daily. While most of the corridor segment has low freight delays, there are a couple of locations where the freight delay exceeds 250,000 ton-hours per mile:

- In Augusta County on US 250 near the I-81 interchange; and
- In Albemarle County on US 250 near the I-64 interchange (east of Charlottesville).

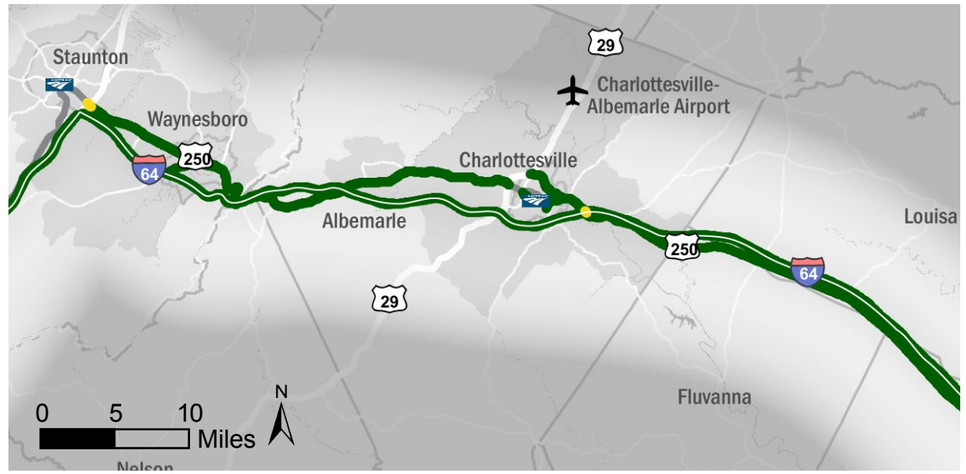
Peak-period freight delays account for a little more than 40 percent of daily congestion.

Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

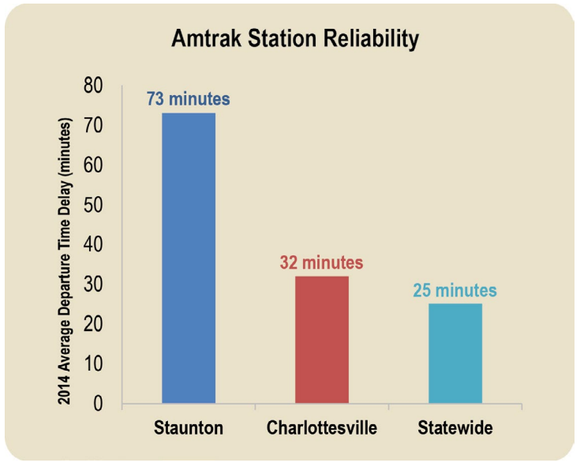
Reliability

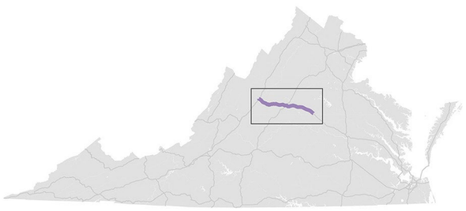
Reliability Index

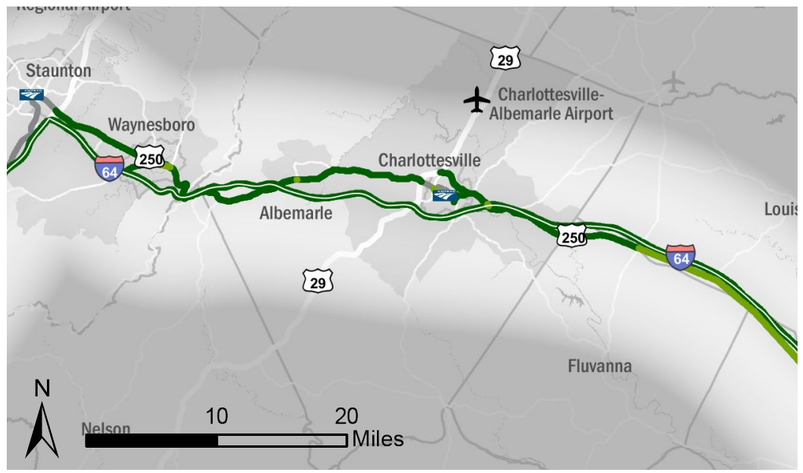
- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

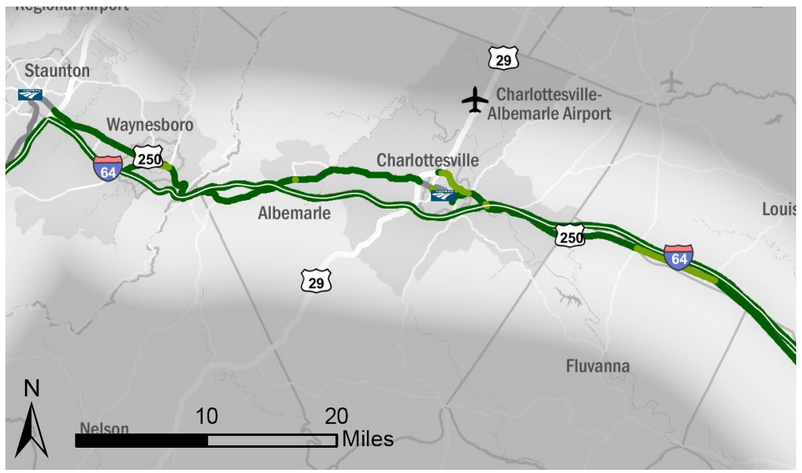






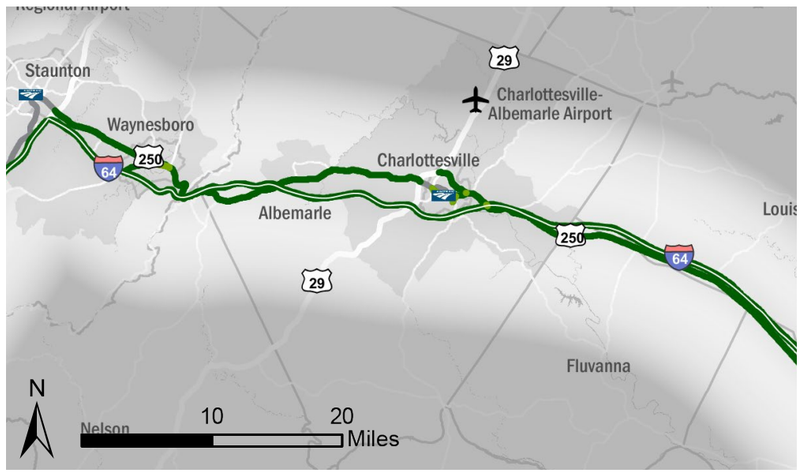
Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment C3 ranges from 0.00 to 0.39 in terms of reliability index, with an average value of 0.09. None of the locations along Segment C3 have reliability index values exceeding the statewide threshold.



Weekday

Reliability of travel during a typical weekday ranges from 0.01 to 0.34 in terms of reliability index, with an average value of 0.09. None of the locations along Segment C3 have reliability index values exceeding the statewide threshold.



Weekend

Reliability of travel during a typical weekend ranges from 0.01 to 0.55 in terms of reliability index, with an average value of 0.09. While this segment's weekday reliability index is higher than the average for CoSS segments statewide, none of the locations along the Segment C3 have reliability index values exceeding the maximum threshold values.

Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

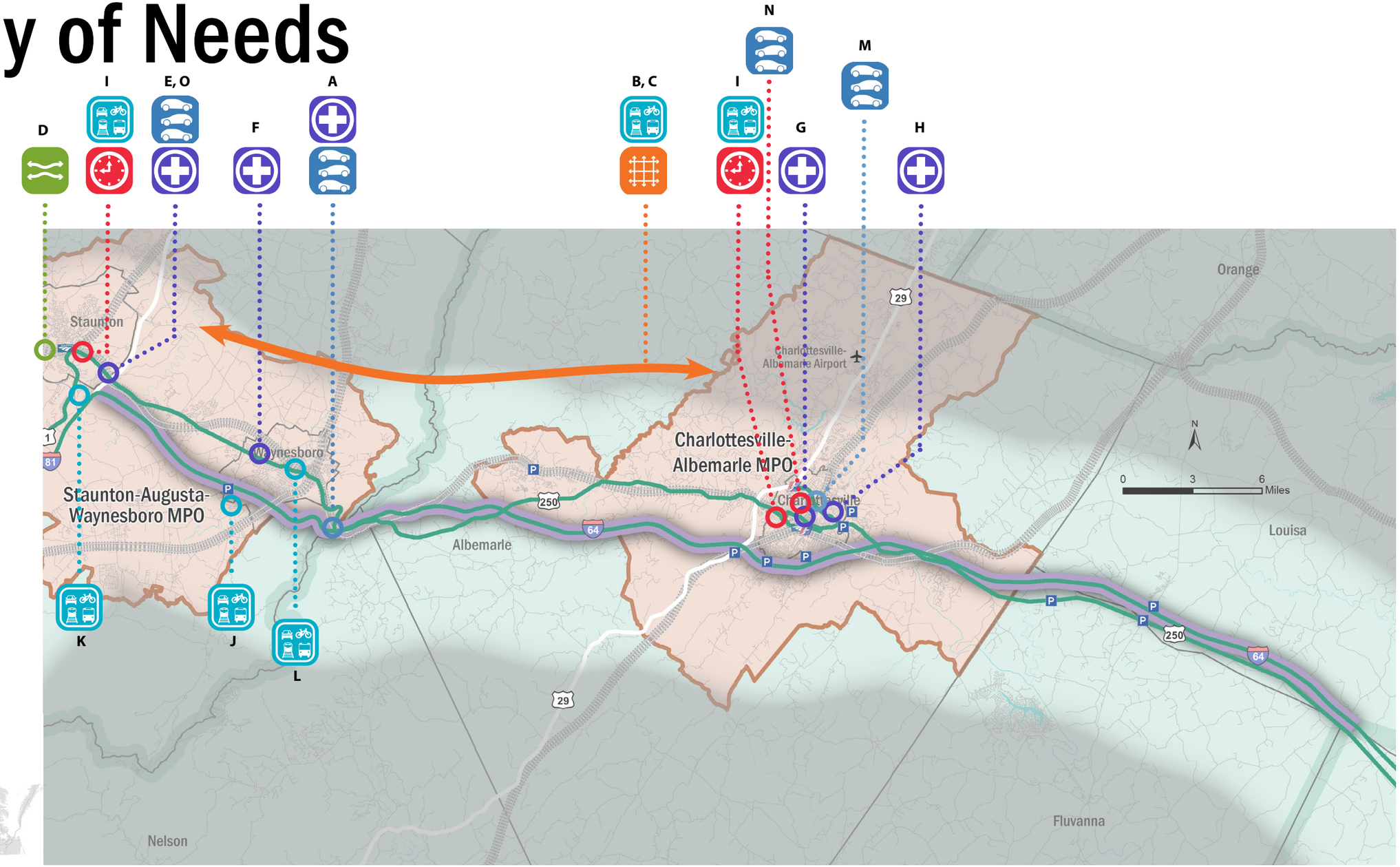
Mode Choice

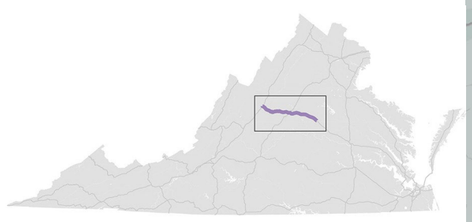
Safety

Congestion

Bottlenecks

Reliability





C3 SEGMENT NEEDS

Summary of Needs - C3 Segment

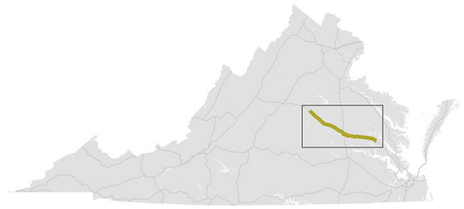
A.	Travel demand between Charlottesville and Staunton region results in peak period congestion and safety issues on Afton Mountain
B.	Redundancy issues along Segment C3: US 250 not able to handle overflow when incident occurs on I-64 resulting in signifcant delays
C.	Limited transit options between Staunton, Waynesboro, and Charlottesville
D.	Freight rail capacity bottleneck: No capacity for double stacking
E.	US 250 between Statler Blvd and I-81 in Staunton: 66 severe crashes
F.	US 250 between Lew Dewitt Blvd and Hopeman Pkwy in Waynesboro: 39 severe crashes
G.	US 250-Business between Jefferson Park Ave and 7th St NE in Charlottesville: 36 severe crashes

Summary of Needs - C3 Segment

H.	US 250 Bypass between Birdwood Road and Peter Jefferson Pkwy in Charlottesville: 48 severe crashes, including 24 at the intersection with McIntire Road
I.	Unreliable Amtrak service from Staunton station (73 minutes average departure delay) and Charlottesville (32 minutes average departure delay) totaling almost 40,000 person-hours of delay from this segment.
J.	Park and Ride lots in Augusta County have higher utilization rates than statewide average
K.	No bus service from Staunton to other cities in the corridor
L.	No passenger rail or bus service from Waynesboro to other cities in the corridor
M.	Congestion issue on US 250 between US 29 Business and I-64 in Charlottesville
N.	Congestion issue on US 250 Business between US 29 Business (Emmett Street) and Ridge Street/McIntire Avenue in Charlottesville
O.	Congestion issue on US 250 at junction with I-81 near Staunton

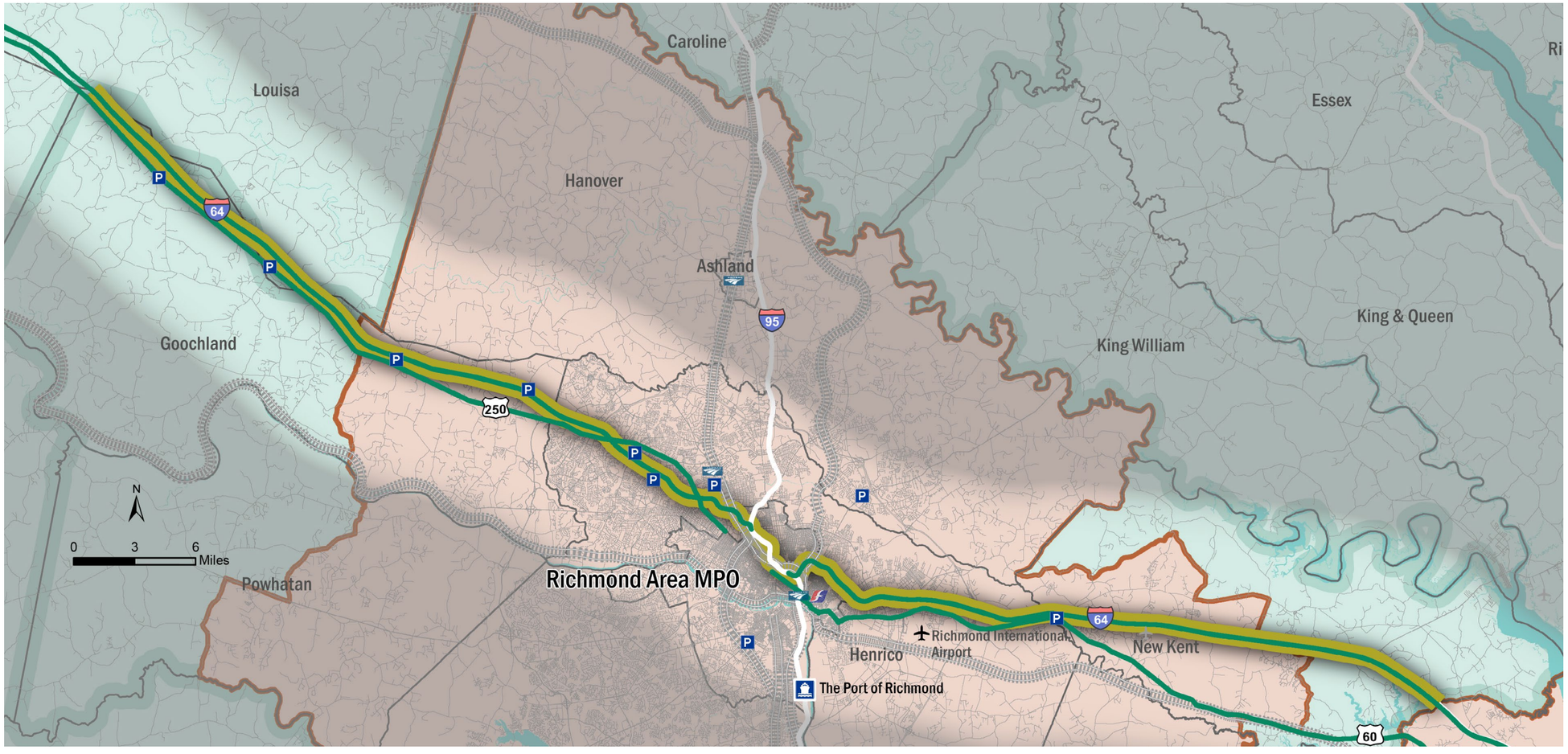
V. Segment C4

- C4
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility

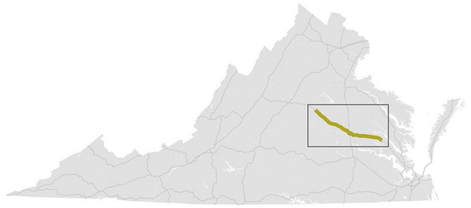


Corridor Segment C4 Components

- I-64
- US 250
- US 60
- Port of Richmond
- James River
- Amtrak
- CSX Coal Corridor
- Richmond International Airport



C4 SEGMENT PROFILE



Segment C4 begins at the western boundary of Goochland County and progresses through the Richmond Area. The segment serves Goochland, Louisa, Henrico, and New Kent Counties, as well as the City of Richmond. The segment also includes portions US 250 and US 60, and overlaps briefly with I-95 in the City of Richmond. Segment C4 acts as a major corridor for through freight travel in Virginia. Within the urbanized areas surrounding Richmond, the segment serves as a major commuter route. Segment C4 also provides a connection to military facilities, as well as multiple natural, historical, and cultural resources in the region.

Highway Facilities: I-64 is primarily a rural highway with four lanes in Segment C4, except in Richmond and Henrico County, where it is a major commuter highway with up to eight lanes. US 250 runs parallel to I-64 west of Richmond, while US 60 runs parallel east of Richmond. I-95 runs concurrently with I-64 for a short portion in the City of Richmond.

Transit Services: Amtrak has two stations in Richmond, providing service to the Northeast Corridor. Greyhound and Megabus also provide service to Richmond. Commuter bus service is offered by the GRTC, connecting residents of Chesterfield and Henrico Counties to downtown Richmond. There are several Park-and-Ride facilities near I-64, the majority of which are located west of Richmond.

Rail Facilities: CSX's Coal Corridor rail lines pass through Segment C4 connecting locations west to the Port of Virginia facilities in the Hampton Roads Area.

Port Facilities: No port facilities are directly accessible from Segment C4, but the East-West Corridor does provide access to the Port of Richmond, the navigational channels of the James River, and the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: Richmond International Airport is the only commercial airport in this segment.

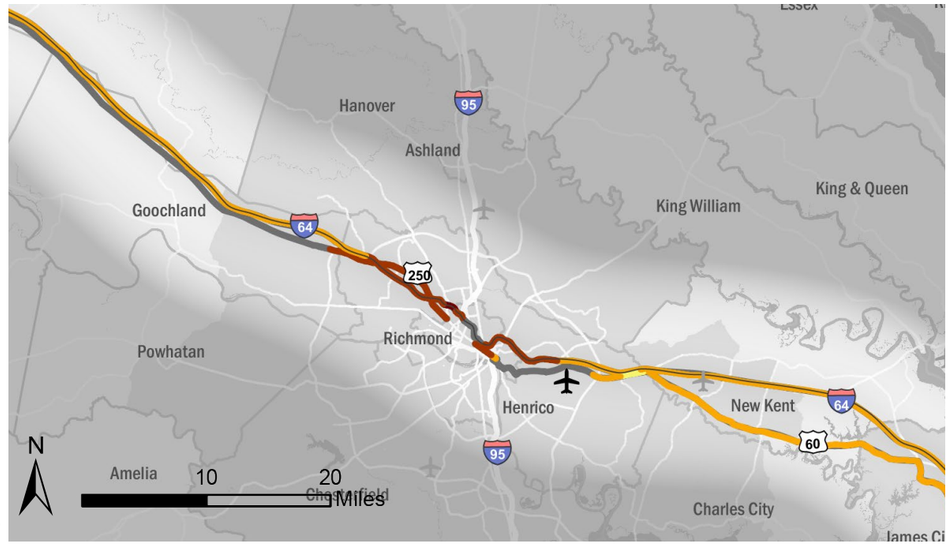
Major planned and future projects include:

City of Richmond: Widening of I-64 from four to six lanes from about a mile west of Route 623 to a half mile west of I-295;

Henrico County: Pedestrian accommodations at seven signalized intersections on Broad Street leading up to the I-64 interchange in unincorporated part of Richmond;

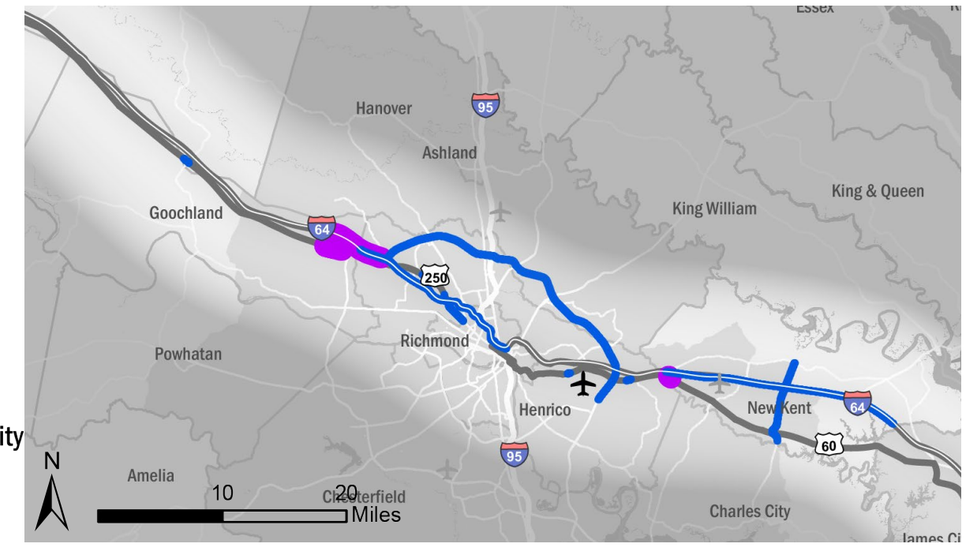
City of Richmond and Henrico County: Installing overhead message boards, CCTV, and fiber optic lines on the portion of I-64 that is concurrent with I-95; and

New Kent County: Widening of North Courthouse Road (Route 155) underneath I-64 to accommodate bicyclists.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

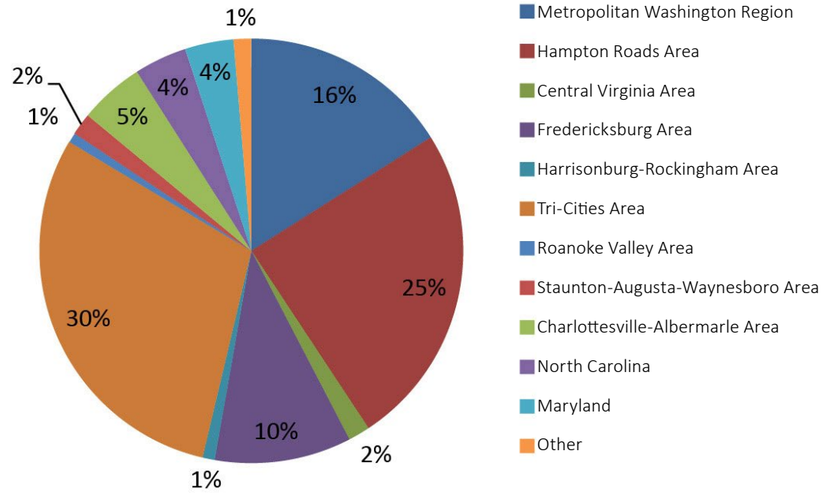
Travel Demand

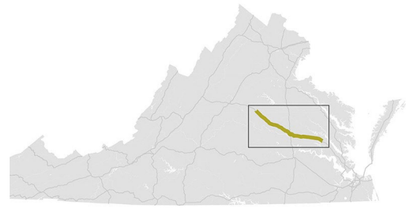
Passenger Demand

Segment C4 traverses the breadth of the Richmond Area, and provides connections towards Charlottesville to the west and the Hampton Roads Area to the east. Significant portions of the intercity passenger travel in the Commonwealth occur on this segment including more than nine percent between Richmond and Hampton Roads and 2.4 percent to western destinations such as Charlottesville and Staunton. This accounts for a total of more than 11 percent of the intercity passenger travel in the Commonwealth.

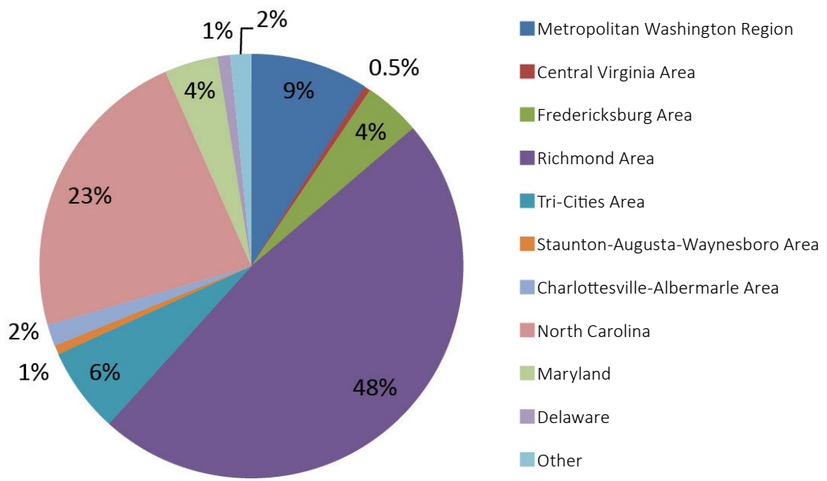
Significant portions of the intercity passenger travel originating in the Richmond Area may use Segment C4 to access the final destination, including one quarter of travel destined for the Hampton Roads Area and five percent destined for the Charlottesville area. Large portions of the intercity passenger travel originating in the Hampton Roads Area will also make use of portions of Segment C4; almost half of the intercity passenger traffic originating in the Hampton Roads Area is destined for the Richmond Area. Some of the additional nine percent destined for the Metropolitan Washington region may also use portions of Segment C4, although other travel options are available.

Travel from Richmond Area to...





Travel from Hampton Roads Area to...



C4 SEGMENT PROFILE

Freight Demand

By truck, Segment C4 carried 26 million tons of freight worth $49 billion in 2012, and is estimated to carry 40 million tons of freight worth $95 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value passes through Virginia. Besides this through traffic, a significant portion of the truck freight on Corridor C originates from (around 13 percent) or is destined for (between 13 and 18 percent) Norfolk and Portsmouth and their port facilities. Another major truck freight movement on Corridor C is between Nevada and the port facilities in the Hampton Roads Area, which accounts for 4,000 tons of freight worth $5 billion in 2012 and is expected to increase significantly in value to $28 billion in 2025, corresponding with only a modest gain in the truck freight tonnage to 4,300 tons. Along Segment C4, there are some minor truck flow patterns from Hanover County to Maryland and North Carolina. In this corridor, the City of Richmond is a significant attractor of truck freight, mostly from the Cities and ports of Norfolk and Portsmouth.

By rail, Segment C4 carried 33 million tons of freight worth $2 billion in 2012, and is estimated to carry 39 million tons of freight worth $2 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travels eastbound from West Virginia and Kentucky to the marine terminal located at Newport News. In terms of total rail freight value, the City of Hopewell is the largest origin of freight value on Corridor C, and produced more than 20 percent of the total rail freight value. Around three-quarters of this freight is destined for Midwest locations and Pennsylvania. The jurisdictions surrounding Segment C4 are significant attractors of rail freight on the corridor, accounting for 12 percent of the total rail freight value. Within Segment C4, there are major rail freight flows from Louisiana, California, and the Midwest region to Henrico County and the City of Richmond.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (36% / 37%)
2. North Carolina (15% / 13%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (6% / 6%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment C4: 6% / 5%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (40% / 41%)
2. North Carolina (10% / 10%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (7% / 7%)
5. New York (7% / 6%)

Corridor Tonnage Destined for Segment C4: 6% / 7%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (74% / 71%)
2. Virginia (9% / 11%)
3. Kentucky (8% / 8%)
4. Dickenson County (3% / 3%)
5. Hanover County (2% / 3%)

Corridor Tonnage Originating in Segment C4: 3% / 5%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Norfolk* and West Virginia
City of Newport News* and Kentucky
Dickenson County and City of Newport News*
Hanover County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (96% / 95%)
2. City of Newport News* (73% / 71%)
3. City of Norfolk* (11% / 10%)
4. City of Covington (2% / 2%)
5. Rockingham County (1% / 2%)

Corridor Tonnage Destined for Segment C4: 3% / 3%

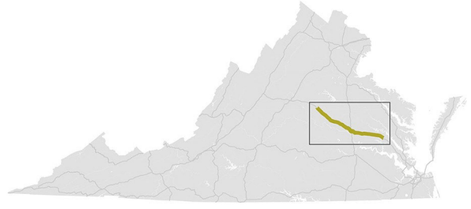


Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment C4 is high compared to traffic volumes on segments in the western half of Corridor C. Average daily traffic volumes along I-64 in Goochland and Louisa Counties range from 29,000 to 42,000 vehicles. Traffic volumes are much higher in Henrico County and Richmond, progressively increasing from 64,000 vehicles per day near I-295 to 138,000 vehicles per day near the I-95 interchange. Traffic volumes vary considerably along I-64 on the east side of Richmond, decreasing from 94,000 vehicles per day near downtown Richmond to 33,000 vehicles per day near the I-295 interchange. Along I-64 in New Kent County, average daily traffic volumes range from 54,000 to 63,000 vehicles. Traffic volumes on US 250 west of Richmond are generally lower than on I-64, and typically range from 12,000 vehicles per day in rural areas to over 42,000 vehicles in the City of Richmond. Volumes on US 60 east of Richmond range from 5,000 to 14,000 vehicles per day.

Daily traffic volumes are projected to increase by 2025 throughout Segment C4, with the greatest increases occurring along the stretch of I-64 from near the western intersection with I-295. Projected increases in daily traffic volumes along this section range from 11,000 to 19,000 additional vehicles. Traffic volumes also are projected to increase by 12,000 vehicles on I-64 in New Kent County by 2025, where average daily traffic volumes are projected to range from 60,000 to 80,000 vehicles. By 2025, average daily traffic volumes along I-64/I-95 near downtown Richmond are projected to range from 141,000 to 154,000 vehicles. Traffic growth on US 60 and US 250 are forecast to be somewhat lower, with up to 6,000 additional vehicles per day by 2025.



Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



C4 SEGMENT PROFILE

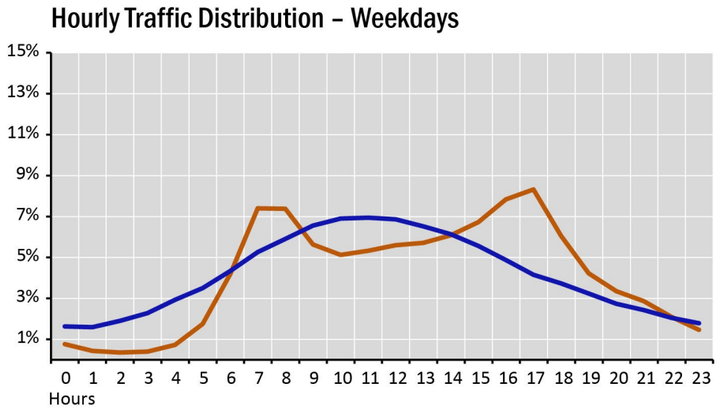
Traffic Distribution

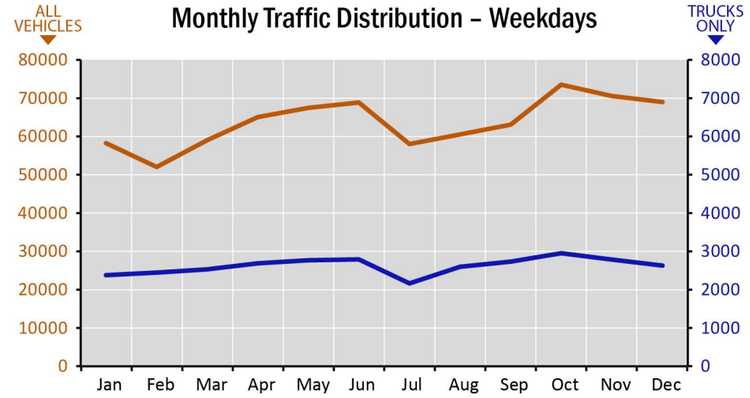
On average, traffic on Segment C4 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 8.3 percent of daily traffic and a morning peak hour between 7 and 8 a.m. accounting for 7.4 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Peaking patterns for truck traffic show a single peak during the midday period, with a peak hourly flow of 6.9 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, with the highest percentage of hourly traffic occurring between 3 and 4 p.m. (7.3 percent of daily traffic) for all traffic, and earlier in the day (9 to 10 a.m.) for truck traffic.

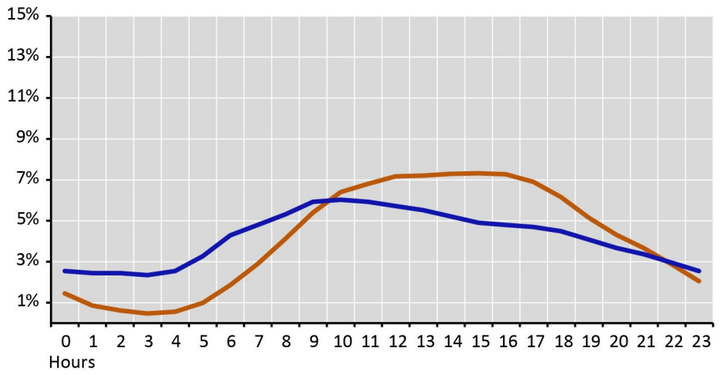
Weekday traffic volumes on Segment C4 vary by as much as 41 percent throughout the year, with the highpoint in October (around 74,000 vehicles per day) and the low point in February (around 52,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the October high (around 3,000 vehicles per day) 36 percent higher than the July low (around 2,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 58,000 vehicles per day) are 41 percent higher than February levels (around 41,000 vehicles per day). Weekend truck traffic shows similar variations with the November high 42 percent higher than the July low. Since truck volumes account for a relatively small portion of traffic on Segment C4, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

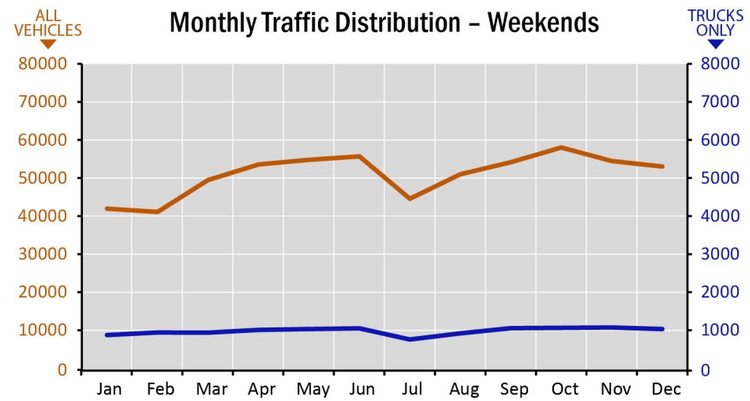
Truck Volumes

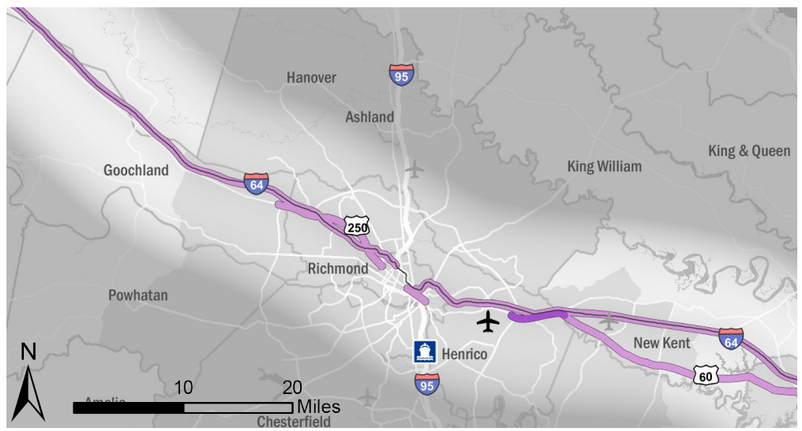
The percent of daily traffic comprised of heavy trucks on Segment C4 is low relative to most other segments in Corridor C. Outside of the most urbanized areas, trucks comprise four to five percent of daily traffic on I-64. In the City of Richmond and Henrico County, trucks comprise no more than two percent of daily traffic. Trucks also make up a small portion of traffic on US 250 in this segment and on US 60 in New Kent County (two percent or less). Trucks do, however, account for six percent of daily traffic on US 60 in Henrico County.

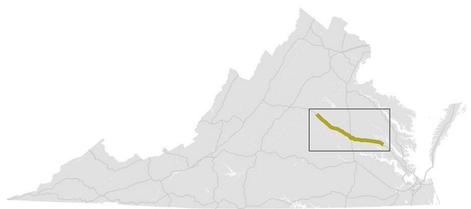












Percent Heavy Trucks

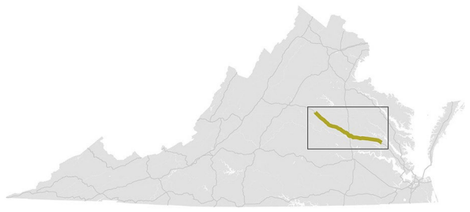
- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

C4 SEGMENT PROFILE

Freight Flows

At the western end of Segment C4, in Goochland County, freight is overwhelmingly moved by truck, in terms of both tonnage and value. In total, 13 million tons (98 percent) of freight is moved through this section of Segment C4 by truck, compared to 295,000 tons by rail. By value, trucks are favored even more, with $27 billion (99.9 percent) of freight value traveling by truck, compared to $23 million by rail. On average, a ton of freight traveling through this section of Segment C4 by truck is worth $2,037 while a ton of freight traveling by rail is worth $77. In 2025, both rail and truck freight tonnages and total values in this section of Segment C4 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on trucks is expected to grow by 2025, with an average of $3,180 per ton, while value per ton will decrease slightly to $71 on rail.

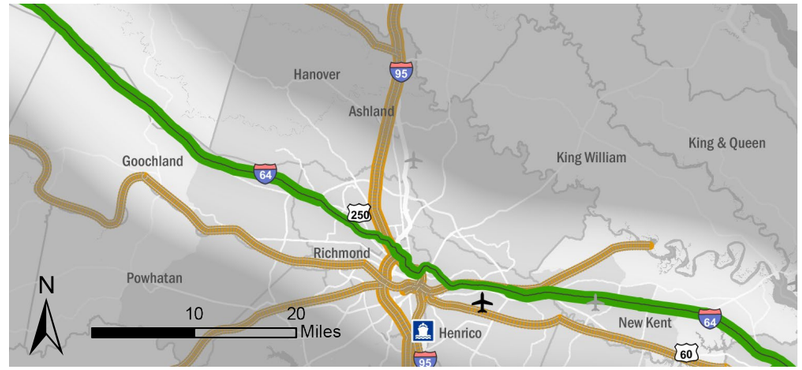
At the eastern end of Segment C4, in New Kent County, freight is moved primarily by rail in terms of tonnage but not value. In total, 26 million tons (44 percent) of freight is moved through this section of Segment C4 by truck, compared to 33 million tons by rail. By value, trucks are carrying far more freight, with $48.5 billion (97 percent) of freight value traveling by truck, compared to $2 billion by rail. This contrast is probably due to the fact that the corridor carries large amounts of coal. On average, a ton of freight traveling through this section of Segment C4 by truck is worth $1,854 while a ton of freight traveling by rail is worth $52. In 2025, both rail and truck freight tonnages and total values in this section of Segment C4 are expected to increase, and the percentage of the freight that travels by truck is expected to increase to 54 percent by tonnage and 98 percent by value. Value per ton on both trucks and rail is expected to grow by 2025, with an average of $2,368 per ton on trucks and $54 on rail.



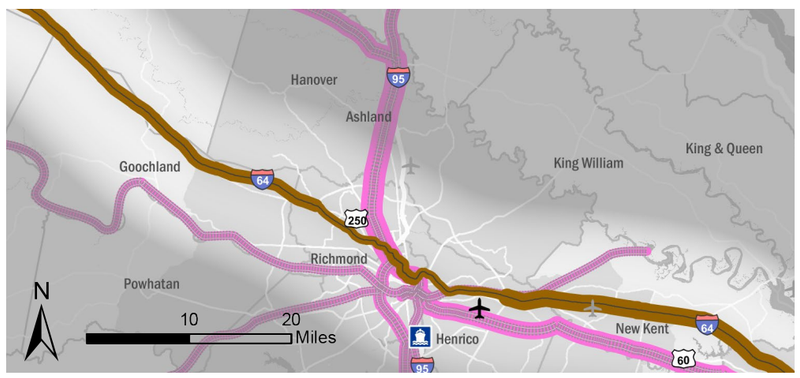
Annual Freight by Tonnage, 2012



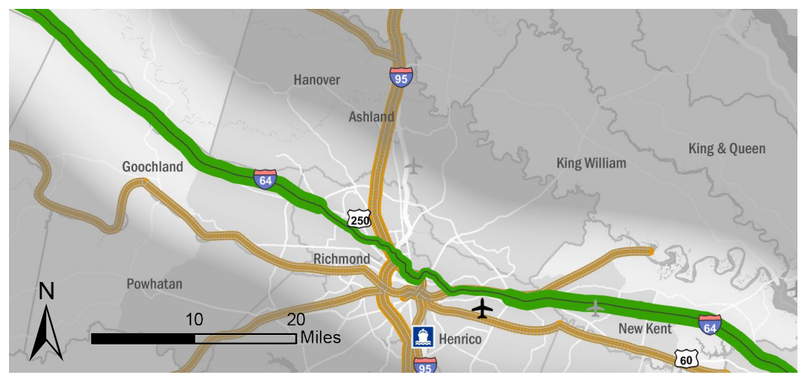
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

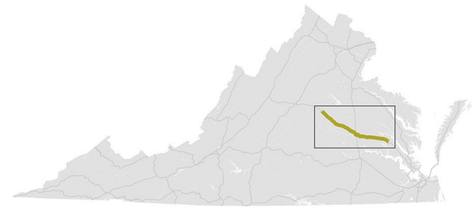
Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

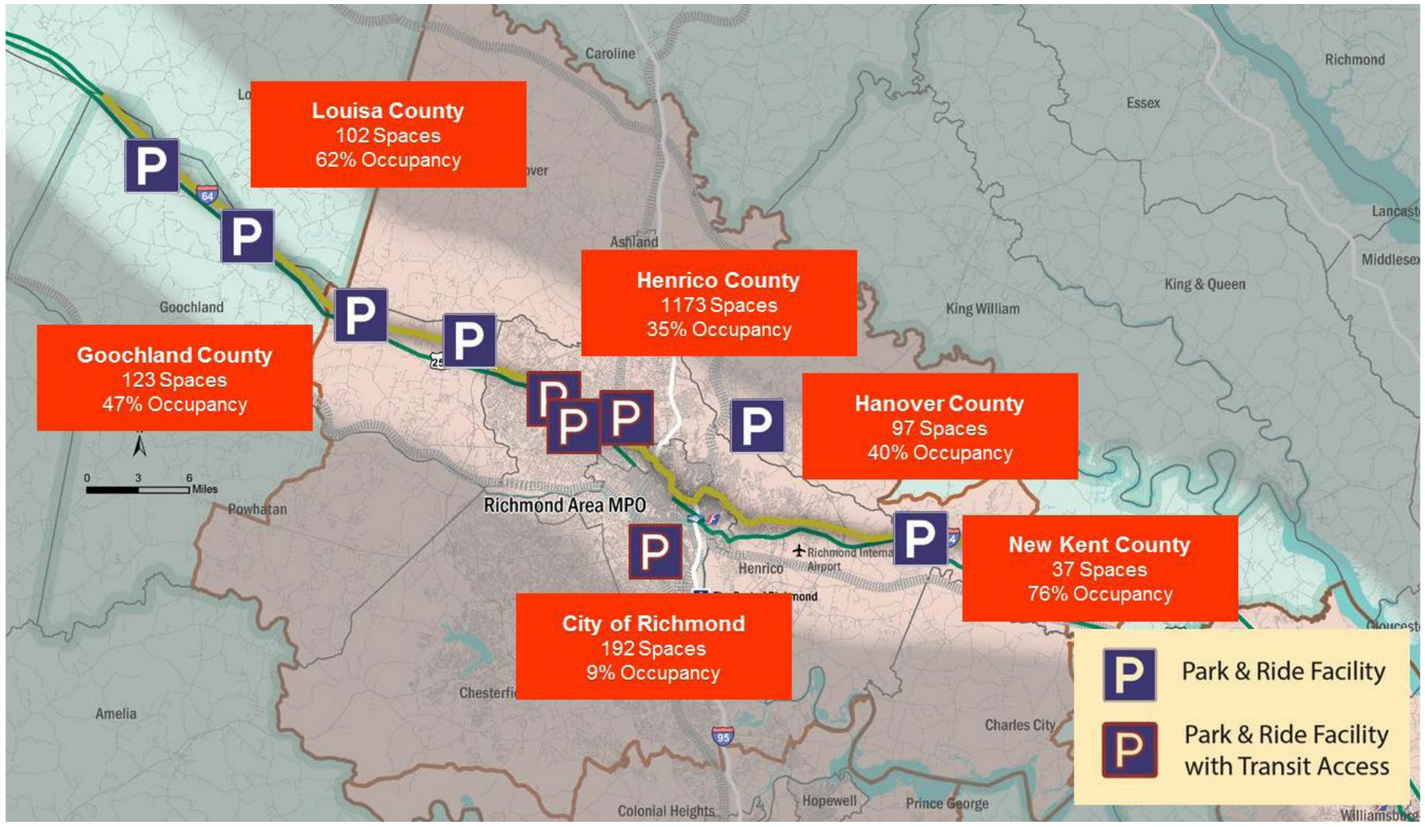
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice



Passenger trips on Segment C4 of the East-West Corridor have a relatively wide range of travel options, both in terms of travel path and mode choice. West of Richmond, US 250 serves as a parallel route to Interstate I-64 while US 60 serves as the parallel route east of Richmond. In addition to supporting trips on the East-West Corridor, Richmond serves as a transfer point for trips heading north and south along the Washington-North Carolina Corridor.

Based on the 2014 federal standard mileage rate of 56 cents per mile, trips through Richmond would be more expensive by automobile than by the other available modes. The alternate modes, including bus and rail, are all limited by the frequency of service and have longer travel times than the typical automobile trip. Richmond is served by Greyhound, Megabus, and two Amtrak stations.



Comparable Travel Options

Hampton Roads (Norfolk) to Richmond

Inter-City Bus	*Train*
5 Trips per Day 2:00 Travel Time $11 Est. Cost	5 Trips per Day 2:03 Travel Time $23 Est. Cost

Auto

Via I-64: 1:35 Travel Time $52 Est. Cost
Via Rt. 60: 2:21 Travel Time $52 Est. Cost

Richmond to Charlottesville

Inter-City Bus	*Train*
3 Trips per Day 1:51 Travel Time $13 Est. Cost	9 Trips per Day 1:45 Travel Time $28 Est. Cost

Auto

Via I-64: 1:10 Travel Time $40 Est. Cost
Via Rt. 250: 1:44 Travel Time $41 Est. Cost

Richmond to Staunton

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	3 Trips per Day 3:29 Travel Time $42 Est. Cost

Auto

Via I-64: 1:38 Travel Time $60 Est. Cost
Via Rt. 250 / I-64: 2:16 Travel Time $62 Est. Cost

Hampton Roads (Norfolk) to DC

Inter-City Bus	*Train*	*Air*
5 Trips per Day 5:35 Travel Time $20 Est. Cost	6 Trips per Day 4:44 Travel Time $42 Est. Cost	4 Trips per Day 1:00 Travel Time $285 Est. Cost

Auto

Via I-64: 2:45 Travel Time $100 Est. Cost
Via Rt. 60 / I-295 / I-95: 3:25 Travel Time $111 Est. Cost

Hampton Roads (Norfolk) to Petersburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	7 Trips per Day 4:26 Travel Time $31 Est. Cost

Auto

Via I-64: 1:29 Travel Time $53 Est. Cost
Via Rt. 60 / I-295 / I-64: 2:37 Travel Time $63 Est. Cost

Park-and-Ride

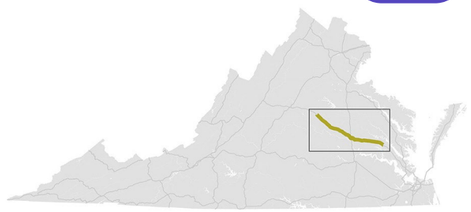
Within Segment C4, commuters can utilize many Park-and-Ride locations, as well as commuter bus service provided by the GRTC. Goochland, Louisa, and Henrico Counties each have three Park-and-Ride locations. Henrico County has the highest number of spaces, while New Kent County has the highest utilization rate of spaces in the region. New Kent County matches the 76 percent statewide average for Park-and-Ride utilization.

C4 SEGMENT NEEDS

Safety

Between 2010 and 2012, Segment C4 experienced the second highest number of severe crashes (818) of any CoSS in the state, resulting in the highest crash rate along the East-West Corridor. The vast majority of these crashes occurred in the City of Richmond and surrounding Henrico County. The largest concentration of severe crashes along Segment C4 occurred on US 250 (West Broad Street) northwest of Richmond in Henrico County. Over a distance of approximately eight miles, between Gayton Road and Dickens Road, 344 crashes took place. Within the eight-mile span, there were 92 crashes over a one-mile stretch between Spring Oak Drive and the on-ramp to I-64 East, 26 collisions at the intersection with Gaskins Road, 52 crashes between Coppermill Terrace and Skipwith Road, 22 incidents between the Fountain Square Shopping Center and the Westland Shopping Center, and 29 collisions at the intersection with Glenside Drive.

Several other areas along Segment C4 also have large concentrations of severe crashes. In downtown Richmond, along US 250 (West Broad Street), 74 collisions took place over two miles between North Hancock Street and N 21st Street. Of these, 43 crashes were at intersections. Also, in Richmond, on I-64, there were 33 crashes that occurred north of the on-ramp to I-95 N.



Performance Metrics:

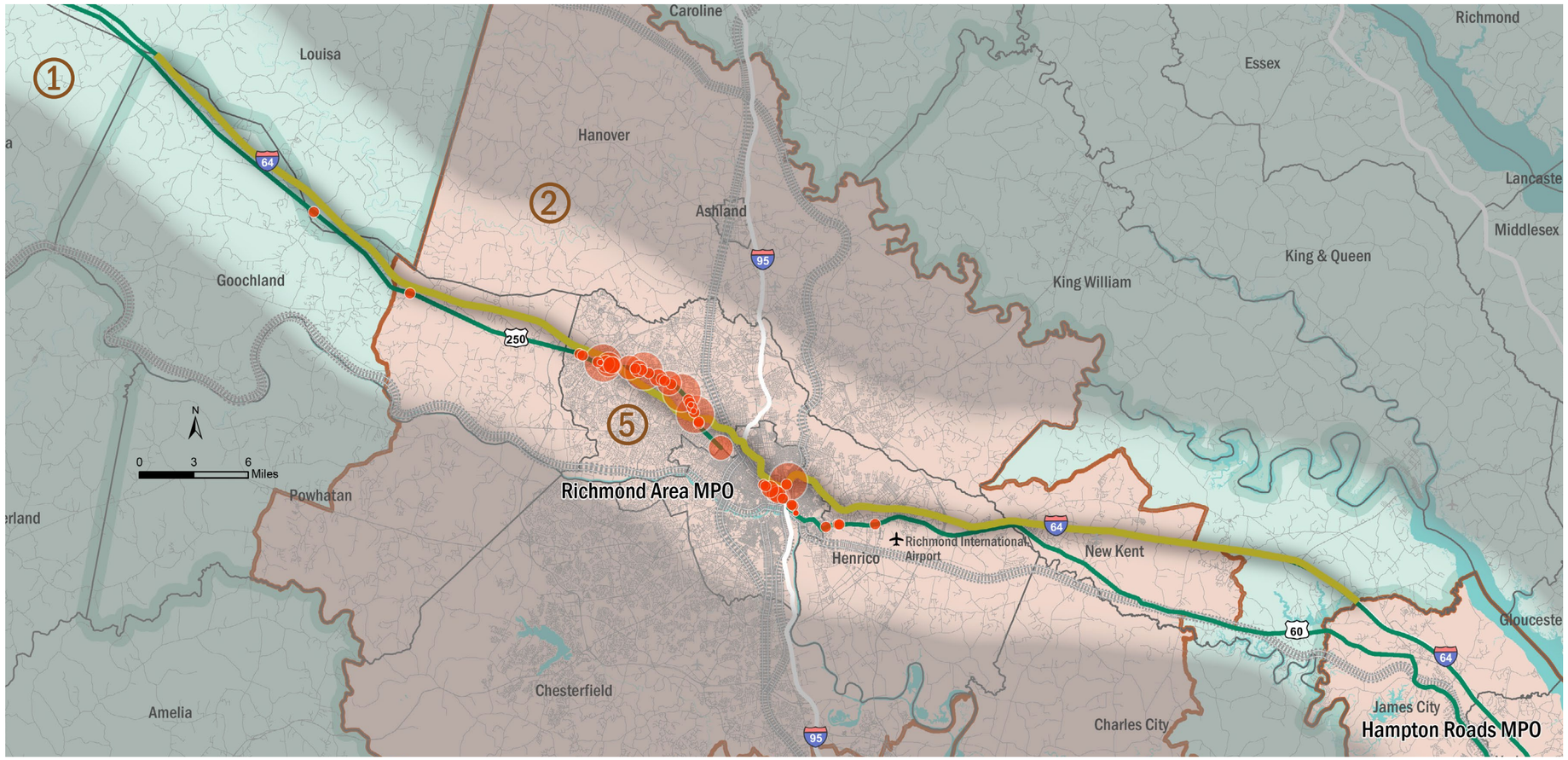
Number of Severe Crashes	520
Severe Crashes/Million VMT	0.6
Number of Railroad Crashes	8

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	21
Freight Ton Hours of Delay per Mile	7.5K

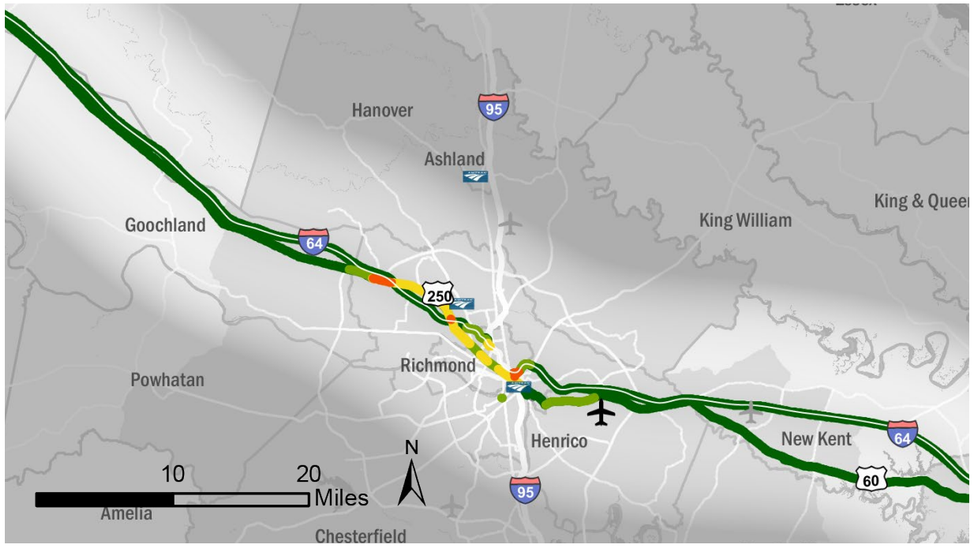
Passenger Delays

Segment C4 is moderately congested overall with around 6,400 person-hours of passenger delay daily. This averages to around 21 person-hours per mile across the entire segment. However, much of the delays exceeding 250,000 ton-hours per mile on Segment C4 are concentrated near Richmond. In Henrico County, there are significant passenger delays on US 250 beginning near Short Pump and continuing into the City of Richmond to US 360. In the City of Richmond, there are significant passenger delays in the area where I-64 and I-85 run concurrently. At 57 percent of the total daily passenger delay, this segment has one of the largest peak-period passenger delay shares among the CoSS segments, likely influenced by daily commuting patterns in and out of Richmond.

Freight Delays

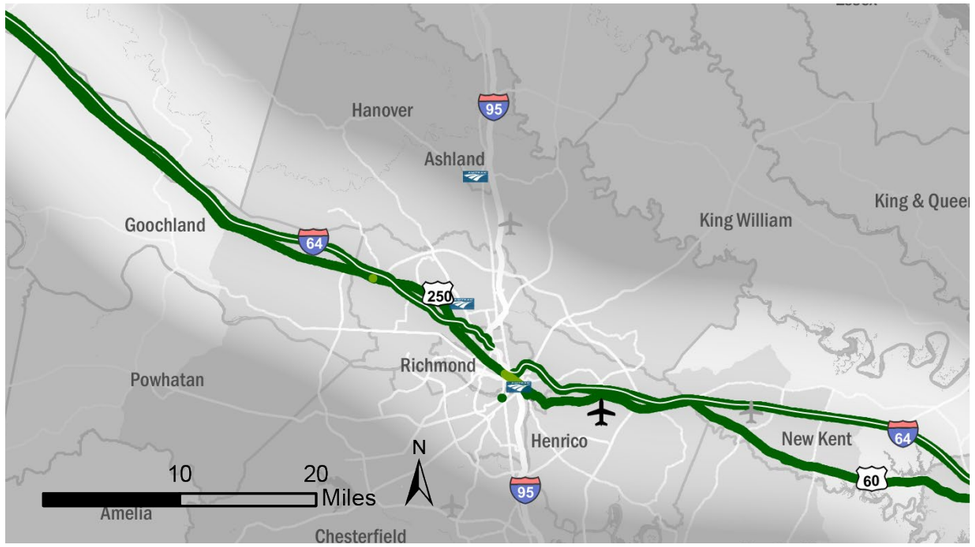
As with passenger delays, freight congestion along Segment C4 is minimal for much of the segment and highest to the west of and near downtown Richmond. However, unlike passenger traffic, there are no locations along the segment with freight delays exceeding 250,000 ton-hours per mile. Peak-period freight delays account for 47 percent of daily congestion, which is significantly higher than the peak period share of congestion for other CoSS segments.

Daily Person Hours of Delay per Mile

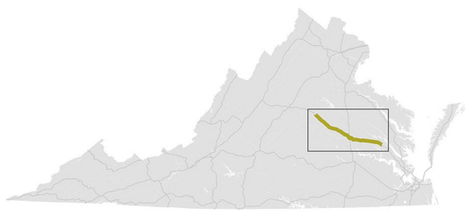


< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



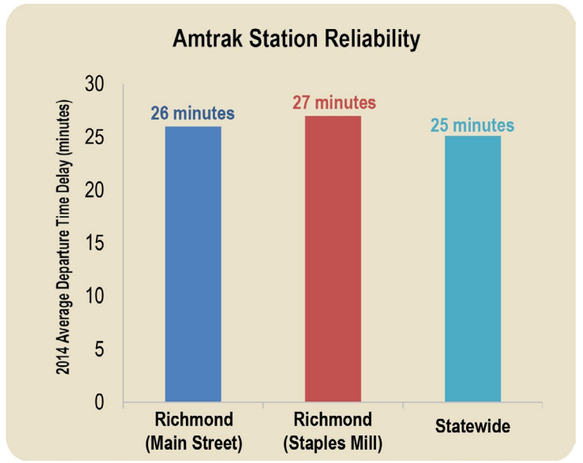
Reliability

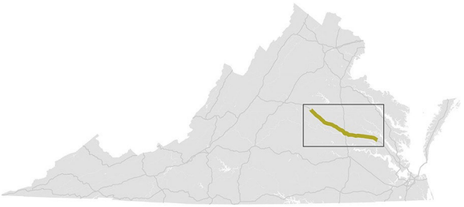
Reliability Index

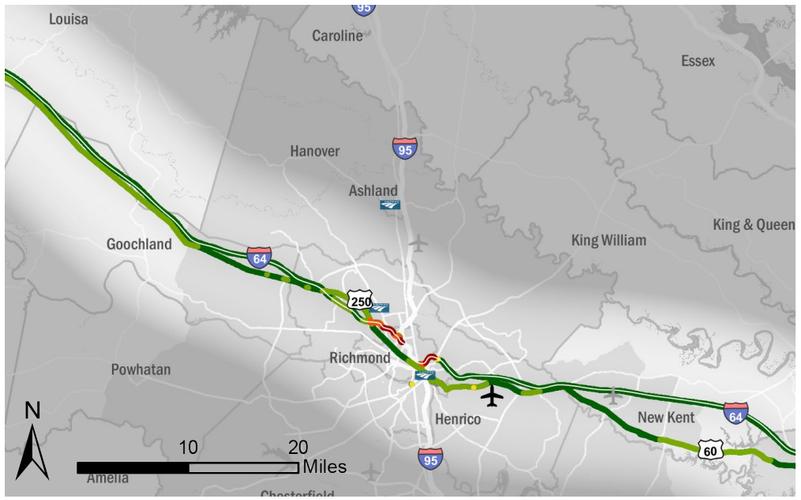
- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



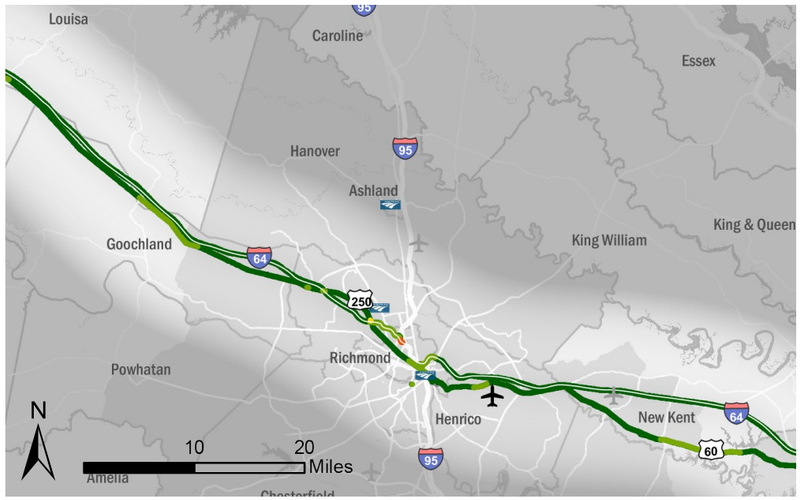




Weekday Peak

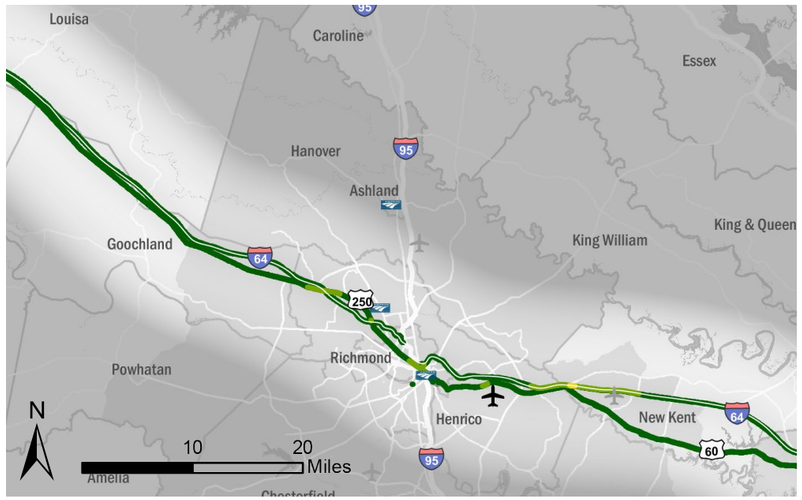
Reliability of travel during the peak period on a typical weekday on Segment C4 ranges from 0.00 to 1.03 in terms of reliability index, with an average value of 0.18. The segment has an average weekday peak period reliability index higher than the average for CoSS segments statewide and includes several locations that exceed the statewide threshold:

- I-64 in Henrico County, between US 33 and the interchange with I-95;
- I-64/I-95 in the City of Richmond, immediately east of the junction with I-95; and
- I-64 in the City of Richmond, east of where I-64 diverges from I-95.



Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.75 in terms of reliability index, with an average value of 0.12. The segment has an average weekday reliability index higher than the average for CoSS segments statewide. Locations that exceed the statewide threshold include US 250 at the intersection with US 33 in Henrico County and I-64/I-95 just east of the merge between the two interstates in the City of Richmond.



Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.53 in terms of reliability index, with an average value of 0.09. None of the locations along Segment C4 have reliability index values exceeding the statewide threshold.

Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

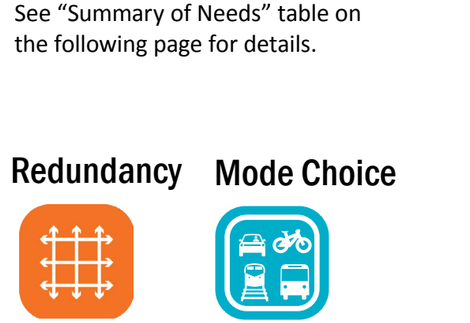
Mode Choice

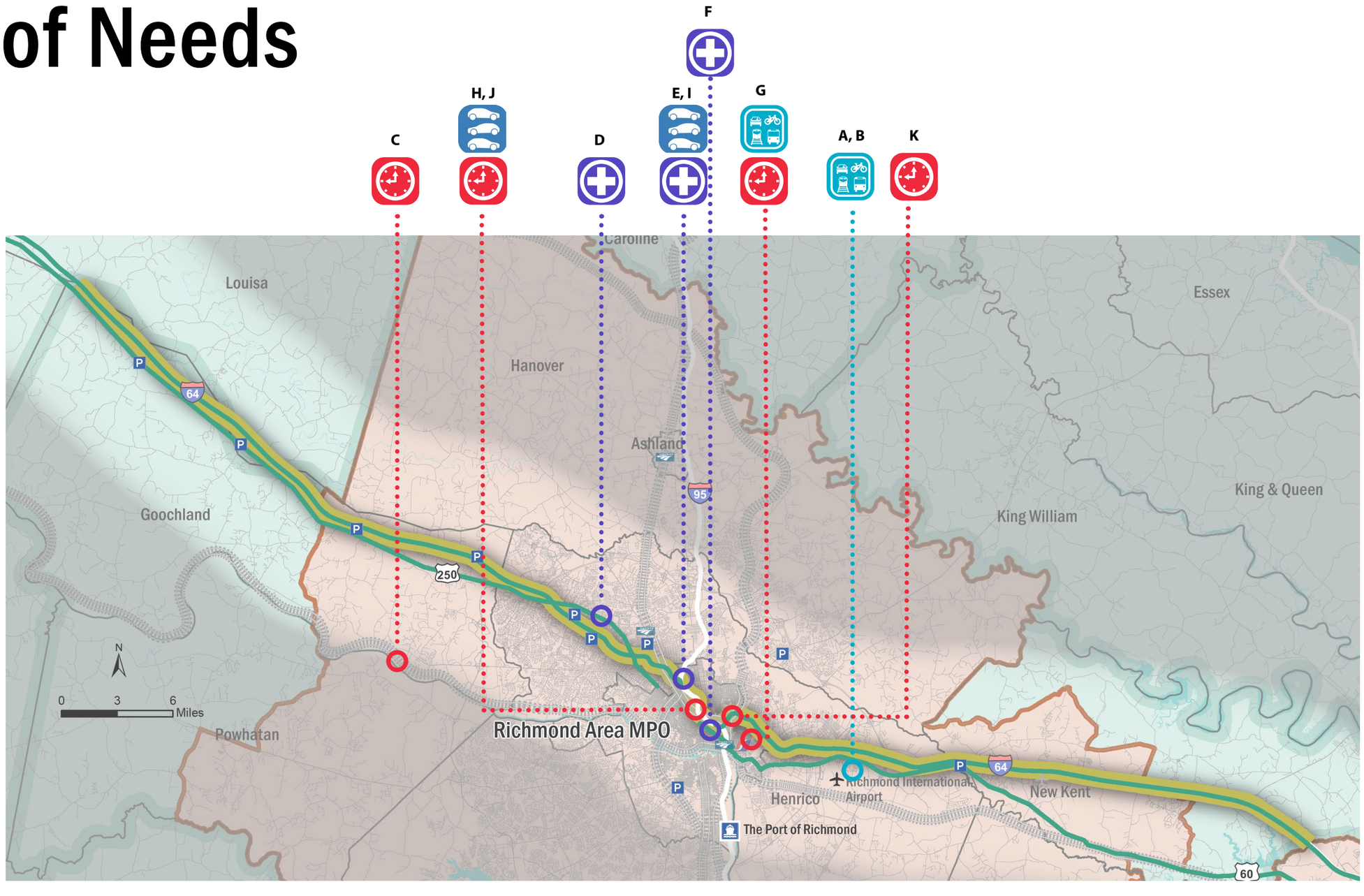
Safety

Congestion

Bottlenecks

Reliability





C4 SEGMENT NEEDS

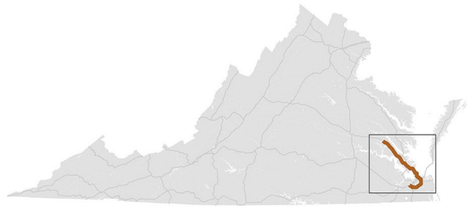
Summary of Needs - C4 Segment

A.		No public transit service provided to Richmond International Airport
B.		Unutilized capacity for freight at Richmond International Airport
C.		Unreliability of freight rail service in the corridor
D.		US 250 between Gayton Rd and Dickens Rd in Henrico County: 344 severe crashes
E.		Safety concerns at interchange of I-95 and I-64: 33 severe crashes on I-64 near interchange with I-95
F.		US 250 between North Hanock St and N 21St in Richmond: 74 severe crashes
G.		Unreliable Amtrak service from Main Street station (26 minutes average departure delay) and Staples Mill Station (27 minutes average departure delay) totaling over 88,000 person-hours of delay from this segment.
H.		Congestion issue on US 250 (Broad Street) between North Gayton Road in Short Pump and US 360 (North 18th Street) in Richmond
I.		Congestion issue at both I-64 and I-95 junctions in Richmond
J.		Reliability issue on I-64 between West Broad Street (Exit 183) and North Boulevard (Exit 78 on I-64/I-95) in Richmond
K.		Reliability issue on I-64 between I-64/I-95 and Mechanicsville Turnpike (Exit 192) in Richmond

VI. Segment C5

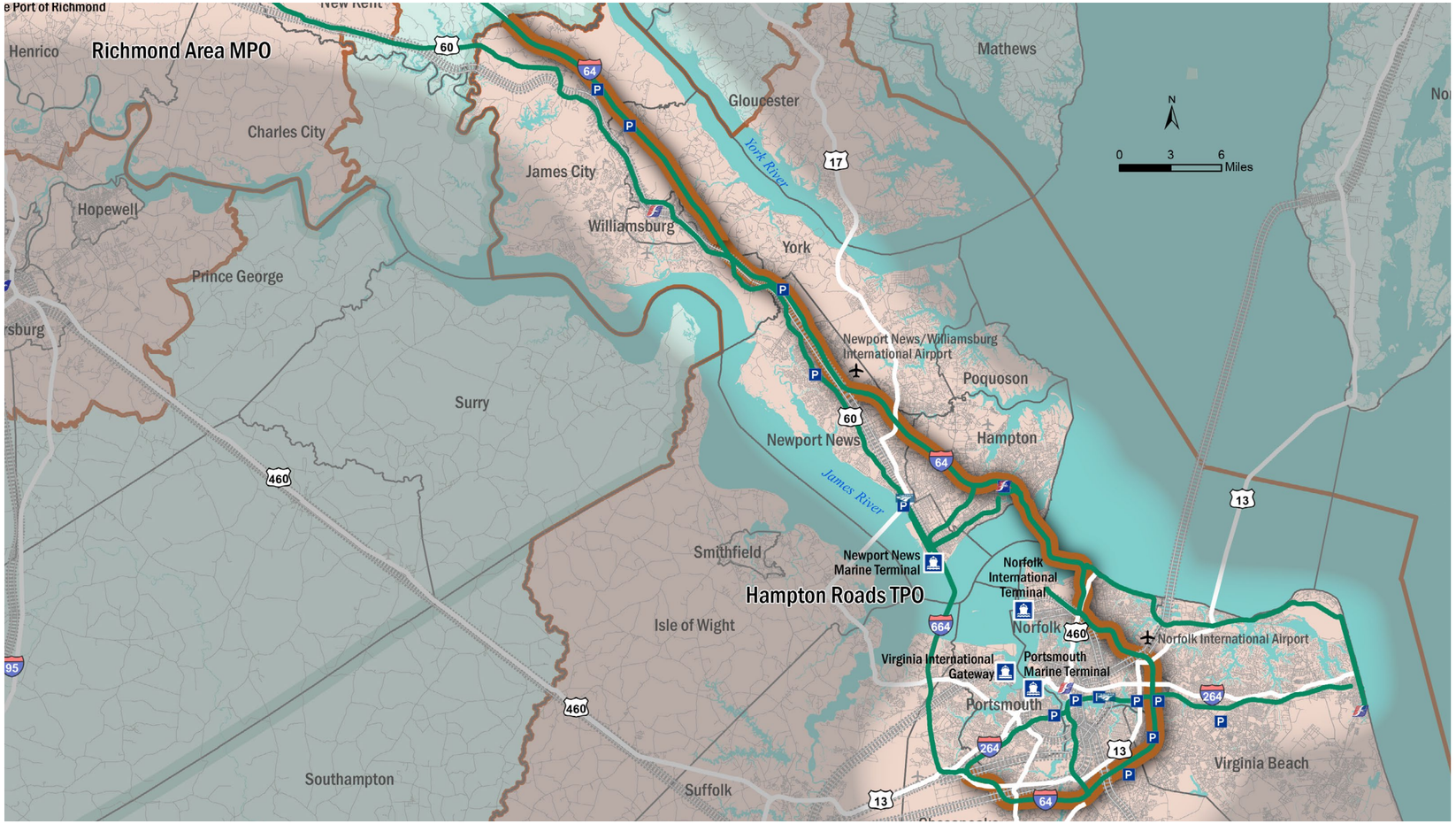
C5
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility



Corridor Segment C4 Components

- I-64
- US 60
- I-664
- I-564
- I-264
- I-464
- Newport News Marine Terminal
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- York River
- James River
- CSX Coal Corridor
- Amtrak
- Norfolk International Airport
- Newport News/Williamsburg International Airport



C5 SEGMENT PROFILE

Segment C5 begins at the western boundary of James City County and progresses to the Hampton Roads Beltway. This segment serves James City and York County, as well as the Cities of Williamsburg, Newport News, Poquoson, Hampton, Suffolk, Chesapeake, Portsmouth, Virginia Beach, and Norfolk. The segment traverses the area covered by the Hampton Roads TPO. The segment also includes portions of US 60 along its length, and several other facilities in the Hampton Roads Area. Segment C5 acts as a major corridor for through freight travel in Virginia. Within the Hampton Roads Area, the segment serves as a major commuter route, as well as a route for major tourist destinations. Segment C5 serves as an important evacuation route to the west for the Hampton Roads Area. The segment also provides a connection to the numerous military facilities located in the region.

Highway Facilities: I-64 is a major commuter and freight highway in Segment C5. US 60 runs parallel to I-64 through the segment, except where it runs concurrently through the Hampton Roads Bridge Tunnel. There are several spurs branching from I-64, including I-264, I-464, I-564, and I-664. There are multiple HOV-2 facilities available on I-64 and I-264.

Transit Services: Amtrak has stations in Williamsburg, Newport News, Norfolk and Virginia Beach, serving the Northeast Corridor. Greyhound provides service from stations in Williamsburg, Norfolk, Hampton, and Virginia Beach. The commuter bus service, Metro Area Express, is offered by Hampton Roads Transit (HRT). There are multiple Park-and-Ride facilities near I-64, the largest cluster of which is located in Norfolk.

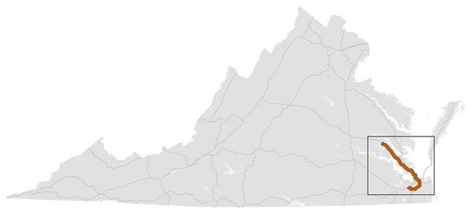
Rail Facilities: CSX's Coal Corridor rail lines pass through Segment C5 connecting locations west to the Port of Virginia facilities in the Hampton Roads Area.

Port Facilities: : I-64 and its spurs also provide connections to the Port of Virginia facilities in the Hampton Roads Area, as well as access to the navigational channels of the James and York Rivers.

Airport Facilities: Norfolk International Airport and Newport News-Williamsburg International Airport provide commercial air service in this segment.

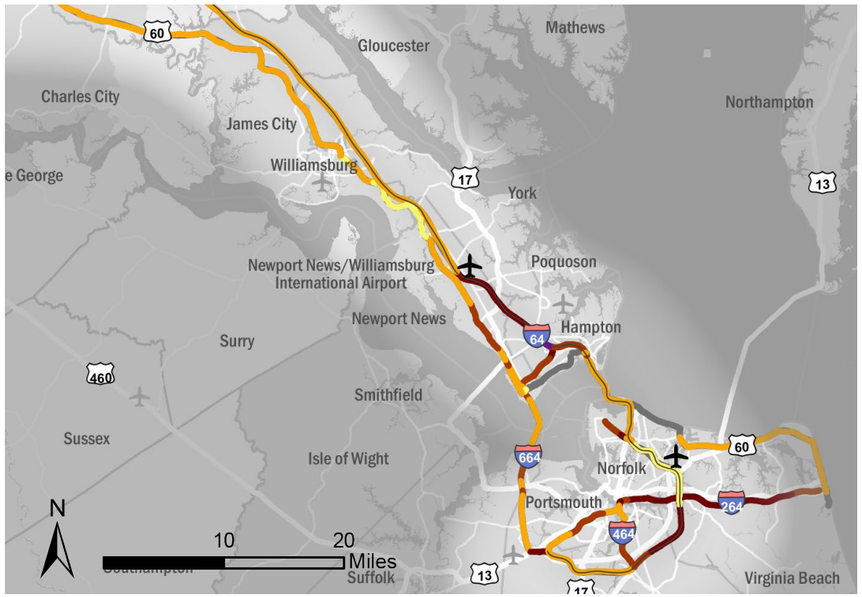
Major planned and future projects include:

- **James City County:** Widening I-64 to three lanes from Route 199 west of Williamsburg (exit 234) to about a half-mile east of Route 238;
- **City of Newport News:** Replacing I-64 Fort Eustis interchange (exit 250) to mitigate congestion and improve safety;
- **City of Newport News:** Relocation of the Amtrak station to the Newport News Multimodal Center;
- **City of Hampton:** New road construction on I-64 between Hampton Coliseum in Hampton and I-564 in the City of Norfolk;
- **City of Norfolk:** Widening of Route 165 (N Military Hwy) underneath I-64;
- **City of Norfolk:** Patriot's Crossing, a third highway crossing of Hampton Roads, currently in preliminary engineering and environmental assessment; and
- **City of Virginia Beach:** Reconstruction and added capacity at the I-64/I-264 interchange.



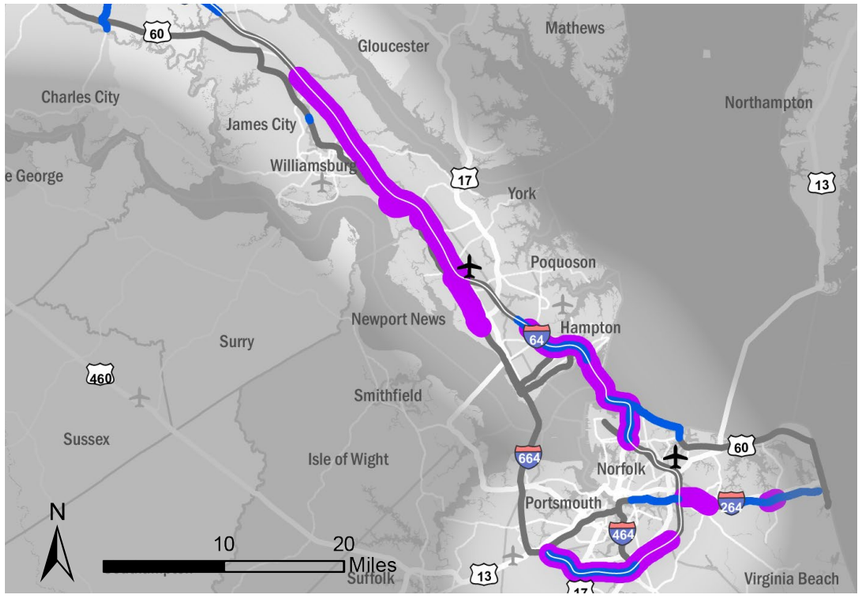
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

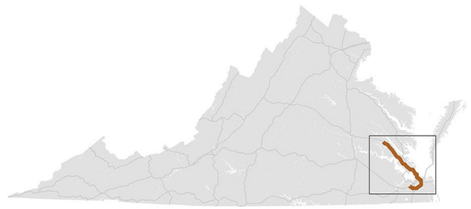


Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



Travel Demand

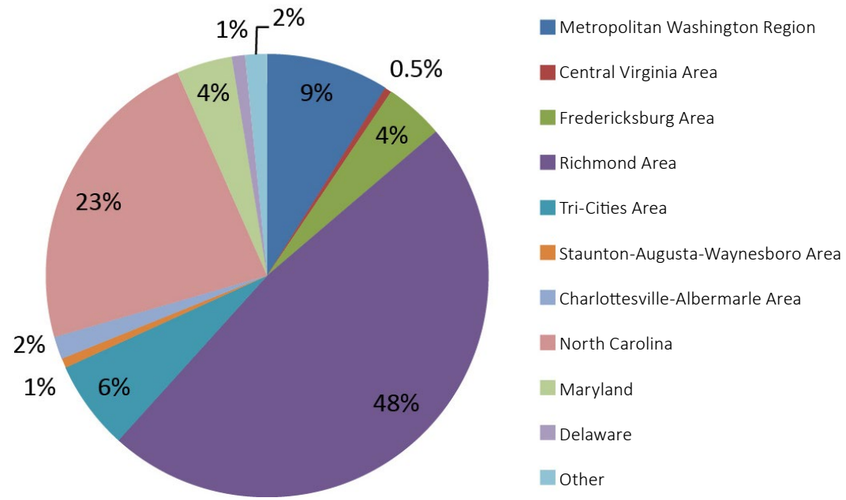


Passenger Demand

The easternmost segment of Corridor C exists entirely within the Hampton Roads TPO Area, and accommodates large amounts of traffic local to the region. Significant portions of the intercity passenger travel in the Commonwealth occur on this segment including more than nine percent between Hampton Roads and Richmond. Of the intercity traffic originating in this region, almost half (48 percent) is destined for the Richmond Area and is likely to use Segment C5. An additional nine percent is destined for the Metropolitan Washington region and may also use portions of Segment C5, although other options are available.

Travel from Hampton Roads Area to...

(clockwise starting from the top)



C5 SEGMENT PROFILE

Freight Demand

By truck, Segment C5 carried 22 million tons of freight worth $43 billion in 2012, and is estimated to carry 33 million tons of freight worth $89 billion in 2025. A large proportion of truck freight traffic on Corridor C, representing approximately 40 percent of total corridor tonnage and approximately 50 percent of the corridor value passes through Virginia. Besides this through traffic, a significant portion of the truck freight on Corridor C originates from (around 13 percent) or is destined for (between 13 and 18 percent) Norfolk and Portsmouth and their port facilities, including a large amount of truck freight traveling from North Carolina. Another major truck freight movement on Corridor C is between Nevada and the ports in the Hampton Roads Area, which accounts for 4,000 tons of freight worth $5 billion in 2012 and is expected to increase significantly in value to $28 billion in 2025, corresponding with only a modest gain in the truck freight tonnage to 4,300 tons. The jurisdictions surrounding Segment C5 are major generators of truck freight, producing approximately 15 percent of the total truck freight tonnage on Corridor C and attracting more than 20 percent of the corridor truck freight tonnage. These numbers include freight passing through the Port of Virginia facilities in these jurisdictions. On Segment C5, there are also significant truck freight movements between North Carolina, Maryland, Pennsylvania and the Hampton Roads Area.

By rail, Segment C5 carried 23 million tons of freight worth $14 billion in 2012, and is estimated to carry 23 million tons of freight worth $17 billion in 2025. Nearly all rail freight on Corridor C (approximately 95 percent of total tonnage) is destined for Virginia, with less than one percent of freight passing through the Commonwealth. This is primarily because large quantities of freight are traveling to/from the port facilities in the Hampton Roads Area. Large amounts of low value rail freight (around two-thirds of the total corridor rail freight tonnage but only around 20 percent of the corridor rail freight value) travels eastbound from West Virginia and Kentucky to the marine terminal located at Newport News. Likewise, approximately 85 percent of the rail freight tonnage in Corridor C is destined for the jurisdictions adjacent to Segment C5, including the ports at Newport News, Norfolk, and Portsmouth, representing 35 percent of the rail freight value on Corridor C. Less than one percent of the total corridor rail tonnage and value originates in the jurisdictions adjacent to Segment C5, corresponding to a one-directional, eastbound movement of rail freight throughout this segment of Corridor C to the ports.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (36% / 37%)
2. North Carolina (15% / 13%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (6% / 6%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment C5: 14% / 16%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (40% / 41%)
2. North Carolina (10% / 10%)
3. Pennsylvania (7% / 7%)
4. City of Norfolk* (7% / 7%)
5. New York (7% / 6%)

Corridor Tonnage Destined for Segment C5: 20% / 22%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (74% / 71%)
2. Virginia (9% / 11%)
3. Kentucky (8% / 8%)
4. Dickenson County (3% / 3%)
5. Hanover County (2% / 3%)

Corridor Tonnage Originating in Segment C5: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Norfolk* and West Virginia
City of Newport News* and Kentucky
Dickenson County and City of Newport News*
Hanover County and City of Newport News*

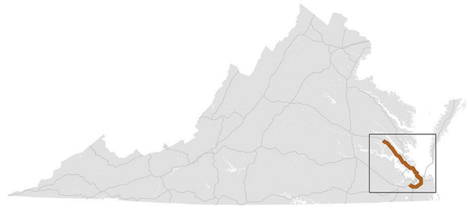
Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (96% / 95%)
2. City of Newport News* (73% / 71%)
3. City of Norfolk* (11% / 10%)
4. City of Covington (2% / 2%)
5. Rockingham County (1% / 2%)

Corridor Tonnage Destined for Segment C5: 87% / 84%



Traffic Conditions



Traffic Volume and AADT

Traffic volume on Segment C5 is high compared to other segments in Corridor C, and average daily traffic volumes vary considerably on different facilities throughout the segment as follows:

- I-64, highest in the Cities of Hampton, Virginia Beach and Norfolk: 60,000 to 163,000 vehicles per day;
- I-264, highest in Virginia Beach: 41,000 to 184,000 vehicles per day;
- I-464, highest near I-64 in Chesapeake: 46,000 to 55,000 vehicles per day;
- I-564, highest at the interchange with I-64 in Norfolk: 21,000 to 56,000 vehicles per day;
- I-664, highest near I-264 in Chesapeake: 53,000 to 96,000 vehicles per day; and
- US 60, highest in Newport News: 2,000 to 40,000 vehicles per day.

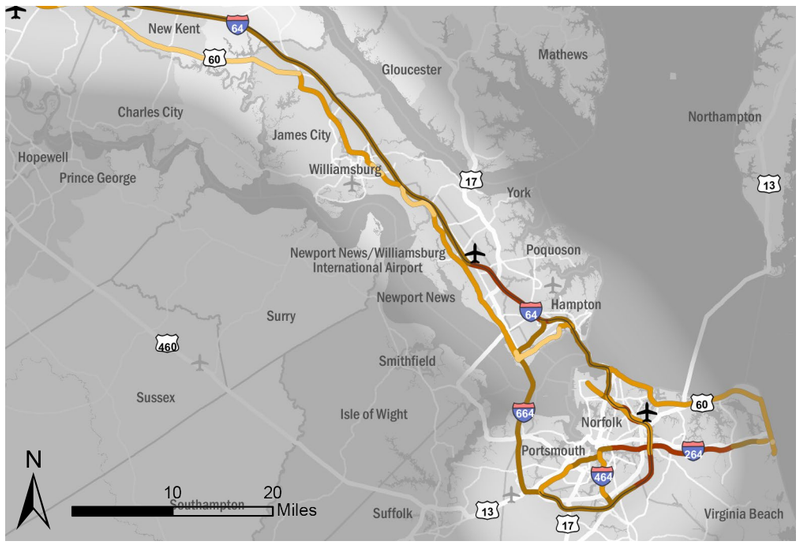
Daily traffic volumes are projected to increase by 2025 throughout Segment C5, as follows:

- I-64: growth of 4,000 to 26,000 vehicles, with higher growth expected on the Peninsula north of the James River;
- I-264: growth of 7,000 to 27,000 vehicles;
- I-464: growth of 4,000 to 10,000 vehicles;
- I-664: growth of 10,000 to 23,000 vehicles, with the highest growth expected approaching I-264 in Chesapeake; and
- US 60: growth of less than 4,000 vehicles across almost all sections

By 2025, the increases detailed above are projected to result in the highest traffic volumes in Segment C5 occurring on I-264 in Virginia Beach. Volumes in this area may exceed 200,000 vehicles per day.

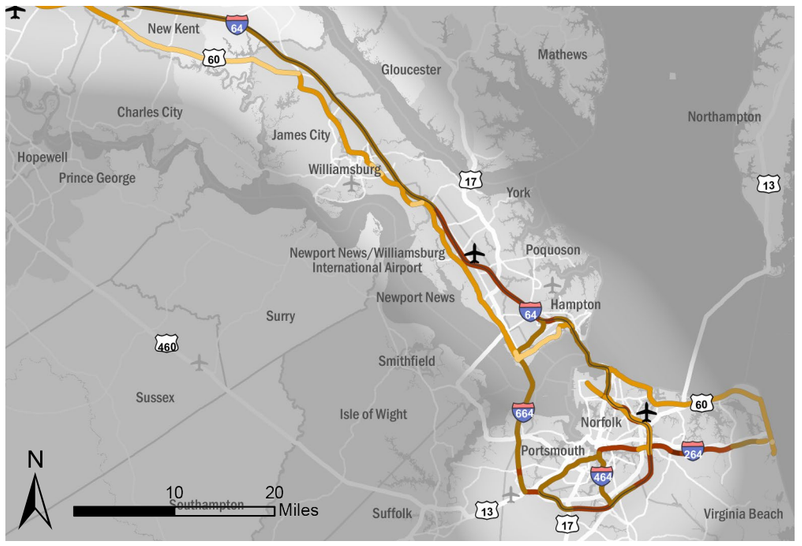
Traffic Volume 2014 (AADT)

< 10,000 | 10,000 - 50,000 | 50,000 - 100,000 | 100,000 - 200,000 | > 200,000 | Primary facility



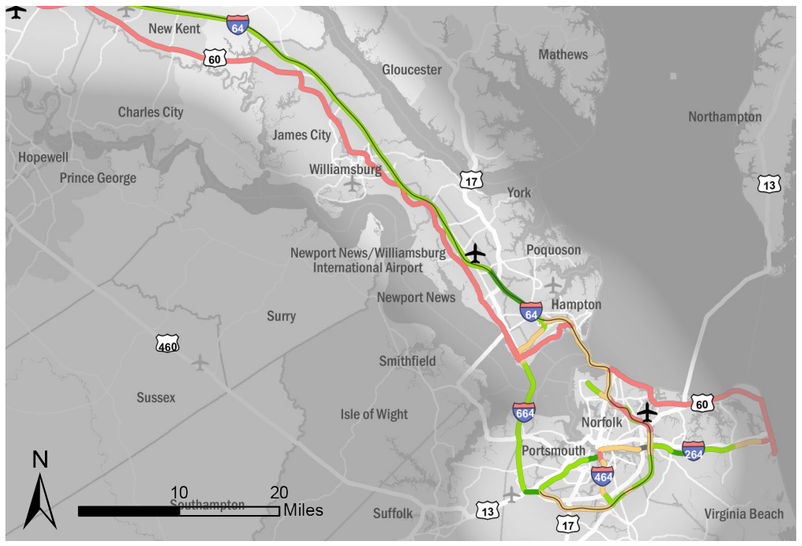
Traffic Volume 2025 (AADT)

< 10,000 | 10,000 - 50,000 | 50,000 - 100,000 | 100,000 - 200,000 | > 200,000 | Primary facility

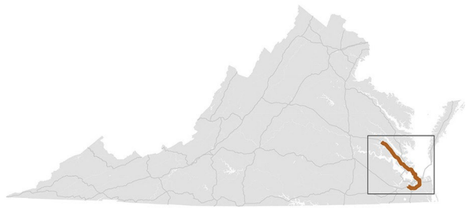


Change in Traffic Volume 2014- 2025 (AADT)

Decreased | 0 - 5,000 | 5,000 - 10,000 | 10,000 - 20,000 | > 20,000 | Primary facility



C5 SEGMENT PROFILE

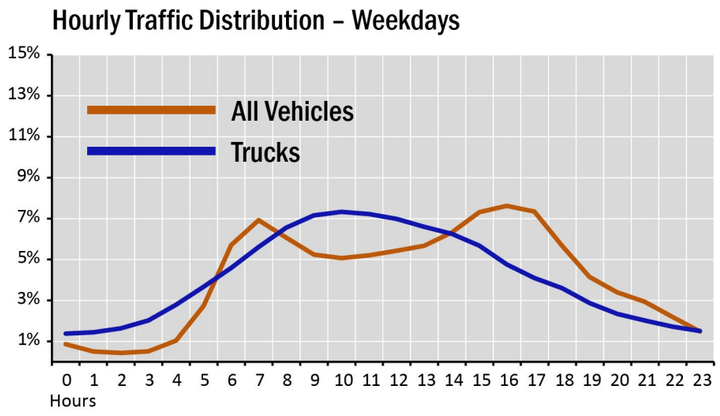


Traffic Distribution

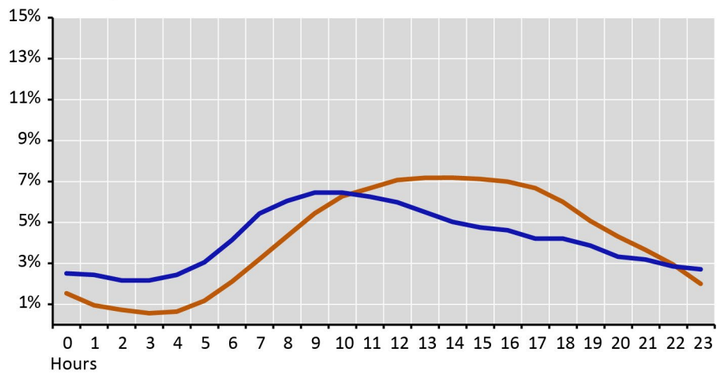
On average, traffic on Segment C5 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.6 percent of daily traffic and a morning peak hour between 7 and 8 a.m. accounting for 6.9 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 52 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic, with a single peak during the midday period and a peak hourly flow of 7.3 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (7.2 percent of daily traffic) for all traffic, and 9 to 10 a.m. (6.4 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment C5 vary by as much as 36 percent throughout the year, with the highpoint in August (around 100,000 vehicles per day) and the low point in January (around 74,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the April high (around 5,000 vehicles per day) 20 percent higher than the January low (around 4,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 92,000 vehicles per day) are 58 percent higher than January levels (around 58,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the September high 26 percent higher than the July low. Since truck volumes account for a relatively small portion of traffic on Segment C5, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

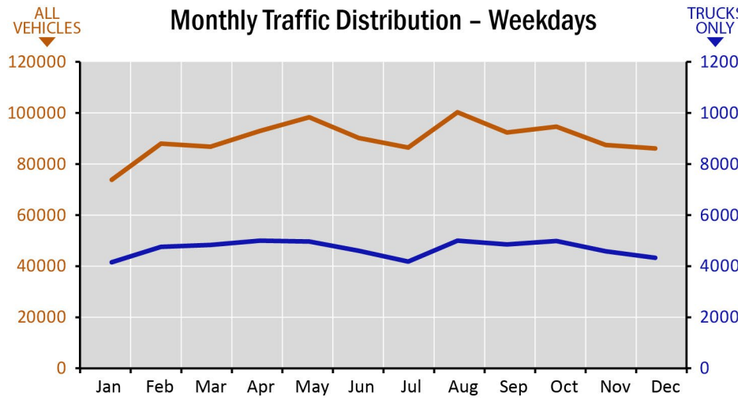
Hourly Traffic Distribution – Weekdays



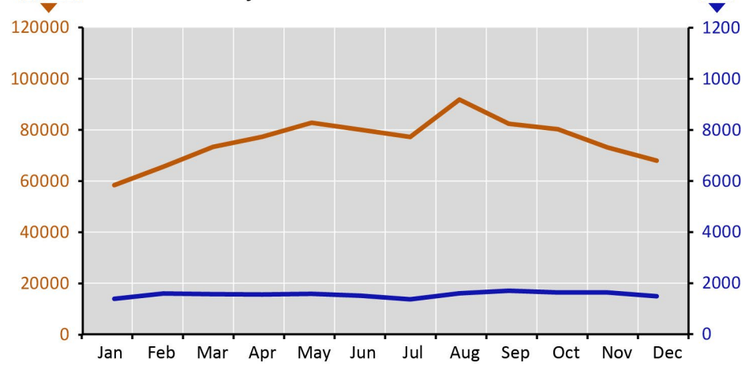
Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekdays



Monthly Traffic Distribution – Weekends

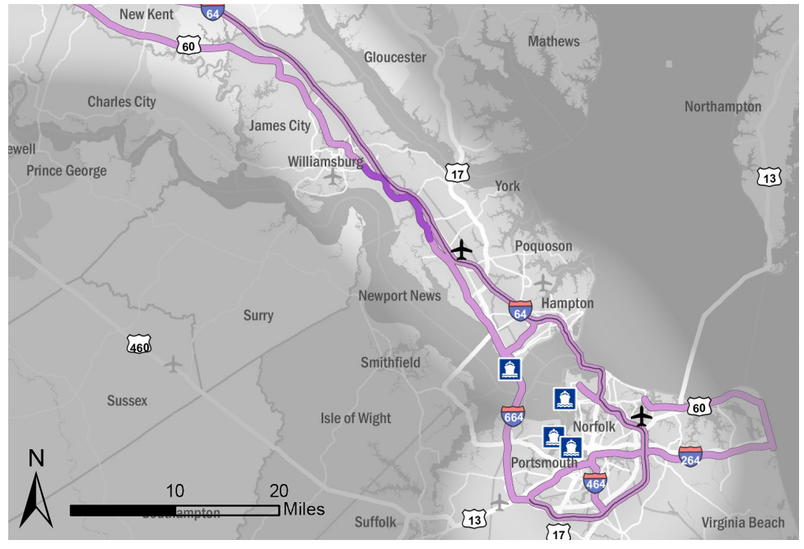


Truck Volumes

The percent of average daily traffic comprised of heavy trucks on Segment C5 is generally the lowest of all segments in Corridor C, due primarily to the large amounts of commuter traffic carried on these facilities. On facilities throughout Segment C5, trucks comprise less than five percent of daily traffic, except on a portion of US 60 between Williamsburg and Route 173 in Newport News, where trucks account for six percent of daily traffic.

Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

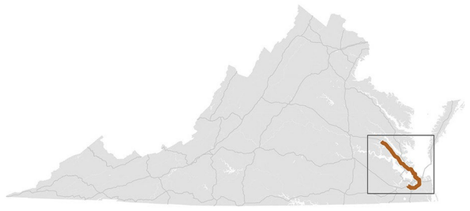


C5 SEGMENT PROFILE

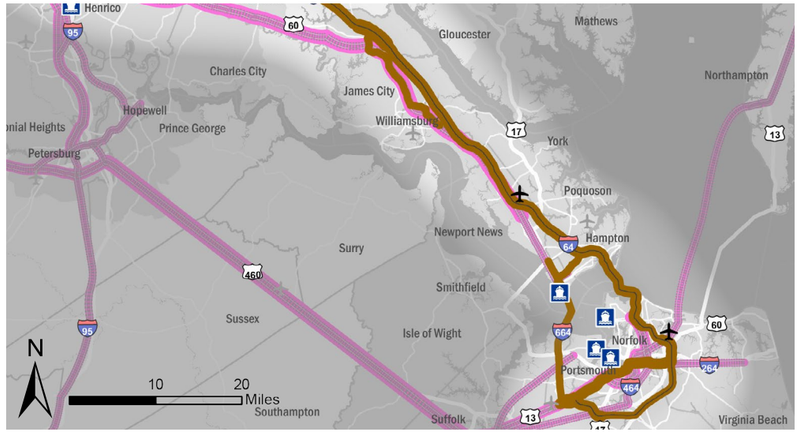
Freight Flows

At the western end of Segment C5 in Newport News, freight is overwhelmingly moved by truck, in terms of both tonnage and value. In total, 22 million tons (99 percent) of freight tonnage is moved through this section of Segment C5 by truck, compared to 243,000 tons by rail. By value, trucks are favored even more, with $43 billion (99.9 percent) of freight value traveling by truck, compared to $2 million by rail. On average, a ton of freight traveling through this section of Segment C5 by truck is worth $1,933 while a ton of freight traveling by rail is worth only $9. In 2025, both rail and truck freight tonnages and total values in this section of Segment C5 are expected to increase, but the percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton on trucks is expected to grow by 2025, with an average of $2,673 per ton, while value per ton will remain the same on rail.

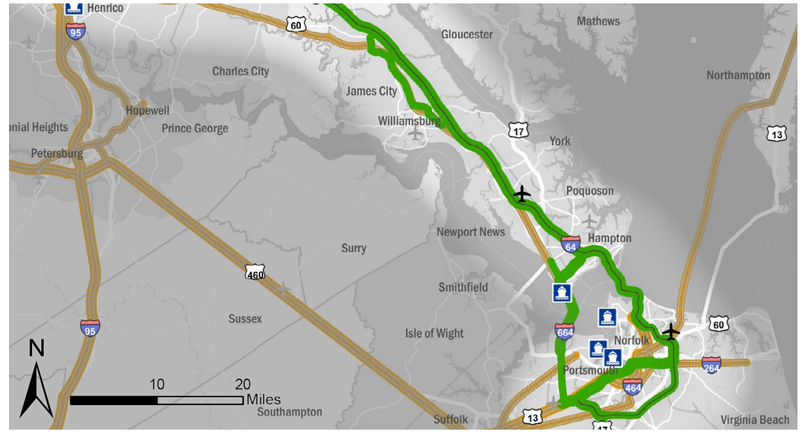
At the eastern end of Segment C5 in Norfolk, freight is moved primarily by rail, in terms of both tonnage and value. In total, five million tons (18 percent) of freight is moved through this section of Segment C5 by truck, compared to 22.5 million tons by rail. By value, rail is also favored, although to a lesser degree, with $7 billion (33 percent) of freight value traveling by truck, compared to $14 billion by rail. On average, a ton of freight traveling through this section of Segment C5 by truck is worth $1,408 while a ton of freight traveling by rail is worth $606. In 2025, both rail and truck freight tonnages and total values in this section of Segment C5 are expected to increase, and the percentage of the freight that travels by truck is expected to increase to 23 percent by tonnage and 34 percent by value. Value per ton on trucks is expected to decrease by 2025, with an average of $1,253 per ton, while value per ton will increase to $744 on rail.



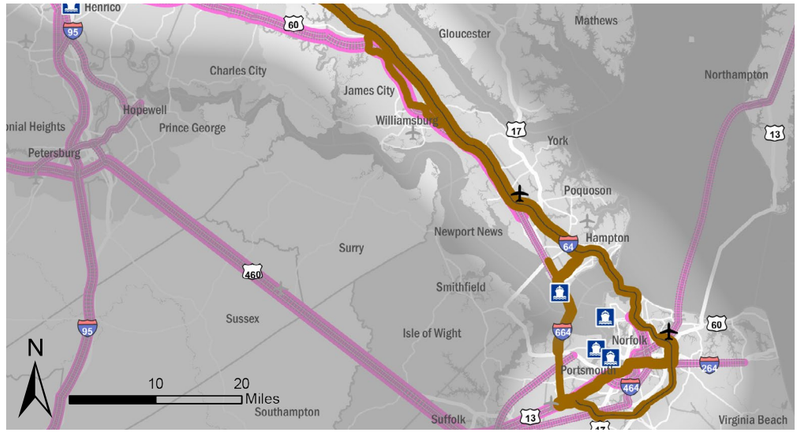
Annual Freight by Tonnage, 2012



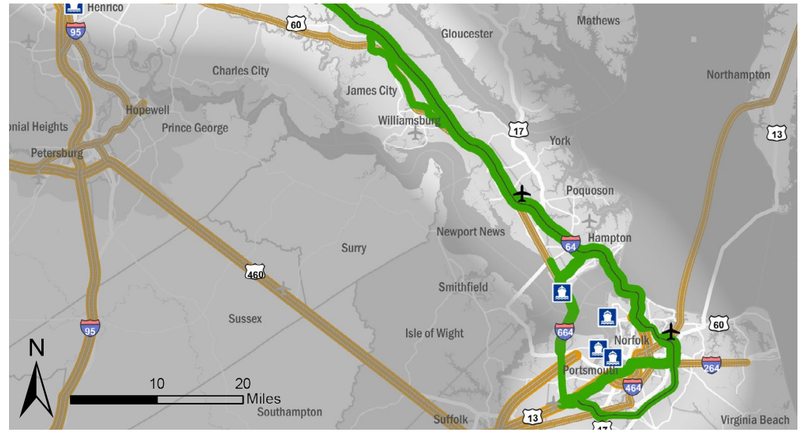
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment C5 of the East-West Corridor have a wide range of travel options, both in terms of travel path and mode choice. US 60 serves as the parallel route to I-64 through most of Segment C5, and many other routes are available within the cities of the Hampton Roads Area. Based on the 2014 federal standard mileage rate of 56 cents per mile, trips to and from the Hampton Roads Area would be more expensive by automobile than by the other available modes. The alternate modes, including bus and rail, are all limited by the frequency of service and have longer travel times than the typical automobile trip. In Segment C5, Amtrak has stations in Williamsburg, Newport News, Norfolk and Virginia Beach. Greyhound provides service in Segment C5 from stations located in Williamsburg, Norfolk, Hampton, and Virginia Beach.

Park-and-Ride

Within Segment C5, commuters can use many Park-and-Ride locations, which are evenly spread throughout the region, as well as commuter bus service provided by HRT. Virginia Beach provides the most Park-and-Ride spaces and has the highest utilization rate of spaces in the region. However, no county or city within the Segment C5 area has a rate higher than the 76 percent statewide average for Park-and-Ride utilization.



Comparable Travel Options

Hampton Roads (Norfolk) to Richmond

Inter-City Bus	*Train*
5 Trips per Day 2:00 Travel Time $11 Est. Cost	5 Trips per Day 2:03 Travel Time $23 Est. Cost

Auto

Via I-64: 1:35 Travel Time $52 Est. Cost
Via Rt. 60: 2:21 Travel Time $52 Est. Cost

Hampton Roads (Norfolk) to Petersburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	7 Trips per Day 4:26 Travel Time $31 Est. Cost

Auto

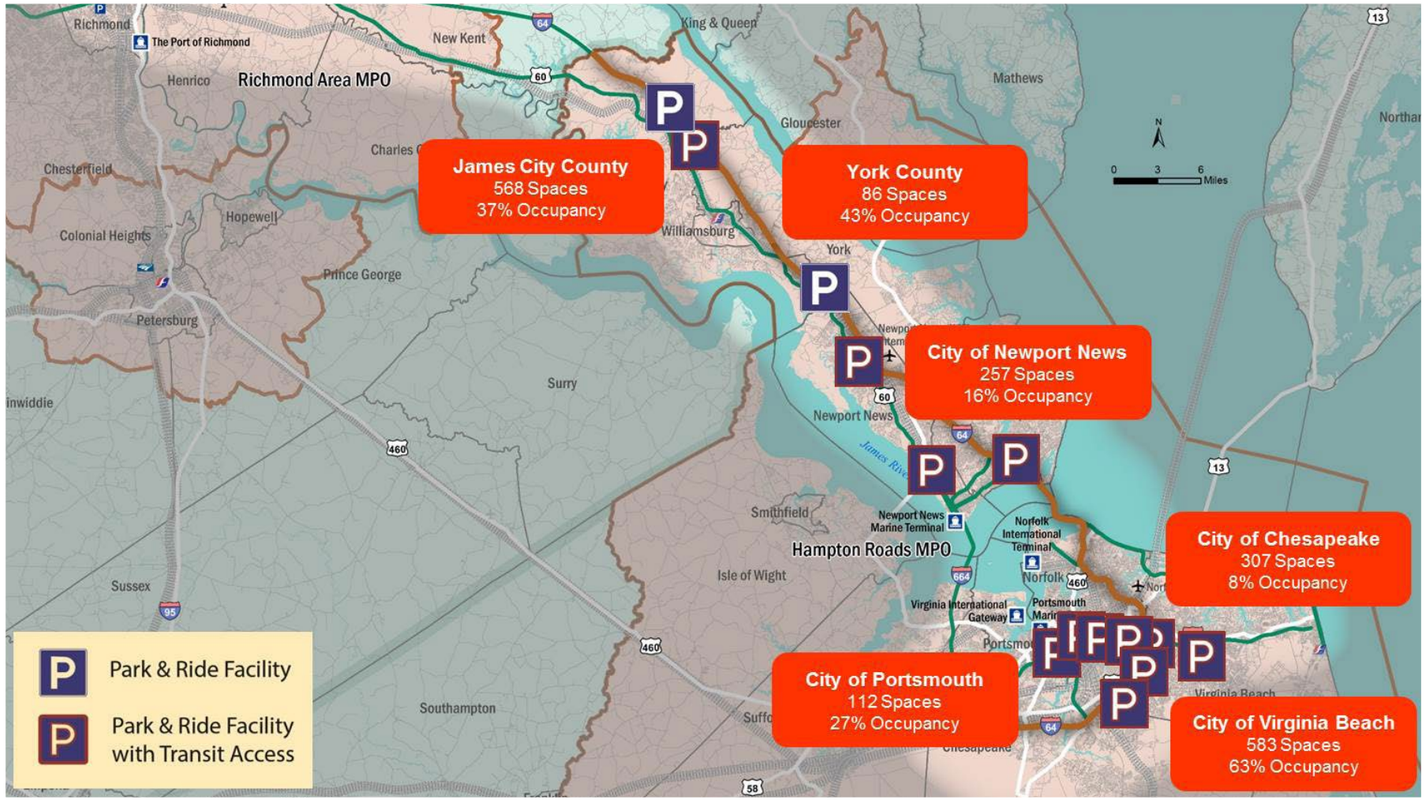
Via I-64: 1:29 Travel Time $53 Est. Cost
Via Rt. 60 / I-295 / I-64: 2:37 Travel Time $63 Est. Cost

Hampton Roads (Norfolk) to DC

Inter-City Bus	*Train*	*Air*
5 Trips per Day 5:35 Travel Time $20 Est. Cost	6 Trips per Day 4:44 Travel Time $42 Est. Cost	4 Trips per Day 1:00 Travel Time $285 Est. Cost

Auto

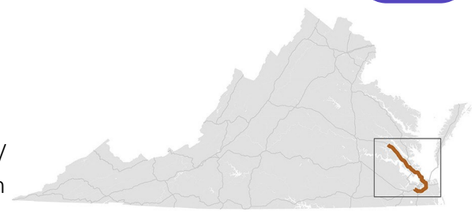
Via I-64: 2:45 Travel Time $100 Est. Cost
Via Rt. 60 / I-295 / I-95: 3:25 Travel Time $111 Est. Cost



C5 SEGMENT NEEDS

Safety

Between 2010 and 2012, Segment C5 experienced a high number of severe crashes (613), but it actually has one of the lowest crash rates in the Corridor. Within the C5 Segment, several areas experienced high concentrations of severe crashes. In Williamsburg, along US 60, there were 58 collisions within 3.5 miles between Lightfoot Road and Route 612. Of the 58 incidents, 36 incidents were at intersections. Along US 60 (Warwick Boulevard) in Newport News, 324 crashes happened over a stretch of approximately ten miles. In the northernmost portion of this ten-mile span, 267 crashes took place over a distance of 6.3 miles between Lees Mill Drive and the Peninsula Memorial Park Cemetery. Of the 267 crashes, 78 crashes were at intersections including 39 at the intersection of Warwick Boulevard and Denbigh Boulevard adjacent to the Warwick Denbigh Shopping Center and Denbigh Village Center. The remaining 57 collisions that occurred within the southernmost portion of the ten-mile span took place between Middlesex Road and Milford Road. On I-64 at Willoughby Bay, there were 51 incidents over a distance of approximately 0.5 miles near the southern entrance to the Hampton Roads Bridge-Tunnel. Also on I-64 in Norfolk, there were 50 collisions north of the on-ramp to I-264. Along US 60 (East Ocean View Avenue/ Shore Drive) in Norfolk, there were 85 crashes over 7.6 miles between Chesapeake Boulevard and Pleasure House Road.



Performance Metrics:

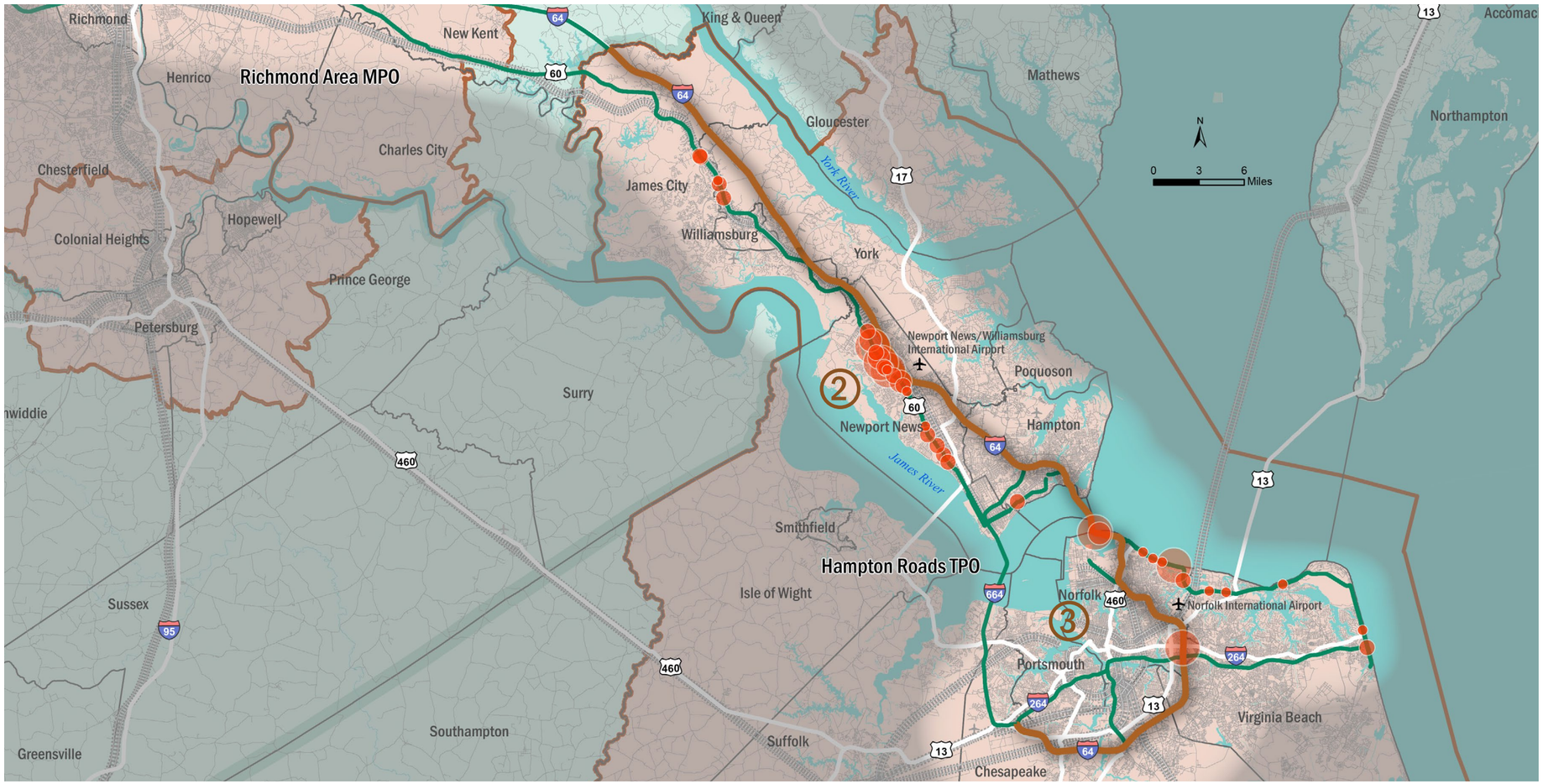
Number of Severe Crashes	613
Severe Crashes/Million VMT	0.2
Number of Railroad Crashes	5

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Passenger Delays

Passenger congestion on Segment C5 is the highest among all segments along the East-West Corridor (Corridor C), accounting for nearly 15,000 person-hours of delay, which averages to over 36 person-hours per mile across the segment. Throughout the Hampton Roads Area, there are several locations where passenger delays exceed 100 person-hours including:

- In the City of Hampton there are severe passenger delays, approaching 920 person-hours per mile, on I-64 approaching the Hampton Roads Bridge-Tunnel. Significant passenger delays on I-64 continue through the bridge tunnel into the City of Norfolk until reaching Route 165;
- There are significant passenger delays on I-264 near the Berkley Bridge in Norfolk continuing to I-464 and the I-264 Downtown Tunnel heading into the City of Portsmouth;
- In the City of Virginia Beach, there are locations of significant passenger delay on I-64 and I-264;
- In the City of Chesapeake, there are significant delays along I-64 and I-664, particularly near major interchanges; and
- In Newport News, there are several areas of significant passenger delay on US 60 and along I-664 approaching the Monitor-Merrimac Memorial Bridge-Tunnel.

At 73 percent of the total daily passenger delay, Segment C5 has the largest peak-period passenger delay share among the CoSS segments.

Performance Metrics:

Person Hours of Delay per Mile	36
Freight Ton Hours of Delay per Mile	22.6K



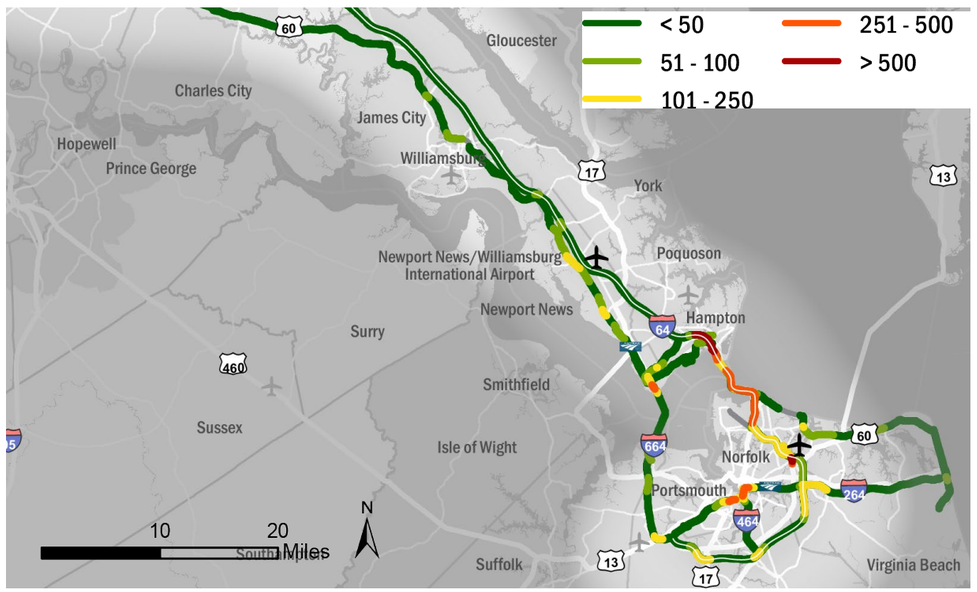
Freight Delays

Freight delays on Segment C5 rank near the top among CoSS segments, with over 9.5 million ton-hours of delay averaging to over 22,000 ton-hours of freight delay per mile. There are several areas of significant freight delay in the Hampton Roads Area, including:

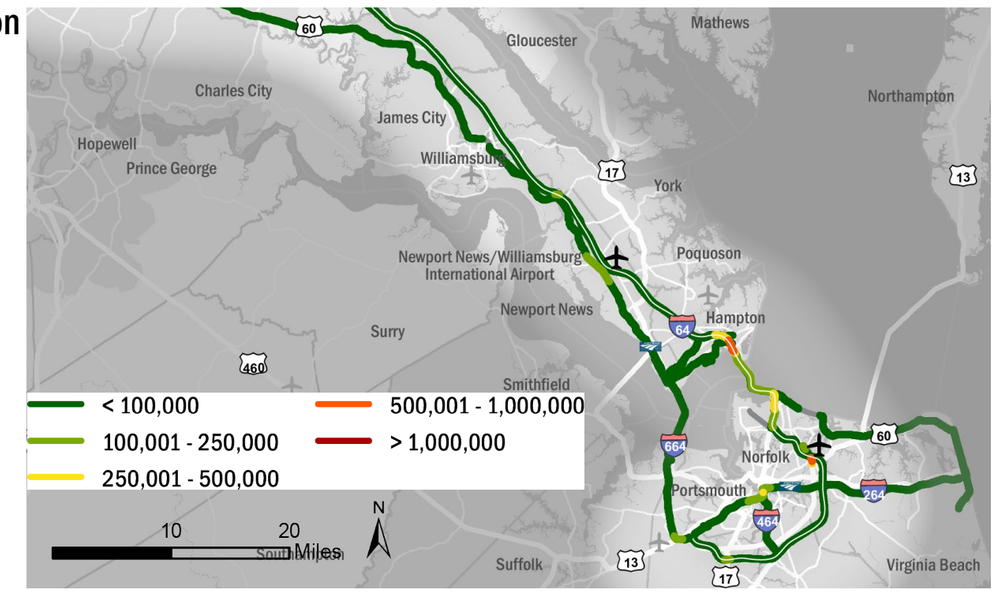
- In the City of Hampton, on I-64 approaching the Hampton Roads Bridge-Tunnel, as well as on the other approach to the bridge tunnel on I-64 in the City of Norfolk; and
- In Norfolk at US 13 and I-264 on the Berkley Bridge.

At 67 percent of the total daily freight delay, this corridor segment has the one of the largest peak-period freight delay shares among the CoSS segments.

Daily Person Hours of Delay per Mile



Daily Freight Ton Hours of Delay per Mile



C5 SEGMENT NEEDS

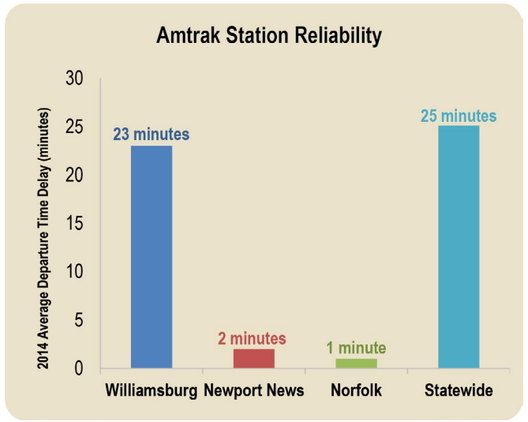
Reliability

Reliability Index

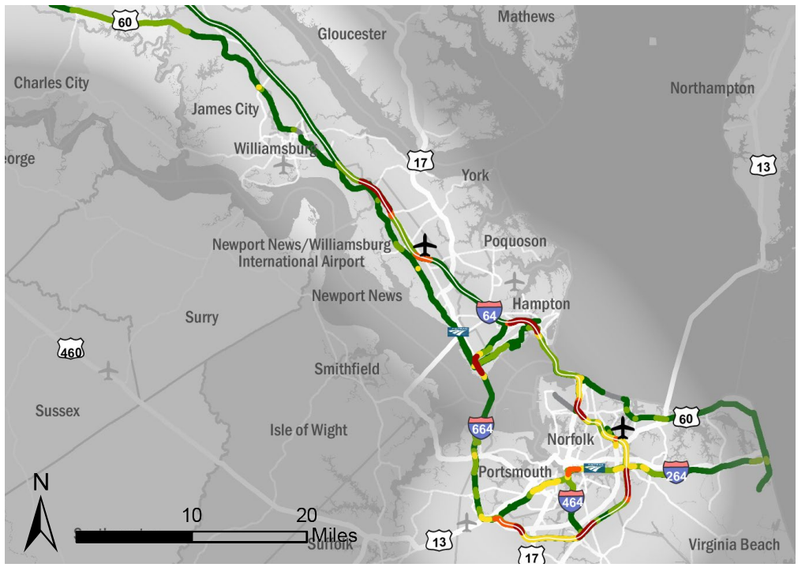
- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



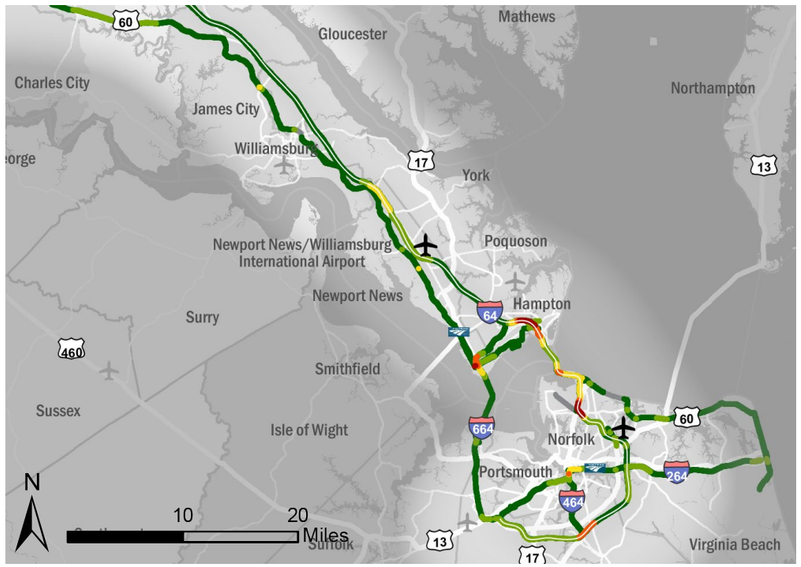




Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment C5 ranges from 0.00 to 2.94 in terms of reliability index, with an average value of 0.23. The weekday peak reliability is one of the worst in the Commonwealth, and is the worst for any CoSS segment outside of Northern Virginia. Locations where the peak period reliability index exceeds the statewide threshold include:

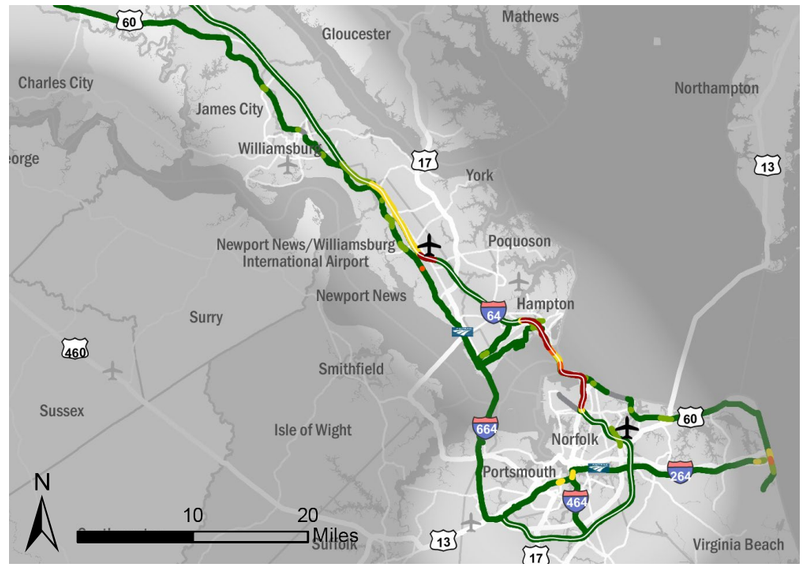
- I-64 in Hampton approaching the Hampton Roads Bridge-Tunnel;
- I-64 in Norfolk near the interchange with I-564;
- I-64 in Virginia Beach, south of the interchange with I-295;
- I-64 in Chesapeake near the interchanges with I-464 and US 17;
- I-664 in Newport News near US 60; and
- I-64 in Newport News near the border with James City County.



Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 1.03 in terms of reliability index, with an average value of 0.16. Weekday reliability is above average compared to other CoSS segments statewide, and includes several locations where the weekday reliability index exceeds the statewide threshold:

- US 60 in James City County north of Route 199;
- I-64 in Newport News near the border with James City County;
- US 60 in Newport News at the intersection with Route 171;
- I-64 on both sides of the Hampton Roads Bridge-Tunnel (from Route 134 in Hampton past I-564 in Norfolk);
- I-64 in Chesapeake between the interchanges with I-464 and Route 168;
- I-664 in Newport News near US 60; and
- I-264 at the interchange with I-464 in Norfolk.



Weekend

Reliability of travel during a typical weekend ranges from 0.01 to 2.20 in terms of reliability index, with an average value of 0.13. Weekday reliability is above average compared to other CoSS segments statewide, and includes several locations where the weekday reliability index exceeds the statewide threshold:

- I-64 in Newport News near the Route 143 interchange;
- US 60 in Newport News at the intersection with Route 171;
- I-64 on both sides of the Hampton Roads Bridge-Tunnel (from Route 134 in Hampton to I-564 in Norfolk); and
- US 60 in Virginia Beach at the interchange with I-264.

C5 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

Mode Choice

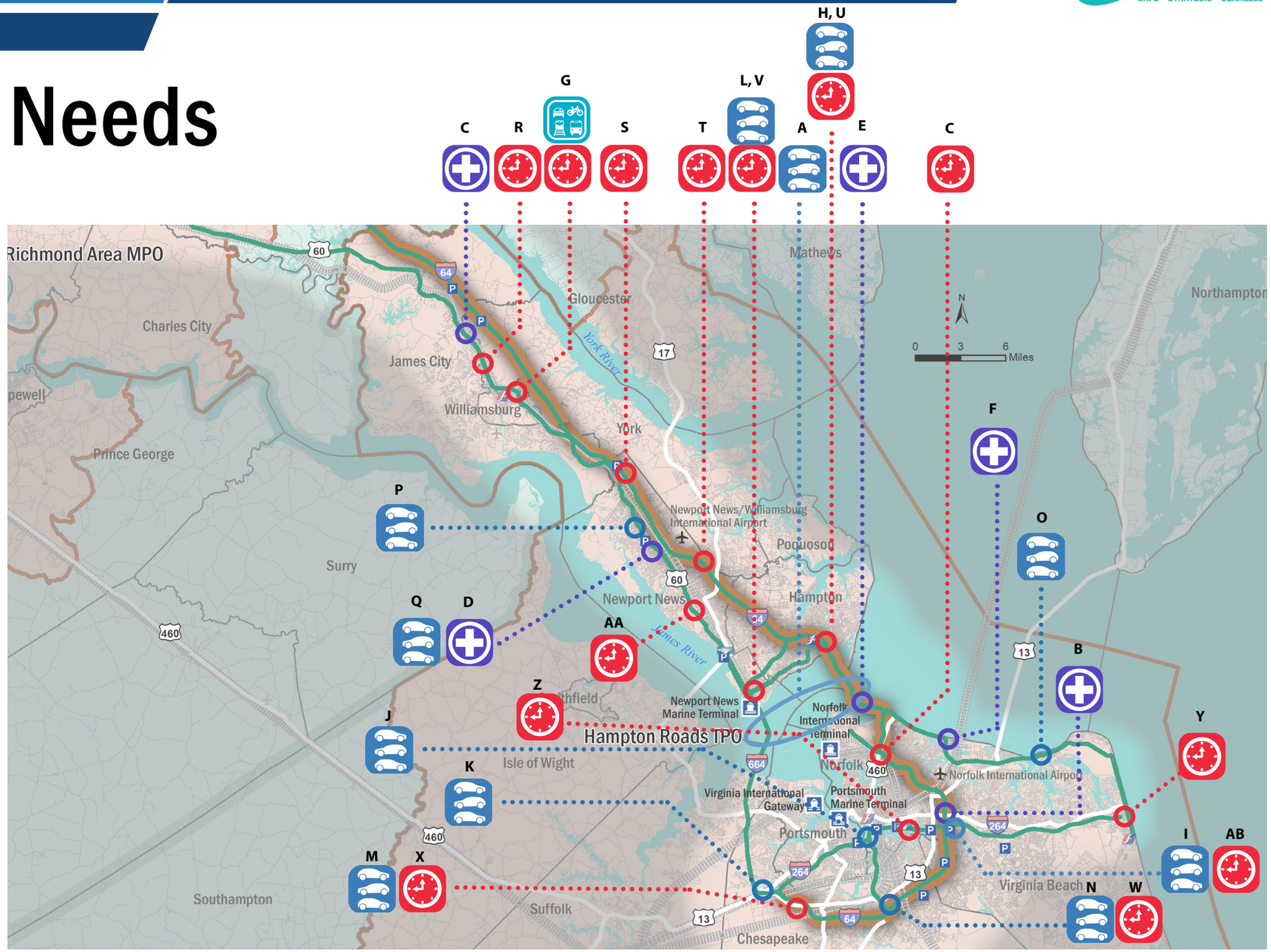
Safety

Congestion

Bottlenecks

Reliability





C5 SEGMENT NEEDS

Summary of Needs - C5 Segment

A.	Congestion between Hampton and Norfolks on all available facilities - very high demand, especially during peak periods
B.	I-64 near interchange with I-264 in Norfolk: 50 severe crashes related to lane changes/lane drops at interchange
C.	US 60 between Lightfoot Rd and Route 612 in Williamsburg: 58 severe crashes
D.	US 60 between Ft. Eustis Blvd and Todds Lane in Newport News: 324 severe crashes
E.	I-64 near southern entrance to Hampton Roads Bridge-Tunnel in Norfolk: 51 severe crashes
F.	US 60 between Chesapeake Blvd and Pleasure House Rd in Norfolk: 85 severe crashes
G.	Unreliable Amtrak service from Williamsburg station. Average departure delay is 23 minutes totaling almost 12,000 person-hours of delay from this segment.
H.	Congestion issue on I-64 between I-664 junction in Hampton and Exit 282 (Northampton Boulevard) in Norfolk, through Hampton Roads Bridge Tunnel
I.	Congestion issue on I-64 between I-264 and Exit 286 (Indian River Road) and on I-264 between I-64 and Exit 16 (South Witchduck Road) in Virginia Beach
J.	Congestion issue on I-264 between Exit 5 (US 17) in Portsmouth and Exit 11 (Campostella Road) in Norfolk
K.	Congestion issue on I-664 at interchange with I-264/US 13/US 460 in Chesapeake
L.	Congestion issue on I-664 between Exit 5 (Jefferson Avenue) and Monitor-Merrimac Memorial Bridge Tunnel in Newport News
M.	Congestion issue on I-64 near Exit 297 (US 13/US 460) in Chesapeake
N.	Congestion issue on I-64 near Exit 291 (I-464) in Chesapeake

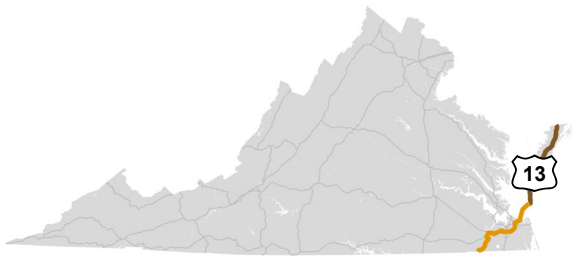
Summary of Needs - C5 Segment

O	Congestion issue at US 60 (Shore Dr) and VA Route 170 (East Little Creek Road) in Norfolk
P.	Congestion issue at US 60 (Warwick Boulevard) and VA Route 173 (Denbigh Boulevard) in Newport News
Q.	Congestion issue at US 60 (Warwick Boulevard) and VA Route 312 (Avenue of the Arts) in Newport News
R.	Reliability issue at US 60 and Route 614 (Centerville Road) in Lightfoot.
S.	Reliability issue on I-64 between Exit 247 (VA Route 143) and Exit 150 (Fort Eustis Boulevard) in Newport News
T.	Reliability issue on I-64 near Exit 255 (VA Route 143) in Newport News
U.	Reliability issue on I-64 between I-664 junction in Hampton and Exit 277 (Tidewater Drive) in Norfolk, through Hampton Roads Bridge Tunnel
V.	Reliability issue on I-664 between Exit 5 (Jefferson Avenue) and Monitor-Merrimac Memorial Bridge Tunnel in Newport News
W.	Reliability issue on I-64 between Exit 290 (North Battlefield Boulevard) and Exit 292 (Great Bridge Boulevard) in Chesapeake
X.	Reliability issue on I-64 near Exit 297 (US 13/US 460) in Chesapeake
Y.	Reliability issue on US 60 near Virginia Beach Boulevard (US 58 Business) at the Virginia Beach oceanfront
Z.	Reliability issue on I-264 between I-464 and Exit 11 (Campostella Road) in Norfolk
AA.	Reliability issue at US 60 (Warwick Boulevard) and VA Route 171 (Oyster Point Road) in Newport News
AB.	Reliability issue on I-64 between I-264 and Exit 286 (Indian River Road) in Virginia Beach

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Eastern Shore Corridor (D)



Office of INTERMODAL Planning and Investment

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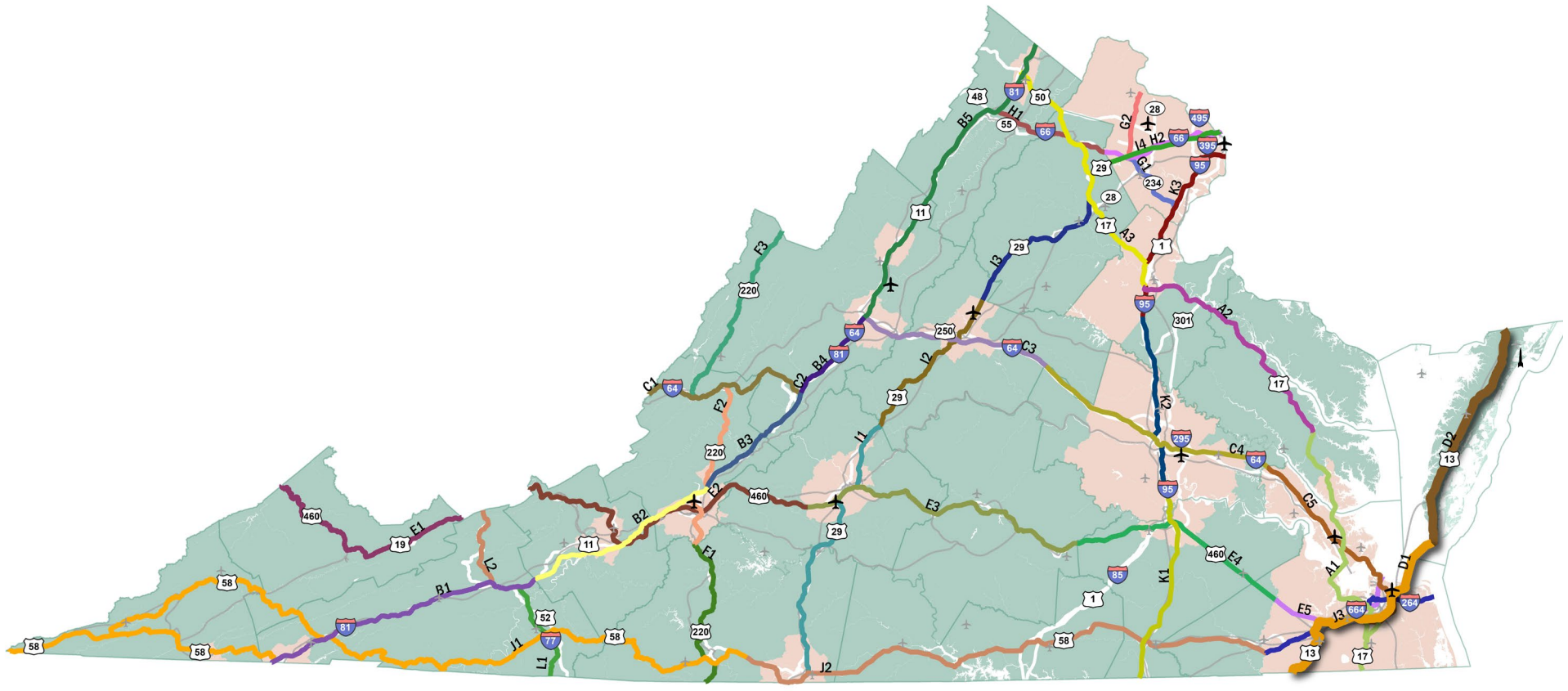
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Spaceport Facility

Metropolitan Planning Organization Area

The Eastern Shore Corridor (Corridor D) is defined primarily by US 13, which runs north to south for more than 500 miles in the eastern United States, from the northeast suburbs of Philadelphia, Pennsylvania, to Fayetteville, North Carolina. In Virginia, US 13 serves as a connector between the Hampton Roads Area and Virginia's Eastern Shore, part of the Delmarva Peninsula, and provides the only direct connection from Delmarva to the rest of Virginia.

US 13 acts as the major roadway on the Delmarva Peninsula, linking many small towns and other communities in Accomack and Northampton Counties to the Cities of Virginia Beach, Chesapeake, and Suffolk. US 13 also provides indirect access in the Hampton Roads Area to the three major Virginia ports located in Newport News, Portsmouth, and Norfolk. In addition, the Chesapeake Bay Bridge-Tunnel was constructed over two major shipping channels that provide access to the Port of Virginia.

There are no true parallel facilities to US 13, except where US 13 Business exists in the urbanized areas. However, the highway accesses other major corridors in the Hampton Roads Area, where it intersects with I-64 and its auxiliary routes, including I-264 and I-664, in multiple locations. It also intersects with US 17, US 58, and US 460, all Corridors of Statewide Significance (CoSS). The corridor does not run concurrently with any interstate highway in Virginia.

Passenger travel along the Eastern Shore Corridor is accomplished primarily via the highway facilities. Other travel options include:

- Multiple Park-and-Ride lots in the Hampton Roads Area: three in Suffolk and five near where US 13 runs parallel to I-64 through Chesapeake and Virginia Beach;
- Hampton Roads Transit (HRT), which serves the Hampton Roads Area providing bus service, as well as Metro Area Express service, which provides service throughout the region. None of the HRT routes access the Eastern Shore or the Chesapeake Bay Bridge-Tunnel;
- Shore Transit and Rideshare which offer bus service on the Eastern Shore, although there is no connection to the Hampton Roads Area;
- Multiple Greyhound bus stations in Hampton Roads, including Newport News, Hampton, and Norfolk, and on the Eastern Shore, in Exmore and Oak Hall;
- Amtrak has stations in the Hampton Roads Area, although the tracks along the Eastern Shore Corridor are not used for passenger rail; and
- Commercial air service, available at both Norfolk International Airport and Newport News-Williamsburg Airport in the Hampton Roads Area. No commercial service is available on the Eastern Shore, except to the north along Maryland's Eastern Shore at the Ocean City/Salisbury Airport.

US 13 does not directly access any of the Port of Virginia facilities, but the Chesapeake Bay Bridge-Tunnel was constructed to allow for two major shipping channels into these ports with little to no disruption of shipping or vehicular traffic. The Port of Virginia's facilities can be accessed indirectly in the Hampton Roads Area from the Eastern Shore Corridor. In addition, Norfolk Southern operates freight rail lines from the Port of Virginia in Chesapeake and Suffolk and out of the Hampton Roads Area. CSX operates rail lines that travel along the corridor in Chesapeake and Suffolk and to the remainder of Virginia and North Carolina. In addition, the Chesapeake and Albemarle Short-Line Railroad operates from Norfolk south to North Carolina, using Norfolk Southern rail lines. The Bay Coast Railroad runs along the Eastern Shore from Maryland and crosses the Chesapeake Bay via rail ferry barge across 26 miles of water to access Norfolk. It interchanges with Norfolk Southern rail lines in both Norfolk and in Maryland.

In addition, the Chesapeake Bay navigational channels and the Inland Waterway are both located in this region. Barge transport is also available between the Port of Virginia facilities and Baltimore, Maryland, as well as the Ports of Richmond and Alexandria.

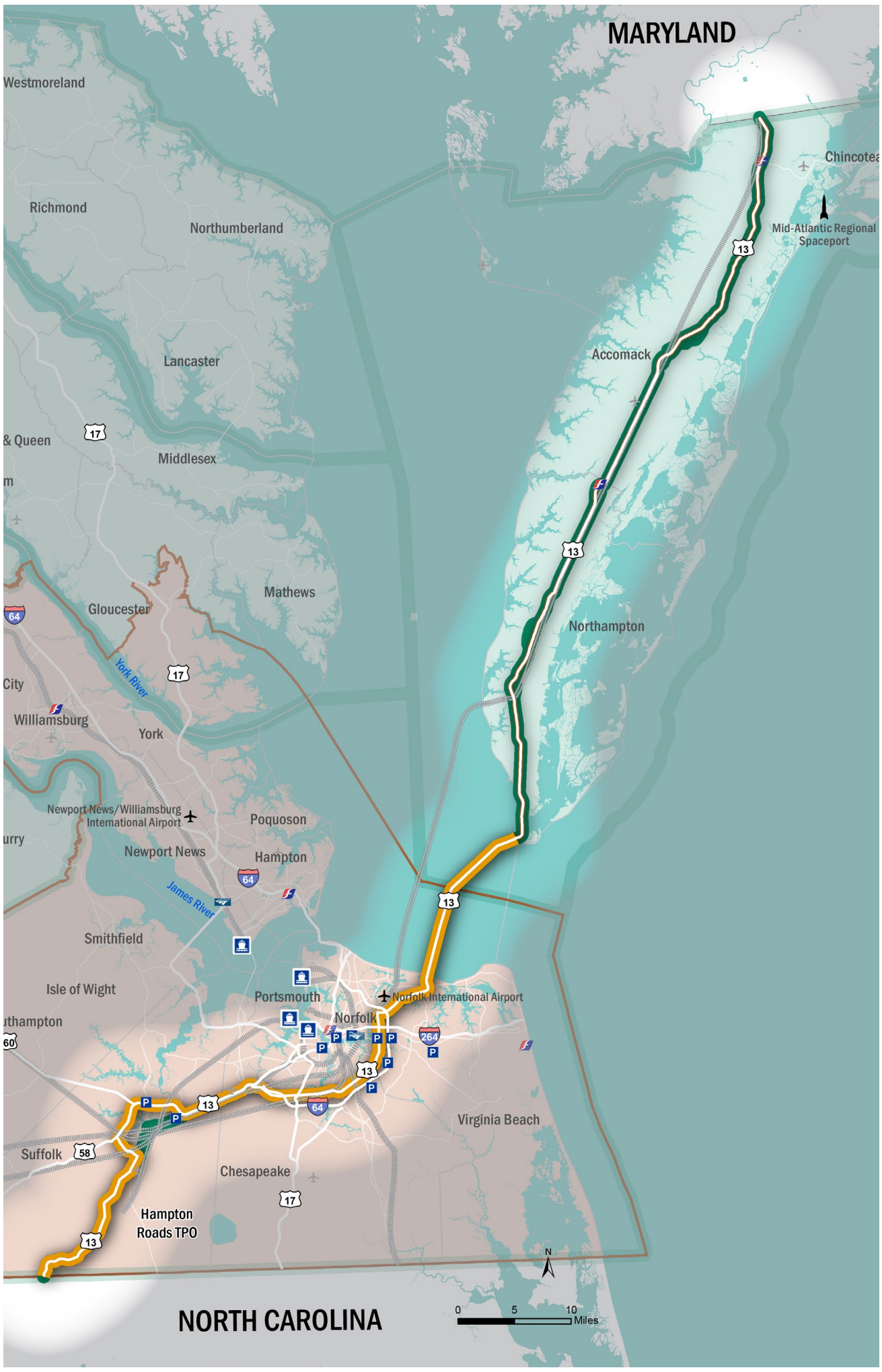
Freight destined for low-earth orbit is served by launch facilities at the Mid-Atlantic Regional Spaceport, which provides service to commercial, governmental, scientific, and academic organizations from Wallops Island on the Eastern Shore.

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

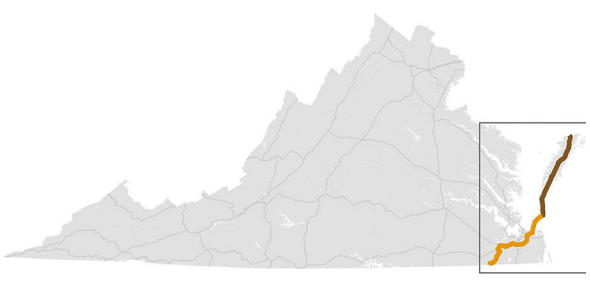
Corridor Components

Highway Facilities	
Primary Facility	• US 13
Other Highway Facilities	• US 13 Business
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• CSX • Norfolk Southern • Bay Coast Railroad and Barge
Port Facilities	
	• Norfolk International Terminal • Portsmouth Marine Terminal • Virginia International Gateway
Airport Facilities	
	• Norfolk International • Newport News/ Williamsburg International • Mid-Atlantic Regional Spaceport

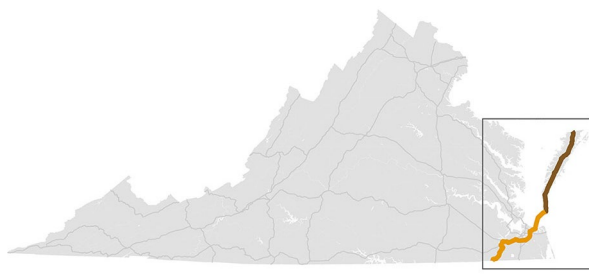


Corridor Segments:
- D1
- D2

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Spaceport Facility
- MPO Area
- Planning District Area



Demographics and Economic Trends



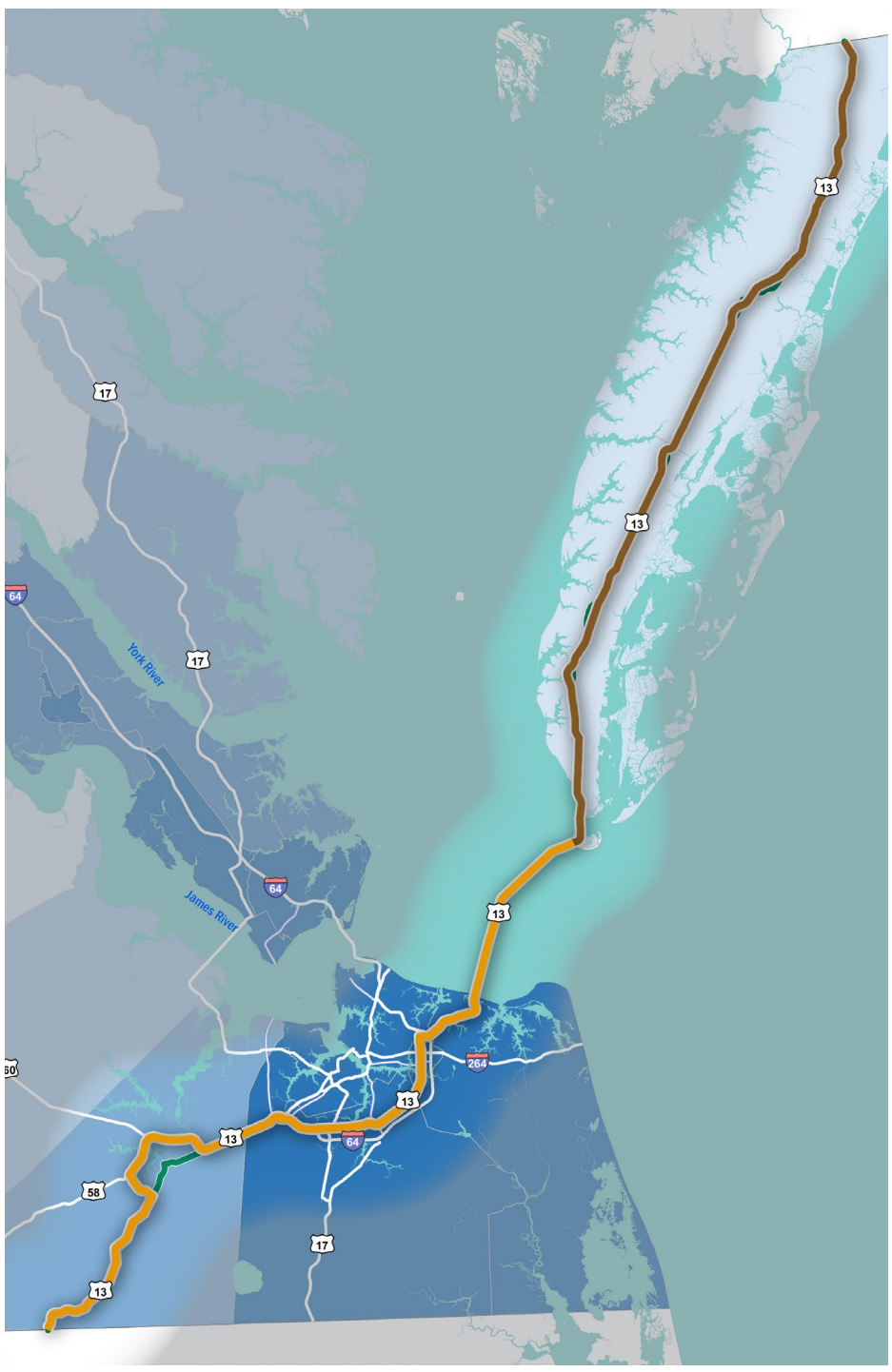
Within Corridor D, the primary population centers with greater than 500 persons per square mile are currently found in the Cities of Norfolk and Virginia Beach. The remainder of the corridor passes through the sparsely populated Northampton and Accomack Counties.

Between 2012 and 2025, Suffolk is anticipated to experience the largest population growth (greater than 25 percent) among jurisdictions along the corridor. Chesapeake is anticipated to have the next highest population growth, between 11 and 25 percent. The already densely-populated City of Norfolk is expected to see the lowest growth, and the populations of the City of Virginia Beach and Northampton County are expected to decrease. Overall, population along the corridor is expected to grow slightly.

Current employment centers follow a pattern analogous to the population centers, with the highest densities in the Cities of Virginia Beach and Chesapeake. Employment growth tracks a similar pattern along the corridor, although it shows growth even in the City of Virginia Beach and Northampton County, where population is expected to decrease. Corridor C passes through the Hampton Roads TPO Area where the three largest industry sectors include health care, retail trade, and wholesale trade.

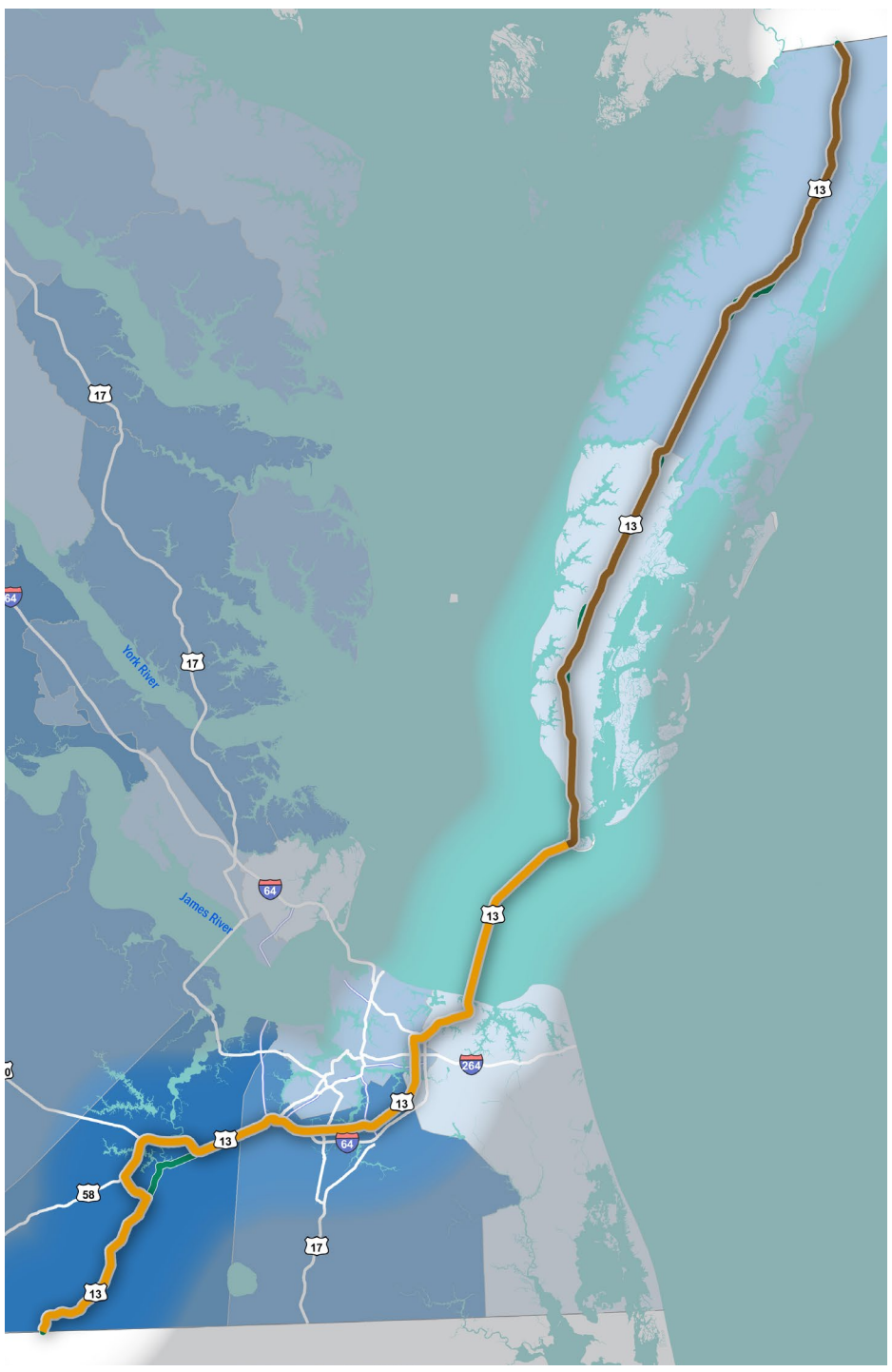
2012 Population Density Persons / Square Mile

0 - 50
50 - 100
100 - 250
250 - 500
500 +



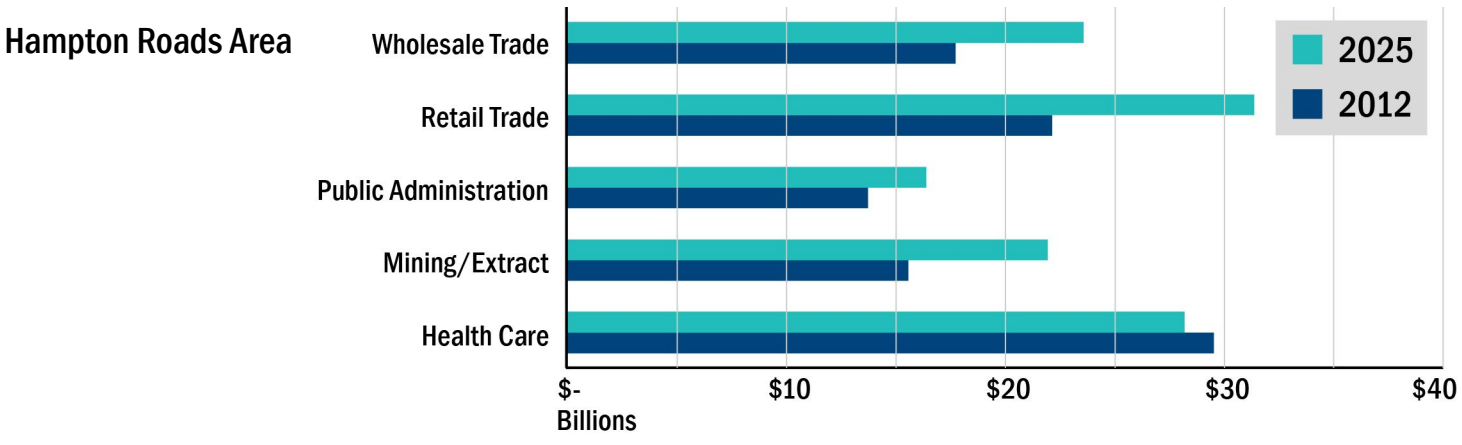
Population Growth (2012-2025 Percent Change)

-8% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 57%



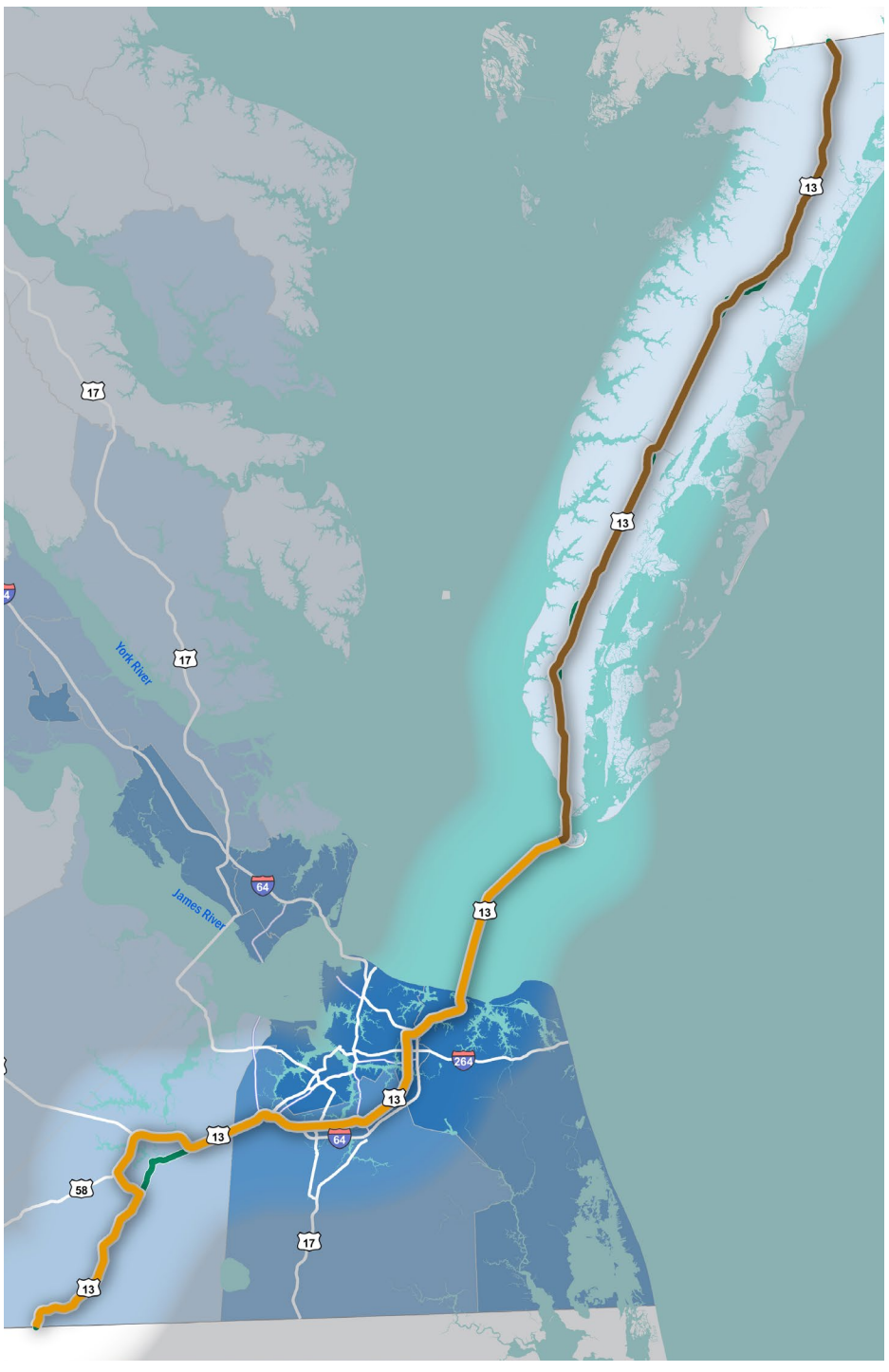
CORRIDOR D OVERVIEW

Top Industries (GDP)



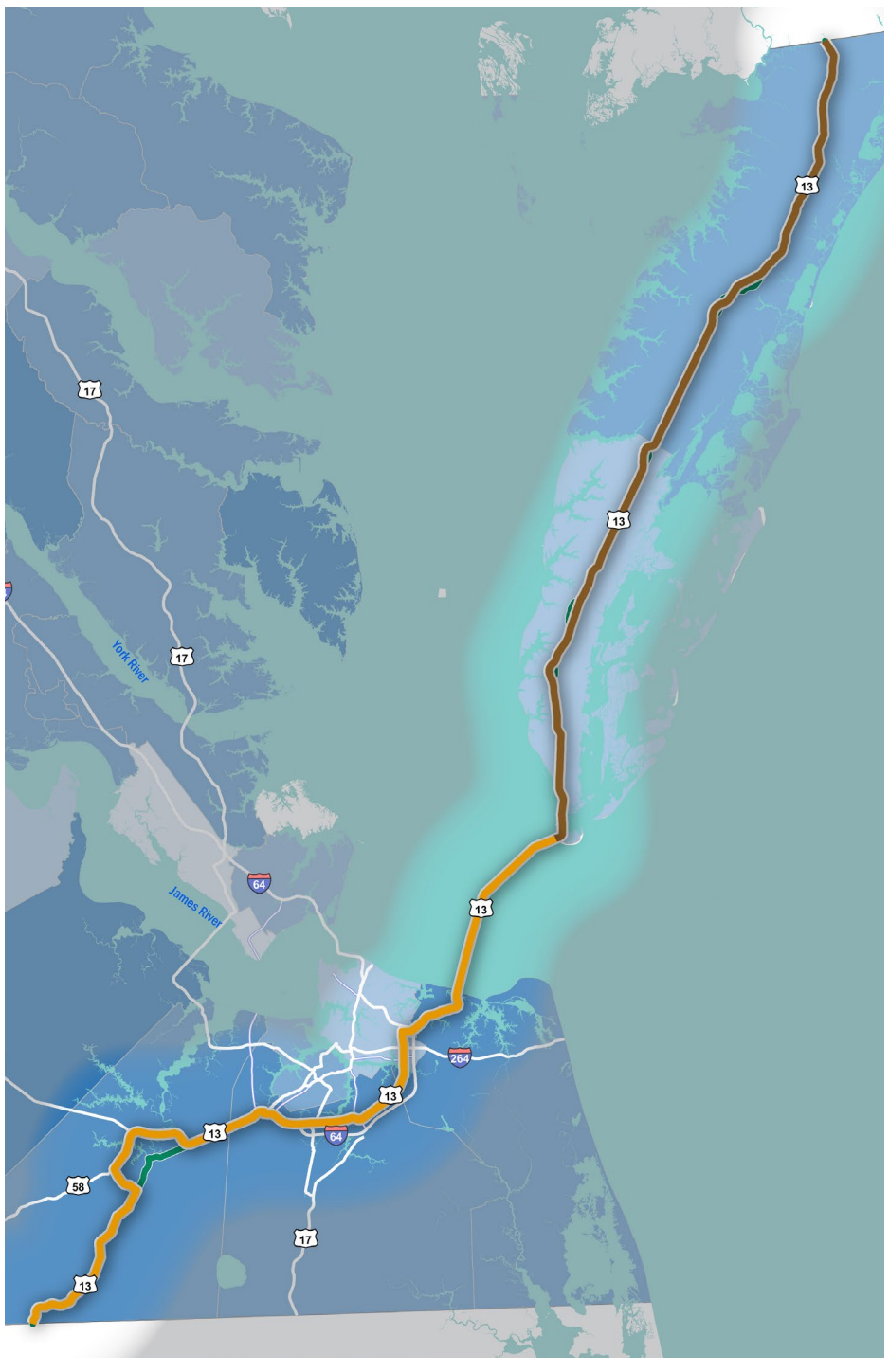
2012 Employment Density Jobs / Square Mile

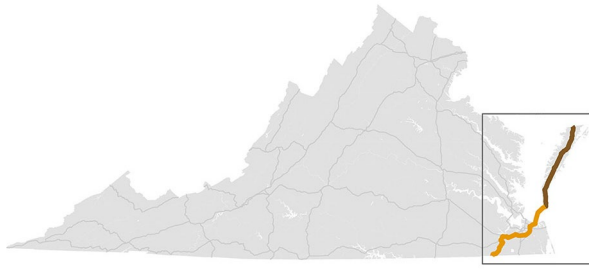
< 25
25 - 100
100 - 250
250 - 500
> 500



Employment Growth (2012-2025 Percent Change)

-7% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 69%



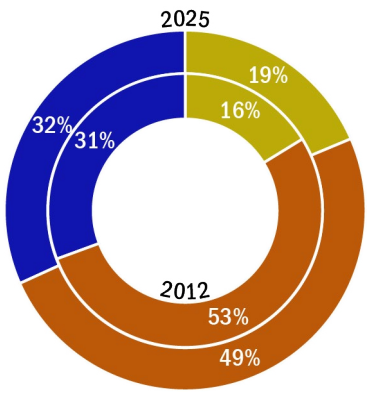


Corridor Travel Patterns

Passenger

Corridor D connects Maryland and North Carolina, and passes through the area of the Hampton Roads TPO. Within the Hampton Roads Area, traffic is dominated by internal local traffic, which accounts for more than 75 percent of the traffic along the corridor. Pass-through traffic comprises a very small portion of traffic on the corridor, accounting for less than four percent.

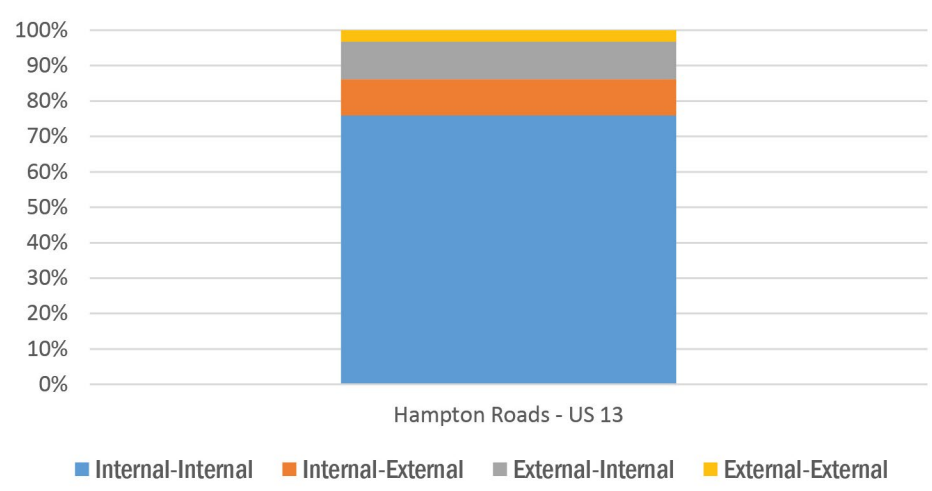
Hampton Roads Area



GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Distribution of Internal and External Travel



Freight

By truck, Corridor D carried 34 million tons of freight worth $51 billion in 2012, and is estimated to carry 51 million tons of freight worth $80 billion in 2025. The major truck freight pattern on Corridor D is from North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. These truck freight flows account for between 12 and 14 percent of the total truck freight tonnage in Corridor D. There are also major truck freight flows between Norfolk and the Cities of Chesapeake and Virginia Beach, accounting for between ten and 11 percent of the total truck freight tonnage in Corridor D. Between 11 and 13 percent of truck freight tonnage on Corridor D corresponds to through-traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Corridor D carried 23 million tons of freight worth $14 billion in 2012, and is estimated to carry 23 million tons of freight worth $17 billion in 2025. The major rail freight pattern on Corridor D is from West Virginia and neighboring Virginia counties, such as Tazewell, Wise, and Buchanan Counties, to the Port of Virginia's Norfolk International Terminal. By tonnage, Norfolk attracts over 90 percent of rail freight tonnage traveling on this corridor. These rail freight flows account for more than 60 percent of the total rail freight value on the corridor. In terms of freight value, Norfolk is also a major generator and attractor of rail freight, accounting for more than 40 percent of rail freight origins and more than 50 percent of rail freight destinations on the corridor. However, the major rail freight movements on Corridor D, in terms of value, are between the Port of Virginia and the Midwest region, accounting for around 60 percent of the total rail freight value on the corridor.

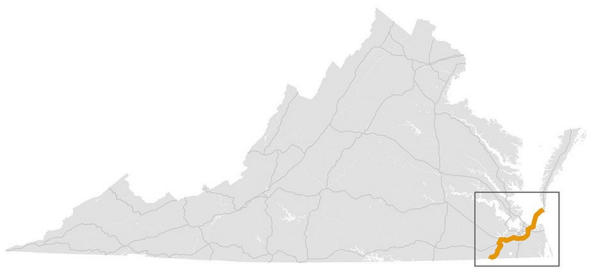
Truck Freight

	2012	2025
Truck Freight Value	$51 Billion	$80 Billion
Truck Freight Tonnage	34 Million Tons	51 Million Tons
Freight Value per Ton	$1512	$1565
Corridor Tonnage Passing Through	13%	11%

Rail Freight

	2012	2025
Rail Freight Value	$14 Billion	$17 Billion
Rail Freight Tonnage	23 Million Tons	23 Million Tons
Freight Value per Ton	$613	$748
Corridor Tonnage Passing Through	<1%	<1%

II. Segment D1

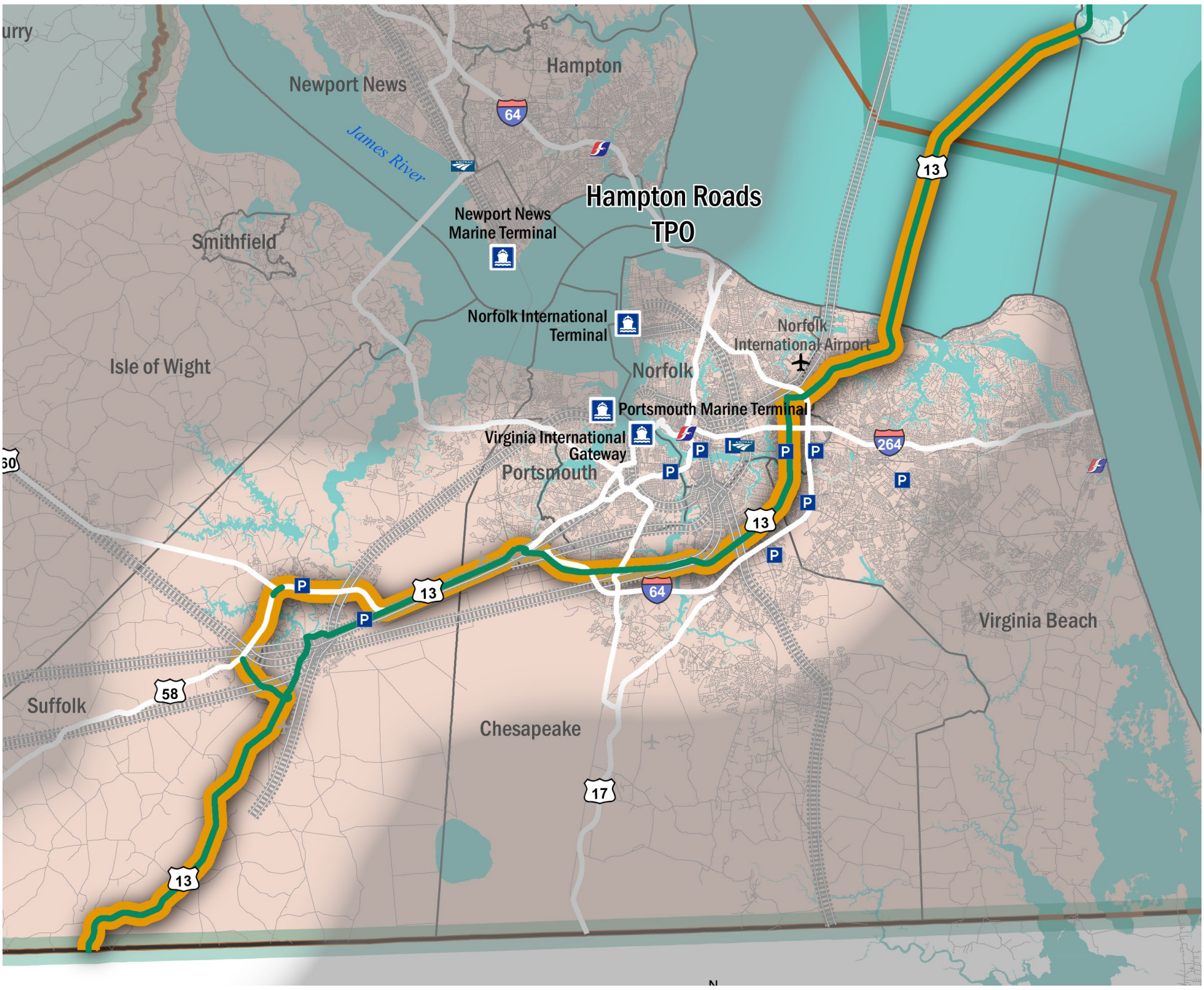


Corridor Segment D1 Components

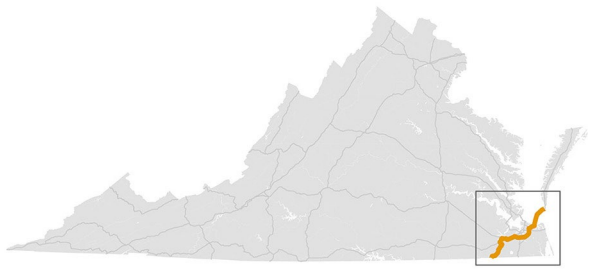
- US 13
- US 13 Business
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- Bay Coast Railroad and Barge
- Norfolk Southern
- CSX
- Amtrak
- Norfolk International Airport
- Newport News/Williamsburg International Airport

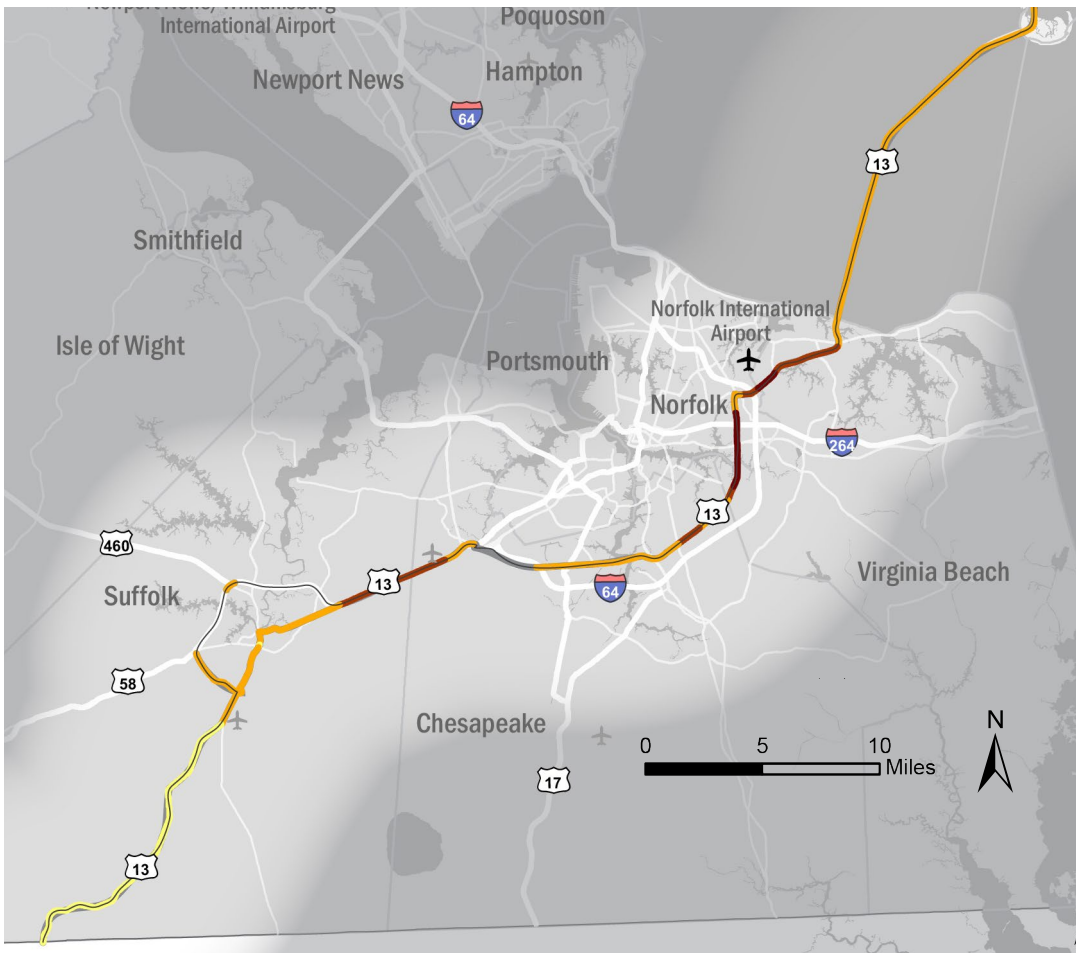
D1
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility



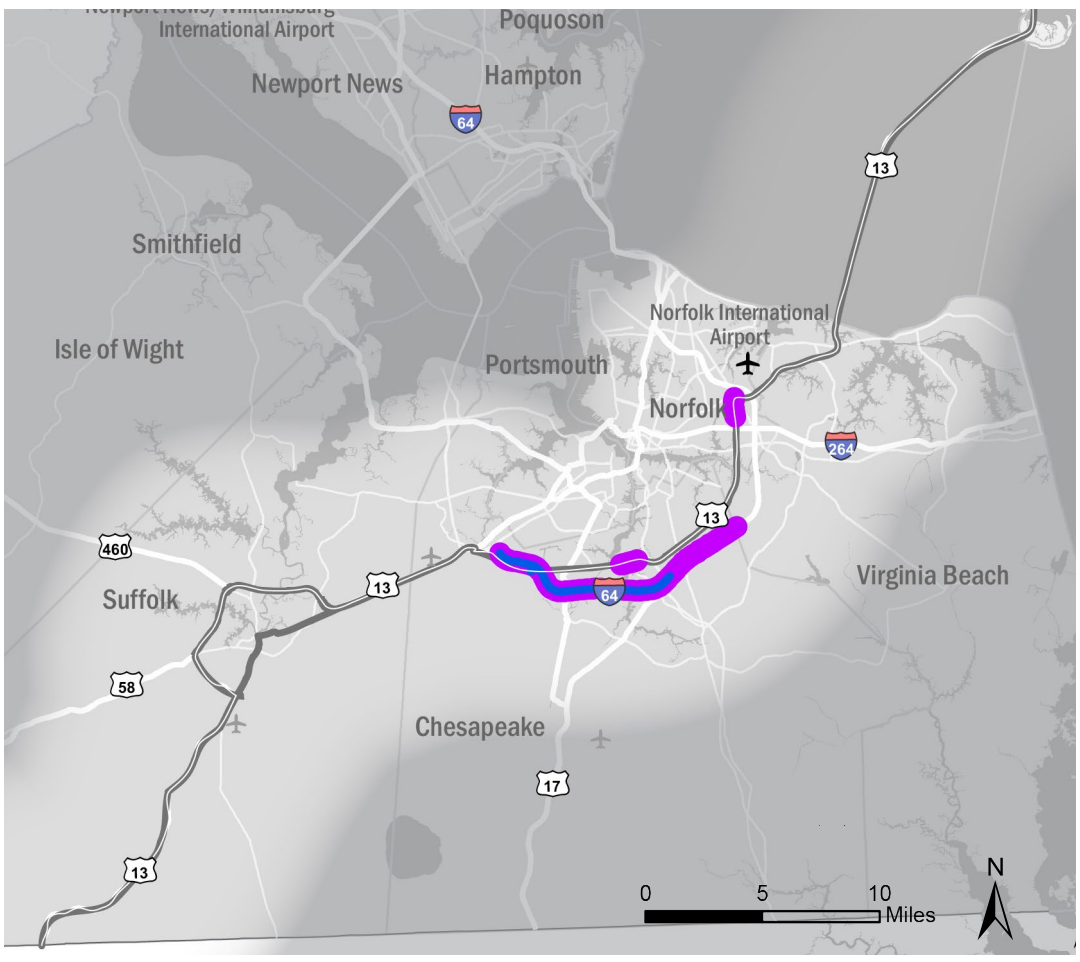
D1 SEGMENT PROFILE





Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Segment D1 begins at the North Carolina border and progresses north over the Chesapeake Bay Bridge-Tunnel, serving the Cities of Suffolk, Chesapeake, Portsmouth, Norfolk, and Virginia Beach. The segment travels through the area covered by the Hampton Roads TPO. The segment includes US 13 Business in Suffolk and runs concurrently with portions of US 58 and US 460. Segment D1 provides a direct connection to the Eastern Shore for passengers and freight. For markets in the Northeast, and for tourists from the Northeast, the Chesapeake Bay Bridge-Tunnel provides the shortest path to the Hampton Roads Area. In the Hampton Roads Area, Segment D1 also provides local access.

Highway Facilities: US 13 is primarily a local access corridor in Segment D1, with a cross section that varies from two lanes in the far south in Suffolk to eight lanes in the center of the Hampton Roads Area. There are no parallel highway facilities to Segment D1, though it does access other major highway facilities in Hampton Roads, including I-64, I-264 and I-664, as well as US 17, US 58, and US 460. US 13 Business provides a parallel roadway in downtown Suffolk.

Transit Services: Amtrak has stations in Newport News, Norfolk, and Virginia Beach; however, routes from these stations serve the Northeast Corridor and do not offer connections within Corridor D. Greyhound provides service from stations in Norfolk, Hampton, and Virginia Beach and does offer routes that cross the Chesapeake Bay Bridge-Tunnel to the Eastern Shore. The commuter bus service, Metro Area Express, is offered by HRT, which serves the Hampton Roads Area, but not the Chesapeake Bay Bridge-Tunnel or the Eastern Shore. There are multiple Park-and-Ride facilities near US 13, the largest cluster of which is located near Norfolk.

Rail Facilities: CSX's Coal Corridor and Norfolk Southern's Coal Corridor rail lines pass through Segment D1 connecting locations west to the Port of Virginia facilities in the Hampton Roads Area. A rail ferry barge and freight barges provide an alternative to trucks crossing the Chesapeake Bay Bridge-Tunnel, connecting Norfolk to the Northeast.

Port Facilities: US 13 does not directly access the Port of Virginia, but does provide an indirect connection and assists in the operation of the Port of Virginia. The Chesapeake Bay Bridge-Tunnel was constructed to allow continuous access to the Port of Virginia for shipping traffic, while causing little to no disruption to vehicular traffic.

Airport Facilities: Norfolk International Airport is the only commercial airport in this segment.

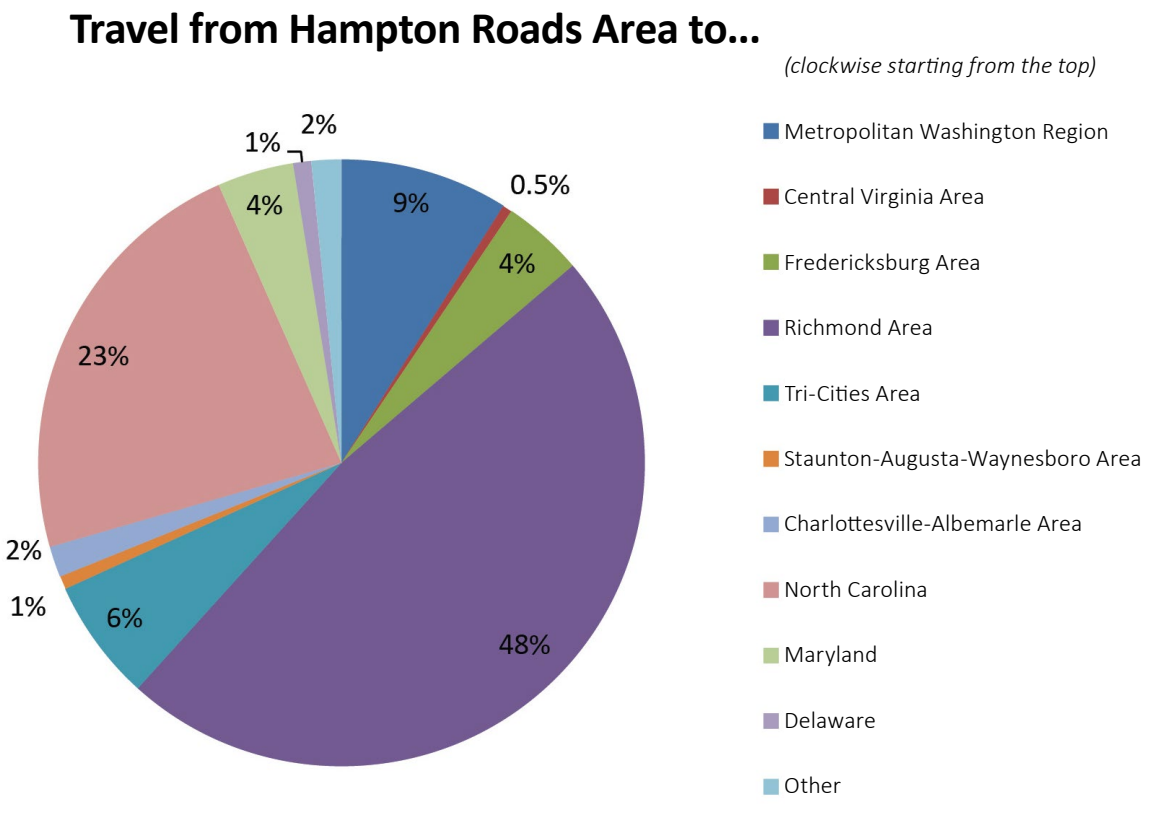
Major planned and future projects include:

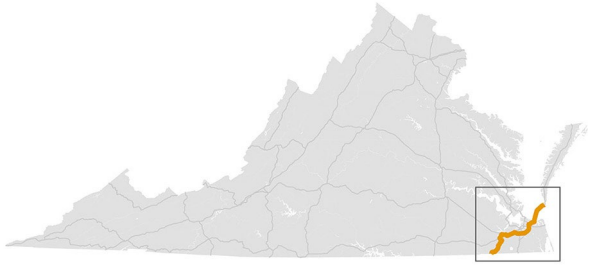
- Widening of US 13 from four to eight lanes from 0.023 miles south of Lowery Road to 0.012 miles south of Northampton Boulevard in the City of Norfolk; and
- Widening of Route 165 (N Military Hwy) north of US 13 and Kempsville Road south of US 13 in the City of Norfolk and the potential addition of new reversible travel lanes.

Travel Demand

Passenger Demand

The southernmost segment of Corridor D is mostly within the Hampton Roads Area, but also includes the US 13 Bridge-Tunnel connection to the Eastern Shore. This segment primarily accommodates traffic local to the Area, but also connects to North Carolina, the Delmarva Peninsula, and multiple other CoSS within the Hampton Roads Area including Segment A1 and Segment C5, while running concurrently with portions of Segment E5 and Segment J3. Travel between the Hampton Roads Area and North Carolina accounts for more than four percent of the intercity passenger travel in the Commonwealth, and some of that traffic is likely to use Segment D1. Of the intercity traffic originating in the Hampton Roads Area, 23 percent is destined for North Carolina. In addition, six percent is destined for the Tri-Cities Area and a small portion is destined for the Lynchburg area. These trips are likely to make use of a portion of Segment D1.





D1 SEGMENT PROFILE

Freight Demand

By truck, Segment D1 carried 22 million tons of freight worth $31 billion in 2012, and is estimated to carry 33 million tons of freight worth $50 billion in 2025. The major truck freight pattern on Corridor D is from North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. These truck freight flows account for between 12 and 14 percent of the total truck freight tonnage in Corridor D in 2012 and estimated for 2025. There are also major truck freight flows between Norfolk and the Cities of Chesapeake and Virginia Beach, accounting for between ten and 11 percent of the total truck freight tonnage in Corridor D. By tonnage, more than 30 percent of truck freight in the corridor originates from Segment D1 and more than 45 percent of truck freight value in the corridor is destined for Segment D1. Between 11 and 13 percent of truck freight tonnage on Corridor D corresponds to through-traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Segment D1 carried 23 million tons of freight worth $14 billion in 2012, and is estimated to carry 23 million tons of freight worth $17 billion in 2025. The major rail freight pattern on Corridor D is from West Virginia and neighboring counties in Virginia, such as Tazewell, Wise, and Buchanan Counties, to the Port of Virginia facility in Norfolk. By tonnage, Norfolk attracts over 90 percent of rail freight tonnage traveling on this corridor. These rail freight flows account for more than 60 percent of the total rail freight value on the corridor. In terms of freight value, Norfolk is also a major generator and attractor of rail freight, accounting for more than 40 percent of rail freight origins and more than 50 percent of rail freight destinations on the corridor. However, the major rail freight movements on Corridor D, in terms of value, are between the Port of Virginia facilities and the Midwest region, accounting for around 60 percent of the total rail freight value on the corridor. Rail freight flows originating from or destined for Segment D1 are almost negligible with respect to the total rail freight tonnage and value on Corridor D.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 44%)
2. North Carolina (25% / 23%)
3. City of Norfolk* (14% / 13%)
4. City of Chesapeake (6% / 9%)
5. New Jersey (6% / 6%)

Corridor Tonnage Originating in Segment D1: 30% / 34%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
City of Chesapeake and North Carolina
City of Portsmouth* and North Carolina
City of Norfolk* and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (55% / 54%)
2. City of Norfolk* (17% / 15%)
3. North Carolina (13% / 14%)
4. City of Virginia Beach (11% / 11%)
5. City of Chesapeake (8% / 10%)

Corridor Tonnage Destined for Segment D1: 45% / 46%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (40% / 41%)
2. West Virginia (40% / 37%)
3. Wise County (15% / 14%)
4. Buchanan County (10% / 10%)
5. Kentucky (7% / 7%)

Corridor Tonnage Originating in Segment D1: 6% / 8%

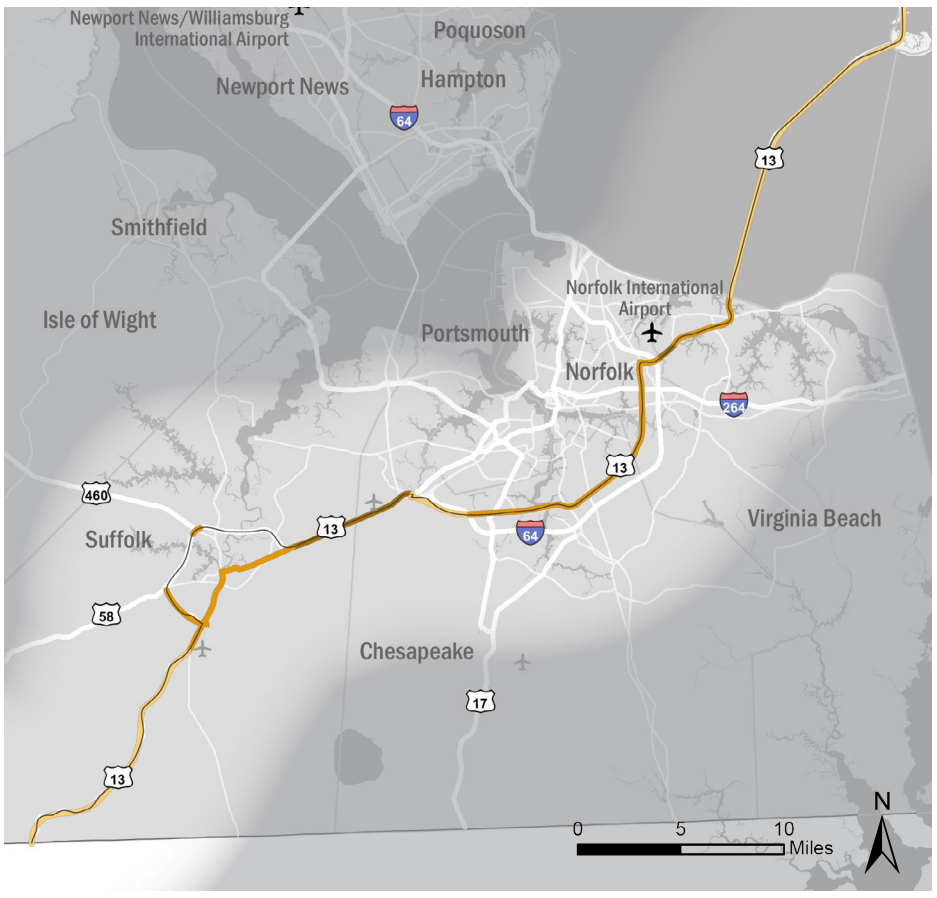
Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
City of Norfolk* and Kentucky
City of Norfolk* and Pennsylvania

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (95% / 93%)
2. City of Norfolk* (93% / 90%)
3. Illinois (2% / 3%)
4. Ohio (1% / 1%)
5. City of Chesapeake (1% / 2%)

Corridor Tonnage Destined for Segment D1: 94% / 92%

Traffic Conditions

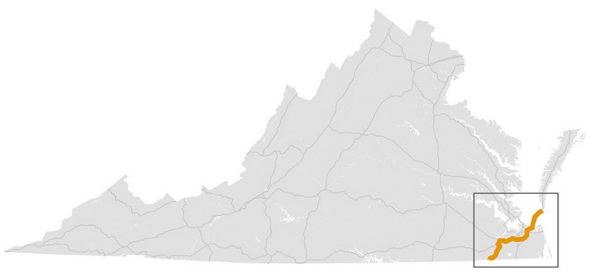


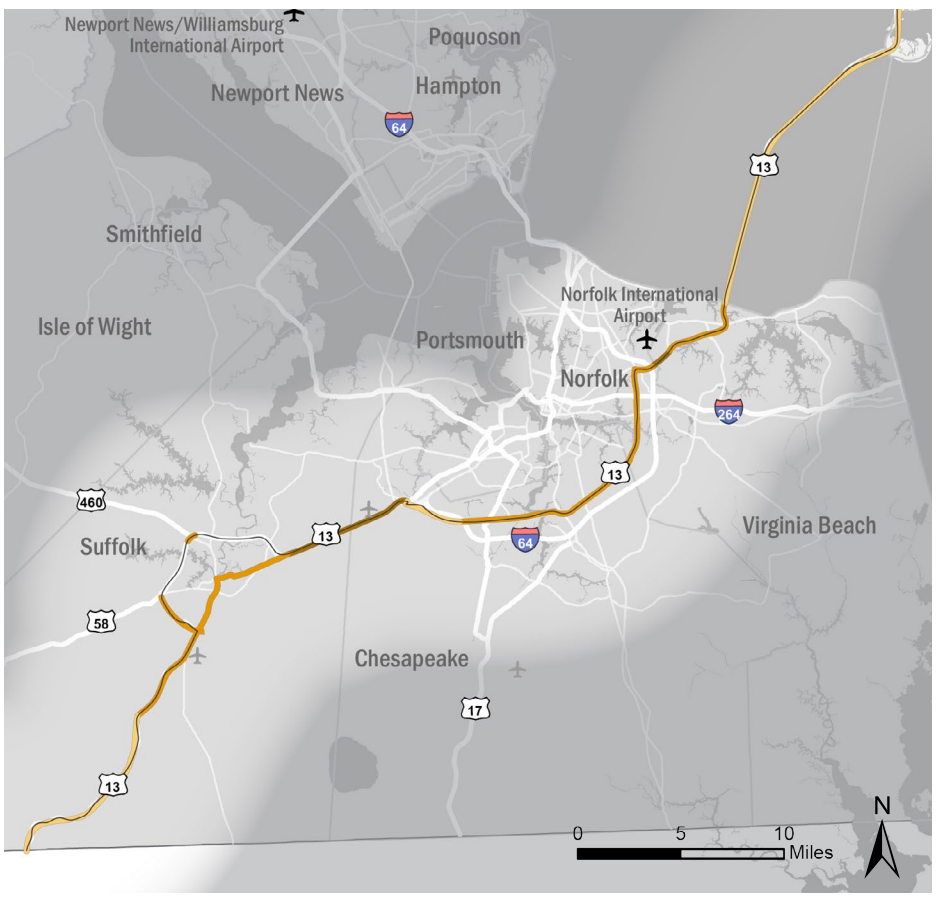
Traffic Volume and AADT

Traffic volume on Segment D1 is high compared to traffic volume on Segment D2 and varies considerably by highway section. The highest volumes occur in Chesapeake west of I-664 (more than 60,000 vehicles per day) and in Virginia Beach east of I-64 (61,000 – 80,000 vehicles per day). On US 13 in Chesapeake, Norfolk, and Virginia Beach, traffic volumes range from 16,000 to 44,000 vehicles per day, with the highest volumes occurring between Route 407 in Virginia Beach and I-64 in Norfolk. Through the Chesapeake Bay Bridge-Tunnel, traffic volumes on US 13 are approximately 9,000 vehicles per day. The greatest increase in traffic volume on Segment D1 is projected to occur west of I-664 on US 13 in Suffolk, where traffic volume is projected to increase by 14,000 additional vehicles per day by 2025. Traffic volume along this section of US 13 is projected to be 83,000 vehicles by 2025. Along US 13 in Chesapeake, Norfolk, and Virginia Beach, traffic volumes in 2025 are projected to range from 17,000 to 50,000 vehicles per day. Traffic volumes on the Chesapeake Bay Bridge-Tunnel are expected to grow only marginally by 2025, to a total of 10,000 vehicles per day.

Traffic Volume 2014 (AADT)

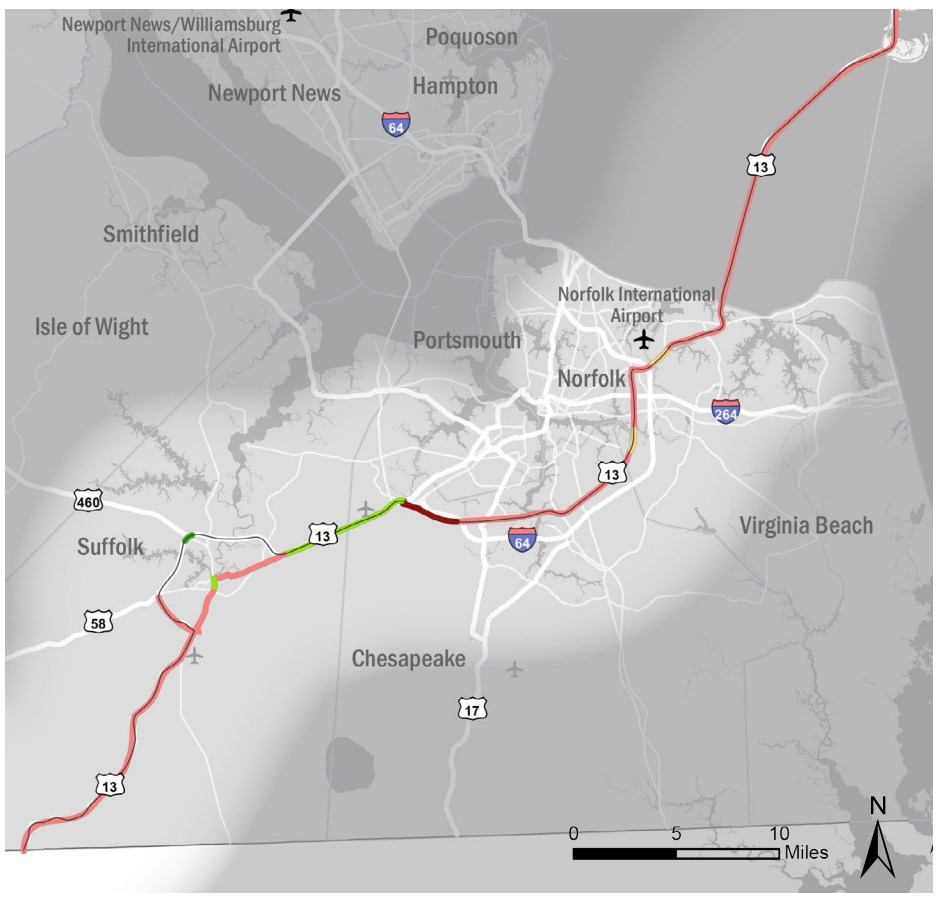
- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility





Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility

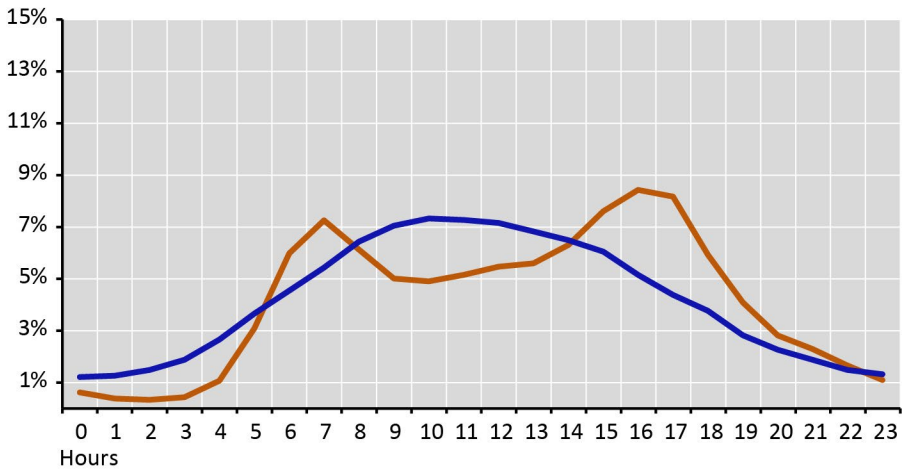


Change in Traffic Volume 2014- 2025 (AADT)

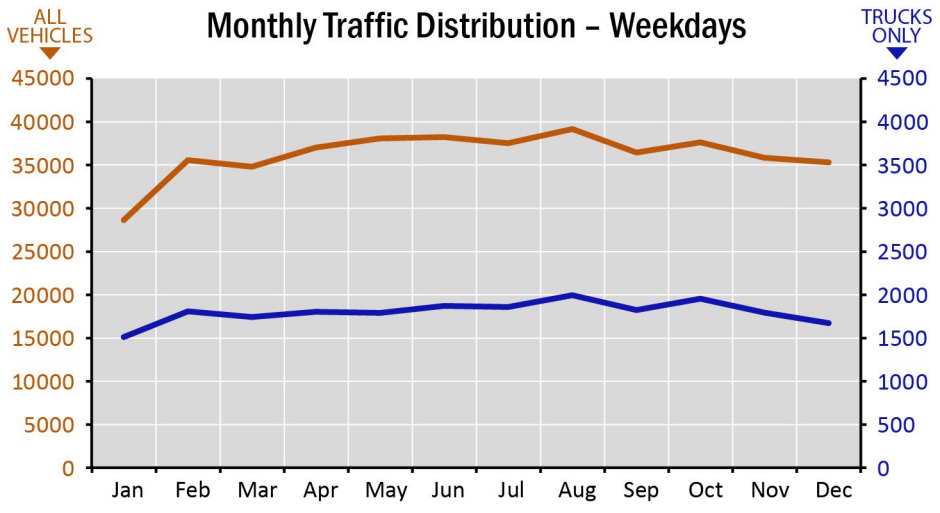
- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility

D1 SEGMENT PROFILE

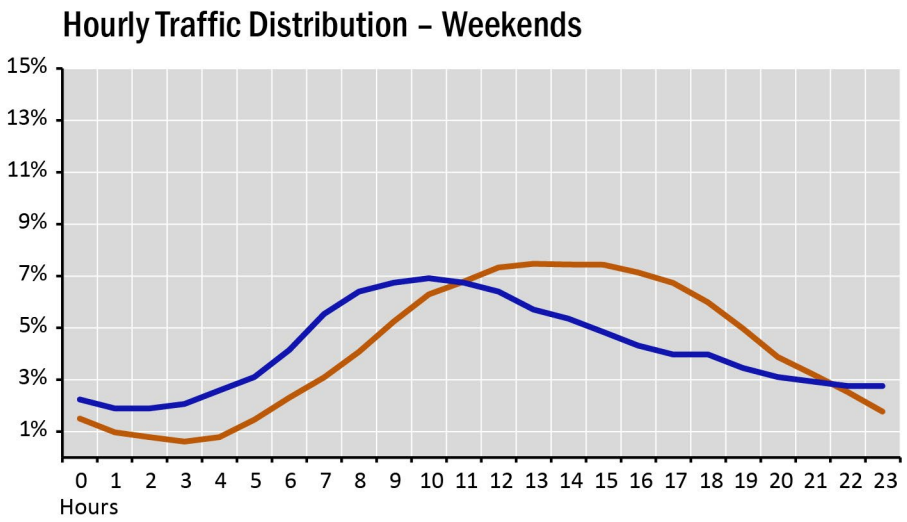
Hourly Traffic Distribution – Weekdays



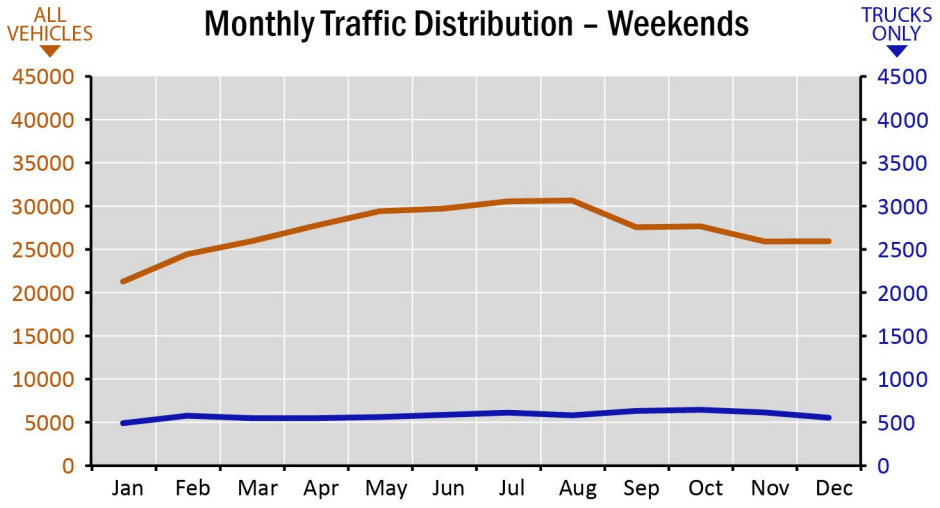
Monthly Traffic Distribution – Weekdays

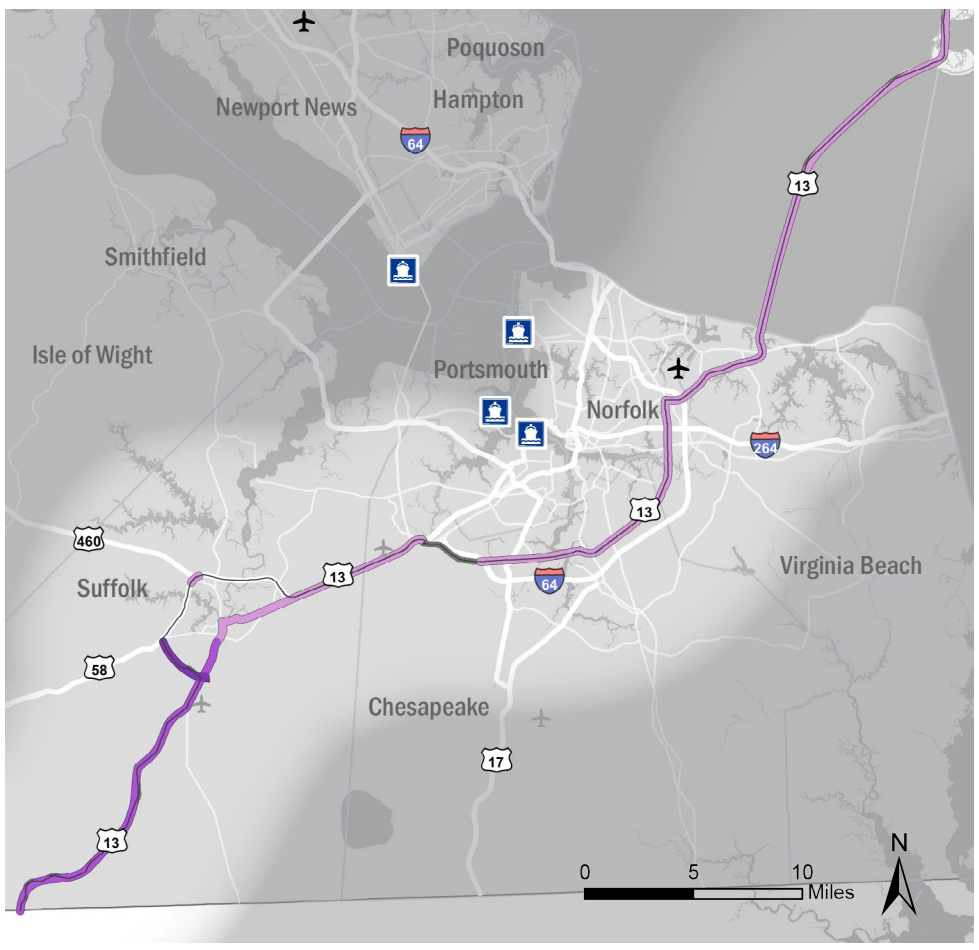


Hourly Traffic Distribution – Weekends



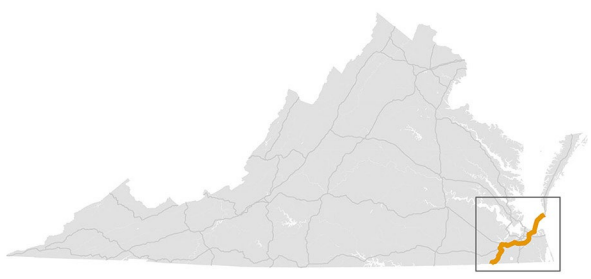
Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



Traffic Distribution

On average, traffic on Segment D1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 8.4 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 7.3 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 55 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic, with a single peak during the midday period, with the highest percentage of hourly traffic occurring between 10 and 11 a.m. (7.3 percent of daily traffic) for all traffic, and 10 to 11 a.m. (6.9 percent of daily traffic) for truck traffic. Weekend traffic patterns are also different from the typical commute patterns, with the highest percentage of hourly traffic occurring between 1 and 2 p.m. (7.5 percent of daily traffic) for all traffic, and from 10 to 11 a.m. (6.9 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment D1 vary by as much as 37 percent throughout the year, with the highpoint in August (around 39,000 vehicles per day) and the low point in January (around 29,000 vehicles per day). Truck volumes also vary throughout the year, with the August high (around 2,000 vehicles per day) 32 percent higher than the January low (around 1,500 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 30,000 vehicles per day) are 44 percent higher than January levels (around 21,000 vehicles per day. Weekend truck traffic is steadier than all vehicle traffic, with the October high 31 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment D1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volume

The percent of daily traffic comprised of heavy trucks on Segment D1 varies by highway section. Along US 13/US 13 Business in southern Suffolk, heavy trucks comprise six percent of total traffic, while on the short highway section connecting US 13 with US 58 in central Suffolk, heavy trucks comprise 13 percent of total traffic. Along the rest of Segment D1, heavy trucks comprise no more than four percent of total traffic.

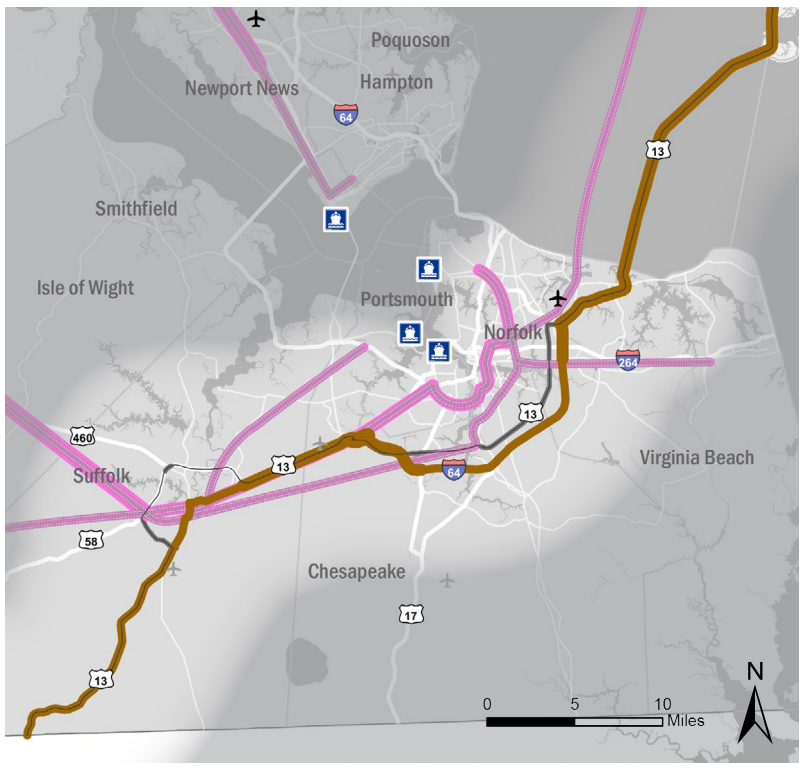
D1 SEGMENT PROFILE

Freight Flows

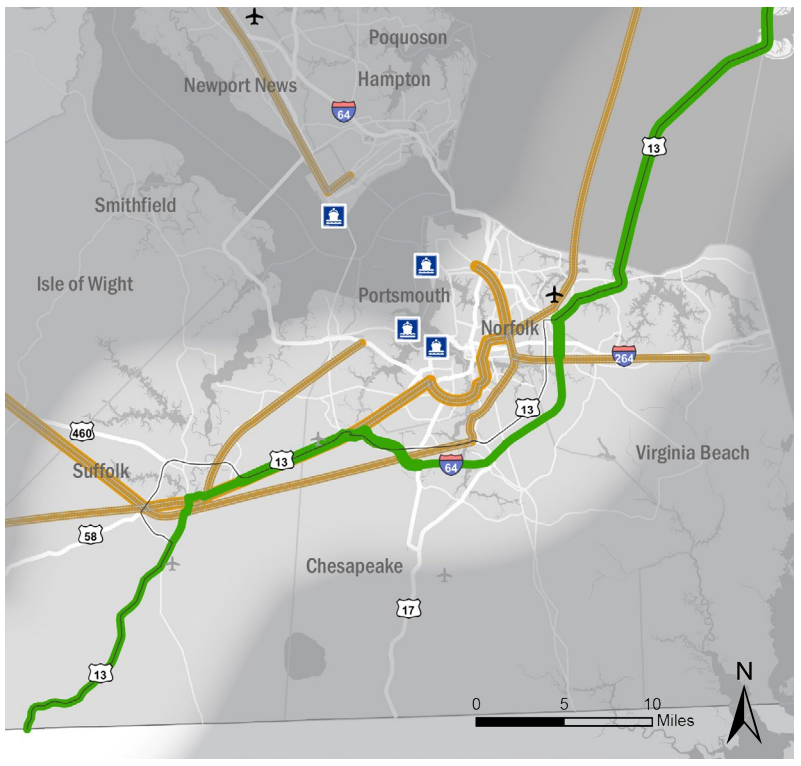
West of the Hampton Roads Executive Airport in Segment D1, freight is moved evenly by both truck and rail in terms of tonnage; however, more freight moves by truck in terms of value. In total, 22 million tons (49 percent) of freight is moved through this section of Segment D1 by truck, compared to 22.5 million tons (51 percent) by rail. By value, however, $31 billion (69 percent) of freight value travels by truck, compared to $14 billion (31 percent) by rail. On average, a ton of freight traveling through this section of Segment D1 by truck is worth $1,449 while a ton of freight traveling by rail is worth $616. In 2025, both rail and truck freight tonnages and total values in this area of Segment D1 are expected to increase, and the percentage of the freight traveling by truck is expected to increase by both tonnage and value to 59 percent and 75 percent, respectively. Value per ton of freight moved on trucks and rail is anticipated to increase to $1,523 and $756, respectively.

Within Segment D1 on the Chesapeake Bay Bridge-Tunnel, the large majority of freight moves by truck, in terms of both tonnage and value. In total, 16 million tons (97 percent) of freight travels through this section of Segment D1 by truck, compared to only 480,000 tons by rail. With respect to value, the disparity is even greater with $26 billion (98 percent) of freight value traveling by truck, compared to $436 million by rail. On average, a ton of freight traveling through this section of Segment D1 by truck is worth $1,622 while a ton of freight traveling by rail is worth $910. In 2025, both rail and truck freight tonnages and total values in Segment D1 are expected to increase, while the percentage of the freight traveling by truck and rail is anticipated to remain the same both in terms of tonnage and value. Value per ton on trucks is expected to increase to $1,660 and by rail is expected to decrease to $850.

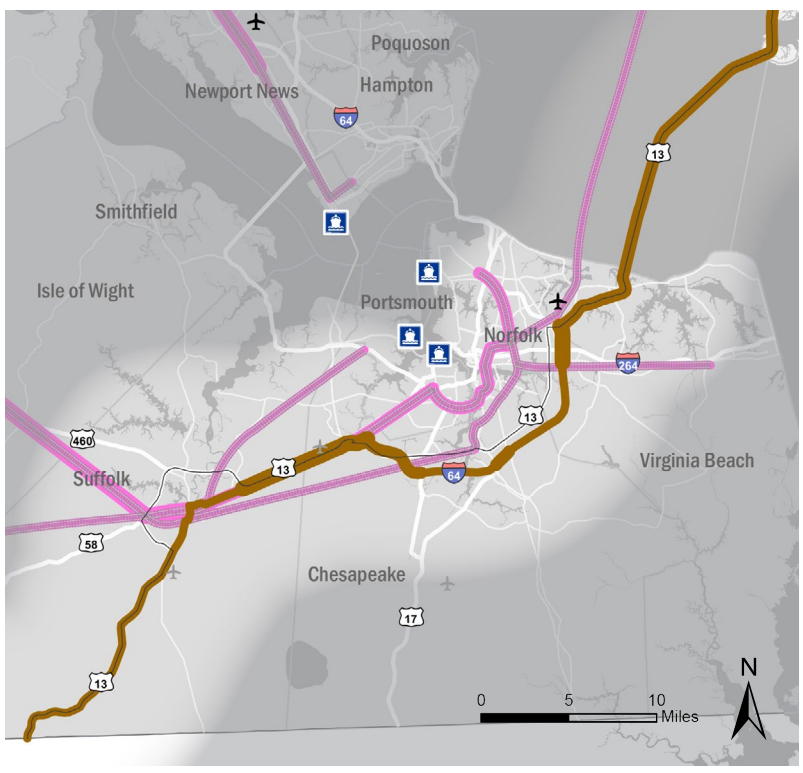
Annual Freight by Tonnage, 2012



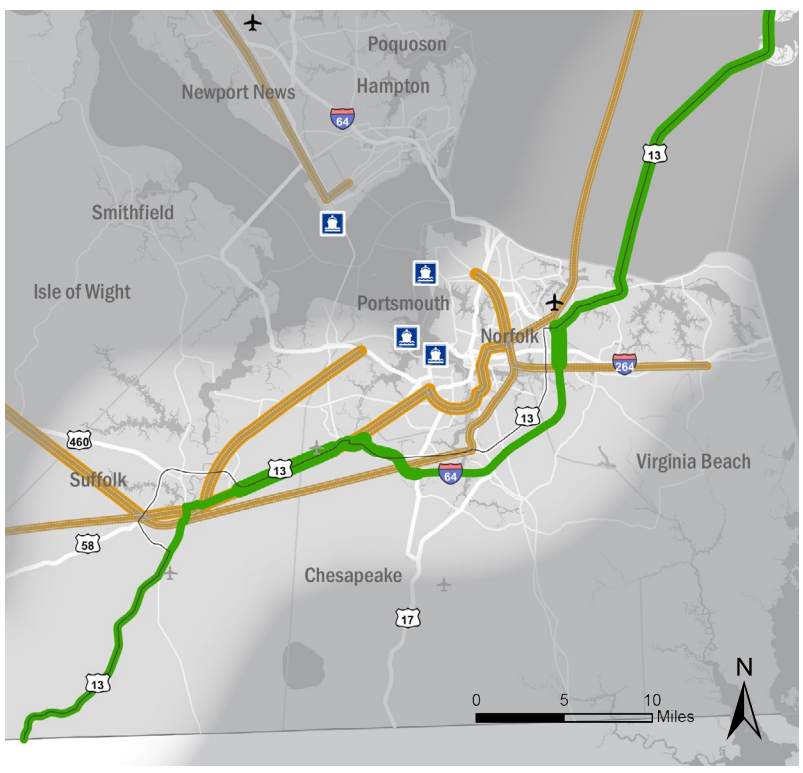
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

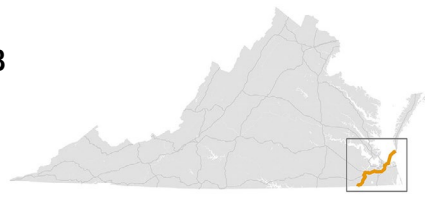
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



D1 SEGMENT NEEDS

Redundancy and Mode Choice

Comparable Travel Options

Chincoteague to Hampton Roads (Norfolk)

Inter-City Bus	*Train*
2 Trips per Day	0 Trips per Day
2:20 Travel Time	0:00 Travel Time
$20 Est. Cost	$0 Est. Cost

Auto

Via US-13: 1:55 Travel Time $59 Est. Cost

Hampton Roads (Norfolk) to Elizabeth City, NC

Inter-City Bus	*Train*
1 Trips per Day	0 Trips per Day
0:50 Travel Time	0:00 Travel Time
$11 Est. Cost	$0 Est. Cost

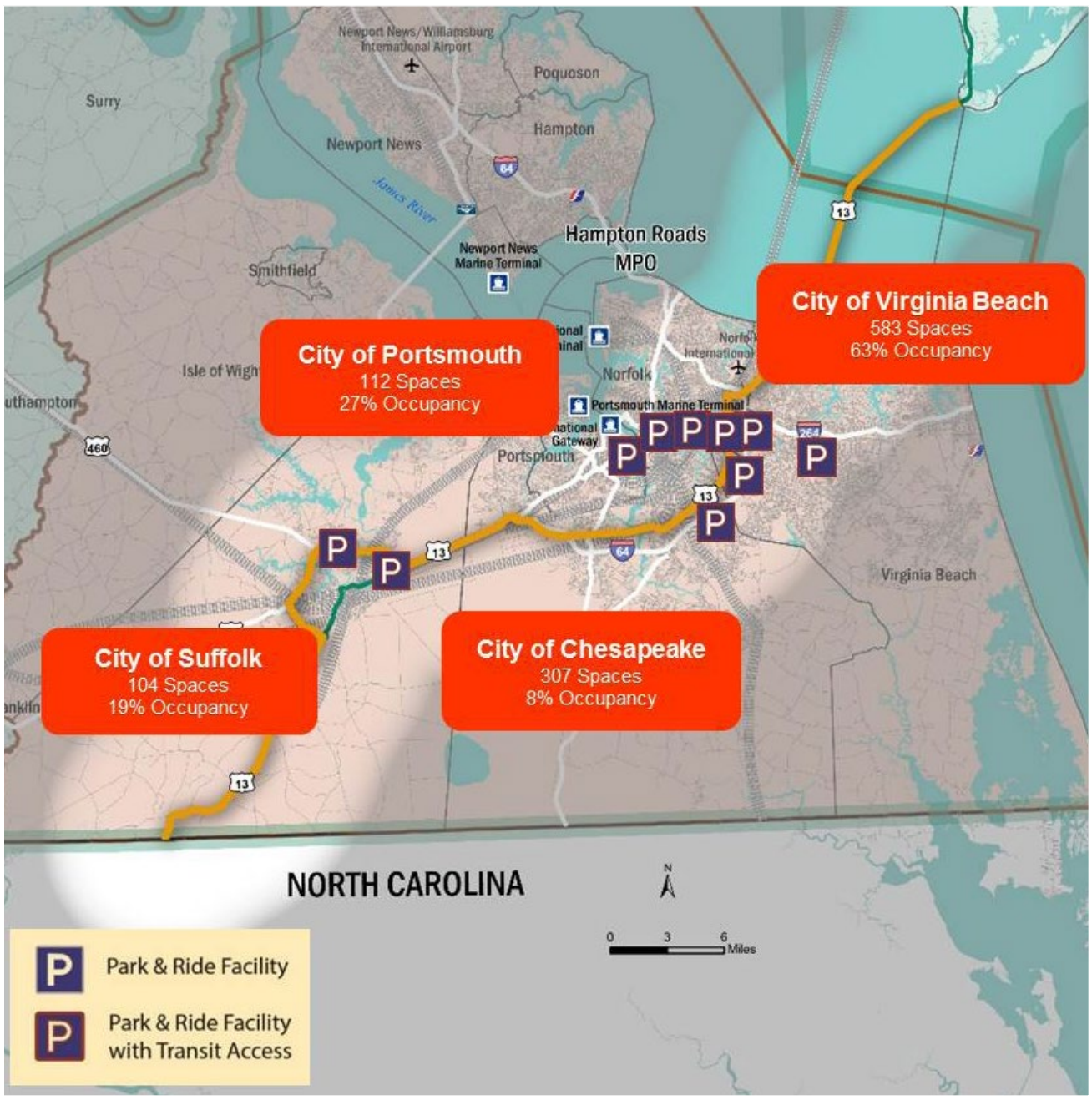
Auto

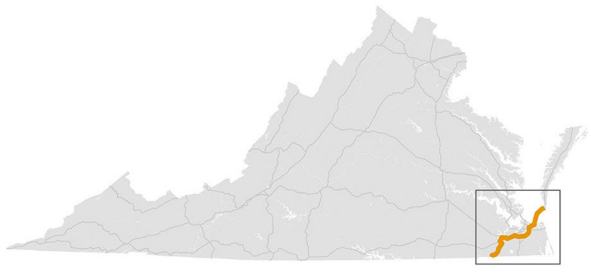
Via US-13: 0:50 Travel Time $26 Est. Cost

Passenger trips on Segment D1 of the Eastern Shore Corridor have a few travel options, both in terms of travel path and mode choice. There are no parallel highway facilities to Segment D1, though it does access other major highway facilities in the Hampton Roads Area, including I-64, I-264, I-664, US 17, US 58, and US 460. However, based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by the other available modes. The alternate mode, specifically bus, is limited by the frequency of service. Amtrak does have stations in Newport News, Norfolk and Virginia Beach; however, routes from these stations serve the Northeast Corridor and do not offer connections within Corridor D.

Park-and-Ride

Within Segment D1, commuters can utilize many Park-and-Ride facilities, as well as commuter bus service provided by HRT. Park-and-Ride locations are spread throughout the region. Virginia Beach provides the highest number of Park-and-Ride spaces and has the highest utilization rate of spaces available in the region. However, no city within the Segment D1 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.





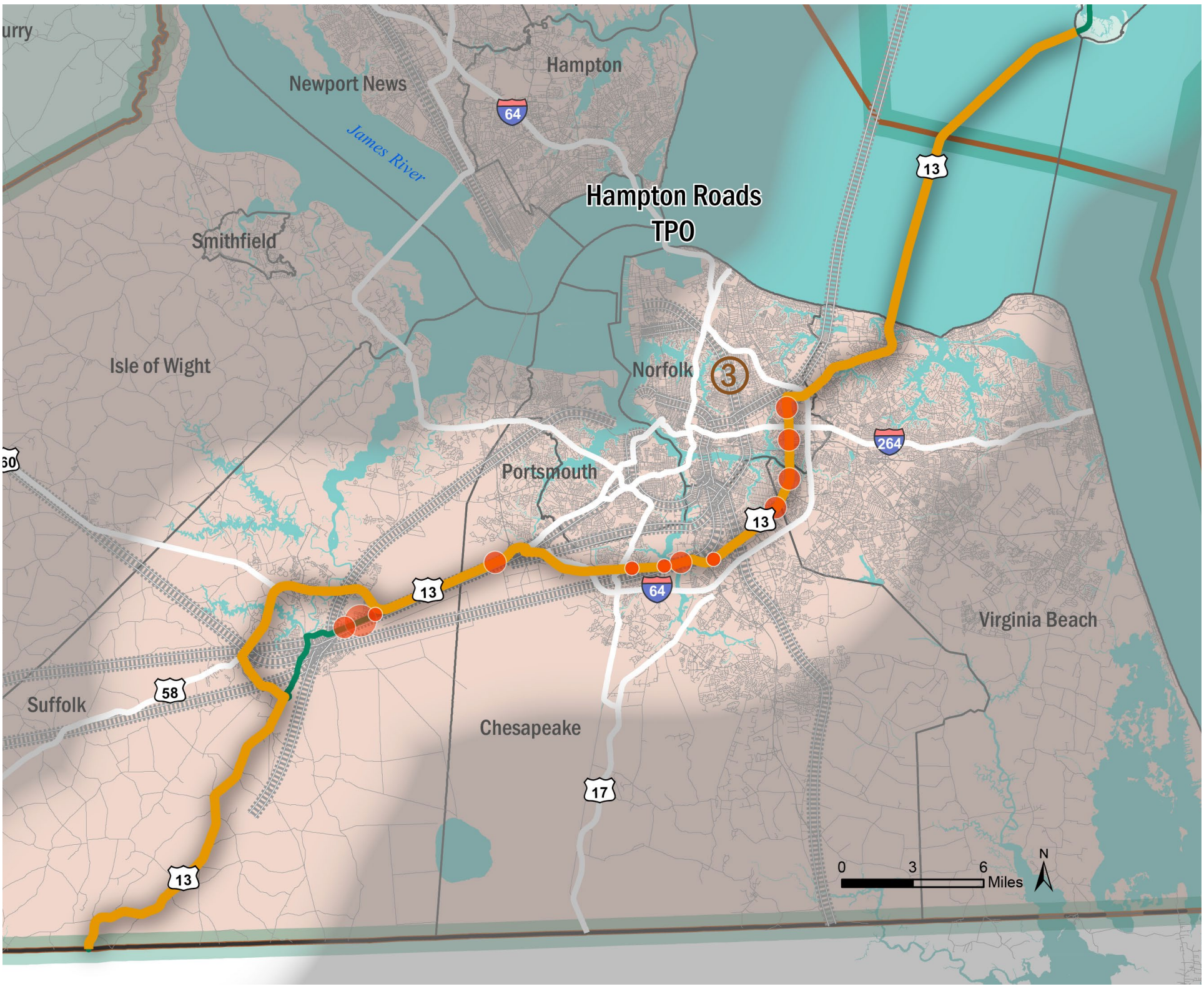
D1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	146
Severe Crashes/Million VMT	1.3
Number of Railroad Crashes	3

Between 2010 and 2012, 146 severe crashes occurred on Segment D1, representing the vast majority of the crashes on Corridor D as a whole. Segment D1 had several concentrated areas of severe crashes. In Suffolk, on US 13 Business (Portsmouth Boulevard), 43 collisions occurred within a distance of 1.5 miles between the on-ramp from US 13 to Suburban Drive. Of the 43 collisions, 35 occurred at the intersections with Suburban Drive and East Washington Street. In Chesapeake, on US 13 (West Military Highway), there were 15 crashes over a 0.5-mile stretch near the Hampton Roads Airport. Also in Chesapeake, on US 13 (South Military Highway), there were 40 collisions over 4.2 miles between George Washington Highway and Campostella Road. Of the 40 collisions, 19 occurred at the intersection with Shell Road. On US 13 (North Military Highway) between Norfolk and Virginia Beach, there were 48 incidents that took place over 4.5 miles between Sparrow Road and Lewis Road. Half of the 48 incidents occurred at the intersections with Sparrow Road and Hoggard Road.

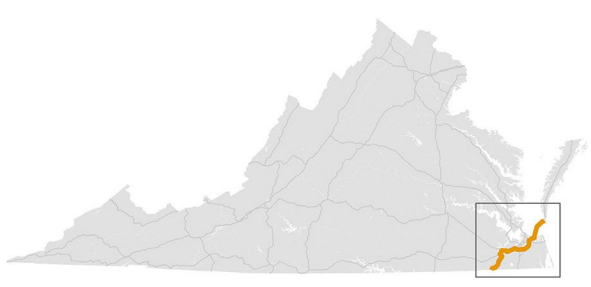


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

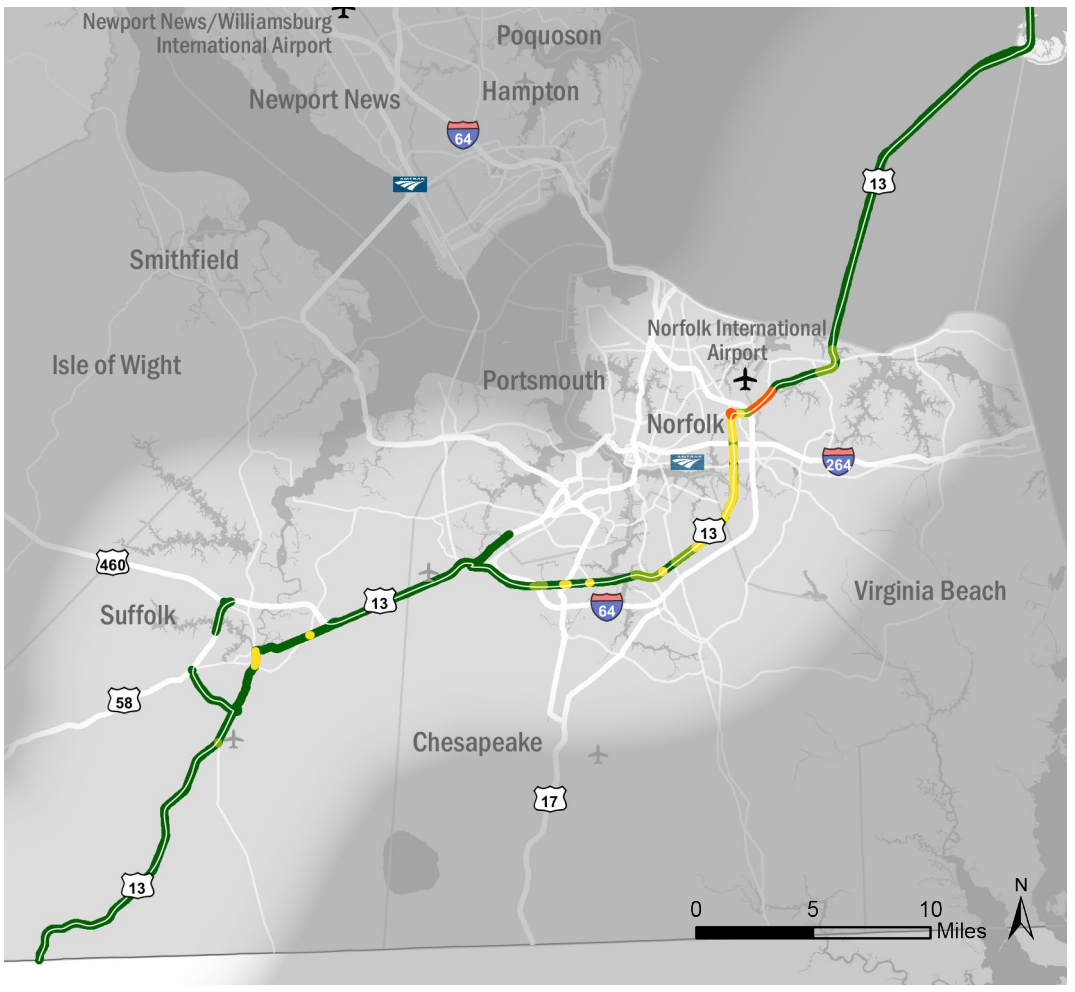
Performance Metrics

Person Hours of Delay per Mile	26
Freight Ton Hours of Delay per Mile	14.2K

Passenger Delays

Segment D1 experiences moderate congestion, approaching 4,000 person-hours of delay, with several areas experiencing delays in excess of 100 person-hours per mile. There are significant passenger delays on US 13 in locations between Route 166 in Virginia Beach and US 17 in Chesapeake. In the City of Suffolk, there are significant passenger delays in locations on US 460 and Route 32. Peak-period passenger delays account for more than half of daily congestion, considerably higher than average for the peak-period share of congestion along CoSS segments.

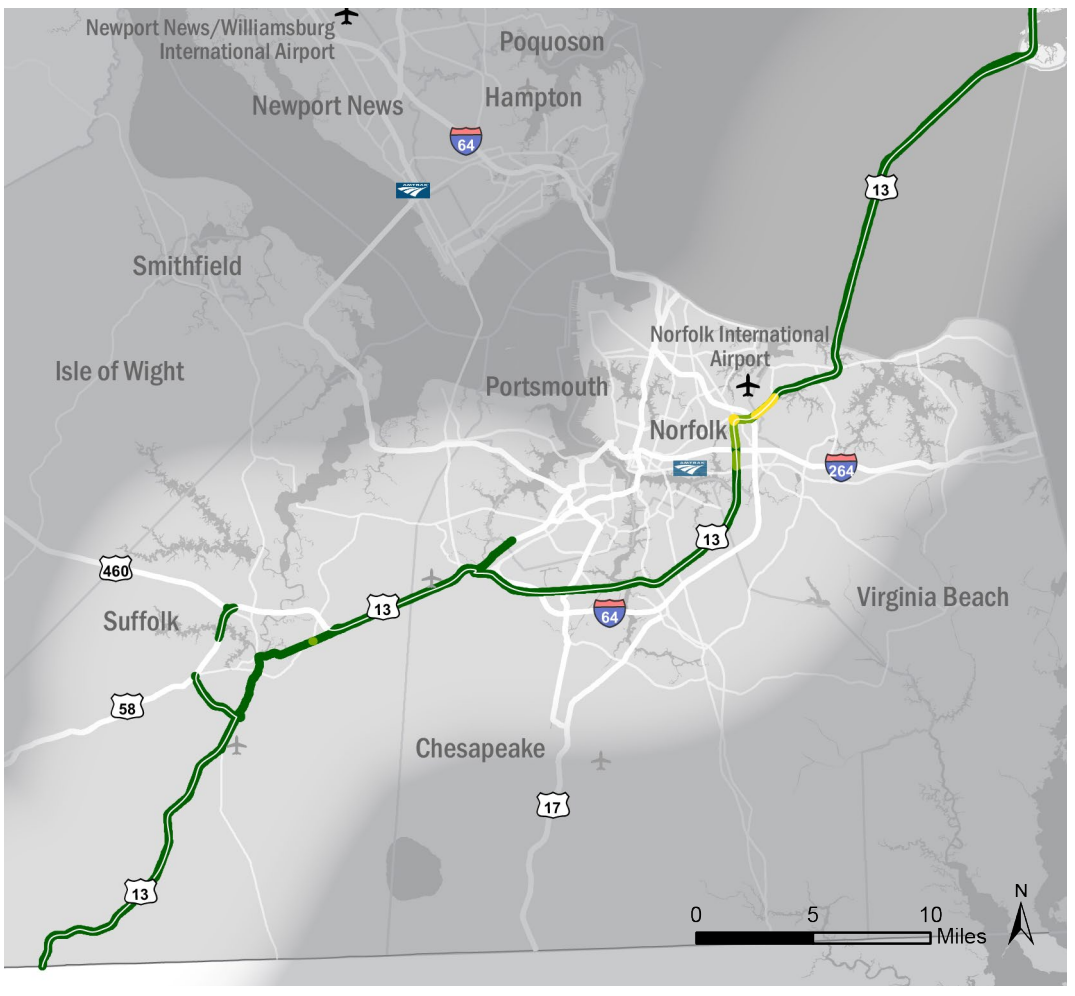
Daily Person Hours of Delay Per Mile

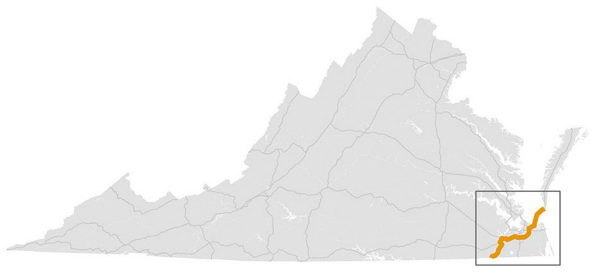


Freight Delays

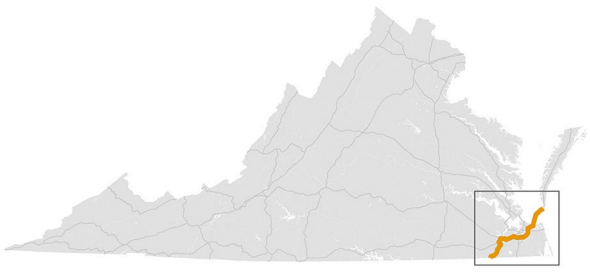
Freight congestion is minimal for much of Segment D1, with an average delay of 14,000 ton-hours per mile on the segment and with significant delays occurring near the Norfolk International Airport. In the City of Virginia Beach, there are significant freight delays on US 13 east of I-64. In the City of Norfolk, freight delays in excess of 250,000 ton-hours per mile are experienced at the intersection of US 13 and Route 165. Peak-period freight delays account for 45 percent of daily congestion, considerably more than average for the peak-period share of congestion along CoSS segments.

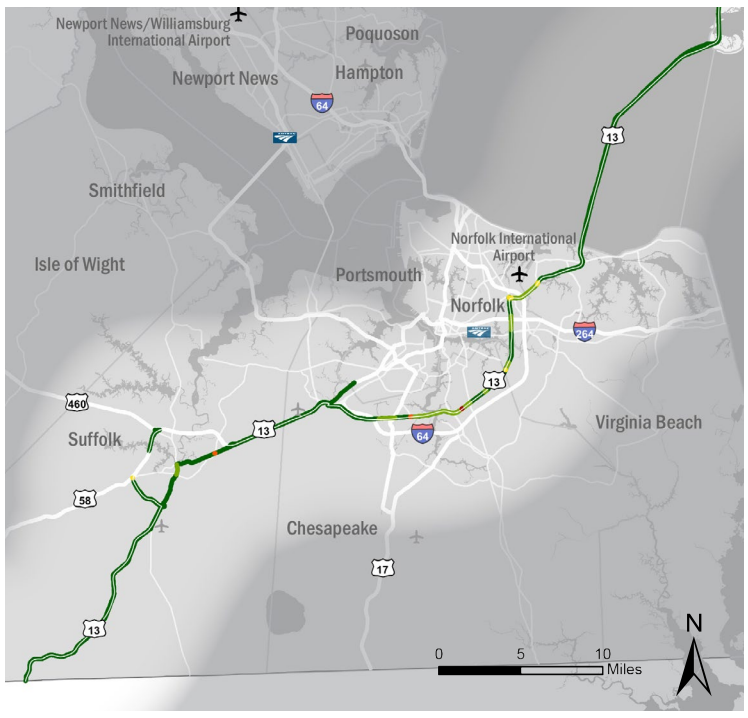
Daily Freight Ton Hours of Delay Per Mile





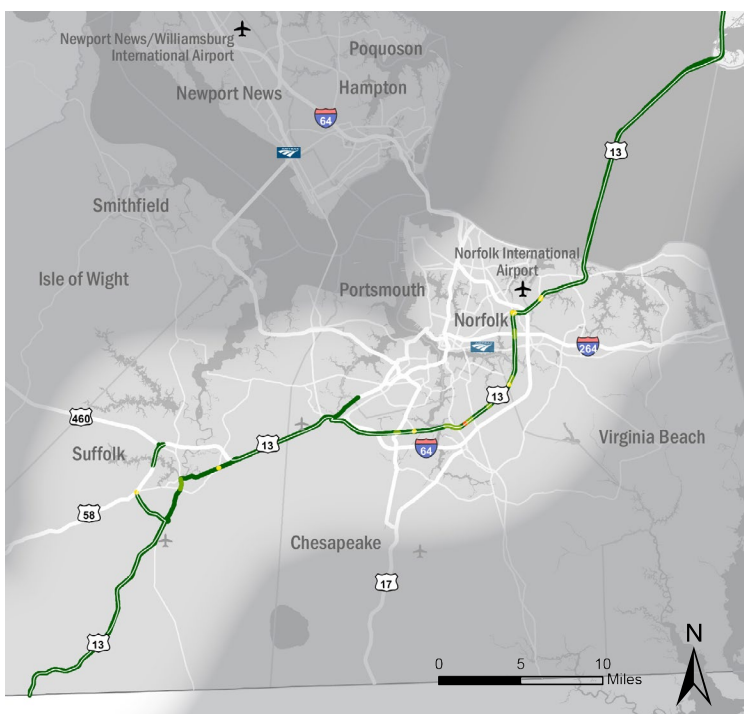
Reliability





Weekday Peak

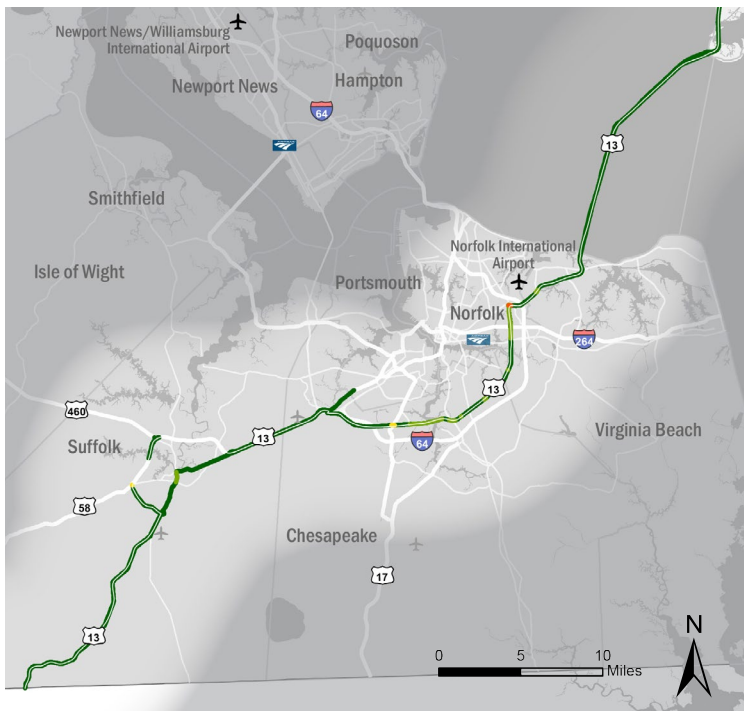
Reliability of travel during the peak period on a typical weekday on Segment D1 ranges from 0.00 to 0.81 in terms of reliability index, with an average value of 0.17. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, only a small segment of US 13 between I-464 and Route 168 in Chesapeake has a reliability index value exceeding the statewide threshold.



Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.64 in terms of reliability index, with an average value of 0.15. Several locations on US 13 have a weekday reliability index exceeding the statewide threshold:

- In Suffolk at US 58;
- In Chesapeake at Route 196 and Compostella Road;
- In Norfolk at Route 165; and
- In Virginia Beach at Route 166.



Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.74 in terms of reliability index, with an average value of 0.12. While this segment has a higher than average level weekday reliability index, only a short segment at the intersection with Route 165 in the City of Norfolk has a reliability index value exceeding the statewide threshold.

Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

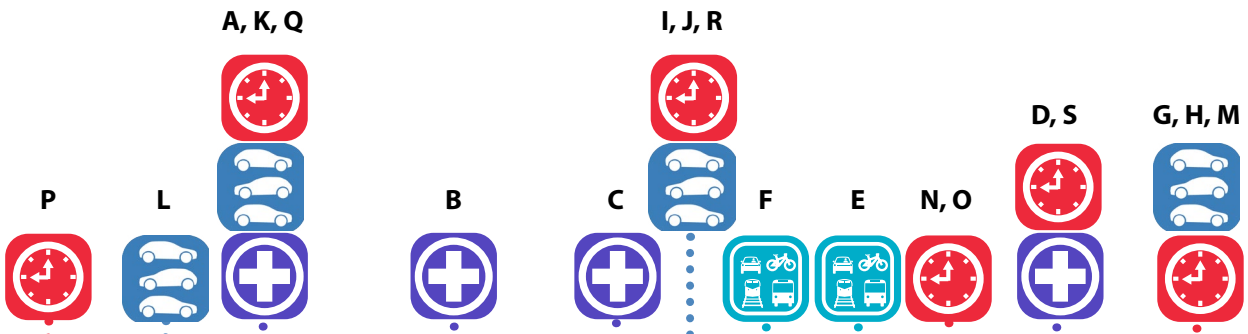
Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

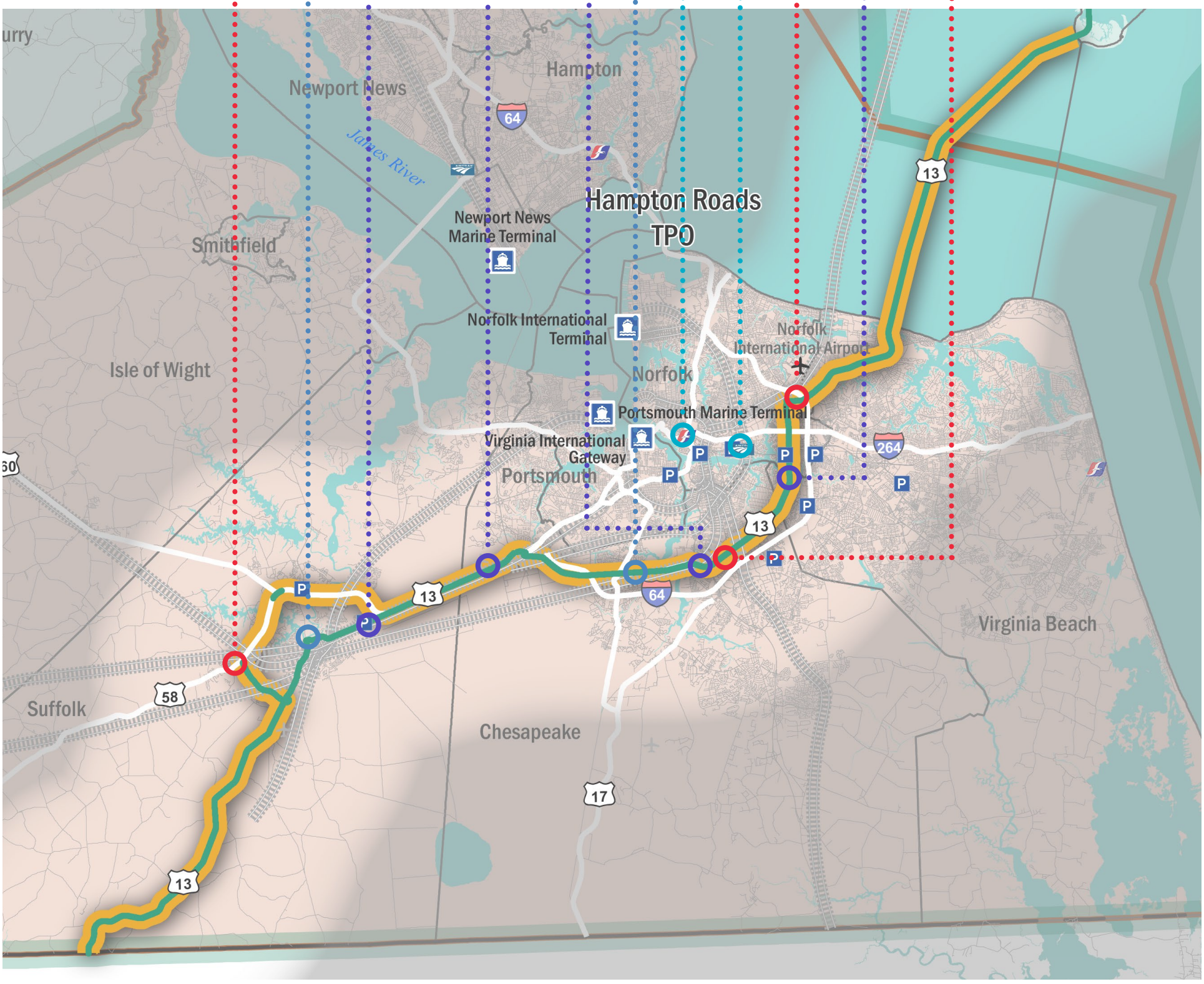
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

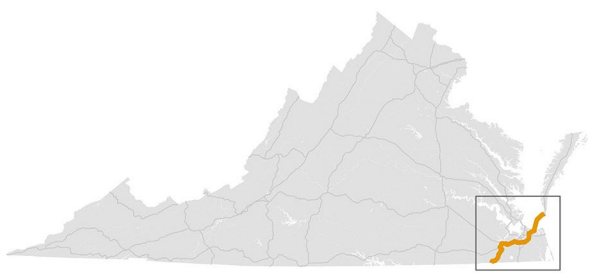
Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability







D1 SEGMENT NEEDS

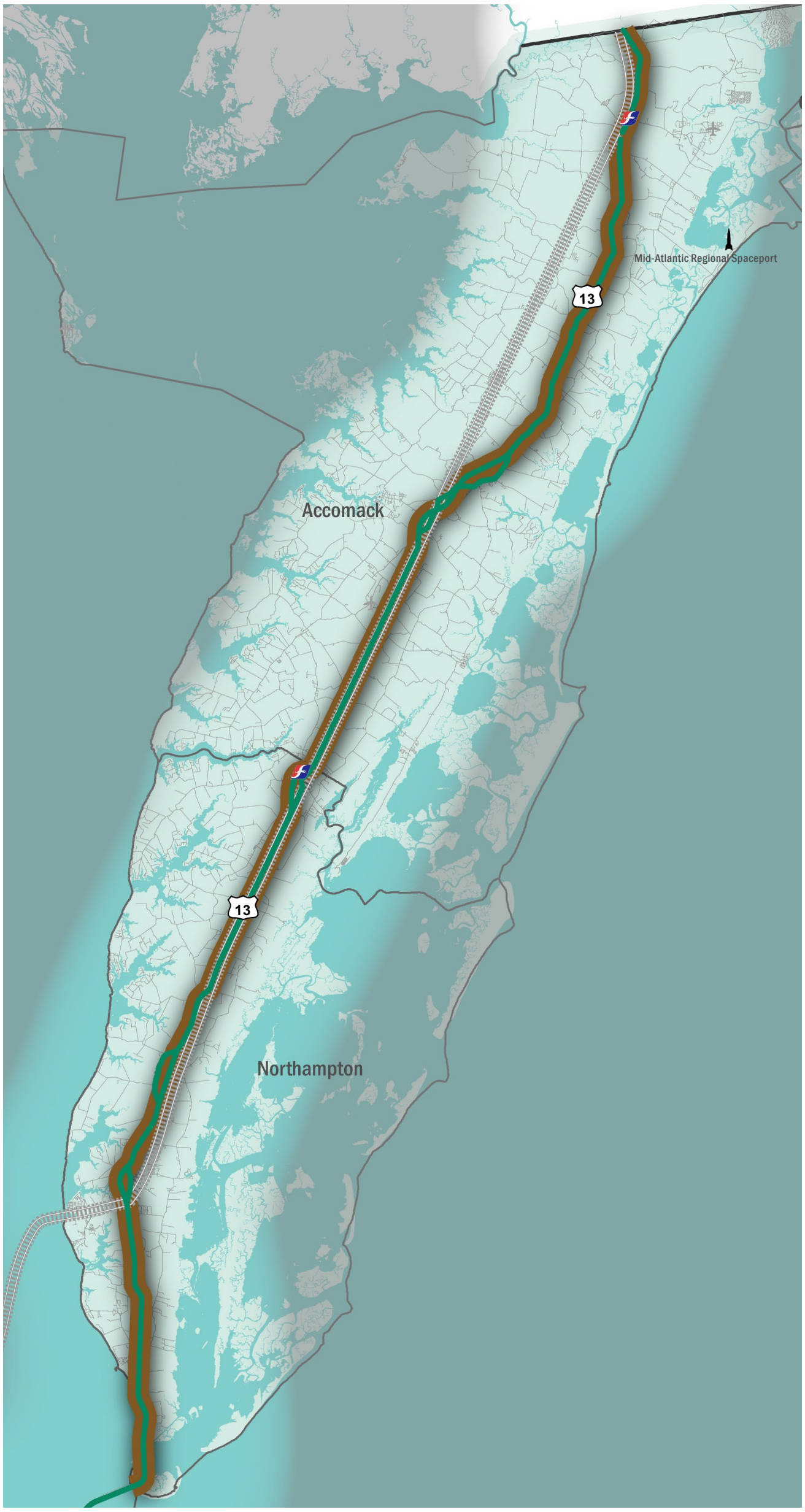
Summary of Needs - D1 Segment

A.		US 13-Business between US 13 and Suburban Dr in Suffolk: 43 severe crashes
B.		US 13 at Hampton Roads Executive Airport in Chesapeake: 15 severe crashes
C.		US 13 between US 17 and Route 166 in Chesapeake: 40 severe crashes
D.		US 13 between Sparrow Rd and Lewis Rd in Norfolk: 48 severe crashes
E.		No passenger rail from Hampton Roads to other cities in the corridor
F.		Intercity bus service from Hampton Roads is limited to twice per day
G.		Congestion issue on US 13 between VA Route 409 (Providence Road) in Norfolk and VA Route 168 (North Battlefield Boulevard) in Chesapeake
H.		Congestion issue at US 13 (South Military Highway) and Campostella Road in Chesapeake
I.		Congestion issue at US 13 (South Military Highway) and VA Route 196 (Canal Drive) in Chesapeake
J.		Congestion issue at US 13/US 460 (South Military Highway) and US 17 in Chesapeake
K.		Congestion issue at US 13 Business (Nansemond Parkway) and US 460 Business (Portsmouth Boulevard) in Suffolk
L.		Congestion issue at US 58 Business/US 460 Business (Constance Road) and VA Route 32 (Main Street) in Suffolk
M.		Reliability issue at US 13 (South Military Highway) and VA Route 168 (North Battlefield Boulevard) in Chesapeake
N.		Reliability issue at US 13 (North Military Highway) and VA Route 166 (East Princess Anne Road) in Norfolk
O.		Reliability issue at US 13 (Northampton Boulevard) and VA Route 166 (Diamond Springs Road) in Norfolk
P.		Reliability issue at US 13/US 58 and US 58 junction in Suffolk
Q.		Reliability issue at US 13 Business (Nansemond Parkway) and US 460 Business (Portsmouth Boulevard) in Suffolk
R.		Reliability issue at US 13/US 460 (South Military Highway) and US 17 in Chesapeake
S.		Reliability issue at US 13 (South Military Highway) and VA Route 409 (Providence Road) in Virginia Beach

III. Segment D2

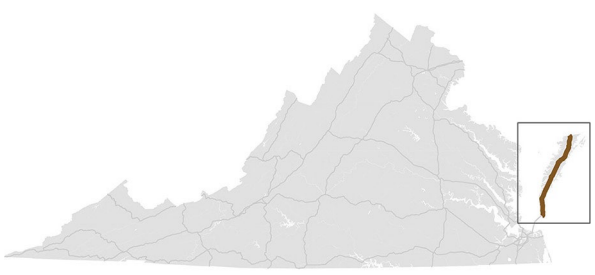
Corridor Segment D2 Components

- US 13
- US 13 Business
- Bay Coast Railroad and Barge
- Mid-Atlantic Regional Spaceport



Segment D2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Spaceport Facility
MPO Area
Planning District Area





Number of Lanes
(both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment D2 begins at the northern terminus of the Chesapeake Bay Bridge-Tunnel and progresses north to the Maryland border, serving Northampton and Accomack Counties. The segment does not travel through any areas covered by a Metropolitan Planning Organization (MPO). Segment D2 is the main corridor through the Eastern Shore for passengers and freight. For markets in the Northeast, as well as for tourists from the Northeast, this route provides the shortest path to the Hampton Roads Area.

Highway Facilities: US 13 is a four-lane facility that primarily provides local access in Segment D2. There are no parallel highway facilities to Segment D2, except for specific locations where US 13 Business exists in the urbanized areas.

Transit Services: Greyhound provides service from stations in Exmore and Oak Hall with routes that connect to Maryland and the Hampton Roads Area. Shore Transit and Rideshare (STAR) offers bus service that connects communities along the length of the Eastern Shore.

Rail Facilities: The Bay Coast Railroad moves freight through the Eastern Shore, connecting to a rail barge that crosses the mouth of the Chesapeake Bay to access Norfolk.

Port Facilities: While no traditional port facilities are located along this segment, barge transportation is also available between Baltimore and the Port of Virginia, paralleling Segment D2. Freight destined for low-earth orbit is served by launch facilities at the Mid-Atlantic Regional Spaceport, which provides service to commercial, governmental, scientific, and academic organizations from Wallops Island on the Eastern Shore.

Airport Facilities: There are no commercial airports in this segment.

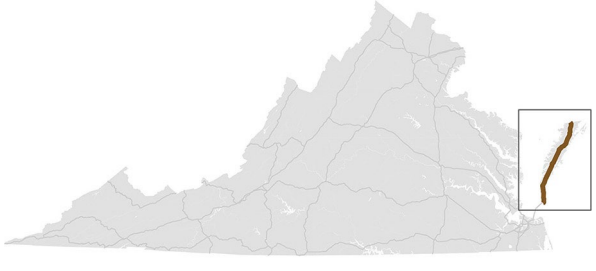
Major planned and future projects include:

- **Northampton County:** Replacing signs and posts that no longer meet the minimum service level for sign retro-reflectivity and function between Wise Point (southern tip of peninsula where Route 600 passes under US 13) and the Accomack County line; and
- **Accomack County:** Rebuilding of existing traffic signals at the US 13 and Bank Street intersection in Onley.



Future Projects

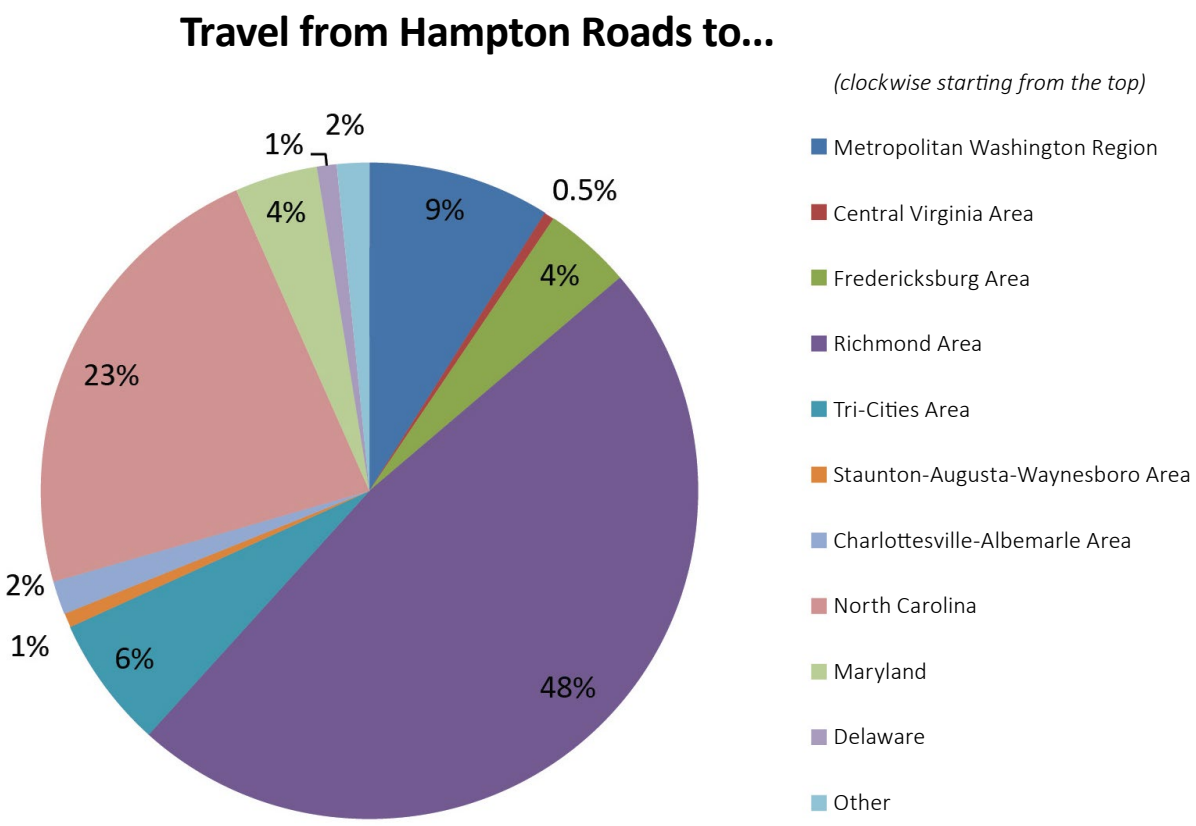
- Reconstruction with added capacity
- Safety improvements
- Primary facility

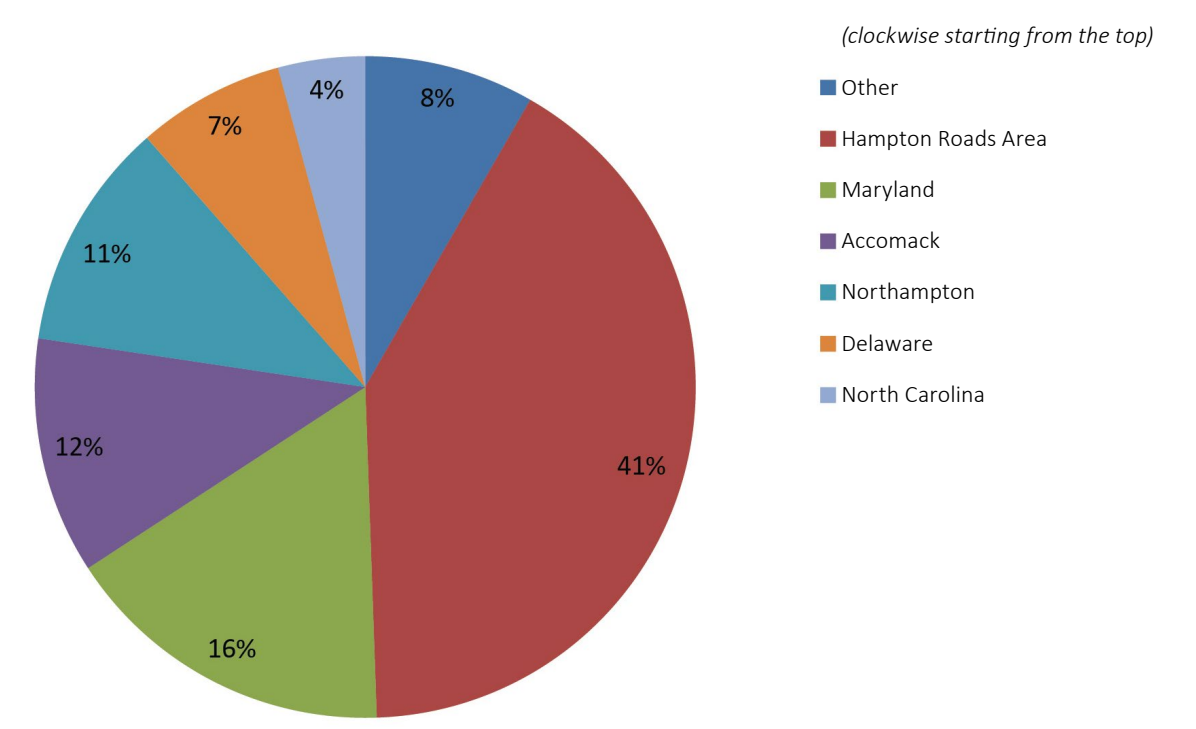


Travel Demand

Passenger Demand

Segment D2 does not traverse any of the Commonwealth's MPO areas, but does provide a connection to the Hampton Roads Area from Maryland and Delaware via Northampton and Accomack Counties. Of the intercity passenger traffic that originates in the Hampton Roads Area, five percent is destined for Maryland and Delaware. Depending on the ultimate destination, many of these travelers may use Segment D2. Of the intercity passenger traffic originating in Accomack and Northampton Counties, 41 percent is destined for the Hampton Roads Area, 23 percent is destined for Maryland and Delaware, and 22 percent is travel between the two counties.





D2 SEGMENT PROFILE

Freight Demand

By truck, Segment D2 carries 17 million tons of freight worth $27 billion in 2012, and is estimated to carry 25 million tons of freight worth $40 billion in 2025. The major truck freight pattern on Corridor D is between North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. Jurisdictions along Segment D2 are only minor generators or attractors of truck freight tonnage on the corridor, accounting for between four and five percent of truck freight origins and two percent of truck freight destinations. This truck freight on Segment D2 is mostly heading to or arriving from locations in the Middle Atlantic region, rather than the Port of Virginia. Between 11 and 13 percent of truck freight tonnage on Corridor D correspond to through traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Segment D2 carried 490,000 tons of freight worth $440 million in 2012, and is estimated to carry 720,000 tons of freight worth $590 million in 2025. The major rail freight pattern on Corridor D is between West Virginia and neighboring counties in Virginia to the Port of Virginia in Norfolk. Rail freight flows originating from or destined for Segment D2 are nearly negligible with respect to total tonnage and value on Corridor D.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 44%)
2. North Carolina (25% / 23%)
3. City of Norfolk* (14% / 13%)
4. City of Chesapeake (6% / 9%)
5. New Jersey (6% / 6%)

Corridor Tonnage Originating in Segment D2: 4% / 5%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
City of Chesapeake and North Carolina
City of Portsmouth* and North Carolina
City of Norfolk* and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (55% / 54%)
2. City of Norfolk* (17% / 15%)
3. North Carolina (13% / 14%)
4. City of Virginia Beach (11% / 11%)
5. City of Chesapeake (8% / 10%)

Corridor Tonnage Destined for Segment D2: 3% / 3%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (40% / 41%)
2. West Virginia (40% / 37%)
3. Wise County (15% / 14%)
4. Buchanan County (10% / 10%)
5. Kentucky (7% / 7%)

Corridor Tonnage Originating in Segment D2: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
City of Norfolk* and Kentucky
City of Norfolk* and Pennsylvania

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

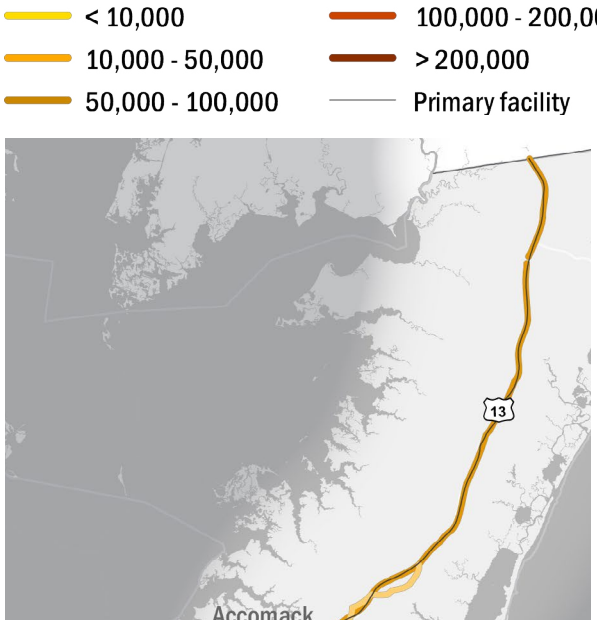
Major Destinations (by Tonnage)
1. Virginia (95% / 93%)
2. City of Norfolk* (93% / 90%)
3. Illinois (2% / 3%)
4. Ohio (1% / 1%)
5. City of Chesapeake (1% / 2%)

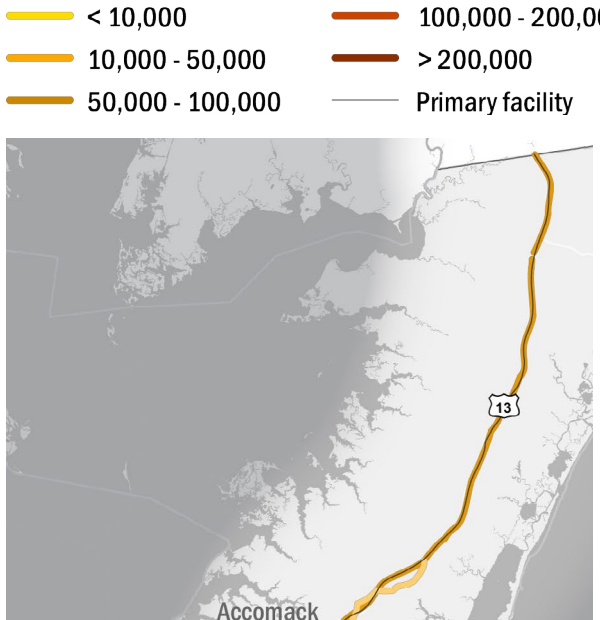
Corridor Tonnage Destined for Segment D2: <1% / <1%

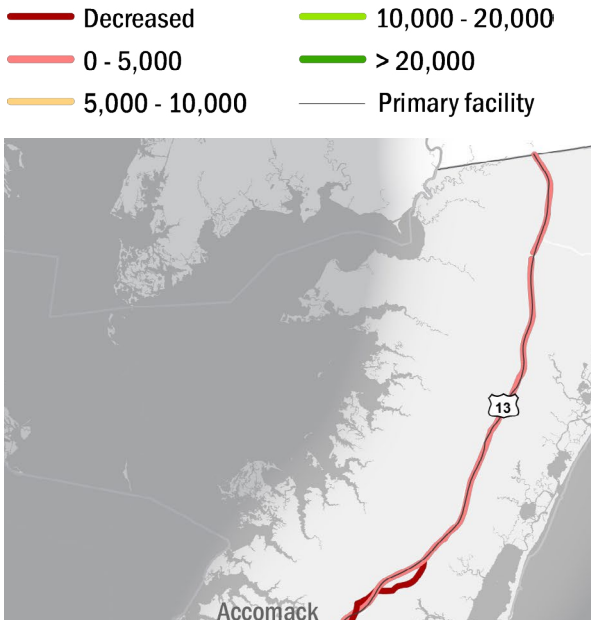
Traffic Conditions

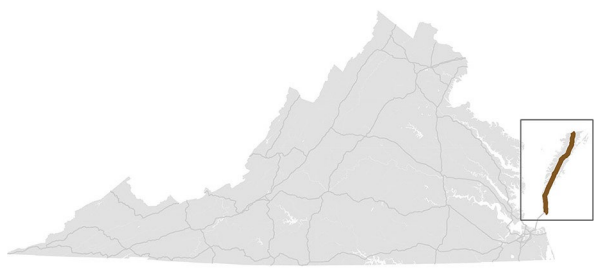
Traffic Volume and AADT

Traffic volume on Segment D2 is less than the traffic volume on Segment D1. Throughout Segment D2 along US 13, average daily traffic volumes range from 12,000 to 22,000 vehicles, with the highest volumes occurring near Onley in Accomack County. Traffic volumes on US 13 Business are less than 4,000 vehicles per day. Traffic volumes are projected to increase by 2025 throughout Segment D2 by no more than 4,000 additional vehicles per day, and are not expected to increase at all on US 13 Business.



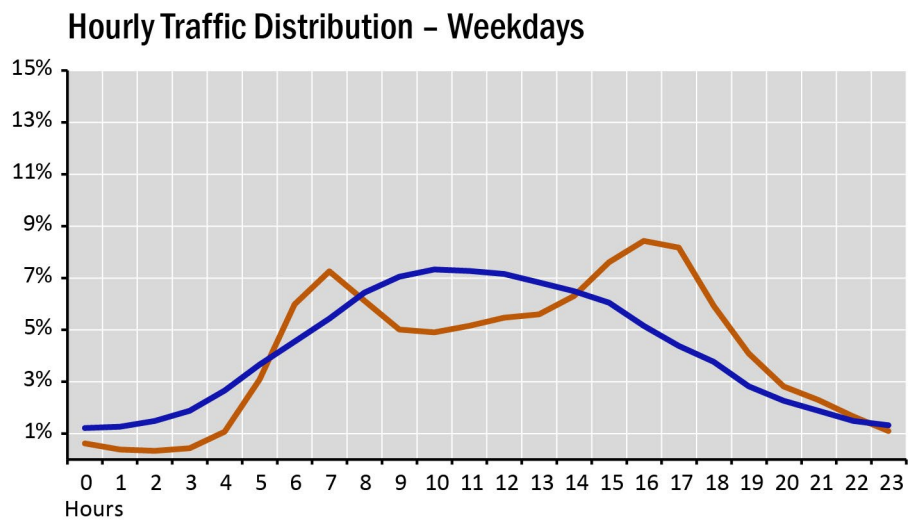


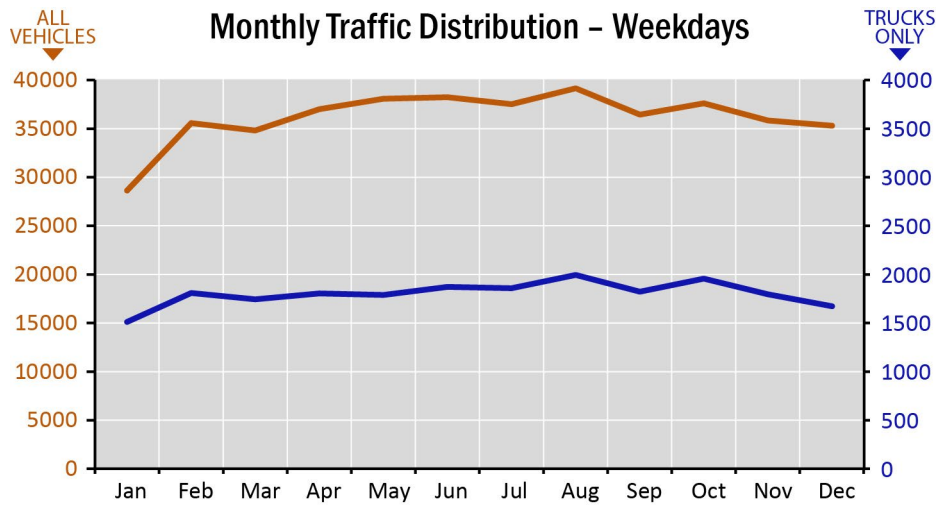


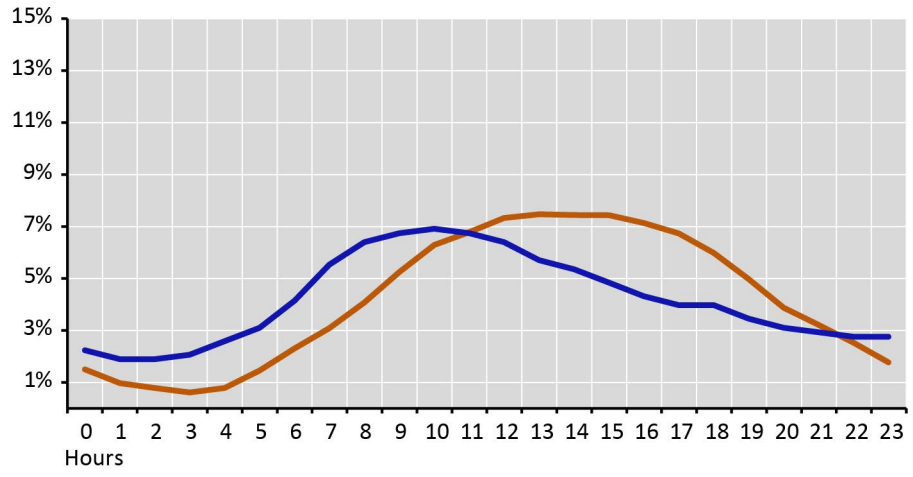


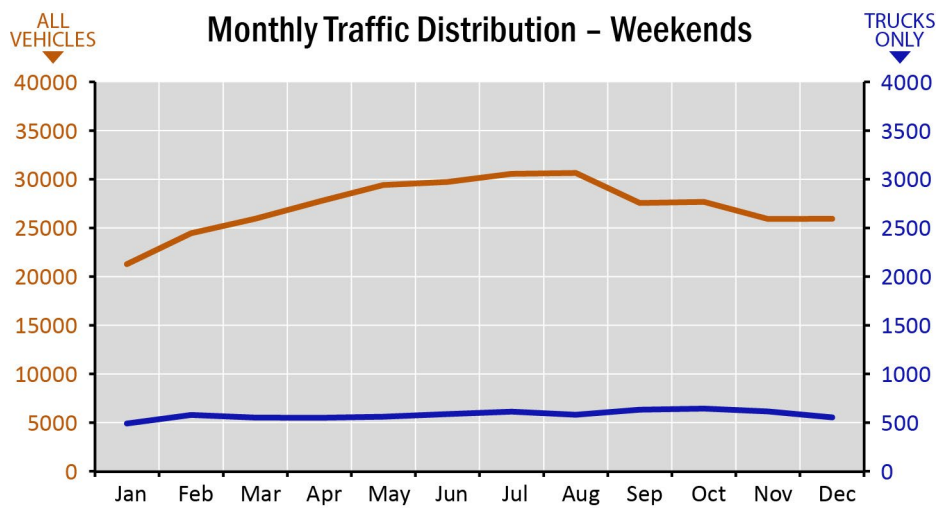
D2 SEGMENT PROFILE

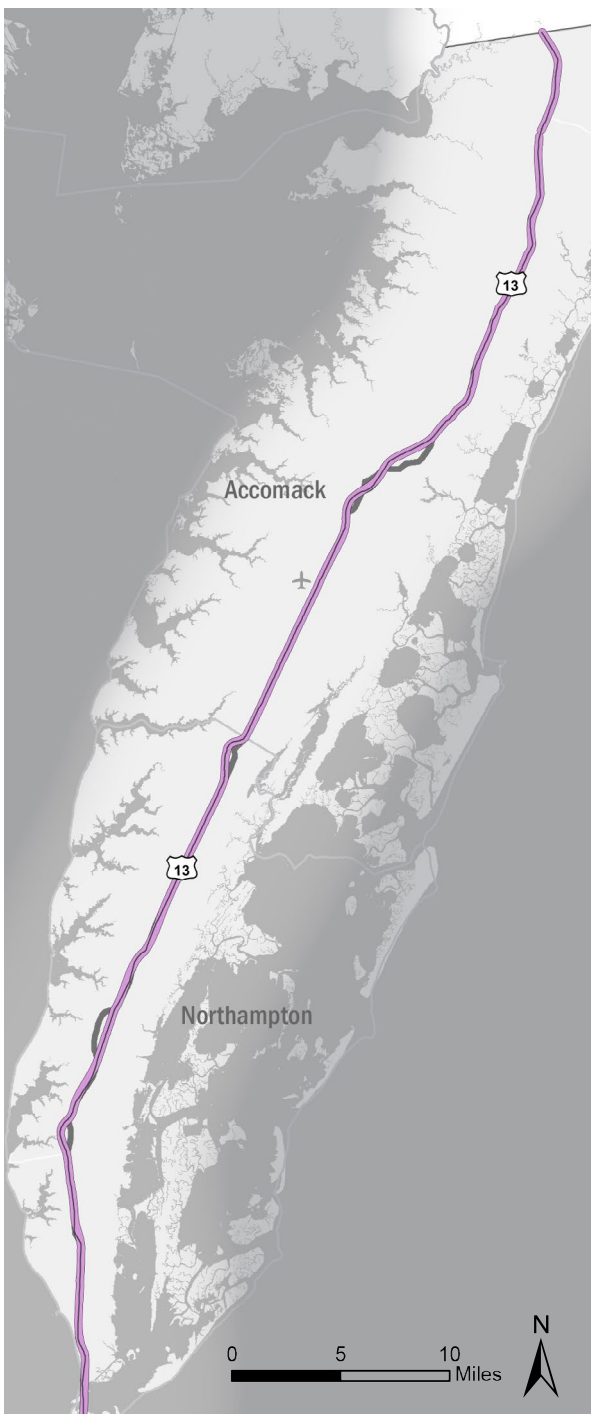
All Vehicles
Trucks











Traffic Distribution

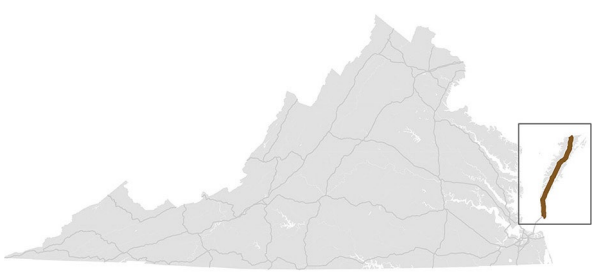
Traffic distribution counts were not available on Segment D2. All analysis therefore assumed the same time of day and annual distributions for all of Corridor D, even though these may not capture traffic patterns on Segment D2 with complete accuracy.

Truck Volumes

On Segment D2 in Northampton and Accomack Counties, heavy trucks comprise four percent of daily traffic.

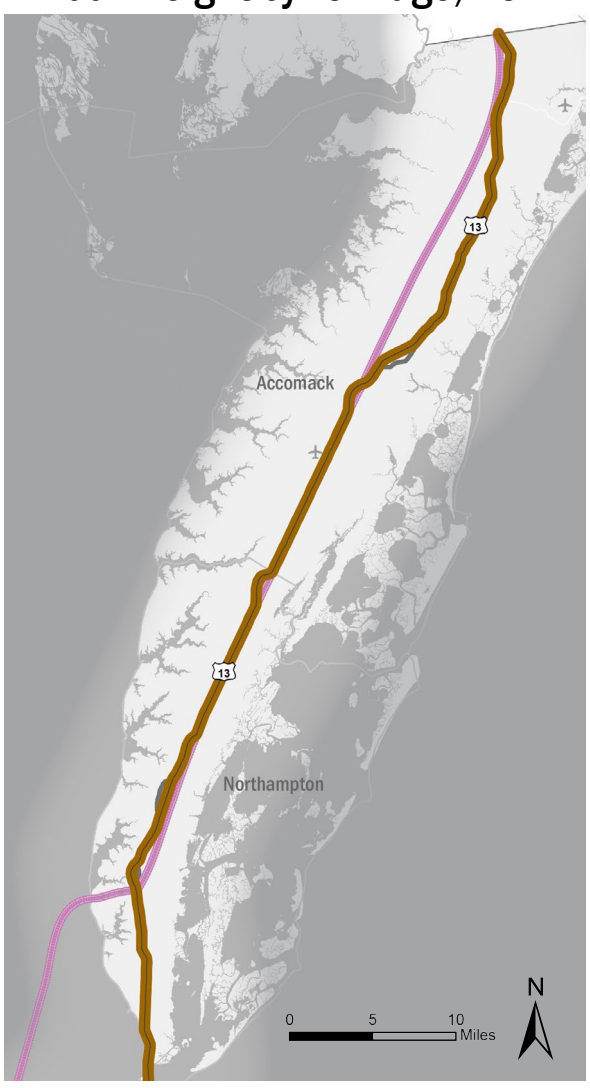
Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



D2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

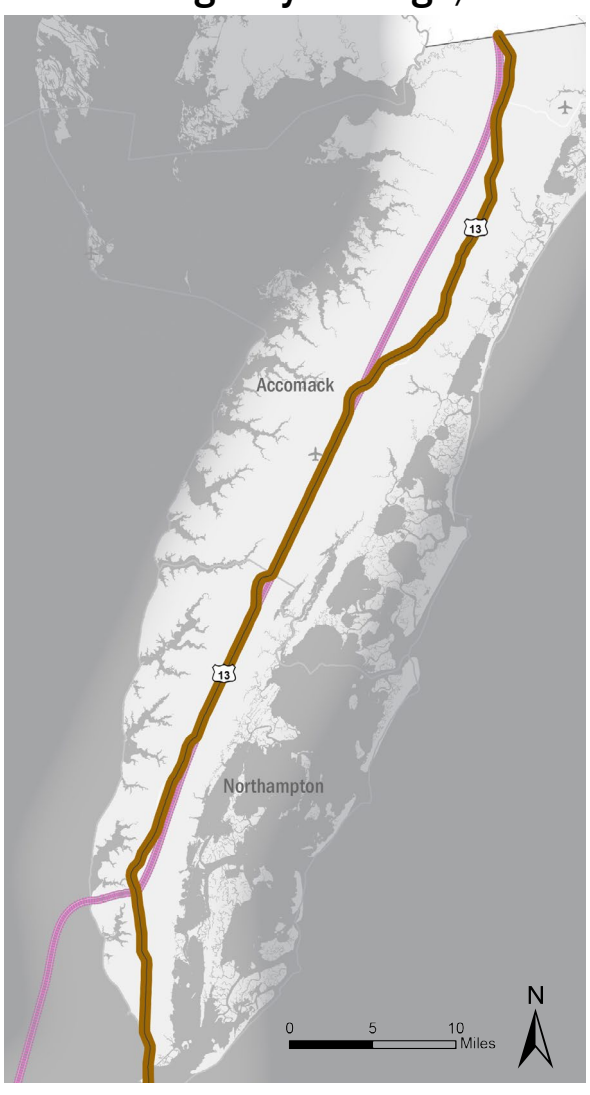


Freight Flows

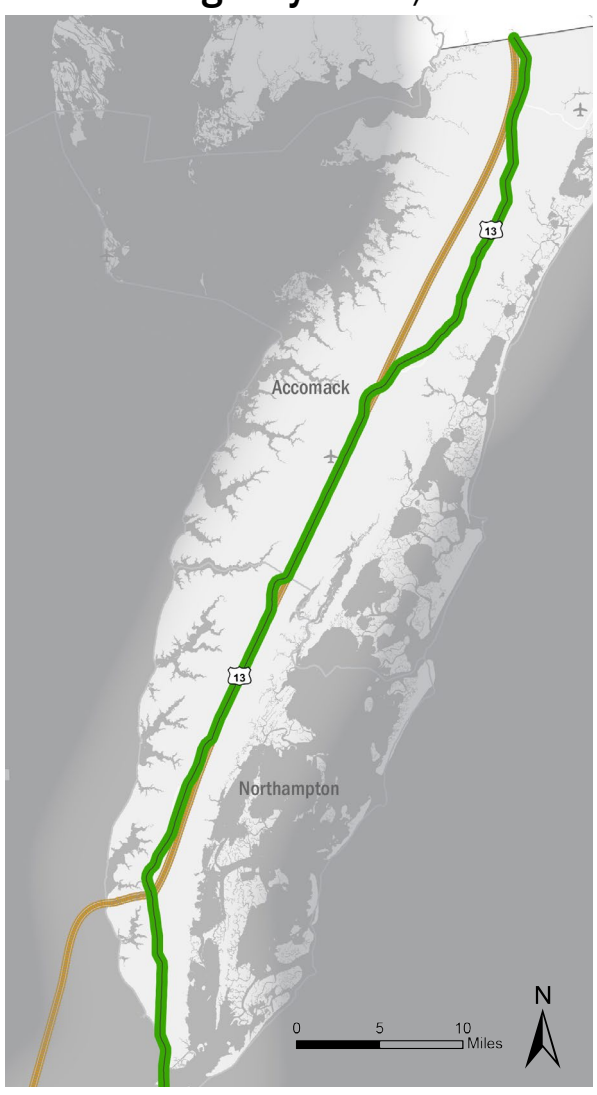
East of the Accomack County Airport in Segment D2, freight is moved primarily by truck in terms of tonnage and value. In total, 16.5 million tons (97 percent) of freight is moved through this section of Segment D2 by truck, compared to 490,000 tons (three percent) by rail. By value, $26 billion (98 percent) of freight value travels by truck, compared to $438 million (two percent) by rail. On average, a ton of freight traveling through this section of Segment D2 by truck is worth $1,582 while a ton of freight traveling by rail is worth $896. In 2025, both rail and truck freight tonnages and total values in this area of Segment D2 are expected to increase, and the percentage of the freight traveling by truck is expected to increase by both tonnage and value, to 97 percent and 99 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,618 and $833, respectively.

Within Segment D2 in the area south of the Maryland/Virginia border, freight is moved primarily by truck in terms of tonnage and value (as in the southern portion of the segment). In total, 17 million tons (97 percent) of freight is moved through this section of Segment D2 by truck, compared to 494,000 tons (three percent) by rail. By value, $27 billion (98 percent) of freight travels by truck, compared to $433 million (two percent) by rail. On average, a ton of freight traveling through this section of Segment D2 by truck is worth $1,586 while a ton of freight traveling by rail is worth $877. In 2025, both rail and truck freight tonnages and total values in this area of Segment D2 are expected to increase, and the percentage of the freight traveling by truck is expected to increase with regard to both tonnage and value to 97 percent and 99 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,618 and $815, respectively.

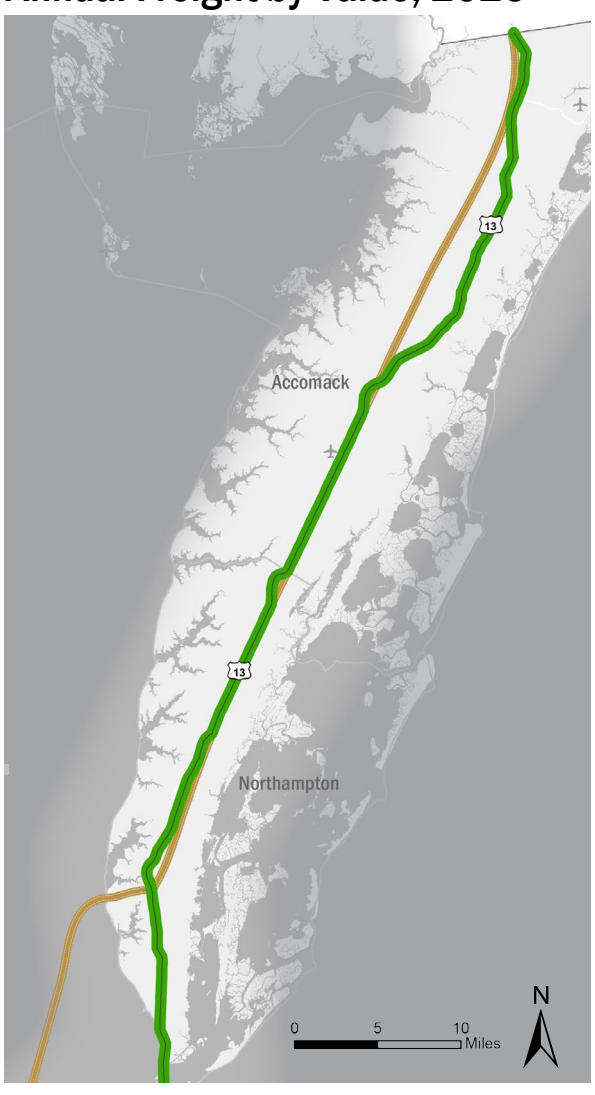
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

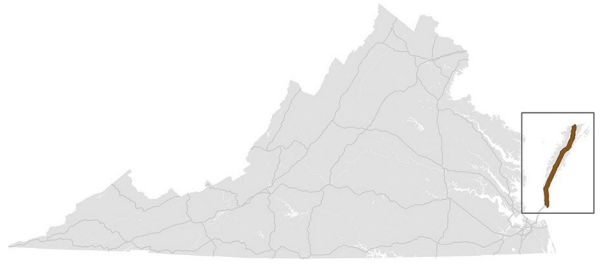
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

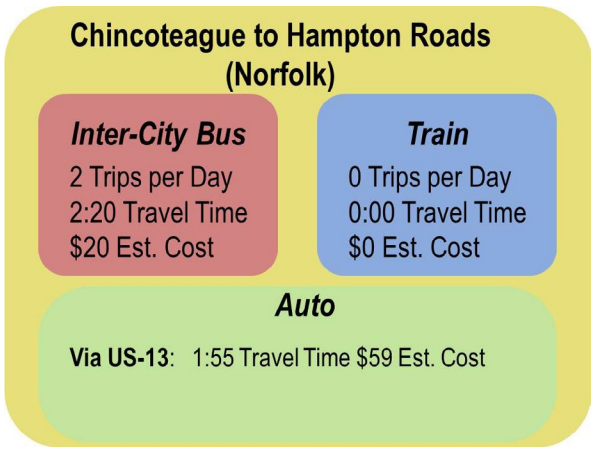
Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

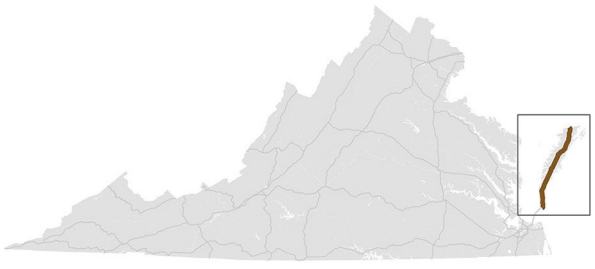
Comparable Travel Options



Passenger trips on Segment D2 of the Eastern Shore Corridor have few travel options, both in terms of travel path and mode choice. There are no parallel facilities to US 13 on the Eastern Shore that accommodate long distance travel. Based on the 2014 federal standard mileage rate of 56 cents per mile, trips to Hampton Roads from the Eastern Shore would be more expensive by automobile than by the other available modes, such as by bus. However, bus travel, offered by Greyhound at Exmore and Oak Hall, is limited by the frequency of service.

Park-and-Ride

Within Segment D2, commuters do not have access to any Park-and-Ride locations or service from HRT; however, STAR offers commuter bus service, which connects communities along the length of the Eastern Shore.



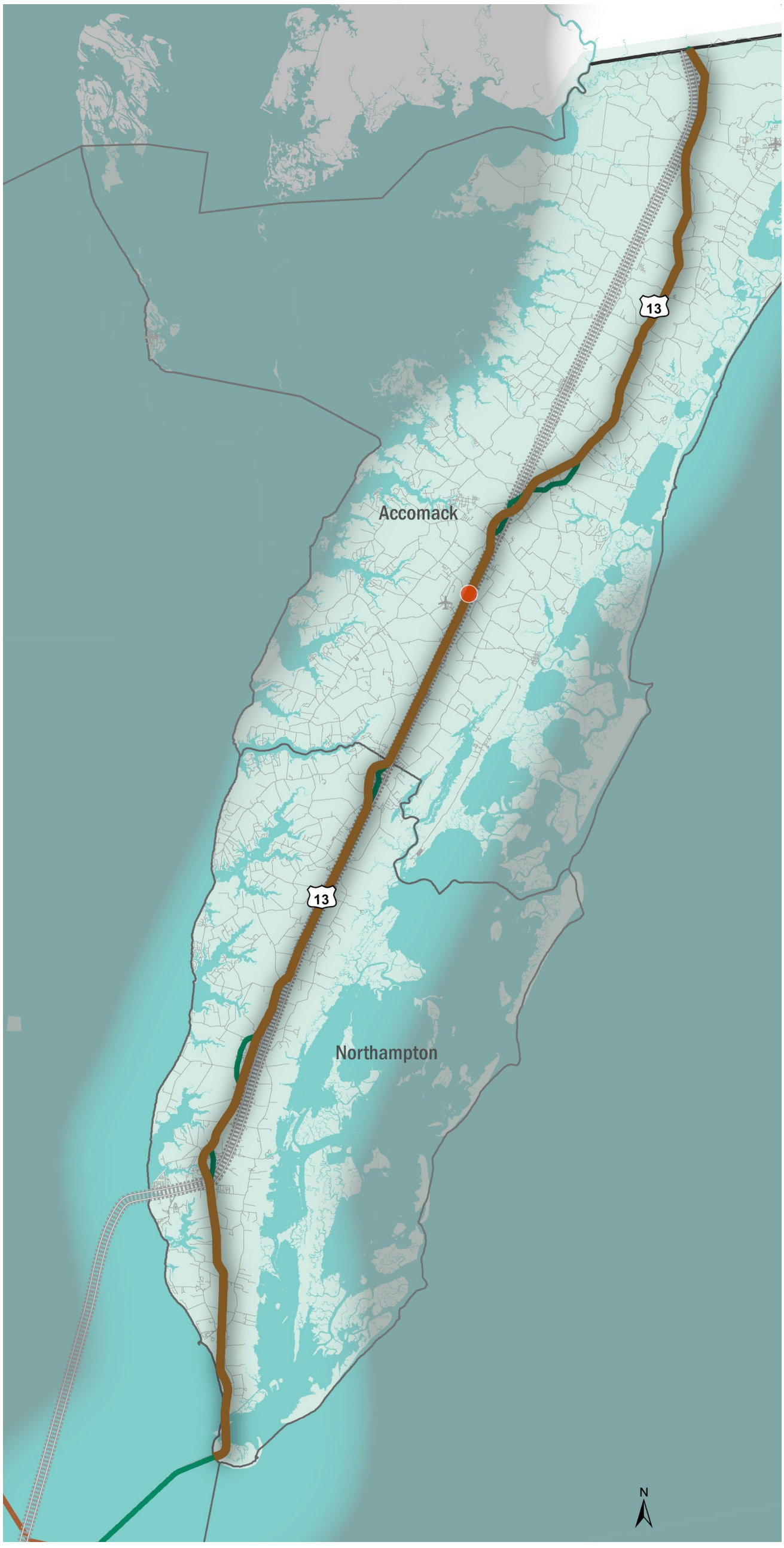
D2 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	10
Severe Crashes/Million VMT	0.1
Number of Railroad Crashes	0

Between 2010 and 2012, ten severe crashes occurred on Segment D2. All of these crashes were located at the intersection of US 13 (Charles M Lankford Memorial Highway) and Main Street in the Town of Melfa.

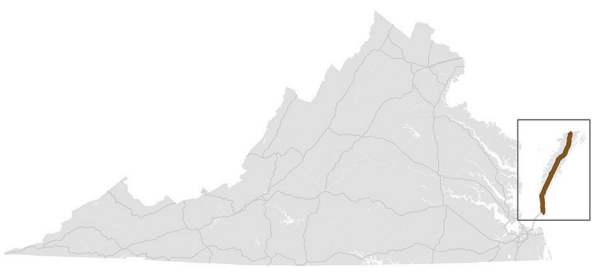


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



D2 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	9
Freight Ton Hours of Delay per Mile	8.8K

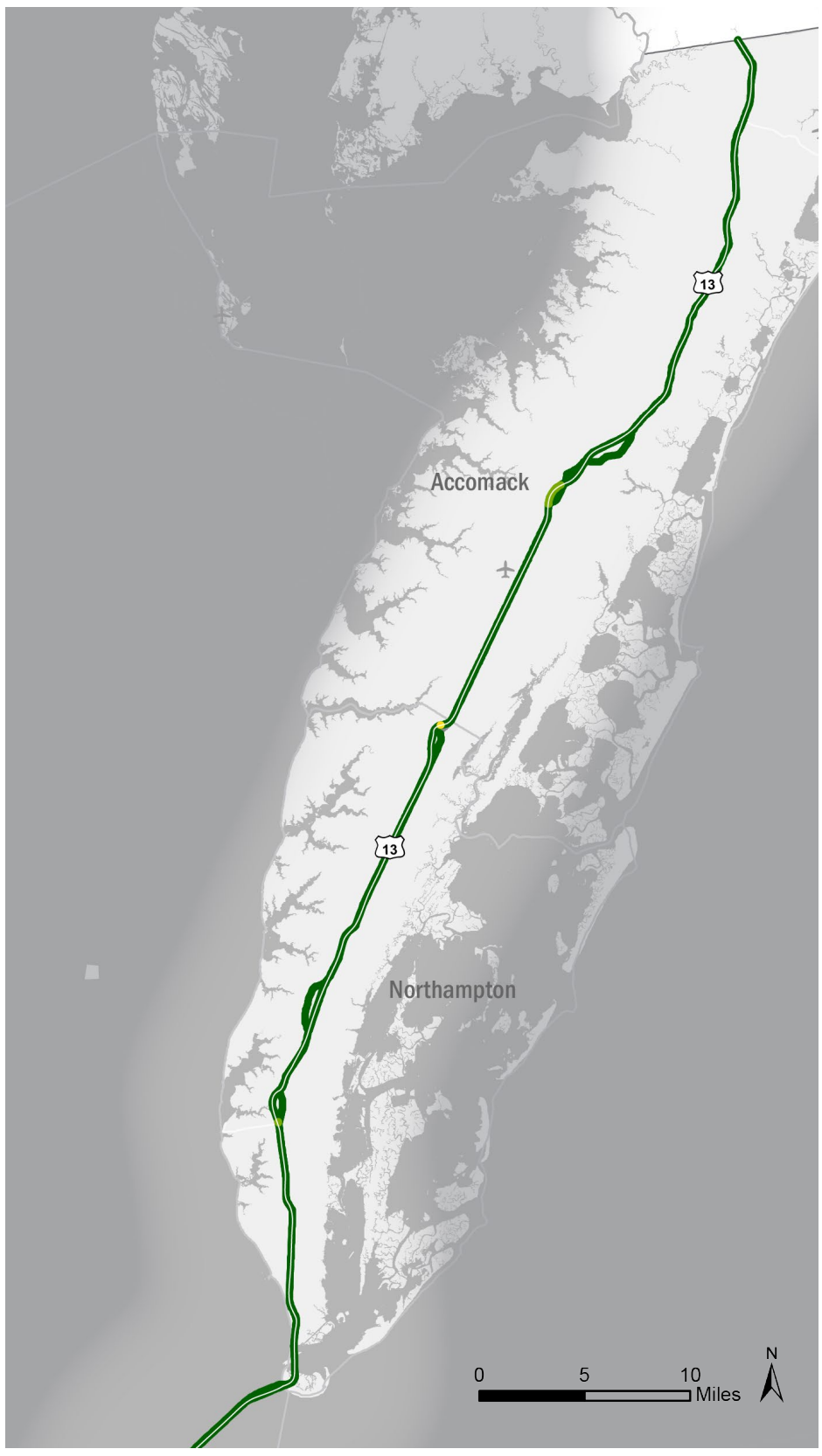
Passenger Delays

Passenger delays are generally minimal for Segment D2, with a daily passenger delay of just under 1,500 person-hours. The only area of significant passenger delay exceeding 100 person-hours per mile occurs on US 13 in Northampton County near Exmore. Peak-period passenger delays account for slightly less than half of the daily congestion on Segment D2, but still represent considerably more than the average peak-period share of congestion along CoSS segments.

Freight Delays

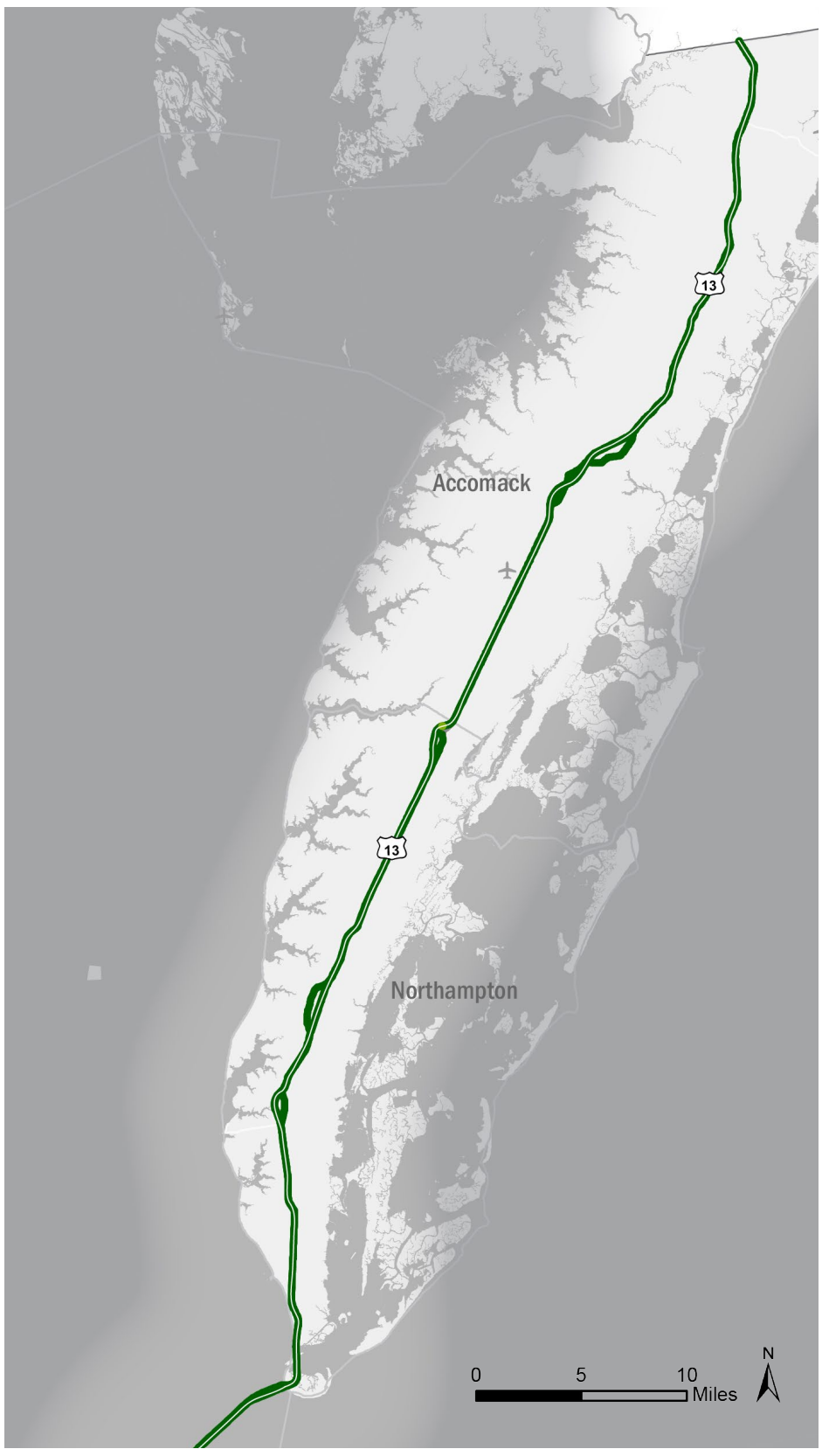
Similar to passenger delays, freight delays on Segment D2 are generally minimal with an average delay of less than 9,000 ton-hours per mile along the segment. As such, there are no locations of significant freight delay along Segment D2. Peak-period freight delays account for about 40 percent of daily congestion, which is somewhat higher than average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile

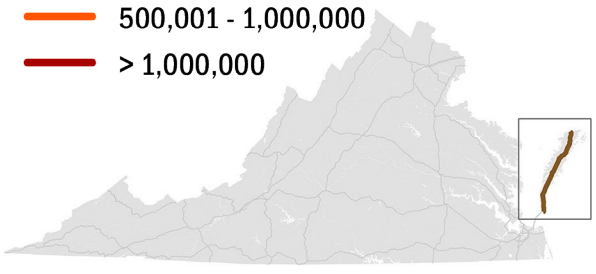


< 50
51 - 100
101 - 250
251 - 500
> 500

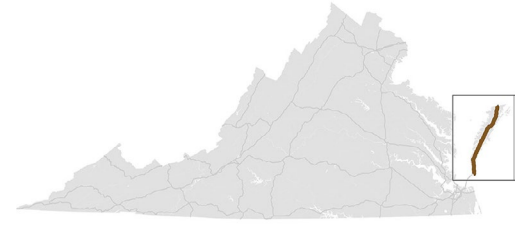
Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



Reliability



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment D2 ranges from 0.00 to 0.91 in terms of reliability index, with an average value of 0.10. The only area with a peak period reliability index exceeding the statewide threshold is on US 13 in Northampton County near Exmore.

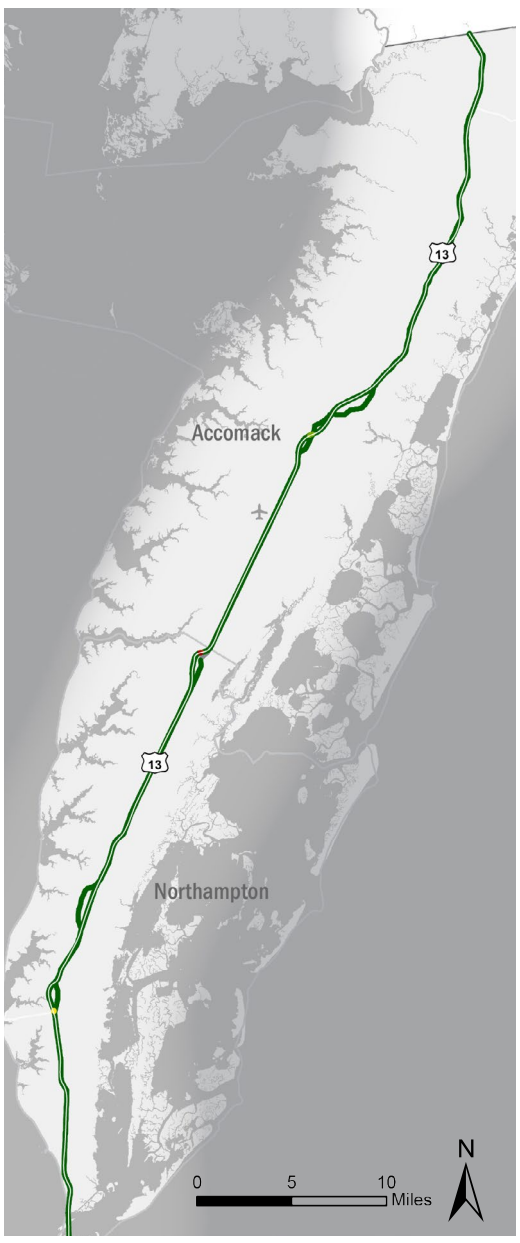
Weekday

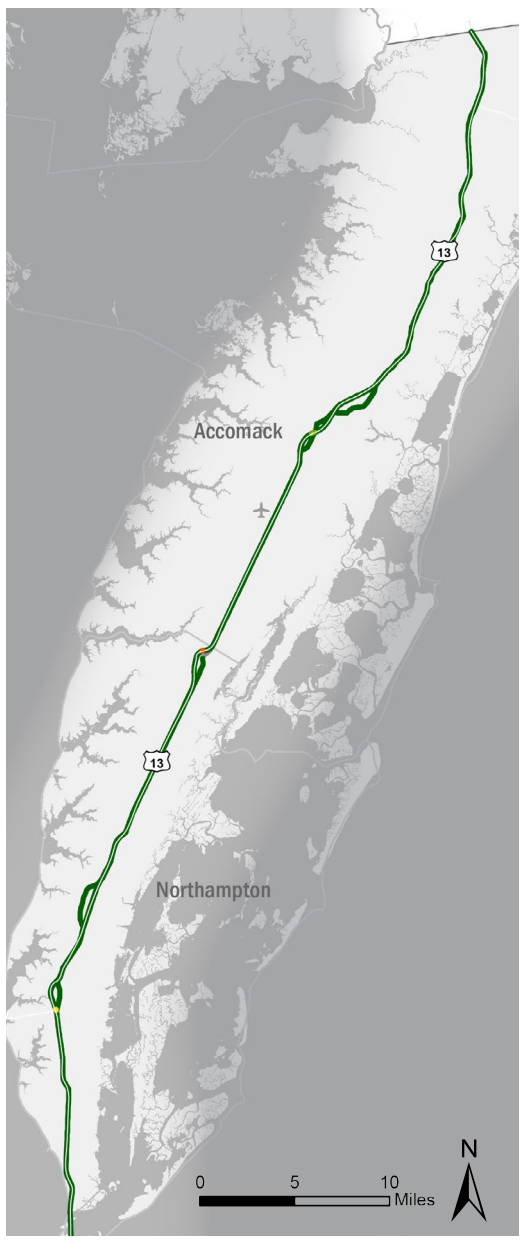
Reliability of travel during a typical weekday ranges from 0.00 to 0.69 in terms of reliability index, with an average value of 0.08. While the segment has a lower than average weekday reliability index compared to CoSS statewide, two locations on Segment D2 have reliability index values exceeding the statewide threshold:

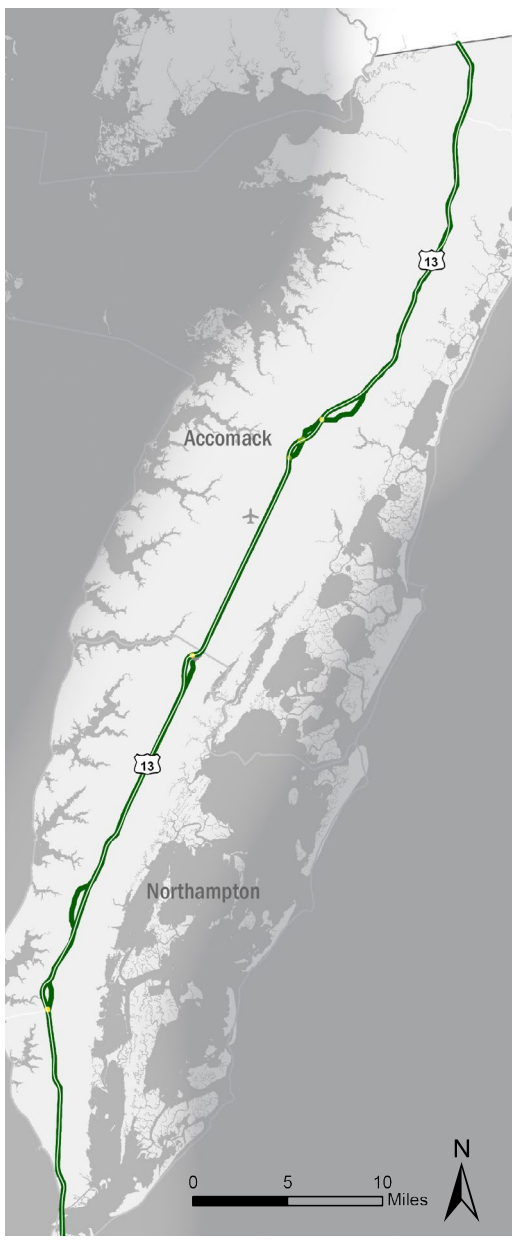
- US 13 in Northampton County near Exmore; and
- US 13 at Route 184 in Northampton County south of Cheriton.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.48 in terms of reliability index, with an average value of 0.07. None of the locations along Segment D2 have reliability index values exceeding the statewide threshold.





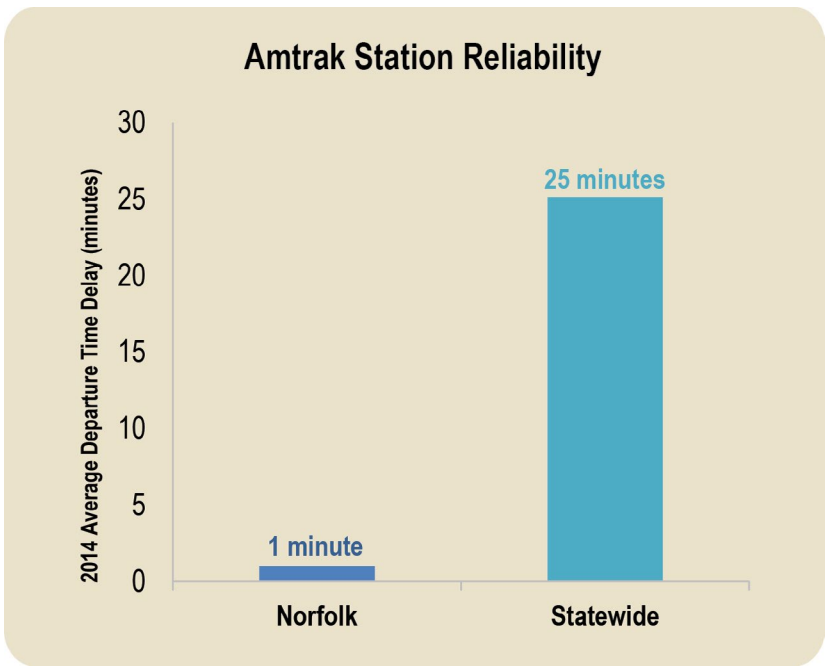


Reliability Index

< 0.2	0.6 - 0.8
0.2 - 0.4	> 0.8
0.4 - 0.6	Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

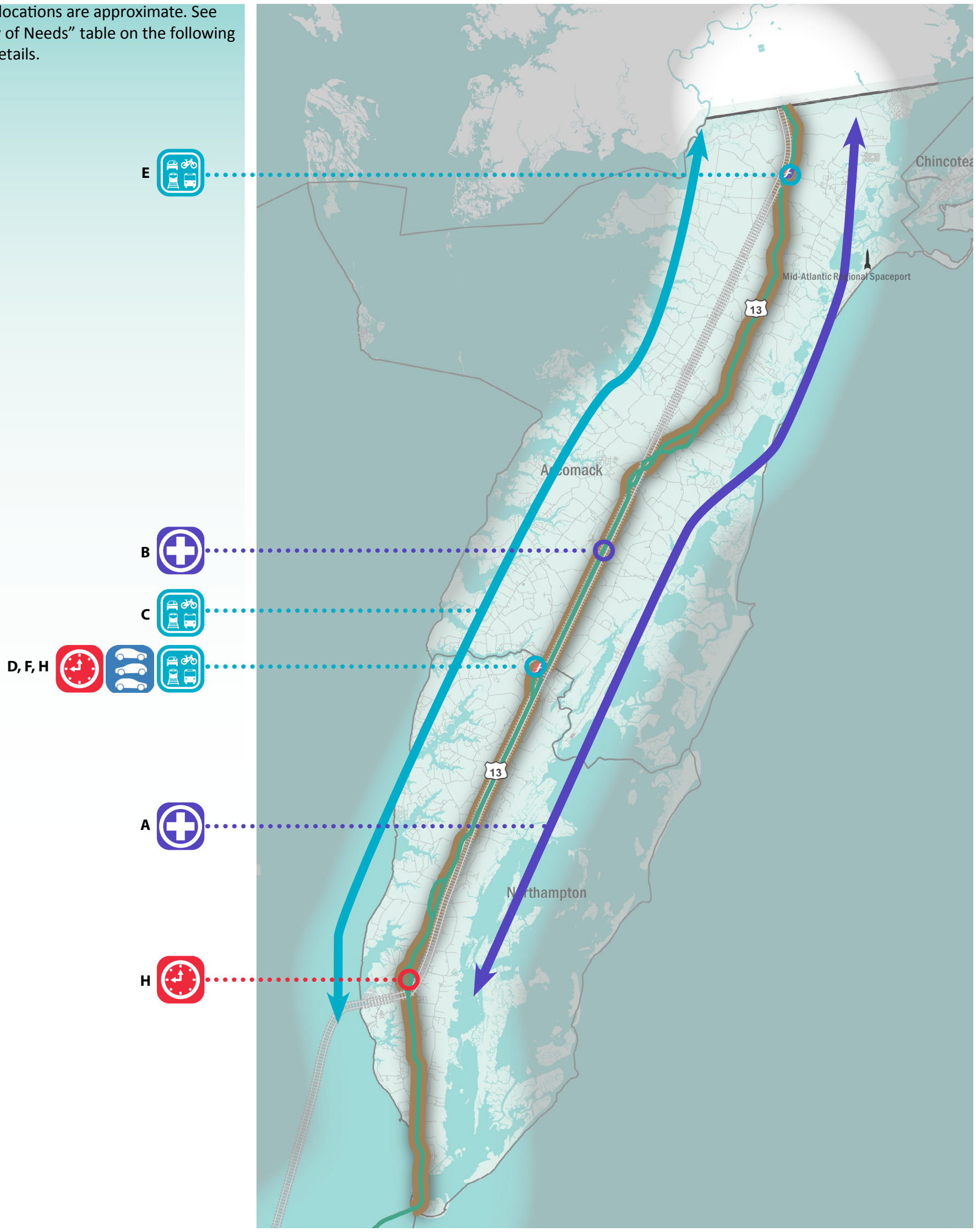
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

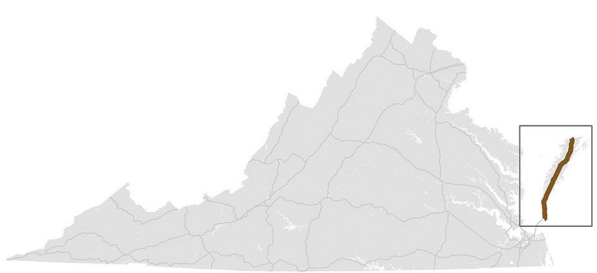


D2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.





Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability

D2 SEGMENT NEEDS

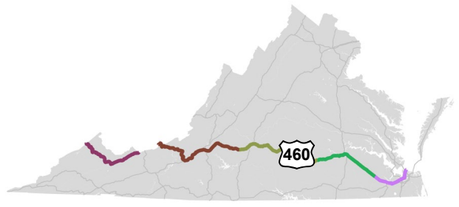
Summary of Needs - D2 Segment

A.		**Safety concern along US 13 in Northampton and Accomack Counties related to numerous median crossovers**
B.		**US 13 at Main Street in Melfa: ten severe crashes**
C.		**No passenger rail exists in segment**
D.		**Bus service from Exmore to Hampton Roads is limited to twice per day**
E.		**Bus service from Oak Hall to Hampton Roads is limited to twice per day**
F.		**Congestion issue at US 13 and VA Route 178 (Belle Haven Road) in Exmore**
G.		**Reliability issue at US 13 and US 13 Business (South Bayside Road) south of Cheriton**
H.		**Reliability issue at US 13 and VA Route 178 (Belle Haven Road) in Exmore**

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Heartland Corridor (E)



Office of INTERMODAL Planning and Investment

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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview

Corridors of Statewide Significance

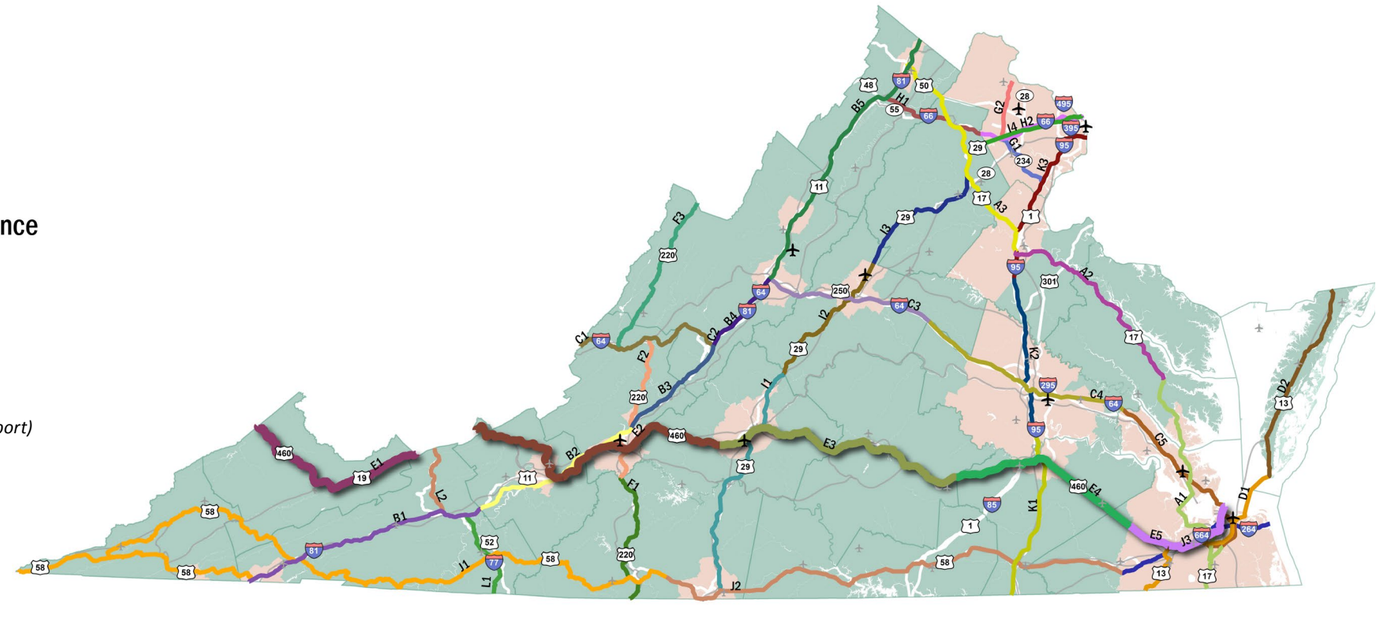
A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area



The Heartland Corridor (Corridor E) is defined primarily by US 460, which runs east to west from Norfolk, Virginia, to Frankfort, Kentucky, and is considered a spur of US 60. US 460 travels more than 400 miles through Virginia, providing local access to several communities and connecting the larger areas of Roanoke, Lynchburg, Petersburg, and Hampton Roads. It also connects to I-81, I-85, I-95 and US 29 The Heartland Corridor is an important freight corridor. Freight rail lines run along most of the corridor as part of the Norfolk Southern's Heartland Corridor, one of the important freight corridors in the eastern United States, providing access between the Port of Virginia and the Midwest.

US 460 is primarily a four-lane facility along its length in Virginia, although there are a few sections where it is a limited-access facility, such as through Blacksburg and Christiansburg, around Lynchburg, and where it bypasses smaller cities and towns such as Bedford, Farmville, and Appomattox. US 460 provides local access to the many small communities it connects and offers an alternative east-west throughway for passengers and freight.

There are no parallel roadway facilities to US 460, although the roadway does run concurrently with other routes for short stretches, most notably I-85 through part of Dinwiddie County and through the City of Petersburg. US 460 also runs concurrently with US 29 in Lynchburg as both of these routes bypass the city and run along the same roadway. It also runs concurrently with portions of US 13 and US 58 in the Hampton Roads Area, where it is known as the Military Highway.

In addition, there are some transit options in the corridor including:

- Line-haul service available along US 460 between Blacksburg and Christiansburg;
- Metro Area Express bus routes that access Park-and-Ride lots in the Hampton Roads Area and provide connections to the larger Hampton Roads Transit (HRT) system with local routes serving the entire Hampton Roads Area;
- Park-and-Ride facilities found in and around Lynchburg, Roanoke, Blacksburg, and Christiansburg, and in Tazewell and Buchanan Counties; and
- Greyhound bus service along the corridor, with stops in Norfolk, Petersburg, Farmville, Lynchburg, and Roanoke.

A substantial amount of freight rail movement occurs, especially along Norfolk Southern rail lines. Although there is no passenger rail directly along the Heartland Corridor and along US 460, several Amtrak routes along connecting corridors are available in Norfolk, Petersburg, and Lynchburg. Several airport facilities along the Heartland Corridor, including facilities in the Hampton Roads Area, Lynchburg, and Roanoke provide commercial service, and many general-aviation and reliever facilities are available.

US 460 provides access to three major port facilities in the Hampton Roads Area. US 460 is a major freight corridor for moving freight in and out of the Port of Virginia, and it provides direct access to the major East Coast freight corridors, including I-81 and I-95. In addition, US 460 provides access to the James River navigational channels. Norfolk Southern operates its Heartland Corridor, which connects the Port of Virginia to West Virginia and Midwest markets, as well as other major rail corridors in Virginia, such as the Norfolk Southern's Coal Corridor and Crescent Corridor and CSX's Coal Corridor and National Gateway Corridor.

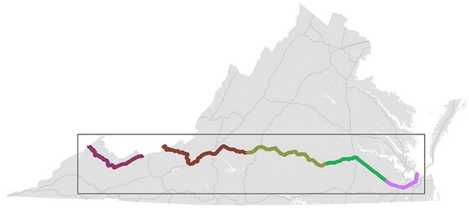
Corridor Components

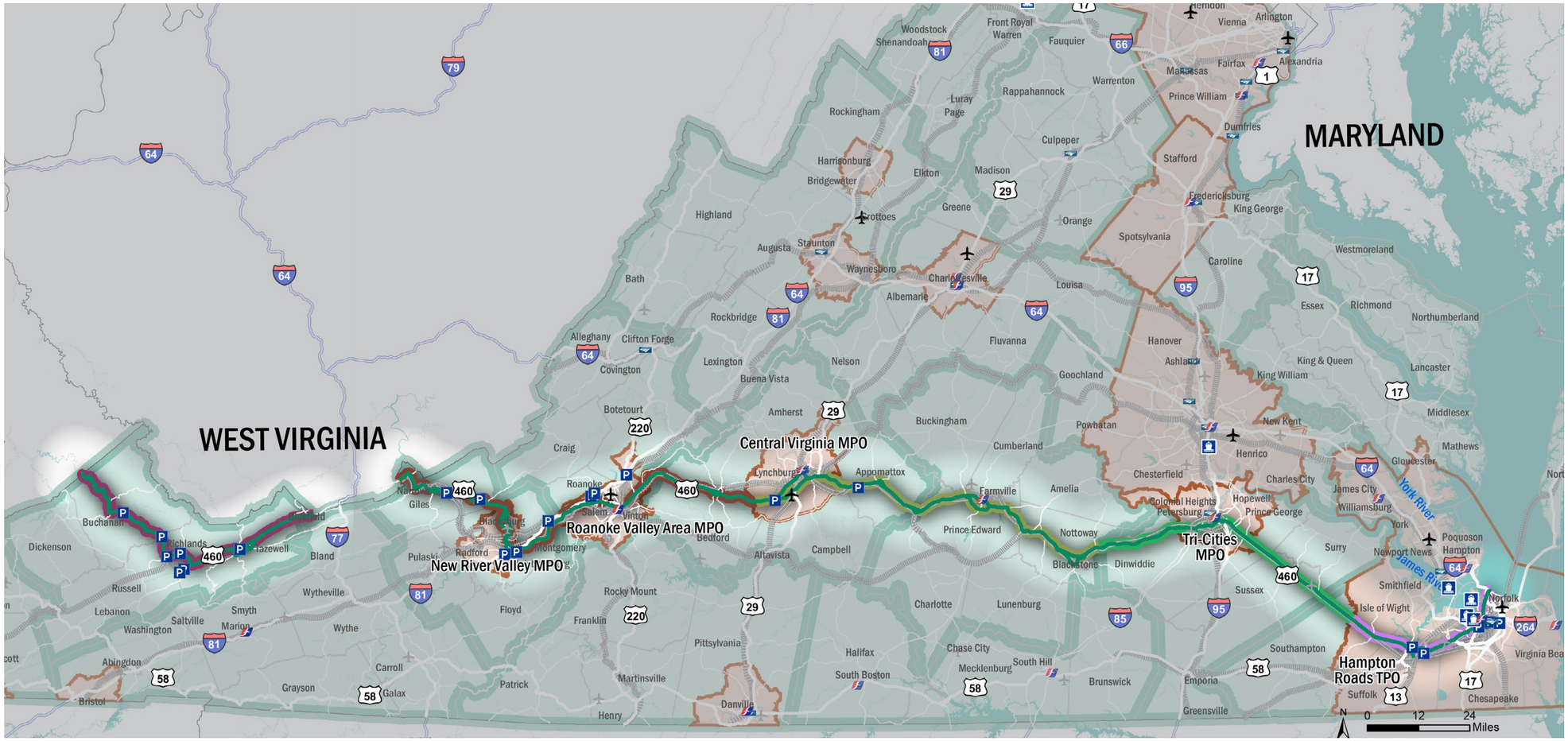
Highway Facilities	
Primary Facility	• US 460
Other Highway Facilities	• US 460 Business • US 460 Bypass
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• Norfolk Southern Heartland Corridor
Port Facilities	
	• Newport News Marine Terminal • Norfolk International Terminal • Portsmouth Marine Terminal • Virginia International Gateway
Airport Facilities	
	• Roanoke Regional Airport • Lynchburg Regional Airport • Richmond International Airport • Newport News/ Williamsburg International Airport • Norfolk International Airport

Corridor Segments
- E1
- E2
- E3
- E4
- E5

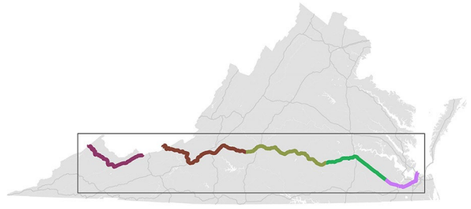
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area

- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility




WEST VIRGINIA
MARYLAND
Roanoke Valley Area MPO
New River Valley MPO
Central Virginia MPO
Tri-Cities MPO
Hampton Roads TPO
Roanoke
Lynchburg
Blacksburg
Christiansburg
Radford
Pulaski
Giles
Bland
Buchanan
Dickenson
Russell
Tazewell
Richlands
Lebanon
Saltville
Washington
Smyth
Wythe
Wytheville
Marion
Abingdon
Bristol
Carroll
Grayson
Galax
Floyd
Patrick
Henry
Martinsville
Danville
Franklin
Rocky Mount
Pittsylvania
Halifax
South Boston
Chase City
Mecklenburg
South Hill
Brunswick
Emporia
Greensville
Southampton
Suffolk
Isle of Wight
Chesapeake
Virginia Beach
Norfolk
Portsmouth
Newport News
Hampton
Poquoson
Smithfield
Surry
Sussex
Prince George
Petersburg
Colonial Heights
Hopewell
Chesterfield
Henrico
Richmond
Goochland
Powhatan
Amelia
Nottoway
Prince Edward
Farmville
Appomattox
Buckingham
Cumberland
Amherst
Nelson
Lexington
Buena Vista
Botetourt
Craig
Alleghany
Clifton Forge
Covington
Rockbridge
Bath
Highland
Augusta
Staunton
Waynesboro
Albemarle
Charlottesville
Fluvanna
Louisa
Orange
Culpeper
Madison
Greene
Rockingham
Harrisonburg
Bridgewater
Elkton
Page
Luray
Rappahannock
Warrenton
Fauquier
Front Royal
Warren
Woodstock
Shenandoah
Manassas
Prince William
Fairfax
Arlington
Alexandria
Vienna
Dumfries
Stafford
Spotsylvania
Fredericksburg
King George
Caroline
Westmoreland
Essex
Richmond
Northumberland
King & Queen
King William
Lancaster
Middlesex
Mathews
Gloucester
James City
Williamsburg
York
York River
James River
Charles City
New Kent
Hanover
Ashland
Goochland
Powhatan
Buckingham
Cumberland
Amelia
Dinwiddie
Blackstone
Lunenburg
Charlotte
Halifax
Campbell
Altavista
Bedford
Montgomery
Roanoke
Salem
Vinton
Botetourt
Craig
Giles
Pulaski
Radford
Bland
Tazewell
Buchanan
Dickenson
Russell
Wythe
Smyth
Marion
Washington
Lebanon
Saltville

Demographics and Economic Trends

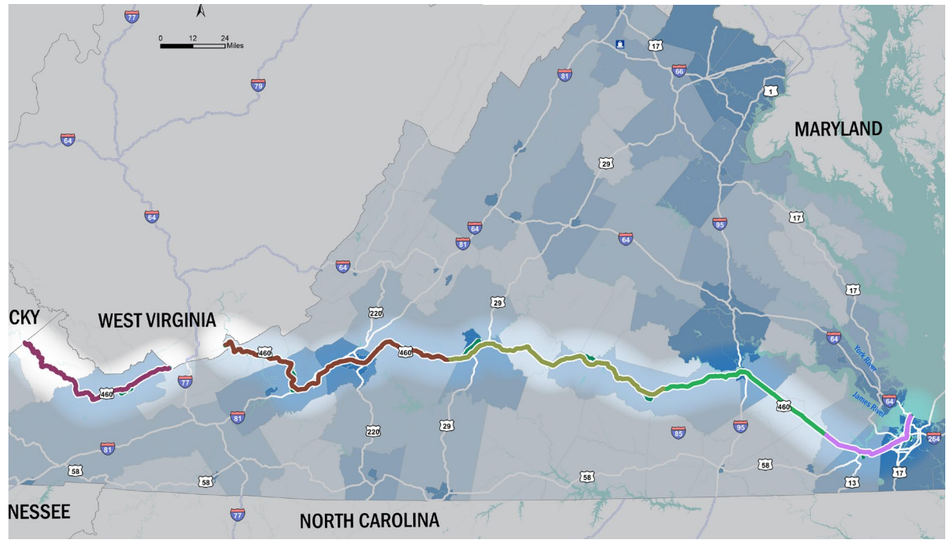


The primary population centers with greater than 500 persons per square mile along Corridor E are currently found in Salem, Roanoke, Lynchburg, Petersburg, Portsmouth, and Norfolk. The most densely populated segments along the corridor are near Blacksburg and Roanoke (E2) and in the Hampton Roads Area (E5). Giles, Appomattox, Sussex, and Southampton Counties have the lowest density along the corridor with less than 50 persons per square mile.

Between 2012 and 2025, Suffolk is anticipated to see the largest population growth (greater than 25 percent) among the jurisdictions along the corridor. Montgomery, Bedford, and Isle of Wight Counties, and the City of Chesapeake are anticipated to have the next highest population growth, between 11 and 25 percent. The already densely-populated City of Norfolk in the Hampton Roads Area is expected to see the lowest growth, and the population of Hampton is expected to decrease. Overall, population along the corridor is expected to grow significantly.

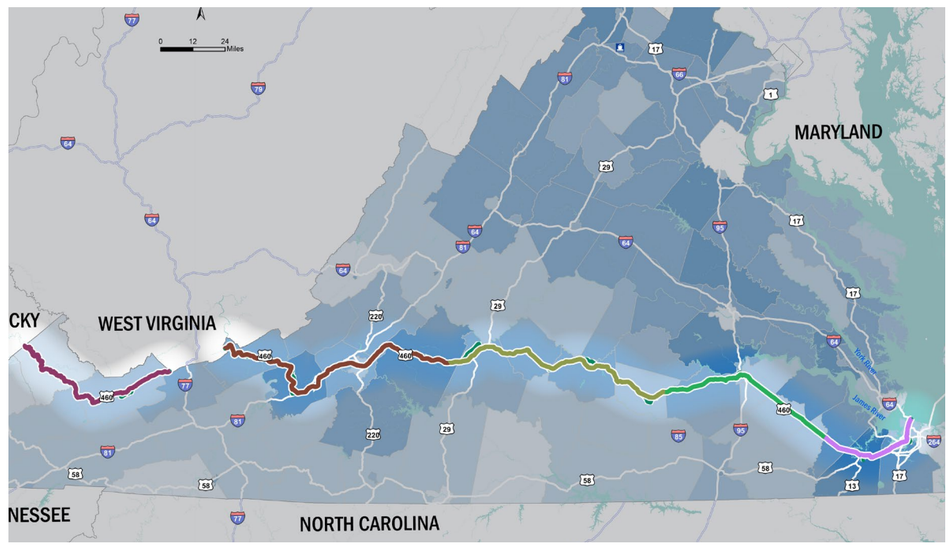
Current employment centers follow a pattern similar to the population centers, with the highest employment densities in the urban areas of Salem, Roanoke, Lynchburg, Petersburg, and Norfolk. Employment growth tracks a similar pattern along the corridor with the highest growth in Appomattox and Isle of Wight Counties; employment is anticipated to decrease in Buchanan and Southampton Counties and in the City of Lynchburg.

Corridor E passes through five Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Hampton Roads Transportation (TPO) Area has the highest GDP of any of the MPO areas in the corridor. The largest industry sectors in the corridor include wholesale trade, retail trade, and health care.



2012 Population Density Persons / Square Mile

- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +

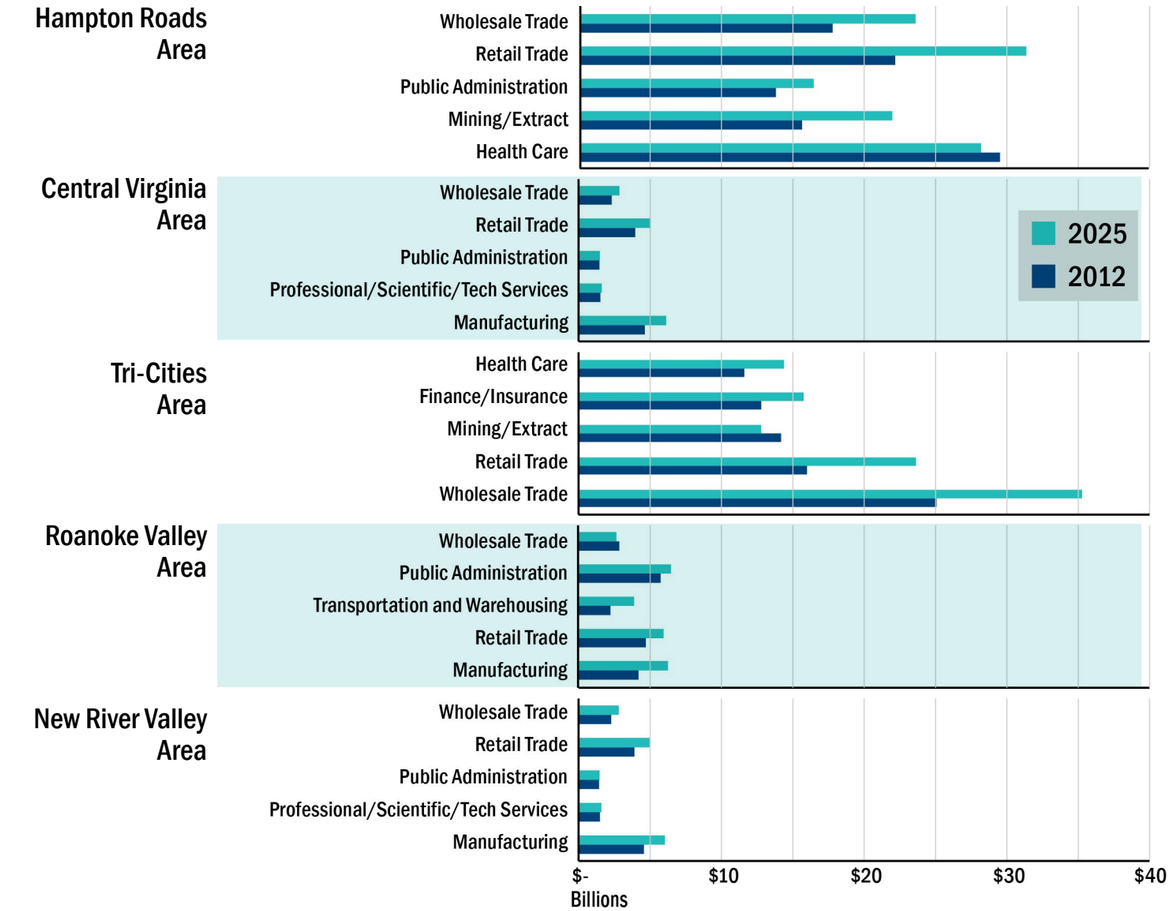


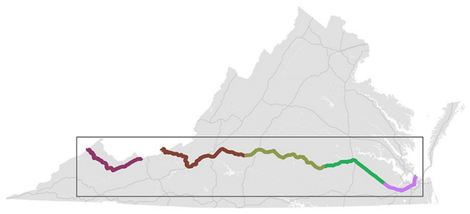
Population Growth (2012-2025 Percent Change)

- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%

CORRIDOR E OVERVIEW

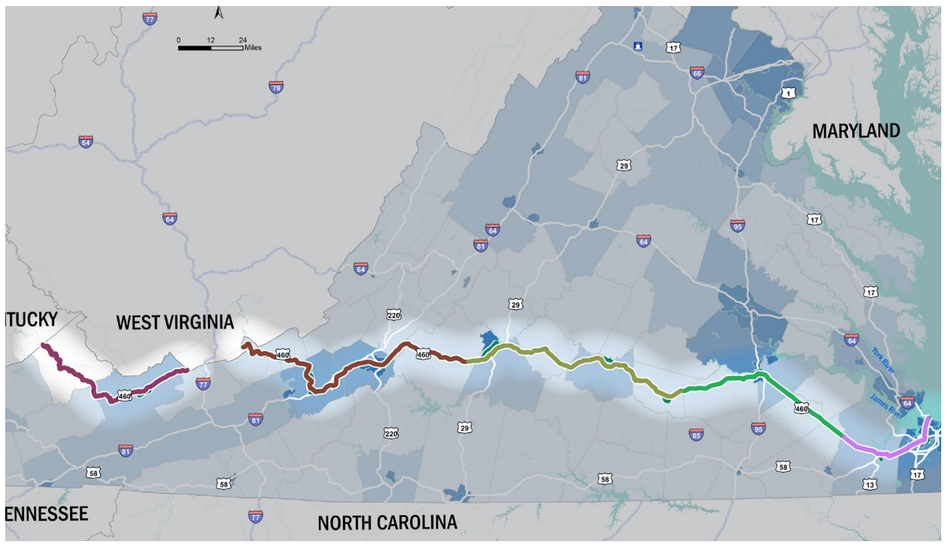
Top Industries (GDP)





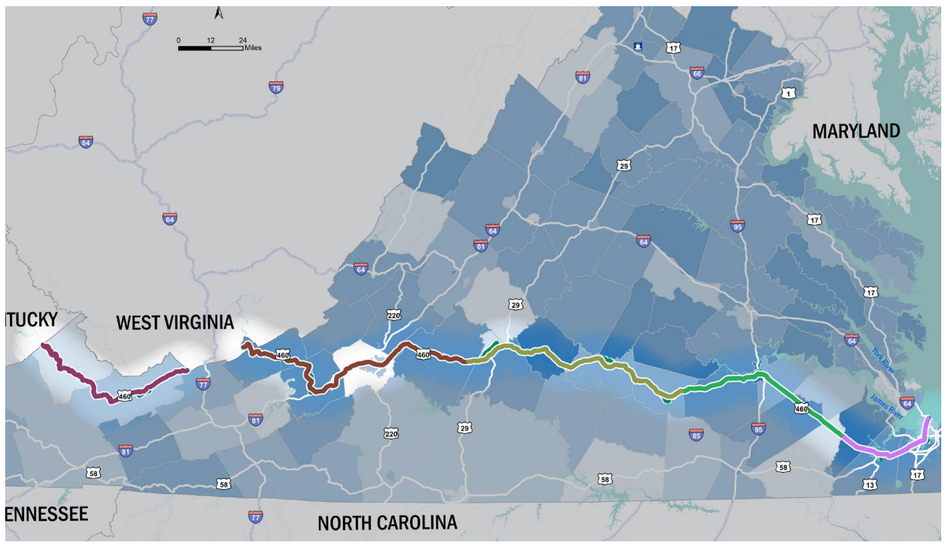
2012 Employment Density Jobs / Square Mile

- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500



Employment Growth (2012-2025 Percent Change)

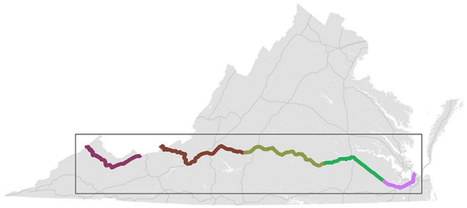
- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



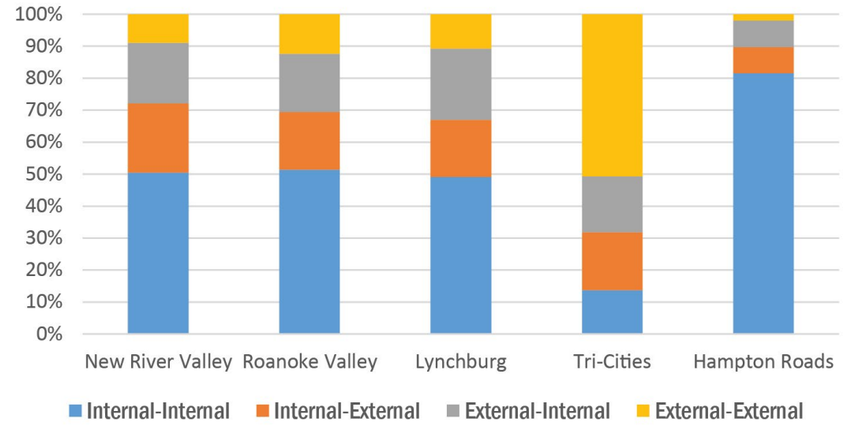
Corridor Travel Patterns

Passenger

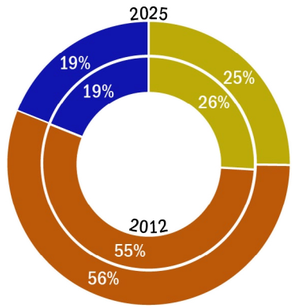
Corridor E connects to Kentucky and West Virginia and passes through five MPO areas – New River Valley, Roanoke Valley, Lynchburg, Tri-Cities, and Hampton Roads – on its way to the Atlantic Coast. Throughout the western half of the state, Corridor E is dominated by local internal traffic, which represents approximately 50 percent of the traffic through the New River Valley, Roanoke Valley and Lynchburg MPO Areas. Less than 15 percent of the traffic in these three areas is pass-through traffic. The Hampton Roads Area is even more strongly dominated by local internal trips, which represent more than 80 percent of the traffic on Corridor E in this area. Conversely, travel along Corridor E in the Tri-Cities Area is dominated by pass-through trips, which represent approximately 50 percent of all traffic within the corridor. An additional 35 percent of trips have only their origin or destination in the Tri-Cities Area, indicative of the large portion of trips between the Hampton Roads Area and the Tri-Cities Area.



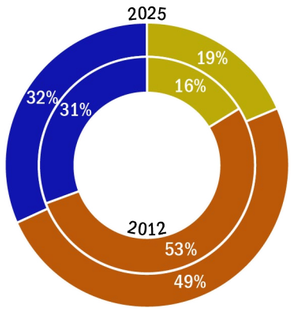
Distribution of Internal and External Travel



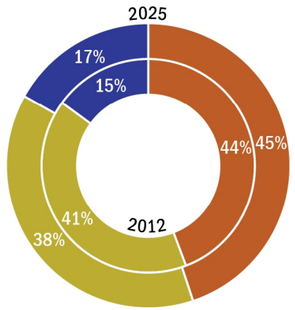
Lynchburg Area



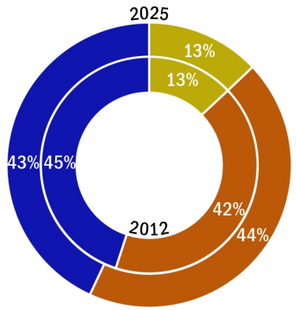
Hampton Roads Area



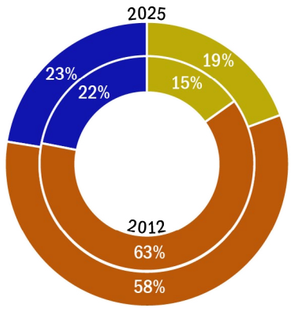
Tri-Cities Area



Roanoke Valley Area



New River Valley Area

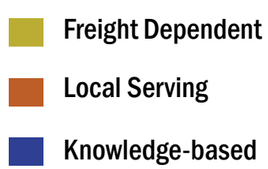


Freight

By truck, Corridor E carried 81 million tons of freight worth $89 billion in 2012, and is estimated to carry 108 million tons of freight worth $130 billion in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area.

By rail, Corridor E carried 62 million tons of freight worth $47 billion in 2012, and is estimated to carry 70 million tons of freight worth $62 billion in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 17 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors.

GDP by Sector, 2012 and 2025



Truck Freight

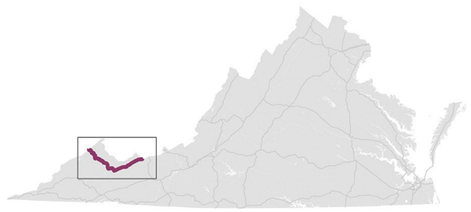
2012	2025
Rail Freight Value	
$47 Billion	$62 Billion
Rail Freight Tonnage	
62 Million Tons	70 Million Tons
Freight Value per Ton	
$755	$882
Corridor Tonnage Passing Through	
38%	39%

Rail Freight

2012	2025
Truck Freight Value	
$89 Billion	$130 Billion
Truck Freight Tonnage	
81 Million Tons	108 Million Tons
Freight Value per Ton	
$1095	$1198
Corridor Tonnage Passing Through	
26%	25%

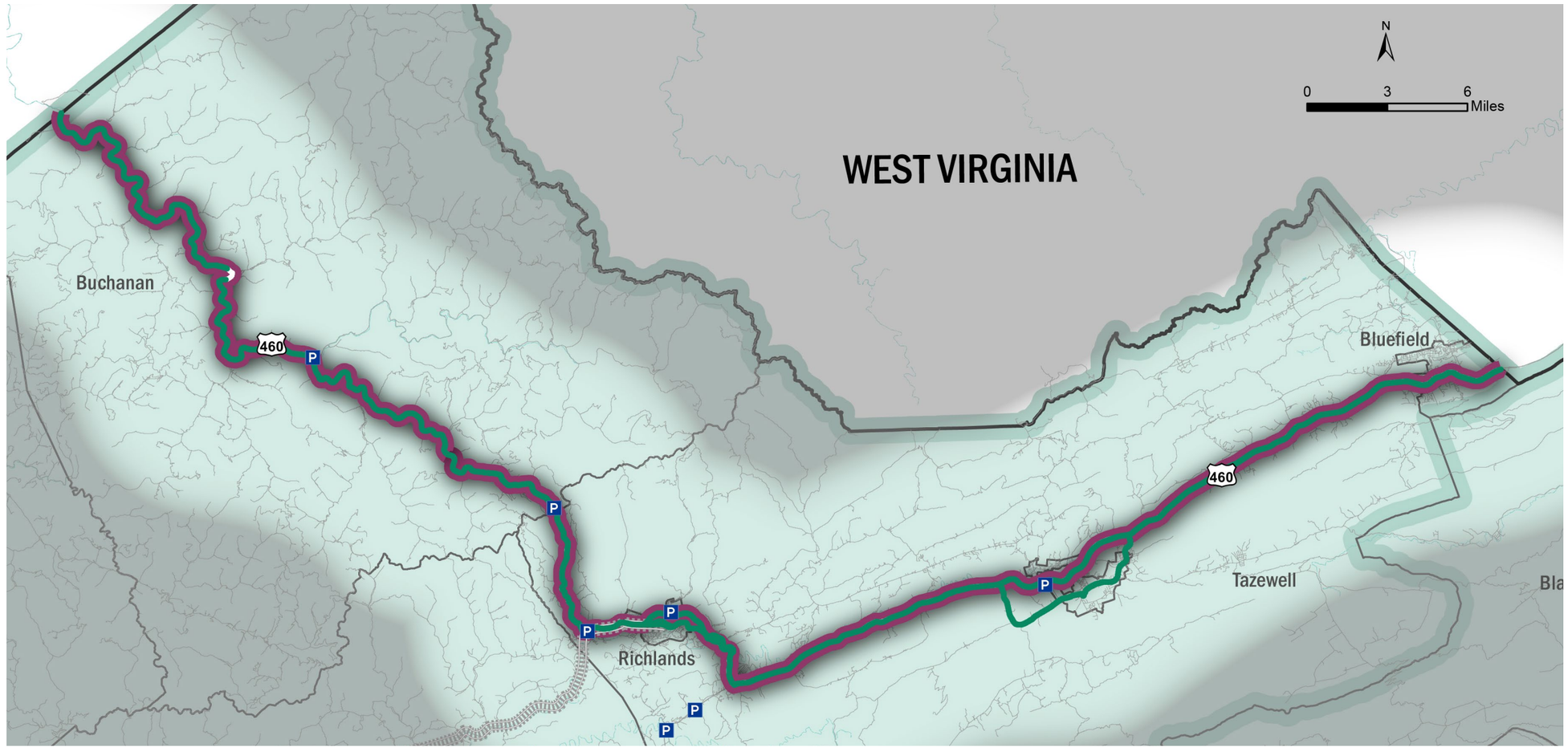
II. Segment E1

- E1
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- Airport Facility



Corridor Segment E1 Components

- US 460
- US 460 Business
- Norfolk Southern Heartland Corridor



E1 SEGMENT PROFILE

Segment E1 begins at the Kentucky border and continues east, serving Buchanan and Tazewell Counties and the Towns of Richlands, Tazewell, and Bluefield before terminating at the West Virginia border. For a portion of its length, the segment runs concurrently with US 19. Segment E1 serves as an alternative east-west throughway for passengers and freight, in addition to providing local access to the rural communities of southwest Virginia.

Highway Facilities: US 460 is a two-lane highway from the Kentucky state line to the Town of Grundy, where the highway becomes four lanes before continuing to the West Virginia state line. At Claypool Hill, US 19 and US 460 run concurrently to the West Virginia border. A business spur of US 460 serves the Towns of Richlands and Tazewell.

Transit Services: In this area, the corridor is served by the Four County Transit system, as well as several Park-and-Ride facilities.

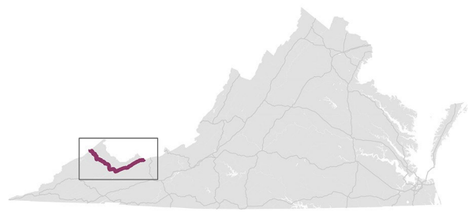
Rail Facilities: Norfolk Southern operates its Heartland Corridor line, the most important rail route for transport between the Port of Virginia and markets located west of Virginia. Richlands serves as a junction between rail traffic by connecting the Heartland Corridor with connections to the south.

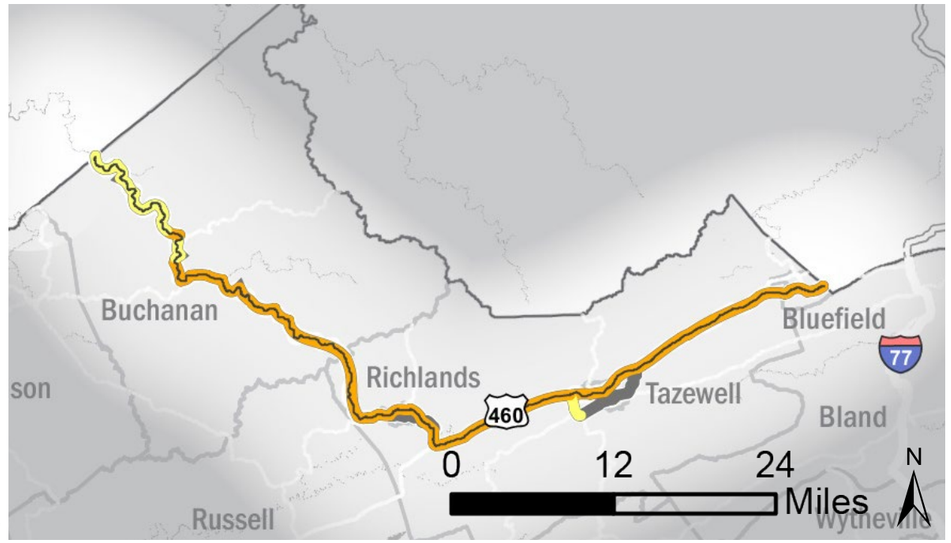
Port Facilities: No port facilities are located directly adjacent to Segment E1, but the Heartland Corridor does provide direct access to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: No commercial air service is available in Segment E1, although two general-aviation facilities do exist.

Major planned and future projects include:

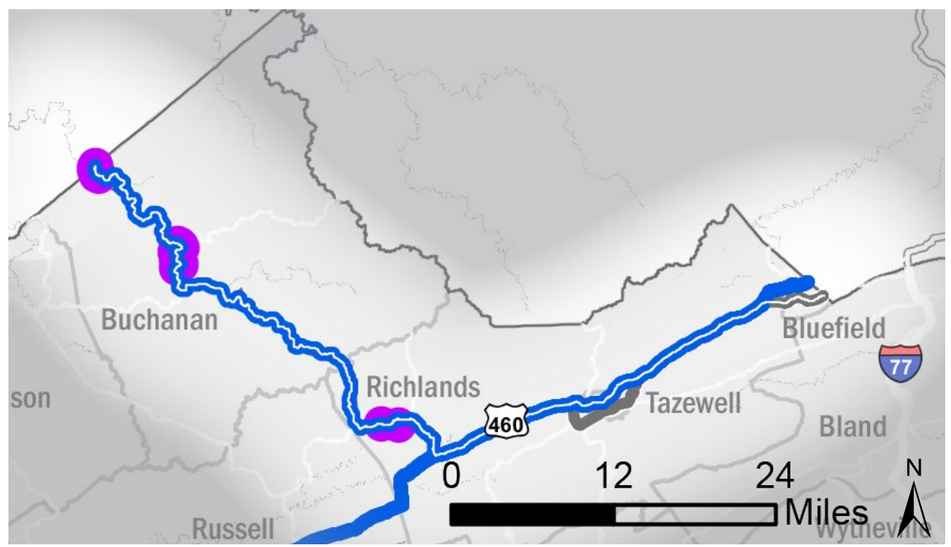
- Installing two- to four-foot paved shoulders, edge line rumble strips, and guardrail from the Kentucky border to the junction of US 460 with US 19 in Claypool Hill; and
- Replacing the Front Street bridge over Big Town Hill Creek (just before the US 460 ramps) in Tazewell County.





Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

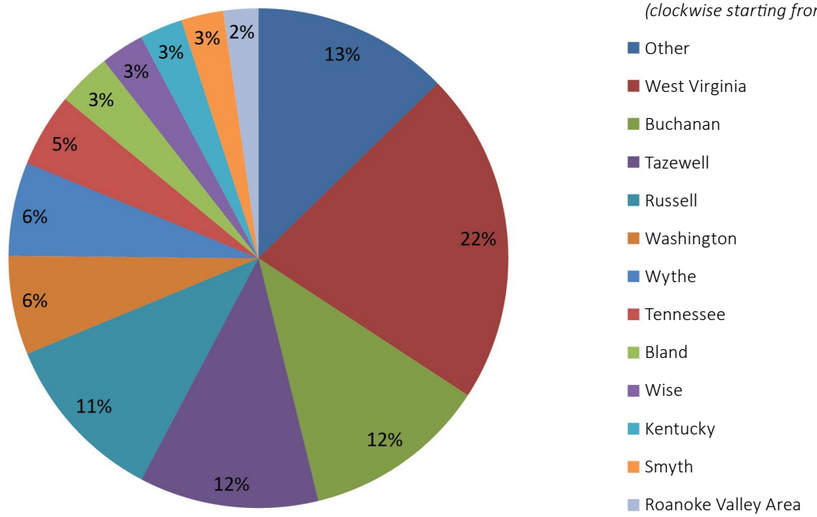
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

Passenger Demand

The westernmost segment of Corridor E connects Kentucky and West Virginia via Buchanan and Tazewell Counties, although it does not provide direct access to any of the Commonwealth's MPO Areas. Intercity passenger travel from these counties accounts for a very small percentage of intercity travel in the Commonwealth (less than 0.4 percent), but major markets for this travel include West Virginia (22 percent), travel between the two counties (24 percent), and Russell County (11 percent), all of which may use portions of Segment E1.

Travel from Jurisdictions along Segment E1 to...



E1 SEGMENT PROFILE

Freight Demand

By truck, Segment E1 carried five million tons of freight worth $2 billion in 2012, and is estimated to carry four million tons of freight worth $3 billion in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. There are significant truck freight flows on this corridor between North Carolina and the Middle Atlantic region. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area. Despite being the destination for less than one percent of the corridor's truck freight, the jurisdictions adjacent to Segment E1 are minor generators of truck freight on the corridor. In particular, truck freight originating in Tazewell County accounts for between two and three percent of all truck freight tonnage on Corridor E, with major flows to West Virginia and North Carolina.

By rail, Segment E1 carried 13 million tons of freight worth $770 million in 2012, and is estimated to carry 13 million tons of freight worth $850 million in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 15 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors. In terms of tonnage, the jurisdictions adjacent to Segment E1 are major generators of rail freight in the corridor, accounting for between six and seven percent of the total rail freight value. Major origin locations of freight along Segment E1 include Buchanan and Tazewell Counties, with the majority of this freight destined for the Port of Virginia facilities in the Hampton Roads Area.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 41%)
2. North Carolina (30% / 28%)
3. South Carolina (4% / 5%)
4. Pennsylania (4% / 4%)
5. Maryland (3% / 3%)

Corridor Tonnage Originating in Segment E1: 4% / 2%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and Pennsylvania
Chesterfield County and North Carolina
North Carolina and New York

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (47% / 48%)
2. North Carolina (18% / 20%)
3. Pennsylvania (5% / 4%)
4. Chesterfield County (5% / 4%)
5. City of Norfolk* (4% / 4%)

Corridor Tonnage Destined for Segment E1: 1% / 1%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (36% / 31%)
2. Virginia (26% / 25%)
3. Illinois (8% / 9%)
4. Wise County (7% / 6%)
5. Kentucky (6% / 5%)

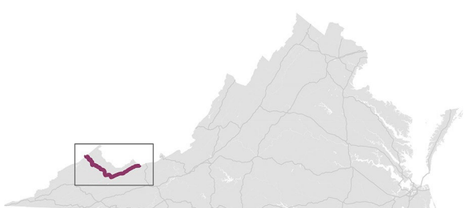
Corridor Tonnage Originating in Segment E1: 7% / 6%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (54% / 52%)
2. City of Norfolk* (34% / 31%)
3. North Carolina (31% / 31%)
4. City of Chesapeake (4% / 5%)
5. Pennsylvania (3% / 3%)

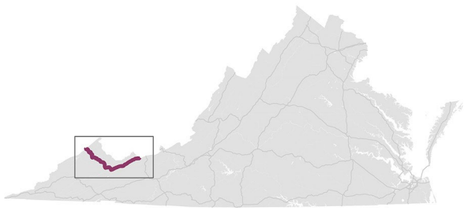
Corridor Tonnage Destined for Segment E1: <1% / <1%



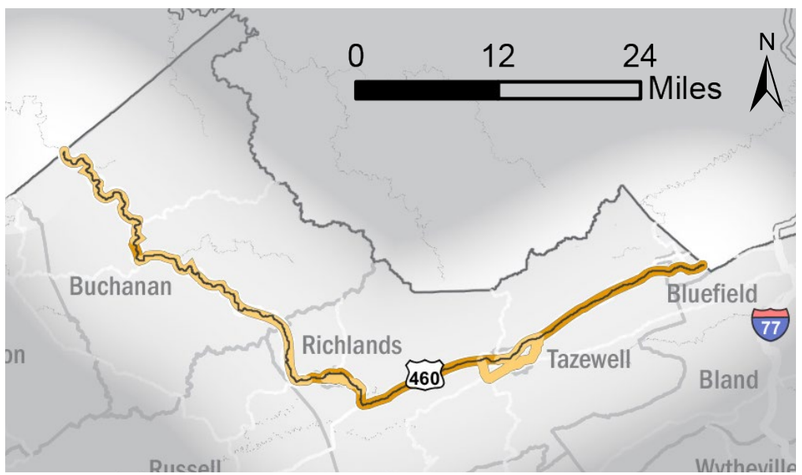
Traffic Conditions

Traffic Volume and AADT

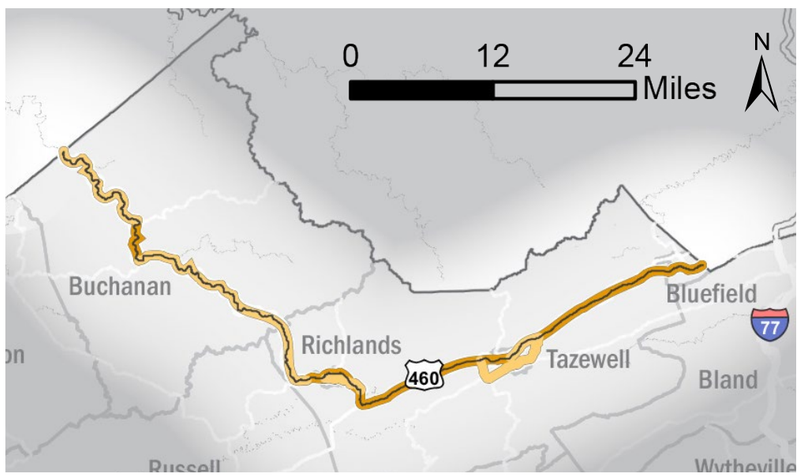
Traffic volume on Segment E1 is low relative to traffic volumes on all other segments of Corridor E. Along US 460 in Buchanan County, average daily traffic volumes range from 3,000 to 10,000 vehicles per day, with the highest volumes south of Grundy. In Tazewell County, daily volumes on US 460 range from 11,000 to 19,000 vehicles per day, with the highest volumes between Richlands and the junction with US 19. Volumes on US 460 Business in Richlands and Tazewell are generally lower, and range between 3,000 and 13,000 vehicles per day. Daily traffic volumes on almost all sections of US 460 are projected to increase by fewer than 1,000 additional vehicles by 2025, with no traffic growth forecast for US 460 Business. Thus, daily traffic volumes in 2025 throughout Segment E1 are projected to be only slightly higher than current daily traffic volumes.



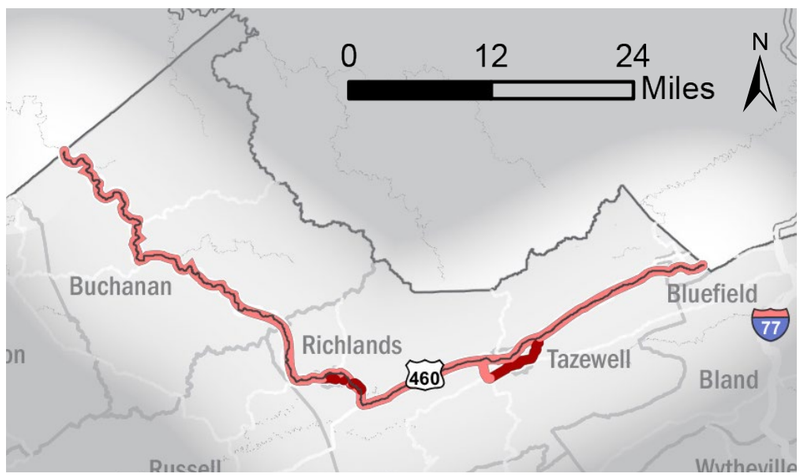
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)



Change in Traffic Volume 2014- 2025 (AADT)



E1 SEGMENT PROFILE

Traffic Distribution

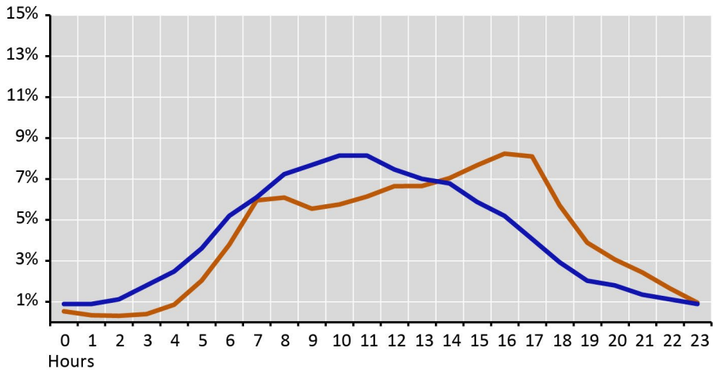
On average, traffic on Segment E1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows morning and evening peak periods over the course of the day, and steady increase in the flow during the midday period. The highest hourly traffic occurs between 4 and 5 p.m. which accounts for 8.2 percent of daily traffic, and a less busy morning peak hour 8 to 9 a.m. accounting for 6.1 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 80 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic with a single midday peak occurring between noon and 2 p.m. Weekend traffic patterns are different from the typical commute patterns, with the highest percentage of hourly traffic occurring between noon and 1 p.m. (8.2 percent of daily traffic) for all traffic, and 10 to 11 a.m. (6.7 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment E1 vary by as much as 21 percent throughout the year, with the highpoint in October (around 14,000 vehicles per day) and the low point in January (around 12,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the February high (around 500 trucks per day) 37 percent higher than the December low (less than 400 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 10,000 vehicles per day) are 29 percent higher than January levels (around 8,000 vehicles per day). Since truck volumes account for a relatively small portion of traffic (less than 3 percent of overall daily traffic for weekday and weekend) on Segment E1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

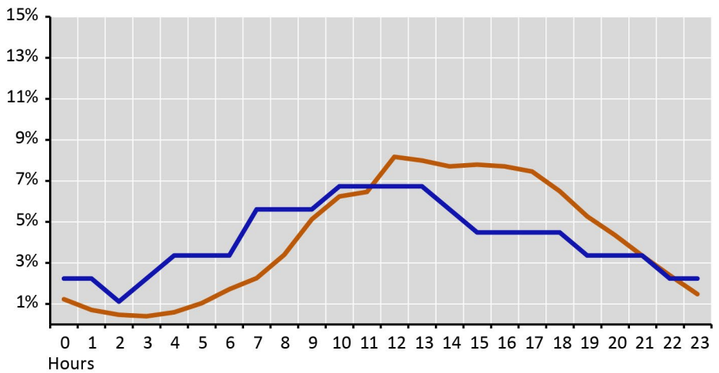
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment E1 is low compared to the other segments in Corridor E. Along US 460 throughout Segment E1, heavy trucks comprise two to four percent of total traffic.

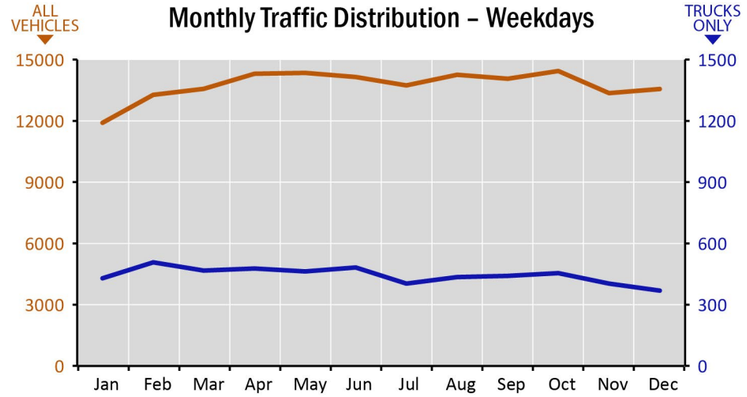
Hourly Traffic Distribution – Weekdays



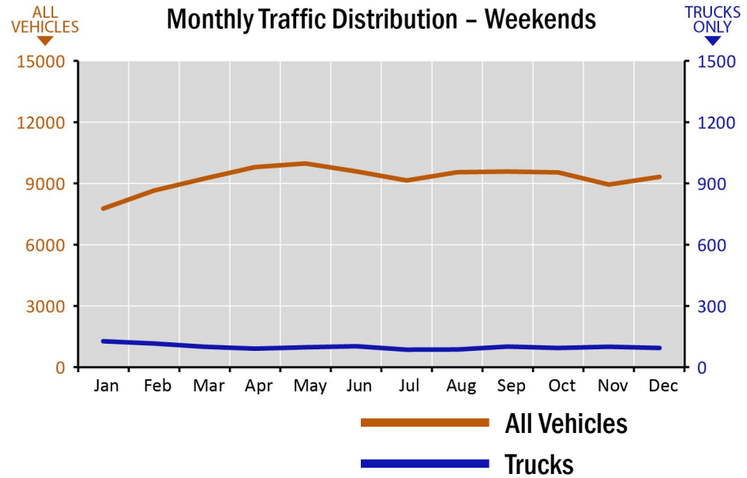
Hourly Traffic Distribution – Weekends

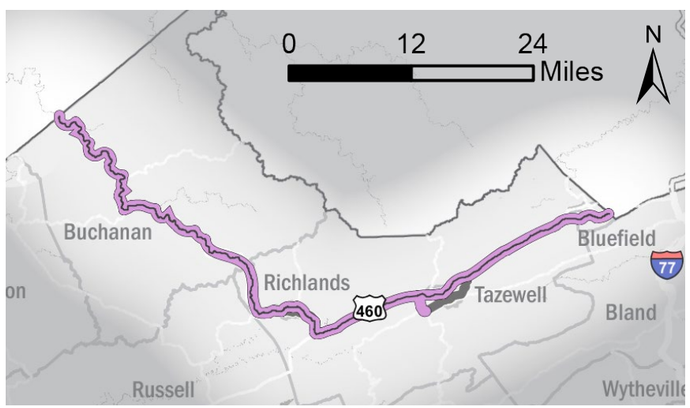


Monthly Traffic Distribution – Weekdays



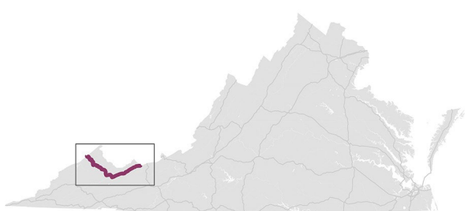
Monthly Traffic Distribution – Weekends



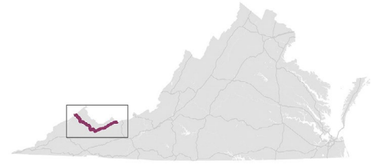


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



E1 SEGMENT PROFILE



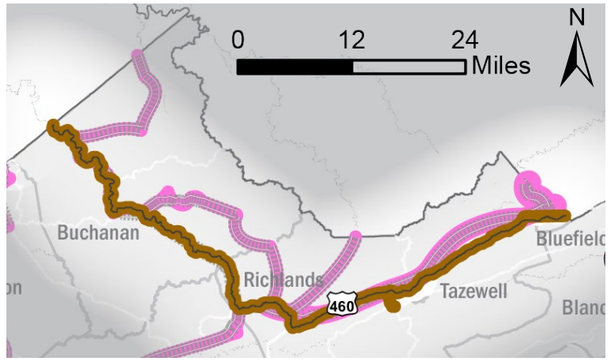
Freight Flows

In the Buchanan County section of Segment E1, freight is moved primarily by rail, in terms of tonnage, but by truck, in terms of value. In total, 1.4 million tons (26 percent) of freight is moved through this section of Segment E1 by truck, compared to four million tons by rail. By value, however, $705 million (82 percent) of freight value travels by truck, compared to $158 million by rail. On average, a ton of freight traveling through this section of Segment A1 by truck is worth $507 while a ton of freight traveling by rail is worth only $41. In 2025, both rail and truck freight tonnages and total values in this location are expected to decrease slightly, but the percentages of tonnage and value moved by truck, and the values per ton on truck and rail, are expected to remain nearly the same.

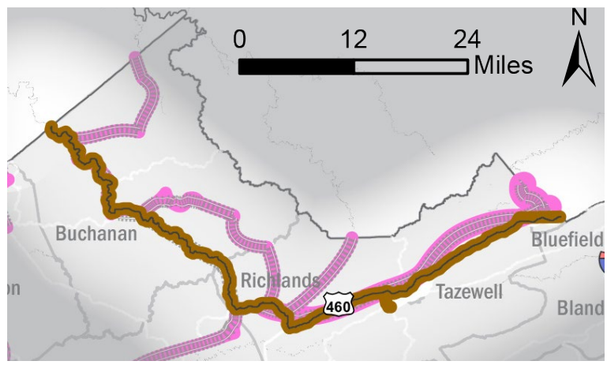
In Richlands, freight movements rely more heavily on rail, in terms of both tonnage and value. Only 1.3 million tons (nine percent) of freight travels through the Richlands section of Segment E1 by truck, compared to 13 million tons moved by rail. Freight value traveling by truck accounts for $692 million (47 percent); freight value by rail accounts for $774 million (53 percent). On average, a ton of freight traveling through this section of Segment E1 by truck is worth $553 while a ton of freight traveling by rail is worth only $59. In 2025, truck freight tonnages and total values in the Richlands area are expected to increase, and the percentage of the freight traveling by truck will likely increase slightly to 11 percent by tonnage and 59 percent by value. Values per ton on both truck and rail in 2025 are expected to increase to $794 and $66, respectively.

Near Springville, freight movements rely more heavily on rail, in terms of tonnage, and on truck, in terms of value. Approximately five million tons (28 percent) of freight travels through the Springville section of Segment E1 by truck, compared to 12 million tons by rail. Freight traveling by truck accounts for $2 billion (74 percent); freight by rail accounts for $716 million (26 percent). On average, a ton of freight traveling through this section of Segment E1 by truck is worth $423 while a ton of freight moving by rail is worth only $59. In 2025, truck and rail freight tonnages in the Springville area are expected to decrease; however, the freight value per ton for truck and rail is likely to increase to $608 and $67, respectively.

Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



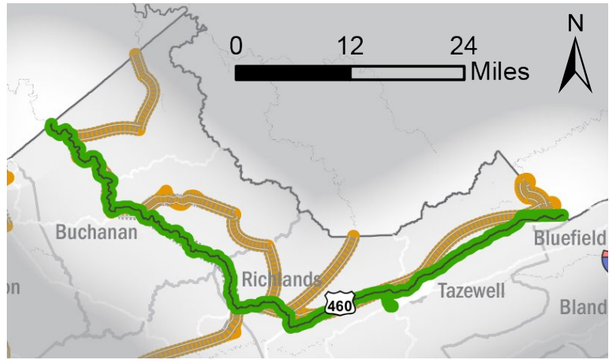
Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

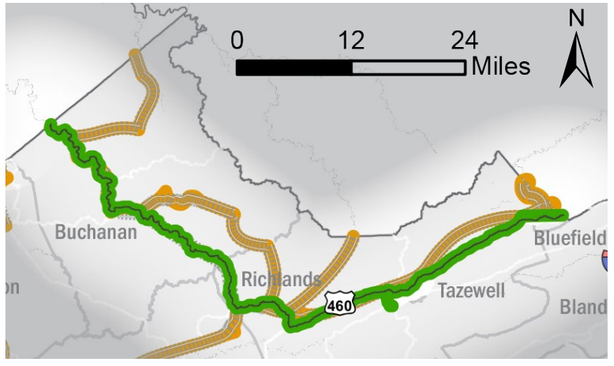
Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

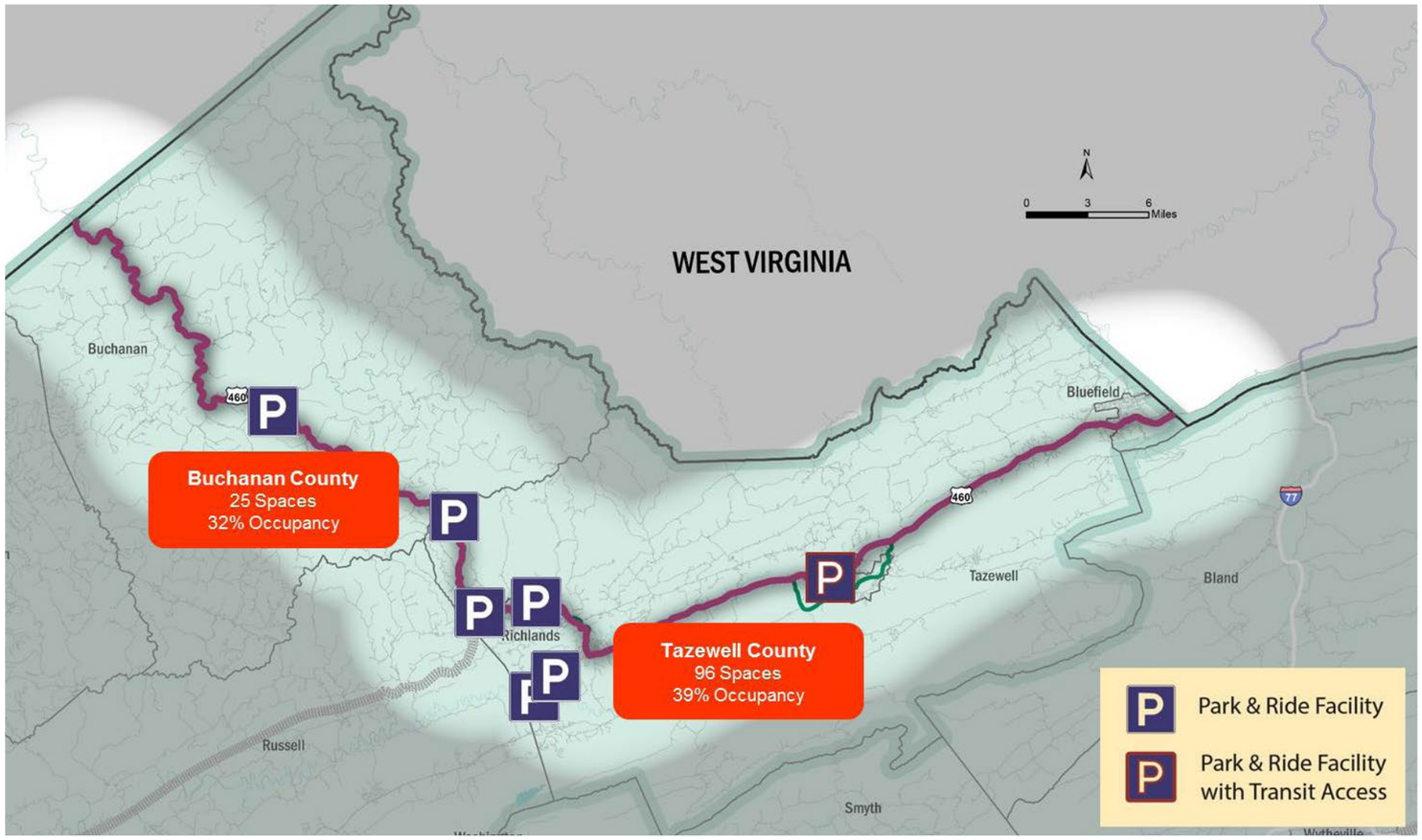
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment E1 of the Heartland Corridor have few travel options, both in terms of travel path and mode choice. There are no parallel highway facilities to US 460 in Segment E1 that accommodate inter-city travel. Four County Transit serves this segment and provides connections to Bluefield, West Virginia. No bus or rail connections are available to the rest of the corridor or the Commonwealth.

Park-and-Ride

Within Segment E1, commuters can utilize several Park-and-Ride facilities. Tazewell County provides the most Park-and-Ride locations, the highest number of Park-and-Ride spaces, and has the highest utilization rate of spaces available in the region. No county within the Segment E1 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



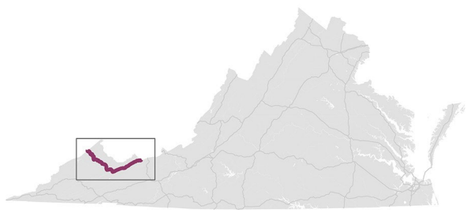
Comparable Travel Options

Blacksburg / Christiansburg to Bluefield, WV

Inter-City Bus	*Train*
0 Trips per Day	0 Trips per Day
0:00 Travel Time	0:00 Travel Time
$0 Est. Cost	$0 Est. Cost

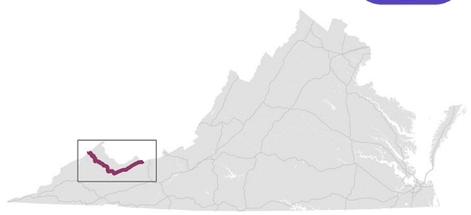
Auto

Via Rt. 460: 1:10 Travel Time $34 Est. Cost



Safety

Between 2010 and 2012, 131 severe crashes occurred on Segment E1, resulting in the highest crash rate on the Heartland Corridor. There are a few locations along Segment E1 where high concentrations of severe crashes occurred. Along US 460 in Tazewell County, north of Raven, there were 18 collisions over a stretch of 2.7 miles between Mulberry Road and Jacks Creek Road. Along US 460 (Front Street) in Richlands, there were 45 crashes over a 1.2-mile stretch between Acme Road, near the Tazewell County Airport, and Front Street. Of the 45 crashes, 14 were at the intersection of US 460 and Front Street. On US 460 Business (2nd Street/Front Street) there were 14 incidents within a distance of 1.6 miles between Rockbridge Avenue and Robinhood Lane.



Performance Metrics:

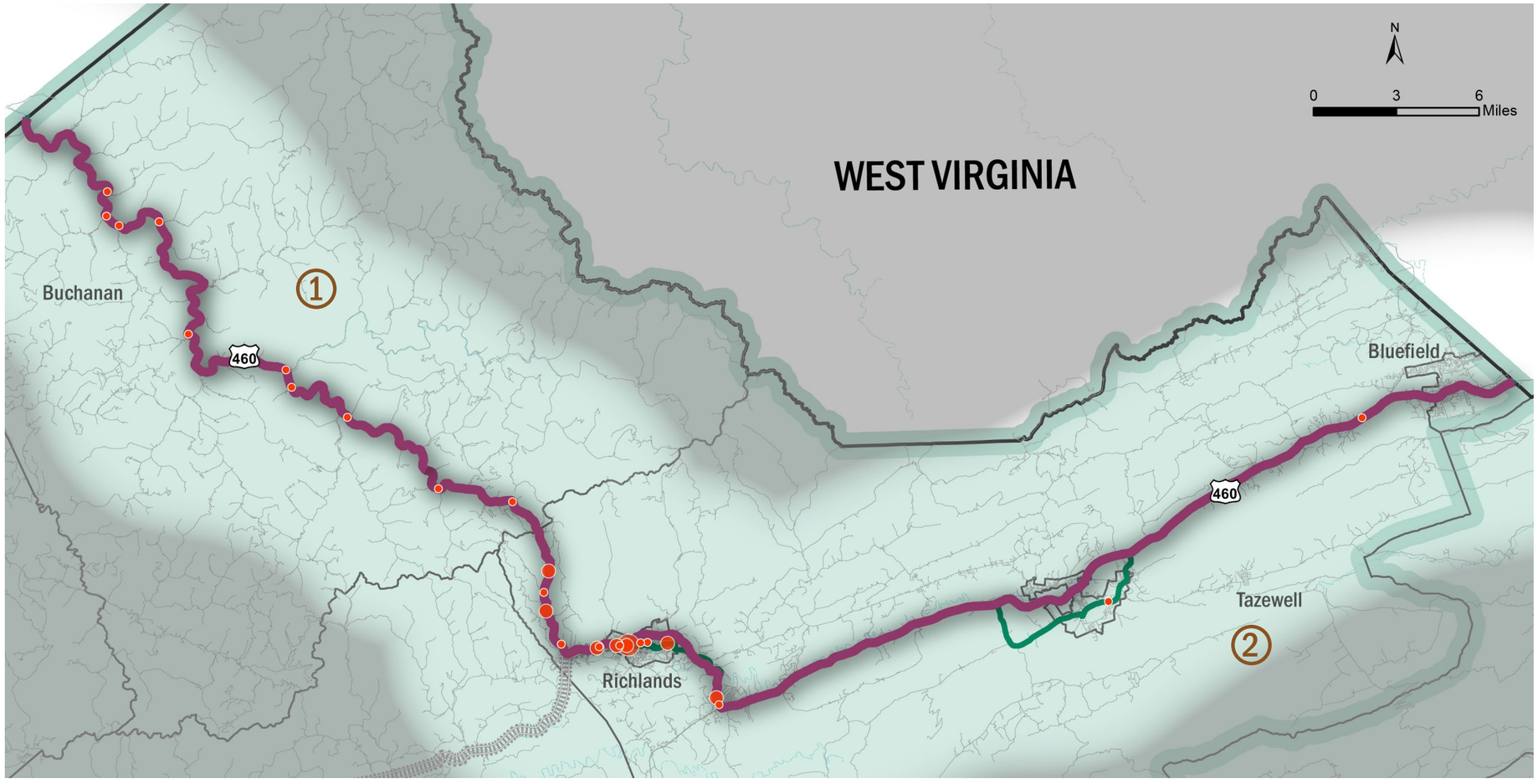
Number of Severe Crashes	131
Severe Crashes/Million VMT	2.0
Number of Railroad Crashes	3

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

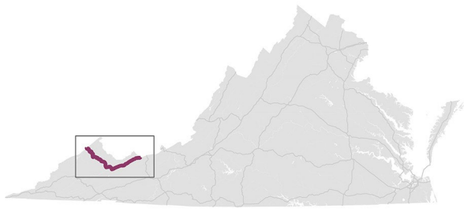
#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	8
Freight Ton Hours of Delay per Mile	670



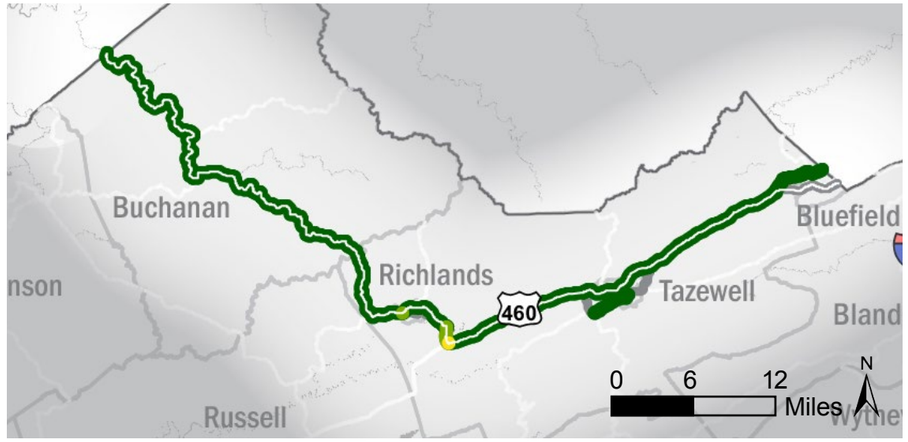
Passenger Delays

Passenger congestion along segment E1 is generally minimal, with the corridor segment experiencing around 1,300 person-hours of delay daily. The only location in which delays exceed 100 person-hours per mile is at the intersection of US 460 and US 19 in Tazewell. Peak-period passenger delays account for 48 percent of daily congestion, marginally higher than average for the peak-period share of congestion on CoSS segments.

Freight Delays

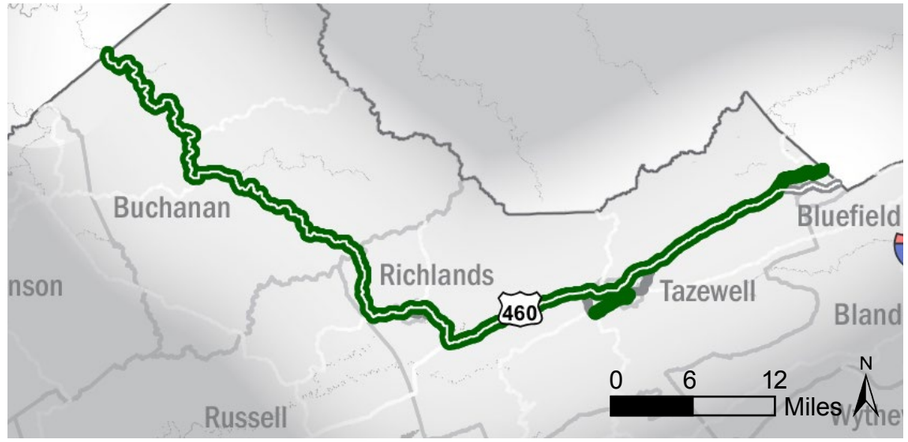
Freight delays along Segment E1 rank among the lowest among CoSS segments with daily freight delays of just 110,000 ton-hours. As such, there are no locations of significant freight delay exceeding 250,000 ton-hours per mile along the corridor segment. Peak-period freight delays on Segment E1 account for 42 percent of daily congestion on the corridor segment.

Daily Person Hours of Delay per Mile



- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000

Reliability

Weekday Peak

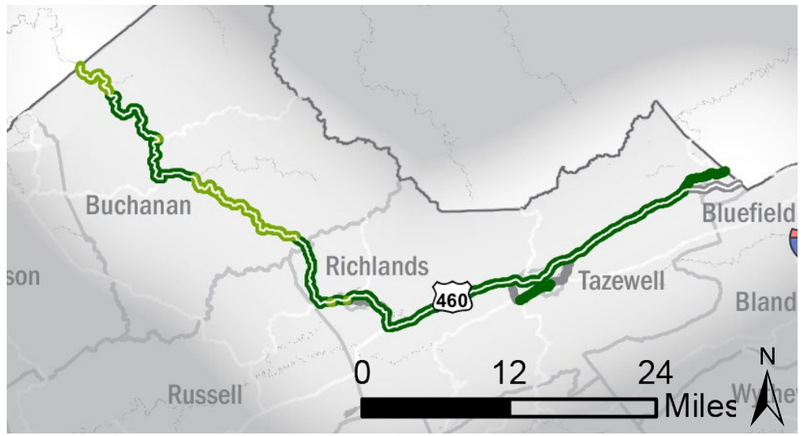
Reliability of travel during the peak period on a typical weekday on Segment E1 ranges from 0.02 to 0.35 in terms of reliability index, with an average value of 0.09. None of the locations along Segment E1 have reliability index values exceeding the statewide threshold.

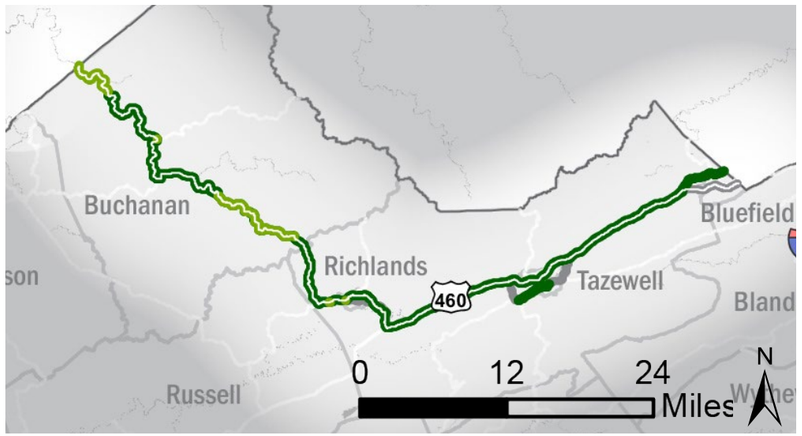
Weekday

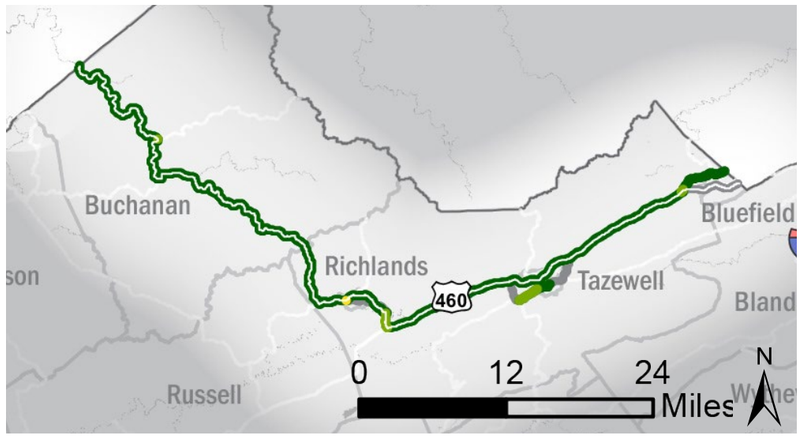
Reliability of travel during a typical weekday ranges from 0.00 to 0.30 in terms of reliability index, with an average value of 0.08. None of the locations along Segment E1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.45 in terms of reliability index, with an average value of 0.07. None of the locations along Segment E1 have reliability index values exceeding the statewide threshold.





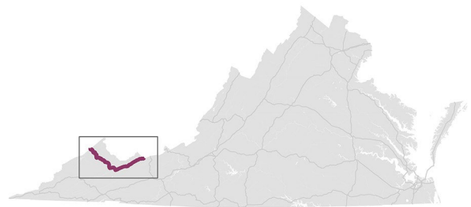


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

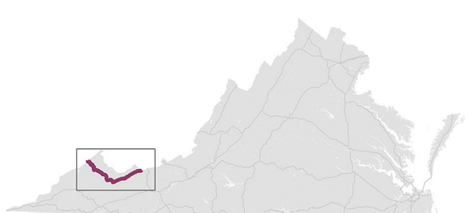
Mode Choice

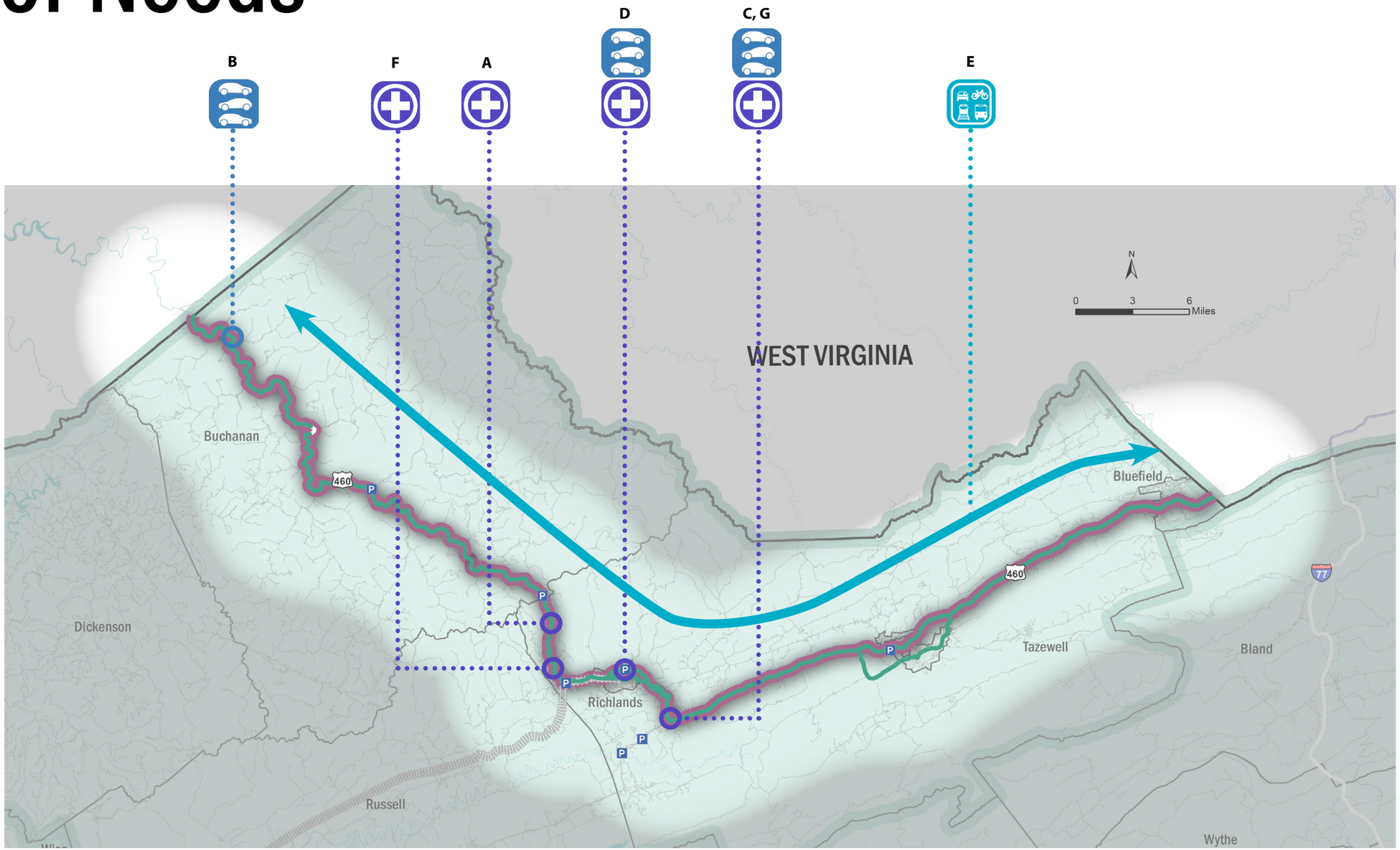
Safety

Congestion

Bottlenecks

Reliability





E1 SEGMENT NEEDS

Summary of Needs - E1 Segment

A.		US 460 north of Richlands: Geometric design, high levels of truck traffic, and mountainous terrain
B.		Limited accessibility along US 460 in Buchanan County (2-lane facility) including connection into Kentucky
C.		US 460 at US 19: Merging issues related to insufficient turning lanes
D.		US 460 in Richlands: Signalized intersections near at-grade rail crossings create safety and congestion issues; insufficient storage for vehicles. 45 severe crashes.
E.		No intercity bus or rail service connects communities in the segment to the rest of the corridor
F.		US 460 north of Raven in Tazewell County: 18 severe crashes
G.		Congestion issue at US 460 and US 19 in Tazewell County

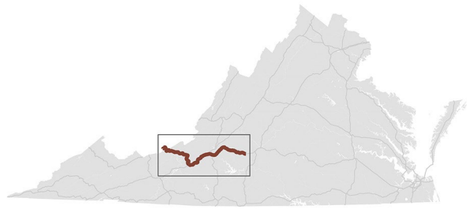
III. Segment E2

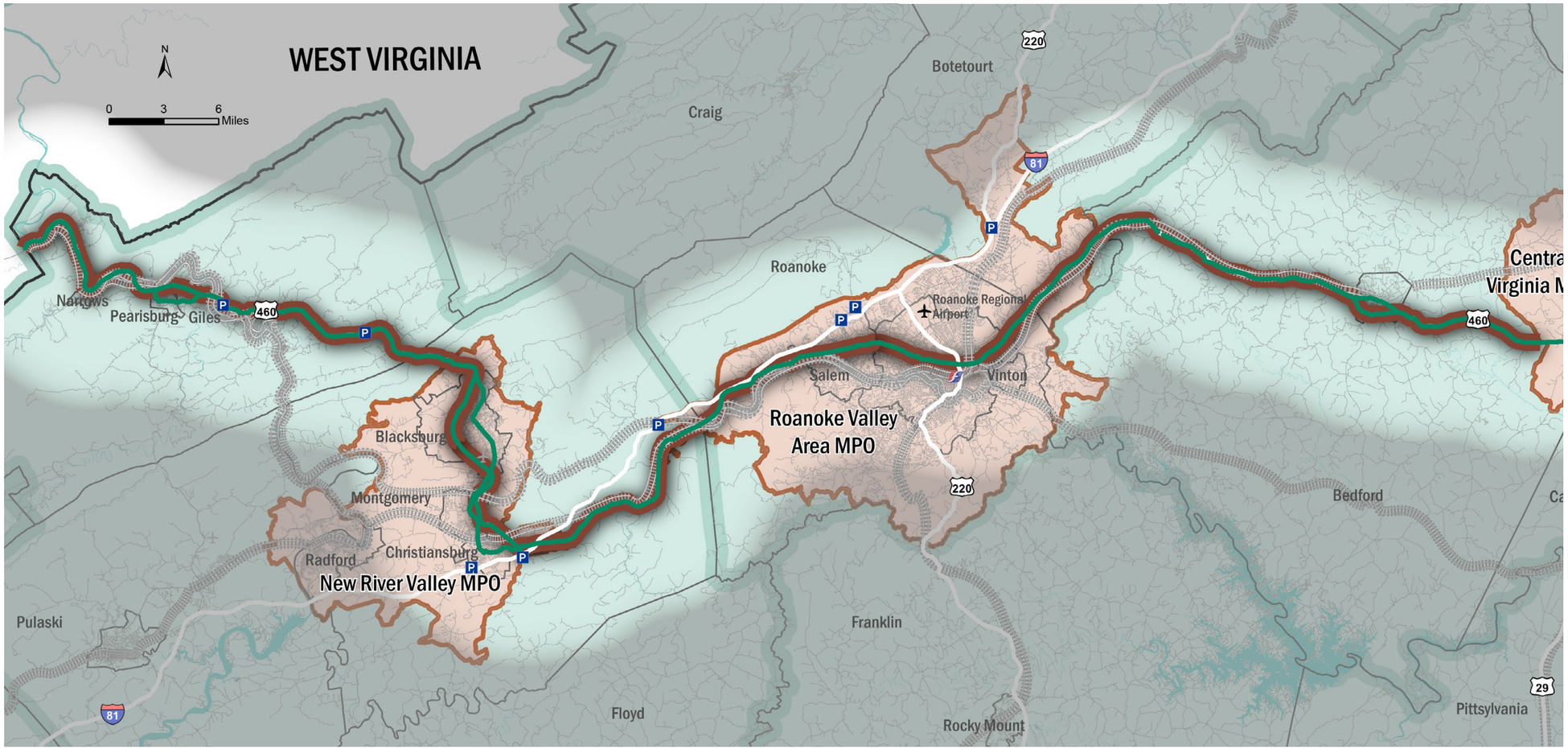
Corridor Segment E2 Components

- US 460
- US 460 Business
- US 460 Bypass
- Norfolk Southern Heartland Corridor
- Roanoke Regional Airport

E2
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility





E2 SEGMENT PROFILE

Segment E2 begins at the West Virginia border and continues east, serving Giles, Montgomery, Roanoke, Botetourt, and Bedford Counties and the Cities of Salem and Roanoke. The segment travels through the New River Valley and Roanoke Valley MPO Areas. Segment E2 terminates at the western boundary of the Central Virginia Area in Bedford County. The segment includes portions of US 460, US 460 Business, and US 460 Bypass, and runs concurrently with sections of US 11, US 11 Alternate, and US 221. Segment E2 serves as an alternative east-west throughway for passengers and freight, in addition to providing local access to the rural communities of southwest Virginia, through Blacksburg and Christiansburg,

Highway Facilities: US 460 is primarily a four-lane highway from the West Virginia state line. A portion of US 460 in Segment E2 is limited access through Blacksburg and Christiansburg and on the bypass around Bedford. US 460 also runs concurrently with US 221 around Roanoke and through Botetourt County, and with US 11 through Roanoke, Salem, and Christiansburg. A business spur of US 460 serves the Towns of Pearisburg, Blacksburg, Christiansburg, and Bedford. Between Christiansburg and Salem, the corridor parallels I-81.

Transit Services: In this segment, the corridor is served by several transit providers. The Two Town Trolley provides service between Blacksburg and Christiansburg, the Blacksburg Transit System services the town of Blacksburg and the Virginia Tech campus, and Valley Metro serves the Roanoke Valley. RADAR provides paratransit service for the greater Roanoke Valley. Greyhound has a bus station in Roanoke. Amtrak operates thruway bus service via Valley Metro's "The Smart Way Connector," connecting Blacksburg, Roanoke, and Bedford to the Lynchburg Amtrak Station. There are numerous Park-and-Ride facilities, mostly clustered around I-81.

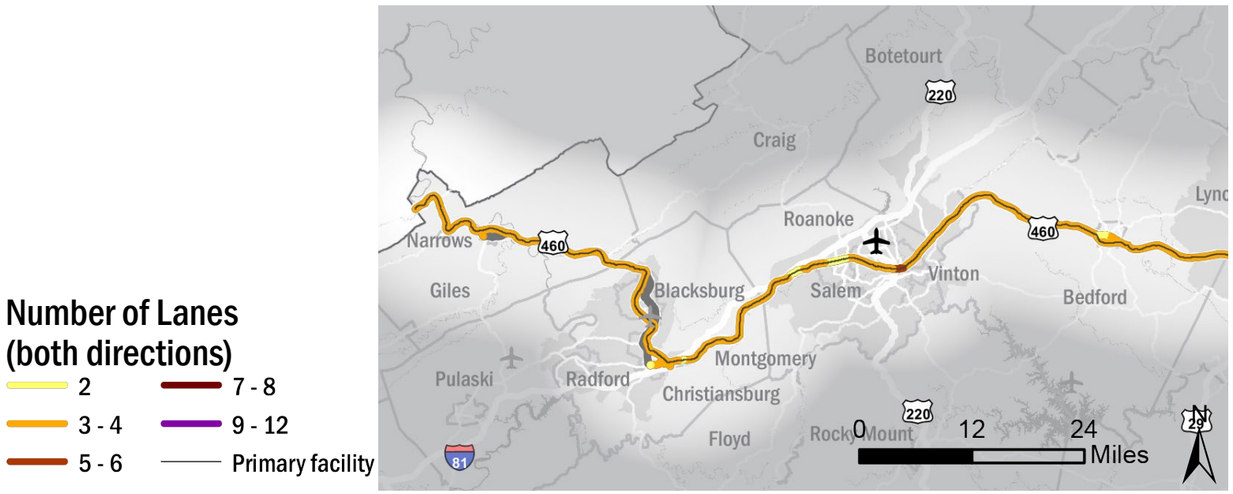
Rail Facilities: Norfolk Southern operates its Heartland Corridor line, the most important rail route for transport between the Port of Virginia and markets located west of Virginia. Numerous rail lines traveling in all directions run throughout the corridor, with Roanoke serving as a major junction area between rail corridors and classified as a Thoroughbred Bulk Transfer Terminal.

Port Facilities: No port facilities are located directly adjacent to Segment E2, but the Heartland Corridor does provide direct access to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: The Roanoke-Blacksburg Regional Airport is the only commercial airport in this segment.

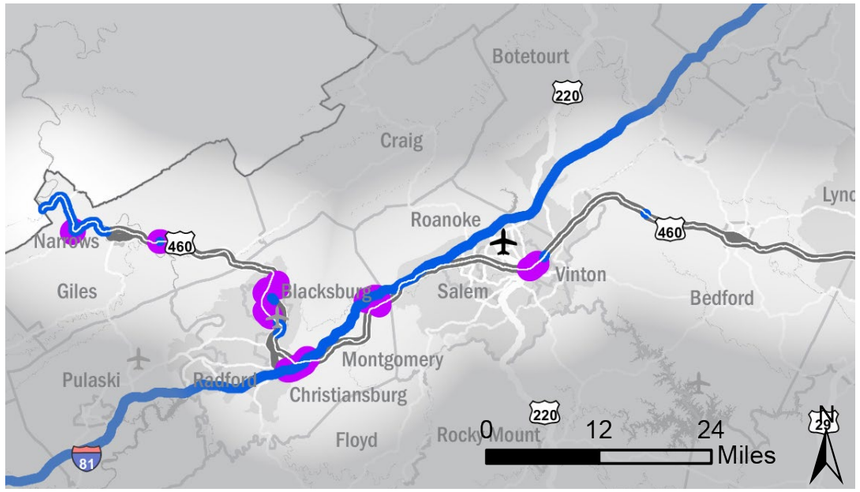
Major planned and future projects include:

- Improving the intersection of US 460 and US 623 to include the addition of left-turn lanes on westbound US 460 and southbound US 623, shifting the alignment of US 623 north of the intersection to better align with US 623 south of the intersection, and adding sidewalks and crosswalks in Giles County;
- Removing the at-grade signalized intersection at US 460 and Southgate Drive in Montgomery County;
- Widening State Route 603 (North Fork Road) between I-81 and US 11/460 in Montgomery County; and
- Widening Orange Avenue (US 460) to six lanes between 11th Street, NE and Gus Nicks Boulevard, NE in the City of Roanoke.



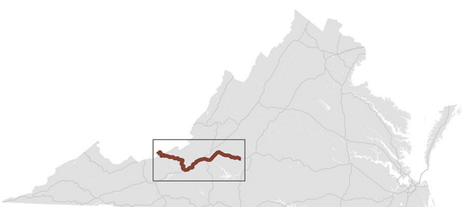
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



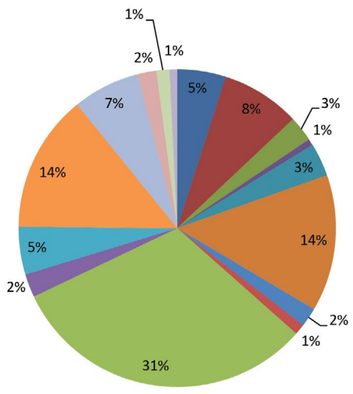
Travel Demand

Passenger Demand

Segment E2 provides connections between the New River Valley, Roanoke Valley, and Lynchburg Areas. Travel between the New River Valley and Roanoke Valley Areas accounts for approximately two percent of the intercity passenger travel in the Commonwealth, and travel between Roanoke and Lynchburg accounts for an additional 1.5 percent. Some of these trips may use Segment E2 or segments along Corridor B.

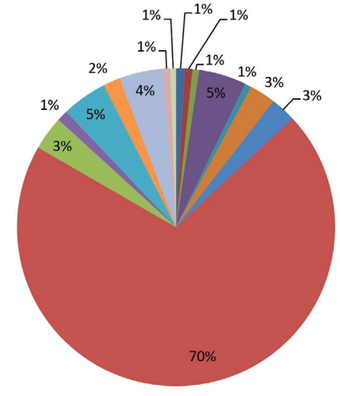
The vast majority (70 percent) of intercity passenger travel starting in the New River Valley Area is destined for the Roanoke Valley Area, located directly adjacent and to the north along this segment. Other major destinations for intercity passenger travel along Segment E2 include the Lynchburg Area (five percent), West Virginia (four percent), and Richmond (three percent). Intercity travel originating in the Roanoke Valley Area is more distributed across the state, although 58 percent is still destined for the adjacent MPO Areas: New River Valley Area (34 percent) and Lynchburg Area (24 percent). Other major destinations for traffic from Roanoke along Segment E2 include Hampton Roads (seven percent), Richmond (five percent), and West Virginia (four percent). Westbound travel that may make use of Segment E2 accounts for a large portion of the intercity travel originating in Lynchburg, including travel to the Roanoke Valley (31 percent), the New River Valley (two percent), and West Virginia (two percent).

Travel from Central Virginia Area to...



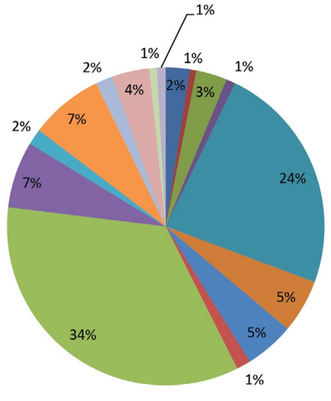
(clockwise starting from the top)
- Metropolitan Washington Region
- Danville Area
- Hampton Roads Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Tri-Cities Area
- Winchester Area
- Roanoke Valley Area
- New River Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- West Virginia
- Maryland
- Other

Travel from New River Valley Area to...



(clockwise starting from the top)
- Metropolitan Washington Region
- Bristol Area
- Danville Area
- Central Virginia Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Roanoke Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- Tennessee
- West Virginia
- Maryland
- Other

Travel from Roanoke Valley Area to...



(clockwise starting from the top)
- Metropolitan Washington Region
- Bristol Area
- Danville Area
- Hampton Roads Area
- Central Virginia Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Winchester Area
- New River Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- Tennessee
- West Virginia
- Maryland
- Other

E2 SEGMENT PROFILE

Freight Demand

By truck, Segment E2 carried six million tons of freight worth $5 billion dollars in 2012, and is estimated to carry seven million tons of freight worth $7 billion dollars in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area. Between seven and eight percent of the total truck freight tonnage on Corridor E originates or is destined for Segment E2. Significant generators along Segment E2 are Montgomery and Bedford Counties, with major freight movements to North Carolina and the Tri-Cities Area.

By rail, Segment E2 carried 26 million tons of freight worth $5 billion dollars in 2012, and is estimated to carry 27 million tons of freight worth $31 billion in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 17 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors. Segment E2 is a minor generator and attractor of rail freight on Corridor E, accounting for between two and three percent of rail freight origins and destinations by tonnage. Botetourt County and the City of Roanoke are the largest generators of rail freight tonnage along the segment, with most of this rail freight destined for North Carolina. Giles County and the City of Roanoke are the largest attractors along Segment E2, with a majority of these rail freight flows originating in Illinois.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 41%)
2. North Carolina (30% / 28%)
3. South Carolina (4% / 5%)
4. Pennsylania (4% / 4%)
5. Maryland (3% / 3%)

Corridor Tonnage Originating in Segment E2: 8% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and Pennsylvania
Chesterfield County and North Carolina
North Carolina and New York

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (47% / 48%)
2. North Carolina (18% / 20%)
3. Pennsylvania (5% / 4%)
4. Chesterfield County (5% / 4%)
5. City of Norfolk* (4% / 4%)

Corridor Tonnage Destined for Segment E2: 7% / 8%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (36% / 31%)
2. Virginia (26% / 25%)
3. Illinois (8% / 9%)
4. Wise County (7% / 6%)
5. Kentucky (6% / 5%)

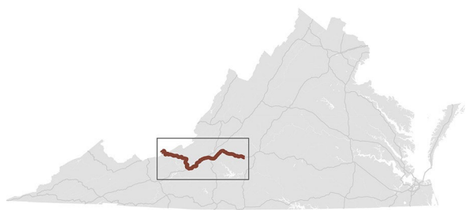
Corridor Tonnage Originating in Segment E2: 2% / 3%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (54% / 52%)
2. City of Norfolk* (34% / 31%)
3. North Carolina (31% / 31%)
4. City of Chesapeake (4% / 5%)
5. Pennsylvania (3% / 3%)

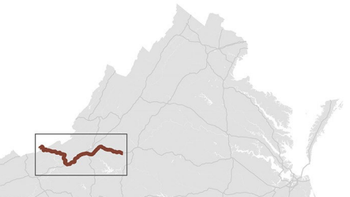
Corridor Tonnage Destined for Segment E2: 3% / 3%



Traffic Conditions

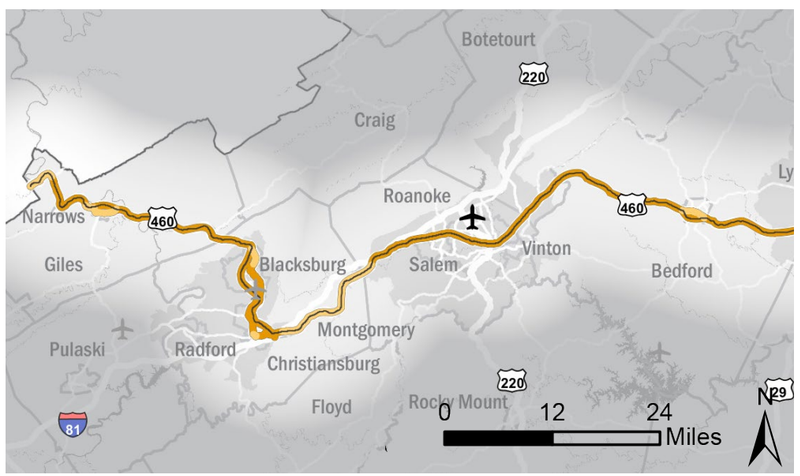
Traffic Volume and AADT

Traffic volume in Segment E2 varies by location and is moderate compared to traffic volumes in other segments of Corridor E. Outside of the major urbanized areas, average daily traffic volumes range from 5,000 to 25,000 vehicles. The highest traffic volumes in Segment E2 occur between Blacksburg and Christiansburg and in Roanoke where volumes can exceed 35,000 and 40,000 vehicles per day, respectively.. Traffic on US 460 Business is approximately 8,000 vehicles per day in Pearisburg and up to 33,000 vehicles per day in Christiansburg. Traffic volumes are projected to increase along US 460 by 2025, with the largest increases occurring near Blacksburg and Roanoke, with increases between 6,000 and 8,000 additional vehicles per day. Outside of the urban areas, traffic growth is expected to be much lower, and no traffic growth is projected for US 460 Business.



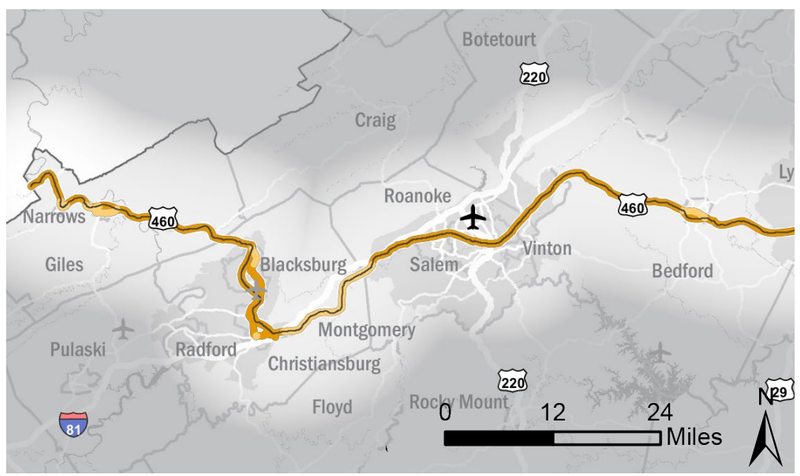
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



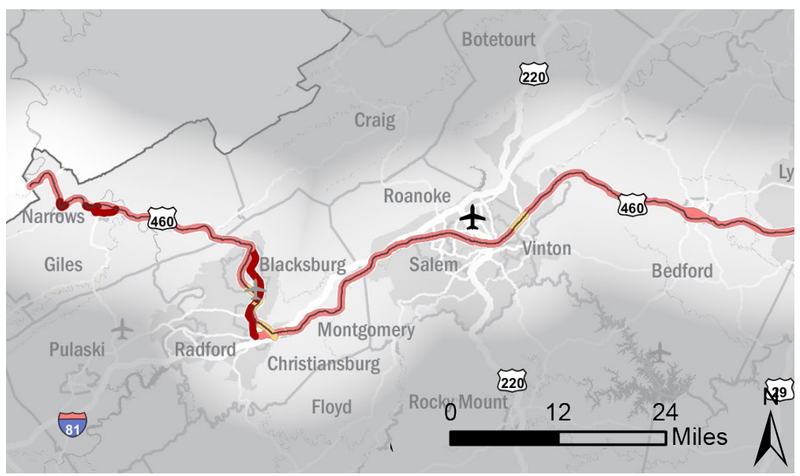
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



E2 SEGMENT PROFILE

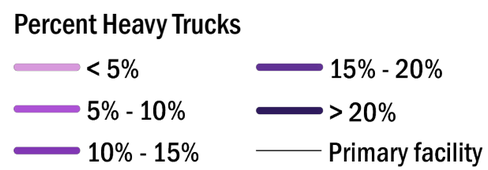
Traffic Distribution

On average, traffic on Segment E2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 8.2 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 6.8 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 52 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic with the peak hourly flow of trucks occurring between 11 a.m. and noon (7.0 percent of daily traffic). Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day with the peak hour flow between noon and 1 p.m. (7.7 percent of daily traffic) for all traffic, and 11 a.m. to noon (5.5 percent of daily traffic) for truck traffic.

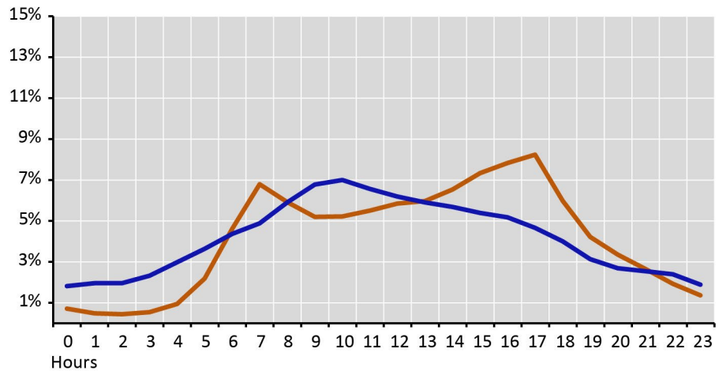
Weekday traffic volumes on Segment E2 vary by as much as 19 percent throughout the year, with the highpoint in May (around 22,000 vehicles per day) and the low point in January (around 19,000 vehicles per day). Truck volumes vary similarly throughout the year, although with the high in October (around 1,500 vehicles per day) is 17 percent higher than the January low (around 1,200 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 17,000 vehicles per day) are 22 percent higher than January levels (around 14,000 vehicles per day). Weekend truck volumes remain relatively steady throughout the year. Since truck volumes account for a relatively small portion of traffic on Segment E2, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volumes

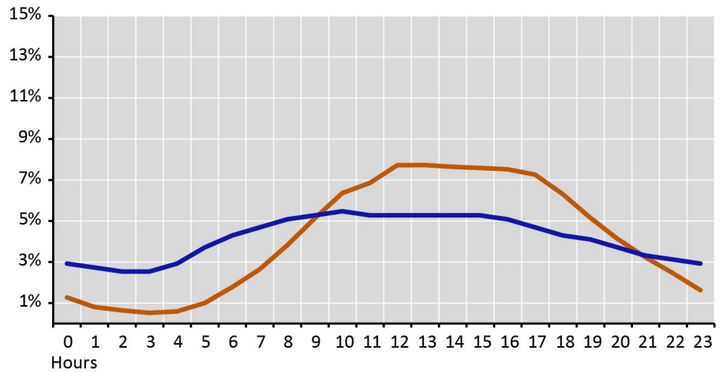
The percent of daily traffic comprised of heavy trucks on Segment E2 is moderate relative to other segments in Corridor E. The highest percentages of heavy truck traffic occur between the urban areas in the segment. From the West Virginia border to I-81, heavy trucks along US 460 comprise four to six percent of total traffic. Along US 460 from eastern Montgomery County to Salem, heavy trucks make up seven percent of total traffic. Through Roanoke, heavy trucks along US 460 comprise less than four percent of total traffic, and in eastern Bedford County heavy trucks account for six percent of total traffic.



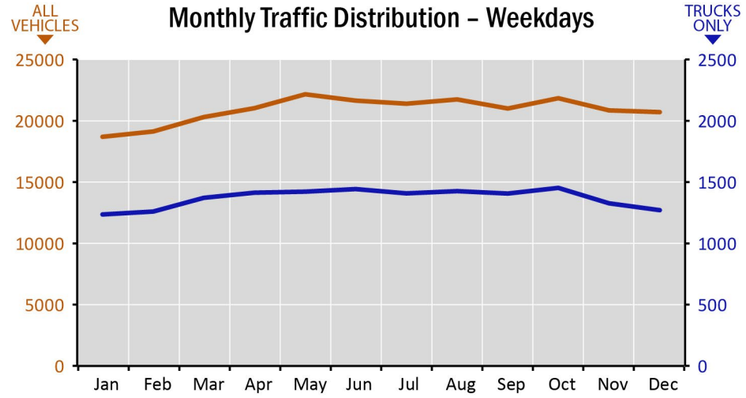
Hourly Traffic Distribution – Weekdays



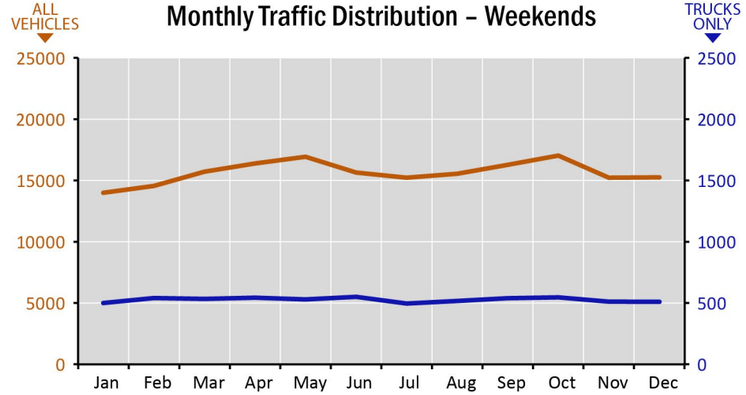
Hourly Traffic Distribution – Weekends



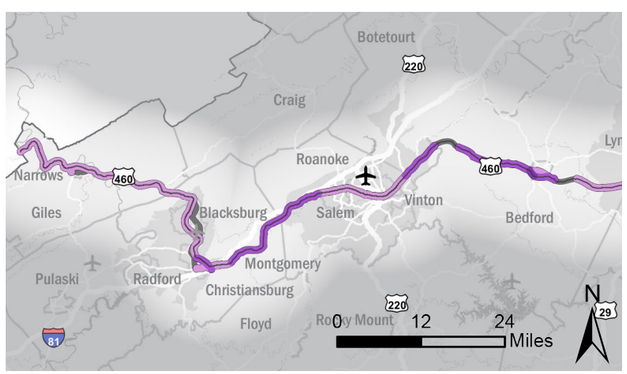
Monthly Traffic Distribution – Weekdays

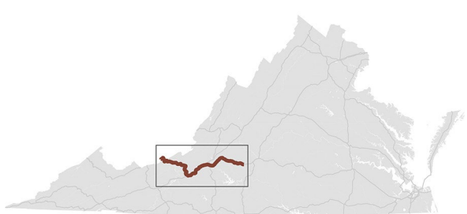


Monthly Traffic Distribution – Weekends



All Vehicles
Trucks



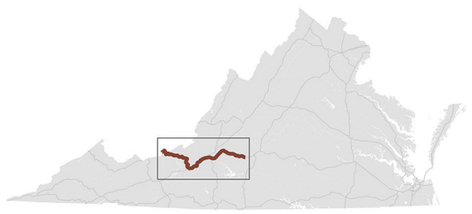


E2 SEGMENT PROFILE

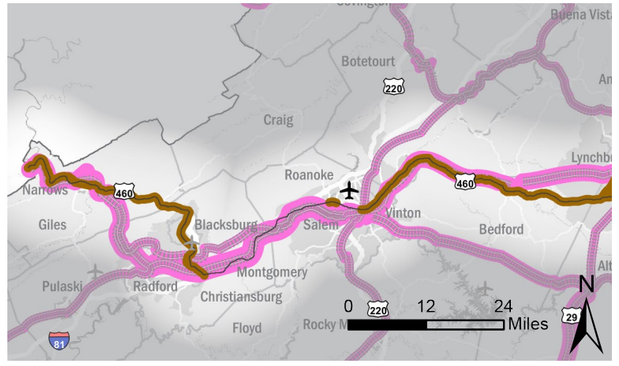
Freight Flows

Near the Town of Pearisburg the large majority of freight moves by truck, in terms of both tonnage and value. In total, six million tons (99 percent) of freight travels through this section of Segment E2 by truck, compared to only 68,000 tons by rail. With regard to value, the contrast is even greater, with $5 billion (almost 100 percent) of freight value traveling by truck, compared to only $6 million by rail. On average, a ton of freight traveling through this section of Segment E2 by truck is worth $856 while a ton of freight traveling by rail is worth $84. In 2025, both rail and truck freight tonnages and total values in Segment E2 are expected to increase, and the percentage of the freight traveling by truck and rail is likely to remain the same both in terms of tonnage and value. Freight value per ton on trucks and rail is expected to increase to $1,012 and $94, respectively.

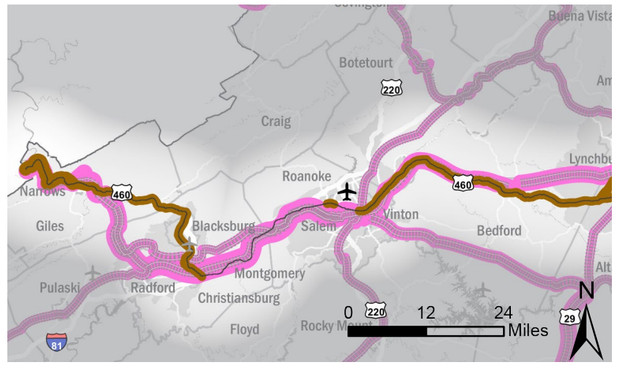
Near the Town of Bedford a large majority of freight moves by rail, in terms of both tonnage and value. In total, four million tons (14 percent) of freight travels through this section of Segment E2 by truck, compared to 26 million tons by rail (86 percent). With respect to value, approximately $4 billion (14 percent) of freight value travels by truck, compared to $24 billion by rail (86 percent). On average, a ton of freight traveling through this section of Segment E2 by truck is worth $976 while a ton of freight traveling by rail is worth $955. In 2025, both rail and truck freight tonnages and total values in Segment E2 are expected to increase. The percentage of the freight traveling by truck is also expected to increase by tonnage and value to 16 percent and 15 percent, respectively. It is anticipated that the freight value per ton on trucks and rail will increase to $1,067 and $1,133, respectively.



Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



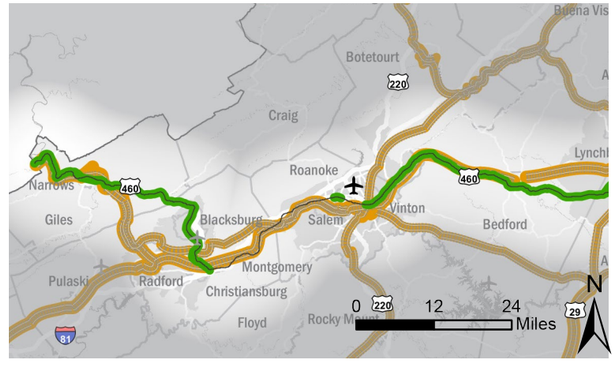
Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

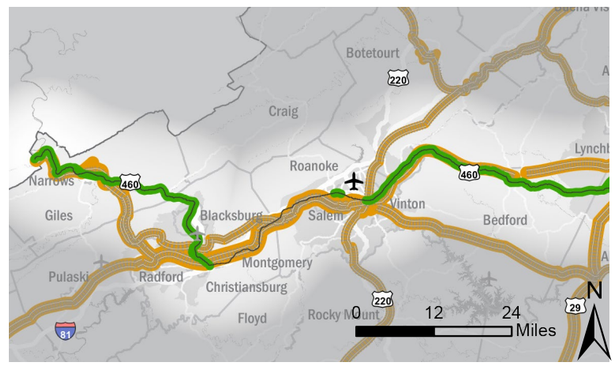
Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

E2 SEGMENT NEEDS

Redundancy and Mode Choice

Comparable Travel Options

Lynchburg to Roanoke

Inter-City Bus	*Train*
5 Trips per Day 1:40 Travel Time $4 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 1:05 Travel Time $32 Est. Cost

Roanoke to Blacksburg / Christiansburg

Inter-City Bus	*Train*
13 Trips per Day 1:29 Travel Time $4 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 0:45 Travel Time $24 Est. Cost

Roanoke to Richmond

Inter-City Bus	*Train*
3 Trips per Day 3:55 Travel Time $46 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 3:04 Travel Time $92 Est. Cost

Roanoke to Danville

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 2:15 Travel Time $65 Est. Cost

Blacksburg / Christiansburg to Lynchburg

Inter-City Bus	*Train*
3 Trips per Day 5:10 Travel Time $10 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

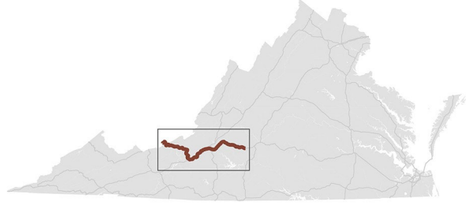
Via Rt. 460: 1:46 Travel Time $53 Est. Cost

Blacksburg / Christiansburg to Richmond

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

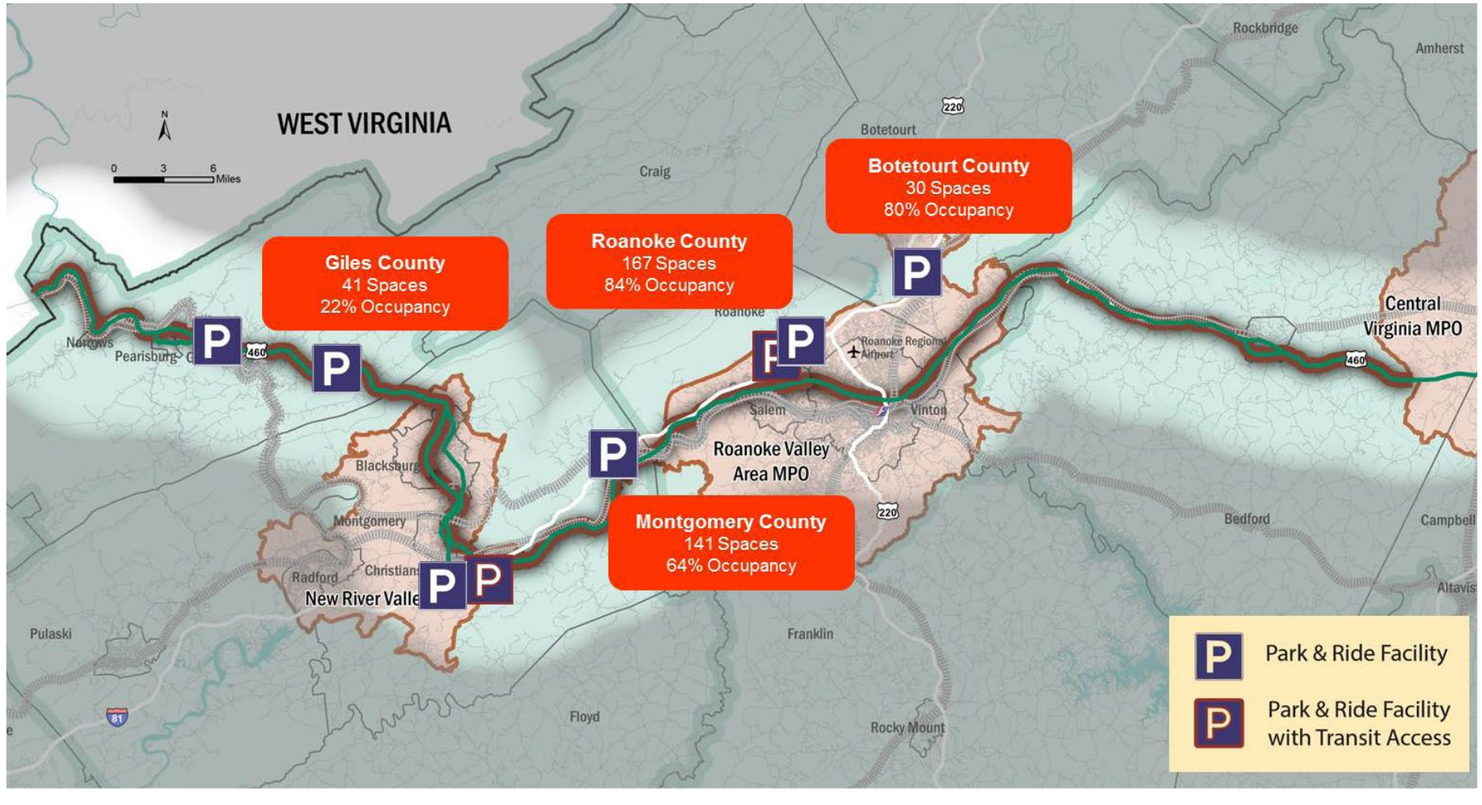
Via Rt. 460: 3:37 Travel Time $114 Est. Cost



Passenger trips on Segment E2 of the Heartland Corridor have few travel options, both in terms of travel path and mode choice. No parallel highway facility exists in Segment E2, except for in the area between Roanoke and Christiansburg, where US 460 runs concurrently to US 11 and parallel to I-81. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by bus. In addition to its advantage over bus travel in terms of frequency, automobile travel in the region is typically quicker than bus. Greyhound offers service from Roanoke and Megabus offers service from Christiansburg. The Smart Way Bus provides transit service between Blacksburg and Roanoke.

Park-and-Ride

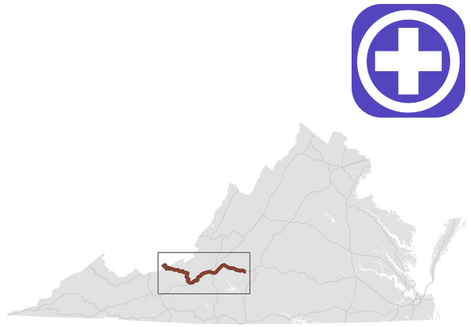
Within Segment E2, commuters can utilize several Park-and-Ride facilities. Roanoke County provides the highest number of Park-and-Ride spaces and experiences the highest utilization rate in the region, while Montgomery County has the most Park-and-Ride locations. Roanoke County (84 percent) and Botetourt County (80 percent) both have a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



E2 SEGMENT NEEDS

Safety

Between 2010 and 2012, Segment E2 experienced 334 severe crashes, the highest on the Heartland Corridor. Several areas along Segment E2 experienced high concentrations of severe crashes. Along US 460 Business (South Main Street) in Blacksburg, near the Virginia Tech Airport, there were 21 incidents over 2.1 miles between Country Club Drive SW and Hightop Road. On US 460 Business (North Franklin Street) in Christiansburg, 21 collisions took place over a 1.3-mile stretch between Merrimac Road and Conston Avenue NW. Along US 11/460 in Salem, 72 crashes occurred along 1.6 miles between Texas Hollow Road and Green Street (as noted for Segment B2). Of the 72 crashes, 12 occurred at the intersection with Route 12 and 12 took place at the intersection with Mill Lane. In Roanoke, along US 460, there were 21 severe collisions in less than a quarter mile between Evan Lane and Patrick Road NE.



Performance Metrics:

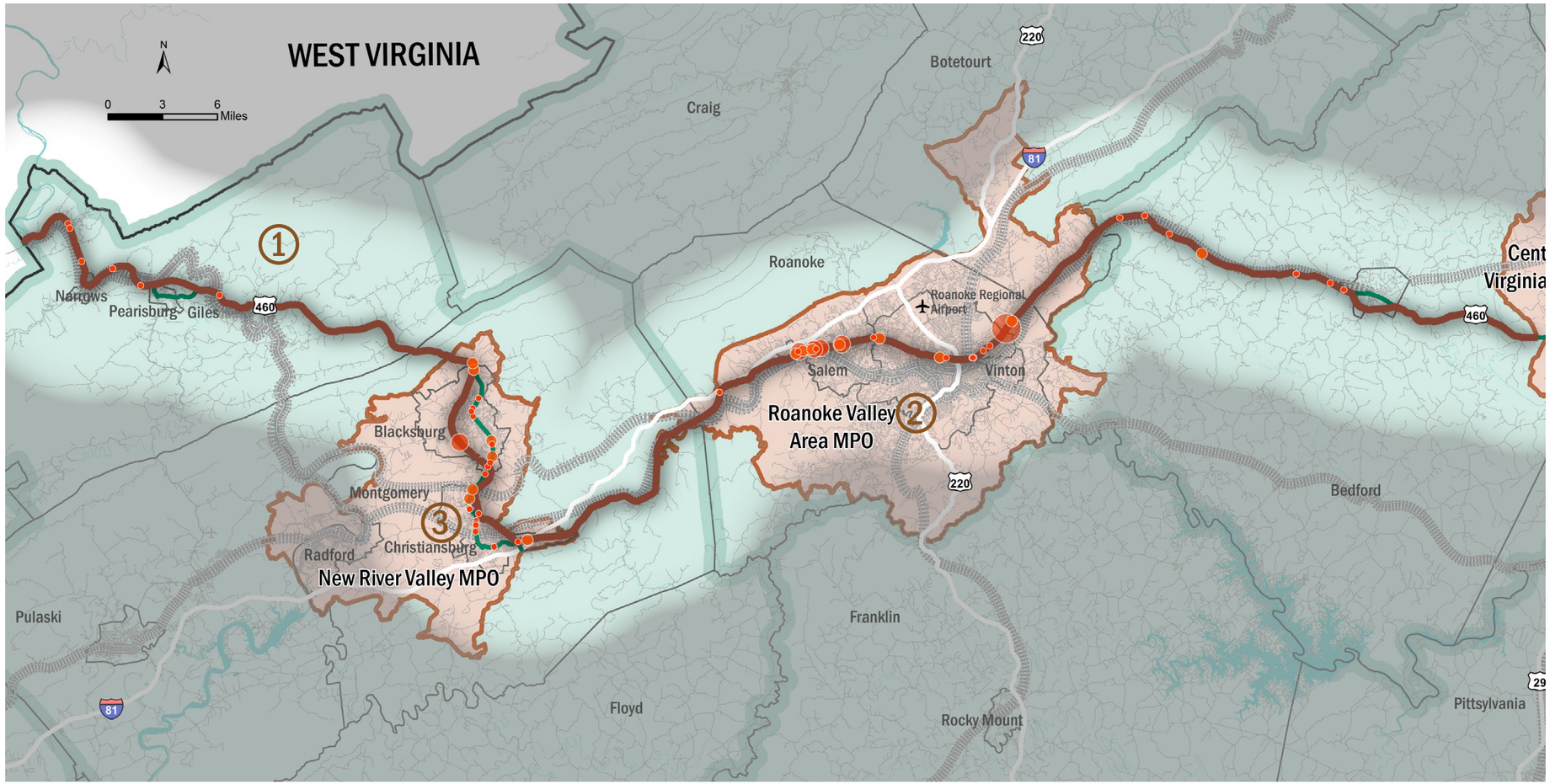
Number of Severe Crashes	334
Severe Crashes/Million VMT	1.1
Number of Railroad Crashes	6

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

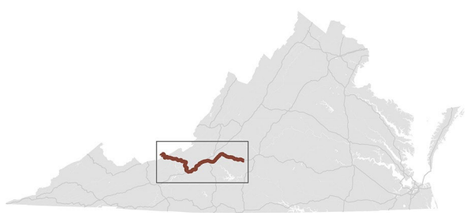
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Congestion

Performance Metrics:

Person Hours of Delay per Mile	15
Freight Ton Hours of Delay per Mile	44.5K



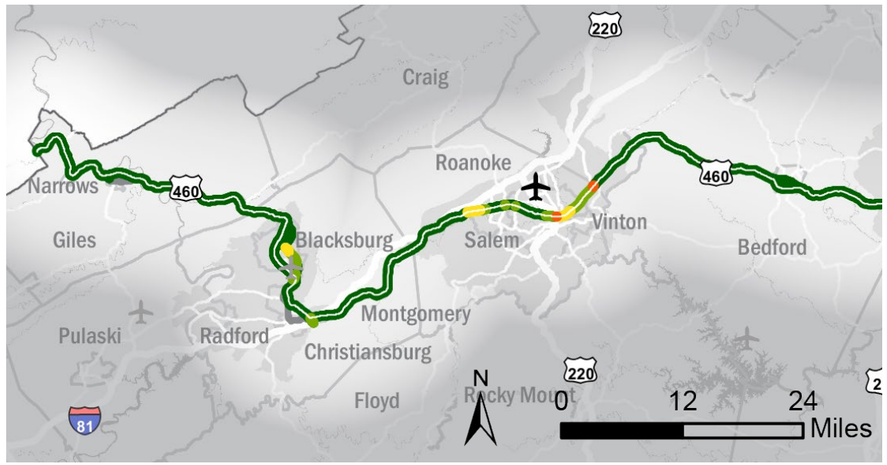
Passenger Delays

Passenger traffic along Segment E2 experiences the second highest daily delay on the Heartland Corridor with over 3,800 person-hours delay. There are significant passenger delays in several locations:

- US 460 Business in Blacksburg near the Virginia Tech campus;
- US 11/460 between Route 112 and Route 635 in the City of Salem;
- US 460 between US 220 and Gus Nicks Blvd NE in the City of Roanoke; and
- US 460 near the intersection with US 221 in Roanoke County.

Peak-period passenger delays account for 27 percent of daily total delays, considerably lower than average for the peak-period share of congestion along CoSS segments.

Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

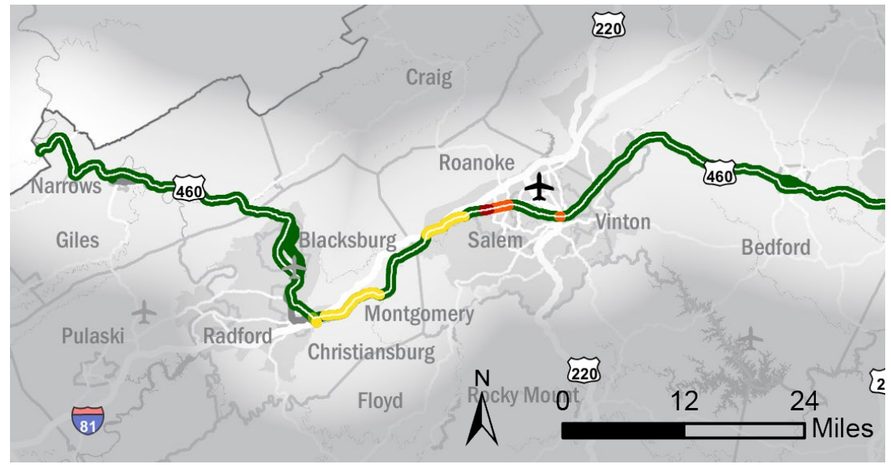
Freight Delays

Segment E2 experiences the highest levels of freight congestion on Corridor E with nearly 11 million ton-hours of delay daily. This results in nearly 45,000 ton-hours per mile of delay along the segment, ranking E2 as one of the most congested CoSS segments. Significant freight congestion occurs only between Christiansburg and Roanoke at the following locations:

- US 460 at the interchange with I-81 in Christiansburg;
- US 11/460 between I-81 and Route 637 in Montgomery County;
- US 11/460 in Roanoke County east of Route 647;
- US 11/460 between US 11 Alternate and Route 419 in the City of Salem; and
- US 460 just west of the US 221 interchange in the City of Roanoke.

Peak-period freight delays account for only six percent of daily congestion, one of the lowest peak-period shares among CoSS segments, suggesting a significant peaking of truck traffic in the middle of the day.

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment E2 ranges from 0.00 to 0.68 in terms of reliability index, with an average value of 0.11. None of the locations along Segment E2 have reliability index values exceeding the statewide threshold.

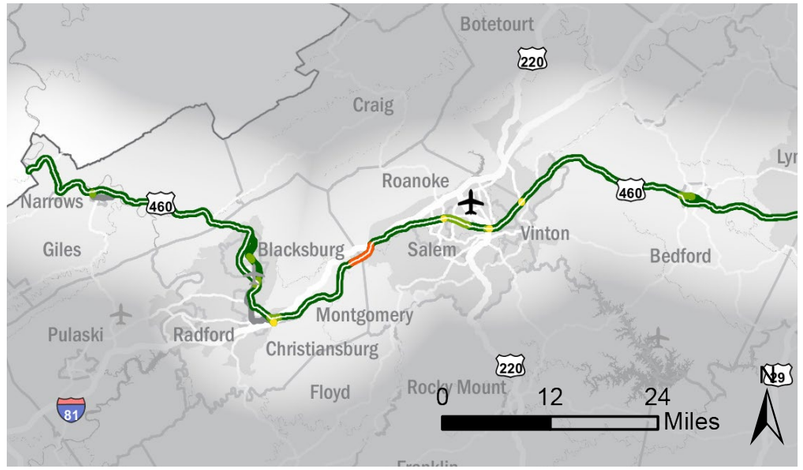
Weekday

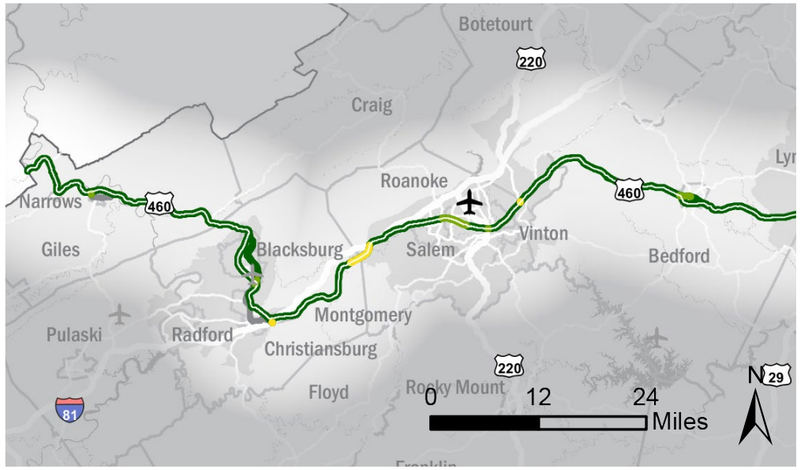
Reliability of travel during a typical weekday ranges from 0.00 to 0.60 in terms of reliability index, with an average value of 0.10. Areas in which the weekday reliability index exceeds the statewide threshold include:

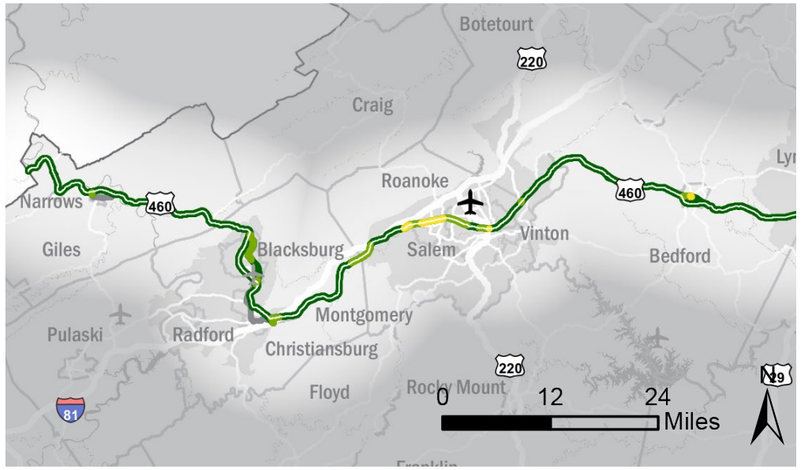
- US 460 at the interchange with I-81 in Christiansburg;
- US 11/460 between Route 647 and 603 in Roanoke and Montgomery Counties; and
- US 460 at the interchange with US 220 Alternate in Roanoke County.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.51 in terms of reliability index, with an average value of 0.08. None of the locations along Segment E2 have reliability index values exceeding the statewide threshold.





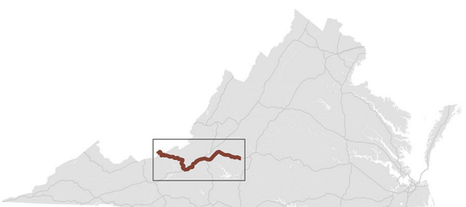


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

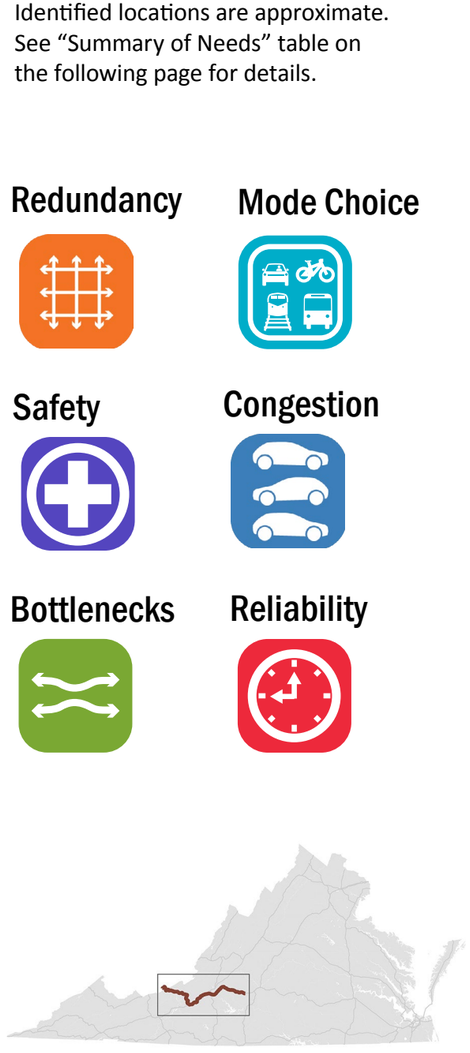
Mode Choice

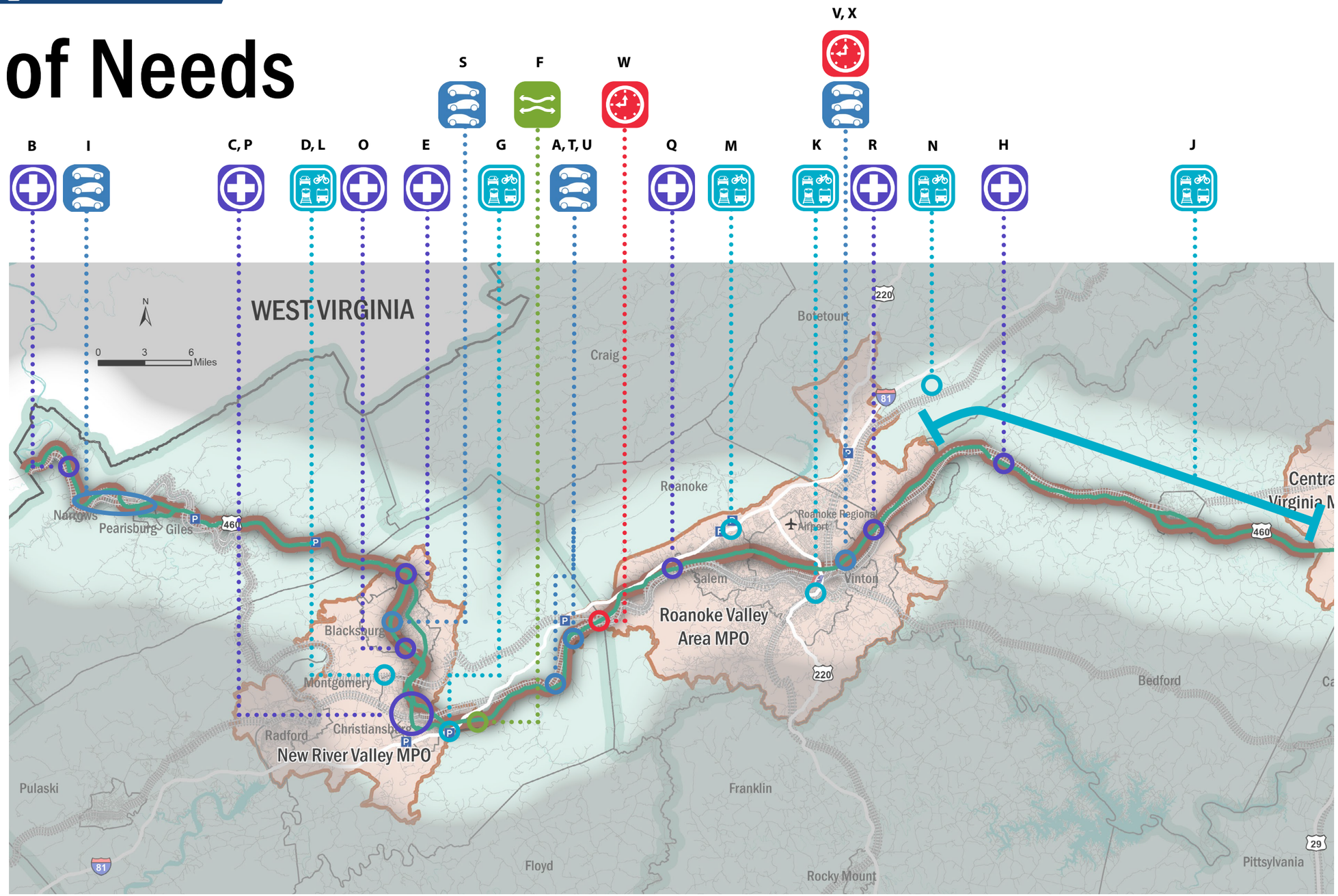
Safety

Congestion

Bottlenecks

Reliability





E2 SEGMENT NEEDS

Summary of Needs - E2 Segment

A.	US 460 west of Roanoke: Frequent driveways and access points result in slow moving traffic
B.	Safety Issues at intersection of US 460 and VA 219
C.	Safety Issues at intersection of US 460 and North Franklin (5-way intersection)
D.	No rail connections to Northern Virginia and remainder of Northeast Corridor
E.	Safety concerns at US 460 and Main Street in Blacksburg
F.	US 11/460: Future capacity bottleneck along 2-lane segment between 4-lane segments to the east and west
G.	Informal park-and-ride on VA 8 near I-81 indicates need for additional park-and-ride facility in this location
H.	Safety concerns related to severe S-curve design on US 460, sight of isolated but very severe crashes
I.	US 460 through Pearisburg and Narrows: Frequent driveways and access points result in slow moving traffic
J.	No parallel highway facilities for US 460
K.	No train service from Roanoke to other cities in the corridor

Summary of Needs - E2 Segment

L.	No train service from Blacksburg/Christiansburg to other cities in the corridor, bus service between cities in corridor is limited to Roanoke and Blacksburg/Christiansburg
M.	Park and Ride lots in Roanoke County have higher utilization rates than statewide average
N.	Park and Ride lots in Botetourt County have higher utilization rates than statewide average
O.	US 460-Business between Country Club Dr SW and Hightop Rd in Blacksburg: 21 severe crashes
P.	US 460-Business between Merrimac Rd and Conston Ave in Christiansburg: 21 severe crashes
Q.	US 460/US 11 between Texas Hollow Rd and Green St in Salem: 72 severe crashes
R.	US 460 between Evan Lane and Patrick Rd NE in Roanoke: 21 severe crashes
S.	Congestion issue at US 460 Business and Prices Fork Road (VA Route 412) in Blacksburg
T.	Congestion issue on US 11 /US 460 between I-81 in Christiansburg and Alleghany Spring Road in Shawsville
U.	Congestion issue on US 11/US 460 between Dow Hollow Road (VA Route 647) and South Electric Road (US 11-Alt) in Salem
V.	Congestion issue on US 460/US 221 between US 11 and US 220-Alt in Roanoke
W.	Reliability issue on US 11/US 460 between North Fork Road (VA Route 603) and Dow Hollow Road (VA Route 647)
X.	Reliability issue at US 460 and US 220-Alt east of Roanoke

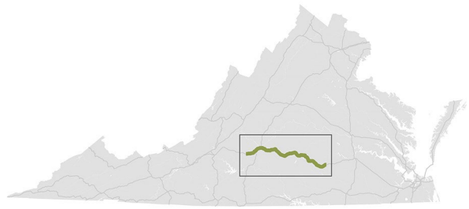
IV. Segment E3

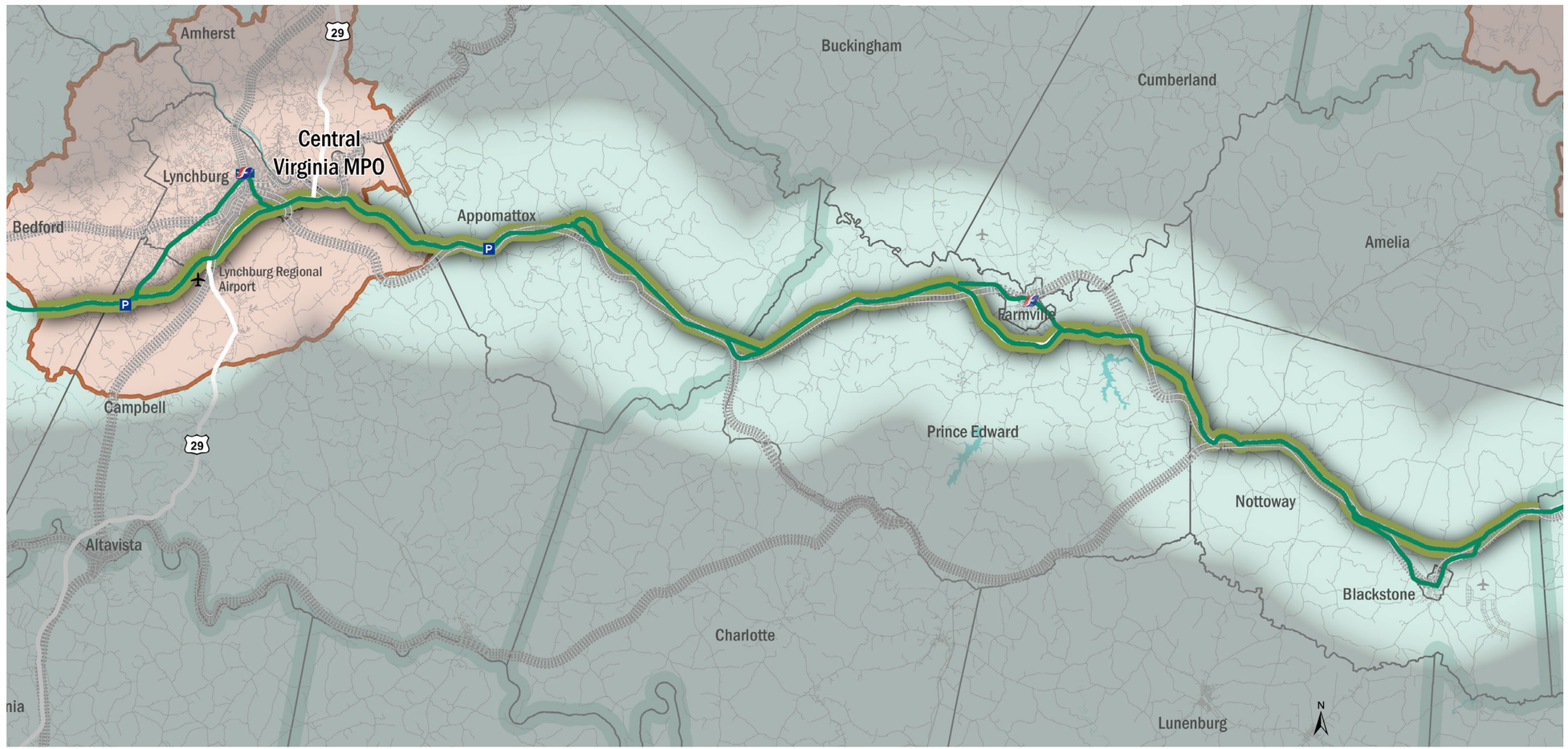
Corridor Segment E3 Components

- US 460
- US 460 Business
- US 29 Bypass
- Norfolk Southern Heartland Corridor
- Lynchburg Regional Airport

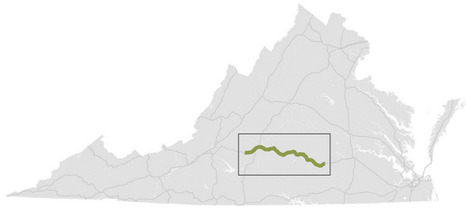
E3
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility





E3 SEGMENT PROFILE



Segment E3 begins in Bedford County and travels east, serving Campbell, Appomattox, Prince Edward, and Nottoway Counties along with the City of Lynchburg. The segment travels through the Central Virginia MPO Area. Segment E3 serves as an alternative east-west throughway for passengers and freight, in addition to providing local access to rural communities. Around Lynchburg, Appomattox, and Farmville, US 460 serves as a limited-access highway.

Highway Facilities: US 460 is a rural four-lane highway in Segment E3. A portion of US 460 is limited access and runs concurrently with US 29 through Lynchburg. US 460 also runs concurrently with US 15 around Farmville and with US 360 around Burkeville. A business spur of US 460 serves Lynchburg and the Towns of Appomattox, Pamplin, Farmville, Burkeville, and Blackstone.

Transit Services: In this segment, the corridor is served by two transit providers: the Greater Lynchburg Transit Company serves Lynchburg and the Farmville Area Bus serves Farmville. Amtrak and Greyhound both have stations in Lynchburg, and Greyhound has a station in Farmville. Amtrak provides service along the corridor from Lynchburg along its Northeast Regional and Crescent Routes. Amtrak also operates thruway bus service connecting Lynchburg to Blacksburg, Roanoke, and Bedford. There are two Park-and-Ride facilities within Segment E3, located outside Lynchburg and Appomattox.

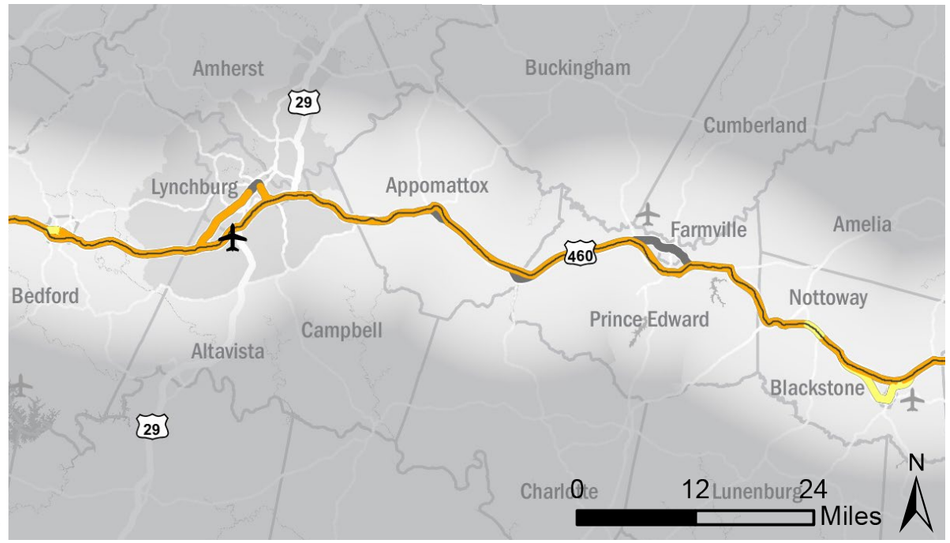
Rail Facilities: Norfolk Southern operates its Heartland Corridor line, the most important rail route for transport between the Port of Virginia and markets located west of Virginia. Lynchburg serves as a junction area between rail corridors traveling north-south and east-west.

Port Facilities: No port facilities are located directly adjacent to Segment E3, but the Heartland Corridor does provide direct access to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: The Lynchburg Regional Airport is the only commercial airport in this segment. Three other general and local service airports exist in Segment E3.

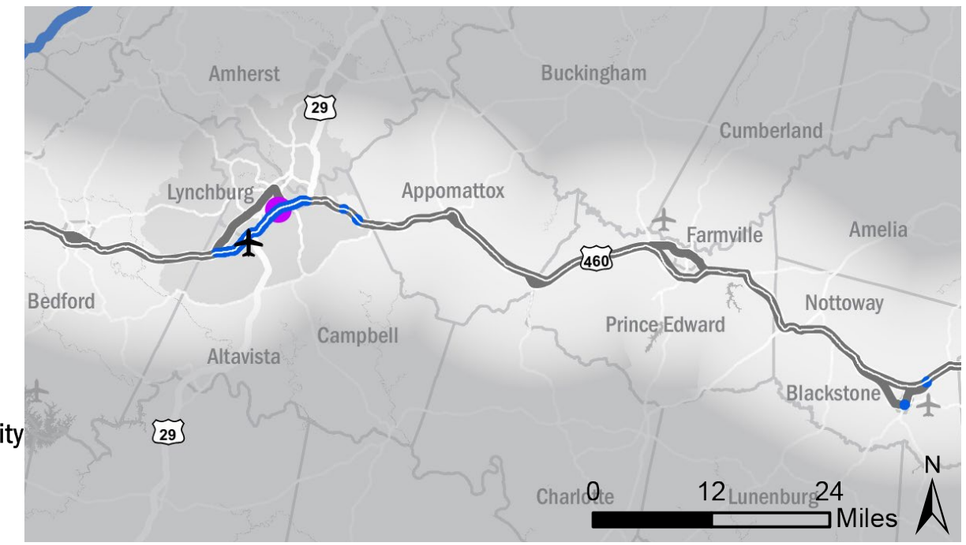
Major planned and future projects include:

- Safety improvements through the use of access management from US 501 (Campbell Avenue) to US 29 (Monacan Parkway) in the City of Lynchburg;
- Adding a right-turn lane at the intersection of eastbound US 460 and Route 752 in Campbell County;
- Adding an offset right-turn lane at the intersection of US 460 and Route 656 in Campbell County; and
- Adding an acceleration lane from US 460 business onto the eastbound US 460 bypass in Nottoway County.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

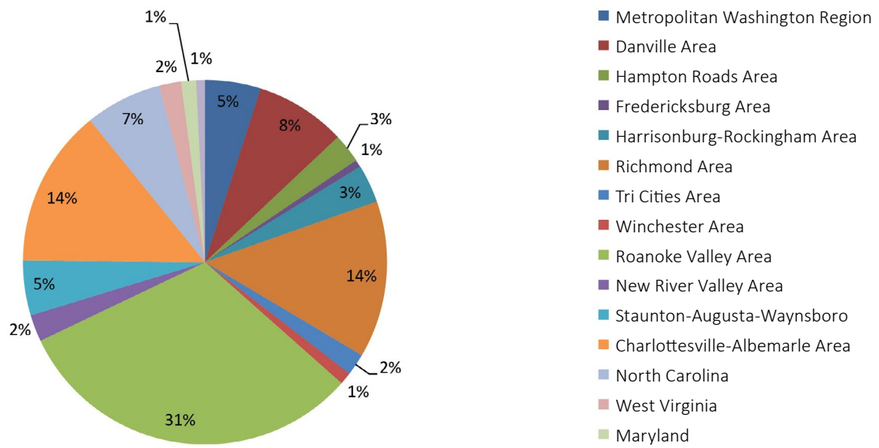
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

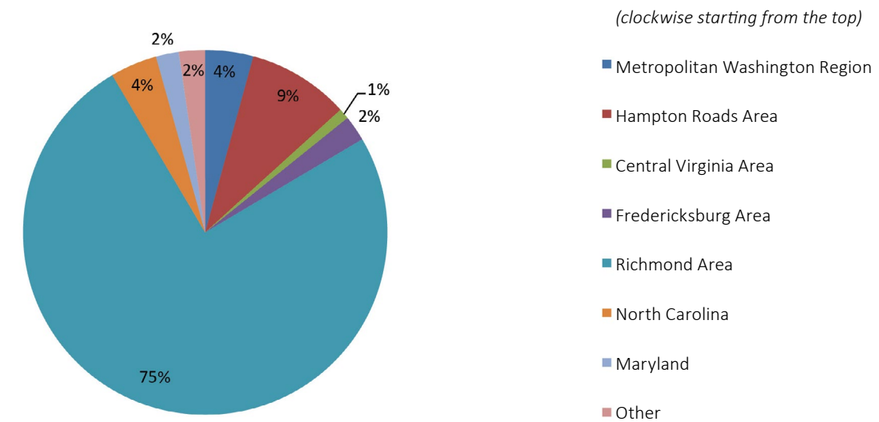
Passenger Demand

Segment E3 traverses the Lynchburg Area and connects it to the Tri-Cities Area. Of the intercity travel originating in the Lynchburg Area, 14 percent will use Segment E3 to access the Richmond Area. Eastbound traffic to Hampton Roads (three percent) and the Tri-Cities Area (two percent) are also likely to use Segment E3. Of the intercity travel originating in the Tri-Cities Area, smaller proportions are likely to use Segment E3 westbound, limited to the one percent of traffic destined for Lynchburg.

Travel from Central Virginia Area to...



Travel from Tri-Cities Area to...



E3 SEGMENT PROFILE

Freight Demand

By truck, Segment E3 carried four million tons of freight worth $2 billion in 2012, and is estimated to carry six million tons of freight worth $5 billion in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area. By tonnage, the jurisdictions adjacent to Segment E3 account for eight percent of the truck freight origins on the corridor and four percent of the truck freight destinations on the corridor. Along this segment, Campbell County and Lynchburg are both significant generators and attractors of truck freight tonnage, with truck freight movements to Tennessee, Pennsylvania, and Texas.

By rail, Segment E3 carried 28 million tons of freight worth $22 billion in 2012, and is estimated to carry 29 million tons of freight worth $28 billion in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 15 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors. The jurisdictions near Segment E3 are neither major generators nor attractors of rail freight, with flows originating from or destined for this segment comprising one percent or less of the total freight corridor tonnage.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 41%)
2. North Carolina (30% / 28%)
3. South Carolina (4% / 5%)
4. Pennsylania (4% / 4%)
5. Maryland (3% / 3%)

Corridor Tonnage Originating in Segment E3: 8% / 8%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and Pennsylvania
Chesterfield County and North Carolina
North Carolina and New York

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (47% / 48%)
2. North Carolina (18% / 20%)
3. Pennsylvania (5% / 4%)
4. Chesterfield County (5% / 4%)
5. City of Norfolk* (4% / 4%)

Corridor Tonnage Destined for Segment E3: 4% / 4%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (36% / 31%)
2. Virginia (26% / 25%)
3. Illinois (8% / 9%)
4. Wise County (7% / 6%)
5. Kentucky (6% / 5%)

Corridor Tonnage Originating in Segment E3: 1% / 1%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

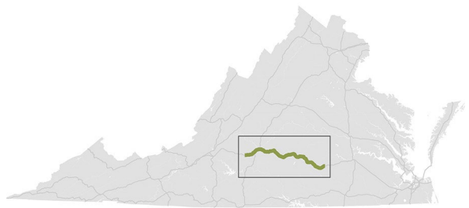
Major Destinations (by Tonnage)
1. Virginia (54% / 52%)
2. City of Norfolk* (34% / 31%)
3. North Carolina (31% / 31%)
4. City of Chesapeake (4% / 5%)
5. Pennsylvania (3% / 3%)

Corridor Tonnage Destined for Segment E3: <1% / 1%

Traffic Conditions

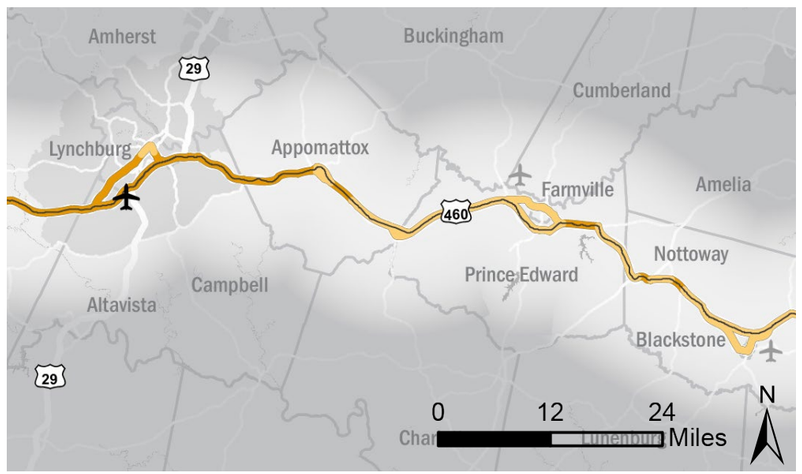
Traffic Volume and AADT

Traffic volume on Segment E3 varies considerably by highway section and is moderate relative to traffic volumes throughout the rest of Corridor E. Along US 460 near Lynchburg, average daily traffic volumes range from 17,000 to 45,000 vehicles, with the highest traffic volumes occurring near the US 29/460 junction. From Appomattox through Prince Edward and Nottoway Counties, average daily traffic volumes range from 5,000 to 14,000 vehicles. US 460 Business generally has lower volumes, although in the City of Lynchburg volumes range between 16,000 and 32,000 vehicles per day. Traffic volumes are projected to increase by 2025 throughout Segment E3, with the greatest increases occurring along US 460 in Lynchburg, ranging from 8,000 to 12,000 additional vehicles per day. Little traffic growth is project on US 460 Business outside of Lynchburg.



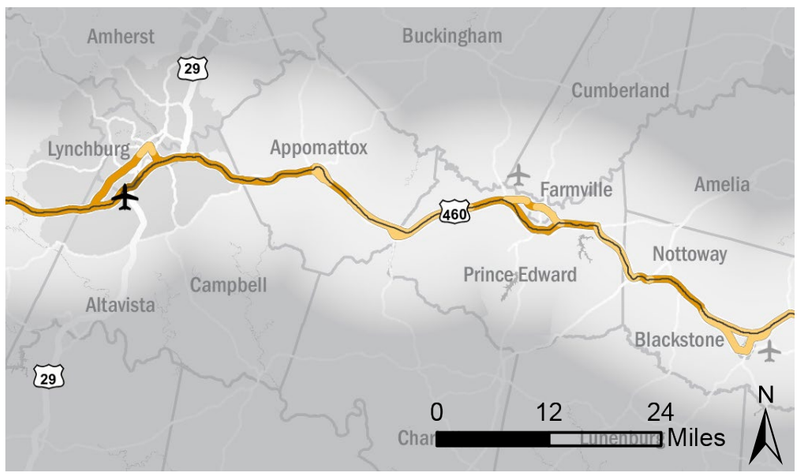
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



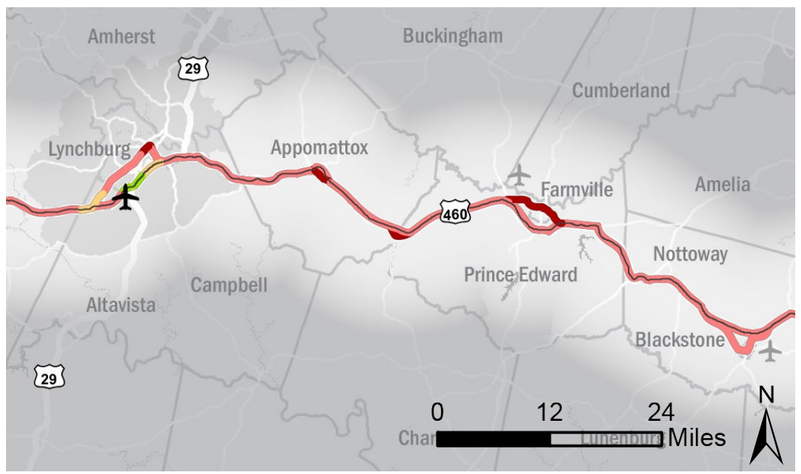
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



E3 SEGMENT PROFILE

Traffic Distribution

On average, traffic on Segment E3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows morning and evening peak periods over the course of the day, and steady increase in the flow during the midday period. The highest hourly traffic occurs between 4 and 5 p.m. which accounts for 8.0 percent of daily traffic and a less busy morning peak hour between 7 and 8 a.m. accounting for 5.7 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 77 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic, with the peak flow of trucks of 7.0 percent of daily traffic beginning at 10 a.m. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day with the peak hour flow between 2 p.m. and 3 p.m. (8.0 percent of daily traffic) for all traffic, and noon to 1 p.m. (6.2 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment E3 vary by as much as 29 percent throughout the year, with the highpoint in May (around 10,000 vehicles per day) and the low point in January (around 8,000 vehicles per day). Truck volumes vary somewhat less than passenger volumes throughout the year, with the April high (around 1,100 vehicles per day) 23 percent higher than the January low (around 900 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 9,000 vehicles per day) are 44 percent higher than January levels (around 6,500 vehicles per day). Weekend truck volumes remain relatively steady throughout the year. Since truck volumes account for a relatively small portion of traffic on Segment E3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

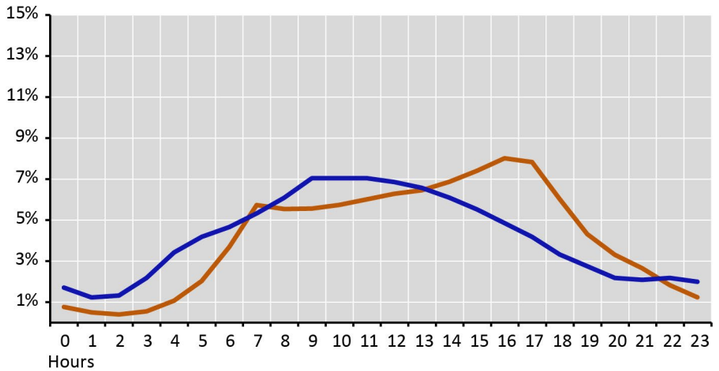
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment E3 is high relative to most other segments in Corridor E. Along US 460 southwest of Lynchburg, heavy trucks comprise five to six percent of total traffic. From Lynchburg to Appomattox, heavy trucks along US 460 account for three percent of daily traffic. From central Appomattox County through Prince Edward and Nottoway Counties, heavy trucks comprise six to eight percent of total traffic on US 460.

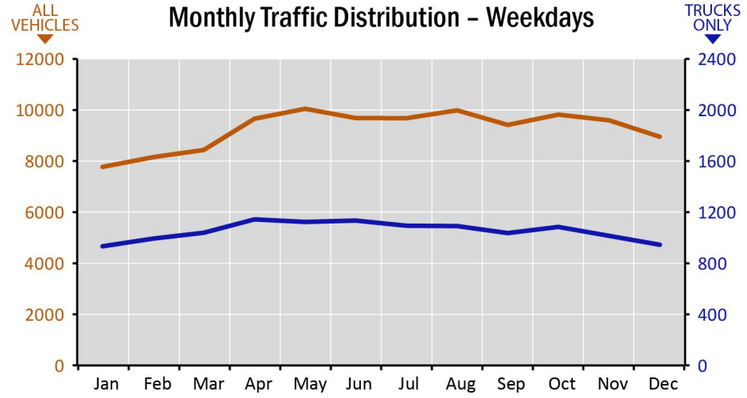
Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

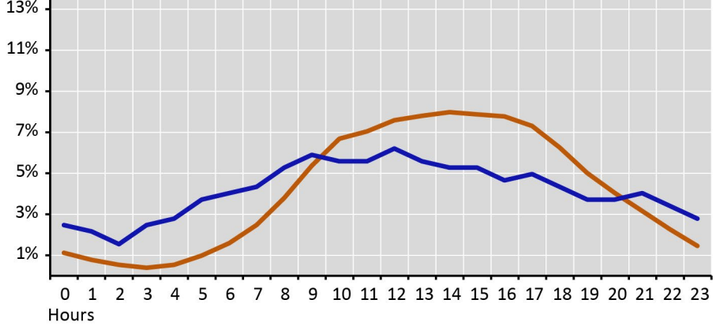
Hourly Traffic Distribution – Weekdays



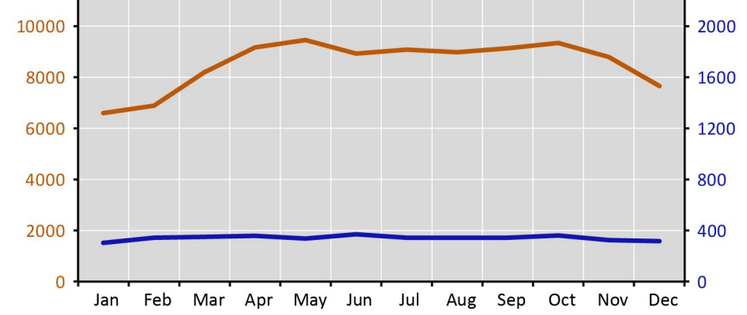
Monthly Traffic Distribution – Weekdays



Hourly Traffic Distribution – Weekends

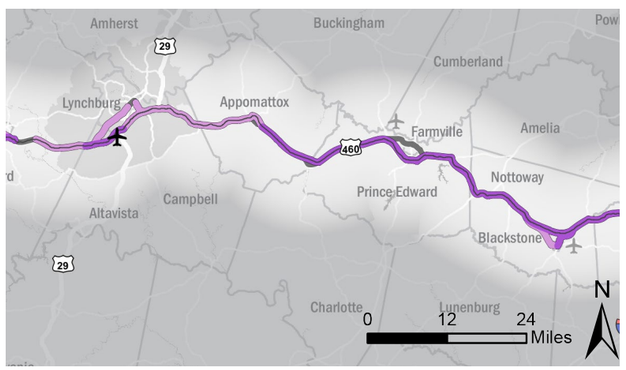


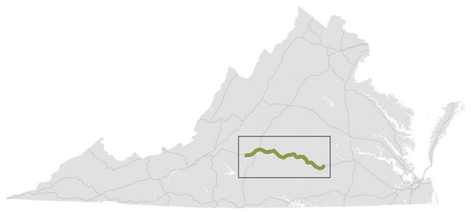
Monthly Traffic Distribution – Weekends



All Vehicles

Trucks



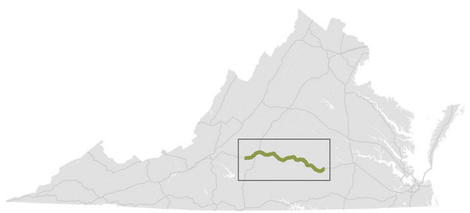


E3 SEGMENT PROFILE

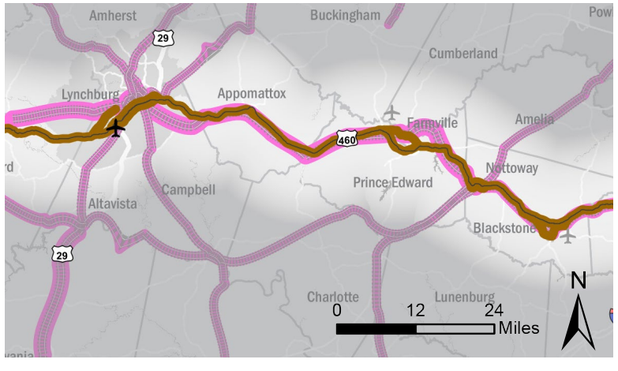
Freight Flows

East of Lynchburg the majority of freight moves by rail, in terms of both tonnage and value. In total, 4 million tons (14 percent) of freight travel through this section of Segment E3 by truck, compared to 28 million tons by rail (86 percent). By value, approximately $4 billion (15 percent) of freight value travel by truck, compared to $22 billion by rail (85 percent). On average, a ton of freight traveling through this section of Segment E3 by truck is worth $909 while a ton of freight traveling by rail is worth $788. In 2025, both rail and truck freight tonnages and total values in Segment E3 are expected to increase. The percentage of the freight traveling by truck is also likely to increase, by both tonnage and value, to 16 percent. Freight value per ton on trucks and rail is expected to increase to $939 and $956, respectively.

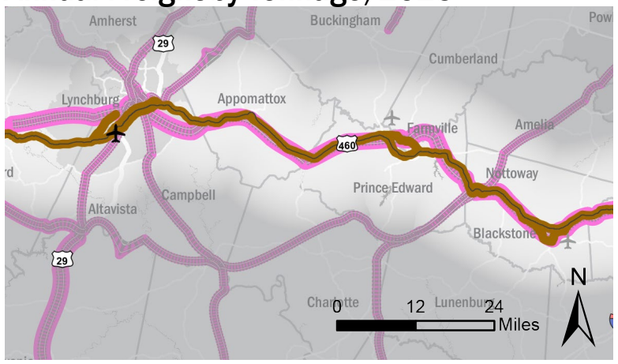
West of Blackstone the majority of freight moves by rail, in terms of both tonnage and value. In total, almost 3 million tons (ten percent) of freight travel through this section of Segment E3 by truck, compared to 24.5 million tons by rail (90 percent). In terms of value, approximately $2 billion (eight percent) of freight value travels by truck, compared to $21 billion by rail (92 percent). On average, a ton of freight traveling through this section of Segment E3 by truck is worth $706 while a ton of freight traveling by rail is worth $869. In 2025, both rail and truck freight tonnages and total values in Segment E3 are expected to increase. The percentage of the freight traveling by truck is also anticipated to increase by tonnage and value to 13 percent and nine percent respectively. Freight value per ton on trucks and rail is expected to increase to $735 and $1,045, respectively.



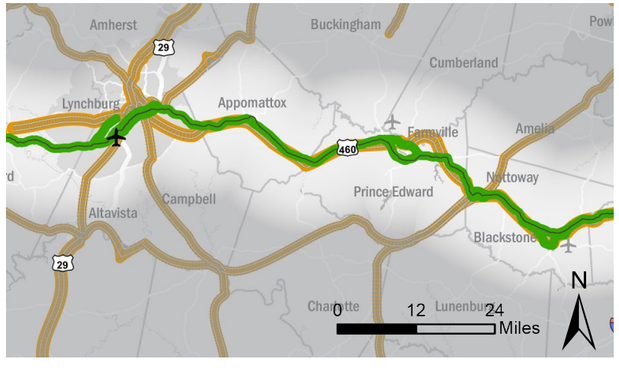
Annual Freight by Tonnage, 2012



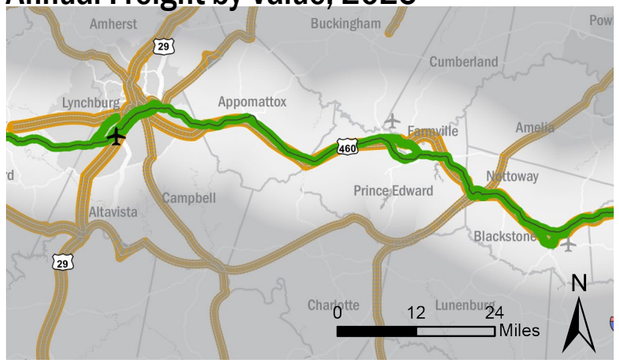
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

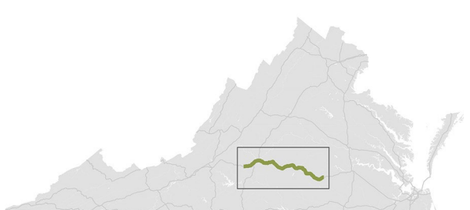
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment E3 of the Heartland Corridor have limited travel options, both in terms of travel path and mode choice. Aside from short various US 460 Business routes that provide local access, no parallel highway facilities exist in the segment. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by bus or rail. However, while travel time for bus is somewhat competitive with automobile travel for trips west of Lynchburg, many trips by bus or rail to other destinations do not run along the Heartland Corridor and require longer, more indirect routes. Greyhound offers service from Lynchburg, as does Amtrak's Crescent Route. Lynchburg Regional Airport does not provide any direct connections to locations on the corridor, as all six of its daily departures are bound exclusively for Charlotte, North Carolina.

Park-and-Ride

Within Segment E3, there are two Park-and-Ride facilities, one located in Campbell County and one located in Appomattox County. The Park-and-Ride location in Campbell County has more spaces and a higher utilization rate (four percent) of the two, though its utilization rate is far below the statewide average for Park-and-Ride utilization, which is 76 percent.



Comparable Travel Options

Lynchburg to Richmond

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	8 Trips per Day 3:30 Travel Time $42 Est. Cost

Auto
Via Rt. 460: 2:01 Travel Time $63 Est. Cost

Blacksburg / Christiansburg to Lynchburg

Inter-City Bus	*Train*
3 Trips per Day 5:10 Travel Time $10 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto
Via Rt. 460: 1:46 Travel Time $53 Est. Cost

Petersburg to Lynchburg

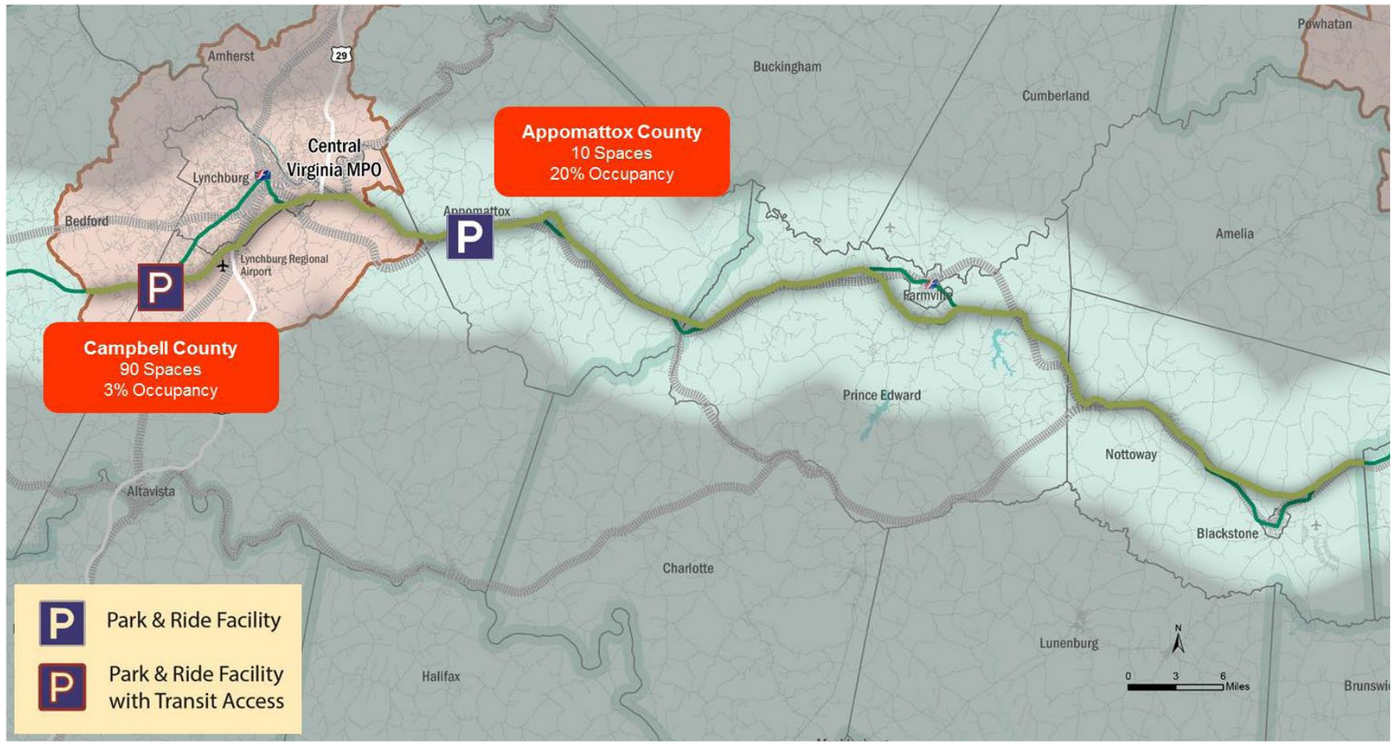
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	5 Trips per Day 6:53 Travel Time $58 Est. Cost

Auto
Via Rt. 460: 2:00 Travel Time $64 Est. Cost

Lynchburg to Roanoke

Inter-City Bus	*Train*
5 Trips per Day 1:40 Travel Time $4 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

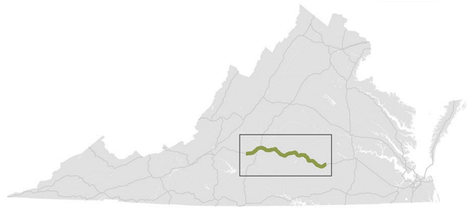
Auto
Via Rt. 460: 1:05 Travel Time $32 Est. Cost



E3 SEGMENT NEEDS

Safety

Between 2010 and 2012, Segment E3 experienced 162 severe crashes. There are several locations along Segment E3 which experienced significant numbers of severe crashes. In Bedford County along US 460 there were 11 collisions at the intersection with Thomas Jefferson Road near the London Downs Golf Club. Along US 460 Business (Timberlake Road) in Lynchburg, there were 66 crashes over 1.6 miles between Tomahawk Drive and Candlewood Court. Of these 66, 46 crashes were at five intersections; fifteen of these crashes occurred at the intersection with Greenview Drive, and 19 took place at the intersection with Laxton Road. Also along US 460 Business in Lynchburg, there were 21 incidents over a two-mile stretch between Highland Drive and Roundelay Road, where eight of the 21 occurred at the intersection with Graves Mill Road. On US 460 in Appomattox, there were 15 collisions within 5.2 miles between Cherry Street and Rocks Church Road.



Performance Metrics:

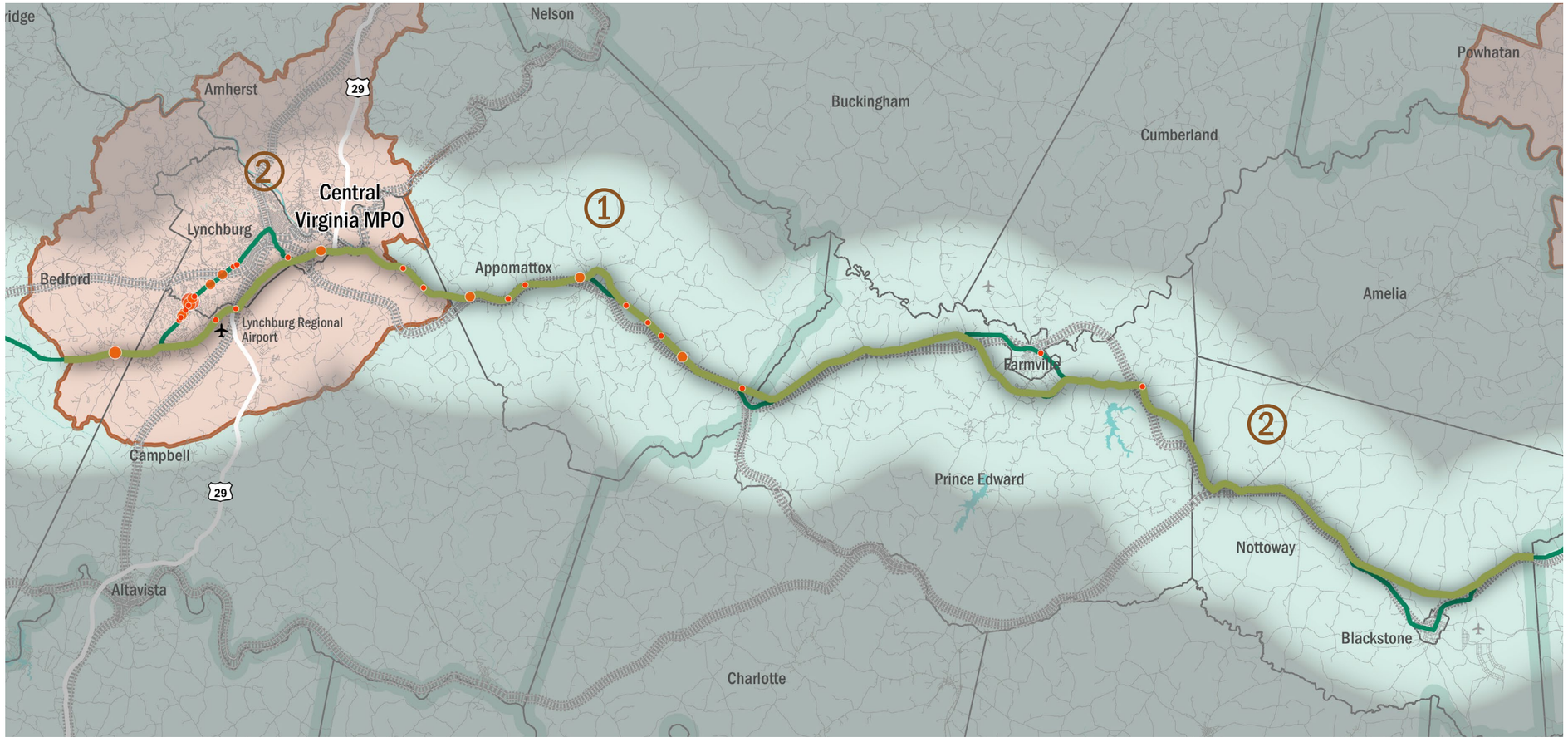
Number of Severe Crashes	162
Severe Crashes/Million VMT	0.9
Number of Railroad Crashes	5

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	4
Freight Ton Hours of Delay per Mile	2.1K

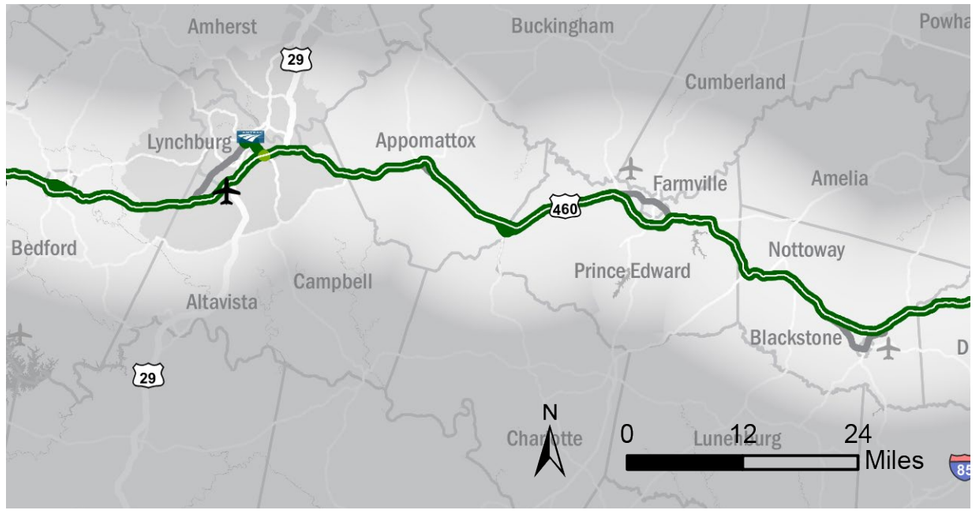
Passenger Delays

Segment E3 experiences some of the lowest passenger delays in Corridor E and in the CoSS segments statewide, with less than 700 person-hours of passenger delays. As such, there are no locations of significant passenger delay along Segment E3. Peak-period passenger delays account for 46 percent of daily total delays, marginally higher than average for the peak-period share of congestion along CoSS segments.

Freight Delays

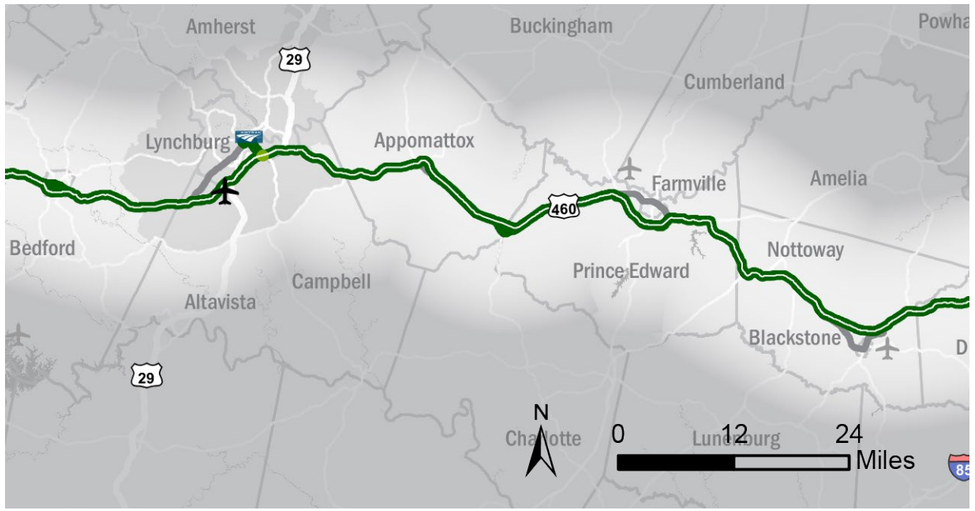
As with passenger congestion, Segment E3 experiences some of the lowest freight delays in the state, with only around 400,000 ton-hours of freight delay. As such, there are no locations of significant freight delay along Segment E3. Peak-period freight delays account for 40 percent of daily total delays, marginally higher than average for the peak-period share of congestion along CoSS segments.

Daily Person Hours of Delay per Mile

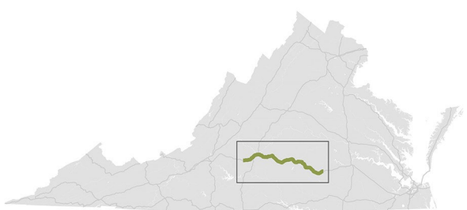


- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000



Reliability

Weekday Peak

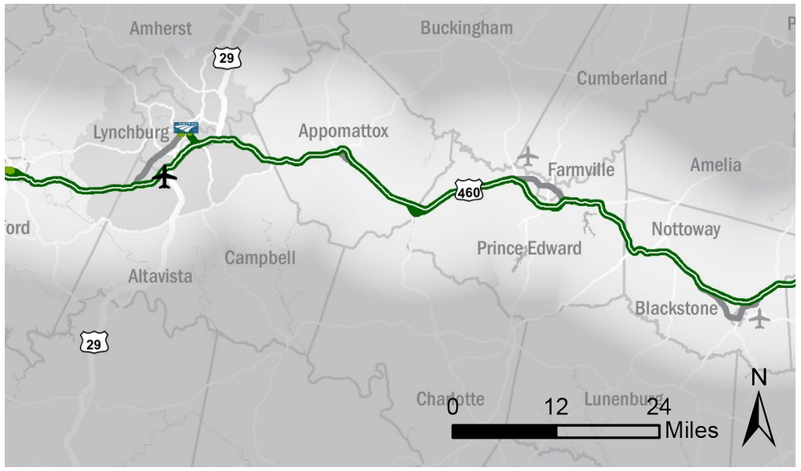
Reliability of travel during the peak period on a typical weekday on Segment E3 ranges from 0.00 to 0.21 in terms of reliability index, with an average value of 0.05. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment E3 have reliability index values exceeding the statewide threshold.

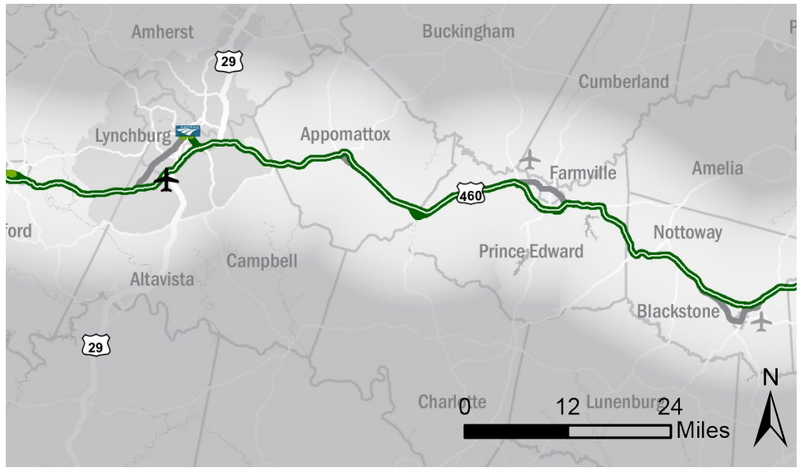
Weekday

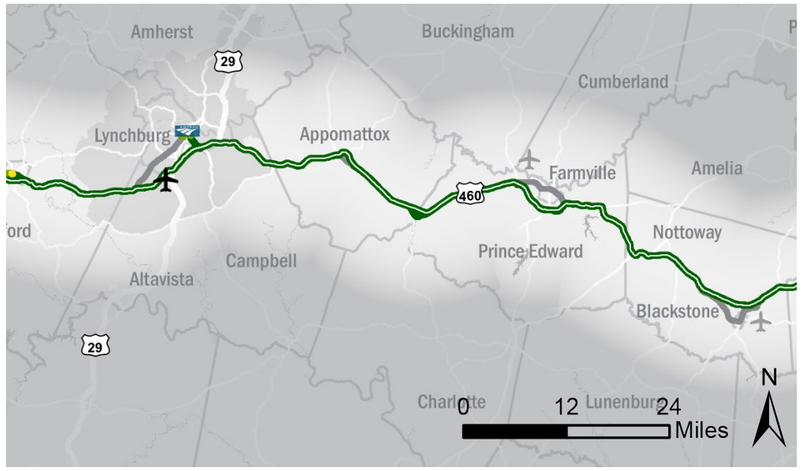
Reliability of travel during a typical weekday ranges from 0.00 to 0.33 in terms of reliability index, with an average value of 0.04. This segment has a weekday reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment E3 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.01 to 0.33 in terms of reliability index, with an average value of 0.04. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment E3 have reliability index values exceeding the statewide threshold.





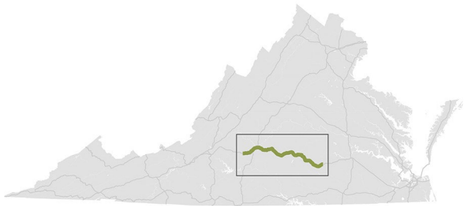


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

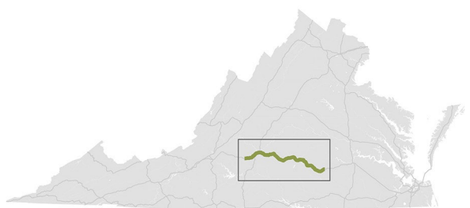
Mode Choice

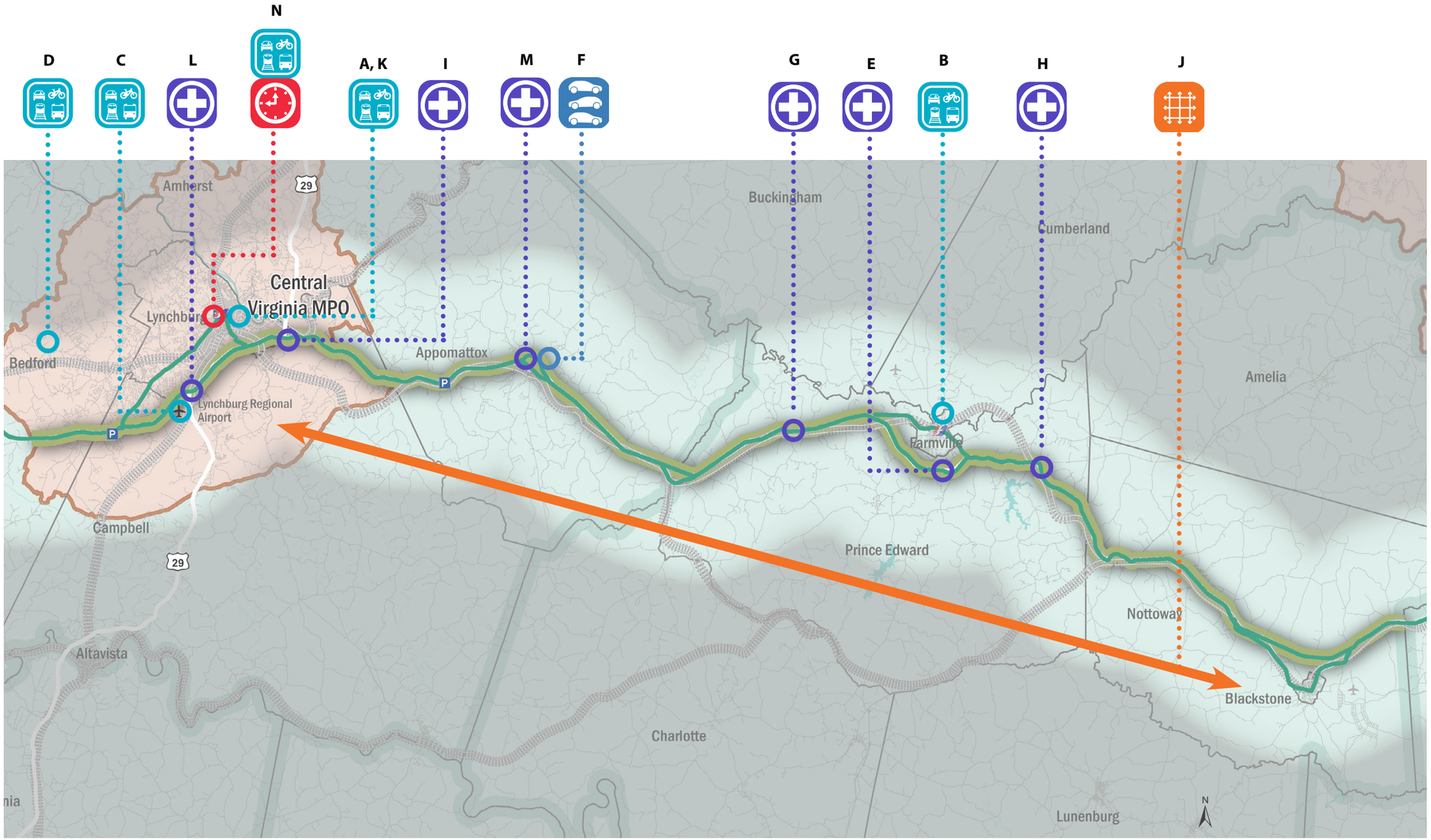
Safety

Congestion

Bottlenecks

Reliability





E3 SEGMENT NEEDS

Summary of Needs - E3 Segment

A.		Parking lot at Amtrak station is often over capacity
B.		Intercity bus service between Lynchburg and Farmville is infrequent and there is no bus shelter at the Farmville station
C.		Lynchburg Regional Airport: flights only available to a single destination (Charlotte, NC)
D.		No passenger rail connections to the Town of Bedford
E.		Safety concerns at US 460 near Farmville
F.		Freight trains stopped on the at-grade crossing over Concord Turnpike causes major traffic delays
G.		Safety concerns at intersection of US 460 and Prospect Rd

Summary of Needs - E3 Segment

H.		Safety concerns at intersection of US 460 and VA 307
I.		Insufficient merge distance on ramp from US 460 to US 29 South
J.		No parallel highway facilities exist for US 460
K.		No passenger rail service from Lynchburg to other cities in the corridor
L.		US 460-Business between Tomahawk Dr and Roundelay Rd in Lynchburg: 87 severe crashes
M.		US 460 between Cherry St and Rocks Church Rd in Appomattox: 15 severe crashes
N.		Unreliable Amtrak service from Lynchburg station. Average departure delay is 23 minutes totaling over 16,200 person-hours of delay from this segment.

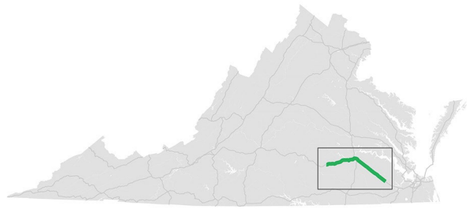
V. Segment E4

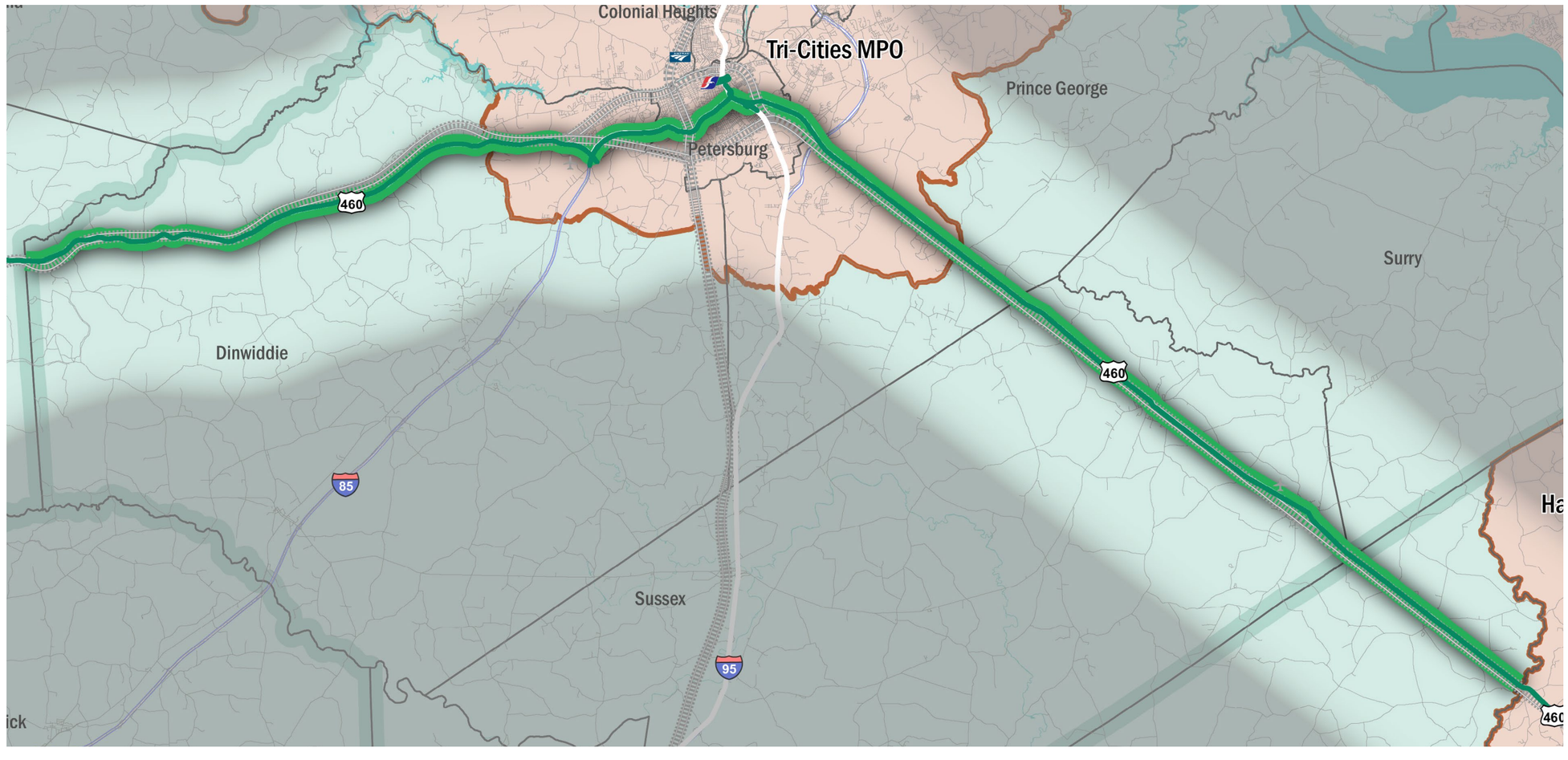
Corridor Segment E4 Components

- US 460
- US 460 Business
- James River
- Norfolk Southern Heartland Corridor
- Amtrak
- Richmond International Airport

E4
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility





E4 SEGMENT PROFILE

Segment E4 serves Dinwiddie, Prince George, Sussex, and Southampton Counties along with the City of Petersburg. The segment travels through the Tri-Cities Area and includes I-85, I-95, portions of US 460 and US 460 Business. Segment E4 serves as an alternative east-west throughway for passengers and freight, in addition to providing local access to rural communities.

Highway Facilities: US 460 is a four-lane highway in Segment E4. A portion of US 460 is limited access and runs concurrently with I-85 and I-95 through Petersburg. A business spur of US 460 serves Petersburg.

Transit Services: In this area, the corridor is served by Petersburg Area Transit. Amtrak and Greyhound both have stations in the Tri-Cities Area. Amtrak provides service from near Petersburg (in Ettrick) along its Northeast Regional, Carolinian/Piedmont, and Silver Service/Palmetto Routes. There are no Park-and-Ride facilities in Segment E4.

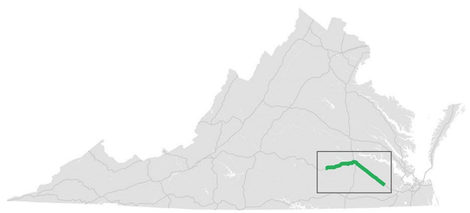
Rail Facilities: Norfolk Southern operates its Heartland Corridor line, the most important rail route for transport between the Port of Virginia and markets located west of Virginia. Petersburg serves as a junction area between rail corridors traveling north-south and east-west and is classified as a Thoroughbred Bulk Transfer Terminal. Fort Lee is the home of the US Army Quartermaster Corps and uses US 460, as well as connecting highways and local roads, to distribute freight to military facilities throughout the region.

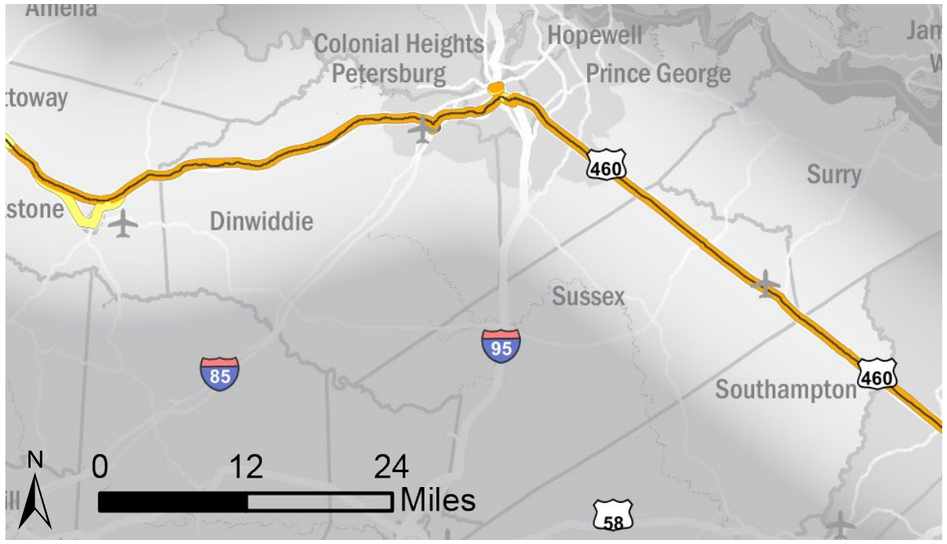
Port Facilities: No port facilities are located directly adjacent to Segment E3, but the Heartland Corridor does provide direct access to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: The Richmond International Airport is the only commercial service airport near the segment. General aviation service is available at Dinwiddie Airport.

Major planned and future projects include:

- Study of a potential southbound I-95 off-ramp connection to South Crater Road in the City of Petersburg; and
- Construction of a northbound left-turn lane from VA 630 to US 460 for westbound traffic in Prince George County.





Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



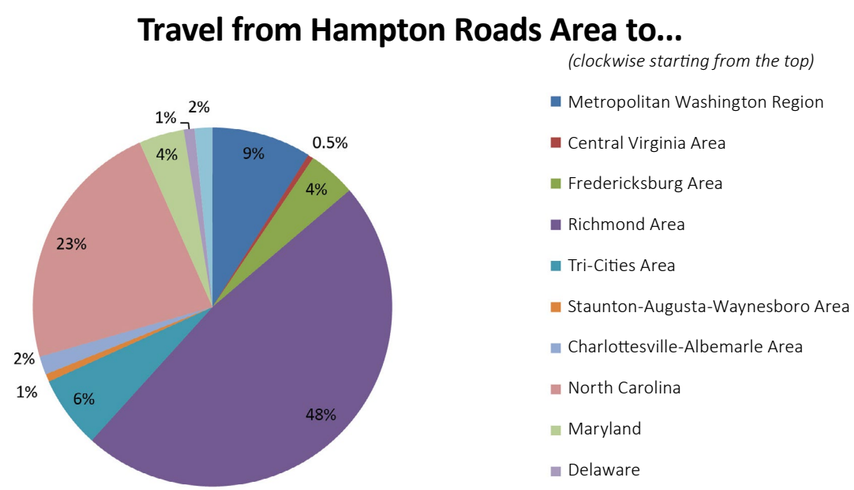
Future Projects

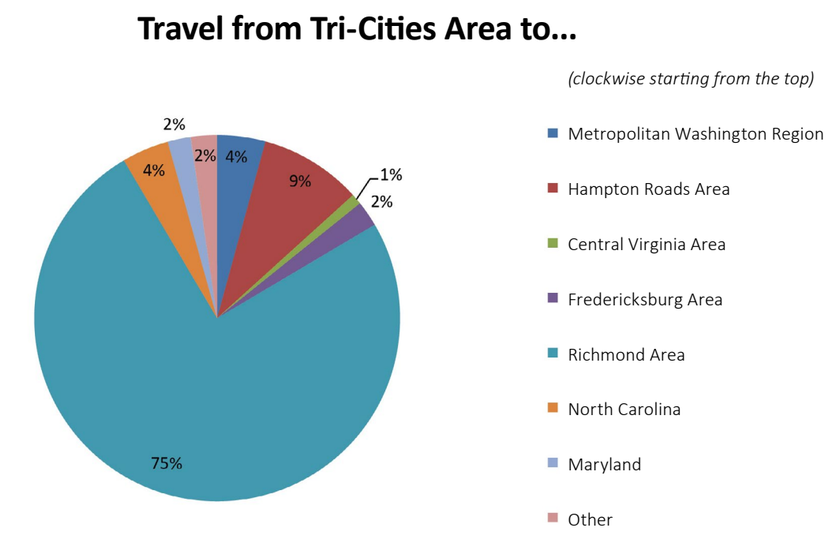
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

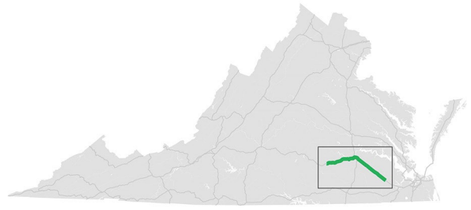
Passenger Demand

Segment E4 traverses the Tri-Cities Area and connects it to the Hampton Roads Area to the east. Very little of the intercity traffic originating in the Tri-Cities Area is likely to use Segment E4 to travel westbound (only one percent of traffic is destined for Lynchburg). However, the eastern portion of the segment makes up nine percent of intercity traffic originating in the Tri-Cities Area that is destined for Hampton Roads. Similarly, of the intercity passenger travel originating in the Hampton Roads Area, six percent will likely use Segment E4 to access the Tri-Cities Area.





E4 SEGMENT PROFILE



Freight Demand

By truck, Segment E4 carried four million tons of freight worth $3 billion in 2012, and is estimated to carry six million tons of freight worth $5 billion in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area. By tonnage, the jurisdictions adjacent to Segment E4 account for between five and seven percent of the truck freight origins on the corridor and eight percent of the truck freight destinations on the corridor. Chesterfield County, located near Segment E4, is a major attractor of truck freight traffic, accounting for between four and five percent of the truck freight tonnage on the corridor, with major truck freight flows originating in North and South Carolina.

By rail, Segment E4 carried 26 million tons of freight worth $22 billion in 2012, and is estimated to carry 28 million tons of freight worth $28 billion in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 17 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors. By tonnage, the jurisdictions adjacent to Segment E4 account less than three percent of the rail freight origins on the corridor and four percent of the rail freight destinations on the corridor. By tonnage, Chesterfield County is the largest attractor of rail freight tonnage on Segment E4, while the City of Petersburg is the largest generator of rail freight along Corridor E by value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 41%)
2. North Carolina (30% / 28%)
3. South Carolina (4% / 5%)
4. Pennsylania (4% / 4%)
5. Maryland (3% / 3%)

Corridor Tonnage Originating in Segment E4: 5% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and Pennsylvania
Chesterfield County and North Carolina
North Carolina and New York

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (47% / 48%)
2. North Carolina (18% / 20%)
3. Pennsylvania (5% / 4%)
4. Chesterfield County (5% / 4%)
5. City of Norfolk* (4% / 4%)

Corridor Tonnage Destined for Segment E4: 7% / 7%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (36% / 31%)
2. Virginia (26% / 25%)
3. Illinois (8% / 9%)
4. Wise County (7% / 6%)
5. Kentucky (6% / 5%)

Corridor Tonnage Originating in Segment E4: 2% / 3%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

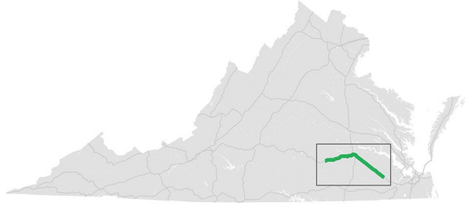
Major Destinations (by Tonnage)
1. Virginia (54% / 52%)
2. City of Norfolk* (34% / 31%)
3. North Carolina (31% / 31%)
4. City of Chesapeake (4% / 5%)
5. Pennsylvania (3% / 3%)

Corridor Tonnage Destined for Segment E4: 4% / 4%

Traffic Conditions

Traffic Volume and AADT

Aside from high traffic volumes where US 460 runs concurrently with I-85 in Petersburg, traffic volume on other sections of Segment E4 are relatively low to moderate compared with other segments throughout the corridor. Traffic volumes along US 460 in Dinwiddie County range from 6,000 to 15,000 vehicles per day. In the City of Petersburg, daily traffic volumes can reach as high as 53,000 vehicles. East of Petersburg, average daily traffic volumes along US 460 range from 10,000 to 15,000 vehicles. By 2025, traffic volumes on almost all sections of US 460 in Segment E4 are projected to increase by fewer than 2,500 vehicles per day, except for in the Petersburg Area. In Segment E4 the highest traffic volume increases by 2025 are projected to occur on I-85, ranging from 7,000 to 10,000 additional vehicles per day.



Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



E4 SEGMENT PROFILE

Traffic Distribution

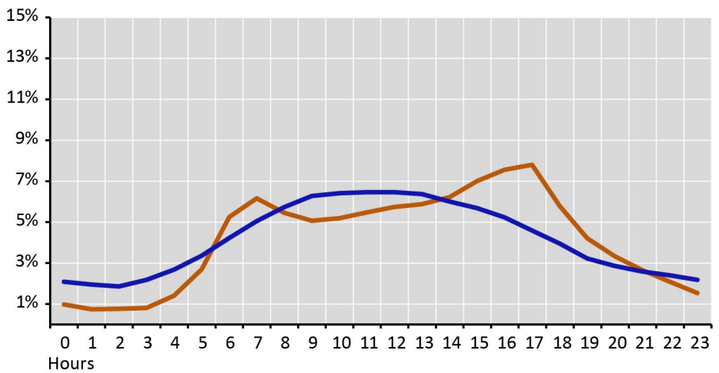
On average, traffic on Segment E4 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 7.8 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 6.1 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 50 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic with a single peak during the midday period. Weekend traffic patterns are different from the typical commute patterns, showing a single peak during the middle of the day with the peak hourly flow between 2 and 3 p.m. (7.5 percent of daily traffic) for all traffic, and 9 to 10 a.m. (5.8 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment E4 vary by as much as 56 percent throughout the year, with the highpoint in May (around 20,000 vehicles per day) and the low point in September (around 13,000 vehicles per day). Truck volumes also vary less throughout the year, with the June high (around 2,500 vehicles per day) 54 percent higher than the September low (around 1,600 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (July, around 18,000 vehicles per day) are 60 percent higher than September levels (around 11,000 vehicles per day). Since truck volumes account for a relatively small portion of traffic on Segment E4, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

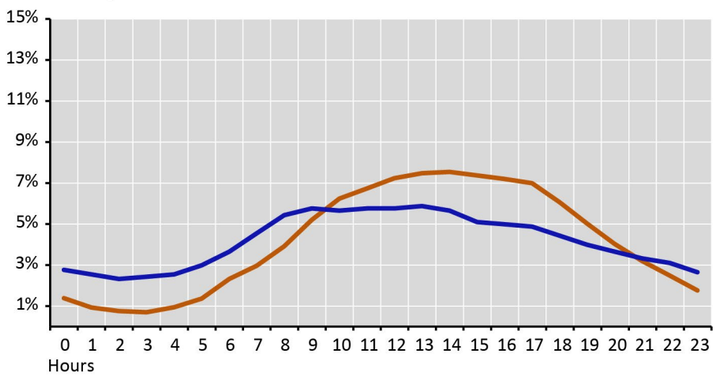
Truck Volumes

The percent of average daily traffic comprised of heavy trucks on Segment E4 is high relative to the other segments in Corridor E. Throughout Segment E4, heavy trucks comprise five to eight percent of daily traffic, with the highest percentage of trucks east of Petersburg.

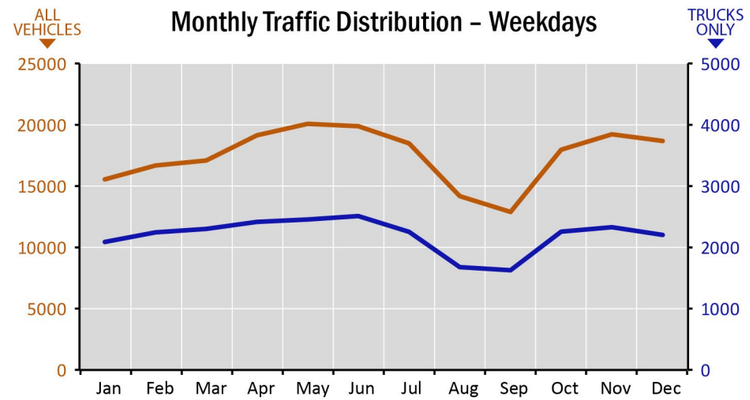
Hourly Traffic Distribution – Weekdays



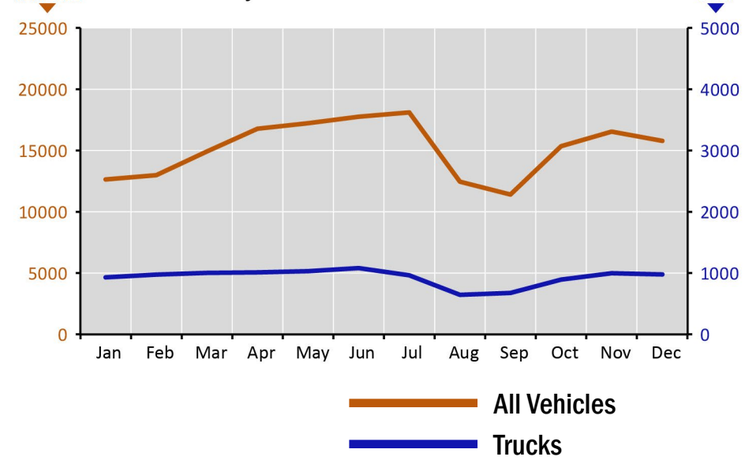
Hourly Traffic Distribution – Weekends

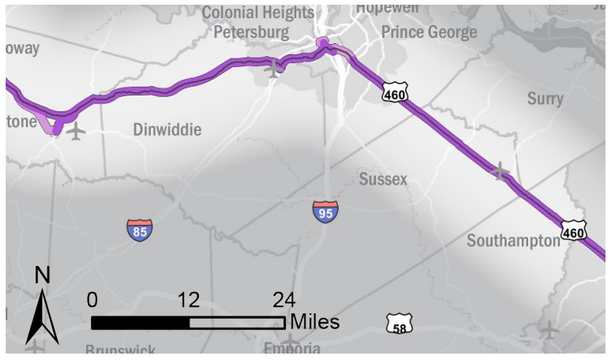


Monthly Traffic Distribution – Weekdays



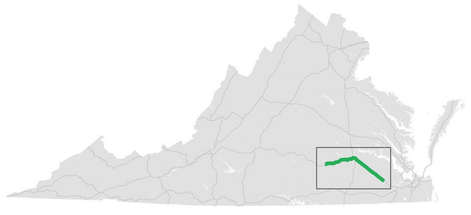
Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

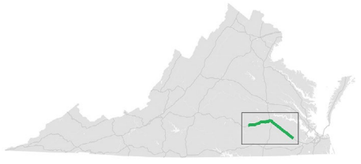


E4 SEGMENT PROFILE

Freight Flows

Near the Dinwiddie County Airport the majority of freight moves by rail, in terms of both tonnage and value. In total, 1.5 million tons (six percent) of freight travels through this section of Segment E4 by truck, compared to 24.5 million tons by rail (94 percent). With respect to value, approximately $1.5 billion (seven percent) of freight value travels by truck, compared to $21 billion by rail (93 percent). On average, a ton of freight traveling through this section of Segment E4 by truck is worth $1,012 while a ton of freight traveling by rail is worth $870. In 2025, both rail and truck freight tonnages and total values in Segment E4 are expected to increase. The percentage of the freight traveling by truck is also projected to increase by tonnage and value to eight percent. Value per ton on trucks and rail is expected to increase to $996 and $1,046, respectively.

In the City of Petersburg the majority of freight moves by rail, in terms of both tonnage and value. In total, three million tons (ten percent) of freight travels through this section of Segment E4 by truck, compared to 26 million tons by rail (90 percent). By value, approximately $3 billion (ten percent) of freight value travels by truck, compared to $23 billion by rail (90 percent). On average, a ton of freight traveling through this section of Segment E4 by truck is worth $905 while a ton of freight traveling by rail is worth $872. In 2025, both rail and truck freight tonnages and total values in Segment E4 are expected to increase. The percentage of the freight traveling by truck is also expected to increase by tonnage and value to 15 percent and 14 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $911 and $1,012, respectively.



Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



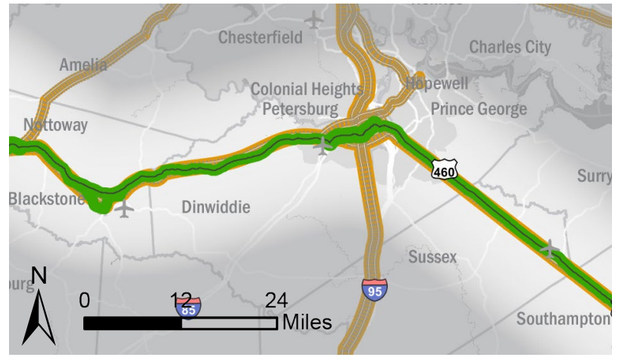
Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

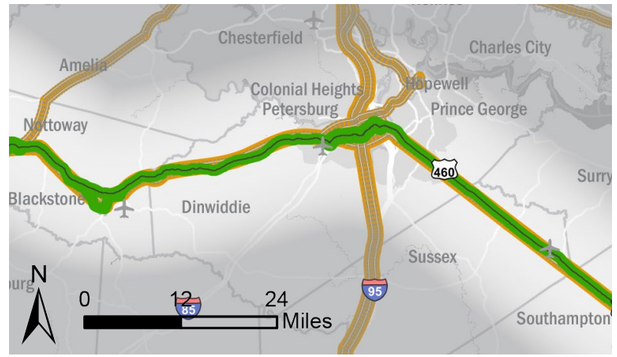
Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment E4 of the Heartland Corridor have few travel options, both in terms of travel path and mode choice. There are no parallel highway facilities to US 460 in Segment E4. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by rail. However, Amtrak service, which has a station in the Petersburg Area, is limited by the frequency of service and is not as fast as the typical automobile trip. Trips by bus, from the Greyhound station in Petersburg, and by rail, from Petersburg to any location on the corridor aside from Hampton Roads, do not run along the Heartland Corridor and require longer, more indirect routes.

Park-and-Ride

Within Segment E4, there are no Park-and-Ride facilities. However, two new Park-and-Ride locations are proposed for Petersburg by VDOT's Park-and-Ride Investment Strategy.

Comparable Travel Options

Hampton Roads (Norfolk) to Petersburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	1 Trip per Day 1:27 Travel Time $18 Est. Cost

Auto

Via Rt. 460: 1:30 Travel Time $43 Est. Cost

Petersburg to Lynchburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	5 Trips per Day 6:53 Travel Time $58 Est. Cost

Auto

Via Rt. 460: 2:00 Travel Time $64 Est. Cost

Hampton Roads (Norfolk) to Richmond

Inter-City Bus	*Train*
5 Trips per Day 2:00 Travel Time $11 Est. Cost	5 Trips per Day 2:03 Travel Time $23 Est. Cost

Auto

Via Rt. 460: 1:56 Travel Time $57 Est. Cost

Lynchburg to Richmond

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	8 Trips per Day 3:30 Travel Time $42 Est. Cost

Auto

Via Rt. 460: 2:01 Travel Time $63 Est. Cost

Roanoke to Richmond

Inter-City Bus	*Train*
3 Trips per Day 3:55 Travel Time $46 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 3:04 Travel Time $92 Est. Cost

Blacksburg / Christiansburg to Richmond

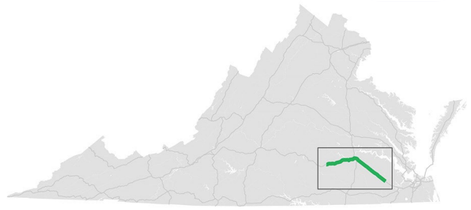
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 460: 3:37 Travel Time $114 Est. Cost

Safety

Between 2010 and 2012, Segment E4 experienced only 14 severe crashes, resulting in the lowest crash rate on the Heartland Corridor. All of these crashes occurred on US 460 Business (County Drive) in Petersburg over approximately two miles between Hickory Hill Road and Route 106 (Courthouse Road).



Performance Metrics:

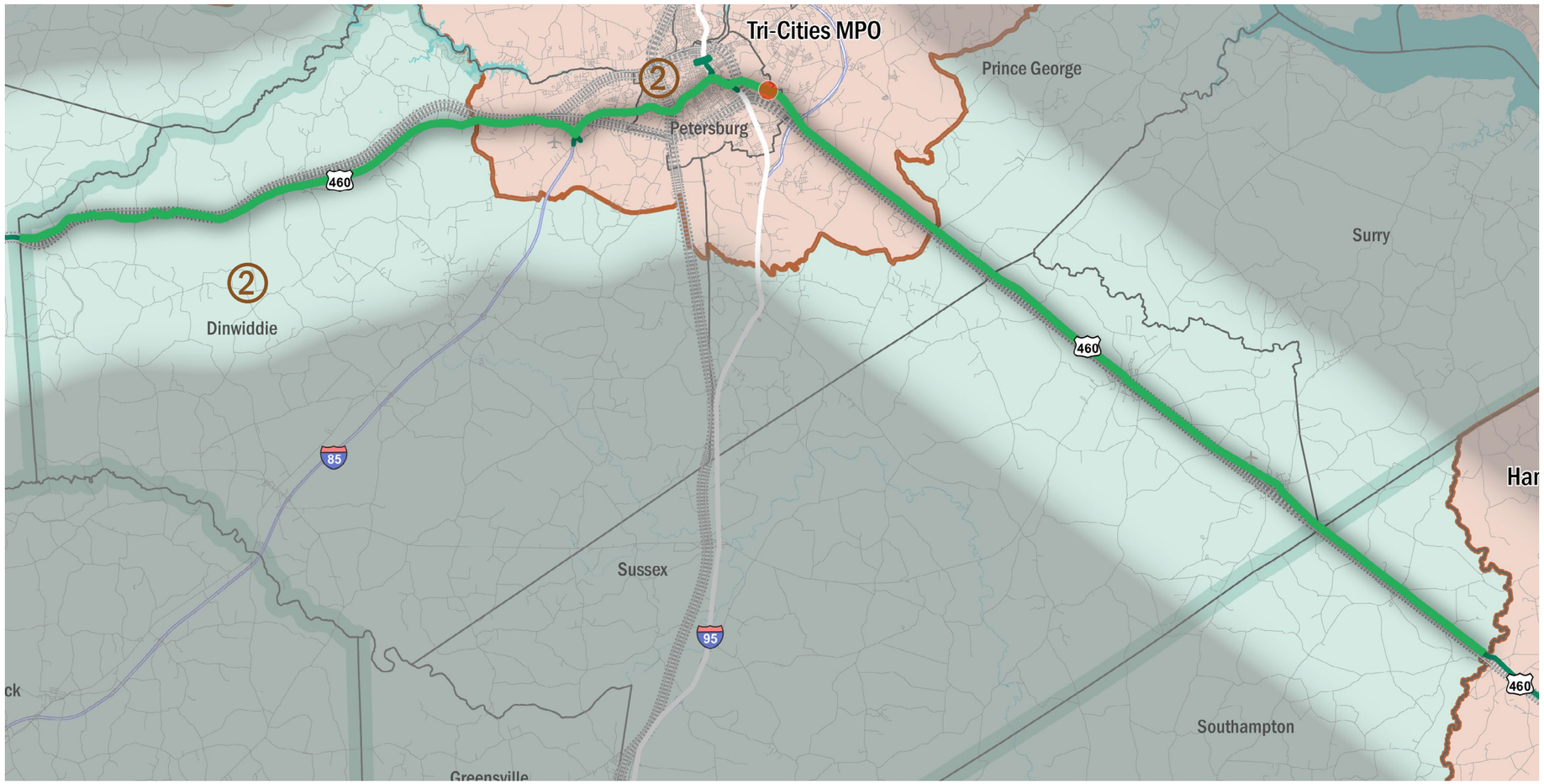
Number of Severe Crashes	14
Severe Crashes/Million VMT	0.3
Number of Railroad Crashes	4

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	3
Freight Ton Hours of Delay per Mile	2.4K

Passenger Delays

Segment E4 experiences some of the lowest passenger delays in Corridor E and in the CoSS segments statewide, with around 400 person-hours of passenger delays. As such, there are no locations of significant passenger delay along Segment E4. Peak-period passenger delays account for 47 percent of daily total delays, marginally higher than average for the peak-period share of congestion along CoSS segments.

Freight Delays

As with passenger congestion, Segment E4 experiences some of the lowest freight delays in the state, with just over 325,000 ton-hours of freight delay. As such, there are no locations of significant freight delay along Segment E4. Peak-period freight delays account for 43 percent of daily total delays, higher than average for the peak-period share of congestion along CoSS segments.

Daily Person Hours of Delay per Mile

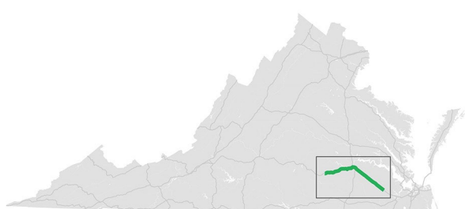


< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



Reliability

Weekday Peak

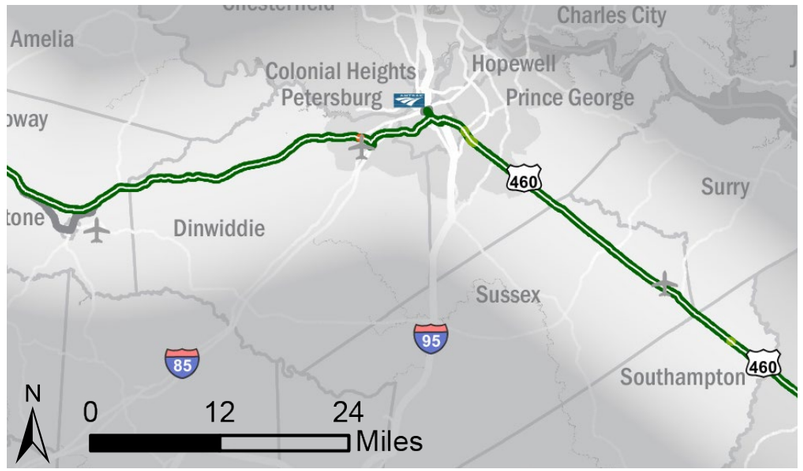
Reliability of travel during the peak period on a typical weekday on Segment E4 ranges from 0.00 to 0.71 in terms of reliability index, with an average value of 0.07. This segment has a peak period reliability index significantly lower than average for the CoSS segments statewide, and none of the locations along Segment E4 have reliability index values exceeding the statewide threshold.

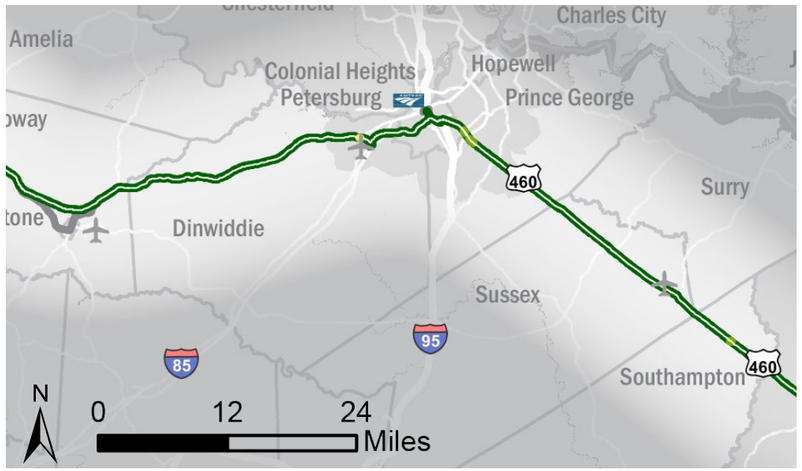
Weekday

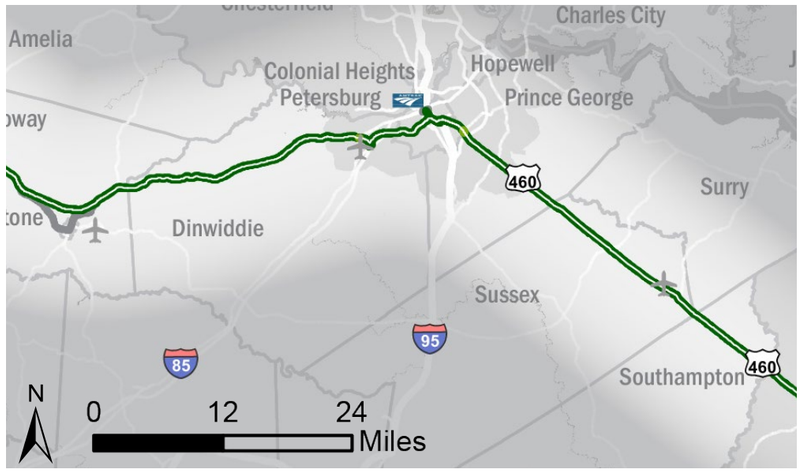
Reliability of travel during a typical weekday ranges from 0.00 to 0.48 in terms of reliability index, with an average value of 0.06. This segment has weekday reliability index significantly lower than average for the CoSS segments statewide, and only a short portion of US 460 (at Route 226 in Dinwiddie County) has a reliability index value exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.36 in terms of reliability index, with an average value of 0.06. This segment has a weekend reliability index significantly lower than average for the CoSS segments statewide, and none of the locations along Segment E4 have reliability index values exceeding the statewide threshold.





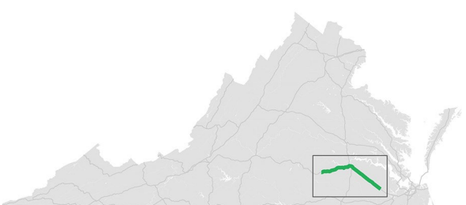


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

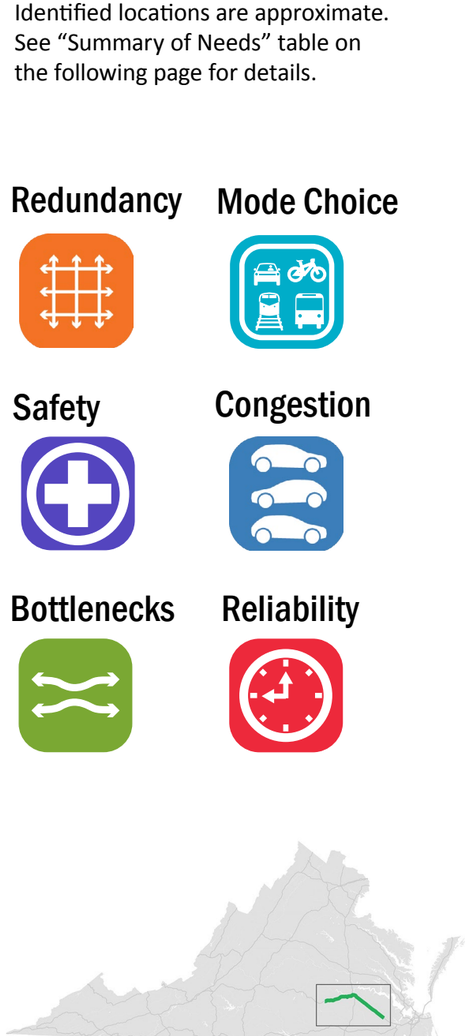
Mode Choice

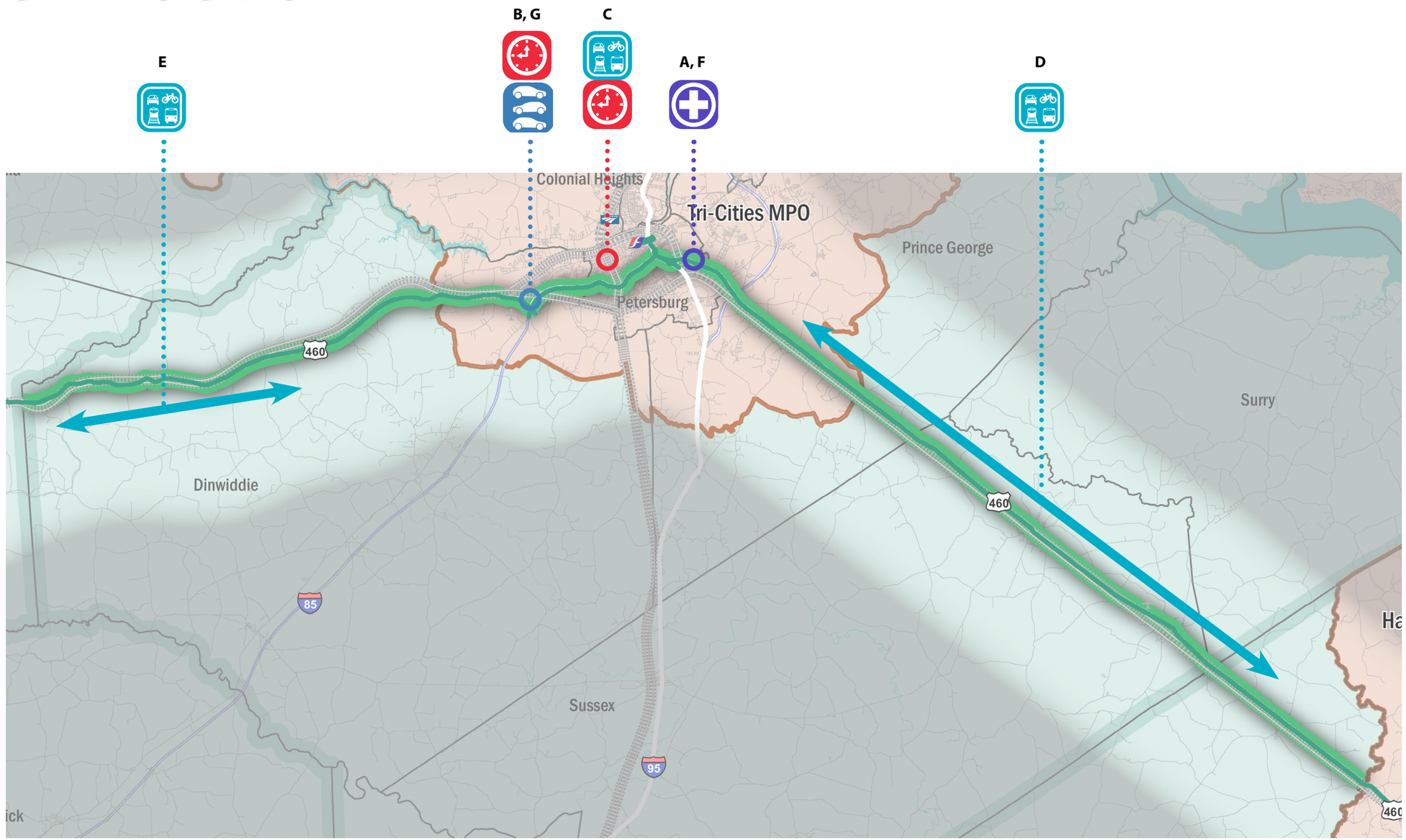
Safety

Congestion

Bottlenecks

Reliability





E4 SEGMENT NEEDS

Summary of Needs - E4 Segment

A.	Unsafe ramp at interchange of I-95 and US 460
B.	Capacity issues at Truck Plaza on US 1 near I-85 and US 460: truck plaza often full or overflowing
C.	Unreliable Amtrak service from Petersburg's Ettrick station. Average departure delay is 34 minutes totaling over 8,200 person-hours of delay from this segment.
D.	Rail capacity limited between Peterburg and Hampton Roads region - trains often full; no intercity bus available
E.	No comparable transit options to Lynchburg: no buses available, trains require long travel times, inconvenient transfers
F.	US 460 in Petersburg (Hickory Hill Rd - Courthouse Rd): 14 crashes in two mile portion of segment
G.	Reliability issue at US 460 and I-85 junction near Dinwiddie County Airport

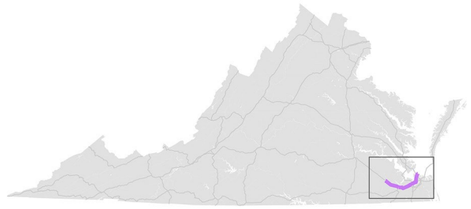
VI. Segment E5

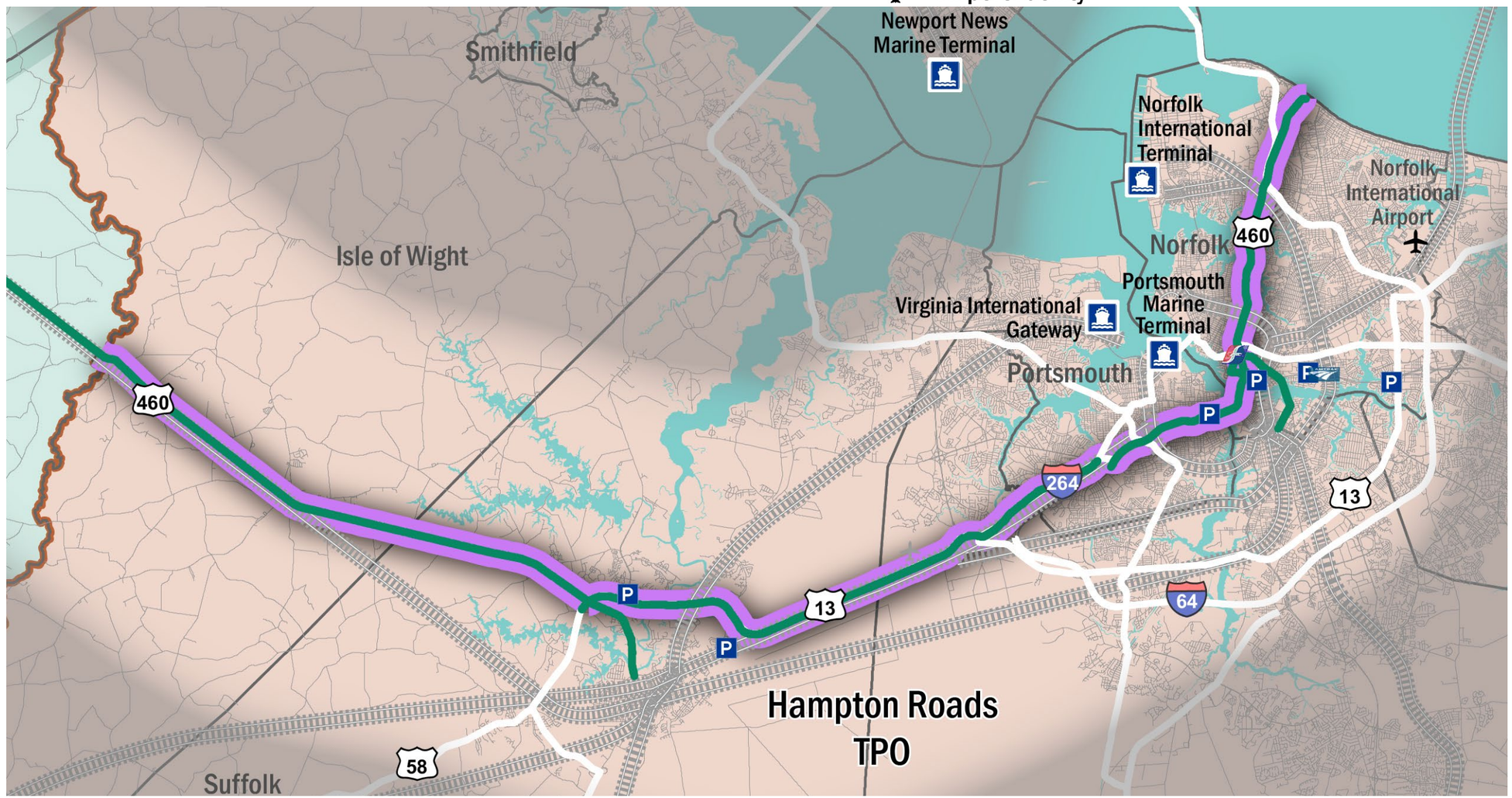
Corridor Segment E5 Components

- US 460
- US 460 Business
- US 460 Alt
- Route 168
- Newport News Marine Terminal
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- James River
- Norfolk Southern Heartland Corridor
- Amtrak
- Norfolk International Airport
- Newport News/Williamsburg International Airport

E5
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility





E5 SEGMENT PROFILE

Segment E5 traverses the area covered by the Hampton Roads TPO Area and begins in Isle of Wight County, continuing east and serving the Cities of Suffolk, Chesapeake, Portsmouth, and Norfolk. The segment includes portions of US 460, US 460 Business, US 460 Alt, and Route 168, Segment E5 serves as an alternative east-west throughway for passengers and freight, in addition to providing local access in the Hampton Roads Area. Segment E5 provides a connection to the Port of Virginia and the numerous military facilities found in Hampton Roads. The segment also serves as an important evacuation route for Hampton Roads, as it does not cross any major waterways.

Highway Facilities: US 460 is primarily a local-access corridor in the Hampton Roads Area, with four lanes west of downtown Suffolk and a variable cross section of up to six lanes further east. Portions of US 460 are limited access, and the route runs concurrently with US 13 around Suffolk and I-264 in Portsmouth and Norfolk. US 460 runs parallel with I-64 north of downtown Norfolk. A business spur of US 460 serves Suffolk. Also, an alternate route, known as US 460 Alternate, travels through Chesapeake and Portsmouth.

Transit Services: In this segment, the corridor is served by Hampton Roads Transit (HRT). HRT operates the Metro Area Express bus routes, connecting Portsmouth and Norfolk. HRT also operates The Tide, a 7.4-mile light rail line that intersects the corridor in Norfolk. Amtrak and Greyhound both have stations in Norfolk. Amtrak provides service from Norfolk along its Northeast Regional Route. Multiple Park-and-Ride facilities are located near I-264, the largest cluster of which is located in Norfolk.

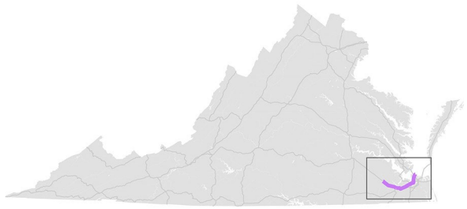
Rail Facilities: Norfolk Southern operates its Heartland Corridor line, the most important rail route for transport between the Port of Virginia and markets located west of Virginia. The Hampton Roads region serves as a junction area between rail corridors traveling north-south and traveling west and is classified as an Intermodal Terminal.

Port Facilities: Segment E5 includes various ports including the Virginia International Gateway, Portsmouth Marine Terminal, and Norfolk International Terminal. The Newport News Marine Terminal is located just outside the corridor.

Airport Facilities: Norfolk International Airport and Newport News–Williamsburg International Airport provide commercial service to Segment E5.

Major planned and future projects include:

- Rehabilitating and replacing the electrical and mechanical systems of Berkeley Bridge on I-264/US 460 in the City of Norfolk.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

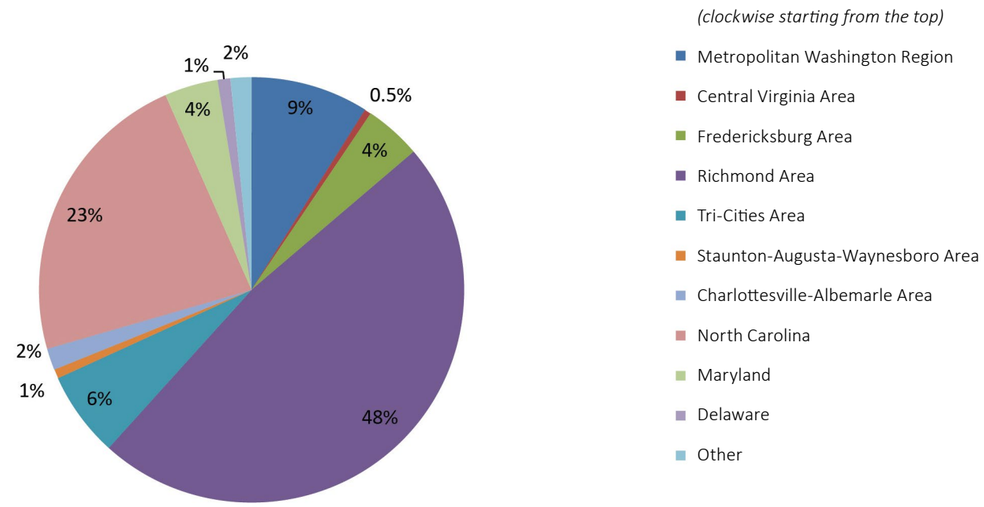


Travel Demand

Passenger Demand

Segment E5, the easternmost segment of Corridor E, exists entirely within the Hampton Roads TPO Area, and accommodates large amounts of traffic local to the region. Of the intercity traffic originating in this region, six percent is destined for the Tri-Cities Area and a small portion is destined for the Lynchburg area. These trips are likely to make use of Segment E5.

Travel from Hampton Roads Area to...



E5 SEGMENT PROFILE

Freight Demand

By truck, Segment E5 carried ten million tons of freight worth $18 billion in 2012, and is estimated to carry 15 million tons of freight worth $28 billion in 2025. A large proportion of truck freight traffic on Corridor E, representing 32 percent of the total truck freight value on the corridor, passes through Virginia. North Carolina is a major generator and attractor of truck freight on Corridor E, with traffic throughout the Mid-Atlantic, the Port of Virginia facilities in the Hampton Roads Area, and the Tri-Cities Area. By tonnage, between eight and ten percent of the truck freight on the corridor originates in jurisdictions adjacent to Segment E4 and more than 12 percent of the truck freight on the corridor is destined for the segment. This includes freight that travels through the Port of Virginia facilities for which the ultimate origin or destination may be overseas. The major truck freight flows along Segment E4 are between North Carolina and the Port of Virginia facilities in the Hampton Roads Area, as well as significant flows between the port facilities and Florida.

By rail, Segment E5 carried 26 million tons of freight worth $23 billion in 2012, and is estimated to carry 28 million tons of freight worth $28 billion in 2025. The largest rail freight flows on Corridor E consist of low-value rail freight travelling from West Virginia to North Carolina, accounting for more than 17 percent of the total rail freight tonnage on the corridor. Rail freight between West Virginia and nearby counties in Virginia to the Port of Virginia in Norfolk accounts for more than 20 percent of the total rail freight tonnage on the corridor. In terms of rail freight value, the largest rail freight traffic patterns on Corridor E are between Illinois and the Port of Virginia, accounting for more than 20 percent of the total rail freight value on the corridor. Ohio and Louisiana are major generators of freight value on Corridor E, while North Carolina and Pennsylvania are major freight attractors. In terms of value, the jurisdictions adjacent to Segment E5 are major generators and attractors of freight on the corridor, with around 20 percent of freight origins and more than 30 percent of freight destinations on Corridor E. This includes freight that travels through the Port of Virginia facilities for which the ultimate origin or destination may be overseas.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 41%)
2. North Carolina (30% / 28%)
3. South Carolina (4% / 5%)
4. Pennsylania (4% / 4%)
5. Maryland (3% / 3%)

Corridor Tonnage Originating in Segment E5: 8% / 10%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
City of Norfolk* and North Carolina
North Carolina and Pennsylvania
Chesterfield County and North Carolina
North Carolina and New York

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (47% / 48%)
2. North Carolina (18% / 20%)
3. Pennsylvania (5% / 4%)
4. Chesterfield County (5% / 4%)
5. City of Norfolk* (4% / 4%)

Corridor Tonnage Destined for Segment E5: 12% / 14%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (36% / 31%)
2. Virginia (26% / 25%)
3. Illinois (8% / 9%)
4. Wise County (7% / 6%)
5. Kentucky (6% / 5%)

Corridor Tonnage Originating in Segment E5: 4% / 4%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Illinois and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

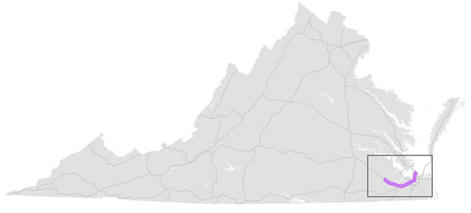
Major Destinations (by Tonnage)
1. Virginia (54% / 52%)
2. City of Norfolk* (34% / 31%)
3. North Carolina (31% / 31%)
4. City of Chesapeake (4% / 5%)
5. Pennsylvania (3% / 3%)

Corridor Tonnage Destined for Segment E5: 40% / 38%

Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment E5 is high relative to traffic volumes on most segments of Corridor E. Along US 460 west of US 13, average daily traffic volumes range from 10,000 to 18,000 vehicles. Along US 13/460 from US 13 to I-664, average daily traffic volumes range from 47,000 to 69,000 vehicles. On Route 460 in Norfolk, traffic volumes range from 12,000 to 36,000 vehicles per day on average. Traffic volumes are projected to increase by 2025 throughout Segment E5, with the greatest increases (26,000 additional vehicles per day) projected for I-264/I-464/US 460 Alternate near the Downtown Tunnel and the Berkley Bridge in the Cities of Portsmouth and Norfolk.



Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



E5 SEGMENT PROFILE

Traffic Distribution

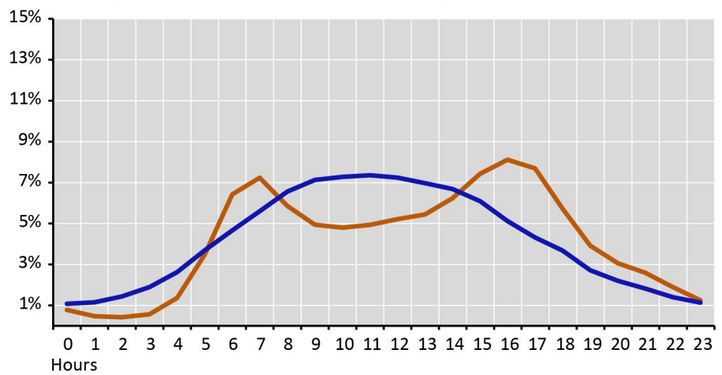
On average, traffic on Segment E5 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 8.1 percent of daily traffic and morning peak between 7 and 8 a.m. accounting for 7.2 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic with a single peak during the midday period and a peak hourly flow of 7.4 percent of daily traffic. Weekend traffic patterns also show a single peak during the middle of the day with the peak hour flow between 2 and 3 p.m. (7.4 percent of daily traffic) for all traffic, and 10 to 11 a.m. (7.2 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment E5 vary by as much as 27 percent throughout the year, with the highpoint in August (around 77,000 vehicles per day) and the low point in January (around 60,000 vehicles per day). Truck volumes also vary throughout the year, with the August high (around 6,000 vehicles per day) 23 percent higher than the January low (around 5,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (June, around 59,000 vehicles per day) are 32 percent higher than January levels (around 45,000 vehicles per day). Weekend truck traffic varies similarly, and the September high is 29 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment E5, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

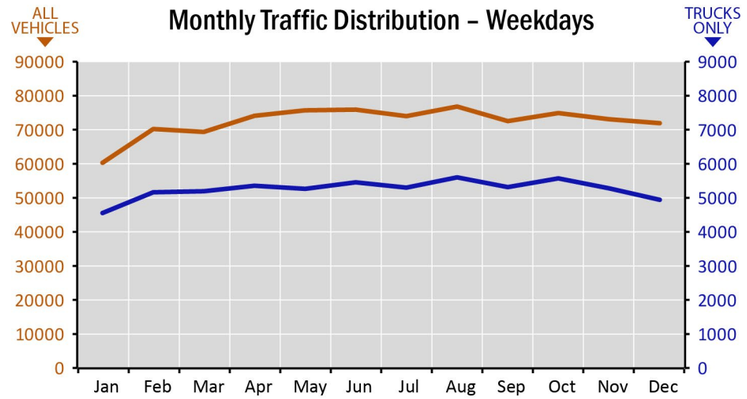
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment E5 varies by location. Along US 460 west of the junction with US 13 in the City of Suffolk, heavy trucks comprise eight percent of total traffic. Throughout the rest of Segment E5, trucks comprise less than five percent of daily traffic volumes.

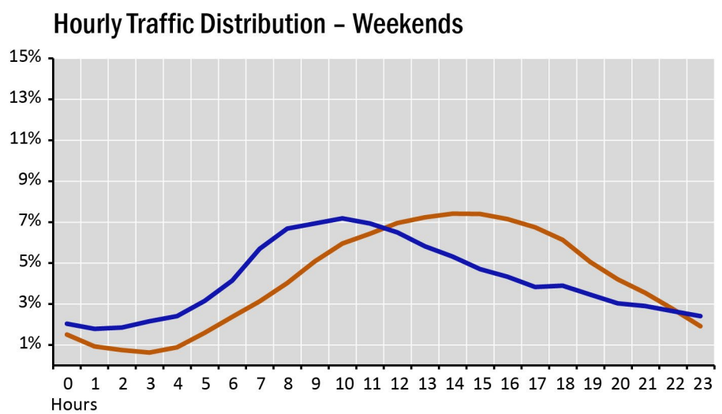
Hourly Traffic Distribution – Weekdays



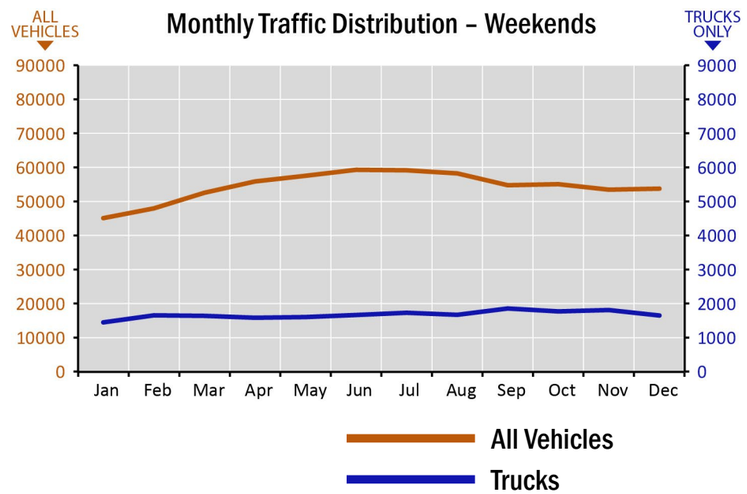
Monthly Traffic Distribution – Weekdays



Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



E5 SEGMENT PROFILE

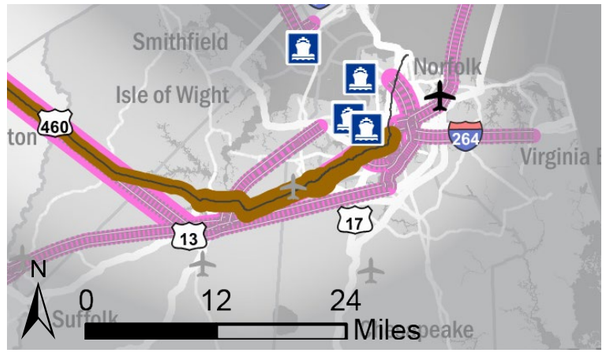
Freight Flows

In the Suffolk area, the majority of freight moves by rail, in terms of both tonnage and value. In total, almost 4 million tons (12 percent) of freight travels through this section of Segment E5 by truck, compared to 26 million tons by rail (88 percent). By value, approximately $3 billion (12 percent) of freight travels by truck, compared to $23 billion by rail (88 percent). On average, a ton of freight traveling through this section of Segment E5 by truck is worth $874 while a ton of freight traveling by rail is worth $873. In 2025, both rail and truck freight tonnages and total values in Segment E5 are expected to increase. The percentage of the freight traveling by truck is also expected to increase by both tonnage and value to 18 percent and 15 percent, respectively. Freight value per ton on trucks is expected to decrease to $850 while the value on rail is expected to increase to $1,012.

In the Portsmouth area, the majority of freight moves by rail in terms of tonnage. In total, more than 10 million tons (32 percent) of freight travels through this section of Segment E5 by truck, compared to 22.5 million tons by rail (68 percent). By value, the majority of freight moves by truck, with approximately $18 billion (56 percent) of freight traveling by truck, compared to $14 billion by rail (44 percent). On average, a ton of freight traveling through this section of Segment E5 by truck is worth $1,709 while a ton of freight traveling by rail is worth $616. In 2025, both rail and truck freight tonnages and total values in Segment E5 are expected to increase. The percentage of the freight traveling by truck is also expected to increase in terms of both tonnage and value to 18 percent and 15 percent, respectively. Freight value per ton on trucks is expected to increase to $1,960 and $756, respectively.



Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

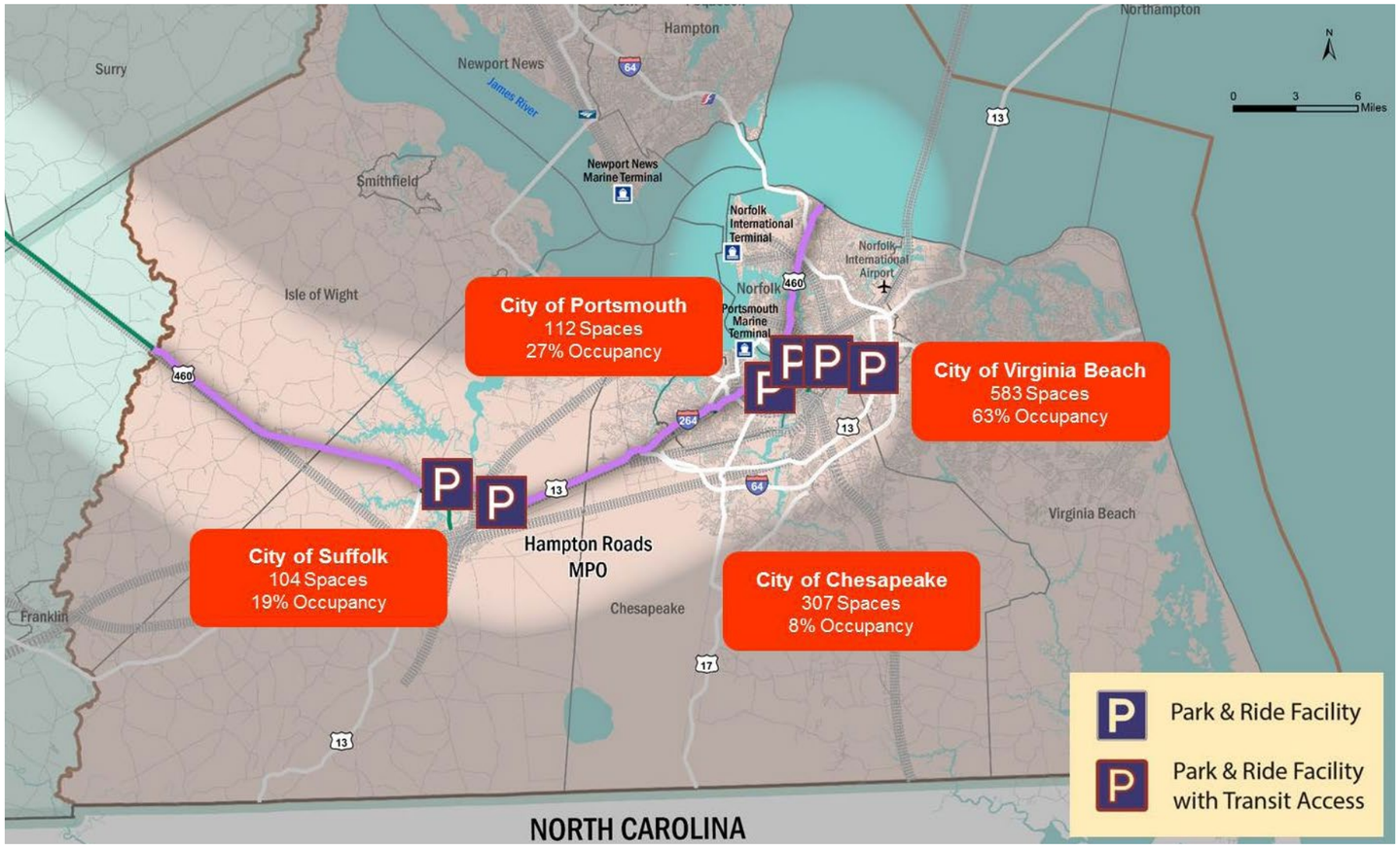
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment E5 of the Heartland Corridor have limited travel options, both in terms of travel path and mode choice. There are no directly parallel highway facilities to Segment E5, though it does access other major highway facilities in Hampton Roads, including I-64, I-264, I-664, US 13, US 17, and US 58. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by bus. However, Greyhound bus service, which has stations in Norfolk, Hampton, and Virginia Beach, is limited by the frequency of service and is not as fast as the typical automobile trip. Amtrak does have stations in Newport News, Norfolk and Virginia Beach; however, routes from these stations serve the Northeast Corridor and offer limited connections to the Heartland Corridor.

Park-and-Ride

Within Segment E5, commuters can utilize many Park-and-Ride facilities, as well as commuter bus service provided by HRT. Park-and-Ride locations are evenly spread throughout the region. Virginia Beach provides the highest number of Park-and-Ride spaces and has the highest utilization rate of spaces in the region. However, no city within the Segment E5 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



Comparable Travel Options

Hampton Roads (Norfolk) to Richmond

Inter-City Bus	*Train*
5 Trips per Day	5 Trips per Day
2:00 Travel Time	2:03 Travel Time
$11 Est. Cost	$23 Est. Cost

Auto

Via Rt. 460: 1:56 Travel Time $57 Est. Cost

Hampton Roads (Norfolk) to Petersburg

Inter-City Bus	*Train*
0 Trips per Day	1 Trip per Day
0:00 Travel Time	1:27 Travel Time
$0 Est. Cost	$18 Est. Cost

Auto

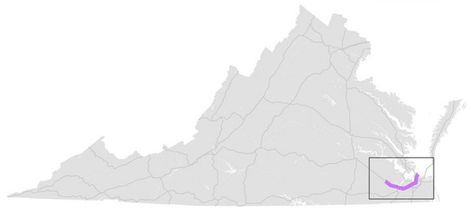
Via Rt. 460: 1:30 Travel Time $43 Est. Cost



E5 SEGMENT NEEDS

Safety

Between 2010 and 2012, 161 severe crashes occurred on Segment E5, which are concentrated in several areas. In Suffolk, on US 460 Business (North Main Street), there were 31 collisions over a one mile stretch between Edgewood Avenue and Lawshes Lane. In Norfolk, there were 22 crashes at the intersection of US 460 (East Brambleton Avenue) and Park Avenue adjacent to Norfolk State University, 18 incidents at the intersection of US 460 (East Brambleton Avenue) and Church Street, and 26 crashes at the intersection of US 460 (Monticello Avenue) and East 26th Street. On US 460 (Granby Street) in Norfolk, 23 collisions took place over a distance of approximately one mile between Elvin Road and Ridgeley Road.



Performance Metrics:

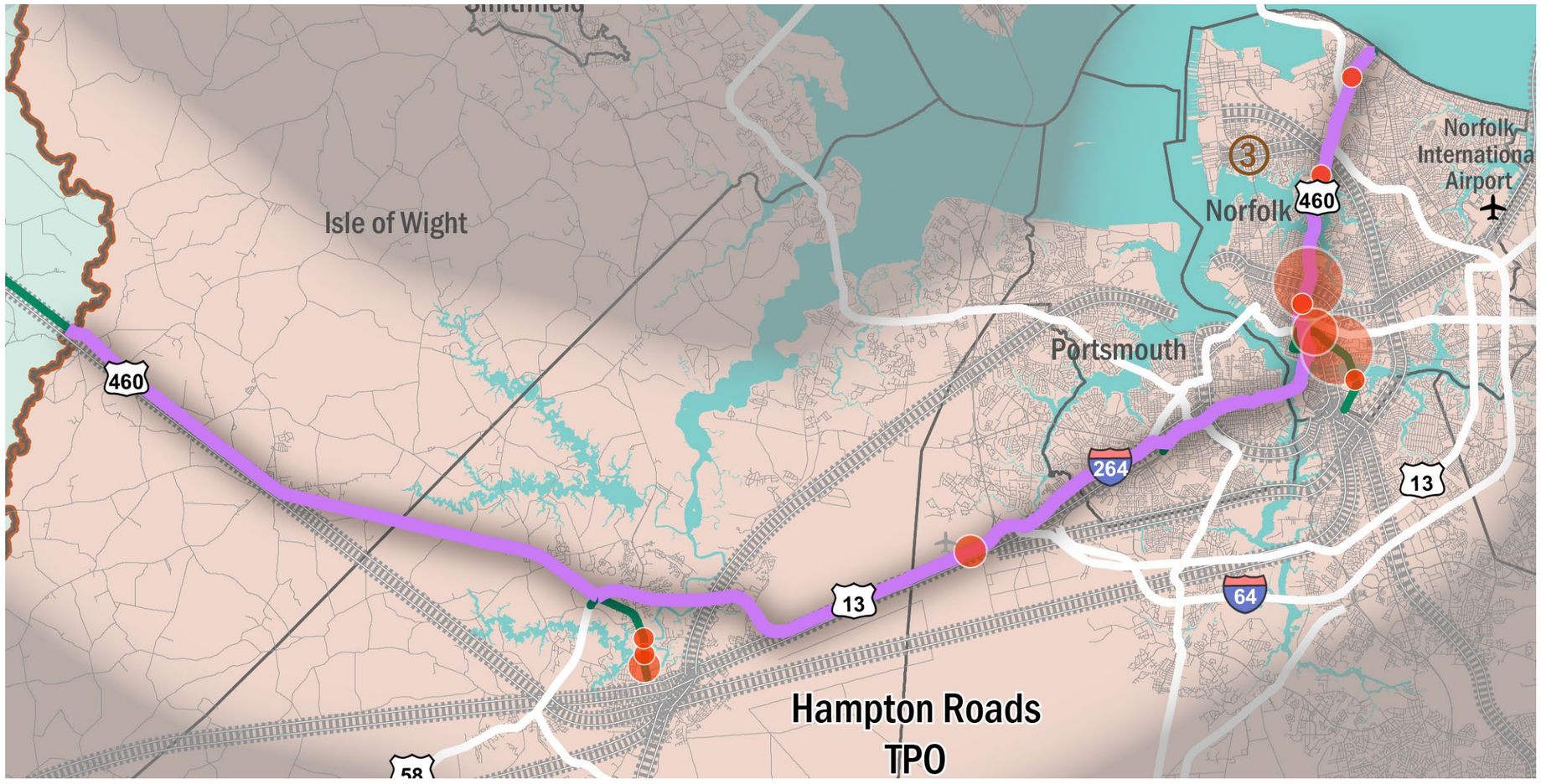
Number of Severe Crashes	161
Severe Crashes/Million VMT	1.5
Number of Railroad Crashes	3

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	39
Freight Ton Hours of Delay per Mile	33.4K

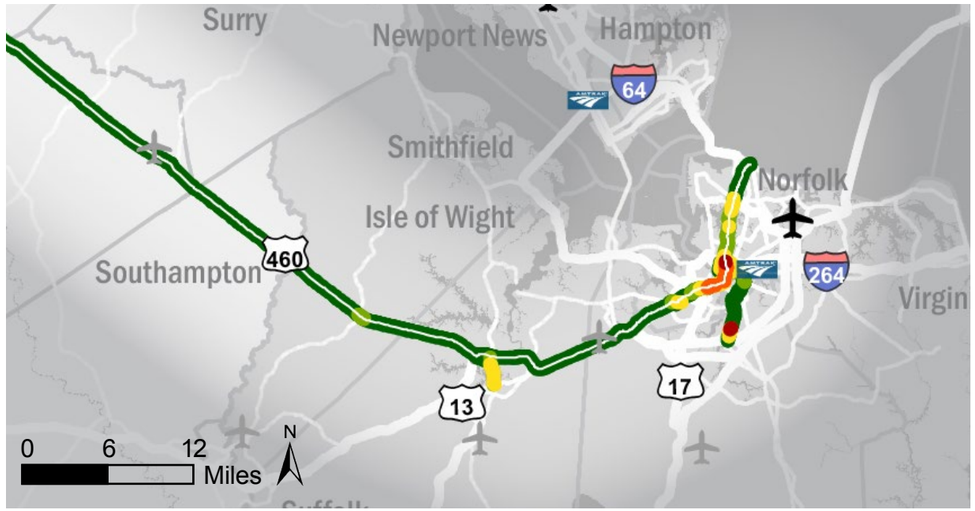
Passenger Delays

Segment E5 experiences the greatest passenger delays of all Corridor E segments with over 4,000 person-hours of delay and by far the highest average delay per mile in the corridor (39 person hours per mile). In the Cities of Portsmouth and Norfolk, there are locations of significant passenger delays on US 460 and US 460 Alternate between I-264 and I-564. Delays exceed 500 person-hours per mile at the intersection of US 460 and US 58. In the City of Chesapeake, there are significant passenger delays on Route 166 near the I-464 interchange, with delays approaching 600 person-hours per mile near Freeman Avenue. In the City of Suffolk, there are significant passenger delays on US 460 Business south of US 13. Peak-period passenger delays account for 38 percent of daily congestion, which is slightly lower than average for the peak-period share of congestion along CoSS segments.

Freight Delays

Segment E5 experiences the second greatest freight delay of all Corridor E segments, behind Segment E2, with over 3.5 million ton-hours of delay. On a per-mile basis, freight traffic on this segment experiences over 33,000 ton-hours per mile delay. In the City of Norfolk, significant freight delay occurs on US 460 and US 460 Alternate south of US 58. In the City of Chesapeake, there is a location of significant freight delay on US 460 near Freeman Avenue. Peak-period freight delays account for 35 percent of daily congestion, which is marginally higher than average for the peak-period share of congestion along CoSS segments.

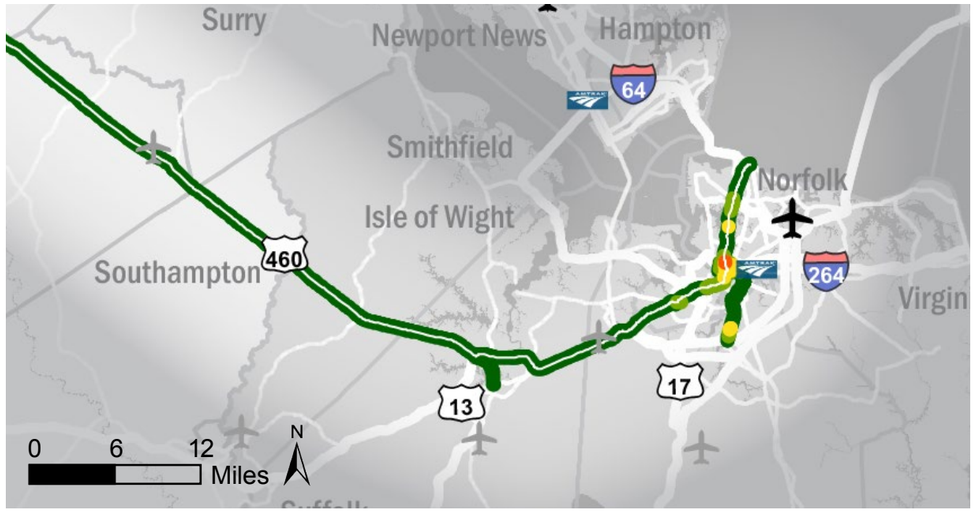
Daily Person Hours of Delay per Mile





- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000

Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment E5 ranges from 0.02 to 0.59 in terms of reliability index, with an average value of 0.18. While this segment does have a peak period reliability index higher than average for the CoSS segments statewide, none of the locations along Segment E5 have reliability index values exceeding the statewide threshold.

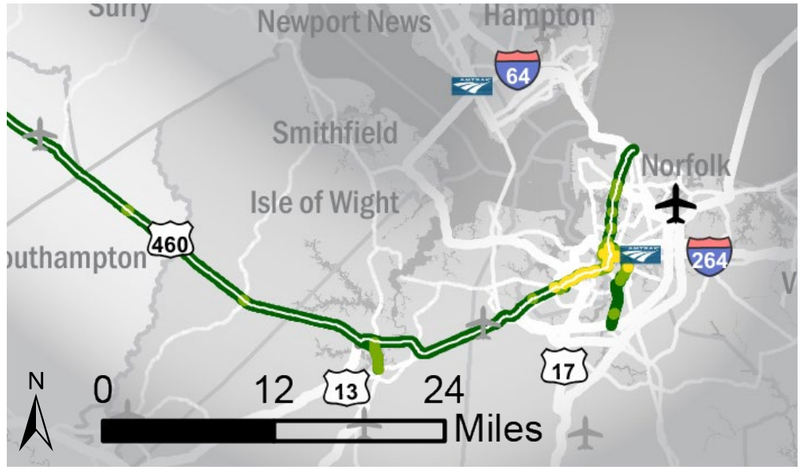
Weekday

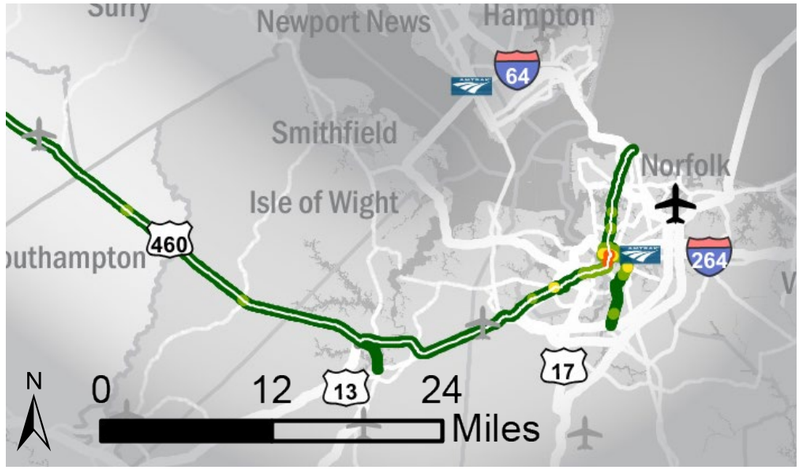
Reliability of travel during a typical weekday ranges from 0.02 to 0.64 in terms of reliability index, with an average value of 0.16. This segment has a weekday reliability index much higher than average for the CoSS segments statewide, and includes several locations where the reliability index value exceeds the statewide threshold:

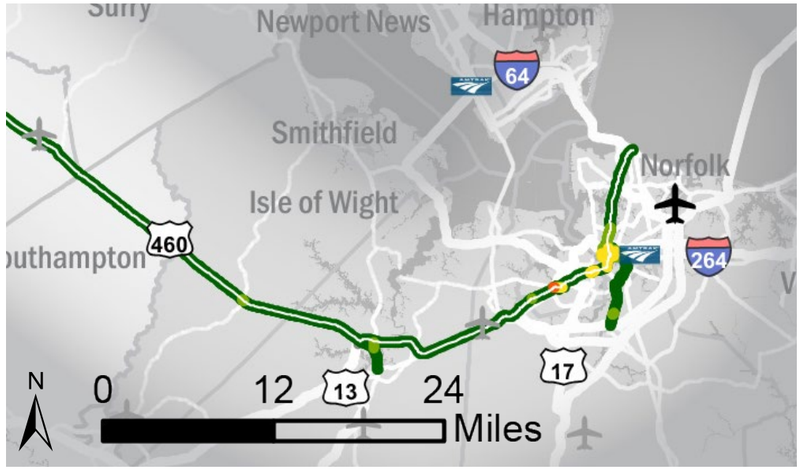
- US 460 Alternate at Route 337 in the City of Portsmouth;
- East City Hall Avenue near US 460 in the City of Norfolk; and
- On US 460 southbound on the Berkley Bridge in the City of Norfolk.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.78 in terms of reliability index, with an average value of 0.15. While this segment does have a weekend reliability index higher than average for the CoSS segments statewide, only a short segment on US 460 Alternate at Route 337 in the City of Portsmouth has a reliability index value exceeding the statewide threshold.





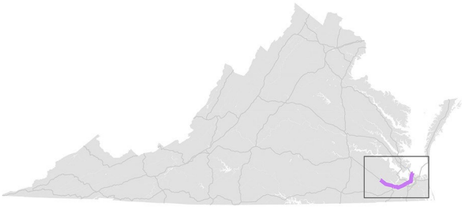


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

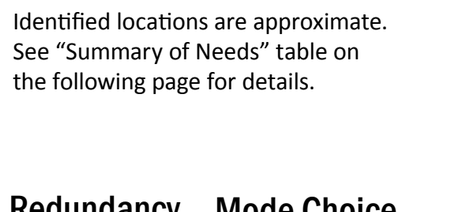
Mode Choice

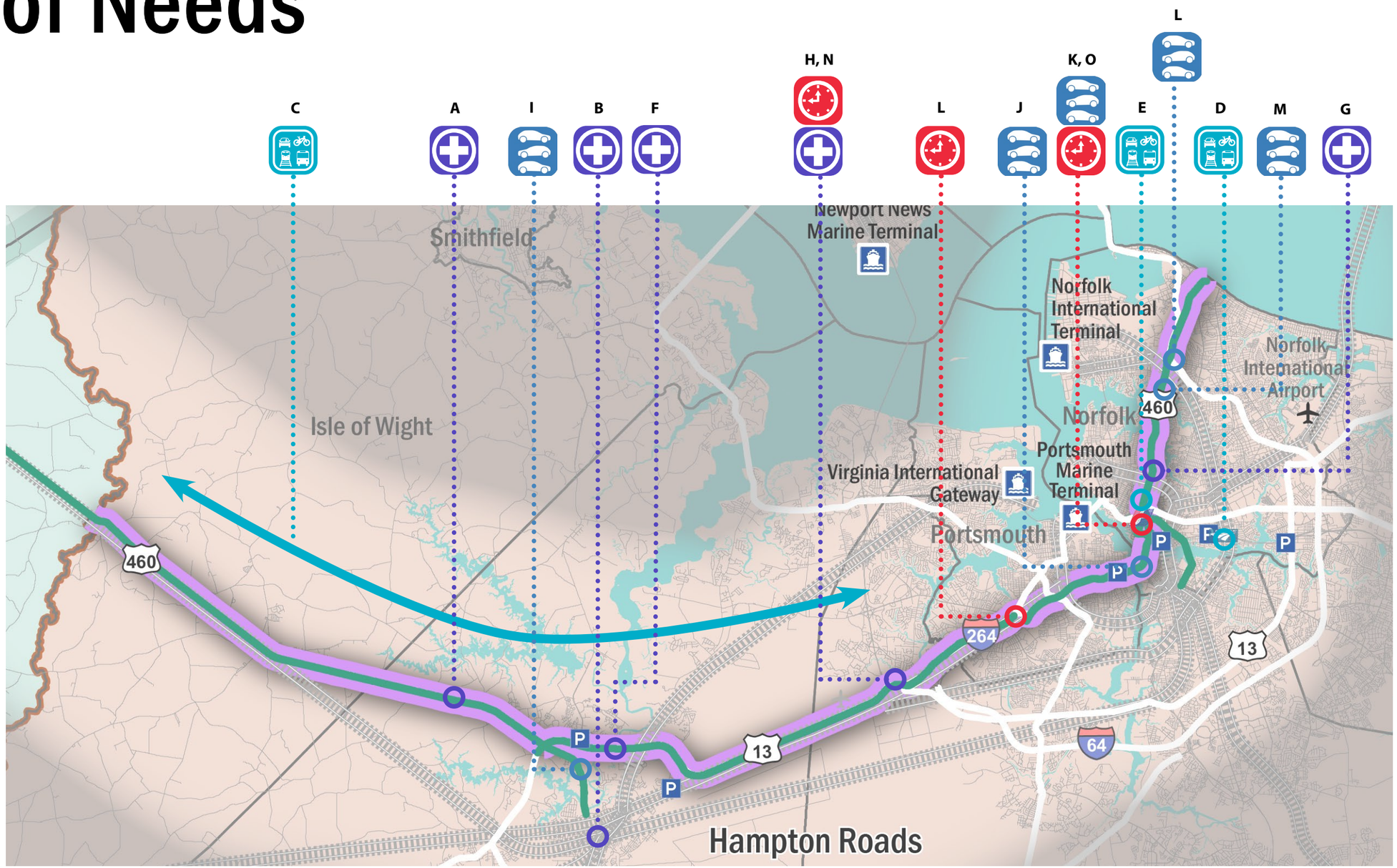
Safety

Congestion

Bottlenecks

Reliability





E5 SEGMENT NEEDS

Summary of Needs - E5 Segment

A.		Safety concerns on US 460 in Suffolk related to lack of median on heavily trafficked roadway
B.		Safety concerns related to numerous at-grade rail crossings in downtown Suffolk
C.		No parallel highway facility for US 460 exists
D.		Passenger rail service does not offer direct connections to corridor communities west of Petersburg; rail service to Petersburg is only once per day
E.		Bus service does not offer direct connection to any other cities in the corridor
F.		US 460-Business in downtown Suffolk: 31 severe crashes
G.		US 460 from Park Avenue to E 26th Street in Norfolk: 66 severe crashes
H.		US 460 at Hampton Roads Executive Airport in Chesapeake: 15 severe crashes

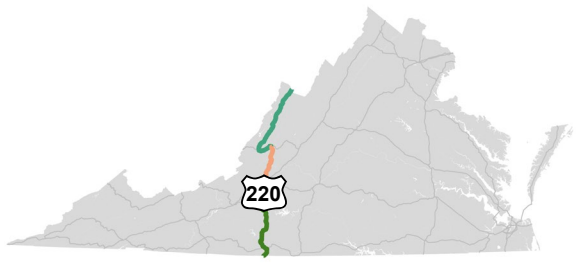
Summary of Needs - E5 Segment

I.		Congestion issue on US 460 Business between US 58/US 460/US 13 and US 58 Business/US 460 Business in Suffolk
J.		Congestion issue on US 460-Alt/I-264 between US 17 in Portsmouth and VA Route 168 (East Brambleton Avenue) in Norfolk
K.		Congestion issue at US 460 and US 58 in Norfolk
L.		Congestion issue at US 460 and I-564 in Norfolk
M.		Congestion issue at US 460 and Willow Wood Road in Norfolk
N.		Reliability issue on US 460 at I-664 intersection in Chesapeake
O.		Reliability issue on US 460 at US 58 intersection in downtown Norfolk

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

North Carolina to West Virginia Corridor (F)



Office of INTERMODAL Planning and Investment

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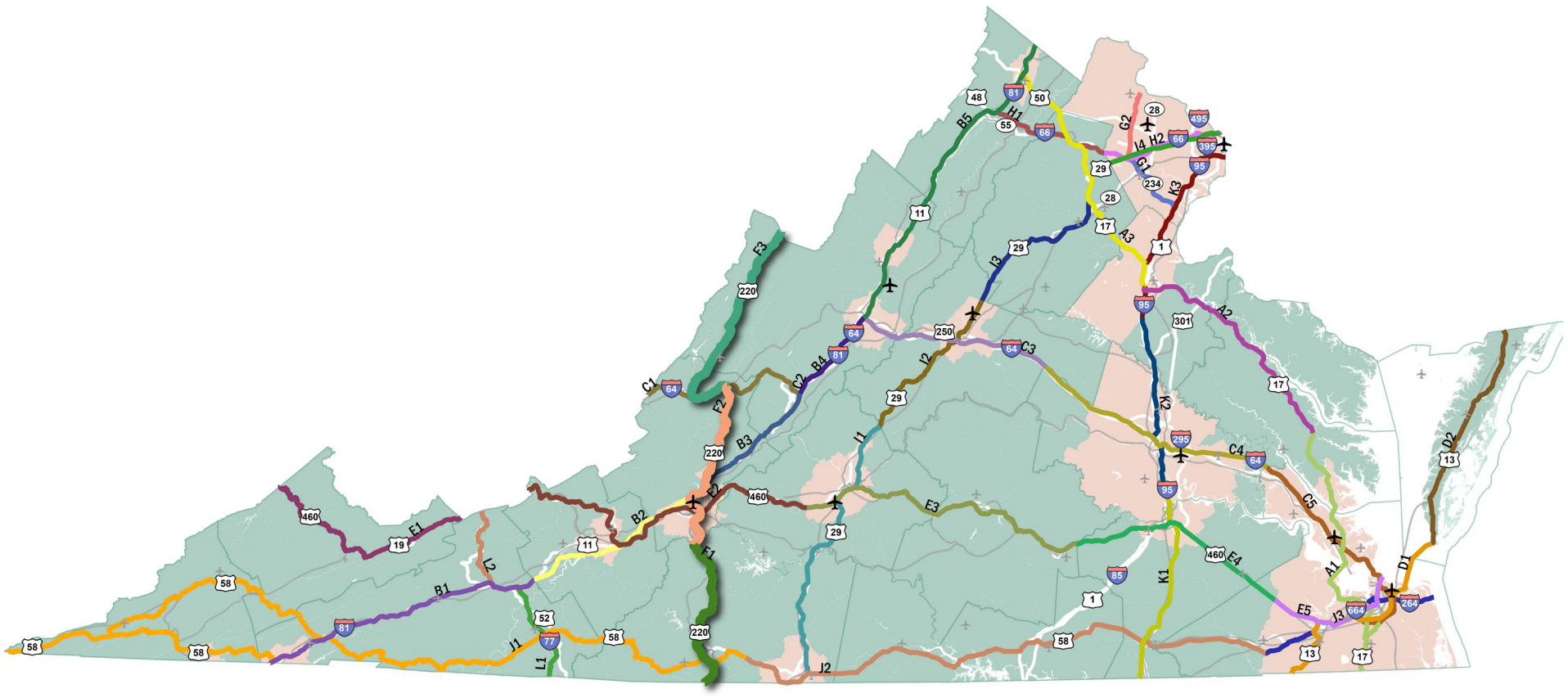
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

The North Carolina to West Virginia Corridor (Corridor F) is defined primarily by US 220, which runs north to south in the eastern United States between Waverly, New York, and Rockingham, North Carolina. I-73 is a planned interstate that will run from Myrtle Beach, South Carolina, to Sault Sainte Marie, Michigan, and would run parallel to US 220 for much of its length through Virginia, from the North Carolina border to Roanoke. In Virginia, US 220 travels for approximately 183 miles between the North Carolina state line, just south of Martinsville, and the West Virginia state line north of Monterey in Highland County.

US 220 traverses mountainous terrain for much of its run through the Commonwealth, leading to relatively slow vehicle speeds. It is primarily a four-lane roadway between the North Carolina state line and Roanoke, where it overlaps with I-581 and then I-81, between Exit 143 and Exit 150. US 220 continues as a four-lane highway for approximately 20 miles north of Roanoke before switching to a two-lane rural facility, except for where it runs concurrently with I-64 between Clifton Forge and Covington. US 220 serves as both a local-access road through southwestern Virginia and as a throughway between North Carolina and West Virginia. Business spurs of US 460 run through Martinsville, Rocky Mount, and south of the City of Roanoke, while US 460 Alternate connects I-81/US 220 and US 221 in southern Botetourt County.

Passenger travel along Corridor F is accomplished primarily via the highway facilities. Other travel options include:

- The Alleghany Highlands Mountain Express (operated by RADAR), which provides an express bus service between Iron Gate and Covington in Alleghany County;
- Greyhound bus service, available in Roanoke;
- Six Park-and-Ride lots, available in the corridor, mostly near the Roanoke Valley Area;
- An Amtrak station in Clifton Forge, which provides passenger rail service east and west of the corridor along the Cardinal Route, which runs between New York City and Chicago; and
- Roanoke-Blacksburg Regional Airport, which provides commercial air service to a dozen major cities and connecting service to the hubs of four major airlines. The airport also provides general aviation service.

Norfolk Southern rail lines run within the corridor between Martinsville and Roanoke. These rail lines connect to the Crescent Corridor and Heartland Corridor in Roanoke and provide freight rail access in this region. The Norfolk Southern lines then run between Roanoke and Clifton Forge, connecting with multiple lines along CSX's Coal Corridor. The Buckingham Branch, which runs between Clifton Forge and Richmond, connects within the corridor and runs parallel to US 220 for a short stretch before connecting to CSX lines in Clifton Forge.

There are no direct connections to any port facilities along US 220, though there is a connection to I-81 in Roanoke, which leads to the Virginia Inland Port. The section of US 220 between I-81 and I-64 (between Roanoke and Clifton Forge) is frequently used as a connection between the two interstate highways. This connection is used mostly for freight movement between southern Virginia and points west, although passenger travel also occurs along this route.

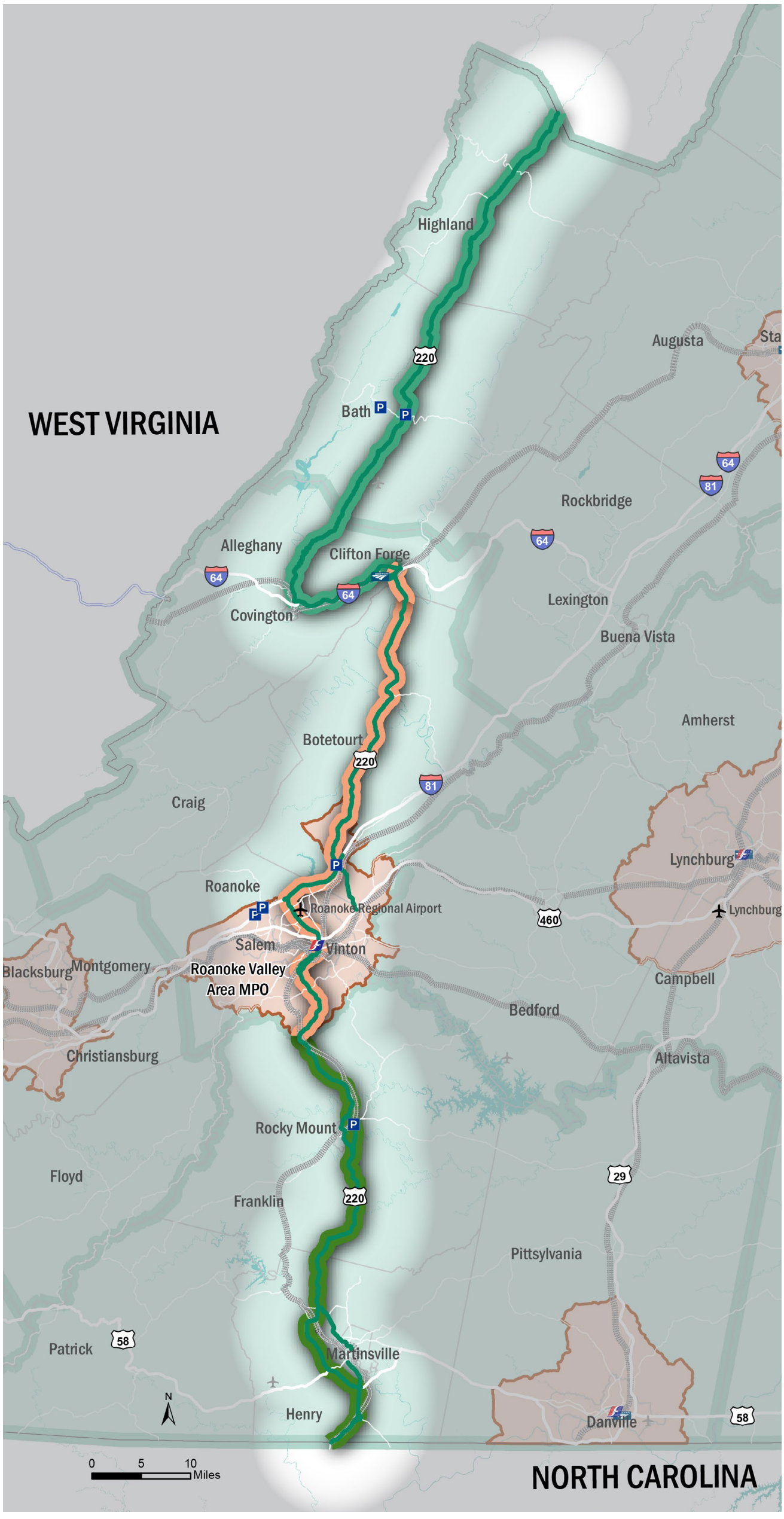
Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor Components

Highway Facilities	
Primary Facility	• US 220
Other Highway Facilities	• US 220 Business • US 220 Alt
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• Norfolk Southern
Airport Facilities	
	• Roanoke-Blacksburg Regional Airport





Demographics and Economic Trends

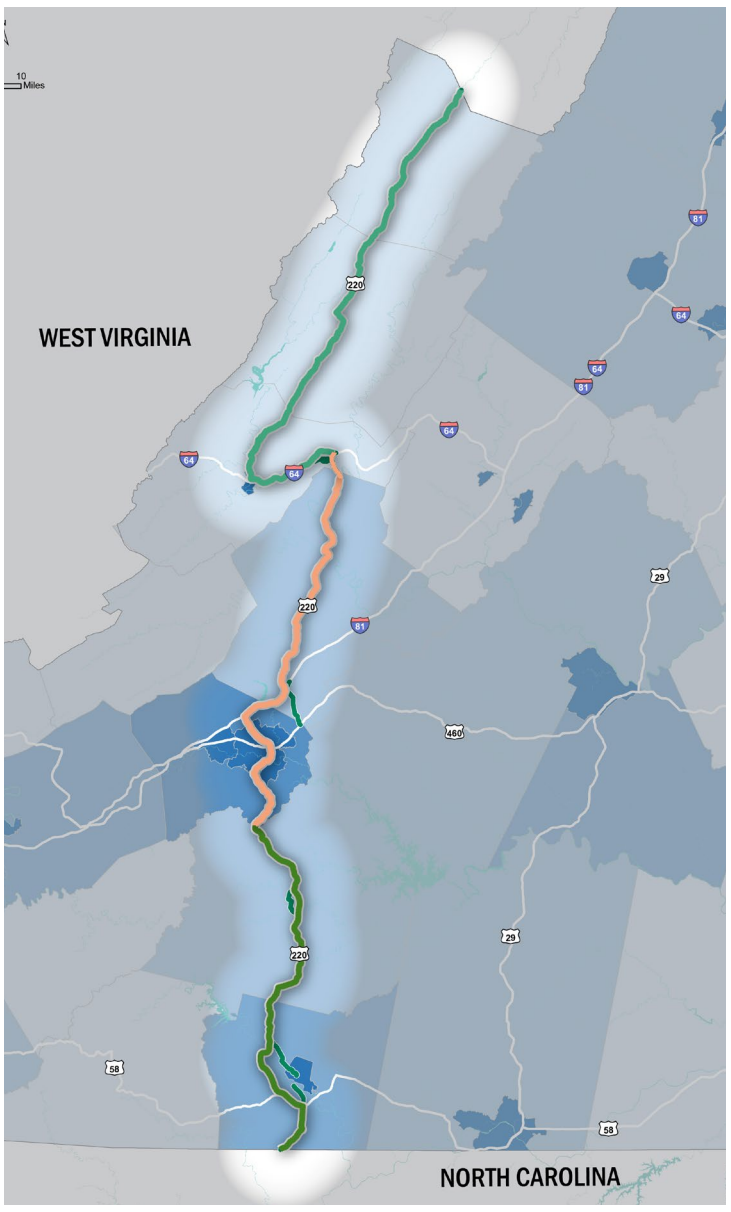
The primary population centers with greater than 500 persons per square mile along Corridor F are currently found in Martinsville, Salem, Roanoke, and Covington. Alleghany, Bath, and Highland Counties, in the northwest, have the lowest density along the corridor with less than 50 persons per square mile. The most densely-populated segment along the corridor is Segment F2 in its path through Roanoke County.

Between 2012 and 2025, Franklin County is anticipated to see the largest population growth (between 11 and 25 percent) among counties along the corridor. The population of Alleghany County is expected to shrink; however, population along the corridor overall is expected to grow moderately.

Current employment centers follow a pattern similar to the population centers, with jobs clustered in the Cities. However, employment growth is anticipated to be the highest in Highland County (higher than 25 percent), and is also expected to grow in the other counties in the northern half of the corridor. Corridor F passes through the Roanoke Valley Area where the three largest industry sectors by GDP include public administration, retail trade, and manufacturing.

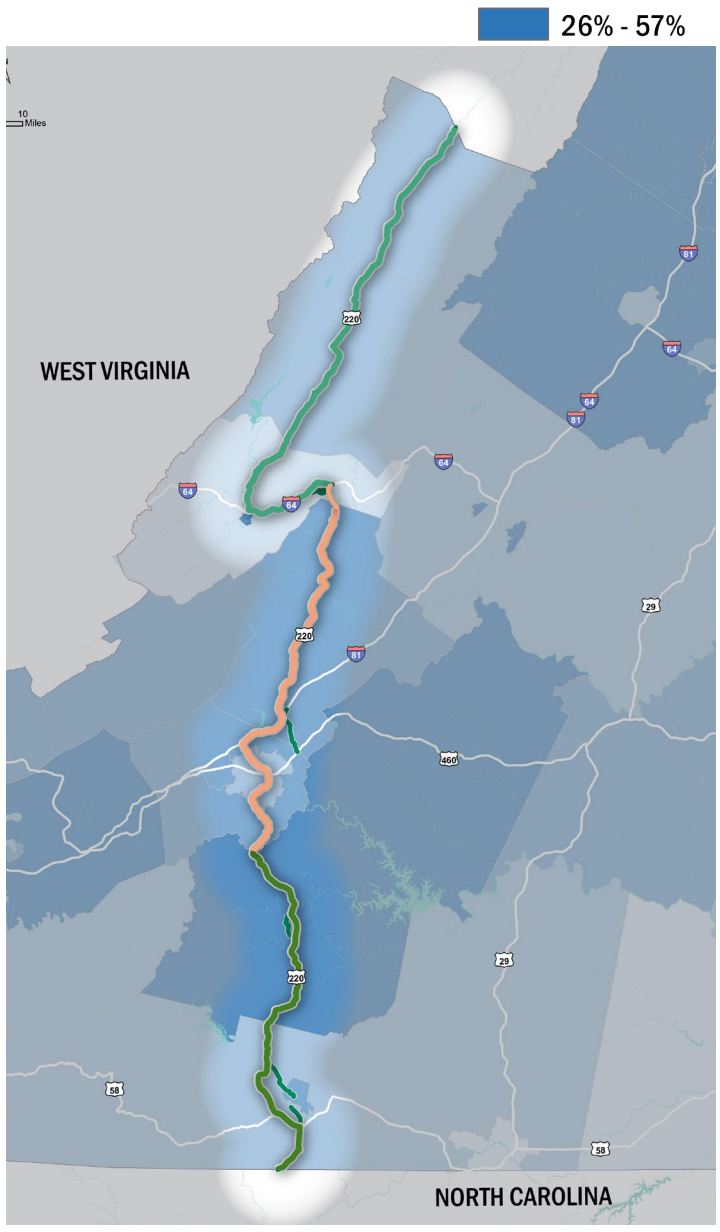
2012 Population Density Persons / Square Mile

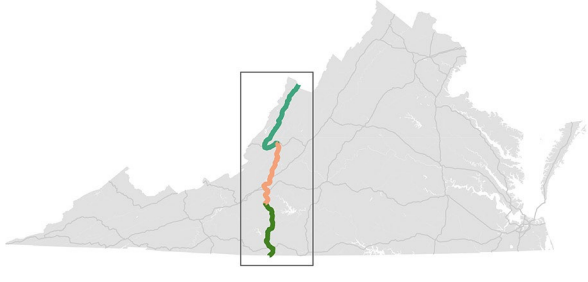
- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



Population Growth (2012-2025 Percent Change)

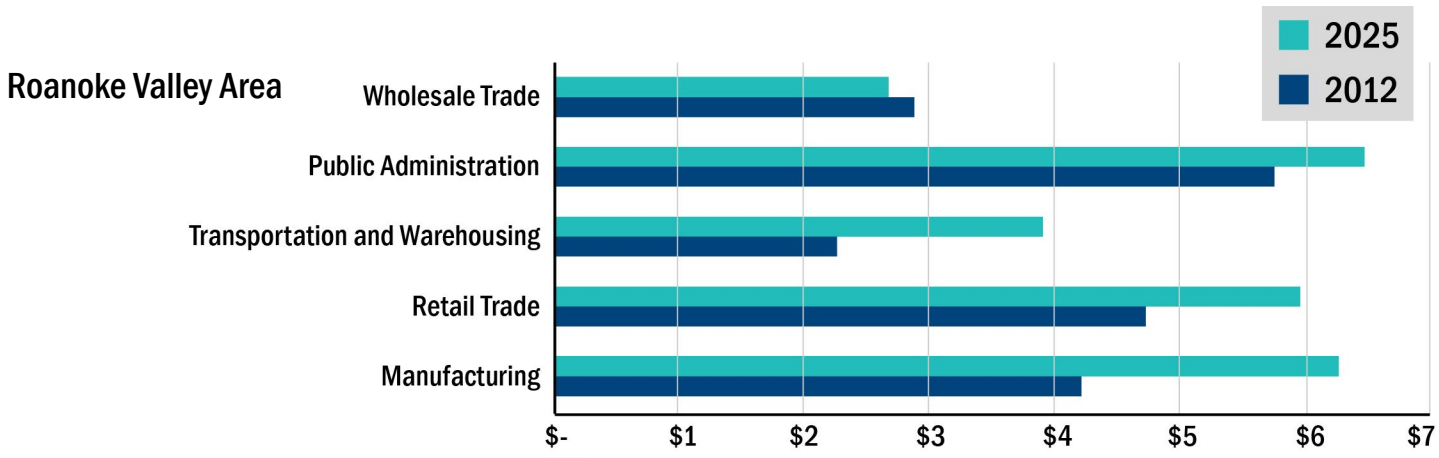
- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%





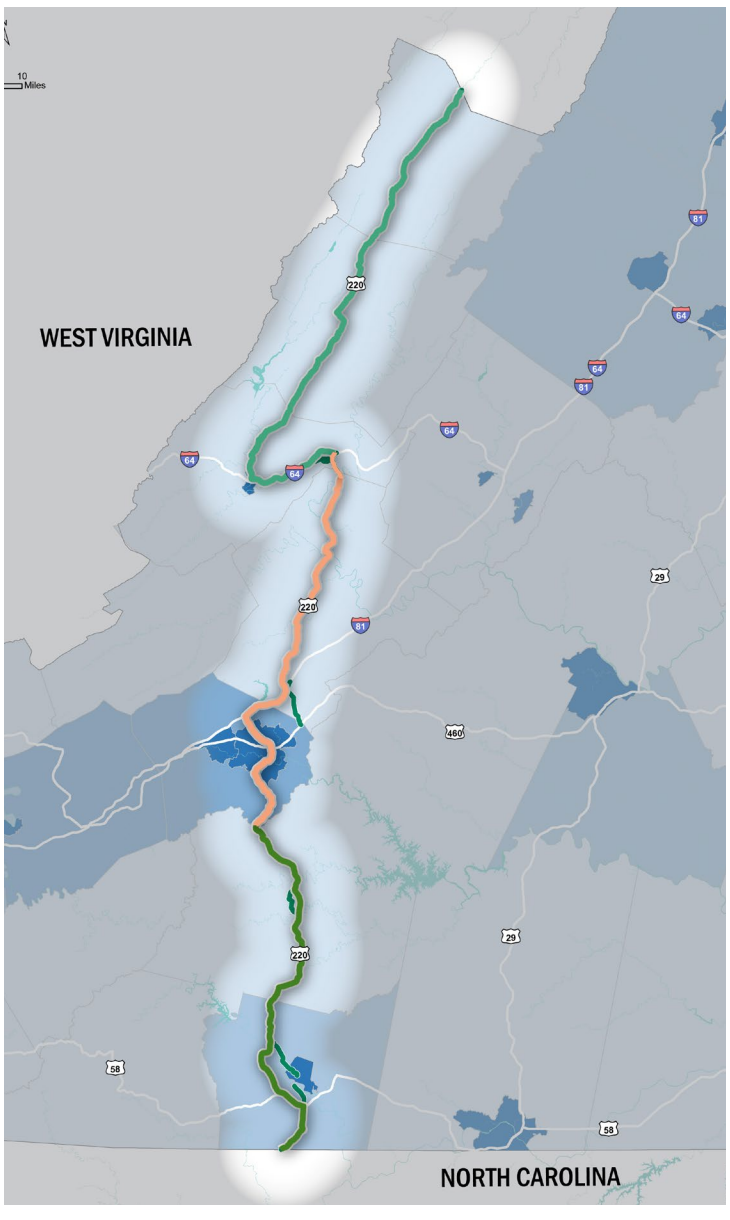
CORRIDOR F OVERVIEW

Top Industries (GDP)



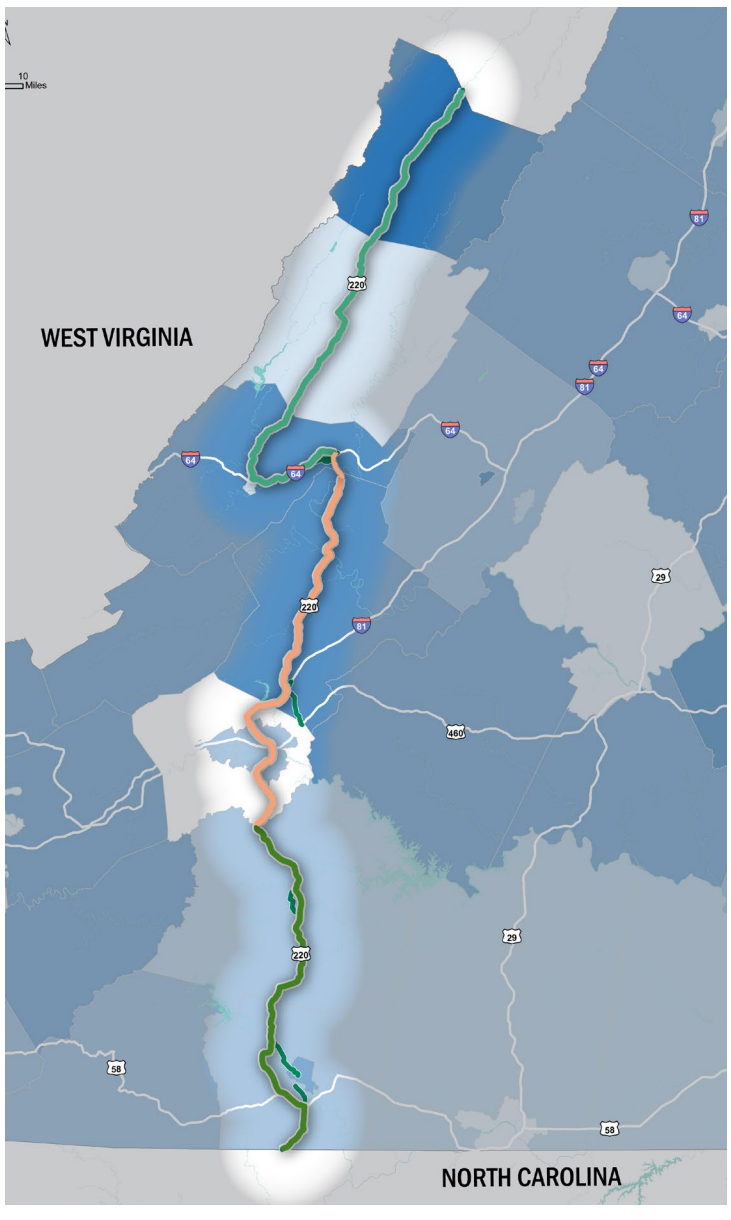
2012 Employment Density Jobs / Square Mile

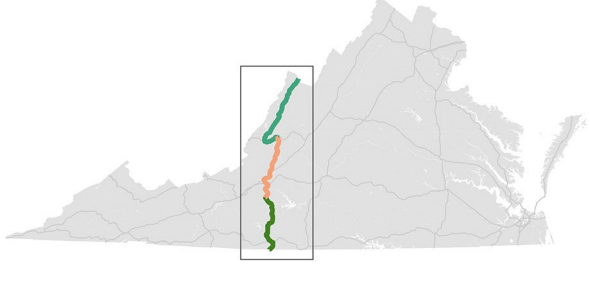
< 25
25 - 100
100 - 250
250 - 500
> 500



Employment Growth (2012-2025 Percent Change)

-7% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 69%



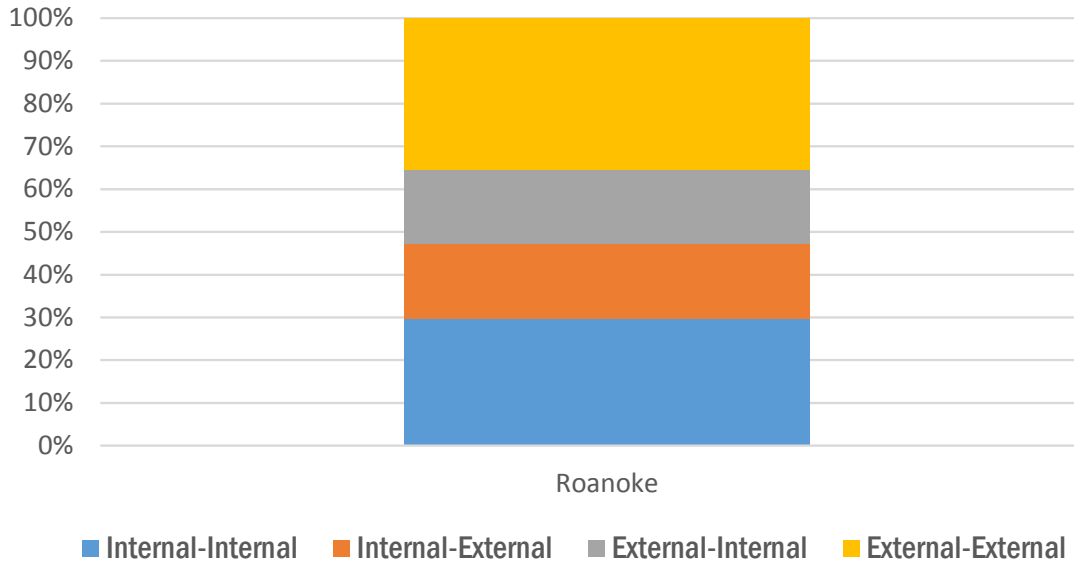


Corridor Travel Patterns

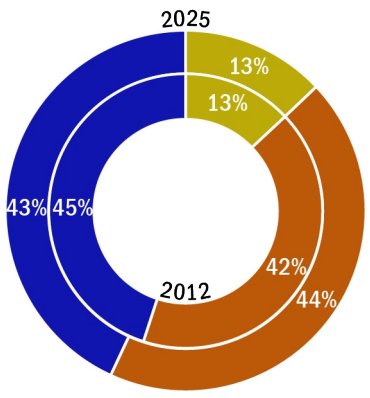
Passenger

Corridor F connects North Carolina and West Virginia, and passes through the Roanoke Valley Area. Within the Roanoke Valley Area, traffic along the corridor is fairly well distributed between internal and external trips. The largest portion of traffic (35 percent) is related to pass-through trips, while just less than 30 percent is related to local internal traffic. The primary facility in the corridor (US 220) carries the majority of the pass-through traffic, while the parallel facility (US 220 Business) carries almost exclusively local internal traffic.

Distribution of Internal and External Travel



Roanoke Valley Area



GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Freight

By truck, Corridor F carried 851 million tons of freight worth $163 billion in 2012, and is estimated to carry 113 million tons of freight worth $262 billion in 2025. The major truck freight patterns on this corridor are interstate through movements, accounting for approximately 55 percent of the total truck tonnage and more than 64 percent of the total corridor truck freight value. There are significant flows on Corridor F between the Southeastern and Middle Atlantic regions. North Carolina, Pennsylvania, and Tennessee are major truck freight generators on this corridor, accounting for more than 20 percent of truck tonnage on Corridor F. North Carolina, New York, and Pennsylvania are major truck freight attractors on Corridor F, accounting for 24 percent of truck tonnage. Truck freight originating from or destined for non-US locations in North America account for approximately five percent of total truck freight on Corridor F.

By rail, Corridor F carried three million tons of freight worth $1 billion in 2012, and neither tonnage nor value is expected to increase by 2025. In terms of tonnage, the largest rail flow on Corridor F is from West Virginia to North Carolina, accounting for more than 44 percent of the total rail tonnage in the corridor. Another significant rail freight movement on Corridor F is from West Virginia to South Carolina, accounting for more than 14 percent of the total rail tonnage on the corridor. In terms of value, the largest rail freight movements on Corridor F are between Ohio and the Carolinas, accounting for more than 26 percent of the total rail value.

Truck Freight

2012	2025
Truck Freight Value	
$163 Billion	$262 Billion
Truck Freight Tonnage	
85 Million Tons	113 Million Tons
Freight Value per Ton	
$1914	$2324
Corridor Tonnage Passing Through	
54%	55%

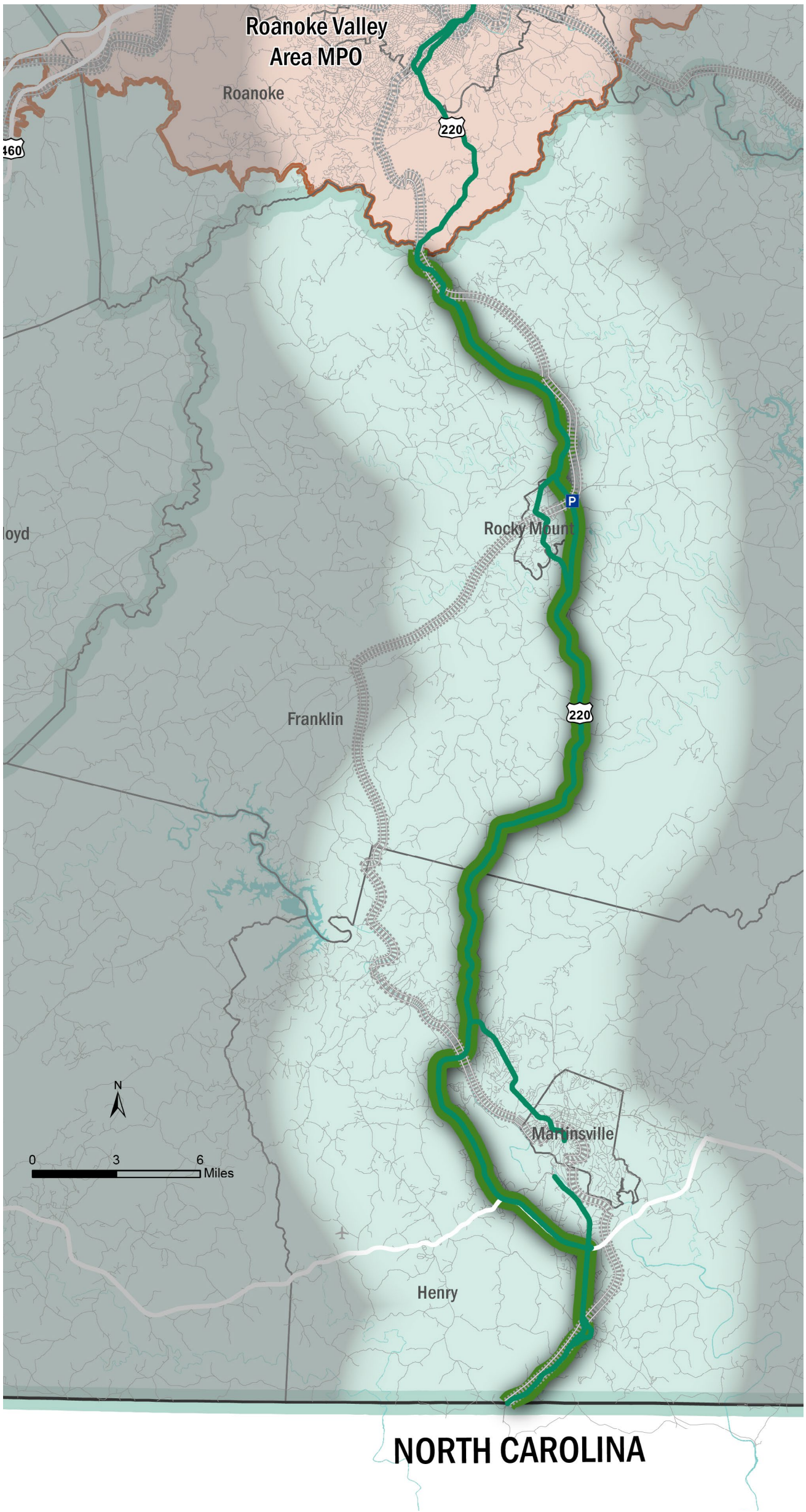
Rail Freight

2012	2025
Rail Freight Value	
$1 Billion	$1 Billion
Rail Freight Tonnage	
3 Million Tons	3 Million Tons
Freight Value per Ton	
$361	$428
Corridor Tonnage Passing Through	
80%	75%

II. Segment F1

Corridor Segment F1 Components

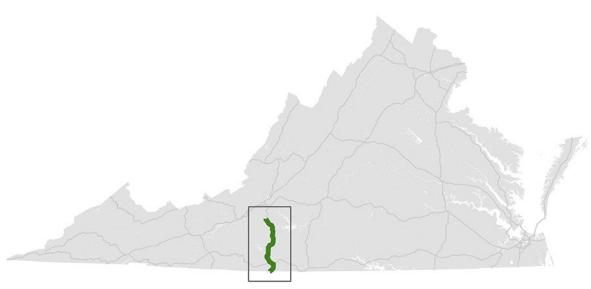
- US 220
- US 220 Business
- Norfolk Southern



Segment F1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



F1 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment F1 runs from the North Carolina border to Roanoke County, serving Henry and Franklin Counties and the City of Martinsville. The primary facility is US 220, which functions as both a local access road through southwestern Virginia and as a throughway between North Carolina and West Virginia.

Highway Facilities: Route 220 is a four-lane roadway in this segment. US 220 Business Routes provide local access in the City of Martinsville and the Town of Rocky Mount.

Transit Services: There is no intercity transit service available on Segment F1.

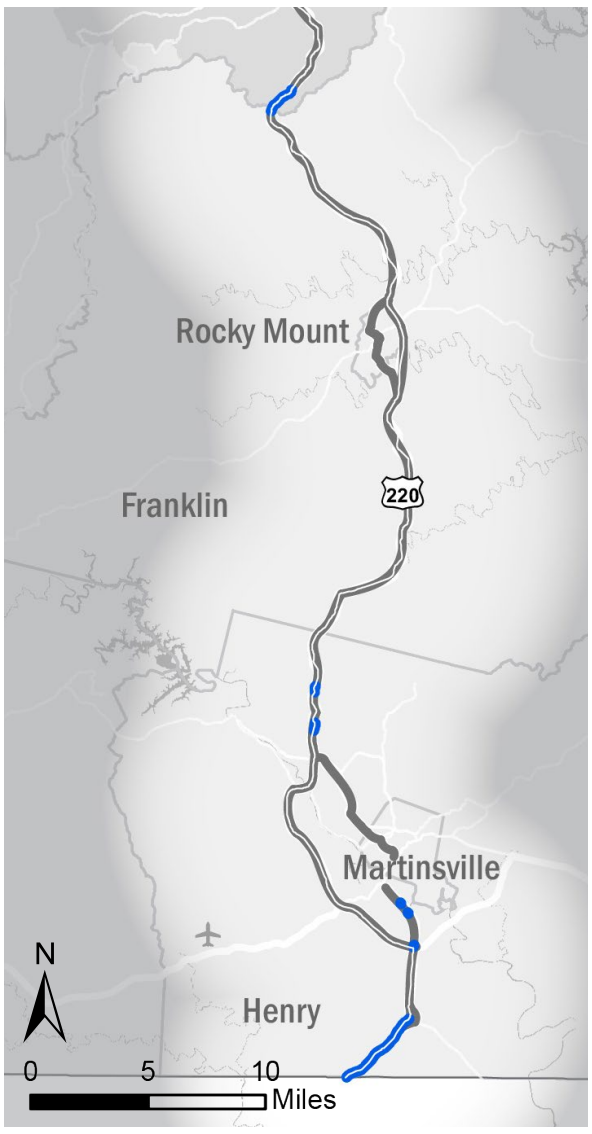
Rail Facilities: Norfolk Southern rail lines provide freight rail access in this region by operating within the North Carolina to West Virginia Corridor between Martinsville and Roanoke, connecting to the Crescent Corridor and Heartland Corridor in Roanoke.

Port Facilities: No port facilities are directly accessible from Segment F1.

Airport Facilities: Commercial air service is provided by the nearby Roanoke Regional Airport. One additional general aviation facility is present along Segment F1.

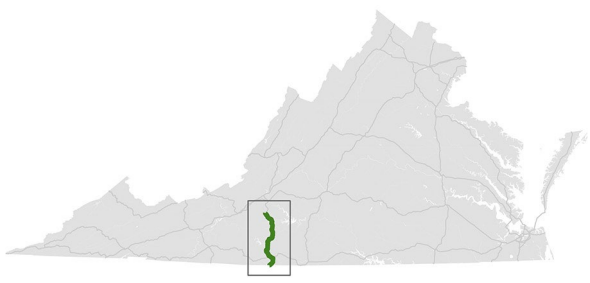
Major planned and future projects include:

- Safety improvements to include shoulder paving, guardrail, rumble strips all within existing right-of-way on Greensboro Road (US 220) near the North Carolina border.



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

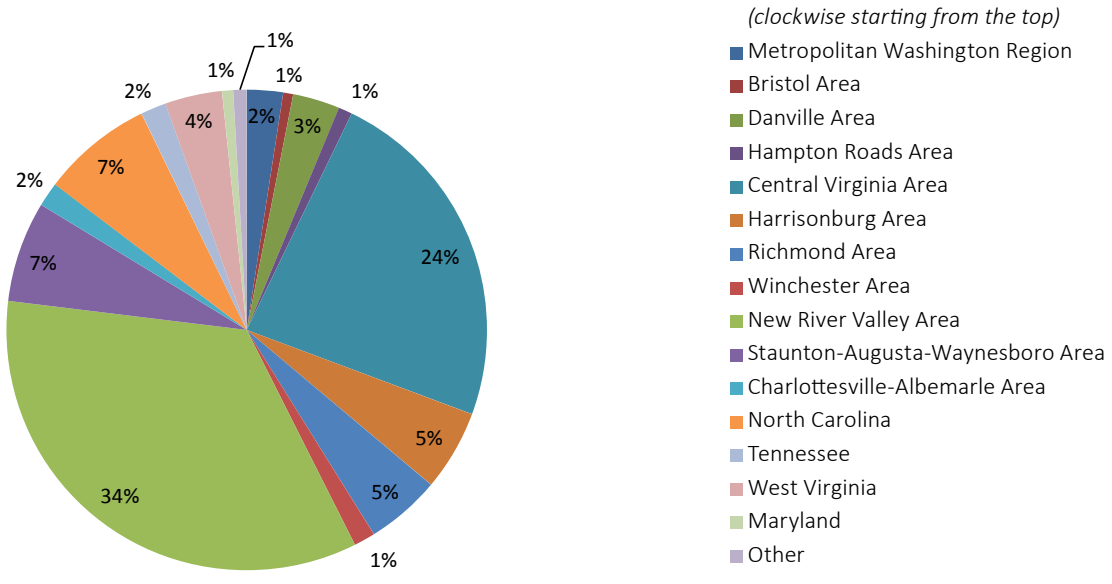


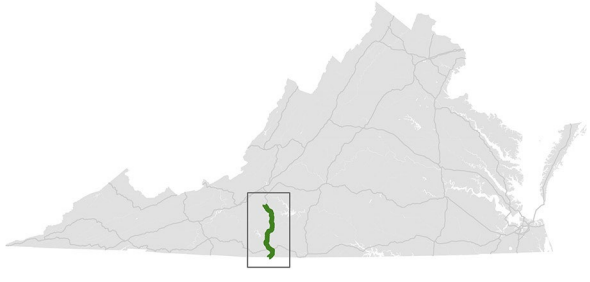
Travel Demand

Passenger Demand

The southernmost segment in Corridor F connects the Roanoke Valley Area to North Carolina, although it does not connect any major cities within Virginia. Of the intercity passenger travel originating in the Roanoke Valley Area, seven percent is destined for locations in North Carolina, although not all of those travelers may use Corridor F as several alternative routes are possible depending on the final destination. An additional three percent of intercity travel from the Roanoke Valley Area is destined for the Danville Area using Segment F1.

Travel from Roanoke Valley Area to...





F1 SEGMENT PROFILE

Freight Demand

By truck, Segment F1 carried 11 million tons of freight worth $13 billion in 2012, and is estimated to carry 13 million tons of freight worth $15 billion in 2025. The major truck freight patterns on this corridor are interstate through movements, accounting for approximately 55 percent of the total truck tonnage and more than 64 percent of the total corridor truck freight value. There are significant flows on Corridor F between the Southeastern and Middle Atlantic regions. North Carolina, Pennsylvania, and Tennessee are major truck freight generators on this corridor, accounting for more than 20 percent of truck tonnage on Corridor F. North Carolina, New York, and Pennsylvania are major truck freight attractors on Corridor F, accounting for 24 percent of truck tonnage. Truck freight originating from or destined for non-US locations in North America account for approximately five percent of total truck freight on Corridor F. Within the jurisdictions adjacent to Segment F1, Franklin County is the largest generator of freight on the corridor, with between one and two percent of the total freight tonnage originating there.

By rail, Segment F1 carried three million tons of freight worth $710 million in 2012, and is estimated to carry three million tons of freight worth $920 million in 2025. The largest rail flow on Corridor F is from West Virginia to North Carolina, accounting for more than 44 percent of the total rail tonnage in the corridor. Another significant rail freight movement is from West Virginia to South Carolina, accounting for more than 14 percent of the total rail tonnage on the corridor. In terms of value, the largest rail freight movements on Corridor F are between Ohio and the Carolinas, accounting for more than 26 percent of the total rail value. Although the amount of rail freight originating in jurisdictions adjacent to Segment F1 is negligible, the segment is a significant attractor of rail freight, accounting for between 16 and 18 percent of the total rail freight value on Corridor F. Approximately six percent of the total rail freight value on the corridor flows between Louisiana and Franklin County, adjacent to Segment F1. Rail freight flows from Henry and Franklin Counties, located adjacent to Segment F1, account for only around 0.5 percent of the total rail freight tonnage on the corridor.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (26% / 27%)
2. North Carolina (10% / 9%)
3. Tennessee (7% / 7%)
4. Pennsylania (7% / 7%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment F1: 4% / 3%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
New York and Georgia
New York and Tennessee
New Jersey and Texas

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (8% / 8%)
3. New York (8% / 8%)
4. Pennsylvania (8% / 8%)
5. New Jersey (5% / 5%)

Corridor Tonnage Destined for Segment F1: 2% / 2%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (70% / 62%)
2. Virginia (13% / 17%)
3. City of Roanoke (11% / 13%)
4. South Carolina (6% / 7%)
5. North Carolina (5% / 6%)

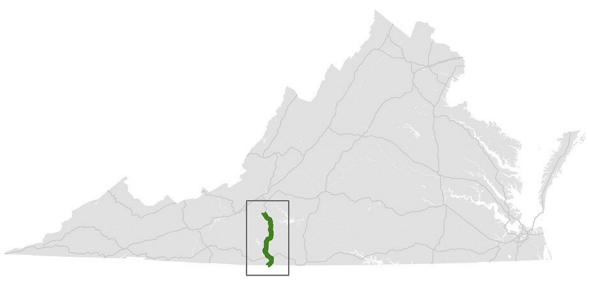
Corridor Tonnage Originating in Segment F1: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (51% / 46%)
2. South Carolina (17% / 15%)
3. Virginia (10% / 12%)
4. Ohio (7% / 8%)
5. West Virginia (4% / 5%)

Corridor Tonnage Destined for Segment F1: 5% / 6%



Traffic Conditions

Traffic Volume

Traffic volume on Segment F1 is moderate compared to traffic volumes throughout the rest of Corridor F. Along US 220, average daily traffic volumes range from 10,000 to 25,000 vehicles, with the highest traffic volumes along US 220 in Segment F1 occurring north of Rocky Mount. Traffic volumes on US 220 throughout Segment F1 are projected to increase by fewer than 3,000 vehicles per day by 2025, with the highest growth projected near Ridgeway in Henry County. Traffic volumes on US 220 Business in Segment F1 are less than 10,000 vehicles per day, and are not projected to increase by 2025.

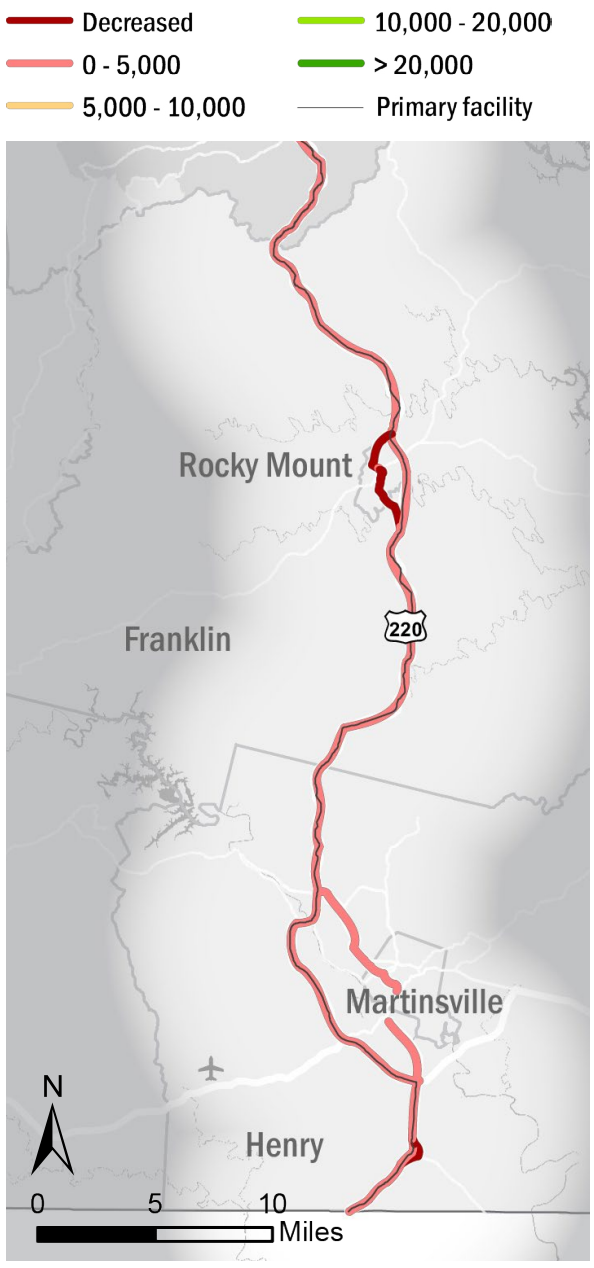
Traffic Volume 2014 (AADT)

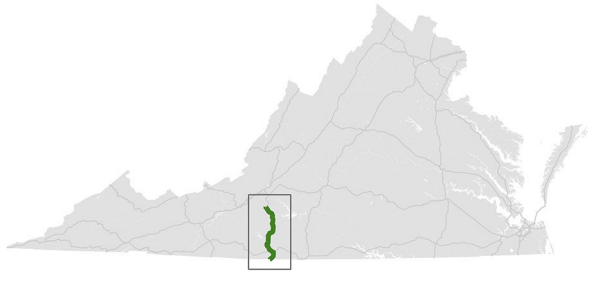


Traffic Volume 2025 (AADT)

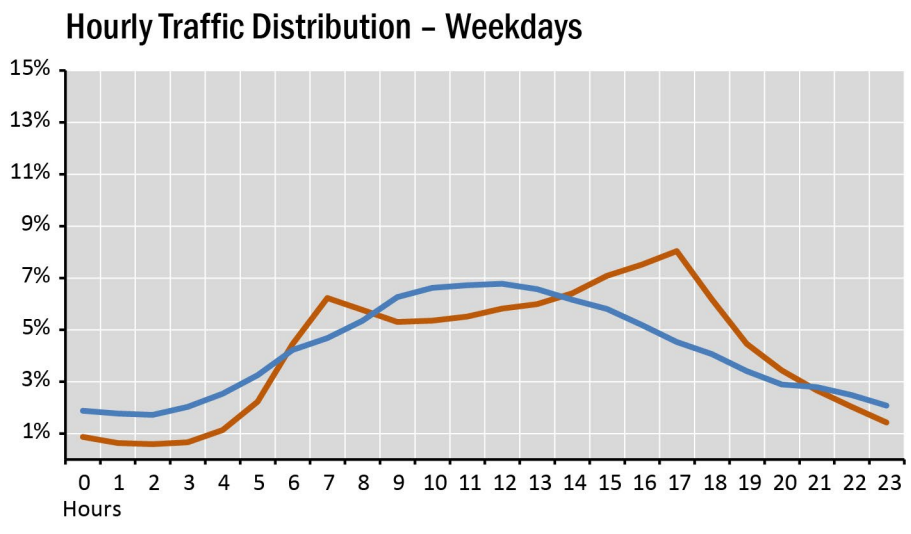


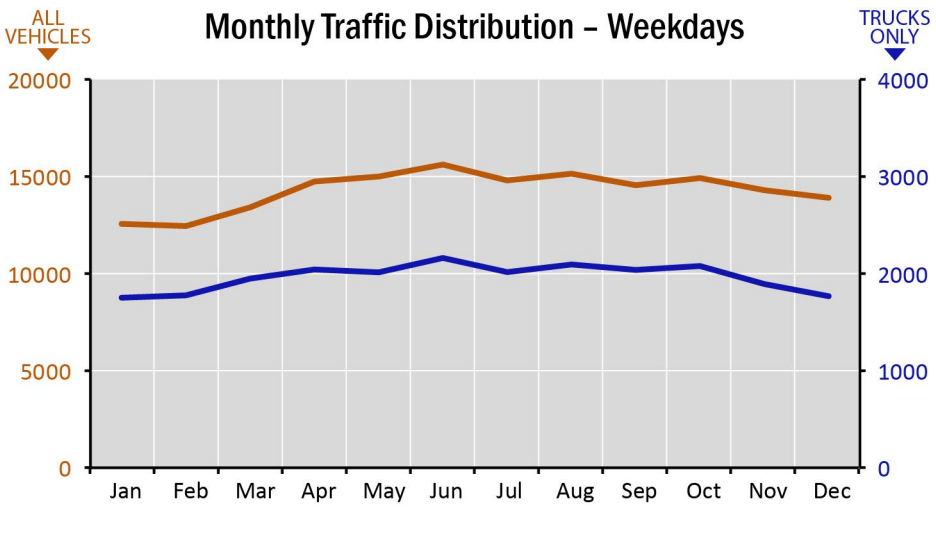
Change in Traffic Volume 2014- 2025 (AADT)

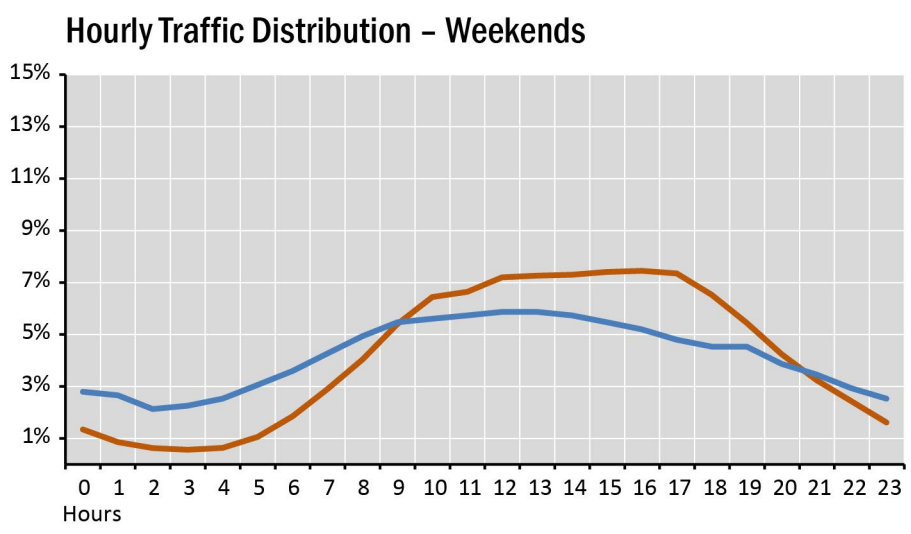


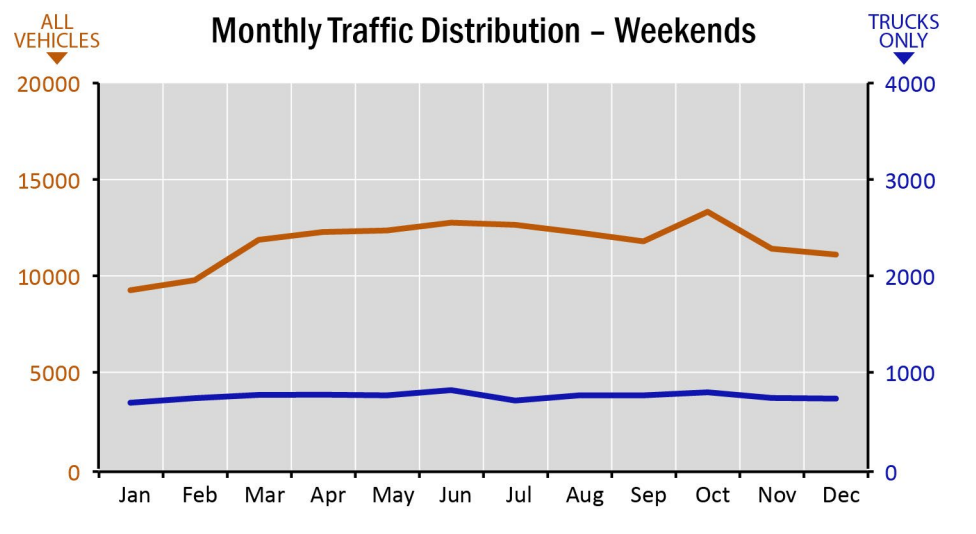


F1 SEGMENT PROFILE











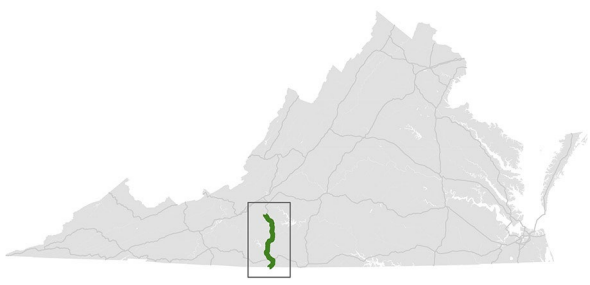
Traffic Distribution

On average, traffic on Segment F1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for eight percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 6.2 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 51 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic with a single peak period during the midday, showing a peak hourly flow of 6.8 percent of daily traffic between 1 and 2 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day with the peak hour flow between 4 and 5 p.m. (7.5 percent of daily traffic) for all traffic, and noon to 1 p.m. (5.9 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment F1 vary by as much as 25 percent throughout the year, with the highpoint in June (around 16,000 vehicles per day) and the low point in February (around 12,000 vehicles per day). Truck volumes also vary throughout the year, with the June high (around 2,000 vehicles per day) 23 percent higher than the January low (around 1,700 vehicles per day). The highest levels of weekend traffic (October, around 13,000 vehicles per day) are 44 percent higher than January levels (around 9,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 19 percent higher than the January low.

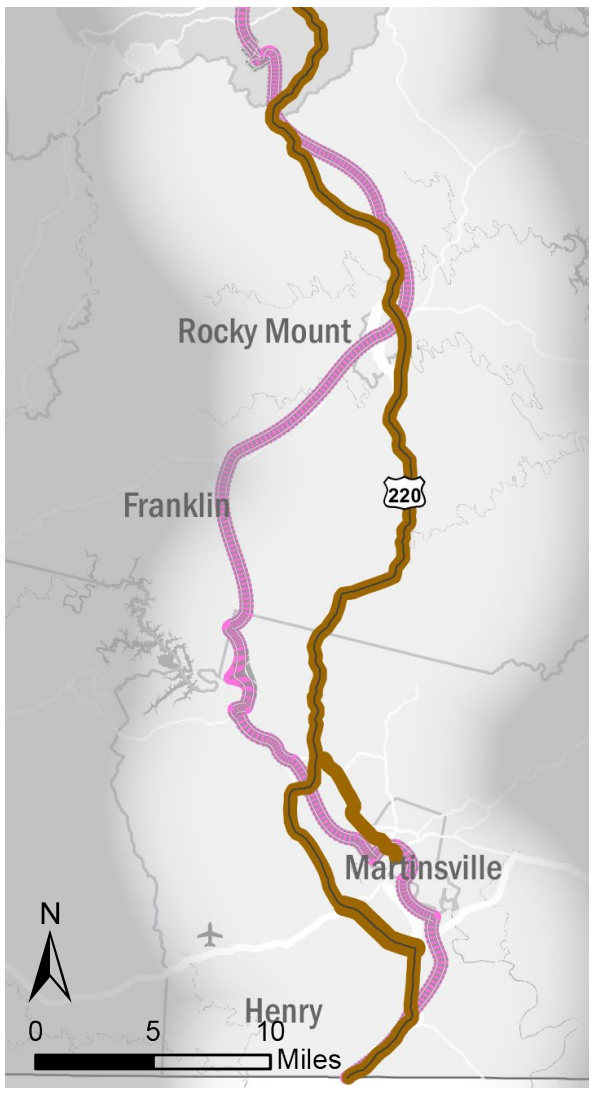
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment F1 is moderate compared to the other segments in Corridor F. On US 220 in Segment F1, heavy trucks comprise six to seven percent of total traffic. On US 220 Business, heavy trucks comprise less than five percent of daily traffic.



F1 SEGMENT PROFILE

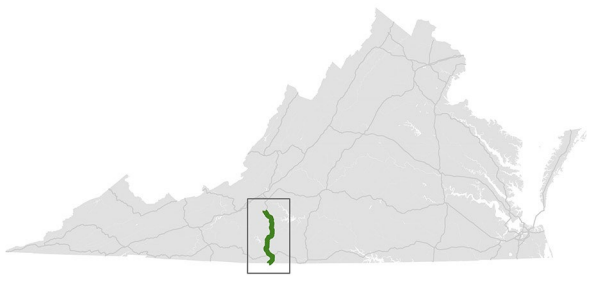
Annual Freight by Tonnage, 2012



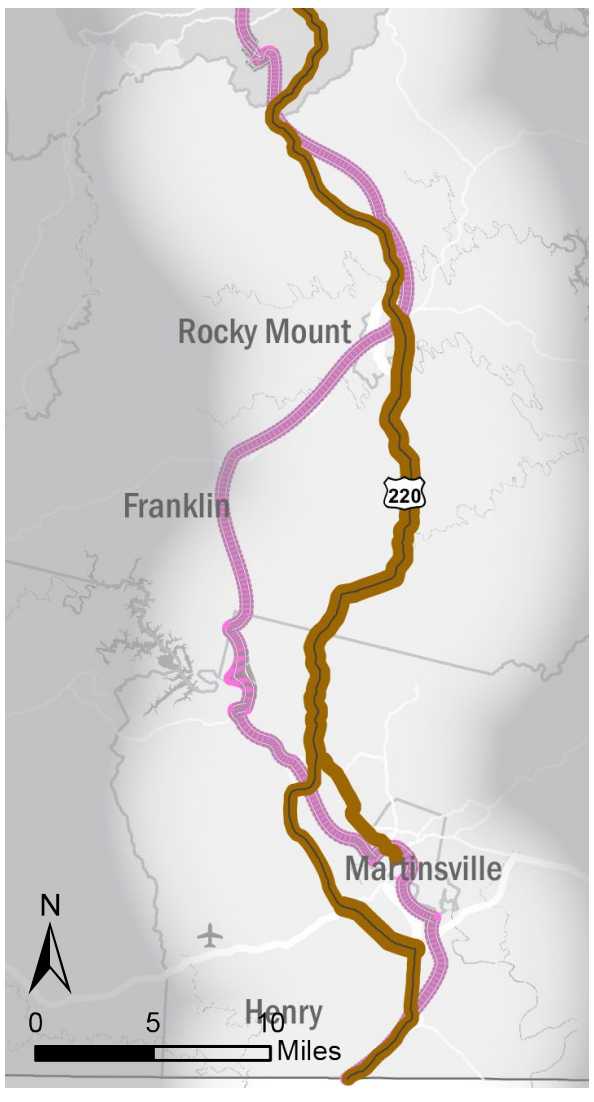
Freight Flows

On Segment F1 near Martinsville, freight is moved primarily by truck in relation to both tonnage and value. In total, 10.5 million tons (80 percent) of freight is moved through this section of Segment F1 by truck, compared to three million tons (20 percent) by rail. With respect to value, $12.5 billion (95 percent) of freight travels by truck, compared to $621 million (five percent) by rail. On average, a ton of freight traveling through this section of Segment F1 by truck is worth $1,189 while a ton of freight traveling by rail is worth $243. In 2025, both rail and truck freight tonnages and values in this area of Segment F1 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value to 83 percent and 95 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,191 and $294, respectively.

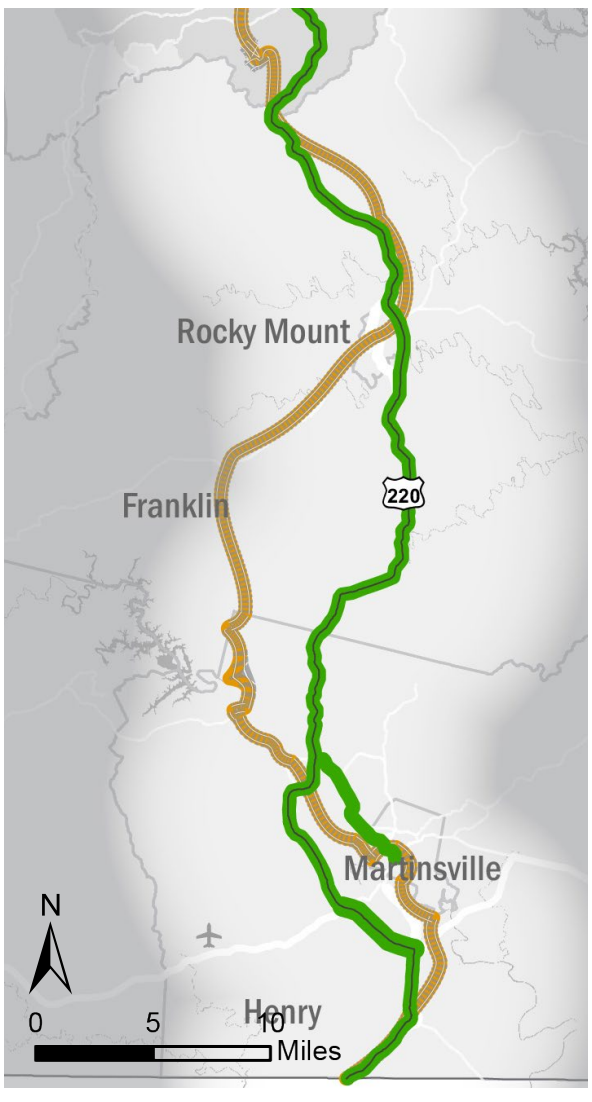
North of Rocky Mount, the majority of freight moves by truck, in terms of both tonnage and value. In total, eight million tons (75 percent) of freight travels through this section of Segment F1 by truck, compared to only three million tons by rail. With respect to value, $10 billion (93 percent) of freight travels by truck, compared to $711 million by rail. On average, a ton of freight traveling through this section of Segment F1 by truck is worth $1,233 while a ton of freight traveling by rail is worth $275. In 2025, both rail and truck freight tonnages and total values in Segment F1 are expected to increase. The percentage of freight traveling by truck is anticipated to increase by both tonnage and value to 78 percent and 93 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,219 and $337, respectively.



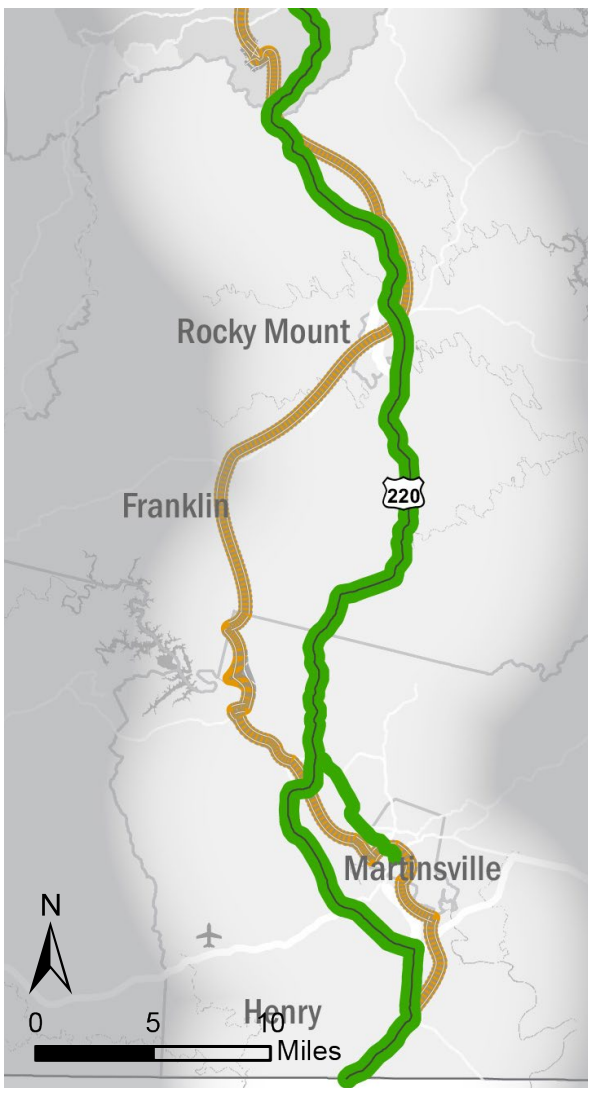
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Comparable Travel Options

Roanoke to Martinsville

Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

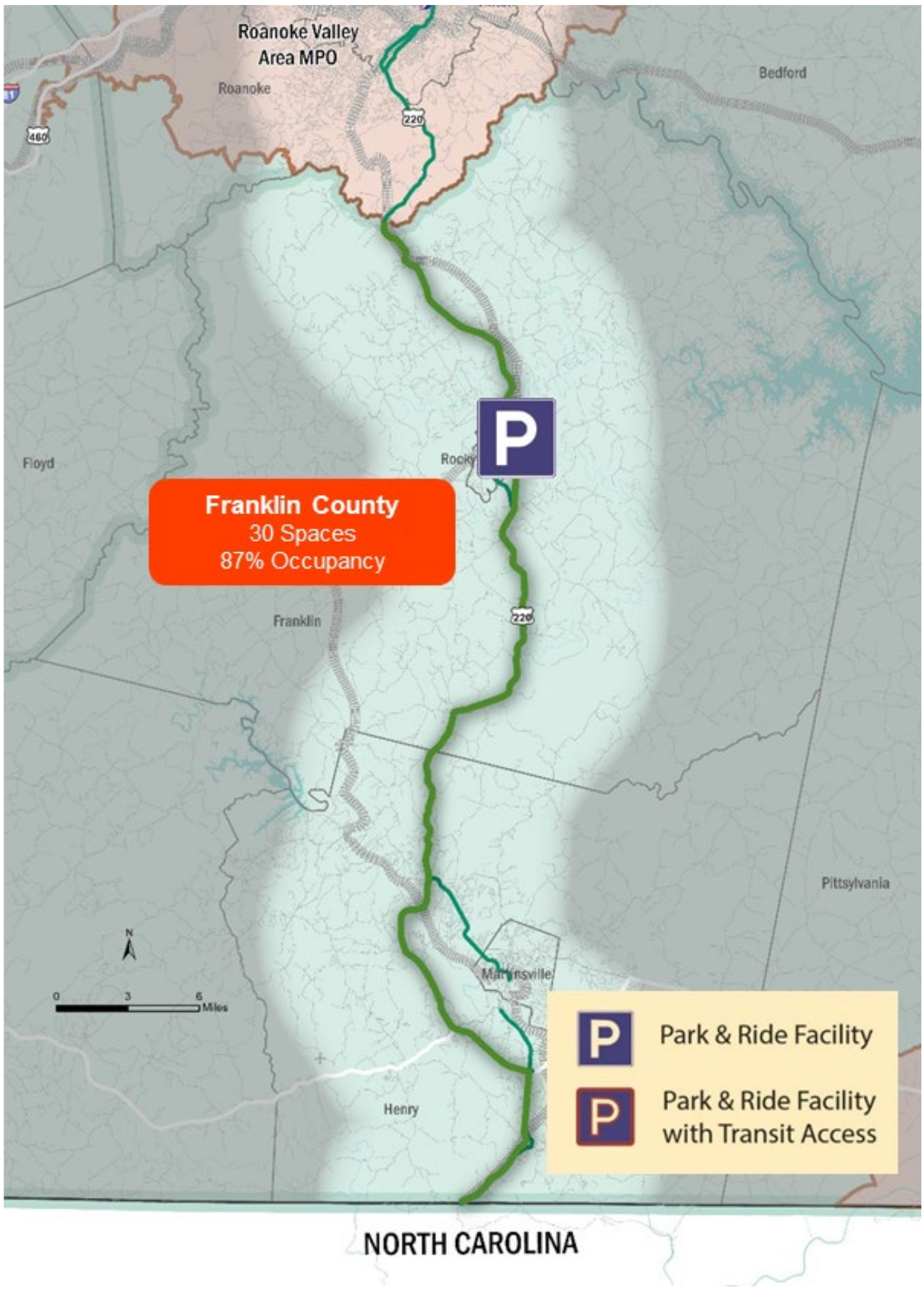
Auto
Via Rt. 220: 1:05 Travel Time $28 Est. Cost

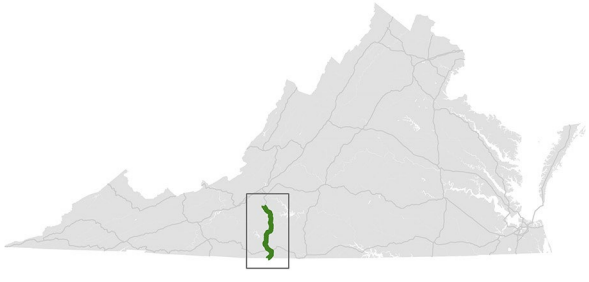
Passenger trips on Segment F1 have few travel options, both in terms of travel path and mode choice. There are no parallel facilities to US 220 in Segment F1 that accommodate inter-city travel. No alternate modes are available to passengers traveling on Segment F1. Roanoke Regional Airport does provide service to the area, but it does not facilitate travel within the corridor.

Park and Ride Facitilities

Park-and-Ride

Within Segment F1, commuters can utilize one Park-and-Ride facility located in Franklin County, while Henry County has no Park-and-Ride locations. This Park-and-Ride facility in Rocky Mount has 30 spaces and its utilization rate of 87 percent is higher than the statewide average of 76 percent for Park-and-Ride utilization.





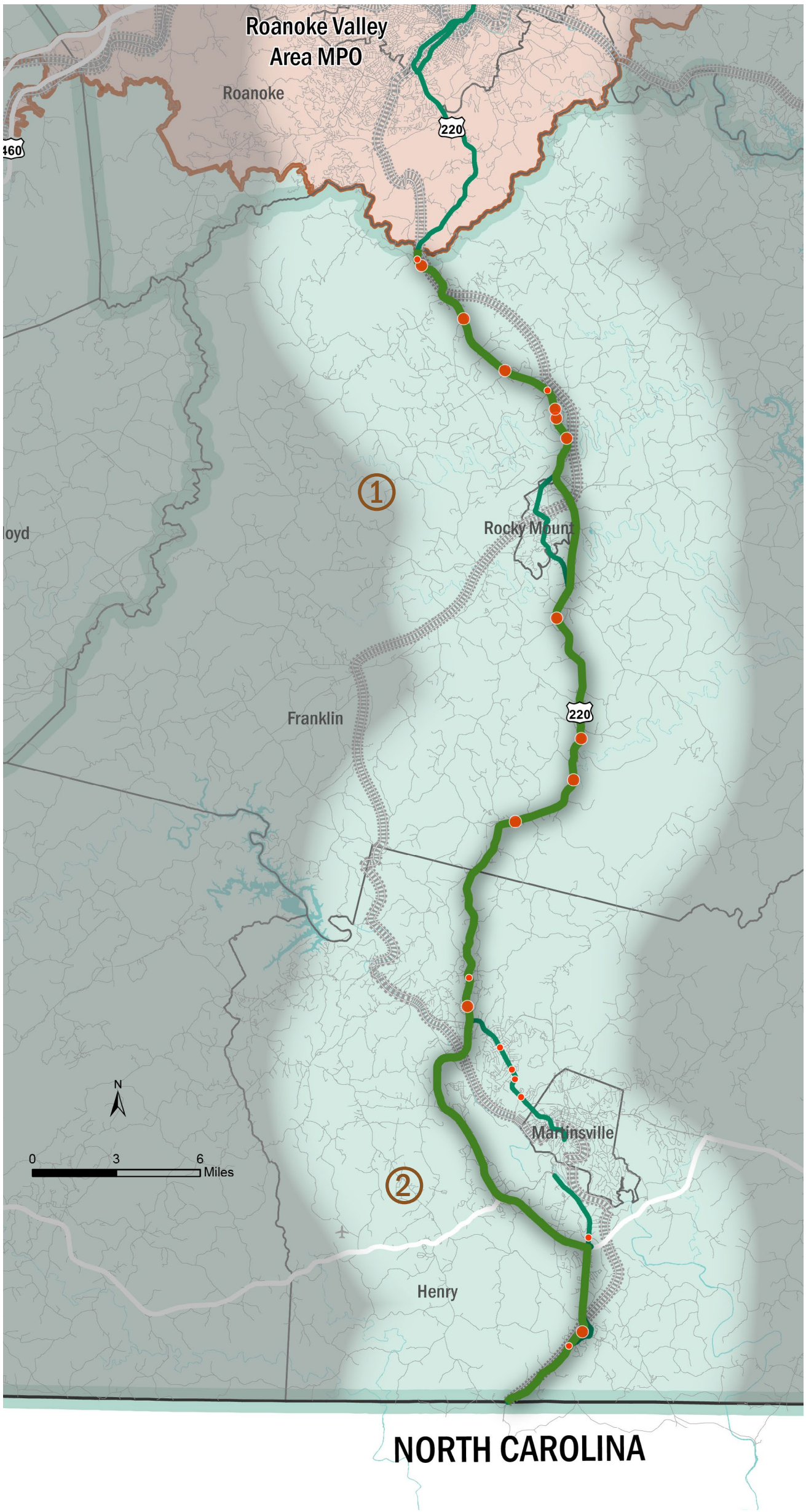
F1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	125
Severe Crashes/Million VMT	2.3
Number of Railroad Crashes	3

Between 2010 and 2012, 125 severe crashes occurred on Segment F1, resulting in the highest crash rate on the North Carolina to West Virginia Corridor. There are several locations along Segment F1 where high concentrations of severe crashes took place. In Ridgeway, south of Martinsville in Henry County, along US 220 (Greensboro Road), 15 collisions occurred within one mile at the intersections with Church Street (five crashes) and Morehead Avenue (ten crashes). In Collinsville, there were 12 incidents along 2.2 miles of US 220 Business (Virginia Avenue) between Eliza Reamy Avenue and Lafayette Avenue. On US 220 (Virgil H. Goode Highway) in Franklin County south of Rocky Mount, 20 crashes occurred over a 5.3-mile distance between Goose Dam Road and Henry Road. Also, on US 220 (Virgil H. Goode Highway) in Franklin County, there were 30 crashes over approximately 2.4 miles between Iron Ridge Road and Wooddale Drive.

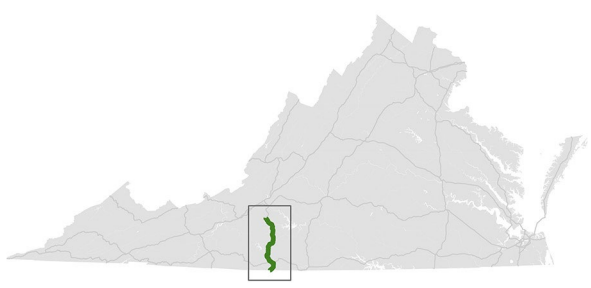


Fatality and Injury Crashes (2010 - 2012)

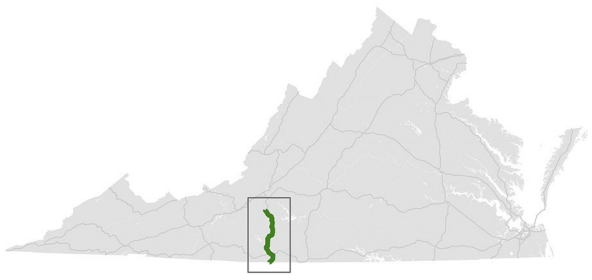
- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion



Performance Metrics

Person Hours of Delay per Mile	8
Freight Ton Hours of Delay per Mile	6.7K

Passenger Delays

Passenger traffic congestion along Segment F1 is minimal in most locations, with slightly over 1,000 person-hours delay across the corridor segment. The only location where passenger traffic experiences delays in excess of 100 person-hours per mile is on US 220 near Ridgeway in Henry County. Peak-period passenger delays account for 47 percent of daily congestion, slightly above average for the peak-period share of congestion along CoSS segments.

Freight Delays

Freight congestion along Segment F1 is minimal, with less than 850,000 ton-hours of delay daily. As such, there are no locations of significant freight delay on Segment F1. Peak-period freight delays account for about 40 percent of daily congestion, which is average for the peak-period share of congestion along CoSS segments.

Daily Person Hours of Delay Per Mile



Daily Freight Ton Hours of Delay Per Mile



Reliability

Weekday Peak

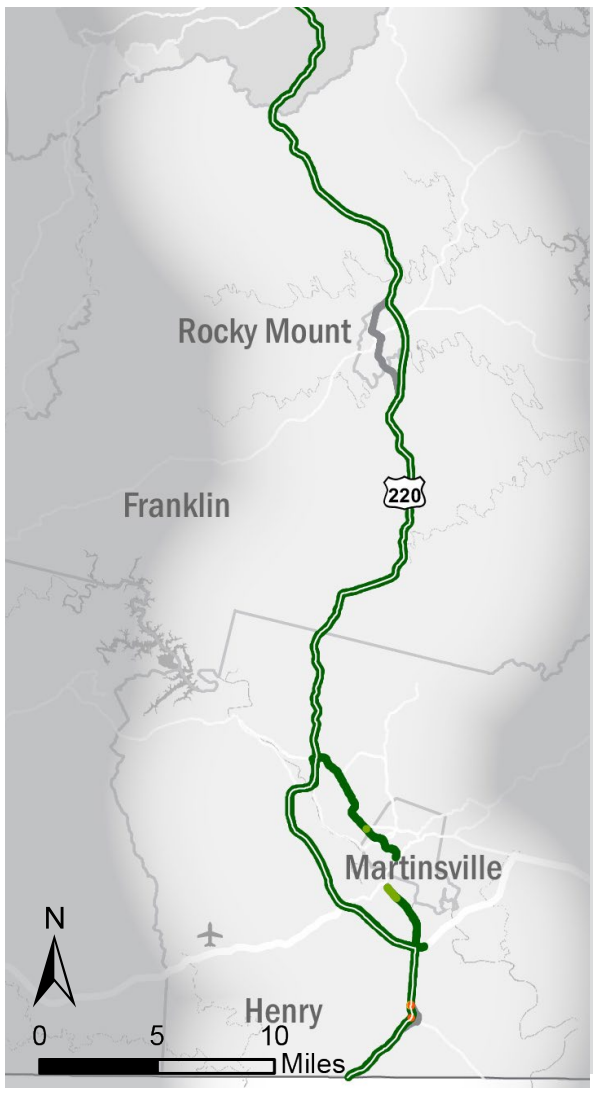
Reliability of travel during the peak period on a typical weekday on Segment F1 ranges from 0.00 to 0.70 in terms of reliability index, with an average value of 0.09. None of the locations along Segment F1 have reliability index values exceeding the statewide threshold.

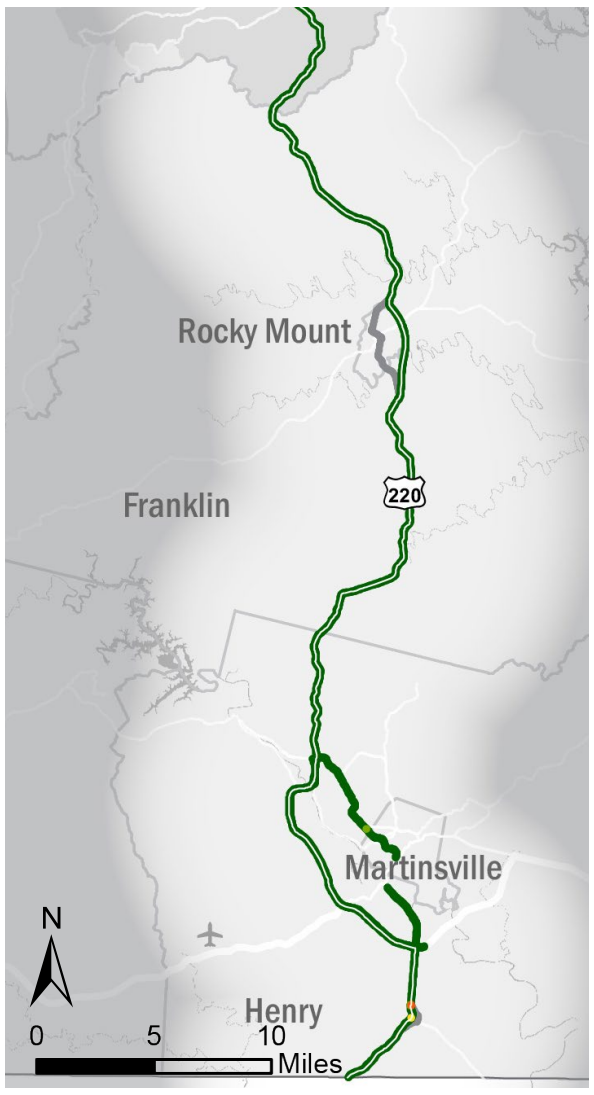
Weekday

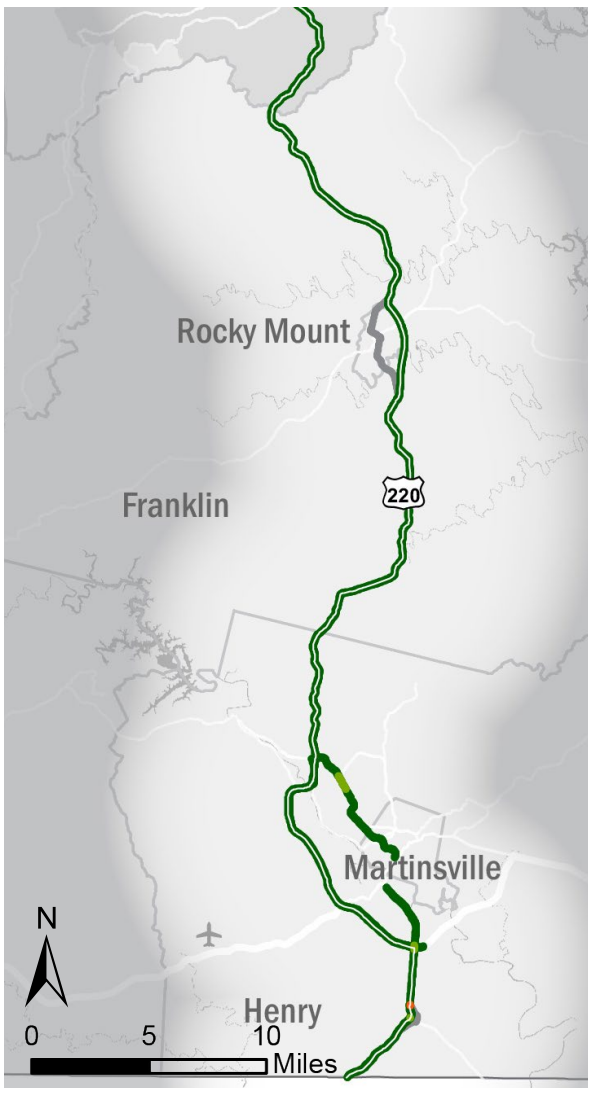
Reliability of travel during a typical weekday ranges from 0.01 to 0.67 in terms of reliability index, with an average value of 0.08. While Segment F1 has a lower weekday reliability index than average for the CoSS segments statewide, two locations on US 220 near Ridgeway in Henry County have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.71 in terms of reliability index, with an average value of 0.07. While Segment F1 has a lower weekend reliability index than average for the CoSS segments statewide, a short segment of US 220 near Ridgeway in Henry County has a reliability index value exceeding the statewide threshold.





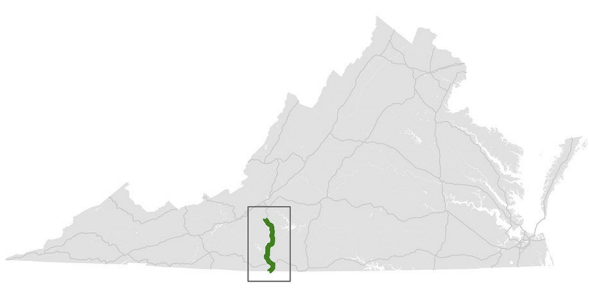


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

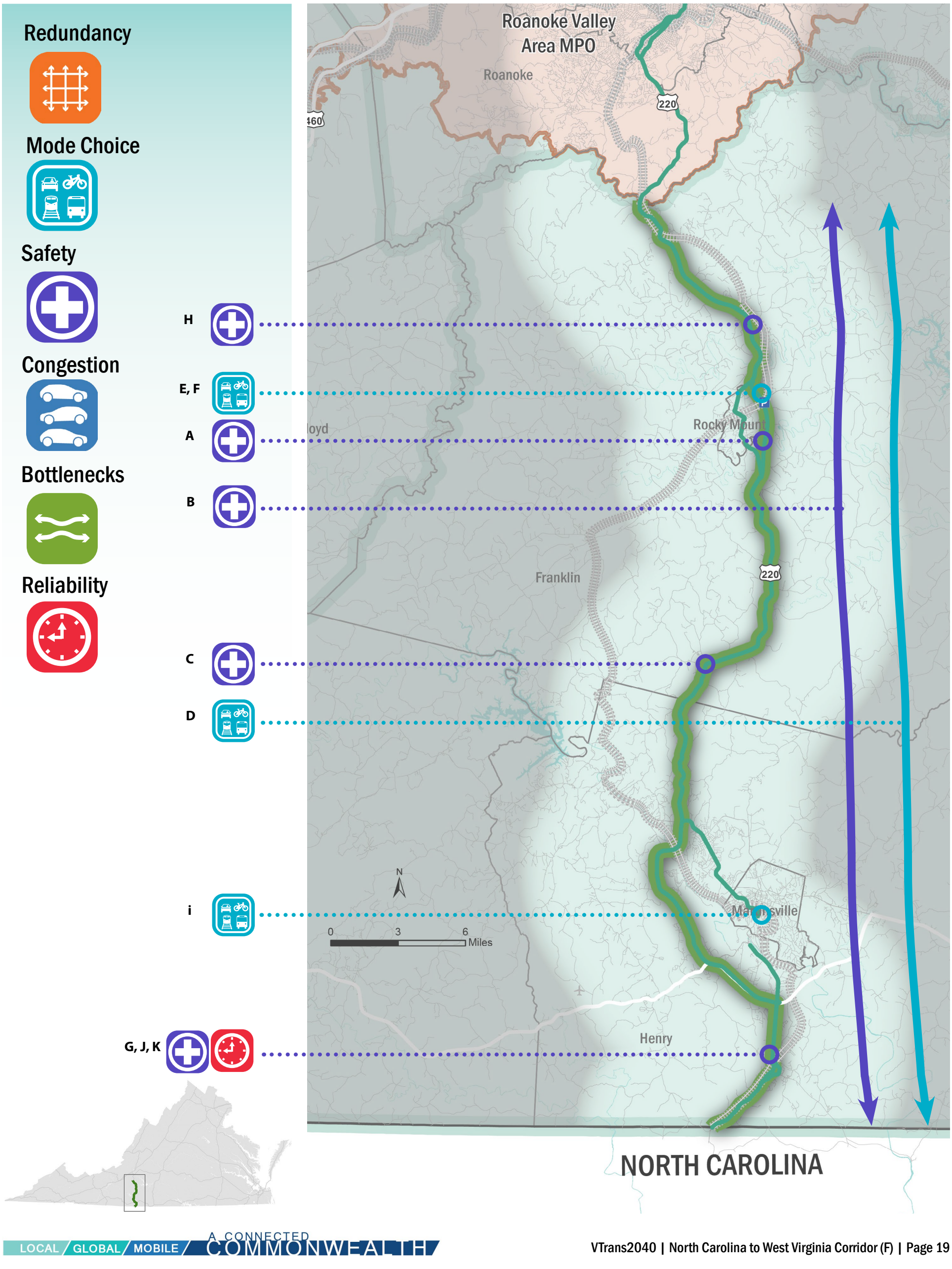
Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



F1 SEGMENT NEEDS

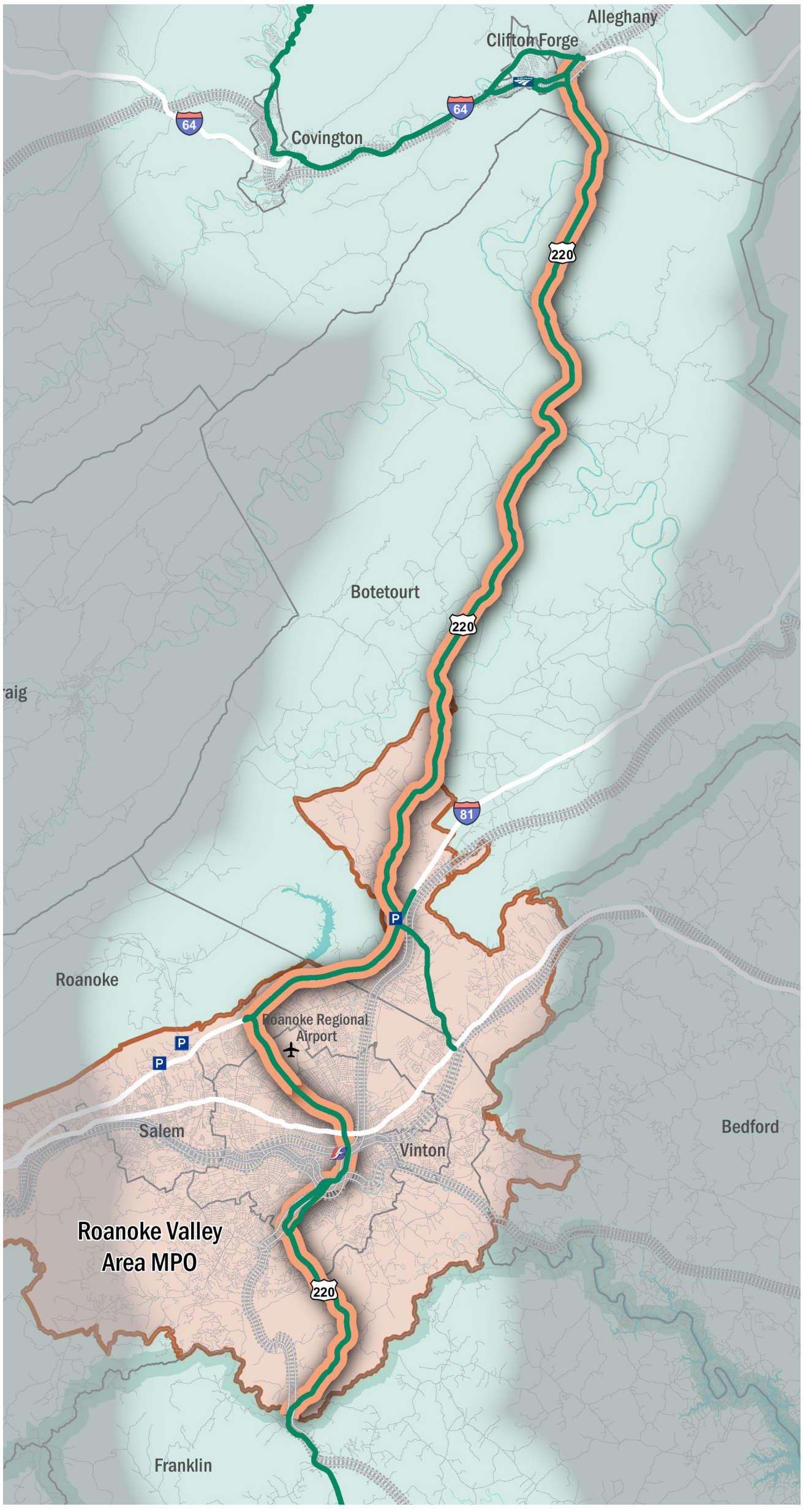
Summary of Needs - F1 Segment

A.		Safety issues caused by intersection geometry at US 220-Business at VA 40 in Rocky Mount
B.		US 220 in Franklin & Henry Counties: roadway geometry including sweeping turns and narrow shoulders not conducive to significant levels of truck traffic.
C.		US 220 between Goose Dam Road and Henry Rd in Franklin County: 20 severe crashes. Sharp horizontal curve at Henry Rd a safety concern for trucks.
D.		No bus or passenger rail service from Martinsville to other cities and towns in the corridor
E.		No bus or passenger rail service from Rocky Mount to other cities and towns in the corridor
F.		Park and Ride lot in Rocky Mount has a higher utilization rate than statewide average
G.		US 220 between Church St and Morehead Ave in Ridgeway: 15 severe crashes
H.		US 220 between Iron Ridge Rd and Wooddale Dr in Franklin County: 30 severe crashes
I.		Congestion issue at US 220 and Main Street in Ridgeway
J.		Reliability issue at US 220 and VA Route 87 (Morehead Avenue) in Ridgeway
K.		Reliability issue at US 220 and Main Street in Ridgeway

III. Segment F2

Corridor Segment F2 Components

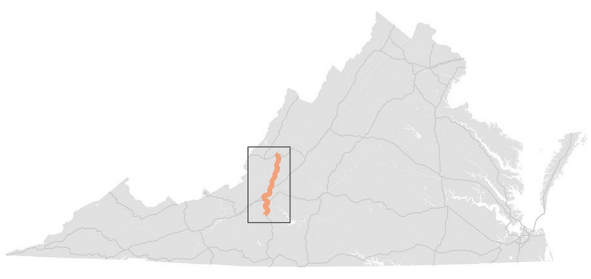
- US 220
- US 220 Business
- US 220 Alt
- Norfolk Southern
- Roanoke Regional Airport



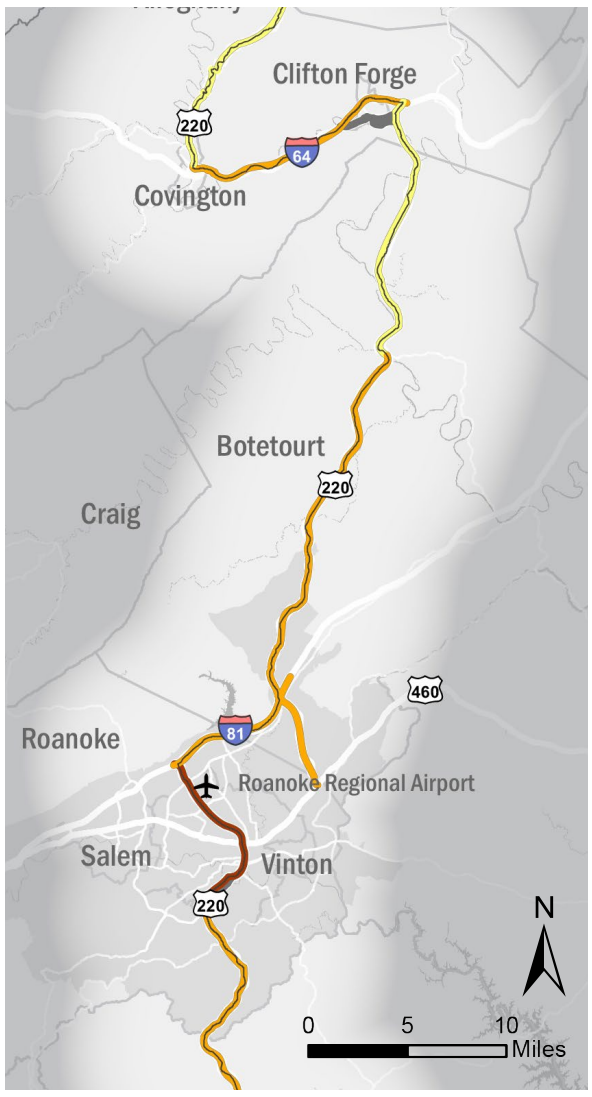
Segment F2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

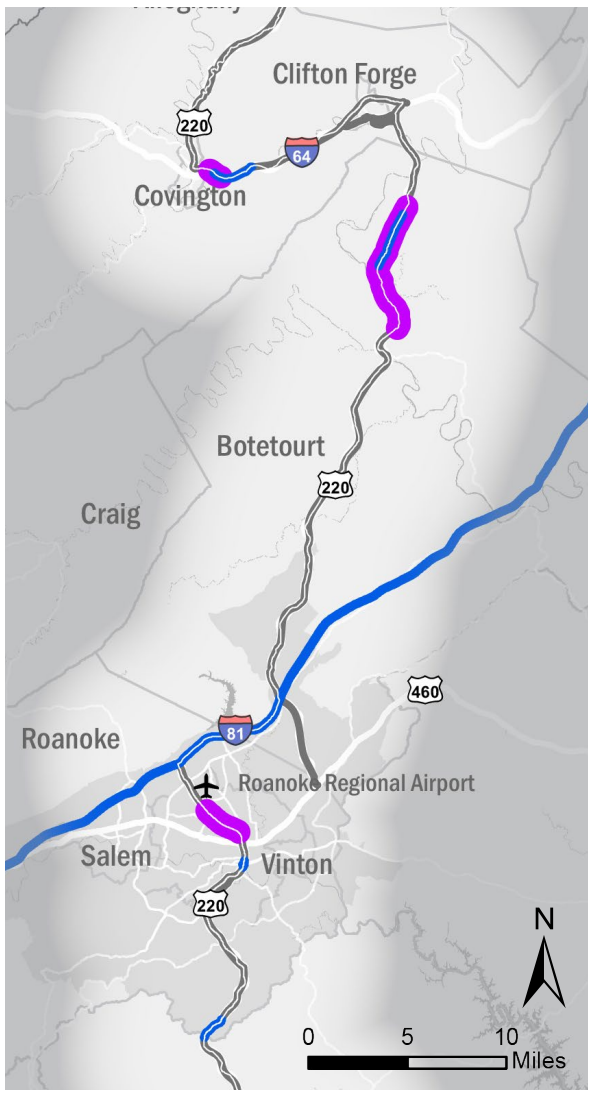


F2 SEGMENT PROFILE



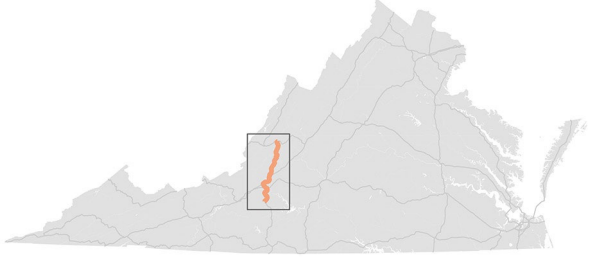
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



Segment F2 traverses the area covered by the Roanoke Valley Area, serving Roanoke and Botetourt Counties, and a portion of Alleghany County, in addition to the City of Roanoke, and terminating at the junction with I-64 near Clifton Forge. The primary facility is US 220, which serves as both a local access road through southwestern Virginia and as a throughway between North Carolina and West Virginia. In Roanoke, as the segment overlaps with I-81 and I-581, it serves as the main through corridor. North of Roanoke, the segment provides access to small communities and rural areas.

The section of US 220 between I-81 and I-64 (between Roanoke and Clifton Forge) is frequently used as a connection between the two interstates instead of the longer route through Lexington to the north and east. This connection is primarily used for freight travel between southern Virginia and areas west, though passenger travel also utilizes this route.

Highway Facilities: In this segment, US 220 is primarily a four-lane roadway. Through Roanoke, it runs concurrently with I-581 (six lanes) and I-81 between Exit 143 and Exit 150 where it is a six-lane facility. North of I-81, US 220 continues as a four-lane facility until approximately 20 miles north of Roanoke before transitioning to a two-lane rural facility. Segment F2 also includes US 220 Business in the southern portion of the City of Roanoke and US 220 Alternate connection US 220 and US 221 in Botetourt County.

Transit Services: Roanoke Area Dial-a-Ride (RADAR) provides an express bus service between Iron Gate and Covington in Alleghany County, called the Alleghany Highlands Mountain Express, a portion of which operates on Segment F2. In addition, Greyhound service is available in Roanoke, and six Park-and-Ride locations are located in the corridor.

Rail Facilities: Norfolk Southern rail lines, which provide freight rail access in this region, run within the North Carolina to West Virginia Corridor between Martinsville and Roanoke, connecting to the Crescent Corridor and Heartland Corridor in Roanoke.

Port Facilities: No port facilities are directly accessible from Segment F1.

Airport Facilities: The Roanoke Regional Airport provides commercial air service to several major cities and connecting service to the hubs of four major airlines. This airport also provides general aviation service.

Major planned and future projects include:

City of Roanoke:

- Complete the interchange at Valley View Boulevard and construct auxiliary lanes west of Valley View Boulevard ramps connecting to the Hershberger Road ramps.

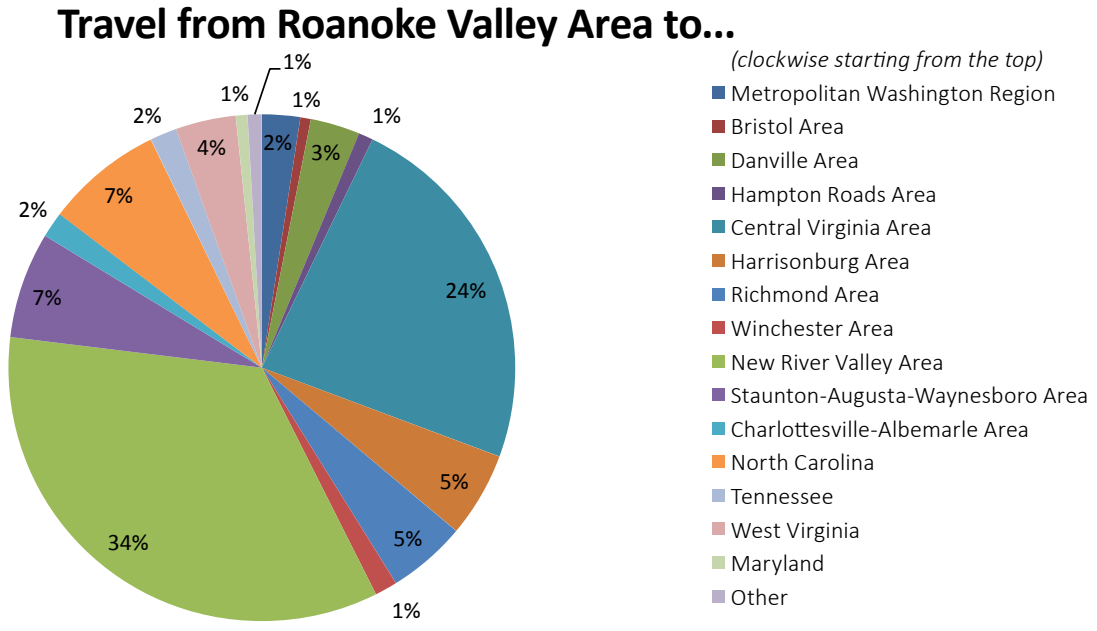
Botetourt County:

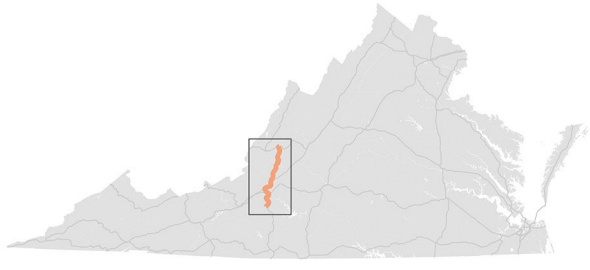
- Reconstruction with added lanes from just south of Route 43 to about a half-mile north of Route 696 to include roadway striping, raised pavement markers, regrading existing shoulders, upgrading or installing guard rail, replacing narrow bridges, and turn lane improvement;
- Widen US 220 from two to four lanes just south of Route 722; and
- Access management project for US 220 and US 220 Alternate near I-81 Exit 150.

Travel Demand

Passenger Demand

Segment F2 traverses the Roanoke Valley Area, and provides connections between I-64 in the north (Corridor C) and I-81 (Corridor B) and US 460 (Corridor E) in the south. Of the intercity passenger travel originating in the Roanoke Valley Area, seven percent is destined for North Carolina and four percent is destined for West Virginia. Depending on the ultimate destination within those states, these travelers may use Segment F2 for their trips. In addition, three percent of intercity travel from the Roanoke Valley Area is destined for the Danville area using Segment F1.





F2 SEGMENT PROFILE

Freight Demand

By truck, Segment F2 carried six million tons of freight worth $9 billion in 2012, and is estimated to carry eight million tons of freight worth $11 billion in 2025. The major truck freight patterns on this corridor are interstate through movements, accounting for approximately 55 percent of the total truck tonnage and more than 64 percent of the total corridor truck freight value. There are significant flows on Corridor F between the Southeastern and Middle Atlantic regions. North Carolina, Pennsylvania, and Tennessee are major truck freight generators on this corridor, accounting for more than 20 percent of truck tonnage on Corridor F. North Carolina, New York, and Pennsylvania are major truck freight attractors on Corridor F, accounting for 24 percent of truck tonnage. Within Segment F2, Botetourt County and the City of Roanoke have significant truck freight flow movements to and from North Carolina and Pennsylvania, accounting for between one and three percent of the total truck freight corridor tonnage.

By rail, Segment F2 carried six million tons of freight worth $710 million in 2012, and is estimated to carry six million tons of freight worth $920 million in 2025. In terms of tonnage, the largest rail flow on Corridor F is from West Virginia to North Carolina, accounting for more than 44 percent of the total rail tonnage in the corridor. Another significant rail freight movement on Corridor F is from West Virginia to South Carolina, accounting for more than 14 percent of the total rail tonnage on the corridor. In terms of value, the largest rail freight movements on Corridor F are between Ohio and the Carolinas, accounting for more than 26 percent of the total rail value. The jurisdictions adjacent to Segment F2 are major generators and attractors of rail freight on Corridor F. In terms of value, 29 percent of the rail freight is generated along this segment and approximately 20 percent of the rail freight is destined for the area jurisdictions along Segment F2. There is a major rail freight movement from the City of Roanoke to West Virginia, accounting for about ten percent of the total rail freight value on the corridor.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (26% / 27%)
2. North Carolina (10% / 9%)
3. Tennessee (7% / 7%)
4. Pennsylania (7% / 7%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment F2: 7% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
New York and Georgia
New York and Tennessee
New Jersey and Texas

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (8% / 8%)
3. New York (8% / 8%)
4. Pennsylvania (8% / 8%)
5. New Jersey (5% / 5%)

Corridor Tonnage Destined for Segment F2: 8% / 7%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (70% / 62%)
2. Virginia (13% / 17%)
3. City of Roanoke (11% / 13%)
4. South Carolina (6% / 7%)
5. North Carolina (5% / 6%)

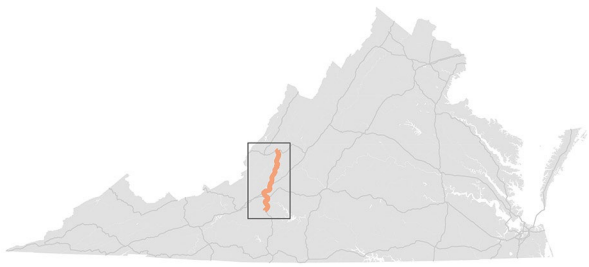
Corridor Tonnage Originating in Segment F2: 12% / 14%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (51% / 46%)
2. South Carolina (17% / 15%)
3. Virginia (10% / 12%)
4. Ohio (7% / 8%)
5. West Virginia (4% / 5%)

Corridor Tonnage Destined for Segment F2: 7% / 9%

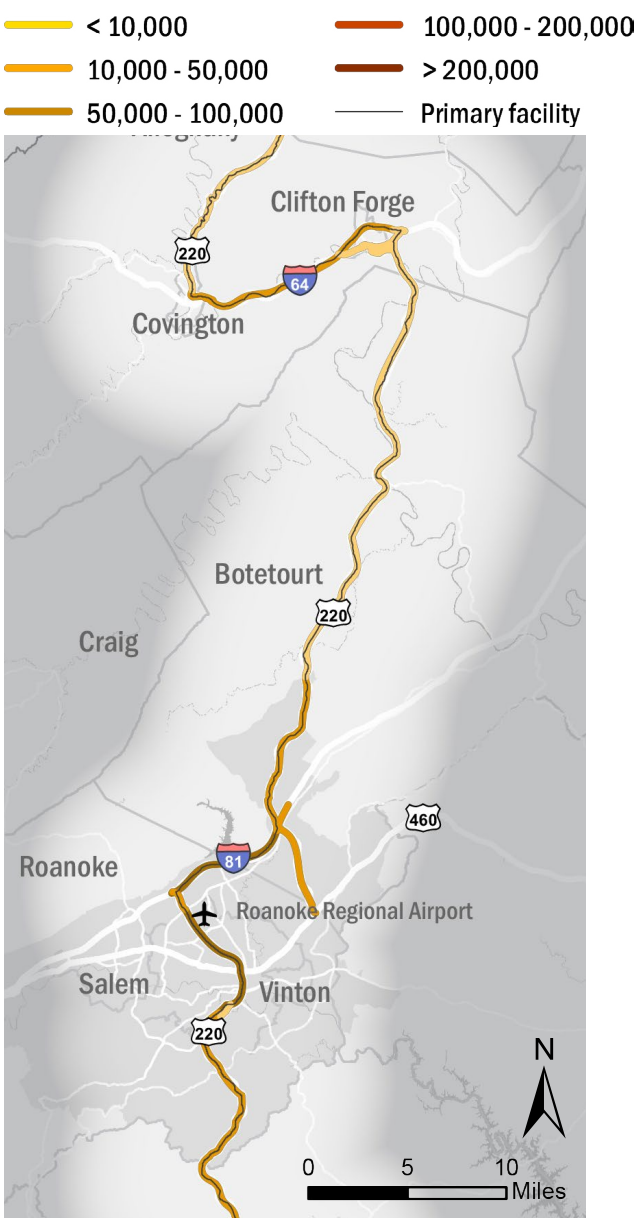


Traffic Conditions

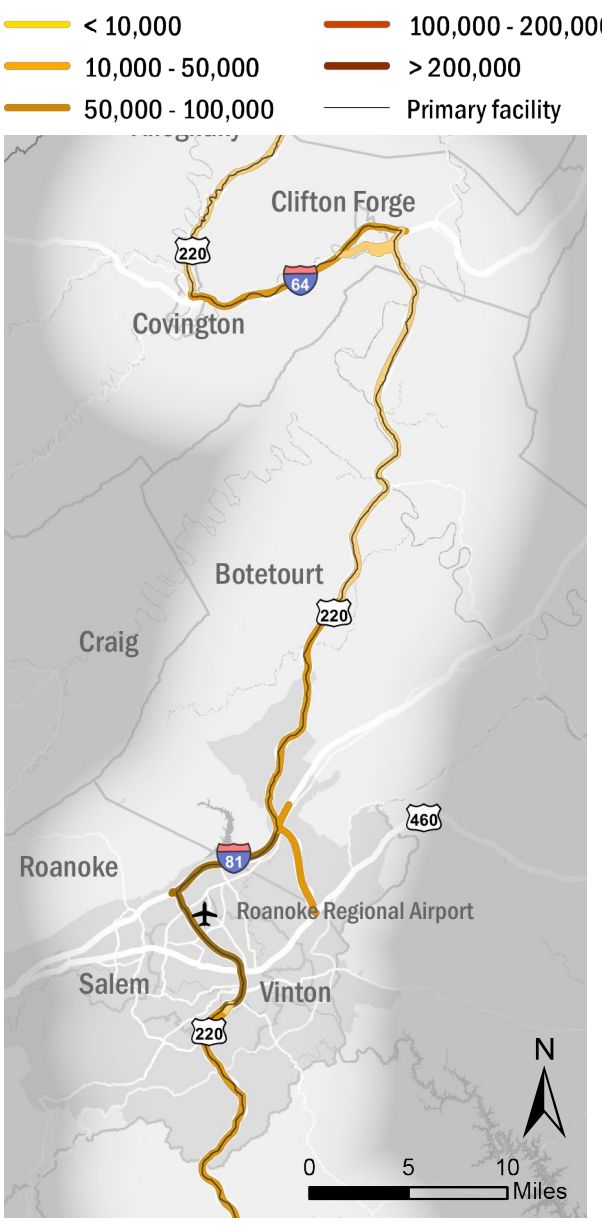
Traffic Volume

Traffic volume on Segment F2 is high compared to traffic volumes throughout the rest of Corridor F and varies considerably based on location. Volumes on the segment are highest where US 220 runs concurrently with I-81 and I-581, where they can reach more than 76,000 vehicles per day. South of US 220 Business in Roanoke County average daily traffic volumes range from 29,000 to 37,000 vehicles. Along US 220 north of the area covered by the Roanoke Valley Area, traffic volumes are less than 9,000 vehicles per day. By 2025, traffic growth is expected throughout the corridor, with the highest growth forecasted where US 220 runs concurrently with I-81 and I-581.

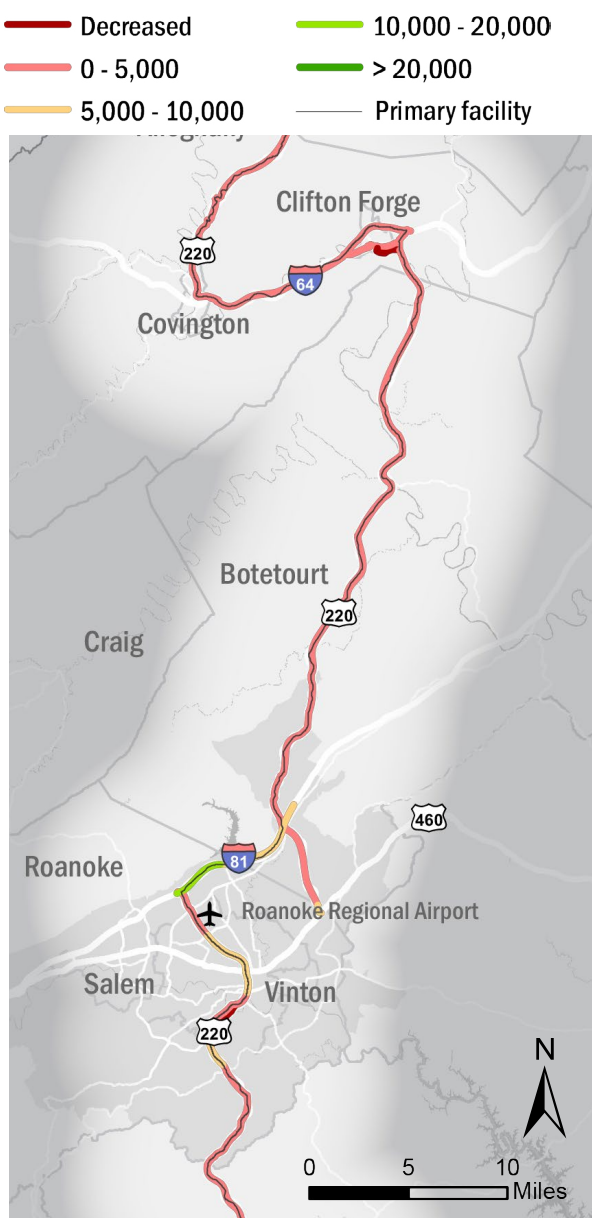
Traffic Volume 2014 (AADT)

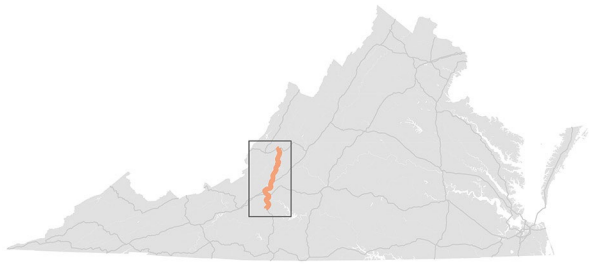


Traffic Volume 2025 (AADT)

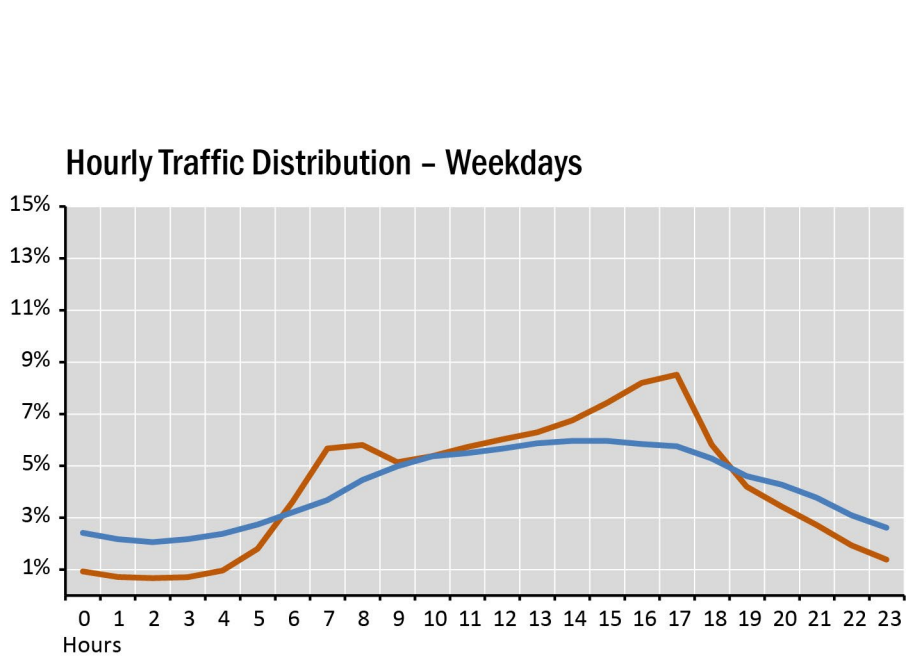


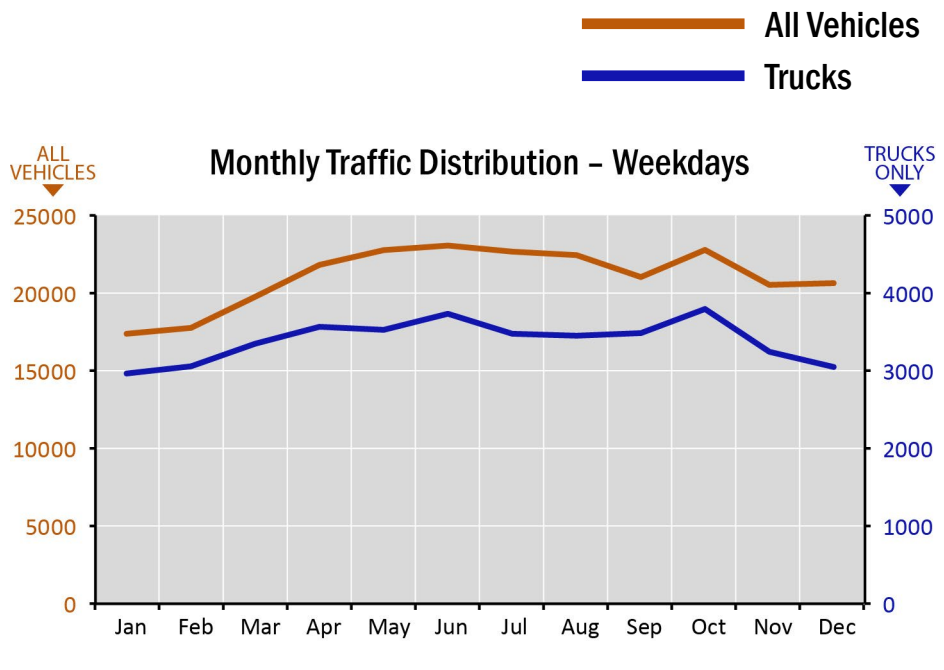
Change in Traffic Volume 2014- 2025 (AADT)

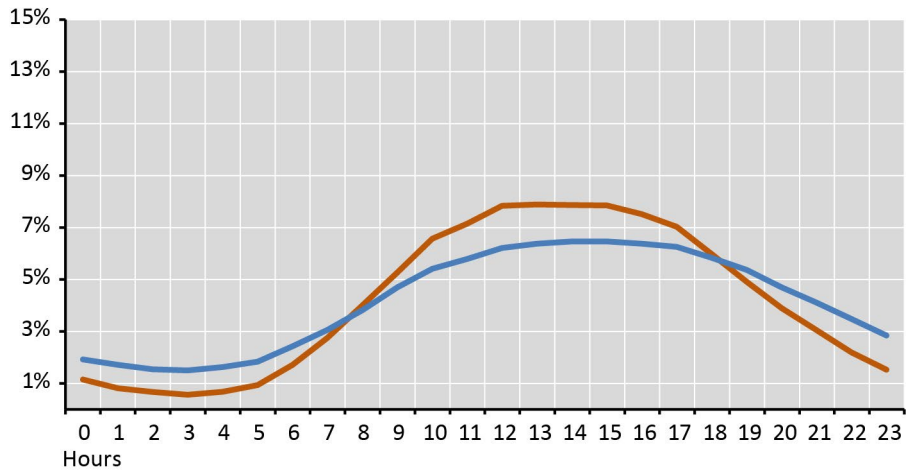


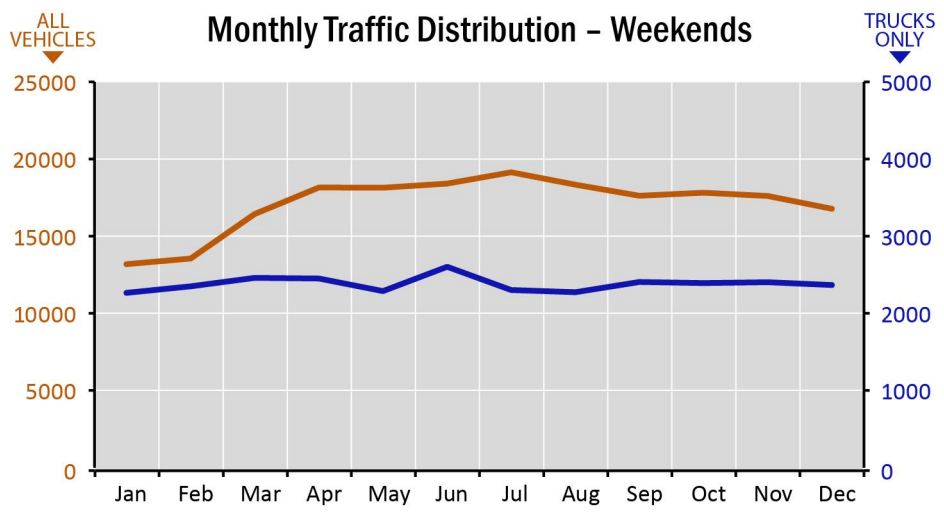


F2 SEGMENT PROFILE





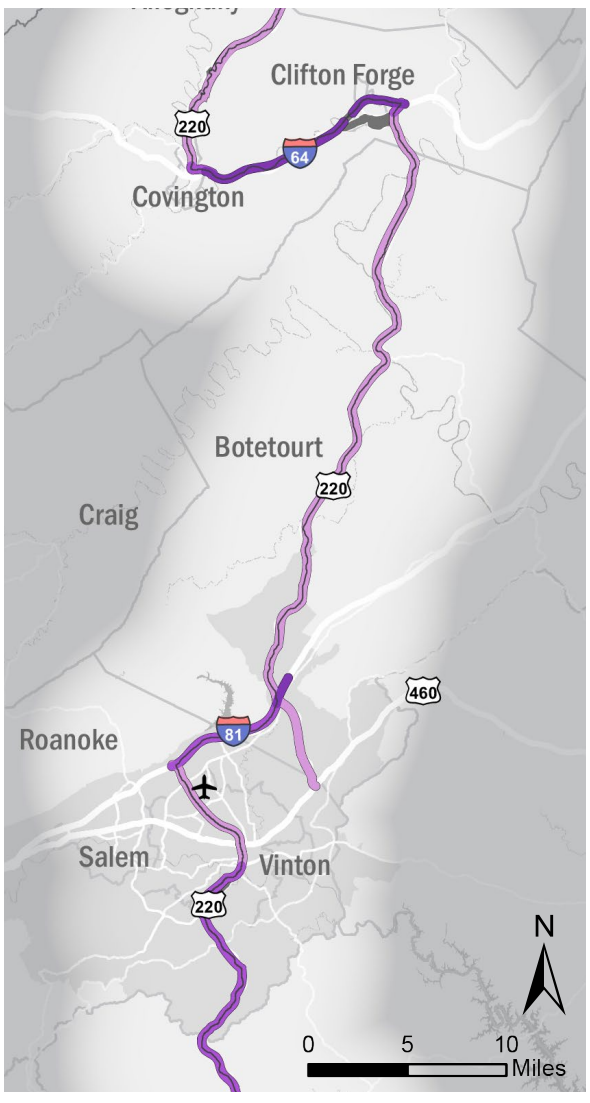




Traffic Distribution

On average, traffic on Segment F2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day. The evening peak hour is between 5 and 6 p.m. (8.5 percent of daily traffic) and a less busy morning peak between 8 and 9 a.m. accounting for 5.8 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 77 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic with a single peak during the midday period with a peak hourly flow of six percent of daily traffic between 3 and 4 p.m. Weekend traffic shows a single midday peak for between 1 and 2 p.m. (7.9 percent of daily traffic) for all traffic, and 2 to 3 p.m. (6.5 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment F2 vary by as much as 33 percent throughout the year, with the highpoint in June (around 23,000 vehicles per day) and the low point in January (around 17,000 vehicles per day). Truck volumes also vary throughout the year, with the October high (around 4,000 vehicles per day) 28 percent higher than the January low (around 3,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (July, around 19,000 vehicles per day) are 45 percent higher than January levels (around 13,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 15 percent higher than the January low. Truck volumes account for a significant portion of traffic on Segment F2 (16 percent of overall daily traffic for weekdays and 14 percent of overall daily traffic for weekends); as a result truck traffic has an impact on overall traffic conditions.

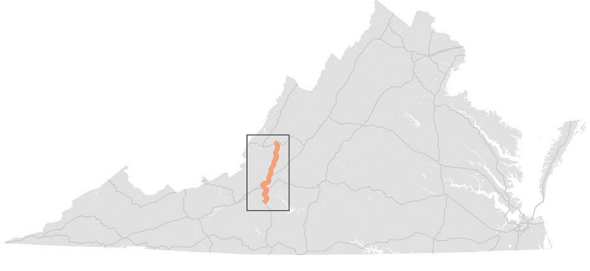


Truck Volumes

The percent of average daily traffic comprised of heavy trucks on Segment F2 varies considerably based on location. Trucks comprise three percent of daily traffic on US 460 in Botetourt County and in the City of Roanoke where US 460 runs concurrently with I-581. On the portion of US 460 that runs concurrently with I-81, heavy trucks comprise between ten and fifteen percent of daily traffic. Elsewhere is Segment F2, heavy trucks comprise five to six percent of daily traffic.

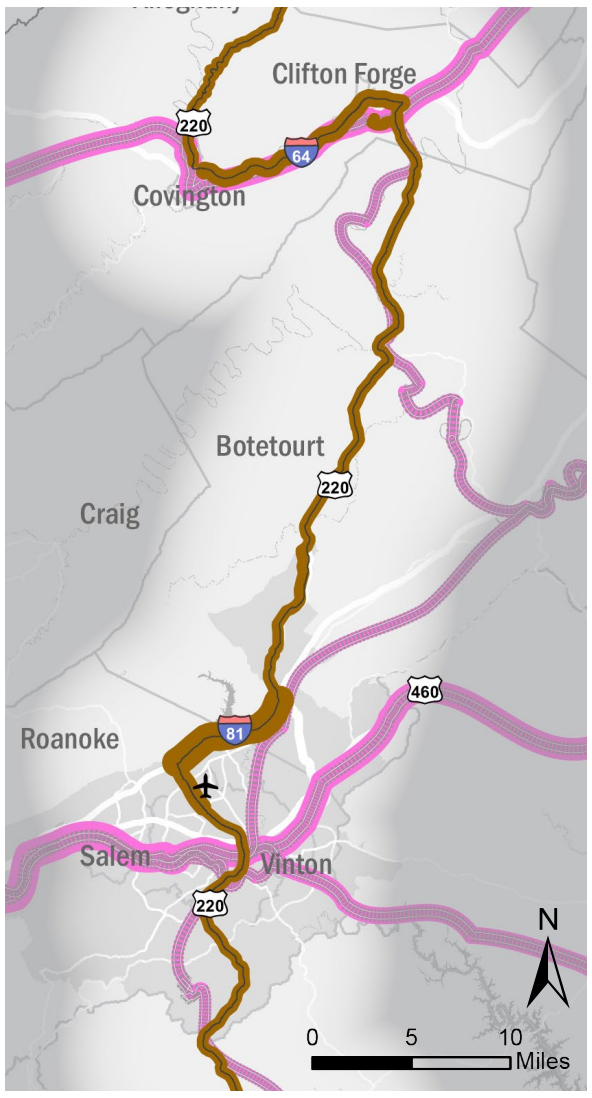
Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



F2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

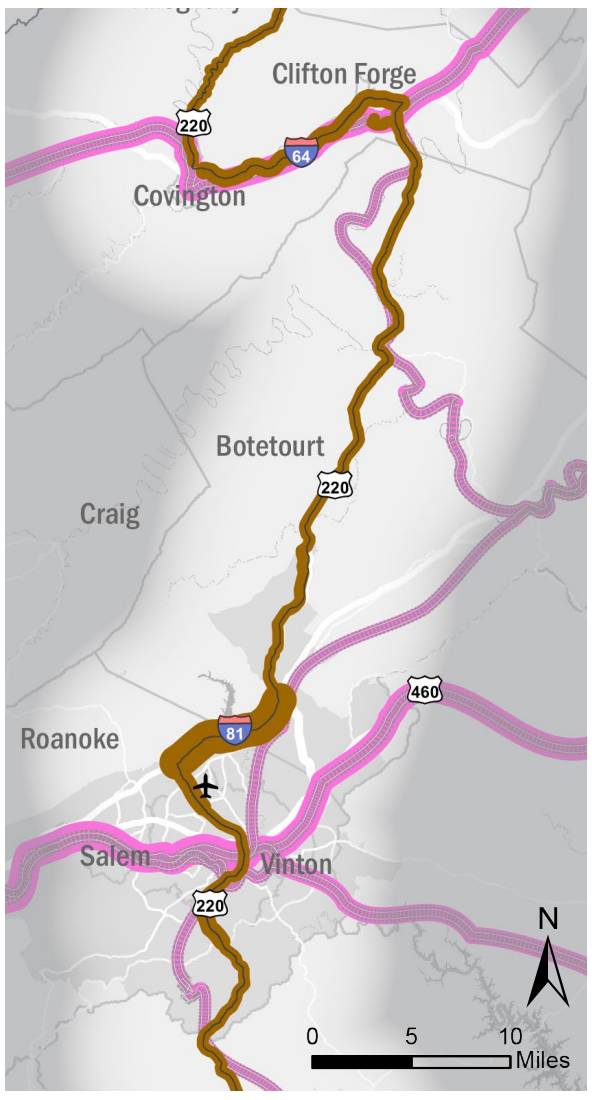


Freight Flows

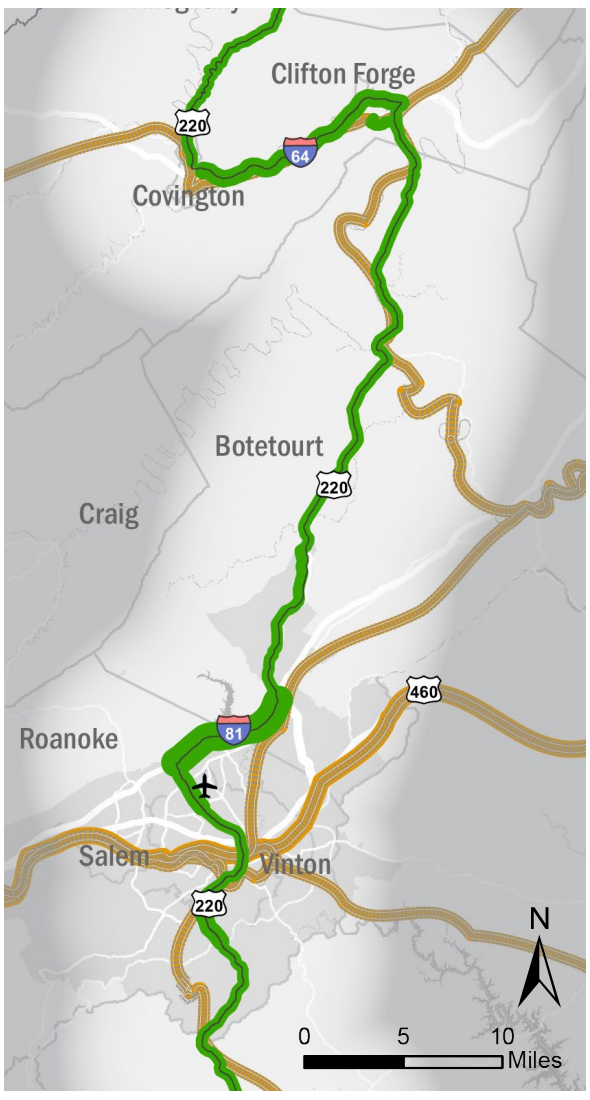
South of the City of Roanoke freight on Segment F2 is moved primarily by truck in relation to both tonnage and value. In total, more than six million tons (71 percent) of freight is moved through this section of Segment F2 by truck, compared to less than three million tons (29 percent) by rail. By value, $8.5 billion (92 percent) of freight value travels by truck, compared to $711 million (eight percent) by rail. On average, a ton of freight traveling through this section of Segment F2 by truck is worth $1,352 while a ton of freight traveling by rail is worth $275. In 2025, both rail and truck freight tonnages and total values in this area of Segment F2 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value to 74 percent and 92 percent, respectively. It is anticipated that freight value per ton on trucks and rail will increase to $1,383 and $337, respectively.

In the northern portion of Segment F2 in Botetourt County, freight is moved primarily by rail in relation to tonnage and by truck in relation to value. In total, just over one million tons (17 percent) of freight is moved through this section of Segment F2 by truck, compared to almost six million tons (83 percent) by rail. By value, $645 million (52 percent) of freight value travels by truck, compared to $584 million (48 percent) by rail. On average, a ton of freight traveling through this section of Segment F2 by truck is worth $547 while a ton of freight traveling by rail is worth $104. In 2025, both rail and truck freight tonnages and total values in this area of Segment F2 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value to 23 percent and 52 percent, respectively. It is anticipated that freight value per ton on trucks and rail will increase to $562 and $157, respectively.

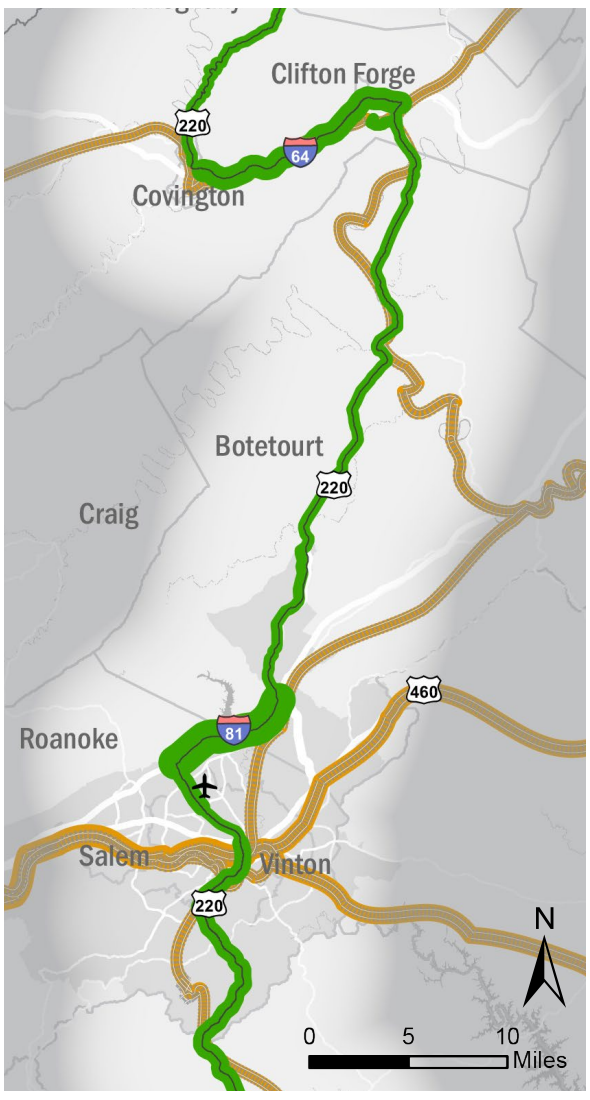
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

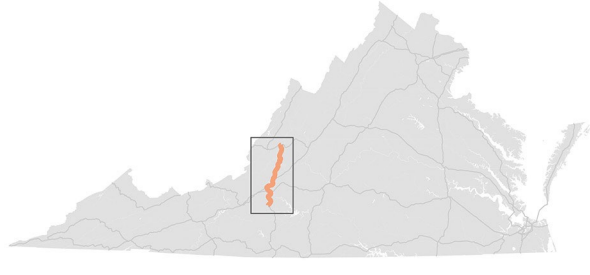
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Clifton Forge to Roanoke

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $00 Est. Cost

Auto

Via Rt. 220: 0:55 Travel Time $27 Est. Cost

Roanoke to Martinsville

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 220: 1:05 Travel Time $28 Est. Cost

Roanoke to Franklin, WV

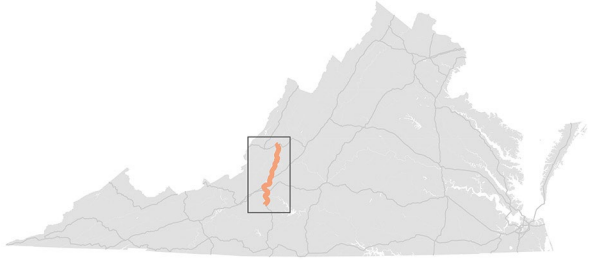
Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 220: 2:49 Travel Time $78 Est. Cost

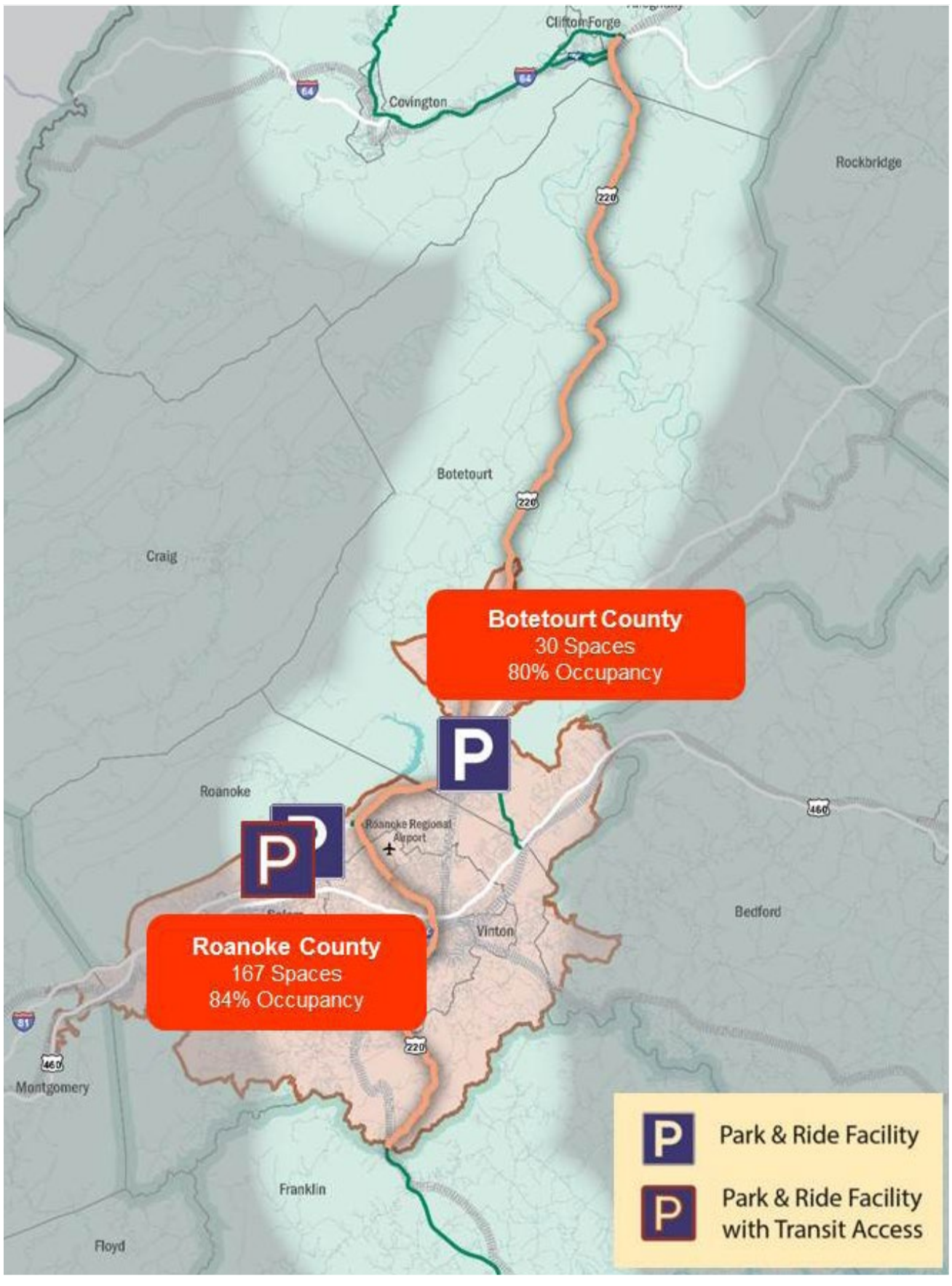
Park-and-Ride

Within Segment F2, commuters can utilize several Park-and-Ride facilities, all of which are located in Roanoke County. Roanoke County has six Park-and-Ride locations and a total of 167 spaces. The Park-and-Ride locations in Roanoke County are heavily used, at a rate of 84 percent, which is higher than the statewide average of 76 percent for Park-and-Ride utilization.



Passenger trips on Segment F2 have limited travel options, both in terms of travel path and mode choice. Aside from the portion within the Roanoke Valley Area, there are no parallel facilities to US 220 in Segment F2. Where US 220 runs concurrently with I-81 and I-581, parallel facilities including US 11 are available. Bus service for inter-city travel is extremely limited with service Thursday to Sunday only between Ferrum College and downtown Roanoke, and the Alleghany Highlands Mountain Express, which connects Iron Gate and Covington. Greyhound offers service from Roanoke, but its routes do not facilitate travel along the corridor.

Park and Ride Facitilities



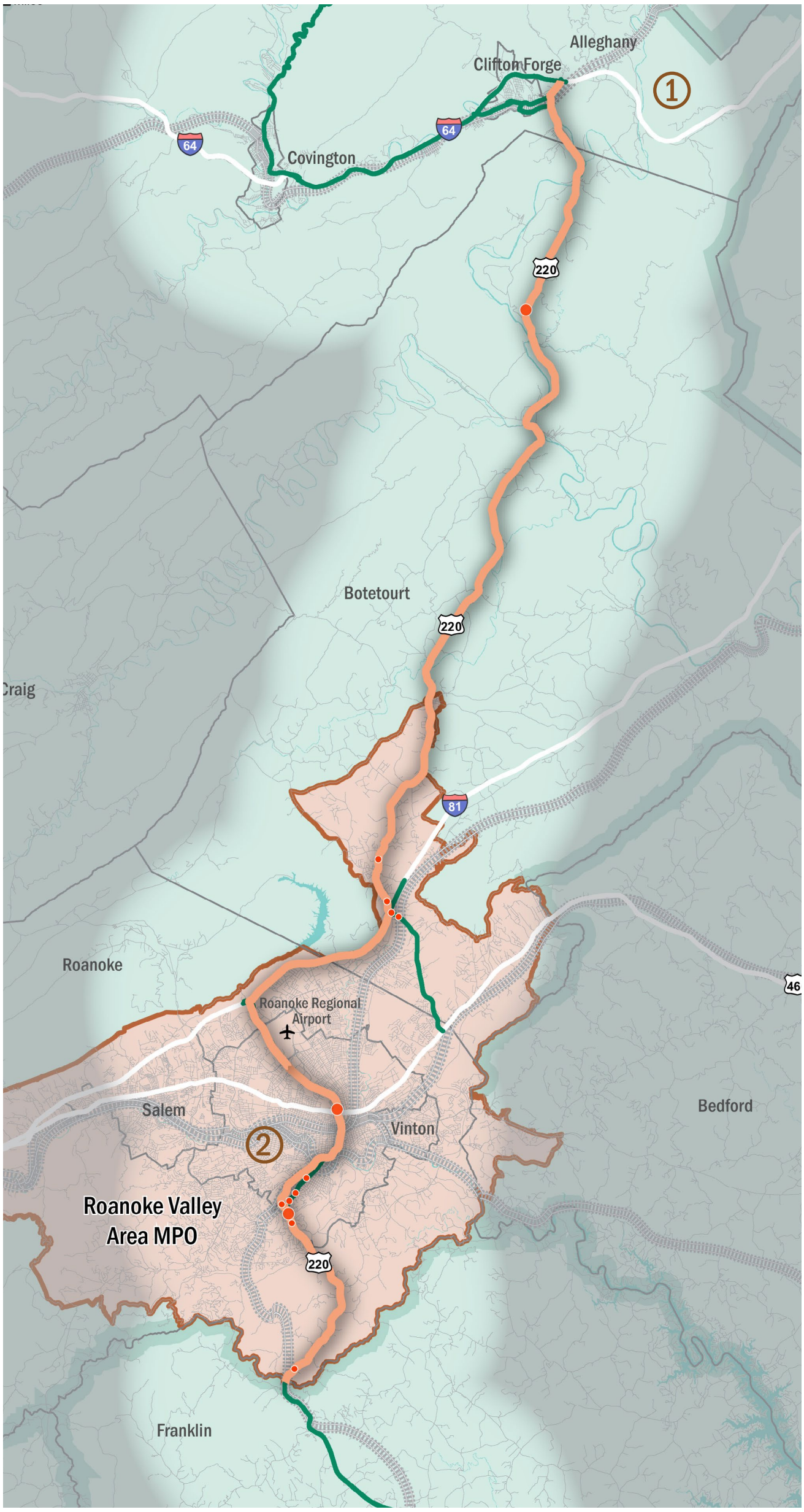
F2 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	50
Severe Crashes/Million VMT	0.5
Number of Railroad Crashes	3

Between 2010 and 2012, 50 severe crashes occurred on Segment F2, clustered in a few locations. On US 220 (Franklin Road) in Roanoke, 12 crashes took place over a distance of 0.9 miles between the exit to Route 419 (Electric Road) and Pheasant Ridge Road SW; of these 12 crashes, seven occurred at the intersection with Southern Hills Drive SW. On US 220 Business in Roanoke, eight incidents occurred over 1.3 miles between Broadway Avenue SW and Penarth Road SW. On US 220 in Roanoke, there were seven collisions at the ramps just north of the interchange with US 460. In Botetourt County, on US 220 between Daleville and the US 220 Alternate (Cloverdale Road) just south of I-81, there were 13 incidents over approximately three miles from Glebe Road to Autumnwood Lane.

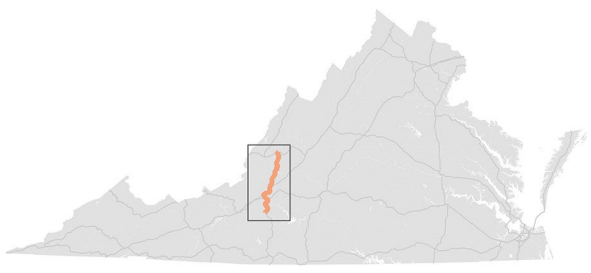


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

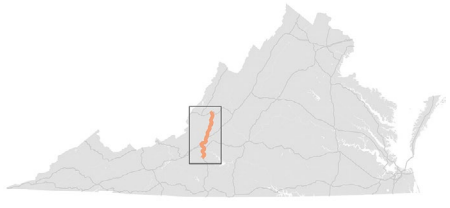


F2 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	9
Freight Ton Hours of Delay per Mile	29.9K



Passenger Delays

Passenger congestion along Segment F2 is the highest among the three segments of the North Carolina to West Virginia Corridor (Corridor F), with around 1,200 person-hours of delay. Locations where delays exceed 250 person-hours per mile include:

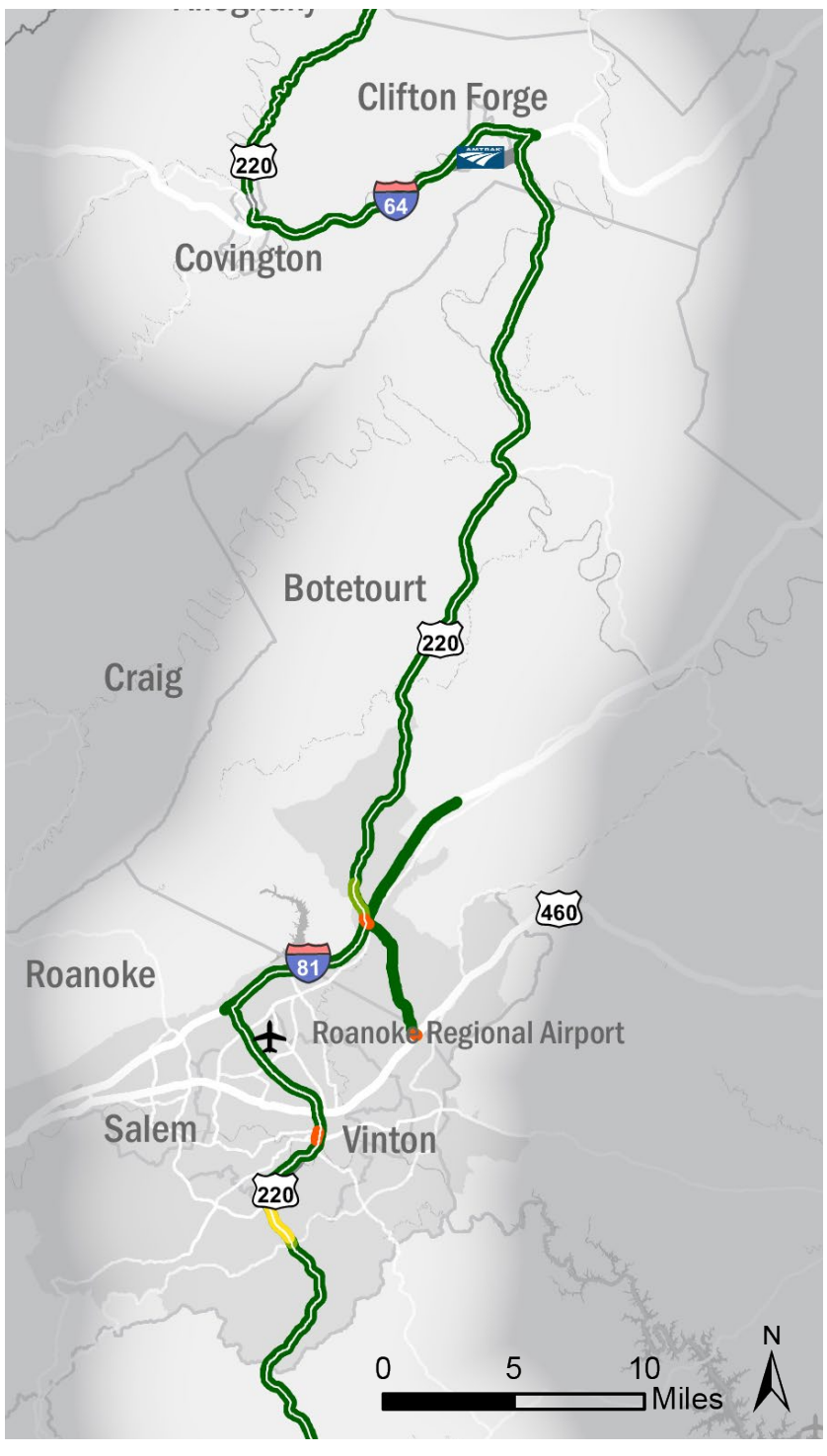
- US 220 south of US 220 Business within the City of Roanoke;
- Route 116 just south of US 11 in downtown Roanoke;
- US 220 Alternate at the interchange with I-81 in Botetourt County; and
- US 220 Alternate at the intersection with US 221/460 in Roanoke County.

Peak-period passenger delays account for around 30 percent of daily congestion, considerably below average for the peak-period share of congestion along CoSS segments.

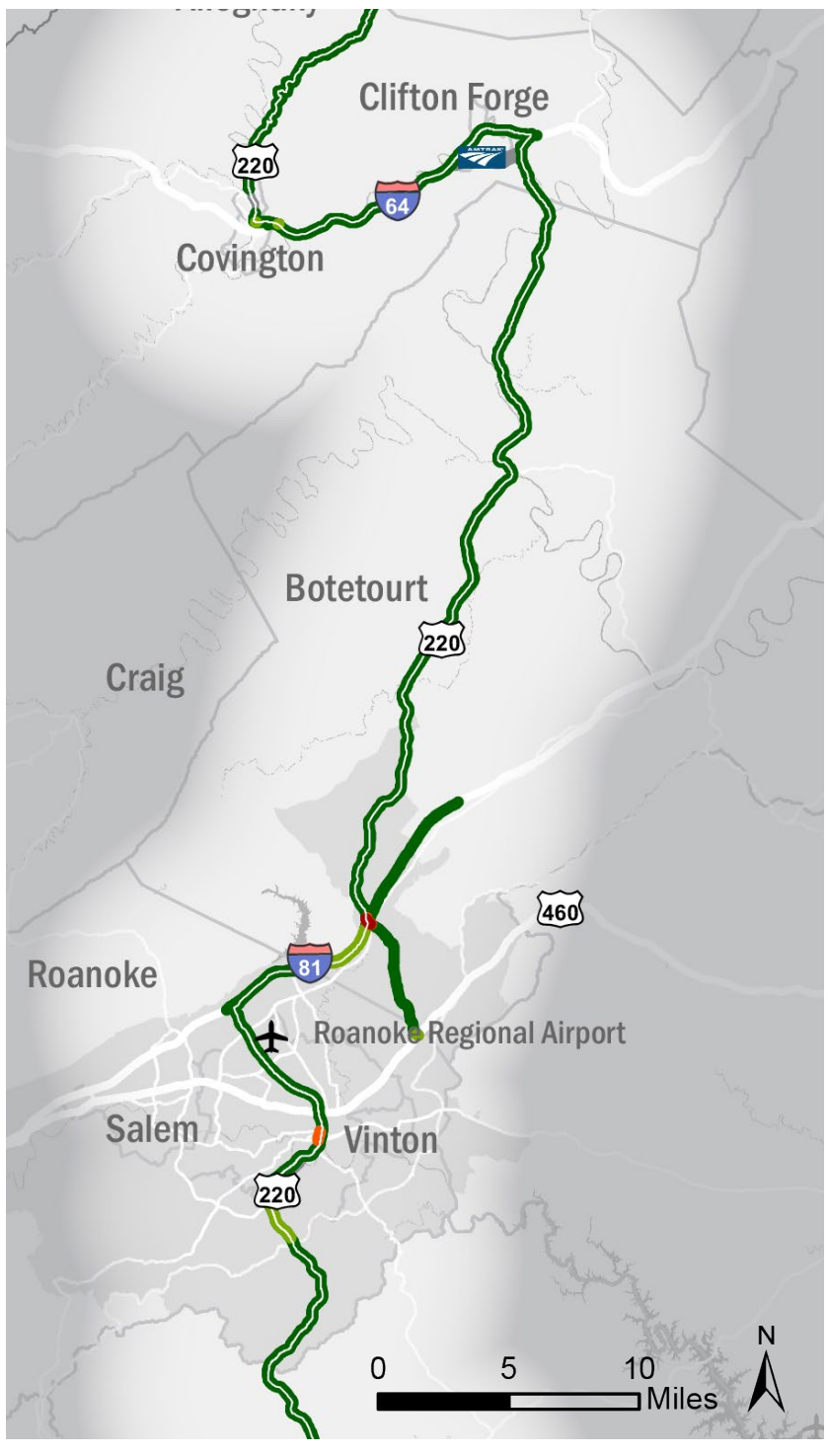
Freight Delays

Freight congestion along Segment F2 is the highest on the corridor, with over 3.8 million ton-hours of delay daily. On a per-mile basis, freight traffic experiences nearly 30,000 ton-hours per mile of delay on this segment. Freight delays follow similar pattern to passenger delay, and significant delays occur on Route 116 just south of US 11 in downtown Roanoke and on US 220 Alternate at the interchange with I-81 in Botetourt County. Peak-period freight delays along Segment F2 account for about 31 percent of daily congestion, which is slightly lower than average for the peak-period share of congestion along CoSS segments.

Daily Person Hours of Delay Per Mile



Daily Freight Ton Hours of Delay Per Mile



Reliability

Weekday Peak

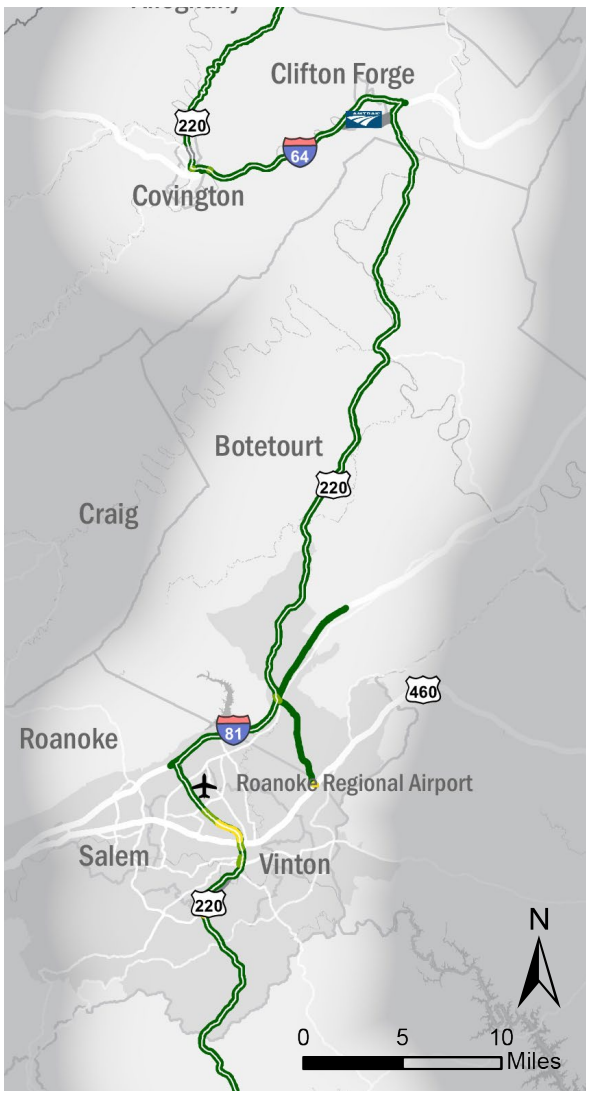
Reliability of travel during the peak period on a typical weekday on Segment F2 ranges from 0.02 to 0.56 in terms of reliability index, with an average value of 0.08. None of the locations along Segment F2 have reliability index values exceeding the statewide threshold.

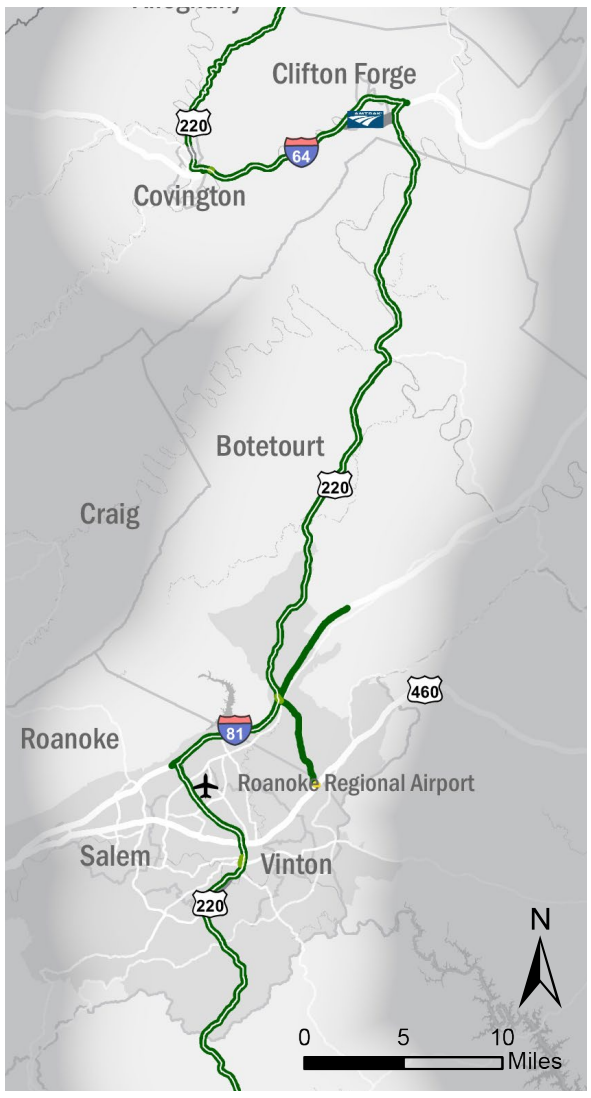
Weekday

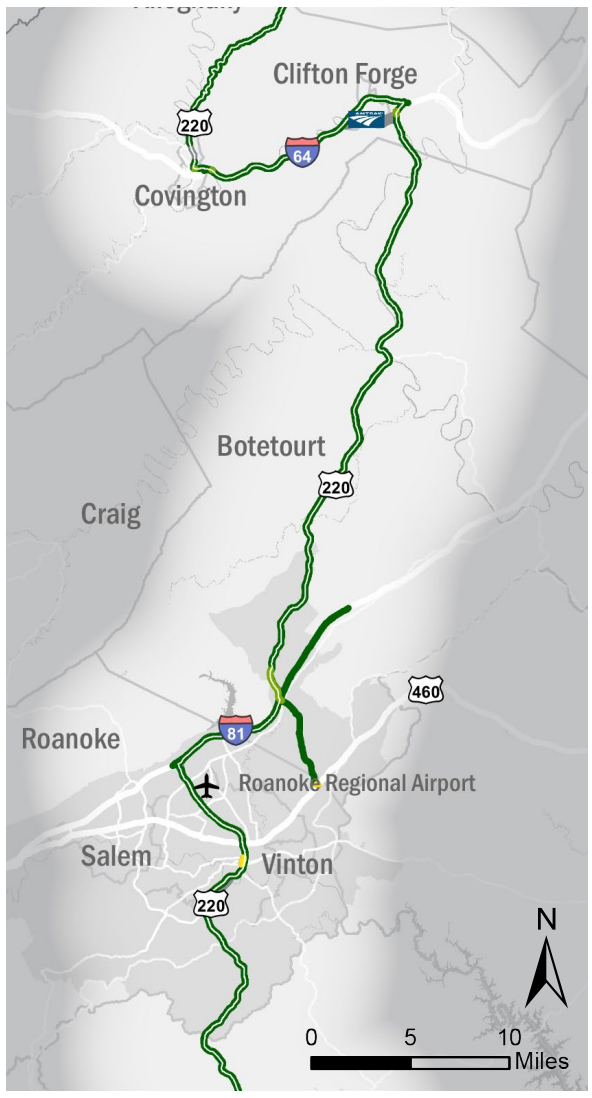
Reliability of travel during a typical weekday ranges from 0.02 to 0.49 in terms of reliability index, with an average value of 0.07. Only a short portion of US 220 Alternate at the intersection with US 221/US 460 in Roanoke County has a weekday reliability index value exceeding the statewide threshold.

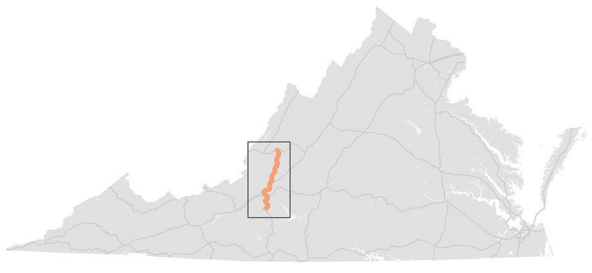
Weekend

Reliability of travel during a typical weekend ranges from 0.02 to 0.59 in terms of reliability index, with an average value of 0.07. None of the locations along Segment F2 have reliability index values exceeding the statewide threshold.









Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

F2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

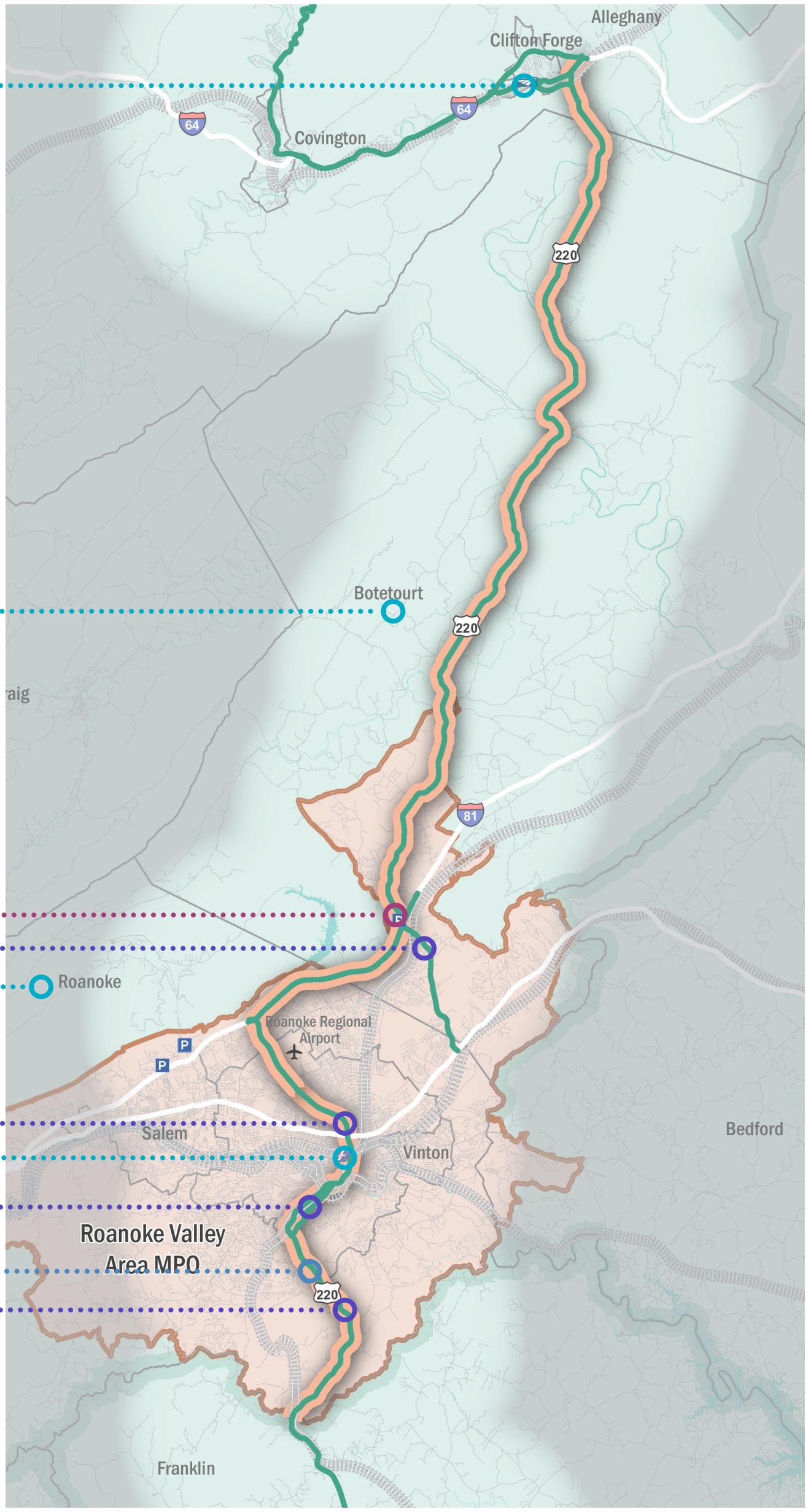
Mode Choice

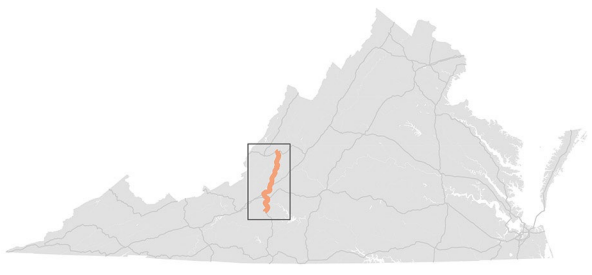
Safety

Congestion

Bottlenecks

Reliability





F2 SEGMENT NEEDS

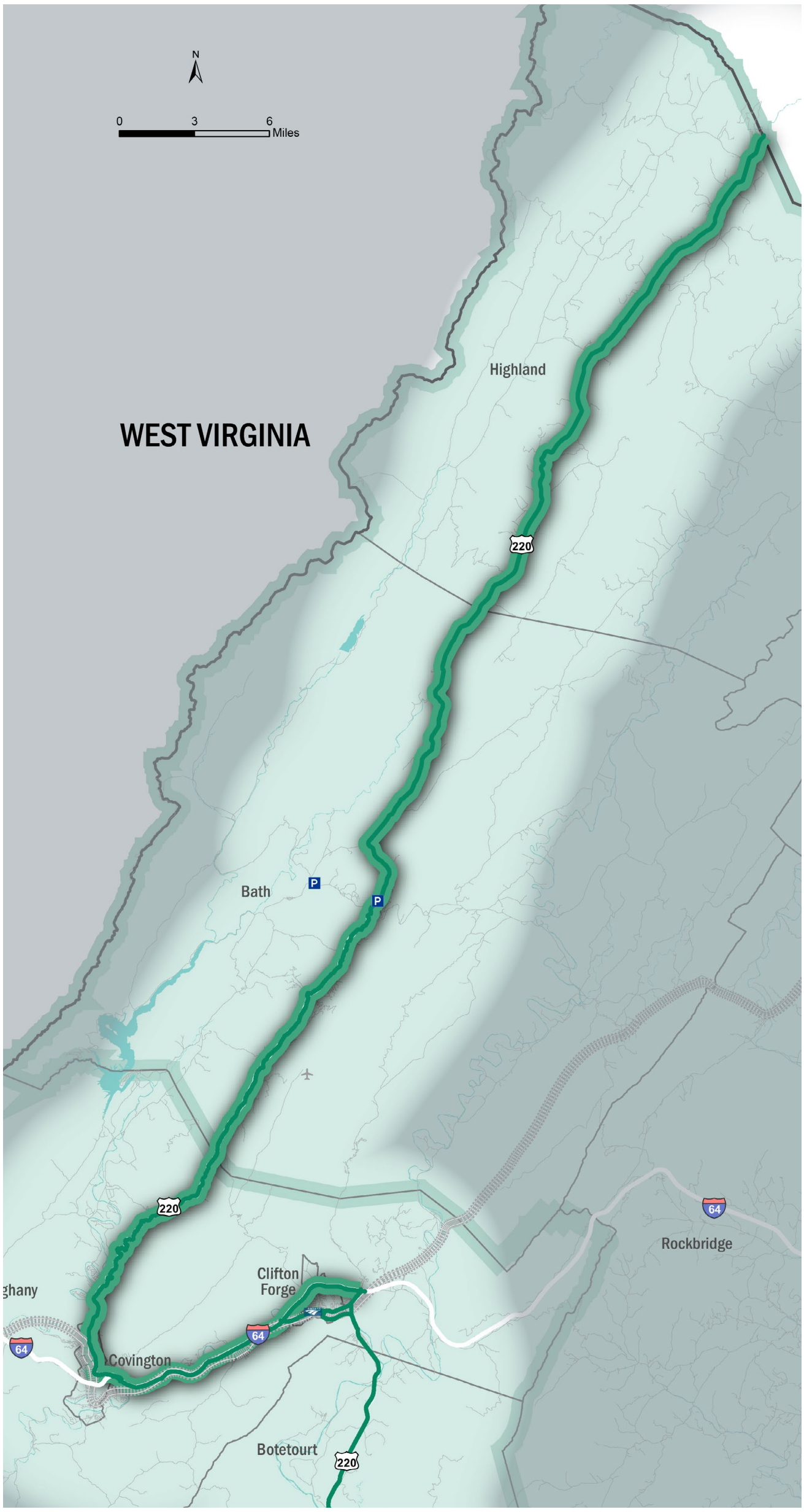
Summary of Needs - F2 Segment

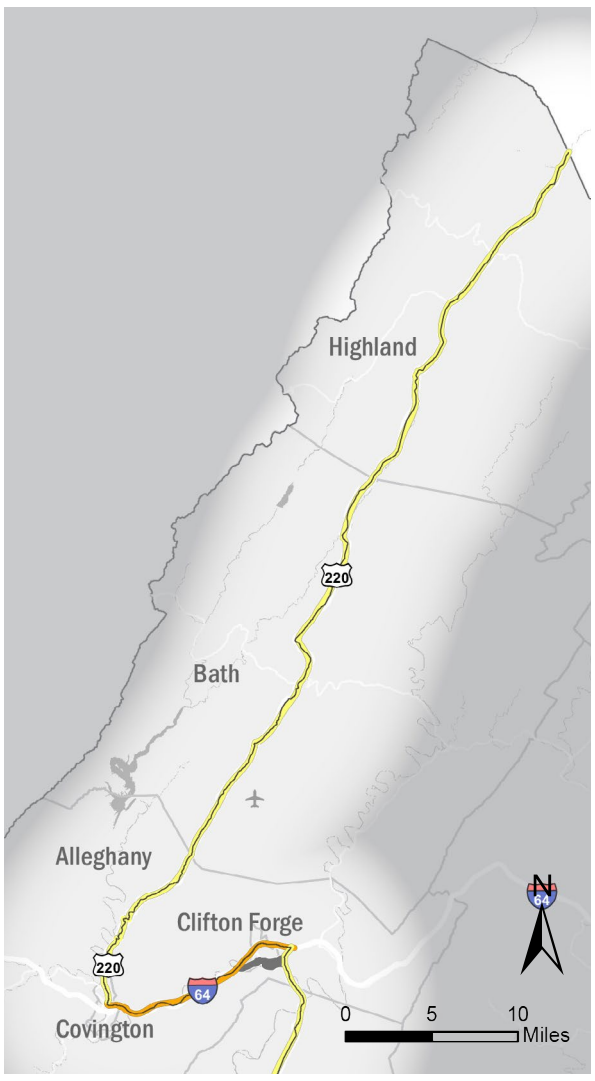
A.	Safety issues caused by geometric design on US 220 south of Roanoke
B.	Park and Ride lots in Roanoke County have higher utilization rates than statewide average
C.	Park and Ride lots in Botetourt County have higher utilization rates than statewide average
D.	No passenger rail or bus service from Roanoke to other cities in the corridor
E.	No passenger rail service from Clifton Forge to other cities in the corridor, bus service between cities in corridor is limited to Covington
F.	US 220 between Electric Rd and Pheasant Ridge Rd SW in Roanoke: 12 severe crashes
G.	US 220 at interchange with US 460 in Roanoke: 7 severe crashes
H.	US 220-Alt between Glebe Rd and Autumnwood Ln north of Roanoke: 13 severe crashes
I.	Congestion issue on US 220 between Electric Road (VA Route 419) and Blue Ridge Parkway in Roanoke
J.	Congestion issue at US 220/I-81 and US 220-Alt/US 220 junction north of Roanoke
K.	Congestion issue on US 220/I-581 at Exit 6 (US 221/VA Route 24) in Roanoke

IV. Segment F3

Corridor Segment F3 Components

- US 220
- US 60 Business





Segment F3 runs from the junction of US 220 and I-64 just east of the Town of Clifton Forge, through the City of Covington, Alleghany County, Bath County, and Highland County, to the West Virginia border. The primary facility is US 220, which serves as both a local access road through southwestern Virginia and as throughway between North Carolina and West Virginia. US 220 runs concurrently with I-64 between the Town of Clifton Forge and the City of Covington in Alleghany County; Segment F2 overlaps with Segment C1 in this area.

Highway Facilities: In this segment, US 220 is primarily a two-lane rural roadway, although it is four lanes where it runs concurrently with I-64 between Clifton Forge and Covington. In addition to US 220, Segment F3 also includes a portion of US 60 Business in the Town of Clifton Forge.

Transit Services: RADAR provides an express bus service between Iron Gate and Covington in Alleghany County, called the Alleghany Highlands Mountain Express, which runs on the southernmost portion of Segment F2. An Amtrak station is located in Clifton Forge and provides passenger rail service east and west of the corridor along the Cardinal Route running between New York City and Chicago. There are Park-and-Ride locations throughout this segment as well.

Rail Facilities: Norfolk Southern rail lines, which provide freight rail access in this region, run between Roanoke and Clifton Forge, connecting with multiple lines along CSX's Coal Corridor. The Buckingham Branch, which runs between Clifton Forge and Richmond, connects within the corridor and runs parallel to US 220 for a short stretch before connecting to CSX coal lines in Clifton Forge.

Port Facilities: No port facilities are directly accessible from Segment F3.

Airport Facilities: One general aviation facility is located near Segment F3.

Major planned and future projects include: There are no major planned projects to improve safety or increase capacity at this time.

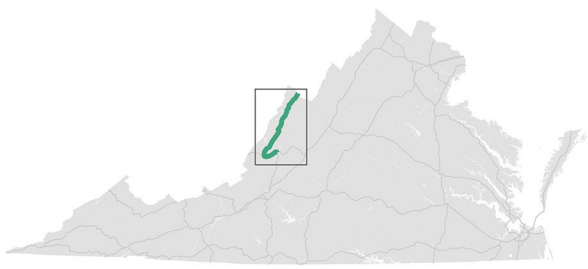
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

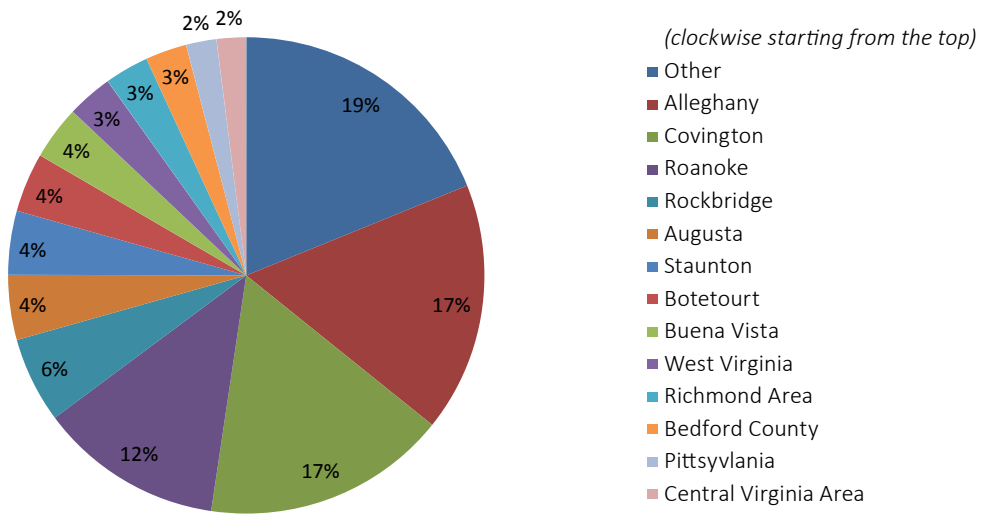
- Reconstruction with added capacity
- Safety improvements
- Primary facility



Travel Demand

Passenger Demand

Segment F3, the northernmost segment of Corridor F, does not provide direct access to any of the Commonwealth's MPO Areas, but does provide access to the City of Covington and communities in Alleghany, Bath, and Highland Counties. Intercity travel in these jurisdictions accounts for a very small percentage of intercity travel in the Commonwealth (less than 0.5 percent), but major destinations for travel from these jurisdictions include Botetourt County, Covington (17 percent each), the Roanoke Valley Area (12 percent), and Rockbridge County (six percent).



F3 SEGMENT PROFILE

Freight Demand

By truck, Segment F3 carried 440,000 tons of freight worth $160 million in 2012, and is estimated to carry 620,000 tons of freight worth $200 million in 2025. The major truck freight patterns on this corridor are interstate through-movements, accounting for approximately 55 percent of the total truck tonnage and more than 64 percent of the total corridor truck freight value. There are significant flows on Corridor F between the Southeast and Middle Atlantic regions. North Carolina, Pennsylvania, and Tennessee are major truck freight generators on this corridor, accounting for more than 20 percent of truck tonnage on Corridor F. North Carolina, New York, and Pennsylvania are major truck freight attractors on Corridor F, accounting for 24 percent of truck tonnage. The majority of truck freight movement on this segment is through-traffic and there are no major generators or attractors of truck freight along Segment F3.

By rail, Segment F3 carried 33 million tons of freight worth $3 billion in 2012, and is estimated to carry 34 million tons of freight worth $4 billion in 2025. In terms of tonnage, the largest rail flow on Corridor F is from West Virginia to North Carolina, accounting for more than 44 percent of the total rail tonnage in the corridor. Another significant rail freight movement on Corridor F is from West Virginia to South Carolina, accounting for more than 14 percent of the total rail tonnage on the corridor. In terms of value, the largest rail freight movements on Corridor F are between Ohio and the Carolinas, accounting for more than 26 percent of the total rail value. For jurisdictions adjacent to Segment F3, there are only negligible rail freight flows of less than one percent of the total corridor tonnage and value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (26% / 27%)
2. North Carolina (10% / 9%)
3. Tennessee (7% / 7%)
4. Pennsylania (7% / 7%)
5. New Jersey (5% / 5%)

Corridor Tonnage Originating in Segment F3: 3% / 3%

Major Origin-Destination Pairs for Freight
North Carolina and Pennsylvania
North Carolina and New York
New York and Georgia
New York and Tennessee
New Jersey and Texas

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (8% / 8%)
3. New York (8% / 8%)
4. Pennsylvania (8% / 8%)
5. New Jersey (5% / 5%)

Corridor Tonnage Destined for Segment F3: 2% / 2%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (70% / 62%)
2. Virginia (13% / 17%)
3. City of Roanoke (11% / 13%)
4. South Carolina (6% / 7%)
5. North Carolina (5% / 6%)

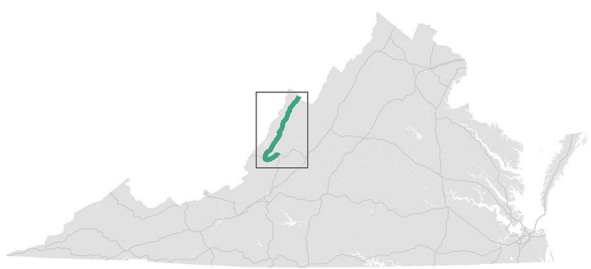
Corridor Tonnage Originating in Segment F3: <1% / 1%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (51% / 46%)
2. South Carolina (17% / 15%)
3. Virginia (10% / 12%)
4. Ohio (7% / 8%)
5. West Virginia (4% / 5%)

Corridor Tonnage Destined for Segment F3: <1% / <1%



Traffic Conditions

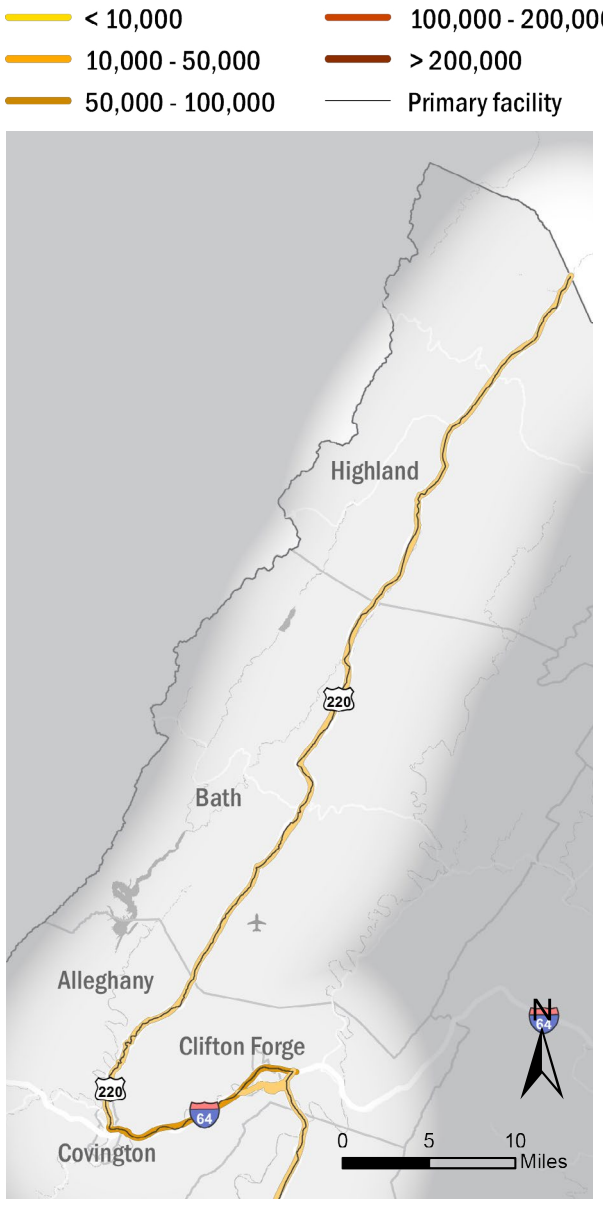
Traffic Volume and AADT

Traffic volumes on Segment F3 are generally lower than elsewhere on the North Carolina to West Virginia Corridor. The portion of US 220 that runs concurrently with I-64 has the highest daily traffic volume at 10,000 to 18,000 vehicles per day. Elsewhere on Segment F3, traffic volumes are less than 9,000 vehicles per day. A small amount of traffic growth is projected throughout the segment by 2025. Traffic growth where US 220 runs concurrently with I-64 is projected to be the highest in the segment, with between 1,000 and 2,000 vehicles per day by 2025.

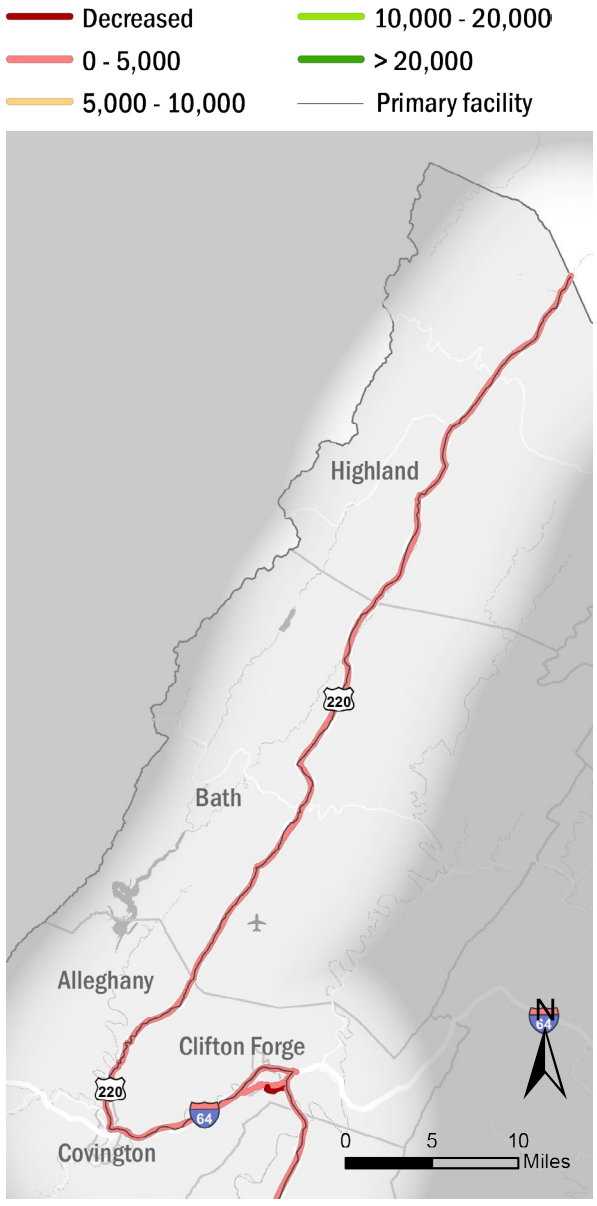
Traffic Volume 2014 (AADT)

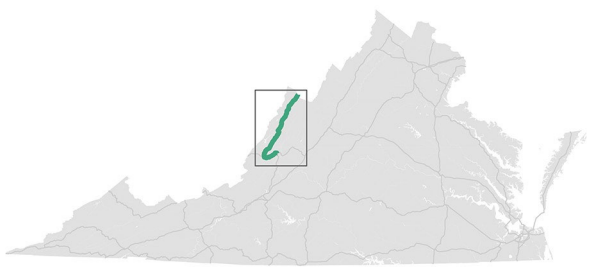


Traffic Volume 2025 (AADT)

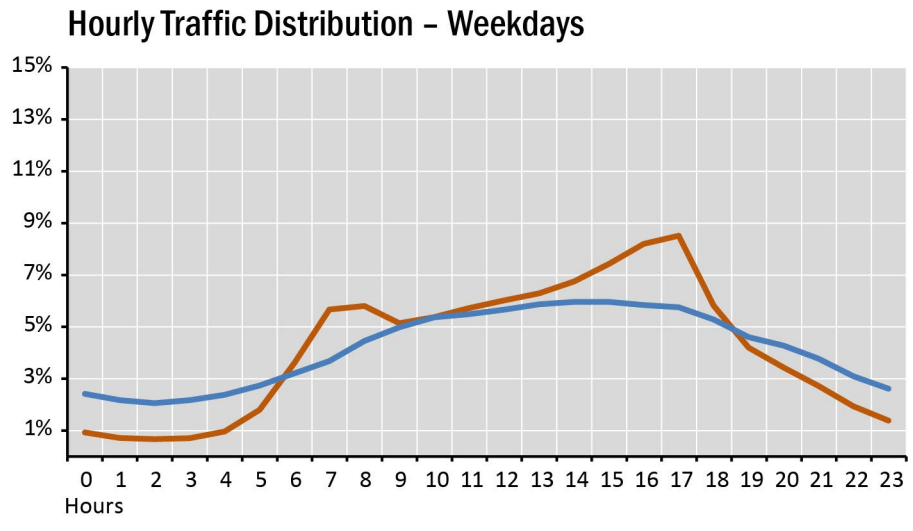


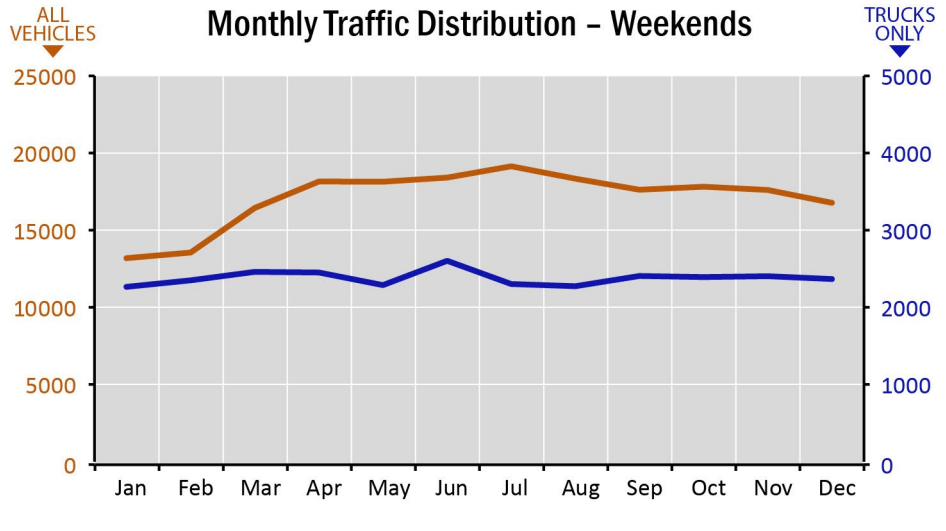
Change in Traffic Volume 2014- 2025 (AADT)

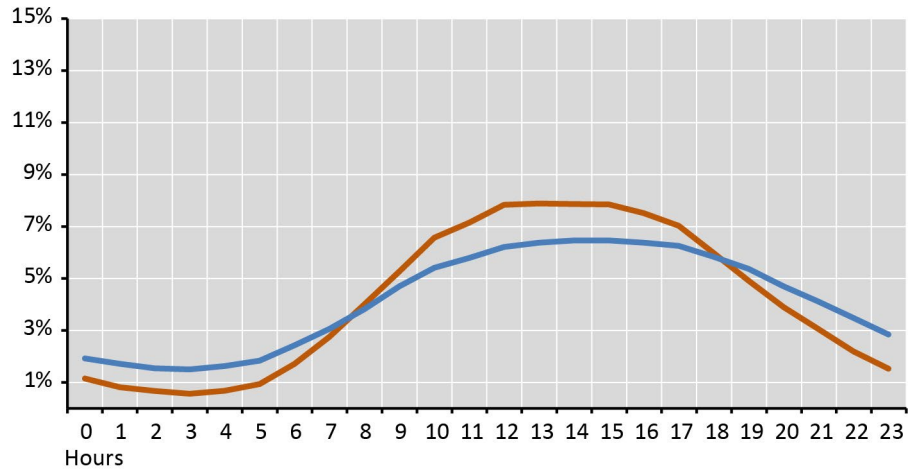


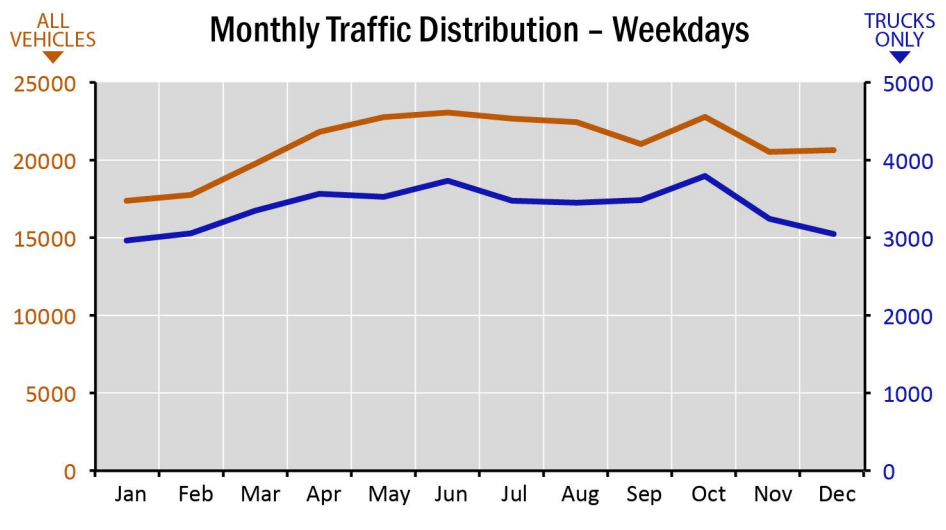


F3 SEGMENT PROFILE











Traffic Distribution

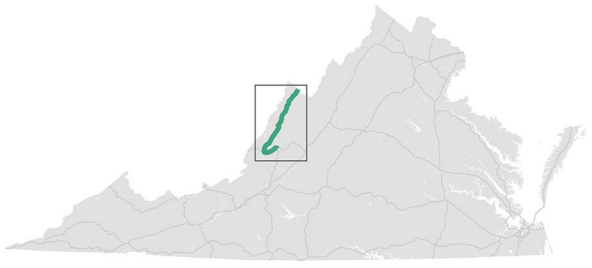
Traffic distribution counts were not available on Segment F3. Therefore, analysis assumed the same time of day and annual distributions for this segment as were observed on Segment F2, even though these may not capture traffic patterns on Segment F3 with complete accuracy.

Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment F3 varies based on location. Where US 220 runs concurrently with I-64 in Segment F3, heavy trucks comprise 11 percent of total traffic. Along US 220, heavy trucks comprise less than five percent of total traffic from Covington to central Bath County and between six and eight percent of total traffic from central Bath County to the West Virginia border.

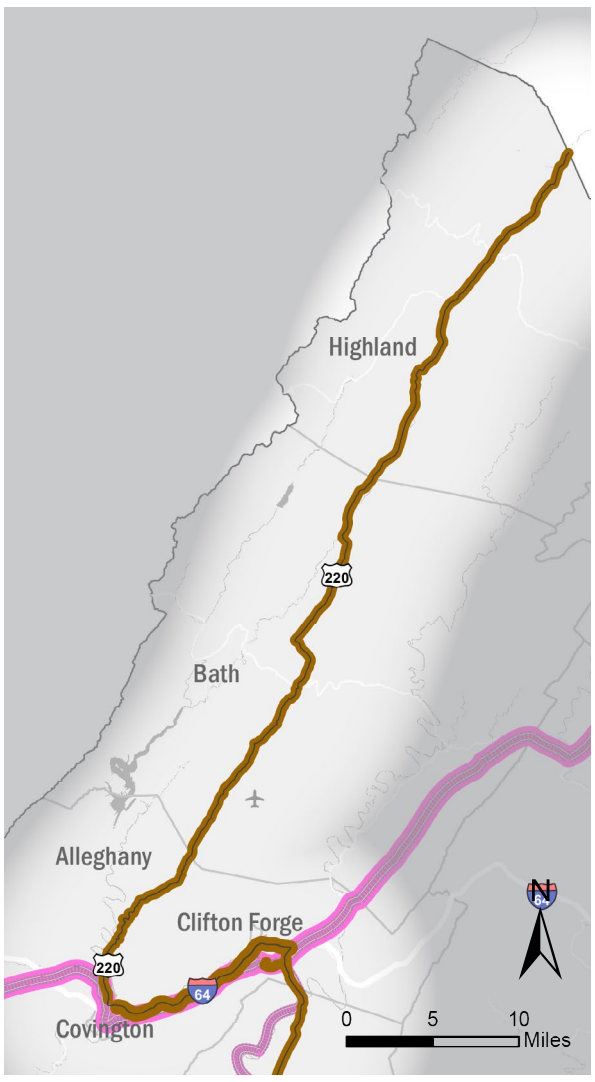
Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



F3 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

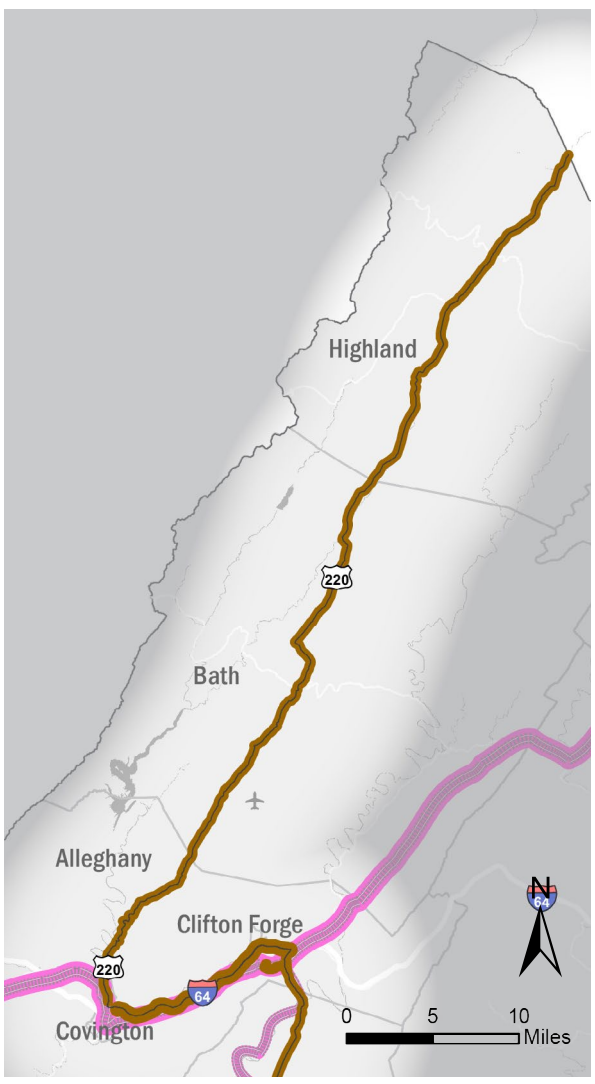


Freight Flows

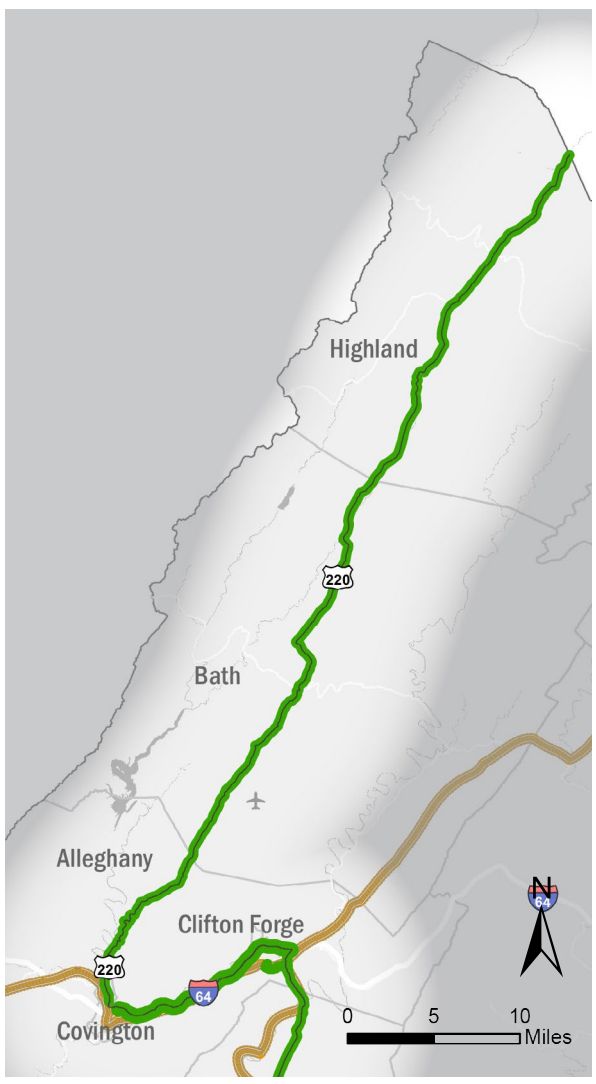
On Segment F3 just north of Covington freight is moved primarily by rail in relation to both tonnage and value. In total, 168,000 tons (one percent) of freight is moved through this section of Segment F3 by truck, compared to 33 million tons (99 percent) by rail. By value, $63 million (two percent) of freight value travels by truck, compared to $3 billion (98 percent) by rail. On average, a ton of freight traveling through this section of Segment F3 by truck is worth $372 while a ton of freight traveling by rail is worth $97. In 2025, both rail and truck freight tonnages and total values in this area of Segment F3 are expected to increase. The percentage of freight traveling by truck by tonnage and value is expected to remain the same. It is anticipated that freight value per ton on trucks and rail will increase to $292 and $109, respectively.

Further north along Segment F3 in Highland County, freight is also moved primarily by rail in relation to both tonnage and value. In total, 438,000 tons (one percent) of freight is moved through this section of Segment F3 by truck, compared to 33 million tons (99 percent) by rail. By value, $162.5 million (five percent) of freight value travels by truck, compared to $3 billion (95 percent) by rail. On average, a ton of freight traveling through this section of Segment F3 by truck is worth $371 while a ton of freight traveling by rail is worth $97. In 2025, both rail and truck freight tonnages and total values in this area of Segment F3 are expected to increase. The percentage of freight traveling by truck by tonnage and value is expected to remain the same. It is anticipated that freight value per ton on trucks and rail will increase to $318 and $109, respectively.

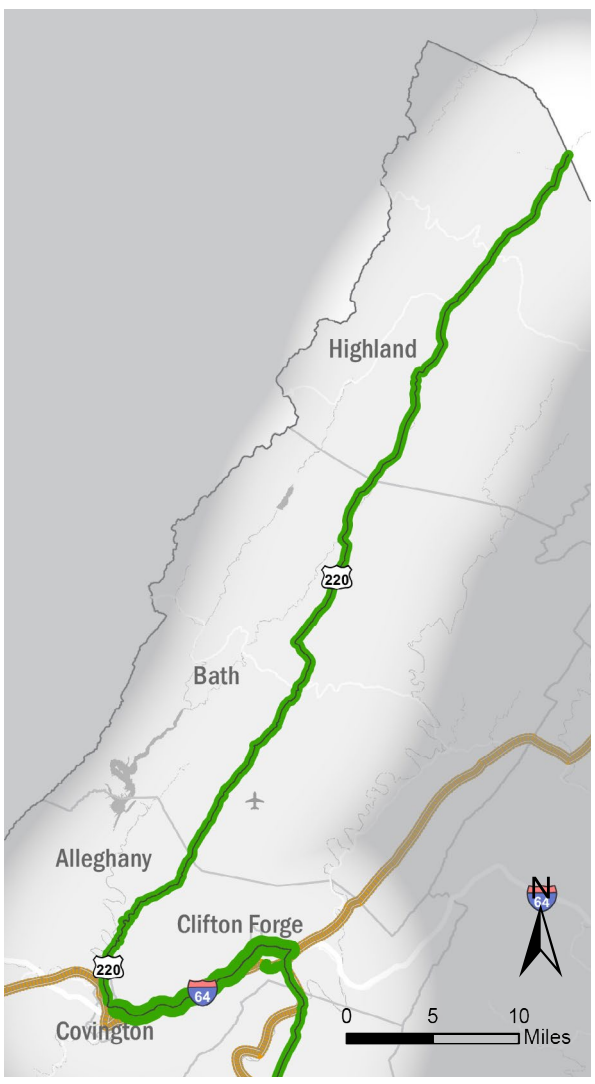
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

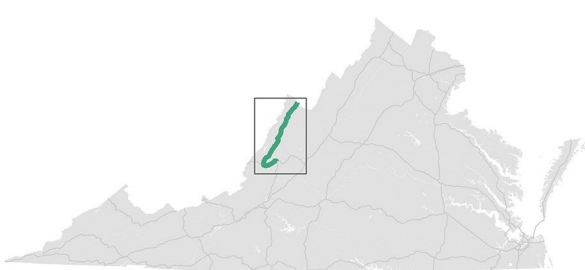
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Clifton Forge to Roanoke

Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$00 Est. Cost

Auto
Via Rt. 220: 0:55 Travel Time $27 Est. Cost

Roanoke to Franklin, WV

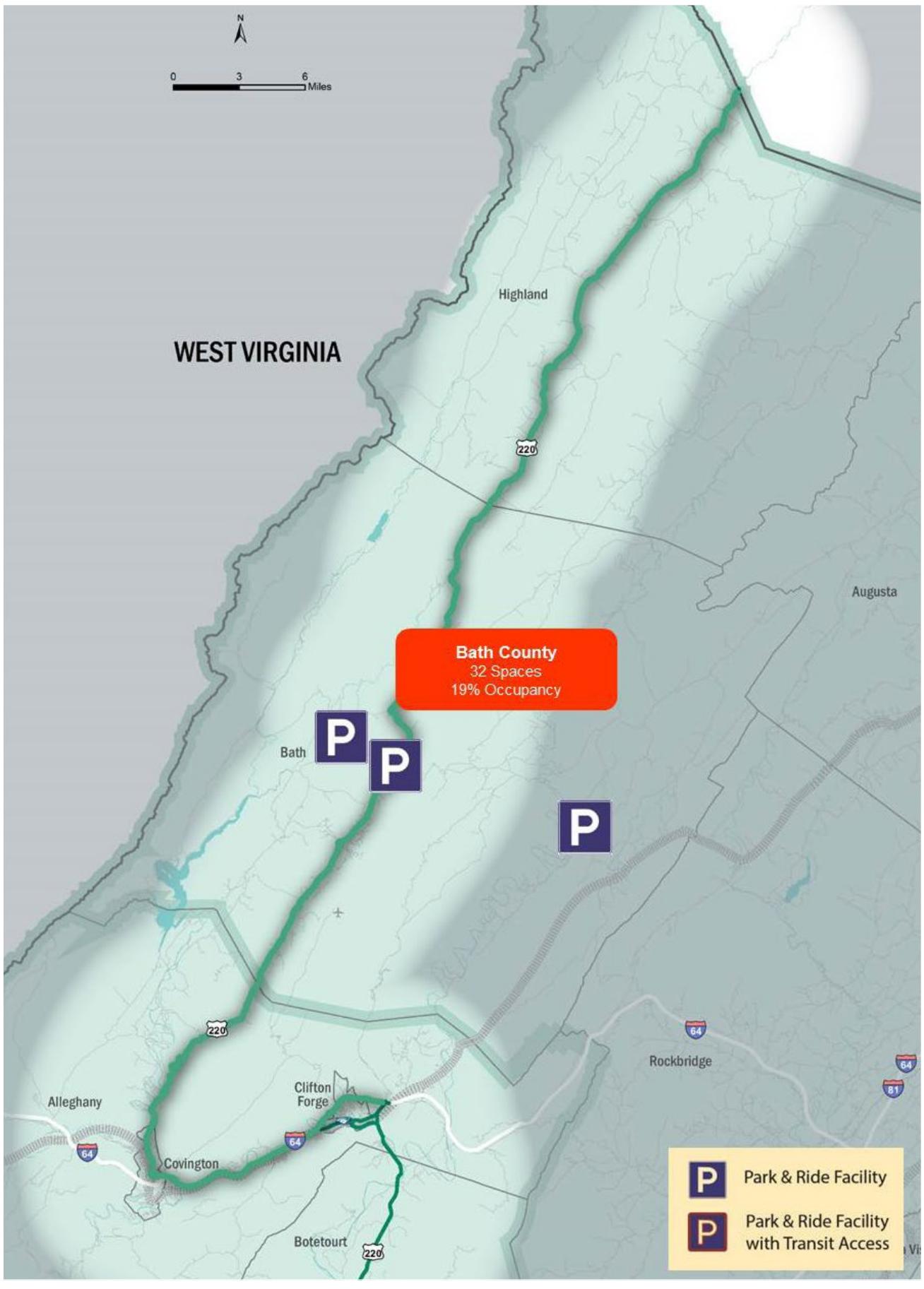
Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Auto
Via Rt. 220: 2:49 Travel Time $78 Est. Cost

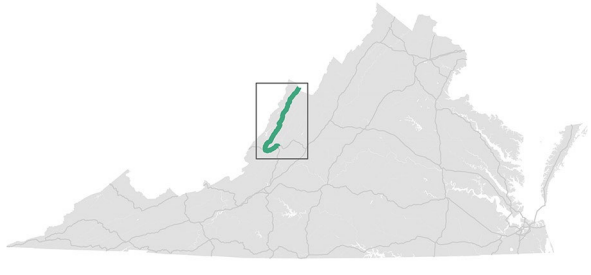
Passenger trips on Segment F3 have limited travel options, both in terms of travel path and mode choice. There are no parallel facilities to US 220 in Segment F3, though it does overlap with interstate I-64. Bus service in the segment includes the Alleghany Highlands Mountain Express, which connects Iron Gate and Covington. Amtrak offers service from Clifton Forge, but its routes do not facilitate travel along the corridor.

Park and Ride Facitilities



Park-and-Ride

Within Segment F3, commuters can utilize three Park-and-Ride facilities, all of which are located in Bath County. Bath County's Park-and-Ride locations have a total of 32 spaces. The Park-and-Ride locations in Bath County are not heavily used, with a utilization rate of only 19 percent, which is much lower than the statewide average of 76 percent for Park-and-Ride utilization.

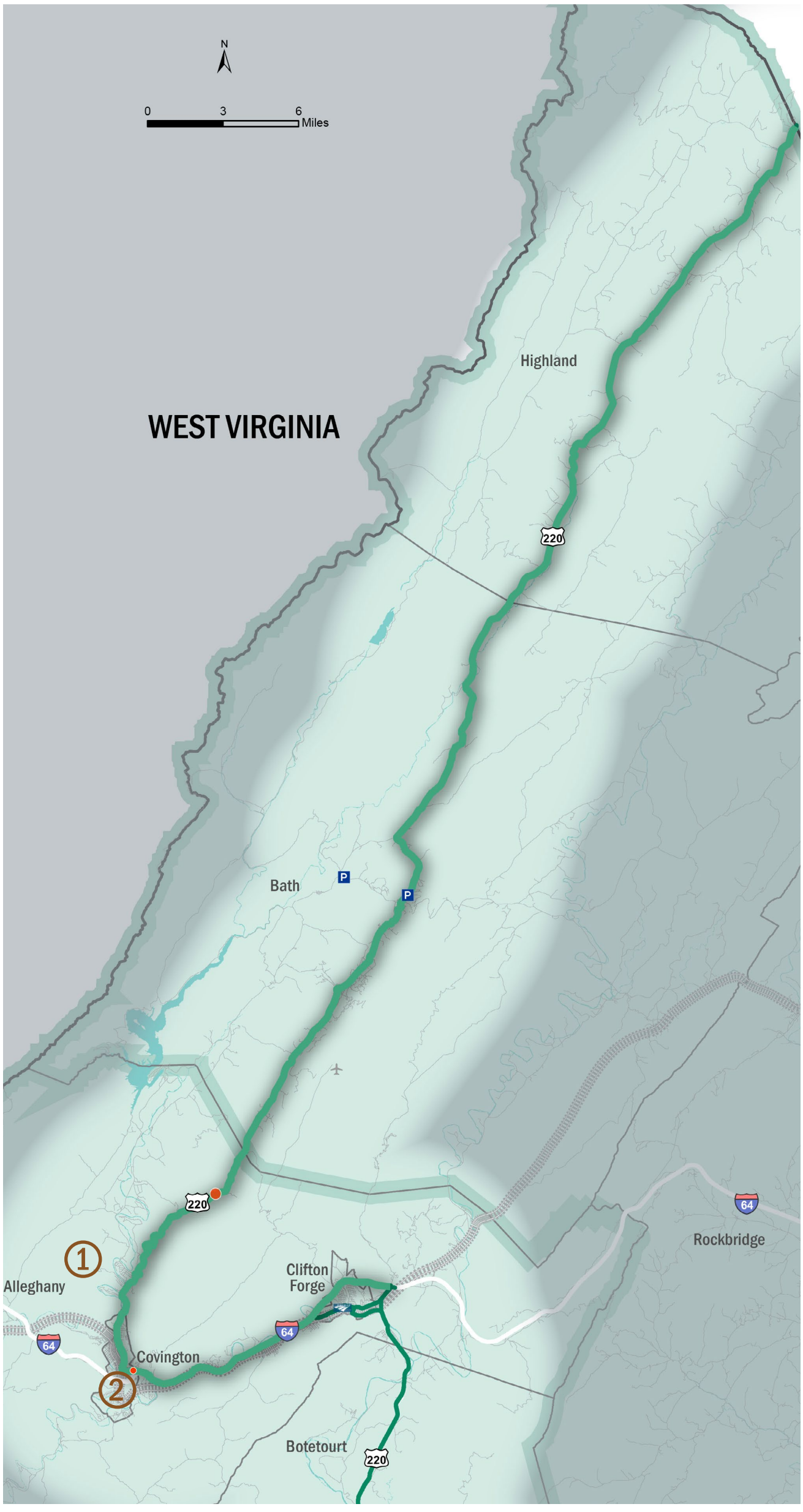


Safety

Performance Metrics:

Number of Severe Crashes	10
Severe Crashes/ Million VMT	0.4
Number of Railroad Crashes	3

Between 2010 and 2012, only 21 severe crashes were recorded in Segment F3, one of the lowest totals for any CoSS segment. These crashes are in two locations along Segment F3. On US 220 (East Madison Street) in Covington, four collisions occurred over 0.16 miles between East Dolly Ann Drive and the on-ramp to I-64 W. On US 220 (Hot Springs Road) in Alleghany County, there were six incidents that took place over a distance of 3.4 miles between McGraw Gap Road and Route 640 (Falls Road).

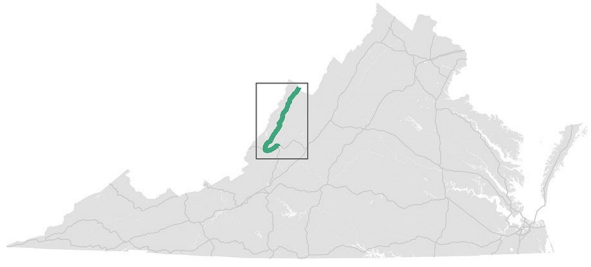


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

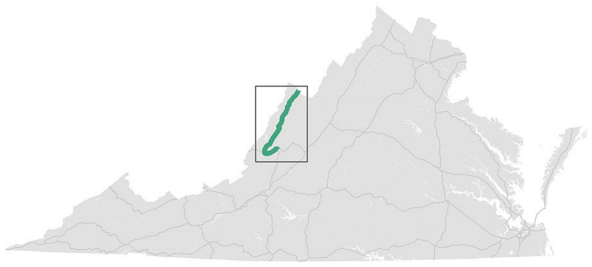
#



Congestion

Performance Metrics

Person Hours of Delay per Mile	1
Freight Ton Hours of Delay per Mile	982



Passenger Delays

Segment F3 has substantially lower levels of passenger congestion than other Corridor F segments. Passenger traffic on this segment only experience 200 person-hours of delay daily, ranking it as one of the least congested CoSS segments in the Commonwealth. As such, there are no locations along the segment where delays exceed 100 person-hours per mile. Peak-period passenger delays along Segment F3 account less than 15 percent of daily congestion, far lower than the peak-period share of congestion along CoSS segments.

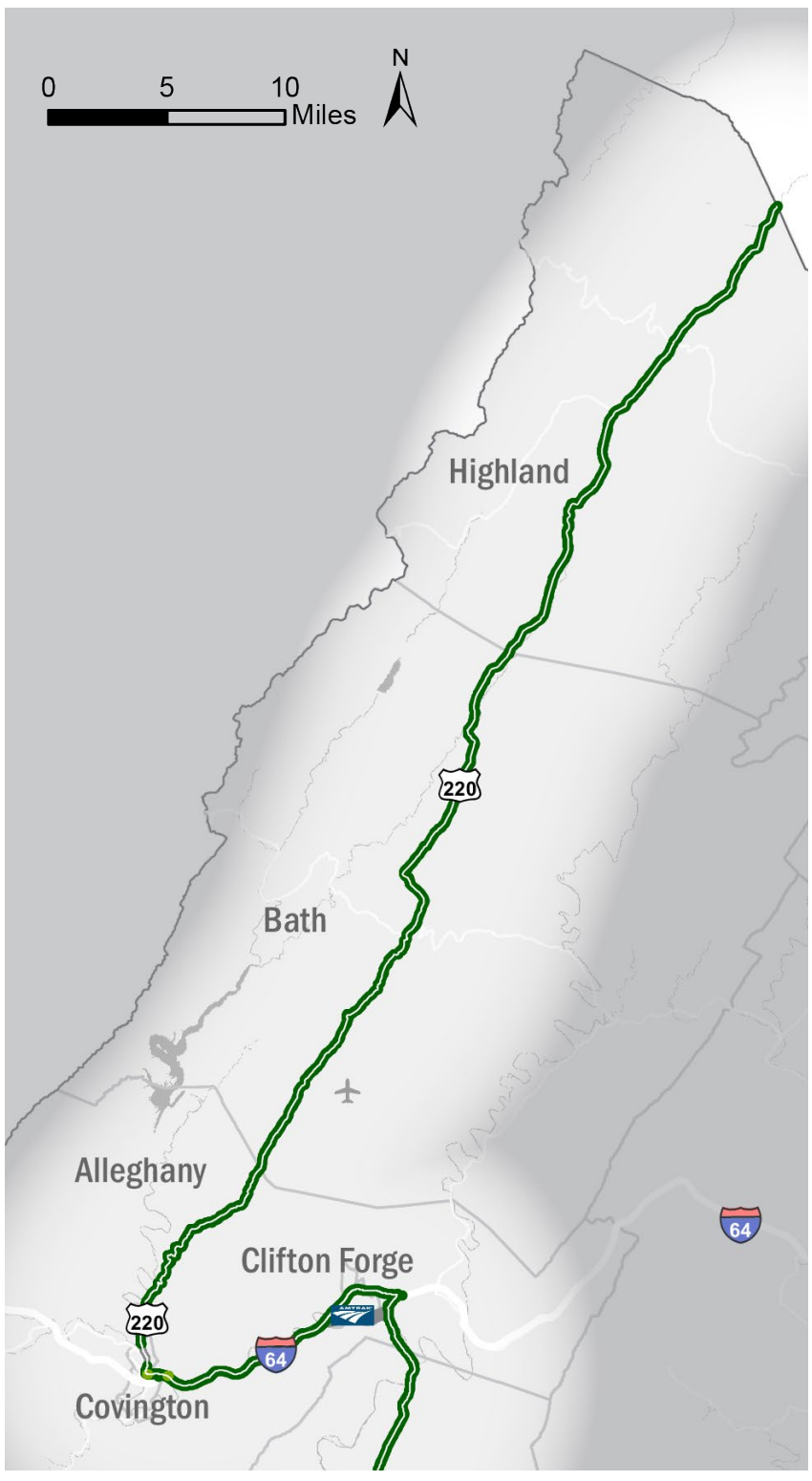
Freight Delays

Segment F3 has substantially lower levels of freight congestion than other Corridor F segments. Traffic on this segment only experiences around 140,000 ton-hours of delay daily, ranking it as one of the least congested CoSS segments. As such, there are no locations along the segment where freight delays exceed 250,000 ton-hours per mile. Peak period freight delays along Segment F3 account for less than one percent of daily congestion, but the total freight delay is minimal.

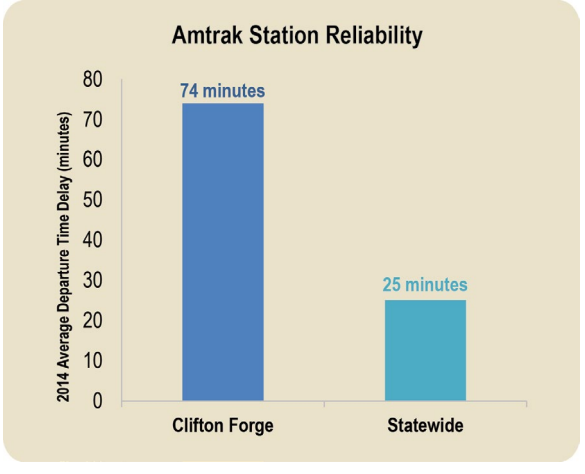
Daily Person Hours of Delay Per Mile



Daily Freight Ton Hours of Delay Per Mile



Reliability



Weekday Peak

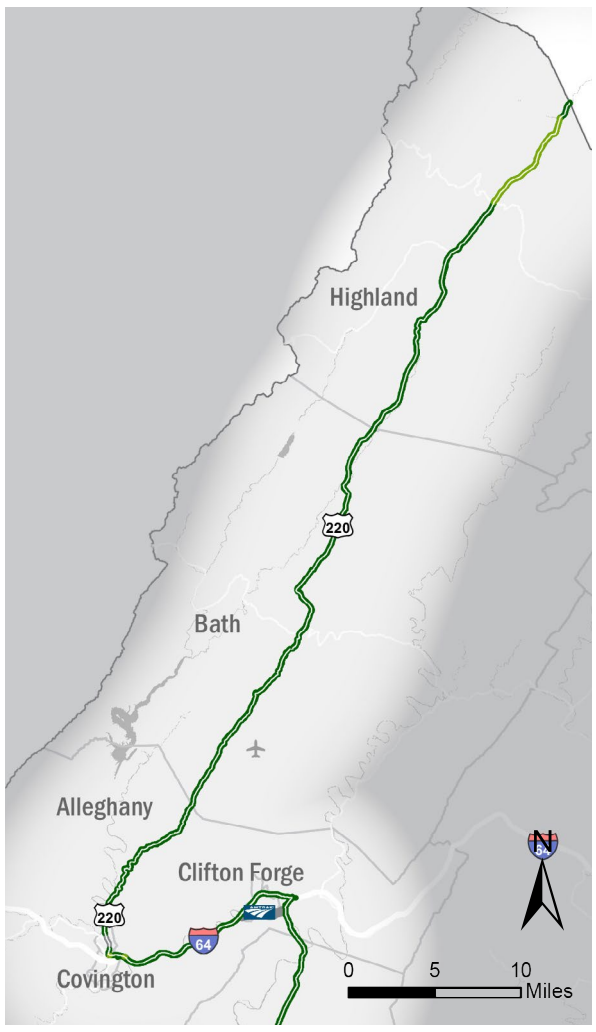
Reliability of travel during the peak period on a typical weekday on Segment F3 ranges from 0.00 to 0.27 in terms of reliability index, with an average value of 0.07. This segment has a peak period reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment F3 have reliability index values exceeding the statewide threshold.

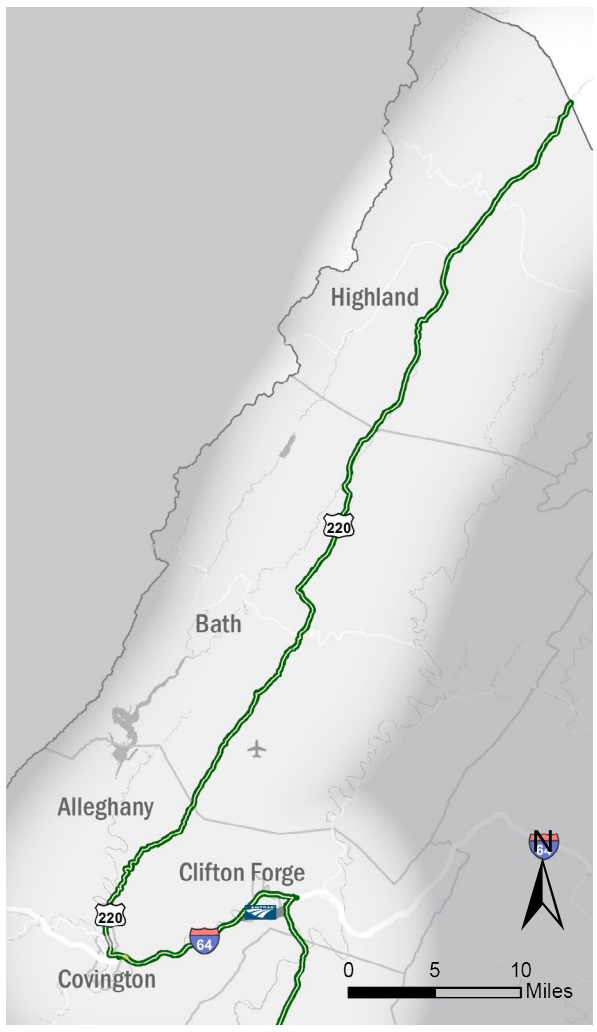
Weekday

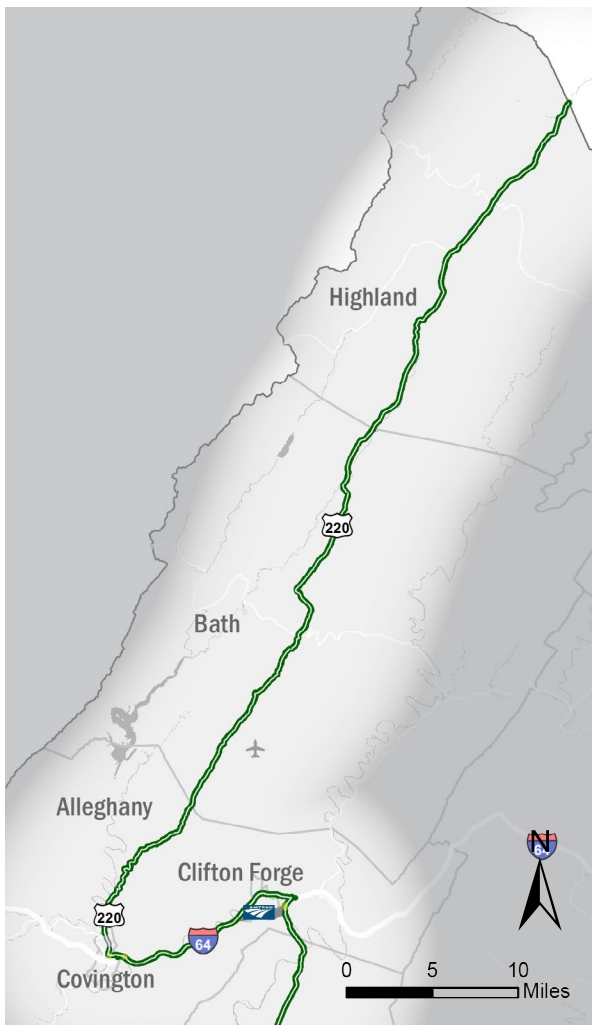
Reliability of travel during a typical weekday ranges from 0.01 to 0.26 in terms of reliability index, with an average value of 0.07. This segment has a weekday reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment F3 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.25 in terms of reliability index, with an average value of 0.04. This segment has a weekend reliability index much lower than average for the CoSS segments statewide, and none of the locations along Segment F3 have reliability index values exceeding the statewide threshold.





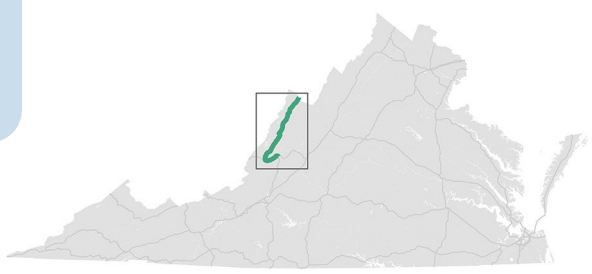


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



F3 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

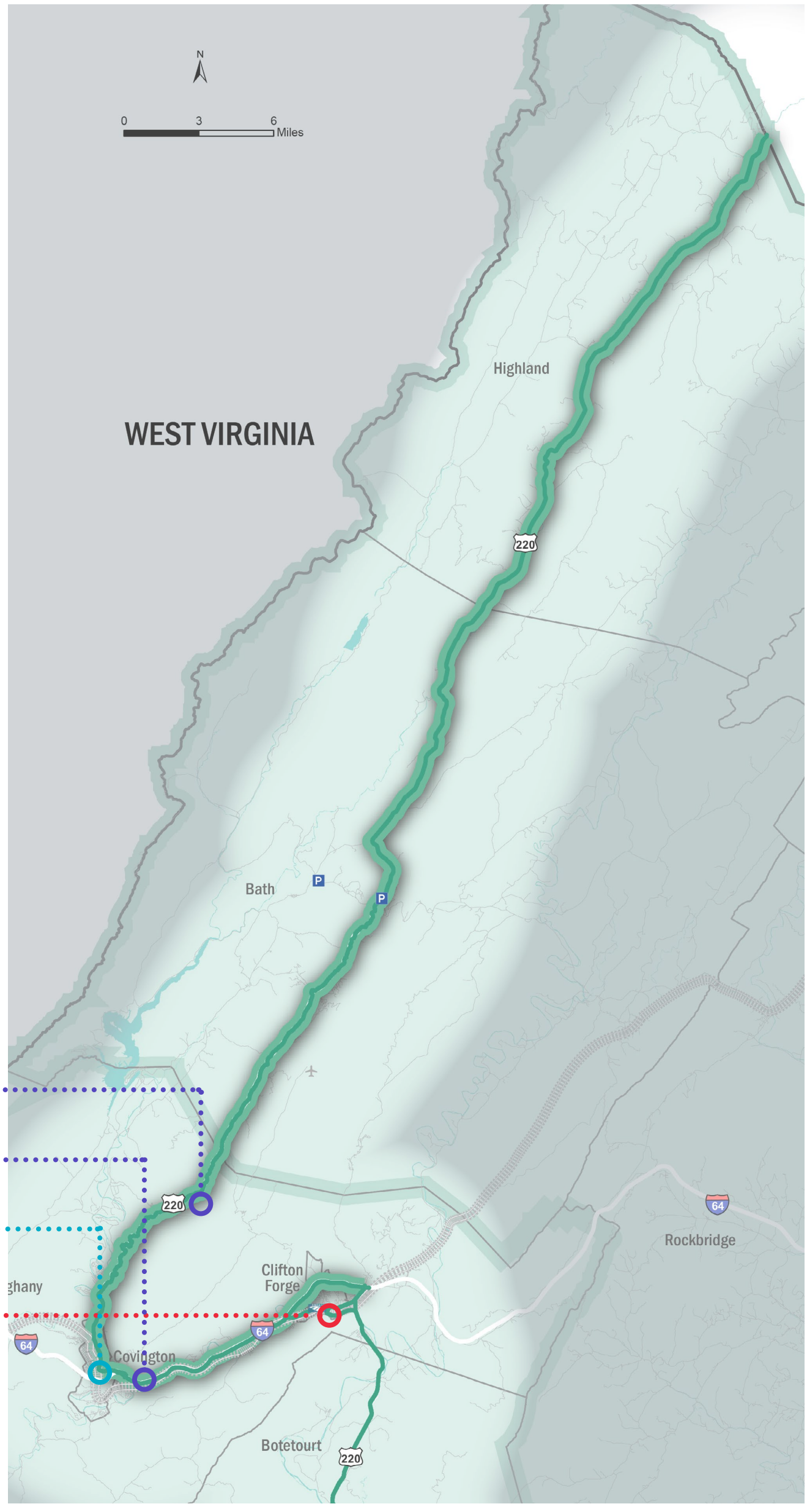
Mode Choice

Safety

Congestion

Bottlenecks

Reliability



F3 SEGMENT NEEDS

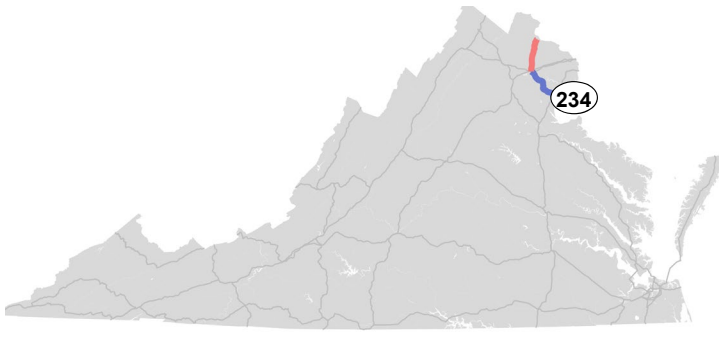
Summary of Needs - F3 Segment

A.		**No passenger rail service from Clifton Forge to other cities in the corridor, bus service between cities in corridor is limited to Covington**
B.		**No passenger rail service from Covington to other cities in the corridor, bus service between cities in corridor is limited to Clifton Forge**
C.		**US 220 near I-64 interchange in Covington: four severe crashes**
D.		**US 220 between Route 640 and McGraw Gap Rd in Alleghany County: 6 severe crashes**
E.		**Unreliable Amtrak service from Clifton Forge station. Average departure delay is 74 minutes (highest in the State) totaling almost 1,500 person-hours of delay from this segment.**

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

North-South Corridor (G)



Office of INTERMODAL Planning and Investment

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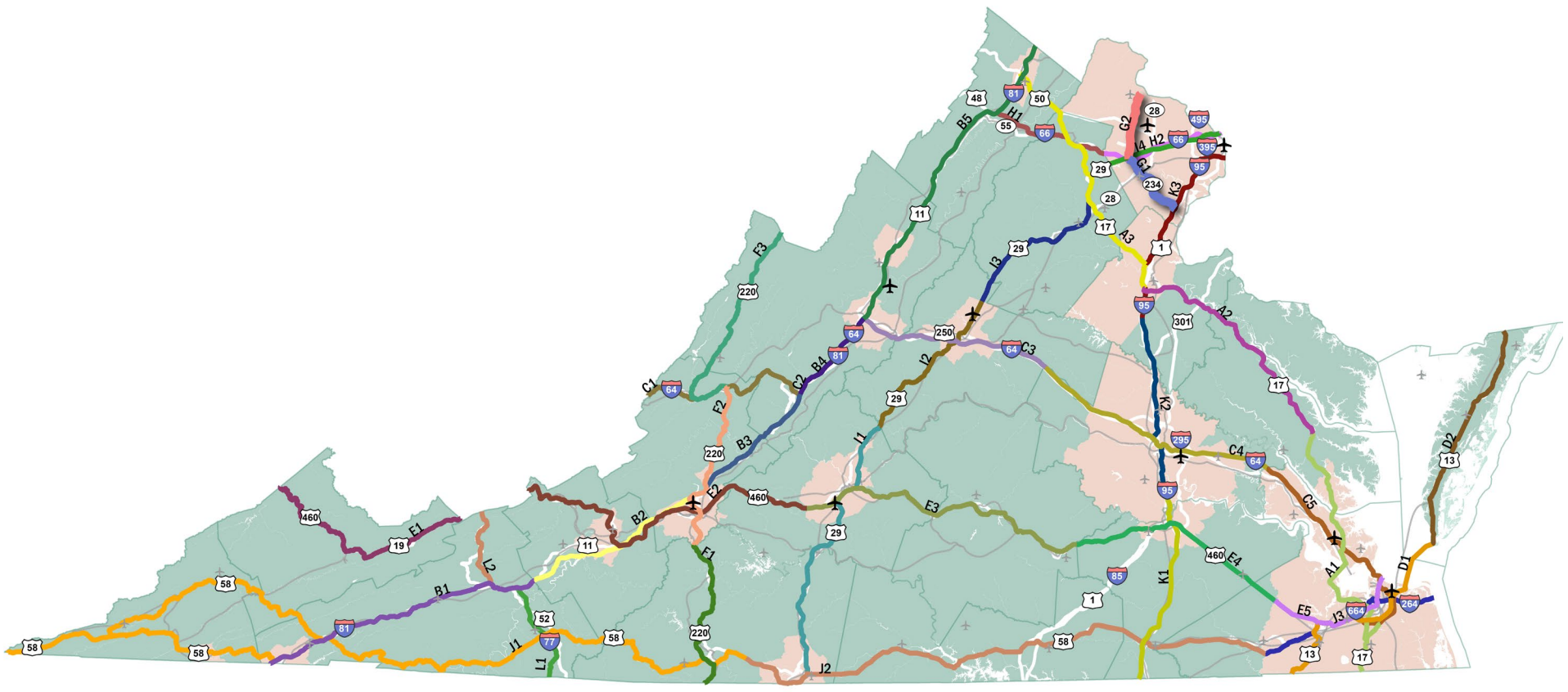
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

The North-South Corridor (Corridor G) connects I-95 to Dulles International Airport and is generally defined by Route 234 between I-66 and US 1 and the proposed Bi-County Parkway north of I-66. Route 659 and Northstar Boulevard are also included in the corridor's 45-mile length. The North-South Corridor serves as a connector between activity centers in and around Woodbridge, Manassas, Gainesville, and areas surrounding Dulles International Airport. It also provides connections between the Washington to North Carolina (Corridor K), Northern Virginia (Corridor H), and Seminole (Corridor I) Corridors. The corridor exists entirely within the area covered by the Northern Virginia portion of the Metropolitan Washington MPO.

Parallel facilities within the North-South Corridor are limited in capacity. Route 619, a rural two-lane road, parallels Route 234 from I-95 to I-66. North of I-66, US 15 and Route 28 serve as a parallel facility to the proposed alignment of the Bi-County Parkway, but neither route connects to I-95. This corridor does not run concurrently with any interstate or major highway in Virginia.

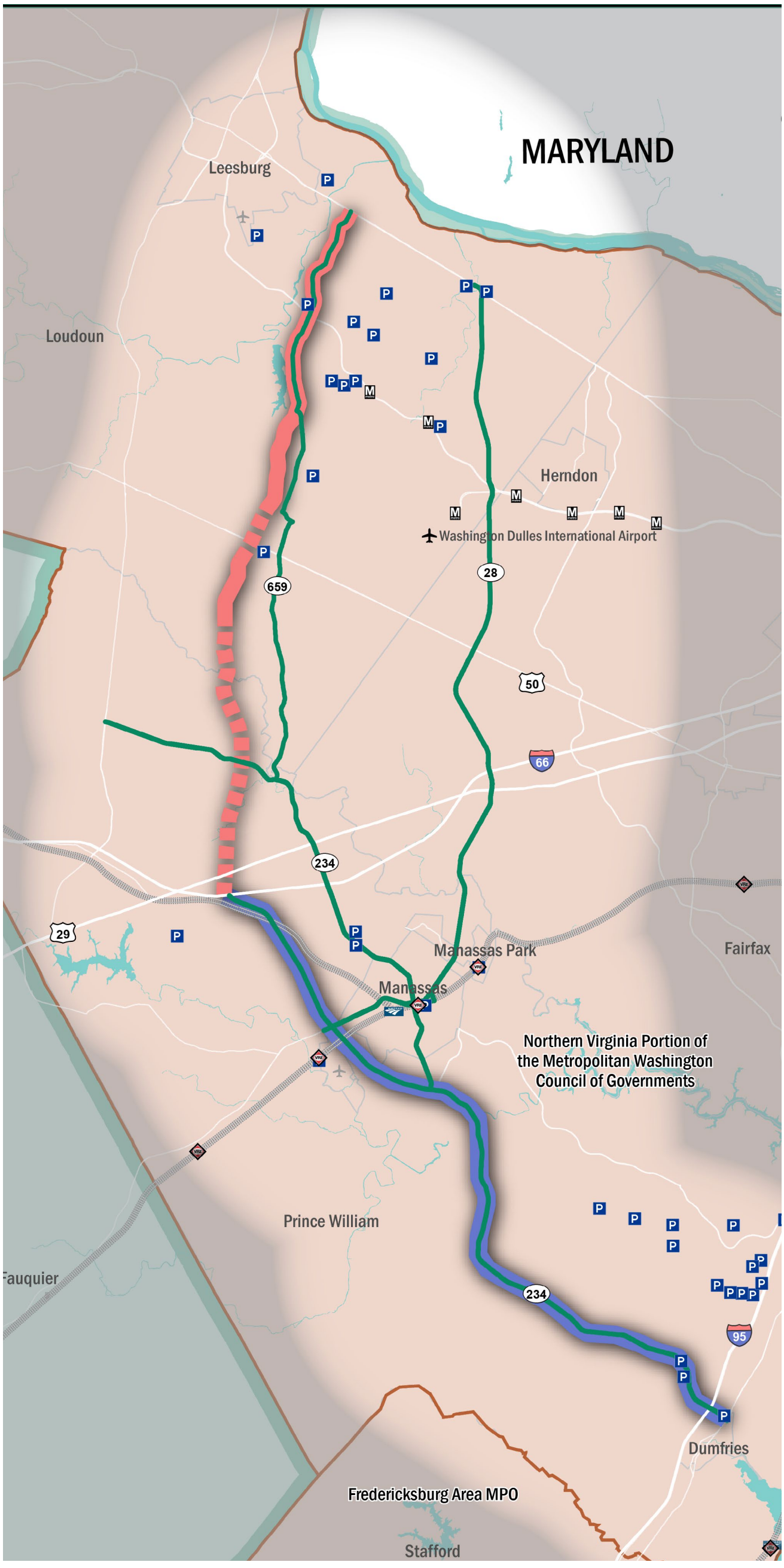
Passenger travel along the North-South Corridor has multiple options beyond driving, including:

- Line-haul bus service from the Potomac and Rappahannock Transportation Commission (PRTC) and Loudoun County Transit, available to passengers traveling the North-South Corridor, and to commuters traveling from the corridor to Washington, DC;
- Virginia Railway Express (VRE), providing commuter service at Woodbridge on the Fredericksburg Line and at Manassas on the Manassas Line into Washington DC;
- Metrorail, which does not currently provide service to the corridor; however, expansion of the Silver Line will bring Metrorail service to Ashburn, near the northern section of the corridor;
- Clusters of Park-and-Ride lots, found in Ashburn, Manassas, and Woodbridge and, in large part, served by commuter bus and VRE service;
- A single Greyhound bus station, near the corridor at Woodbridge;
- Amtrak's Cardinal, Crescent, and Northeast Regional routes serving the station at Manassas, with the station at Woodbridge receiving service only from the Northeast Regional route; and
- Dulles International Airport, the largest and busiest airport in the region, located to the east of the corridor. Two reliever airports, Manassas Regional Airport and Leesburg Executive Airport, are also accessible.

Although no rail facilities run parallel to the North-South Corridor, several rail lines do cross it, including Norfolk Southern's Crescent Corridor and CSX's National Gateway Corridor, which connect the North-South Corridor to the Virginia Inland Port to the west and the Port of Virginia facilities in the Hampton Roads Area. Freight regularly travels to and from the North-South Corridor through Dulles International Airport, and construction of the Bi-County Parkway will allow this freight to more directly access I-66, I-95, and the Norfolk Southern and CSX rail corridors.

Corridor Components

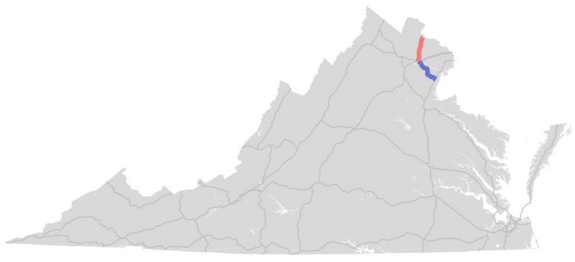
Highway Facilities	
Primary Facility	• Route 234 • Nothstar Boulevard • Proposed Bi-County Parkway
Other Highway Facilities	• Route 234 Business • Route 28 • Route 659
Transit Services	
	• Intercity bus service
Airport Facilities	
	• Washington Dulles International



Corridor Segments:
- G1
- G2

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



Demographics and Economic Trends

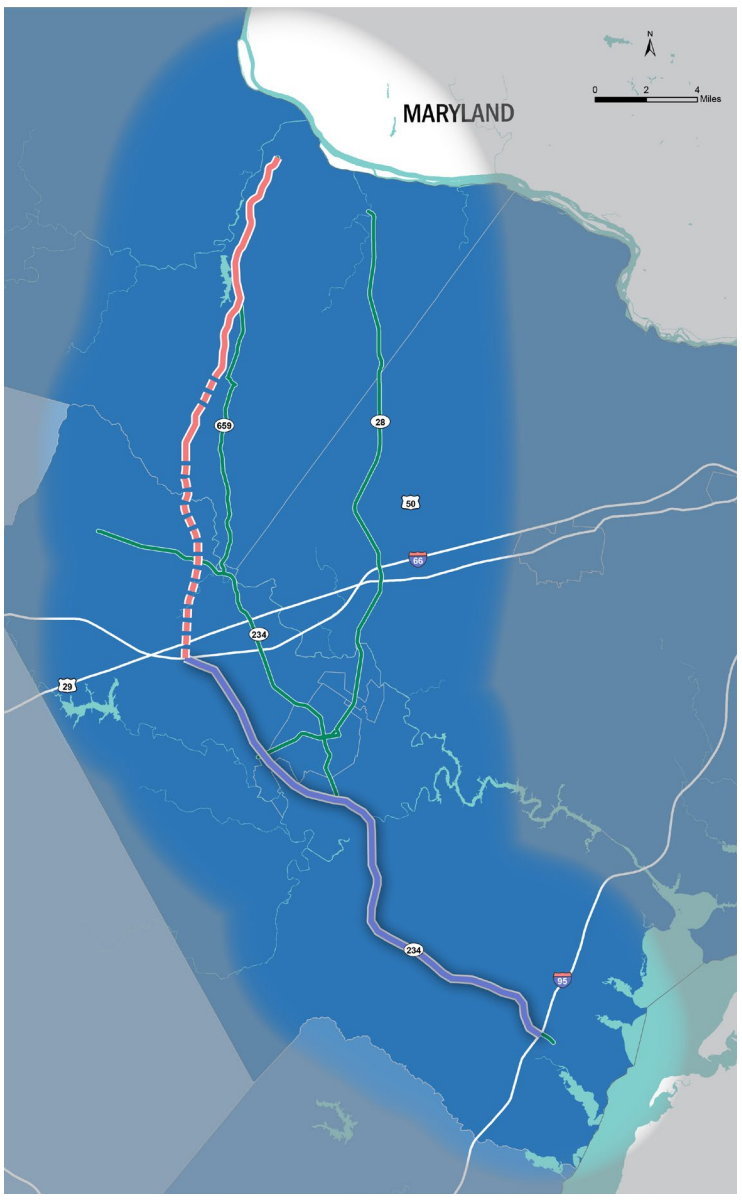
The entirety of Corridor G lies within high-density population centers with greater than 500 persons per square mile (Prince William and Loudoun Counties and the City of Manassas).

Between 2012 and 2025, Loudoun County is anticipated to see the largest population growth (greater than 30 percent) among jurisdictions along the corridor. Prince William County and the City of Manassas Park are anticipated to have the next highest population growth - 11 and 22 percent, respectively. The already densely-populated City of Manassas is expected to experience relatively lower growth (approximately eight percent). Overall, population along the corridor is expected to grow significantly.

Current employment density is highest in the Cities of Manassas and Manassas Park. Employment growth will be high (higher than 26 percent) along most of the corridor; however, employment rates in the City of Manassas and Fairfax County will grow at a slightly slower pace. Corridor G is entirely within the Northern Virginia portion of the Metropolitan Washington MPO Area, where the three largest industry sectors by GDP include professional/scientific/technical services, public administration, and retail trade.

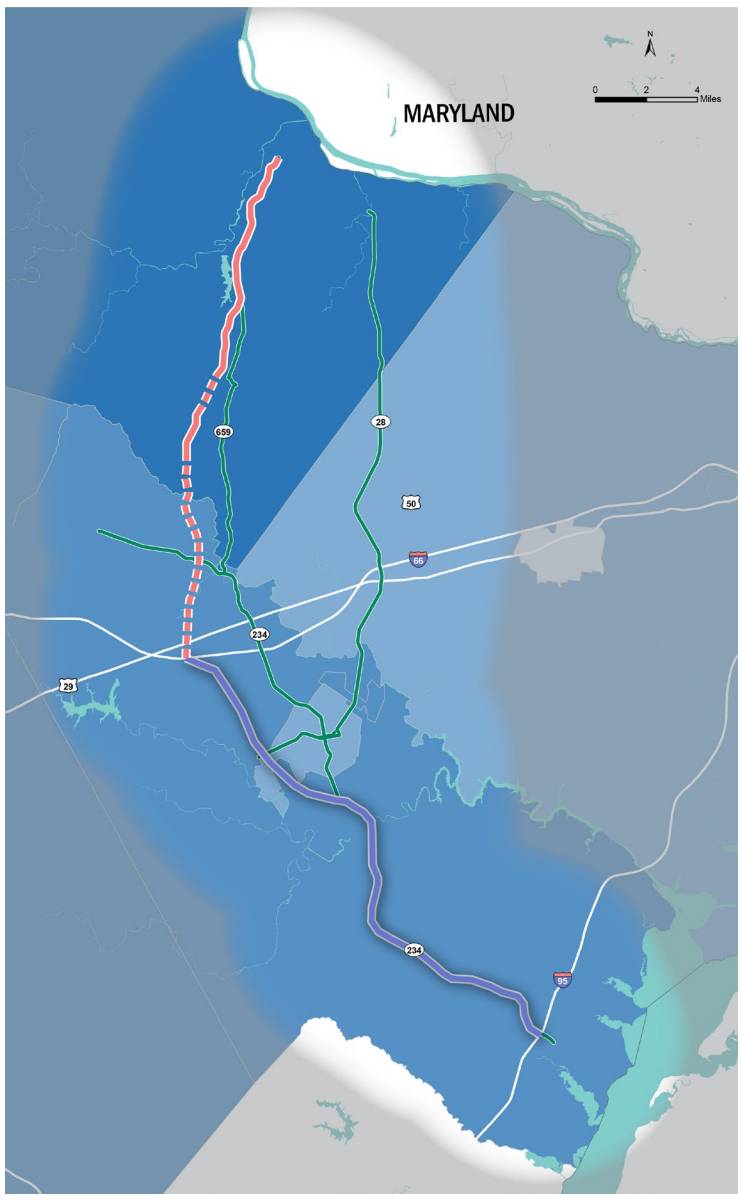
2012 Population Density Persons / Square Mile

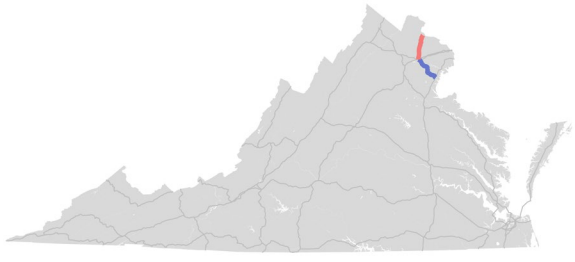
- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



Population Growth (2012-2025 Percent Change)

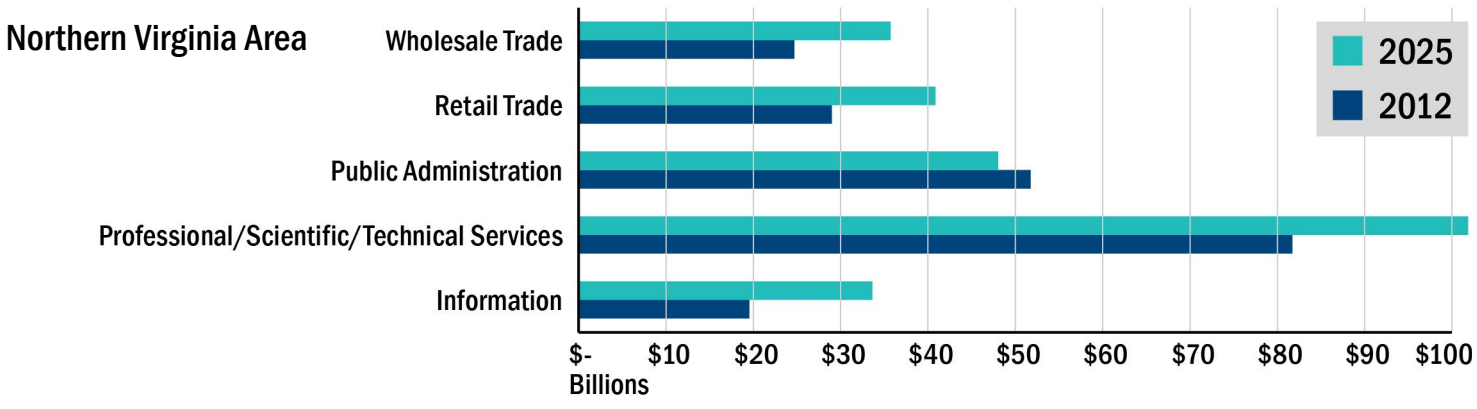
- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%





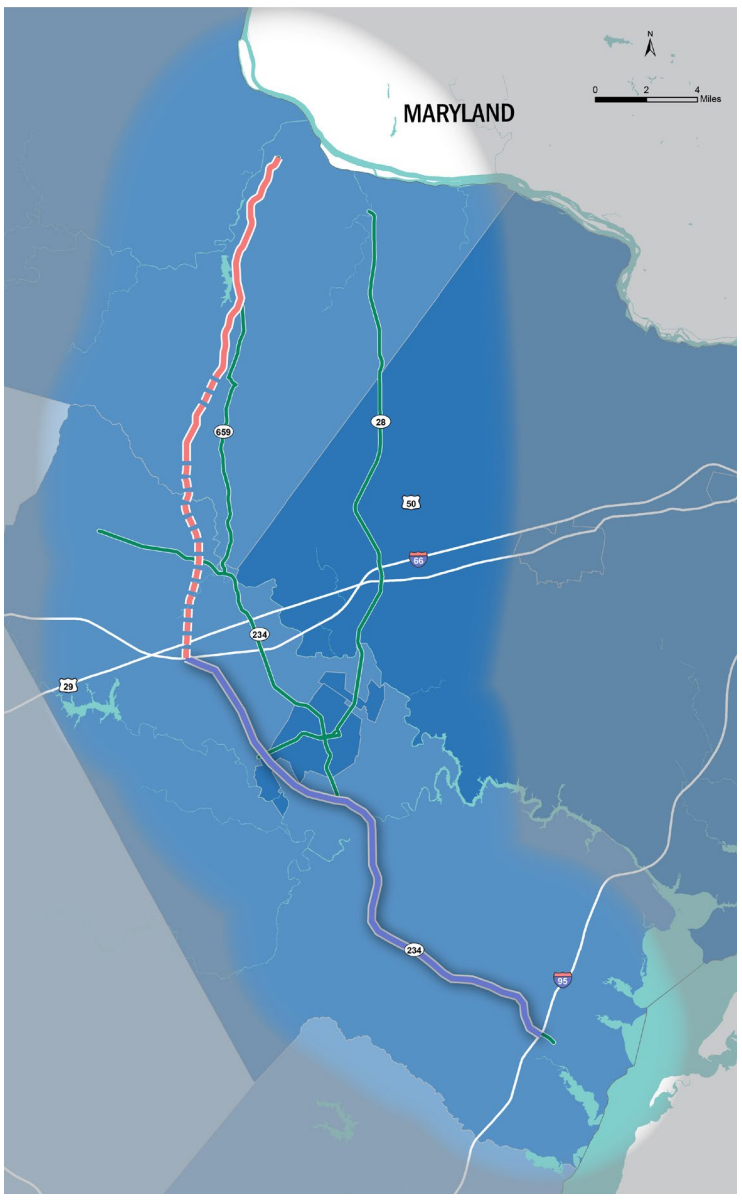
CORRIDOR G OVERVIEW

Top Industries (GDP)



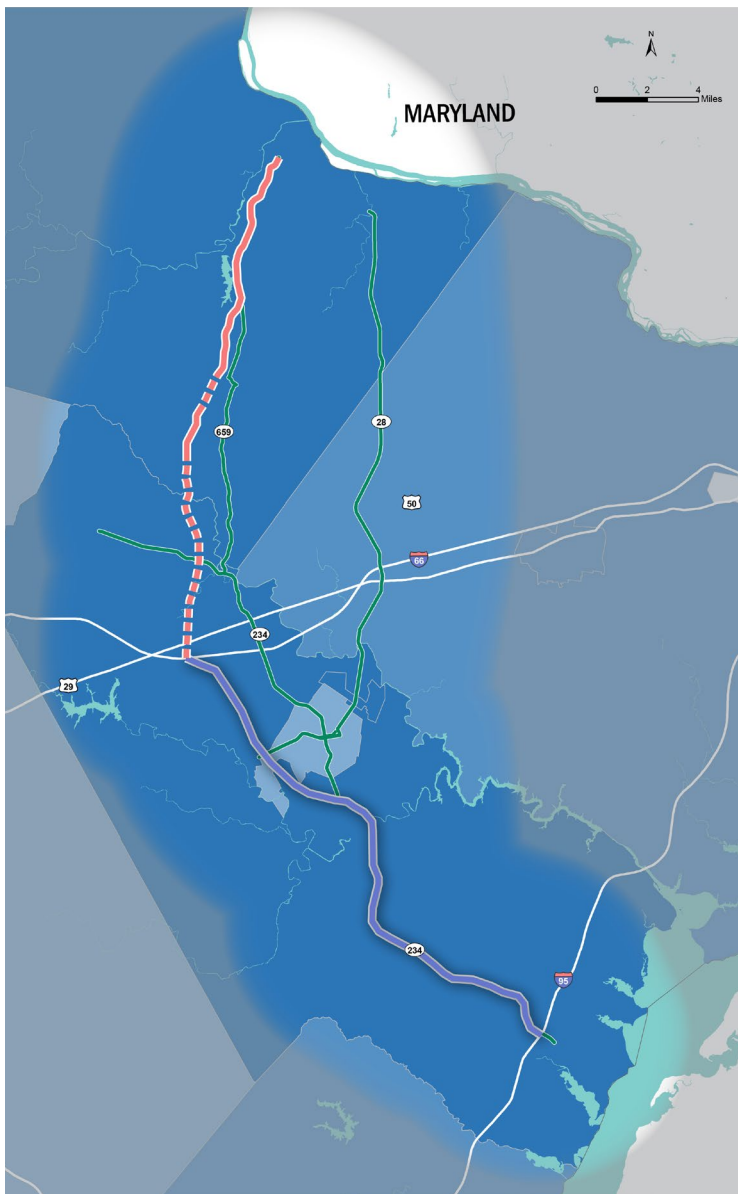
2012 Employment Density Jobs / Square Mile

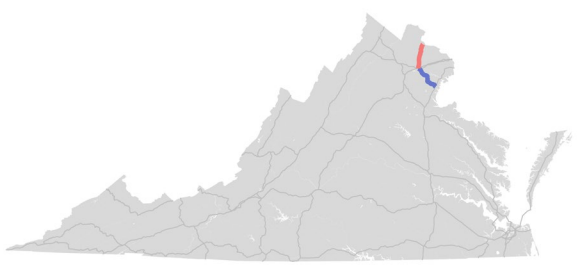
- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500



Employment Growth (2012-2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



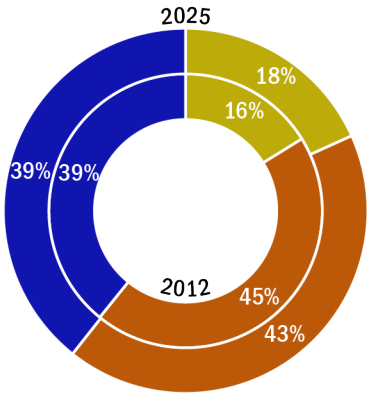


Corridor Travel Patterns

Passenger

Corridor G is located entirely within the Northern Virginia portion of the Metropolitan Washington Council of Governments (MWCOG) region, and thus accommodates a very large portion of local traffic. Almost 60 percent of the traffic along the corridor is represented by trips with both origin and destination ends within the Northern Virginia Area. An additional 35 percent of the traffic on this corridor has a trip origin or destination outside of Northern Virginia, including other areas within the MWCOG MPO area (such as the District of Columbia and Maryland). Only eight percent of traffic on Corridor G is through traffic passing through the Northern Virginia portion of the MPO area.

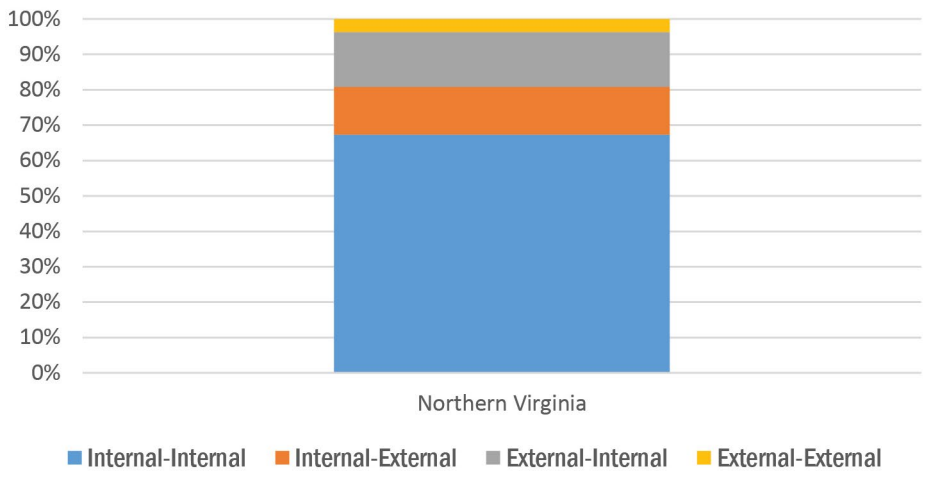
Northern Virginia Area



GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Distribution of Internal and External Travel

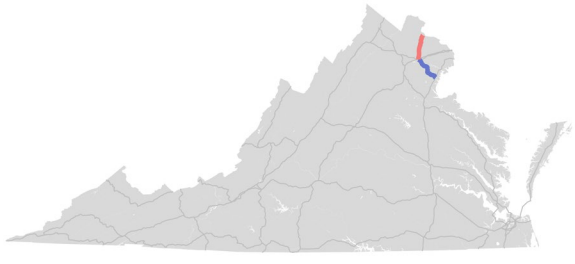


Freight

By truck, Corridor G carried four million tons of freight worth $2 billion in 2012, and is estimated to carry five million tons of freight worth $4 billion in 2025. Truck freight traffic using Corridor G is mostly comprised of freight movements within Virginia, as 50 percent of truck freight tonnage on the corridor is intra-state traffic and just three percent of freight tonnage passes through the Commonwealth.

Truck Freight

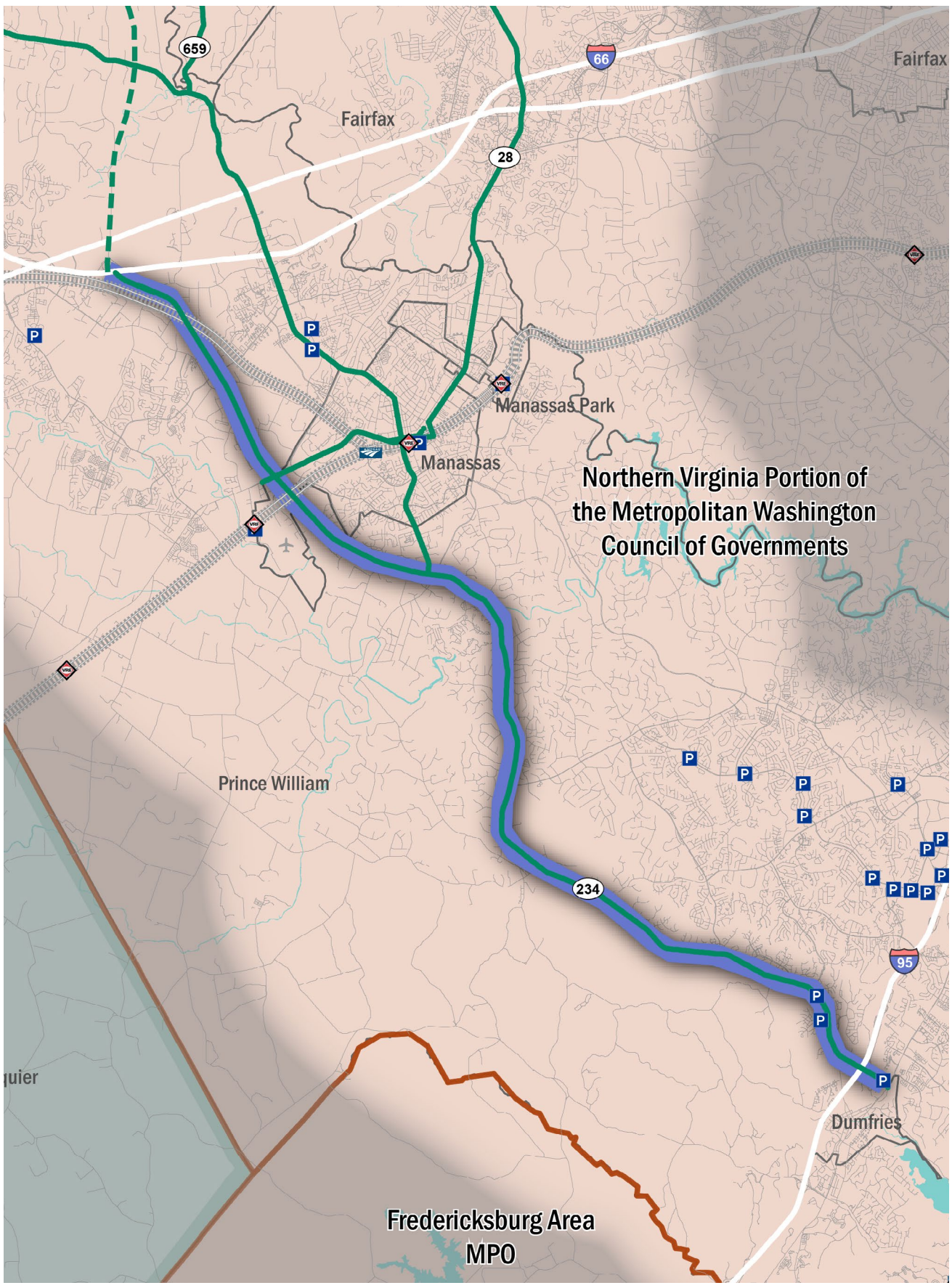
	2012	2025
Truck Freight Value	$2 Billion	$4 Billion
Truck Freight Tonnage	4 Million Tons	5 Million Tons
Freight Value per Ton	$535	$833
Corridor Tonnage Passing Through	3%	3%



II. Segment G1

Corridor Segment G1 Components

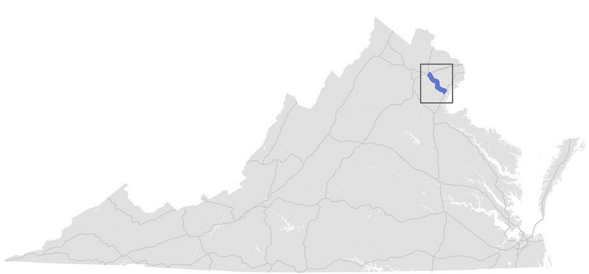
- Route 234
- Route 234 Business
- Route 28



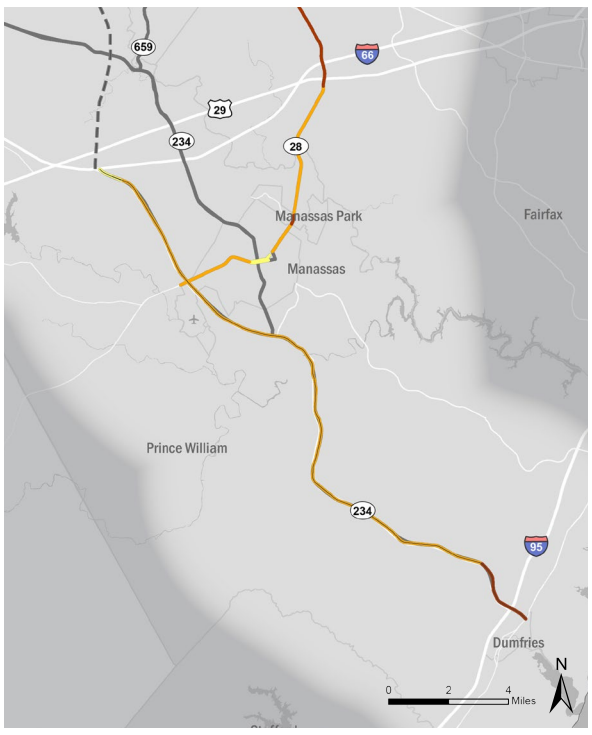
Segment G1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

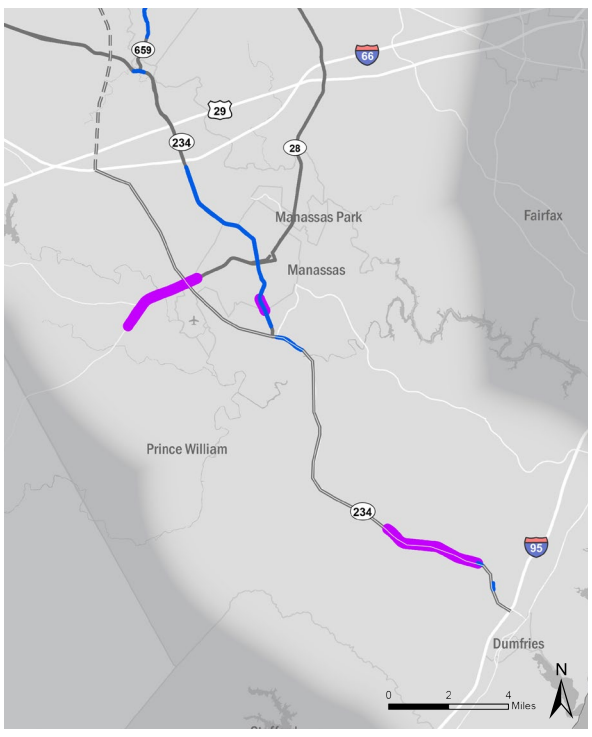


G1 SEGMENT PROFILE



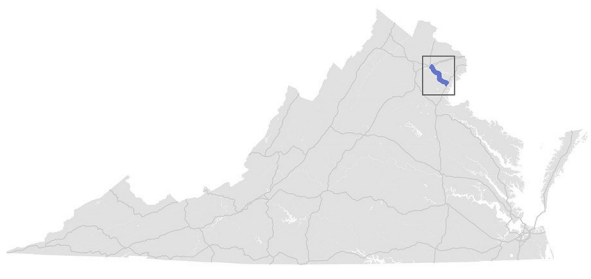
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



Segment G1 begins at US 1 in Prince William County and progresses northwest to the junction of Virginia Route 234 and I-66, serving Prince William County, as well as the cities of Manassas and Manassas Park. The segment travels through the Northern Virginia portion of the Metropolitan Washington MPO Area. Segment G1 functions as a connection from I-95 to I-66 and the Virginia Inland Port. The segment also serves as an important corridor for local commuter travel in Northern Virginia.

Highway Facilities: VA 234 is primarily a four-lane local access road, connecting I-66 and I-95, as well as local residential and commercial areas of Prince William County. Route 28 provides parallel service to the north of Segment G1, and Route 234 Business provides more local access in and around the City of Manassas.

Transit Services: Transit services provide connections from Segment G1 within Northern Virginia and Washington DC including VRE service at Woodbridge and Manassas, commuter bus services provided by PRTC, and private service providers. Amtrak and Greyhound provide service from Manassas and Woodbridge. Park-and-Ride locations are available, especially near Woodbridge.

Rail Facilities: There are no rail facilities that parallel the segment, though Norfolk Southern's Crescent Corridor does intersect the segment at Manassas.

Port Facilities: Segment G1 provides a connection from I-95 to Virginia Inland Port via I-66.

Airport Facilities: There is one reliever airport located in Segment G1.

Major planned and future projects include:

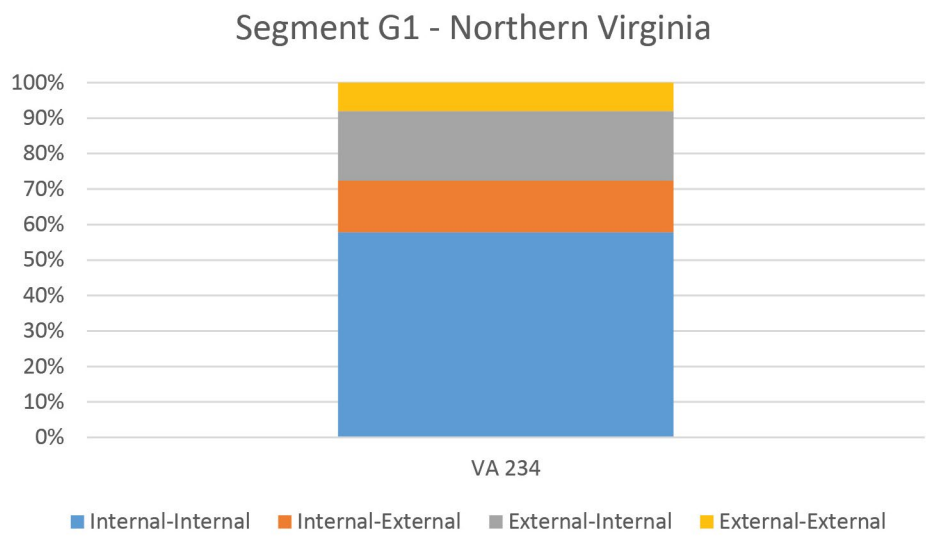
- Pedestrian improvements including 1,300 feet of sidewalk with curb and gutter between Four Seasons Drive and Fortuna Center Plaza on Route 234;
- Widening of Minnieville Road between Route 234 and Route 643 from two lanes to a four-lane divided urban section with pedestrian facilities;
- Realignment of Purcell Road between Route 234 and Vista Brooke Drive. Providing safety and drainage improvements at the curve just east of Vista Brooke Drive on an existing two-lane section of road;
- Widening of Nokesville Road (Route 28) from four to six lanes underneath Route 234; and
- Route 234 bypass interchange construction at relocated Balls Ford Road (Route 621). Balls Ford Road (Route 621) will also be widened.

Travel Demand

Passenger Demand

Segment G1 exists entirely within the Northern Virginia Area, and accommodates large amounts of traffic local to the region. This segment provides connections between multiple CoSS segments within Northern Virginia, including Segment H2, Segment I4 and Segment K3. While this segment provides flexibility and redundancy for intercity passenger traffic in or through Northern Virginia, it is not the primary route for any intercity traffic.

On Route 234 in Segment G1, 58 percent of travel is local traffic with both its origin and destination inside the Northern Virginia Area. An additional 35 percent of traffic in this segment has one end of the trip outside of Northern Virginia, including other areas within the Metropolitan Washington MPO Area (such as the District of Columbia and Maryland). Only eight percent of the travel is through traffic passing through the Northern Virginia Area.



Freight Demand

By truck, Segment G1 carried three million tons of freight worth $3 billion in 2012, and is estimated to carry four million tons of freight worth $5 billion in 2025. Truck freight traffic using Corridor G is mostly comprised of freight movements within Virginia, as 50 percent of truck freight tonnage on the corridor is intra-state traffic and just three percent of freight tonnage passes through the Commonwealth. Truck freight between Loudoun County and North Carolina accounts for more than ten percent of the total truck freight tonnage and 12 percent of the total value on the corridor. There are also significant truck freight flows between Fauquier County and Pennsylvania, accounting for five percent of the truck tonnage on Corridor G. An additional five percent of the truck tonnage on the corridor travels between Loudoun County and Chesterfield County in Virginia.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (72% / 69%)
2. Loudoun County (26% / 19%)
3. North Carolina (9% / 9%)
4. Pennsylania (7% / 7%)
5. Maryland (4% / 6%)

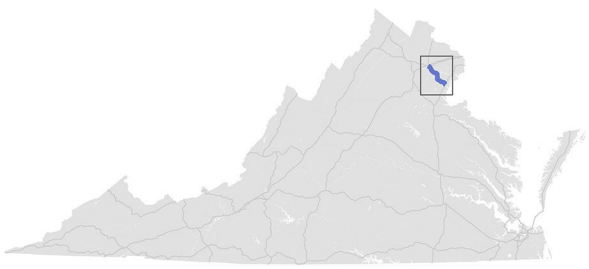
Corridor Tonnage Originating in Segment G1: 32% / 26%

Major Origin-Destination Pairs for Freight
Loudoun County and North Carolina
Culpeper County and Pennsylvania
Fauquier County and Pennsylvania
Loudoun County and Chesterfield County
Loudoun County and City of Richmond*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (72% / 77%)
2. Loudoun County (25% / 31%)
3. Pennsylvania (12% / 10%)
4. Prince William County (8% / 8%)
5. North Carolina (7% / 5%)

Corridor Tonnage Destined for Segment G1: 37% / 45%

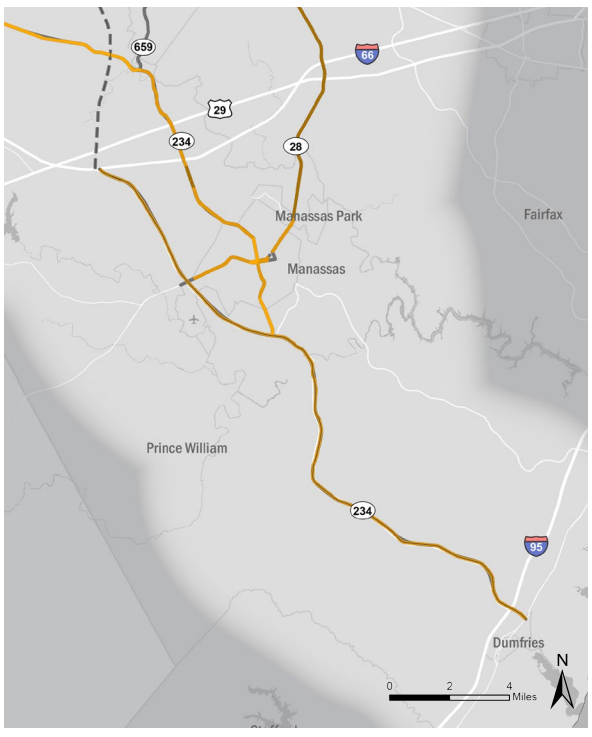


Traffic Conditions

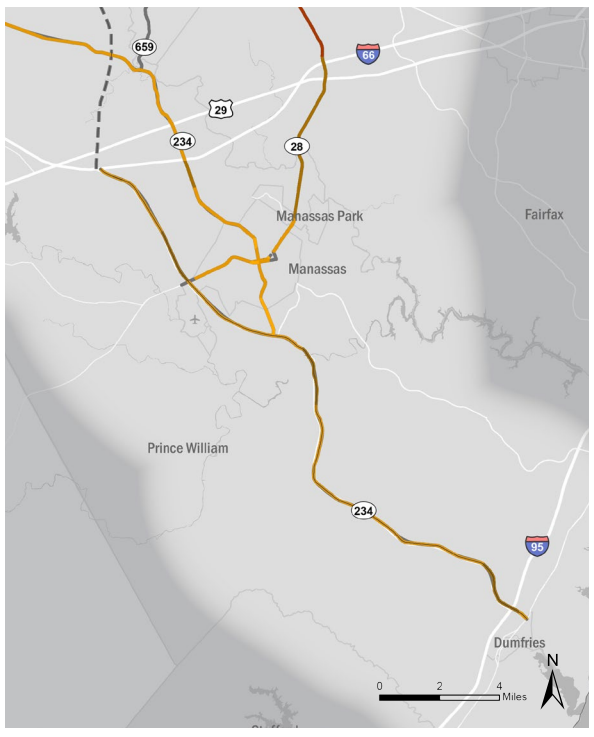
Traffic Volume and AADT

Average daily traffic volumes along Route 234 in Segment G1 range from 24,000 to 45,000 vehicles, with the highest volumes occurring at either end of the segment near the interchanges with I-66 and I-95. By 2025, traffic volumes on Segment G1 are projected to increase along Route 234, bringing the average daily traffic volume up by 6,000 to 10,000 vehicles per day.

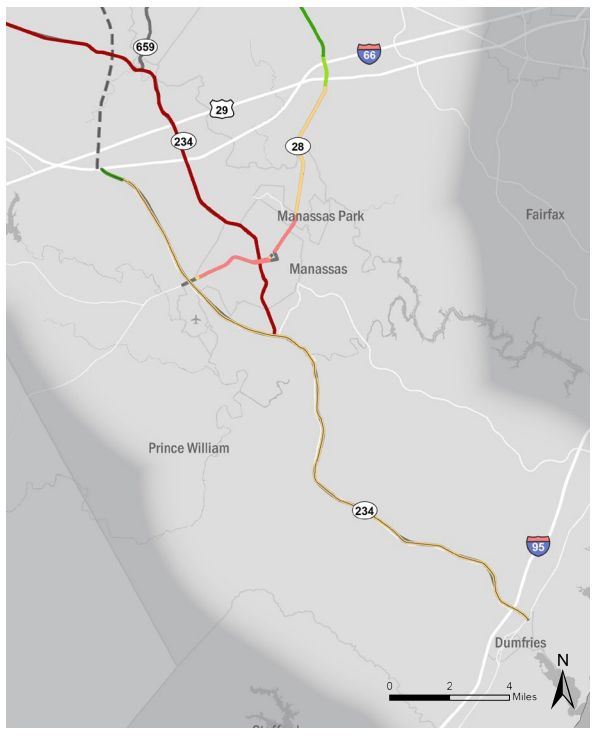
Traffic Volume 2014 (AADT)

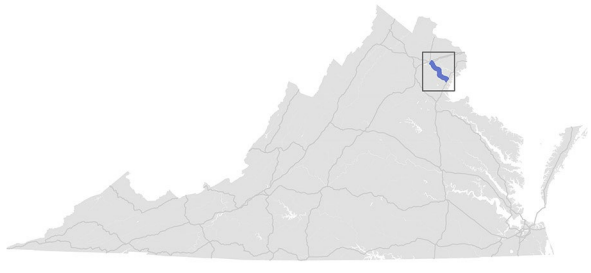


Traffic Volume 2025 (AADT)

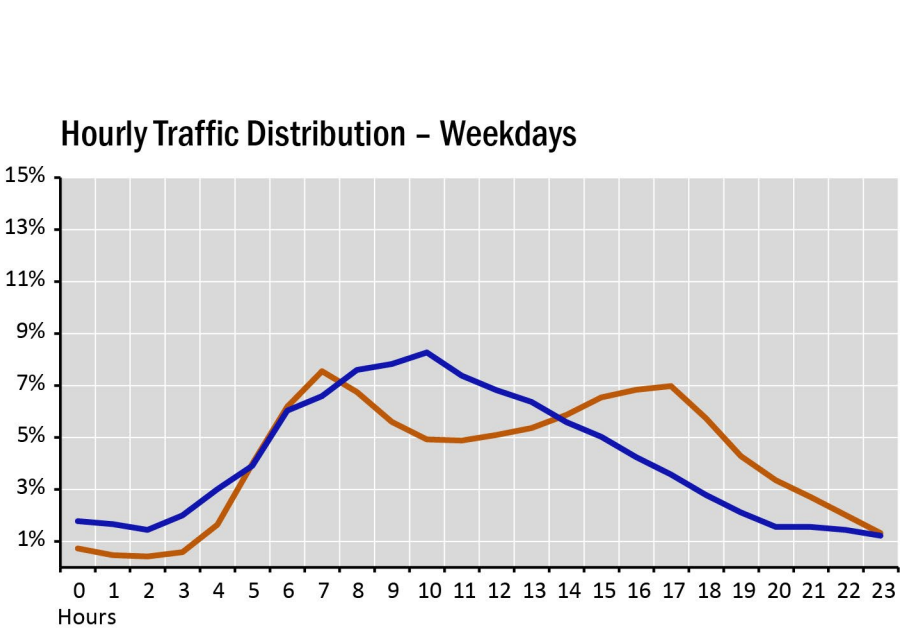


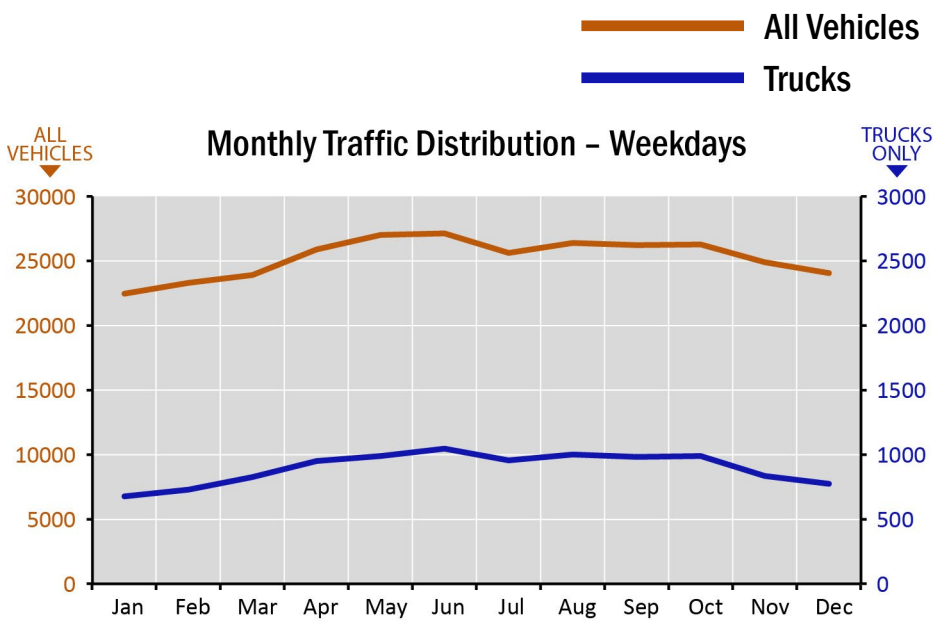
Change in Traffic Volume 2014 - 2025 (AADT)

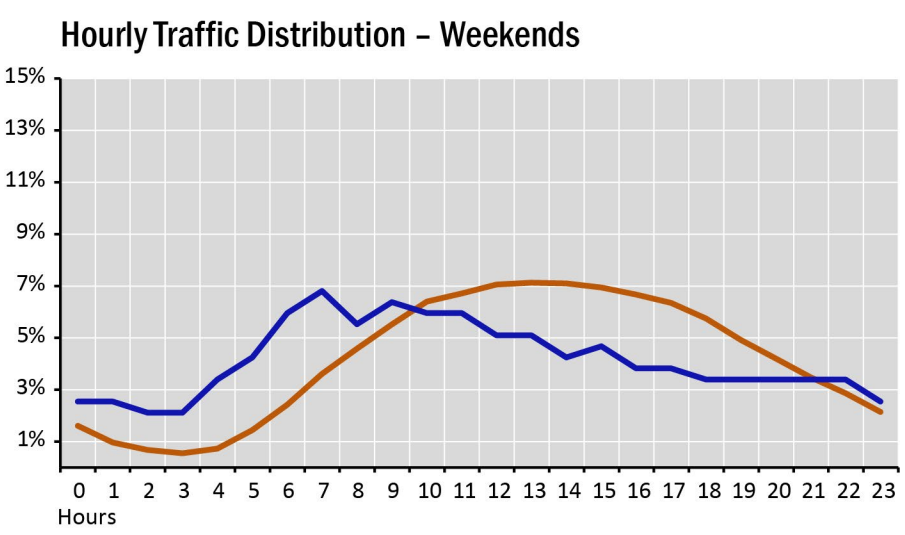


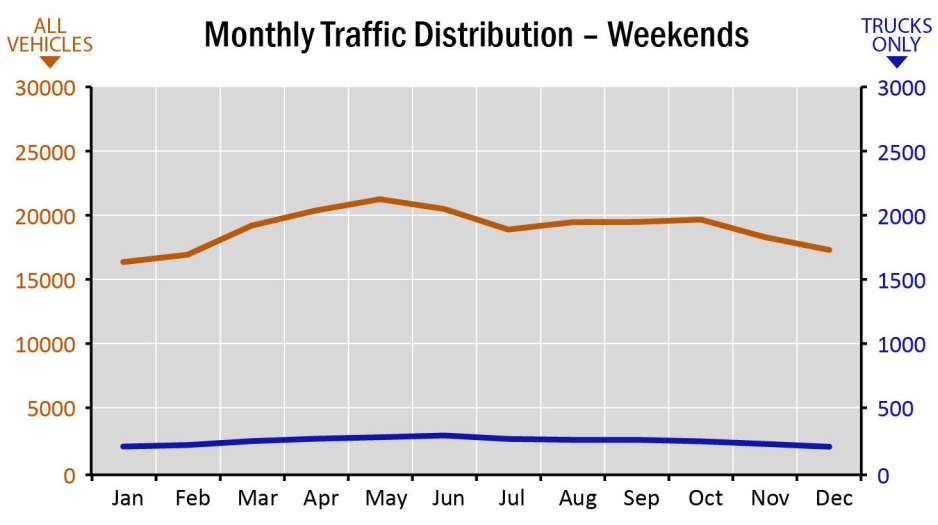


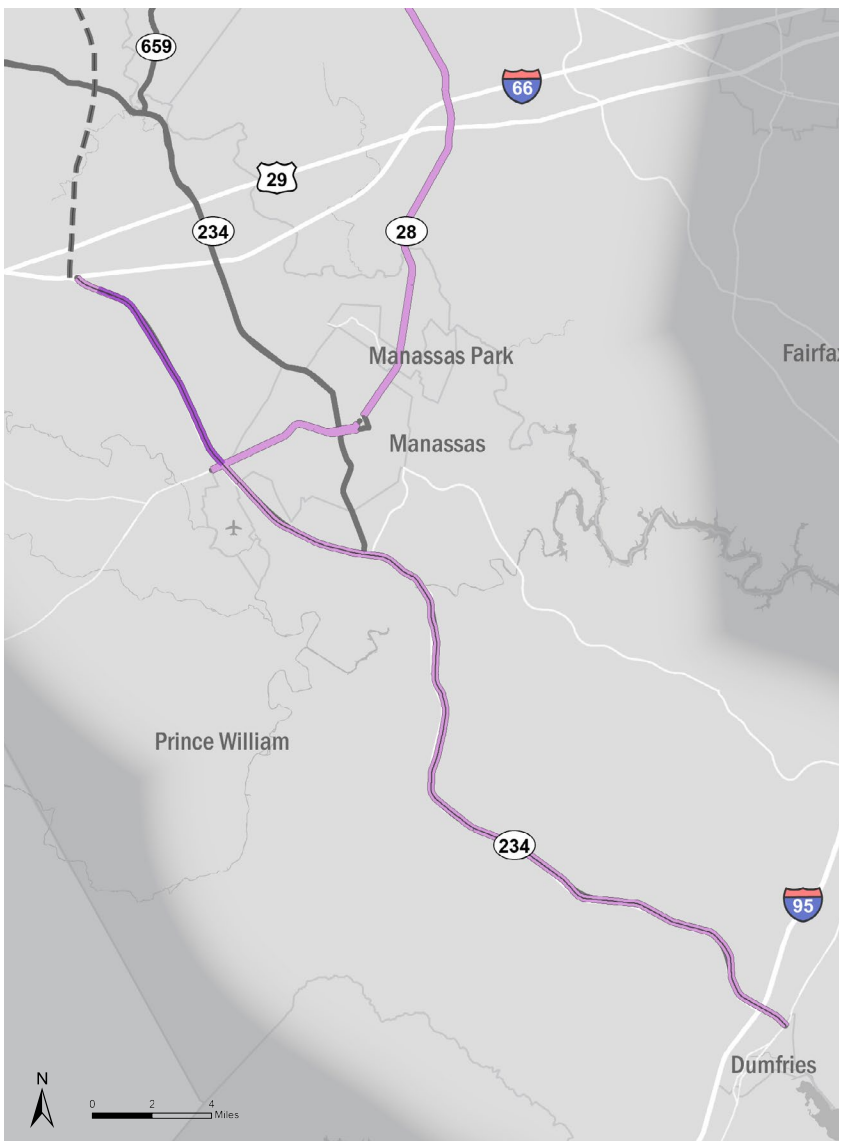
G1 SEGMENT PROFILE











Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

Traffic Distribution

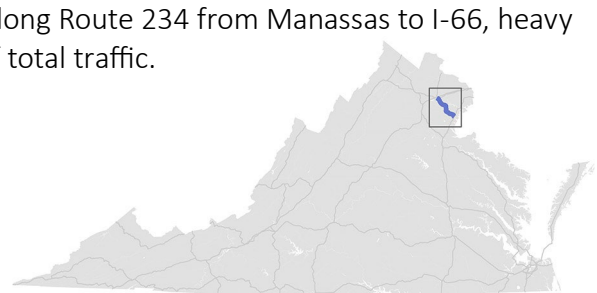
On average, traffic on Segment G1 is distributed throughout the day as shown in the graphs below.

Weekday traffic shows two peak periods over the course of the day, and the highest hourly traffic occurs between 7 and 8 a.m. which accounts for 7.6 percent of daily traffic and a less busy evening peak between 5 and 6 p.m. accounting for 7.0 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 52 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic, with a peak hourly flow of 8.3 percent of daily traffic occurring between 10 and 11 a.m. Weekend traffic patterns are different from the typical commute patterns, showing a single peak during the middle of the day with the peak hour flow between 1 and 2 p.m. (7.1 percent of daily traffic) for all traffic. Weekend truck traffic decreases throughout the day, and the peak hourly traffic occurs from 7 to 8 a.m. (6.8 percent of daily traffic).

Weekday traffic volumes on Segment G1 vary by as much as 21 percent throughout the year, with the highpoint in June (around 27,000 vehicles per day) and the low point in January (around 22,000 vehicles per day). Truck volumes vary significantly throughout the year, with the June high (around 1,000 vehicles per day) 55 percent higher than the January low (around 700 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 21,000 vehicles per day) are 30 percent higher than January levels (around 16,000 vehicles per day). Truck volumes account for a relatively small portion of traffic on Segment G1 (three percent of weekday daily traffic and one percent of weekend daily traffic); traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

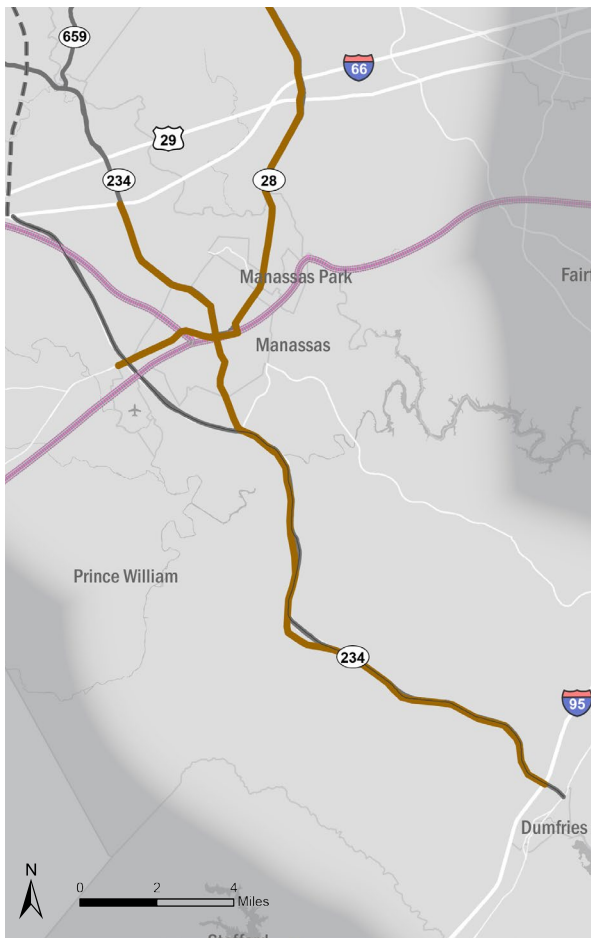
Truck Volume

In Segment G1, heavy trucks account for three percent of total traffic along Route 234 from Dumfries to Manassas. Along Route 234 from Manassas to I-66, heavy trucks account for seven percent of total traffic.



G1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

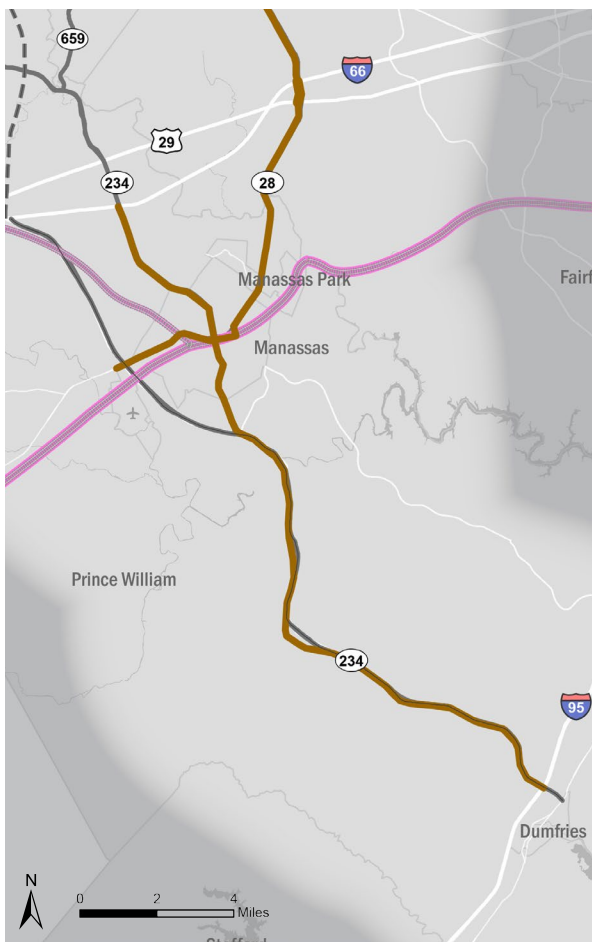


Freight Flows

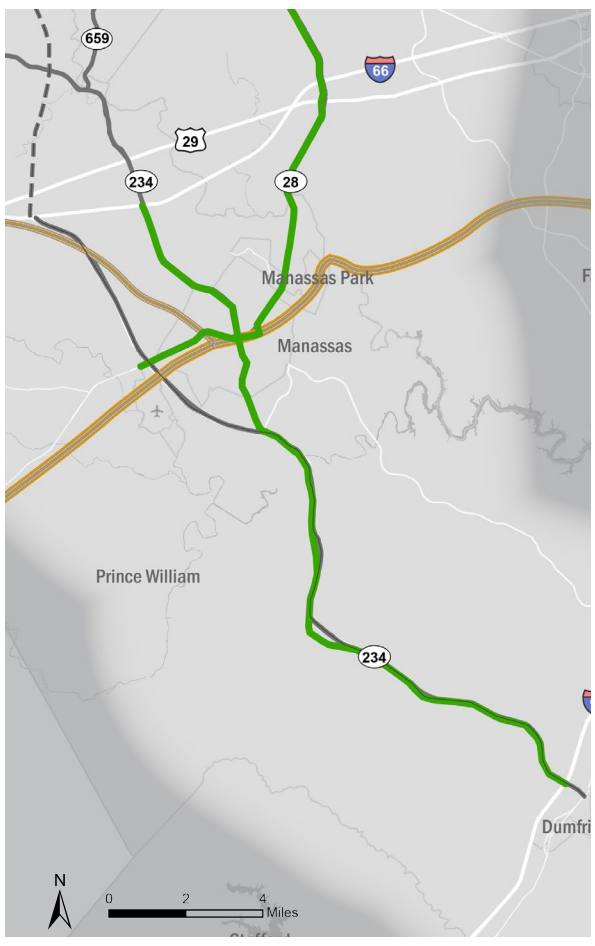
In Corridor G, freight is moved primarily by truck, in terms of both tonnage and value. In Segment G1, rail only provides a parallel facility for trucks between Manassas and I-66. Through Segment G1, more than two million tons (80 percent) of freight is moved by truck, compared to 607,000 tons by rail. In terms of freight value, $2.5 billion (99.7 percent) of freight value travels by truck, compared to $5 million by rail. On average, a ton of freight traveling through Segment G1 by truck is worth $1,009 while a ton of freight traveling by rail is worth $9. By 2025, both rail and truck freight tonnages and total values in Segment G1 are expected to increase, but the relative percentages of tonnage and value moved by truck are expected to remain nearly the same. Value per ton of freight by truck is expected to grow by 2025, with an average of $1,386 per ton, while value per ton of freight by rail is predicted to remain the same.

At the southern end of Segment G1, near the junction with I-95, no parallel rail facility exists. Trucks carry a total of 2.5 million tons of freight, worth $2.5 billion. On average, a ton of freight traveling through the southern end of G1 is worth $1,007. By 2025, truck freight tonnage and value is expected to increase, as is value per ton, to an average of $1,385.

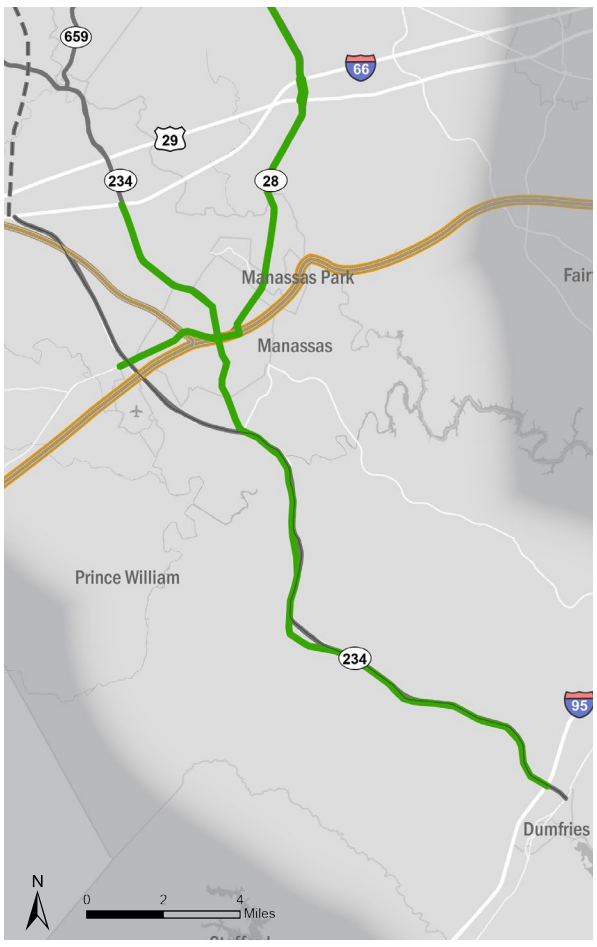
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

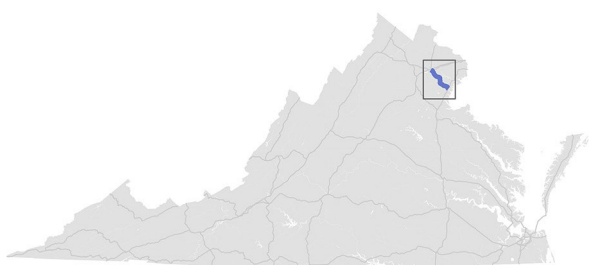
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight (in value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight (in value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Manassas to Dale City

Inter-City Bus	Train
30 Trips per Day 0:50 Travel Time $8 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rte. 234: 0:30 Travel Time $10 Est. Cost

Fredericksburg to Leesburg

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

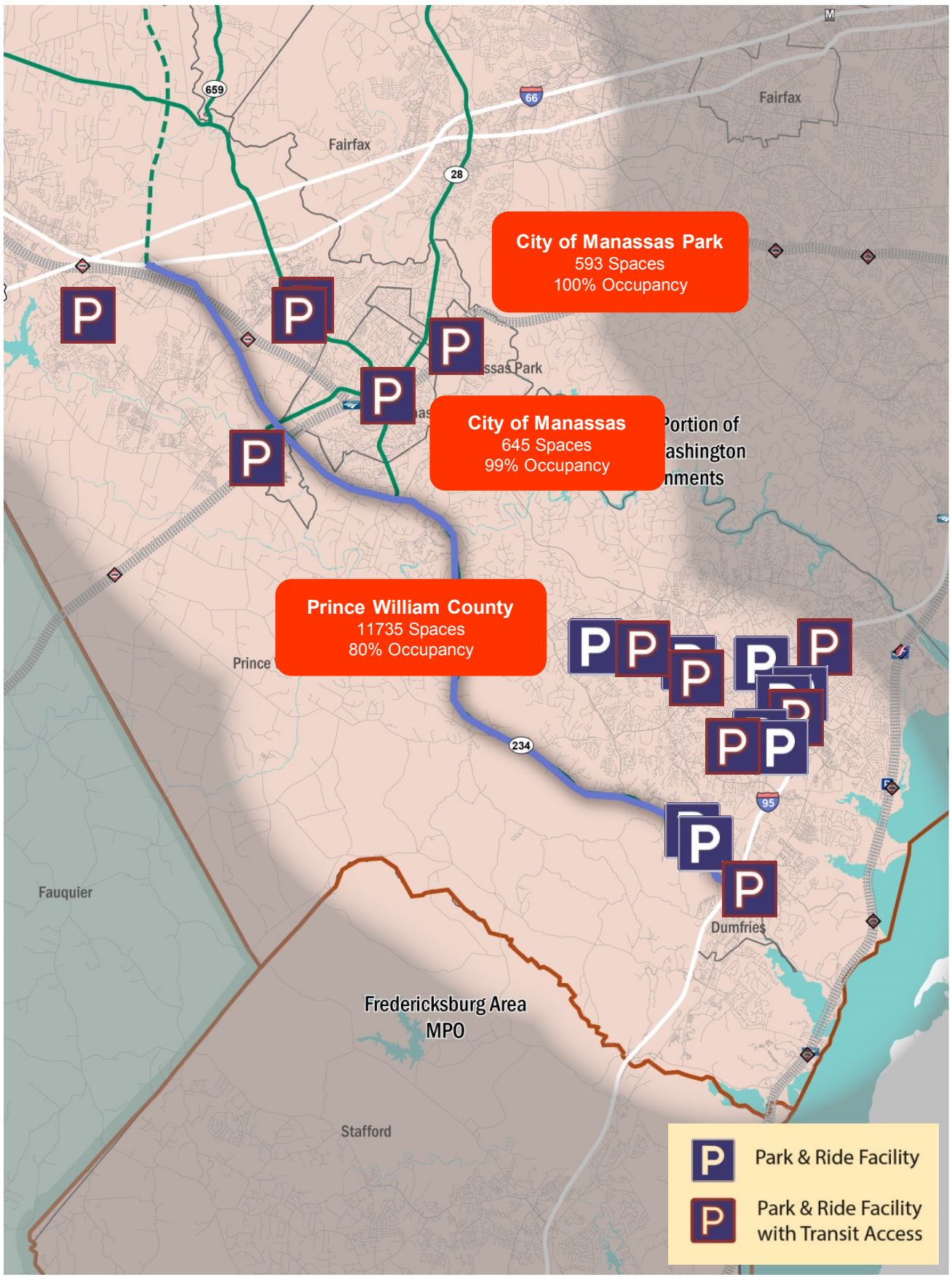
Auto

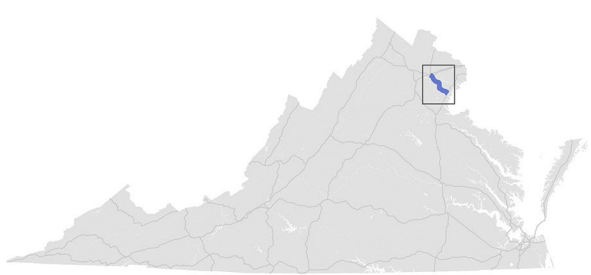
Via Rte. 234: 1:35 Travel Time $43 Est. Cost

Passenger trips on Segment G1 of the North-South Corridor have limited travel options, both in terms of travel path and mode choice. US 234 does not have a parallel highway facility for the full length of Segment G1, although alternatives are available north of the City of Manassas. Based on the 2014 federal standard mileage rate of 56 cents per mile, trips along the corridor would be more expensive by automobile than by the other available modes, such as by bus. Bus service, offered by PRTC, provides access to locations within the segment, but does not currently offer service to the rest of the corridor. Amtrak, Greyhound, and VRE have stations at Woodbridge and Manassas, though these services provide a connection to Washington DC and do not facilitate travel within the corridor.

Park-and-Ride

Within Segment G1, commuters can utilize many Park-and-Ride locations in Prince William County, as well as commuter bus service to Northern Virginia and Washington DC from PRTC. Prince William County has a high number of Park-and-Ride locations (30) and spaces (11,735). The Park-and-Ride locations in Prince William County are heavily used, and the utilization rate of 80 percent is higher than the statewide average of 76 percent.





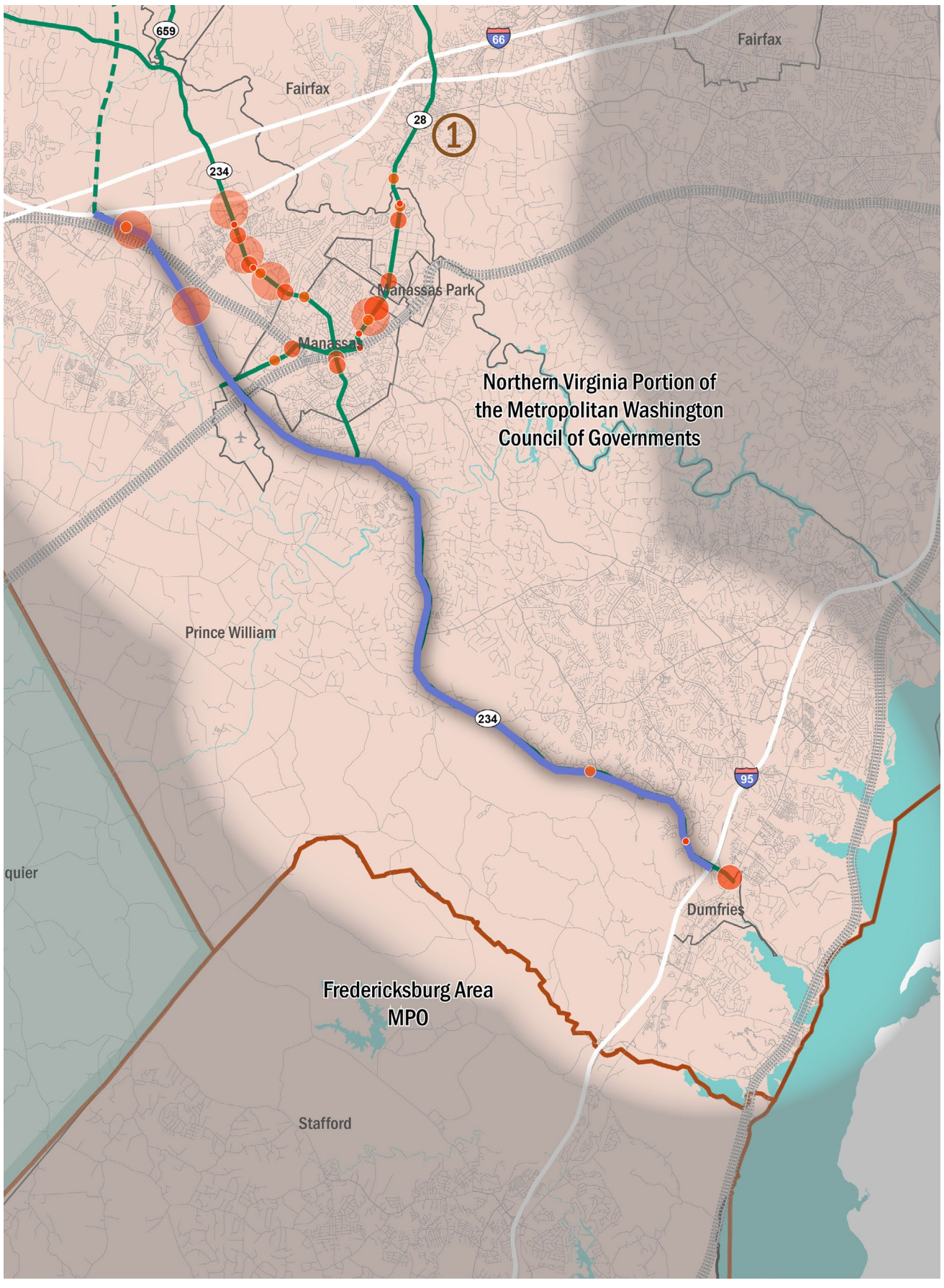
G1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	266
Severe Crashes/Million VMT	8.4
Number of Railroad Crashes	1

Between 2010 and 2012, 266 severe crashes occurred on Segment G1, resulting in the highest crash rate by far among CoSS segments in the Commonwealth. There are several areas along Segment G1 with high concentrations of severe crashes. Near the intersection of Route 234 (Dumfries Road) and US 1 (North Fraley Boulevard), there were 42 severe collisions. In Manassas, along Route 234 Business (Grant Avenue), 22 incidents occurred within a 0.2-mile stretch between Prince William Street and Byrd Drive. The largest number of crashes, 140, occurred on Sudley Road, south of I-66, over a distance of approximately three miles between Balls Ford Road and Digges Road. Of the 140 crashes, 100 occurred at intersections: 27 of these occurred at Balls Ford Road, 23 took place at Lomond Drive, and 21 happened at Rixlew Lane. On Route 234 (Prince William County Parkway), 21 collisions occurred at the intersection with Wellington Road, and 30 crashes occurred over 0.44 miles at and near the intersection with Balls Ford Road.

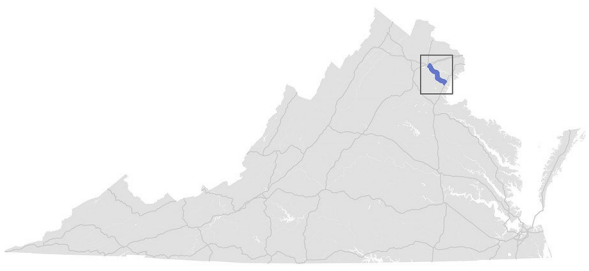


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

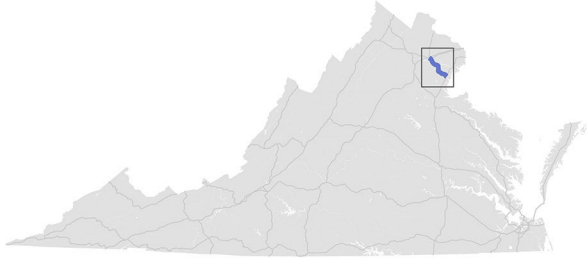


G1 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	99
Freight Ton Hours of Delay per Mile	19.4K



Passenger Delays

While total passenger delays along Segment G1 are moderate with respect to other CoSS segments, this segment ranks as one of the most highly congested segments for passenger traffic on a per-mile basis, with nearly 100 person-hours per mile of delay. There are significant passenger delays in excess of 100 person-hours per mile in a number of locations:

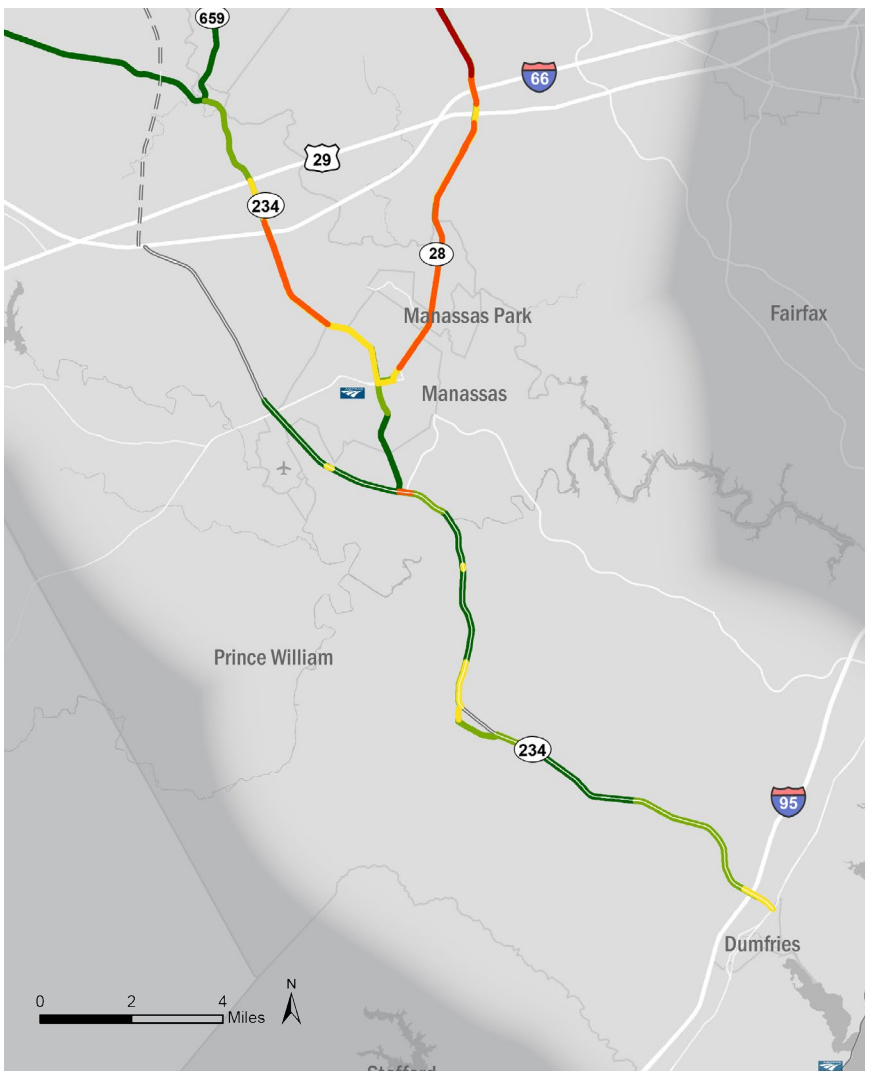
- Route 28 east of Route 234 Business in Fairfax and Prince William Counties and the Cities of Manassas and Manassas Park;
- Route 234 Business between Route 28 and US 29 in Manassas and Prince William County;
- Various locations on Route 234 in Prince William County between Route 28 and Bristow Road (Route 619);
- Route 234 at the intersection with Route 234 Business in Prince William County; and
- Route 234 between I-95 and US 1.

Peak-period passenger delays account for 38 percent of daily congestion, slightly less than the average peak-period congestion share for passengers among CoSS segments.

Freight Delays

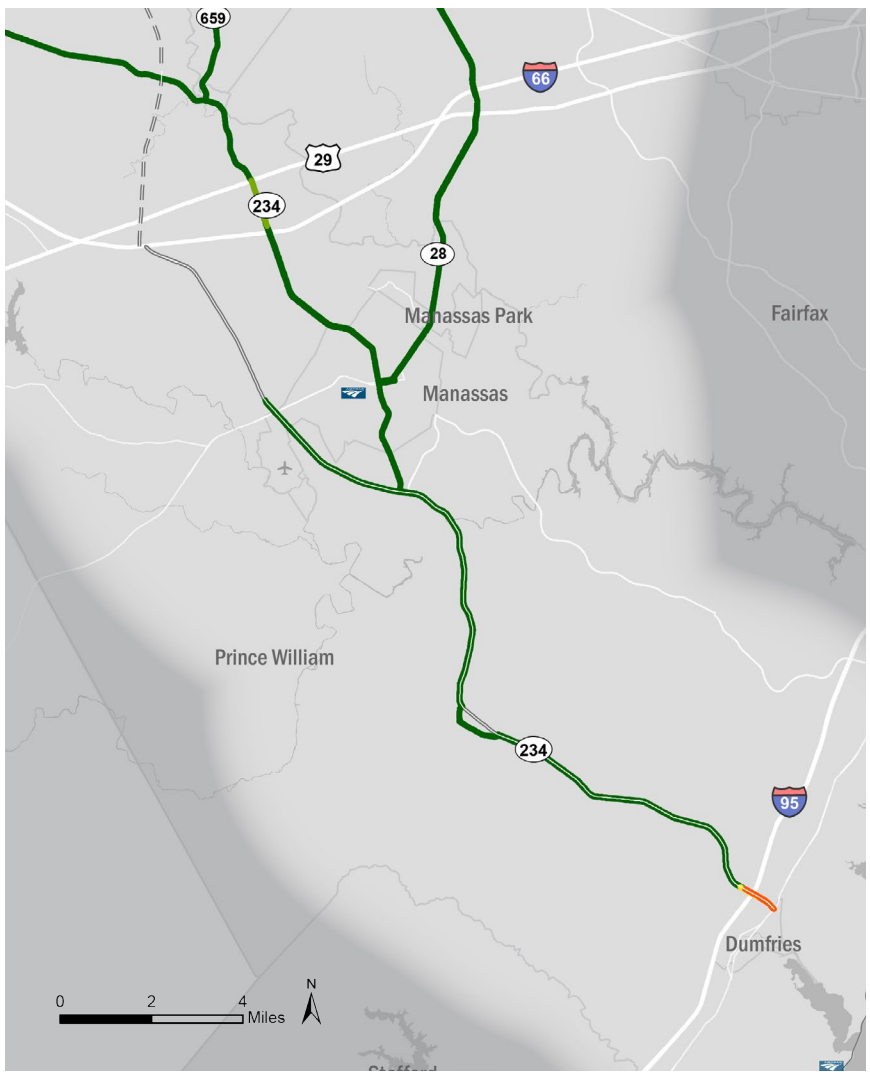
Freight delays along Segment G1 are moderate with respect to other CoSS, with nearly 20,000 ton-hours per mile of delay, although freight congestion is not nearly as severe as passenger congestion for this segment. In general, freight delays along the segment do not exceed 250,000 ton-hours per mile, with the exception of on Route 234 between I-95 and US 1. Peak-period freight delays account for 47 percent of daily congestion, which is higher than the average peak period congestion share for freight among CoSS segments.

Daily Person Hours of Delay Per Mile



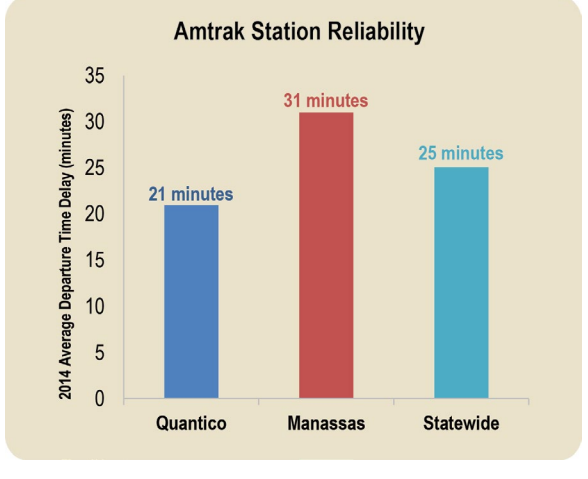
< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability



Weekday Peak Reliability

Reliability of travel during the peak period on a typical weekday on Segment G1 ranges from 0.05 to 0.98 in terms of reliability index, with an average value of 0.22. While this segment has a peak period reliability index much higher than average for the CoSS segments statewide, only a short segment on Route 234 near Bristow Road in Prince William County has a reliability index value exceeding the statewide threshold.

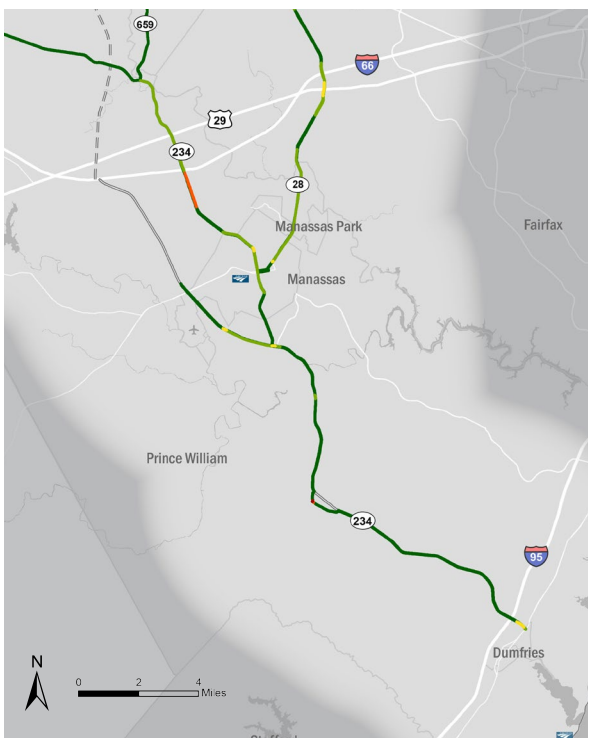
Weekday Reliability

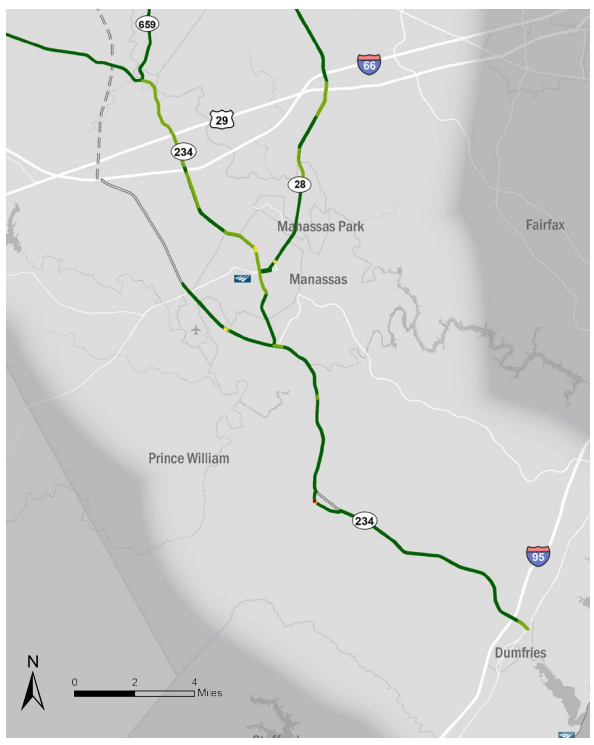
Reliability of travel during a typical weekday ranges from 0.04 to 0.82 in terms of reliability index, with an average value of 0.19. Locations where the weekday reliability index exceeds the statewide threshold include:

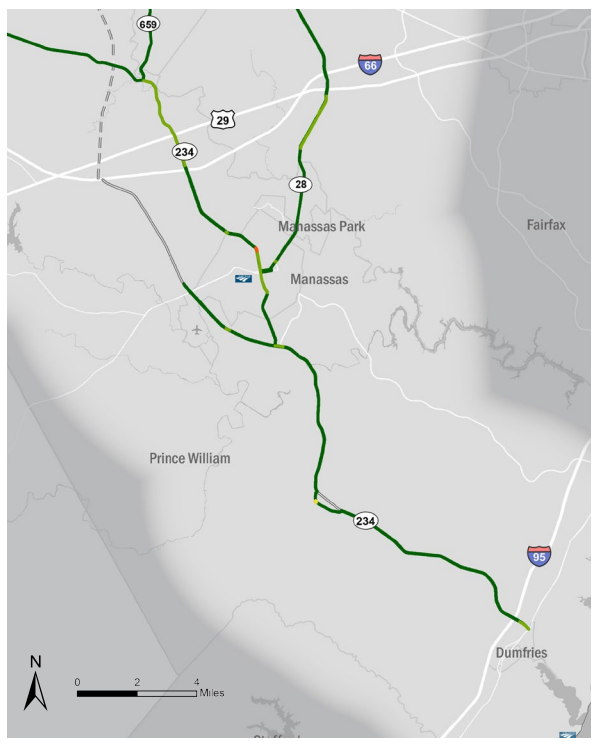
- Route 234 near Bristow Road in Prince William County;
- Route 234 near Clover Hill Road in Prince William County;
- Route 234 Business at the intersection of Sudley Road and Grant Avenue in the City of Manassas; and
- Route 28 near the intersection with Sudley Road in the City of Manassas.

Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.01 to 0.64 in terms of reliability index, with an average value of 0.17. While this segment has a weekend reliability index much higher than average for the CoSS segments statewide, only a short segment on Route 234 Business near the intersection of Sudley Road and Grant Avenue in the City of Manassas has a reliability index value exceeding the statewide threshold.





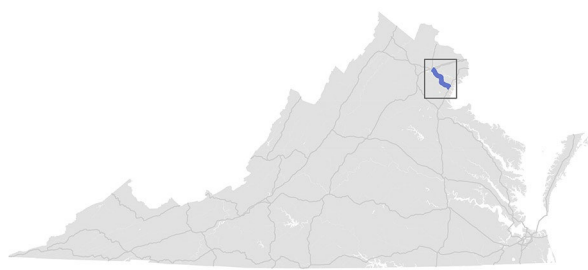


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



G1 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

Redundancy

Safety

Congestion

Bottlenecks

Reliability

F

E, K

J, D

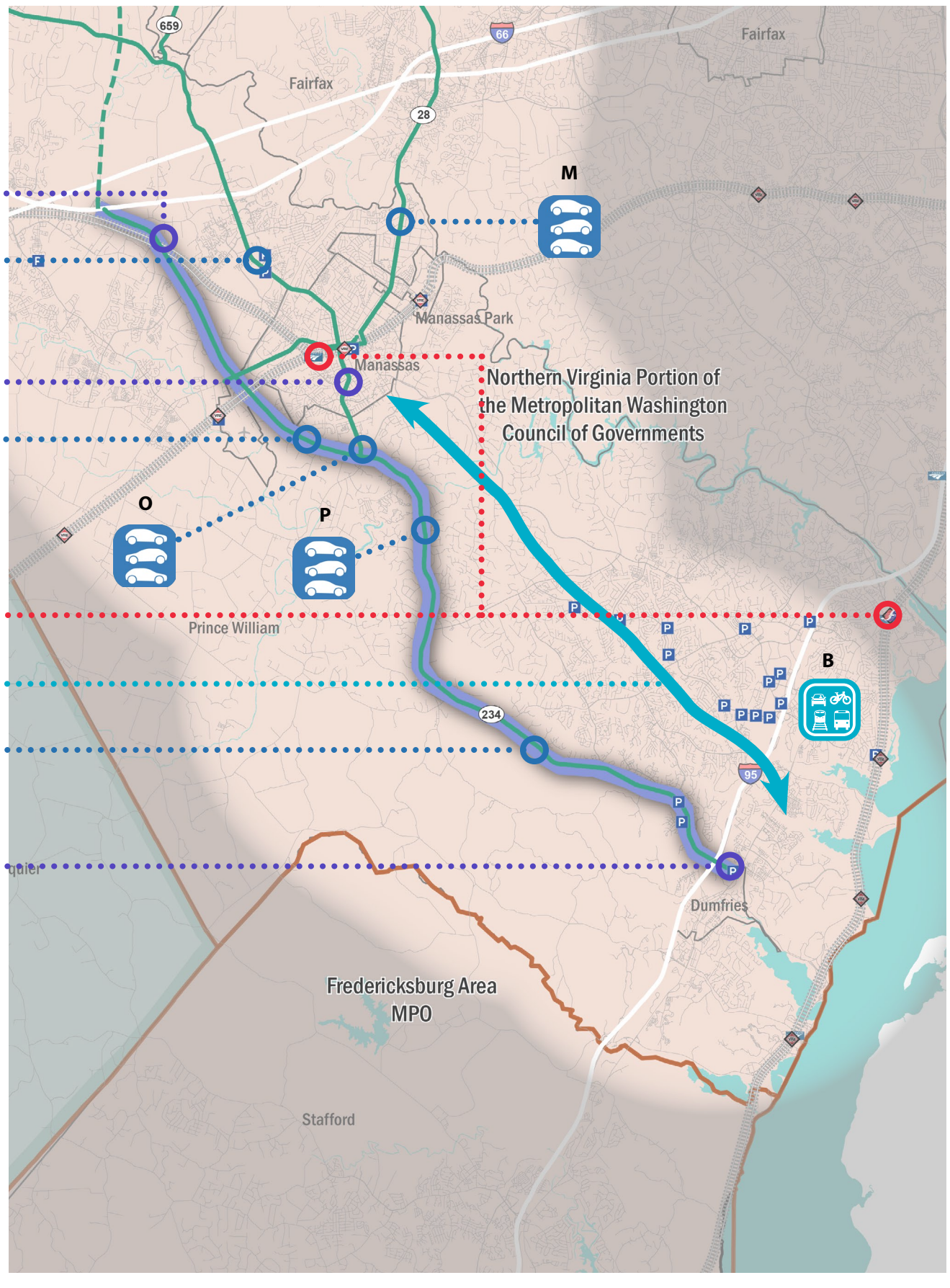
I, N

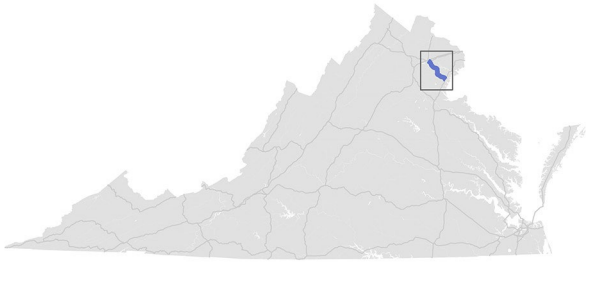
G

A

H, Q

L, C





G1 SEGMENT NEEDS

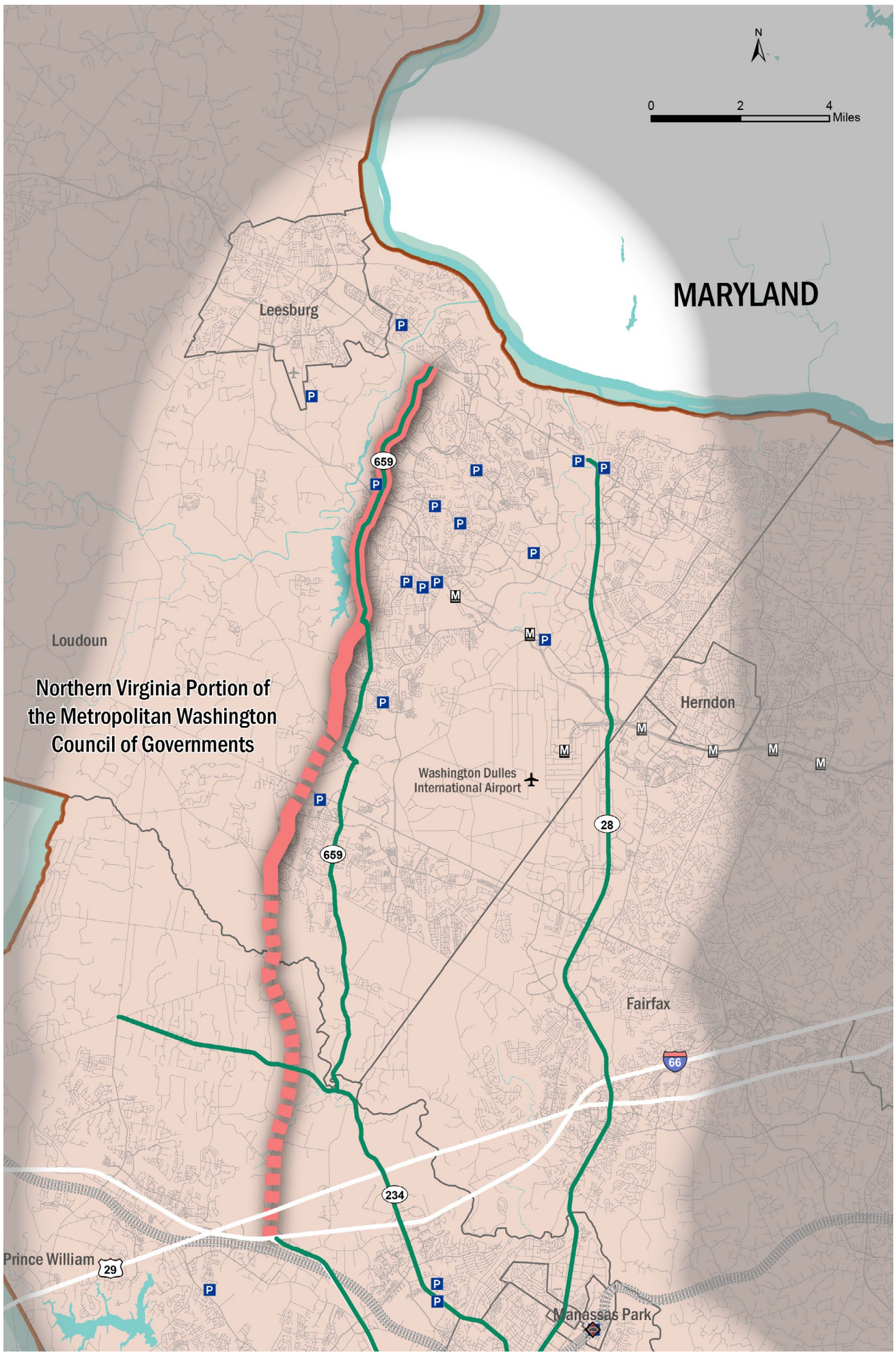
Summary of Needs - G1 Segment

A.		Passenger rail services do not facilitate travel within the corridor
B.		Park and Ride lots in Prince William County have higher utilization rates than statewide average
C.		Intersection of Dumfries Rd and US 1 in Dumfries: 42 severe crashes
D.		VA 234-Business between Prince William St and Byrd Dr in Manassas: 22 severe crashes
E.		Sudley Rd between Balls Ford Rd and Digges Rd in Manassas: 140 severe crashes
F.		Prince William County Pkwy at Wellington Rd and Balls Ford Rd in Manassas: 51 severe crashes
G.		Unreliable Amtrak service from Quantico (21 minutes average departure delay) and Manassas Station (31 minutes average departure delay) totaling over 13,800 person-hours of delay from this segment.
H.		Reliability issue at VA Route 234 and Independent Hill Drive in Prince William County
I.		Reliability issue at VA Route 234 (Prince William Parkway) and Clover Hill Road in Prince William County
J.		Reliability issue at VA Route 234 (Dumfries Road) and Wellington Road in Manassas
K.		Congestion on VA Route 234 (Grant Avenue/Sudley Road) between VA Route 28 and I-66
L.		Congestion issue on VA Route 234 at I-95 and US 1 in Dumfries
M.		Congestion on VA Route 28 between VA Route 234 (Grant Avenue) and I-66
N.		Congestion issue at VA Route 234 (Prince William Parkway) and Clover Hill Road in Prince William County
O.		Congestion issue at VA Route 234 (Prince William Parkway) and VA Route 234 (Dumfries Road) south of Manassas
P.		Congestion issue on VA Route 234 near Morningside Drive in Prince William County
Q.		Congestion issue at VA Route 234 and Independent Hill Drive in Prince William County

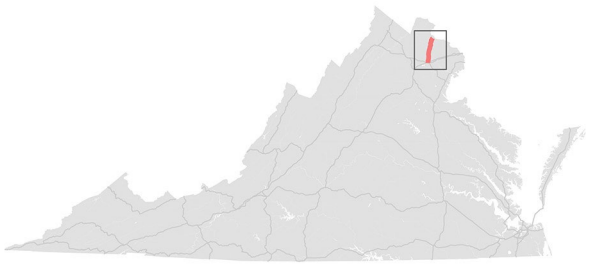
III. Segment G2

Corridor Segment G2 Components

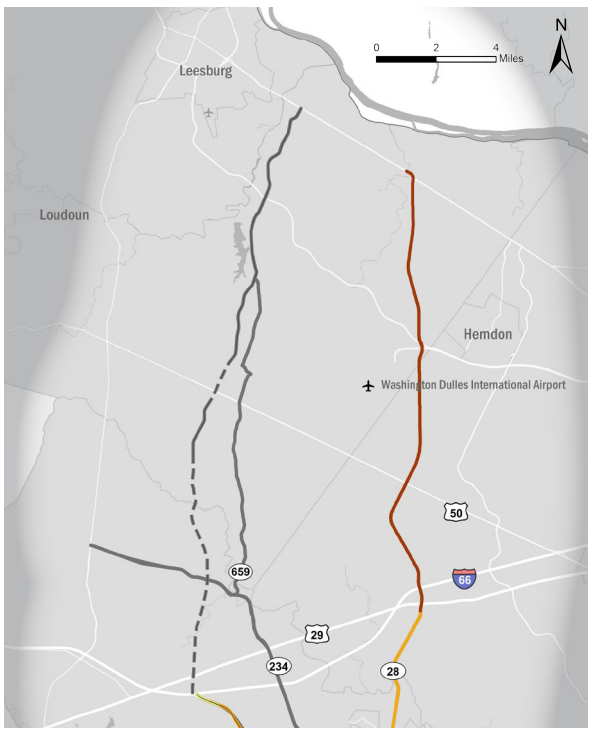
- Route 234
- Route 659
- Bi-County Parkway
- Northstar Boulevard
- Washington Dulles International Airport



- Segment G2
- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- MPO Area
- Planning District Area



G2 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment G2 begins at I-66 and progresses north to Route 7, serving Prince William and Loudoun Counties. The segment travels through the Northern Virginia portion of the Metropolitan Washington MPO Area.

With the construction of the Bi-County Parkway, Segment G2 is intended to provide an important connection for passengers and freight to Dulles International Airport, I-66, and I-95. Additionally, the segment is intended to serve local commuting traffic and provide a link between growing communities in the region, such as Ashburn, Brambleton, and Manassas.

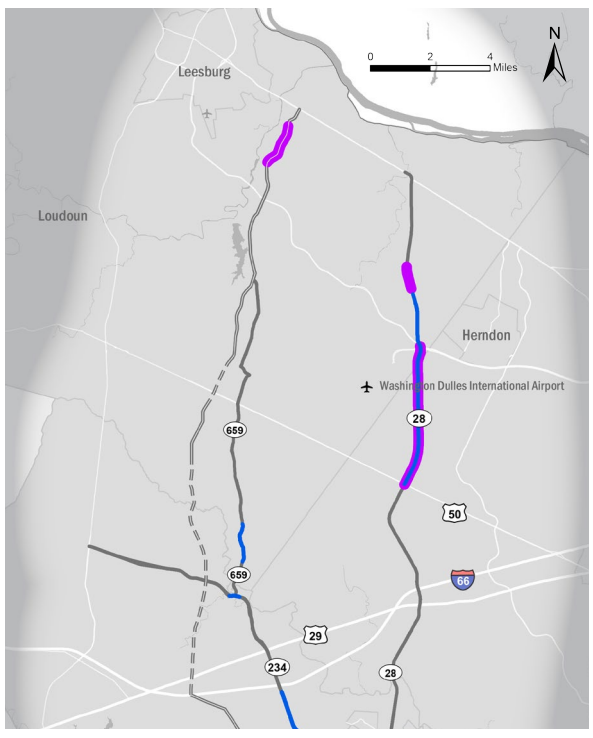
Highway Facilities: The Bi-County Parkway is a proposed limited-access highway providing connections between Dulles International Airport, I-66 and I-95, as well as to local residential and commercial areas of Prince William County and Loudoun County. Northstar Boulevard and Route 659 are roadway facilities that will be incorporated into the new Bi-County Parkway. Route 28 and US 15 serve as the closest parallel facilities to the Bi-County Parkway corridor in Segment G2.

Transit Services: Commuter bus services throughout the segment are provided by Loudoun County Transit, PRTC, and private service providers. VRE provides commuter rail within Northern Virginia and Washington DC nearby at Gainesville. The Washington Metropolitan Area Transit Authority (WMATA) is currently constructing the second phase of the Metrorail Silver Line, which will have a station in Ashburn that will provide transit access to the Metropolitan Washington region. There are numerous Park-and-Ride locations available, especially near Ashburn.

Rail Facilities: There are no rail facilities that parallel the segment.

Port Facilities: Segment G2 provides a connection from Dulles International Airport to I-95, as well as the Virginia Inland Port via I-66.

Airport Facilities: Dulles International Airport provides commercial air service in the segment and is the busiest airport in the Commonwealth in terms of both passengers and freight. There is also one reliever airport located in Segment G2.

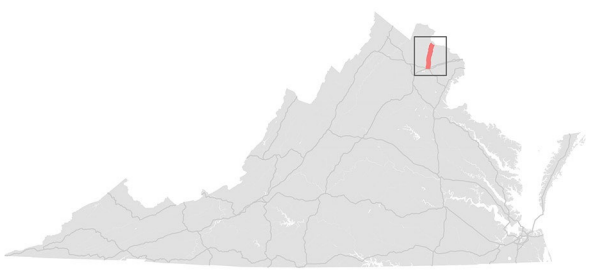


Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Major planned and future projects include:

- Widening of Belmont Ridge Road (Route 659) between Hay Road and Gloucester Parkway to four lanes; and
- Widening of Harry Byrd Highway (Route 7) at intersection with Belmont Ridge Road (Route 659).



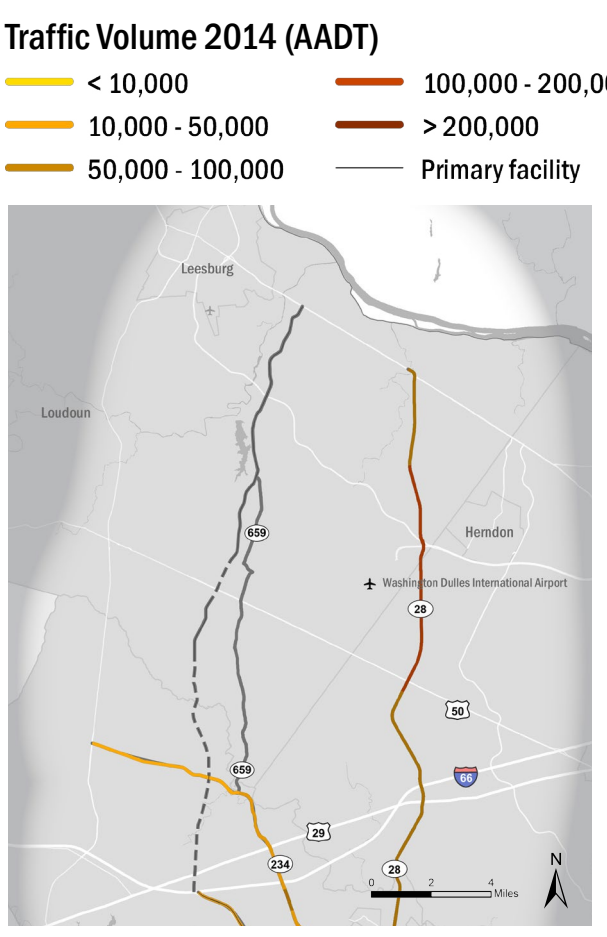
Travel Demand and Traffic Conditions

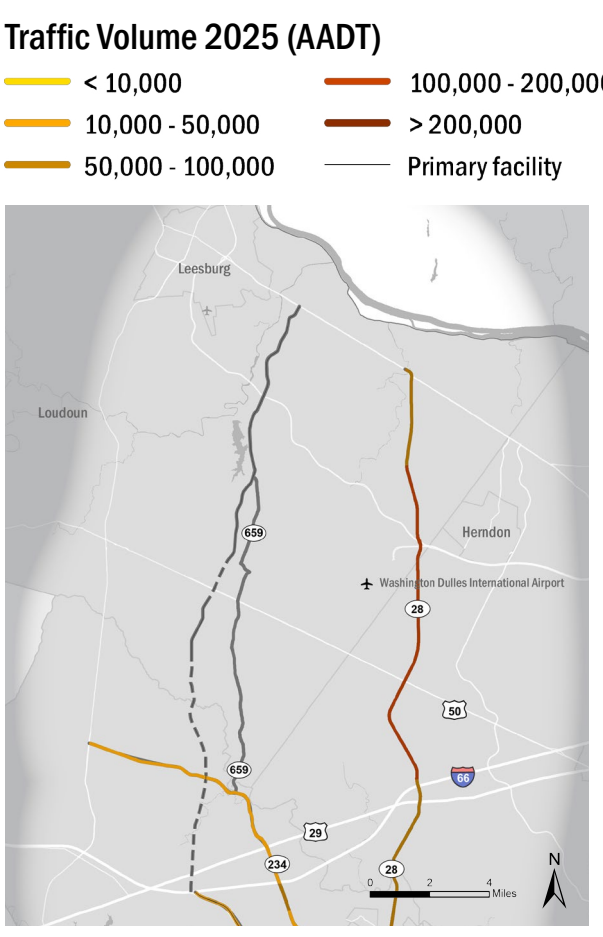
Passenger Demand

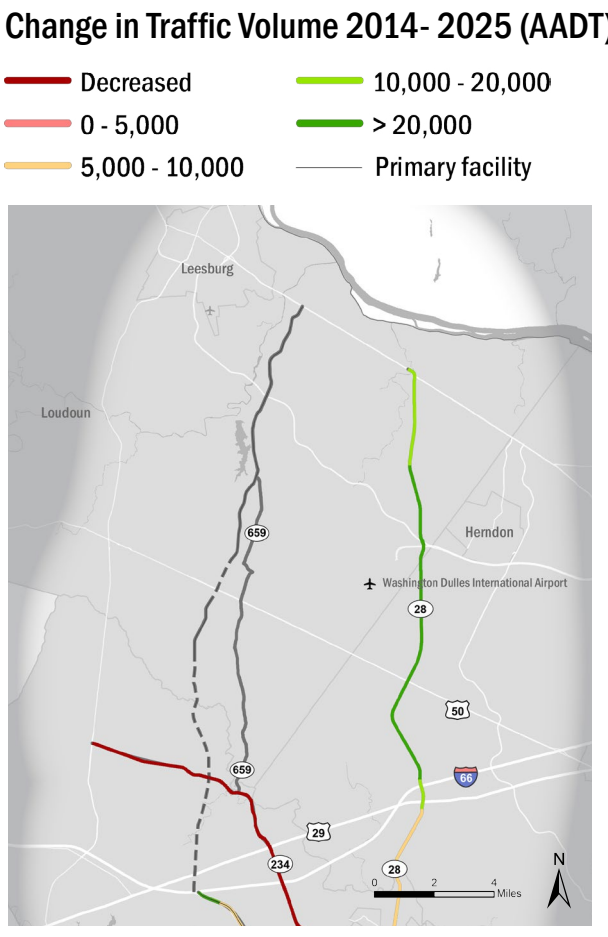
Currently, the primary facility of Segment G2 is not fully constructed, and few direct high capacity connections exist along this CoSS. Segment G2 is entirely within the Northern Virginia portion of the MWCOG region, and accommodates large amounts of traffic local to the region. Traffic analysis results on this specific segment are not yet available, but it can be reasonably assumed that it will perform similarly to Segment G1, which carries only eight percent of traffic passing through the Northern Virginia portion of the Metropolitan Washington MPO Area.

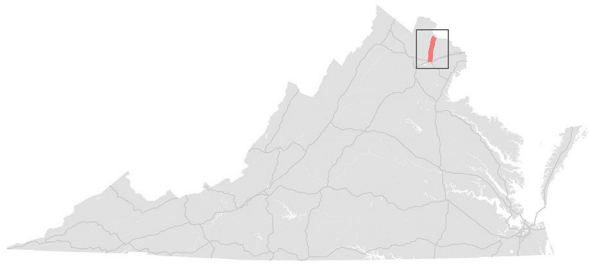
Traffic Volume and AADT

Segment G2 contains the proposed Bi-County Parkway, which has not been constructed. Other highways in the vicinity of the proposed location of the Bi-County Parkway include U.S. 15 and Route 28. Along U.S. 15 from U.S. 29 to Route 7 in Leesburg, average daily traffic volumes on most sections of highway range from 12,000 to 17,000 vehicles. The exception is the section along U.S. 15 from I-66 northward to Route 234; this section has an average daily traffic volume of 31,000 vehicles. By 2025, daily traffic volumes are projected to increase along U.S. 15 from U.S. 29 to U.S. 50 by 3,000 to 7,000 vehicles. By 2025, traffic volumes along U.S. 15 are projected to range from 9,000 to 38,000 vehicles per day. Current average daily traffic volumes along Route 28 from Manassas to Route 7 range from 45,000 to 134,000 vehicles, with the highest volumes near the junction with the Dulles Toll Road (Route 267). Along Route 28 north of I-66, traffic volumes are projected to increase greatly, ranging from 15,000 to 28,000 more vehicles per day. By 2025, traffic volumes along Route 28 north of I-66 are projected to range between 87,000 and 157,000 vehicles per day.



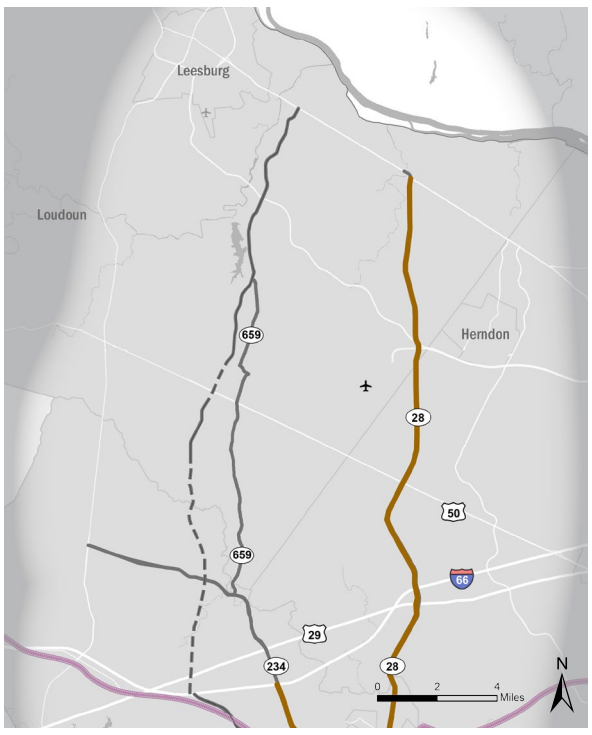






G2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012



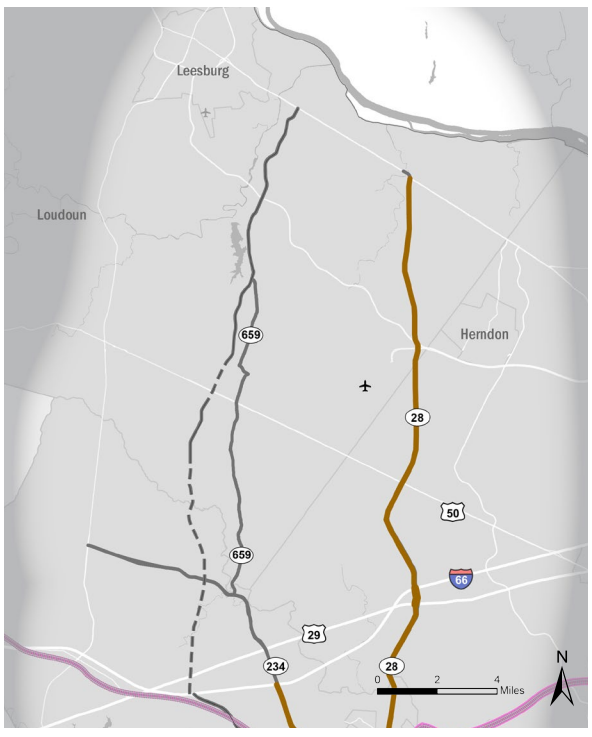
Freight Flows

In Segment G2, freight moves along existing parallel roadways, US 15 and Route 28, as well as through the Dulles International Airport. The Bi-County Parkway, which in intended to become the segment's primary roadway in the future, has not yet been constructed and no parallel rail facility exists. Dulles International Airport accommodates 174 million tons of freight arriving and departing annually, in addition to its passenger service. Route 28 provides direct access to Dulles International Airport and trucks using Route 28 carry more than five million tons of freight, worth over $4 billion. US 15, located west of the proposed Bi-County Parkway, carries more than one million tons of truck freight worth $442 million. Trucks on Route 28 carry more valuable freight than on US 15, on average $810 per ton on Route 28 compared to $368 on US 15. This difference will be even more pronounced by 2025, when freight on Route 28 is estimated to be worth an average of $1,219 per ton in comparison to $392 per ton on US 15.

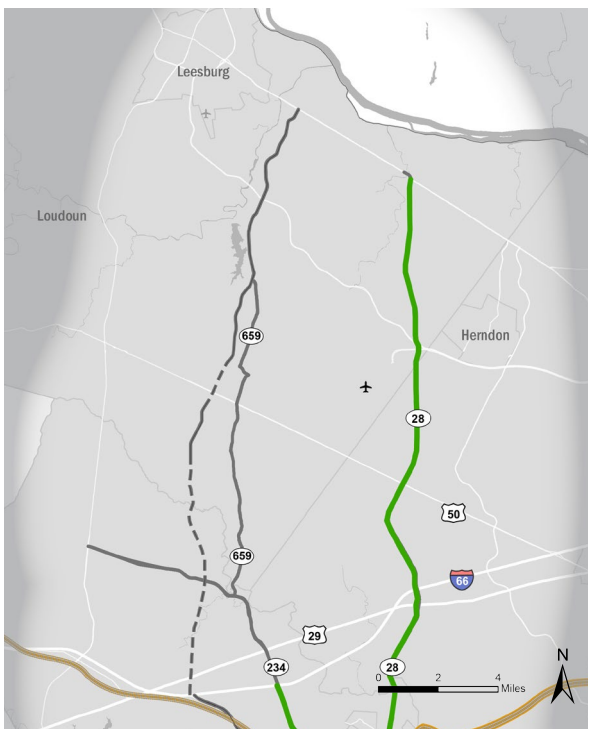
Truck Volume

Segment G2 includes the proposed Bi-County Parkway, which has not yet been constructed. Trucks account for a small percentage of daily traffic on Segment G2. On Route 28 in Fairfax and Loudoun Counties, trucks account for just one percent of daily traffic. On US 15 in Loudoun County, trucks comprise between four and six percent of daily traffic.

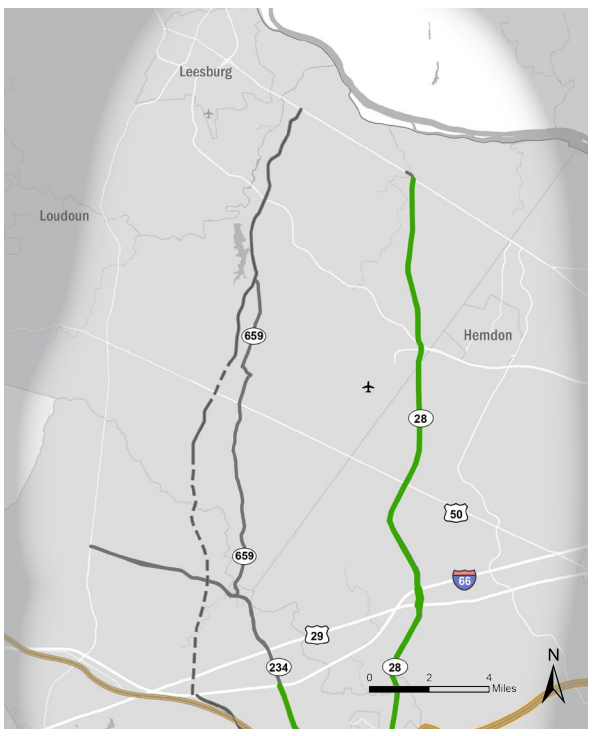
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

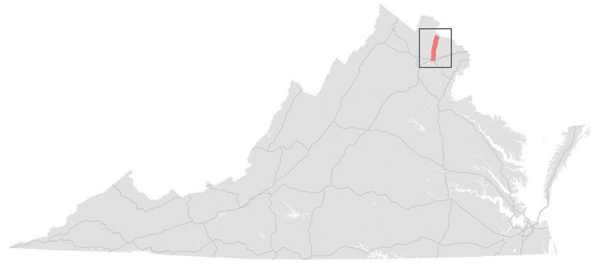
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight (in value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight (in value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Leesburg to Manassas

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

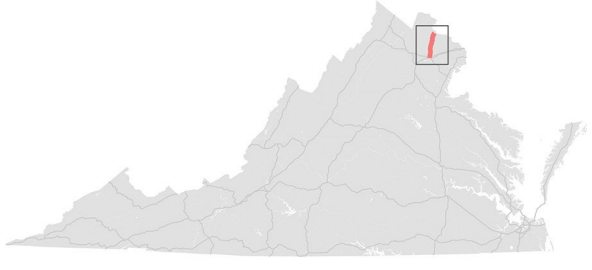
Via Rte. 234: 0:50 Travel Time $19 Est. Cost

Fredericksburg to Leesburg

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

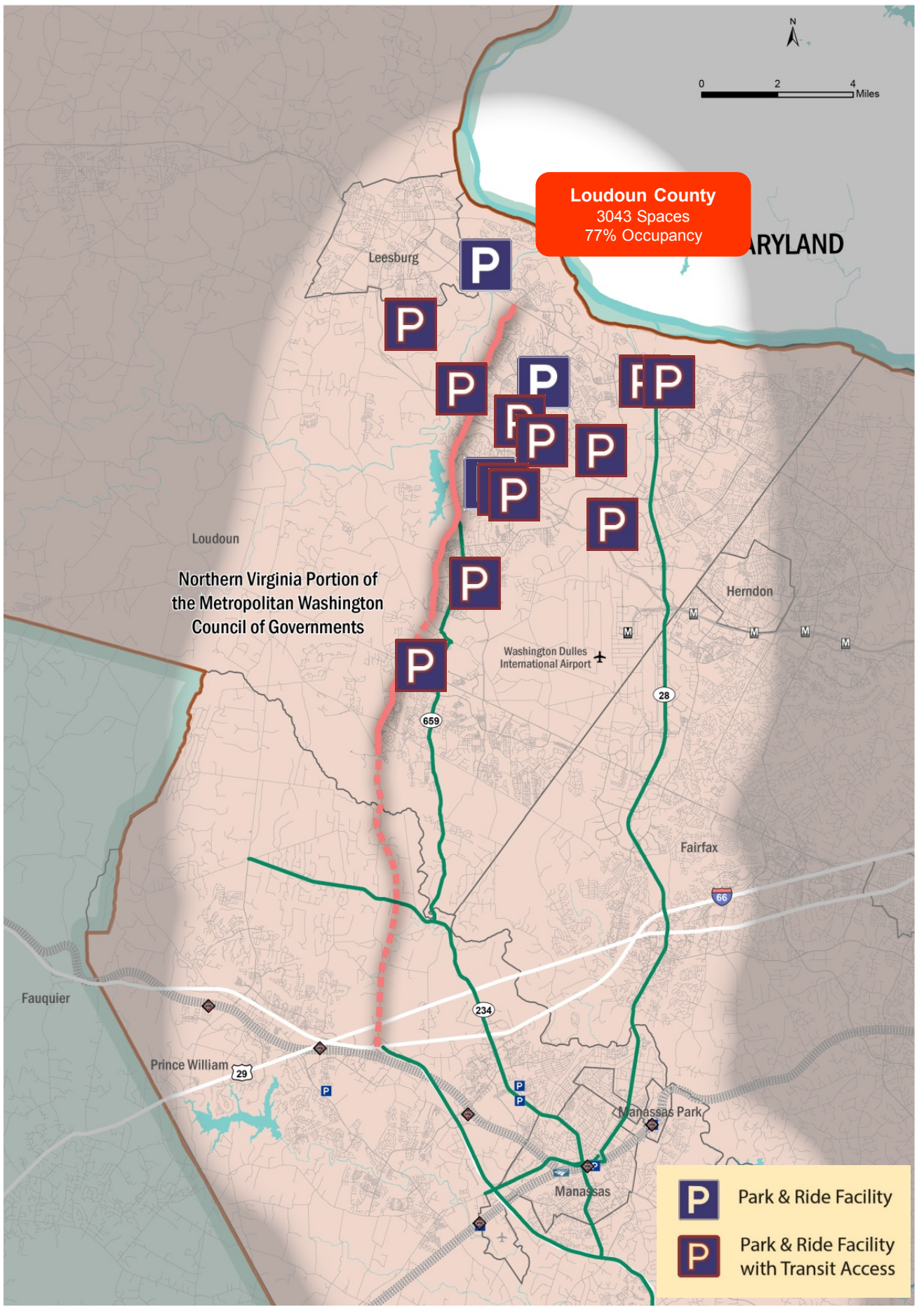
Via Rte. 234: 1:35 Travel Time $43 Est. Cost



Passenger trips on Segment G2 of the North-South Corridor currently have limited travel options, both in terms of travel path and mode choice. The proposed Bi-County Parkway has two parallel highway facilities, US 15 and Route 28, as it travels through Segment G2. No alternative modes provide connections within the segment or to the rest of the corridor, though transit service has been proposed as part of the implementation of the Bi-County Parkway. Current bus service, offered by PRTC, Loudoun County Transit, and VRE service at Gainesville provides connections to Washington DC but does not facilitate travel within the corridor. WMATA is currently constructing the second phase of the Metrorail Silver Line, which will have a station in Ashburn that will provide transit access to Northern Virginia, Washington DC, and Maryland, but not to the rest of the corridor. Dulles International Airport links passengers in the corridor to locations all over the world.

Park-and-Ride

Within Segment G2, commuters can utilize many Park-and-Ride locations, as well as commuter bus service to Northern Virginia and Washington DC from PRTC and Loudoun County Transit. Prince William County has a higher number of Park-and-Ride locations (30) and spaces (11,735) than Loudoun County, as well as a higher utilization rate of available spaces. However, within Segment G2, more of the Park-and-Ride locations are clustered near Ashburn in Loudoun County, while the majority of Park-and-Ride facilities in Prince William County are located near Manassas and Woodbridge in Segment G1. The Park-and-Ride locations in Prince William County and Loudoun County are heavily used, with utilization rates of 80 percent and 77 percent, respectively. Both counties have higher than average park-and-ride utilization rates, as the statewide average is 76 percent.



G2 SEGMENT NEEDS

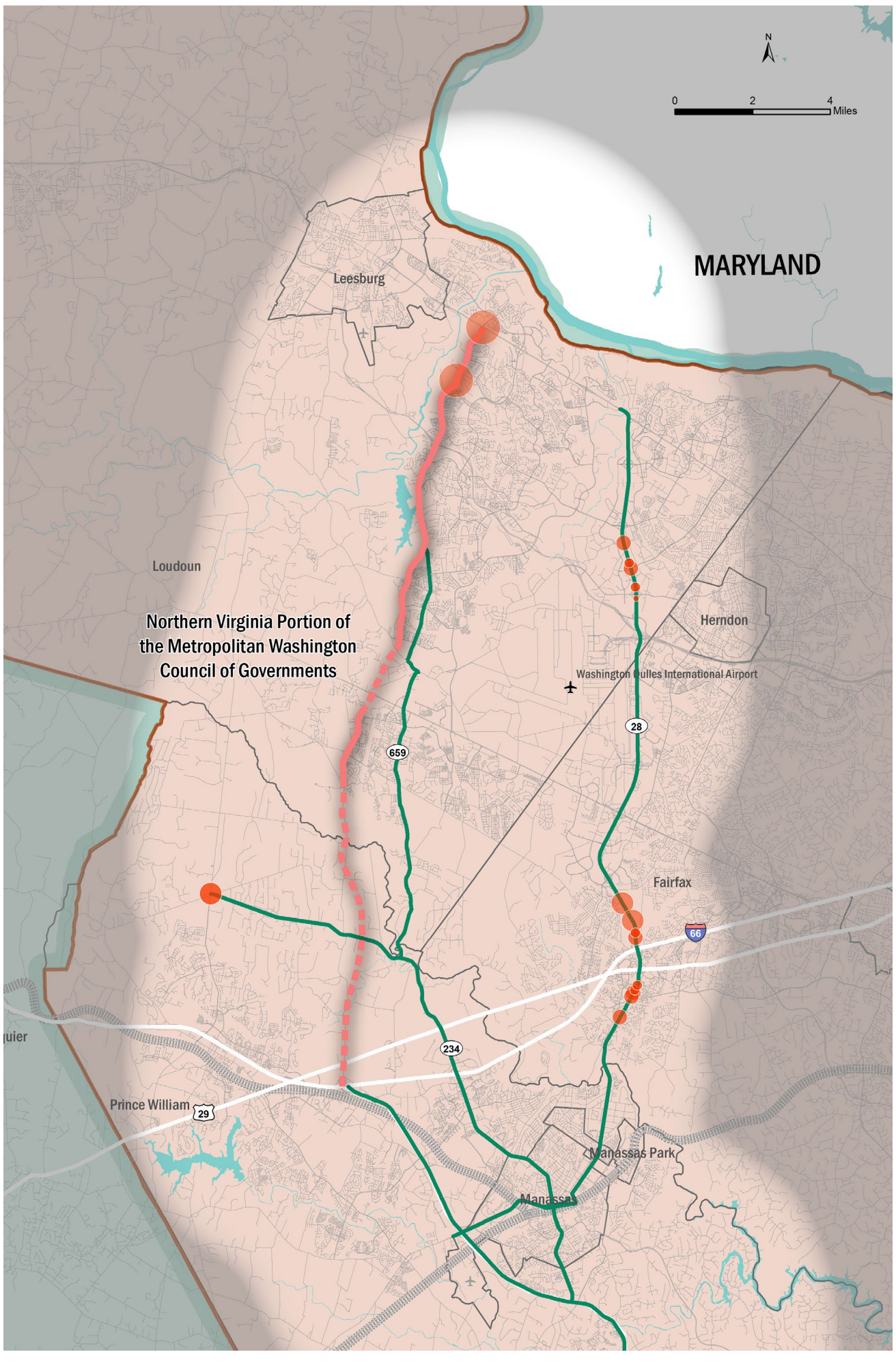
Safety

Performance Metrics

Number of Severe Crashes	20
Severe Crashes/Million VMT	--
Number of Railroad Crashes	0

Currently, the primary facility of Segment G2 is not fully constructed, resulting in a small number of severe crashes in Segment G2 between 2010 and 2012. Only one area experienced severe crashes along Segment G2. There were 20 incidents in Haymarket at the intersection of US 15 (James Madison Highway) and Waterfall Road, just south of the Bull Run Golf Club. Other locations on facilities parallel to Segment G2 which experience large concentrations of severe crashes include:

- US 15 at US 50 in Loudoun County (16 crashes);
- Belmont Ridge Road between Route 267 and Route 7 in Loudoun County (53 crashes);
- Route 28 between Route 267 and Waxpool Road in Sterling (46 crashes); and
- Route 28 between US 29 and Westfield Boulevard in Centreville (98 crashes).

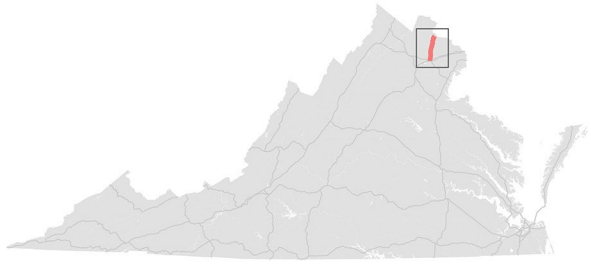


Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

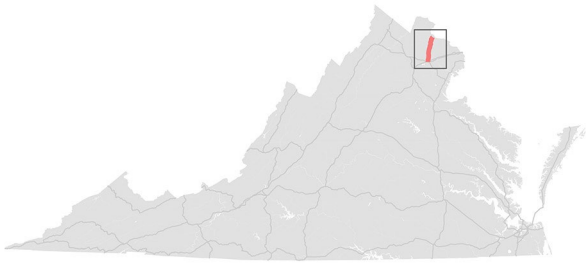


G2 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	93
Freight Ton Hours of Delay oer Mile	4.9K



Passenger Delays

While the majority of Segment G2 has not yet been constructed, there is already a significant amount of congestion on nearby facilities, with around 8,000 person-hours of delay. This results in 93 person-hours of delay per mile across the entire corridor segment, one of the highest values in the Commonwealth. Locations with significant levels of passenger delay include:

- Route 28 between the City of Manassas Park and US 50 in Fairfax County;
- Route 28 south of Route 625 in Loudoun County;
- Route 659 (Belmont Ridge Road) between the Dulles Greenway and Route 7 in Loudoun County; and
- Route 659 between US 50 and Shreveport Drive in Loudoun County.

Freight Delays

Compared with other CoSS segments, G2 has minimal freight delays, since this segment is not currently a major freight corridor. As such, there are no locations of significant freight delay along Segment G2. Peak-period freight delays account for 42 percent of daily congestion, which is considerably above the average peak period congestion share for freight among CoSS segments.

Daily Person Hours of Delay Per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak Reliability

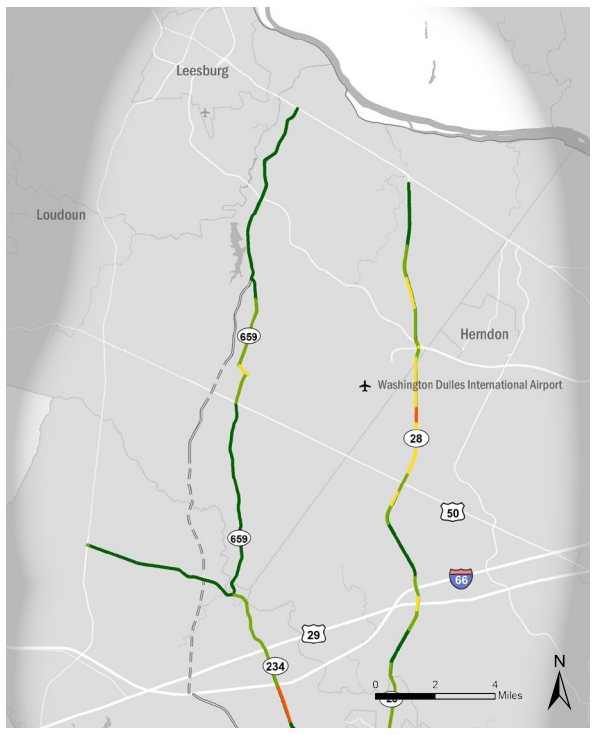
Reliability of travel during the peak period on a typical weekday on Segment G2 ranges from 0.00 to 0.62 in terms of reliability index, with an average value of 0.26. While this segment does have a peak period reliability index much higher than average for the CoSS segments statewide, none of the locations along Segment G2 have reliability index values exceeding the statewide threshold.

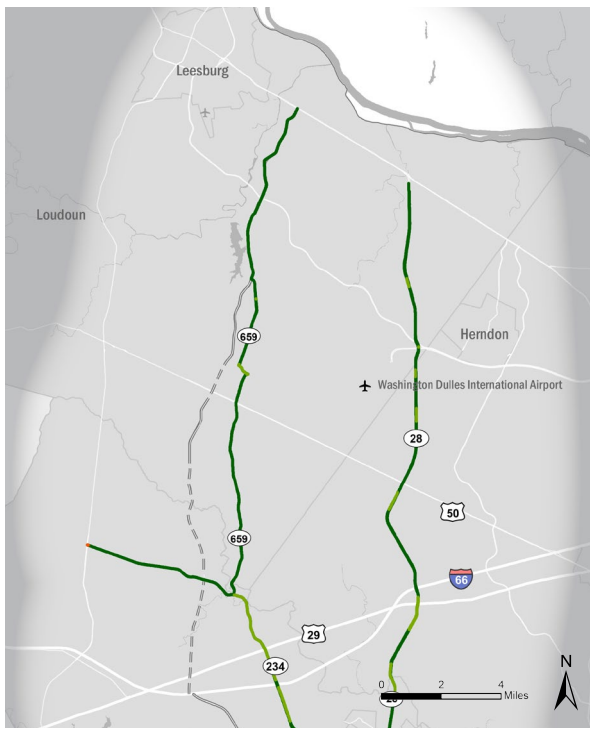
Weekday Reliability

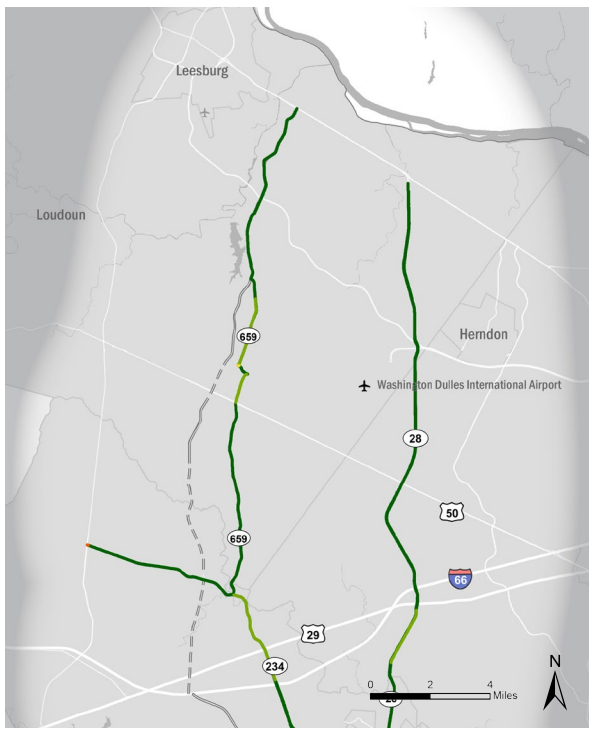
Reliability of travel during on a typical weekday on Segment G2 ranges from 0.05 to 0.69 in terms of reliability index, with an average value of 0.17. While this segment does have a weekday reliability index much higher than average for the CoSS segments statewide, only a short section on Route 234 at US 15 in Prince William County has a reliability index value exceeding the statewide threshold.

Weekend Reliability

Reliability of travel during on a typical weekend on Segment G2 ranges from 0.00 to 0.65 in terms of reliability index, with an average value of 0.11. While this segment does have a weekend reliability index higher than average for the CoSS segments statewide, only a short section on Route 234 at US 15 in Prince William County has a reliability index value exceeding the statewide threshold.





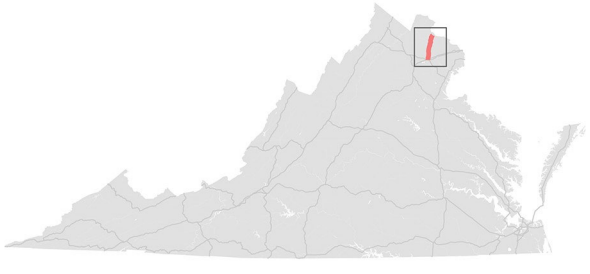


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



G2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

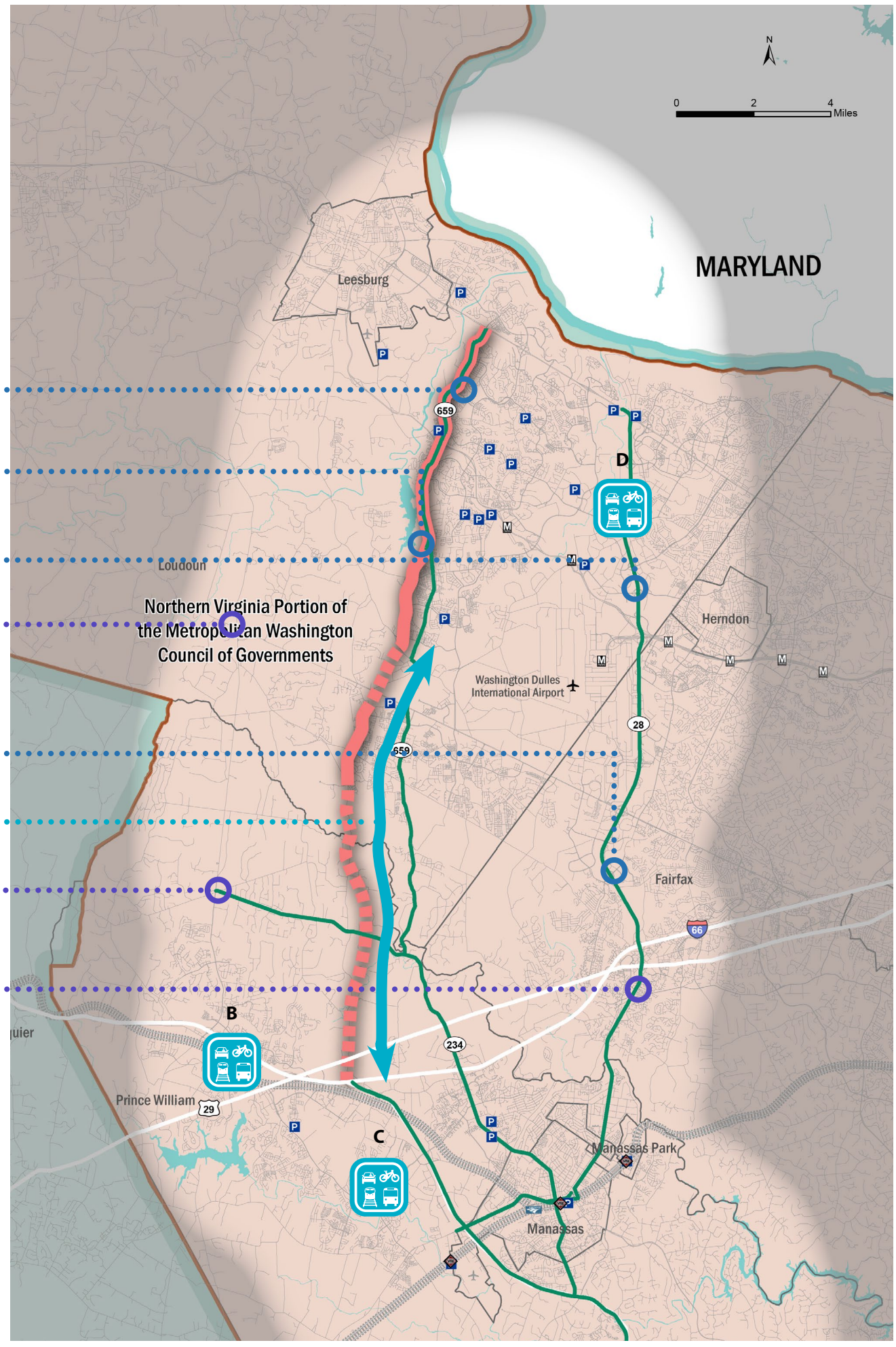
Redundancy

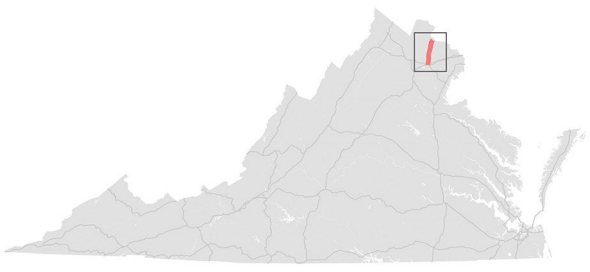
Safety

Congestion

Bottlenecks

Reliability





G2 SEGMENT NEEDS

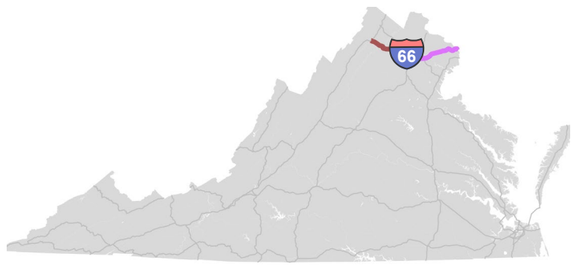
Summary of Needs - G2 Segment

A.		Continuous, grade-separated facility not present north of I-66
B.		Passenger rail services do not facilitate travel within the corridor
C.		Park and Ride lots in Prince William County have higher utilization rates than statewide average
D.		Park and Ride lots in Loudoun County have higher utilization rates than statewide average
E.		US 15 at Waterfall Rd in Haymarket: 20 severe crashes
F.		US 15 at US 50 in Loudoun County: 16 severe crashes
G.		Belmont Ridge Rd between VA 267 and VA 7: 53 severe crashes
H.		Route 28 between VA 267 and Waxpool Rd in Sterling: 46 severe crashes
I.		Route 28 between US 29 and Westfield Blvds in Centreville: 98 severe crashes
J.		Congestion issue on VA Route 28 between VA Route 267 (Dulles Greenway) and VA Route 625 (Waxpool Road)
K.		Congestion issue on VA Route 28 between I-66 and US 50
L.		Congestion issue on VA Route 659 (Belmont Ridge Road) between VA Route 267 (Dulles Greenway) and VA Route 7 in Loudoun County
M.		Congestion issue at VA Route 659 (Belmont Ridge Road) and VA Route 772 (Ryan Rd) in Brambleton
N.		Reliability issue at VA Route 234 (Sudley Road) and US 15 in Loudoun County

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Northern Virginia Corridor (H)



Office of INTERMODAL Planning and Investment

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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview

Corridors of Statewide Significance

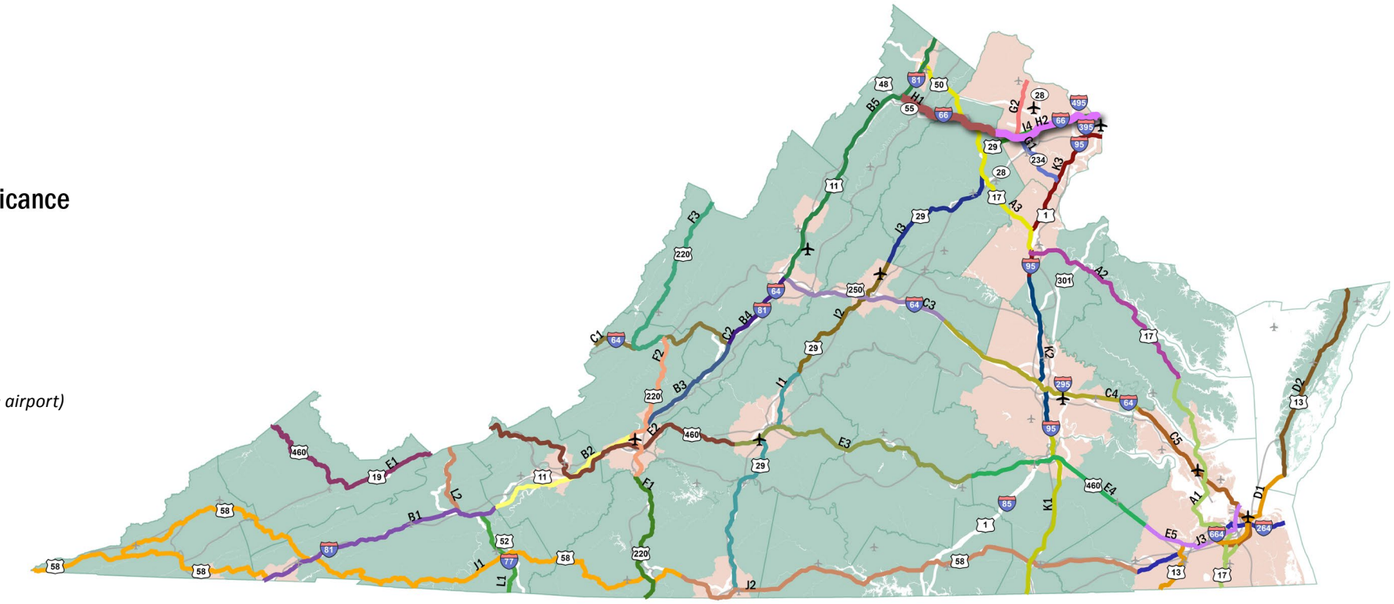
A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area



The Northern Virginia Corridor (Corridor H) is primarily defined by I-66, which is a four- to eight-lane interstate highway located in the northern part of Virginia. This corridor traverses urban, suburban, and rural areas over the course of its approximate 75-mile length. The western limit of I-66 is located at I-81 near Strasburg, Virginia, and the eastern limit is at the border with the District of Columbia in Arlington, Virginia.

I-66 is primarily a commuting corridor used to connect residential areas in the west to employment centers in the east. I-66 is primarily an urban highway through Arlington County and travels through a primarily suburban environment through Fairfax and Prince William Counties. The environment is mostly rural through both Fauquier and Warren Counties.

US 29 and Route 55 both run parallel to and at times concurrently with I-66. US 29 runs within the Northern Virginia Corridor from Arlington to Gainesville, and Route 55 is part of the corridor from Gainesville to the western limits of I-66. US 50 also runs parallel to I-66 from Arlington County to Winchester, and runs concurrently with US 29 for a short section in the City of Fairfax.

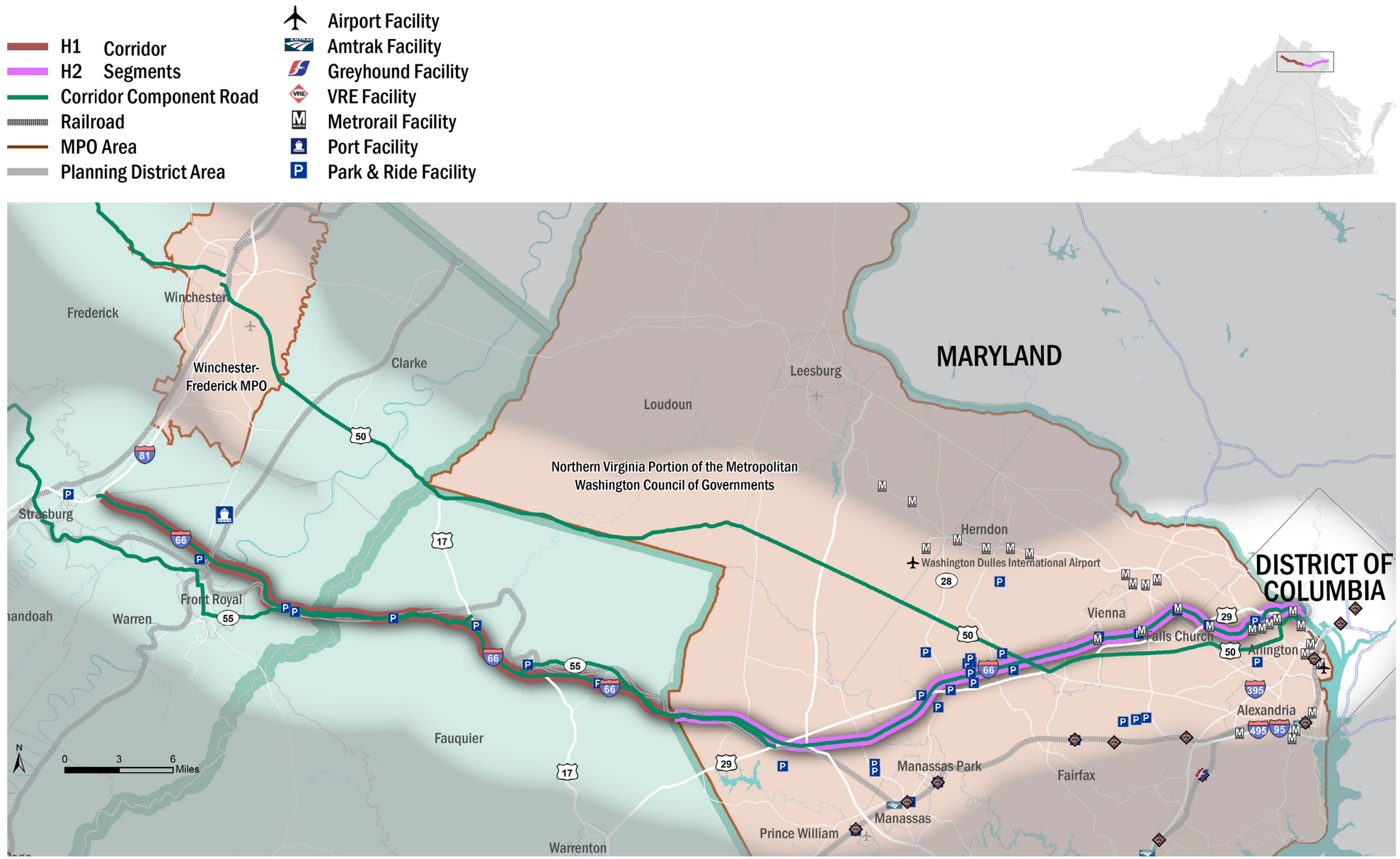
I-66 is an important multimodal corridor, and a range of transit options is available for long- and short-distance commuters, including the following:

- Multiple transit options, including Metrorail's Orange and Silver Lines and the Virginia Railway Express (VRE), which runs near I-66 between Manassas and Washington, DC;
- Multiple express bus services, including commuter bus services provided by Metrobus, Loudoun County Transit, the Potomac and Rappahannock Transportation Commission (PRTC), and Fairfax Connector;
- East of I-495, I-66 is limited to high-occupancy vehicles (HOV) during weekday peak periods/peak directions;
- At least ten Park-and-Ride lots in Prince William County along the Northern Virginia Corridor, several in Arlington County, and approximately 30 Park-and-Ride lots in Fairfax County, many associated with Metrorail stops and VRE stations;
- Both Dulles International Airport and Reagan National Airport, located within ten miles of the Northern Virginia Corridor, and I-66 which provides access to numerous other airports; and
- Amtrak, which operates a station in Manassas that provides passenger rail service along Amtrak's Crescent Route, which runs from Washington, DC, to the south along the US 29 Corridor.

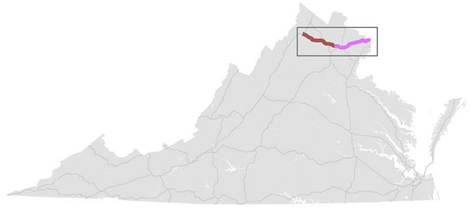
The Virginia Inland Port is located one mile north of I-66 and five miles west of I-81, providing freight connections to Northern Virginia and the Metropolitan Washington Area. Norfolk Southern operates rail lines along the Northern Virginia Corridor, accessing the Inland Port, Washington, DC, and points north. The Inland Port is located near the junction with I-81, which is the major freight corridor in Virginia. Norfolk Southern provides rail lines in and out of the Inland Port. The Winchester and Western Railroad Company operates a short-line railroad between Gore and Winchester and then north to Maryland that is exclusively a freight line with connections to the CSX and Norfolk Southern lines.

Corridor Components

Highway Facilities	
Primary Facility	• I-66
Other Highway Facilities	• US 50 • Route 55
Transit Services	
	• WMATA Metrorail • Virginia Railway Express • Amtrak • Intercity bus service
Rail Facilities	
	• Norfolk Southern Crescent Corridor
Port Facilities	
	• Virginia Inland Port
Airport Facilties	
	• Ronald Reagan National • Washington Dulles International



Demographics and Economic Trends



The primary population centers with greater than 500 persons per square mile along Corridor H are currently found in Prince William, Fairfax, and Arlington Counties, and the Cities of Manassas, Manassas Park, Fairfax and Falls Church. The remainder of the corridor traverses counties and cities with population densities between 100 and 250 persons per square mile. The most densely-populated segment along the corridor is Segment H2.

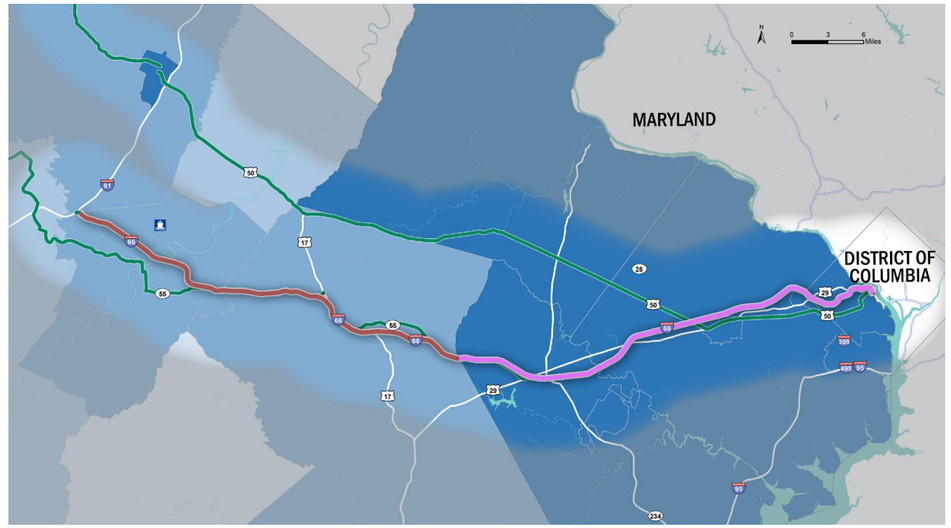
Between 2012 and 2025, Frederick County is anticipated to experience the largest population growth (greater than 34 percent) among jurisdictions along the corridor. Warren, Fauquier, and Prince William Counties, as well as the City of Manassas Park are anticipated to have the next-highest population growth, between 11 and 25 percent. The already densely-populated Arlington County is expected to decrease in population. However, overall, population along the corridor is expected to grow significantly.

Current employment centers follow a pattern similar to the population centers, with the highest concentrations of employment located in Fairfax and Arlington Counties, and the Cities of Manassas, Manassas Park, Fairfax, and Falls Church. Employment growth is projected to be relatively high along the entire corridor, with the highest growth in Manassas Park and Prince William County. Employment is expected to decrease in rural Shenandoah County.

Corridor H passes through two Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Northern Virginia Area has a much larger GDP than the Winchester MPO Area, and the largest industry sectors in the corridor include professional/ scientific/technical services, public administration, and retail trade.

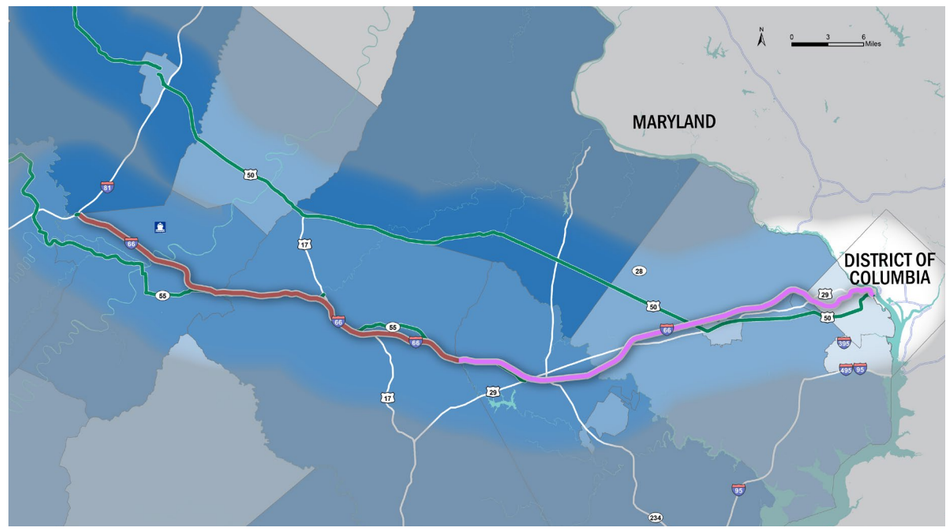
2012 Population Density Persons / Square Mile

- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



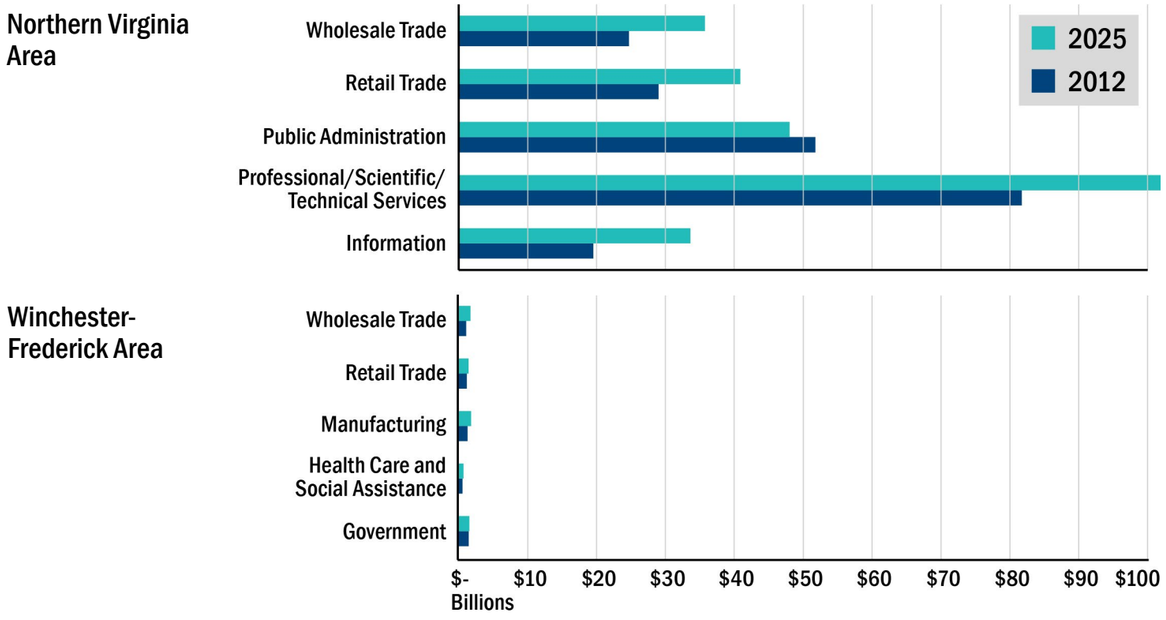
Population Growth (2012-2025 Percent Change)

- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%



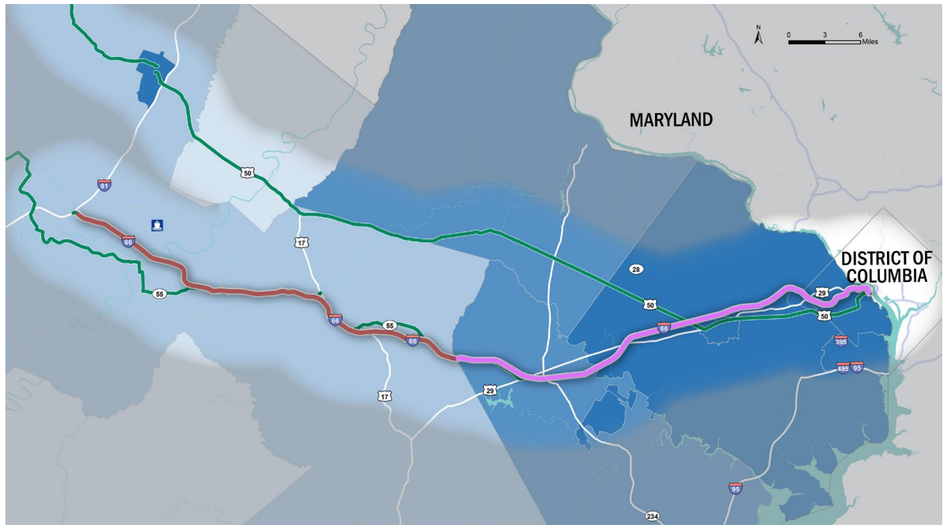
CORRIDOR H OVERVIEW

Top Industries (GDP)



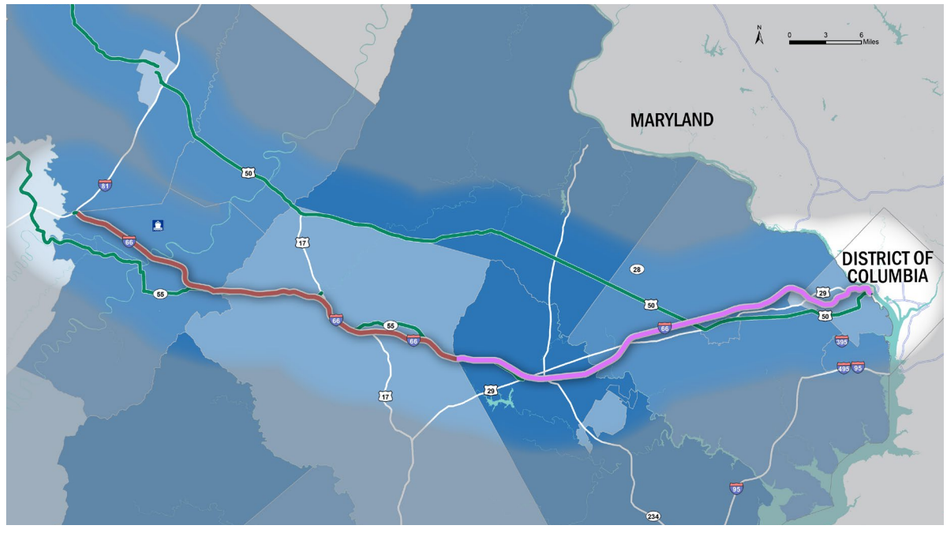
2012 Employment Density Jobs / Square Mile

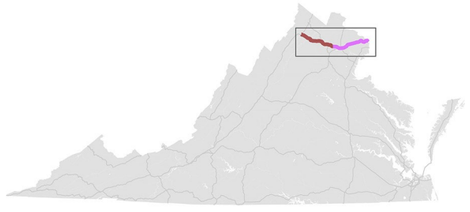
- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500



Employment Growth (2012-2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%





Corridor Travel Patterns

Passenger

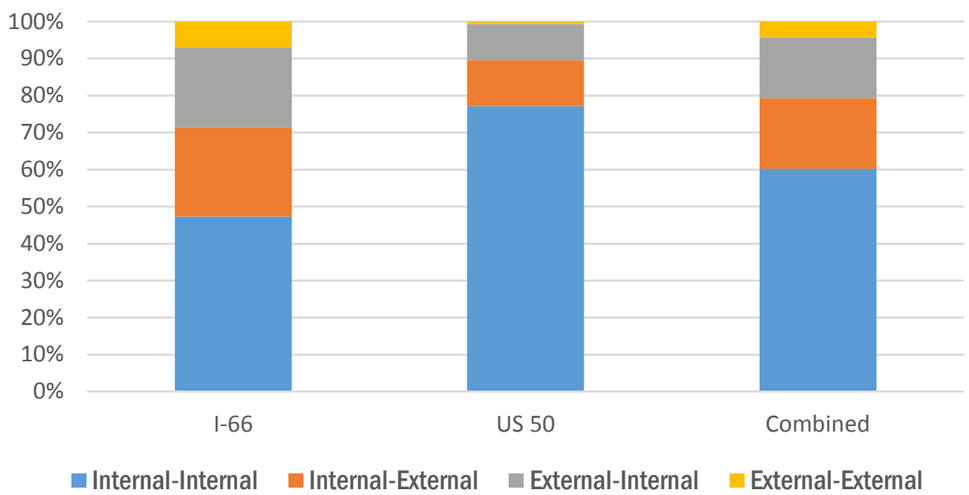
Corridor H passes through the Northern Virginia portion of the Metropolitan Washington Area, and provides a connection to the District of Columbia. Within the Northern Virginia Area, local traffic dominates and comprises 60 percent of the traffic on the corridor. Through traffic represents a very small portion (less than five percent) of the traffic along Corridor H in Northern Virginia. The proportion of local traffic is somewhat less on the primary facility in the corridor (I-66); however, it is still close to 50 percent.

Freight

By truck, Corridor H carried 26 million tons of freight worth $30 billion in 2012, and is estimated to carry 34 million tons of freight worth $45 billion in 2025. A large proportion of truck freight traffic on Corridor H - 27 percent of total corridor tonnage and almost 50 percent of total value in the corridor - passes through Virginia. Freight movements between North Carolina and the Middle Atlantic region account for more than 11 percent of the total truck freight tonnage in the corridor. In terms of value, Fairfax County is a major attractor of truck freight on Corridor H, accounting for more than 12 percent of the total value on the corridor, with significant truck freight movements originating from California, Texas, and Tennessee.

By rail, Corridor H carried 644,000 tons of freight worth $1 billion in 2012, and is estimated to carry 832,000 tons of freight worth $2 billion in 2025. Nearly all rail freight on this corridor is destined for Virginia, with no rail freight passing though Virginia. Rail freight flows from Illinois to Culpeper County account for more than 35 percent of the total corridor rail tonnage. There are also significant rail freight flows on Corridor H from West Virginia and South Carolina to the City of Winchester. In terms of value, flows between the Port of Virginia facilities in the Hampton Roads region and the Virginia Inland Port, located in Warren County, are the dominant rail freight movements on Corridor H, accounting for approximately 80 percent of the total rail freight value.

Distribution of Internal and External Travel



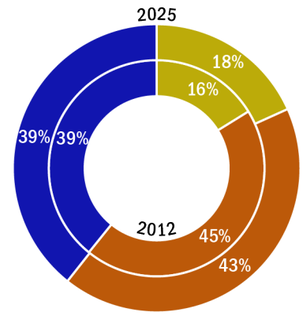
Truck Freight

2012	2025
Truck Freight Value	
$30 Billion	$45 Billion
Truck Freight Tonnage	
26 Million Tons	34 Million Tons
Freight Value per Ton	
$1159	$1305
Corridor Tonnage Passing Through	
27%	27%

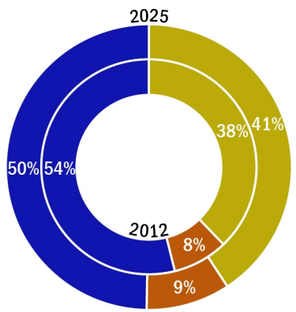
Rail Freight

2012	2025
Rail Freight Value	
$1 Billion	$2 Billion
Rail Freight Tonnage	
644,000 Tons	832,000 Tons
Freight Value per Ton	
$2034	$2020
Corridor Tonnage Passing Through	
0%	0%

Northern Virginia Area



Winchester-Frederick Area



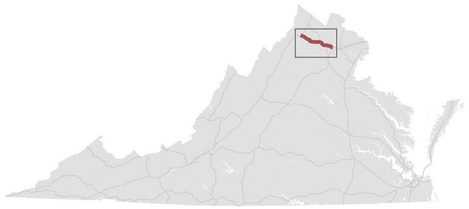
GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

II. Segment H1

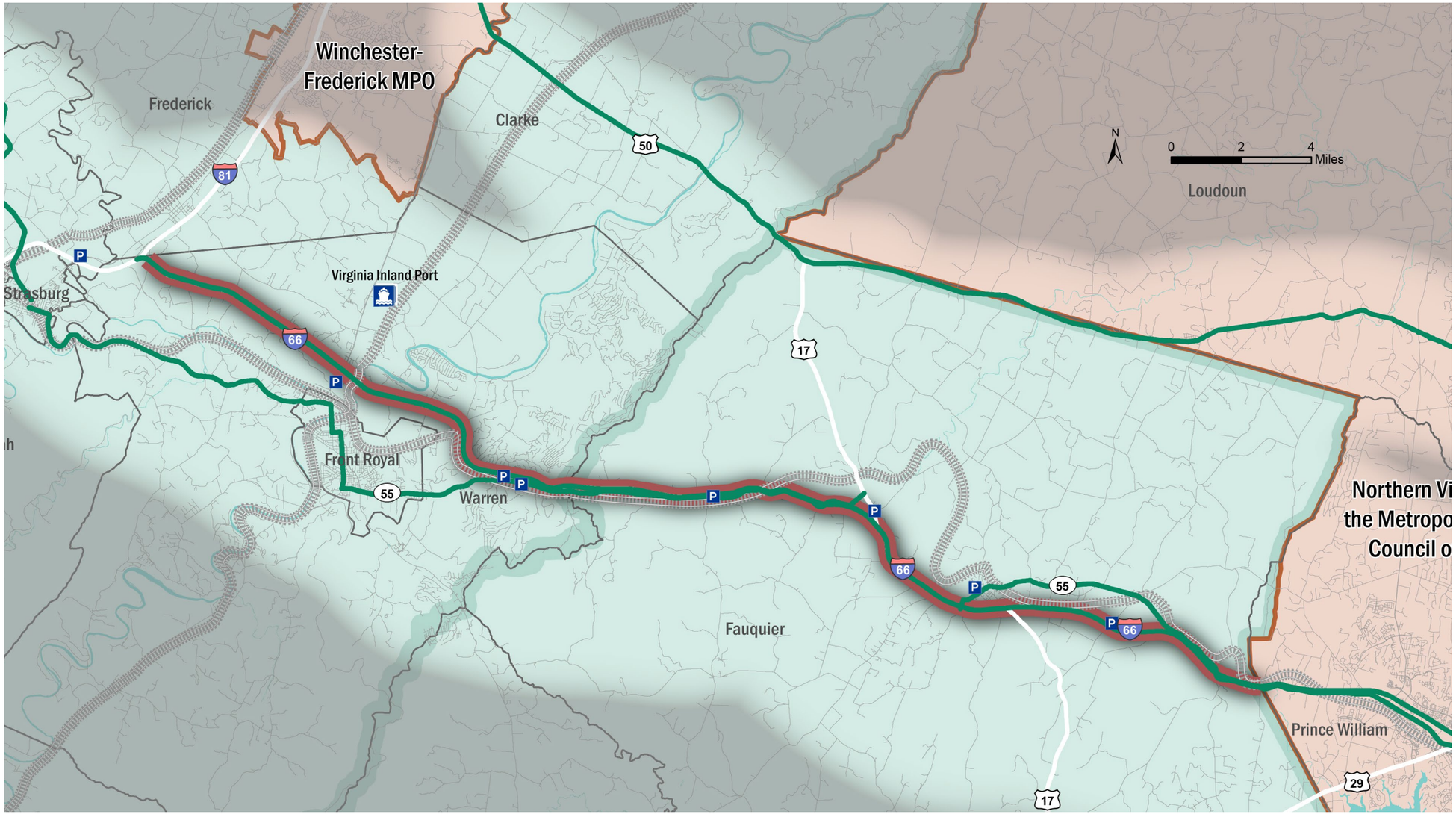
- H1
- Corridor Component Road
- Railroad
- MPO Area
- Planning District Area

- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility



Corridor Segment H1 Components

- I-66
- US 50
- Route 55
- Virginia Inland Port
- Norfolk Southern Crescent Corridor



H1 SEGMENT PROFILE

Segment H1 begins at the western terminus of I-66 near the town of Strasburg and travels through Warren and Fauquier Counties on its route to the Prince William County border. The segment is primarily defined by I-66, which is mostly a rural highway in this segment, and an important multimodal corridor, with critical access to the Virginia Inland Port and rail lines. The segment also serves as an important corridor for local commuter travel in Northern Virginia.

Highway Facilities: Within this segment, I-66 is a four-lane highway. Route 55 is a two-lane facility that runs parallel to, and occasionally concurrently with, I-66.

Transit Services: Transit services provide connections from Segment H1 to Northern Virginia and Washington, DC. Commuter bus service, operated by PRTC and private service operators, is provided throughout the segment. While no Amtrak or Greyhound service is provided in Segment H1, both services are available from Manassas nearby on Segment H2. There are Park-and-Ride locations available throughout the length of the segment.

Rail Facilities: Norfolk Southern rail lines grant access to the Virginia Inland Port, Washington, DC, and areas to the north.

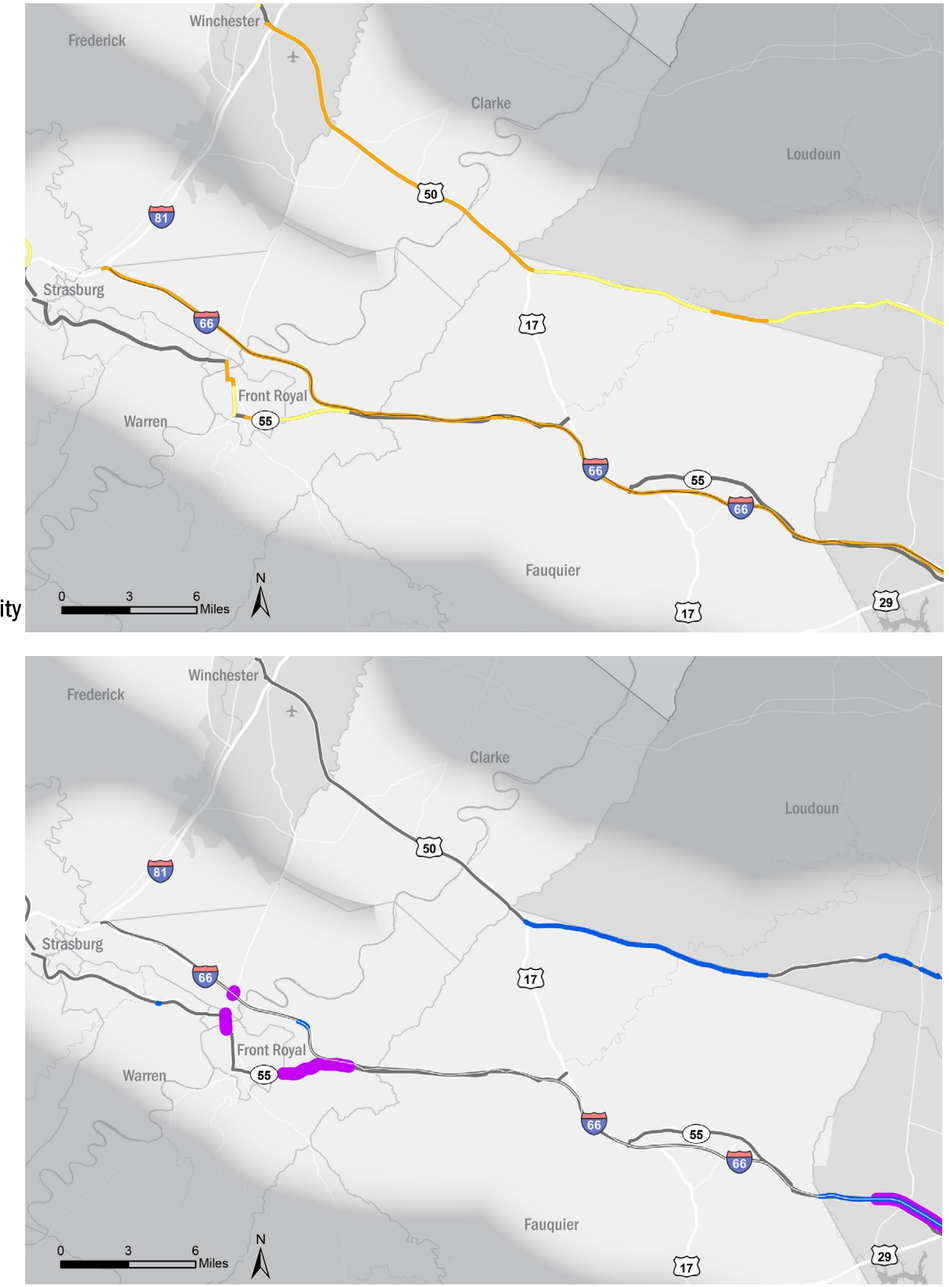
Port Facilities: The Virginia Inland Port is located one mile north of I-66 on Segment H2 and five miles west of I-81, providing freight connections to Northern Virginia and the Metropolitan Washington Area.

Airport Facilities: There are no commercial airports in this segment.

Major planned and future projects include:

- VRE commuter rail extension to Gainesville/Haymarket on the Norfolk Southern B Line.





Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

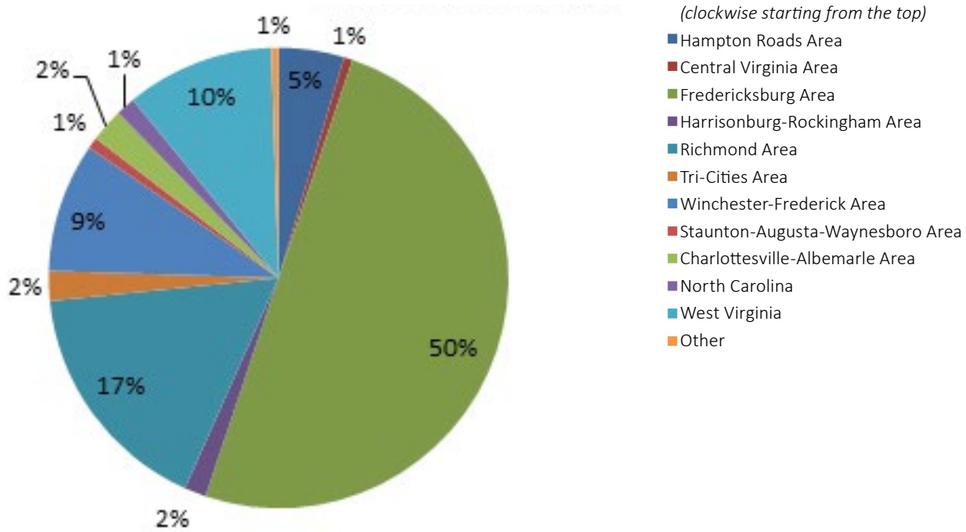
Travel Demand

Passenger Demand

Segment H1, the western segment of Corridor H, connects the Northern Virginia Area to Corridor B near Winchester. Segment H1 primarily provides access to and from the Metropolitan Washington Area. In particular, travel between the Metropolitan Washington Area and West Virginia accounts almost four percent of statewide intercity passenger travel, while travel between the Metropolitan Washington Area and Winchester accounts for an additional three percent.

Segment H1 also provides access between the Northern Virginia Area and the communities along the I-81 corridor. Of the intercity passenger travel originating in the Metropolitan Washington Area, significant portions are destined for locations requiring the use of Segment H1 including West Virginia (ten percent), Winchester (nine percent), and Harrisonburg (two percent).

Travel from Metropolitan Washington Region to...



H1 SEGMENT PROFILE

Freight Demand

By truck, Segment H1 carried 11 million tons of freight worth $13 billion in 2012, and is estimated to carry 15 million tons of freight worth $20 billion in 2025. A large proportion of truck freight traffic on Corridor H - 27 percent of total corridor tonnage and almost 50 percent of total value in the corridor - passes through Virginia. Freight movements between North Carolina and the Middle Atlantic region account for more than 11 percent of the total truck freight tonnage in the corridor. In terms of value, Fairfax County is a major attractor of truck freight on Corridor H, accounting for more than 12 percent of the total value on the corridor, with significant truck freight movements originating from California, Texas, and Tennessee. Adjacent to Segment H1, Culpeper County is a significant generator of truck freight, accounting for more than five percent of the total corridor truck tonnage, with major truck freight movements destined for Maryland, Pennsylvania, and New York.

By rail, Segment H1 carried 480,000 tons of freight worth $1.1 billion in 2012, and is estimated to carry 630,000 tons of freight worth $1.4 billion in 2025. Nearly all rail freight on this corridor is destined for Virginia, with no rail freight passing though Virginia. Rail freight flows from Illinois to Culpeper County account more than 35 percent of the total corridor rail tonnage. There are also significant rail freight flows on Corridor H from West Virginia and South Carolina to the City of Winchester. In terms of value, flows between the Port of Virginia facilities in the Hampton Roads Area and the Virginia Inland Port, located in Warren County, are the dominant rail freight movements on Corridor H, accounting for approximately 80 percent of the total rail freight value. The jurisdictions adjacent to Segment H1 are dominant attractors of rail freight on the corridor, accounting for more than 70 percent of the total rail tonnage on the corridor.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (44% / 42%)
2. Maryland (11% / 9%)
3. North Carolina (9% / 9%)
4. Pennsylania (8% / 9%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment H1: 13% / 15%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (41% / 44%)
2. Maryland (19% / 20%)
3. Fairfax County (9% / 11%)
4. Pennsylvania (8% / 7%)
5. North Carolina (6% / 6%)

Corridor Tonnage Destined for Segment H1: 11% / 10%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (41% / 39%)
2. Illinois (35% / 37%)
3. City of Norfolk* (17% / 16%)
4. City of Portsmouth* (9% / 9%)
5. West Virginia (9% / 7%)

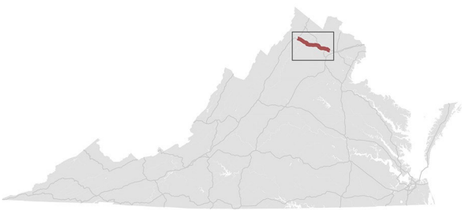
Corridor Tonnage Originating in Segment H1: 12% / 11%

Major Origin-Destination Pairs for Freight
Culpeper County and Illinois
City of Norfolk* and Warren County
City of Portsmouth* and Warren County
City of Winchester and West Virginia
City of Winchester and South Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (91% / 91%)
2. Culpeper County (36% / 39%)
3. Warren County (26% / 25%)
4. City of Winchester (17% / 17%)
5. Maryland (4% / 5%)

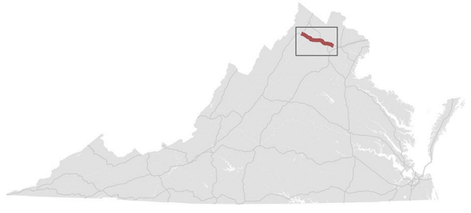
Corridor Tonnage Destined for Segment H1: 32% / 30%



Traffic Conditions

Traffic Volume and AADT

Traffic volumes on Segment H1 are much lower than traffic volumes on Segment H2, which is in the Northern Virginia Area. The highest traffic volumes on Segment H1 occur along I-66, where average daily traffic volumes range from 31,000 to 46,000 vehicles. Traffic volumes on US 50 range quite significantly across the segment (between 5,000 and 42,000 vehicles per day), with the highest volumes occurring in the City of Winchester near the interchange with I-81. Traffic on Route 55 reaches its highest levels in Front Royal, with volumes exceeding 30,000 vehicles per day. Average daily traffic along I-66 is projected to increase by 7,000 to 10,000 vehicles by 2025, bringing traffic volumes to over 50,000 vehicles per day. Traffic growth on US 50 is expected to be more modest, with an additional 1,000 to 5,000 vehicles per day by 2025. Traffic growth on Route 55 is expected to be negligible outside of the Town of Front Royal.



Traffic Volume 2014 (AADT)

< 10,000
10,000 - 50,000
50,000 - 100,000
100,000 - 200,000
> 200,000
Primary facility



Traffic Volume 2025 (AADT)

< 10,000
10,000 - 50,000
50,000 - 100,000
100,000 - 200,000
> 200,000
Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

Decreased
0 - 5,000
5,000 - 10,000
10,000 - 20,000
> 20,000
Primary facility



H1 SEGMENT PROFILE

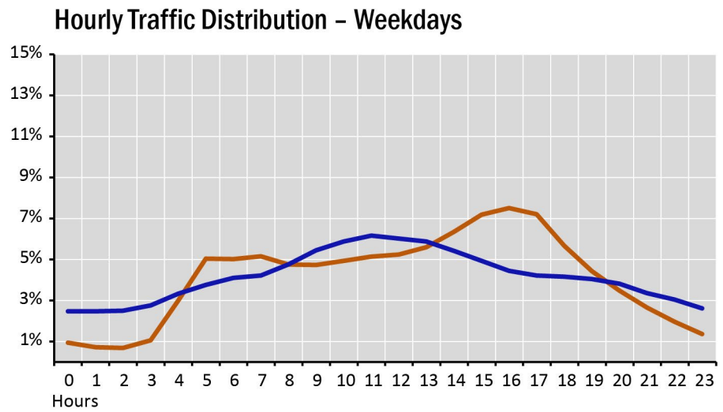
Traffic Distribution

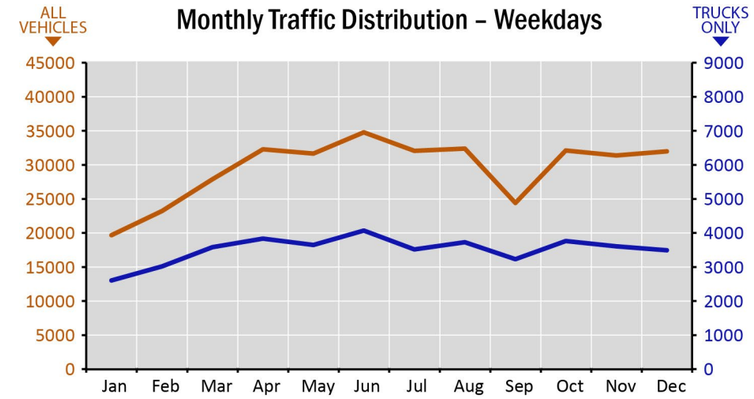
On average, traffic on Segment H1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, and steady flow during the midday period. The evening peak period shows an hourly peak flow between 4 and 5 p.m. (7.5 percent of daily traffic) and a less busy morning peak between 7 and 8 a.m. accounting for 5.2 percent of daily traffic. The combined weekday traffic from the 7 a.m. to 7 p.m. period accounts for 70 percent of total daily traffic. Peaking patterns for truck traffic show a single peak during the midday period with a peak hourly flow of 6.2 percent of daily traffic between 1 and 2 p.m. Weekend traffic patterns are different from the typical commute patterns, showing an even distribution of traffic during the middle of the day between 11 a.m. and 6 p.m. for all traffic, and a steady flow of truck traffic throughout the majority of the day.

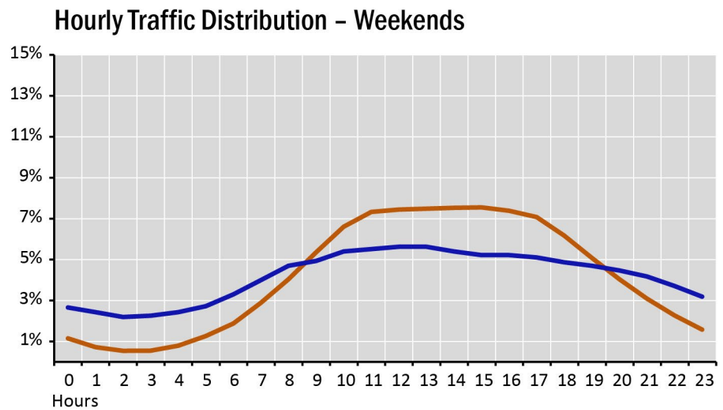
Weekday traffic volumes on Segment H1 vary by as much as 77 percent throughout the year, with the highpoint in June (around 35,000 vehicles per day) and the low point in January (around 20,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the June high (around 4,000 vehicles per day) 56 percent higher than the January low (around 2,500 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 36,000 vehicles per day) are 115 percent higher than January levels (around 17,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 48 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment H1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

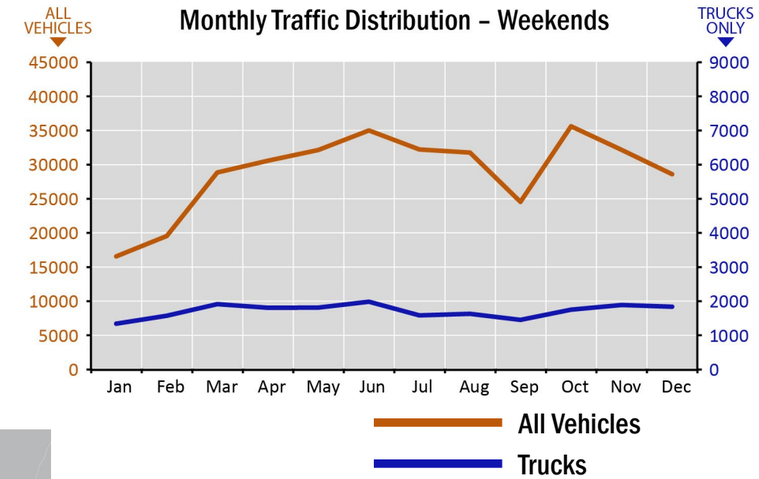
Truck Volume

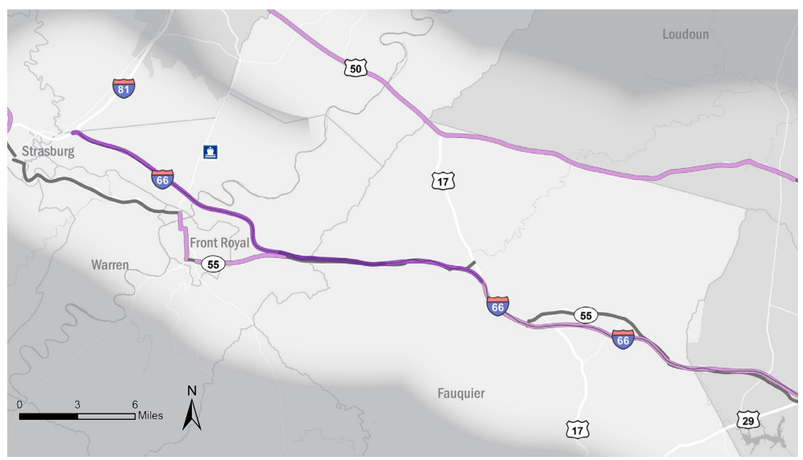
The percent of daily traffic comprised of heavy trucks on Segment H1 is high compared to Segment H2. In Segment H1, heavy trucks comprise less than four percent of total traffic along US 50 and Route 55. Along I-66, heavy trucks comprise between seven and 12 percent of daily traffic between I-81 and US 17, with the highest truck volumes occurring in western Fauquier County.





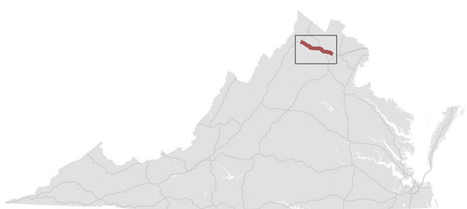




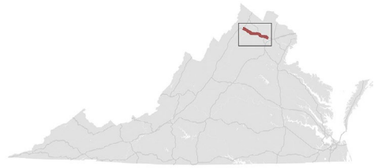


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



H1 SEGMENT PROFILE

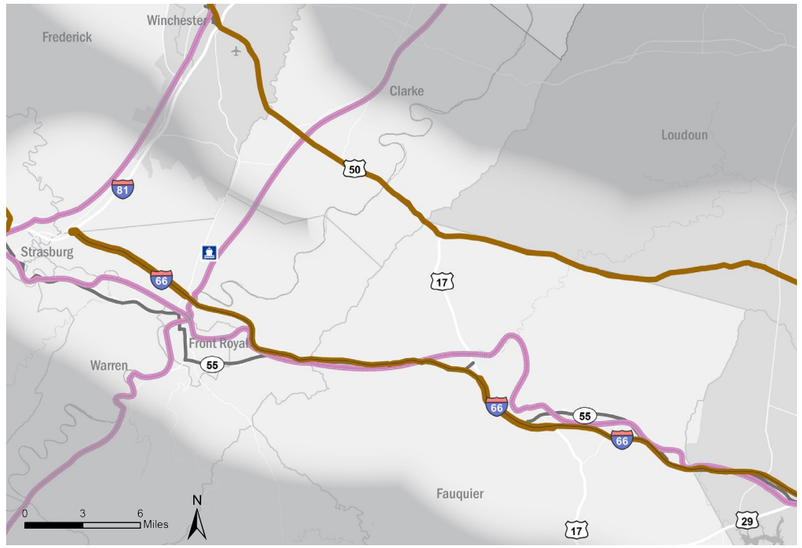


Freight Flows

Near the Virginia Inland Port in Warren County, freight is moved primarily by truck in relation to both tonnage and value. In total, 11 million tons (98 percent) of freight is moved through this section of Segment H1 by truck, compared to 204,000 tons (two percent) by rail. By value, $13 billion (99 percent) of freight travels by truck, compared to $177 million (two percent) by rail. On average, a ton of freight traveling through this section of Segment H1 by truck is worth $1,209 while a ton of freight traveling by rail is worth $865. In 2025, both rail and truck freight tonnages and values in this area of Segment H1 are expected to increase; however, the percentage of the freight traveling by truck is expected to remain the same. It is anticipated that freight value per ton on trucks and rail will increase to $1,308 and $971, respectively.

East of US 17 in Fauquier County, freight is moved primarily by truck, in terms of both tonnage and value. In total, 7 million tons (94 percent) of freight travels through this section of Segment H1 by truck, compared to only 478,000 tons (six percent) by rail. With regard to value, $11 billion (90 percent) of freight travels by truck, compared to $1 billion (10 percent) by rail. On average, a ton of freight traveling through this section of Segment H1 by truck is worth $1,506 while a ton of freight traveling by rail is worth $2,378. This is one of the few locations in the Commonwealth where rail freight is on average more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in Segment H1 are expected to increase. The percentage of the freight traveling by truck is expected to remain the same by tonnage and to increase to 95 percent by value. It is anticipated that freight value per ton on trucks will increase to $1,594 and decrease to $2,282 for rail.

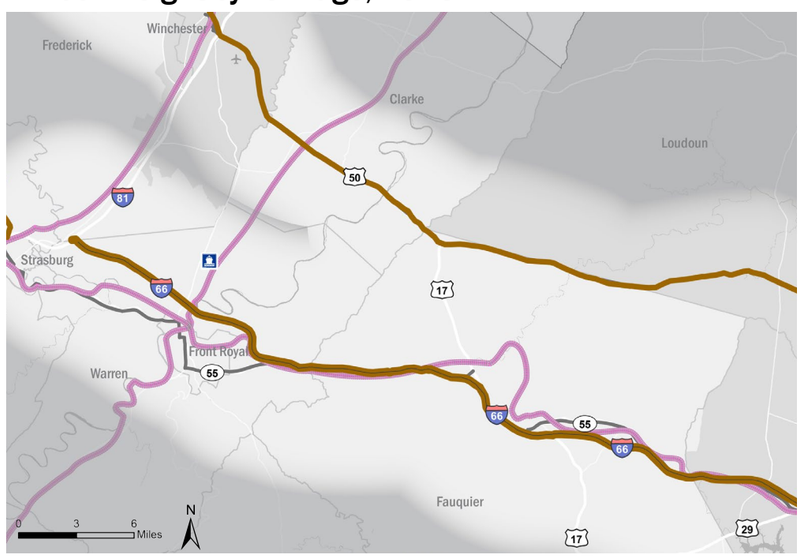
Annual Freight by Tonnage, 2012



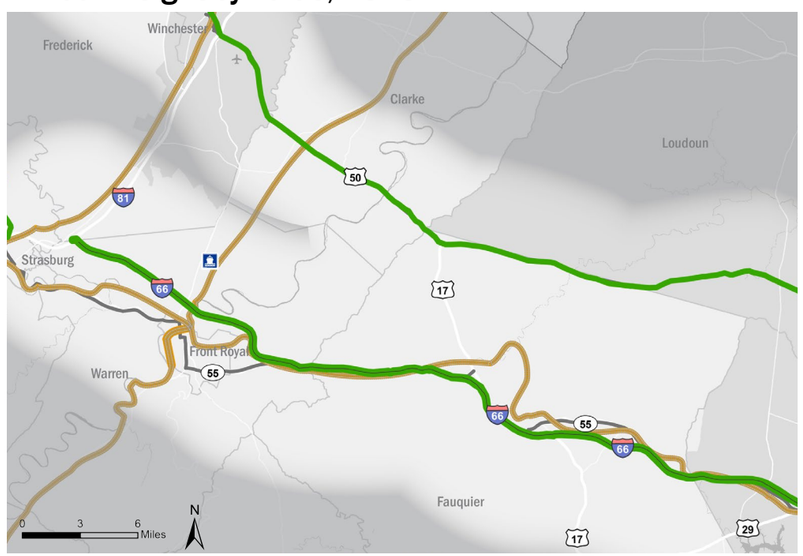
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

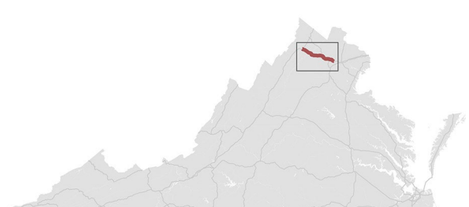
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment H1 of the Northern Virginia Corridor have several travel options, both in terms of travel path and mode choice. US 50 serves as a parallel facility to the north, as does Route 55 further south. However, the use of Route 55 for long distance travel is limited by speed and capacity and its use as a parallel facility is primarily for local access and bypassing incidents causing congestion on sections of I-66. West of Gainesville, alternative modes of travel are limited to commuter bus services provided by PRTC, as well as private bus services.

Park-and-Ride

Within Segment H1, commuters can utilize many Park-and-Ride locations, most of which are located near I-66. Fauquier County provides the highest number of Park-and-Ride locations, while Warren County has the most spaces and the highest utilization rate of spaces available in the area. Only Warren County (85 percent) has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



Comparable Travel Options

Manassas to Winchester

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-66: 1:05 Travel Time $30 Est. Cost
Via Rt. 50 / I-66: 1:04 Travel Time $30 Est. Cost

DC to Winchester

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

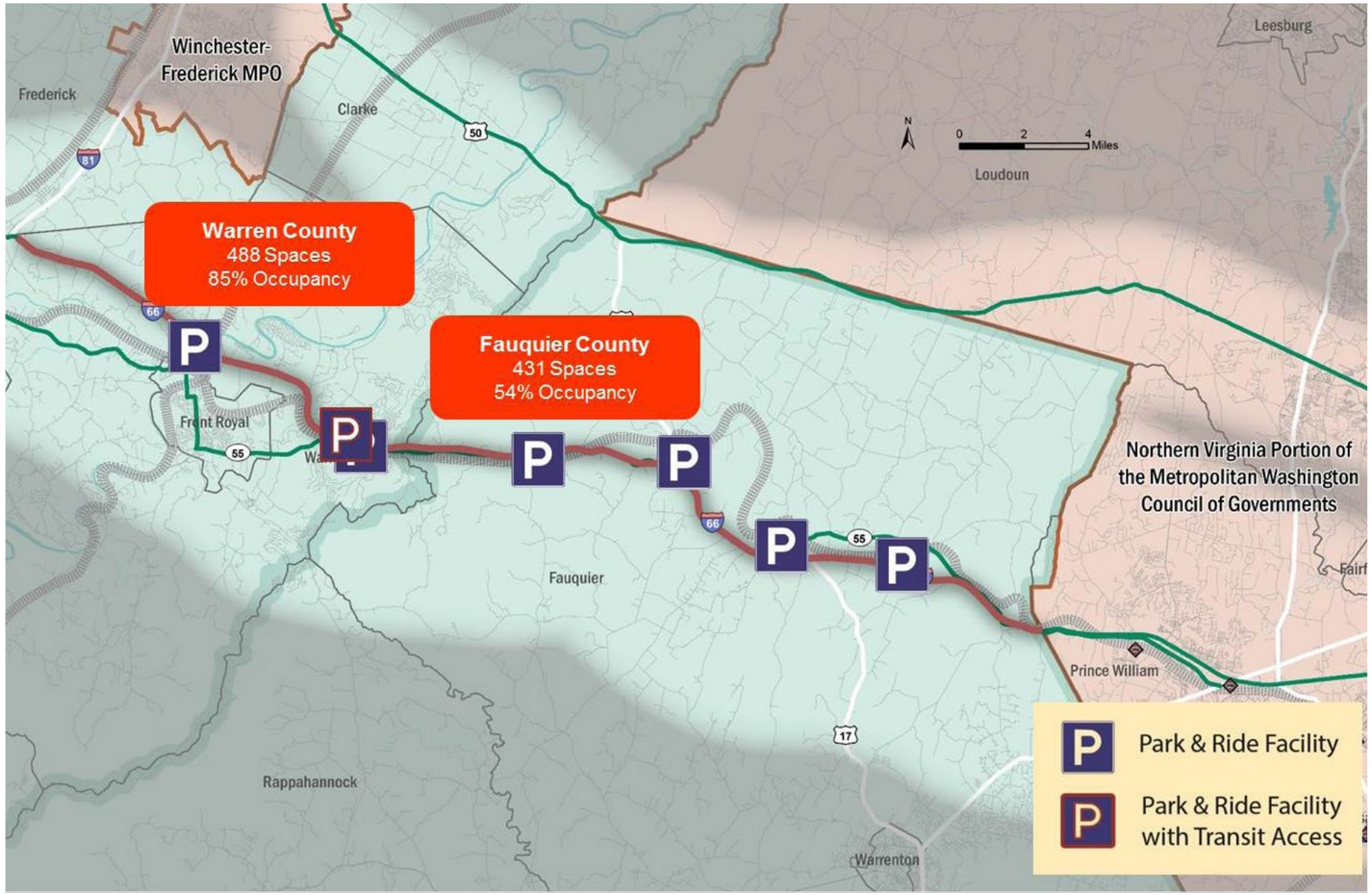
Via I-66: 1:30 Travel Time $52 Est. Cost
Via Rt. 50 / I-66: 1:50 Travel Time $42 Est. Cost

DC to Harrisonburg

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-66: 2:05 Travel Time $74 Est. Cost
Via I-66 / Rt. 55 / I-81: 2:23 Travel Time $76 Est. Cost



H1 SEGMENT NEEDS

Safety

Between 2010 and 2012, 155 severe crashes occurred on Segment H1, which were concentrated in several areas. In Front Royal, on Route 55 (US 340 and South Street), there were 29 collisions within approximately 2.1 miles between West 7th Street and Route 522 (Remount Road). On Route 55 (John Marshall Highway) in Warren County, east of Front Royal, there were 11 incidents over a 1.9-mile stretch between Esa Lane and Faith Way, and in Linden, there were six crashes at the intersection of Route 55 and Freezeland Road. Along I-66 in Fauquier County, there were ten crashes over a distance of approximately 0.6 miles between Winchester Road and Bolling Branch Creek.

Performance Metrics:

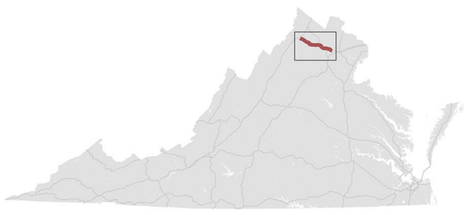
Number of Severe Crashes	155
Severe Crashes/Million VMT	0.7
Number of Railroad Crashes	0

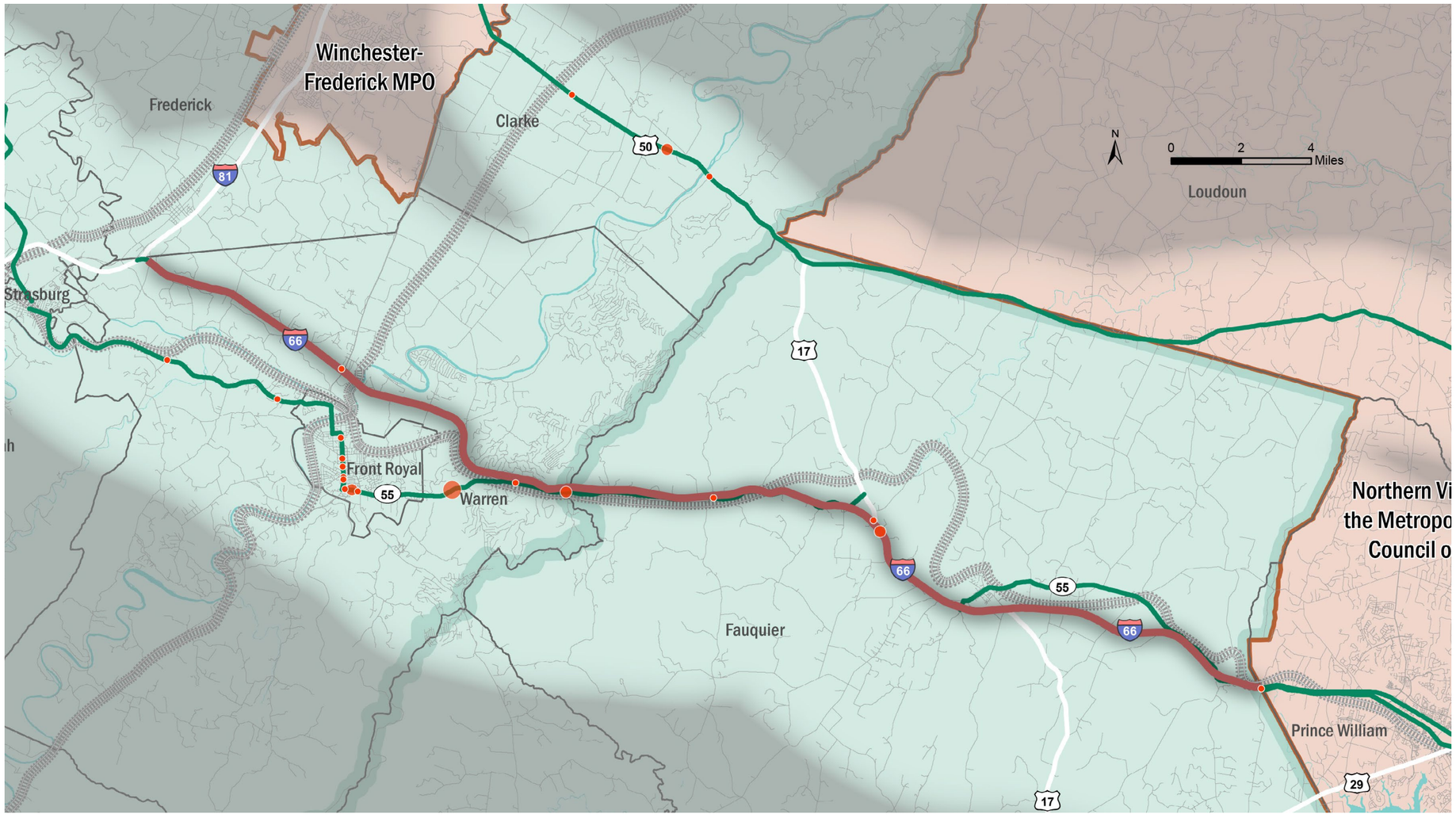
Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#





Congestion

Performance Metrics:

Person Hours of Delay per Mile	7
Freight Ton Hours of Delay per Mile	17.3K

Passenger Delays

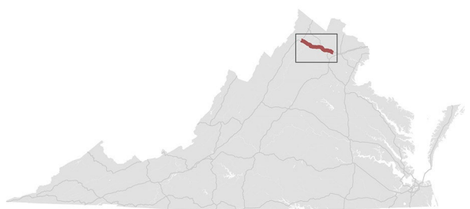
Passenger congestion along Segment H1 is minimal for most of the corridor segment with an average of only seven person-hours per mile of delay for passenger traffic. The only location in which passenger delays are in excess of 100 person-hours per mile is along US 50 in the City of Winchester near the interchange with I-81. Peak-period passenger delays along Segment H1 account for only 19 percent of daily congestion, which ranks near the bottom of peak-period delay share for passengers among CoSS segments.

Freight Delays

Freight congestion along Segment H1 is minimal for most of the corridor segment, although it is more substantial than passenger congestion. Total daily freight delay along this segment is over three million ton-hours. The only location on Segment H1 with significant freight delay is on US 50 in the City of Winchester between US 11 and the interchange with I-81. These delays are among the most significant on the CoSS segments statewide, with delays over 2.1 million ton-hours per mile. Peak-period freight delays along Segment H1 account for only four percent of daily congestion, which is very low for CoSS segments. This may be because truck traffic levels along Segment H1 peak around noon and are low during the traditional peak periods.

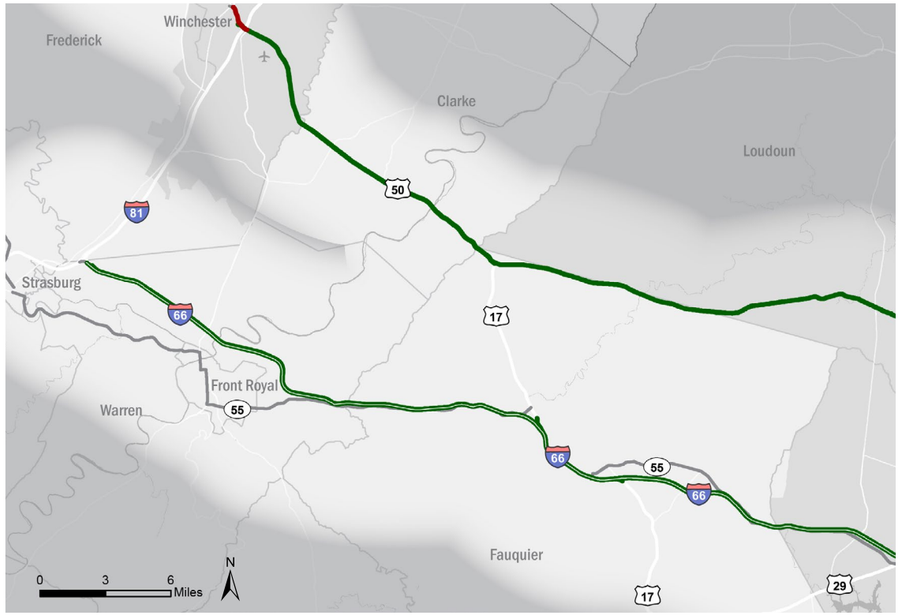
Daily Person Hours of Delay per Mile





< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

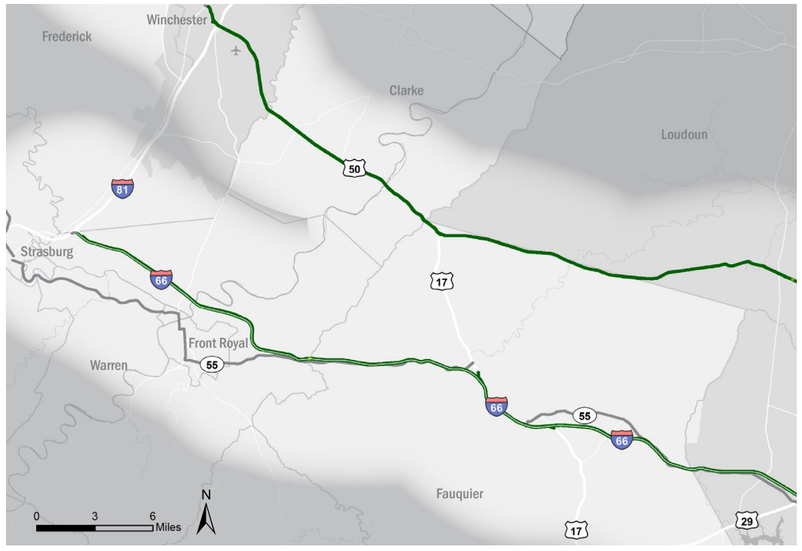
Reliability of travel during the peak period on a typical weekday on Segment H1 ranges from 0.00 to 0.27 in terms of reliability index, with an average value of 0.07. None of the locations along Segment H1 have reliability index values exceeding the statewide threshold.

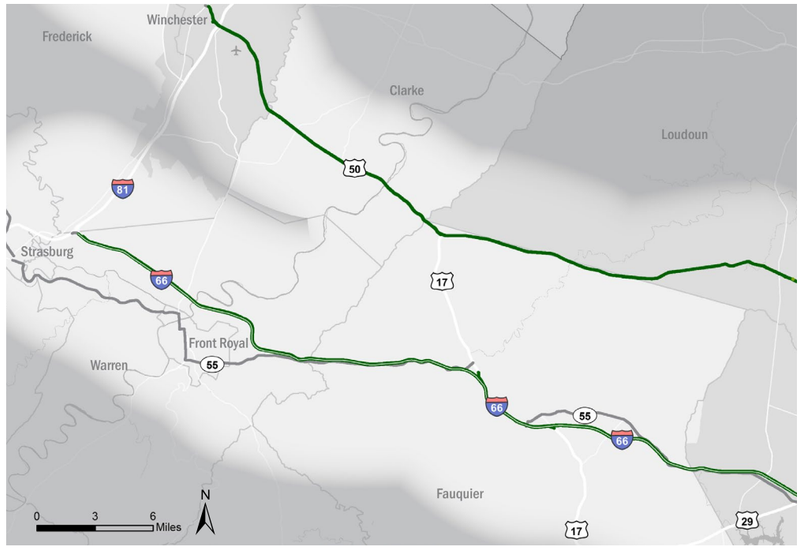
Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.22 in terms of reliability index, with an average value of 0.06. None of the locations along Segment H1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.27 in terms of reliability index, with an average value of 0.07. None of the locations along Segment H1 have reliability index values exceeding the statewide threshold.





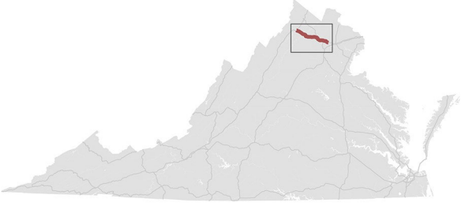


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



H1 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

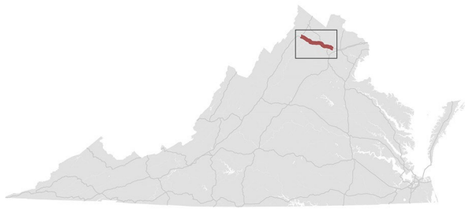
Mode Choice

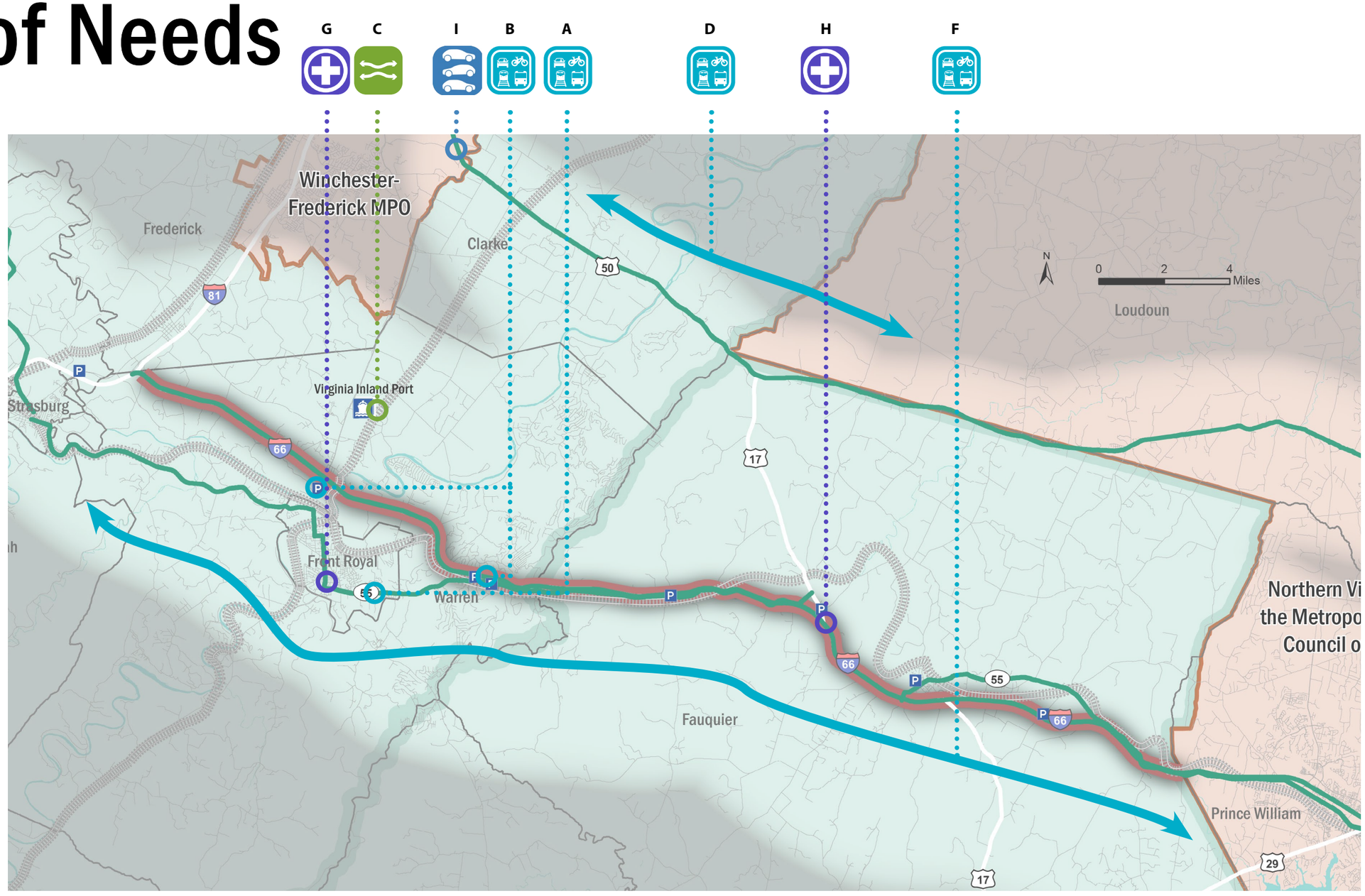
Safety

Congestion

Bottlenecks

Reliability





H1 SEGMENT NEEDS

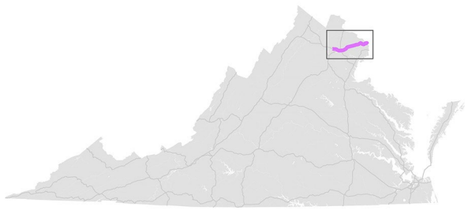
Summary of Needs - H1 Segment

A.	Lack of commuter transit service between Front Royal and D.C./Northern Virginia
B.	Park-and-Ride lots at capacity
C.	Limited rail access to the Inland Port
D.	Lack of transit service between Winchester and D.C./Northern Virginia
E.	Park and Ride lots in Warren County have higher utilization rates than statewide average
F.	Ability for VA 55 to serve as a parallel highway facility limited by speed and capacity
G.	Route 55 in Front Royal: 29 severe crashes
H.	I-66 near Exit 23 in Delplane: 10 crashes
I.	Congestion issue on US 50 from I-81 to US 11 in Winchester

III. Segment H2

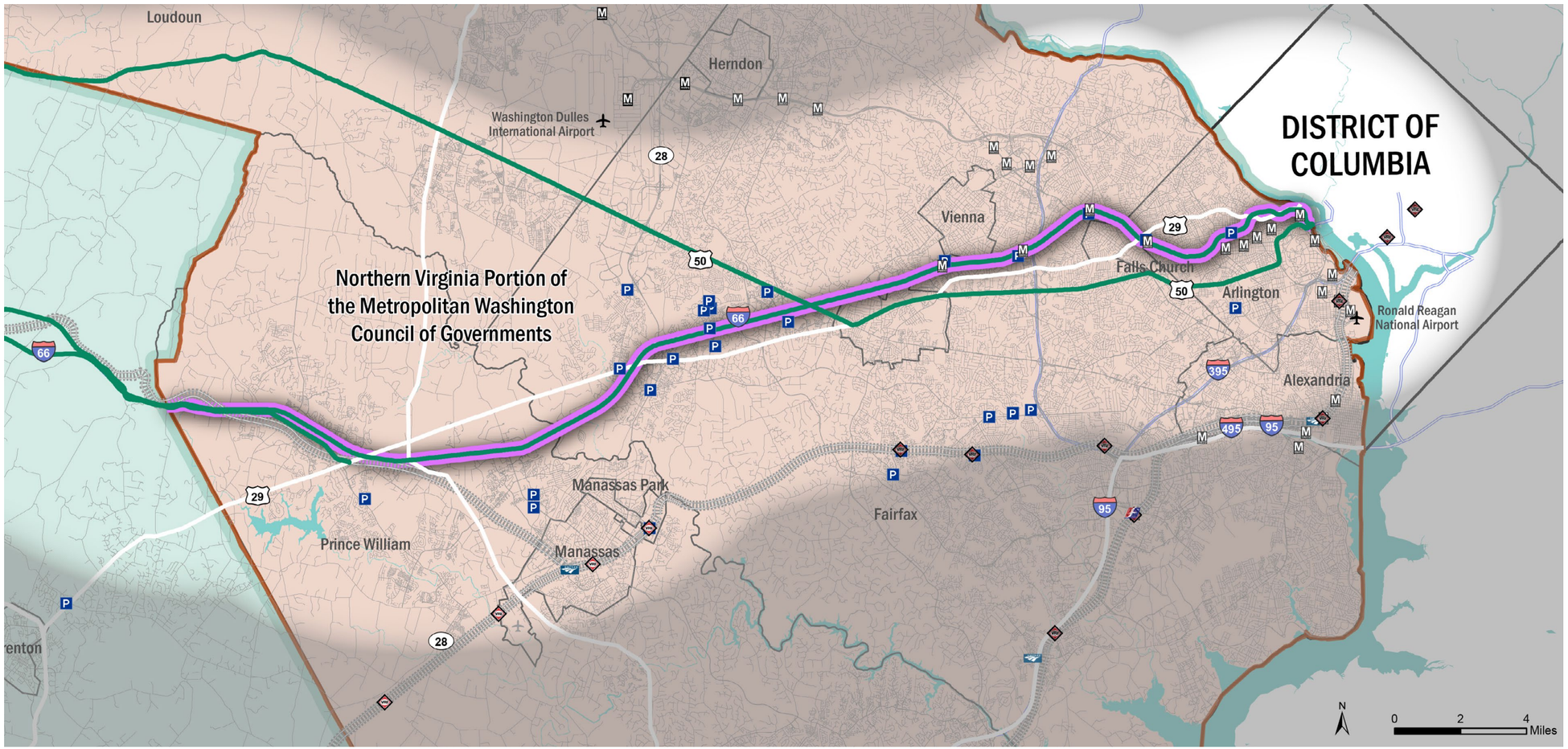
H2
Corridor Component Road
Railroad
MPO Area
Planning District Area

Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility



Corridor Segment H2 Components

- I-66
- US 50
- Route 55
- Metrorail Orange Line
- Virginia Railway Express
- Amtrak
- Washington Dulles International Airport
- Ronald Reagan Washington National Airport



H2 SEGMENT PROFILE

Segment H2 begins near Broad Run in Prince William County, runs to Rosslyn in Arlington County, and also serves Fairfax and Loudoun Counties and the Cities of Fairfax and Falls Church. The segment is primarily defined by I-66, which is a commuting corridor used to connect residential areas in the west to employment centers in the east.

Highway Facilities: Within this segment, I-66 is a four- to eight-lane highway, with eight lanes between US 29 in Gainesville and US 50 in Fair Lakes, six lanes from US 50 to Gallows Road and four lanes elsewhere in the segment. In various segments, I-66 provides peak direction HOV restrictions during weekday peak periods. Trucks are prohibited at all times in both directions on I-66 east of I-495. US 29 (Corridor I) and US 50 serve as parallel facilities. US 50 is primarily a six-lane roadway in Fairfax and Arlington Counties, while it narrows to two lanes in the western half of Loudoun County. US 50 runs concurrently with US 29 along a short section in the City of Fairfax. In the western portion of Prince William County (west of Gainesville), Route 55 also serves as a parallel facility.

Transit Services: Multiple line-haul transit options are available along I-66 in the Northern Virginia Area including:

- The Washington Metropolitan Area Transit Authority (WMATA) which operates the Metrorail Orange Line which runs parallel to I-66 from Arlington to Vienna with multiple stations and almost 9,000 Park-and-Ride spaces available. Metrorail's Silver Line (Phase I opened in 2014 and Phase II is currently under construction) connects to Dulles Airport and into Loudoun County;
- The VRE which operates commuter rail service in Segment H2 on the Manassas Line. Service travels between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route, which runs from Washington, DC to the south along the US 29 Corridor;
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC and Loudoun County Transit. Bus connections to the Metrorail system are also provided by the Fairfax Connector and Metrobus; and
- Dozens of Park-and-Ride facilities, available in the Northern Virginia Corridor, including many associated with Metrorail or VRE stations.

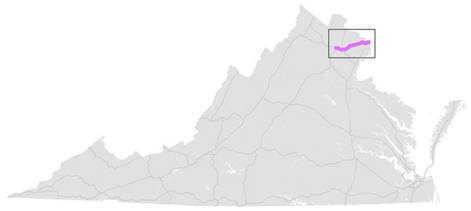
Rail Facilities: Norfolk Southern operates the Piedmont Division and Washington District rail lines along the Northern Virginia Corridor. These lines provide rail access north of Washington, DC to Baltimore and areas north along the east coast.

Port Facilities: No port facilities are located directly adjacent to Segment H2, but the Northern Virginia Corridor does provide direct access to the Virginia Inland Port south of Winchester.

Airport Facilities: Dulles International Airport and Reagan National Airport are within ten miles of the Northern Virginia Connector.

Major planned and future projects include:

- Rehabilitation and addition of capacity to the Chain Bridge Road bridge;
- Accessibility improvements to the Vienna Metrorail station; and
- Safety improvements along I-66 from mile marker 40 to mile marker 75 (DC Line/Potomac River), including lane/shoulder control display, queue/ incident detectors, and emergency areas with detection and surveillance



Number of Lanes (both directions)

2 | 3 - 4 | 5 - 6 | 7 - 8 | 9 - 12 | Primary facility



Future Projects

Reconstruction with added capacity | Safety improvements | Primary facility



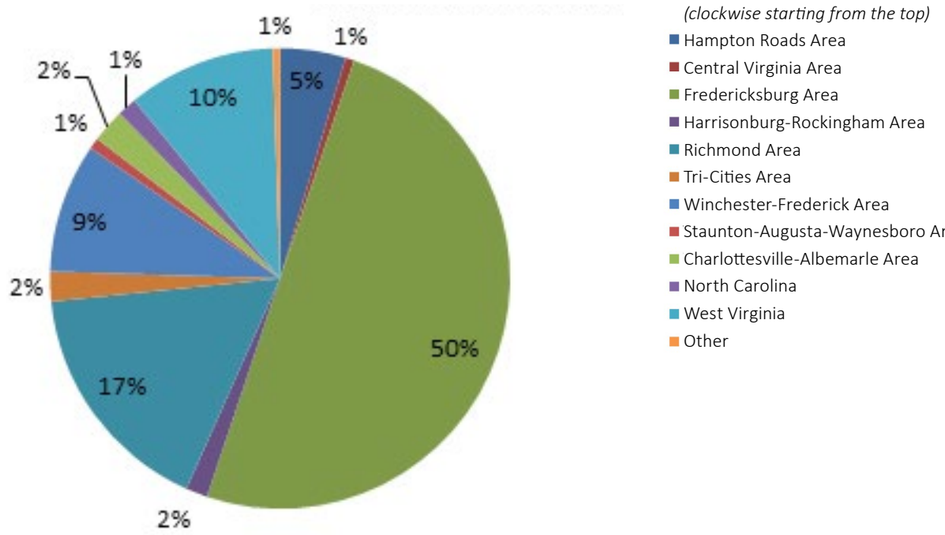
Travel Demand

Passenger Demand

Segment H2, the eastern segment of Corridor H, exists entirely within the Northern Virginia portion of the Metropolitan Washington Area, and accommodates large amounts of traffic local to the region. Travel between the Metropolitan Washington Area and West Virginia accounts for almost four percent of intercity passenger travel in the Commonwealth, while travel between the Metropolitan Washington Area and Winchester accounts for an additional three percent. These trips are likely to use portions of Segment H2.

Segment H2 provides access between the Northern Virginia Area and the communities along the I-81 corridor. Of the intercity passenger travel originating in the Metropolitan Washington Area, significant portions are destined for locations requiring the use of Segment H2 including West Virginia (ten percent), Winchester (nine percent), and Harrisonburg (two percent).

Travel from Metropolitan Washngton Region to...



H2 SEGMENT PROFILE

Freight Demand

By truck, Segment H2 carried 20 million tons of freight worth $27 billion in 2012, and is estimated to carry 27 million tons of freight worth $39 billion in 2025. A large proportion of truck freight traffic on Corridor H - 27 percent of total corridor tonnage and almost 50 percent of total value in the corridor - passes through Virginia. Freight movements between North Carolina and the Middle Atlantic region account for more than 11 percent of the total truck freight tonnage in the corridor. In terms of value, Fairfax County is a major attractor of truck freight on Corridor H, accounting for more than 12 percent of the total value on the corridor, with significant truck freight movements originating from California, Texas, and Tennessee. Adjacent to Segment H2, Manassas is a major generator of truck freight, accounting for one percent of total corridor truck tonnage in 2012 and estimated to account for more than four percent by 2025. Arlington and Prince William Counties are major destinations for truck freight on the corridor, accounting for four to six percent of the truck freight value destined for Corridor H, with major truck flows originating from Maryland, Pennsylvania, and California.

By rail, Segment H2 carried nine million tons of freight worth $12 billion in 2012, and is estimated to carry 11 million tons of freight worth $15 billion in 2025. Nearly all rail freight on this corridor is destined for Virginia, with no rail freight passing though Virginia. Rail freight flows from Illinois to Culpeper County account more than 35 percent of the total corridor rail tonnage. In terms of value, flows between the Port of Virginia facilities in the Hampton Roads region and the Virginia Inland Port, located in Warren County, are the dominant rail freight movements on Corridor H, accounting for approximately 80 percent of the total rail freight value. No rail freight originates along Segment H2 and the value and tonnage of rail freight heading to the jurisdictions located adjacent to this segment are negligible.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (44% / 42%)
2. Maryland (11% / 9%)
3. North Carolina (9% / 9%)
4. Pennsylania (8% / 9%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment H2: 12% / 12%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (41% / 44%)
2. Maryland (19% / 20%)
3. Fairfax County (9% / 11%)
4. Pennsylvania (8% / 7%)
5. North Carolina (6% / 6%)

Corridor Tonnage Destined for Segment H2: 24% / 28%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (41% / 39%)
2. Illinois (35% / 37%)
3. City of Norfolk* (17% / 16%)
4. City of Portsmouth* (9% / 9%)
5. West Virginia (9% / 7%)

Corridor Tonnage Originating in Segment H2: <1% / 1%

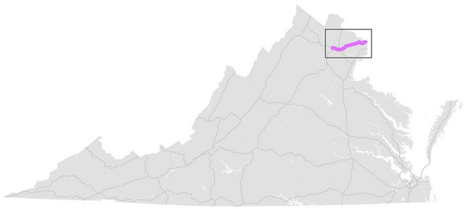
Major Origin-Destination Pairs for Freight
Culpeper County and Illinois
City of Norfolk* and Warren County
City of Portsmouth* and Warren County
City of Winchester and West Virginia
City of Winchester and South Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (91% / 91%)
2. Culpeper County (36% / 39%)
3. Warren County (26% / 25%)
4. City of Winchester (17% / 17%)
5. Maryland (4% / 5%)

Corridor Tonnage Destined for Segment H2: <1% / 1%

Traffic Conditions





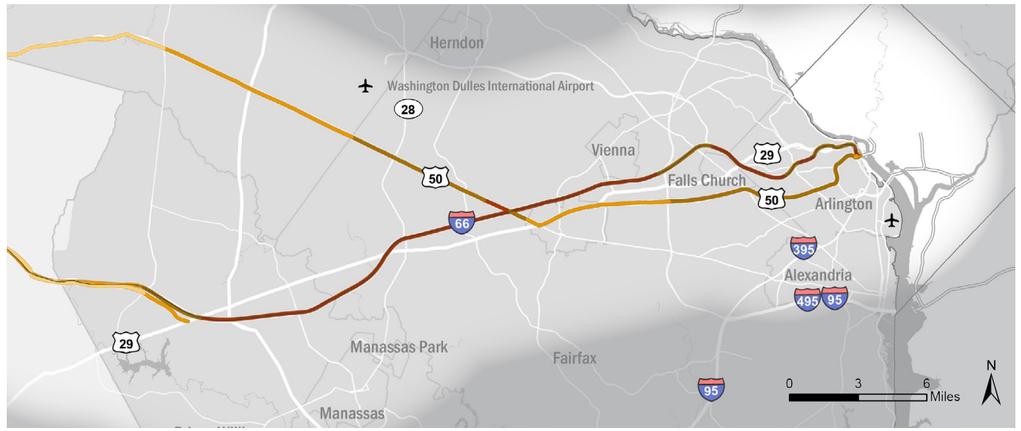
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility

Traffic Volume and AADT

Traffic volumes on Segment H2 are the highest on the Northern Virginia Corridor, with the highest trafficked sections located along I-66 in Fairfax County. Average daily traffic volumes along I-66 range from 39,000 vehicles per day west of Gainesville, to 174,000 vehicles per day near the City of Fairfax. On US 50, average daily traffic volumes are somewhat lower, but still significant. East of Dulles Airport, volumes range from 34,000 to 98,000 vehicles per day, with the highest traffic levels occurring near the interchange with I-66. Volumes on US 50 in Loudoun County are generally less than 30,000 vehicles per day.

Traffic volumes on I-66 are expected to grow significantly by 2025, and an additional 4,000 to 25,000 vehicles per day are forecast for the segment. The highest growth of traffic on I-66 is expected west of US 50 in Fairfax County. Traffic volumes on US 50 are also expected to grow significantly, with more than 15,000 additional vehicles per day forecast by 2025 to the west of I-66 in Fairfax County.



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility

H2 SEGMENT PROFILE

Traffic Distribution

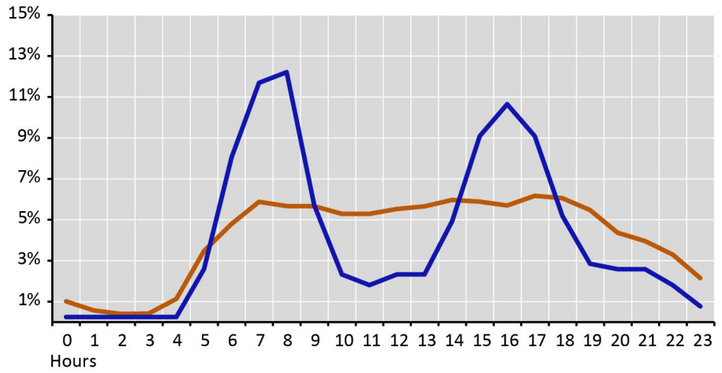
On average, traffic on Segment H2 is distributed throughout the day as shown in the graphs below.

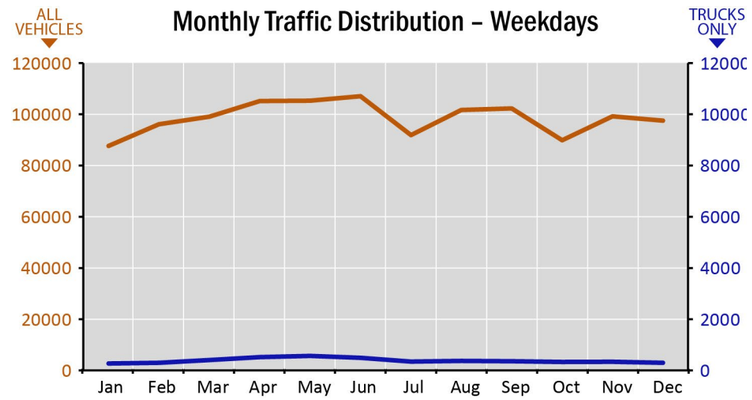
Weekday traffic shows steady flow over the course of the day from 7 a.m. and 7 p.m., which is quite different from the typical commute patterns. The combined weekday traffic during the 7 a.m. to 7 p.m. period accounts for 69 percent of total daily traffic. While accounting for only a small portion of total traffic on this segment (due in large part to truck restrictions on I-66 east of I-495), truck traffic shows two sharp peaks: the morning peak period between 6 a.m. and 10 a.m. (38 percent of daily truck traffic) and evening peak period between 3 p.m. and 6 p.m. (34 percent of daily truck traffic). Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day, with the highest peak hour flow for all traffic between 2 and 3 p.m. (6.6 percent of daily traffic). Weekend truck traffic shows a very sharp morning peak hour flow between 8 and 9 a.m. (14.0 percent of daily truck traffic).

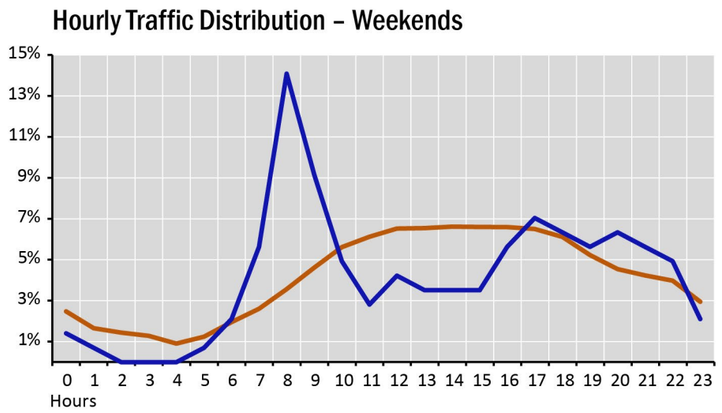
Weekday traffic volumes on Segment H2 vary by as much as 22 percent throughout the year, with the highpoint in June (around 100,000 vehicles per day) and the low point in January (around 88,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (April, around 86,000 vehicles per day) are 24 percent higher than July levels (around 69,000 vehicles per day). Truck volumes account for a very small portion of traffic on Segment H2 (less than one percent of overall daily traffic for weekday and weekend); as a result, truck traffic has almost no impact on overall traffic conditions.

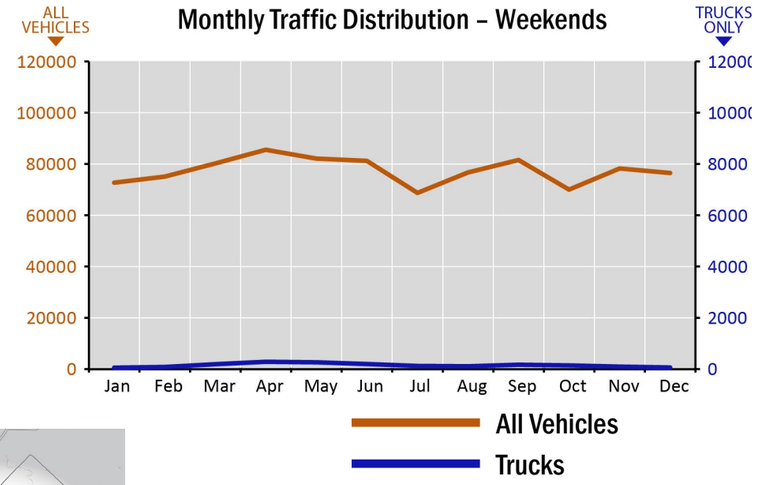
Truck Volume

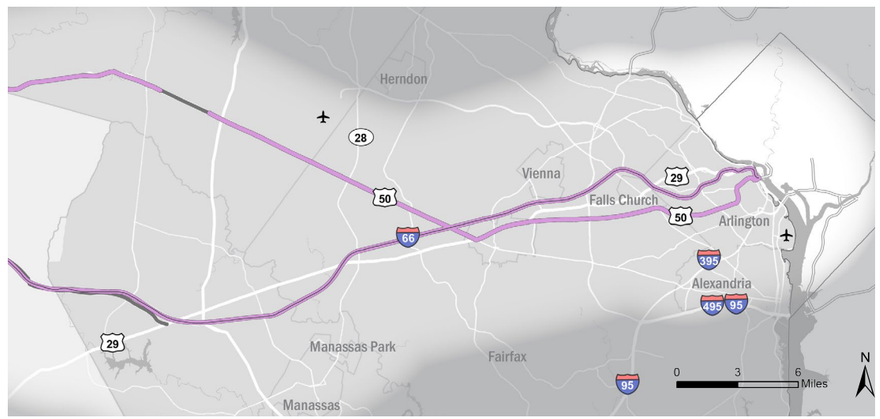
The percent of daily traffic comprised of heavy trucks on Segment H2 is low relative to Segment H1. Due to use restrictions, there is no heavy truck traffic on I-66 or on US 50 east of I-495. Further west, heavy trucks comprise three to four percent of traffic on I-66, and one percent of traffic on US 50.





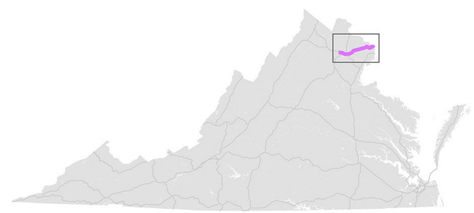




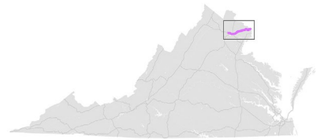


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



H2 SEGMENT PROFILE

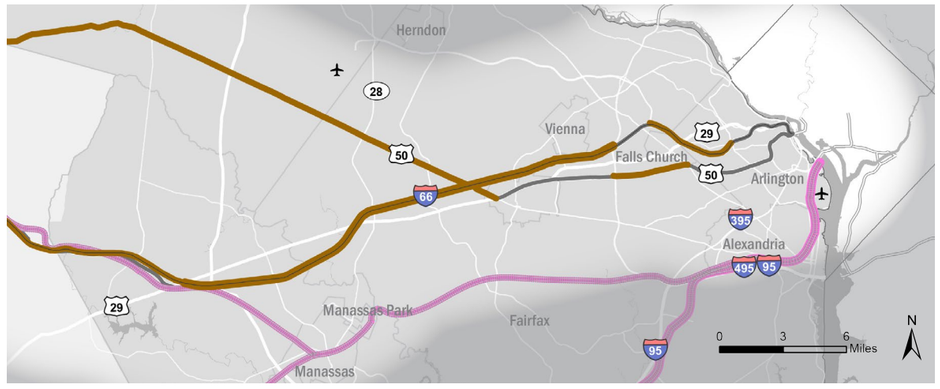


Freight Flows

On Segment H2 near Gainesville, freight is moved primarily by truck in relation to both tonnage and value. Much of this truck freight is likely to travel through Dulles International Airport, which accommodates the largest amount of air freight in the Commonwealth. In total, 19 million tons (98 percent) of freight is moved through this section of Segment H2 by truck, compared to 478,000 tons (two percent) by rail. With regard to value, $27 billion (96 percent) of freight travels by truck, compared to $1 million (four percent) by rail. On average, a ton of freight traveling through this section of Segment H2 by truck is worth $1,360 while a ton of freight traveling by rail is worth $2,378. This is one of the few locations in the Commonwealth where rail freight is on average more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment H2 are expected to increase. It is anticipated that the percentage of freight traveling by truck by tonnage and value will remain the same. Freight value per ton on trucks is expected to increase to $1,472 and decrease to $2,282 for rail.

Near the City of Fairfax, freight on Corridor H is moved primarily by truck in relation to both tonnage and value. In total, 19 million tons (69 percent) of freight is moved through this section of Segment H2 by truck, compared to nine million tons (31 percent) by rail. By value, $25 billion (67 percent) of freight travels by truck, compared to $12 billion (33 percent) by rail. On average, a ton of freight traveling through this section of Segment H2 by truck is worth $1,295 while a ton of freight traveling by rail is worth $1,396. In 2025, both rail and truck freight tonnages and total values in this area of Segment H2 are expected to increase. The percentage of freight traveling by truck by tonnage is expected to remain the same and to increase by value to 70 percent. Freight value per ton on trucks and rail is expected to increase to $1,466 and $1,355, respectively.

Annual Freight by Tonnage, 2012



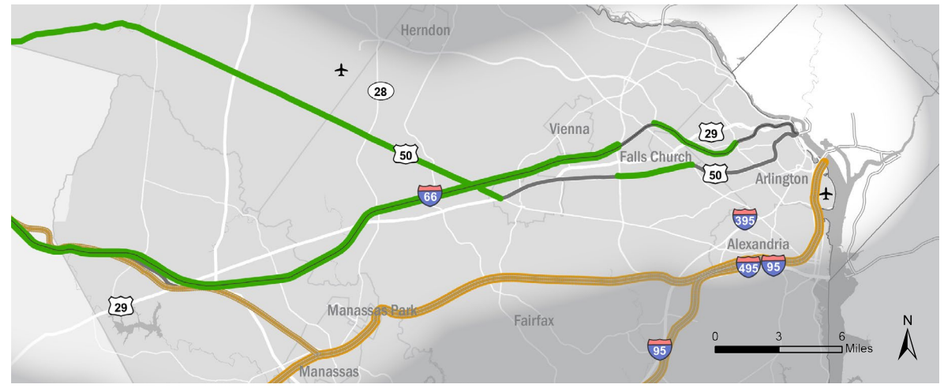
Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

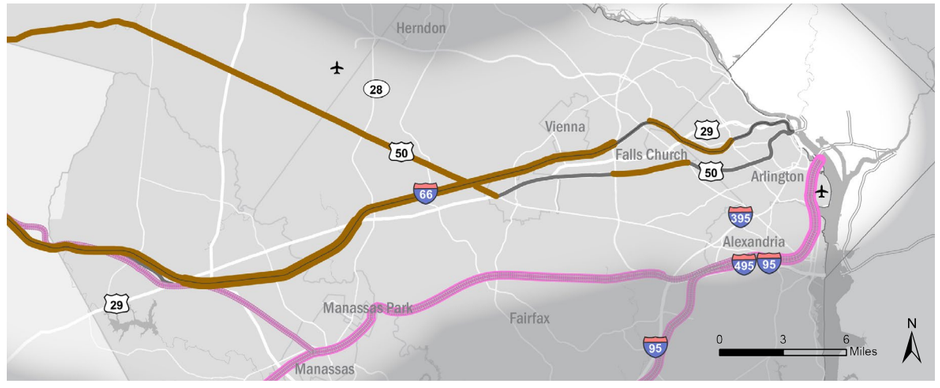
Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



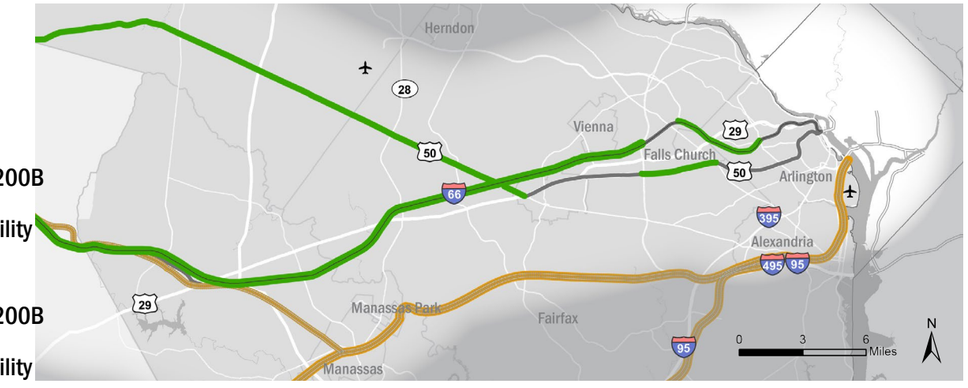
Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Annual Freight by Value, 2025



Redundancy and Mode Choice

Passenger trips on Segment H2 of the Northern Virginia Corridor have several travel options, both in terms of travel path and mode choice. US 50 serves as a parallel facility and is a viable option in the eastern half of the corridor. Further west, US 50 diverges from I-66 and travels further to the north. To mitigate congestion and encourage carpooling and transit use, HOV restrictions are imposed on I-66 during weekday peak periods. Truck prohibitions east of I-495 further restrict the availability of alternative highway routes on Segment H2. Direct or indirect connections to all of the other CoSS in the Northern Virginia Area are available, including Corridors G, I and, K.

Many transit options are available within Segment H2, mostly providing connections within the Northern Virginia Area or to neighboring DC. Transit services in the segment include:

- Metrorail's Orange Line which runs parallel to I-66 from DC to Vienna with multiple stations;
- Metrorail's Silver Line which runs parallel to I-66 through the City of Falls Church, before diverting to the northern areas of Tysons Corner, Reston (Phase I), Dulles Airport, and Loudoun County (phase II);
- The VRE which operates commuter rail service in Segment H2 on the Manassas Line. Service travels between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route, which runs from Washington, DC to the south along the US 29 corridor; and
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC and Loudoun County Transit. Bus connections to the Metrorail system are also provided by the Fairfax Connector and Metrobus.

Park-and-Ride

Within Segment H2, commuters can utilize a number of Park-and-Ride locations, many of which are served by transit service. Fairfax County provides the highest number of Park-and-Ride locations and the most parking spaces in the Commonwealth, accounting for nearly half of the Park-and-Ride parking spaces in Virginia. Arlington County has the highest utilization rate of spaces available in the segment. Fairfax (83 percent) and Prince William (80 percent) Counties also have a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.

Comparable Travel Options

DC to Manassas

Inter-City Bus	*Train*
11 Trips per Day 1:20 Travel Time $8 Est. Cost	11 Trips per Day 1:15 Travel Time $10 Est. Cost

Auto

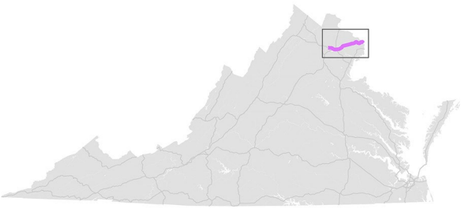
Via I-66: 0:45 Travel Time $18 Est. Cost
Via Rt. 50 / I-66: 1:01 Travel Time $18 Est. Cost

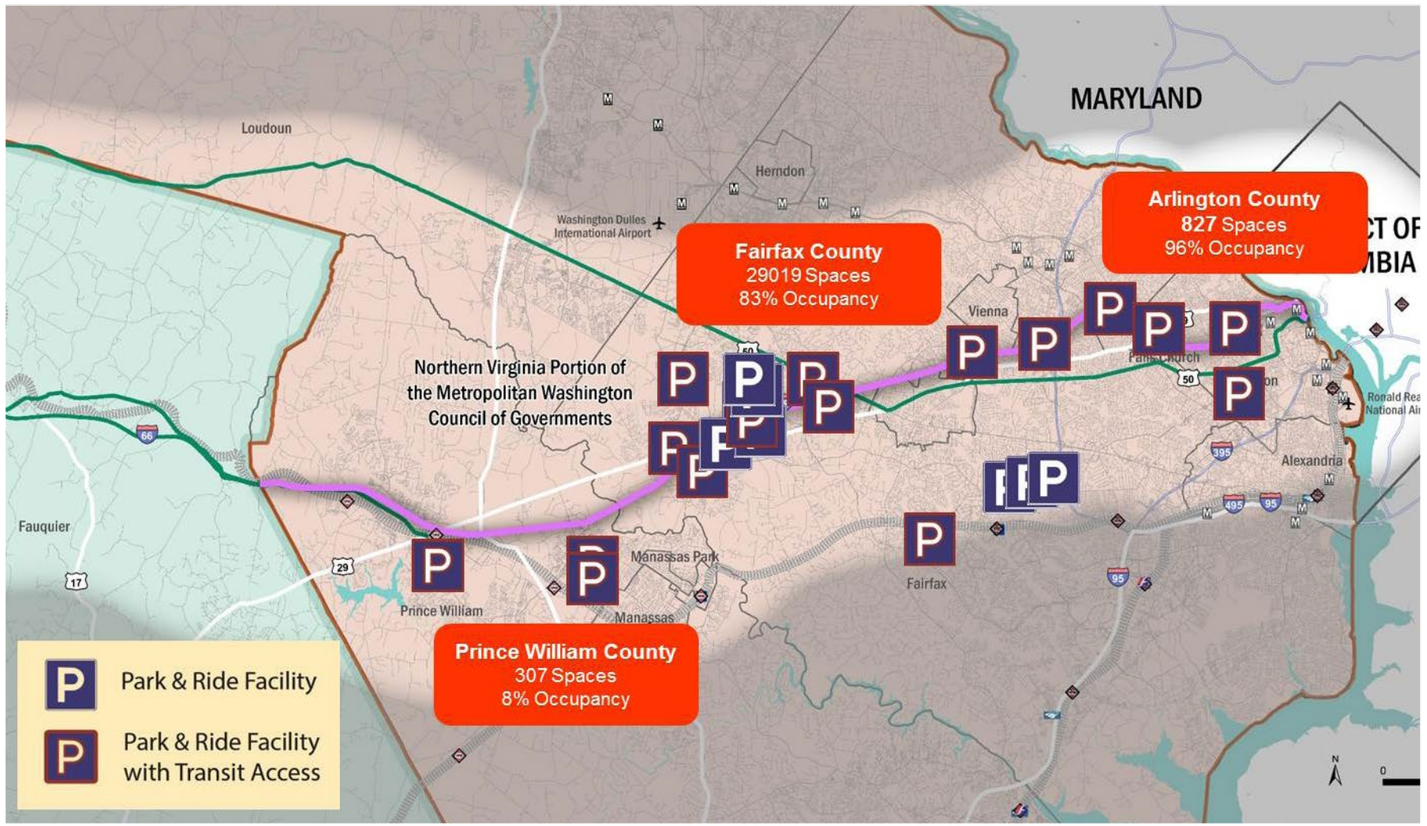
Manassas to Winchester

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via I-66: 1:05 Travel Time $30 Est. Cost
Via Rt. 50 / I-66: 1:04 Travel Time $30 Est. Cost





H2 SEGMENT NEEDS

Safety

Between 2010 and 2012, 391 severe crashes occurred on Segment H2, resulting in the highest crash rate on the Northern Virginia Corridor. The highest concentrations of severe collisions along Segment H2 occurred between Centreville and the District of Columbia. Along US 50 (Lee Jackson Memorial Highway) in Fairfax County, there were 46 crashes near Fair Oaks Mall. Of the 46 crashes, 29 occurred at the intersection with Fair Ridge Drive. On US 50 (Lee Jackson Highway/Fairfax Boulevard) in the City of Fairfax, there were 75 incidents that took place over approximately 3.6 miles between the I-66 W on-ramp and Campbell Drive. Of the 75 incidents, 26 occurred over a distance of 0.7 miles between Main Street and McLean Avenue. On US 50 (Arlington Boulevard) west of I-495, there were 32 crashes near the intersection with Prosperity Avenue. On US 50 (Arlington Boulevard) east of I-495, there were 24 collisions that occurred over approximately 0.6 miles between Fenwick Road and Wallace Drive. On US 50 (Arlington Boulevard) in Arlington, 23 crashes took place within about 0.3 miles between North Jackson Street and Fenwick Street.



Performance Metrics:

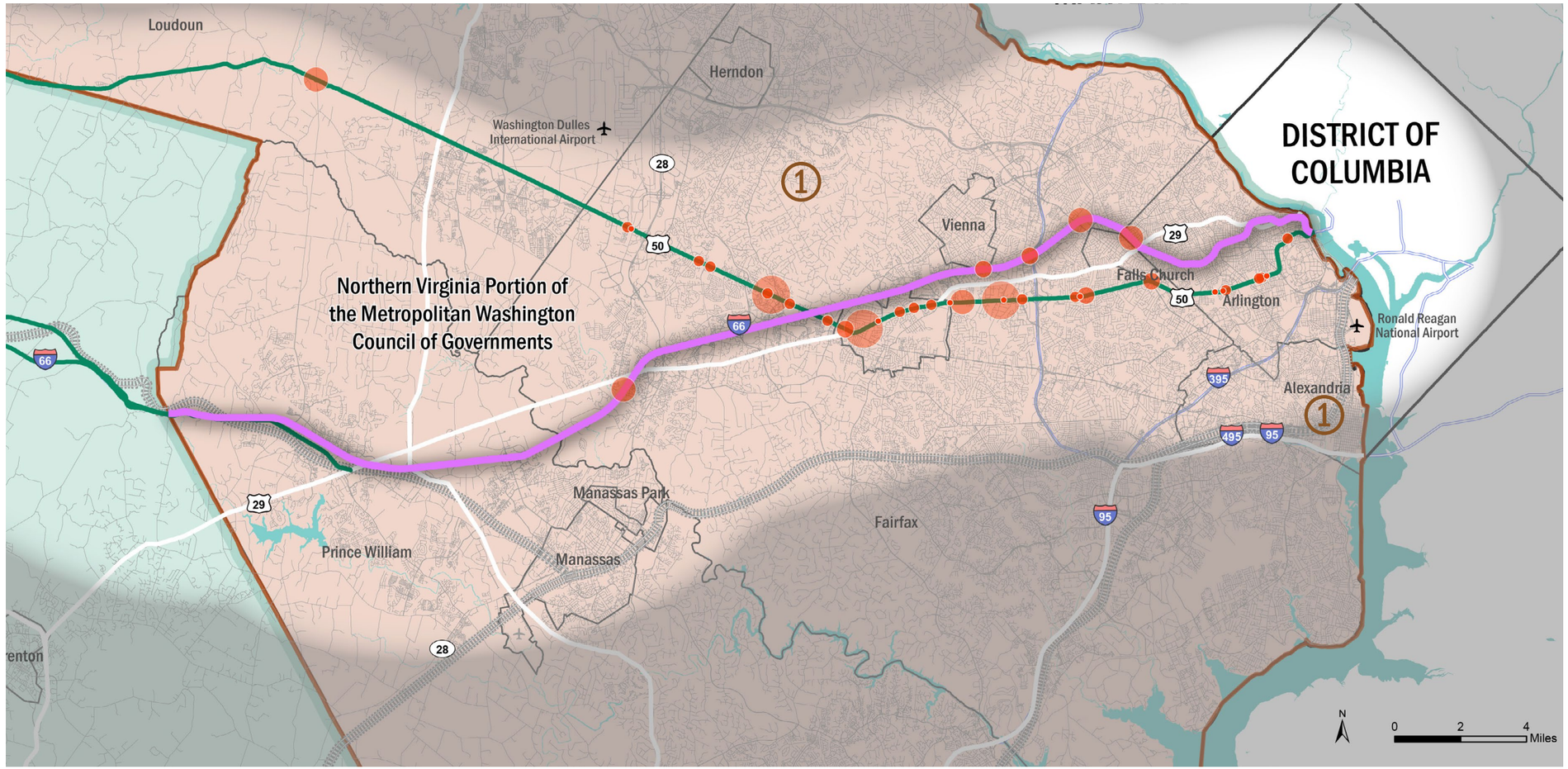
Number of Severe Crashes	391
Severe Crashes/Million VMT	0.9
Number of Railroad Crashes	2

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile 210

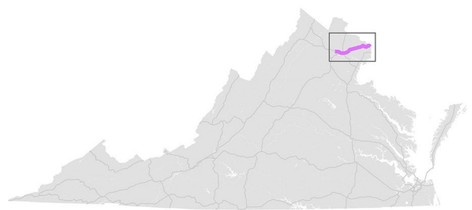
Freight Ton Hours of Delay per Mile 17.1K

Passenger Delays

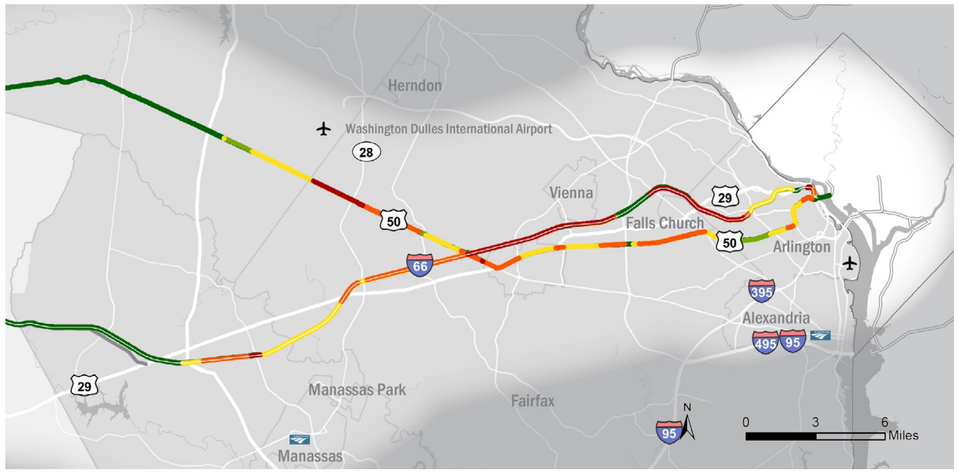
Passenger congestion is far more substantial along Segment H2 than H1, with total daily passenger delays exceeding 29,000 person-hours. On a per-mile basis, Segment H2 has the highest passenger delay among CoSS segments at 210 person-hours per mile. There are significant passenger delays at almost all locations in Segment H2, including I-66 east of Route 234 near Manassas and US 50 east of Route 606 near Dulles Airport. The worst passenger delays (exceeding 1,000 person-hours per mile of delay) occur on I-66 east of US 50 in Fairfax County. Peak-period passenger delays along Segment H2 account for 58 percent of daily congestion, which is considerably higher than the peak-period share of congestion along Segment H1. All lanes on I-66 east of I-495 are open only to HOV traffic from 6:30 to 9:00 a.m. in the eastbound direction and from 4 to 6:30 p.m. in the westbound direction.

Freight Delays

Freight delays along Segment H2 are minimal relative to passenger congestion, with around 2.4 million ton-hours of delay. Freight congestion is so low on Segment H2 due to the low level of truck traffic caused in part by truck restrictions east of I-495. As such, there are no locations of significant freight delay along Segment H2. Peak period freight delay on Segment H2 accounts for 78 percent of daily freight congestion, which is the highest peak-period share of congestion among CoSS segments.

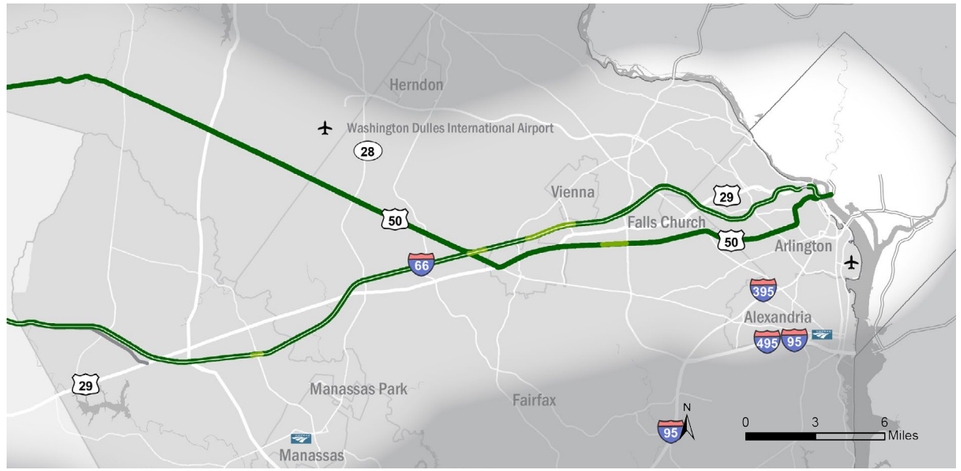


Daily Person Hours of Delay per Mile



< 50
51 - 100
101 - 250
251 - 500
> 500

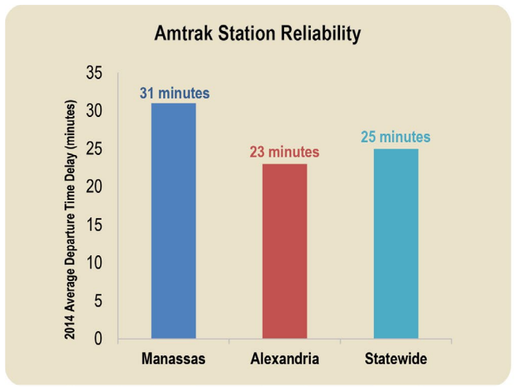
Daily Freight Ton Hours of Delay per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

H2 SEGMENT NEEDS

Reliability



VRE On-Time Performance
Manassas Line
93%

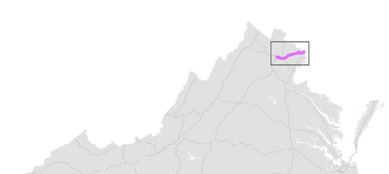
WMATA On-Time Performance
Orange Line
91%
Silver Line
88%

Reliability Index

< 0.2	0.6 - 0.8
0.2 - 0.4	> 0.8
0.4 - 0.6	Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment H2 ranges from 0.04 to 1.38 in terms of reliability index, with an average value of 0.29. This segment has one of the highest peak period reliability index values of CoSS segments statewide, and locations where the weekday peak reliability index exceeds the statewide threshold include:

- US 50 near I-66 in Fairfax County;
- I-66 near Route 234 in Gainesville;
- I-66 near the interchange with US 50 in Fairfax County;
- I-66 near Nutley Street near Vienna;
- I-66 near Gallows Road in Fairfax County; and
- I-66 near the merge with the Dulles Toll Road where four eastbound lanes merge into two.

Weekday

Reliability of travel during a typical weekday ranges from 0.03 to 0.69 in terms of reliability index, with an average value of 0.22. This segment has one of the highest weekday reliability index values of CoSS segments statewide, and locations where the weekday reliability index exceeds the statewide threshold include:

- US 50 at the intersection with US 29 in the City of Fairfax;
- I-66 near Route 234 in Gainesville; and
- I-66 east of US 50 in Fairfax County.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 1.00 in terms of reliability index, with an average value of 0.17. This segment has one of the highest weekend reliability index values of CoSS segments statewide, and locations where the weekend reliability index exceeds the statewide threshold include:

- US 50 east of Route 606 in Loudoun County;
- US 50 just south of I-66 near the City of Fairfax;
- I-66 just east of the interchange with US 50 in Fairfax County; and
- I-66 between Nutley Street and Gallows Road in Fairfax County.







Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

Mode Choice

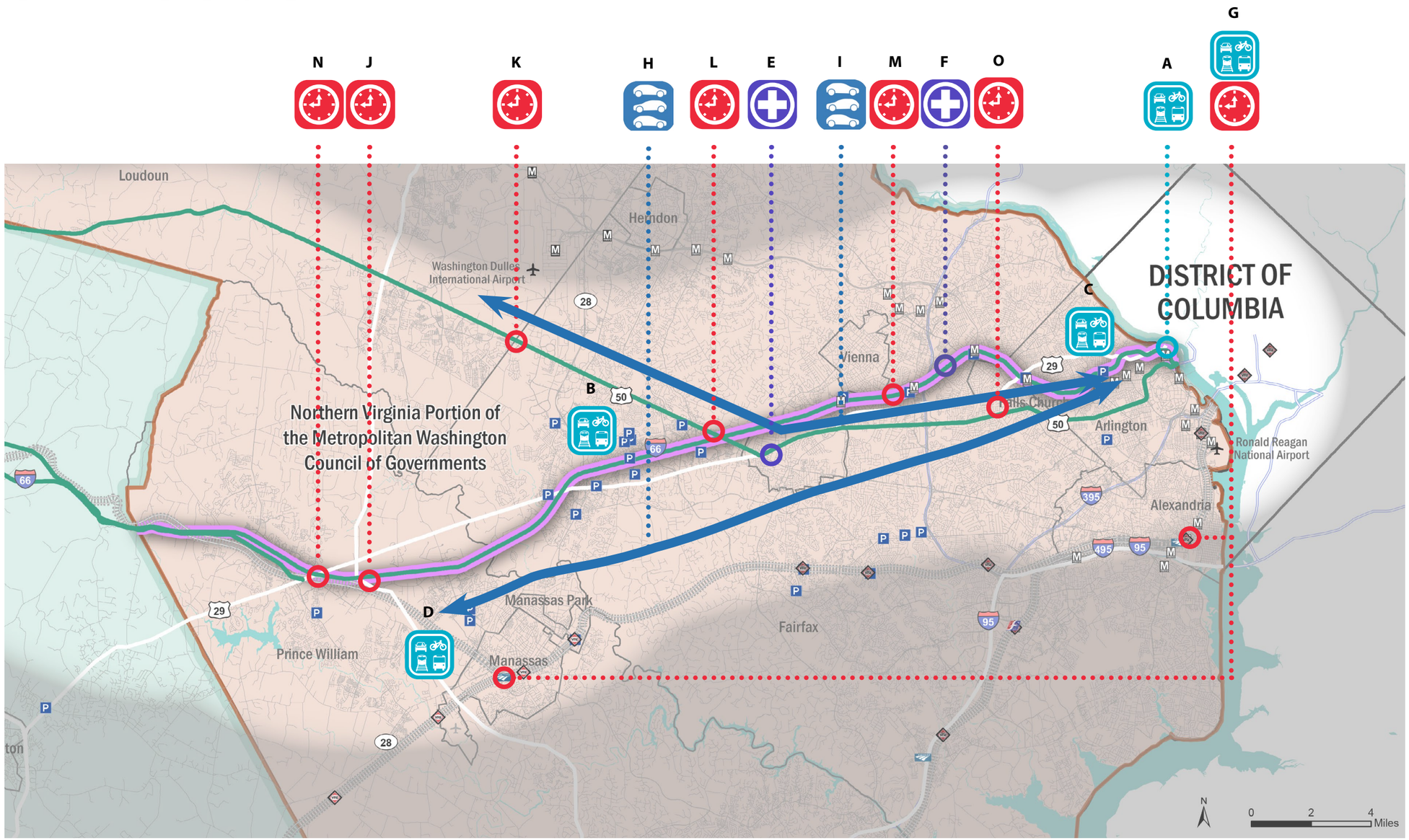
Safety

Congestion

Bottlenecks

Reliability





H2 SEGMENT NEEDS

Summary of Needs - H2 Segment

A.		Orange Line Metrorail Over capacity in many portions of the corridor; Potomac River crossing at Rosslyn at capacity
B.		Park and Ride lots in Fairfax County have higher utilization rates than statewide average
C.		Park and Ride lots in Arlington County have higher utilization rates than statewide average
D.		Park and Ride lots in Prince William County have higher utilization rates than statewide average
E.		US 50 between Fairfax County Pkwy and Gallows Rd: 181 severe crashes
F.		I-66 between Gallows Rd and US 29 in East Falls Church: 62 severe crashes
G.		Unreliable Amtrak service from Alexandria station (23 minutes average departure delay) and Manassas Station (31 minutes average departure delay) totaling over 42,500 person-hours of delay from this segment.

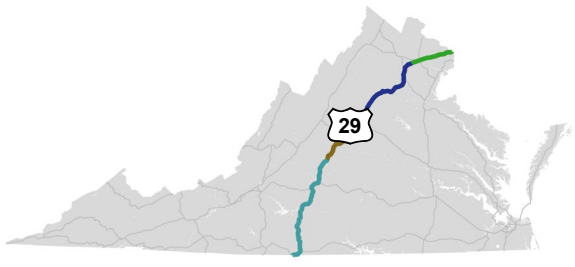
Summary of Needs - H2 Segment

H.		Congestion issue on I-66 from Exit 44 (US 234) to Exit 73 (US 29)
I.		Congestion issue on US 50 from VA Route 606 (Loudoun County Parkway) to I-66 and George Washington Memorial Parkway
J.		Reliability issue on I-66 at Exit 44 (VA Route 234)
K.		Reliability issue on US 50 between VA Route 606 (Loudoun County Parkway) and VA Route 28
L.		Reliability issue on US 50 at I-66 interchange
M.		Reliability issue on I-66 from Exit 57 (US 50) to Exit 69 (US 29) in Fairfax County
N.		Reliability issue on I-66 at Exit 43 (US 29)
O.		Reliability issue at US 50 and US 29 in Fairfax County

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Seminole Corridor (I)



Office of INTERMODAL Planning and Investment

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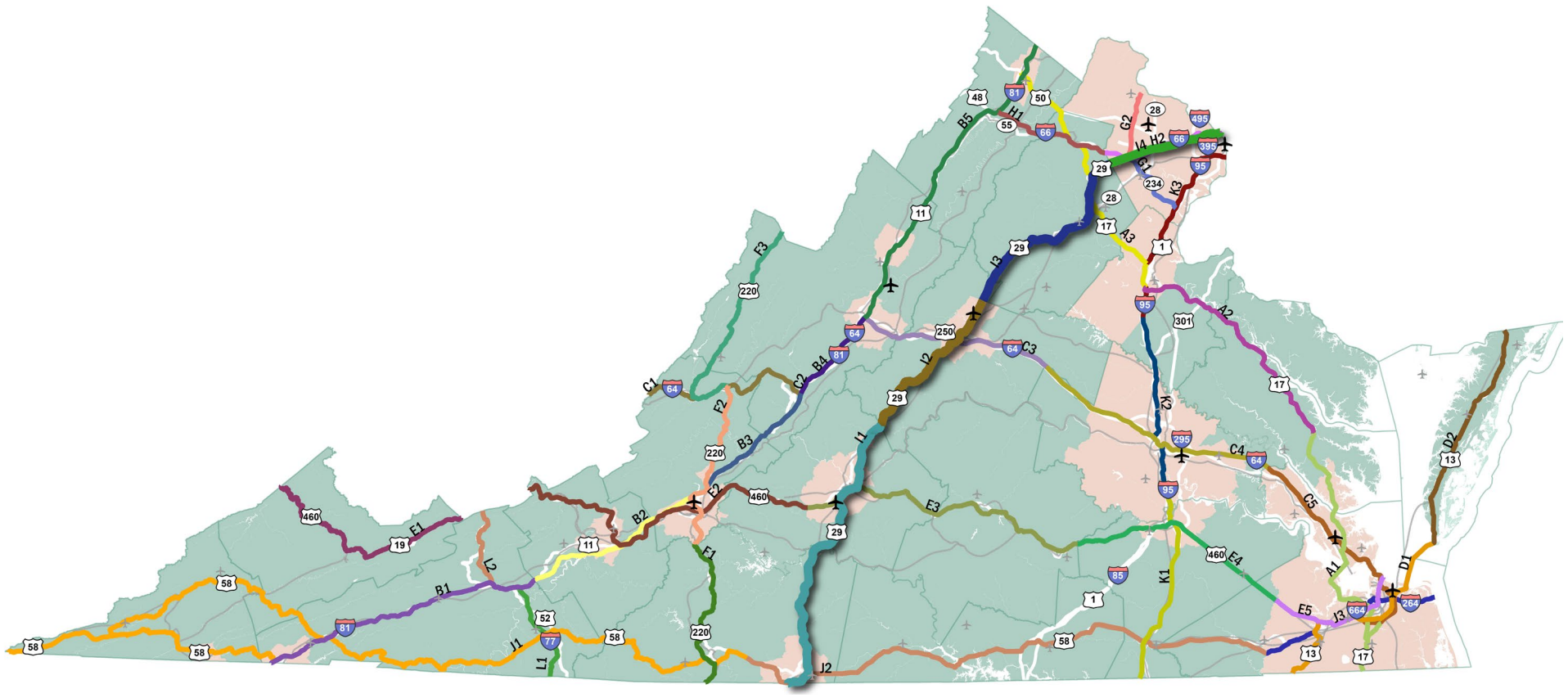
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

The Seminole Corridor (Corridor I) is defined primarily by US 29, which runs north to south in the eastern United States for more than 1,000 miles. The northern terminus of US 29 is in the suburbs of Baltimore, Maryland, and its southern terminus is in Pensacola, Florida. US 29 serves as the major north-south corridor through central Virginia, as it lies between I-95 and I-81. It provides the main connection between the Metropolitan Washington Area and the Cities of Charlottesville, Lynchburg, and Danville. US 29 is also designated as a National Scenic Highway.

US 29 is a multi-lane highway through Virginia, with most sections at four lanes. In the Northern Virginia Area and the northern portion of the Charlottesville-Albemarle Area, US 29 serves as an arterial roadway. Although US 29 provides local access to many areas, there are numerous grade-separated interchanges along its length. Business spurs of US 29 are present in almost all of the urbanized areas on the Seminole Corridor. US 29 serves as a parallel corridor and local-access route for I-66 in Northern Virginia. Route 28 also serves as a parallel corridor for US 29 between the western end of Fairfax County and Fauquier County. US 50 serves as a parallel roadway through Fairfax and Arlington Counties. South of Fauquier County, there are no continuous parallel roadways. US 29 runs concurrently with other roadways throughout its course in Virginia, including US 15 for a long stretch near Warrenton, US 250 near Charlottesville, and US 460 near Lynchburg.

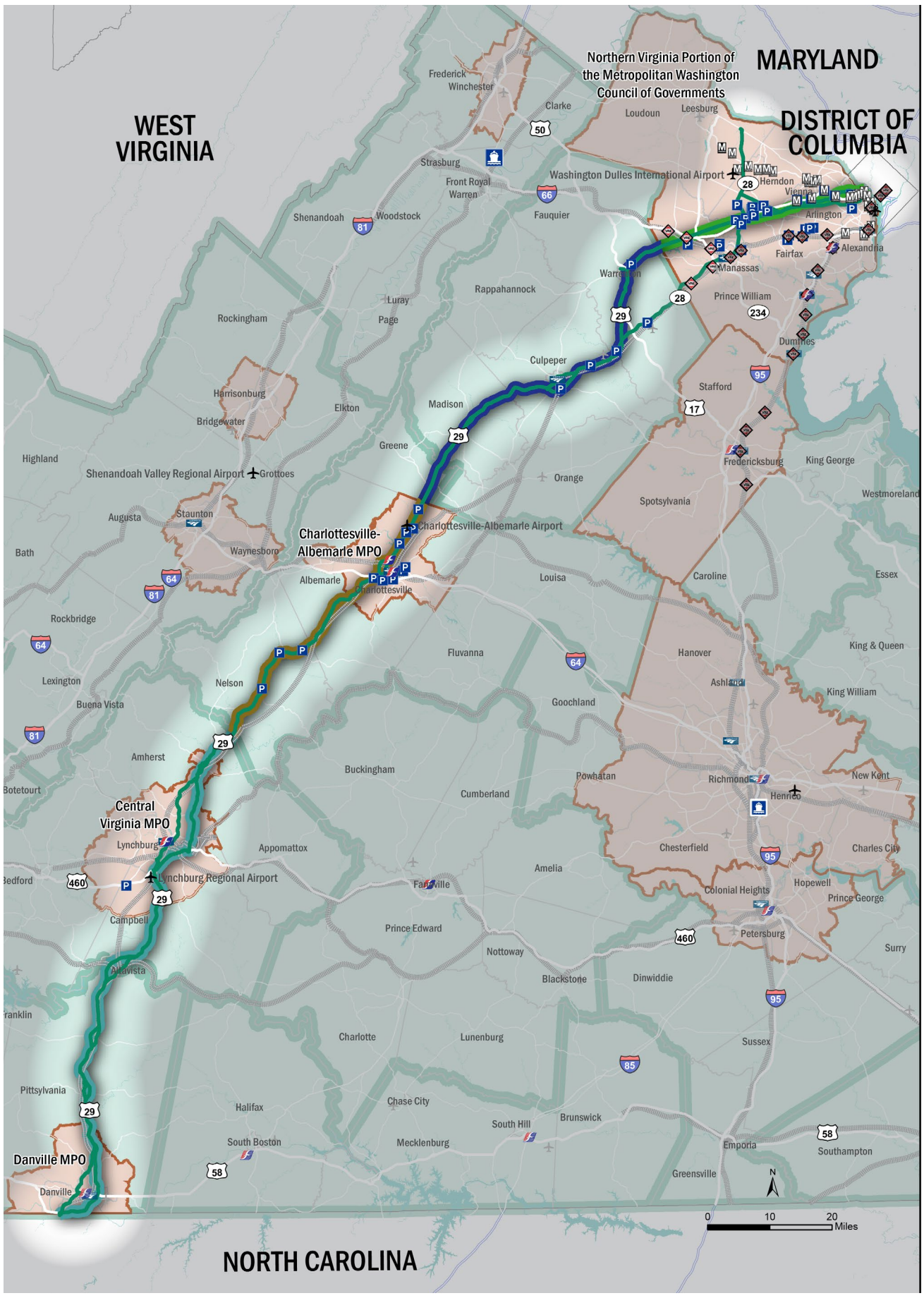
Multiple line-haul transit options are available along US 29, primarily in the Northern Virginia Area. Options for passenger travel include:

- Metrorail's Orange and Silver Lines, which run parallel to US 29 from Arlington to Vienna with multiple stations and almost 9,000 Park-and-Ride spaces available. Phase II of the Silver Line – currently under construction – will provide a direct connection to Dulles Airport and into Loudoun County;
- Bus services provided by Fairfax Connector, Loudoun County Transit, Potomac and Rappahannock Transportation Commission (PRTC), ART, and CUE in the Northern Virginia Area. Express bus service from Culpeper to Washington, DC is provided by Rappahannock Rapidan Community Services;
- Virginia Railway Express (VRE), which operates commuter trains along the corridor between Manassas and Washington, DC on the Norfolk Southern Piedmont freight rail;
- Amtrak's Crescent and Cardinal Routes, which provide passenger rail service, running directly along the Norfolk Southern rail lines within the Seminole Corridor with stops in Lynchburg, Charlottesville, Washington, DC, and Manassas;
- Greyhound, which offers bus service along the entire Seminole Corridor, with stations located in Danville, Lynchburg, Charlottesville, and Northern Virginia (in Springfield and Woodbridge);
- Express-bus transit service between Lovingston in Nelson County and the City of Charlottesville, provided by JAUNT;
- Multiple Park-and-Ride lots available throughout the Seminole Corridor, with large clusters in the Northern Virginia Areas associated with Metrorail and VRE stations; and
- Commercial air service, most readily available at Dulles International Airport in the Northern Virginia Area. Limited commercial service to larger cities is available at Charlottesville-Albemarle Airport and Lynchburg Regional Airport. In addition, there are numerous general-aviation facilities within the corridor.

Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to points south along US 29 as well as north of Washington, DC. The eastern line of Norfolk Southern's Crescent Route also runs along US 29, connecting the Virginia Inland Port and the western line of Norfolk Southern's Crescent Corridor via the I-66 corridor. In Charlottesville, there is a junction between Norfolk Southern's Crescent Corridor and CSX's Coal Corridor, which provides a connection between the Port of Virginia facilities in the Hampton Roads Area and the Appalachian coal fields to the west. In the Lynchburg Area, there is a junction between three major Norfolk Southern rail corridors: the Crescent Corridor, the Coal Corridor, and the Heartland Corridor, which connect to the Port of Virginia facilities in the Hampton Roads Area, the Appalachian coal fields, and the Midwest.

Corridor Components

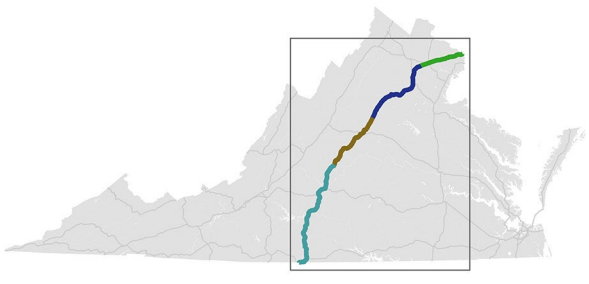
Highway Facilities	
Primary Facility	• US 29
Other Highway Facilities	• US 50 • US 29 Business • Route 28
Transit Services	
	• Metrorail Orange Line • Metrorail Silver Line • Virginia Railway Express • Amtrak • Intercity bus service
Rail Facilities	
	• Norfolk Southern Crescent Corridor
Airport Facilities	
	• Washington Dulles International • Charlottesville-Albemarle Airport • Lynchburg Regional Airport



Corridor Segments:
- I1
- I2
- I3
- I4

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



Demographics and Economic Trends

The primary population centers, with greater than 500 persons per square mile, along Corridor I are currently found in the Northern Virginia Area. Small pockets with population densities greater than 500 persons per square mile along the corridor are also found in Danville, Lynchburg, and Charlottesville. The most densely-populated segment along the corridor is Segment I4 in the Northern Virginia Area. Nelson and Madison Counties have the lowest population densities along the corridor with less than 50 persons per square mile.

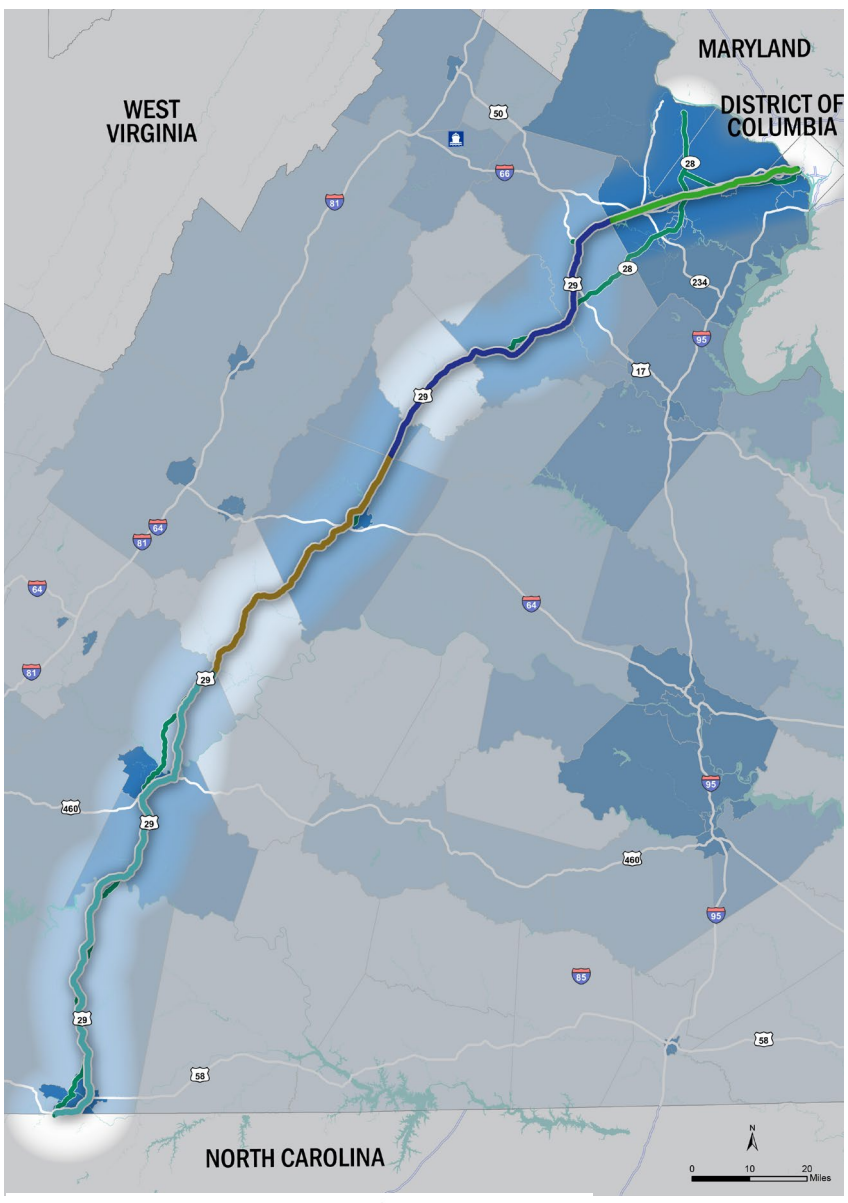
Between 2012 and 2025, the northern half of the Corridor is anticipated to see the largest population growth. Between 11 and 25 percent population growth is anticipated in Albemarle, Greene, Culpepper, Fauquier and Prince William Counties. Pittsylvania, Amherst and Nelson Counties are expected to see the lowest growth, while the populations of the City of Danville and Arlington County are expected to decrease. Overall, population along the corridor is expected to grow.

Current employment centers follow a pattern similar to the population centers. Employment is expected to have the highest growth in Greene and Prince William Counties, but is expected to decline in the Cities of Danville and Lynchburg, and in Amherst County.

Corridor I passes through four Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Northern Virginia Area has the highest GDP of any of the MPO areas in the corridor. The largest industry sectors in the corridor include professional/scientific/technical services, public administration, and retail trade.

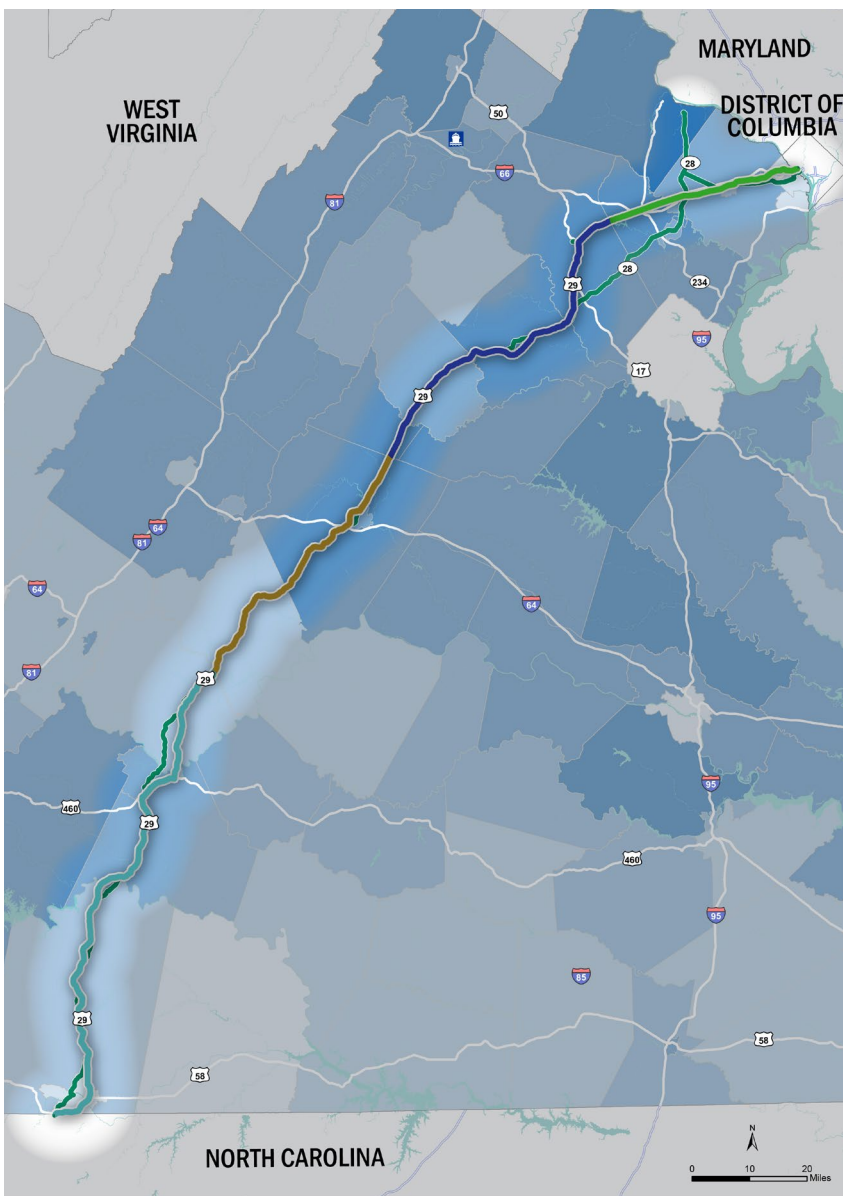
2012 Population Density Persons / Square Mile

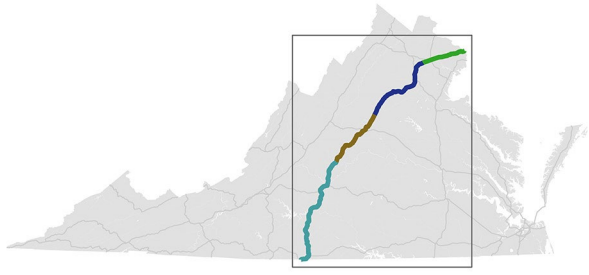
- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



Population Growth (2012-2025 Percent Change)

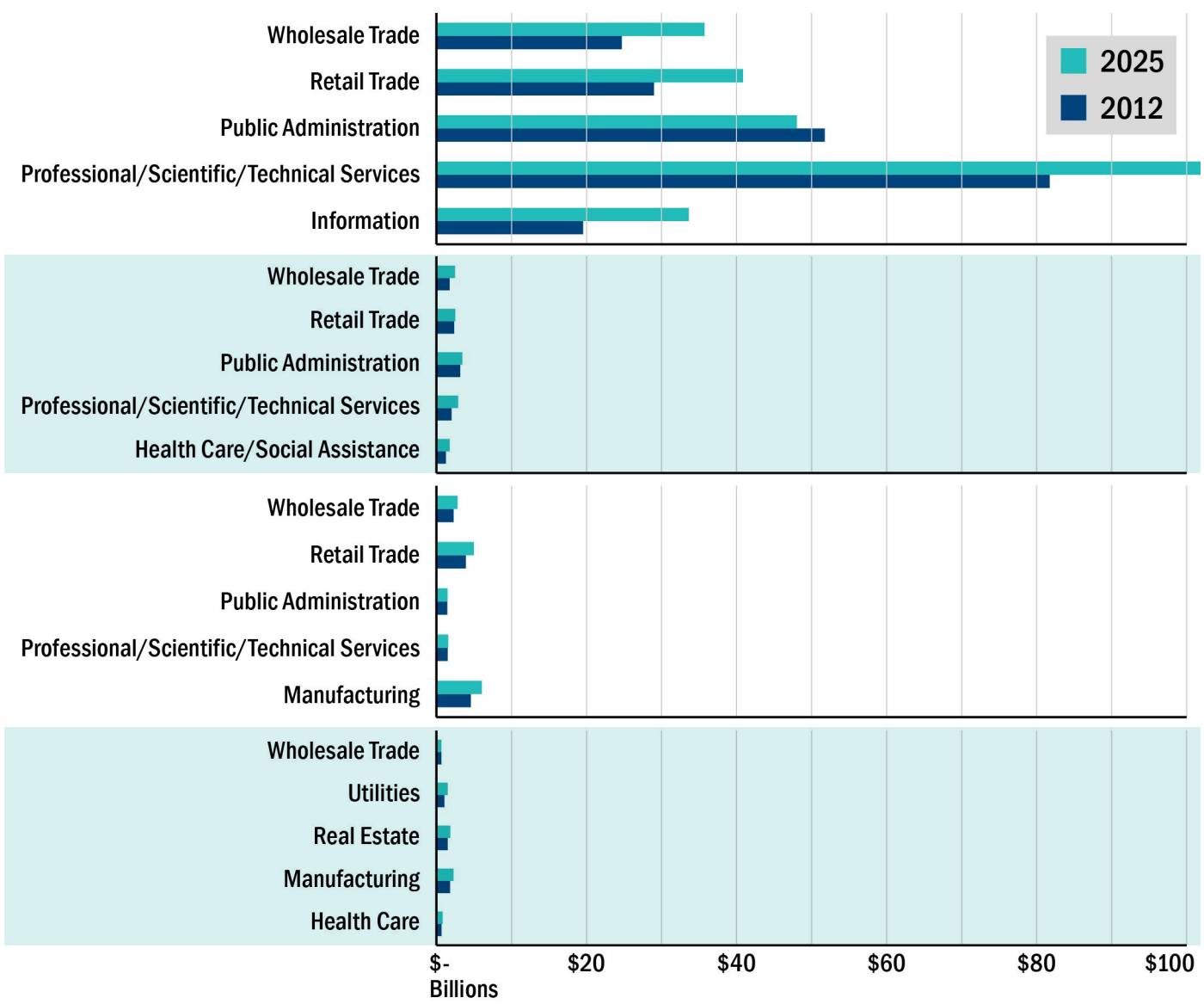
- -8% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 57%





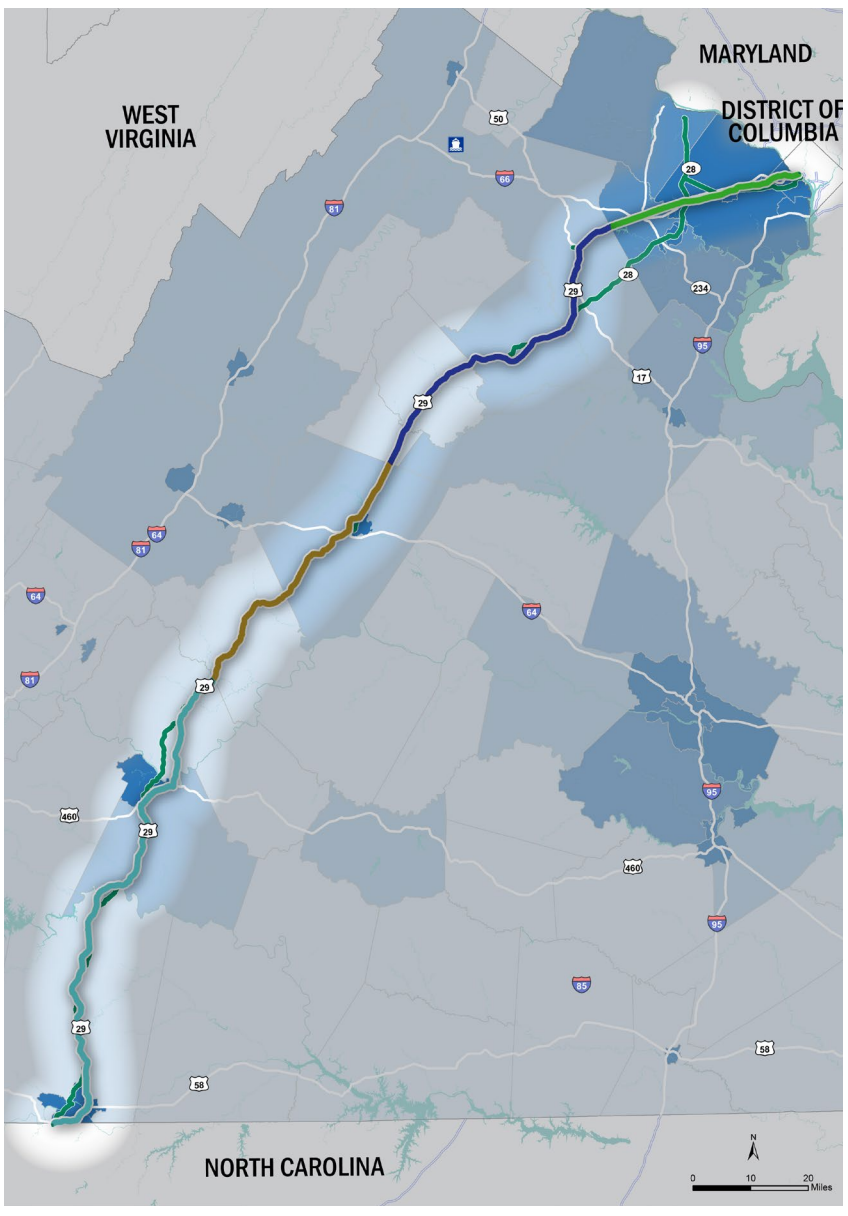
CORRIDOR I OVERVIEW

Top Industries (GDP)



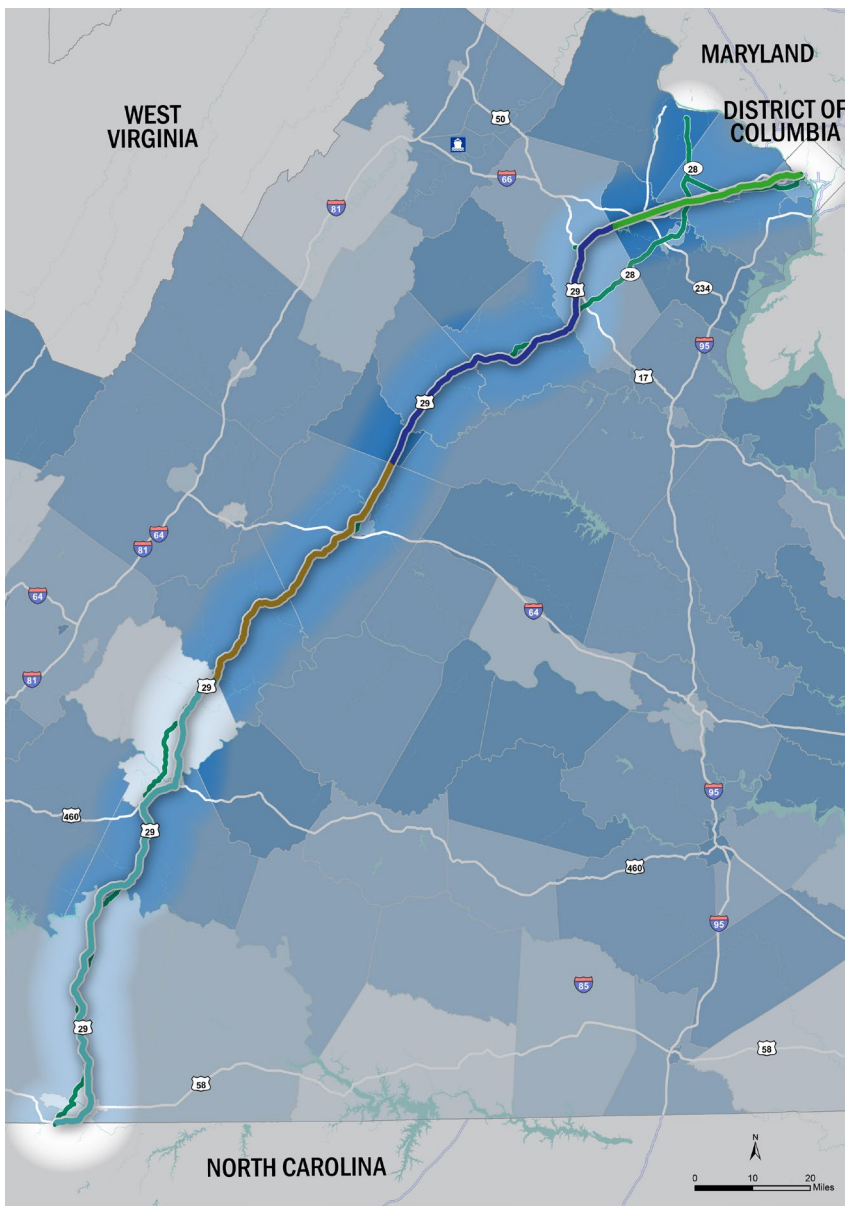
2012 Employment Density Jobs / Square Mile

< 25
25 - 100
100 - 250
250 - 500
> 500



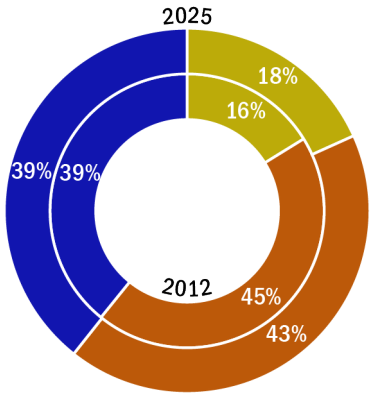
Employment Growth (2012-2025 Percent Change)

-7% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 69%

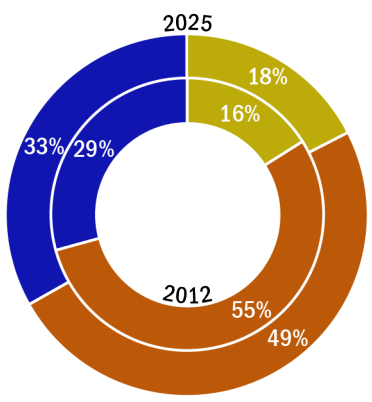


Corridor Travel Patterns

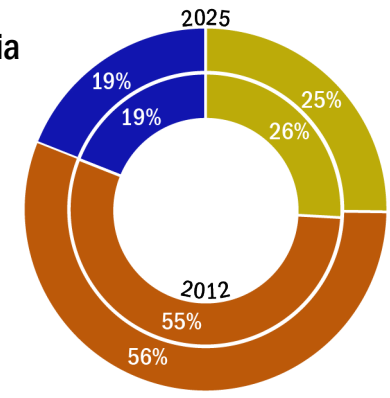
Northern Virginia Area



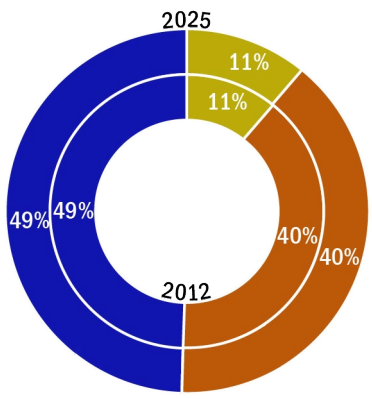
Charlottesville-Albemarle Area



Central Virginia Area



Danville Area



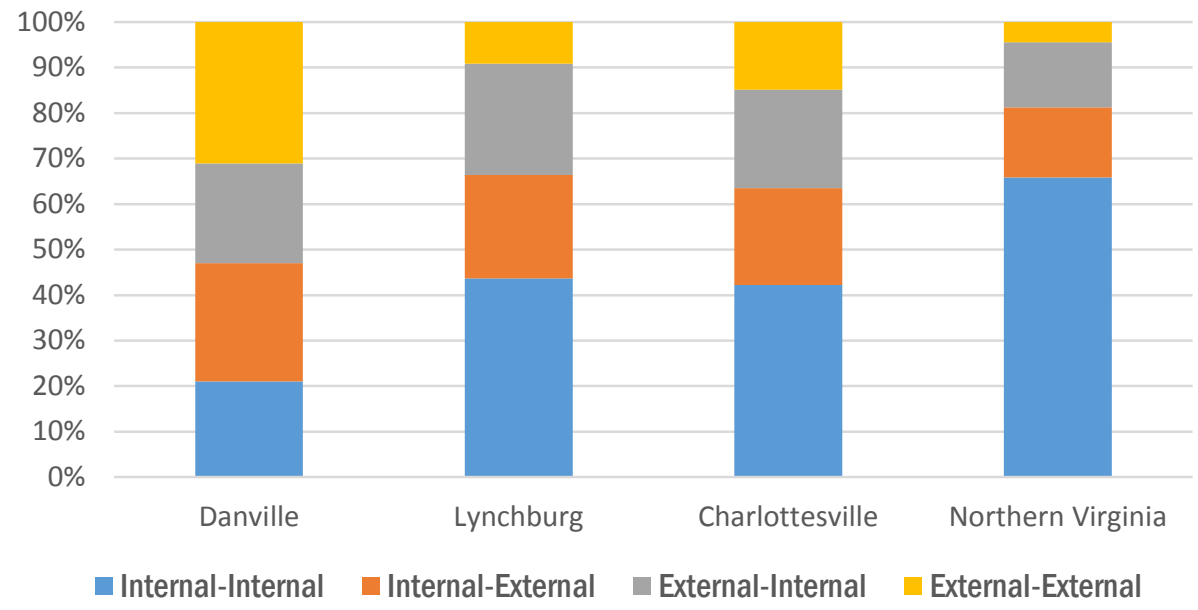
GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Passenger

Corridor I connects the District of Columbia to North Carolina, and passes through four MPO areas along its route: Danville, Central Virginia, Charlottesville-Albemarle, and Northern Virginia. In the Danville Area, traffic on Corridor I is distributed fairly evenly between local (21 percent) and pass-through (31 percent) traffic. In the Central Virginia area, traffic is more oriented towards local trips, with 44 percent comprised of internal local trips and less than ten percent comprised of pass-through trips. In the Charlottesville Area, local trips are also more prevalent - 42 percent of the traffic consists of local internal trips and 15 percent consists of pass-through trips. In Northern Virginia, Corridor I is dominated by local internal trips which account for 65 percent of the total passenger traffic. Less than five percent of the total traffic along Corridor I is pass-through traffic in Northern Virginia.

Distribution of Internal and External Travel



Freight

By truck, Corridor I carried 33 million tons of freight worth $32 billion in 2012, and is estimated to carry 42 million tons of freight worth $45 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there.

By rail, Corridor I carried 53 million tons of freight worth $39 billion in 2012, and is estimated to carry 63 million tons of freight worth $51 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value.

Truck Freight

	2012	2025
Truck Freight Value	$32 Billion	$45 Billion
Truck Freight Tonnage	33 Million Tons	42 Million Tons
Freight Value per Ton	$956	$1060
Corridor Tonnage Passing Through	19%	19%

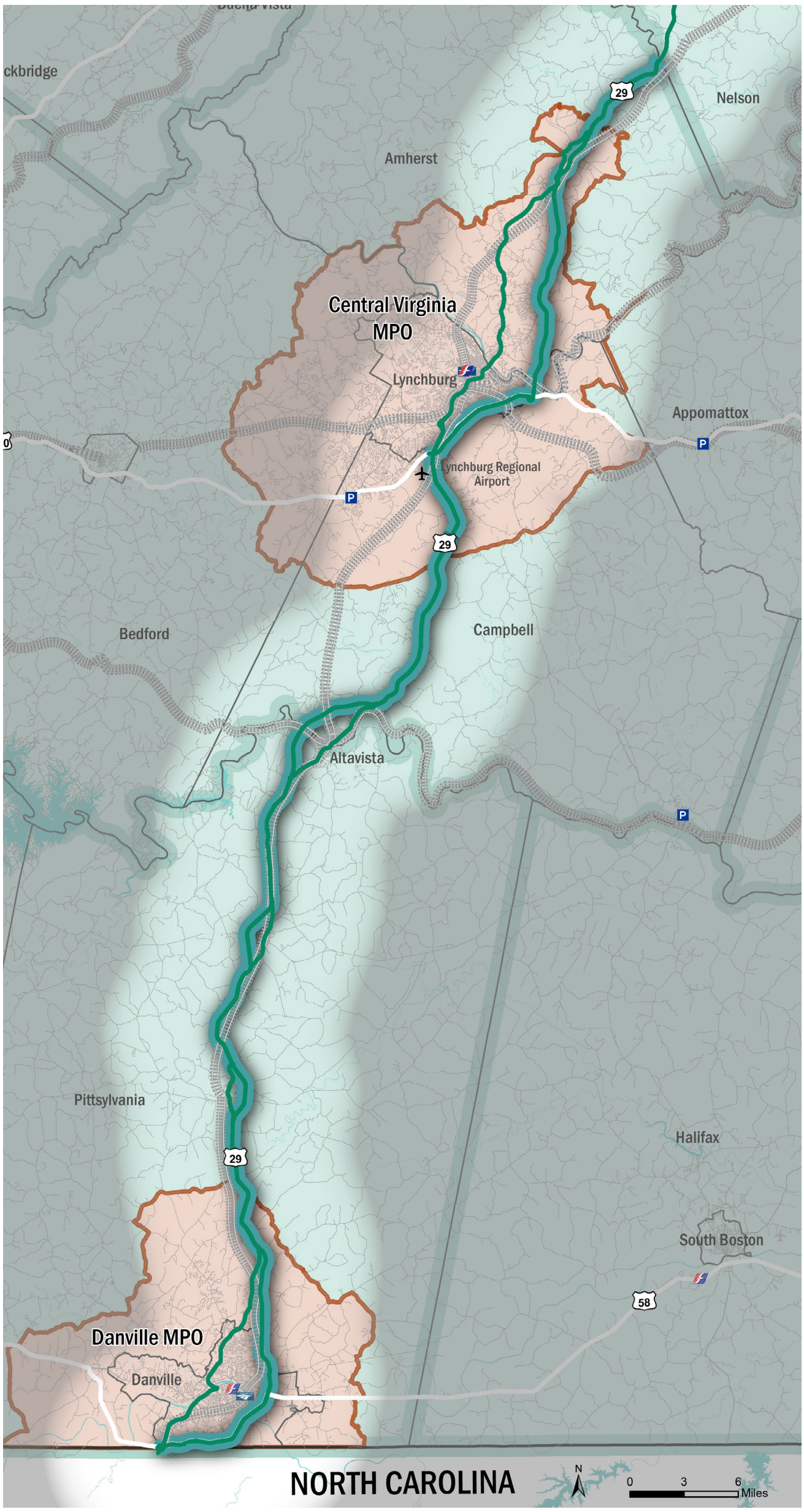
Rail Freight

	2012	2025
Rail Freight Value	$39 Billion	$51 Billion
Rail Freight Tonnage	53 Million Tons	63 Million Tons
Freight Value per Ton	$733	$811
Corridor Tonnage Passing Through	65%	64%

II. Segment I1

Corridor Segment I1 Components

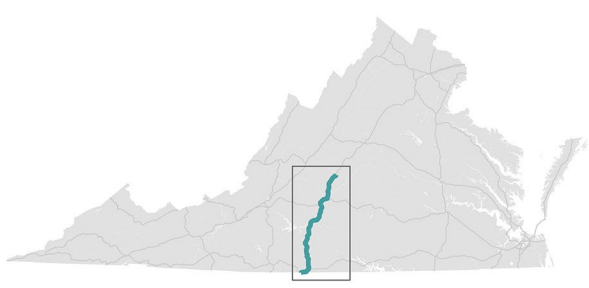
- US 29
- US 29 Business
- Norfolk Southern Crescent Corridor
- Amtrak
- Lynchburg Regional Airport



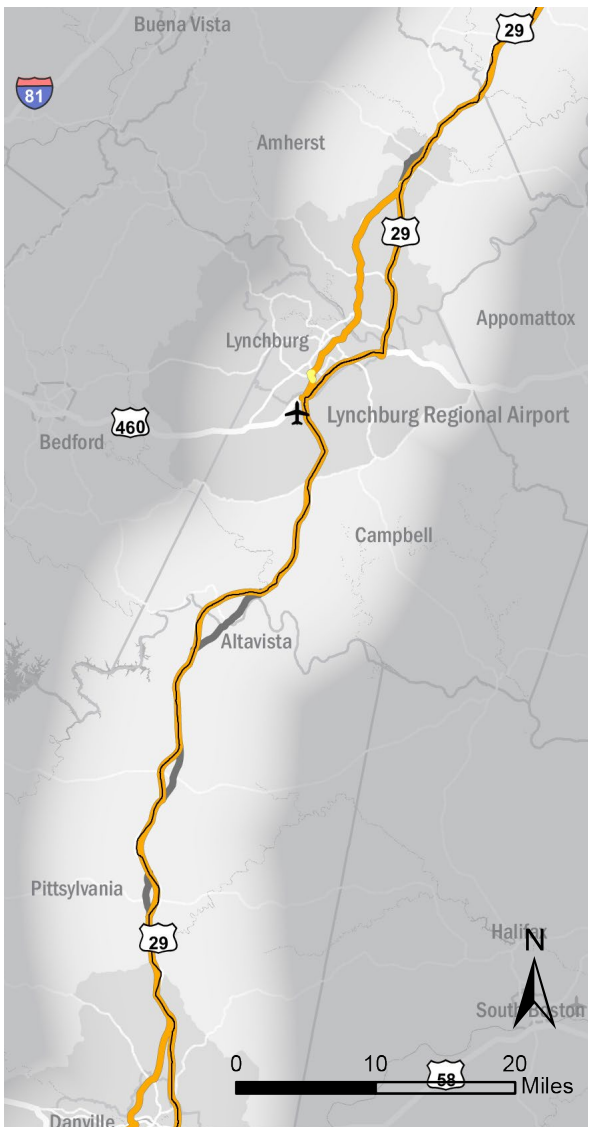
Segment I1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



I1 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment I1 runs from North Carolina through the Danville and Central Virginia Areas serving Pittsylvania, Campbell, and Amherst Counties, in addition to the Cities of Danville and Lynchburg. The primary facility that defines this segment is US 29 which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout Segment I1, US 29 is a four-lane highway. US 29 Business provides local access to the downtown areas of many of the urbanized areas along the segment, including Danville, Chatham, Gretna, Altavista, Lynchburg, and Amherst. US 29 runs concurrently with US 460 (Segment E3) for a short distance in the City of Lynchburg, and with US 58 in the City of Danville.

Transit Services: Amtrak's Crescent Route, running from New York to New Orleans, provides passenger rail service along the Norfolk Southern rail lines within the Seminole Corridor, including stops in Lynchburg and Danville. Greyhound bus offers bus service along the entire corridor, also providing stops located in Danville and Lynchburg.

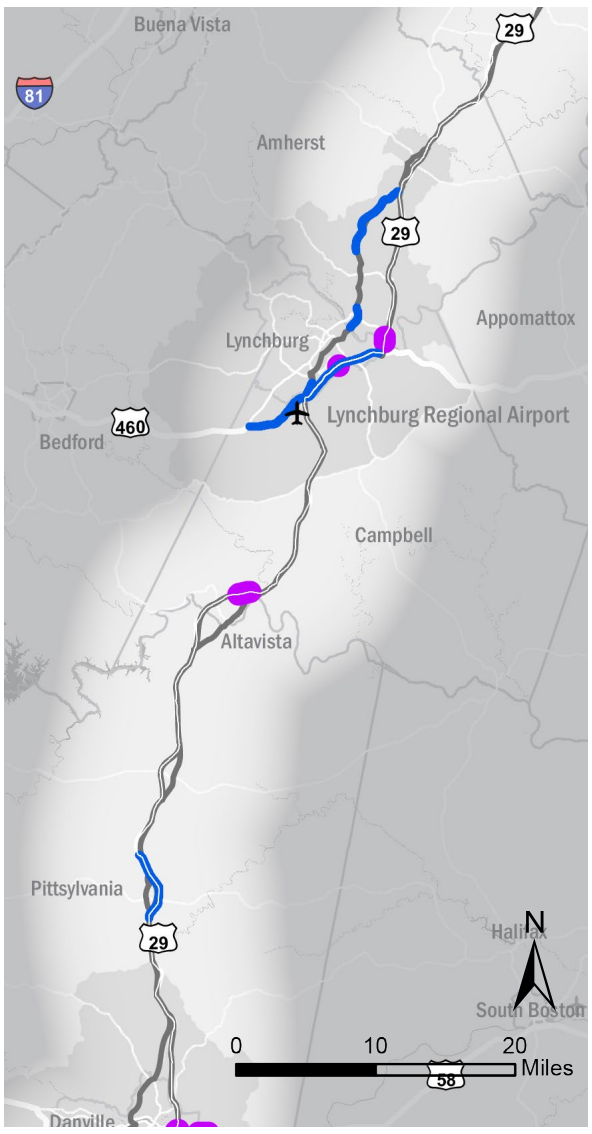
Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC. In the Central Virginia Area, there is a junction between three major Norfolk Southern rail corridors: the Crescent Corridor, the Coal Corridor, and the Heartland Corridor, which connect the Port of Virginia facilities in the Hampton Roads Area, the Appalachian coal fields, and the Midwest.

Port Facilities: No port facilities are located directly adjacent to Segment I1.

Airport Facilities: The Lynchburg Regional Airport is the only commercial airport in Segment I1, providing direct service only to Charlotte, North Carolina.

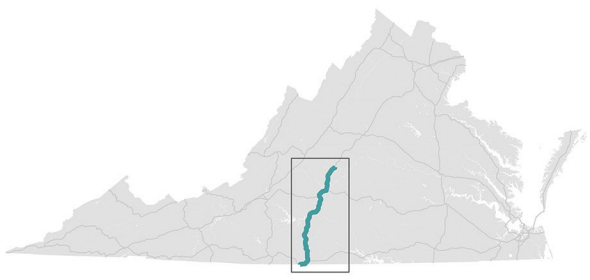
Major planned and future projects include:

- **City of Danville:** Addition of a third lane to westbound US 58 at the US 29 bypass interchange;
- **Pittsylvania County:** Four-foot paved shoulders and the addition of rumble strips along the inside and outside lanes of Chatham Bypass (US 29); and
- **City of Lynchburg:** Access management from US 501 (Campbell Avenue) to US 29 (Monacan Parkway).



Future Projects

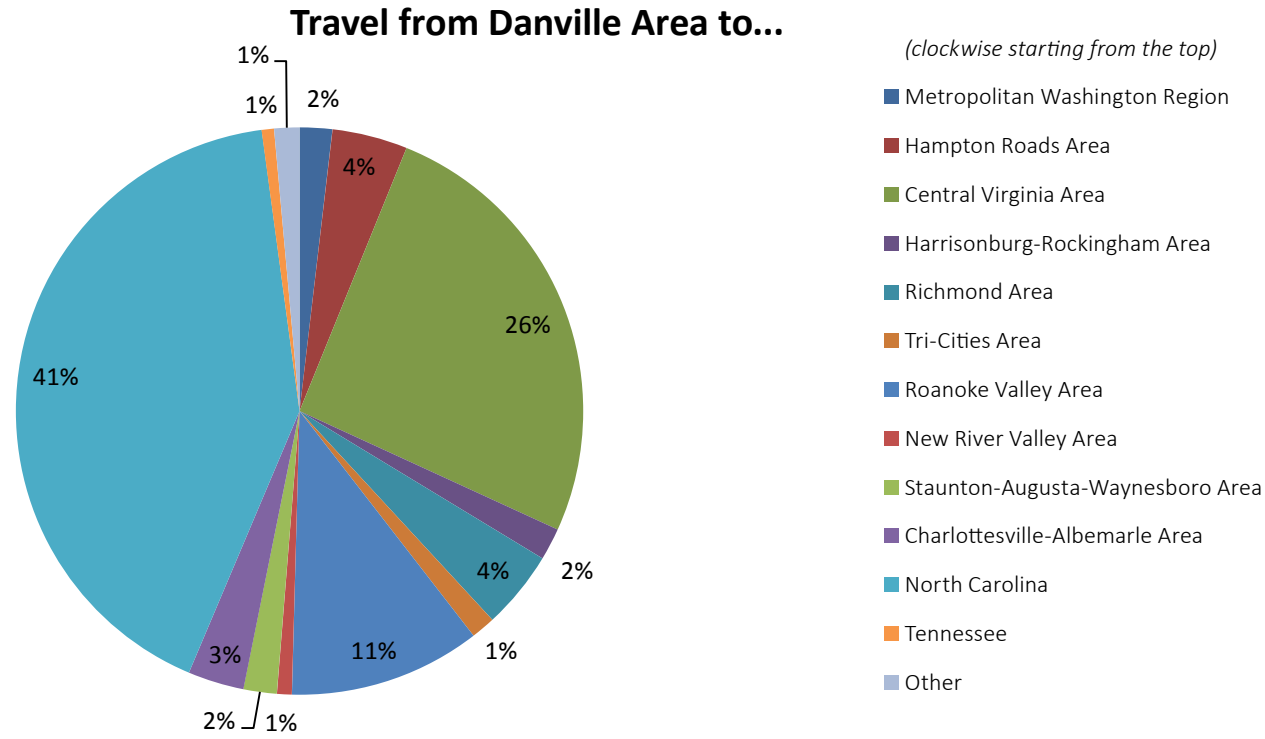
- Reconstruction with added capacity
- Safety improvements
- Primary facility

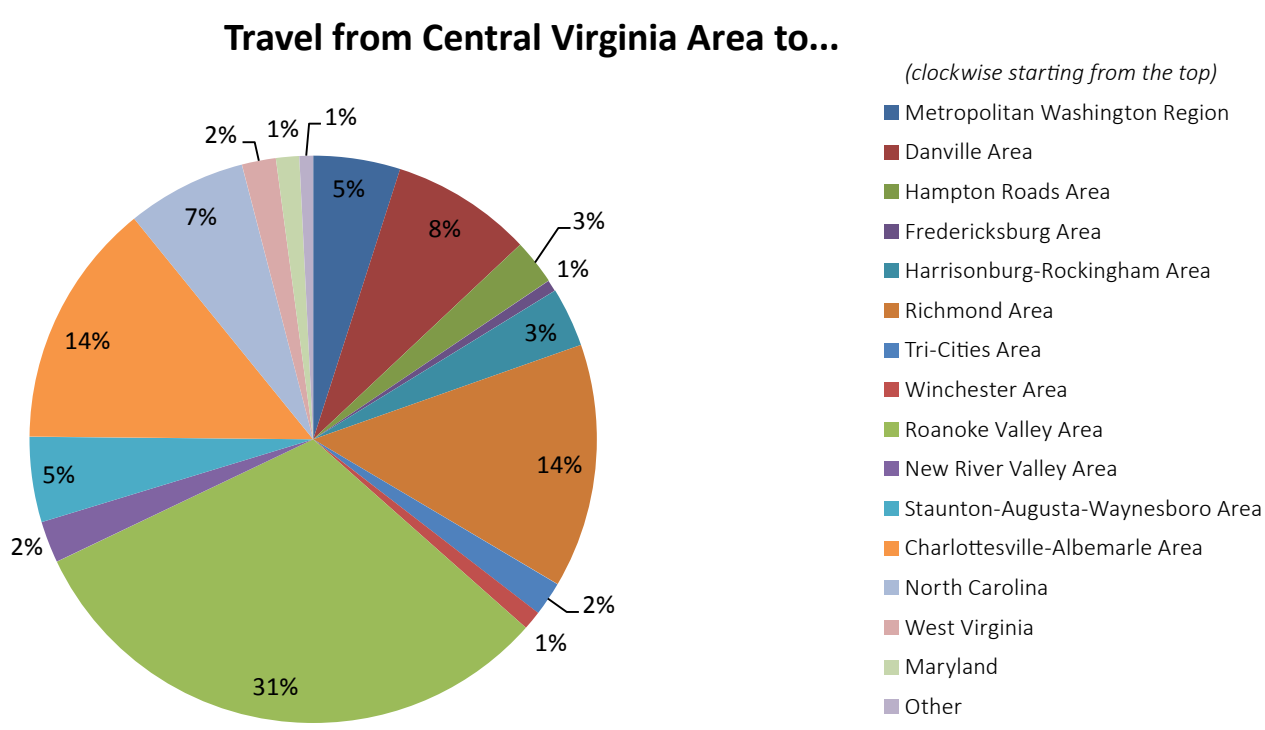


Travel Demand

Passenger Demand

Segment I1, the southernmost segment of Corridor I, traverses the Danville and Central Virginia Areas. The majority of intercity passenger travel originating in the Danville Area is likely to use Segment I1, including 41 percent destined for North Carolina and 26 percent destined for the Lynchburg Area. Intercity travel from the Central Virginia Area is more distributed across the state, but several notable destinations that may make use of portions of Segment I1 include the Charlottesville-Albemarle Area (14 percent), the Danville Area (eight percent), and the Metropolitan Washington Area (five percent).





I1 SEGMENT PROFILE

Freight Demand

By truck, Segment I1 carried 14 million tons of freight worth $19 billion in 2012, and is estimated to carry 18 million tons of freight worth $27 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. The City of Lynchburg generates more than six percent of the total truck freight value in the corridor, with major truck freight flows to North Carolina, Florida, and Maryland. Campbell County and the City of Danville are also significant truck freight generators, accounting for between four and six percent of the total truck freight value in the corridor. Lynchburg is a major attractor of truck freight, accounting for four percent of total corridor truck freight value.

By rail, Segment I1 carried 25 million tons of freight worth $17 billion in 2012, and is estimated to carry 30 million tons of freight worth $23 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (52% / 49%)
2. North Carolina (14% / 13%)
3. Pennsylvania (6% / 7%)
4. Maryland (6% / 6%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment I1: 14% / 14%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (51% / 53%)
2. North Carolina (12% / 11%)
3. Maryland (8% / 9%)
4. Fairfax County (8% / 10%)
5. Pennsylvania (7% / 6%)

Corridor Tonnage Destined for Segment I1: 14% / 13%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (34% / 27%)
2. Virginia (11% / 12%)
3. Pennsylvania (11% / 9%)
4. Ohio (6% / 7%)
5. Illinois (6% / 7%)

Corridor Tonnage Originating in Segment I1: <1% / <1%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Illinois and North Carolina
Ohio and North Carolina
Pennsylvania and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (41% / 39%)
2. Virginia (29% / 30%)
3. City of Norfolk* (12% / 10%)
4. Pennsylvania (6% / 6%)
5. New Jersey (4% / 5%)

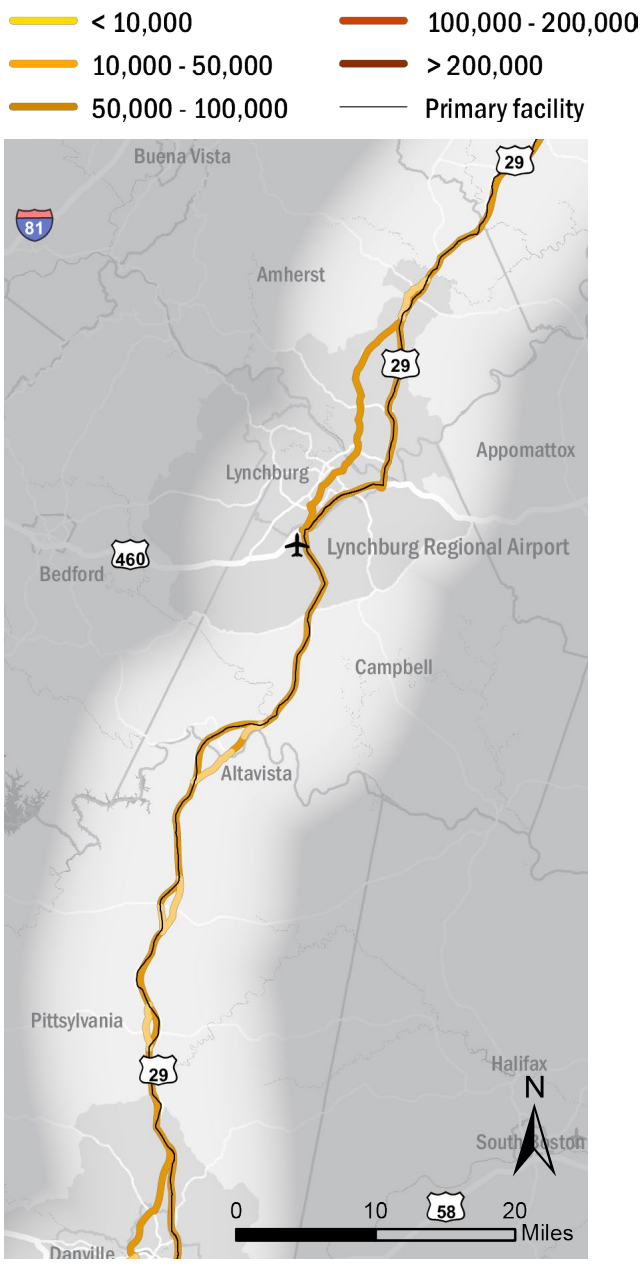
Corridor Tonnage Destined for Segment I1: 1% / 2%

Traffic Conditions

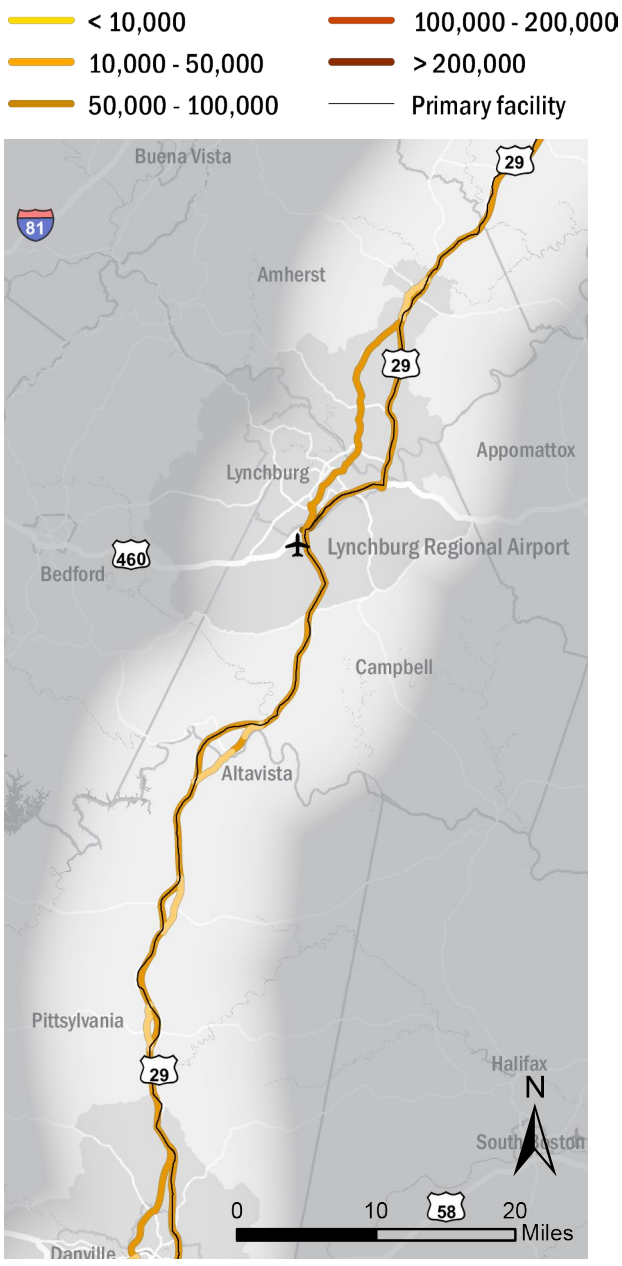
Traffic Volume and AADT

Traffic volume on Segment I1 is lower than on the northern segments of Corridor I. Throughout the segment, volumes on US 29 generally range from 10,000 to 21,000 vehicles per day. Higher traffic volumes have been observed in the Central Virginia Area (up to 45,000 vehicles per day) and in the City of Danville (up to 30,000 vehicles per day). On almost all sections of US 29 in Segment I1, traffic volumes are projected to increase by fewer than 5,000 vehicles by 2025. However, by 2025, traffic volumes along portions of US 29 and US 29 Business in Lynchburg are projected to increase by as much as 12,000 vehicles per day.

Traffic Volume 2014 (AADT)

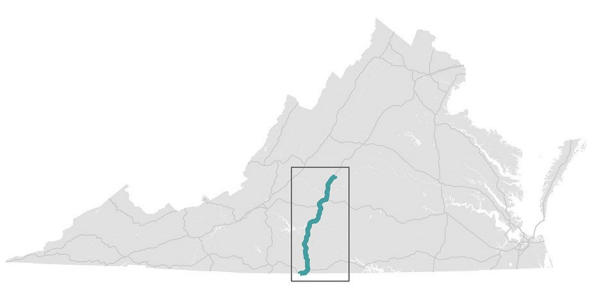


Traffic Volume 2025 (AADT)

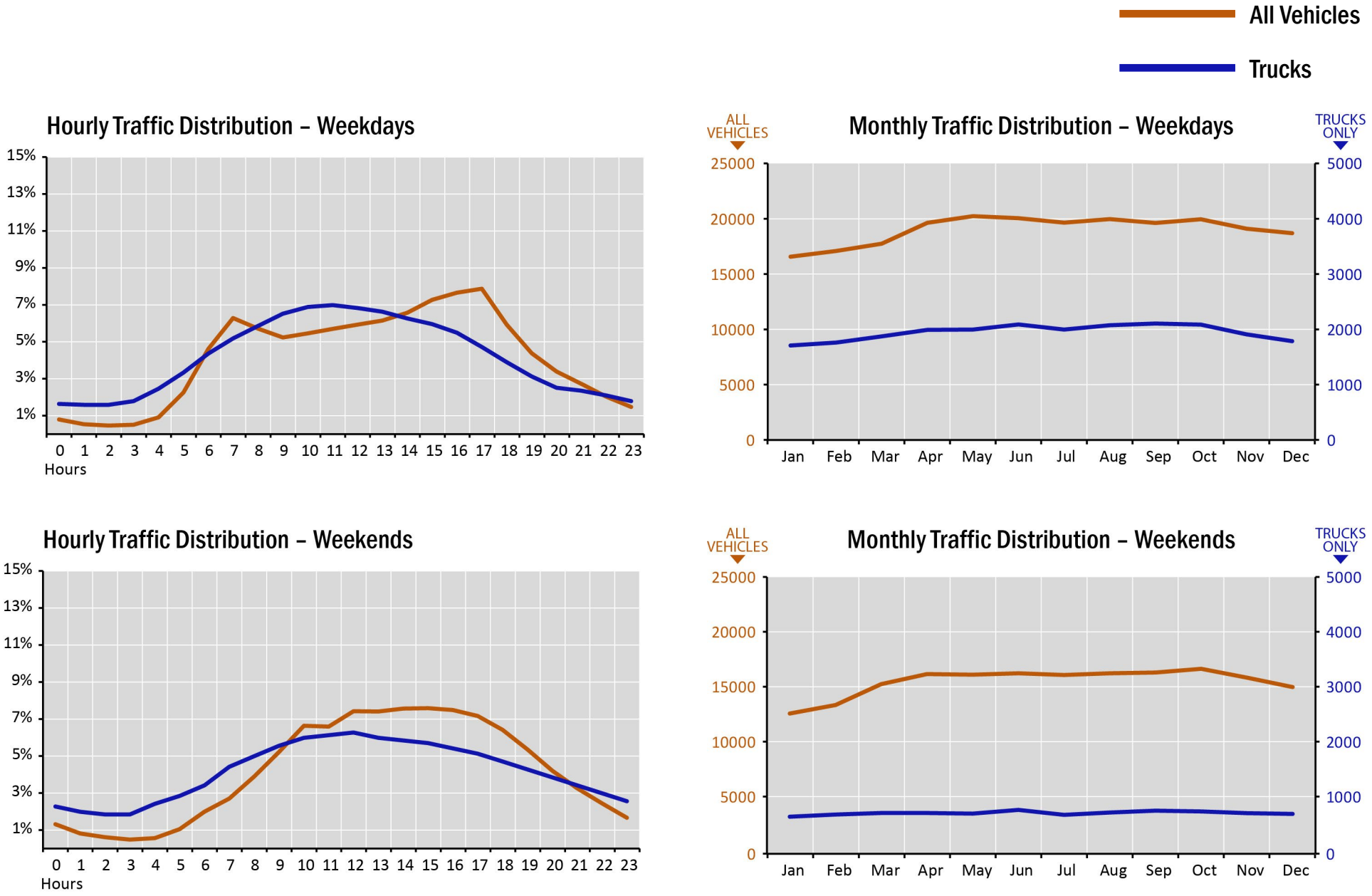


Change in Traffic Volume 2014- 2025 (AADT)





I1 SEGMENT PROFILE



Traffic Distribution

On average, traffic on Segment I1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows distinct morning and evening peak periods, typical of commute travel patterns. The highest hourly traffic occurs between 5 and 6 p.m. which accounts for 7.9 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 6.3 percent of daily traffic. The combined weekday traffic from the 7 a.m. to 7 p.m. period accounts for 76 percent of total daily traffic. Peaking patterns for truck traffic differ from commuter traffic, with a single peak during the midday period, with the highest peak hourly flow of 7.0 percent of daily traffic occurring between 11 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the afternoon with the highest peak hour flow between 3 and 4 p.m. (7.5 percent of daily traffic) for all traffic, and noon to 1 p.m. (6.3 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment I1 vary by as much as 22 percent throughout the year, with the highpoint in May (around 20,000 vehicles per day) and the low point in January (around 17,000 vehicles per day). Truck volumes also vary throughout the year, with the September high (around 2,100 vehicles per day) 23 percent higher than the January low (around 1,700 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 16,000 vehicles per day) are 32 percent higher than January levels (around 13,000 vehicles per day). Weekend truck traffic is marginally more steady than all vehicle traffic, with the June high 19 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.



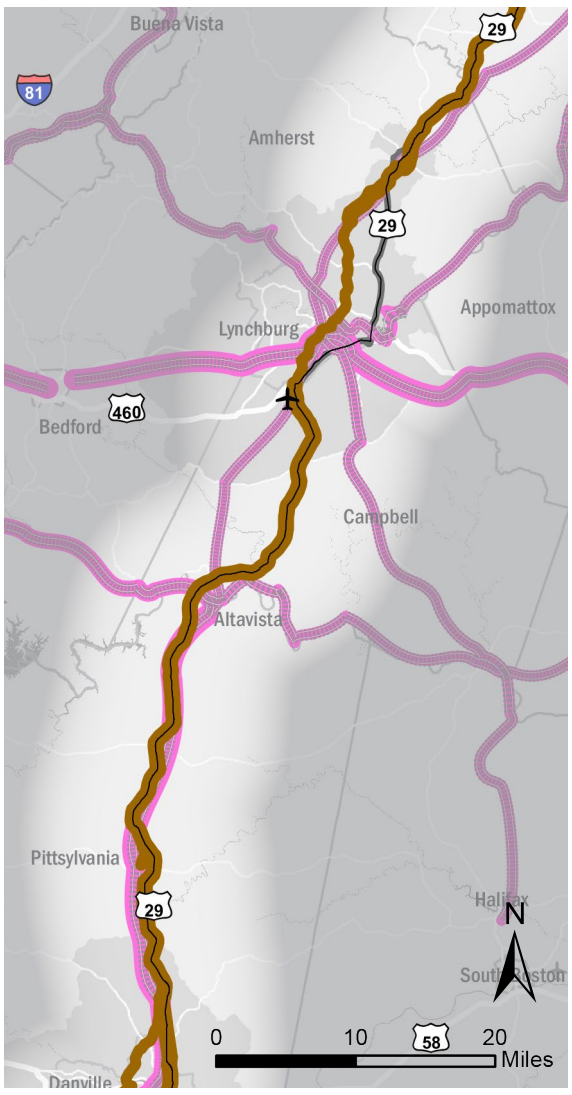
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I1 is high compared to the other segments in Corridor I. Along US 29 in the Danville Area, heavy trucks comprise 17 percent of total traffic. Through the remainder of Pittsylvania County, heavy trucks account for seven percent of overall traffic. Throughout the remainder of the segment, including within the Central Virginia Area, heavy trucks make up five percent or less of total daily traffic.



I1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

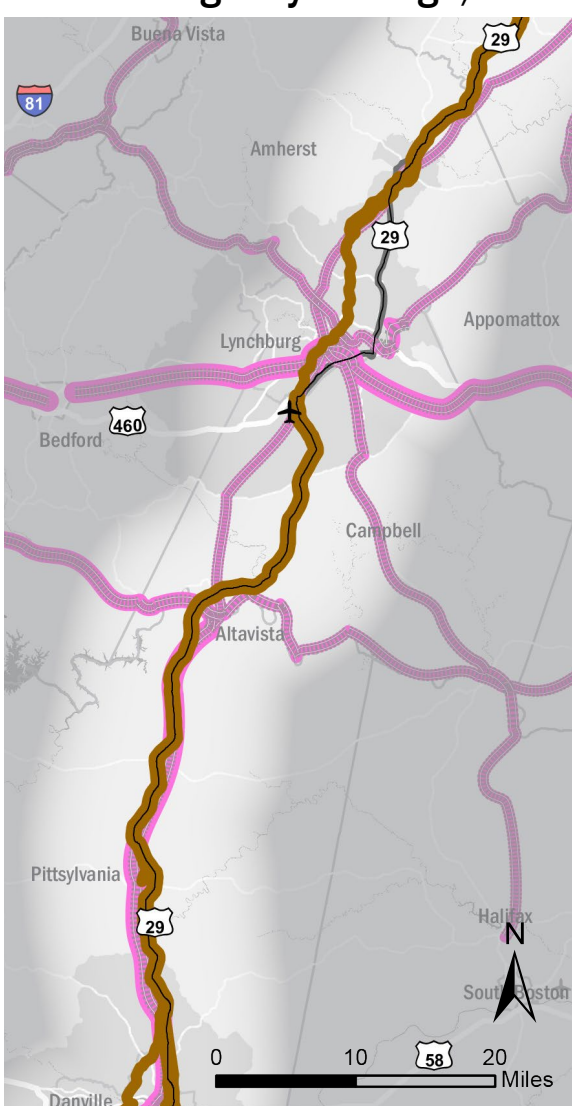


Freight Flows

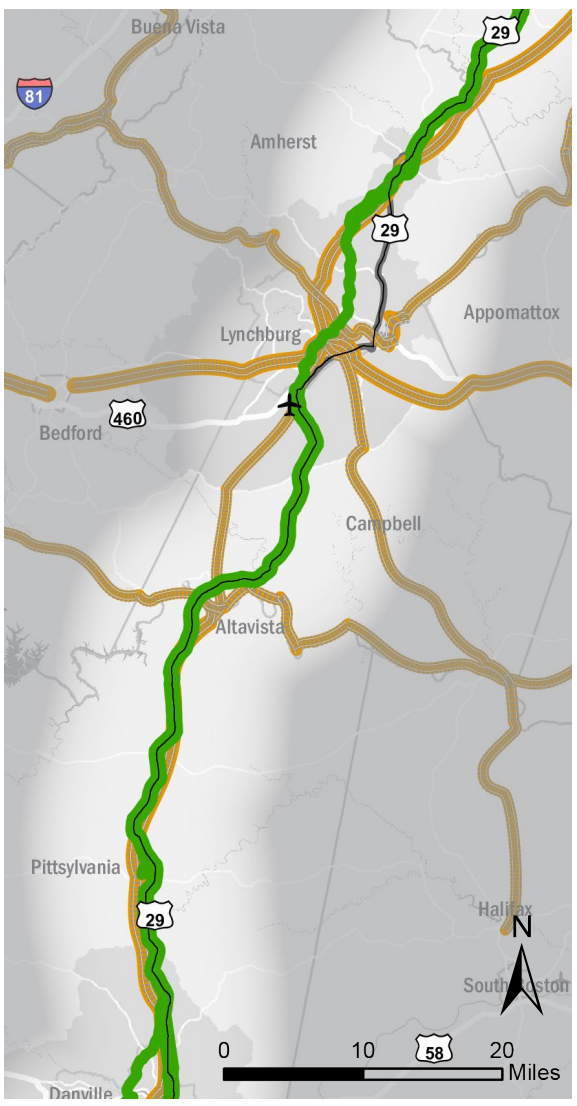
In the southern portion of Segment I1, south of Altavista, freight is primarily moved by rail in terms of tonnage, but by truck in terms of value. In total, 14 million tons (35 percent) of freight is moved through this section of Segment I1 by truck, compared to 25 million tons (65 percent) by rail. In relation to value, $19 billion (53 percent) of freight travels by truck, while $17 billion (47 percent) travels by rail. On average, a ton of freight traveling through this section of Segment I1 by truck and by rail is worth $1,378 and $663, respectively. In 2025, truck and rail freight tonnages and values in this area of Segment I1 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value, to 38 percent and 58 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,464 and $767, respectively.

North of Amherst, freight on Segment I1 is moved primarily by truck in relation to both tonnage and value. In total, 14 million tons (68 percent) of freight is moved through this section of Segment I1 by truck and 6 million tons (32 percent), by rail. In terms of value, $19 billion (64 percent) of freight travels by truck and $11 billion (36 percent) travels by rail. On average, a ton of freight traveling through this section of Segment I1 by truck and by rail is worth $1,417 and $1,721, respectively. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, truck freight tonnages and value in this area of Segment I1 are expected to increase. The percentage of the freight traveling by truck is expected to increase by both tonnage and value to 69 percent and 66 percent, respectively. It is anticipated that the freight value per ton on trucks and rail will increase to $1,512 and $1,726, respectively.

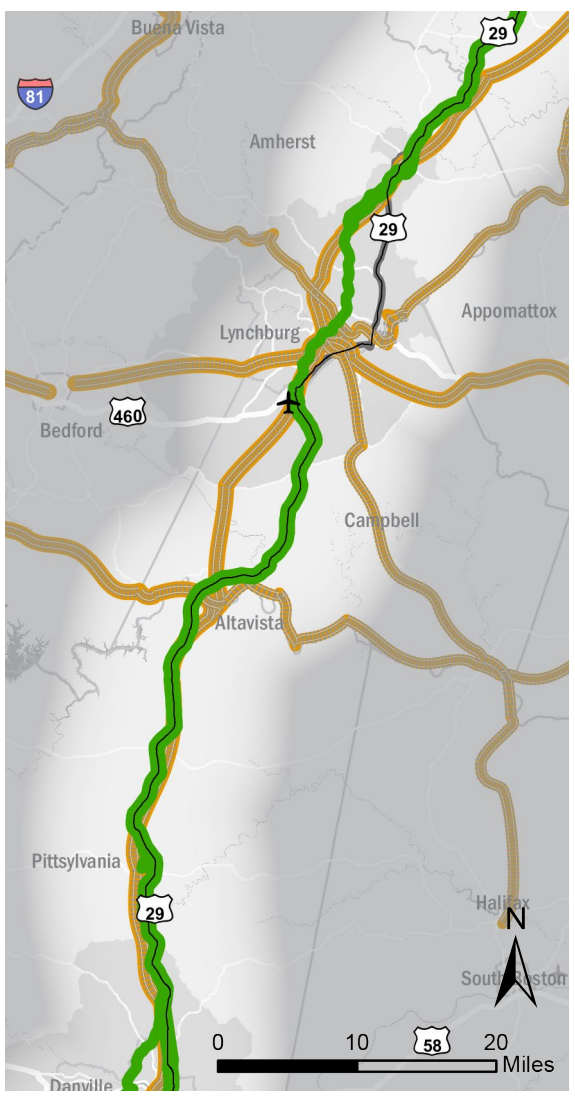
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

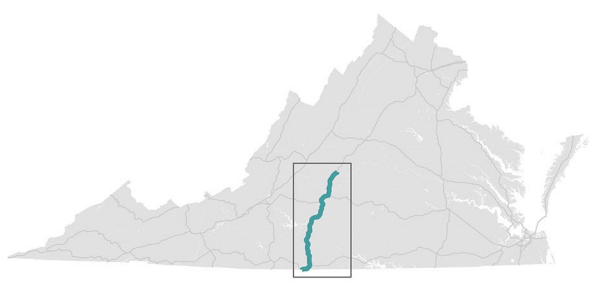
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Danville to Lynchburg

Inter-City Bus	Train
0 Trips per Day	1 Trips per Day
0:00 Travel Time	1:09 Travel Time
$0 Est. Cost	$38 Est. Cost

Auto

Via Rt. 29: 1:13 Travel Time $39 Est. Cost

Danville to DC

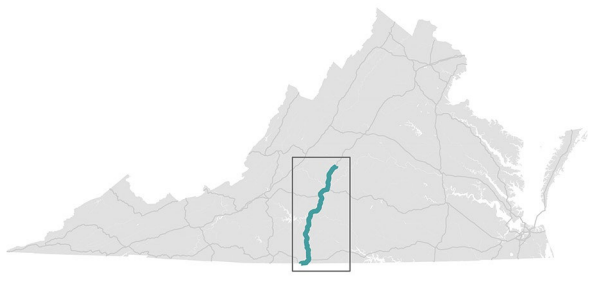
Inter-City Bus	Train
2 Trips per Day	1 Trips per Day
6:10 Travel Time	5:10 Travel Time
$64 Est. Cost	$106 Est. Cost

Auto

Via Rt. 29: 4:45 Travel Time $138 Est. Cost

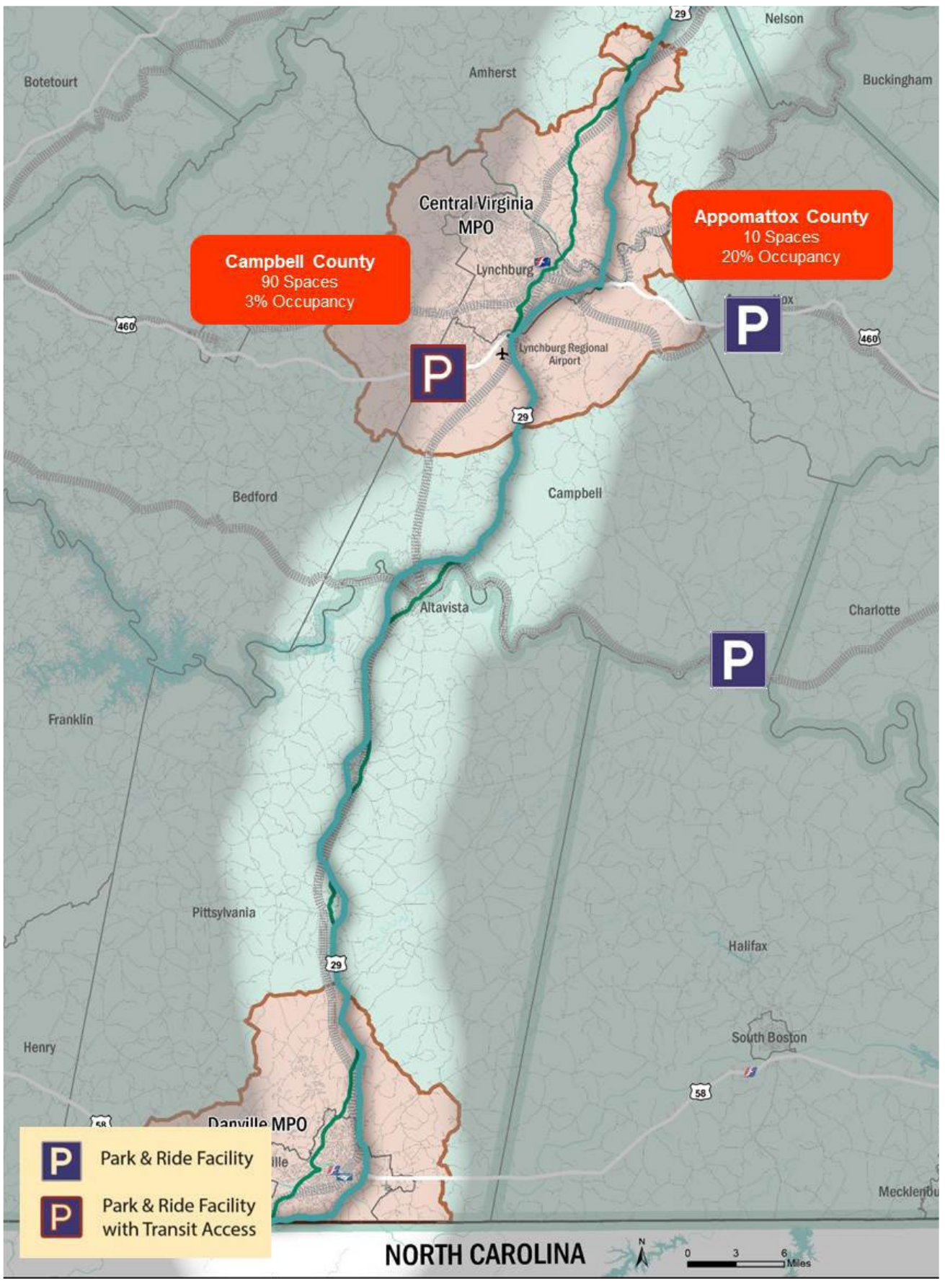
Park-and-Ride

Within Segment I1, there are two Park-and-Ride locations located in Campbell County. The Park-and-Ride locations in Campbell County have a total of 90 spaces, which are utilized at an extremely low rate of three percent, far below the statewide average of 76 percent for Park-and-Ride utilization.



Passenger trips on Segment I1 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Aside from short US 29 Business routes that provide local access, no parallel highway facilities exist in the segment. Greyhound offers service from Danville and Lynchburg, as does Amtrak's Crescent Route. Automobile travel from Danville to Lynchburg is competitive with the available rail service both in terms of cost (based on the 2014 federal standard mileage rate of 56 cents per mile) as well as travel time. For trips from Danville to other locations, such as Washington, DC, available bus and rail service may be more cost effective, but generally takes longer and is limited by frequency of service. Lynchburg Regional Airport does not provide any direct connections to locations on the corridor, as all six of its daily departures are bound exclusively for Charlotte, North Carolina.

Park and Ride Facitilities



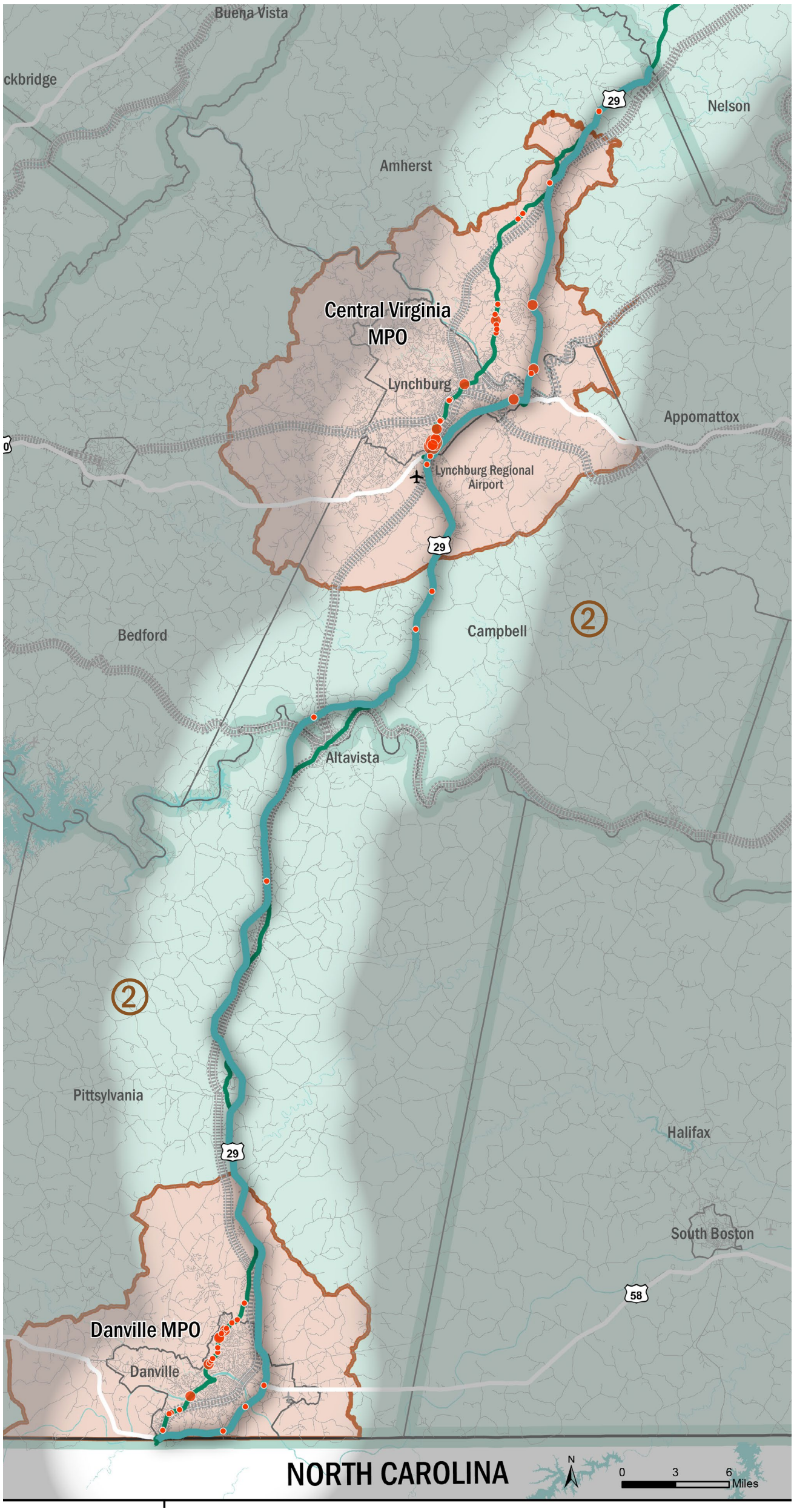
I1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	251
Severe Crashes/Million VMT	0.8
Number of Railroad Crashes	4

Between 2010 and 2012, 251 severe crashes occurred along Segment I1, which were concentrated in several areas. In Danville, on US 29 Business, there were 67 crashes within approximately 3.3 miles between the ramp from Piedmont Drive to Greenwood Drive; of the 67 crashes, 19 occurred over a distance of 0.5 miles between the ramp and Redwood Drive and 38 occurred over 0.8 miles between Ash Street and Maplewood Street. On US 29 Business (Wards Road) in Lynchburg, 42 incidents took place over a 1.2-mile stretch adjacent to Liberty University and Central Virginia Community College, between Wards Road and US 501. Also in Lynchburg, there were 12 collisions along US 501 (Lynchburg Expressway)/US 29 Business at the ramps to and from Route 128. On US 29 Business in Amherst County, north of Madison Heights, there were 20 crashes over approximately 1.2 miles between Seminole Drive and Daniels Drive.

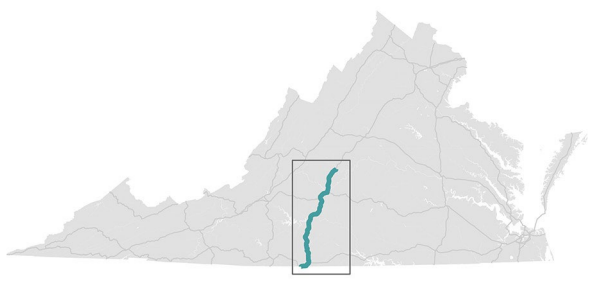


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

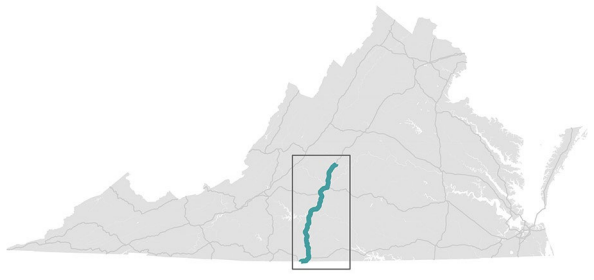


I1 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	9
Freight Ton Hours of Delay per Mile	5.4K



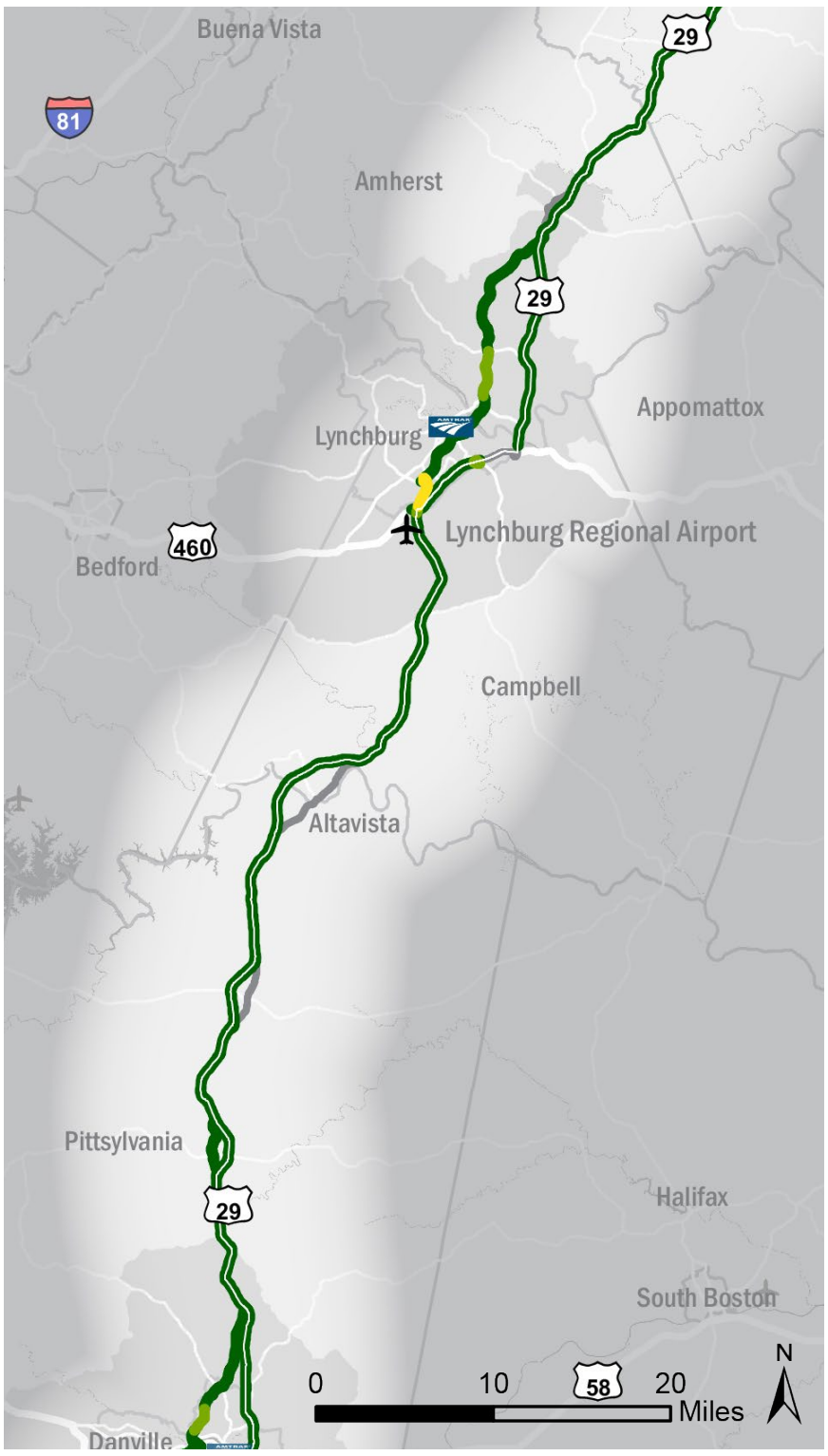
Passenger Delays

Passenger congestion along Segment I1 is the lowest of the segments in the Seminole Corridor (Corridor I), with a daily passenger delay of around 2,200 person-hours. Most of the roadways in this corridor have minimal congestion, but delays in excess of 100 person-hours per mile are experienced on US 29 Business between US 460 and US 501 in the City of Lynchburg. Peak-period passenger delays account for 41 percent of daily congestion, which is about average for CoSS segments statewide.

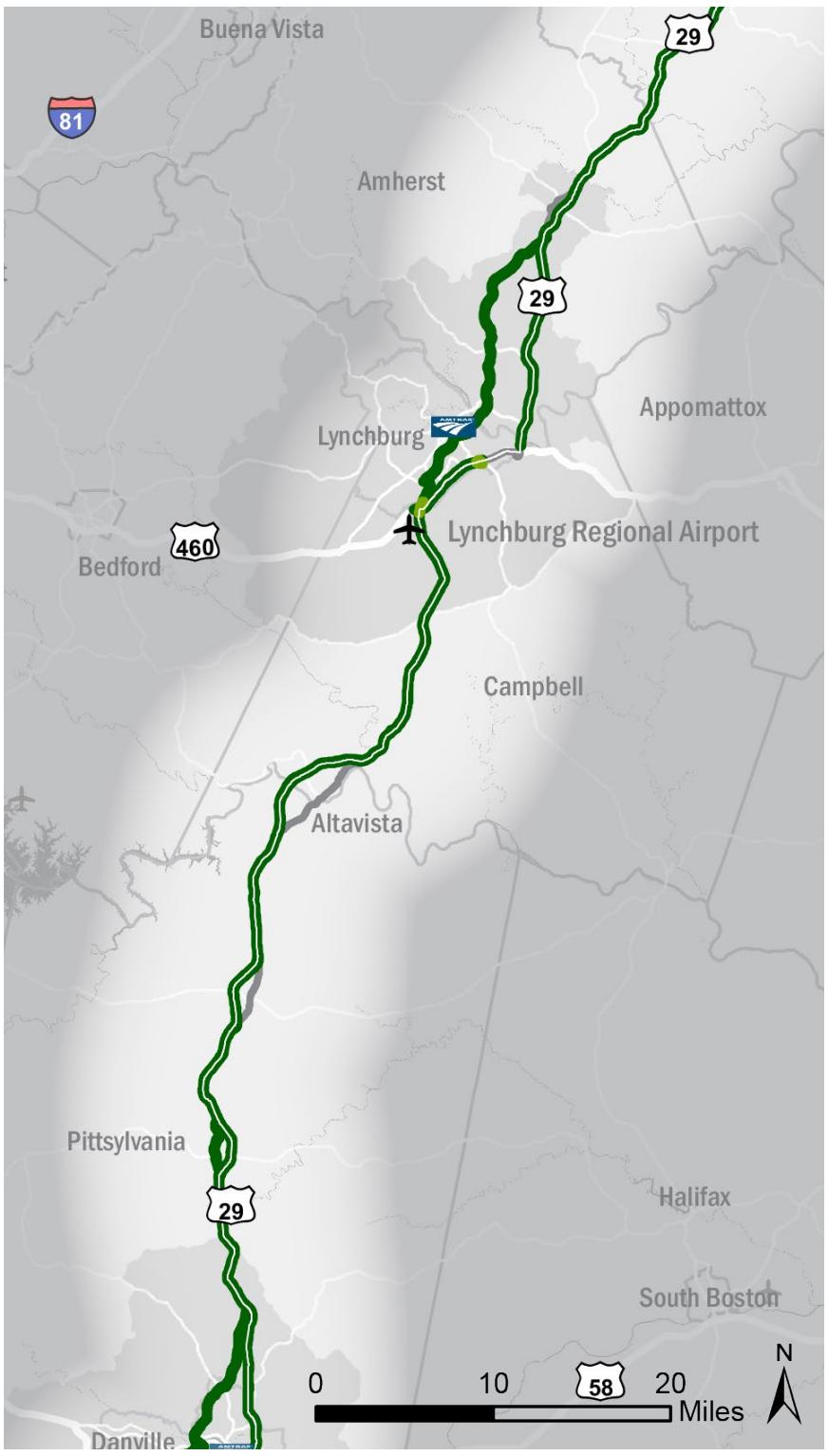
Freight Delays

Freight congestion along Segment I1 is relatively minimal with a daily freight delay of around 1.4 million ton-hours. As such, there are no locations along Segment I1 where the freight delays exceed 250,000 ton-hours per mile. Peak period freight delays along Segment I1 account for 27 percent of daily congestion, which is slightly less than the average peak period congestion share for freight on CoSS segments.

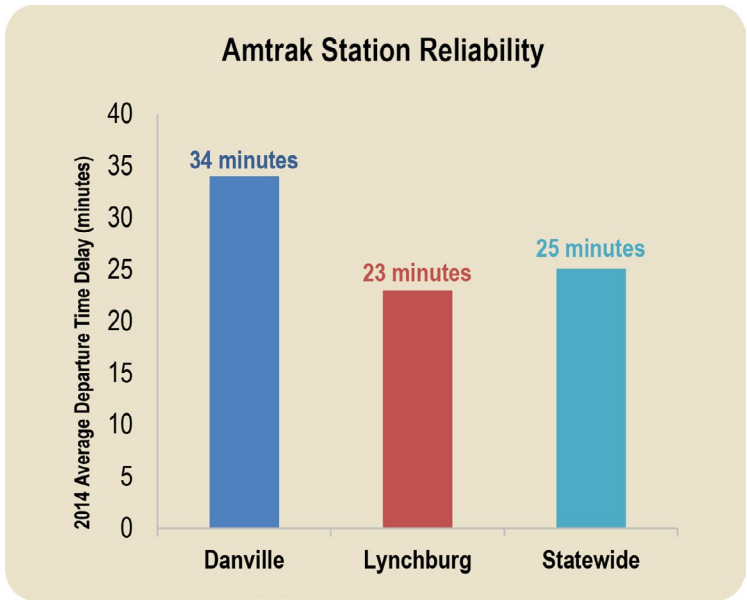
Daily Person Hours of Delay Per Mile



Daily Freight Ton Hours of Delay Per Mile



Reliability



Weekday Peak

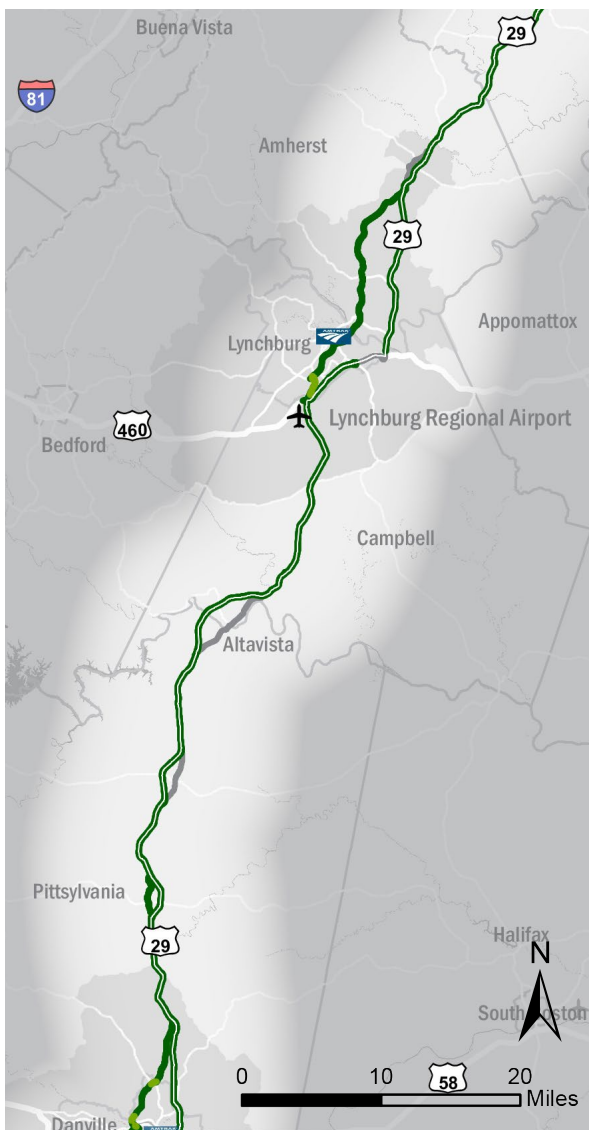
Reliability of travel during the peak period on a typical weekday on Segment I1 ranges from 0.00 to 0.26 in terms of reliability index, with an average value of 0.07. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.

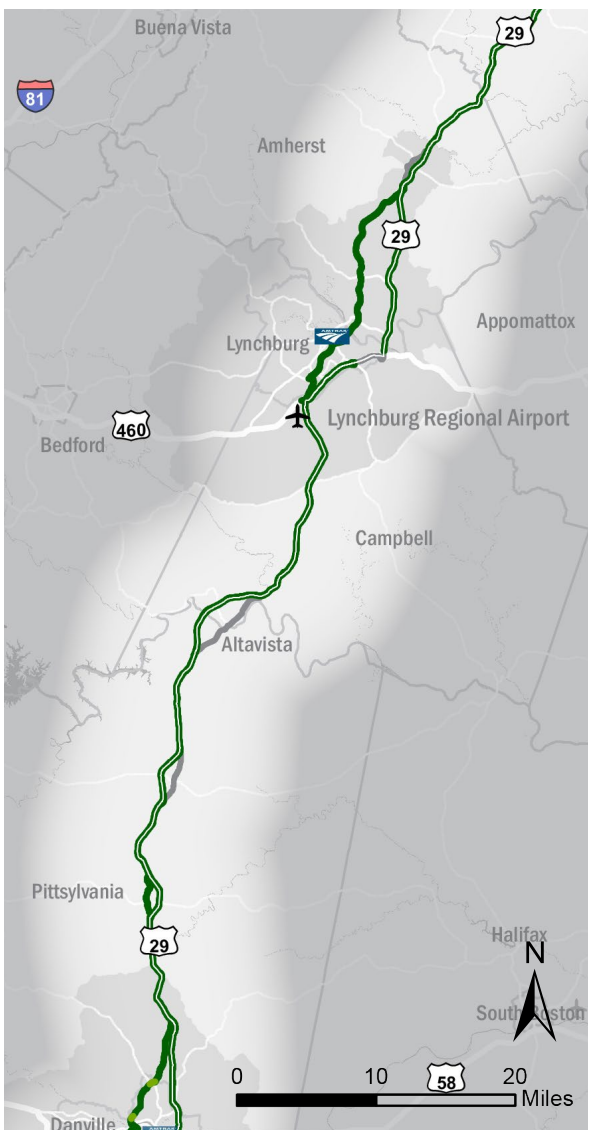
Weekday

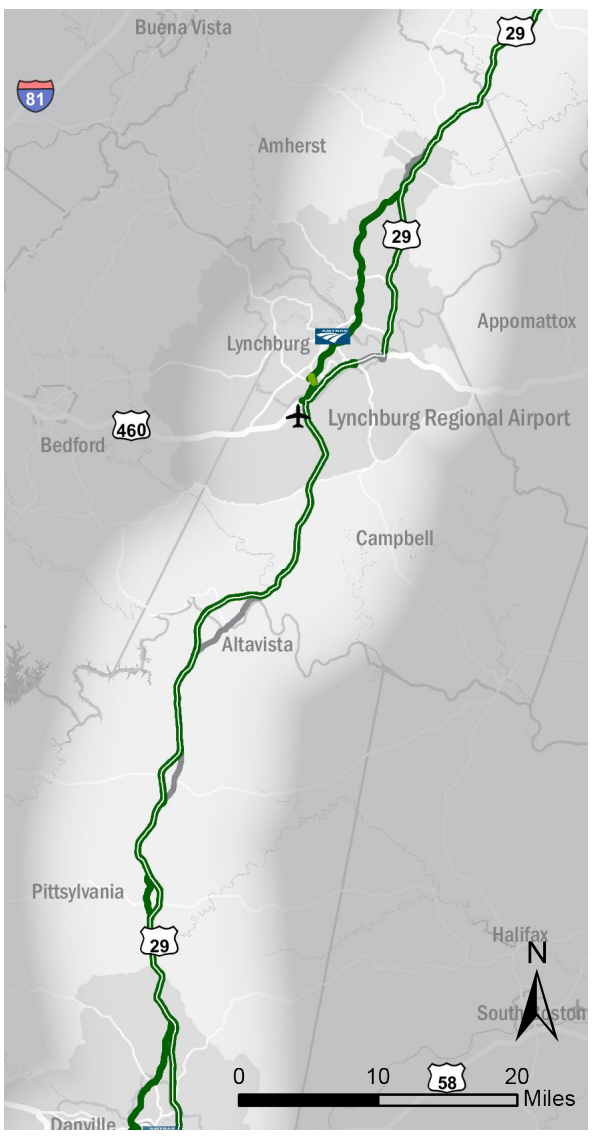
Reliability of travel during a typical weekday ranges from 0.01 to 0.28 in terms of reliability index, with an average value of 0.06. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.26 in terms of reliability index, with an average value of 0.05. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.





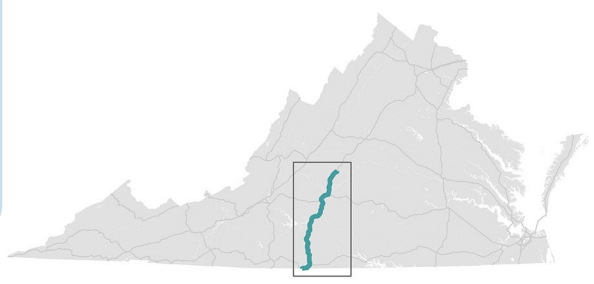


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

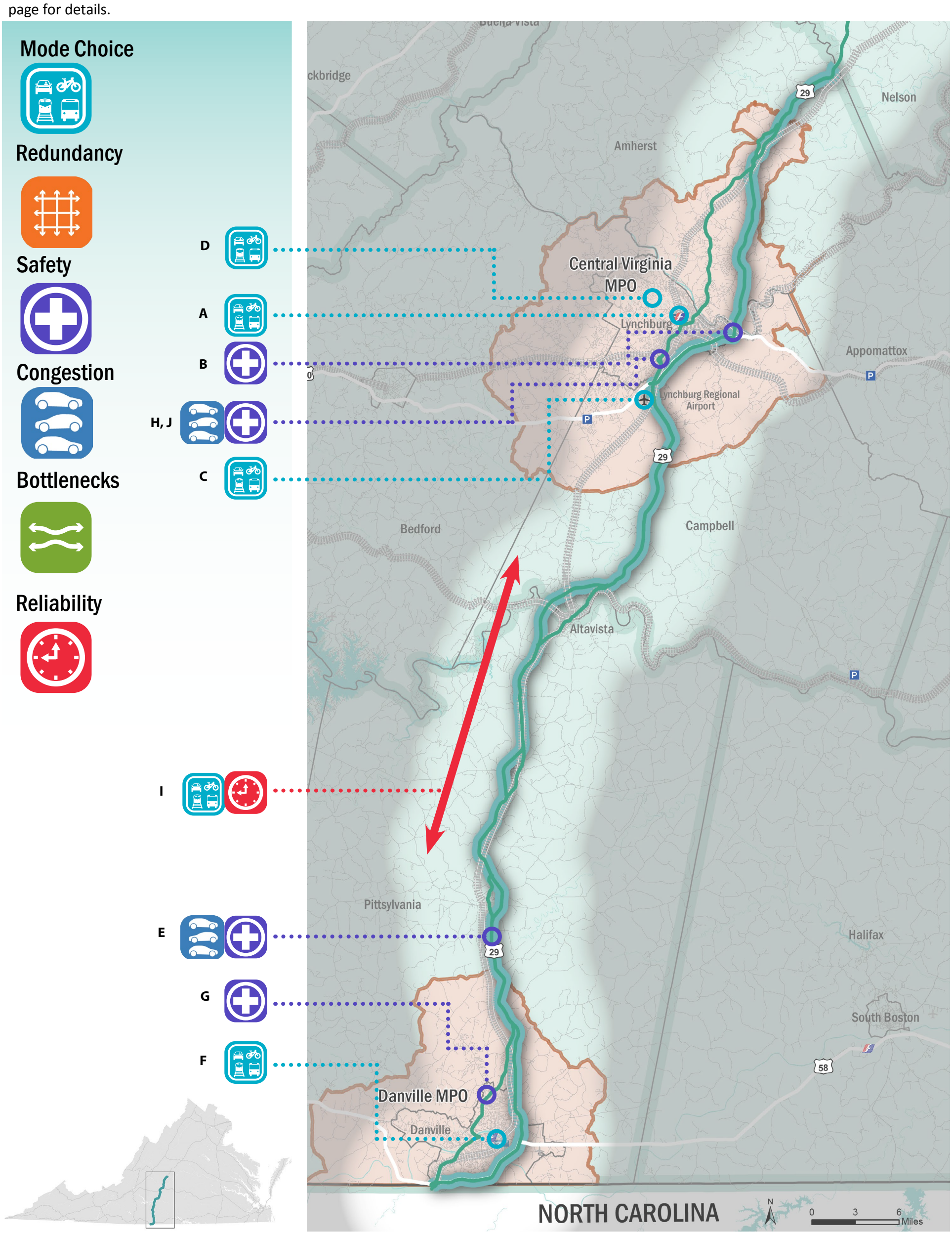
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



I1 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



I1 SEGMENT NEEDS

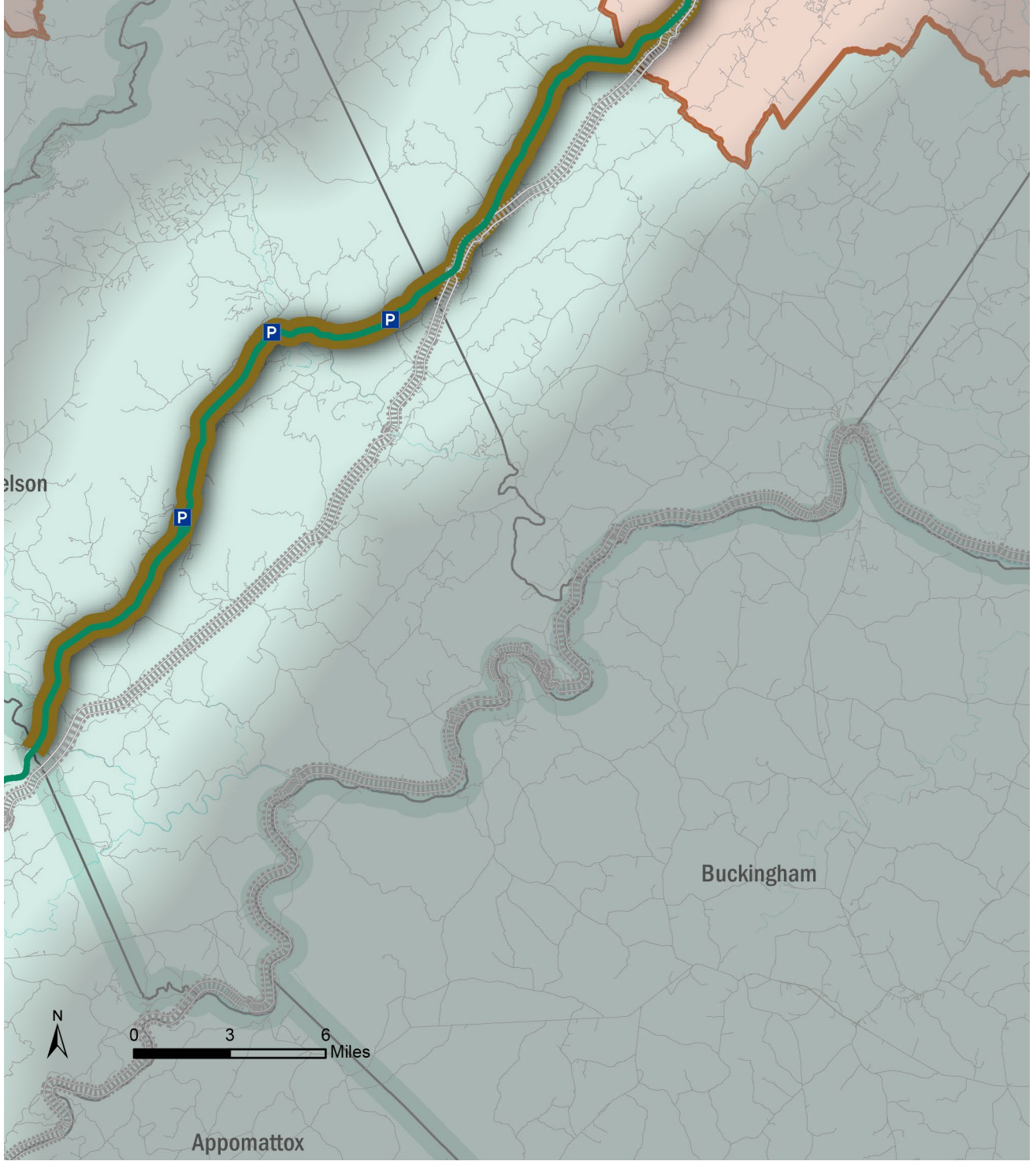
Summary of Needs - I1 Segment

A.		Parking lot at Amtrak station is often over capacity
B.		Insufficient merge distance on ramp from US 460 to US 29 South
C.		Lynchburg Regional Airport: flights only available to a single destination (Charlotte, NC)
D.		Poor signage and limited availability of information related to park-and-ride facilities in the area
E.		Geometry on US 29 south of Chatham in Tightsqueeze results in safety concerns, and slow speeds
F.		Passenger rail north departs unreasonably early (~4:30 a.m.), makes intercity travel by rail inconvenient
G.		US 29-Business between Piedmont Dr and Greenwood Dr in Danville: 67 severe crashes
H.		US 29-Business between US 29 and US 501 in Lynchburg: 42 severe crashes
I.		Unreliable Amtrak service from Danville station (34 minutes average departure delay) and Lynchburg Station (23 minutes average departure delay) totaling over 18,400 person-hours of delay from this segment.
J.		Congestion issue on US 29 Business between US 29/US 460 and US 501/US 29 Business (Lynchburg Expressway)

III. Segment I2

Corridor Segment I2 Components

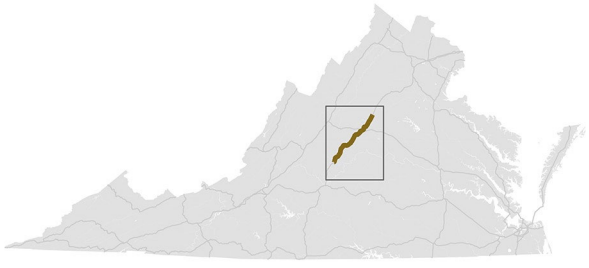
- US 29
- US 29 Business
- Norfolk Southern Crescent Corridor
- Amtrak
- Charlottesville Albemarle Airport



Segment I2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



I2 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment I2 runs through the Charlottesville Area, serving Nelson and Albemarle Counties, in addition to the City of Charlottesville. The primary facility that defines this segment is US 29, which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout the majority of Segment I2, US 29 is a four-lane highway, with the exception of a section in Albemarle County north of the City of Charlottesville, where US 29 widens to eight lanes. US 29 Business provides local access through downtown Charlottesville, in addition to a much shorter US 29 Business route through Lovingston in Nelson County. US 29 runs concurrently with US 250 in and around the City of Charlottesville.

Transit Services: Charlottesville Area Transit (CAT) provides bus service to the greater Charlottesville Area. Amtrak also has a station in Charlottesville which provides service to destinations north and east (Washington, DC, Philadelphia, New York, Norfolk) via the Northeast Regional route as well as north and south destinations along the Crescent Route, which includes New York, Atlanta, and New Orleans. Greyhound also provides intercity bus service with a station in Charlottesville.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC. In Charlottesville, there is a junction between Norfolk Southern's Crescent Corridor and CSX's Coal Corridor, which provides a connection between the Port of Virginia facilities in the Hampton Roads Area and the Appalachian coal fields to the west.

Port Facilities: No port facilities are located directly adjacent to Segment I2.

Airport Facilities: The Charlottesville-Albemarle Airport is the only commercial airport in this segment.

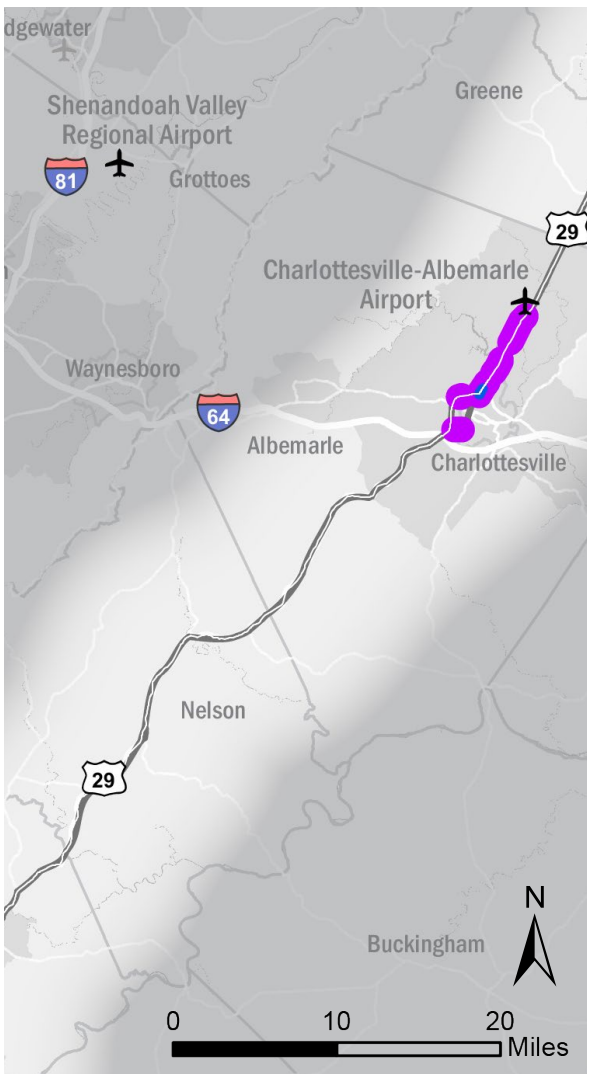
Major planned and future projects include:

Albemarle County:

- New road and grade separated intersection on US 29 between Route 851 (Dominion Drive) and Route 1417 (Woodbrook Drive); and
- Road reconstruction with added capacity on US 29 between Polo Grounds Road and Town Center Drive.

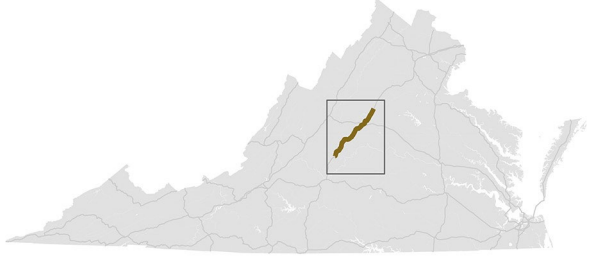
City of Charlottesville:

- Grade separated intersection at Hydraulic Road and US 29 between Ivy Road and the northern city limit of Charlottesville.



Future Projects

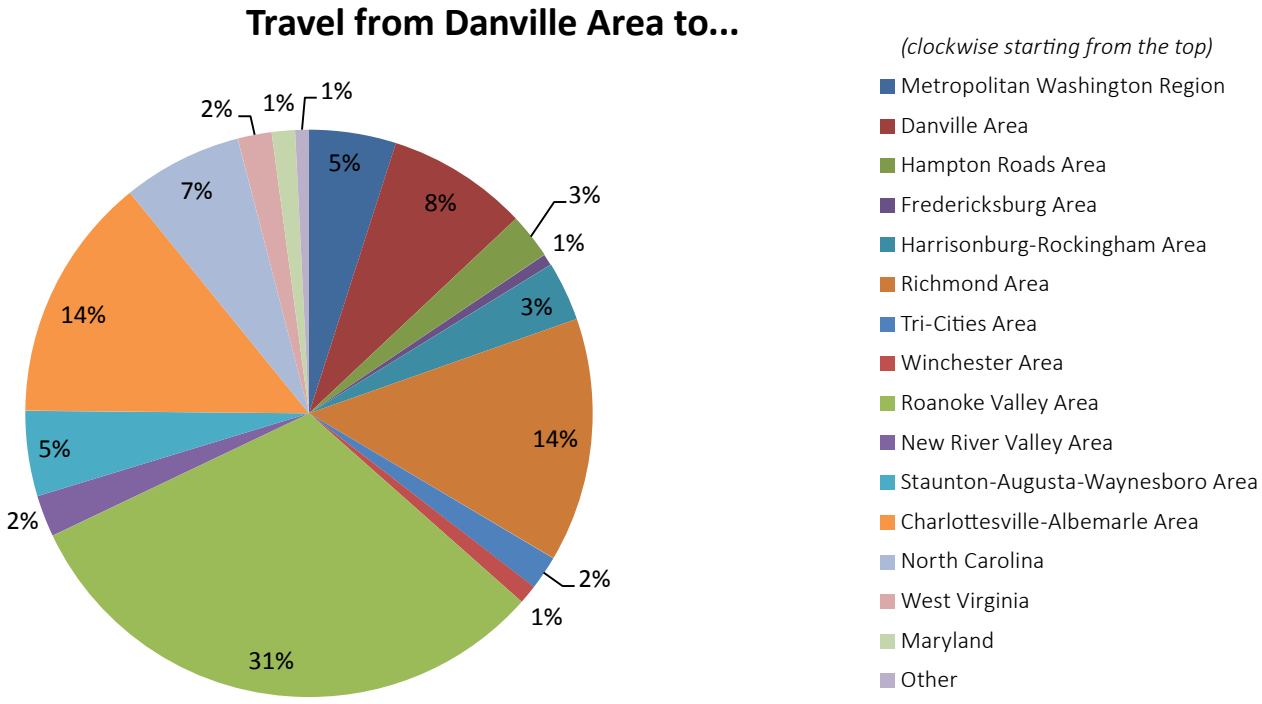
- Reconstruction with added capacity
- Safety improvements
- Primary facility

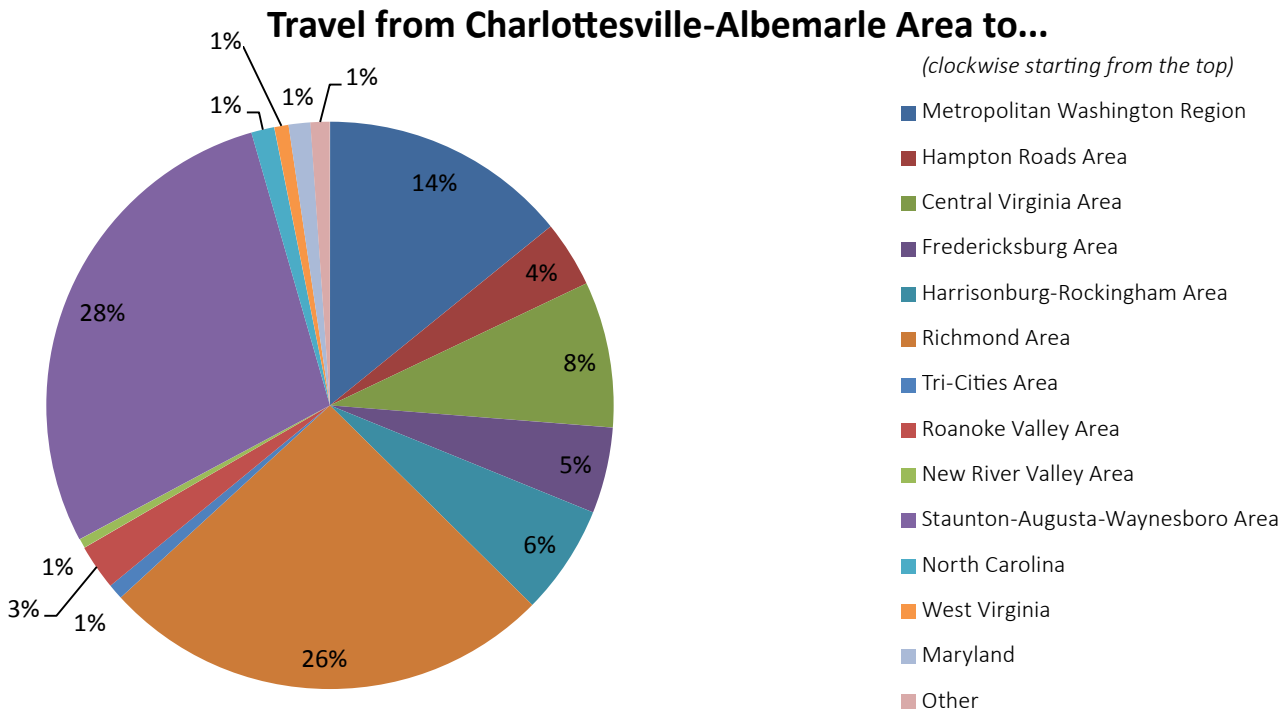


Travel Demand

Passenger Demand

Segment I2 connects from the Central Virginia Area in the south through the Charlottesville-Albemarle Area to the north. Of the intercity passenger travel originating in the Central Virginia Area, only a limited portion is likely to use this segment, including 14 percent destined for the Charlottesville Area and the five percent destined for the Metropolitan Washington Area. Travel from the Charlottesville Area is also distributed fairly widely across the Commonwealth and the largest markets for intercity passenger travel include the Metropolitan Washington Area (14 percent) and the Lynchburg Area (eight percent).





I2 SEGMENT PROFILE

Freight Demand

By truck, Segment I2 carried 13 million tons of freight worth $19 billion in 2012, and is estimated to carry 17 million tons of freight worth $27 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. Ten percent of the corridor truck freight tonnage originates in jurisdictions adjacent to Segment I2 and another nine percent is destined for these jurisdictions. There are significant truck freight flows between Albemarle County and North Carolina, Maryland, and Pennsylvania. The City of Lynchburg and Pittsylvania County are the largest attractors of truck freight along Segment I2, accounting for a combined two percent of the total truck freight value on the corridor.

By rail, Segment I2 carried seven million tons of freight worth $11 billion in 2012, and is estimated to carry nine million tons of freight worth $14 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. Negligible rail freight flows to or from the jurisdictions adjacent to Segment I2.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (52% / 49%)
2. North Carolina (14% / 13%)
3. Pennsylvania (6% / 7%)
4. Maryland (6% / 6%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment I2: 10% / 10%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (51% / 53%)
2. North Carolina (12% / 11%)
3. Maryland (8% / 9%)
4. Fairfax County (8% / 10%)
5. Pennsylvania (7% / 6%)

Corridor Tonnage Destined for Segment I2: 9% / 9%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (34% / 27%)
2. Virginia (11% / 12%)
3. Pennsylvania (11% / 9%)
4. Ohio (6% / 7%)
5. Illinois (6% / 7%)

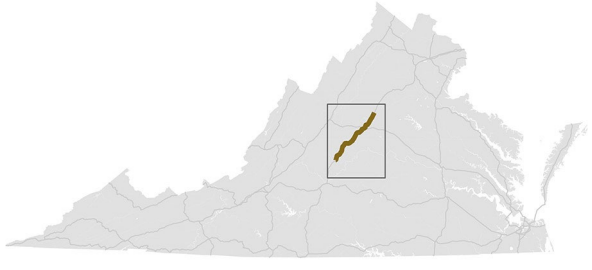
Corridor Tonnage Originating in Segment I2: <1% / <1%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Illinois and North Carolina
Ohio and North Carolina
Pennsylvania and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (41% / 39%)
2. Virginia (29% / 30%)
3. City of Norfolk* (12% / 10%)
4. Pennsylvania (6% / 6%)
5. New Jersey (4% / 5%)

Corridor Tonnage Destined for Segment I2: <1% / <1%



Traffic Conditions

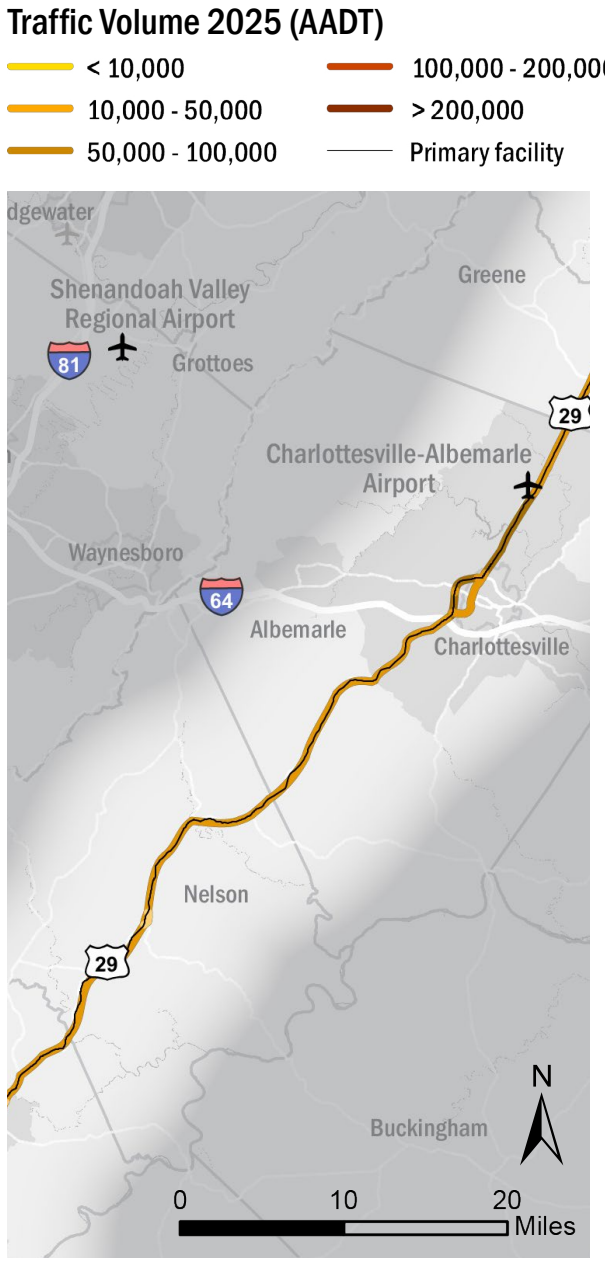
Traffic Volume and AADT

Traffic volume in Segment I2 varies by location. Along US 29 south of Charlottesville, traffic volumes range from 11,000 to 17,000 vehicles per day. Along US 29 through Charlottesville and northern Albemarle County, average daily traffic volumes range from 33,000 to 60,000 vehicles, with the highest volumes just north of the City of Charlottesville. On US 29 Business in Charlottesville, volumes are somewhat lower, between 23,000 and 30,000 vehicles per day. Traffic growth is expected throughout Segment I2 by 2025, with growth of more than 5,000 vehicles per day in and directly north of the City of Charlottesville.

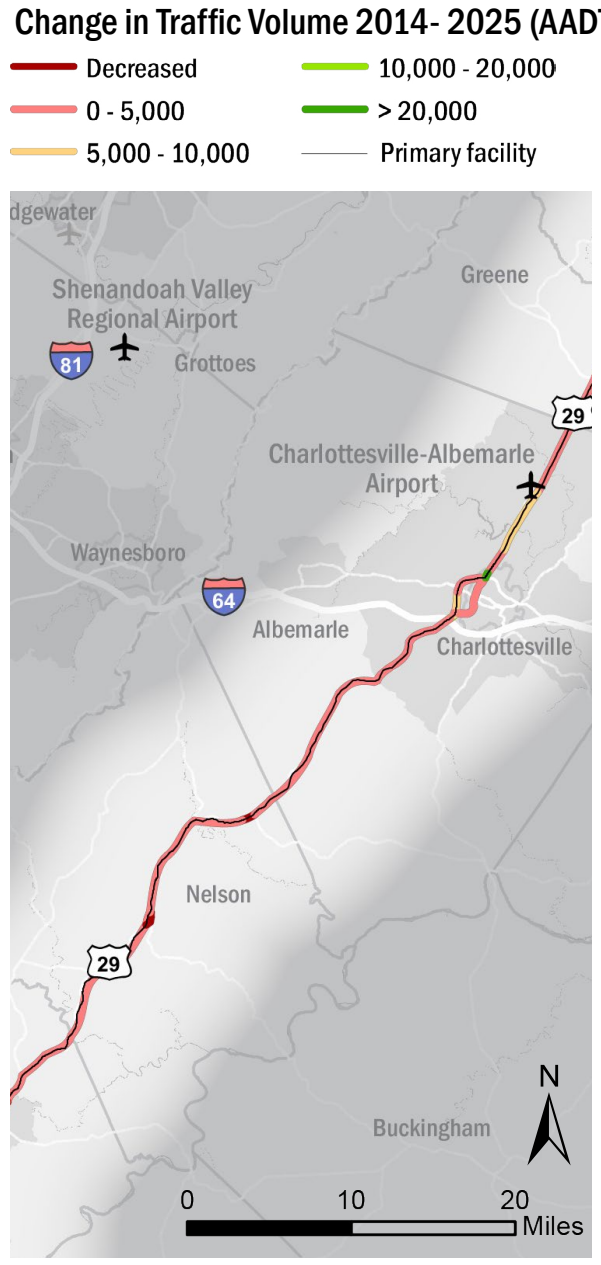
Traffic Volume 2014 (AADT)

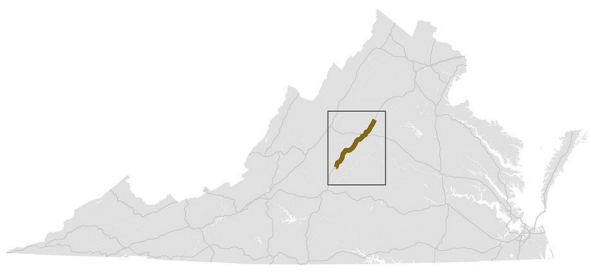


Traffic Volume 2025 (AADT)

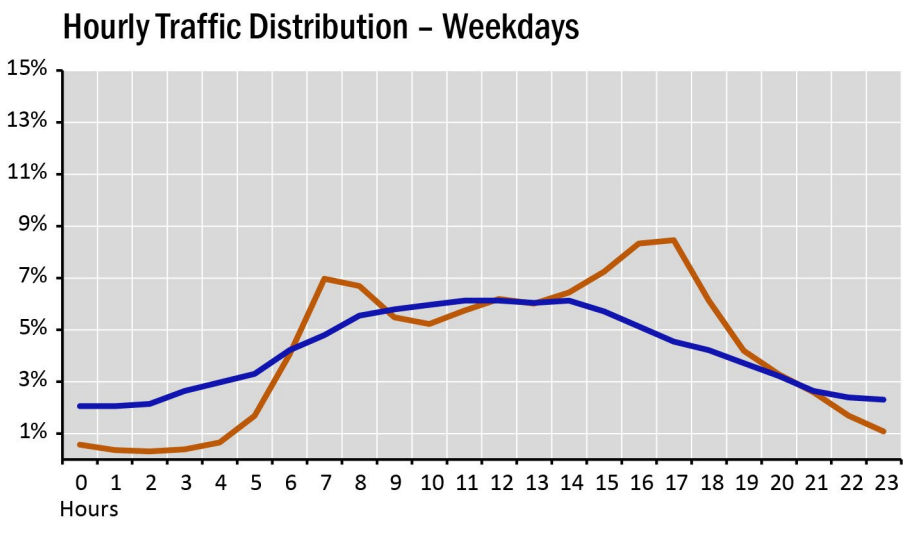


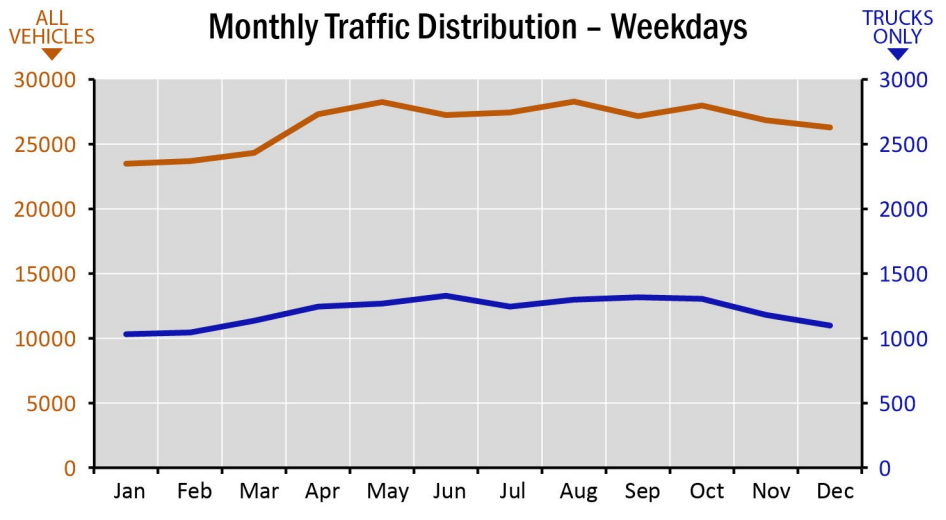
Change in Traffic Volume 2014- 2025 (AADT)

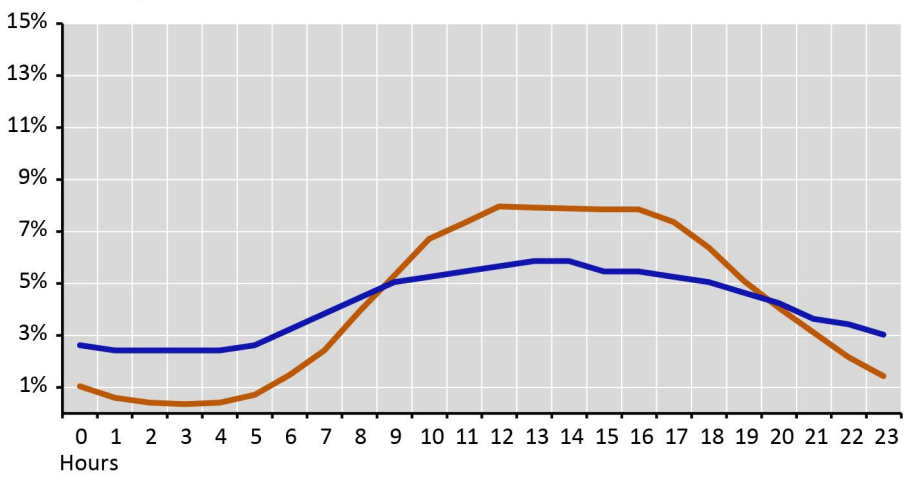


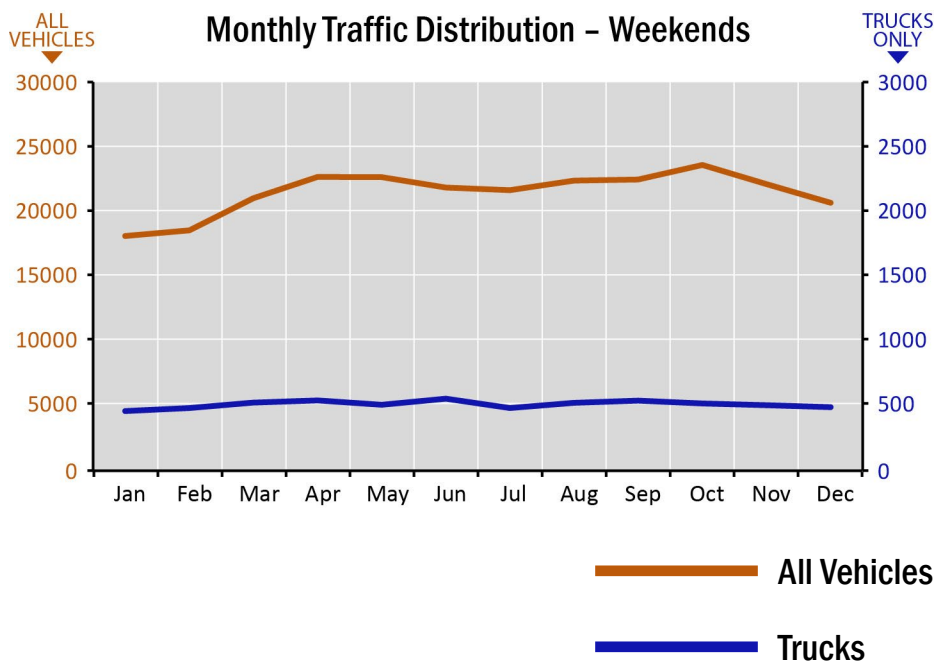


I2 SEGMENT PROFILE











Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

Traffic Distribution

On average, traffic on Segment I2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 8.5 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 7.0 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic showing a single peak during the midday period, and the highest hourly flow of 6.1 percent of daily traffic between 11 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day between noon and 5 p.m. for all traffic, and starting at 1 p.m. (5.8 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment I2 vary by as much as 20 percent throughout the year, with the highpoint in May (around 28,000 vehicles per day) and the low point in January (around 23,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the June high (around 1,300 vehicles per day) 29 percent higher than the January low (around 1,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 24,000 vehicles per day) are 31 percent higher than January levels (around 18,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 22 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I2, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

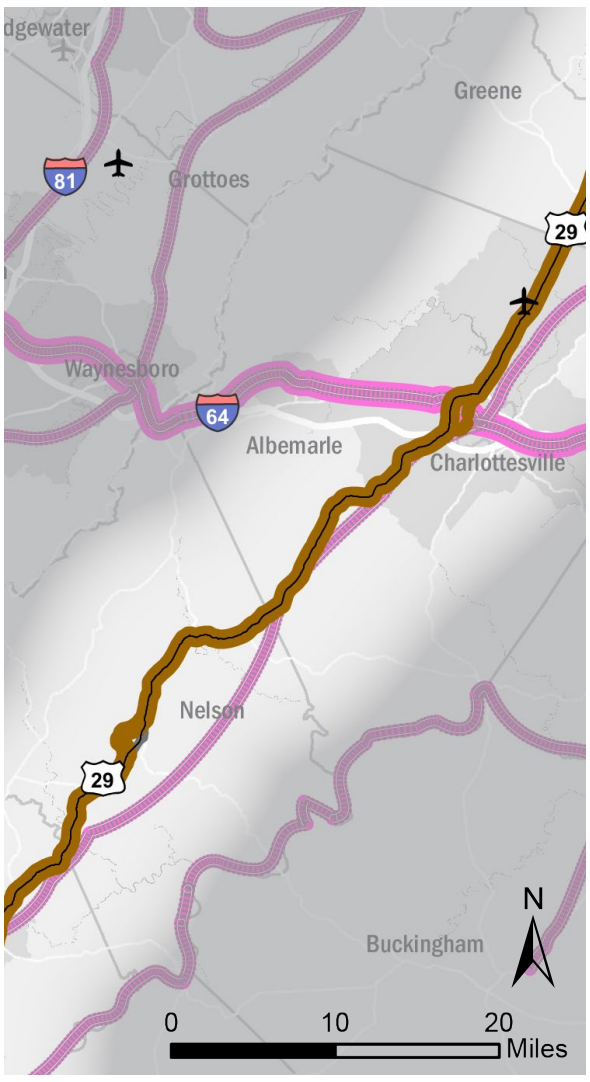
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I2 is low relative to other segments in Corridor I. Along US 29 in Nelson County and southern Albemarle County, heavy trucks comprise five percent of total traffic. Along US 29 through Charlottesville to the border with Greene County, heavy trucks make up three percent or less of total traffic.



I2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

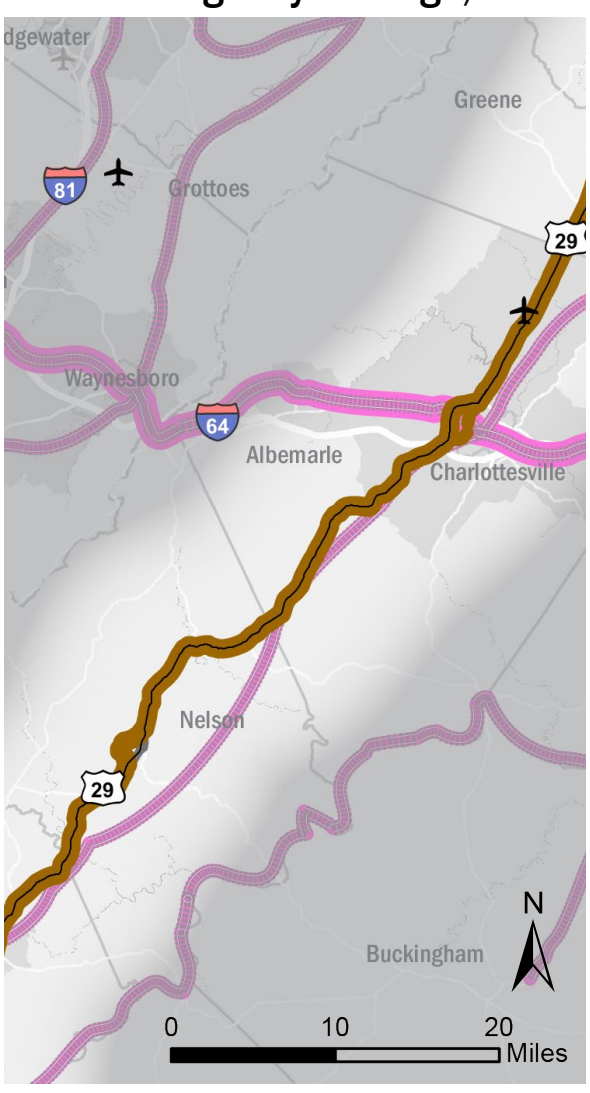


Freight Flows

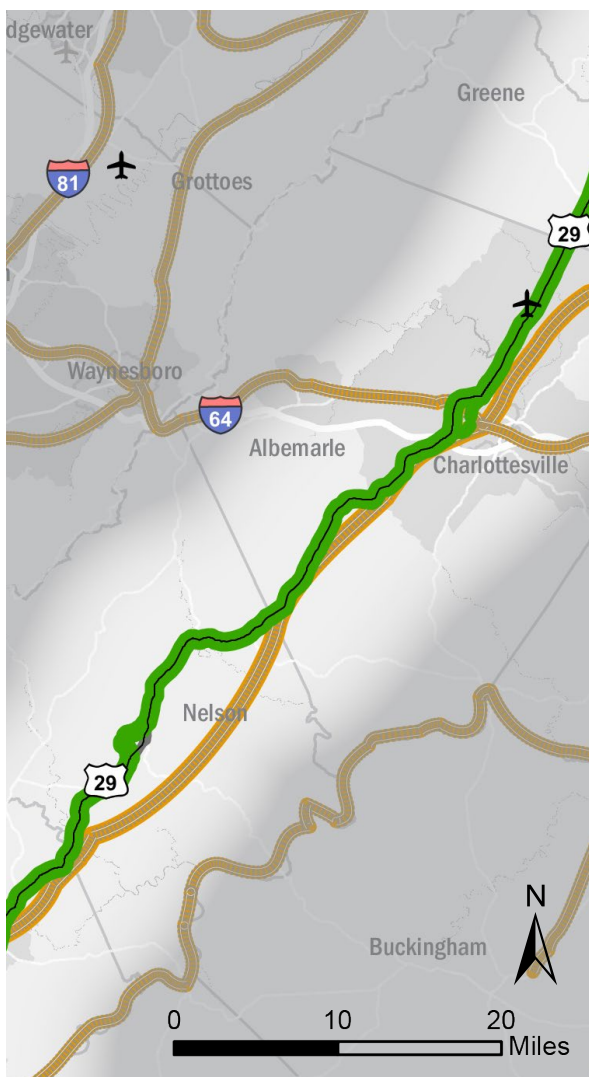
On Segment I2 near Lovingston, freight is moved primarily by truck in terms of both tonnage and value. In total, 13 million tons (68 percent) of freight is moved through this section of Segment I2 by truck, compared to 6 million tons (32 percent) by rail. By value, $19 billion (63 percent) of freight travels by truck, compared to $11 billion (37 percent) by rail. On average, a ton of freight traveling through this section of Segment I2 by truck is worth $1,428 while a ton of freight traveling by rail is worth $1,717. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I2 are expected to increase. The percentage of freight traveling by truck in terms of tonnage is expected to remain the same and in relation to value, is expected to increase to 66 percent. Freight value per ton is anticipated to increase to $1,524 for trucks and decrease to $1,722 for rail.

North of Charlottesville, freight is moved primarily by truck by tonnage and by value. In total, 12.5 million tons (64 percent) of freight is moved through this section of Segment I2 by truck, compared to 7 million tons (36 percent) by rail. By value, $17 billion (60 percent) of freight travels by truck, compared to $11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I2 by truck is worth $1,359 while a ton of freight traveling by rail is worth $1,606. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I2 are expected to increase. The percentage of the freight traveling by truck is expected to increase by tonnage and value to 65 percent and 63 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,492 and $1,608, respectively.

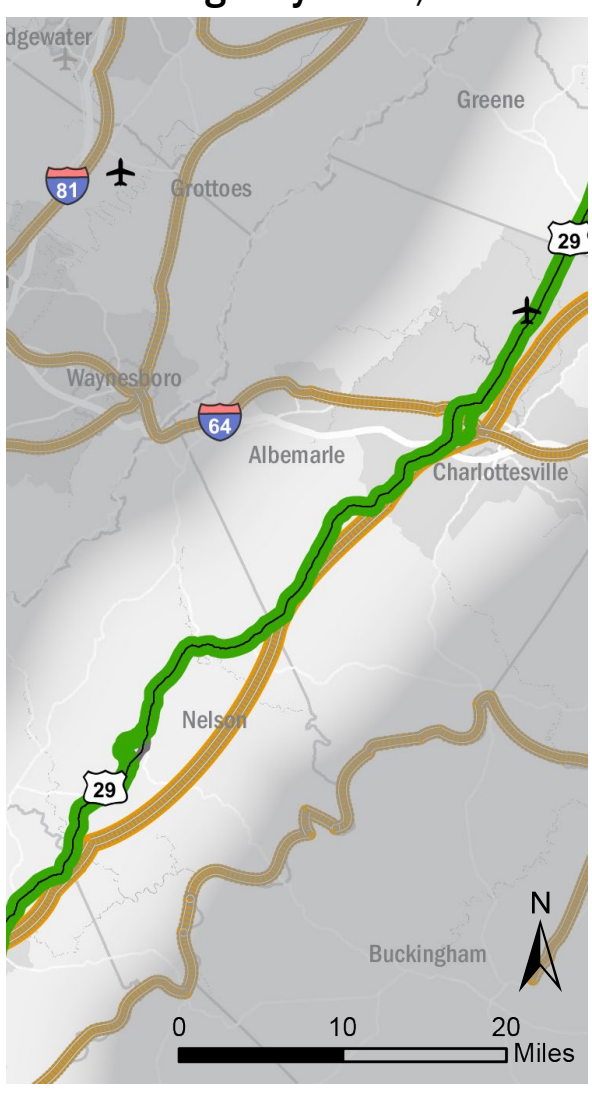
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025

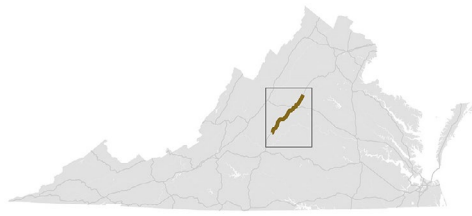


Truck Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Lynchburg to Charlottesville

Inter-City Bus	Train	Auto
3 Trips per Day 1:15 Travel Time $22 Est. Cost	2 Trips per Day 1:13 Travel Time $13 Est. Cost	**Via Rt. 29**: 1:12 Travel Time $39 Est. Cost

Lynchburg to DC

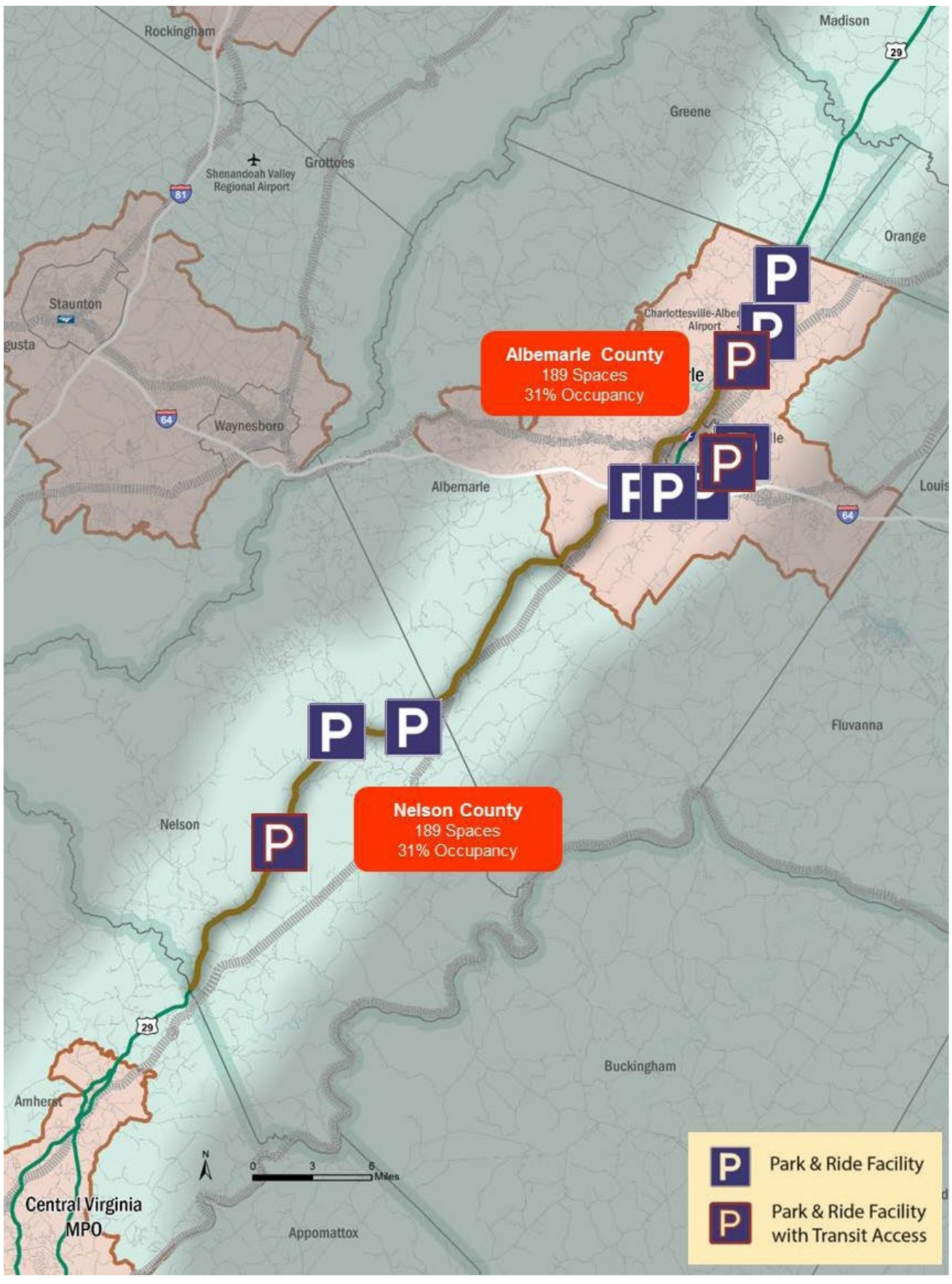
Inter-City Bus	Train	Air	Auto
2 Trips per Day 4:40 Travel Time $44 Est. Cost	5 Trips per Day 3:42 Travel Time $32 Est. Cost	6 Trips per Day 2:55 Travel Time $360 Est. Cost	**Via Rt. 29**: 3:18 Travel Time $101 Est. Cost **Via Rt. 29 / I-66**: 3:13 Travel Time $101 Est. Cost

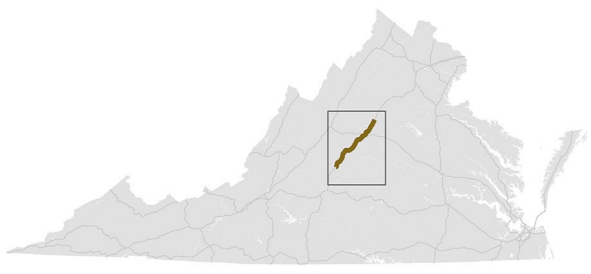
Passenger trips on Segment I2 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Aside from short US 29 Business routes that provide local access, no parallel highway facilities exist in the segment. Greyhound offers service to the corridor from Charlottesville, as does Amtrak, which serves the segment with its Northeast Regional and Crescent Routes. Automobile travel from Charlottesville to destinations like Culpeper, Washington, DC, Lynchburg, and Danville is typically more expensive than travel by alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile) and is also comparable in terms of travel time, although alternative modes are limited by the frequency of service. Air travel along the corridor, with service offered from Charlottesville-Albemarle Airport, is much faster than any other mode, but far more expensive.

Park-and-Ride

Within Segment I2, commuters can utilize multiple Park-and-Ride locations in Nelson and Albemarle counties. Albemarle County has the most Park-and Ride-locations, the highest number of Park-and-Ride spaces, and the highest utilization rate of spaces in the region. Neither county has a utilization rate higher than the statewide average of 76 percent for Park-and-Ride utilization.

Park and Ride Facitilities



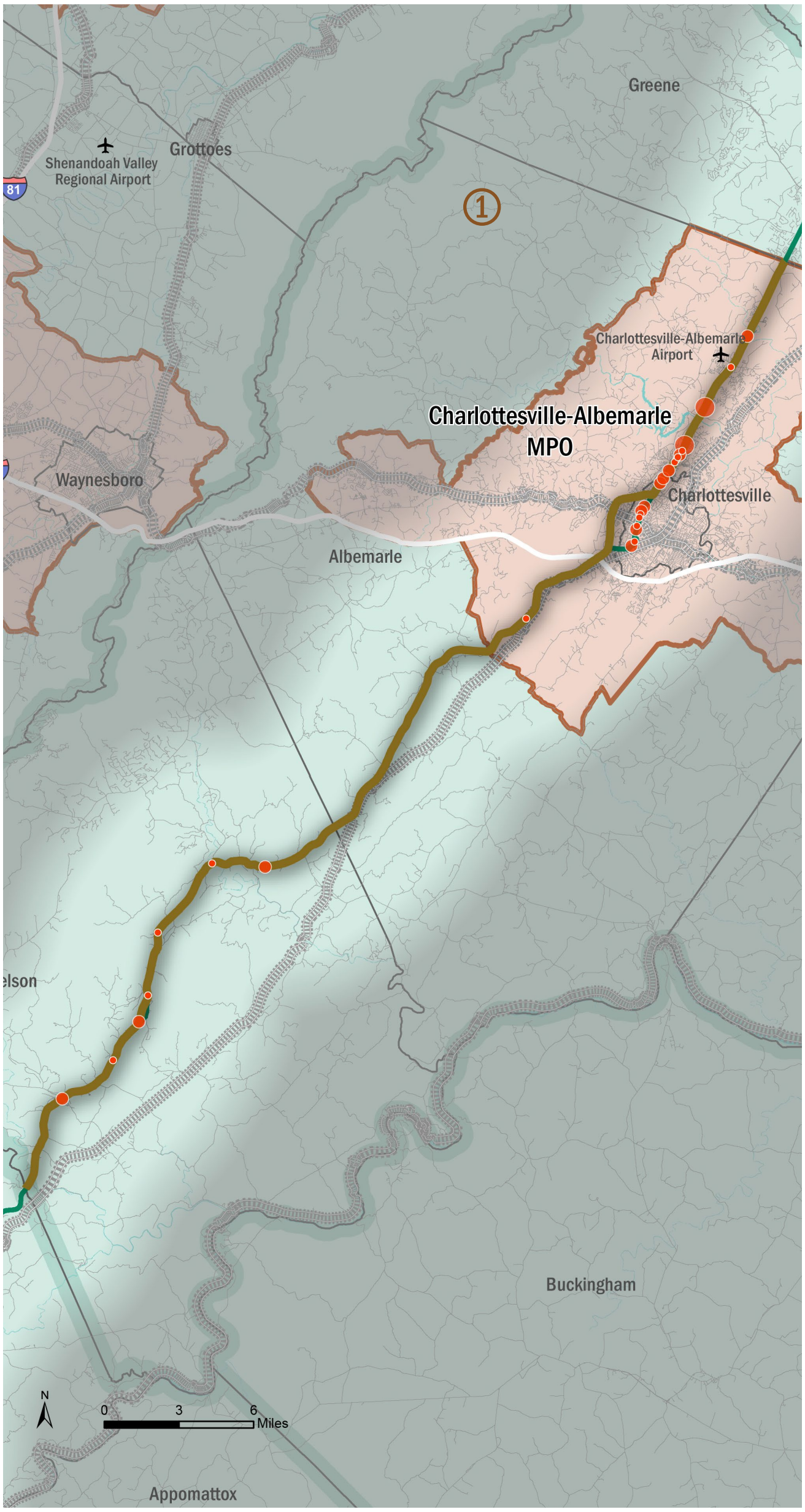


Safety

Performance Metrics

Number of Severe Crashes	169
Severe Crashes/Million VMT	3.5
Number of Railroad Crashes	1

Between 2010 and 2012, 169 severe crashes occurred on Segment I2, resulting in one of the highest crash rates among CoSS segments in the Commonwealth. The areas along Segment I2 with the highest concentrations of severe crashes are in and north of Charlottesville. In Charlottesville along US 29 Business (Fontaine Avenue/Emmet Street) adjacent to the University of Virginia campus, there were 43 crashes that occurred over a two-mile stretch between Shamrock Road and Earhart Street. On US 29 (Seminole Trail) in Albemarle County, there were 19 collisions in a span of less than 0.5 miles, just north of the intersection with Hydraulic Road. In another stretch of US 29 (Seminole Trail), a total of 34 incidents took place over a distance of approximately one mile between Dominion Drive and Woodbrook Drive and, in another more northern span of US 29, 15 crashes occurred over 0.8 miles between Polo Grounds Road and Ashwood Boulevard.

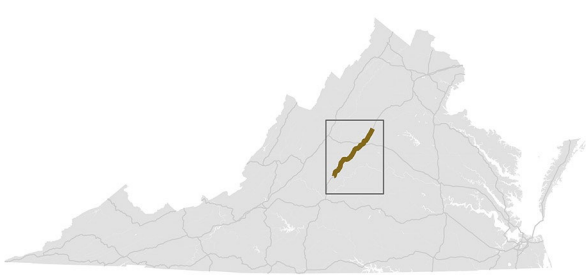


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

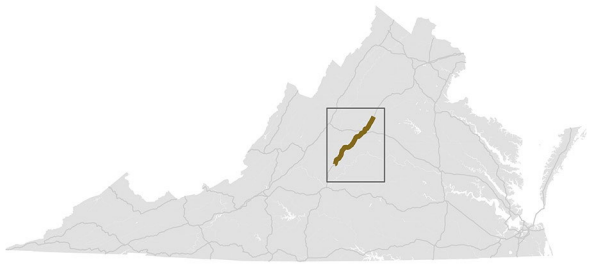
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Congestion

Performance Metrics

Person Hours of Delay per Mile	26
Freight Ton Hours of Delay per Mile	11.8K



Passenger Delays

Passenger delays on Segment I2 are higher than Segments I1 and I3 with an average of 26 person-hours per mile of delay. In the City of Charlottesville, there are significant passenger delays on US 29 Business north of the University of Virginia. These passenger delays continue on US 29 in Albemarle County through Rio Road. Significant passenger delays are also experienced on US 29 at Airport Road further north in Albemarle County. Peak-period passenger delays account for 49 percent of daily congestion, which is considerably higher than average for the peak-period share of congestion on CoSS segments.

Freight Delays

Freight delays on Segment I2 are relatively minimal, accounting for around 1.3 million ton-hours of delay daily. Freight delays along the segment are minimal, with the exception of a short stretch on US 29 near the intersection with Rio Road in Albemarle County. Peak-period freight delays account for 40 percent of daily congestion, which is considerably higher than average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile



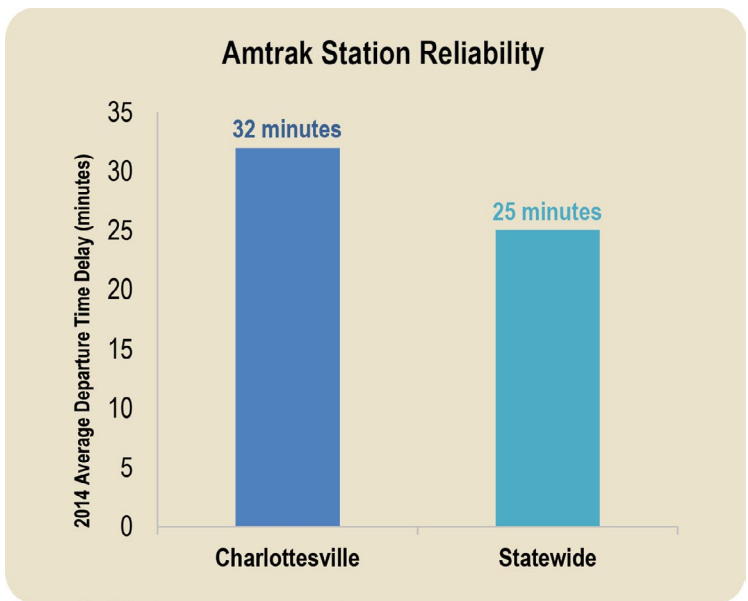
< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment I2 ranges from 0.00 to 0.64 in terms of reliability index, with an average value of 0.13. While this segment does have a peak period reliability index higher than average for the CoSS segments statewide, none of the locations along Segment I2 have reliability index values exceeding the statewide threshold.

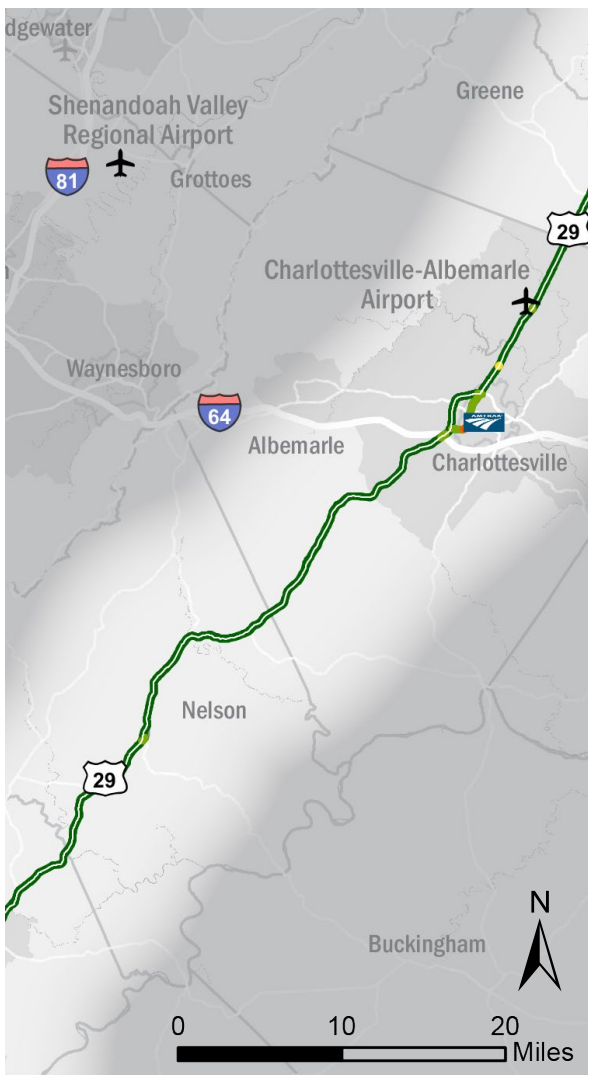
Weekday

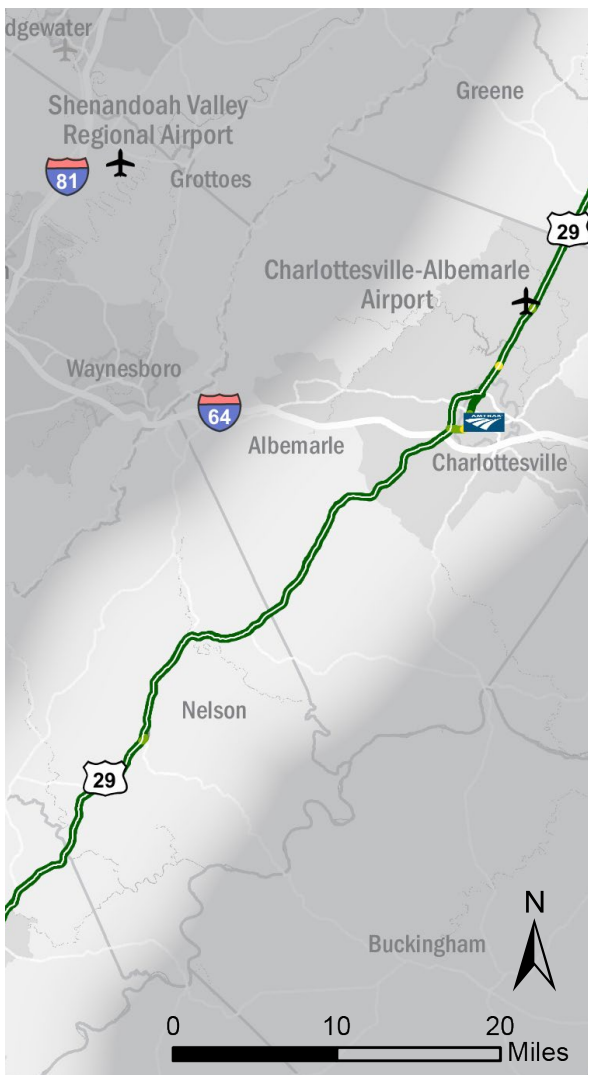
Reliability of travel during a typical weekday ranges from 0.00 to 0.50 in terms of reliability index, with an average value of 0.12. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, only two locations have a reliability index value exceeding the statewide threshold:

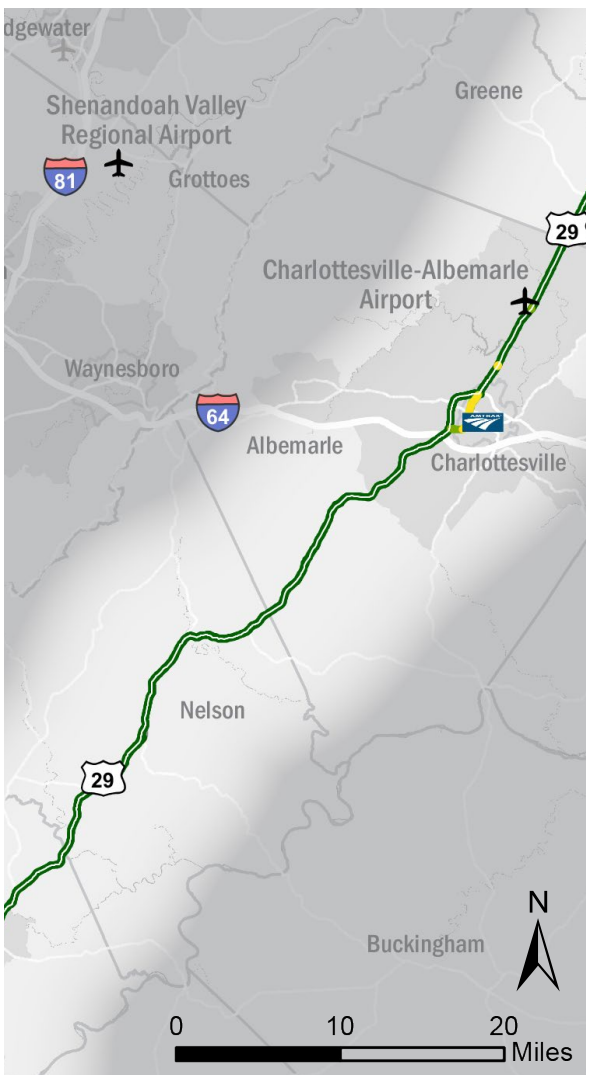
- US 29 at Rio Road in Albemarle County; and
- US 29 Business between Maury Avenue and Jefferson Park Avenue in Charlottesville.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.57 in terms of reliability index, with an average value of 0.13. While this segment does have a weekend reliability index higher than average for the CoSS segments statewide, none of the locations along Segment I2 have reliability index values exceeding the statewide threshold.





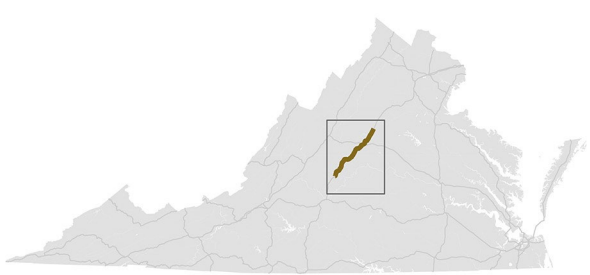


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

Redundancy

Safety

Congestion

Bottlenecks

Reliability

G

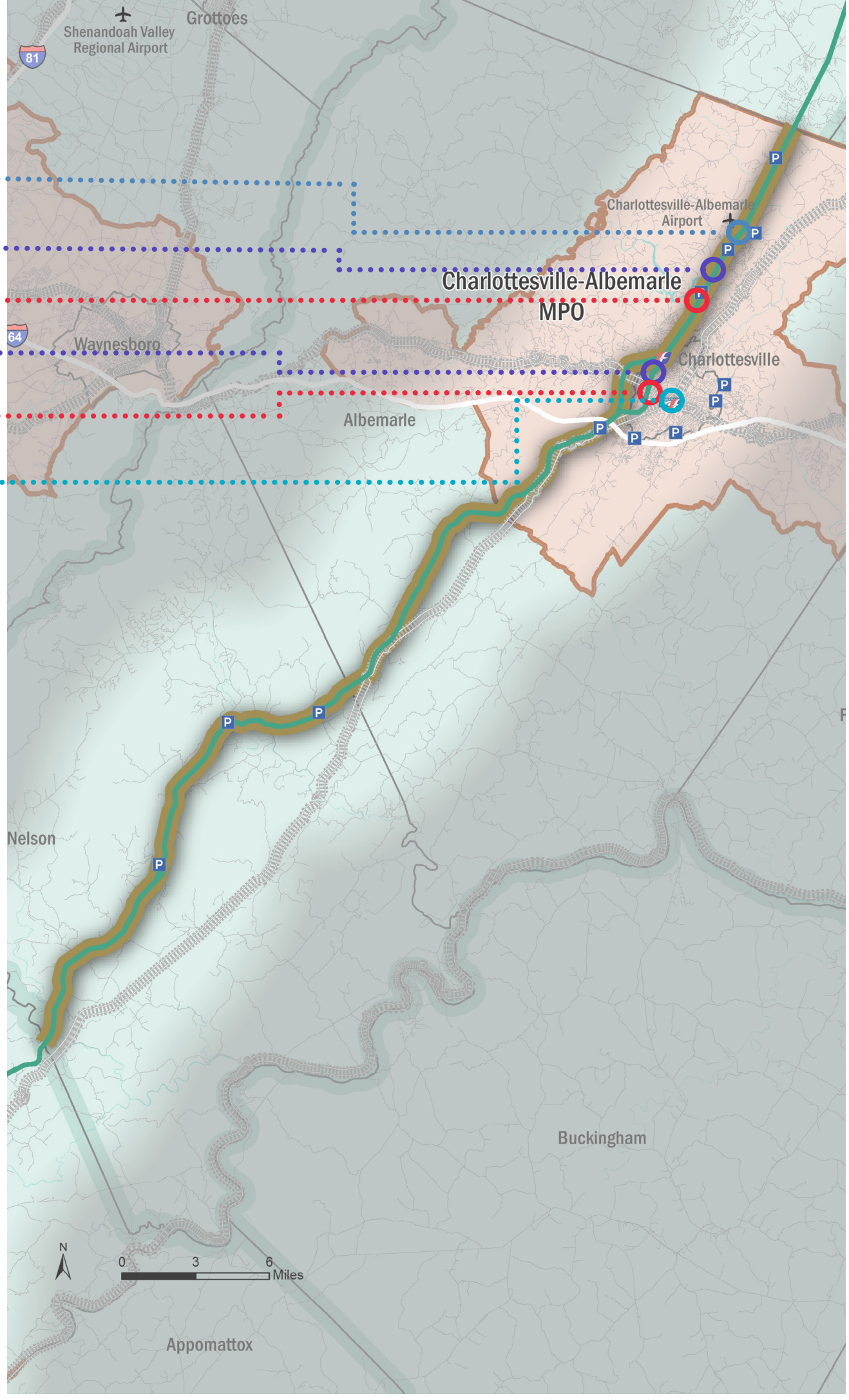
E

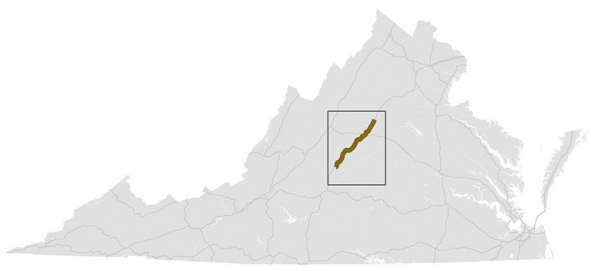
C, J

D

H, I

A, B, F





I2 SEGMENT NEEDS

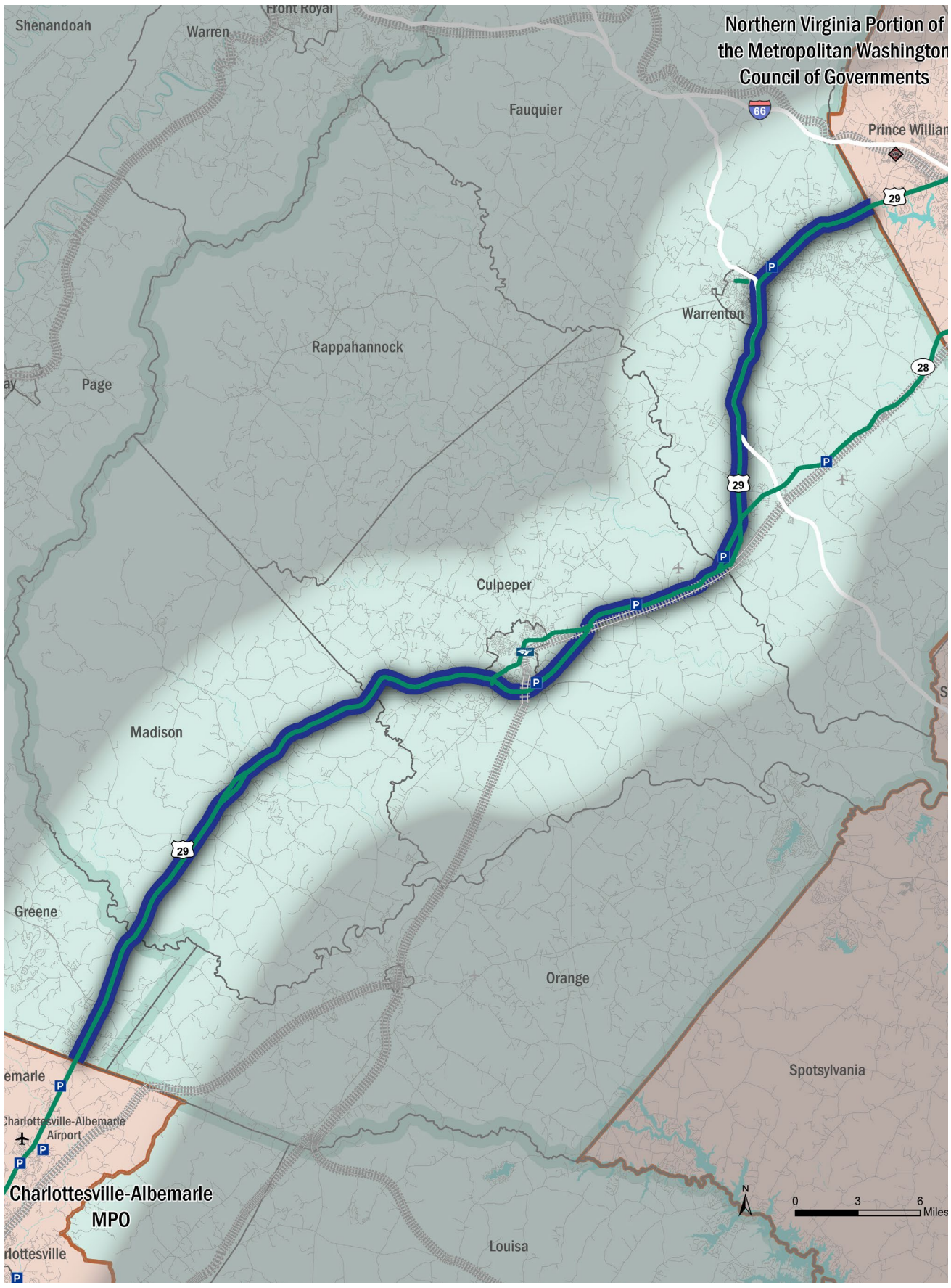
Summary of Needs - I2 Segment

A.		Insufficient passenger amenities (including waiting area) at Charlottesville Amtrak station
B.		Poor connections between Amtrak and Greyhound Bus stations
C.		US 29 between downtown and River: Frequent driveways and access points result in slow moving traffic
D.		US 29-Business between Shamrock Rd and Earheart St in Charlottesville: 43 severe crashes
E.		US 29 between Hydraulic Rd and Ashwood Rd north of Charlottesville: 66 severe crashes
F.		Unreliable Amtrak service from Charlottesville station. Average departure delay is 32 minutes totaling over 35,500 person-hours of delay from this segment.
G.		Congestion issue at US 29 and VA Route 649 (Airport Road) in Albemarle County
H.		Congestion issue on US 29/US 29 Business between US 29 Business (Jefferson Park Avenue) and VA Route 631 (Rio Road)
I.		Reliability issue on US 29 Business (Jefferson Park Avenue) between Maury Avenue and Emmet Street South in Charlottesville
J.		Reliability issue at US 29 and VA Route 631 (Rio Road) in Albemarle County

IV. Segment I3

Corridor Segment I3 Components

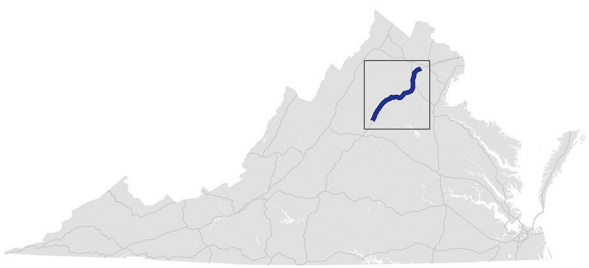
- US 29
- US 29 Business
- Route 28
- Norfolk Southern Crescent Corridor
- Amtrak
- Intercity bus service



Segment I3

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



I3 SEGMENT PROFILE



Segment I3 runs between the Charlottesville-Albemarle MPO Area and the Northern Virginia Area. It serves Greene, Madison, Culpeper, and Fauquier Counties. The primary facility that defines this segment is US 29 which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout the majority of Segment I3, US 29 is a four-lane highway. North of Remington, Route 28 splits from US 29 and provides a parallel route towards Northern Virginia. Route 28 is mostly a two-lane highway. US 29 Business provides local access in and around the Town of Culpeper. US 29 runs concurrently with US 15 and US 17 through portions of Culpeper and Fauquier Counties.

Transit Services: Virginia Regional Transit (VRT) provides demand response service in the Culpeper area. The Amtrak station located in the Town of Culpeper offers service to destinations north (including the District of Columbia) and east towards Norfolk and Virginia Beach. VRE has a station in Manassas near the northern end of the segment.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29, as well as north of Washington, DC.

Port Facilities: No port facilities are located directly adjacent to Segment I3.

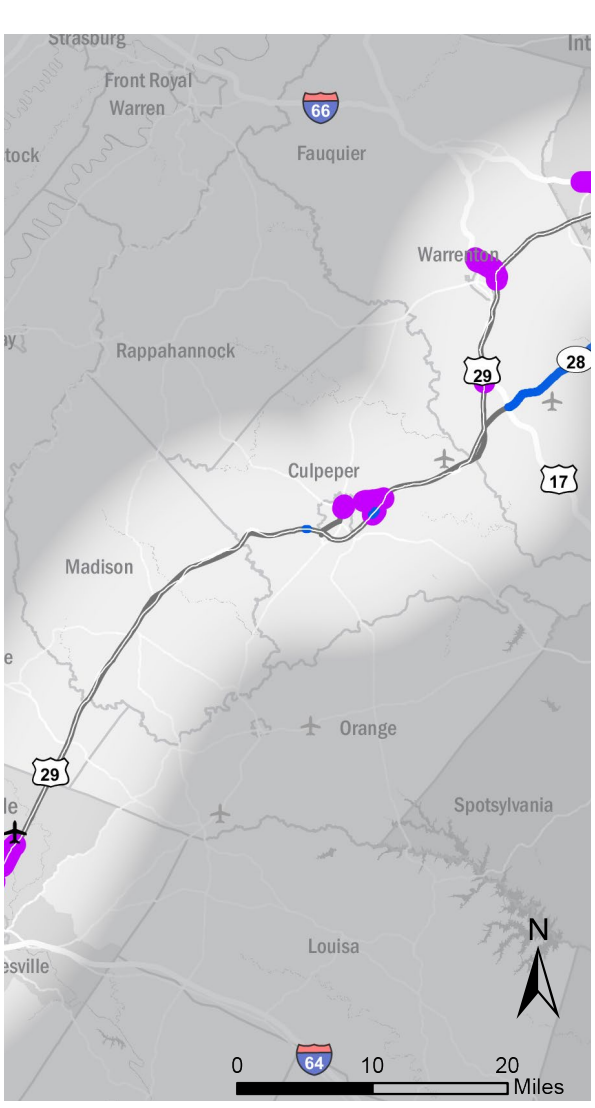
Airport Facilities: There are no airports offering commercial service in Segment I3.

Major planned and future projects include:

- Adding turn lanes at the intersection of Matthew Mill Road and US 29 in Greene County;
- Designing and constructing safety improvements to reduce the crash rate at the intersection of US 29 and Route 718 in Culpeper County; and
- Reconstruction with added capacity at the interchange of US 15/US 29 and Route 666 in Culpeper County.

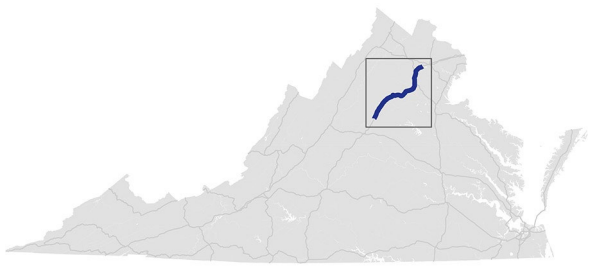
Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

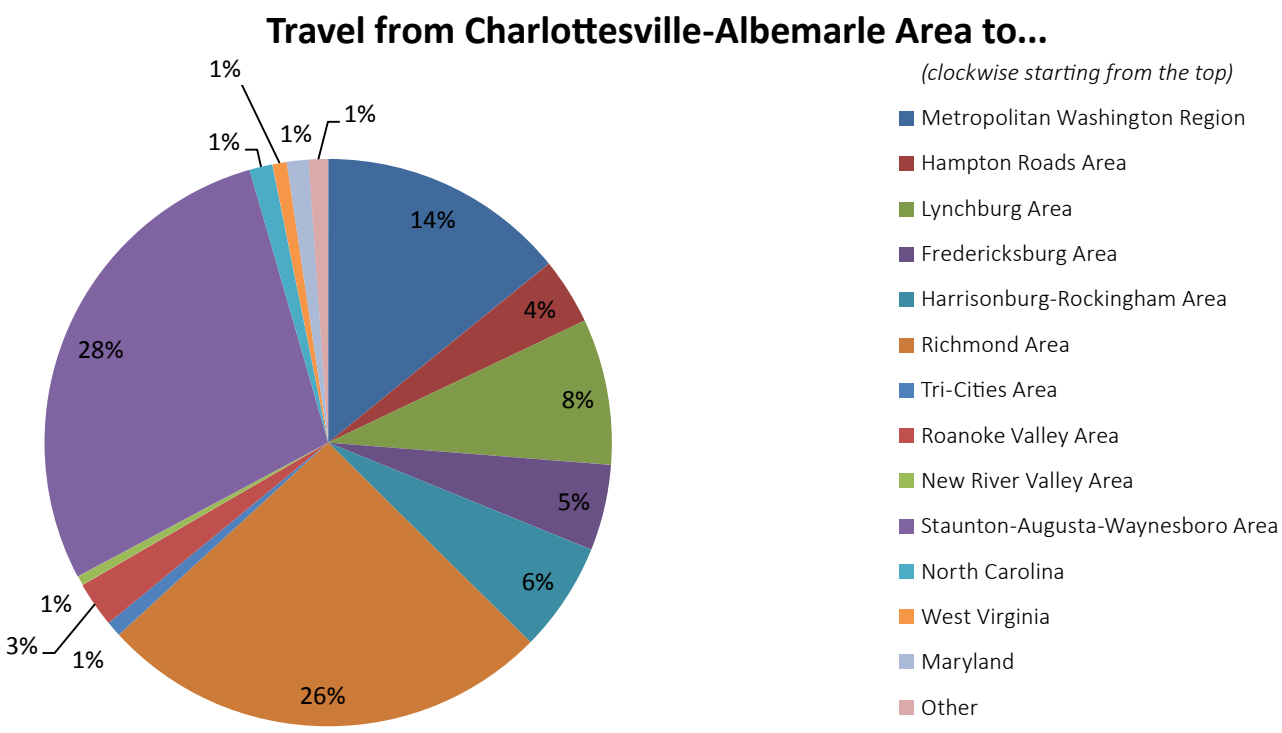
- Reconstruction with added capacity
- Safety improvements
- Primary facility

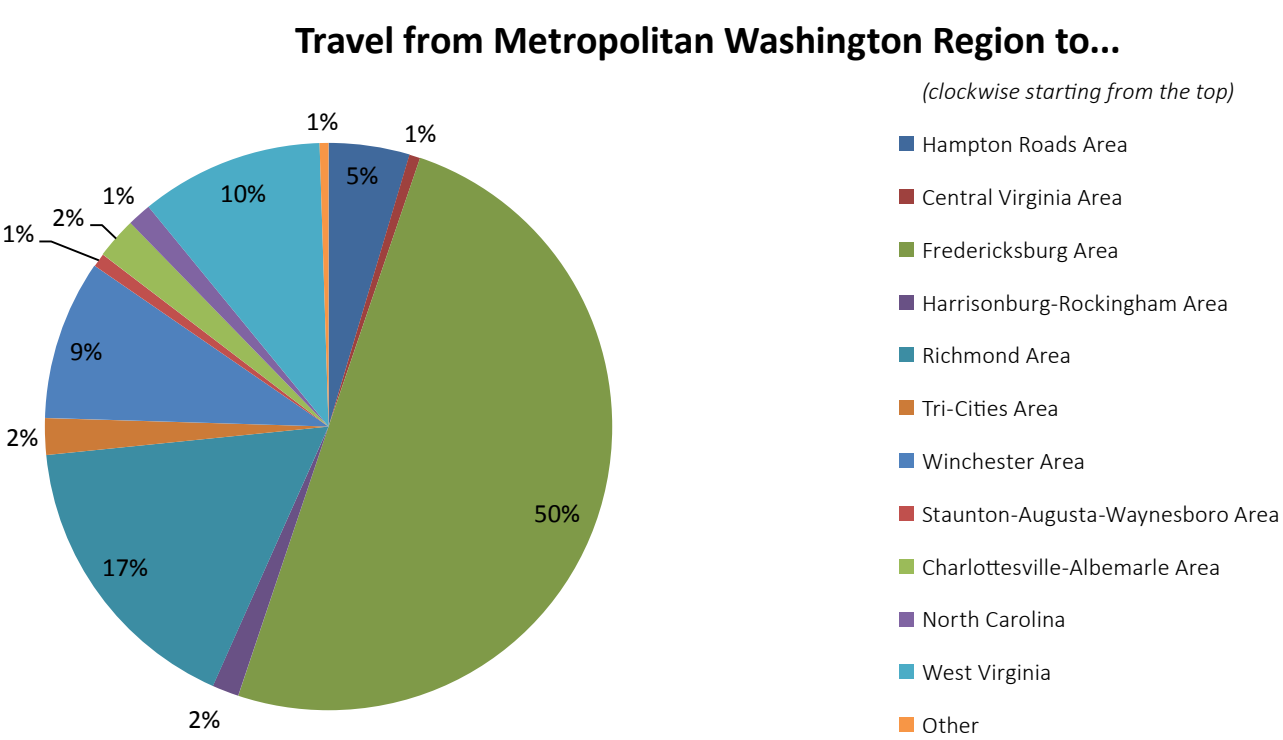


Travel Demand

Passenger Demand

Segment I3 connects the Charlottesville Area to the Metropolitan Washington Area. Travel between these two regions accounts for less than one percent of the intercity passenger travel in the Commonwealth. Travel from the Charlottesville Area is distributed fairly widely across the state and the largest markets for intercity passenger travel on this segment include the Metropolitan Washington Area (14 percent), the Lynchburg Area (eight percent), and the Fredericksburg Area (five percent). Of the intercity passenger travel originating in the Metropolitan Washington Area, only small portions are likely to use Segment I3, including two percent destined for the Charlottesville Area and one percent destined for the Lynchburg Area. Some travel destined for North Carolina or points further south could also use this segment, but other faster options (such as I-95 on Corridor K) are available depending on the ultimate destination.





I3 SEGMENT PROFILE

Freight Demand

By truck, Segment I3 carried 14 million tons of freight worth $17 billion in 2012, and is estimated to carry 18 million tons of freight worth $25 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. The jurisdictions adjacent to Segment I3 are major generators of truck freight tonnage, accounting for more than 16 percent of the corridor truck freight tonnage and more than five percent of the truck freight value on the corridor. Significant truck freight flows exist on Segment I3 between Culpeper and Fauquier Counties, Maryland, and Pennsylvania that account for between three and four percent of the total corridor truck freight tonnage.

By rail, Segment I3 carried seven million tons of freight worth $11 billion in 2012, and is estimated to carry nine million tons of freight worth $14 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. Between two and three percent of all rail freight tonnage on the corridor travels from Fauquier and Fairfax Counties.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (52% / 49%)
2. North Carolina (14% / 13%)
3. Pennsylvania (6% / 7%)
4. Maryland (6% / 6%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment I3: 17% / 16%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (51% / 53%)
2. North Carolina (12% / 11%)
3. Maryland (8% / 9%)
4. Fairfax County (8% / 10%)
5. Pennsylvania (7% / 6%)

Corridor Tonnage Destined for Segment I3: 10% / 10%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (34% / 27%)
2. Virginia (11% / 12%)
3. Pennsylvania (11% / 9%)
4. Ohio (6% / 7%)
5. Illinois (6% / 7%)

Corridor Tonnage Originating in Segment I3: 4% / 5%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Illinois and North Carolina
Ohio and North Carolina
Pennsylvania and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (41% / 39%)
2. Virginia (29% / 30%)
3. City of Norfolk* (12% / 10%)
4. Pennsylvania (6% / 6%)
5. New Jersey (4% / 5%)

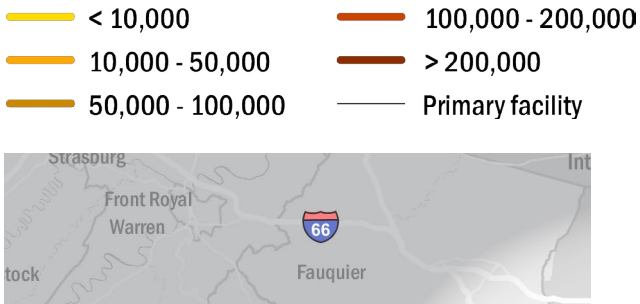
Corridor Tonnage Destined for Segment I3: 1% / 1%

Traffic Conditions

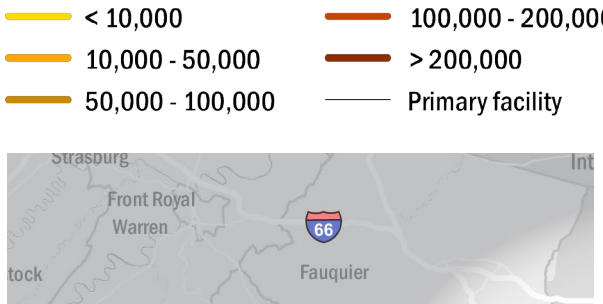
Traffic Volume and AADT

Traffic volume on Segment I3 is moderate compared with traffic volumes on the other segments of Corridor I. In Greene, Madison, and Culpeper Counties, average daily traffic volumes along US 29 range from 14,000 to 31,000 vehicles. The highest traffic volumes in Segment I3 occur along US 29 in Fauquier County, where average daily traffic volumes range from 23,000 to 50,000 vehicles. Volumes on Route 28 in Segment I3 are generally lower, with volumes between 10,000 and 16,000 vehicles per day. Traffic growth is expected throughout the segment by 2025, with the greatest increases projected to occur along US 29 in Fauquier County. No growth is projected for Route 28 in Segment I3.

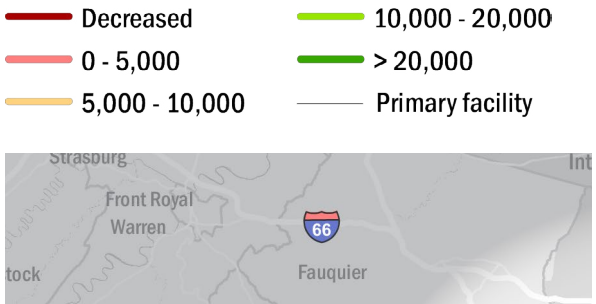
Traffic Volume 2014 (AADT)

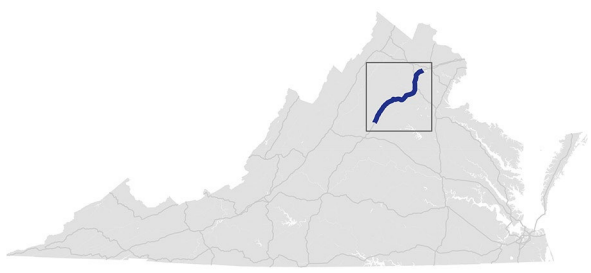


Traffic Volume 2025 (AADT)

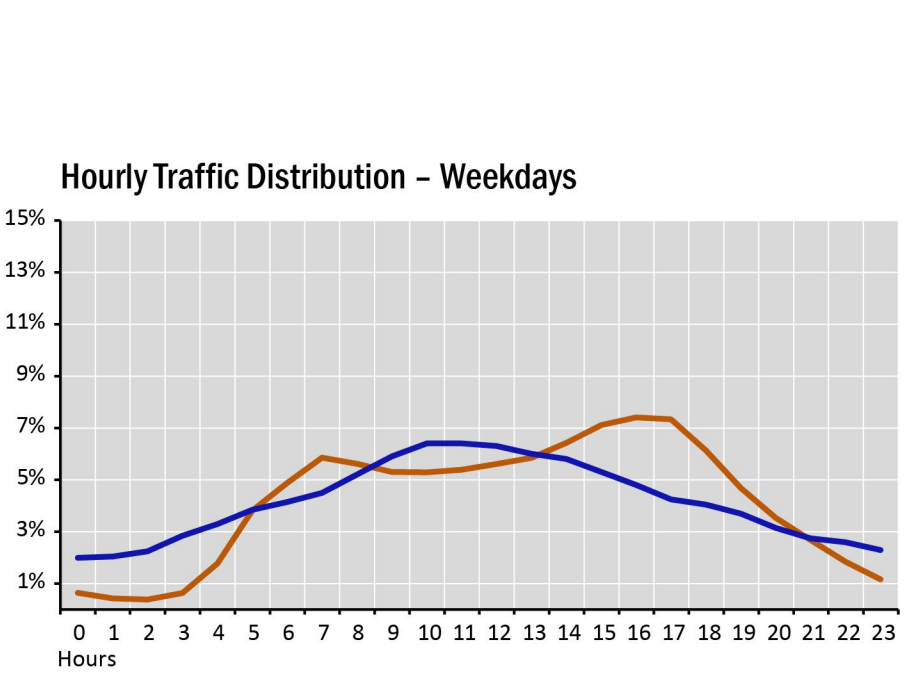


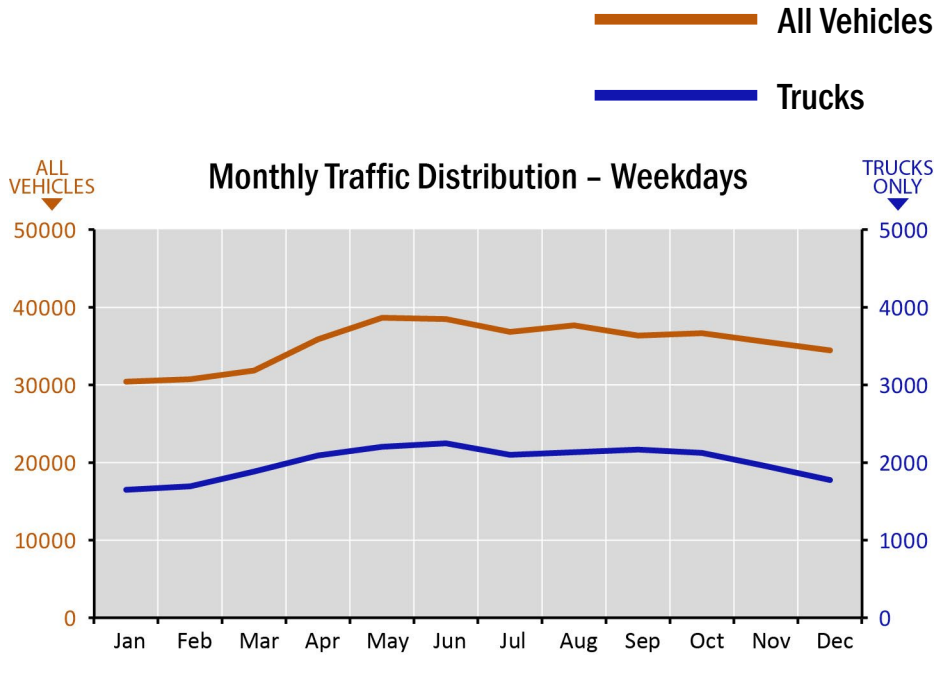
Change in Traffic Volume 2014- 2025 (AADT)

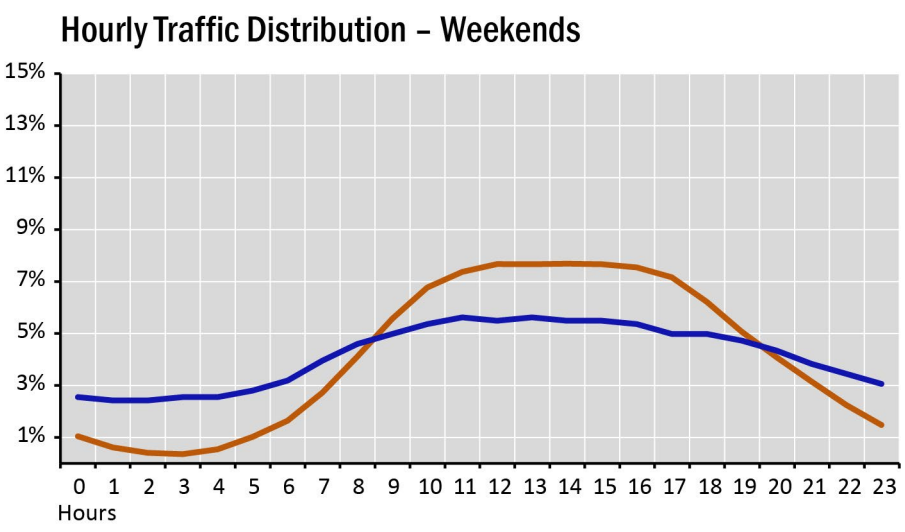


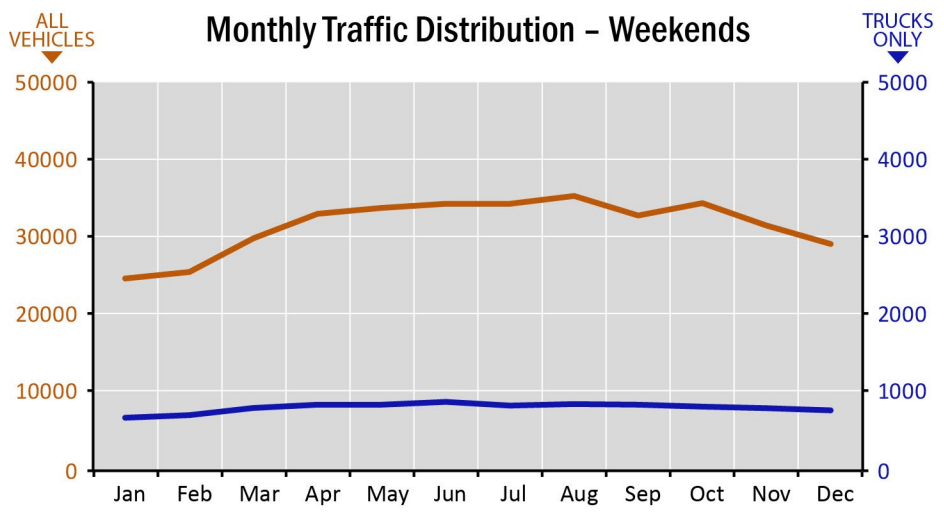


I3 SEGMENT PROFILE





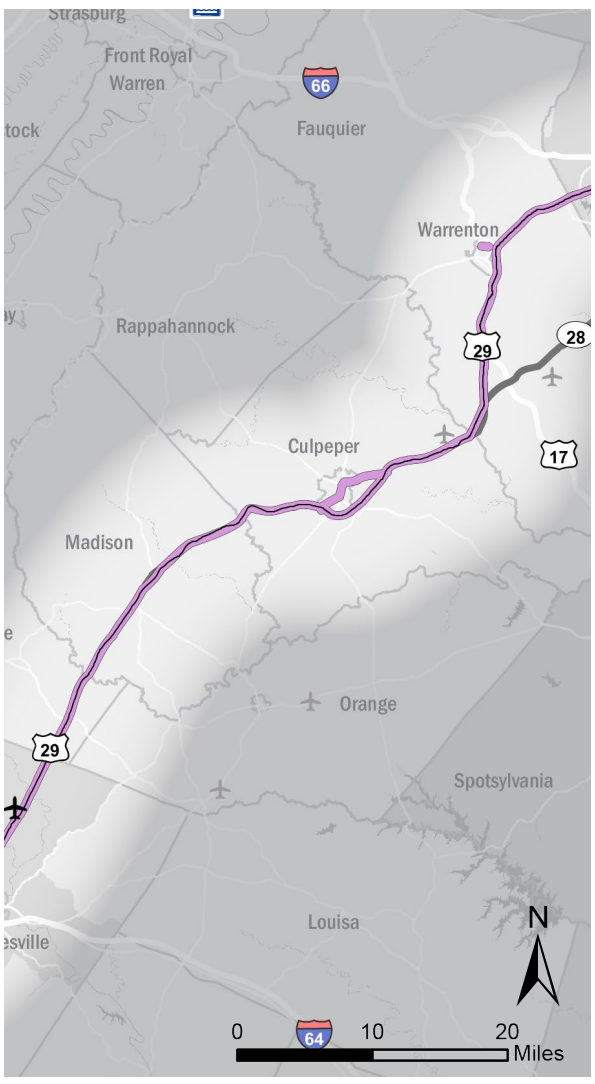




Traffic Distribution

On average, traffic on Segment I3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.4 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 5.9 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 50 percent of total daily traffic. Peaking patterns for truck traffic differ from other traffic with a single midday peak with the highest hourly flow of 6.4 percent of daily traffic between 10 and 11 a.m. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day with over 7 percent of general traffic occurring during each hour between 10 a.m. and 6 p.m. Truck traffic also has a relatively steady flow of traffic on the weekends, with a peak hour between and 11 a.m. and noon (5.6 percent of daily traffic).

Weekday traffic volumes on Segment I3 vary by as much as 27 percent throughout the year, with the highpoint in May (around 39,000 vehicles per day) and the low point in January (around 30,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the June high (around 2,200 vehicles per day) 36 percent higher than the January low (around 1,600 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 35,000 vehicles per day) are 44 percent higher than January levels (around 25,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 32 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

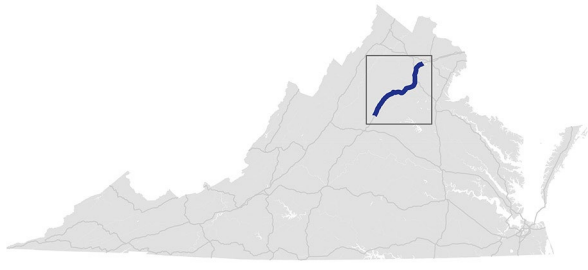


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

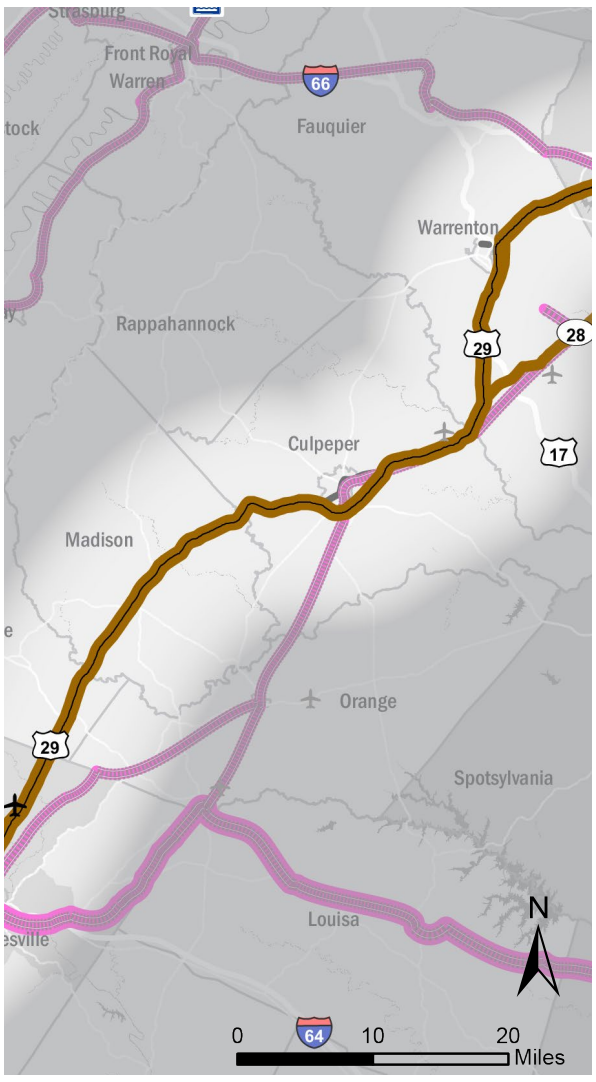
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I3 is low relative to most other segments in Corridor I. Throughout Segment I3, heavy trucks make up less than five percent of total traffic. The highest percentage of trucks occurs between Culpeper and Warrenton where US 29 runs concurrently with US 15 and US 17.



I3 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

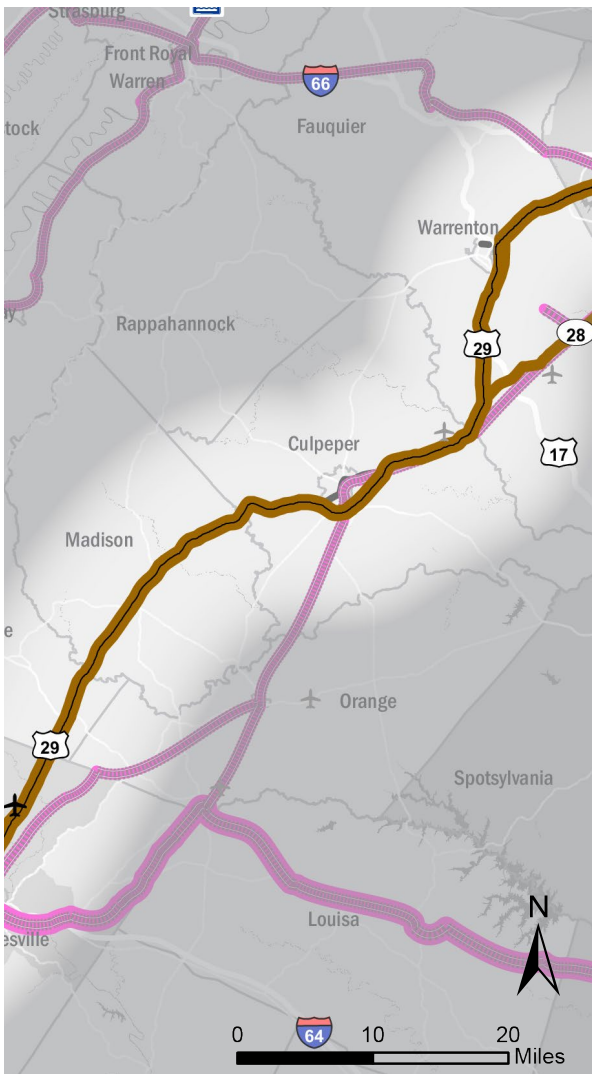


Freight Flows

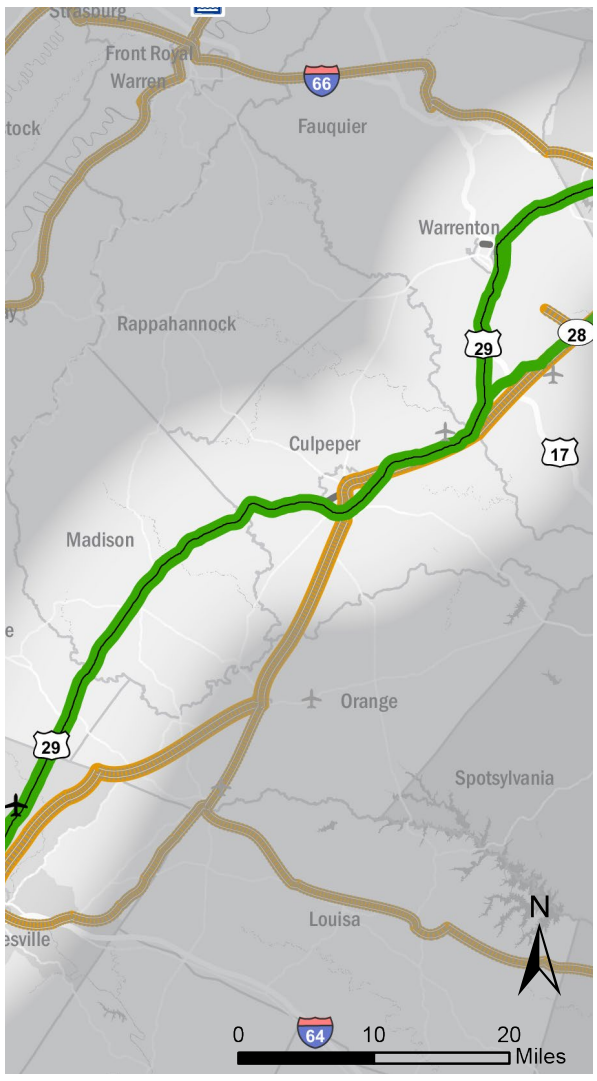
On Segment I3 west of Culpeper, freight is moved primarily by truck in terms of both tonnage and value. In total, 11 million tons (62 percent) of freight is moved through this section of Segment I3 by truck, compared to seven million tons (38 percent) by rail. In relation to value, $16.5 billion (60 percent) of freight travels by truck, compared to $11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I3 by truck is worth $1,439 while a ton of freight traveling by rail is worth $1,597. In 2025, both rail and truck freight tonnages and total values in this area of Segment I3 are expected to increase. The percentage of freight traveling by truck in terms of tonnage and value is expected to increase to 63 percent. It is anticipated that freight value per ton on trucks and rail will increase to $1,602 and $1,599, respectively.

North of the Rappahannock River, freight is moved primarily by truck with regard to both tonnage and value. In total, 14 million tons (66 percent) of freight is moved through this section of Segment I3 by truck, compared to seven million tons (34 percent) by rail. With respect to value, $17 billion (60 percent) of freight travels by truck, compared to $11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I3 by truck is worth $1,439 while a ton of freight traveling by rail is worth $1,597. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I3 are expected to increase. The percentage of freight traveling by truck is predicted to decrease by tonnage to 65 percent and increase by value to 63 percent. It is anticipated that freight value per ton on trucks and rail will decrease to $1,390 and to $1,501, respectively.

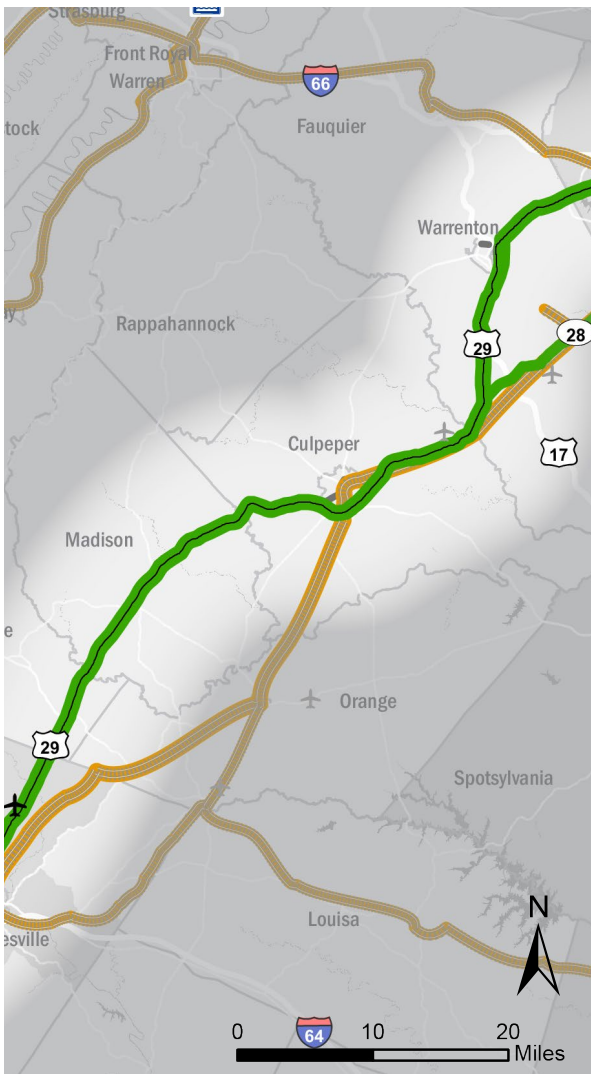
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

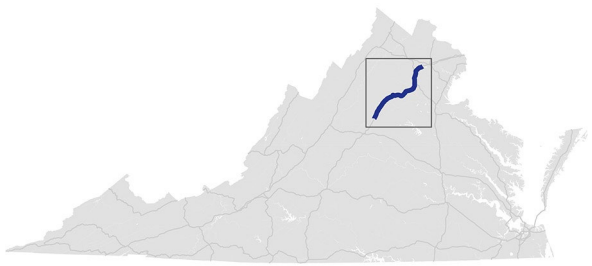
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Lynchburg to Charlottesville

Inter-City Bus
3 Trips per Day
1:15 Travel Time
$22 Est. Cost

Train
2 Trips per Day
1:13 Travel Time
$13 Est. Cost

Auto
Via Rt. 29: 1:12 Travel Time $39 Est. Cost

Charlottesville to Culpeper

Inter-City Bus
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Train
3 Trips per Day
0:52 Travel Time
$12 Est. Cost

Auto
Via Rt. 29: 1:00 Travel Time $25 Est. Cost

Charlottesville to DC

Inter-City Bus
2 Trips per Day
3:05 Travel Time
$22 Est. Cost

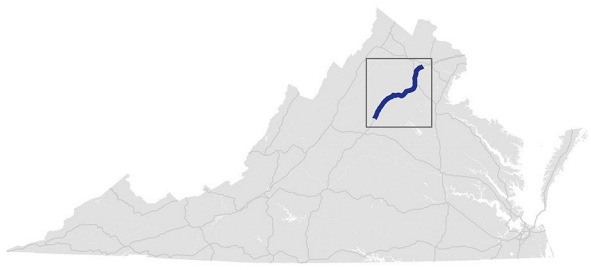
Train
4 Trips per Day
2:28 Travel Time
$25 Est. Cost

Air
3 Trips per Day
0:55 Travel Time
$215 Est. Cost

Auto
Via Rt. 29 / I-66: 2:14 Travel Time $65 Est. Cost

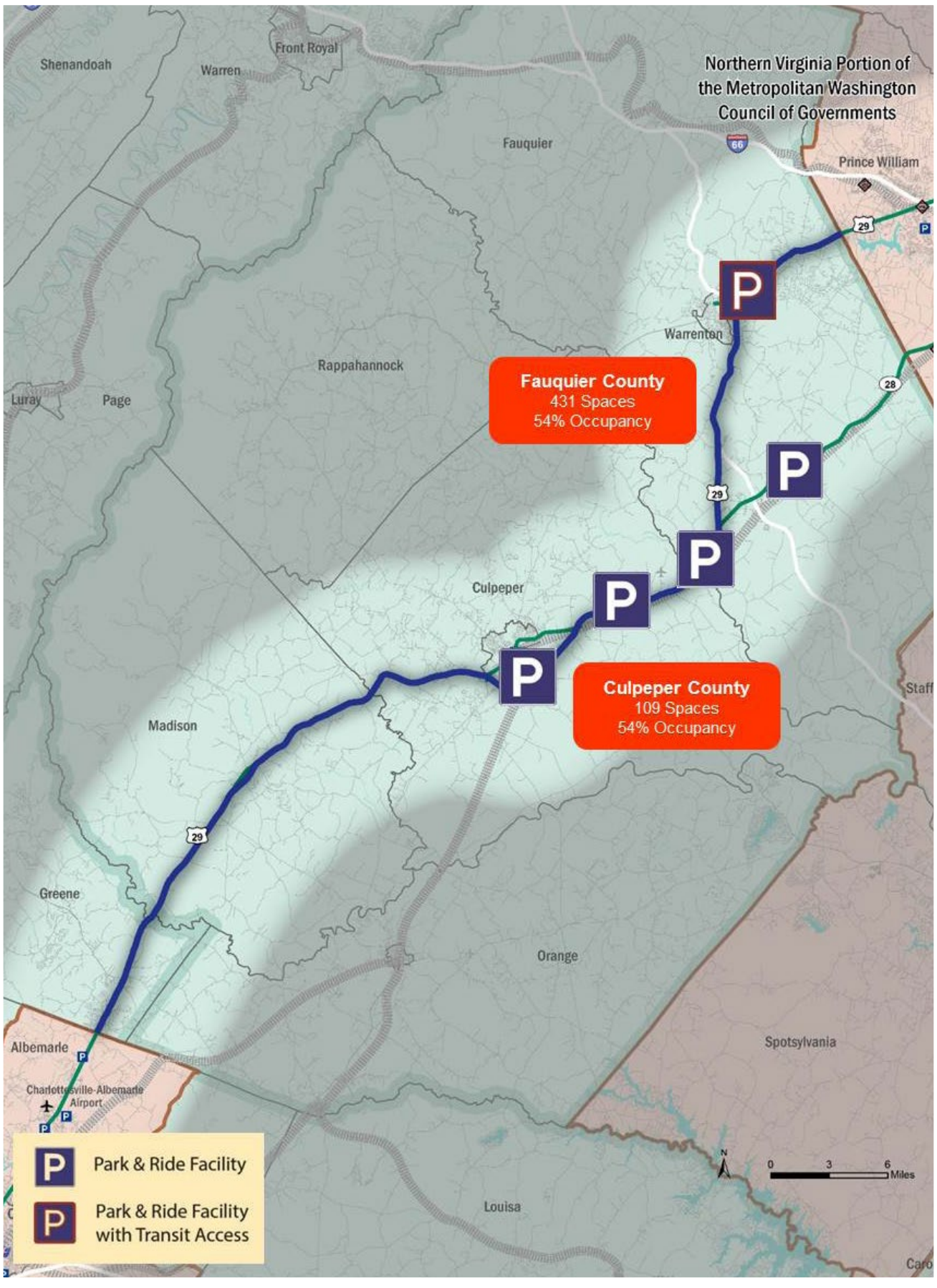
Park-and-Ride

Within Segment I3, commuters can use several Park-and-Ride locations. Fauquier County has the most Park-and-Ride locations, the highest number of Park-and-Ride spaces, and the highest utilization rate of spaces available in the region, though only three of its seven Park-and-Ride locations serve the Seminole Corridor. No county within Segment I3 has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



Passenger trips on Segment I3 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Route 28 serves as a parallel highway facility for inter-city traffic north of Culpeper. Amtrak offers service to the corridor from Culpeper, which serves the segment with its Northeast Regional and Crescent Routes. Near the northern end of the segment, VRE provides service to Northern Virginia and Washington, DC from Manassas. Automobile trips on this segment to destinations like Charlottesville, Washington, DC, Lynchburg, and Danville are typically less expensive by alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile) and are also comparable in terms of travel time, although the alternative modes are limited by the frequency of service. Air travel along the corridor is much faster than any other mode, but far more expensive.

Park and Ride Facitilities



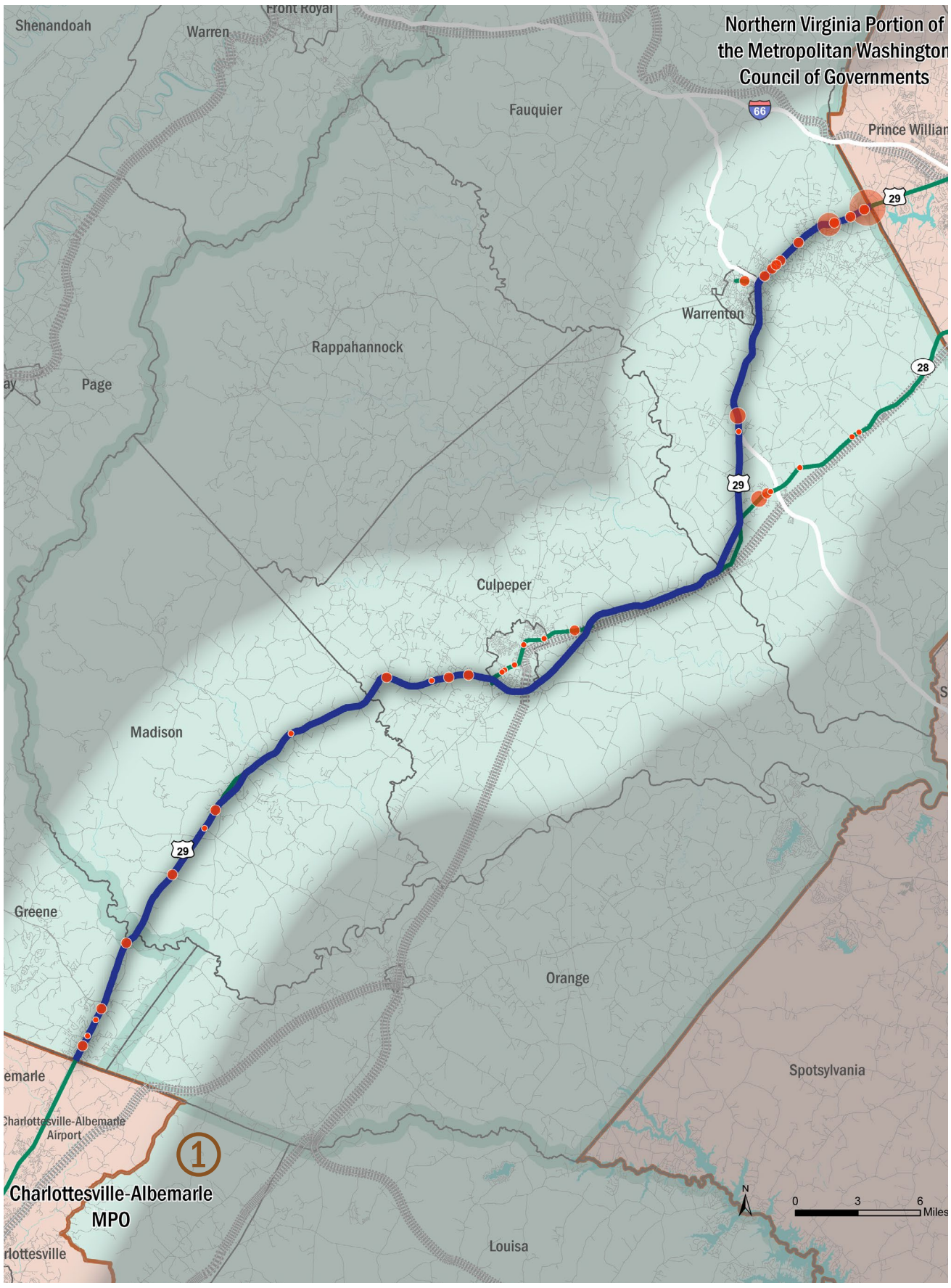
I3 SEGMENT NEEDS

Safety

Performance Metrics:

Number of Severe Crashes	259
Severe Crashes/Million VMT	2.3
Number of Railroad Crashes	1

Between 2010 and 2012, 259 severe crashes occurred on Segment I4, resulting in one of the highest crash rates for CoSS segments statewide. The areas along Segment I3 with the highest concentrations of severe crashes are located in the northern half of the segment. In Fauquier County near Bealeton, 24 collisions took place along a stretch of Route 28 (Catlett Road), approximately 0.8 miles long, between Marsh Road and Schoolhouse Road; of the 24 collisions, 13 occurred at the intersection with Schoolhouse Road. On US 29 (South Lee Highway) in Fauquier County, there were 29 crashes that occurred over a 1.4 mile span north of the intersection of US 17, US 29, and US 211. Farther north along US 29 (South Lee Highway), there were 26 incidents within 0.4 miles of the intersection of US 29 and Route 600 (Beverley's Mill Road); of the 26 incidents, 19 occurred at the intersection. Even farther north on US 29, 31 crashes took place within 0.4 miles of the intersection with Route 215 (Vint Hill Road); a total of 25 of the 31 crashes occurred at the intersection.

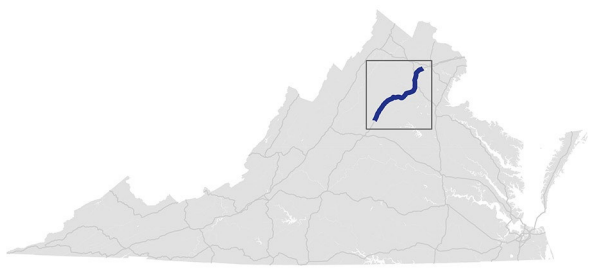


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

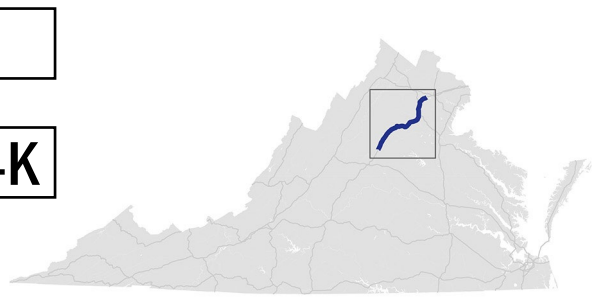


I3 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	15
Freight Ton Hours of Delay per Mile	11.4K



Passenger Delays

Passenger congestion on Segment I3 is similar to the southern half of the corridor, with daily delays of around 2,500 person-hours. There are several locations along the corridor segment where passenger delays are in excess of 100 person-hours per mile, including:

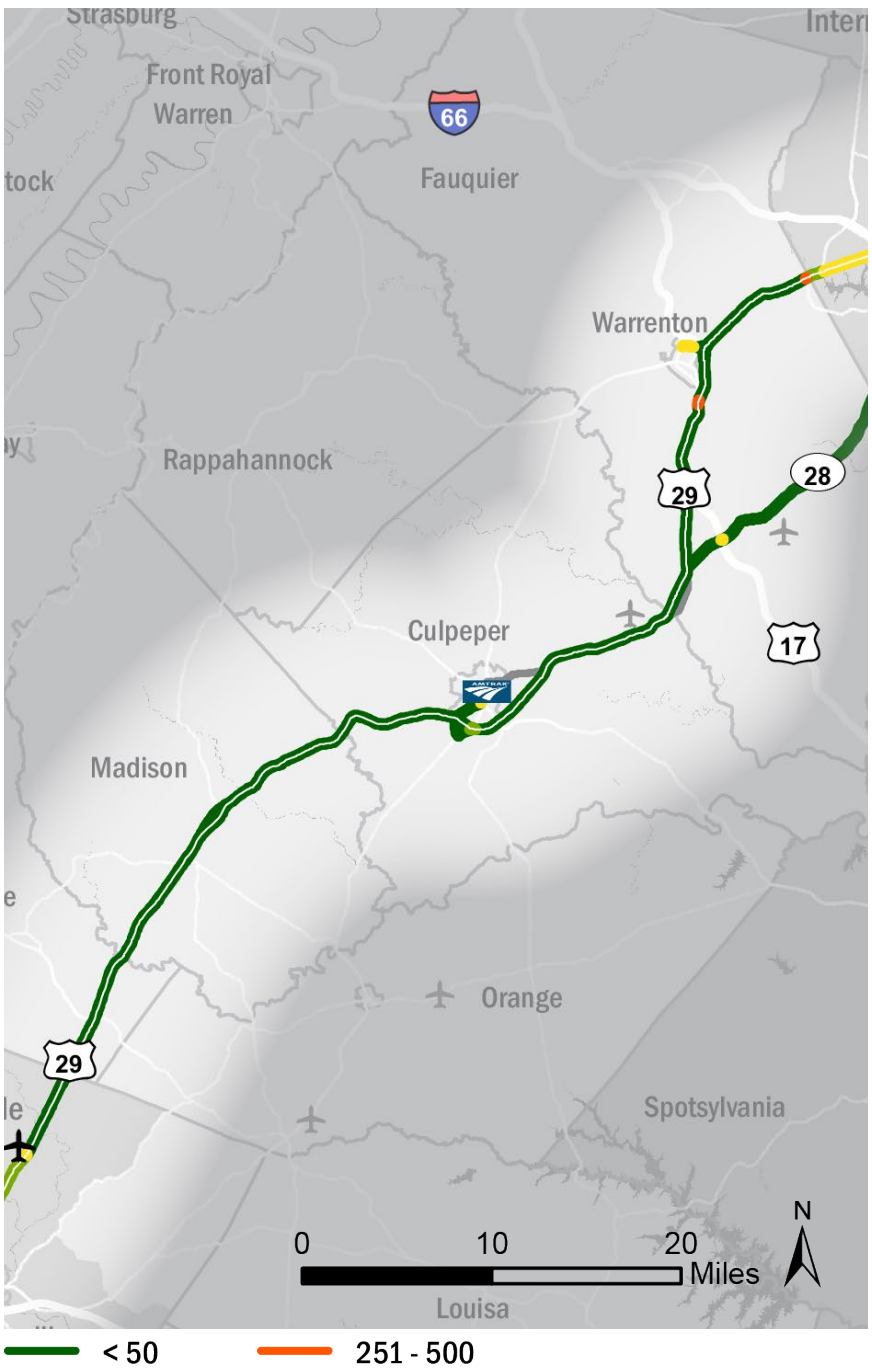
- US 29 Business between Route 3 and US 522 in the Town of Culpeper;
- US 29 around the interchange with US 17 south of Warrenton in Fauquier County;
- Route 28 at US 17 around Bealeton in Fauquier County;
- US 29 Business/US 211 between US 17 Business and US 29 in the Town of Warrenton; and
- US 29 near the border with Prince William County.

Peak-period passenger delays account for 40 percent of daily congestion, which is average for the peak-period share of congestion on CoSS segments.

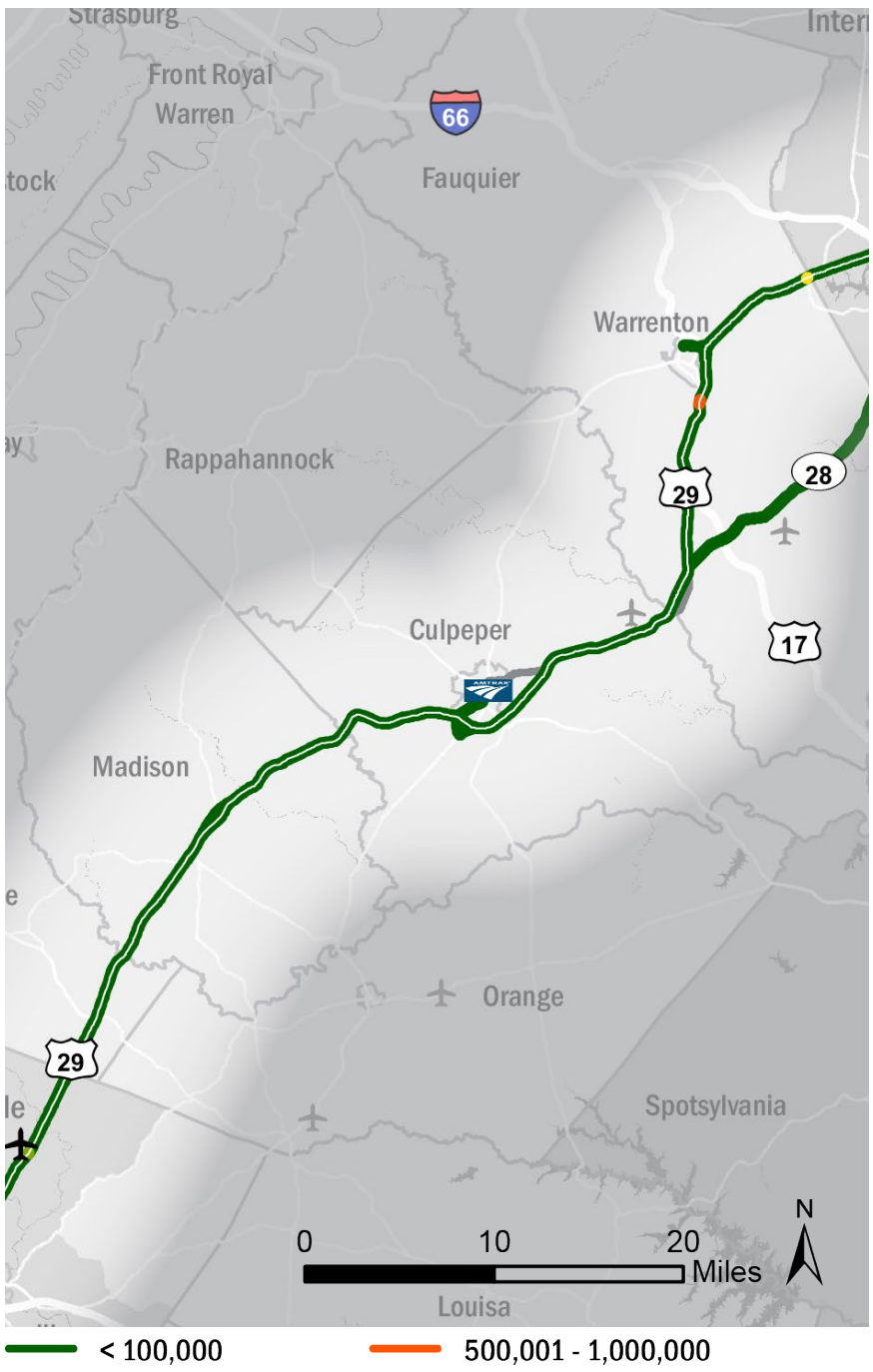
Freight Delays

The total freight delay on Segment I3 is the highest on the Seminole Corridor, although, on average, such delays are similar to the southern half of the corridor, with an average of 11,400 ton-hours per mile of delay daily. Freight congestion along much of the corridor segment is minimal. However, delays exceed 250,000 ton-hours per mile in two locations in Fauquier County: near the border with Prince William County and near the interchange with US 17 Business south of Warrenton. Peak-period freight delays account for just 21 percent of daily congestion, which is considerably less than the average for the peak-period share of congestion on CoSS segments.

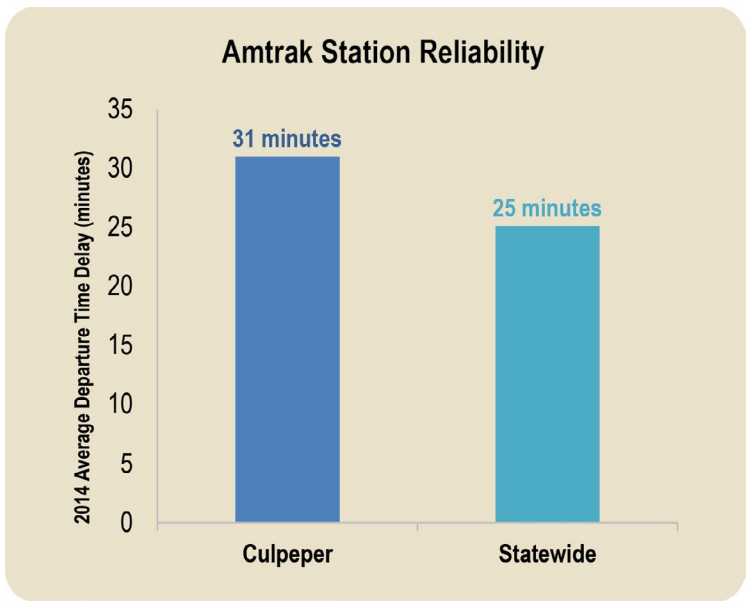
Daily Person Hours of Delay Per Mile



Daily Freight Ton Hours of Delay Per Mile



Reliability



Weekday Peak Reliability

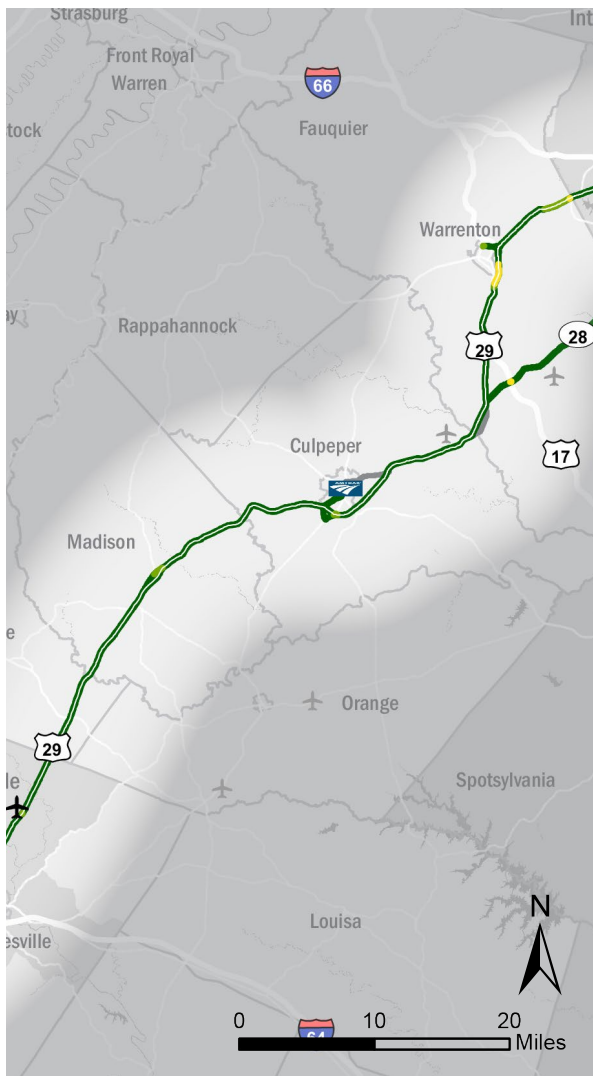
Reliability of travel during the peak period on a typical weekday on Segment I3 ranges from 0.00 to 0.59 in terms of reliability index, with an average value of 0.10. None of the locations along Segment I3 have reliability index values exceeding the statewide threshold.

Weekday Reliability

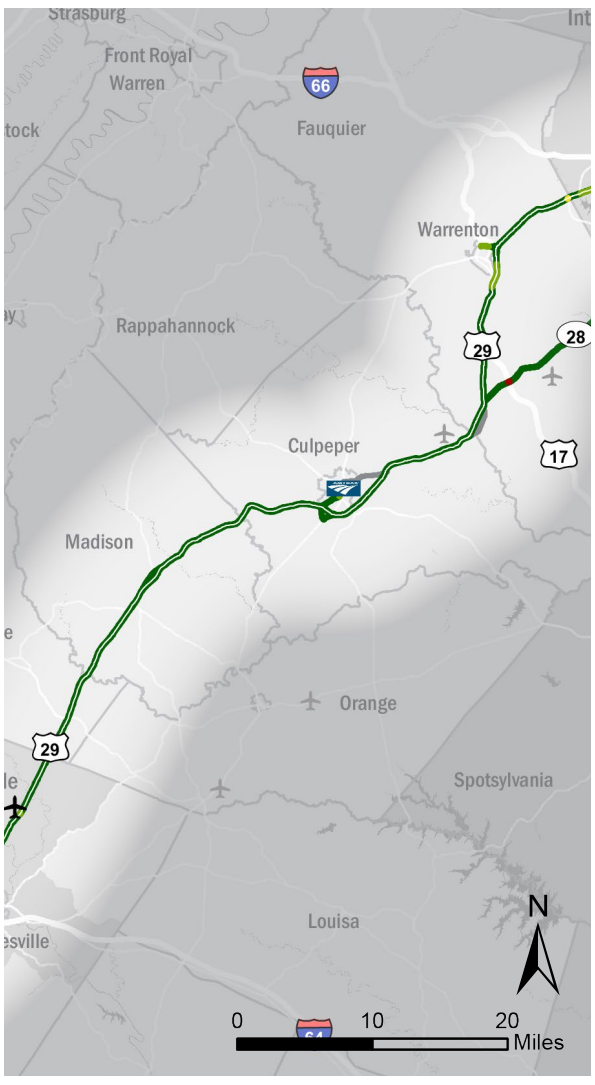
Reliability of travel during a typical weekday ranges from 0.00 to 0.42 in terms of reliability index, with an average value of 0.09. The only location where the weekday reliability index value exceeds the statewide threshold is a short stretch along Route 28 at US 17 in Fauquier County.

Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 0.83 in terms of reliability index, with an average value of 0.09. The only location where the weekend reliability index value exceeds the statewide threshold is a short stretch along Route 28 at US 17 in Fauquier County.





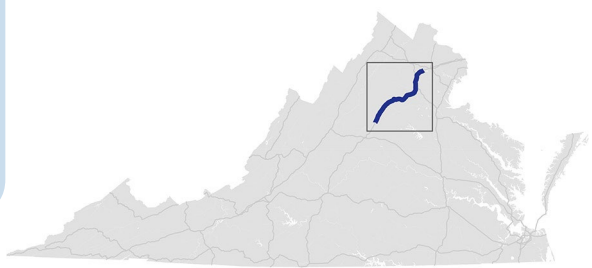


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

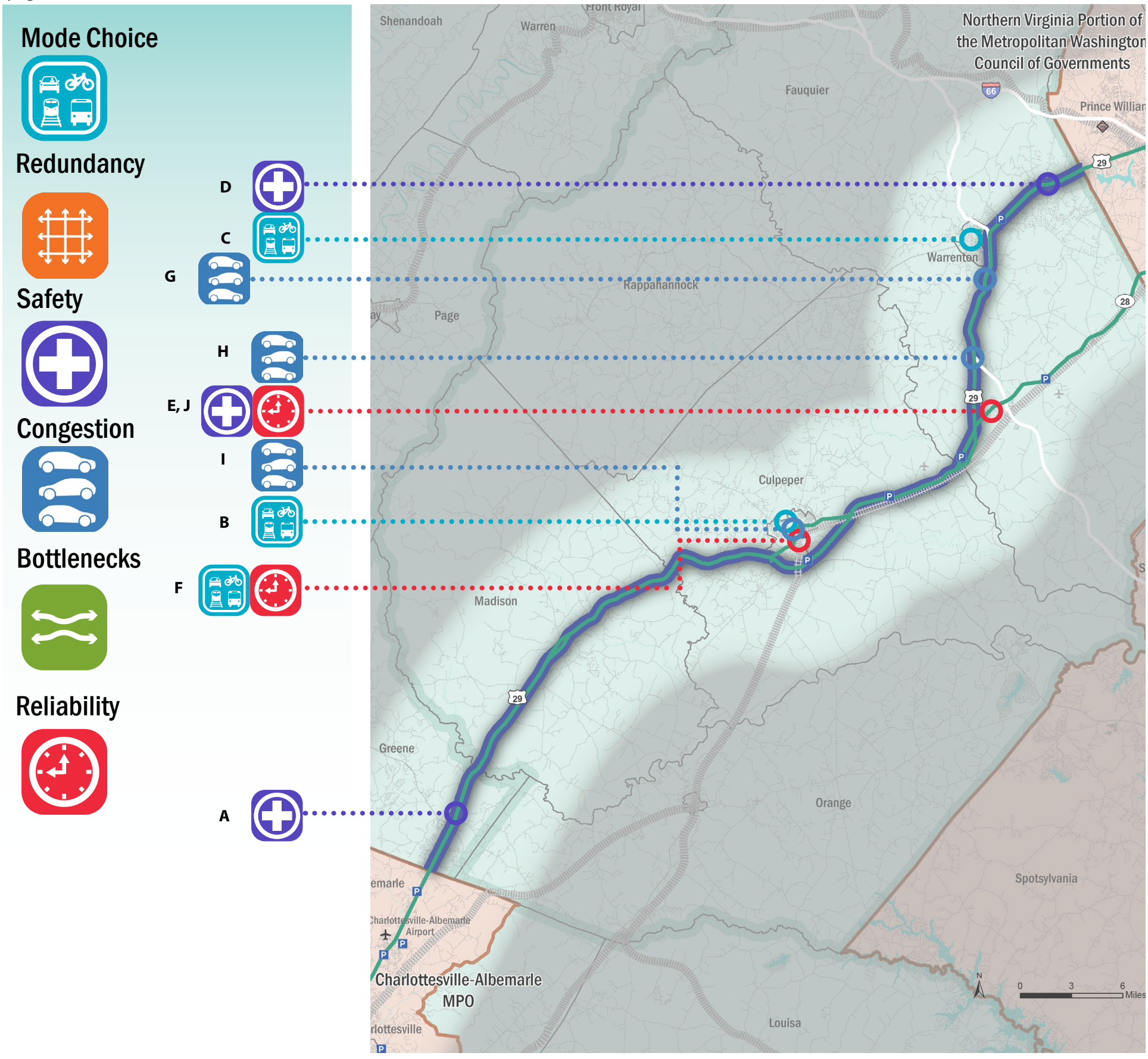
Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

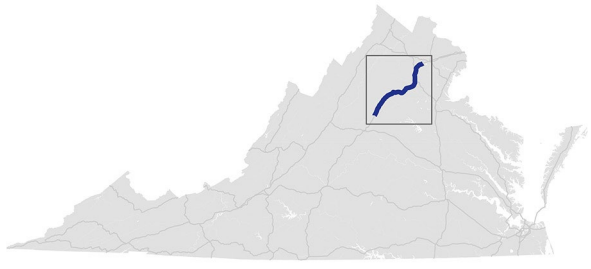
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



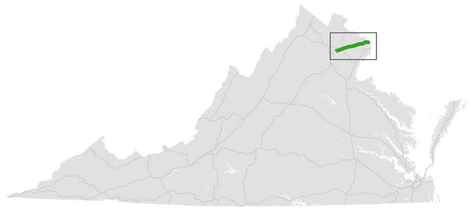


I3 SEGMENT NEEDS

Summary of Needs - I3 Segment

A.	Safety concerns at the intersection of US 29 and US 33 in Greene County
B.	No intercity bus service to Culpeper
C.	No intercity bus service to Warrenton
D.	VA 28 between US 29 and US 17 near Bealton: 24 severe crashes
E.	US 29 between US 17 and Vint Hill Rd east of Warrenton: 101 severe crashes
F.	Unreliable Amtrak service from Culpeper station. Average departure delay is 31 minutes totaling over 3,600 person-hours of delay from this segment.
G.	Congestion issue at US 29/US 17 and US 17 Business south of Warrenton
H.	Congestion issue at US 29 and US 17 in Opal
I.	Congestion issue on US 29 Business in Culpeper between Colonel Jameson Boulevard and VA Route 3/US 522 (Germanna Highway)
J.	Reliability issue at US 17 and VA Route 28

II. Segment I4



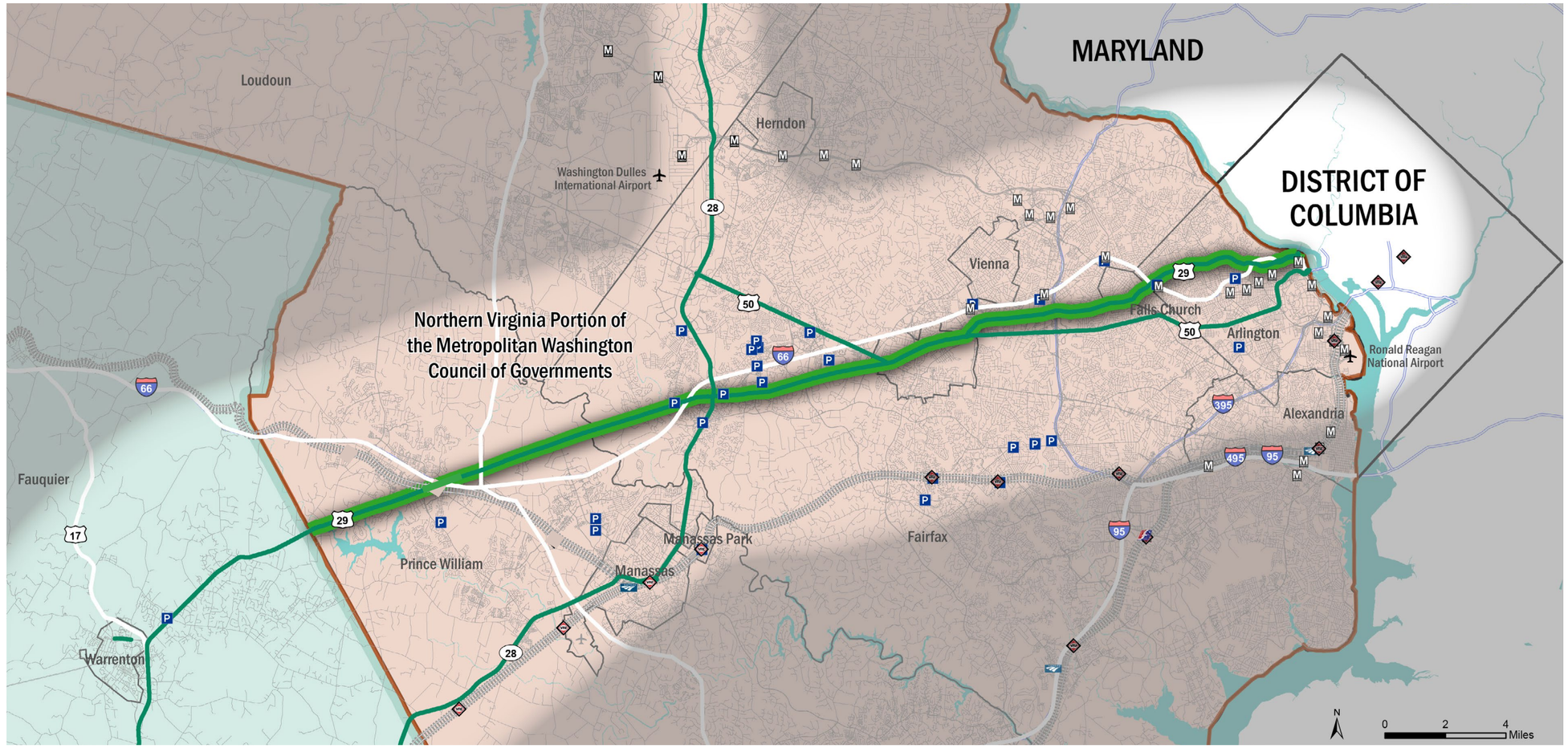
Corridor Segment I4 Components

- US 29
- US 50
- Route 28
- Metrorail Orange Line
- Metrorail Silver Line
- Virginia Railway Express
- Amtrak
- Washington Dulles International Airport

Segment I4

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area



I4 SEGMENT PROFILE

Segment I4 begins Prince William County and progresses through Fairfax and Arlington Counties and the Cities of Manassas, Manassas Park, Fairfax and Falls Church to its terminus at the Potomac River. The segment lies entirely within the Northern Virginia portion of the Metropolitan Washington MPO Area. The primary facility is US 29, but includes US 28 and US 50 as parallel facilities in Segment I4. US 29 and US 50 run concurrently for a short section in the City of Fairfax.

Highway Facilities: Throughout the majority of Segment I4, US 29 is a four-lane highway. Through this segment, US 29 serves as a parallel corridor and local access route for I-66. Route 28 is a six-lane grade-separated highway north of US 29, and a four-lane highway to the south. Route 28 also serves as a parallel corridor for US 29 between the western end of Fairfax County and Fauquier County. US 50 is a parallel facility with six lanes that serves the Cities of Fairfax and Falls Church, and Arlington County, providing direct access to the District of Columbia.

Transit Services: Multiple line-haul transit options are available along US 29 in the Northern Virginia Area including:

- The Washington Metropolitan Area Transit Authority (WMATA), which operates the Metrorail Orange Line which runs parallel to I-66 from Arlington to Vienna with multiple stations and almost 9,000 Park-and-Ride spaces available. Metrorail's Silver Line (Phase I opened in 2014 and Phase II is currently under construction) connects to Dulles Airport and into Loudoun County;
- The Virginia Railway Express (VRE), which operates commuter rail service in Segment I4 on the Manassas Line. Service travels between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route, running from Washington, DC to the south along the US 29 Corridor; and
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC. Bus connections to the Metrorail system are also provided by the Fairfax Connector, Metrobus, and ART.

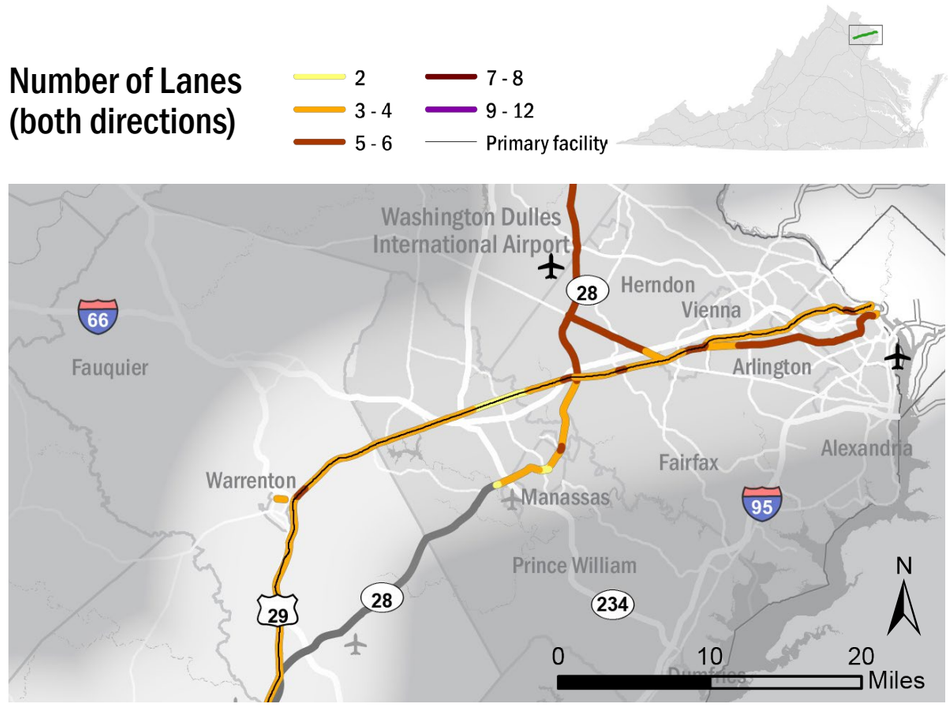
Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC, and to the northeast.

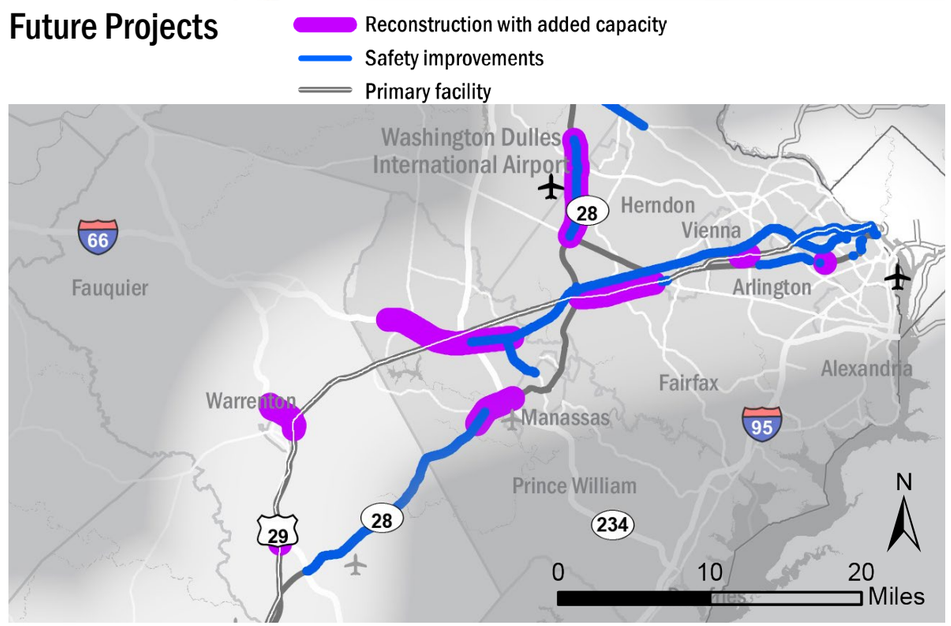
Port Facilities: No port facilities are located directly adjacent to Segment I4.

Airport Facilities: Dulles International Airport, located in Segment I4, provides commercial aviation and air cargo services. Manassas Regional Airport (Prince William County) and Warrenton-Fauquier Airport (Fauquier County) are two reliever airports in this segment.

Major planned and future projects include:

- Safety improvements at the intersection of US 29/US 50 and Route 236 in the City of Fairfax; and
- Studying construction of full intersections, ADA requirements, and turn lanes on US 29 between Bollard Street and North Oakland Street in Arlington County.



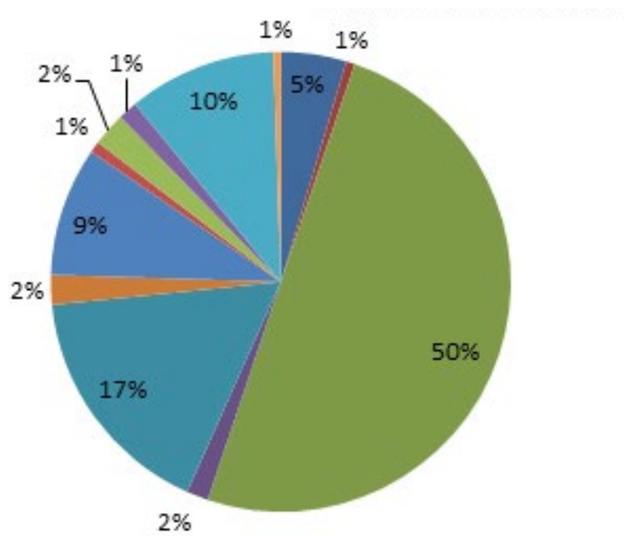


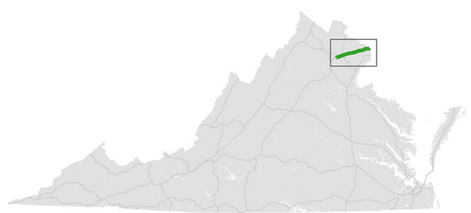
Travel Demand

Passenger Demand

Segment I4, the northernmost segment of Corridor I, exists entirely within the Northern Virginia portion of the Metropolitan Washington Area, and accommodates large amounts of traffic local to the region. Of the intercity traffic originating in this Area, two percent is destined for the Charlottesville-Albemarle Area and one percent is destined for the Lynchburg area. These trips are likely to make use of Segment I4. Other intercity travel markets may make use of Segment I4 to exit the Northern Virginia Area to the south or west, as it provides connectivity to many other corridors including I-66 (Segment H2) and US 17 (Segment A3).

Travel from Metropolitan Washington Region to...





I4 SEGMENT PROFILE

Freight Demand

By truck, Segment I4 carried 13 million tons of freight worth $17 billion in 2012, and is estimated to carry 16 million tons of freight worth $22 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. In terms of value, only three percent of the total truck freight value on the corridor originates from jurisdictions adjacent to Segment I4, but more than 18 percent of the total truck freight value is destined for this segment. Fairfax and Arlington Counties are major attractors of truck freight in Segment I4, accounting for more than 16 percent of the total truck freight value on Corridor I, with significant freight movements originating from California, Texas, and Tennessee. Truck freight originating in the City of Manassas is estimated to increase significantly by 2025, from less than one percent to three percent of total corridor value.

By rail, Segment I4 carried nine million tons of freight worth $11 billion in 2012, and is estimated to carry 11 million tons of freight worth $15 billion in 2025. Rail freight movements mainly consist of through travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. The City of Alexandria is the largest attractor of rail freight along Segment I4, accounting for one percent of the total corridor rail freight value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (52% / 49%)
2. North Carolina (14% / 13%)
3. Pennsylvania (6% / 7%)
4. Maryland (6% / 6%)
5. Culpeper County (6% / 5%)

Corridor Tonnage Originating in Segment I4: 7% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and New York
North Carolina and New Jersey
Prince William County and Pennsylvania
Culpeper County and Maryland

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (51% / 53%)
2. North Carolina (12% / 11%)
3. Maryland (8% / 9%)
4. Fairfax County (8% / 10%)
5. Pennsylvania (7% / 6%)

Corridor Tonnage Destined for Segment I4: 15% / 18%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (34% / 27%)
2. Virginia (11% / 12%)
3. Pennsylvania (11% / 9%)
4. Ohio (6% / 7%)
5. Illinois (6% / 7%)

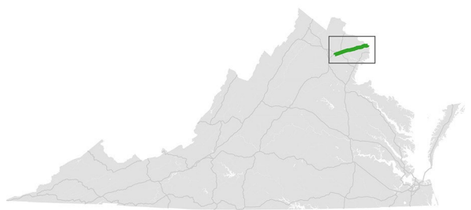
Corridor Tonnage Originating in Segment I4: 3% / 4%

Major Origin-Destination Pairs for Freight
West Virginia and North Carolina
City of Norfolk* and West Virginia
Illinois and North Carolina
Ohio and North Carolina
Pennsylvania and North Carolina

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. North Carolina (41% / 39%)
2. Virginia (29% / 30%)
3. City of Norfolk* (12% / 10%)
4. Pennsylvania (6% / 6%)
5. New Jersey (4% / 5%)

Corridor Tonnage Destined for Segment I4: 5% / 6%

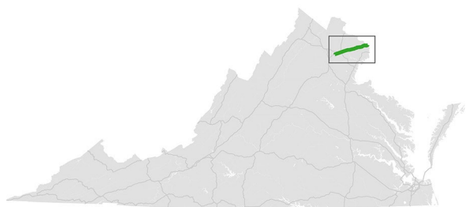


Traffic Conditions

Traffic Volume and AADT

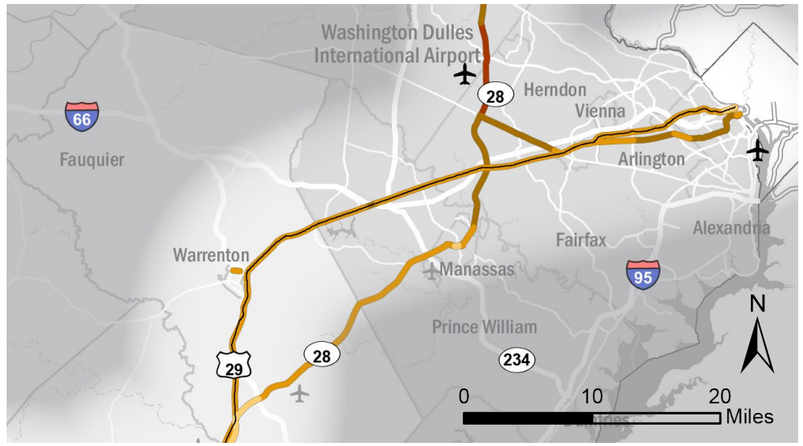
Traffic volume on Segment I4 is high relative to traffic volumes on all other segments in Corridor I, though they vary greatly depending upon location within the segment. The highest average daily traffic volumes in Segment I4 occur along Route 28 between I-66 and Route 7 where volumes can exceed 130,000 vehicles per day. Along US 29, traffic levels vary considerably, and are lowest (less than 7,000 vehicles per day) near the Potomac River in Arlington County, and are highest (greater than 60,000 vehicles per day) near the westernmost interchange with I-66 in Gainesville. Volumes on US 50 west of the City of Fairfax range from 70,000 to 98,000 vehicles per day. Traffic levels on US 50 east of the City of Fairfax are lower, ranging between 48,000 and 59,000 vehicles per day.

By 2025, the greatest traffic volume increases are projected to occur on Route 28 between I-66 and Route 7, ranging from 15,000 to 28,000 additional vehicles per day and resulting in traffic volumes up to 157,000 vehicles per day. By 2025, average daily traffic volumes along US 29 west of Route 28 are projected to be as high as 62,000 vehicles per day. Traffic volumes on US 50 are also expected to grow significantly by 2025, with the most growth (more than 10,000 additional vehicles per day) in the western portion of the segment.



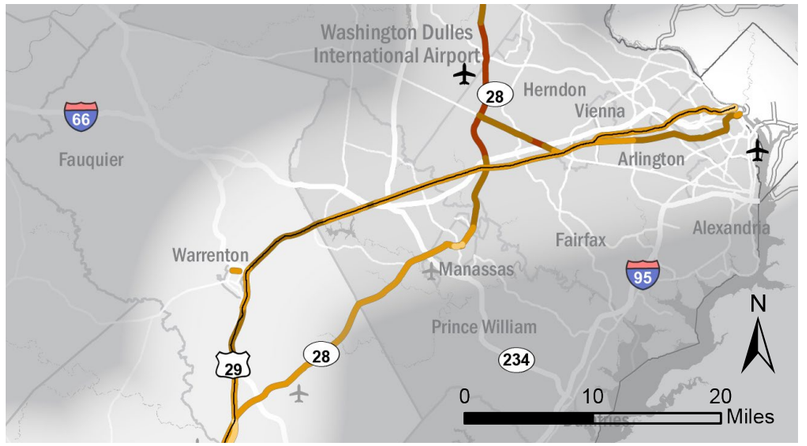
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



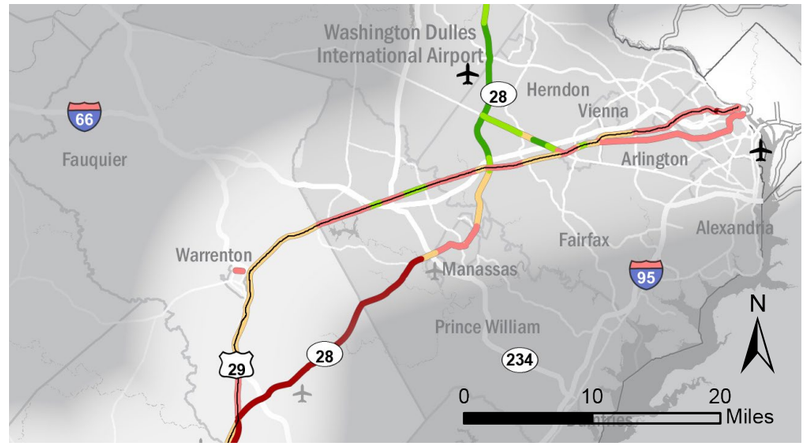
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



I4 SEGMENT PROFILE

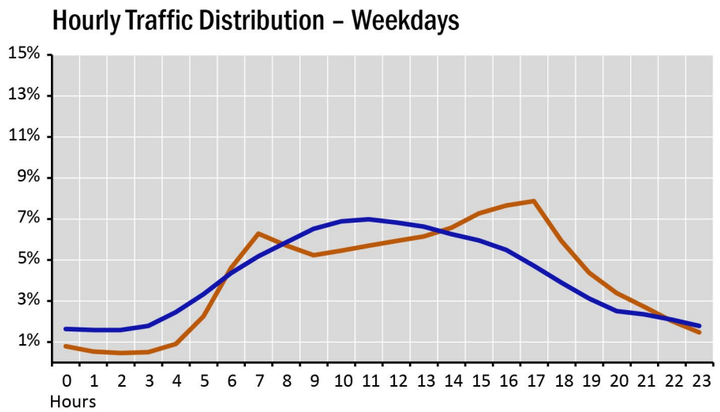
Traffic Distribution

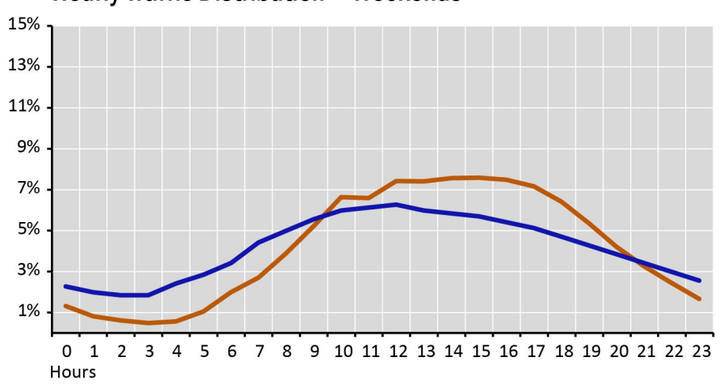
On average, traffic on Segment I4 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 7.9 percent of daily traffic and a less busy morning peak between 8 and 9 a.m. accounting for 7.0 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Truck traffic shows a distinct morning peak, with 12.7 percent of daily truck traffic occurring between 8 and 9 a.m. Weekend traffic patterns are different from the typical commute patterns, showing a single peak period during the middle of the day, with the highest peak hour flow between 1 and 2 p.m. (8.4 percent of daily traffic) for all traffic. Conversely, weekend truck traffic is very steady throughout the day.

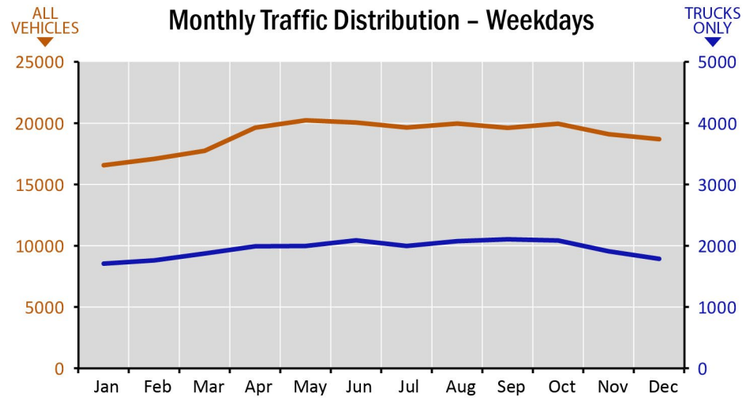
Weekday traffic volumes on Segment I4 vary by as much as 18 percent throughout the year, with the highpoint in June (around 32,000 vehicles per day) and the low point in January (around 27,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 24,000 vehicles per day) are 21 percent higher than August levels (around 20,000 vehicles per day). Since truck volumes account for a very small portion of traffic on Segment I4 (less than one percent of overall daily traffic for weekday and weekend), traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

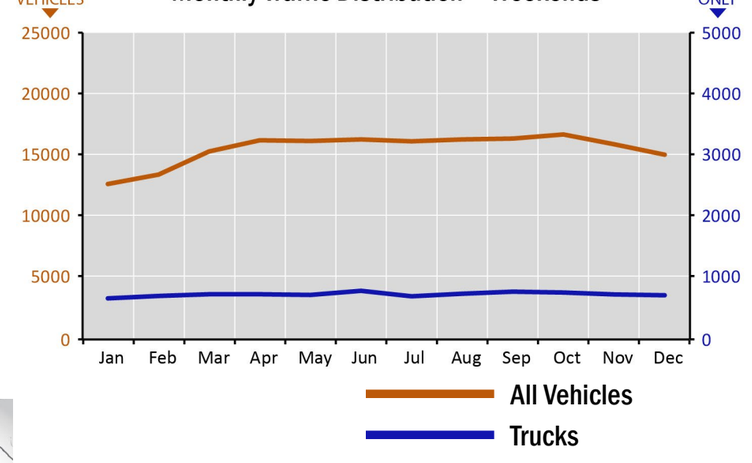
Truck Volume

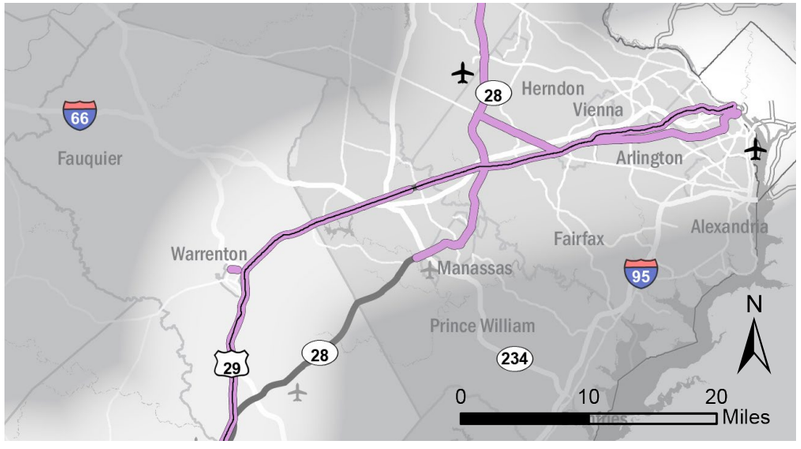
The percent of average daily traffic comprised of heavy trucks on Segment I4 is very low relative to the other segments in Corridor I. With the exception of a small section of Route 28 near Manassas, heavy trucks make up two percent or less of total traffic along Segment I4.





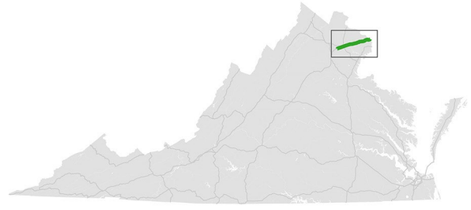






Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



I4 SEGMENT PROFILE

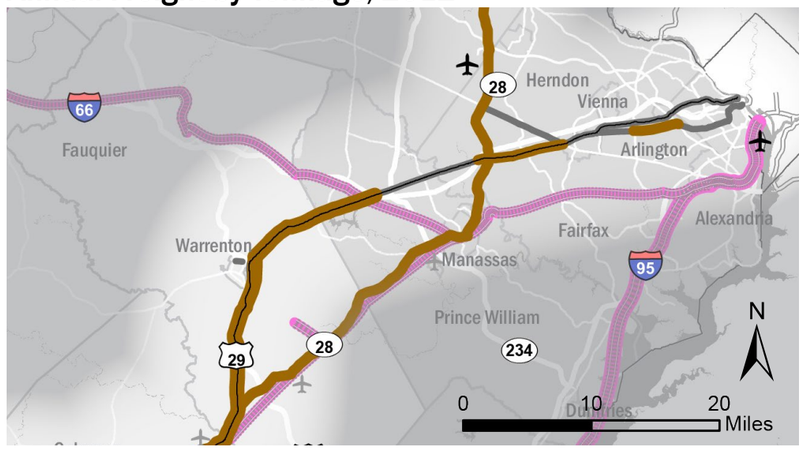


Freight Flows

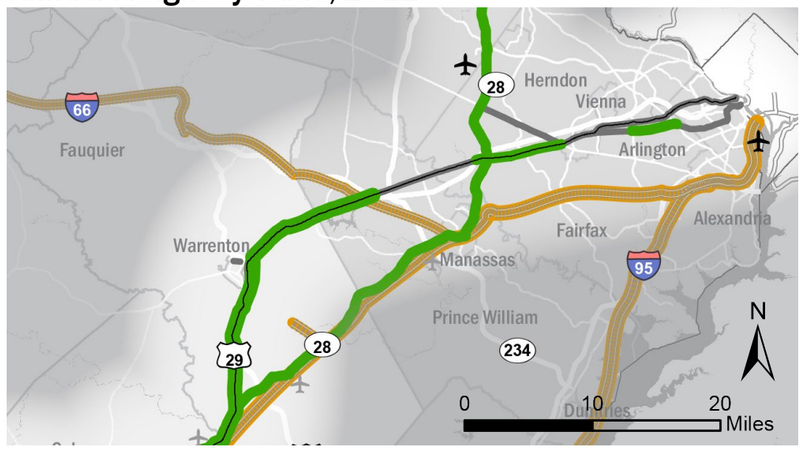
On Segment I4 near Gainesville, freight is moved primarily by truck in relation to both tonnage and value. In total, 13 million tons (59 percent) of freight is moved through this section of Segment I4 by truck, compared to 9 million tons (41 percent) by rail. With respect to value, $16 billion (59 percent) of freight travels by truck, compared to $11 billion (41 percent) by rail. On average, a ton of freight traveling through this section of Segment I4 by truck is worth $1,277 while a ton of freight traveling by rail is worth $1,292. In 2025, both rail and truck freight tonnages and total values in this area of Segment I4 are expected to increase. The percentage of freight traveling by truck in terms of tonnage is expected to remain the same and in terms of value is expected to increase to 61 percent. It is anticipated that freight value will increase to $1,392 per ton on trucks and will decrease to $1,253 on rail.

On Segment I4 near Fair Lakes (near Route 286), freight is moved primarily by rail by in relation to both tonnage and value. In total, 4 million tons (32 percent) of freight is moved through this section of Segment I4 by truck, compared to 9 million tons (68 percent) by rail. By value, $5 billion (30 percent) of freight travels by truck, compared to $12 billion (70 percent) by rail. On average, a ton of freight traveling through this section of Segment I4 by truck is worth $1,225 while a ton of freight traveling by rail is worth $1,396. This is one of the few locations in the Commonwealth where rail freight is on average more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I4 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value to 36 percent. It is anticipated that freight value will increase to $1,342 per ton on trucks and will decrease to $1,355 on rail.

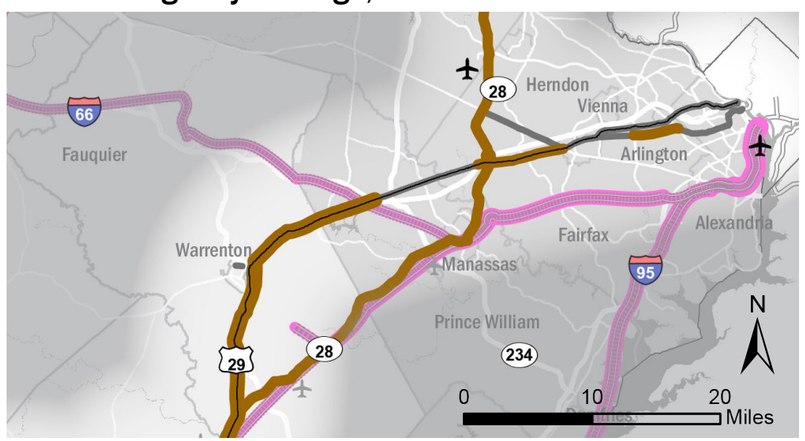
Annual Freight by Tonnage, 2012



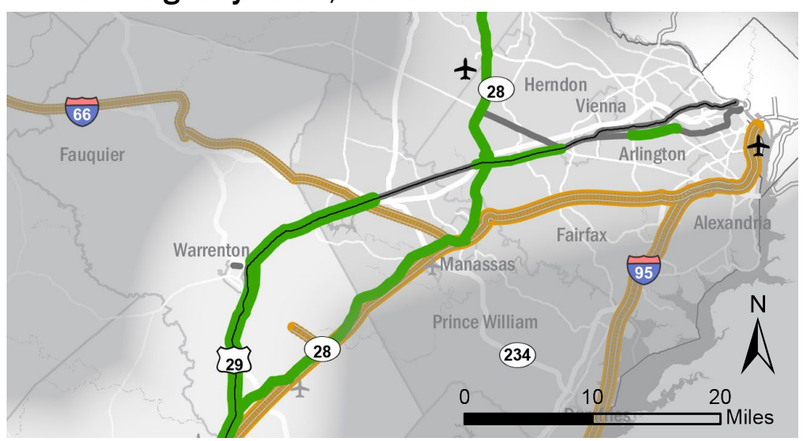
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



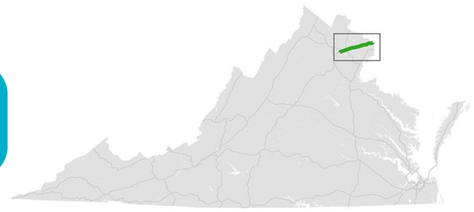
Truck Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice



Passenger trips on Segment I4 of the Seminole Corridor have several travel options, both in terms of travel path and mode choice. US 50 and Route 28 serve as parallel highway facilities for portions of the segment. Route 28 is parallel to the segment through Manassas, where it turns northward to Dulles International Airport and Sterling. US 50 serves as a parallel facility between Chantilly and the District of Columbia; west of Chantilly, US 50 heads north and west to Winchester (as part of Corridor H), while the Seminole Corridor turns southwest toward Culpeper.

Many transit options are available within Segment I4, mostly providing connections within the Northern Virginia Area or to neighboring DC. Transit services in the segment include:

- Metrorail's Orange Line, which runs parallel to US 29 from Washington, DC to Vienna with multiple stations;
- Metrorail's Silver Line, which runs parallel to US 29 through the City of Falls Church, before diverting to the northern areas of Tysons Corner, Reston (Phase I), Dulles Airport, and Loudoun County (Phase II);
- VRE, which operates commuter rail service in Segment I4 on the Manassas Line and provides service between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route running from Washington, DC to the south along the Seminole Corridor; and
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC and Loudoun County Transit. Bus connections to the Metrorail system are also provided by the Fairfax Connector, Metrobus, and ART.

Comparable Travel Options

Lynchburg to DC

Inter-City Bus	Train	Air
2 Trips per Day 4:40 Travel Time $44 Est. Cost	5 Trips per Day 3:42 Travel Time $32 Est. Cost	6 Trips per Day 2:55 Travel Time $360 Est. Cost

Auto

Via Rt. 29 / I-66: 3:13 Travel Time $101 Est. Cost

Manassas to DC

Inter-City Bus	Train
0 Trips per Day 0:00 Travel Time $0 Est. Cost	11 Trips per Day 1:09 Travel Time $10 Est. Cost

Auto

Via Rt. 29: 1:19 Travel Time $17 Est. Cost
Via Rt. 28 / Rt. 29 / Rt. 50: 1:03 Travel Time $17 Est. Cost

Charlottesville to DC

Inter-City Bus	Train	Air
2 Trips per Day 3:05 Travel Time $22 Est. Cost	4 Trips per Day 2:28 Travel Time $25 Est. Cost	3 Trips per Day 0:55 Travel Time $215 Est. Cost

Auto

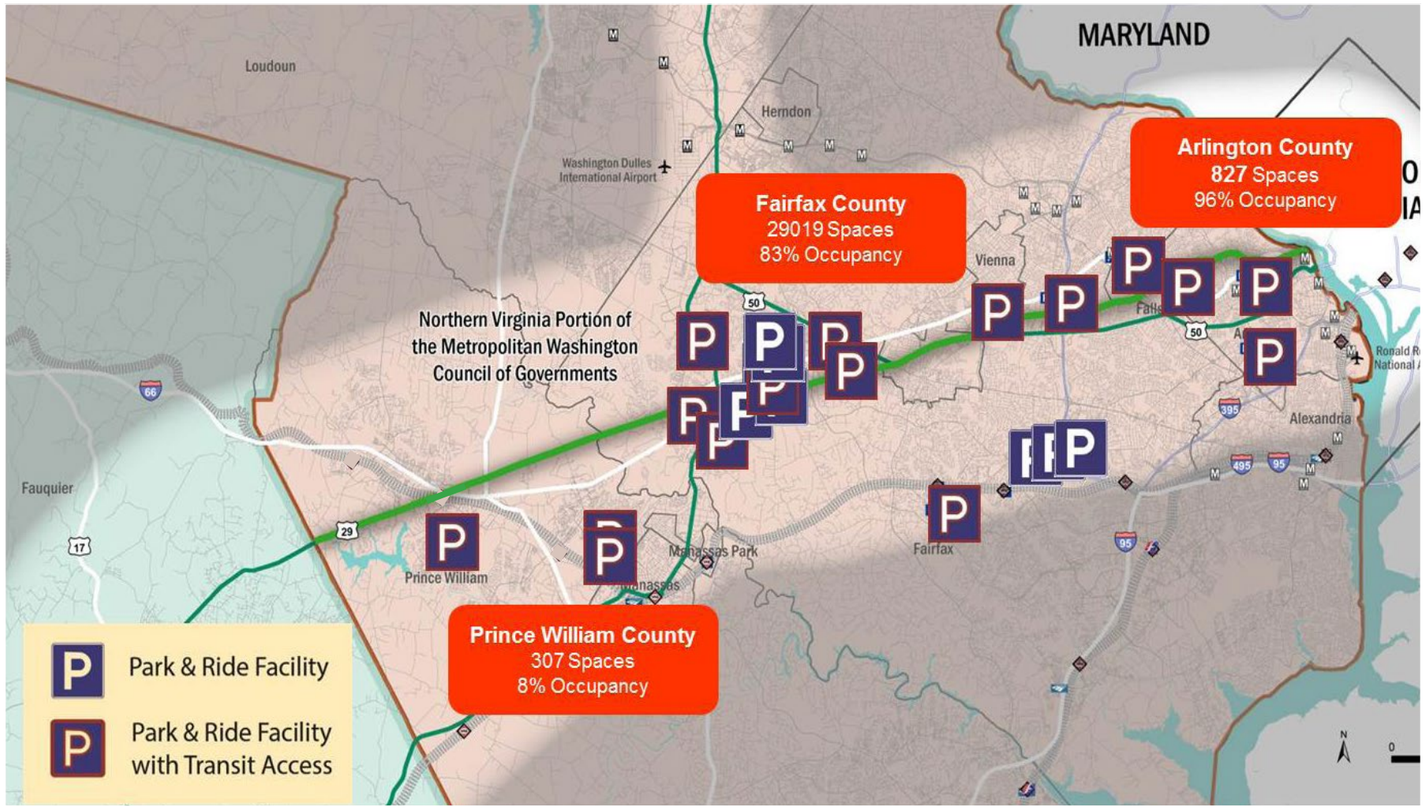
Via Rt. 29 / I-66: 2:14 Travel Time $65 Est. Cost

Danville to DC

Inter-City Bus	Train
2 Trips per Day 6:10 Travel Time $64 Est. Cost	1 Trips per Day 5:10 Travel Time $106 Est. Cost

Auto

Via Rt. 29: 4:45 Travel Time $138 Est. Cost



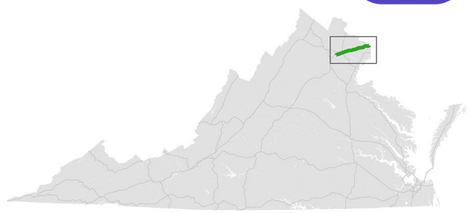
Park-and-Ride

Within Segment I4, commuters can utilize a number of Park-and-Ride locations, many of which are served by transit service. Fairfax County provides the highest number of Park-and-Ride locations and the most parking spaces in the Commonwealth, accounting for nearly half of the Park-and-Ride parking spaces in Virginia. While Arlington County has the highest utilization rate of spaces available in the segment, Fairfax (83 percent) and Prince William (80 percent) Counties also have a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.

I4 SEGMENT NEEDS

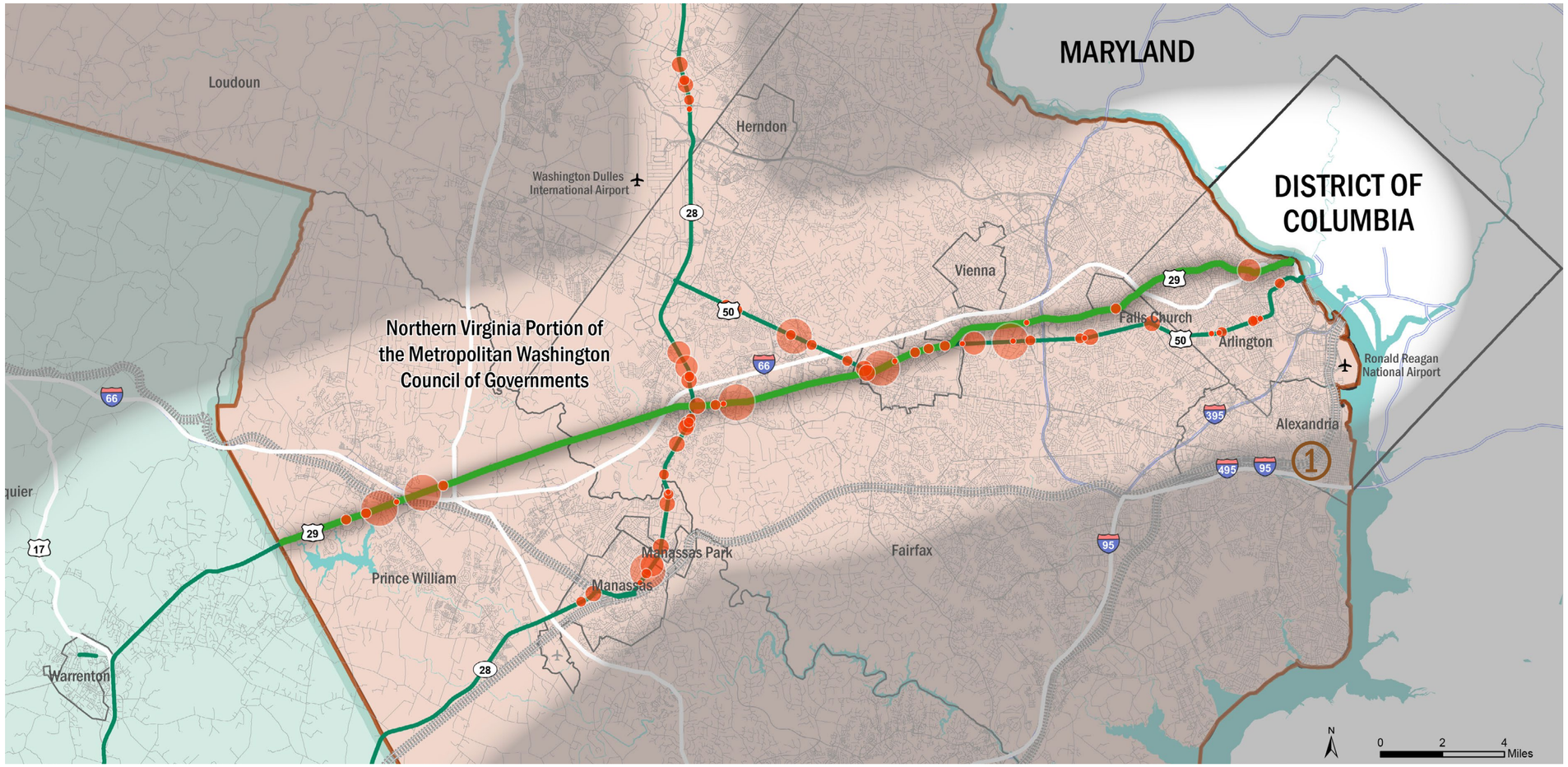
Safety

Between 2010 and 2012, 775 severe crashes occurred on Segment I4, one of the highest totals on CoSS segments statewide. There are many areas with high concentrations of severe crashes along Segment I4. In Gainesville along US 29 (Lee Highway), there were 28 collisions over 0.37 miles between Webb Drive and Logos Way. In Manassas, on Route 28 (Centreville Road), there were 66 crashes over a distance of 0.5 miles between Reb Yank Drive and Breeden Avenue, where 43 of the crashes occurred at the intersection with Liberia Avenue. On Route 28 (Centreville Road) north of Centreville, 39 incidents took place over 0.5 miles between New Braddock Road and Old Centreville Road; a total of 13 of these incidents occurred at the intersection with Machen Road. At the intersection of US 29 (Lee Highway) and Route 645 (Clifton Road) in Fairfax County, 38 collisions took place. On US 50 north of the interchange with I-66, there were 38 crashes within 0.24 miles of the intersection with Fair Ridge Drive, as noted for Segment H2. On US 50 near Merrifield, there were 32 incidents near the intersection with Prosperity Avenue.



Performance Metrics:

Number of Severe Crashes	775
Severe Crashes/Million VMT	1.7
Number of Railroad Crashes	1



Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#

I4 SEGMENT NEEDS

Congestion

Performance Metrics

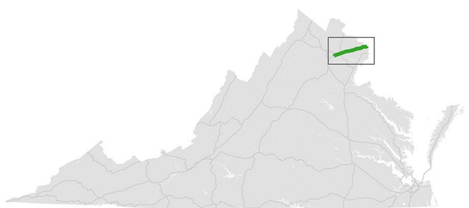
Person Hours of Delay per Mile	137
Freight Ton Hours of Delay per Mile	4K

Passenger Delays

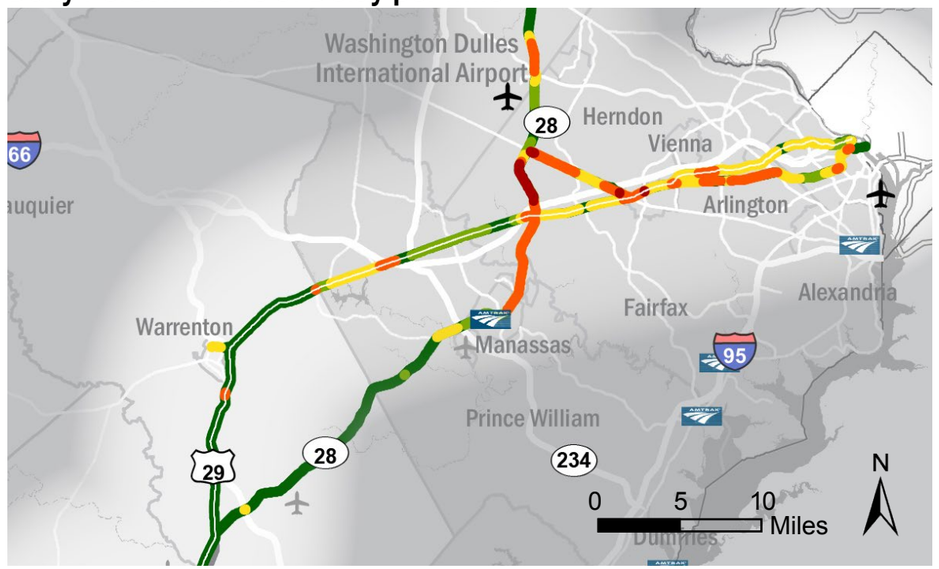
Passenger congestion along Segment I4 is far greater than the other segments in Corridor I, with nearly 23,000 person-hours of delay daily. On a per-mile basis, Segment I4 experiences some of the most severe congestion among CoSS segments, with an average passenger delay of 137 person-hours per mile. There is significant congestion on US 29 for much of its length in Segment I4, including west of I-66 in Gainesville and east of I-66 in Centreville. There are also significant passenger delays on US 50 for much of its length between Route 28 in Fairfax County and Rosslyn in Arlington County. Significant congestion is also apparent on Route 28 between Route 234 and US 50 and between the Dulles Toll Road and Route 625 in Loudoun County. The most severe congestion on Segment I4 occurs on Route 28 near the interchange with Westfields Boulevard, where delays exceed 900 person-hours per mile. Approximately one-third of the daily passenger delays are experienced in the peak period, which is considerably lower than average for the peak-period share of congestion along CoSS segments. This reflects a growing spread of congestion throughout the rest of the day in Northern Virginia.

Freight Delays

Compared to passenger delays along Segment I4, freight delays are relatively low for much of this segment. With an average delay of 4,000 ton-hours per mile, Segment I4 has the lowest level of freight congestion on Corridor I. As such, there are no locations along Segment I4 with freight delays exceeding 250,000 ton-hours per mile. Only 14 percent of the daily freight delays are experienced in the peak period, which reflects a growing spread of congestion throughout the rest of the day in Northern Virginia.



Daily Person Hours of Delay per Mile



< 50 | 251 - 500
51 - 100 | > 500
101 - 250

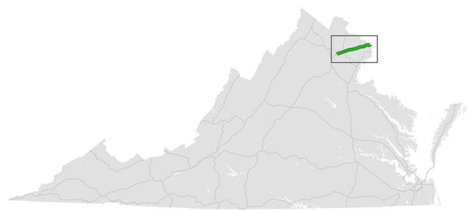
Daily Freight Ton Hours of Delay per Mile

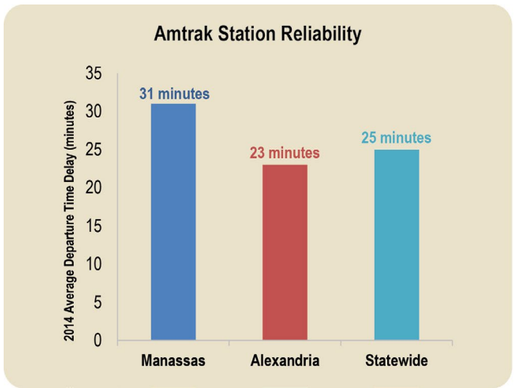


< 100,000 | 500,001 - 1,000,000
100,001 - 250,000 | > 1,000,000
250,001 - 500,000

I4 SEGMENT NEEDS

Reliability





VRE On-Time Performance
Manassas Line
93%

WMATA On-Time Performance
Orange Line
91%
Silver Line
88%

Weekday Peak Reliability

Reliability of travel during the peak period on a typical weekday on Segment I4 ranges from 0.04 to 0.88 in terms of reliability index, with an average value of 0.27. While this segment has one of the highest peak period reliability index values of CoSS segments statewide, only one short section on US 50 near the interchange with I-66 has a reliability index value exceeding the statewide threshold.

Weekday Reliability

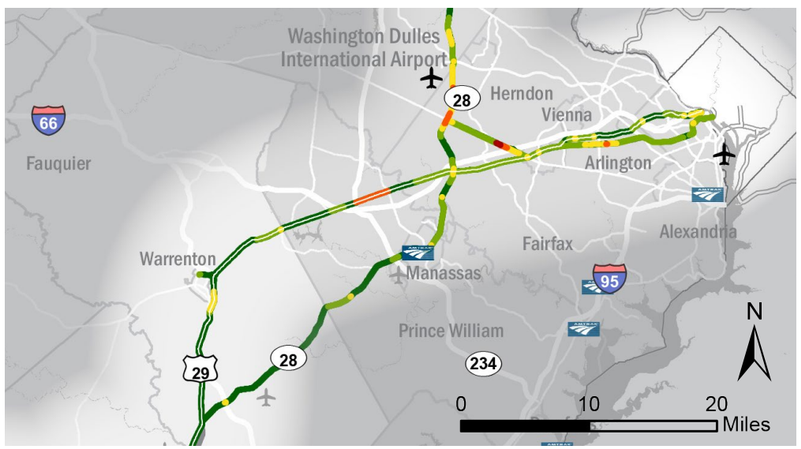
Reliability of travel during a typical weekday ranges from 0.04 to 0.58 in terms of reliability index, with an average value of 0.19. Locations where the weekday peak reliability index exceeds the statewide threshold are mostly limited to very short sections or individual intersections, including:

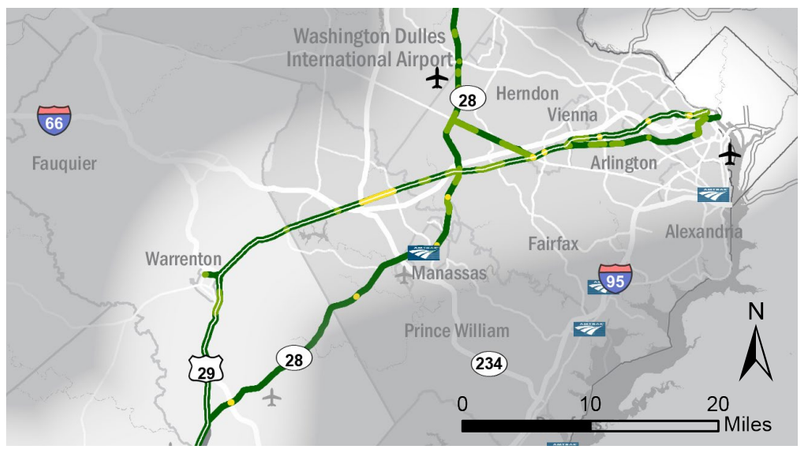
- US 29 between Pageland Road and Route 234 in Prince William County;
- Route 28 at Route 652 in Prince William County;
- Route 28 at Sudley Road in the City of Manassas;
- Route 28 at Route 658 in Fairfax County;
- US 50 at the intersection with US 29 in the City of Fairfax;
- US 29/US 50 at the intersection with Route 123 in the City of Fairfax;
- US 29 at Gallows Road in Fairfax County;
- US 29 at N Sycamore Street in Arlington County; and
- US 29 at Kirkwood Road in Arlington County.

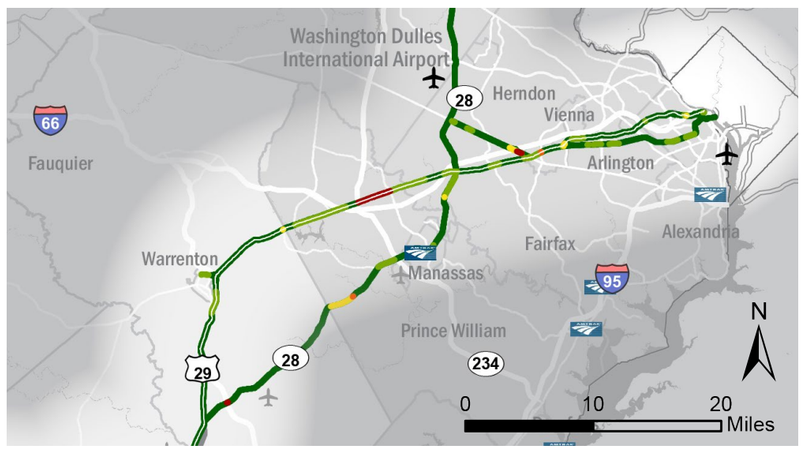
Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 1.59 in terms of reliability index, with an average value of 0.16. Locations where the weekday peak reliability index exceeds the statewide threshold include:

- Route 28 at Route 652 in Prince William County;
- US 29 between Pageland Road and Route 234 in Prince William County;
- US 29/US 50 at the intersection with Route 123 in the City of Fairfax; and
- US 50 between I-66 and Waples Mill Road (Route 665) in Fairfax County.







Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

I4 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

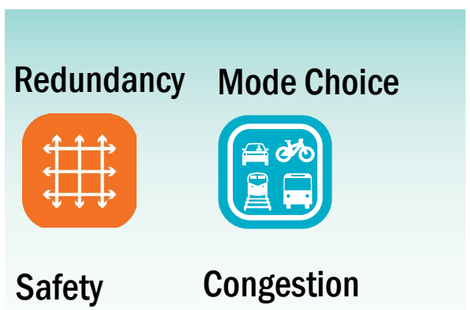
Mode Choice

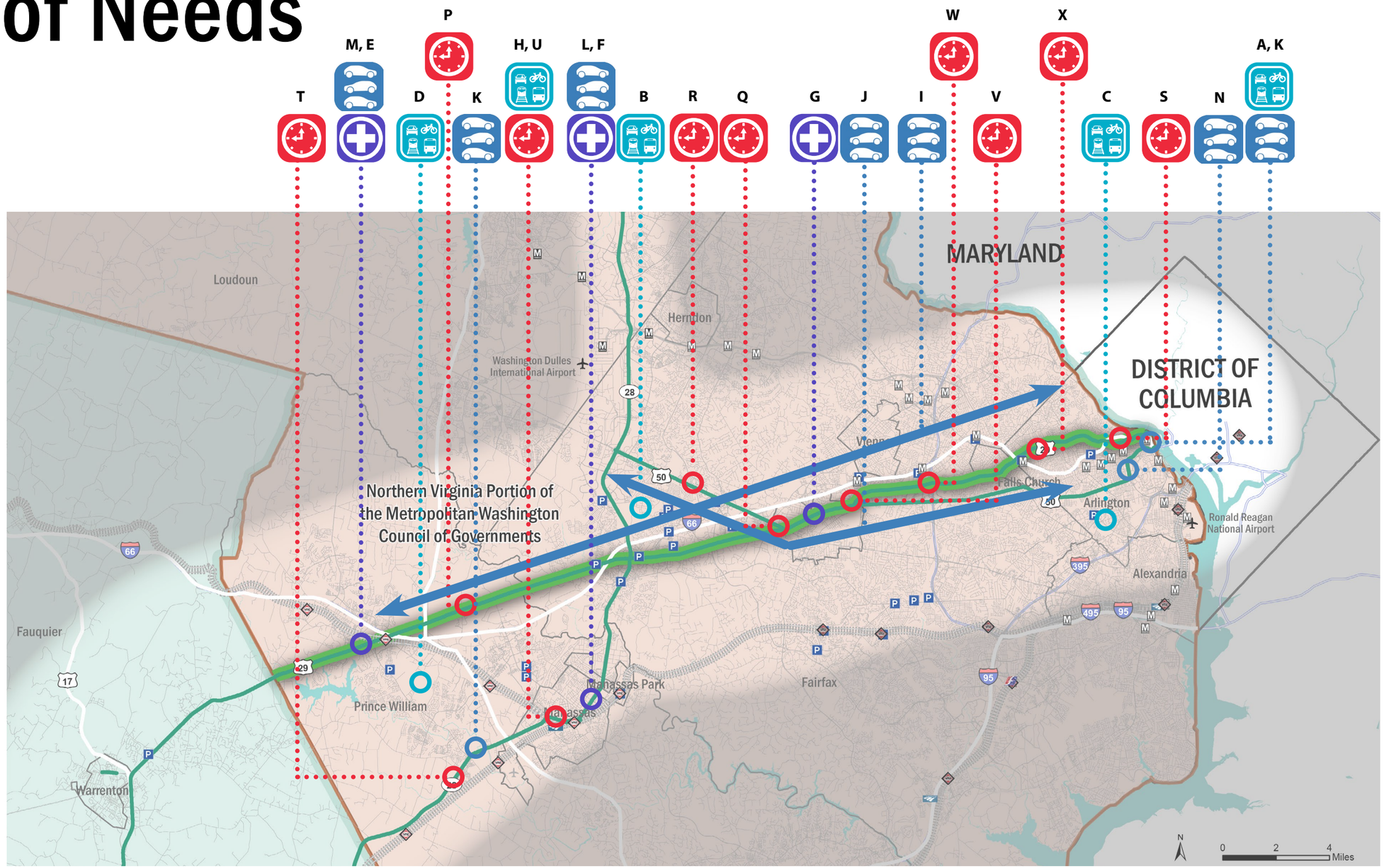
Safety

Congestion

Bottlenecks

Reliability





I4 SEGMENT NEEDS

Summary of Needs - I4 Segment

A.		Orange Line Metrorail Over capacity in many portions of the corridor; Potomac River crossing at Rosslyn at capacity
B.		Park and Ride lots in Fairfax County have higher utilization rates than statewide average
C.		Park and Ride lots in Arlington County have higher utilization rates than statewide average
D.		Park and Ride lots in Prince William County have higher utilization rates than statewide average
E.		US 29 between US 15 and VA 234 in Gainesville: 75 severe crashes
F.		VA 28 between Sudley Rd and Old Centreville Rd in Manassas: 85 severe crashes
G.		US 29/50 between Fairfax County Pkwy and Gallows Rd: 181 severe crashes
H.		Unreliable Amtrak service from Manassas station. Average departure delay is 31 minutes totaling over 7,400 person-hours of delay from this segment.
I.		Congestion issue on US 29 between I-66 in Gainesville and VA Route 124 (North Kirkwood Road/Spout Run Parkway) in Arlington County
J.		Congestion issue on US 50 between VA Route 28 in Chantilly and North Carlin Springs Road in Arlington County
K.		Congestion issue at US 29 and I-66 at Exit 73 in Arlington County
L.		Congestion issue on VA Route 28 between VA Route 234 (Grant Avenue) and US 50

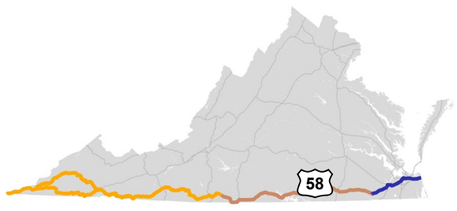
Summary of Needs - I4 Segment

M.		Congestion issue on US 29 between US 15 and I-66 in Gainesville
N.		Congestion issue on US 50 between VA Route 120 (Glebe Road) and North Meade Street in Arlington County
O.		Congestion issue on VA Route 28 between VA Route 619 (Linton Hall Road) and VA Route 234 (Prince William Parkway)
P.		Reliability issue on US 29 between Pageland Lane and VA Route 234 (Sudley Road)
Q.		Reliability issue at US 29 and US 50
R.		Reliability issue on US 50 between VA Route 286 (Fairfax County Parkway) and US 29
S.		Reliability issue at US 29 and VA Route 124 (North Kirkwood Road/Spout Run Parkway) in Arlington County
T.		Reliability issue at VA Route 28 and VA Route 652 (Fitzwater Driver) in Nokesville
U.		Reliability issue at VA Route 28 and VA Route 234 (Grant Avenue) in Manassas
V.		Reliability issue at US 29 and VA Route 123 (Chain Bridge Road)
W.		Reliability issue at US 29 and VA Route 650 (Gallows Road) in Fairfax County
X.		Reliability issue at US 29 and North Sycamore Street in East Falls Church

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Southside Corridor (J)



Office of INTERMODAL Planning and Investment

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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview

Corridors of Statewide Significance

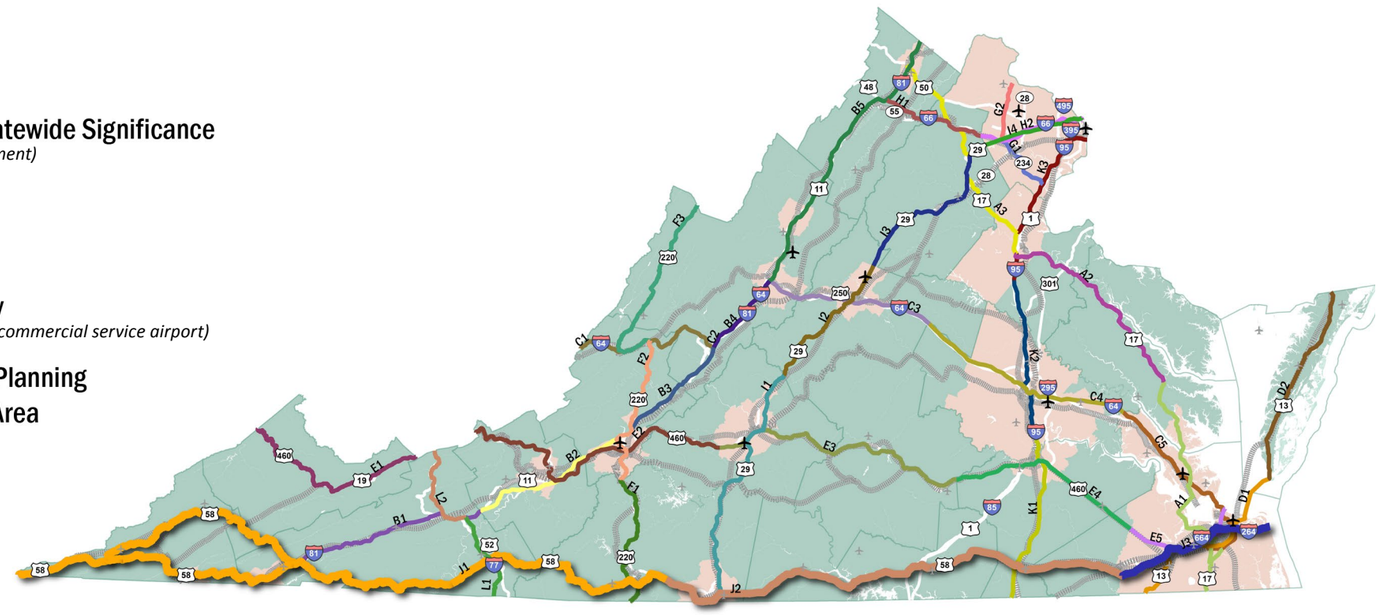
A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area



The Southside Corridor (Corridor J) is defined primarily by US 58, which runs east to west for more than 500 miles, mostly in southern Virginia. US 58 acts as the major corridor for this part of the state, and it connects with and provides connections to all of the major north-south corridors in the Commonwealth, including I-81, I-85, I-95, and US 29. Within the Hampton Roads Area, many other major facilities can be accessed directly from US 58. US 58 shifts between two-lane and multi-lane sections and travels through 14 counties west of the Hampton Roads Area.

There are no true parallel facilities to US 58, although the highway accesses other major corridors and many other major routes run concurrently for stretches. US 58 Business and US 58 Bypass spurs exist through several of the urbanized areas in the corridor, including Martinsville, Danville, Emporia, Franklin, and Suffolk. US 58 Alternate runs parallel to US 58 in the far western portions of the state, west of Bristol. US 58 runs concurrently with other CoSS facilities for short stretches including I-77 (Corridor L), US 29 (Corridor I), US 220 (Corridor F), and US 460 (Corridor E).

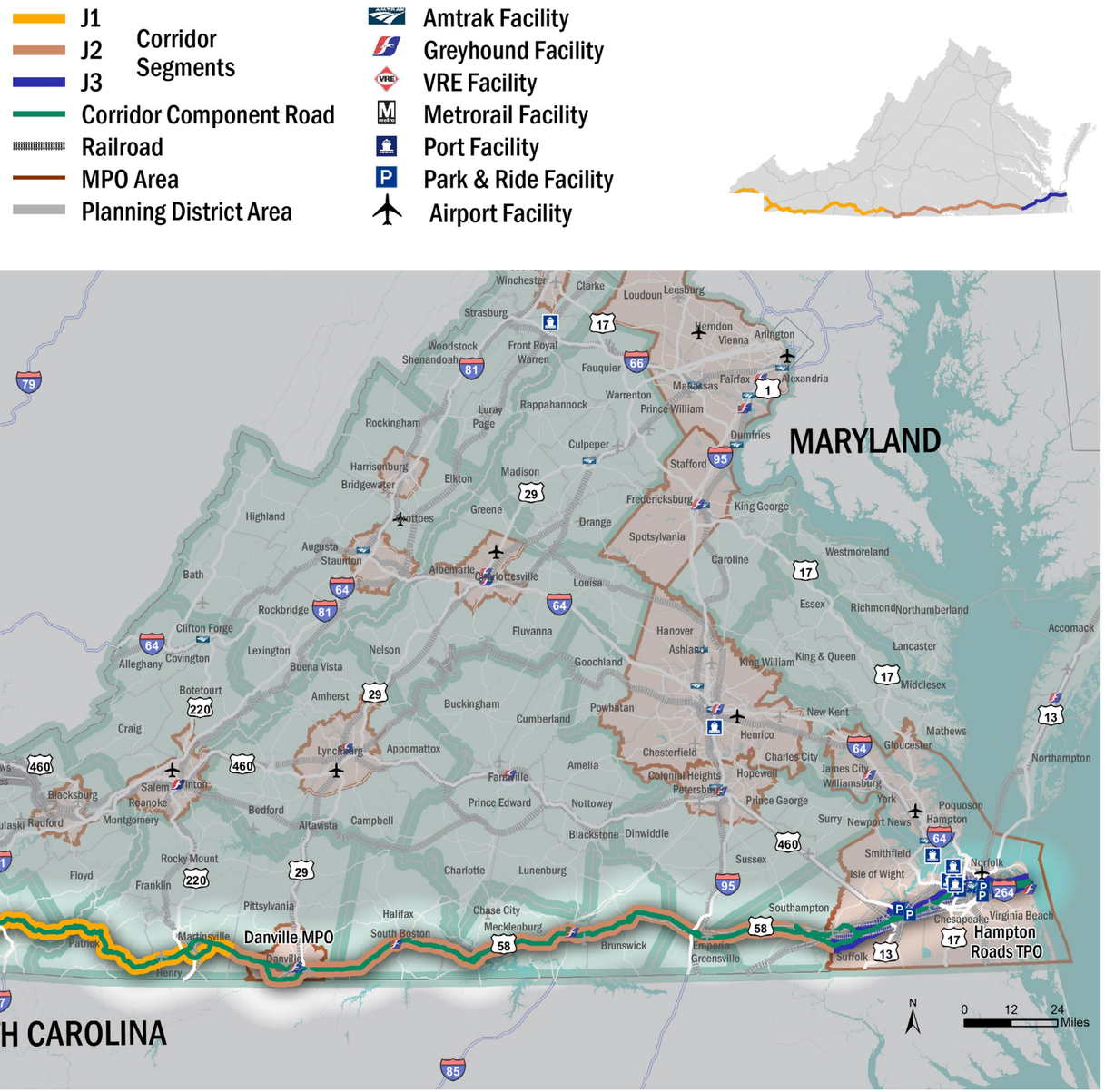
Passenger travel along the Southside Corridor is accomplished primarily via the highway facilities. Other travel options include:

- Transit service, available in the Hampton Roads Area;
- Numerous Park-and-Ride facilities, present in the Hampton Roads Area, including Suffolk, Chesapeake, Portsmouth, and Virginia Beach. In addition, many Park-and-Ride facilities are available in the western part of the state directly along the Southside Corridor, in Lee and Scott Counties, and along US 58 Alternate in the western part of Virginia;
- Three Greyhound bus stations, which operate in the Hampton Roads Area, with one each in Norfolk, Hampton, and Virginia Beach, as well as in Danville, South Boston, South Hill, and Emporia;
- Amtrak passenger rail, which can be accessed in Danville and Norfolk; and
- Fifteen airports, including two reliever facilities with commercial service in the Hampton Roads Area. In addition, US 58 provides indirect access to the two commercial-service airports in the area, Norfolk International and Newport News-Williamsburg Airports.

The Southside Corridor does not directly access the Port of Virginia, but it provides indirect access to the three port facilities via US 13. There are multiple rail lines along the Southside Corridor, although none run throughout the entire length of the corridor. CSX operates a spur of its National Gateway Corridor from Weldon, North Carolina, just south of the Virginia border, to the Hampton Roads Area to connect with the Port of Virginia facilities in that area. This corridor is CSX's primary freight corridor connecting the Port of Virginia with national markets. Norfolk Southern provides rail lines along the Southside Corridor from Brunswick County east to the Hampton Roads Area and the Port of Virginia facilities located there. Norfolk Southern also operates rail lines within the Southside Corridor and near US 58 Alternate in the western part of the state as part of its Heartland Corridor and Coal Corridor. The Southside Corridor also crosses multiple north-south freight rail corridors, including the main line of the National Gateway Corridor near Emporia, the Norfolk Southern Crescent Corridor, and the Norfolk Southern Coal Corridor.

Corridor Components

Highway Facilities	
Primary Facility	• US 58
Other Highway Facilities	• US 58 Business • US 58 Alt • US 58 Bypass
Transit Services	
	• Intercity bus service
Rail Facilities	
	• CSX National Gateway Corridor
Port Facilities	
	• Norfolk International Terminal • Portsmouth Marine Terminal • Virginia Internaitonal Gateway
Airport Facilities	
	• Norfolk International Airport • Newport News/ Williamsburg International Airport



Demographics and Economic Trends

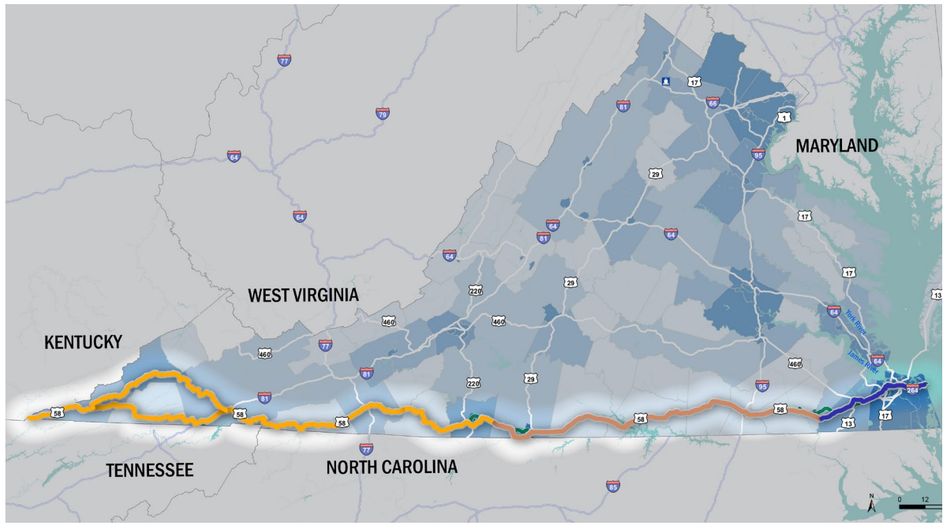
The primary population centers with greater than 500 persons per square mile along Corridor J are found in the cities along US 58 including the Cities of Bristol, Galax, Martinsville, Danville, Emporia, and Franklin. In addition, several larger cities in the Hampton Roads Area have high population densities, including Chesapeake, Norfolk, and Virginia Beach. Scott, Grayson, Patrick, Halifax, Mecklenburg, Brunswick, Greenville, and Southampton Counties have the lowest density along the corridor, with less than 50 persons per square mile. The most densely-populated segment along the corridor is Segment J3 in the Hampton Roads Area. Between 2012 and 2025, the City of Suffolk, in the Hampton Roads Area, is predicted to have the largest population growth (greater than 25 percent) among jurisdictions along the corridor. The Cities of Chesapeake, Emporia, and Galax are anticipated to have population growth between 11 and 25 percent. Overall, other than the Hampton Roads Area, population along the corridor is not expected to grow significantly, with populations decreasing in a few counties and in the City of Virginia Beach.

Current employment centers follow a pattern similar to the population centers, with employment highly concentrated in the cities along the corridor. The highest employment growth (11 to 25 percent) is anticipated in the Hampton Roads Area, the City of Emporia, and in Lee, Grayson, and Floyd Counties.

Corridor J passes through four Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Hampton Roads Transportation Planning Organization (TPO) Area has the highest GDP of any of the MPO areas in the corridor. The largest industry sectors in the corridor are health care, retail trade, and wholesale trade.

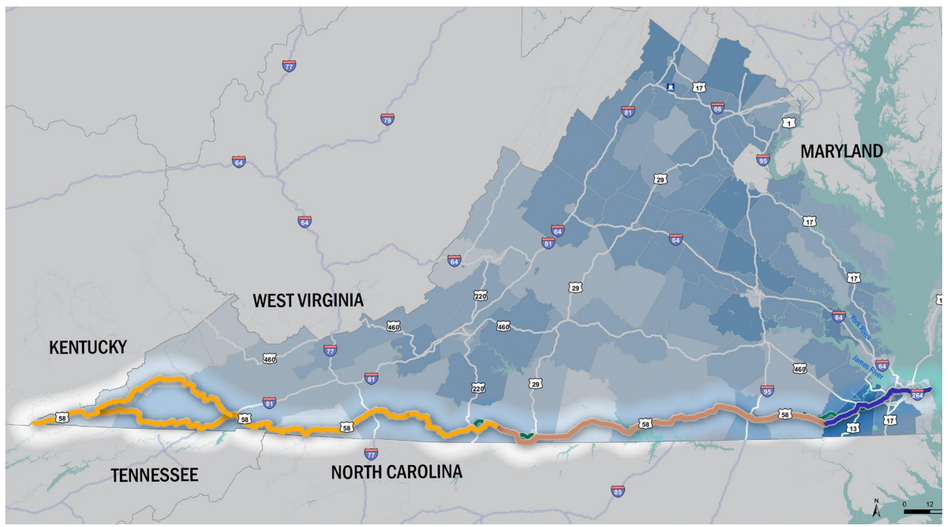
2012 Population Density (Persons / Square Mile)

- 0 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 +



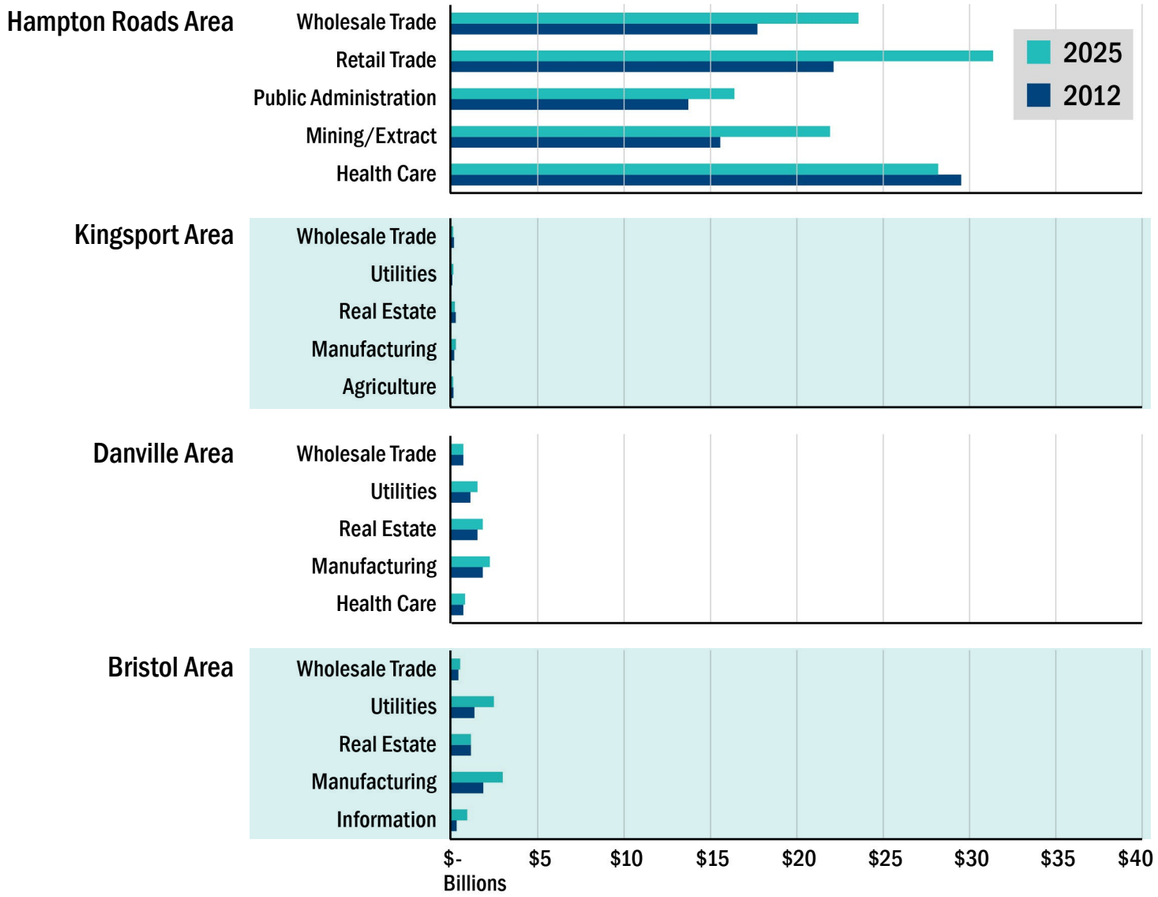
Population Growth (2012 - 2025 Percent Change)

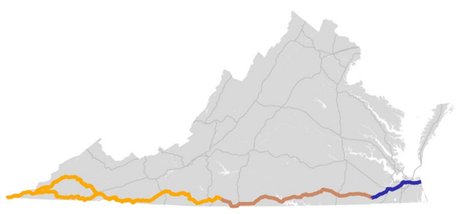
- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



CORRIDOR J OVERVIEW

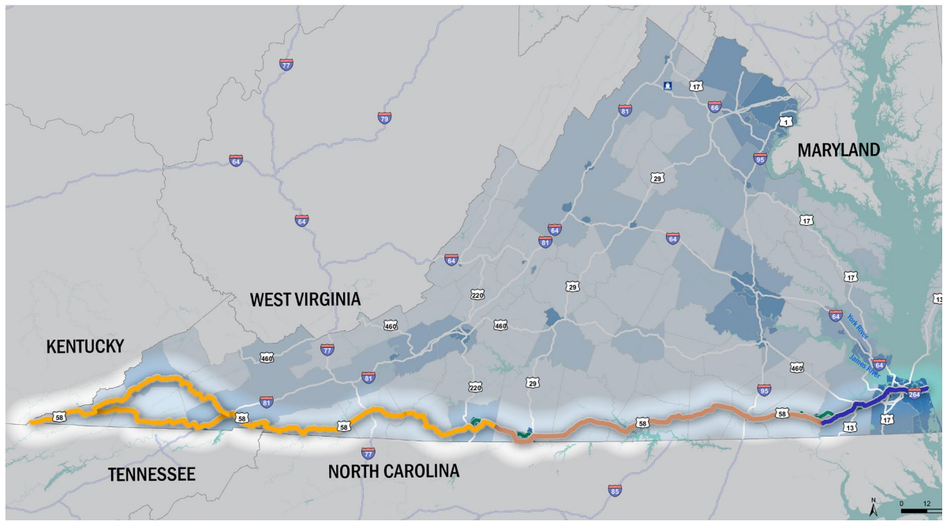
Top Industries (GDP)





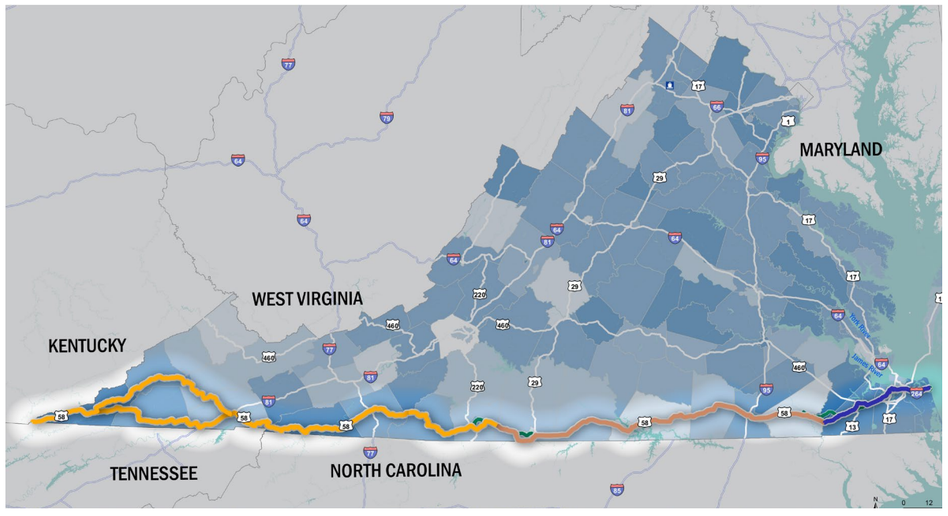
2012 Employment Density Jobs / Square Mile

- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500

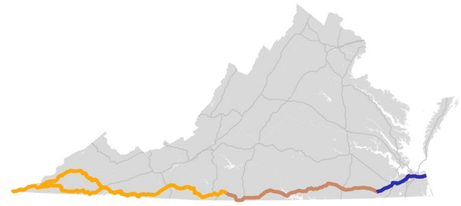


Employment Growth (2012 - 2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



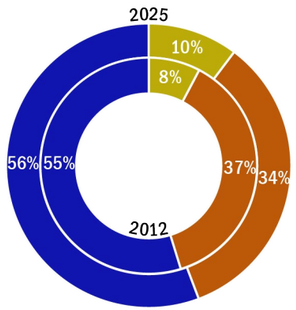
Corridor Travel Patterns



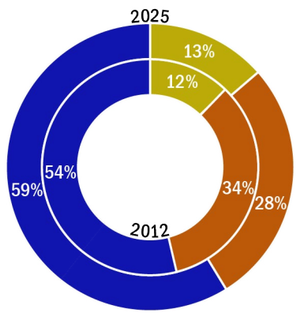
Passenger

Corridor J provides connections to Tennessee and Kentucky in the far southwestern corner of the state and passes through four MPO Areas - Kingsport, Bristol, Danville, and Hampton Roads - en route to its terminus on the Atlantic coast in Virginia Beach. In the Kingsport and Bristol Areas, traffic along Corridor J is dominated by through traffic with more than 60 percent of the traffic in each region having neither its origin nor its destination in the region. In the Danville Area, the proportion of local and through traffic is more evenly divided; 30 percent of traffic is through travel, 22 percent is local traffic within the Danville area, and the remainder of traffic within the corridor has only one trip end in the area. In the Hampton Roads Area, the vast majority of traffic along Corridor J (over 80 percent) is local, internal to the Hampton Roads Area.

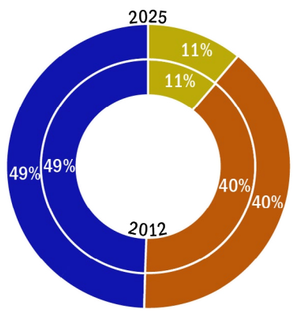
Kingsport Area



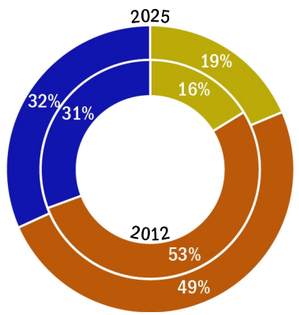
Bristol Area



Danville Area



Hampton Road Area



Freight

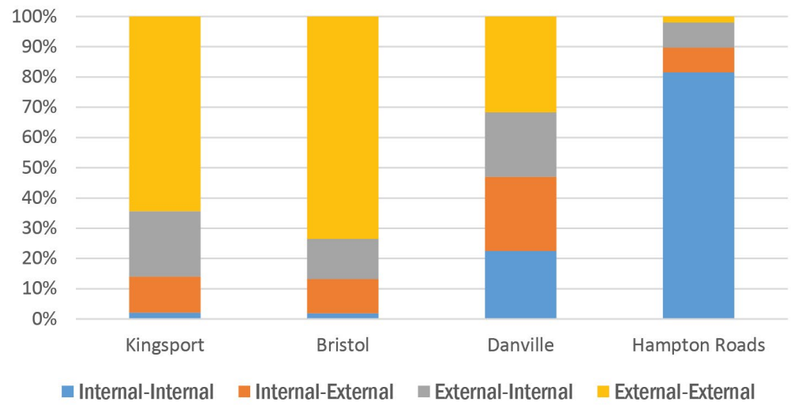
By truck, Corridor J carried 92 million tons of freight worth $147 billion in 2012, and is estimated to carry 125 million tons of freight worth $226 billion in 2025. On Corridor J, 45 percent of the truck freight tonnage, and 60 percent of the truck freight value, passes through Virginia. The major truck freight interstate through patterns are similar to those observed on Corridor B as a result of a concurrency between US 58 (Segment J1) and I-81 (Segment B1). In terms of tonnage, the largest truck freight flows on Corridor J are between North Carolina and the Hampton Roads Area, accounting for more than eight percent of the total truck freight tonnage on the corridor. North Carolina and Tennessee are the largest generators and attractors of truck freight tonnage on Corridor J, with 29 percent of the truck freight tonnage originating in these locations and 22 percent destined for these locations.

By rail, Corridor J carried 34 million tons of freight worth $26 billion in 2012, and is estimated to carry 36 million tons of freight worth $32 billion in 2025. On Corridor J, the majority of rail freight either originates from or is destined for Virginia, with only four percent of the rail freight tonnage and two percent of the total rail freight value passing through the Commonwealth. In terms of tonnage, the dominant flow of rail freight on Corridor I is from West Virginia, Kentucky, and Wise and Buchanan Counties in Virginia to the Port of Virginia marine terminal in Norfolk, accounting for more than 43 percent of the total corridor rail freight tonnage. Tennessee and Georgia are also major attractors of rail freight tonnage along Corridor J, with significant rail freight flows from Wise County and Kentucky. In terms of value, the dominant movement of rail freight on Corridor J is between the states of Illinois and Ohio and the Port of Virginia facilities in the Hampton Roads Area. These flows account for more than 55 percent of the total rail freight value on the corridor.

GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Distribution of Internal and External Travel



Truck Freight

2012	2025
Rail Freight Value	
$26 Billion	$32 Billion
Rail Freight Tonnage	
34 Million Tons	36 Million Tons
Freight Value per Ton	
$748	$874
Corridor Tonnage Passing Through	
4%	4%

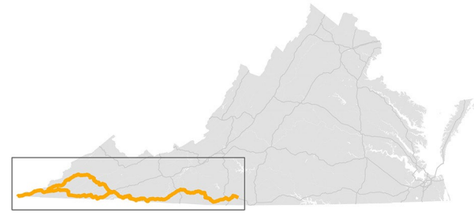
Rail Freight

2012	2025
Truck Freight Value	
$147 Billion	$226 Billion
Truck Freight Tonnage	
92 Million Tons	125 Million Tons
Freight Value per Ton	
$1602	$1810
Corridor Tonnage Passing Through	
46%	46%

II. Segment J1

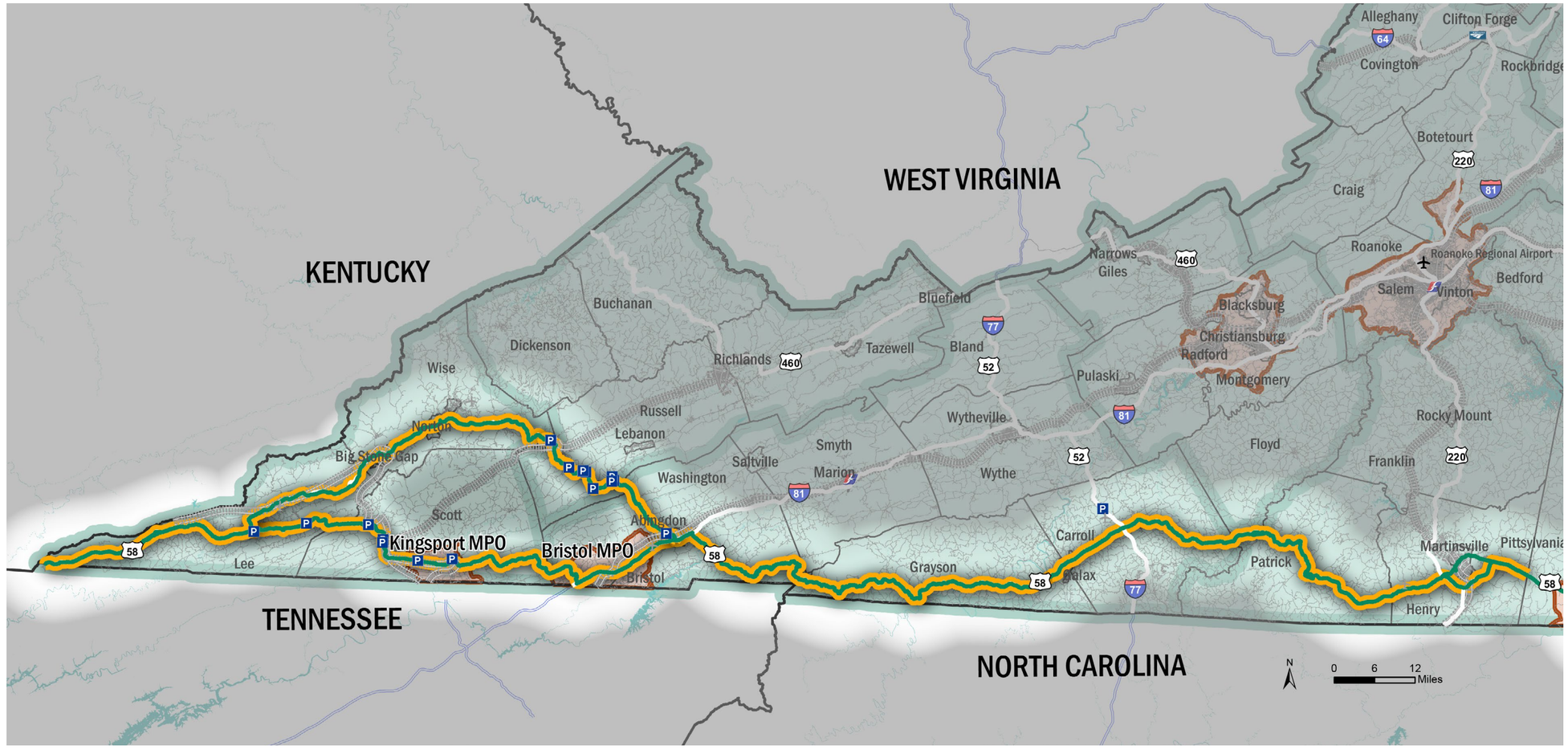
J1
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility



Corridor Segment J1 Components

- US 58
- US 58 Business
- US 58 Alt
- US 58 Bypass
- CSX National Gateway Corridor
- Intercity bus service



J1 SEGMENT PROFILE

Segment J1 begins at the Tennessee and Kentucky border and ends at the western border of Pittsylvania County. The segment serves 12 counties and four independent cities while traversing two MPO Areas - Kingsport and Bristol. US 58 is an important freight corridor in Virginia and provides access to economic opportunities in a relatively undeveloped portion of the state.

Highway Facilities: US 58 is primarily a two-lane rural highway through Segment J1, although sections are as wide as six lanes in the City of Bristol. US 58 Alternate is a mostly four-lane rural highway that parallels US 58 to the north through Big Stone Gap, Norton, and Russell County, rejoining US 58 at Abingdon. US 58 Business spurs provide local access in the urbanized areas in the segment, including Gate City and Martinsville. US 58 runs concurrently with other CoSS facilities in Segment J1, including I-81 between Bristol and Abingdon and US 220 near Martinsville.

Transit Services: District Three Public Transit provides Dial-a-Ride service for the localities of the Mount Rogers Planning District, which includes Bland, Carroll and Grayson Counties, the Towns of Abingdon, Marion, and Wytheville, and the independent City of Galax.

Rail Facilities: Norfolk Southern operates rail lines within the Southside Corridor and near US 58 Alternate in the western part of the state as part of its Heartland Corridor and Coal Corridor. North-south running rail lines, including both lines of the Norfolk Southern Crescent Corridor and Coal Corridor, can be accessed along the Southside Corridor.

Port Facilities: No port facilities are located directly adjacent to Segment J1, but the Southside Corridor does provide connections to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: There are no commercial airports located within this segment.

Major planned and future projects include:

Lee County:

- Install rumble strips on the existing paved shoulders along US 58 from the Tennessee border to Route 652; and
- Improve the transition alignment from the two-lane to four-lane section of US 58 Alternate in conjunction with the replacement of the bridge at Morgan Avenue.

Wise County:

- Install adaptive signal control equipment to improve traffic flow and safety on all portions of Segment J1 within Wise County;
- Install communication equipment to connect traffic signals to existing resources, sharing fiber optic cable along all portions of Segment J1 within Wise County;
- Install two- to four-foot paved shoulders, rumble strips, and guardrails along US 58 Alternate between Norton and St. Paul; and
- Install four-foot paved shoulders and rumble trips along US 23, including the portion where US 58 and US 23 are concurrent.

City of Bristol:

- Reconstruction of Old Airport Road at I-81/US 58 near exit 7, underneath US 58.

Washington County:

- Reconstruction with added capacity on US 58 from 0.61 km east of Route 708 to 0.2 km west of the western town limit of Damascus

Washington County and Russell County:

- Install four-foot paved shoulders and rumble strips on Porterfield Hwy (US 19/ US 58 Alternate/) between Route 660 and US 58 Alternate.

Grayson County:

- Install rumble strips on existing four-foot paved shoulders from Route 274 to the City of Galax.

City of Galax:

- Provide safety improvements to the US 58 corridor within Galax City limits.

Town of Hillsville:

- Upgrade existing span wire signal to mast arms at the intersection of US 58/ US 221 and US 52.

Carroll County:

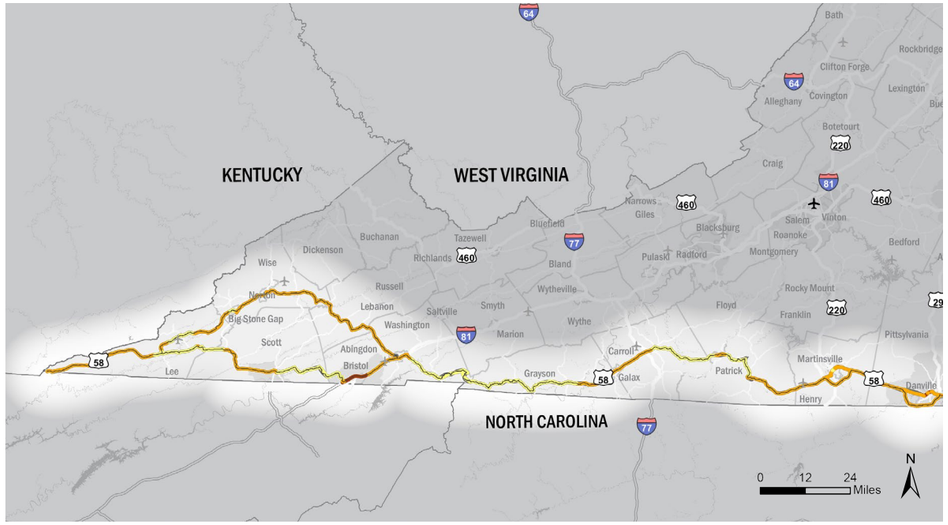
- Reconstruction with added capacity from 0.13 km west of Route 820 to 0.49 km east of Big Reed Island Creek.

Patrick County:

- Reconstruction with added capacity from 0.18 km west of Route 795 to 0.66 km east of Route 610; and
- Reconstruction with added capacity from 0.66 km east of Route 714 to the Stuart Bypass

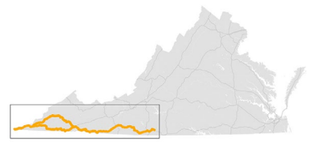
Henry County:

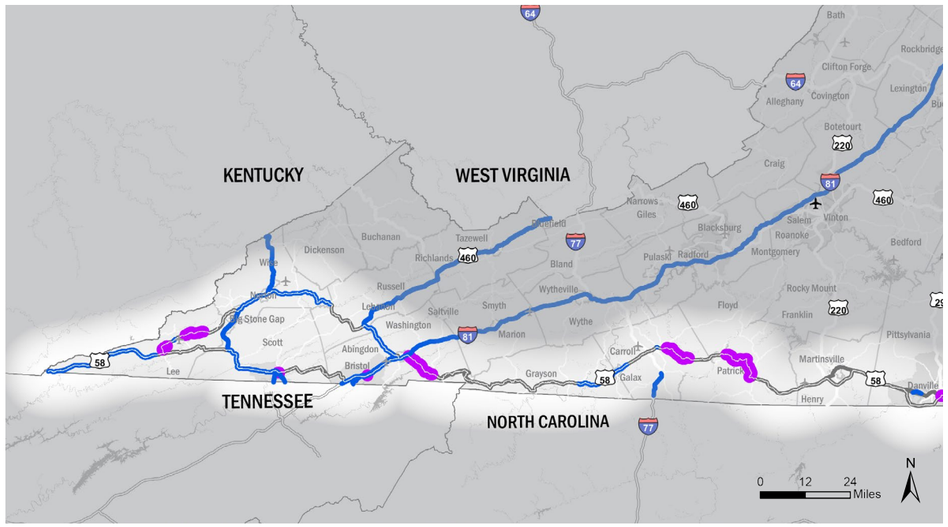
- Replace existing mast arm signal at the intersection of US 220 Business and US 58 Bypass ramps.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility





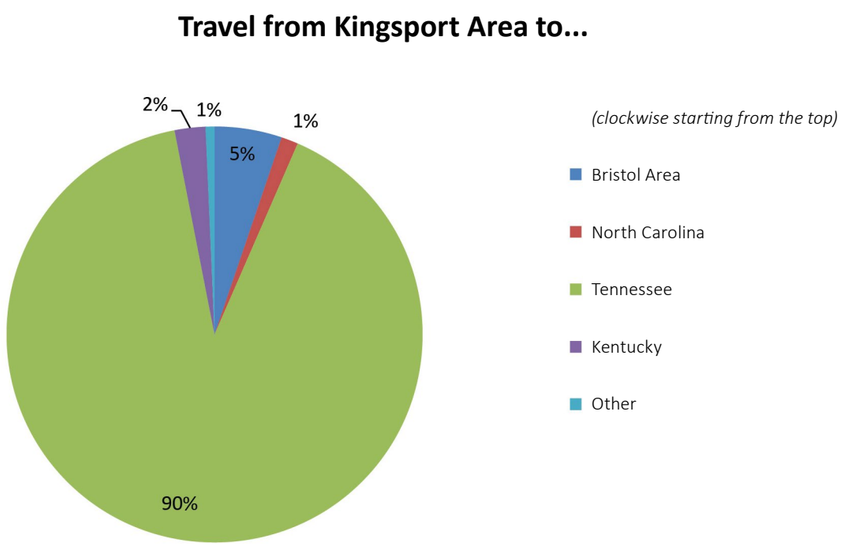
Future Projects

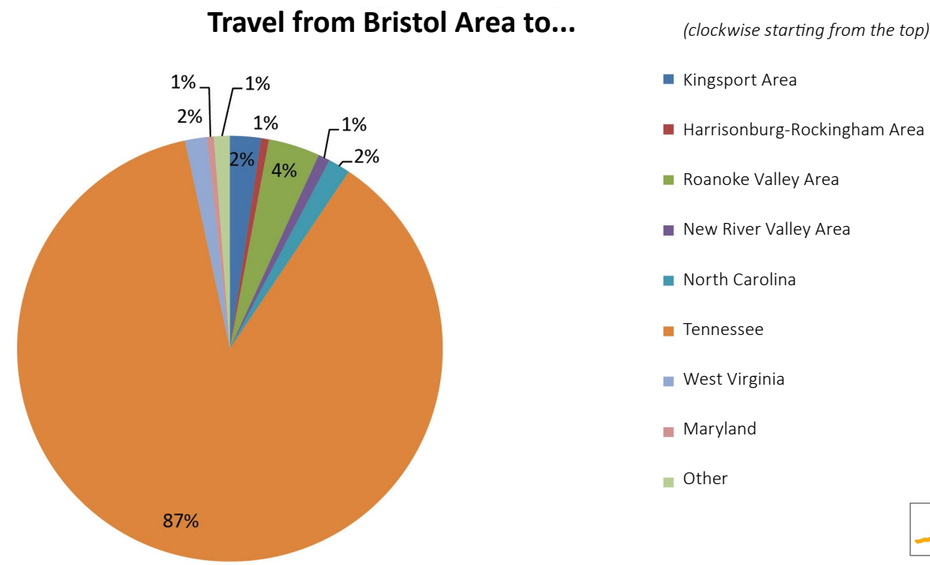
- Reconstruction with added capacity
- Safety improvements
- Primary facility

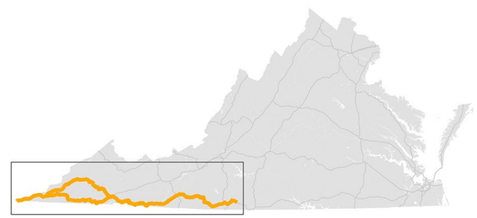
Travel Demand

Passenger Demand

Segment J1, the westernmost segment of Corridor J, provides connections through many counties in southwestern Virginia, in addition to the Kingsport and Bristol Areas. The vast majority (90 percent) of intercity travel originating in the Kingsport Area is destined for locations in Tennessee. An additional five percent is destined for the Bristol Area, and would make use of Segment J1. Intercity travel from the Bristol Area is also dominated by travel to Tennessee, which accounts for 87 percent of such travel. Travel to the Roanoke Area, which uses portions of Segment J1, accounts for four percent of intercity travel, and travel to Kingsport accounts for an additional two percent. Travel to all other destinations along Corridor J, or elsewhere in the state, is minimal.







J1 SEGMENT PROFILE

Freight Demand

By truck, Segment J1 carried 54 million tons of freight worth $107 billion in 2012, and is estimated to carry 75 million tons of freight worth $165 billion in 2025. On Corridor J, 45 percent of the truck freight tonnage, and 60 percent of the truck freight value, passes through Virginia. The major truck freight interstate through patterns are similar to those observed on Corridor B as a result of a concurrency between US 58 (Segment J1) and I-81 (Segment B1). In terms of tonnage, the largest truck freight flows on Corridor J are between North Carolina and the Hampton Roads Area, accounting for more than eight percent of the total truck freight tonnage on the corridor. North Carolina and Tennessee are the largest generators and attractors of truck freight tonnage on Corridor J, with 29 percent of the truck freight tonnage originating in these locations and 22 percent destined for these locations. The jurisdictions adjacent to Segment J1 are not major generators or attractors of truck freight on the corridor, with less than three percent of the total freight value originating in Segment J1 and less than two percent destined for the segment.

By rail, Segment J1 carried six million tons of freight worth $11 billion in 2012, and is estimated to carry eight million tons of freight worth $16 billion in 2025. On Corridor J, the majority of rail freight either originates from or is destined for Virginia, with only four percent of the rail freight tonnage and two percent of the total rail freight value passing through the Commonwealth. In terms of tonnage, the dominant flow of rail freight on Corridor I is from West Virginia, Kentucky, and Wise and Buchanan Counties in Virginia to the Port of Virginia marine terminal in Norfolk, accounting for more than 43 percent of the total corridor rail freight tonnage. Tennessee and Georgia are also major attractors of rail freight tonnage along Corridor J, with significant rail freight flows from Wise County and Kentucky. In terms of value, the dominant movement of rail freight on Corridor J is between the states of Illinois and Ohio and the Port of Virginia facilities in the Hampton Roads Area. These flows account for more than 55 percent of the total rail freight value on the corridor. The jurisdictions adjacent to Segment J1 are significant generators of low-value rail freight, accounting for more 23 percent of the total corridor rail freight tonnage, but representing only one percent of the total rail freight value on the corridor. The major rail freight generators along Segment J1 are Wise and Lee Counties.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (18% / 18%)
3. Tennessee (11% / 10%)
4. Pennsylvania (4% / 5%)
5. Texas (4% / 4%)

Corridor Tonnage Originating in Segment J1: 7% / 6%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
North Carolina and Maryland
City of Chesapeake and North Carolina
Pennsylvania and Tennessee

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (33% / 33%)
2. North Carolina (13% / 14%)
3. Tennessee (9% / 9%)
4. Pennsylvania (5% / 4%)
5. New York (4% / 4%)

Corridor Tonnage Destined for Segment J1: 6% / 5%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (47% / 46%)
2. West Virginia (28% / 25%)
3. Wise County (21% / 19%)
4. Kentucky (8% / 8%)
5. Buchanan County (7% / 6%)

Corridor Tonnage Originating in Segment J1: 26% / 23%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

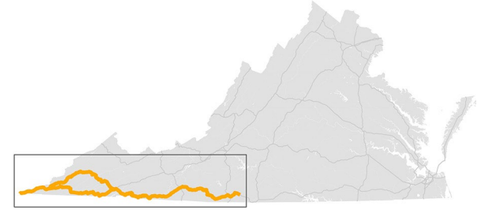
Major Destinations (by Tonnage)
1. Virginia (75% / 74%)
2. City of Norfolk* (62% / 57%)
3. Tennessee (7% / 6%)
4. City of Chesapeake (6% / 9%)
5. Georgia (5% / 5%)

Corridor Tonnage Destined for Segment J1: <1% / <1%

Traffic Conditions

Traffic Volume and AADT

On most sections of Segment J1, traffic volume is lower than traffic volumes elsewhere on Corridor J. Average daily traffic volumes vary across the segment, with the highest volumes reaching almost 50,000 vehicles per day on the section where US 58 runs concurrently with I-81. Off of I-81, traffic volumes on Segment J1 do not exceed 27,000 vehicles per day, which occurs in Scott County. Traffic volumes on all sections of Segment J1 (excluding the portion which runs concurrently with I-81) are projected to increase by fewer than 4,000 additional vehicles per day by 2025. The highest growth in traffic is projected to occur in Carroll County, east of the City of Galax.



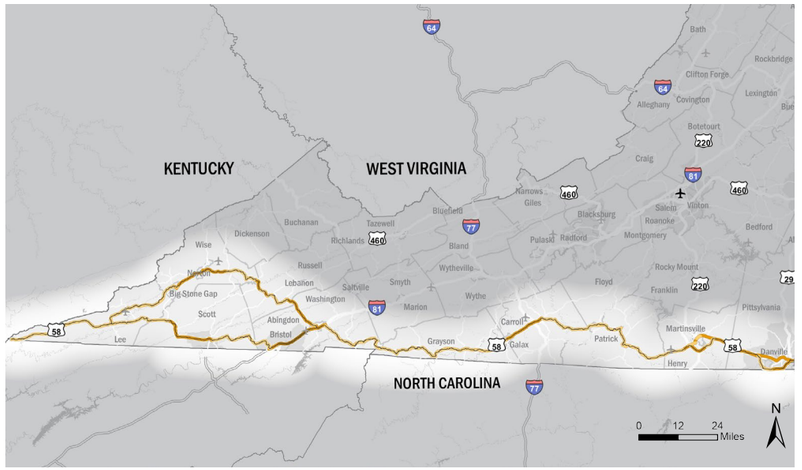
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



J1 SEGMENT PROFILE

Traffic Distribution

On average, traffic on Segment J1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows morning and evening peak periods, with a steady increase in the flow between the two peak periods. The highest hourly traffic occurs between 5 and 6 p.m. which accounts for 7.8 percent of daily traffic and a less busy morning peak between 8 and 9 a.m. accounts for 5.9 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 78 percent of total daily traffic. Truck traffic exhibits a single peak during the midday period, showing the highest hourly flow of 6.2 percent of daily traffic between 11 a.m. and noon. Weekend traffic patterns also show a single peak during the middle of the day with the highest hourly flow between noon and 1 p.m. (7.9 percent of daily traffic) for all traffic, and noon to 1 p.m. (6.5 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment J1 vary by as much as 33 percent throughout the year, with the highpoint in August (around 18,000 vehicles per day) and the low point in January (around 14,000 vehicles per day). Truck volumes vary less than passenger volumes, with the June high (around 2,500 vehicles per day) 19 percent higher than the January low (around 2,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 15,000 vehicles per day) are 44 percent higher than January levels (around 10,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 26 percent higher than the April low. Since truck volumes account for a relatively small portion of traffic on Segment J1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

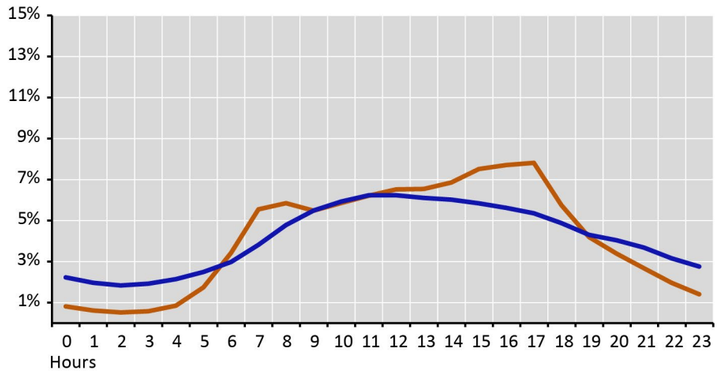
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment J1 is lower than on other segments of Corridor J. On most sections of Segment J1, heavy trucks comprise five percent or less of total daily traffic. Where US 58 runs concurrently with I-81 in Segment J1, heavy trucks make up about ten percent of total traffic. On some sections of US 58 in Patrick County, heavy trucks comprise eight to 13 percent of daily traffic.

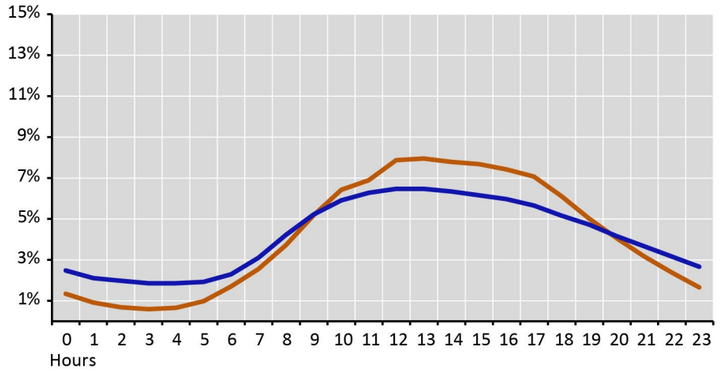
Percent Heavy Trucks

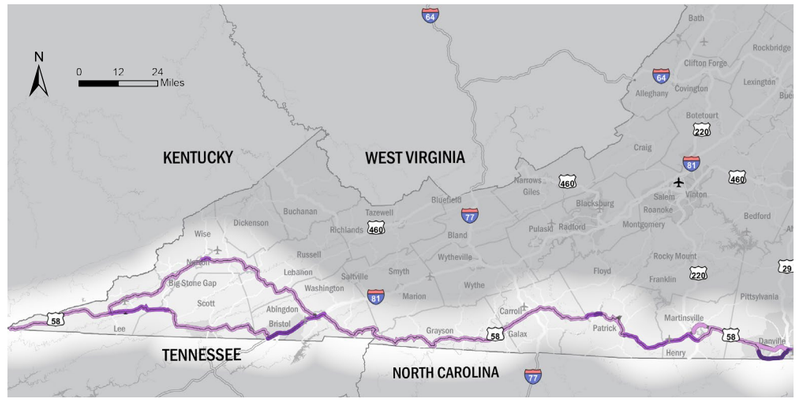
- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

Hourly Traffic Distribution – Weekdays

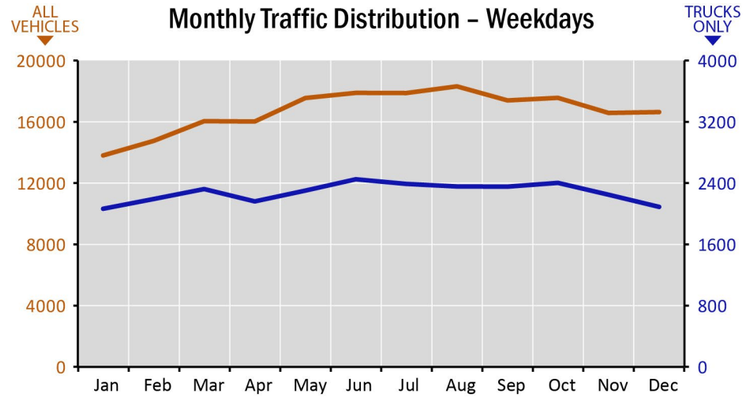


Hourly Traffic Distribution – Weekends

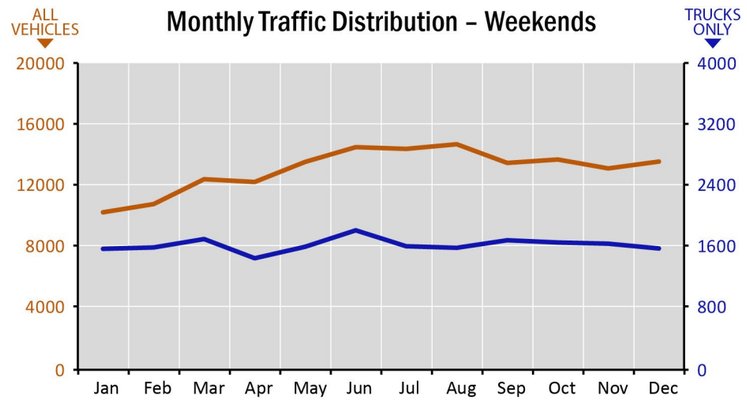




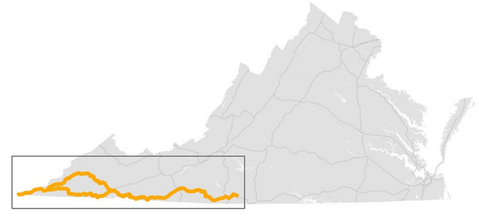
Monthly Traffic Distribution – Weekdays



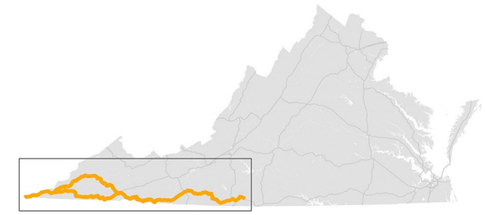
Monthly Traffic Distribution – Weekends



All Vehicles
Trucks



J1 SEGMENT PROFILE

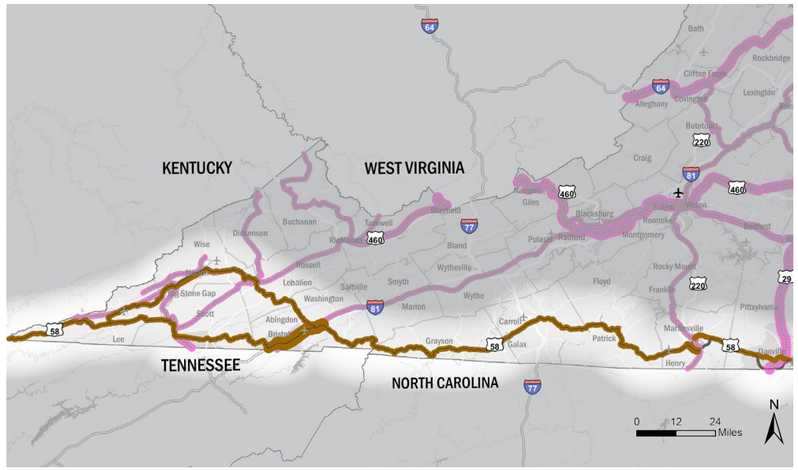


Freight Flows

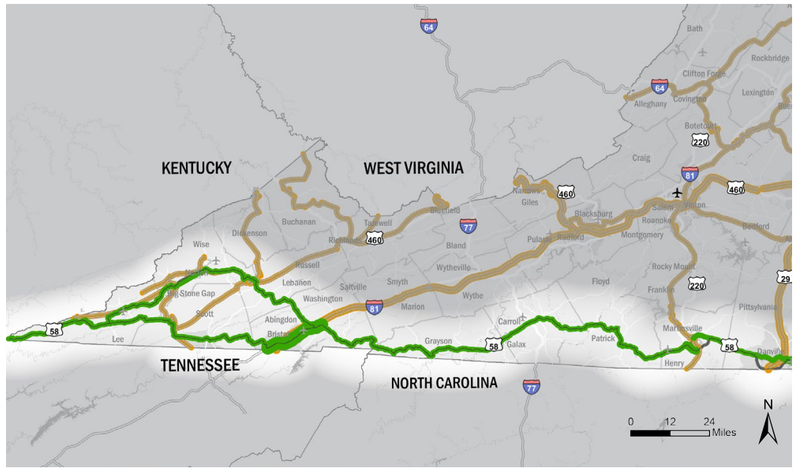
In Lee County, freight movements on Segment J1 rely more heavily on rail, in terms of tonnage, and on truck, in terms of value. In total, 865,000 tons (42 percent) of freight is moved through this section of Segment J1 by truck, compared to 1.2 million tons (58 percent) by rail. By value, however, $486 million (78 percent) of freight travels by truck, while $135 million (22 percent) travels by rail. On average, a ton of freight traveling through this section of Segment J1 by truck is worth $561 while a ton of freight traveling by rail is worth only $114. In 2025, truck freight tonnage and value in this area of Segment J1 are expected to increase while rail freight tonnage is expected to decrease and value is expected to increase. The percentage of freight traveling by truck is expected to increase by tonnage and by value to 50 percent and 81 percent, respectively. The value per ton will likely decrease to $555 on trucks and increase to $135 on rail.

On the portion of US 58 that runs concurrently with I-81 in Segment J1, freight is moved primarily by truck in terms of both tonnage and value. In total, 54 million tons (90 percent) of freight is moved through this section of Segment J1 by truck and six million tons (10 percent) by rail. By value, $106.5 billion (90 percent) of freight travels by truck and $11 billion (10 percent) travels by rail. On average, a ton of freight traveling through this section of Segment J1 by truck and by rail is worth $1,966 and $1,939, respectively. In 2025, truck freight tonnage and value in this area of Segment J1 are expected to increase. The percentage of the freight traveling by truck is expected to remain the same by tonnage and to increase by value to 91 percent. The value per ton will likely increase to $2,209 on trucks and to $1,949 on rail.

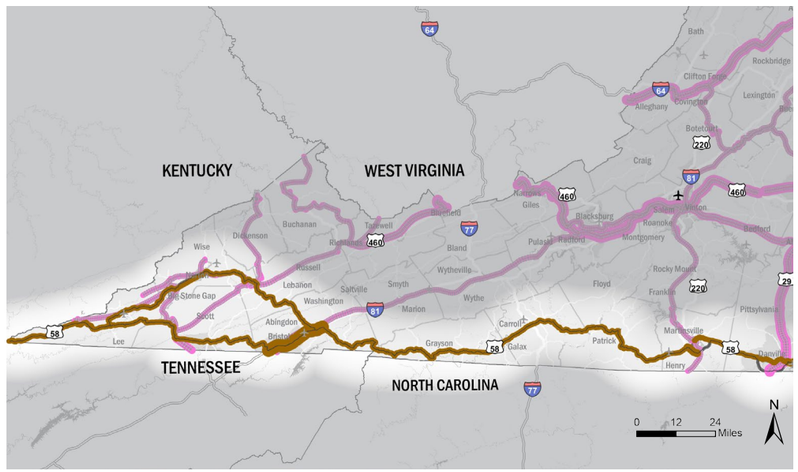
Annual Freight by Tonnage, 2012



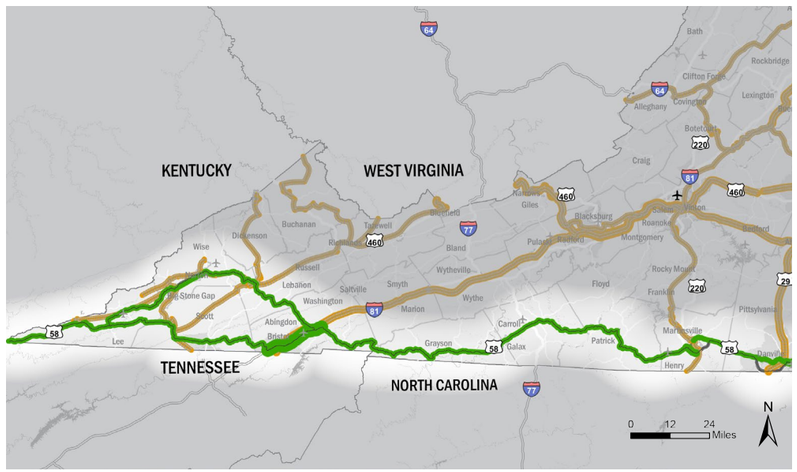
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment J1 of the Southside Corridor have limited travel options, both in terms of travel path and mode choice. US 58 Alternate serves as a parallel route to US 58 in the western section of the segment, but no parallel facility exists elsewhere in the segment. Greyhound offers service from the Bristol Area, although its station is located in Tennessee. Automobile travel to destinations like Danville and Kingsport, Tennessee is cost competitive with the available bus service (based on the 2014 federal standard mileage rate of 56 cents per mile), and is usually much faster as well. Service frequencies are the most severely limiting factor for bus service. District Three Public Transit provides Dial-a-Ride service for the localities of the Mount Rogers Planning District, which includes Bland, Carroll and Grayson Counties, the Towns of Abingdon, Marion, and Wytheville, and the independent City of Galax.

Park-and-Ride

Within Segment J1, commuters can utilize many Park-and-Ride locations. Russell County has the most Park-and-Ride locations, as well the highest number of Park-and-Ride spaces, while Lee County has the highest utilization rate of spaces available in the region. At 79 percent, Lee County has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent. Washington County's Park-and-Ride utilization rate matches the statewide average.

Comparable Travel Options

Danville to Bristol

Inter-City Bus	*Train*
1 Trip per Day 13:20 Travel Time $104 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

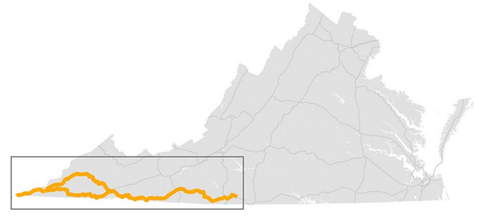
Via Rt. 58 / I-81: 4:16 Travel Time $114 Est. Cost

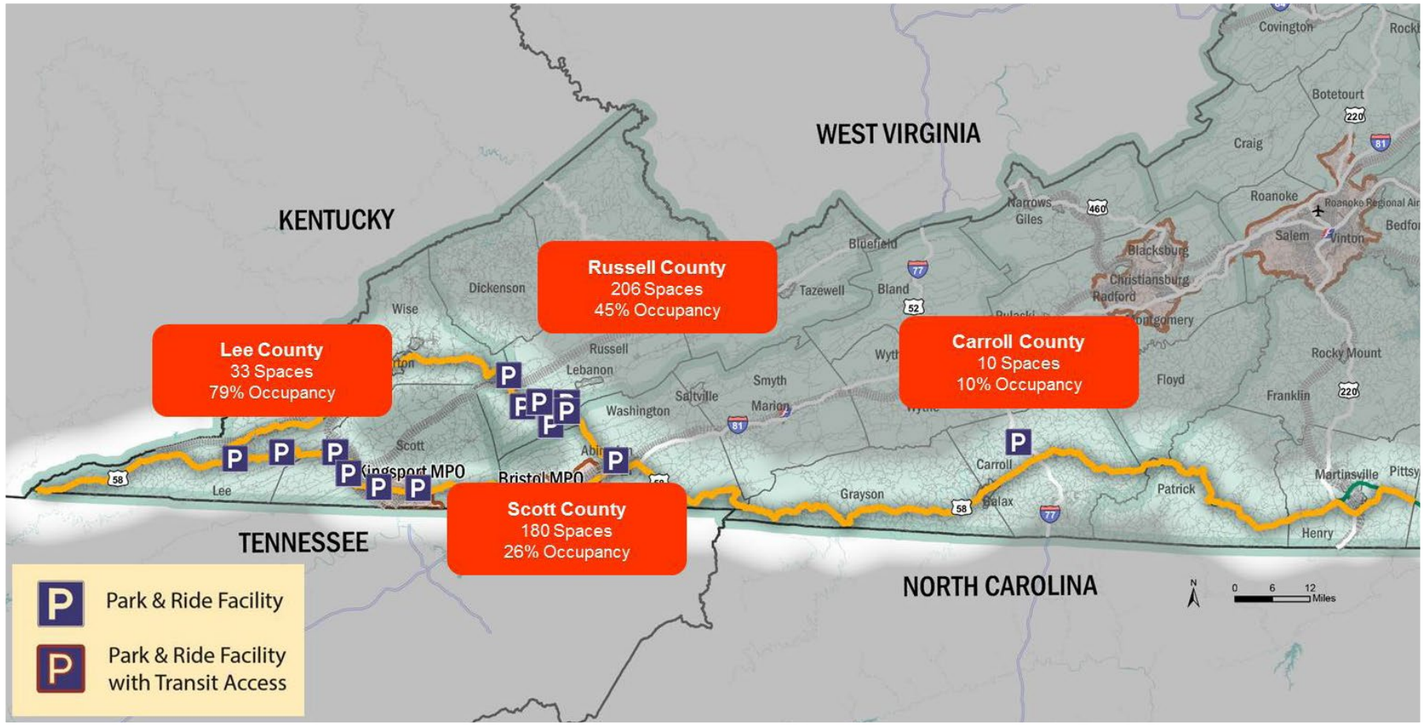
Bristol to Kingsport, TN

Inter-City Bus	*Train*
1 Trips per Day 0:40 Travel Time $14 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 58: 0:39 Travel Time $13 Est. Cost
Via Rt. 11W: 0:32 Travel Time $13 Est. Cost

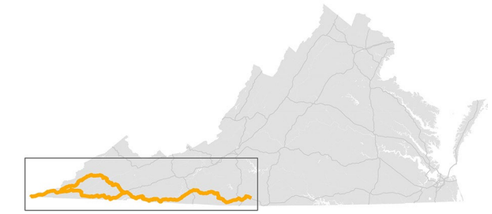




J1 SEGMENT NEEDS

Safety

Between 2010 and 2012, 252 severe crashes occurred on Segment J1, concentrated in several areas. In Russell County, along US 58 Alternate (Trail of the Lonesome Pine), over a stretch of approximately 1.8 miles near the intersection with Route 71, there were 17 collisions. Along US 58 Alternate/US 19 (Porterfield Highway) in Washington County, there were 13 incidents over a two-mile stretch near the intersection with Brumley Gap Road. In the Town of Abingdon on Route 75 (Cummings Street), there were 18 crashes over 0.6 miles between Wall Street S and I-81. In Galax, on US 58/ US 221 (East Stuart Drive), 25 crashes took place over 1.9 miles between Country Club Lane and Connor Lane. In Martinsville along US 58 Business (East Church Street), 19 collisions occurred over approximately 0.9 miles between Watt Street and the city line near Cabell Street; of the 19, nine collisions occurred at the intersection with East Watt Street.



Performance Metrics:

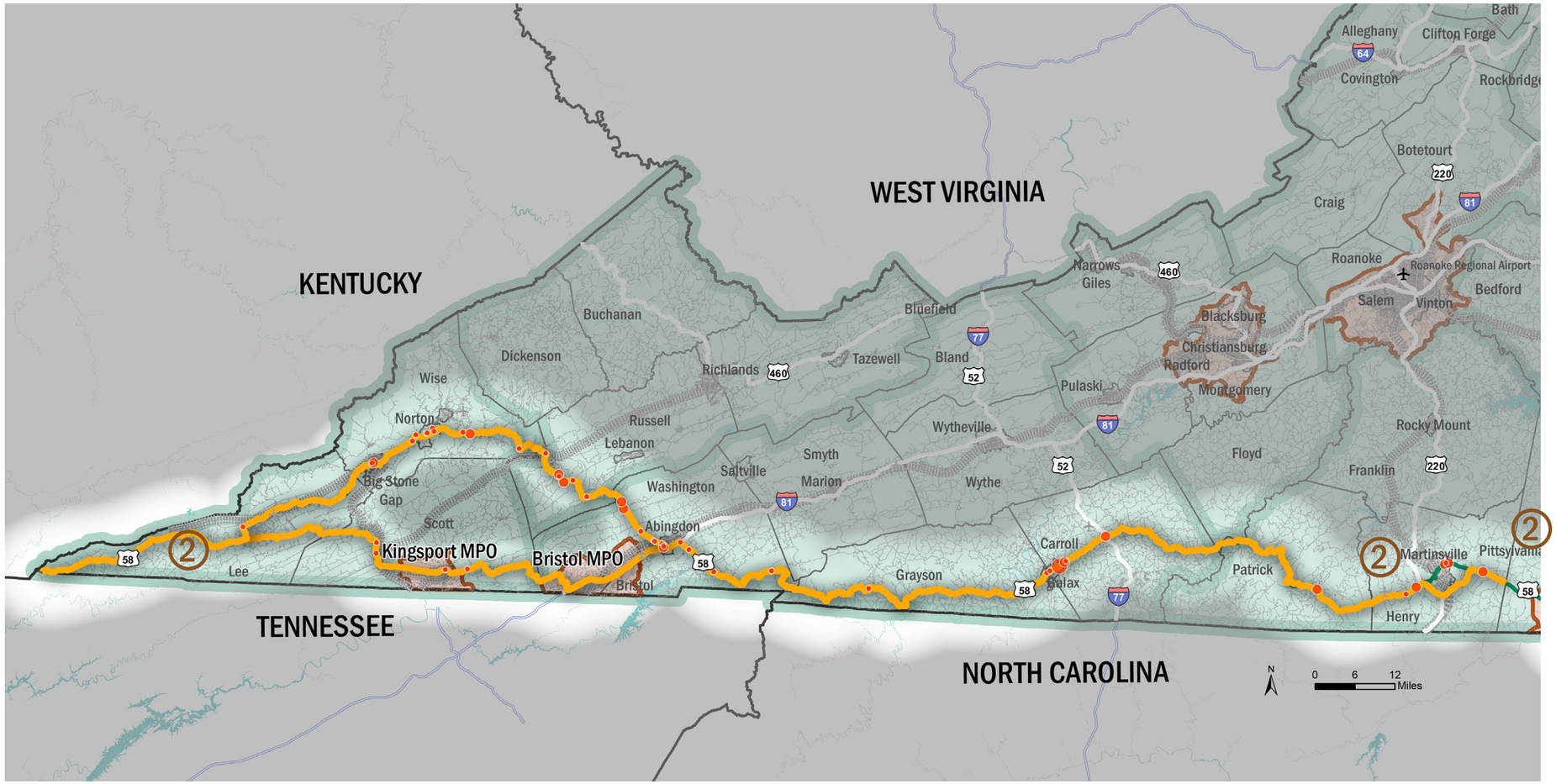
Number of Severe Crashes	252
Severe Crashes/Million VMT	0.2
Number of Railroad Crashes	6

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	5
Freight Ton Hours of Delay per Mile	8.8K

Passenger Delays

Passenger congestion along Segment J1 is relatively low on a per-mile basis, with an average delay of just five person-hours per mile. Throughout the segment, passenger congestion is minimal; however, passenger delay exceeds 100 person-hours per mile in a few locations, as follows:

- US 58 near US 58 Business in the Town of Gate City;
- Route 381 at the intersection with US 11 in Bristol;
- Near the intersection of US 11 and US 19 in the Town of Abingdon; and
- US 58 Business at the intersection with US 220 Business in the City of Martinsville.

Peak-period passenger delays account for 31 percent of daily congestion, which is considerably lower than the average for the peak-period share of congestion on CoSS segments.

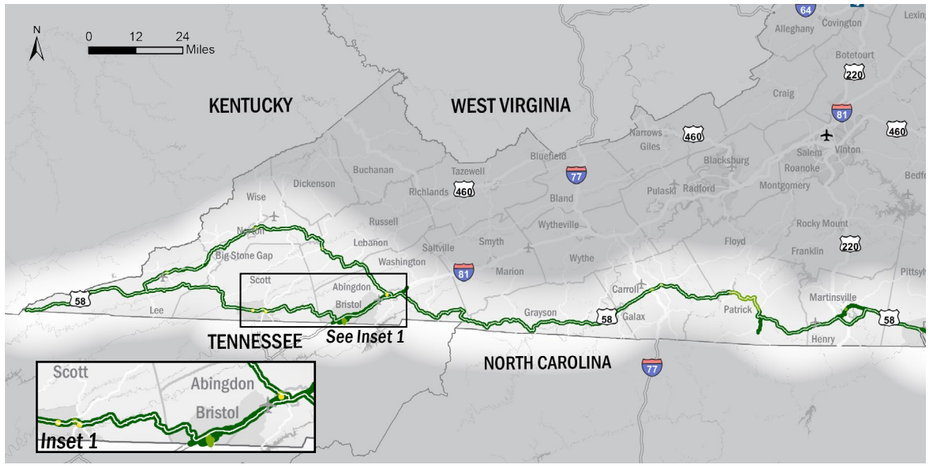
Freight Delays

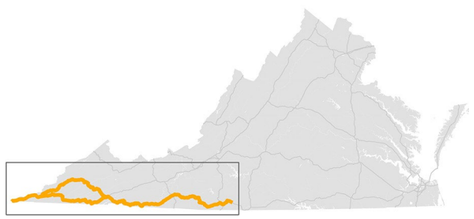
Freight delays along Segment J1 are relatively low on a per-mile basis, with an average delay of around 8,800 ton-hours per mile. The only locations where freight delays exceed 250,000 ton-hours per mile are located in and between the City of Bristol and the Town of Abingdon, where freight volumes are highest because US 58 runs concurrently with I-81. Specific locations with significant freight delay include:

- US 11 between I-81 in Bristol and Route 611 near the Virginia Highlands Airport;
- Near the intersection of US 11 and US 19 in the Town of Abingdon;
- I-81/US 58 at the interchange with Route 140 (exit 14);
- I-81/US 58 at the interchange with US 58 Alternate (exit 17); and
- US 58 at the interchange with I-81 near Abingdon.

Peak-period freight delays account for just 11 percent of daily congestion, which significantly less than the average for the peak-period share of congestion on CoSS segments.

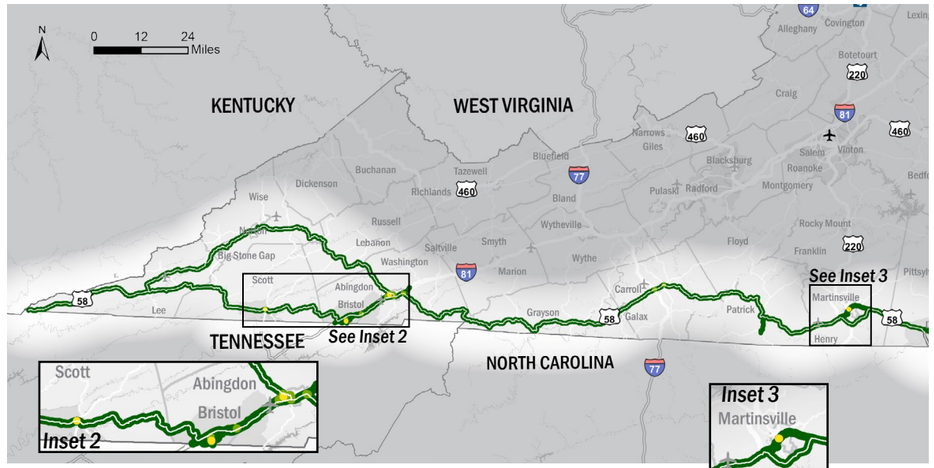
Daily Person Hours of Delay Per Mile





< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment J1 ranges from 0.00 to 1.44 in terms of reliability index, with an average value of 0.09. The only location in the segment where the peak period reliability index exceeds the statewide threshold is on the US 58 Bypass near the interchange with US 58 in Henry County.

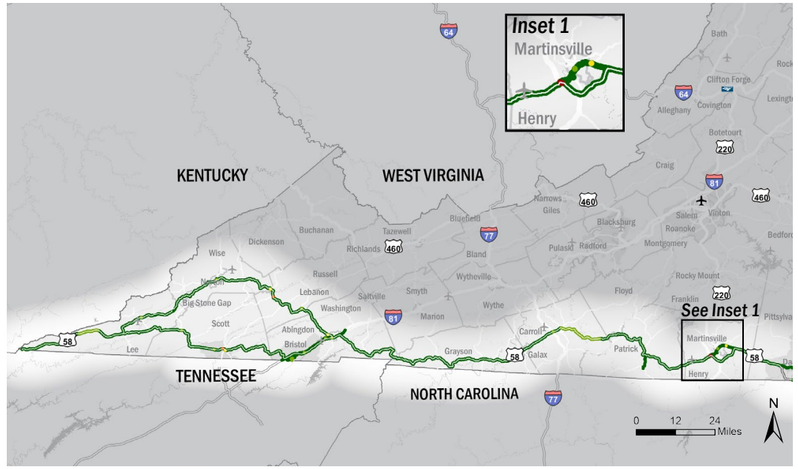
Weekday

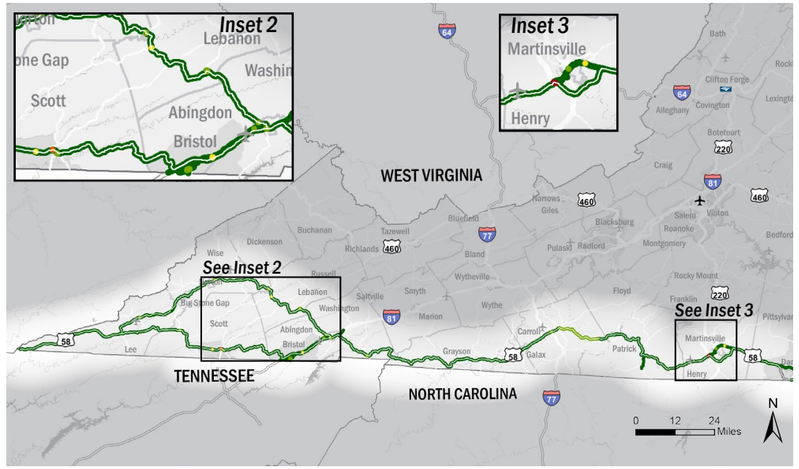
Reliability of travel during a typical weekday ranges from 0.00 to 0.91 in terms of reliability index, with an average value of 0.08. While the average weekday reliability index for this segment is lower than the average for the state, several locations have reliability index values exceeding the statewide threshold, as follows:

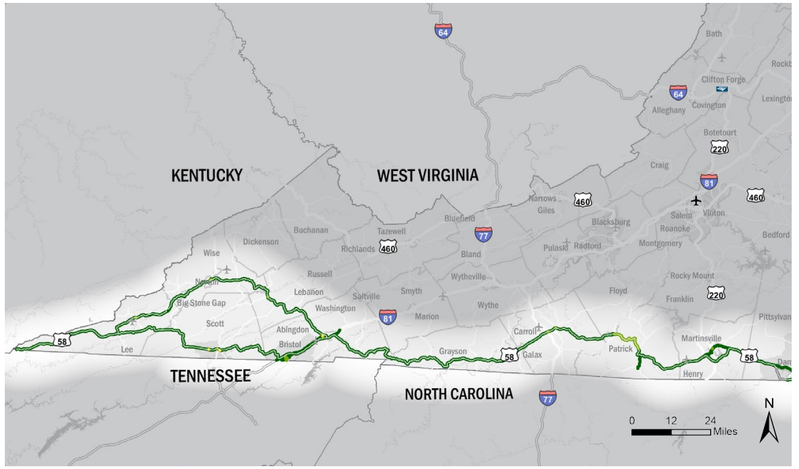
- Both intersections of US 58 with US 58 Business in the Town of Gate City;
- US 11 at Route 659 in the City of Bristol;
- US 58 Alternate at Route 65 in Russell County;
- US 58 Bypass near the interchange with US 58 in Henry County; and
- US 58 Business at Route 57 in Henry County.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.56 in terms of reliability index, with an average value of 0.07. None of the locations along Segment J1 have reliability index values exceeding the statewide threshold.





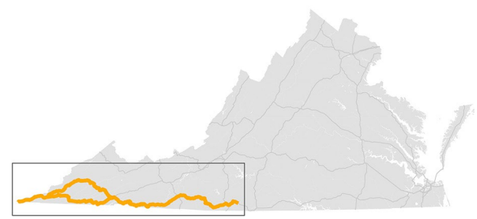


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

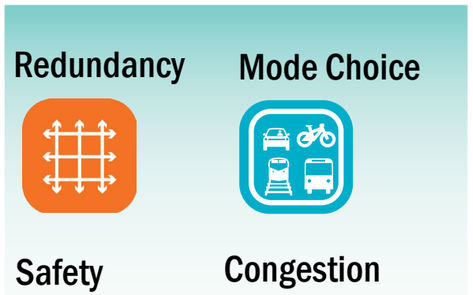
Mode Choice

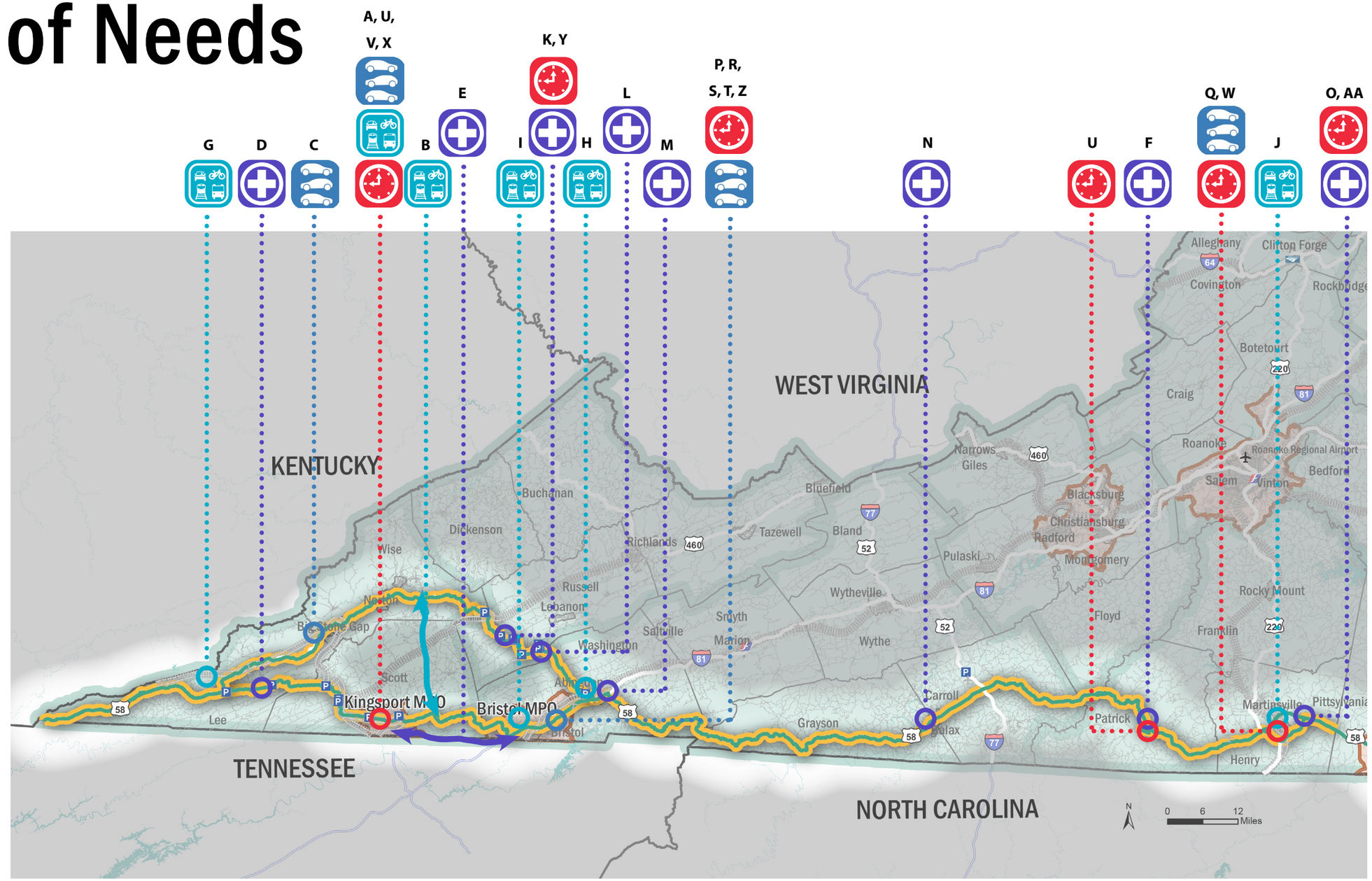
Safety

Congestion

Bottlenecks

Reliability





J1 SEGMENT NEEDS

Summary of Needs - J1 Segment

A.	At-grade rail crossing near US 58 and VA 224 near Gate City: No alternative crossing nearby, requires 57 mile detour; Weekday Reliability Index >0.4
B.	Provide north south connections between US 58 and US 58-Business through Wise and into Tennessee
C.	Alt. US 58 in Big Stone Gap: Two 90 degree turns on Main Street cannot be made by large trucks
D.	Inadequate climbing lanes for trucks on US 58 between Duffield and Stickleyville
E.	US 58 between Gate City and Bristol: horizontal and vertical curves with insufficient sight distance
F.	Inadequate climbing lanes for trucks on US 58 between Meadows of Dan and Stuart
G.	Park and Ride lots in Lee County have higher utilization rates than statewide average
H.	Park and Ride lots in Washington County have utilization rates that match the statewide average
I.	No intercity bus or passenger rail service from Bristol to other cities in the corridor
J.	No intercity bus or passenger rail service from Martinsville to other cities in the corridor
K.	US 58-Alt near intersection with VA 71 in Russell County: 19 severe crashes
L.	US 58-Alt/US 19 near Brumley Gap Road in Washington County: 13 severe crashes
M.	US 58-Alt between US 11 and I-81 in Abingdon: 18 severe crashes

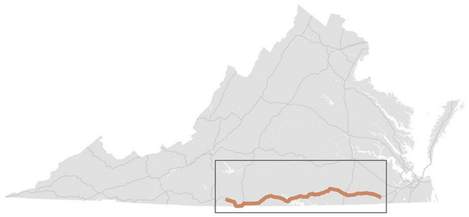
Summary of Needs - J1 Segment

N.	US 58 between Country Club Ln and Connor Ln in Galax: 25 severe crashes
O.	US 58-Business between Watt St and Cabell St in Martinsville: 19 severe crashes
P.	Congestion issue on US 11 between I-81 in Bristol and Abingdon
Q.	Congestion issue at US 58 Business (Starling Avenue) and US 220 Business (Memorial Boulevard) in Martinsville
R.	Congestion issue at I-81/US 58 Exit 14 (Old Jonesboro Road)
S.	Congestion issue at I-81/US 58 Exit 17 (US 58-Alt/Cummings Street)
T.	Congestion issue at I-81/US 58 Exit 19 (US 58/US 11)
U.	Congestion issue at US 58/US 23/US 421 and US 58 Business (Kane Street) in Gate City
V.	Reliability issue at US 58/US 23/US 421 and US 58 Business (Daniel Boone Road) in Gate City
W.	Reliability issue at US 58 and US 220 intersection west of Martinsville
X.	Reliability issue at US 58/US 23/US 421 and US 58 Business (Kane Street) in Gate City
Y.	Reliability issue at US 58-Alt and VA Route 65
Z.	Reliability issue at US 11 and Clear Creek Road/Old Airport Road in Bristol
AA.	Reliability issue at US 58 Business and VA Route 57 (Chatham Road) in Martinsville

III. Segment J2

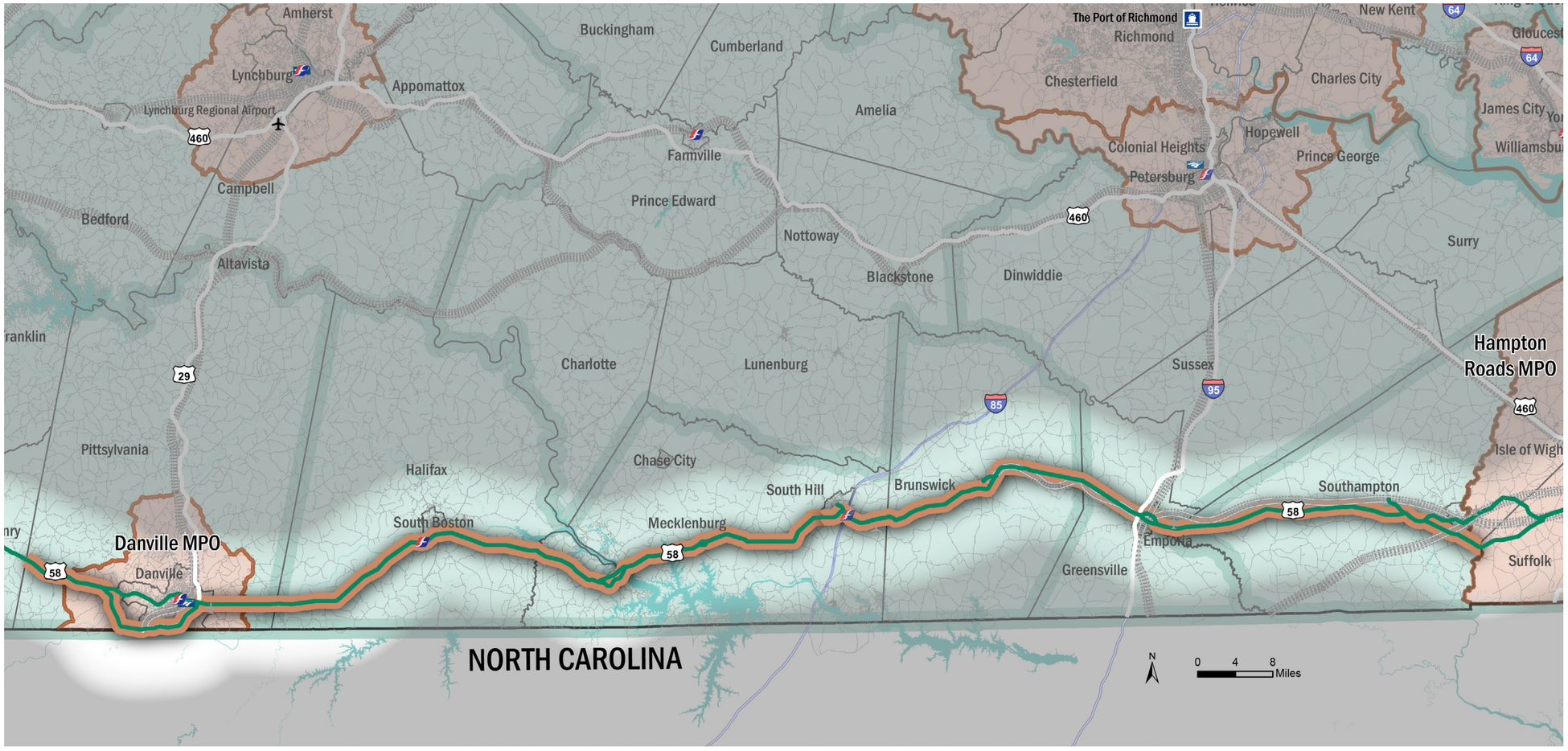
J2
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility

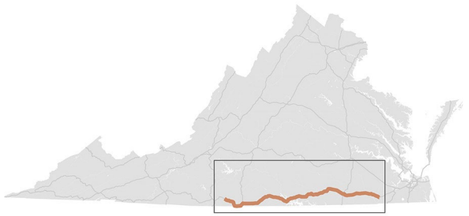


Corridor Segment J2 Components

- US 58
- US 58 Business
- US 58 Bypass
- CSX National Gateway Corridor
- Norfolk Southern Heartland Corridor



J2 SEGMENT PROFILE



Segment J2 connects the Danville Area to the Hampton Roads Area, and serves Pittsylvania, Halifax, Mecklenburg, Brunswick, Greensville, and Southampton Counties, as well as the Cities of Danville, Emporia, and Franklin. Segment J2 is primarily defined by US 58, which provides local access to communities in the southern portion of the Commonwealth. US 58 also connects to I-95 (Corridor K) and US 29 (Corridor I) in this segment.

Highway Facilities: In Segment J2, US 58 is a two-lane highway and no parallel facility is available that accommodates inter-city travel along the Tennessee/ North Carolina border. US 58 Business spurs do provide local access to many of the urbanized areas along Segment J2, including Danville, Clarksville, Lawrenceville, and Franklin. US 58 Bypass runs through the City of Emporia and US 58 runs concurrently with US 29 for a short section in the City of Danville.

Transit Services: There are Greyhound bus stations located in the City of Danville, the Town of South Boston and the Town of South Hill.

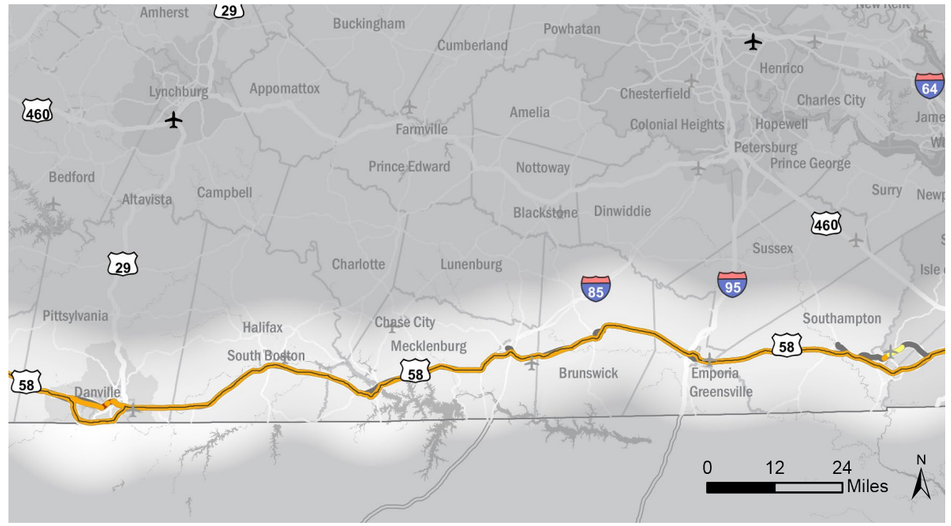
Rail Facilities: Norfolk Southern provides rail lines along the Southside Corridor from Brunswick County east to the Hampton Roads Area and the Port of Virginia facilities located there. CSX also operates a spur of its National Gateway Corridor from Weldon, North Carolina, just south of the Virginia border along I-95 to connect with the Port of Virginia facilities in the Hampton Roads Area. Both the City of Danville and the City of Emporia provide connections to freight rail lines that travel to other destinations north.

Port Facilities: No port facilities are located directly adjacent to Segment J2, but the Southside Corridor does provide connections to the Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: There are no commercial airports located within this segment.

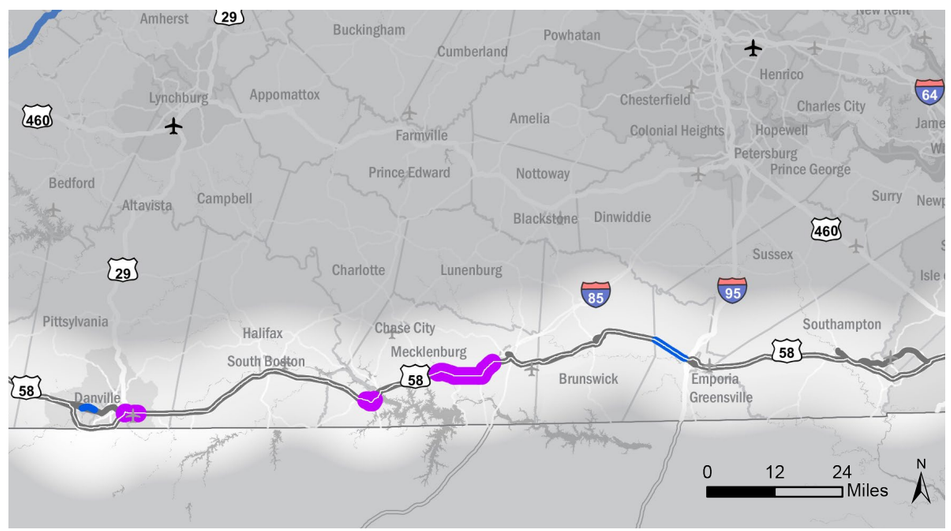
Major planned and future projects include:

- **City of Danville:** Widen westbound US 58 from two to three lanes leading up to the US 29 Bypass interchange.
- **Southampton County:** Improve existing superelevation on eastbound US 58 and add a right-turn lane on eastbound US 58 to southbound Route 609.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



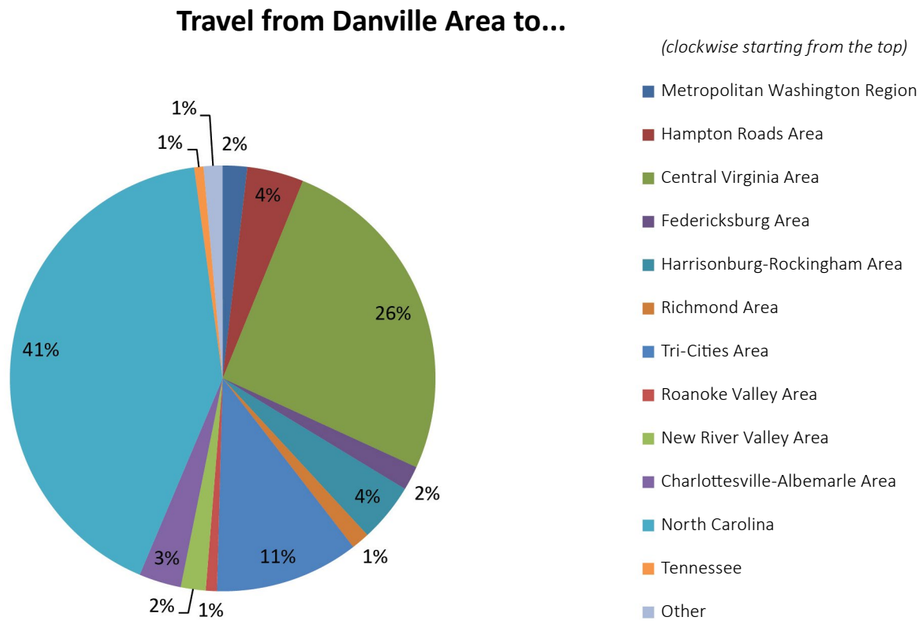
Future Projects

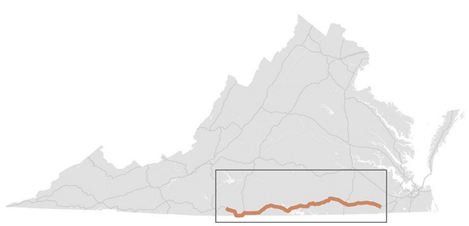
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

Passenger Demand

Segment J2 connects the Danville Area in the west, to the Hampton Roads Area in the east. Intercity travel from the Danville Area is fairly dispersed, and is destined for a wide range of locations; however, not many of these destinations are served by Corridor J. The largest market using Segment J2 is represented by the four percent of trips occurring between the Danville and Hampton Roads Areas. The traffic between these two areas accounts for less than 0.1 percent of intercity traffic in the Commonwealth.





J2 SEGMENT PROFILE

Freight Demand

By truck, Segment J2 carried 21 million tons of freight worth $29 billion in 2012, and is estimated to carry 17 million tons of freight worth $27 billion in 2025. On Corridor J, 45 percent of the truck freight tonnage and 60 percent of the truck freight value passes through Virginia. The major truck freight interstate through patterns are similar to those observed on Corridor B as a result of a concurrency between US Route 58 (Segment J1) and I-81 (Segment B1). In terms of tonnage, the largest truck freight flows on Corridor J are between North Carolina and the Hampton Roads Area, accounting for more than eight percent of the total truck freight tonnage on the corridor. North Carolina and Tennessee are the largest generators and attractors of truck freight tonnage on Corridor J, with 29 percent of the truck freight tonnage originating in these locations and 22 percent destined for these locations. The jurisdictions adjacent to Segment J2 are not major generators or attractors of truck freight on the corridor, with less than three percent of the total freight value originating in Segment J2 and less than two percent of the value destined for the segment.

By rail, Segment J2 carried 25 million tons of freight worth $17 billion in 2012, and is estimated to carry 29 million tons of freight worth $22 billion in 2025. On Corridor J, the majority of rail freight either originates from or is destined for Virginia, with only four percent of the rail freight tonnage and two percent of the total rail freight value passing through the Commonwealth. In terms of tonnage, the dominant flow of rail freight on Corridor I is from West Virginia, Kentucky, and Wise and Buchanan Counties in Virginia to the Port of Virginia marine terminal in Norfolk, accounting for more than 43 percent of the total corridor rail freight tonnage. Tennessee and Georgia are also major attractors of rail freight tonnage along Corridor J, with significant rail freight flows from Wise County and Kentucky. In terms of value, the dominant movement of rail freight on Corridor J is between the states of Illinois and Ohio and the Port of Virginia facilities in the Hampton Roads Area. These flows account for more than 55 percent of the total rail freight value on the corridor. The jurisdictions adjacent to Segment J2 are not major generators or attractors of rail freight on the corridor. Less than three percent of the total corridor rail freight tonnage and value originates along Segment J2 and less than two percent of the total corridor rail freight tonnage and value is destined for this segment.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (18% / 18%)
3. Tennessee (11% / 10%)
4. Pennsylvania (4% / 5%)
5. Texas (4% / 4%)

Corridor Tonnage Originating in Segment J2: 5% / 5%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
North Carolina and Maryland
City of Chesapeake and North Carolina
Pennsylvania and Tennessee

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (33% / 33%)
2. North Carolina (13% / 14%)
3. Tennessee (9% / 9%)
4. Pennsylvania (5% / 4%)
5. New York (4% / 4%)

Corridor Tonnage Destined for Segment J2: 3% / 3%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (47% / 46%)
2. West Virginia (28% / 25%)
3. Wise County (21% / 19%)
4. Kentucky (8% / 8%)
5. Buchanan County (7% / 6%)

Corridor Tonnage Originating in Segment J2: 2% / 3%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

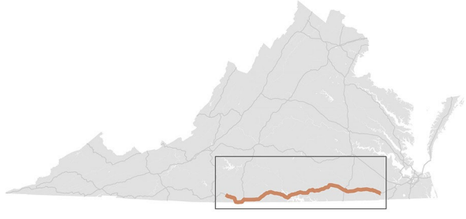
Major Destinations (by Tonnage)
1. Virginia (75% / 74%)
2. City of Norfolk* (62% / 57%)
3. Tennessee (7% / 6%)
4. City of Chesapeake (6% / 9%)
5. Georgia (5% / 5%)

Corridor Tonnage Destined for Segment J2: 1% / 2%

Traffic Conditions

Traffic Volume and AADT

Traffic volumes on Segment J2 are low to moderate compared to other segments of Corridor J. Most sections along US 58 in Segment J2 have average daily traffic volumes ranging from 5,000 to 15,000 vehicles, while a few sections near the City of Danville and in eastern Southampton County have volumes ranging as high as 27,000 vehicles per day. Average daily traffic volumes on almost all sections of J2 are projected to increase by fewer than 2,500 additional vehicles by 2025. The greatest increase in traffic volume by 2025 is projected to occur near the intersection of US 58 and US 1 in Mecklenburg County, with an increase of 6,000 additional vehicles per day.



Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



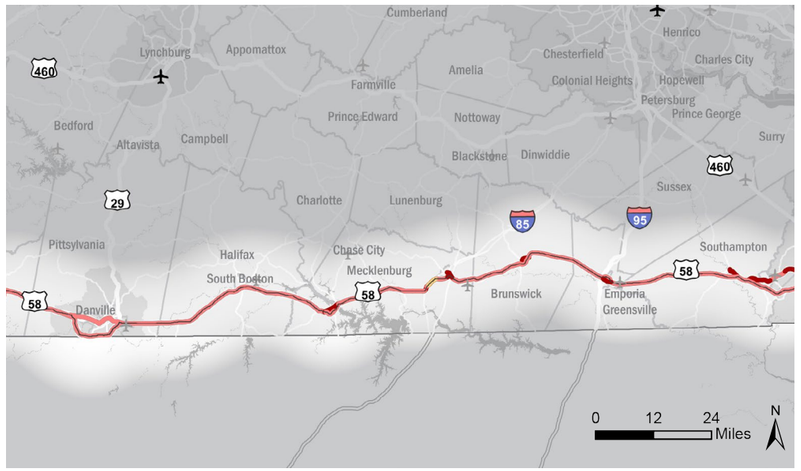
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



J2 SEGMENT PROFILE

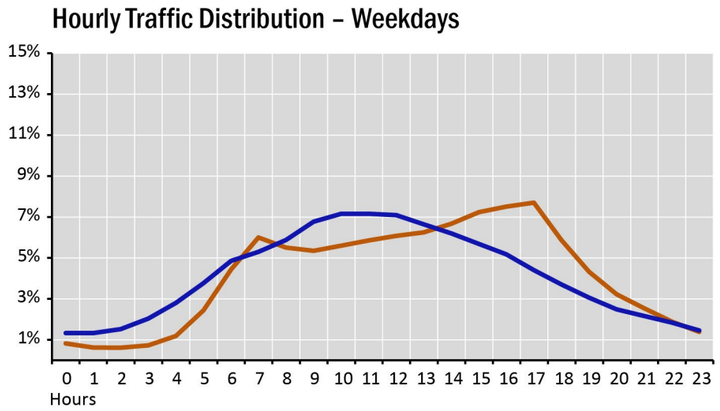
Traffic Distribution

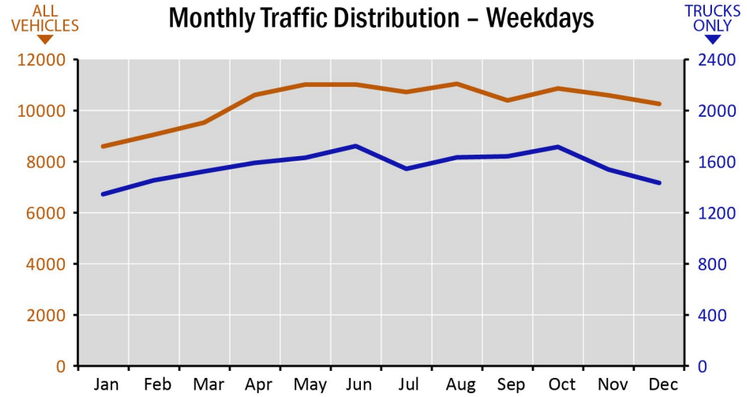
On average, traffic on Segment J2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows distinct morning and evening peak periods. The highest hourly traffic occurs between 5 and 6 p.m. which accounts for 7.7 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 6.0 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. period accounts for 76 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic with a single peak during the midday period, with the highest hourly flow of 7.2 percent of daily traffic. Weekend traffic patterns are also different from the typical commute patterns, showing a single midday peak (peaking between 3 and 4 p.m. with 7.7 percent of daily traffic). Weekend truck traffic peaks earlier in the day, from 11 a.m. and noon (6.5 percent of daily traffic).

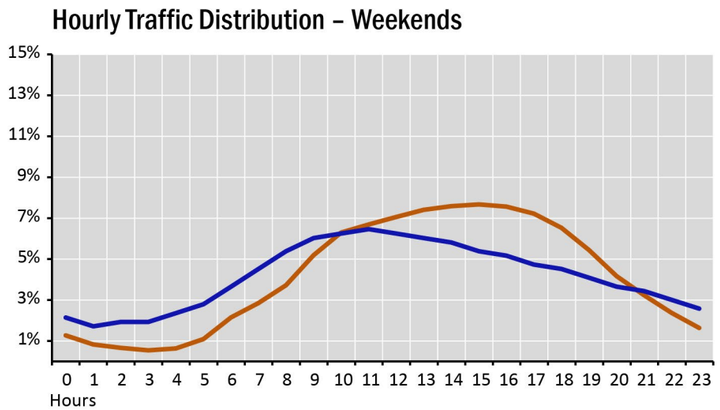
Weekday traffic volumes on Segment J2 vary by as much as 29 percent throughout the year, with the high point in August (around 11,000 vehicles per day) and the low point in January (around 9,000 vehicles per day). Truck volumes also vary throughout the year, with the June high (around 1,700 vehicles per day) 28 percent higher than the January low (around 1,300 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (June, around 10,000 vehicles per day) are 46 percent higher than January levels (around 7,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 34 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment J2, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

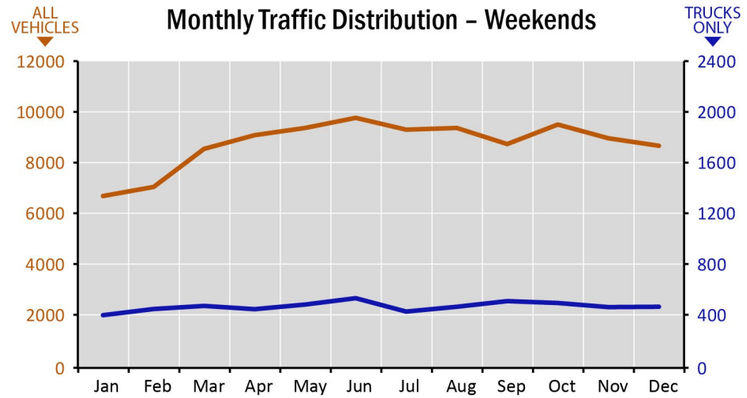
Truck Volumes

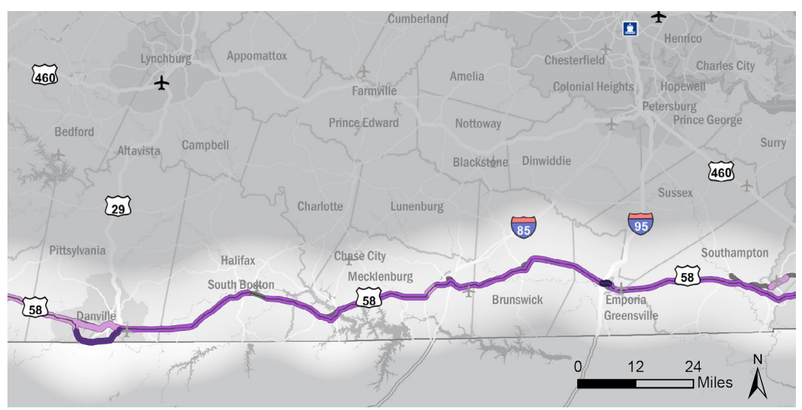
The percent of daily traffic comprised of heavy trucks on Segment J2 is high compared to other segments in Corridor J and varies considerably by location. In most of Segment J2, heavy trucks generally comprise seven to ten percent of total traffic on average throughout Segment J2. Some sections of US 58 Business in Danville and US 58 in Emporia have a much higher proportion - as high as 29 percent - of heavy trucks.

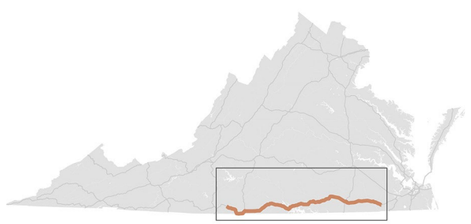












Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

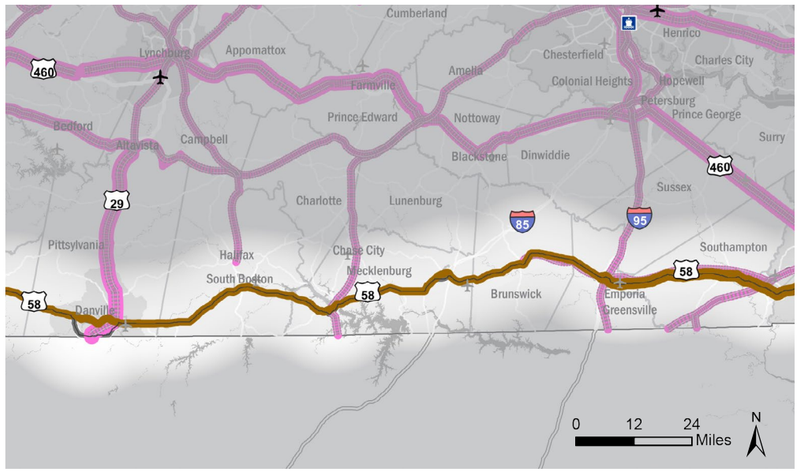
J2 SEGMENT PROFILE

Freight Flows

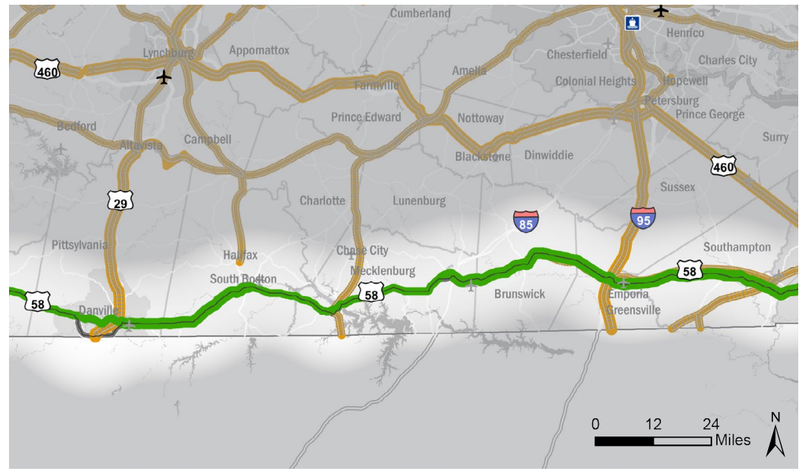
In the City of Danville, freight movements on Segment J2 rely more heavily on rail, in terms of tonnage, and on truck, in terms of value. In total, 21 million tons (46 percent) of freight is moved through this section of Segment J2 by truck, compared to 25 million tons (54 percent) by rail. With regard to value, however, $27 billion (62 percent) of freight travels by truck, compared to $16.5 billion (38 percent) by rail. On average, a ton of freight traveling through this section of Segment J2 by truck is worth $1,284 while a ton of freight traveling by rail is worth $656. In 2025, both rail and truck freight tonnages and total values in this area of Segment J2 are expected to increase. The percentage of freight traveling by truck in terms of tonnage and by value is expected to increase to 49 percent and 63 percent, respectively. The value per ton will likely increase to $1,357 on trucks and $760 on rail.

In Brunswick County, freight on Segment J2 is moved primarily by truck by tonnage and by value, mostly due to a lack of through rail facilities in this area. Almost 100 percent of both freight value and tonnage travels by truck on this portion of Segment J2, including eight million tons worth $15 billion. On average, a ton of freight traveling through this section of Segment J2 by truck is worth $1,879 while a ton of freight traveling by rail is worth $9. In 2025, both rail and truck freight tonnages and total values in this area of Segment J2 are expected to increase. The percentage of freight traveling by truck is expected to remain the same by tonnage and value. The value per ton will likely increase to $2,052 on trucks and $9 on rail.

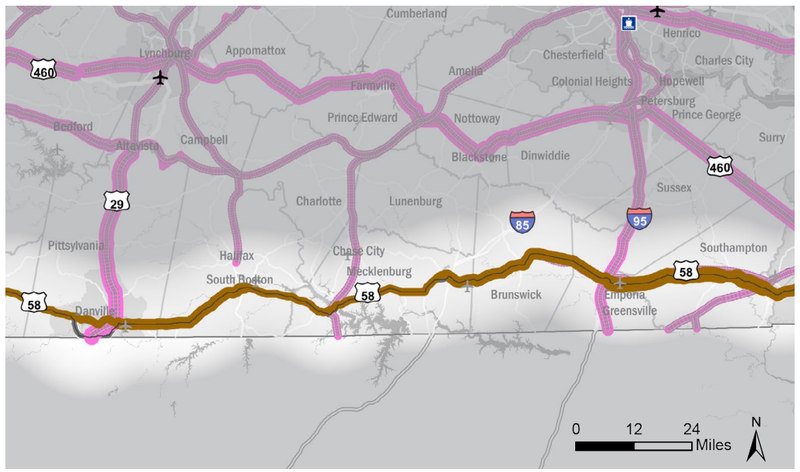
Annual Freight by Tonnage, 2012



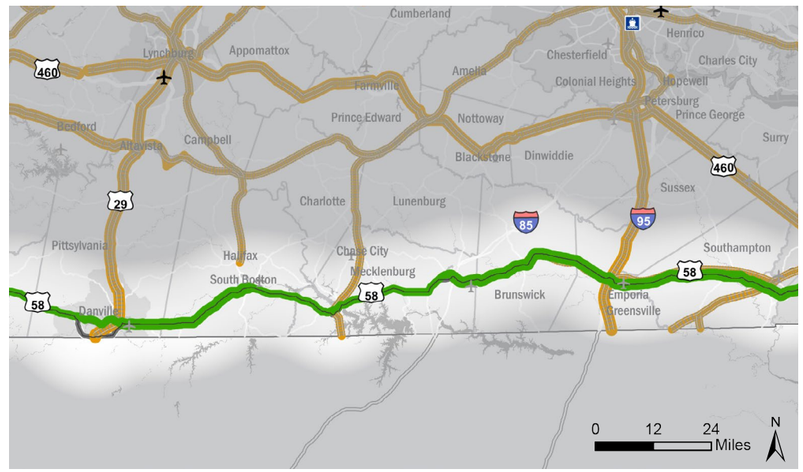
Annual Freight by Value, 2012

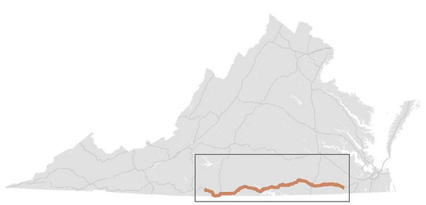


Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025





Truck Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight
- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment J2 of the Southside Corridor have few travel options, both in terms of travel path and mode choice. There are no highway facilities parallel to US 58 that accommodate inter-city travel in Segment J2. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by bus. However, Greyhound bus service, which has stations in Danville, South Boston, and South Hill, is limited by the frequency of service and is not as fast as the typical automobile trip.

Park-and-Ride

Within Segment J2, there are no Park-and-Ride facilities. Furthermore, no new Park-and-Ride locations are proposed by VDOT's Park-and-Ride Investment Strategy.

Comparable Travel Options

Hampton Roads (Norfolk) to Emporia

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 58 / Rt. 13: 1:27 Travel Time $43 Est. Cost

Emporia to Danville

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 58: 2:10 Travel Time $65 Est. Cost

Hampton Roads (Norfolk) to Danville

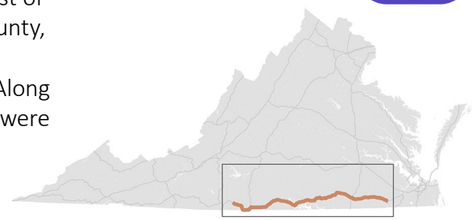
Inter-City Bus	*Train*
1 Trip per Day 9:25 Travel Time $52 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 58: 3:27 Travel Time $108 Est. Cost

Safety

Between 2010 and 2012, 81 severe crashes occurred on Segment J2, the lowest number of crashes in the Southside Corridor. Severe crashes occurred in several areas along Segment J2. In Danville, along US 58 Business (Riverside Drive), there were 25 collisions that took place over approximately two miles between Piedmont Drive and Union Street. Of the 25 collisions, seven occurred at the intersection with Barter Street. On US 58 (Boston Road) in Danville, there were eight incidents that took place over approximately 0.3 miles between US 29 and Clover Lane, just west of the Danville Airport. Just east of Danville, along US 58 (South Boston Highway) in Pittsylvania County, south of the Ringgold Golf Club, nine incidents occurred over a stretch 0.8 miles long between Ringgold Road and Vista Drive. Along US 58 (Governor Harrison Parkway) in Brunswick County, there were eight crashes over a 1.9-mile span between Edgerton Lane and Vulcan Quarry Lane.



Performance Metrics:

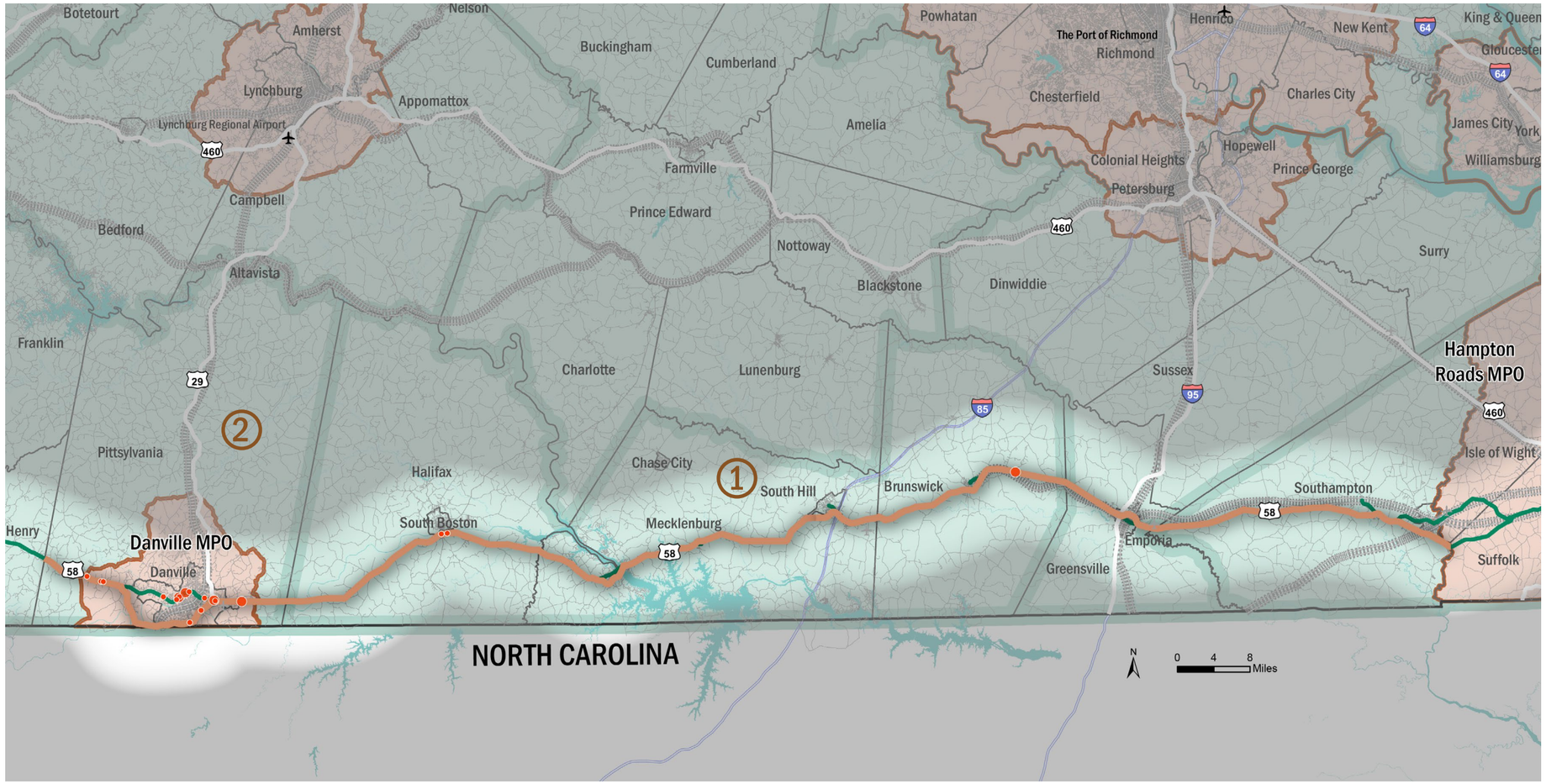
Number of Severe Crashes	81
Severe Crashes/Million VMT	0.2
Number of Railroad Crashes	3

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	4
Freight Ton Hours of Delay per Mile	5.5K

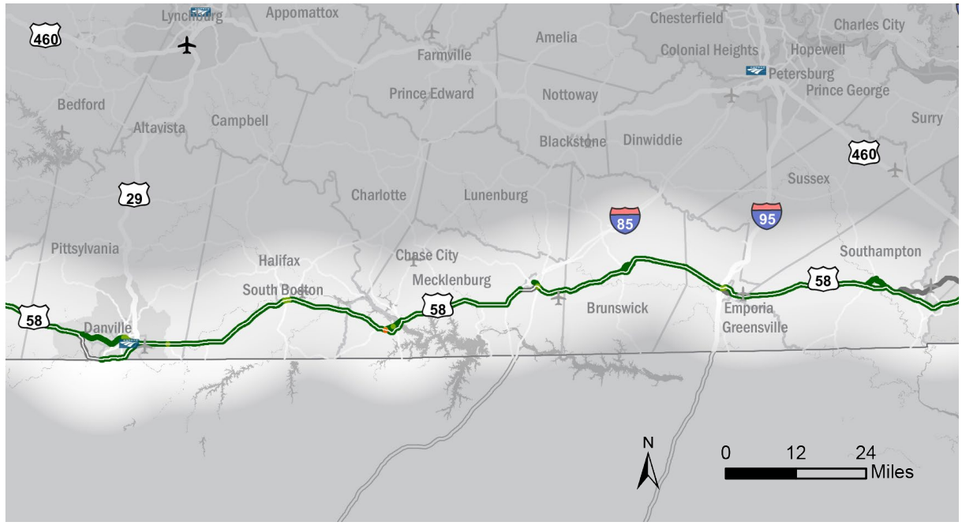
Passenger Delays

Passenger congestion along Segment J2 is relatively low on a per-mile basis, with an average delay of just four person-hours per mile. As such, there are no locations along the segment with delays exceeding 100 person-hours per mile. Peak-period passenger delays account for 46 percent of daily congestion, which is slightly greater than the average for the peak-period share of congestion on CoSS segments.

Freight Delays

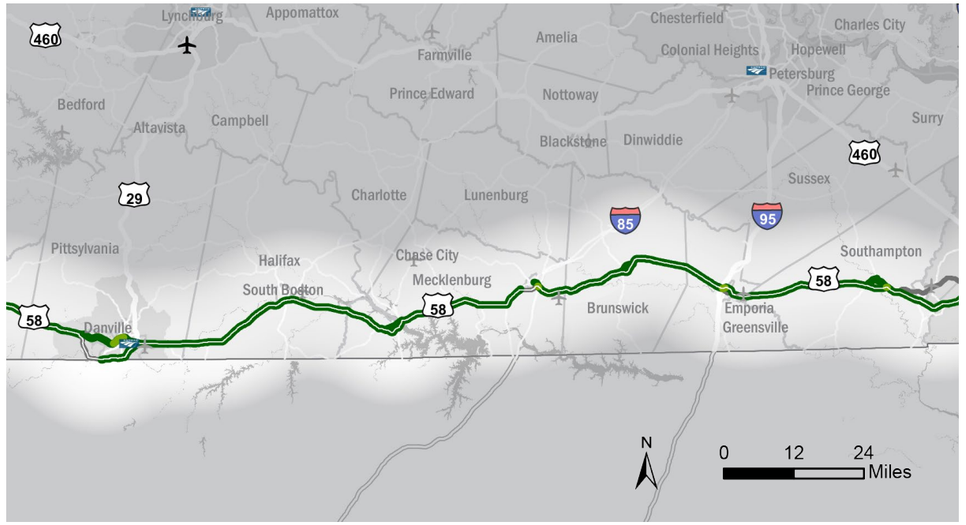
Freight congestion along Segment J2 is the lowest among segments on Corridor J, with an average delay of 5,500 ton-hours per mile. The only location with freight delays exceeding 250,000 ton-hours per mile is on US 58 in City of Emporia between US 301 and the interchange with I-95. About 38 percent of the daily freight delays are experienced in the peak period, which is greater than the average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile

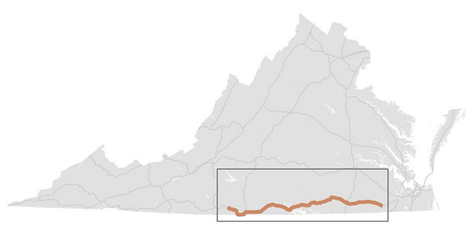


< 50
51 - 100
101 - 250
251 - 500
> 500

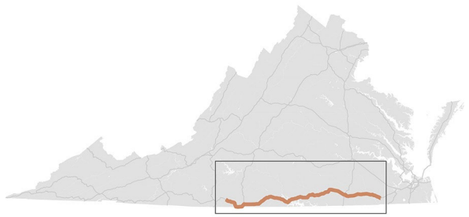
Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000



Reliability

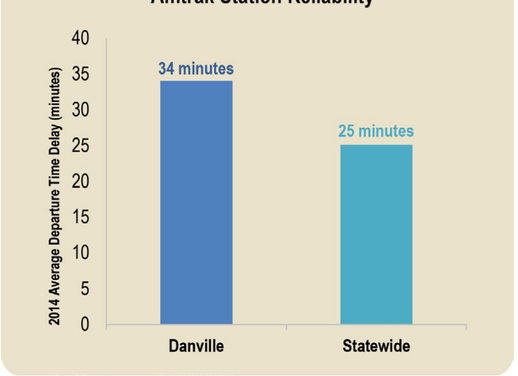


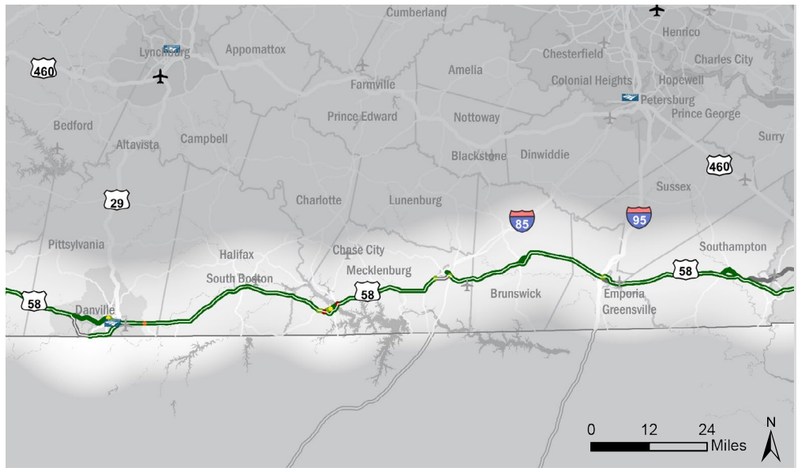
Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

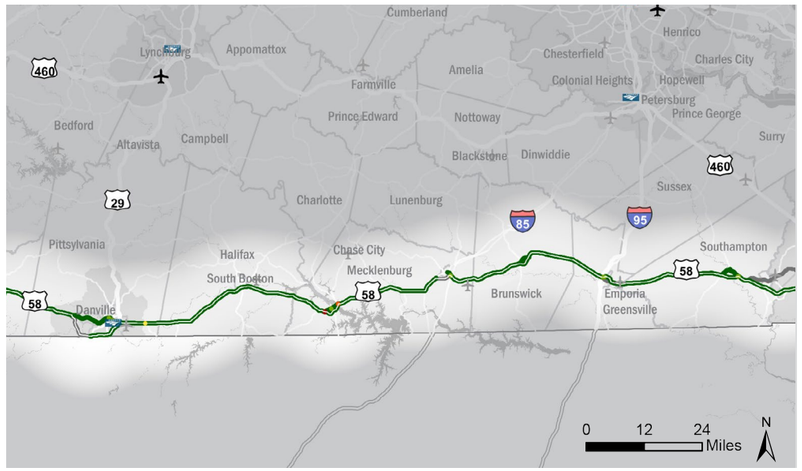
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60





Weekday Peak Reliability

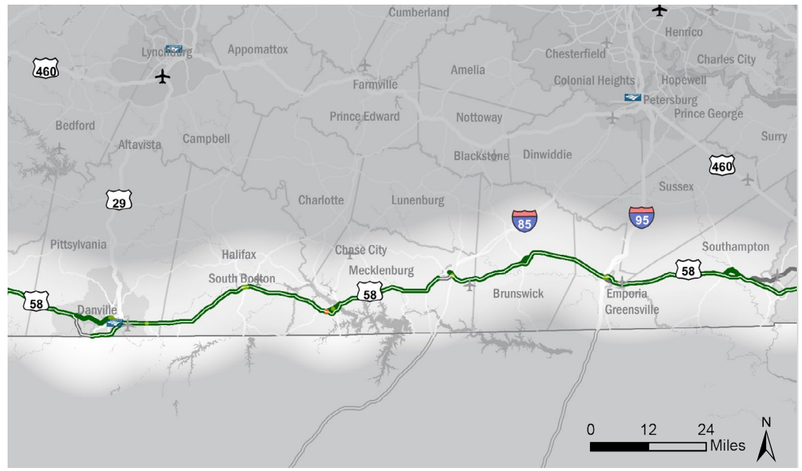
Reliability of travel during the peak period on a typical weekday on Segment J2 ranges from 0.00 to 1.00 in terms of reliability index, with an average value of 0. 10. Only two locations near Clarksville in Mecklenburg County have peak period reliability index values above the statewide threshold: US 58 at US 58 Business west of the Roanoke River and US 58 at US 15 east of the river.



Weekday Reliability

Reliability of travel during a typical weekday ranges from 0.00 to 0.81 in terms of reliability index, with an average value of 0.09. While this segment has a weekday reliability index on average with other CoSS segments statewide, three locations do have reliability index values higher than the statewide threshold as follows:

- US 58 at US 58 Business west of the Roanoke River in the Town of Clarksville;
- US 58 at US 15 east of the Roanoke River in Mecklenburg County; and
- US 58 at the intersection with Routes 62/726 in Pittsylvania County.

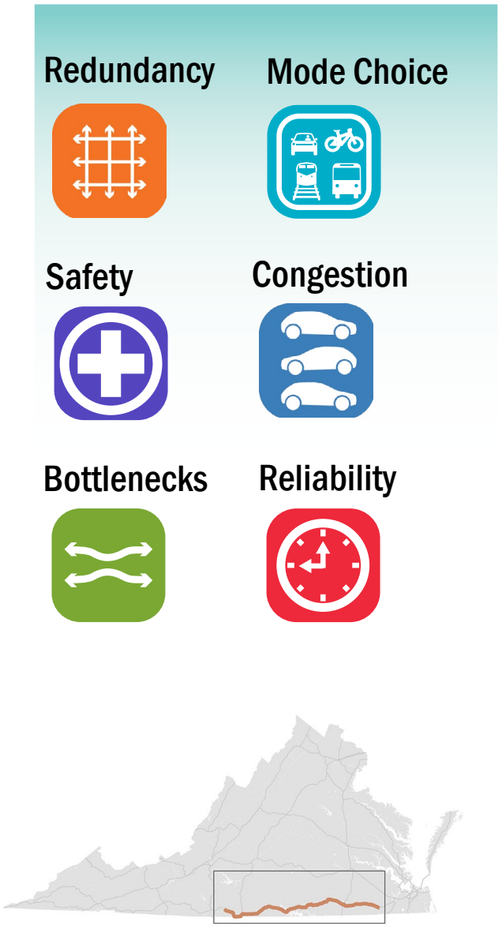


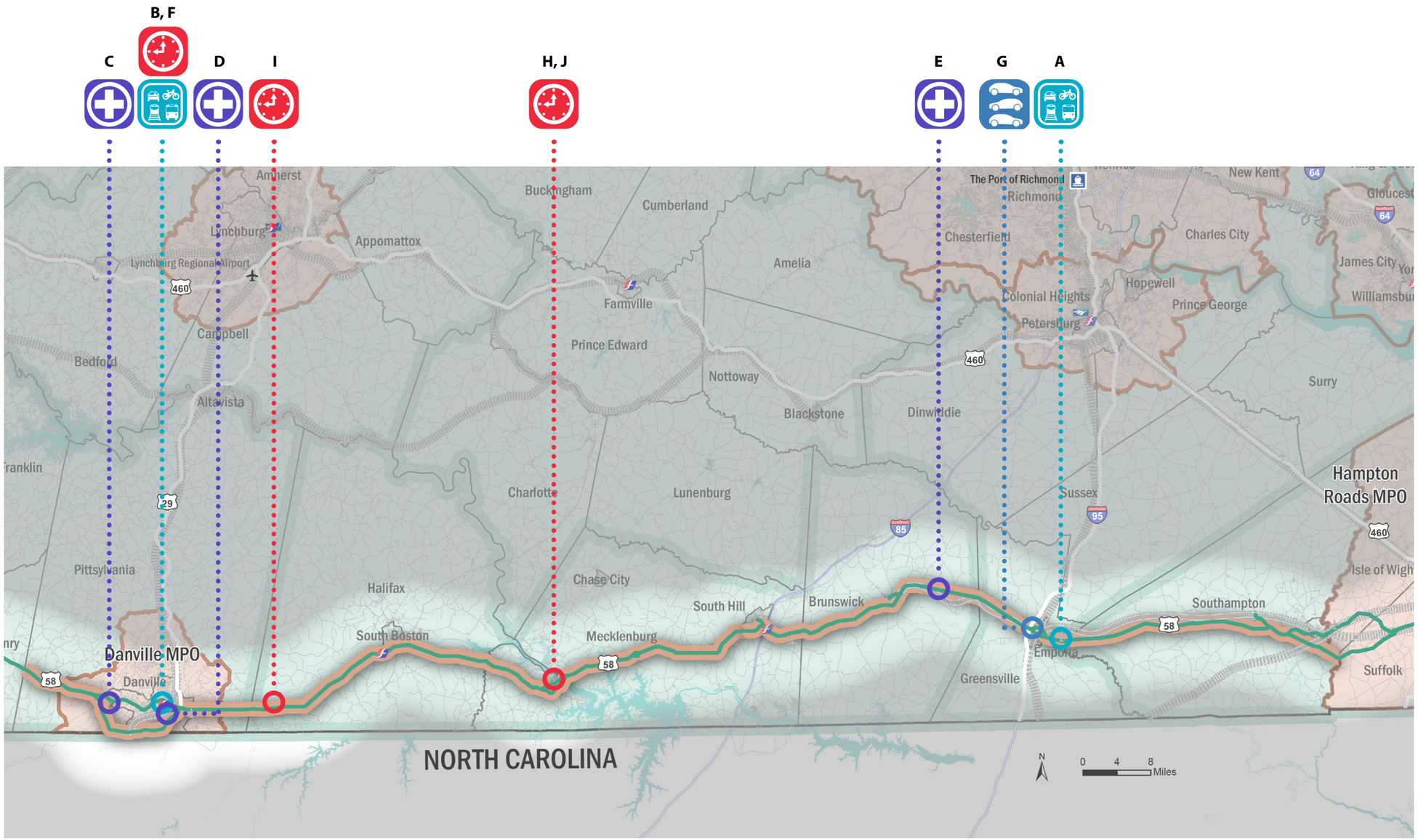
Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 0.68 in terms of reliability index, with an average value of 0.07. The only location with a weekend reliability index above the statewide threshold is located on US 58 at US 58 Business west of the Roanoke River in the Town of Clarksville.

Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.





J2 SEGMENT NEEDS

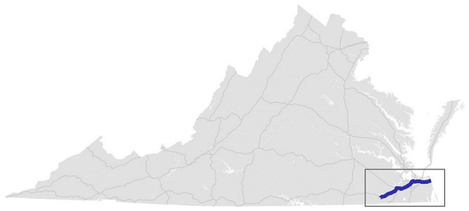
Summary of Needs - J2 Segment

A.		No intercity bus or passenger rail service from Emporia to other cities or towns in the corridor
B.		No direct intercity bus or passenger rail service from Danville to Hampton Roads
C.		US 58-Business between Russ Wholesale Rd and Union St in Danville: 25 severe crashes
D.		US 58 between US 29 and Vista Dr in/near Danville: 17 severe crashes
E.		US 58 between Edgerton Ln and Vulcan Quarry Ln in Brunswick County: 8 severe crashes
F.		Unreliable Amtrak service from Danville station. Average departure delay is 34 minutes totaling over 2,200 person-hours of delay from this segment.
G.		Congestion issue at US 58 and I-95 interchange in Emporia
H.		Reliability issue at US 58 and US 15 in Clarksville
I.		Reliability issue at US 58/US 360 and VA Route 62 (Milton Highway) in Halifax County
J.		Reliability issue at US 58 and US 58 Business (Virginia Avenue) west of Clarksville

IV. Segment J3

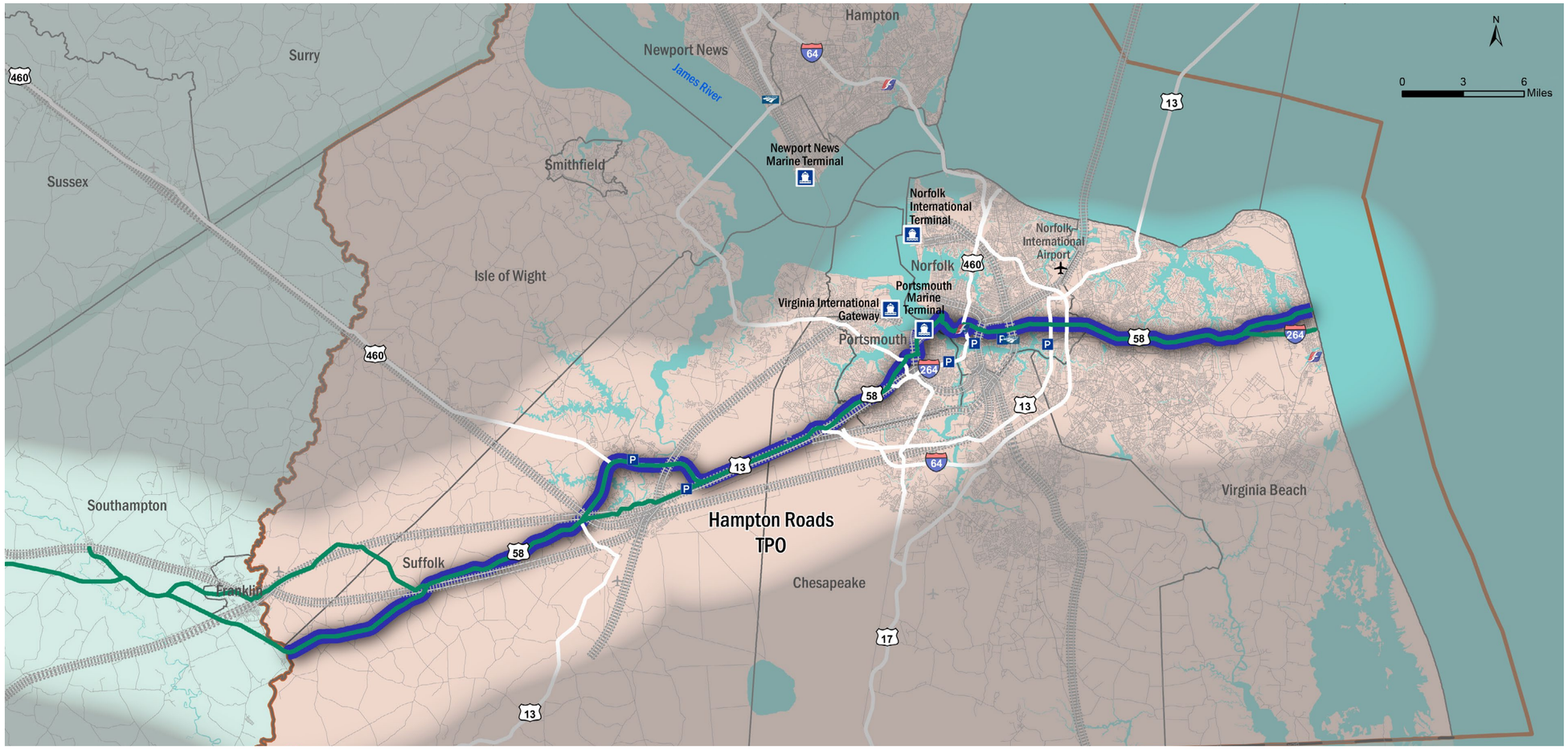
J3
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility

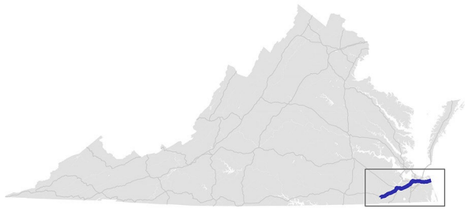


Corridor Segment J3 Components

- US 58
- US 58 Business
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- CSX National Gateway Corridor
- Norfolk International Airport
- Newport News/ Williamsburg International Airport



J3 SEGMENT PROFILE



Segment J3 is the shortest segment of Corridor K and exists entirely within the area covered by the Hampton Roads TPO. The segment serves Isle of Wight County and the Cities of Suffolk, Chesapeake, Portsmouth, Norfolk, and Virginia Beach, terminating at the Atlantic Ocean. Segment J3 serves as a major local access corridor in the Hampton Roads Area, as well as a link for both passengers and freight to Southside Virginia. This segment connects manufacturing centers in Southside Virginia, as well as coal mines in Southwestern Virginia, to the Port of Virginia facilities in the Hampton Roads Area. Segment J3 also serves as an alternative evacuation route for the Hampton Roads Area.

Highway Facilities: US 58 is primarily a local-access corridor within the Hampton Roads Area, with four lanes through most of its length. There are portions of US 58 that have as many as eight lanes in the eastern portion of the segment. No parallel facilities exist for US 58 along the entire length of Segment J3, though I-264 does serve as a parallel facility in multiple sections of the segment. US 58 provides either direct or indirect access to major highways in the region, including I-64 and its spurs. US 58 Business spurs provide additional local access near Franklin, and in Suffolk and Virginia Beach. In the western half of the segment, US 58 also runs concurrently with US 13 and US 460.

Transit Services: Amtrak has stations in Norfolk and Virginia Beach, serving the Northeast Corridor; however, it does not serve destinations in the Southside Corridor. Greyhound provides bus service from stations in Norfolk, Hampton, and Virginia Beach. Commuter bus service, called the Metro Area Express, is offered by Hampton Roads Transit (HRT). There are multiple Park-and-Ride facilities located near US 58, the largest cluster of which is located in Virginia Beach.

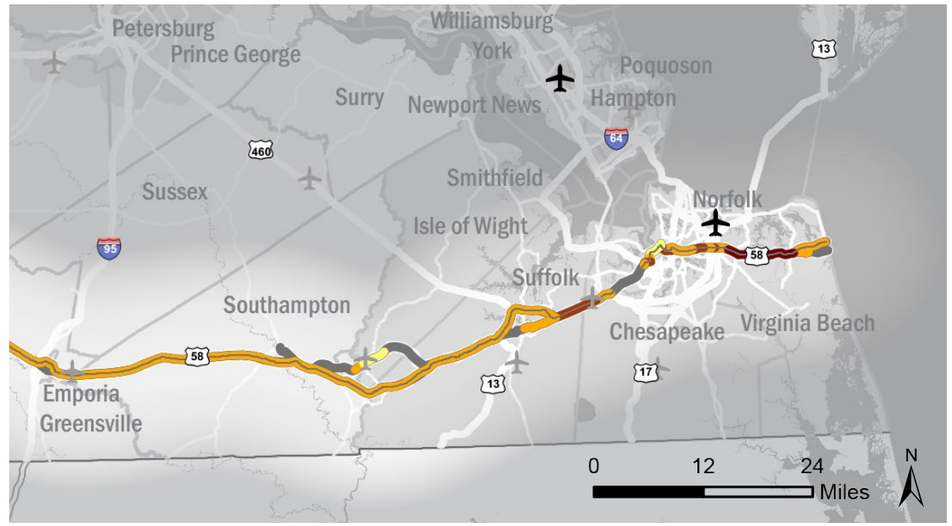
Rail Facilities: CSX's National Gateway Corridor rail lines pass through Segment J3, connecting locations to the west to the Port of Virginia facilities in the Hampton Roads Area. Norfolk Southern also provides rail lines along the Southside Corridor to the Hampton Roads Area and the Port of Virginia facilities located there.

Port Facilities: US 58 provides a direct connection to the Portsmouth Marine Terminals, and indirect connections are available to the other Port of Virginia facilities in the Hampton Roads Area.

Airport Facilities: Norfolk International Airport and Newport News-Williamsburg International Airport provide commercial service to Segment J3.

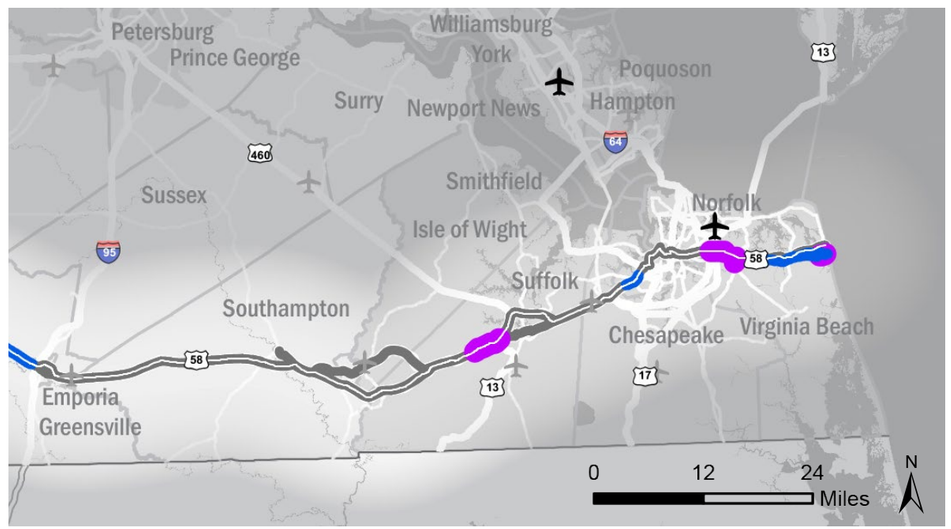
Major planned and future projects include:

- **City of Suffolk:** On US 58 from the US 13 Bypass/US 58/Route 32 to 0.7 miles west of Manning Bridge Road plans include construction of an additional travel lane in both directions, traffic signal upgrades, access management improvements, and a bikeway and/or multiuse path.
- **City of Virginia Beach:** Reconstruction with added capacity on Witchduck Road from I-264 to Virginia Beach Boulevard.



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

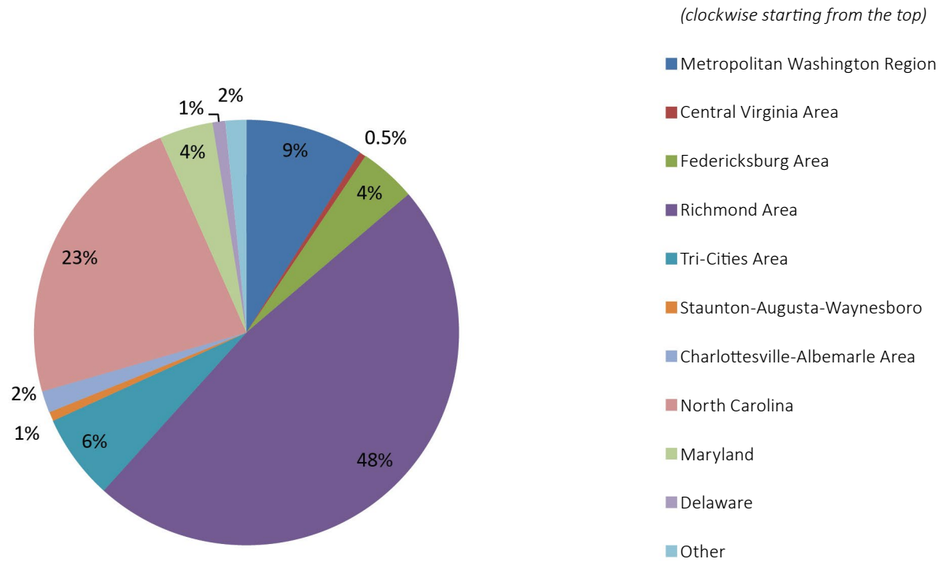
- Reconstruction with added capacity
- Safety improvements
- Primary facility

Travel Demand

Passenger Demand

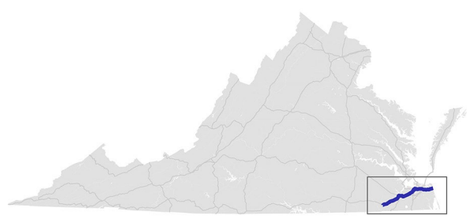
Segment J3 exists entirely within the Hampton Roads Area, and accommodates large amounts of traffic local to the region. Of the intercity traffic originating in this region, six percent is destined for the Tri-Cities Area and a small portion is destined for the Lynchburg Area. These trips are likely to make use of the portion of Segment J3 that runs concurrently with US 460. A very small portion of traffic generated in the Hampton Roads Area is actually destined for locations along Corridor J.

Travel from Hampton Roads Area to...



(clockwise starting from the top)

- Metropolitan Washington Region
- Central Virginia Area
- Fredericksburg Area
- Richmond Area
- Tri-Cities Area
- Staunton-Augusta-Waynesboro
- Charlottesville-Albemarle Area
- North Carolina
- Maryland
- Delaware
- Other



J3 SEGMENT PROFILE

Freight Demand

By truck, Segment J3 carried 22 million tons of freight worth $31 billion in 2012, and is estimated to carry 33 million tons of freight worth $50 billion in 2025. On Corridor J, 45 percent of the truck freight tonnage, and 60 percent of the truck freight value, passes through Virginia. The major truck freight interstate through patterns are similar to those observed on Corridor B as a result of a concurrency between US Route 58 (Segment J1) and I-81 (Segment B1). In terms of tonnage, the largest truck freight flows on Corridor J are between North Carolina and the Hampton Roads Area, accounting for more than eight percent of the total truck freight tonnage on the corridor. North Carolina and Tennessee are the largest generators and attractors of truck freight tonnage on Corridor J, with 29 percent of the truck freight tonnage originating in these locations and 22 percent destined for these locations. Jurisdictions adjacent to Segment J3, particularly in the Hampton Roads Area, generate between nine and ten percent of the total corridor truck freight value, with major truck freight movements from the Carolinas, Georgia, Texas, and California. In terms of truck freight value, a large proportion of the flows originating in the jurisdictions adjacent to Segment J3 are destined for the Carolinas, Florida, and Texas.

By rail, Segment J3 carried 2 million tons of freight worth $1.2 billion in 2012, and is estimated to carry 4 million tons of freight worth $2 billion in 2025. On Corridor J, the majority of rail freight either originates from or is destined for Virginia, with only four percent of the rail freight tonnage and two percent of the total rail freight value passing through the Commonwealth. In terms of tonnage, the dominant flow of rail freight on Corridor I is from West Virginia, Kentucky, and Wise and Buchanan Counties in Virginia to the Port of Virginia marine terminal in Norfolk, accounting for more than 43 percent of the total corridor rail freight tonnage. In terms of value, the dominant movement of rail freight on Corridor J is between Illinois and Ohio and the Port of Virginia facilities in the Hampton Roads Area. These flows account for more than 55 percent of the total rail freight value on the corridor. Some significant rail freight flows on Corridor J also exist between Kentucky, Missouri, and the Port of Virginia facilities in the Hampton Roads Area. There are one-directional movements of low-value rail freight, with 74 percent of rail freight tonnage on Corridor J destined for the jurisdictions adjacent to Segment J3; more than eight percent of rail freight tonnage originates there. In terms of value, there is a more balanced movement of rail freight, with almost 40 percent of rail freight originating along Segment J3 and more than 58 percent destined for this segment.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (27% / 27%)
2. North Carolina (18% / 18%)
3. Tennessee (11% / 10%)
4. Pennsylvania (4% / 5%)
5. Texas (4% / 4%)

Corridor Tonnage Originating in Segment J3: 7% / 9%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
North Carolina and Maryland
City of Chesapeake and North Carolina
Pennsylvania and Tennessee

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (33% / 33%)
2. North Carolina (13% / 14%)
3. Tennessee (9% / 9%)
4. Pennsylvania (5% / 4%)
5. New York (4% / 4%)

Corridor Tonnage Destined for Segment J3: 12% / 13%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (47% / 46%)
2. West Virginia (28% / 25%)
3. Wise County (21% / 19%)
4. Kentucky (8% / 8%)
5. Buchanan County (7% / 6%)

Corridor Tonnage Originating in Segment J3: 7% / 9%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
Wise County and Georgia
City of Norfolk* and Kentucky

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

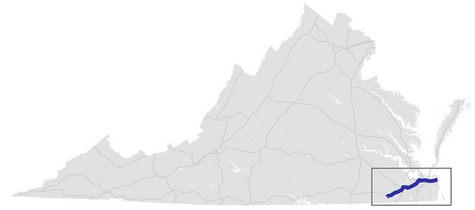
Major Destinations (by Tonnage)
1. Virginia (75% / 74%)
2. City of Norfolk* (62% / 57%)
3. Tennessee (7% / 6%)
4. City of Chesapeake (6% / 9%)
5. Georgia (5% / 5%)

Corridor Tonnage Destined for Segment J3: 74% / 73%

Traffic Conditions

Traffic Volume and AADT

Traffic volumes on Segment J3 are high compared the rest of Corridor J. Traffic volumes vary considerably depending upon the location within Segment J3. On US 58 Business in western Suffolk, traffic volumes are very low for the segment – generally less than 5,000 vehicles per day. The highest traffic volumes occur between Suffolk and Chesapeake where US 13, US 58, and US 460 run concurrently. In this area, daily traffic volumes exceed 68,000 vehicles per day in 2012, and are projected to increase to over 80,000 vehicles per day by 2025. In the City of Virginia Beach, traffic volumes on US 58 range from 27,000 to 47,000 vehicles per day. Traffic volumes throughout most of Segment J3 are projected to increase by 2025, with the largest increase along US 13/US 58 in Suffolk.



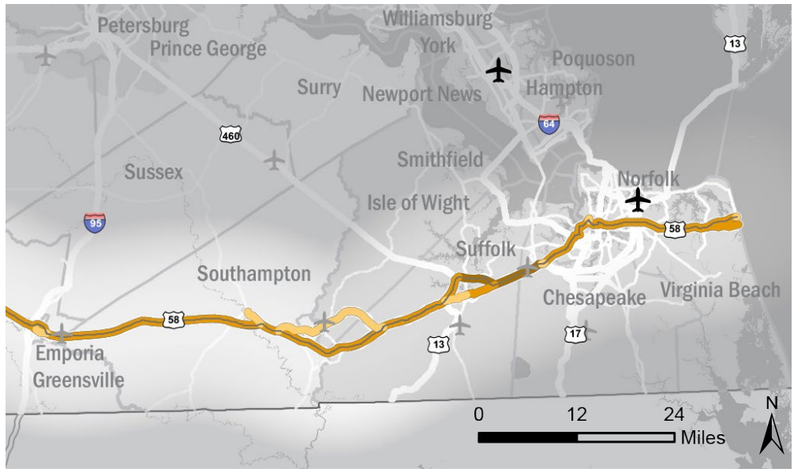
Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



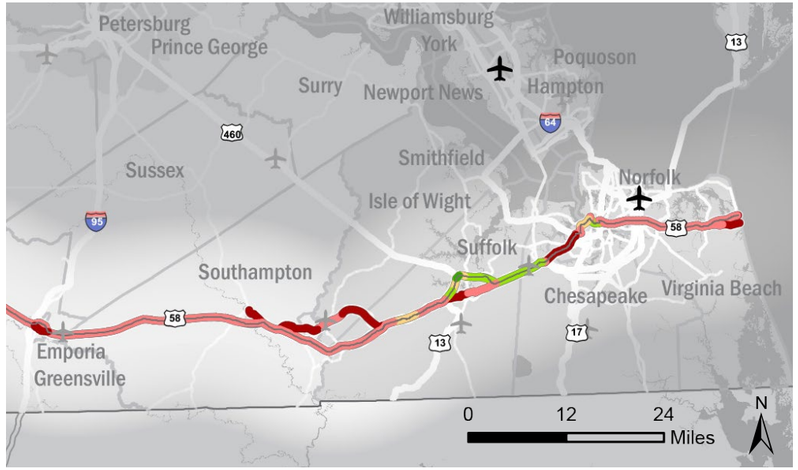
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility



Change in Traffic Volume 2014- 2025 (AADT)

- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility



J3 SEGMENT PROFILE

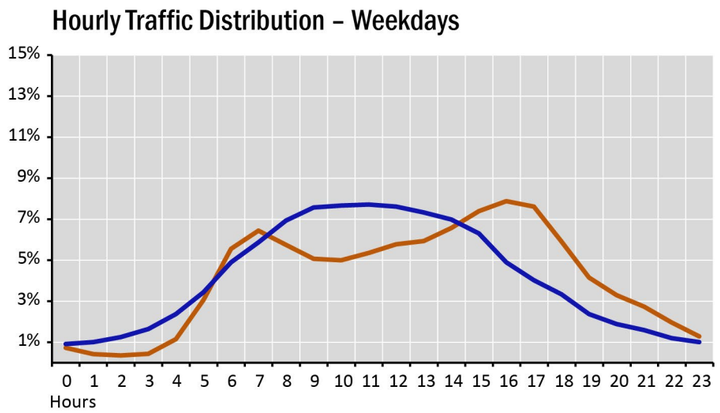
Traffic Distribution

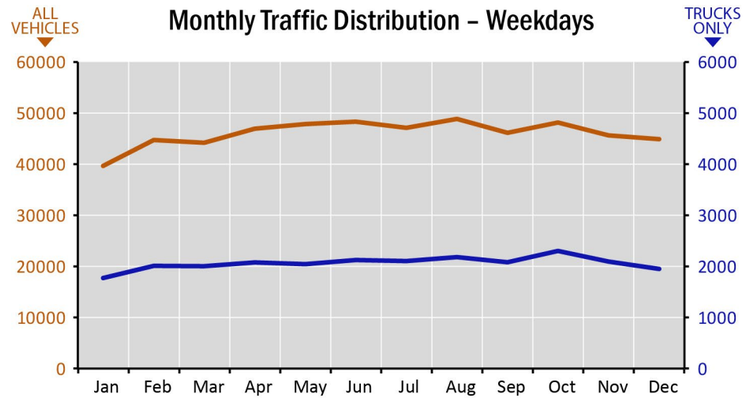
On average, traffic on Segment J3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.9 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 6.4 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 52 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic with a single midday peak showing the highest hourly flow of 7.7 percent of daily traffic between 11 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing single peaks for all traffic and truck traffic: all traffic peaks between 2 and 3 p.m. (7.6 percent of daily traffic) and truck traffic peaks between 10 and 11 a.m. (7.8 percent of daily traffic).

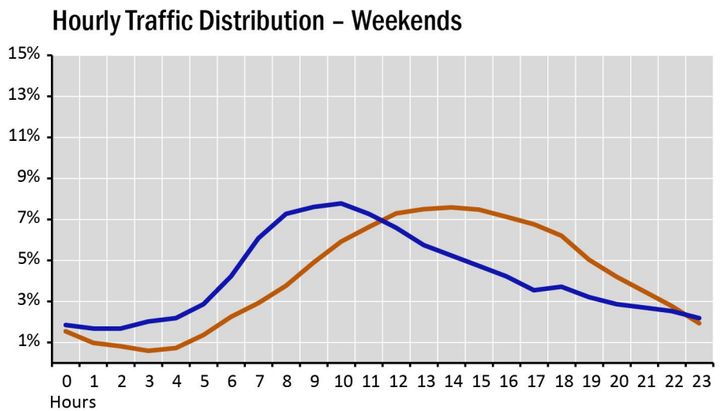
Weekday traffic volumes on Segment J3 vary by as much as 23 percent throughout the year, with the highpoint in August (around 49,000 vehicles per day) and the low point in January (around 40,000 vehicles per day). Truck volumes vary more than passenger volumes, with the October high (around 2,300 vehicles per day) 30 percent higher than the January low (around 1,800 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 36,000 vehicles per day) are 21 percent higher than January levels (around 30,000 vehicles per day). Weekend truck traffic is less steady than all vehicle traffic, with the October high 39 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment J3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

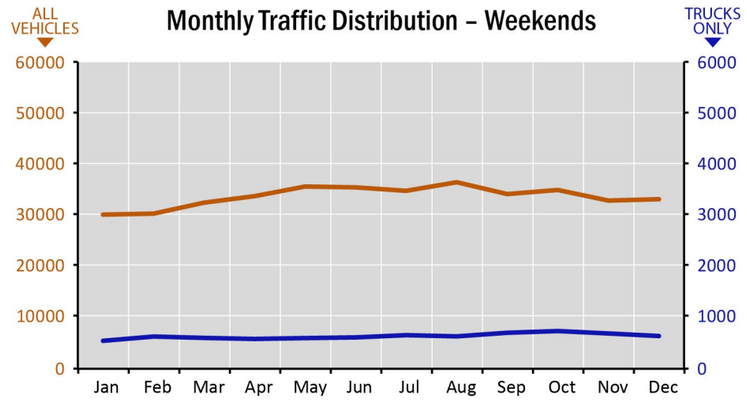
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment J3 is generally low, but does vary by location. Along US 58 in the City of Suffolk west of US 460, heavy trucks comprise seven percent of total traffic. Throughout the rest of Segment J3, heavy trucks comprise less than five percent of total traffic.





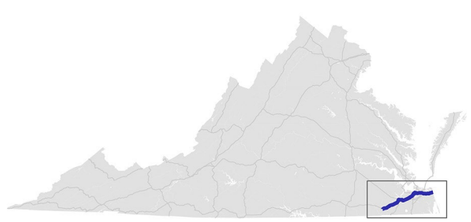






Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

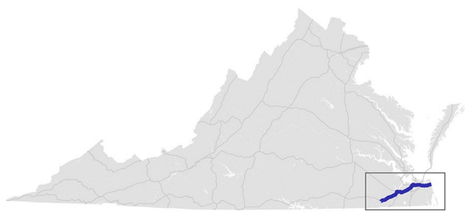


J3 SEGMENT PROFILE

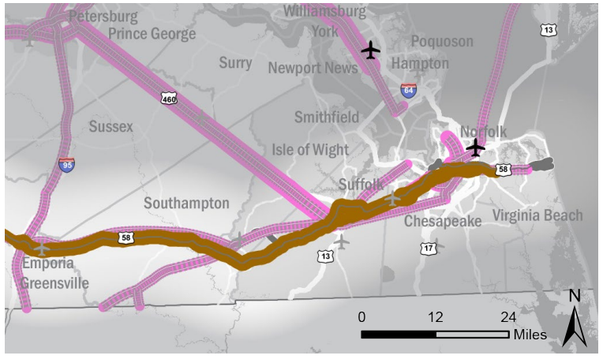
Freight Flows

In the western half of Suffolk, freight on Segment J3 is moved primarily by truck in terms of tonnage and value. In total, 16.5 million tons (95 percent) of freight is moved through this section of Segment J3 by truck, compared to 828,000 tons (five percent) by rail. With regard to value, $28 billion (96 percent) of freight travels by truck, compared to $1.2 billion (four percent) by rail. On average, a ton of freight traveling through this section of Segment J3 by truck is worth $1,707 while a ton of freight traveling by rail is worth $1,394. In 2025, both rail and truck freight tonnages and total values in this area of Segment J3 are expected to increase. The percentage of freight traveling by truck in terms of tonnage and value will likely increase to 96 and 97 percent, respectively. It is anticipated that the freight value per ton on trucks will increase to $1,816 and decrease to $1,291 for rail.

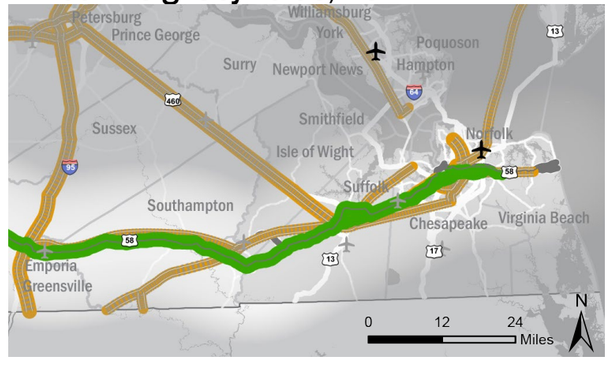
Further east in the City of Suffolk, near the Hampton Roads Executive Airport, freight on Segment J3 is moved primarily by truck in terms of tonnage and value. In total, 22 million tons (90 percent) of freight is moved through this section of Segment J3 by truck, compared to 2 million tons (ten percent) by rail. With regards to value, $31 billion (97 percent) of freight travels by truck, compared to $1 billion (three percent) by rail. On average, a ton of freight traveling through this section of Segment J3 by truck is worth $1,449 while a ton of freight traveling by rail is worth $483. In 2025, both rail and truck freight tonnages and total values in this area of Segment J3 are expected to increase. The percentage of truck freight by tonnage and value will likely remain the same. It is anticipated that the freight value per ton on trucks will increase to $1,523 and decrease to $480 for rail.



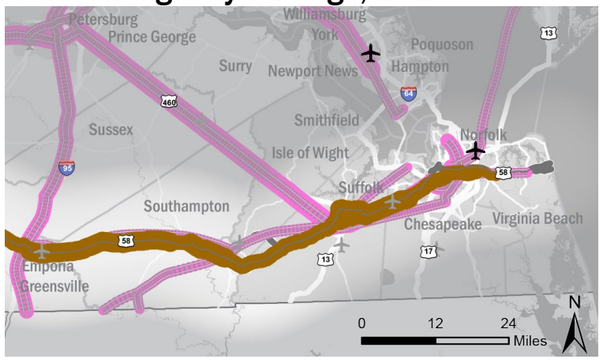
Annual Freight by Tonnage, 2012



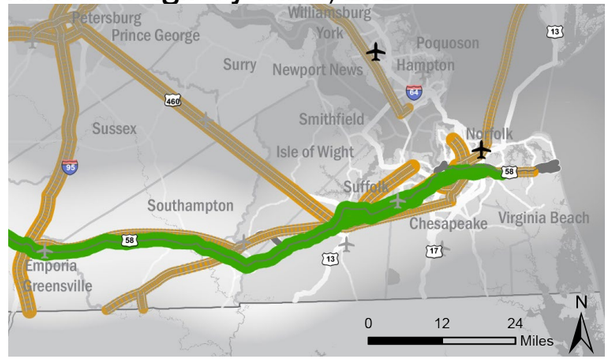
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Passenger trips on Segment J3 of the Southside Corridor have limited travel options, both in terms of travel path and mode choice. There are no parallel highway facilities that accommodate inter-city travel in Segment J3, though I-264 is a parallel option through portions of Chesapeake Portsmouth, Norfolk, and Virginia Beach. US 58 also provides access to other major highway facilities in the Hampton Roads Area, including I-64, I-664, US 13, US 17, and US 460. Based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by bus. However, Greyhound bus service, which has stations in Norfolk, Hampton, and Virginia Beach, is limited by the frequency of service and is not as fast as the typical automobile trip. Amtrak does have stations in Newport News, Norfolk and Virginia Beach; however, routes from these stations serve the Northeast Corridor and do not offer connections within Corridor J.

Park-and-Ride

Within Segment J3, commuters can utilize many Park-and-Ride locations, as well as commuter bus service provided by HRT. Park-and-Ride locations are evenly spread throughout the region. Virginia Beach provides the highest number of Park-and-Ride spaces and has the highest utilization rate of spaces available in the region. However, no city within the Segment J3 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.

Comparable Travel Options

Hampton Roads (Norfolk) to Emporia

Inter-City Bus	*Train*
0 Trips per Day 0:00 Travel Time $0 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

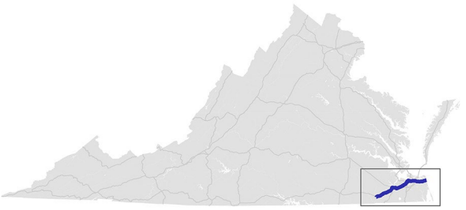
Via Rt. 58 / Rt. 13: 1:27 Travel Time $43 Est. Cost

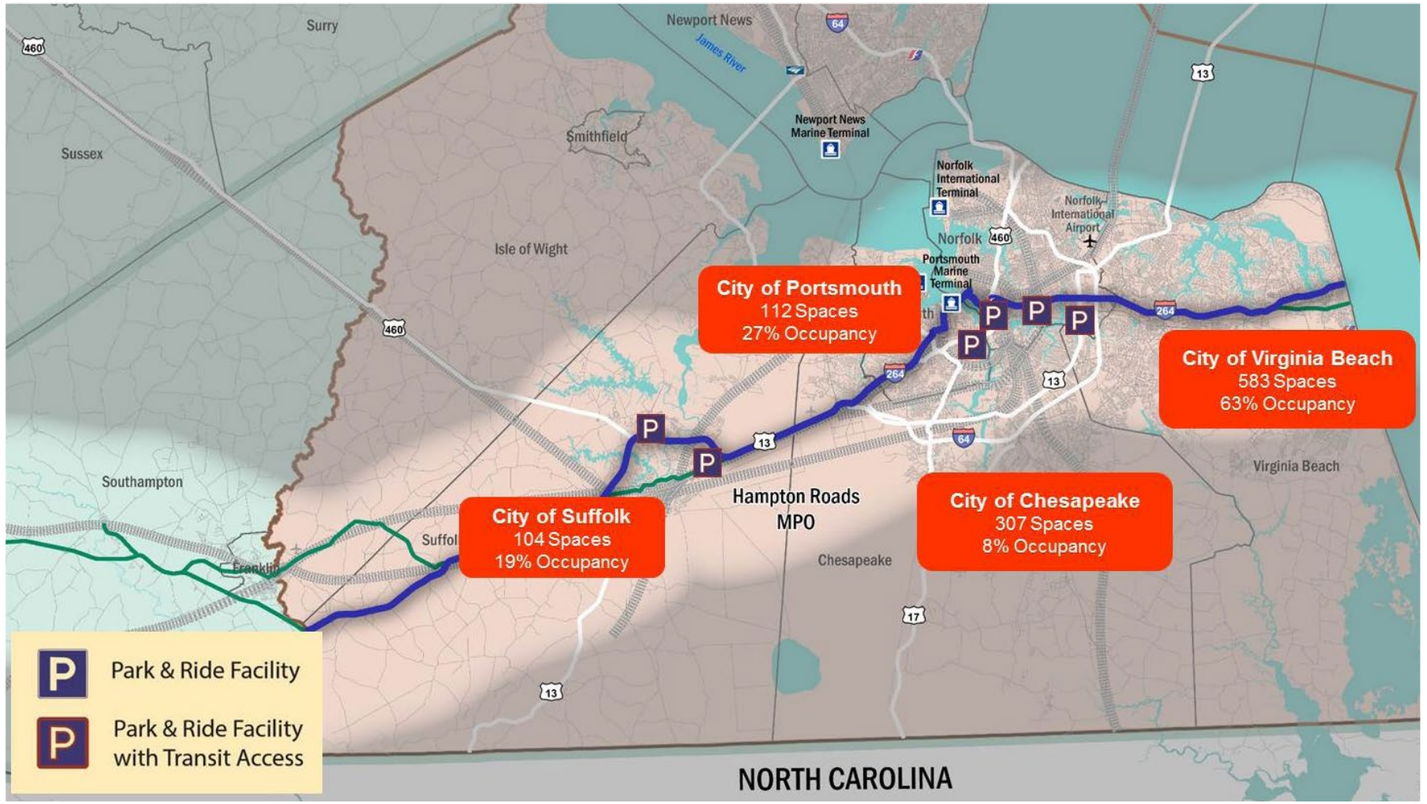
Hampton Roads (Norfolk) to Danville

Inter-City Bus	*Train*
1 Trip per Day 9:25 Travel Time $52 Est. Cost	0 Trips per Day 0:00 Travel Time $0 Est. Cost

Auto

Via Rt. 58: 3:27 Travel Time $108 Est. Cost

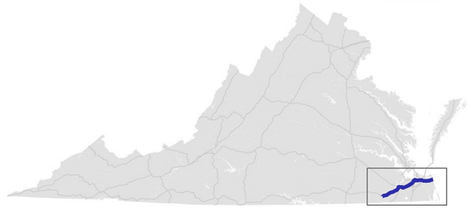




J3 SEGMENT NEEDS

Safety

Between 2010 and 2012, 668 severe crashes occurred on Segment J3, resulting in one of the highest accident rates among CoSS segments statewide. There are multiple areas with high concentrations of severe collisions along Segment J3. In Norfolk, on US 58, at the east end of the Midtown Tunnel, there were 20 crashes over a 0.5-mile distance. In Virginia Beach, there were 53 incidents on US 58 (Virginia Beach Boulevard) over approximately 2.2 miles between Winburne Lane and Southgate Avenue. Also in Virginia Beach, on US 58 (Virginia Beach Boulevard), there were 175 crashes along a stretch approximately 4.9 miles long between Town Center Drive, outside of the Pembroke Mall, and Farmington Road. Along US 58 in Virginia Beach, there were 36 collisions over approximately 0.7 miles between Regency Drive and Hilltop West Shopping Center, where 12 of the 36 collisions took place at the intersection with Regency Drive. Along US 58 Business (Virginia Beach Boulevard) in Virginia Beach, just north of the Oceana Naval Air Station, 61 crashes occurred over a distance of approximately 0.8 miles between Laskin Road and First Colonial Road; a total of 31 of the 61 crashes happened at the intersection with First Colonial Road.



Performance Metrics:

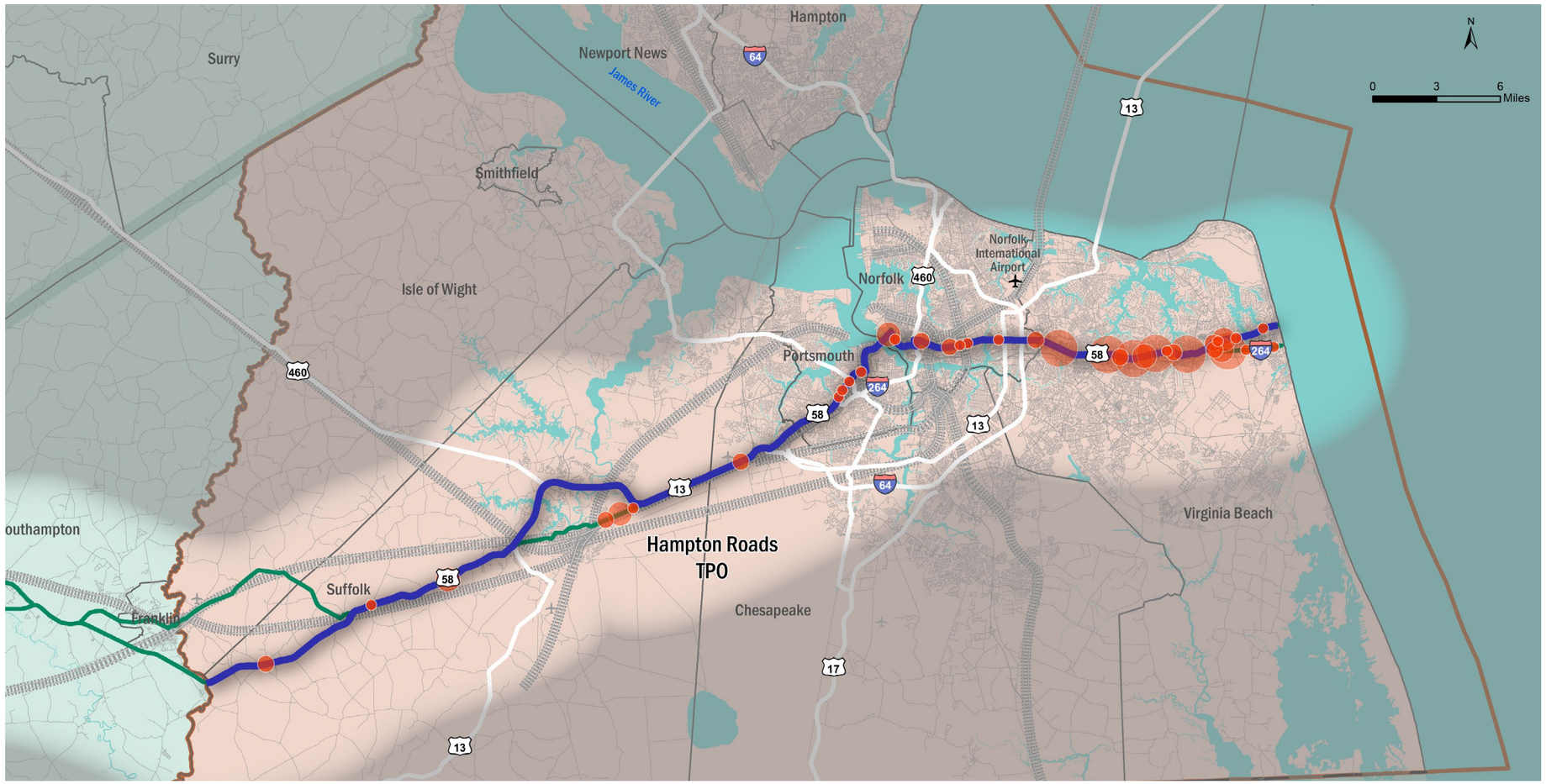
Number of Severe Crashes	587
Severe Crashes/Million VMT	3.5
Number of Railroad Crashes	0

Fatality and Injury Crashes (2010 - 2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	41
Freight Ton Hours of Delay per Mile	12.1K

Passenger Delays

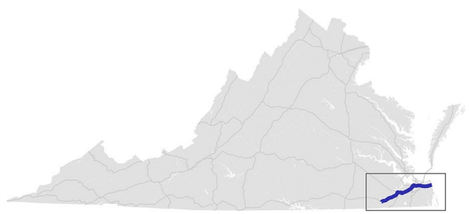
On a per-mile basis, passenger delays along Segment J3 are some of the most severe among CoSS segments, with delays of 41 person-hours per mile. Locations with significant levels of passenger delay include:

- US 58 Business at Route 337 in Suffolk;
- US 58 at both approaches to the Midtown Tunnel in the cities of Norfolk and Portsmouth;
- US 58 (St. Paul's Boulevard) between US 58 (Brambleton Avenue) and US 58 (Virginia Beach Boulevard) in the City of Norfolk; and
- US 58 between I-64 and US 60 in the City of Virginia Beach.

Approximately 48 percent of the daily passenger delays along Segment J3 occur during the peak period, which is above average for the peak-period share of congestion on CoSS segments.

Freight Delays

Freight congestion along Segment J3 is moderate with 1.6 million ton-hours of delay daily, averaging to 12,000 ton-hours of delay per mile. However, unlike passenger congestion, there are no locations of significant freight delay along Segment J3. Peak-period freight delays account for 31 percent of daily congestion, which is slightly less than the average for the peak-period share of congestion on CoSS segments.



Daily Person Hours of Delay Per Mile



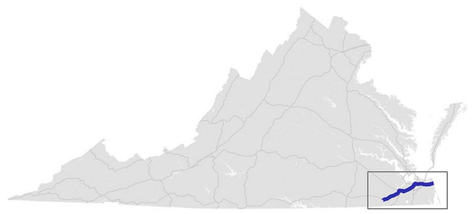
< 50
51 - 100
101 - 250
251 - 500
> 500

Daily Freight Ton Hours of Delay Per Mile



< 100,000
100,001 - 250,000
250,001 - 500,000
500,001 - 1,000,000
> 1,000,000

Reliability

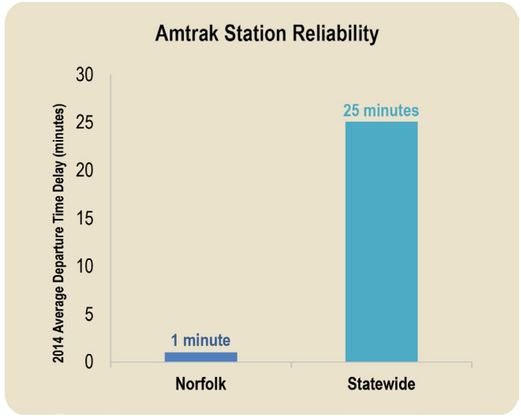


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Weekday Peak Reliability

Reliability of travel during the peak period on a typical weekday on Segment J3 ranges from 0.01 to 0.69 in terms of reliability index, with an average value of 0.15. While this segment does have a peak period reliability index much higher than average for the CoSS segments statewide, none of the locations along Segment J3 have reliability index values exceeding the statewide threshold.

Weekday Reliability

Reliability of travel during a typical weekday ranges from 0.01 to 0.53 in terms of reliability index, with an average value of 0.13. While this segment does have a weekday reliability index much higher than average for the CoSS segments statewide, only a few short sections have reliability index values that exceed the statewide threshold, including:

- US 58 Business at Route 337 in Suffolk;
- US 58 at US 460 Business in the City of Portsmouth;
- US 58 at Route 168 in the City of Norfolk; and
- US 58 at the junction with US 58 Business in the City of Virginia Beach.

Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 0.78 in terms of reliability index, with an average value of 0.13. While this segment does have a weekend reliability index much higher than average for the CoSS segments statewide, only two locations have reliability index values that exceed the statewide threshold, including:

- US 58 at US 460 Business in the City of Portsmouth; and
- US 58 at the eastern approach to the Midtown Tunnel in the City of Portsmouth.







Summary of Needs

Identified locations are approximate. See “Summary of Needs” table on the following page for details.

Redundancy

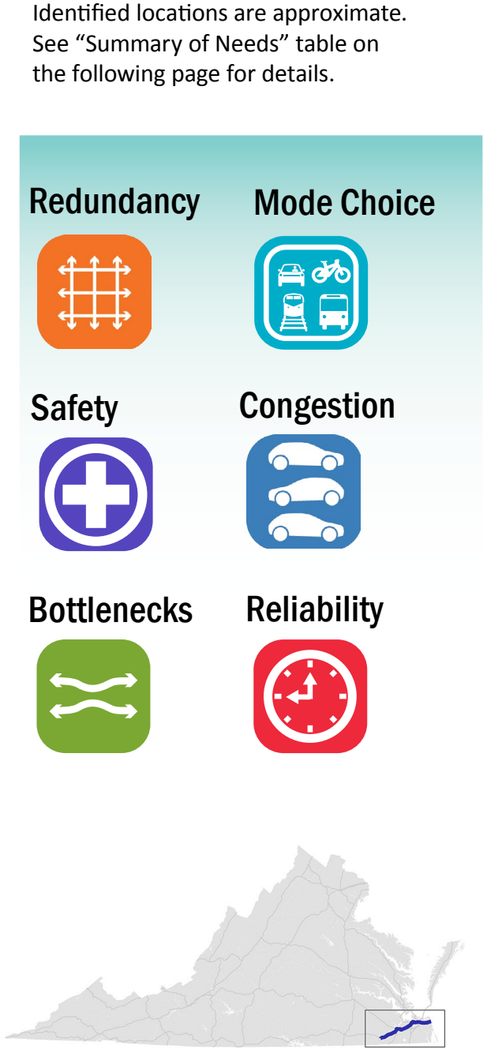
Mode Choice

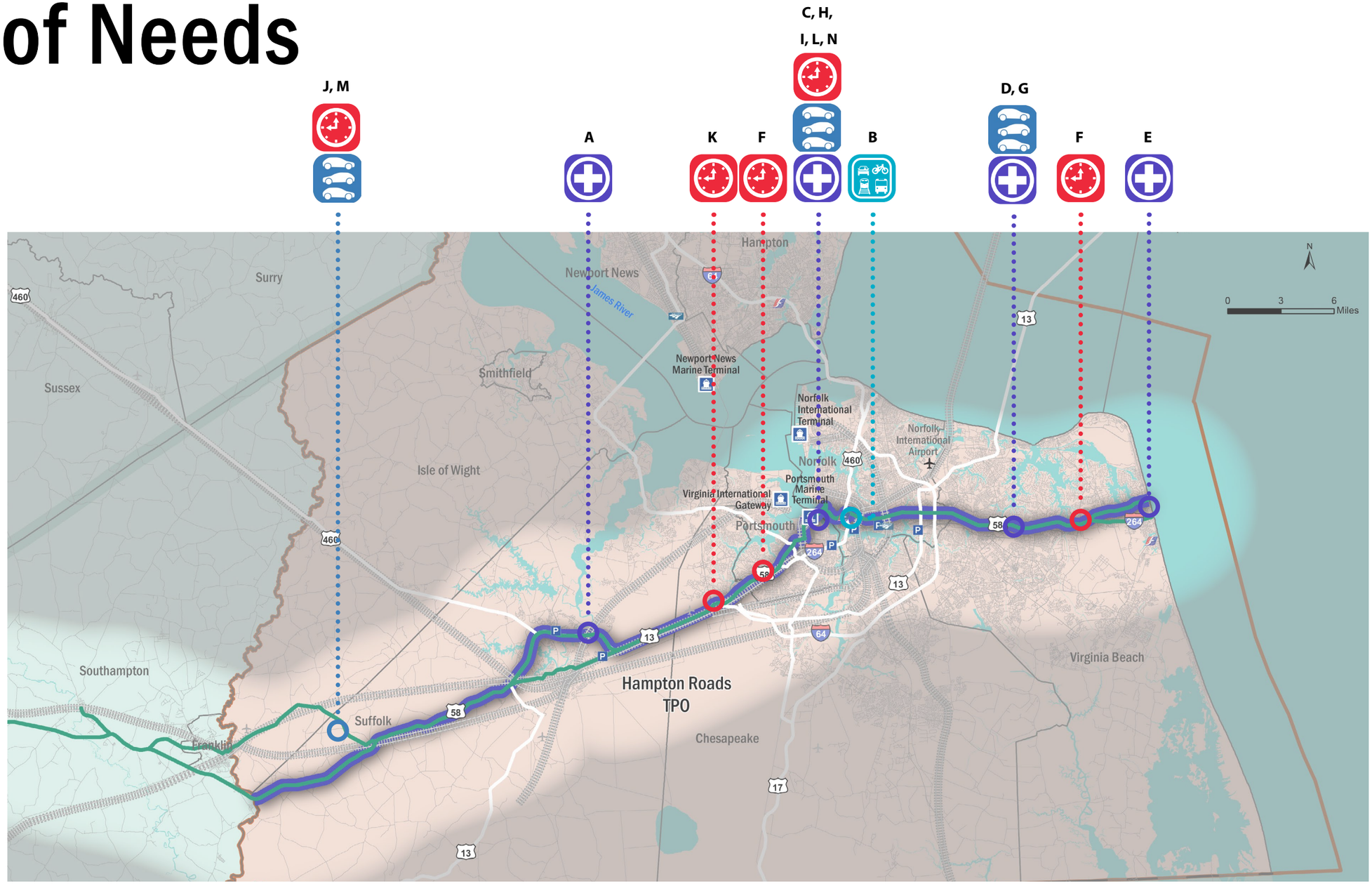
Safety

Congestion

Bottlenecks

Reliability





J3 SEGMENT NEEDS

Summary of Needs - J3 Segment

A.		Safety concerns related to numerous at-grade rail crossings in downtown Suffolk
B.		Passenger rail and bus service does not offer direct connections from Hampton Roads to other cities in the corridor
C.		US 58 near the Midtown Tunnel in Portsmouth/Norfolk: 72 severe crashes
D.		US 58 east of I-64 in Virginia Beach: 282 severe crashes
E.		US 58-Business east of US 58 in Virginia Beach: 94 severe crashes
F.		US 58 at US 460-Alt in Portsmouth: Weekday Reliability Index >0.4, Weekend Reliability Index >0.6
G.		Congestion issue on US 58 (Virginia Beach Boulevard) between Newtown Road and US 60 (Pacific Avenue)
H.		Congestion issue on US 58 near the Midtown Tunnel in Portsmouth and Norfolk

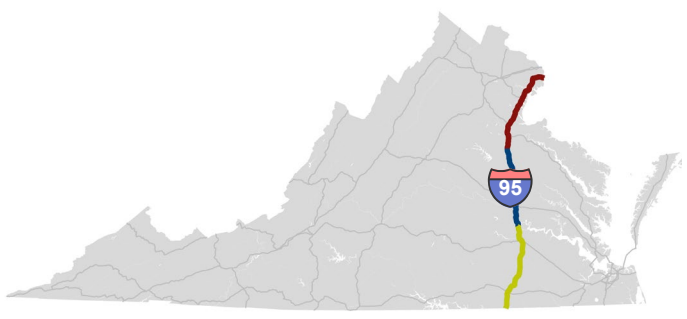
Summary of Needs - J3 Segment

I.		Congestion issue at US 58 and US 460 intersection in downtown Norfolk
J.		Congestion issue at US 460 Business (Portsmouth Boulevard) and US 13 Business (Nansemond Parkway/East Washington Street) in Suffolk
K.		Reliability issue on US 58/US 460 at I-664 intersection in Chesapeake
L.		Reliability issue on US 58 near the Portsmouth Marine Terminals
M.		Reliability issue at US 460 Business (Portsmouth Boulevard) and US 13 Business (Nansemond Parkway/East Washington Street) in Suffolk
N.		Reliability issue at US 58 (Virginia Beach Boulevard) and VA Route 166 (Park Avenue) in Norfolk
O.		Reliability issue at US 58 (Virginia Beach Boulevard) and VA Route 632 (London Bridge Road) in Virginia Beach

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Washington to North Carolina Corridor (K)



Office of INTERMODAL Planning and Investment

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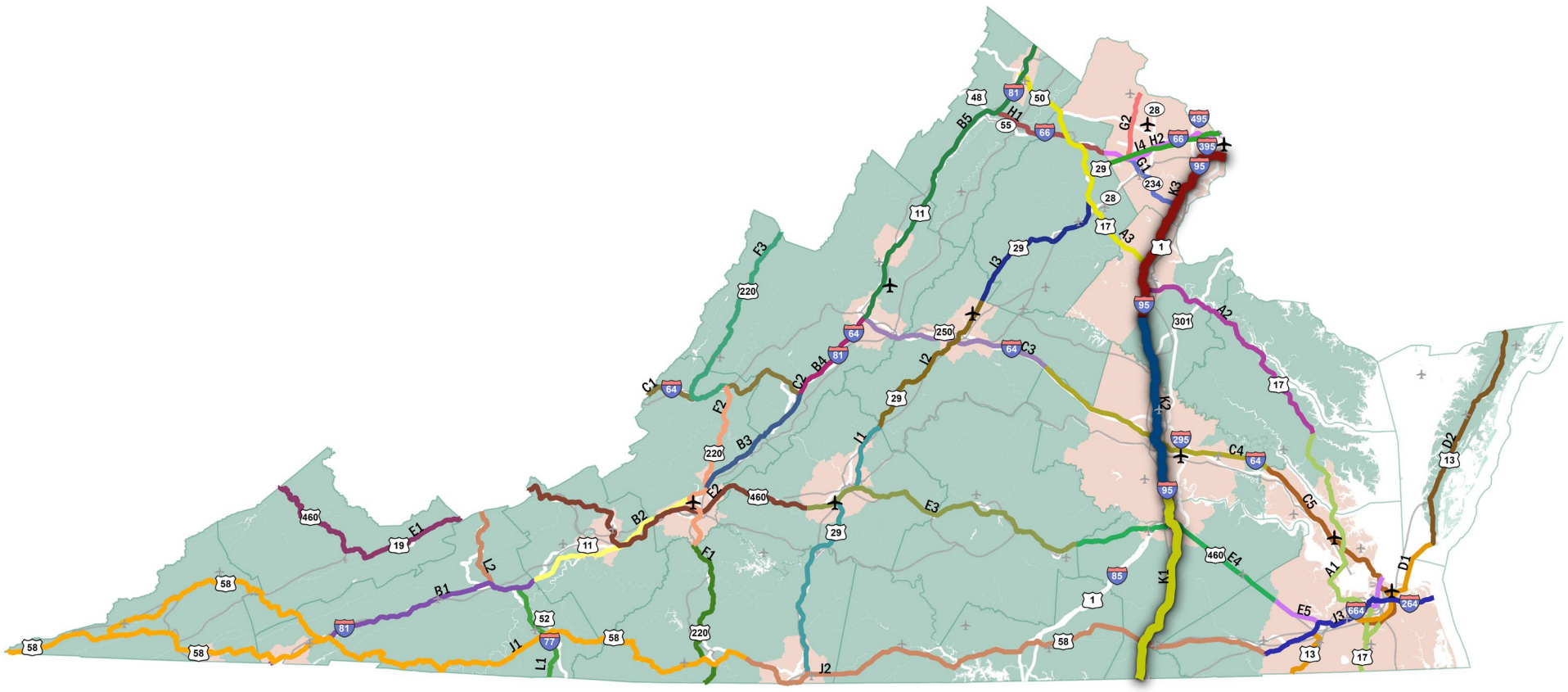
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

The Washington to North Carolina Corridor (Corridor K) is defined primarily by I-95, a multi-lane interstate highway that serves as the primary corridor for the East Coast of the United States, running from Maine to Florida. I-95 is also an important north-south freight corridor in the eastern United States. In the Commonwealth of Virginia, it serves as one of the state's main through corridors for both passengers and freight. I-95 traverses approximately 178 miles of Virginia, between North Carolina in the south and the District of Columbia in the north. The character of I-95 changes from north to south – it is as wide as ten lanes in the Northern Virginia Area and is used primarily for commuting, while it is a four-lane highway south of Petersburg. I-95 includes reversible high-occupancy toll (HOT lanes) between Stafford and Fairfax Counties.

From the northern terminus in the City of Alexandria through the City of Colonial Heights, US 1 parallels I-95 very closely until it diverges in the City of Petersburg to follow I-85 to the North Carolina border. Both I-85 and US 301 are considered to be parallel facilities from Petersburg south. Portions of US 301 and Route 207 between Richmond and Fredericksburg are also considered to be parallel facilities. I-95 runs concurrently with I-64 within the City of Richmond for approximately four miles, and with US 17 for a short section near Fredericksburg. The Washington to North Carolina Corridor includes a number of auxiliary routes:

- I-395 in the Northern Virginia Area, which begins at the interchange with I-495 and travels into the District of Columbia, including reversible high-occupancy vehicle (HOV) lanes;
- I-495 in the Northern Virginia Area, which travels to the west and north from the interchange with I-95 and I-395 and travels into Maryland over the American Legion Bridge, including HOT lanes;
- I-195, which connects to downtown Richmond from I-95; and
- I-295, which is a bypass around Richmond and Petersburg with connections to I-64 east and west of I-95.

Numerous opportunities to use transit exist in Corridor K, mostly in the Northern Virginia. Options for passenger travel include:

- Metrorail's Blue and Yellow Lines, which follow I-395 south from Washington, DC;
- Express bus service, available along I-95 in Northern Virginia provided by the Potomac and Rappahannock Transportation Commission (PRTC);
- Park-and-Ride lots, which are present throughout the corridor (especially concentrated in the Northern Virginia Area) and provide connections in many cases to other transit systems such as the Fairfax Connector and Metrobus;
- Private commuter bus carriers, also operating in the northern portion of this corridor;
- Virginia Railway Express (VRE), which operates commuter trains along the corridor between Fredericksburg and Washington, DC on the CSX National Gateway Corridor;
- An express route, in the Richmond Area, which provides service between Richmond and Petersburg along the Washington to North Carolina Corridor;

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

CORRIDOR K OVERVIEW

- Amtrak, which operates stations in Alexandria, Springfield, Lorton, Woodbridge, Fredericksburg, Ashland, near Petersburg (in the Town of Ettrick), and Richmond (two stations). Amtrak routes include the Carolinian Line, the Auto Train (only in Lorton), the Northeast Corridor Regional Route (which provides access between Newport News and Boston), the Silver Star Route, the Palmetto Route, and the Silver Meteor Route;
- Greyhound, which operates long-distance bus service along the corridor, with stops in Petersburg, Richmond, Fredericksburg, Woodbridge, Springfield, and Washington, DC; and
- Access to the two largest airports in Virginia, Dulles International and Ronald Reagan National, which together account for 45 percent of all commercial enplanements in Virginia. Access to Richmond International Airport and numerous general-aviation facilities is also available.

CSX Transportation provides freight rail lines along its National Gateway Corridor, which runs along most of the East Coast of the United States and provides the main connection from the Port of Virginia facilities in the Hampton Roads Area through western Virginia and to markets in Ohio, Illinois, and other states. A small portion of the Buckingham Branch Short-Line Railroad, between Clifton Forge and Richmond, operates along the Washington to North Carolina Corridor north of Richmond. The Washington to North Carolina Corridor provides access to two smaller port facilities, the Port of Alexandria and the Port of Richmond. Neither of these ports is operated by the Commonwealth or the Port of Virginia. I-95 accesses the Potomac River and James River navigational channels.

Corridor Components

Highway Facilities

Primary Facility
- I-95

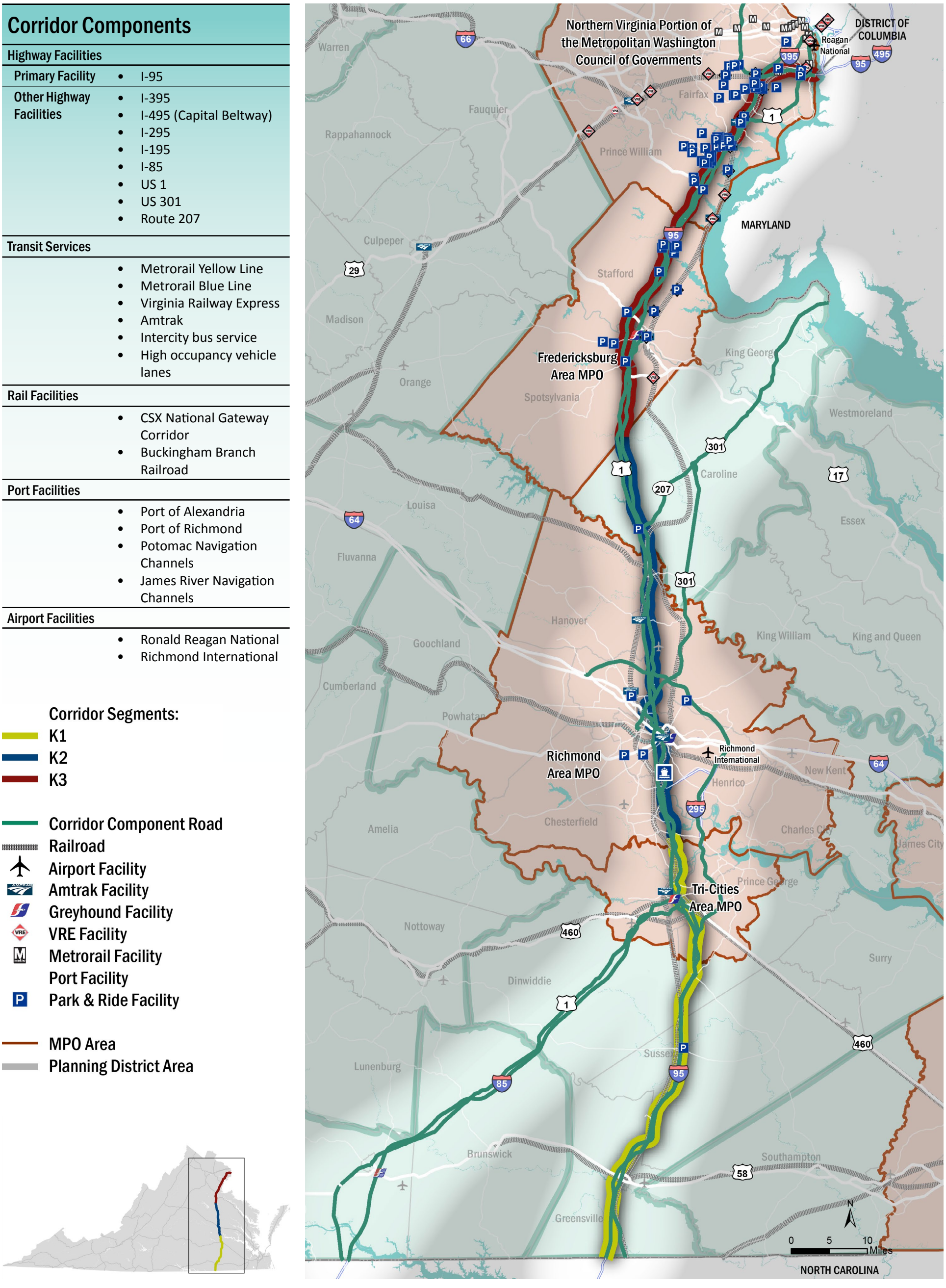
Other Highway Facilities
- I-395
- I-495 (Capital Beltway)
- I-295
- I-195
- I-85
- US 1
- US 301
- Route 207

Transit Services
- Metrorail Yellow Line
- Metrorail Blue Line
- Virginia Railway Express
- Amtrak
- Intercity bus service
- High occupancy vehicle lanes

Rail Facilities
- CSX National Gateway Corridor
- Buckingham Branch Railroad

Port Facilities
- Port of Alexandria
- Port of Richmond
- Potomac Navigation Channels
- James River Navigation Channels

Airport Facilities
- Ronald Reagan National
- Richmond International



Corridor Segments:
- K1
- K2
- K3

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area

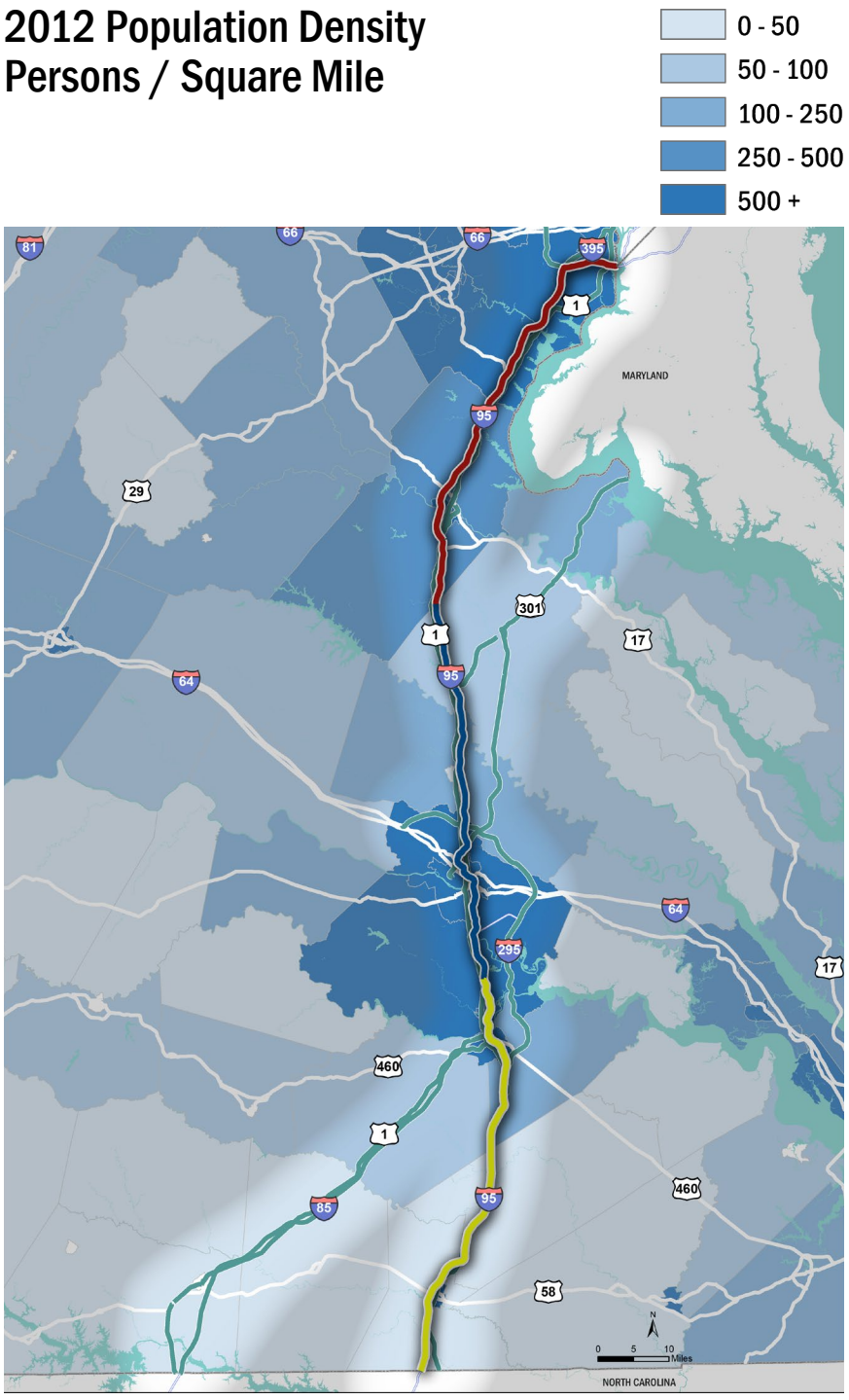
Demographics and Economic Trends

The primary population centers along Corridor K are found in the Northern Virginia Area, the Richmond Area, and the Tri-Cities Area. Along with the Cities of Fredericksburg and Emporia, these are the most densely populated areas along the corridor. As the corridor moves further south, the population density quickly drops off, with most of Segment K1 traveling through some of the least densely populated counties in the state.

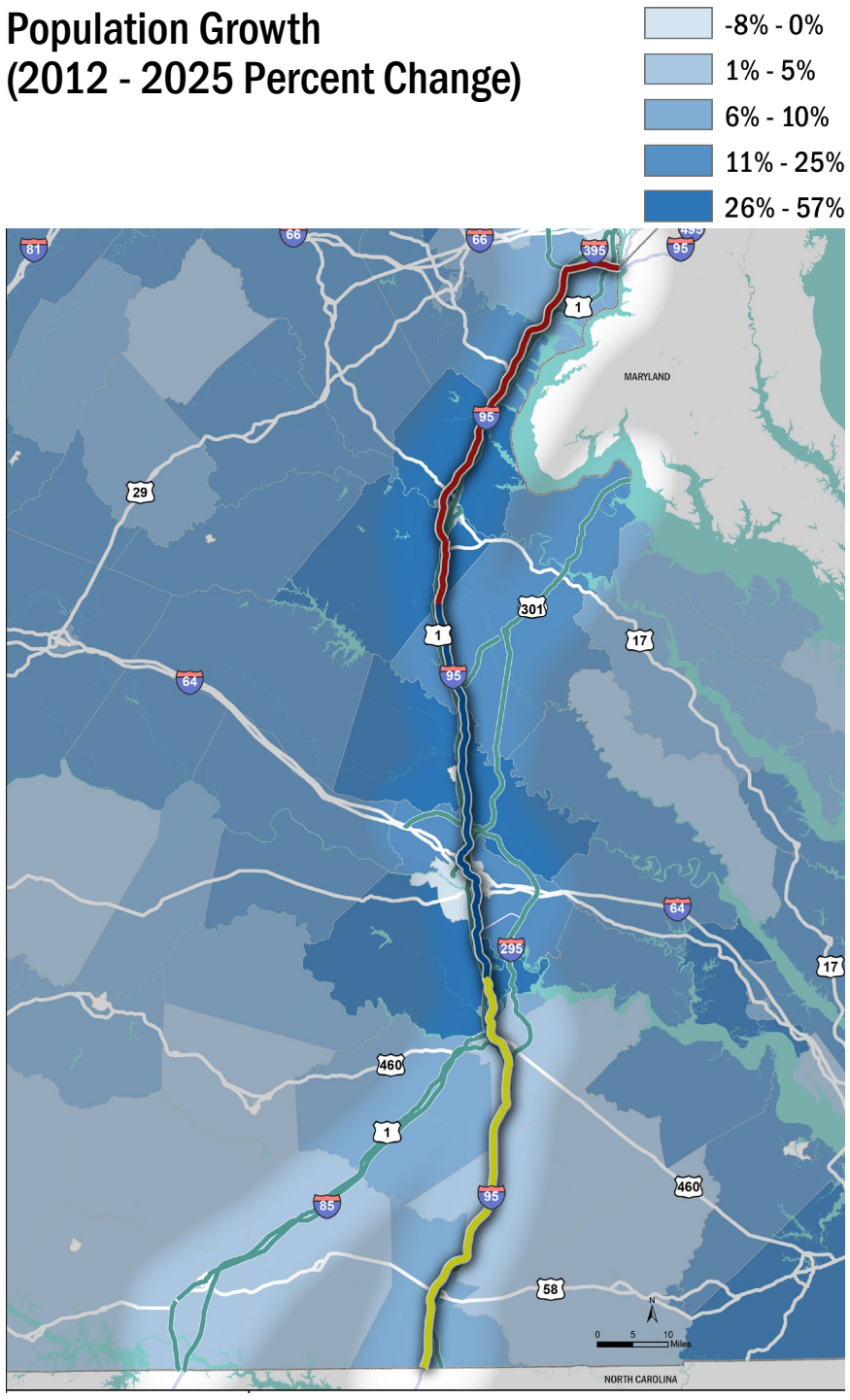
The suburban counties surrounding Fredericksburg and Richmond are expected to see the largest percentage of population growth among jurisdictions along the corridor. Conversely, the Cities of Richmond and Fredericksburg, along with Arlington County and Alexandria, are expected to see a decrease in population by 2025. Overall, suburban areas from the Tri-Cities Area to north of Fredericksburg are anticipated to see substantial population growth while growth in the northern and southern reaches of the corridor will be more modest. Employment growth tracks a similar pattern along the corridor, but with less disparity between the jurisdictions.

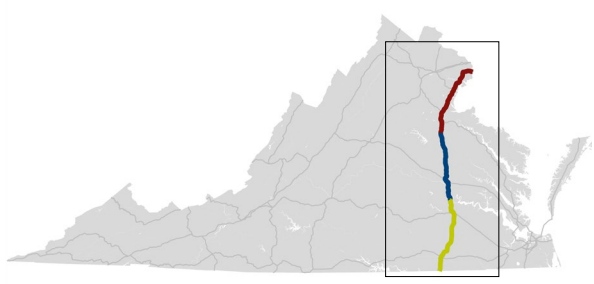
Corridor K passes through four Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Northern Virginia Area has the highest GDP of any of the MPO areas in the corridor. The largest industry sectors in the corridor include professional/scientific/technical services, wholesale trade, and public administration.

2012 Population Density Persons / Square Mile



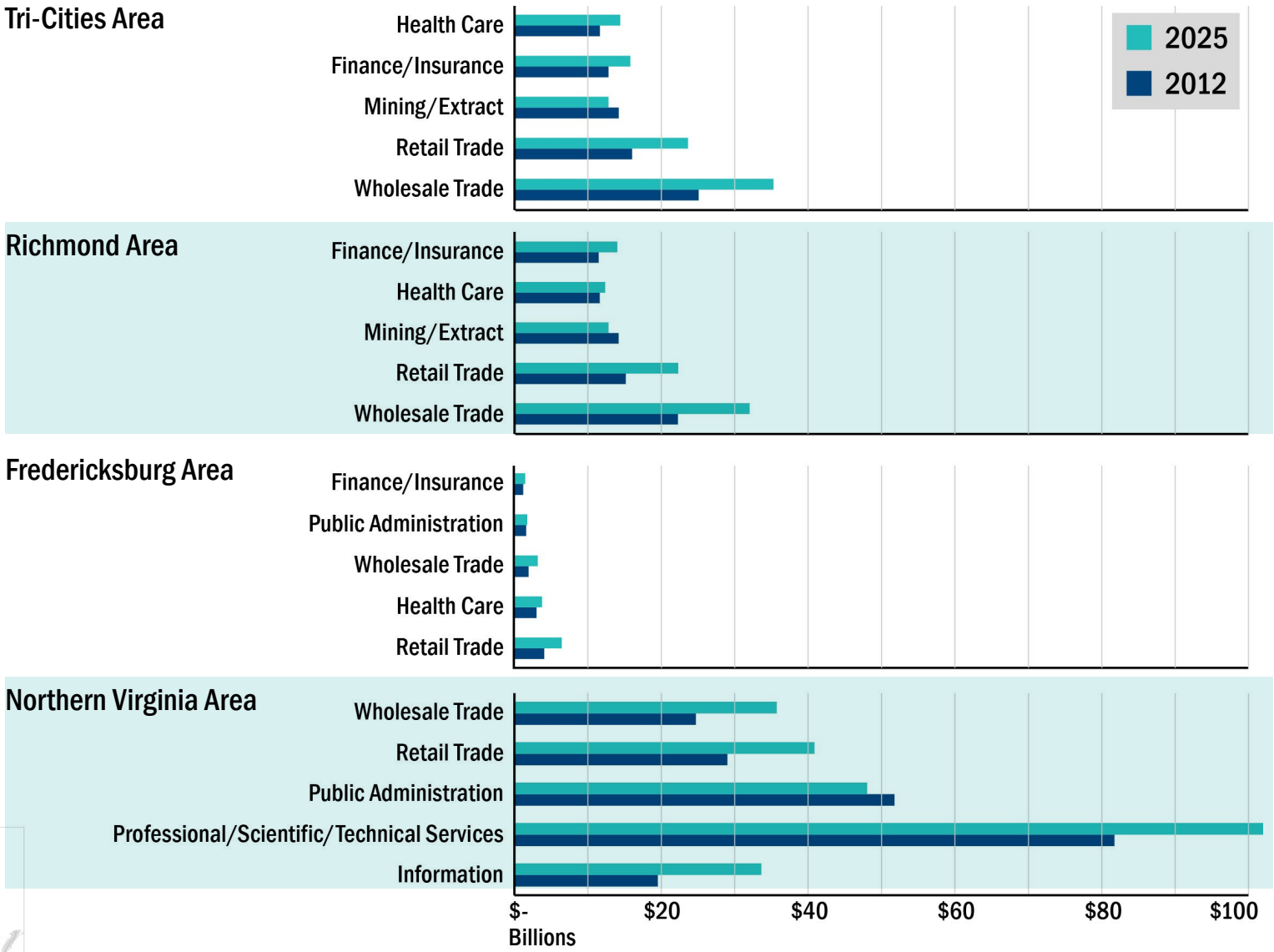
Population Growth (2012 - 2025 Percent Change)

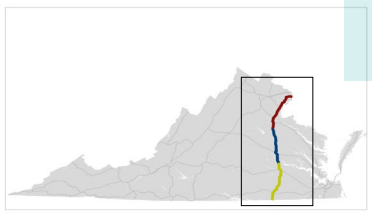




CORRIDOR K OVERVIEW

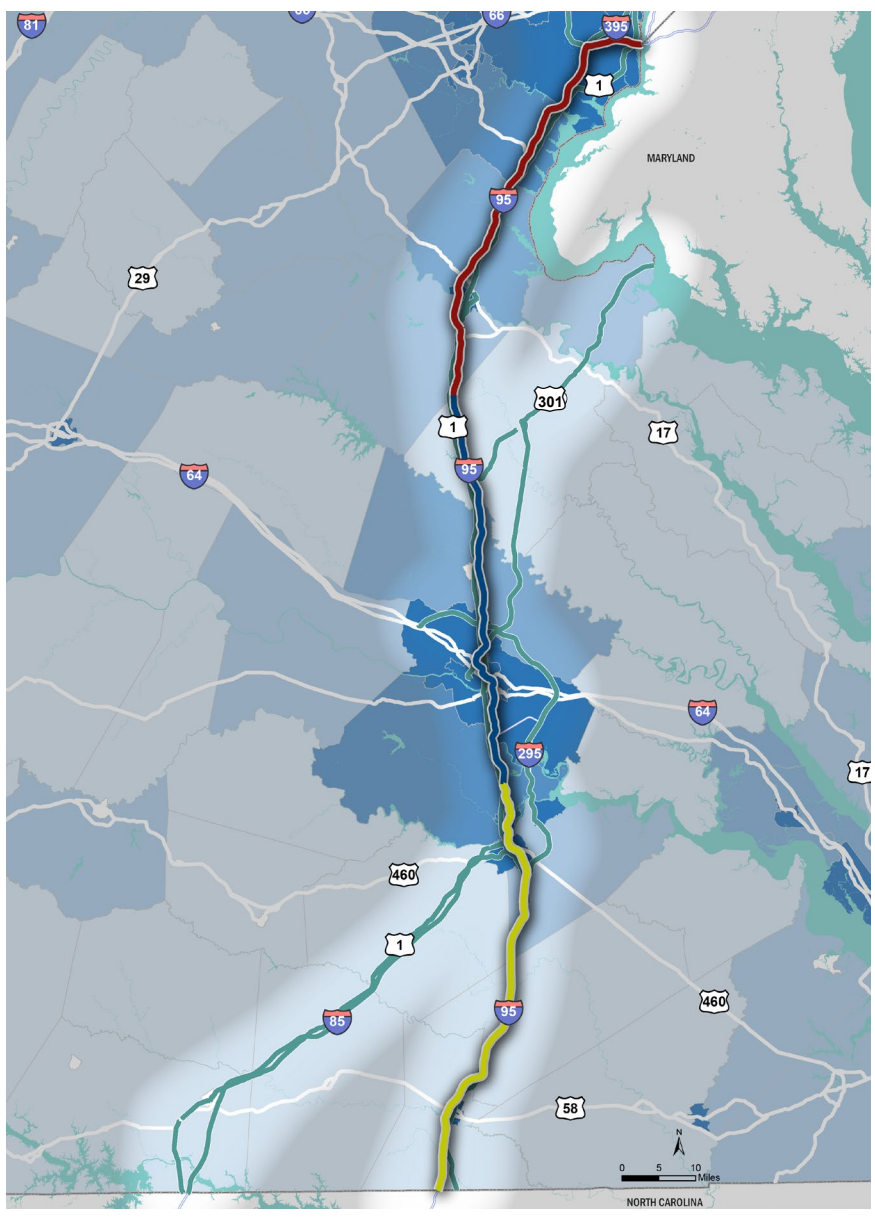
Top Industries (GDP)





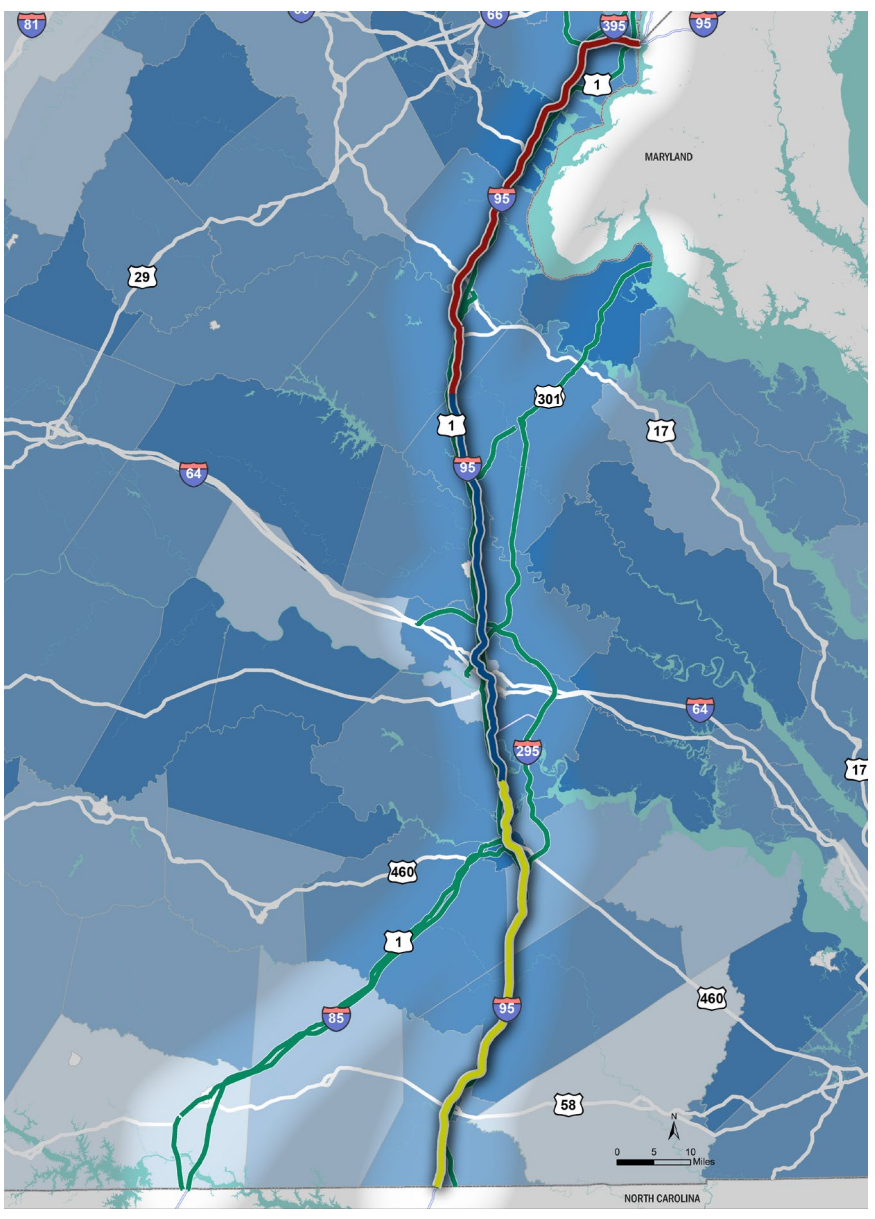
2012 Employment Density
Jobs / Square Mile

- < 25
- 25 - 100
- 100 - 250
- 250 - 500
- > 500



Employment Growth
(2012 - 2025 Percent Change)

- -7% - 0%
- 1% - 5%
- 6% - 10%
- 11% - 25%
- 26% - 69%



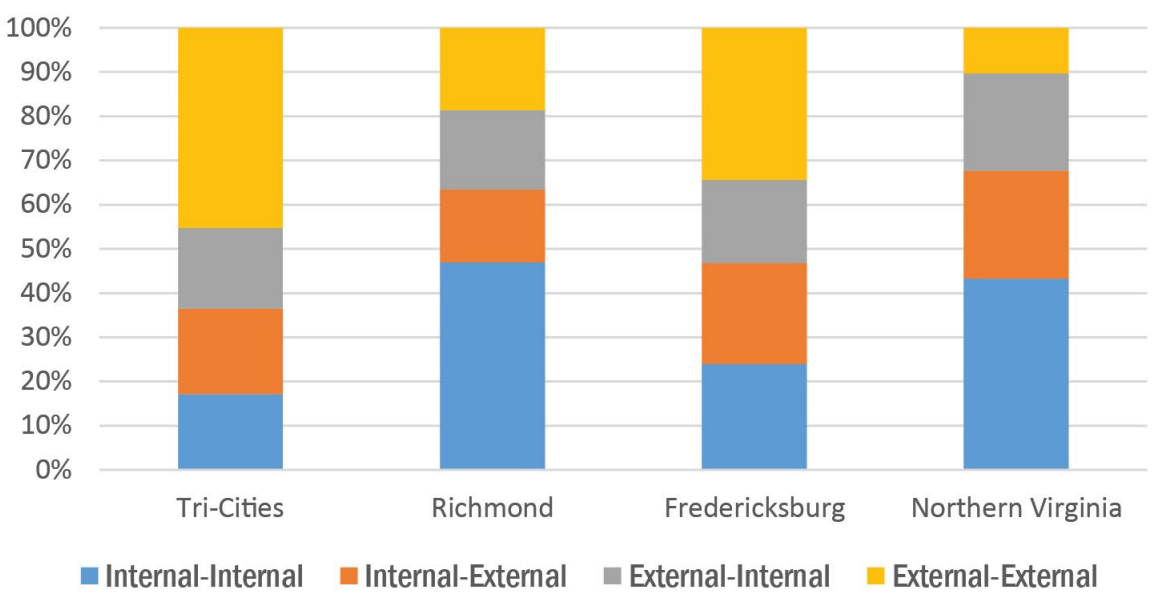
Corridor Travel Patterns

Passenger

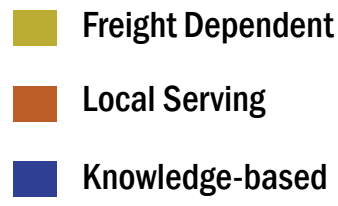
Corridor K connects North Carolina and Maryland and passes through four Metropolitan Planning Organization (MPO) areas along its length: the Tri-Cities Area, the Richmond Area, the Fredericksburg Area, and the Northern Virginia Area. Within the Tri-Cities Area, traffic along Corridor K is dominated by pass-through traffic which accounts for more than 40 percent of the total corridor traffic, but an additional 37 percent of traffic has its trip origin or destination inside the MPO area, due to the large market for travel between the Tri-Cities Area and the Richmond Area. On the interstates, there is a much higher proportion of pass-through traffic than on the parallel facilities. In the Richmond Area, local traffic prevails on Corridor K (47 percent) and a significant portion has only one trip end inside the MPO Area as there are large markets for passenger travel between Richmond and the Tri-Cities and Hampton Roads Areas. Within the Richmond Area, the parallel facilities (non-interstates) are heavily dominated by local traffic (more than 75 percent).

In the Fredericksburg Area, there is a large amount of pass-through traffic; however, the largest proportion of traffic is comprised of trips with only one end inside the MPO Area, due in part to the large number of passenger trips made between the Fredericksburg Area and the Northern Virginia Area. In Northern Virginia, most traffic is related to the area; more than 40 percent of the traffic along Corridor K reflects local internal trips, while an additional 40 percent has at least one trip end in the region (this includes trips originating in or destined for other portions of the Metropolitan Washington Council of Governments (MWCOG) MPO area).

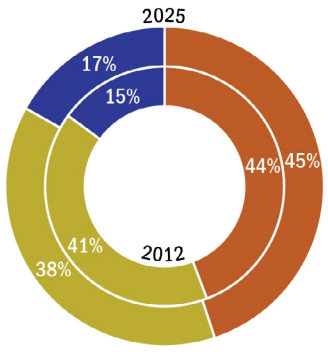
Distribution of Internal and External Travel



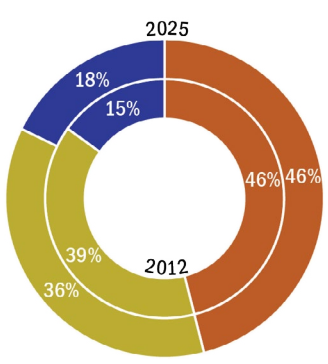
GDP by Sector, 2012 and 2025



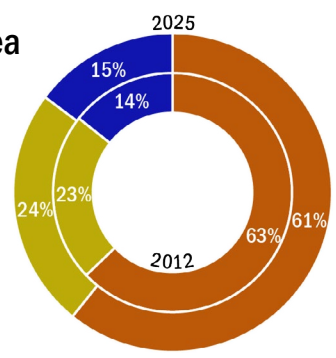
Tri-Cities Area



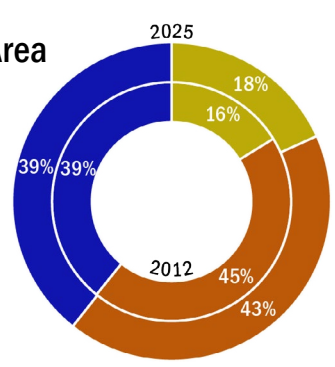
Richmond Area



Fredericksburg Area



Northern Virginia Area



Freight

By truck, Corridor K carried 122 million tons of freight worth $172 billion in 2012, and is estimated to carry 170 million tons of freight worth $252 billion in 2025. A large proportion of truck freight on Corridor K passes through the Commonwealth, representing more than 35 percent of total corridor tonnage and 55 percent of total corridor value. In terms of tonnage, North Carolina is the largest producer and attractor of truck freight traveling along this corridor. In terms of value, Florida is the largest destination for truck freight along the corridor. Corridor K is used heavily by truck freight traffic traveling between locations in the Middle Atlantic and the Southeastern U.S. Within Virginia, the Port of Virginia marine terminal in Norfolk is a major generator of freight traffic on Corridor K, accounting for around five percent of the total truck freight value. Fairfax and Henrico Counties each attract about three percent of the total truck freight value on the corridor, with freight arriving from North Carolina, the Middle Atlantic, and the Port of Virginia.

By rail, Corridor K carried 53 million tons of freight worth $25 billion in 2012, and is estimated to carry 59 million tons of freight worth $32 billion in 2025. Rail freight between Florida and New Jersey accounts for more than 12 percent of the total rail value in Corridor K. The City of Petersburg attracts more than nine percent of the total rail value in Corridor K, where the railroad distribution center processes rail freight arriving from the Midwest for distribution along the Eastern Seaboard. The Port of Virginia facilities in the Hampton Roads Area attracts around four percent of rail tonnage in the corridor.

Truck Freight

	2012	2025
Truck Freight Value	$172 Billion	$252 Billion
Truck Freight Tonnage	122 Million Tons	170 Million Tons
Freight Value per Ton	$1406	$1477
Corridor Tonnage Passing Through	37%	35%

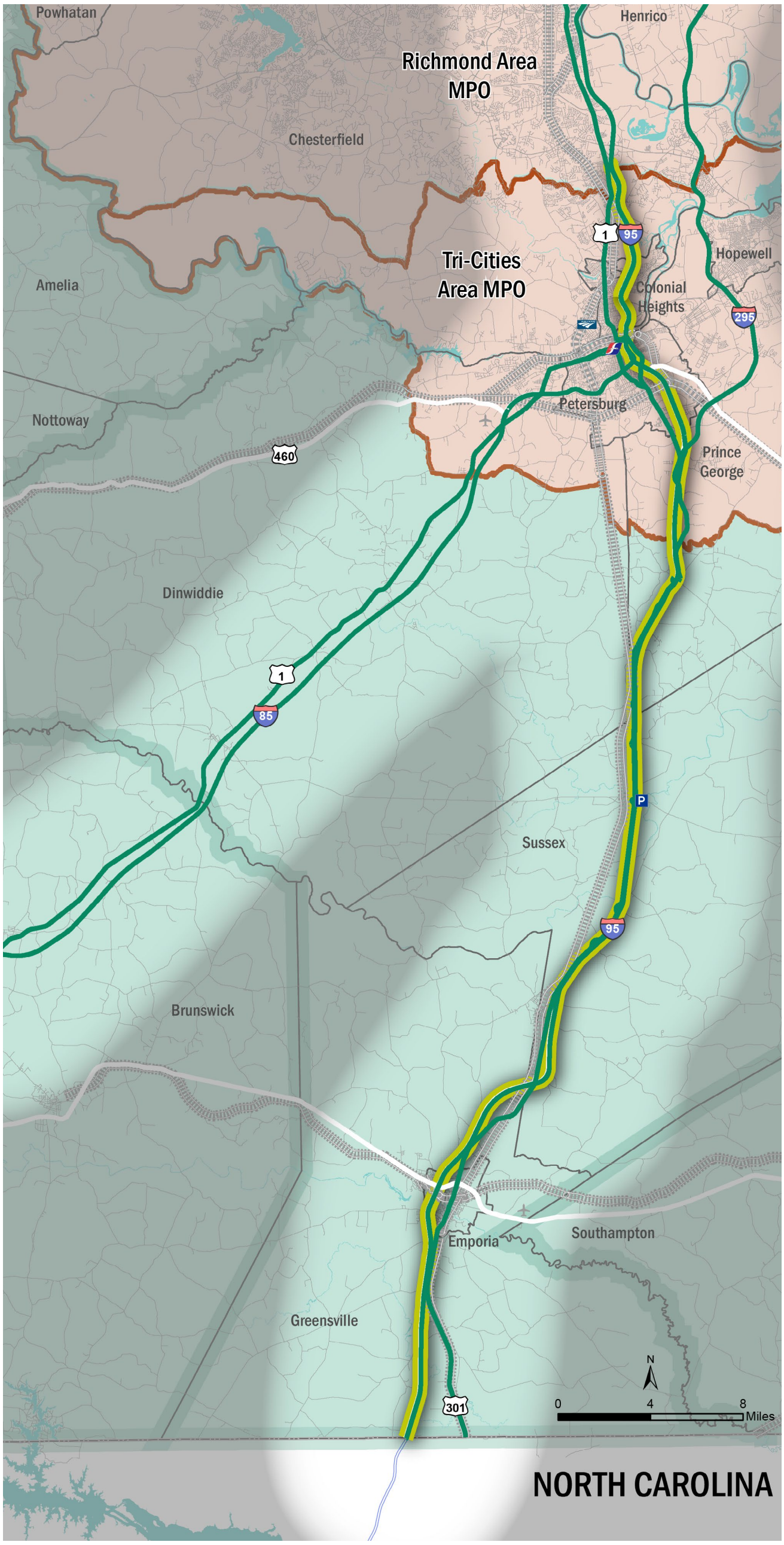
Rail Freight

	2012	2025
Rail Freight Value	$25 Billion	$32 Billion
Rail Freight Tonnage	53 Million Tons	59 Million Tons
Freight Value per Ton	$468	$537
Corridor Tonnage Passing Through	17%	19%

II. Segment K1

Corridor Segment K1 Components

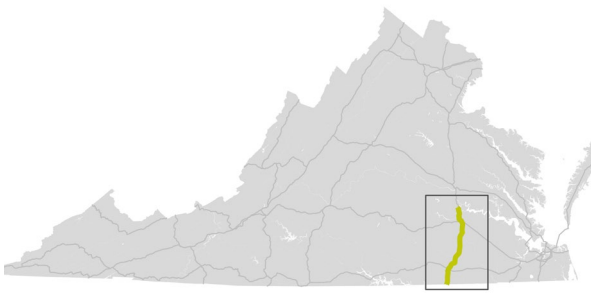
- I-95
- I-85
- I-295
- US 1
- US 301
- CSX National Gateway Corridor
- Intercity bus service



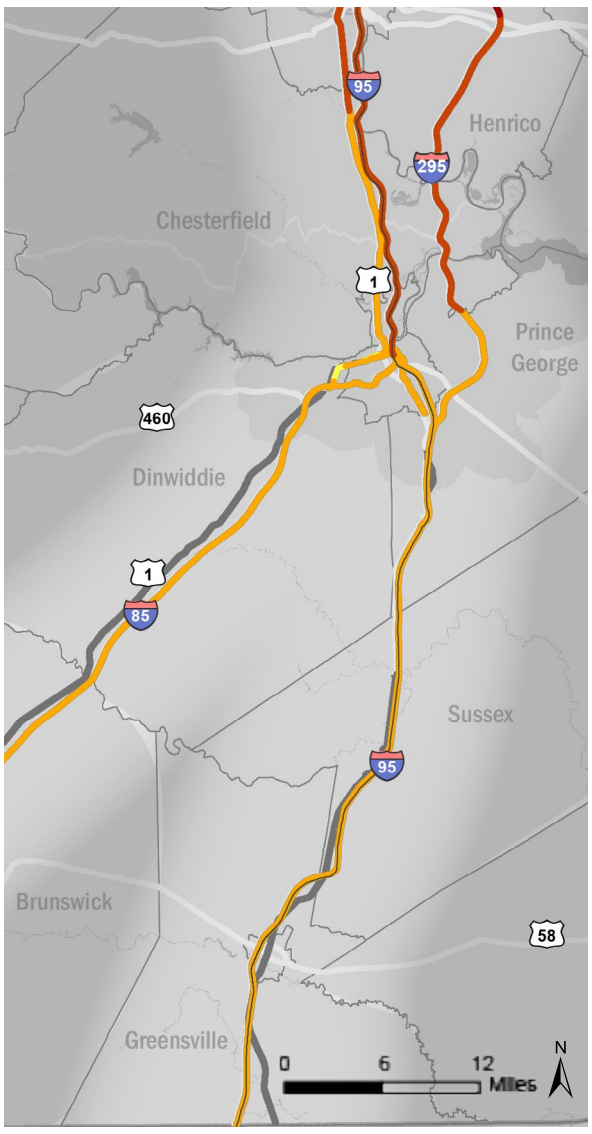
Segment K1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

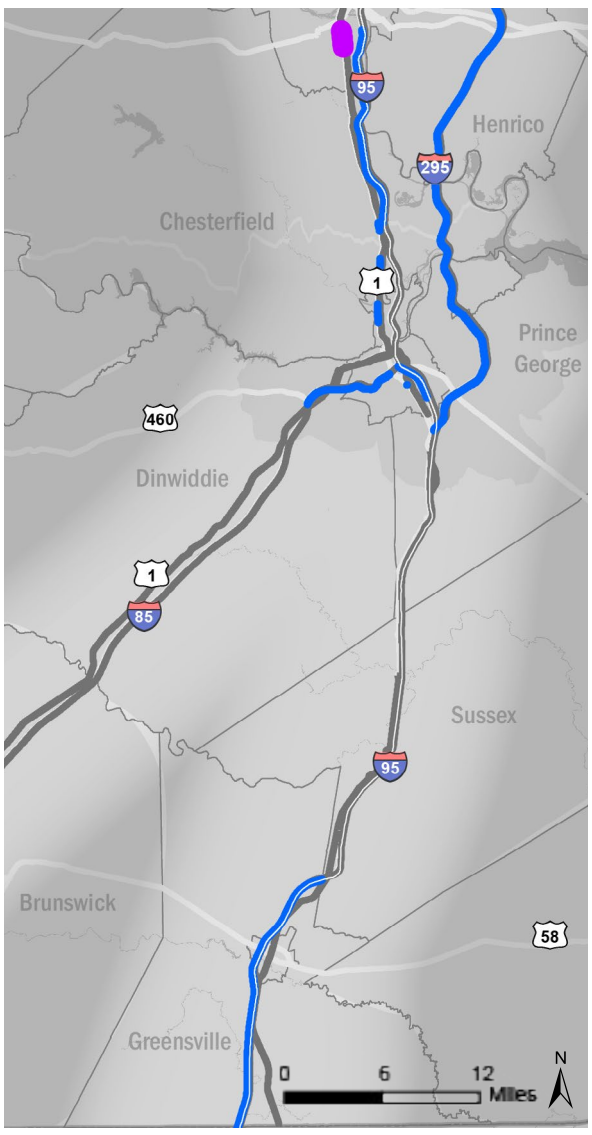


K1 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Segment K1 begins at the North Carolina border and progresses north, serving Greensville, Sussex, Prince George, Chesterfield, Mecklenburg, Brunswick, and Dinwiddie Counties, as well as the Cities of Emporia, Petersburg, Hopewell, and Colonial Heights. The segment exists entirely within the Crater Planning District Commission (PDC) boundaries and serves the Tri-Cities MPO Area. Segment K1 is primarily defined by I-95, but also includes the parallel facilities of I-85, I-295, US 1, and US 301. Segment K1 is characterized by through traffic; however, commuter traffic is heavy through the Cities of Colonial Heights and Petersburg and the areas north toward Richmond.

Highway Facilities: I-95 is primarily a four-lane facility south of Colonial Heights. US 1 parallels I-95 through most of Corridor K, but diverges to the west in the City of Petersburg, where it follows I-85 to the North Carolina border. South of Petersburg, US 301 parallels I-95, and all four of these facilities are components of Segment K3. I-295 acts as a bypass around Petersburg and Richmond to the north with four lanes south of Hopewell and six lanes further north.

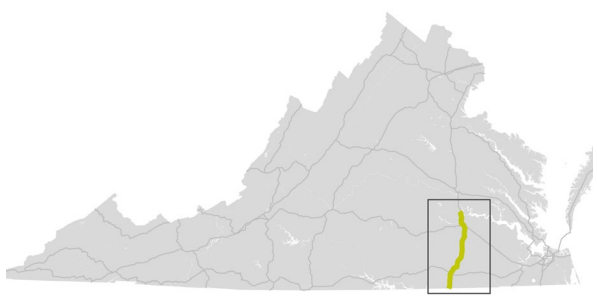
Transit Services: In this area, the corridor is served by the Greater Richmond Transit Company (GRTC) transit system and the Petersburg Area Transit System (PAT). There are also several Park-and-Ride facilities within the segment. GRTC's Richmond–Petersburg Express provides bus service along the segment. In addition, Greyhound and Amtrak have stations in Petersburg and Ettrick (in Chesterfield County), respectively, and provide service to destinations throughout the country, including Richmond, and Washington, DC.

Rail Facilities: CSX Transportation's National Gateway Corridor is a freight rail line that operates in this segment providing connection between Petersburg and Emporia.

Port Facilities: No port facilities are directly accessible from Segment K1, but connections are available to the Norfolk Southern lines that serve the Port of Virginia terminals in the Hampton Roads Area.

Airport Facilities: There are no commercial airports located within this segment.

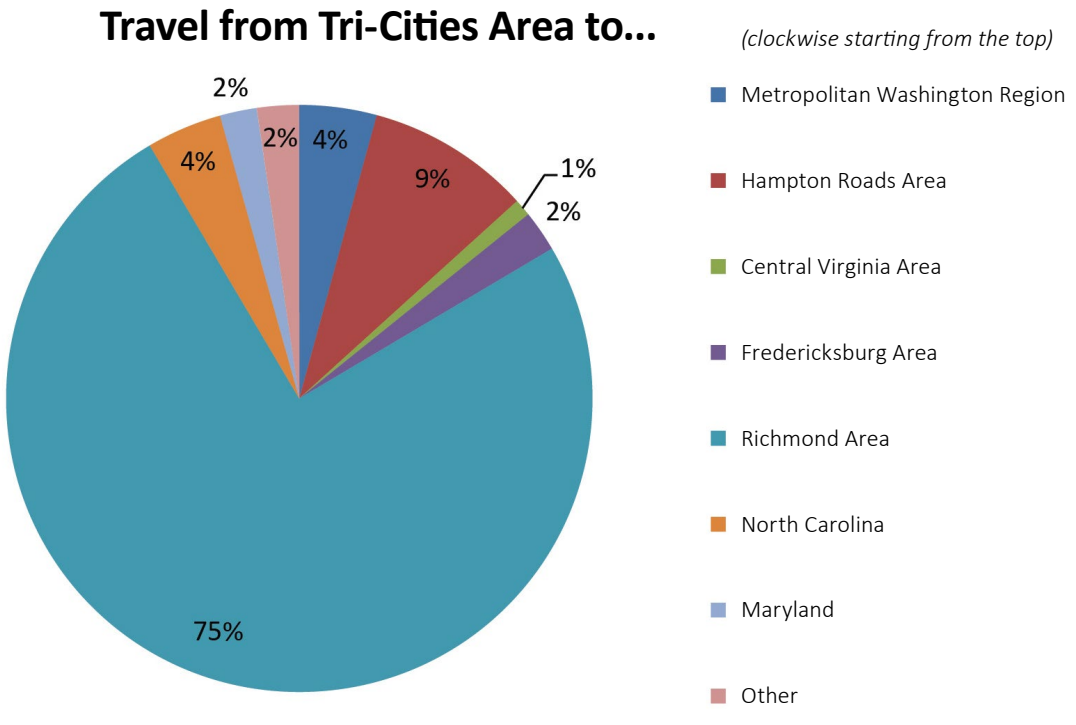
Major planned and future projects include: There are no major planned projects to improve safety or increase capacity at this time.

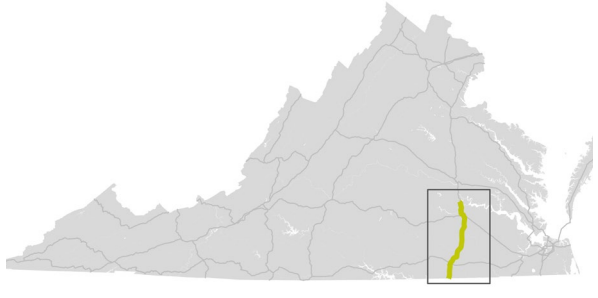


Travel Demand

Passenger Demand

The southernmost Segment of Corridor K connects the Tri-Cities Area to North Carolina, although it does not connect any major cities within Virginia. The vast majority (75 percent) of inter-city passenger travel starting in the Tri-Cities Area is destined for the Richmond Area, located directly adjacent to the north of this segment. Travel between these two adjacent MPO Areas accounts for 11 percent of intercity travel in the Commonwealth. Other major destinations for intercity passenger travel along Corridor K include the Metropolitan Washington Area, the Fredericksburg Area, and other parts of Maryland, which account for a total of nine percent of the travel starting in the Tri-Cities Area. Southbound travel to North Carolina accounts for an additional four percent of passenger travel from the Tri-Cities Area.





K1 SEGMENT PROFILE

Freight Demand

By truck, Segment K1 carried 47 million tons of freight worth $92 billion in 2012, and is estimated to carry 65 million tons of freight worth $135 billion in 2025. A large proportion of truck freight on Corridor K passes through the Commonwealth, representing more than 35 percent of total corridor tonnage and 55 percent of total corridor value. In terms of tonnage, North Carolina is the largest producer and attractor of truck freight traveling along this corridor. In terms of value, Florida is the largest destination for truck freight along the corridor. Corridor K is used heavily by truck freight traffic traveling between locations in the Middle Atlantic and the Southeastern U.S. Within Virginia, the Port of Virginia marine terminal in Norfolk is a major generator of freight traffic on Corridor K, accounting for around five percent of the total truck freight value. Fairfax and Henrico Counties each attract about three percent of the total truck freight value on the corridor, with freight arriving from North Carolina, the Middle Atlantic, and the Port of Virginia facilities in the Hampton Roads Area. Henrico County attracts about three percent of the total truck freight value on the corridor, with freight arriving from North Carolina, the Middle Atlantic, and the Port of Virginia facilities in the Hampton Roads Area. Within Segment K1, more than three percent of corridor truck freight tonnage is destined for Chesterfield County. This freight primarily originates in North Carolina, Maryland, and Pennsylvania. Segment K1 is also used by truck freight traffic traveling between the Port of Virginia facilities in the Hampton Roads Area and locations in the Southeastern U.S.

By rail, Segment K1 carried 12 million tons of freight worth $16 billion in 2012, and is estimated to carry 15 million tons of freight worth $20 billion in 2025. Rail freight between Florida and New Jersey accounts for more than 12 percent of the total rail value in Corridor K. The City of Petersburg attracts more than nine percent of the total rail value in Corridor K, where the railroad distribution center processes rail freight arriving from the Midwest for distribution along the Eastern Seaboard. The Port of Virginia facilities in the Hampton Roads Area attracts around four percent of rail tonnage in the corridor. Dinwiddie County and the City of Hopewell are major freight generators along Segment K1, and the latter accounts for approximately six percent of the total rail freight value in the corridor. There are also significant rail freight movements from Sussex County, in Segment K1, to Mississippi.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (35% / 37%)
2. North Carolina (19% / 17%)
3. Pennsylvania (8% / 9%)
4. Maryland (7% / 7%)
5. Florida (6% / 6%)

Corridor Tonnage Originating in Segment K1:
6% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
Florida and Pennsylvania
Florida and New York

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (39% / 40%)
2. North Carolina (11% / 12%)
3. Maryland (10% / 10%)
4. Pennsylvania (7% / 7%)
5. Florida (7% / 7%)

Corridor Tonnage Destined for Segment K1:
10% / 9%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (52% / 48%)
2. Virginia (12% / 14%)
3. Pennsylvania (8% / 7%)
4. Kentucky (6% / 5%)
5. Florida (3% / 4%)

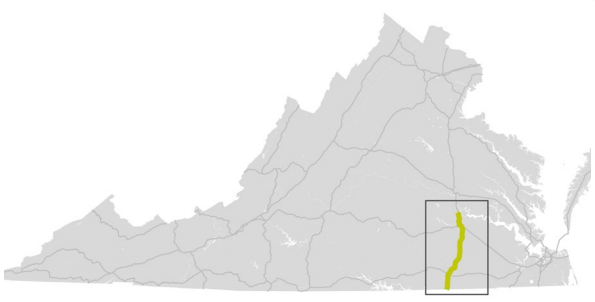
Corridor Tonnage Originating in ment K1:
% / 6%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Newport News* and Kentucky
Florida and New Jersey
Pennsylvania and South Carolina
Dickenson County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (77% / 75%)
2. City of Newport News* (60% / 55%)
3. South Carolina (4% / 4%)
4. City of Norfolk* (4% / 4%)
5. North Carolina (3% / 3%)

Corridor Tonnage Destined for Segment K1:
6% / 7%



Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment K1 is generally low in comparison to Corridor K overall. The facility with the highest average daily traffic is the portion of I-95 north of the City of Petersburg, which carries over 95,000 vehicles on an average day. South of Petersburg, traffic volumes are significantly lower, with volumes ranging from 32,000-40,000 vehicles per day on I-95 and between 20,000-26,000 ADT on the alternative I-85. Traffic volumes on Segment K1 are forecast mostly to increase by 2025, with the largest increases on I-95 north of Petersburg. By 2025, the volume on I-95 north of Petersburg is forecast to increase to over 110,000 vehicles. South of Petersburg volumes in 2025 are forecast to increase to 35,000-45,000 on I-95 and 23,000-31,000 on I-85.

Traffic Volume 2014 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility

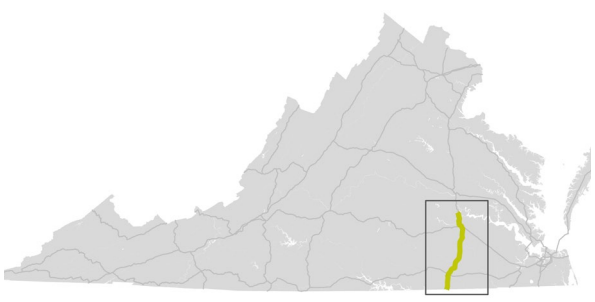
Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility

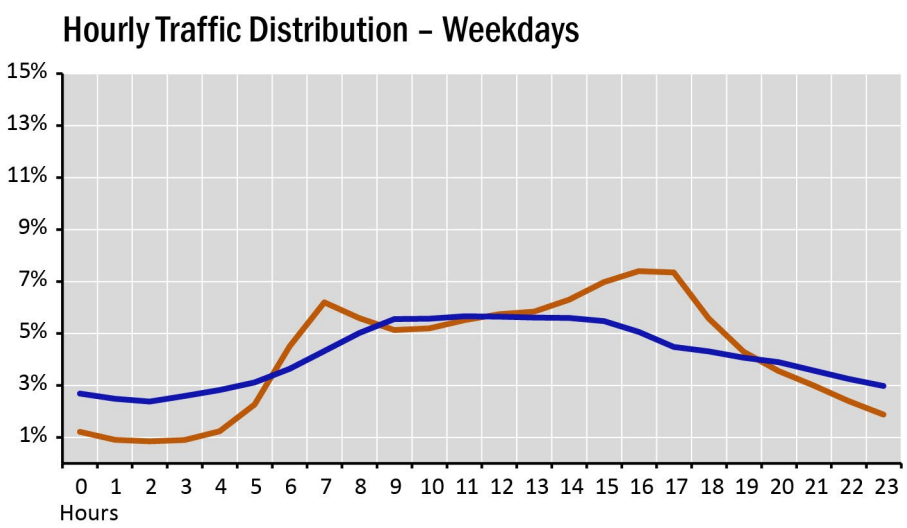
Change in Traffic Volume 2014- 2025 (AADT)

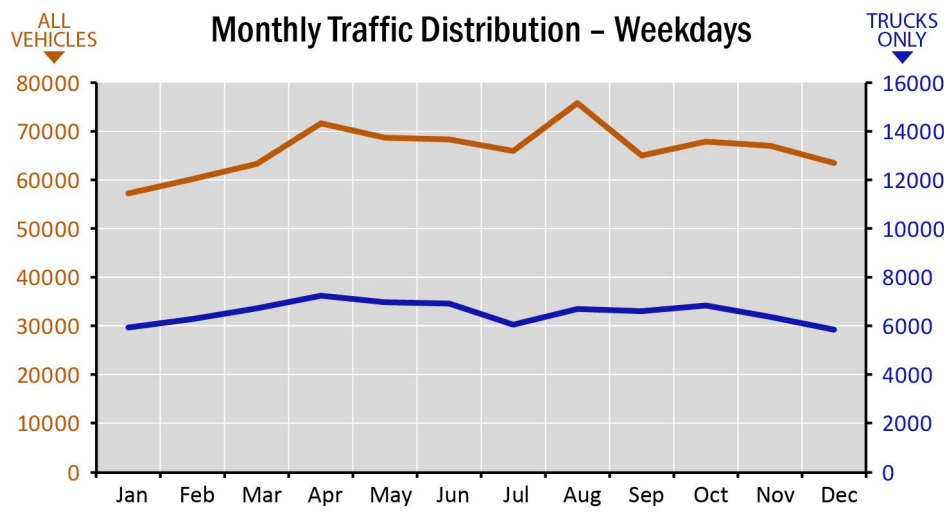
- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility

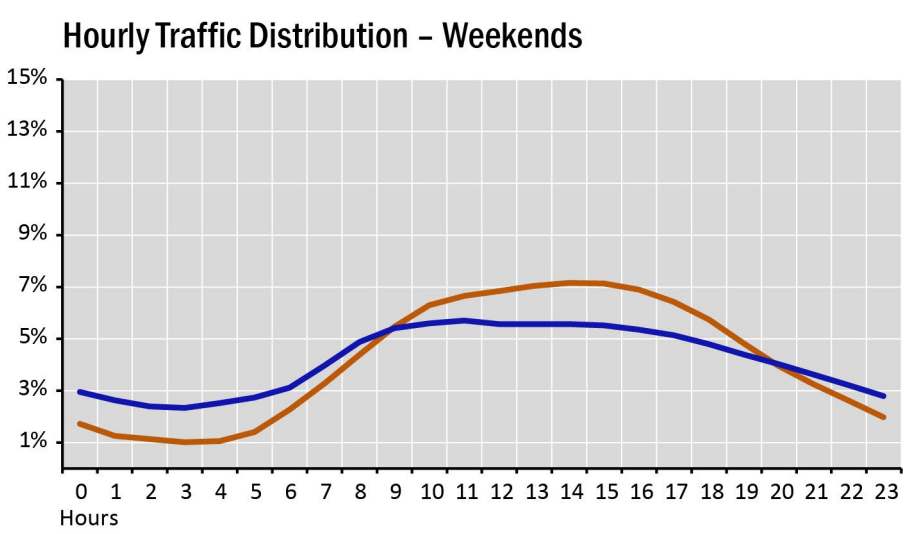


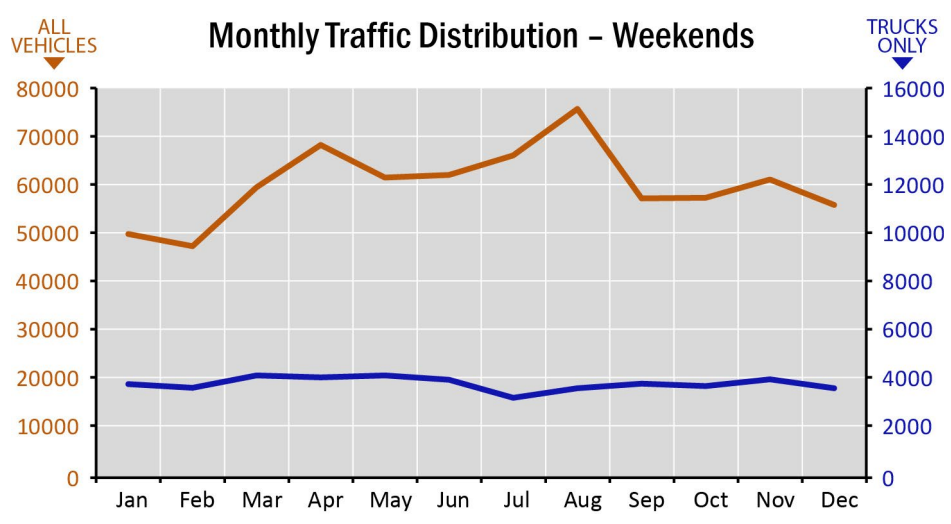


K1 SEGMENT PROFILE



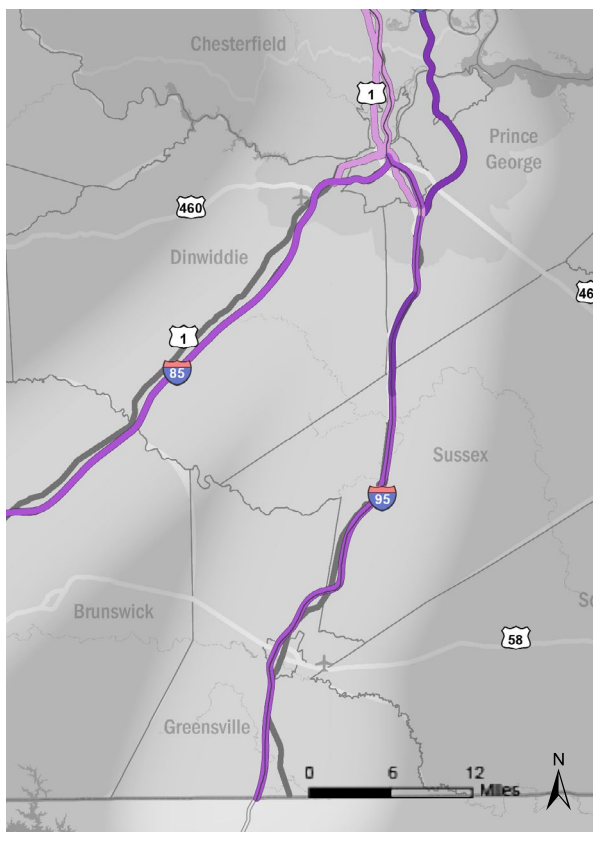






All Vehicles

Trucks



Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

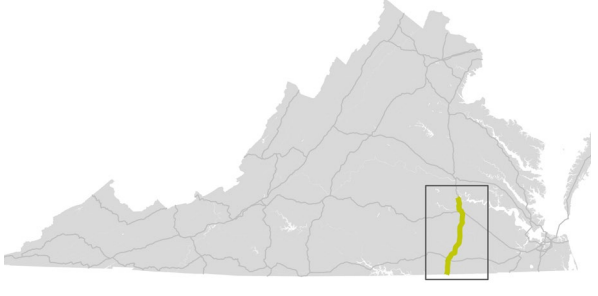
Traffic Distribution

On average, traffic on Segment K1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.4 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 6.2 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 49 percent of total daily traffic. Peaking patterns for truck traffic are different from other traffic, with a relatively steady flow of trucks during the midday period between 10 a.m. and 4 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day, with the highest percentage of hourly traffic occurring between 3 and 4 p.m. (7.1 percent of daily traffic) for all traffic, and 11 a.m. to noon (5.7 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment K1 vary by as much as 32 percent throughout the year, with the high point in August (around 76,000 vehicles per day) and the low point in January (around 57,000 vehicles per day). Truck volumes vary less than passenger volumes throughout the year, with the April high (around 7,200 vehicles per day) 24 percent higher than the December low (around 5,800 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 76,000 vehicles per day) are 60 percent higher than February levels (around 47,000 vehicles per day). Weekend truck traffic is marginally more steady than all vehicle traffic, with the March high (around 4,000 vehicles per day) 29 percent higher than the July low (around 3,000 vehicles per day). Since truck volumes account for a relatively small portion of traffic on Segment K1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

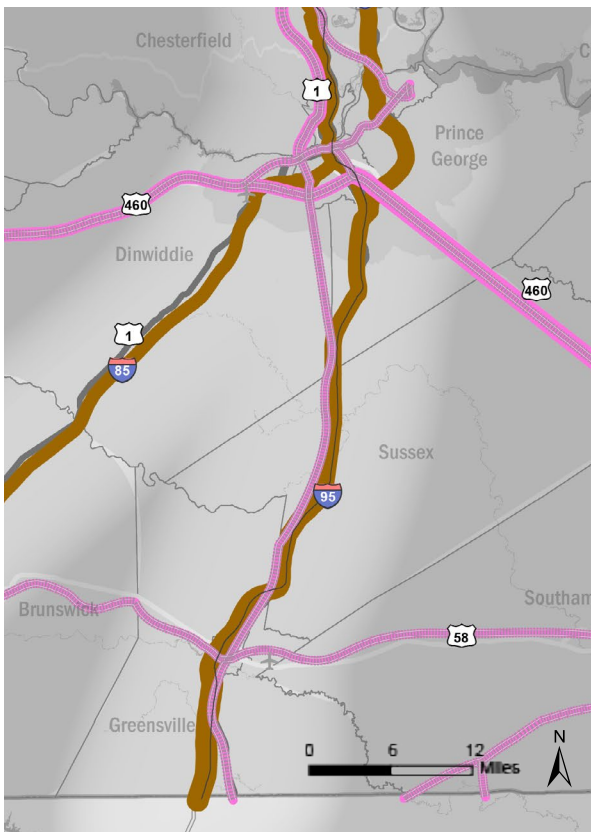
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment K1 is generally less than ten percent, although it does vary by location. Heavy trucks account for less than five percent of daily traffic volumes on I-95 and US 1 north of Petersburg (where overall vehicle traffic is highest), but account for approximately 11 percent of vehicle traffic on I-295 in the same area. South of Petersburg, heavy trucks account for between eight and ten percent of ADT on I-95 and I-85.



K1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

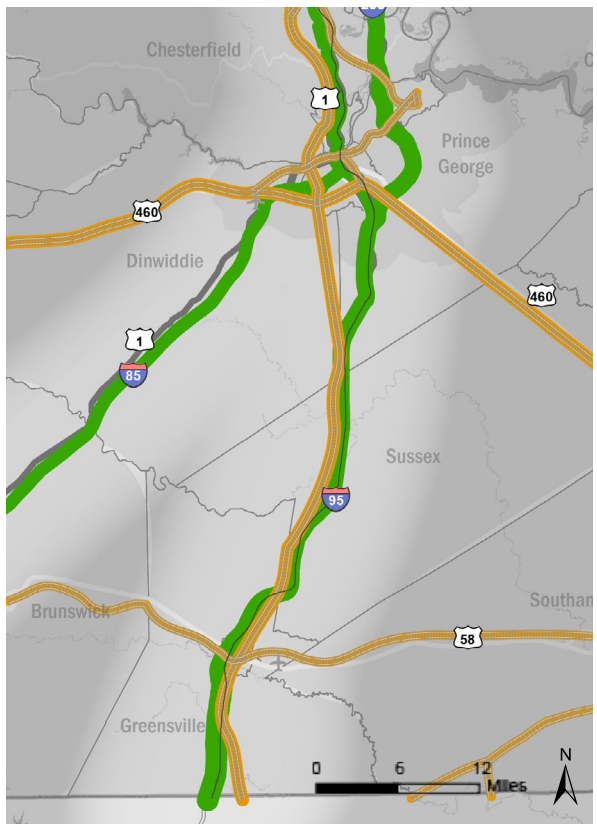


Freight Flows

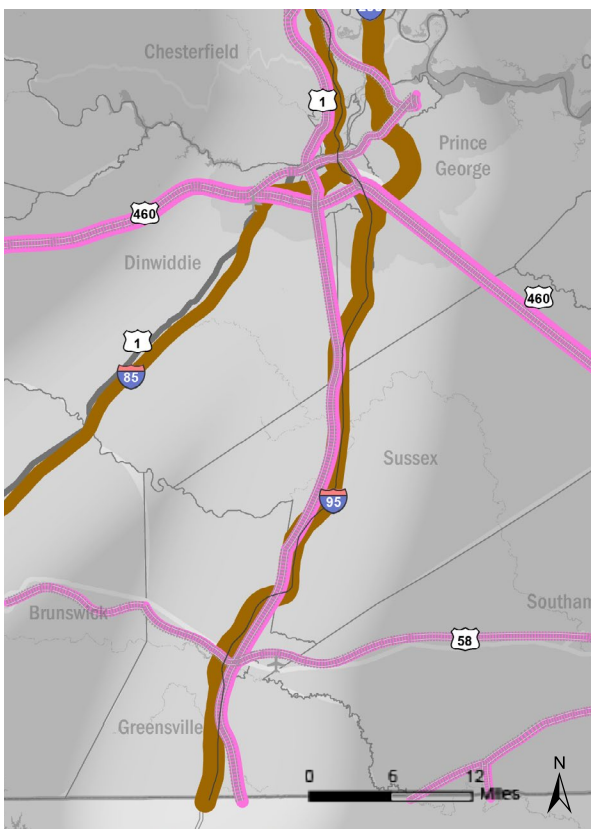
North of Emporia in Greensville County on Segment K1, freight is primarily moved by truck in terms of tonnage and value. In total, 47 million tons (84 percent) of freight is moved through this section of Segment K1 by truck, compared to nine million tons (16 percent) moved by rail. With regard to value, $92 billion (88 percent) of freight travels by truck, while $12 billion (12 percent) of freight travels by rail. On average, a ton of freight moving through this section of Segment K1 by truck and by rail is worth $1,943 and $1,393, respectively. In 2025, truck and rail freight tonnages and value in this area of Segment K1 will likely increase. The percentage of freight moving by truck is expected to increase by tonnage and by value to 86 percent and 90 percent, respectively. It is anticipated that value per ton on trucks will increase to $2,061 and increase to $1,425 for rail.

North of Colonial Heights on Segment K1, freight is moved primarily by truck by tonnage and value. In total, 21 million tons (65 percent) of freight is moved through this section of Segment K1 by truck and 12 million tons (35 percent) by rail. With regard to value, $21 billion (57 percent) of freight travels by truck and $16 billion (43 percent) travels by rail. On average, a ton of freight moving through this section of Segment K1 by truck and by rail is worth $964 and $1,344, respectively. This is one of the few locations in the Commonwealth where rail freight is on average more valuable than truck freight. In 2025, truck freight tonnage and value in this area of Segment K1 are expected to increase. The percentage of freight traveling by truck by tonnage and value will increase to 66 percent and 60 percent, respectively. It is anticipated that value per ton on trucks and rail will increase to $1,087 and $1,379, respectively.

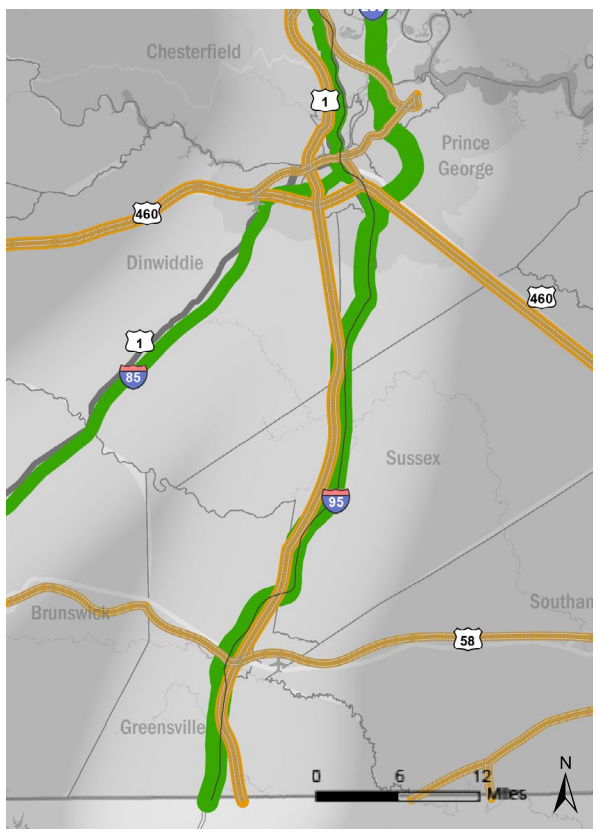
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

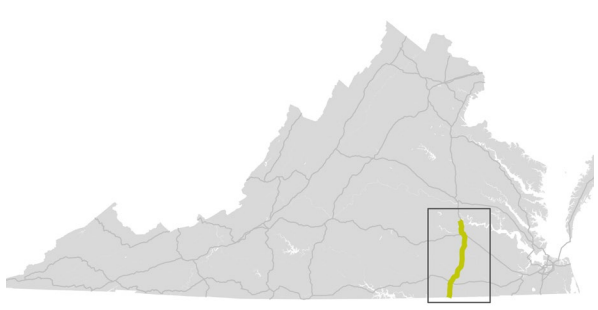
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

Comparable Travel Options

Petersburg to Richmond

Inter-City Bus	*Train*
4 Trips per Day	5 Trips per Day
0:45 Travel Time	0:35 Travel Time
$3.50 Avg Cost	$12 Avg Cost

Auto

Via I-95: 0:25 Travel Time $13 Avg Cost
Via US-1: 0:45 Travel Time $13 Avg Cost

Petersburg to Rocky Mount, NC

Inter-City Bus	*Train*
0 Trips per Day	4 Trips per Day
	1:30 Travel Time
	$18 Avg Cost

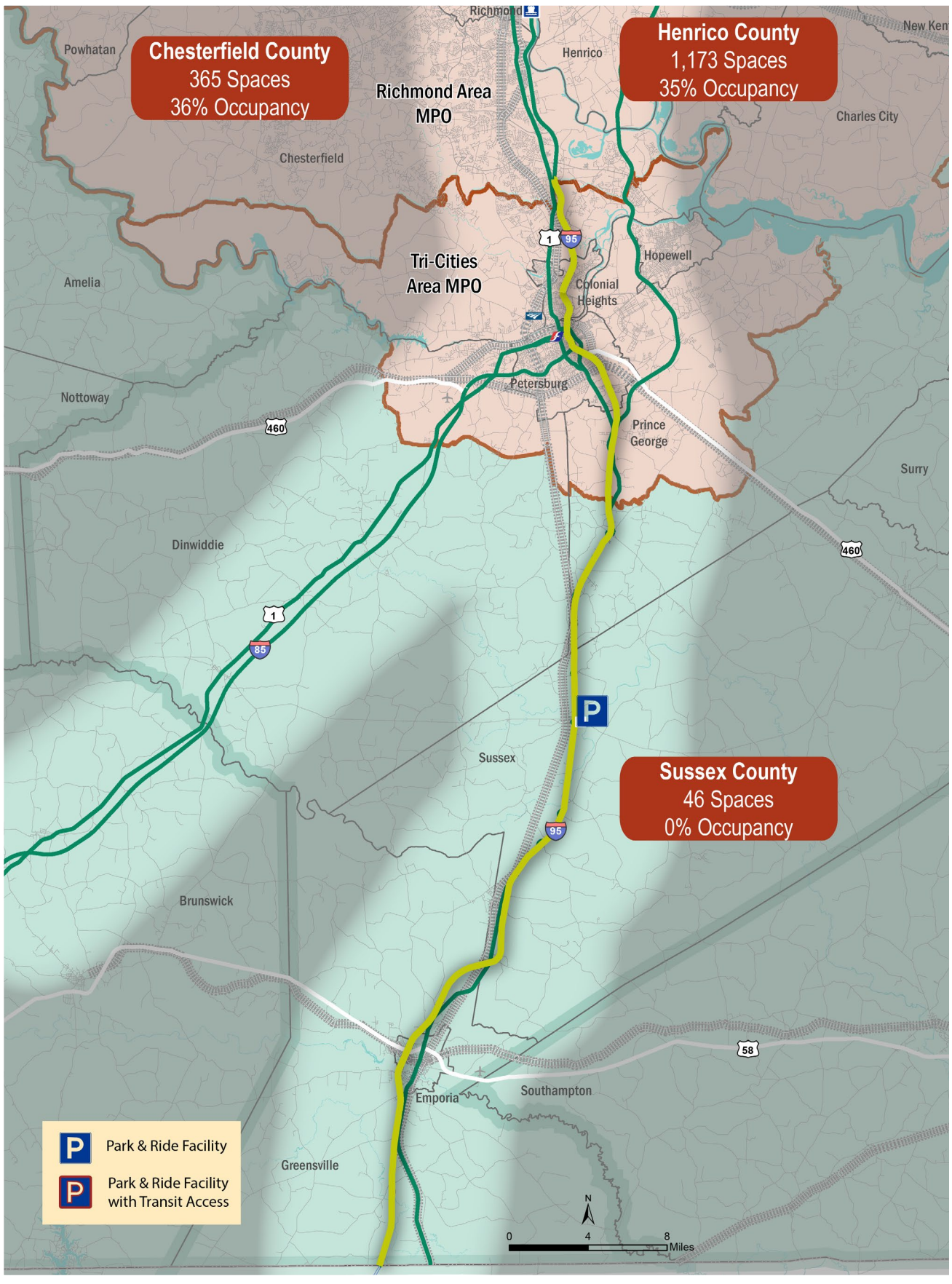
Auto

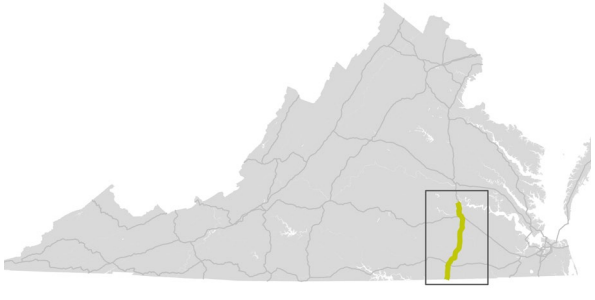
Via I-95: 1:30 Travel Time $58 Avg Cost
Via US-360: 2:05 Travel Time $56 Avg Cost

Passenger trips on Segment K1 of the Washington to North Carolina Corridor have several travel options, both in terms of travel path and mode choice. Interstates I-85, I-295, US 1, and US 301 serve as parallel highway facilities within the segment. The segment is served by a variety of modes with frequent service, including the Richmond-Petersburg Express bus service offered by GRTC. Greyhound and Amtrak each have stations in the Petersburg Area serving the corridor, as well as providing connections to destinations east and west. Automobile travel from Petersburg is typically less expensive than by alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile), but is not as competitive in terms of speed or frequency of service.

Park-and-Ride

Within Segment K1, commuters can use one Park-and-Ride location, as well as local and commuter bus services provided by GRTC and PAT. The single Park-and-Ride location in Sussex County, the Stony Creek lot, has little to no usage. Chesterfield County does have more Park-and-Ride locations, as well as higher utilization of these lots; however, these lots do not directly serve Segment K1. No county within the Segment K1 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.





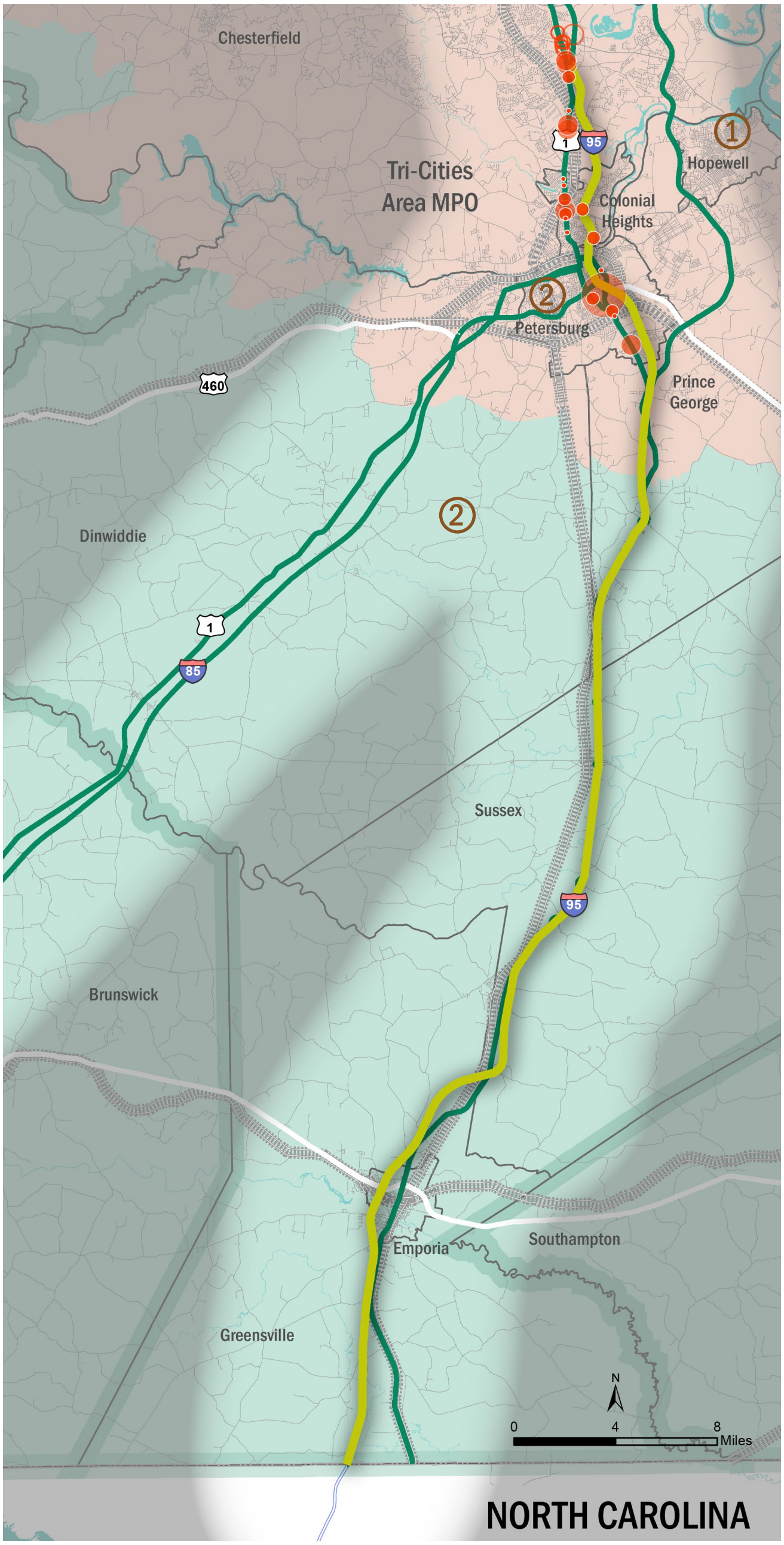
K1 SEGMENT NEEDS

Safety

Performance Metrics:

Number of Severe Crashes	178
Severe Crashes/Million VMT	0.2
Number of Railroad Crashes	5

Between 2010 and 2012, 178 severe crashes occurred on Segment K1. The largest concentration of severe crashes occurred in the northernmost portion of the segment, near Petersburg and Colonial Heights. Most of the collisions occurred along a span of US 1 in Colonial Heights and north of the Appomattox River. A total of 47 incidents took place within a stretch of approximately two miles, with 13 of the crashes in this span occurring at the intersection of US 1 and Route 144. A significant number of collisions (39) also occurred along a 1.4 mile segment of US 301 (South Crater Road) in Petersburg, south of I-95 and north of Roberts Avenue. Of the 39 crashes, 28 happened along a 0.7 mile segment between I-95 and South Boulevard. There is also a concentration of crashes on US 1 further north in Chesterfield County; these crashes are included in the analysis of the southernmost portion of Segment K2.

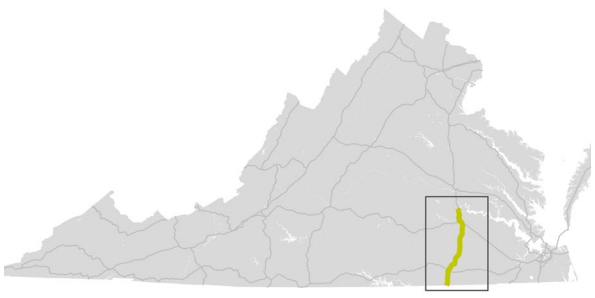


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



K1 SEGMENT NEEDS

Congestion

Performance Metrics:

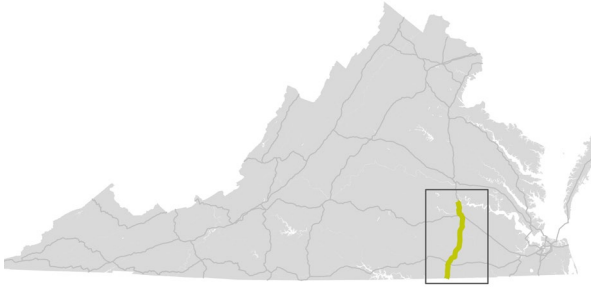
Person Hours of Delay per Mile	4
Freight Ton Hours of Delay per Mile	8.7K

Passenger Delays

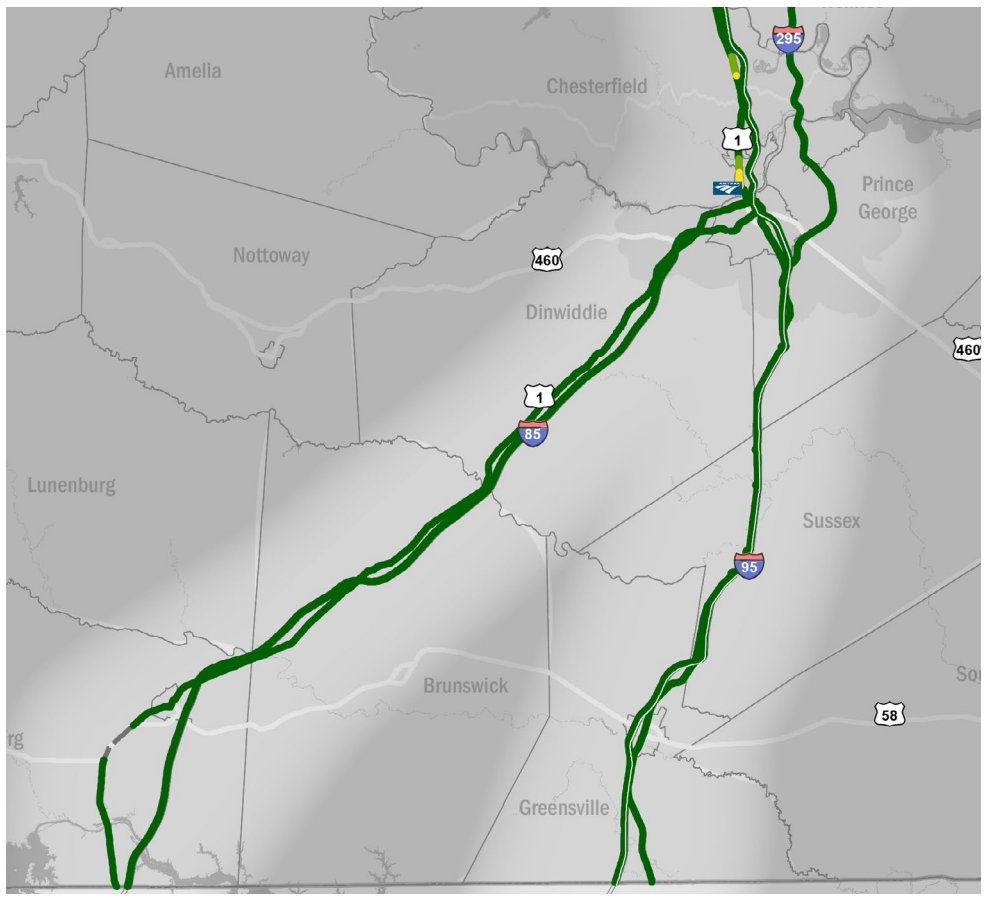
Passenger delays along Segment K1 are quite low, with an average delay of just four person-hours per mile. While the passenger delays are minimal for most of the segment, passenger delays exceed 100 person-hours per mile for a short section of US 1 in Colonial Heights. Approximately 46 percent of the daily passenger delays are experienced in the peak period, which is higher than average for the peak-period share of congestion on CoSS segments.

Freight Delays

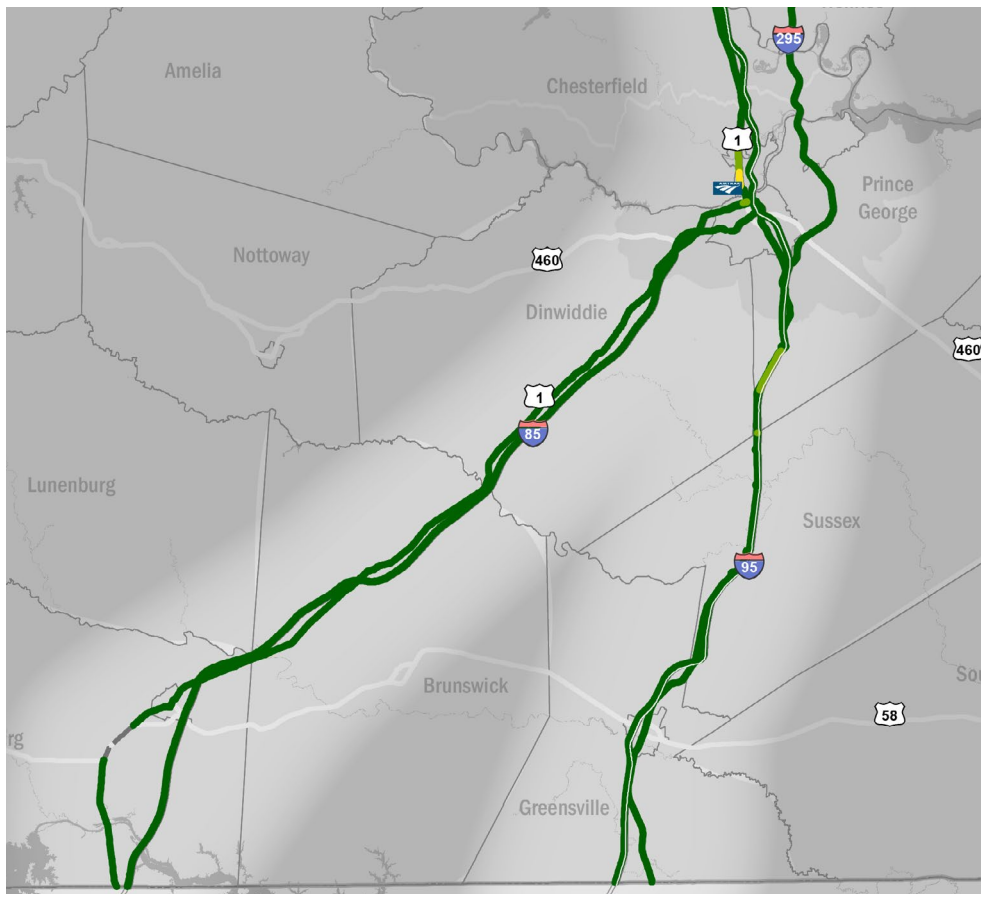
Freight congestion along Segment K1 is the lowest in the corridor, with an average delay of 8,700 ton-hours per mile. Freight delays follow similar patterns to passenger delays, with only minimal freight delays for most of the segment, and significant freight delays (exceeding 250,000 ton-hours per mile) for a short section of US 1 in Colonial Heights. Approximately 38 percent of the daily freight delays are experienced in the peak period, which is slightly higher the average peak periods share of freight delay among CoSS segments statewide.



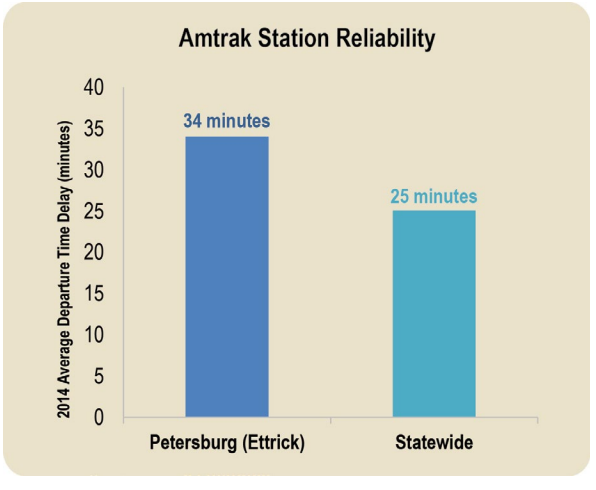
Daily Person Hours of Delay per Mile



Daily Freight Ton Hours of Delay per Mile



Reliability



Weekday Peak

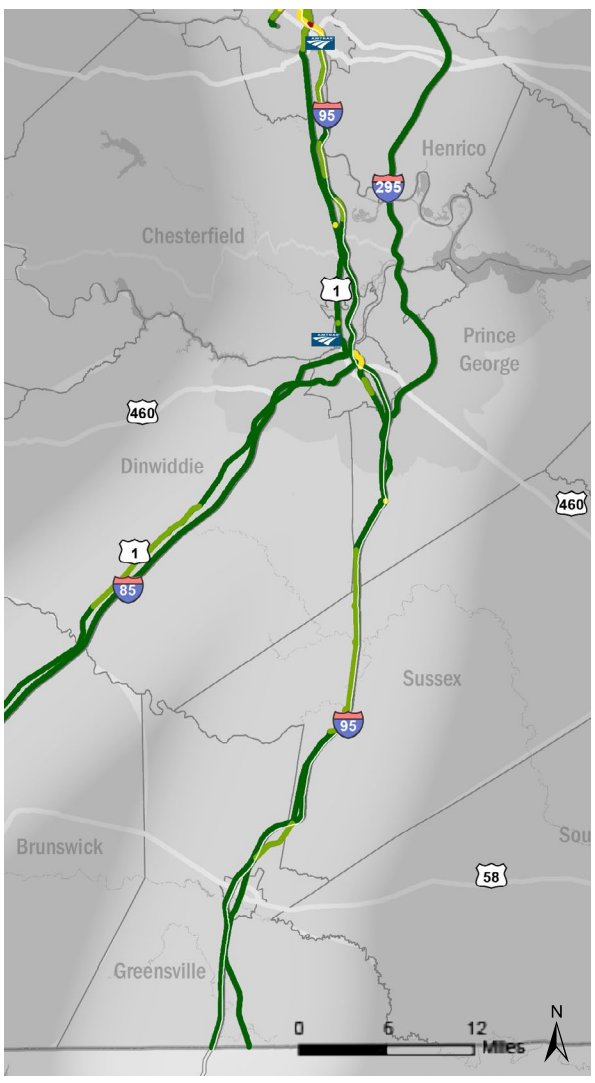
Reliability of travel during the peak period on a typical weekday on Segment K1 ranges from 0.00 to 0.56 in terms of reliability index, with an average value of 0.08. None of the locations along Segment K1 have reliability index values exceeding the statewide threshold.

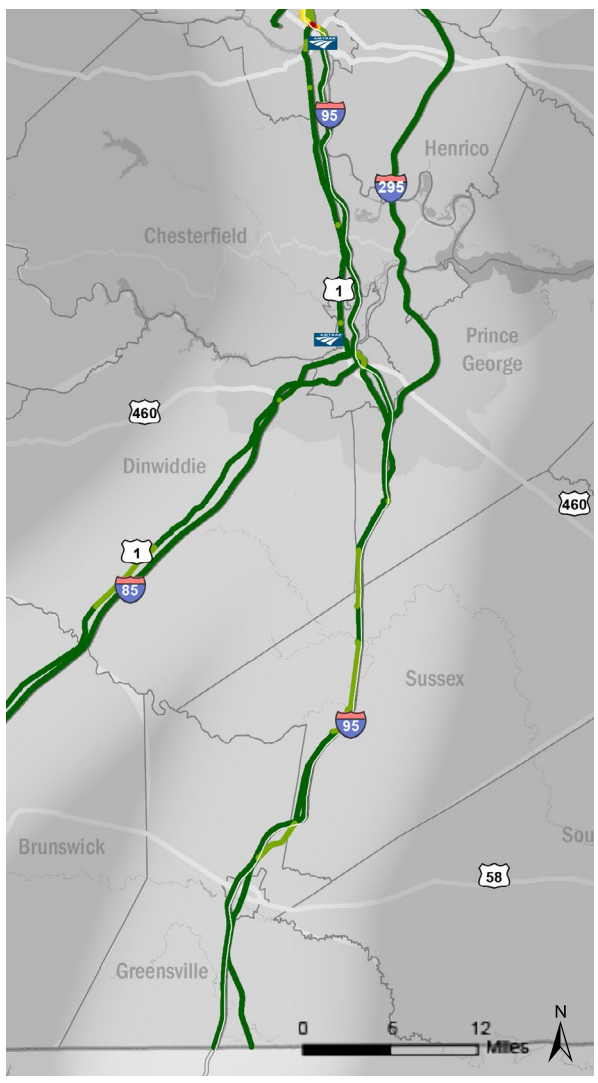
Weekday

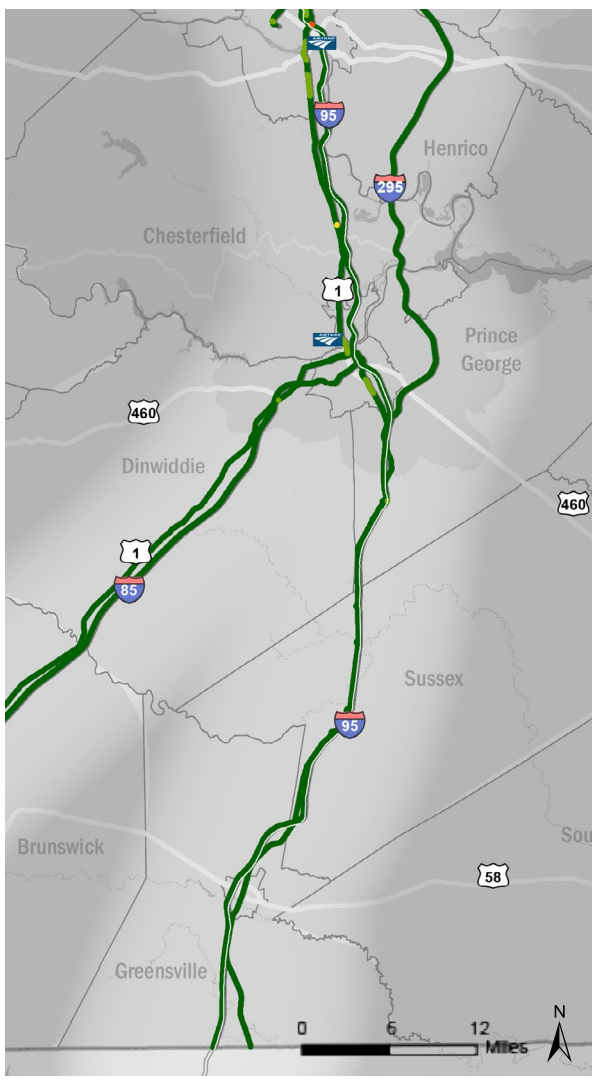
Reliability of travel during a typical weekday ranges from 0.00 to 0.29 in terms of reliability index, with an average value of 0.07. None of the locations along Segment K1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.37 in terms of reliability index, with an average value of 0.05. None of the locations along Segment K1 have reliability index values exceeding the statewide threshold.





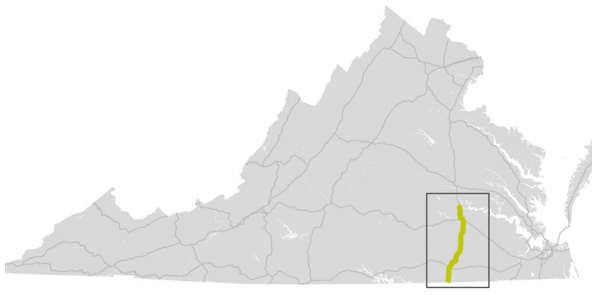


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

Redundancy

Safety

Congestion

Bottlenecks

Reliability

C

E

F

B

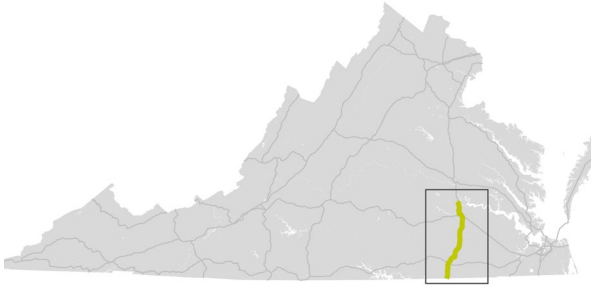
A

D

H

G





K1 SEGMENT NEEDS

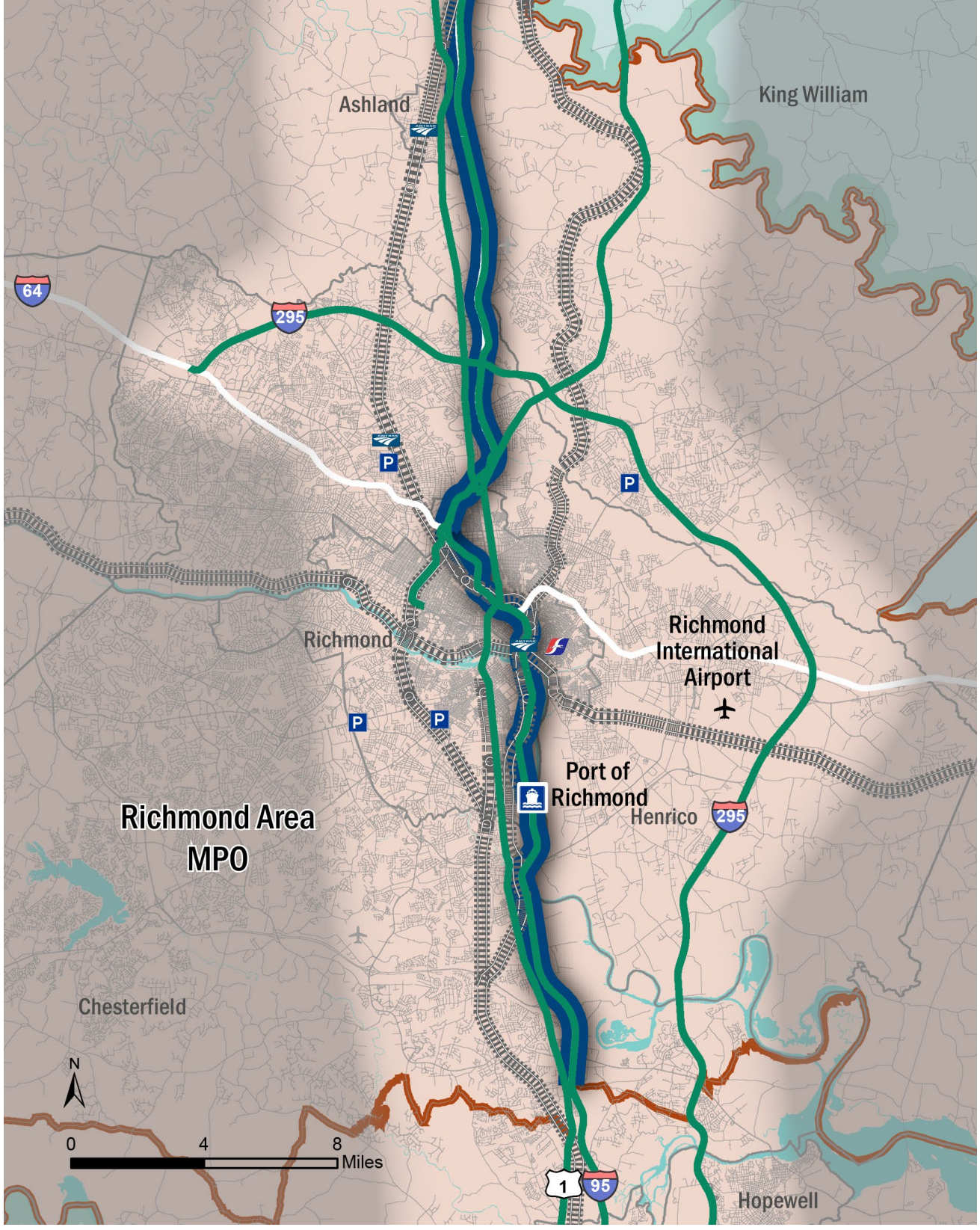
Summary of Needs - K1 Segment

A.		Unsafe interchange at junction of I-95 and I-85
B.		Unsafe ramp at interchange of I-95 and US 460
C.		US 1 in Colonial Heights (near intersection with VA 144/Temple Ave) : Highest number of crashes on the Segment (47)
D.		US 301/South Crater Road in Petersburg: 39 crashes between I-95 and Roberts Avenue
E.		Limited availability of transit options from Petersburg to Metropolitan Washington region (2 buses, 11 rail trips daily)
F.		Unreliable Amtrak service from Petersburg (Ettrick) station. Average departure delay is 34 minutes totaling over 8,200 person-hours of delay from this segment.
G.		Congestion issue at US 1 and VA Route 144 (Temple Avenue) in Colonial Heights
H.		Capacity issues at Truck Plaza on US 1 near I-85 and US 460: truck plaza often full or overflowing, causing congestion issues on surrounding roadways.

III. Segment K2

Corridor Segment K2 Components

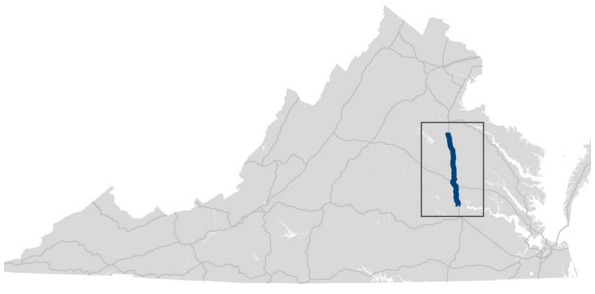
- I-95
- I-195
- I-295
- US 1
- US 301
- Route 207
- CSX National Gateway Corridor
- Port of Richmond
- James River
- Amtrak
- Richmond International Airport
- Intercity bus service



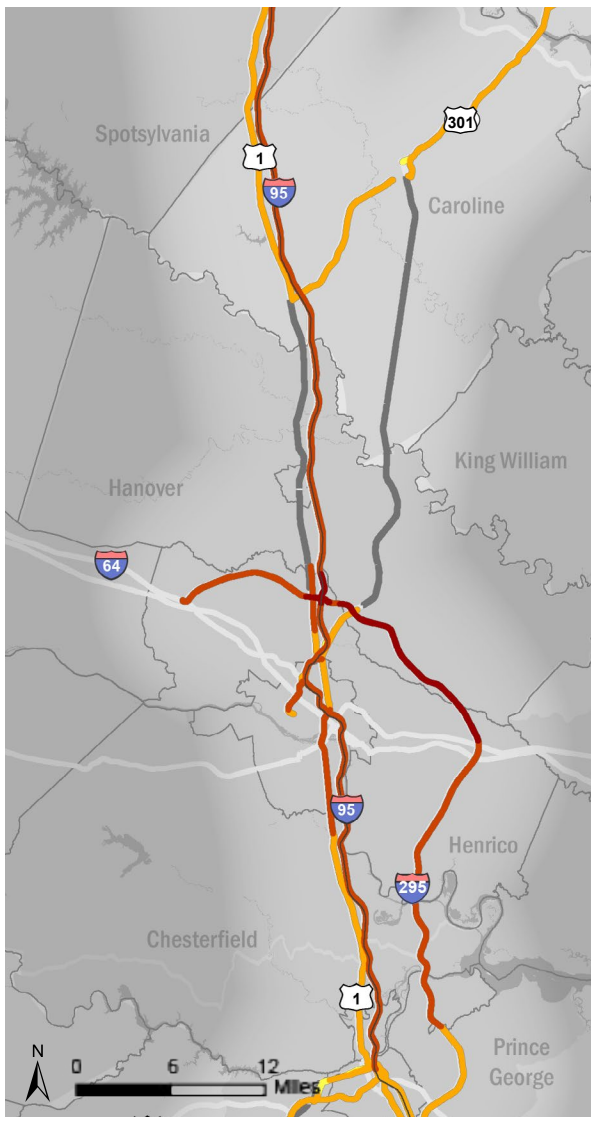
Segment K2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

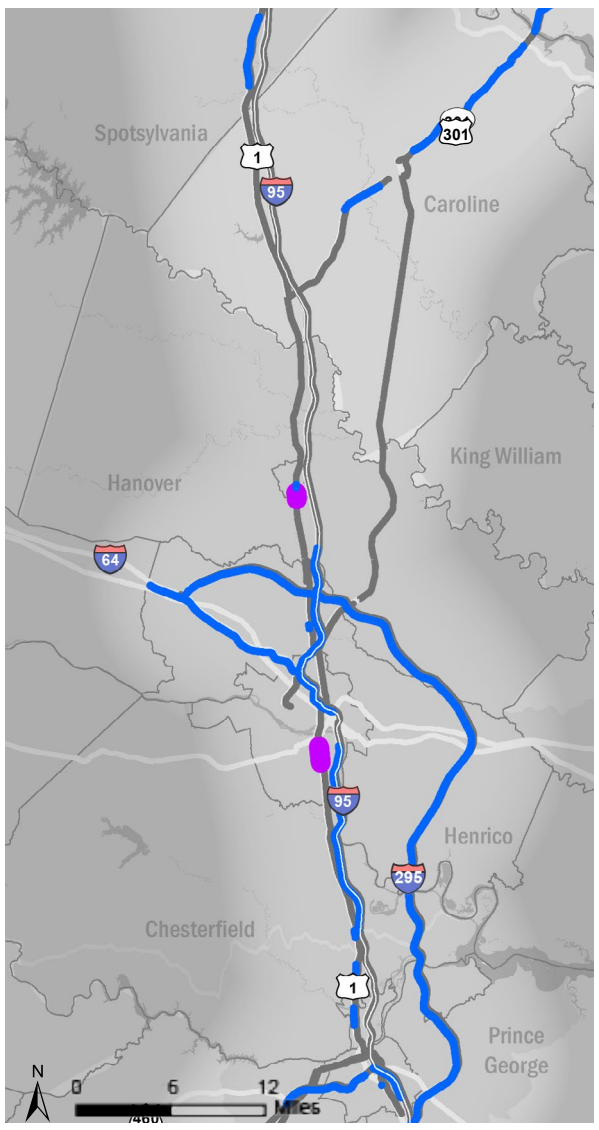


K2 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Centered on the City of Richmond, Segment K2 stretches from the city's southern suburbs through Chesterfield, Henrico, Hanover, and Caroline Counties to the border of Spotsylvania County. The segment traverses the area covered by the Richmond Area and connects to the Tri-Cities Area to the south and the Fredericksburg Area to the north. Segment K2 is primarily defined by I-95, but it also includes portions of I-195, I-295, US 1, US 301, and Route 207. There is heavy commuter traffic throughout Segment K2.

Highway Facilities: I-95 is primary a four-lane freeway in Segment K2, although there is some variation in cross-section along its length. I-295 acts as a bypass around Richmond, with six to eight lanes in this segment. US 1 is mostly a four-lane roadway that runs parallel to I-95 throughout Segment K2. US 301 branches off eastward to north of Richmond, providing an alternate path to Maryland. I-195 is a short spur which connects to downtown Richmond from I-95. I-95 also runs concurrently with I-64 (Segment C4) for a short distance in the City of Richmond.

Transit Services: The segment is served by the GRTC transit system and PAT, as well as several Park-and-Ride facilities. Amtrak operates one station in Ashland and two stations in Richmond. Richmond is served by Amtrak's Northeast Regional Service, which operates along the corridor from Washington, DC to Richmond, where it travels east toward its termini in Newport News and Norfolk.

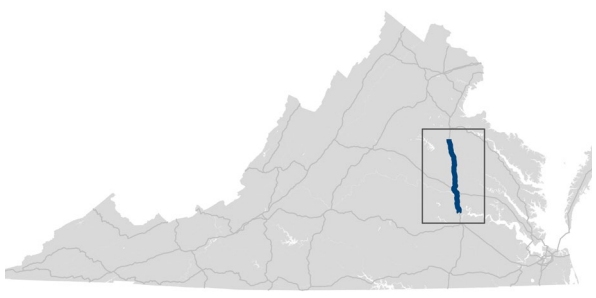
Rail Facilities: The CSX National Gateway Corridor operates over the length of this segment. The Buckingham Ranch Short Line Railroad serves the segment with stations in Richmond and Doswell providing service as far west as Clifton Forge.

Port Facilities: Segment K2 provides access to the James River navigational channels and the Port of Richmond. Rail connections are also available from Segment K2 to the Port of Virginia facilities in the Hampton Roads Area via Norfolk Southern rail lines.

Airport Facilities: Commercial air service in Segment K2 is provided by the Richmond International Airport.

Major planned and future projects include:

- **Chesterfield County:** Widen West Hundred Road from four to six lanes from Jefferson Davis Highway to 0.27 miles east of Old Bermuda Hundred Road;
- **Chesterfield County:** Add center turn lane with raised median on Commerce Road from Bells Road to 0.13 north of Bellemeade Road;
- **Henrico County:** Upgrade existing signs, sign lighting, and ground mounted sign structures on concurrent I-64/I-95 section (between I-195 and southeastern I-64/I-95 split);
- **City of Richmond and Henrico County:** Install overhead message boards, CCTV, and fiber optic lines on the portion of I-95 from mile marker 76.8 (0.08 miles south of Lombardy Street Bridge) to mile marker 88 (Sliding Hill Road); and
- **Hanover County:** Shoulder wedging, milling, and overlay of Ashcake Road, including a portion that goes over I-95.

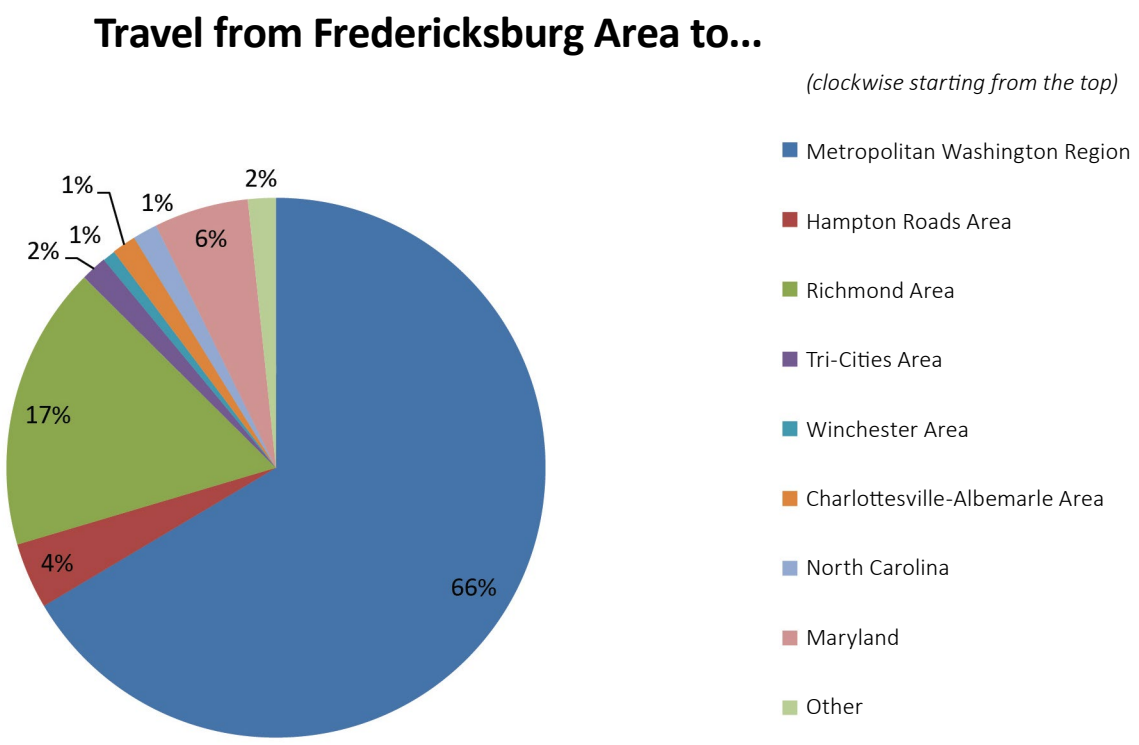


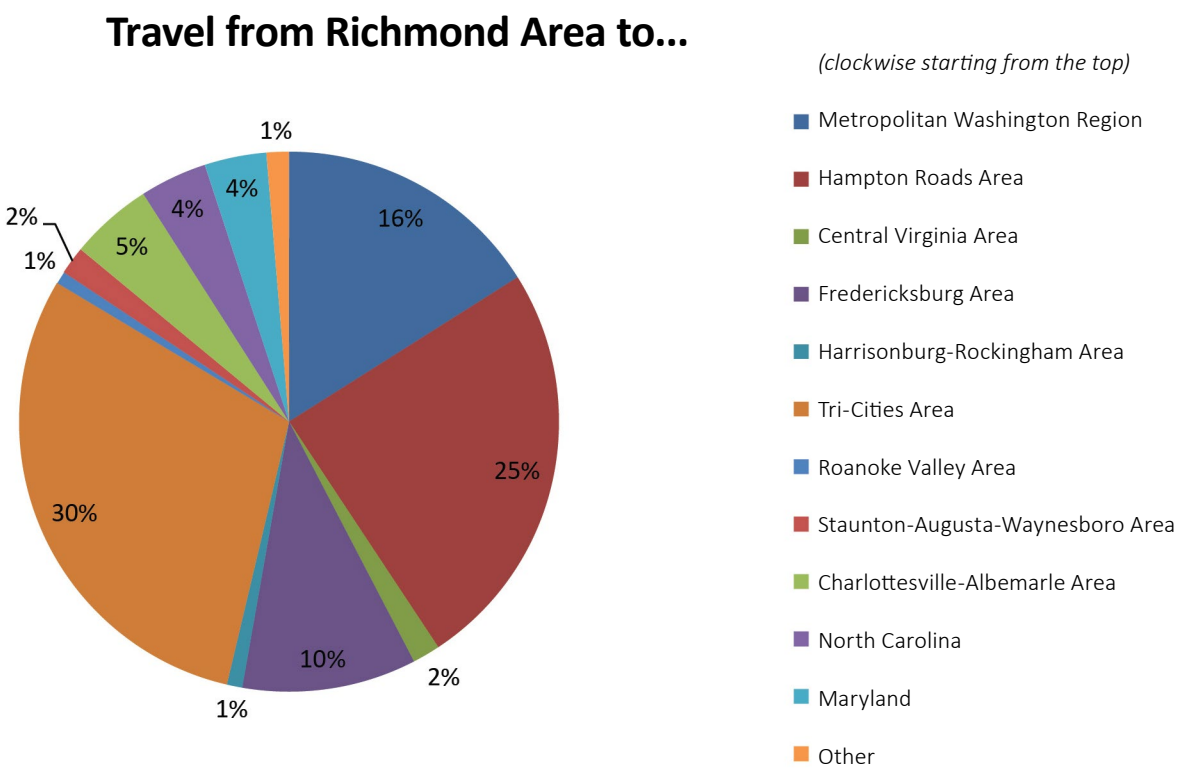
Travel Demand

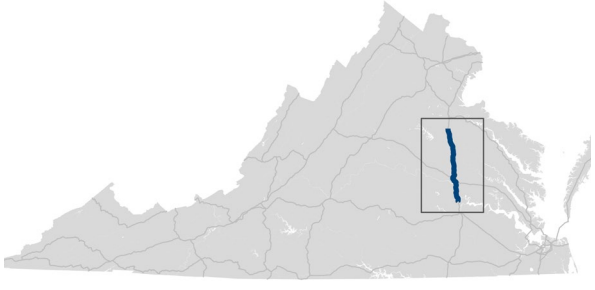
Passenger Demand

This segment of Corridor K connects the Richmond Area and the Fredericksburg Area. All told, a large portion of intercity passenger travel in the Commonwealth occurs on this segment; 11 percent of the statewide total occurs between the Tri-Cities Area and Richmond, an additional four percent occurs between the Richmond Area and the Fredericksburg Area, while travel between the Richmond Area and the Metropolitan Washington Area accounts for another six percent. This accounts for a total of more than 20 percent of the intercity passenger travel in the Commonwealth.

Of the intercity passenger travel originating in the Richmond Area, 30 percent is destined for the Tri-Cities Area located directly to the south along Corridor K. Twenty six percent of intercity travel originating in the Richmond Area is destined for the Fredericksburg Area and the Metropolitan Washington Area, using this segment to access major areas to the north. Significant portions of passenger travel originating in the Fredericksburg Area will also use Segment K2, with approximately 20 percent destined for the Richmond Area, the Tri-Cities Area, and North Carolina.







K2 SEGMENT PROFILE

Truck Freight Demand

By truck, Segment K2 carried 100 million tons of freight worth $154 billion in 2012, and is estimated to carry 138 million tons of freight worth $225 billion in 2025. A large proportion of truck freight on Corridor K passes through the Commonwealth, representing more than 35 percent of total corridor tonnage and 55 percent of total corridor value. In terms of tonnage, North Carolina is the largest producer and attractor of truck freight traveling along this corridor. In terms of value, Florida is the largest destination for truck freight along the corridor. Corridor K is used heavily by truck freight traffic traveling between locations in the Middle Atlantic and the Southeastern U.S. Within Virginia, the Port of Virginia marine terminal in Norfolk is a major generator of freight traffic on Corridor K, accounting for around five percent of the total truck freight value. The jurisdictions adjacent to Segment K2 generate more than 11 percent of and attract more than 13 percent of truck freight traveling on the corridor. Henrico County is the largest attractor of truck freight traffic along the segment, while Hanover County is the largest producer of truck freight traffic along the segment.

By rail, Segment K2 carried 16 million tons of freight worth $18 billion in 2012, and is estimated to carry 19 million tons of freight worth $23 billion in 2025. Rail freight between Florida and New Jersey accounts for more than 12 percent of the total rail value in Corridor K. In terms of tonnage, Segment K2 is dominated by rail freight travel from West Virginia, Kentucky, and Dickenson County, VA to the marine terminal in Newport News (accounting for more than 57 percent of rail freight tonnage on Corridor K). Hanover County is a major generator of rail freight in the corridor, accounting for more than two percent of the total rail freight tonnage in Corridor K. The major destinations of rail freight from Hanover County are North Carolina and the marine terminal at Newport News.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (35% / 37%)
2. North Carolina (19% / 17%)
3. Pennsylvania (8% / 9%)
4. Maryland (7% / 7%)
5. Florida (6% / 6%)

Corridor Tonnage Originating in Segment K2: 13% / 15%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
Florida and Pennsylvania
Florida and New York

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (39% / 40%)
2. North Carolina (11% / 12%)
3. Maryland (10% / 10%)
4. Pennsylvania (7% / 7%)
5. Florida (7% / 7%)

Corridor Tonnage Destined for Segment K2: 15% / 13%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (52% / 48%)
2. Virginia (12% / 14%)
3. Pennsylvania (8% / 7%)
4. Kentucky (6% / 5%)
5. Florida (3% / 4%)

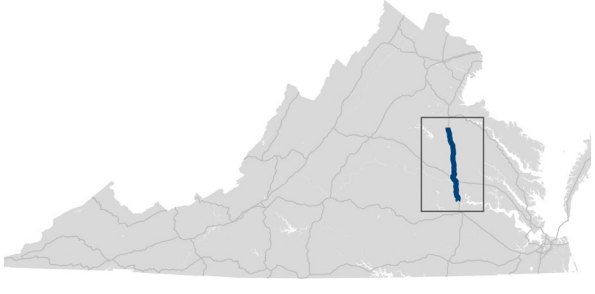
Corridor Tonnage Originating in Segment K2: 4% / 5%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Newport News* and Kentucky
Florida and New Jersey
Pennsylvania and South Carolina
Dickenson County and City of Newport News*

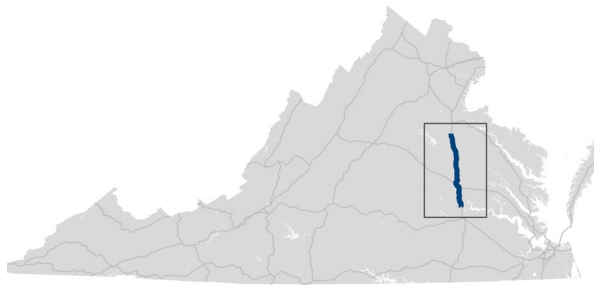
Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (77% / 75%)
2. City of Newport News* (60% / 55%)
3. South Carolina (4% / 4%)
4. City of Norfolk* (4% / 4%)
5. North Carolina (3% / 3%)

Corridor Tonnage Destined for Segment K2: 4% / 4%



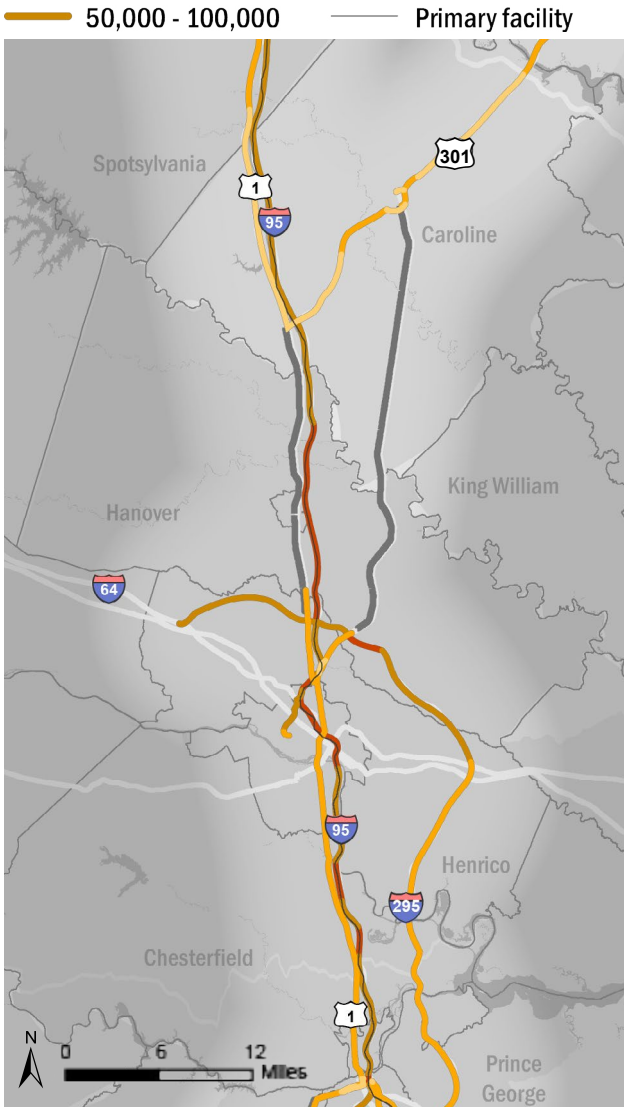
Traffic Conditions



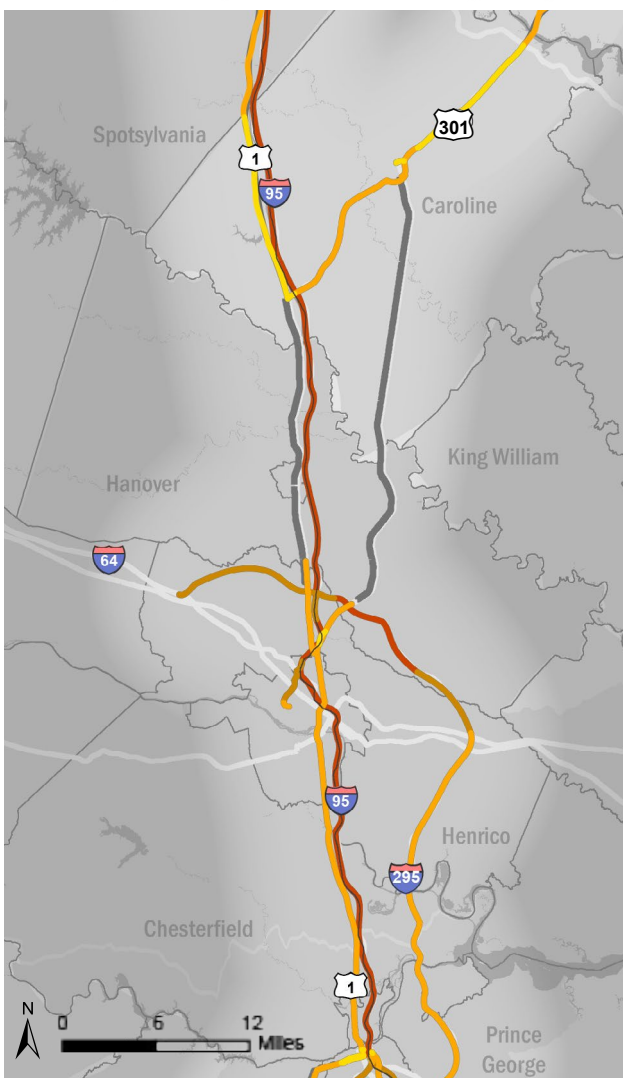
Traffic Volume and AADT

Traffic volumes on Segment K2 vary significantly throughout the segment. The highest traffic volumes in the segment can exceed 130,000 vehicles per day, and occur on the section I-64/I-95 in downtown Richmond and on I-95 north of I-295 near the border of Hanover and Henrico Counties. Average daily volumes on I-95 taper to about 95,000 vehicles per day in the northernmost portions of the segment. South of Richmond, average daily traffic volumes on I-95 range from 92,000 to 110,000 vehicles per day. Average daily traffic on US 1 is much lower, with volumes between 15,000 to 30,000 vehicles per day throughout Segment K2. Substantial traffic growth is expected on Segment K2 by 2025. Growth of more than 20,000 vehicles is projected for portions of I-95 and I-295 in northern Henrico County.

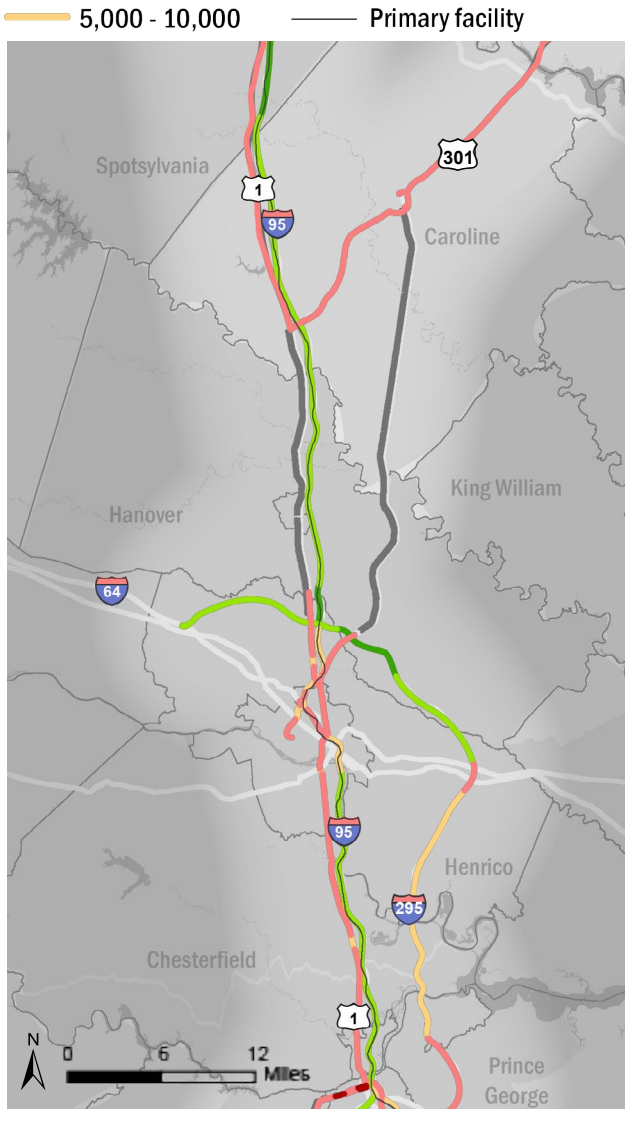
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)

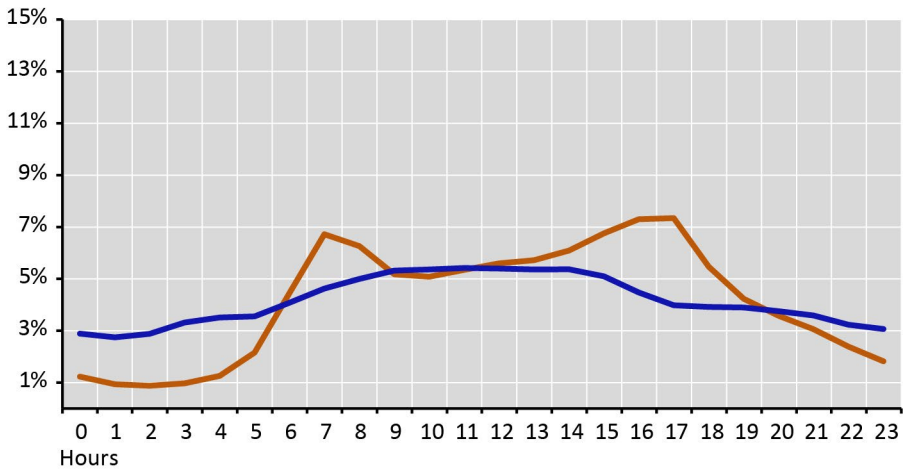


Change in Traffic Volume 2014- 2025 (AADT)

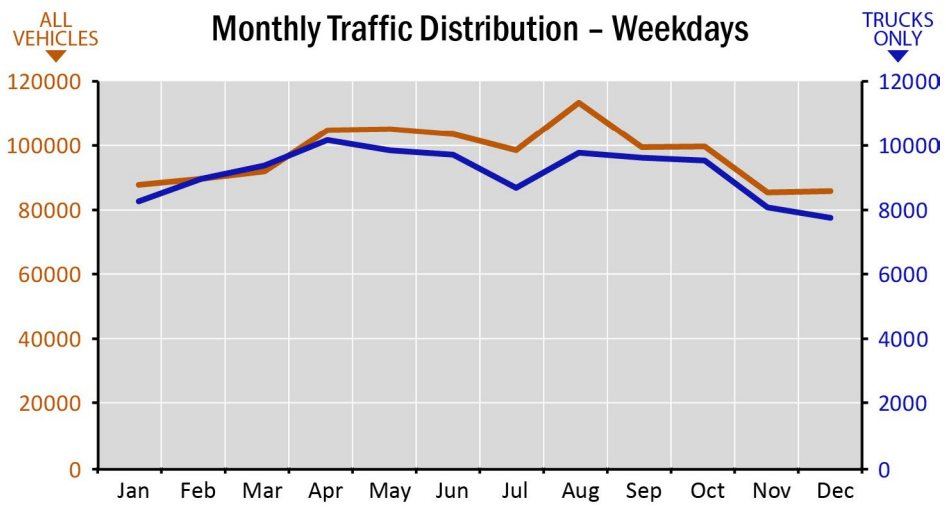


K2 SEGMENT PROFILE

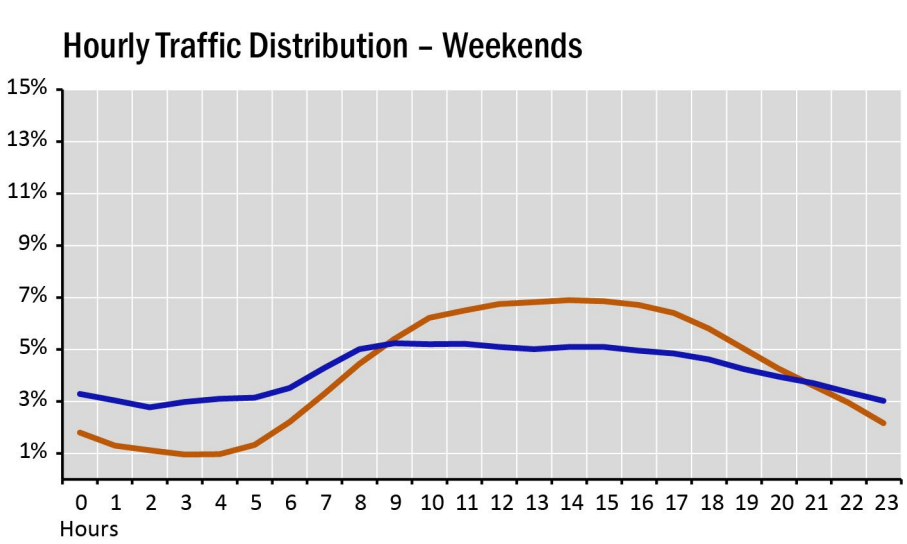
Hourly Traffic Distribution – Weekdays



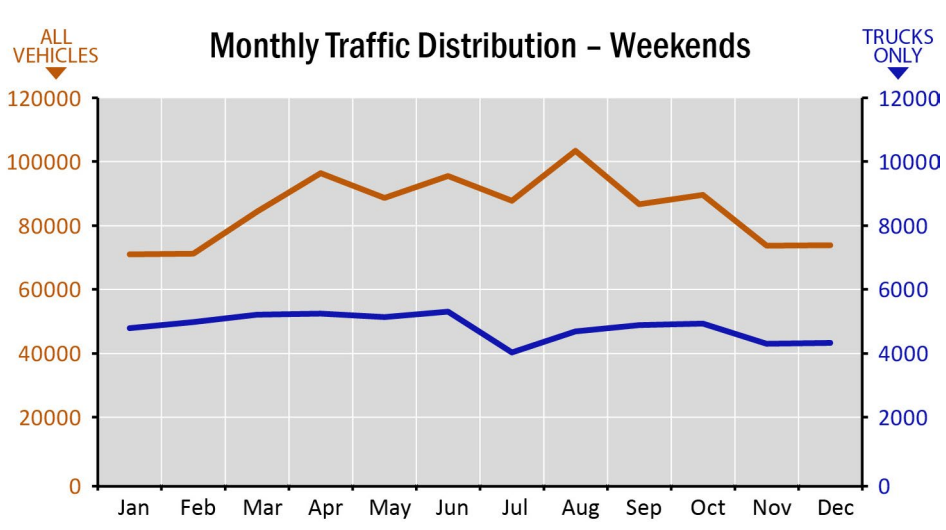
Monthly Traffic Distribution – Weekdays



Hourly Traffic Distribution – Weekends



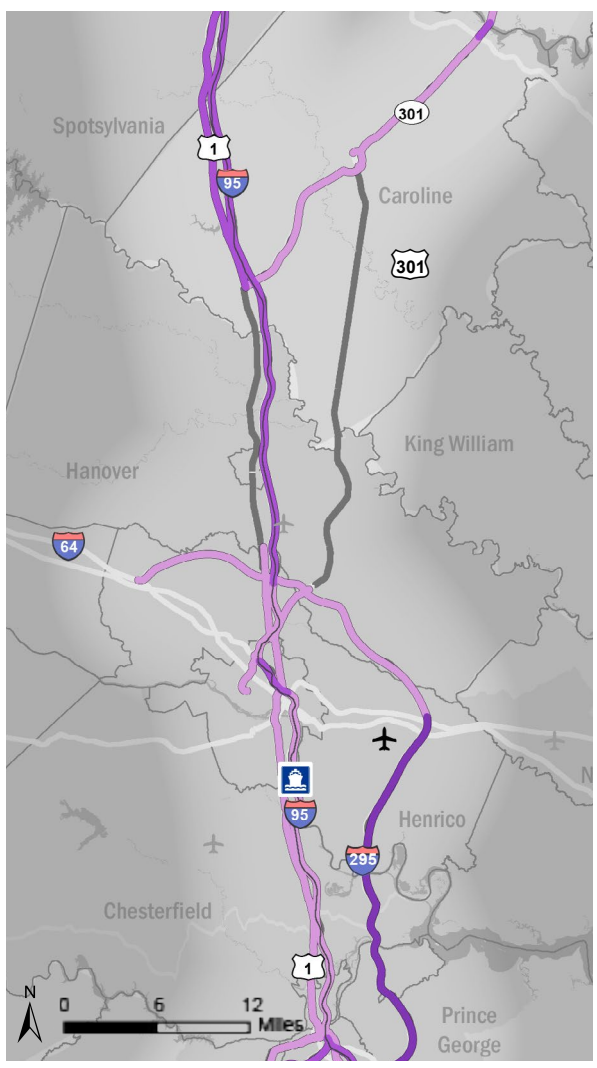
Monthly Traffic Distribution – Weekends



Traffic Distribution

On average, traffic on Segment K2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods over the course of the day, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.3 percent of daily traffic and the morning peak hour between 7 and 8 a.m. accounting for 6.7 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 50 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic, with a relatively steady flow of trucks during the midday period between 10 a.m. and 4 p.m. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the middle of the day, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (6.9 percent of daily traffic) for all traffic, and 9 to 10 a.m. (5.2 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment K2 vary by as much as 33 percent throughout the year, with the high point in August (around 113,000 vehicles per day) and the low point in November (around 85,000 vehicles per day). Truck volumes vary similarly throughout the year, with the April high (around 10,000 vehicles per day) 31 percent higher than the December low (around 7,700 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 103,000 vehicles per day) are 45 percent higher than January levels (around 71,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high (around 5,300 vehicles per day) 31 percent higher than the July low (around 4,000 vehicles per day).

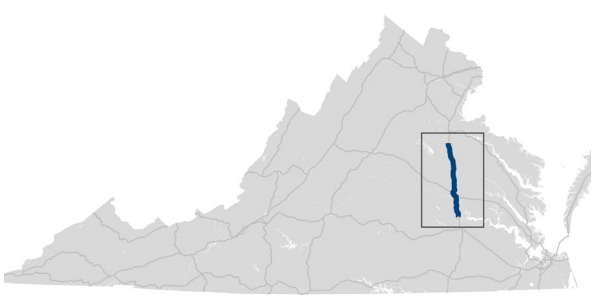


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

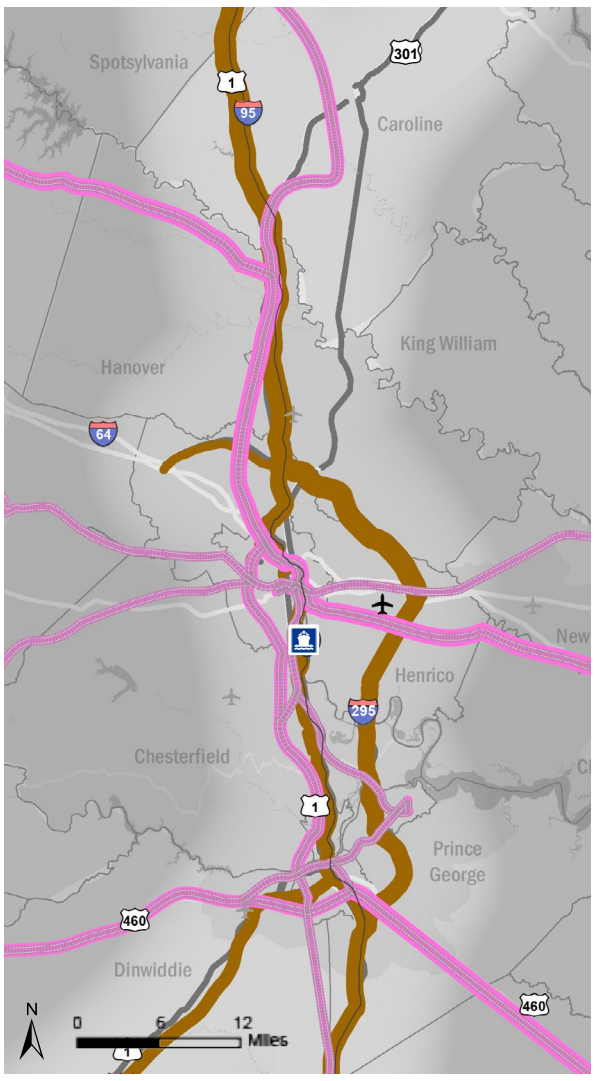
Truck Volume

The percent of daily traffic comprised of heavy trucks on Segment K2 is typically less than five percent in the more urbanized areas in and around Richmond. North of Henrico County, heavy trucks comprise between five and eight percent of daily traffic on I-95, US 1, and US 301. The highest proportion of truck traffic occurs on the southern portion of I-295, where trucks account for 11 percent of daily vehicle traffic as trucks use this facility to bypass congestion through the City of Richmond.

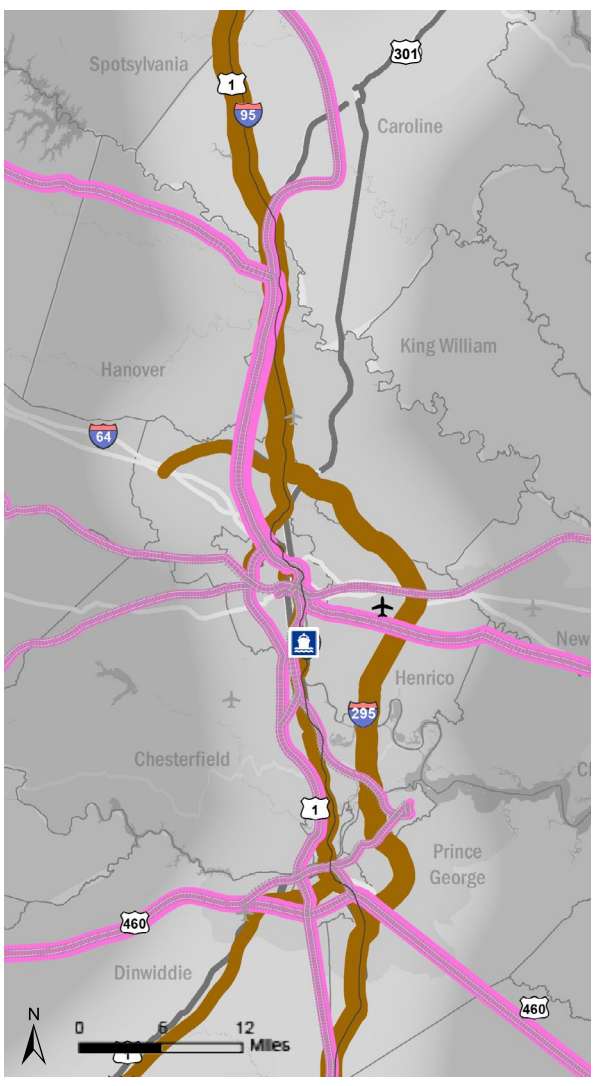


K2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012



Annual Freight by Tonnage, 2025

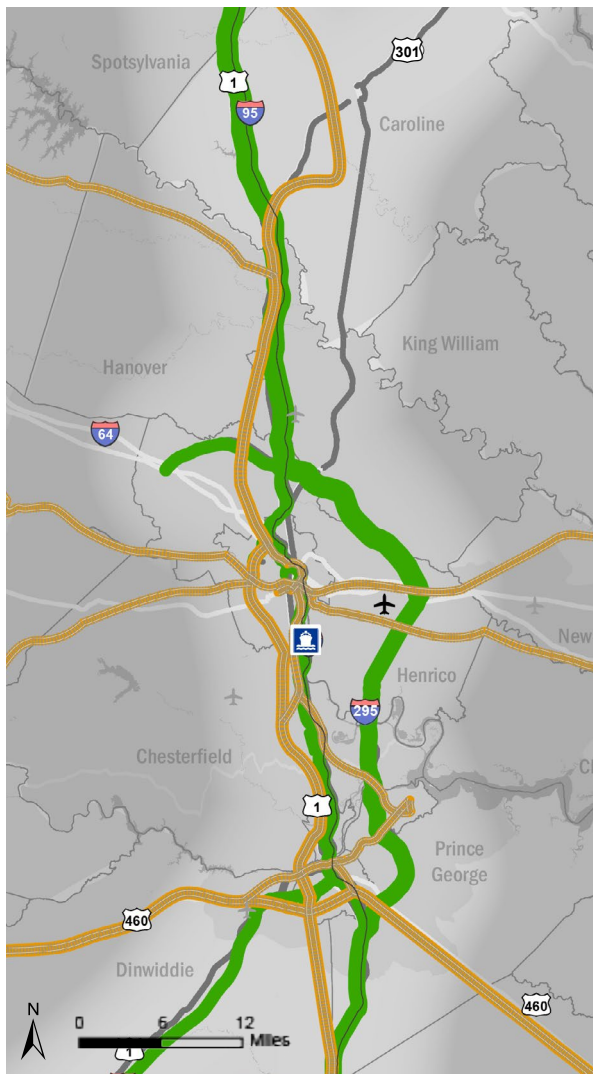


Freight Flows

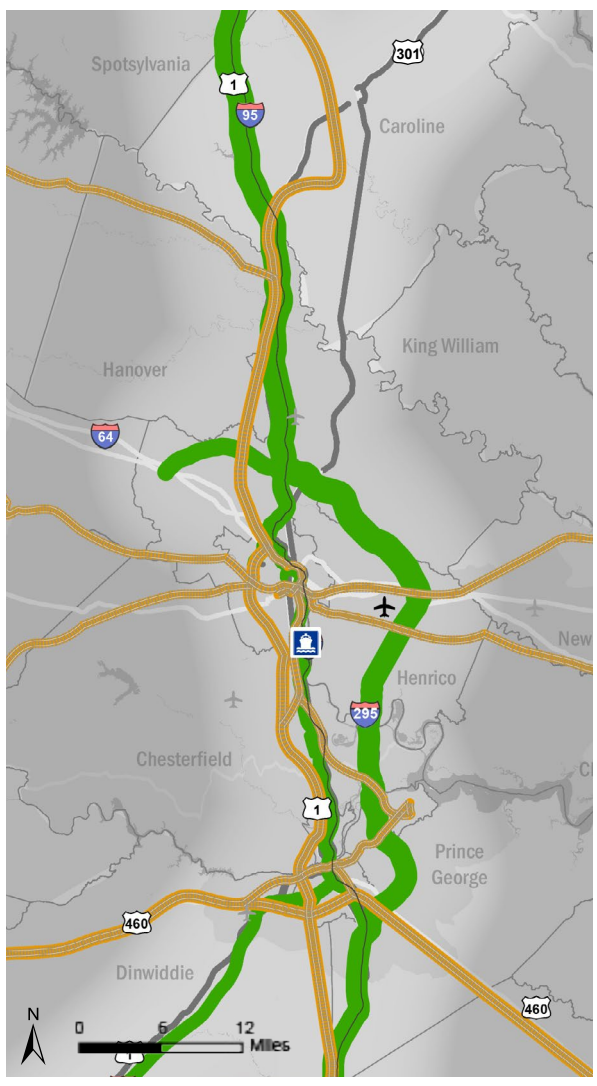
In the City of Richmond, freight on Segment K2 is primarily moved by truck in terms of tonnage and value. In total, 19 million tons (94 percent) of freight is moved through this section of Segment K2 by truck, compared to just over 1 million tons (6 percent) by rail. With regard to value, $18.5 billion (93 percent) of freight travels by truck, while $1.4 billion (7 percent) of freight travels by rail. On average, a ton of freight traveling through this section of Segment K2 by truck and rail is worth $989 and $1,113, respectively. In 2025, truck and rail freight tonnages and value in this area of Segment K2 will likely increase. The percentage of freight traveling by truck is expected to remain the same by tonnage and increase by value to 94 percent. It is anticipated that value per ton on trucks will increase to $1,133 and decrease to $1,080 for rail.

In northern Hanover County, freight on Segment K2 is moved primarily by truck in terms of tonnage and value. In total, 99 million tons (86 percent) of freight is moved through this section of Segment K2 by truck and 16 million tons (14 percent) by rail. With regard to value, $154 billion (90 percent) of freight travels by truck and $18 billion (10 percent) travels by rail. On average, a ton of freight traveling through this section of Segment K2 by truck and by rail is worth $1,552 and $1,129, respectively. In 2025, truck freight tonnage and value in this area of Segment K2 are expected to increase. The percentage of freight traveling by truck will likely increase to 88 percent by tonnage and 91 percent by value. It is anticipated that value per ton on trucks and rail will increase to $1,632 and $1,174, respectively.

Annual Freight by Value, 2012



Annual Freight by Value, 2025

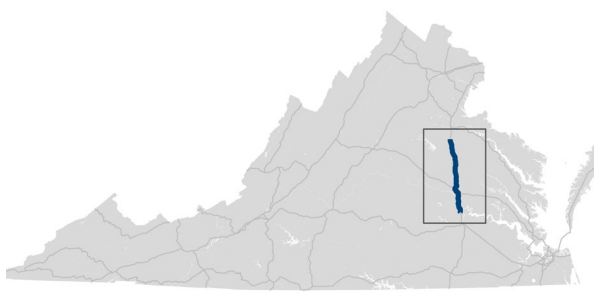


Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy & Mode Choice

Passenger trips on Segment K2 of the Washington to North Carolina Corridor have a wide range of travel options, both in terms of travel path and mode choice. Interstate I-295, US 1, and US 301 serve as parallel highway facilities to I-95 in this segment. In addition to trips on the Washington to North Carolina Corridor, Richmond serves as a transfer point for trips heading east and west along the East-West Corridor.

The segment is served by a variety of modes with relatively frequent service, including the Richmond-Petersburg Express bus service offered by the GRTC. Amtrak has two stations in Richmond and one in Ashland. Greyhound and Megabus also serve Richmond. Travel on Segment K2 is typically less expensive using alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile). However, these options are not as competitive in terms of speed or frequency of service.

Park-and-Ride

Within Segment K2, commuters can utilize many Park-and-Ride locations, as well as commuter bus service provided by GRTC. Henrico County has the most Park-and-Ride locations and the highest number of spaces, while Hanover County has the highest utilization rate of spaces available in the region. However, no county within Segment K2 area has a rate higher the statewide average for Park-and-Ride utilization, which is 76 percent.

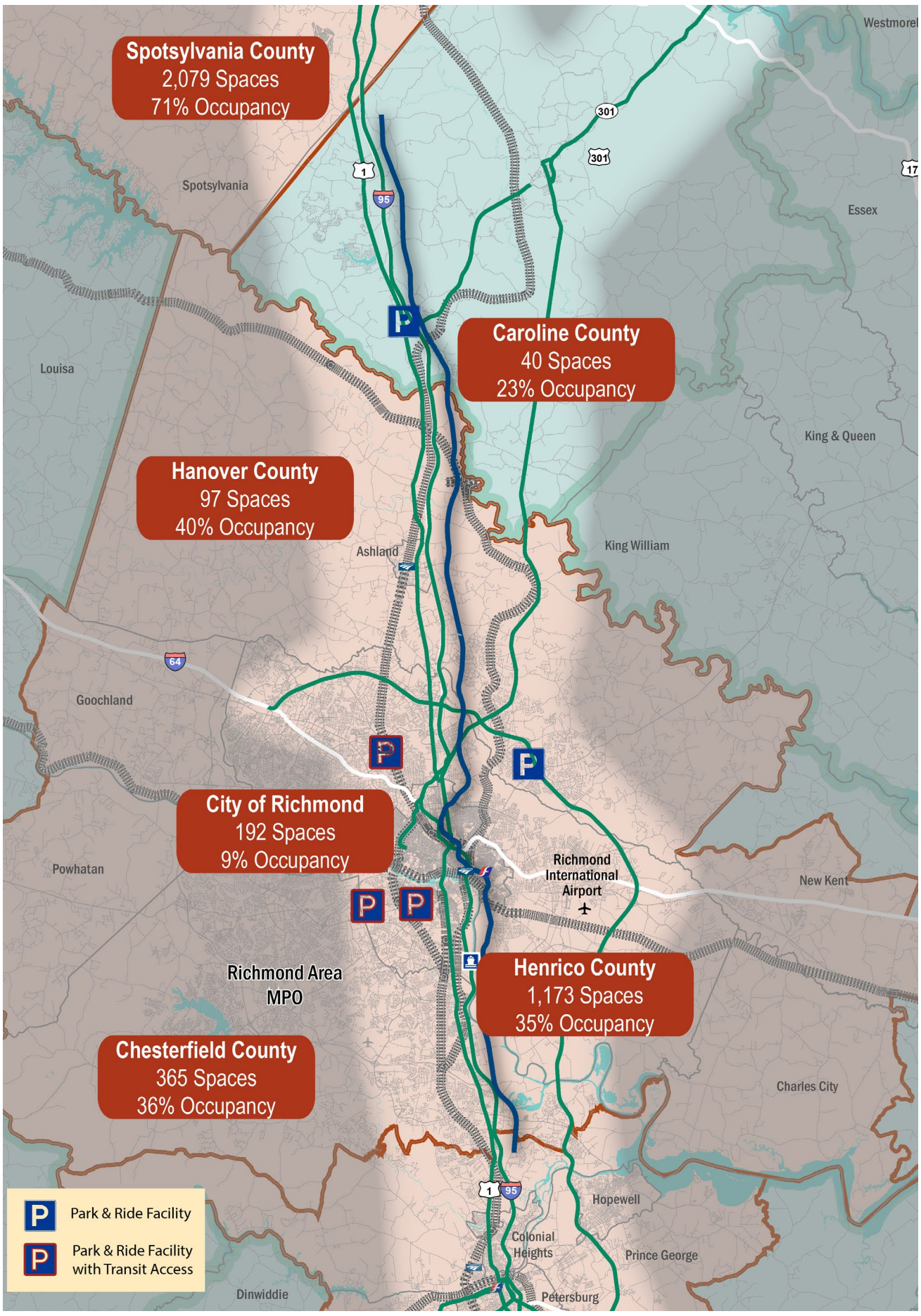
Comparable Travel Options

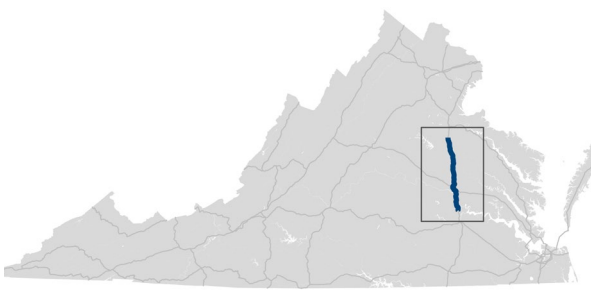
Richmond to Fredericksburg

Inter-City Bus	*Train*
3 Trips per Day	6 Trips per Day
1:00 Travel Time	1:05 Travel Time
$10 Avg Cost	$22 Avg Cost

Auto

Via I-95: 1:00 Travel Time $33 Avg Cost
Via US-1: 1:40 Travel Time $32 Avg Cost





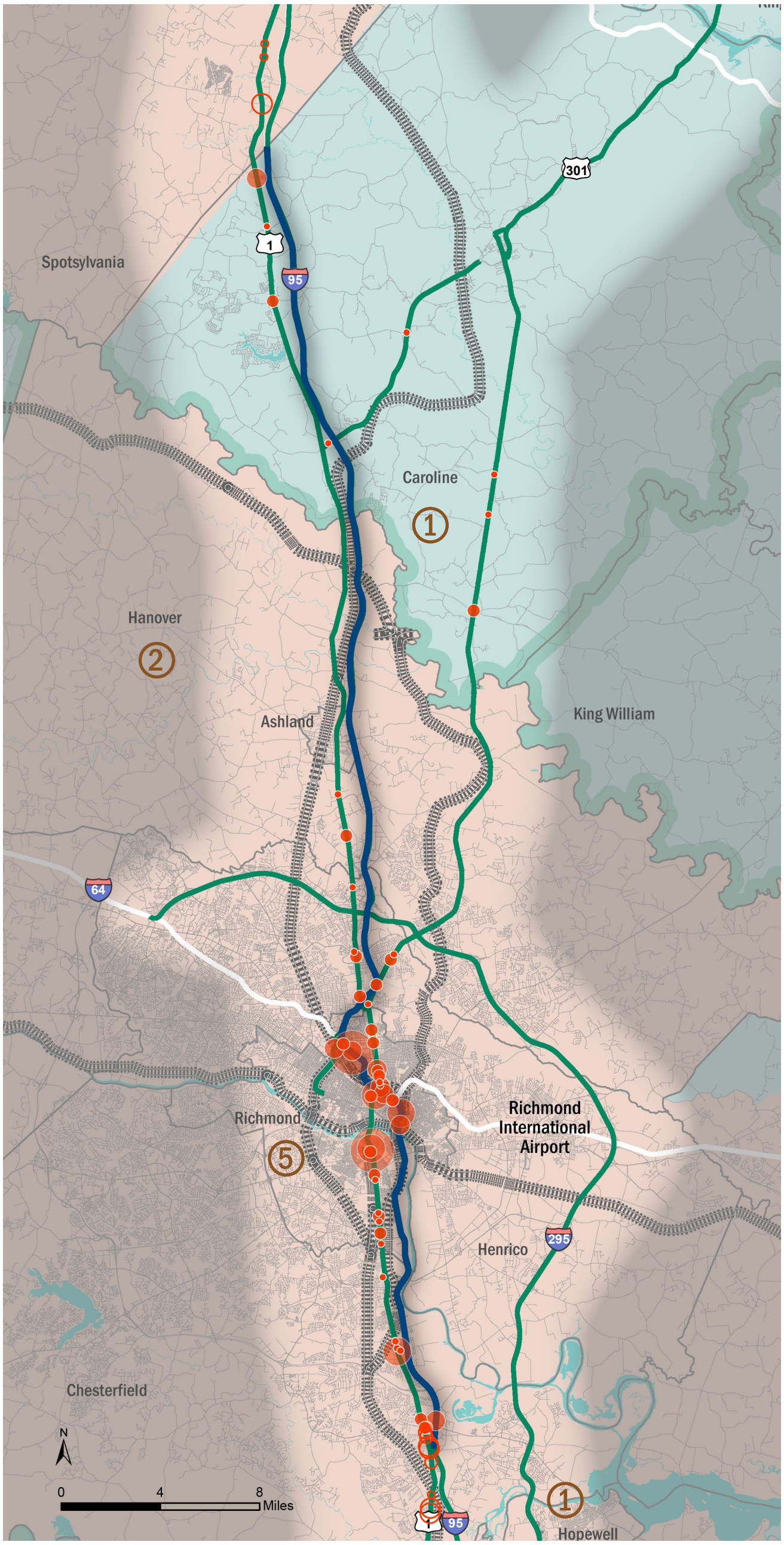
K2 SEGMENT NEEDS

Safety

Performance Metrics:

Number of Severe Crashes	418
Severe Crashes/Million VMT	0.3
Number of Railroad Crashes	9

Between 2010 and 2012, 418 severe crashes occurred on Segment K2, with the largest concentration in the Richmond area. A span of approximately 1.2 miles of US 1 at I-64 /I-95 experienced 68 crashes. Of the 68, 15 took place at the intersection with Overlook Road, 11 occurred at the intersection with Mitchell Street, and 18 were in a 0.2 mile segment between I-95 and US 250 (West Broad Street). Another section of US 1 Richmond had 45 collisions at and near the intersection with US 360. A segment of I-95 in Richmond also experienced a large number of incidents (28) between US 1 and the James River. Outside of Richmond, 62 severe crashes occurred across a 1.9 mile interval in the southernmost portion of Segment K2, along US 1 near Route 10 in Chester.

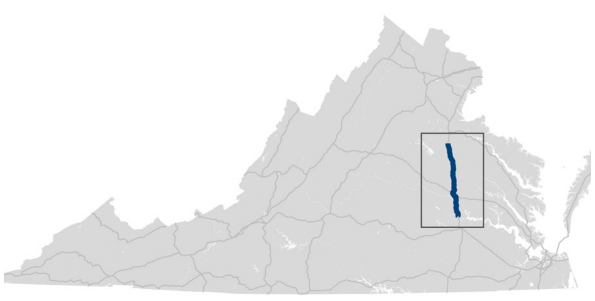


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics:

Person Hours of Delay per Mile	13
Freight Ton Hours of Delay per Mile	37.2K

Passenger Delays

Passenger traffic congestion along Segment K2 is more substantial than K1, with average passenger delays of 13 person-hours per mile along the segment. While there are minimal passenger delays along much of the segment, there are several areas where delays are in excess of 100 person-hours per mile, primarily in the City of Richmond:

- US 1 at Route 10 in Chesterfield County
- US 1 between Route 195 and Brookland Parkway in the City of Richmond;
- Brook Road between US 1 and Lombardy Street in the City of Richmond;
- US 1 in Henrico County south of Parham Road;
- I-95 between US 60 and US 1 in the City of Richmond;
- I-95 in the City of Richmond near the exits for Hermitage Road (exits 80 and 78); and
- I-195 near both the northern and southern termini in the City of Richmond.

Peak period passenger delays account for 62 percent of daily congestion, which gives Segment K2 one of the largest peak period shares of passenger delay among CoSS segments.

Daily Person Hours of Delay per Mile

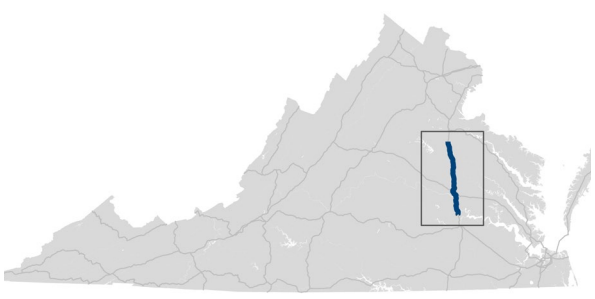


Freight Delays

Freight congestion along Segment K2 is far greater than K1, with average freight delays of over 37,000 ton-hours per mile on the segment. Locations with significant levels of freight delay include:

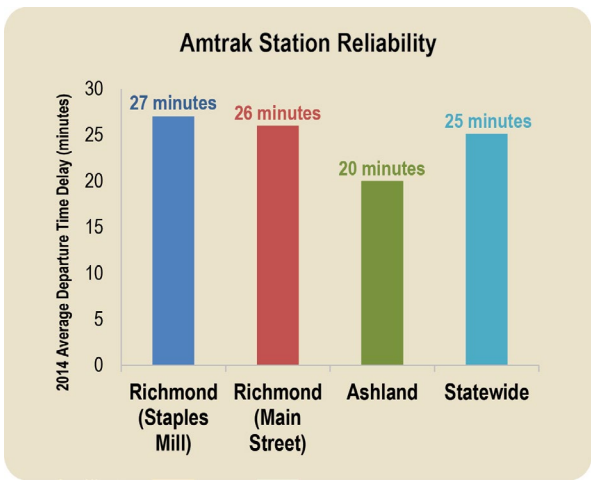
- Many locations on US 1 between Ashland and US 1 in Henrico County and the City of Richmond;
- Locations on I-95 between US 1 and US 60 in the City of Richmond;
- I-195 near the interchange with I-64/I-95 in the City of Richmond;
- Brook Road between US 1 and Lombardy Street in the City of Richmond; and
- Route 297 between US 1 and I-95 in Caroline County.

Peak period freight delays account for 50 percent of daily congestion, which gives Segment K2 one of the largest peak period shares of freight delay among CoSS segments.



Daily Freight Ton Hours of Delay per Mile

Reliability



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment K2 ranges from 0.00 to 4.03 in terms of reliability index, with an average value of 0.17. While this segment does have a peak period reliability index much higher than average for the CoSS segments statewide, only two locations have reliability index values over the statewide threshold: Brook Road just south of US 1 in the City of Richmond and near the intersection of US 301 and Route 207 in Bowling Green in Caroline County.

Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 3.39 in terms of reliability index, with an average value of 0.13.

Locations where the weekday reliability index exceeds the statewide threshold include:

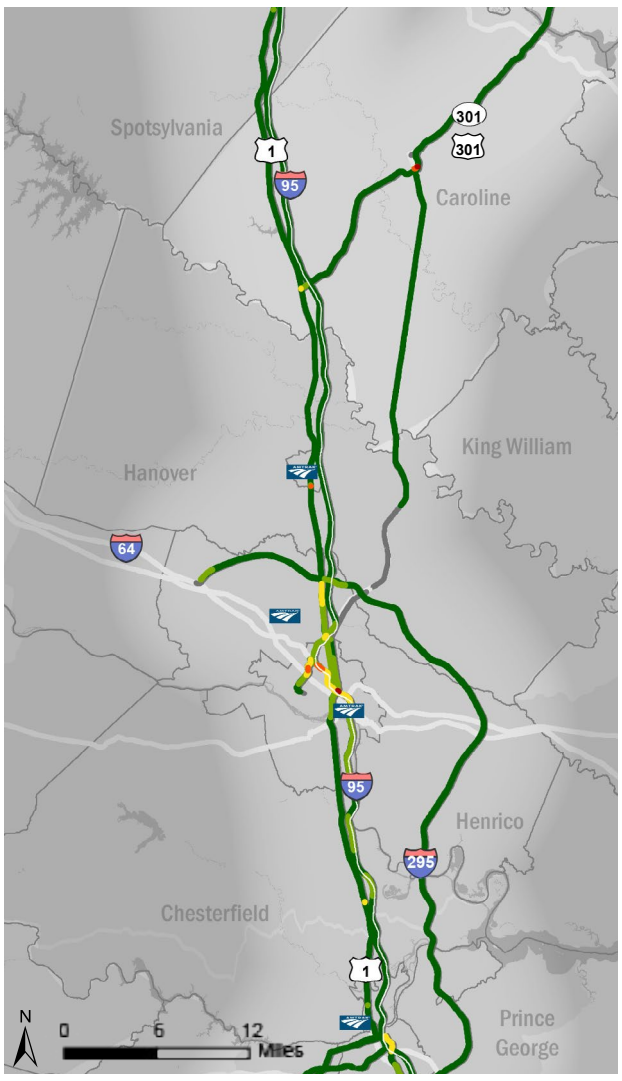
- I-95 where it runs concurrently with I-64 in the City of Richmond;
- Brook Road just south of US 1 in the City of Richmond;
- US 1 near the intersection with Route 657 in the Town of Ashland; and
- Near the intersection of US 301 and Route 207 in Bowling Green in Caroline County.

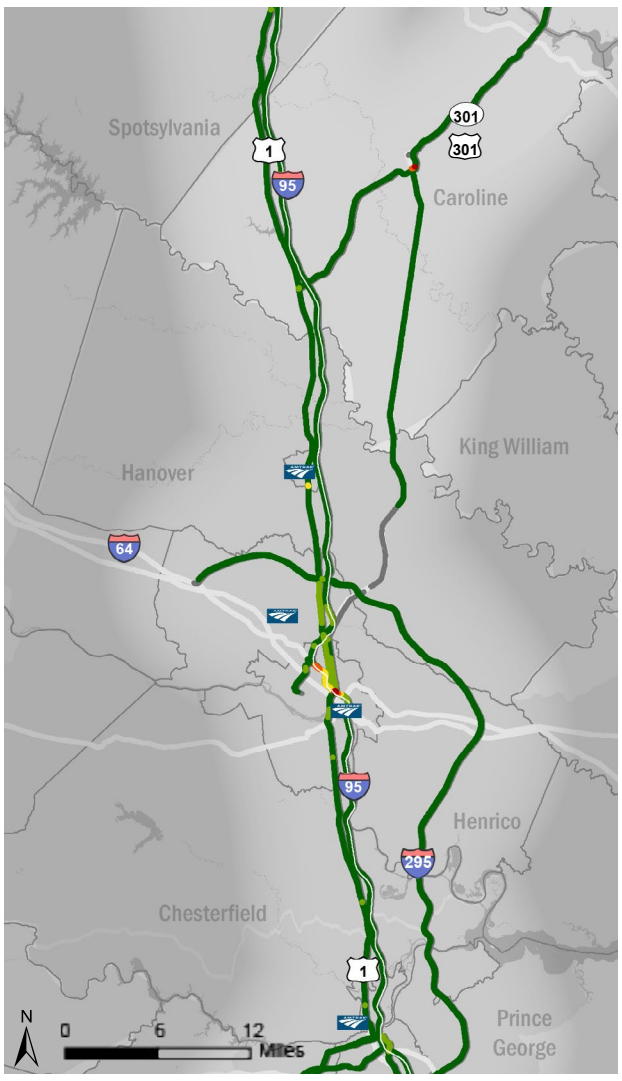
Weekend

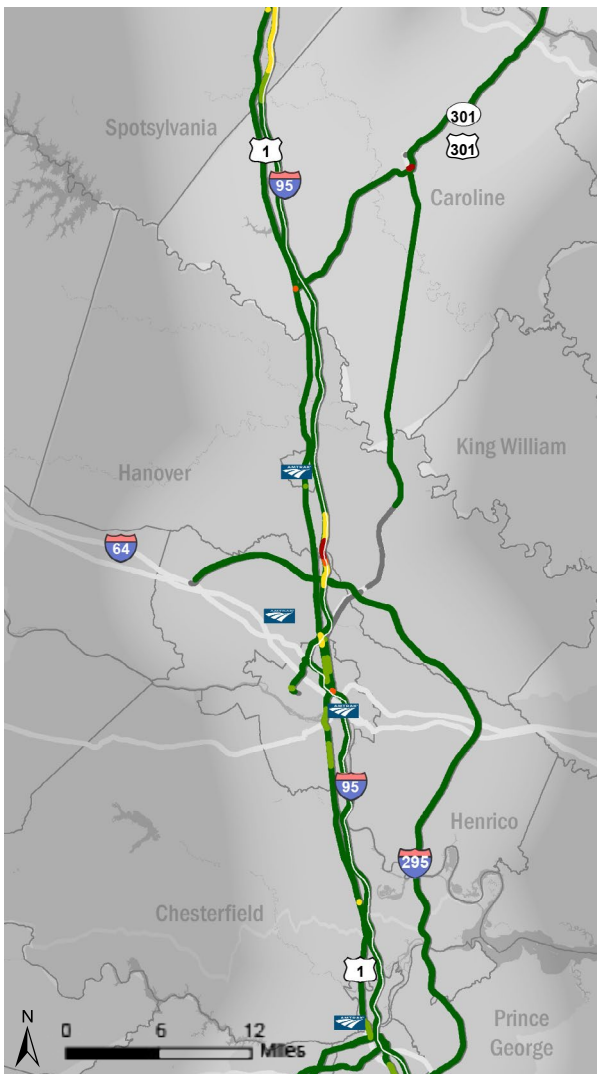
Reliability of travel during a typical weekend ranges from 0.00 to 2.75 in terms of reliability index, with an average value of 0.10.

Locations where the weekend reliability index exceeds the statewide threshold include:

- Brook Road just south of US 1 in the City of Richmond;
- I-95 between the northernmost ramps for Route 656 (exit 86) and the northernmost ramps for I-295 (exit 84);
- US 1 at the intersection with Route 207 in Caroline County; and
- Near the intersection of US 301 and Route 207 in Bowling Green in Caroline County.





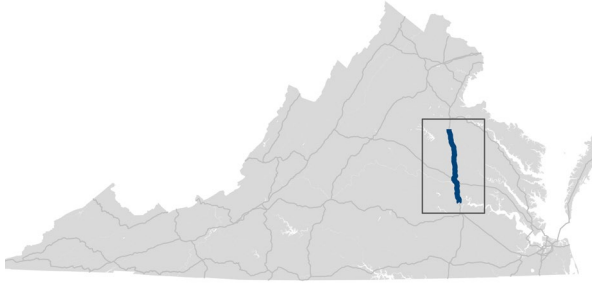


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

Redundancy

Safety

Congestion

Bottlenecks

Reliability

L

A, N

B

C

D

E

F

B

G, K, P, Q

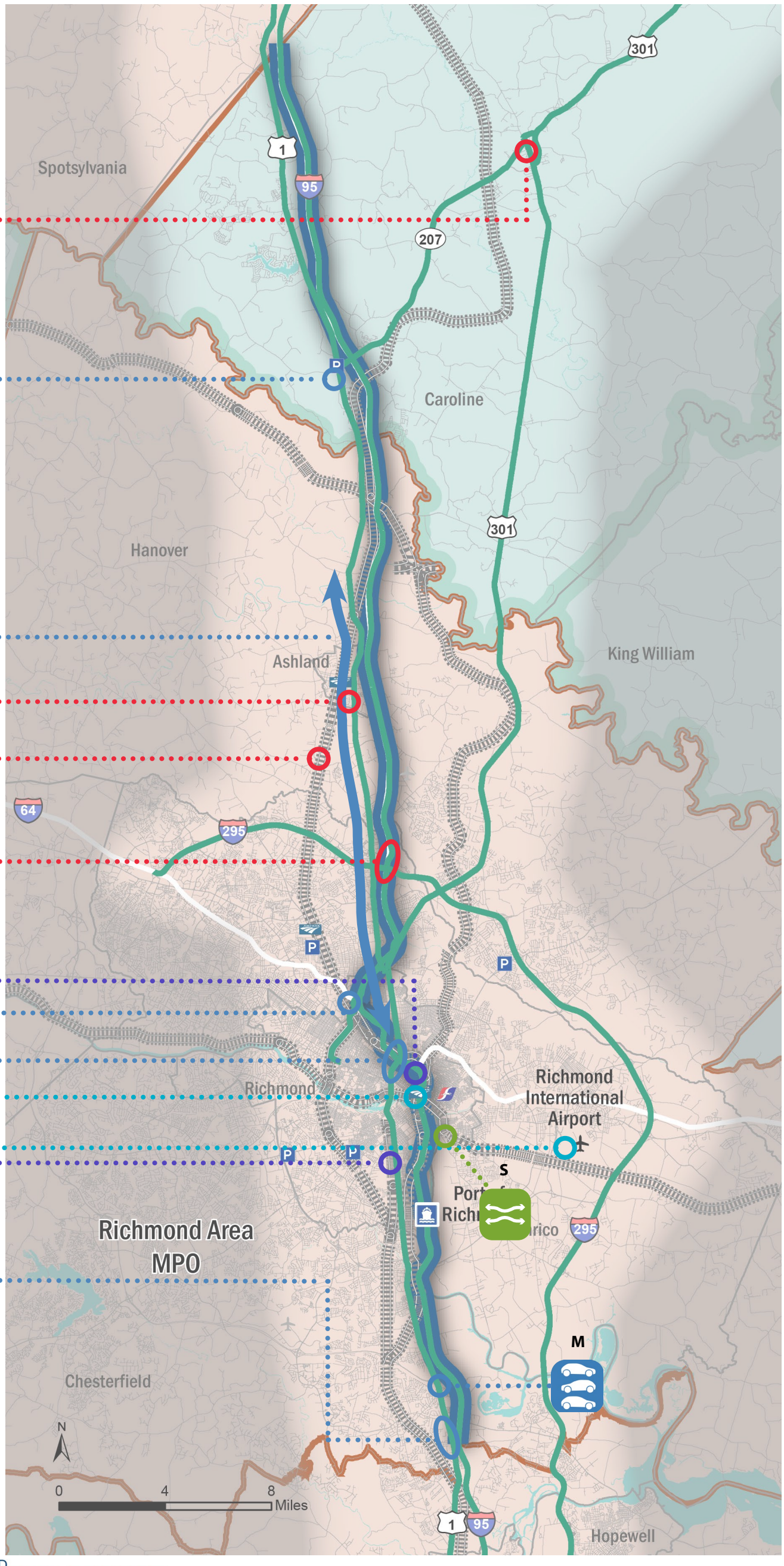
H

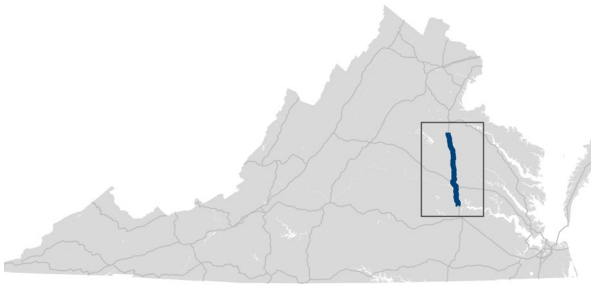
I

J, R

S

M





K2 SEGMENT NEEDS

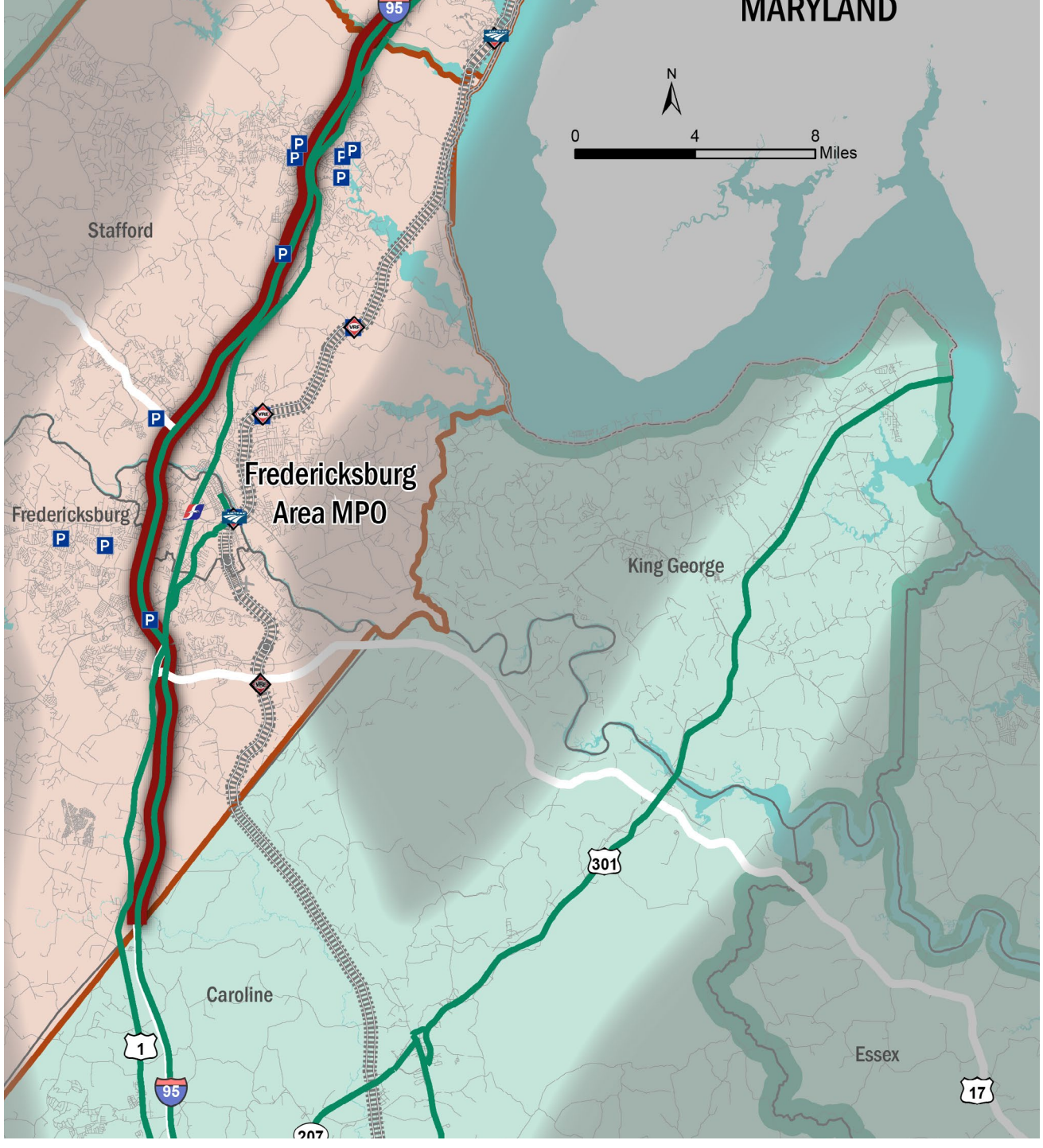
Summary of Needs - K2 Segment

A.		Reliability issue at US 1 and VA Route 207 (Rogers Clark Boulevard) near Ruther Glen
B.		Congestion issue on US 1 from VA Route 54 in Ashland to James River in downtown Richmond
C.		Reliability issue at US 1 and Virginia Route 54 (England Street) in Ashland
D.		Shared tracks lead to unreliable Amtrak service between Richmond and Washington DC. Average departure delays from stations in this segment range from 20 to 27 minutes.
E.		Reliability issue on I-95 at Exit 86 (VA Route 656/Sliding Hill Road) near Poindexters
F.		A segment of I-95 in downtown Richmond also experienced a large number of crash incidents (28) between Route 1 and the James River.
G.		The largest concentration of severe incidents crashes along the K2 segment occurred in the Richmond area. A span of approximately 1.2 miles of Route 1 at I-95/I-64 near the Chamberlayne Industrial Center experienced 68 crashes.
H.		Public transportation does not offer access to Richmond Airport or Amtrak.
I.		Segment along Route 1 in the Richmond area, located south of the James River, had 45 collisions at and near the intersection with Route 360. Capacity improvement projects are planned for this area.
J.		62 severe crashes occurred across a 1.9 mile interval in the southernmost portion of K2, along Route 1 near Route 10 in Chester.
K.		Reliability issue on I-95/I-64 through Richmond between the I-64 and I-95 interchanges
L.		Reliability issue at US 301 and VA Route 207 (Bowling Green Bypass) in Bowling Green
M.		Congestion issue at US 1 and VA Route 10 (West Hundred Road) in Chester
N.		Congestion issue at US 1 and VA Route 207 (Rogers Clark Boulevard) near Ruther Glen
O.		Congestion issue at I-64/I-95/I-195 interchange in west Richmond
P.		Congestion issue at I-64/I-95 interchange in downtown Richmond
Q.		Congestion issue at I-195/VA Route 76/VA Route 195 interchange in Richmond
R.		Congestion issue at US 1 and VA Route 144 (Temple Avenue) in Colonial Heights
S.		Triple bridge in Richmond bottlenecks rail traffic, impacting passenger and freight travel.

IV. Segment K3

Corridor Segment K3 Components

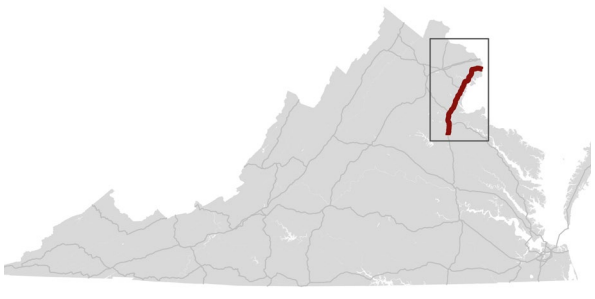
- I-95
- I-395
- I-495
- US 1
- US 301
- Metrorail Blue Line
- Metrorail Yellow Line
- Virginia Railway Express
- CSX National Gateway Corridor
- Port of Alexandria
- Amtrak
- Ronald Reagan National Airport



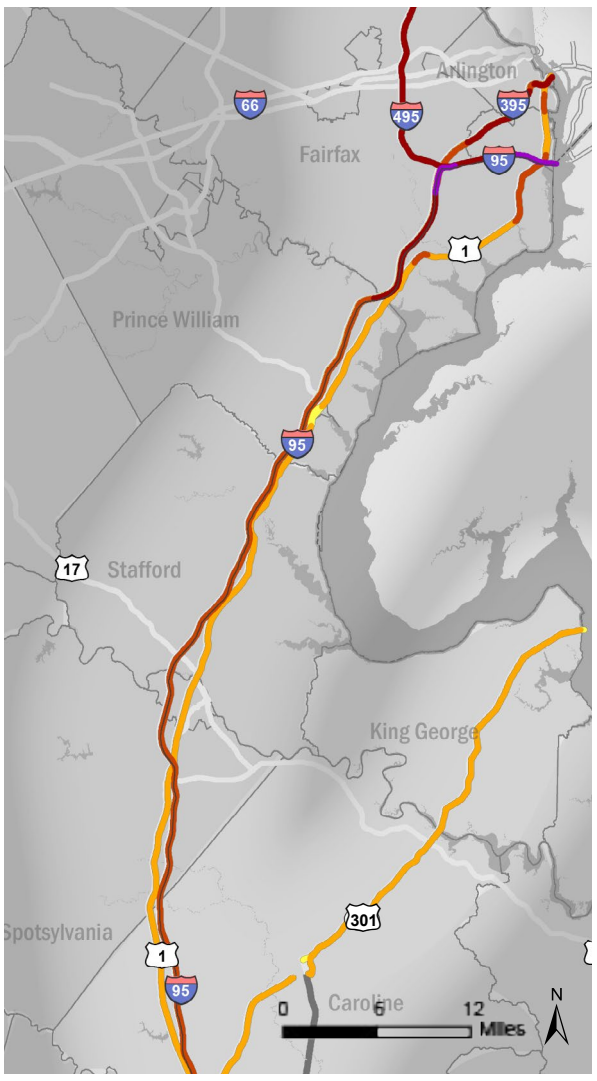
Segment K3

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

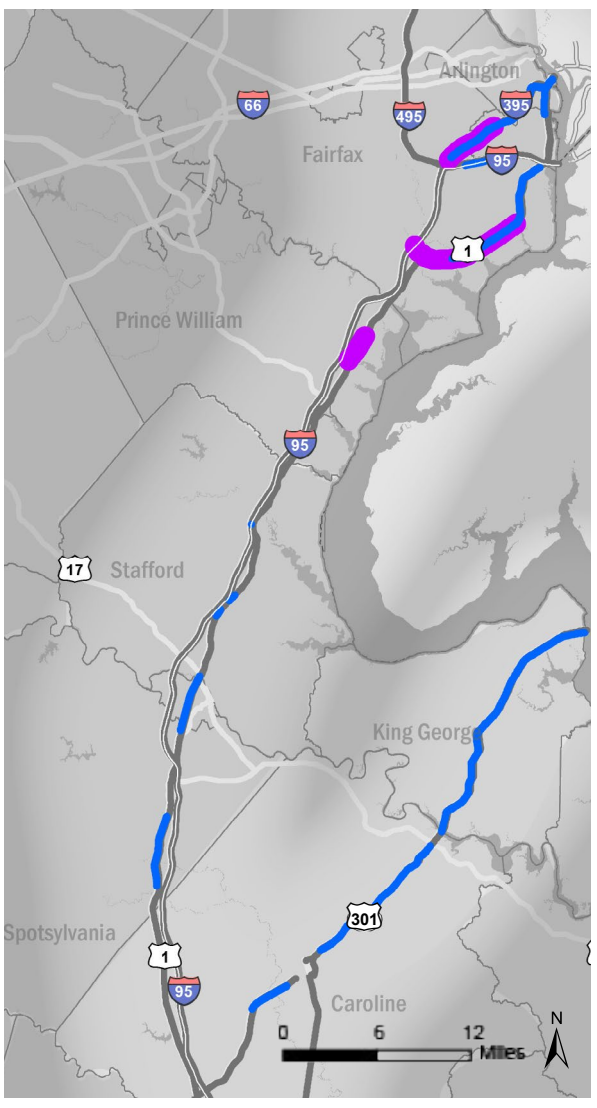


K3 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

The northernmost segment in the North Carolina to Washington Corridor, Segment K3, begins in Spotsylvania County and progresses through Stafford, Prince William, Fairfax, and Arlington Counties as well as the Cities of Fredericksburg and Alexandria. The segment serves a substantial area of the Fredericksburg Area MPO and the Northern Virginia portion of the Metropolitan Washington MPO Area. Each day there are thousands of commuters who navigate through the segment to travel to Washington, DC, Arlington, or Maryland. These commuters travel from residences in Northern Virginia as well as the south, all the way through Spotsylvania County. This segment is both a commuter corridor and an important high-capacity multimodal corridor.

Highway Facilities: I-95 is a six- to ten-lane facility in Segment K3, with reversible HOT lanes between Stafford and Fairfax Counties. A major interchange in Springfield (known as "the mixing bowl") provides access to other corridor components including I-395 and I-495 (the Capital Beltway). I-395 is a six- to eight-lane facility with reversible HOV lanes and I-495 is a six- to ten-lane freeway. US 1 runs parallel to I-95 for the majority of the segment until it diverges eastward near Lorton in Fairfax County. US 301 north of Bowling Green also provides an alternative route into Maryland in Segment K3. Direct or indirect connections to all of the other CoSS in the Northern Virginia Area are available, including Corridors G, I and H.

Transit Service: Segment K3 includes many alternatives to driving, including reversible HOV-3 and HOT lanes, in addition to Metrorail, commuter rail, express, and local bus services. Options include:

- Two reversible HOV-3/HOT lanes on I-95 and I-395 for a total of 30 miles between Stafford County and the Potomac River;
- HOT lanes on I-495;
- Virginia Railway Express (VRE) and Amtrak service provided to downtown Washington, DC and destinations north, with stops along the corridor via the CSX National Gateway Corridor rail line;
- Amtrak, which operates the Auto Train service along CSX tracks, a service that transports vehicles and passengers between Florida and Lorton in Fairfax County;
- Metrorail's Blue and Yellow Lines, which follow I-395 south from Washington, DC serving stations in Arlington County, Alexandria, and Fairfax County, including Ronald Regan National Airport;
- PRTC, which provides the OmniRide and Metro Direct service that travels the segment between Dumfries and Washington, DC. Many of the routes originate at Park-and-Ride locations;
- Metrobus and Fairfax Connector, which provide local transit connections throughout the segment, including Metrobus' Richmond Highway Express (REX) on US 1;
- Private commuter bus carriers that operate in Segment K3;
- Greyhound, which operates long distance bus service along the segment, with stops in Fredericksburg, Woodbridge, Springfield, and Washington, DC; and
- Park-and-Ride facilities which are available at over 15 locations in Fairfax and Arlington Counties. There are over 30 Park-and-Ride facilities in Prince William County, and more than ten Park-and-Ride locations available within the segment in Stafford and Spotsylvania Counties.

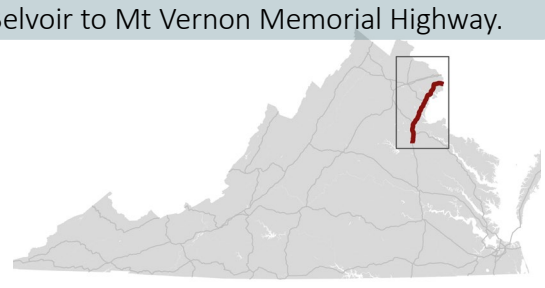
Rail Facilities: CSX Transportation provides freight rail lines along its National Gateway Corridor, which runs along most of the east coast of the United States and provides the main connection from the Port of Virginia facilities in the Hampton Roads Area to national markets.

Port Facilities: The Washington to North Carolina Corridor provides access to the Port of Alexandria.

Airport Facilities: Reagan National Airport operates in Arlington County.

Major planned and future projects include:

- **Spotsylvania County:** Widen Mudd Tavern Road from two to four lanes from 0.51 miles west of the bridge over I-95 to the bridge over I-95 (includes portion of Mudd Tavern Road with I-95 on- and off-ramps);
- **Spotsylvania County and Prince William County:** New VRE stations at Spotsylvania and Potomac Shores in Prince William County;
- **City of Fredericksburg:** Widen Fall Hill Avenue from two to four lanes from 0.12 miles west of Gordon W. Shelton Boulevard to 0.03 miles west of Rappahannock Drive to include reconstructing and widening the bridge over I-95;
- **City of Fredericksburg:** Construct I-95 Southbound collector/distributor lanes and I-95 Southbound Bridge over Rappahannock River from Exit 130 (Route 3) to Exit 133 (US 17). Ramp improvements at Exit 133 for southbound movements;
- **Stafford County:** Reconstruct and add capacity along I-95 between mile markers 143 and 136; and
- **Fairfax County:** Widen US 1 to six lanes from Fort Belvoir to Mt Vernon Memorial Highway.

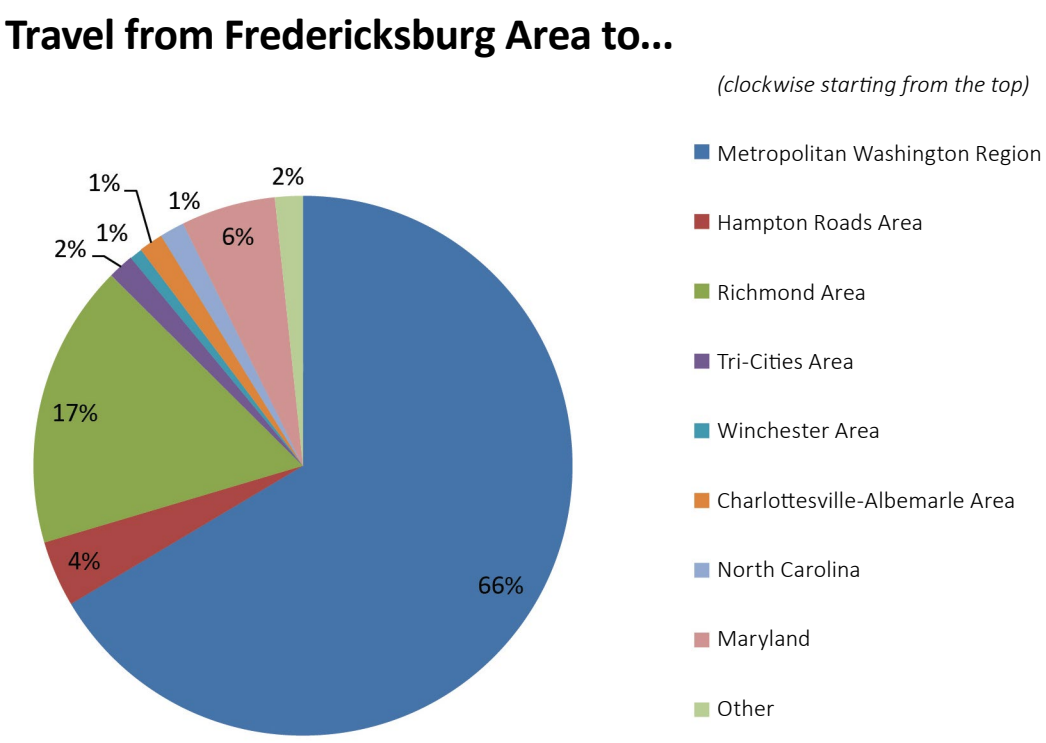


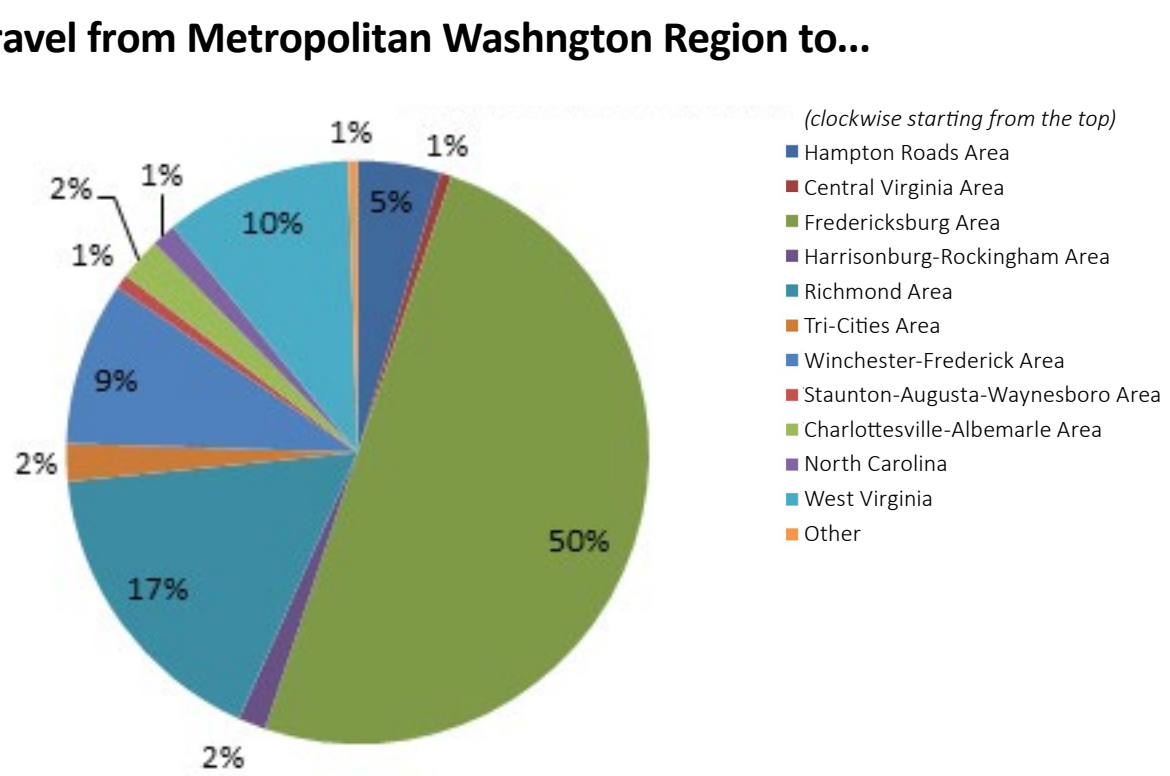
Travel Demand

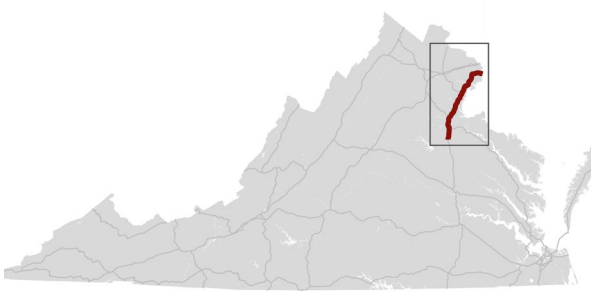
Passenger Demand

Segment K3, the northernmost Segment of Corridor K, covers the Fredericksburg Area and the Northern Virginia Area. It connects Virginia to Maryland and the District of Columbia, and other points further to the north. One quarter of the Commonwealth's intercity passenger travel occurs on this segment including 18 percent between the Fredericksburg Area and the Metropolitan Washington Area and six percent between the Northern Virginia Area and the Richmond Area.

Of intercity passenger travel originating in the Fredericksburg Area, the vast majority (66 percent) is destined for the Metropolitan Washington Area, while an additional six percent is destined for other areas in Maryland. Of intercity passenger travel originating in the Metropolitan Washington Area, half is destined for the Fredericksburg Area. An additional 17 percent of intercity passenger travel originating in the Metropolitan Washington Area is destined for the Richmond Area and five percent, for the Hampton Roads Area; in both cases, Segment K3 will be utilized for portions of the trips.







K3 SEGMENT PROFILE

Freight Demand

By truck, Segment K3 carried 99 million tons of freight worth $155 billion in 2012, and is estimated to carry 137 million tons of freight worth $227 billion in 2025. A large proportion of truck freight on Corridor K passes through the Commonwealth, representing more than 35 percent of total corridor tonnage and 55 percent of total corridor value. In terms of tonnage, North Carolina is the largest producer and attractor of truck freight traveling along this corridor. In terms of value, Florida is the largest destination for truck freight along the corridor. Corridor K is used heavily by truck freight traffic traveling between locations in the Middle Atlantic and the Southeastern U.S. Within Virginia, the Port of Virginia marine terminal in Norfolk is a major generator of freight traffic on Corridor K, accounting for around five percent of the total truck freight value. Fairfax County attracts about three percent of the total truck value on the corridor, with freight arriving from North Carolina, the Middle Atlantic, and the Port of Virginia facilities in Hampton Roads. The jurisdictions adjacent to Segment K3 are not major producers of truck freight on the corridor, accounting for around 1.5 percent of the total truck freight value on Corridor K.

By rail, Segment K3 carried 16 million tons of freight worth $18 billion in 2012, and is estimated to carry 20 million tons of freight worth $23 billion in 2025. Major markets for rail freight include flows between Florida and New Jersey (more than 12 percent of corridor rail value) and flows between Florida and Pennsylvania (six percent of corridor rail value). Within Segment K3, the largest attractor of rail freight, accounting for around one percent of total rail value in the corridor, is the City of Fredericksburg. Segment K3 is a very minor generator of rail freight traffic on Corridor K, accounting for less than one percent of total corridor rail freight tonnage and value.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (35% / 37%)
2. North Carolina (19% / 17%)
3. Pennsylvania (8% / 9%)
4. Maryland (7% / 7%)
5. Florida (6% / 6%)

Corridor Tonnage Originating in Segment K3: 6% / 7%

Major Origin-Destination Pairs for Freight
North Carolina and Maryland
North Carolina and Pennsylvania
North Carolina and New York
Florida and Pennsylvania
Florida and New York

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. Virginia (39% / 40%)
2. North Carolina (11% / 12%)
3. Maryland (10% / 10%)
4. Pennsylvania (7% / 7%)
5. Florida (7% / 7%)

Corridor Tonnage Destined for Segment K3: 8% / 9%

Rail Freight

Major Origins (by Tonnage)
1. West Virginia (52% / 48%)
2. Virginia (12% / 14%)
3. Pennsylvania (8% / 7%)
4. Kentucky (6% / 5%)
5. Florida (3% / 4%)

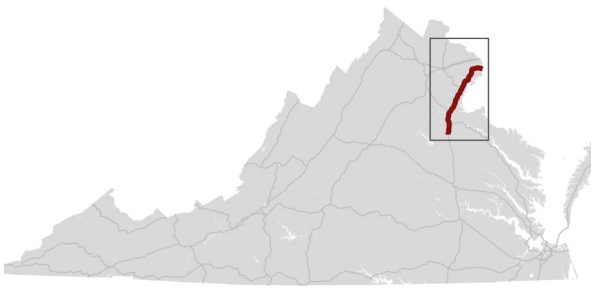
Corridor Tonnage Originating in Segment K3: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Newport News* and West Virginia
City of Newport News* and Kentucky
Florida and New Jersey
Pennsylvania and South Carolina
Dickenson County and City of Newport News*

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (77% / 75%)
2. City of Newport News* (60% / 55%)
3. South Carolina (4% / 4%)
4. City of Norfolk* (4% / 4%)
5. North Carolina (3% / 3%)

Corridor Tonnage Destined for Segment K3: <1% / <1%



Traffic Conditions

Traffic Volume and AADT

Segment K3 generally has the highest traffic volumes in Corridor K. On I-95, average daily traffic varies along Segment K3 from 95,000 vehicles south of Fredericksburg to 188,000 vehicles in Fairfax County.

Volumes on other components of Segment K3 vary as well, as follows:

- I-395: 144,000 – 166,000 vehicles;
- I-495: 142,000 – 201,000 vehicles;
- US 1, from Route 234 near Dumfries to the Pentagon: 35,000 – 50,000 vehicles; and
- US 1, south of Dumfries: 15,000 to 30,000 vehicles.

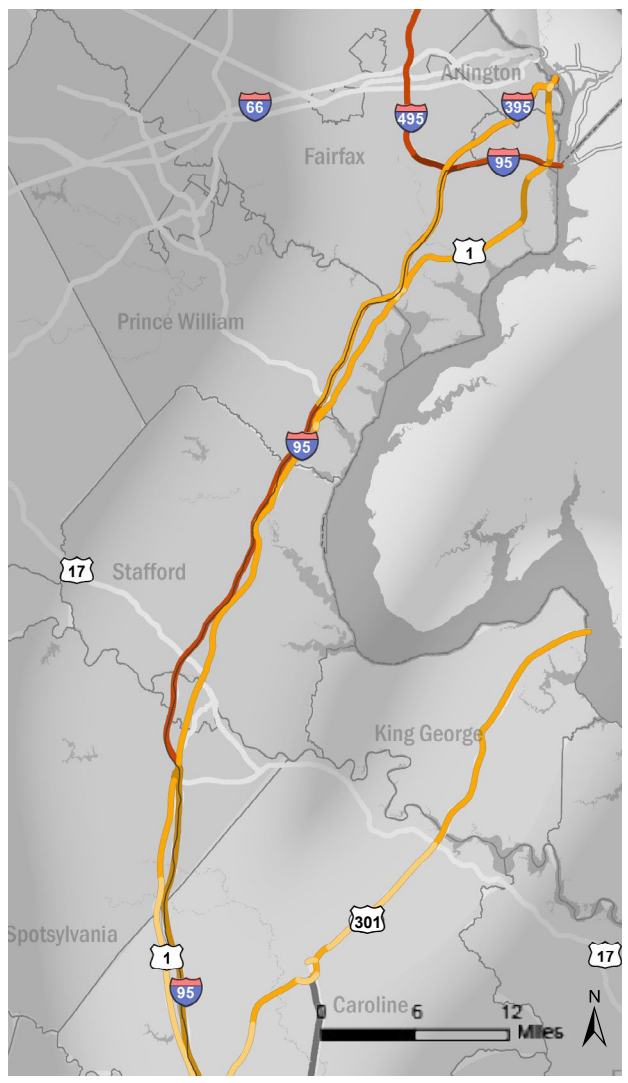
By 2025, daily traffic volumes in Segment K3 are forecasted to increase, as follows:

- Most sections of I-95: 24,000 – 30,000 vehicles;
- I-495, from the Maryland border to the I-95 interchange: 10,000 – 12,000 vehicles;
- I-495, from the I-95 interchange to the DC border: 19,000 – 31,000 vehicles;
- I-395: 14,000 – 16,000 vehicles; and
- US 1, south of I-495: 2,000 – 8,000 vehicles.

The highest daily traffic volumes in 2025 are forecasted to occur in the following locations:

- The intersection of I-95 and Route 123: 202,000 vehicles;
- I-95, south of the I-95/I-495 interchange: 214,000 vehicles;
- I-495, near the I-95/I-495 interchange: 205,000 – 211,000 vehicles; and
- I-495, near the I-66 interchange and from the Dulles Toll Road to the Maryland border: 200,000 – 205,000 vehicles.

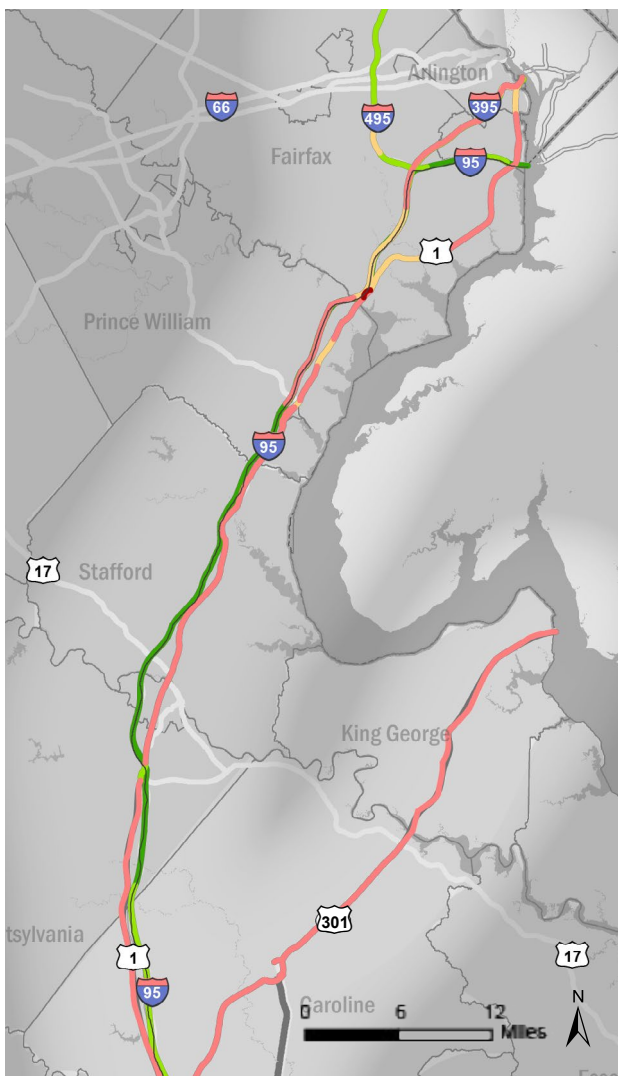
Traffic Volume 2014 (AADT)

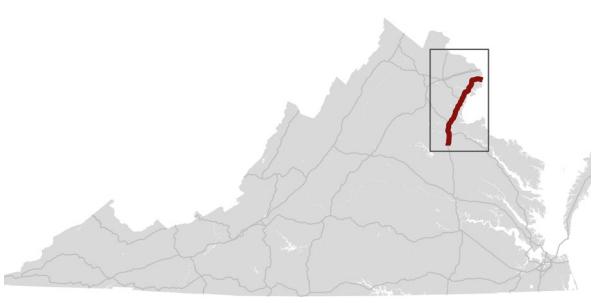


Traffic Volume 2025 (AADT)



Change in Traffic Volume 2014- 2025 (AADT)

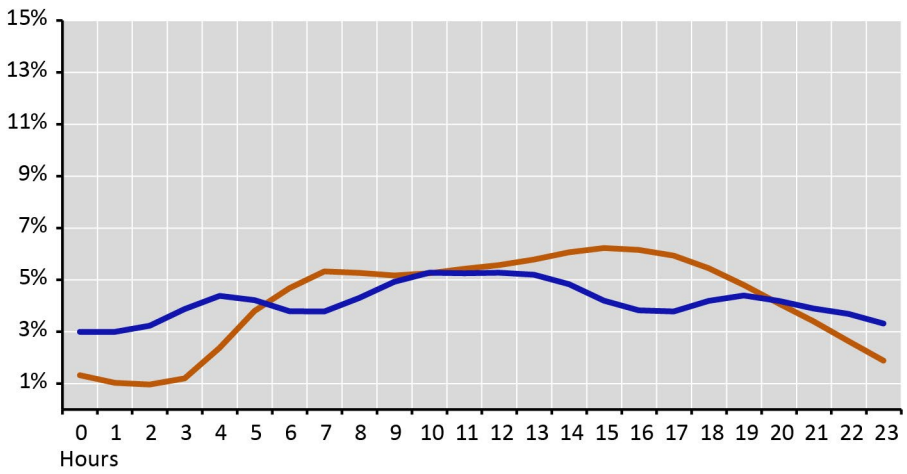




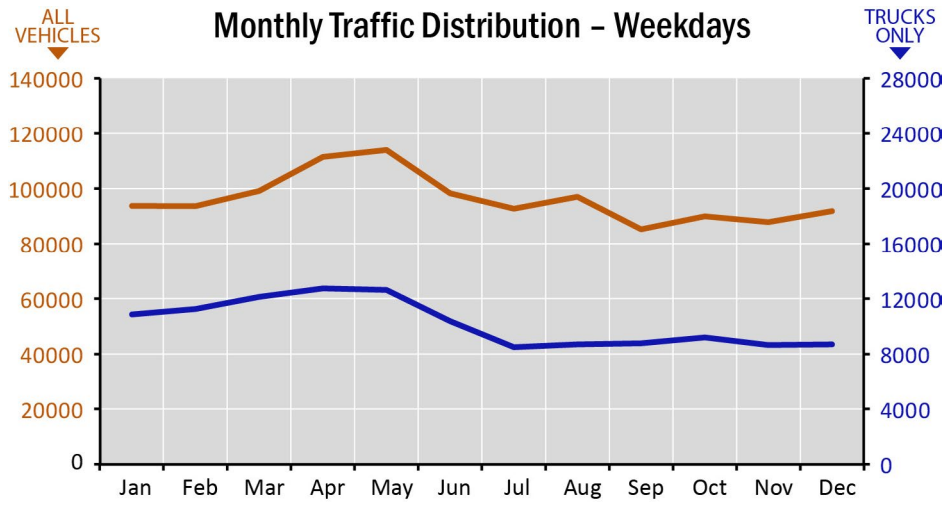
K3 SEGMENT PROFILE

All Vehicles
Trucks

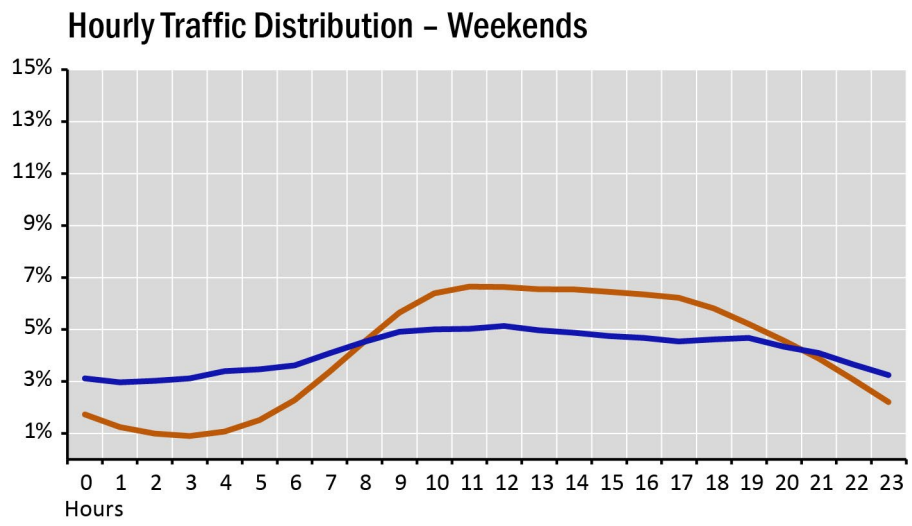
Hourly Traffic Distribution – Weekdays



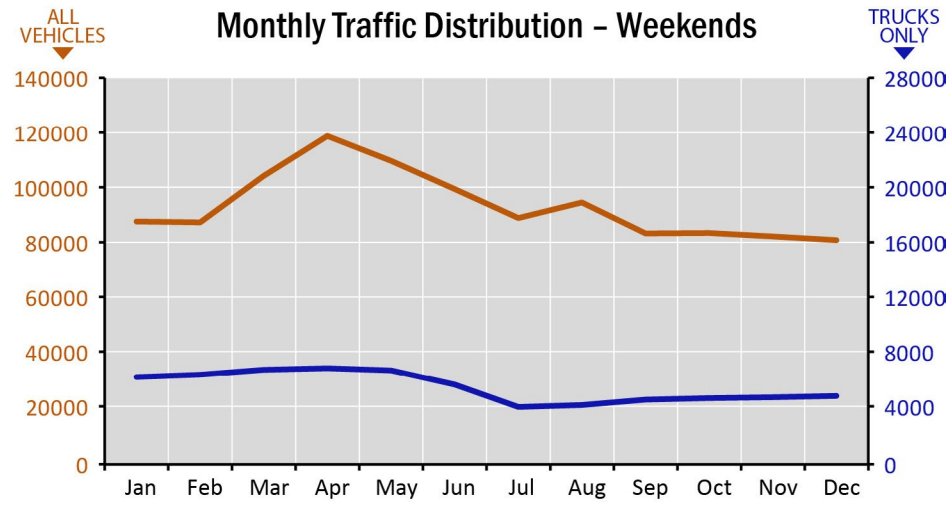
Monthly Traffic Distribution – Weekdays

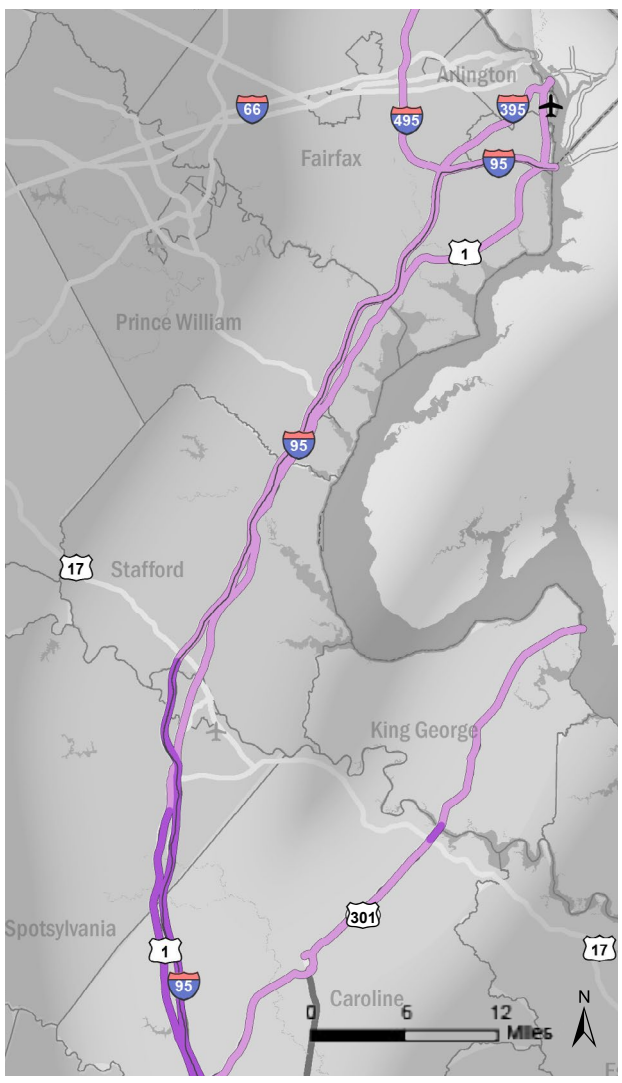


Hourly Traffic Distribution – Weekends



Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

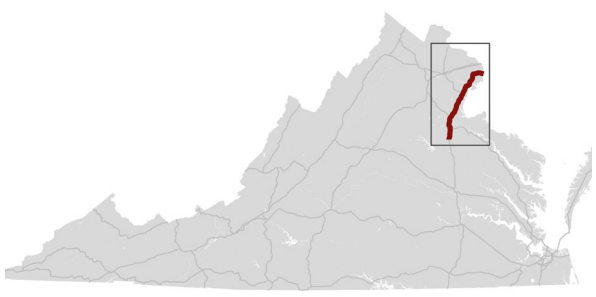
Traffic Distribution

On average, traffic on Segment K3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a relatively steady flow over the course of the day from 7 a.m. to 7 p.m., which is different from the typical commute patterns. The highest hourly traffic occurs between 3 and 4 p.m. which accounts for 6.2 percent of daily traffic and the less busy morning peak hour between 7 and 8 a.m. accounts for 5.3 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. accounts for 68 percent of total daily traffic. Peaking patterns for truck traffic show relatively steady flow with a midday peak, with the highest hourly traffic occurring between 10 and 11 a.m. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day, with the highest percentage of hourly traffic occurring from 11 a.m. to noon (6.7 percent of daily traffic) for all traffic, and noon to 1 p.m. (5.1 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment K3 vary by as much as 34 percent throughout the year, with the high point in May (around 114,000 vehicles per day) and the low point in September (around 85,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the April high (around 12,800 vehicles per day) 50 percent higher than the July low (around 8,500 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (April, around 119,000 vehicles per day) are 47 percent higher than December levels (around 81,000 vehicles per day). Weekend truck traffic varies more than all vehicle traffic, with the April high (around 6,800 vehicles per day) 72 percent higher than the July low (around 4,000 vehicles per day). Since truck volumes account for a relatively small portion of traffic on Segment K3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

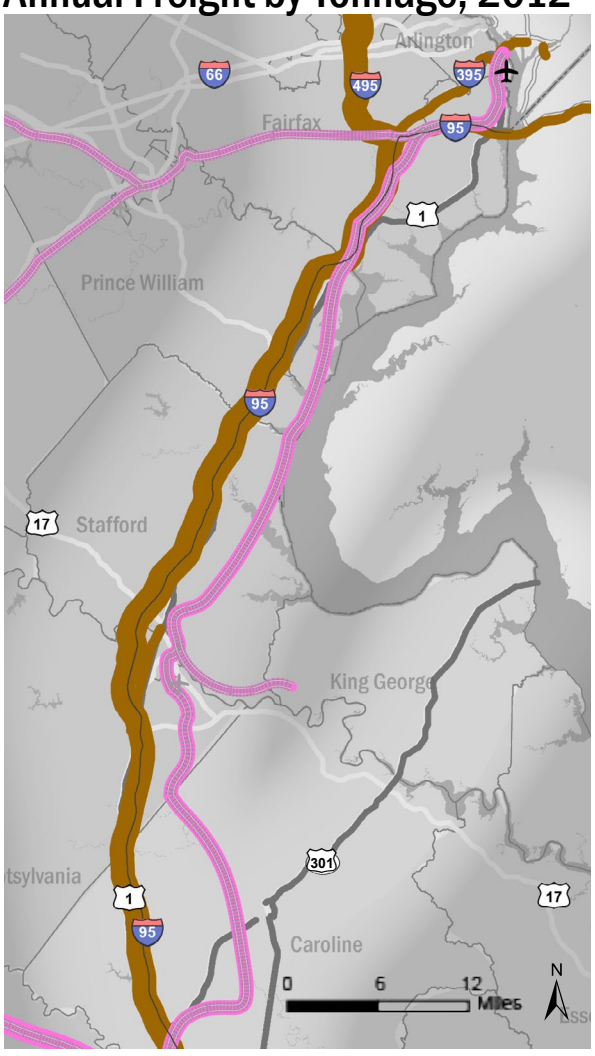
Truck Volume

The percent of daily traffic comprised of heavy trucks on Segment K3 varies across the different segment components, including a high of seven percent on I-95 in Spotsylvania County and Fredericksburg. Ranges for other locations on Segment K3 are lower (below four percent) including some facilities where truck traffic is not a factor at all, such as I-395 north of I-495 where truck prohibitions are in effect.



K3 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

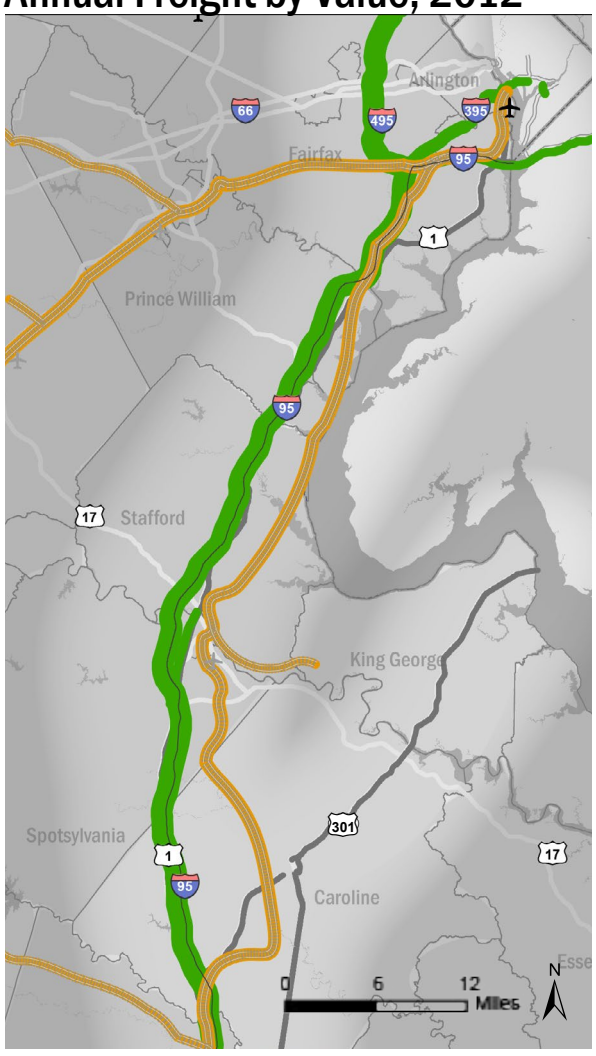


Freight Flows

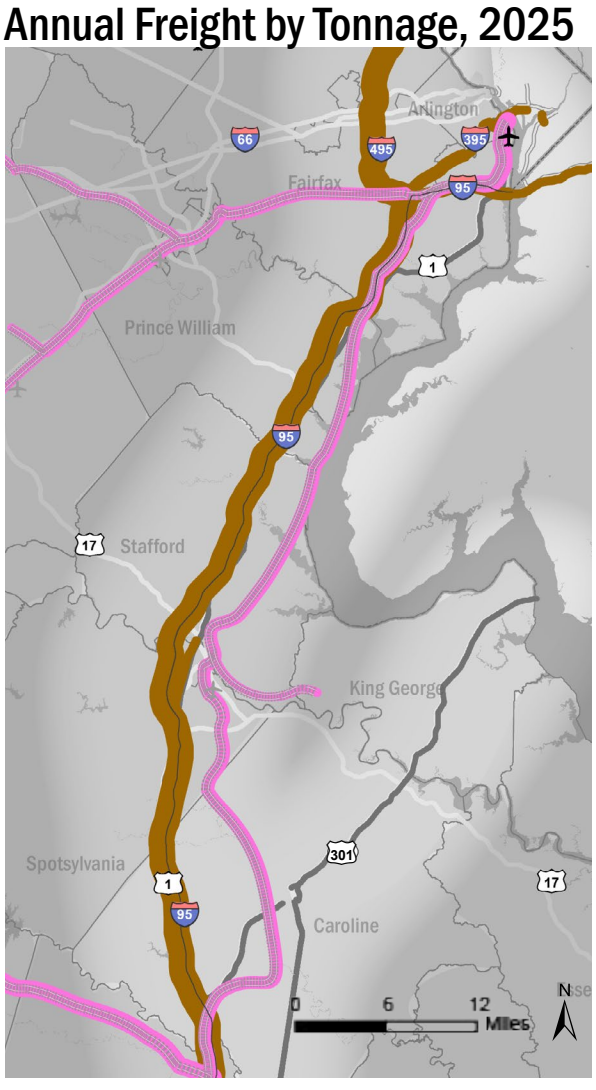
South of US 17 on Segment K3, freight is primarily moved by truck in terms of tonnage and value. In total, 92 million tons (86 percent) of freight is moved through this section of Segment K3 by truck, compared to 15.5 million tons (16 percent) by rail. With regard to value, $153 billion (90 percent) of freight value travels by truck, while $18 billion (10 percent) of freight travels by rail. On average, a ton of freight traveling through this section of Segment K3 by truck and by rail is worth $1,563 and $1,130, respectively. In 2025, truck and rail freight tonnages and value in this area of Segment K3 are expected to increase. The percentage of freight traveling by truck will increase by tonnage and by value to 88 percent and 91 percent, respectively. It is anticipated that value per ton on trucks and rail will increase to $1,648 and $1,175, respectively.

South of I-495 near Springfield on Segment K3, freight is moved primarily by truck by tonnage and value. In total, 99 million tons (86 percent) of freight is moved through this section of Segment K3 by truck and 16 million tons (14 percent) by rail. With regard to value, $155 billion (90 percent) of freight value travels by truck and $18 billion (10 percent) travels by rail. On average, a ton of freight traveling through this section of Segment K3 by truck and by rail is worth $1,568 and $1,109, respectively. In 2025, truck freight tonnages and value in this area of Segment K3 are expected to increase. The percentage of freight moving by truck by tonnage and value will increase to 87 percent and 91 percent, respectively. It is anticipated that value per ton on trucks and rail will increase to $1,651 and $1,147, respectively.

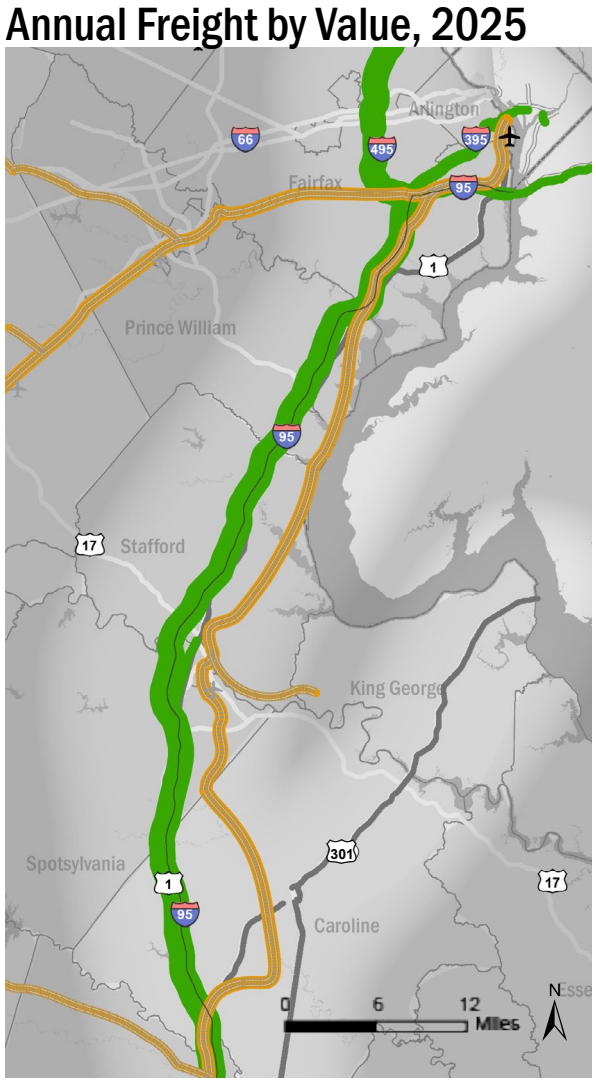
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025

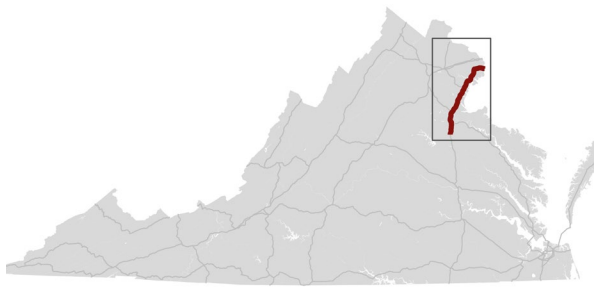


Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility



Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

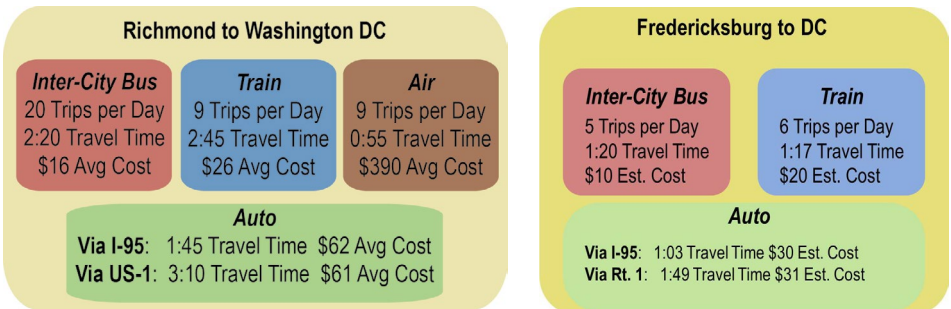
Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy & Mode Choice

Passenger trips on Segment K3 of the Washington to North Carolina Corridor have many travel options, both in terms of travel path and mode choice. US 1 and US 301 serve as parallel highway facilities on the segment, while interstates I-395 and I-495 serve as spurs that connect Northern Virginia, Washington, DC, and Maryland to I-95. Based on the 2014 federal standard mileage rate of 56 cents per mile, alternative modes of travel in the segment are typically more cost effective than automobile travel, but not as competitive in terms of speed or frequency of service.

Comparable Travel Options

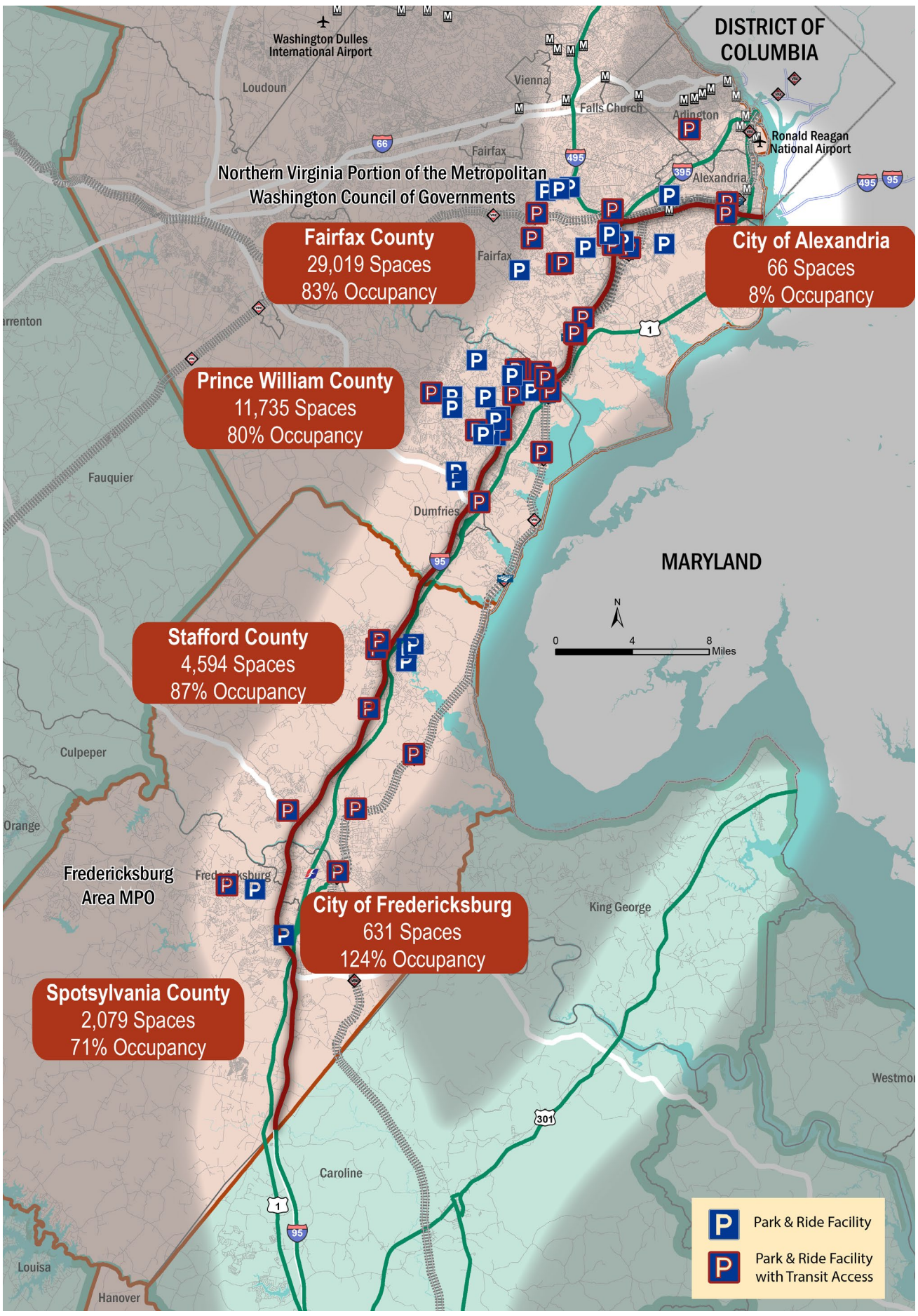


Many transit options are available within Segment K3 that provide access within the Northern Virginia Area in addition to longer distance locations. Options include the following:

- VRE and Amtrak, which provide service to downtown Washington, DC and destinations north, with stops along the corridor via the CSX National Gateway Corridor rail line;
- Amtrak, which operates multiple services in the corridor with stations in Lorton, Fredericksburg, Quantico, Woodbridge, and Alexandria;
- Metrorail's Blue and Yellow Lines, which follow I-395 south from Washington, DC serving stations in Arlington County, Alexandria, and Fairfax County;
- PRTC, which provides the OmniRide and Metro Direct service that travels the segment between Dumfries and Washington, DC;
- Metrobus and Fairfax Connector, which provide local transit connections throughout the segment, including Metrobus' Richmond Highway Express (REX) on US 1; and
- Greyhound, which operates long distance bus service along the segment, with stops in Fredericksburg, Woodbridge, Springfield, and Washington, DC.

Park-and-Ride

Within Segment K3, commuters can utilize many Park-and-Ride locations, many of which are served by transit service. Fairfax County provides the highest number of Park-and-Ride locations and the most parking spaces in the Commonwealth, accounting for nearly half of the Park-and-Ride parking spaces in Virginia. While Arlington County (96 percent) has the highest utilization rate of spaces available in the segment, Fairfax (83 percent) and Prince William (80 percent) Counties also have a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.

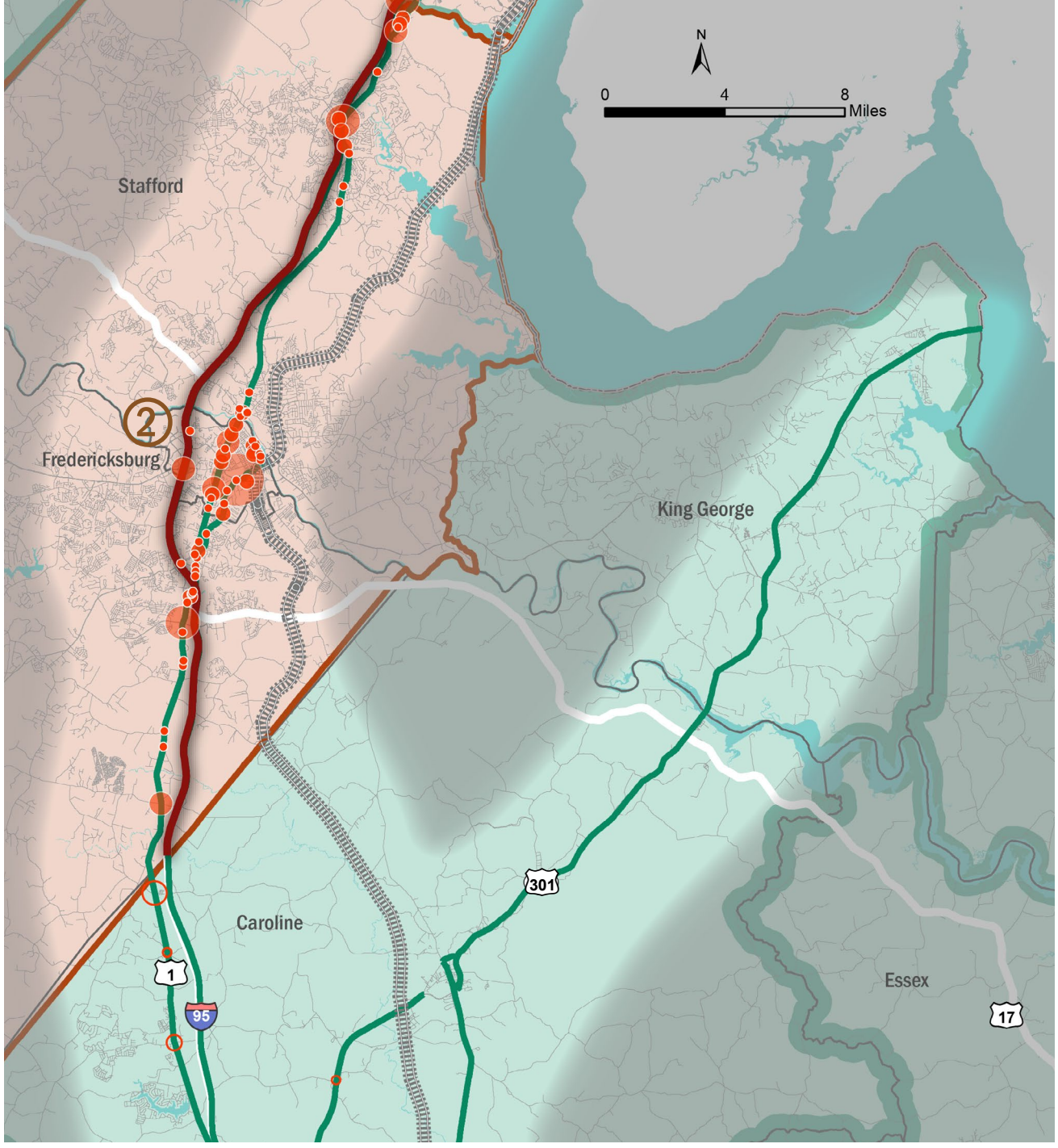


Safety

Performance Metrics:

Number of Severe Crashes	1,108
Severe Crashes/Million VMT	0.3
Number of Railroad Crashes	4

Between 2010 and 2012, over 1,100 severe crashes occurred on Segment K3, the most of any CoSS segment in the Commonwealth. High concentrations of severe crashes occurred near Fredericksburg and between Dumfries and Alexandria. In Woodbridge, along approximately 1.3 miles of US 1 just south of the Woodbridge Amtrak station, there were 136 severe incidents, 98 of which were at intersections. Just north of this area, north of the Occoquan River near Lorton, there were 128 severe collisions within a stretch of approximately three miles along I-95. Along US 1 in Fort Belvoir, on approximately 2.5 miles between Route 235 and Route 286, 94 incidents took place; slightly over half of these occurred at intersections. On US 1 in Fredericksburg, within a span of about two miles directly south of Route 218, 55 crashes transpired. At the intersection of Lafayette Boulevard and Route 3 in Fredericksburg, 35 collisions occurred. Other segments and intersections with high crash numbers were on I-495, with 22 collisions taking place approximately 1.9 miles west of the intersection with I-95, and on Route 21 at the intersection with US 1, just south of I-95.

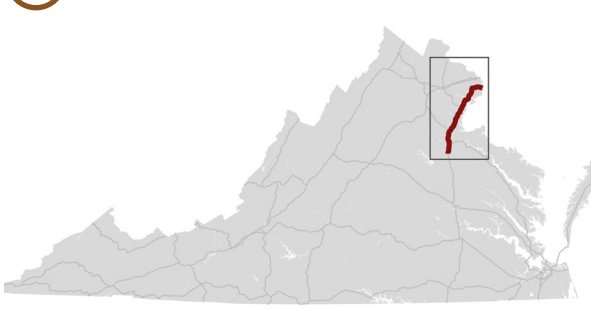


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

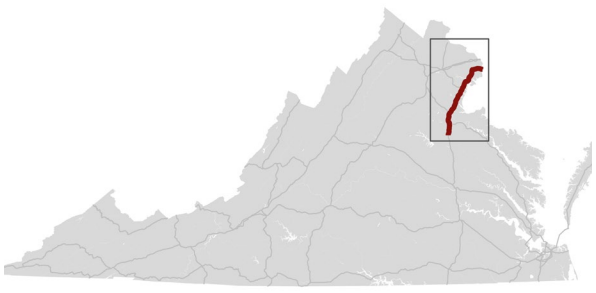
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Congestion

Performance Metrics:

Person Hours of Delay per Mile	118
Freight Ton Hours of Delay per Mile	892.6K



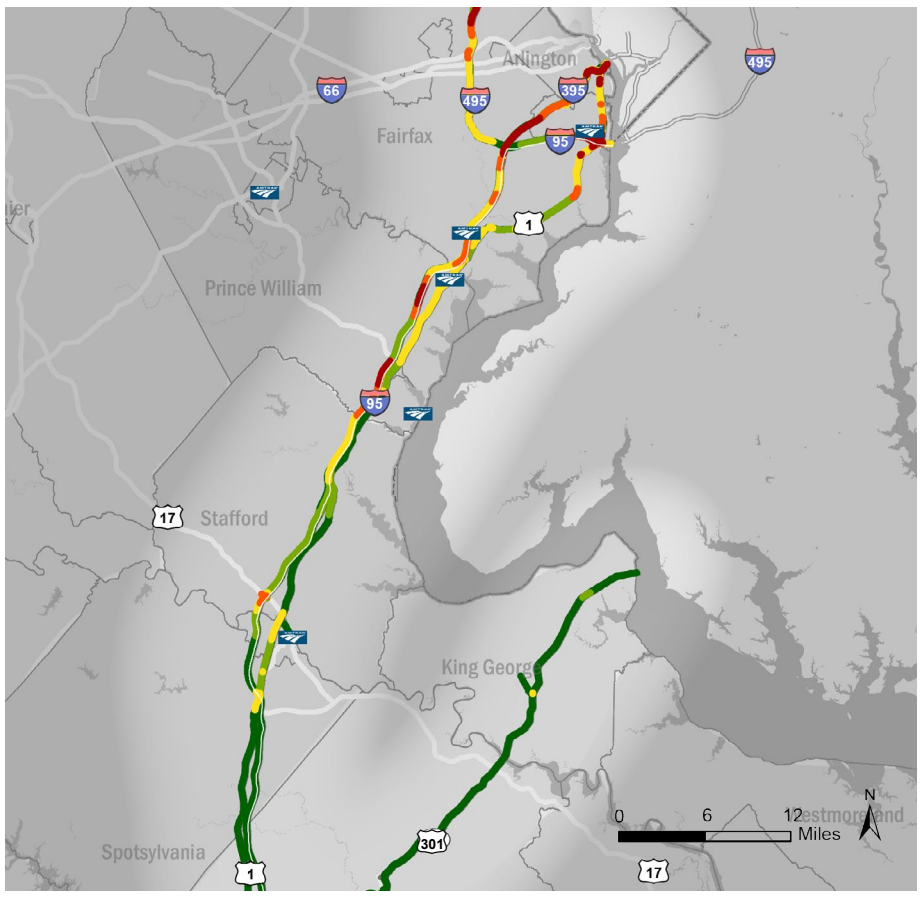
Passenger Delays

Passenger delays along Segment K3 are by far the highest among CoSS segments, with the highest total passenger delay (47,000 person-hours of delay) and one of the highest average delays (118 person-hours per mile). There are significant passenger delays on large portions of Segment K3, including:

- Almost the entire Capital Beltway (I-495) between the American Legion and Wilson Bridges;
- All of I-395 between I-495 and the Potomac River;
- US 301 at Route 3 in King George County;
- US 1 near the interchange with I-95 south of Fredericksburg in Spotsylvania County;
- US 1 between Route 3 and US 17 in the City of Fredericksburg;
- I-95 between US 17 and the Rappahannock River in Spotsylvania County;
- Many locations on US 1 between Route 234 in Prince William County and the Potomac River; and
- Most of I-95 in Prince William and Fairfax Counties.

The highest levels of passenger delay, exceeding 1,800 person-hours per mile of daily, occur on the far northern portions of I-495 north of Tysons Corner. Peak period passenger delays account for 61 percent of daily congestion, which gives Segment K3 one of the largest peak period shares of passenger delay among CoSS segments.

Daily Person Hours of Delay per Mile



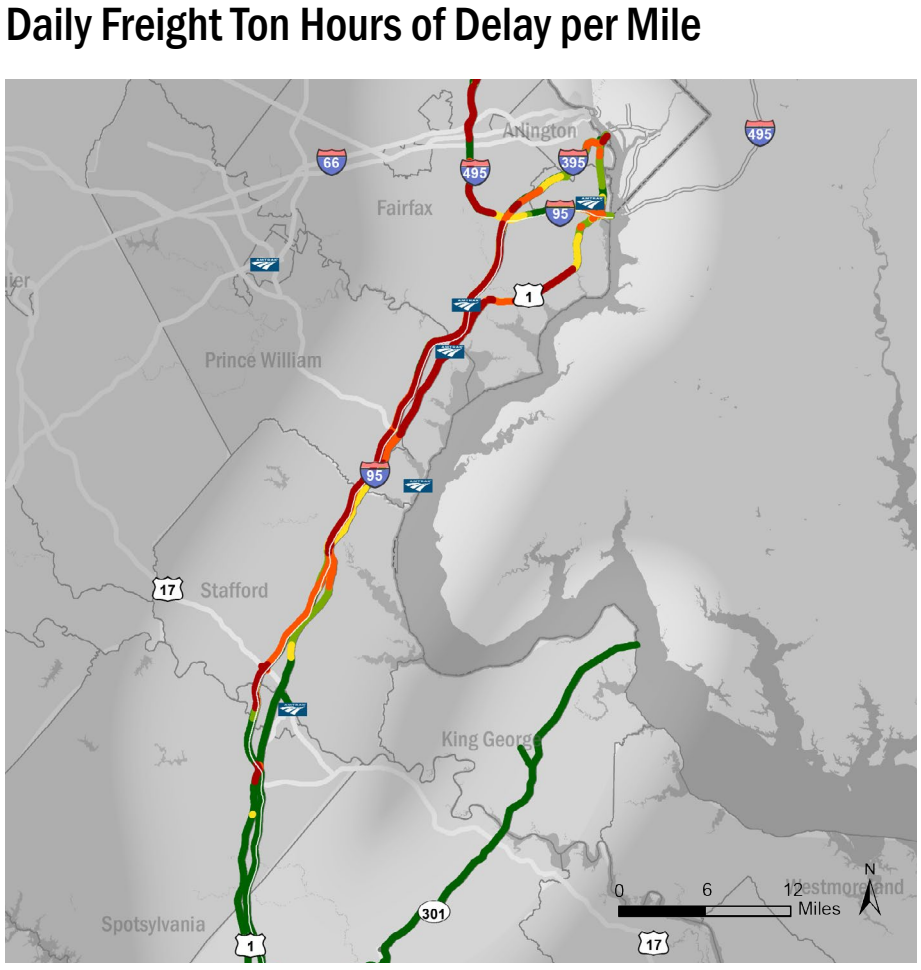
Freight Delays

Freight delays along Segment K3 are by far the highest among CoSS segments, with the highest total passenger delay (357 million ton-hours of delay) and average delays (893,000 ton-hours per mile), exceeding the next most congested CoSS segment by a factor of ten. There are significant freight delays on large portions of Segment K3, including:

- Almost all of I-495 north of the interchange with I-95;
- Most of I-395 between I-495 and the Potomac River;
- US 1 near the interchange with I-95 south of Fredericksburg in Spotsylvania County;
- Most of US 1 between Centreport Parkway in Stafford County and Route 7 in the City of Alexandria;
- US 1 in Crystal City in Arlington County;
- I-95 between Route 3 in the City of Fredericksburg and I-495 in Fairfax County; and
- I-95/I-495 near the interchange with US1 in the City of Alexandria.

The most severe freight congestion occurs on I-495 north of Tysons Corner in Fairfax County, where delay exceeds 10 million ton-hours per mile of delay. Peak period freight delays account for 58 percent of daily congestion, which gives Segment K3 one of the largest peak period shares of freight delay among CoSS segments.

Daily Freight Ton Hours of Delay per Mile



Reliability

Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment K3 ranges from 0.00 to 4.93 in terms of reliability index, with an average value of 0.38. This segment has the highest peak period reliability index of the CoSS segments statewide, and includes many locations where the reliability index exceeds the statewide threshold:

- I-495 between I-66 and the Dulles Toll Road (Route 267);
- I-495 near US 29 and US 50;
- I-495 near the interchange with I-95;
- I-395 north of Route 27 (Washington Boulevard);
- I-95 between Route 289 near Springfield and Route 611 in Alexandria;
- I-95 between US 1 and Route 642 in Fairfax County;
- I-95 between Route 294 and Dale Boulevard in Woodbridge; and
- I-95 near the interchange with Route 234 in Dumfries.

Weekday

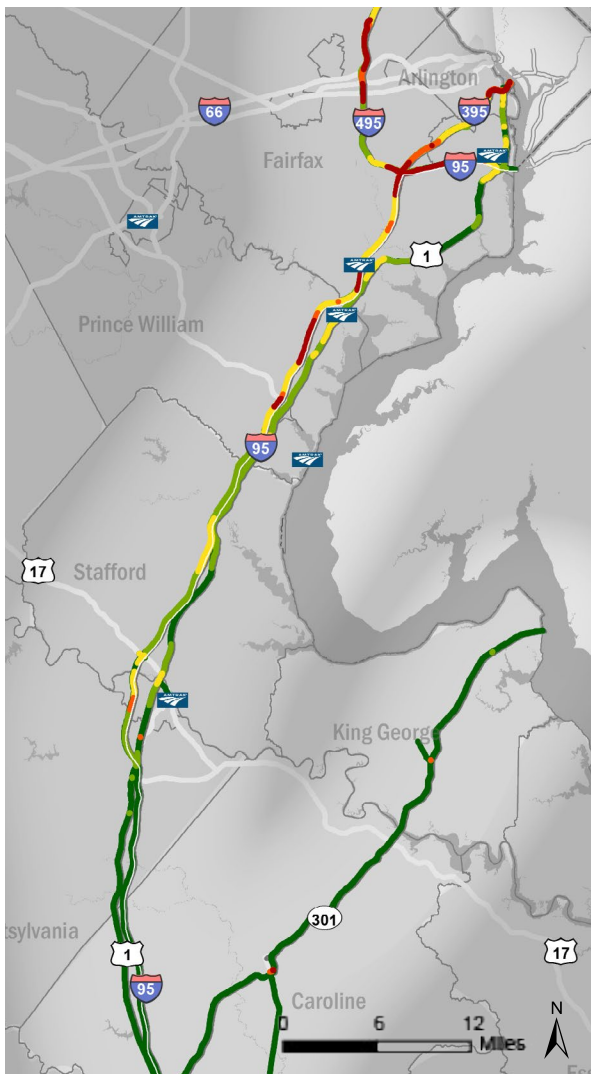
Reliability of travel during a typical weekday ranges from 0.00 to 2.63 in terms of reliability index, with an average value of 0.36. This segment has the highest weekday reliability index of the CoSS segments statewide, and includes many locations where the reliability index exceeds the statewide threshold:

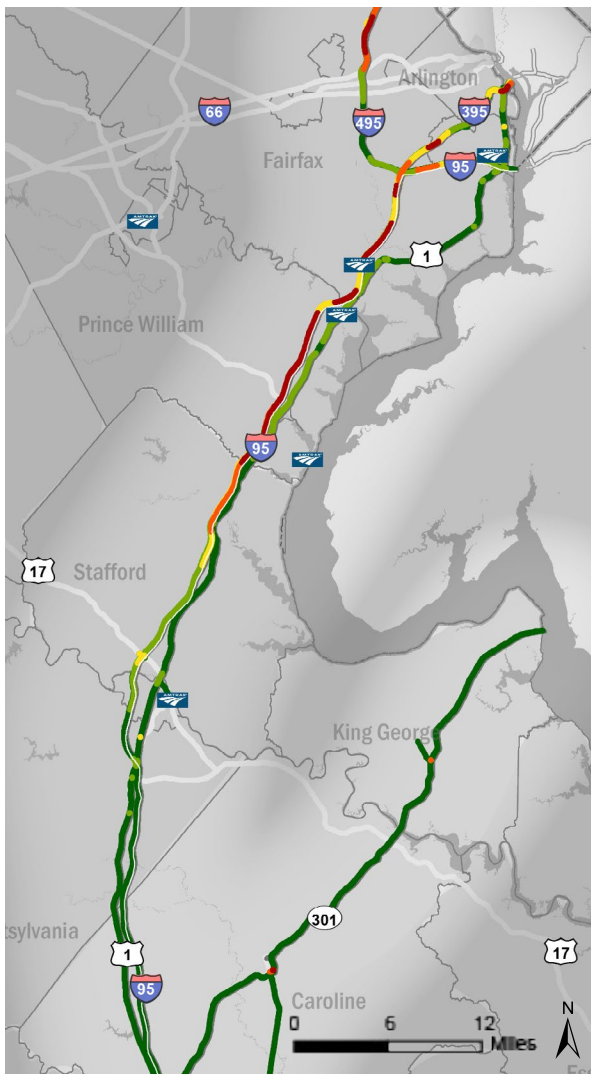
- US 301 at Route 3 in King George County;
- US 1 near Route 620 south of Fredericksburg in Spotsylvania County;
- I-95 near the interchange with US 17 in Stafford County;
- Most of I-95 between Route 628 in Stafford County and Route 611 in the City of Alexandria;
- I-495 north of I-66 in Fairfax County;
- I-395 south of Seminary Road in Fairfax County and the City of Alexandria;
- I-395 north of Route 27 (Washington Boulevard); and
- US 1 near the intersection with East Glebe Road in the City of Alexandria.

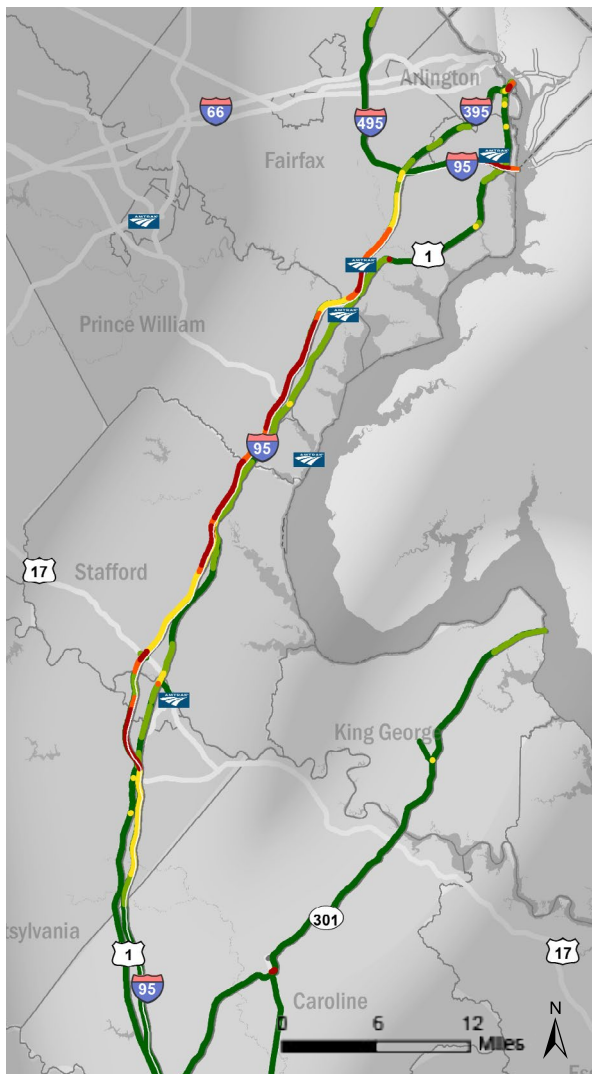
Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 2.58 in terms of reliability index, with an average value of 0.25. This segment has the highest weekend reliability index of the CoSS segments statewide, and includes many locations where the reliability index exceeds the statewide threshold:

- I-95 where it runs concurrently with US 17 in and around the City of Fredericksburg;
- US 1 near US 17 Business in the City of Fredericksburg;
- Most sections of I-95 between Route 628 in Stafford County and Route 286 in Fairfax County;
- US 1 at Route 611 near Lorton in Fairfax County;
- I-95/I-495 between east of Route 611 in the City of Alexandria; and
- I-395/US 1 north of the interchange with US 1.





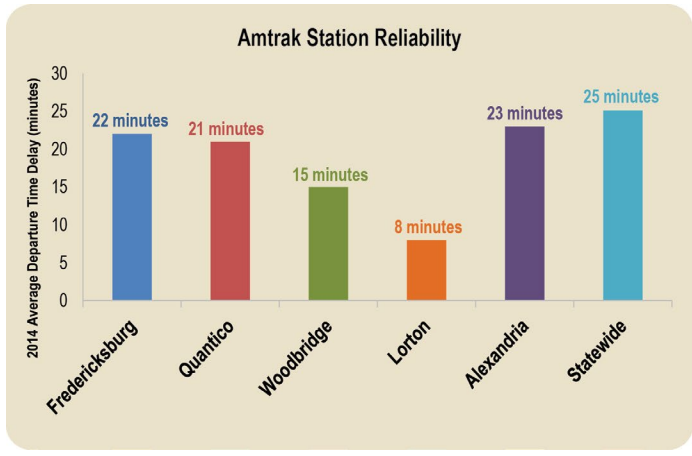


Reliability Index

< 0.2	0.6 - 0.8
0.2 - 0.4	> 0.8
0.4 - 0.6	Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



VRE On-Time Performance

Fredericksburg Line

93%

WMATA On-Time Performance

Blue Line

90%

Yellow Line

94%

K3 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Mode Choice

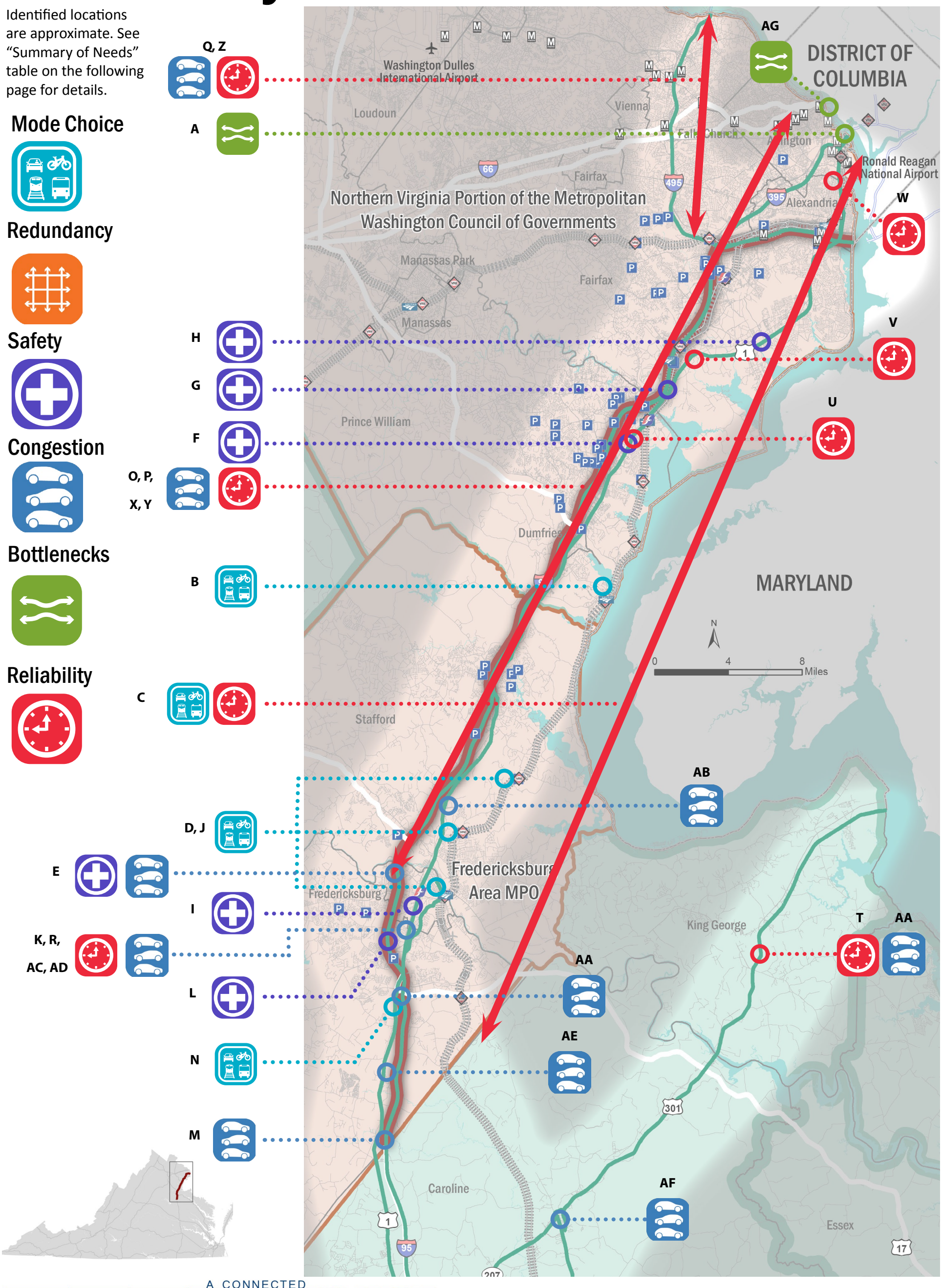
Redundancy

Safety

Congestion

Bottlenecks

Reliability



K3 SEGMENT NEEDS

Summary of Needs - K3 Segment

A.		Long Bridge: Rail bottleneck
B.		Inadequate parking facilities at VRE stations
C.		Congestion along rail lines affects reliability of Passenger Rail services. Over 83,000 passenger hours of delay for Amtrak riders in Segment.
D.		Park-and-ride lots in Fredericksburg area are over-capacity. Large portions of commuters traveling 25+ miles per day, and Frederickburg to DC region accounts for 18 percent of intercity passenger travel in Commonwealth.
E.		Slow speeds and safety concerns at interchange of I-95 and US 3.
F.		US 1 in Woodbridge (south of VRE station) : Highest concentration of crashes on Segment (136)
G.		I-95 north of Occoquan River: 128 severe collisions with a 3-mile stretch
H.		US 1 near Ft. Belvoir: 94 severe crashes in 2.5 miles between VA 235 and Fairfax County Pkwy (VA 286)
I.		US 1 in Fredericksburg: 55 severe crashes in 2 miles south of VA 218
J.		Limited availability/connections to non-auto modes at VRE stations along the Corridor
K.		High-growth commercial area near VA 3 forecast to be congested by 2025.
L.		I-95 at US 3: safety concerns related to interchange design
M.		I-95 at Exit 118: Planned growth in the area may exacerbate congestion issues
N.		Limited availability/connections to transit modes at park-and-ride lots
O.		Reliability issue on I-95 between Exit 126 (US 1/US 17) and Rappahannock River
P.		Reliability issue on I-95/I-395 between Exit 140 (Courthouse Road) and Potomac River

K3 SEGMENT NEEDS

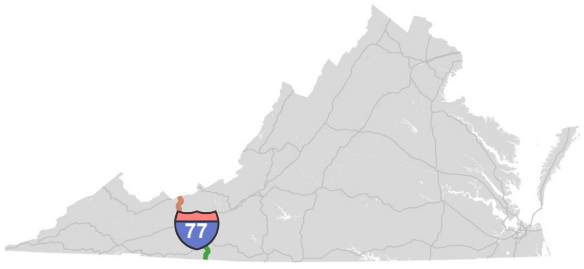
Summary of Needs - K3 Segment

Q.		Reliability issue on I-495 between Exit 51 (VA Route 650/Gallows Road) and Potomac River
R.		Reliability issue at US 1 and Harrison Road in Fredericksburg
S.		Reliability issue at US 1 and VA Route 639 (Fall Hill Avenue) in Fredericksburg
T.		Reliability issue at US 301 and VA Route 3 (Kings Highway) in King George County
U.		Reliability issue at US 1 and VA Route 123 (Gordon Boulevard) in Woodbridge
V.		Reliability issue at US 1 and VA Route 611 (Telegraph Road) in Fairfax County
W.		Reliability issue at US 1 and East Glebe Road in Alexandria
X.		Congestion issue on I-95/I-395 between Rappahannock River and Potomac River
Y.		Congestion issue on US 1 between Courthouse Road in Stafford to Potomac River
Z.		Congestion issue on I-495 between I-95/I-395 and Potomac River in Fairfax County
AA.		Congestion issue on US 1/US 17 at junction with I-95 south of Fredericksburg
AB.		Congestion issue at US 1 and Centerport Parkway in Stafford County
AC.		Congestion issue on US 1 between VA Route 3 and US 17 Business in Fredericksburg
AD.		Congestion issue at US 1 and Harrison Road in Fredericksburg
AE.		Congestion issue at US 1 and Massaponax Church Road south of Fredericksburg
AF.		Congestion issue at US 301 and VA Route 207 (Bowling Green Bypass) in Bowling Green
AG.		Rail bottleneck at Rosslyn tunnel problematic for Metrorail Blue Line.

VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Western Mountain Corridor (L)



Office of INTERMODAL Planning and Investment

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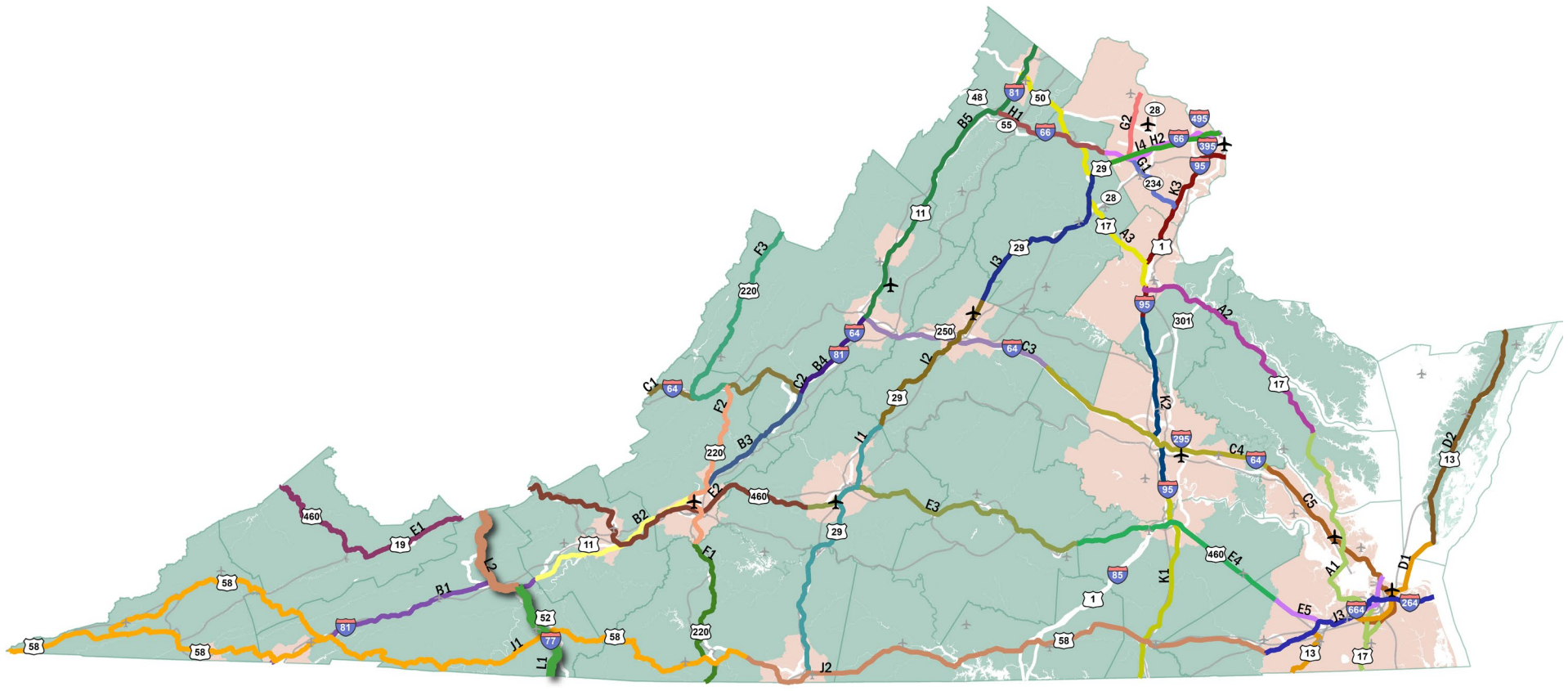
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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Metropolitan Planning Organization Area

The Western Mountain Corridor (Corridor L) is defined primarily by I-77, a multi-lane interstate highway that runs from Ohio to South Carolina, with its northern terminus in Cleveland, Ohio, and its southern terminus in Columbia, South Carolina. In southwestern Virginia, I-77 serves as an important corridor, traversing approximately 67 miles between the West Virginia state line to the north and the North Carolina state line to the south.

I-77 runs concurrently with I-81/US 11 for approximately 13 miles and provides access to US 58 (Corridor J) in southern Virginia and US 460 (Corridor E) just north of the border in West Virginia. US 52 runs parallel or concurrently with I-77 in the corridor throughout its length in Virginia.

Because the Western Mountain Corridor is mostly rural outside of Wytheville, passenger travel is accomplished primarily via the highway facilities. Only a few other travel options are available, including:

- A Greyhound bus station in Wytheville, providing bus connections to North Carolina, West Virginia, and Roanoke;
- Multiple Park-and-Ride lots near Wytheville; and
- A single airport facility, the Twin County Airport, located south of I-81, which serves as a community general-aviation facility. No airport facilities with commercial service are located along the Western Mountain Corridor. The two closest facilities with commercial connections are the Roanoke-Blacksburg Regional Airport and the Tri-Cities Airport in Tennessee.

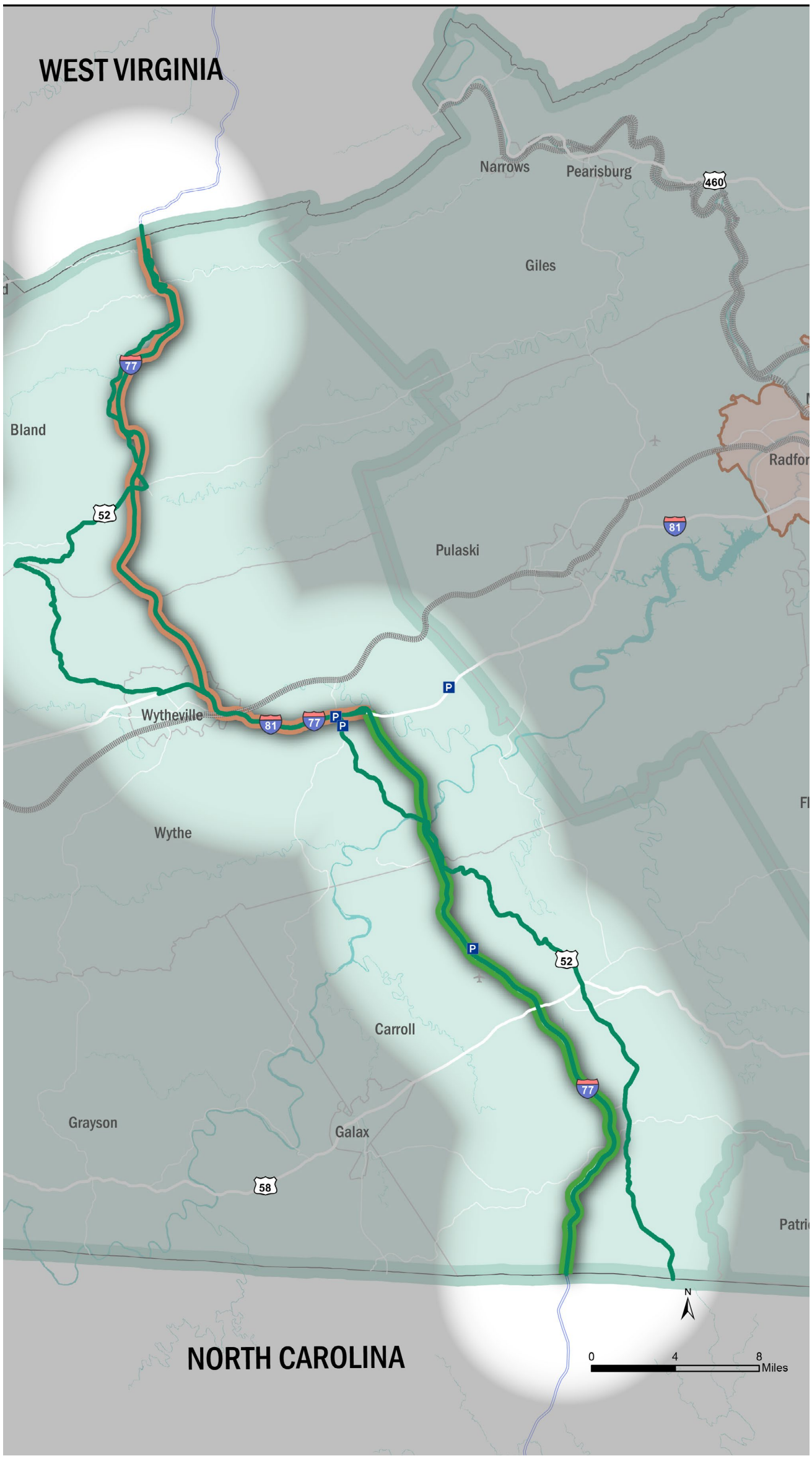
There are no direct connections to any port facilities, although the Western Mountain Corridor is a heavy-freight corridor, acting as an alternative to I-81 and connecting it to the US 58 corridor. There are no direct rail lines along most of the Western Mountain Corridor. However, the western half of Norfolk Southern's Crescent Line runs along the part of the corridor where I-77 runs concurrently with I-81.

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Corridor Components

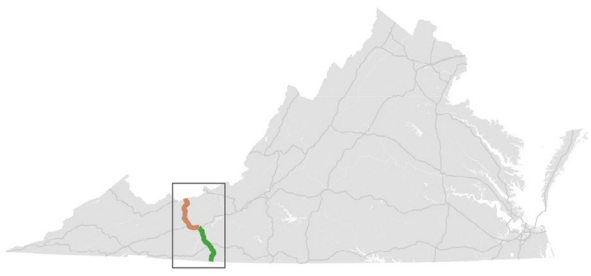
Highway Facilities	
Primary Facility	• I-77
Other Highway Facilities	• US 52
Transit Services	
	• Intercity bus service
Rail Facilities	
	• Norfolk Southern Crescent Corridor



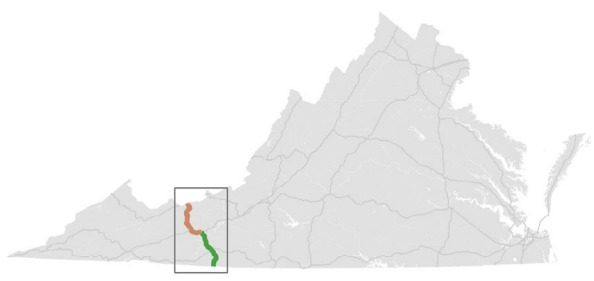
Corridor Segments:
- L1
- L2

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



Demographics and Economic Trends

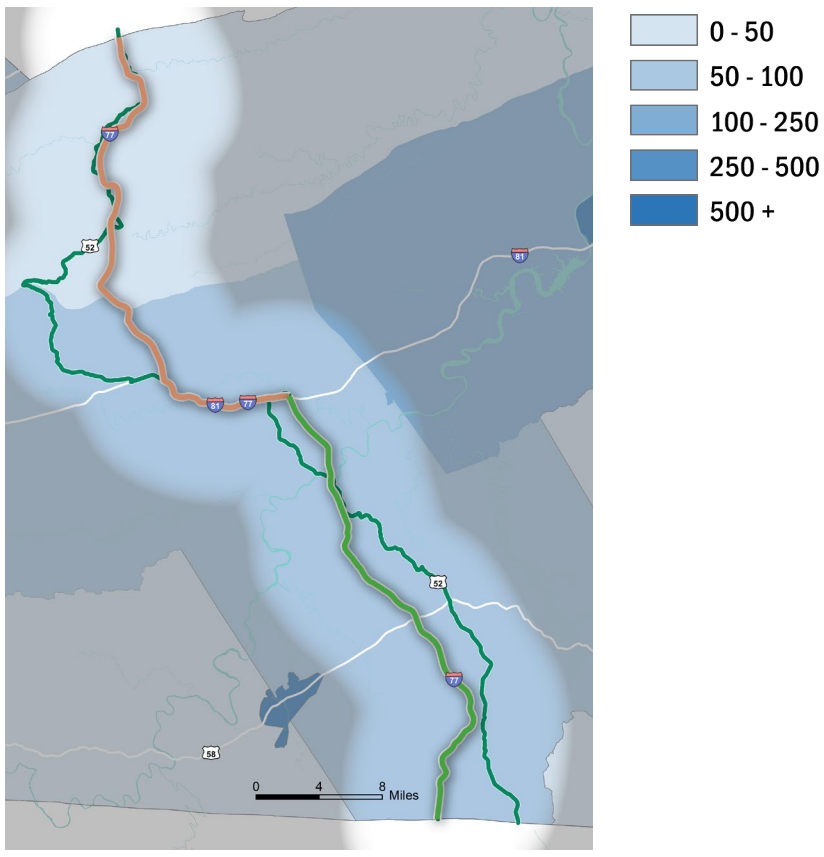


Generally, the population density along Corridor L is less than 100 persons per square mile. Bland County has the lowest density along the corridor with less than 50 persons per square mile. Of the segments in Corridor L, Segment L1 is more densely populated.

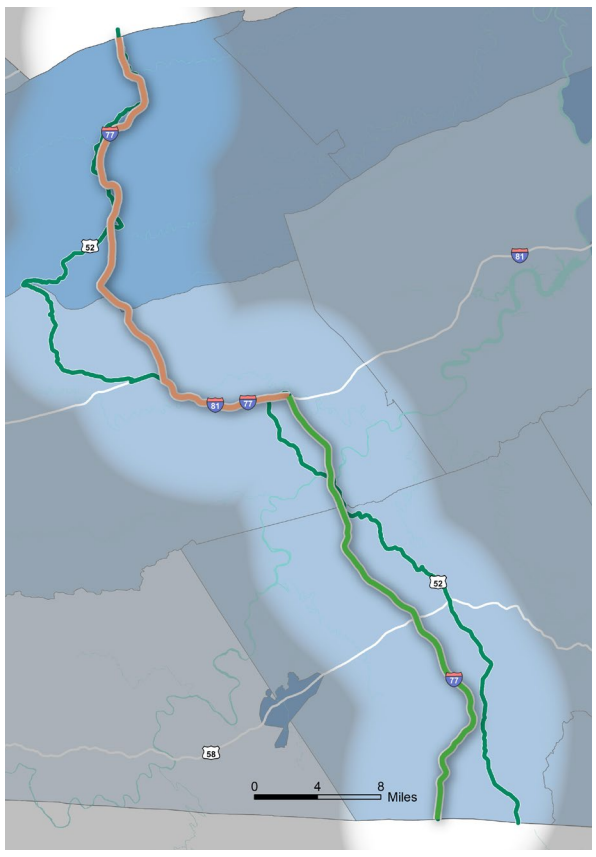
Between 2012 and 2025, Bland County is projected to experience the largest population growth (six to ten percent) among the jurisdictions along the corridor. Carroll and Wythe Counties are anticipated to have population growth between one and five percent. Overall, population along the corridor is expected to grow.

Current employment centers follow a pattern similar to the population centers, with the highest concentration of employment in Wythe County. Employment growth between 2012 and 2025 is forecast to be highest in Bland and Carroll Counties, with an increase in jobs between six and ten percent.

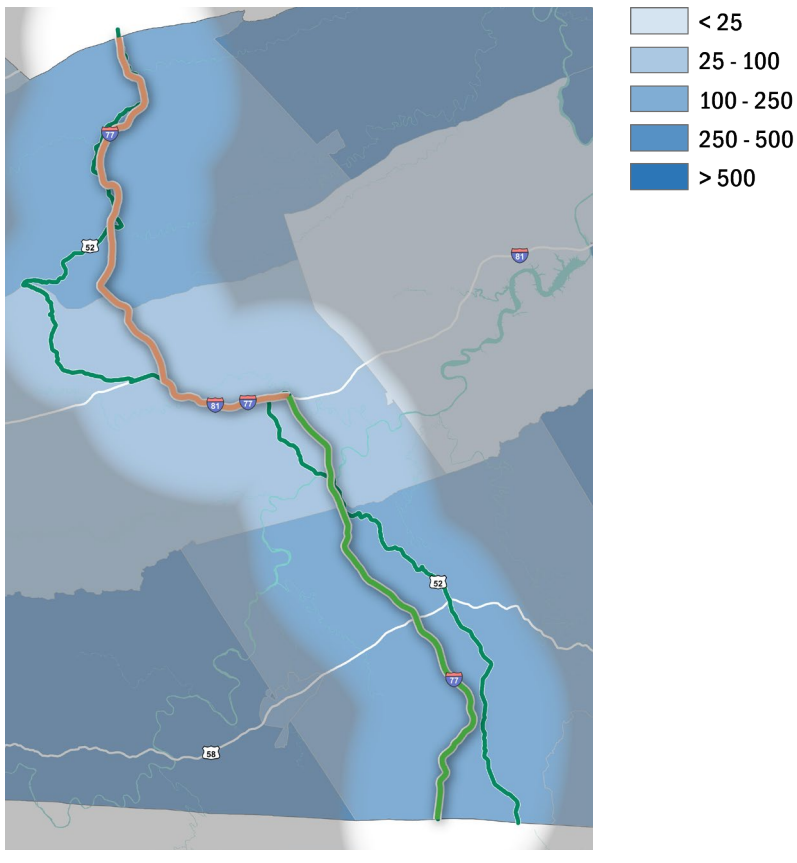
2012 Population Density (Persons / Square Mile)



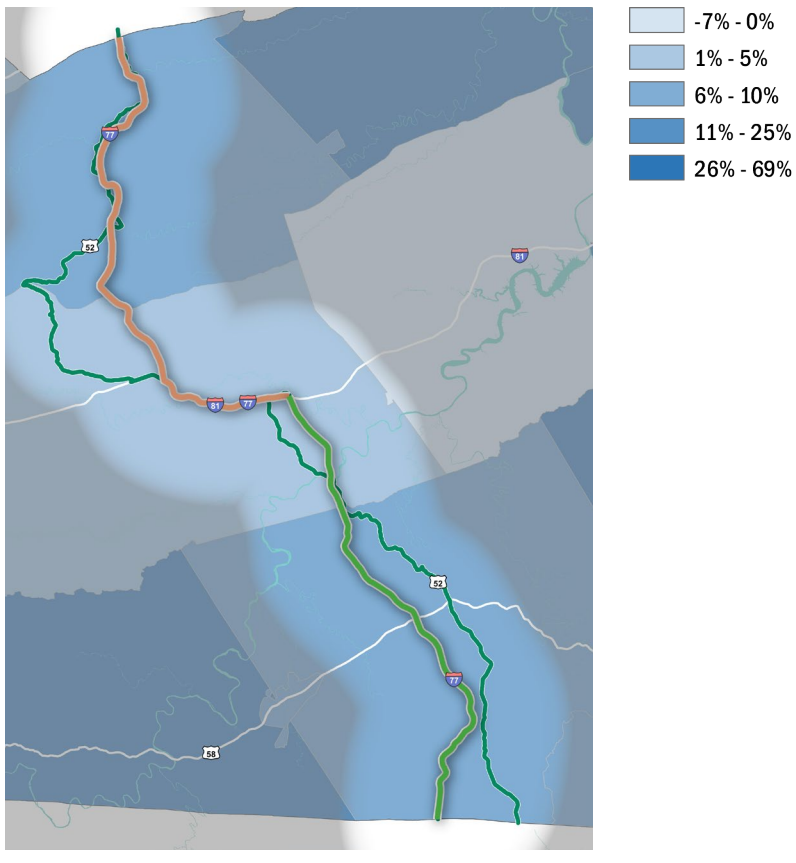
Population Growth (2012 - 2025 Percent Change)



2012 Employment Density (Jobs / Square Mile)



Employment Growth (2012-2025 Percent Change)

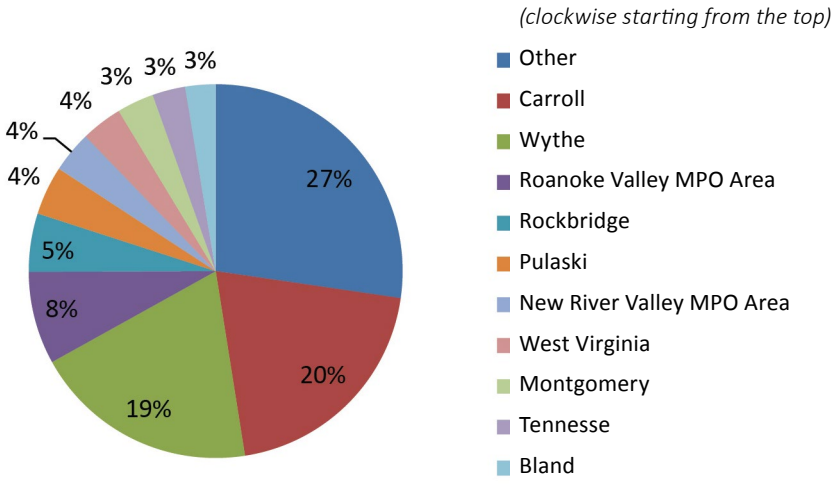


Corridor Travel Patterns

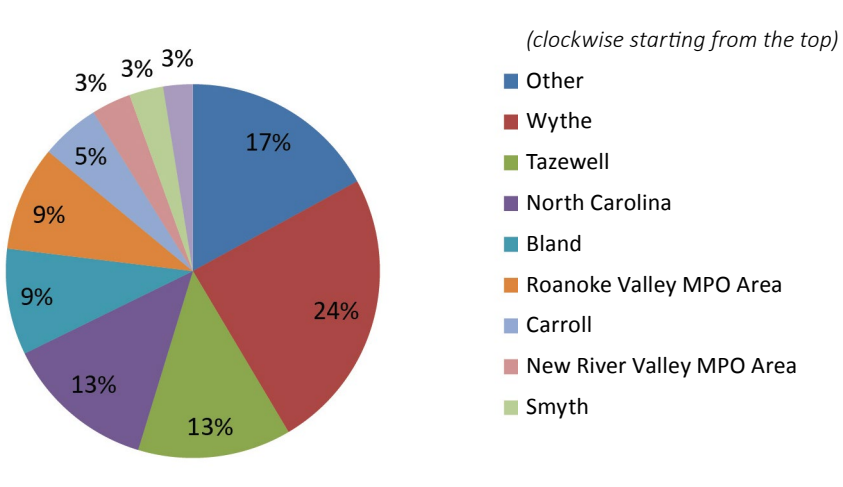
Passenger

Corridor L connects West Virginia and North Carolina, and does not pass through any of the Commonwealth's Metropolitan Planning Organization (MPO) areas. Of the traffic traveling along Corridor L at the West Virginia Border, the highest percentages are destined for locations in Wythe County (24 percent), Tazewell County (13 percent), and North Carolina (13 percent). Of the traffic traveling along Corridor L at the North Carolina border, the highest percentages are destined for locations in Carroll County (20 percent), Wythe County (19 percent), and the Roanoke Valley Area (eight percent).

Corridor L Travel passing North Carolina Border to...



Corridor L Travel passing West Virginia Border to...

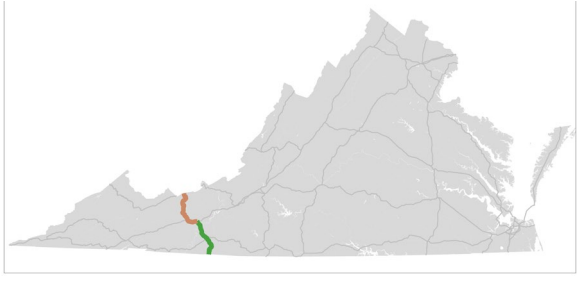


Freight

By truck, Corridor L carried 117 million tons of freight worth $225 billion in 2012, and is estimated to carry 158 million tons of freight worth $334 billion in 2025. Truck freight patterns on this corridor are mostly interstate through-movements, with more than 76 percent of corridor freight tonnage and more than 87 percent of the corridor freight value, passing through Virginia. In terms of both tonnage and value, North Carolina is the largest generator and attractor of truck freight on Corridor L. The largest truck freight movements on Corridor L are between North Carolina and Ohio, accounting for six percent of the total freight tonnage and four percent of the total freight value on the corridor. Several of the largest truck freight flows on Corridor L are movements between the Midwest region and the Southeast region. In terms of value, New York and Pennsylvania are major attractors of truck freight on Corridor L, accounting for 15 percent of the total truck freight value on the corridor.

Truck Freight

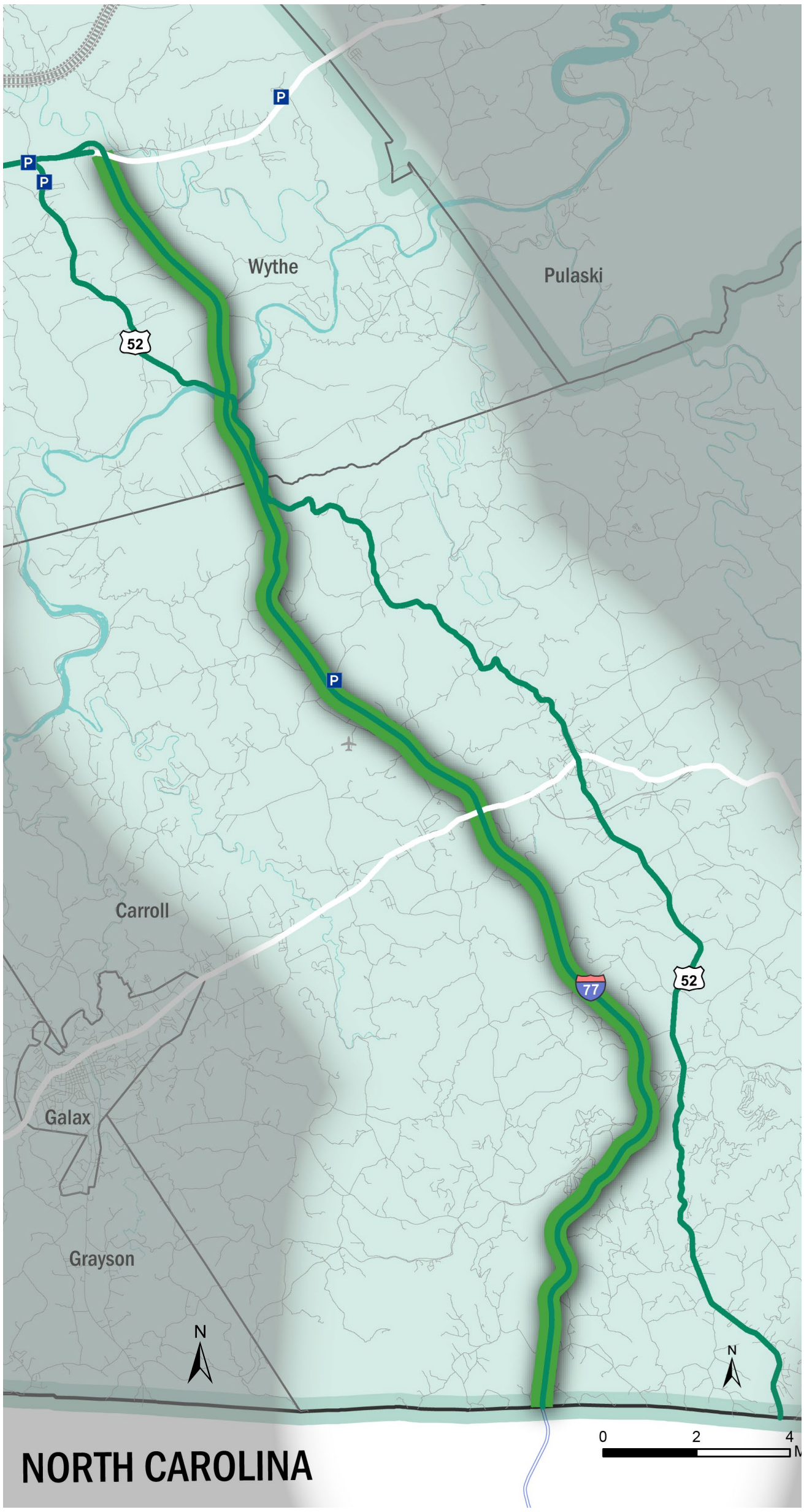
	2012	2025
Truck Freight Value	$225 Billion	$334 Billion
Truck Freight Tonnage	117 Million Tons	158 Million Tons
Freight Value per Ton	$1919	$2111
Corridor Tonnage Passing Through	76%	77%



II. Segment L1

Corridor Segment L1 Components

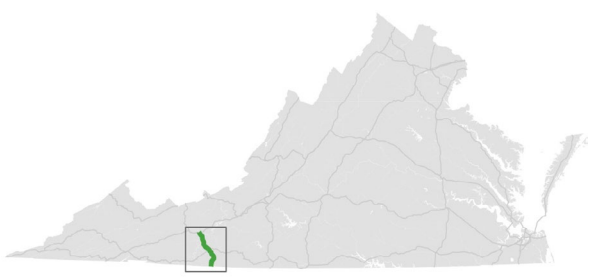
- I-77
- US 52



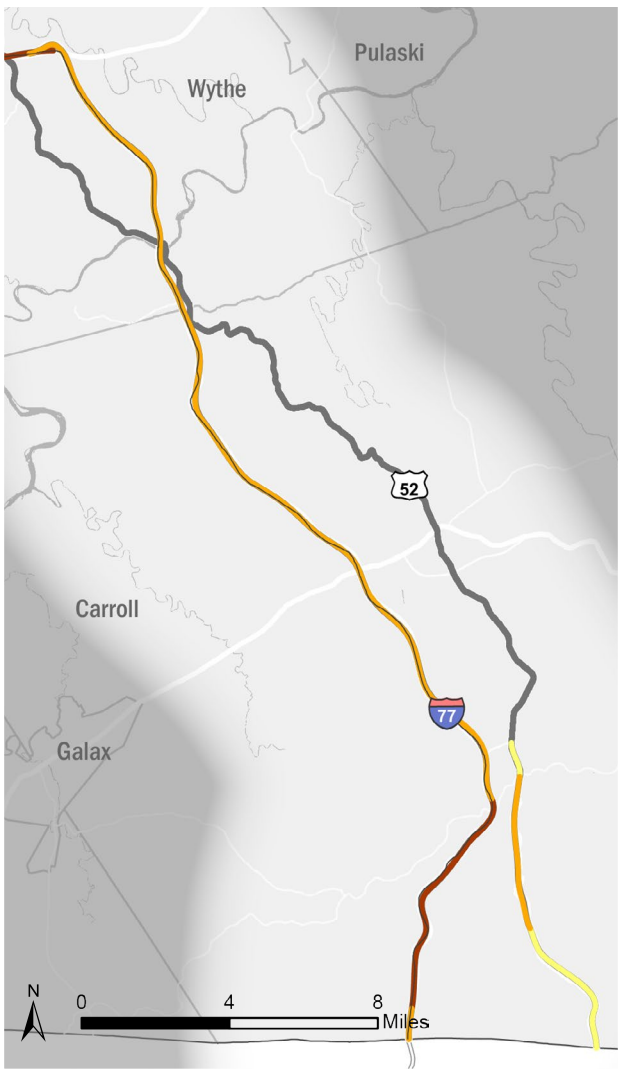
Segment L1

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

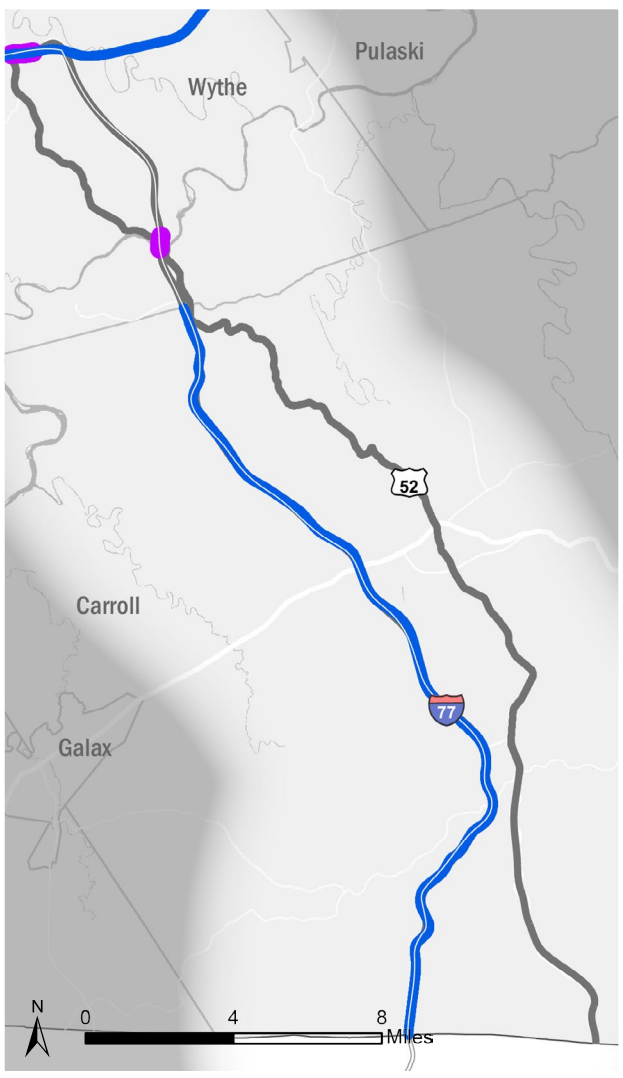


L1 SEGMENT PROFILE



Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Segment L1 begins at the North Carolina border and progresses north to the eastern junction of Interstates I-77 and I-81, serving Carroll and Wythe Counties. The segment does not travel through any area covered by an MPO. Segment L1 serves as an inter-state freight connection, linking North Carolina and South Carolina to West Virginia and the Midwest. The segment also provides a connection between the southeast and freight facilities located within the I-81 corridor, including the Virginia Inland Port.

Highway Facilities: I-77 is primarily a rural highway with four lanes through most of Segment L1. US 52 serves as a parallel highway facility to I-77 throughout this segment.

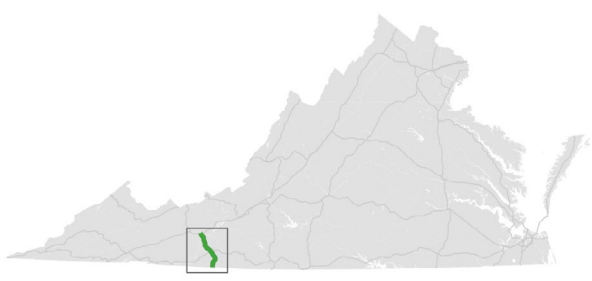
Transit Services: There is one Park-and-Ride location within Segment L1, located north of Woodlawn in Carroll County.

Rail Facilities: There are no freight rail facilities in Segment L1.

Port Facilities: Segment L1 does not provide direct connections to any port facilities, although it does connect to US 58 and I-81, which connect to the Port of Virginia facilities in the Hampton Roads Area and the Virginia Inland Port, respectively.

Airport Facilities: There are no commercial airports in this segment.

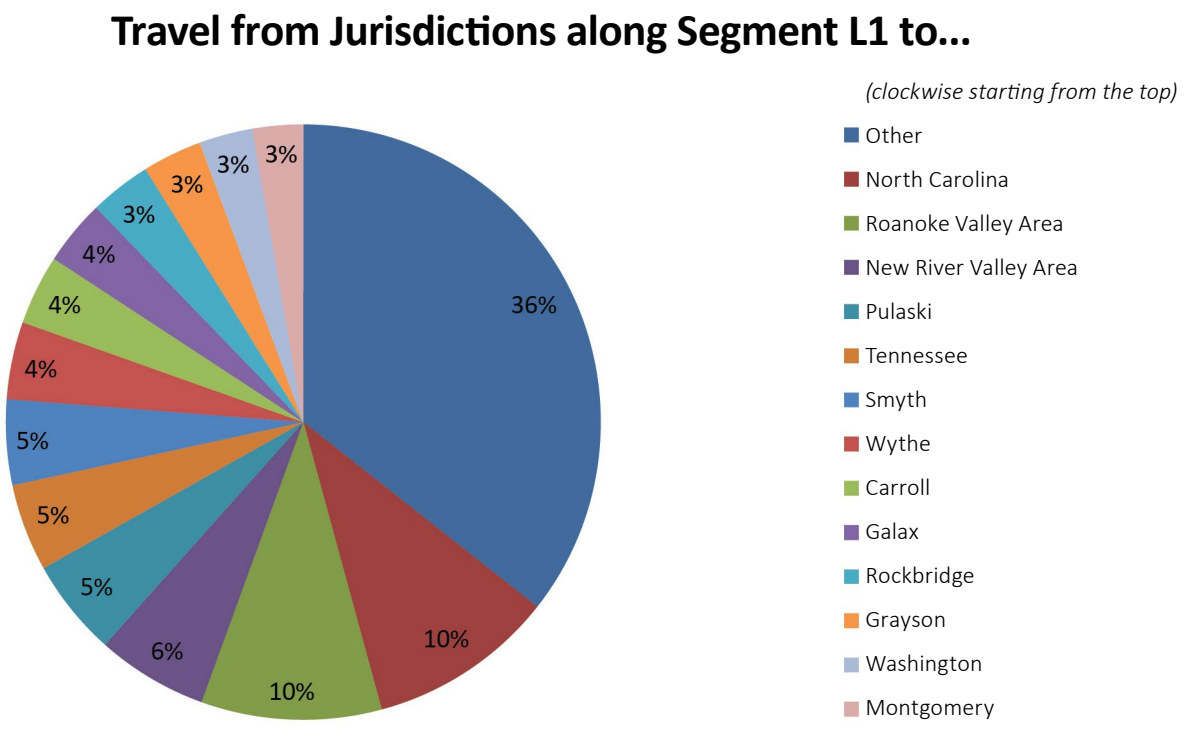
Major planned and future projects include: There are no major planned projects to improve safety or increase capacity at this time.



Travel Demand

Passenger Demand

Segment L1, the southern segment on Corridor L, connects North Carolina to Corridor B via Carroll and Wythe Counties, although it does not provide direct access to any of the Commonwealth's MPO Areas. Intercity passenger travel from these counties accounts for a small percentage of intercity travel in the Commonwealth (just over one percent), but major markets for this travel include North Carolina (ten percent), the Roanoke Valley Area (ten percent), and travel between the two counties (eight percent total), all of which may use portions of Segment L1.





L1 SEGMENT PROFILE

Freight Demand

By truck, Segment L1 carried 80 million tons of freight worth $142 billion in 2012, and is estimated to carry 109 million tons of freight worth $204 billion in 2025. Truck freight patterns on this corridor are mostly interstate through-movements, with more than 76 percent of corridor freight tonnage and more than 87 percent of the corridor freight value, passing through Virginia. In terms of both tonnage and value, North Carolina is the largest generator and attractor of truck freight on Corridor L. The largest truck freight movements on Corridor L are between North Carolina and Ohio, accounting for six percent of the total freight tonnage and four percent of the total freight value on the corridor. Several of the largest truck freight flows on Corridor L are movements between the Midwest and Southeast regions. In terms of value, New York and Pennsylvania are major attractors of truck freight on Corridor L, accounting for 15 percent of the total truck freight value on the corridor. Jurisdictions adjacent to Segment L1 are not major generators or attractors of truck freight on Corridor L, with less than one percent of the freight value originating from or destined for these jurisdictions. Wythe County is the largest generator of truck freight along Segment L1, accounting for two percent of the total truck freight tonnage on Corridor L.

Truck Freight

Major Origins (by Tonnage)
1. North Carolina (16% / 15%)
2. Virginia (14% / 12%)
3. Ohio (8% / 8%)
4. Pennsylvania (7% / 8%)
5. Tennessee (7% / 7%)

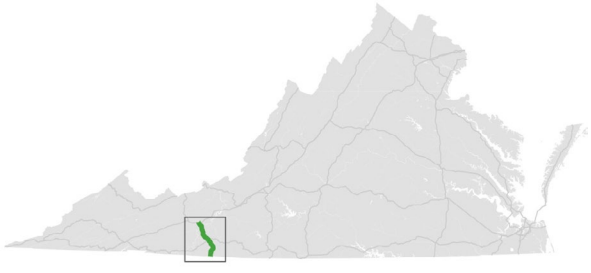
Corridor Tonnage Originating in Segment L1: 3% / 3%

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
Ohio and South Carolina

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. North Carolina (17% / 18%)
2. Virginia (13% / 13%)
3. Pennsylvania (7% / 7%)
4. New York (6% / 6%)
5. Ohio (5% / 5%)

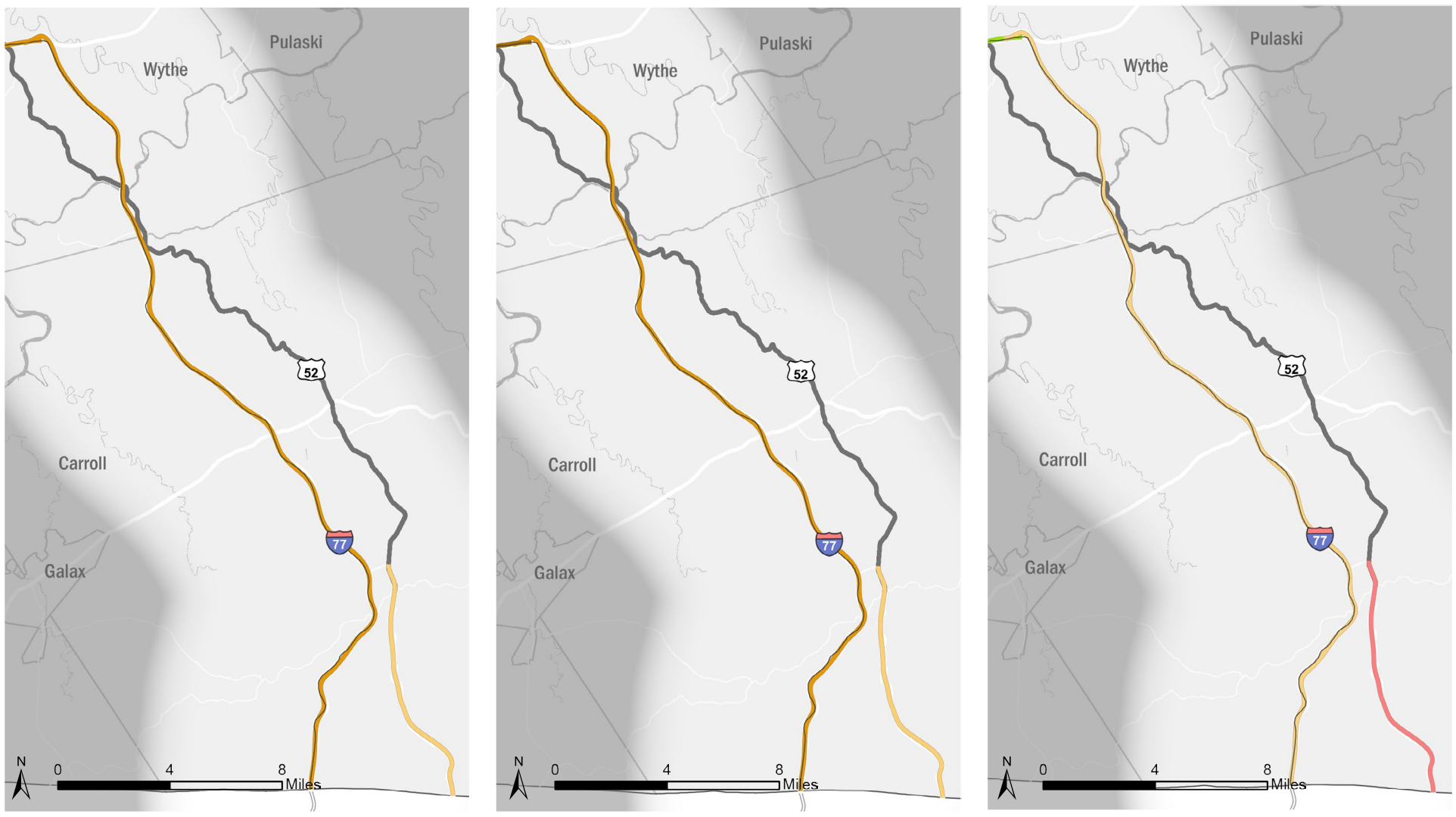
Corridor Tonnage Destined for Segment L1: 1% / 1%

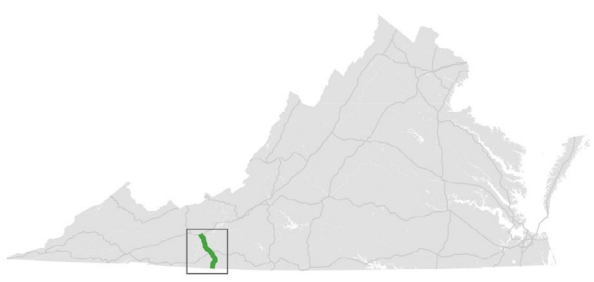


Traffic Conditions

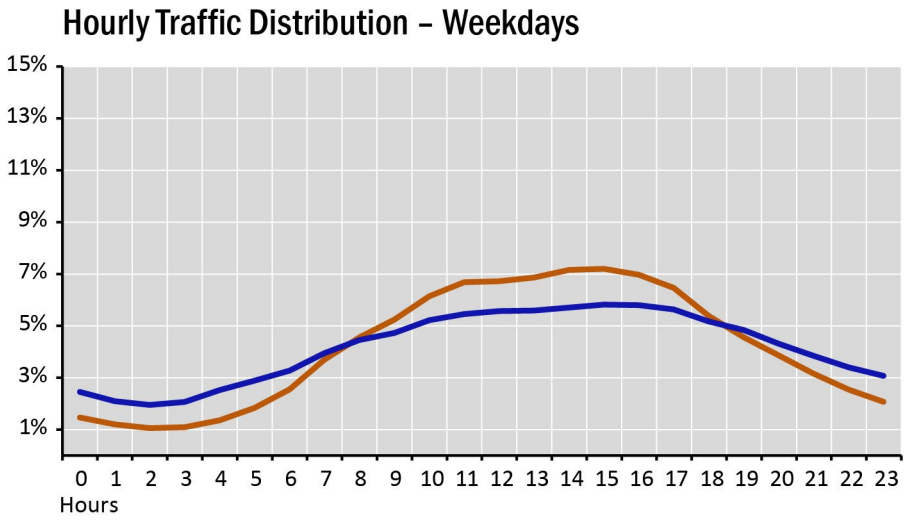
Traffic Volume and AADT

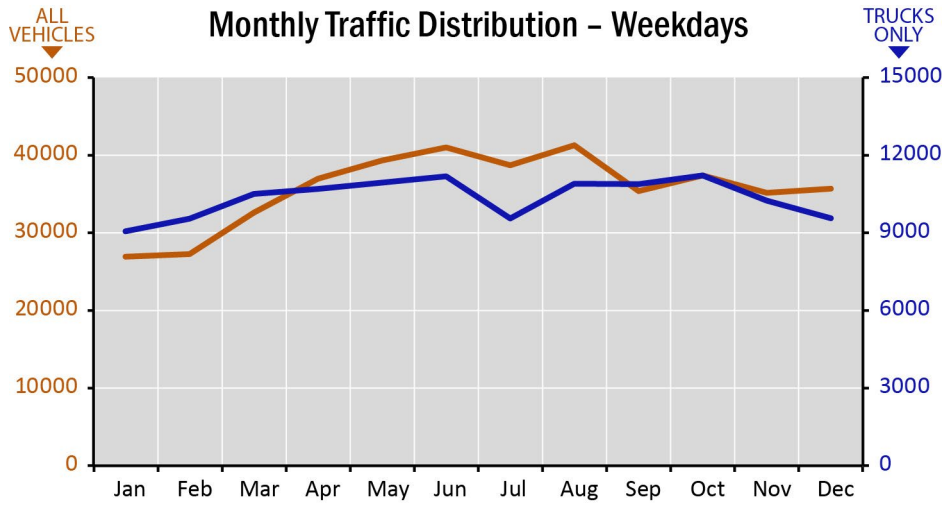
Throughout Segment L1 along I-77, average daily traffic volumes range from 35,000 to 42,000 vehicles. Traffic volumes on US 52 are much lower, with daily volumes less than 8,000 vehicles per day. By 2025, daily traffic volumes along I-77 throughout Segment L1 are projected to increase by approximately 6,000 additional vehicles, with much lower growth projected for US 52.

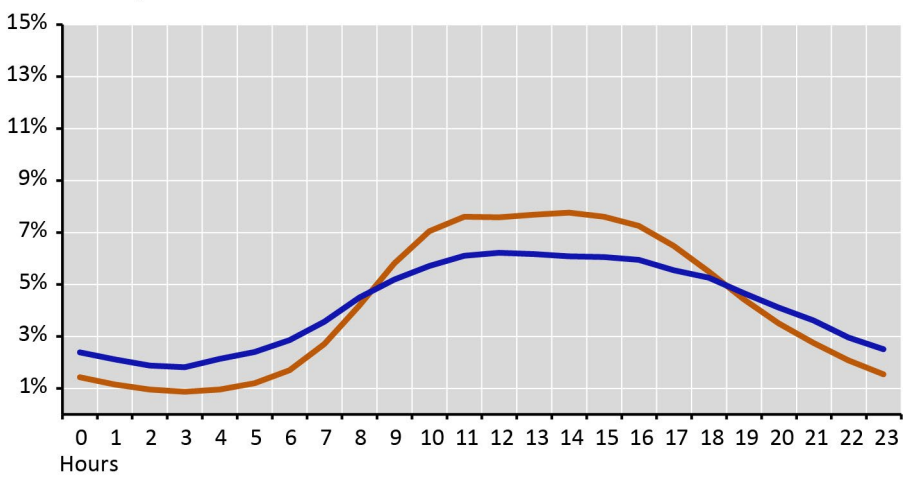


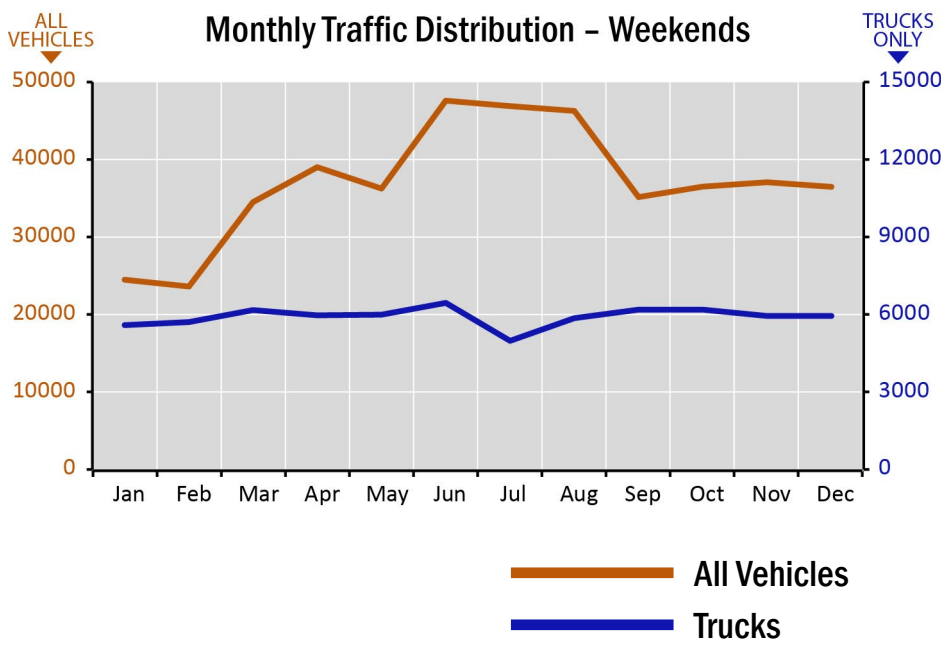


L1 SEGMENT PROFILE





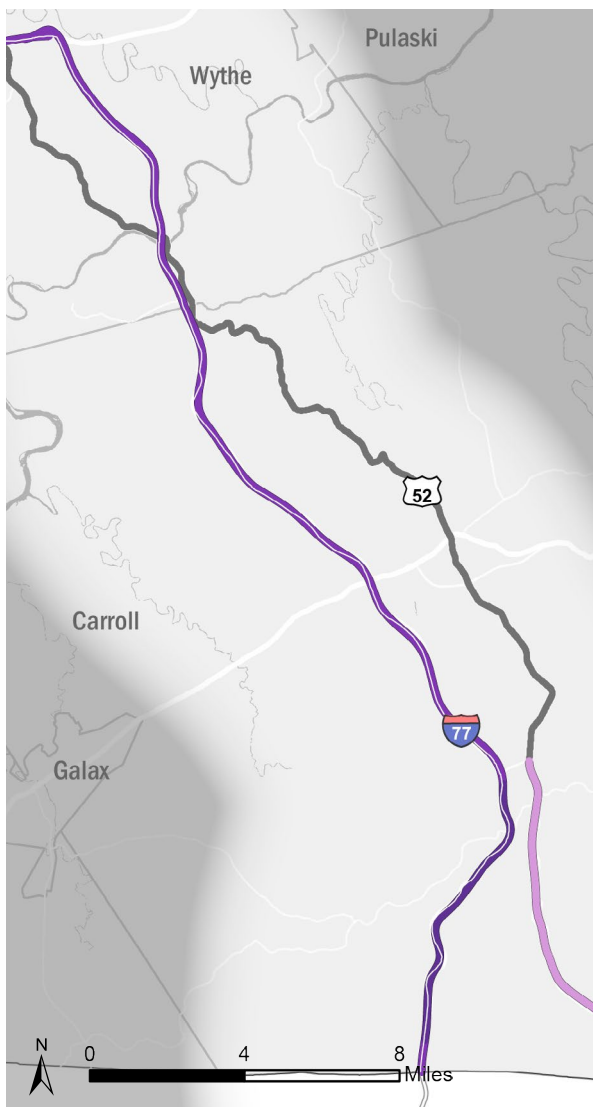




Traffic Distribution

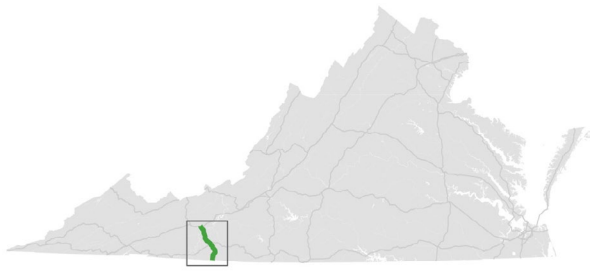
On average, traffic on Segment L1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a single midday peak period, which is very different from typical commute patterns. The highest hourly traffic occurs between 3 and 4 p.m. which accounts for 7.2 percent of daily traffic. The combined weekday traffic from 7 a.m. to 7 p.m. accounts for 73 percent of total daily traffic. Peaking patterns for truck traffic show a similar profile, with an hourly peak flow of 5.8 percent from 4 to 5 p.m. Weekend traffic patterns also show a single midday peak, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (7.8 percent of daily traffic) for all traffic, and noon to 1 p.m. (6.2 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment L1 vary by as much as 54 percent throughout the year, with the high point in August (around 41,000 vehicles per day) and the low point in January (around 27,000 vehicles per day). Truck volumes vary less than passenger volumes, with the October high (around 11,000 vehicles per day) 24 percent higher than the January low (around 9,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (June, around 48,000 vehicles per day) are 102 percent higher than February levels (around 24,000 vehicles per day). Weekend truck traffic is significantly steadier than all vehicle traffic, with the June high (around 6,500 vehicles per day) 29 percent higher than the July low (around 5,000 vehicles per day). Truck volumes account for a significant portion of traffic on Segment L1 (29 percent of overall daily traffic for weekdays and 16 percent of overall daily traffic for weekends); as a result truck traffic has an impact on overall traffic conditions.



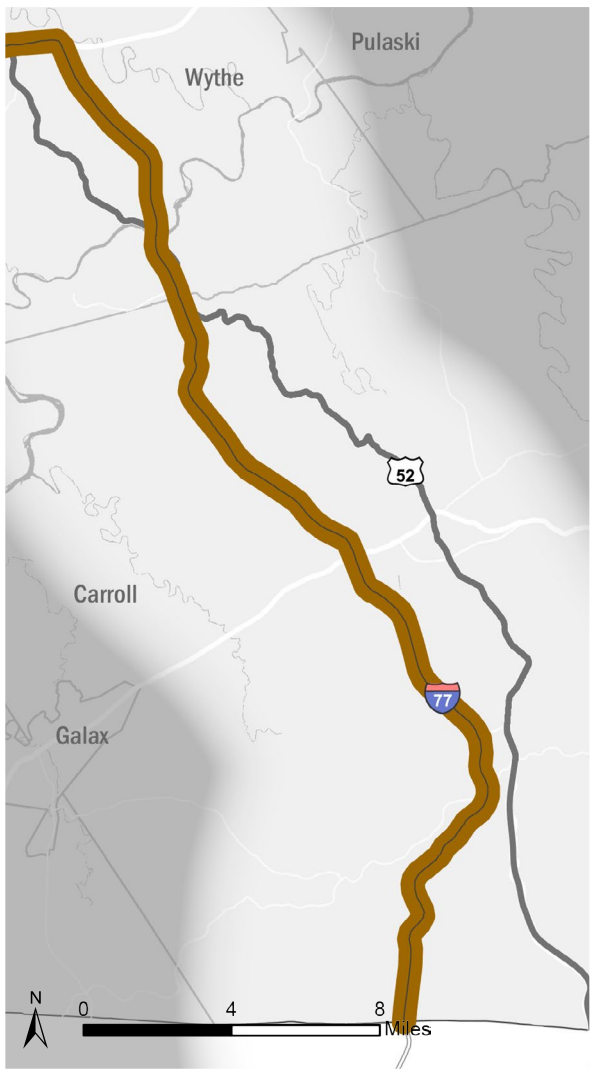
Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment L1 is relatively high. Along I-77 in southern Carroll County, heavy trucks comprise 20 percent of total traffic. Along I-77 from central Carroll County to I-81 in Wythe County, heavy trucks account for 13 percent of total traffic. Trucks account for only three percent of daily traffic on US 52.



L1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012



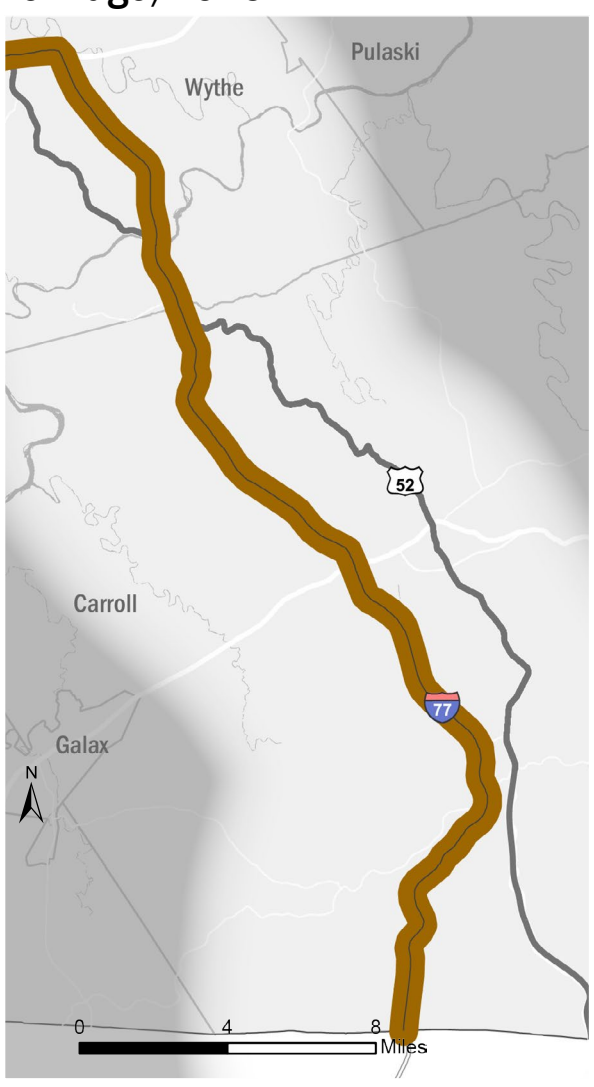
Freight Flows

Freight on Segment L1 is moved only by truck as there is no rail link in the Western Mountain Corridor. In Carroll County, 78 million tons of freight worth 138.5 billion is moved through this section of Segment L1 by truck. On average, a ton of freight moving through this section of Segment L1 is worth $1,774. In 2025, truck freight tonnage and value in this area of Segment L1 are expected to increase. It is anticipated that value per ton on trucks will increase to $1,882.

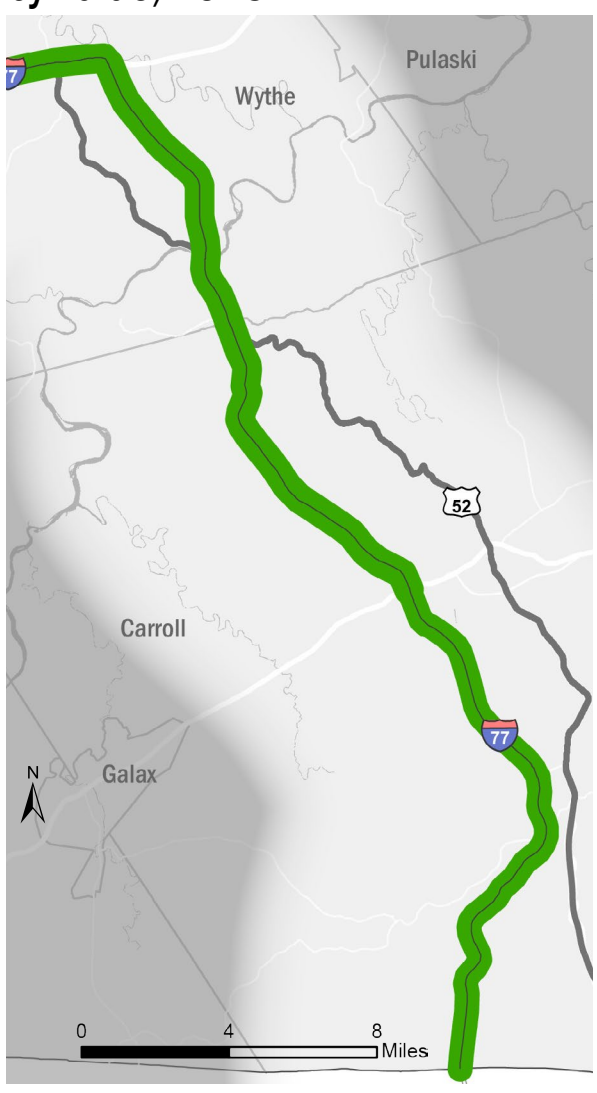
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025

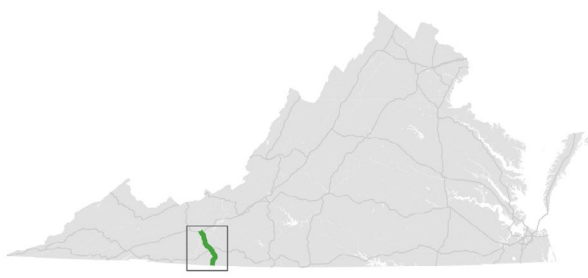


Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M



Truck Freight (Value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B

Redundancy and Mode Choice

Comparable Travel Options

Wytheville to Charlotte, NC

Inter-City Bus
2 Trips per Day
2:40 Travel Time
$47 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

Auto
Via I-77: 2:04 Travel Time $77 Est. Cost
Via I-85 / Rt. 52: 3:23 Travel Time $97 Est. Cost

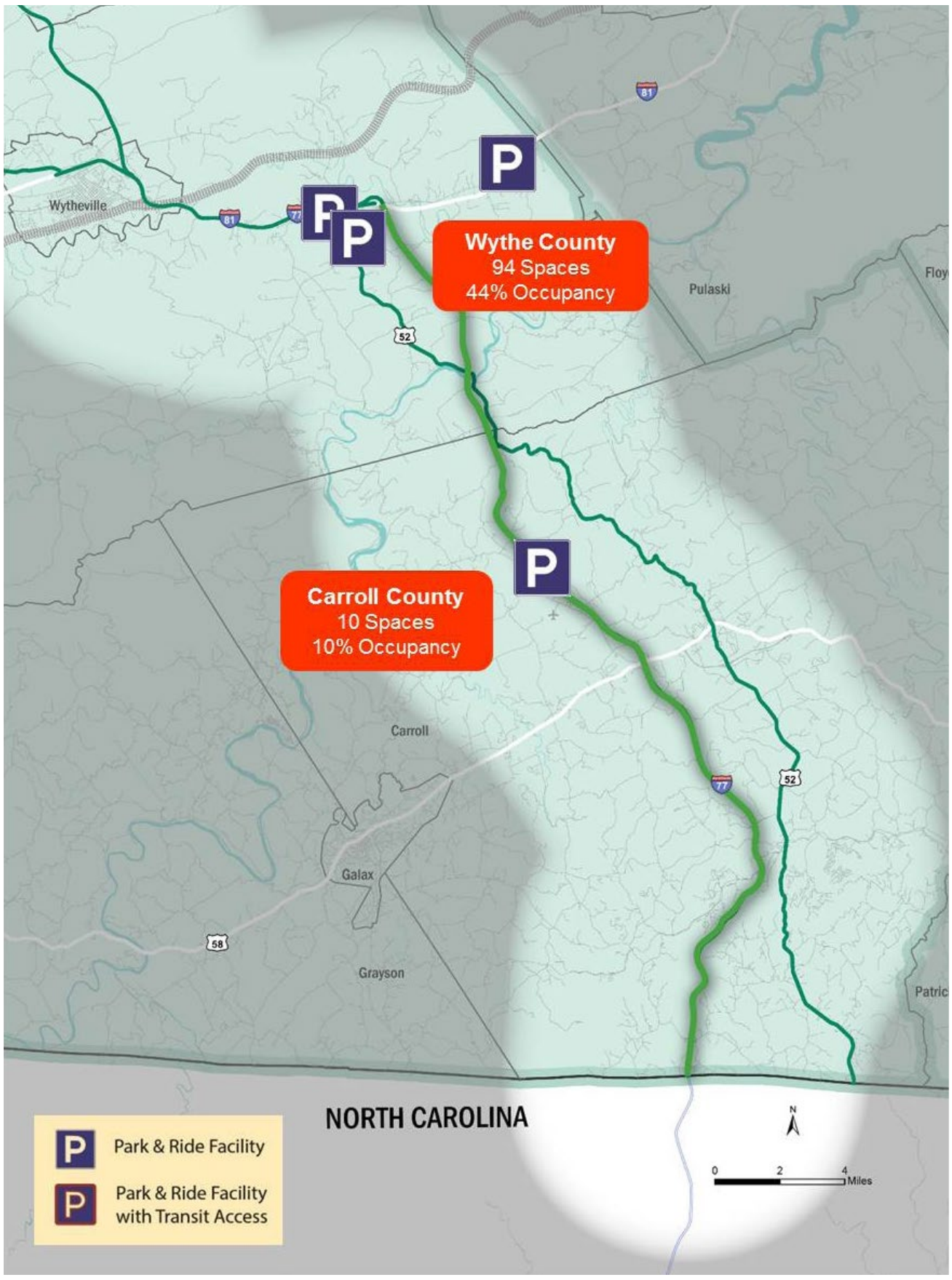
Wytheville to Winston-Salem, NC

Inter-City Bus
1 Trips per Day
1:20 Travel Time
$30 Est. Cost

Train
0 Trips per Day
0:00 Travel Time
$0 Est. Cost

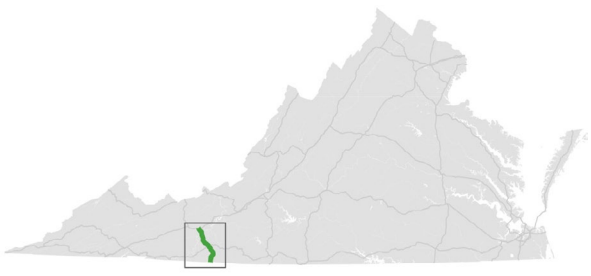
Auto
Via I-77: 1:23 Travel Time $51 Est. Cost
Via Rt. 52: 1:49 Travel Time $50 Est. Cost

Passenger trips on Segment L1 of the Western Mountain Corridor have a limited range of travel options, both in terms of travel path and mode choice. While US 52 serves as a parallel facility, its use for long range travel is limited by speed and capacity; its function as a parallel facility is primarily for local access and bypassing incidents causing congestion on sections of I-77. Applying the 2014 federal standard mileage rates of 56 cents per mile, long-distance trips would be more expensive by automobile than by the available bus service. However, the Greyhound service from Wytheville is limited by the frequency of service.



Park-and-Ride

Within Segment L1, commuters can use one Park-and-Ride location in Carroll County. This Park-and-Ride location, north of Woodland, has a low number of spaces (ten) and a utilization rate of ten percent, which is far below the statewide average of 76 percent for Park-and-Ride utilization.



L1 SEGMENT NEEDS

Safety

Performance Metrics:

Number of Severe Crashes	--
Severe Crashes/Million VMT	--
Number of Railroad Crashes	1

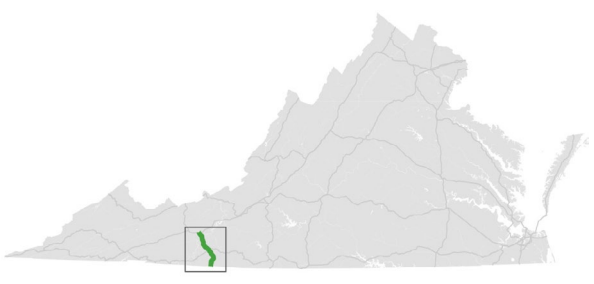
Between 2010 and 2012, no severe crashes occurred along Segment L1.

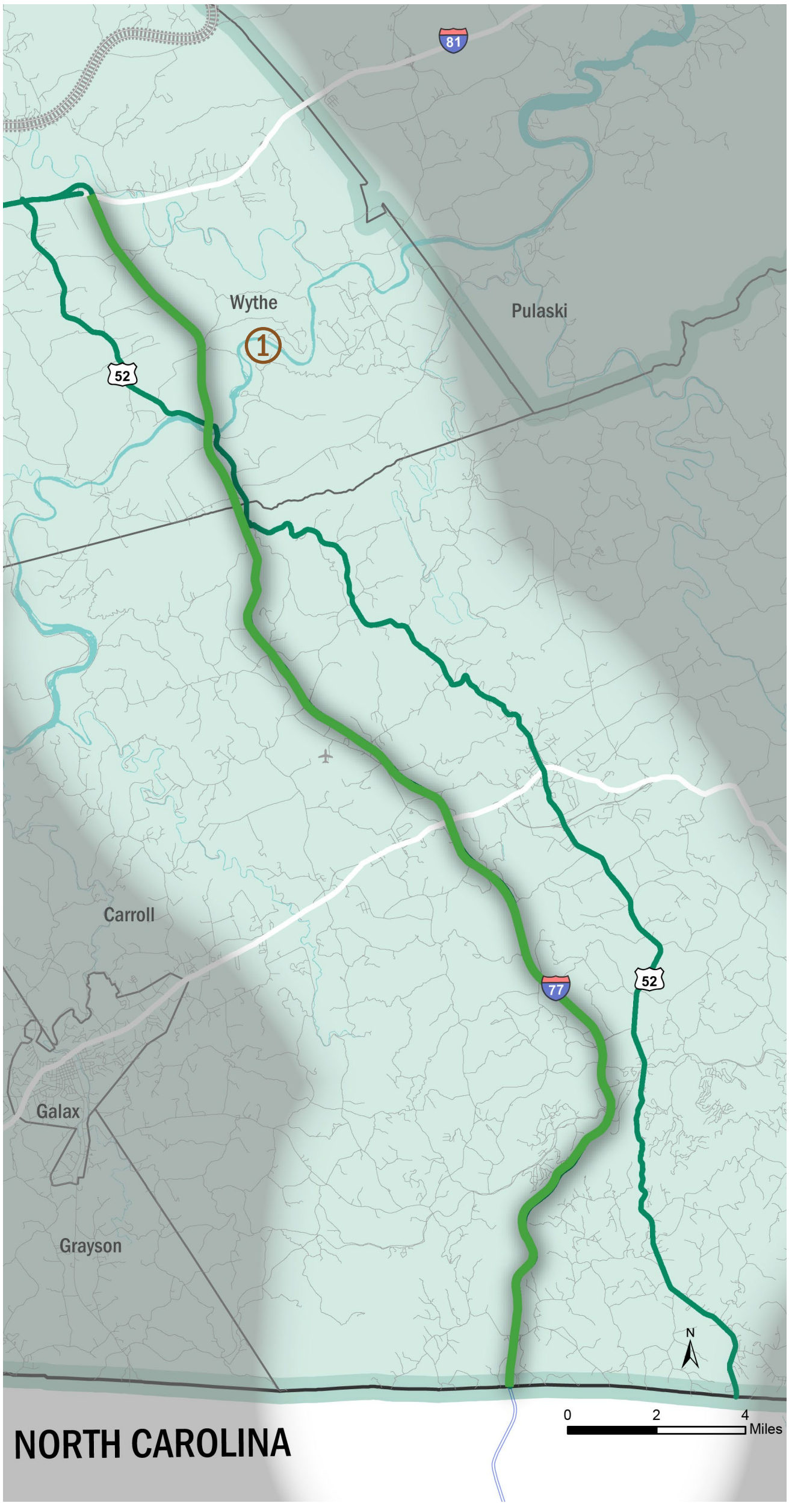
Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#





Congestion

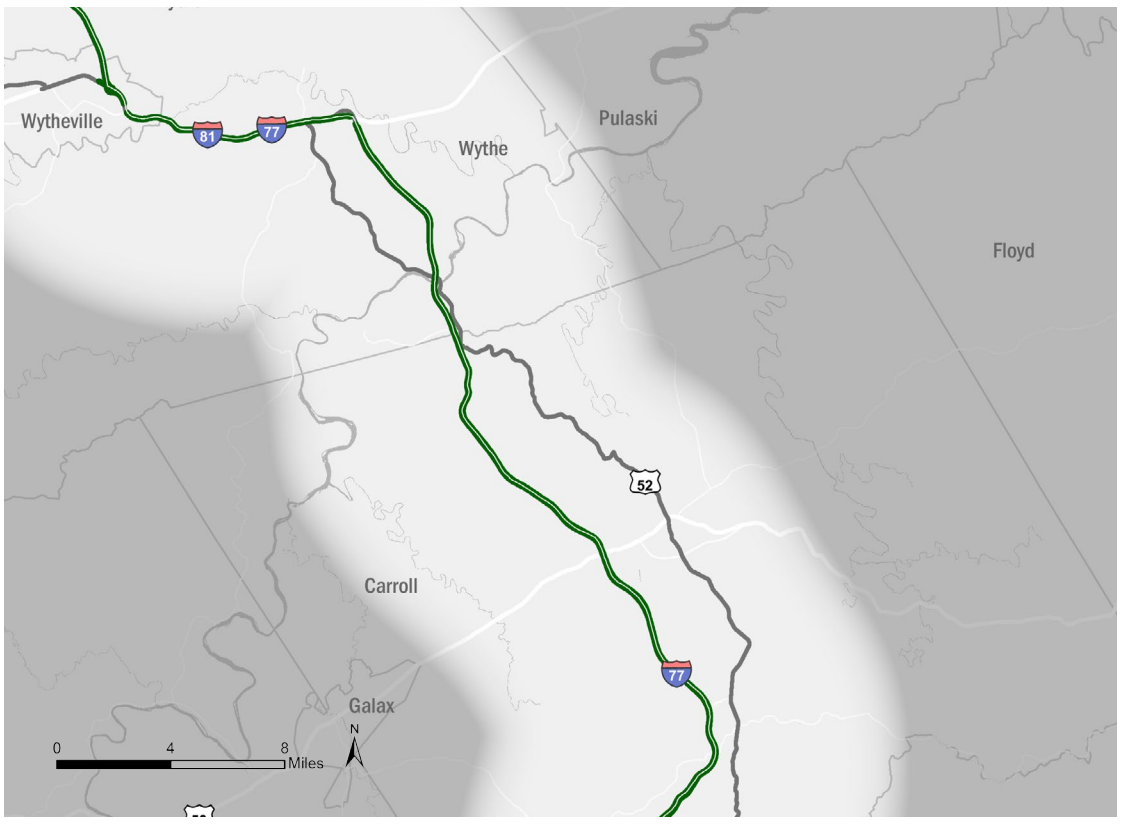
Performance Metrics

Person Hours of Delay per Mile	1
Freight Ton Hours of Delay per Mile	43.4K

Passenger Delays

Passenger delays along Segment L1 are among the lowest in the CoSS segments with daily delays of just 46 person-hours. Passenger congestion is minimal through most of the segment, with no locations experiencing delays of greater than 100 person-hours per mile. Peak-period passenger delays account for 24 percent of daily congestion, which is considerably less than the average for the peak-period share of congestion on CoSS segments.

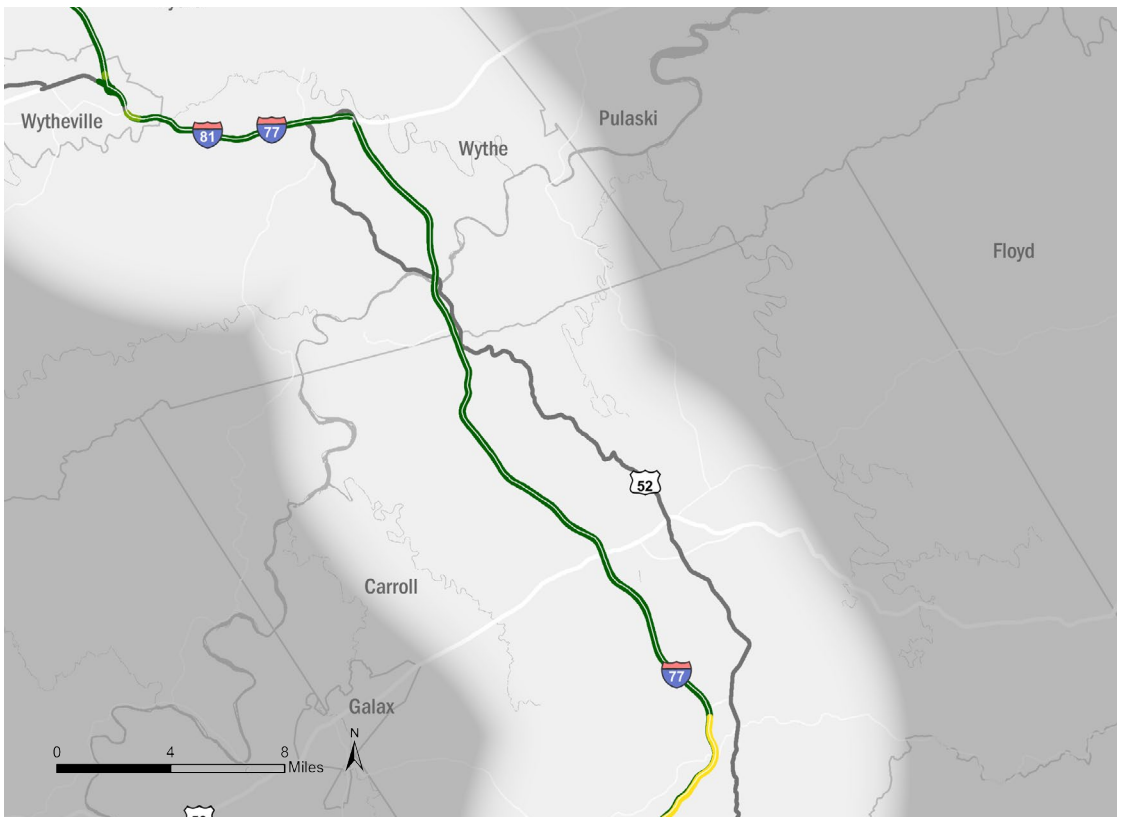
Daily Person Hours of Delay per Mile

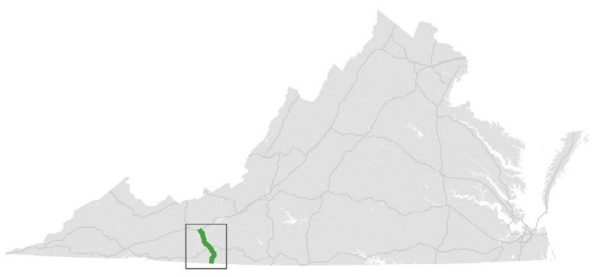


Freight Delays

Unlike passenger delays, there are some significant freight delays on Segment L1. This segment, which is ranked as one of the most congested freight segments, has an average delay of over 43,000 ton-hours per mile. Congestion on most of Segment L1 is minimal, with delays exceeding 250,000 ton-hours per mile on I-77 in Carroll County south of Route 148 near Fancy Gap. This congestion is indicative of heavy freight movement between Virginia and North Carolina. Peak-period freight delays account for 16 percent of daily congestion, which is considerably less than the average for the peak-period share of congestion on CoSS segments.

Daily Freight Ton Hours of Delay per Mile





Reliability

Weekday Peak

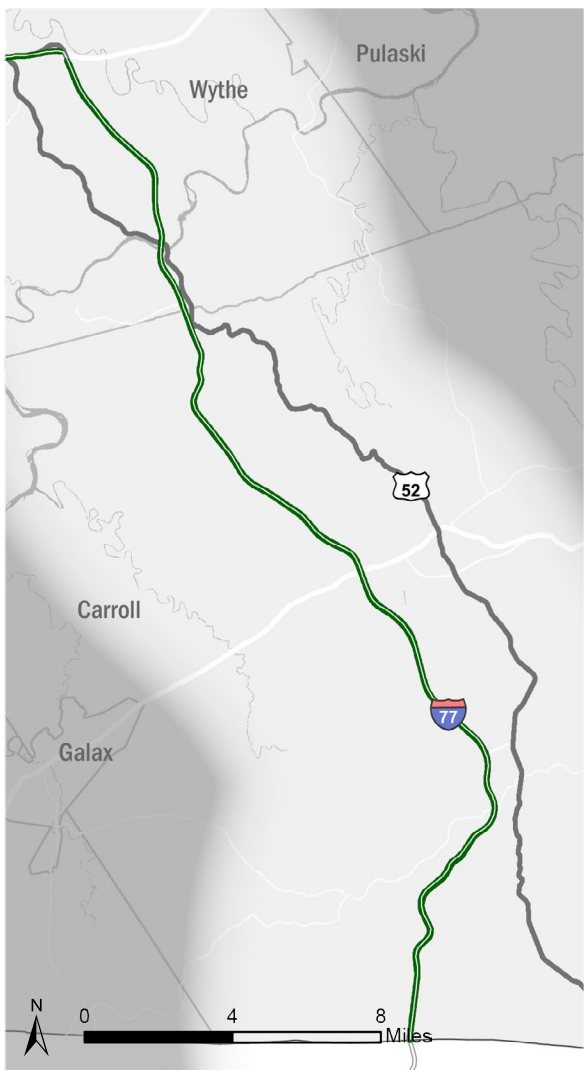
Reliability of travel during the peak period on a typical weekday on Segment L1 ranges from 0.02 to 0.07 in terms of reliability index, with an average value of 0.03. This segment has a peak period reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L1 have reliability index values exceeding the statewide threshold.

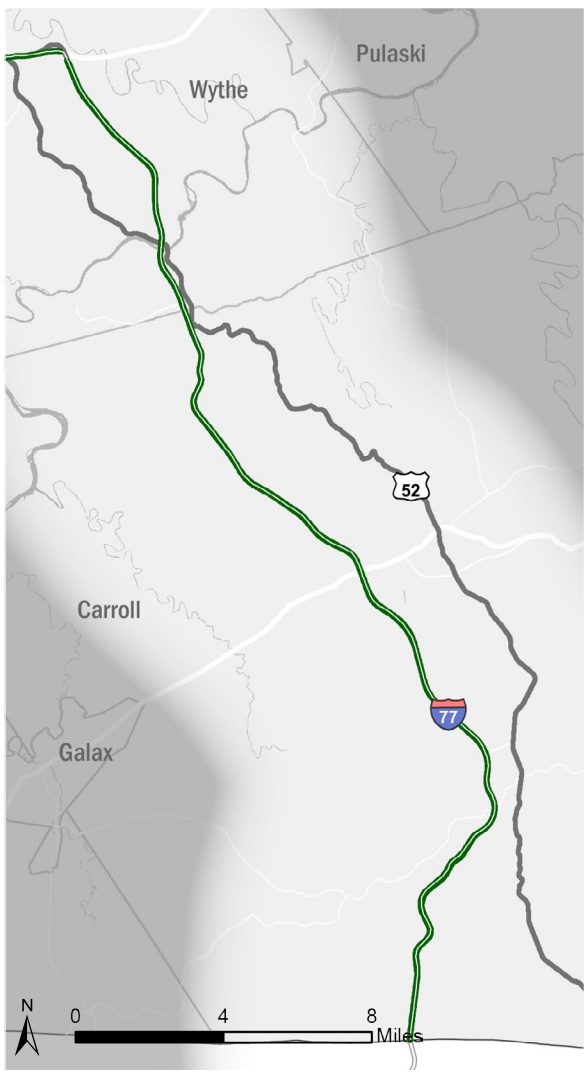
Weekday

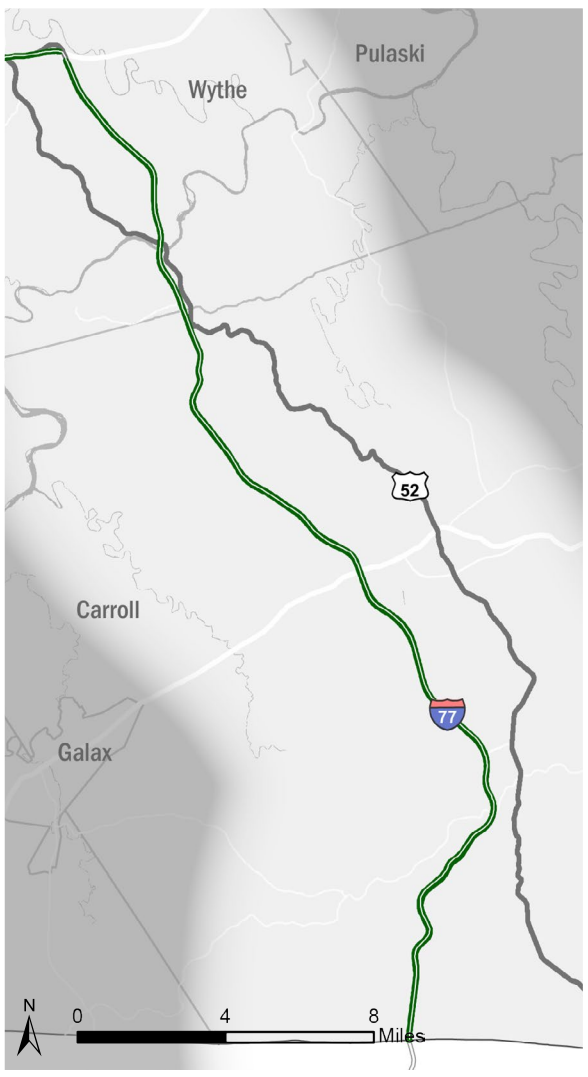
Reliability of travel during a typical weekday ranges from 0.02 to 0.11 in terms of reliability index, with an average value of 0.03. This segment has a weekday reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.02 to 0.09 in terms of reliability index, with an average value of 0.04. This segment has a weekend reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L1 have reliability index values exceeding the statewide threshold.





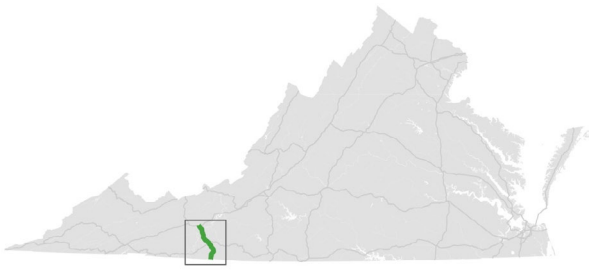


Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy

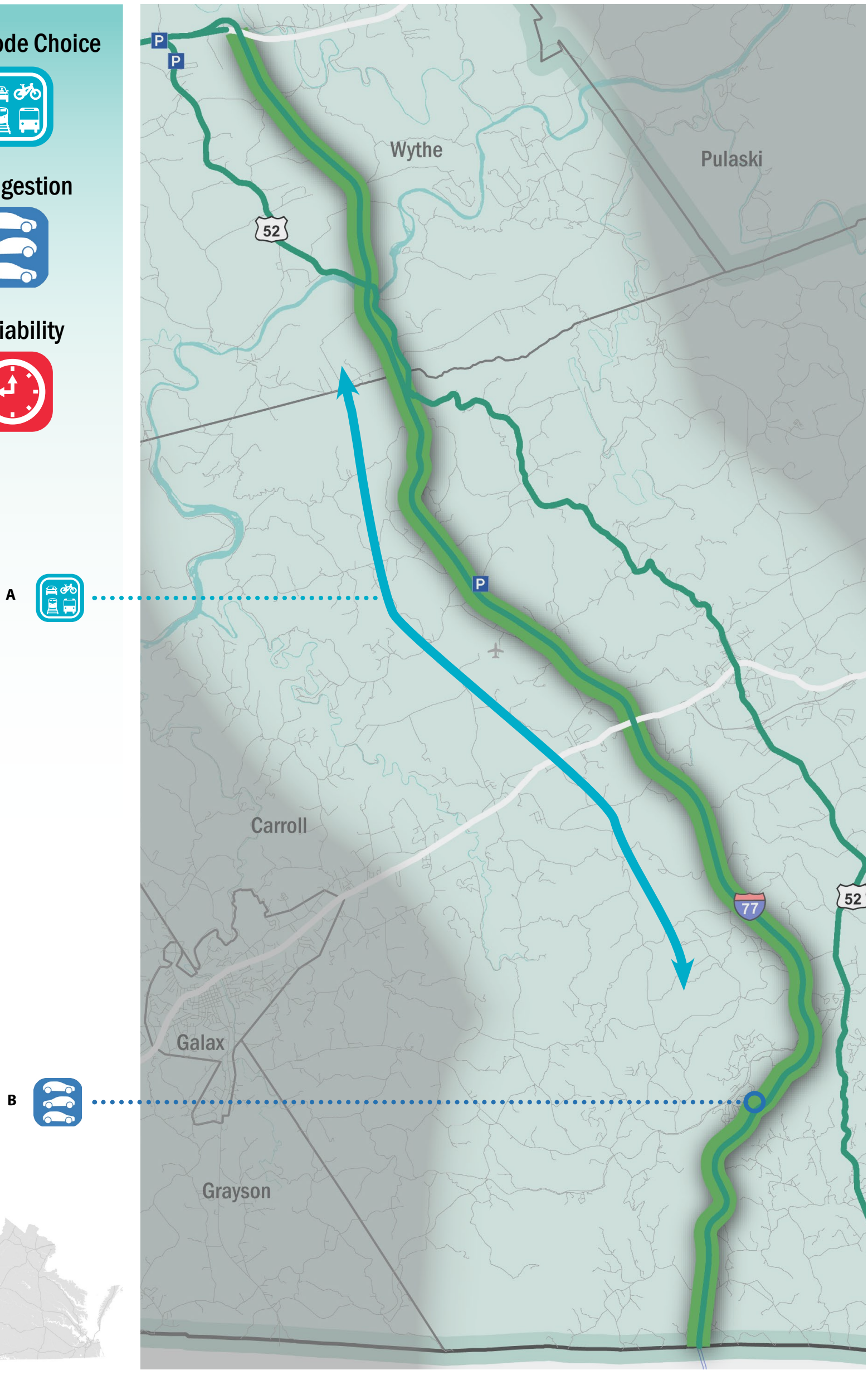
Mode Choice

Safety

Congestion

Bottlenecks

Reliability



L1 SEGMENT NEEDS

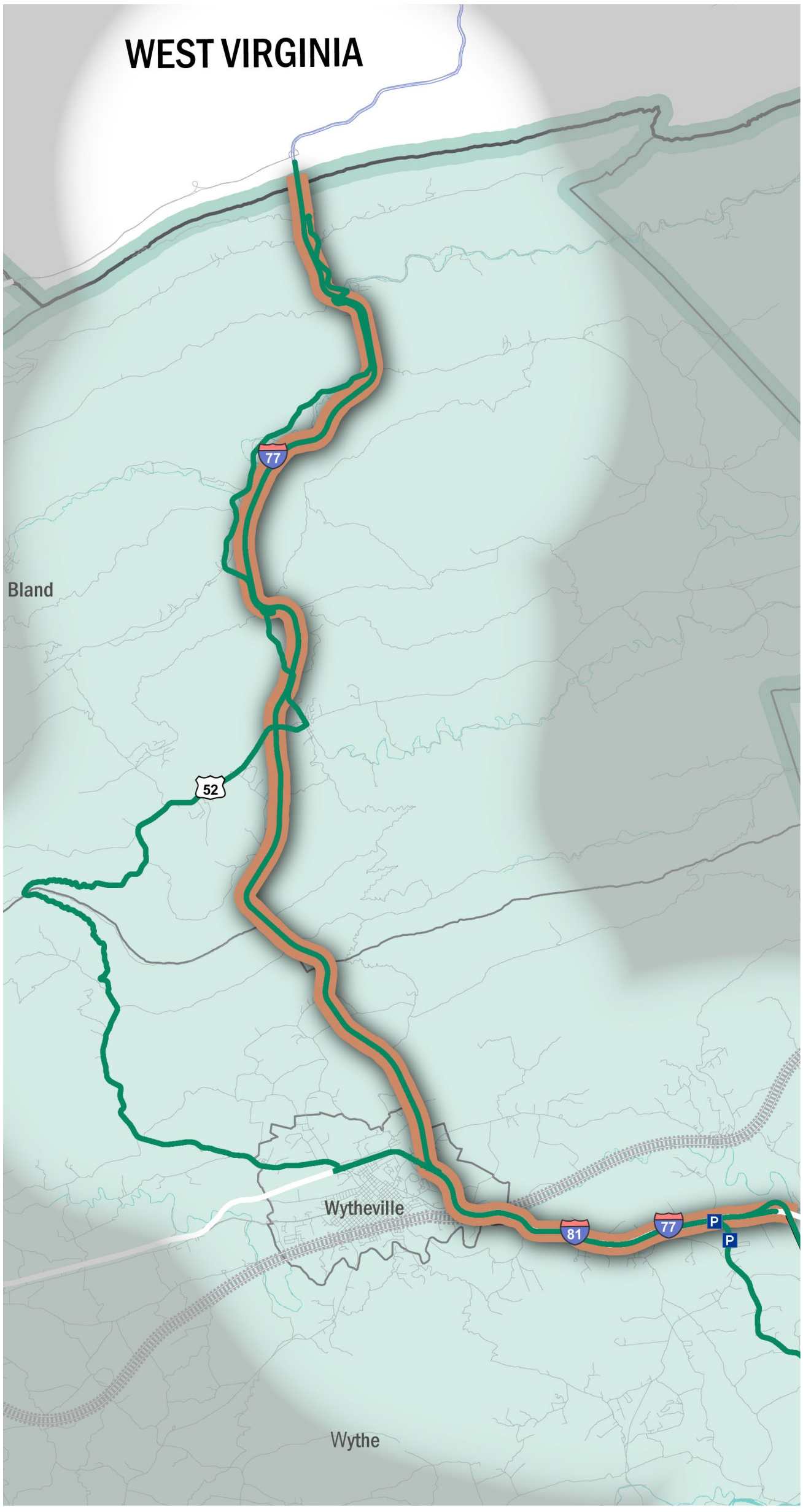
Summary of Needs - L1 Segment

A.		**Intercity bus service from Wytheville north only runs twice per day; no passenger rail service is available in the corridor**
B.		**Congestion issue on I-77 between Exit 1 (VA Route 620) and Exit 8 (VA Route 148) in Carroll County**

III. Segment L2

Corridor Segment L2 Components

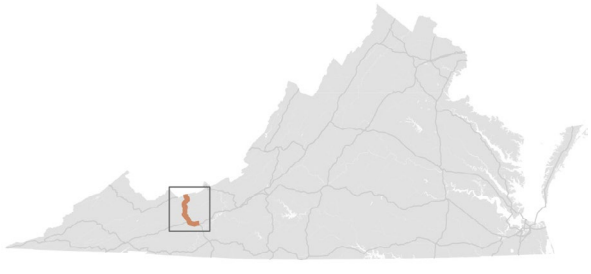
- I-77
- US 52
- Intercity bus service



Segment L2

Corridor Component Road
Railroad
Airport Facility
Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility

MPO Area
Planning District Area

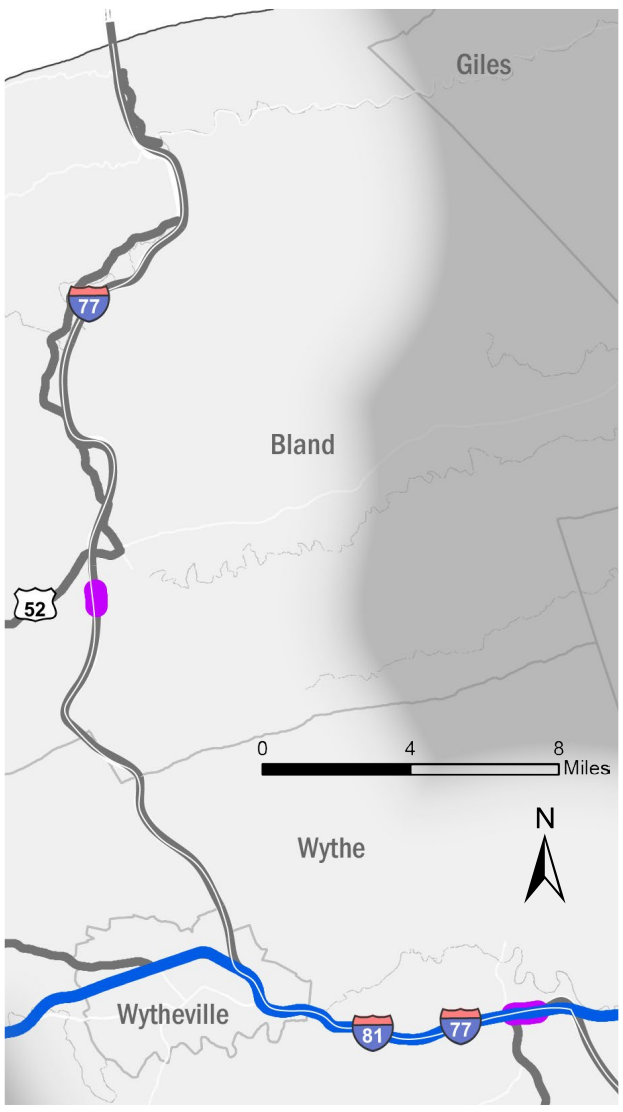


L2 SEGMENT PROFILE



Number of Lanes (both directions)

2
3 - 4
5 - 6
7 - 8
9 - 12
Primary facility



Future Projects

Reconstruction with added capacity
Safety improvements
Primary facility

Segment L2 begins at the eastern junction of I-77 and I-81 and follows I-81 into Wytheville, where it advances north to the West Virginia border. The segment serves Bland and Wythe Counties and does not travel through any areas covered by a Metropolitan Planning Organization (MPO). Segment L2 serves as an inter-state freight connection, linking North Carolina and South Carolina to West Virginia and the Midwest. The segment also provides a connection between West Virginia, the Midwest states, and freight facilities located within the I-81 corridor, including the Virginia Inland Port.

Highway Facilities: I-77 is primarily a rural highway with four lanes in Segment L2, except where I-77 runs concurrently with I-81/US 11 between Wytheville and Fort Chiswell. In areas of this segment where it does not run concurrently with I-77, US 52 serves as a parallel highway facility to I-77.

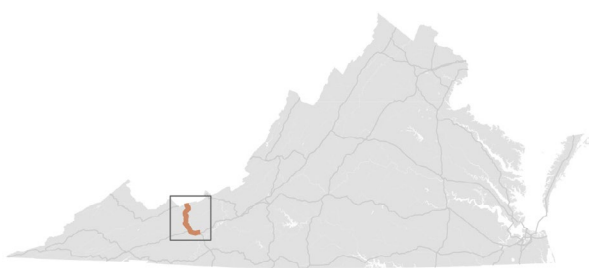
Transit Services: Greyhound provides bus service from a station in Wytheville. There are several Park-and-Ride locations located in Segment L2, clustered around Fort Chiswell.

Rail Facilities: Norfolk Southern's Crescent Corridor rail lines pass through Segment L2, providing connections north and south along Corridor B and the Virginia Inland Port, south of Winchester.

Port Facilities: Segment L1 does not provide direct connections to any port facilities, although it does run concurrently with I-81, which connects to the Virginia Inland Port.

Airport Facilities: There are no commercial airports located in Segment L2.

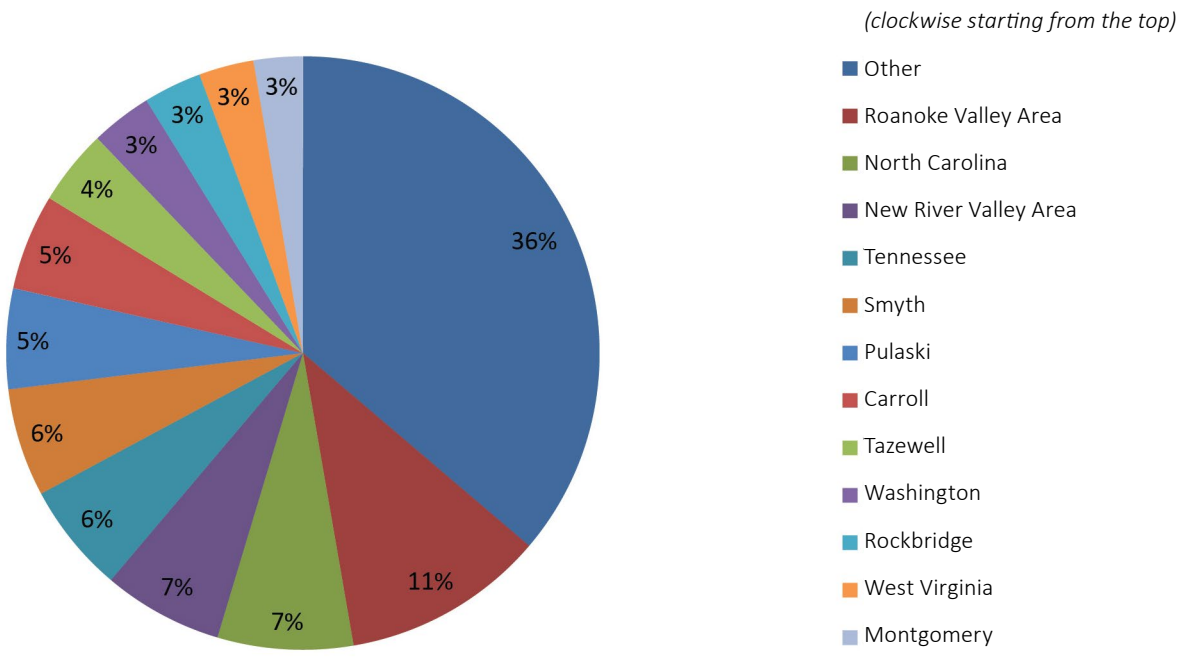
Major planned and future projects: There are no major planned projects to improve safety or increase capacity at this time.

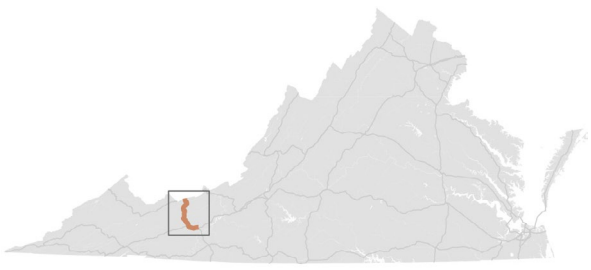


Travel Demand

Passenger Demand

Segment L2, the northern segment on Corridor L, connects West Virginia to Corridor B via Bland and Wythe Counties, although it does not provide direct access to any of the Commonwealth's MPO areas. Intercity passenger travel from these counties accounts for a small percentage of intercity travel in the Commonwealth (approximately 0.9 percent), but major markets for this travel include the Roanoke Valley Area (11 percent), North Carolina (seven percent), and the New River Valley Area (seven percent), all of which may use portions of Segment L1.





L2 SEGMENT PROFILE

Freight Demand

By truck, Segment L2 carried 56 million tons of freight worth $101 billion in 2012, and is estimated to carry 78 million tons of freight worth $148 billion in 2025. Truck freight patterns on this corridor are mostly interstate through-movements, with more than 76 percent of corridor freight tonnage and more than 87 percent of the corridor freight value, passing through Virginia. In terms of both tonnage and value, North Carolina is the largest generator and attractor of truck freight on Corridor L. The largest truck freight movements on Corridor L are between North Carolina and Ohio, accounting for six percent of the total freight tonnage and four percent of the total freight value on the corridor. Several of the largest truck freight flows on Corridor L are movements between the Midwest and Southeast regions. In terms of value, New York and Pennsylvania are major attractors of truck freight Corridor L, accounting for 15 percent of the total truck freight value on the corridor. Jurisdictions adjacent to Segment L2 are not major generators or attractors of truck freight on Corridor L, with less than one percent of the truck freight value originating from or destined for these jurisdictions. Wythe County is the largest generator of truck freight along Segment L2, accounting for two percent of the total truck freight tonnage originating on Corridor L.

Truck Freight

Major Origins (by Tonnage)
1. North Carolina (16% / 15%)
2. Virginia (14% / 12%)
3. Ohio (8% / 8%)
4. Pennsylvania (7% / 8%)
5. Tennessee (7% / 7%)

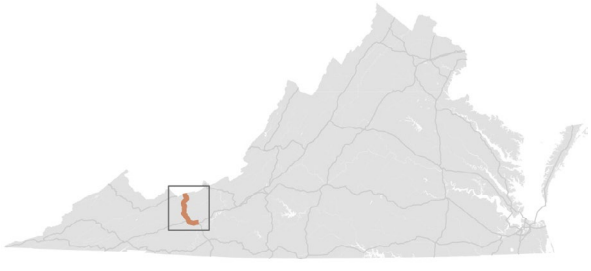
Corridor Tonnage Originating in Segment L2: 2% / 2%

Major Origin-Destination Pairs for Freight
North Carolina and Ohio
North Carolina and Pennsylvania
North Carolina and West Virginia
Ohio and Florida
Ohio and South Carolina

Percentages represent 2012 / 2025 values.

Major Destinations (by Tonnage)
1. North Carolina (17% / 18%)
2. Virginia (13% / 13%)
3. Pennsylvania (7% / 7%)
4. New York (6% / 6%)
5. Ohio (5% / 5%)

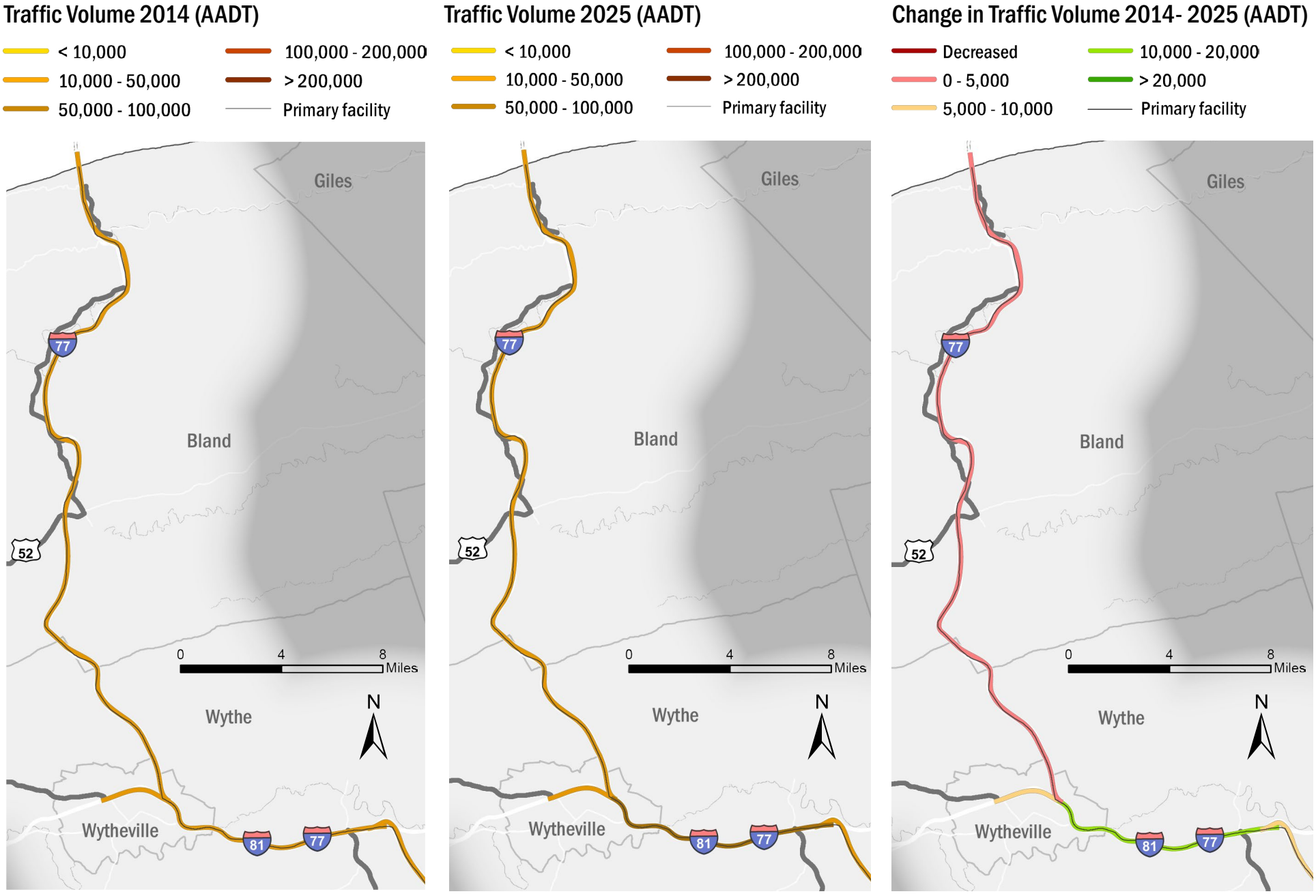
Corridor Tonnage Destined for Segment L2: <1% / <1%



Traffic Conditions

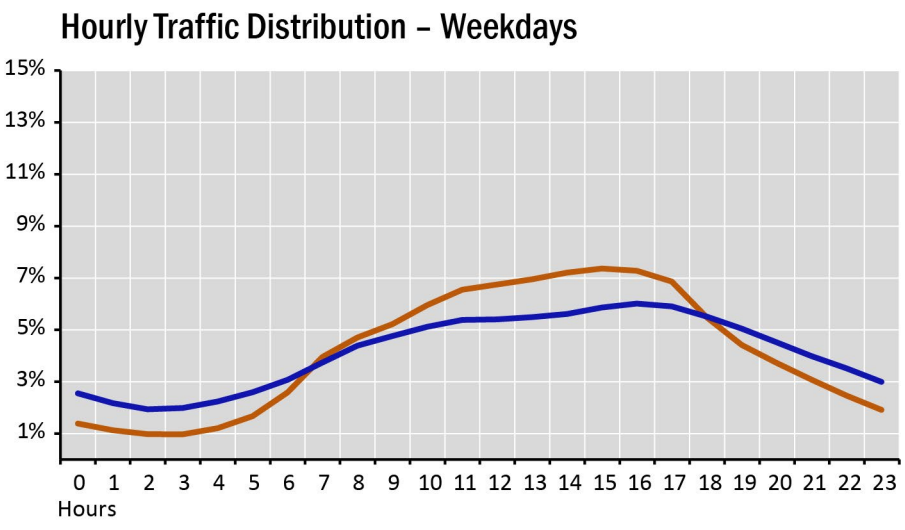
Traffic Volume and AADT

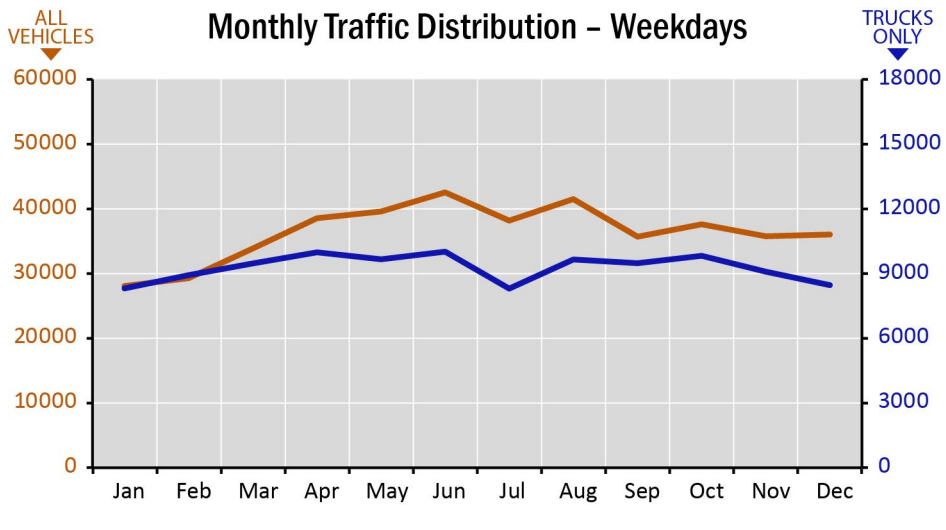
Traffic volume varies on Segment L2 depending upon location. Along the concurrent section of I-77/I-81 between Wytheville and Fort Chiswell, average daily traffic volume is approximately 47,000 vehicles. Along this section, daily traffic volumes are projected to increase by 11,000 vehicles by 2025. Along I-77 north of I-81, average daily traffic volume is approximately 24,000 vehicles. On this section of I-77 north of I-81, daily traffic volumes are projected to increase by approximately 3,000 vehicles by 2025.

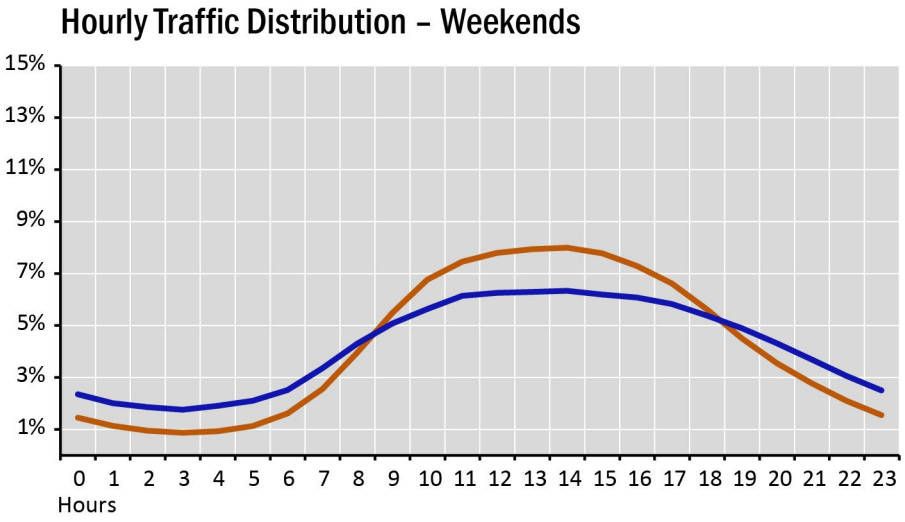


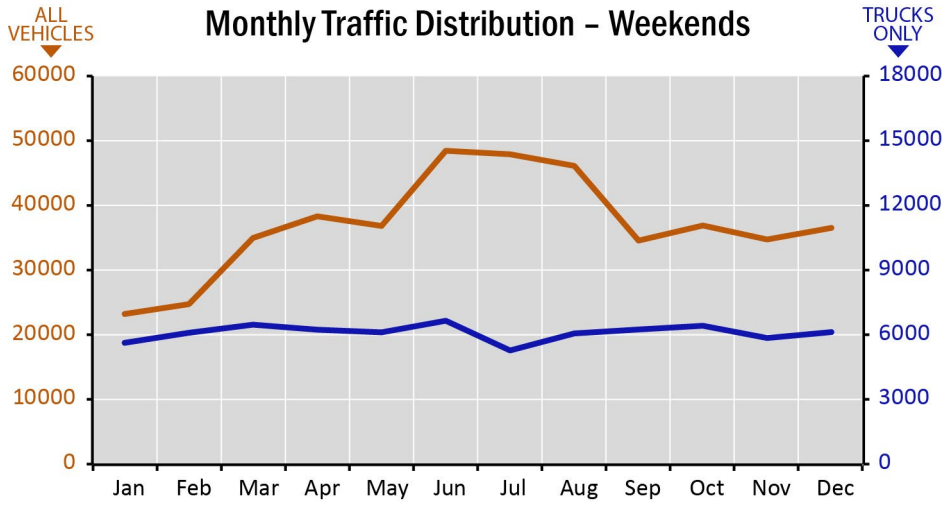


L2 SEGMENT PROFILE









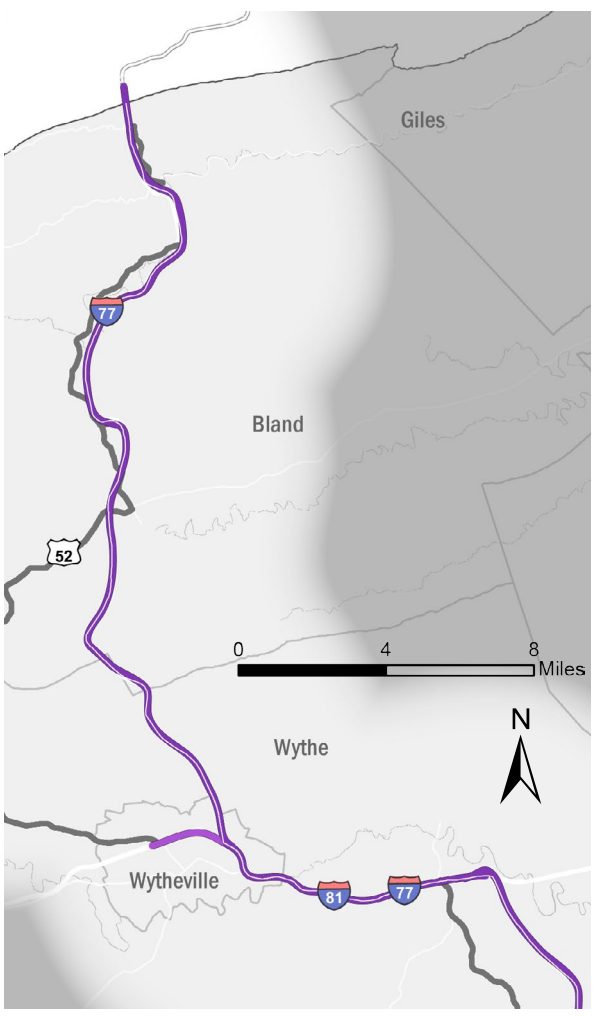
All Vehicles

Trucks

Traffic Distribution

On average, traffic on Segment L2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows a single afternoon peak with the highest flow occurring between 3 and 4 p.m. The combined weekday traffic from the 7 a.m. to 7 p.m. period accounts for 74 percent of total daily traffic. Peaking patterns for truck traffic show a similar profile to overall weekday traffic, with a peak hour flow of 6.0 percent between 4 and 5 p.m. Weekend traffic patterns also show a single midday peak, with the highest percentage of hourly traffic occurring between 2 and 3 p.m. (8.0 percent for all traffic and 6.3 percent for truck traffic).

Weekday traffic volumes on Segment L2 vary by as much as 52 percent throughout the year, with the high point in June (around 42,000 vehicles per day) and the low point in January (around 28,000 vehicles per day). Truck volumes vary less than passenger volumes, with the June high (around 10,000 vehicles per day) 21 percent higher than the January low (around 8,300 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (June, around 48,000 vehicles per day) are 109 percent higher than January levels (around 23,000 vehicles per day). Weekend truck traffic is significantly steadier than all vehicle traffic, with the June high (around 6,600 vehicles per day) 26 percent higher than the July low (around 5,300 vehicles per day). Truck volumes account for a significant portion of traffic on Segment L2 (25 percent of overall daily traffic for weekdays and 16 percent of overall daily traffic for weekends); as a result truck traffic has an impact on overall traffic conditions.

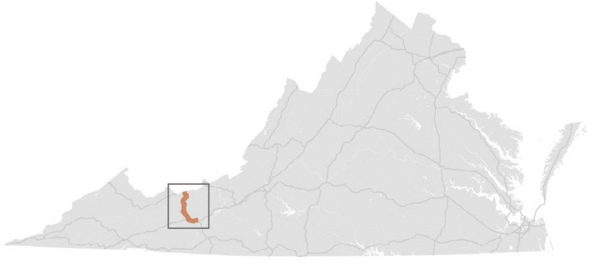


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

Truck Volumes

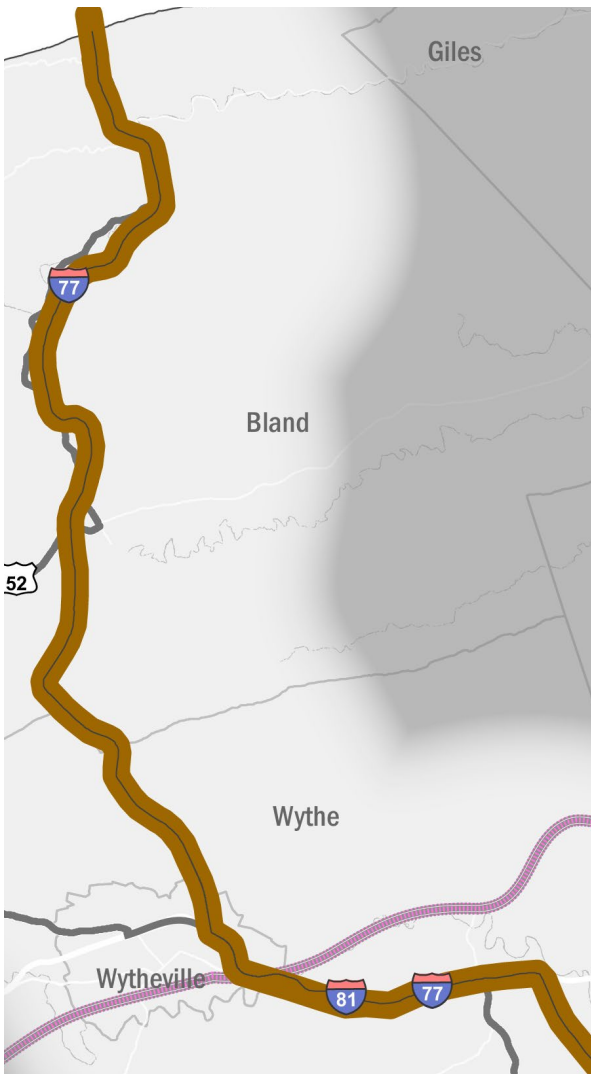
The percent of daily traffic comprised of heavy trucks on Segment L2 is lower than on Segment L1. Along the concurrent section of I-77/I-81, heavy trucks comprise 13 percent of truck traffic. Along I-77 north of I-81, heavy trucks account for 11 percent of total traffic.



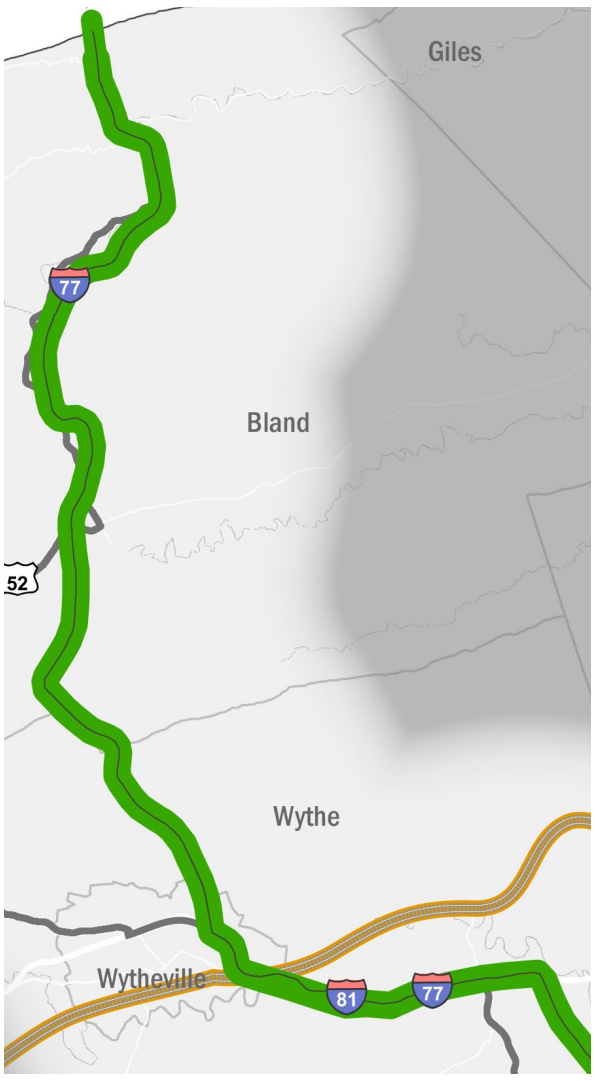
L2 SEGMENT PROFILE

Freight Flows

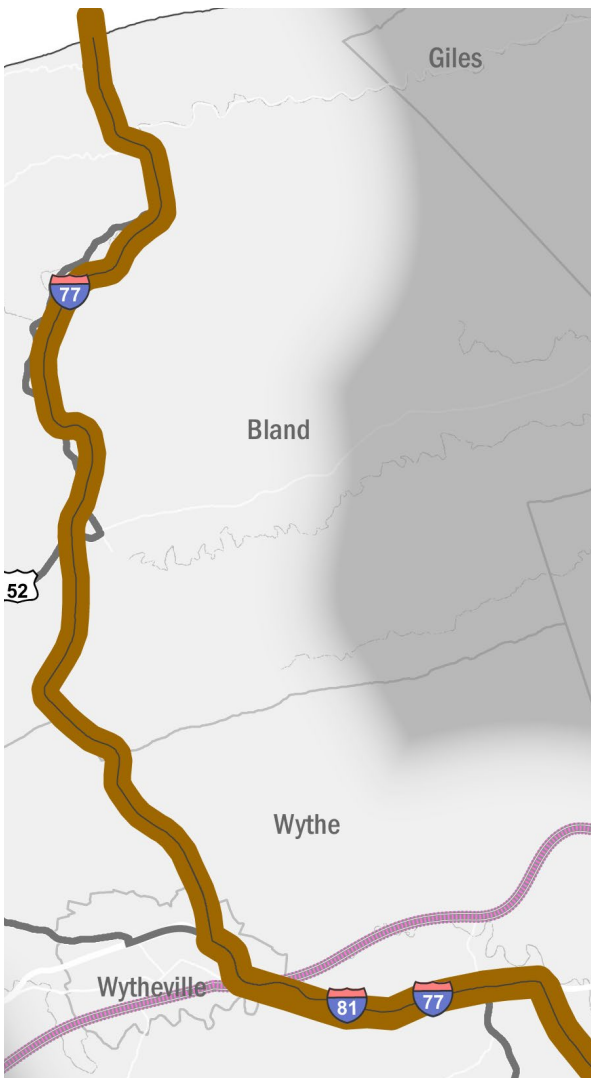
Freight on Segment L2 is moved only by truck as there is no rail link in the Western Mountain Corridor. In Bland County, 56 million tons of freight worth $100.5 billion is moved through this section of Segment L2 by truck. On average, a ton of freight traveling through this section of Segment L2 is worth $1,799. In 2025, truck freight tonnage and value in this area of Segment L1 will likely increase. It is anticipated that value per ton on trucks will increase to $1,911.



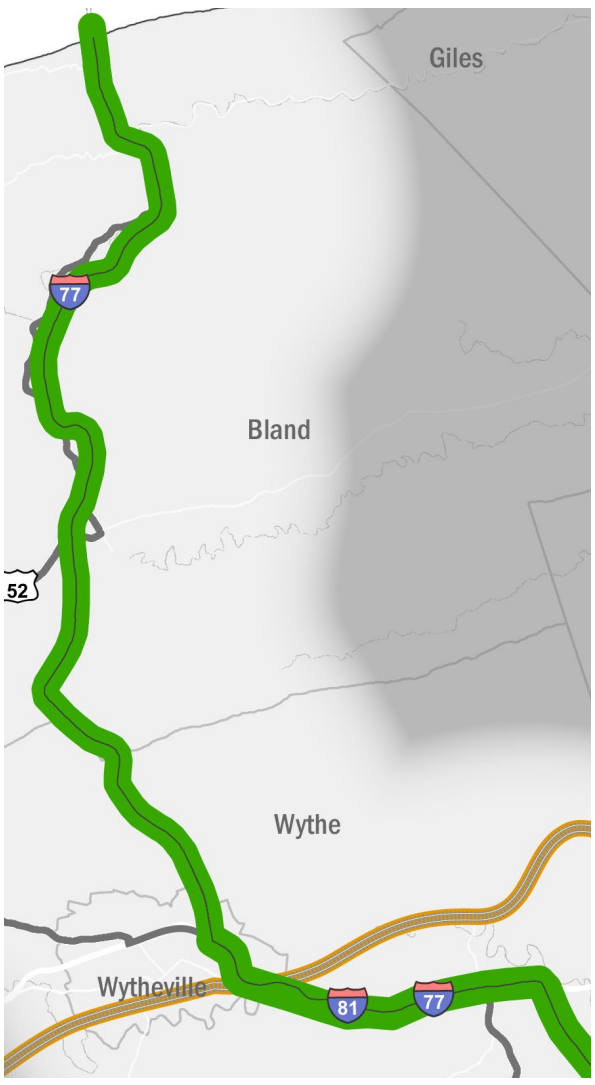
Annual Freight by Tonnage, 2012



Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



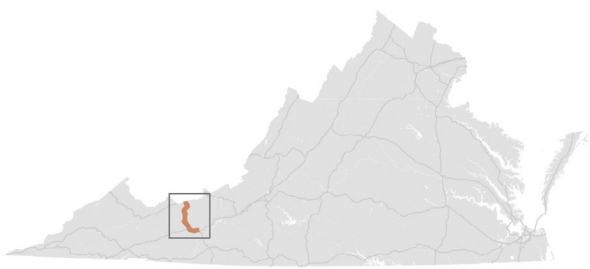
Annual Freight by Value, 2025

Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility



Truck Freight (Value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight (Value)

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Redundancy and Mode Choice

Comparable Travel Options

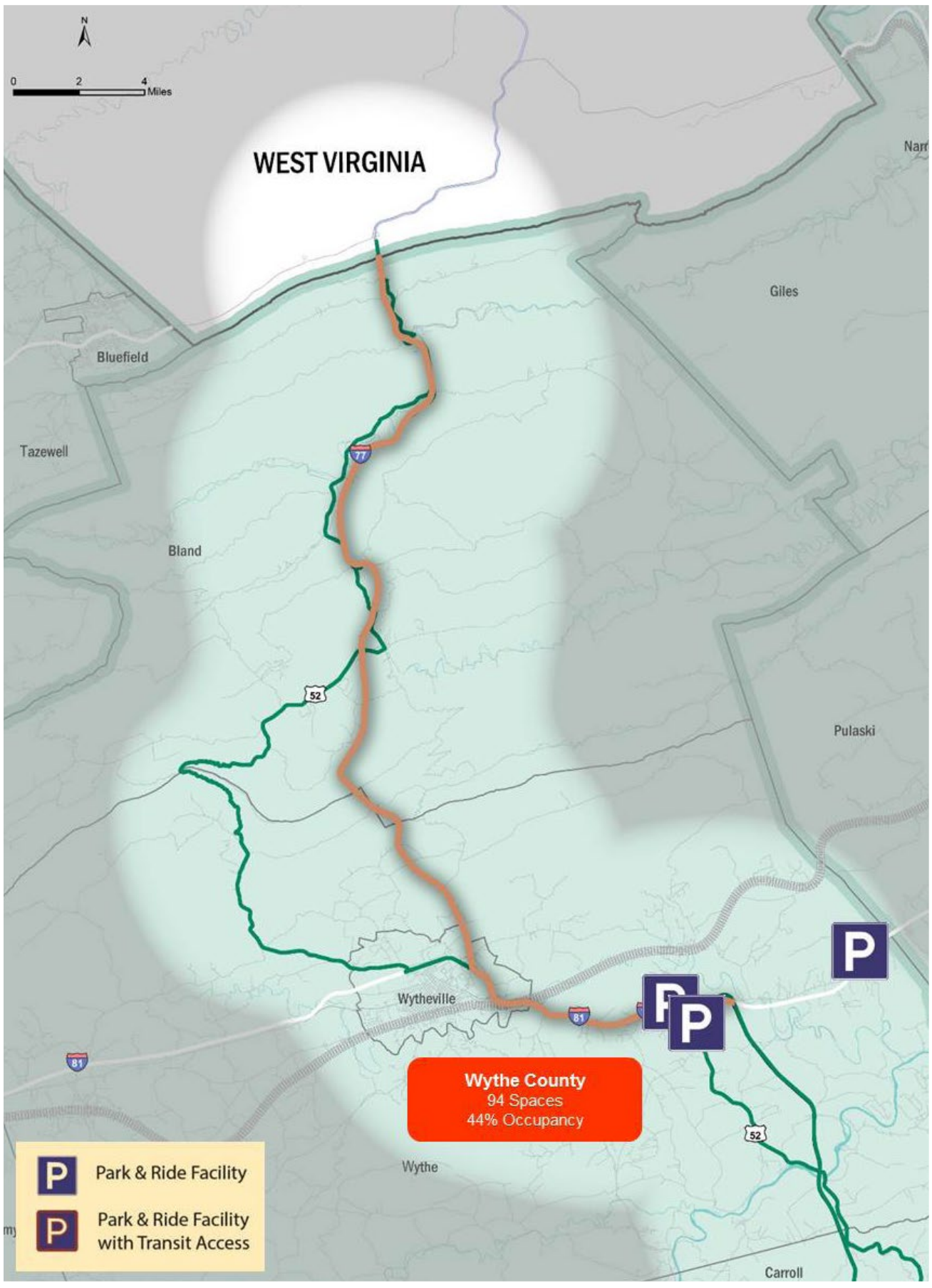
Beckley, WV to Wytheville

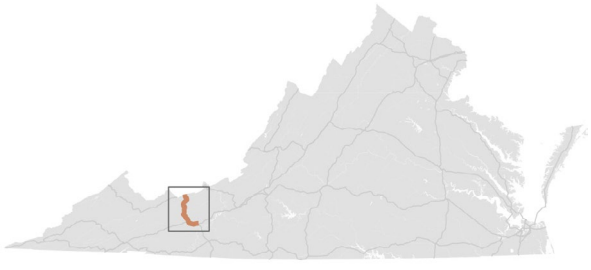
Inter-City Bus	Train	Auto
2 Trips per Day	0 Trips per Day	**Via I-77**: 1:20 Travel Time $41 Est. Cost
1:50 Travel Time	0:00 Travel Time	**Via Rt. 52**: 1:44 Travel Time $47 Est. Cost
$31 Est. Cost	$0 Est. Cost	

Passenger trips on Segment L2 of the Western Mountain Corridor have a limited range of travel options, both in terms of travel path and mode choice. While US 52 serves as a parallel facility, its use for long range travel is limited by speed and capacity; its function as a parallel facility is primarily for local access and bypassing incidents causing congestion on sections of I-77. Applying the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by the available bus service. However, the Greyhound service from Wytheville, is limited by the frequency of service.

Park-and-Ride

Within Segment L2, commuters can utilize four Park-and-Ride locations in Wythe County. Wythe County's Park-and-Ride locations have a utilization rate of 44 percent, which is lower than the statewide average of 76 percent for Park-and-Ride utilization.



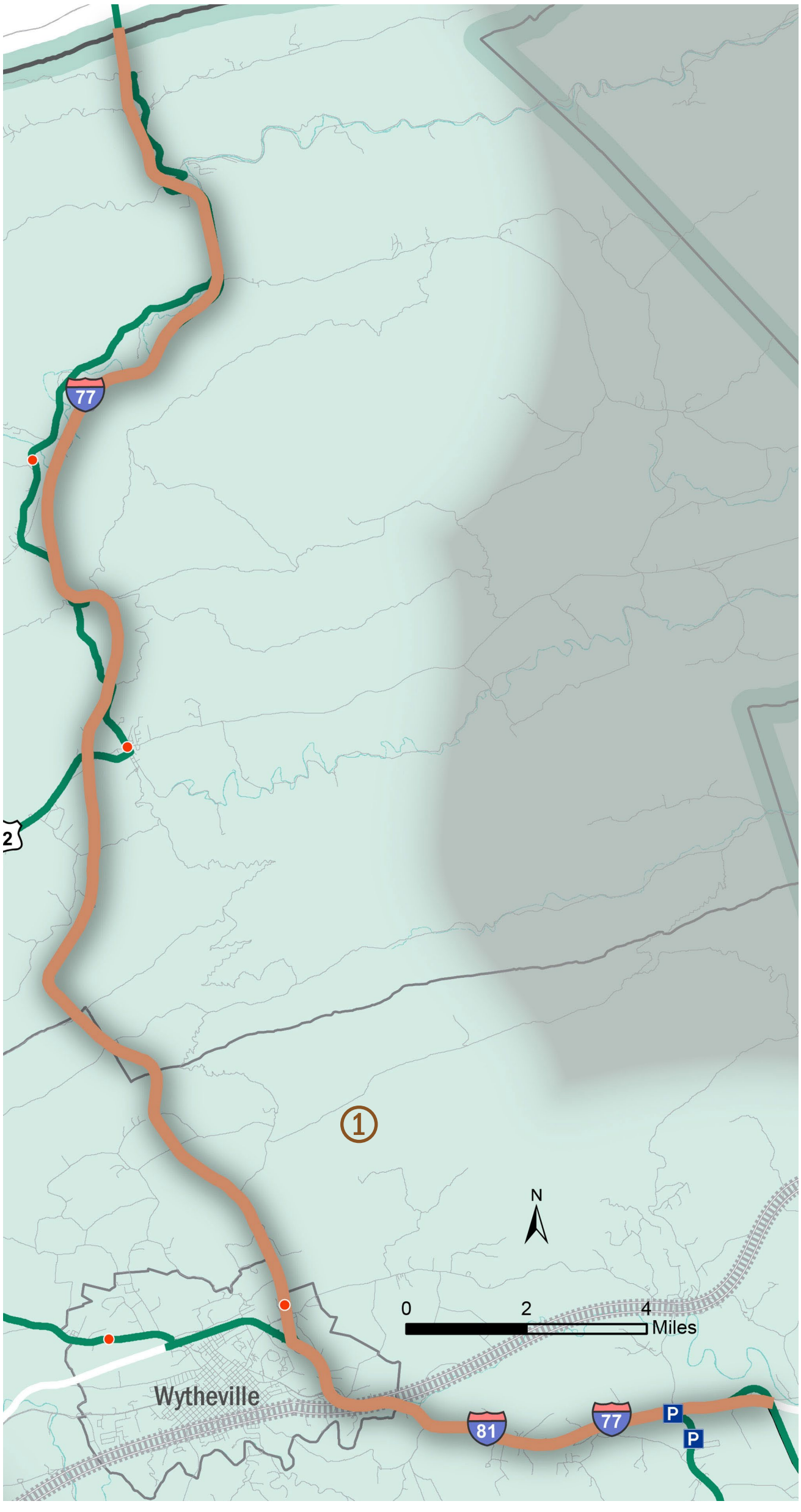


Safety

Performance Metrics:

Number of Severe Crashes	14
Severe Crashes/Million VMT	0.3
Number of Railroad Crashes	1

Between 2010 and 2012, 14 severe crashes occurred on Segment L2, clustered in four locations. On I-77 in Wytheville, there were four collisions over a 0.14-mile stretch at the on- and off-ramps to and from Peppers Ferry Road. On US 52 (North 4th Street) in Wytheville, there were three crashes over a distance of 1.25 miles between Mount Pleasant Road and Stafford Umberger Drive. In Bland County, two incidents took place at the intersection of US 52 (Main Street) and Route 42 (East Blue Grass Trail) and there were five crashes over 0.8 miles between Route 614 (Grapefield Road) and Round Mountain Road.

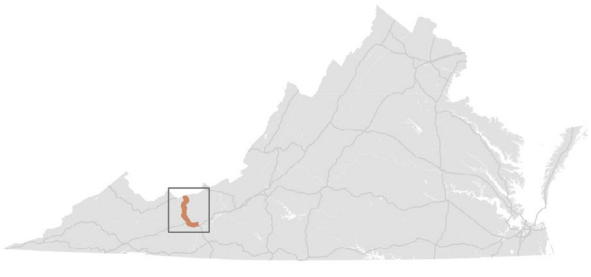


Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

Performance Metrics

Person Hours of Delay per Mile	3
Freight Ton Hours of Delay per Mile	88.6K

Passenger Delays

Passenger delays along Segment L2 are among the lowest in the CoSS segments with daily delays of just 258 person-hours. Passenger congestion is minimal through most of the segment, with no locations experiencing delays of greater than 100 person-hours per mile. Peak-period passenger delays account for 36 percent of daily congestion, which is slightly less than the average for the peak-period share of congestion on CoSS segments.

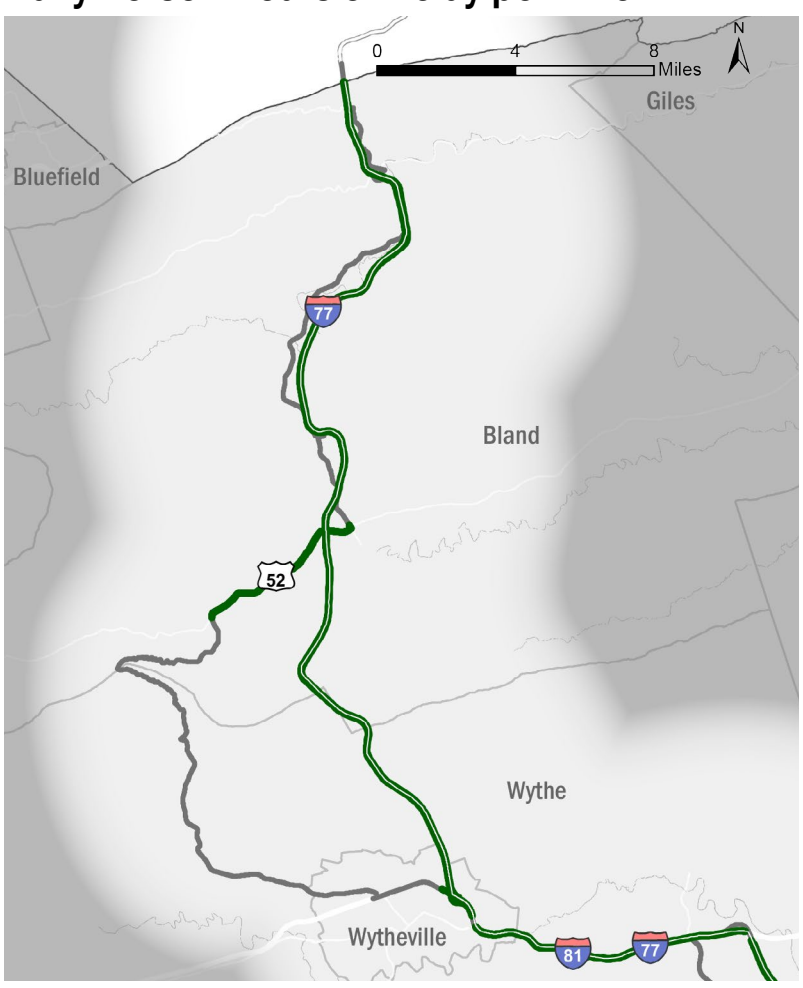
Freight Delays

Unlike passenger delays, freight delays are substantial on Segment L1, which is ranked as the second most congested freight segment in the CoSS with an average delay of over 88,000 ton-hours per mile. However, congestion on most of the corridor segment is minimal. There are significant freight delays, often exceeding 500,000 ton-hours per mile, in Bland County; locations include the following:

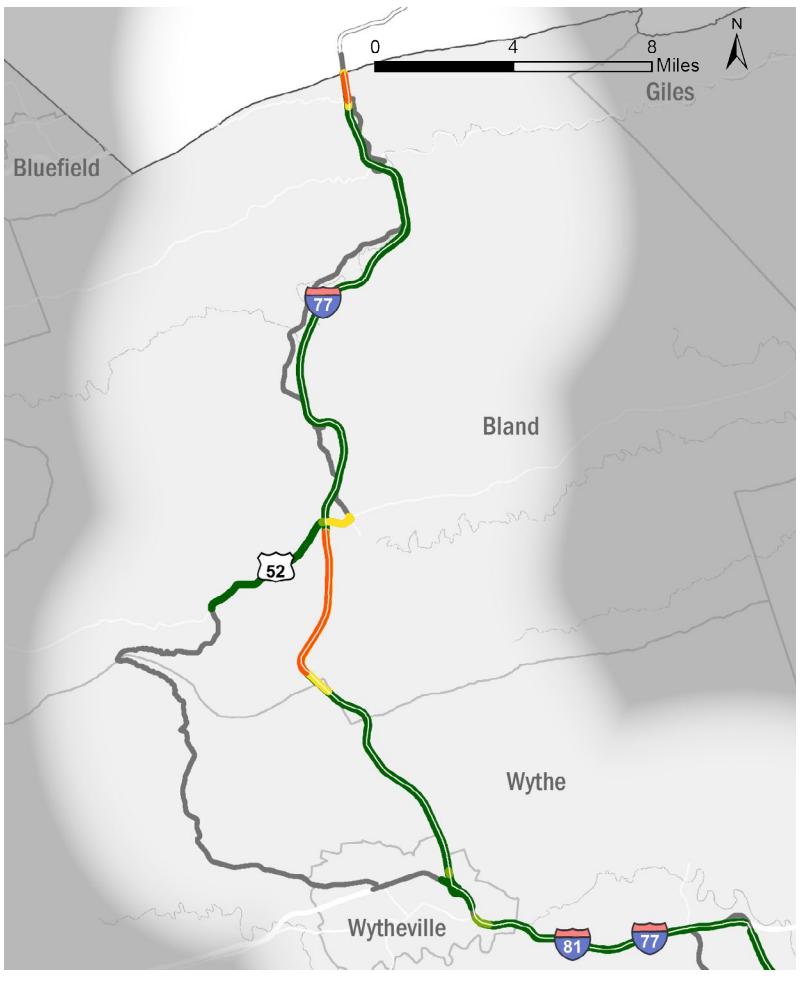
- I-77 between US 52/Route 42 and Route 717;
- I-77 near the West Virginia border; and
- US 52 near the interchange with I-77 near Bland.

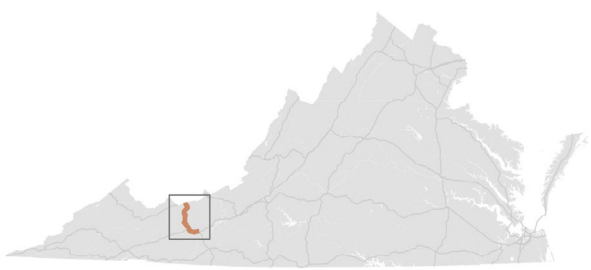
Peak-period freight delays account for 29 percent of daily congestion, which is slightly less than the average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay per Mile



Daily Freight Ton Hours of Delay per Mile





Reliability

Weekday Peak Reliability

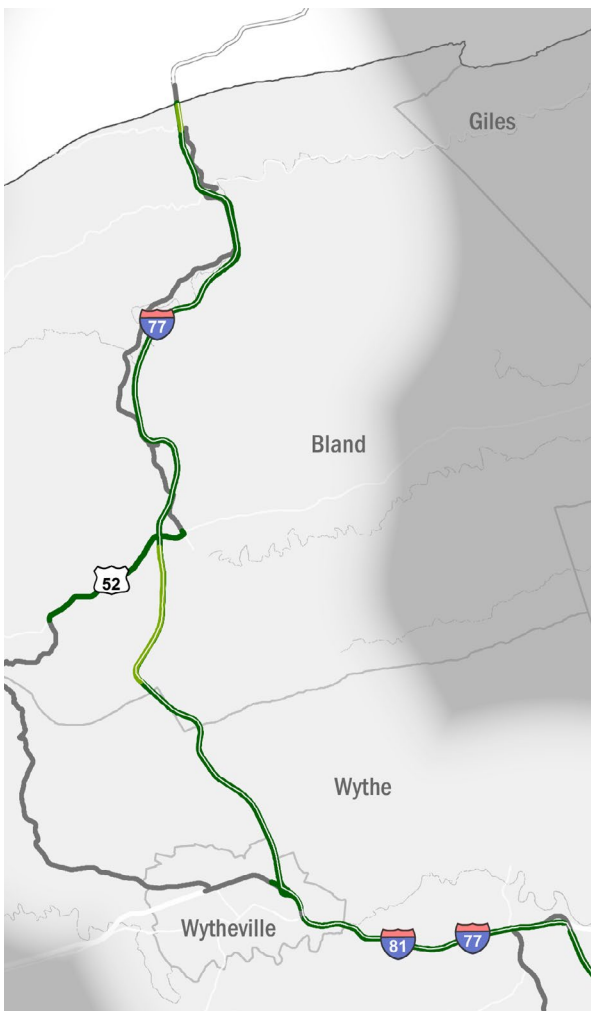
Reliability of travel during the peak period on a typical weekday on Segment L2 ranges from 0.00 to 0.22 in terms of reliability index, with an average value of 0.05. This segment has a peak period reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L2 have reliability index values exceeding the statewide threshold.

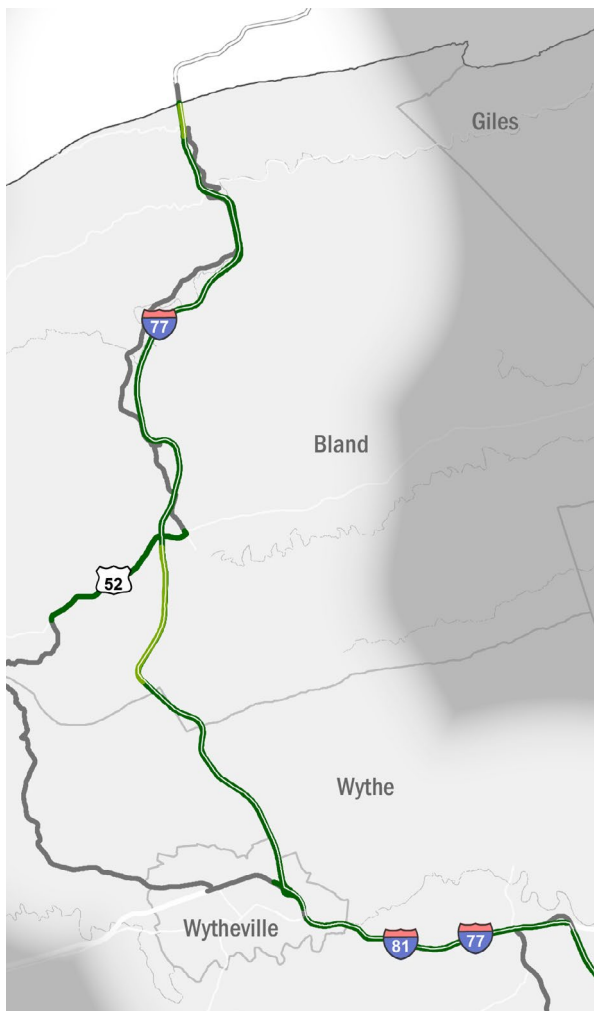
Weekday Reliability

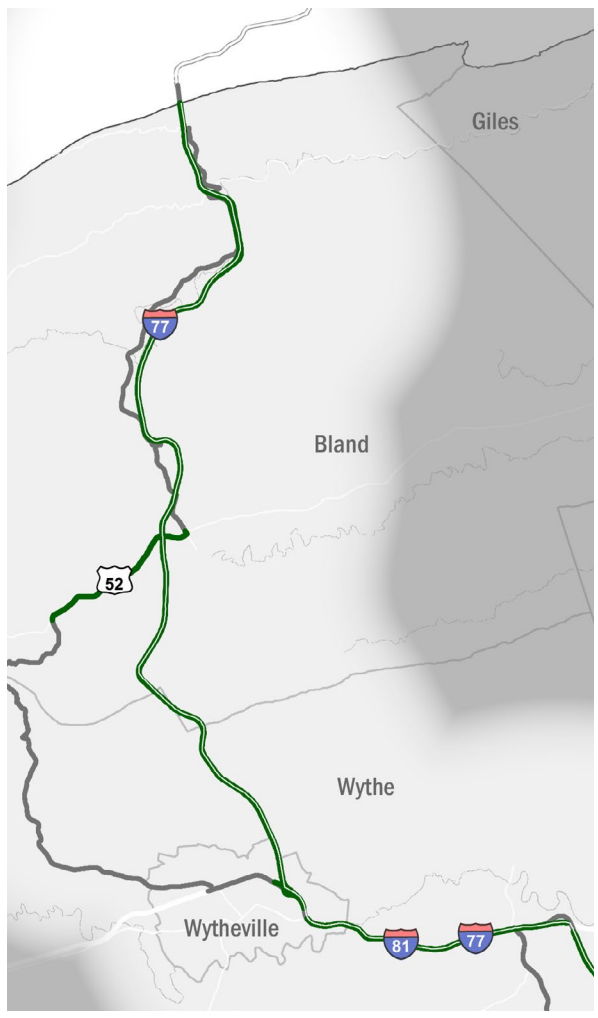
Reliability of travel during a typical weekday ranges from 0.02 to 0.27 in terms of reliability index, with an average value of 0.05. This segment has a weekday reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L2 have reliability index values exceeding the statewide threshold.

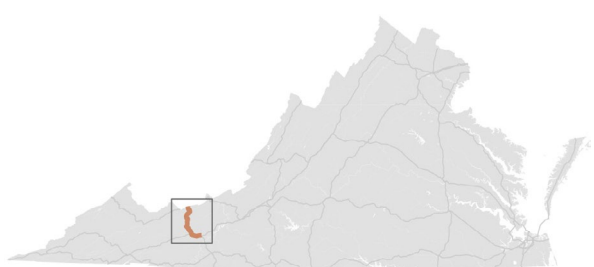
Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.01 to 0.14 in terms of reliability index, with an average value of 0.04. This segment has a weekend reliability index much lower than average for the CoSS segments statewide; therefore, none of the locations along Segment L2 have reliability index values exceeding the statewide threshold.









Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

L2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate.
See “Summary of Needs” table on
the following page for details.

Mode Choice

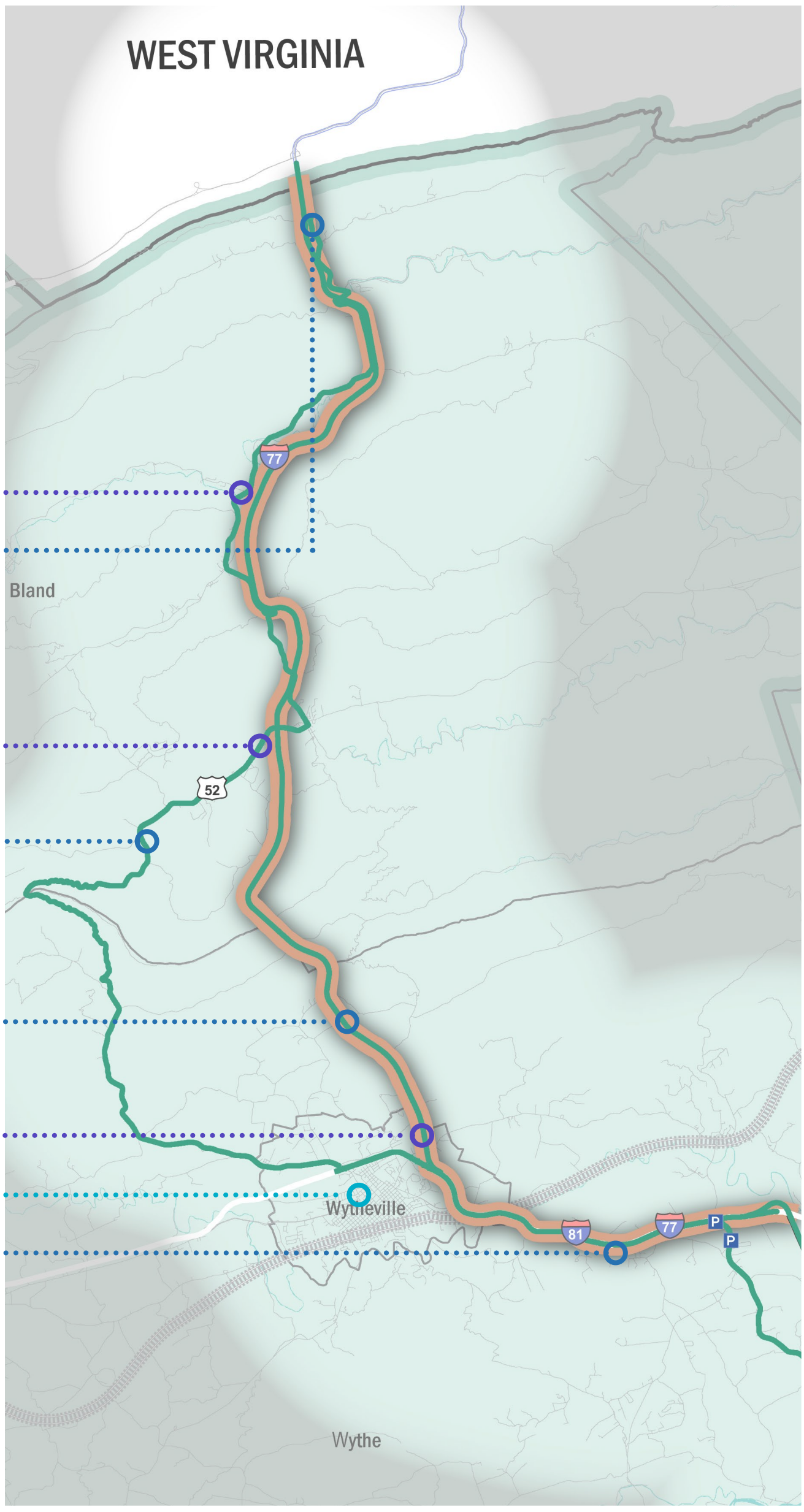
Redundancy

Safety

Congestion

Bottlenecks

Reliability



L2 SEGMENT NEEDS

Summary of Needs - L2 Segment

A.		Inadequate climbing lanes for trucks on I-81 through Wytheville can cause backups
B.		Seasonal traffic accessing beaches in the Carolinas causes major backups through Wythe County
C.		Intercity bus service from Wytheville north only runs twice per day; no passenger rail service is available in the corridor
D.		I-77 at Peppers Ferry Rd: 3 severe crashes
E.		US 52 at VA 42 in Bland County: 2 severe crashes
F.		US 52 near VA 614 (Grapefield Rd) in Bland County: 5 severe crashes
G.		Congestion issue on I-77 between Exit 47 (VA Route 717) in Wythe County and Exit 52 (US 52/VA Route 42) in Bland County
H.		Congestion issue on US 52/VA Route 42 between I-77 and VA Route 42 (East Blue Grass Trail) in Bland County
I.		Congestion issue on I-77 between West Virginia-Virginia border and Exit 66 (US 52) in Bland County