VMTP 2025 Needs Assessment

Regional Needs Profile

Legend:
- ✈ Airports
- 🅿 Park and Ride Lots
- Amtrak Stations
- Railroads

0 — 5 Mi

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 <u>currently</u> that serves the current industries in a region, and the <u>future</u> 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 <u>Regional Network.</u> 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.
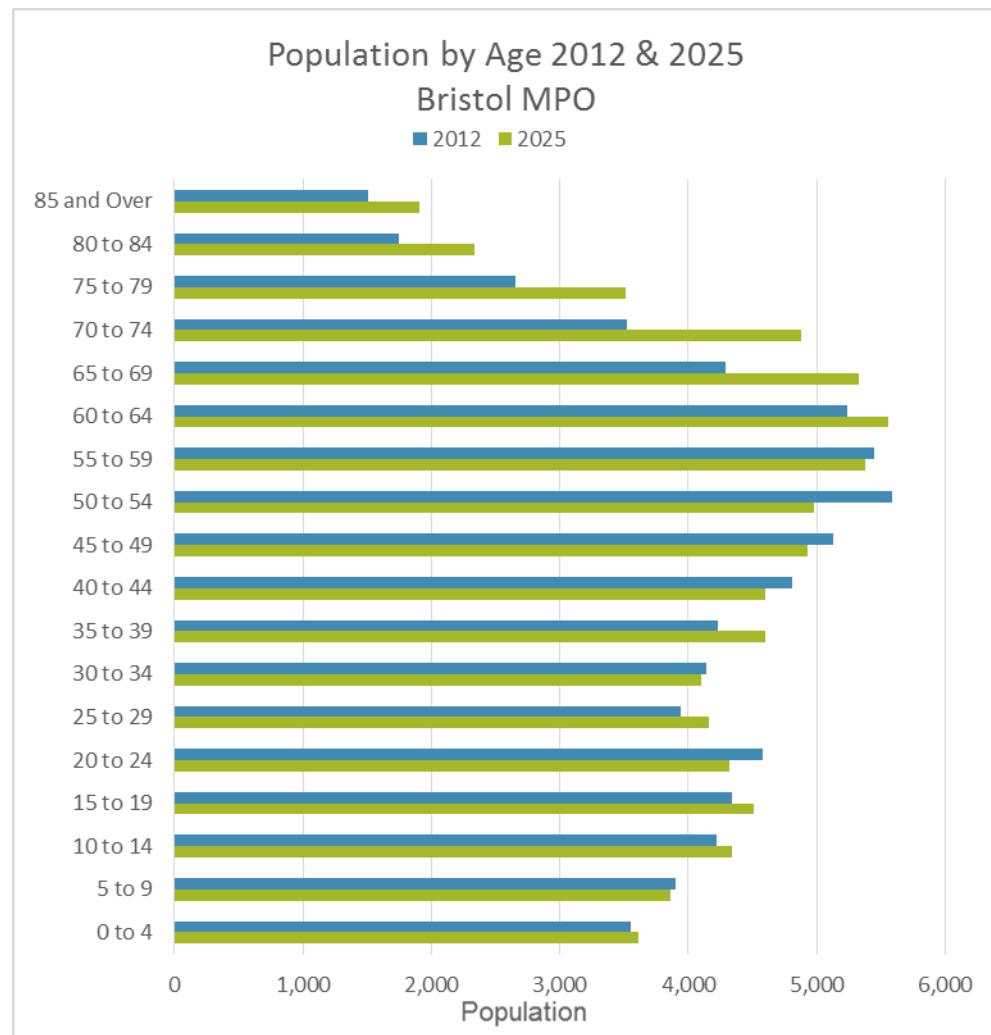
Figure 1: Population of Region 2000 in the years2012 and Projected for the year 2025.

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.
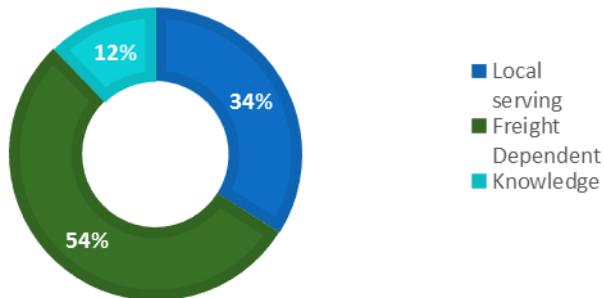
Figure 3 – Top Sectors by Output (2012). Source: IHS Global Insights
Source: IHS Global Insight, 2012.

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
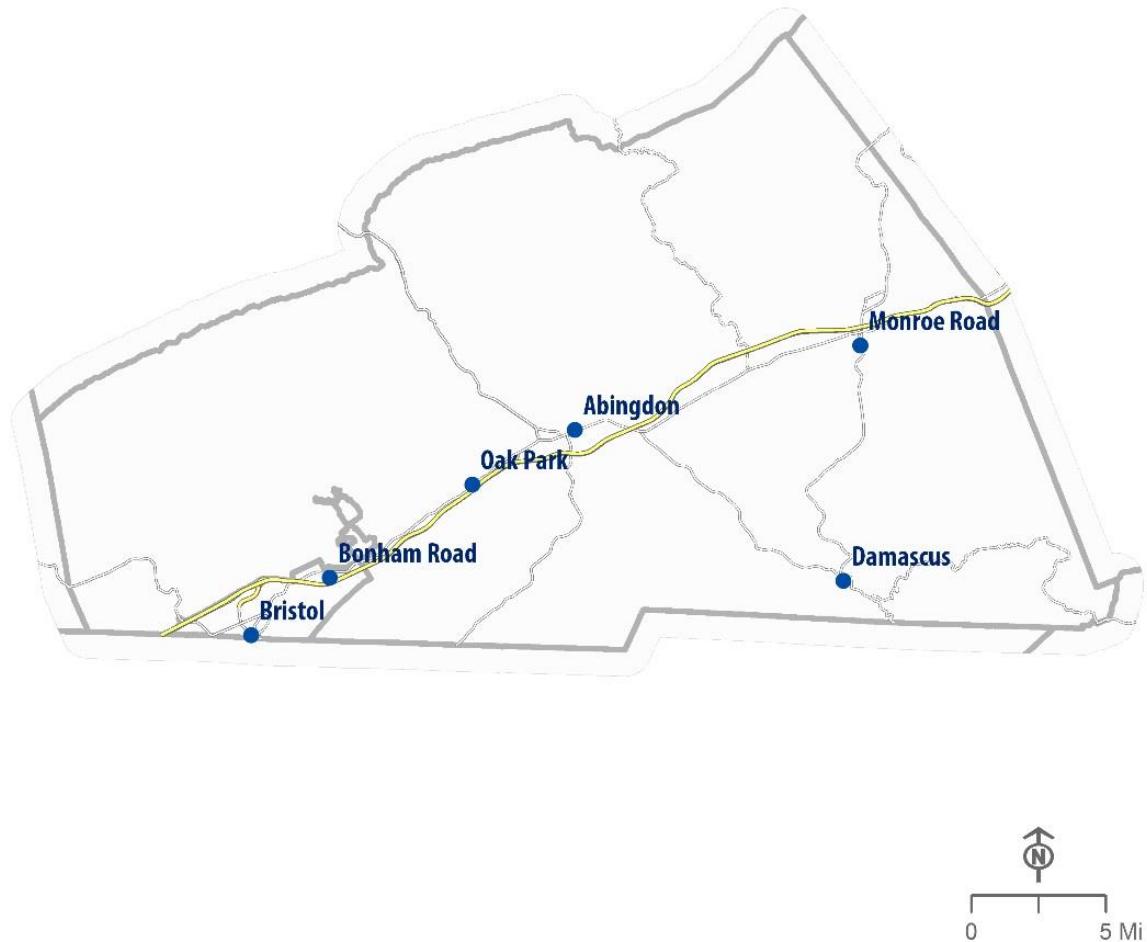
Figure 2: Map of Activity Centers based on Job Density and Stakeholder Input.

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.
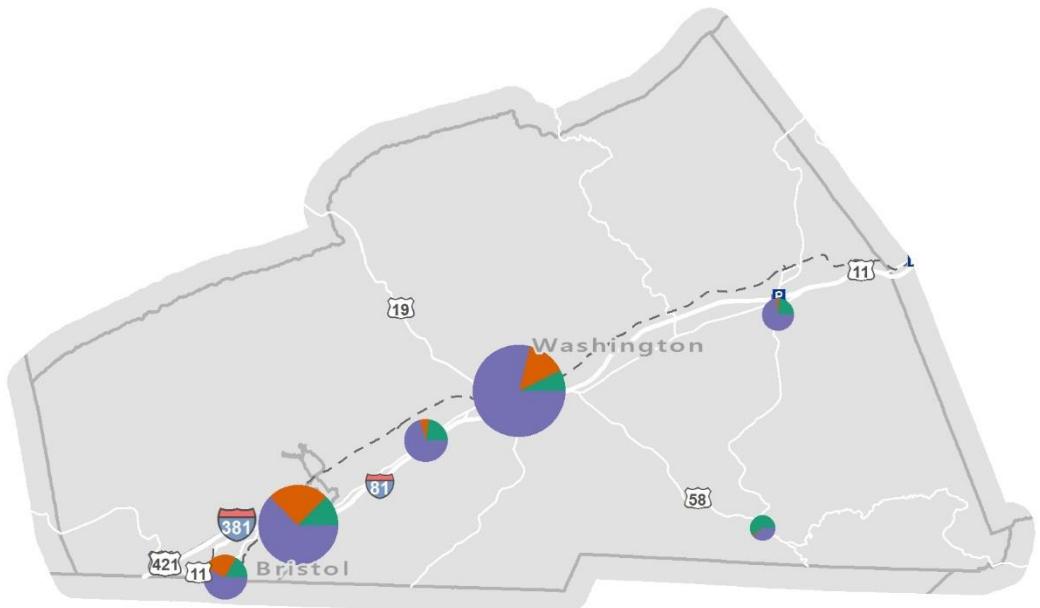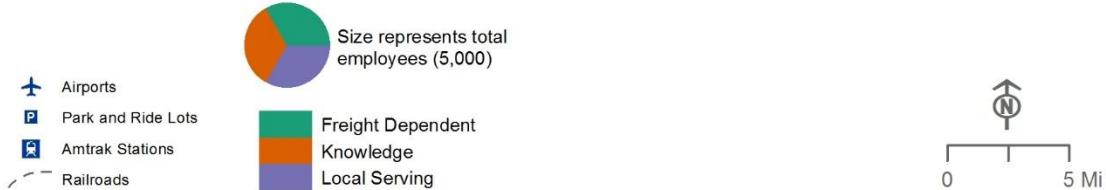
Figure 3: Activity Center Employment by Industry Sector.
Source: InfoUSA, 2012.

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.
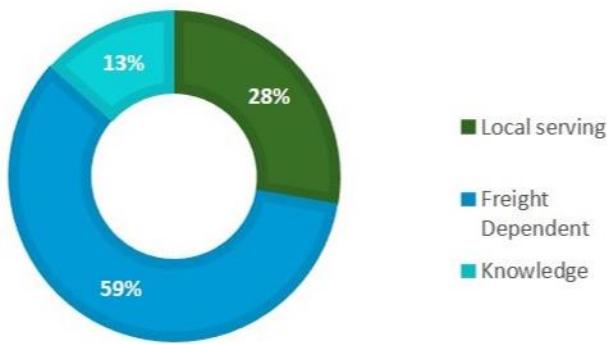
Figure 4: 2025 Industry Sectors by Output.
Source: IHS Global Insight Data, 2012

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.
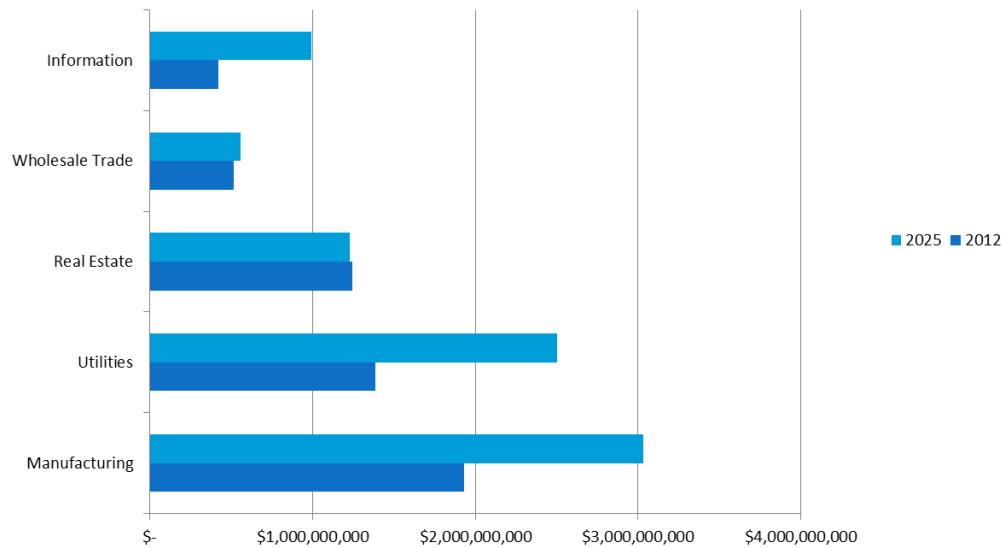
Figure 5: Top Industries by Output
Source: IHS Global Insight Data, 2012

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.
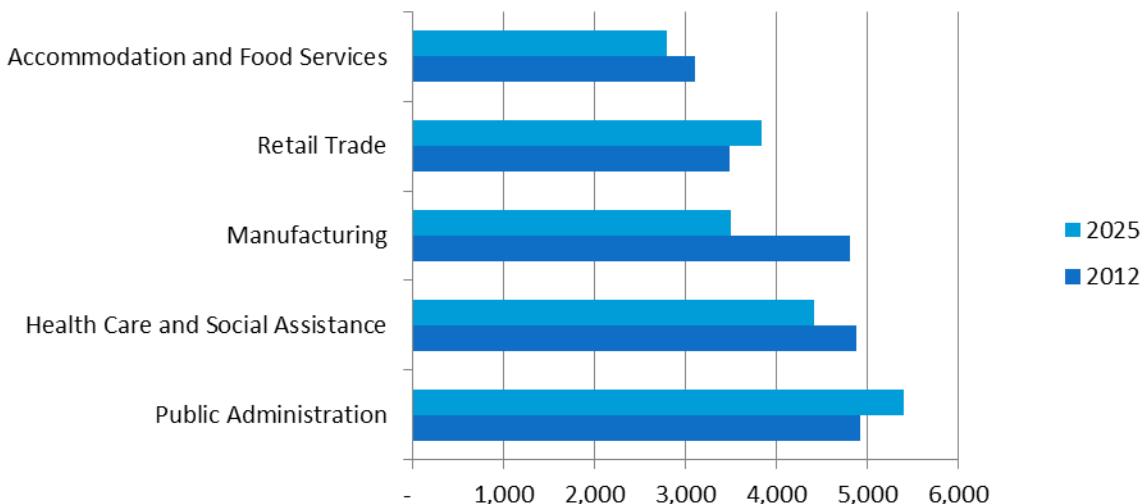
Figure 6: Top Industries by Employment.
Source: IHS Global Insight Data, 2012

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.

Commuter Origin/Destination Flow
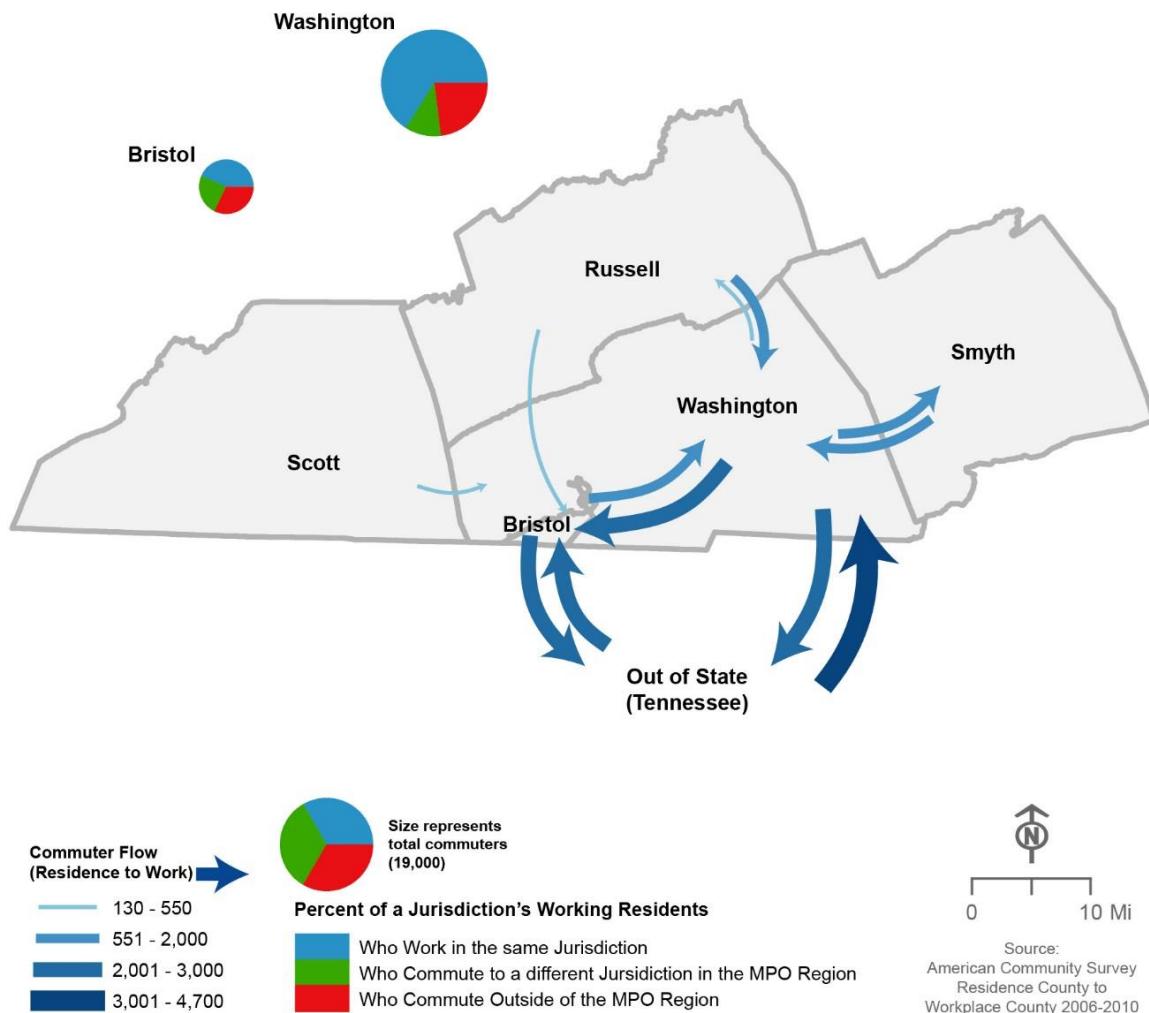
Figure 7: Regional Commuting Patterns.
Source: Census Commuting Data, 2006-2010

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).
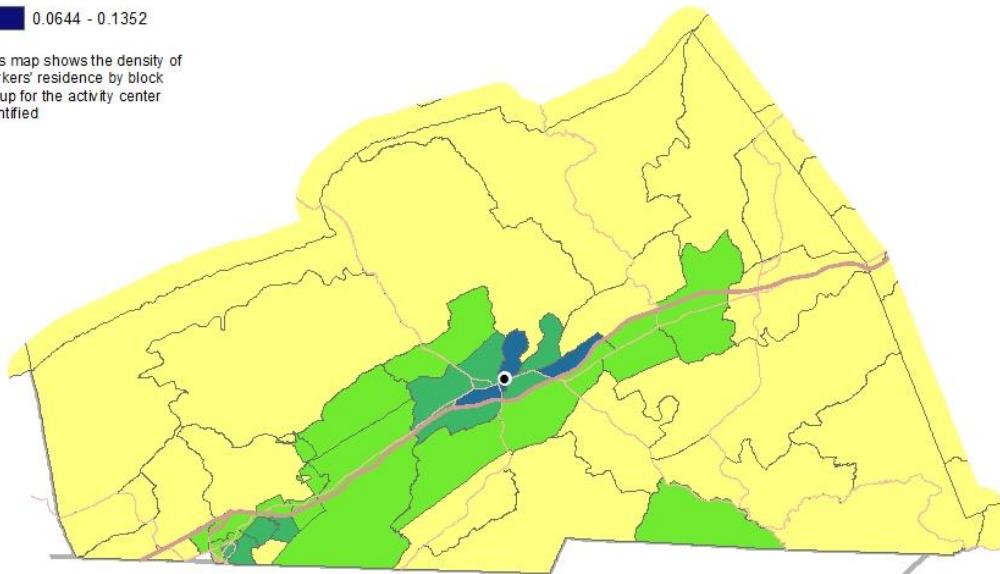

Figure 8: Commuting Patterns to Abingdon Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

The Bonham Road worker origins are concentrated in the City of Bristol. (Refer to Figure 9). Fewer commutes originate in Washington County.

Bonham Road Worker Origins

• Bonham Road Activity Center

Worker Origins Density

	0.0001 - 0.0058
	0.0059 - 0.0212
	0.0213 - 0.0454
	0.0455 - 0.0762
	0.0763 - 0.1424

This map shows the density of workers' residence by block group for the activity center identified

0   5 Mi
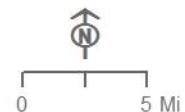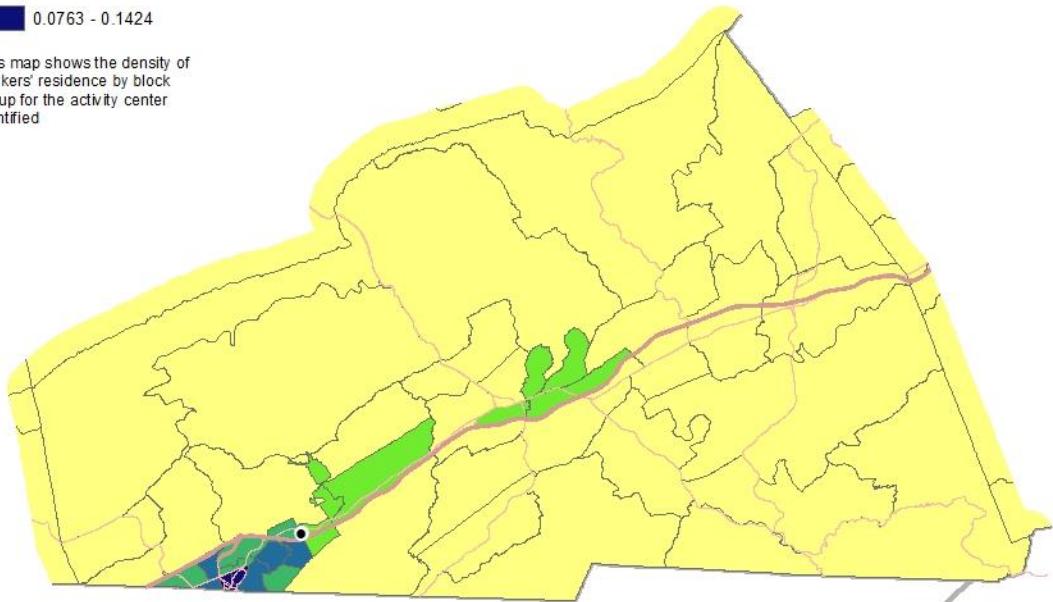
Figure 9: Commuting Patterns to Bonham Road Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

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).

Bristol Worker Origins
- Bristol Activity Center

Worker Origins Density
	0.0001 - 0.0035
	0.0036 - 0.0148
	0.0149 - 0.0474
	0.0475 - 0.1002
	0.1003 - 0.2022
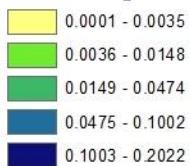
This map shows the density of workers' residence by block group for the activity center identified
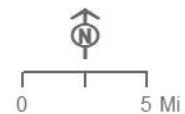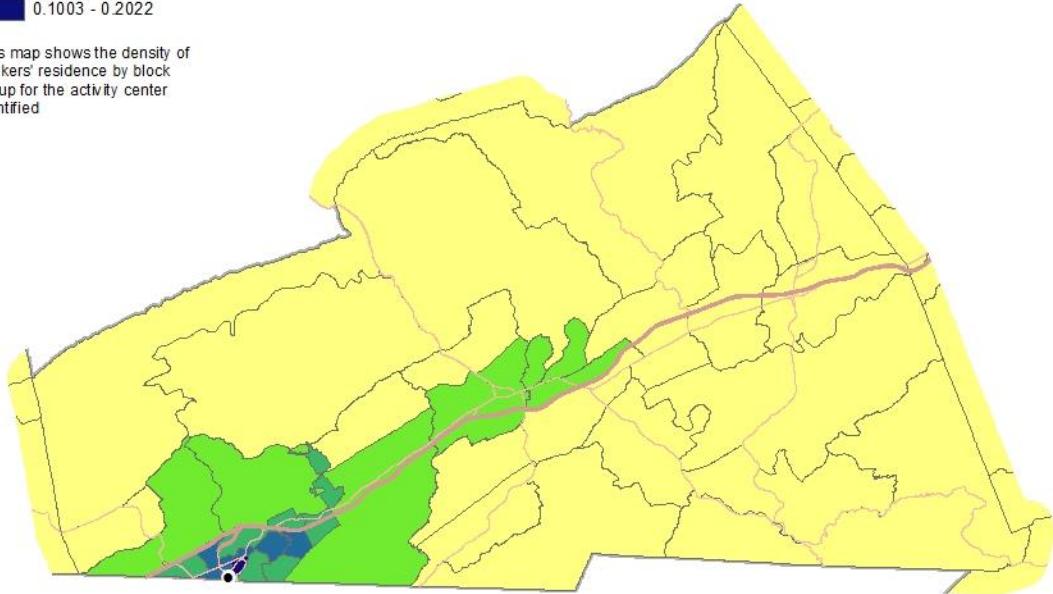
Figure 10: Commuting Patterns to the City of Bristol Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

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.
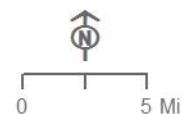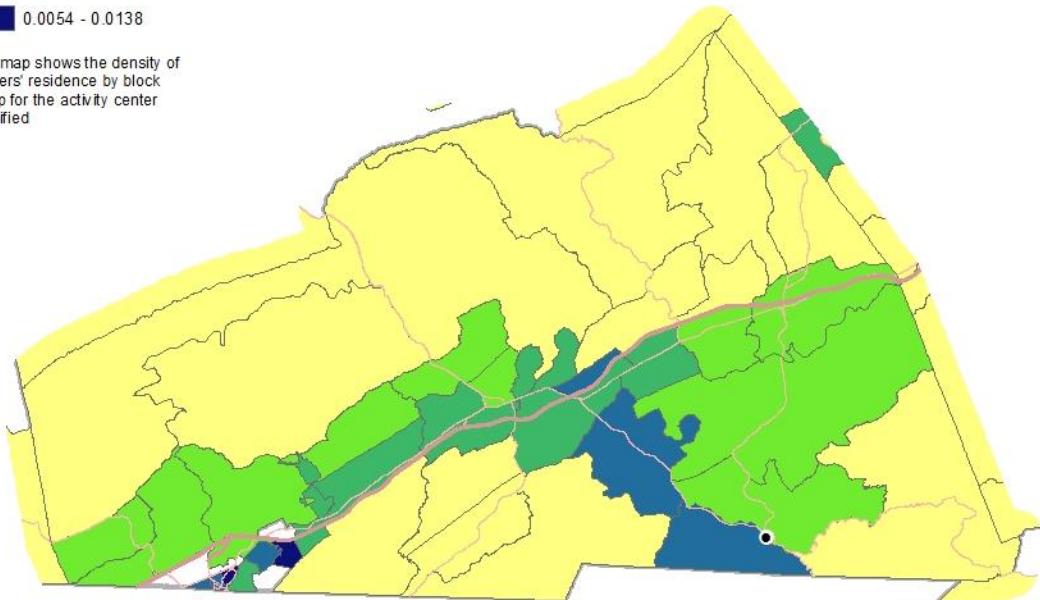
Figure 11: Commuting Patterns to Damascus Activity Center.
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

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.
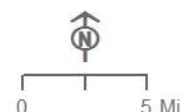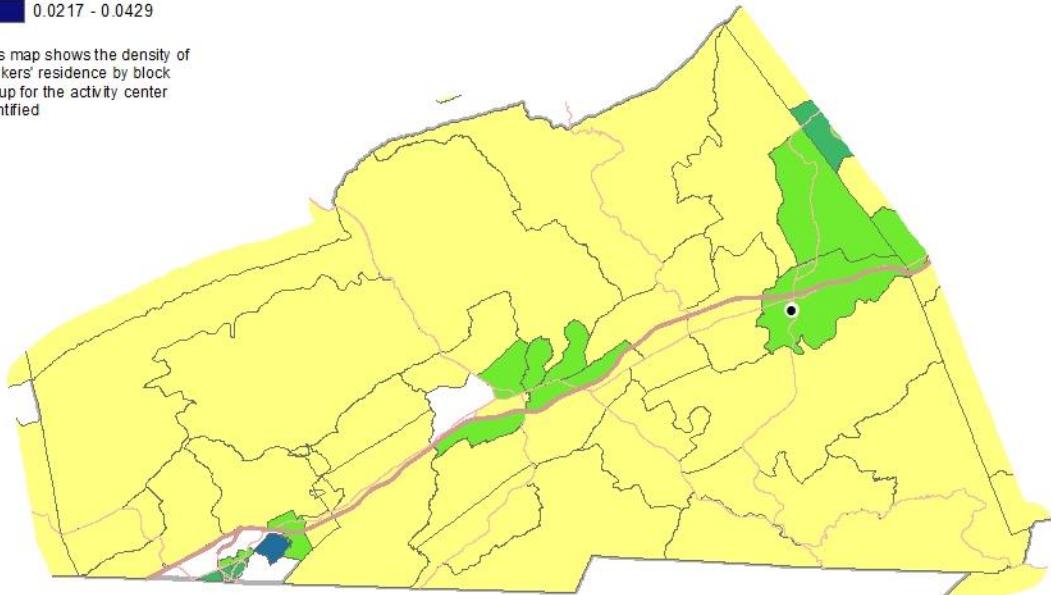
**Figure 12: Commuting Patterns to Monroe Park Activity Center.**
Source: US Census, LEHD Origin-Destination Employment Statistics (LODES), 2011

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.
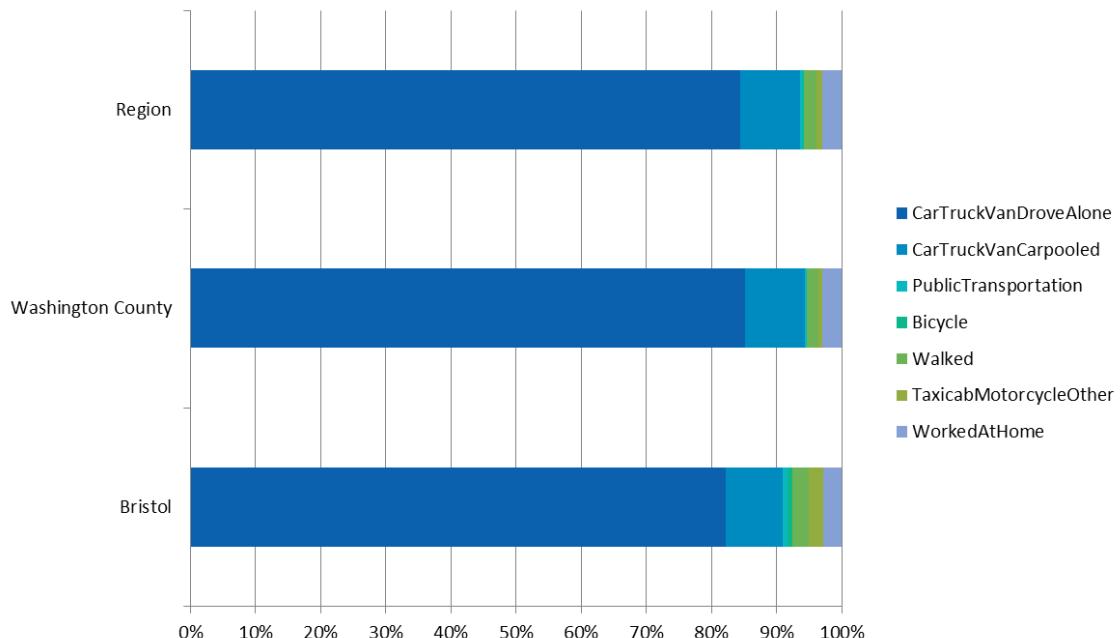
Source: ACS 2013 5-Year Estimates

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).
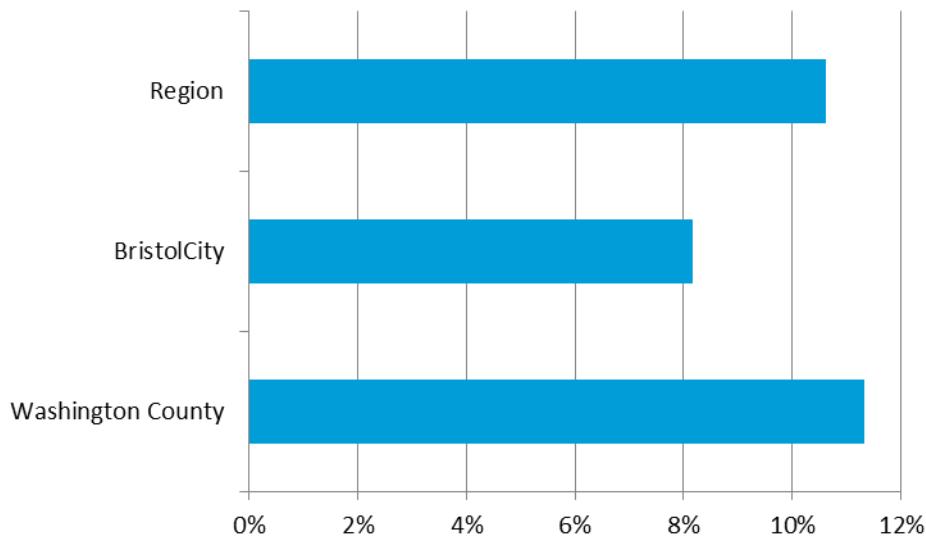

Figure 15: Percent of Commutes Long than 45 Minutes.
Source: ACS 2013 5-Year Estimates

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.

Commute Time

Average Commute Time (Minutes)

- ● Activity Centers

■	11 - 18
■	19 - 23
■	23.6 (Average)
■	25 - 30
■	31 - 39

This map shows the Areas with average commute time above or below regional average. The regional average is 23.6 min. The formula is the Average Time divided by the Regional Average

0   5 Mi
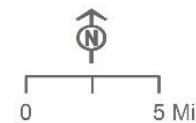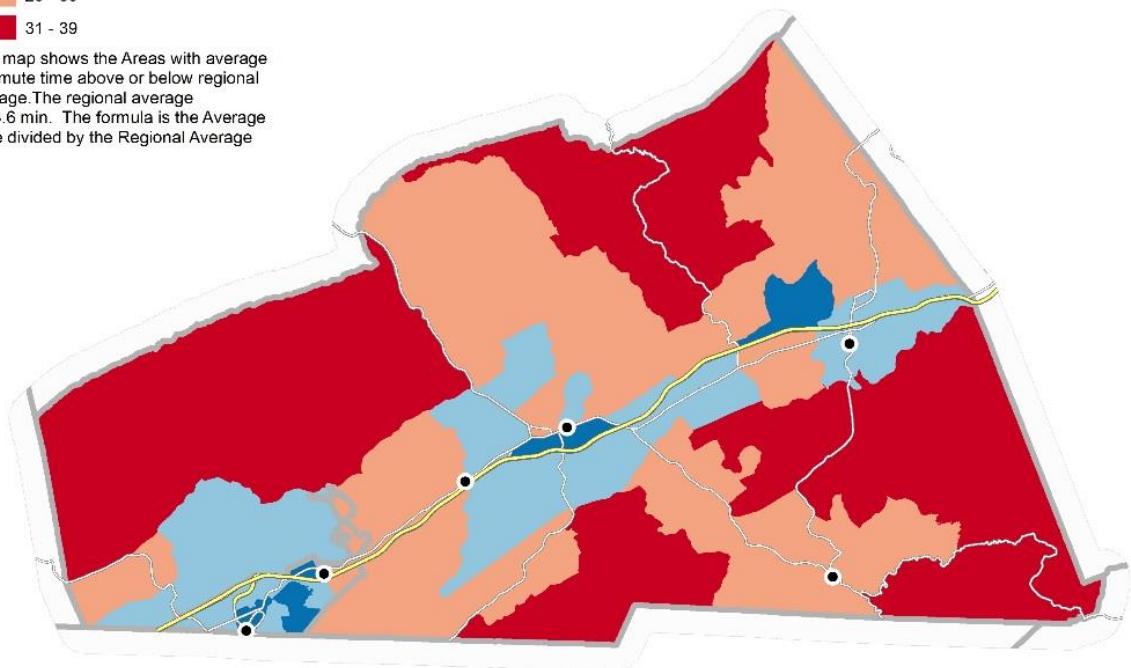
Source:
American Community Survey
2009-2013 5 Year Estimate,
Table B08303

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).

Auto Accessibility
● Activity Centers

Population-Weighted Auto Accessibility

	11,097,780 - 25,612,938
	25,612,939 - 39,349,607
	39,349,608 - 53,074,833
	53,074,834 - 58,484,460
	58,484,461 - 67,981,000
	67,981,001 - 79,487,317
	79,487,318 - 87,781,201
	87,781,202 - 106,314,453
	106,314,454 - 164,827,031
	164,827,032 - 227,856,719
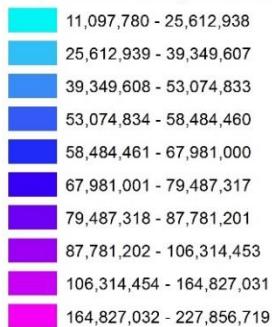
Total number of jobs reachable in a 45 minute drive time for each Census Block Group multiplied by population in the CBG

0   5 Mi
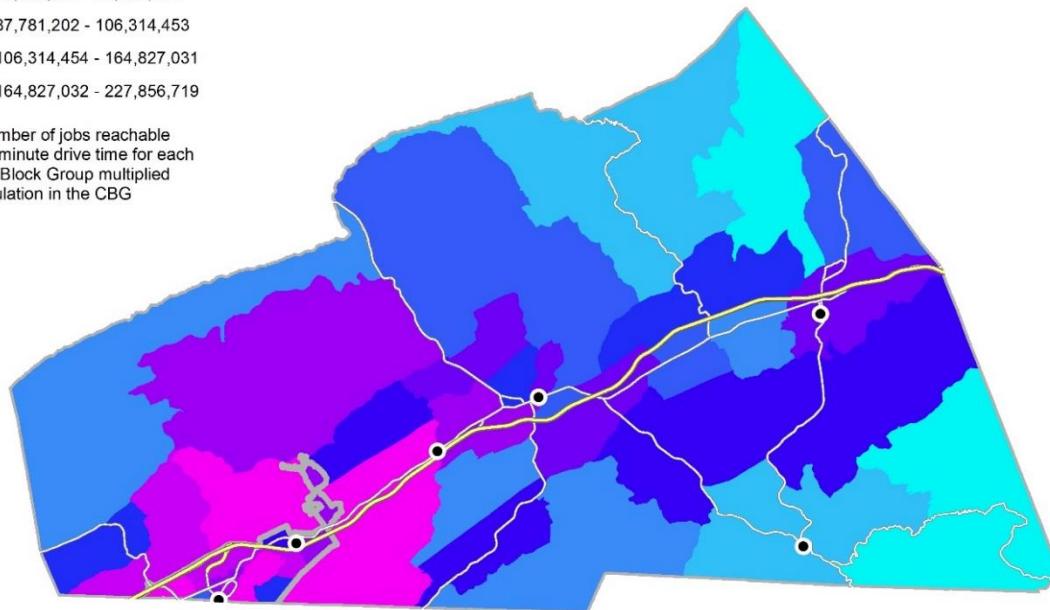
Source:
OIPI Consultant Team Work Product, HERE Roadway Network Travel Speeds

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).

Transit Accessibility

- Activity Centers

Population-Weighted Transit Accessibility

	0
	1 - 2,494,806
	2,494,807 - 4,121,670
	4,121,671 - 4,283,781
	4,283,782 - 5,508,590
	5,508,591 - 5,861,332
	5,861,333 - 5,900,175
	5,900,176 - 8,267,076
	8,267,077 - 11,487,074
	11,487,075 - 13,822,882
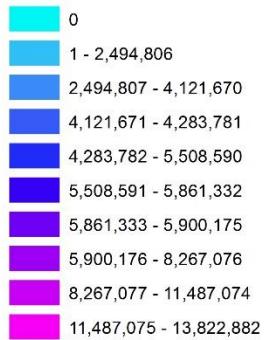
Total number of jobs reachable in a 45 minute transit time for each Census Block Group multiplied by population in the CBG

0   5 Mi
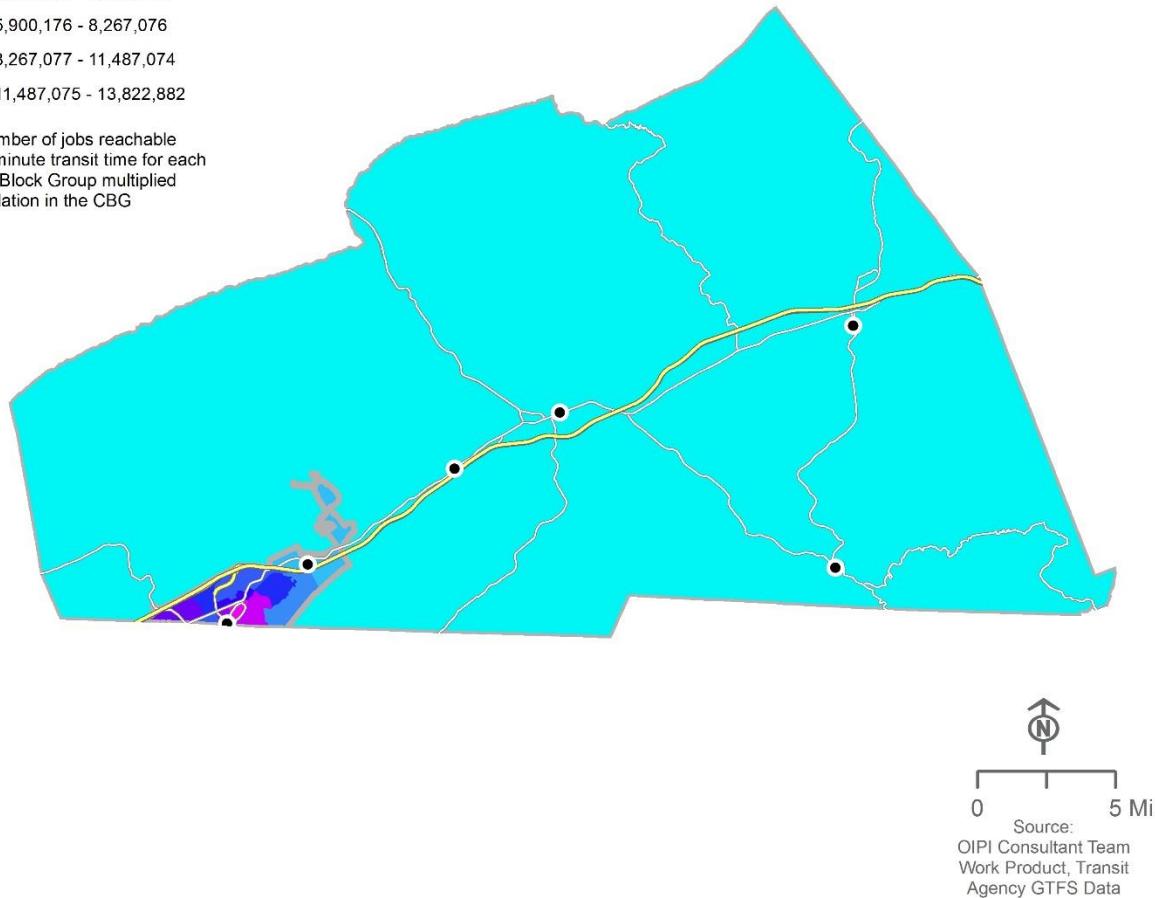
Source:
OIPI Consultant Team
Work Product, Transit
Agency GTFS Data

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).

Access to Interstate or Principal Arterial Ramps

- Activity Centers

Blockgroup to Interstate or Principal Arterial Ramps

Drive Time (Minutes)

- 16.1 - 22.7
- 10.1 - 16.0
- 6.1 - 10.0
- 5.1 - 6.0
- 4.1 - 5.0
- 3.1 - 4.0
- 2.1 - 3.0
- 0.7 - 2.0
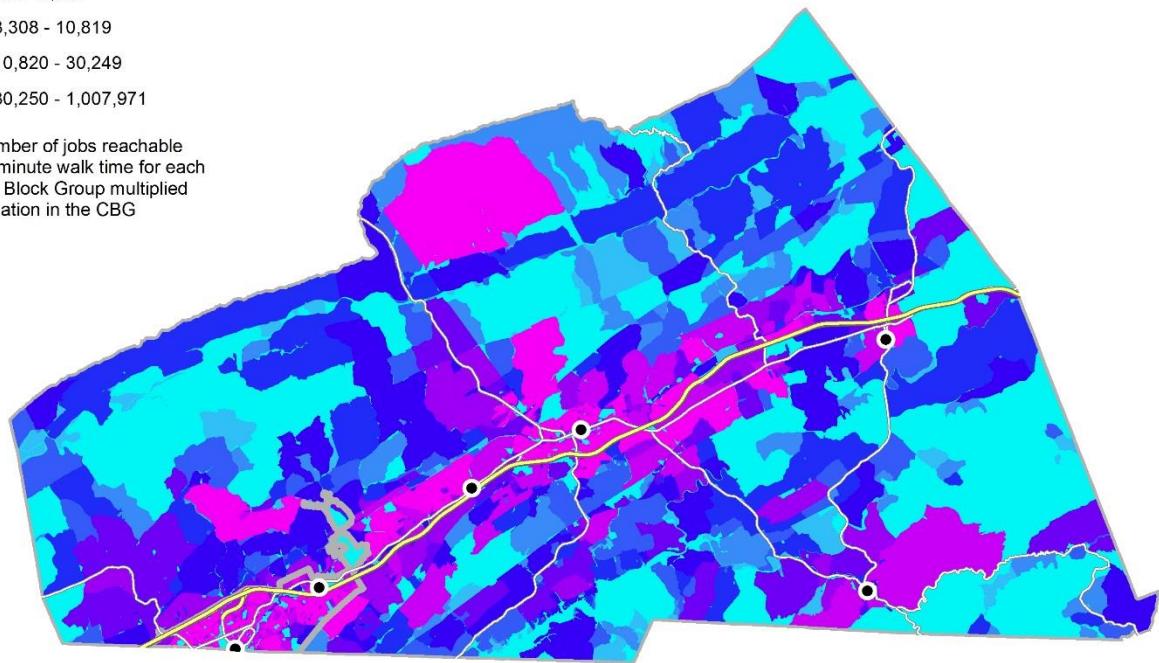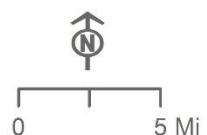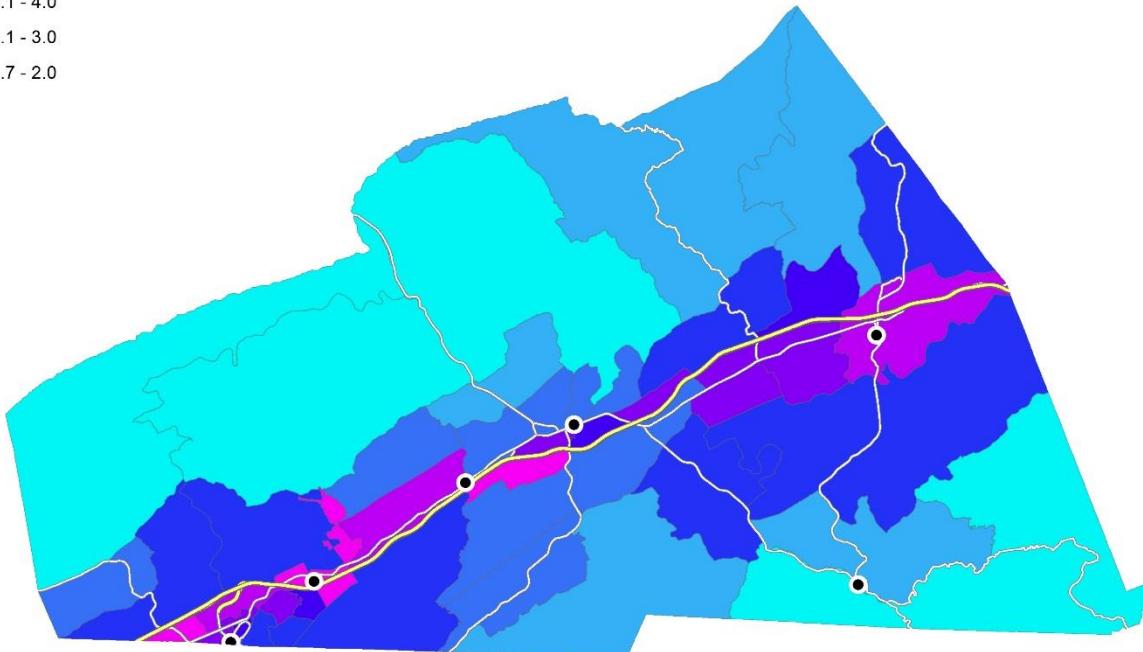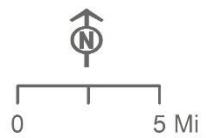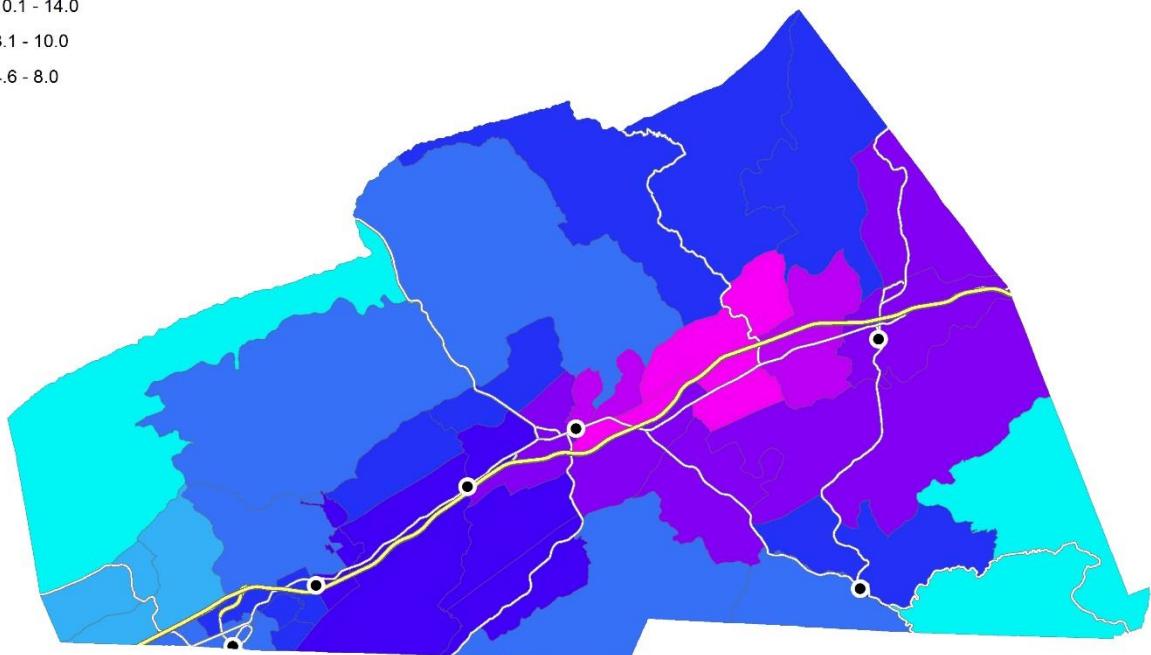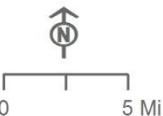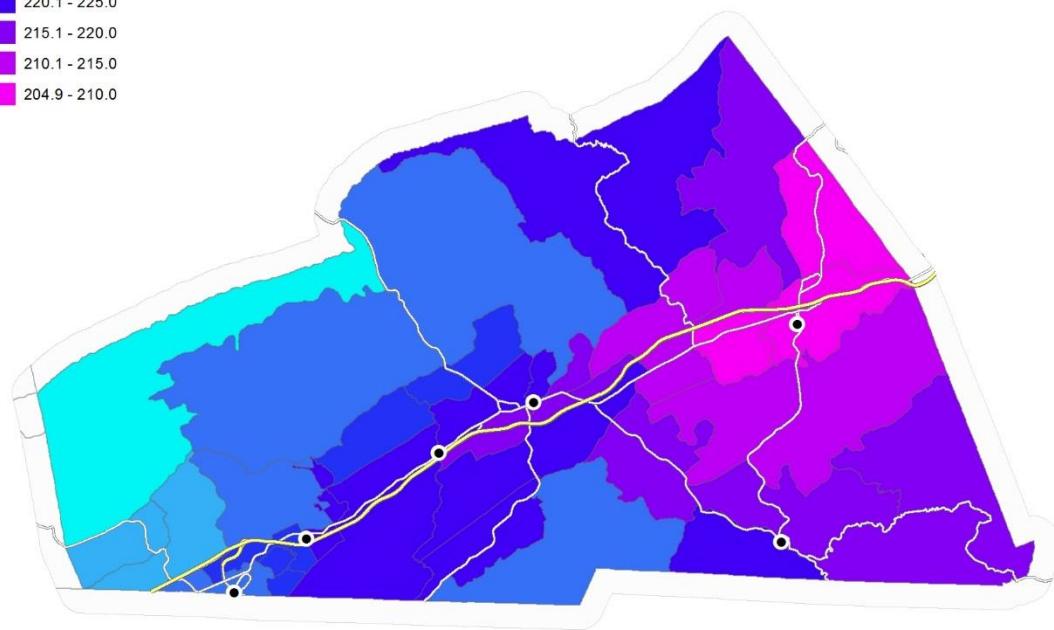
Source:
OIPI Consultant Team Work Product

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).

## Access to Warehouse and Distribution Centers

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).

Highway Conditions:PM - Peak Reliability Index

- Activity Centers

PM - Peak Reliability Index
- —— 1.0 - 1.1
- —— 1.2
- —— 1.3 - 1.6

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).

Highway Conditions: PM Peak - Percent Time Congested
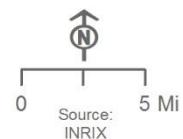
Figure 24: Percent of Time Congested

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).

Highway Conditions: AM Peak Delay Hours

- Activity Centers

AM Peak Delay Hours
- 0 - 25
- 26 - 50
- 51 - 75
- 76 - 110

This map displays the total number of hours of delay per vehicle experienced during the weekday. AM Peak Period during the study year. Delay is measured as the difference between free flow times and AM peak travel times.

0   5 Mi

Source: INRIX
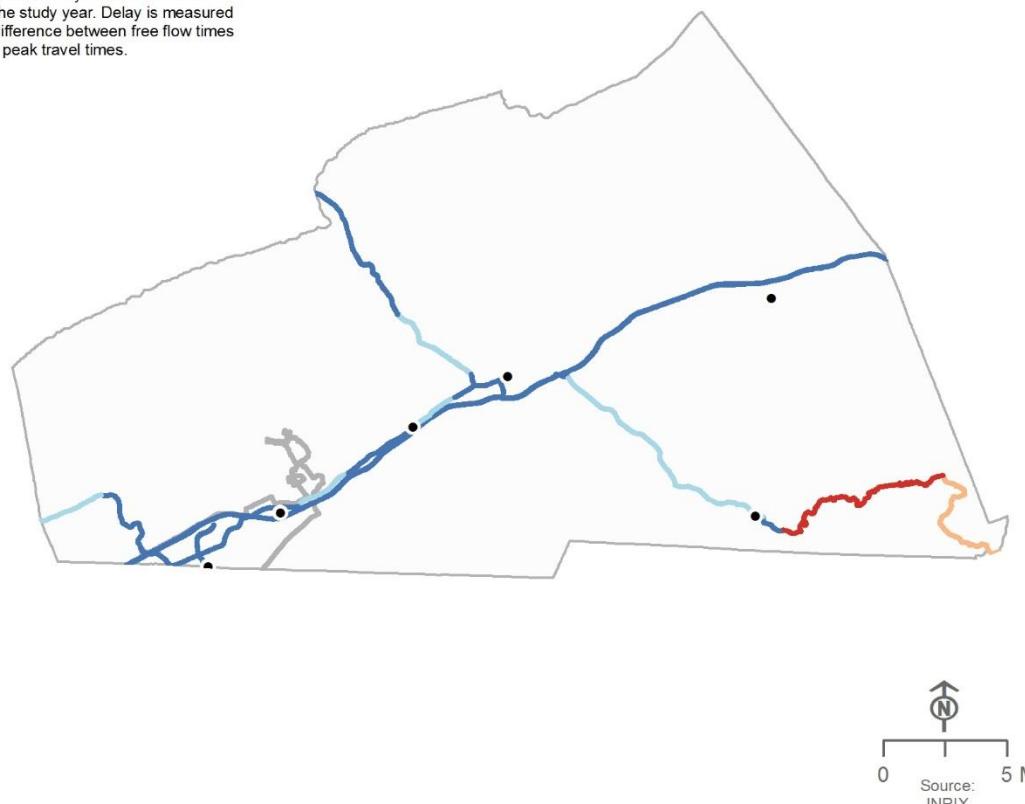
Figure 25: Travel Time Delay

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).

Highway Conditions: PM Peak Median Speed

● Activity Centers

Ratio of Median Speed and Speed Limit

— 0.00 - 0.50
— 0.51 - 0.85
— 0.86 - 1.00
— >1

This 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.

0   5 Mi

Source: INRIX
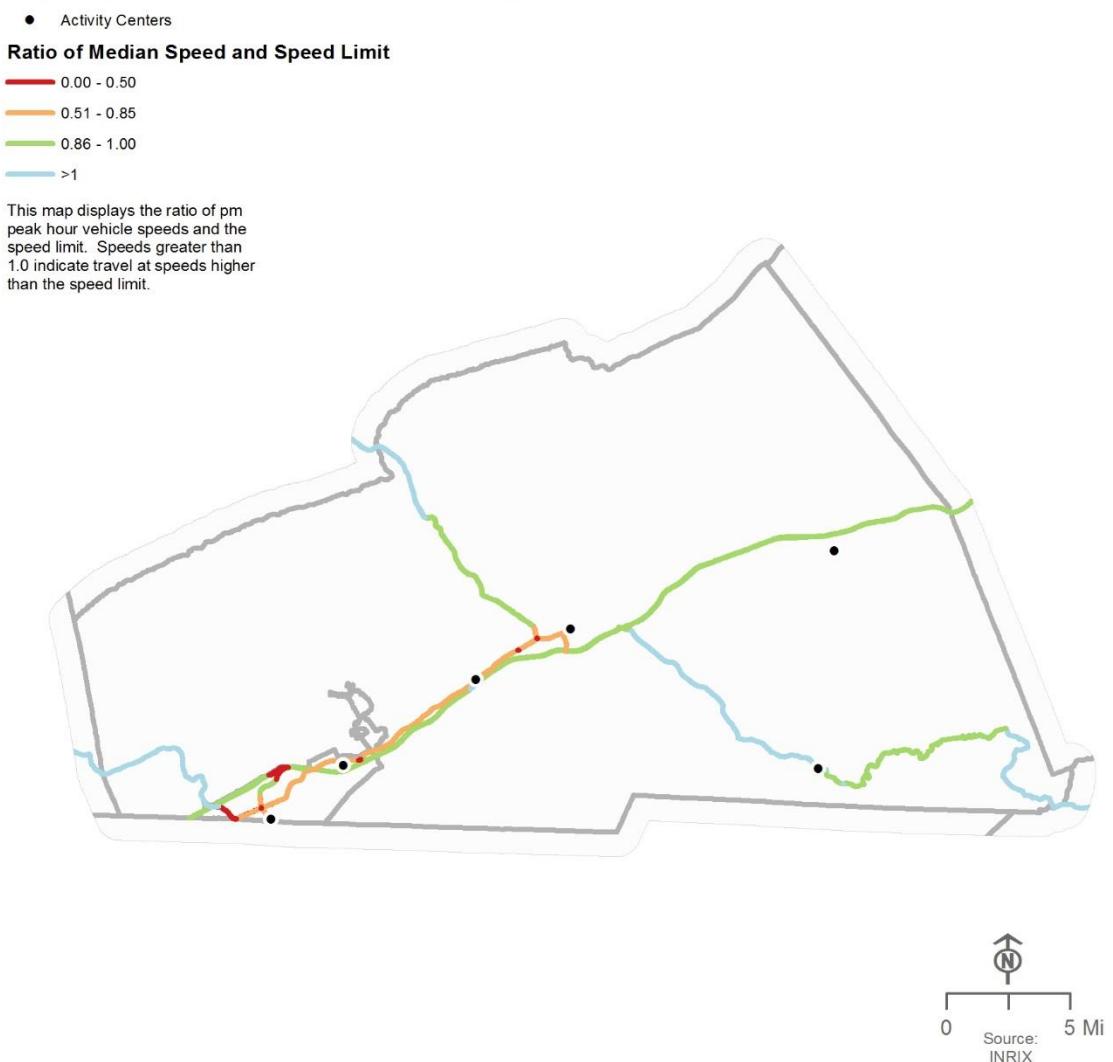
Figure 26: Median Speeds

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).
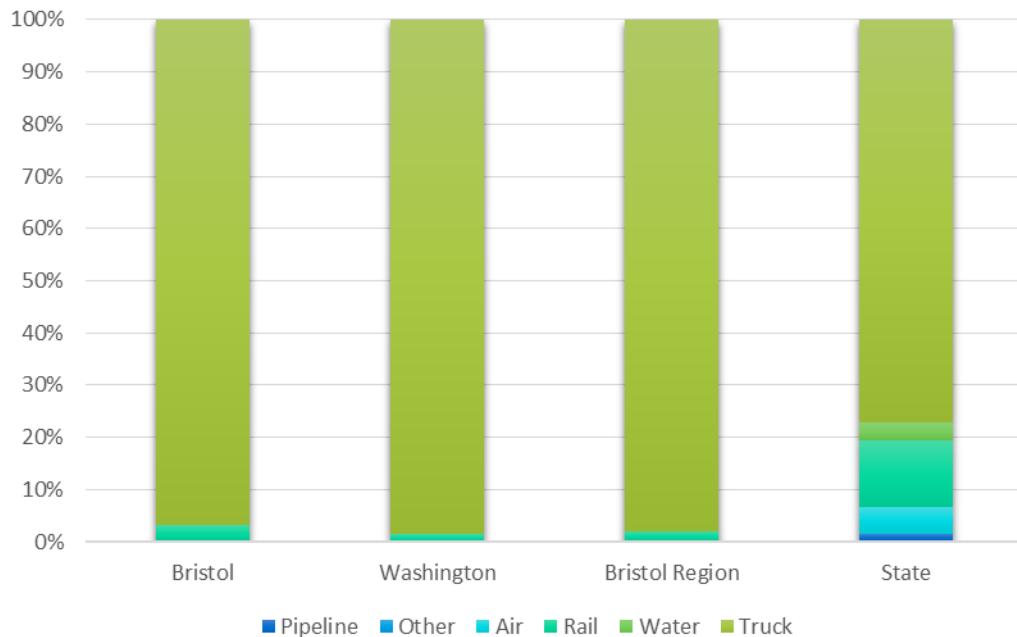

Figure 27: Comparison of Freight Modal Dependence
Source: TranSearch, 2012

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).
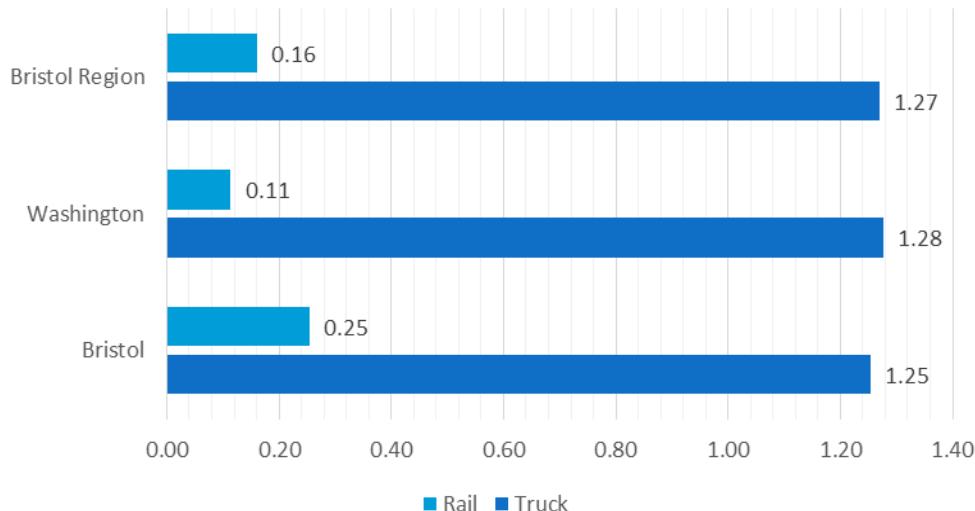
Figure 28: Location Quotient by Mode of Freight Travel
Source: TranSearch, 2012

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).

Inbound Commodities, by Value ($M)

Secondary Traffic, $352

Petroleum or Coal Products, $320

Food or Kindred Products, $191

Primary Metal Products, $175

Chemicals or Allied Products, $174

OTHER, $963.11
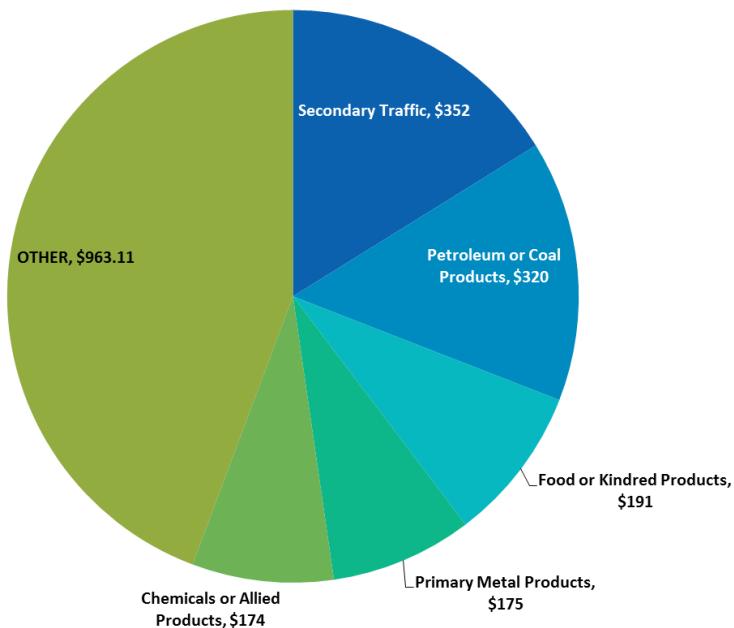
Figure 29: Top Freight Values by Commodities - Inbound.
Source: TranSearch, 2012

Outbound Commodities, by Value ($M)

OTHER, $813

Textile Mill Products, $935

Machinery, $444

Transportation Equipment, $292

Petroleum or Coal Products, $212

Fabricated Metal Products, $202
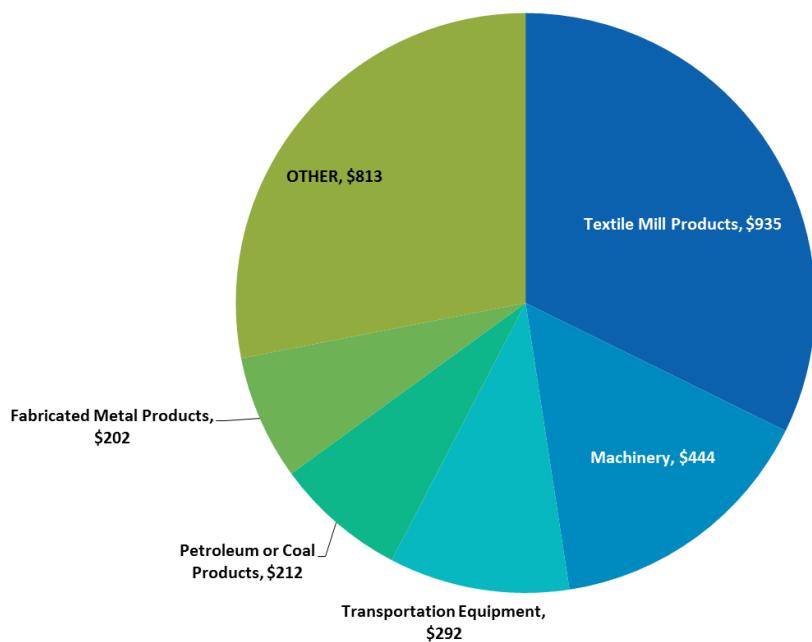
Figure 30: Top Freight Values by Commodities – Outbound
Source: TranSearch, 2012

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).
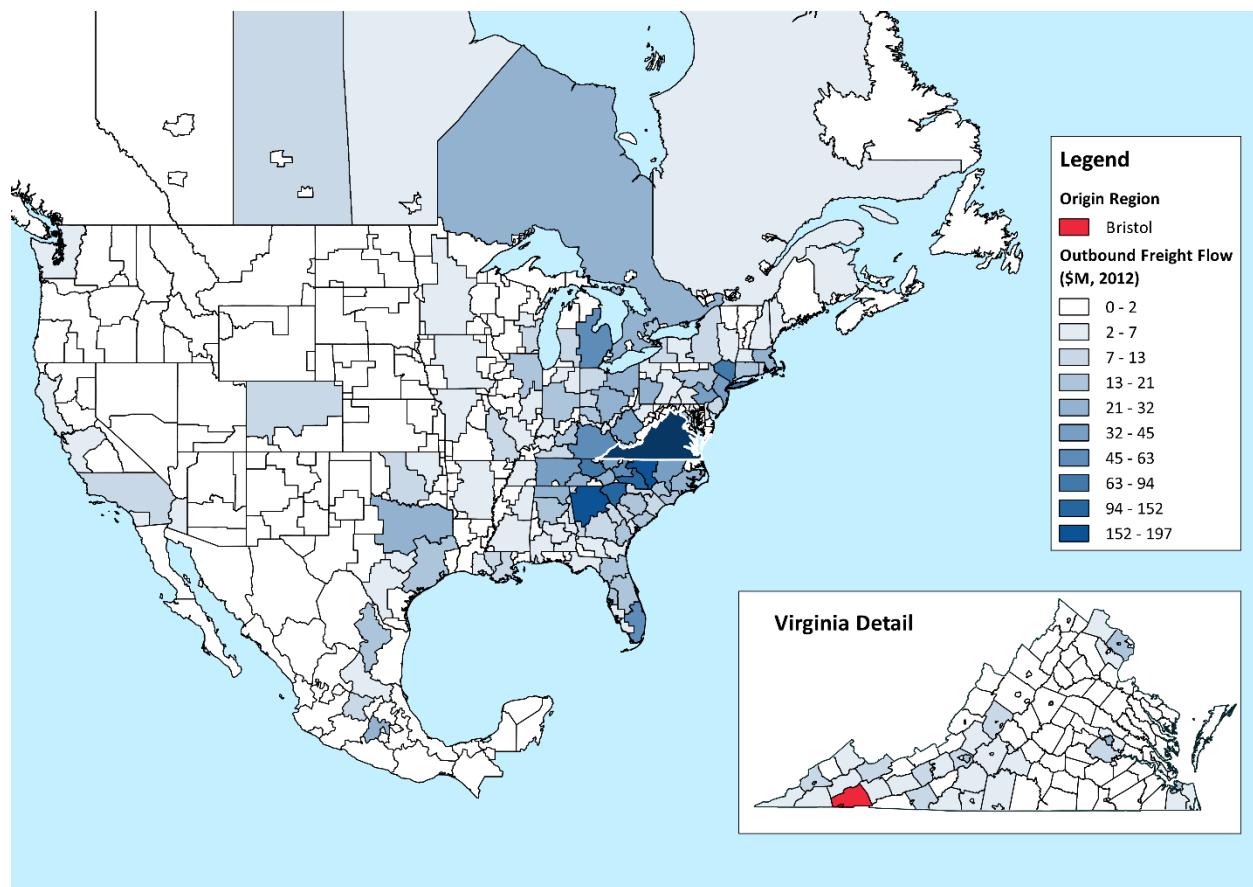
Figure 31: Top Freight Values by Region.
Source: TranSearch, 2012

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).

Inbound Commodities, by Weight (000s of tons)

OTHER, 1

Clay,concrete,glass or Stone, 197

Farm Products, 221

Nonmetallic Minerals, 591

Secondary Traffic, 286

Petroleum or Coal Products, 328
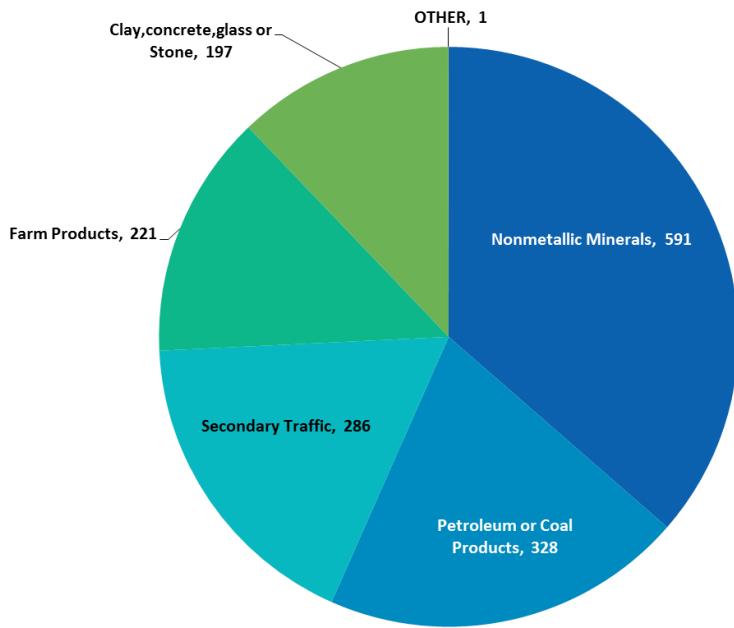
Figure 32: Top Commodities by Weight – Inbound.
Source: TranSearch, 2012

Outbound Commodities, by Weight (000s of tons)

Textile Mill Products, 146

OTHER, 1

Petroleum or Coal Products, 213

Nonmetallic Minerals, 690

Clay,concrete,glass or Stone, 214

Farm Products, 217
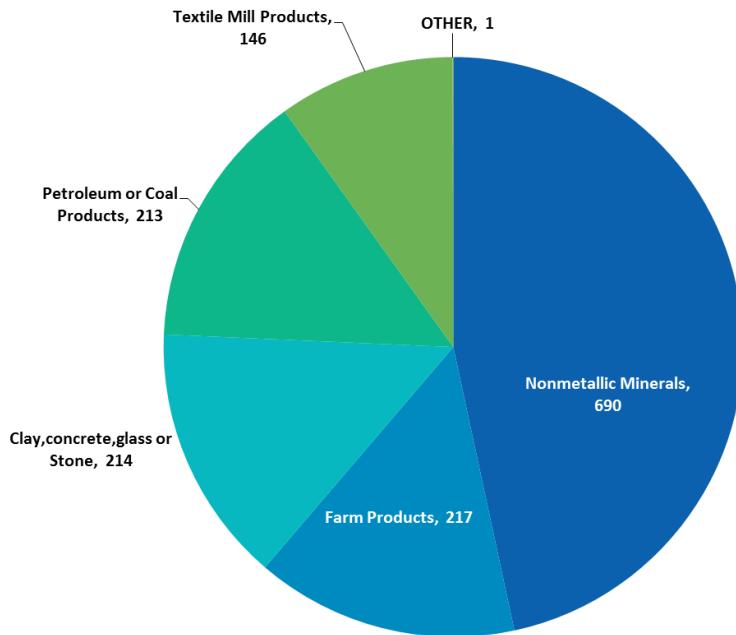
Figure 33: Top Commodities by Weight - Outbound.
Source: TranSearch, 2012

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.
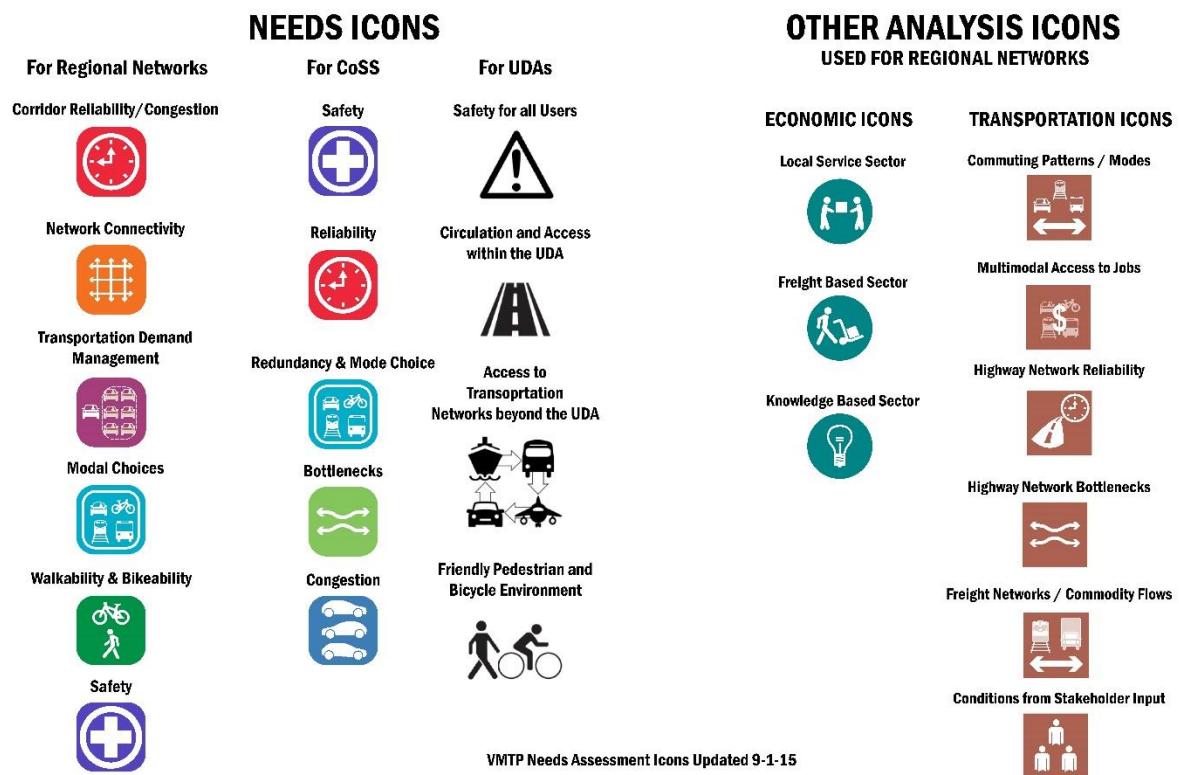

Figure 34. VMTP Needs Icons

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 Table

Needs Map

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.

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

Activity Centers

Railroads

NEEDS INDICATED BY LETTERS DESCRIBED IN NEEDS TABLE

0   3 Mi

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.