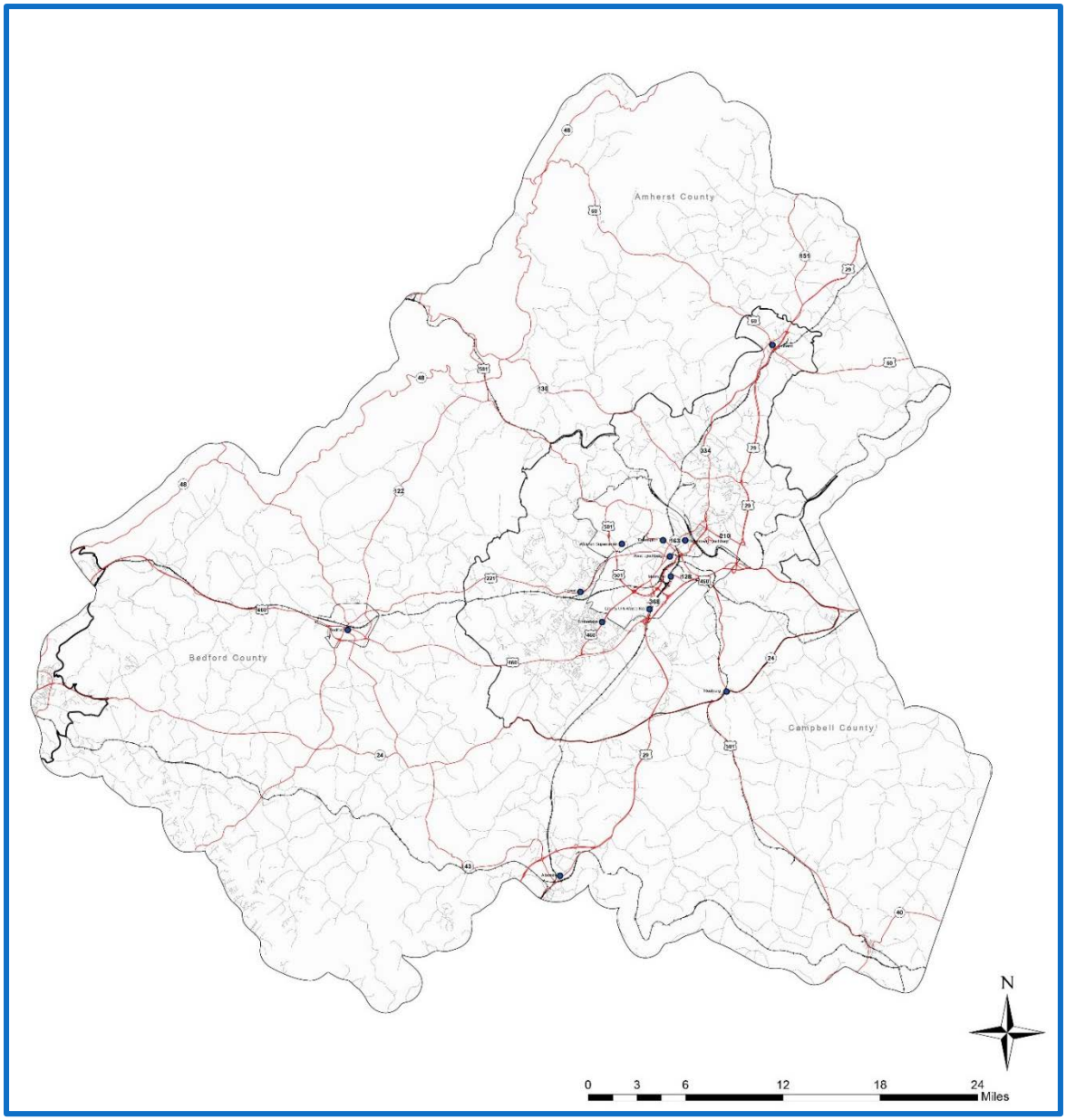
VMTP 2025 Needs Assessment

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.

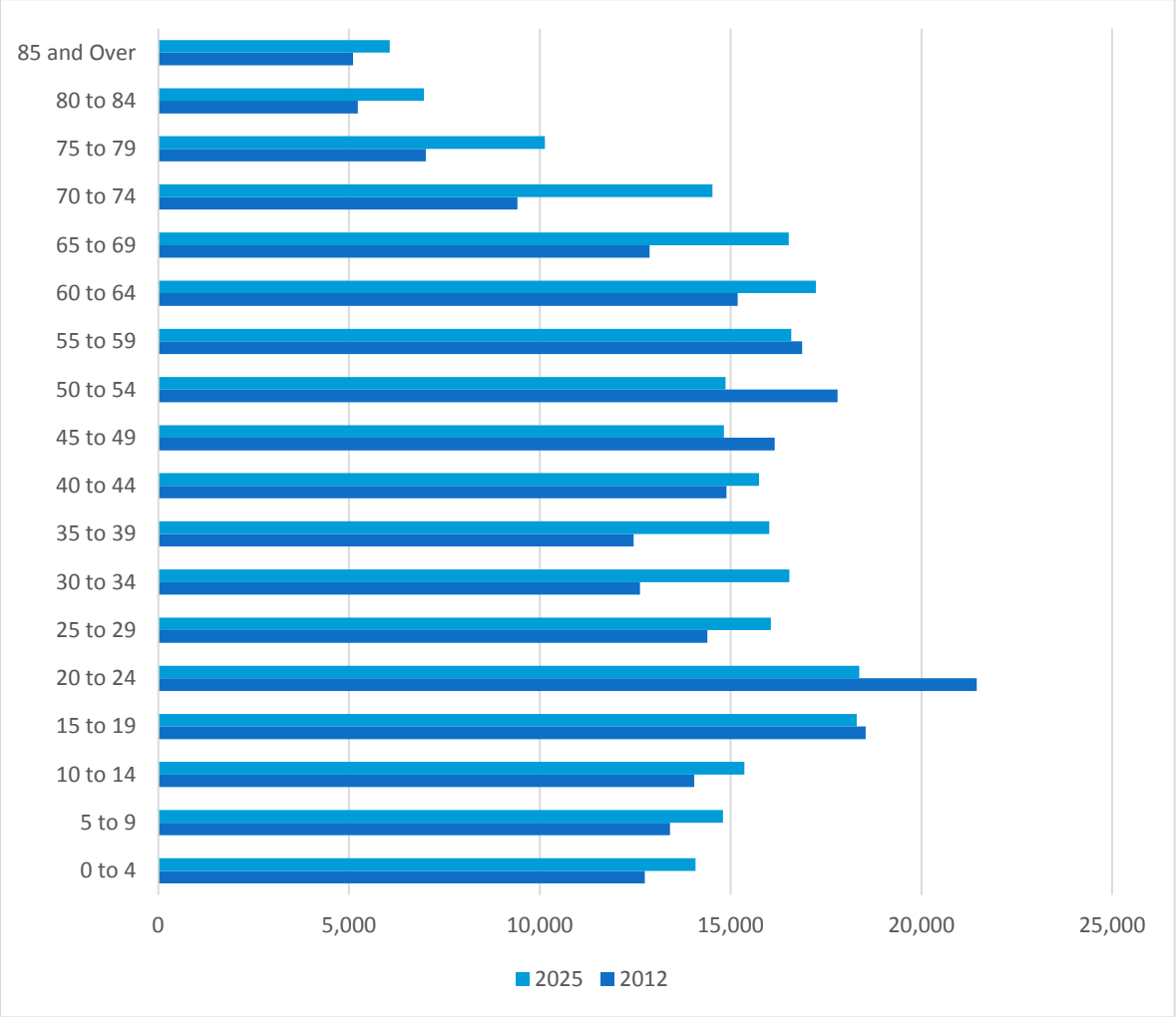


Figure 1: Population by Age in the year 2012 and Projected for the year 2025

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.

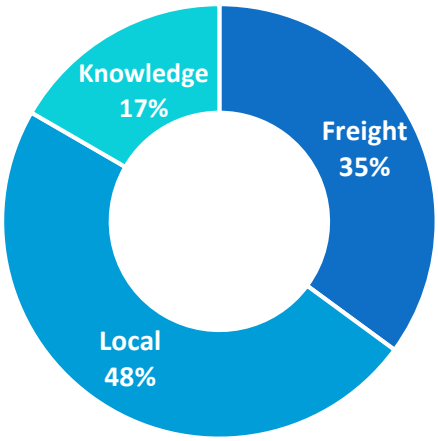


Figure 2: Top Sectors by Output (2012)

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.

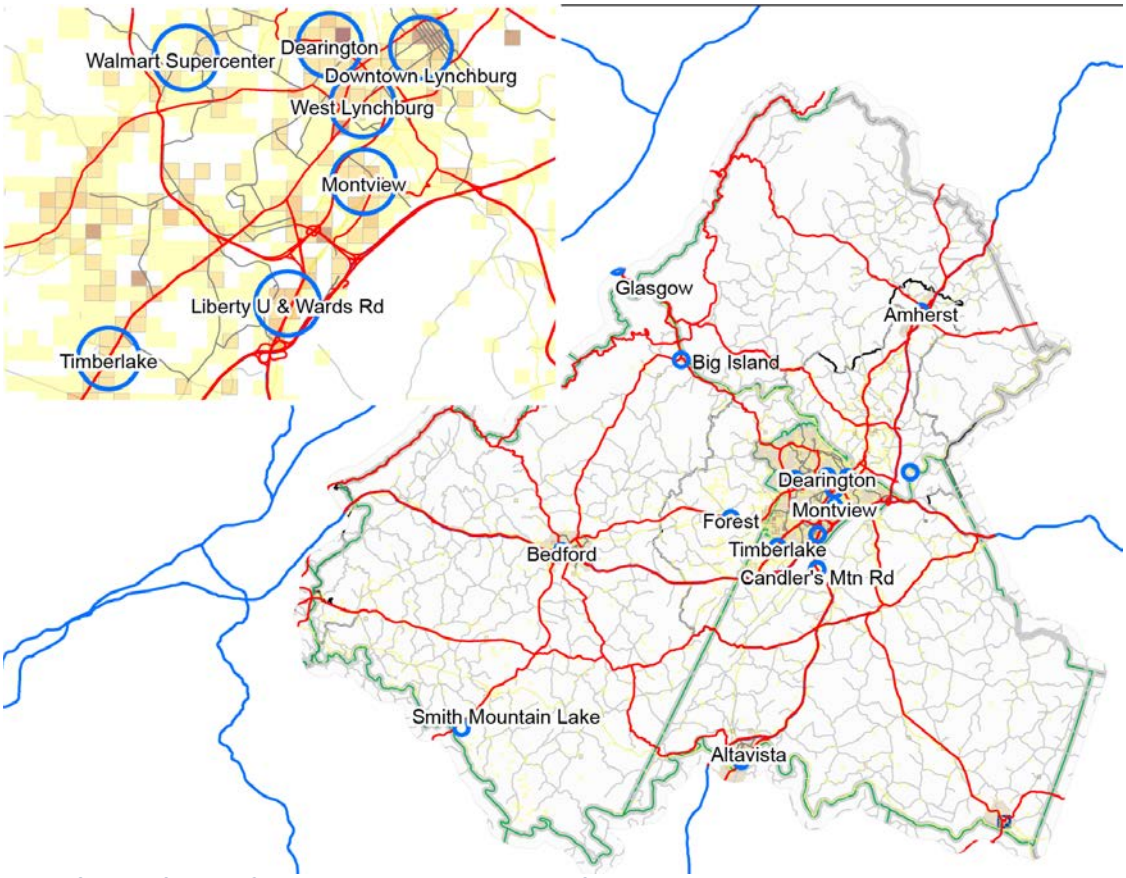


Figure 3: Map of Activity Centers based on Job Density and Stakeholder Input (Region view; Downtown view).

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.

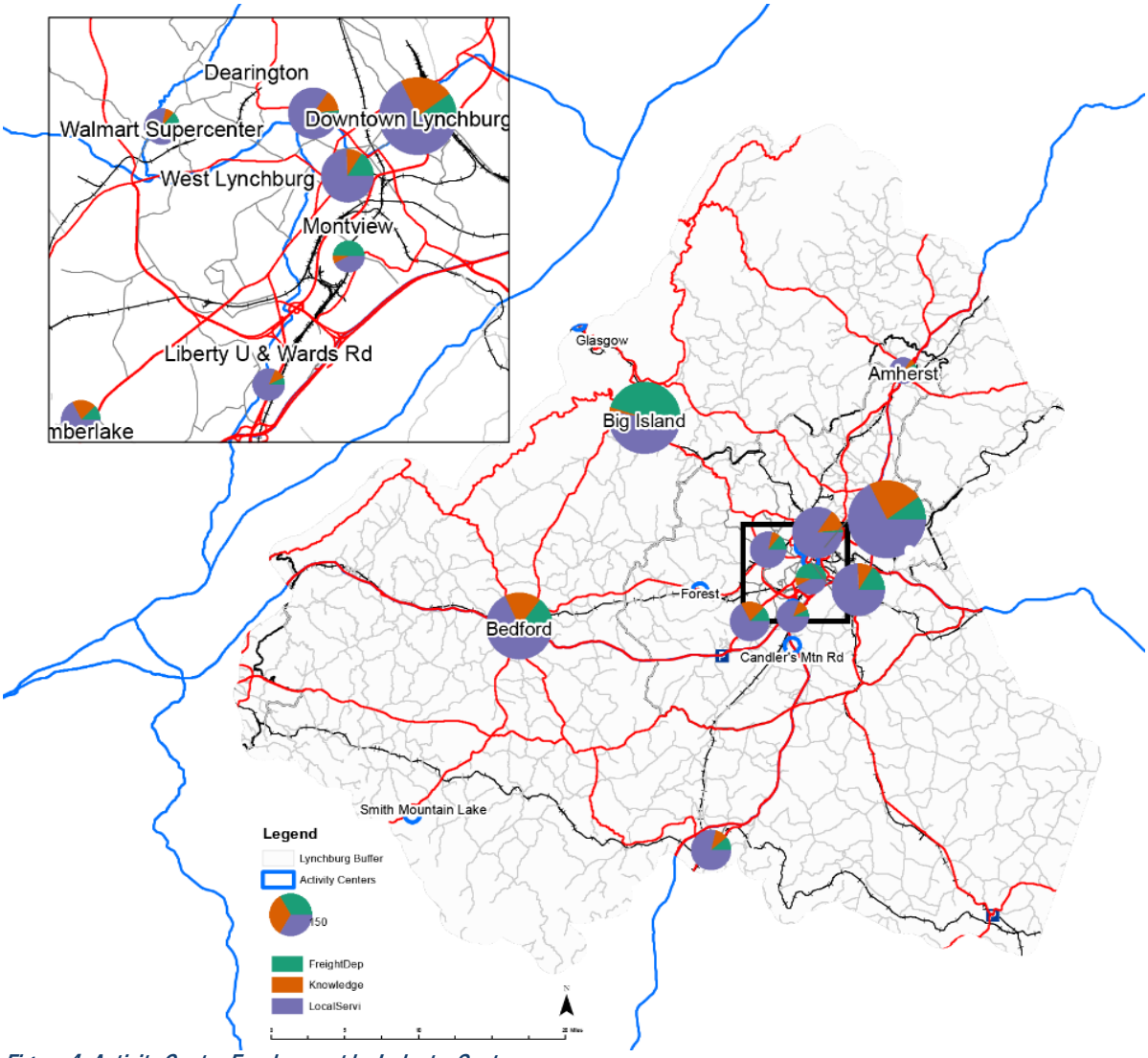


Figure 4: Activity Center Employment by Industry Sector

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).

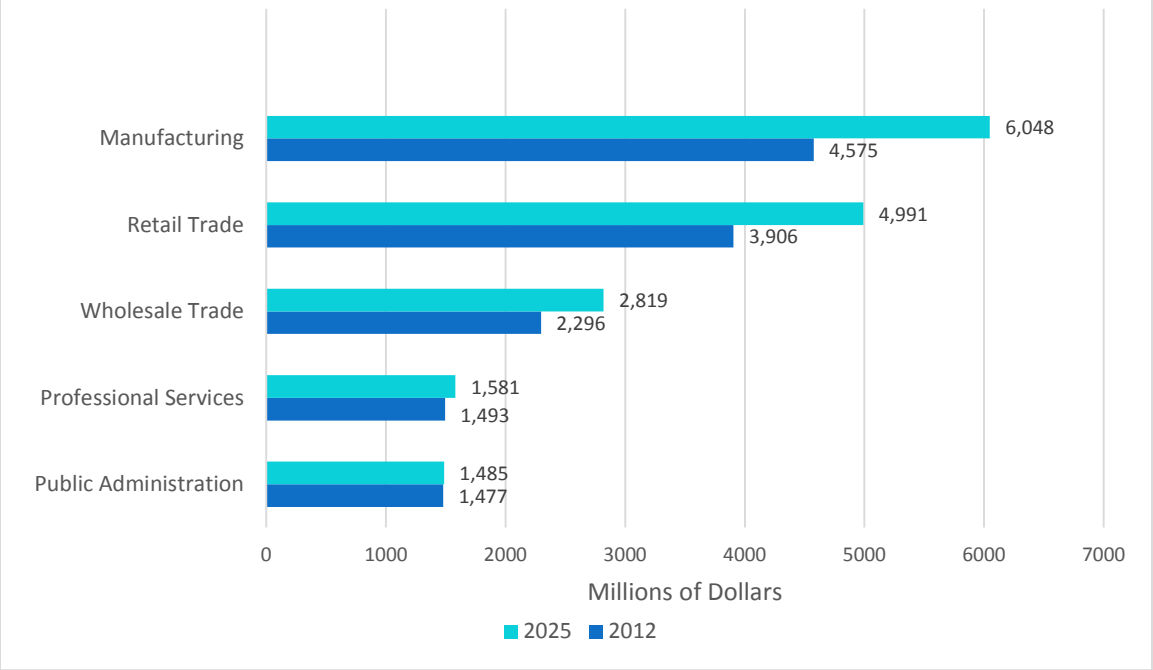


Figure 5: Top Industries by Output.
Source: IHS Global Insight, 2012

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).

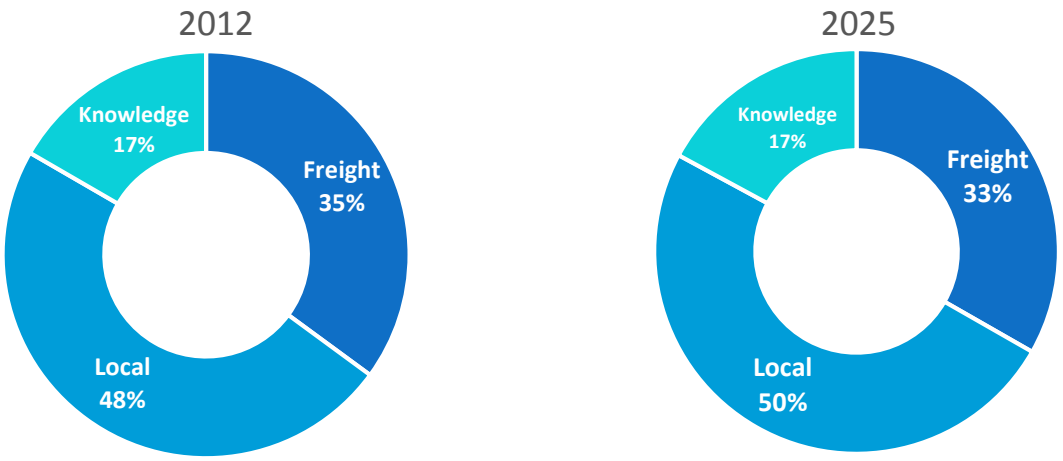


Figure 6: Current and Forecasted Output by Sector
Source: IHS Global Insight, 2012 & 2025

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).

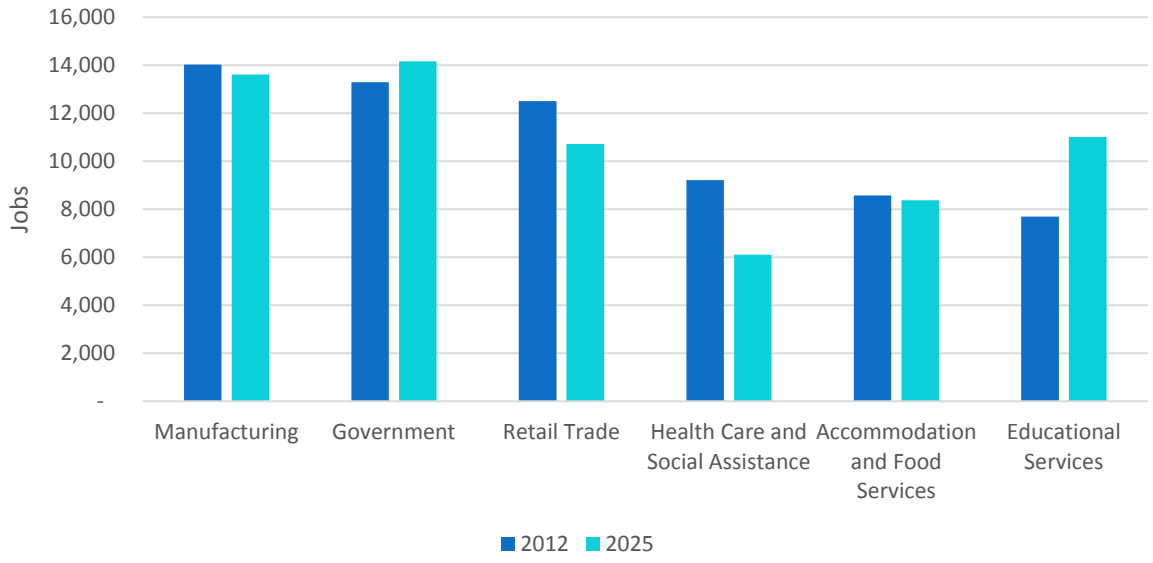


Figure 7: Employment in Major Industries.
Source: IHS Global Insight, 2012

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).

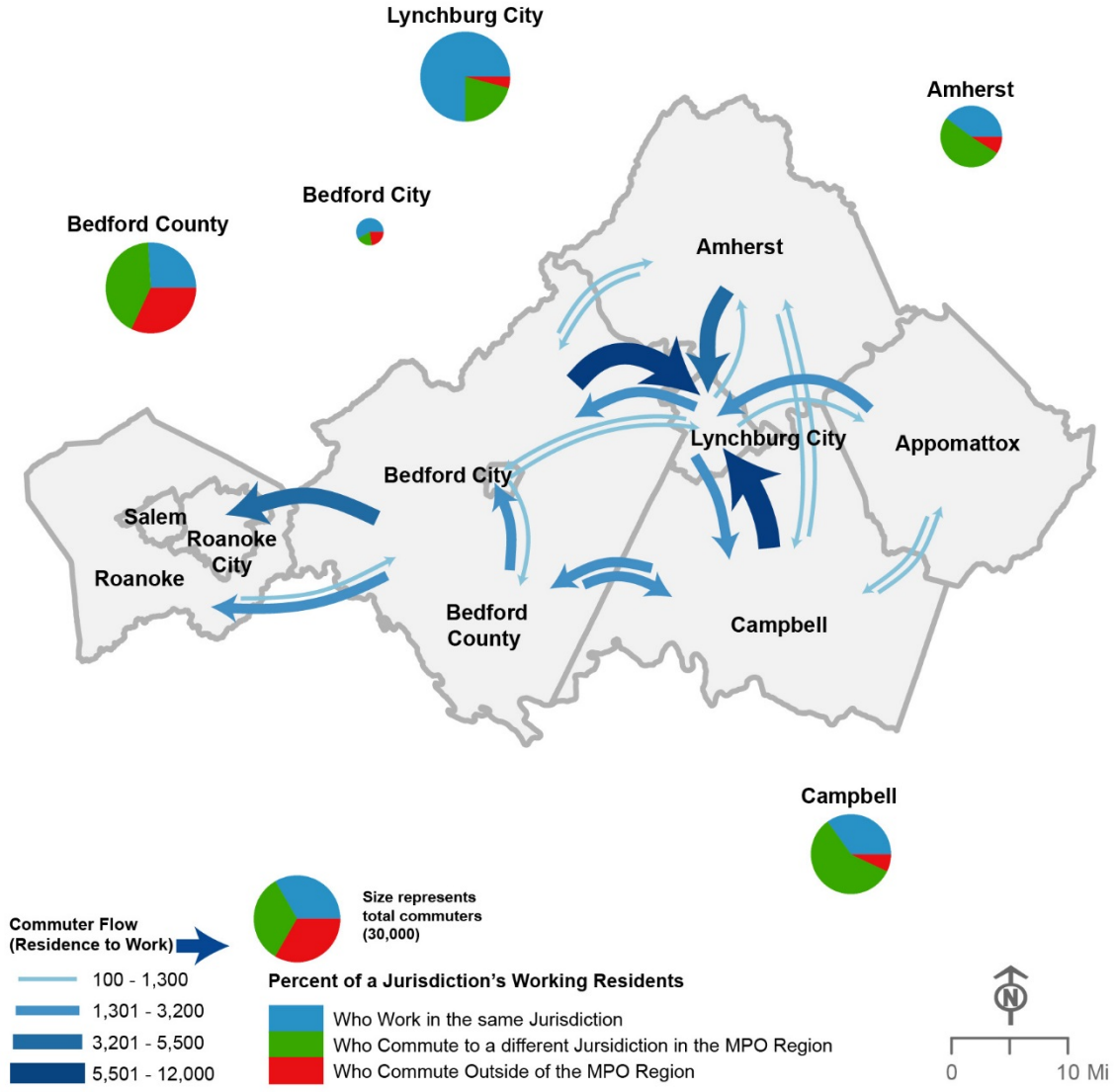


Figure 8: Regional Commuting Patterns
Source: US Census Longitudinal Employer-Household Dynamics (LEHD). 2006-2010.

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).

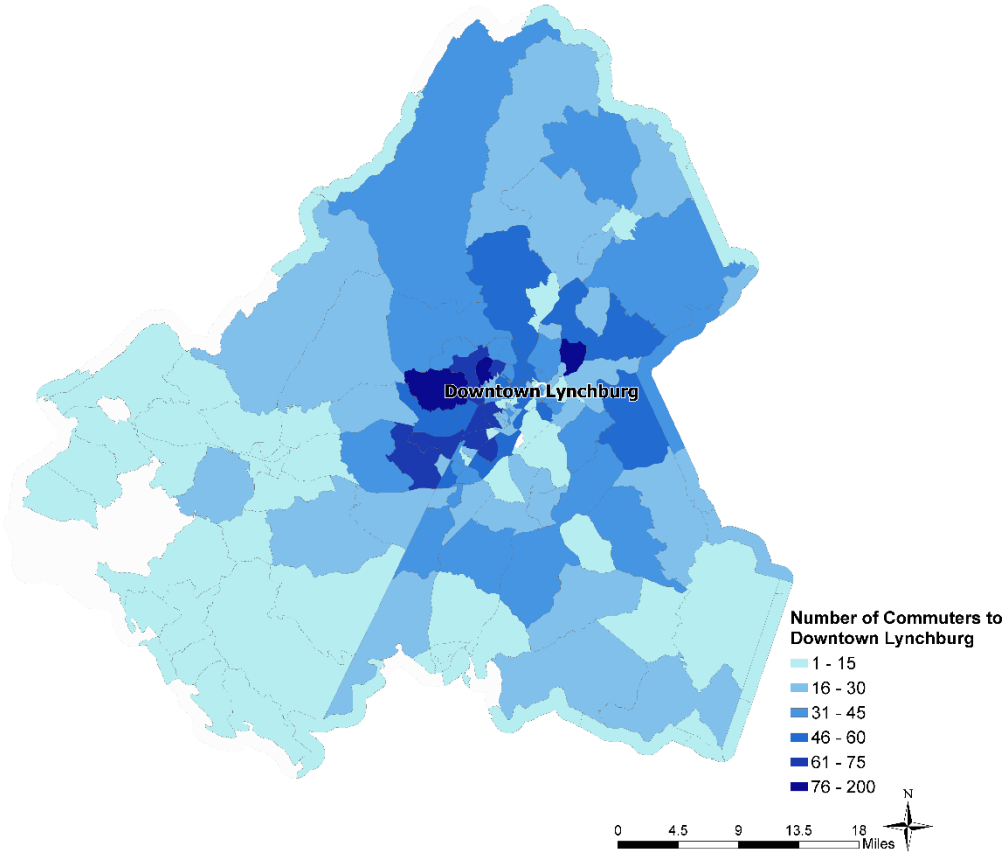


Figure 9: Commuting Patterns to Downtown Lynchburg Activity Center.
Source: LEHD

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.

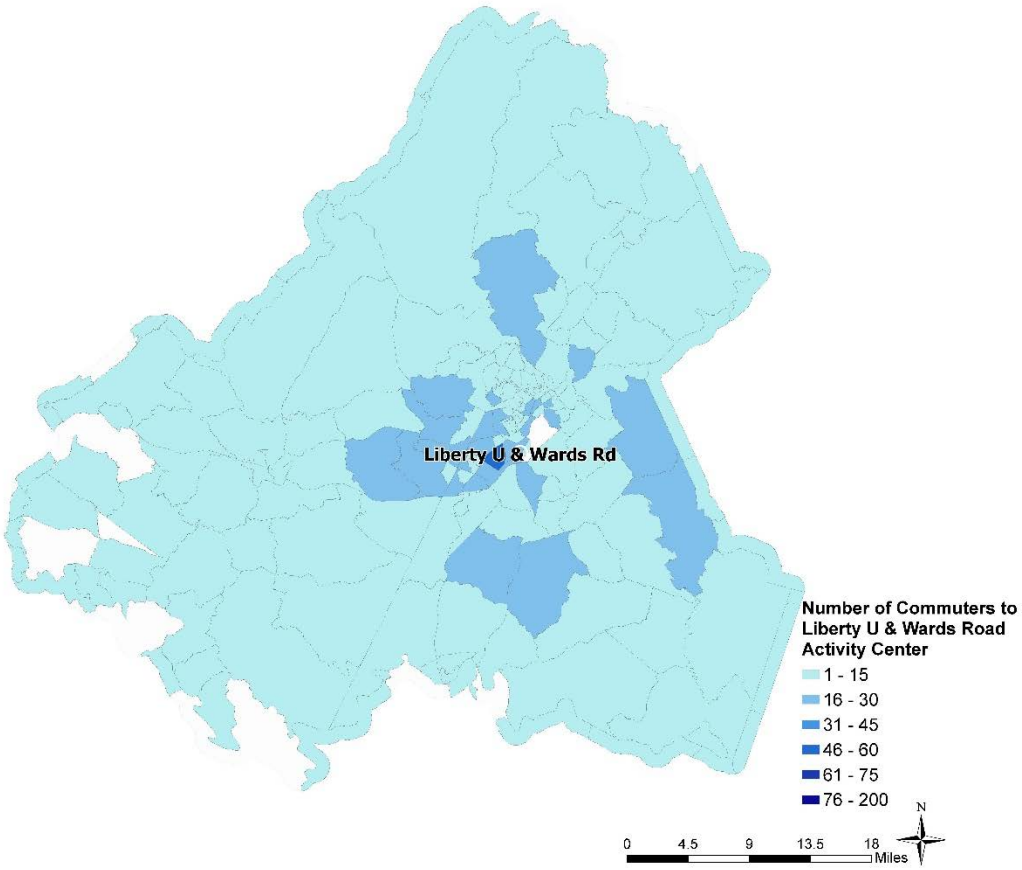


Figure 10: Commuting Patterns to Liberty University and Wards Road Activity Center.
Source: LEHD

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).

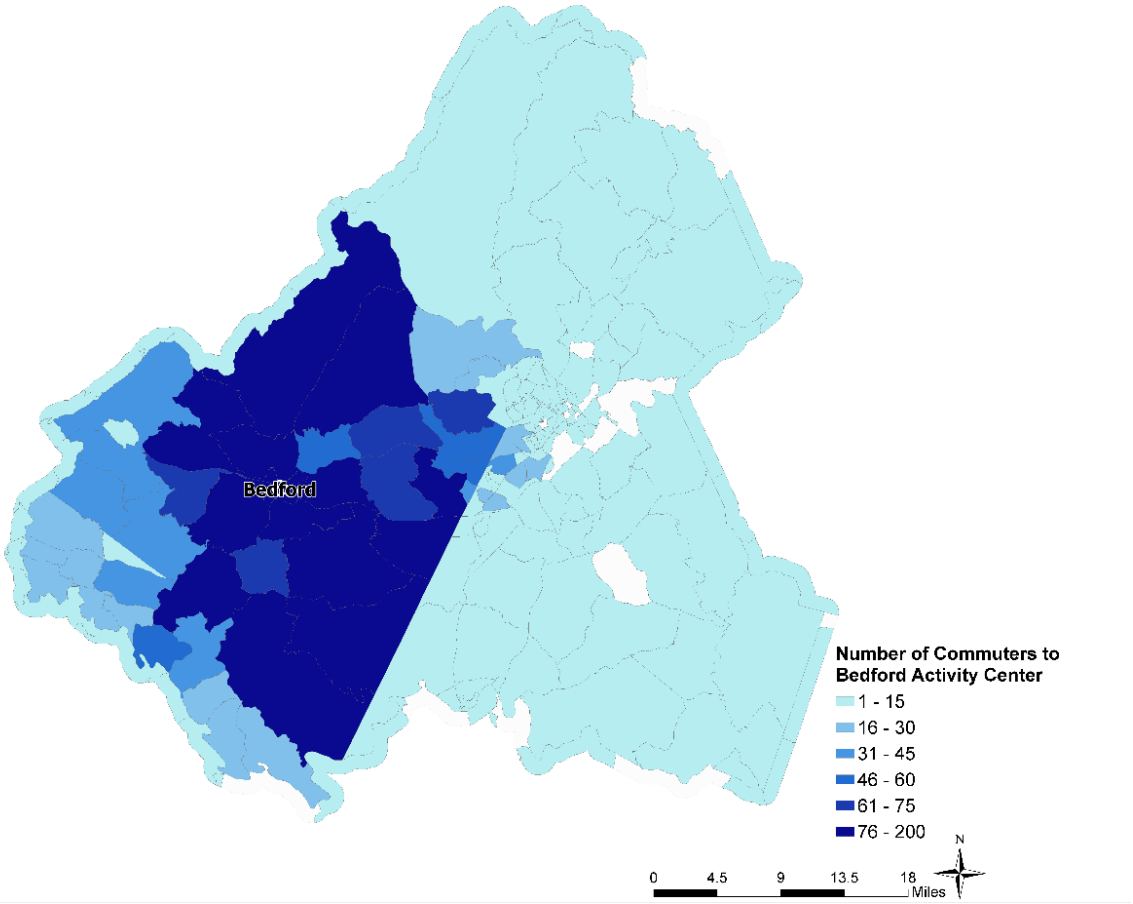


Figure 11: Commuting Patterns to Bedford Activity Center.
Source: LEHD

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).

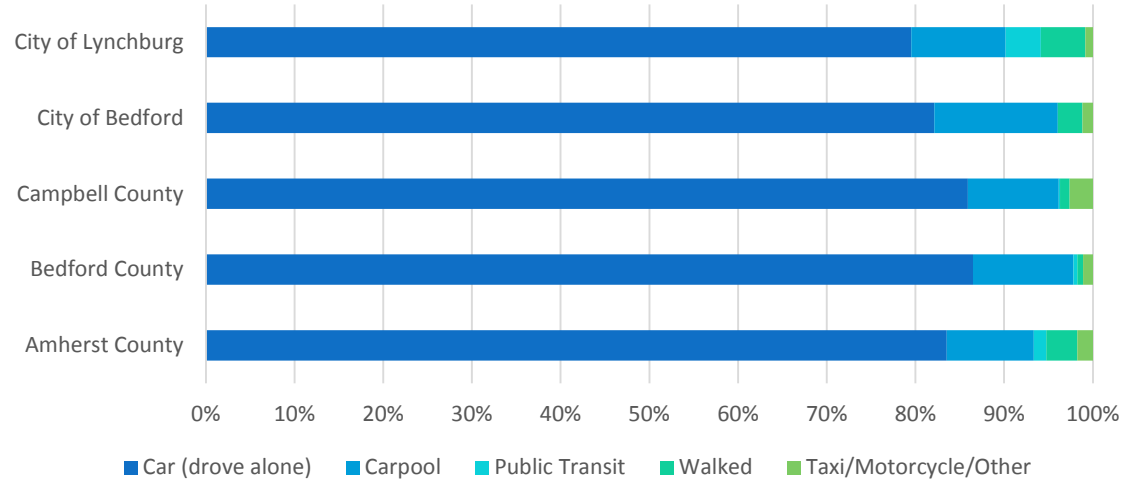


Figure 12: Mode Share Split by Jurisdiction.
Source: ACS 2013 5-Year Estimates

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).

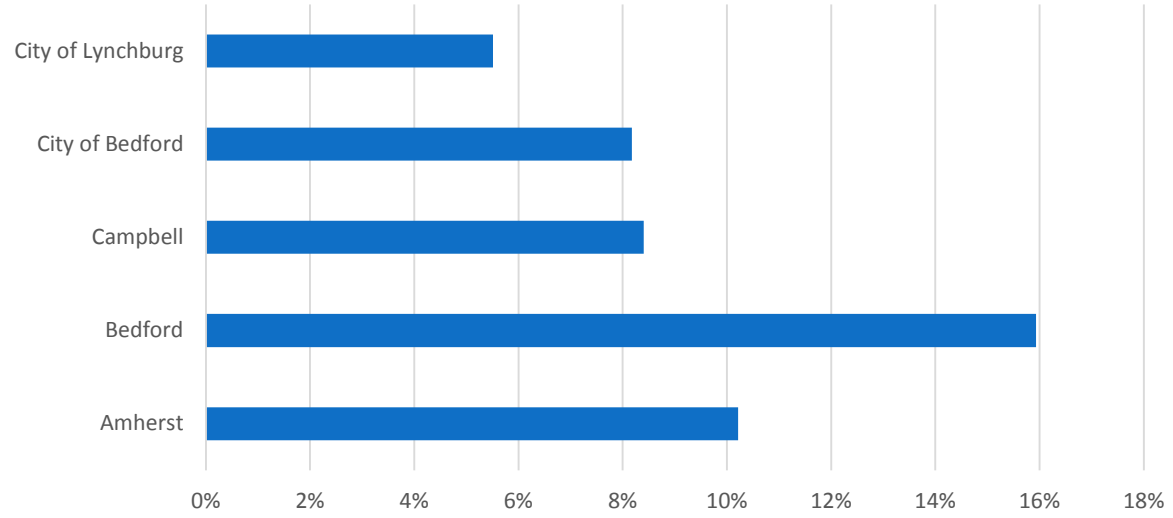


Figure 13: Percent of Commutes Long than 45 Minutes
Source: ACS 2013 5-Year Estimates

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.

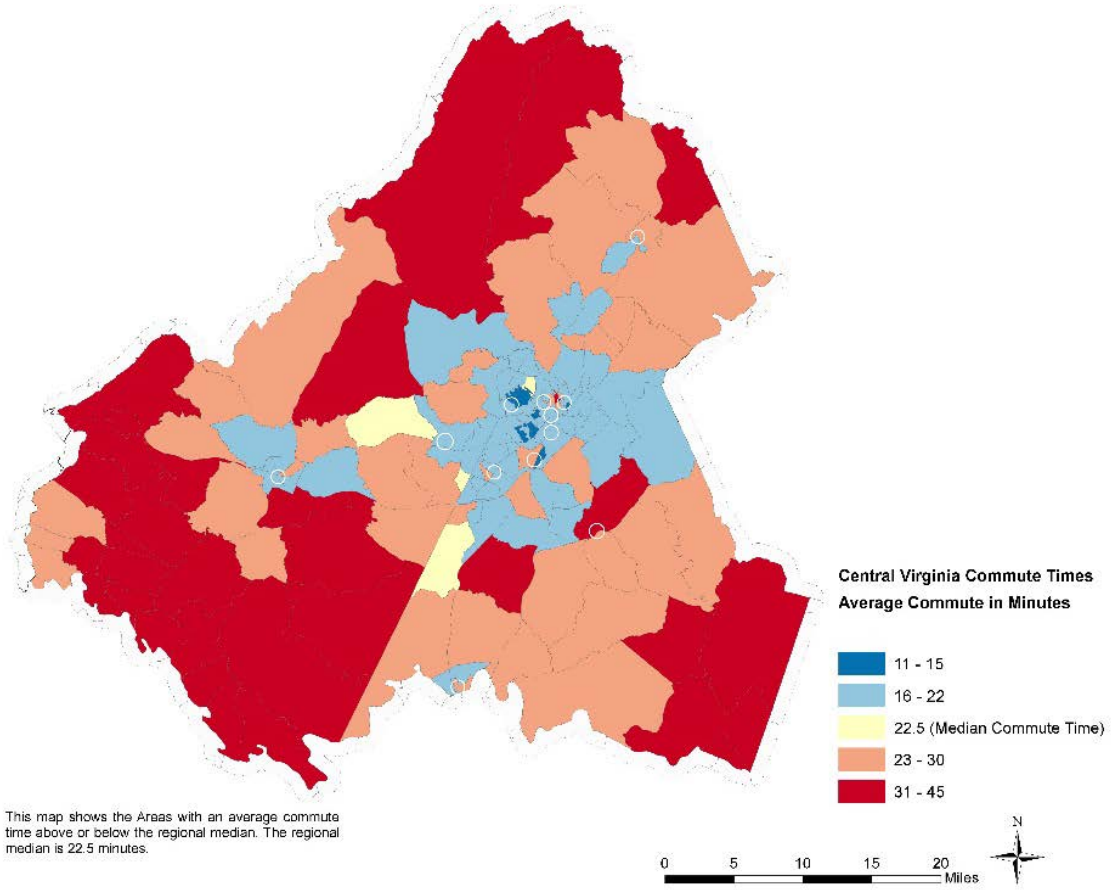


Figure 14: Central Virginia Commute Times
Source: ACS 2013, 5-Year Estimates.

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).

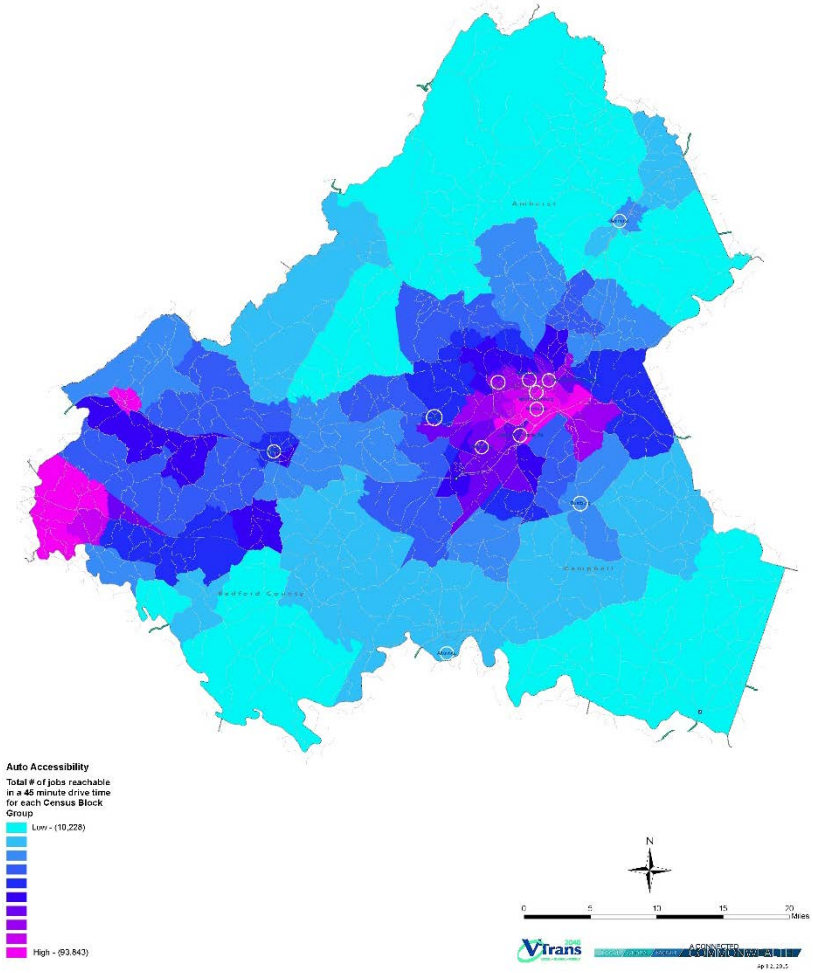


Figure 15: Auto Accessibility

[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).

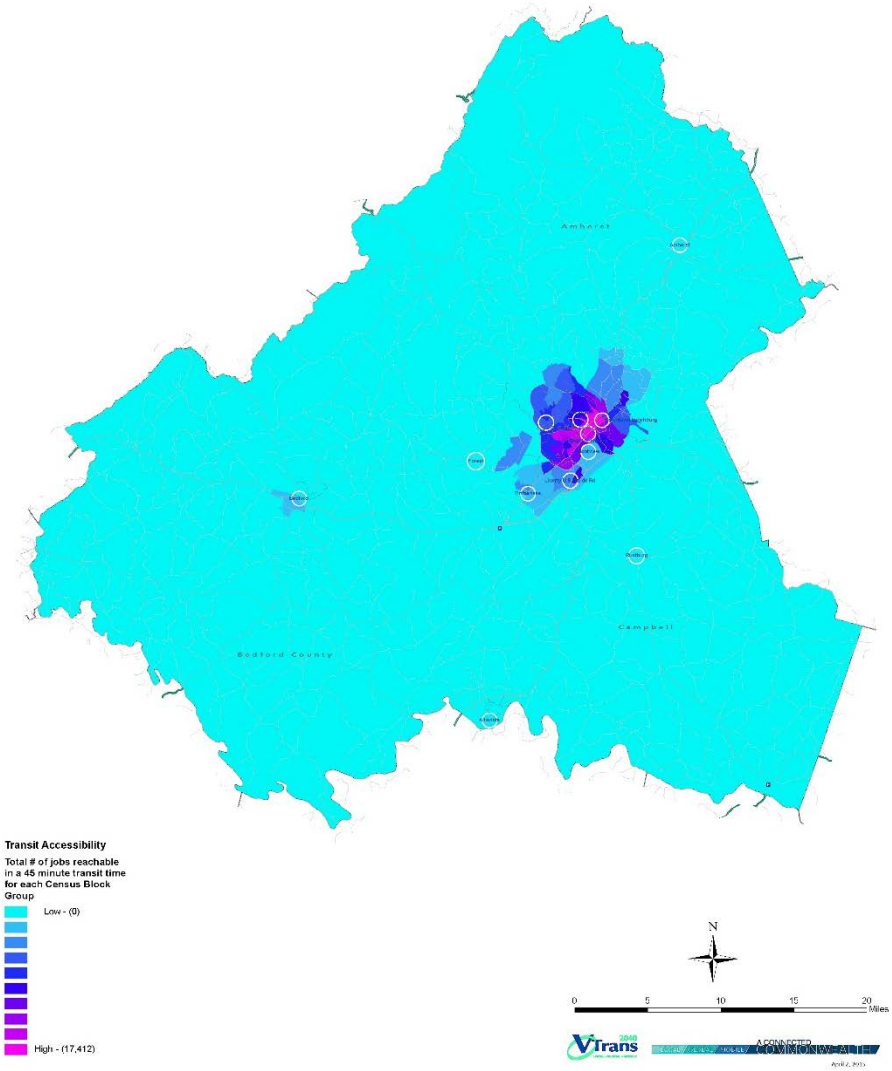


Figure 16: Transit Accessibility

[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).

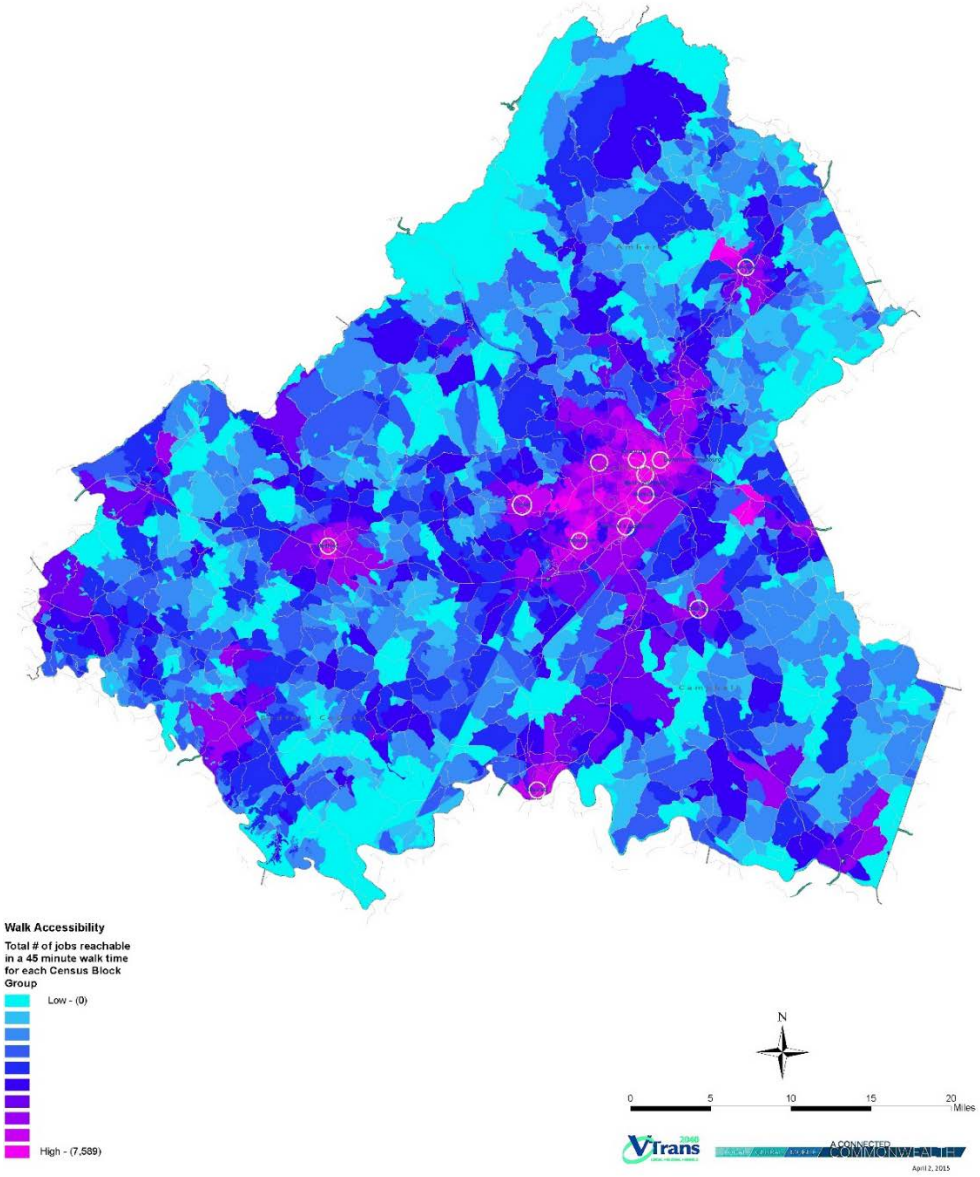


Figure 17: Walk Accessibility

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).

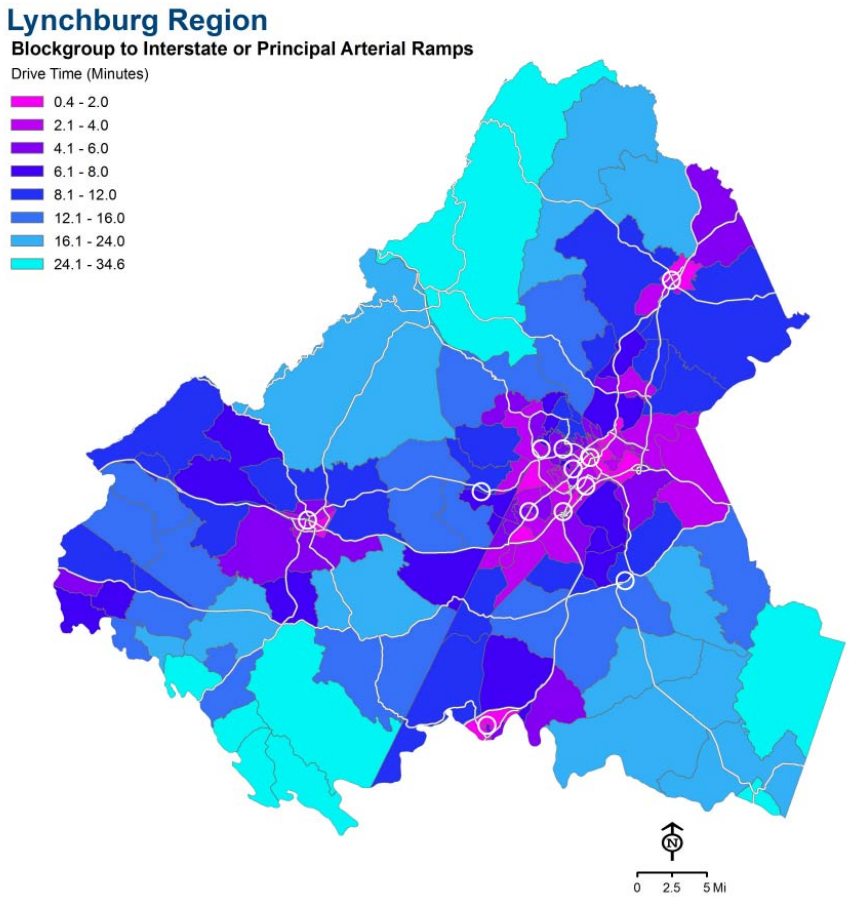


Figure 18: Access to Interstate and Principal Arterial Ramps

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).

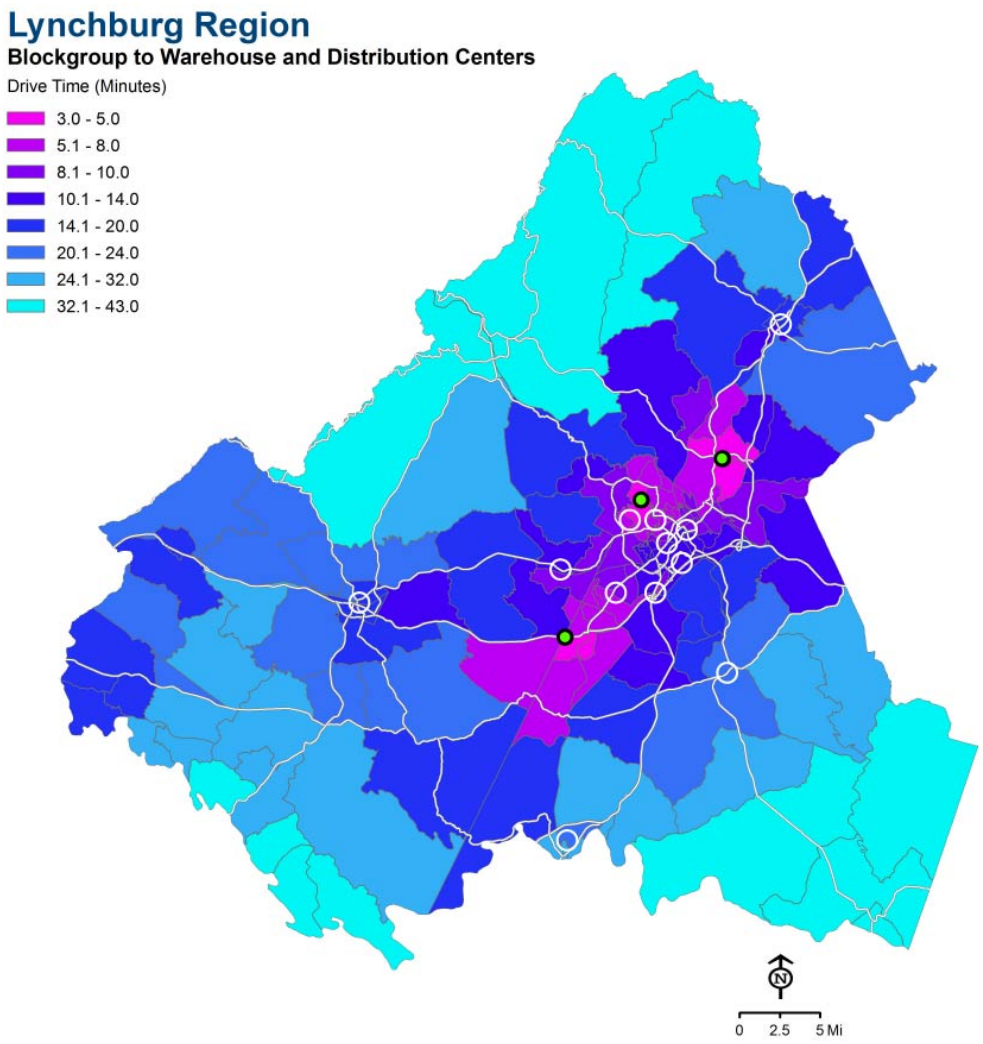


Figure 19: Access to Warehouses & Distribution Centers

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).

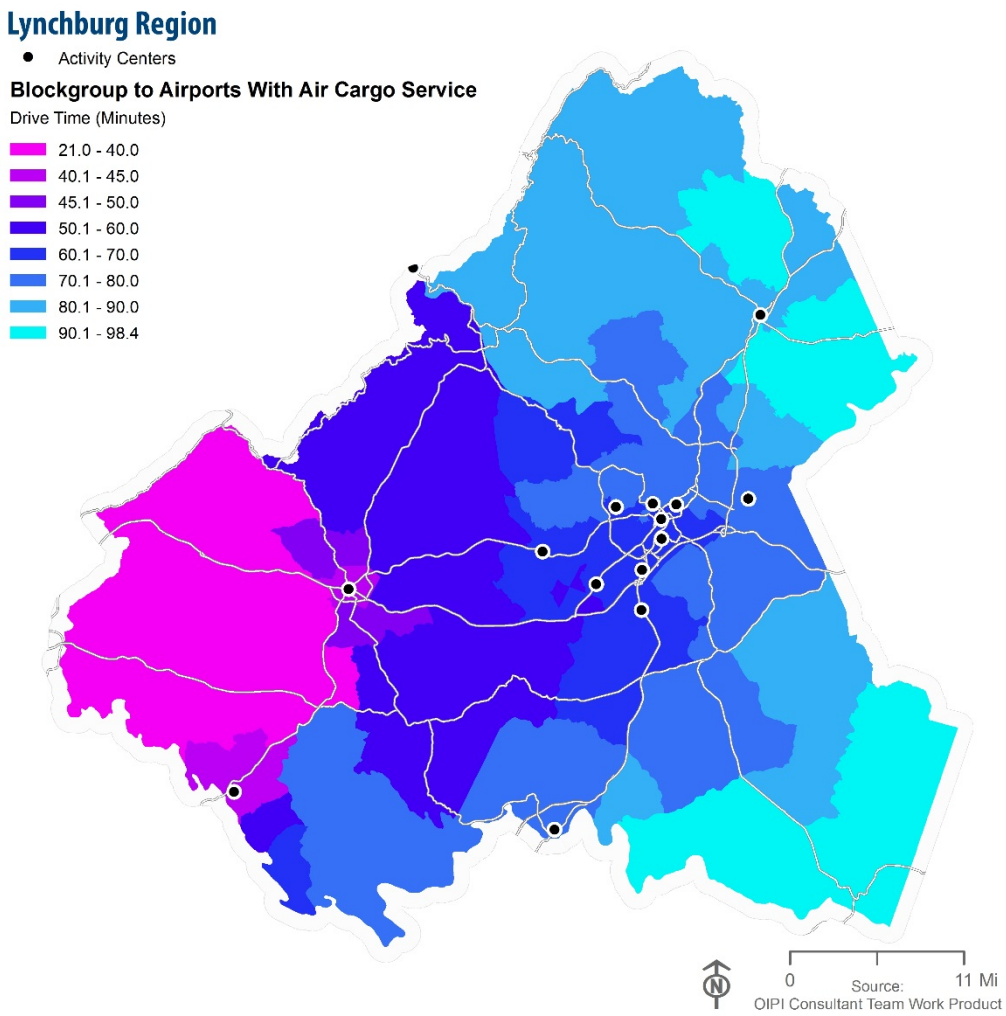


Figure 20: Access to Airports with Major Air Cargo Service

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).

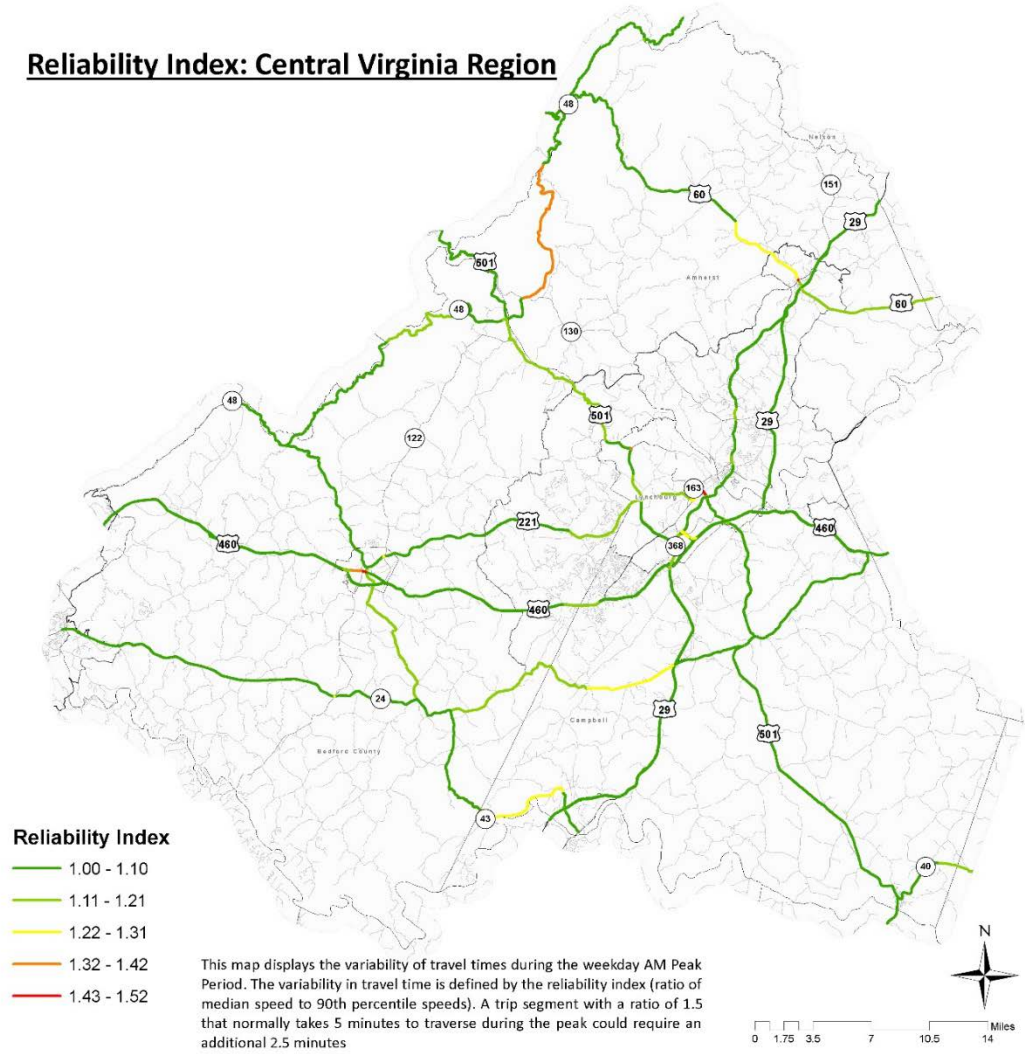


Figure 21: Travel Time Reliability

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).

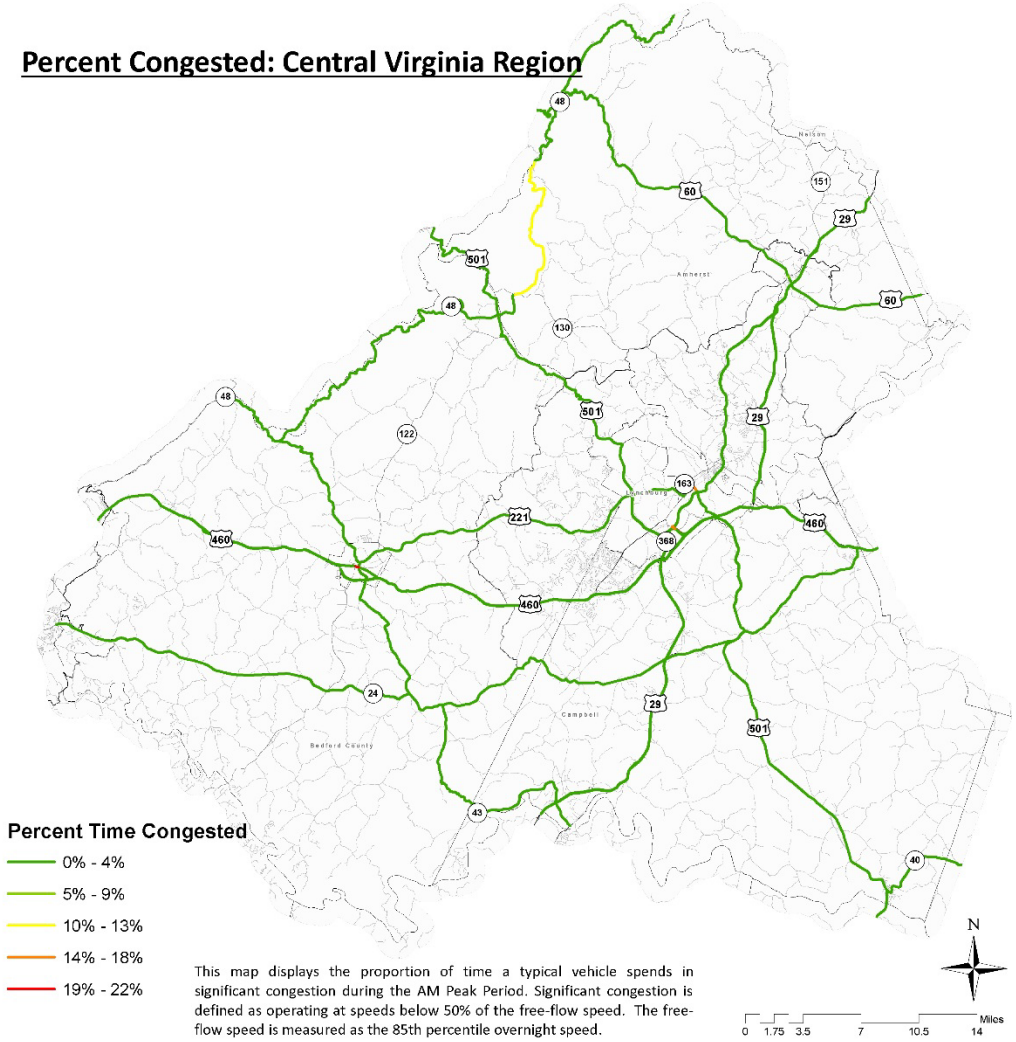


Figure 22: Percent of Time Congested

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.

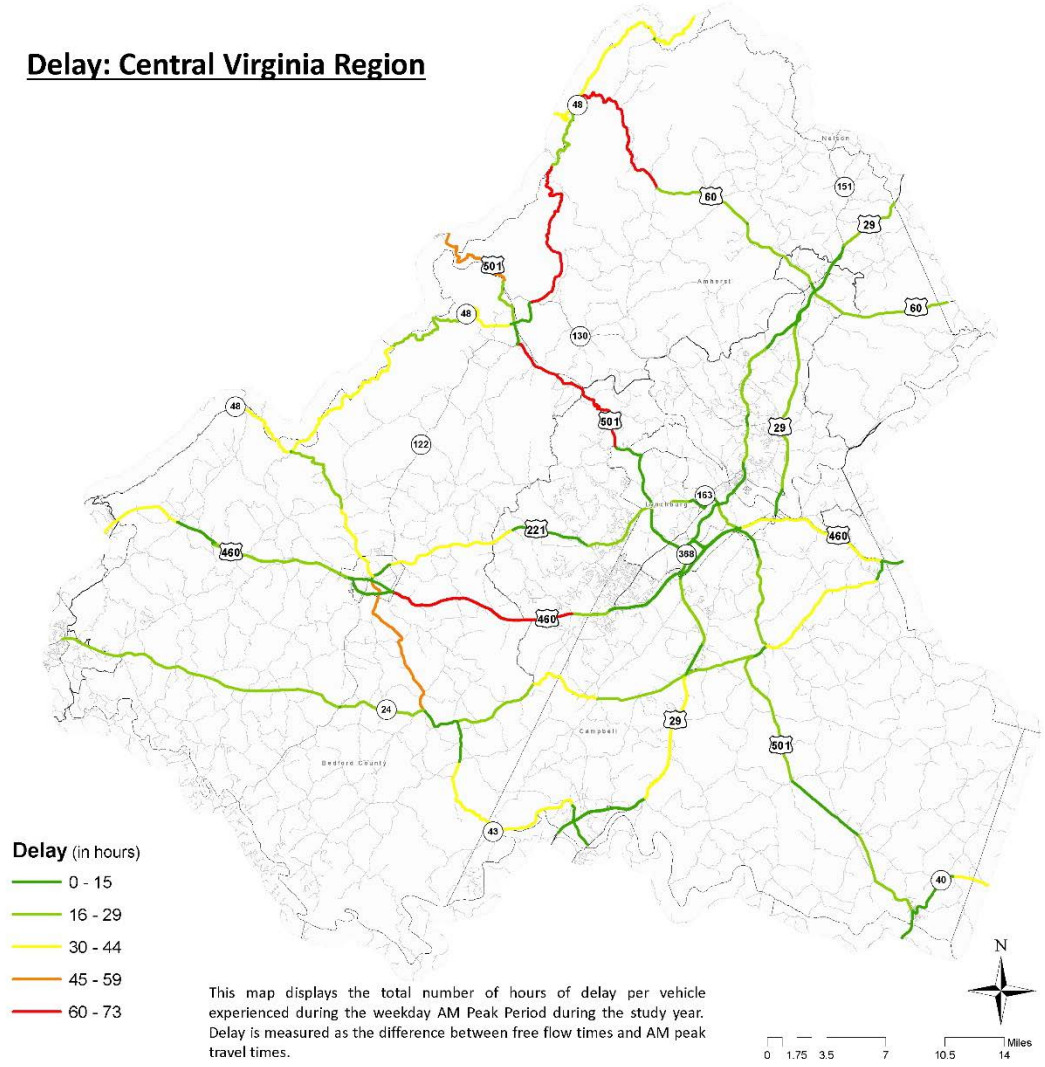


Figure 23: Travel Time Delay

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.

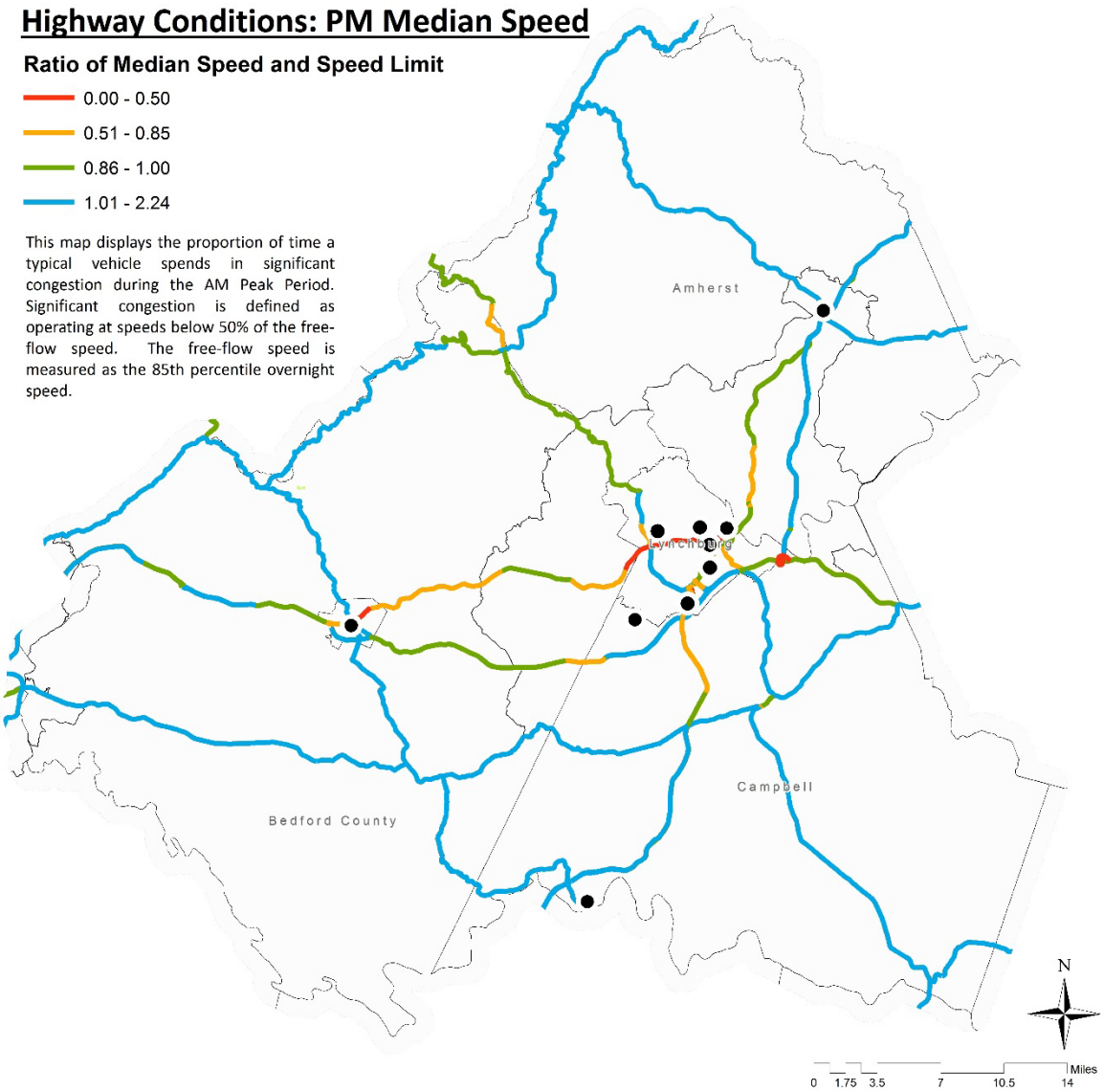


Figure 24: Median Speeds

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).

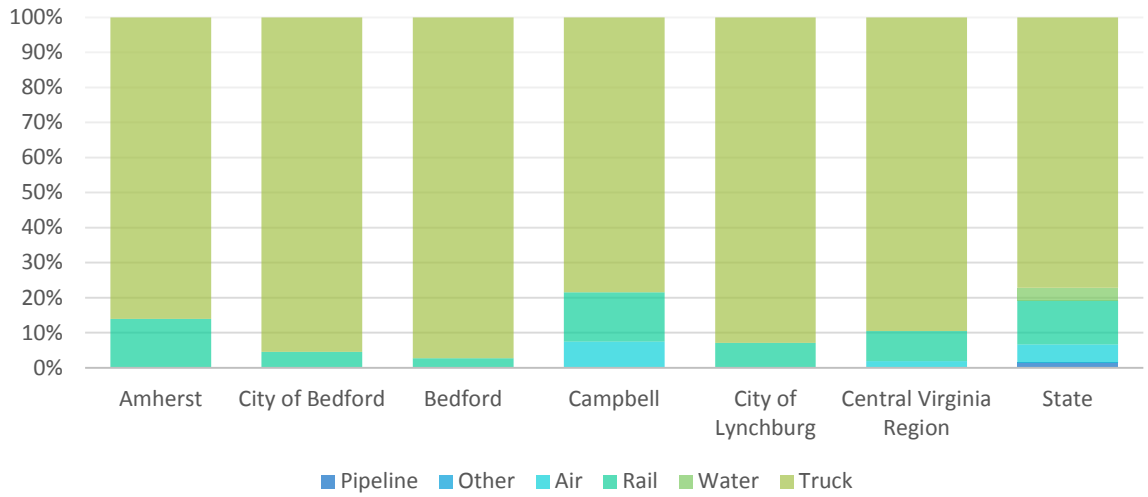


Figure 25: Comparison of Freight Modal Dependence

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).

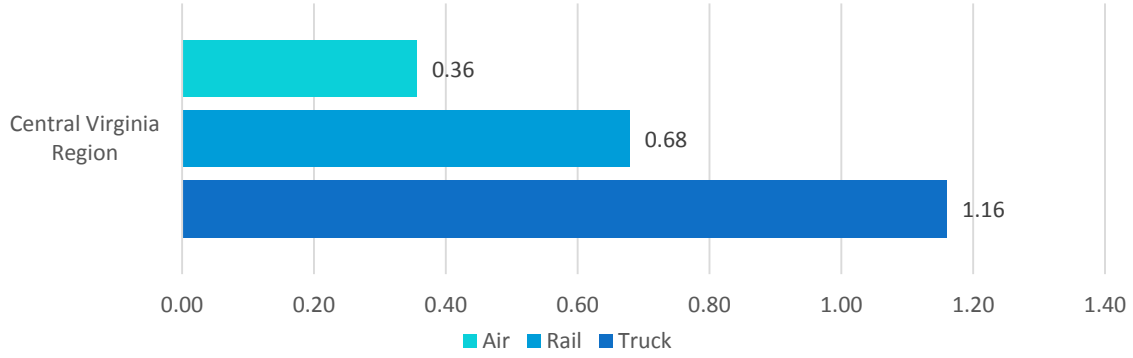


Figure 26: Location Quotient by Mode of Freight Travel

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).

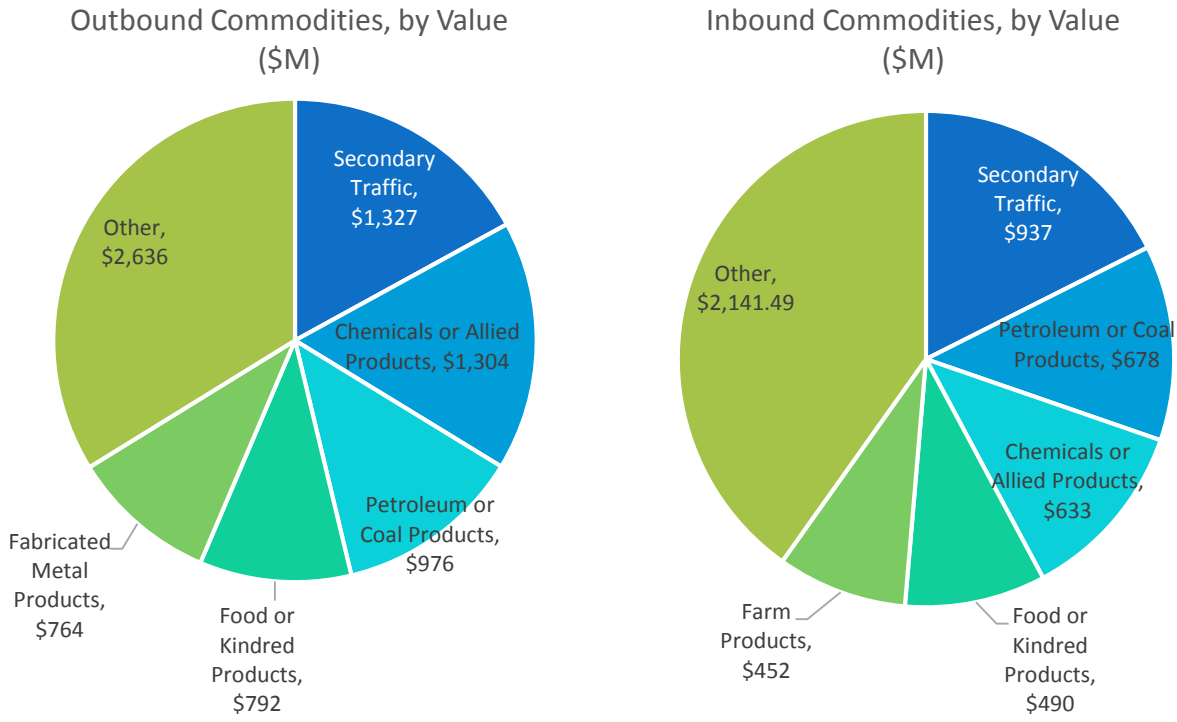


Figure 27: Top Freight Values by Commodities.
Source: TranSearch, 2012

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).

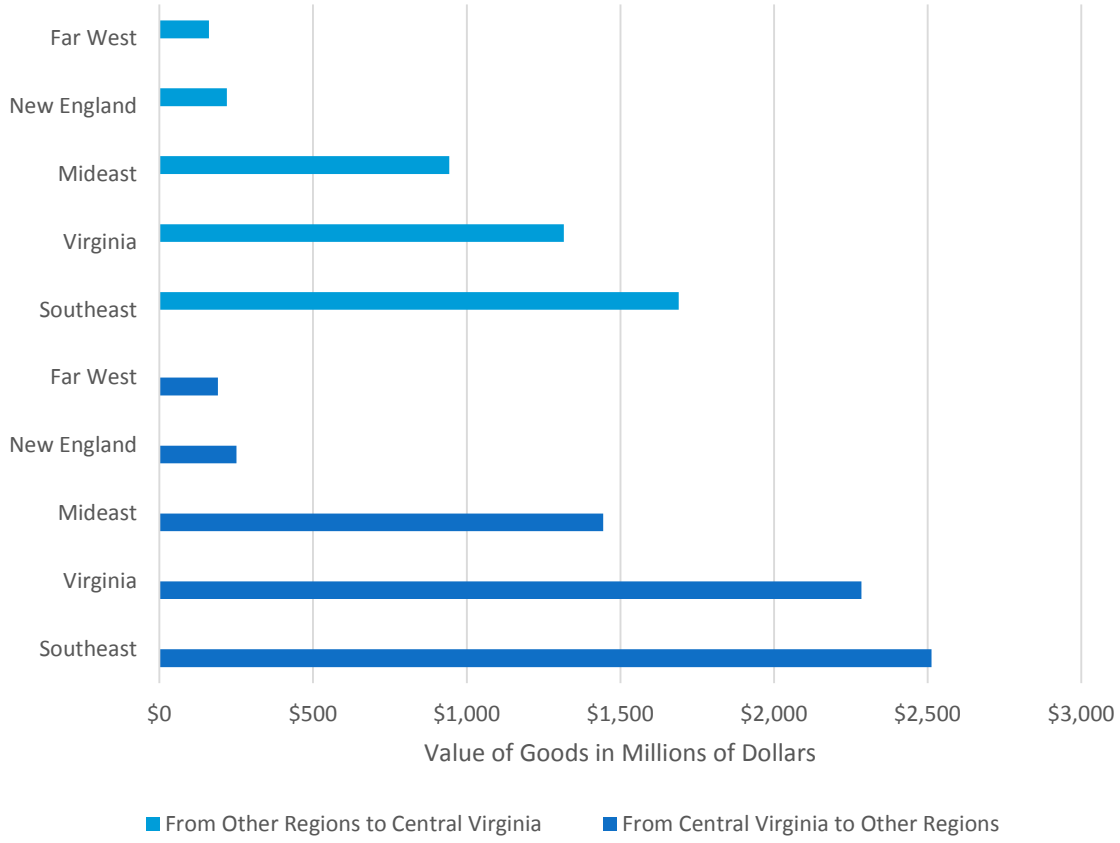


Figure 28: Top Freight Values by Region
Source: TranSearch, 2012

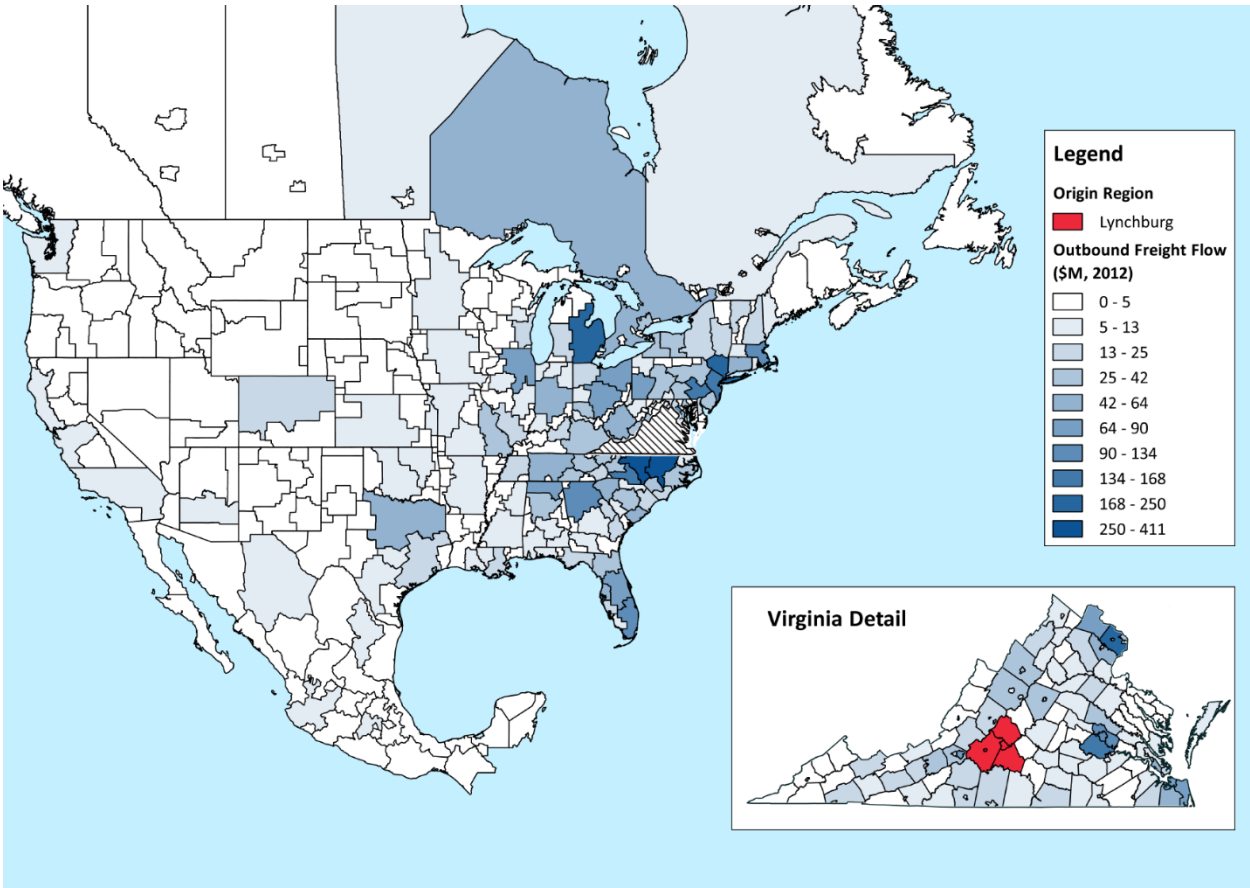


Figure 29: Outbound Freight Destinations
Source: TranSearch, 2012

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.

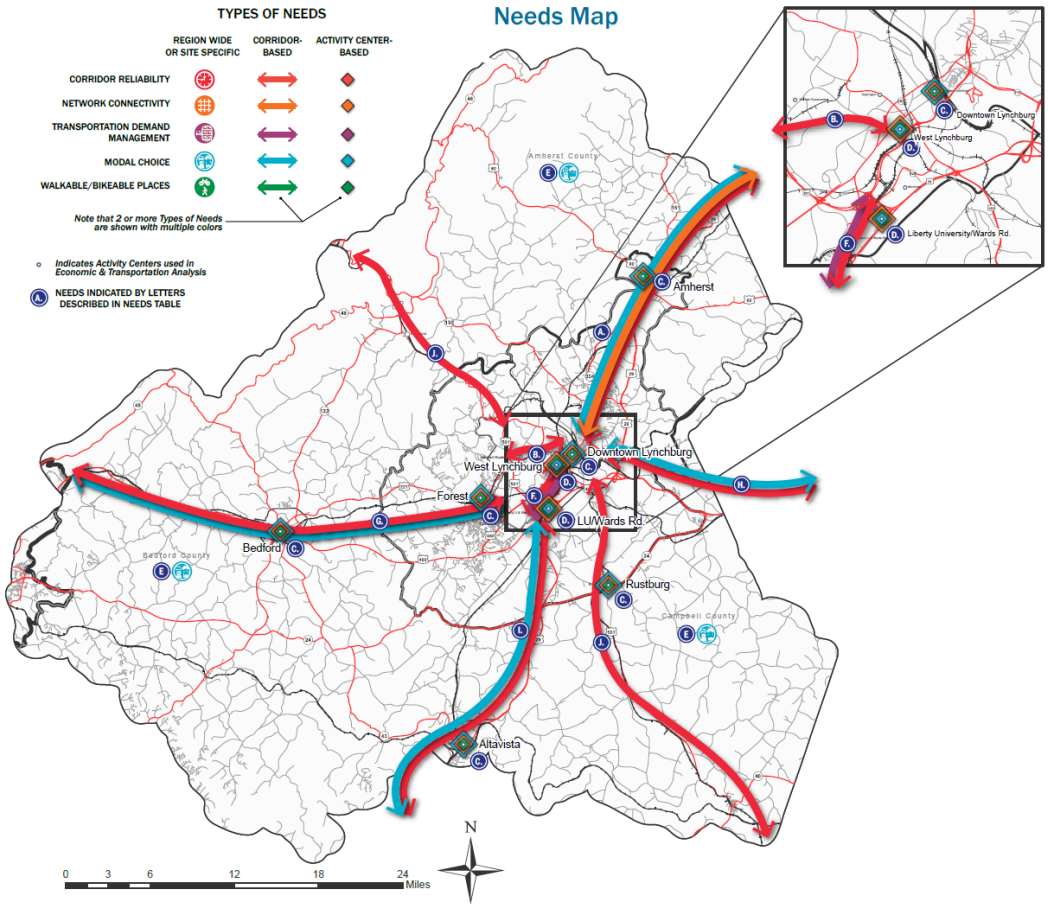


Figure 30: Summary Needs Map for Central Virginia

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.