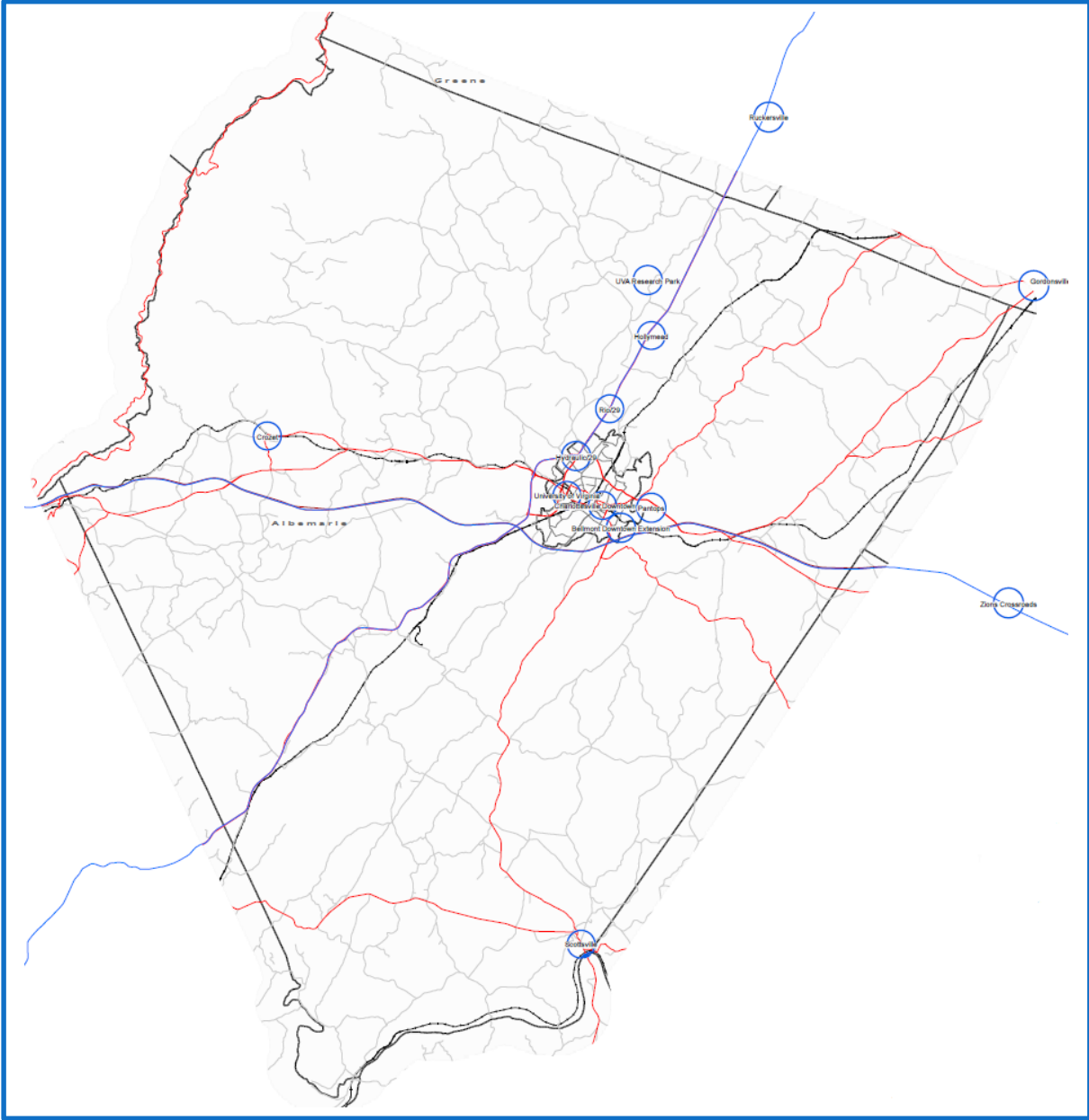# VMTP 2025 Needs Assessment

Regional Needs Profile

Charlottesville-Albemarle Region

December 2015

1. NEEDS ASSESSMENT PURPOSE

The VMTP 2025 Needs Assessment framework is based on two principal objectives underlying transportation policy to enhance economic competitiveness. These are 1) to attract and retain the 21st century workforce, and 2) to support goods movement for Virginia businesses. The purpose of this Transportation Needs Assessment to identify the Transportation Needs that are part of the Charlottesville-Albemarle Regional Network that would support regional industries and workforces.

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place <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 Charlottesville-Albemarle regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network
This portion of the VMTP 2025 Needs Assessment is for a <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. However, an initial needs analysis area for each region has been defined as the MPO boundary, with the stipulation that if an MPO boundary includes only a portion of a county, the entire county will be included in the needs analysis area. All transportation infrastructure within these defined boundaries is included within the regional network analysis. The determination of Transportation Needs will primarily be focused on this needs analysis area. However, each region is different and consideration needs to be given to the economic characteristics of each region. If, for example, there is a particular industry that is located outside the needs analysis area but is important to the regional economy; or, if a key corridor is located outside the needs analysis area but supports commuters or goods movement that are important to the regional economy, it may be included in the Needs Assessment for that region.

The Charlottesville-Albemarle Region is defined as City of Charlottesville and Albemarle County. However, as shown in the Needs Assessment, below, other areas beyond the immediate needs analysis area, such as Fluvanna County, Greene County, Louisa County, Nelson County, and were considered in the Needs Assessment as well.

2. ECONOMIC PROFILE

A. Introduction

The Trends Analysis conducted as part of the VTrans2040 Vision Plan showed strong indications that future economic success for both states and regions will hinge on attracting and retaining increasingly scarce talented workers, particularly from among the well-educated Millennials. In addition, future goods movements will be critical to supporting Virginia's current and emerging businesses. A key part of understanding emerging transportation needs statewide is understanding the current and future economic conditions in different parts of the state. The Needs Assessment therefore focuses on

understanding the major economic dynamics of each region and using that understanding to shape Transportation Needs.

The Study Team used available data from state and national sources, as well as input from Charlottesville-Albemarle stakeholders to identify an overall current economic profile for the region. The current economic profiles layers together demographic and economic characteristics of the region. The Regional Profile incorporates the following baseline data for each region:

- Demographic Characteristics
- Top Industries by Employment, Output and Location Quotient
- Workforce Characteristics
- Activity centers, characteristics and travel markets (as defined by existing centers of employment as modified by input from stakeholders in each region)

B. Demographics

At a regional level, research regarding basic demographics was analyzed as a foundation for understanding regional economic dynamics. The economic and demographic data analyzed in this report support insights regarding which workforce and/or key age groups are currently present in the region. This information is important to inform potential types of investments to attract and retain the desired workforce.

Statewide Demographics

According to Weldon Cooper, the current population in the state of Virginia is 8,185,867. By the year 2025, the Commonwealth of Virginia's population is projected to increase by between 1 million, to 1.5 million. Statewide per-capita incomes are expected to rise 21%, from 44,765 to 54,226.

Table 1: Statewide Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
8,185,867	9,203,977	9,740,553

Regional Demographics

As evident in Table 1, substantial population growth is projected for the Charlottesville-Albemarle Region. Projections range from 25,000 to nearly 50,000 new residents in the region by the year 2025. (Refer to Table 2).

Table 2: Charlottesville-Albemarle Region Population Projections[1]

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
239,202	276,077	278,186

Table 3 provides a closer look at population projections by jurisdiction within the Charlottesville-Albemarle Region.

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[1] These estimates include Albemarle County, the City of Charlottesville, and the Counties of: Fluvanna, Greene, Louisa, and Nelson.

Table 3: County and City Population Projections. Source: Weldon Cooper

Jurisdiction	Current population	Weldon 2025 Projection	% Change
City of Charlottesville	43,956	46,321	5%
Albemarle County	102,251	124,589	22%

According to Woods & Poole, population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60 (Figure 1).

Figure 1: Population of Region 2000 in the years 2012 and Projected for the year 2025. Source: Woods & Poole Economics, Incorporated. 2014 State Profile of Virginia. Washington DC. 2014.
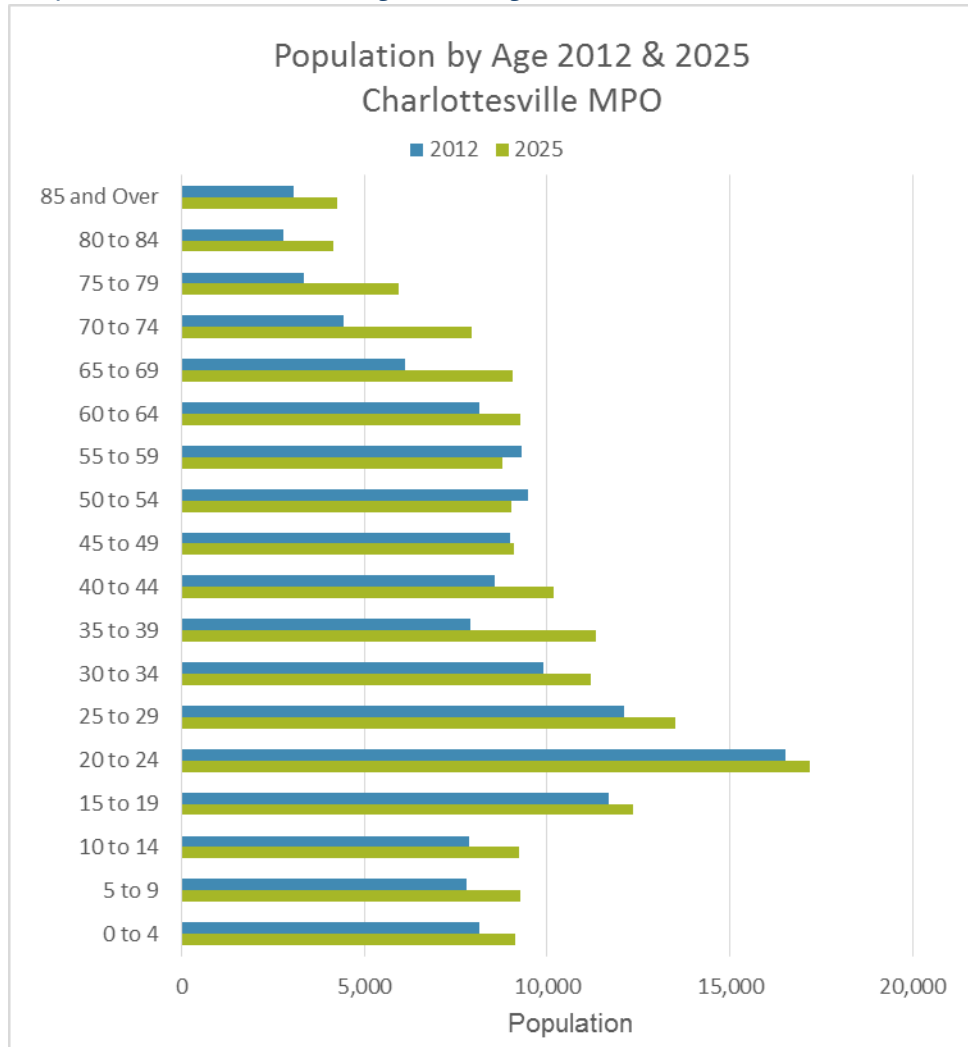
Also according to Woods & Poole, per-capita income for the region is expected to rise 16% (slightly less than the state average of 21%) from $42,226 to $48,875. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in the Charlottesville-Albemarle region.
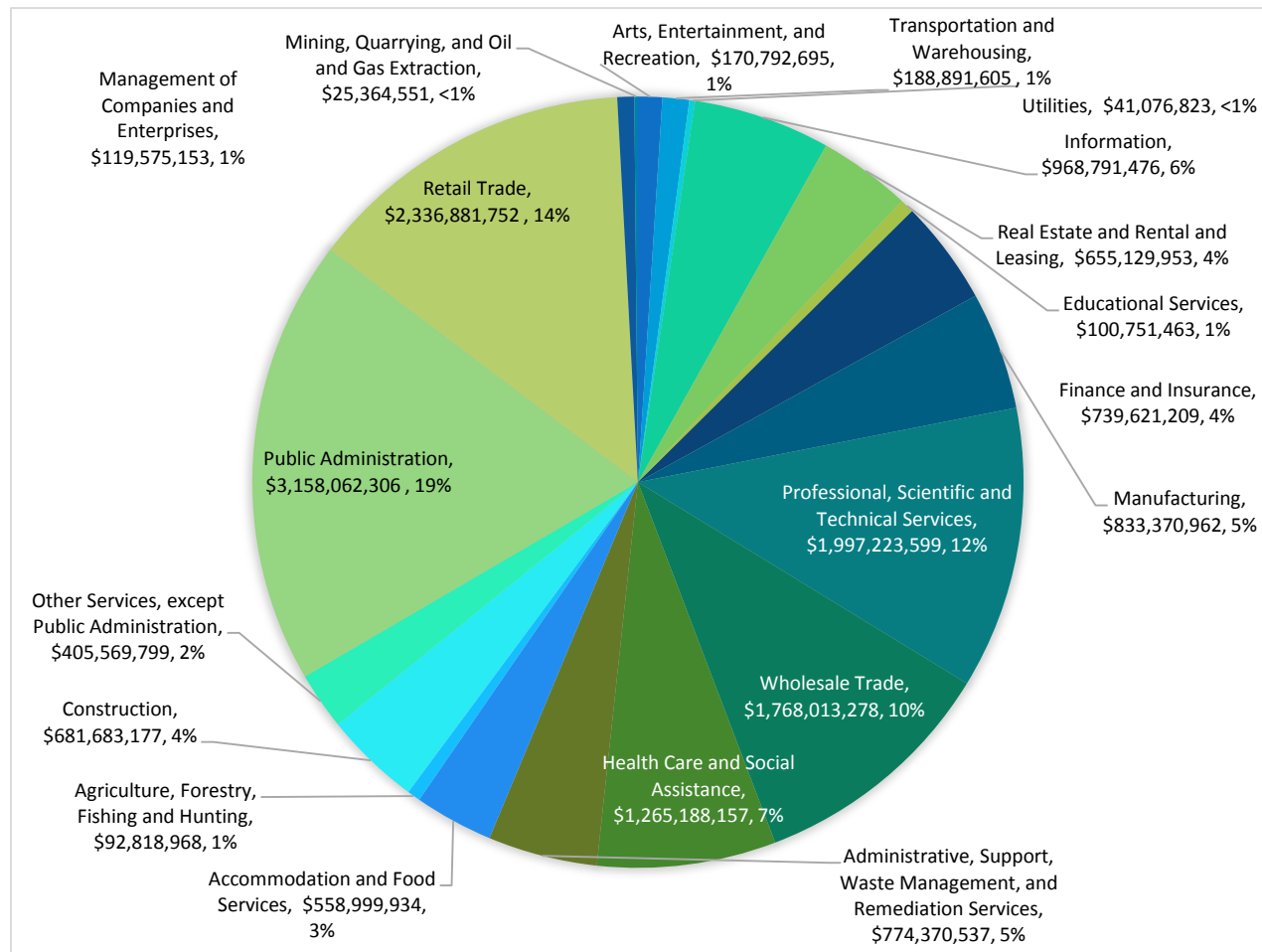
Top Industries by Output

As shown in Table 4, public administration is the strongest industry in the region in terms of output, accounting for 19 percent. Retail trade; professional, scientific, and technical services; and wholesale trade all account for over 10 percent of the region's output (at 14, 12, and 10 percent, respectively). The fifth largest industry is health care and social assistance, which accounts for 7 percent of the region's output.

Table 4: Current Industries by Output. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Output
Public Administration	92	19%
Retail Trade	44	14%
Professional, Scientific, and Technical Services	54	12%
Wholesale Trade	42	10%
Health Care and Social Assistance	62	7%

Figure 2 below shows the breakdown of all output in the Charlottesville-Albemarle region by industry. Following the top five industries, the: information; manufacturing; administrative, support, waste management, and remediation services; finance and insurance; construction; and real estate and rental and leasing industries all account for between 4 and 6 percent of the region's output.

Figure 2: Breakdown of 2012 Output in the Charlottesville-Albemarle Region by Industry


Management of Companies and Enterprises, $119,575,153, 1%

Mining, Quarrying, and Oil and Gas Extraction, $25,364,551, <1%

Arts, Entertainment, and Recreation, $170,792,695, 1%

Transportation and Warehousing, $188,891,605 , 1%

Utilities, $41,076,823, <1%

Information, $968,791,476, 6%

Real Estate and Rental and Leasing, $655,129,953, 4%

Educational Services, $100,751,463, 1%

Finance and Insurance, $739,621,209, 4%

Manufacturing, $833,370,962, 5%

Retail Trade, $2,336,881,752 , 14%

Public Administration, $3,158,062,306 , 19%

Professional, Scientific and Technical Services, $1,997,223,599, 12%

Other Services, except Public Administration, $405,569,799, 2%

Wholesale Trade, $1,768,013,278, 10%

Construction, $681,683,177, 4%

Health Care and Social Assistance, $1,265,188,157, 7%

Agriculture, Forestry, Fishing and Hunting, $92,818,968, 1%

Accommodation and Food Services, $558,999,934, 3%

Administrative, Support, Waste Management, and Remediation Services, $774,370,537, 5%

Top Industries by Employment

As shown in Table 5, the Charlottesville-Albemarle Region, public administration, health care and social assistance, accommodation and food services, retail trade, and professional, scientific, and technical services are the top industries by employment. Public administration, the largest industry by output, makes up an even larger share of the region's employment. Accommodation and food services is the only top five industry by employment that is not also in the top five for output (it accounts for just 3 percent of the region's output). Wholesale trade, which was a significant output-generator, is much lower in terms of its share of the region's employment.

Table 5: Current Top Industries by Employment. IHS Global Insight Data, 2012

Top Industries	NAICS Code	% of Workforce
Public Administration	92	32%
Health Care and Social Assistance	62	11%
Accommodation and Food Services	72	10%
Retail Trade	44	9%
Professional, Scientific, and Technical Services	54	6%

Figure 3 below shows the breakdown of 2012 employment in the region by industry for the remaining 30 percent of employment (as well as those in the table above).

Figure 3: Breakdown of 2012 Employment in the Charlottesville-Albemarle Region by Industry
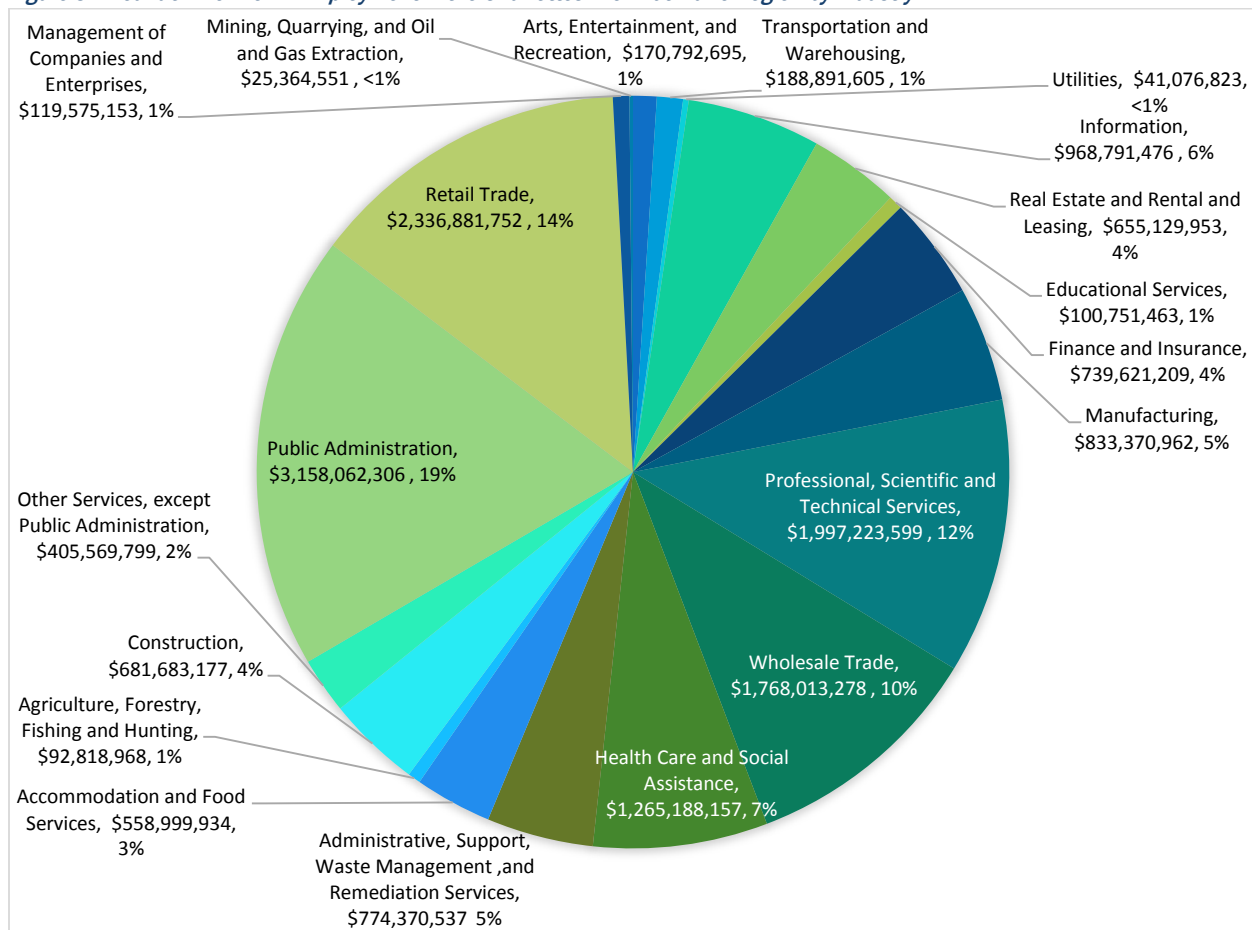
Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as

compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Charlottesville-Albemarle region (Table 6). The industries expressed in Table 4 have the highest LQ scores in the region. The score for Professional services, for example, can be inferred to mean that these services are more than 2 times more concentrated in the region than in the entire nation, on average.

Table 6: Current Top Industries by Location Quotient. Source: IHS Global Insight Data, 2012

Top Industries	NAICS Code	Location Quotient
Professional, Scientific, and Technical Services	54	2.21
Public Administration	92	1.99
Information	51	1.48
Arts and Entertainment	71	1.34
Accommodation and Food Services	72	1.33

Economic Sectors

The Study Team grouped the 20 industry sectors, as defined by The North American Industry Classification System (NAICS), into three clusters – or broader economic groupings – based on the characteristics that support each industry's growth. These clusters are defined as the local-serving, knowledge-based, and freight-dependent economic sectors. Each economic sector has different characteristics in terms of land use, commuting patterns, and other aspects of regional accessibility that are essential to attracting and retaining these businesses and their workforce. These different characteristics and each region's mix of economic clusters combine to create unique needs, opportunities and constraints related to transportation and accessibility. For example, a region with greater economic emphasis on manufacturing or warehousing will have a greater focus on freight intermodal needs than a region with stronger knowledge-based service industries such as financial services, where passenger travel needs would be a greater concern. The three economic sector classifications considered for this analysis, and their respective transportation needs, are:

- **Knowledge-based industries**[2] sector, in which companies and entrepreneurs thrive on proximity to one another and to regional, national, and global markets. They need reliable, efficient multimodal accessibility for commuters traveling to and within the centers where they are located, particularly via transit, bicycle, and walking modes. Knowledge-based industries, particularly the information industry, are growing in this region.

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[2] NAICS codes in the knowledge-based category include: 51 Information; 54 Professional, Scientific, and Technical Services; 55 Management of Companies and Enterprises; and 56 Administrative, Support, Waste Management, and Remediation Services. Note: NAICS code 56 combines two types of employment: Code 561 includes a wide range of services including office administration, facilities support, and a variety of business support services related to employment and facilities management, security, cleaning, and meeting organization. Code 562 includes jobs in waste collection, disposal, and remediation services. In Northern Virginia, the largest revenue-generating industries within NAICS Code 56 (as of 2012) are Security Guards and Patrol Services (561612), Janitorial Services (561720), and Facilities Support Services (561210).

- **Local-serving industries**[3] depend upon multimodal accessibility to nearby residents and customers, and upon the ease with which goods providers can reach their doors. They generate trips by all modes throughout the day and night, made by employees, customers, students, and delivery professionals in automobiles, vans, trucks, buses, bicycles, and on foot.

- **Freight-dependent industries**[4] require accessibility for high-speed and/or long-distance travel by truck, rail vehicle, and air. They need reliable access to major highways, freight rail services, cargo ports, and warehousing and distribution centers.

In addition to the unique characteristics of each cluster, there are also underlying principles with respect to land use density that relate to the different economic sectors and also to the suitability of different transportation modes. These relationships work differently in different regions, and will be applied in context for all 15 of the regional networks. When considering the output of all industries present in the Charlottesville-Albemarle Region, Figure 4 provides a summary of the predominance of each economic cluster, as analyzed by a methodology developed by the Study Team and used in all regional analyses throughout the State. Each sector has different transportation needs; for example, the local-serving sector is typically characterized by different peak commute time, customer traffic, trip-chaining destinations, and truck deliveries.

Figure 4: Top Sectors by Output and Employment 2012). Source: IHS Global Insights
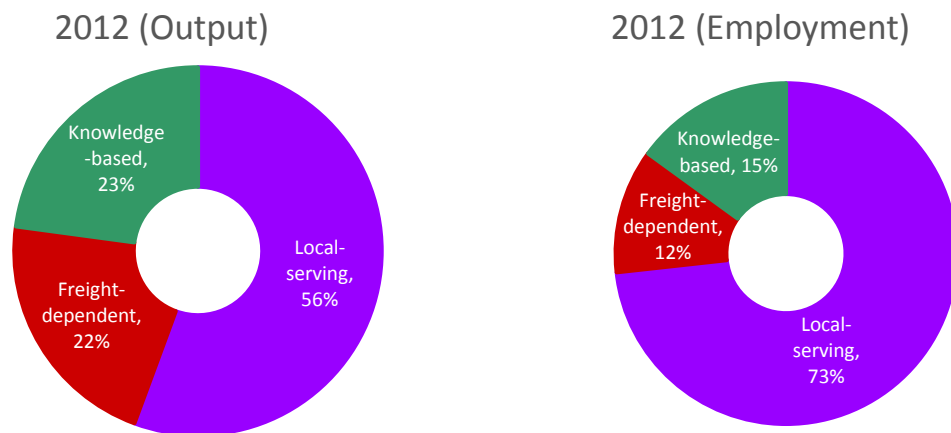
The Local Services cluster is clearly the strongest in this region. Local services make up 73% of the economic output in the Charlottesville Region. Conversely, the Knowledge and Freight-dependent clusters account for 15 and 12% of economic output, respectively. Each economic sector has different transportation characteristics and needs, as will be discussed below. The Local Services economic

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[3] NAICS codes in the local-serving category include: 44-45 Retail Trade; 52 Finance and Insurance; 53 Real Estate and Rental and Leasing; 61 Educational Services; 62 Health Care and Social Assistance; 71 Arts, Entertainment, and Recreation; 72 Accommodation and Food Services; 81 Other Services, except Public Administration; and 92 Public Administration.

[4] NAICS codes in the freight-dependent category include: 11 Agriculture, Forestry, Fishing, and Hunting; 21 Mining, Quarrying, and Oil and Gas Extraction; 22 Utilities; 23 Construction; 31-33 Manufacturing; 42 Wholesale Trade; and 48-49 Transportation and Warehousing.

cluster, for example, is typically characterized by different peak commute times; customer traffic; trip-chaining destinations; and truck deliveries

D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity. Activity centers were first defined in draft form using employment location patterns. A GIS-based spatial analysis was conducted to determine which areas have the greatest relative density of jobs. Activity centers, drawn with a 1-mile-radius, were then developed for these areas. Activity centers were revised, refined, or amended after discussing economic conditions with regional stakeholders. Centers were then affirmed by stakeholders with knowledge of the regional significance of the activity there and mapped accordingly. Figure 5 below shows the InfoUSA job density color scale in shades of yellow, and the activity centers as blue circles.

Figure 5: Map of Activity Centers based on Job Density and Stakeholder Input
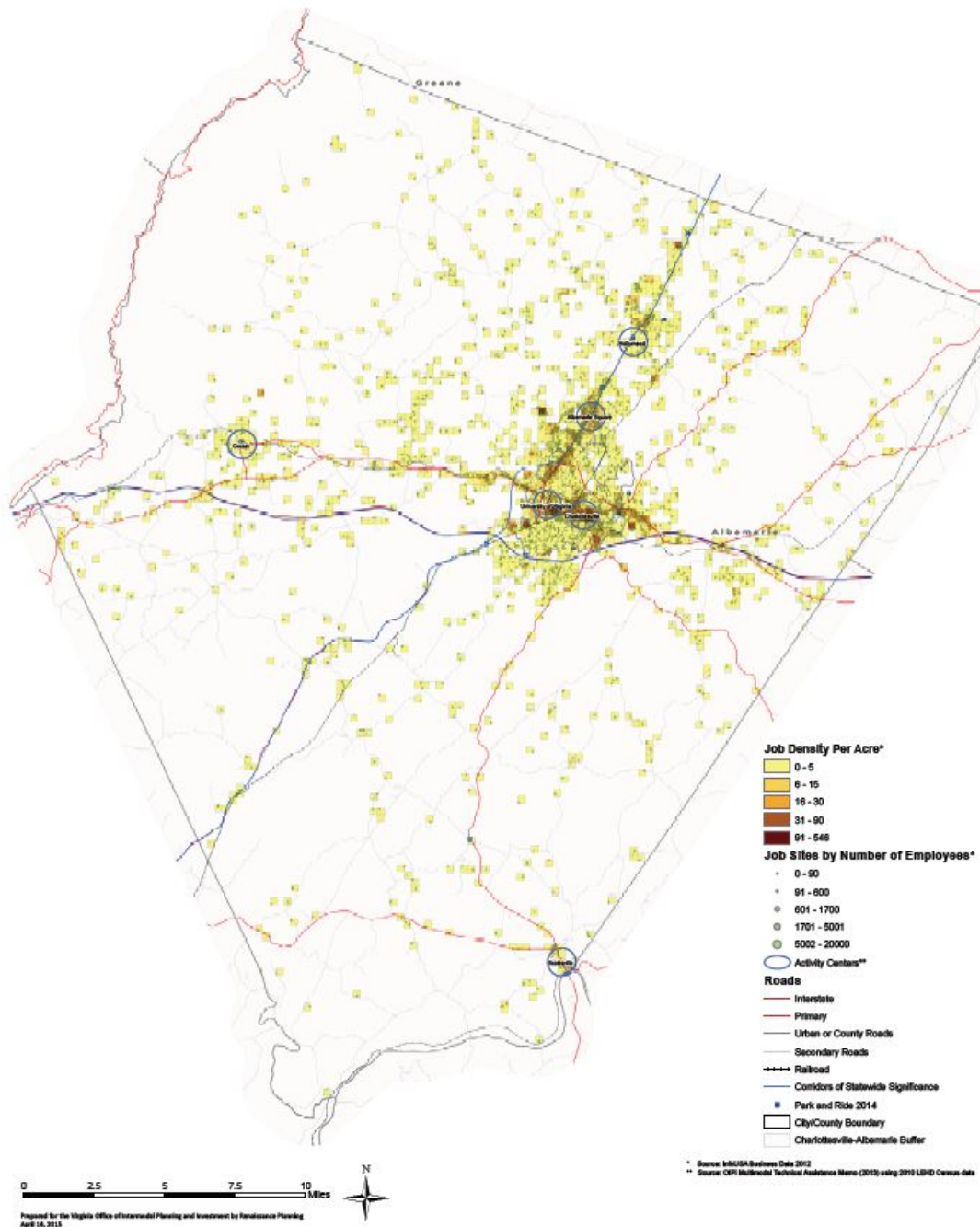
Once activity centers were identified, the next step was to analyze the type and scale of economic activity that took place in those locations. Based on the categorization of jobs by NAICS code into the three economic clusters of local-serving, knowledge-based, and freight-dependent economies, analysts developed charts that represented the breakdown of employment by industry sector in each activity center, and scaled those charts based on the number of jobs in each center relative to the other centers in the region. Figure 6 below shows the mapping of each activity center broken down by industry sector, and scaled by relative number of jobs.

Figure 6: Activity Center Employment by Industry Sector
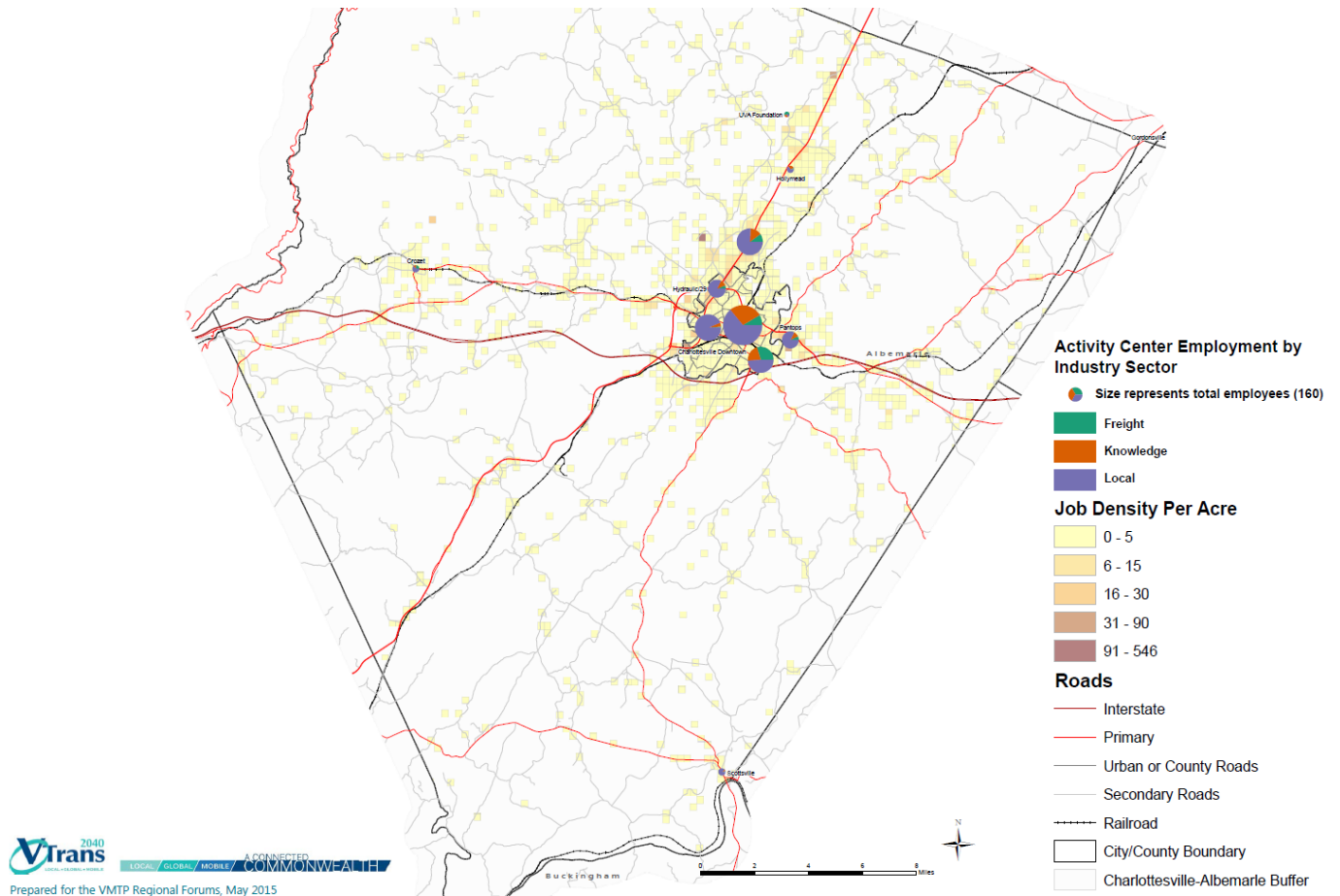
E. Forecasted 2025 Industry Strengths

Through a series of work sessions with the Charlottesville-Albemarle stakeholders, the Study Team used economic forecasts for 2025 and got input from stakeholders to determine the future desired economic profiles for each region. The 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Charlottesville-Albemarle's economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires.

The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Charlottesville-Albemarle region. The basic economic datasets that were compiled include:

- Current and Projected Top Industries by Workforce, Output and Location Quotient
- Future Growth Industries
- Activity center profiles
- Economic Development Priorities

Substantial growth is forecasted for the Charlottesville-Albemarle area by 2025 (Figure 7). According to statewide and national datasets used, the Manufacturing and Retail Trade industries will see the largest growth. Combined, they are expected to produce $2.47 billion more in 2025 than was produced in 2012.

Figure 7: Current and Projected Top Industries by Output - source: IHS Global Insight, 2012
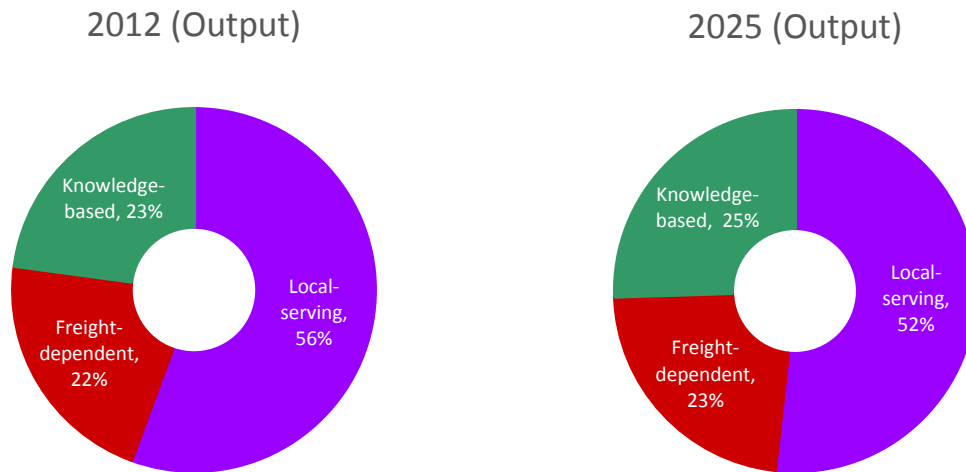
TOP INDUSTRIES BY OUTPUT

Industry	2025 Output	2012 Output
Public Administration	$3,451,773,546	$3,158,062,306
Retail Trade	$2,519,468,333	$2,336,881,752
Professional, Scientific, and Technical Services	$2,899,217,613	$1,999,223,599
Wholesale Trade	$2,490,204,376	$1,768,013,278
Health Care and Social Assitance	$1,768,860,668	$1,265,188,157
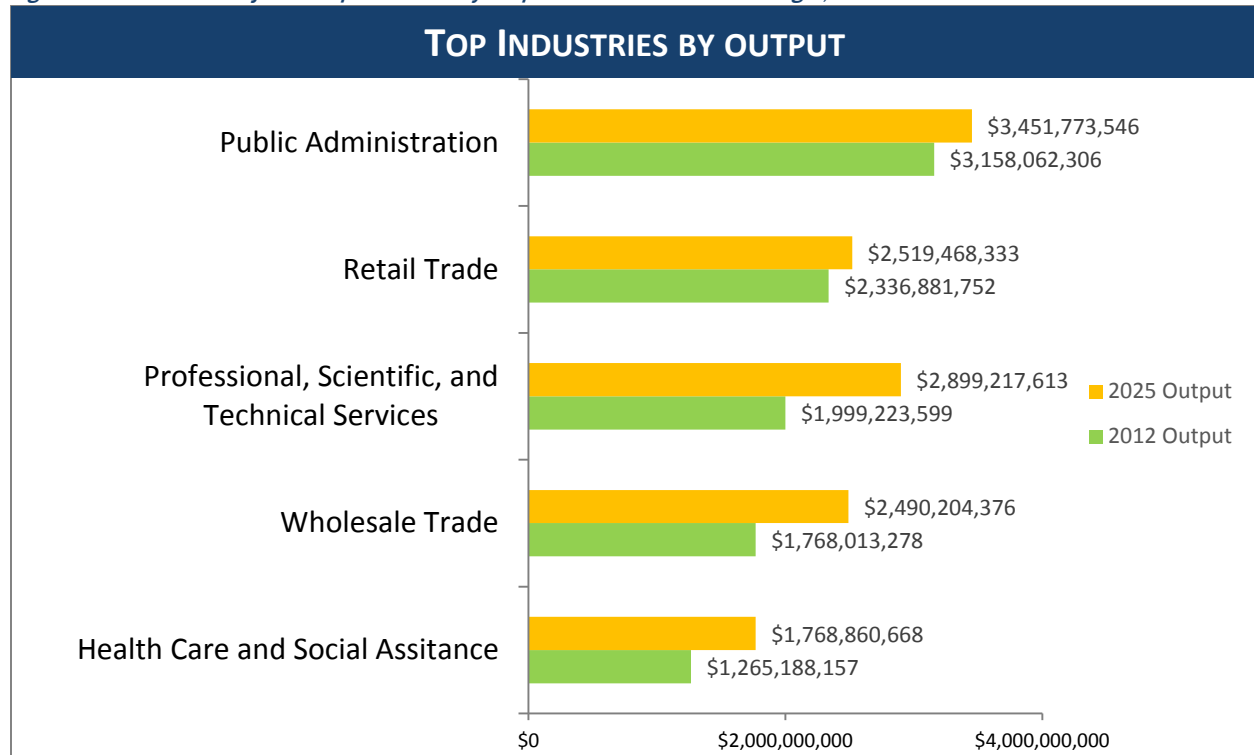
All of the top industries by output in the region are expected to grow between 2012 and 2025. As shown in Table 7, growth is expected to be largest in the Information industry, at 75 percent, while significant growth (40-45 percent) is also expected in: professional, scientific, and technical services; wholesale trade; and health care and social assistance.

Table 7: Top Industries by Output – Current and Projected (2025)

Industry	2012	2025	Change
Public Administration	$3,158,062,306	$3,451,773,546	9%
Professional, Scientific, Technical Services	$1,997,223,599	$2,899,217,613	45%
Retail Trade	$2,336,881,752	$2,519,468,333	8%
Wholesale Trade	$1,768,013,278	$2,490,204,376	41%
Health Care and Social Assistance	$1,265,188,157	$1,768,860,668	40%
Information	$ 968,791,476	$1,694,521,158	75%

Figure 8 shows the anticipated change in the distribution of the region's industries among the three economic sectors that is predicted to occur by 2025. The local-serving sector's relative importance is expected to decrease slightly, by 4 percent, while the relative size of the knowledge-based sector will increase by 2 percent and the freight-dependent sector's share of output will increase by 1 percent.

Figure 8: Economic Sectors by 2012 Output and Projected Output in 2025 - Source: IHS Global Insight

2012 (Output)

Knowledge-based, 23%

Freight-dependent, 22%

Local-serving, 56%

2025 (Output)

Knowledge-based, 25%

Freight-dependent, 23%

Local-serving, 52%

The region's expected fastest growing industries are shown in Table 8 below. Only two industries from the list of top industries – professional, scientific, and technical services, and information – are also high growth industries. Real Estate and Rental and Leasing, and Finance and Insurance both account for 4 percent of the region's output and employment, and they are also high growth industries.

Table 8: High Growth Industries by Projected 2025 Output

Industry	2012	2025	Change
Arts, Entertainment, and Recreation	$ 170,792,695	$ 322,618,194	89%
Transportation and Warehousing	$ 188,891,605	$ 349,292,314	85%
Utilities	$ 41,076,823	$ 74,728,291	82%
Information	$ 968,791,476	$1,694,521,158	75%
Real Estate and Rental and Leasing	$ 655,129,953	$1,080,105,199	65%
Educational Services	$ 100,751,463	$ 162,209,746	61%
Finance and Insurance	$ 739,621,209	$1,141,898,139	54%
Manufacturing	$ 833,370,962	$1,267,646,167	52%
Professional, Scientific, and Technical Services	$1,997,223,599	$2,899,217,613	45%

Forecasted 2025 Employment

Unlike most urban areas, where the local-serving cluster accounts for about half of all employment, the Charlottesville-Albemarle region's employment is dominated by the local-serving sector. This is relatively unsurprising, given the high level of employment in public administration, health care and social assistance, and accommodation and food services. The presence of the University of Virginia accounts for a significant portion of all three of these employment industries. In the Charlottesville-Albemarle region, the local-serving sector's share of employment will decrease by approximately 2 percent by 2025 (Figure 9). By 2025, the proportion of knowledge-based jobs is expected to increase from 15 to 16 percent of the region's employment, while freight-dependent employment will stay relatively flat (a decrease of less than 1 percent is expected).

Figure 9: Economic Sectors by 2012 Employment and Projected Employment in 2025 - Source: IHS Global Insight
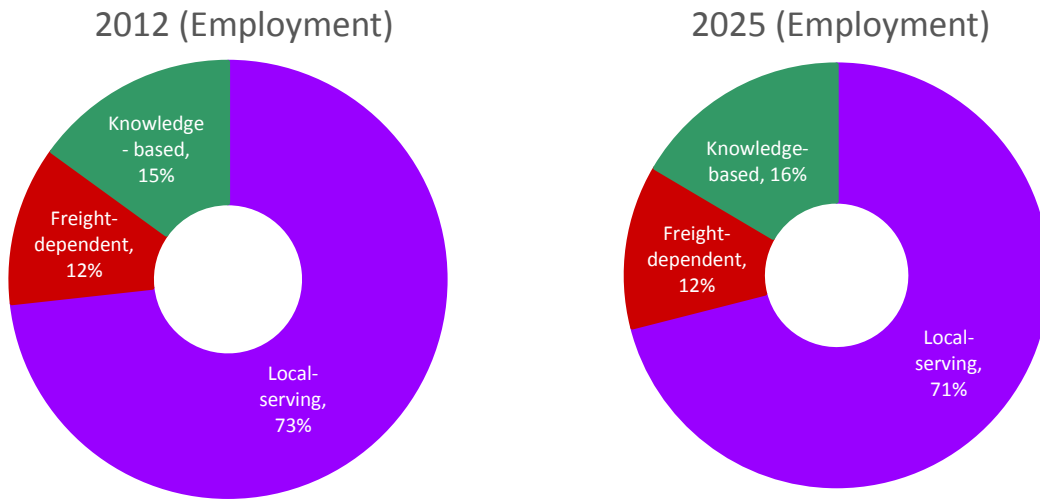
2012 (Employment)

Knowledge - based, 15%

Freight-dependent, 12%

Local-serving, 73%

2025 (Employment)

Knowledge-based, 16%

Freight-dependent, 12%

Local-serving, 71%

Figure 8 shows the expected change in the region's top employment sectors between 2012 and 2035. Among the region's current top industries in terms of employment, all are expected to grow significantly between 2012 and 2025 except for retail trade, which is expected to decrease by over 2,200 jobs. Public administration is expected to add over 3,000 jobs. Professional scientific, and technical services and health care and social assistance are expected to add nearly 1,500 jobs each. The growth in accommodation and food services will be modest; the industry is expected to add approximately 500 jobs over the same period.

Figure 10: Top Sectors by Employment in 2012 and Projected for 2025- Source: IHS Global Insight

Figure 10: Top Sectors by Employment in 2012 and Projected for 2025- Source: IHS Global Insight

TOP INDUSTRIES BY EMPLOYMENT
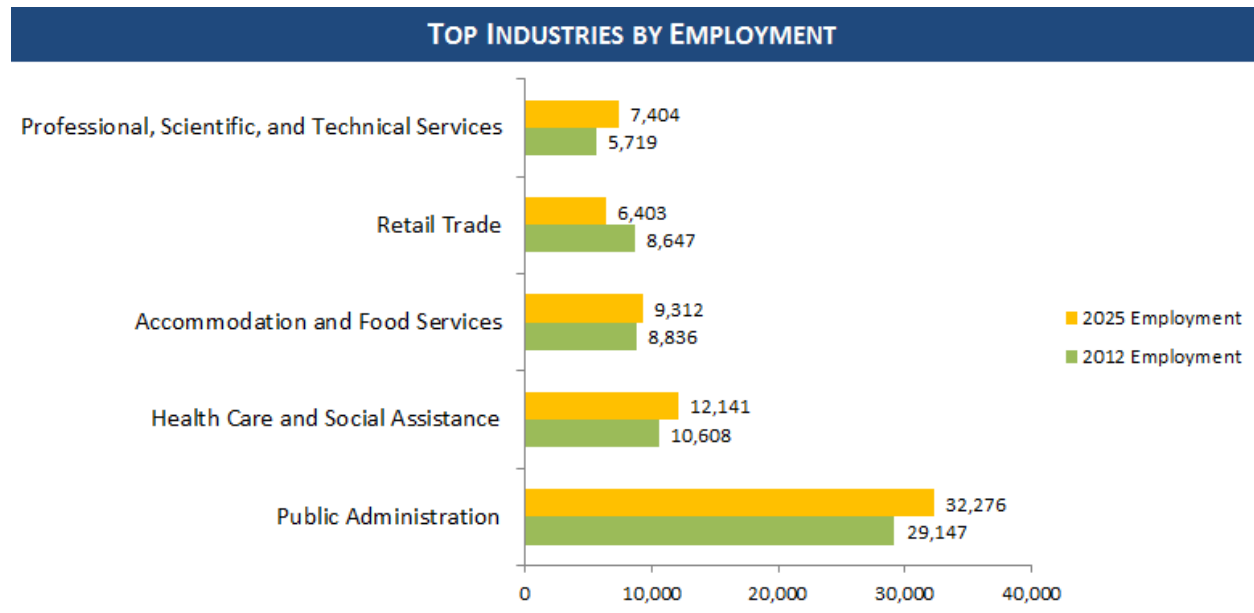
Table 9 shows the changes in employment from Figure 8 as percentages. The highest expected increase in employment (by percentage) is expected to come from professional, scientific, and technical services, at 29 percent, while retail trade is expected to decrease by 26 percent.

Table 9: Forecasted Employment by Top Industries - Source: IHS Global Insight

Industry	2012	2025	Change
Public Administration	29,147	32,276	11%
Health Care and Social Assistance	10,608	12,141	14%
Accommodation and Food Services	8,836	9,312	5%
Professional, Scientific, and Technical Services	5,719	7,404	29%
Retail Trade	8,647	6,403	-26%
Administrative, support, Waste Management, and Remediation Services	5,106	5,872	15%

The region's fastest-growing industries in terms of employment are shown in Table 10 below. Among the region's fastest-growing industries, only Professional, scientific, and technical services is also within the list of employers that account for the highest percentage of the region's jobs. Transportation and warehousing, Utilities, and Construction are the freight-dependent industries on the list. Information is knowledge-based, and the rest are local-serving. As such, the highest growth industries in the region are split across all three sectors.

Table 10: Highest Growth Industries by Projected 2025 Employment

Industry	2012	2025	Change
Transportation and Warehousing	878	1,335	52%
Arts, Entertainment, and Recreation	1,443	2,055	42%
Real Estate and Rental and Leasing	954	1,242	30%
Professional, Scientific, and Technical Services	5,719	7,404	29%
Utilities	62	80	29%
Construction	4,046	5,186	28%
Information	2,296	2,940	28%
Finance and Insurance	2,568	3,237	26%

3. TRANSPORTATION PROFILE

A. Introduction

The following section describes the transportation and accessibility measures that were developed to capture the workforce needs and the freight needs at a regional scale. This set of measures reflects regional transportation characteristics in Charlottesville-Albemarle such as typical commute times and overall travel reliability. The following categories of performance metrics that were used to create a regional transportation profile for Charlottesville-Albemarle:

- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

The map in Figure 11 summarizes commuting patterns within and among the localities in the Charlottesville region. In Charlottesville City, approximate half of commuters stay within the City, while a majority of those remaining commute to locations in Albemarle County. Only a very small percentage of Charlottesville City residents commute to locations outside of Albemarle County. Nearly two-thirds of Albemarle County residents stay within the County in commuting to their work locations, while most of those remaining commute to Charlottesville City (the only other jurisdiction within the region). A small portion of Albemarle County residents commute outside the region for work. Over 20,000 people commute from outside the region into Charlottesville City and Albemarle County for work.

Figure 11: Regional Commuting Patterns
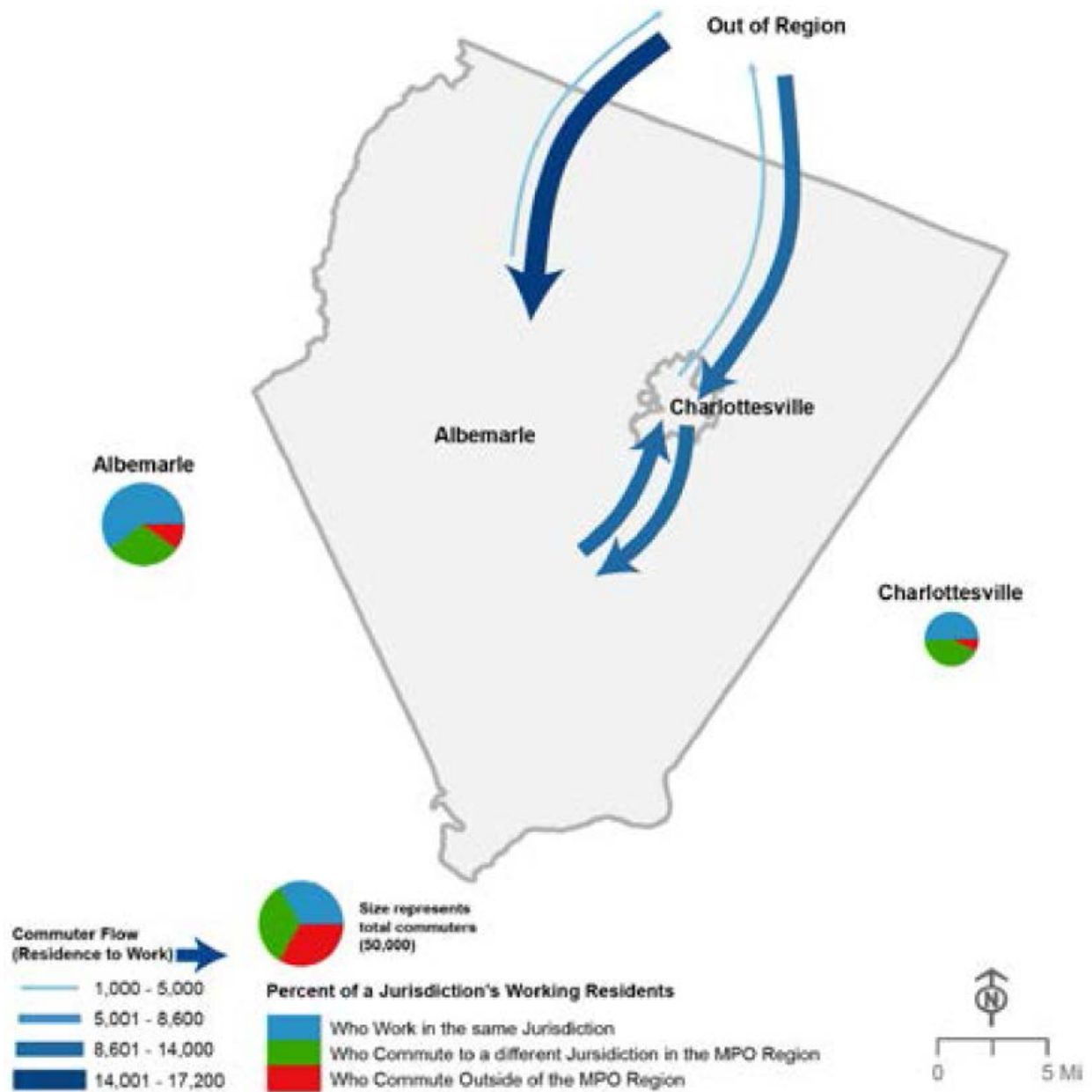
Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for the Charlottesville-Albemarle Region was the analysis of commuting patterns between activity centers. Figure 12 through Figure 15 provide insights into the commuting patterns for four of the activity centers in the region. Each purple dot on these maps represents a single commuter who travels into the activity center of interest (outlined in magenta) for work.

As shown on the map below (Figure 12), downtown Charlottesville sees a significant number of commuters from within the activity center and from other locations in Charlottesville City and Albemarle County. Smaller but still significant numbers of workers commute in from the surrounding jurisdictions, particularly Greene County, the Cities of Staunton and Waynesboro, and Fluvanna County.

Figure 12: Commuting Patterns to Downtown Charlottesville Activity Center. Source: LEHD
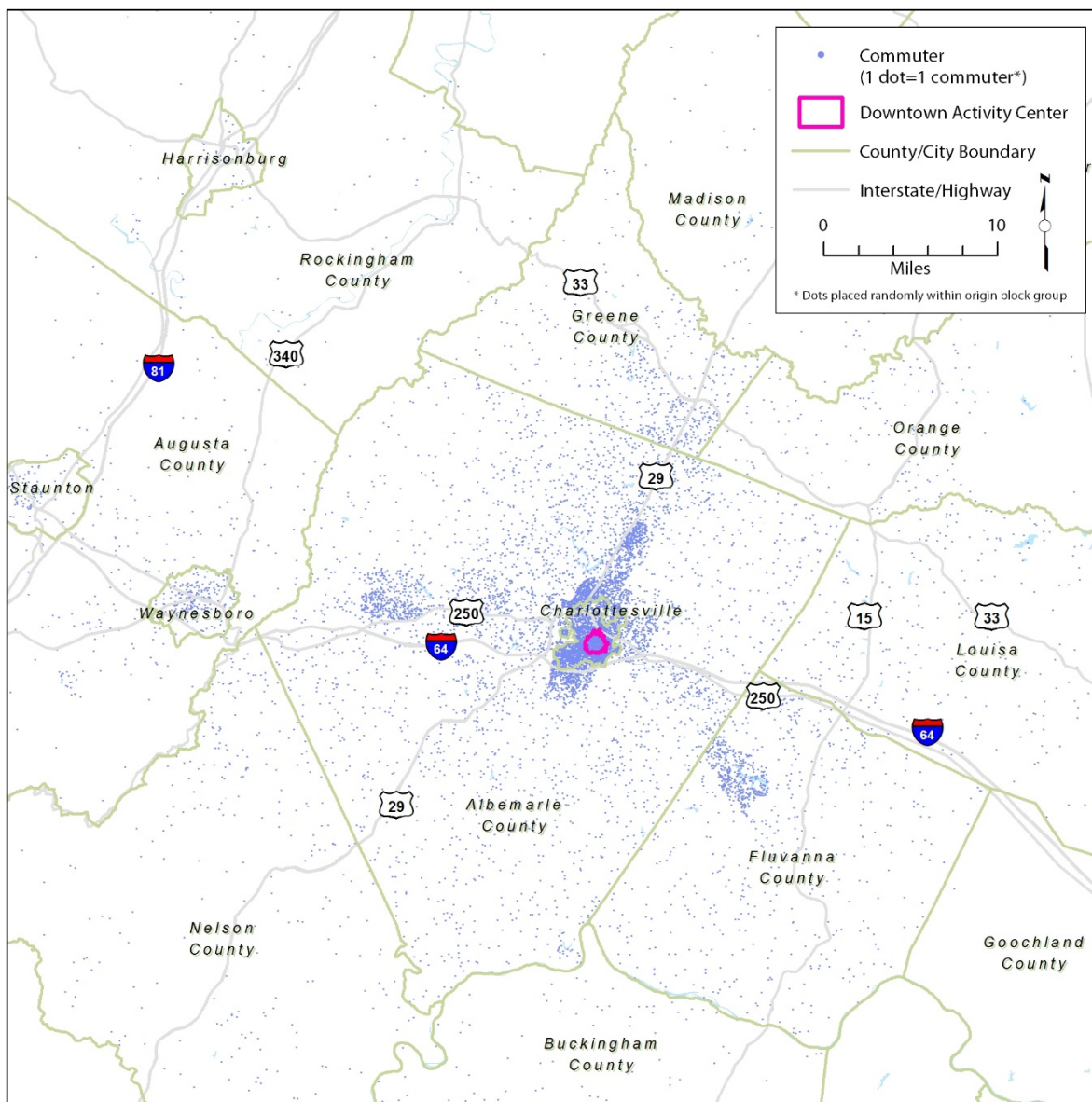
As shown in Figure 13, commuters into the Hydraulic/Route 29 activity center come primarily from locations within Charlottesville City, as well as Albemarle County. Additional clusters of commuters into the activity center are located in the Cities of Waynesboro and Harrisonburg, and Greene and Fluvanna Counties.

Figure 13: Commuting Patterns to Hydraulic/Route 29 Activity Center. Source: LEHD
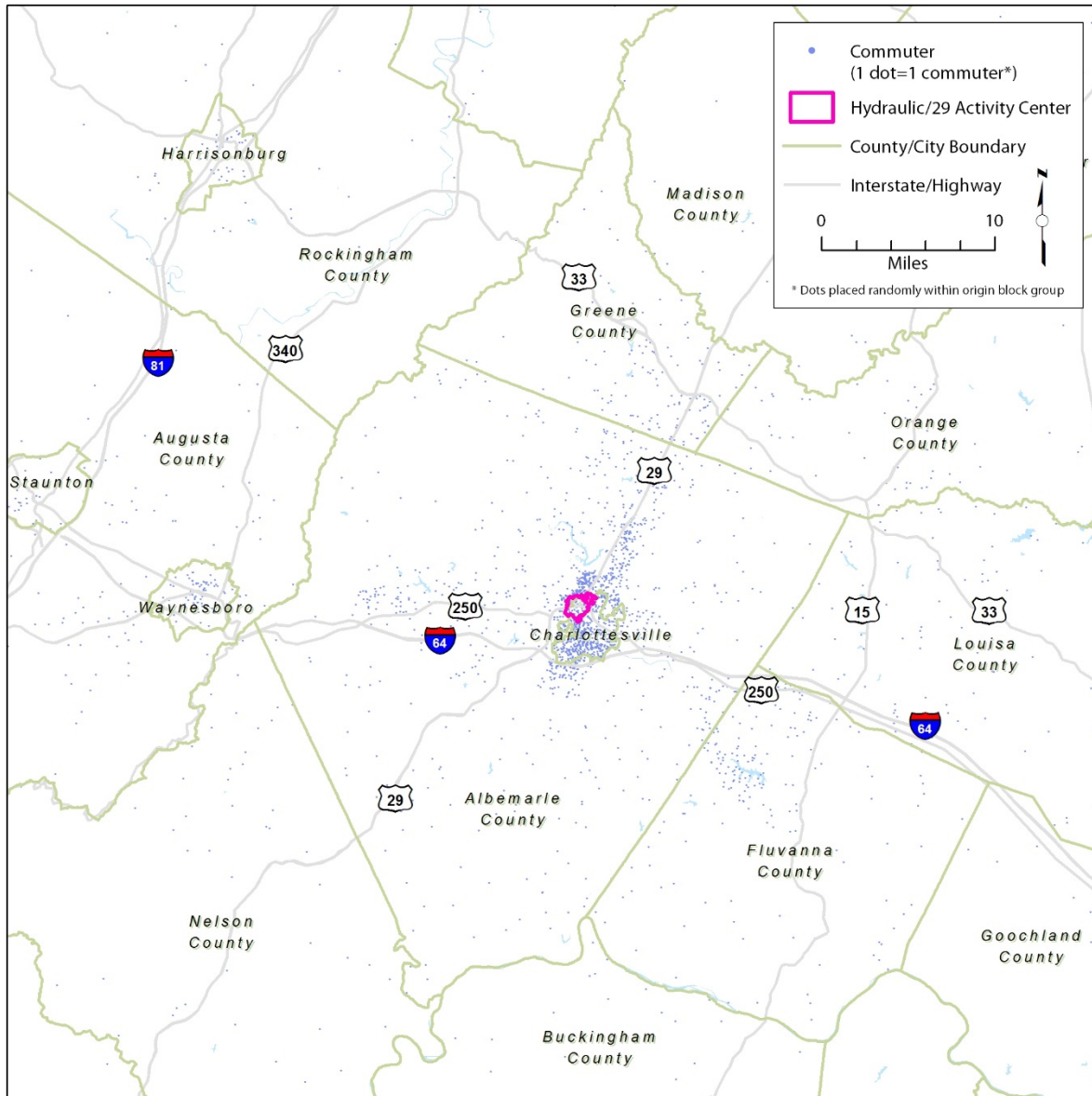
The Rio/Route 29 activity center receives the most commuters from Charlottesville City. Clusters of commuters also come in from Albemarle County, Greene County, Fluvanna County, and the City of Waynesboro. Smaller numbers of commuters travel in from the other surrounding jurisdictions, as shown in Figure 14.

Figure 14: Commuting Patterns to Rio/Route 29 Activity Center. Source: LEHD
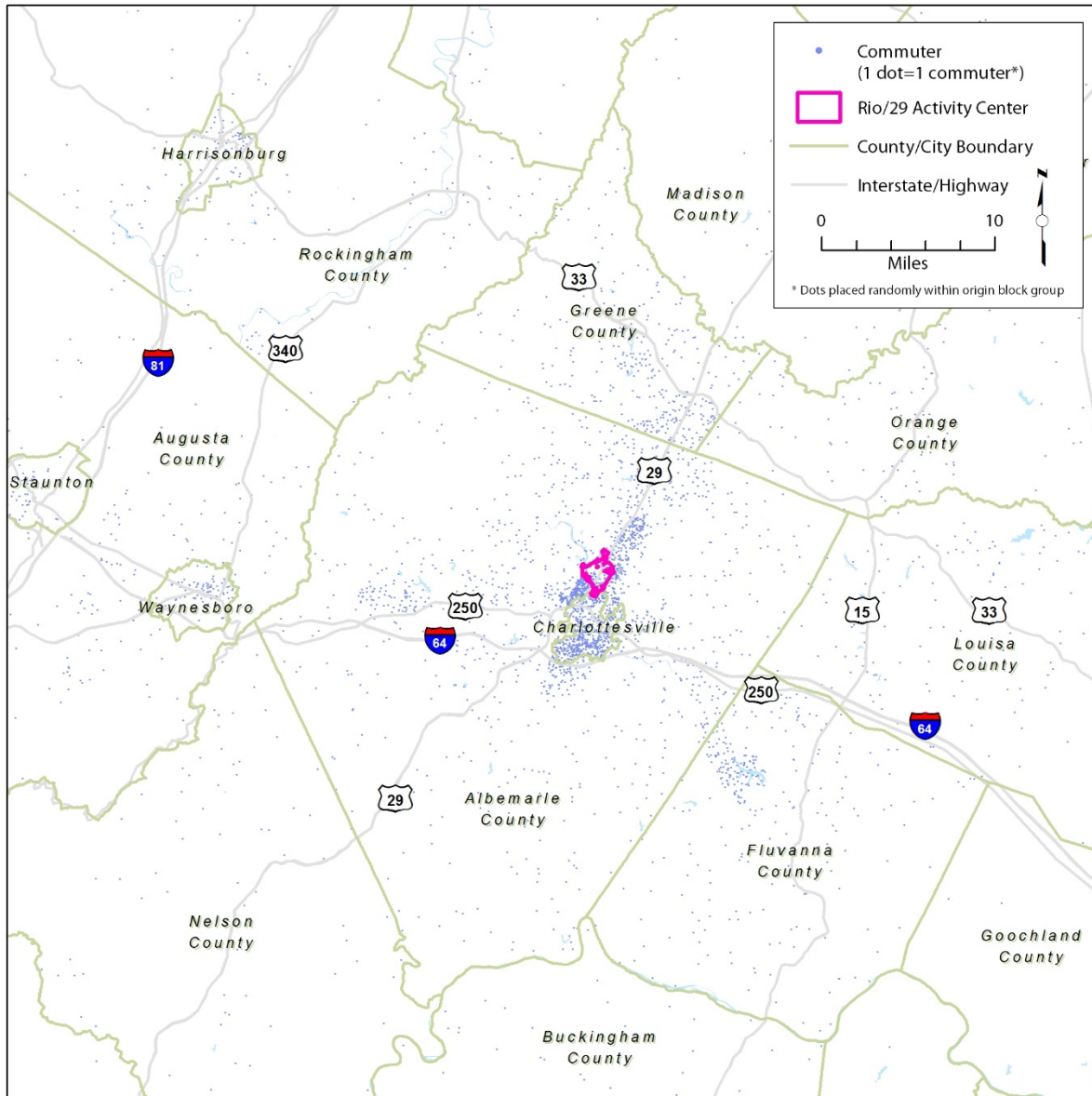
The concentration of commuters into the UVA activity center from within the City of Charlottesville is particularly high. Additional clusters of commuters traveling in are located in Albemarle County (along Route 29 north and from the area around Crozet) and Waynesboro, Greene County, and Fluvanna County.

Figure 15. Commuting Patterns to UVA Activity Center. Source: LEHD
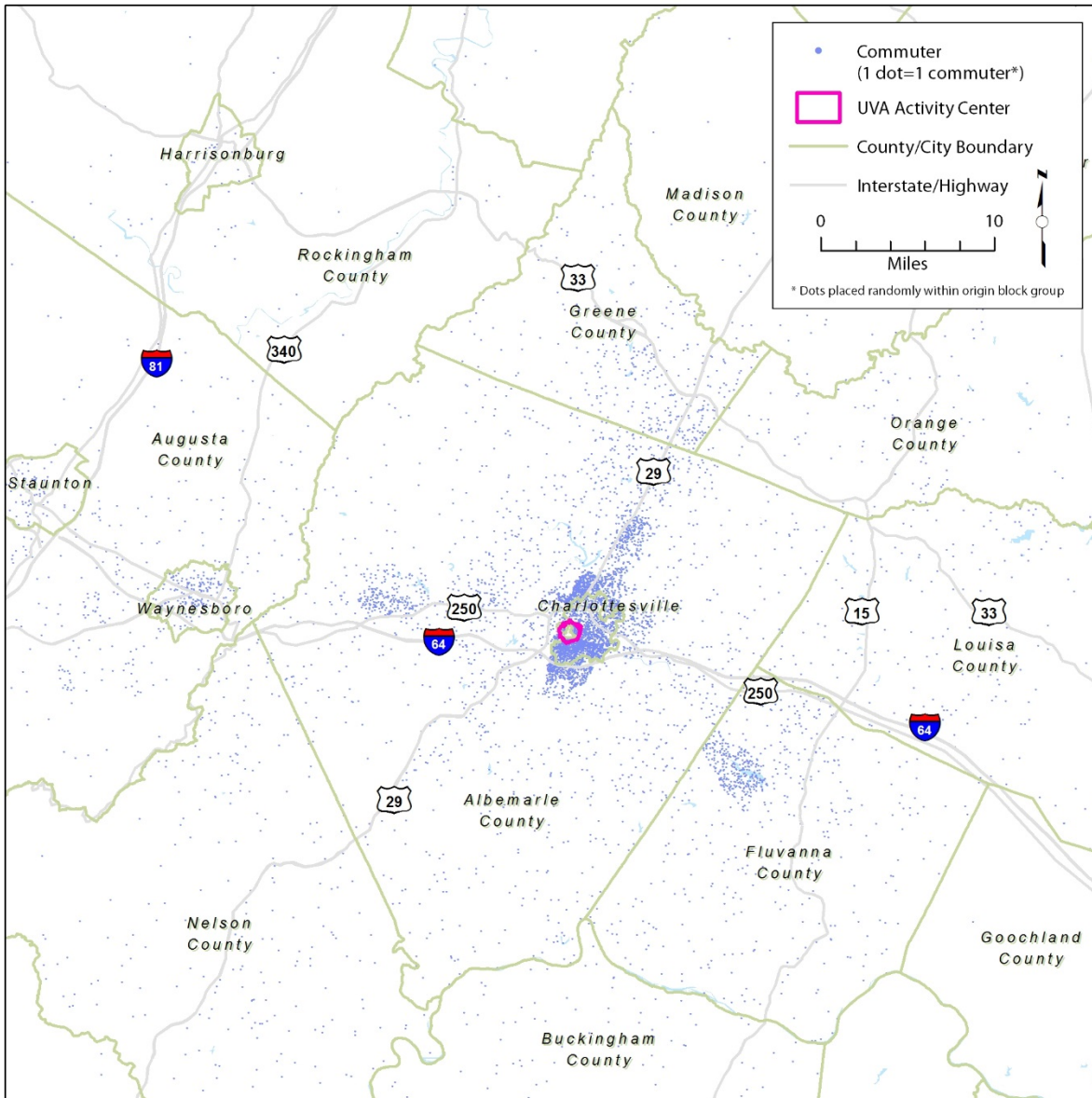
Mode Choice

In the Charlottesville-Albemarle, the majority of commuters drive alone to work. While there is some variation between jurisdictions, cars are used between 61% and 79% of the time. For Albemarle County, commuting by taxi/motorcycle/other is the second most popular option, accounting for 9% of the mode share. For the City of Charlottesville, walking is the second most popular option, accounting for 12% of the mode share. Public transit use is highest in the City of Charlottesville, which has the most robust transit system in the region. (Refer to Figure 16).

Figure 16: Mode Share Split by Jurisdiction. Source: ACS 2013 5-Year Estimates
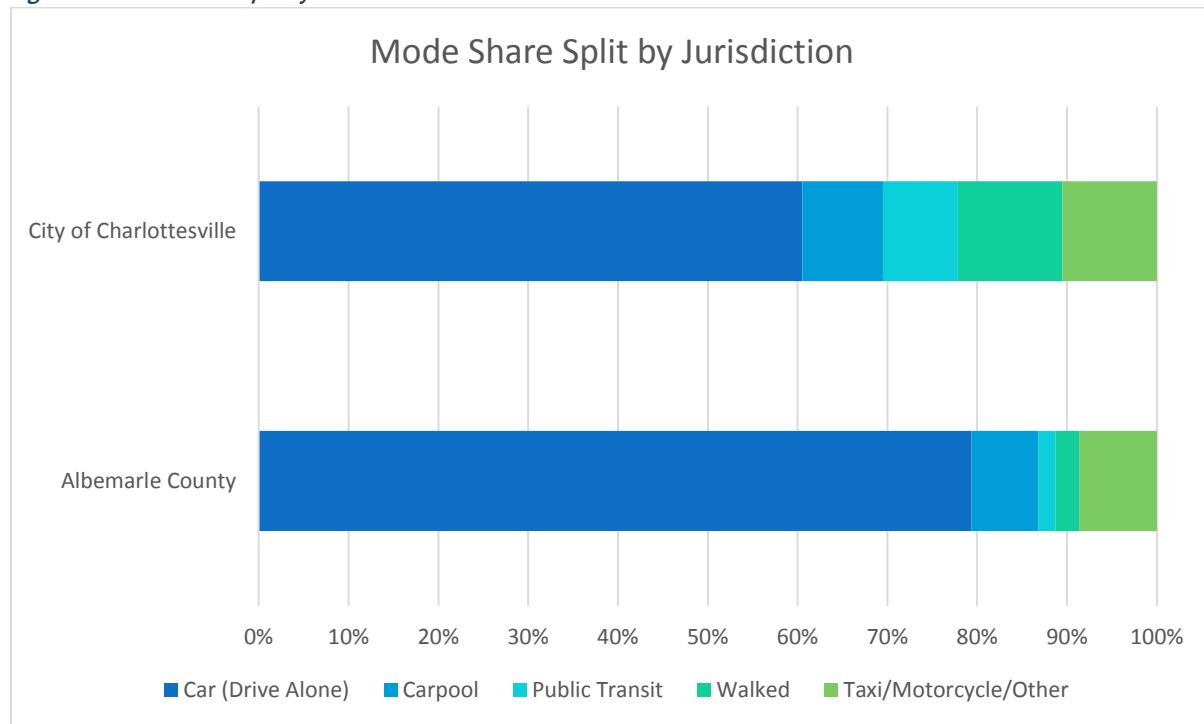
Average Commute Times

As shown in Table 11, in the Charlottesville-Albemarle Region, average commute times range from 16 to 21 minutes among the various jurisdictions. Due to its density and proximity to employment centers, the City of Charlottesville has the shortest average commute, which is about four minutes shorter than the average for Albemarle County. Compared to other areas in Virginia, both of these averages are relatively low.

Table 11: Mean Commute Time by Jurisdiction. Source: ACS 2013 5-Year Estimates.

Jurisdiction	Mean Commute Time (Minutes)
Albemarle County	20.6
City of Charlottesville	16.4

Commutes of over 45 minutes are uncommon in the Charlottesville-Albemarle Region. Albemarle County has the highest percentage of workers who commute over 45 minutes at 7 percent, which is almost twice as high as the City of Charlottesville's rate of long commutes. (Refer to Figure 17).

% Commutes Longer than 45 Min
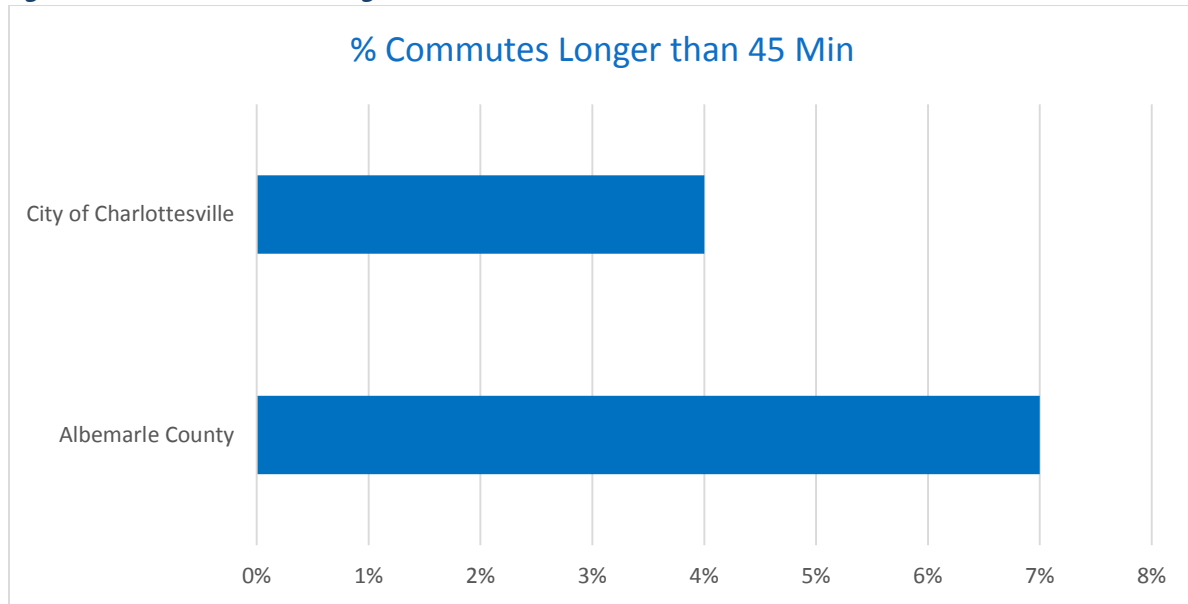
Figure 18 provides a closer look at where longer commutes originate. Unsurprisingly, commute times are the lowest close to employment centers in Charlottesville, as well as Harrisonburg and Waynesboro/Staunton (which are outside the region). As noted above, commute times longer than 45 minutes are uncommon, which results in a positive impact on quality of life.

Figure 18: Charlottesville-Albemarle Commute Times. Source: ACS 2013, 5-Year Estimates.
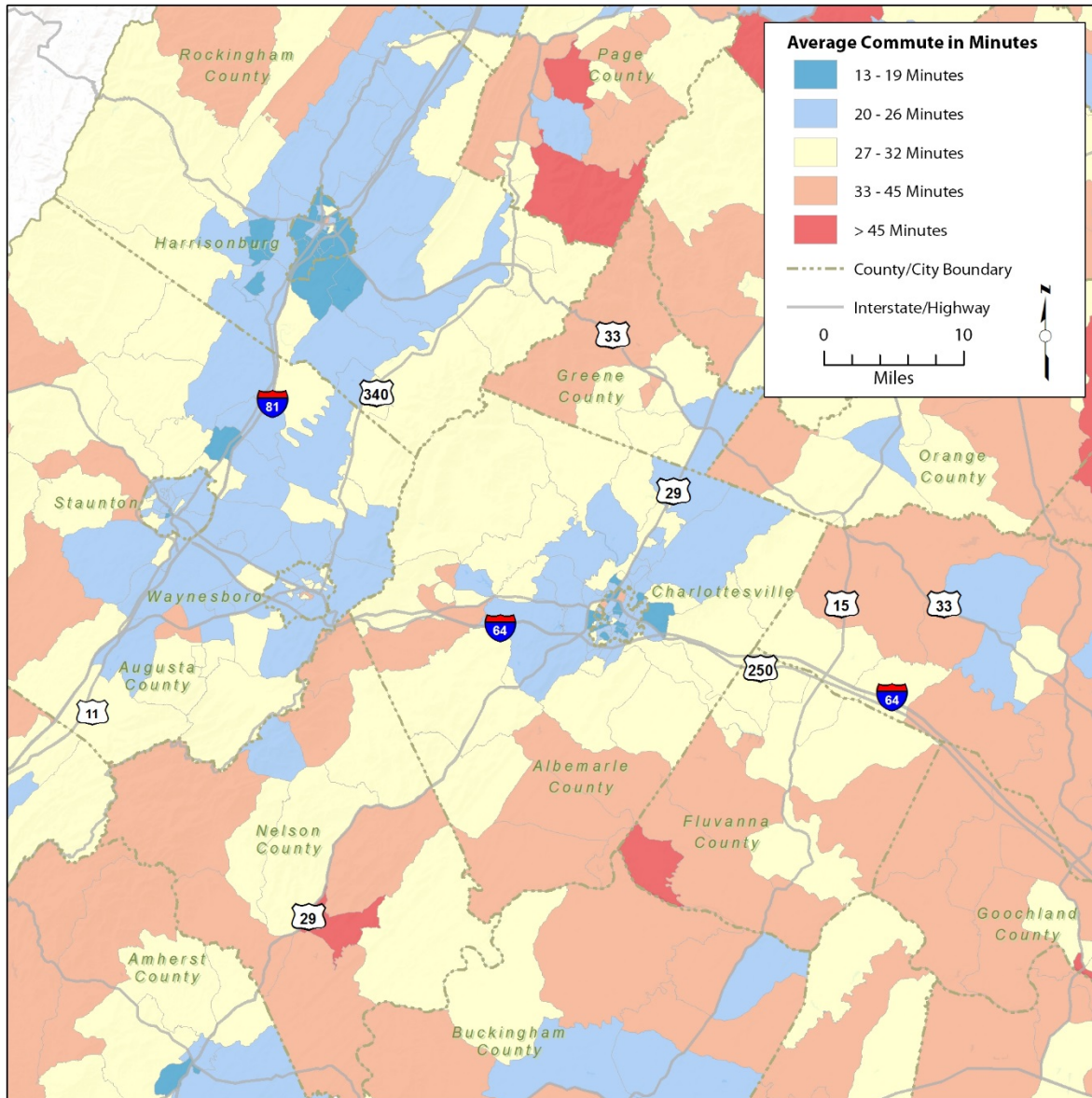
C. Accessibility to Employment

As part of the transportation conditions assessment, a set of accessibility performance measures and attributes were employed to address the workforce and freight needs at the general regional scale. This set of performance measures/attributes reflects regional characteristics such as commute times and the availability of multimodal transportation between activity centers.

Auto Accessibility

Auto Accessibility in the Charlottesville-Albemarle area is driven by two main factors: distance from activity centers, and distance from major arterial roadways. Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. Unsurprisingly, as shown in Figure 19,

the areas with the highest level of auto accessibility exist in and around the City of Charlottesville. Auto accessibility to jobs decreases as one moves to the outer parts of the county, particularly to the north and south, with the exception of the areas along Route 29 going north out of Charlottesville. In the "least auto accessible" areas in the county, residents still have access to car to between 41,000 and 85,000 jobs.

Figure 19: Auto Accessibility

Transit Accessibility

Outside of the City of Charlottesville, there are few fixed-route transit options, which is reflected in the number of jobs that can be reached by transit within 45 minutes being zero in many areas in Albemarle County. Many activity centers in the north of the County and near Crozet have no viable transit options for getting to employment locations. As shown in Figure 20, in the highest scoring areas, residents can reach over 35,000 jobs within a 45-minute transit trip.

Figure 20: Transit Accessibility

Transit Accessibility
Total # of jobs reachable in a 45 minutes
- 0
- 1 - 13,941
- 13,942 - 15,902
- 15,903 - 19,799
- 19,800 - 20,837
- 20,838 - 21,997
- 21,998 - 26,142
- 26,143 - 28,283
- 28,284 - 31,372
- 31,373 - 35,054
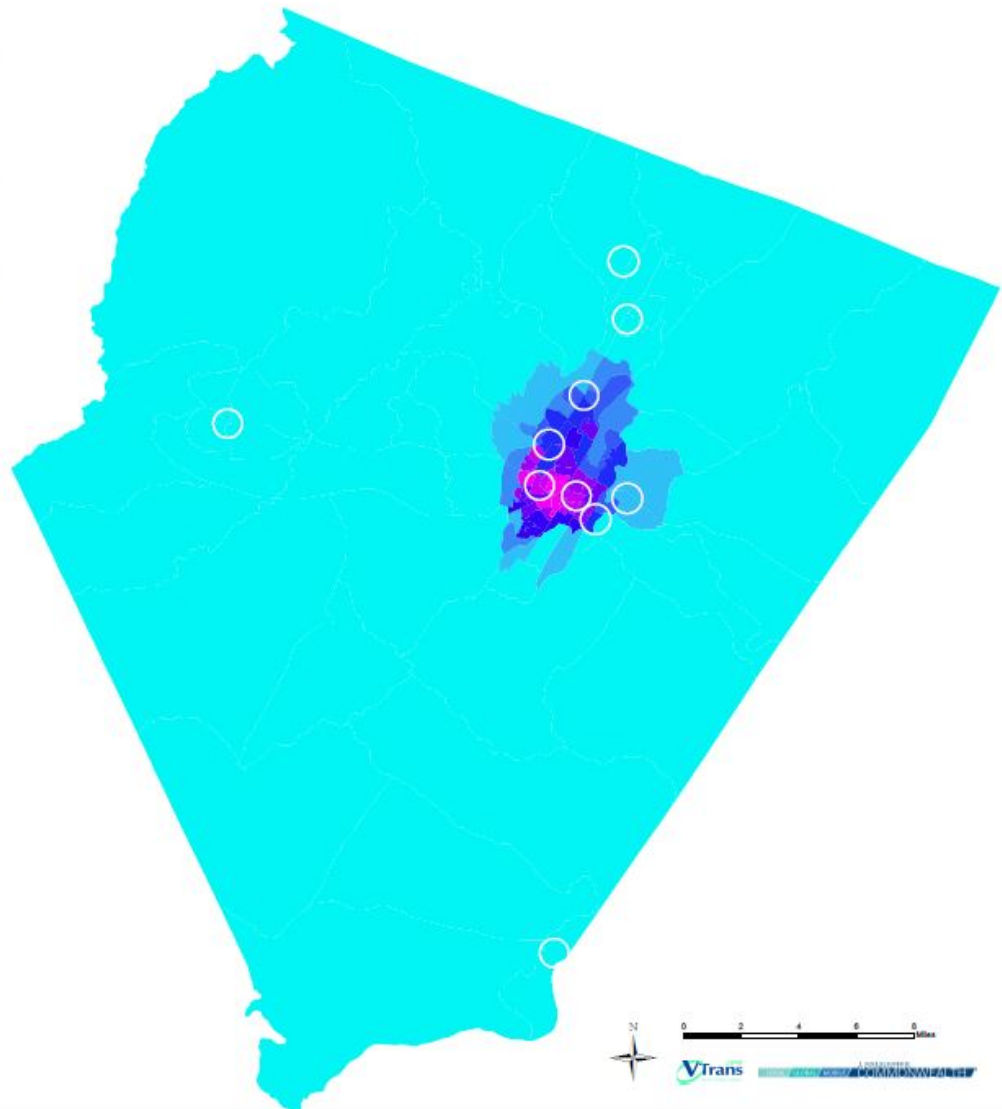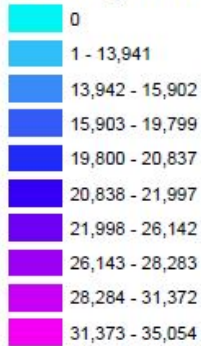
Walk Accessibility

Walk Accessibility is largely determined by the mix of land use and density of development surrounding the origin of each trip. Charlottesville City, some areas on both sides of Route 29 north of the City, and Crozet have the highest walk accessibility, giving pedestrians access to up to 23,680 jobs. Walk accessibility is lowest on the edges of Albemarle County, as well as additional locations where no employment exists within walking distances of residential areas.

Figure 21: Walk Accessibility

Freight Accessibility

I-64 is the only Interstate that runs through the Charlottesville-Albemarle region. As such, accessibility to interstate and principal arterial ramps is highest in an east-to-west band that runs along I-64. As shown in Figure 22, areas in the north and south of the county are between a 13- and 26-minute drive from the nearest ramp. Most activity centers in the region, however, are within a 13-minute drive to the interstate.
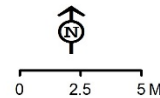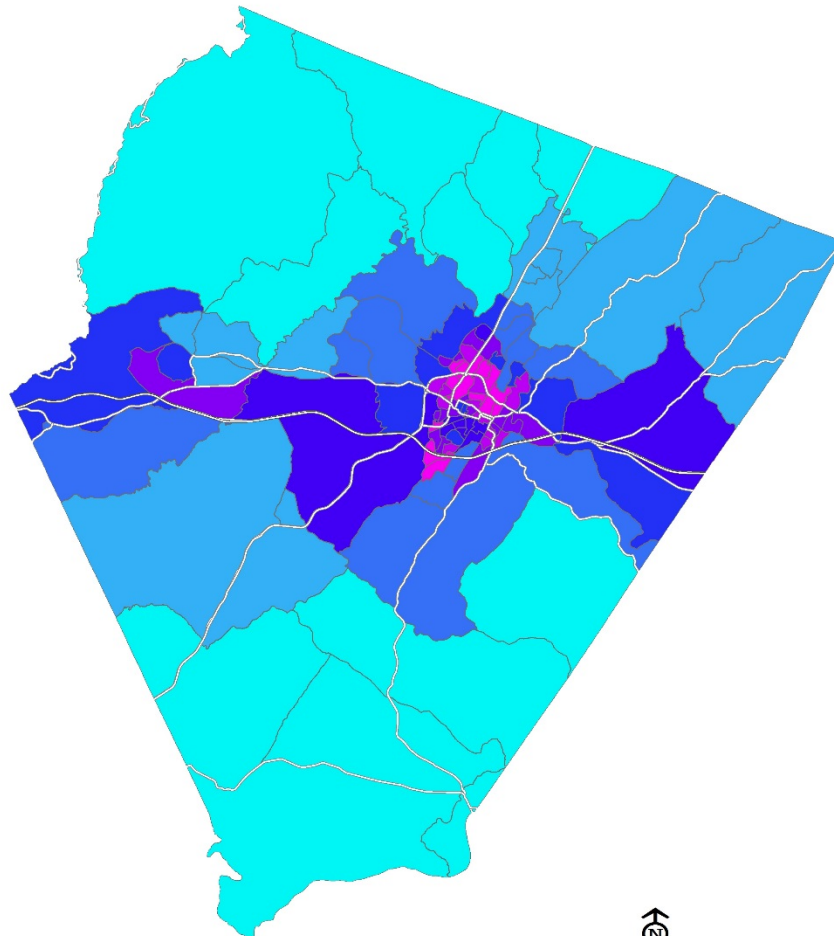
Figure 22: Access to Interstate and Principal Arterial Ramps

The location of warehouses and distribution centers is another important factor in the level of freight accessibility for the region. Figure 23 shows that most warehouses and distribution centers in the Charlottesville-Albemarle region are clustered along I-64 and US-250 in the western part of Albemarle County. There are no warehouse and distribution centers in the southern and northeastern parts of the County, resulting in driving times of up to 53 minutes to reach the nearest warehouses or distribution centers.

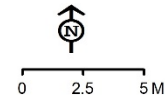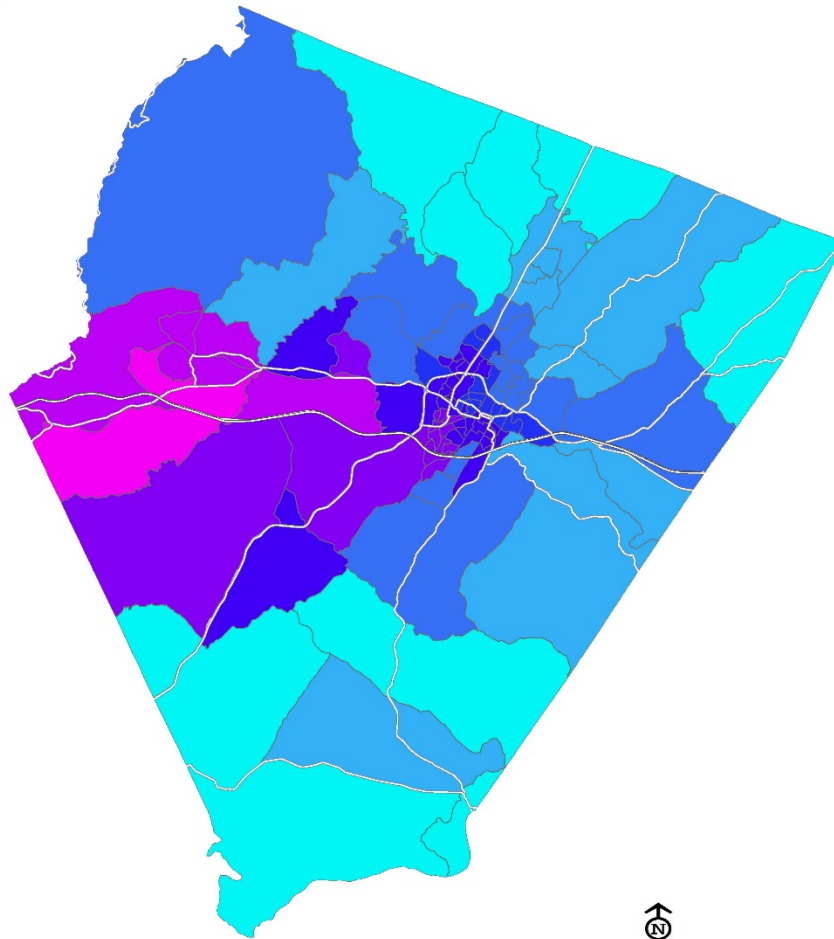*Figure 23: Access to Warehouses & Distribution Centers*

Charlottesville Region

○ Distribution Centers

Blockgroup to Warehouse and Distribution Centers

Drive Time (Minutes)

■ 20.0 - 22.0
■ 22.1 - 28.0
■ 28.1 - 32.0
■ 32.1 - 34.0
■ 34.1 - 36.0
■ 36.1 - 40.0
■ 40.1 - 46.0
■ 46.1 - 53.4

0   2.5   5 Mi

Richmond International Airport, which is approximately 80 minute away from Downtown Charlottesville, is the closest major airport that handles significant quantities of freight. Unsurprisingly, the areas in the region to the east, closest to Richmond, have a shorter travel distance to the airport, as shown in Figure 24.
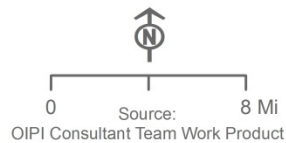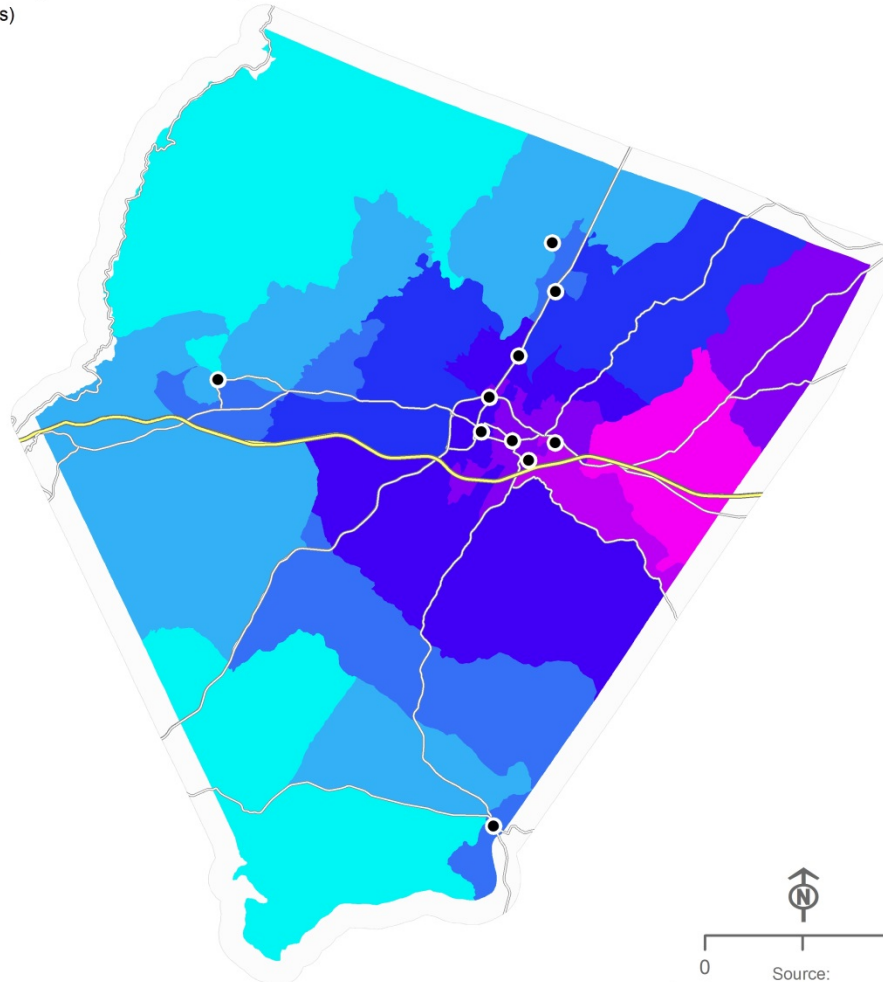
Figure 24: Access to International Airports

D. Roadway Measures

This assessment identified the transportation conditions in Charlottesville-Albemarle based on a series of quantitative roadway measures. The findings in this section reflect corridor-level measures that are critical to access and mobility for people and freight.

Travel Time Reliability

Travel Time Reliability (TTR) measures the frequency by which trips along a specified corridor are significantly delayed (Figure 26). Peak periods TTR is calculated the ratio of median speeds to the 90th percentile speeds. A higher the TTR score indicates that the network link is less reliable. TTR can be considered the additional time that might be required to travel across a roadway segment. For example, a trip segment with a ratio of 1.5 that normally takes 5 minutes to traverse during the peak could require an additional 2.5 minutes. In the Charlottesville region, reliability is quite good overall. There are some reliability issues along Route 29 north of Charlottesville City and on Route 250 going east from the intersection with Route 29 at The Meadows.

Figure 25: Travel Time Reliability
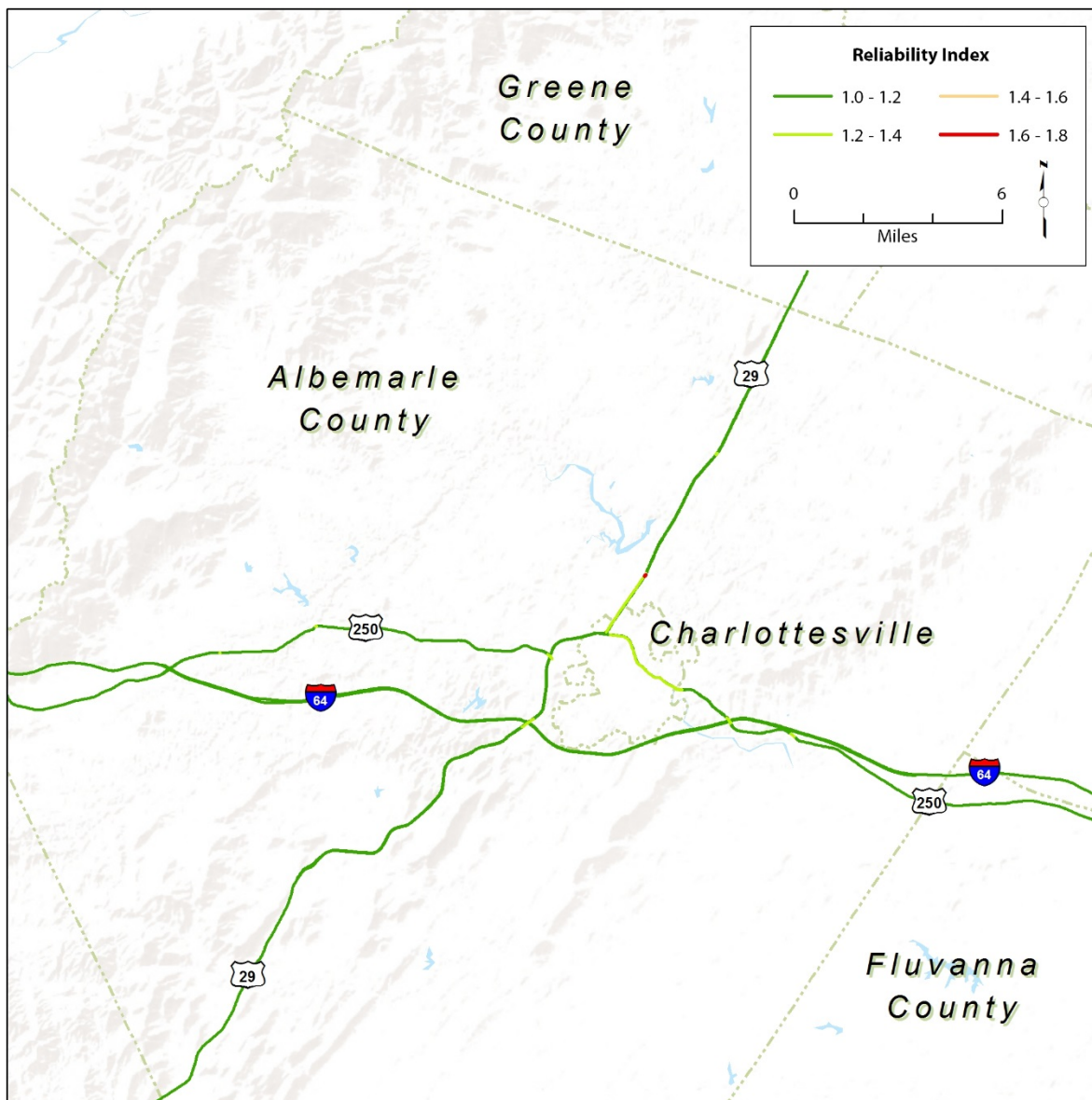
Percent of Time Congested

Figure 26 shows the AM and PM peak percent time congested. This represents the percentage of the time that a typical vehicle spends in significantly congested conditions. Significant congestion is defined as operating speeds below 50 percent of the free-flow speed. The free-flow speed is measured as the 85th percentile of overnight speed. In the Charlottesville region, there is relatively little peak period congestion, with the exception of the intersection of Route 29 with Route 631 (near the Albemarle Square Shopping Center) and at a few short points along Route 250 northeast of the City of Charlottesville.

Figure 26: Percent of Time Congested
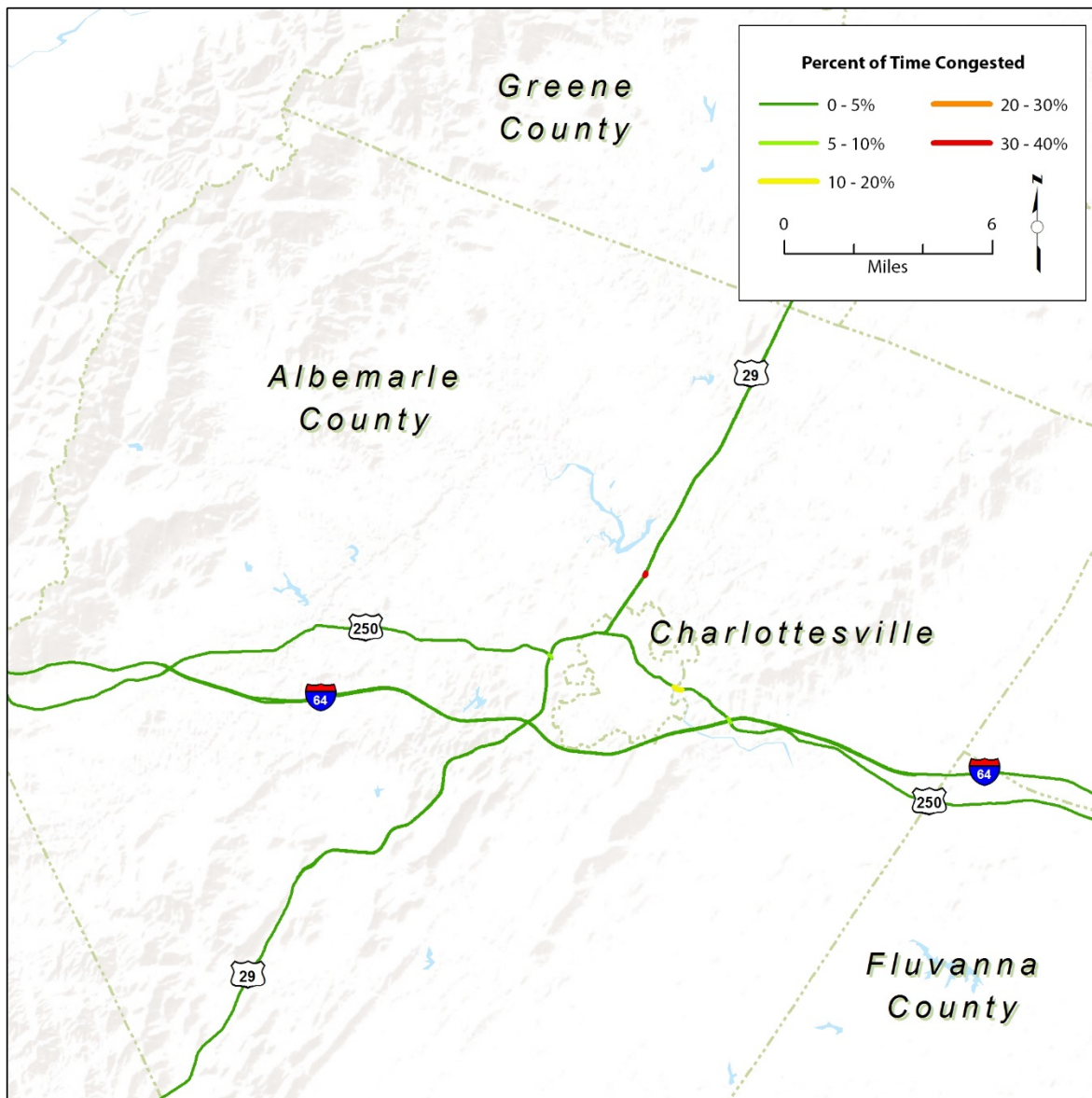
Travel Time Delay

Figure 27 shows total hours of delay per vehicle experienced during the evening peak period on Tuesday, Wednesdays, and Thursdays in 2014. A traveler is considered to be experiencing delay when travel speeds fall below the posted speed limit. It can also be thought of as delay per vehicle. Travel time delay is most severe on Route 29 south of Charlottesville City and on Skyline Drive. It is also problematic on Route 29 north of Charlottesville City and numerous segments on I-64, Route 250, and Route 20.

Figure 27: Travel Time Delay
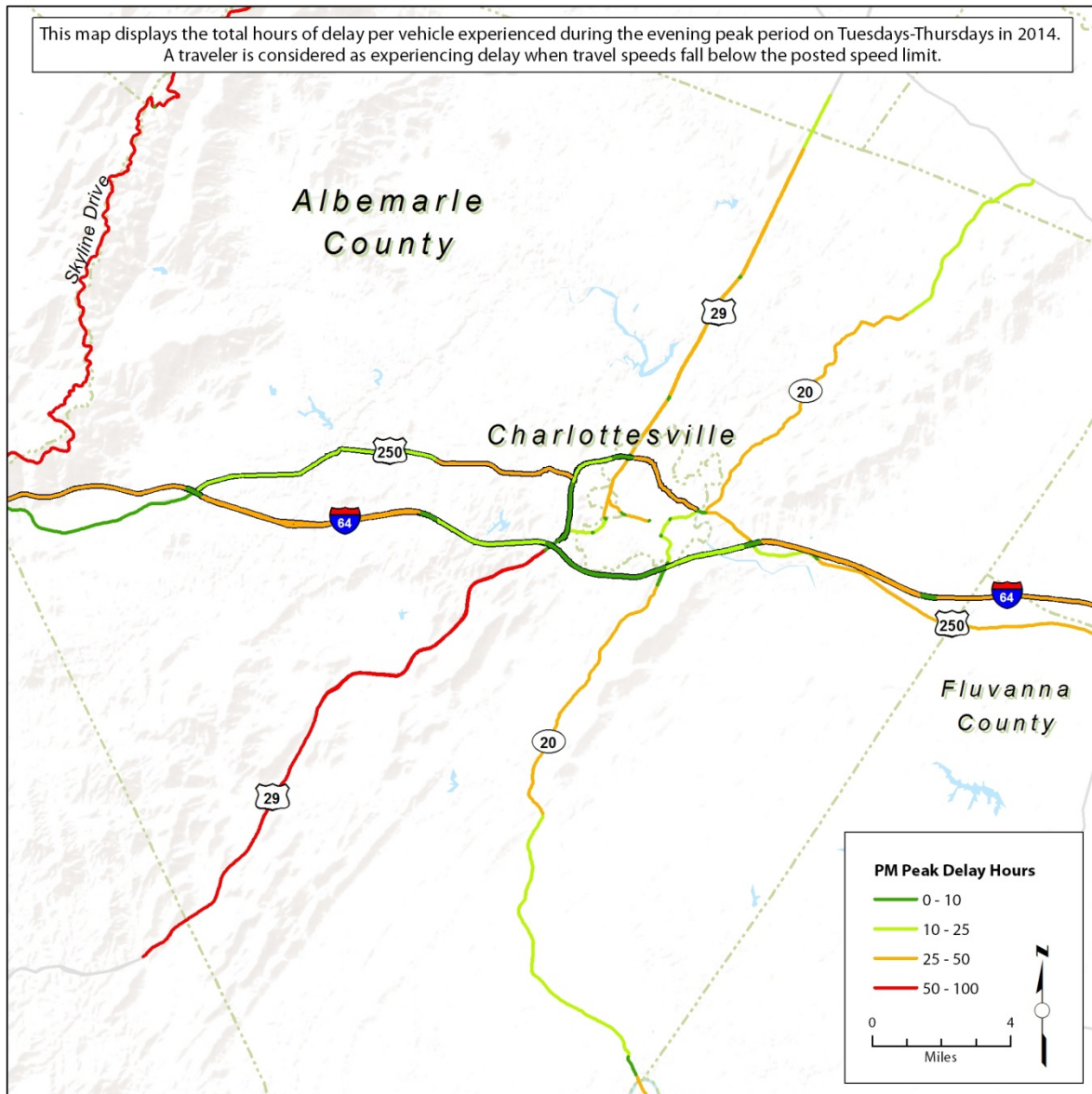
# Median Speeds

Figure 29 shows the ratio of evening peak hour vehicle speeds to the speed limit. Measuring median speeds evaluates typical conditions, while avoiding the undue influence of severe congestion events. If the median (50th percentile) is 30 miles per hour, for example, this means that half of all observations are above 30 miles per hour, and half are below 30 miles per hour. This map indicates that median evening peak speeds are generally at least three quarters of the speed limit, with the exceptions of some specific trouble spots along I-64 and Routes 250 and 29, particularly where they surround the City of Charlottesville and intersect with each other.

Figure 28: Median Speeds
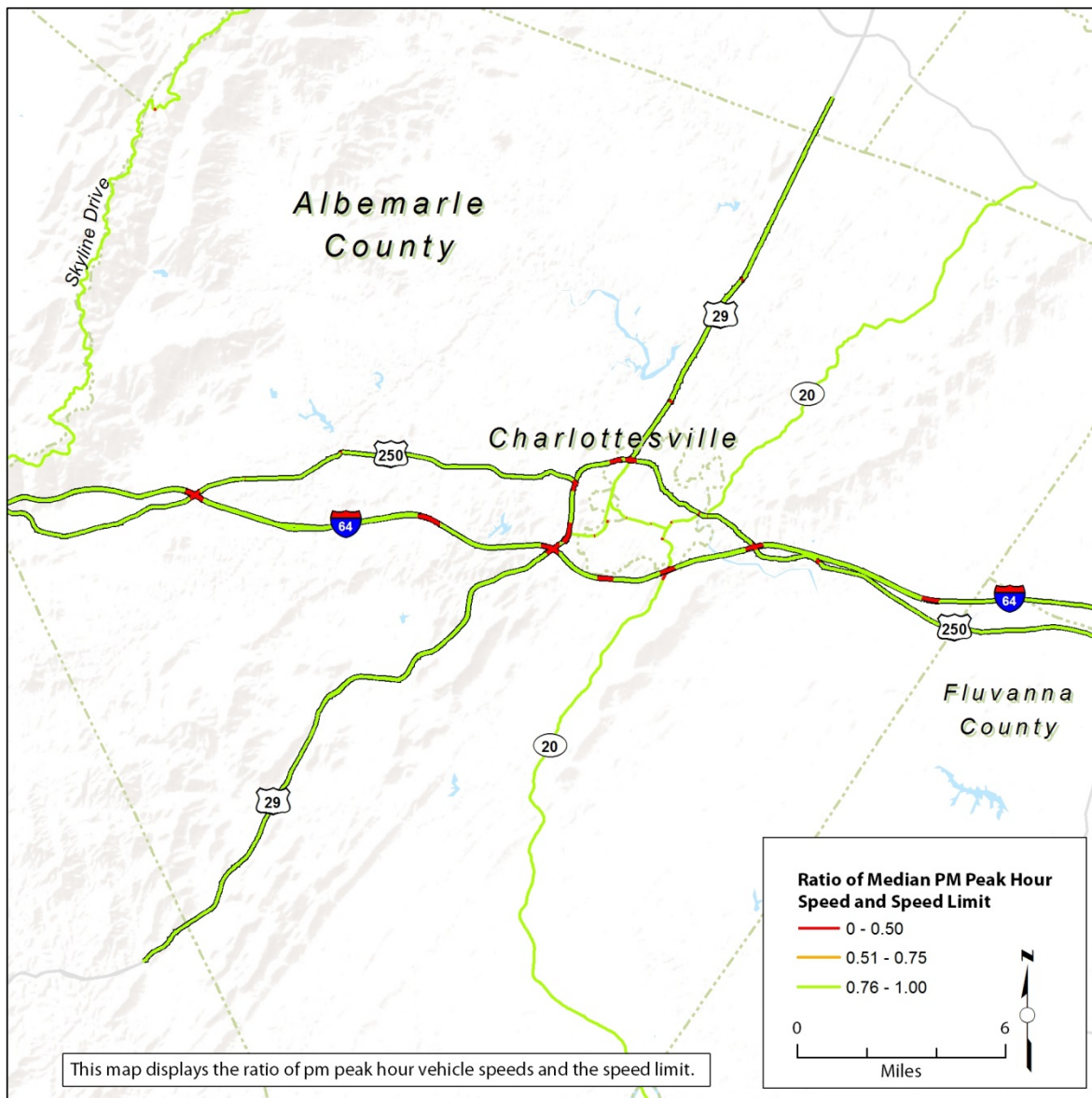
D. Regional & Local Commodity Flows

An understanding of commodity flows is one important piece of identifying and characterizing how transportation systems support regional businesses. Freight flows within, out of, and into the Charlottesville-Albemarle region support local businesses by moving goods to market and allowing business to access key material inputs. The measures below discuss freight modal dependence of regional industries, as well as the top commodities moving into and out of the region by monetary value, geographic destination, and tonnage.

Modal Dependence

The ability of goods and services to flow between industries and customers is the foundation of a functioning economy. Freight delivery is essential to enable input commodities to reach production locations, deliver intermediate goods, and also to deliver finished products to customers. Industry output (sales) in this context can be considered to be dependent on freight, since transportation is used to move products between buyers and suppliers.

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output.[5] In the Charlottesville Region, an average of 93 percent of the dollar value of all goods that are moved through the region are moved by truck. Air is the second most important mode, carrying around 6 percent of the total dollar value of goods. In comparison to the City of Charlottesville, Albemarle County is more dependent on air service, but overall throughout all jurisdictions in the region, trucks are the primary means of moving goods.

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[5] Note that this approach is distinct from quantifying the dollar value of commodities moved by different modes. The relationship between commodities move and supported industry activity (as measured in output terms) is established by linking Transearch commodity flow data with input-output economic models.

Figure 29: Comparison of Freight Modal Dependence
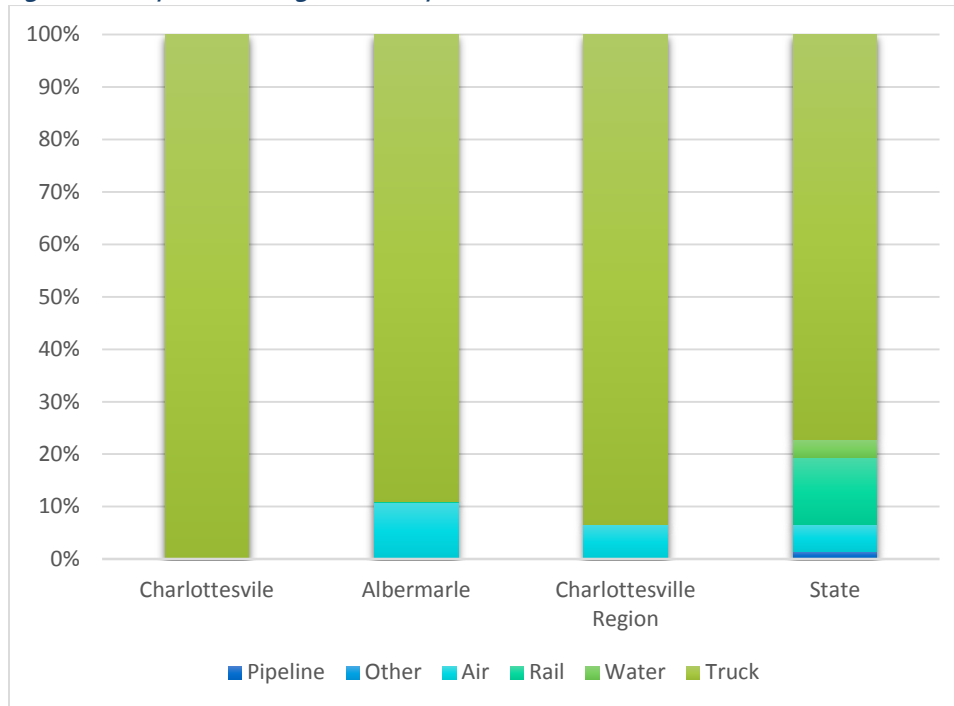
Location Quotients by freight transportation mode are used to compare the prominence of freight modes between the region and the state as a whole (Figure 30). Industry activity, as measured by output, within the region is more dependent on both trucking and air as compared to the state as a whole. Albemarle County, in particular is dependent on air freight. The region does not depend at all on water or rail freight transport. Rail and water borne commodities tend to be bulky (with low value/volume ratios) and rail and water transportation have traditionally served industries that depend on bulk commodities (for either inputs or outputs or both) because these modes offer relatively low-cost transportation on a tonnage (ton-mile) basis. In general, the reliance of the Charlottesville-Albemarle region's industries on truck and air freight is consistent with an economy involved mostly in the production and use of higher-value commodities that require rapid and flexible shipments.

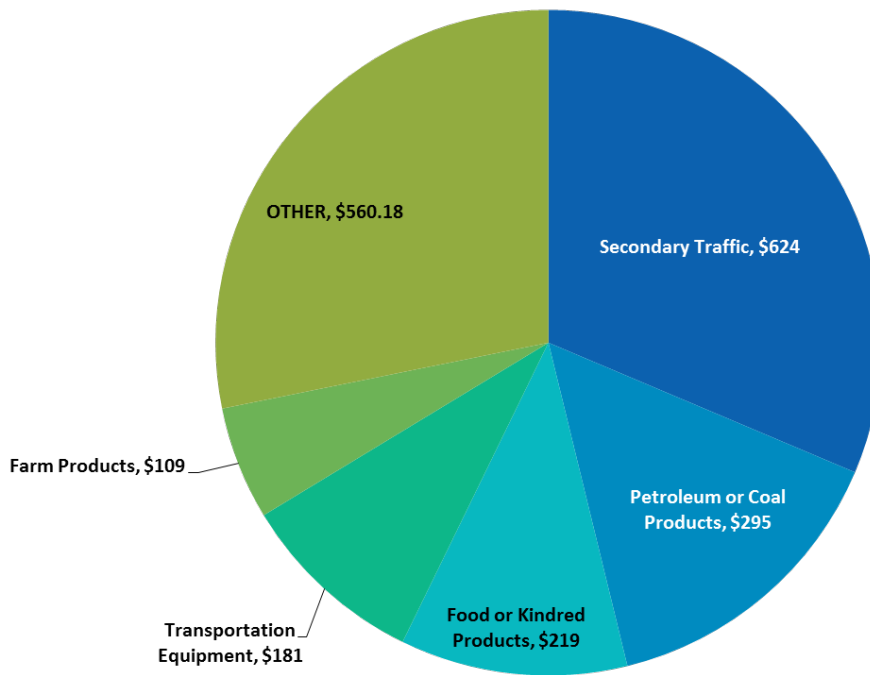*Figure 30: Location Quotient by Mode of Freight Travel*
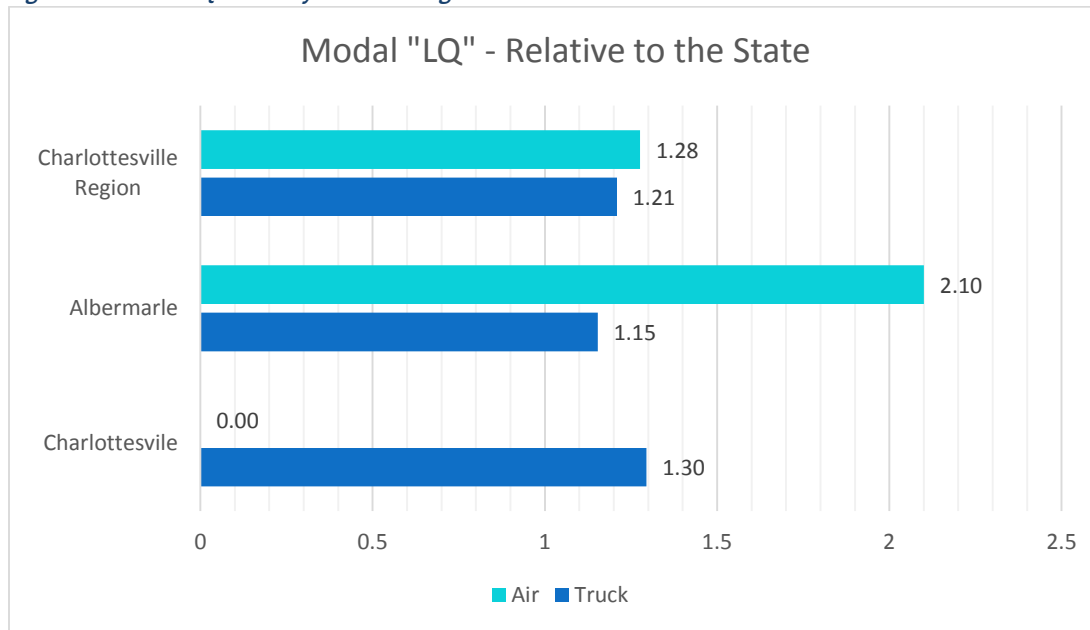
Top Commodities

The last section addressed freight modal dependence on the basis of industry output; this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. In total, approximately $2 billion of goods are brought into the Charlottesville region each year. As shown in Figure 31, Secondary traffic (i.e. freight that is made up of goods being transferred between warehouses or retail centers) accounts for the largest share of freight value moving into the region. Other single categories of commodities that make up a large share of inbound quantity value are petroleum or coal products, food or kindred products, transportation equipment, and farm products. The "other" category of commodities, which makes u the second largest share, includes a variety of manufactured and agricultural products and natural resources (such as minerals). The largest outbound commodities by value include electrical equipment (approximately one third of the total), food or kindred products, farm products, chemicals or allied products, and instruments, photo and optical equipment. The "other" categories comprises approximately 20 percent of all outbound product value.

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

Inbound Commodities, by Value ($M)

- OTHER, $560.18
- Secondary Traffic, $624
- Farm Products, $109
- Petroleum or Coal Products, $295
- Transportation Equipment, $181
- Food or Kindred Products, $219

Outbound Commodities, by Value ($M)

- OTHER, $248
- Electrical Equipment, $409
- Instrum, Photo Equipment, Optical Eq, $53
- Chemicals or Allied Products, $58
- Farm Products, $142
- Food or Kindred Products, $217
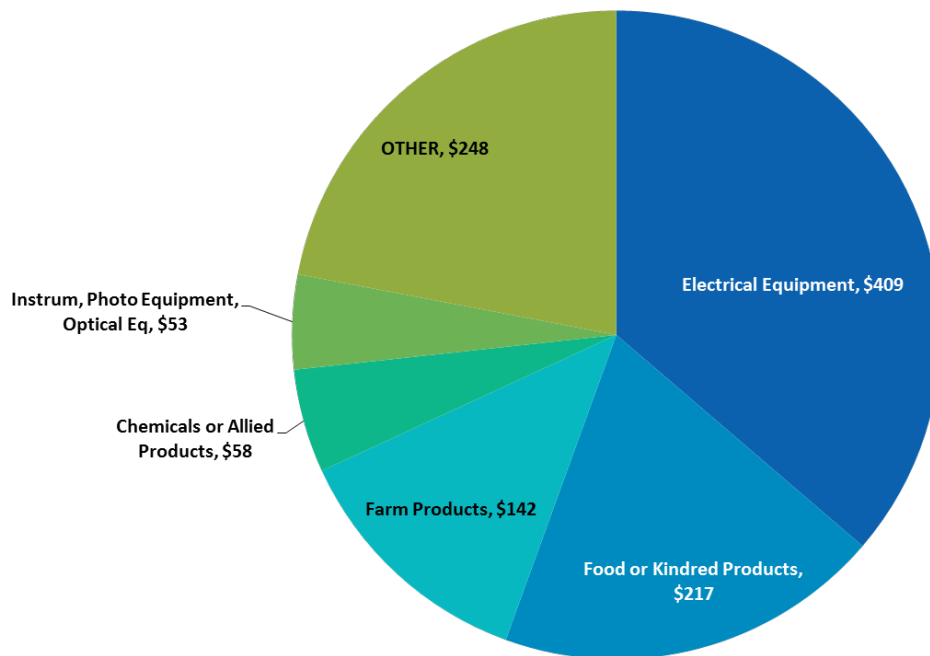
The Southeast and Mid-Atlantic regions, as defined by the Bureau of Economic analysis, are the most important destination for freight from the Charlottesville-Albemarle region. Additional receiving areas for the area's outbound freight include the northeast and Florida. Very few of the region's outbound products are destined for areas west of the Mississippi River, as shown in Figure 32.

Figure 32: Top Freight Values by Region. Source: TranSearch, 2012.

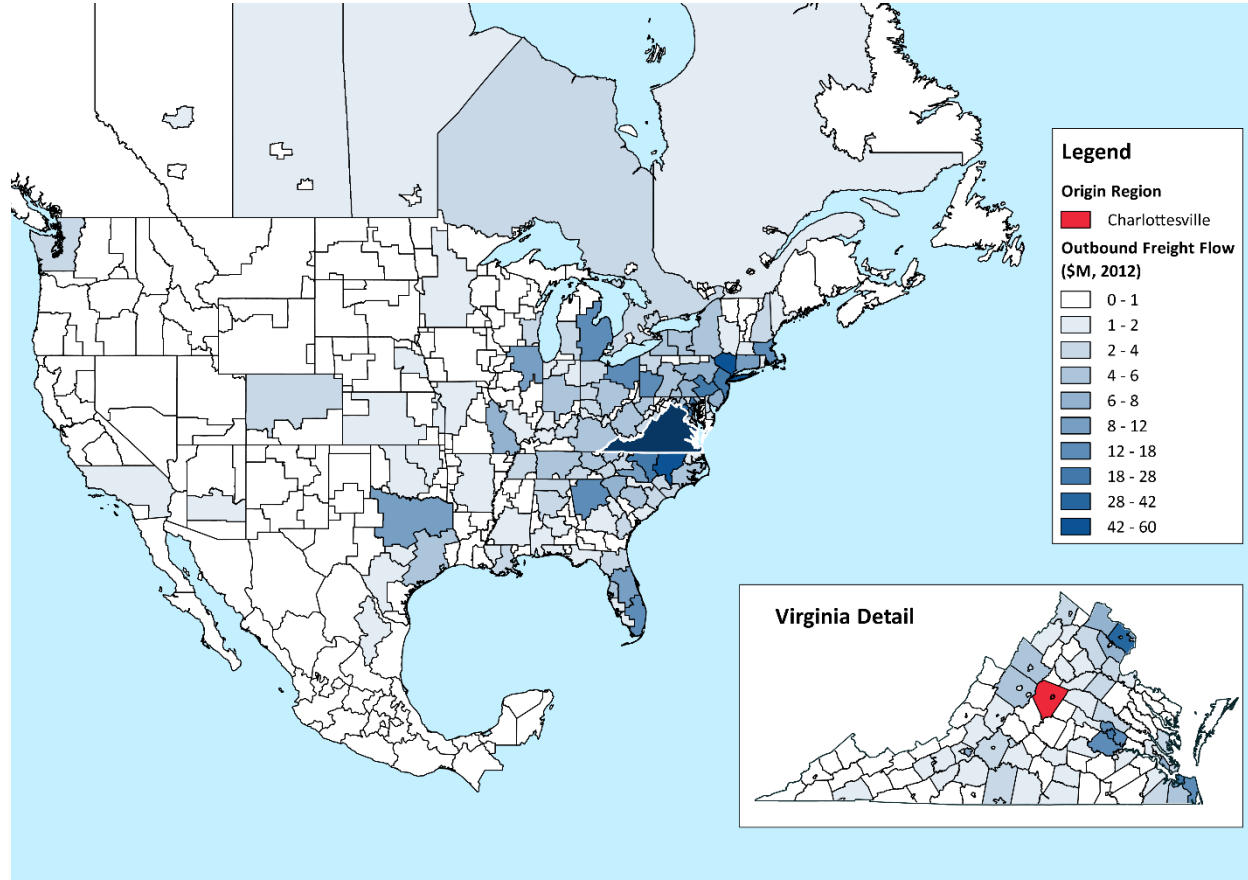Figure 33 presents information on the top commodities moved into and out of the region based on their weight in tons. Consider freight movements in terms of tonnage provides a different perspective for transportation planning, as tonnage can serve as an indicator of likely wear and tear imposed on the transportation network by freight movement, while value relates most directly to economic activity. Non-metallic minerals, which have a relatively low value-per-ton, account for approximately half of the weight of inbound commodities and closer to two thirds of the weight of outbound commodities. Secondary traffic makes up a smaller by still significant share of inbound commodities by weight (vis-à-vis value), while the relative share of petroleum or coal products by value and weight are similar. Farm and food products both make up a significant share of outbound commodities by value and weight, although their shares of weight are lower.

Figure 33: Top Commodities by Weight

Inbound Commodities, by Weight (000s of tons)

Food or Kindred Products, 200
OTHER, 0
Clay,concrete,glass or Stone, 358
Petroleum or Coal Products, 417
Nonmetallic Minerals, 1,487
Secondary Traffic, 506

Outbound Commodities, by Weight (000s of tons)

Waste or Scrap Materials, 141
OTHER, 0
Farm Products, 187
Food or Kindred Products, 191
Clay,concrete,glass or Stone, 268
Nonmetallic Minerals, 1,355
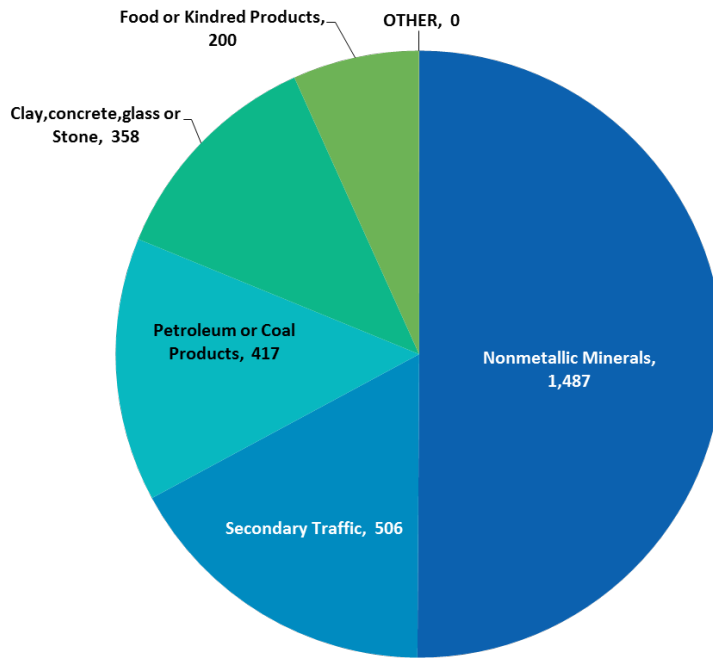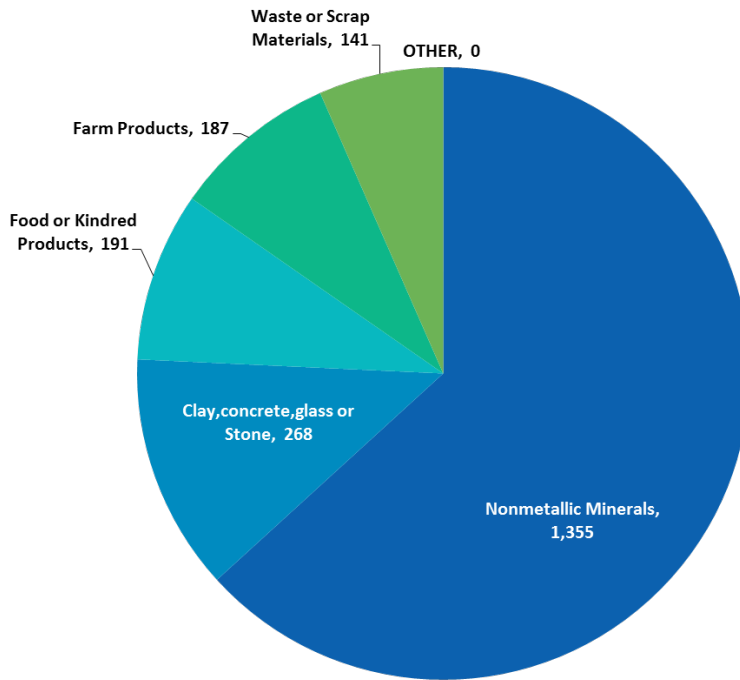
4. NEEDS PROFILE

A. Introduction

Based on the overall approach to the VMTP Needs Assessment, Transportation Needs are considered deficiencies or gaps in the transportation conditions that are most critical to each region's key future industries. The key economic and transportation conditions have been identified in the Economic and Transportation profiles above and key correlations have been described above as Economic and Transportation Linkages.

The Needs Assessment relates current transportation conditions and deficiencies to key future industries and economic profiles. The Needs Assessment, however, does not propose specific projects to address the Transportation Needs in each region, since this should be done by MPOs, localities and other nominating entities when they put forward projects for potential funding programs, including those subject to HB2 screening. Instead, the VMTP Transportation Needs Assessment is intended to identify a set of regional Transportation Needs in order to be able to compare proposed projects to Needs. The Needs Assessment also uses a spatial analysis for the Region to provide observations about specific corridors, travel markets, and activity centers in addition to the regional profiles that will provide more detail regarding specific areas within the region around which some of the transportation needs are focused.

Needs have been identified based on both stakeholder input and on the analysis of economic and transportation conditions. The Needs have been categorized into a series of five very broad types of Capacity Needs (Corridor Reliability, Network Connectivity, Transportation Demand Management, Modal Choice, and Walkable and Bikeable Places). The Study Team assembled and described the Transportation Needs in each region with a particular focus on attracting and retaining the 21st century workforce needed for each region's 2025 economy.

B. Economic and Transportation Needs Correlation

The Study Team conducted a number of research efforts aimed at identifying key correlations between industries and their transportation needs. These included national research of industry trends in workforce needs and goods movement needs and a national survey of site selection professionals conducted by the Southeastern Institute of Research. Based on the findings of this research, Table 12 outlines the key correlations between three broad industry sectors (local-serving, knowledge-based, and freight-dependent sectors) and their general transportation needs. It should be noted that the table does not reflect that these industry sectors always have these and only these transportation needs. Individual industry types and individual business needs for transportation will vary and the table only represents where there were apparent correlations between industry sectors and basic categories of transportation needs.

Table 12: Economic and Transportation Correlation. Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by the Study Team.

Economic and Transportation Correlation Table			
	Local Sector	**Knowledge Sector**	**Freight Sector**
Highway Access	3	3	3
Passenger Reliability	3	3	1
Bottleneck Relief	2	3	3
Freight Reliability	2	2	3
Freight Accessibility	1	2	3
Network Connectivity	3	2	1
Transportation Demand Management	1	2	2
Modal Choice	3	2	1
Transit Access	3	2	1
Active Transportation (Walk/Bike) Options	2	3	1
Walkable Places	2	3	1

Correlations:

3 = High Correlation to Transportation Need
2 = Moderate Correlation to Transportation Need
1 = Low Correlation to Transportation Need

Source: Summary correlations based on national research and survey of national Industry Site Selection Professionals conducted by OIPI Consultant Team

The table of correlations above was used to identify potential categories of Transportation Needs in the region by linking prominent regional economic sectors with anticipated Needs and comparing these to the general transportation conditions that currently exist, as described below.

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Charlottesville-Albemarle Region, it showed relative stability in the distribution of output and employment across the three sectors, with both output and employment in the knowledge-based and local-serving sectors, respectively, to increase and decrease slightly. As outlined in the Economic and Transportation Correlation above, the top Transportation Needs of these two dominant sectors (local-serving and knowledge-based) include highway access, passenger reliability, bottleneck relief, network connectivity, modal choice, transit access, active transportation, and walkable places. Freight reliability and accessibility are of a relatively lower importance.

The forecasted growth in the knowledge-based economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge-based sector particularly point to improving modal choice, transit access and walkable places. The local-serving economic sector (which makes up the overwhelming majority of the region's employment) also has important correlations with transit accessibility to support workforce access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the

region's economic activity centers, and between the centers. In particular, there is a need for additional high capacity and high frequency transit service in the region. Further support for the knowledge-based sector would also come from additional walkable places and modal options for walking and biking in the region.

The discussion above represent general transportation needs for the region based on an analysis of its economic sectors and projected growth. More specific needs from a more detailed spatial analysis of the economic and transportation conditions in the region are described below.

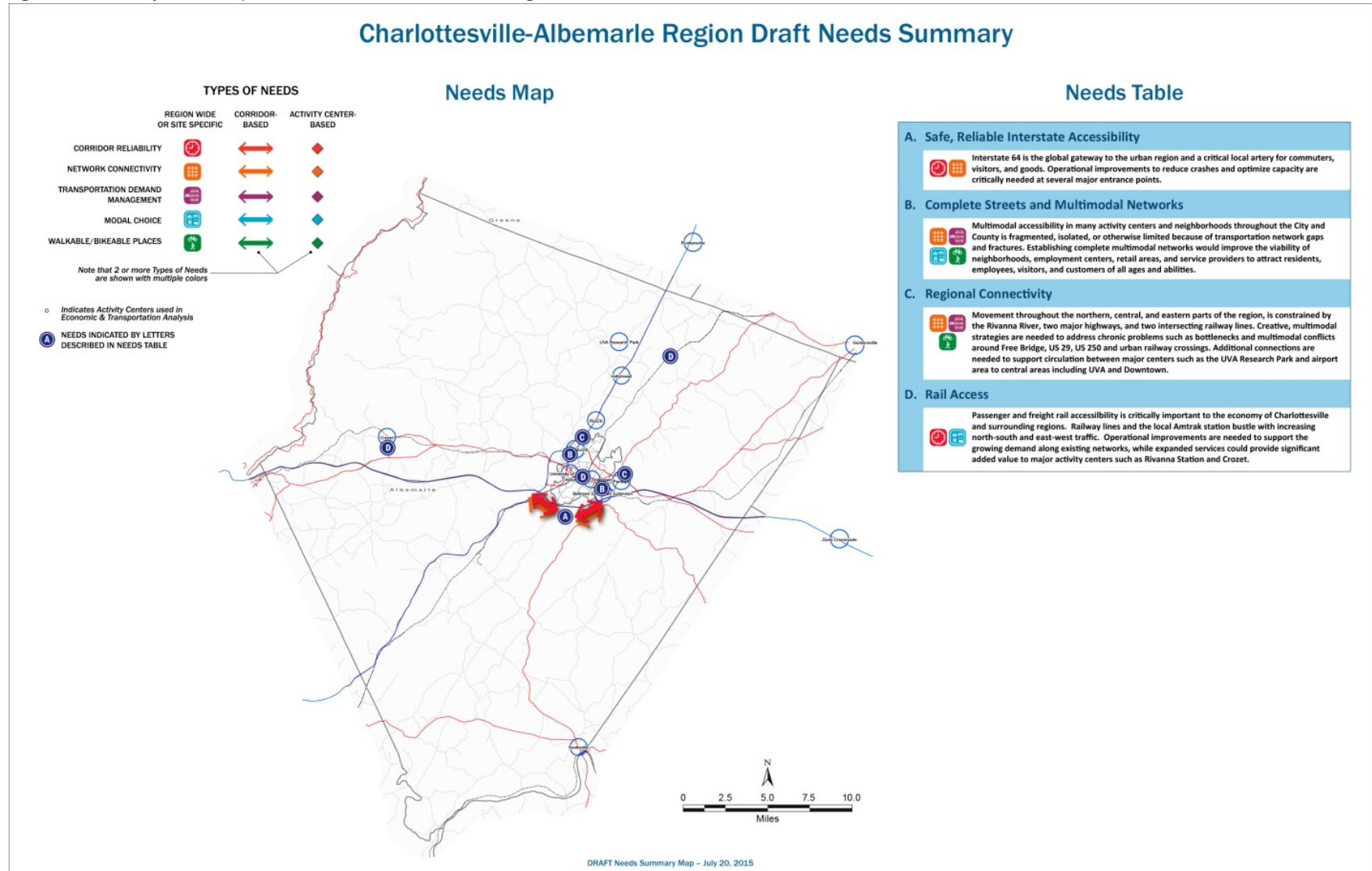# D. Spatial Analysis of Regional Network Needs

Summary of Needs

Potential Needs were also developed by analyzing the economic and transportation data in the region from a spatial standpoint. This analysis included the potential Needs identified by stakeholders in the first Regional Forums, as well as new Needs that emerged from the spatial analysis of the data. These Needs were categorized into a series of very broad types of capacity Needs as described above. The spatial analysis of Needs consists of a Map of Needs, a table of identified Needs, and a Findings of Needs that summarizes the economic and transportation findings to support each identified Need. Each of these is summarized below.

Map of Needs

Figure 34 summarizes the regional Transportation Needs according to activity centers and corridors. The Needs are summarized and color coded by general category. Each of the Needs is also numbered and keyed to the Finding of Needs table.

Figure 34: Summary Needs Map for the Charlottesville-Albemarle Region

Findings of Needs

The table below lists each of the identified Transportation Needs in the Region, and describes the basis for each Need in terms of economic and transportation findings and data. The analysis of Regional Network Transportation Needs for the region was compiled into a table (Table 13) that identifies the following findings of need:

1. Category of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need

The findings to support the determination of need generally came from the statewide datasets of economic and transportation conditions summarized above. However, in cases where the statewide data is not of a fine enough grain or level of detail to accurately determine a Need, it was supplemented by locally obtained data from studies or plans. It is important to note that local plans and studies were not used to identify proposed projects as Needs, but only for supporting data to make an objective determination of need.

Table 13: Findings of Needs

A. Safe, Reliable Interstate Accessibility

NEED

Interstate 64 is the gateway to the region's core areas. Currently, crash frequency and severity are high at key points where travelers enter and exit I-64. Poor reliability reduces the capacity at these points, causing delay and inhibiting access to the more central areas of the region. The need on I-64 is improvements at major entrance points to reduce crashes and improve reliability.

ECONOMIC

Interstate 64 is a key artery for goods and people moving into and out of Charlottesville, the region's center and only major city. Workers from all sectors rely on the interstate to get to work, and the interstate is used by tourists, who have a significant role in the region's economy.

TRANSPORT.

Operational improvements are needed to improve safety and reduce crashes. In addition, improvements are critically needed to improve the flow of vehicles to optimize capacity at several major entrance points.

B. Complete Streets and Multimodal Networks

NEED

The ability to travel around Charlottesville and other areas in the region by bicycle, walking, and transit is critical for many residents' accessibility. The availability of multimodal transportation options alleviates potential congestion, and allows for more efficient movement of goods and people traveling longer distances. There is a need to strengthen and complete multimodal networks to support travel by all modes.

ECONOMIC

Establishing complete and connected multimodal networks would improve the viability of neighborhoods, employment centers, retail areas, and service providers to attract residents, employees, visitors, and customers of all ages and abilities. Workers, particularly those in the knowledge and local-serving sectors, rely on access to bicycling and walking, which is a significant factor in many workers' decisions to locate in the region's communities. UVA is the city's largest economic anchor, and both students and faculty frequently travel around the region's core areas using modes other than driving.

TRANSPORT.

Multimodal accessibilty in many activity centers and neighborhoods throughout the City and County is fragmented, isolated, or otherwise limited because of transportation network gaps and fractures. There is a need to improve connections between existing facilities, as well as improve the quality of these facilities in key locations where they are most frequently used.

C. Regional Connectivity

NEED

Heavy reliance on a limited number of roadways and arterials results in chronic problems such as bottlenecks and modal conflicts throughout the northern, central, and eastern parts of the region. Improving street network connectivity and reducing modal conflicts at key points would improve travel by all modes throughout the Charlottesville-Albemarle region.

ECONOMIC

All three industry sectors rely on the frequency movement of people and goods. Given the constraints placed on movement by the Rivanna River, two major highways, and two intersecting railway lines, there is a need to improve connections to enhance connectivity and sustain the relatively low commute times that attract workers to the region.

TRANSPORT.

Chronic connectivity problems lead to bottlenecks and multimodal conflicts around Free Bridge, US 29, US 250 and urban railway crossings. These are key locations where improved connections can address this need.

D. Rail Access

NEED

Amtrak trains running through Charlottesville are regularly at capacity, and experience delays due to the freight rail services in the region, which are important for freight-dependent industries, as well as others that rely on timely goods deliveries. Expanded passenger and freight rail services and operational improvements are needed to support growing demand on existing networks.

ECONOMIC

Passenger and freight rail accessilbility is critically important to the economy of Charlottesville and surrounding regions. Railway lines and the local Amtrak station bustle with increasing north-south and east-west traffic. Demand is growing along existing networks, and expanded services would add economic value to major activity centers such as Rivanna Station and Crozet. Many Charlottesville residents, particularly knowledge-sector workers, rely on rail to commute or travel to Northern Virginia and other areas throughout the state and region.

TRANSPORT.

The need for additional rail capacity along major north-south and east-west traffic roots to accommodate people and goods movement.