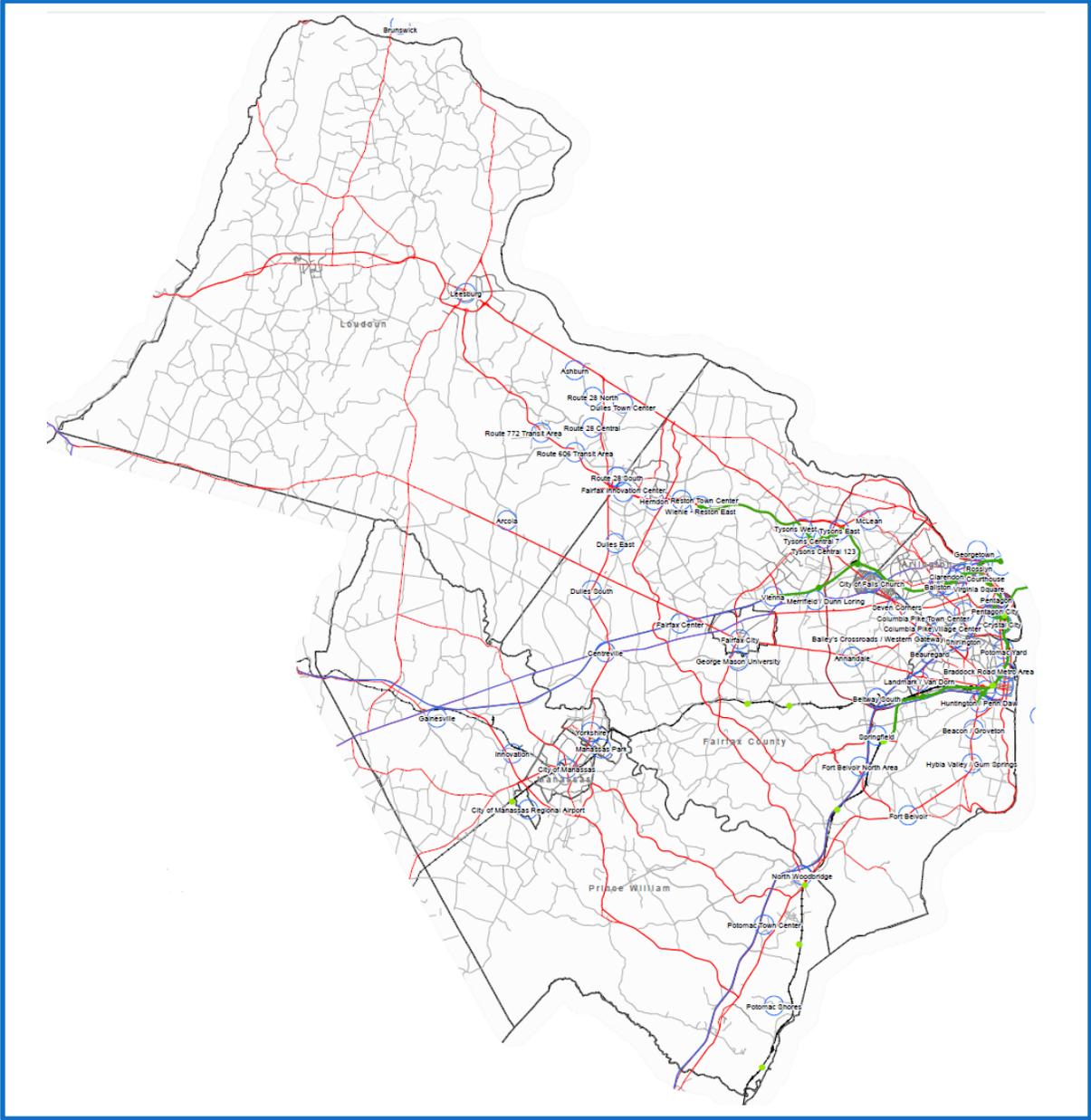


VMTP 2025 Needs Assessment

Regional Needs Profile



Northern Virginia

December 2015

1. NEEDS ASSESSMENT PURPOSE

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

Transportation Needs, as considered in the 2025 Needs Assessment, are defined as the gap between the transportation system in place currently that serves the current industries in a region, and the future transportation system needed to serve the desired future economy in the region. The gap between the transportation needs and economic conditions is the basis for the findings in this report. The following sections outline the Northern Virginia regional Economic Profile, regional Transportation Profile, and regional Transportation Needs profiles.

Defining a Regional Network

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

The Northern Virginia Region is defined as Arlington County, Fairfax County, Loudoun County, Prince William County, City of Alexandria, City of Fairfax, City of Falls Church, City of Manassas, and City of Manassas Park for the needs analysis.

2. ECONOMIC PROFILE

A. Introduction

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

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

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

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

B. Demographics

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

Statewide Demographics

According to Weldon Cooper, the current population in the state of Virginia is 8,185,867 (Table 1). By the year 2025, the Commonwealth of Virginia’s population is projected to increase by between 1 and 1.6 million residents. Statewide per capita incomes are expected to rise 2 percent, from \$44,765 to \$54,226.

Table 1: Statewide Population Projections for Virginia

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

Regional Demographics

As shown in Table 2, substantial population growth is projected for the Northern Virginia Region. Projections range from approximately 295,000 to 722,000 new residents in the region by the year 2025.

Table 2: Northern Virginia Region Population Projections

Current Population - 2012	Weldon Cooper 2025 Projection	Woods &Poole 2025 Projection
2,346,221	2,641,728	3,068,306

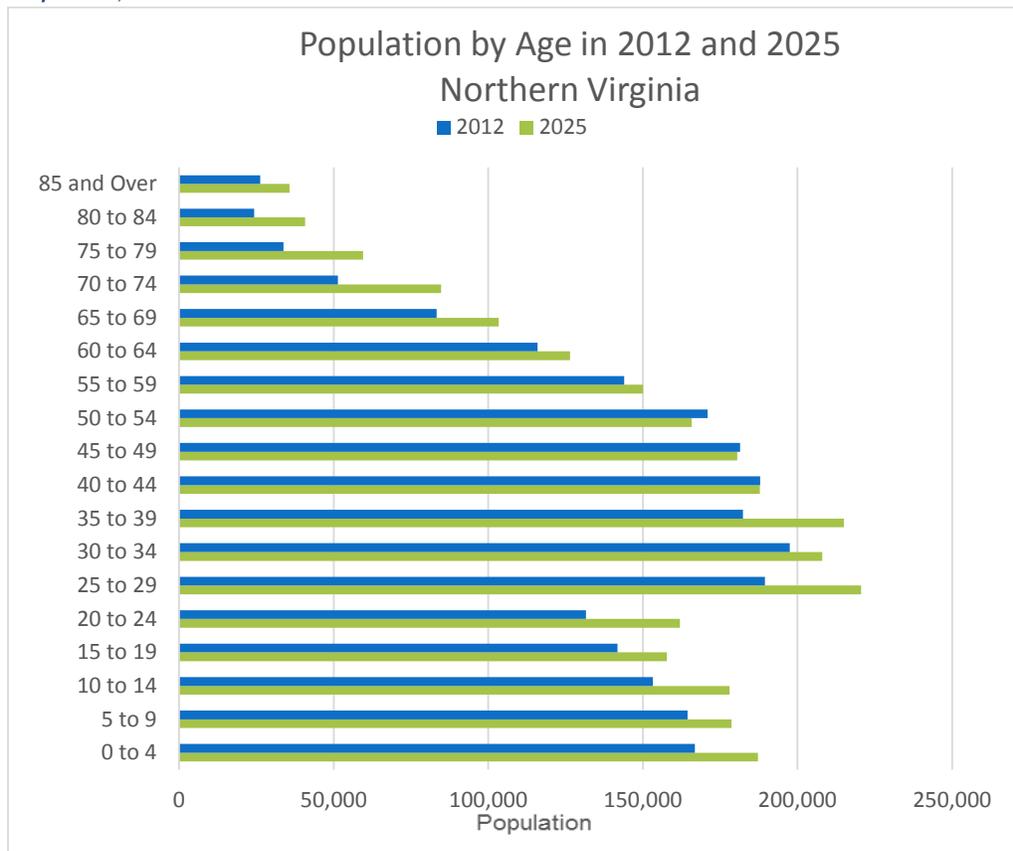
Table 3 provides a closer look at population projections by jurisdiction within the Northern Virginia Region. All of the region’s jurisdictions are expected to grow, with the largest growth expected in the more remote areas of the region – Loudoun and Prince William Counties. Still, growth is expected to be strong in more “inner” jurisdictions as well, including Arlington County, the City of Alexandria, and the City of Falls Church.

Table 3: County and City Population Projections from Metropolitan Washington Council of Governments – Round 8.3 Cooperative Forecasting, 2014

Jurisdiction	2010 Population	Projected 2025 Population	Change
Arlington County	207,600	248,700	20%
Fairfax County	1,081,700	1,212,500	12%
Loudoun County	312,300	452,200	45%
Prince William County	402,000	530,700	32%
City of Alexandria	140,000	167,100	19%
City of Fairfax	22,700	26,400	16%
City of Falls Church	12,300	15,500	26%
City of Manassas	37,800	43,100	14%
City of Manassas Park	14,300	15,900	11%

According to Woods & Poole, per capita income for the region is expected to rise 19 percent (slightly less than the state average of 21 percent) from \$62,403 to \$74,090 (Figure 1). This income growth may be lower than the state average due to a higher proportion of the region’s residents living on (often fixed) retirement incomes, and/or slower expected growth in federal employment. Population growth is also projected to be accompanied by a demographic shift, with a higher percentage of the population over the age of 60.

Figure 1: Comparison of 2012 and Projected 2025 Population of the Northern Virginia Region per Woods & Poole Economics, Incorporated, 2014 State Profile



C. Current Industry Strengths

The following economic measures were used to analyze the strength and characteristics of the current regional economy in Northern Virginia.

Top Industries by Output

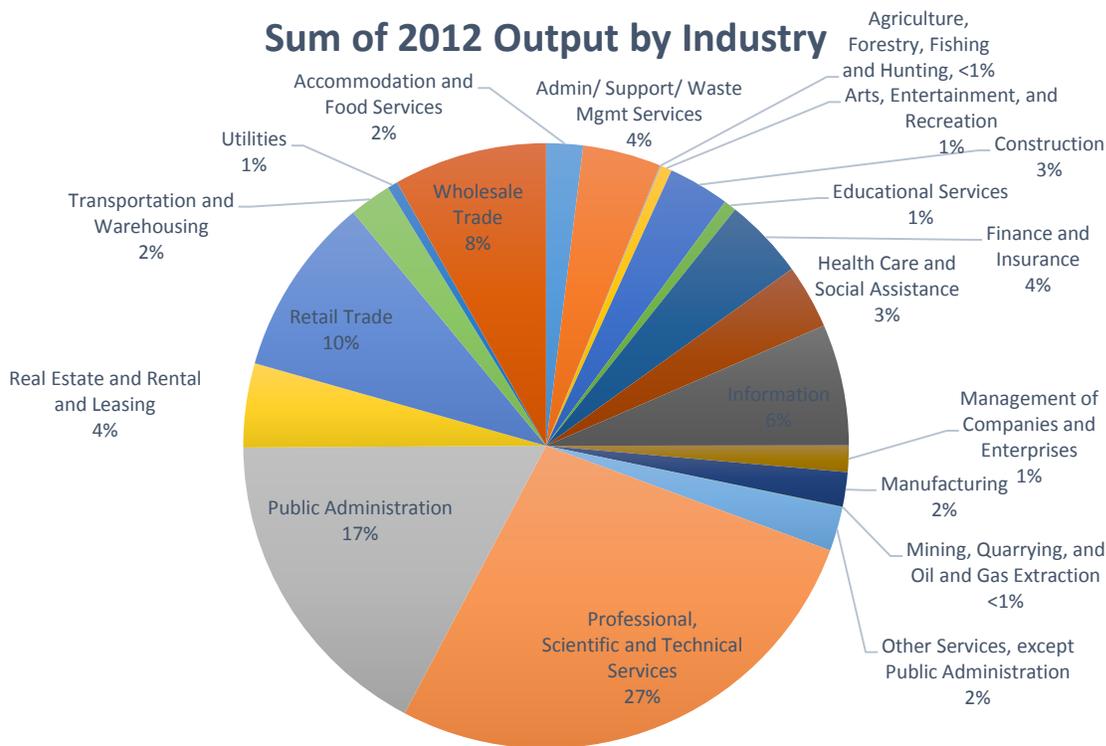
As shown in Table 4, professional, scientific, and technical services is the strongest industry in the Northern Virginia region in terms of economic output. This is due largely to the presence of many large and small firms that provide services to the federal government and other organizations located in the region due to the federal government’s presence. For similar reasons, public administration comes in second, reflecting the large number of professionals employed by the Federal government. Retail trade, wholesale trade, and information round out the top five industries in the region with the greatest economic output. Many workers in these sectors serve the local economy and the workers in the region’s driving industries. The top five industries accounted for approximately 70 percent of all the Region’s output in 2012.

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

Top Industries	2-Digit NAICS Code	% of Output
Professional, Scientific, and Technical Services	54	27
Public Administration	92	17
Retail Trade	44	10
Wholesale Trade	42	8
Information	51	6

Figure 2 below shows the region’s output by industry for all industries. The remaining 30 percent of of the region’s 2012 output is divided among many smaller sectors.

Figure 2: Breakdown of 2012 Output in the Northern Virginia Region by Industry



Top Industries by Employment

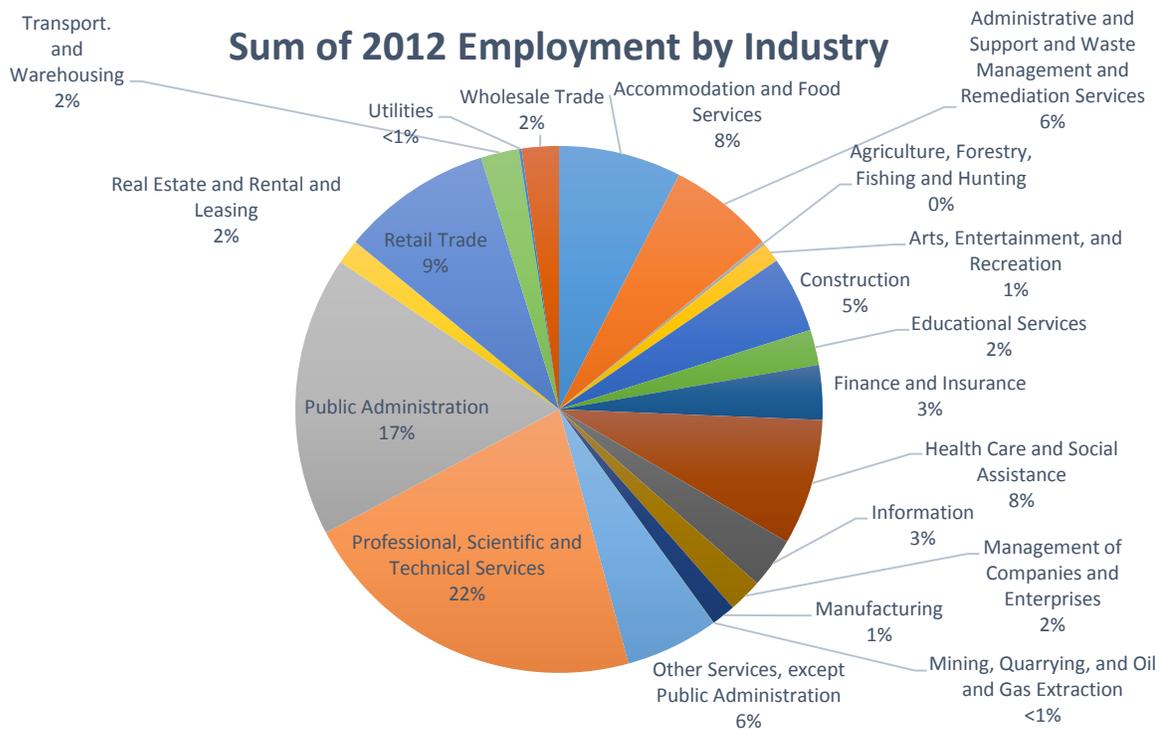
As shown in Table 5, professional, scientific, and technical services, public administration, transportation and warehousing, health care and social assistance, and accommodation and food services are the top five industries by employment. The top two industries for employment – professional, scientific, and technical services and public administration – also make up the largest shares of the region’s output, while the following three top employment industries do not fall in the top five industries in terms of output, which is due in part to their relatively higher labor intensity.

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

Top Industries	2-Digit NAICS Code	% of Workforce
Professional, Scientific, and Technical Services	54	22
Public Administration	92	17
Transportation and Warehousing	48-49	9
Health Care and Social Assistance	62	8
Accommodation and Food Services	72	8

Regional economic drivers in Northern Virginia are predominantly centered around knowledge-based industries (professional services, information services, corporate management, etc.) and local-serving industries (health care, retail trade, real estate, etc.), as shown in Figure 3. Freight-dependent industries such as wholesale trade and utilities may employ fewer people than other industries, but contribute significantly to regional output.

Figure 3: Breakdown of 2012 Employment in the Northern Virginia Region by Industry



Top Industries by Location Quotient

Location quotient (LQ) is an economic measure, expressed as a ratio, which compares a region to a larger reference region according to some characteristic or asset. It is often used to quantify how concentrated a particular industry, cluster, occupation, or demographic group is in a region, as compared to the nation, and can reveal what makes a particular region unique in comparison to the national average.

Location quotients for 20 different industry categories were calculated for the Northern Virginia region. The industries shown in Table 6 have the highest LQ scores in the region. The score for Professional Services, for example, can be inferred to mean that these services are more than nearly 8 times more

concentrated in the region than in the entire nation, on average. The region has twice as many jobs in corporate management compared to the nation as a whole.

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

Top Industries	NAICS Code	Location Quotient
Professional, Scientific, and Technical Services	54	7.68
Corporate Management	55	2.06
Real Estate	53	1.85
Information	51	1.84
Other Services	81	1.59

Economic Sectors

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

- **Knowledge-based industries¹** sector, in which companies and entrepreneurs thrive on proximity to one another and to regional, national, and global markets. They need reliable, efficient multimodal accessibility for commuters traveling to and within the centers where they are located, particularly via transit, bicycle, and walking modes. Knowledge-based industries, particularly the information industry, are growing fast in this region.
- **Local-serving industries²** depend upon multimodal accessibility to nearby residents and customers, and upon the ease with which goods providers can reach their doors. They generate

¹ NAICS codes in the knowledge-based category include: 51 Information; 54 Professional, Scientific, and Technical Services; 55 Management of Companies and Enterprises; and 56 Administrative, Support, Waste Management, and Remediation Services. Note: NAICS code 56 combines two types of employment: Code 561 includes a wide range of services including office administration, facilities support, and a variety of business support services related to employment and facilities management, security, cleaning, and meeting organization. Code 562 includes jobs in waste collection, disposal, and remediation services. In Northern Virginia, the largest revenue-generating industries within NAICS Code 56 (as of 2012) are Security Guards and Patrol Services (561612), Janitorial Services (561720), and Facilities Support Services (561210).

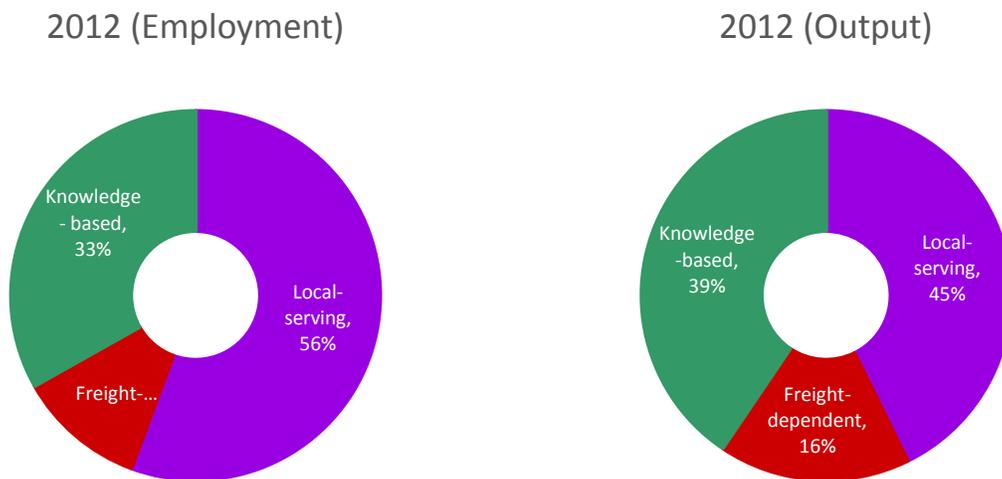
² NAICS codes in the local-serving category include: 44-45 Retail Trade; 52 Finance and Insurance; 53 Real Estate and Rental and Leasing; 61 Educational Services; 62 Health Care and Social Assistance; 71 Arts, Entertainment, and Recreation; 72 Accommodation and Food Services; 81 Other Services, except Public Administration; and 92 Public Administration.

trips by all modes throughout the day and night, made by employees, customers, students, and delivery professionals in automobiles, vans, trucks, buses, bicycles, and on foot.

- Freight-dependent industries³** require accessibility for high-speed and/or long-distance travel by truck, rail vehicle, and air. They need reliable access to major highways, freight rail services, cargo ports, and warehousing and distribution centers. In Northern Virginia, many freight-oriented companies manufacture sophisticated technology such as equipment for the aerospace industry. Thus, there is a strong interplay between the freight-dependent and knowledge-based sectors in this region. Additionally, products shipped by freight-dependent industries in this region may generate smaller tonnage rates than those of other regions, but much higher comparative value.

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

Figure 4: Top Economic Sectors in the Northern Virginia Region by Employment and Output in 2012. Source: IHS Global Insight



The local-serving economic sector is the strongest in the Northern Virginia region, making up 56 percent of the employment but just 45 percent of output. The knowledge-based and freight-dependent economic sectors account for 33 and 11 percent of employment and 39 and 16 percent of output, respectively; these industries' larger share of output than employment is likely due to their relatively higher dependency on technology and automation for producing goods and services.

³ NAICS codes in the freight-dependent category include: 11 Agriculture, Forestry, Fishing, and Hunting; 21 Mining, Quarrying, and Oil and Gas Extraction; 22 Utilities; 23 Construction; 31-33 Manufacturing; 42 Wholesale Trade; and 48-49 Transportation and Warehousing.

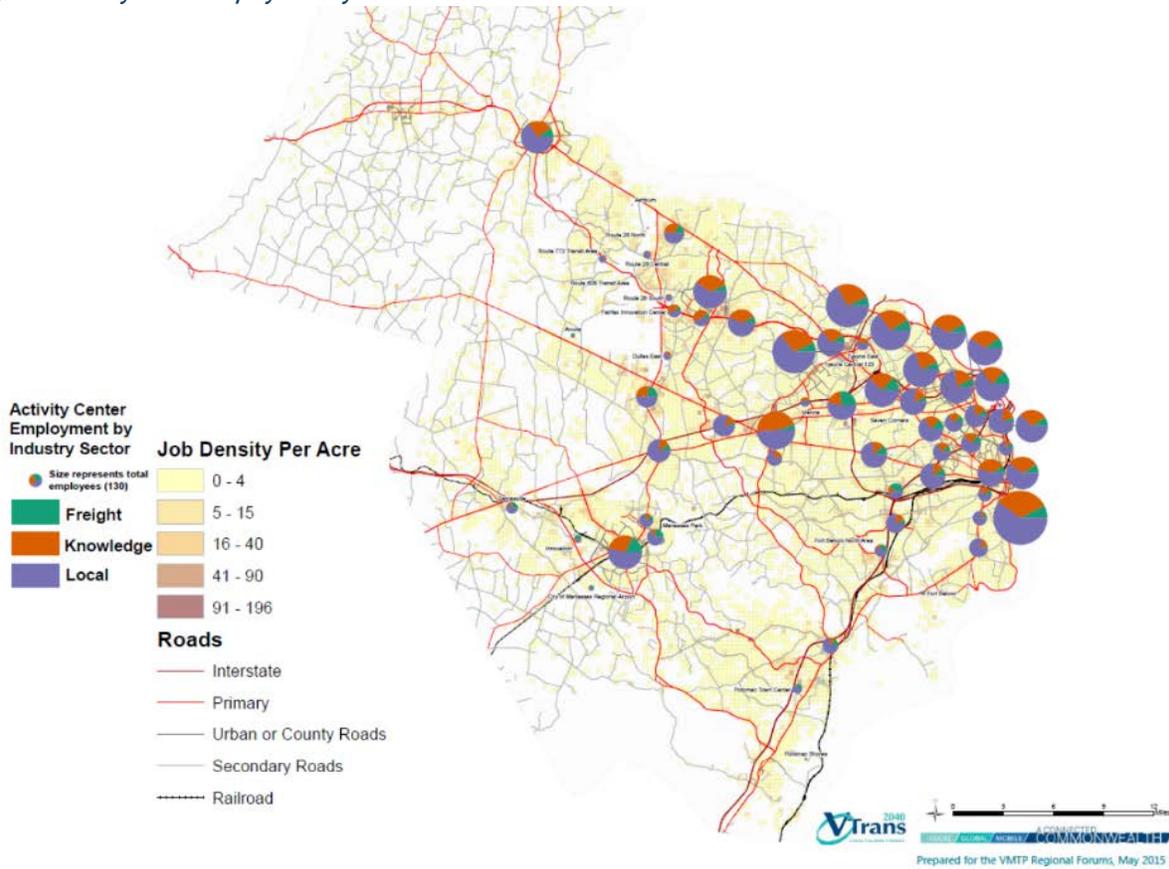
D. Activity Center Analysis

An important part of the Needs Assessment at the regional level has been the identification and evaluation of economic activity centers. For the purposes of this analysis, activity centers are defined as areas of regional importance that have a high density of economic and social activity and/or are expected to accommodate a large share of the region's future growth. In the Northern Virginia Region, the Study Team adopted the Metropolitan Washington Council of Government's (MWCOC) designated activity centers in Virginia (from the MWCOC Place + Opportunity Study)⁴ as those for the region, rather than conducting a GIS-based analysis to select activity centers based on density of jobs. MWCOC undertook an extensive and collaborative process to identify the activity centers where future growth will be concentrated to further the area's *Region Forward* vision. The activity center list had already been reviewed, commented upon, and approved by the local jurisdictions, so this was the logical choice for identification of economic activity centers. The activity centers include existing urban centers, priority growth areas, traditional towns, and transit hubs and most accurately reflect the locations where growth makes most sense from an economic, transportation, and social perspective. Figure 5 below shows these activity centers.

⁴ <http://www.mwcog.org/planning/planning/activitycenters/>

Figure 6 below shows the mapping of each activity center broken down by the three economic sectors, and scaled by relative number of jobs.

Figure 6: Activity Center Employment by Economic Sector

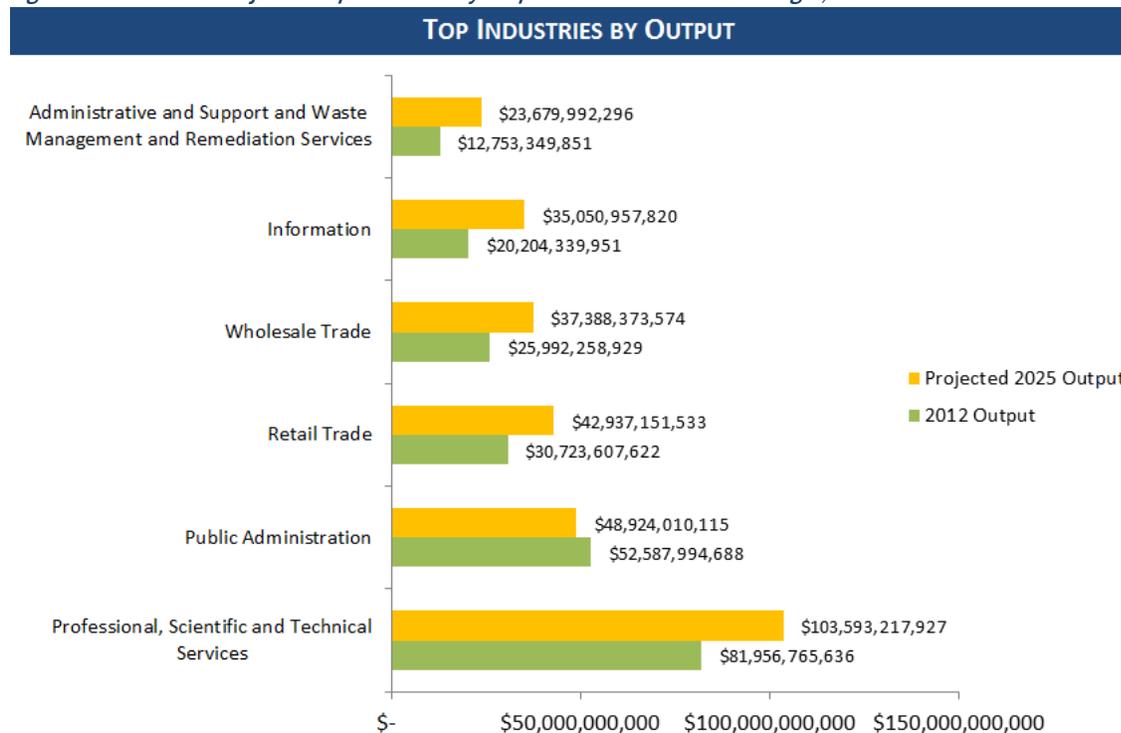


E. Forecasted 2025 Industry Strengths

Through a series of work sessions with the Northern Virginia stakeholders, the Study Team used economic forecasts for 2025 and solicited input from stakeholders to determine the future desired economic profile for the region. The 2025 economic forecasts for employment by industry from third party data sources were the primary source for the future economic profiles. However, the intent of this process was not to presuppose Northern Virginia’s economic future, but to allow input from stakeholders to affirm or modify these basic economic forecasts according to regional desires. The future economic profiles were used as the basis for determining future transportation needs to support the future economic vision in the Northern Virginia region.

Substantial growth is forecasted for the Northern Virginia area by 2025 (Figure 7). According to statewide and national datasets used, the already-dominant professional, scientific, and technical services industry will see the largest growth; it is expected to produce \$21.6 billion more output in 2025 than it produced in 2012. The only industry projected to produce lower levels of output in 2025 than in 2012 is public administration. Across all industries, economic output in Northern Virginia is expected to increase by \$96.6 billion by 2025.

Figure 7: Current and Projected Top Industries by Output - Source: IHS Global Insight, 2012



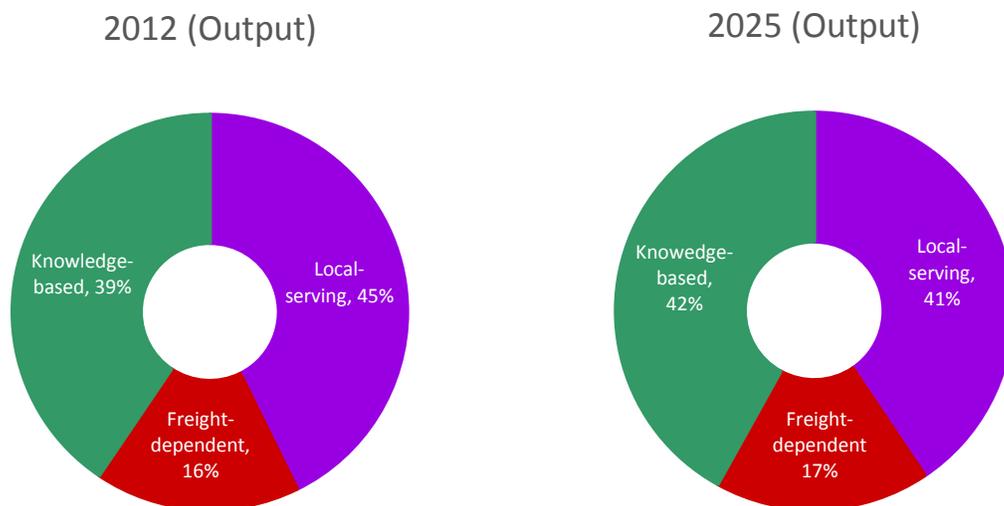
As Table 7 indicates, more than 80 percent of the region’s output is generated by eight industries. As also indicated above, the top generator, accounting for a quarter of the region’s output, is professional, scientific, and technical services (a knowledge-based industry), followed by local-serving industries public administration and retail trade. Of the remaining top industries, the only freight-dependent industry is wholesale trade, which generates nearly 10 percent of the region’s output. Across the top eight industries, economic output is expected to increase by \$74.5 billion by 2025.

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

Industry	2012 Output	2025 Output	% of Total (2012)	% of Total (2025)
Professional, Scientific, and Technical Services	\$ 81,729,213,510	\$ 103,272,543,519	27	26
Public Administration	\$ 51,752,139,700	\$ 48,023,224,368	17	12
Retail Trade	\$ 28,998,949,452	\$ 40,870,400,982	10	10
Wholesale Trade	\$ 24,699,145,257	\$ 35,739,924,738	8	9
Information	\$ 19,555,549,578	\$ 33,645,450,855	6	8
Real Estate, Rental, Leasing	\$ 13,542,678,044	\$ 18,747,264,171	4	5
Finance and Insurance	\$ 13,069,803,572	\$ 16,685,099,875	4	4
Administrative, Support, Waste Management, Remediation Services	\$ 12,594,558,034	\$ 23,463,230,618	4	6
Total Top Eight Industries	\$245,942,037,147	\$320,447,139,126	82	81

Figure 8 shows the anticipated change in the distribution of the region’s industries among the three economic sectors that is predicted to occur by 2025. The local-serving sector’s relative importance is expected to decrease slightly, while the relative size of the knowledge-based sector will increase by 3 percent and the freight-dependent sector’s share of output will increase by 1 percent.

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



The region’s fastest growing industries are shown in Table 8 below.

Only half of the fastest-growing industries in terms of output are among the region’s largest industries. Collectively, however, the top eight high-growth industries represent well over a third of the region’s total output in 2012, and their presence is expected to grow to more than 41 percent of the region’s economic output by the year 2025.

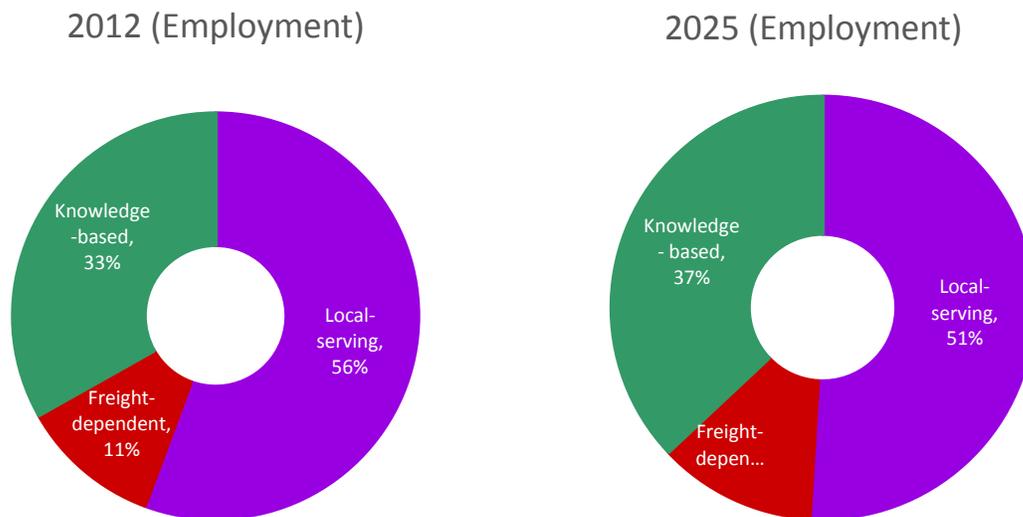
Table 8: High Growth Industries by Projected 2025 Output

Industry	2012 Output	2025 Output	% of Region's Output (2012)	% of Region's Output (2025)	Change in Total Output
Administrative, Support, Waste Management, and Remediation Services	\$12,594,558,034	\$23,463,230,618	4	6	86%
Manufacturing	\$5,530,754,297	\$9,910,798,750	2	2	79%
Information	\$19,555,549,578	\$33,645,450,855	6	8	72%
Arts, Entertainment, and Recreation	\$ 1,774,763,755	\$2,759,852,005	1	1	56%
Management of Companies and Enterprises	\$4,252,600,498	\$6,493,527,321	1	2	53%
Accommodation and Food Services	\$5,919,573,999	\$8,995,685,166	2	2	52%
Wholesale Trade	\$24,699,145,257	\$35,739,924,738	8	9	45%
Retail Trade	\$28,998,949,452	\$40,870,400,982	10	10	41%
Total Top 8 Industries	\$103,325,894,870	\$161,878,870,43	34	41	57%

Forecasted 2025 Employment

As in most urban areas, the local-serving cluster accounts for about half of all employment in the Northern Virginia region; the local-serving sector's share of employment will decrease by approximately 5 percent by 2025 (Figure 9). Over the coming decade, the proportion of knowledge-based jobs is expected to increase from 33 to 37 percent of the region's employment, while freight-dependent employment will inch up from 11 to 12 percent.

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



As shown in Table 9, the top employers in the region in 2012 were nearly all knowledge-based or local-serving industries, with the exception of the construction trade, which is freight-dependent. Together, the top eight employment industries in the Northern Virginia region account for over 80 percent of all employment, and employment in all these industries is expected to increase by 2025, though the magnitude of projected increase varies significantly by industry. Increases are projected to be much higher in administrative, support, waste management, and remediation services and construction than in any other industries. Projected employment growth in public administration and retail trade is expected to be very modest.

Table 9: Top Industries by Employment – Current and Projected (2025)

Industry	Employment		% of Total		Change in Total Employment (2012 to 2025)
	2012	2025	2012	2025	
Professional, Scientific, Technical	266,250	324,710	22	22	22%
Public Administration	212,906	220,793	17	15	4%
Retail Trade	114,666	116,896	9	8	2%
Health Care, Social Assistance	95,797	112,546	8	8	17%
Accommodation, Food Services	93,166	112,865	8	8	21%
Admin, Support, Waste Management, Remediation Services	80,449	135,884	6	9	69%
Other Services, except Public	70,788	75,650	6	5	7%
Construction	57,875	88,628	5	6	53%
Total Top 8 Industries	991,897	1,187,972	80	81	20%

The region's fastest-growing industries in terms of employment are shown in Table 10 below. Among the region's fastest-growing industries, only professional, scientific, and technical services and accommodate and food services are also within the list of employers that account for the highest percentage of the region's jobs. Other than the freight-dependent construction industry, all the fast-growing industries are in the knowledge-based and local-serving sectors. Only the administrative, support, waste management, and remediation services industry is expected to considerably increase its share of the region's employment, from 6 percent today to 9 percent in 2025.

Table 10: Highest Growth Industries by Projected 2025 Employment

Industry	Employment		% of Total		Change in Total Employment (2012 to 2025)
	2012	2025	2012	2025	
Administrative, Support, Waste Management, Remediation	80,449	135,884	6	9	69%
Construction	57,875	88,628	5	6	53%
Management	25,642	34,329	2	2	34%

Professional, Scientific, and	266,250	324,710	22	22	22%
Accommodation and Food	93,166	112,865	8	8	21%
Arts, Entertainment, and	14,941	17,554	1	1	17%
Health Care and Social Assistance	95,797	112,546	8	8	17%
Information	38,268	44,957	3	3	17%
Total top eight high-growth industries for employment	672,388	871,473	54%	60%	30%

3. TRANSPORTATION PROFILE

A. Introduction

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

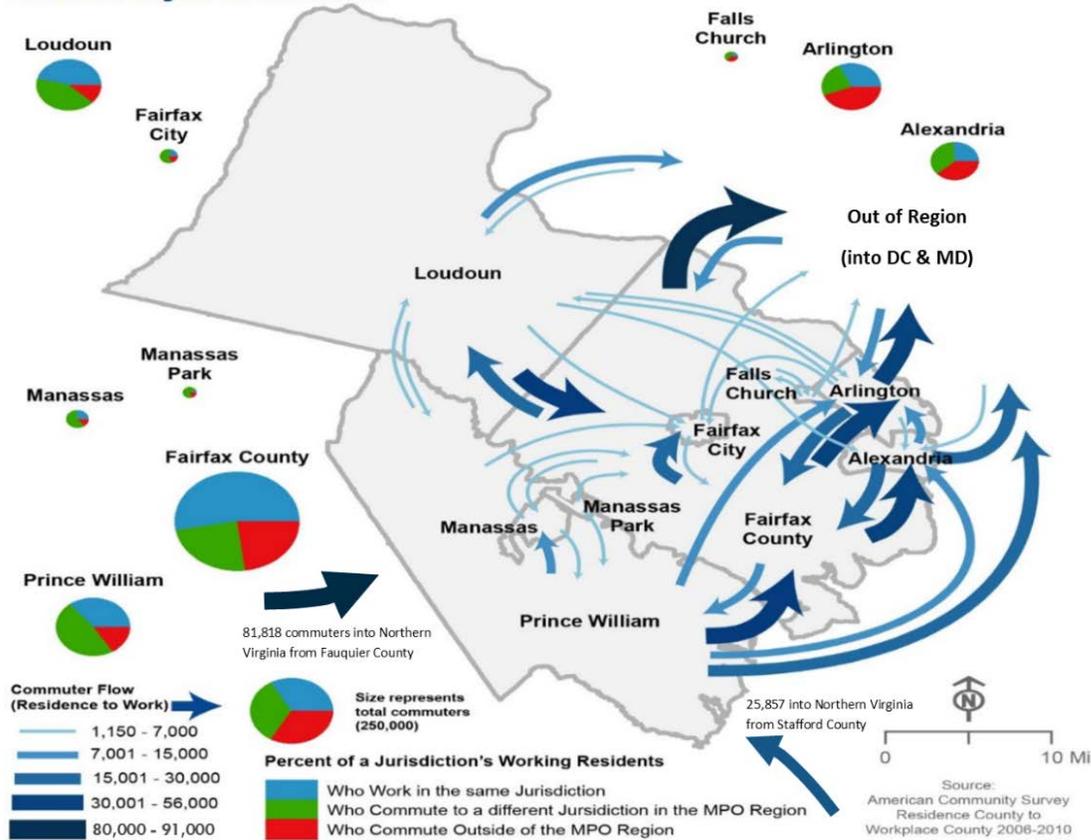
- Commuting Patterns
- Accessibility to Employment
- Roadway Measures
- Freight Measures

B. Commuting Patterns

Regional Commuting Patterns

The map in Figure 10 map summarizes commuting patterns within and among Northern Virginia localities between 2009 and 2013. The pie charts indicate that the majority of workers commute beyond their home locality every day. Fairfax and Loudoun are the only jurisdictions where as many as half of the local residents work within their county of residence. The arrows indicate that commuter travel occurs in virtually every direction throughout the region. While a quarter to a third of most residents in each locality commute outside the region (presumably most of whom work in the urban core of Washington, DC), a large portion of each locality's workers travel to another Northern Virginia locality. Much of the regional highway and transit network was built during an era when commuting patterns were centered in the metropolitan core, but the economic conditions have shifted to a point where commuter travel is spread broadly throughout the entire region.

Figure 10: Regional Commuting Patterns
Commuter Origin/Destination Flow

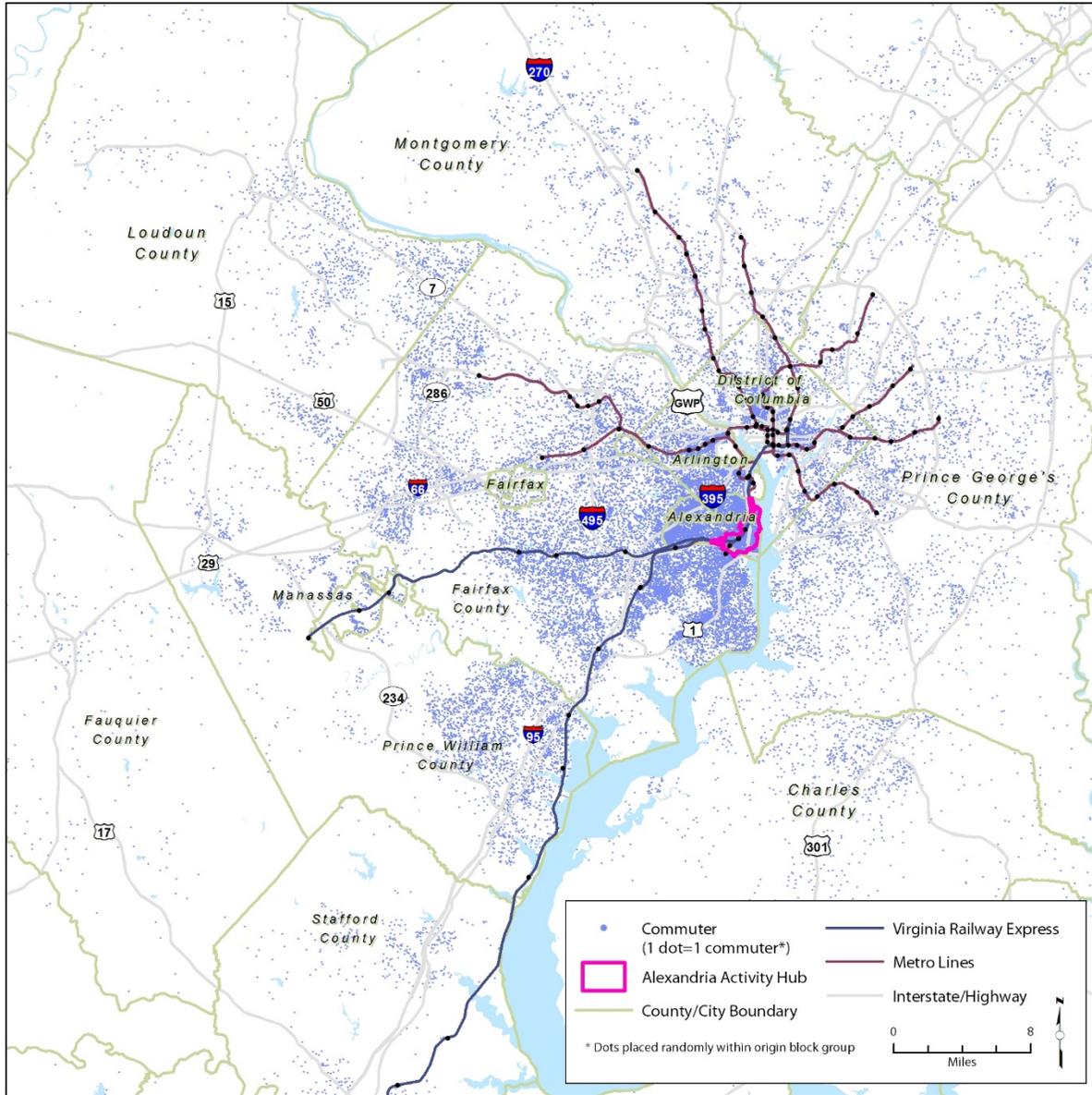


Activity Center Commuting Patterns

Equally important to the formation of a regional transportation profile for Northern Virginia was the analysis of commuting patterns between activity centers. Figure 11 through Figure 16 below provide insights into the commuting patterns for six employment “hubs” (clusters of activity centers) in the Northern Virginia region. Each dot on the maps represents a single commuter’s origin jurisdiction to the hub outlined in pink. It is important to note that the docs are randomly placed within each Census block group; as such, the worker origin locations are approximate, not exact.

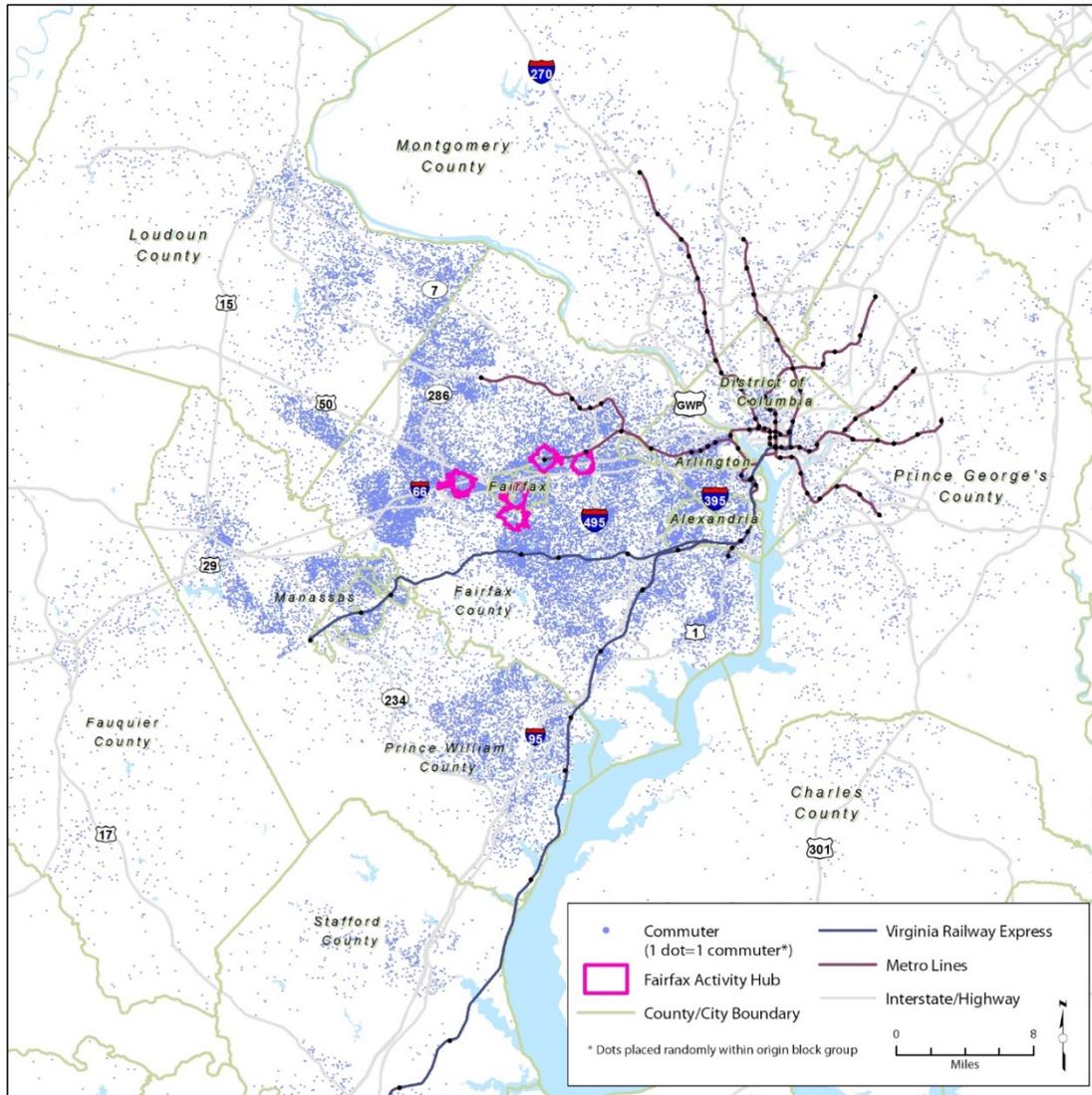
As shown on the map in Figure 11, the City of Alexandria receives a significant number of commuters from within the City, as well as from neighboring and more far-flung locations both in Northern Virginia, as well as the District of Columbia and Maryland.

Figure 11: Commuting Patterns to Alexandria Activity Hub. Source: LEHD



The employment hub that includes various locations near the Orange line and George Mason University in Fairfax County (Figure 13) receives high levels of commuters from within Fairfax County, as well as from Loudoun and Prince William Counties. Given its location farther from the region’s core, it is not surprising that fewer residents of the District of Columbia and Maryland commute to this employment hub.

Figure 13: Commuting Patterns to Fairfax Activity Hub. Source: LEHD



The Fort Belvoir hub (Figure 14) receives commuters primarily from Fairfax County, Prince William County, Arlington, Alexandria, and the Manassas area.

Figure 14: Commuting Patterns to Fort Belvoir Activity Hub. Source: LEHD

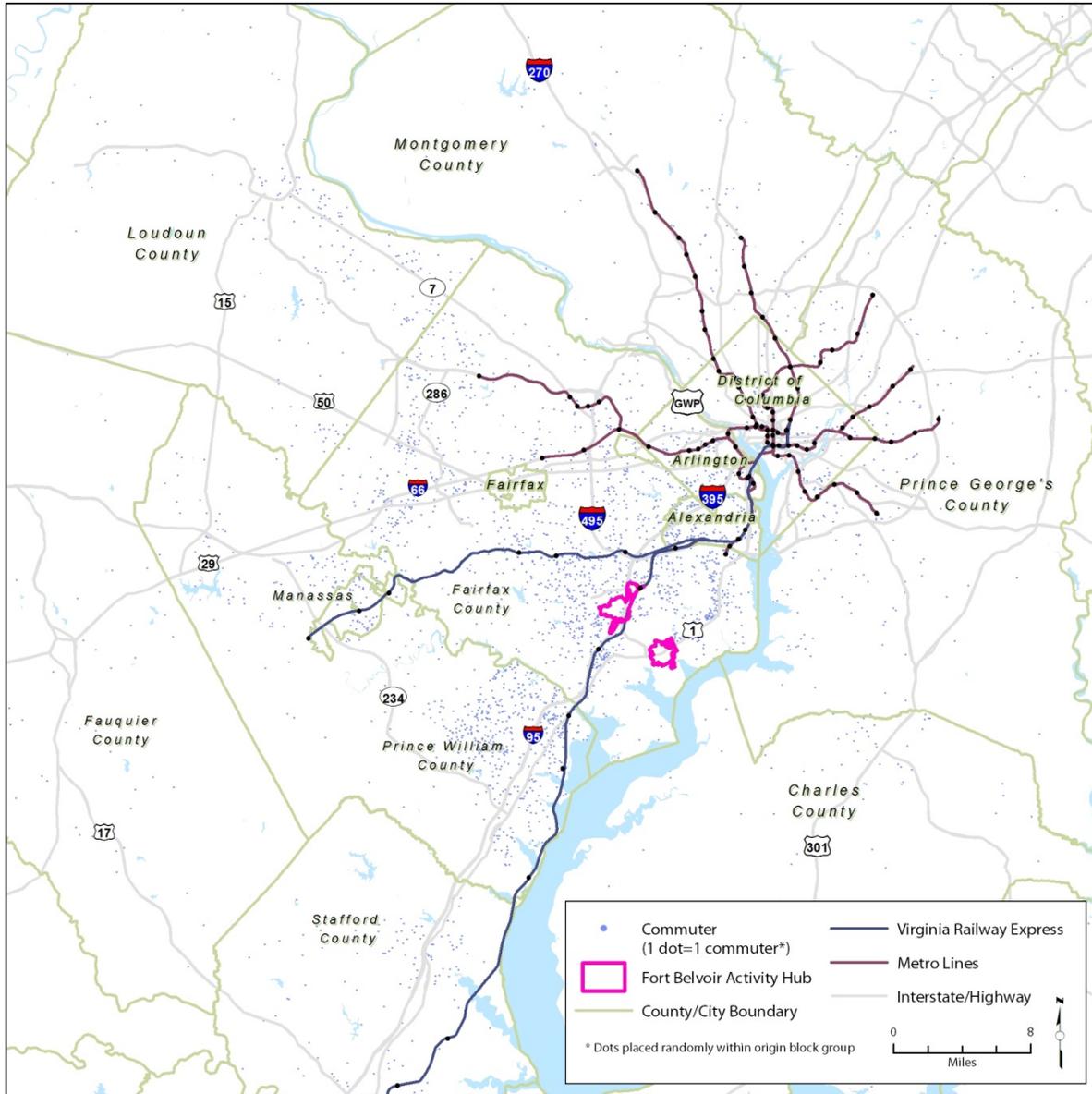
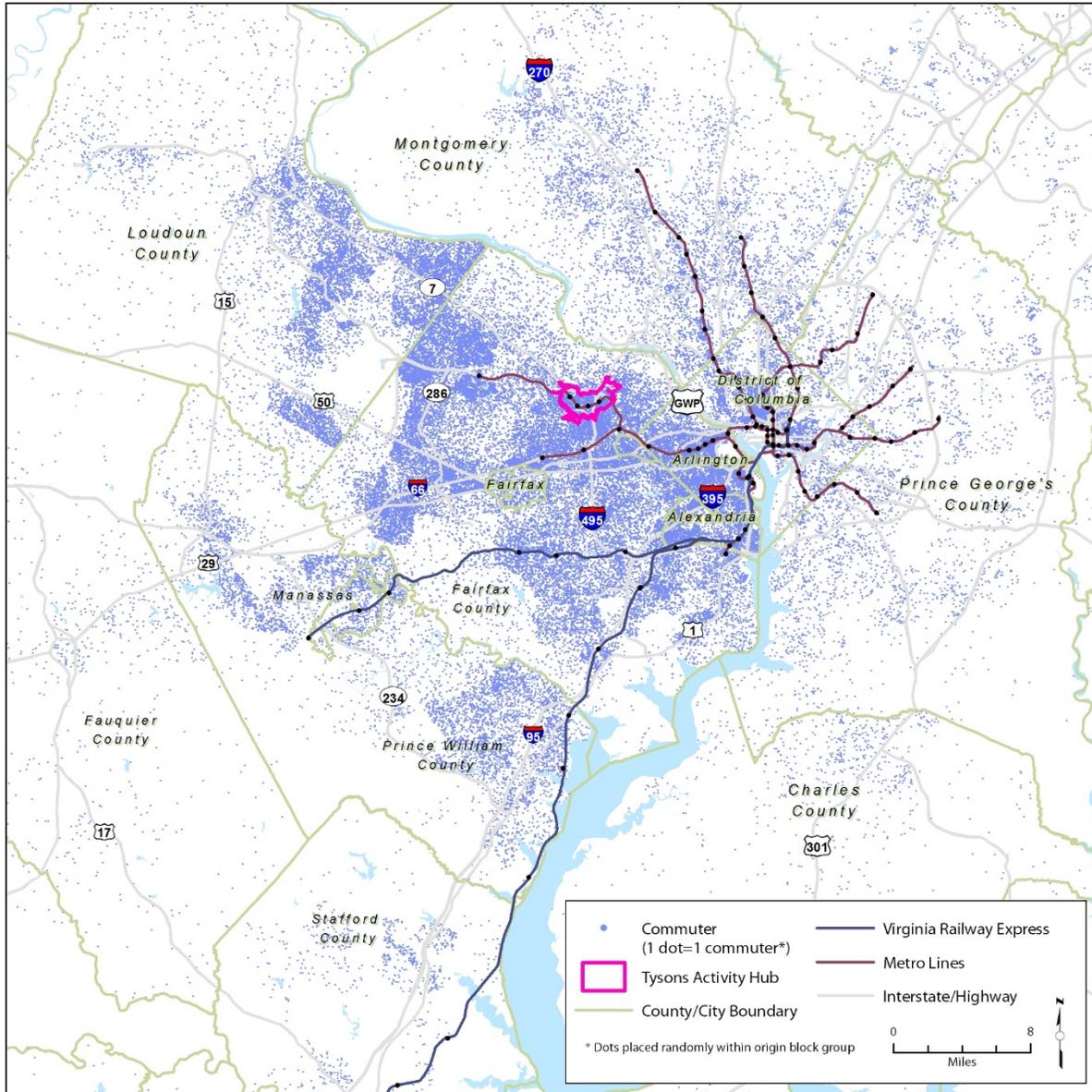


Figure 16 shows the Tysons area’s importance for employment across the entire region. Over 100,000 people work in the Tysons area, and heavy concentrations of commuters into the area exist in nearly every jurisdiction in the region.

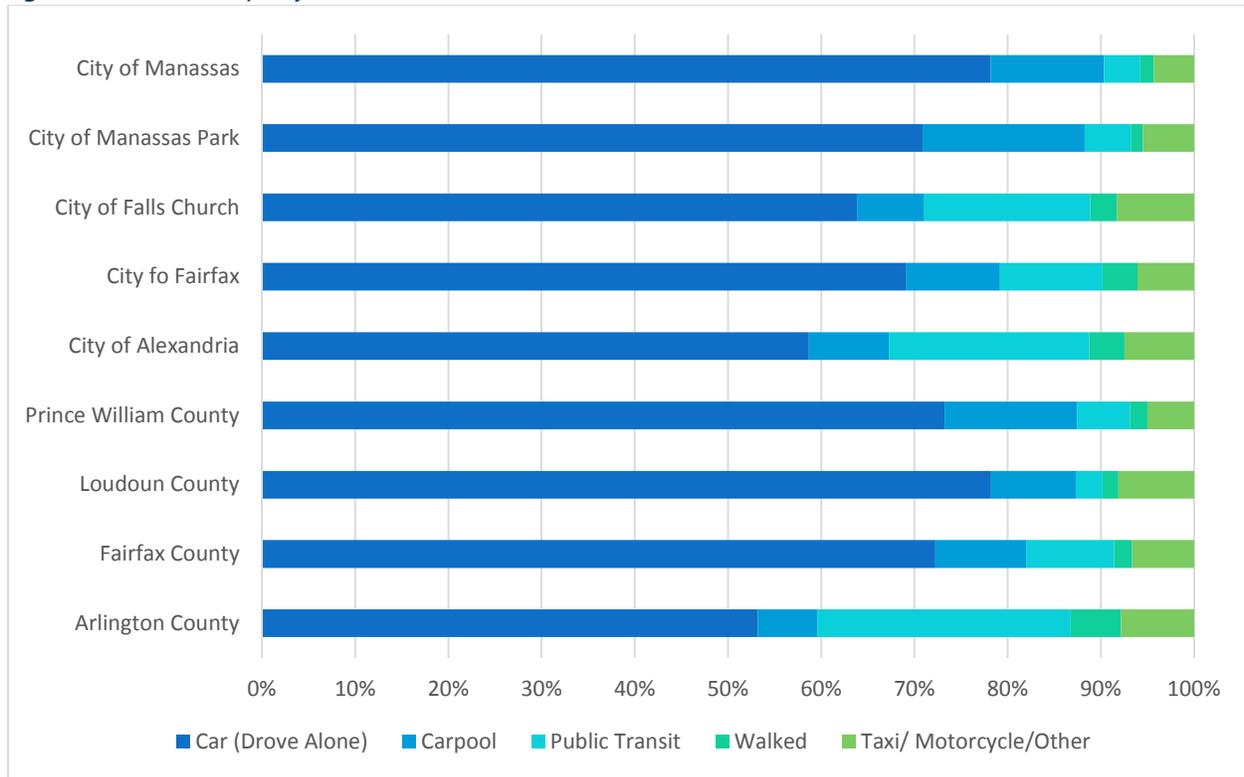
Figure 16: Commuting Patterns to Tysons Activity Hub. Source: LEHD



Mode Choice

In the Northern Virginia Region, the majority of commuters drive alone to work (Figure 17). While there is some variation between jurisdictions, commuters drive alone between 53 and 78 percent of the time. For just over half of the jurisdictions, carpooling is the second most popular option, accounting for 6 to 14 percent of the mode share. Public transit use is highest in Arlington County, which has a high concentration of transit-supportive development patterns.

Figure 17: Mode Share Split by Jurisdiction. Source: ACS 2013 5-Year Estimates



Average Commute Times

In the Northern Virginia Region, average commute times range from 27 to 40 minutes among the various jurisdictions (Table 11). Largely due to density and proximity to employment centers, the Cities of Arlington and Falls Church have the shortest average commute times, while more remote areas such as Prince William County, have longer commutes on average.

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

Jurisdiction	Mean Commute Time (Minutes)
Arlington County	27.3
Fairfax County	32.0
Loudoun County	33.1
Prince William County	39.2
City of Alexandria	30.5
City of Fairfax	31.7
City of Falls Church	27.3
City of Manassas	33.8
City of Manassas Park	40.8

Only a minority of commuters travel more than 45 minutes in the Northern Virginia Region (Figure 18). Prince William County, at 42 percent, has the highest percentage of workers who commute over 45 minutes; Prince William’s percentage is over twice as high as those of the City of Falls Church and Arlington County.

Figure 18: Percentage of Commutes Longer than 45 Minutes. Source: ACS 2013 5-Year Estimates.

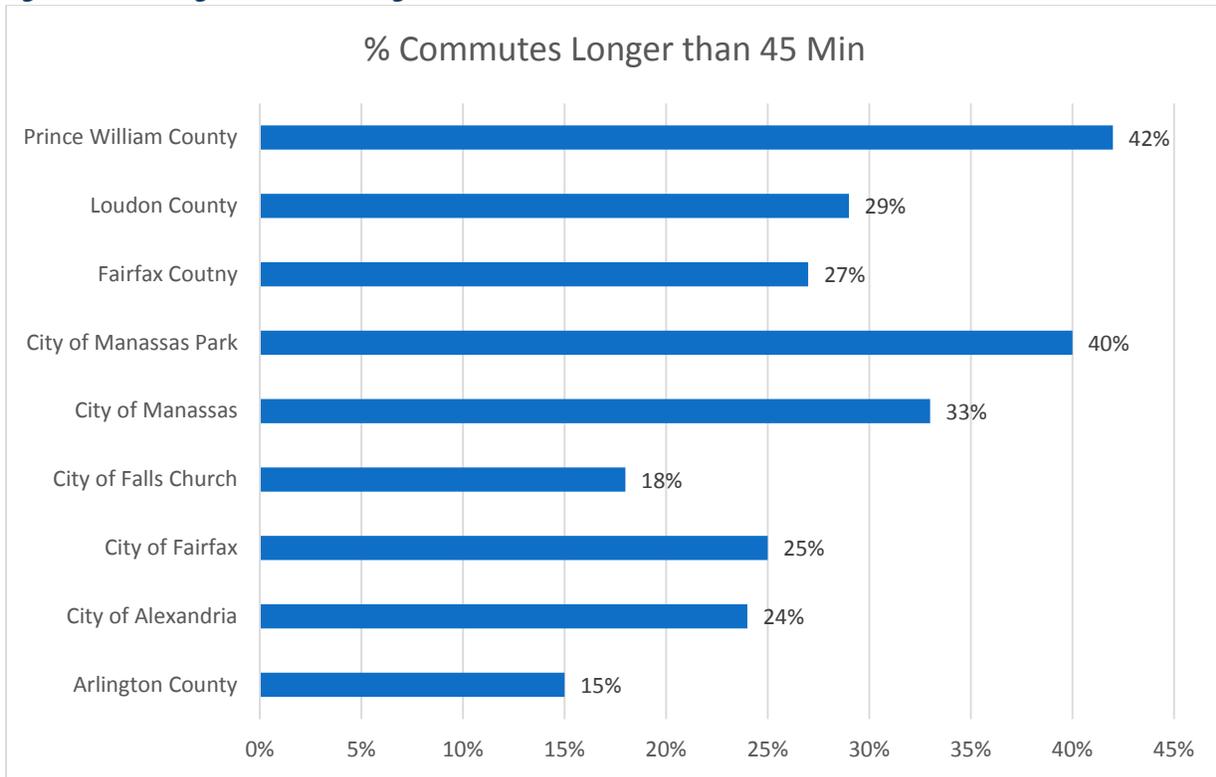
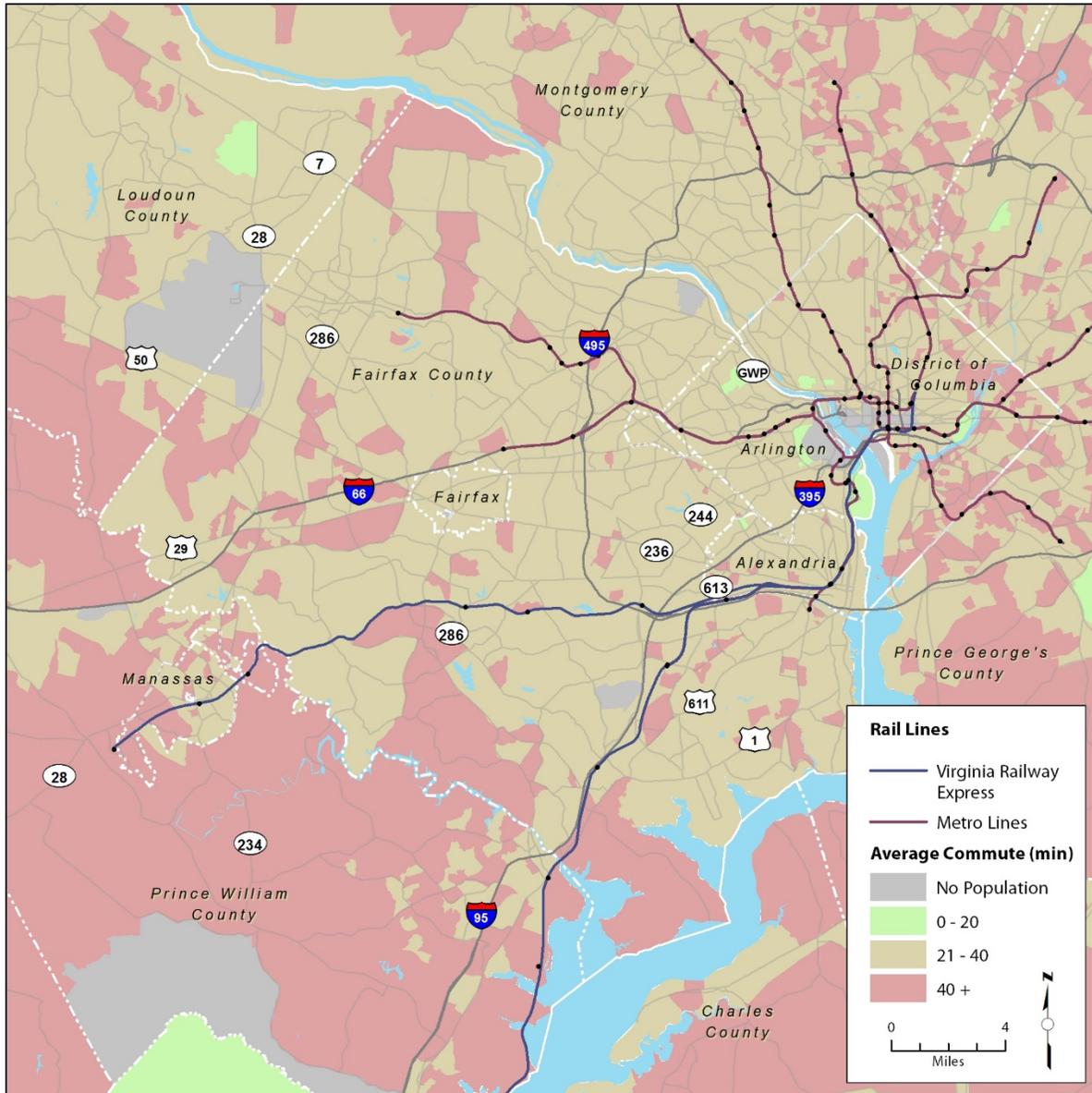


Figure 19 provides a closer look at where longer commutes originate. Unsurprisingly, the prevalence of long commute times is much higher in the more remote parts of the region such as Prince William County. In addition to location, this is likely due to the County’s relatively high concentration of residential development vis-à-vis available jobs.

Figure 19: Northern Virginia Commute Times. Source: ACS 2013, 5-Year Estimates.



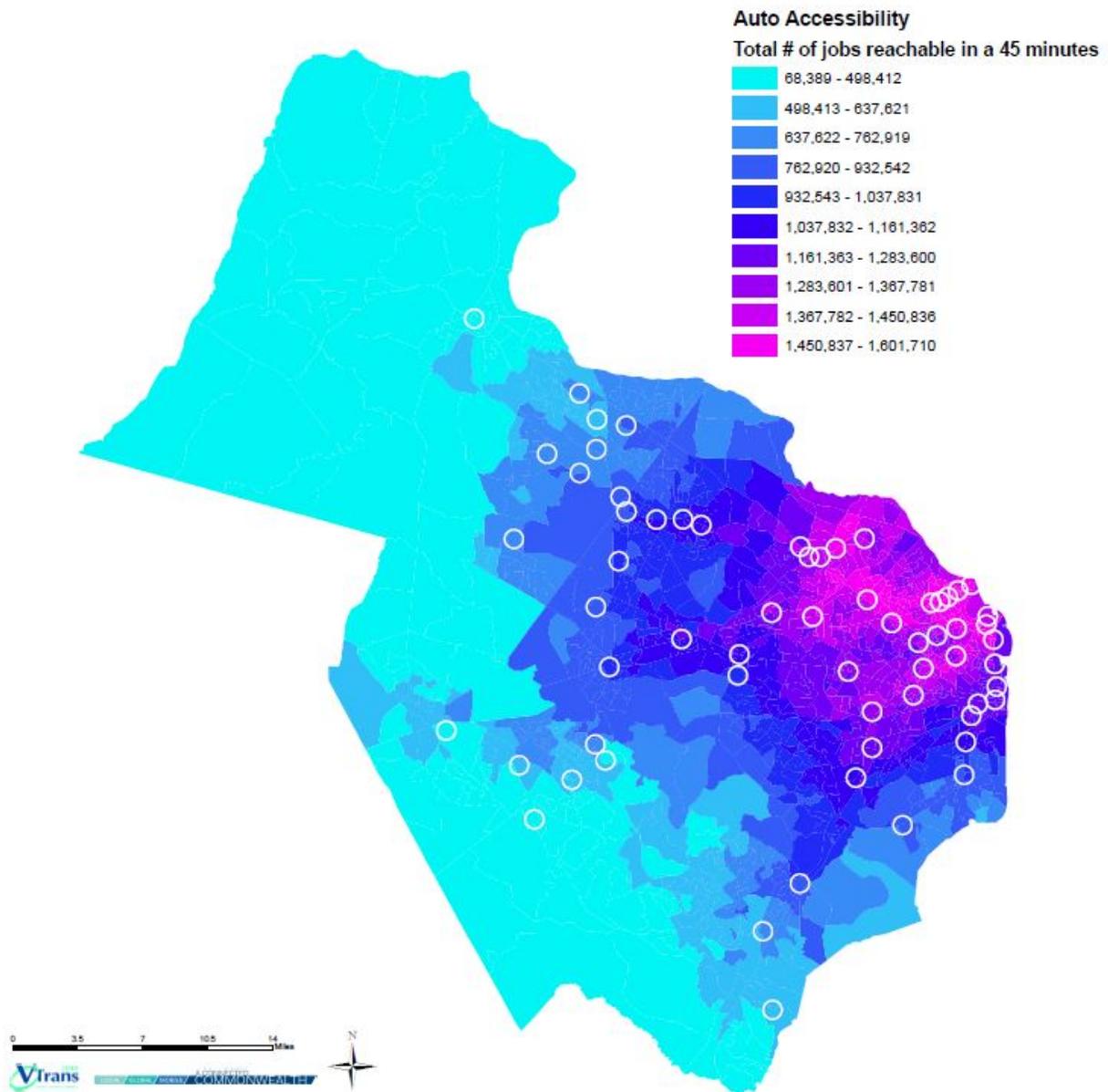
C. Accessibility to Employment

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

Auto Accessibility

Auto Accessibility in the Northern Virginia Region, as in other regions, is driven by two main factors: distance from activity centers, and distance from major arterial roadways (Figure 20). Accessibility for auto travel is measured as the number of jobs that can be reached within a 45 minute drive. While this map indicates the potential for relatively long commutes by automobile for people who live in outer suburbs and rural areas (principally in Loudoun and Prince William Counties) it is worth noting that even these “far flung” areas are within a 45 minute drive of tens or hundreds of thousands of jobs. The jobs in the map legend are “distance-weighted,” meaning that jobs closer are weighted more than jobs located farther away.

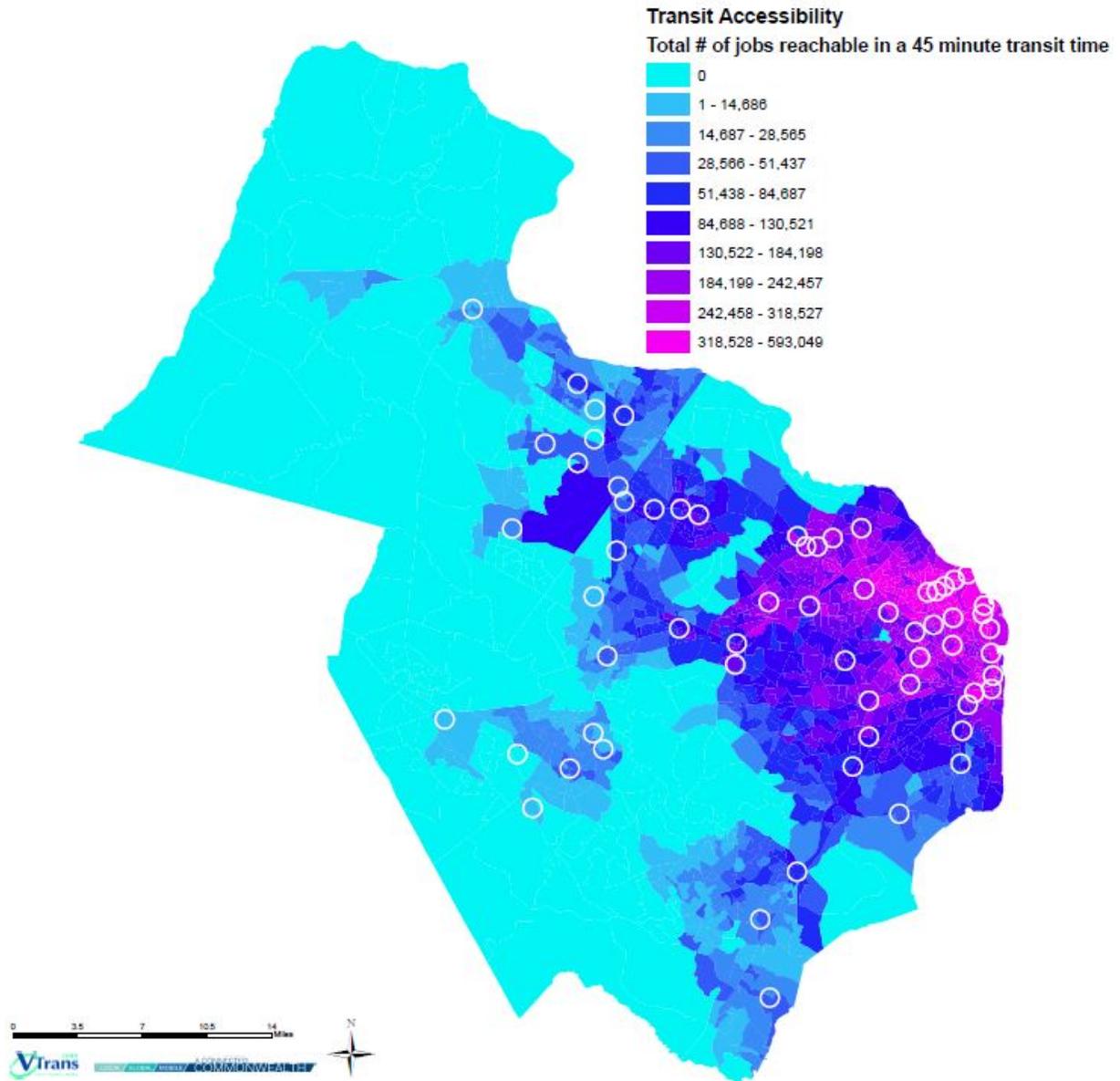
Figure 20: Auto Accessibility



Transit Accessibility

There is a significant difference between the number of jobs accessible by transit versus automobile in Northern Virginia (Figure 21). While residents in even the most rural areas of the region can access tens of thousands of jobs by car within 45 minutes, this map reveals that transit access to jobs is nonexistent in many suburban and rural parts of the region, though this might be slightly exaggerated because data from smaller suburban and rural transit services may be missing. Even in the core suburban areas, the number of jobs within a 45 minute transit ride is just a little over half a million, compared to 1.6 million jobs available within a 45 minute drive.

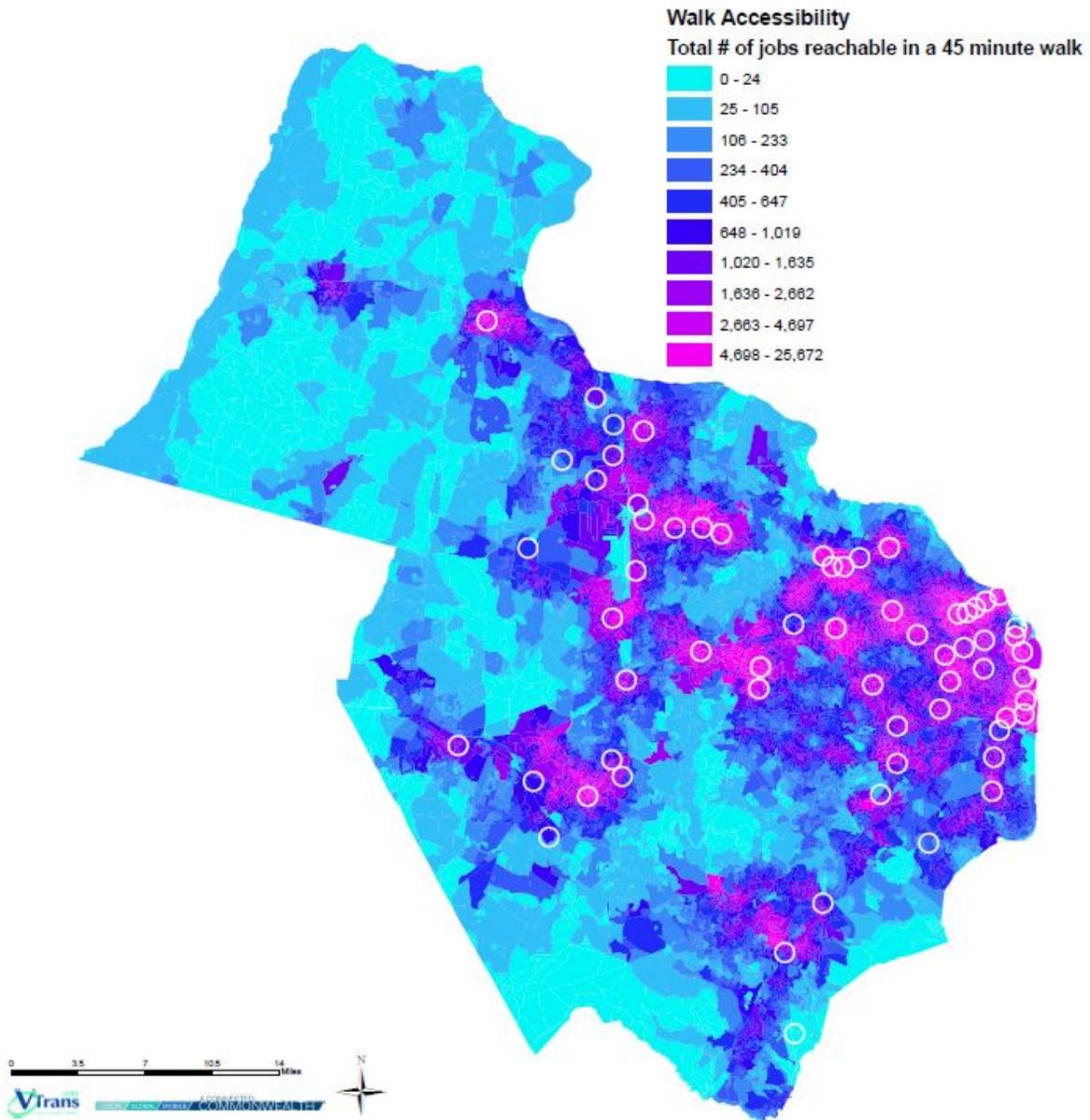
Figure 21: Transit Accessibility



Walk Accessibility

The Walk Accessibility map in Figure 22 reveals a regional pattern of mixed use development in communities where residents live within walking distance of thousands of jobs and/or the services represented by those jobs (ranging from about 5,000 to 25,000). These centers are not limited to the areas just outside of the region’s core, but can be found throughout the central areas of the region, loosely strung along key corridors, such as I-66, I-95, and major US routes such as 50,7,28, and 29. It is important to note, however, that the close proximity to jobs and housing does not, in and of itself, mean that walking is a viable commuting choice; walkability depends upon accessibility to nearby activities via safe, convenient pedestrian networks.

Figure 22: Walk Accessibility



Freight Accessibility

The map in Figure 23 measures drive time to access-controlled highway interchanges and on-ramps, which is an important element of freight movement. Not surprisingly, drive time is lowest within close proximity to Interstates 95 and 66, but even the most rural parts of the region are still within a 25-minute drive of a highway interchange.

Figure 23: Access to Interstate and Principal Arterial Ramps

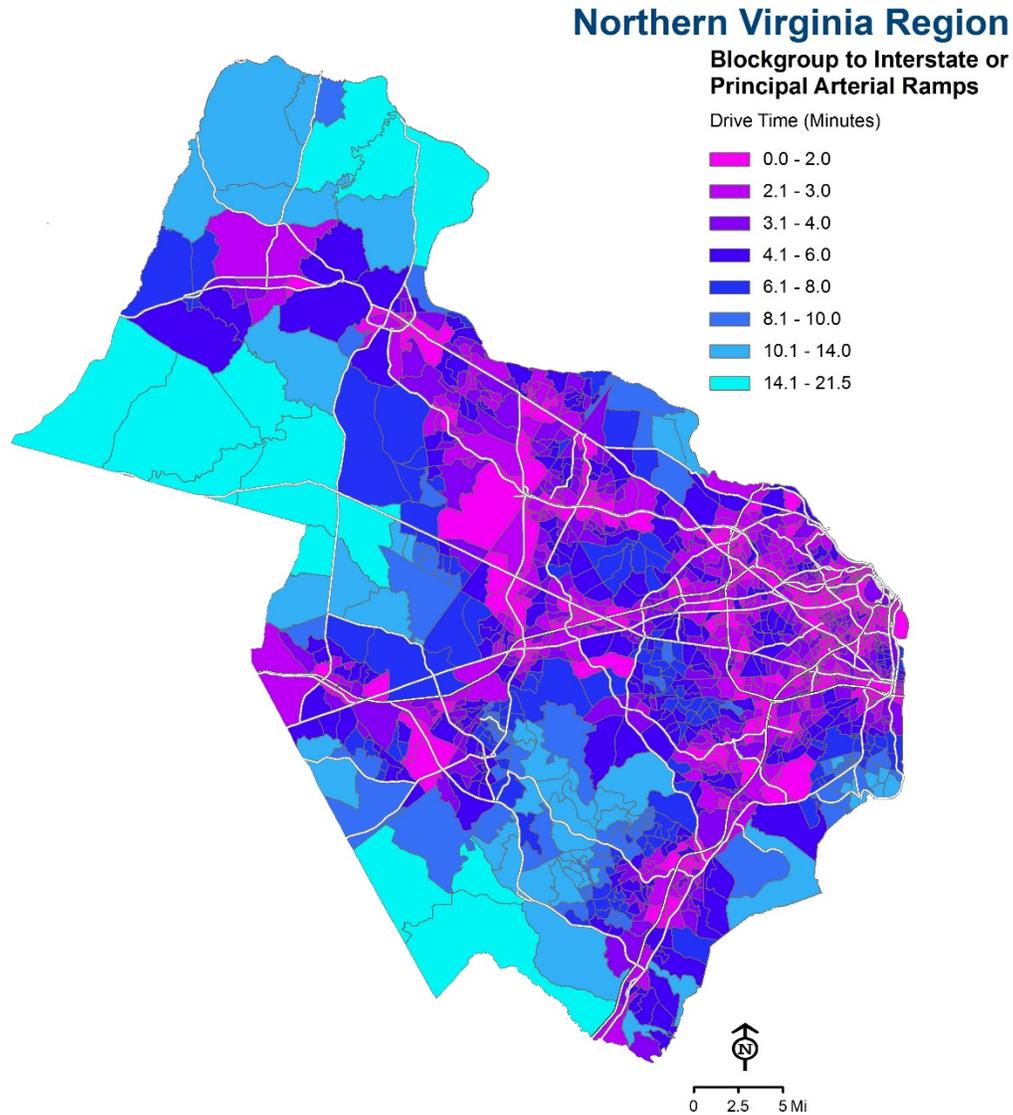


Figure 24 shows that access to warehouses and distribution centers is lowest around the urban ring of the region. But even in the most accessible areas of the region, the drive time to these types of facilities can be a half hour or more.

Figure 24: Access to Warehouses & Distribution Centers

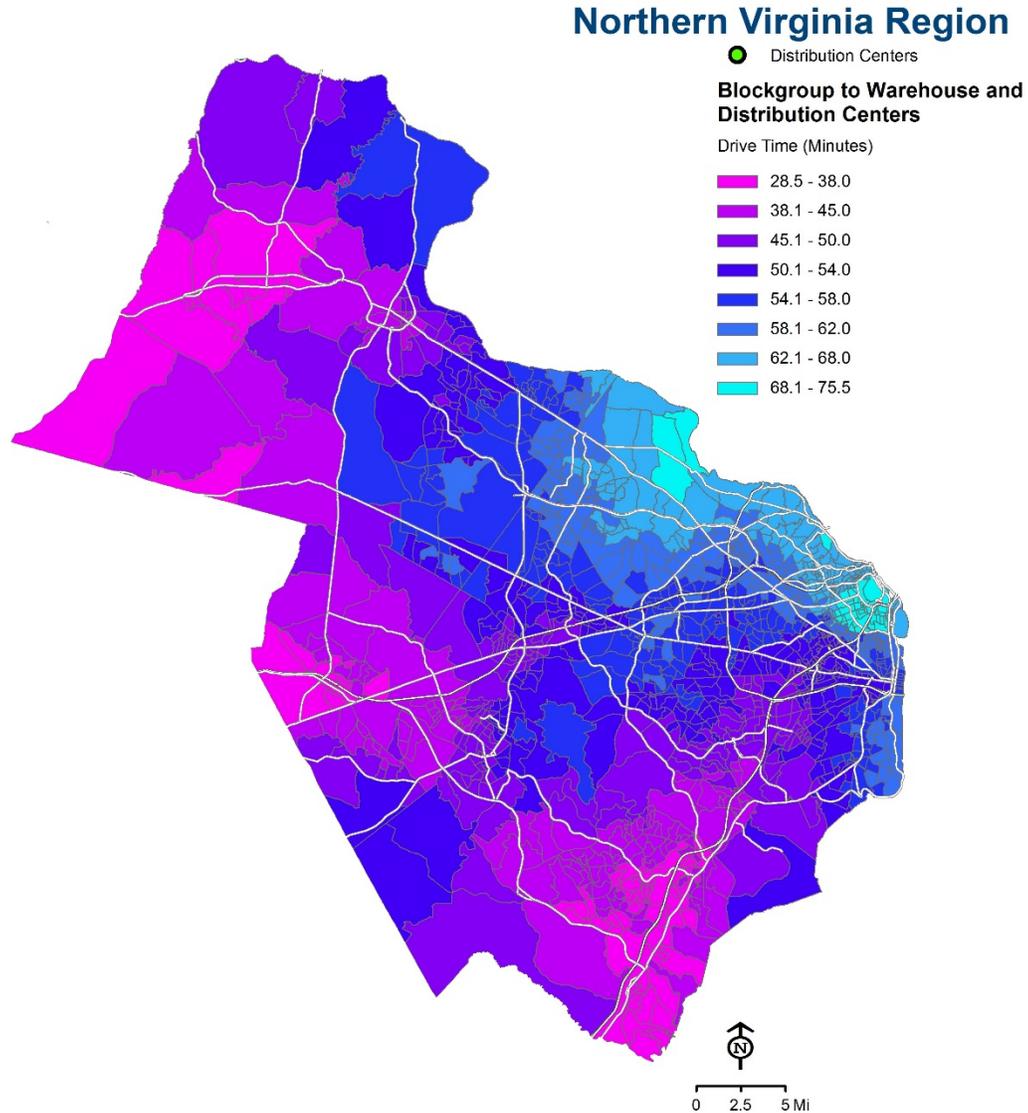
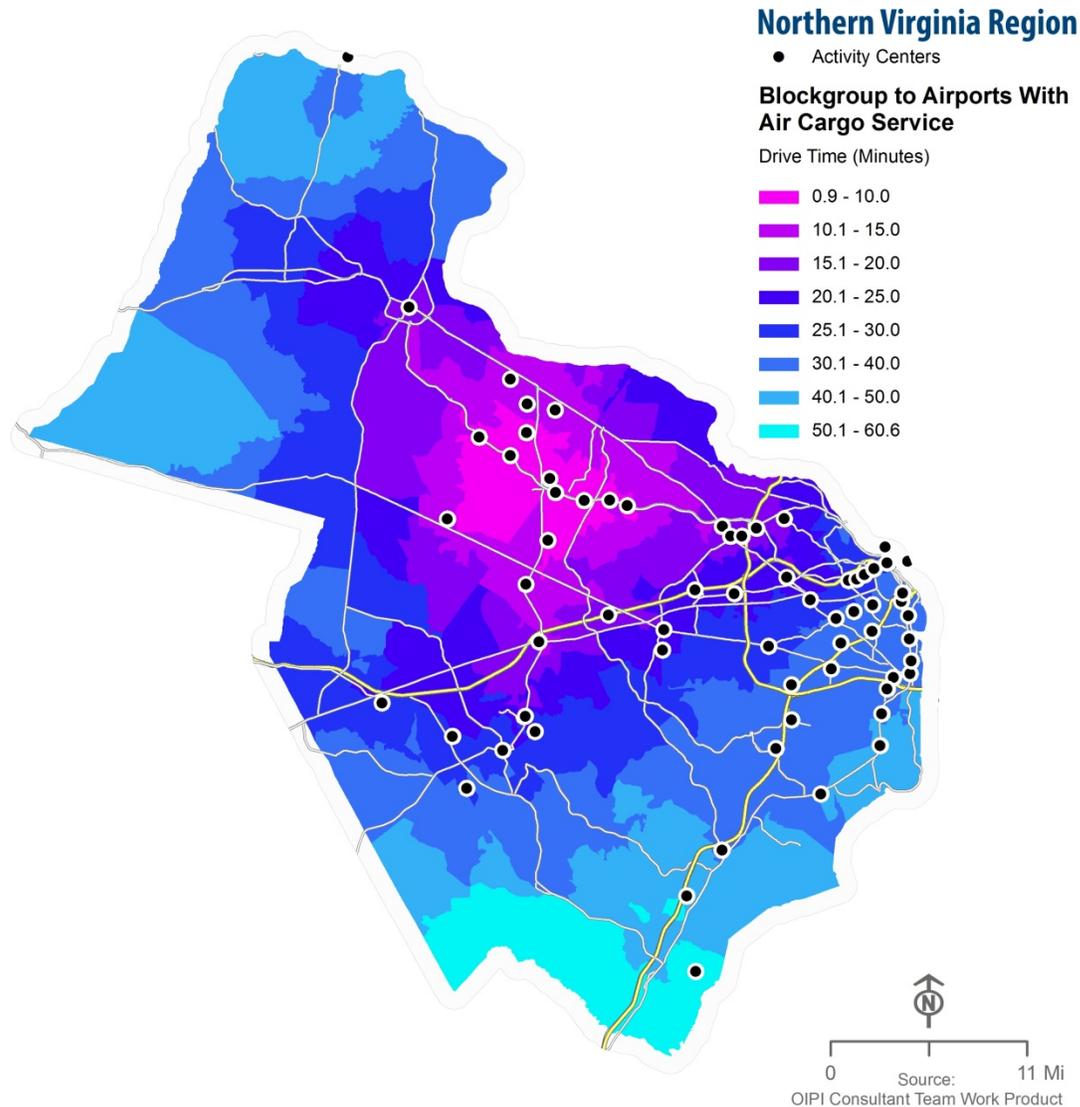


Figure 25 displays proximity to international airports that can handle significant levels of cargo, which is important for some types of freight distribution. For the most part, the airport that serves this purpose for Northern Virginia businesses is Dulles International.

Figure 25: Access to International Airports



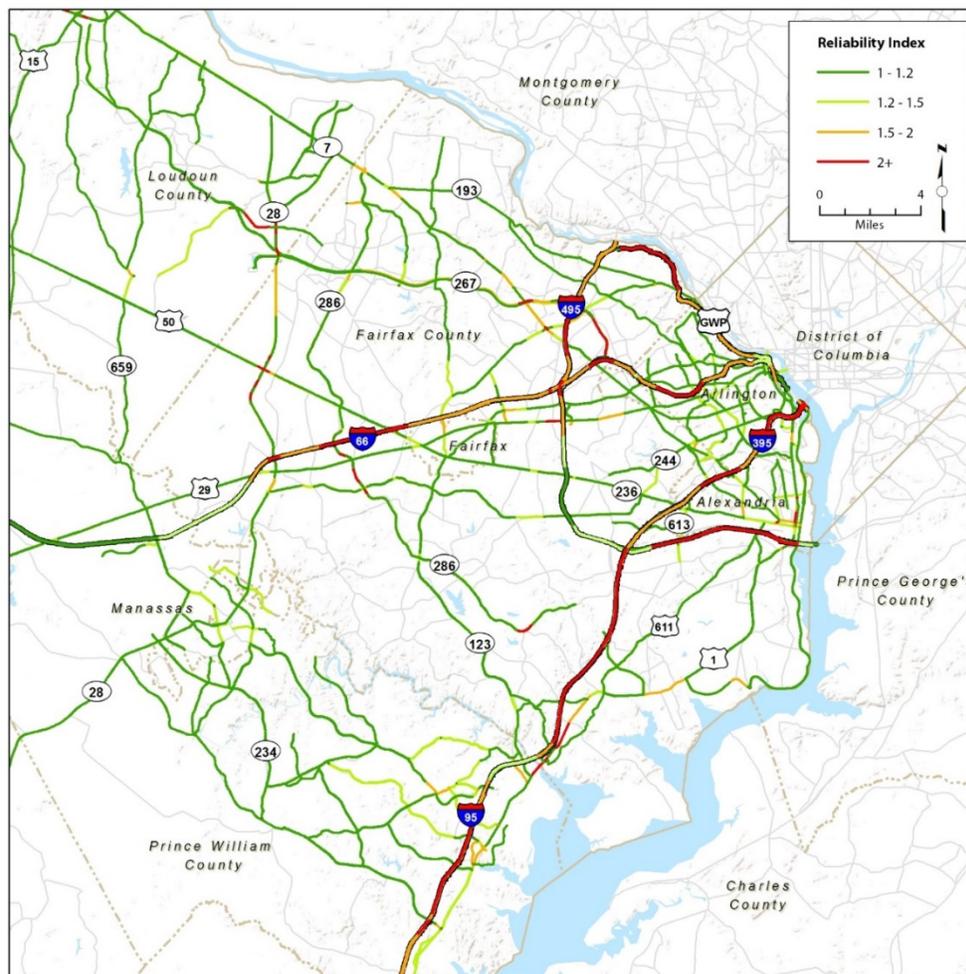
D. Roadway and Local Rail Transit Conditions

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

Travel Time Reliability

Travel Time Reliability (TTR) measures the frequency by which trips along a specified corridor are significantly delayed (Figure 26). Peak period⁵ TTR is calculated the ratio of median speeds to the 90th percentile speeds. A higher the TTR score indicates that the network link is less reliable. TTR can be considered the additional time that might be required to travel across a roadway segment. For example, a trip segment with a ratio of 1.5 that normally takes 5 minutes to traverse during the peak could require an additional 2.5 minutes. In Northern Virginia, reliability issues are most profound along the interstates (I-66, I-95, I-395, and I-495) and on a few portions of key corridors. The impact of this unreliability is felt both by commuters suffering lost productivity and reduced quality of life, and also by trucking companies and freight-dependent businesses under pressure to deliver goods quickly and consistently.

Figure 26: Travel Time Reliability. Source: INRIX



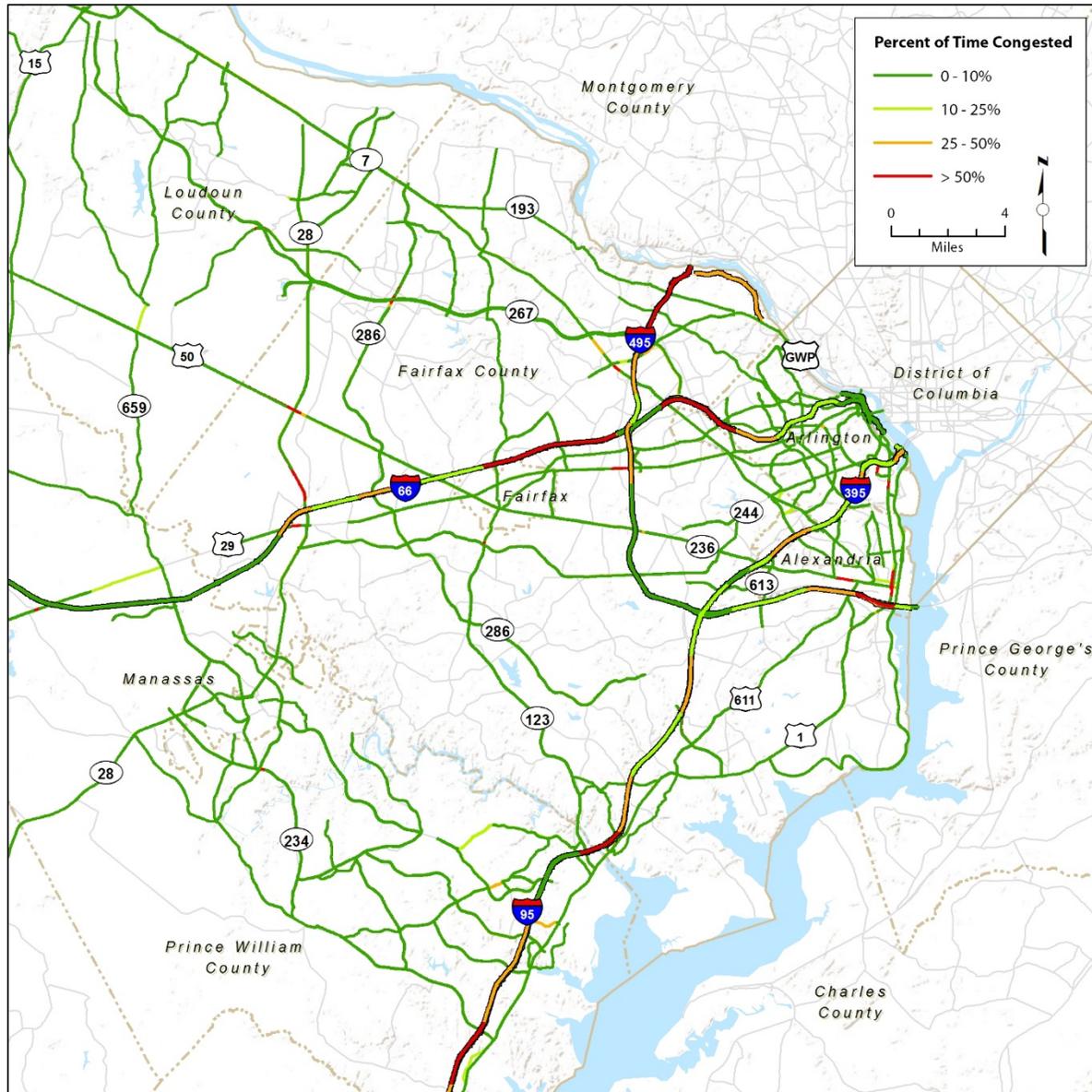
Percent of Time Congested

Figure 27 shows the AM and PM peak percent time congested. This represents the percentage of the time that a typical vehicle spends in significantly congested conditions. Significant congestion is defined

⁵ The AM and PM peak periods are defined as 6-9am and 3-7pm, respectively.

as operating at speeds below 50 percent of the free-flow speed. The free-flow speed is measured as the 85th percentile of overnight speed. Within Northern Virginia, travelers experience long periods of congestion (30 percent of travel time) on a few segments of major corridors such as I-95 and I-66. On many other major corridors, drivers routinely experience significant congestion 15-20 percent of their travel time, with the percentage dropping to 5-15 percent on the outskirts of the urban core.

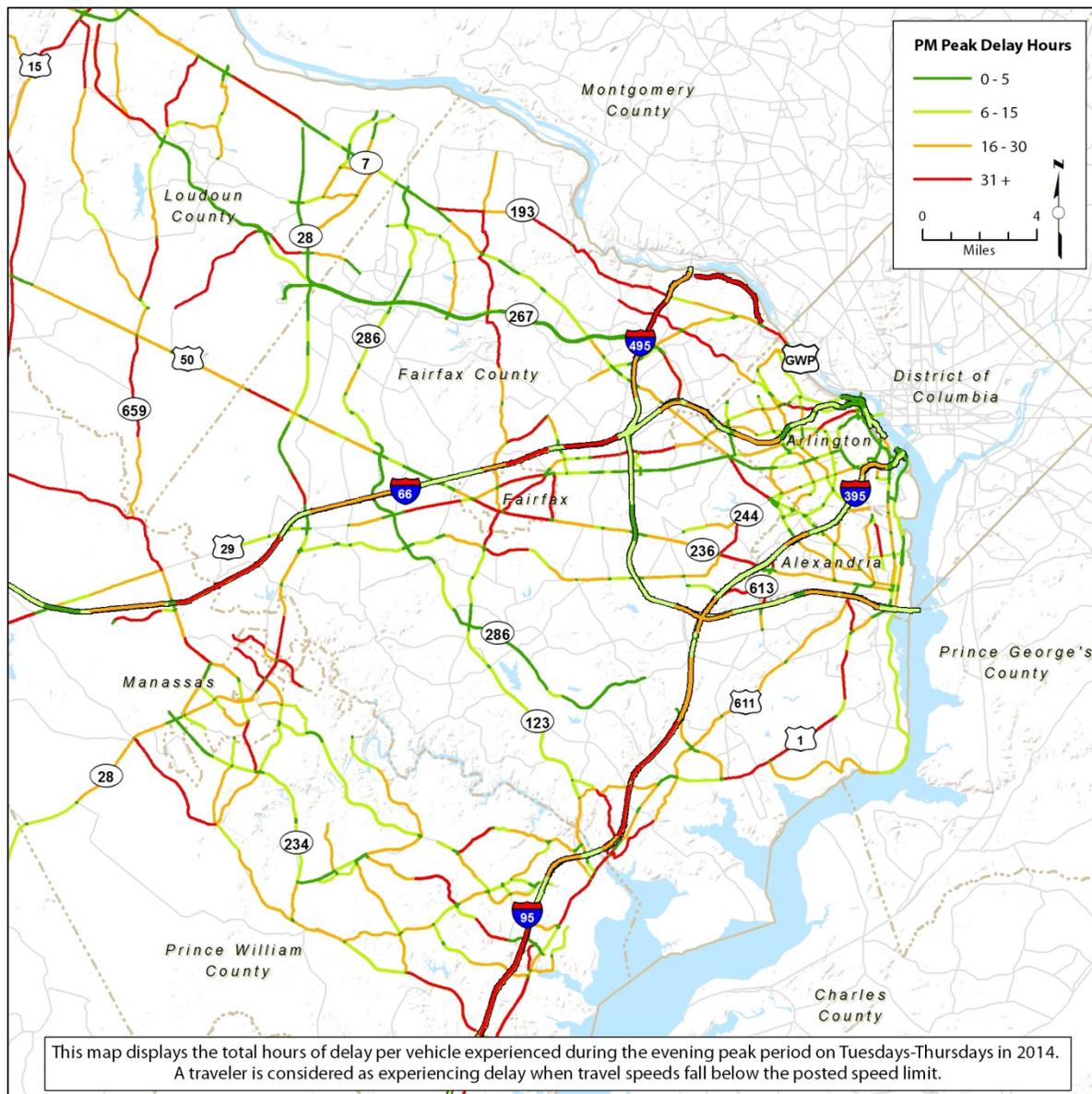
Figure 27: Percent of Time Congested. Source: INRIX



Travel Time Delay

Figure 28 shows total hours of delay per vehicle experienced during the evening peak period on Tuesday, Wednesdays, and Thursdays in 2014. A traveler is considered to be experiencing delay when travel speeds fall below the posted speed limit. It can also be thought of as delay per vehicle. Along many major highways in the Northern Virginia region, commuters spend at least 31 hours per year driving at less than 90 percent of free-flow speeds. Delay is particularly severe along much of I-95 and several stretches of I-66, I-495, and the George Washington Parkway, as well as along portions of other major US Routes.

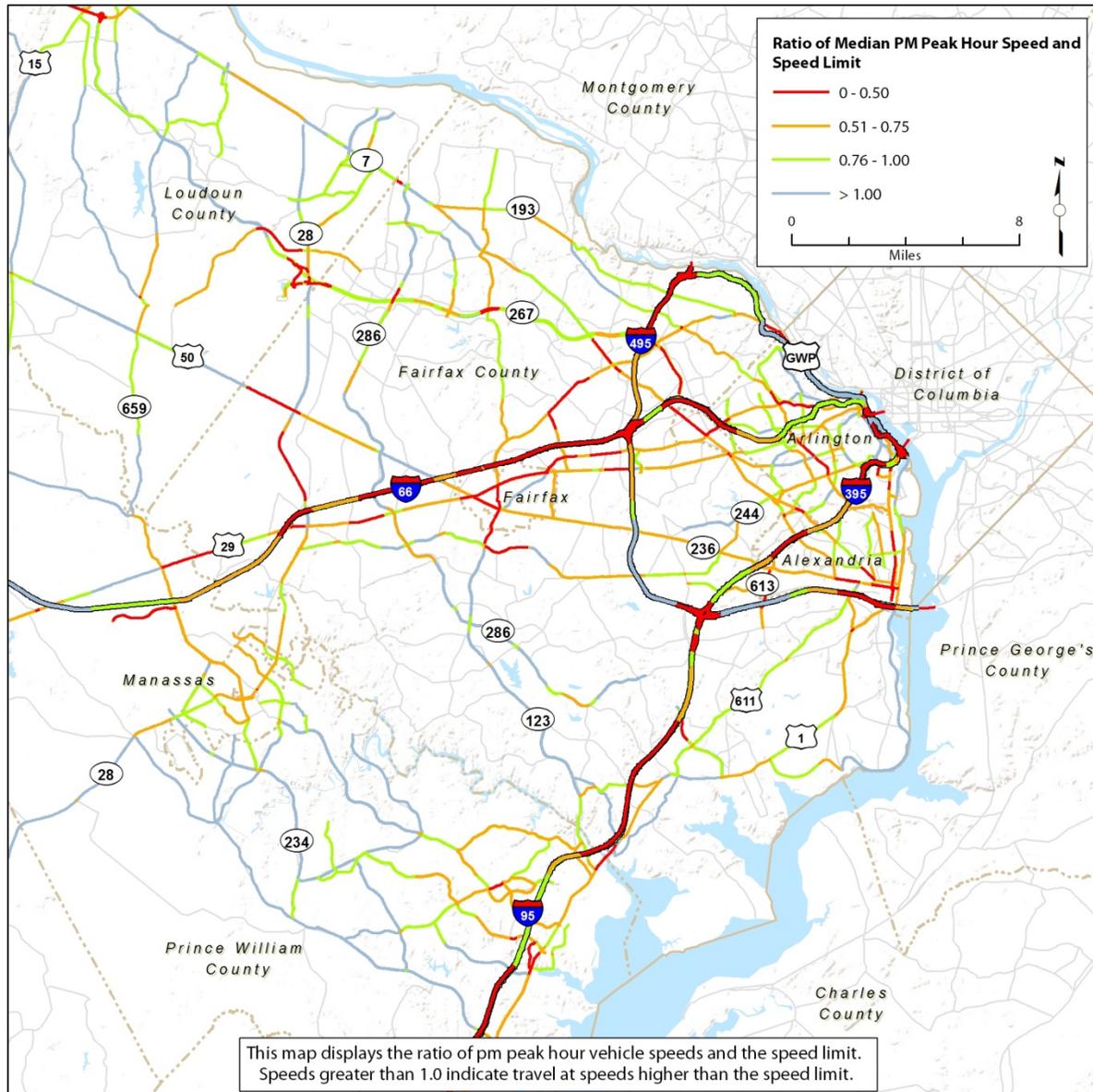
Figure 28: Travel Time Delay. Source: INRIX



Median Speeds

Figure 29 shows the ratio of evening peak hour vehicle speeds to the speed limit. Measuring median speeds evaluates typical conditions, while avoiding the undue influence of severe congestion events. If the median (50th percentile) is 30 miles per hour, for example, this means that half of all observations are above 30 miles per hour, and half are below 30 miles per hour. In Northern Virginia, evening traffic moves at less than 50 percent of the speed limit along interstate corridors 66 and 95 throughout much of the Northern Virginia region, and along many sections of primary routes such as Routes 50 and 28.

Figure 29: Median Speeds. Source: INRIX



Transit Capacity Challenges

The transportation profile must also consider the capacity and demand for transit services through the year 2025. The Washington Metropolitan Area Transit Authority's (WMATA's) strategic plan, *Momentum*, identifies the historic growth patterns and the likely needs for the system by 2025 to accommodate demand. Without significant new investments, the system will be over capacity by 2025. This is particularly significant considering the benefits that the Metrorail system brings both to riders and to the region more generally. Without Metrorail service, across the entire Washington, DC metropolitan region, there would be a 25 percent increase in congestion and the region would have to accommodate 1 million more automobile trips per day. It is self-evident that the Metrorail system plays a critical role in alleviating roadway congestion. It is also important to note that transit vehicles are almost always subject to the same traffic delays as vehicles, and would benefit from reductions in roadway congestion and reliability improvements.

D. Regional Commodity Flows

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

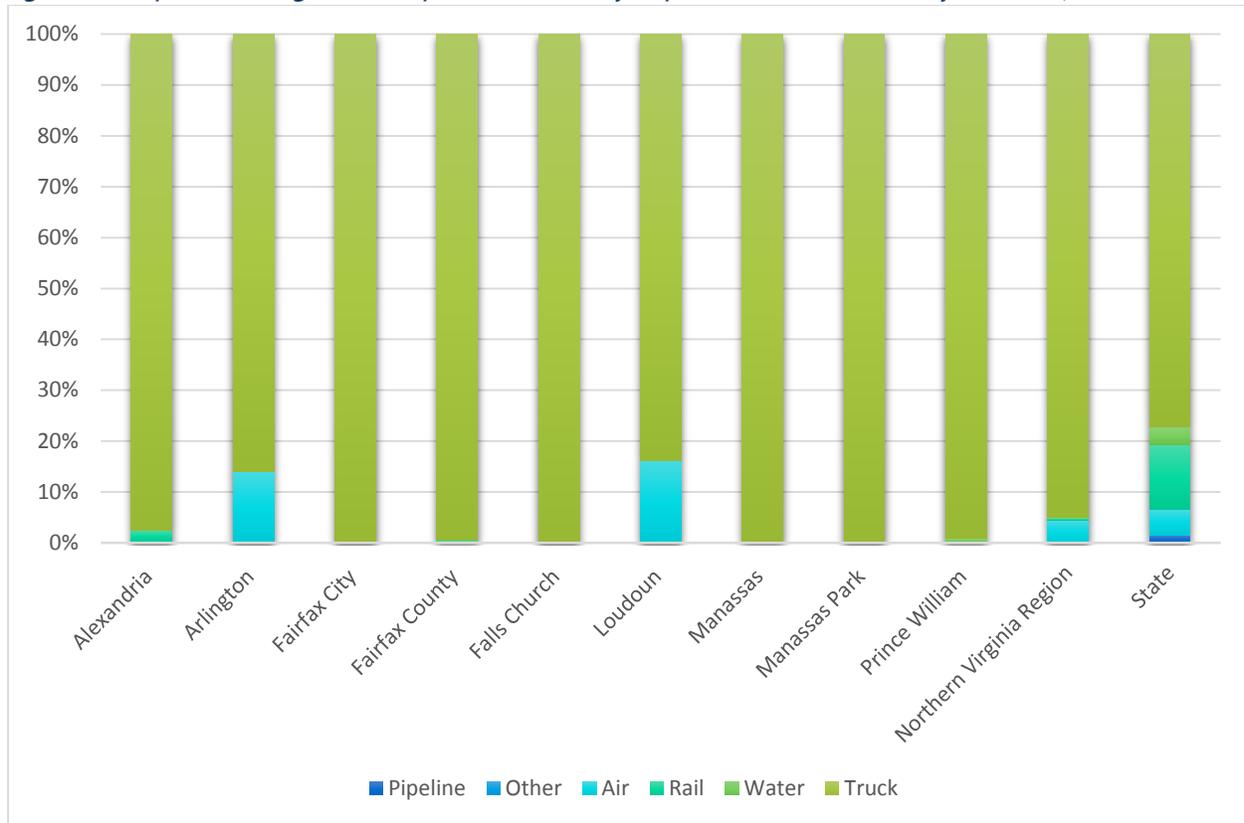
Modal Dependence

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

This section assesses the relative reliance of different industries on modes, quantified in terms of dollars of freight-dependent industry output.⁶ In the Northern Virginia region, the overwhelming majority of all freight-dependent business output, 95 percent, is reliant on truck transportation (Figure 30). Air is the second most important mode, supporting around 4 percent of the total freight-dependent industry output in the region. In comparison to the other jurisdictions in the region, Arlington and Loudoun counties are more dependent on air service, due to the presence of airports in each jurisdiction. According to Transearch, the top two commodities moved by air (in both dollar value and tonnage terms) are consolidated freight shipments (called FAK or Freight of All Kinds) and drugs, with the former being by far the largest commodity category. The types of industries typically supported by air freight in the region are wholesale trade, along with sectors that rely on or produce high-value products such as high-tech manufacturing, research and development, the medical sector, and in some cases food establishments.

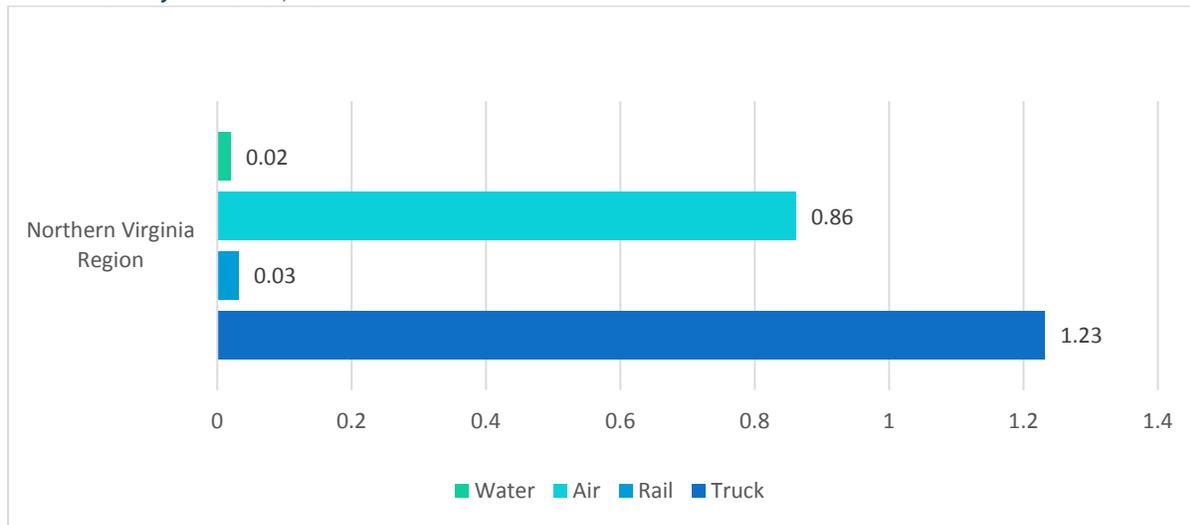
⁶ Note that this approach is distinct from quantifying the dollar value of commodities moved by different modes. The relationship between commodities moved and supported industry activity (as measured in output terms) is established by linking Transearch commodity flow data with input-output economic models.

Figure 30: Comparison of Freight Modal Dependence of Industry Output. Source: TREDIS fueled by Transearch, 2012



Location Quotients by freight transportation mode are used to compare the prominence of freight modes between the Northern Virginia region and the state as a whole (Figure 31). Industry activity, as measured by output, within the region is slightly more dependent on trucking compared to the state as a whole. Additionally, the region approaches the statewide average for air freight. Northern Virginia has a very marginal industry dependence on water and rail freight modes. While some other urban areas in Virginia do approach the statewide level of rail dependence (the Tri-Cities region, for example, has a rail location quotient of 0.91), dependence on water and rail freight is generally higher in rural regions of the state. Rail and water borne commodities tend to be bulky (with low value/volume ratios) and rail and water transportation have traditionally served industries that depend on bulk commodities (for either inputs or outputs or both) because these modes offer relatively low-cost transportation on a tonnage (ton-mile) basis. In general, the reliance of Northern Virginia industries on truck and air freight is consistent with an economy involved mostly in the production and use of higher-value commodities that require rapid and flexible shipments. Nevertheless, bulk commodity shipments are important for certain sectors within the region: construction industries often depend on rail and/or water freight for inputs such as aggregate and concrete. Therefore, while these modes play a small role Northern Virginia’s economy, they can have important implications for the cost of infrastructure and housing.

Figure 31: Location Quotient by Mode of Freight Travel (calculated on the basis of freight-dependent industry output). Source: TREDIS fueled by Transearch, 2012.

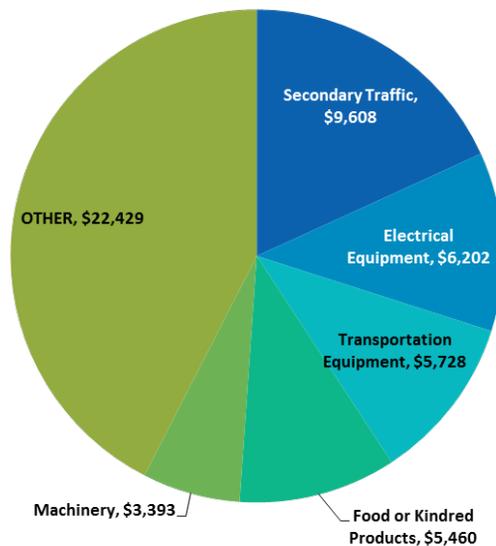


Top Commodities

The last section addressed freight modal dependence on the basis of industry output; this section describes commodities shipped into and out of the region, as measured in terms of the dollar value and tonnage of each commodity group. In total, \$52.8 billion of goods are brought into the Northern Virginia region each year. As shown in Figure 32, secondary traffic, electrical equipment, transportation equipment, food or kindred products, and machinery (in that order) are the largest single categories of commodities brought into the region. The “other” category of commodities includes a variety of manufactured and agricultural products and natural resources (such as ore, coal, and petroleum).

Figure 32: Top Freight Values by Inbound Commodities. Source: Transearch, 2012

Inbound Commodities, by Value (\$M)

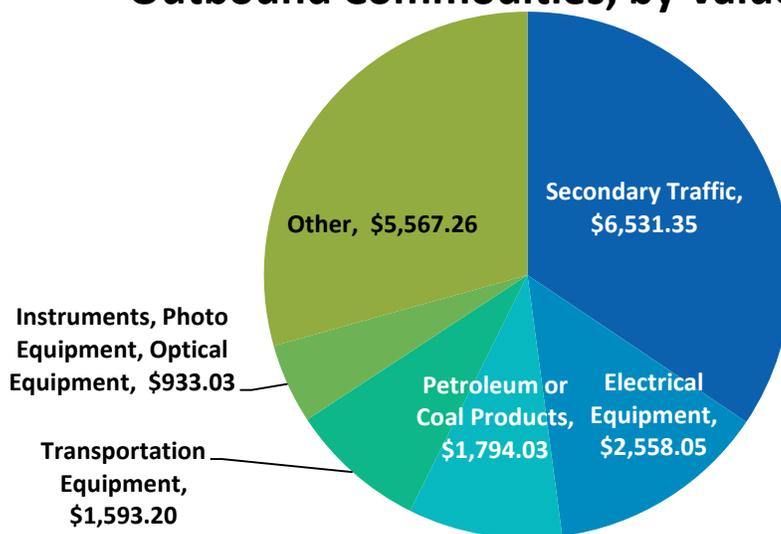


Secondary Traffic (freight that is made up of goods being transferred between warehouses or retail centers as well as drayage – short term transport – to rail or air terminals) accounts for the most

valuable freight moving out of the Northern Virginia region. The importance of secondary traffic is consistent with the region’s high levels of economic activity in wholesale trade and with relatively high demand from end-consumers (e.g. retail trade and consumption by service sector industries). After secondary traffic, the largest single categories of outbound commodities include electrical equipment, petroleum or coal products, transportation equipment, and instruments, and photo and optical equipment. The outbound movement of electrical equipment corresponds to the largest manufacturing sector within Northern Virginia, Computer & Electronics Manufacturing, which, according to IHS Global Insight data, accounted for just over \$2 billion of business output in 2012. Transportation equipment shipments are associated with the third largest manufacturing sector in the region, transportation equipment manufacturing, which accounted for \$756 million in output in 2012. The “other” category of outbound commodities includes a variety of manufactured and agricultural products and natural resources (such as ore, coal, and petroleum). Figure 33 Indicates that the region is a net receiver of commodities.

Figure 33: Top Freight Values by Outbound Commodities. Source: Transearch, 2012

Outbound Commodities, by Value (\$M)



The Mid-Atlantic region (as defined by the Bureau of Economic analysis) is the most important destination for freight from the Northern Virginia region. Figure 34 shows the other regions throughout the United States that receive a significant amount of the region’s outbound freight. These national destinations of outbound freight are typically other population centers or major ports of exit for international trade. For goods-producing businesses within Virginia, access to these broader markets is critical to their economic competitiveness.

Figure 34: Top Freight Values by Region. Source: TranSearch, 2012.

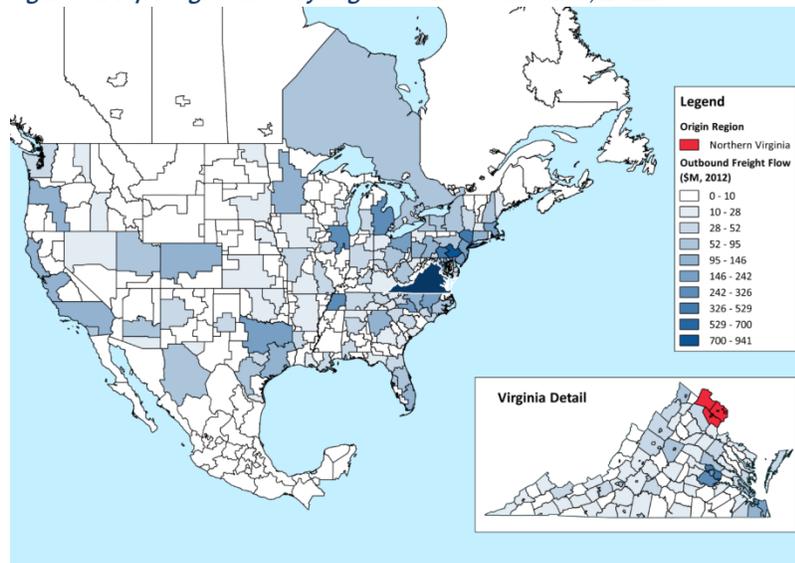


Figure 35 and Figure 36 present information on top commodities moved to and from the region, based on their tonnage. Considering freight movements both in terms of value and in terms of tonnage provide distinct perspectives for transportation planning. Value most directly relates to economic activity, while tonnage can serve as one indicator of likely wear and tear imposed on the transportation network by freight movement. Non-metallic minerals account for approximately half of the weight of both inbound and outbound commodities.

Figure 35: Top Inbound Commodities by Weight

Inbound Commodities, by Weight (Thousands of tons)

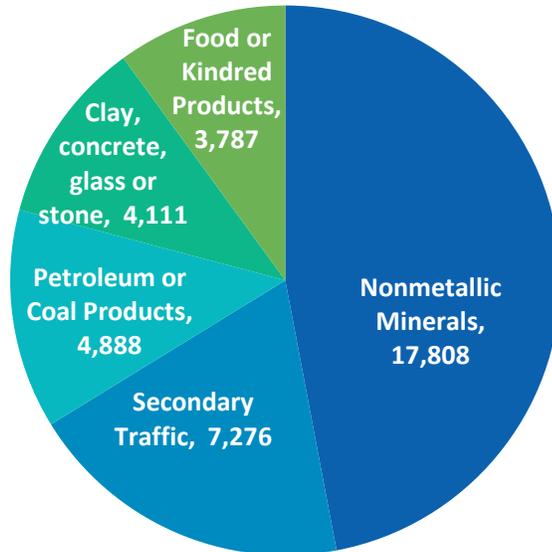
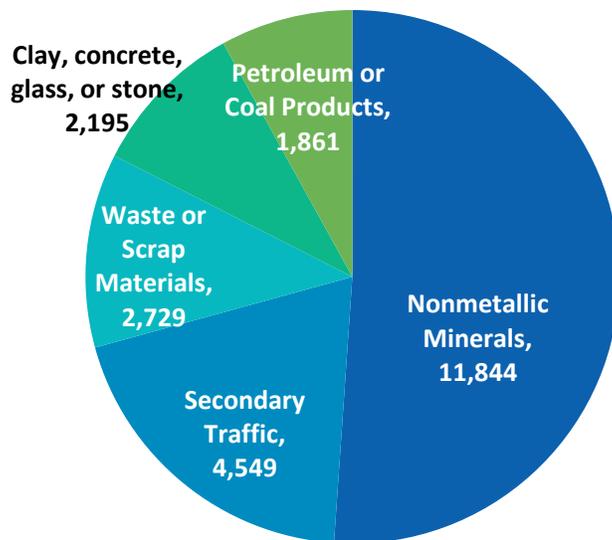


Figure 36: Top Outbound Commodities by Weight

Outbound Commodities, by Weight (Thousands of tons)



4. NEEDS PROFILE

A. Introduction

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

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

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

B. Economic and Transportation Needs Correlation

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

Table 12: Economic and Transportation Correlation. Source: Summary Correlations Based on National Research and Survey of National Industry Site Selection Professionals Conducted by the Study Team.

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

Correlations:

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

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

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

C. General Regional Needs

As discussed in the Economic Profile above, when the 2025 Future Economic Profile was estimated for the Northern Virginia region, it showed a heavy focus on the local-serving and knowledge-based economic sectors (83 percent of output and 88 percent of employment, combined), with a smaller segment of the freight-dependent sector. The relative importance of each economic sector in the Northern Virginia region is expected to remain largely similar to 2012 conditions over the next decade, with the local-serving sector expected to decrease slightly. As outlined in the Economic and Transportation Correlation above, the top Transportation Needs of these two dominant sectors (local-serving and knowledge-based) (Table 12) including highway access, passenger reliability, bottleneck relief, network connectivity, modal choice, transit access, active transportation, and walkable places. Freight reliability and accessibility are of a relatively lower importance.

The forecasted growth in the knowledge-based economic sector for this region brings the potential for additional transportation needs. The Economic and Transportation correlations for the knowledge-based sector particularly point to improving modal choice, transit access and walkable places. The local-serving economic sector also has important correlations with transit accessibility to support workforce

access to these kinds of jobs. Therefore, transportation needs in the region should include expanding transit access, both within the region’s economic activity centers, and between the centers. In particular, there is a need for additional high capacity and high frequency transit service in the region. Further support for the knowledge-based sector would also come from additional walkable places and modal options for walking and biking in the region.

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

D. Spatial Analysis of Regional Network Needs

Summary of Needs

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

It is important to note that two key existing Plans in the Northern Virginia region must be taken into account in understanding and interpreting the Needs in this Assessment. *TransAction 2040* plan, the region’s long range transportation plan developed pursuant to Sections 33.2-2500 and 33.2-2508 of the Virginia Code, should be considered a key and authoritative source of information about the region’s challenges and needs. The plan’s vision as follows:

In the 21st century, Northern Virginia will develop and sustain a multimodal transportation system that supports our economy and quality of life. It will be fiscally sustainable, promote areas of concentrated growth, manage both demand and capacity, and employ the best technology, joining rail, roadway, bus, air, water, pedestrian, and bicycle facilities into an interconnected network.

The *TransAction 2040* plan is currently undergoing an update; when the new plan is approved, it will be the region’s official long range plan.

In addition, the Washington Metropolitan Area Transit Authority (WMATA) has developed a strategic plan for the year 2025, *Momentum*, which identifies the key challenges and needs of the Metrorail system, as well as a strategic set of planned system improvements. These include the use of eight-car trains during peak travel periods, core station improvements, a Metrobus Priority Corridor Network (PCN), new Blue Line connections, next generation communications, bus fleet expansion, and pocket tracks.

Findings of Needs

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

1. Category/ies of Need
2. General Description of Need
3. Economic findings to support need
4. Transportation findings to support need
5. Locations that exemplify this need⁷

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

⁷ Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

Table 13: Findings of Needs

A. Enhance multimodal access around transit access points such as existing and emerging rail stations, high capacity bus stops, and intermodal transfer centers	
NEED	<p>There is a need for improved connections for those walking, biking, and using "feeder" transit services to make transit a more viable option for travel within the region, particularly around current and future station areas and other activity centers. In some cases, it would be possible to reduce traffic congestion by improving multimodal linkages among activity centers.</p>
ECONOMIC	<p>The ability of communities around transit stations (particularly the areas within 1-2 miles of the stations and other travel hubs) to attract residents and skilled workers and grow businesses can be enhanced by building safe, convenient walking and bicycling networks and facilities, and by providing high-frequency transit services throughout the day. A robust array of travel choices for commuting and local trips is a critical asset for attracting workers and businesses. Employers' abilities to access skilled workers is a top concern, and 21st century workers seek to live and work in locations they can reach via multiple travel modes.</p>
TRANSPORTATION	<p>Increased multimodal access to transit would benefit all of the region's current and future rail station areas and other key transit hubs, such as those with high-capacity and high-frequency bus services. Enhancements to address this Need would help to solve "last mile" challenges for commuters. Extra priority should be placed on investments in and around activity centers, as they have higher average residential densities and are expected to contain a significant portion of the region's new housing development and economic activity. Because of higher densities, improvements near transit hubs have the potential to serve and benefit large numbers of residents in a cost-effective way. In some cases, improvements are needed to Metrorail stations themselves to increase capacity and improve safety.</p>
EXAMPLE LOCATIONS	<p>Areas surrounding the WAMATA Orange and Silver Line stations (Dunn Loring, Wiehle Avenue, Spring Hill), Blue/Yellow stations (Franconia-Springfield, Huntington, Eisenhower), VRE stations, and intermodal transit hubs (e.g. Shirlington, Seven Corners). This also applies to areas preparing for Metro expansion, such as the stations planned for Loudoun County and Herndon station, and the Gainesville-Haymarket area of Prince William County, where a VRE extension is planned for construction.</p>

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

B. Increase equity in access to high quality transportation facilities	
NEED	<p>A fundamental factor in access to economic opportunity, multimodal transportation accessibility is urgently needed in communities with high concentrations of economically disadvantaged residents. Strategic multimodal transportation investments can yield equity benefits. Improvements to facilities of all types used by disadvantaged residents, and increased awareness and availability of affordable travel options, such as through TDM and other programs, are needed.</p>
ECONOMIC	<p>Improving service workers' and other residents' access to jobs and services provides both social and economic benefits. This need is especially important for the region's economically disadvantaged and transit-dependent residents. Many of the region's low- and moderate-income workers provide essential goods and services to residents, visitors, and businesses, which strengthens the attractiveness of the region to prospective employers, tourists, and other generators of economic activity. In addition, multimodal access to health service centers, which contribute significantly to the region's economic activity, is critical for people with disabilities, veterans, and older adults who rely upon demand response transit services, and for residents who use transit and/or bike and walk to work and other destinations.</p>
TRANSPORTATION	<p>There is a need to enhance the operations and affordability of key commuting facilities, both roadways and transit, to improve accessibility from and for communities with high concentrations of low- and moderate-income residents to jobs and services, which are often located in communities with higher-cost housing. Bus transportation is sometimes the only affordable and readily accessible mode of transportation for many service workers and residents in the region. Higher-frequency, higher-capacity, and more efficient transit services can produce benefits for the region's workforce. Pedestrian and bicycle facilities can improve transportation conditions at very low cost to both the government and user. There is a need for enhanced availability and awareness of affordable commuting options to expand travel options, and the effective capacity of the transportation system, for all residents. A lack of ADA-compliant facilities in strategic locations creates "broken links" in multimodal networks, which render entire areas inaccessible to low-mobility residents. As such, ensuring ADA compliance is a cost effective way to serve the disabled community.</p>
EXAMPLE LOCATIONS	<p>Toll roadway facilities, activity centers, non-ADA-compliant facilities, communities with concentrations of disadvantaged residents, transit routes on arterial roads, and sidewalks and bikeways.</p>

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

C. There is a need for corridor safety and operational improvements to alleviate bottlenecks and reduce acute congestion, thereby expanding effective capacity for travel by all modes, along key corridors in the region.

NEED	<p>The Northern Virginia region suffers from the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to current and potential residents, workers, and businesses. Actions are needed throughout the region to address ongoing congestion issues, which affect travel by all modes along key corridors. While congestion is common throughout the region, crashes and breakdowns in numerous roadway "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the entire travel network for passenger vehicles, trucks, and buses. In addition, many of the region's passenger rail facilities are already at capacity, and are expected to experience more severe overcrowding by 2025. As such, safety improvements to reduce the frequency of crashes and breakdowns, operational improvements to improve accessibility for emergency vehicles to enhance efficiency of incidence clearance, and improvements that increase physical and/or effective capacity on all modes have significant potential to alleviate impacts.</p>
ECONOMIC	<p>Severe congestion and subsequent lost productivity and freight movement results in economic losses that are borne by the region's residents and businesses. Increased congestion and travel times on all modes make the area less attractive to current and prospective residents and, consequently, the businesses that threaten their skills. In particular, lack of reliability for freight can have profoundly negative economic impacts. In particular, congestion on key routes leading to cargo and transport hubs (e.g. Dulles Airport, National Airport, Union Station) results in lost economic productivity.</p>
TRANSPORTATION	<p>Recurring and non-recurring acute congestion events present major challenges to roadway users in all types of motorized vehicles, as well as for those traveling by foot, motorcycle, public or private buses, truck, and bicycle. Particularly on corridors that support pedestrians and cyclists, motorized traffic congestion also threatens safety and efficiency for non-motorized travelers. Roadway safety and operational improvements, and improvements that would enhance the efficiency with which emergency vehicles can clear roadways after accidents, are urgently needed throughout the entire region. This is particularly urgent on routes that lead to the airports and train stations that provide interregional transportation for people and goods. In some cases, improving signal timing, access management, and integration and implementation of more "intelligent" technologies can be cost-effective ways to alleviate roadway and transit congestion and thereby enhance effective corridor capacity. In other cases, physical roadway and transit enhancements may also need to be considered. In particular, improvements are needed on many of the facilities identified by NVRTA as corridors of regional importance.*</p>
EXAMPLE LOCATIONS	<p>NVRTA multimodal Corridors*: I-66; I-95 south of the Springfield interchange; I-495; Route 1 corridor between Fort Belvoir and Washington, DC; Route 7; Route 15; Route 28; Route 29; Route 50; Route 123; Prince William County Parkway; other corridors providing airport access; Columbia Pike; Dale Boulevard; Glebe Road; Minnieville Road; Pentagon-Beauregard Corridor; activity centers in Prince William County (Gainesville, Innovation center, Potomac Communities); WMATA lines throughout the Metrorail system that are experiencing overcrowding</p> <p>* NVRTA Corridors: Virginia Route 7 and Dulles Toll Road Corridor, including the future WMATA Silver Line; Loudoun County Parkway/Tri-County Parkway/Belmont Ridge Road/Gum Springs Road Corridor; Virginia Route 28 Corridor; Prince William Parkway Corridor; Fairfax County Parkway Corridor; I-66/U.S. Route 29/U.S. Route 50 Corridor, including the WMATA Orange Line; Beltway (I-495) Corridor; and I-95/I-395/U.S. Route 1 Corridor, including the VRE and WMATA Blue and Yellow Lines</p> <p><i>Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.</i></p>

D. Expand and improve multimodal accessibility to existing and emerging hubs of economic activity

NEED	<p>This Need specifically focuses on enhancing multimodal access to economic activity centers. Improving multimodal facilities and programs that serve existing and emerging centers of jobs, commerce, services, tourism, mixed-use development, and other economic generators - particularly those already served or to be served in the future by high capacity transit - can improve the economic viability of these areas, while also expanding travel choices and reducing congestion. Continued actions to focus growth and development around activity centers established through the MWCOG-led process will be highly supportive of this strategy.</p>
ECONOMIC	<p>Activity centers' desirability is highly correlated with the presence of multimodal travel options. Jurisdictions throughout the region have identified activity centers where they will encourage a higher concentration of future residential, commercial, and office development. These activity centers need adequate transportation facilities to support their growth and prosperity. In addition, existing activity centers need enhanced modal choices. The defense industry, for example, is a significant economic driver in the region. Current and anticipated military expansion and relocation sites, many of which are located in areas already experiencing heavy highway and transit congestion, have critical modal enhancement needs.</p>
TRANSPORTATION	<p>Activity centers need multimodal travel improvements to ensure safe, reliable movement for workers, consumers, and the goods and services they need. Enhancing networks to allow access to workplaces and services via walking, biking, and transit is necessary, and expanding the frequency and capacity of transit services can make non-SOV travel a more viable option. In particular, gaps in walking and bicycling networks pose significant barriers to using these modes, while the bottlenecks caused by limited capacity in the Rosslyn Metrorail Tunnel limit any frequency increases of Metrorail trains running into and out of DC. Other rail and transit bottlenecks are also critical challenges. Further, there is a need for enhanced transit services that operate frequently throughout the day and evening, including during non-peak hours, to make transit a more viable travel option for those with non-traditional work schedules (possibly including the use of 8-car trains through the Rosslyn Tunnel, as well as other strategies). Intelligent transportation and transit technologies could be considered for addressing this Need, as they can be cost-effective tools to enhance accessibility through a number of different mechanisms (e.g. reducing the roadway congestion that negatively impacts the on-time performance of buses).</p>
EXAMPLE LOCATIONS	<p>Activity centers and Urban Development Areas (UDAs) throughout the region such as Tysons, Rosslyn-Ballston Corridor, the Pentagon, and Seven Corners, as well as emerging activity centers such as Gainesville, Innovation Park, and the City of Manassas. Multimodal options are needed along key travel routes including but not limited to I-66 outside the Beltway, Columbia Pike, Route 1, Route 7, and Route 29.</p> <p><i>Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.</i></p>

E. Improve bicycle and pedestrian facilities and networks to provide additional uninterrupted connections for bicyclists and pedestrians within and between activity centers

NEED	<p>The percentage of residents traveling to work and other destinations by bike and foot continues to increase in the region. In addition, bicycle and pedestrian trips are often made for the purpose of accessing transit. However, gaps in existing bicycle and pedestrian networks, as well as capacity challenges on some existing facilities, limit the viability of biking and walking. Walking and biking are both affordable and healthy travel options, and can help alleviate roadway congestion and transit capacity challenges. Increasing the mode share of bicyclists and pedestrians among commuters and everyday travelers could help to reduce the rising rates of automobile congestion, even while the region continues to attract residents and jobs.</p>
ECONOMIC	<p>The ability to bike and walk for all types of trips is seen as a highly desirable asset among 21st century workers and others seeking to locate in work-live communities. Easily navigable bike and walking routes for people of all ages and abilities are also essential assets for attracting tourists, who contribute significantly to the region's economy, and for helping communities retain lifelong residents.</p>
TRANSPORTATION	<p>Many of the region's residents regularly bicycle and walk to work and other destinations along popular recreational trails and other facilities that make up the region's bike and pedestrian networks. Congestion and conflicts among different types of users (such as fast-moving cyclists and runners versus child cyclists and walkers) has become an increasing safety concern along many multi-use trails and facilities. Expanding the capacity, availability, and connectivity of trails, while minimizing conflicts between bicyclists and pedestrian users, will make bicycling and walking even more viable travel options. Expanded bicycle and pedestrian facilities are needed at many transit stations to improve intermodal connections. Improvements are also needed along roadway corridors to eliminate gaps in bicycle and pedestrian networks and improving accessibility at pedestrian crossings to provide uninterrupted connections for non-motorized modes.</p>
EXAMPLE LOCATIONS	<p>Custis Trail, Mount Vernon Trail, Woodrow Wilson Bridge Trail, locations where pedestrian and bicycle facilities do not provide complete and continuous connections between activity centers and other hubs (for example, the Custis Trail does not provide connections to the Ballston activity center).</p>

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

F. Improve multimodal connectivity among existing and emerging activity centers

NEED	<p>Many key roadways and bicycle and transit networks in the region were designed to provide routes for commuters into and out of the District of Columbia and "first-tier" suburbs, which historically contained most of the region's employment centers. But employment and residential growth patterns have changed over the years, to the point that high concentrations of jobs and services and residential communities are located in a wide range of areas throughout Northern Virginia. Today, the volume of residents traveling between activity centers in non-core areas ("suburb to suburb") and from suburban residential areas to activity centers, is higher than the planned capacity on many roadway and bicycle networks. Connectivity improvements, combined with more sustainable development patterns in and around activity centers, can improve the efficiency of travel throughout the Northern Virginia region and may thereby reduce congestion on routes leading into the region's core areas.</p>
ECONOMIC	<p>Improving multimodal accessibility and connectivity to and within existing and emerging activity centers can improve their attractiveness and economic prospects. The need is particularly urgent in areas where private investors and local governments have developed partial multimodal networks and mixed-use communities. In these cases, filling in multimodal network gaps would maximize the return on investment and strengthen the ability of localities to attract the planned balance of residents and workers.</p>
TRANSPORTATION	<p>In many areas, completion of "missing links" to transportation system networks could enhance accessibility for travelers using all modes. Disconnected roadway, transit, bicycle and pedestrian networks force travelers to take circuitous routes, resulting in neighborhood congestion and air quality issues. Lack of connections also discourages travelers from choosing to walk or bike for short trips. Making suburban activity centers more transit-accessible would further help to alleviate or reduce traffic congestion by enabling communities to add jobs and workers that generate fewer vehicle trips than the number of trips that area associated with automobile-oriented growth.</p>
EXAMPLE LOCATIONS	<p>Accessibility between activity centers such as those in Arlington; Alexandria; Tysons; Reston; Springfield; Merrifield; Baileys Crossroads; Columbia Pike; Reston; Herndon Seven Corners; Fairfax Center, and other areas with high concentrations of economic activity and high travel volumes, as well as emerging activity centers such as Gainesville, Innovation, and the City of Manassas.</p>

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

G. Improve rail accessibility and reliability for both freight and passengers

NEED	<p>Rail lines throughout the region enable intra- and inter-regional movement for both freight and passengers. Rail services suffer from congestion and unreliability. Passenger rail services connect workers and consumers with areas of concentrated economic activity, while freight rail brings needed goods into and out of the region.</p>
ECONOMIC	<p>Freight passenger rail transportation supports all sectors of the region's economy. Workers in all sectors, as well as other travelers, rely on VRE and Amtrak for inter-city service. Providing multimodal alternatives to commuters using key corridors (I-95, I-66, I-395) prevents congestion and reliability from worsening on roadways. Freight rail service along CSX and Norfolk Southern rail corridors is critical for supporting growing industries in the region that require freight movement of goods and commodities.</p>
TRANSPORTATION	<p>Rail traffic throughout there region is congested and unreliable and suffers from delays that affect both passenger and freight traffic, particularly where they both share the same facilities. Some existing VRE stations have inadequate platforms. Conflicts between passenger and freight trains can magnify the negative impacts of even slight delays. As such, improving freight reliability will produce benefits for passenger reliability as well. Rail bottlenecks, such as the Long Bridge crossing of the Potomac River and the Rosslyn Tunnel, and the limited capacity of the freight rail corridors limits the ability to expand commuter rail and intercity passenger rail service. There is a need for improved identification and collaboration of system bottlenecks in rail capacity to be coordinated between host and guest railroads.</p>
EXAMPLE LOCATIONS	<p>North-South rail lines along I-95, VRE, Amtrak, and freight lines throughout the region.</p>

Important note: Example locations are provided for illustrative purposes only. The inclusion of examples should not be interpreted to suggest that areas omitted are not included in this need.

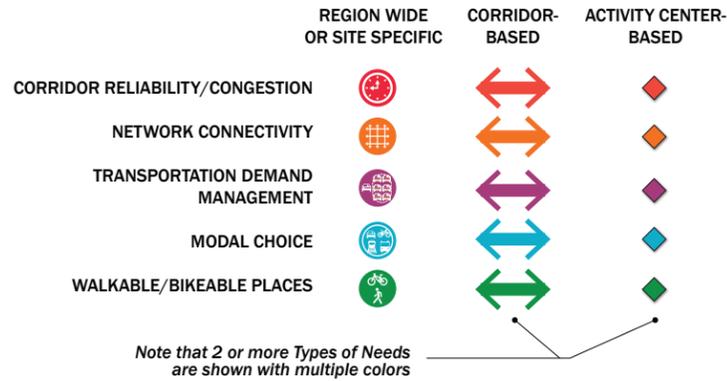
Maps of Needs

Maps illustrating Northern Virginia’s Transportation Needs are shown below. The example locations shown in the maps are provided for illustrative purposes only, and their depiction should not be interpreted to indicate or suggest that areas not depicted are not included in this need.

Northern Virginia Region Draft Needs Summary

Needs Map: Need A

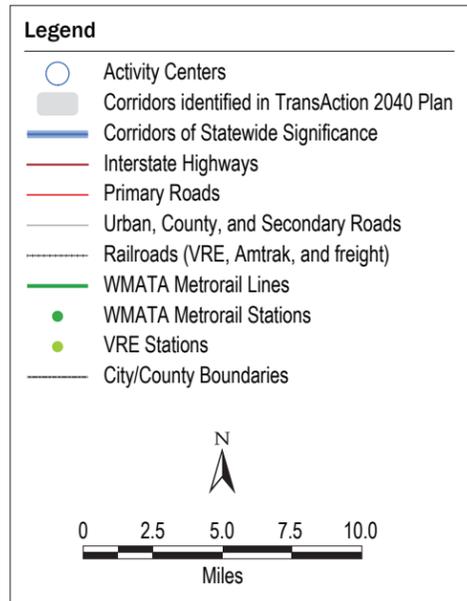
TYPES OF NEEDS



Needs Table

NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS*
A Enhance multimodal networks and facilities around transit access points such as existing and emerging rail stations, high capacity bus stops, and intermodal transfer centers	<p>There is a need for improved multimodal networks that include walking, biking, and “feeder” transit services and facilities to make transit a more viable option for travel within the region, particularly around current and future station areas and other activity centers. In some cases, traffic congestion can be reduced by improving multimodal linkages among activity centers.</p>	<p>The ability of communities around transit stations (particularly the areas within 1-2 miles of the stations and other travel hubs) to attract skilled workers and grow businesses can be enhanced by building safe, convenient walking and bicycling networks and providing high-frequency transit services throughout the day. A robust array of travel choices for commuting and local trips is a critical asset for attracting workers and businesses. Employers' abilities to access skilled workers is a top concern, and 21st century workers seek to live and work in locations they can reach via multiple travel modes.</p>	<p>Multimodal enhancements would benefit all of the region's current and future rail station areas and other key transit hubs, such as those with high-capacity and high-frequency bus services. Multimodal enhancements would help to solve “last mile” challenges for commuters. Extra priority should be placed on enhancements in and around activity centers, as they have higher average residential densities and are expected to contain a significant portion of the region's new housing development and economic activity. Because of higher densities, improvements near transit hubs have the potential to serve and benefit the large numbers of residents in a cost-effective way. In some cases, improvements are needed to Metrorail stations themselves to increase capacity and improve safety.</p>
			<p>Areas surrounding Orange and Silver Line stations (Dunn Loring, Wiehle Avenue, Spring Hill), Blue/Yellow stations (Franconia-Springfield, Huntington, Eisenhower), VRE stations, and intermodal transit hubs (e.g. Shirlington, Seven Corners). This also applies to areas preparing for Metro expansion, such as the stations planned for Loudoun County.</p>

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.



Northern Virginia Region Draft Needs Summary

Needs Map: Need B

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors

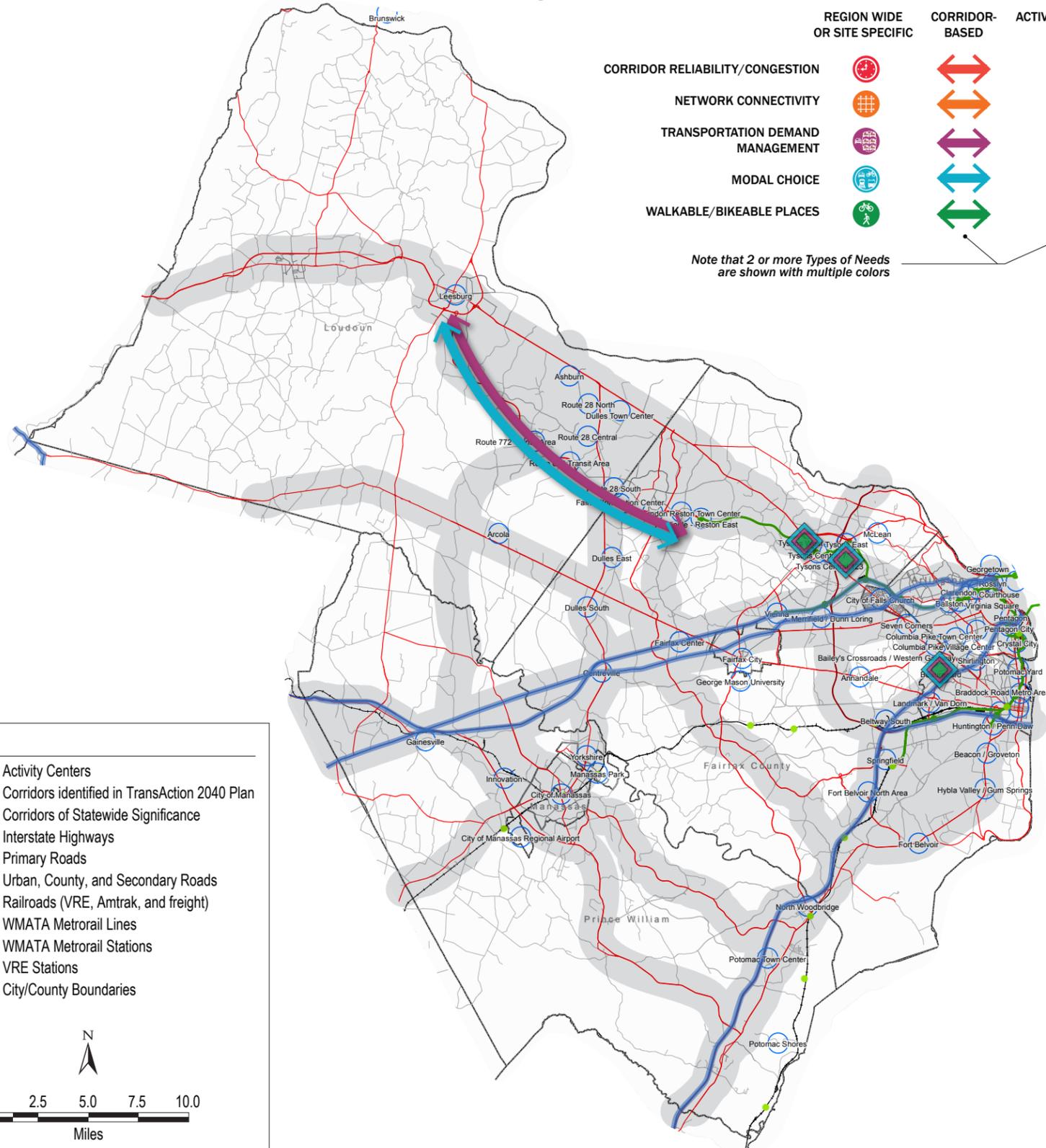
Needs Table

NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS*
B Increase equity in access to high quality transportation facilities	<p> A fundamental factor in economic advancement, multimodal transportation accessibility is most urgently needed in communities with high concentrations of economically disadvantaged residents. Strategic multimodal transportation investments can yield equity benefits. Improvements to facilities of all types used by disadvantaged residents, and increased awareness and availability of affordable travel options through TDM and other programs, are needed.</p> <p> Improving service workers' and disadvantaged residents' access to jobs and services provides both social and economic benefits. Many of the region's low- and moderate-income workers provide essential goods and services to residents, visitors, and businesses, which strengthens the attractiveness of the region to prospective employers, tourists, and other generators of economic activity. In addition, multimodal access to health service centers, which contribute significantly to the region's economic activity, is critical for people with disabilities and older adults who rely upon demand response transit services, and for employees who use transit and/or bike and walk to work.</p>	<p> There is a need to enhance the operations and affordability of key commuting facilities, roadways and transit, to improve accessibility from communities with high concentrations of low- and moderate-income residents to jobs and services, which are often located in communities with higher-cost housing. Bus transportation is sometimes the only affordable and readily accessible mode of transportation for many service workers in the region. Higher-frequency, higher-capacity, and more efficient transit services would produce benefits for the region's workforce. Stronger TDM programs could enhance availability and awareness of affordable commuting options to expand travel options for all residents. A lack of ADA-compliant facilities in strategic locations creates "broken links" in multimodal networks, which render entire areas inaccessible to low-mobility residents.</p>	<p>Toll roadway facilities, activity centers, non-ADA-compliant facilities, and communities with heavy concentrations of disadvantaged residents.</p>

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries



Northern Virginia Region Draft Needs Summary

Needs Map: Need C

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors

Needs Table

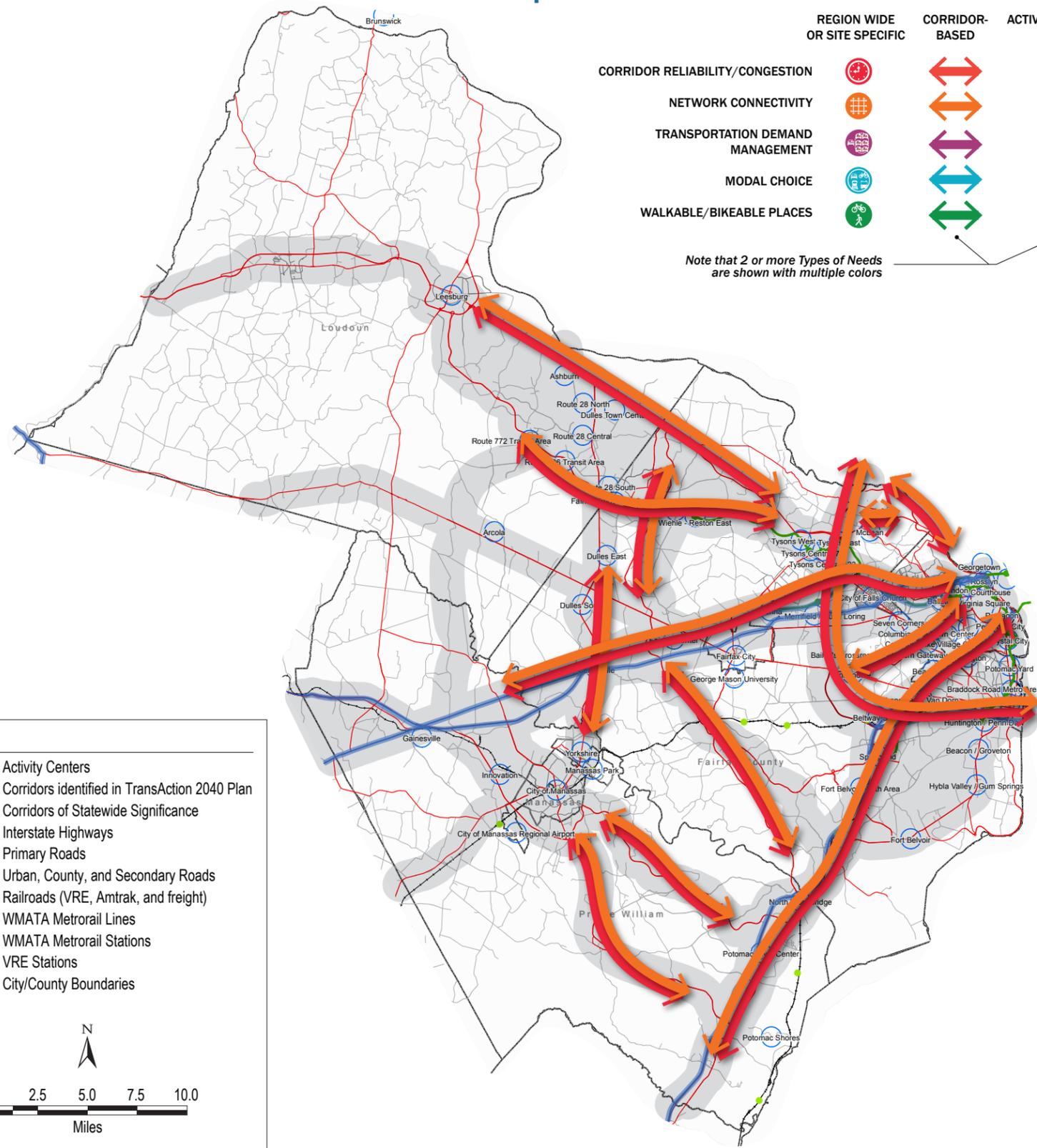
	NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS**
C	<p>Make roadway safety and operational improvements to alleviate bottlenecks and reduce acute congestion, including "hot spots" with frequent but unpredictable (non-recurring) congestion</p> <p> The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.</p>	<p> Severe congestion and subsequent lost productivity and freight movement results in economic losses that are borne by the region's residents and businesses. Increased congestion and travel times on all modes make the area less attractive to current and prospective residents and, consequently, the businesses that want their skills. In particular, lack of reliability for freight can have profoundly negative economic impacts. Congestion on key routes leading to cargo and transport hubs (e.g. Dulles Airport, National Airport, Union Station) results in lost economic productivity.</p>	<p> Recurring and non-recurring acute congestion events present major challenges to roadway users in all types of motorized vehicles, from passenger cars and motorcycles to buses and trucks. On corridors that support pedestrians and cyclists, motorized traffic congestion also threatens safety and efficiency for non-motorized travelers. Roadway safety and operational improvements, and improvements that would enhance the efficiency with which emergency vehicles can clear roadways after accidents, are urgently needed throughout the entire region. This is particularly urgent on routes that lead to the airports and train stations that provide interregional transportation for people and goods. In some cases, improving signal timing, access management, and integration of more "intelligent" technologies can be cost-effective ways to alleviate congestion. In particular, improvements are needed on many of the facilities identified by NVTAs as corridors of regional importance.*</p>	<p>I-66; I-95 south of the Springfield interchange; I-495; Route 1 corridor between Fort Belvoir and Washington, DC; Route 7; Route 15; Route 28; Route 29; Route 50; Route 123; Prince William County Parkway; other corridors providing airport access; Columbia Pike; Dale Boulevard; Glebe Road; Minnieville Road; Pentagon-Beauregard Corridor; activity centers in Prince William County (Gainesville, Innovation center, Potomac Communities).</p>

- * NVTAs Corridors:
- Virginia Route 7 and Dulles Toll Road Corridor, including the future Metrorail Silver Line
 - Loudoun County Parkway/Tri-County Parkway/Belmont Ridge Road/Gum Springs Road Corridor
 - Virginia Route 28 Corridor
 - Prince William Parkway Corridor
 - Fairfax County Parkway Corridor
 - I-66/U.S. Route 29/U.S. Route 50 Corridor, including the Metrorail Orange Line
 - Beltway (I-495) Corridor
 - I-95/I-395/U.S. Route 1 Corridor, including the VRE and Metrorail Blue and Yellow Lines.

** Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries



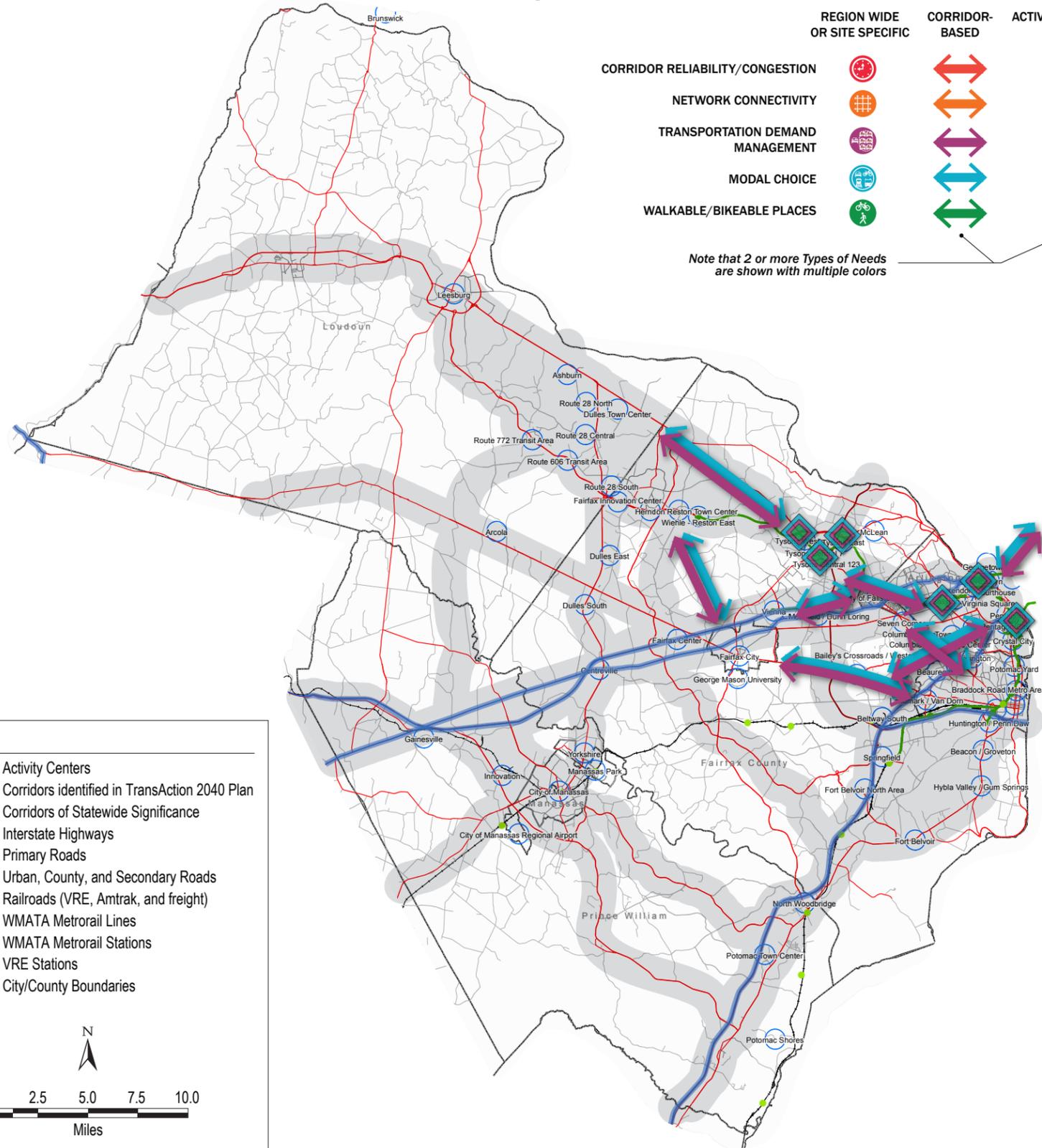
Northern Virginia Region Draft Needs Summary

Needs Map: Need D

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors



Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

0 2.5 5.0 7.5 10.0 Miles

Needs Table

NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS*
D	Expand and improve multimodal accessibility to existing and emerging hubs of economic activity		

The Northern Virginia region suffers from some of the most severe congestion in the nation, which results in economic losses and reduces the region's attractiveness to workers and businesses. While congestion is common throughout the region, crashes and breakdowns in numerous "hot spots" cause frequent but unpredictable bouts of severe congestion, which degrades the reliability of the travel network. As such, safety improvements to reduce the frequency of crashes and breakdowns, and operational improvements to improve accessibility for emergency vehicles to enhance the efficiency of incident clearance, have significant potential to alleviate this challenge.

Activity centers' viability and desirability is highly correlated with the presence of multimodal travel options. Jurisdictions throughout the region have identified activity centers where they will encourage a higher concentration of future residential, commercial, and office development. These activity centers need adequate transportation facilities to support their growth and prosperity. In addition, existing activity centers need enhanced modal choices. The defense industry, for example, is a significant economic driver in the region. Current and anticipated military expansion and relocation sites, many of which are located in areas already experiencing heavy highway and transit congestion, have critical modal enhancement needs.

Activity centers need multimodal travel improvements to ensure safe, reliable movement for workers, consumers, and the goods and services they need. Enhancing networks to allow access to workplaces and services via walking, biking, and transit is necessary, while expanding the frequency and capacity of transit services can make non-SOV travel a more viable option. In particular, gaps in walking and bicycling networks pose significant barriers to using these modes, while the bottlenecks caused by limited capacity in the Rosslyn Metrorail Tunnel limit any frequency increases of Metrorail cars running into and out of DC. Further, there is a need for enhanced transit services that operate frequently throughout the day and evening, including during non-peak hours, to make transit a more viable travel option for those with non-traditional work schedules.

Activity centers throughout the region such as Tysons, the Rosslyn-Ballston Corridor, and the Pentagon. Multimodal options are needed along key travel routes including but not limited to Columbia Pike, Route, Route 7, and Route 29.

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Northern Virginia Region Draft Needs Summary

Needs Map: Need E

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors

Needs Table

NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS*
E Improve bicycle and pedestrian facilities and networks to provide additional and uninterrupted connections for bicyclists and pedestrians within and between activity centers	<p> The percentage of workers commuting by bike and foot continues to increase in the region. However, gaps in existing bicycle and pedestrian networks, as well as capacity challenges on some existing facilities, limit the viability of biking and walking. Walking and biking are both affordable and healthy travel options, and can help alleviate roadway congestion and transit capacity challenges. Increasing the mode share of bicyclists and pedestrians among commuters and everyday travelers could help reduce the rising rates of automobile congestion, even while the region continues to attract residents and jobs.</p>	<p> The ability to bike and walk for all types of trips is seen as a highly desirable asset among 21st century workers seeking to locate in work-live communities. Easily navigable bike and walking routes for people of all ages and abilities are also essential assets for attracting tourists, who contribute significantly to the region's economy, and for helping communities to attract and retain lifelong residents.</p>	<p> Many of the region's residents regularly bicycle and walk to work and other destinations along popular trails and other facilities that make up the region's bike and pedestrian networks. Congestion and conflicts among different types of users (such as fast-moving cyclists and runners versus child cyclists and walkers) has become an increasing safety concern along many multi-use trails and facilities. Expanding the capacity, availability, and connectivity of trails will make bicycling and walking more viable travel options. Expanded bicycle and pedestrian facilities are needed at many transit stations to improve intermodal connections. Improvements such as eliminating gaps in bicycle and pedestrian networks and improving accessibility at pedestrian crossings are also needed along roadway corridors.</p>
			<p>Custis Trail, Mount Vernon Trail, Woodrow Wilson Bridge Trail, locations where pedestrian and bicycle facilities do not provide complete and continuous connections between activity centers and other hubs (e.g. the Custis Trail does not provide connections to the Ballston activity center).</p>

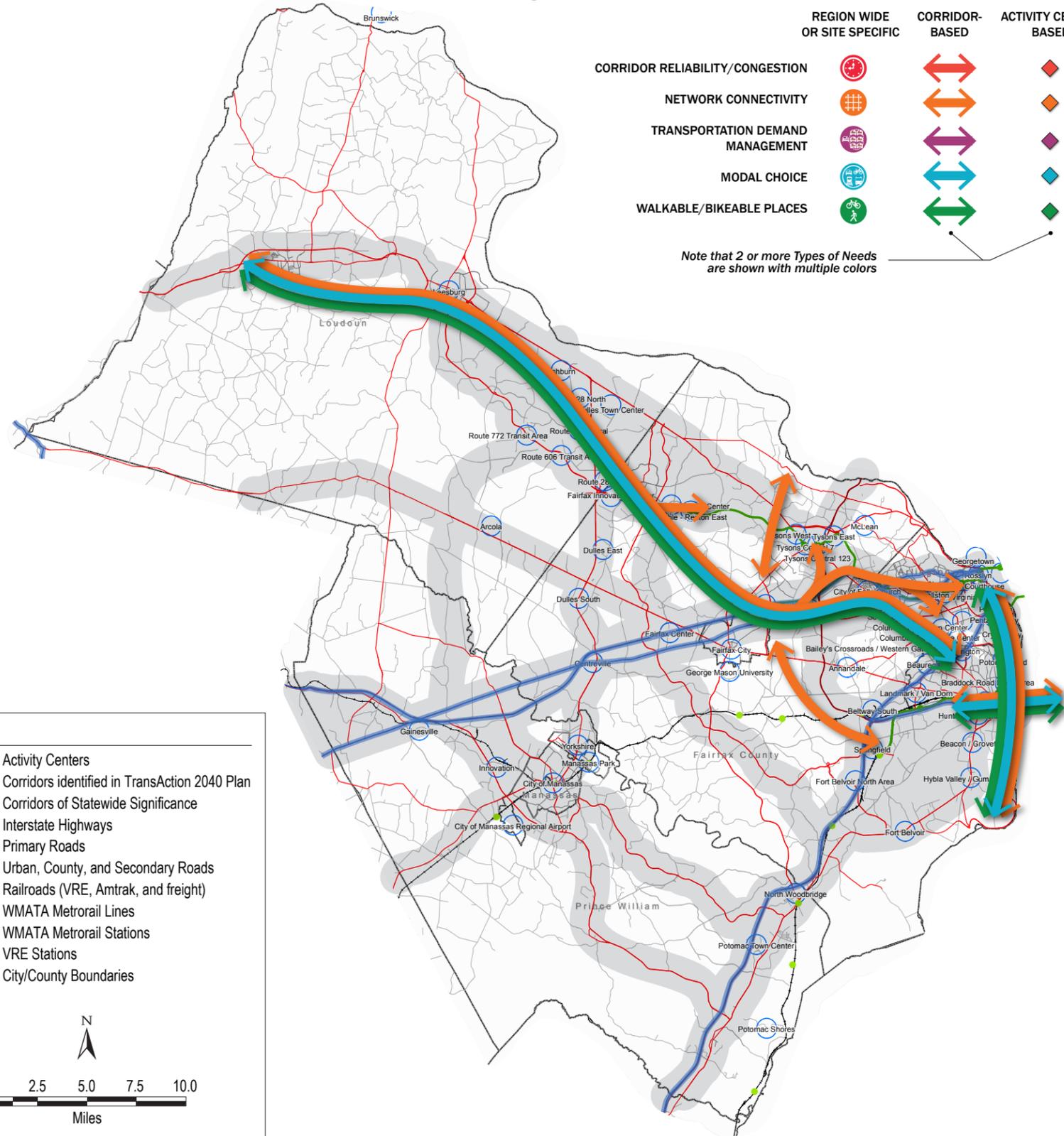
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Legend

- Activity Centers
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- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries

N

0 2.5 5.0 7.5 10.0
Miles



Northern Virginia Region Draft Needs Summary

Needs Map: Need F

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors

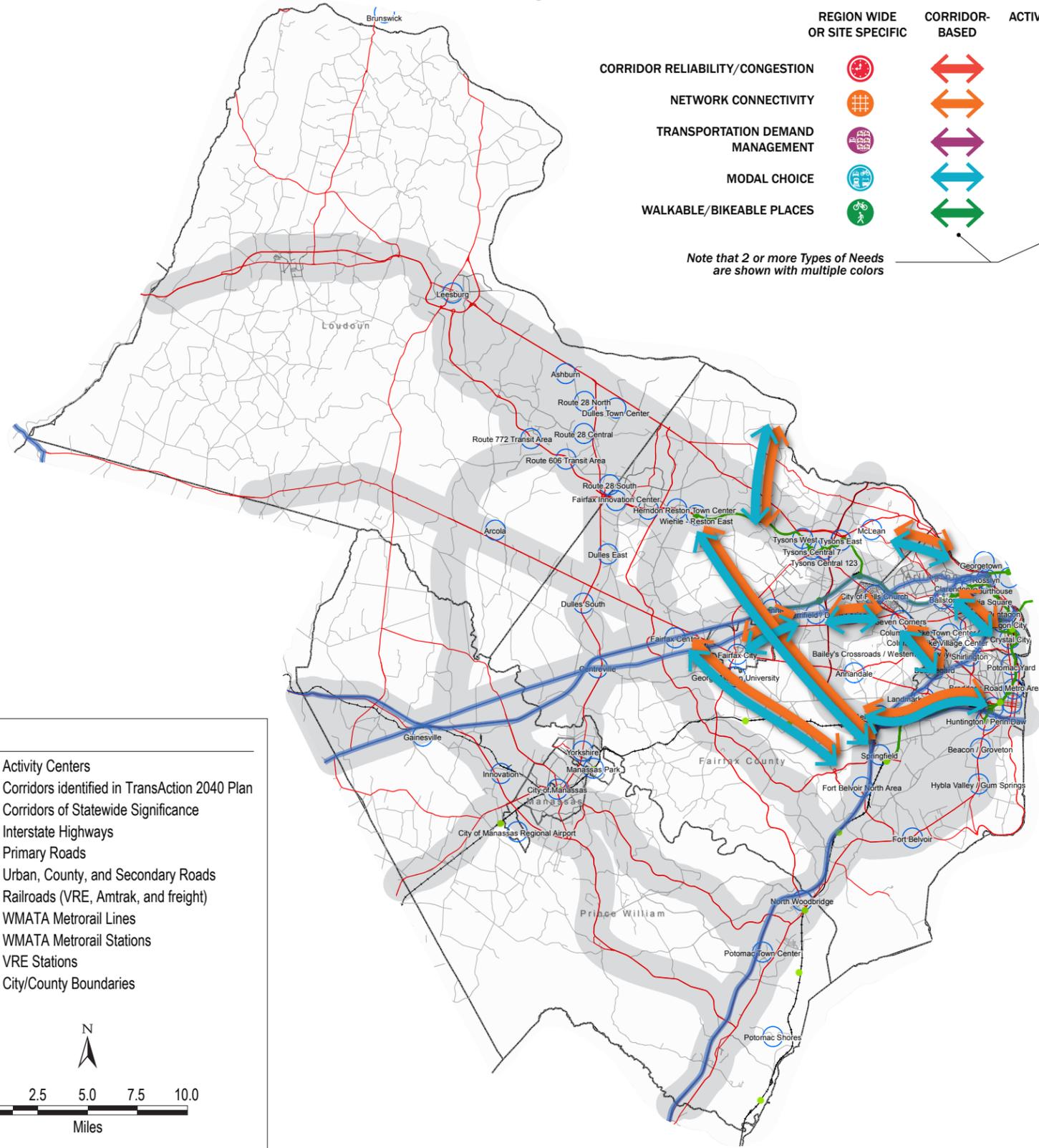
Needs Table

NEED	ECONOMIC	TRANSPORTATION	EXAMPLE LOCATIONS*
F Improve multimodal connectivity among existing and emerging activity centers	<p>Many key roadways and bicycle and transit networks in the region were designed to provide routes for commuters into and out of the District of Columbia and "first-tier" suburbs, which historically contained most of the region's employment centers. But employment and residential growth patterns have changed over the years, to the point that high concentrations of jobs and services as well as residential communities are located in a wide range of areas throughout Northern Virginia. Today, the volume of residents traveling between activity centers in non-core areas ("suburb to suburb") is higher than the planned capacity on many roadway and bicycle networks. Connectivity improvements can improve the efficiency of travel throughout the Northern Virginia region and may thereby reduce congestion on routes leading into the region's core areas.</p>	<p>Improving multimodal accessibility to and within existing and emerging activity centers can improve their attractiveness and economic prospects. The need is particularly urgent in areas where private investors and local governments have developed partial multimodal networks and mixed-use communities. In these cases, filling in multimodal network gaps would maximize the return on investment and strengthen the ability of localities to attract the planned balance of residents and workers.</p>	<p>In many areas, completion of "missing links" to planned transportation system networks will enhance accessibility for travelers using all modes. Disconnected roadway, transit, bicycle and pedestrian networks force travelers to take circuitous routes, resulting in neighborhood congestion and air quality issues. Lack of connections also discourages travelers from choosing to walk or bike for short trips. Making suburban activity centers more transit-accessible can further help to alleviate or reduce traffic congestion by enabling communities to add jobs and workers that generate fewer vehicle trips than the number of trips that area associated with automobile-oriented growth.</p>
			<p>Accessibility between activity centers such as those in Arlington; Alexandria; Tysons; Reston; Springfield; Merrifield; Baileys Crossroads; Columbia Pike; Seven Corners; Fairfax Center, and other areas with high concentrations of economic activity and high travel volumes.</p>

* Example locations are provided for illustrative purposes only. The inclusion of example locations does not indicate that areas omitted do not fit the description of this need.

Legend

- Activity Centers
- Corridors identified in TransAction 2040 Plan
- Corridors of Statewide Significance
- Interstate Highways
- Primary Roads
- Urban, County, and Secondary Roads
- Railroads (VRE, Amtrak, and freight)
- WMATA Metrorail Lines
- WMATA Metrorail Stations
- VRE Stations
- City/County Boundaries



Northern Virginia Region Draft Needs Summary

Needs Map: Need G

TYPES OF NEEDS

	REGION WIDE OR SITE SPECIFIC	CORRIDOR-BASED	ACTIVITY CENTER-BASED
CORRIDOR RELIABILITY/CONGESTION			
NETWORK CONNECTIVITY			
TRANSPORTATION DEMAND MANAGEMENT			
MODAL CHOICE			
WALKABLE/BIKEABLE PLACES			

Note that 2 or more Types of Needs are shown with multiple colors

Needs Table

NEED	DESCRIPTION
G	Improve rail accessibility and reliability for both freight and passengers
NEED	<p>Rail lines throughout the region enable inter-regional movement for both freight and passengers. Rail services suffer from congestion and unreliability. Passenger rail services connect workers and consumers with areas of concentrated economic activity, while freight rail brings needed goods into and out of the region.</p>
ECONOMIC	<p>Freight and passenger rail transportation supports the region's economy. Workers in all sectors rely on VRE and Amtrak for inter-city service. Providing multimodal alternatives to commuters using key corridors (I-95, I-66, I-395) prevents congestion and reliability from worsening on roadways.</p>
TRANSPORTATION	<p>Rail traffic throughout the region is congested and suffers from delays that affect passenger and freight traffic. Some existing VRE stations have inadequate platforms. Conflicts between passenger and freight trains can magnify the negative impacts of even slight delays.</p>
EXAMPLE LOCATIONS*	<p>North-South rail lines along I-95, VRE, Amtrak, and freight lines throughout the region.</p>

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Legend

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