



VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Seminole Corridor (I)

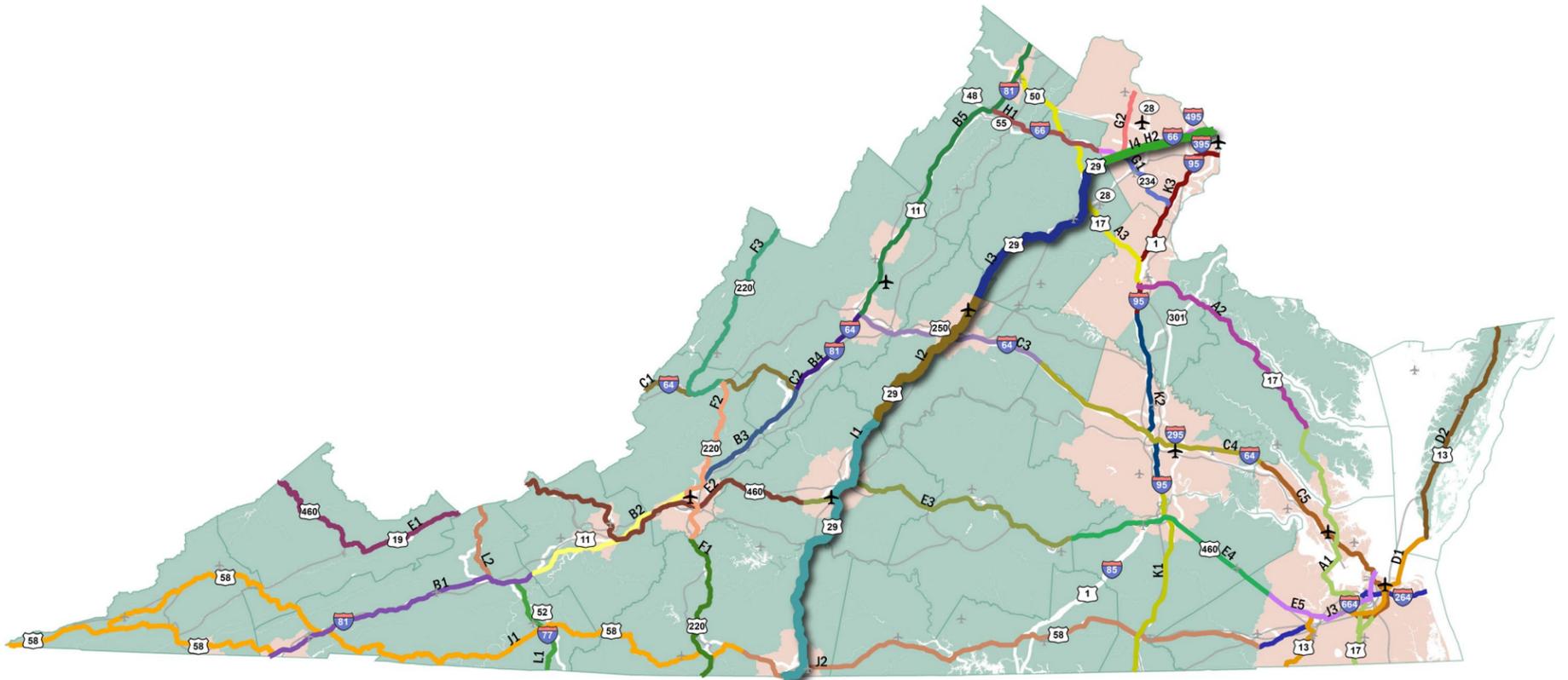


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See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



- **Corridor of Statewide Significance**
(color varies by segment)
- Railroad**
- Airport Facility**
(grey denotes not a commercial service airport)
- Metropolitan Planning Organization Area**

The Seminole Corridor (Corridor I) is defined primarily by US 29, which runs north to south in the eastern United States for more than 1,000 miles. The northern terminus of US 29 is in the suburbs of Baltimore, Maryland, and its southern terminus is in Pensacola, Florida. US 29 serves as the major north-south corridor through central Virginia, as it lies between I-95 and I-81. It provides the main connection between the Metropolitan Washington Area and the Cities of Charlottesville, Lynchburg, and Danville. US 29 is also designated as a National Scenic Highway.

US 29 is a multi-lane highway through Virginia, with most sections at four lanes. In the Northern Virginia Area and the northern portion of the Charlottesville-Albemarle Area, US 29 serves as an arterial roadway. Although US 29 provides local access to many areas, there are numerous grade-separated interchanges along its length. Business spurs of US 29 are present in almost all of the urbanized areas on the Seminole Corridor. US 29 serves as a parallel corridor and local-access route for I-66 in Northern Virginia. Route 28 also serves as a parallel corridor for US 29 between the western end of Fairfax County and Fauquier County. US 50 serves as a parallel roadway through Fairfax and Arlington Counties. South of Fauquier County, there are no continuous parallel roadways. US 29 runs concurrently with other roadways throughout its course in Virginia, including US 15 for a long stretch near Warrenton, US 250 near Charlottesville, and US 460 near Lynchburg.

Multiple line-haul transit options are available along US 29, primarily in the Northern Virginia Area. Options for passenger travel include:

- Metrorail’s Orange and Silver Lines, which run parallel to US 29 from Arlington to Vienna with multiple stations and almost 9,000 Park-and-Ride spaces available. Phase II of the Silver Line – currently under construction – will provide a direct connection to Dulles Airport and into Loudoun County;
- Bus services provided by Fairfax Connector, Loudoun County Transit, Potomac and Rappahannock Transportation Commission (PRTC), ART, and CUE in the Northern Virginia Area. Express bus service from Culpeper to Washington, DC is provided by Rappahannock Rapidan Community Services;
- Virginia Railway Express (VRE), which operates commuter trains along the corridor between Manassas and Washington, DC on the Norfolk Southern Piedmont freight rail;
- Amtrak’s Crescent and Cardinal Routes, which provide passenger rail service, running directly along the Norfolk Southern rail lines within the Seminole Corridor with stops in Lynchburg, Charlottesville, Washington, DC, and Manassas;
- Greyhound, which offers bus service along the entire Seminole Corridor, with stations located in Danville, Lynchburg, Charlottesville, and Northern Virginia (in Springfield and Woodbridge);
- Express-bus transit service between Lovingston in Nelson County and the City of Charlottesville, provided by JAUNT;
- Multiple Park-and-Ride lots available throughout the Seminole Corridor, with large clusters in the Northern Virginia Areas associated with Metrorail and VRE stations; and
- Commercial air service, most readily available at Dulles International Airport in the Northern Virginia Area. Limited commercial service to larger cities is available at Charlottesville-Albemarle Airport and Lynchburg Regional Airport. In addition, there are numerous general-aviation facilities within the corridor.

Corridors of Statewide Significance

A	Coastal Corridor (US 17)
B	Crescent Corridor (I-81)
C	East-West Corridor (I-64)
D	Eastern Shore Corridor (US 13)
E	Heartland Corridor (US 460)
F	North Carolina to West Virginia Corridor (US 220)
G	North-South Corridor (Route 234)
H	Northern Virginia Corridor (I-66)
I	Seminole Corridor (US 29)
J	Southside Corridor (US 58)
K	Washington to North Carolina Corridor (I-95)
L	Western Mountain Corridor (I-77)

Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to points south along US 29 as well as north of Washington, DC. The eastern line of Norfolk Southern’s Crescent Route also runs along US 29, connecting the Virginia Inland Port and the western line of Norfolk Southern’s Crescent Corridor via the I-66 corridor. In Charlottesville, there is a junction between Norfolk Southern’s Crescent Corridor and CSX’s Coal Corridor, which provides a connection between the Port of Virginia facilities in the Hampton Roads Area and the Appalachian coal fields to the west. In the Lynchburg Area, there is a junction between three major Norfolk Southern rail corridors: the Crescent Corridor, the Coal Corridor, and the Heartland Corridor, which connect to the Port of Virginia facilities in the Hampton Roads Area, the Appalachian coal fields, and the Midwest.

Corridor Components

Highway Facilities

- | | |
|---------------------------------|---|
| Primary Facility | • US 29 |
| Other Highway Facilities | • US 50
• US 29 Business
• Route 28 |

Transit Services

- Metrorail Orange Line
- Metrorail Silver Line
- Virginia Railway Express
- Amtrak
- Intercity bus service

Rail Facilities

- Norfolk Southern Crescent Corridor

Airport Facilities

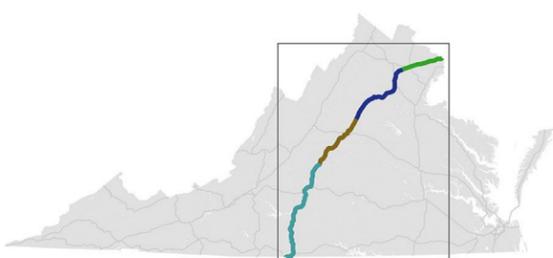
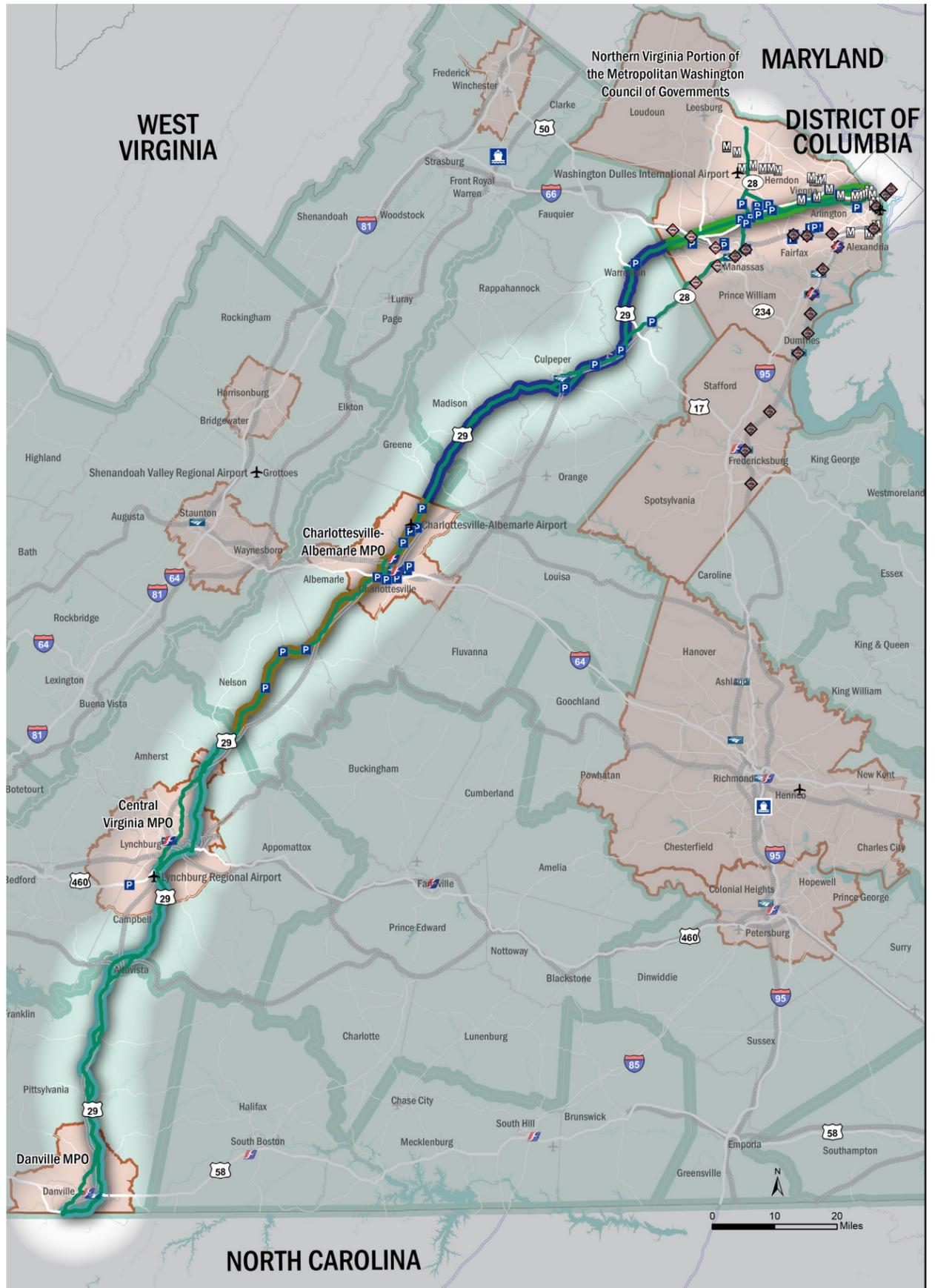
- Washington Dulles International
- Charlottesville-Albemarle Airport
- Lynchburg Regional Airport

Corridor Segments:

- I1
- I2
- I3
- I4

- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility

- MPO Area
- Planning District Area



CORRIDOR I OVERVIEW

Demographics and Economic Trends

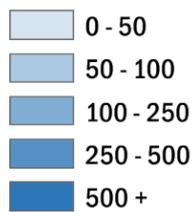
The primary population centers, with greater than 500 persons per square mile, along Corridor I are currently found in the Northern Virginia Area. Small pockets with population densities greater than 500 persons per square mile along the corridor are also found in Danville, Lynchburg, and Charlottesville. The most densely-populated segment along the corridor is Segment I4 in the Northern Virginia Area. Nelson and Madison Counties have the lowest population densities along the corridor with less than 50 persons per square mile.

Between 2012 and 2025, the northern half of the Corridor is anticipated to see the largest population growth. Between 11 and 25 percent population growth is anticipated in Albemarle, Greene, Culpepper, Fauquier and Prince William Counties. Pittsylvania, Amherst and Nelson Counties are expected to see the lowest growth, while the populations of the City of Danville and Arlington County are expected to decrease. Overall, population along the corridor is expected to grow.

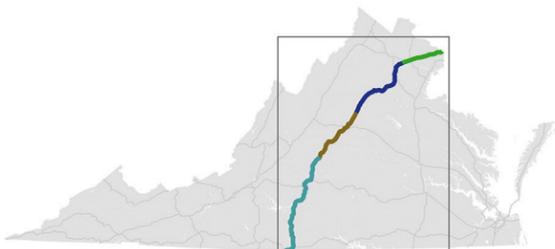
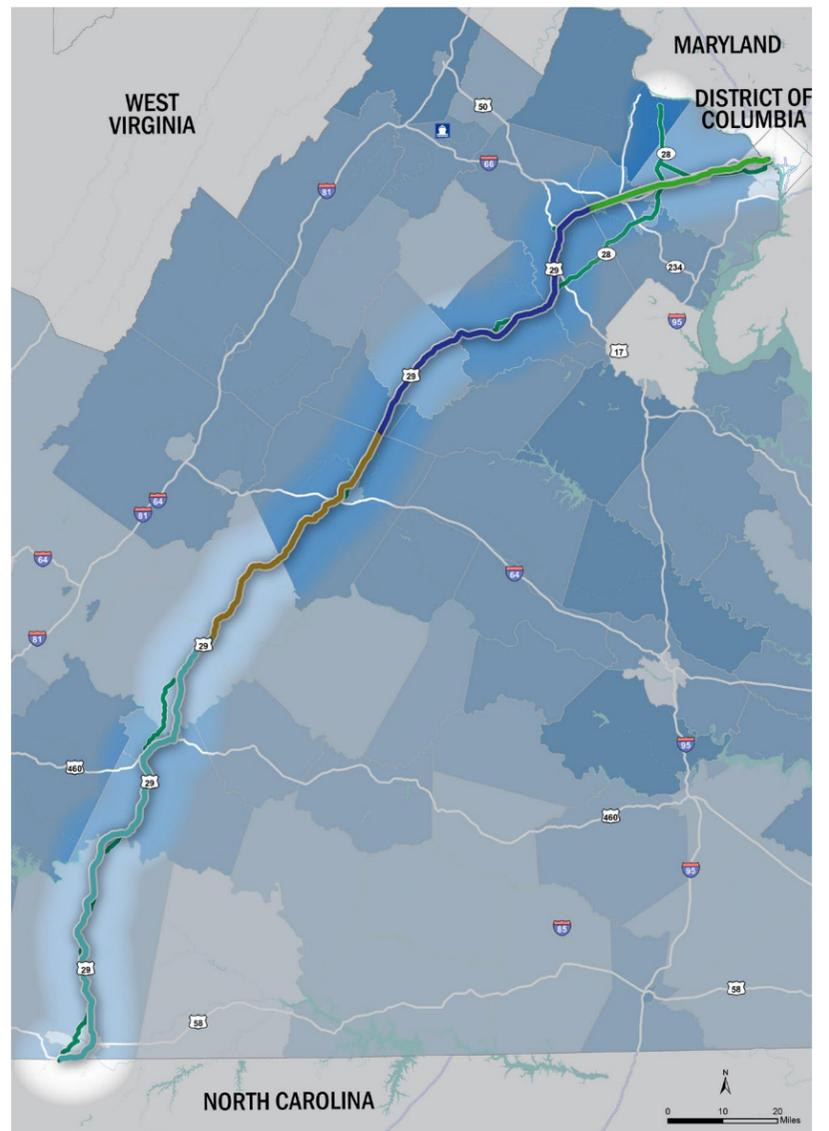
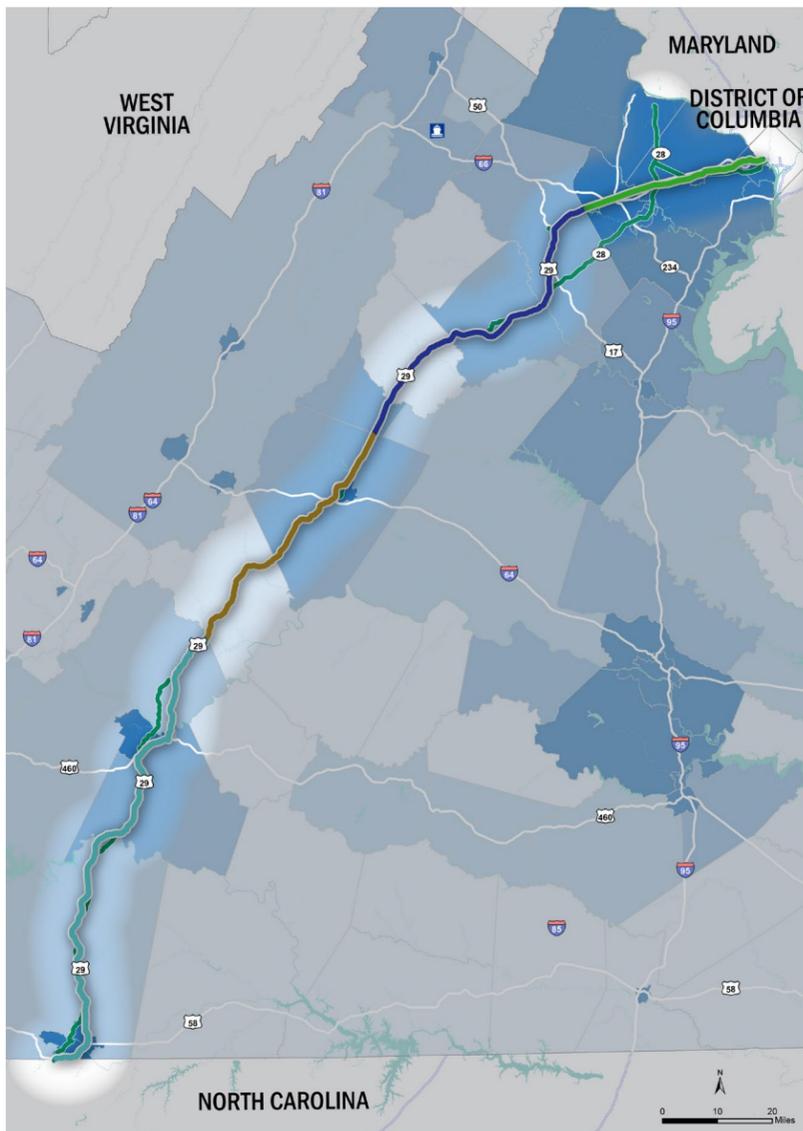
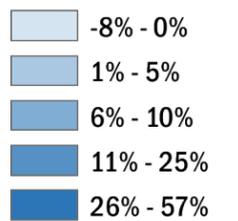
Current employment centers follow a pattern similar to the population centers. Employment is expected to have the highest growth in Greene and Prince William Counties, but is expected to decline in the Cities of Danville and Lynchburg, and in Amherst County.

Corridor I passes through four Metropolitan Planning Organization (MPO) areas along its route, each with a different size and focus for its local economy. The Northern Virginia Area has the highest GDP of any of the MPO areas in the corridor. The largest industry sectors in the corridor include professional/scientific/technical services, public administration, and retail trade.

**2012 Population Density
Persons / Square Mile**

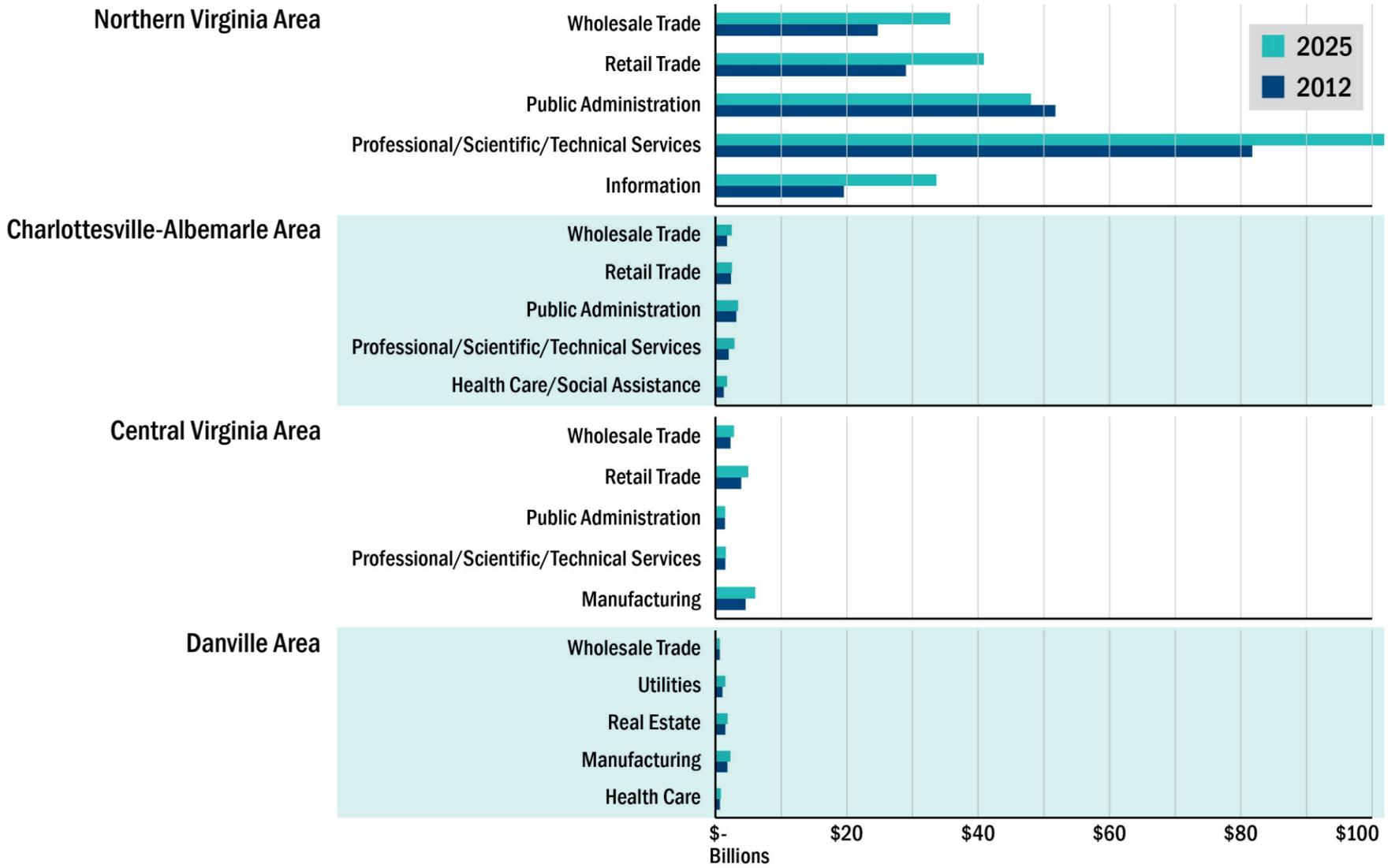


**Population Growth
(2012-2025
Percent Change)**

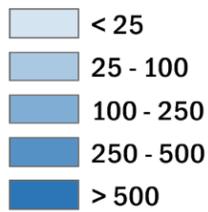


CORRIDOR I OVERVIEW

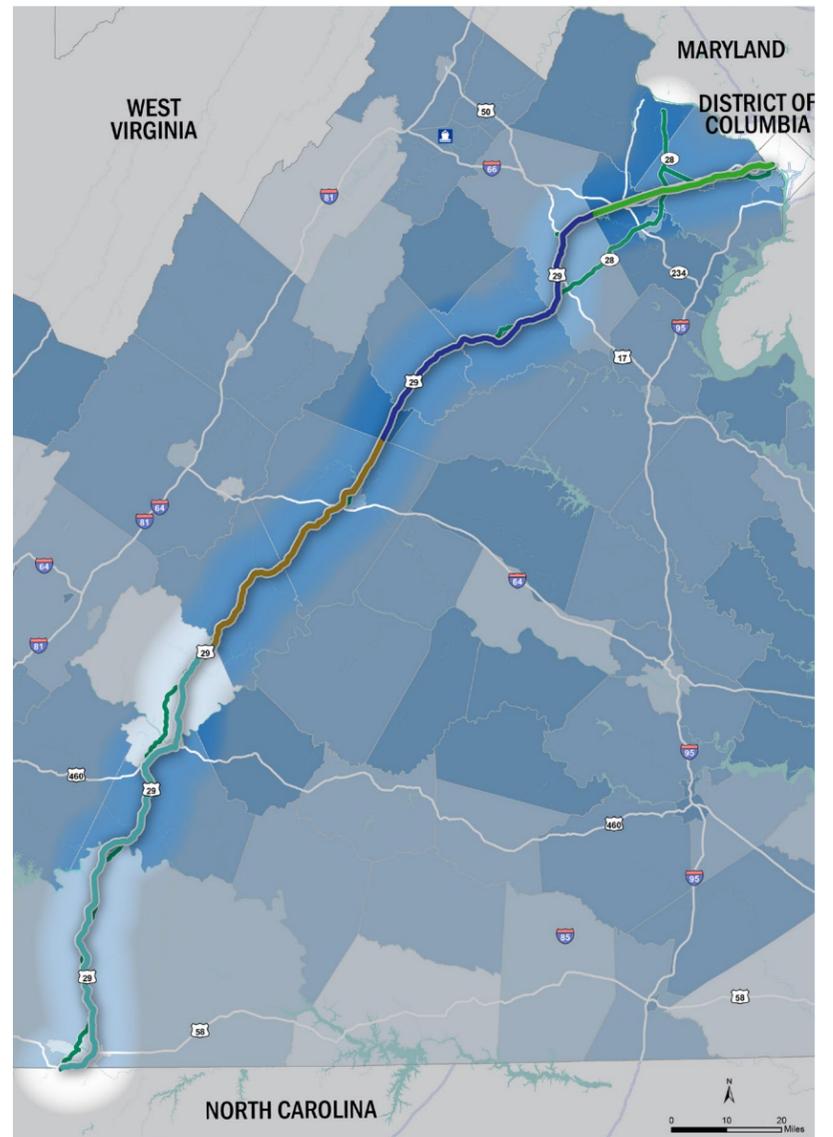
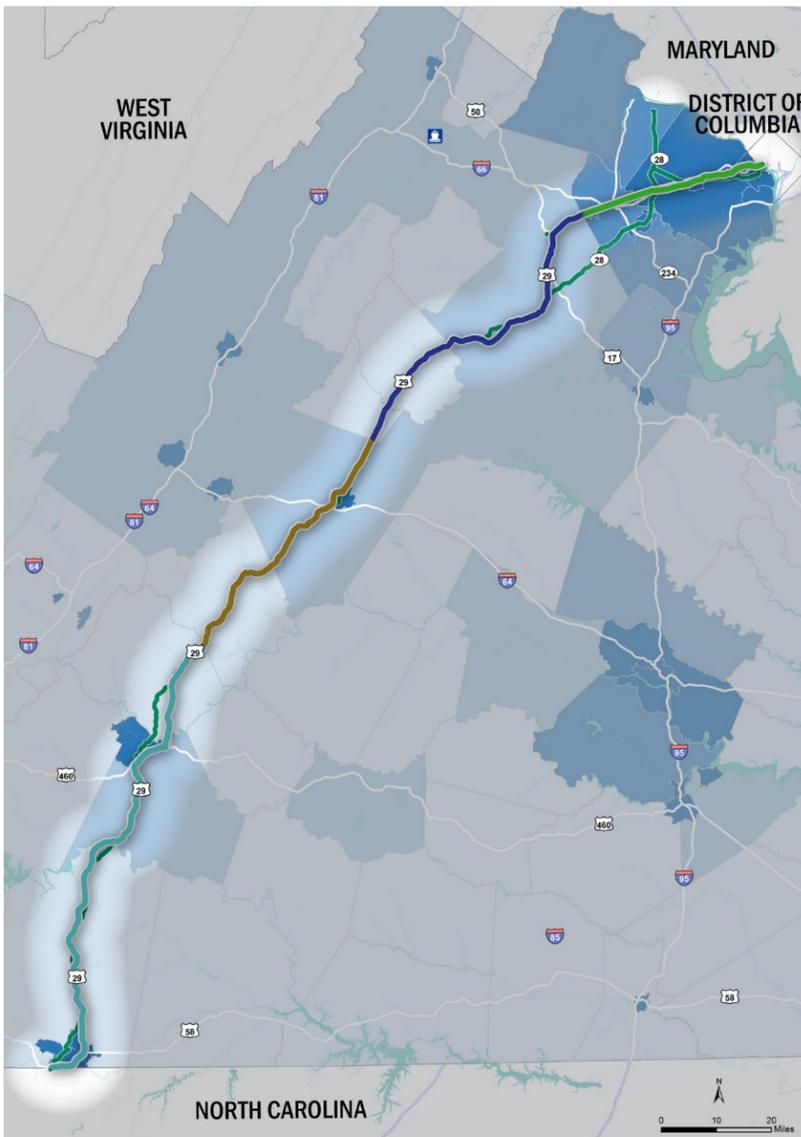
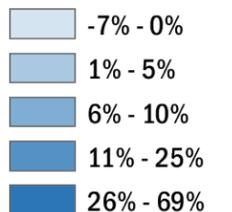
Top Industries (GDP)



2012 Employment Density Jobs / Square Mile



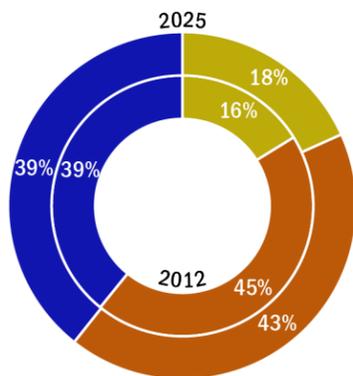
Employment Growth (2012-2025) Percent Change



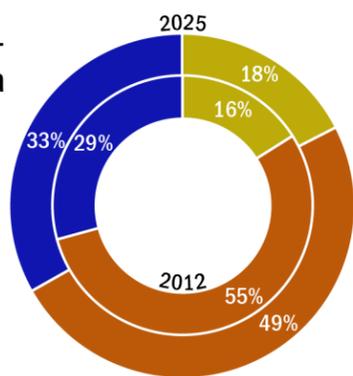
CORRIDOR I OVERVIEW

Corridor Travel Patterns

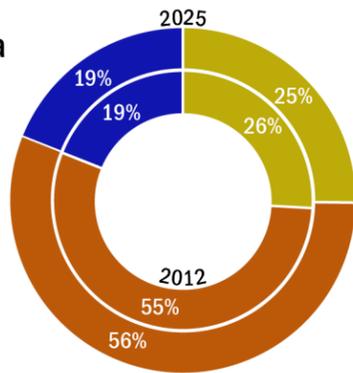
Northern Virginia Area



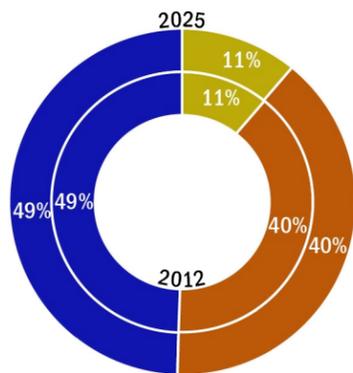
Charlottesville-Albemarle Area



Central Virginia Area



Danville Area



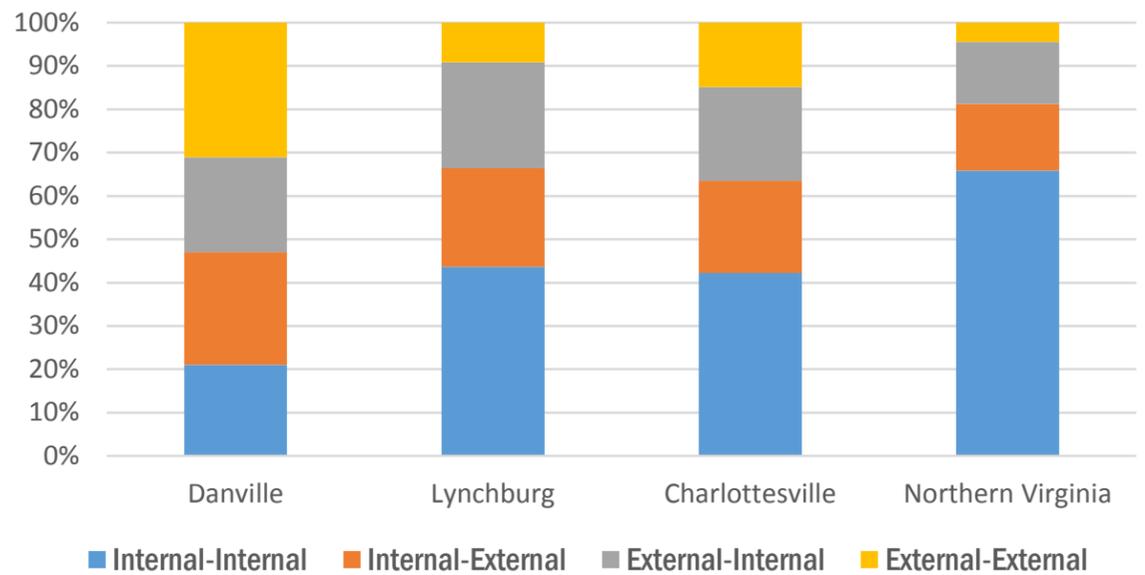
GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Passenger

Corridor I connects the District of Columbia to North Carolina, and passes through four MPO areas along its route: Danville, Central Virginia, Charlottesville-Albemarle, and Northern Virginia. In the Danville Area, traffic on Corridor I is distributed fairly evenly between local (21 percent) and pass-through (31 percent) traffic. In the Central Virginia area, traffic is more oriented towards local trips, with 44 percent comprised of internal local trips and less than ten percent comprised of pass-through trips. In the Charlottesville Area, local trips are also more prevalent - 42 percent of the traffic consists of local internal trips and 15 percent consists of pass-through trips. In Northern Virginia, Corridor I is dominated by local internal trips which account for 65 percent of the total passenger traffic. Less than five percent of the total traffic along Corridor I is pass-through traffic in Northern Virginia.

Distribution of Internal and External Travel



Freight

By truck, Corridor I carried 33 million tons of freight worth \$32 billion in 2012, and is estimated to carry 42 million tons of freight worth \$45 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there.

By rail, Corridor I carried 53 million tons of freight worth \$39 billion in 2012, and is estimated to carry 63 million tons of freight worth \$51 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value.

Truck Freight

2012	2025
Truck Freight Value	Truck Freight Value
\$32 Billion	\$45 Billion
Truck Freight Tonnage	Truck Freight Tonnage
33 Million Tons	42 Million Tons
Freight Value per Ton	Freight Value per Ton
\$956	\$1060
Corridor Tonnage Passing Through	Corridor Tonnage Passing Through
19%	19%

Rail Freight

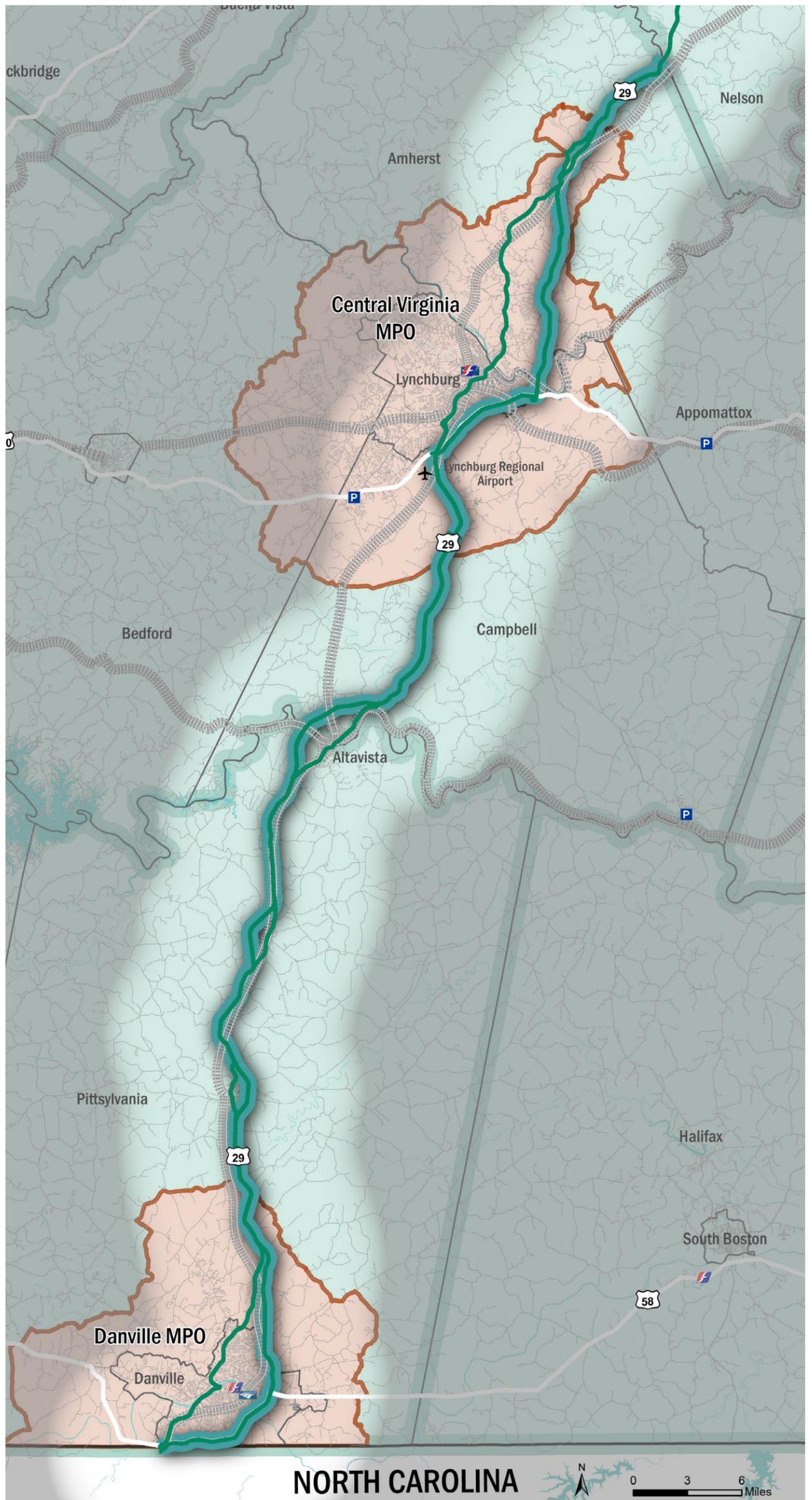
2012	2025
Rail Freight Value	Rail Freight Value
\$39 Billion	\$51 Billion
Rail Freight Tonnage	Rail Freight Tonnage
53 Million Tons	63 Million Tons
Freight Value per Ton	Freight Value per Ton
\$733	\$811
Corridor Tonnage Passing Through	Corridor Tonnage Passing Through
65%	64%

II. Segment I1

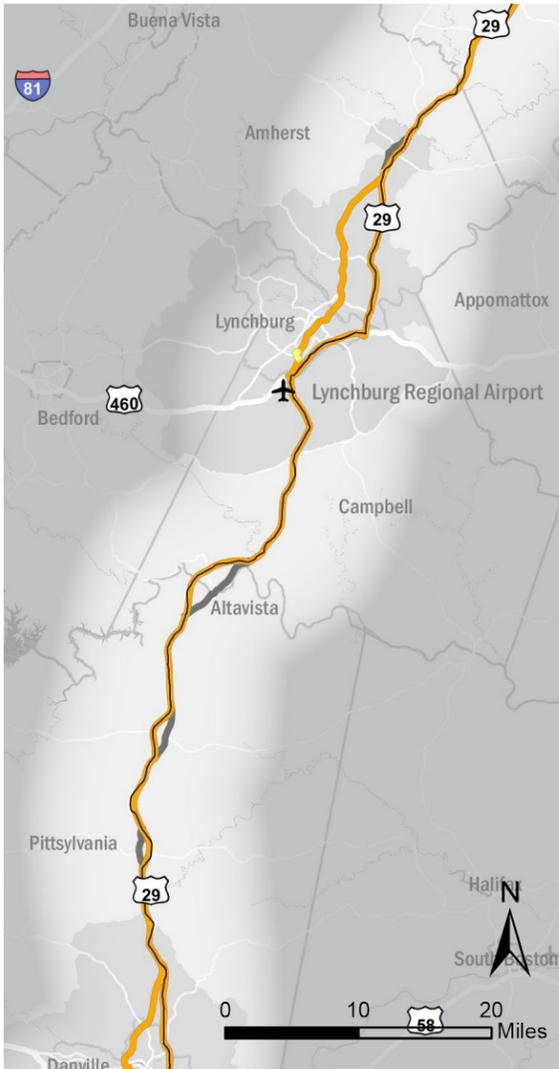
Corridor Segment I1 Components

- US 29
- US 29 Business
- Norfolk Southern Crescent Corridor
- Amtrak
- Lynchburg Regional Airport

-  Segment I1
-  Corridor Component Road
-  Railroad
-  Airport Facility
-  Amtrak Facility
-  Greyhound Facility
-  VRE Facility
-  Metrorail Facility
-  Port Facility
-  Park & Ride Facility
-  MPO Area
-  Planning District Area



I1 SEGMENT PROFILE



Segment I1 runs from North Carolina through the Danville and Central Virginia Areas serving Pittsylvania, Campbell, and Amherst Counties, in addition to the Cities of Danville and Lynchburg. The primary facility that defines this segment is US 29 which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout Segment I1, US 29 is a four-lane highway. US 29 Business provides local access to the downtown areas of many of the urbanized areas along the segment, including Danville, Chatham, Gretna, Altavista, Lynchburg, and Amherst. US 29 runs concurrently with US 460 (Segment E3) for a short distance in the City of Lynchburg, and with US 58 in the City of Danville.

Transit Services: Amtrak’s Crescent Route, running from New York to New Orleans, provides passenger rail service along the Norfolk Southern rail lines within the Seminole Corridor, including stops in Lynchburg and Danville. Greyhound bus offers bus service along the entire corridor, also providing stops located in Danville and Lynchburg.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC. In the Central Virginia Area, there is a junction between three major Norfolk Southern rail corridors: the Crescent Corridor, the Coal Corridor, and the Heartland Corridor, which connect the Port of Virginia facilities in the Hampton Roads Area, the Appalachian coal fields, and the Midwest.

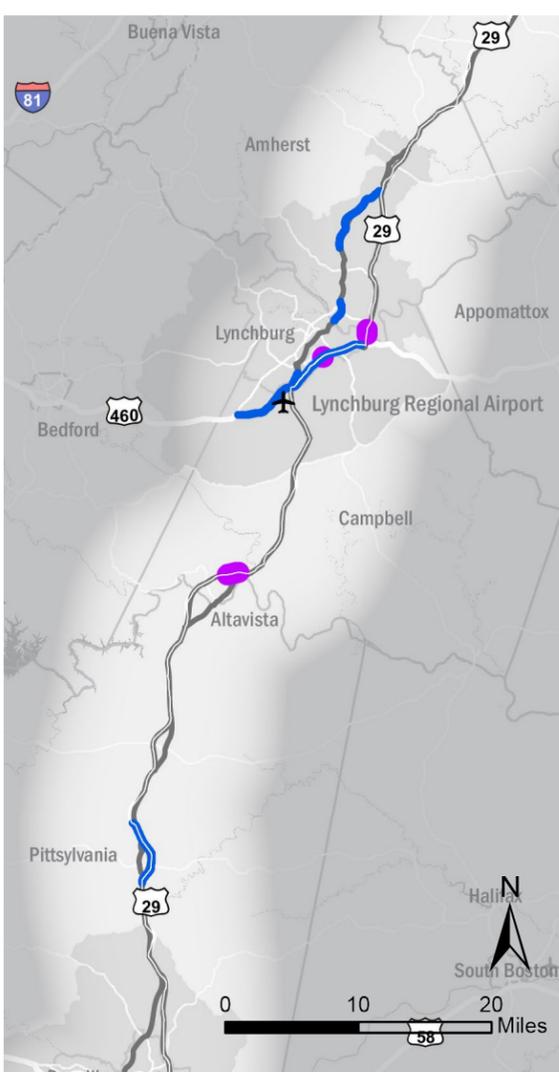
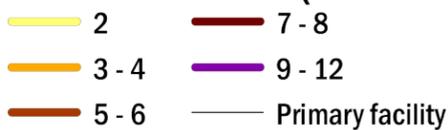
Port Facilities: No port facilities are located directly adjacent to Segment I1.

Airport Facilities: The Lynchburg Regional Airport is the only commercial airport in Segment I1, providing direct service only to Charlotte, North Carolina.

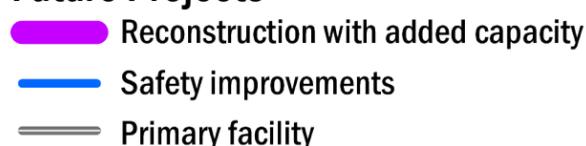
Major planned and future projects include:

- **City of Danville:** Addition of a third lane to westbound US 58 at the US 29 bypass interchange;
- **Pittsylvania County:** Four-foot paved shoulders and the addition of rumble strips along the inside and outside lanes of Chatham Bypass (US 29); and
- **City of Lynchburg:** Access management from US 501 (Campbell Avenue) to US 29 (Monacan Parkway).

Number of Lanes (both directions)



Future Projects

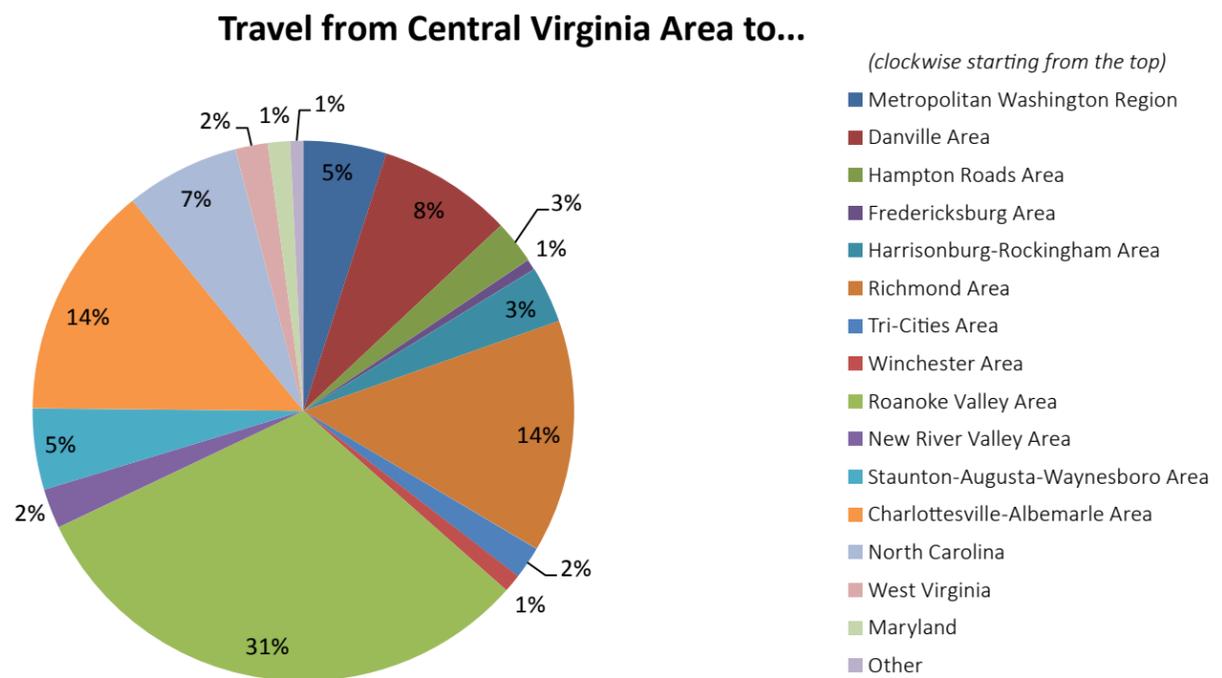
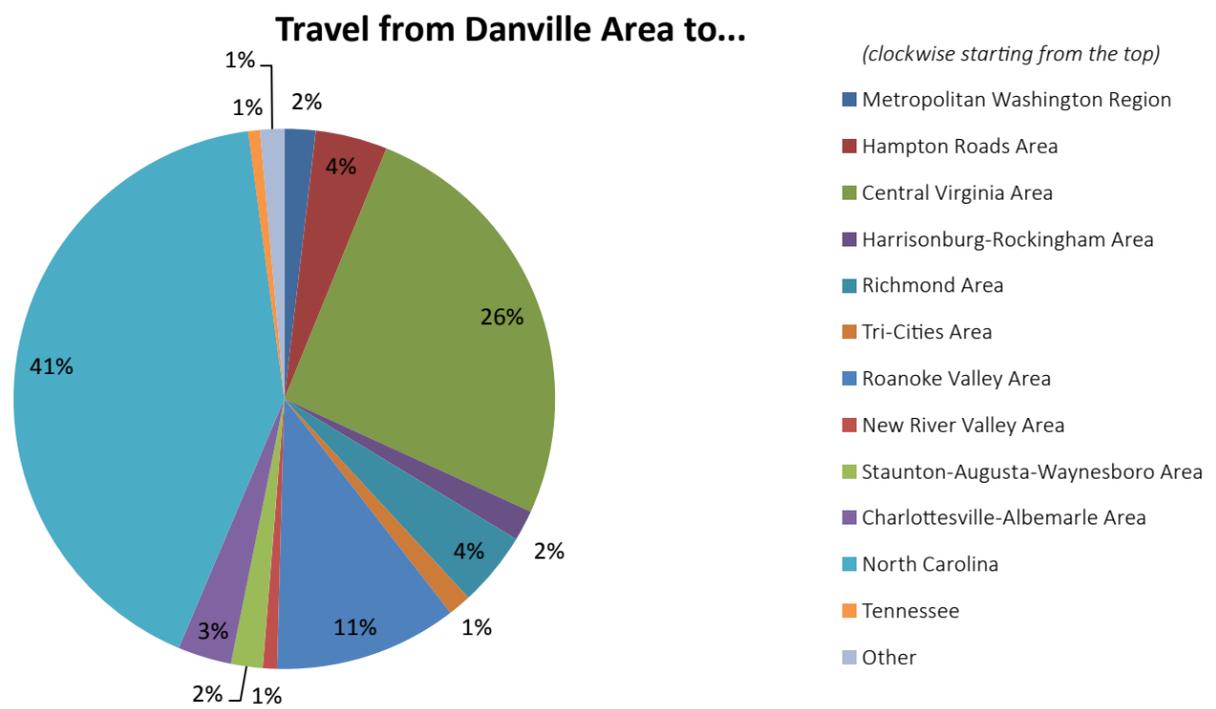


I1 SEGMENT PROFILE

Travel Demand

Passenger Demand

Segment I1, the southernmost segment of Corridor I, traverses the Danville and Central Virginia Areas. The majority of intercity passenger travel originating in the Danville Area is likely to use Segment I1, including 41 percent destined for North Carolina and 26 percent destined for the Lynchburg Area. Intercity travel from the Central Virginia Area is more distributed across the state, but several notable destinations that may make use of portions of Segment I1 include the Charlottesville-Albemarle Area (14 percent), the Danville Area (eight percent), and the Metropolitan Washington Area (five percent).



I1 SEGMENT PROFILE

Freight Demand

By truck, Segment I1 carried 14 million tons of freight worth \$19 billion in 2012, and is estimated to carry 18 million tons of freight worth \$27 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. The City of Lynchburg generates more than six percent of the total truck freight value in the corridor, with major truck freight flows to North Carolina, Florida, and Maryland. Campbell County and the City of Danville are also significant truck freight generators, accounting for between four and six percent of the total truck freight value in the corridor. Lynchburg is a major attractor of truck freight, accounting for four percent of total corridor truck freight value.

By rail, Segment I1 carried 25 million tons of freight worth \$17 billion in 2012, and is estimated to carry 30 million tons of freight worth \$23 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value.

Truck Freight



Rail Freight



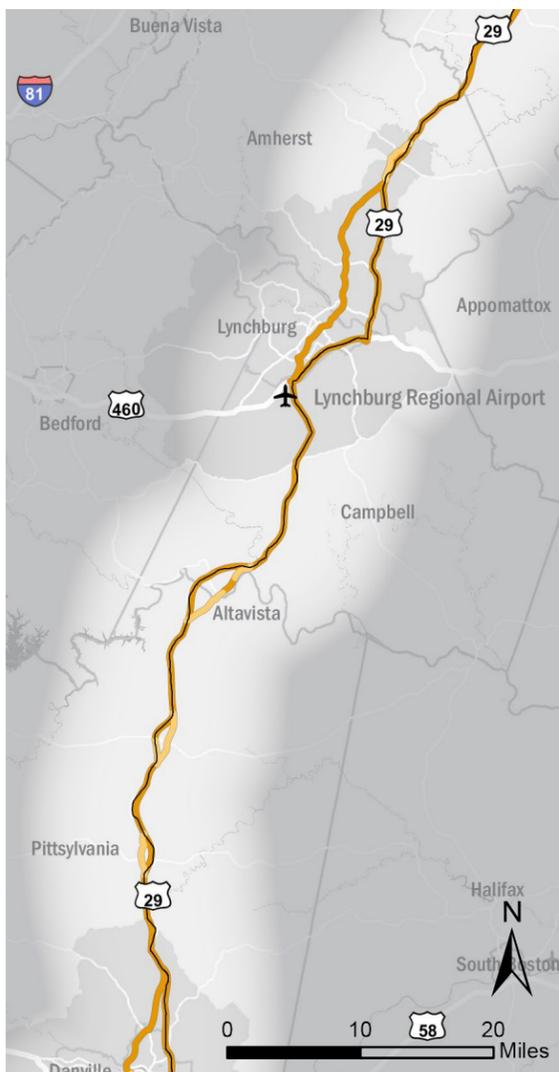
I1 SEGMENT PROFILE

Traffic Conditions

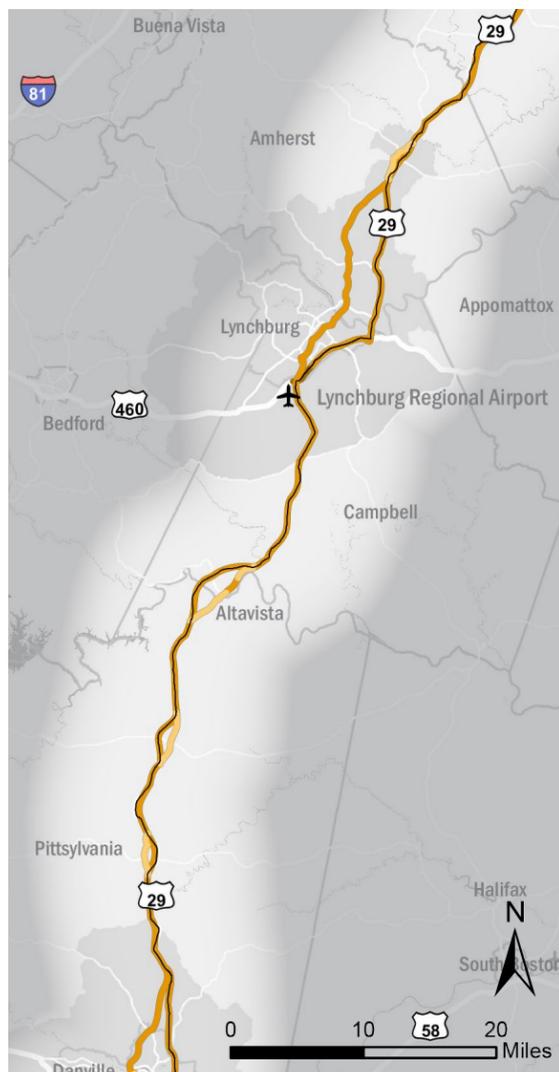
Traffic Volume and AADT

Traffic volume on Segment I1 is lower than on the northern segments of Corridor I. Throughout the segment, volumes on US 29 generally range from 10,000 to 21,000 vehicles per day. Higher traffic volumes have been observed in the Central Virginia Area (up to 45,000 vehicles per day) and in the City of Danville (up to 30,000 vehicles per day). On almost all sections of US 29 in Segment I1, traffic volumes are projected to increase by fewer than 5,000 vehicles by 2025. However, by 2025, traffic volumes along portions of US 29 and US 29 Business in Lynchburg are projected to increase by as much as 12,000 vehicles per day.

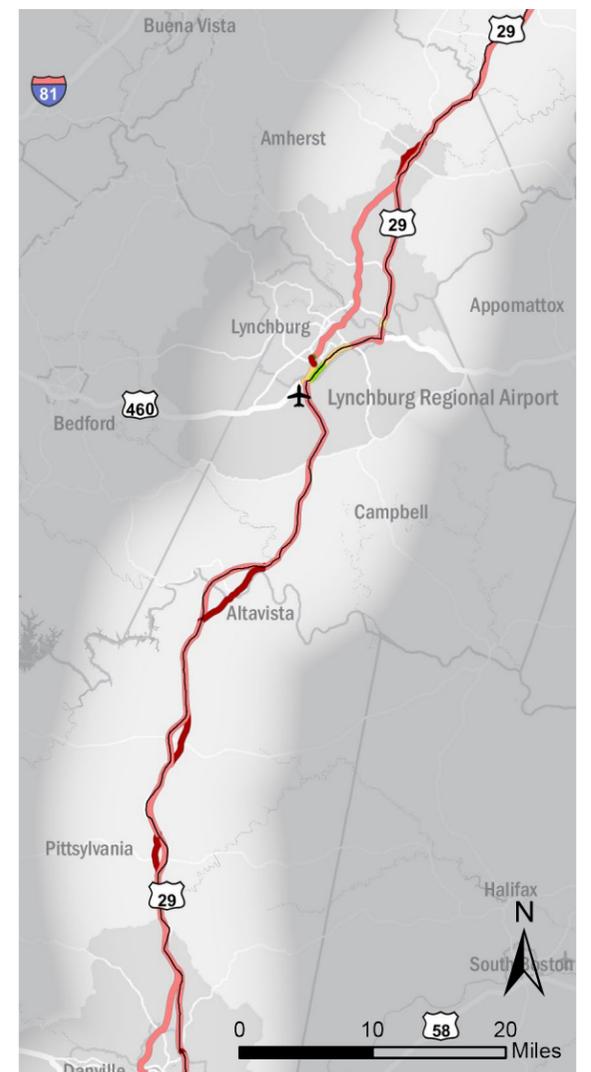
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)

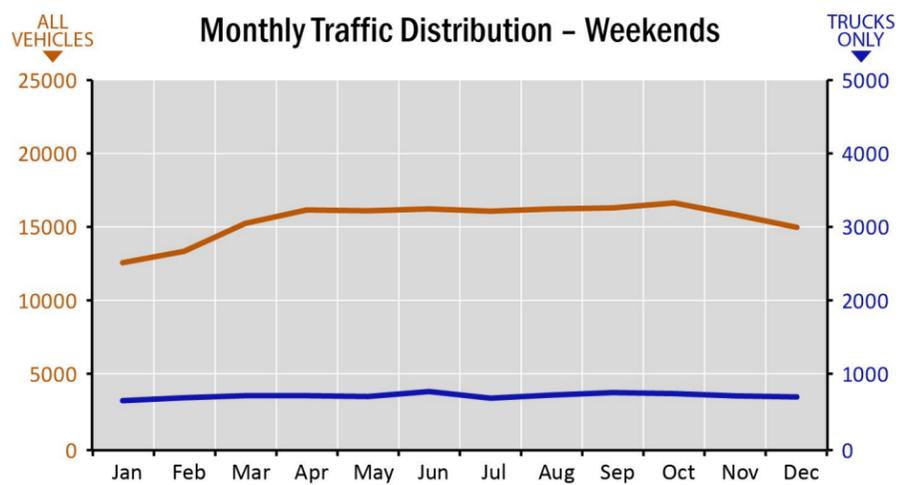
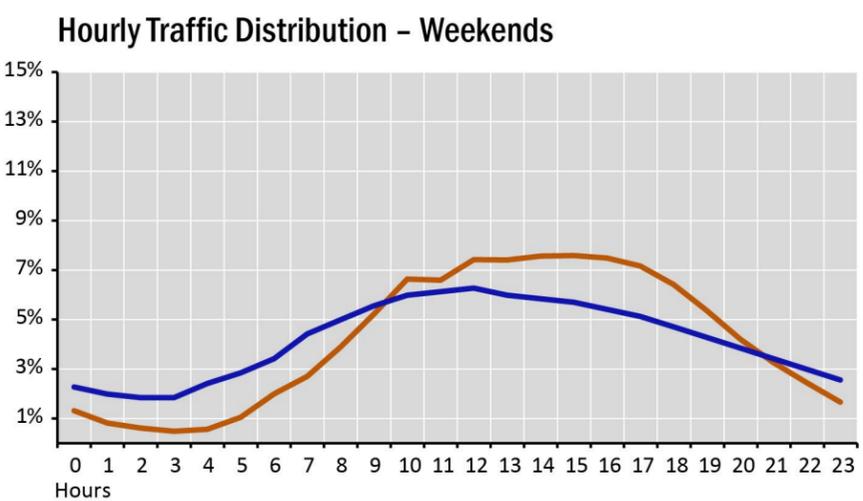
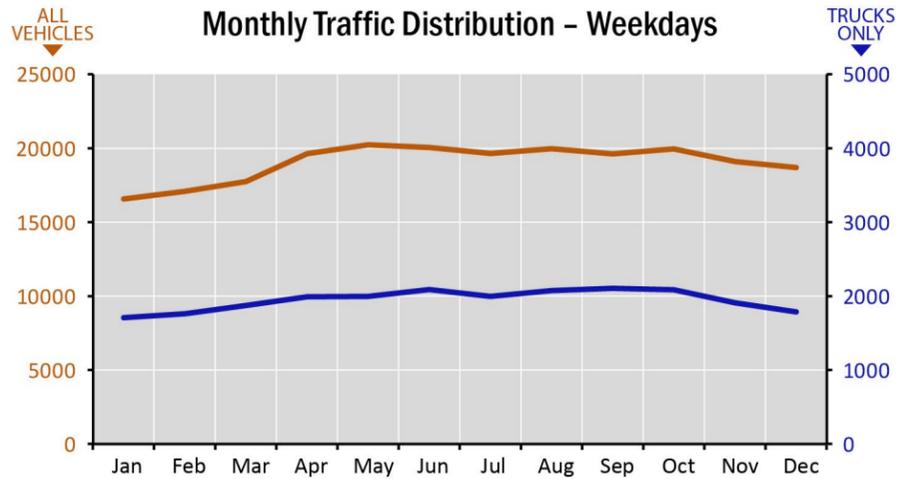
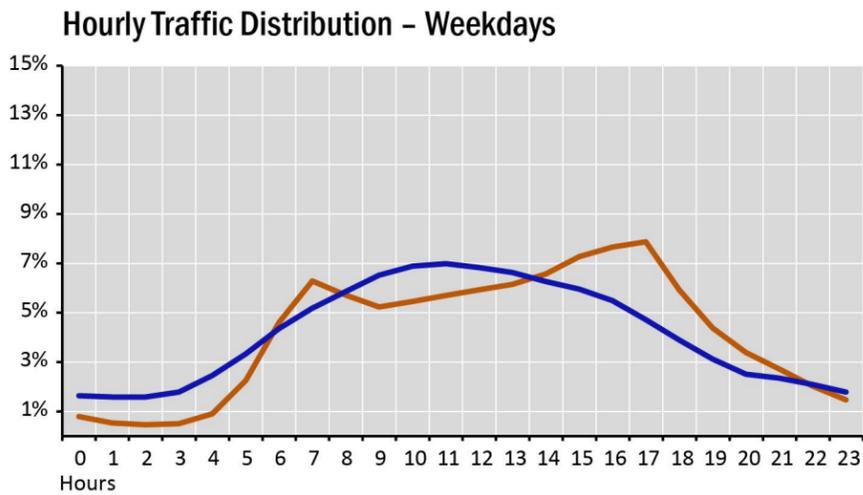


Change in Traffic Volume 2014- 2025 (AADT)



I1 SEGMENT PROFILE

— All Vehicles
— Trucks



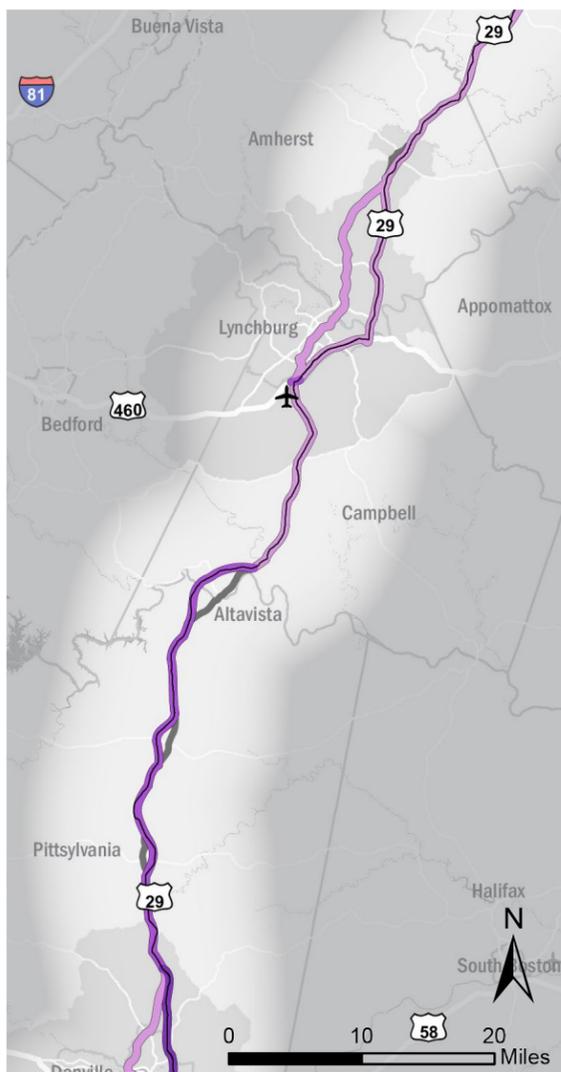
Traffic Distribution

On average, traffic on Segment I1 is distributed throughout the day as shown in the graphs below. Weekday traffic shows distinct morning and evening peak periods, typical of commute travel patterns. The highest hourly traffic occurs between 5 and 6 p.m. which accounts for 7.9 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 6.3 percent of daily traffic. The combined weekday traffic from the 7 a.m. to 7 p.m. period accounts for 76 percent of total daily traffic. Peaking patterns for truck traffic differ from commuter traffic, with a single peak during the midday period, with the highest peak hourly flow of 7.0 percent of daily traffic occurring between 11 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing a single peak during the afternoon with the highest peak hour flow between 3 and 4 p.m. (7.5 percent of daily traffic) for all traffic, and noon to 1 p.m. (6.3 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment I1 vary by as much as 22 percent throughout the year, with the highpoint in May (around 20,000 vehicles per day) and the low point in January (around 17,000 vehicles per day). Truck volumes also vary throughout the year, with the September high (around 2,100 vehicles per day) 23 percent higher than the January low (around 1,700 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 16,000 vehicles per day) are 32 percent higher than January levels (around 13,000 vehicles per day). Weekend truck traffic is marginally more steady than all vehicle traffic, with the June high 19 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I1 is high compared to the other segments in Corridor I. Along US 29 in the Danville Area, heavy trucks comprise 17 percent of total traffic. Through the remainder of Pittsylvania County, heavy trucks account for seven percent of overall traffic. Throughout the remainder of the segment, including within the Central Virginia Area, heavy trucks make up five percent or less of total daily traffic.



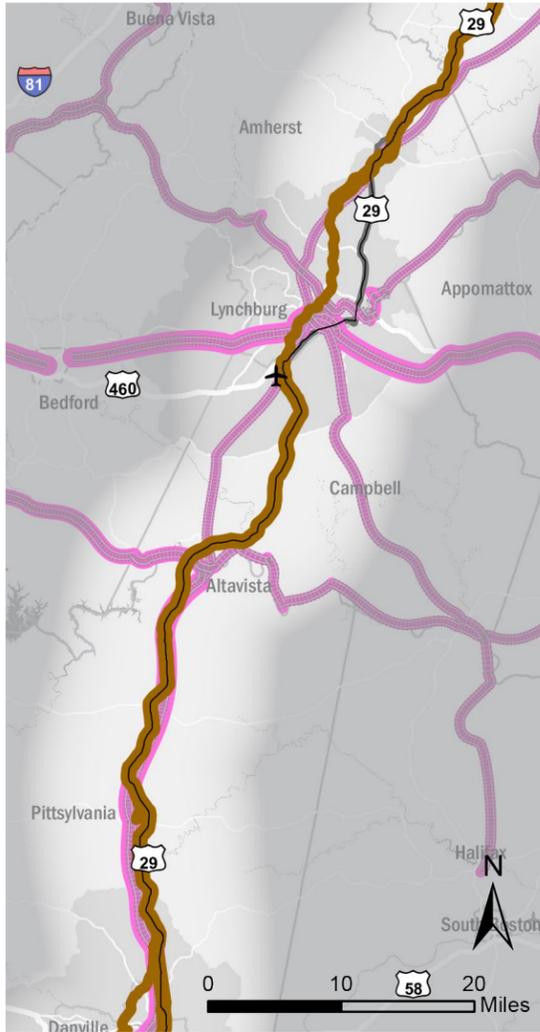
Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



I1 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

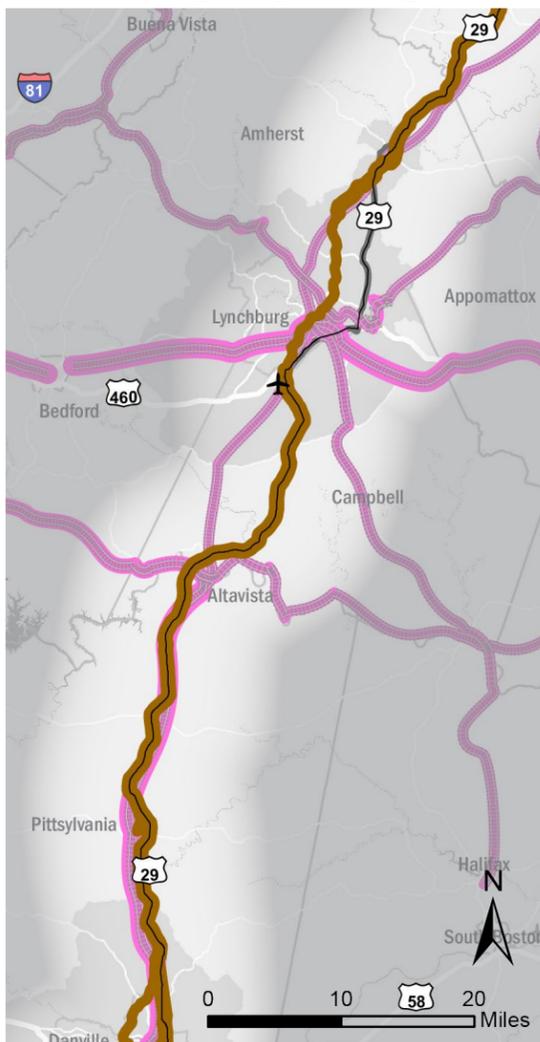


Freight Flows

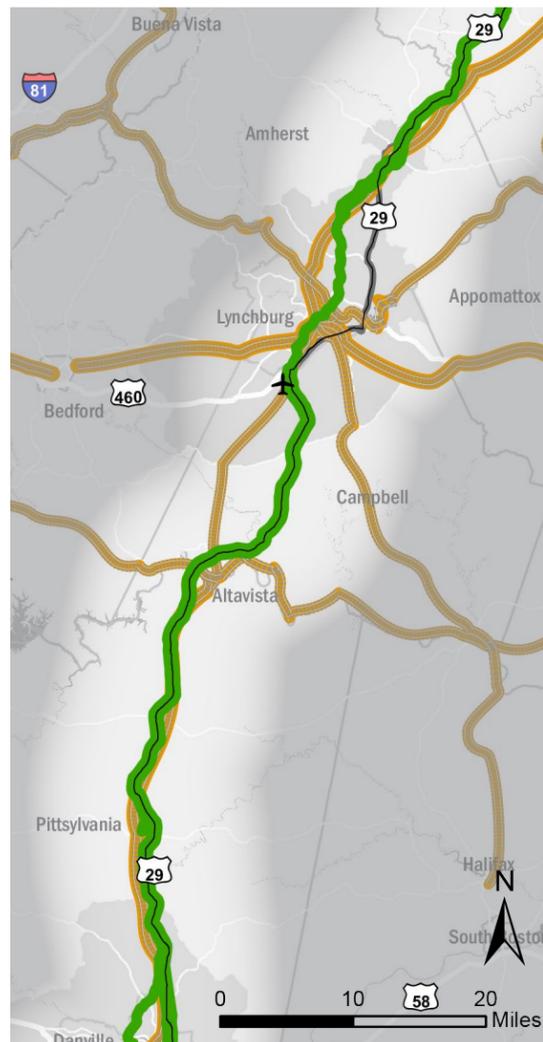
In the southern portion of Segment I1, south of Altavista, freight is primarily moved by rail in terms of tonnage, but by truck in terms of value. In total, 14 million tons (35 percent) of freight is moved through this section of Segment I1 by truck, compared to 25 million tons (65 percent) by rail. In relation to value, \$19 billion (53 percent) of freight travels by truck, while \$17 billion (47 percent) travels by rail. On average, a ton of freight traveling through this section of Segment I1 by truck and by rail is worth \$1,378 and \$663, respectively. In 2025, truck and rail freight tonnages and values in this area of Segment I1 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value, to 38 percent and 58 percent, respectively. Freight value per ton on trucks and rail is expected to increase to \$1,464 and \$767, respectively.

North of Amherst, freight on Segment I1 is moved primarily by truck in relation to both tonnage and value. In total, 14 million tons (68 percent) of freight is moved through this section of Segment I1 by truck and 6 million tons (32 percent), by rail. In terms of value, \$19 billion (64 percent) of freight travels by truck and \$11 billion (36 percent) travels by rail. On average, a ton of freight traveling through this section of Segment I1 by truck and by rail is worth \$1,417 and \$1,721, respectively. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, truck freight tonnages and value in this area of Segment I1 are expected to increase. The percentage of the freight traveling by truck is expected to increase by both tonnage and value to 69 percent and 66 percent, respectively. It is anticipated that the freight value per ton on trucks and rail will increase to \$1,512 and \$1,726, respectively.

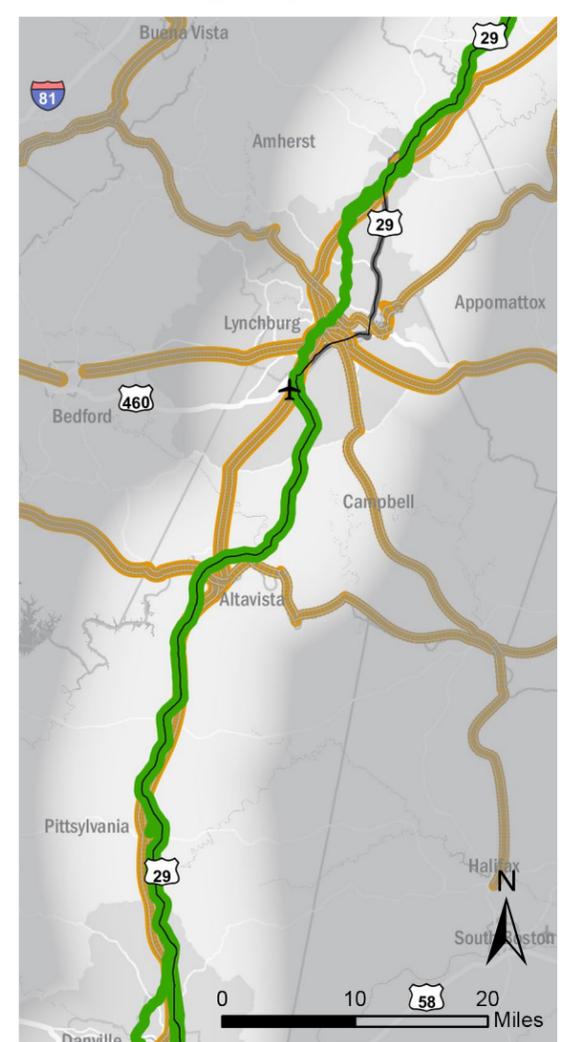
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)



Rail Freight (in tons)



Truck Freight



Rail Freight



I1 SEGMENT NEEDS

Redundancy and Mode Choice



Comparable Travel Options

Danville to Lynchburg

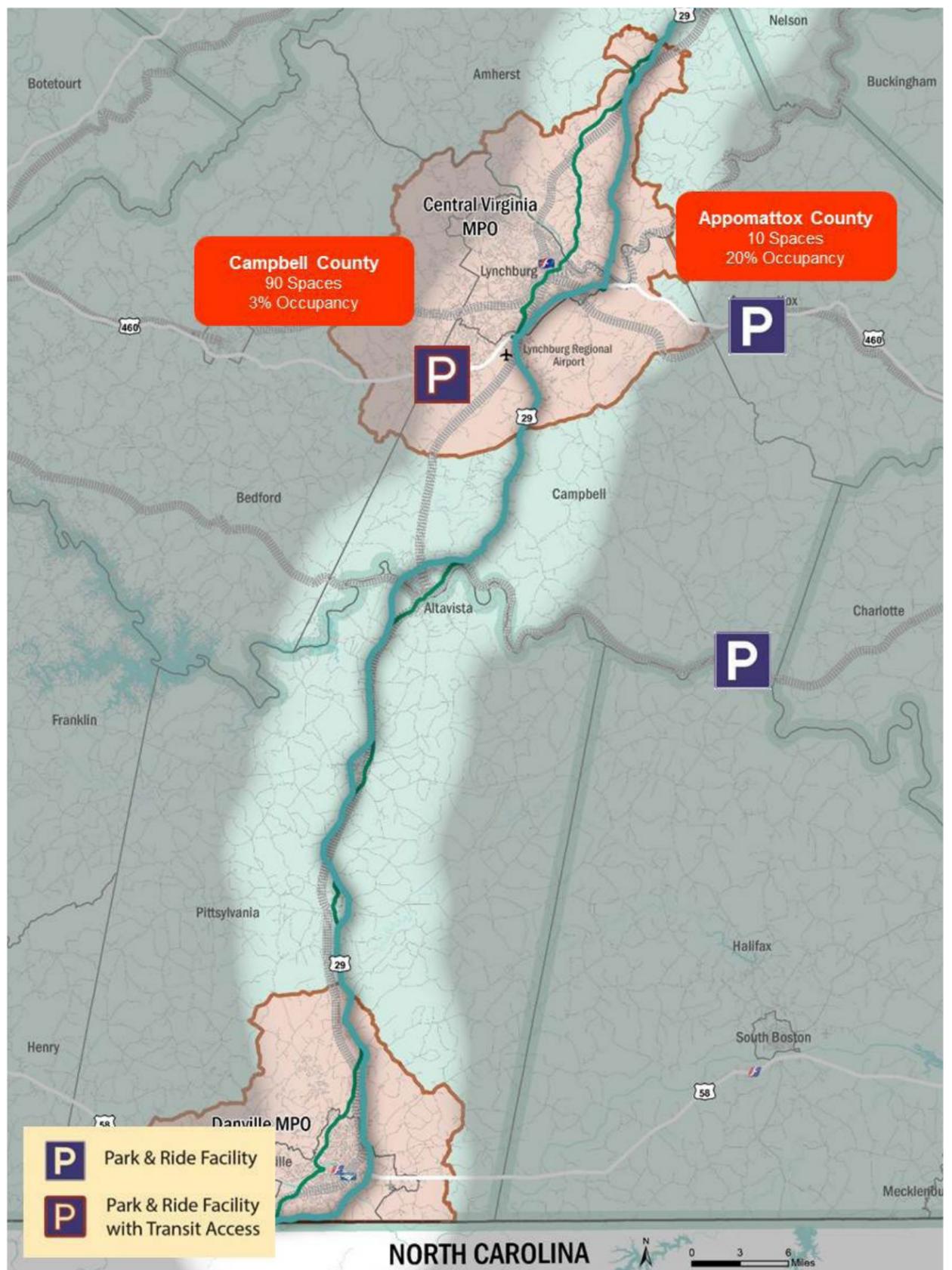
Inter-City Bus 0 Trips per Day 0:00 Travel Time \$0 Est. Cost	Train 1 Trips per Day 1:09 Travel Time \$38 Est. Cost
Auto Via Rt. 29: 1:13 Travel Time \$39 Est. Cost	

Danville to DC

Inter-City Bus 2 Trips per Day 6:10 Travel Time \$64 Est. Cost	Train 1 Trips per Day 5:10 Travel Time \$106 Est. Cost
Auto Via Rt. 29: 4:45 Travel Time \$138 Est. Cost	

Passenger trips on Segment I1 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Aside from short US 29 Business routes that provide local access, no parallel highway facilities exist in the segment. Greyhound offers service from Danville and Lynchburg, as does Amtrak's Crescent Route. Automobile travel from Danville to Lynchburg is competitive with the available rail service both in terms of cost (based on the 2014 federal standard mileage rate of 56 cents per mile) as well as travel time. For trips from Danville to other locations, such as Washington, DC, available bus and rail service may be more cost effective, but generally takes longer and is limited by frequency of service. Lynchburg Regional Airport does not provide any direct connections to locations on the corridor, as all six of its daily departures are bound exclusively for Charlotte, North Carolina.

Park and Ride Facilities



Park-and-Ride

Within Segment I1, there are two Park-and-Ride locations located in Campbell County. The Park-and-Ride locations in Campbell County have a total of 90 spaces, which are utilized at an extremely low rate of three percent, far below the statewide average of 76 percent for Park-and-Ride utilization.



I1 SEGMENT NEEDS

Safety



Performance Metrics

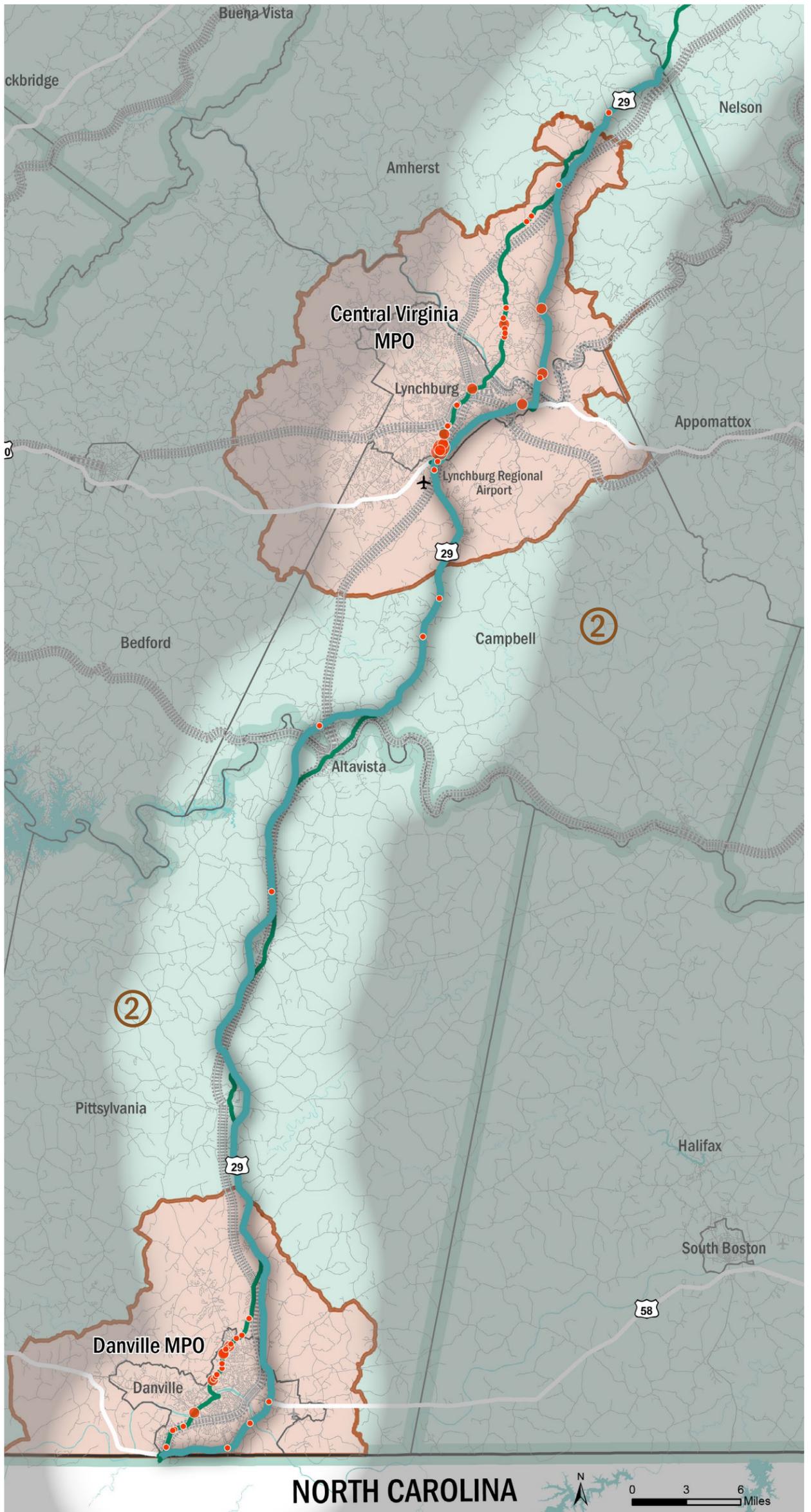
Number of Severe Crashes	251
Severe Crashes/Million VMT	0.8
Number of Railroad Crashes	4

Between 2010 and 2012, 251 severe crashes occurred along Segment I1, which were concentrated in several areas. In Danville, on US 29 Business, there were 67 crashes within approximately 3.3 miles between the ramp from Piedmont Drive to Greenwood Drive; of the 67 crashes, 19 occurred over a distance of 0.5 miles between the ramp and Redwood Drive and 38 occurred over 0.8 miles between Ash Street and Maplewood Street. On US 29 Business (Wards Road) in Lynchburg, 42 incidents took place over a 1.2-mile stretch adjacent to Liberty University and Central Virginia Community College, between Wards Road and US 501. Also in Lynchburg, there were 12 collisions along US 501 (Lynchburg Expressway)/US 29 Business at the ramps to and from Route 128. On US 29 Business in Amherst County, north of Madison Heights, there were 20 crashes over approximately 1.2 miles between Seminole Drive and Daniels Drive.

Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)



I1 SEGMENT NEEDS

Congestion



Performance Metrics

Person Hours of Delay per Mile **9**

Freight Ton Hours of Delay per Mile **5.4K**



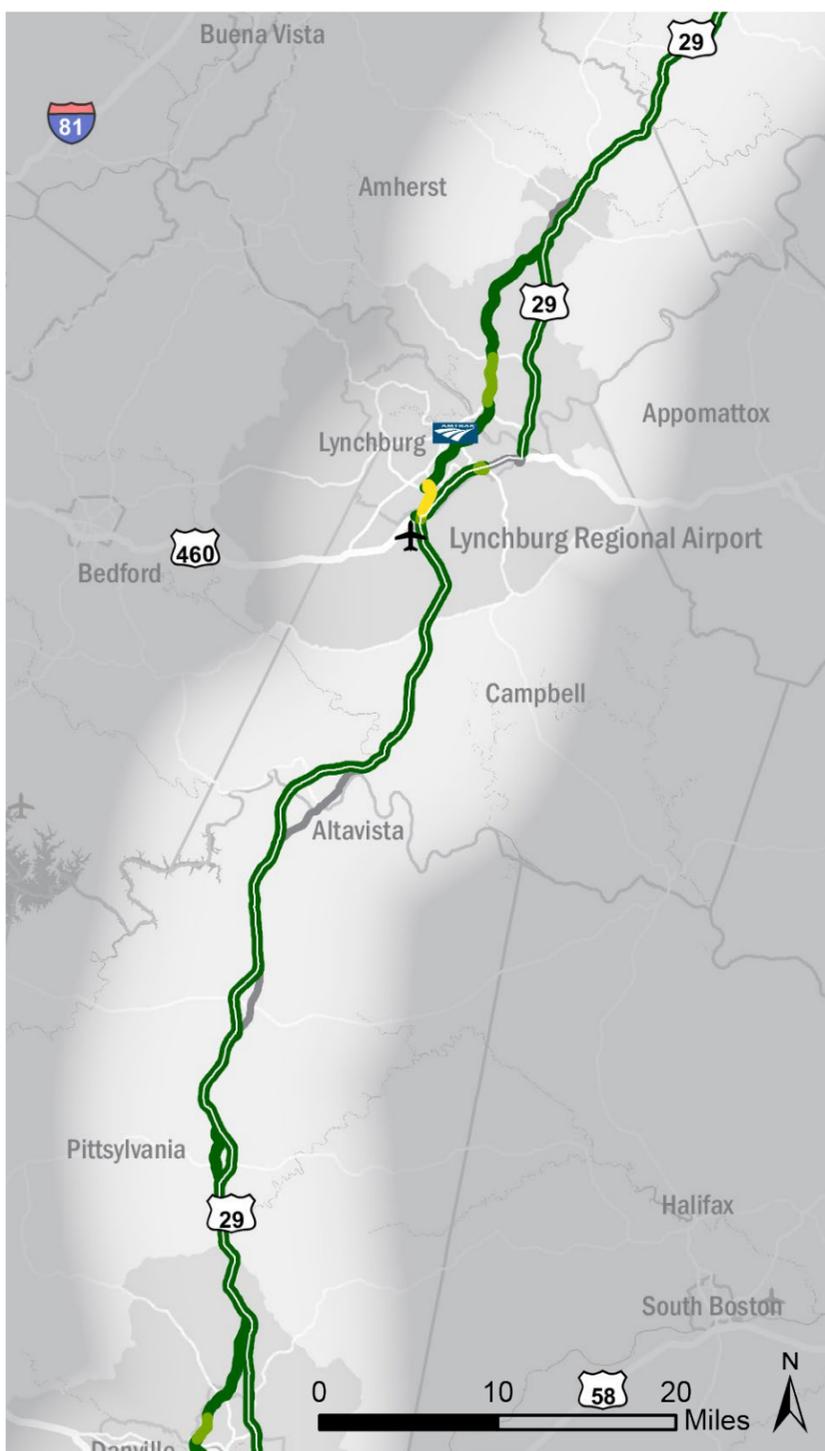
Passenger Delays

Passenger congestion along Segment I1 is the lowest of the segments in the Seminole Corridor (Corridor I), with a daily passenger delay of around 2,200 person-hours. Most of the roadways in this corridor have minimal congestion, but delays in excess of 100 person-hours per mile are experienced on US 29 Business between US 460 and US 501 in the City of Lynchburg. Peak-period passenger delays account for 41 percent of daily congestion, which is about average for CoSS segments statewide.

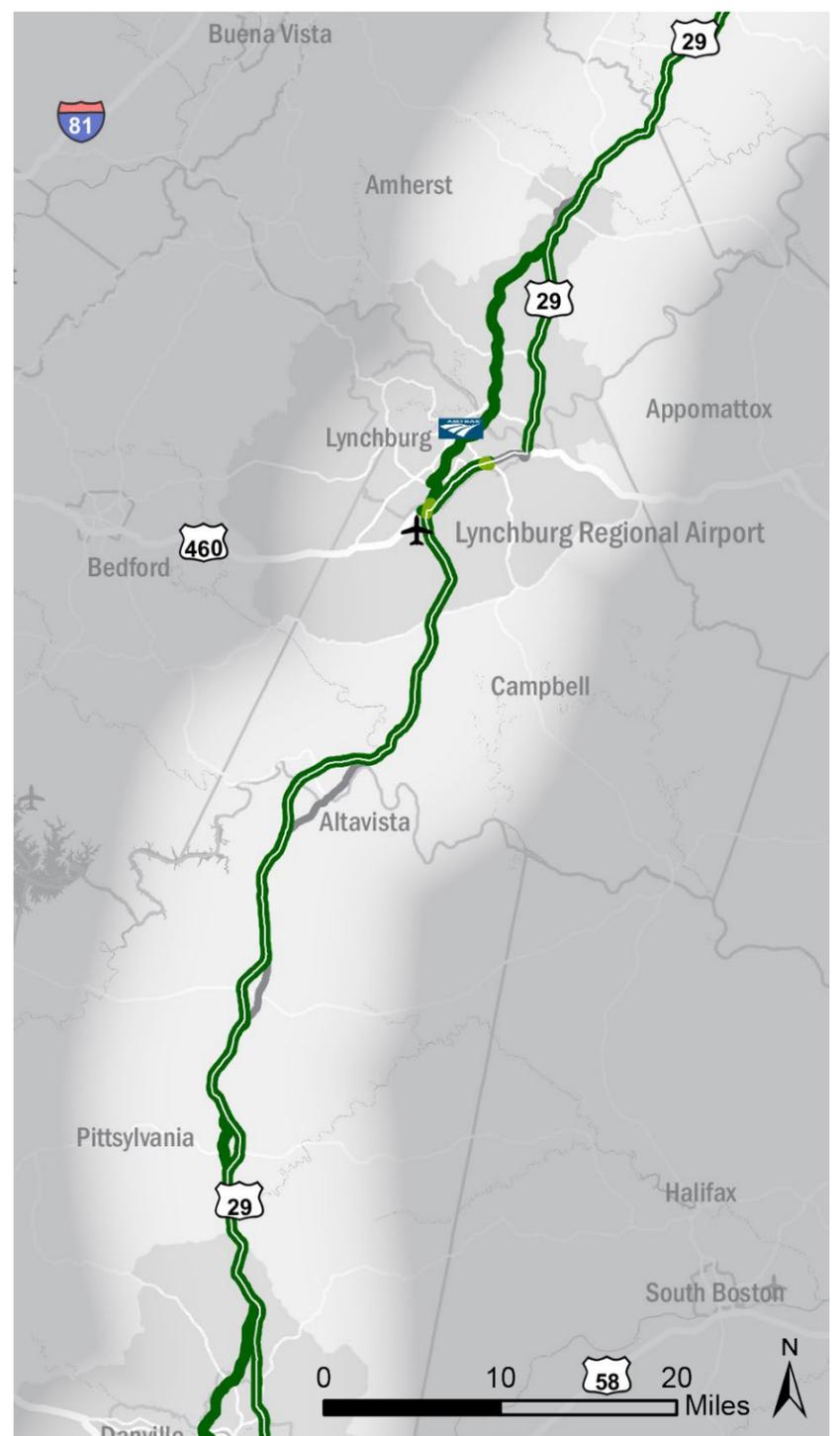
Freight Delays

Freight congestion along Segment I1 is relatively minimal with a daily freight delay of around 1.4 million ton-hours. As such, there are no locations along Segment I1 where the freight delays exceed 250,000 ton-hours per mile. Peak period freight delays along Segment I1 account for 27 percent of daily congestion, which is slightly less than the average peak period congestion share for freight on CoSS segments.

Daily Person Hours of Delay Per Mile

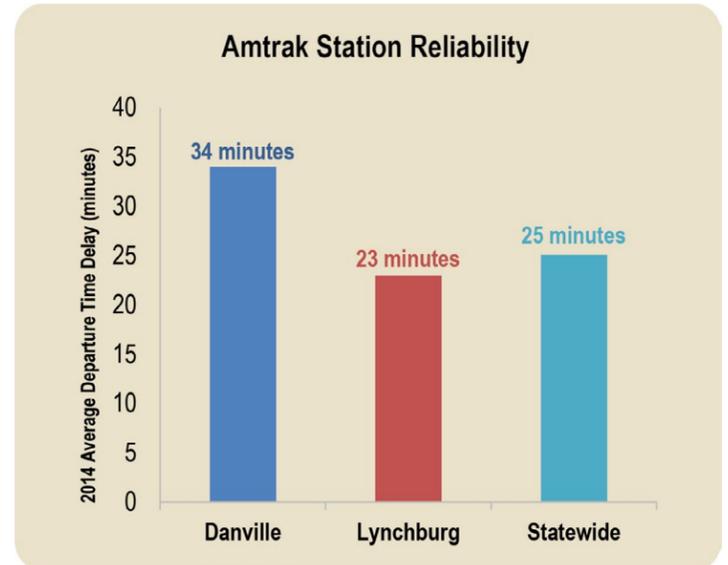


Daily Freight Ton Hours of Delay Per Mile



I1 SEGMENT NEEDS

Reliability



Weekday Peak

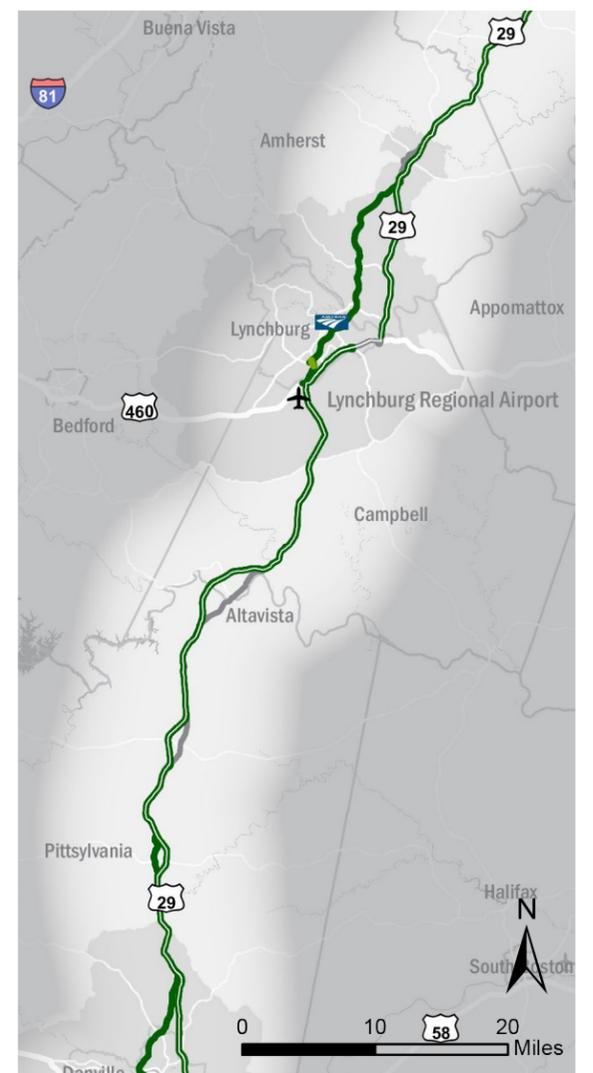
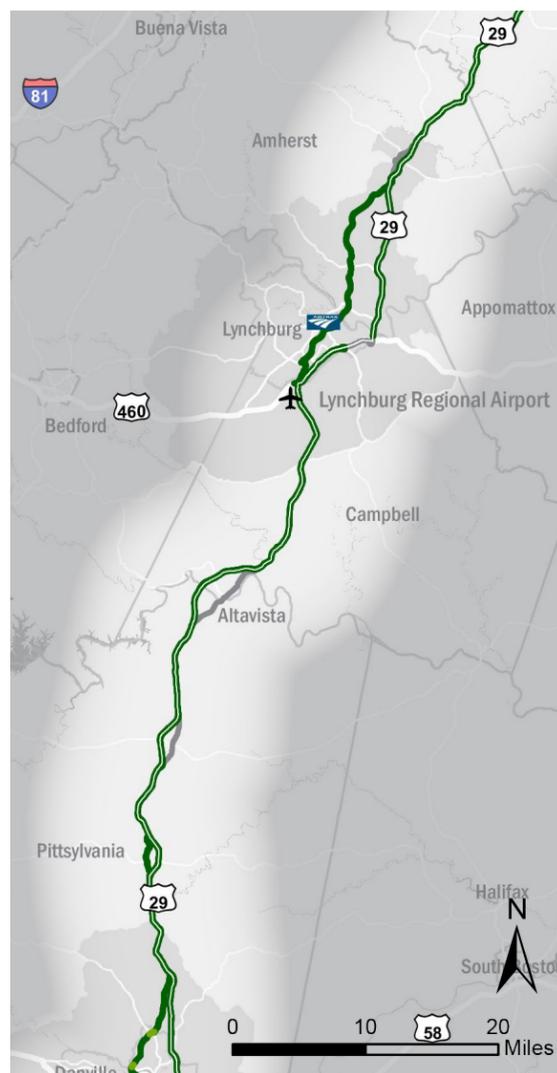
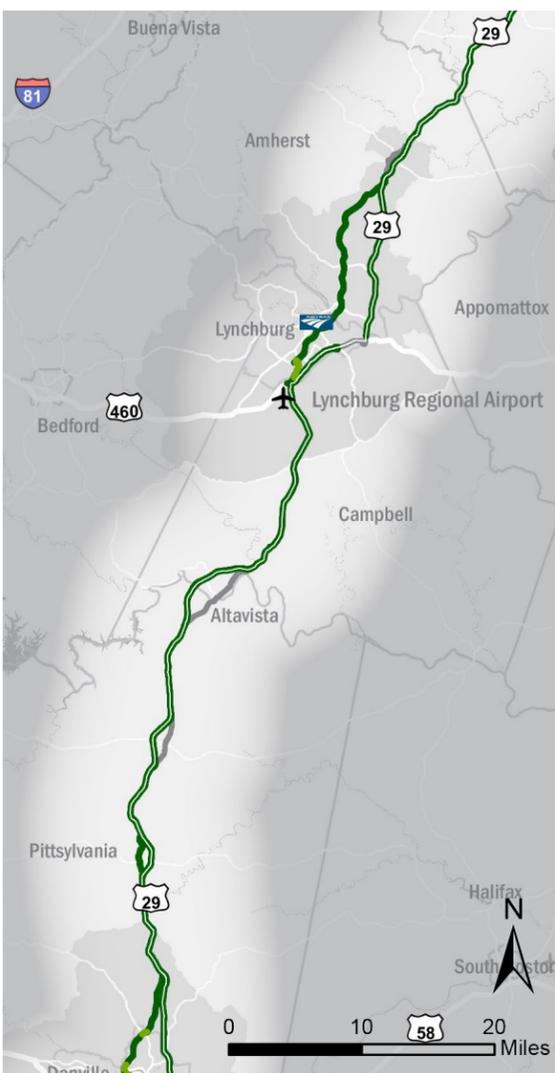
Reliability of travel during the peak period on a typical weekday on Segment I1 ranges from 0.00 to 0.26 in terms of reliability index, with an average value of 0.07. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.

Weekday

Reliability of travel during a typical weekday ranges from 0.01 to 0.28 in terms of reliability index, with an average value of 0.06. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.26 in terms of reliability index, with an average value of 0.05. None of the locations along Segment I1 have reliability index values exceeding the statewide threshold.



Reliability Index

- < 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

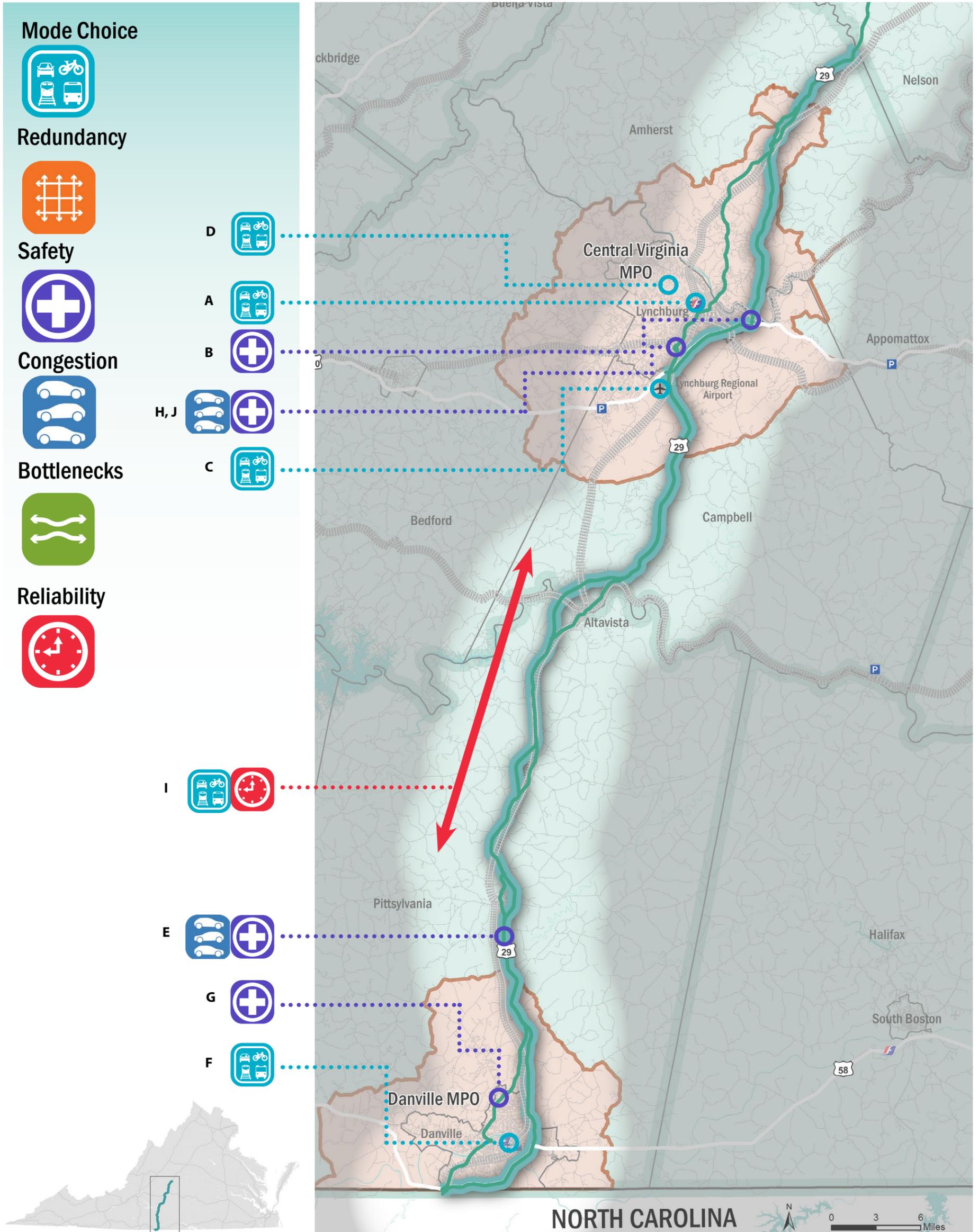
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



I1 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



I1 SEGMENT NEEDS

Summary of Needs - I1 Segment

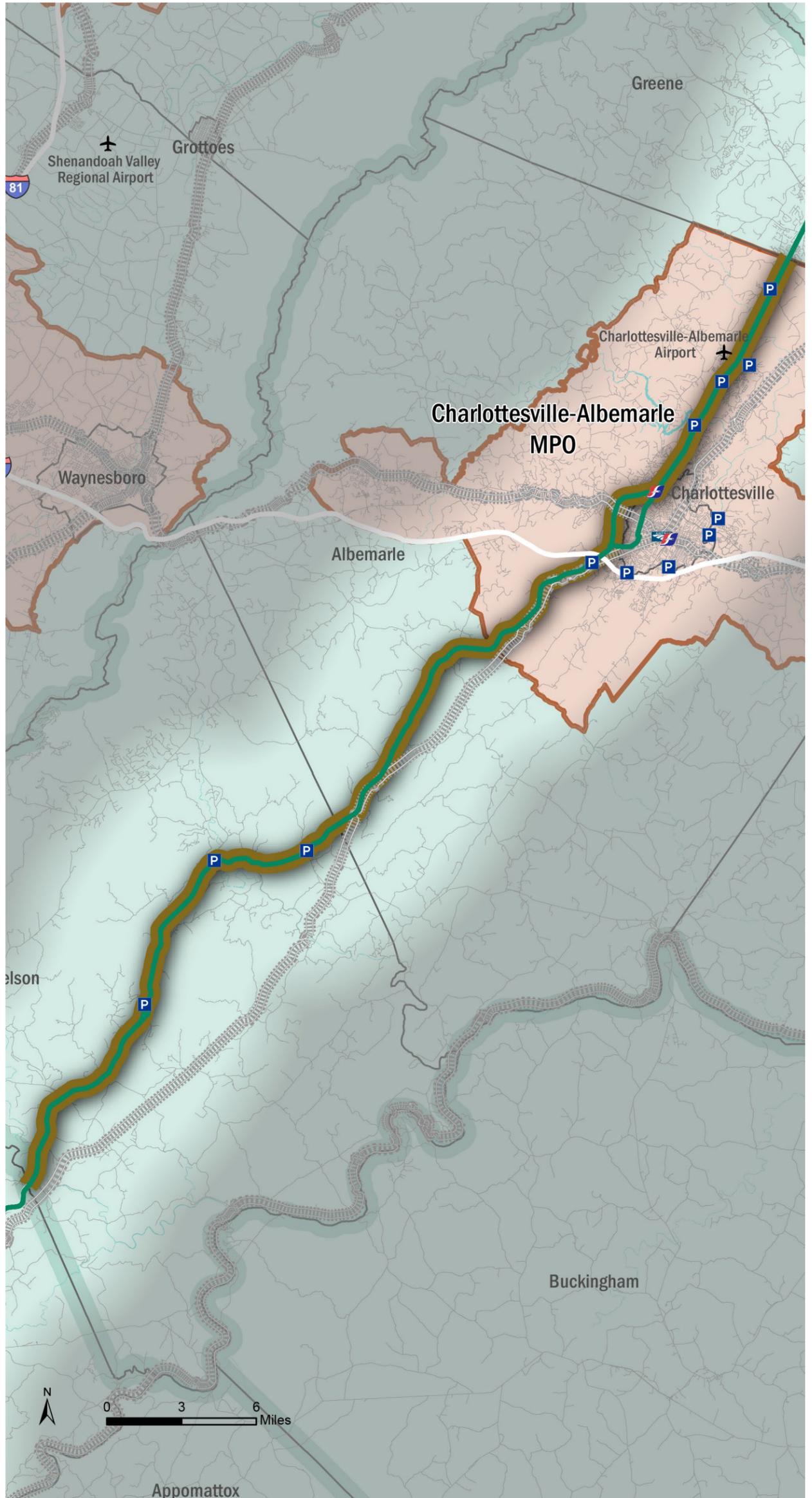
A.		Parking lot at Amtrak station is often over capacity
B.		Insufficient merge distance on ramp from US 460 to US 29 South
C.		Lynchburg Regional Airport: flights only available to a single destination (Charlotte, NC)
D.		Poor signage and limited availability of information related to park-and-ride facilities in the area
E.		Geometry on US 29 south of Chatham in Tightsqueeze results in safety concerns, and slow speeds
F.		Passenger rail north departs unreasonably early (~4:30 a.m.), makes intercity travel by rail inconvenient
G.		US 29-Business between Piedmont Dr and Greenwood Dr in Danville: 67 severe crashes
H.		US 29-Business between US 29 and US 501 in Lynchburg: 42 severe crashes
I.		Unreliable Amtrak service from Danville station (34 minutes average departure delay) and Lynchburg Station (23 minutes average departure delay) totaling over 18,400 person-hours of delay from this segment.
J.		Congestion issue on US 29 Business between US 29/US 460 and US 501/US 29 Business (Lynchburg Expressway)

III. Segment I2

Corridor Segment I2 Components

- US 29
- US 29 Business
- Norfolk Southern Crescent Corridor
- Amtrak
- Charlottesville Albemarle Airport

-  Segment I2
-  Corridor Component Road
-  Railroad
-  Airport Facility
-  Amtrak Facility
-  Greyhound Facility
-  VRE Facility
-  Metrorail Facility
-  Port Facility
-  Park & Ride Facility
-  MPO Area
-  Planning District Area



I2 SEGMENT PROFILE



Segment I2 runs through the Charlottesville Area, serving Nelson and Albemarle Counties, in addition to the City of Charlottesville. The primary facility that defines this segment is US 29, which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout the majority of Segment I2, US 29 is a four-lane highway, with the exception of a section in Albemarle County north of the City of Charlottesville, where US 29 widens to eight lanes. US 29 Business provides local access through downtown Charlottesville, in addition to a much shorter US 29 Business route through Lovingsston in Nelson County. US 29 runs concurrently with US 250 in and around the City of Charlottesville.

Transit Services: Charlottesville Area Transit (CAT) provides bus service to the greater Charlottesville Area. Amtrak also has a station in Charlottesville which provides service to destinations north and east (Washington, DC, Philadelphia, New York, Norfolk) via the Northeast Regional route as well as north and south destinations along the Crescent Route, which includes New York, Atlanta, and New Orleans. Greyhound also provides intercity bus service with a station in Charlottesville.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC. In Charlottesville, there is a junction between Norfolk Southern’s Crescent Corridor and CSX’s Coal Corridor, which provides a connection between the Port of Virginia facilities in the Hampton Roads Area and the Appalachian coal fields to the west.

Port Facilities: No port facilities are located directly adjacent to Segment I2.

Airport Facilities: The Charlottesville-Albemarle Airport is the only commercial airport in this segment.

Major planned and future projects include:

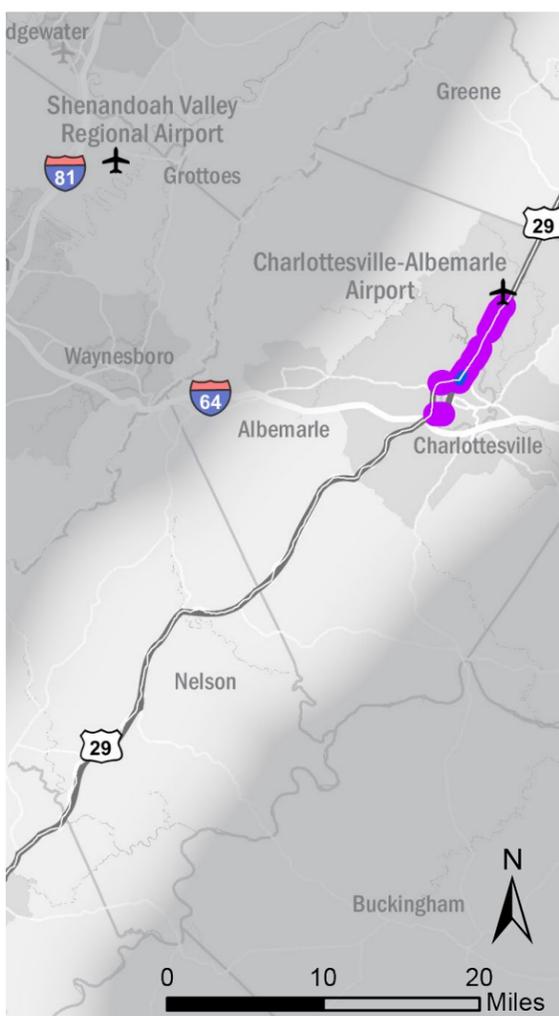
Albemarle County:

- New road and grade separated intersection on US 29 between Route 851 (Dominion Drive) and Route 1417 (Woodbrook Drive); and
- Road reconstruction with added capacity on US 29 between Polo Grounds Road and Town Center Drive.

City of Charlottesville:

- Grade separated intersection at Hydraulic Road and US 29 between Ivy Road and the northern city limit of Charlottesville.

Number of Lanes (both directions)



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility



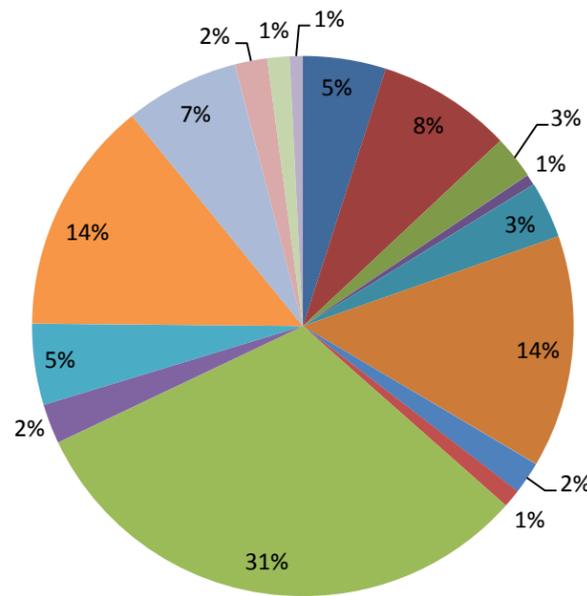
I2 SEGMENT PROFILE

Travel Demand

Passenger Demand

Segment I2 connects from the Central Virginia Area in the south through the Charlottesville-Albemarle Area to the north. Of the intercity passenger travel originating in the Central Virginia Area, only a limited portion is likely to use this segment, including 14 percent destined for the Charlottesville Area and the five percent destined for the Metropolitan Washington Area. Travel from the Charlottesville Area is also distributed fairly widely across the Commonwealth and the largest markets for intercity passenger travel include the Metropolitan Washington Area (14 percent) and the Lynchburg Area (eight percent).

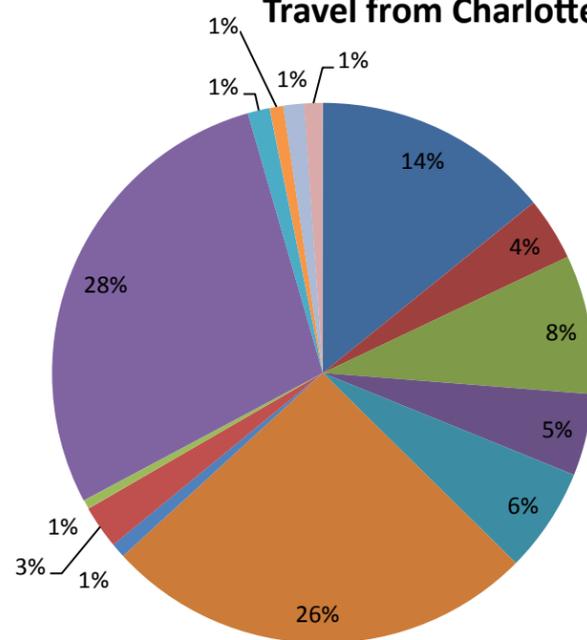
Travel from Danville Area to...



(clockwise starting from the top)

- Metropolitan Washington Region
- Danville Area
- Hampton Roads Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Tri-Cities Area
- Winchester Area
- Roanoke Valley Area
- New River Valley Area
- Staunton-Augusta-Waynesboro Area
- Charlottesville-Albemarle Area
- North Carolina
- West Virginia
- Maryland
- Other

Travel from Charlottesville-Albemarle Area to...



(clockwise starting from the top)

- Metropolitan Washington Region
- Hampton Roads Area
- Central Virginia Area
- Fredericksburg Area
- Harrisonburg-Rockingham Area
- Richmond Area
- Tri-Cities Area
- Roanoke Valley Area
- New River Valley Area
- Staunton-Augusta-Waynesboro Area
- North Carolina
- West Virginia
- Maryland
- Other

I2 SEGMENT PROFILE

Freight Demand

By truck, Segment I2 carried 13 million tons of freight worth \$19 billion in 2012, and is estimated to carry 17 million tons of freight worth \$27 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. Ten percent of the corridor truck freight tonnage originates in jurisdictions adjacent to Segment I2 and another nine percent is destined for these jurisdictions. There are significant truck freight flows between Albemarle County and North Carolina, Maryland, and Pennsylvania. The City of Lynchburg and Pittsylvania County are the largest attractors of truck freight along Segment I2, accounting for a combined two percent of the total truck freight value on the corridor.

By rail, Segment I2 carried seven million tons of freight worth \$11 billion in 2012, and is estimated to carry nine million tons of freight worth \$14 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. Negligible rail freight flows to or from the jurisdictions adjacent to Segment I2.

Truck Freight



Rail Freight



I2 SEGMENT PROFILE

Traffic Conditions

Traffic Volume and AADT

Traffic volume in Segment I2 varies by location. Along US 29 south of Charlottesville, traffic volumes range from 11,000 to 17,000 vehicles per day. Along US 29 through Charlottesville and northern Albemarle County, average daily traffic volumes range from 33,000 to 60,000 vehicles, with the highest volumes just north of the City of Charlottesville. On US 29 Business in Charlottesville, volumes are somewhat lower, between 23,000 and 30,000 vehicles per day. Traffic growth is expected throughout Segment I2 by 2025, with growth of more than 5,000 vehicles per day in and directly north of the City of Charlottesville.

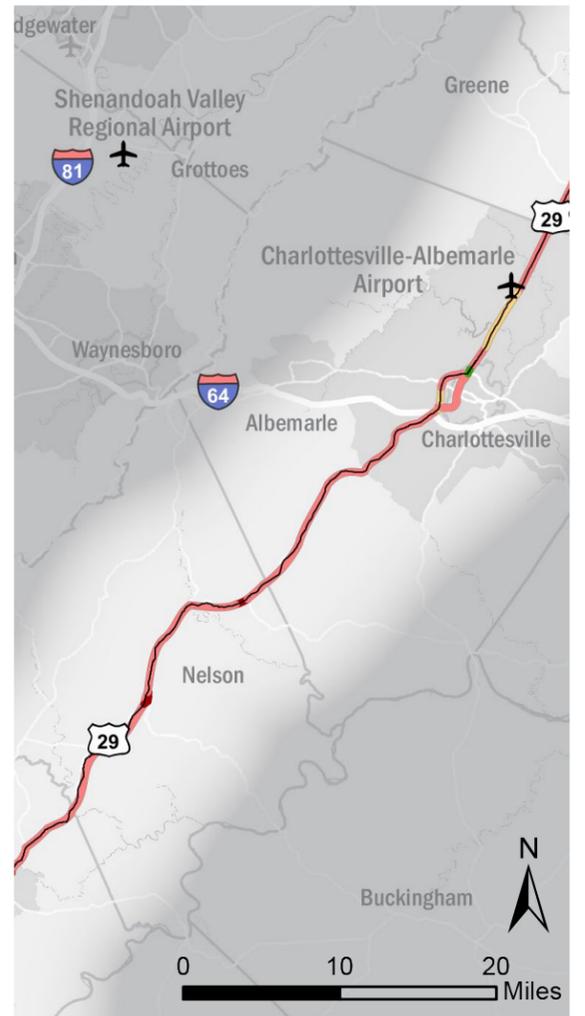
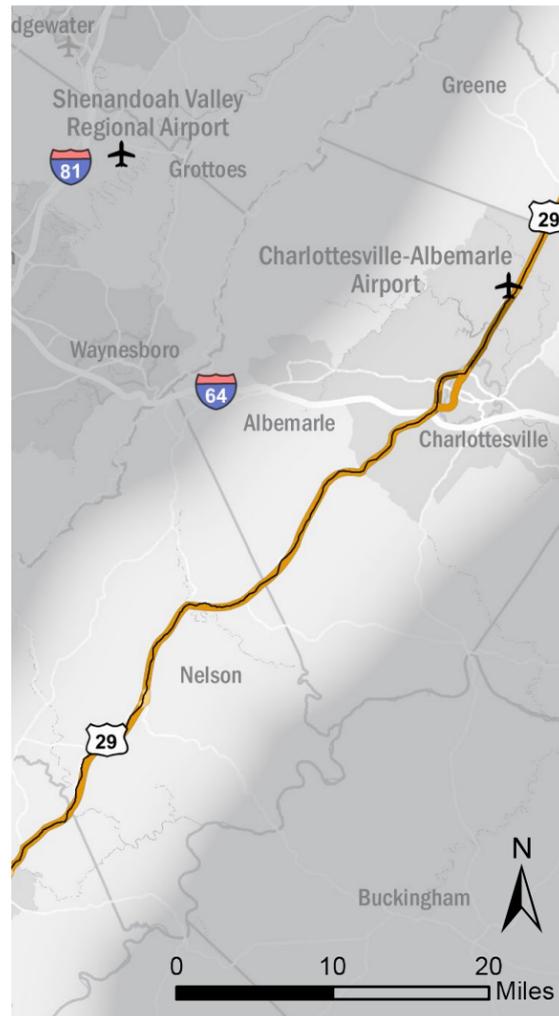
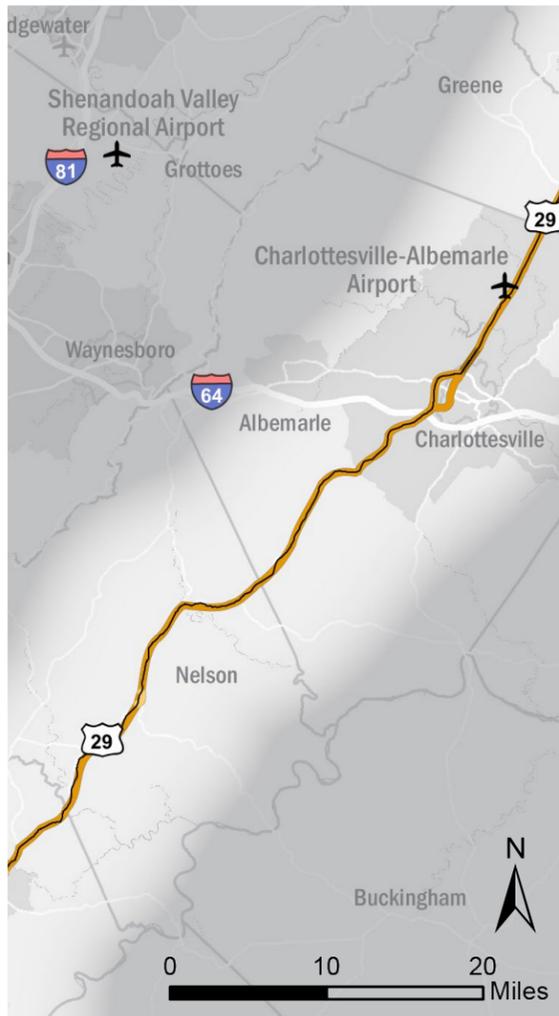
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)

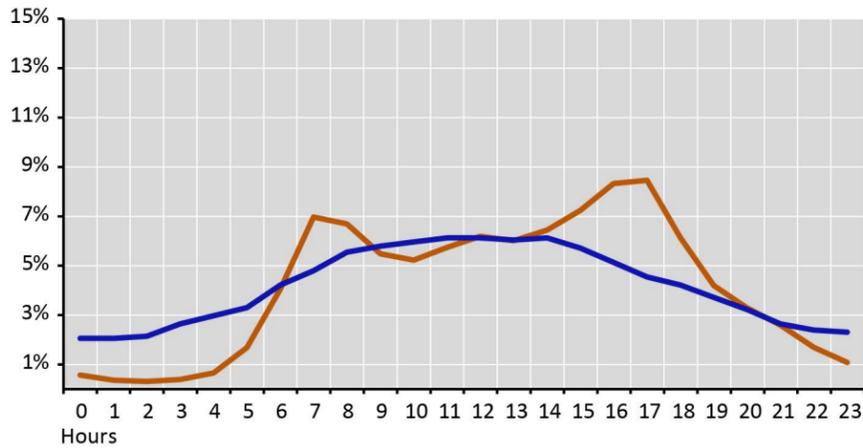


Change in Traffic Volume 2014- 2025 (AADT)

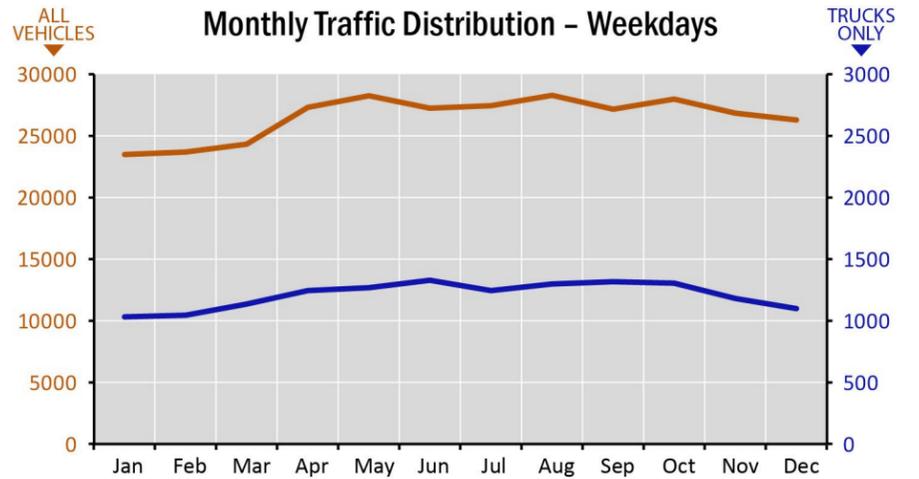


I2 SEGMENT PROFILE

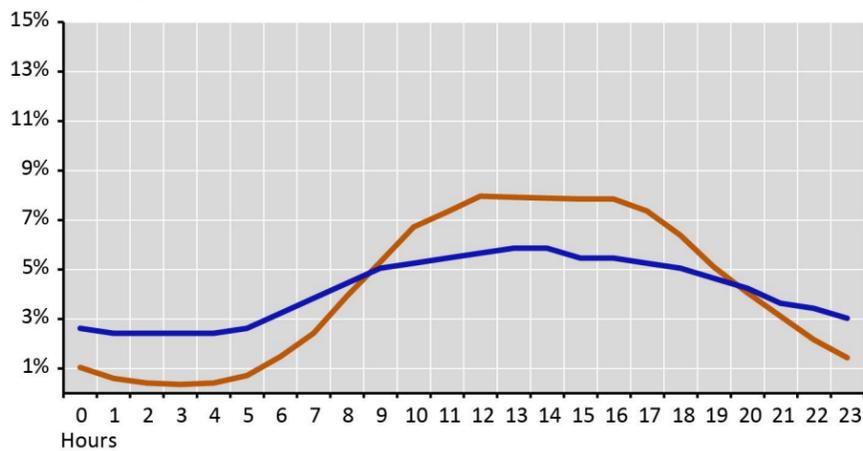
Hourly Traffic Distribution - Weekdays



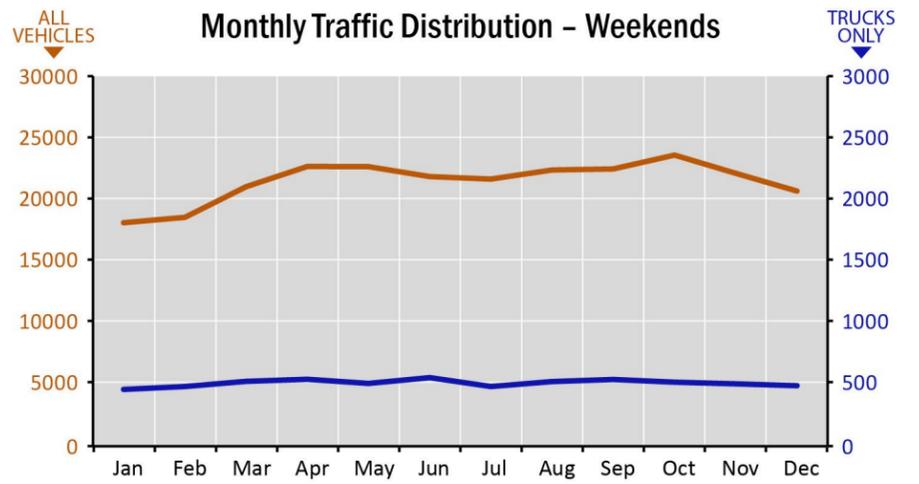
Monthly Traffic Distribution - Weekdays



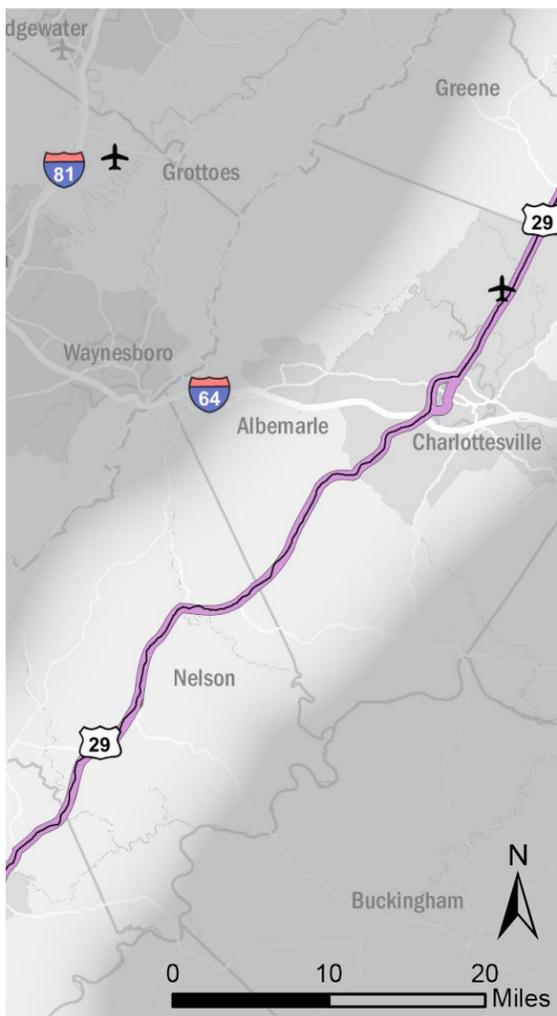
Hourly Traffic Distribution - Weekends



Monthly Traffic Distribution - Weekends



— All Vehicles
— Trucks



Traffic Distribution

On average, traffic on Segment I2 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 8.5 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 7.0 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic showing a single peak during the midday period, and the highest hourly flow of 6.1 percent of daily traffic between 11 a.m. and noon. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day between noon and 5 p.m. for all traffic, and starting at 1 p.m. (5.8 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment I2 vary by as much as 20 percent throughout the year, with the highpoint in May (around 28,000 vehicles per day) and the low point in January (around 23,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the June high (around 1,300 vehicles per day) 29 percent higher than the January low (around 1,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (October, around 24,000 vehicles per day) are 31 percent higher than January levels (around 18,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 22 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I2, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I2 is low relative to other segments in Corridor I. Along US 29 in Nelson County and southern Albemarle County, heavy trucks comprise five percent of total traffic. Along US 29 through Charlottesville to the border with Greene County, heavy trucks make up three percent or less of total traffic.

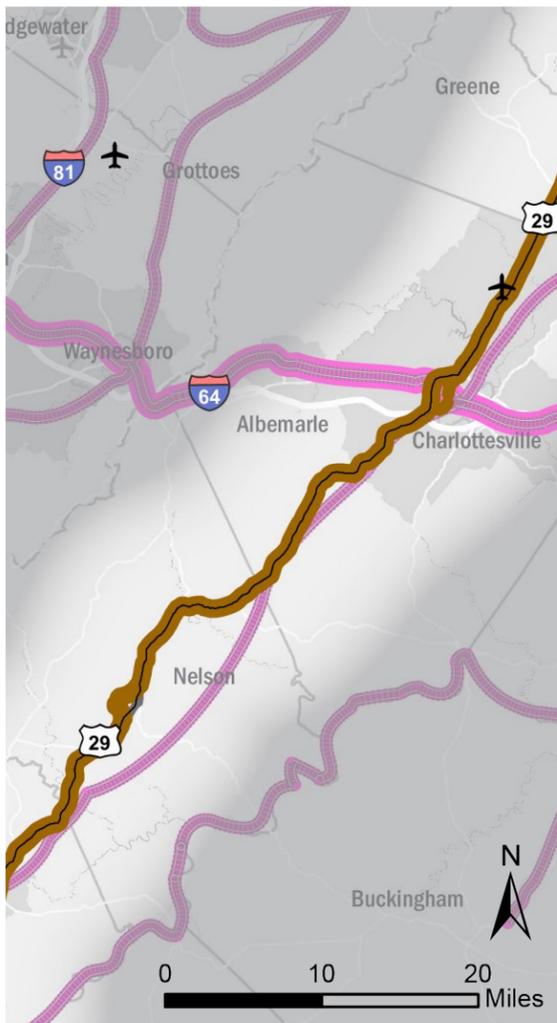


Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility

I2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

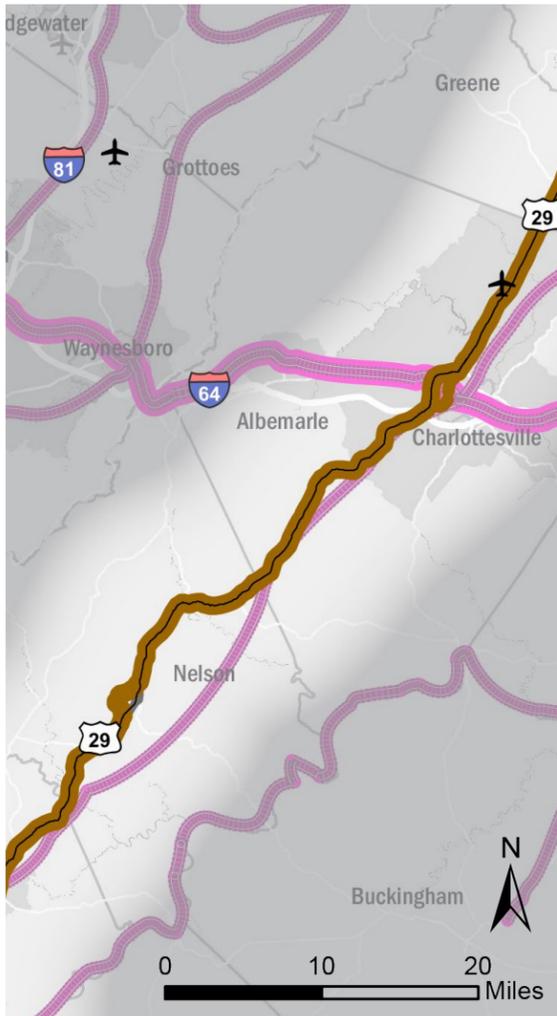


Freight Flows

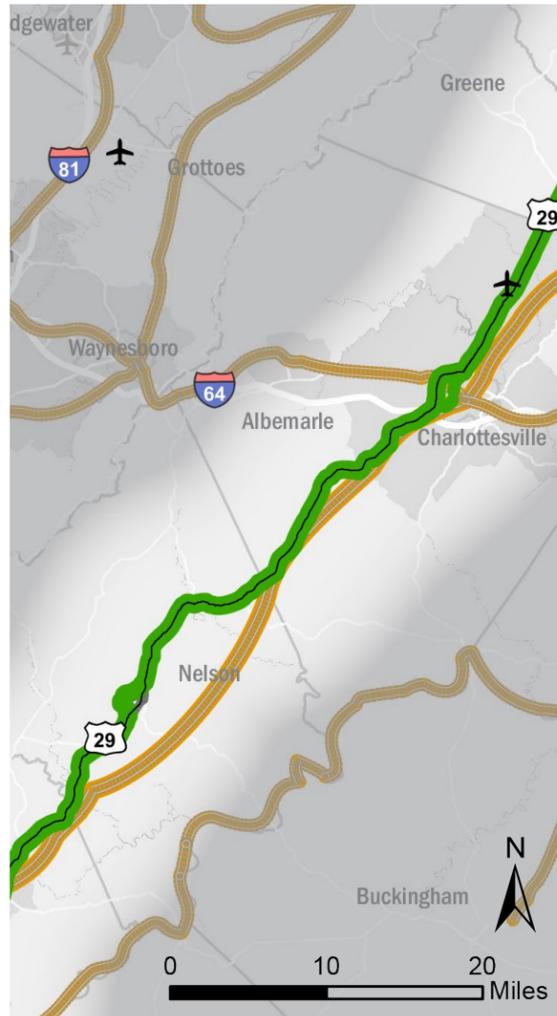
On Segment I2 near Lovingson, freight is moved primarily by truck in terms of both tonnage and value. In total, 13 million tons (68 percent) of freight is moved through this section of Segment I2 by truck, compared to 6 million tons (32 percent) by rail. By value, \$19 billion (63 percent) of freight travels by truck, compared to \$11 billion (37 percent) by rail. On average, a ton of freight traveling through this section of Segment I2 by truck is worth \$1,428 while a ton of freight traveling by rail is worth \$1,717. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I2 are expected to increase. The percentage of freight traveling by truck in terms of tonnage is expected to remain the same and in relation to value, is expected to increase to 66 percent. Freight value per ton is anticipated to increase to \$1,524 for trucks and decrease to \$1,722 for rail.

North of Charlottesville, freight is moved primarily by truck by tonnage and by value. In total, 12.5 million tons (64 percent) of freight is moved through this section of Segment I2 by truck, compared to 7 million tons (36 percent) by rail. By value, \$17 billion (60 percent) of freight travels by truck, compared to \$11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I2 by truck is worth \$1,359 while a ton of freight traveling by rail is worth \$1,606. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I2 are expected to increase. The percentage of the freight traveling by truck is expected to increase by tonnage and value to 65 percent and 63 percent, respectively. Freight value per ton on trucks and rail is expected to increase to \$1,492 and \$1,608, respectively.

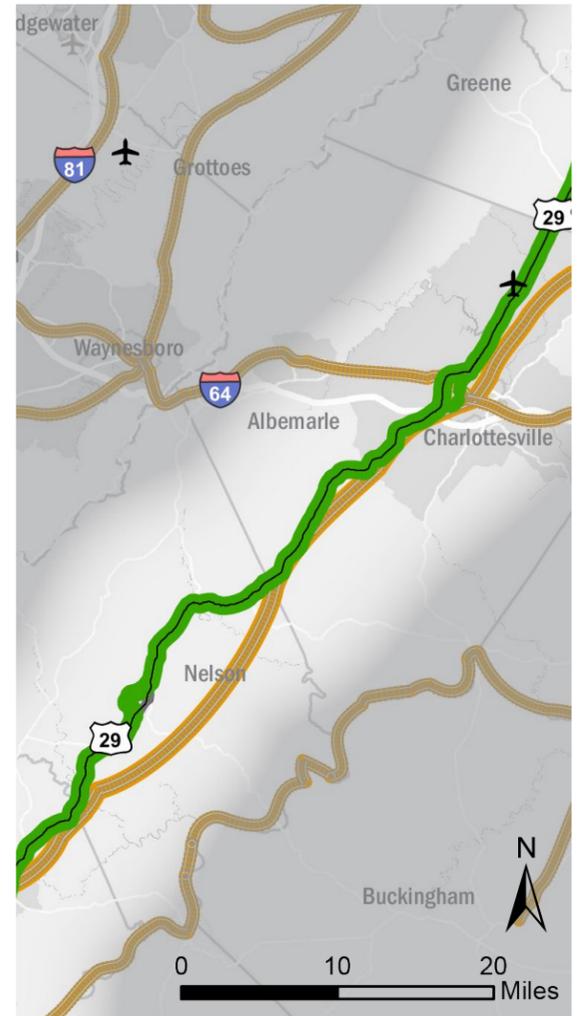
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



I2 SEGMENT NEEDS

Redundancy and Mode Choice



Comparable Travel Options

Lynchburg to Charlottesville

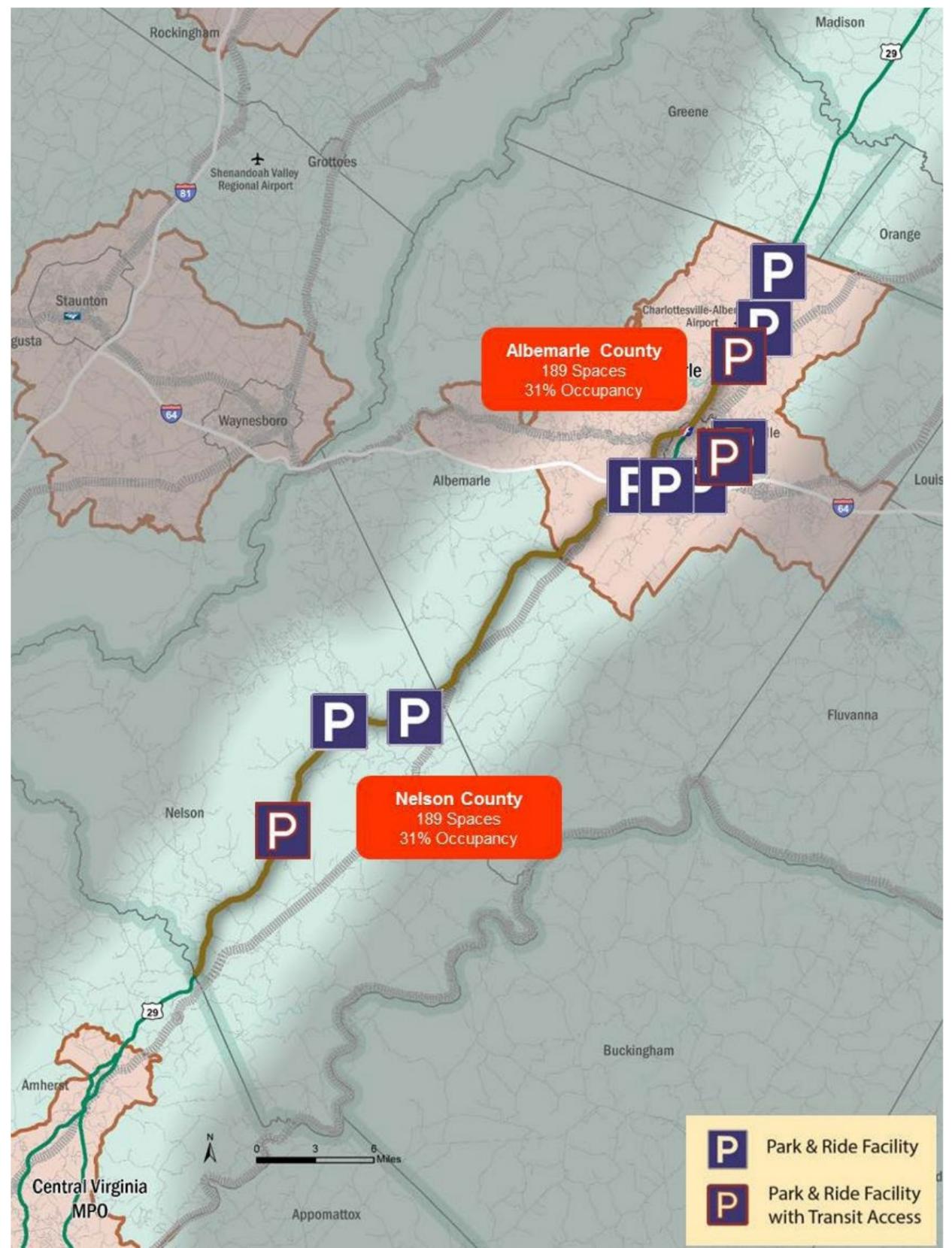
Inter-City Bus 3 Trips per Day 1:15 Travel Time \$22 Est. Cost	Train 2 Trips per Day 1:13 Travel Time \$13 Est. Cost
Auto Via Rt. 29: 1:12 Travel Time \$39 Est. Cost	

Lynchburg to DC

Inter-City Bus 2 Trips per Day 4:40 Travel Time \$44 Est. Cost	Train 5 Trips per Day 3:42 Travel Time \$32 Est. Cost	Air 6 Trips per Day 2:55 Travel Time \$360 Est. Cost
Auto Via Rt. 29: 3:18 Travel Time \$101 Est. Cost Via Rt. 29 / I-66: 3:13 Travel Time \$101 Est. Cost		

Passenger trips on Segment I2 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Aside from short US 29 Business routes that provide local access, no parallel highway facilities exist in the segment. Greyhound offers service to the corridor from Charlottesville, as does Amtrak, which serves the segment with its Northeast Regional and Crescent Routes. Automobile travel from Charlottesville to destinations like Culpeper, Washington, DC, Lynchburg, and Danville is typically more expensive than travel by alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile) and is also comparable in terms of travel time, although alternative modes are limited by the frequency of service. Air travel along the corridor, with service offered from Charlottesville-Albemarle Airport, is much faster than any other mode, but far more expensive.

Park and Ride Facilities



Park-and-Ride

Within Segment I2, commuters can utilize multiple Park-and-Ride locations in Nelson and Albemarle counties. Albemarle County has the most Park-and-Ride-locations, the highest number of Park-and-Ride spaces, and the highest utilization rate of spaces in the region. Neither county has a utilization rate higher than the statewide average of 76 percent for Park-and-Ride utilization.



I2 SEGMENT NEEDS

Safety



Performance Metrics

Number of Severe Crashes **169**

Severe Crashes/Million VMT **3.5**

Number of Railroad Crashes **1**

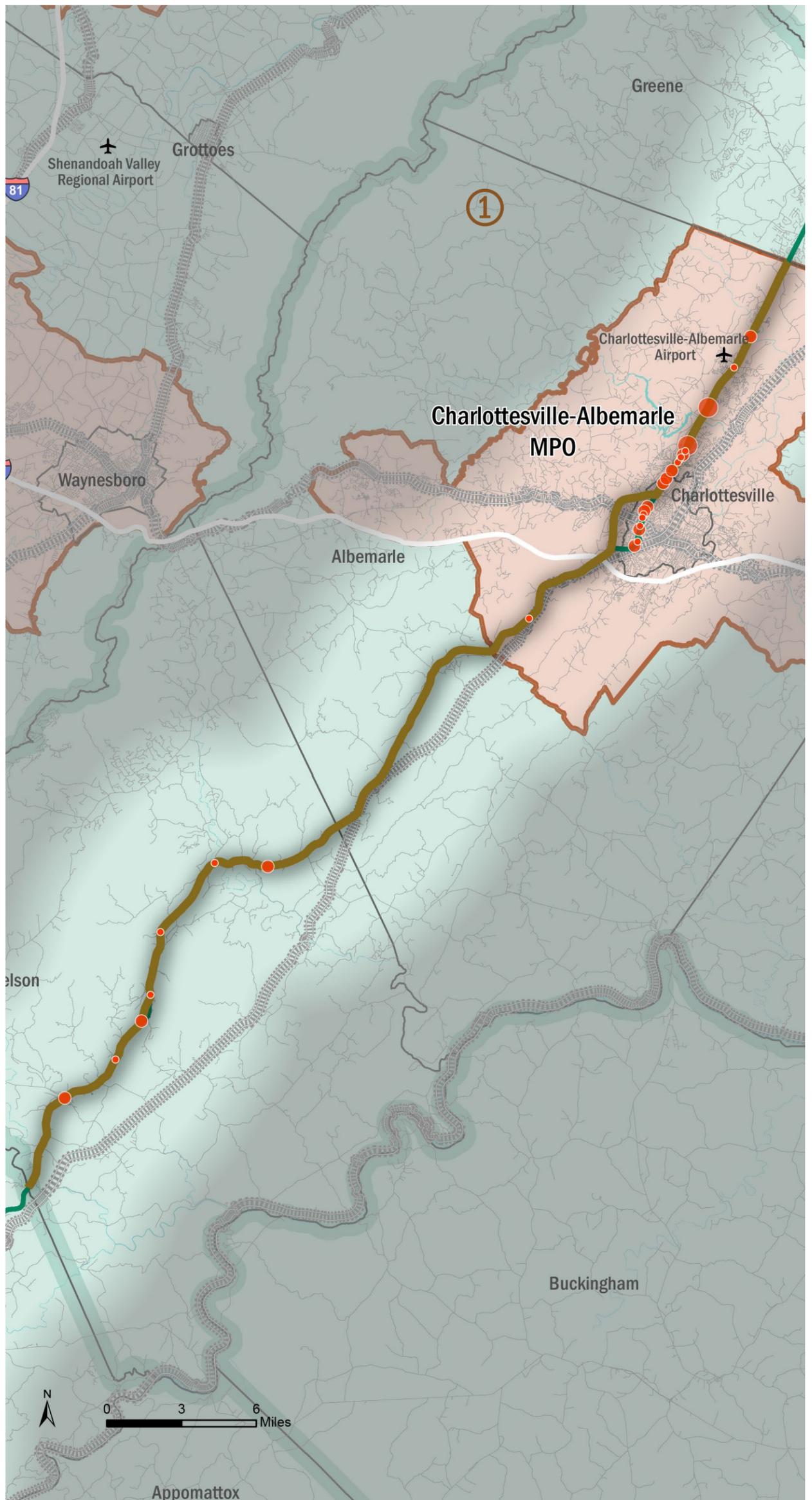
Between 2010 and 2012, 169 severe crashes occurred on Segment I2, resulting in one of the highest crash rates among CoSS segments in the Commonwealth. The areas along Segment I2 with the highest concentrations of severe crashes are in and north of Charlottesville. In Charlottesville along US 29 Business (Fontaine Avenue/Emmet Street) adjacent to the University of Virginia campus, there were 43 crashes that occurred over a two-mile stretch between Shamrock Road and Earhart Street. On US 29 (Seminole Trail) in Albemarle County, there were 19 collisions in a span of less than 0.5 miles, just north of the intersection with Hydraulic Road. In another stretch of US 29 (Seminole Trail), a total of 34 incidents took place over a distance of approximately one mile between Dominion Drive and Woodbrook Drive and, in another more northern span of US 29, 15 crashes occurred over 0.8 miles between Polo Grounds Road and Ashwood Boulevard.

Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)

#



I2 SEGMENT NEEDS

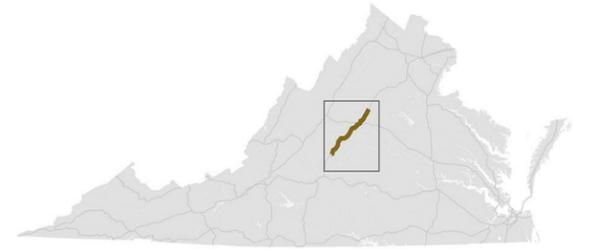
Congestion



Performance Metrics

Person Hours of Delay per Mile **26**

Freight Ton Hours of Delay per Mile **11.8K**



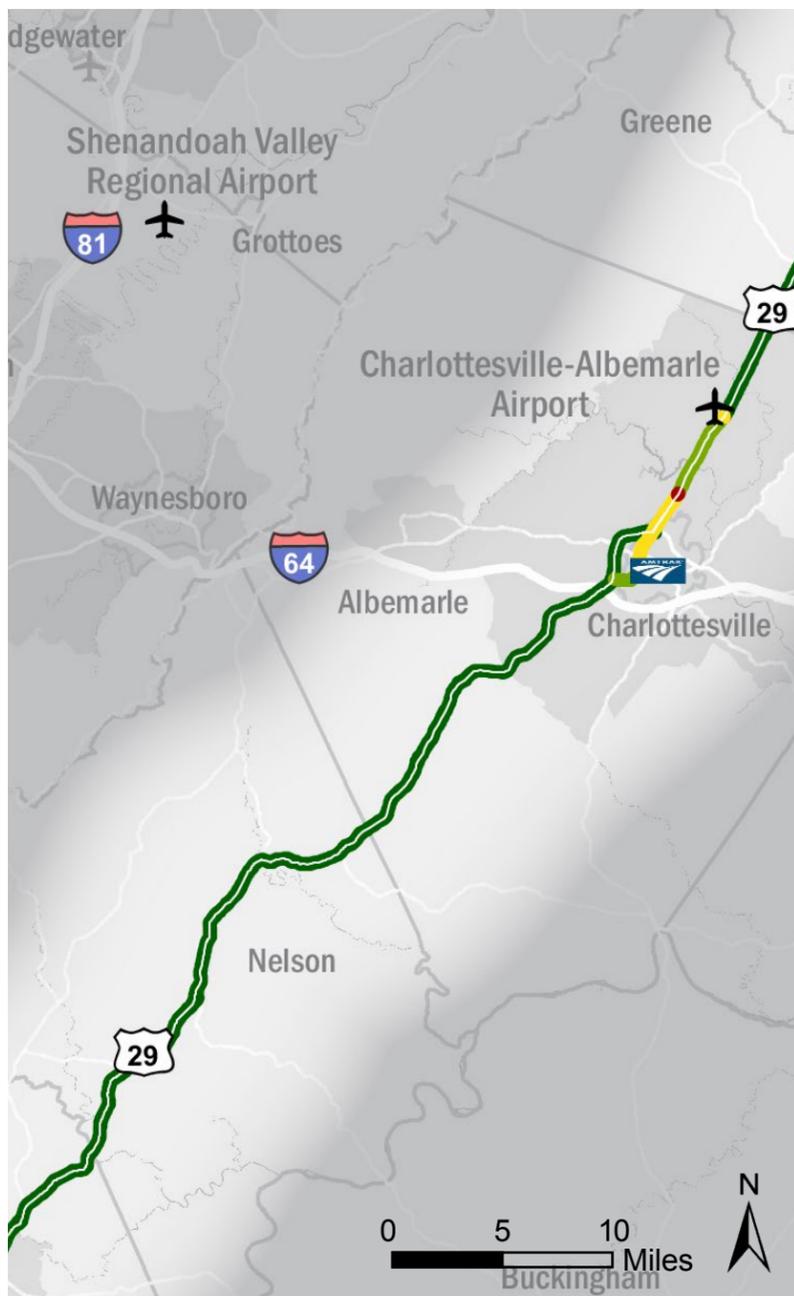
Passenger Delays

Passenger delays on Segment I2 are higher than Segments I1 and I3 with an average of 26 person-hours per mile of delay. In the City of Charlottesville, there are significant passenger delays on US 29 Business north of the University of Virginia. These passenger delays continue on US 29 in Albemarle County through Rio Road. Significant passenger delays are also experienced on US 29 at Airport Road further north in Albemarle County. Peak-period passenger delays account for 49 percent of daily congestion, which is considerably higher than average for the peak-period share of congestion on CoSS segments.

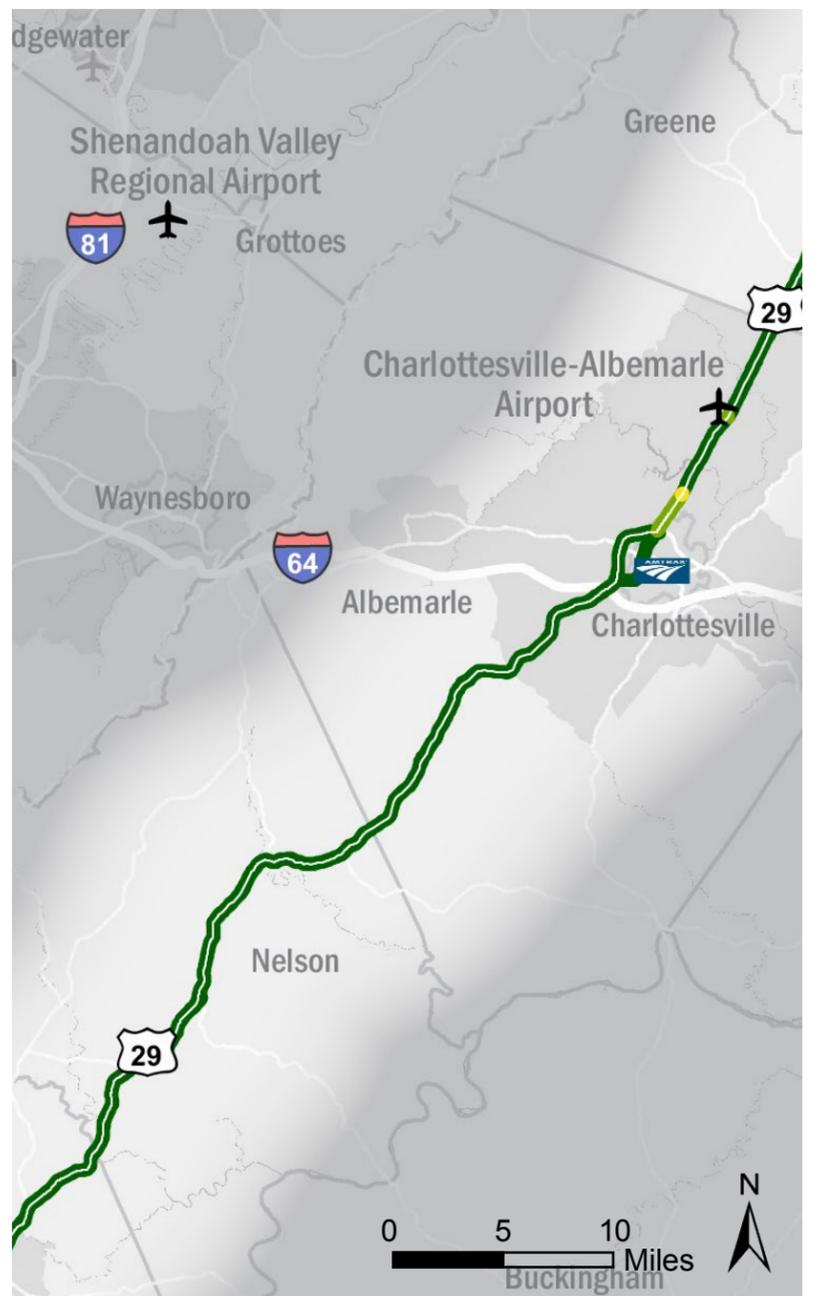
Freight Delays

Freight delays on Segment I2 are relatively minimal, accounting for around 1.3 million ton-hours of delay daily. Freight delays along the segment are minimal, with the exception of a short stretch on US 29 near the intersection with Rio Road in Albemarle County. Peak-period freight delays account for 40 percent of daily congestion, which is considerably higher than average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile

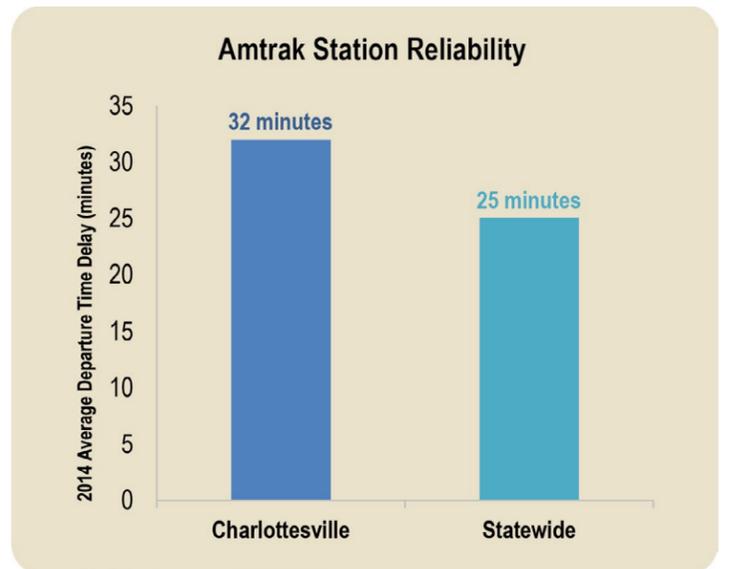


Daily Freight Ton Hours of Delay Per Mile



I2 SEGMENT NEEDS

Reliability



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment I2 ranges from 0.00 to 0.64 in terms of reliability index, with an average value of 0.13. While this segment does have a peak period reliability index higher than average for the CoSS segments statewide, none of the locations along Segment I2 have reliability index values exceeding the statewide threshold.

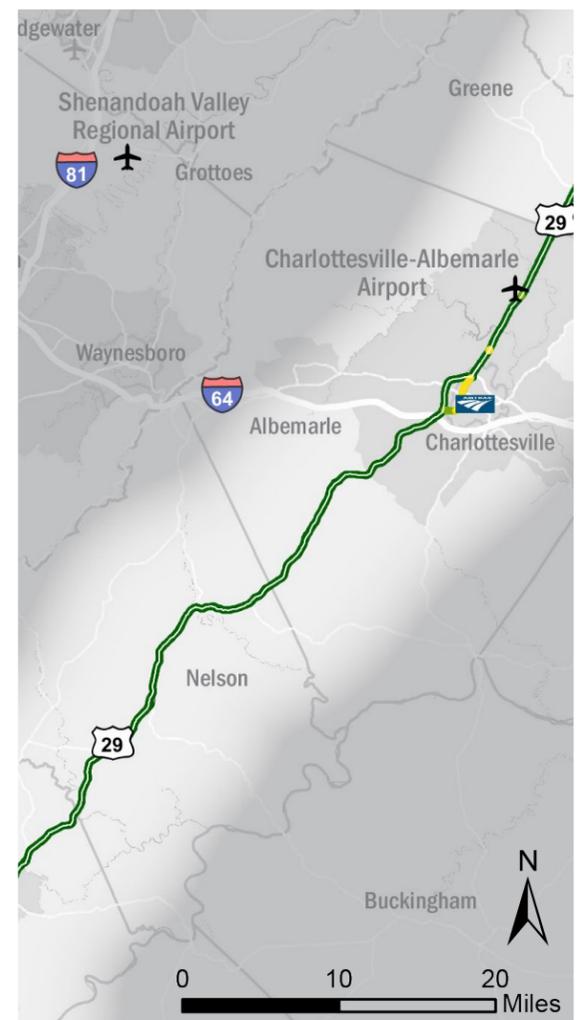
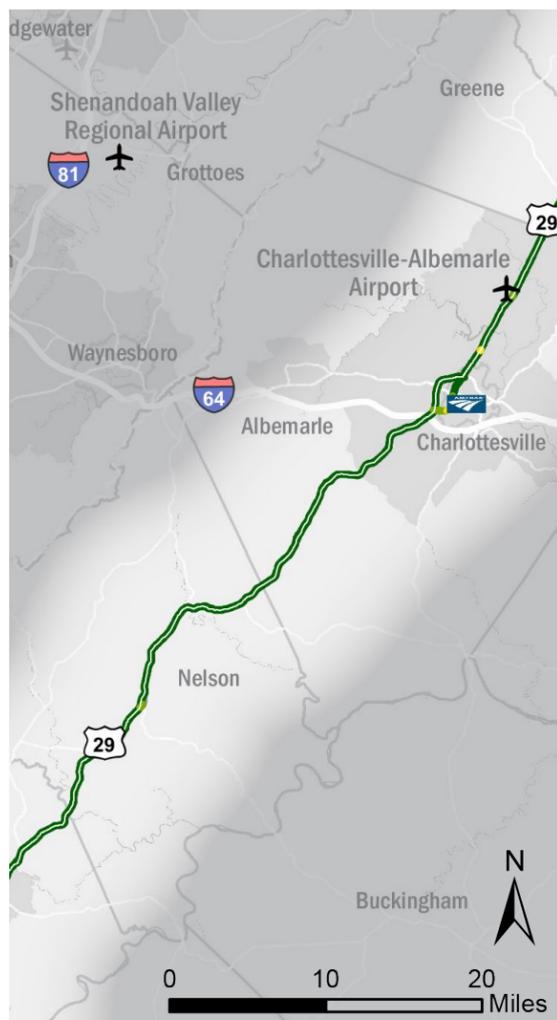
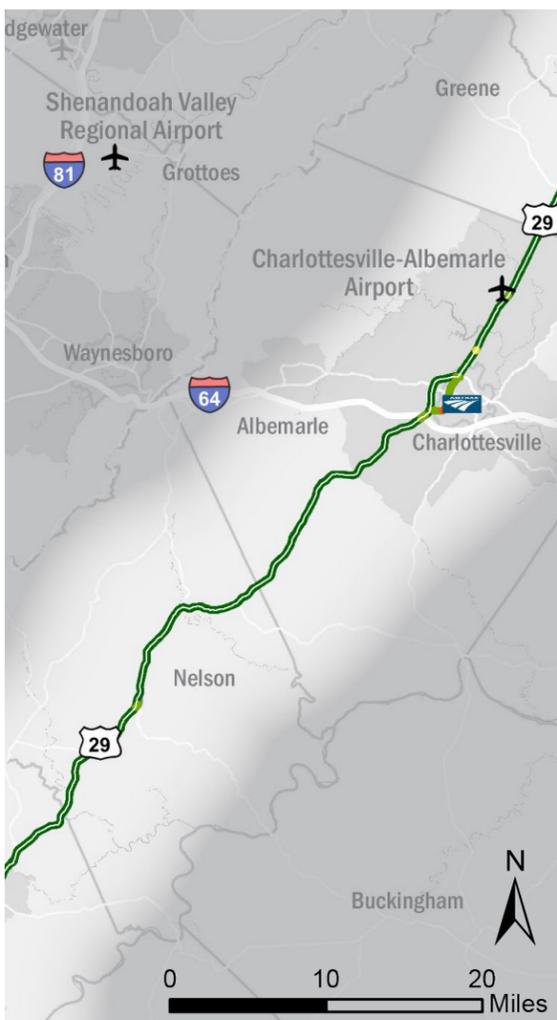
Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.50 in terms of reliability index, with an average value of 0.12. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, only two locations have a reliability index value exceeding the statewide threshold:

- US 29 at Rio Road in Albemarle County; and
- US 29 Business between Maury Avenue and Jefferson Park Avenue in Charlottesville.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.57 in terms of reliability index, with an average value of 0.13. While this segment does have a weekend reliability index higher than average for the CoSS segments statewide, none of the locations along Segment I2 have reliability index values exceeding the statewide threshold.



Reliability Index

- < 0.2
- 0.6 - 0.8
- 0.2 - 0.4
- > 0.8
- 0.4 - 0.6
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

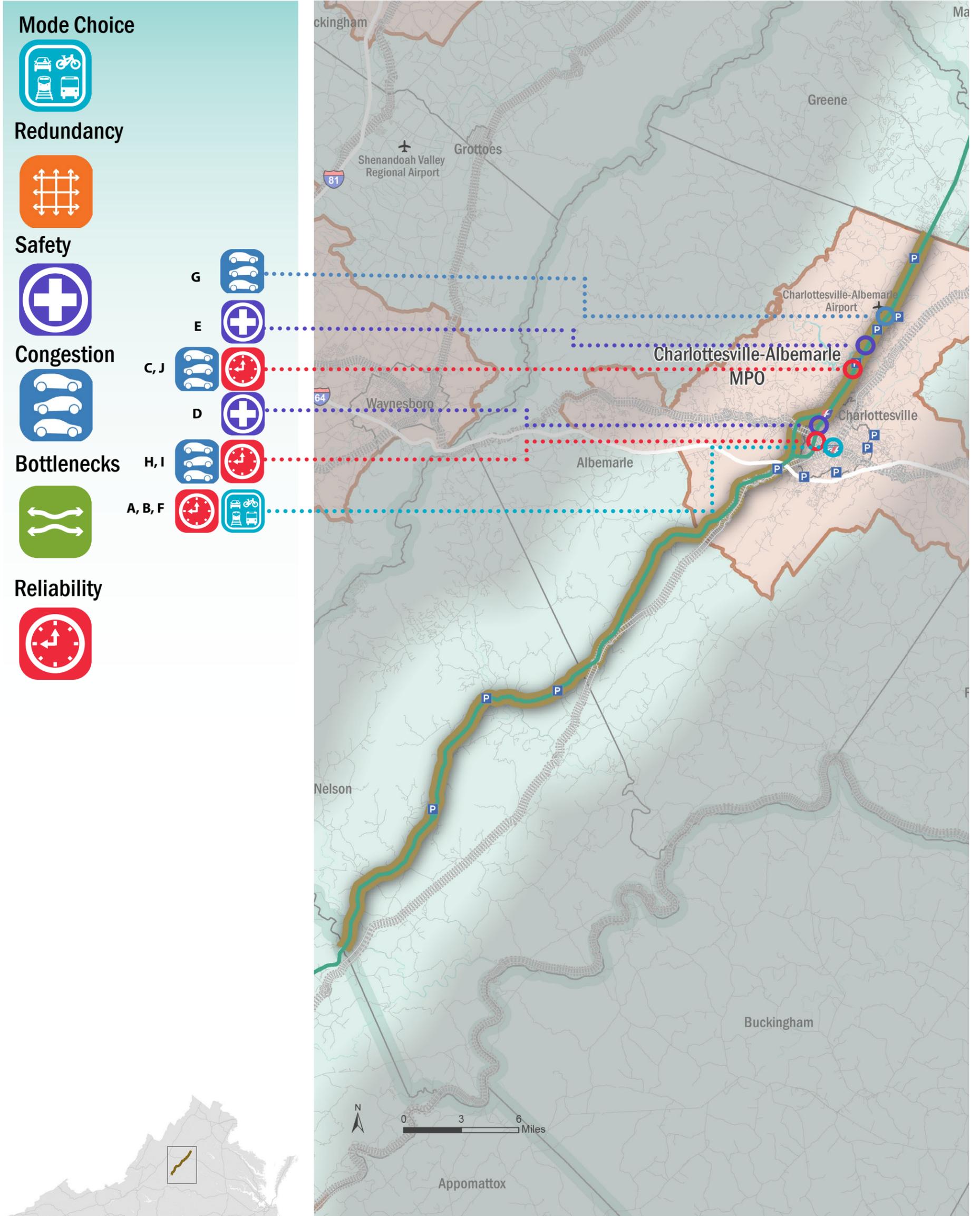
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



I2 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



I2 SEGMENT NEEDS

Summary of Needs - I2 Segment

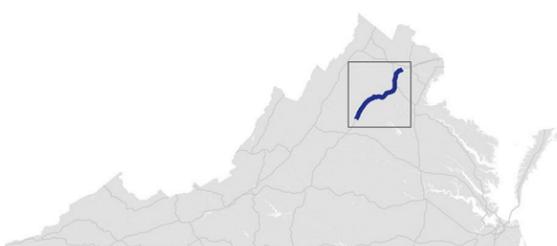
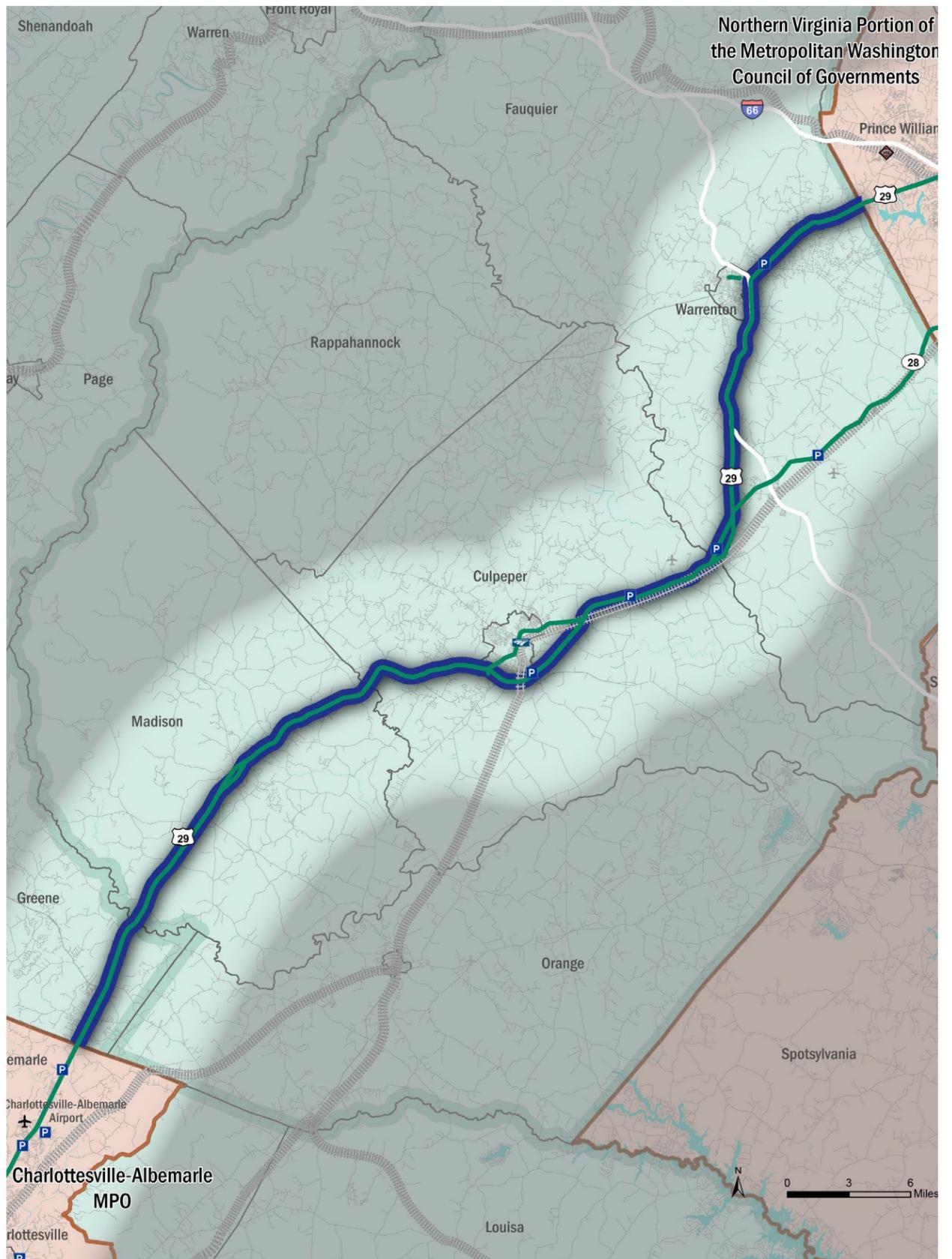
A.		Insufficient passenger amenities (including waiting area) at Charlottesville Amtrak station
B.		Poor connections between Amtrak and Greyhound Bus stations
C.		US 29 between downtown and River: Frequent driveways and access points result in slow moving traffic
D.		US 29-Business between Shamrock Rd and Earheart St in Charlottesville: 43 severe crashes
E.		US 29 between Hydraulic Rd and Ashwood Rd north of Charlottesville: 66 severe crashes
F.		Unreliable Amtrak service from Charlottesville station. Average departure delay is 32 minutes totaling over 35,500 person-hours of delay from this segment.
G.		Congestion issue at US 29 and VA Route 649 (Airport Road) in Albemarle County
H.		Congestion issue on US 29/US 29 Business between US 29 Business (Jefferson Park Avenue) and VA Route 631 (Rio Road)
I.		Reliability issue on US 29 Business (Jefferson Park Avenue) between Maury Avenue and Emmet Street South in Charlottesville
J.		Reliability issue at US 29 and VA Route 631 (Rio Road) in Albemarle County

IV. Segment I3

Corridor Segment I3 Components

- US 29
- US 29 Business
- Route 28
- Norfolk Southern Crescent Corridor
- Amtrak
- Intercity bus service

- Segment I3
- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- MPO Area
- Planning District Area



I3 SEGMENT PROFILE



Segment I3 runs between the Charlottesville-Albemarle MPO Area and the Northern Virginia Area. It serves Greene, Madison, Culpeper, and Fauquier Counties. The primary facility that defines this segment is US 29 which serves as the major north-south corridor through central Virginia, and is designated as a National Scenic Highway.

Highway Facilities: Throughout the majority of Segment I3, US 29 is a four-lane highway. North of Remington, Route 28 splits from US 29 and provides a parallel route towards Northern Virginia. Route 28 is mostly a two-lane highway. US 29 Business provides local access in and around the Town of Culpeper. US 29 runs concurrently with US 15 and US 17 through portions of Culpeper and Fauquier Counties.

Transit Services: Virginia Regional Transit (VRT) provides demand response service in the Culpeper area. The Amtrak station located in the Town of Culpeper offers service to destinations north (including the District of Columbia) and east towards Norfolk and Virginia Beach. VRE has a station in Manassas near the northern end of the segment.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29, as well as north of Washington, DC.

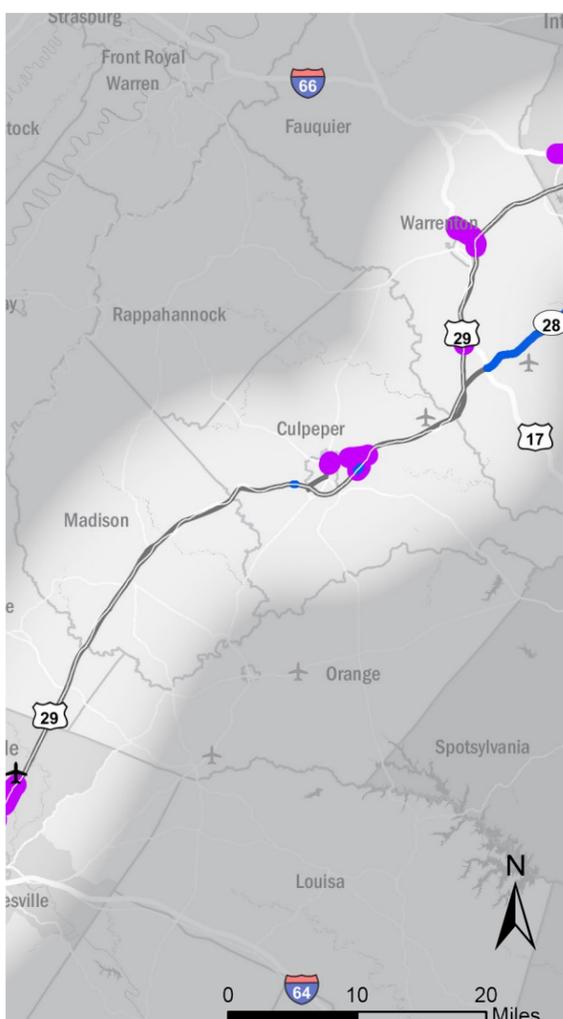
Port Facilities: No port facilities are located directly adjacent to Segment I3.

Airport Facilities: There are no airports offering commercial service in Segment I3.

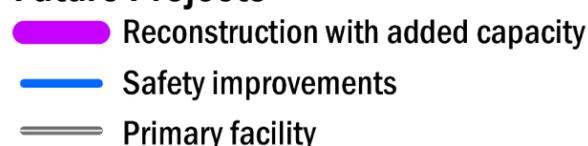
Major planned and future projects include:

- Adding turn lanes at the intersection of Matthew Mill Road and US 29 in Greene County;
- Designing and constructing safety improvements to reduce the crash rate at the intersection of US 29 and Route 718 in Culpeper County; and
- Reconstruction with added capacity at the interchange of US 15/US 29 and Route 666 in Culpeper County.

Number of Lanes (both directions)



Future Projects

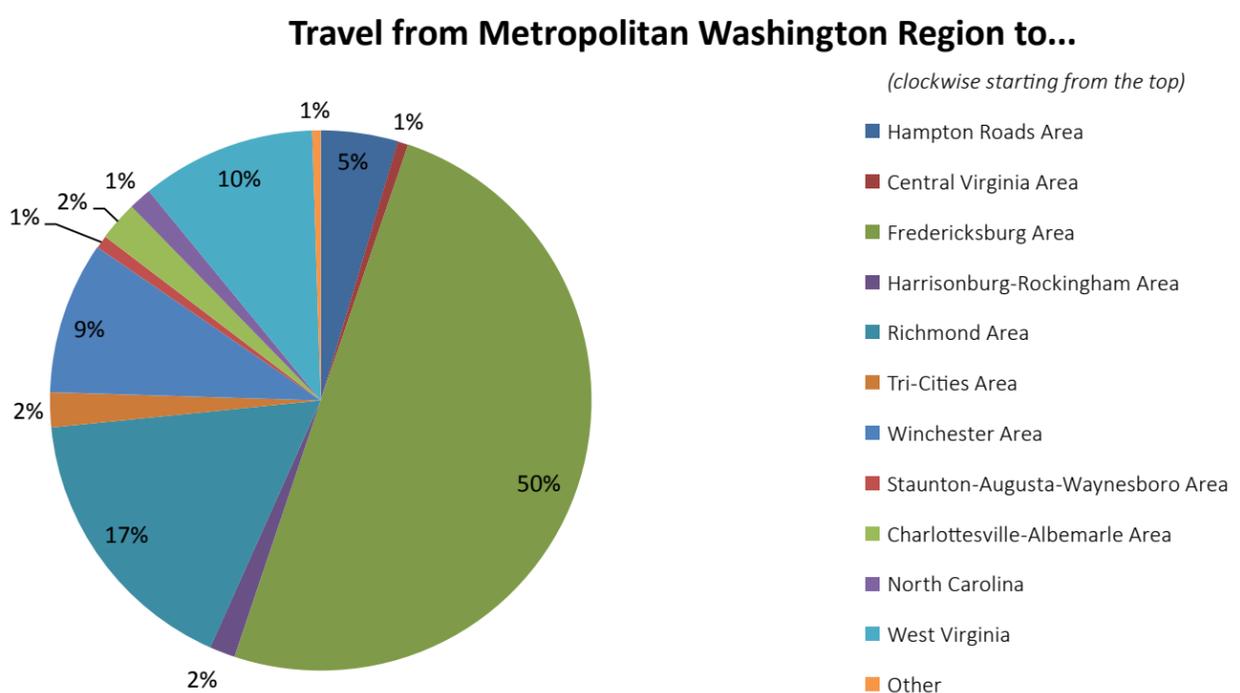
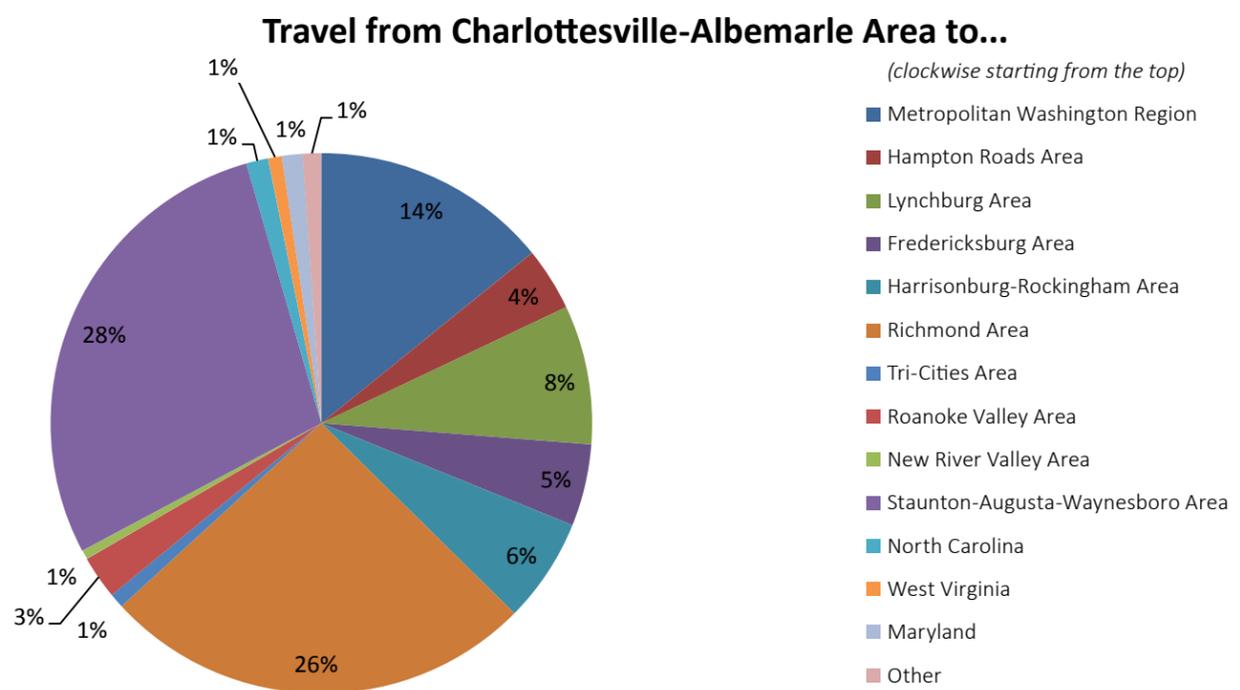


I3 SEGMENT PROFILE

Travel Demand

Passenger Demand

Segment I3 connects the Charlottesville Area to the Metropolitan Washington Area. Travel between these two regions accounts for less than one percent of the intercity passenger travel in the Commonwealth. Travel from the Charlottesville Area is distributed fairly widely across the state and the largest markets for intercity passenger travel on this segment include the Metropolitan Washington Area (14 percent), the Lynchburg Area (eight percent), and the Fredericksburg Area (five percent). Of the intercity passenger travel originating in the Metropolitan Washington Area, only small portions are likely to use Segment I3, including two percent destined for the Charlottesville Area and one percent destined for the Lynchburg Area. Some travel destined for North Carolina or points further south could also use this segment, but other faster options (such as I-95 on Corridor K) are available depending on the ultimate destination.



I3 SEGMENT PROFILE

Freight Demand

By truck, Segment I3 carried 14 million tons of freight worth \$17 billion in 2012, and is estimated to carry 18 million tons of freight worth \$25 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. The jurisdictions adjacent to Segment I3 are major generators of truck freight tonnage, accounting for more than 16 percent of the corridor truck freight tonnage and more than five percent of the truck freight value on the corridor. Significant truck freight flows exist on Segment I3 between Culpeper and Fauquier Counties, Maryland, and Pennsylvania that account for between three and four percent of the total corridor truck freight tonnage.

By rail, Segment I3 carried seven million tons of freight worth \$11 billion in 2012, and is estimated to carry nine million tons of freight worth \$14 billion in 2025. Rail freight movements mainly consist of through-travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. Between two and three percent of all rail freight tonnage on the corridor travels from Fauquier and Fairfax Counties.

Truck Freight



Rail Freight



I3 SEGMENT PROFILE

Traffic Conditions

Traffic Volume and AADT

Traffic volume on Segment I3 is moderate compared with traffic volumes on the other segments of Corridor I. In Greene, Madison, and Culpeper Counties, average daily traffic volumes along US 29 range from 14,000 to 31,000 vehicles. The highest traffic volumes in Segment I3 occur along US 29 in Fauquier County, where average daily traffic volumes range from 23,000 to 50,000 vehicles. Volumes on Route 28 in Segment I3 are generally lower, with volumes between 10,000 and 16,000 vehicles per day. Traffic growth is expected throughout the segment by 2025, with the greatest increases projected to occur along US 29 in Fauquier County. No growth is projected for Route 28 in Segment I3.

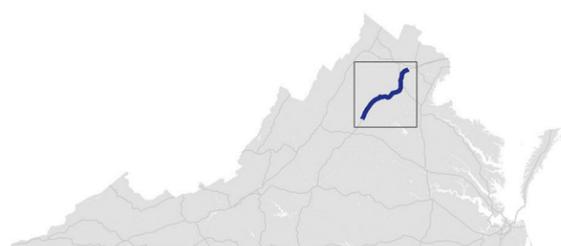
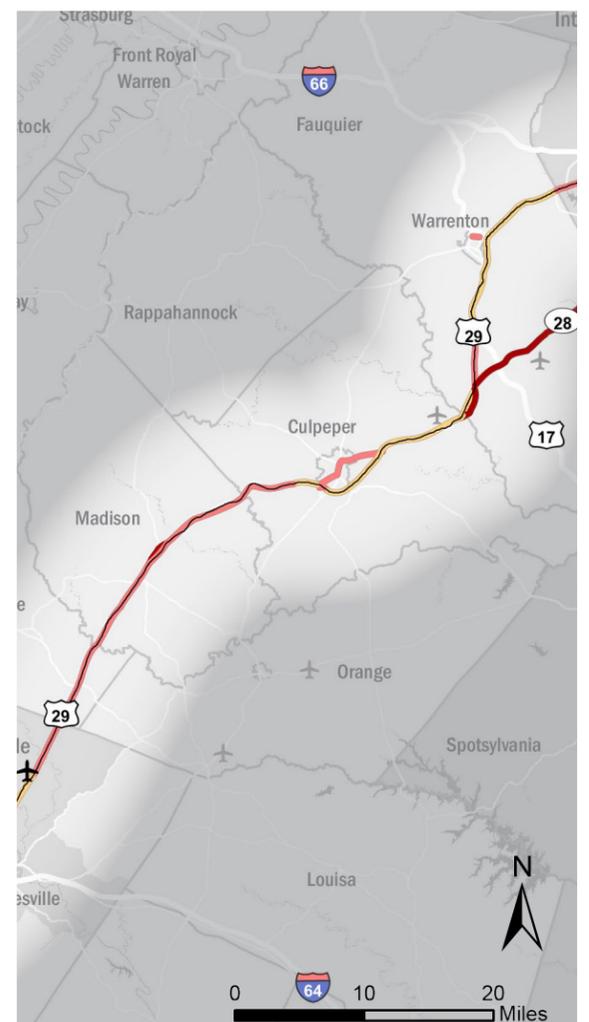
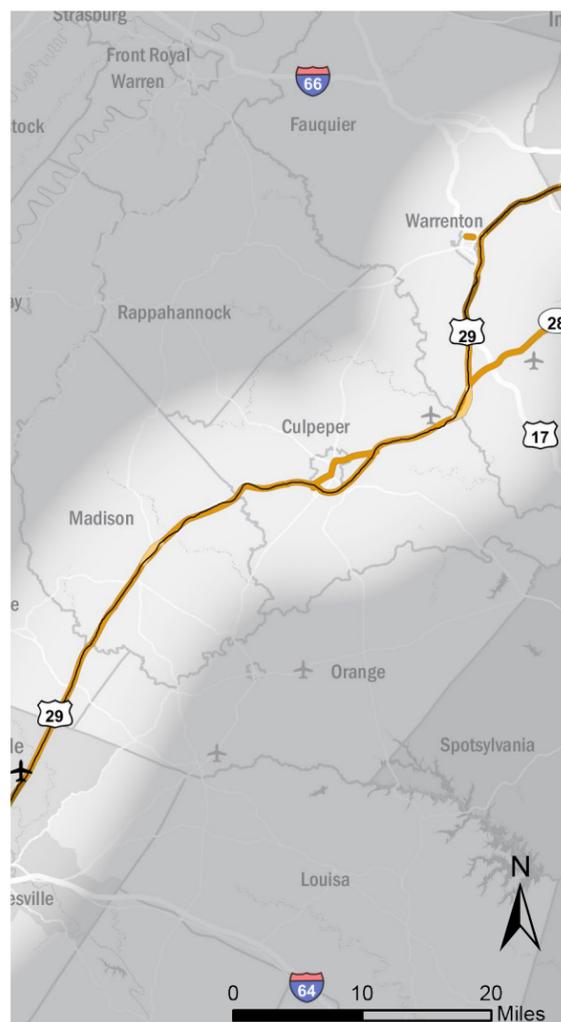
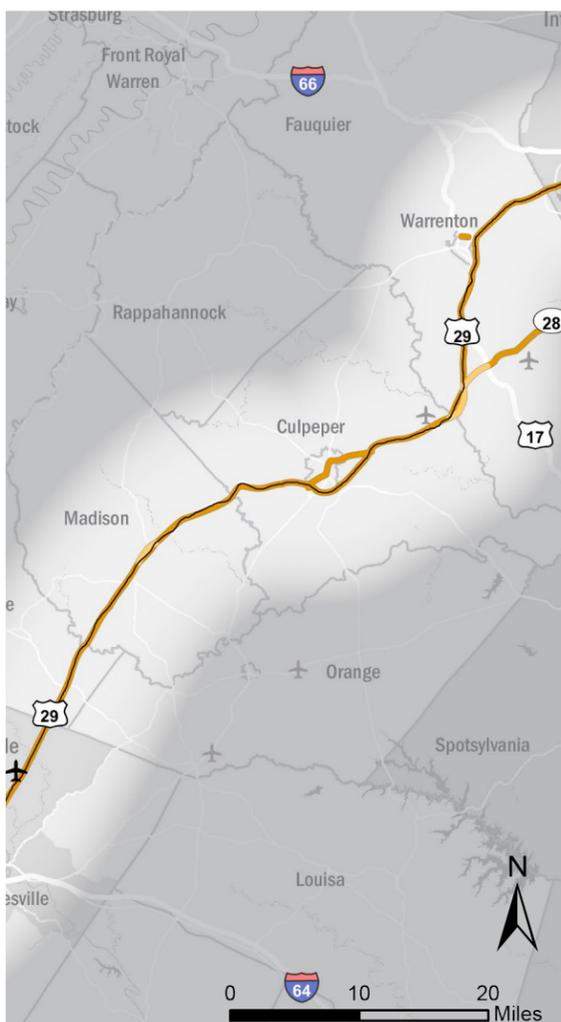
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)

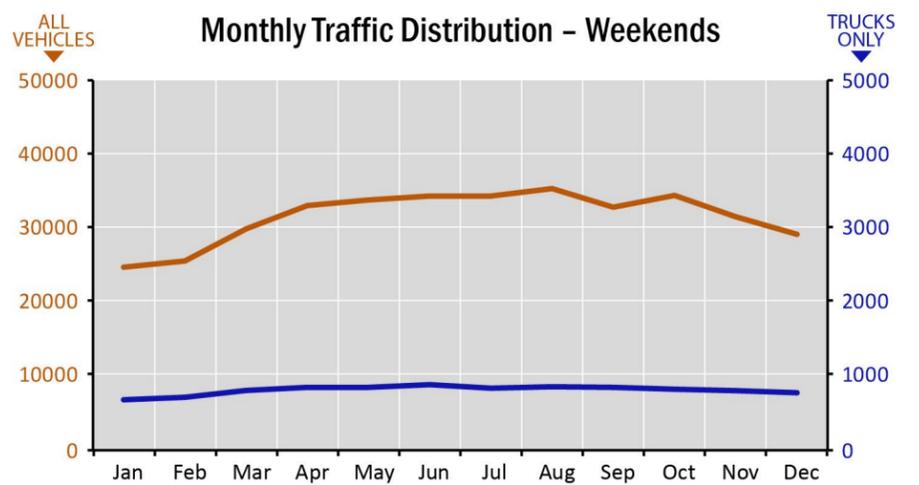
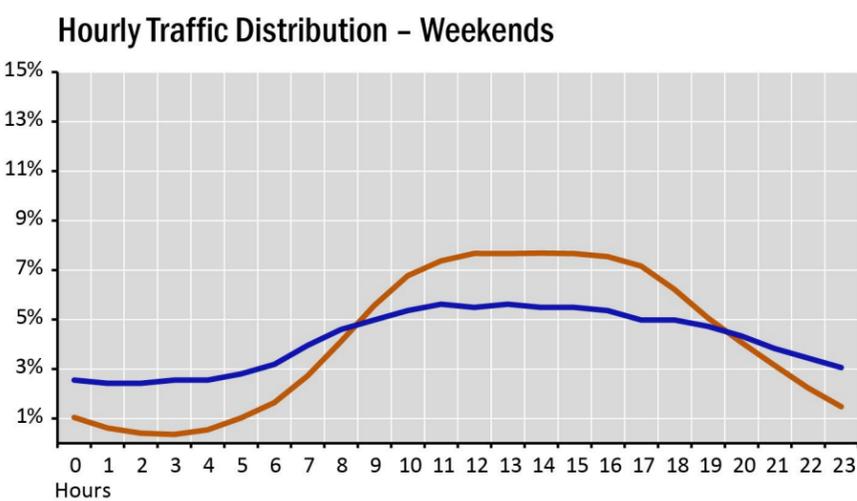
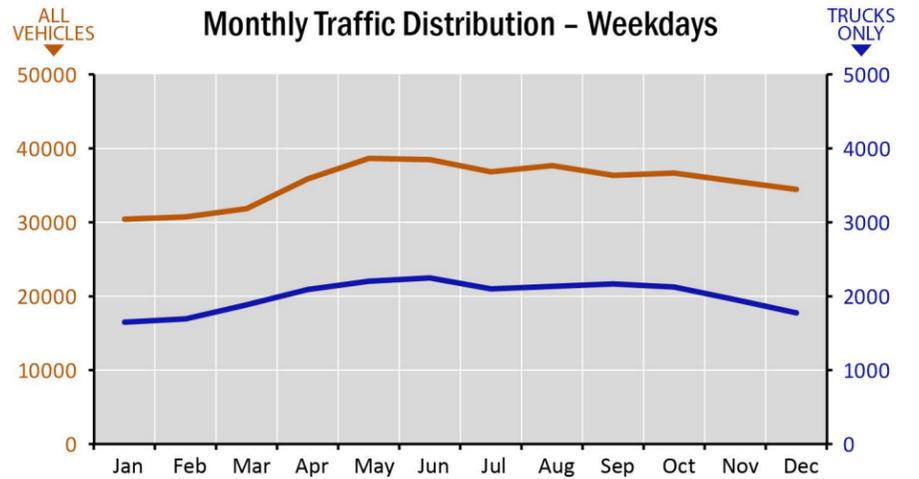
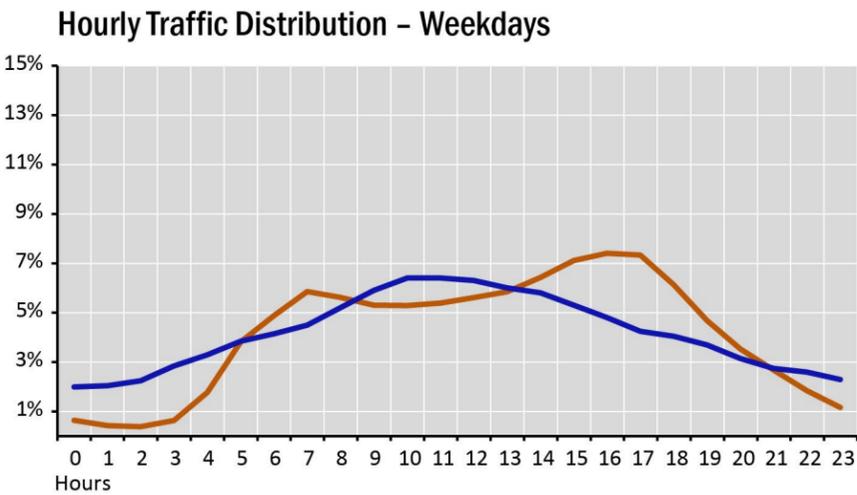


Change in Traffic Volume 2014- 2025 (AADT)



I3 SEGMENT PROFILE

— All Vehicles
— Trucks



Traffic Distribution

On average, traffic on Segment I3 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two distinct peak periods, with the highest hourly traffic occurring between 4 and 5 p.m. which accounts for 7.4 percent of daily traffic and a less busy morning peak between 7 and 8 a.m. accounting for 5.9 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 50 percent of total daily traffic. Peaking patterns for truck traffic differ from other traffic with a single midday peak with the highest hourly flow of 6.4 percent of daily traffic between 10 and 11 a.m. Weekend traffic patterns are also different from the typical commute patterns, showing an even distribution of traffic during the middle of the day with over 7 percent of general traffic occurring during each hour between 10 a.m. and 6 p.m. Truck traffic also has a relatively steady flow of traffic on the weekends, with a peak hour between 11 a.m. and noon (5.6 percent of daily traffic).

Weekday traffic volumes on Segment I3 vary by as much as 27 percent throughout the year, with the highpoint in May (around 39,000 vehicles per day) and the low point in January (around 30,000 vehicles per day). Truck volumes vary more than passenger volumes throughout the year, with the June high (around 2,200 vehicles per day) 36 percent higher than the January low (around 1,600 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 35,000 vehicles per day) are 44 percent higher than January levels (around 25,000 vehicles per day). Weekend truck traffic is steadier than all vehicle traffic, with the June high 32 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment I3, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volumes

The percent of daily traffic comprised of heavy trucks on Segment I3 is low relative to most other segments in Corridor I. Throughout Segment I3, heavy trucks make up less than five percent of total traffic. The highest percentage of trucks occurs between Culpeper and Warrenton where US 29 runs concurrently with US 15 and US 17.



Percent Heavy Trucks

- < 5%
- 5% - 10%
- 10% - 15%
- 15% - 20%
- > 20%
- Primary facility



I3 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

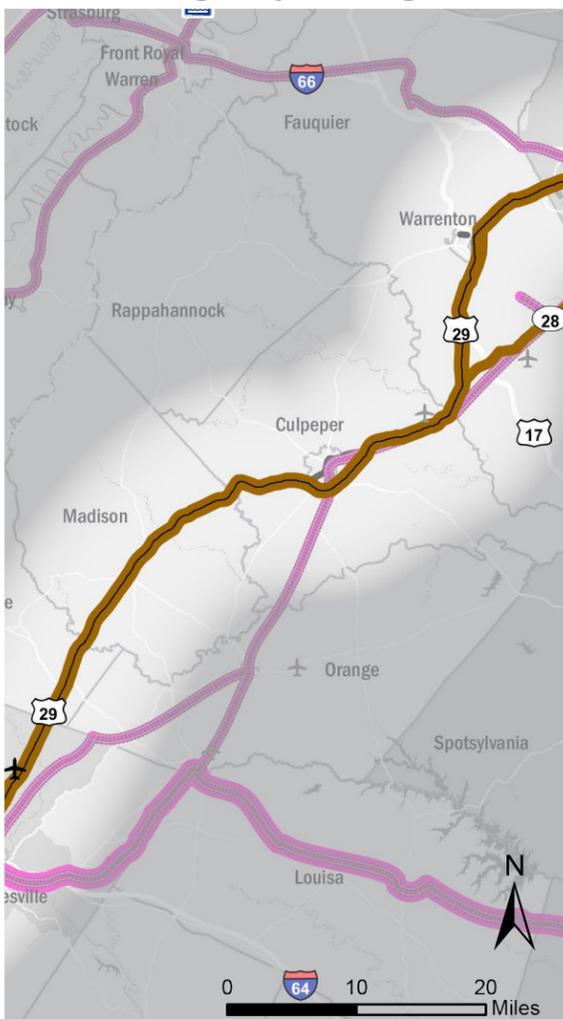


Freight Flows

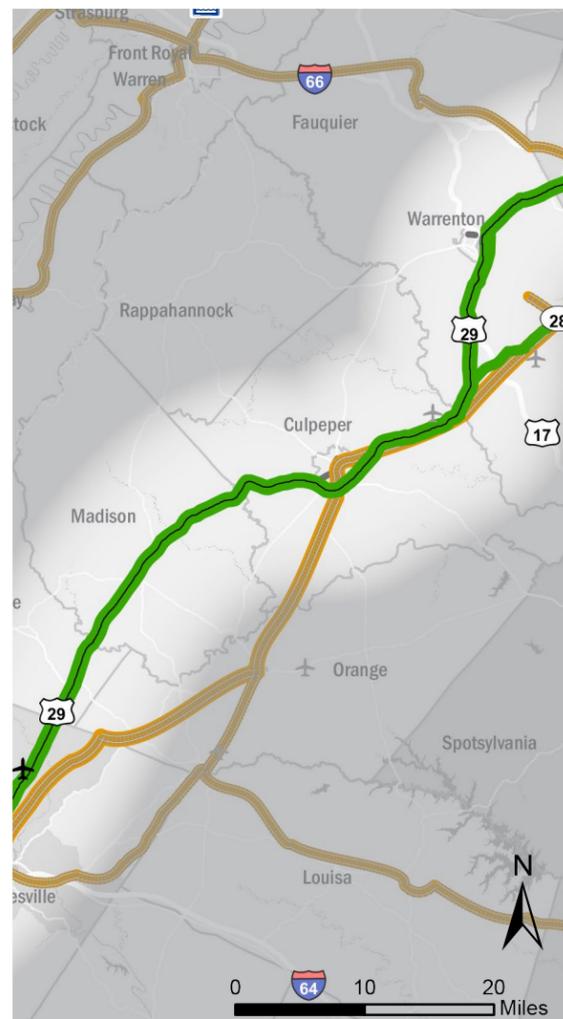
On Segment I3 west of Culpeper, freight is moved primarily by truck in terms of both tonnage and value. In total, 11 million tons (62 percent) of freight is moved through this section of Segment I3 by truck, compared to seven million tons (38 percent) by rail. In relation to value, \$16.5 billion (60 percent) of freight travels by truck, compared to \$11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I3 by truck is worth \$1,439 while a ton of freight traveling by rail is worth \$1,597. In 2025, both rail and truck freight tonnages and total values in this area of Segment I3 are expected to increase. The percentage of freight traveling by truck in terms of tonnage and value is expected to increase to 63 percent. It is anticipated that freight value per ton on trucks and rail will increase to \$1,602 and \$1,599, respectively.

North of the Rappahannock River, freight is moved primarily by truck with regard to both tonnage and value. In total, 14 million tons (66 percent) of freight is moved through this section of Segment I3 by truck, compared to seven million tons (34 percent) by rail. With respect to value, \$17 billion (60 percent) of freight travels by truck, compared to \$11 billion (40 percent) by rail. On average, a ton of freight traveling through this section of Segment I3 by truck is worth \$1,439 while a ton of freight traveling by rail is worth \$1,597. This is one of the few locations in the Commonwealth where rail freight is, on average, more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I3 are expected to increase. The percentage of freight traveling by truck is predicted to decrease by tonnage to 65 percent and increase by value to 63 percent. It is anticipated that freight value per ton on trucks and rail will decrease to \$1,390 and to \$1,501, respectively.

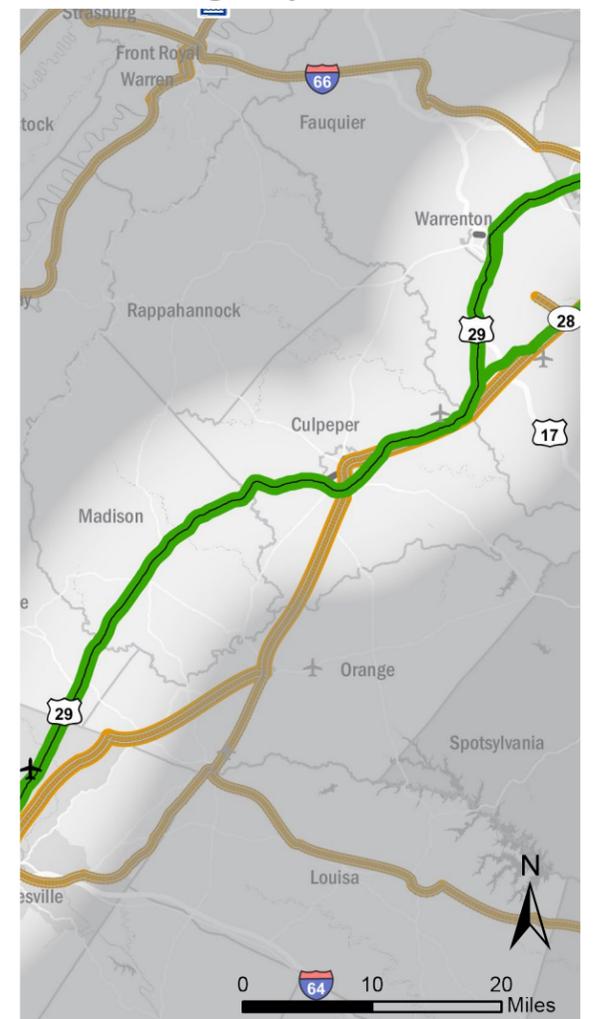
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)



Rail Freight (in tons)



Truck Freight



Rail Freight



13 SEGMENT NEEDS

Redundancy and Mode Choice



Comparable Travel Options

Lynchburg to Charlottesville

Inter-City Bus 3 Trips per Day 1:15 Travel Time \$22 Est. Cost	Train 2 Trips per Day 1:13 Travel Time \$13 Est. Cost
Auto Via Rt. 29: 1:12 Travel Time \$39 Est. Cost	

Charlottesville to Culpeper

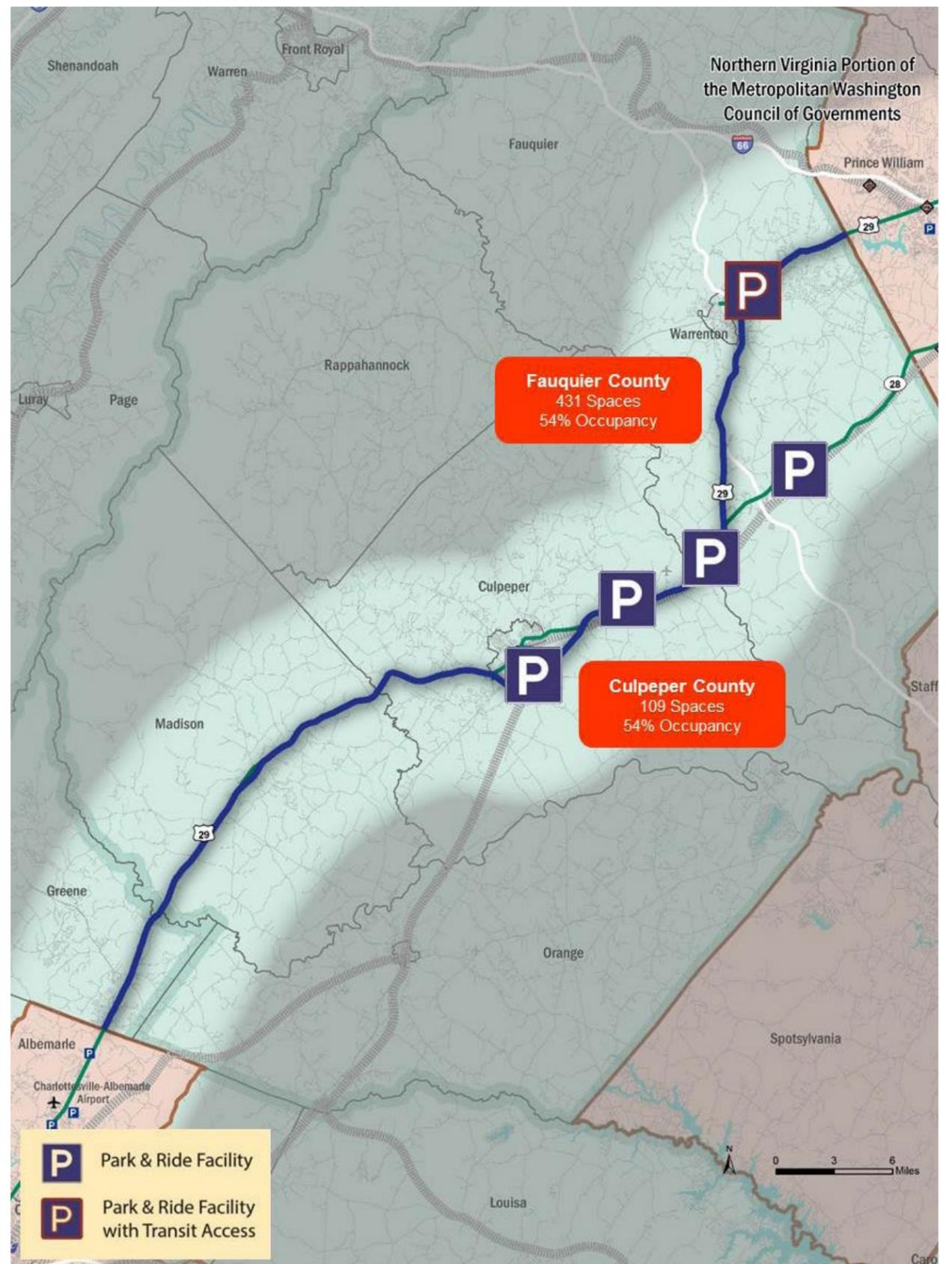
Inter-City Bus 0 Trips per Day 0:00 Travel Time \$0 Est. Cost	Train 3 Trips per Day 0:52 Travel Time \$12 Est. Cost
Auto Via Rt. 29: 1:00 Travel Time \$25 Est. Cost	

Charlottesville to DC

Inter-City Bus 2 Trips per Day 3:05 Travel Time \$22 Est. Cost	Train 4 Trips per Day 2:28 Travel Time \$25 Est. Cost	Air 3 Trips per Day 0:55 Travel Time \$215 Est. Cost
Auto Via Rt. 29 / I-66: 2:14 Travel Time \$65 Est. Cost		

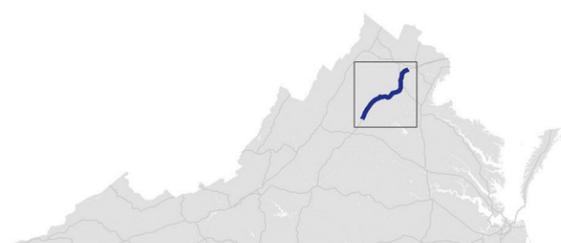
Passenger trips on Segment 13 of the Seminole Corridor have limited travel options, both in terms of travel path and mode choice. Route 28 serves as a parallel highway facility for inter-city traffic north of Culpeper. Amtrak offers service to the corridor from Culpeper, which serves the segment with its Northeast Regional and Crescent Routes. Near the northern end of the segment, VRE provides service to Northern Virginia and Washington, DC from Manassas. Automobile trips on this segment to destinations like Charlottesville, Washington, DC, Lynchburg, and Danville are typically less expensive by alternative modes such as rail or bus (based on the 2014 federal standard mileage rate of 56 cents per mile) and are also comparable in terms of travel time, although the alternative modes are limited by the frequency of service. Air travel along the corridor is much faster than any other mode, but far more expensive.

Park and Ride Facilities



Park-and-Ride

Within Segment 13, commuters can use several Park-and-Ride locations. Fauquier County has the most Park-and-Ride locations, the highest number of Park-and-Ride spaces, and the highest utilization rate of spaces available in the region, though only three of its seven Park-and-Ride locations serve the Seminole Corridor. No county within Segment 13 has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.



I3 SEGMENT NEEDS

Safety



Performance Metrics:

Number of Severe Crashes **259**

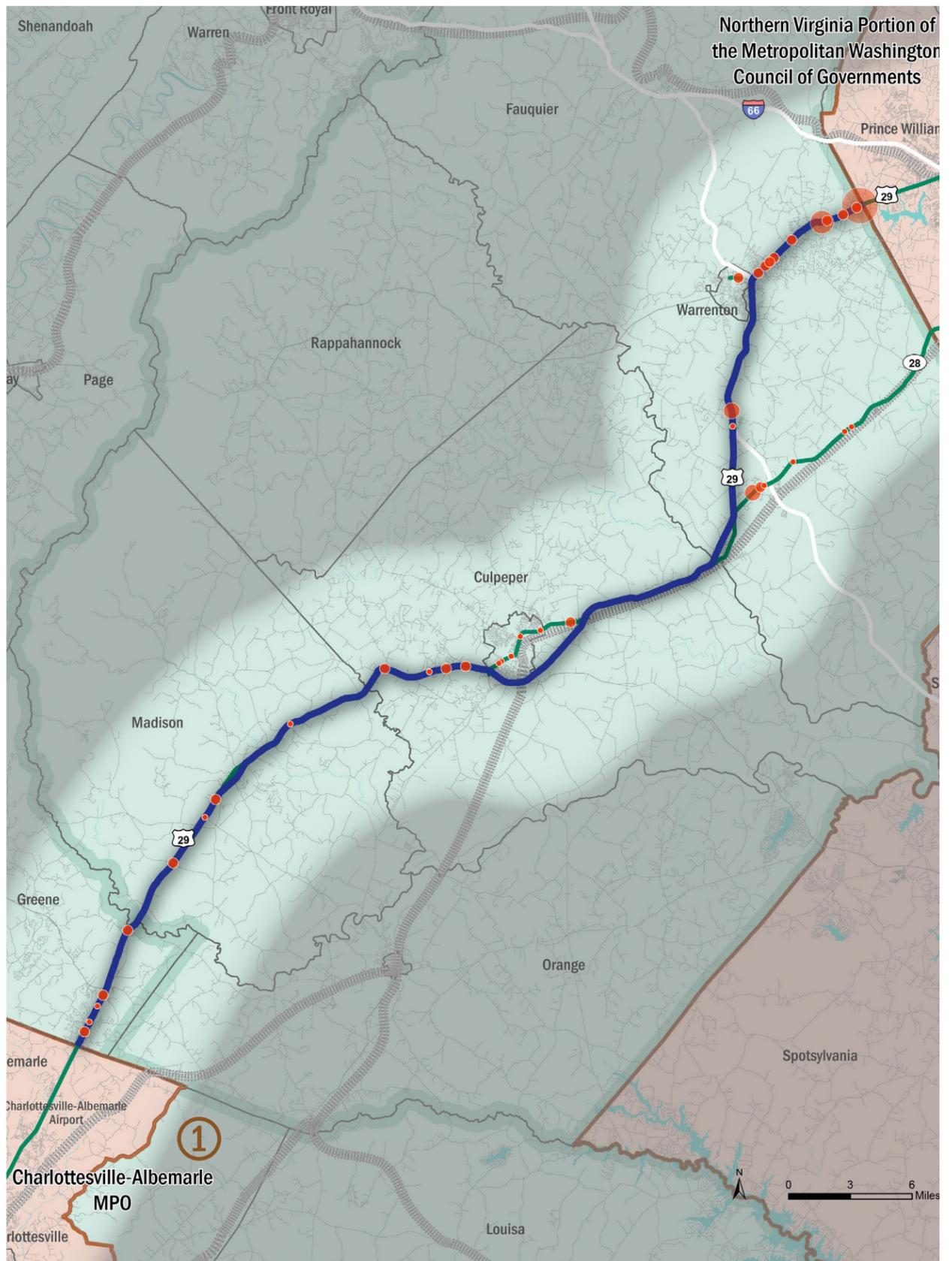
Severe Crashes/Million VMT **2.3**

Number of Railroad Crashes **1**

Between 2010 and 2012, 259 severe crashes occurred on Segment I4, resulting in one of the highest crash rates for CoSS segments statewide. The areas along Segment I3 with the highest concentrations of severe crashes are located in the northern half of the segment. In Fauquier County near Bealeton, 24 collisions took place along a stretch of Route 28 (Catlett Road), approximately 0.8 miles long, between Marsh Road and Schoolhouse Road; of the 24 collisions, 13 occurred at the intersection with Schoolhouse Road. On US 29 (South Lee Highway) in Fauquier County, there were 29 crashes that occurred over a 1.4 mile span north of the intersection of US 17, US 29, and US 211. Farther north along US 29 (South Lee Highway), there were 26 incidents within 0.4 miles of the intersection of US 29 and Route 600 (Beverley's Mill Road); of the 26 incidents, 19 occurred at the intersection. Even farther north on US 29, 31 crashes took place within 0.4 miles of the intersection with Route 215 (Vint Hill Road); a total of 25 of the 31 crashes occurred at the intersection.

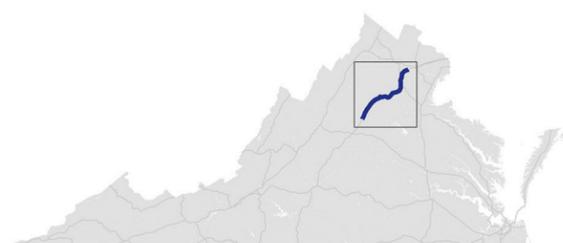
Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20



Railroad Incidents/Accidents per County (2011-2014)

#



I3 SEGMENT NEEDS

Congestion



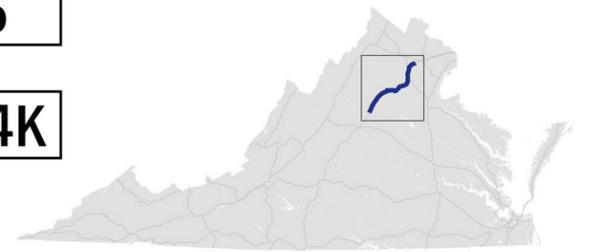
Performance Metrics

Person Hours of Delay per Mile

15

Freight Ton Hours of Delay per Mile

11.4K



Passenger Delays

Passenger congestion on Segment I3 is similar to the southern half of the corridor, with daily delays of around 2,500 person-hours. There are several locations along the corridor segment where passenger delays are in excess of 100 person-hours per mile, including:

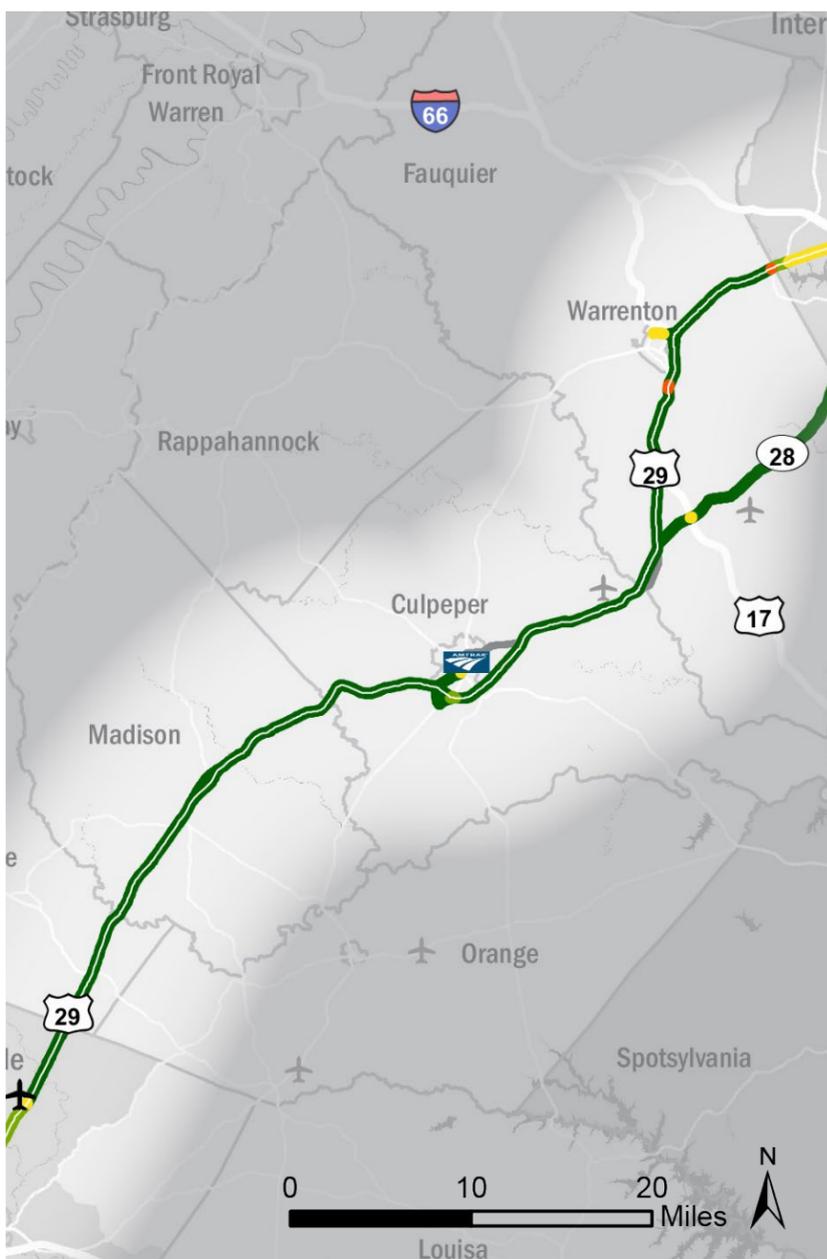
- US 29 Business between Route 3 and US 522 in the Town of Culpeper;
- US 29 around the interchange with US 17 south of Warrenton in Fauquier County;
- Route 28 at US 17 around Bealeton in Fauquier County;
- US 29 Business/US 211 between US 17 Business and US 29 in the Town of Warrenton; and
- US 29 near the border with Prince William County.

Peak-period passenger delays account for 40 percent of daily congestion, which is average for the peak-period share of congestion on CoSS segments.

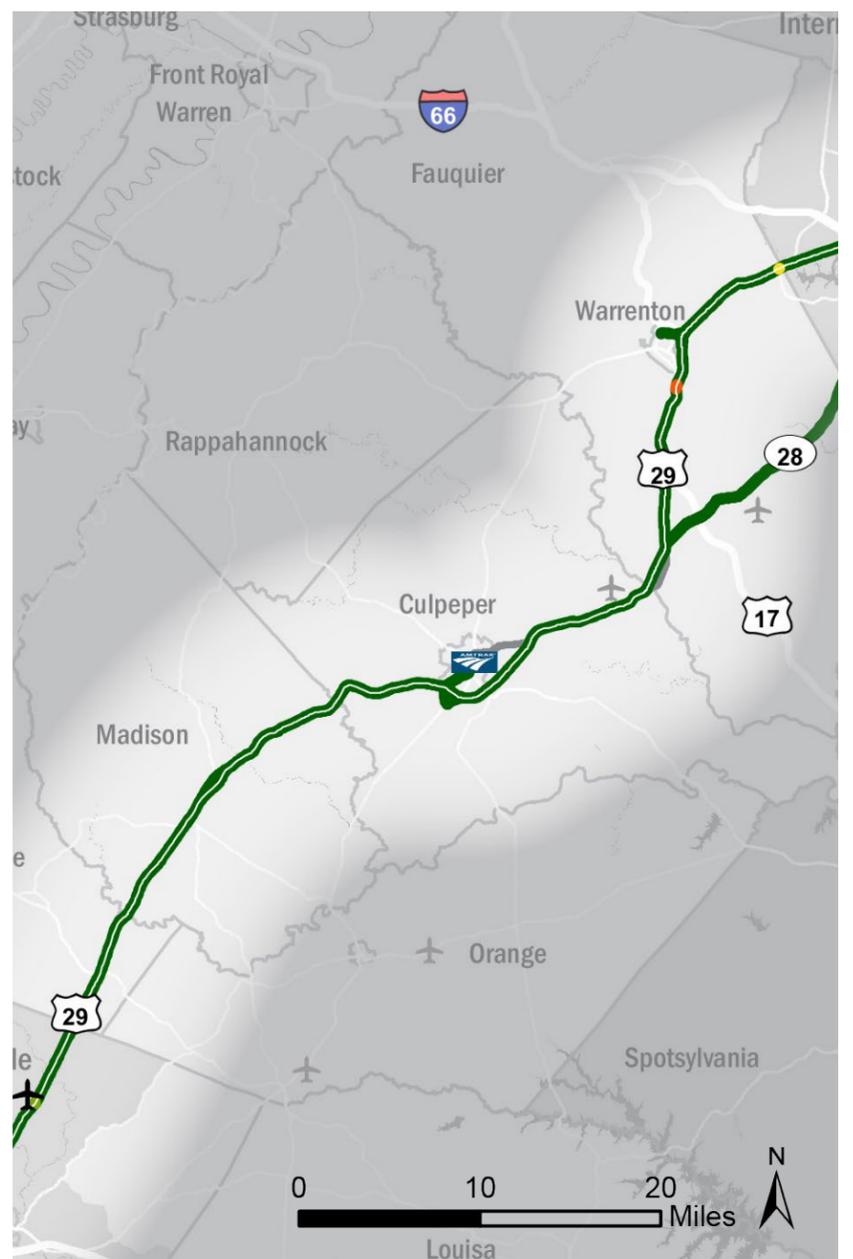
Freight Delays

The total freight delay on Segment I3 is the highest on the Seminole Corridor, although, on average, such delays are similar to the southern half of the corridor, with an average of 11,400 ton-hours per mile of delay daily. Freight congestion along much of the corridor segment is minimal. However, delays exceed 250,000 ton-hours per mile in two locations in Fauquier County: near the border with Prince William County and near the interchange with US 17 Business south of Warrenton. Peak-period freight delays account for just 21 percent of daily congestion, which is considerably less than the average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile

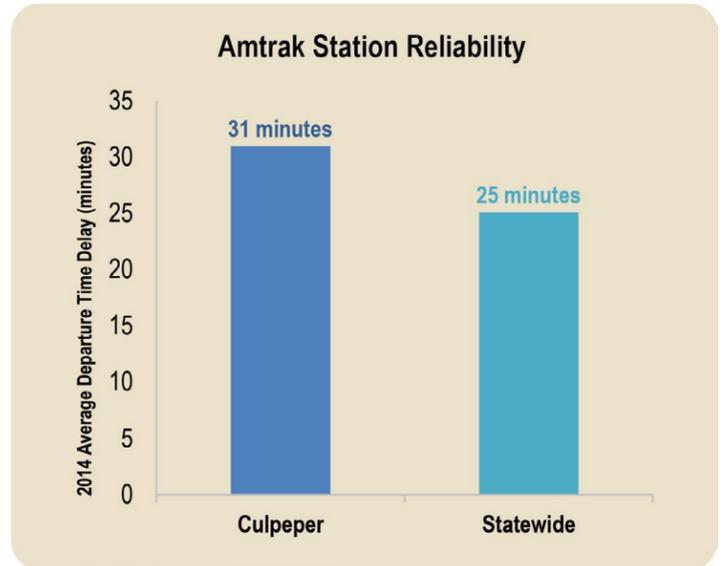


Daily Freight Ton Hours of Delay Per Mile



I3 SEGMENT NEEDS

Reliability



Weekday Peak Reliability

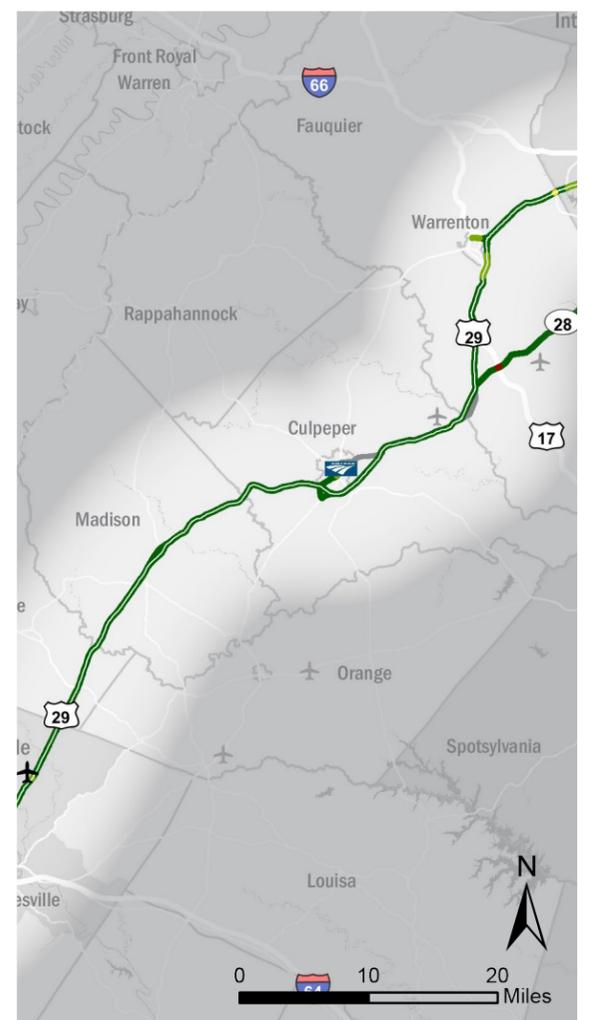
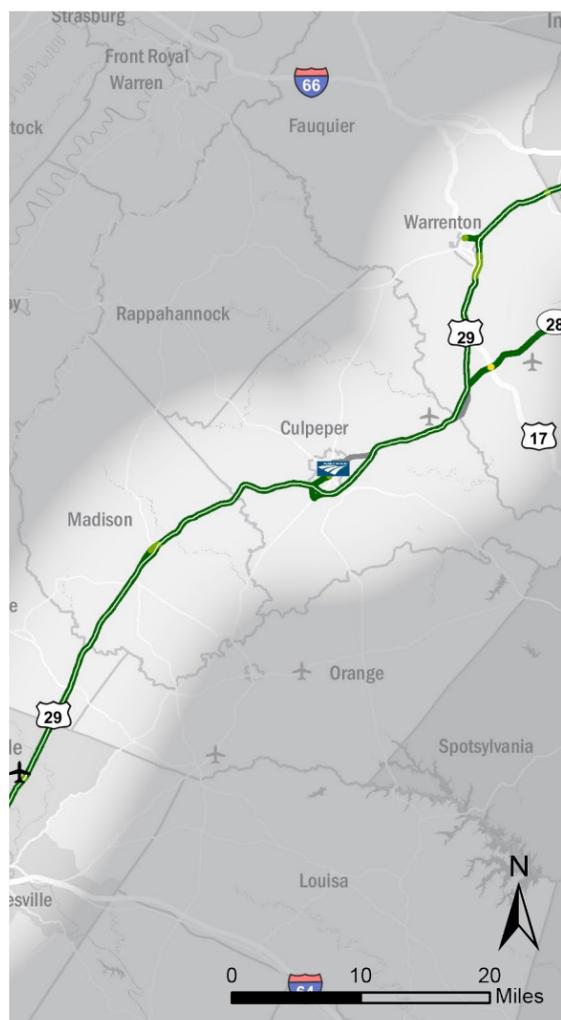
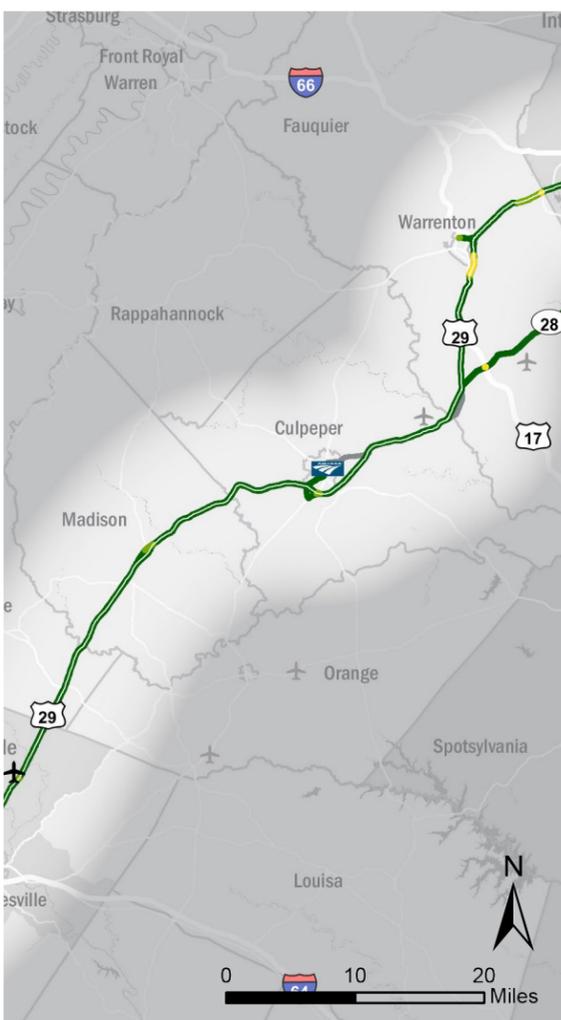
Reliability of travel during the peak period on a typical weekday on Segment I3 ranges from 0.00 to 0.59 in terms of reliability index, with an average value of 0.10. None of the locations along Segment I3 have reliability index values exceeding the statewide threshold.

Weekday Reliability

Reliability of travel during a typical weekday ranges from 0.00 to 0.42 in terms of reliability index, with an average value of 0.09. The only location where the weekday reliability index value exceeds the statewide threshold is a short stretch along Route 28 at US 17 in Fauquier County.

Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 0.83 in terms of reliability index, with an average value of 0.09. The only location where the weekend reliability index value exceeds the statewide threshold is a short stretch along Route 28 at US 17 in Fauquier County.



Reliability Index

- █ < 0.2
- █ 0.2 - 0.4
- █ 0.4 - 0.6
- █ 0.6 - 0.8
- █ > 0.8
- Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

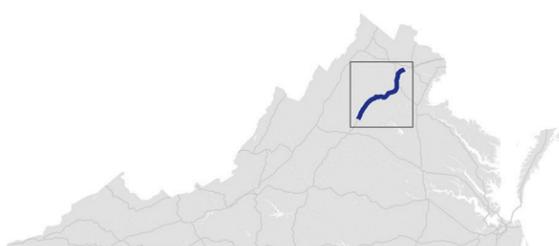
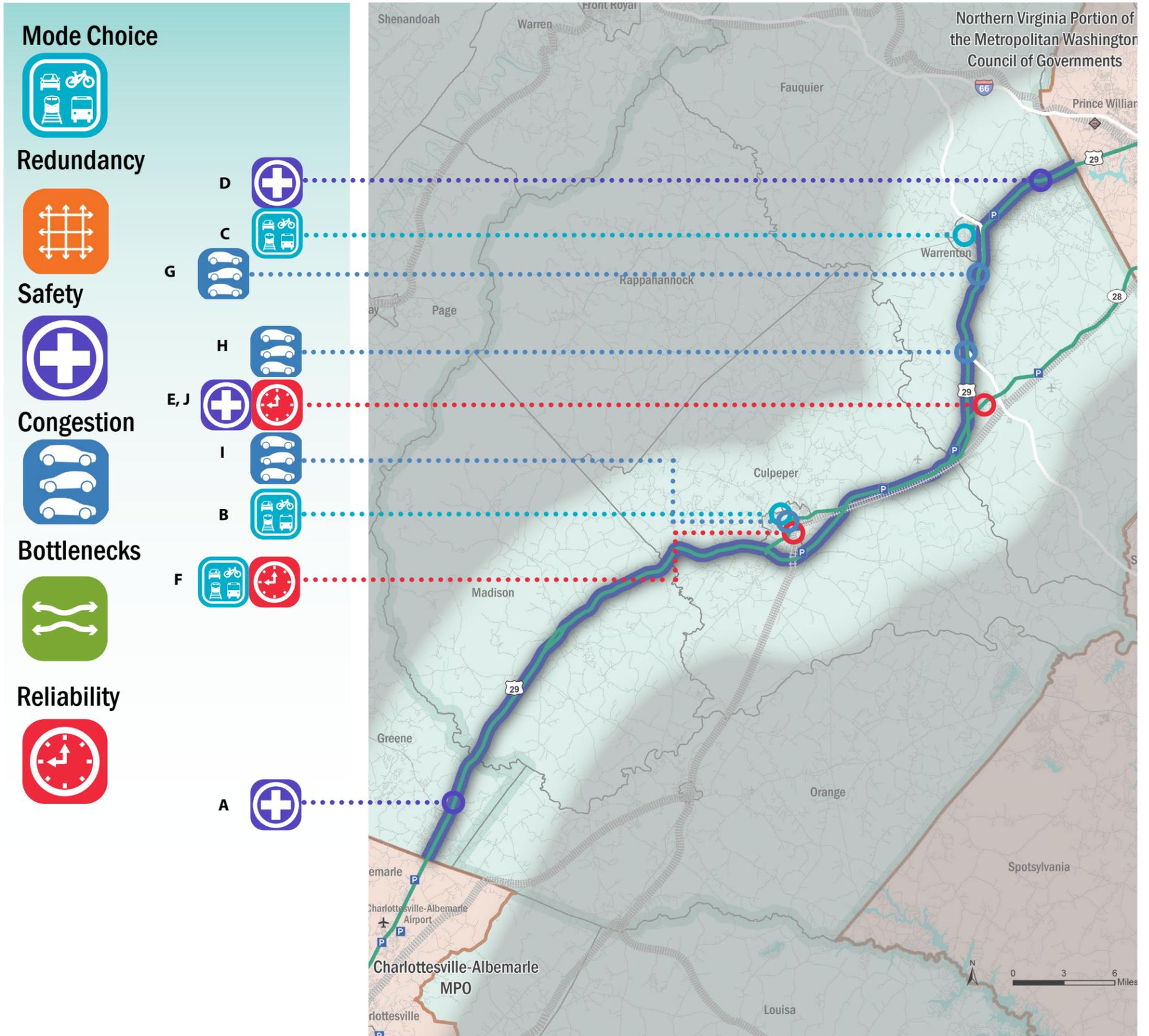
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60



I3 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.



I3 SEGMENT NEEDS

Summary of Needs - I3 Segment

A.		Safety concerns at the intersection of US 29 and US 33 in Greene County
B.		No intercity bus service to Culpeper
C.		No intercity bus service to Warrenton
D.		VA 28 between US 29 and US 17 near Bealton: 24 severe crashes
E.		US 29 between US 17 and Vint Hill Rd east of Warrenton: 101 severe crashes
F.	 	Unreliable Amtrak service from Culpeper station. Average departure delay is 31 minutes totaling over 3,600 person-hours of delay from this segment.
G.		Congestion issue at US 29/US 17 and US 17 Business south of Warrenton
H.		Congestion issue at US 29 and US 17 in Opal
I.		Congestion issue on US 29 Business in Culpeper between Colonel Jameson Boulevard and VA Route 3/US 522 (Germanna Highway)
J.		Reliability issue at US 17 and VA Route 28

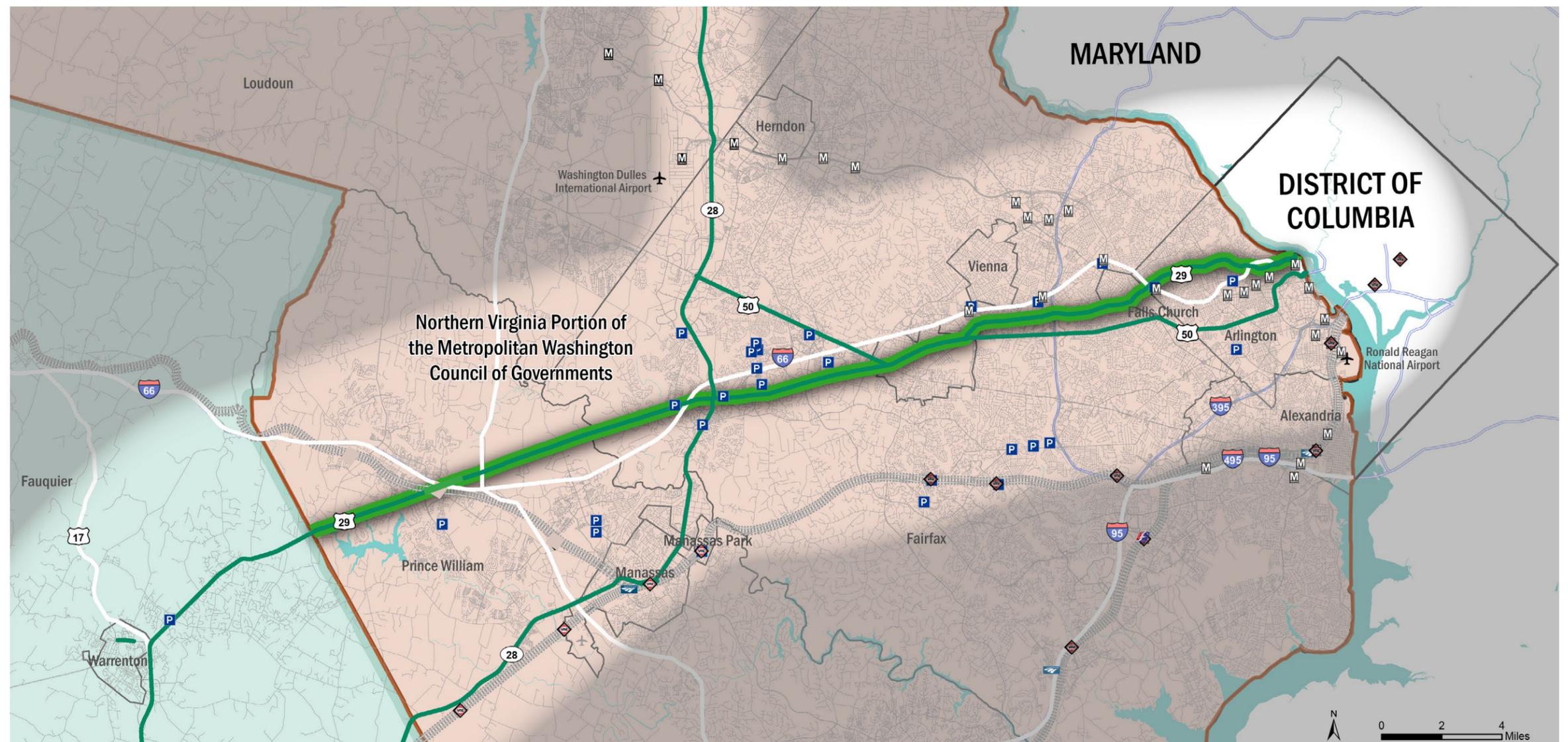
II. Segment I4



Corridor Segment I4 Components

- US 29
- US 50
- Route 28
- Metrorail Orange Line
- Metrorail Silver Line
- Virginia Railway Express
- Amtrak
- Washington Dulles International Airport

- Segment I4
- Corridor Component Road
- Railroad
- Airport Facility
- Amtrak Facility
- Greyhound Facility
- VRE Facility
- Metrorail Facility
- Port Facility
- Park & Ride Facility
- MPO Area
- Planning District Area



I4 SEGMENT PROFILE

Segment I4 begins Prince William County and progresses through Fairfax and Arlington Counties and the Cities of Manassas, Manassas Park, Fairfax and Falls Church to its terminus at the Potomac River. The segment lies entirely within the Northern Virginia portion of the Metropolitan Washington MPO Area. The primary facility is US 29, but includes US 28 and US 50 as parallel facilities in Segment I4. US 29 and US 50 run concurrently for a short section in the City of Fairfax.

Highway Facilities: Throughout the majority of Segment I4, US 29 is a four-lane highway. Through this segment, US 29 serves as a parallel corridor and local access route for I-66. Route 28 is a six-lane grade-separated highway north of US 29, and a four-lane highway to the south. Route 28 also serves as a parallel corridor for US 29 between the western end of Fairfax County and Fauquier County. US 50 is a parallel facility with six lanes that serves the Cities of Fairfax and Falls Church, and Arlington County, providing direct access to the District of Columbia.

Transit Services: Multiple line-haul transit options are available along US 29 in the Northern Virginia Area including:

- The Washington Metropolitan Area Transit Authority (WMATA), which operates the Metrorail Orange Line which runs parallel to I-66 from Arlington to Vienna with multiple stations and almost 9,000 Park-and-Ride spaces available. Metrorail’s Silver Line (Phase I opened in 2014 and Phase II is currently under construction) connects to Dulles Airport and into Loudoun County;
- The Virginia Railway Express (VRE), which operates commuter rail service in Segment I4 on the Manassas Line. Service travels between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route, running from Washington, DC to the south along the US 29 Corridor; and
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC. Bus connections to the Metrorail system are also provided by the Fairfax Connector, Metrobus, and ART.

Rail Facilities: Norfolk Southern freight rail lines run along virtually the entire Seminole Corridor in Virginia, offering a freight option to areas south along US 29 as well as north of Washington, DC, and to the northeast.

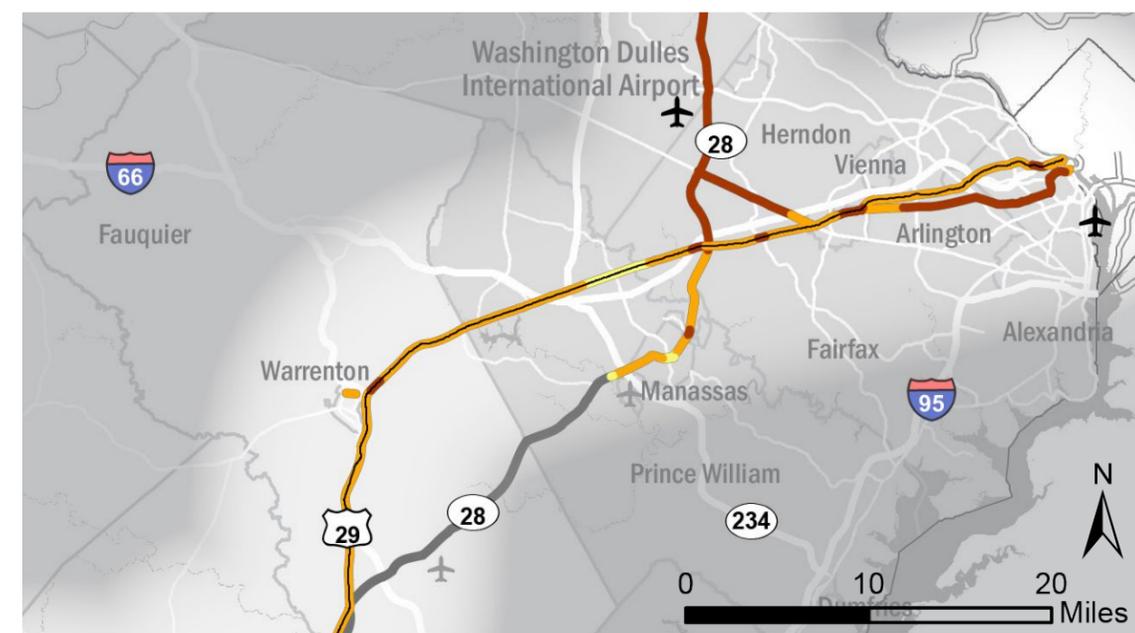
Port Facilities: No port facilities are located directly adjacent to Segment I4.

Airport Facilities: Dulles International Airport, located in Segment I4, provides commercial aviation and air cargo services. Manassas Regional Airport (Prince William County) and Warrenton-Fauquier Airport (Fauquier County) are two reliever airports in this segment.

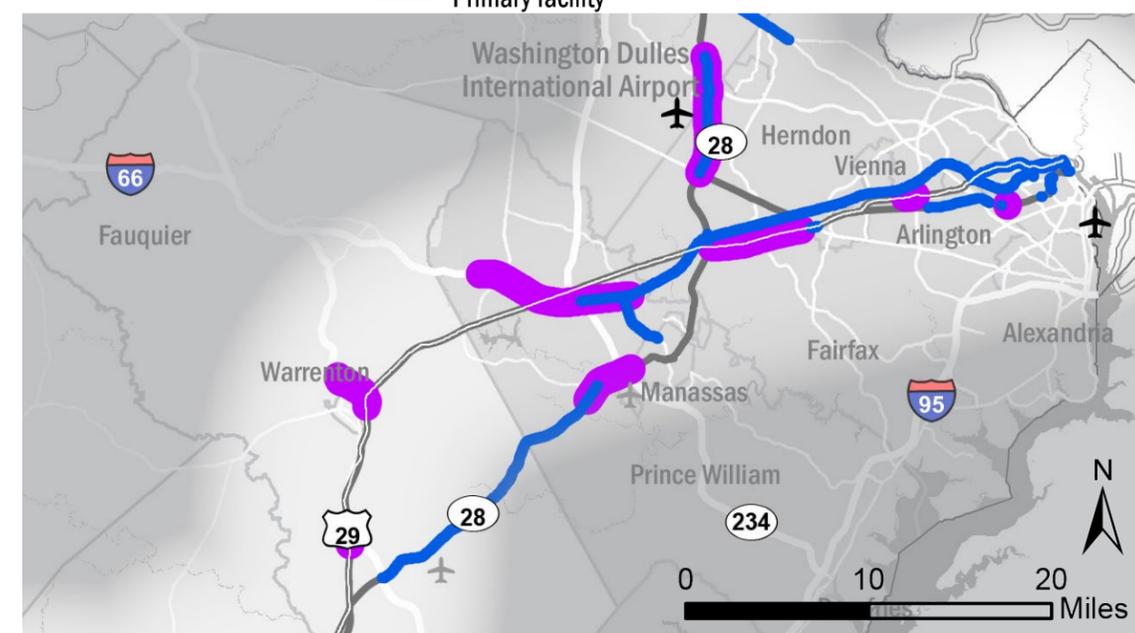
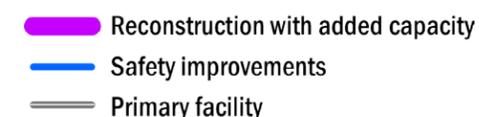
Major planned and future projects include:

- Safety improvements at the intersection of US 29/US 50 and Route 236 in the City of Fairfax; and
- Studying construction of full intersections, ADA requirements, and turn lanes on US 29 between Bollard Street and North Oakland Street in Arlington County.

Number of Lanes (both directions)



Future Projects



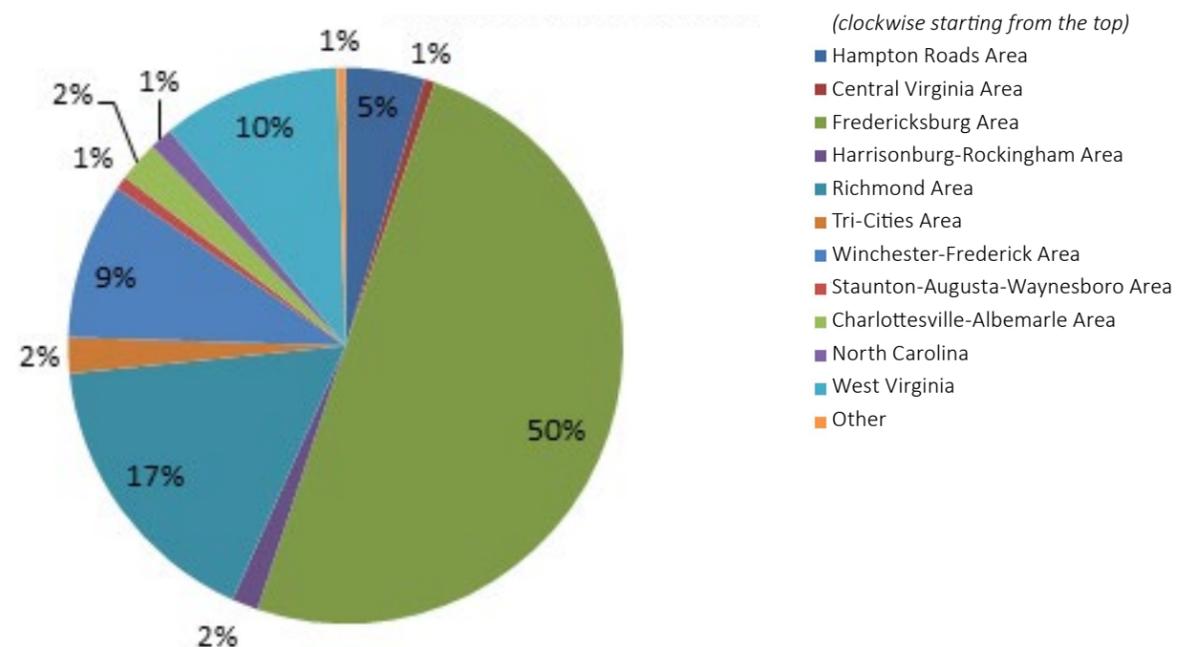
I4 SEGMENT PROFILE

Travel Demand

Passenger Demand

Segment I4, the northernmost segment of Corridor I, exists entirely within the Northern Virginia portion of the Metropolitan Washington Area, and accommodates large amounts of traffic local to the region. Of the intercity traffic originating in this Area, two percent is destined for the Charlottesville-Albemarle Area and one percent is destined for the Lynchburg area. These trips are likely to make use of Segment I4. Other intercity travel markets may make use of Segment I4 to exit the Northern Virginia Area to the south or west, as it provides connectivity to many other corridors including I-66 (Segment H2) and US 17 (Segment A3).

Travel from Metropolitan Washington Region to...



I4 SEGMENT PROFILE

Freight Demand

By truck, Segment I4 carried 13 million tons of freight worth \$17 billion in 2012, and is estimated to carry 16 million tons of freight worth \$22 billion in 2025. North Carolina is the largest generator and attractor of truck freight traveling on Corridor I, in terms of both tonnage and value. More than 13 percent of the total truck tonnage on the corridor originates in North Carolina and another 11 percent of truck freight is destined there. In terms of value, only three percent of the total truck freight value on the corridor originates from jurisdictions adjacent to Segment I4, but more than 18 percent of the total truck freight value is destined for this segment. Fairfax and Arlington Counties are major attractors of truck freight in Segment I4, accounting for more than 16 percent of the total truck freight value on Corridor I, with significant freight movements originating from California, Texas, and Tennessee. Truck freight originating in the City of Manassas is estimated to increase significantly by 2025, from less than one percent to three percent of total corridor value.

By rail, Segment I4 carried nine million tons of freight worth \$11 billion in 2012, and is estimated to carry 11 million tons of freight worth \$15 billion in 2025. Rail freight movements mainly consist of through travel on Corridor I, with 75 percent of all rail freight on the corridor passing through Virginia. West Virginia is the largest generator of rail freight tonnage on the corridor, with major rail freight flows destined for North Carolina and the Port of Virginia facilities in the Hampton Roads Area. North Carolina is the largest destination for rail freight tonnage on Corridor I, accounting for 40 percent of the total corridor rail freight tonnage, with major rail freight flows originating in the Midwest region and Pennsylvania. The most valuable rail freight movements on Corridor I are between Georgia and Pennsylvania, accounting for more than ten percent of the total corridor rail freight value. The City of Alexandria is the largest attractor of rail freight along Segment I4, accounting for one percent of the total corridor rail freight value.

Truck Freight



Rail Freight



I4 SEGMENT PROFILE

Traffic Conditions

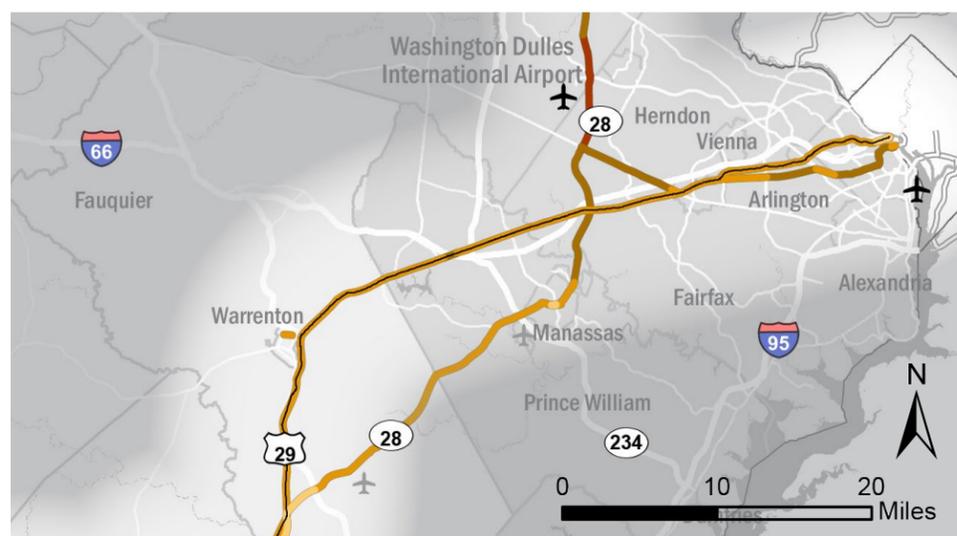
Traffic Volume and AADT

Traffic volume on Segment I4 is high relative to traffic volumes on all other segments in Corridor I, though they vary greatly depending upon location within the segment. The highest average daily traffic volumes in Segment I4 occur along Route 28 between I-66 and Route 7 where volumes can exceed 130,000 vehicles per day. Along US 29, traffic levels vary considerably, and are lowest (less than 7,000 vehicles per day) near the Potomac River in Arlington County, and are highest (greater than 60,000 vehicles per day) near the westernmost interchange with I-66 in Gainesville. Volumes on US 50 west of the City of Fairfax range from 70,000 to 98,000 vehicles per day. Traffic levels on US 50 east of the City of Fairfax are lower, ranging between 48,000 and 59,000 vehicles per day.

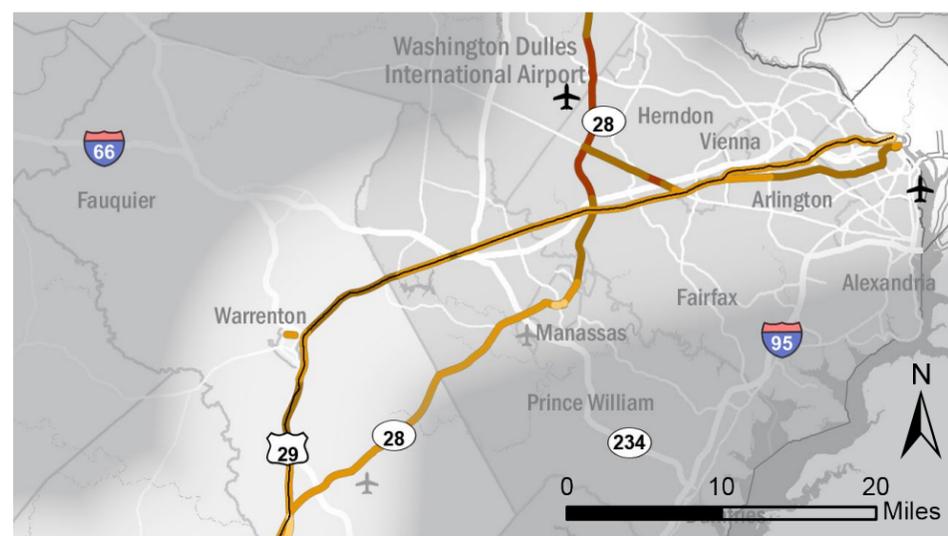
By 2025, the greatest traffic volume increases are projected to occur on Route 28 between I-66 and Route 7, ranging from 15,000 to 28,000 additional vehicles per day and resulting in traffic volumes up to 157,000 vehicles per day. By 2025, average daily traffic volumes along US 29 west of Route 28 are projected to be as high as 62,000 vehicles per day. Traffic volumes on US 50 are also expected to grow significantly by 2025, with the most growth (more than 10,000 additional vehicles per day) in the western portion of the segment.



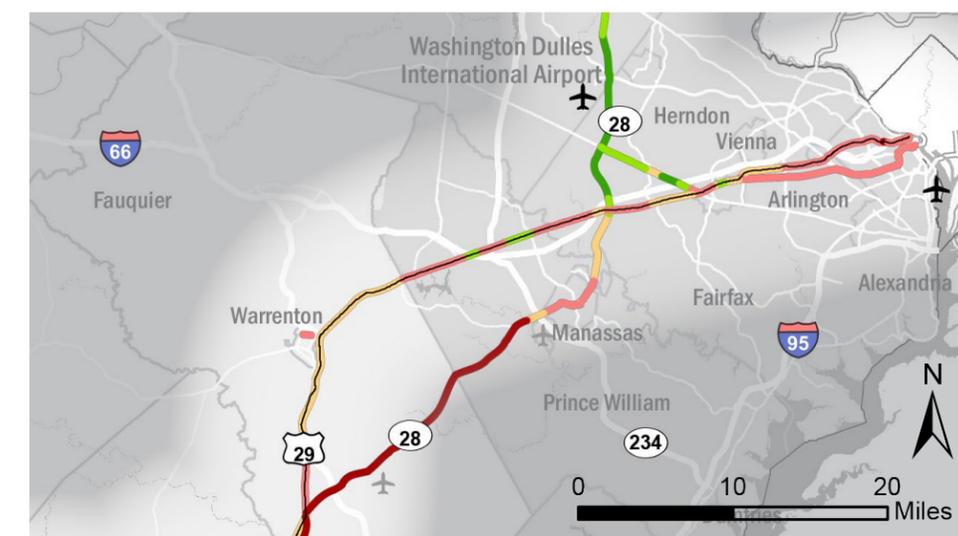
Traffic Volume 2014 (AADT)



Traffic Volume 2025 (AADT)



Change in Traffic Volume 2014- 2025 (AADT)



I4 SEGMENT PROFILE

Traffic Distribution

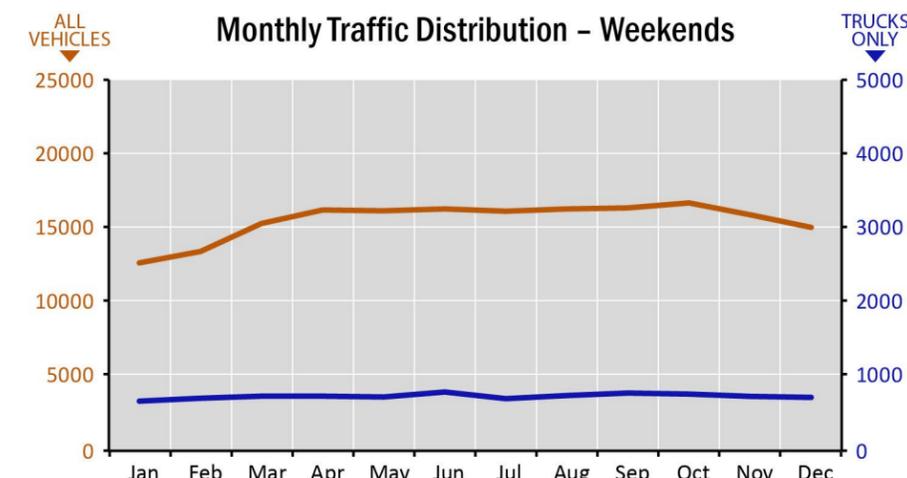
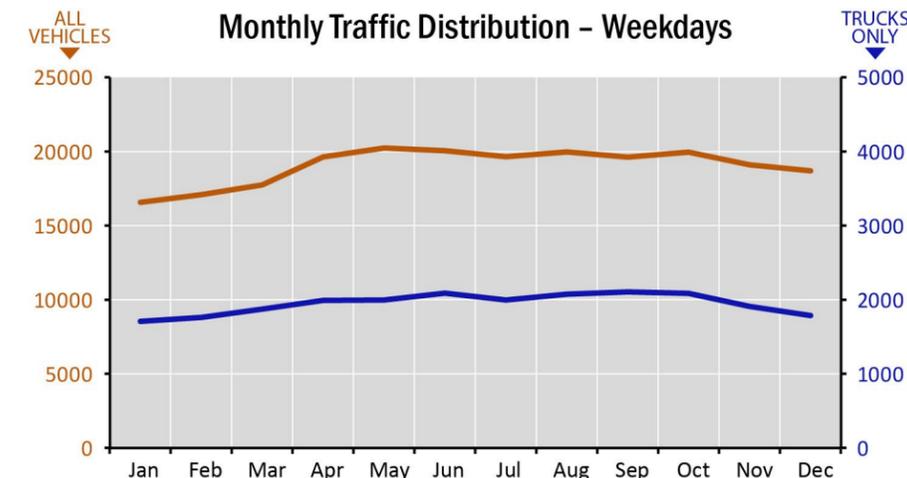
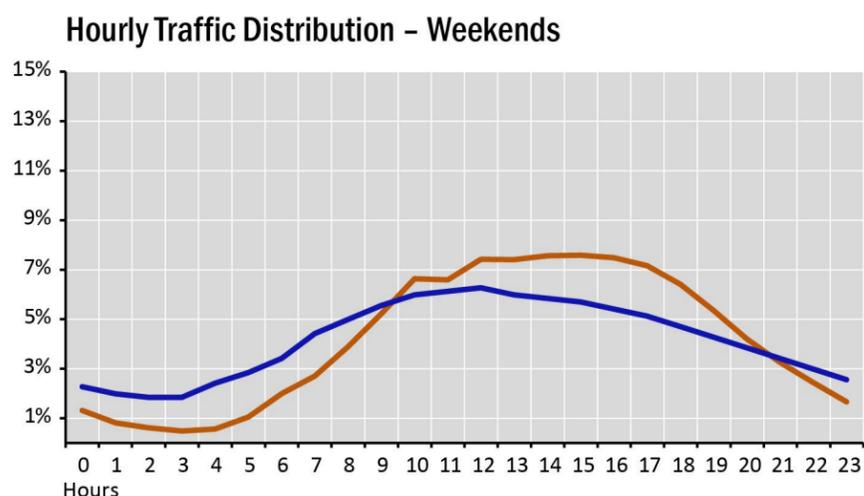
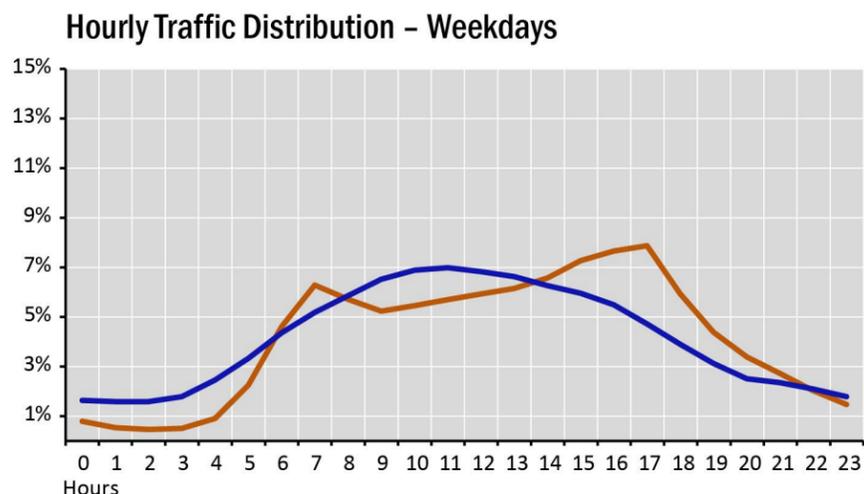
On average, traffic on Segment I4 is distributed throughout the day as shown in the graphs below. Weekday traffic shows two peak periods over the course of the day, with the highest hourly traffic occurring between 5 and 6 p.m. which accounts for 7.9 percent of daily traffic and a less busy morning peak between 8 and 9 a.m. accounting for 7.0 percent of daily traffic. The combined weekday traffic in the two peak periods (from 6 to 10 a.m. and from 3 to 7 p.m.) accounts for 54 percent of total daily traffic. Truck traffic shows a distinct morning peak, with 12.7 percent of daily truck traffic occurring between 8 and 9 a.m. Weekend traffic patterns are different from the typical commute patterns, showing a single peak period during the middle of the day, with the highest peak hour flow between 1 and 2 p.m. (8.4 percent of daily traffic) for all traffic. Conversely, weekend truck traffic is very steady throughout the day.

Weekday traffic volumes on Segment I4 vary by as much as 18 percent throughout the year, with the highpoint in June (around 32,000 vehicles per day) and the low point in January (around 27,000 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (May, around 24,000 vehicles per day) are 21 percent higher than August levels (around 20,000 vehicles per day). Since truck volumes account for a very small portion of traffic on Segment I4 (less than one percent of overall daily traffic for weekday and weekend), traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

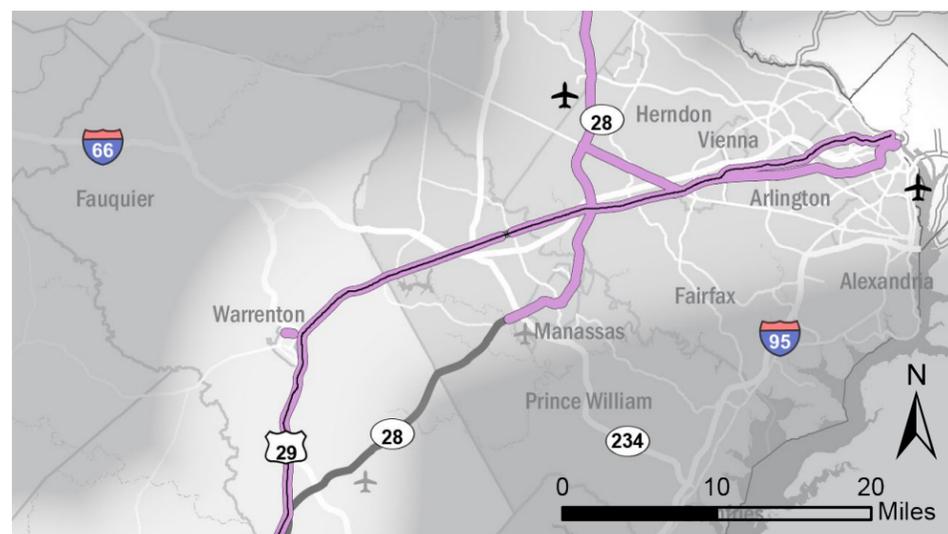
Truck Volume

The percent of average daily traffic comprised of heavy trucks on Segment I4 is very low relative to the other segments in Corridor I. With the exception of a small section of Route 28 near Manassas, heavy trucks make up two percent or less of total traffic along Segment I4.

Percent Heavy Trucks



All Vehicles
 Trucks



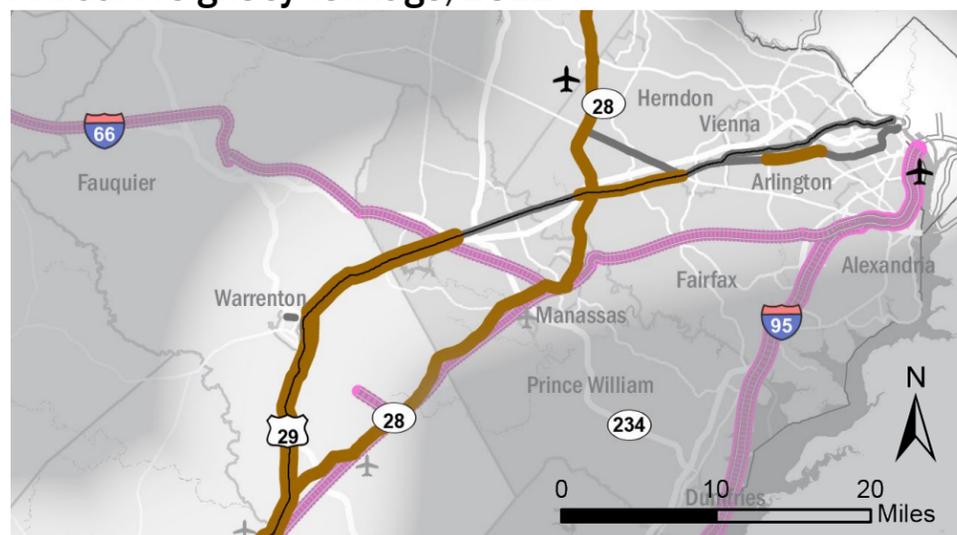
I4 SEGMENT PROFILE

Freight Flows

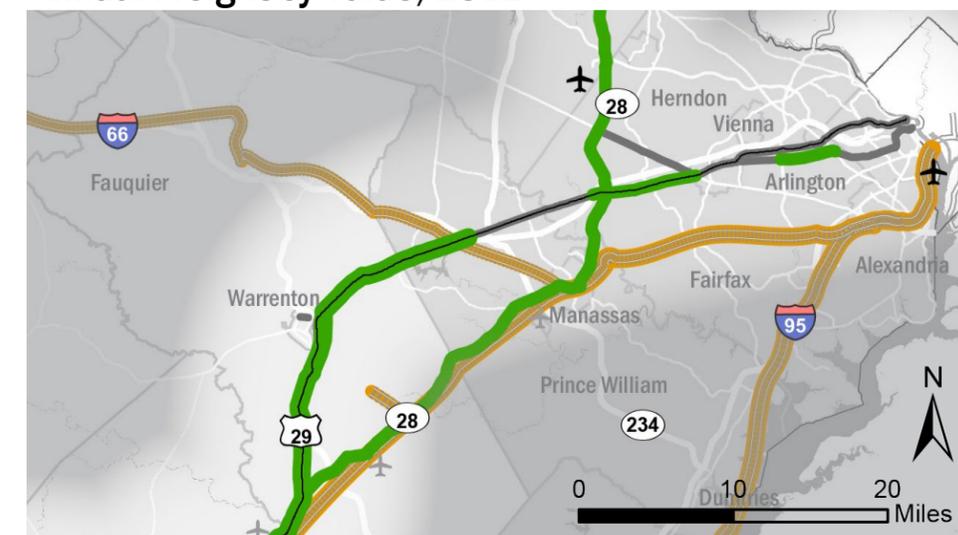
On Segment I4 near Gainesville, freight is moved primarily by truck in relation to both tonnage and value. In total, 13 million tons (59 percent) of freight is moved through this section of Segment I4 by truck, compared to 9 million tons (41 percent) by rail. With respect to value, \$16 billion (59 percent) of freight travels by truck, compared to \$11 billion (41 percent) by rail. On average, a ton of freight traveling through this section of Segment I4 by truck is worth \$1,277 while a ton of freight traveling by rail is worth \$1,292. In 2025, both rail and truck freight tonnages and total values in this area of Segment I4 are expected to increase. The percentage of freight traveling by truck in terms of tonnage is expected to remain the same and in terms of value is expected to increase to 61 percent. It is anticipated that freight value will increase to \$1,392 per ton on trucks and will decrease to \$1,253 on rail.

On Segment I4 near Fair Lakes (near Route 286), freight is moved primarily by rail by in relation to both tonnage and value. In total, 4 million tons (32 percent) of freight is moved through this section of Segment I4 by truck, compared to 9 million tons (68 percent) by rail. By value, \$5 billion (30 percent) of freight travels by truck, compared to \$12 billion (70 percent) by rail. On average, a ton of freight traveling through this section of Segment I4 by truck is worth \$1,225 while a ton of freight traveling by rail is worth \$1,396. This is one of the few locations in the Commonwealth where rail freight is on average more valuable than truck freight. In 2025, both rail and truck freight tonnages and total values in this area of Segment I4 are expected to increase. The percentage of freight traveling by truck is expected to increase by both tonnage and value to 36 percent. It is anticipated that freight value will increase to \$1,342 per ton on trucks and will decrease to \$1,355 on rail.

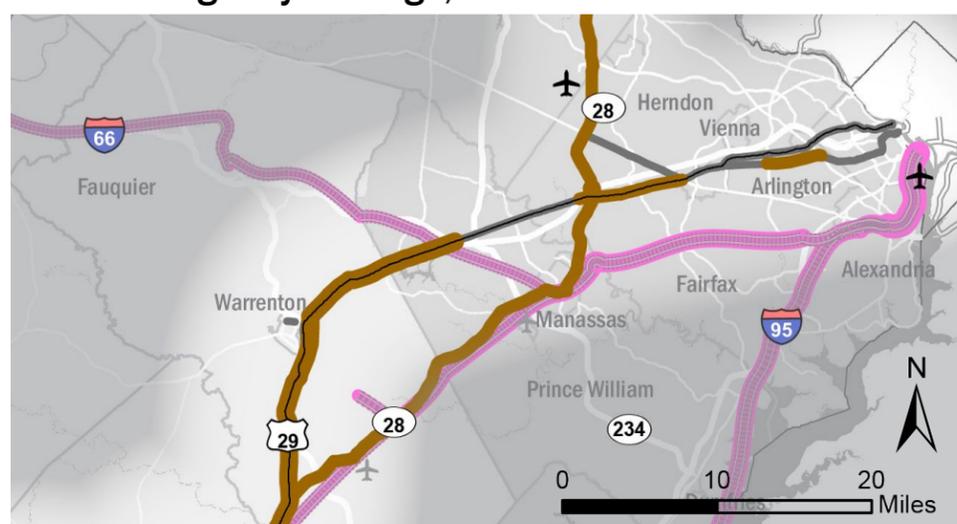
Annual Freight by Tonnage, 2012



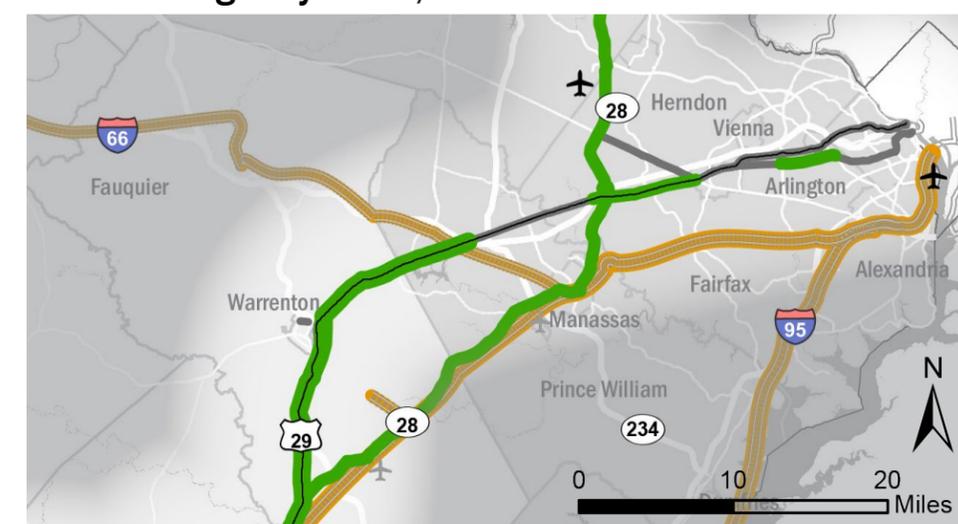
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



I4 SEGMENT NEEDS

Redundancy and Mode Choice

Passenger trips on Segment I4 of the Seminole Corridor have several travel options, both in terms of travel path and mode choice. US 50 and Route 28 serve as parallel highway facilities for portions of the segment. Route 28 is parallel to the segment through Manassas, where it turns northward to Dulles International Airport and Sterling. US 50 serves as a parallel facility between Chantilly and the District of Columbia; west of Chantilly, US 50 heads north and west to Winchester (as part of Corridor H), while the Seminole Corridor turns southwest toward Culpeper.

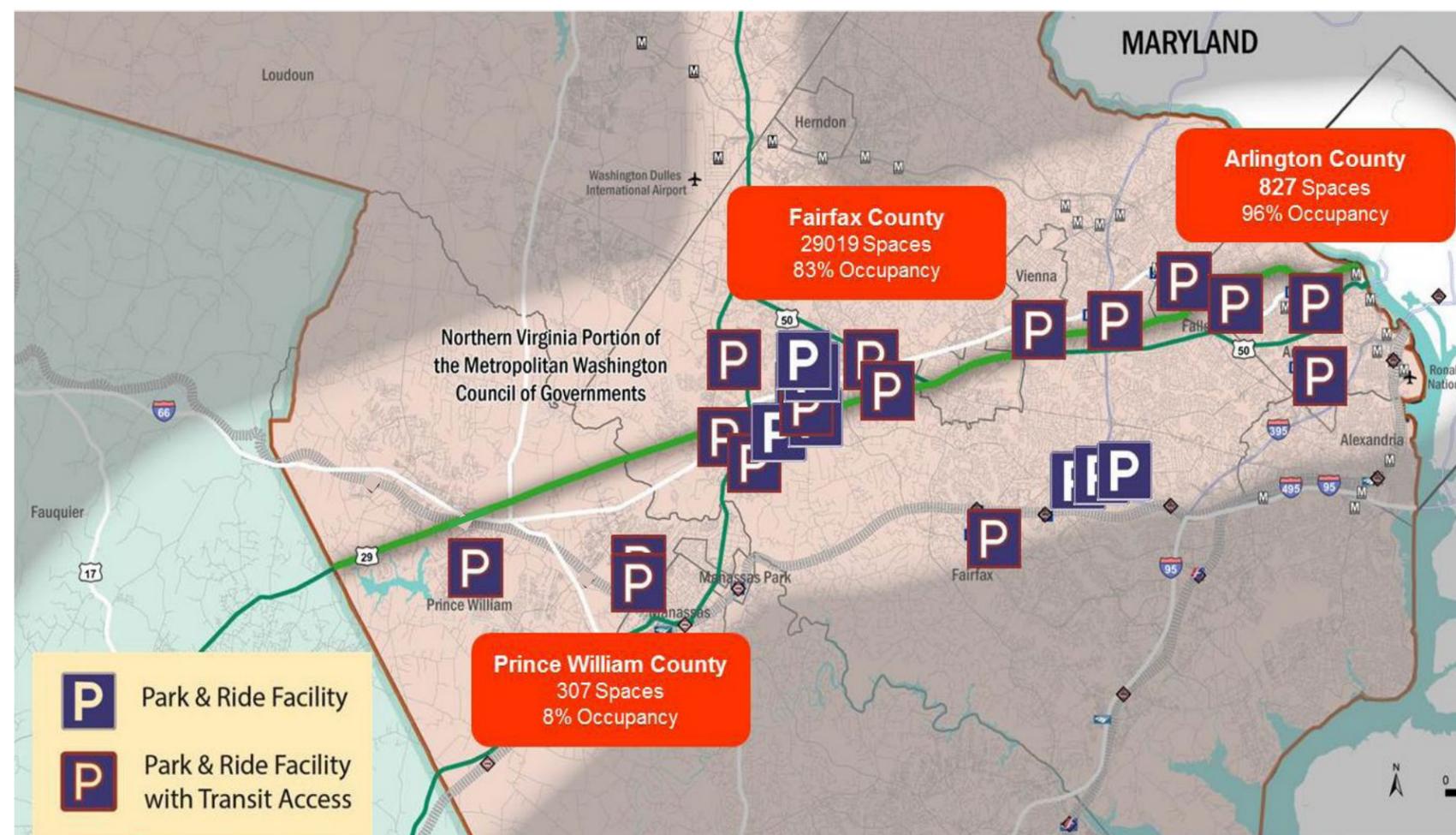
Many transit options are available within Segment I4, mostly providing connections within the Northern Virginia Area or to neighboring DC. Transit services in the segment include:

- Metrorail's Orange Line, which runs parallel to US 29 from Washington, DC to Vienna with multiple stations;
- Metrorail's Silver Line, which runs parallel to US 29 through the City of Falls Church, before diverting to the northern areas of Tysons Corner, Reston (Phase I), Dulles Airport, and Loudoun County (Phase II);
- VRE, which operates commuter rail service in Segment I4 on the Manassas Line and provides service between the Manassas Airport and Washington, DC using the Norfolk Southern Piedmont freight rail line;
- Amtrak, which has a station in Manassas that provides passenger rail service along its Crescent Route running from Washington, DC to the south along the Seminole Corridor; and
- Commuter bus service, provided from outlying jurisdictions into the District of Columbia by PRTC and Loudoun County Transit. Bus connections to the Metrorail system are also provided by the Fairfax Connector, Metrobus, and ART.

Park-and-Ride

Within Segment I4, commuters can utilize a number of Park-and-Ride locations, many of which are served by transit service. Fairfax County provides the highest number of Park-and-Ride locations and the most parking spaces in the Commonwealth, accounting for nearly half of the Park-and-Ride parking spaces in Virginia. While Arlington County has the highest utilization rate of spaces available in the segment, Fairfax (83 percent) and Prince William (80 percent) Counties also have a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.

Comparable Travel Options



I4 SEGMENT NEEDS

Safety

Between 2010 and 2012, 775 severe crashes occurred on Segment I4, one of the highest totals on CoSS segments statewide. There are many areas with high concentrations of severe crashes along Segment I4. In Gainesville along US 29 (Lee Highway), there were 28 collisions over 0.37 miles between Webb Drive and Logos Way. In Manassas, on Route 28 (Centreville Road), there were 66 crashes over a distance of 0.5 miles between Reb Yank Drive and Breeden Avenue, where 43 of the crashes occurred at the intersection with Liberia Avenue. On Route 28 (Centreville

Road) north of Centreville, 39 incidents took place over 0.5 miles between New Braddock Road and Old Centreville Road; a total of 13 of these incidents occurred at the intersection with Machen Road. At the intersection of US 29 (Lee Highway) and Route 645 (Clifton Road) in Fairfax County, 38 collisions took place. On US 50 north of the interchange with I-66, there were 38 crashes within 0.24 miles of the intersection with Fair Ridge Drive, as noted for Segment H2. On US 50 near Merrifield, there were 32 incidents near the intersection with Prosperity Avenue.



Performance Metrics:

Number of Severe Crashes **775**

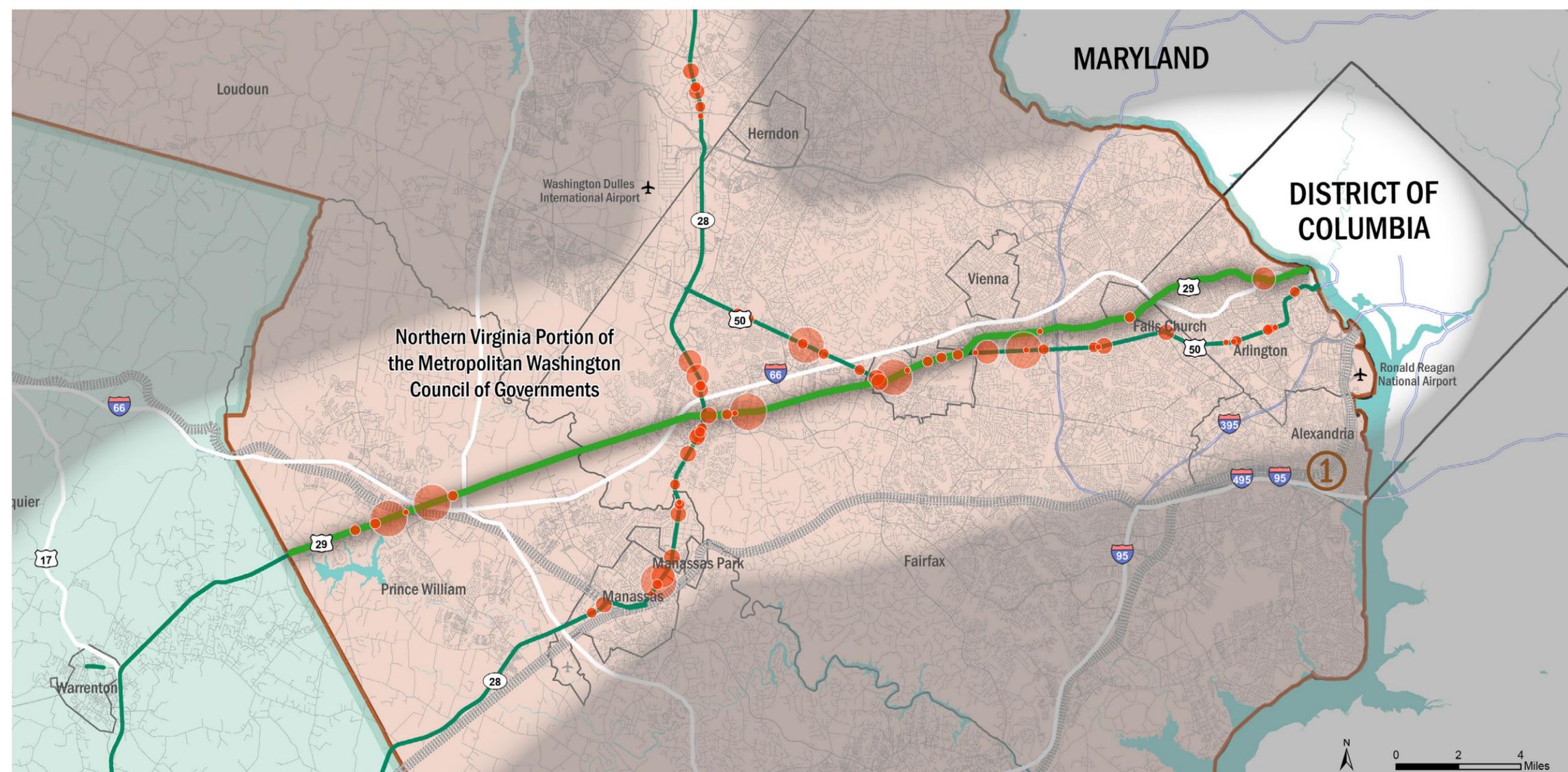
Severe Crashes/Million VMT **1.7**

Number of Railroad Crashes **1**

Fatality and Injury Crashes (2010-2012)

- < 5
- 5 - 10
- 11 - 15
- 16 - 20
- > 20

Railroad Incidents/Accidents per County (2011-2014)



I4 SEGMENT NEEDS

Congestion



Performance Metrics

Person Hours of Delay per Mile **137**

Freight Ton Hours of Delay per Mile **4K**

Passenger Delays

Passenger congestion along Segment I4 is far greater than the other segments in Corridor I, with nearly 23,000 person-hours of delay daily. On a per-mile basis, Segment I4 experiences some of the most severe congestion among CoSS segments, with an average passenger delay of 137 person-hours per mile. There is significant congestion on US 29 for much of its length in Segment I4, including west of I-66 in Gainesville and east of I-66 in Centreville. There are also significant passenger delays on US 50 for much of its length between Route 28 in Fairfax County and Rosslyn in Arlington County. Significant congestion is also apparent on Route 28 between Route 234 and US 50 and between the Dulles Toll Road and Route 625 in Loudoun County. The most severe congestion on Segment I4 occurs on Route 28 near the interchange with Westfields Boulevard, where delays exceed 900 person-hours per mile. Approximately one-third of the daily passenger delays are experienced in the peak period, which is considerably lower than average for the peak-period share of congestion along CoSS segments. This reflects a growing spread of congestion throughout the rest of the day in Northern Virginia.

Freight Delays

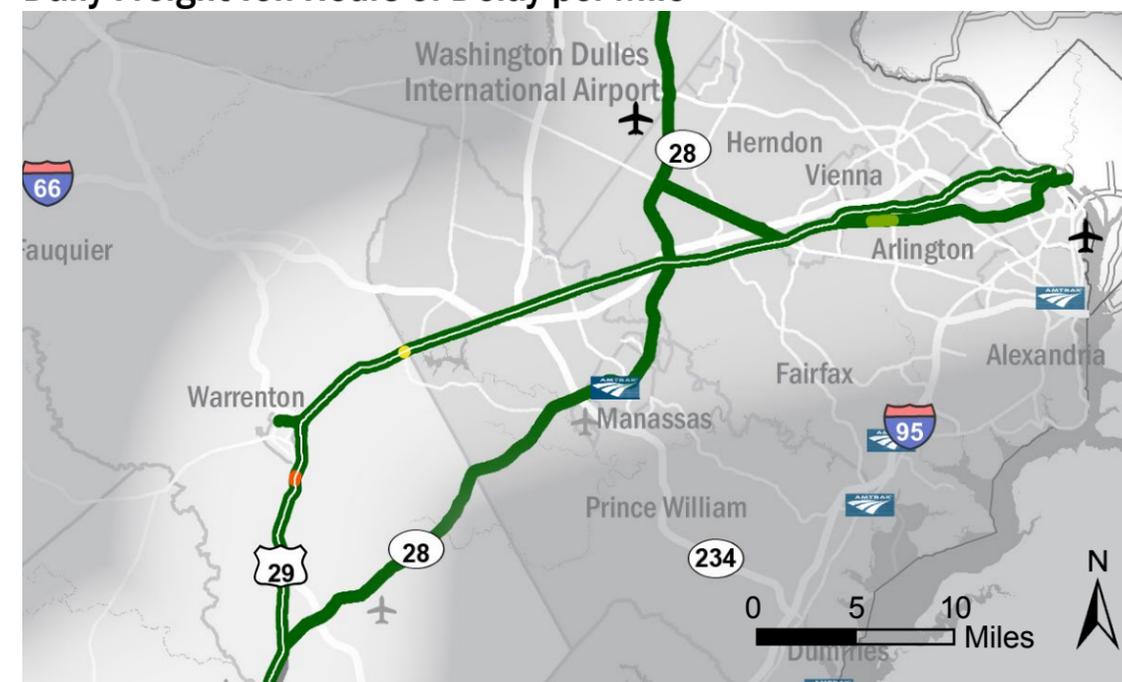
Compared to passenger delays along Segment I4, freight delays are relatively low for much of this segment. With an average delay of 4,000 ton-hours per mile, Segment I4 has the lowest level of freight congestion on Corridor I. As such, there are no locations along Segment I4 with freight delays exceeding 250,000 ton-hours per mile. Only 14 percent of the daily freight delays are experienced in the peak period, which reflects a growing spread of congestion throughout the rest of the day in Northern Virginia.

Daily Person Hours of Delay per Mile



- < 50
- 51 - 100
- 101 - 250
- 251 - 500
- > 500

Daily Freight Ton Hours of Delay per Mile



- < 100,000
- 100,001 - 250,000
- 250,001 - 500,000
- 500,001 - 1,000,000
- > 1,000,000



14 SEGMENT NEEDS

Reliability



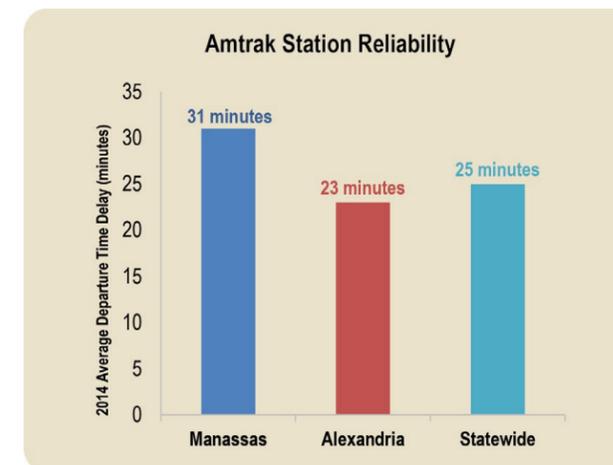
Weekday Peak Reliability

Reliability of travel during the peak period on a typical weekday on Segment 14 ranges from 0.04 to 0.88 in terms of reliability index, with an average value of 0.27. While this segment has one of the highest peak period reliability index values of CoSS segments statewide, only one short section on US 50 near the interchange with I-66 has a reliability index value exceeding the statewide threshold.

Weekday Reliability

Reliability of travel during a typical weekday ranges from 0.04 to 0.58 in terms of reliability index, with an average value of 0.19. Locations where the weekday peak reliability index exceeds the statewide threshold are mostly limited to very short sections or individual intersections, including:

- US 29 between Pageland Road and Route 234 in Prince William County;
- Route 28 at Route 652 in Prince William County;
- Route 28 at Sudley Road in the City of Manassas;
- Route 28 at Route 658 in Fairfax County;
- US 50 at the intersection with US 29 in the City of Fairfax;
- US 29/US 50 at the intersection with Route 123 in the City of Fairfax;
- US 29 at Gallows Road in Fairfax County;
- US 29 at N Sycamore Street in Arlington County; and
- US 29 at Kirkwood Road in Arlington County.



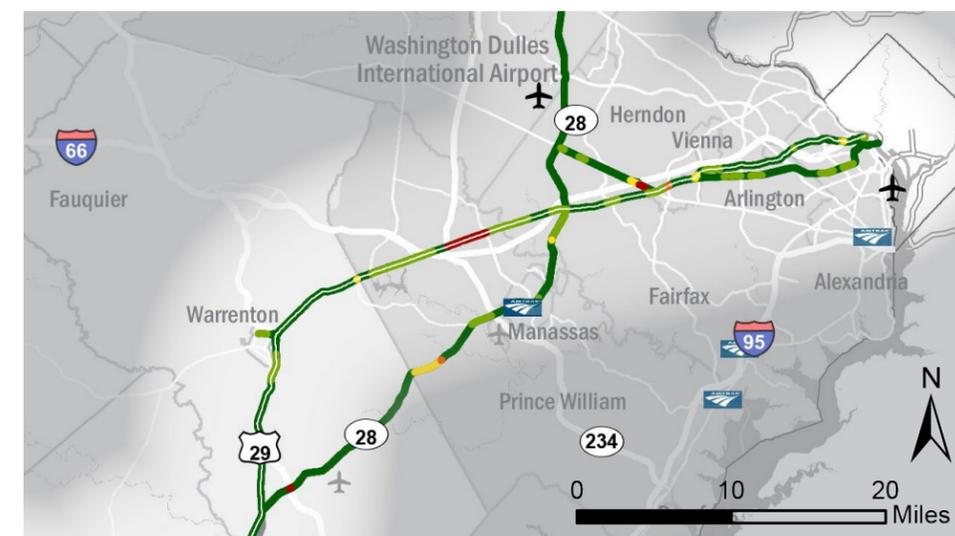
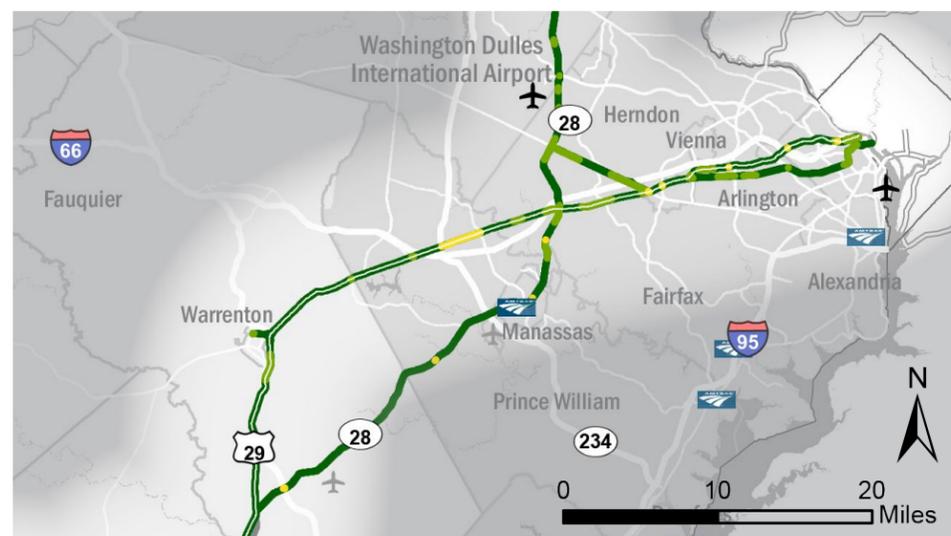
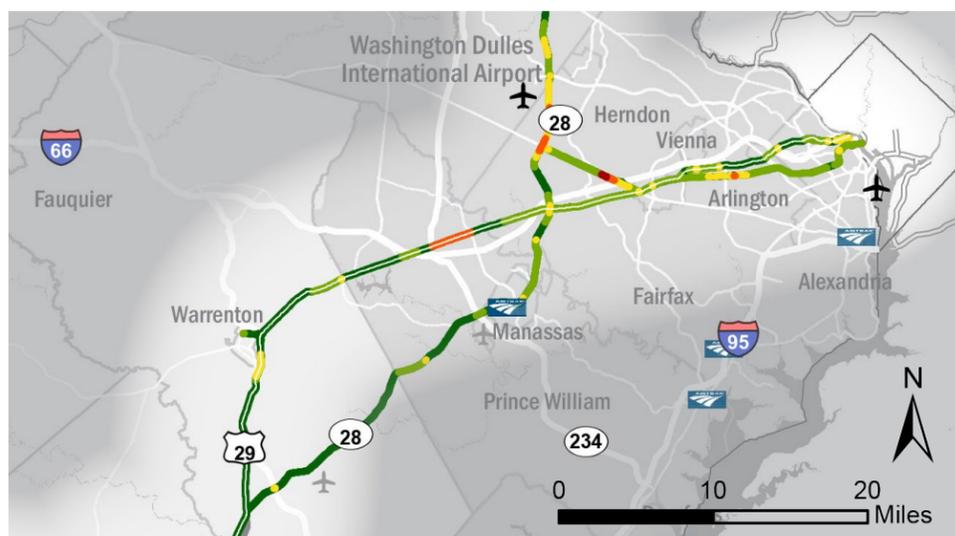
VRE On-Time Performance
Manassas Line
93%

WMATA On-Time Performance
Orange Line
91%
Silver Line
88%

Weekend Reliability

Reliability of travel during a typical weekend ranges from 0.00 to 1.59 in terms of reliability index, with an average value of 0.16. Locations where the weekday peak reliability index exceeds the statewide threshold include:

- Route 28 at Route 652 in Prince William County;
- US 29 between Pageland Road and Route 234 in Prince William County;
- US 29/US 50 at the intersection with Route 123 in the City of Fairfax;
- and
- US 50 between I-66 and Waples Mill Road (Route 665) in Fairfax County.



Reliability Index

Green	< 0.2	Orange	0.6 - 0.8
Light Green	0.2 - 0.4	Red	> 0.8
Yellow	0.4 - 0.6	Grey line	Primary facility (in white)

Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability index thresholds:

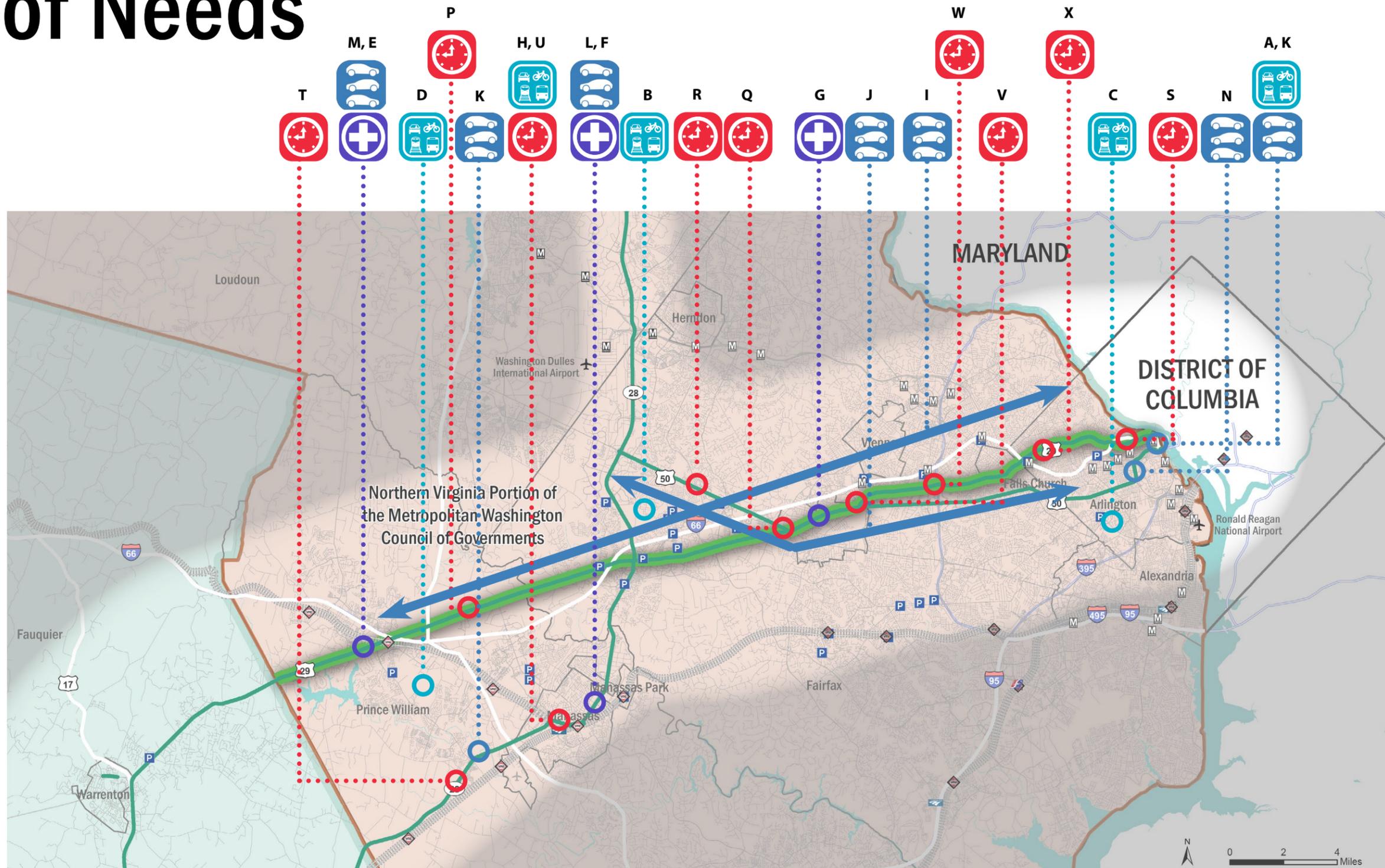
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

14 SEGMENT NEEDS

Summary of Needs

Identified locations are approximate. See "Summary of Needs" table on the following page for details.

Redundancy	Mode Choice
Safety	Congestion
Bottlenecks	Reliability



I4 SEGMENT NEEDS

Summary of Needs - I4 Segment

A.		Orange Line Metrorail Over capacity in many portions of the corridor; Potomac River crossing at Rosslyn at capacity
B.		Park and Ride lots in Fairfax County have higher utilization rates than statewide average
C.		Park and Ride lots in Arlington County have higher utilization rates than statewide average
D.		Park and Ride lots in Prince William County have higher utilization rates than statewide average
E.		US 29 between US 15 and VA 234 in Gainesville: 75 severe crashes
F.		VA 28 between Sudley Rd and Old Centreville Rd in Manassas: 85 severe crashes
G.		US 29/50 between Fairfax County Pkwy and Gallows Rd: 181 severe crashes
H.		Unreliable Amtrak service from Manassas station. Average departure delay is 31 minutes totaling over 7,400 person-hours of delay from this segment.
I.		Congestion issue on US 29 between I-66 in Gainesville and VA Route 124 (North Kirkwood Road/Spout Run Parkway) in Arlington County
J.		Congestion issue on US 50 between VA Route 28 in Chantilly and North Carlin Springs Road in Arlington County
K.		Congestion issue at US 29 and I-66 at Exit 73 in Arlington County
L.		Congestion issue on VA Route 28 between VA Route 234 (Grant Avenue) and US 50

Summary of Needs - I4 Segment

M.		Congestion issue on US 29 between US 15 and I-66 in Gainesville
N.		Congestion issue on US 50 between VA Route 120 (Glebe Road) and North Meade Street in Arlington County
O.		Congestion issue on VA Route 28 between VA Route 619 (Linton Hall Road) and VA Route 234 (Prince William Parkway)
P.		Reliability issue on US 29 between Pageland Lane and VA Route 234 (Sudley Road)
Q.		Reliability issue at US 29 and US 50
R.		Reliability issue on US 50 between VA Route 286 (Fairfax County Parkway) and US 29
S.		Reliability issue at US 29 and VA Route 124 (North Kirkwood Road/Spout Run Parkway) in Arlington County
T.		Reliability issue at VA Route 28 and VA Route 652 (Fitzwater Driver) in Nokesville
U.		Reliability issue at VA Route 28 and VA Route 234 (Grant Avenue) in Manassas
V.		Reliability issue at US 29 and VA Route 123 (Chain Bridge Road)
W.		Reliability issue at US 29 and VA Route 650 (Gallows Road) in Fairfax County
X.		Reliability issue at US 29 and North Sycamore Street in East Falls Church