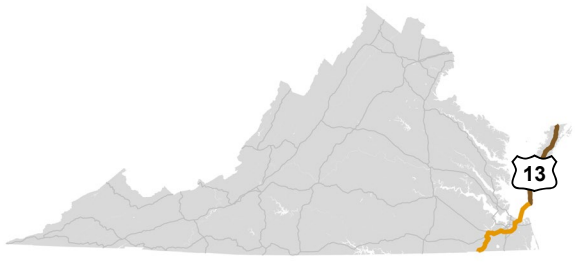
VTrans2040 Multimodal Transportation Plan

Corridors of Statewide Significance Needs Assessment

Eastern Shore Corridor (D)



Office of INTERMODAL Planning and Investment

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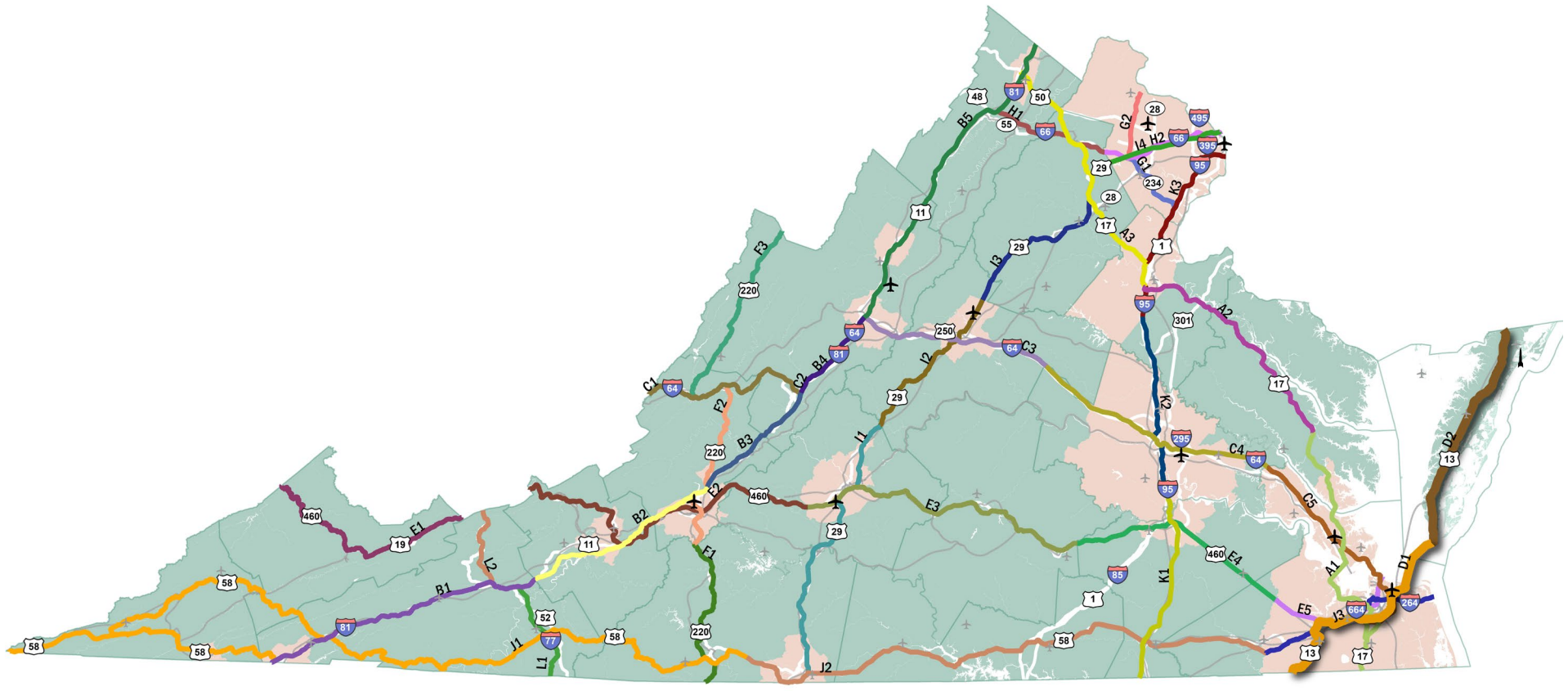
See *Corridors of Statewide Significance, Needs Assessment: Executive Summary and Methodology Report* for details on the overall assessment approach, data sources, and performance measures used throughout this report.

I. Corridor Overview



Corridor of Statewide Significance
(color varies by segment)

Railroad

Airport Facility
(grey denotes not a commercial service airport)

Spaceport Facility

Metropolitan Planning Organization Area

The Eastern Shore Corridor (Corridor D) is defined primarily by US 13, which runs north to south for more than 500 miles in the eastern United States, from the northeast suburbs of Philadelphia, Pennsylvania, to Fayetteville, North Carolina. In Virginia, US 13 serves as a connector between the Hampton Roads Area and Virginia's Eastern Shore, part of the Delmarva Peninsula, and provides the only direct connection from Delmarva to the rest of Virginia.

US 13 acts as the major roadway on the Delmarva Peninsula, linking many small towns and other communities in Accomack and Northampton Counties to the Cities of Virginia Beach, Chesapeake, and Suffolk. US 13 also provides indirect access in the Hampton Roads Area to the three major Virginia ports located in Newport News, Portsmouth, and Norfolk. In addition, the Chesapeake Bay Bridge-Tunnel was constructed over two major shipping channels that provide access to the Port of Virginia.

There are no true parallel facilities to US 13, except where US 13 Business exists in the urbanized areas. However, the highway accesses other major corridors in the Hampton Roads Area, where it intersects with I-64 and its auxiliary routes, including I-264 and I-664, in multiple locations. It also intersects with US 17, US 58, and US 460, all Corridors of Statewide Significance (CoSS). The corridor does not run concurrently with any interstate highway in Virginia.

Passenger travel along the Eastern Shore Corridor is accomplished primarily via the highway facilities. Other travel options include:

- Multiple Park-and-Ride lots in the Hampton Roads Area: three in Suffolk and five near where US 13 runs parallel to I-64 through Chesapeake and Virginia Beach;
- Hampton Roads Transit (HRT), which serves the Hampton Roads Area providing bus service, as well as Metro Area Express service, which provides service throughout the region. None of the HRT routes access the Eastern Shore or the Chesapeake Bay Bridge-Tunnel;
- Shore Transit and Rideshare which offer bus service on the Eastern Shore, although there is no connection to the Hampton Roads Area;
- Multiple Greyhound bus stations in Hampton Roads, including Newport News, Hampton, and Norfolk, and on the Eastern Shore, in Exmore and Oak Hall;
- Amtrak has stations in the Hampton Roads Area, although the tracks along the Eastern Shore Corridor are not used for passenger rail; and
- Commercial air service, available at both Norfolk International Airport and Newport News-Williamsburg Airport in the Hampton Roads Area. No commercial service is available on the Eastern Shore, except to the north along Maryland's Eastern Shore at the Ocean City/Salisbury Airport.

US 13 does not directly access any of the Port of Virginia facilities, but the Chesapeake Bay Bridge-Tunnel was constructed to allow for two major shipping channels into these ports with little to no disruption of shipping or vehicular traffic. The Port of Virginia's facilities can be accessed indirectly in the Hampton Roads Area from the Eastern Shore Corridor. In addition, Norfolk Southern operates freight rail lines from the Port of Virginia in Chesapeake and Suffolk and out of the Hampton Roads Area. CSX operates rail lines that travel along the corridor in Chesapeake and Suffolk and to the remainder of Virginia and North Carolina. In addition, the Chesapeake and Albemarle Short-Line Railroad operates from Norfolk south to North Carolina, using Norfolk Southern rail lines. The Bay Coast Railroad runs along the Eastern Shore from Maryland and crosses the Chesapeake Bay via rail ferry barge across 26 miles of water to access Norfolk. It interchanges with Norfolk Southern rail lines in both Norfolk and in Maryland.

In addition, the Chesapeake Bay navigational channels and the Inland Waterway are both located in this region. Barge transport is also available between the Port of Virginia facilities and Baltimore, Maryland, as well as the Ports of Richmond and Alexandria.

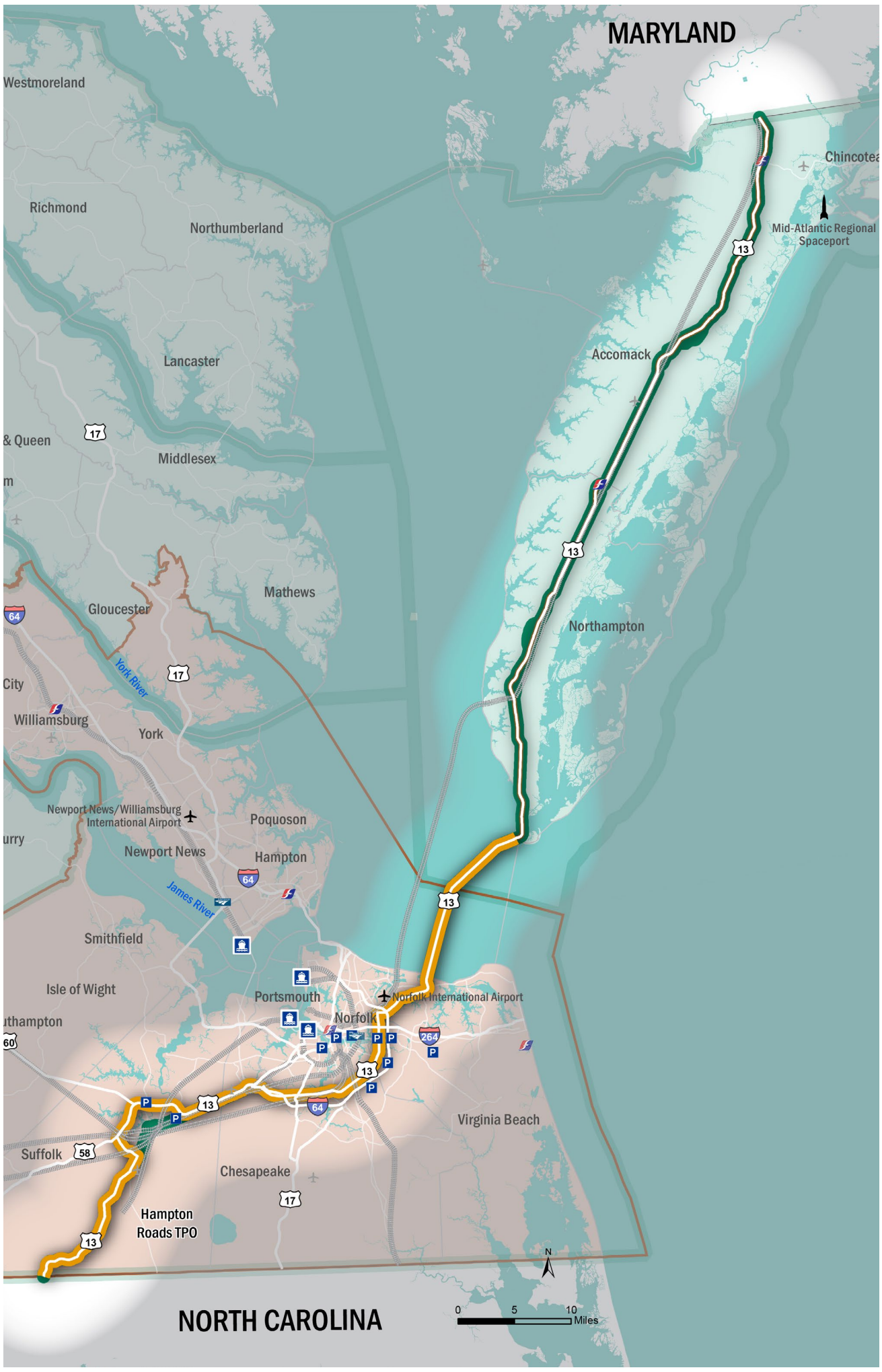
Freight destined for low-earth orbit is served by launch facilities at the Mid-Atlantic Regional Spaceport, which provides service to commercial, governmental, scientific, and academic organizations from Wallops Island on the Eastern Shore.

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)

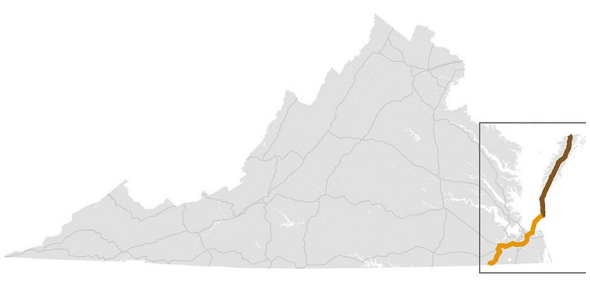
Corridor Components

Highway Facilities	
Primary Facility	• US 13
Other Highway Facilities	• US 13 Business
Transit Services	
	• Amtrak • Intercity bus service
Rail Facilities	
	• CSX • Norfolk Southern • Bay Coast Railroad and Barge
Port Facilities	
	• Norfolk International Terminal • Portsmouth Marine Terminal • Virginia International Gateway
Airport Facilities	
	• Norfolk International • Newport News/ Williamsburg International • Mid-Atlantic Regional Spaceport

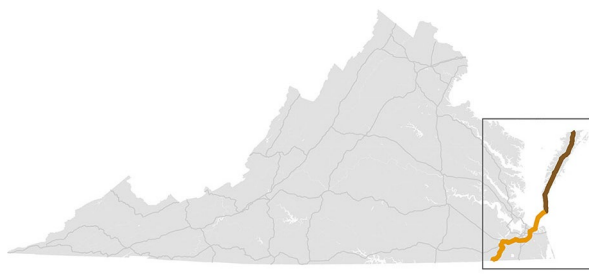


Corridor Segments:
- D1
- D2

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



Demographics and Economic Trends

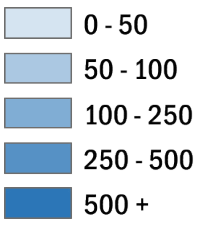


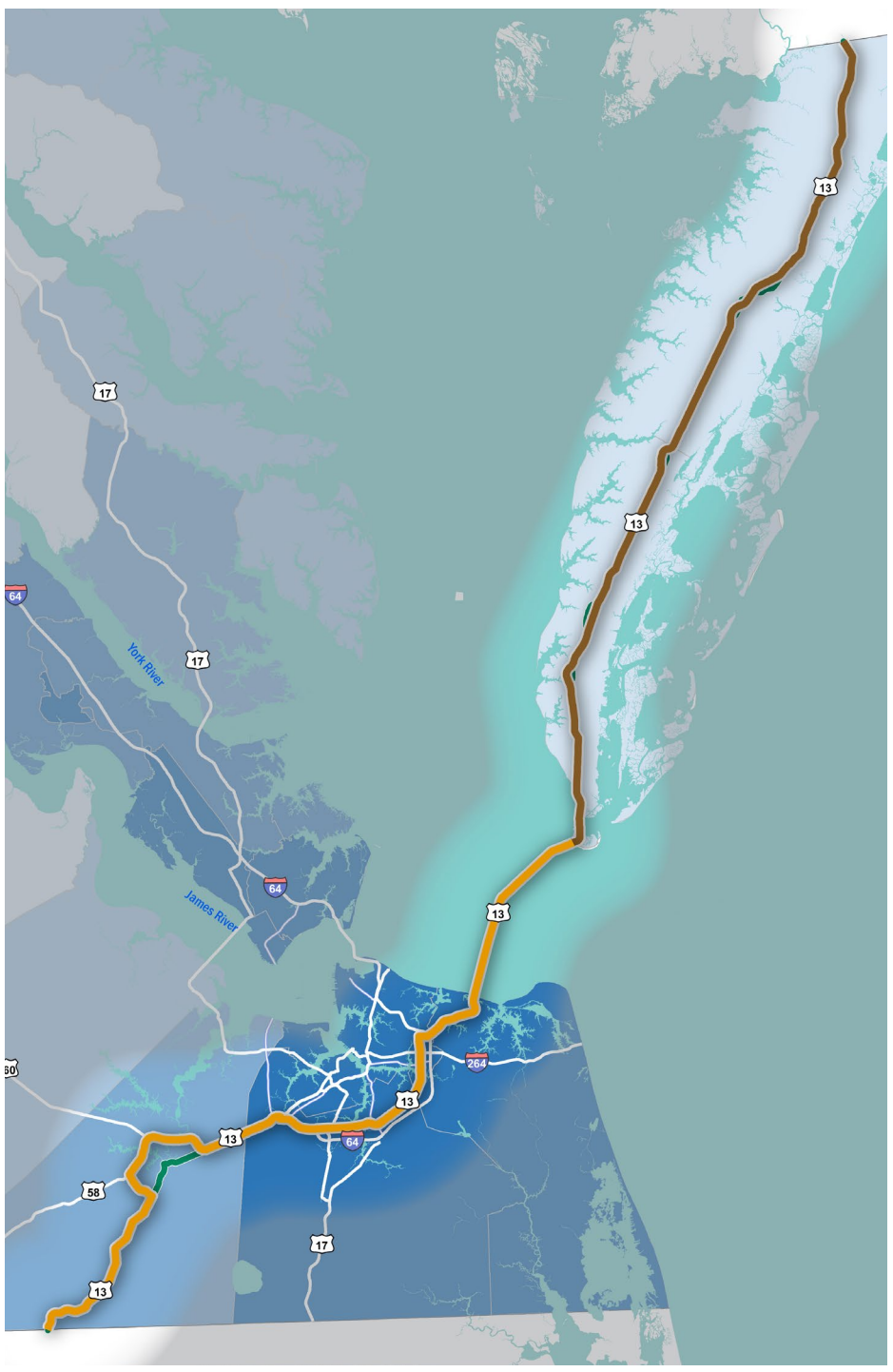
Within Corridor D, the primary population centers with greater than 500 persons per square mile are currently found in the Cities of Norfolk and Virginia Beach. The remainder of the corridor passes through the sparsely populated Northampton and Accomack Counties.

Between 2012 and 2025, Suffolk is anticipated to experience the largest population growth (greater than 25 percent) among jurisdictions along the corridor. Chesapeake is anticipated to have the next highest population growth, between 11 and 25 percent. The already densely-populated City of Norfolk is expected to see the lowest growth, and the populations of the City of Virginia Beach and Northampton County are expected to decrease. Overall, population along the corridor is expected to grow slightly.

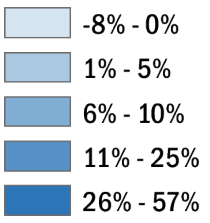
Current employment centers follow a pattern analogous to the population centers, with the highest densities in the Cities of Virginia Beach and Chesapeake. Employment growth tracks a similar pattern along the corridor, although it shows growth even in the City of Virginia Beach and Northampton County, where population is expected to decrease. Corridor C passes through the Hampton Roads TPO Area where the three largest industry sectors include health care, retail trade, and wholesale trade.

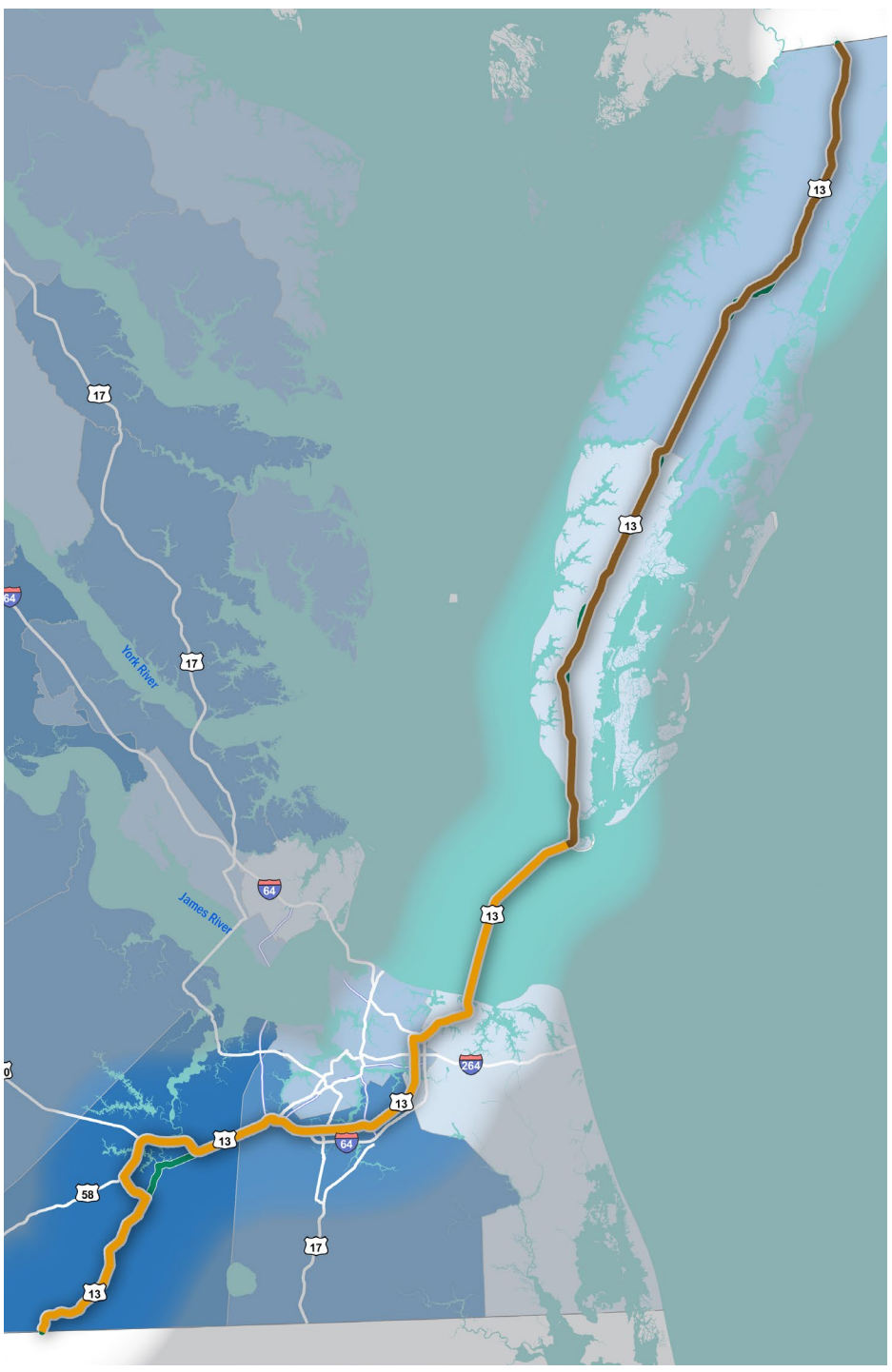
2012 Population Density Persons / Square Mile





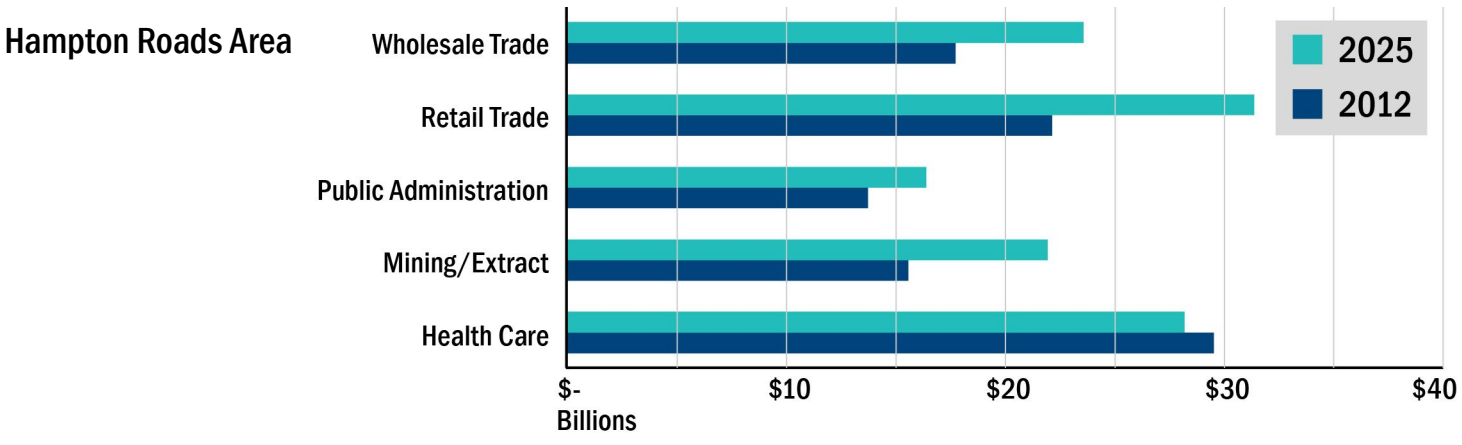
Population Growth (2012-2025 Percent Change)





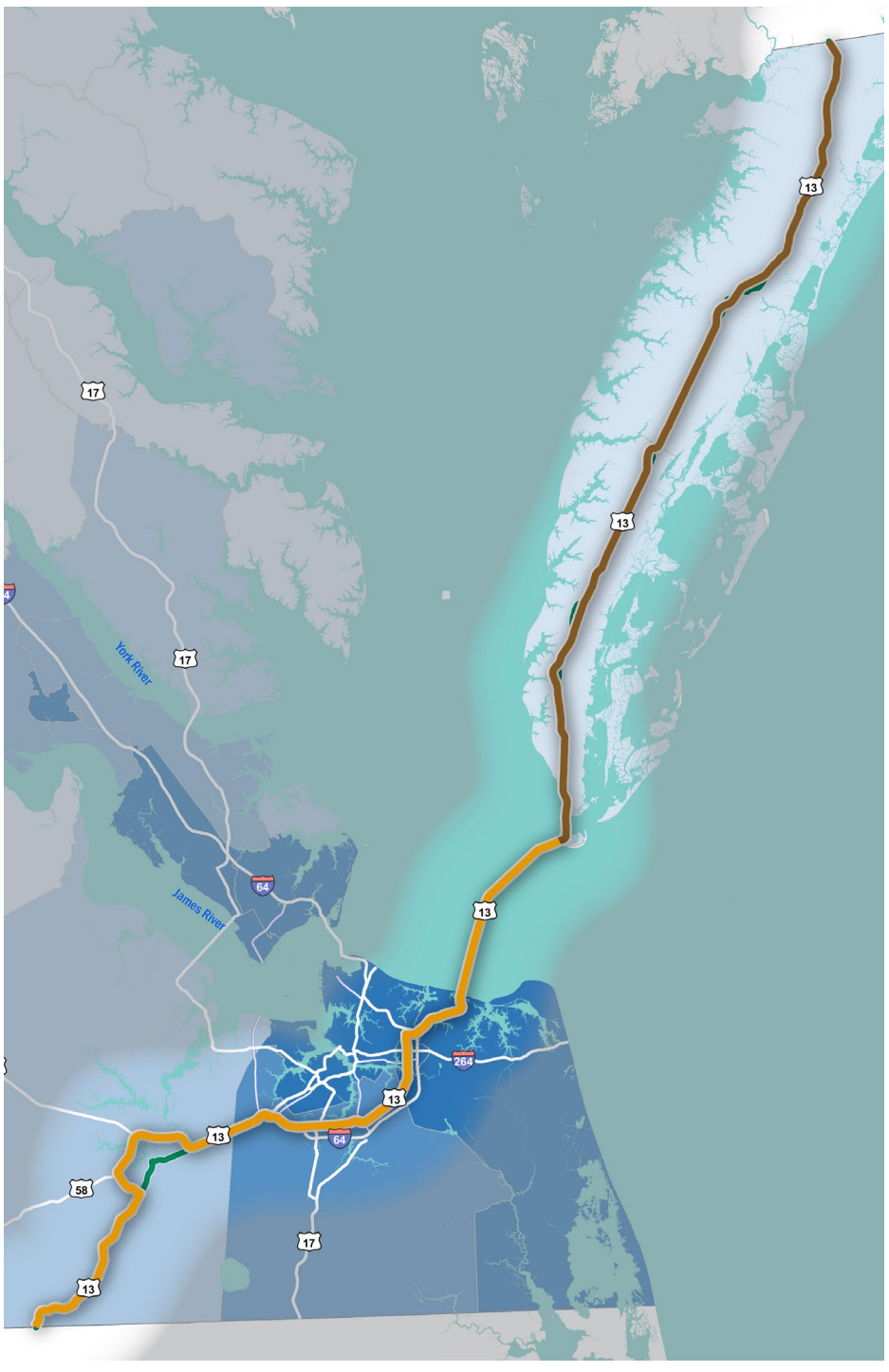
CORRIDOR D OVERVIEW

Top Industries (GDP)



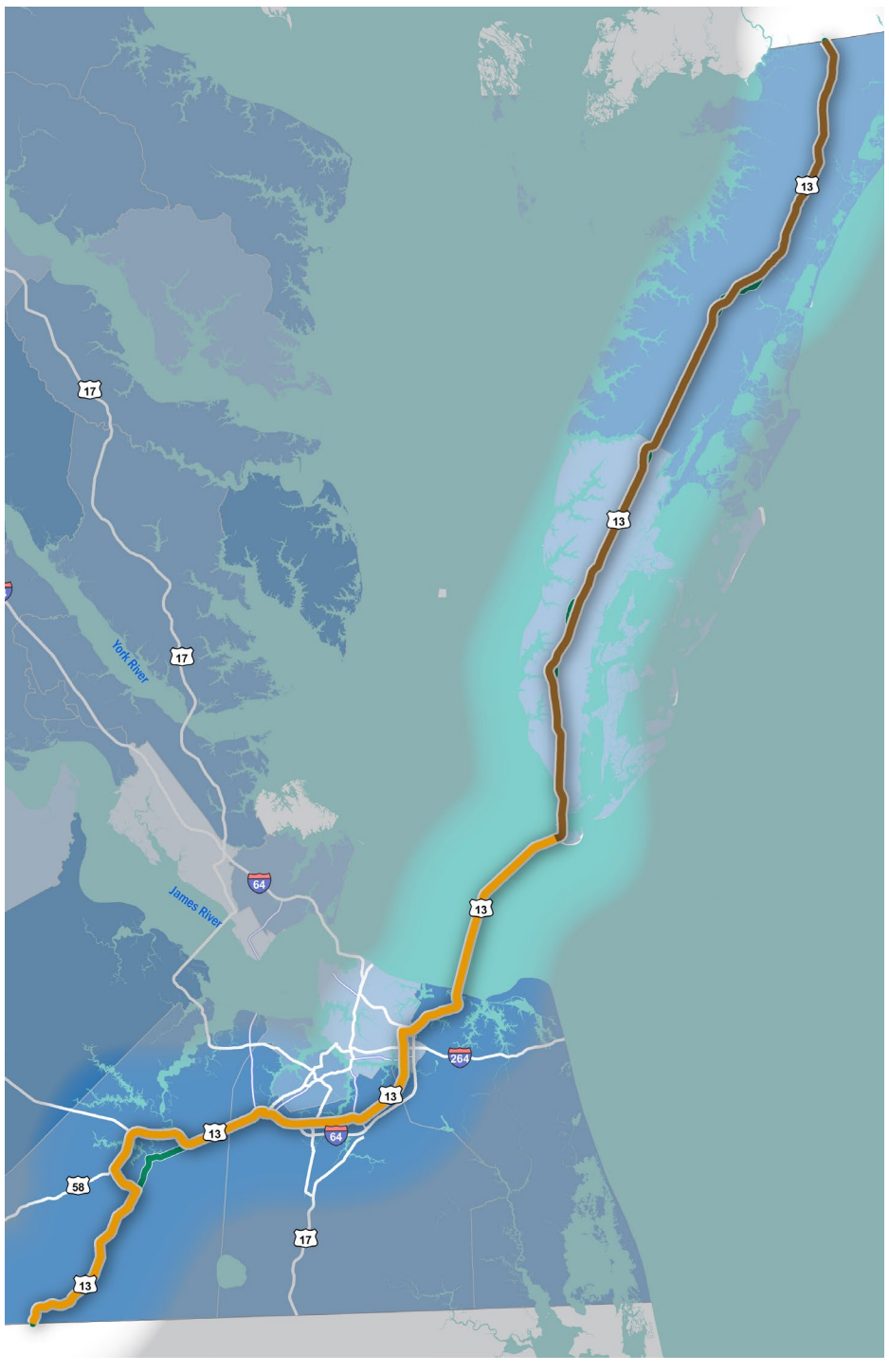
2012 Employment Density Jobs / Square Mile

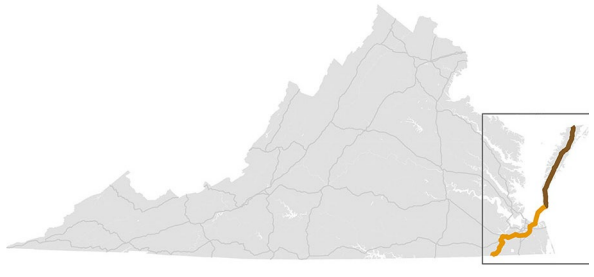
< 25
25 - 100
100 - 250
250 - 500
> 500



Employment Growth (2012-2025 Percent Change)

-7% - 0%
1% - 5%
6% - 10%
11% - 25%
26% - 69%



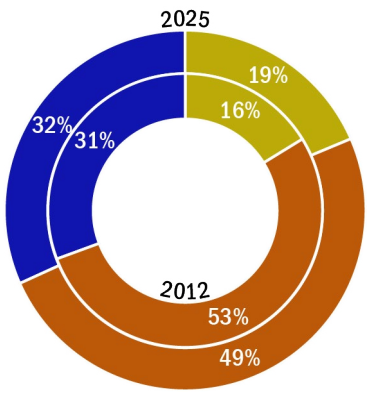


Corridor Travel Patterns

Passenger

Corridor D connects Maryland and North Carolina, and passes through the area of the Hampton Roads TPO. Within the Hampton Roads Area, traffic is dominated by internal local traffic, which accounts for more than 75 percent of the traffic along the corridor. Pass-through traffic comprises a very small portion of traffic on the corridor, accounting for less than four percent.

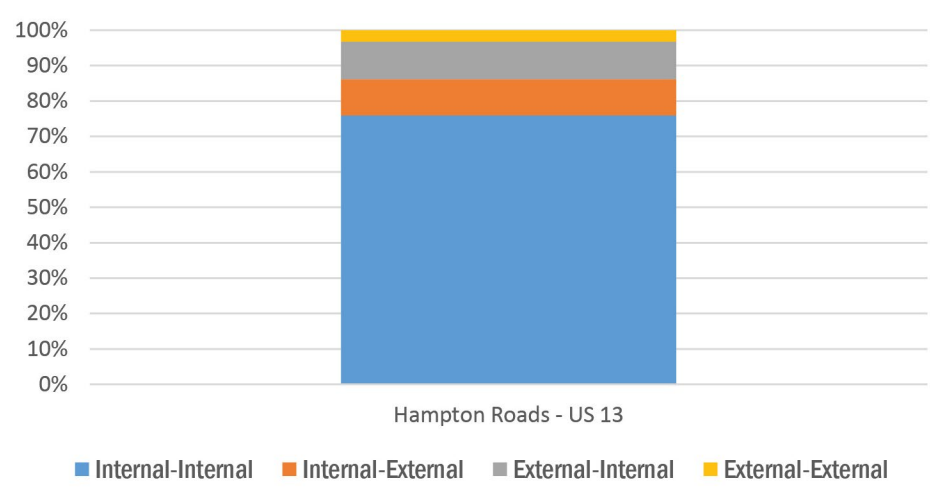
Hampton Roads Area



GDP by Sector, 2012 and 2025

- Freight Dependent
- Local Serving
- Knowledge-based

Distribution of Internal and External Travel



Freight

By truck, Corridor D carried 34 million tons of freight worth $51 billion in 2012, and is estimated to carry 51 million tons of freight worth $80 billion in 2025. The major truck freight pattern on Corridor D is from North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. These truck freight flows account for between 12 and 14 percent of the total truck freight tonnage in Corridor D. There are also major truck freight flows between Norfolk and the Cities of Chesapeake and Virginia Beach, accounting for between ten and 11 percent of the total truck freight tonnage in Corridor D. Between 11 and 13 percent of truck freight tonnage on Corridor D corresponds to through-traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Corridor D carried 23 million tons of freight worth $14 billion in 2012, and is estimated to carry 23 million tons of freight worth $17 billion in 2025. The major rail freight pattern on Corridor D is from West Virginia and neighboring Virginia counties, such as Tazewell, Wise, and Buchanan Counties, to the Port of Virginia's Norfolk International Terminal. By tonnage, Norfolk attracts over 90 percent of rail freight tonnage traveling on this corridor. These rail freight flows account for more than 60 percent of the total rail freight value on the corridor. In terms of freight value, Norfolk is also a major generator and attractor of rail freight, accounting for more than 40 percent of rail freight origins and more than 50 percent of rail freight destinations on the corridor. However, the major rail freight movements on Corridor D, in terms of value, are between the Port of Virginia and the Midwest region, accounting for around 60 percent of the total rail freight value on the corridor.

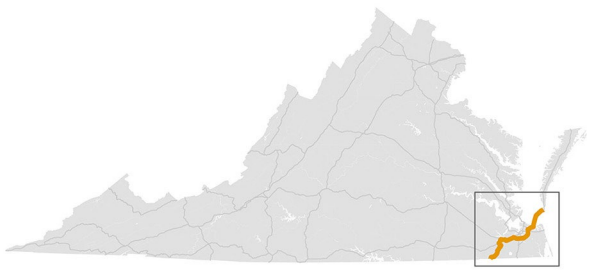
Truck Freight

	2012	2025
Truck Freight Value	$51 Billion	$80 Billion
Truck Freight Tonnage	34 Million Tons	51 Million Tons
Freight Value per Ton	$1512	$1565
Corridor Tonnage Passing Through	13%	11%

Rail Freight

	2012	2025
Rail Freight Value	$14 Billion	$17 Billion
Rail Freight Tonnage	23 Million Tons	23 Million Tons
Freight Value per Ton	$613	$748
Corridor Tonnage Passing Through	<1%	<1%

II. Segment D1

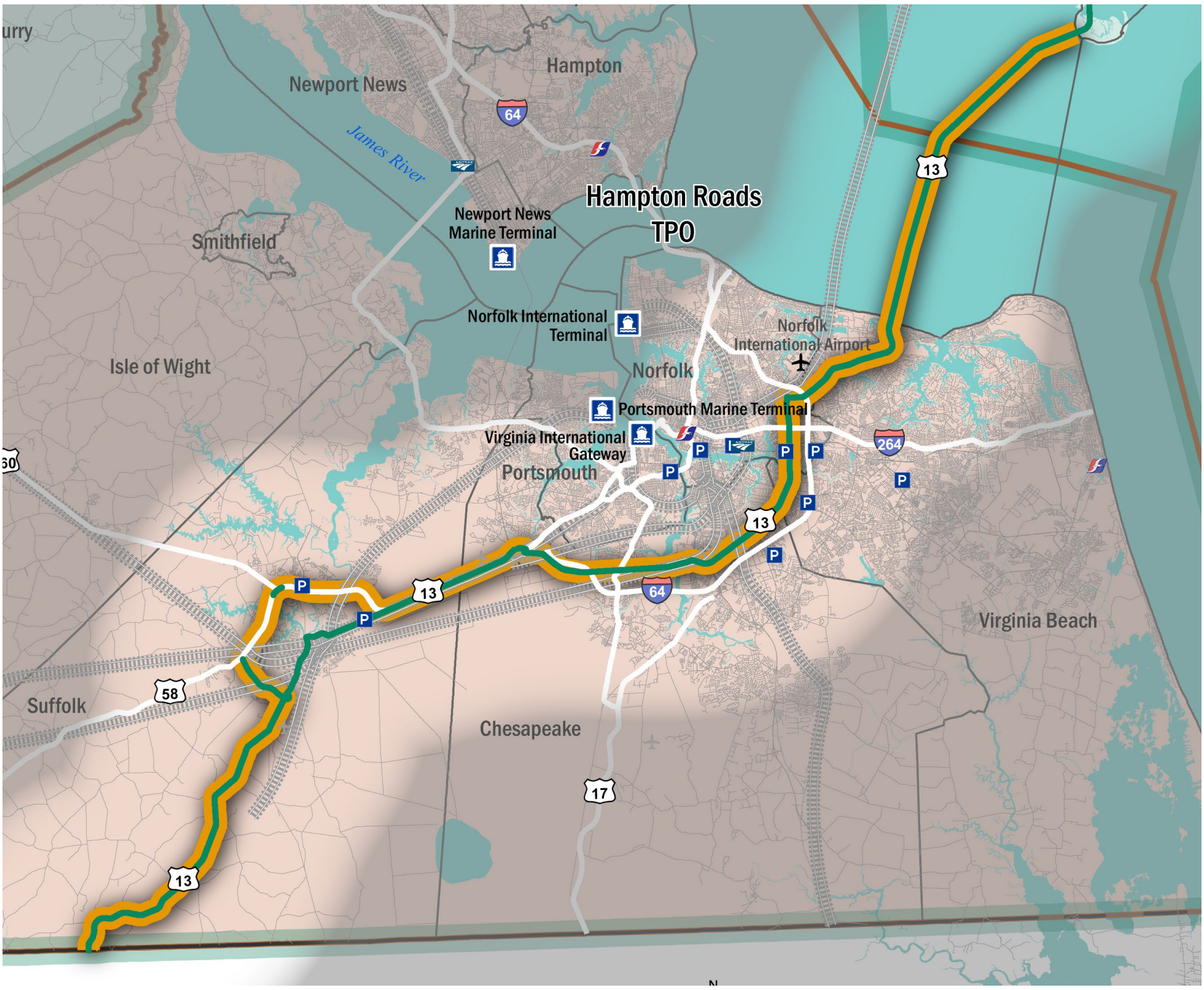


Corridor Segment D1 Components

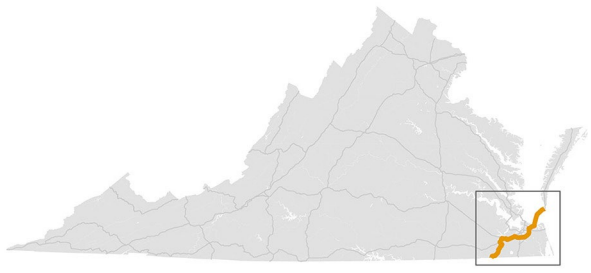
- US 13
- US 13 Business
- Norfolk International Terminal
- Portsmouth Marine Terminal
- Virginia International Gateway
- Bay Coast Railroad and Barge
- Norfolk Southern
- CSX
- Amtrak
- Norfolk International Airport
- Newport News/Williamsburg International Airport

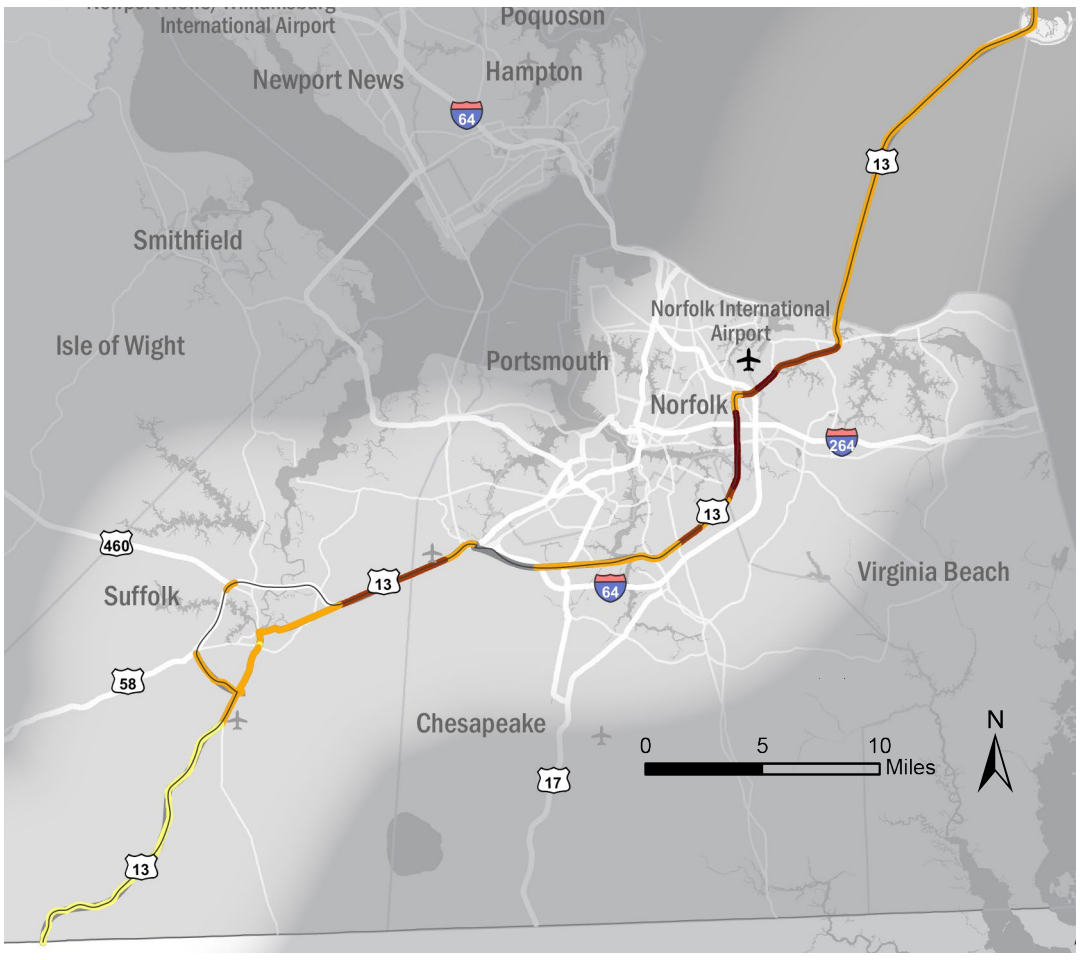
D1
Corridor Component Road
Railroad
MPO Area
Planning District Area

Amtrak Facility
Greyhound Facility
VRE Facility
Metrorail Facility
Port Facility
Park & Ride Facility
Airport Facility



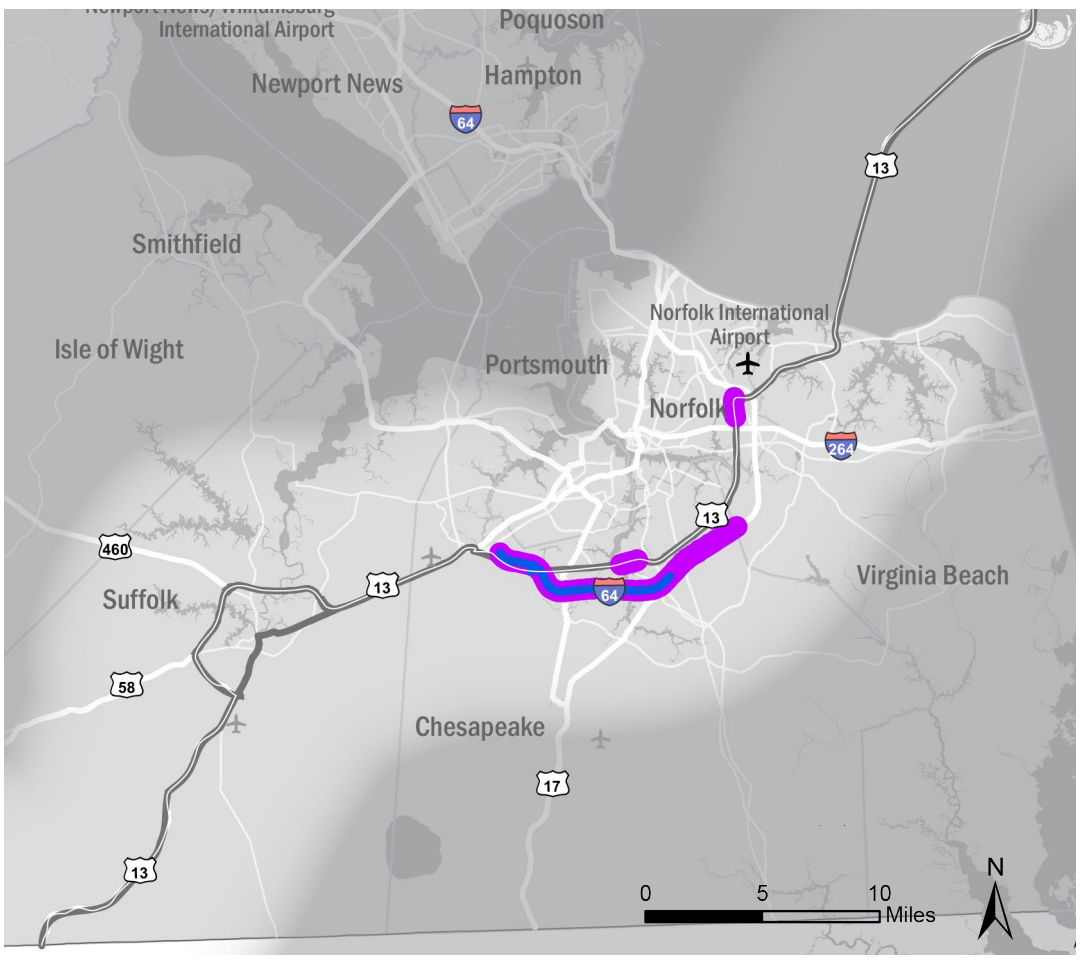
D1 SEGMENT PROFILE





Number of Lanes (both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility



Future Projects

- Reconstruction with added capacity
- Safety improvements
- Primary facility

Segment D1 begins at the North Carolina border and progresses north over the Chesapeake Bay Bridge-Tunnel, serving the Cities of Suffolk, Chesapeake, Portsmouth, Norfolk, and Virginia Beach. The segment travels through the area covered by the Hampton Roads TPO. The segment includes US 13 Business in Suffolk and runs concurrently with portions of US 58 and US 460. Segment D1 provides a direct connection to the Eastern Shore for passengers and freight. For markets in the Northeast, and for tourists from the Northeast, the Chesapeake Bay Bridge-Tunnel provides the shortest path to the Hampton Roads Area. In the Hampton Roads Area, Segment D1 also provides local access.

Highway Facilities: US 13 is primarily a local access corridor in Segment D1, with a cross section that varies from two lanes in the far south in Suffolk to eight lanes in the center of the Hampton Roads Area. There are no parallel highway facilities to Segment D1, though it does access other major highway facilities in Hampton Roads, including I-64, I-264 and I-664, as well as US 17, US 58, and US 460. US 13 Business provides a parallel roadway in downtown Suffolk.

Transit Services: Amtrak has stations in Newport News, Norfolk, and Virginia Beach; however, routes from these stations serve the Northeast Corridor and do not offer connections within Corridor D. Greyhound provides service from stations in Norfolk, Hampton, and Virginia Beach and does offer routes that cross the Chesapeake Bay Bridge-Tunnel to the Eastern Shore. The commuter bus service, Metro Area Express, is offered by HRT, which serves the Hampton Roads Area, but not the Chesapeake Bay Bridge-Tunnel or the Eastern Shore. There are multiple Park-and-Ride facilities near US 13, the largest cluster of which is located near Norfolk.

Rail Facilities: CSX's Coal Corridor and Norfolk Southern's Coal Corridor rail lines pass through Segment D1 connecting locations west to the Port of Virginia facilities in the Hampton Roads Area. A rail ferry barge and freight barges provide an alternative to trucks crossing the Chesapeake Bay Bridge-Tunnel, connecting Norfolk to the Northeast.

Port Facilities: US 13 does not directly access the Port of Virginia, but does provide an indirect connection and assists in the operation of the Port of Virginia. The Chesapeake Bay Bridge-Tunnel was constructed to allow continuous access to the Port of Virginia for shipping traffic, while causing little to no disruption to vehicular traffic.

Airport Facilities: Norfolk International Airport is the only commercial airport in this segment.

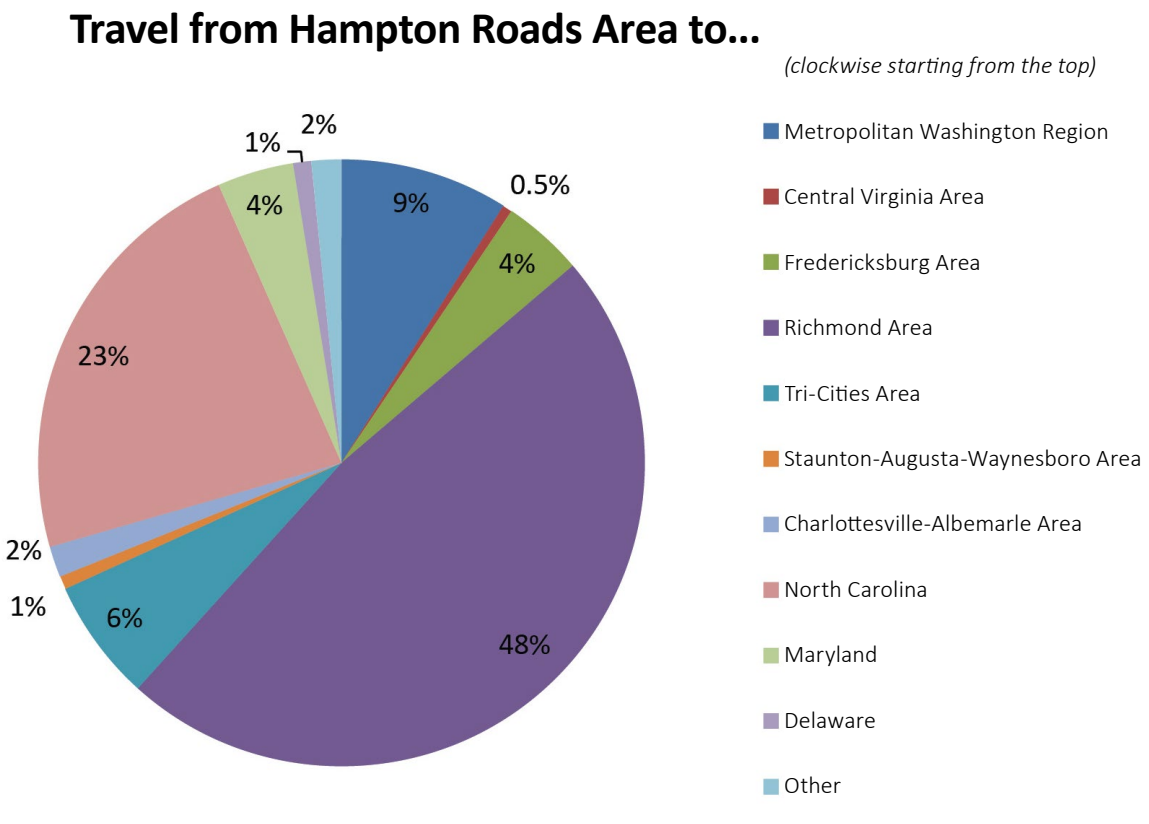
Major planned and future projects include:

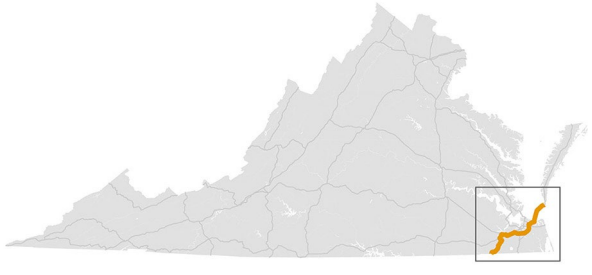
- Widening of US 13 from four to eight lanes from 0.023 miles south of Lowery Road to 0.012 miles south of Northampton Boulevard in the City of Norfolk; and
- Widening of Route 165 (N Military Hwy) north of US 13 and Kempsville Road south of US 13 in the City of Norfolk and the potential addition of new reversible travel lanes.

Travel Demand

Passenger Demand

The southernmost segment of Corridor D is mostly within the Hampton Roads Area, but also includes the US 13 Bridge-Tunnel connection to the Eastern Shore. This segment primarily accommodates traffic local to the Area, but also connects to North Carolina, the Delmarva Peninsula, and multiple other CoSS within the Hampton Roads Area including Segment A1 and Segment C5, while running concurrently with portions of Segment E5 and Segment J3. Travel between the Hampton Roads Area and North Carolina accounts for more than four percent of the intercity passenger travel in the Commonwealth, and some of that traffic is likely to use Segment D1. Of the intercity traffic originating in the Hampton Roads Area, 23 percent is destined for North Carolina. In addition, six percent is destined for the Tri-Cities Area and a small portion is destined for the Lynchburg area. These trips are likely to make use of a portion of Segment D1.





D1 SEGMENT PROFILE

Freight Demand

By truck, Segment D1 carried 22 million tons of freight worth $31 billion in 2012, and is estimated to carry 33 million tons of freight worth $50 billion in 2025. The major truck freight pattern on Corridor D is from North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. These truck freight flows account for between 12 and 14 percent of the total truck freight tonnage in Corridor D in 2012 and estimated for 2025. There are also major truck freight flows between Norfolk and the Cities of Chesapeake and Virginia Beach, accounting for between ten and 11 percent of the total truck freight tonnage in Corridor D. By tonnage, more than 30 percent of truck freight in the corridor originates from Segment D1 and more than 45 percent of truck freight value in the corridor is destined for Segment D1. Between 11 and 13 percent of truck freight tonnage on Corridor D corresponds to through-traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Segment D1 carried 23 million tons of freight worth $14 billion in 2012, and is estimated to carry 23 million tons of freight worth $17 billion in 2025. The major rail freight pattern on Corridor D is from West Virginia and neighboring counties in Virginia, such as Tazewell, Wise, and Buchanan Counties, to the Port of Virginia facility in Norfolk. By tonnage, Norfolk attracts over 90 percent of rail freight tonnage traveling on this corridor. These rail freight flows account for more than 60 percent of the total rail freight value on the corridor. In terms of freight value, Norfolk is also a major generator and attractor of rail freight, accounting for more than 40 percent of rail freight origins and more than 50 percent of rail freight destinations on the corridor. However, the major rail freight movements on Corridor D, in terms of value, are between the Port of Virginia facilities and the Midwest region, accounting for around 60 percent of the total rail freight value on the corridor. Rail freight flows originating from or destined for Segment D1 are almost negligible with respect to the total rail freight tonnage and value on Corridor D.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 44%)
2. North Carolina (25% / 23%)
3. City of Norfolk* (14% / 13%)
4. City of Chesapeake (6% / 9%)
5. New Jersey (6% / 6%)

Corridor Tonnage Originating in Segment D1: 30% / 34%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
City of Chesapeake and North Carolina
City of Portsmouth* and North Carolina
City of Norfolk* and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (55% / 54%)
2. City of Norfolk* (17% / 15%)
3. North Carolina (13% / 14%)
4. City of Virginia Beach (11% / 11%)
5. City of Chesapeake (8% / 10%)

Corridor Tonnage Destined for Segment D1: 45% / 46%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (40% / 41%)
2. West Virginia (40% / 37%)
3. Wise County (15% / 14%)
4. Buchanan County (10% / 10%)
5. Kentucky (7% / 7%)

Corridor Tonnage Originating in Segment D1: 6% / 8%

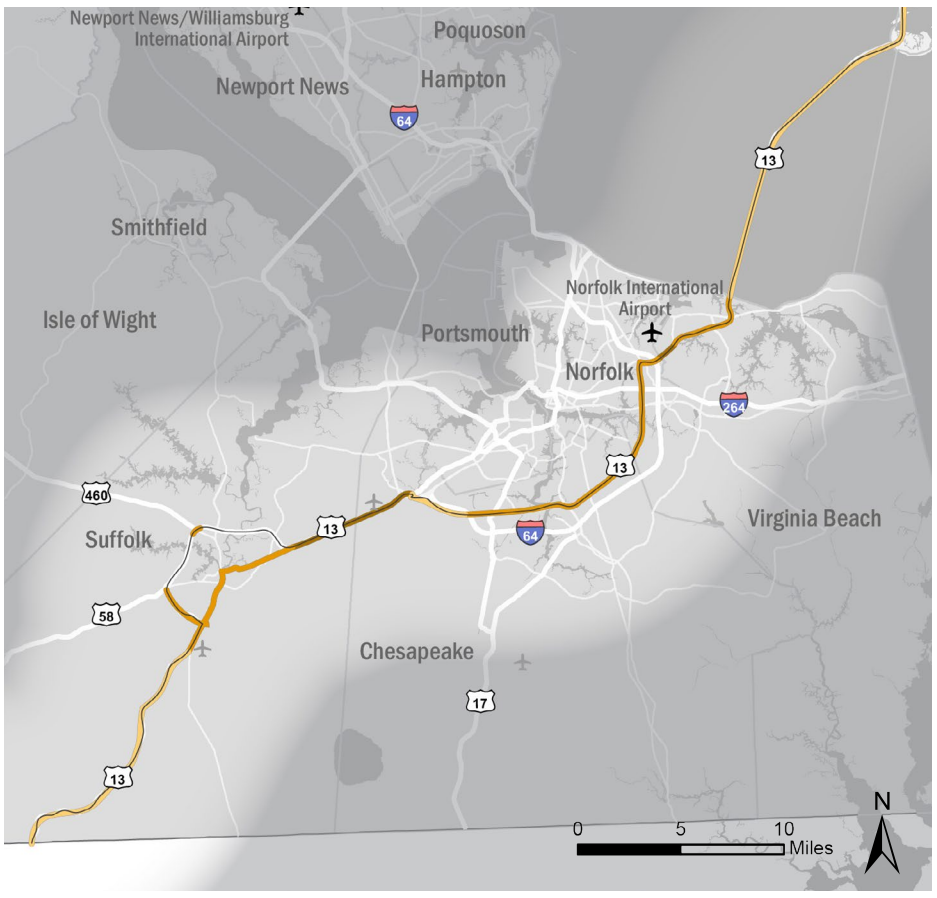
Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
City of Norfolk* and Kentucky
City of Norfolk* and Pennsylvania

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (95% / 93%)
2. City of Norfolk* (93% / 90%)
3. Illinois (2% / 3%)
4. Ohio (1% / 1%)
5. City of Chesapeake (1% / 2%)

Corridor Tonnage Destined for Segment D1: 94% / 92%

Traffic Conditions

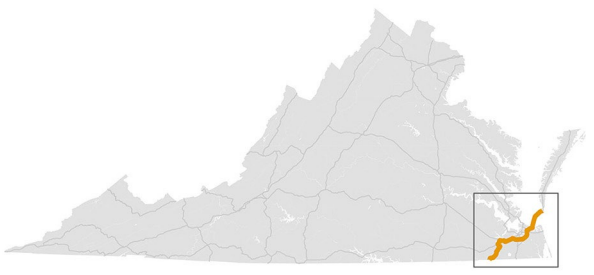


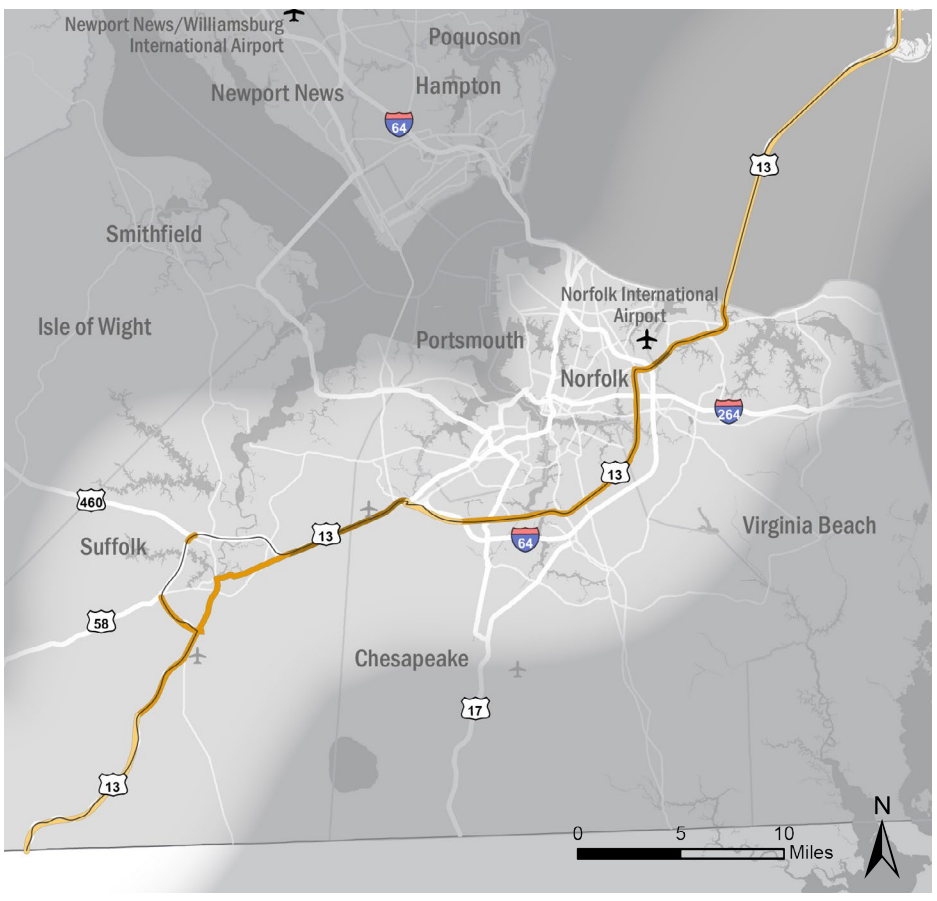
Traffic Volume and AADT

Traffic volume on Segment D1 is high compared to traffic volume on Segment D2 and varies considerably by highway section. The highest volumes occur in Chesapeake west of I-664 (more than 60,000 vehicles per day) and in Virginia Beach east of I-64 (61,000 – 80,000 vehicles per day). On US 13 in Chesapeake, Norfolk, and Virginia Beach, traffic volumes range from 16,000 to 44,000 vehicles per day, with the highest volumes occurring between Route 407 in Virginia Beach and I-64 in Norfolk. Through the Chesapeake Bay Bridge-Tunnel, traffic volumes on US 13 are approximately 9,000 vehicles per day. The greatest increase in traffic volume on Segment D1 is projected to occur west of I-664 on US 13 in Suffolk, where traffic volume is projected to increase by 14,000 additional vehicles per day by 2025. Traffic volume along this section of US 13 is projected to be 83,000 vehicles by 2025. Along US 13 in Chesapeake, Norfolk, and Virginia Beach, traffic volumes in 2025 are projected to range from 17,000 to 50,000 vehicles per day. Traffic volumes on the Chesapeake Bay Bridge-Tunnel are expected to grow only marginally by 2025, to a total of 10,000 vehicles per day.

Traffic Volume 2014 (AADT)

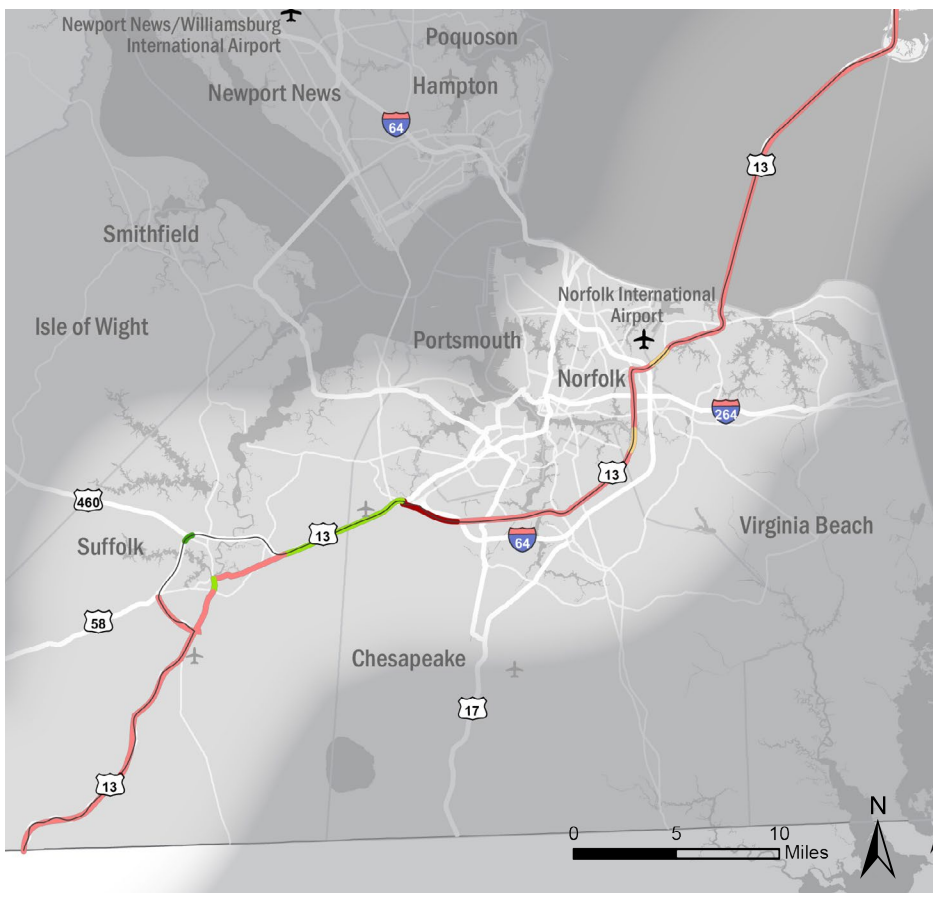
- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility





Traffic Volume 2025 (AADT)

- < 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- > 200,000
- Primary facility

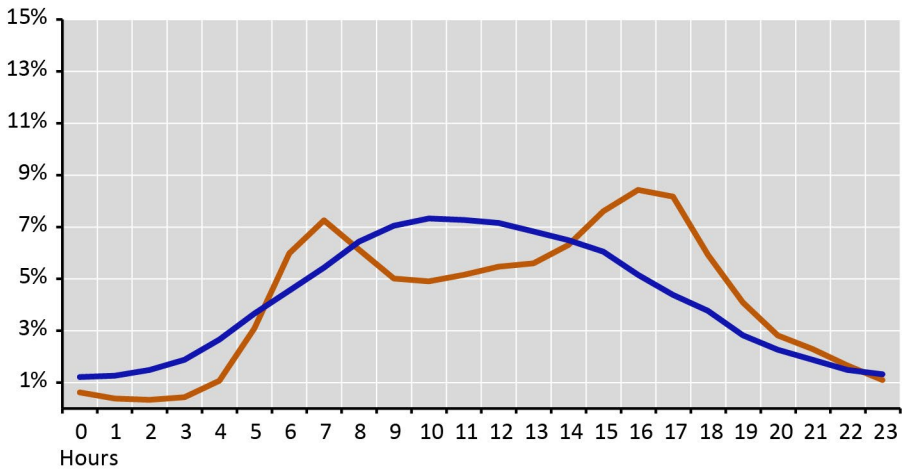


Change in Traffic Volume 2014- 2025 (AADT)

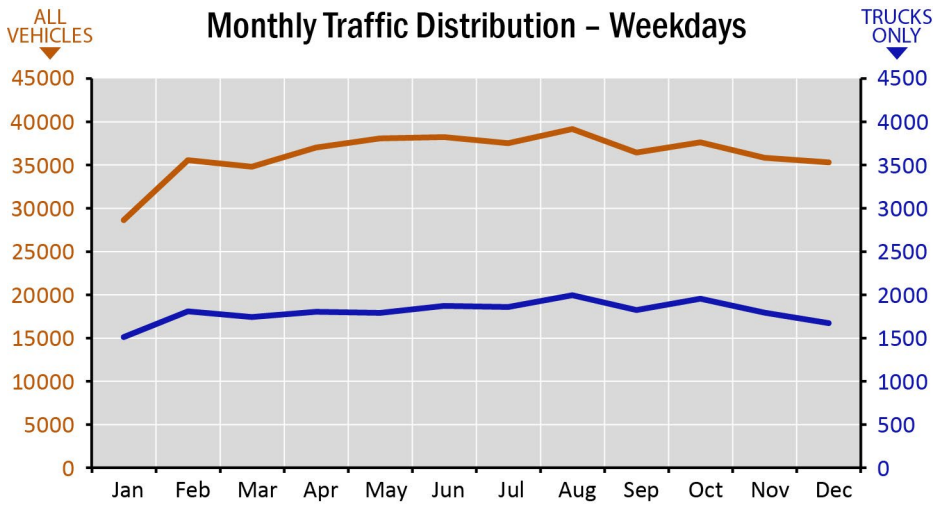
- Decreased
- 0 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- > 20,000
- Primary facility

D1 SEGMENT PROFILE

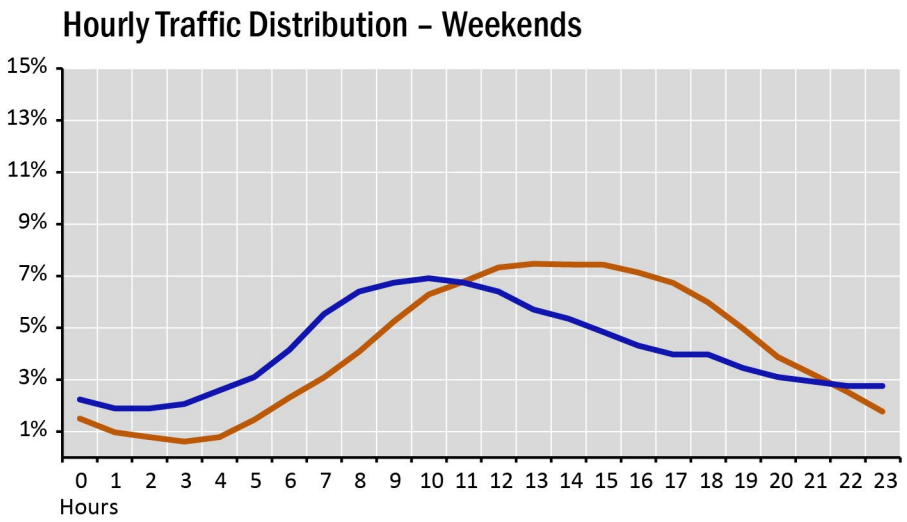
Hourly Traffic Distribution – Weekdays



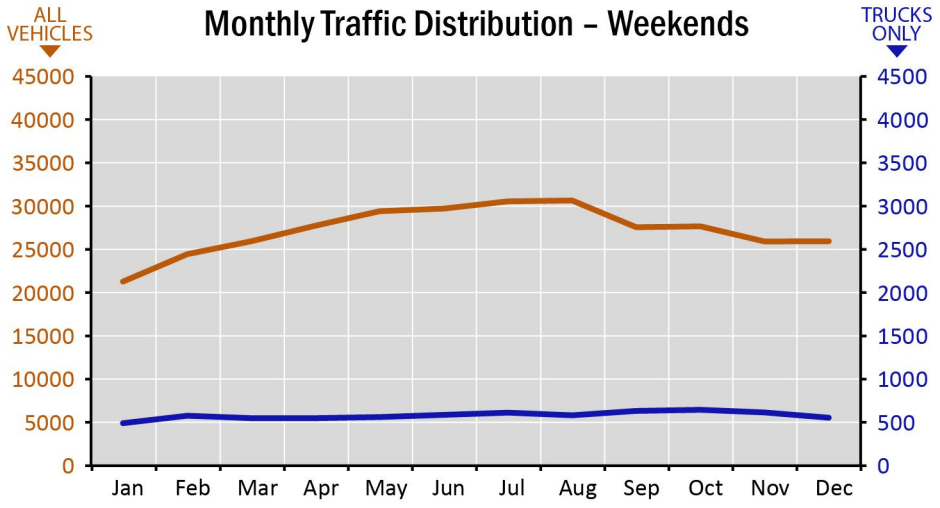
Monthly Traffic Distribution – Weekdays

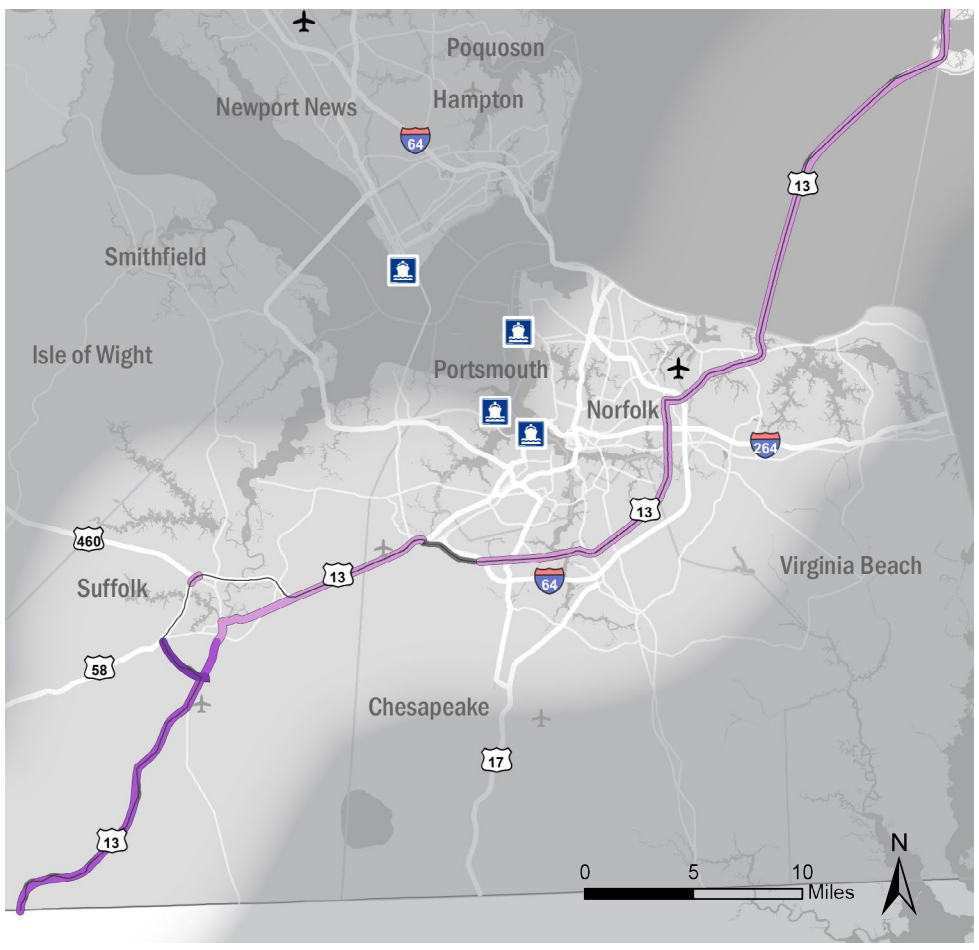


Hourly Traffic Distribution – Weekends



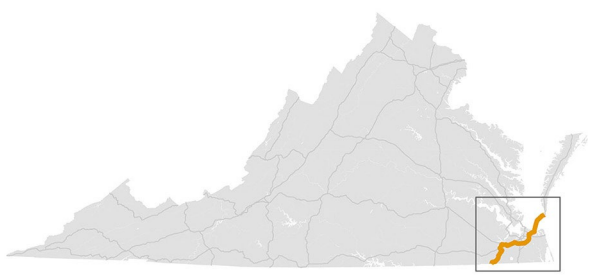
Monthly Traffic Distribution – Weekends





Percent Heavy Trucks

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



Traffic Distribution

On average, traffic on Segment D1 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 4 and 5 p.m. which accounts for 8.4 percent of daily traffic. The morning peak hour is less busy, with the 7 to 8 a.m. hour accounting for 7.3 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 55 percent of total daily traffic. Peaking patterns for truck traffic are different from commuter traffic, with a single peak during the midday period, with the highest percentage of hourly traffic occurring between 10 and 11 a.m. (7.3 percent of daily traffic) for all traffic, and 10 to 11 a.m. (6.9 percent of daily traffic) for truck traffic. Weekend traffic patterns are also different from the typical commute patterns, with the highest percentage of hourly traffic occurring between 1 and 2 p.m. (7.5 percent of daily traffic) for all traffic, and from 10 to 11 a.m. (6.9 percent of daily traffic) for truck traffic.

Weekday traffic volumes on Segment D1 vary by as much as 37 percent throughout the year, with the highpoint in August (around 39,000 vehicles per day) and the low point in January (around 29,000 vehicles per day). Truck volumes also vary throughout the year, with the August high (around 2,000 vehicles per day) 32 percent higher than the January low (around 1,500 vehicles per day). Weekend traffic levels also vary over the course of the year, and the highest levels of weekend traffic (August, around 30,000 vehicles per day) are 44 percent higher than January levels (around 21,000 vehicles per day. Weekend truck traffic is steadier than all vehicle traffic, with the October high 31 percent higher than the January low. Since truck volumes account for a relatively small portion of traffic on Segment D1, traffic conditions are much more responsive to variations in automobile traffic than truck traffic.

Truck Volume

The percent of daily traffic comprised of heavy trucks on Segment D1 varies by highway section. Along US 13/US 13 Business in southern Suffolk, heavy trucks comprise six percent of total traffic, while on the short highway section connecting US 13 with US 58 in central Suffolk, heavy trucks comprise 13 percent of total traffic. Along the rest of Segment D1, heavy trucks comprise no more than four percent of total traffic.

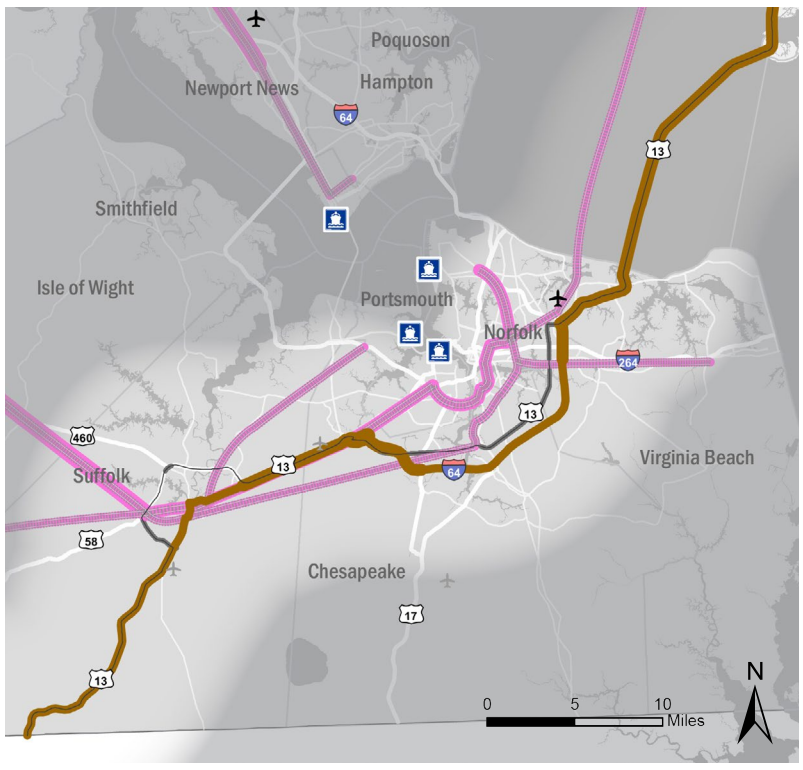
D1 SEGMENT PROFILE

Freight Flows

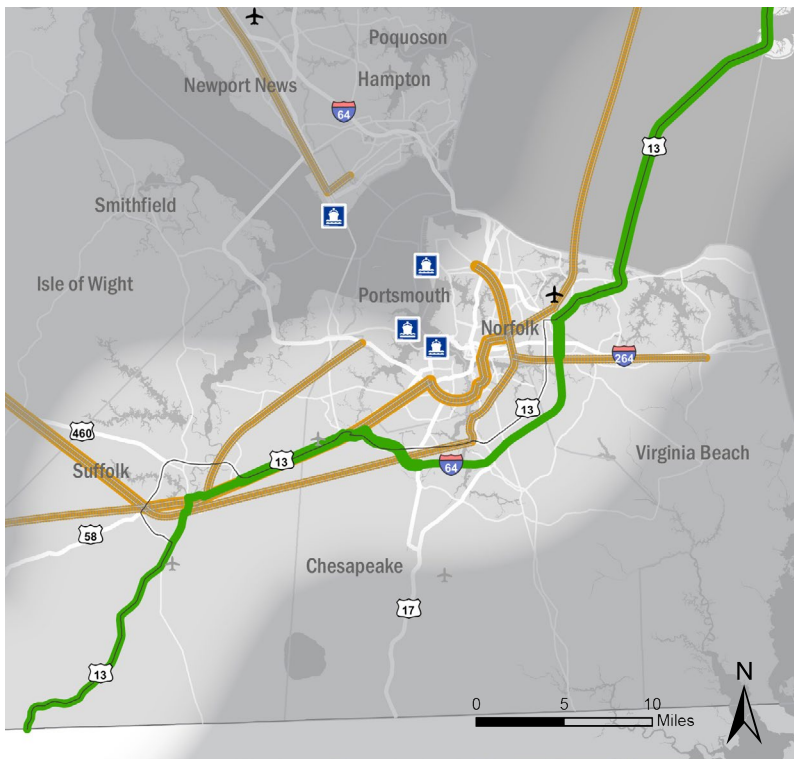
West of the Hampton Roads Executive Airport in Segment D1, freight is moved evenly by both truck and rail in terms of tonnage; however, more freight moves by truck in terms of value. In total, 22 million tons (49 percent) of freight is moved through this section of Segment D1 by truck, compared to 22.5 million tons (51 percent) by rail. By value, however, $31 billion (69 percent) of freight value travels by truck, compared to $14 billion (31 percent) by rail. On average, a ton of freight traveling through this section of Segment D1 by truck is worth $1,449 while a ton of freight traveling by rail is worth $616. In 2025, both rail and truck freight tonnages and total values in this area of Segment D1 are expected to increase, and the percentage of the freight traveling by truck is expected to increase by both tonnage and value to 59 percent and 75 percent, respectively. Value per ton of freight moved on trucks and rail is anticipated to increase to $1,523 and $756, respectively.

Within Segment D1 on the Chesapeake Bay Bridge-Tunnel, the large majority of freight moves by truck, in terms of both tonnage and value. In total, 16 million tons (97 percent) of freight travels through this section of Segment D1 by truck, compared to only 480,000 tons by rail. With respect to value, the disparity is even greater with $26 billion (98 percent) of freight value traveling by truck, compared to $436 million by rail. On average, a ton of freight traveling through this section of Segment D1 by truck is worth $1,622 while a ton of freight traveling by rail is worth $910. In 2025, both rail and truck freight tonnages and total values in Segment D1 are expected to increase, while the percentage of the freight traveling by truck and rail is anticipated to remain the same both in terms of tonnage and value. Value per ton on trucks is expected to increase to $1,660 and by rail is expected to decrease to $850.

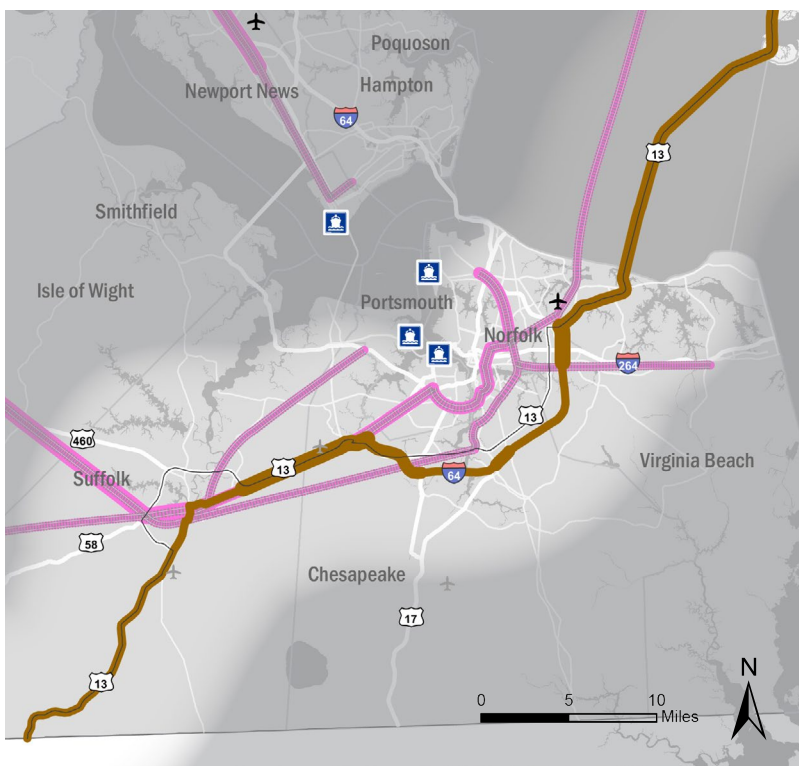
Annual Freight by Tonnage, 2012



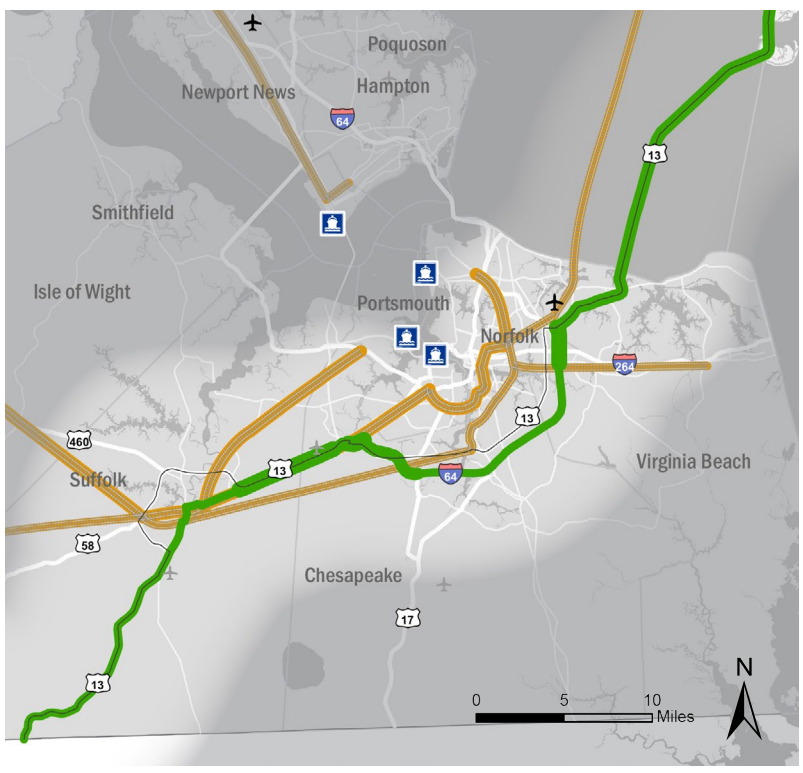
Annual Freight by Value, 2012



Annual Freight by Tonnage, 2025



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

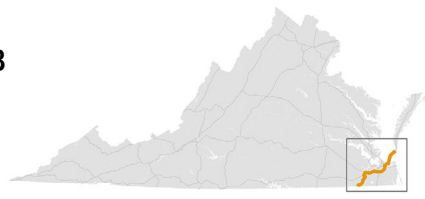
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



D1 SEGMENT NEEDS

Redundancy and Mode Choice

Comparable Travel Options

Chincoteague to Hampton Roads (Norfolk)

Inter-City Bus	*Train*
2 Trips per Day	0 Trips per Day
2:20 Travel Time	0:00 Travel Time
$20 Est. Cost	$0 Est. Cost

Auto

Via US-13: 1:55 Travel Time $59 Est. Cost

Hampton Roads (Norfolk) to Elizabeth City, NC

Inter-City Bus	*Train*
1 Trips per Day	0 Trips per Day
0:50 Travel Time	0:00 Travel Time
$11 Est. Cost	$0 Est. Cost

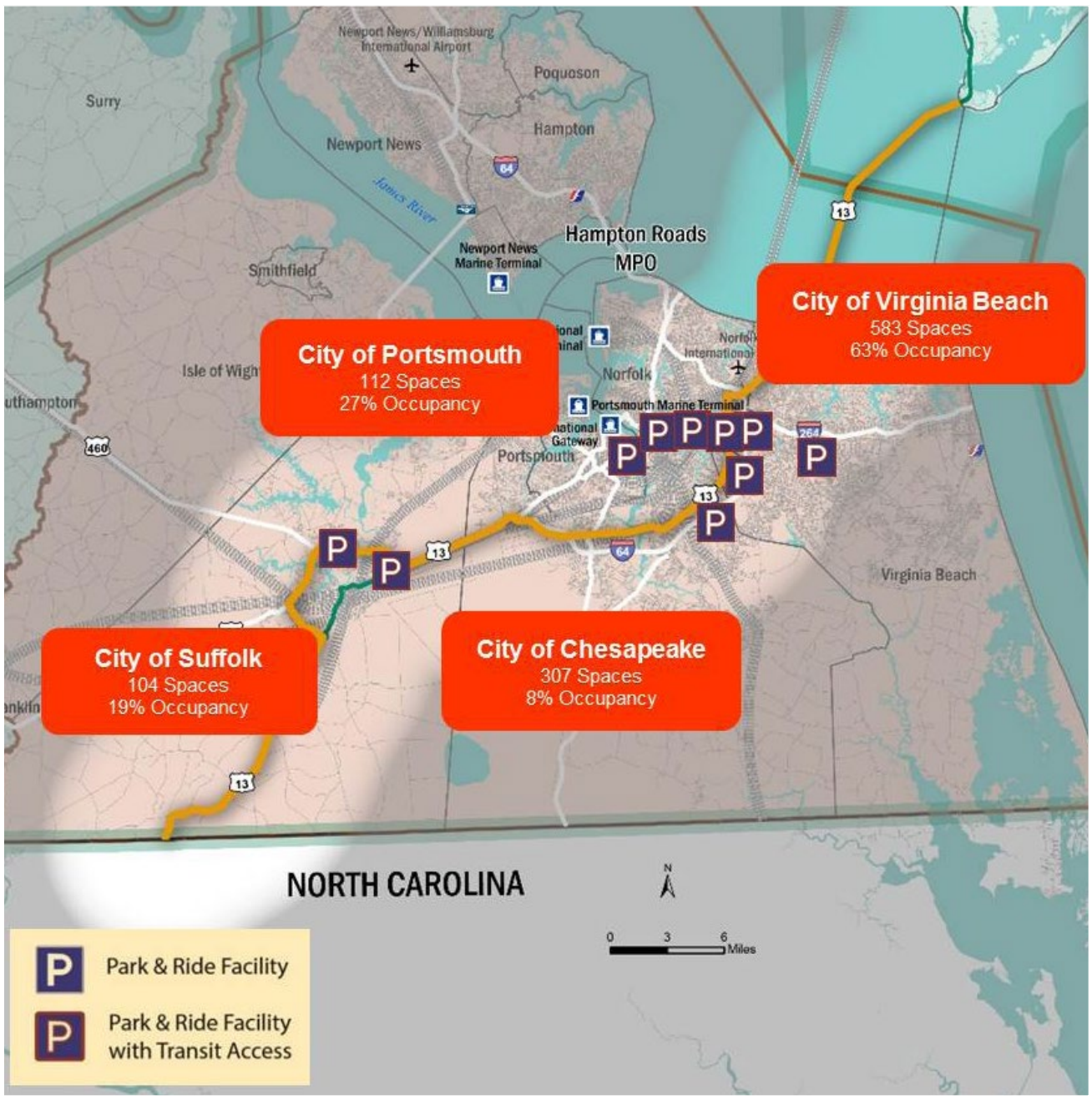
Auto

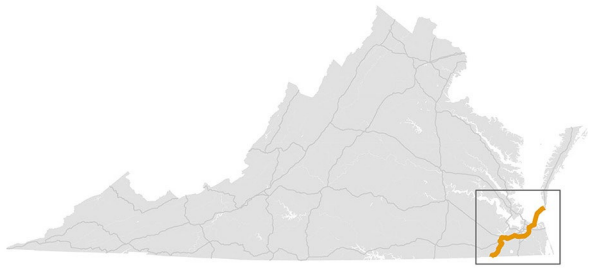
Via US-13: 0:50 Travel Time $26 Est. Cost

Passenger trips on Segment D1 of the Eastern Shore Corridor have a few travel options, both in terms of travel path and mode choice. There are no parallel highway facilities to Segment D1, though it does access other major highway facilities in the Hampton Roads Area, including I-64, I-264, I-664, US 17, US 58, and US 460. However, based on the 2014 federal standard mileage rate of 56 cents per mile, long-distance trips would be more expensive by automobile than by the other available modes. The alternate mode, specifically bus, is limited by the frequency of service. Amtrak does have stations in Newport News, Norfolk and Virginia Beach; however, routes from these stations serve the Northeast Corridor and do not offer connections within Corridor D.

Park-and-Ride

Within Segment D1, commuters can utilize many Park-and-Ride facilities, as well as commuter bus service provided by HRT. Park-and-Ride locations are spread throughout the region. Virginia Beach provides the highest number of Park-and-Ride spaces and has the highest utilization rate of spaces available in the region. However, no city within the Segment D1 area has a rate higher than the statewide average for Park-and-Ride utilization, which is 76 percent.





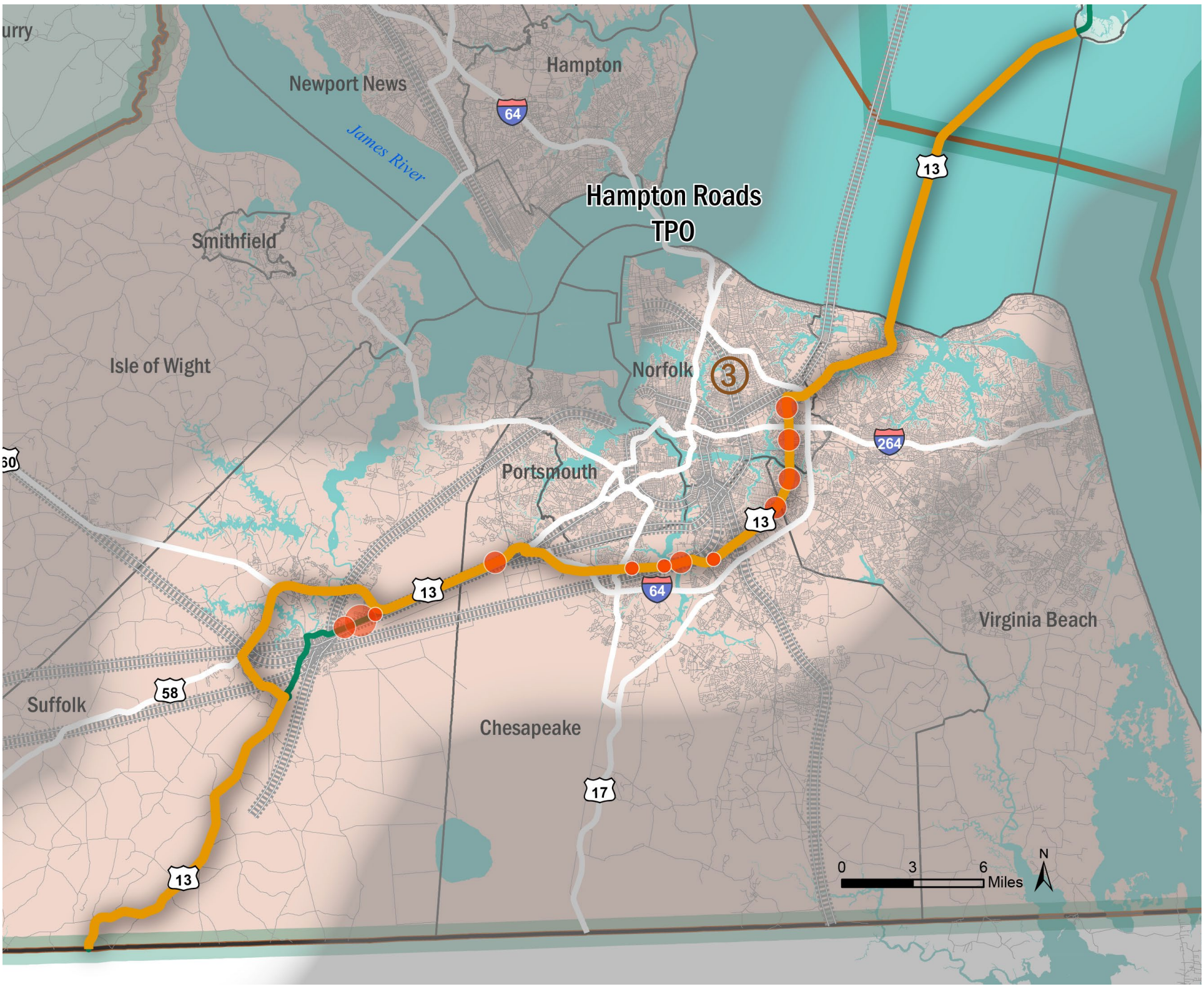
D1 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	146
Severe Crashes/Million VMT	1.3
Number of Railroad Crashes	3

Between 2010 and 2012, 146 severe crashes occurred on Segment D1, representing the vast majority of the crashes on Corridor D as a whole. Segment D1 had several concentrated areas of severe crashes. In Suffolk, on US 13 Business (Portsmouth Boulevard), 43 collisions occurred within a distance of 1.5 miles between the on-ramp from US 13 to Suburban Drive. Of the 43 collisions, 35 occurred at the intersections with Suburban Drive and East Washington Street. In Chesapeake, on US 13 (West Military Highway), there were 15 crashes over a 0.5-mile stretch near the Hampton Roads Airport. Also in Chesapeake, on US 13 (South Military Highway), there were 40 collisions over 4.2 miles between George Washington Highway and Campostella Road. Of the 40 collisions, 19 occurred at the intersection with Shell Road. On US 13 (North Military Highway) between Norfolk and Virginia Beach, there were 48 incidents that took place over 4.5 miles between Sparrow Road and Lewis Road. Half of the 48 incidents occurred at the intersections with Sparrow Road and Hoggard Road.

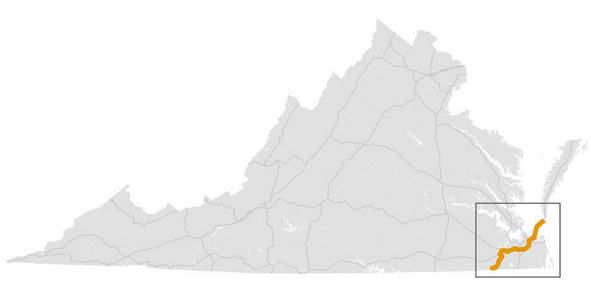


Fatality and Injury Crashes (2010 - 2012)

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

Railroad Incidents/Accidents per County (2011-2014)

#



Congestion

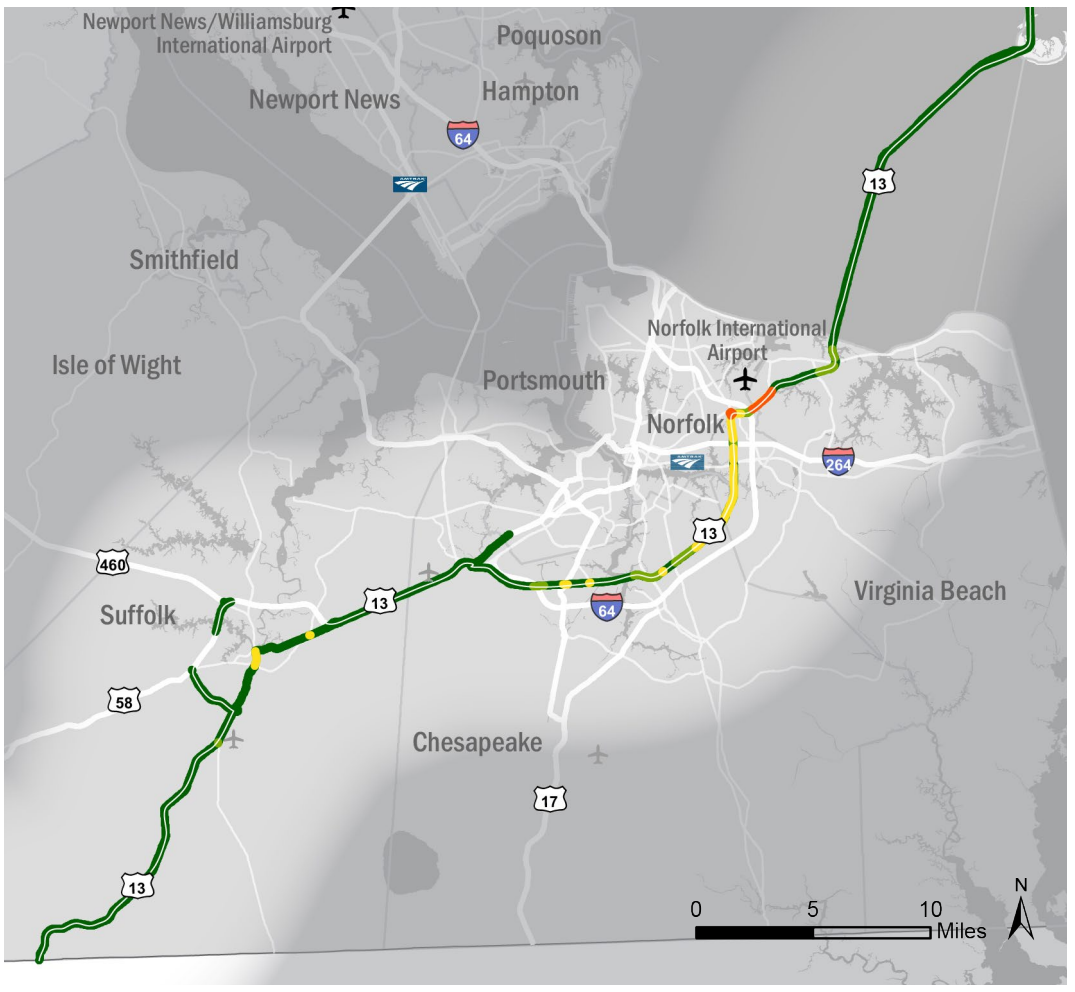
Performance Metrics

Person Hours of Delay per Mile	26
Freight Ton Hours of Delay per Mile	14.2K

Passenger Delays

Segment D1 experiences moderate congestion, approaching 4,000 person-hours of delay, with several areas experiencing delays in excess of 100 person-hours per mile. There are significant passenger delays on US 13 in locations between Route 166 in Virginia Beach and US 17 in Chesapeake. In the City of Suffolk, there are significant passenger delays in locations on US 460 and Route 32. Peak-period passenger delays account for more than half of daily congestion, considerably higher than average for the peak-period share of congestion along CoSS segments.

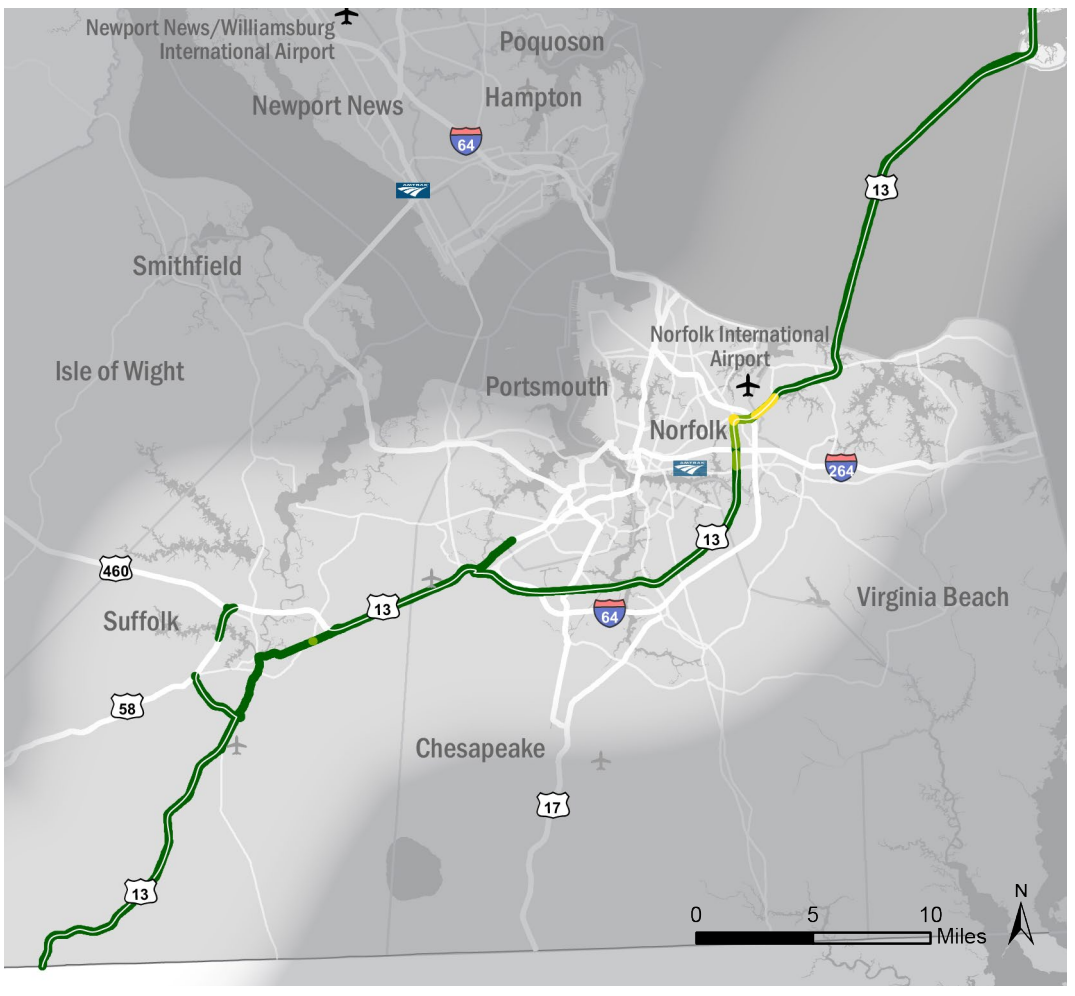
Daily Person Hours of Delay Per Mile

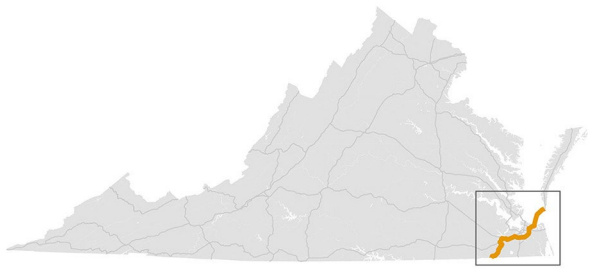


Freight Delays

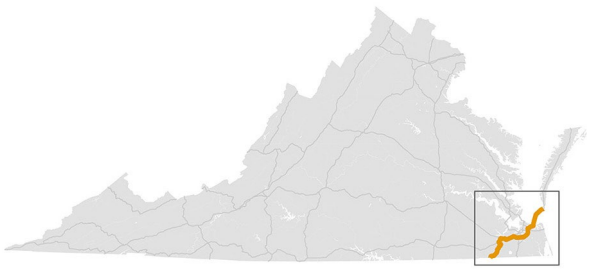
Freight congestion is minimal for much of Segment D1, with an average delay of 14,000 ton-hours per mile on the segment and with significant delays occurring near the Norfolk International Airport. In the City of Virginia Beach, there are significant freight delays on US 13 east of I-64. In the City of Norfolk, freight delays in excess of 250,000 ton-hours per mile are experienced at the intersection of US 13 and Route 165. Peak-period freight delays account for 45 percent of daily congestion, considerably more than average for the peak-period share of congestion along CoSS segments.

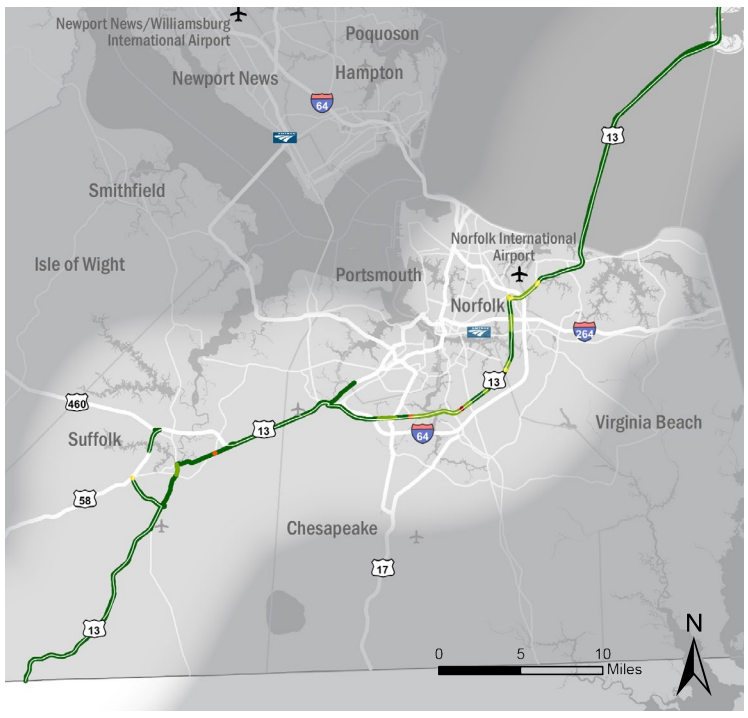
Daily Freight Ton Hours of Delay Per Mile





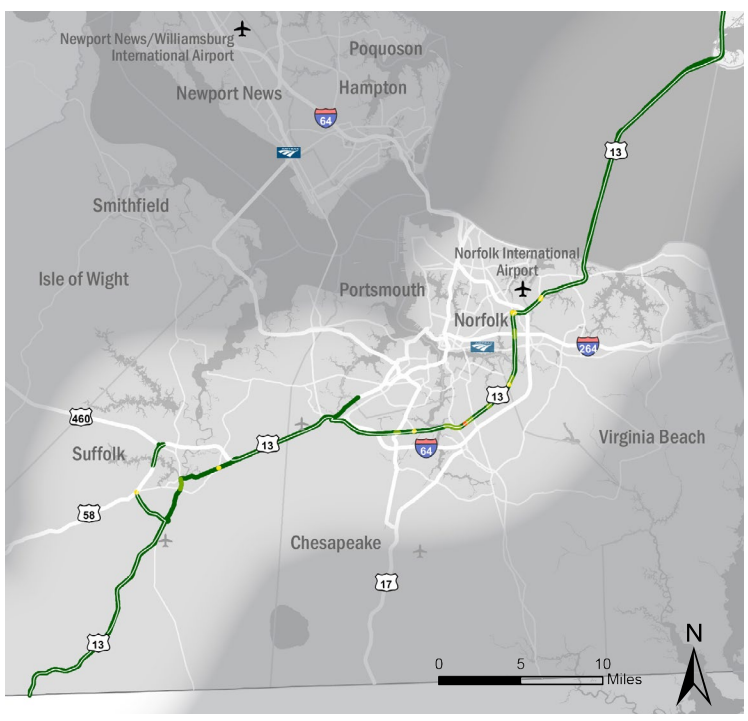
Reliability





Weekday Peak

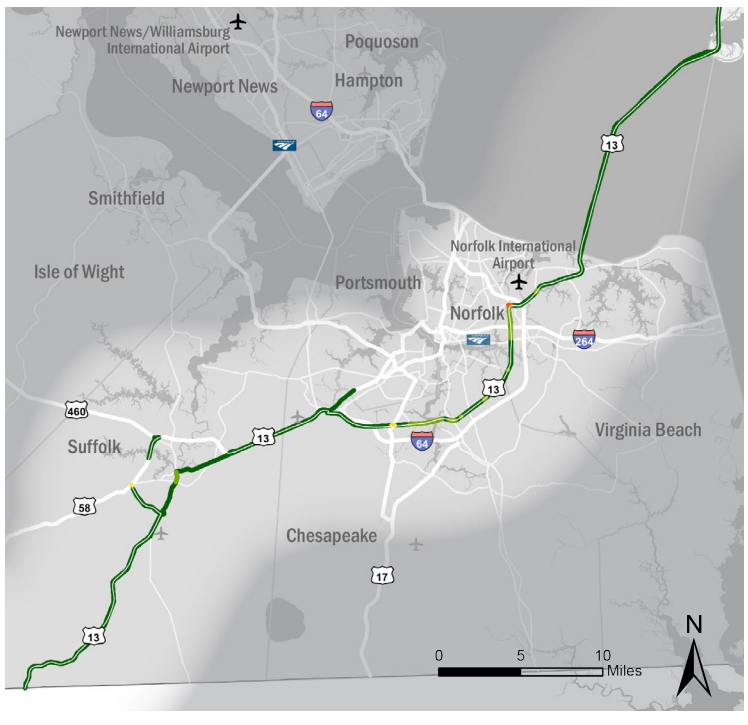
Reliability of travel during the peak period on a typical weekday on Segment D1 ranges from 0.00 to 0.81 in terms of reliability index, with an average value of 0.17. While this segment does have a weekday reliability index higher than average for the CoSS segments statewide, only a small segment of US 13 between I-464 and Route 168 in Chesapeake has a reliability index value exceeding the statewide threshold.



Weekday

Reliability of travel during a typical weekday ranges from 0.00 to 0.64 in terms of reliability index, with an average value of 0.15. Several locations on US 13 have a weekday reliability index exceeding the statewide threshold:

- In Suffolk at US 58;
- In Chesapeake at Route 196 and Compostella Road;
- In Norfolk at Route 165; and
- In Virginia Beach at Route 166.



Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.74 in terms of reliability index, with an average value of 0.12. While this segment has a higher than average level weekday reliability index, only a short segment at the intersection with Route 165 in the City of Norfolk has a reliability index value 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)

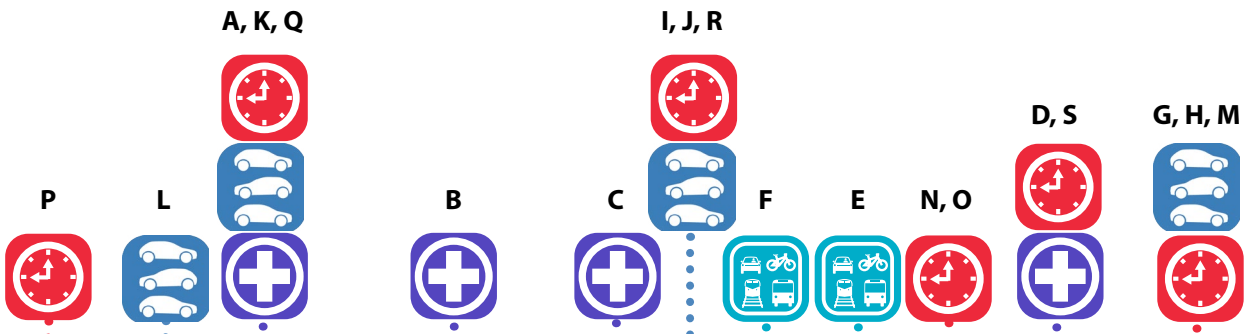
Statewide reliability index thresholds have been set for weekday peak, weekday and weekend travel to assess the reliability of travel on each segment on all corridors of statewide significance. A higher reliability index indicates that travel times are more unreliable. The following are the reliability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

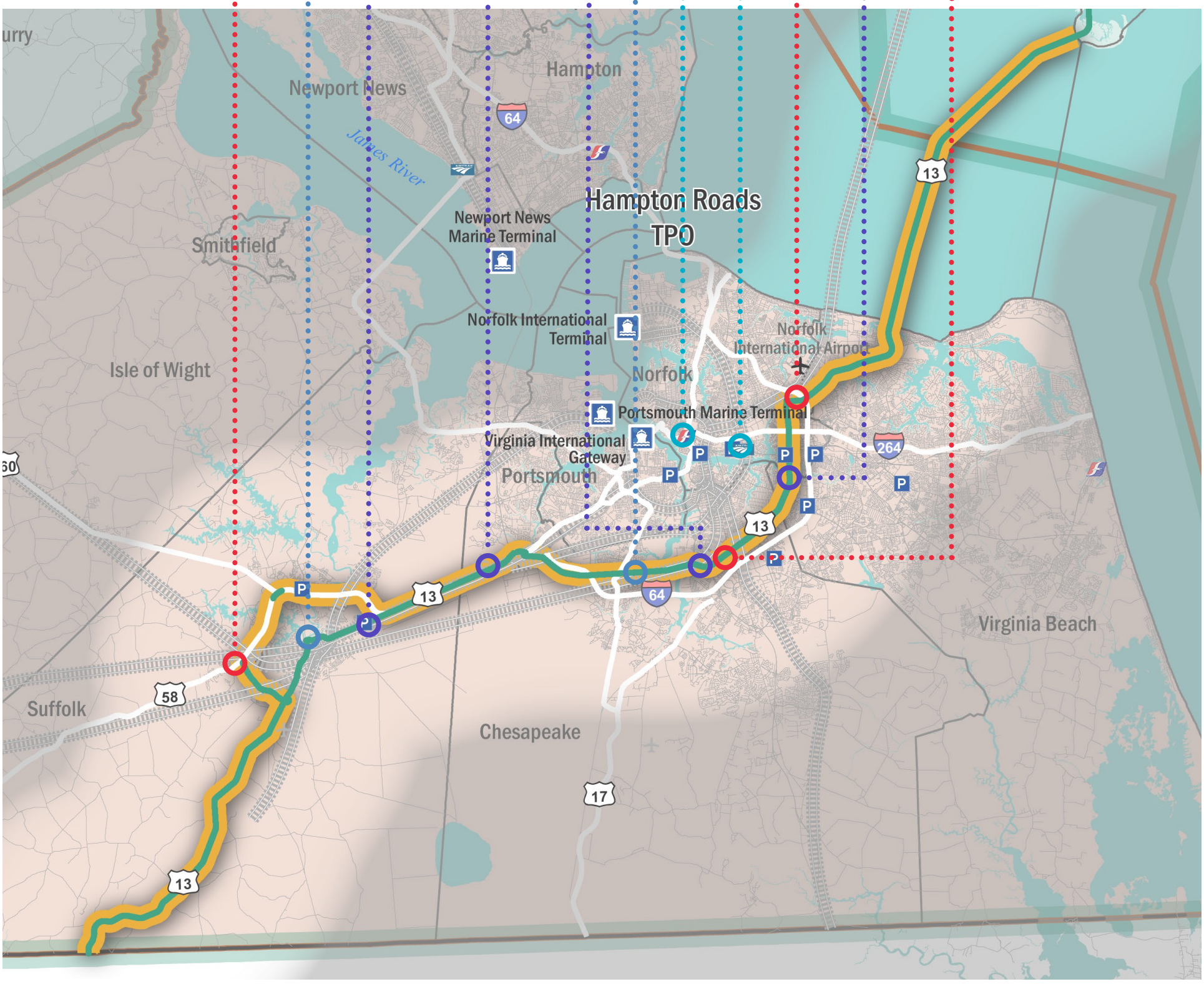
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

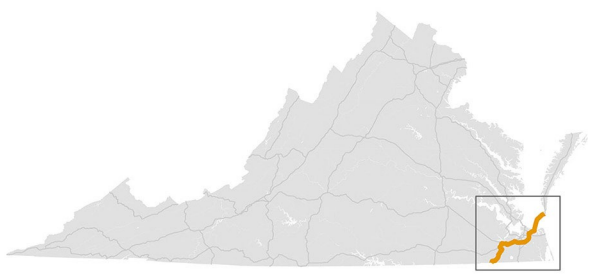
Summary of Needs

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

Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability







D1 SEGMENT NEEDS

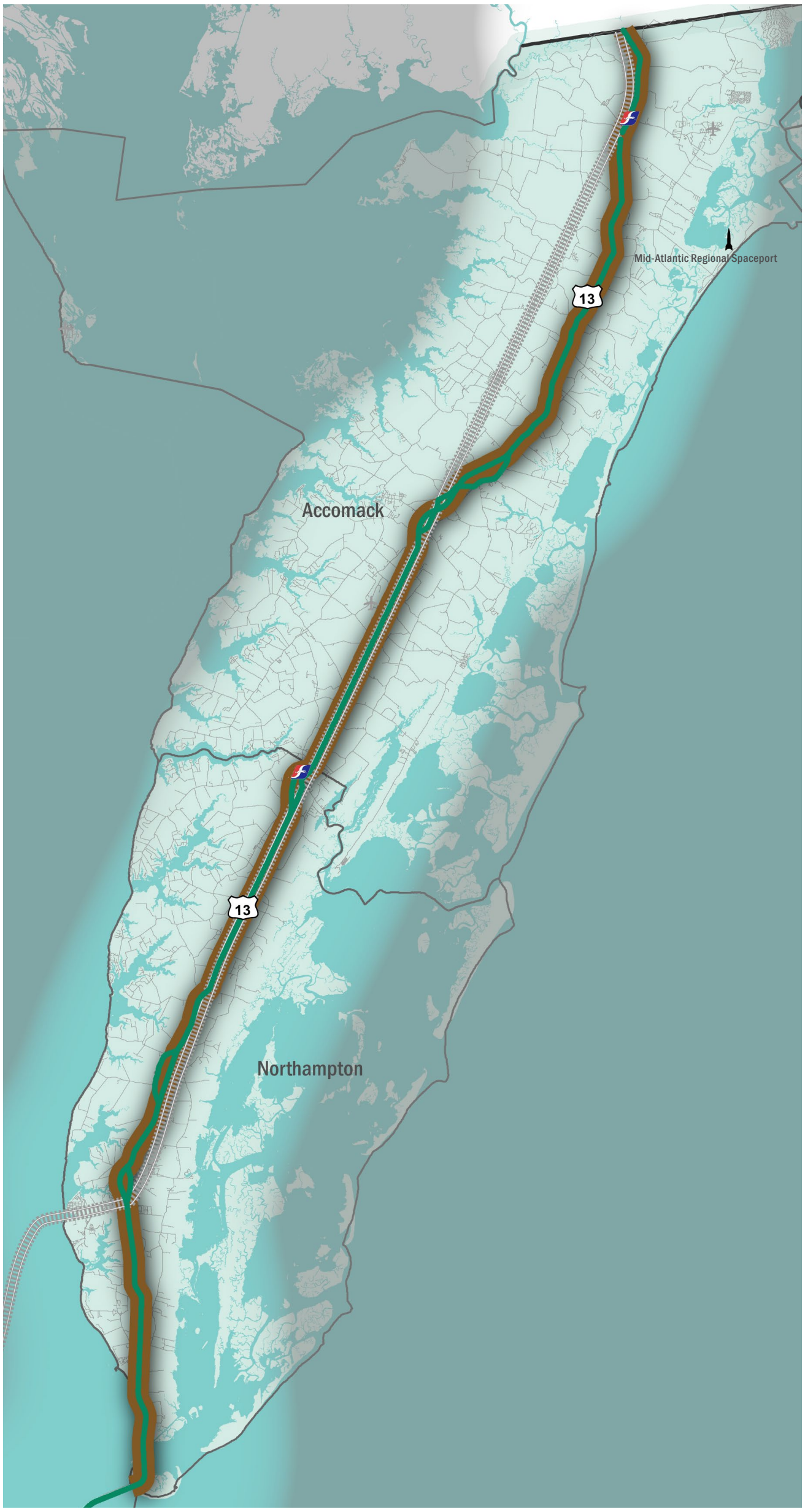
Summary of Needs - D1 Segment

A.		US 13-Business between US 13 and Suburban Dr in Suffolk: 43 severe crashes
B.		US 13 at Hampton Roads Executive Airport in Chesapeake: 15 severe crashes
C.		US 13 between US 17 and Route 166 in Chesapeake: 40 severe crashes
D.		US 13 between Sparrow Rd and Lewis Rd in Norfolk: 48 severe crashes
E.		No passenger rail from Hampton Roads to other cities in the corridor
F.		Intercity bus service from Hampton Roads is limited to twice per day
G.		Congestion issue on US 13 between VA Route 409 (Providence Road) in Norfolk and VA Route 168 (North Battlefield Boulevard) in Chesapeake
H.		Congestion issue at US 13 (South Military Highway) and Campostella Road in Chesapeake
I.		Congestion issue at US 13 (South Military Highway) and VA Route 196 (Canal Drive) in Chesapeake
J.		Congestion issue at US 13/US 460 (South Military Highway) and US 17 in Chesapeake
K.		Congestion issue at US 13 Business (Nansemond Parkway) and US 460 Business (Portsmouth Boulevard) in Suffolk
L.		Congestion issue at US 58 Business/US 460 Business (Constance Road) and VA Route 32 (Main Street) in Suffolk
M.		Reliability issue at US 13 (South Military Highway) and VA Route 168 (North Battlefield Boulevard) in Chesapeake
N.		Reliability issue at US 13 (North Military Highway) and VA Route 166 (East Princess Anne Road) in Norfolk
O.		Reliability issue at US 13 (Northampton Boulevard) and VA Route 166 (Diamond Springs Road) in Norfolk
P.		Reliability issue at US 13/US 58 and US 58 junction in Suffolk
Q.		Reliability issue at US 13 Business (Nansemond Parkway) and US 460 Business (Portsmouth Boulevard) in Suffolk
R.		Reliability issue at US 13/US 460 (South Military Highway) and US 17 in Chesapeake
S.		Reliability issue at US 13 (South Military Highway) and VA Route 409 (Providence Road) in Virginia Beach

III. Segment D2

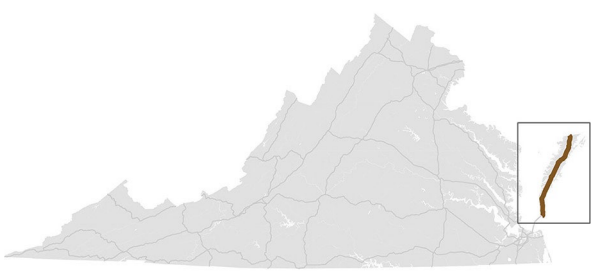
Corridor Segment D2 Components

- US 13
- US 13 Business
- Bay Coast Railroad and Barge
- Mid-Atlantic Regional Spaceport



Segment D2

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



Number of Lanes
(both directions)

- 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 12
- Primary facility

Segment D2 begins at the northern terminus of the Chesapeake Bay Bridge-Tunnel and progresses north to the Maryland border, serving Northampton and Accomack Counties. The segment does not travel through any areas covered by a Metropolitan Planning Organization (MPO). Segment D2 is the main corridor through the Eastern Shore for passengers and freight. For markets in the Northeast, as well as for tourists from the Northeast, this route provides the shortest path to the Hampton Roads Area.

Highway Facilities: US 13 is a four-lane facility that primarily provides local access in Segment D2. There are no parallel highway facilities to Segment D2, except for specific locations where US 13 Business exists in the urbanized areas.

Transit Services: Greyhound provides service from stations in Exmore and Oak Hall with routes that connect to Maryland and the Hampton Roads Area. Shore Transit and Rideshare (STAR) offers bus service that connects communities along the length of the Eastern Shore.

Rail Facilities: The Bay Coast Railroad moves freight through the Eastern Shore, connecting to a rail barge that crosses the mouth of the Chesapeake Bay to access Norfolk.

Port Facilities: While no traditional port facilities are located along this segment, barge transportation is also available between Baltimore and the Port of Virginia, paralleling Segment D2. Freight destined for low-earth orbit is served by launch facilities at the Mid-Atlantic Regional Spaceport, which provides service to commercial, governmental, scientific, and academic organizations from Wallops Island on the Eastern Shore.

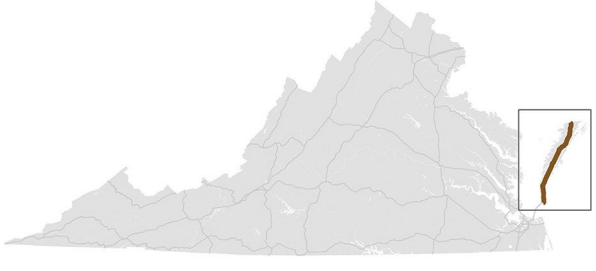
Airport Facilities: There are no commercial airports in this segment.

Major planned and future projects include:

- **Northampton County:** Replacing signs and posts that no longer meet the minimum service level for sign retro-reflectivity and function between Wise Point (southern tip of peninsula where Route 600 passes under US 13) and the Accomack County line; and
- **Accomack County:** Rebuilding of existing traffic signals at the US 13 and Bank Street intersection in Onley.

Future Projects

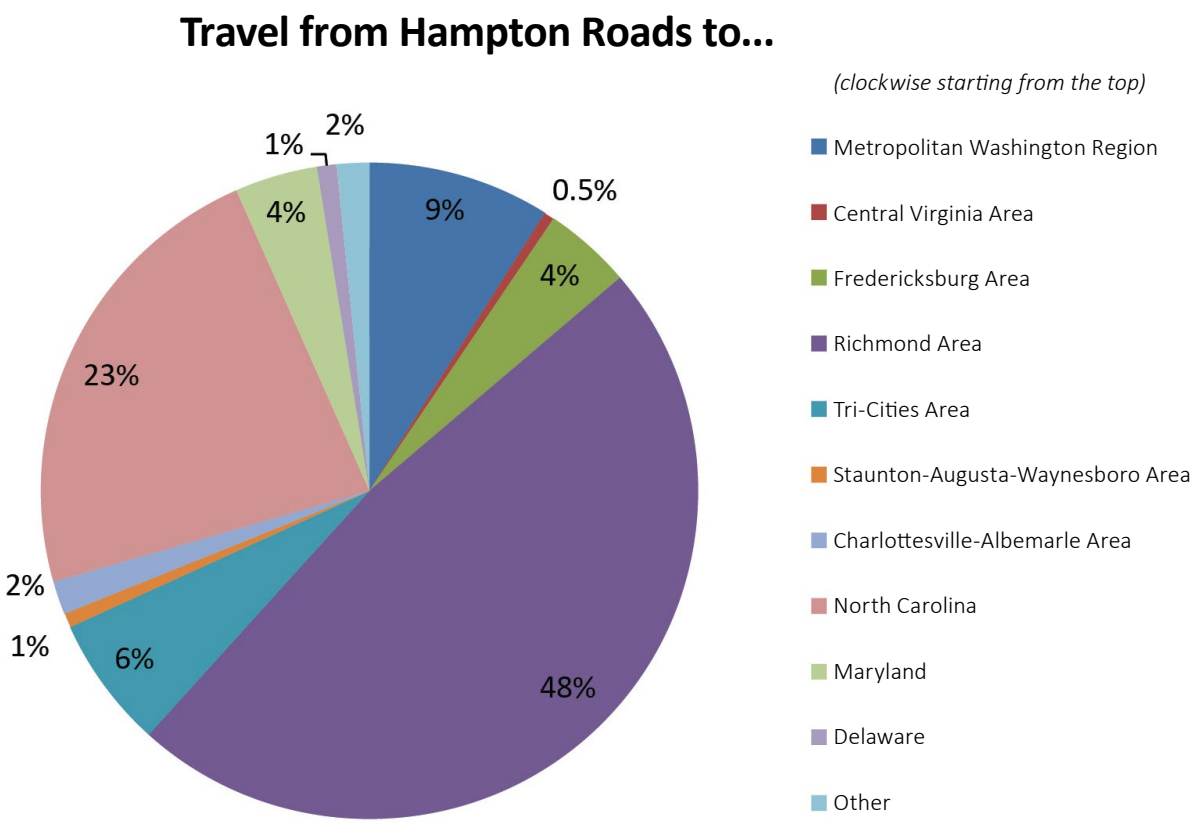
- Reconstruction with added capacity
- Safety improvements
- Primary facility

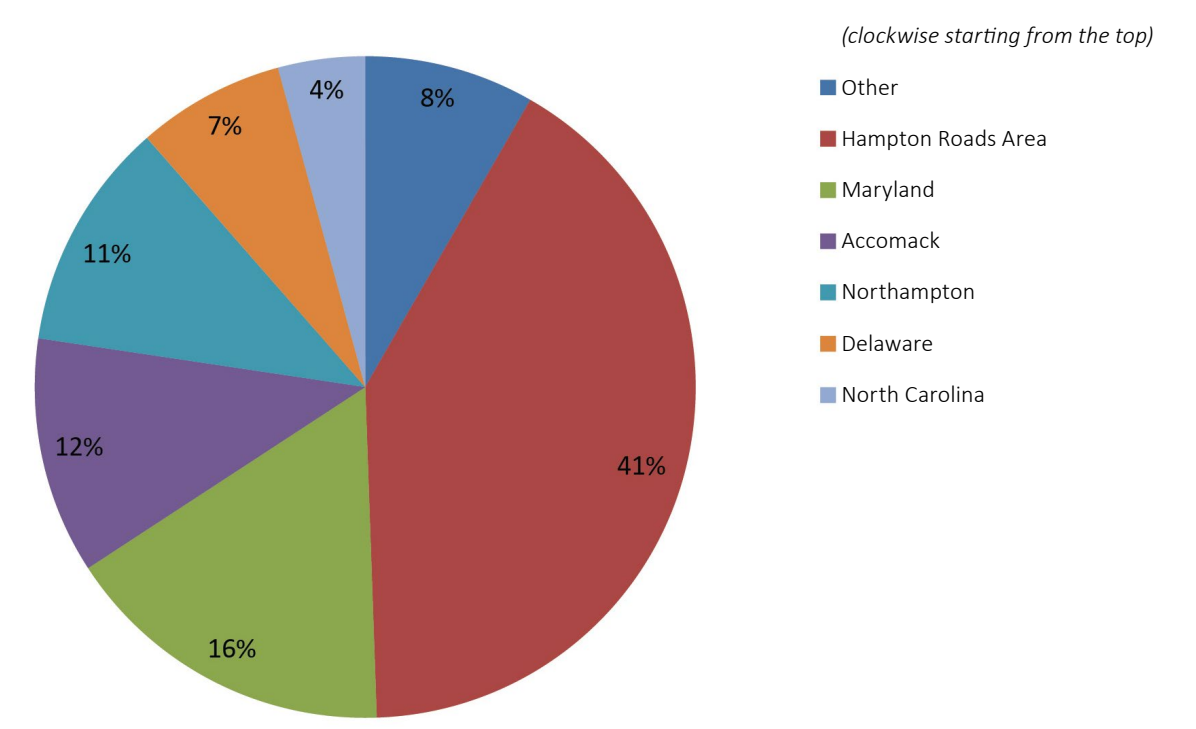


Travel Demand

Passenger Demand

Segment D2 does not traverse any of the Commonwealth's MPO areas, but does provide a connection to the Hampton Roads Area from Maryland and Delaware via Northampton and Accomack Counties. Of the intercity passenger traffic that originates in the Hampton Roads Area, five percent is destined for Maryland and Delaware. Depending on the ultimate destination, many of these travelers may use Segment D2. Of the intercity passenger traffic originating in Accomack and Northampton Counties, 41 percent is destined for the Hampton Roads Area, 23 percent is destined for Maryland and Delaware, and 22 percent is travel between the two counties.





D2 SEGMENT PROFILE

Freight Demand

By truck, Segment D2 carries 17 million tons of freight worth $27 billion in 2012, and is estimated to carry 25 million tons of freight worth $40 billion in 2025. The major truck freight pattern on Corridor D is between North Carolina and the Port of Virginia, specifically the Cities of Norfolk and Portsmouth. Jurisdictions along Segment D2 are only minor generators or attractors of truck freight tonnage on the corridor, accounting for between four and five percent of truck freight origins and two percent of truck freight destinations. This truck freight on Segment D2 is mostly heading to or arriving from locations in the Middle Atlantic region, rather than the Port of Virginia. Between 11 and 13 percent of truck freight tonnage on Corridor D correspond to through traffic between North Carolina and the Middle Atlantic region by way of the Eastern Shore.

By rail, Segment D2 carried 490,000 tons of freight worth $440 million in 2012, and is estimated to carry 720,000 tons of freight worth $590 million in 2025. The major rail freight pattern on Corridor D is between West Virginia and neighboring counties in Virginia to the Port of Virginia in Norfolk. Rail freight flows originating from or destined for Segment D2 are nearly negligible with respect to total tonnage and value on Corridor D.

Truck Freight

Major Origins (by Tonnage)
1. Virginia (41% / 44%)
2. North Carolina (25% / 23%)
3. City of Norfolk* (14% / 13%)
4. City of Chesapeake (6% / 9%)
5. New Jersey (6% / 6%)

Corridor Tonnage Originating in Segment D2: 4% / 5%

Major Origin-Destination Pairs for Freight
City of Norfolk* and North Carolina
City of Virginia Beach and North Carolina
City of Chesapeake and North Carolina
City of Portsmouth* and North Carolina
City of Norfolk* and New Jersey

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

Major Destinations (by Tonnage)
1. Virginia (55% / 54%)
2. City of Norfolk* (17% / 15%)
3. North Carolina (13% / 14%)
4. City of Virginia Beach (11% / 11%)
5. City of Chesapeake (8% / 10%)

Corridor Tonnage Destined for Segment D2: 3% / 3%

Rail Freight

Major Origins (by Tonnage)
1. Virginia (40% / 41%)
2. West Virginia (40% / 37%)
3. Wise County (15% / 14%)
4. Buchanan County (10% / 10%)
5. Kentucky (7% / 7%)

Corridor Tonnage Originating in Segment D2: <1% / <1%

Major Origin-Destination Pairs for Freight
City of Norfolk* and West Virginia
Wise County and City of Norfolk*
Buchanan County and City of Norfolk*
City of Norfolk* and Kentucky
City of Norfolk* and Pennsylvania

Percentages represent 2012 / 2025 values.
*Includes freight passing through the Port of Virginia.

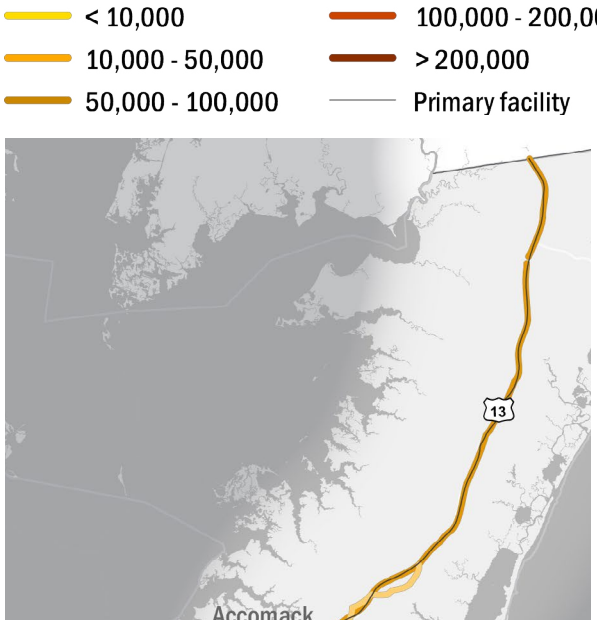
Major Destinations (by Tonnage)
1. Virginia (95% / 93%)
2. City of Norfolk* (93% / 90%)
3. Illinois (2% / 3%)
4. Ohio (1% / 1%)
5. City of Chesapeake (1% / 2%)

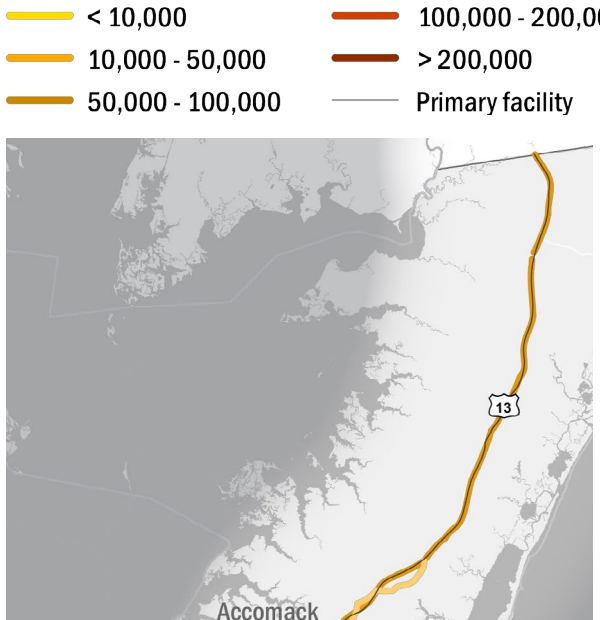
Corridor Tonnage Destined for Segment D2: <1% / <1%

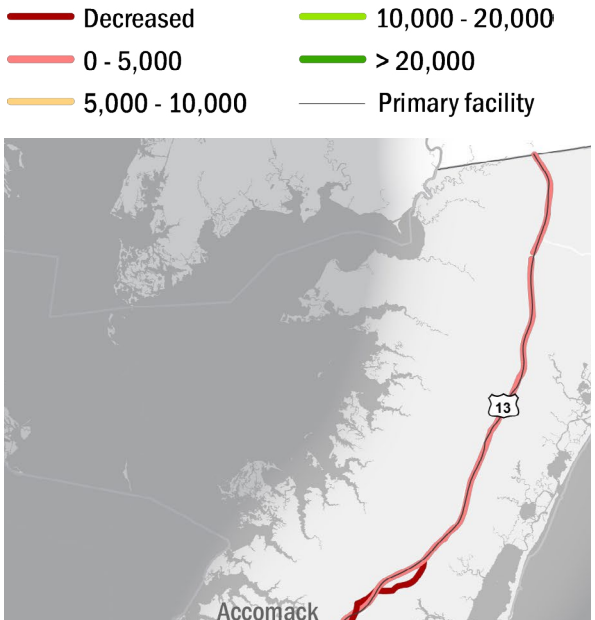
Traffic Conditions

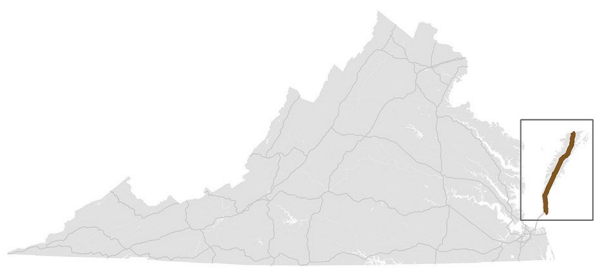
Traffic Volume and AADT

Traffic volume on Segment D2 is less than the traffic volume on Segment D1. Throughout Segment D2 along US 13, average daily traffic volumes range from 12,000 to 22,000 vehicles, with the highest volumes occurring near Onley in Accomack County. Traffic volumes on US 13 Business are less than 4,000 vehicles per day. Traffic volumes are projected to increase by 2025 throughout Segment D2 by no more than 4,000 additional vehicles per day, and are not expected to increase at all on US 13 Business.



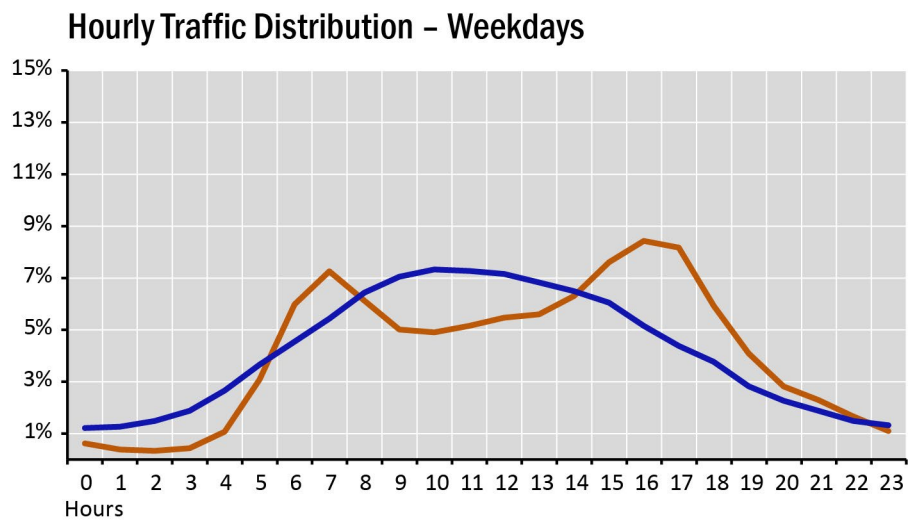


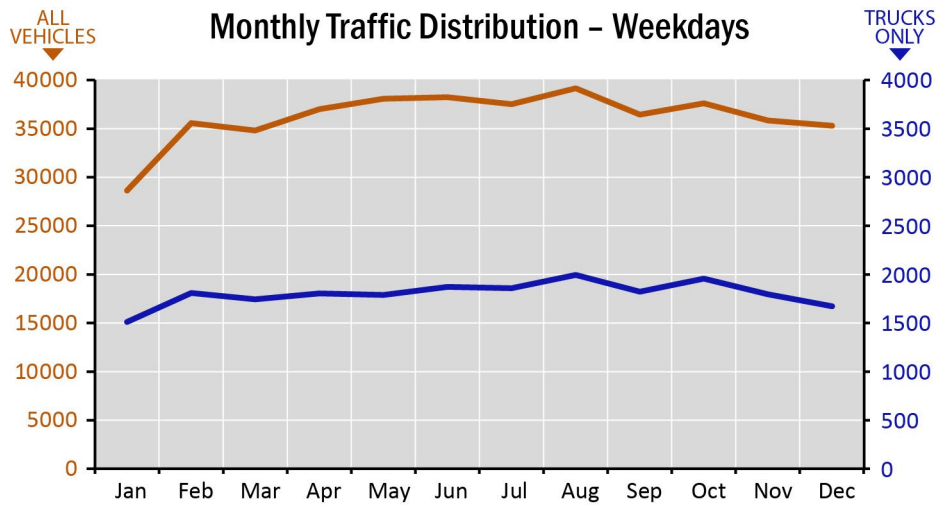


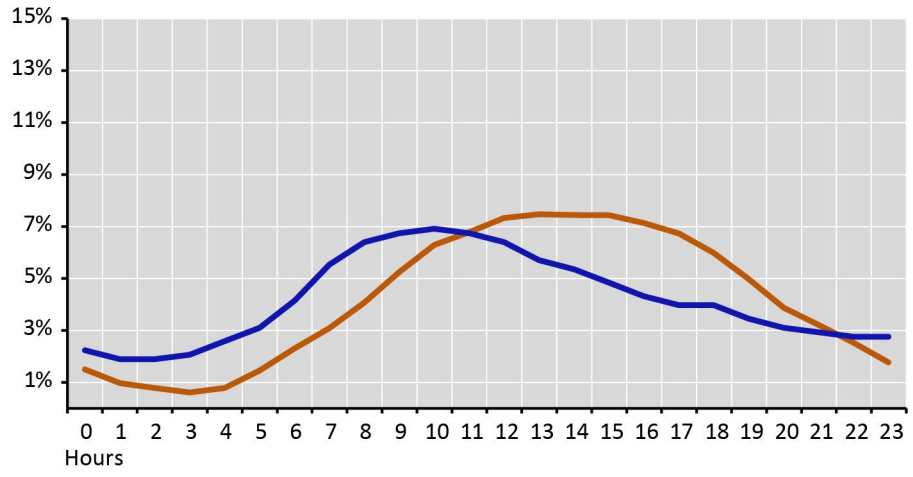


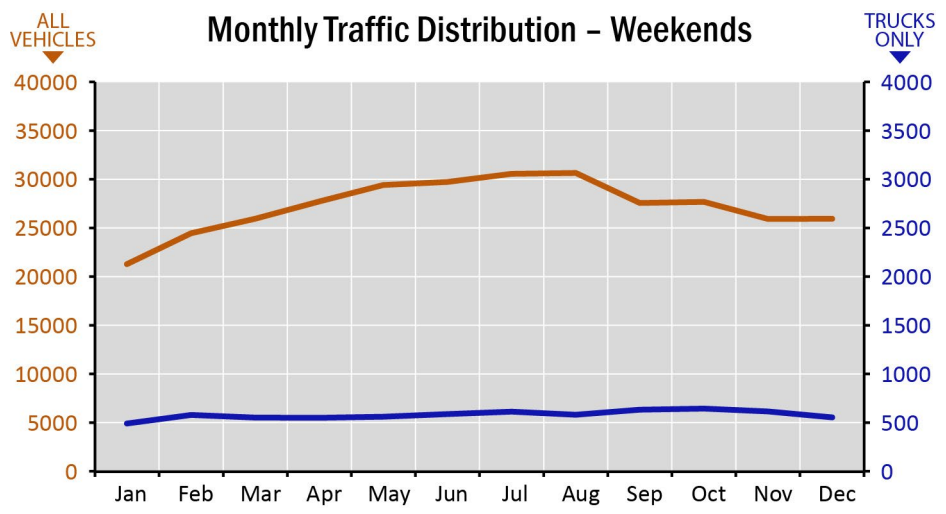
D2 SEGMENT PROFILE

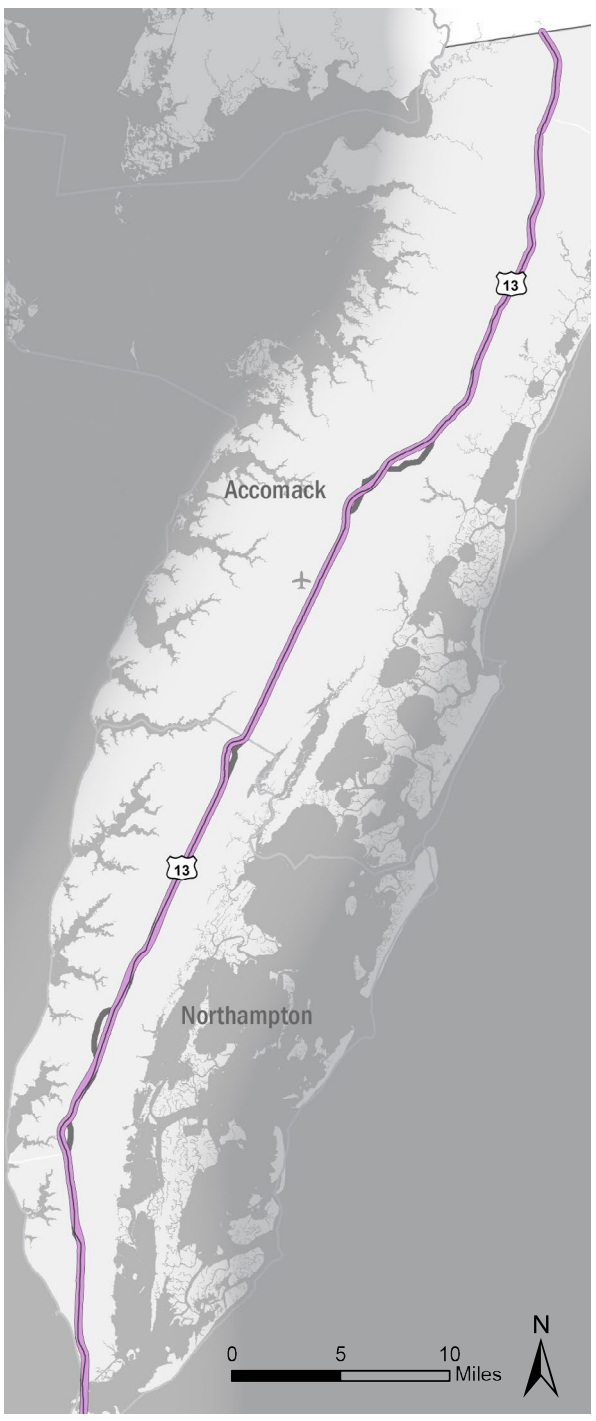
All Vehicles
Trucks











Traffic Distribution

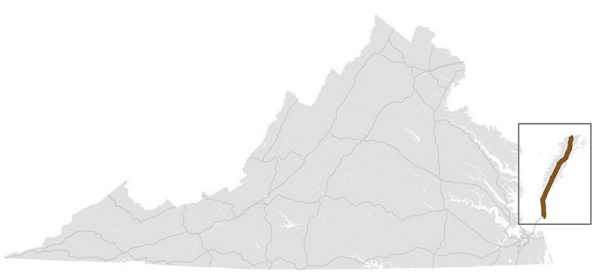
Traffic distribution counts were not available on Segment D2. All analysis therefore assumed the same time of day and annual distributions for all of Corridor D, even though these may not capture traffic patterns on Segment D2 with complete accuracy.

Truck Volumes

On Segment D2 in Northampton and Accomack Counties, heavy trucks comprise four percent of daily traffic.

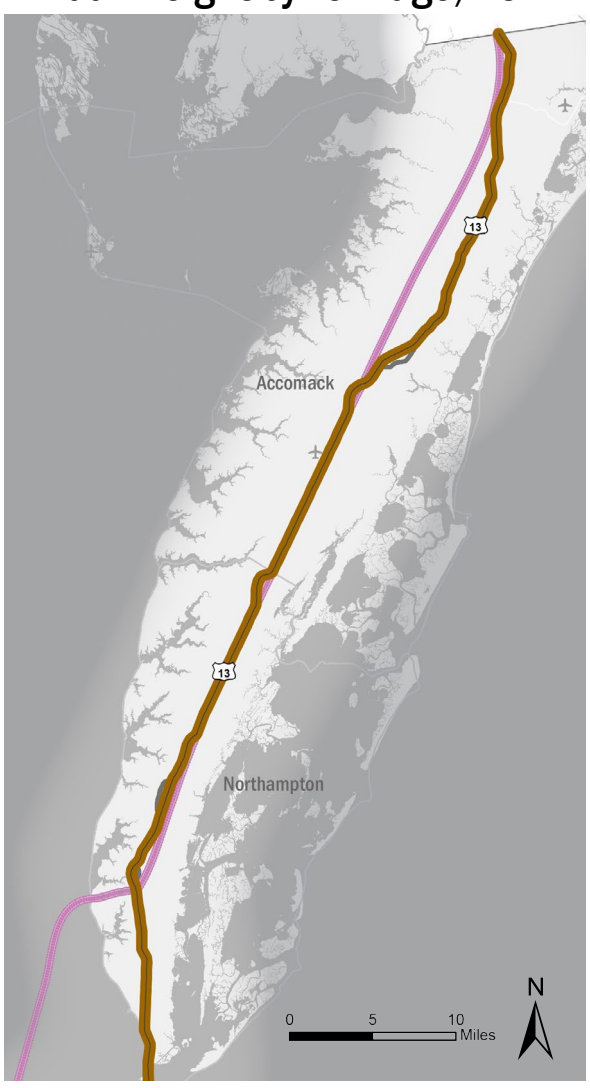
Percent Heavy Trucks

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



D2 SEGMENT PROFILE

Annual Freight by Tonnage, 2012

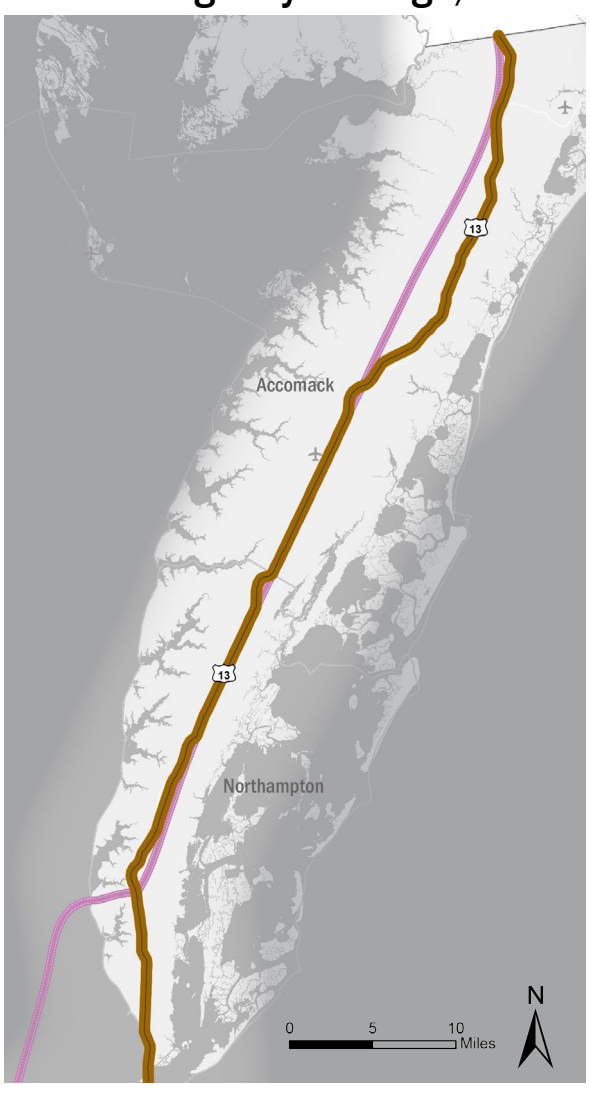


Freight Flows

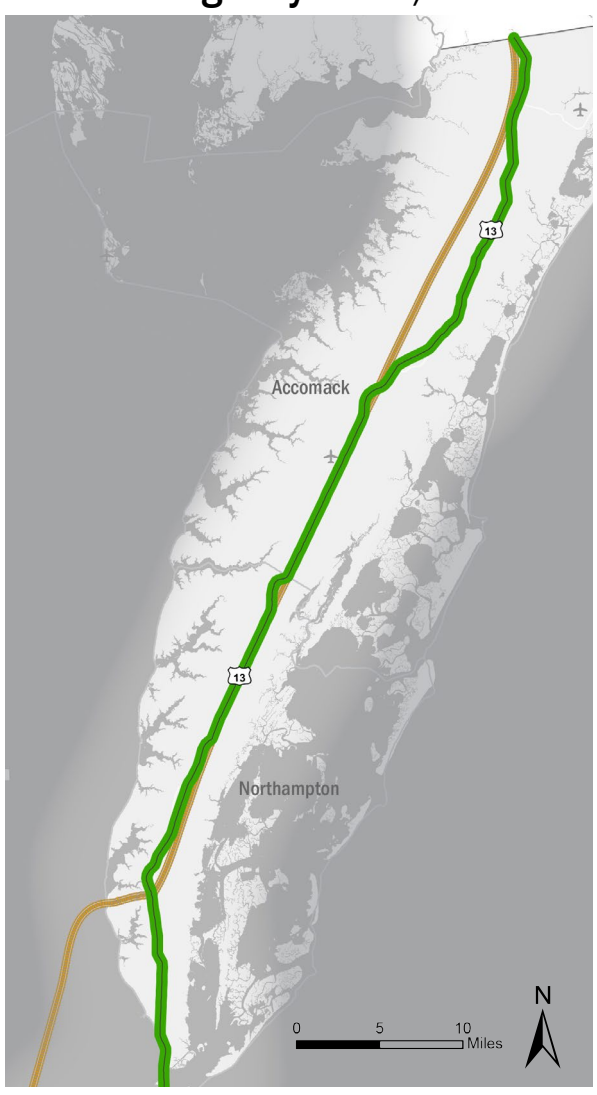
East of the Accomack County Airport in Segment D2, freight is moved primarily by truck in terms of tonnage and value. In total, 16.5 million tons (97 percent) of freight is moved through this section of Segment D2 by truck, compared to 490,000 tons (three percent) by rail. By value, $26 billion (98 percent) of freight value travels by truck, compared to $438 million (two percent) by rail. On average, a ton of freight traveling through this section of Segment D2 by truck is worth $1,582 while a ton of freight traveling by rail is worth $896. In 2025, both rail and truck freight tonnages and total values in this area of Segment D2 are expected to increase, and the percentage of the freight traveling by truck is expected to increase by both tonnage and value, to 97 percent and 99 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,618 and $833, respectively.

Within Segment D2 in the area south of the Maryland/Virginia border, freight is moved primarily by truck in terms of tonnage and value (as in the southern portion of the segment). In total, 17 million tons (97 percent) of freight is moved through this section of Segment D2 by truck, compared to 494,000 tons (three percent) by rail. By value, $27 billion (98 percent) of freight travels by truck, compared to $433 million (two percent) by rail. On average, a ton of freight traveling through this section of Segment D2 by truck is worth $1,586 while a ton of freight traveling by rail is worth $877. In 2025, both rail and truck freight tonnages and total values in this area of Segment D2 are expected to increase, and the percentage of the freight traveling by truck is expected to increase with regard to both tonnage and value to 97 percent and 99 percent, respectively. Freight value per ton on trucks and rail is expected to increase to $1,618 and $815, respectively.

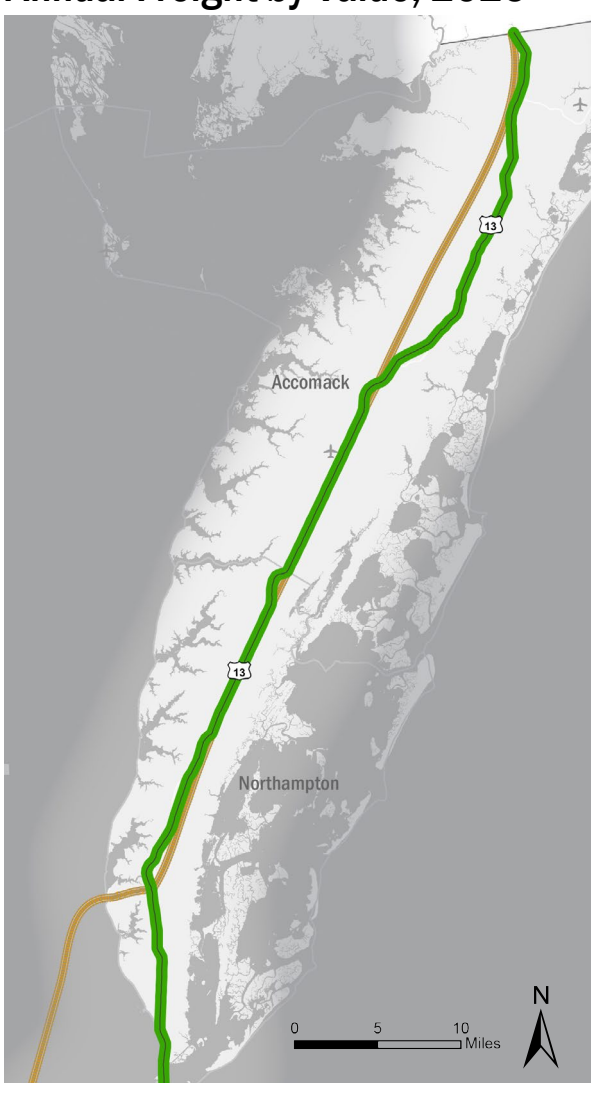
Annual Freight by Tonnage, 2025



Annual Freight by Value, 2012



Annual Freight by Value, 2025



Truck Freight (in tons)

- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Rail Freight (in tons)

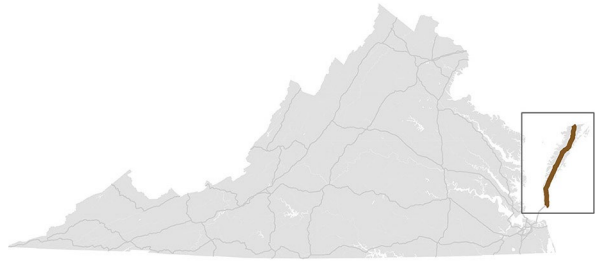
- < 10M
- 10M - 25M
- 25M - 50M
- 50M - 100M
- > 100M
- Primary facility

Truck Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility

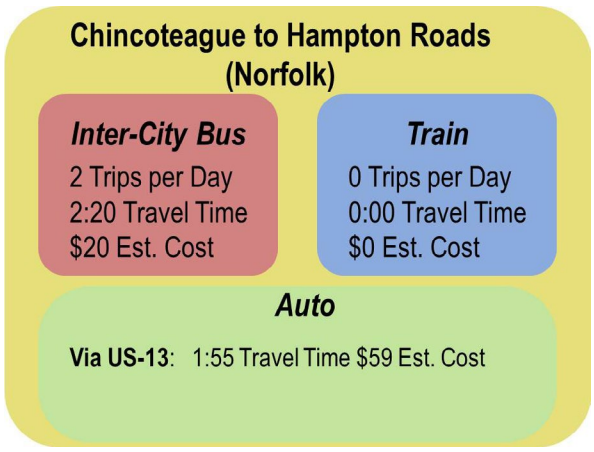
Rail Freight

- < $10B
- $10B - $50B
- $50B - $100B
- $100B - $200B
- > $200B
- Primary facility



Redundancy and Mode Choice

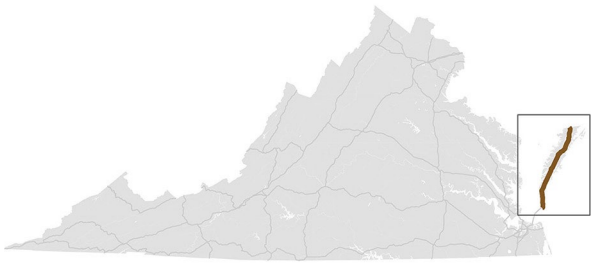
Comparable Travel Options



Passenger trips on Segment D2 of the Eastern Shore Corridor have few travel options, both in terms of travel path and mode choice. There are no parallel facilities to US 13 on the Eastern Shore that accommodate long distance travel. Based on the 2014 federal standard mileage rate of 56 cents per mile, trips to Hampton Roads from the Eastern Shore would be more expensive by automobile than by the other available modes, such as by bus. However, bus travel, offered by Greyhound at Exmore and Oak Hall, is limited by the frequency of service.

Park-and-Ride

Within Segment D2, commuters do not have access to any Park-and-Ride locations or service from HRT; however, STAR offers commuter bus service, which connects communities along the length of the Eastern Shore.



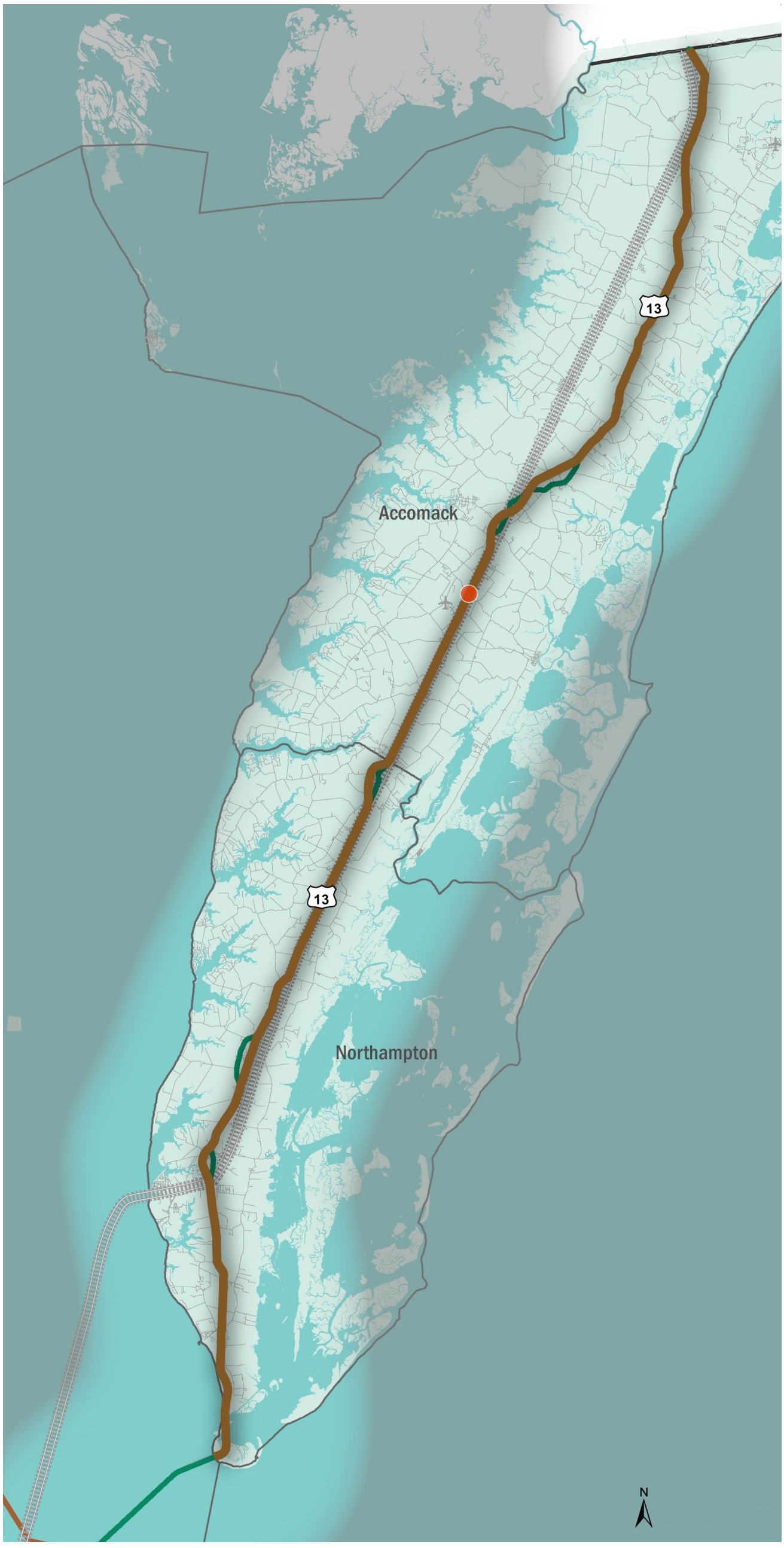
D2 SEGMENT NEEDS

Safety

Performance Metrics

Number of Severe Crashes	10
Severe Crashes/Million VMT	0.1
Number of Railroad Crashes	0

Between 2010 and 2012, ten severe crashes occurred on Segment D2. All of these crashes were located at the intersection of US 13 (Charles M Lankford Memorial Highway) and Main Street in the Town of Melfa.

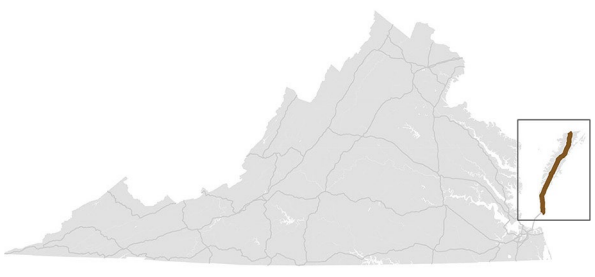


Fatality and Injury Crashes (2010 - 2012)

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

Railroad Incidents/Accidents per County (2011-2014)

#



D2 SEGMENT NEEDS

Congestion

Performance Metrics

Person Hours of Delay per Mile	9
Freight Ton Hours of Delay per Mile	8.8K

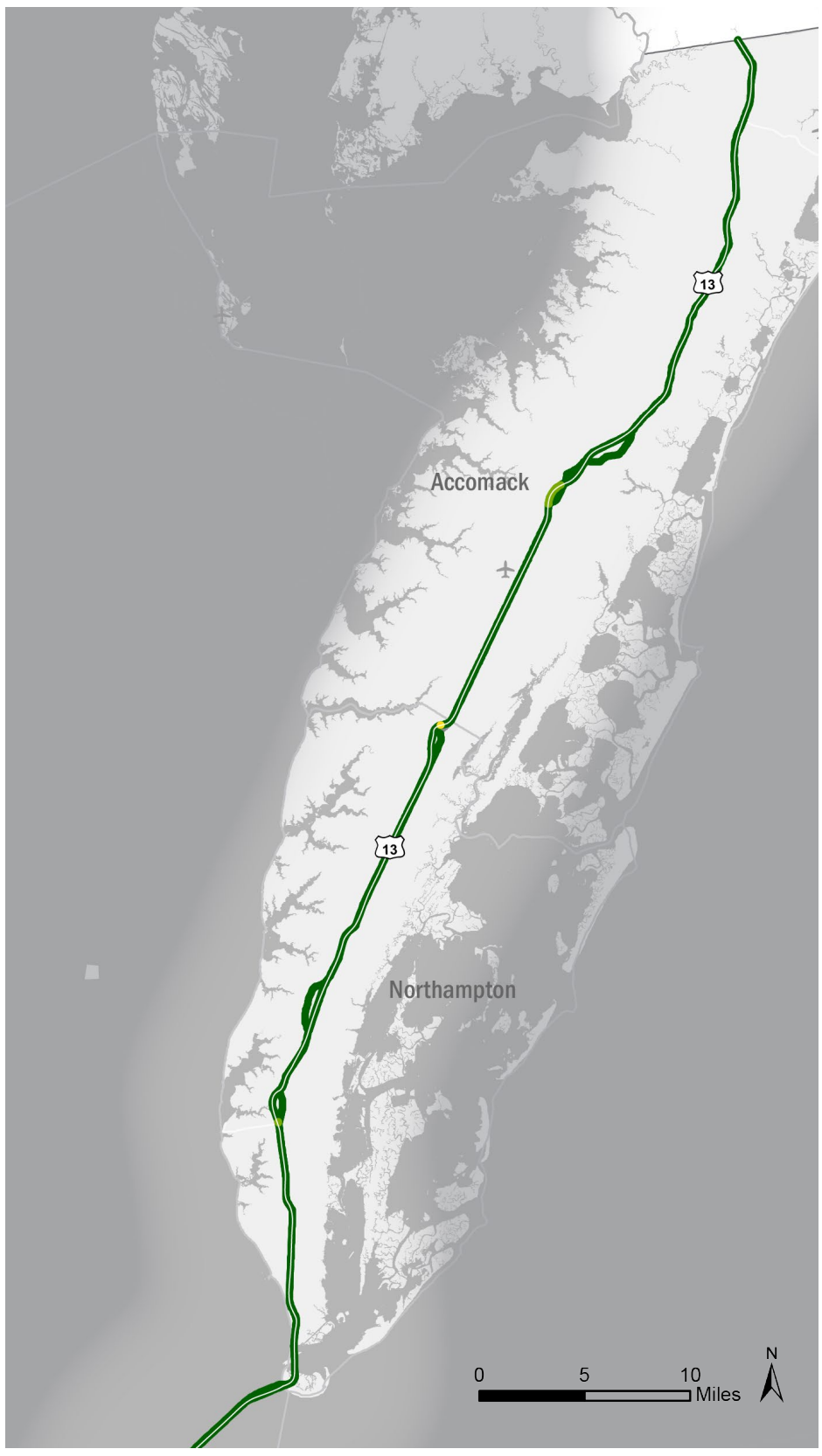
Passenger Delays

Passenger delays are generally minimal for Segment D2, with a daily passenger delay of just under 1,500 person-hours. The only area of significant passenger delay exceeding 100 person-hours per mile occurs on US 13 in Northampton County near Exmore. Peak-period passenger delays account for slightly less than half of the daily congestion on Segment D2, but still represent considerably more than the average peak-period share of congestion along CoSS segments.

Freight Delays

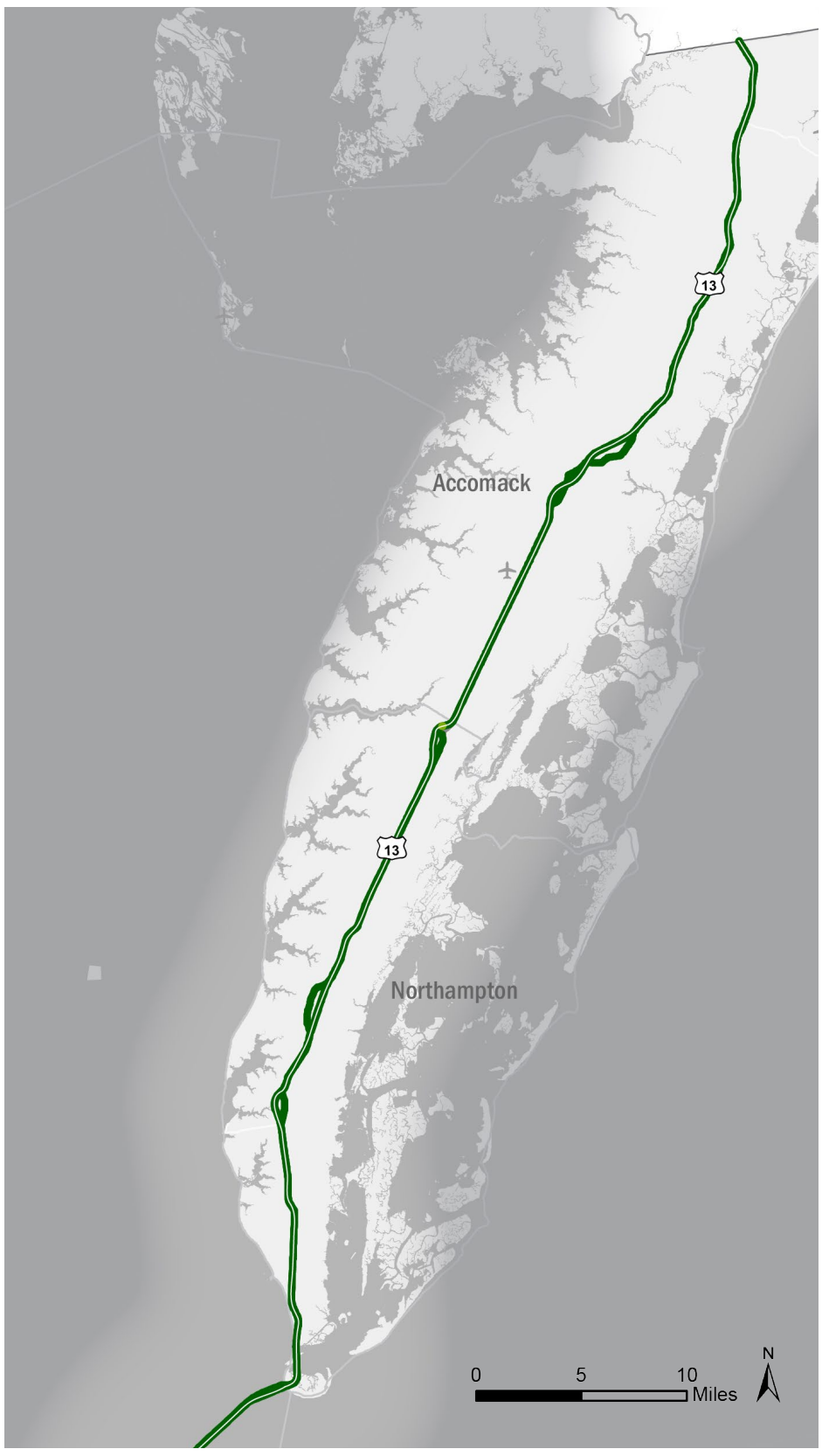
Similar to passenger delays, freight delays on Segment D2 are generally minimal with an average delay of less than 9,000 ton-hours per mile along the segment. As such, there are no locations of significant freight delay along Segment D2. Peak-period freight delays account for about 40 percent of daily congestion, which is somewhat higher than average for the peak-period share of congestion on CoSS segments.

Daily Person Hours of Delay Per Mile

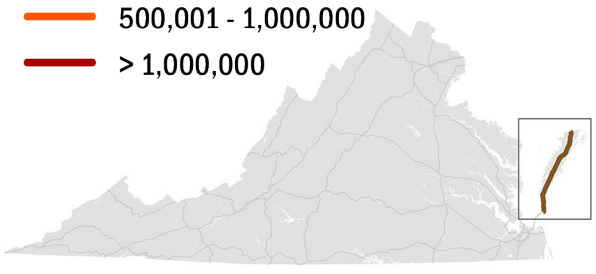


< 50
51 - 100
101 - 250
251 - 500
> 500

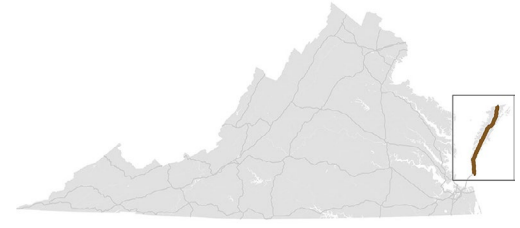
Daily Freight Ton Hours of Delay Per Mile



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



Reliability



Weekday Peak

Reliability of travel during the peak period on a typical weekday on Segment D2 ranges from 0.00 to 0.91 in terms of reliability index, with an average value of 0.10. The only area with a peak period reliability index exceeding the statewide threshold is on US 13 in Northampton County near Exmore.

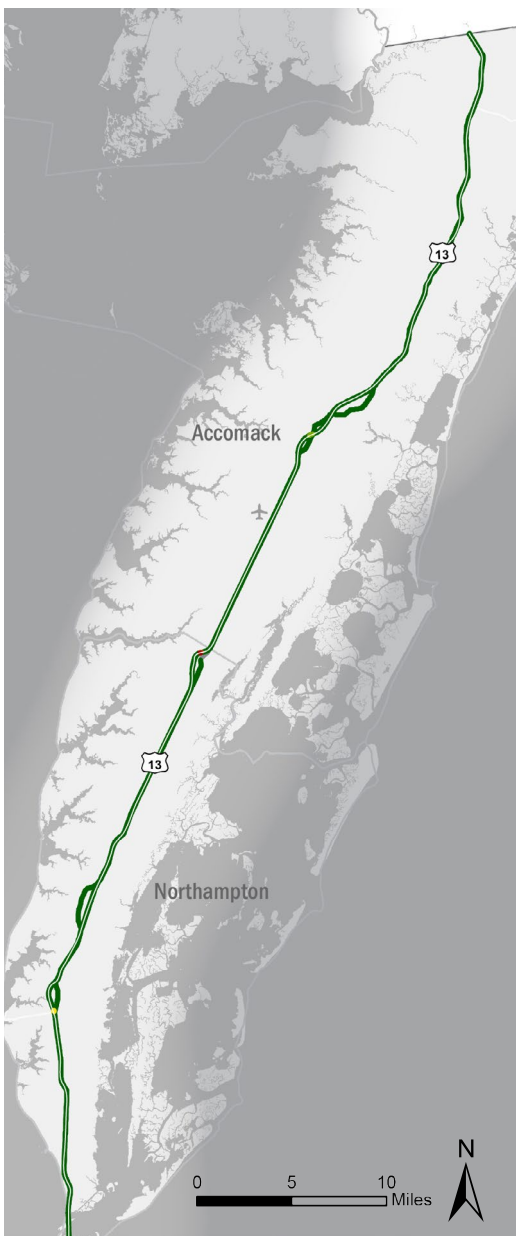
Weekday

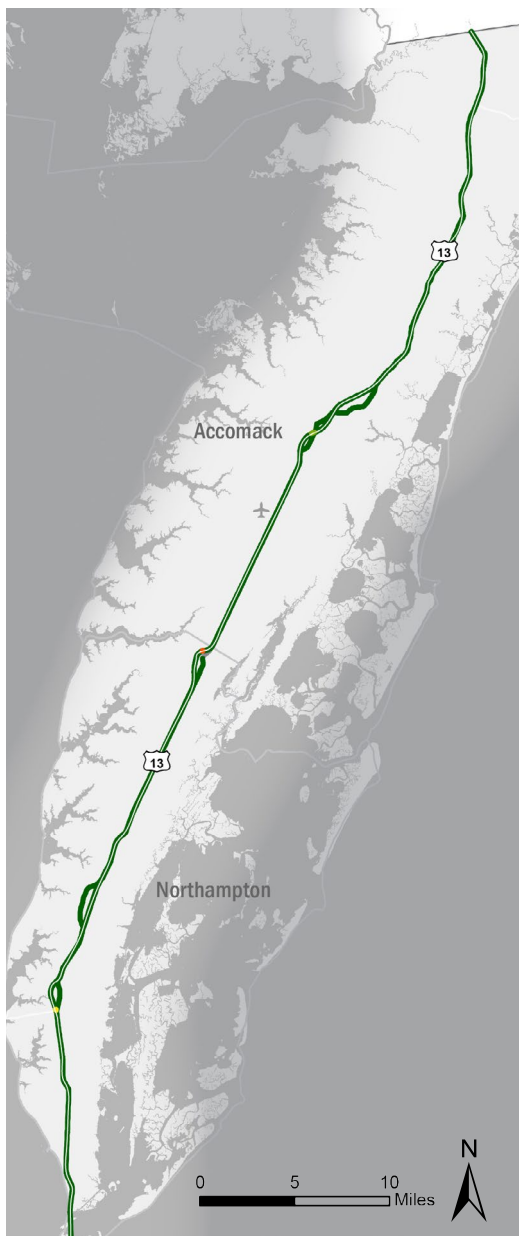
Reliability of travel during a typical weekday ranges from 0.00 to 0.69 in terms of reliability index, with an average value of 0.08. While the segment has a lower than average weekday reliability index compared to CoSS statewide, two locations on Segment D2 have reliability index values exceeding the statewide threshold:

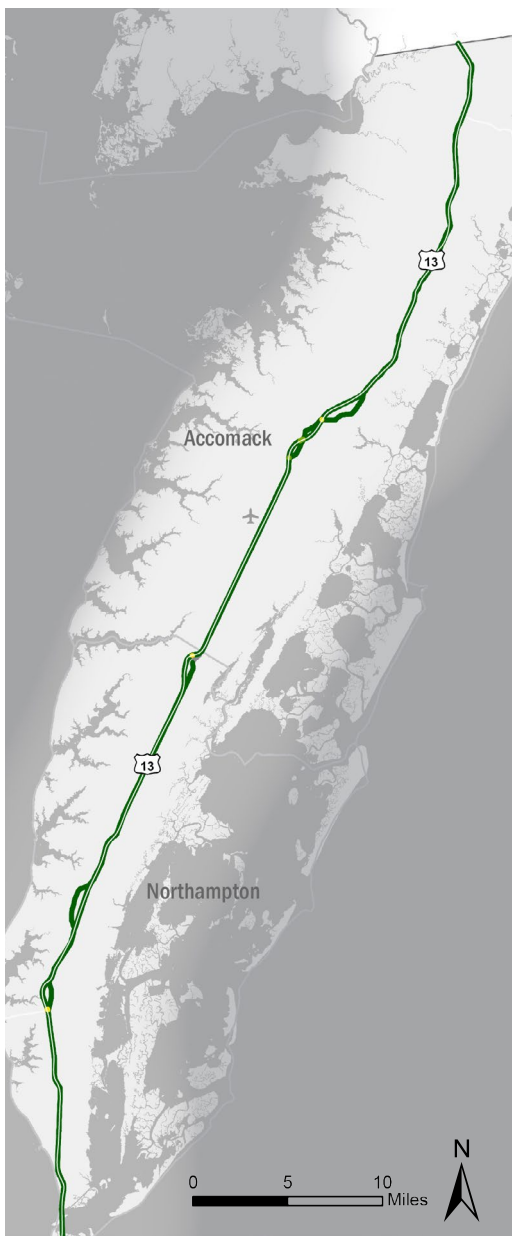
- US 13 in Northampton County near Exmore; and
- US 13 at Route 184 in Northampton County south of Cheriton.

Weekend

Reliability of travel during a typical weekend ranges from 0.00 to 0.48 in terms of reliability index, with an average value of 0.07. None of the locations along Segment D2 have reliability index values exceeding the statewide threshold.





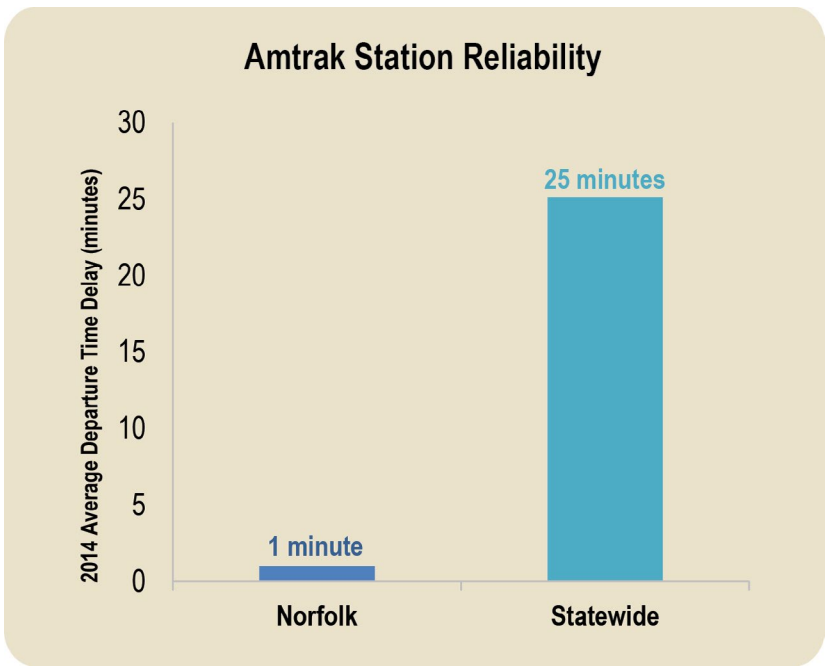


Reliability Index

< 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:

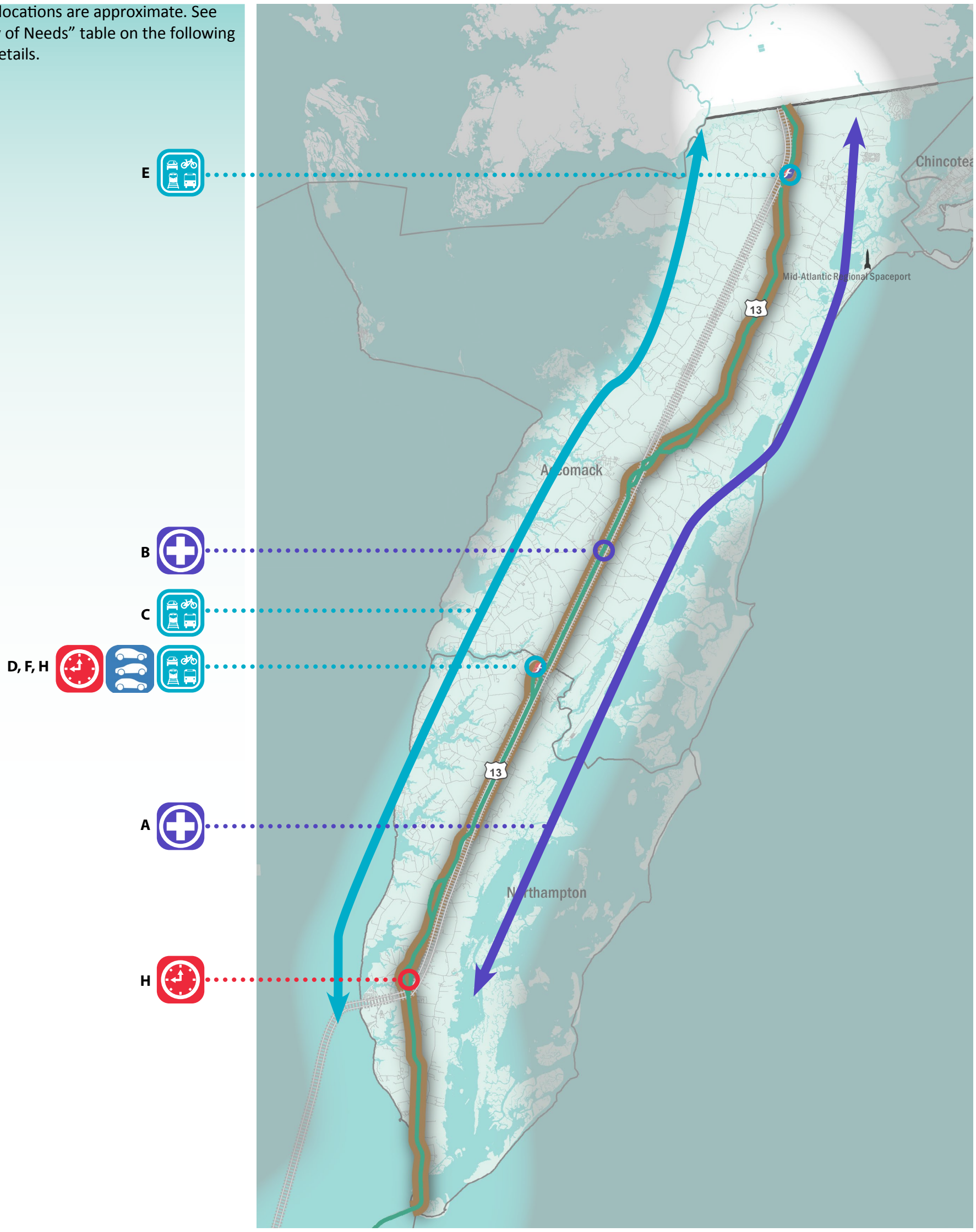
- Weekday Peak - 0.80
- Weekday - 0.40
- Weekend - 0.60

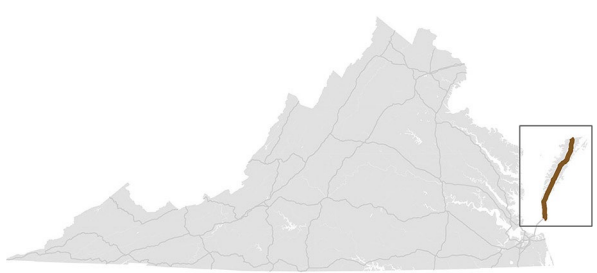


D2 SEGMENT NEEDS

Summary of Needs

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





Mode Choice | Redundancy | Safety | Congestion | Bottlenecks | Reliability

D2 SEGMENT NEEDS

Summary of Needs - D2 Segment

A.		**Safety concern along US 13 in Northampton and Accomack Counties related to numerous median crossovers**
B.		**US 13 at Main Street in Melfa: ten severe crashes**
C.		**No passenger rail exists in segment**
D.		**Bus service from Exmore to Hampton Roads is limited to twice per day**
E.		**Bus service from Oak Hall to Hampton Roads is limited to twice per day**
F.		**Congestion issue at US 13 and VA Route 178 (Belle Haven Road) in Exmore**
G.		**Reliability issue at US 13 and US 13 Business (South Bayside Road) south of Cheriton**
H.		**Reliability issue at US 13 and VA Route 178 (Belle Haven Road) in Exmore**