

# RAPPAHANNOCK-RAPIDAN REGIONAL MULTIMODAL FREIGHT STUDY

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## Project Analysis and Recommendations



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Prepared in cooperation with the U.S. Department of Transportation,  
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# **Rappahannock-Rapidan Regional Commission**

## **Multimodal Freight Study**

As part of its ongoing development of a Regional Long-Range Transportation Plan, the Rappahannock-Rapidan Regional Commission (RRRC) was awarded funding for a regional, multimodal freight study to assess the impacts of freight in and through the Rappahannock-Rapidan Region. The study examines the movement of freight by truck, rail and air originating, destined to, or passing through the region in order to identify strategies on how the region can best position itself to accommodate future freight growth while minimizing adverse impacts on the region's transportation system and environment. It also provides recommendations for future infrastructure investments and policies that enable the region's transportation system to continue to operate at the highest levels of efficiency and safety in the years ahead.

### **Why Study Freight?**

The overarching goal of transportation planning in the Rappahannock-Rapidan Region and the Commonwealth of Virginia is to provide for the effective, safe, and efficient movement of people and goods. While the importance of safe and efficient modes of passenger transportation – whether by road, rail or air – is self-evident, the ways in which freight transportation influences the quality of life of every resident, in addition to its impact on the overall economic wellbeing of the region, may not be as obvious. Some of reasons for studying regional freight transportation, which are explored in this report, include the following:

- Freight competes with passengers for limited capacity on roads, highways and rail. Freight traffic in the region is projected to increase significantly in the next 20 years, creating major impacts on regional transportation infrastructure. Without a comprehensive transportation planning process that includes the consideration of the needs of freight stakeholders from the federal, state and local level, quality of life for all residents in the region will be impacted by traffic congestion, safety problems and environmental decline.
- In the R-R Region, 41% of wages paid are from freight-related industries. These businesses are financially connected to the efficiency of the transportation system to move product and meet customers' needs. Maintaining or improving transportation system efficiency could create opportunities for growth and new jobs. Similarly, an efficient freight transportation network helps make the R-R Region an attractive place for new business. A forward-looking multimodal approach to freight planning may offer new economic development opportunities.

- In addition to the importance to freight-intensive industries, such as manufacturing and agriculture, efficient freight transportation systems can help to minimize the cost of consumer goods, benefiting consumers and the retail industry. Freight traveling through the R-R Region, which represents of the vast majority of total truck traffic, also contributes to the local economy, although in different ways. Trucks passing through the region utilize local fuel facilities, restaurants and hotels.
- While many aspects of freight planning reside at the federal and state levels, certain local decisions – most significantly those related to land use – can share in improving the efficiency of the local transportation network. Conversely, decisions made without a complete picture of freight’s role may have unintended negative consequences.

## Study Overview

This study includes several key elements that will help regional decision makers understand how freight fits into the overall regional planning framework.

- Freight Movement Profile
- Survey of Major Shippers
- Freight Infrastructure Profile
- Project Analysis and Recommendations
- Final Report

The *Freight Movement Profile* provides a baseline understanding of the current movement of freight to, from, and through the region. In many ways, this is the “demand” portion of the study where current patterns and future trends are analyzed and presented to help “tell the story” of regional goods movement. Topics covered include the variety of data sources for freight data, the types of freight moved and how that can be expected to change in coming years.

The *Survey of Major Shippers* summarizes locally collected information from regionally significant shippers who produce or consume large quantities of commodities. One goal of this survey is to identify more specific information from these shippers regarding what they ship, how they ship it, how that will be changing and their perspectives regarding local freight issues and opportunities. It is expected that this survey will also open a long-term dialog with these shippers so that their insights can help inform transportation planning decisions in the years ahead.

The *Freight Infrastructure Profile* captures the “supply” side of the study. It provides inventories and analyses of nationally and regionally significant freight infrastructure, how it is utilized or under-utilized, and helps set the stage for identifying critical gaps, deficiencies and opportunities.

*Project Analysis and Recommendations* takes the findings from the first three tasks and explores options to solve current freight deficiencies, to plan for future issues and to lay out options that will shape future strategic investments. In this report, the relationships between land use, transportation and investments are explored and a case is presented for making strategic policies and investments that will improve the goods movement capabilities of local employers, the economic competitiveness of the region and the overall quality of life of its residents.

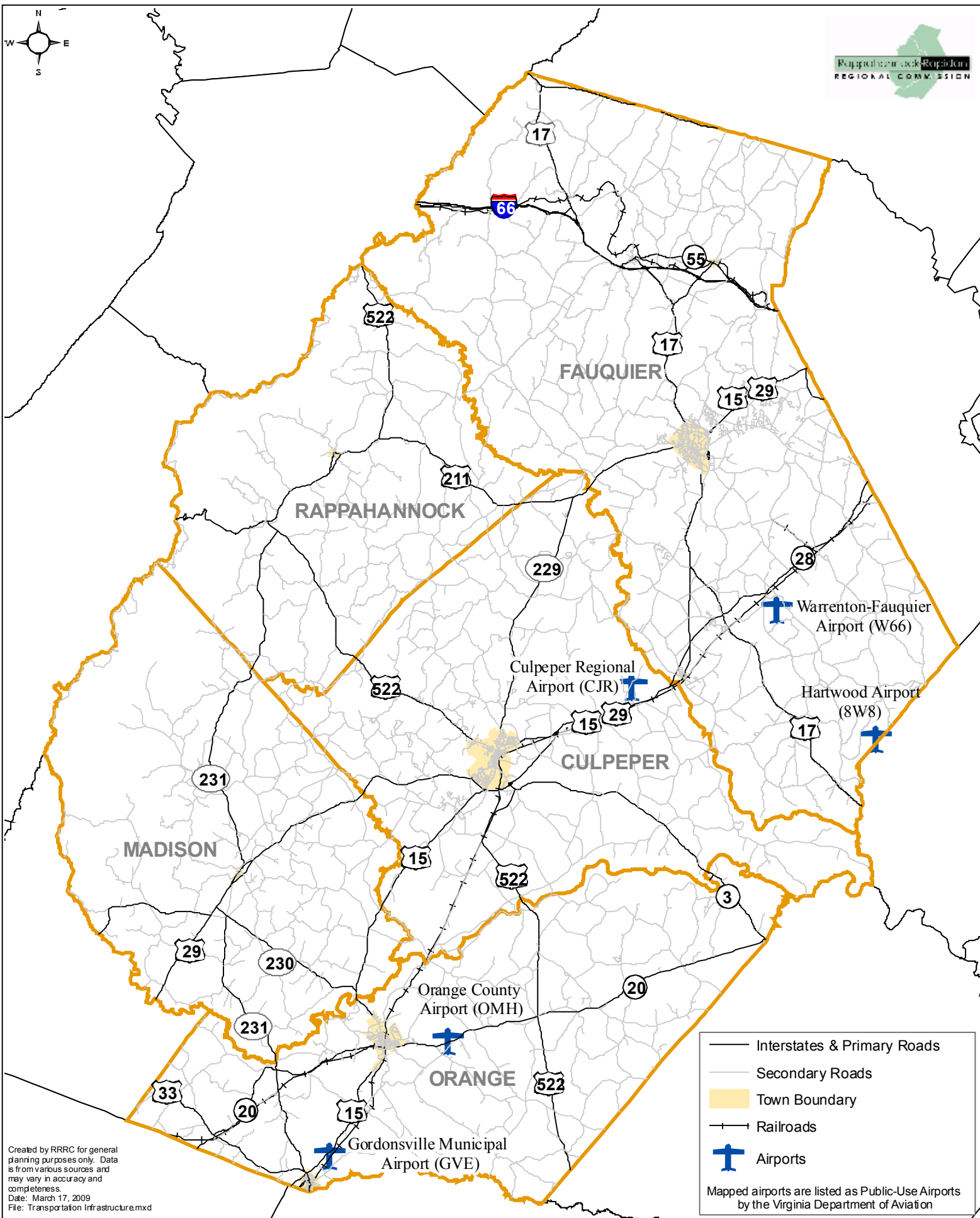
Together these four elements comprise the *Final Report*, which is intended to help inform the development of the region’s long-range transportation plan and ensure freight-related issues are addressed and weighted appropriately in the analysis of projects – an important step in informing decision makers of the tradeoffs between various modes and investment strategies.

## **Summary of Data Collected**

### **Freight Infrastructure Profile**

A profile of regionally significant freight infrastructure was prepared by Whitehouse Group, Inc. as part of this study. This profile includes freight modes of truck, rail and air, and notes the absence of intermodal facilities in the region. The report assesses roadway and rail capacity, identifies deficiencies, and suggests additional opportunities for freight enhancement in the region. The full *Freight Infrastructure Profile* can be found at <http://www.rrregion.org/publications>.

# Existing Transportation Infrastructure in the Rappahannock-Rapidan Region



Created by RRRRC for general planning purposes only. Data is from various sources and may vary in accuracy and completeness.  
 Date: March 17, 2009  
 File: Transportation Infrastructure.mxd

## Roadways

The *Infrastructure Profile* identifies the roadways in the R-R Region designated in the U.S. Department of Transportation's Freight Analysis Framework (FAF) as having strategic importance at the state and federal level. These include I-66, US 29, US 522, US 17, US 211, VA 3, VA 28, VA 20, US 15, US 33 and a portion of VA 231. Of these, Virginia's Commonwealth Transportation Board has designated I-66, US 17 and US 29 (Seminole Corridor) as corridors of statewide significance.

Hot spots and capacity deficiencies were identified through field observation, and a general Level of Service (LOS) analysis using existing data. As expected, the hotspots coincide with VDOT's Roadway System Deficiencies, documented in the Regional Long Range Transportation Plan. Most of the hotspots occur at major intersections along US 29, at the US 17 and I-66 interchange, and in the downtown areas of Culpeper, Gordonsville and Warrenton. LOS analysis parallels these conclusions, showing the most impaired roadway segments, in terms of congestion, in the towns of Warrenton and Culpeper and in Fauquier County.

Another gauge of highway system efficiency is existence of freight bottlenecks, as defined by the Statewide Multimodal Freight Study. Bottlenecks – whether existing or emerging – prohibit the efficient flow of freight through the system and across the Commonwealth. Bottlenecks are created by a combination of a demand to utilize a transportation asset, the capacity of the asset, and fluctuations in the demand at different points in time. The road system of the entire urbanized region of Northern Virginia, including most of Fauquier County, is identified as a freight bottleneck. Key projects, already planned or underway, will address some of the hotspots and bottlenecks in the Rappahannock-Rapidan Region. These include the most-recent Route 29 Corridor Study and improvements to the US 29/US 17 Interchange at Opal.

The *Infrastructure Profile* noted a lack of rest stops and truck service areas in the region. Trucks take advantage of the limited number of stations offering diesel fuel along the primary highways, and trucks making left turns in and out of some of these stations, notably along US 29 in Fauquier County, have been observed to block north-bound and south-bound lanes to access a station on the opposite side of their travel lane. As traffic volumes increase on the primary roads, this will present greater safety and congestion problems.

Also of note in the Profile, U.S. 29, from I-64 to I-66, is a designated Radioactive Hazardous Materials (RAM) Preferred Route, as identified in the Federal Motor Carrier Safety Administration Hazmat Route Registry.

## **Railways**

Norfolk Southern (NS) is the primary freight rail service in the region. The NS Virginia north-south main line parallels US 15 through Orange and Culpeper Counties, and US 28 through Fauquier County. This line is part of the Crescent Corridor, which runs from Memphis and New Orleans to New Jersey. A connecting NS rail line, which passes through Fauquier County, operates between Manassas and the Virginia Inland Port in Front Royal, connecting with the western route of the Crescent Corridor, which runs north to Harrisburg and south to Roanoke and Memphis. Buckingham Branch Railroad (BB) receives rail cars from NS in Orange County as part of its service between Richmond and Clifton Forge. The BB track in Orange County is owned by NS and leased to CSX, which subleases to the BB.

The railroad interfaces with roadways through multiple stations, sidings and railroad/traffic crossings in the region. Currently, there are no operating intermodal shipping facilities in the five-county region.

Amtrak operates passenger service over the same NS rail tracks that handle freight on the Crescent Corridor. Virginia Rail Express (VRE) operates passenger service between Washington, D.C and Manassas, with plans to extend service to Haymarket.

## **Airports**

The Rappahannock-Rapidan Region has four general aviation airports licensed for public use: Culpeper Regional (CJR), Warrenton-Fauquier (W66), Orange County (OMH) and Gordonsville Municipal (GVE). The nearest commercial airports are Dulles International and Charlottesville-Albemarle County. (Note: Culpeper County is currently conducting an Airport Master Plan update. Further study will be done to document airport development plans and potential for airfreight activity.)

## **Summary Freight Movement Profile**

The *Freight Quantitative Profile*, also prepared by Whitehouse Group Inc., provides a baseline understanding of the current movement of freight to, from and through the region, by truck, rail and air. It also presents data on freight movement projections up to the year 2035. Topics covered in the profile include the data sources for freight analysis, the types of freight moved, how that mix is expected to change in coming years, and the relationship between freight and the regional economy. The full report can be found at <http://www.rrregion.org/publications>.

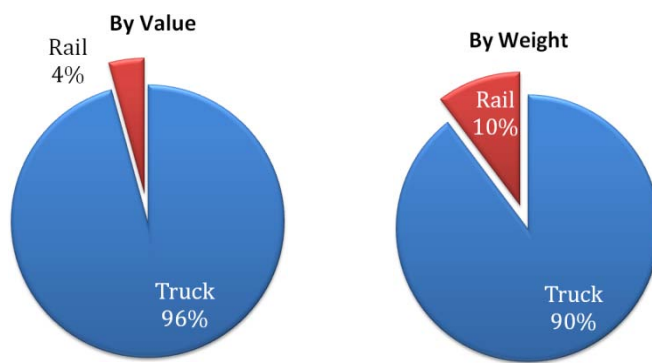
Approximately 96.5 percent of the freight tonnage that utilizes the region’s transportation infrastructure passes through the region, while 2.1 percent originates in the region and 1.4 percent terminates in the region.

### Mode of Transportation

For freight originating within the region, about 93% of tonnage is transported by truck, with most of the rest moving by rail. Airfreight constitutes less than 1% of locally generated freight. When measured by dollar value, rail is responsible for only 0.2% of freight originating in the region.

Rail represents a slightly higher percentage of freight destined for the region: 10% by weight and 4% by value.

**2004 Freight Destined for Region by Mode**



Source: Global Insight  
 Note: Airfreight represents less than 1% of total

### Commodities

In 2004, businesses in the region generated about 480,000 truckloads of freight. The top five commodities, by ton, were non-metallic materials, secondary traffic (defined as a mix of commodities that involve warehouse and distribution activities), lumber/wood products, farm products, and clay/concrete/glass/stone. When ranked by value, secondary traffic was first.

**2004 Top Commodities Originating within the Region by Weight**

Rank	Commodity	Tons	% of Total
1 <sup>st</sup>	Non-Metallic Materials	2,645,333	40.1
2 <sup>nd</sup>	Secondary Traffic	1,155,816	17.5
3 <sup>rd</sup>	Lumber or Wood Products	830,052	12.6
4 <sup>th</sup>	Farm Products	682,944	10.4
5 <sup>th</sup>	Clay, Concrete, Glass or Stone	358,016	5.4

(Source: Global Insight,)

### 2004 Top Commodities Originating within the Region by Value

Rank	Commodity	Value	% of Total
1 <sup>st</sup>	Secondary Traffic	\$7,516,223,960	44.1
2 <sup>nd</sup>	Transportation Equipment	\$3,783,988,991	22.2
3 <sup>rd</sup>	Machinery	\$3,215,328,636	18.9
4 <sup>th</sup>	Electrical Equipment	\$841,532,913	4.9
5 <sup>th</sup>	Farm Products	\$461,526,026	2.7

(Source: Global Insight)

### Projected Increases in Freight Volume

TRANSEARCH data analysis projects that the volume of freight moving through the region, measured in tonnage, will triple between 2004 and 2035, while the dollar values will more than quadruple.

### Survey of Major Shippers

As part of this study, RRRRC conducted a survey of major employers in the region to help better understand infrastructure and transit needs from the perspective of businesses dependent on the regional transportation network. While the majority of respondents indicated that they are satisfied with local roads, certain freight-intensive businesses commented that a more open and complete four-lane secondary arterial system would improve their access to the interstate highways. Specifically, routes 3, 15, 20, and 522 were mentioned as important freight routes in the southern part of the region.

Gordonsville was mentioned as a bottleneck for trucks traveling from the southern part of the region to Interstates 64 and 95. A bypass, already proposed by Orange County, was suggested. Respondents to the survey also mentioned the need to limit access on Route 29 and provide for more efficient rail access. The Employer Survey Report can be found at <http://www.rregion.org/publications>.

# Analysis and Conclusions

## Adequacy of Transportation Infrastructure

### Regional Highway Capacity

Based on the Level of Service analysis and survey of local businesses, the highway infrastructure in most of the region is adequate to meet the current and projected capacity needs through 2035. However, there are bottlenecks in the northern part of Fauquier County, the Route 17/29 intersection near Opal, and downtown areas of the towns of Culpeper, Warrenton, Orange and Gordonsville.

Most of these hotspots, which occur in the northern part of Fauquier County and at the US 17/US 29 intersection near Opal, are the result of congestion, which affects passenger vehicles as well as freight. While trucks account for about eight percent of total traffic on most of the affected road segments, US 17 through Fauquier County currently has about 10% truck traffic. Both US 17 and US 29 are important freight alternatives to I-64 and I-95 between the Port of Virginia and Washington D.C.

Without highway bypasses, the Towns of Gordonsville and Orange experience significant through truck traffic on routes 15, 20 and 33. A bypass for Gordonsville has been proposed by Orange County. With no state-operated rest stops in the region and limited private facilities that offer diesel and accommodate truck parking, congestion in all of the towns is made worse by larger trucks entering for fuel, food and rest when these amenities are not available on the arterial highways.

### Future Capacity Problems

US 17 is not currently over capacity on any segment, however, by 2035 it is projected that this primary road will be overcapacity on the segments that coincide with US 29 and I-66 through Fauquier County. Most of I-66 through Fauquier County is expected to be overcapacity by 2035. The planned interchange and realignment of US 17 with US 29 near Opal will alleviate capacity issues at that location. Other strategies include improved transit along the corridor to reduce the volume of passenger vehicles.

Other highway segments projected to be unacceptably overcapacity by 2035 are US 29 north of Warrenton and US 211 in Fauquier County.

Recommendations for addressing congestion can be found in the Rappahannock-Rapidan Congestion Management Plan (May 2008) and the Regional Long-range Transportation Plan (Draft, December 2009), both of which can found at <http://www.rregion.org/publications>.

### Adequacy of Rail Infrastructure

The Norfolk Southern rail line through the region has adequate capacity, without improvements, to handle current freight and the projected increase in the number and length of trains proposed by NS as part of the Crescent Corridor service. A major freight bottleneck occurs just northeast of Fauquier County in the Gainesville area.

Beginning in 2013, NS plans to operate an additional six to eight freight trains each day along the rail line that runs through the Region. Each train may be up to 8,000 feet long with double-stack container cars, operating at speeds up to 60 miles per hour. This increase in train traffic presents potential safety and traffic issues at the at-grade public road crossings in the Region, as well as for many private roads and driveways.

The projected increase in freight has implications for the capacity of the rail line to carry additional passenger trains, as proposed by other state plans. The Route 29 Corridor Study recommends double-tracking the NS line that traverses the region in order to add additional capacity for Amtrak and VRE.

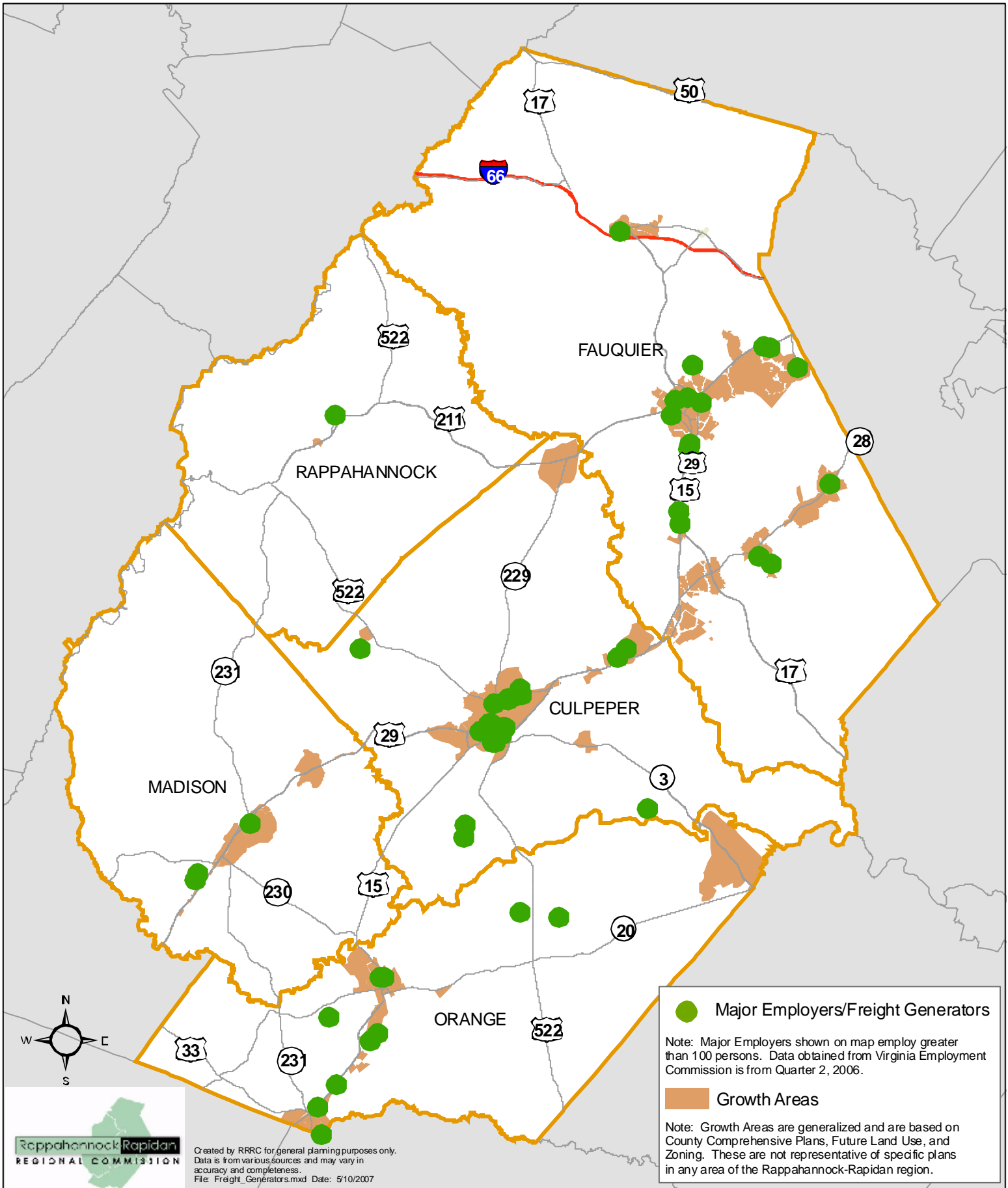
### **Land Use and Zoning Policy**

The counties and towns of the Rappahannock-Rapidan Region, in accordance with Virginia Law, have each adopted Comprehensive Plans and land use ordinances that seek to direct the majority of new housing and retail, commercial and industrial growth to designated village centers or service districts. The growth nodes are existing communities or other defined areas that are well-served by existing roadway and other transportation infrastructure. A major goal of land use planning across the region is to preserve the area's prime agricultural, forested, and open space lands, in addition to water bodies and other ecologically sensitive areas. Directing residential growth into established villages and other nodes will locate the growing traffic on and around roads best able to handle it. Similarly, industrial and commercial growth is directed to locations along major roads and in proximity to other transportation infrastructure, such as regional airports and rail lines, where freight traffic can have unimpeded access to major inter-regional and interstate arterials, and the least impact on local traffic.

The map identifies the growth areas designated by local governments in the R-R Region, and the locations of the largest employers, which also indicate many of the largest freight generators.

# Major Employers, Freight & Trip Generators in the Rappahannock-Rapidan Region

As Identified by the RRRRC Rural Transportation Technical Committee



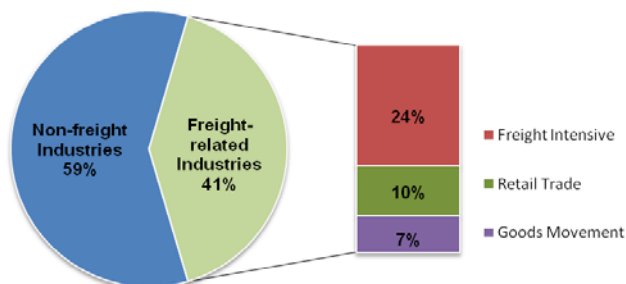
Land use conservation easements and historic designations also have potential consequences for highway and rail expansion, if designations make it difficult to secure right-of-way for additional tracks or lanes.

## Freight and Economic Development

Freight-reliant industry is an important part of the economy of the Rappahannock-Rapidan Region, responsible for 41 percent of the wages paid in the Region in 2008. Freight-intensive industries – such as agriculture, food products, construction, wood and paper, machinery and mineral extraction – account for the largest portion of these wages. For these businesses, efficient flow of freight keeps expenses down

and can result in new jobs. For retail trades, efficient movement of goods can keep consumer prices down.

**Wages Paid by Industry Type  
Rappahannock-Rapidan Region 2008**



Source: Virginia Employment Commission

Strategic multimodal infrastructure also offers new economic development opportunities. Such opportunities may arise from the availability of appropriately zoned locations, with rail access points, for freight-intensive business, or development of multimodal facilities.

According to the Port of Virginia, containerized cargo is expected to increase 350 percent between 2005 and 2035, due in part to expanded port capacity and opening of a third series of locks in the Panama Canal. Container traffic from the Port of Virginia will increase need for distribution centers and warehouses (Statewide Freight Study.) Since 1996, port-related warehousing and distribution investment has increased by over \$416 million and employed over 12,000 people in the Hampton Roads area alone. The Virginia Inland Port, located in Front Royal Virginia, has stimulated the attraction of some 24 warehousing and distribution centers providing a total income of \$599 million with over 6 million square feet of space together with employee levels of over 7,000 workers. The use of rail is a significant part of the Port of Virginia plan to enhance the efficiency and cost effectiveness of shipping.

## **State-level Transportation Studies**

The primary roads that traverse the Rappahannock-Rapidan Region have strategic significance for freight flow on both the state and federal level and are included in the U.S. Department of Transportation's Freight Analysis Framework. More than 96 percent of freight traffic utilizing the Region's primary roads, I-66, and the Norfolk Southern rail line is traveling through the region, while less than four percent originates or terminates in the region. The condition and future of these transportation assets are subjects of multiple statewide studies.

### VTRANS 2035

VTrans2035, which is an update of the Commonwealth of Virginia's statewide 20-year long-range multi-modal transportation plan, is being developed by the Office of Intermodal Planning and Investment in partnership with the the four state transportation modal agencies - Department of Aviation (DOAV), Department of Rail and Public Transportation (VDRPT), Port Authority (VPA), and the Department of Transportation (VDOT). The Federal Highway Administration and regional planning bodies across the state are also participating in its development. The stated goal of this long-range comprehensive planning process is to create a safer, more integrated, and efficient transportation network, which is indispensable to the continued economic vitality of Virginia.

### Statewide Multimodal Freight Study

Virginia's Office of Intermodal Planning and Investment is also in the process of finalizing Phase II of a Statewide Multimodal Freight Study. This study, in conjunction with Phase I, will address project planning for critical corridors and metropolitan sub-regions and offer analysis and recommendations on organizational, funding, regulation and other priority issues. The study will also identify highway improvements to reduce bottlenecks in high-congestion areas, on national through-travel corridors, or intersections of major interstate highways. It will evaluate alternative policy and infrastructure investment scenarios to guide future resource allocation.

### Route 29 Corridor Study

The Route 29 Corridor Study, initiated by the Commonwealth Transportation Board, is a multimodal transportation study covering the length of this corridor from the Virginia/North Carolina line to Interstate 66 at Gainesville. The study's focus is to develop a planning framework for the full corridor, identifying transportation and land use issues, concerns and potential changes around which to build a corridor-wide consensus. As a multimodal project, the study includes transit along the corridor and the Norfolk-Southern Railroad line that parallels much of Route 29. Follow-on activities will assess and develop high-level recommendations of the study on a local level.

### Rural Regional Long-range Transportation Plan

Virginia Department of Transportation (VDOT) is working with 20 planning district commissions, including RRRC, to evaluate the state's rural transportation system and to recommend a range of transportation improvements that best satisfy existing and future needs. This effort will result in regional plans that identify needs based upon goals and objectives established by each region. These rural-focused plans will complement the transportation plans that currently exist for metropolitan areas of Virginia, and will be incorporated in development of the State Highway Plan.

The State-level Studies' recommendations and subsequent action may affect local jurisdictions within the Rappahannock-Rapidan Region in several ways:

- Bottlenecks and hotspots that impede through traffic flow have an equal or greater effect on local freight and passenger travel. Priority setting based on state-level studies may influence scheduling of improvements to the primary and secondary arterials through the region, including I-66, US 29, US 522, US 17, US 15, US 211, VA 3, VA 28, VA 20, and VA 231.
- State-level projects, and even federal-level projects, may impact the future volume of freight traffic through the region, both by truck and by rail, impacting local congestion, safety, noise and air quality and the need for supporting facilities, such as service stations. An example of this effect was seen in the increased truck traffic on US 17 in Fauquier County during work on the 'Springfield mixing bowl' interchange. It should be noted that the results of corridor-level or statewide transportation changes could decrease as well as increase local freight traffic volumes, and although some impacts can be negative, some changes could offer economic opportunity.
- Transportation projects outside of the Rappahannock-Rapidan Region can have an impact on local freight-related industry. Again, this impact could be positive or negative, depending on whether the projects make transportation routes more or less efficient from a local perspective.

Although many final decisions about recommendations from these studies lie with state authorities, it is important for local governments in the region to become familiar with the studies and monitor consequent action in order to provide input and incorporate anticipated traffic changes into local and regional planning. It is also important to recognize that statewide freight studies are usually limited to mobility on state roads and do not address freight access on a local level. It is up to town and county governments to plan, monitor and facilitate the efficient movement of goods on local roads.

## Recommendations and Strategies

1. Roadway deficiencies, as identified in the Regional Long-range Plan, should take into account the effect on truck traffic as well as passenger traffic. Deficiencies specific to accommodation of truck traffic should be identified as such.
2. Safety of railroad crossings should be studied further in light of Norfolk Southern planned service expansion. Local governments should maintain communication with NS to anticipate future changes that will affect local traffic.
3. The potential for expanded airfreight through regional airports should be studied. As part of this study, data on locally-generated freight drayed to Dulles Airport and other commercial airports should be examined.
4. Land use and zoning policy should be reviewed with the objective of optimizing the ability to locate freight-intensive industries where they have access to major arterials, the least impact on local roads and, where appropriate, access to multimodal facilities.
5. Local governments and the Regional Commission should continue to participate in regional and statewide efforts to build efficient freight systems, by identifying strategic improvements to the transportation system that increase access and decrease delay for freight-bearing vehicles; and to monitor federal, state and private action that may affect the RR Region transportation infrastructure.
6. For purposes of economic development, local governments should continue communication with freight-reliant businesses and explore ways to capitalize on proximity to the Inland Port, the volume of through traffic, and the Norfolk Southern rail line to attract new industry, including distribution centers.
7. It is recommended that this plan be updated every five years, and that, in the interim, RRRC will identify and document issues, model ordinances, and demonstration projects that have relevance for the R-R Region.

## ***Proposed Next Steps***

- *This report, with recommendations, will be submitted to the Rural Transportation Technical Committee for review and comment in January 2010 and will be presented to the R-R Regional Commission at its February 2010 meeting.*
- *The final report will be incorporated in the Rappahannock-Rapidan Region's Long Range Transportation Plan, which will be submitted to local governing bodies for consideration for adoption and relevance to local comprehensive plans.*
- *RRRC will host a meeting for economic development directors and other stakeholders to discuss the implications of the freight study for regional economic development and help develop a plan for further action.*
- *RRRC staff, in conjunction with the RTC, will coordinate with VDOT and DRPT on future freight-related transportation planning initiatives on the local, regional and statewide levels; and will pursue opportunities to extend this study to "front door" access for local businesses.*

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