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National Capital Region Freight Plan Executive Summary

National Capital Region

Transportation Planning Board

Metropolitan Washington Council of Governments

July 2, 2015

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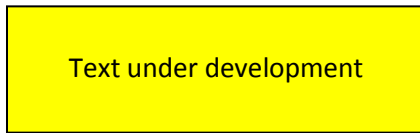
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Notes on this initial draft...

This initial draft of the 2015 National Capital Region Freight Plan is still a work in progress. Sections that are currently under development are indicated with the following graphic:



The next version of the Plan will include a references section and a list of acronyms.

While all comments on the existing content are welcome and will be addressed or responded to, please also let us know if there are additional sections that should be added or particular issues that should be addressed that are not part of this current draft.

Acknowledgements

Acknowledgments are under
development

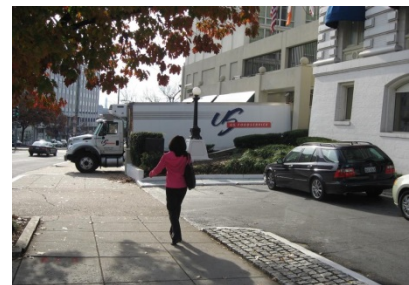
ES 1.0 Introduction

The National Capital Region’s (hereafter referred to as “the Region”) multimodal transportation system is vital to the economy of the Region and to the quality of life of its residents. It connects people and businesses to important regional activity centers and to major domestic and international markets. Each year hundreds of millions tons of freight valued in the billions of dollars move over the Region’s roadways and railways and pass through its airports. The Region’s service-based economy, with its growing employment, population, and wealth will continue to drive demand for freight in the foreseeable future. Economic growth along the eastern seaboard, throughout the nation, and across the world will also result in greater quantities of goods moving into, out of, and through the Region—especially along the I-95 corridor. Evolving logistics practices, changes in where goods are produced and how they are distributed, expansion of the Panama Canal, and increasing urbanization are but a few of the factors that will impact how freight will move across the Region in the future. The Transportation Planning Board (TPB) as the Metropolitan Planning Organization (MPO) for the National Capital Region has an important role to play in ensuring that the regional transportation system continues to be responsive to and supportive of the freight demands placed upon it by its residents, businesses, and visitors.

The Region’s service-based economy, growing employment and population, and increasing wealth will continue to drive demand for freight.

ES 1.1 About the Plan

The **NATIONAL CAPITAL REGION FREIGHT PLAN** (the Plan) describes the role freight transportation plays in the Region’s economy, provides an overview of the Region’s multimodal freight transportation system, describes the drivers of freight demand and the freight flows resulting from it, identifies the most significant freight issues in the region, and provides recommendations to ensure the multimodal freight transportation system continues to support the economy of the region and the quality of life of its residents and visitors. The Plan serves as a foundation for future regional freight planning activities and builds on the results of the previous **NATIONAL CAPITAL REGION FREIGHT PLAN** published in 2010. Much of the content in the Plan has its origins in that previous Plan and in the extensive freight and rail planning efforts of the Federal Highway Administration, the Federal Motor Carrier Safety Administration; the Federal Railroad Administration; a wide range of State and regional freight plans – especially those of the Commonwealth of Virginia, the District of Columbia, and the State of Maryland; and numerous publications of the Transportation Research Board. It provides relevant context and support for the freight element of the **CONSTRAINED LONG-RANGE TRANSPORTATION PLAN**. It provides the basis for understanding the goods movement impacts of transportation projects included in the Region’s **TRANSPORTATION IMPROVEMENT PROGRAM**. Because the efficient and safe movement freight is important to the economic health of the Region and the quality of life of its residents, this freight plan is intended to be a helpful reference to planners and elected officials in their continuing efforts to make the Region a better place to live, work, and visit.



ES 1.2 Freight Planning in the National Capital Region

ES 1.2.1 Transportation Planning Board Vision

The TPB Transportation Vision, adopted in 1998, provides a framework to guide the Region's transportation planning and investment decisions into the 21st century. It lays out eight broad goals with associated objectives and strategies. Two of the goals are closely tied to freight transportation (see below) and are supported by this Plan:

- Goal 2: The Washington metropolitan region will develop, implement, and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy throughout the region, including a healthy regional core and dynamic regional activity centers with a mix of jobs, housing, and services in a walkable environment.
- Goal 2, Objective 3. A web of multi-modal transportation connections which provide convenient access (including improved mobility with reduced reliance on the automobile) between the regional core and regional activity centers, reinforcing existing transportation connections and creating new connections where appropriate.
- Goal 8, Strategy 5: Develop a regional plan for freight movement.

ES 1.2.2 Regional Freight Planning

The TPB included a dedicated freight planning task within its unified planning work program beginning in fiscal year 2007. The TPB engages public- and private-sector stakeholders, gathers and analyzes freight data, and works to better integrate freight considerations into overall transportation planning activities. The TPB Freight Subcommittee supports this effort by providing a venue in which both public- and private-sector representatives share information and provide input on the regional transportation planning process. The TPB also incorporates freight considerations into overall regional planning through the Constrained Long Range Transportation Plan and Transportation Improvement Program.

ES 1.2.3 Compliance with Federal Law – MAP-21

The Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed by the President of the United States on July 6, 2012 and became law on October 1, 2012. While it did not significantly change the existing MPO planning goals or the process of administering federal planning funds to the MPOs, it did include provisions to improve national, state, and regional freight policy and planning and to improve the condition and performance of the national freight network. Most of MAP-21's freight provisions affect federal transportation agencies and State Departments of Transportation. The most significant change for MPOs with respect to freight transportation is the requirement to, in consultation with State DOTs, establish, monitor, and set targets for freight performance. The eight federal planning factors issued by Congress through SAFETEA-LU remain unchanged under MAP-21. The two that apply to freight planning are:

- Increase the accessibility and mobility of people and freight; and
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

TPB's ongoing regional freight planning program addresses each of these factors.

ES 1.2.4 TPB Activities to Address MAP-21 Requirements

At the time of this Plan's release, the FHWA together with the FTA are in the process of translating the MAP-21 legislation into regulations that define what states, local governments, MPOs, and other entities must do to comply with the law. The TPB is monitoring the federal government's periodic releases of MAP-21 notices of proposed rule makings (NPRM), reviewing their contents, identifying the requirements within them that are relevant to MPOs, and developing preliminary plans and processes to address them. While the freight performance management NPRM has not yet been released, it is likely to require the TPB to develop and track freight performance measures and possibly set freight performance targets. Complying with these requirements will require close coordination with DDOT, VDOT, and MDOT. Key freight performance management personnel within each of these organizations have been identified and preliminary meetings to discuss their various performance management approaches, including data sources and methodologies, have been scheduled.

ES 1.3 Freight Planning in Member Jurisdictions

Among TPB member jurisdictions, the state-level agencies (Maryland, Virginia, and the District of Columbia) are the most engaged in freight planning activities.

The District of Columbia recently published the District of Columbia Freight Plan (2014) and MoveDC (2014) both of which include significant freight provisions. The urban goods delivery issues identified in these two documents are likely to become relevant in the future for those areas of the Region becoming more urbanized as growth is concentrated in activity centers. Staff from the District Department of Transportation (DDOT) currently chairs the TPB Freight Subcommittee.

The Commonwealth's Office of Intermodal Planning and Investment coordinates freight planning efforts of several state agencies. Representatives from both VDOT's Northern Virginia region office and DRPT are regular participants in TPB freight planning and coordinating activities. The Commonwealth has published several freight planning documents that are important to the National Capital Region including:

- Virginia Statewide Multimodal Freight Study, Phase I: (2007)
- Virginia Statewide Multimodal Freight Study, Phase II: (2011)
- Virginia Multimodal Freight Plan: (2013)
- Virginia Statewide Rail Plan: (2013)

Most of Maryland's freight planning activities are coordinated through the Maryland Department of Transportation (MDOT) Office of Freight and Multimodalism (OFM). Representatives from MDOT and the Maryland State Highway Administration (SHA) are regular participants in TPB freight planning activities. MDOT has published several freight planning documents including:

- Maryland Statewide Freight Plan: (2009)
- Maryland Strategic Goods Movement Plan (draft): (2015)
- Maryland Freight System Performance Annual Report(s):.

While many of the TPB's non-state member jurisdictions have not developed freight-specific plans, some of them address freight issues within their respective planning documents. Frederick County Maryland developed the **FREDERICK COUNTY FREIGHT AND LAND USE PLAN** (2011) which provides transportation infrastructure recommendations and a set of land-use tools the county can use to improve the coordination between freight related land uses and the multimodal transportation system.

ES 2.0 The Multimodal Freight System

This section describes the elements that make up the regional freight system. Understanding these elements enables the TPB to better assess the way that freight vehicles use the system and how freight movements contribute to congestion, pavement consumption, bridge stress, economic development, and quality of life.

ES 2.1 Freight System Overview

The region's multimodal freight transportation system consists of:

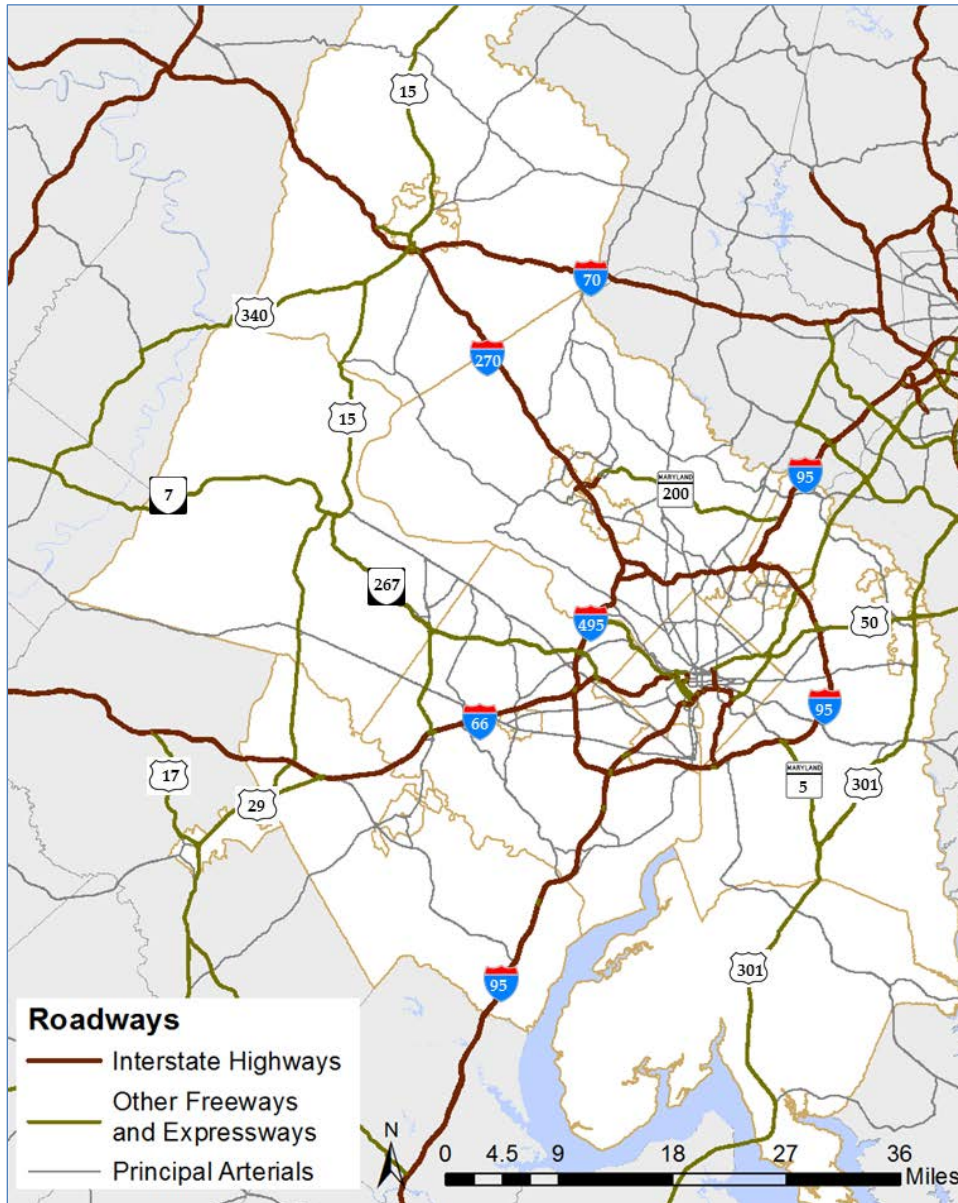
- More than 16,000 miles of roadways carrying more than 300 million tons of goods annually.
- Two Class I railroads – CSX Transportation and the Norfolk Southern Corporation – operating over 250 miles of mainline track and carrying more than 47 million tons of local freight annually.
- Two major cargo airports – Washington Dulles International Airport and Baltimore Washington International Thurgood Marshall Airport.
- An extensive pipeline network that carries more than nine million tons of freight per year.

ES 2.2 Trucking and the Region's Roads

The region's highway system is organized into the following categories:

- **Interstate** – More than 230 miles of 4- to 10-lane highways that connect the region to the rest of the nation.
- **Primary** – More than 2,400 miles of 2- to 8-lane roads that connect communities within the Region to each other and to the interstates.
- **Secondary** – More than 2,100 miles of connector roads.
- **Local** – More than 12,000 miles of local streets.

Figure ES.1 Interstate and Primary Highway Systems in the Region



ES 2.2.1 The Regional Freight-Significant Network

Certain components of the region’s highway system are particularly important for goods movement. Each of the Region’s member states, Maryland, Virginia, and the District of Columbia have identified a designated truck network linking major freight shipping and receiving areas and accommodating through state freight movement. Within the Region, most of these state designated truck routes are represented by interstate highways and major arterials. At the regional level, the importance of roadways other than state designated truck routes is also recognized. These regionally freight-significant roadways function as important connectors between retail establishments, warehouse and distribution centers, and state-designated truck routes.

DRAFT The Multimodal Freight System

TPB staff, in consultation with the TPB Freight Subcommittee, identified a network of these freight-important roadways using a combination of data analysis and collective expertise. The resulting regional freight-significant network is organized into three tiers.

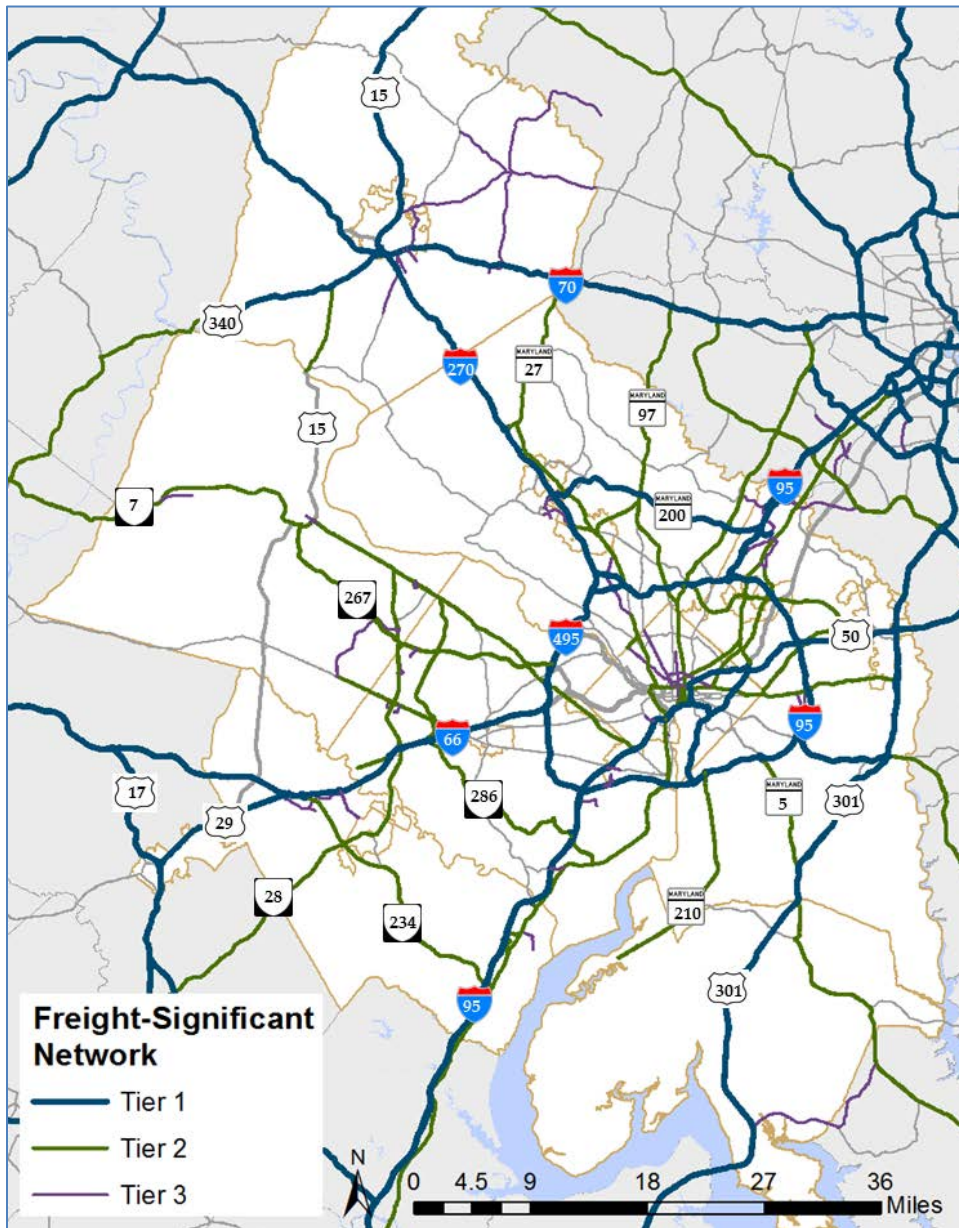
- **Tier 1** - roadways in this tier include state-designated truck routes, interstates, and other high volume roadways. These roads are the means by which most freight enters and leaves the Region and are typically used by pass-through trucks.
- **Tier 2** - roadways in this tier allow trucks to permeate the Region and provide access to important freight generators and attractors.
- **Tier 3** - roadways in this tier provide last mile connectivity.

The primary purpose of developing the regional freight-significant network is to facilitate performance monitoring. For example, congestion can be measured on the freight significant network and compared to that of the overall region. Similar comparisons can be made for pavement condition, bridge condition, or safety. The Regional freight-significant network is shown in Figure ES.2.

ES 2.2.2 Truck Utilization

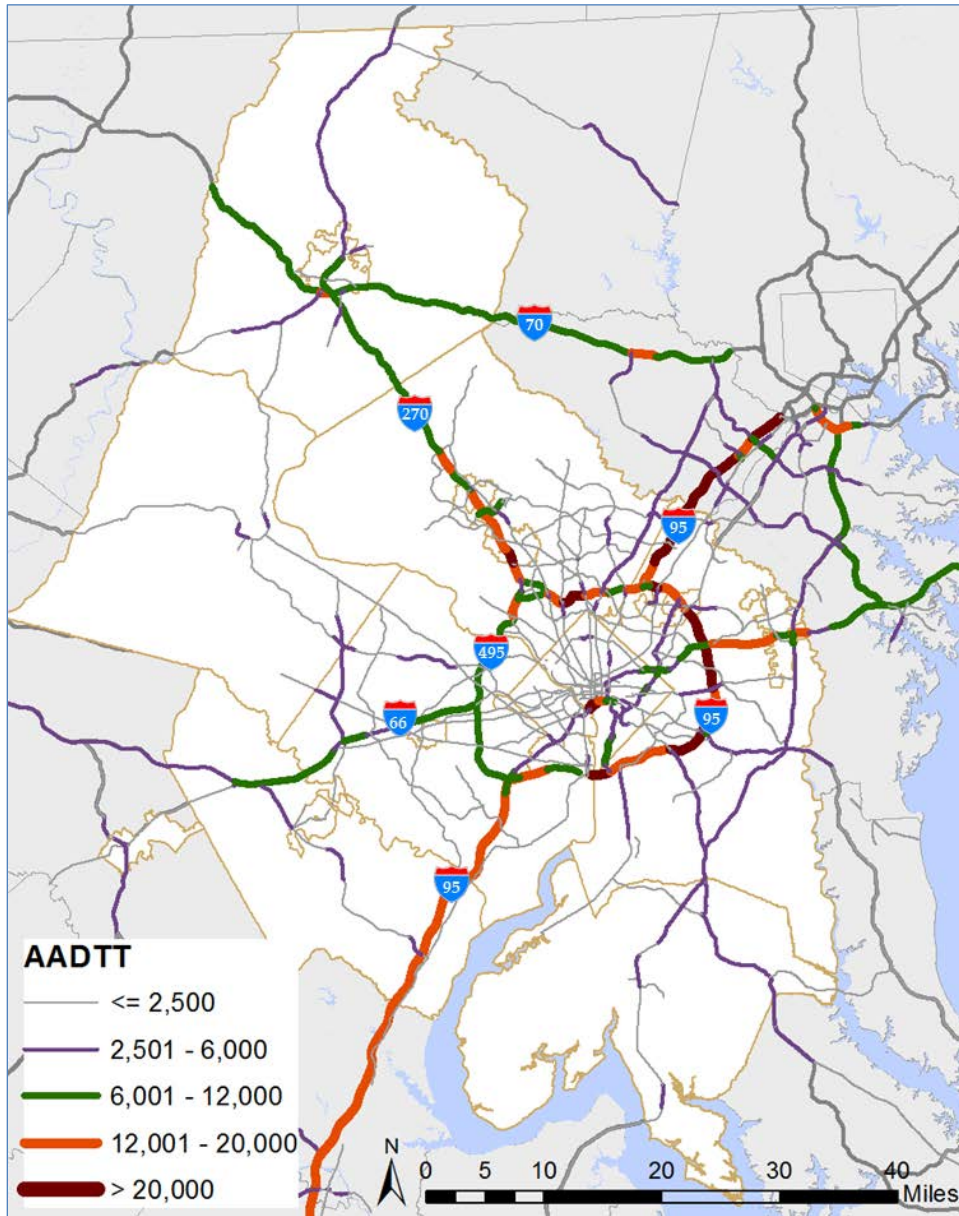
Analysis of Highway Performance Monitoring System (HPMS) data provides average annual daily truck traffic (AADTT) and truck percentage data by roadway segment. Viewing these data (See Figures ES.3 and ES.4) provide an understanding of which roadways have the most truck volume and which roadways have a high proportion of truck traffic.

Figure ES.2 Regional Freight-Significant Network



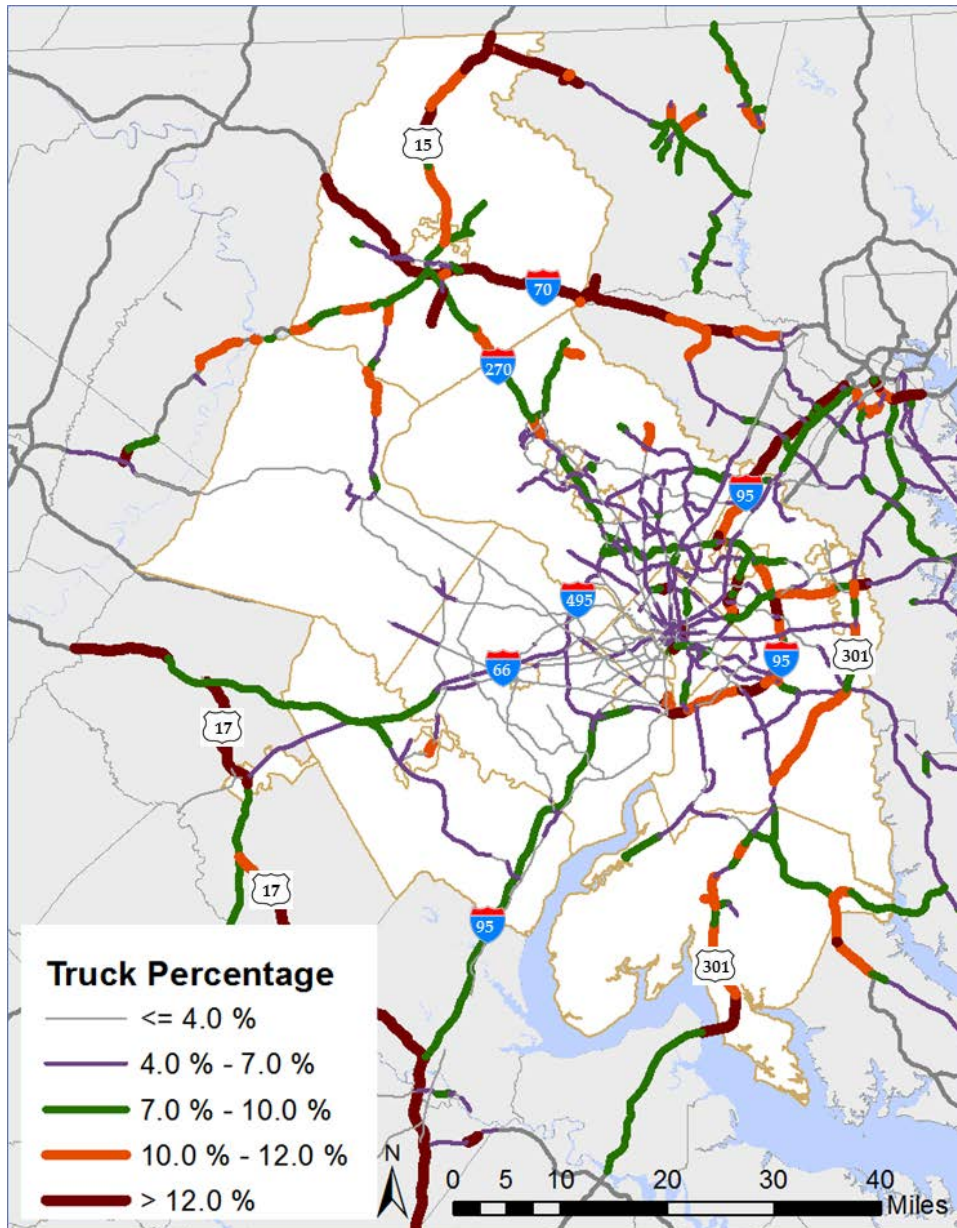
Developed in consultation with the TPB Freight Subcommittee – route inclusion supported by truck volume and percentage analysis – for planning purposes only.

Figure ES.3 Average Truck AADT Map



Source: MWCOG Analysis of 2013 Highway Performance Monitoring System Submittal – for planning purposes only.

Figure ES.4 Average Truck Percentage Map

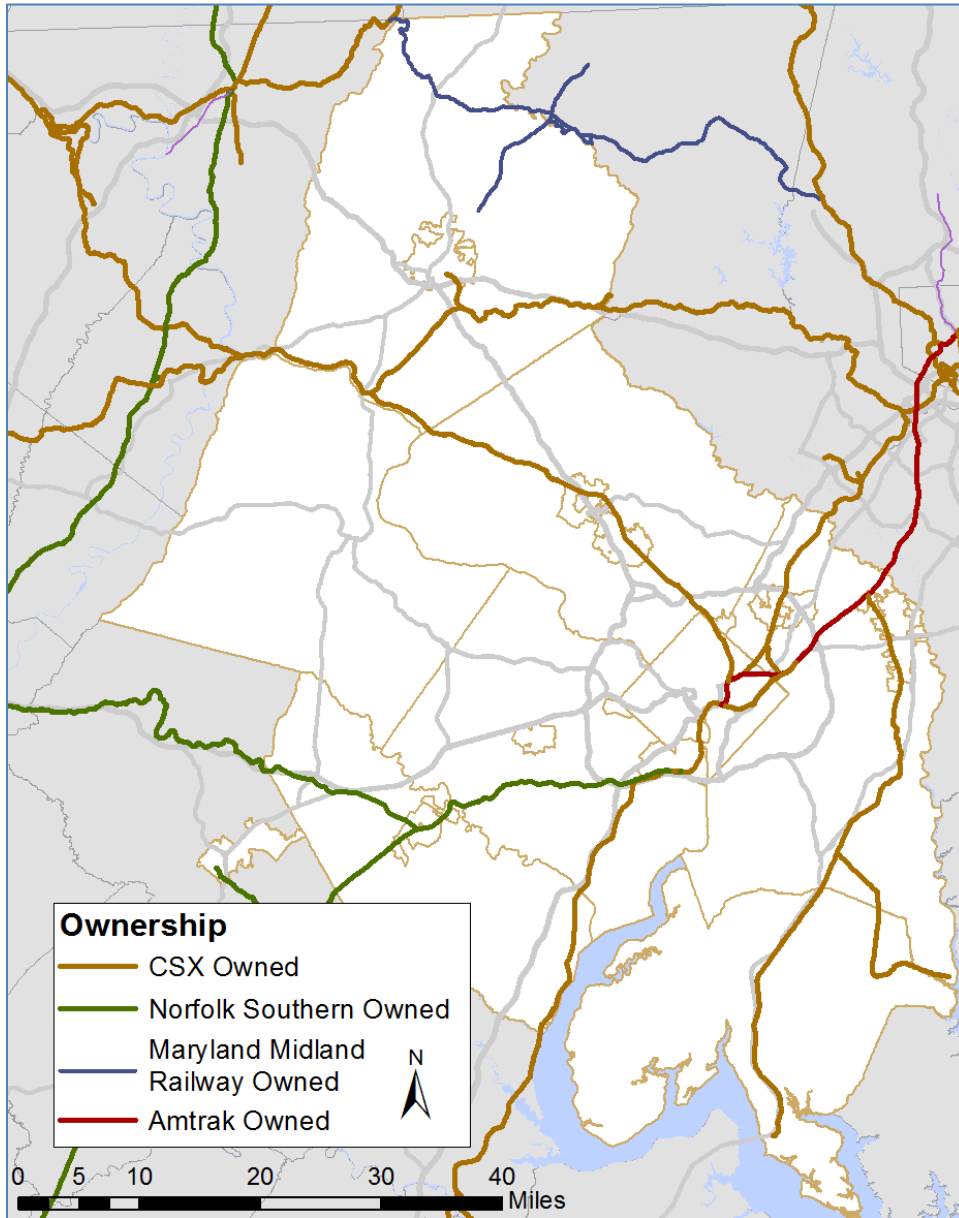


Source: MWCOG Analysis of 2013 Highway Performance Monitoring System Submittal – for planning purposes only.

ES 2.3 Railroads

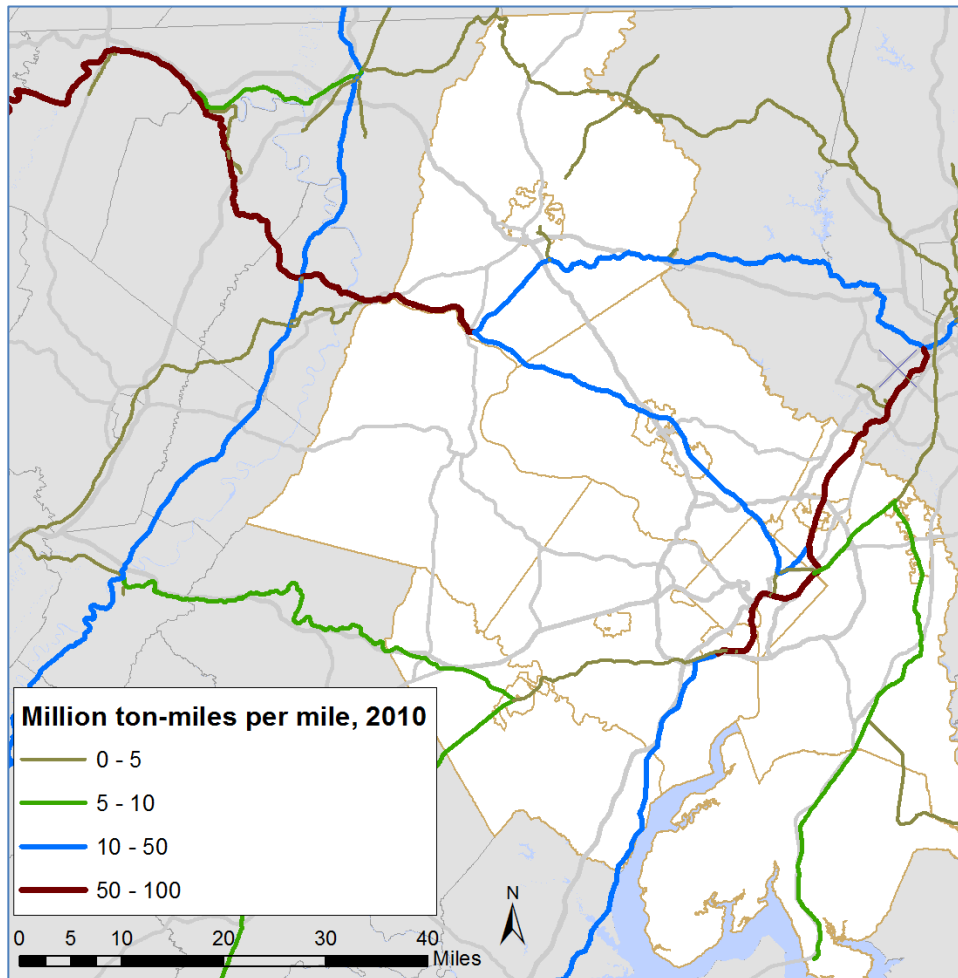
The Region’s rail system consists of more than 300 miles of mainline track, most of which are operated by two railroads – CSX (211 miles), and the Norfolk Southern Corporation (46 miles). Additionally, the Region is served by Maryland Midland Railway, a short line operating in Frederick County, Maryland. Three passenger systems – Amtrak, Virginia Railway Express, and MARC – also operate over the freight rail system. Figures ES.5 and ES.6 show the rail system by ownership and by rail density respectively.

Figure ES.5 Overview of the Region's Rail Network



Source: MWCOG Analysis of 2013 National Transportation Atlas Database – for planning purposes only

Figure ES.6 Railroad Freight Density - 2010



Source: MWCOG Analysis of 2013 National Transportation Atlas Database – for planning purposes only

ES 2.4 Air Cargo

Text under development

ES 3.0 Freight Demand

ES 3.1 National Capital Region Commodities

By analyzing the commodities that are most critical to the Region’s economy – those that are moving into, out of, and within (but not through) the Region, important links between economic activity and freight movement become apparent.

ES 3.1.1 Weight and Value

The two primary measures of freight activity are weight and value. Value is an indicator of the economic activity associated with freight, while weight is an indicator of the demand that freight places on transportation infrastructure.

Inbound, outbound, and intraregional commodities totaling nearly 212 million tons and with an equivalent value of more than \$240 billion moved over the Region’s multimodal transportation system in 2007¹. These figures include both domestic trade (within the Region or between the Region and other areas of the United States) as well as international trade (between the Region and other countries).

Weight: Four major commodity groups are responsible for more than 50 percent of the Region’s tonnage – gravel and crushed stone, waste and scrap, nonmetallic mineral products, and petroleum products. Other important commodity groups by weight include natural sands, prepared foodstuffs, wood products, nonmetallic minerals, mixed freight, and coal among others. These data show that construction activities, electric power generation, and retail consumption generate much of the freight (by weight) moving across the Region’s transportation network.

By weight, gravel and crushed stone is the top commodity type hauled in the Region.

Value: Four major commodity groups – electronic and electrical equipment, machinery, mixed freight, and pharmaceutical products – account for more than

By value, electronic and electrical equipment is the top commodity type hauled in the Region.

40 percent of the total value of commodities moved in the Region. Other important commodity groups include textiles, leather and articles of textiles and leather; motorized vehicles and parts; miscellaneous manufactured products; prepared foodstuffs; articles of base metal; and precision instruments and apparatus among others. These data reflect the importance of the technology and life sciences sectors to the Region’s economy as well as the demands for goods by the Region’s businesses and consumers.

ES 3.1.2 Direction of Trade

The Region’s freight moves in different directions, depending on the commodity:

- Inbound freight is moved from other states, or other countries, to the Region.
- Outbound freight is moved from the Region to other areas of the United States, or to other countries.
- Intraregional freight is moved from one point

The Region receives over 2 ½ times more inbound freight than it produces outbound freight

¹ 2007 is the most recently available data – 2012 data will likely be available later in 2015.

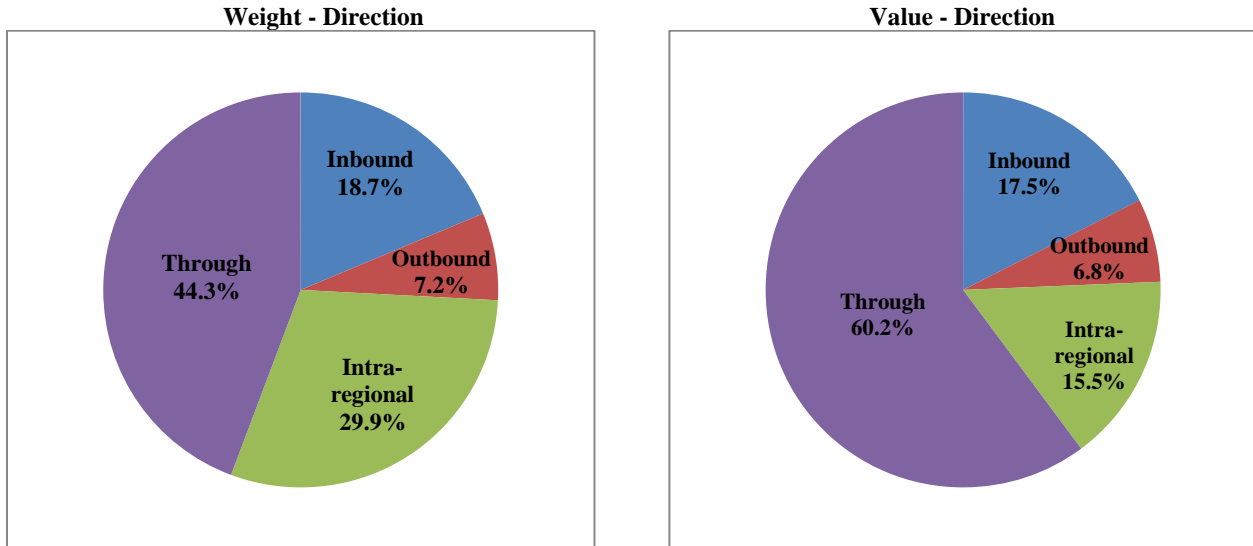
DRAFT Freight Demand

in the Region to another point in the Region.

- Through freight is moved from a location outside of the Region to another location outside of the Region, via transportation infrastructure within the Region. Through freight does not contribute significantly to the region's economy and is not included in the tabulation of commodities.

Figure ES.6 summarizes the direction of travel for the Region's commodities, based on weight and value.

Figure ES.6 Total Freight Weight and Value by Direction



Source: Federal Highway Administration Freight Analysis Framework and Metropolitan Washington Council of Governments

ES 3.1.3 Transportation Modes Used

All freight moves utilize either a single mode or a combination of more than one mode of transportation. The FAF categorizes each freight move as being one of the following (see Table 3.1 for more detailed information about the FAF modes):

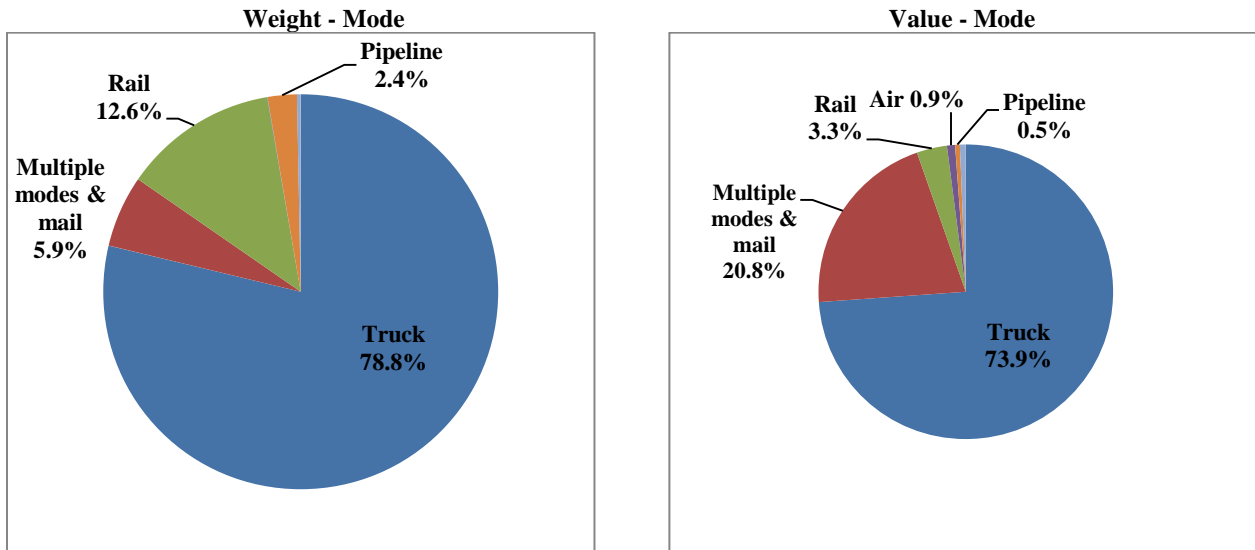
- Truck;
- Rail;
- Multiple modes and mail;
- Water;
- Air (includes truck-air);
- Pipeline; and
- Other/unknown

86 percent of total freight (by weight) in the Region is hauled by truck

Figure ES.7 summarizes the modes used for the Region's commodities, based on weight and value and Figure ES.8 compares the mode share profile of the Region to that of the nation as a whole.

DRAFT Freight Demand

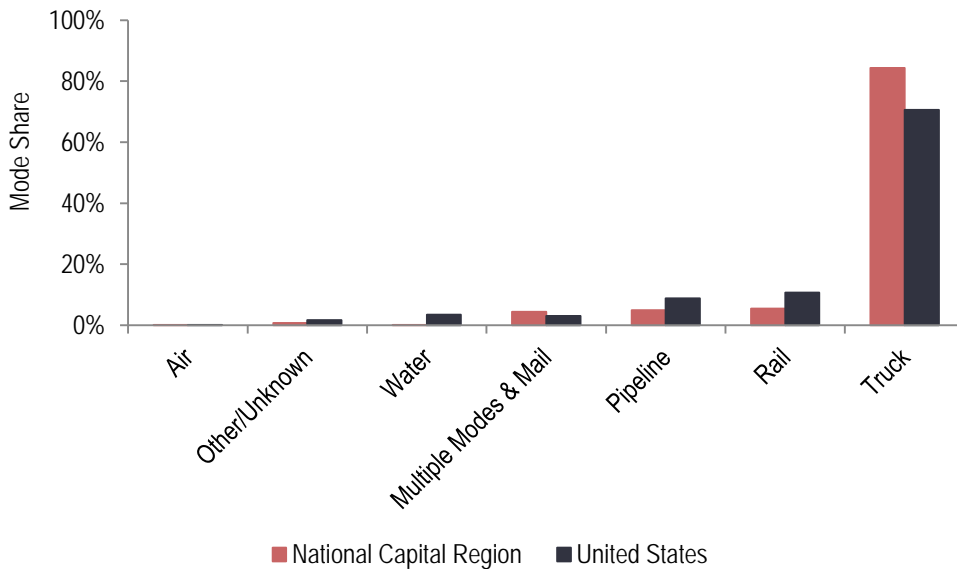
Figure ES.7 Total Freight Weight and Value by Mode Used



Source: Federal Highway Administration Freight Analysis Framework and Metropolitan Washington Council of Governments

Trucks haul a greater proportion of total freight (by weight) in the Region than in the nation overall. Relatively less freight is hauled by rail, water, or pipeline in the Region than in the broader nation (see Figure ES.8).

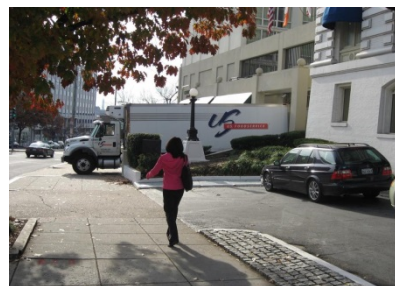
Figure ES.8 Transportation Modes Used (by Weight) – National Capital Region and United States



Source: Federal Highway Administration Freight Analysis Framework

ES 4.0 Freight Trends and Issues

While the freight transportation system is currently performing at a level that supports the Region’s economy and quality of life, recurring bottlenecks on some roadways and railways negatively affect the reliability of freight deliveries. The growth in freight volumes forecasted for the region is a result of an increasing demand for goods – demand driven by the Region’s expanding economy, growing population, and increasing standard of living. To fully realize the benefits associated with the forecasted growth in freight traffic, the Region will need to address the challenges to the multimodal transportation system caused by that growth. These challenges include more trucks sharing the roadways with passenger vehicles, bicycles, and pedestrians; more and longer freight trains sharing the railways with commuter and intercity passenger trains; and increased wear and tear on pavements, bridges, and rail infrastructure. Because trucks are the primary means by which goods are delivered to stores, restaurants, businesses, and residences, the more dense and vibrant a neighborhood becomes, the more that trucks must share the streets in close proximity to pedestrians, bicyclists, and other vulnerable road users. Addressing these challenges is essential in light of the increasing densification of the Region’s activity centers.



ES 4.1 Trends Impacting Freight in the Region

ES 4.1.1 Demographic and Economic Drivers of Freight Demand

The physical movement of freight is of critical importance to any region’s economy. Consumers rely on efficient and reliable freight transportation for shipments of consumer products to homes and retail establishments and for product returns and trash removal. Commercial enterprises rely on efficient and reliable freight transportation for inbound shipments of raw materials, intermediate goods, and other supplies required for the production of finished goods as well as outbound shipments of intermediate goods and finished products to regional, national, and global markets. Commercial enterprises in the service sector stimulate freight demand by providing income to their employees, who in turn use that income to purchase goods and services.

All commercial enterprises depend on freight, but those that are directly involved in activities such as transporting goods, farming, mining, manufacturing, construction, and managing retail operations depend on it more strongly than others. These freight-dependent industries account for 19 percent of the Region’s gross domestic product (GDP) and 18 percent of its total employment.

Freight-dependent industries account for 19 percent of the Region’s gross domestic product.

To understand freight movement in the Region, it is therefore useful to examine the key economic and demographic drivers of freight demand, including overall employment, GDP, economic structure, population, and wealth.

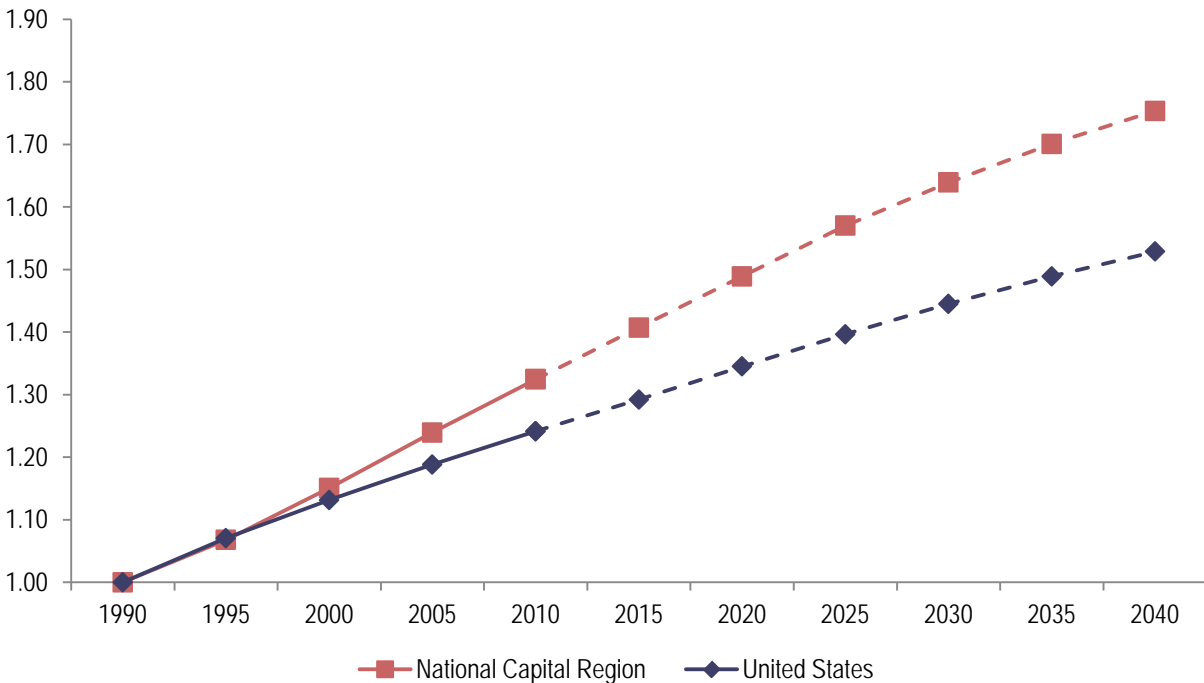
Recent Trends

Population

As of 2013 the Washington-Arlington-Alexandria Metropolitan Statistical Area was home to 5.6 million people, making it the 7th most populous metropolitan statistical area in the nation. The Region is adding population at a faster pace than the nation as a whole (see Figure ES.9 on the next page). The Region's population is expected to grow by an additional 32 percent by the year 2040. Each new resident creates additional demand for consumer goods – residents with higher disposable income generate greater demand for material goods and correspondingly greater overall demand for freight transportation. The combination of a growing population and rising consumer affluence generates high demand for consumer goods, which translates into high demand for freight transportation services.

The Region's population is expected to grow by 32 percent by 2040.

Figure ES.9 Population Growth Trends - National Capital Region



Sources: U.S. Census Bureau²; Metropolitan Washington Council of Governments³

Employment and Gross Domestic Product

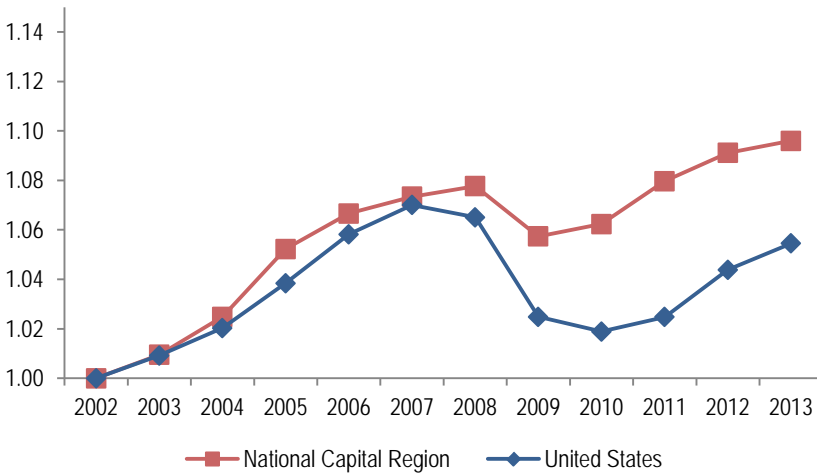
The Region's economy employed 2.8 million people in 2013⁴, roughly 1.9 percent of all U.S. jobs. Between 2002 and 2013, total employment in the Region increased by 245,000 or 9.6 percent, compared to a U.S. growth rate of 5.5 percent (see Figure ES.10 on the next page).

2 For all historical data points; 1990 – 2010 and United States population projections; 2015 – 2040.

3 For TPB Planning Area and District of Columbia population projections; 2015 – 2040.

4 Quarterly Census of Employment and Work (QCEW)

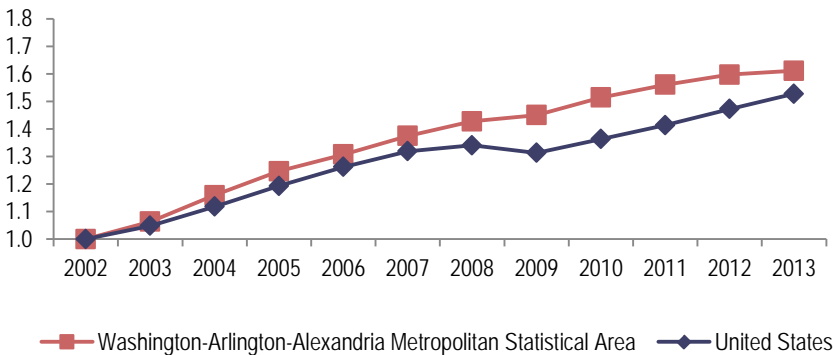
Figure ES.10 **Historic Employment Trends, United States and National Capital Region**



Sources: U.S. Bureau of Labor Statistics and Metropolitan Washington Council of Governments compilation of Quarterly Census of Employment and Work (QCEW) summaries for TPB Planning Area jurisdictions.

In 2013, the Region’s gross domestic product (or GDP) was \$464 billion. GDP is a measure of the total value added to goods and services due to economic activity in the Region. As with employment, the Region has been surpassing the United States as a whole in terms of GDP growth. There is a direct relationship between the growth in economic activity, as measured by GDP, and the demand for freight transportation.

Figure ES.11 **Regional and U.S. Gross Domestic Product**



Source: U.S. Bureau of Economic Analysis

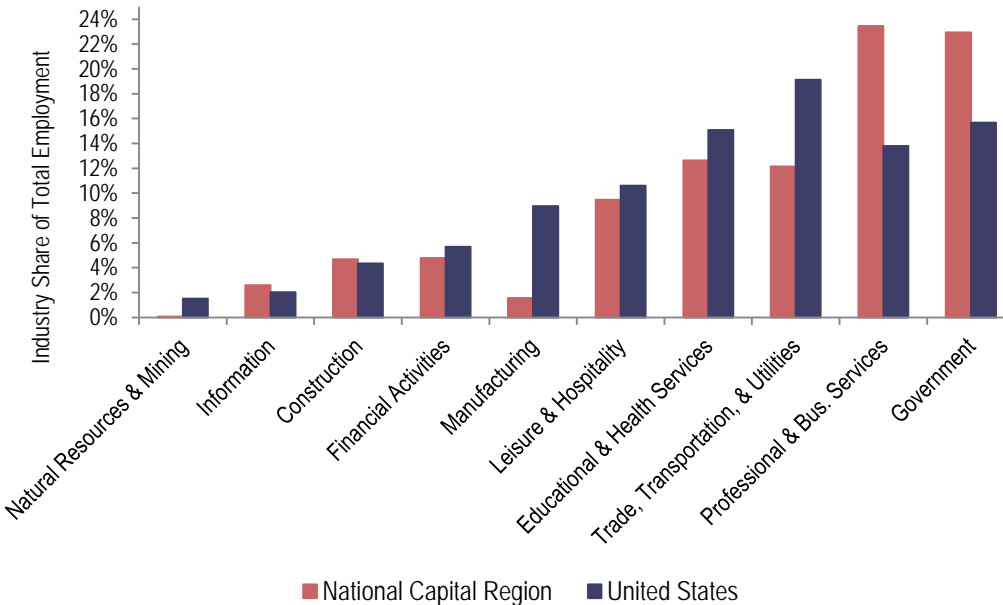
Structure of the Economy

The structure of the Region’s economy is significantly different than that of the United States as a whole. The proportion of total employment in the government sector and in the professional and business services sector is higher in the Region than it is nationwide. Conversely, the proportion of total employment in the manufacturing; trade, transportation, and utilities; and natural resources and mining sectors is lower in the Region than it is nationwide.

DRAFT Freight Trends and Issues

This relatively high representation of government and professional and business services employment and relatively low representation of manufacturing, mining, and trade, transportation and utilities employment is consistent with service-based regional economy that demands more goods than it produces.

Figure ES.12 Economic Structure – Share of Employment by Major Industry Sector, National Capital Region and United States



Sources: U.S. Bureau of Labor Statistics and Metropolitan Washington Council of Governments

Freight Dependent Industries

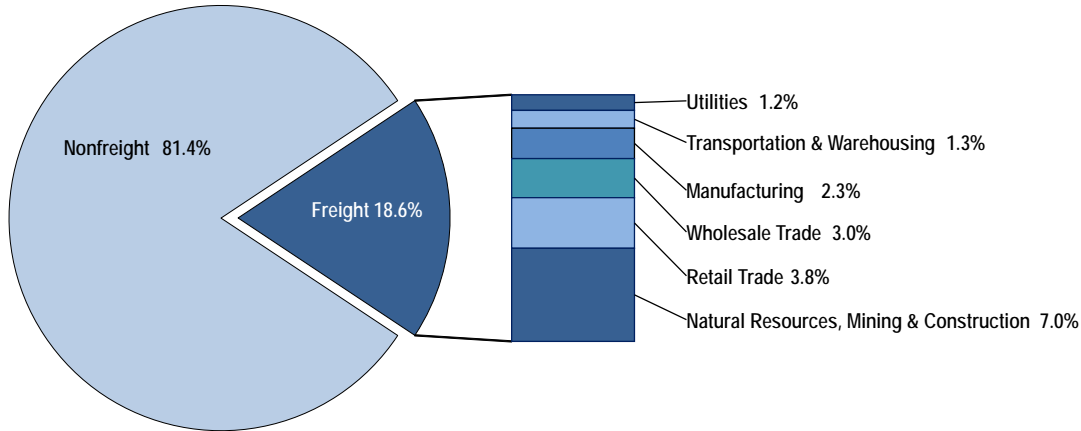
Regional businesses such as farms that grow crops and raise animals and quarries that extract gravel for use in construction depend on freight movement to move the products they produce to processing plants, wholesalers, and retail outlets. Other producing businesses, like manufacturers and construction firms, also depend on freight transportation to bring them the intermediate products – fabricated steel, component parts, concrete, etc. – needed to manufacture finished products or construct buildings and infrastructure. Businesses in the transportation, warehousing and logistics, and wholesale trade industries connect producers and consumers; ensuring that needed goods are transported where and when they are needed. Finally, consumers such as retail establishments, residents, and utilities rely on freight movement to deliver goods and materials to the final point-of-sale or point-of-use. These freight dependent industries can be organized into three categories or clusters:

- The **goods movement cluster** is composed of businesses that provide freight transportation services, such as trucking companies, logistics firms, railroads, air cargo firms, wholesalers, and warehouse / distribution / fulfillment center operators. Overall, the goods movement cluster represents a little more than four percent of the Region’s GDP.
- The **freight intensive industry cluster** is composed of industries where the transportation of raw materials, intermediate products, and finished goods accounts for a significant share of their cost of doing business such as natural resources, mining, manufacturing, construction, and utilities. The freight intensive industry cluster represents around eleven percent of the Region’s GDP.

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- The **retail cluster** is composed of consumer outlets – such as supermarkets, auto dealers, and apparel stores – that require freight transportation services to stock and replenish their inventory. The retail cluster represents a little less than four percent of the Region’s GDP.

Figure ES.13 National Capital Region Freight- and Nonfreight-Related Industry Sectors by Share of Gross Regional Product



Source: U.S Bureau of Economic Analysis

Forecasts

Population and employment forecasts (see Table 4.1) for the Region indicate that demand for goods, along with the associated demand for freight transportation services, will continue to grow in the future.

Table ES.1 National Capital Region’s Population and Employment Growth Projections

	2010 (thousands)	2040 (thousands)	Growth (absolute)	Growth (percentage)
Population	5,046.6	6,682.2	1,635.7	32.4%
Employment	3,069.6	4,386.7	1,317.1	42.9%

Source: Metropolitan Washington Council of Governments, Round 8.3 Cooperative Forecasts⁵

The Region’s population is forecast to increase by 32 percent through 2040. By 2040, the Region is expected to have over 6.6 million people, an increase of 1.6 million people. This population growth will have a direct impact on transportation demand. More people mean more trips generated, more services required, and more goods purchased.

Employment in the Region is forecasted to grow even faster than population. By 2040 the Region is expected to employ over 4.3 million people, an increase of 1.3 million or 43 percent. This expansion of jobs provides evidence that the Region’s businesses, including those that are freight dependent, will generate increasing demand for freight transportation services going forward.

⁵ note: Cooperative Forecast numbers include military employees and the self-employed – people that are not included in the Quarterly Census of Employment and Work (QCEW) figures used in the review of historical employment shown in Figure 2.2.

ES 4.1.2 Evolving Supply Chains and Logistics Patterns

New technology coupled with increasingly demanding customer expectations are continuing to push businesses to reduce costs and improve responsiveness. The various aspects of e-commerce are enabling some businesses to accomplish both of these imperatives while transforming the supply chain in the process. Consumers are spending less time in retail stores and more time shopping on computers, tablets, and smart phones. They increasingly expect immediate gratification and successful businesses are working to satisfy those expectations. Businesses that do not keep up with these changing expectations are at increased risk of failure. Three relatively new retail channels have emerged in response to these trends.

Omni-channel: refers to retail merchants using multiple channels to serve their customer base. It involves planning and utilizing traditional brick and mortar stores in combination with e-commerce.

M-commerce: refers to the increased use of smart phones and tablets in retail trade. One element of m-commerce is the use of smart phones to scan bar codes for more product information. M-commerce also includes the use of data collected from consumer's online searches to micro segment markets by individual consumer preferences.

Social commerce: refers to the use of social media to market products, build awareness, and increase demand. Social media sites such as Pinterest and Facebook, as well as various blogs educate consumers about products and stimulate demand.

The combination of ever tightening inventory control systems and consumers increasing use of e-commerce is affecting the way goods are distributed. These changes are being manifested in terms of the designs and locations of distribution centers and in the way products are distributed to the end customer.

Evolving Distribution Center Designs and Locations

A typical distribution center is roughly rectangular in shape and features an enormous number of loading docks. Traditional distribution centers typically employ about 0.3 workers per thousand square feet whose primary work tasks involved shipping and receiving activities. The rise in e-commerce is resulting in a transformation of the typical distribution center into an e-commerce fulfillment center. An e-commerce fulfillment center typically employs about 1.0 workers per thousand square feet whose primary work tasks include picking and packing in addition to shipping and receiving activities. While traditional distribution centers are typically not located to maximize transit options, newer fulfillment centers are better able to attract the work force needed if they have robust transit options available.

The Changing Last Mile

In an effort to increase speed to market, traditional retailers are converting their brick and mortar stores into centrally located urban distribution centers. This enables same day fulfillment of a customer's online order from the urban department store. Online retailers such as Amazon are installing lockers in locations such as transit stations, Dunkin donut shops, and convenience stores to enable secure delivery of packages to customers when there is no one available to accept the package during the day. As the emphasis of last mile logistics continues to shift towards personalized delivery services, the number of trucks on the Region's streets and roadways will grow. However, these additional trucks are likely to be smaller on average.

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ES 4.1.3 Trends in the Transportation Industry

The transportation industry is dynamic and continues to evolve with large firms making strategic investments in infrastructure and technology.

Trucking

While small trucking firms will continue to exist, they will increasingly contract to larger carriers and utilize load-matching services in an effort to maximize their return on capital. Trucking firms that effectively utilize information technology are likely to prosper relative to firms that are less technology-adept. This trend favors larger firms. Driver shortages will continue to be a problem for the industry, particularly for long haul routes, but as the economy continues to generate high value time sensitive goods, demand for trucking services will continue to be high.

As of early 2015, the profitability of trucking firms was at multi-year highs due to the combination of record tonnage, high shipping rates, and low fuel prices. Industry observers expect this environment to continue through 2015 and fleet owners are investing part of their profits in equipment upgrades and expansion. While the incentives for these investments are related to the need to expand capacity rather than the desire for greater fuel efficiency, fleet turnover is likely to result in a higher proportion of cleaner and more fuel-efficient trucks across the nation and in the Region.

Rail

Deregulation of the railroad industry in the 1980s enabled railroads to steadily increase productivity by restructuring the rail system, shedding unprofitable lines, creating new business opportunities through long-haul intermodal service, and by transporting coal from mines in Appalachia and Wyoming's Powder River Basin. Recent improvements in hydraulic fracturing techniques that have enabled oil to be cost effectively extracted from previously inaccessible shale deposits have also provided new business opportunities for railroads to transport this oil to refineries primarily along the Gulf Coast and in the Northeast.

While this has resulted in increased economic opportunities for the freight railroads, it has not come without negative externalities. Due to the chemical makeup of the crude oil extracted from many of these shale deposits, the likelihood of fire and explosions as a result of a derailment is greater than it is with other types of crude oil. The resulting headline grabbing effects of recent derailments have elevated public safety concerns about these crude oil shipments by rail throughout the nation and the issues associated with crude by rail transport are therefore national in scope. The National Capital Region does not have petrochemical refineries or terminals where crude oil is transferred from rail to barges. CSX transportation has voluntarily limited the transport of hazardous materials through the District of Columbia. Also CSX's north-south rail line through the region is not geographically oriented to be a major transportation artery for crude oil transport. However, CSX's east-west rail line through Frederick County is a probable route for the transport of crude oil from the middle of the continent to refineries in the Philadelphia area or to barge terminals in Baltimore.

The two Class I railroads operating in the National Capital Region, Norfolk Southern and CSX Transportation, are also working to expand their intermodal business through major initiatives to add additional track, straighten curves, increase clearances, and add intermodal terminals on key rail corridors to clear the way for trains hauling double stack container cars moving between Mid-Atlantic ports and the Midwestern markets (CSX National Gateway) and between the Southeast and the Northeast (Norfolk Southern Crescent Corridor).

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Ports and Shipping

To realize greater economies of scale, shipping lines have continued to acquire larger and larger ships. To accommodate them, a program to expand the Panama Canal is currently underway and expected to be completed in early 2016. Container terminals at the Port of Baltimore and at the Port of Virginia, along with at least three other East Coast ports, are currently able to accommodate these larger post-Panamax ships and are anticipating increased container traffic as a result. The advent of larger container ships may impact the size of nearby distribution centers. This is not only because greater volumes of containers are expected overall, but also because there are more containers per ship to offload. This creates demand for larger buildings to accommodate the “surge” volume. While it is difficult to predict all of the effects that the Panama Canal expansion will have on the National Capital Region, it will likely result in some increase in economic activity coupled with more rail and truck freight on the Region’s multimodal transportation system.

ES 4.2 Regional Freight Issues, Challenges, and Opportunities

ES 4.2.1 Congestion and Delay

Roadways

Congestion on the nation’s roadways is a significant cost to shippers and to the economy overall. The American Transportation Research Institute (ATRI) estimates that congestion added over \$9.2 billion in operational costs and resulted in 141 million hours in lost productivity to the trucking industry in 2013.⁶ This is the equivalent of over 51,000 truck drivers sitting idle for a working year. Freight congestion is concentrated in urban areas and is most apparent at bottlenecks on highways - especially those serving major international gateways, major domestic freight hubs, and in major urban areas where important national truck flows intersect congested urban areas. In fact, ATRI ranked congestion in the Washington, DC metropolitan area as fifth in the nation in terms of its contribution to increased operating costs for the trucking industry (see Table ES.2 below).

⁶ ATRI, Cost of Congestion to the Trucking Industry report, April, 2014.

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Table ES.2 Cost of Congestion for Trucking by Metropolitan Area - 2013

Rank	Metropolitan Area	Cost to the Trucking Industry (millions of dollars)
1	Los Angeles, CA	1,081.7
2	New York, NY	984.3
3	Chicago, IL	466.9
4	Dallas, TX	406.1
5	<u>Washington, DC</u>	<u>379.4</u>
6	Houston, TX	373.6
7	Philadelphia, PA	292.1
8	San Francisco, CA	288.6
9	Boston, MA	278.2
10	Atlanta, GA	275.1

Source: American Transportation Research Institute

The Transportation Planning Board has been monitoring congestion in the Region for many years. Table ES.3 identifies the 10 most significant bottlenecks on the Region’s interstate highways. Because the freight-significant network includes many of the Region’s interstate highways, nine of these top ten general bottlenecks are also freight bottlenecks.

Table ES.3 Regional Bottlenecks

Rank	Location	Direction	Average Duration	Average Maximum Length (miles)	Occurrences	Impact Factor ¹	Located on Freight-significant Network?
1	I-95 at Fredericksburg/Stafford County Line	SB	5 hr 36 min	33.6	24	270,972	Yes
2	I-270 at I-495/MD 355	SB	2 hr 3 min	18.1	74	165,339	Yes
3	I-395 at 2 nd St.	NB	2 hr 30 min	6.6	156	154,793	Yes
4	I-95 at VA-630/Exit 140	SB	3 hr 46 min	22.4	30	151,575	Yes
5	I-95 at VA-3/Exit 130	SB	4 hr 48 min	36.2	13	135,657	Yes
6	I-95 at VA-606/Exit 118	SB	7 hr 57 min	50.1	5	119,430	Yes
7	I-66 at VA-7/Exit 66	WB	1 hr 7 min	1.2	1,410	111,572	No
8	I-95 at Russell Rd/Exit 148	SB	2 hr 18 min	6.4	126	110,853	Yes
9	I-270 at Middlebrook Rd/Exit 13	NB	1 hr 49 min	6.8	138	102,357	Yes
10	I-395 at 2 nd St	NB	1 hr 29 min	3.3	318	94,077	Yes

Note 1: The Impact Factor accounts for multiple aspects of the bottleneck including duration, length, number of occurrences, and traffic volumes

Source: COG/TPB

The projected growth in population and employment (see section 4.1.1) will tend to add VMT (of all vehicle types) to the Region’s transportation system, potentially exacerbating congestion and delay.

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Rail

Congestion on the freight rail network increases costs to shippers and hampers efforts to expand commuter and inter-city passenger rail operations. Railroad capacity is not only a function of track infrastructure; but also of rolling stock and railroad operating strategies related to train speed, train size, and scheduling. Typical infrastructure related capacity constraints include insufficient mainline tracks, lack of adequate sidings along single track lines, low ceiling tunnels, antiquated bridges, outdated signal systems, missing connections, and inadequate terminal capacity.

The most significant freight rail capacity constraint in the National Capital Region is the Virginia Avenue Tunnel, a roughly ¾ mile passage beneath Virginia Avenue in southeast Washington, DC owned by CSX. This tunnel houses a single track and does not have enough vertical clearance to accommodate double stack container traffic. Located on a critical rail line between port terminals in the Hampton Roads area and markets in the Northeast and Midwest, this chokepoint significantly limits the amount of freight that can be moved by rail along this corridor. Other freight rail facilities in the region that are likely to face capacity constraints in the future are the Long Bridge and the CSX rail line between Washington, DC and Richmond, VA.

ES 4.2.2 Freight and the Environment

Section under development

ES 4.2.3 Freight in Regional Activity Centers

Section under development

ES 4.2.4 Addressing Freight within Local and Regional Planning Processes

Section under development

ES 5.0 Recommendations and Next Steps

The TPB vision is to develop, implement, and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy including a healthy regional core and dynamic regional activity centers. Realizing this vision requires a focus on the efficient transportation of both people and goods. The following recommended actions, which can be accomplished with resources that are already in place, will help the Region move towards its vision. These actions are organized into two categories; those related to maintaining and strengthening the existing regional freight planning process and longer-term, strategic actions.

ES 5.1 Actions Related to Maintaining and Strengthening the Regional Freight Planning Process

- Continue to Support the TPB Freight Subcommittee
- Maintain and Strengthen Private-Sector Participation in the TPB Freight Subcommittee
- Create Opportunities to Hold Joint Meetings with Other TPB Subcommittees
- Develop “Freight Around the Region” Brochures in Coordination with Member Jurisdictions
- Organize Periodic Regional Freight Forums
- Collect and Analyze Freight Data and Make Available to Member Jurisdictions and the Public
- Continue Coordination with Federal, State, Local, and Private-Sector Freight Partners
- Coordinate TPB’s MAP-21 Freight-Related Activities – Including Performance Measures
- Identify and Communicate Freight-Related Infrastructure Issues to Member Agencies to Address in their Planning and Programming Activities
- Strengthen Relationships with Local Jurisdiction Planners
- Highlight Economic Development Aspects of Freight with Local Jurisdiction Planners

ES 5.2 Strategic Regional Freight Planning Activities

- Raise Freight Profile within Local and Regional Planning Processes
- Develop and Communicate Helpful Information about Accommodating Freight within Regional Activity Centers
- Continue Participation in FHWA Effort to Develop Innovative Strategies for Improving Freight Movement in Urban Areas
- Monitor Developments of Autonomous and Connected Freight Vehicles
- Monitor Key Economic and Industry Trends Impacting Goods Movement