DRAFT

National Capital Region Freight Plan

National Capital Region

Transportation Planning Board

Metropolitan Washington Council of Governments

July 3, 2015

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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:

Text under development

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

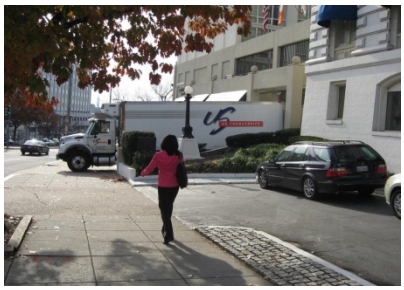
Acknowledgments are under development

Section 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.

1.2 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.

1.2.1 Overview

The Plan is organized into the following major sections:

Executive Summary – provides highlights of the Plan.

1.0 Introduction – underscores the importance of freight to the Region, provides an overview of the Plan, and describes its institutional and regulatory context.

2.0 Multimodal Freight Transportation System – describes the physical infrastructure, including roadways, railways, airports, and intermodal facilities, that comprise the Region's freight transportation system.

3.0 Freight Demand – identifies the key commodities transported into, out of, within, and through the region; describes the relative importance of the various transportation modes used to move these commodities; identifies their origins and destinations; and forecasts how these elements are expected to change in the future.

4.0 Freight Trends, Challenges, and Opportunities – discusses the broad trends impacting freight and identifies the challenges and opportunities associated with freight transportation in the Region.

5.0 Recommendations and Next Steps – a brief summary of the Plan's key findings and recommendations.

Appendices – provides additional background and technically detailed materials that support the content within the body of the main document.

1.3 Freight Planning in the National Capital Region

1.3.1 Transportation Planning Board Vision

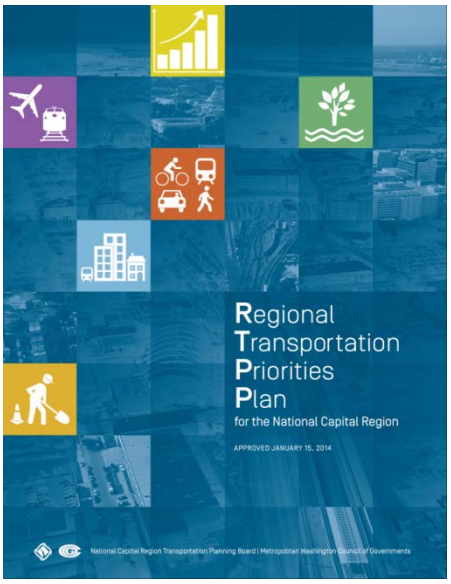
The TPB Transportation Vision, adopted in 1998, provides a framework to guide the Region's transportation planning and investment decisions into the 21st century. It lays out eight broad goals with associated objectives and strategies. Two of the goals are closely tied to freight transportation (see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

Issues that indirectly relate to freight transportation (e.g. safety) are included within other goals.

Regional Transportation Priorities Plan

On January 15, 2014, the TPB approved the **REGIONAL TRANSPORTATION PRIORITIES PLAN** (RTPP). The RTPP builds on the Vision goals by identifying strategies with the greatest potential to respond to our most significant transportation challenges. The strategies are intended to be complementary, to make better use of existing infrastructure, and to be within reach both financially and politically. The RTPP identifies priorities and strategies that impact freight, including the following:



- Ensure maintenance of roads and bridges;
- Alleviate roadway bottlenecks;
- Concentrate growth in activity centers; and
- Enhance circulation within activity centers.

1.3.2 Regional Freight Planning

The TPB included a dedicated freight planning task within its unified planning work program beginning in fiscal year 2007. While freight issues were addressed in overall transportation planning before that time, such involvement was mostly limited to participation in freight-related groups such as the I-95 Corridor Coalition and the Baltimore Metropolitan Council's Freight Movement Task Force. Responding to recommendations described in a May 2007 consultant-led study entitled, **ENHANCING CONSIDERATIONS OF FREIGHT IN REGIONAL TRANSPORTATION PLANNING**, the TPB strengthened its freight planning capacity by hiring an additional staff person with responsibility to further the Region's freight program. This additional resource enabled the TPB to engage public- and private-sector stakeholders, gather and analyze freight data, and better integrate freight considerations into overall transportation planning activities. The increased focus on these activities led to the establishment of the TPB Freight Subcommittee in April 2008, providing a venue in which both public- and private-sector representatives share information and provide input on the regional transportation planning process.

In July 2009, TPB staff published the **INTEGRATE FREIGHT REPORT** highlighting regional freight trends and identifying the steps necessary to incorporate freight into the transportation planning process. This was followed by the publication of the first **NATIONAL CAPITAL REGION FREIGHT PLAN** in 2010. This 2015 edition of the **NATIONAL CAPITAL REGION FREIGHT PLAN** builds upon the foundation provided by that initial effort.

1.3.3 Role of the Metropolitan Planning Organization

The TPB is the federally designated Metropolitan Planning Organization (MPO) for the Region. The role of an MPO is to implement the comprehensive regional transportation planning process as initially required by the Federal-Aid Highway Act of 1962 and amended by subsequent legislation. One of the primary objectives of any MPO is to ensure that expenditures for transportation projects and programs are part of a continuing, cooperative, and comprehensive planning

The TPB brings key decision-makers together to coordinate planning activities for the Region's transportation system.

process. The TPB accomplishes these objectives by bringing key decision-makers together to coordinate planning activities for the Region's transportation system. The TPB is composed of representatives from 22 local governments; the Departments of Transportation of Maryland, Virginia, and the District of Columbia; the state legislatures of Maryland, Virginia, and the District of Columbia; the Washington Metropolitan Area Transit Authority (WMATA); the Metropolitan Washington Airports Authority (MWAA); the Federal Highway Administration (FHWA); the Federal Transit Administration (FTA); the National Park Service (NPS); and the National Capital Planning Commission (NCPC). See Figure 1.1 on page 6 for a map of TPB member jurisdictions. These members collaborate through the TPB process to develop two federally mandated documents; the financially **CONSTRAINED LONG-RANGE TRANSPORTATION PLAN** (CLRP) and the **TRANSPORTATION IMPROVEMENT PROGRAM** (TIP).

Constrained Long-Range Transportation Plan

The **CONSTRAINED LONG-RANGE TRANSPORTATION PLAN** (CLRP) identifies all significant transportation projects and programs that are planned in the Region over a 25 to 30 year period. This list of projects is financially constrained; meaning that they have a reasonable expectation of funding. Some of these projects will be completed in the near future, while others are only in the initial planning stages. A major update of the CLRP is done every four years.

Transportation Improvement Program

The **TRANSPORTATION IMPROVEMENT PROGRAM** (TIP) is a six-year financial program that describes the schedule for obligating federal funds to state and local transportation projects. The TIP contains projects and funding information for all modes of transportation including highways and transit. State, regional, and local transportation agencies update the program each year to reflect priority projects in the CLRP.

CLRP and TIP updates are made through an annual "Call for Projects" process that enables member agencies to submit new projects or updates to existing projects. As part of the project submittal process, agencies complete a project description form that describes what the project entails, its estimated cost, and how it will benefit the region. Each project submittal requires the agency to indicate which regional goals the project supports and which of the federally required planning factors apply to it. The project description form has included language designed to identify the freight benefits of candidate projects since November of 2009. The following two freight-related questions are included in the current project description form.

Question 27: Support Interregional and International Travel and Commerce

- Please identify all freight carrier modes that this project it enhances, supports, or promotes:

Long Haul Truck

Local Delivery

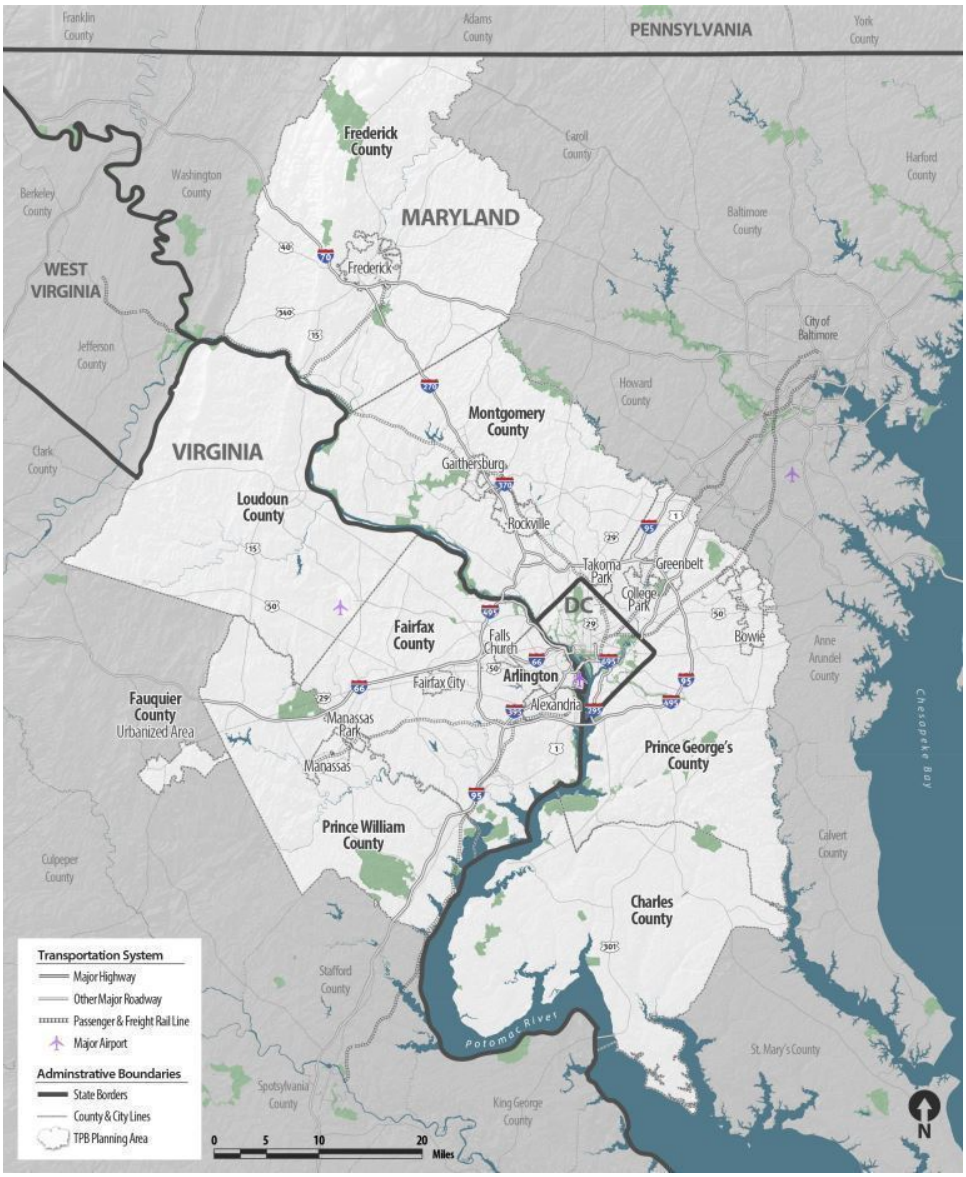
Rail

Air

Question 29: (MAP-21 Planning Factors) please identify any and all planning factors that are addressed by this project:

- (a) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and deficiency
- (e) Increase accessibility and mobility of freight
- (g) Enhance the integration and conductivity of the transportation system, a cross and between modes, for people and freight

Figure 1.1 TPB Member Jurisdictions



1.3.4 Federal Context for Freight Planning in Metropolitan Areas

The federal government, primarily through its legislative and executive branches, establishes the legal framework through which regional transportation planning in general, and freight planning in particular, operates. In addition to this legal function, the federal government also provides funding, technical assistance, data, and data analysis tools to support transportation planning activities at the state, regional, and local levels.

The various administrations and offices of the United States Department of Transportation (USDOT) influence the freight transportation planning activities at all levels of government for each mode and vehicle type. USDOT administrations with important roles in freight transportation planning include:

- Federal Highway Administration (FHWA): supports state and local governments in the design, construction, and maintenance of the Nation's highway system and provides financial and technical assistance to state and local governments.
- Federal Motor Carrier Safety Administration (FMCSA): issues and enforces commercial vehicle related safety regulations; works to improve safety information systems and commercial motor vehicle technologies; and works to strengthen vehicle standards and increase safety awareness.
- Federal Railroad Administration (FRA): issues, implements, and enforces railroad safety regulations; makes selective investments in rail corridors; conducts research; and develops technology.
- Federal Aviation Administration (FAA): ensures that aircraft and the national airport system is safe, efficient, and environmentally responsible.
- Maritime Administration (MARAD): works in areas involving ships and shipbuilding, port operations, vessel operations, national security, the environment, and safety.
- Pipeline and Hazardous Materials Safety Administration (PHMSA): establishes national policy on pipelines and hazardous materials transport; sets and enforces standards; conducts research to prevent incidents; and prepares first responders.

Among the agencies listed above, the FHWA has the greatest influence on freight transportation planning for the Region. By law, every four years the FHWA, together with the FTA, must jointly certify the TPB's transportation planning process. This certification process includes a review of the Region's freight transportation planning activities.

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. Key freight provisions affecting all levels of government include[1]:

1 This list of MAP-21 provisions is a slightly modified version of FHWA's Significant Freight Provisions Fact Sheet available at http://www.fhwa.dot.gov/map21/factsheets/freight.cfm

- Establishment of a National Freight Policy: The USDOT will establish a national freight policy to improve the condition and performance of the national freight network and provide the foundation for the United States to compete in the global economy.
- Establishment of a National Freight Network: The USDOT will establish a national freight network consisting of:
    - a 27,000 mile primary freight network (PFN);
    - those portions of the Interstate System that are not part of the PFN; and
    - critical rural corridors.
- Development of a National Freight Strategic Plan: The USDOT will develop a national freight strategic plan and update it every three years.
- Development and improvement of freight data: The USDOT will develop new freight data tools and improve existing ones.
- Establishment of a Freight Conditions and Performance Report: The USDOT will prepare a biennial report describing the condition and performance of the National Freight Network.
- Prioritization of projects to improve freight mobility: The USDOT is authorized to allow a maximum federal share of 95 percent for Interstate System (90 percent for non-Interstate System) projects that improve freight efficiency and are identified in a state freight plan.
- Encouragement of state freight advisory committees and freight plans: the USDOT will encourage states to establish freight advisory committees and to develop comprehensive freight plans.
- Changes eligibility for freight projects under certain grant and loan programs:
    - Surface Transportation Program (STP) – provides eligibility for truck parking improvements and for intermodal improvements in port terminals;
    - Highway Safety Improvement Program (HSIP) – provides eligibility for truck parking projects;
    - Congestion Mitigation and Air Quality Improvement Program (CMAQ) – provides eligibility for electric vehicle charging stations and natural gas refueling stations;
    - Transportation Infrastructure Finance and Innovation Act (TIFIA) program – restricts loans for freight rail projects to those involving direct intermodal transfer.
- Jason's Law: provides federal funding eligibility for construction of rest areas, commercial motor vehicle parking facilities, and electric vehicle and natural gas vehicle infrastructure.
- Truck Size and Weight Limit Study: The USDOT will provide a report to Congress on a comprehensive study of truck size and weight limits as well as a compilation of state truck size and weight limitations.
- Special Permits During Periods of National Emergency: Allows states to issue divisible load permits to overweight trucks hauling relief supplies following a Presidential declaration of a major disaster.
- Metropolitan and Statewide Planning: Continues to allow shippers and freight transportation providers to participate in metropolitan and statewide transportation planning processes. Continues to require that planning processes consider strategies to increase the accessibility and mobility for people and freight, and enhance integration and connectivity across and between modes for people and freight.

- Performance: The USDOT will establish national performance goals, measures, and targets in the areas of safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, and environmental sustainability. States will be required to set targets in each of the above areas and MPOs will set targets in some cases as well. To the maximum extent practicable, state and MPO target setting should be coordinated.

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.

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. Further TPB actions related to MAP-21 will be developed as additional NPRMs are released.

1.3.5 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.

District of Columbia Freight Planning

The District of Columbia has recently published two major documents that include significant freight provisions. Staff from the District Department of Transportation (DDOT) currently chairs the TPB Freight Subcommittee.

- The District of Columbia Freight Plan: (2014) This plan addresses issues surrounding urban goods movement and includes strategies and recommendations to support sustainable future economic growth and balance the needs of communities and industries within the District. It is the foundation for integrating freight priority projects into the District's capital programming process.
- MoveDC: (2014) MoveDC is the District's multimodal long-range transportation plan. It includes a freight element based on information developed in the District of Columbia Freight Plan.

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.

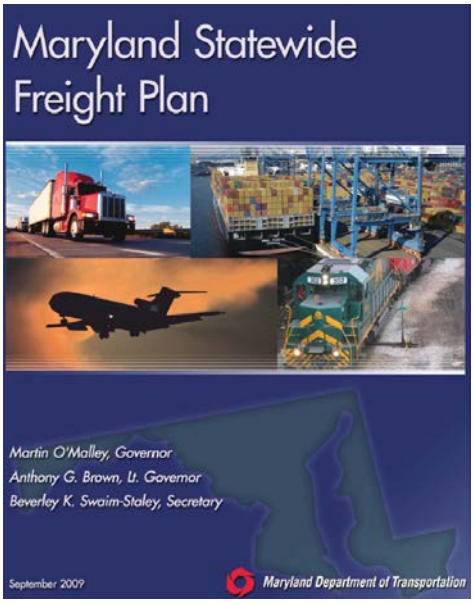
Commonwealth of Virginia Freight Planning

The Commonwealth's Office of Intermodal Planning and Investment coordinates freight planning efforts of several state agencies, including the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (DRPT), and the Virginia Port Authority (VPA). 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) This study established a guiding framework for near-term and long-range freight policy and investment strategies. It compiled available information, identified current and projected future needs, and provided implementable recommendations for Commonwealth freight planning and programming. Many structural elements of this Plan were modeled on this Phase I Study.
- Virginia Statewide Multimodal Freight Study, Phase II: (2011) This study developed analysis tools, analyzed corridor and regional freight needs and alternatives, and evaluated infrastructure projects and policy alternatives based on public benefits and return on investment to the Commonwealth.
- Virginia Multimodal Freight Plan: (2013) This plan provides the vision, goals, and investment strategies designed to keep freight moving in Virginia. It describes the relationship among statewide transportation goals, freight specific priorities, and investment strategies; identifies key performance indicators to track progress; and summarizes outreach efforts to engage public agencies and freight stakeholders.
- Virginia Statewide Rail Plan: (2013) This plan provides a vision for passenger and freight rail transportation in Virginia through 2040. It profiles the Commonwealth's current rail assets, services, and capacity choke points. It includes recommended improvement projects and is part of a multimodal interagency transportation planning effort guided by VTrans, Virginia's statewide long-range multimodal policy plan.

State of Maryland Freight Planning

Most of Maryland's statewide and regional 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 and coordinating activities. MDOT has published several relevant freight planning documents including:



- Maryland Statewide Freight Plan: (2009) This plan provides a comprehensive overview of Maryland's current and long-range freight system performance and identifies the public and private investments and policies needed to ensure the efficient movement of freight across the state.

- Maryland Strategic Goods Movement Plan (draft): (2015) This update to the 2009 Maryland Statewide Freight Plan examines existing conditions and long range projections, and recommends policy positions and strategies for MDOT and freight stakeholders to advance over the next five years.
- Maryland Freight System Performance Annual Report(s): This periodically updated report identifies freight performance measures for each Modal Administration within MDOT.

Freight Planning in Other Member Jurisdictions

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. One member jurisdiction, Frederick County Maryland, developed a freight-specific document. The **FREDERICK COUNTY FREIGHT AND LAND USE PLAN** (2011) 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.

Section 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.

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.

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.

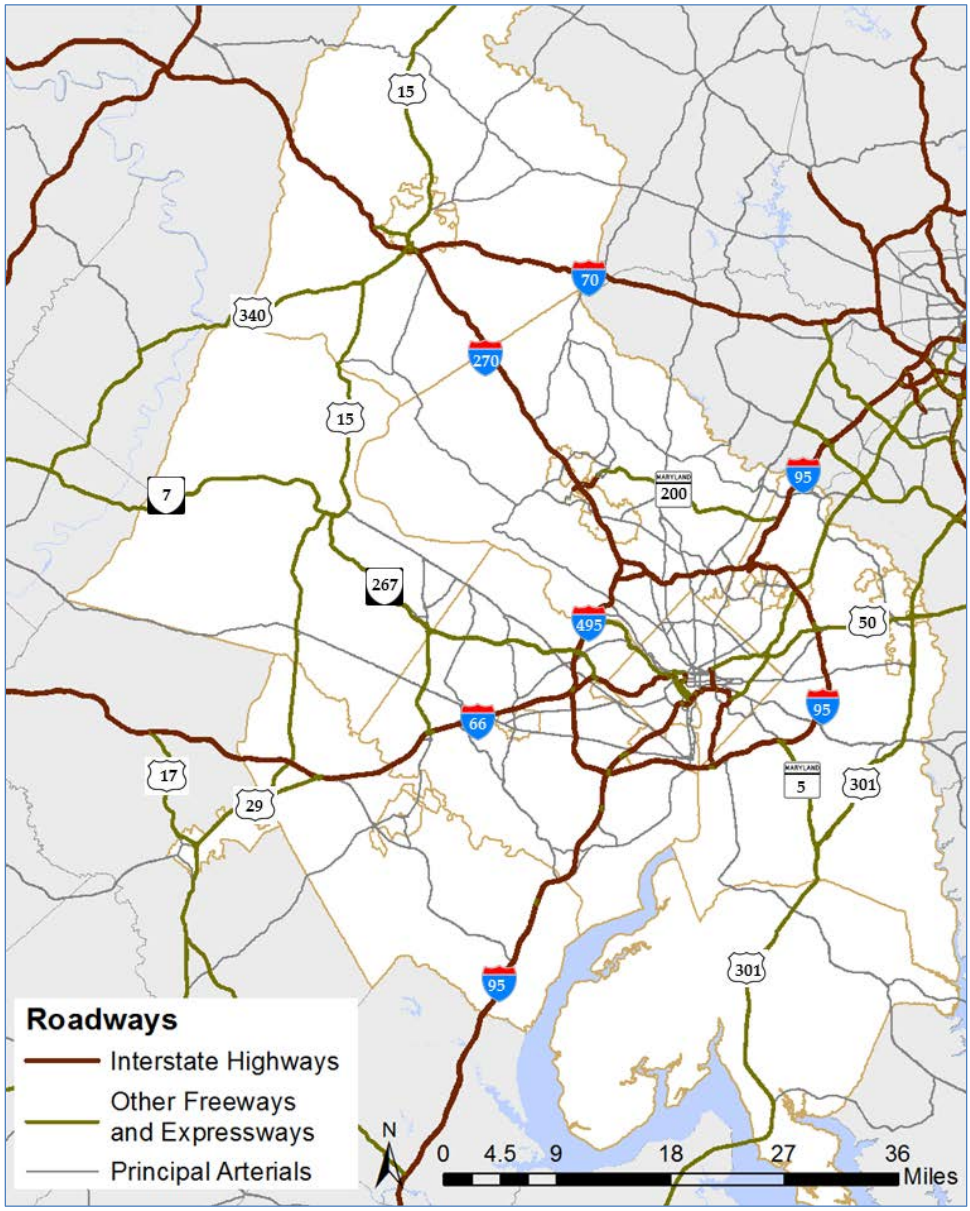
2.2.1 Truck Types

Text under development

2.2.2 Highway Inventory

Text under development

Figure 2.1 Interstate and Primary Highway Systems in the Region



2.2.3 The Regional Freight-Significant Network

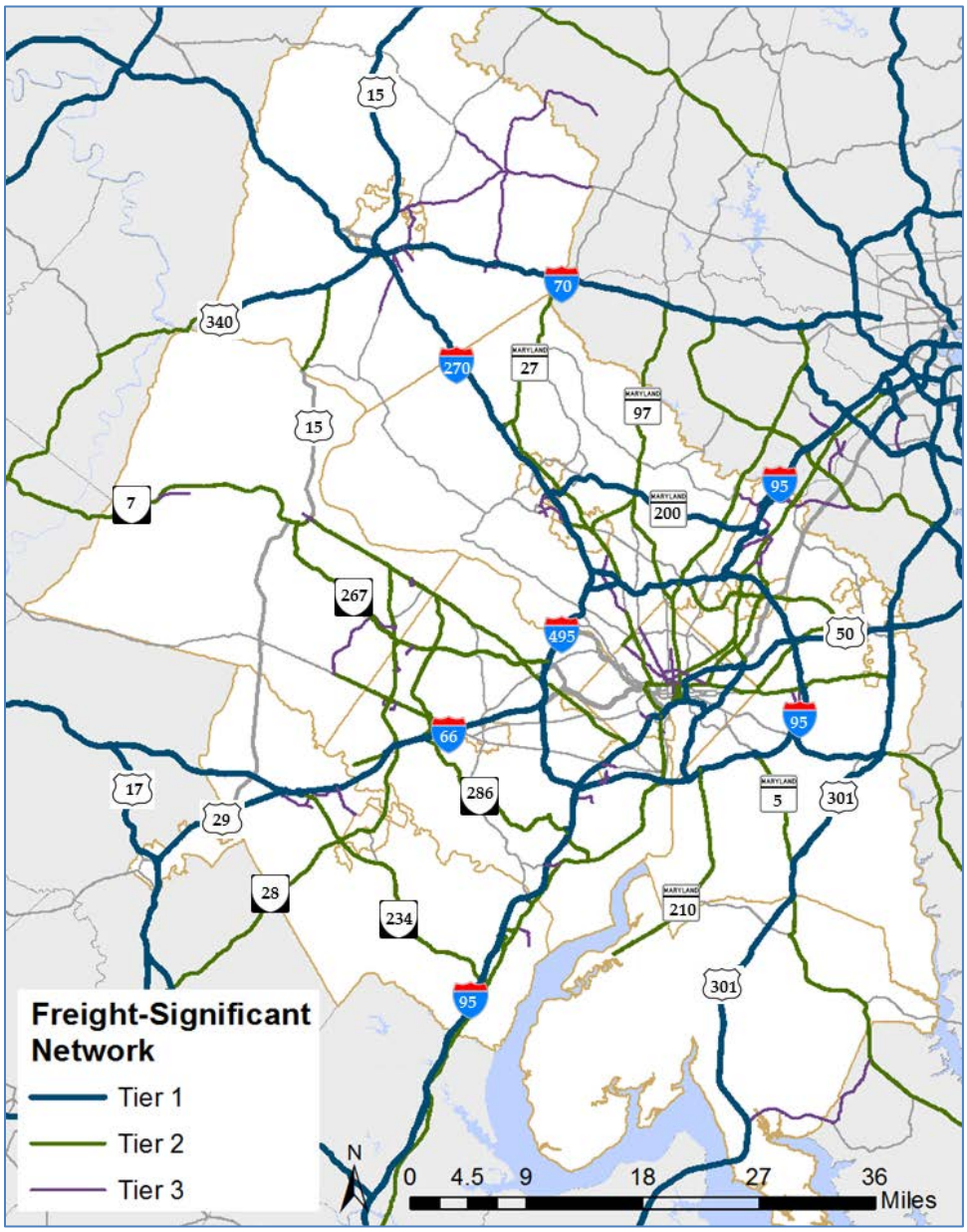
Certain components of the region's highway system are particularly important for goods movement. Each of the Region's member states, Maryland, Virginia, and the District of Columbia have identified a designated truck network linking major freight shipping and receiving areas and accommodating through 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.

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 2.8.

Figure 2.2 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.

Table 2.1 Components of the Regional Freight-Significant Network

Route Name	Tier	From	To	Comments
Frederick County, MD				
I-70	Tier 1	Washington-Frederick County line	Frederick-Carroll County line	Part of Maryland Truck Route System
I-270	Tier 1	Montgomery-Frederick County line	I-70	Part of Maryland Truck Route System
US-15	Tier 1	US-340	Maryland-Pennsylvania line	Provides good truck access from Frederick to Gettysburg, PA and points north
US-340	Tier 1	Washington-Frederick County line	I-70	Part of Maryland Truck Route System
US-15	Tier 2	MD 28	US-340	Provides access to commercial and freight routes to Point of Rocks and points south – note vehicle length restrictions in place on US-15 in Loudoun County, VA
MD 140	Tier 2	US-15	Frederick-Carroll County line	Provides truck access to various facilities in northern Frederick and Carroll Counties
MD 26	Tier 3	US-15	Frederick-Carroll County line	Provides access to commercial and industrial areas including MD 75 and to Carroll County and beyond
MD 75	Tier 3	W. Baldwin Road	Frederick-Carroll County line	South of I-70: provides truck access to W. Baldwin Road / Intercoastal Drive and on to Costco distribution facility – note vehicle height restrictions south of W. Baldwin Road North of I-70: provides truck access to cement plant in Carroll County
MD 85	Tier 3	I-70	Manor Woods Road	Provides truck access to industrial areas
MD 355	Tier 3	MD 85	New Technology Way	Provides truck access to commercial and industrial areas – note trucks are not encouraged beyond New Technology Way
MD 550	Tier 3	MD 194	MD 26	Provides truck access to Woodsboro Mining and connection to MD 75 via MD 26
Monocacy Blvd	Tier 3	South Street / Reichs Ford Road	MD 26	Provides truck access to industrial areas in and around Frederick
Reichs Ford Road	Tier 3	I-70	Ray Smith Road	Provides truck access to industrial and commercial areas

Route Name	Tier	From	To	Comments
W. Baldwin Road & Intercoastal Drive	Tier 3	MD 75	Costco distribution facility	Provides truck access to Costco distribution facility
Montgomery County, MD				
I-270	Tier 1	I-495	Montgomery-Frederick County line	Part of Maryland Truck Route System
I-270 SPUR	Tier 1	I-495	I-270	Part of Maryland Truck Route System
I-370	Tier 1	I-270	MD 200	Provides truck connection between I-270 and I-95
I-495	Tier 1	Virginia – Maryland line	Montgomery-Prince George's County line	Part of Maryland Truck Route System
MD 200	Tier 1	I-370	Montgomery-Prince George's County line	Provides truck connection between I-270 and I-95
US-29	Tier 2	DC-Maryland line	Montgomery-Howard County line	Connects to DC Truck Route (Georgia Ave.) and provides truck access to a variety of commercial areas in Silver Spring, White Oak, and Columbia
MD 27	Tier 2	MD 355	Montgomery-Howard County line	Provides truck access to northern Montgomery County
MD-28	Tier 2	I-270	MD 97	Provides truck access to commercial areas in central Montgomery County
MD 97	Tier 2	US-29	Montgomery-Howard County line	Connects to DC Truck Route (Georgia Ave.) via US-29 and provides access to commercial areas of Silver Spring, Wheaton and points north
MD 355	Tier 2	I-495	MD 27	Provides truck access to commercial areas of Rockville and Gaithersburg
MD 355	Tier 2	MD 410 / MD 187	DC-Maryland line	Connects to DC Truck Route (Wisconsin Ave.) and provides truck access to a variety of commercial areas in the District of Columbia and Bethesda
MD 193	Tier 2	I-495	Montgomery-Prince George's County line	Provides truck access to commercial areas in southern Montgomery and western Prince George's Counties
Father Hurley Blvd & Ridge Road	Tier 2	I-270	MD 27 / MD 355	Provides truck access to commercial areas in Germantown and connects I-270 to MD 27 and MD 355
MD 28	Tier 3	I-270	Darnestown Road	Provides truck access to Johns Hopkins and Adventist Hospital as well as adjacent commercial areas
MD 119	Tier 3	Sam Eig Highway	MD 28	Provides truck access to Johns Hopkins and Adventist Hospital as well as adjacent commercial areas

Route Name	Tier	From	To	Comments
MD 187	Tier 3	MD 355 (in Bethesda)	MD 355 (north of I-495)	Provides truck access to commercial and medical facilities including the National Institutes of Health, Montgomery Mall, and Bethesda
MD 198	Tier 3	U.S-29	Montgomery-Prince George's County line	Provides truck access from U.S. 29 to industrial areas along Sweitzer Ln – also provides truck access to Laurel and Fort Meade.
Sam Eig Highway	Tier 3	I-270 / I-370	MD 119	Provides truck access to Johns Hopkins and Adventist Hospital as well as adjacent commercial areas
Prince George's County, MD				
I-95	Tier 1	Virginia – Maryland line	Prince George's-Howard County line	Part of Maryland Truck Route System
I-295	Tier 1	I-495	Maryland-DC line	Part of Maryland Truck Route System
I-495	Tier 1	Montgomery-Prince George's County line	I-95	Part of Maryland Truck Route System
US-50	Tier 1	DC-Maryland line	Prince George's-Anne Arundel County line	Part of Maryland Truck Route System – provides connectivity to DC Truck route System (New York Ave)
US-301	Tier 1	Charles-Prince George's County line	Prince George's-Anne Arundel County line	Part of Maryland Truck Route System
MD 3	Tier 1	US-50	Prince George's-Anne Arundel County line	Part of Maryland Truck Route System
MD 4	Tier 1	I-95	US-301	Part of Maryland Truck Route System
MD 200	Tier 1	Montgomery-Prince George's County line	US-1	Provides truck connection between I-270 and I-95 / US-1
MD 201	Tier 1	US-50	Maryland-DC line	Provides critical truck connection between US-50 and DC-295 (DC Truck Route) and for trucks leaving DC to reach US-50 and I-95 / I-495
US-1	Tier 2	DC-Maryland line	Prince George's-Howard County line	Provides truck access to a variety of commercial and industrial areas along the entire length of the corridor. Connects to DC Truck Route (Rhode Island Avenue)
US-1 ALT	Tier 2	DC-Maryland line	US-1	Connects to DC Truck Route (Bladensburg Rd) – provides access to commercial and industrial areas in and around Hyattsville

Route Name	Tier	From	To	Comments
MD 4	Tier 2	US-301	Prince George's-Anne Arundel County line	Provides truck access from US-301 to points east and south and to commercial areas of Calvert County
MD 5	Tier 2	I-95	Prince George's-Charles County line	Provides truck connection between Southern Maryland and the National Capital Region - connects Southern Maryland to the National Freight Network
MD 193	Tier 2	Montgomery-Prince George's County line	MD 450	Provides truck access to commercial areas in Langley Park, College Park, Greenbelt, and Bowie
MD 201	Tier 2	US-50	MD 212	Provides truck access to commercial and industrial areas of Greenbelt, Bladensburg, Cheverly, and Hyattsville – including the Pepsi bottling plant in Cheverly and the Tuxedo Road industrial area in Hyattsville
MD 210	Tier 2	I-95	Prince George's-Charles County line	Provides truck access to Indian Head from I-95 / I-495
MD 214	Tier 2	DC-Maryland line	US-301	Provides truck connection to East Capitol St. (DC Truck Route) – provides truck access to and from the industrial areas off Ritchie Rd and Hampton Park Blvd
MD 450	Tier 2	MD 193	MD 704	Links MD-193 to MD-704
MD 704	Tier 2	DC-Maryland line	MD 450	Connects DC Truck Route system (East Capitol St. via 63rd St) to commercial areas in central Prince George's County and to US-50
MD 198	Tier 3	Montgomery-Prince George's County line	Prince George's-Anne Arundel County line	Provides access from I-95 and US-29 to industrial areas along Sweitzer Ln – also provides truck access to Laurel and Fort Meade
MD 212	Tier 3	US-1	MD 201	Connects the industrial areas in Beltsville (east of the CSX Capital Subdivision) to US-1 – note: the portion of MD-212 (Powder Mill Rd) between Ammendale Rd and US-1 is "not" part of the Regional Freight-Significant Network
MD 212 – Ammendale Rd – Virginia Manor Road	Tier 3	I-95	Konterra Dr – Muirkirk Rd	Provides truck access between I-95 and the commercial and industrial areas along Virginia Manor Rd and Konterra Dr., including the FedEx and Frito Lay facilities along Trolley Lane - the portion of MD-212 (Powder Mill Rd) between Ammendale Rd and US-1 is "not" part of the Regional Freight-Significant Network
Edmonston Rd – Old Baltimore Pike	Tier 3	MD-201 / MD-212	Muirkirk Rd	Provides truck access to industrial areas in and around Beltsville

Route Name	Tier	From	To	Comments
Leeland Rd	Tier 3	Safeway distribution center entrance	US-301	Provides truck access to and from major Safeway distribution center – note: Leeland Rd east of the Safeway distribution center is not recommended for trucks
Muirkirk Rd	Tier 3	Virginia Manor Rd / Konterra Dr	Old Baltimore Pike	Provides truck access from MD-200 and I-95 to Beltsville industrial areas (via Konterra Dr and Virginia Manor Rd / MD-212 – note: Bridge over CSX on Muirkirk Rd is weight restricted - 56,000 lbs for single unit trucks and 54,000 lbs for combinations
Ritz Way	Tier 3	Virginia Manor Rd	US-1	Provides access to US-1 in Beltsville from MD-200 via Konterra Dr and Virginia Manor Rd and from I-95 via MD-212 and Virginia Manor Rd
Sweitzer Ln – Konterra Dr	Tier 3	MD 198	Virginia Manor Rd / Muirkirk Rd	Provides truck access to industrial areas including a major UPS facility and a WSSC Filtration Plant
Charles County, MD				
US-301	Tier 1	Virginia-Maryland line	Charles-Prince George's County line	Part of Maryland Truck Route System
MD 5	Tier 2	US-301	Charles-St. Mary's County line	Provides truck connection between Southern Maryland and the National Capital Region - connects Southern Maryland to the National Freight Network
MD 210	Tier 2	Prince George's-Charles County line	Naval Support Facility Indian Head	Provides truck access to Indian Head from I-95 / I-495
MD 234	Tier 3	US-301	Charles-St. Mary's County line	Provides a connection (in combination with MD-236, MD-5, and MD-235) between industrial and commercial areas of St. Mary's county and US-301
District of Columbia				
I-295	Tier 1	Maryland-DC line	I-695 / DC-295	Provides truck access to the District of Columbia from I-95 / I-495 and points south
I-395	Tier 1	Virginia – DC line	New York Avenue	Provides truck access to the District of Columbia from I-95 / I-495 and points south
I-695	Tier 1	I-395	I-295 / DC-295	Major east-west Interstate connection through the District of Columbia
DC-295	Tier 1	I-295 / I-695	DC-Maryland line	Provides truck access to the District of Colombia from Maryland and points east
New York Avenue (US-50)	Tier 1	Maryland-DC line	I-395	Provides truck access to the District of Colombia from Maryland and points east

Route Name	Tier	From	To	Comments
Benning Road	Tier 2	Bladensburg Road	East Capitol Street	Provides truck connections between commercial areas in the District and Maryland
Bladensburg Road	Tier 2	Benning Road	DC-Maryland line	Provides truck connections between commercial areas in the District and Maryland
East Capitol Street	Tier 2	Benning Road	DC-Maryland line	Provides truck connections between commercial areas in the District and Maryland
Georgia Avenue	Tier 2	7th Street NW	DC-Maryland line	Provides truck connections between commercial areas in the District and Maryland
Independence Avenue	Tier 2	14th Street NW	7th Street NW	Provides truck connections between 7th Street NW and access points to I-395 via 12th and 14th Streets NW
Rhode Island Avenue	Tier 2	7th Street NW	DC-Maryland line	Provides truck connections between commercial areas in the District and Maryland
Western Avenue	Tier 2	Wisconsin Avenue	Massachusetts Avenue	Provides truck connection between Wisconsin and Massachusetts Avenues
Whitehurst Freeway	Tier 2	M Street NW	K Street NW	Links Key Bridge and Virginia to the central business district
Wisconsin Avenue	Tier 2	Maryland-DC line	K Street NW	Provides truck connections between commercial areas in the District and Maryland
H Street (NW and NE)	Tier 2	Massachusetts Avenue	Benning Road	Provides truck connections from the central business district to Maryland and points east
K Street NW	Tier 2	Georgetown	12th Street NW	Provides truck connections between the central business district, Georgetown, the Whitehurst Freeway, Virginia and points south
M Street NW	Tier 2	Wisconsin Avenue	US-29	Provides truck connection between Wisconsin Avenue, Virginia, and points south
7th Street NW	Tier 2	Independence Avenue	Georgia Avenue	Provides truck connections from the central business district to Maryland
12th Street NW	Tier 2	I-395	Massachusetts Avenue	Provides truck access from I-395 to the central business district
Connecticut Avenue	Tier 3	K Street NW	DC-Maryland line	Provides truck access to commercial areas along Connecticut Avenue
Florida Avenue	Tier 3	Benning Road	Massachusetts Avenue	Provides truck access to commercial areas in the District
Massachusetts Avenue	Tier 3	H Street NW	DC-Maryland line	Provides truck access to commercial areas along Massachusetts Avenue
14th Street NW	Tier 3	I-395	Upshur Avenue NW	Provides truck access to commercial areas along 14th Street NW

Route Name	Tier	From	To	Comments
Loudoun County, VA				
US-50	Tier 2	VA-606	Loudoun-Fairfax County line	Provides truck access to Dulles Airport and to Arcola and Chantilly industrial areas
VA-7	Tier 2	Loudoun-Frederick County line	Loudoun-Fairfax County line	Provides truck access to Purcellville, Leesburg, and the commercial areas along VA-7 in eastern Loudoun County - STAA National Network (western Loudoun County), STAA Virginia Qualifying Highway (eastern Loudoun County)
VA-28	Tier 2	VA-7	Loudoun-Fairfax County line	Provides truck access to commercial and industrial areas in Loudoun, Fairfax, and Prince William Counties and the Cities of Manassas and Manassas Park – STAA Virginia Qualifying Highway
VA-267	Tier 2	VA-7	Loudoun-Fairfax County line	Provides truck connections to Leesburg, Dulles Airport, Reston/Herndon, and I-495 – STAA Virginia Access Route
VA-606	Tier 3	VA-28	US-50	Links warehouse area north of Dulles Airport to VA-28, VA-267, and US-50
Cascades Pkwy – Bartholomew Fair Dr	Tier 3	VA-7	Price Cascades Plaza	Provides truck access to Costco and Potomac Run Plaza retail areas - STAA Virginia Access Route
E. Market St	Tier 3	VA-7	Catoctin Circle	Provides truck access to commercial areas of Leesburg - STAA Virginia Access Route
W. Main St	Tier 3	VA-7	N. 23rd St	Provides truck access to downtown Purcellville - STAA Virginia Access Route
Fairfax County, VA				
I-66	Tier 1	Prince William-Fairfax County line	I-495	STAA National Network
I-95	Tier 1	Prince William-Fairfax County line	Fairfax County-City of Alexandria line	STAA National Network
I-395	Tier 1	I-95 / I-495	Fairfax County-City of Alexandria line	STAA National Network
I-495	Tier 1	I-95 / I-395	Virginia-Maryland line	STAA National Network
US-1	Tier 2	Prince William-Fairfax County line	Fairfax County-City of Alexandria line	Provides truck access to Fort Belvoir, Quantico, and an assortment of businesses in Stafford, Prince William, and Fairfax Counties as well as the City of Alexandria

Route Name	Tier	From	To	Comments
US-29	Tier 2	Luck Stone quarry just east of the Manassas National Battlefield Park	I-66	Provides truck access to Luck Stone quarry
US-50	Tier 2	Loudoun-Fairfax County line	I-66	Provides access to Dulles Airport and to Arcola and Chantilly industrial areas - STAA Virginia Access Route between Lee Rd and I-66
VA-7	Tier 2	Loudoun-Fairfax County line	Fairfax County-City of East Falls Church line	Provides truck access to commercial areas along VA-7 in Fairfax County
VA-7	Tier 2	City of East Falls Church-Fairfax County line	Fairfax County-City of Alexandria line	Provides truck access to commercial areas along VA-7 in Fairfax County
VA-28	Tier 2	Loudoun-Fairfax County line	Fairfax-Prince William County line	Provides truck access to commercial and industrial areas
VA-267	Tier 2	Loudoun-Fairfax County line	I-495	Provides truck connections to Dulles Airport, Reston/Herndon, and I-495 - STAA Virginia Access Route
VA-286	Tier 2	VA-7	US-1	Provides truck connections between VA-7, I-66, and I-95 and access to Fort Belvoir
Braddock Rd – Port Royal Rd	Tier 3	I-495	Terminus of Port Royal Rd	Provides truck access to industrial areas along Port Royal Rd - STAA Virginia Access Route
Centreville Rd	Tier 3	VA-267	Coppermine Rd	Provides truck access to commercial areas along Centreville Rd - STAA Virginia Access Route
Franconia Rd – Fleet Rd	Tier 3	I-95	Fleet Industrial Park	Provides truck access to commercial and industrial areas including Springfield Town Center and Fleet Industrial Park - STAA Virginia Access Route
Lee Rd	Tier 3	US-50	Flint Lee Rd	Provides truck access to industrial areas along Lee Rd and to the Chantilly Crossing Shopping Center (Costco) - STAA Virginia Access Route
Lorton Rd	Tier 3	I-95	US-1	Provides a truck connection between I-95 and US-1 in Lorton - STAA Virginia Access Route
McLearen Rd – Towerview Rd – Park Center Rd	Tier 3	VA-28	Terminus of Park Center Rd	Provides truck access to industrial areas along Park Center and Towerview Roads - STAA Virginia Access Route
Terminal Rd	Tier 3	VA-286	Terminus	Provides truck access to Plantation Pipeline Terminal facilities and other industrial areas - STAA Virginia Access Route

Route Name	Tier	From	To	Comments
Walney Rd – Willard Rd	Tier 3	US-50	Brookfield Corporate Drive	Provides truck access to the Dulles Expo Center and other commercial areas - STAA Virginia Access Route
City of Falls Church, VA				
VA-7	Tier 2	Fairfax County-City of Falls Church line	City of Falls Church- Fairfax County line	Provides truck access to commercial areas along VA-7 in Falls Church and connects to VA-7 on either side of Falls Church
Prince William County, VA				
I-66	Tier 1	Fauquier-Prince William County line	Prince William-Fairfax County line	STAA National Network
I-95	Tier 1	Stafford-Prince William County line	Prince William-Fairfax County line	STAA National Network
US-29	Tier 1	Fauquier-Prince William County line	I-66	STAA National Network
US-1	Tier 2	Stafford-Prince William County line	Prince William-Fairfax County line	Provides truck access to Fort Belvoir, Quantico, and an assortment of businesses in Stafford, Prince William, and Fairfax Counties
VA-28	Tier 2	Fairfax-Prince William County line	Prince William County-City of Manassas Park line	Provides truck access to commercial and industrial areas in Loudoun, Fairfax, and Prince William Counties and the Cities of Manassas and Manassas Park
VA-28	Tier 2	City of Manassas-Prince William County line	Prince William-Fauquier County line	Provides truck access to commercial and industrial areas in Loudoun, Fairfax, and Prince William Counties and the Cities of Manassas and Manassas Park
VA-234	Tier 2	I-66	City of Manassas-Prince William County line	Provides truck connection through Prince William County between US-1, I-95, City of Manassas, I-66, and the Balls Ford Road industrial area
VA-234	Tier 2	City of Manassas-Prince William County line	US-1	Provides truck connection through Prince William County between US-1, I-95, City of Manassas, I-66, and the Balls Ford Road industrial area
Balls Ford Road	Tier 3	Wellington Rd	Terminus of Balls Ford Rd	Provides truck access to industrial areas along the length of Balls Ford Rd – provides truck connection to Wellington Rd industrial and commercial areas - STAA Virginia Access Route
Dale Blvd – Neabsco Mills Rd	Tier 3	I-95	US-1	Provides truck connection between I-95 and US-1 - STAA Virginia Access Route
Featherstone Rd – Farm Creek Dr	Tier 3	US-1	Terminus of Farm Creek Dr	Provides truck access to industrial areas along Farm Creek Dr - STAA Virginia Access Route

Route Name	Tier	From	To	Comments
Opitz Blvd	Tier 3	I-95	US-1	Provides truck connection between I-95 and US-1 - STAA Virginia Access Route
Sudley Rd	Tier 3	I-66	Godwin Dr	Provides truck access to industrial and commercial areas, including Costco, Westgate Plaza Shopping Center, and Manassas Mall - STAA Virginia Access Route
Wellington Rd	Tier 3	Limestone Dr	Livingston Rd	Provides truck access to industrial areas - STAA Virginia Access Route
City of Manassas, VA				
VA-28	Tier 2	City of Manassas Park-City of Manassas line	City of Manassas – Prince William County line	Provides truck access to commercial and industrial areas in Loudoun, Fairfax, and Prince William Counties and the Cities of Manassas and Manassas Park
VA-234	Tier 2	Prince William County-City of Manassas line	City of Manassas – Prince William County line	Provides truck connection through Prince William County between US-1, I-95, City of Manassas, I-66, and the Balls Ford Road industrial area
City of Manassas Park, VA				
VA-28	Tier 2	Prince William County-City of Manassas Park line	City of Manassas Park– City of Manassas line	Provides truck access to commercial and industrial areas in Loudoun, Fairfax, and Prince William Counties and the Cities of Manassas and Manassas Park
Fauquier County, VA (Urbanized Area)				
US-29	Tier 1	Through urbanized area		STAA National Network
US-17	Tier 1	Through urbanized area		STAA National Network – trucks prohibited on US-17 between I-66 and US-50
Arlington County, VA				
I-395	Tier 1	City of Alexandria-Arlington County line	Virginia-DC line	STAA National Network
US-1	Tier 2	City of Alexandria-Arlington County line	Virginia-DC line	Provides truck access to an assortment of businesses in Arlington County and the City of Alexandria
VA-110	Tier 2	I-395	Rosslyn	Provides a truck connection between I-395 and US-29 / Key Bridge
Lynn St – Fort Meyer Dr	Tier 2	VA-110	Virginia-DC line – Key Bridge	Provides truck connection between the Key Bridge and VA-110
VA-27	Tier 3	I-395	2nd Street S.	Provides truck access Fort Myer - STAA Virginia Access Route

Route Name	Tier	From	To	Comments
VA-233	Tier 3	US-1	Washington Reagan National Airport	Provides truck access to Washington Reagan National Airport
City of Alexandria, VA				
I-95	Tier 1	Fairfax County-City of Alexandria line	Virginia-Maryland line	STAA National Network
I-395	Tier 1	Fairfax County-City of Alexandria line	City of Alexandria-Arlington County line	STAA National Network
US-1	Tier 2	Fairfax County-City of Alexandria line	City of Alexandria-Arlington County line	Provides truck access to Arlington and Fairfax Counties as well as the City of Alexandria
VA-7	Tier 2	Arlington County-City of Alexandria line	I-395	Provides truck access to the commercial areas along VA-7 in Fairfax County
Duke Street	Tier 3	I-395	S. Pickett St	Provides truck access to the Landmark Mall and other commercial areas - STAA Virginia Access Route
Van Dorn St – Metro Rd	Tier 3	I-95 / I-495	Edsall Rd	Provides truck access to industrial areas and CSX intermodal facility - STAA Virginia Access Route and FHWA Intermodal Connector

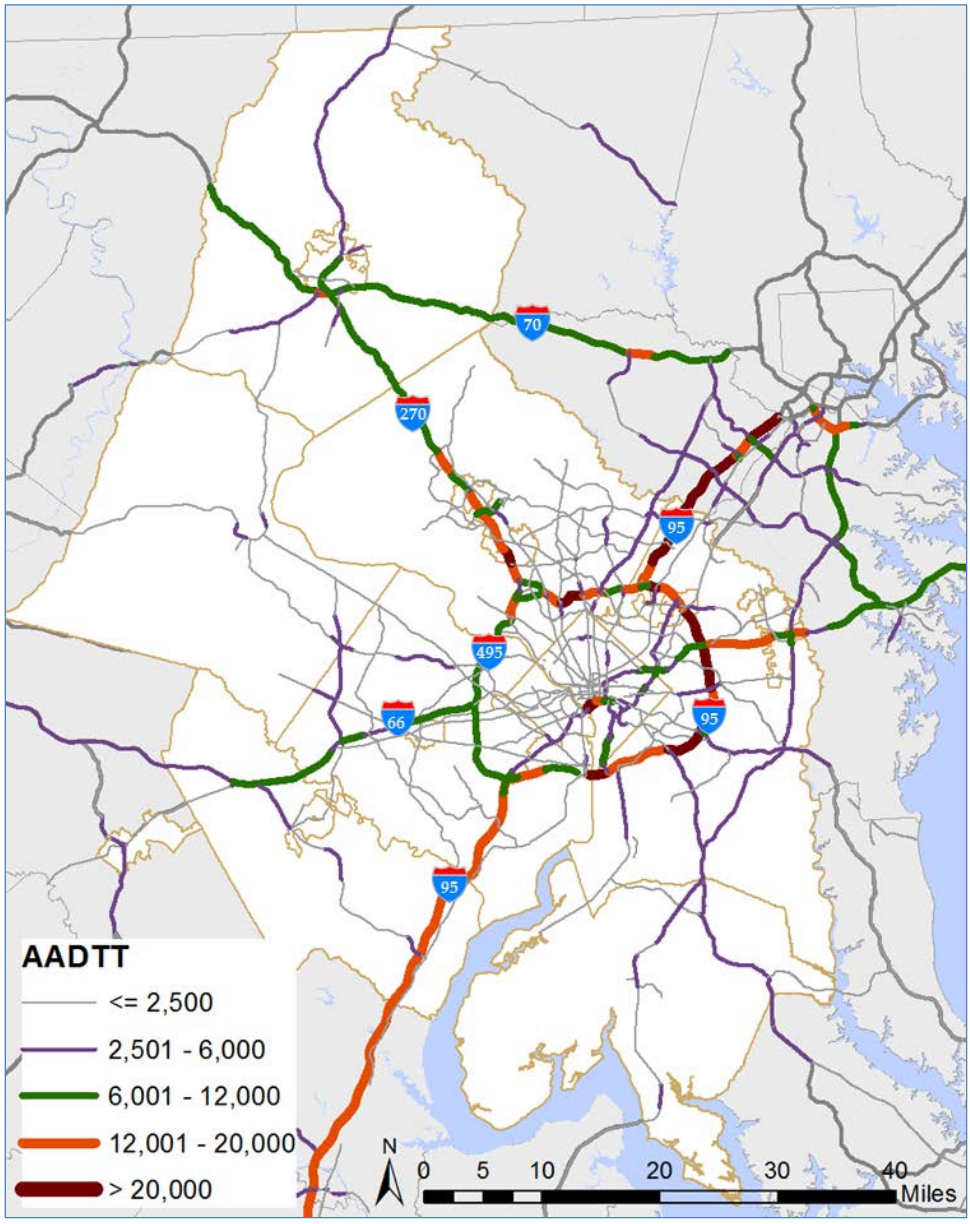
Figure 2.3 Truck Parking Area Locations in the Region

Graphic under development

2.2.4 Truck Utilization

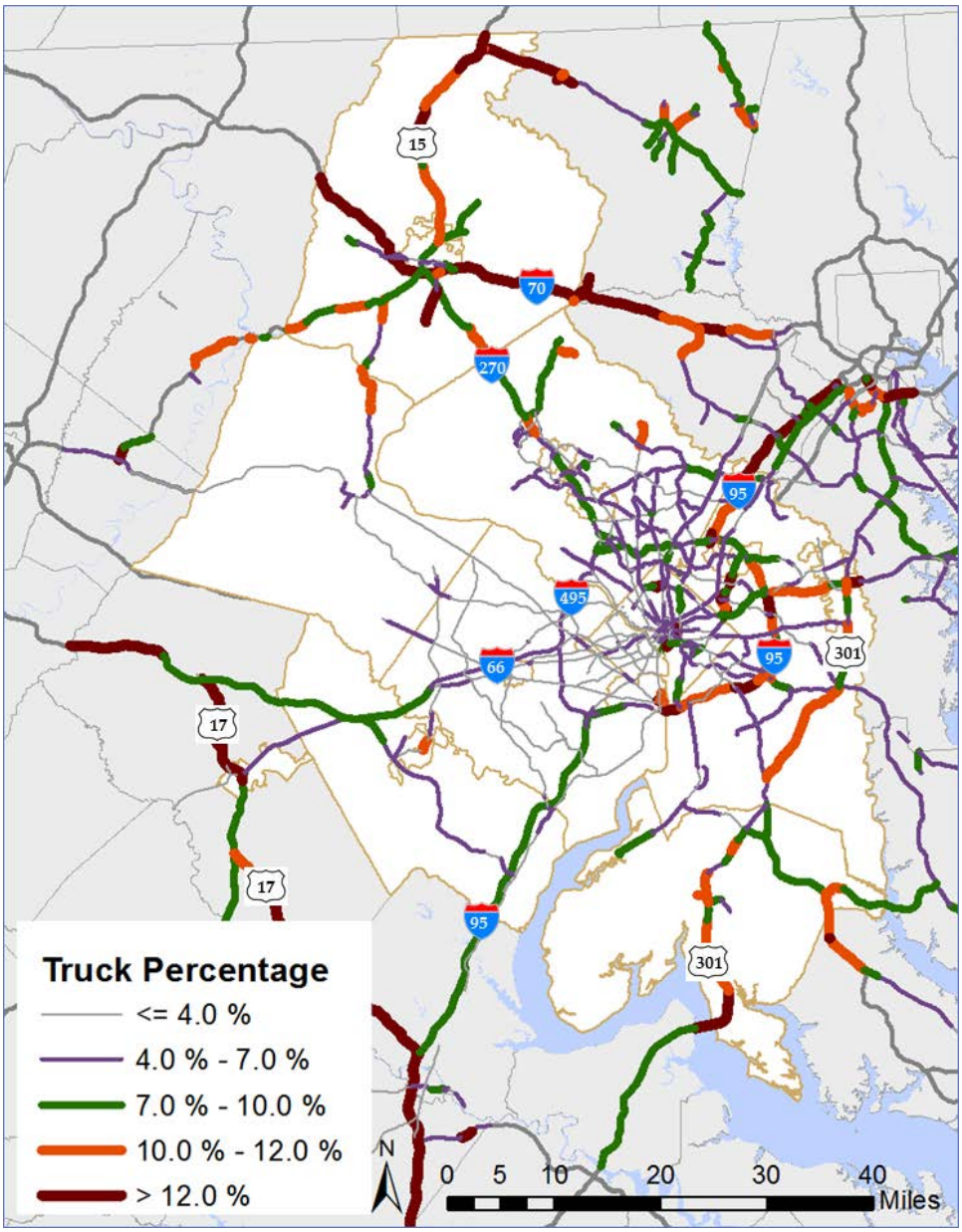
Analysis of Highway Performance Monitoring System (HPMS) data provides average annual daily truck traffic (AADTT) and truck percentage data by roadway segment. Viewing these data (See Figures 2.11 and 2.12) provide an understanding of which roadways have the most truck volume and which roadways have a high proportion of truck traffic.

Figure 2.4 Average Truck AADT Map



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

Figure 2.5 Average Truck Percentage Map



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

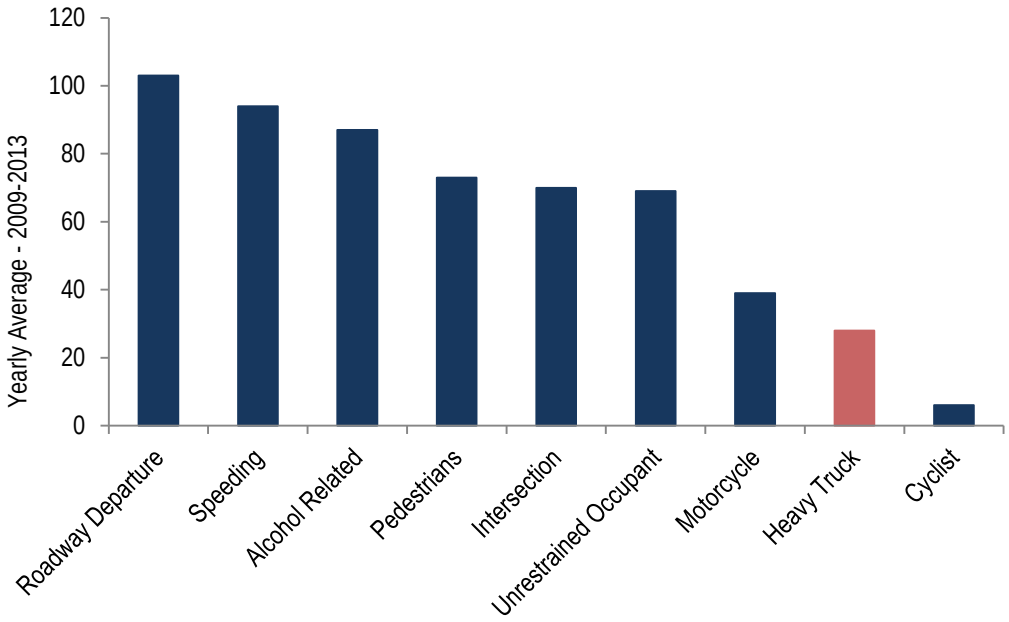
2.1.4 Pavement and Bridge Condition

Text under development

2.1.5 Truck Safety

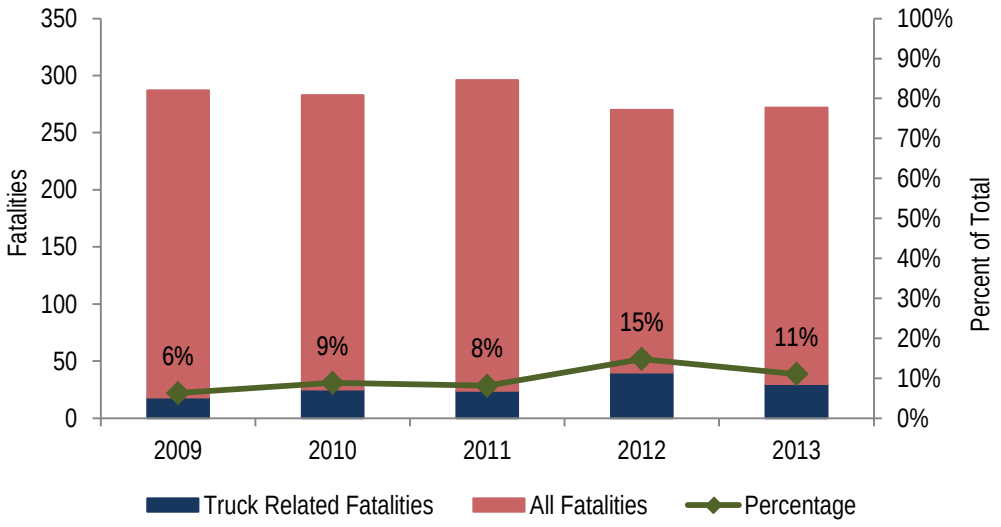
Text under development

Figure 2.6 Fatalities in the Region by Emphasis Area



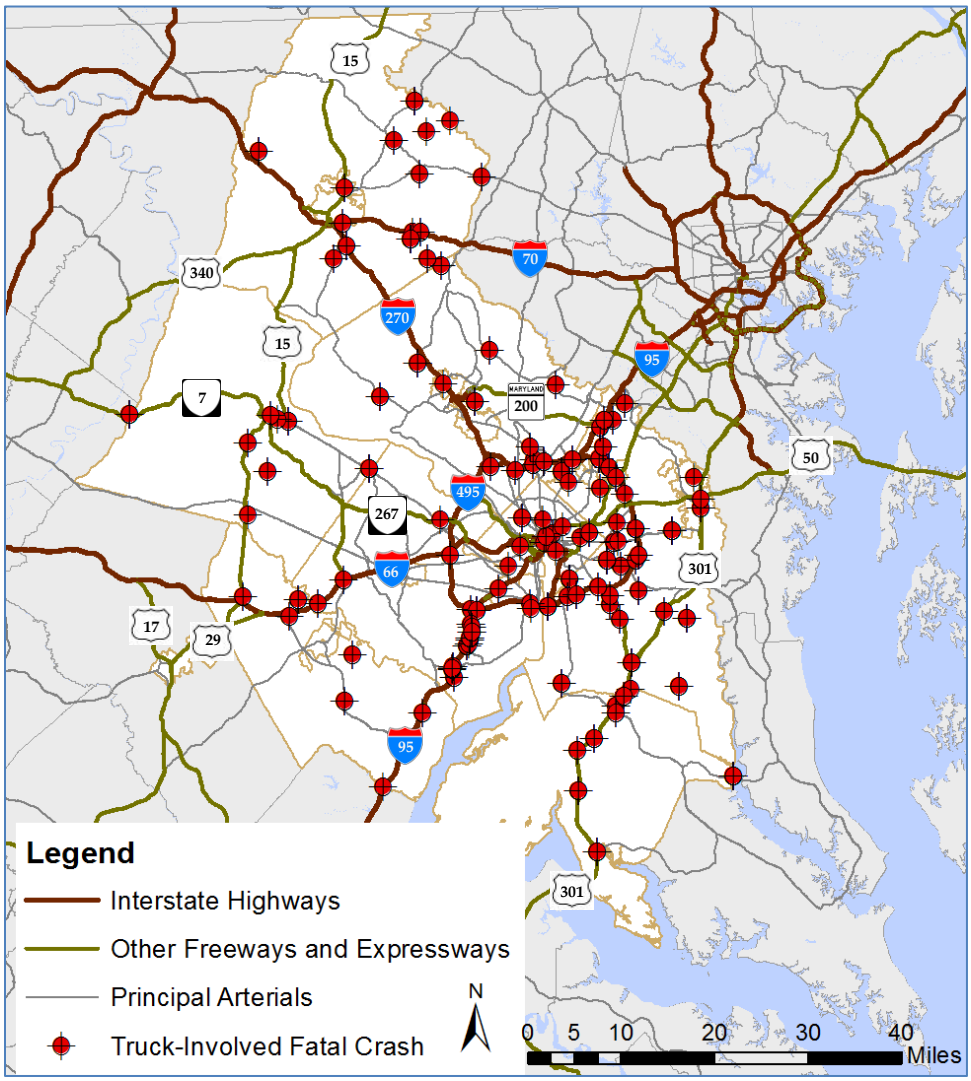
Source: MWCOG analysis of District Department of Transportation, Maryland Highway Safety Office, and Virginia Department of Motor Vehicles safety data - for planning purposes only

Figure 2.7 National Capital Region Crash-Related Fatalities



Source: MWCOG analysis of District Department of Transportation, Maryland Highway Safety Office, and Virginia Department of Motor Vehicles safety data - for planning purposes only

Figure 2.8 Fatal Truck Crashes in the Region – 2009 – 2013



2.2 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.

2.2.1 Railcar Types and Rail Services

Text under development

2.2.2 Rail System Inventory

Text under development

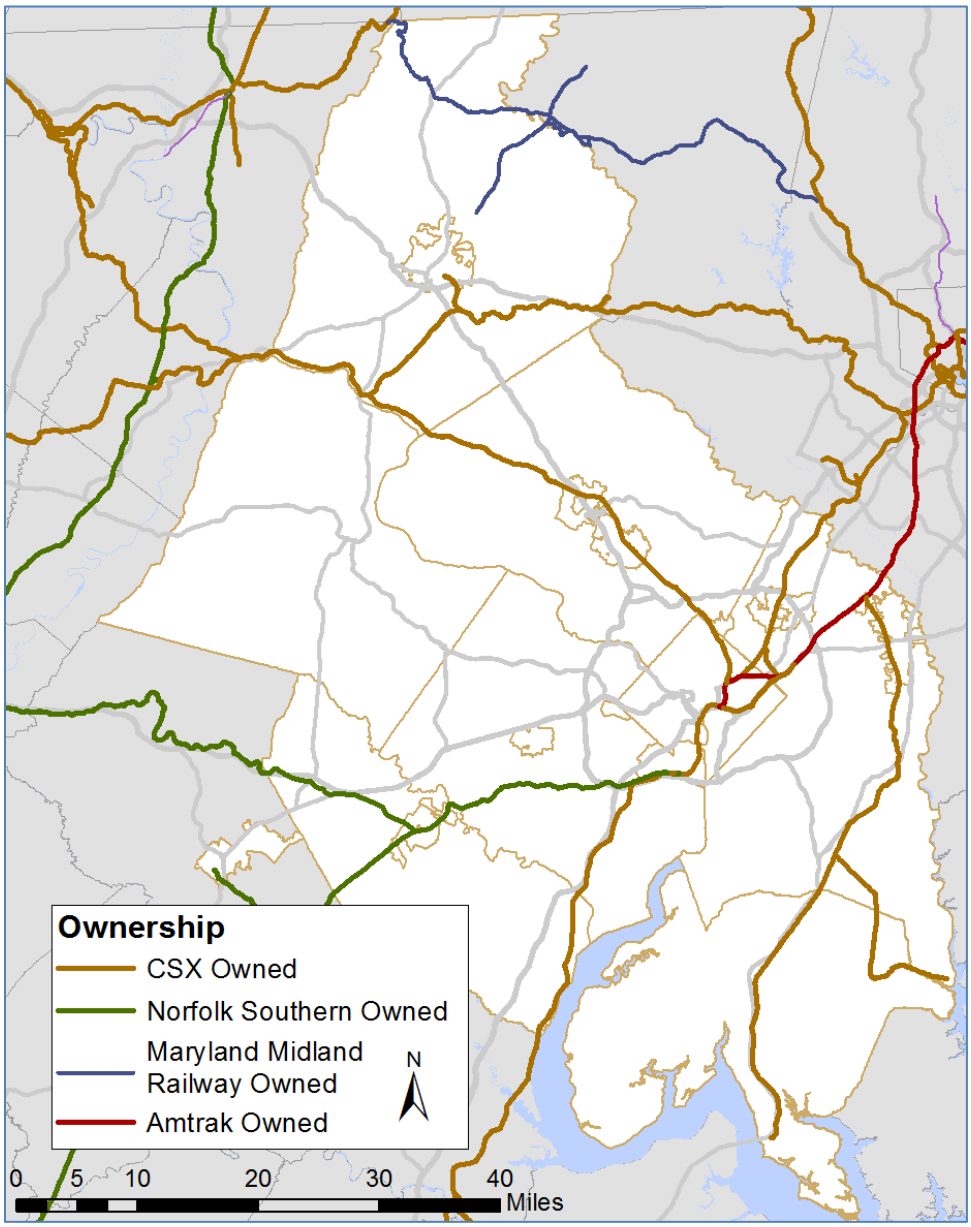
Table 2.2 National Capital Region Railroads

Railroad	Class I Freight	Class III Freight	Passenger	Miles Owned in the Region
CSX Transportation	√			211
Norfolk Southern Corporation	√			46
Maryland Midland Railway*		√		26
Amtrak			√	18

* Maryland Midland Railroad is a subsidiary of Genesee & Wyoming Inc.

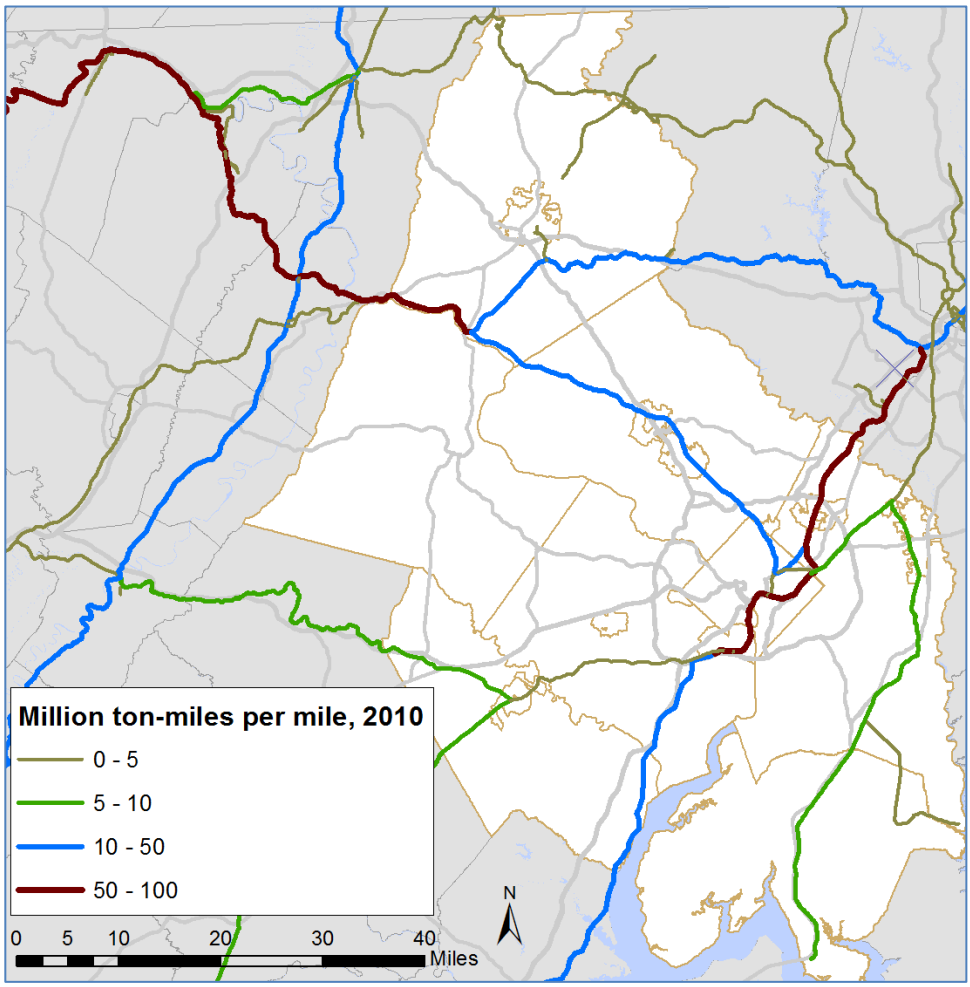
Source: Metropolitan Washington Council of Governments analysis of National Transportation Atlas Database Rail Network file – 2013.

Figure 2.9 Overview of the Region's Rail Network



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

Figure 2.10 Railroad Freight Density - 2010



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

Figure 2.11 Major Intermodal Facilities Served by Rail

Graphic under development

2.3 Selected Warehouse/Distribution Facilities

Section under development

Figure 2.12 Selected Warehouse and Distribution Facilities

Graphic under development

2.4 Air Cargo

2.4.1 Air Cargo Service Types

Text under development

2.4.2 Air Cargo System Inventory

Text under development

Figure 2.13 Major Cargo Airports Serving the National Capital Region

Graphic under development

2.4.3 Air Cargo Operations

Table 2.3 Freight Activity at Cargo Airports Serving the Region

Table under development

Critical Success Factors

Section under development

Role of Out-of-Region Airports

Section under development

2.5 Intermodal Connectors

Section under development

Section 3.0 Freight Demand

To examine the linkage between the economic and demographic drivers of freight (described in the previous section) and actual freight movement, it is helpful to consider various *commodity flow data*, such as:

- The types of commodities that are being moved in support of the Region's economy including their weights, values, and direction of travel;
- The transportation modes used to move these commodities;
- The origins and destinations of freight in the Region, and
- Forecasts for freight movement in the Region.

The Region's transportation system handled more than 379 million tons of freight worth more than $604 billion in 2007

Information obtained from analyses of these data provide insight into the types of industries that generate the most freight demand in the Region, help to identify the products and are consumed and produced, and highlight the relative importance of key regional trading partners. This Section presents the results of these analyses in the form of summary tables and graphics.

3.1 Freight Analysis Framework

The freight demand analysis presented in this report relies on the Freight Analysis Framework[2] (FAF), a publicly available dataset developed by the Federal Highway Administration. The most recently available FAF dataset (for the 2007 calendar year) provides estimates of the quantity of freight by weight (in tons) and by value (in 2007 dollars) moving between different geographic areas, by various freight transportation modes (truck, rail, water, air, pipeline, multiple modes), and by commodity type for the year 2007 with forecasts at intervals out to the year 2040.[3]

The FAF is constructed primarily from United States Census Bureau's Commodity Flow Survey data. The transportation modes, commodity classifications, and geographies developed for the Commodity Flow Survey are carried through to the FAF and described below.

2 For detailed information about the FAF and to download FAF data please visit the Federal Highway Administration's web site at: http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/

3 Detailed descriptions of the FAF commodity types as well as a discussion of FAF geographies is provided in the Appendix, pgs. (A1 – A4)

3.1.1 FAF Transportation Modes

The FAF assigns freight moves to one of seven modes as defined in Table 3.1 below.

Table 3.1 FAF Modes

Mode	Description
Truck	Includes private and for-hire truck. Does not include truck that is part of Multiple Modes & Mail or truck moves in conjunction with domestic air cargo.
Rail	Includes any common carrier or private railroad. Does not include rail that is part of Multiple Modes & Mail.
Multiple Modes & Mail	Includes shipments by multiple modes and by parcel delivery services, U.S. Postal Service, or couriers. This category is not limited to containerized or trailer-on-flatcar shipments. Shipments reported as Multiple Modes can include anything from containerized cargo to coal moving from mine to railhead by truck and rail to harbor. The "Mail" component recognizes that shippers who use parcel delivery services typically do not know what modes were involved after the shipment was picked up.
Water	Includes shallow draft, deep draft, Great Lakes and intra-port shipments. Does not include water that is part of Multiple Modes & Mail.
Air (includes truck-air)	Includes shipments typically weighing more than 100 pounds that move by air or a combination of truck and air in commercial or private aircraft. Includes air freight and air express. Does not include shipments weighing 100 pounds or less which are typically classified with Multiple Modes & Mail. In the case of imports and exports by air, domestic moves by ground to and from the port of entry or exit are categorized with Truck.
Pipeline	Includes crude petroleum, natural gas, and product pipelines. Does not include pipeline that is part of Multiple Modes & Mail.
Other & Unknown	Includes movements not elsewhere classified such as flyaway aircraft, and shipments for which the mode cannot be determined.

Source: Federal Highway Administration Freight Analysis Framework

3.2 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.

3.2.1 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. In this report weight is measured in tons and value in 2007 dollars.

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 2007. 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).

Considering weight first, as shown in Table 3.2:

- 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.

Next, considering value, as shown in Table 3.3:

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

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

Table 3.2 Top Commodity Types by Weight

Rank	Commodity Class	Total (thousands of tons)	Cumulative Share
1	Gravel & crushed stone	41,277	19%
2	Waste & scrap	32,319	35%
3	Nonmetallic mineral products	25,212	47%
4	Other petroleum products	14,421	53%
5	Natural sands	8,869	58%
6	Other prepared foodstuffs	8,032	61%
7	Wood products	7,821	65%
8	Other nonmetallic minerals	7,212	69%
9	Mixed freight	7,164	72%
10	Coal	6,230	75%
11	Gasoline/aviation fuel/ethanol	5,549	78%
12	Fuel oils	3,709	79%
13	Cereal grains	3,439	81%
14	Machinery	3,438	83%
15	Articles of base metal	2,982	84%
16	Other agricultural products	2,549	85%
17	Alcoholic beverages	1,941	86%
18	Milled grain & bakery products	1,890	87%
19	Printed products	1,725	88%
	All other commodities	21,745	100%
	Grand Total	**211,693**	

Source: Federal Highway Administration Freight Analysis Framework

Table 3.3 Top Commodity Types by Value

Rank	Commodity Class	Total (millions of $)	Cumulative Share
1	Electronic & electrical equipment	31,848	13%
2	Machinery	27,578	25%
3	Mixed freight	22,584	34%
4	Pharmaceutical products	19,225	42%
5	Textiles, leather & their articles	13,143	48%
6	Motorized vehicles & parts	11,280	52%
7	Miscellaneous manufactured products	11,143	57%
8	Other prepared foodstuffs	9,214	61%
9	Articles of base metal	8,231	64%
10	Precision instruments and apparatus	7,102	67%
11	Plastics and rubber	6,359	70%
12	Basic chemicals	5,993	72%
13	Other petroleum products	5,566	74%
14	Other chemical products	5,359	77%
15	Nonmetallic mineral products	5,349	79%
16	Furniture/mattresses/lamps/signs	5,216	81%
17	Printed products	5,065	83%
18	Wood products	4,885	85%
19	Meat/poultry/fish/seafood	3,704	87%
	All other commodities	26,614	100%
	Grand Total	**240,712**	

Source: Federal Highway Administration Freight Analysis Framework

3.2.2 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 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.

Tables 3.4 and 3.5 describe the directions of travel for the Region's commodities, based on weight and value.

As shown in Table 3.4, the directions of travel for the Region's top commodities on the basis of weight are:

- Approximately 34 percent of total freight by weight is inbound, 13 percent is outbound, and 54 percent is intraregional. Commodities that are primarily inbound include: petroleum products; wood products; mixed freight; coal; and articles of base metal. Commodities that are primarily intraregional include: gravel and crushed stone; waste and scrap; nonmetallic mineral products; natural sands; nonmetallic minerals; gasoline, aviation fuel. And ethanol; fuel oils; machinery; and alcoholic beverages. Other commodity

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

groups do not show a clearly dominant direction. The fact that inbound freight by weight is more than 2 ½ times greater than outbound freight indicates that the Region's economy consumes significantly more goods than it produces.

Table 3.4 Direction of Travel for Top Commodities by Weight

Rank	Commodity Class	Inbound	Outbound	Intraregional
1	Gravel & crushed stone	18%	3%	78%
2	Waste & scrap	19%	21%	60%
3	Nonmetallic mineral products	22%	16%	61%
4	Other petroleum products	55%	1%	44%
5	Natural sands	27%	3%	70%
6	Other prepared foodstuffs	42%	24%	33%
7	Wood products	54%	17%	29%
8	Other nonmetallic minerals	28%	18%	54%
9	Mixed freight	63%	16%	21%
10	Coal	96%	4%	0%
11	Gasoline/aviation fuel/ethanol	28%	16%	56%
12	Fuel oils	25%	16%	59%
13	Cereal grains	44%	48%	8%
14	Machinery	27%	4%	69%
15	Articles of base metal	50%	7%	43%
16	Other agricultural products	41%	14%	45%
17	Alcoholic beverages	43%	3%	54%
18	Milled grain & bakery products	31%	48%	21%
19	Printed products	44%	28%	28%
	All other commodities	44%	12%	43%
	Grand Total	**34%**	**13%**	**54%**

Source: Federal Highway Administration Freight Analysis Framework

As shown in Table 3.5 below, the directions of travel for the Region's top commodities on the basis of value are:

- Approximately 43 percent of total freight by value is inbound, 17 percent is outbound, and 39 percent is intraregional. Commodities that are primarily inbound include: mixed freight; motorized vehicles and parts; miscellaneous manufactured products; precision instruments and apparatus; plastics and rubber; petroleum products; chemical products; furniture, mattresses, lamps, lighting fittings, and illuminated signs; and wood products. Commodities that are primarily intraregional include machinery and basic chemicals. Other commodity groups do not show a clearly dominant direction. By value, inbound freight is more than 2 ½ times greater than outbound freight, indicating that the Region's economy consumes more goods than it produces.

Table 3.5 Direction of Travel for Top Commodities by Value

Rank	Commodity Class	Inbound	Outbound	Intraregional
1	Electronic & electrical equipment	44%	31%	25%
2	Machinery	16%	5%	79%
3	Mixed freight	67%	12%	21%
4	Pharmaceutical products	39%	25%	36%
5	Textiles, leather & their articles	45%	27%	28%
6	Motorized vehicles & parts	57%	11%	31%
7	Miscellaneous manufactured products	57%	22%	21%
8	Other prepared foodstuffs	46%	25%	28%
9	Articles of base metal	44%	10%	46%
10	Precision instruments and apparatus	54%	10%	36%
11	Plastics and rubber	70%	18%	13%
12	Basic chemicals	15%	4%	81%
13	Other petroleum products	66%	2%	32%
14	Other chemical products	53%	21%	26%
15	Nonmetallic mineral products	44%	16%	40%
16	Furniture/mattresses/lamps/signs	54%	13%	33%
17	Printed products	41%	34%	25%
18	Wood products	56%	14%	30%
19	Meat/poultry/fish/seafood	48%	15%	37%
	All other commodities	35%	13%	53%
	Grand Total	**44%**	**17%**	**39%**

Source: Federal Highway Administration Freight Analysis Framework

3.2.3 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

From Table 3.6 below it can be seen that trucking accounts for 86 percent of total freight moved by weight, followed by rail at 5 percent, multiple modes and mail at 4 percent and pipelines at 1 percent respectively. Except for coal and petroleum products, the other leading tonnage commodities depend heavily on trucking. Rail has a dominant share of coal traffic and a significant share of cereal grains traffic[4], while petroleum products, especially natural gas, are transported via pipeline. Water and air are not significant modes of regional freight transport in terms of weight.

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

4 Except for a few coal-fired power plants, one intermodal terminal, and a relatively small number of businesses with active sidings, there are relatively few significant rail shippers and receivers in the Region. Consequently, most of the rail freight observed in the Region is "through" freight.

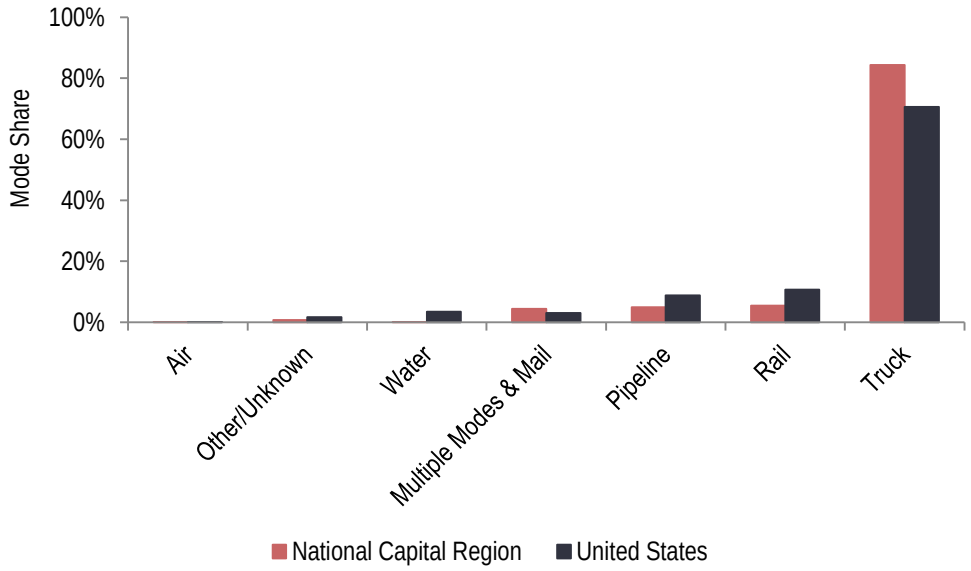
Table 3.6 Commodities Share of Tonnage by Mode

Commodity Class	Truck	Rail	Multiple Modes & Mail	Water	Air	Pipeline	Other / Unknown
Gravel & crushed stone	89%		11%				
Waste & scrap	97%	3%					
Nonmetal mineral. products	95%	4%					1%
Other petroleum products	34%	2%		1%		63%	
Natural sands	98%		1%				1%
Other prepared foodstuffs	93%	2%	5%				
Wood products	92%	6%	1%				1%
Other nonmetallic minerals	96%	2%	2%				
Mixed freight	99%		1%				
Coal	5%	94%	1%				
Gasoline/aviation fuel/ethanol	100%						
Fuel oils	99%						
Cereal grains	65%	17%	17%				
Machinery	98%	1%	1%				
Articles of base metal	95%	1%	3%				1%
Other agricultural products	94%	4%	2%				
Alcoholic beverages	97%	1%	1%				
Milled grain & bakery products	94%		3%				3%
Printed products	88%		4%		1%		7%
All other commodities	90%	4%	4%				2%
Total	**86%**	**5%**	**4%**	**0%**	**0%**	**4%**	**1%**

Source: Federal Highway Administration Freight Analysis Framework

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 3.1).

Figure 3.1 Transportation Modes Used (by Weight) – National Capital Region and United States



Source: Federal Highway Administration Freight Analysis Framework

From Table 3.7 below we see that trucking accounts for 79 percent, multiple modes and mail for 15 percent, air for 2 percent, and rail and pipeline each for 1 percent of total freight moved by value. Pipelines carry the majority of petroleum products by value (especially natural gas), and a meaningful share of precision instruments are transported via air freight. Water is not a significant mode of regional freight transport in terms of value – or weight.

79 percent of total freight (by value) in the Region is hauled by truck

Table 3.7 Commodities Share of Tonnage by Value

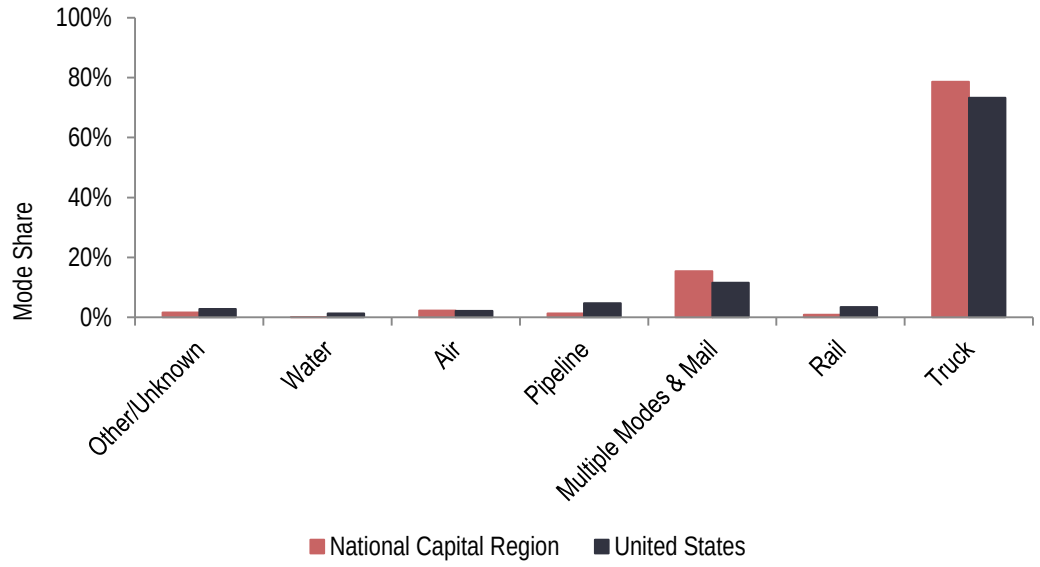
Commodity Class	Truck	Rail	Multiple Modes & Mail	Water	Air	Pipeline	Other / Unknown
Electronic & electrical equipment	56%	1%	31%		9%		3%
Machinery	95%		4%				
Mixed freight	92%		6%				1%
Pharmaceutical products	69%		31%		1%		
Textiles, leather & their articles	68%		29%		3%		1%
Motorized vehicles & parts	82%		6%				12%
Misc. manufactured products	65%		33%		2%		1%
Other prepared foodstuffs	89%	2%	9%				
Articles of base metal	88%	1%	10%				1%
Precision instruments & apparatus	44%		38%		18%		
Plastics & rubber	78%	3%	17%				2%
Basic chemicals	94%	3%	3%				
Other petroleum products	41%	1%	1%	1%		56%	
Other chemical products	83%	2%	13%				2%
Nonmetallic mineral products	79%	1%	10%		4%		6%
Furniture/mattresses/lamps/signs	91%		9%				

Commodity Class	Truck	Rail	Multiple Modes & Mail	Water	Air	Pipeline	Other / Unknown
Printed products	63%		32%		1%		4%
Wood products	94%	3%	2%				1%
Meat/poultry/fish/seafood	99%		1%				
All other commodities	91%	3%	6%				1%
Total	**79%**	**1%**	**15%**	**0%**	**2%**	**1%**	**2%**

Source: Federal Highway Administration Freight Analysis Framework

A greater proportion of total freight (by value) in the Region is hauled via truck or multiple modes and mail 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 3.2).

Figure 3.2 Transportation Modes Used (by Value) – National Capital Region and United States



Source: Federal Highway Administration Freight Analysis Framework

3.3 The National Capital Region's Freight Transportation Modes

3.3.1 Trucking

Trucks are essential to freight transportation. They are responsible for the most tonnage handled[5], the largest number of trips, and the largest number of ton-miles in the United States. Trucks are enormously flexible in that they can accommodate a broad range of commodities, from raw materials to semi-finished goods to consumer goods to post-consumer products. Trucks, unlike any of

Gravel and crushed stone, waste and scrap, and nonmetallic mineral products are the leading truck-hauled commodities in the Region

5 According to the 2007 Commodity Flow Survey, trucks carried about 85 percent of total tonnage and total value shipped in the United States.

the other modes, can access virtually any origin or destination. Often they provide key links between other modes within complex, multimodal supply chains. Every freight shipper or receiver that is not located on an active rail line, next to a navigable waterway, or inside the gates of an airport, is dependent on trucking. The continued growth and evolution of e-commerce systems, reliance on just-in-time inventory practices, and expansion of expedited small package home delivery services, points to the growing significance of the role that trucks will play in the future.

By tonnage, the leading truck-hauled commodities in the Region are gravel and crushed stone, waste and scrap, and nonmetallic mineral products followed by natural sands, other foodstuffs, wood products, and mixed freight. By value, machinery; mixed freight; electronic and electrical equipment; and pharmaceutical products are the leading commodities followed by motorized vehicles and parts; textiles, leather and products of textiles and leather; and prepared foodstuffs.

Table 3.8 Commodity Types Handled via Truck

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Gravel & crushed stone	36,668	Machinery	26,318
Waste & scrap	31,231	Mixed freight	20,820
Nonmetallic mineral products	23,949	Electronic & electrical equipment	17,910
Natural sands	8,723	Pharmaceutical products	13,208
Other prepared foodstuffs	7,432	Motorized vehicles & parts	9,244
Wood products	7,202	Textiles, leather & their articles	8,980
Mixed freight	7,061	Other prepared foodstuffs	8,191
Other nonmetallic minerals	6,925	Articles of base metal	7,233
Gasoline/aviation fuel/ethanol	5,549	Misc. manufactured products	7,221
Other petroleum products	4,865	Basic chemicals	5,631

Source: Federal Highway Administration Freight Analysis Framework

3.3.2 Rail

Rail operations specialize in long-haul transportation of high-value containerized goods; transportation of bulk goods, such as coal; and long-haul transportation of mixed car types (known as carload service). The availability of rail service can reduce the dependence on trucking. This can be particularly important for heavy commodities that can damage pavements if hauled by truck.

Coal is the leading rail-hailed commodity in the Region

By weight, the leading commodity moved by rail in the Region by far is coal, followed by waste and scrap, and nonmetallic mineral products. By value, the leading rail commodities are electronic and electrical equipment, coal, prepared foodstuffs, and basic chemicals.

Table 3.9 Commodity Types Handled via Rail

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Coal	5,864	Electronic & electrical equipment	305
Waste & scrap	1,029	Coal	280
Nonmetallic mineral products	984	Other prepared foodstuffs	200
Cereal grains	597	Basic chemicals	171
Wood products	432	Plastics & rubber	165
Other petroleum products	343	Wood products	152
Basic chemicals	313	Cereal grains	109
Plastics & rubber	199	Chemical products	100
Other nonmetallic minerals	157	Articles of base metal	92
Other prepared foodstuffs	155	Machinery	92

Source: Federal Highway Administration Freight Analysis Framework

3.2.3 Multiple Modes and Mail

Due to the nature of the available data underlying the FAF dataset, some freight flows cannot be assigned to a specific mode. These flows are reported as *multiple modes and mail* in FAF and include truck-rail, truck-water, and rail-water intermodal shipments involving one or more end-to-end transfers of cargo between two different modes.[6] It also includes parcel delivery service shipments weighing 100 pounds or less (because shippers that use such services do not typically know what modes are involved in the actual shipping process).

By tonnage, the leading multiple modes and mail commodity is gravel and crushed stone, followed by cereal grains and prepared foodstuffs. By value, the leading multiple modes and mail commodities are electronic and electrical equipment, pharmaceutical products, textile and leather products, miscellaneous manufactured products, and precision instruments, among others.

Table 3.10 Commodity Types Handled via Multiple Modes and Mail

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Gravel & crushed stone	4,608	Electronic & electrical equipment	9,875
Cereal grains	587	Pharmaceutical products	5,870
Other prepared foodstuffs	427	Textiles, leather & their articles	3,749
Electronic & electrical equipment	133	Misc. manufactured products	3,681
Chemical products	132	Precision instruments & apparatus	2,688
Plastics & rubber	128	Printed products	1,639
Other nonmetallic minerals	117	Mixed freight	1,410
Nonmetallic mineral products	104	Plastics & rubber	1,098
Wood products	101	Machinery	990
Articles of base metal	98	Articles of base metal	858

Source: Federal Highway Administration Freight Analysis Framework

3.2.4 Water

A small quantity of cargo, mainly petroleum products, is transported by water in the National Capital Region. Because there are no major port facilities within the Region, such waterborne shipments rely solely on barge transport.

6 The Freight Analysis Framework, Version 3: Overview of the FAF3 National Freight Flow Tables. pg. 6. Federal Highway Administration, Washington, D.C.

Table 3.11 Commodity Types Handled via Water

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Other petroleum products	95	Other petroleum products	34
Other nonmetallic minerals	5	Plastics & rubber	1
Cereal grains	2		

Source: Federal Highway Administration Freight Analysis Framework

3.2.5 Air

Air cargo enables fast, reliable, just-in-time delivery service that integrated carriers such as UPS and FedEx have perfected. Air freight is more expensive than other modes and is therefore typically used for transport of high value, time-sensitive goods such as mail and express packages, perishable products, specialized machinery, consumer goods, etc.

By value, electronic / electrical equipment and precision instruments are the leading air cargo commodities in the Region

The leading air freight commodities in the Region by weight are electronic and electrical equipment, printed products, motorized vehicle parts, and textile products. By value, the leading air freight commodities are electronic and electrical equipment, precision instruments and apparatus, and textile products.

Table 3.12 Commodity Types Handled via Air

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Electronic & electrical equipment	37	Electronic & electrical equipment	2,906
Printed products	12	Precision instruments & apparatus	1,258
Motorized vehicles & parts	4	Textiles, leather & their articles	330
Textiles, leather & their articles	4	Nonmetallic mineral products	216
Precision instruments & apparatus	2	Misc. manufactured products	180
Misc. manufactured products	2	Pharmaceutical products	108
Pharmaceutical products	2	Railway equipment/aircraft/boats.	87
Articles of base metal	1	Printed products	62
Machinery	1	Machinery	54
Railway equipment/aircraft/boats	1	Motorized vehicles & parts	54

Source: Federal Highway Administration Freight Analysis Framework

3.2.6 Pipeline

Pipelines are a very efficient way to transport large quantities of liquids or gas. In the National Capital Region, pipelines carry refined petroleum products, including natural gas. The Plantation Pipeline Terminal in Newington, VA receives petroleum products via pipeline from Gulf Coast refineries, performs various blending operations, distributes gasoline products via truck to area gas stations, and distributes jet fuel via pipelines to Dulles International Airport and Ronald Reagan Washington National Airport.

Table 3.13 Commodity Types Handled via Pipeline

Top Tonnage Commodities	Thousands of Tons	Top Value Commodities	Millions of Dollars
Other petroleum products	9,061	Other petroleum products	3,105

Source: Federal Highway Administration Freight Analysis Framework

3.2.8 Total Weight and Value

In 2007, the Region's transportation system handled about 379 million tons of freight worth more than $604 billion, including inbound, outbound, intraregional, and through traffic.

Total weight and value handled by the Region's multimodal freight transportation system is summarized in Figure 3.3 and Tables 3.14 and 3.15 below.

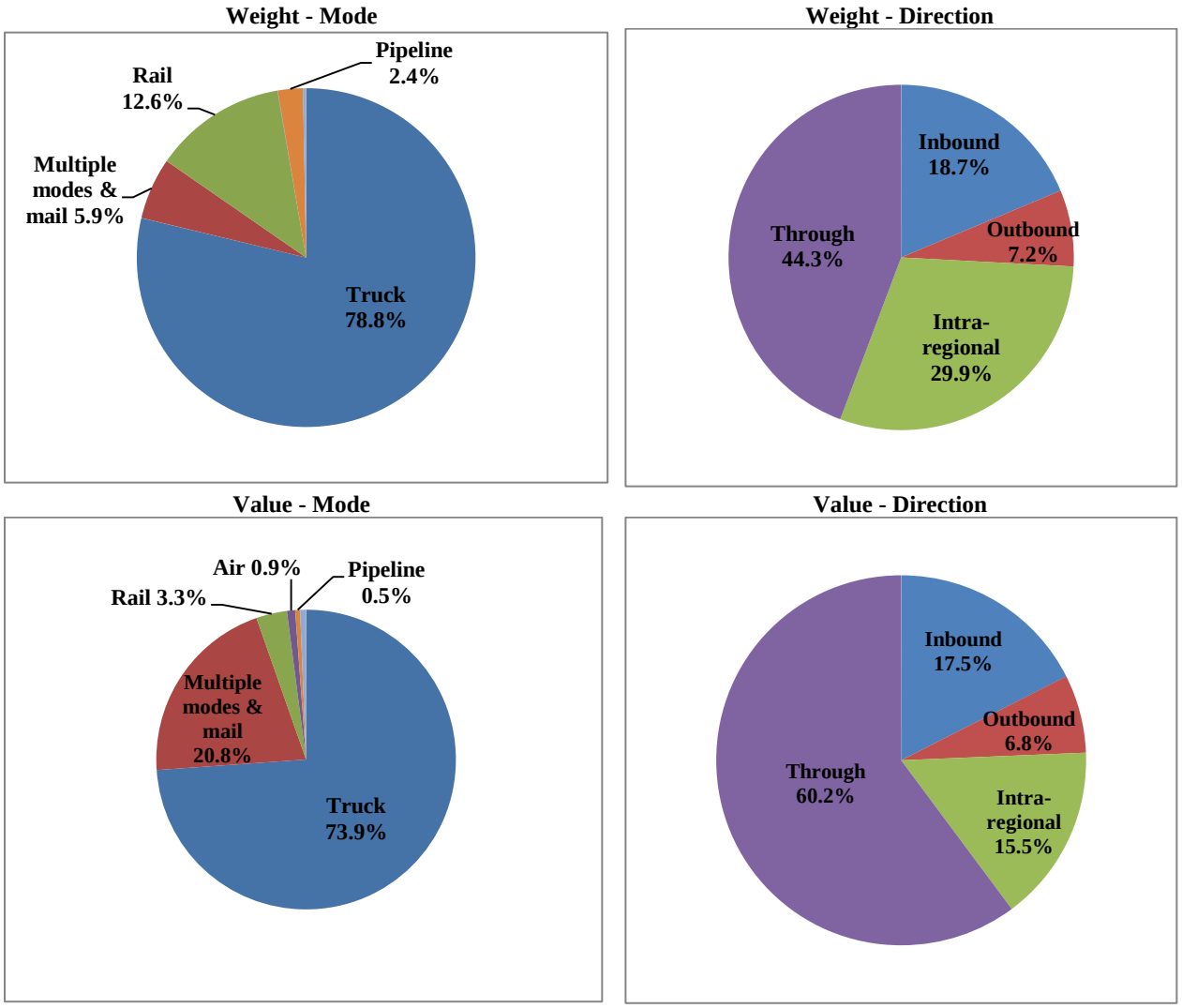
On the basis of weight:

- Trucks handled about 79 percent of total tonnage, followed by rail at 13 percent, multiple modes and mail at 6 percent, pipeline at 2 percent, and air at less than 0.1 percent.
- Approximately 19 percent of total tonnage was inbound, 7 percent was outbound, 30 percent was intraregional, and 44 percent was through.

On the basis of value:

- Trucks handled around 74 percent of value, followed by multiple modes and mail at 21 percent, rail at 3 percent, air at 1 percent, and pipeline at 0.5 percent.
- Around 18 percent of value was inbound, 7 percent was outbound, 16 percent was intraregional, and 60 percent was through.

Figure 3.3 Total Freight Weight and Value by Mode and Direction



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

Table 3.14 National Capital Region Freight Modes – Weight (thousands of tons)

Mode	Inbound	Outbound	Intraregional	Through	Total
Truck	48,690	24,544	109,810	116,144	**299,188**
Multiple modes & mail	6,559	909	24	14,791	**22,283**
Rail	9,232	1,520	0	37,240	**47,991**
Air	35	34	0	N/A	**68**
Water	100	2	0	N/A	**102**
Pipeline	5,675	31	3,355	N/A	**9,061**
Other / Unknown	641	133	400	N/A	**1,174**
Total	**70,931**	**27,173**	**113,589**	**168,174**	**379,867**

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

Table 3.15 National Capital Region Freight Modes – Value (millions of dollars)

Mode	Inbound	Outbound	Intraregional	Through	Total
Truck	70,469	30,179	88,550	257,359	**446,557**
Multiple modes & mail	25,617	8,124	3,212	88,542	**125,495**
Rail	1,932	267	0	17,847	**20,047**
Air	3,802	1,519	0	N/A	**5,321**
Water	36	0	0	N/A	**36**
Pipeline	2,046	11	1,048	N/A	**3,105**
Other / Unknown	1,993	1,100	805	N/A	**3,889**
Total	**105,896**	**41,200**	**93,616**	**363,748**	**604,460**

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

3.3 National Capital Region's Freight Origins and Destinations

3.3.1 Trading Partners

Analyses of FAF data reveal the relative importance of other regions in terms of the quantity and value of goods moved. These National Capital Region *trading partners* are sorted in terms of the sum of freight flows (inbound to the National Capital Region from the other region plus outbound from the National Capital Region to the other region). According to these analyses, the leading trading partner regions are listed in Tables 3.16 (by weight) and 3.17 (by value) below.

The Region's top three trading partners (by weight) are the Baltimore region, and the states of West Virginia and Virginia

Table 3.16 Top Trading Partner Regions by Weight

Rank	Partner Region	Thousands of Tons	Percent	Cumulative Percent
1	Baltimore MD MSA	20,673	21%	21%
2	West Virginia	10,940	11%	32%
3	Remainder of Virginia	10,113	10%	43%
4	Remainder of Pennsylvania	7,226	7%	50%
5	Richmond VA MSA	6,132	6%	56%
6	Remainder of Maryland	5,466	6%	62%
7	Norfolk VA MSA	4,382	4%	66%
8	New York NY CSA	3,608	4%	70%
9	Philadelphia PA CSA	3,310	3%	73%
10	Houston TX CSA	2,619	3%	76%
11	Remainder of New York	1,303	1%	77%
12	Remainder of North Carolina	1,117	1%	78%

Source: Federal Highway Administration Freight Analysis Framework

Table 3.17 Top Trading Partner Regions by Value

Rank	Partner Region	Millions of Dollars	Percent	Cumulative Percent
1	Baltimore MD MSA	20,959	14%	14%
2	New York NY CSA	12,334	8%	23%
3	Remainder of Pennsylvania	8,323	6%	28%
4	Philadelphia PA CSA	6,928	5%	33%
5	Remainder of Virginia	6,531	4%	37%
6	Los Angeles CA CSA	6,084	4%	42%
7	Richmond VA MSA	5,742	4%	45%
8	Memphis TN MSA	3,903	3%	48%
9	Norfolk VA MSA	3,560	2%	51%
10	Chicago IL CSA	2,757	2%	52%
11	Remainder of Maryland	2,755	2%	54%
12	Houston TX CSA	2,719	2%	56%

Source: Federal Highway Administration Freight Analysis Framework

3.4 Freight Transportation Forecasts

3.4.1 National Capital Region Freight Forecasts

Freight Analysis Framework data for the National Capital Region includes a set of forecasts for growth in freight tonnage and value, by mode, by commodity, and by origin-destination pair. These forecasts are derived from broader forecasts for the national economy. Like most forecasts, these represent a base case scenario. More detailed forecasting would consider a range of scenarios and reflect a variety of "what if" conditions, such as significant changes in economic activity, fuel prices, climate, and logistics practices.

National Capital Region Commodities

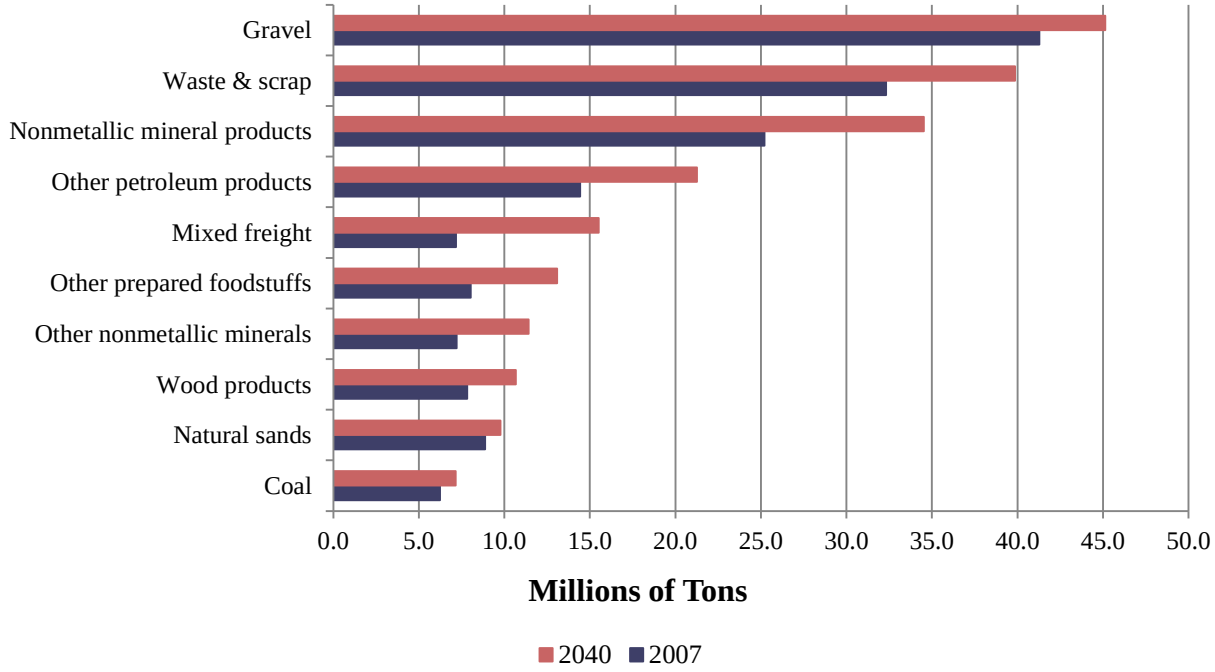
Growth in output and consumption drive growth in freight demand and result in increased tonnage moving across the Region's transportation infrastructure and increased in inflation-adjusted dollars. Growth in some types of commodities will be greater than others and will change the relative proportions of commodity types transported within the Region.

On the basis of weight (see Figure 3.4 below):

Commodities in the mixed freight category are projected to more than double in volume (by weight) by 2040

The volume of gravel and crushed stone is projected to grow slightly yet remain the top commodity type in 2040. Similarly, waste and scrap, nonmetallic mineral products, and petroleum products are forecasted to grow in volume and retain their 2nd, 3rd, and 4th rankings in 2040. Mixed freight is projected to more than double in volume by 2040 causing it to rise in ranking from 9th to 5th overall.

Figure 3.4 Forecasted Growth in Regional Commodities by Weight



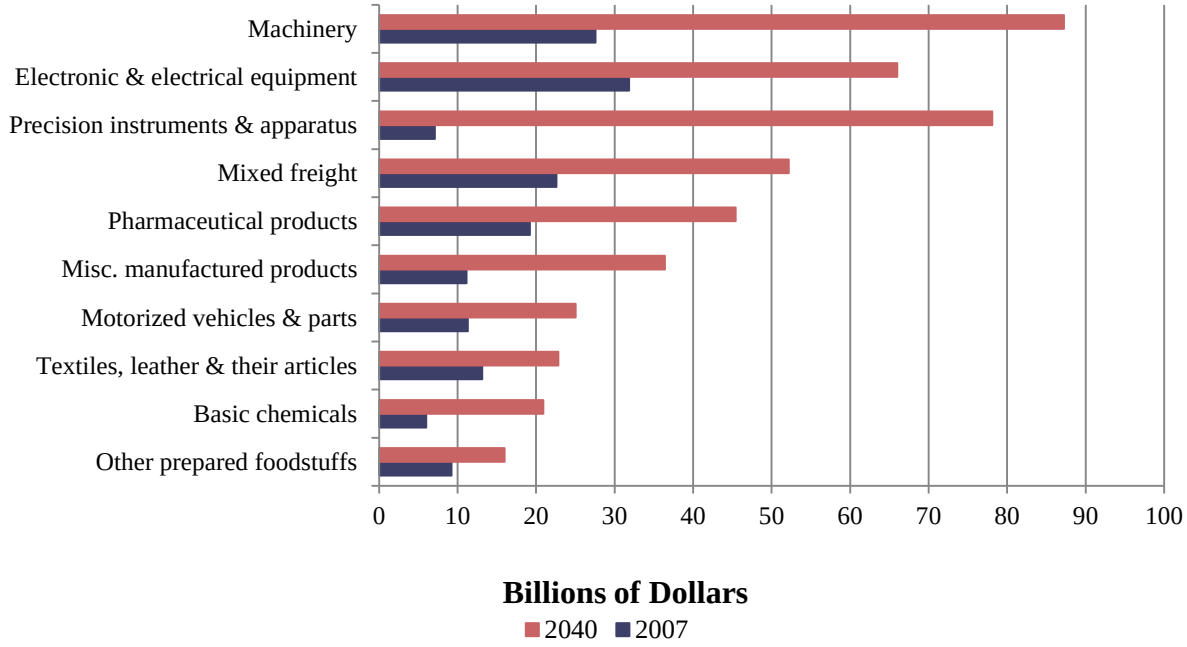
Source: Federal Highway Administration Freight Analysis Framework

On the basis of value (see Figure 3.5 below):

Eight of the ten top regional commodities by value are expected to more than double by 2040 with the value of precision instruments and apparatus projected to grow nearly tenfold. Machinery, miscellaneous manufactured products, and basic chemicals are each projected to grow over threefold in value over the same time period.

Precision instruments and apparatus are projected to grow more than tenfold (by value) by 2040

Figure 3.5 Forecasted Growth in Regional Commodities by Value



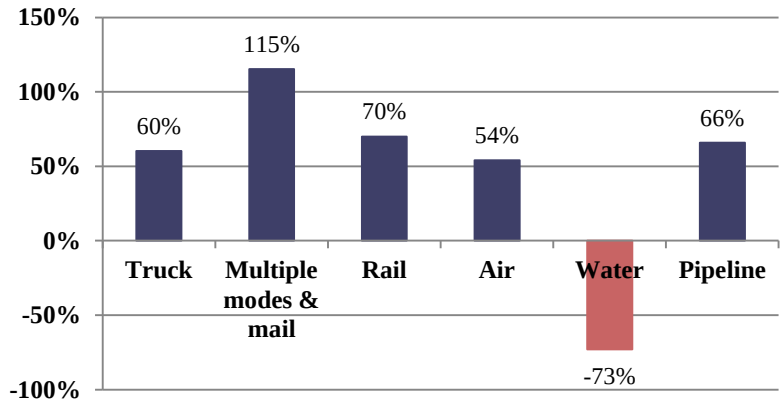
Source: Federal Highway Administration Freight Analysis Framework

National Capital Region Modes

Different transportation modes will experience different growth rates. Modes that specialize in the fastest growing commodities will grow fastest.

The fastest growth is for multiple modes and mail which is anticipated to increase by 115 percent by 2040. Trucking, rail, air, and pipeline traffic are expected to increase at rates between 54 percent and 66 percent over the same time period. Waterborne freight, which is very small relative to the other modes, is projected to decline significantly.

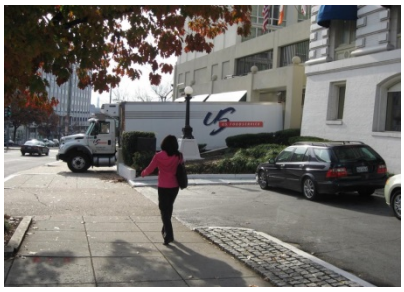
Figure 3.6 Forecasted Growth in Tonnage by Mode



Source: Federal Highway Administration Freight Analysis Framework

Section 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.



4.1 Trends Impacting Freight in the Region

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.

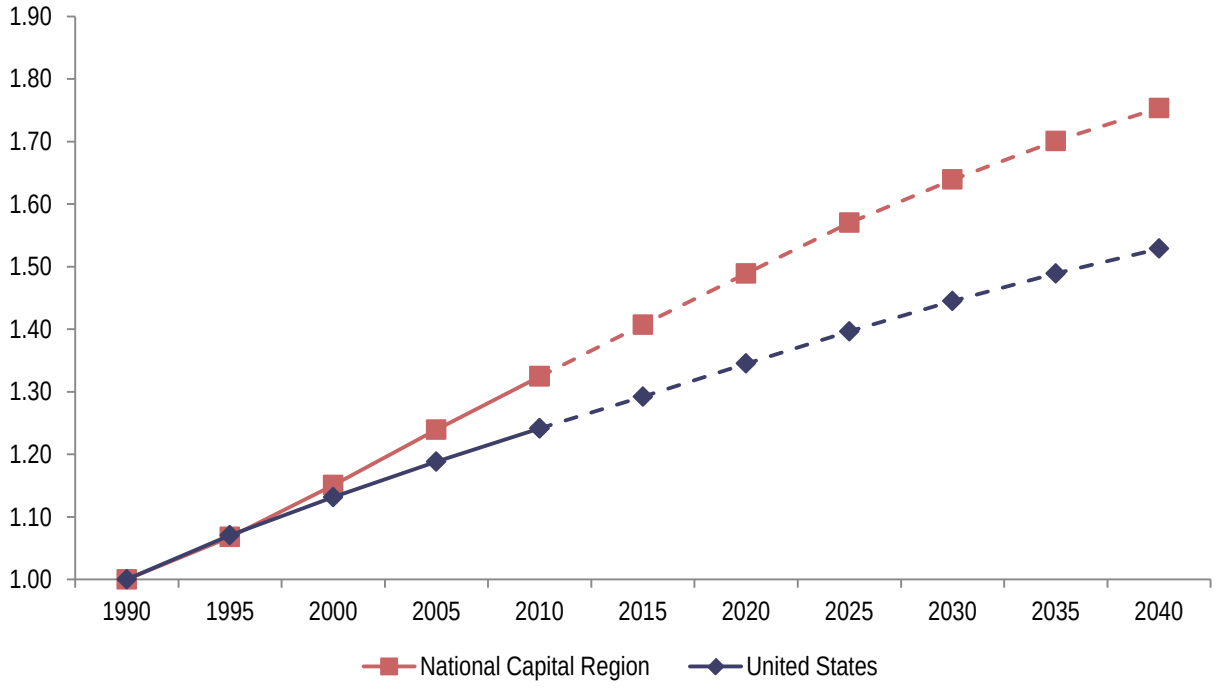
Recent Trends

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 4.1 on the next page). Expanding employment in the business and professional service- and government-sectors attracts highly educated people from throughout the United States and the world. 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 Region ranks second in the nation for median household income ($90,149 in 2013), 73 percent above the national average.[7] This means that the median Regional household earns approximately $38,000 more per year than the median American household. 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 4.1 Population Growth Trends - National Capital Region



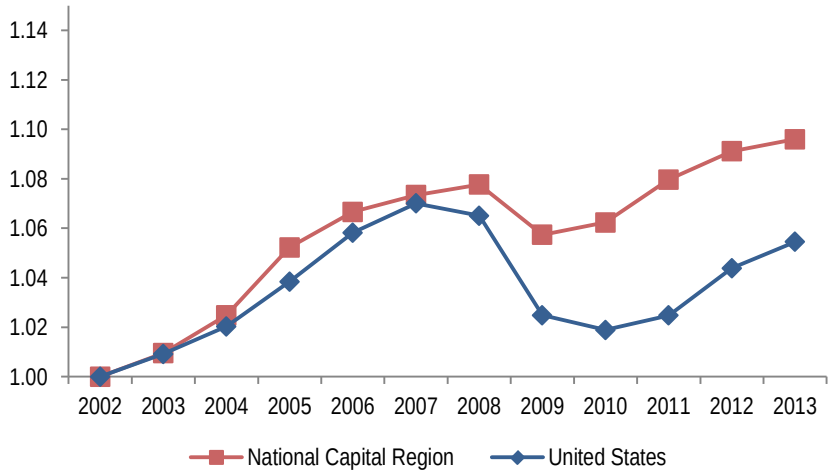
Sources: U.S. Census Bureau[8]; Metropolitan Washington Council of Governments[9]

7 U.S. Census Bureau, 2013 American Community Survey 1-Year Estimates.
8 For all historical data points; 1990 – 2010 and United States population projections; 2015 – 2040.
9 For TPB Planning Area and District of Columbia population projections; 2015 – 2040.

Employment and Gross Domestic Product

The Region's economy employed 2.8 million people in 2013[10], 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 4.2 on the next page).

Figure 4.2 Historic Employment Trends, United States and National Capital Region

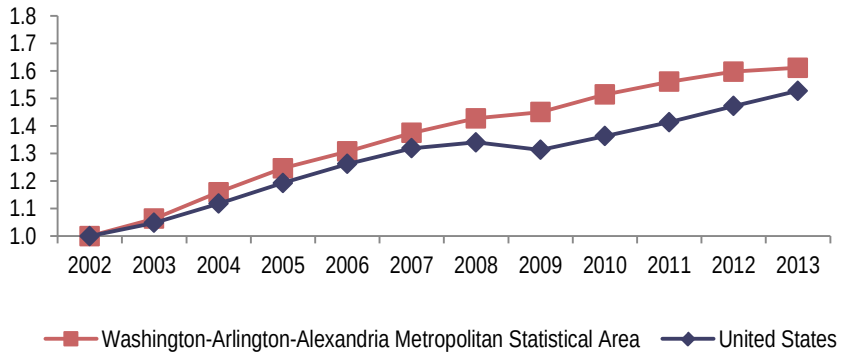


Sources: U.S. Bureau of Labor Statistics and Metropolitan Washington Council of Governments compilation of Quarterly Census of Employment and Work (QCEW) summaries for TPB Planning Area jurisdictions.

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. In nominal terms, the Region's GDP grew by 61 percent between 2002 and 2013, compared to 53 percent for the United States overall (see Figure 4.3). There is a direct relationship between the growth in economic activity, as measured by GDP, and the demand for freight transportation. The United States Bureau of Transportation Statistics (BTS) defines this relationship as the ratio of total ton-miles[11] of freight to total GDP. In 2002 this *freight transportation intensity* ratio was 0.38 ton-miles per dollar, indicating that every marginal dollar of GDP would be expected to generate an additional 0.38 ton-miles of freight activity.[12]

10 Quarterly Census of Employment and Work (QCEW)
11 A ton-mile is defined as one ton of freight carried one mile.
12 Measured in year 2000 dollars. See U.S. Bureau of Transportation web site http://www.rita.dot.gov/bts/programs/freight_transportation/html/freight_and_growth.html accessed June 6, 2015.

Figure 4.3 Regional and U.S. Gross Domestic Product



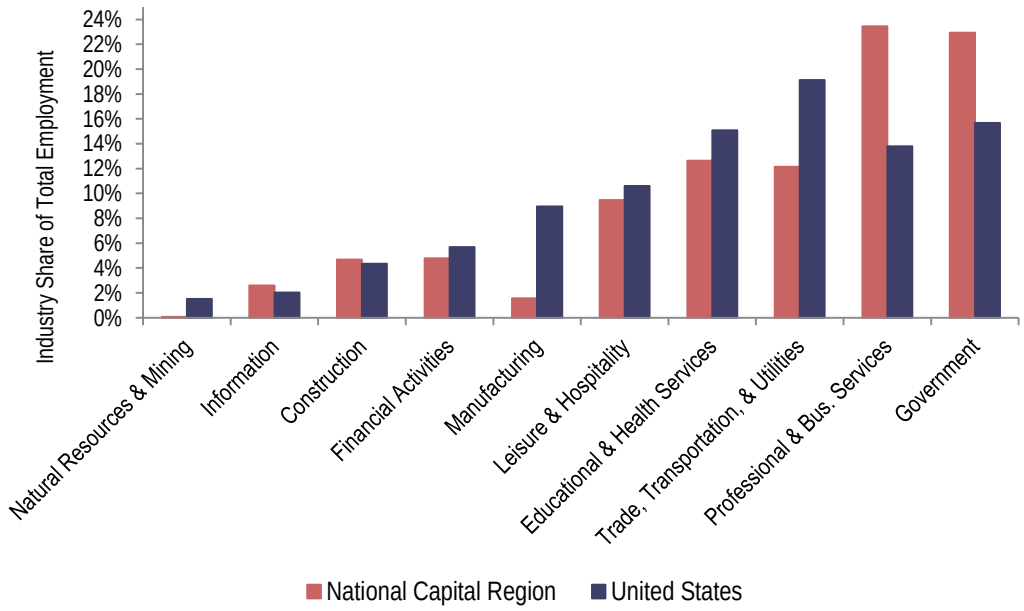
Source: U.S. Bureau of Economic Analysis

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. The Region's other sectors; information, construction, financial activities, leisure and hospitality, and educational and health services, are roughly equivalent to that of the United States as a whole (see Figure 4.4) in terms of employment proportions.

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 4.4 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

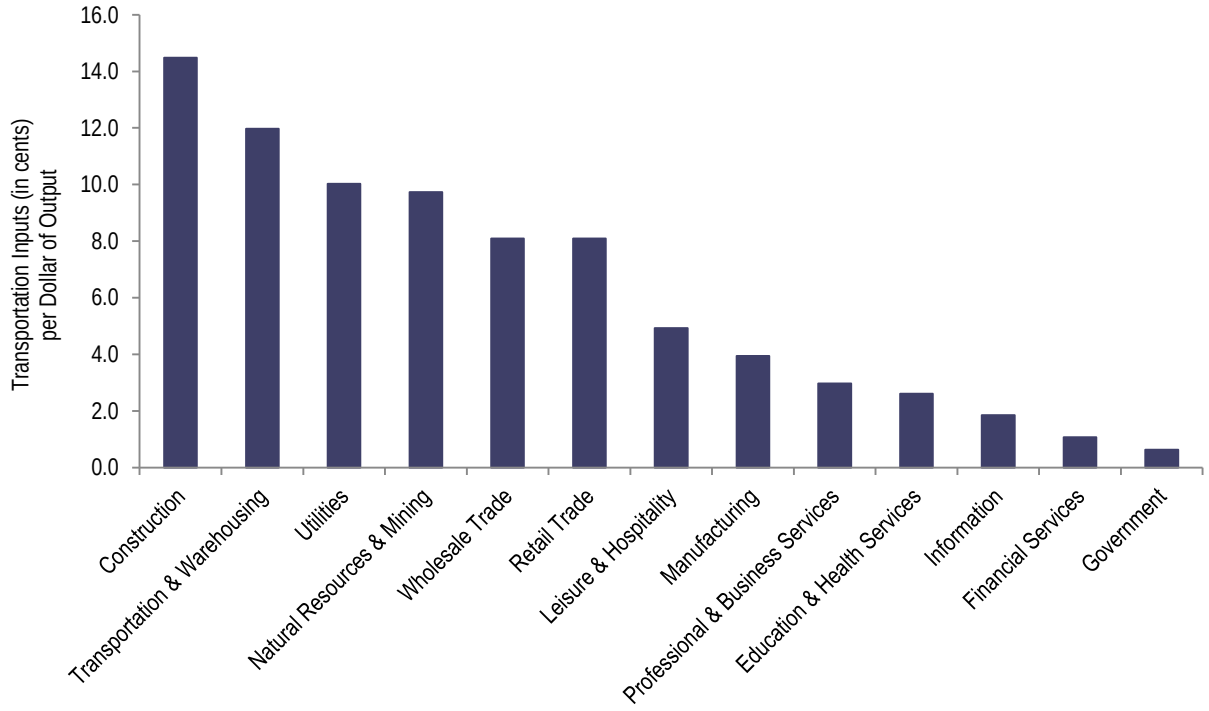
Freight Demand by Industry

Transportation is a cost of doing business and an important input for major sectors of the Region's economy. The impact of transportation costs on a given business depends in large part upon the type of industry the business is in. By examining the transportation inputs required to produce a given output by industry sector, it is possible to identify which sectors are particularly dependent on freight transportation.

Demand for Freight Transportation Services

Figure 4.5 shows the relative use of freight and passenger transportation services by industry, and illustrates the industry sectors that are most dependent on transportation services. In order, the most transportation dependent industries are: construction, transportation and warehousing, utilities, wholesale and retail trade, leisure and hospitality, and manufacturing. Except for leisure and hospitality, these sectors are primarily dependent on freight transportation, rather than passenger transportation.

Figure 4.5 Transportation Reliance by Industry



Source: U.S. Department of Transportation, Bureau of Transportation Statistics Transportation Satellite Accounts, 1997

Freight Dependent Industries

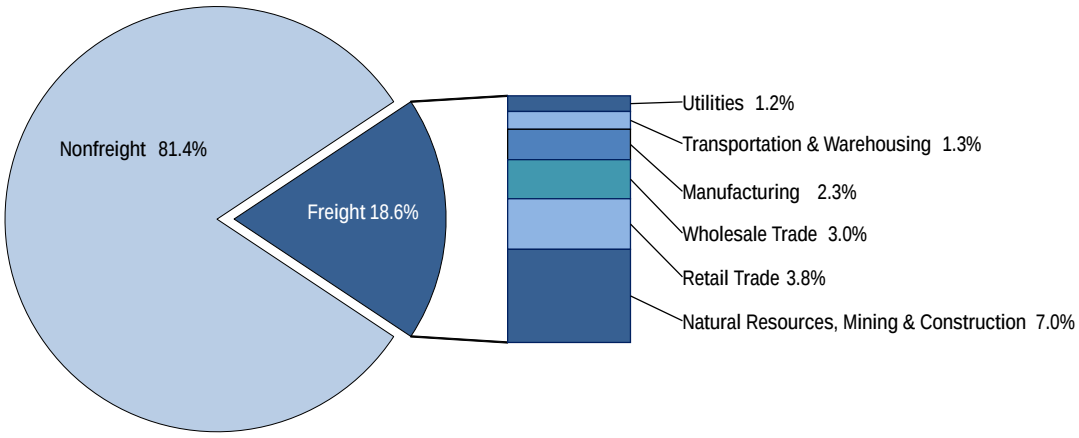
Regional businesses such as farms that grow crops and raise animals and quarries that extract gravel for use in construction depend on freight movement to move the products they produce to processing plants, wholesalers, and retail outlets. Other producing businesses, like manufacturers and construction 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.
- 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.

While other industries depend on freight movement to some extent they are not considered freight dependent in this analysis. These non-freight dependent industries include government, financial services, information, education and health services, professional and business services, and leisure and hospitality and represent about 81 percent of the Region's GDP.

Figure 4.6 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 4.1 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 Forecasts[13]

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. In addition, population and economic growth in the rest of the nation and around the world will result in increased freight shipments on the regions highways, railroads, and airports.

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.

4.1.2 Evolving Supply Chains and Logistics Patterns

Thirty to forty years ago most businesses operated within a *push* supply chain paradigm. Materials, supplies, and finished products were *pushed* from suppliers to manufacturers to distributors and finally to retail outlets. A key feature of this supply chain paradigm is the requirement for businesses to maintain large and expensive inventories as insurance against stockouts. Because businesses and this paradigm have access to significant inventories, they can generally absorb late deliveries with little impact to their operations. However, having large inventories presented several problems including the high cost of owning and storing inventoried items and the inability to quickly respond to changes in customer demand.[14] To reduce these costs and to better respond to changing consumer preferences, businesses have engaged in a long-term and sustained effort to reduce inventories. These efforts have resulted in a shift towards a *pull* or on-demand supply chain paradigm.

Pull supply chains feature an emphasis on replenishing parts or products whenever they are consumed or sold. Once a part is consumed in a manufacturing process or a product is sold in a retail outlet, a signal is generated up the supply chain causing the part or product to be replenished on a just-in-time basis. Instead of relying on a large stock (or inventory) to ensure product availability, businesses in a *pull* supply chain environment will typically only have enough inventory on hand to meet customer demand for a short period of time – sometimes less than a day. To satisfy customers by always having products available when demanded while at the same time holding a minimal level of stock on hand, businesses must

13 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.
14 The following two examples illustrate how the presence of large inventories reduces the ability of a business to respond quickly to the market or address quality issues: (1) a clothing retailer has a large inventory of a particular style of shirt – if that style goes out of fashion, the retailer will have to mark down or scrap a large number of them do to the excess inventory; (2) an auto manufacturer maintains a large inventory of transmissions – if a quality problem with the transmission is discovered, the manufacturer will have to rework or scrap a large number of them. With just-in-time inventory, the negative impacts of these issues are minimized.

manage inventories very closely and develop systems to make sure products arrive where they are needed on schedule. This is why private sector businesses place a high value on the reliability of the freight transportation system.

The current *pull* or on-demand supply chain paradigm has resulted in retail businesses locating their distribution centers at the periphery of major urban areas. These large distribution centers are strategically placed so as to service retail establishments in one or more metropolitan area. To maximize efficiency, trucks must be able to leave the distribution center, deliver goods to retail stores, and return in one shift. While it is most efficient to use trucks with 53 foot trailers to service multiple stores, congestion in many urban areas has caused a shift towards more trucks, albeit often smaller ones - each of which services fewer stores.

New technology coupled with increasingly demanding customer expectations are continuing to push businesses to further 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. The confluence of e-commerce and customer's high expectations are changing the retail landscape and introducing new transportation providers. 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. Examples of how retail merchants are using omni-channel ideas include:

- If a customer does not find the item they want in a brick and mortar store, there is an e-commerce booth available where it can be ordered;
- Customers can purchase an item online and pick it up in the brick and mortar store;
- Customers can return an item purchased online at a brick and mortar store.

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 a large 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. These additional workers require places to park, so fulfillment centers have larger employee parking lots. 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 fulfillment centers also require more secured truck parking, typically two or three trailer locations per loading dock and. This allows drop off some pickups enabling off peak deliveries to make full use of the loading docks.

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.

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

Over the past 30 years the trucking industry has undergone a series of consolidations and restructurings – a trend that industry observers expect to continue. Larger trucking firms have been making significant investments in GPS and other technologies to help track and manage shipments. Smaller trucking firms, of which there are still a large number, often lack the expertise and capital required to implement tracking technology to the same degree as the larger firms can.

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).

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.

4.2 Regional Freight Issues, Challenges, and Opportunities

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.[15] 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 4.2 below).

Table 4.2 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	**Washington, DC**	**379.4**
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 4.3 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 4.3 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 2nd 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	NB	1 hr 49 min	6.8	138	102,357	Yes

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

Rank	Location	Direction	Average Duration	Average Maximum Length (miles)	Occurrences	Impact Factor[1]	Located on Freight-significant Network?
	Rd/Exit 13						
10	I-395 at 2nd 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/TBP

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.

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.

4.2.2 Freight and the Environment

Section under development

4.2.3 Freight in Regional Activity Centers

Section under development

4.2.4 Addressing Freight within Local and Regional Planning Processes

Section under development

Section 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.

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

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

Appendix A Freight Analysis Framework

This appendix contains technical information and supplementary materials for the National Capital Region Freight Plan. Relevant sections of the main body of the Freight Plan are referenced directly under each major topic area of this appendix.

A.1 Freight Analysis Framework

This section of the appendix provides additional detail on the commodity codes and geographic regions used within the Freight Analysis Framework (FAF). It relates to Section 2.0: Freight Demand within the main body of the Plan.

A.1.1 FAF Commodity Types

The FAF dataset defines freight commodities according to the Standard Classification of Transported Goods[16] (SCTG) coding system. To provide concise commodity descriptions in the many tables and figures in this report, the FAF commodity descriptions have been shortened as shown in Table A.1 below. Detailed information about the specific types of goods included within each of the FAF commodities is available from the United States Census Bureau.[17]

Table A.1 FAF Commodity Descriptions

SCGT Code	FAF Commodity Description	Commodity Description Used in this Report
1	Live animals and live fish	Animals & fish (live)
2	Cereal grains	Cereal grains
3	Other agricultural products	Other agricultural products
4	Animal feed and products of animal origin, n.e.c.	Animal feed
5	Meat, fish, seafood, and their preparations	Meat/poultry/fish/seafood
6	Milled grain products and preparations, bakery products	Milled grain & bakery products
7	Other prepared foodstuffs and fats and oils	Other prepared foodstuffs
8	Alcoholic beverages	Alcoholic beverages
9	Tobacco products	Tobacco products
10	Monumental or building stone	Monumental or building stone
11	Natural sands	Natural sands
12	Gravel and crushed stone	Gravel & crushed stone
13	Nonmetallic minerals n.e.c.	Other nonmetallic minerals
14	Metallic ores and concentrates	Metallic ores & concentrates
15	Coal	Coal
16	Crude petroleum	Crude petroleum
17	Gasoline and aviation turbine fuel	Gasoline/aviation fuel/ethanol
18	Fuel oils	Fuel oils
19	Coal and petroleum products, n.e.c.* (includes Natural gas)	Other petroleum products
20	Basic chemicals	Basic chemicals
21	Pharmaceutical products	Pharmaceutical products
22	Fertilizers	Fertilizers

[16] The SCGT coding system was developed by agencies of the United States and Canadian governments to address statistical needs in regard to products transported.

[17] A thorough description of each of the SCTG codes is available in a document titled **2012 COMMODITY FLOW SURVEY: STANDARD CLASSIFICATION OF TRANSPORTED GOODS (SCGT)** available here: https://bhs.econ.census.gov/bhs/cfs/Commodity%20Code%20Manual%20%28CFS-1200%29.pdf

SCGT Code	FAF Commodity Description	Commodity Description Used in this Report
23	Chemical products and preparations, n.e.c.*	Other chemical products
24	Plastics and rubber	Plastics & rubber
25	Logs and other wood in the rough	Logs & wood in the rough
26	Wood products	Wood products
27	Pulp, newsprint, paper, and paperboard	Pulp/newsprint/paper/paperboard
28	Paper or paperboard articles	Paper & paperboard articles
29	Printed products	Printed products
30	Textiles, leather, and articles of textiles or leather	Textiles, leather & their articles
31	Nonmetallic mineral products	Nonmetallic mineral products
32	Base metal in primary or semi-finished forms and in finished basic shapes	Base metals in primary forms
33	Articles of base metal	Articles of base metal
34	Machinery	Machinery
35	Electronic and other electrical equipment and components and office equipment	Electronic & electrical equipment
36	Motorized and other vehicles (including parts)	Motorized vehicles & parts
37	Transportation equipment, n.e.c.*	Railway equipment/aircraft/boats
38	Precision instruments and apparatus	Precision instruments & apparatus
39	Furniture, mattresses and mattress supports, lamps, lighting fittings, and illuminated signs	Furniture/mattresses/lamps/signs
40	Miscellaneous manufactured products	Misc. manufactured products
41	Waste and scrap	Waste & scrap
43	Mixed freight	Mixed freight
99	Commodity unknown	Unknown

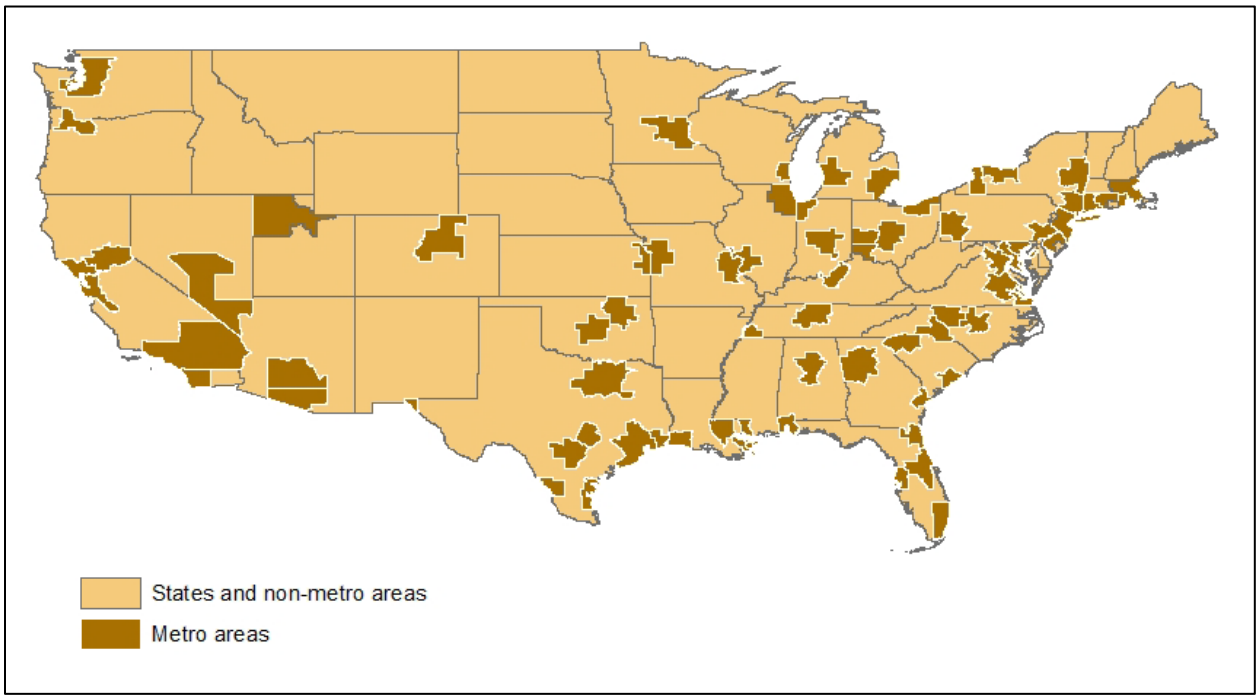
* n.e.c. – not elsewhere classified
Source: Federal Highway Administration Freight Analysis Framework and Metropolitan Washington Council of Governments

A.1.2 FAF Geographies

The FAF dataset is organized into 123 domestic FAF regions (see Figure A.1 below). Each of these FAF regions falls into one of the following categories:

- Census defined Consolidated Statistical Region (CMA)
- Census defined Metropolitan Statistical Area (MSA)
- The rest of a state (everything in a state that is not included in a CSA or MSA)
- An entire state (if that state does not include a CMA or MSA)

Figure A.1 FAF Regions



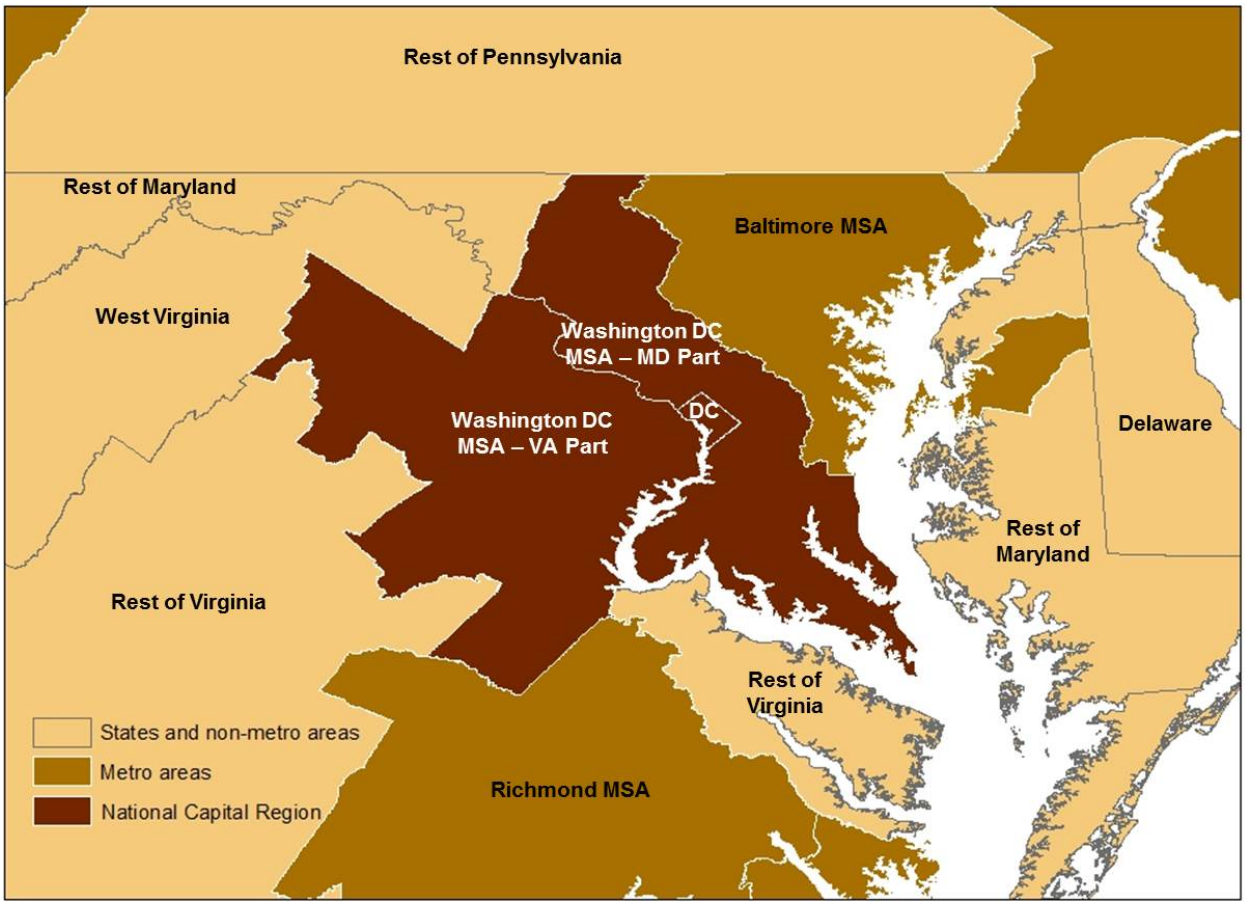
Source: Federal Highway Administration Freight Analysis Framework and Metropolitan Washington Council of Governments

For purposes of FAF analysis, the National Capital Region is an amalgamation of three FAF regions (see Figure A.2):

- Washington, DC MSA – District of Columbia part
- Washington, DC MSA – Maryland part
- Washington, DC MSA – Virginia part

While the geography of these combined FAF regions does not precisely match the boundaries of the National Capital Region's planning area, it is sufficiently proximate to provide useful information.

Figure A.2 FAF Regions Comprising the National Capital Region



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

Appendix B Regional Freight-Significant Network

This appendix contains a series of detailed maps and tables describing the Regional Freight Significant Network.

Figure B.1 Regional Freight-Significant Network – Frederick County Area

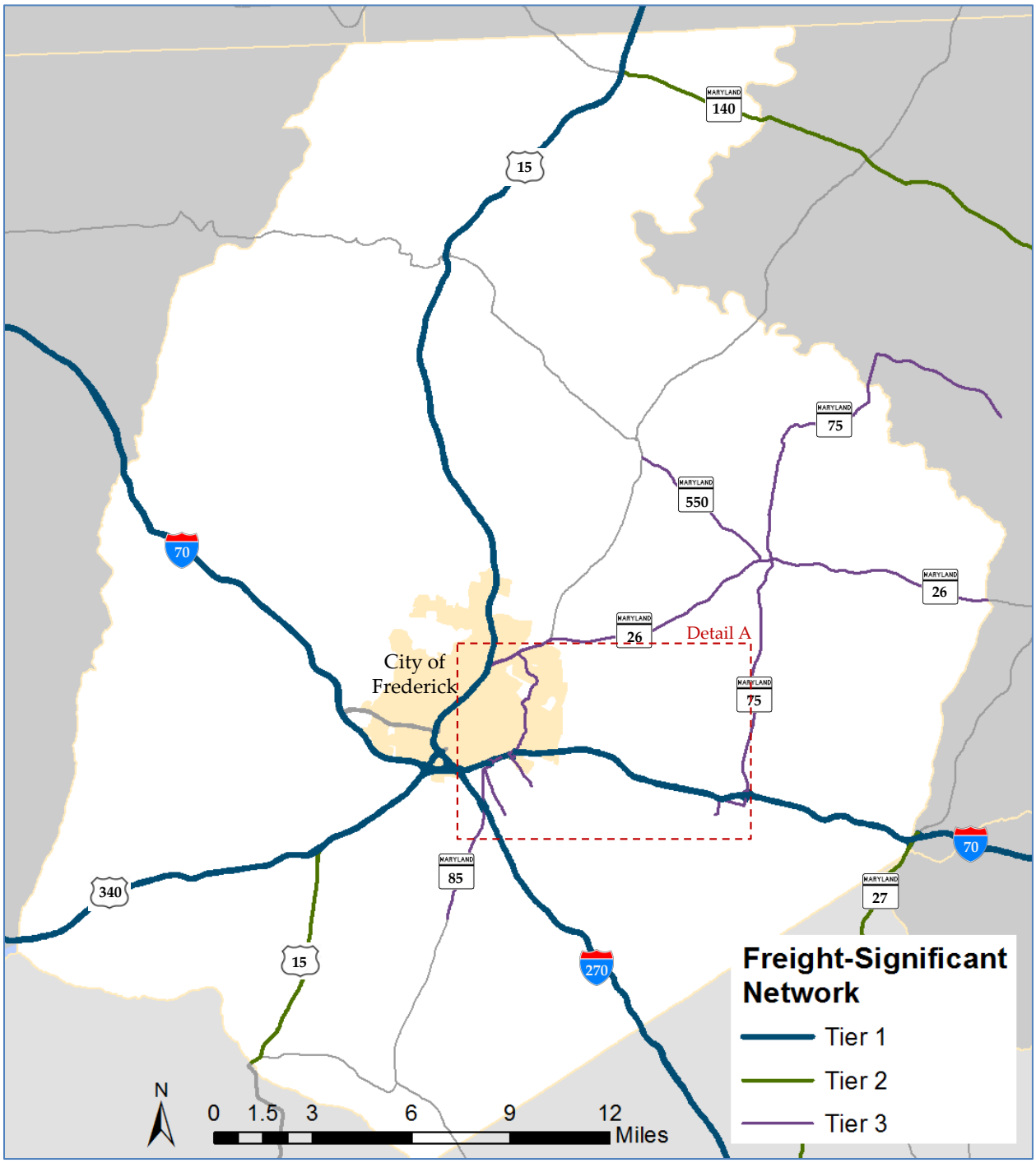


Figure B.2 Regional Freight-Significant Network – Frederick County Detail A

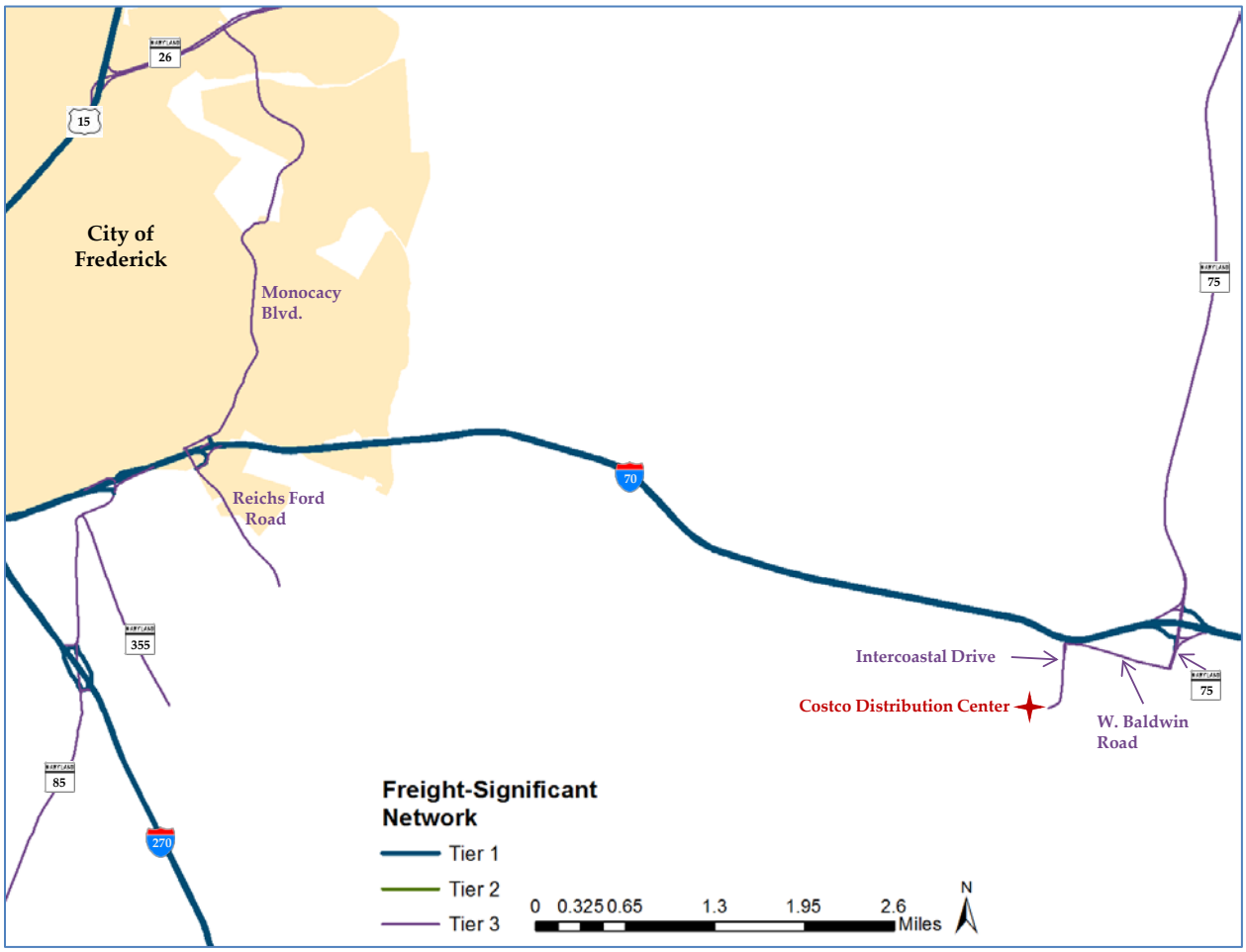


Figure B.3 Regional Freight-Significant Network – Montgomery County Area

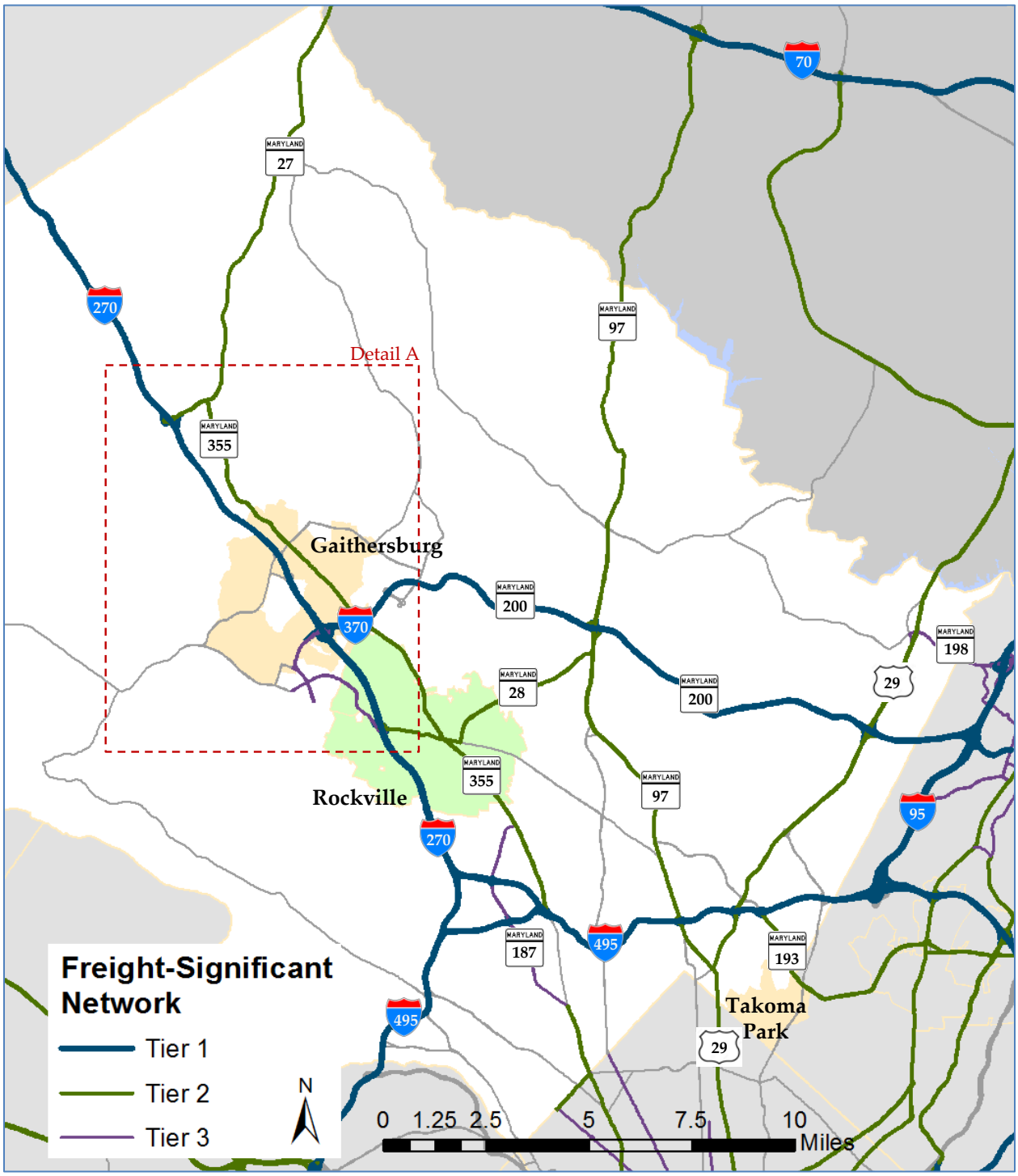


Figure B.4 Regional Freight-Significant Network – Montgomery County Detail A

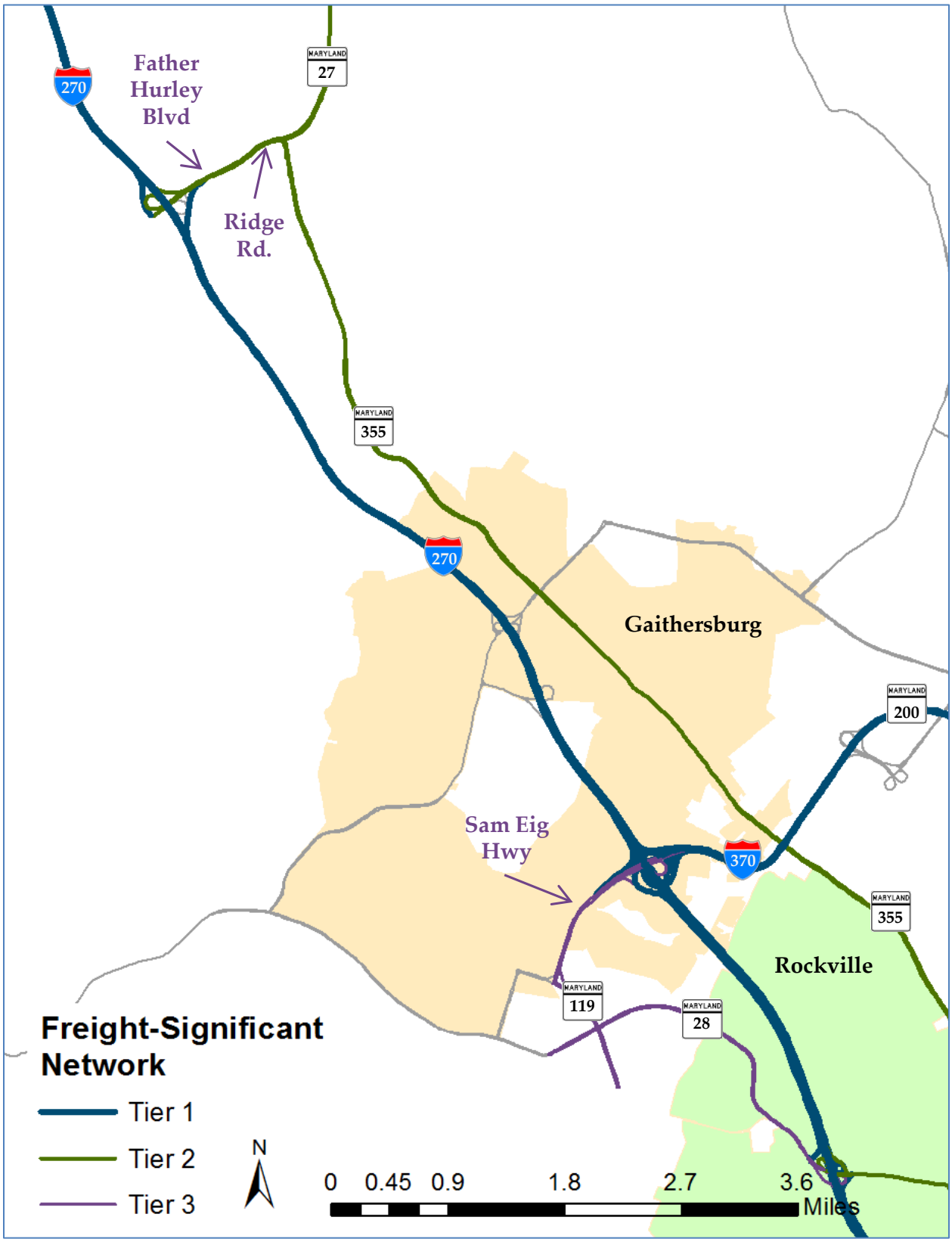


Figure B.5 Regional Freight-Significant Network – Prince George's County

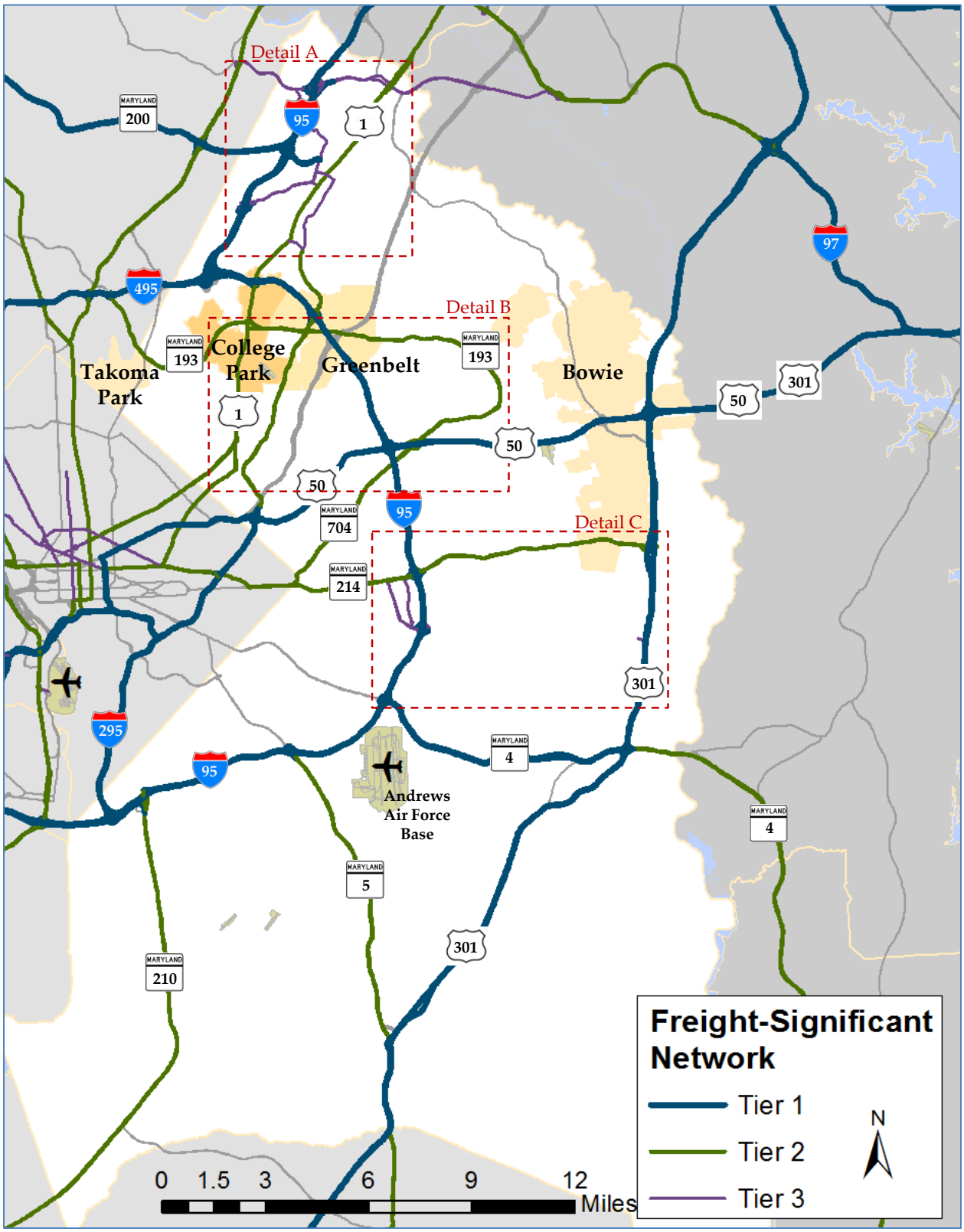


Figure B.6 Regional Freight-Significant Network – Prince George's County Detail A

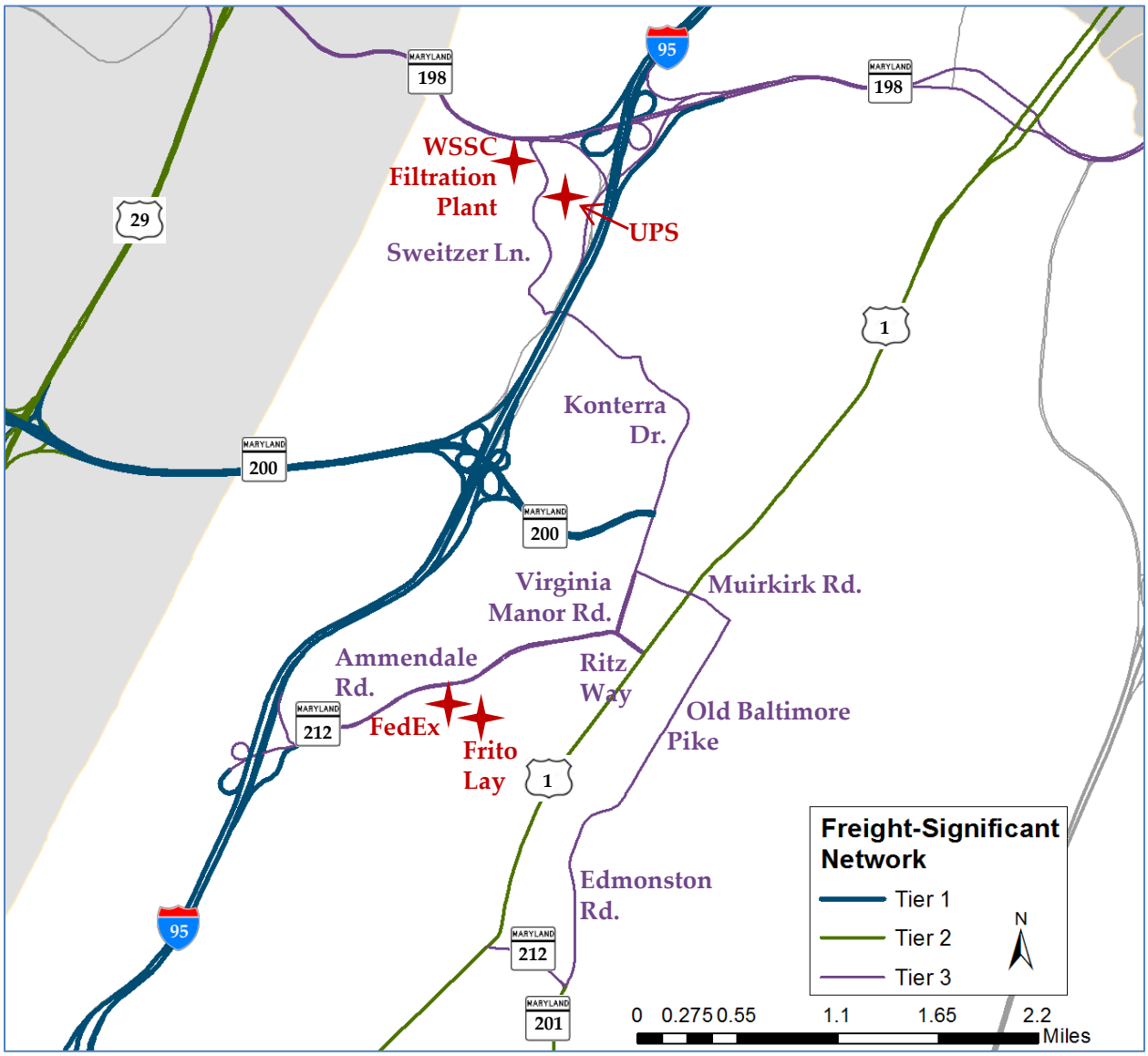


Figure B.7 Regional Freight-Significant Network – Prince George's County Detail B

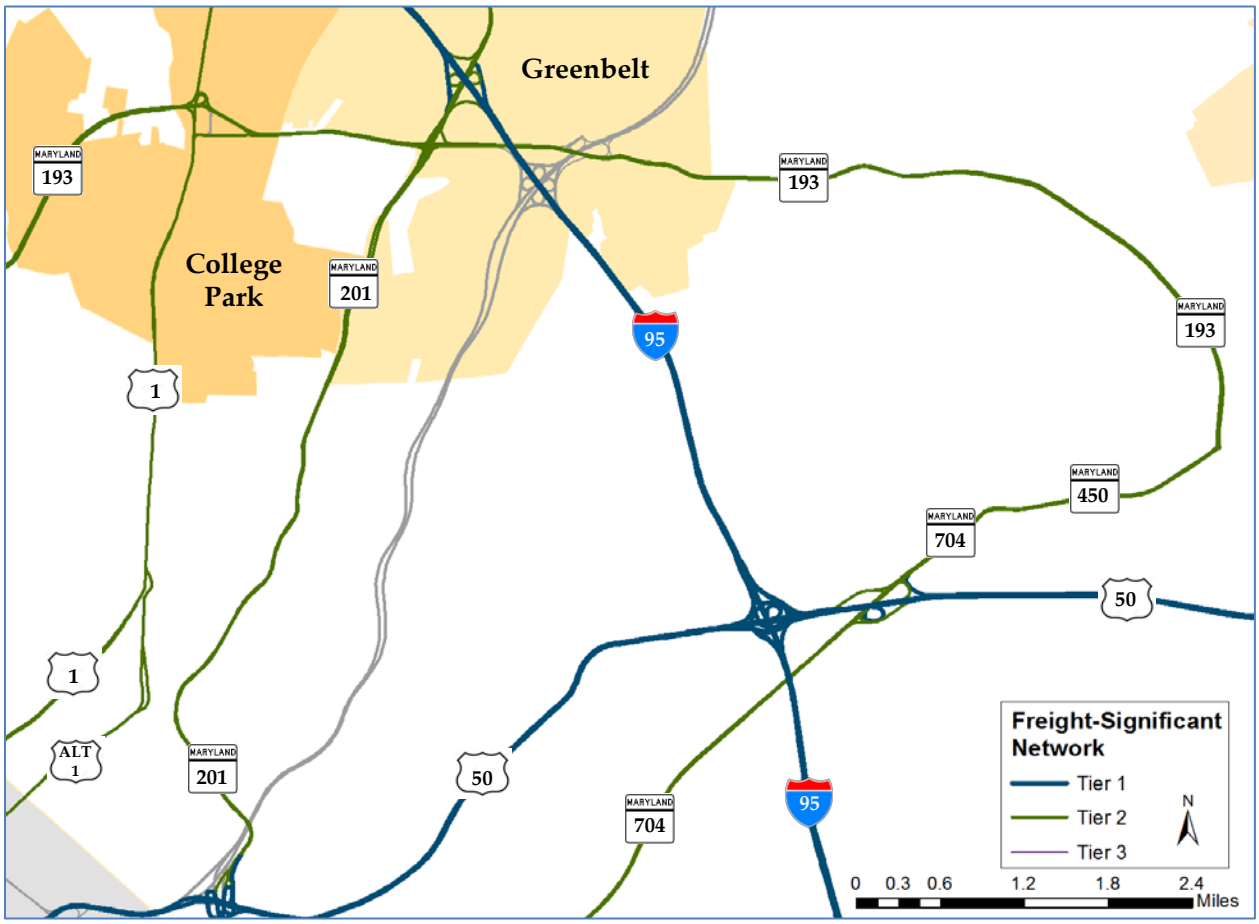


Figure B.8 Regional Freight-Significant Network – Prince George's County Detail C

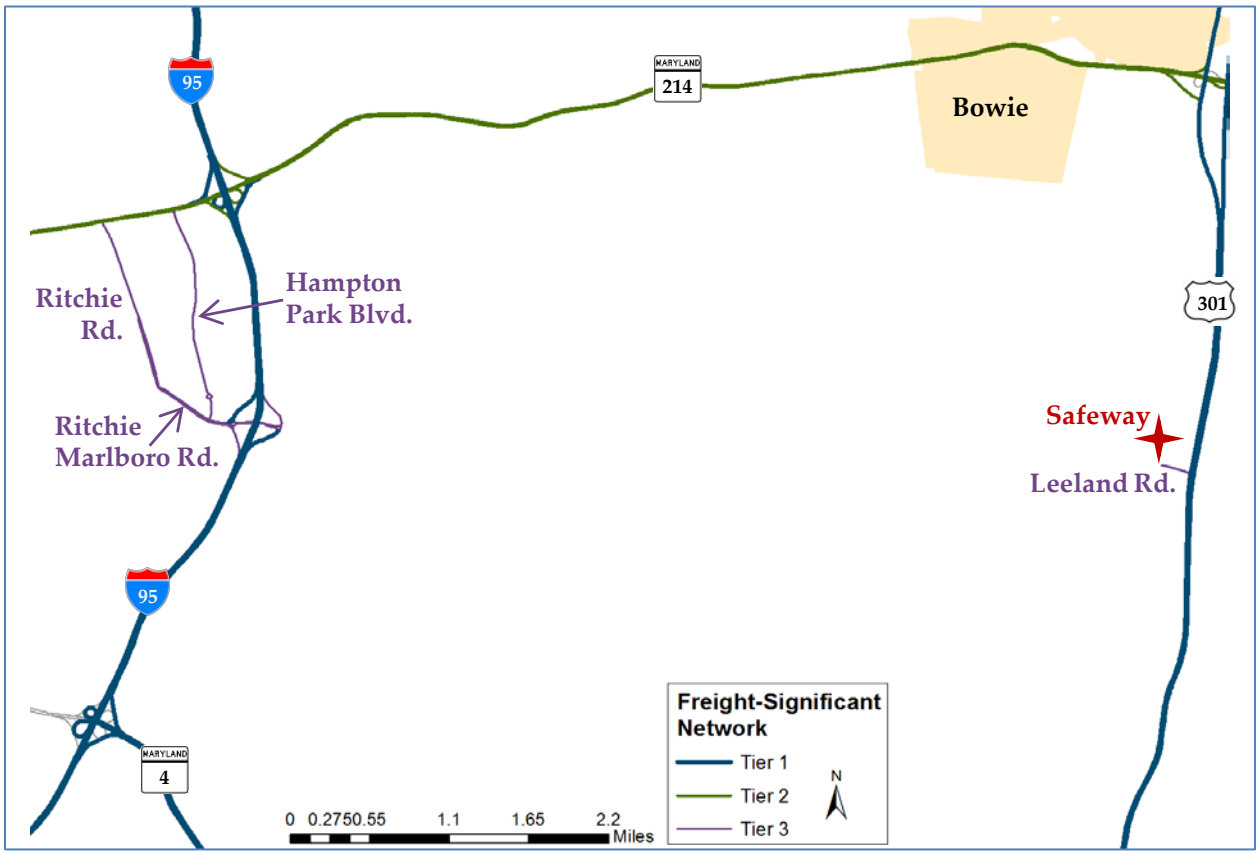


Figure B.9 Regional Freight-Significant Network – Charles County

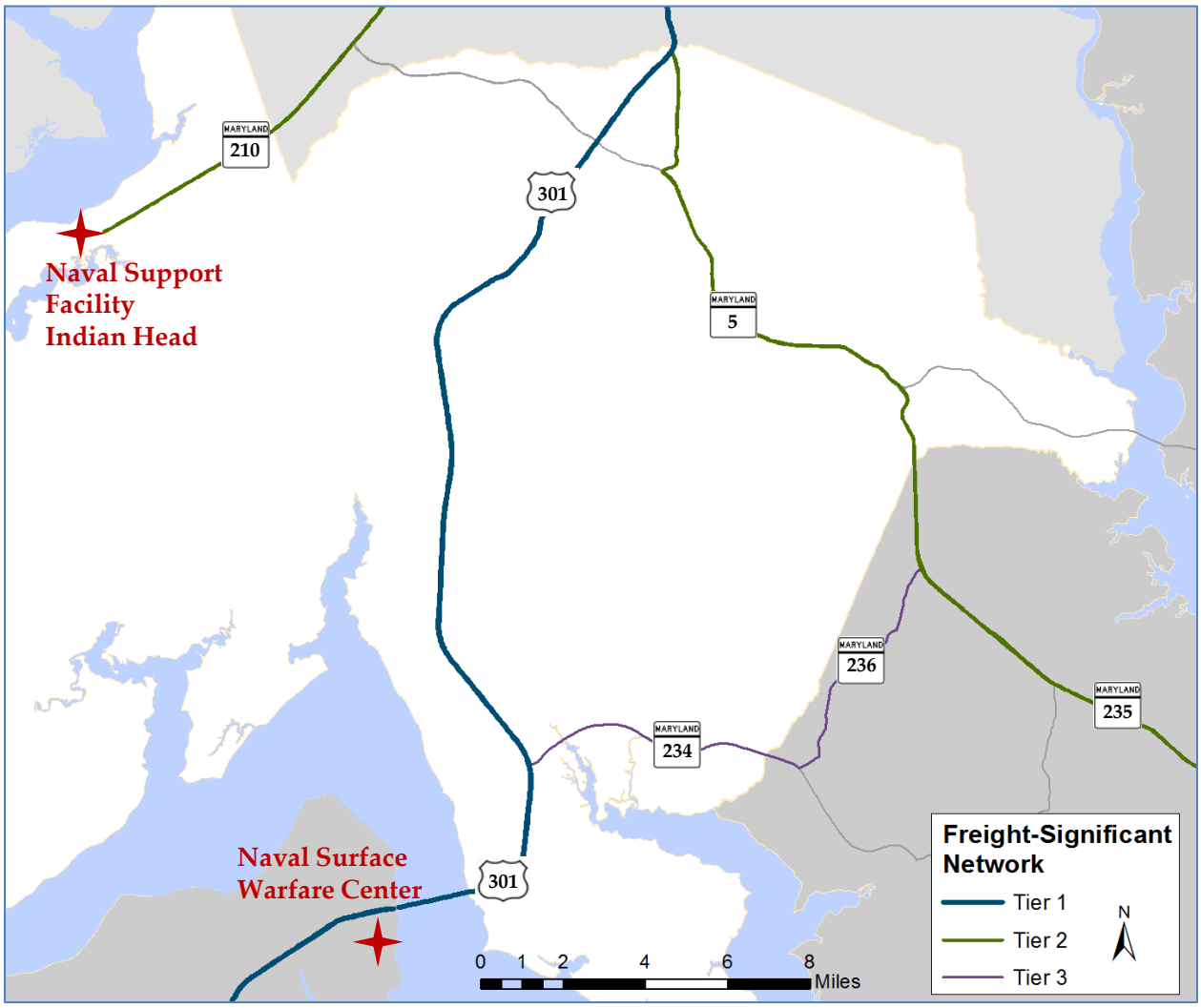


Figure B.10 Regional Freight-Significant Network – District of Columbia

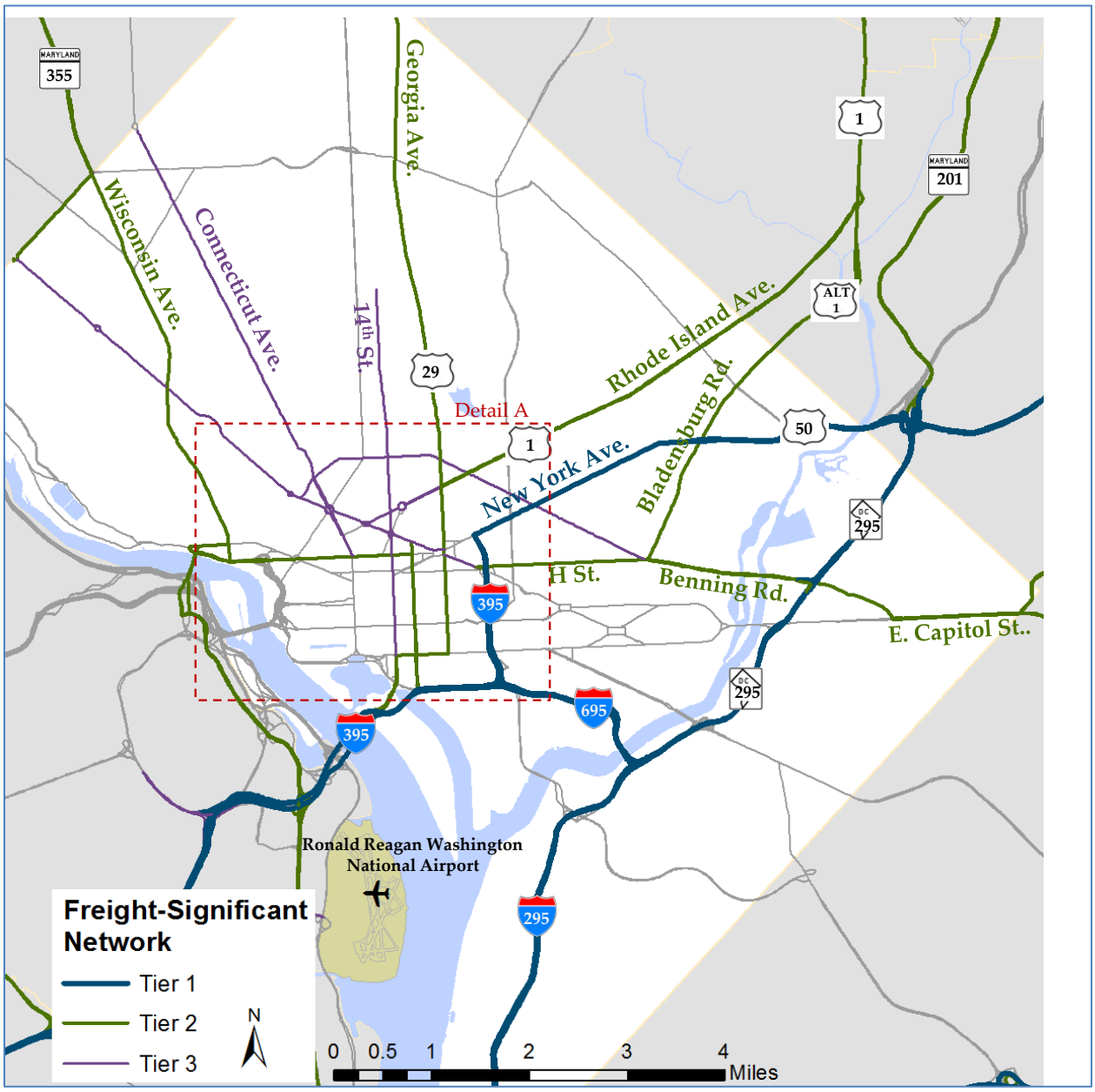


Figure B.11 Regional Freight-Significant Network – District of Columbia Detail A

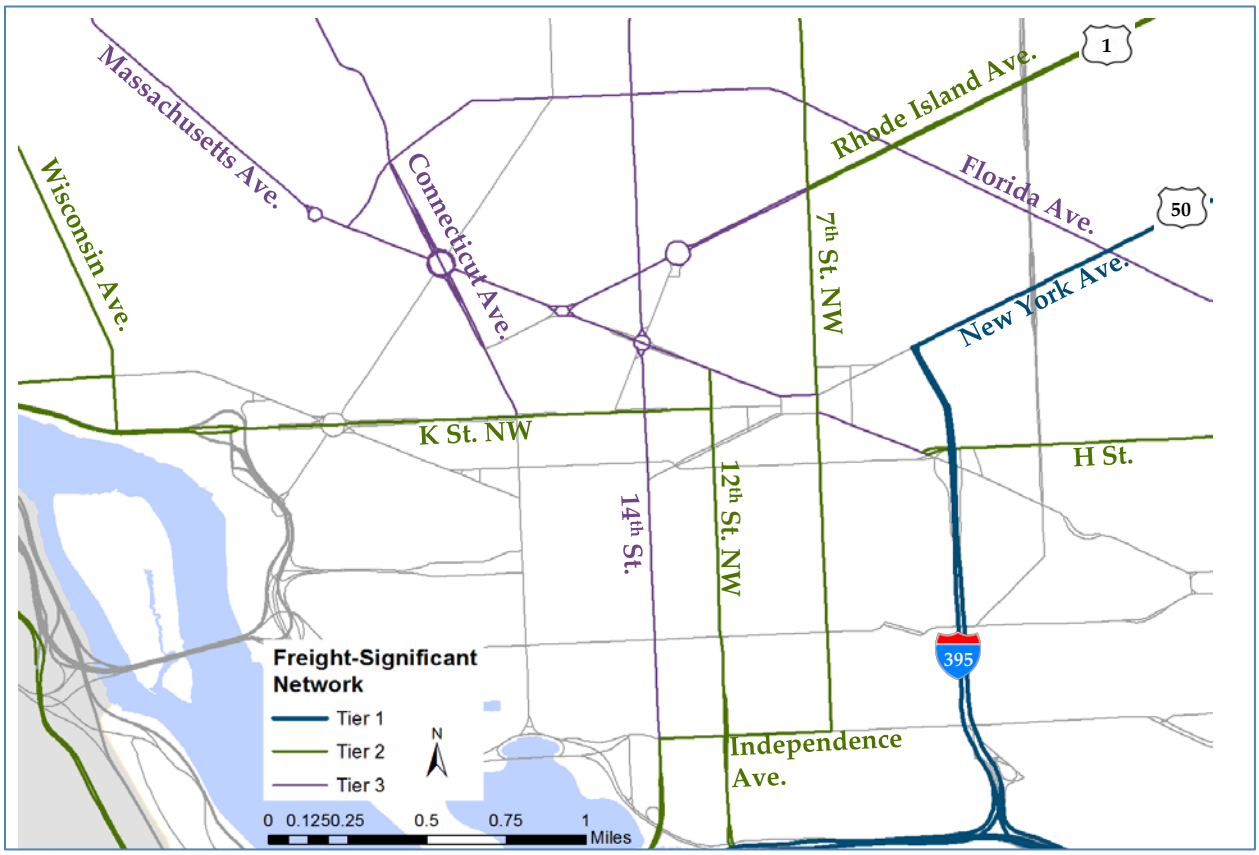


Figure B.12 Regional Freight-Significant Network – Loudoun County Area

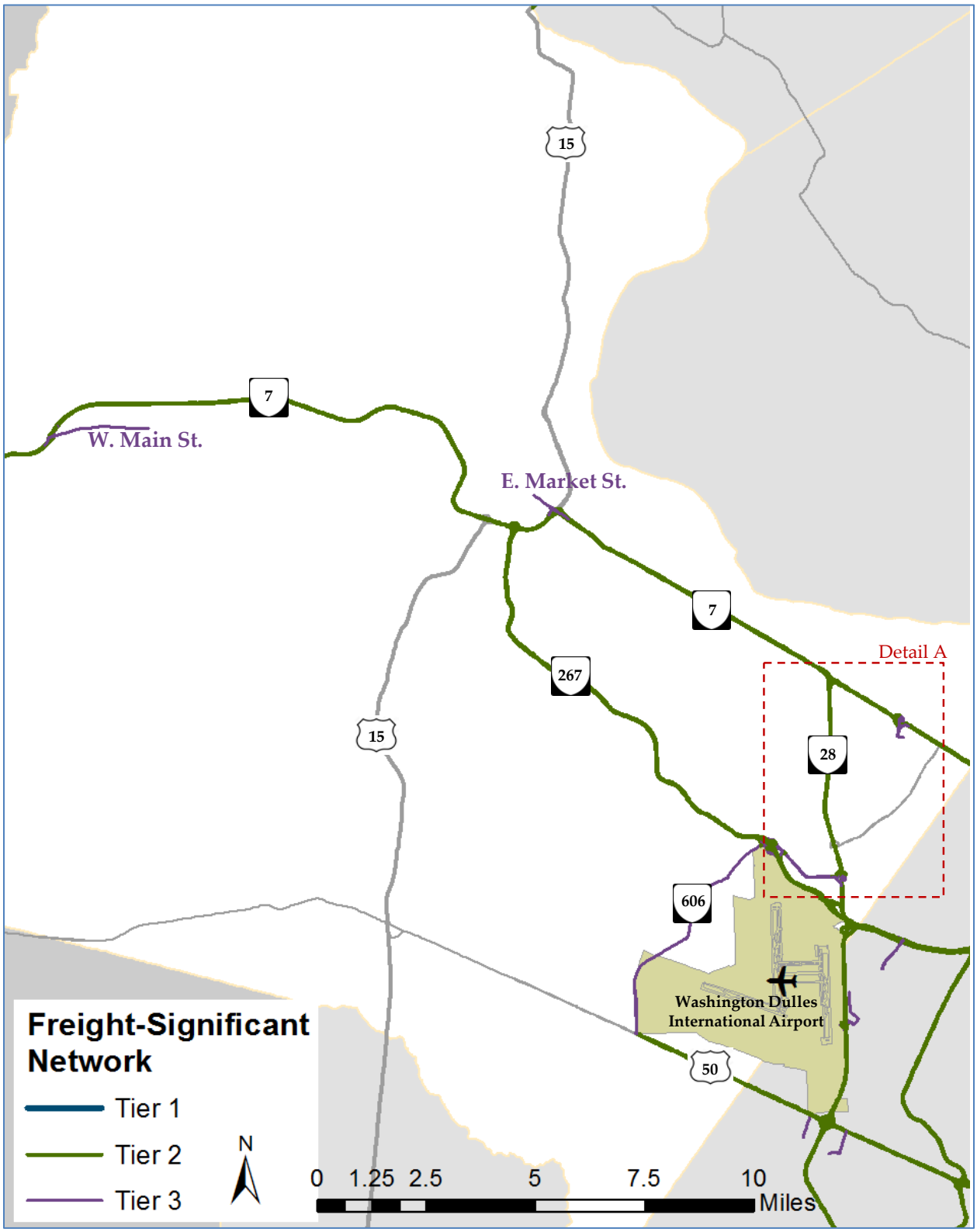


Figure B.13 Regional Freight-Significant Network – Loudoun County Detail A

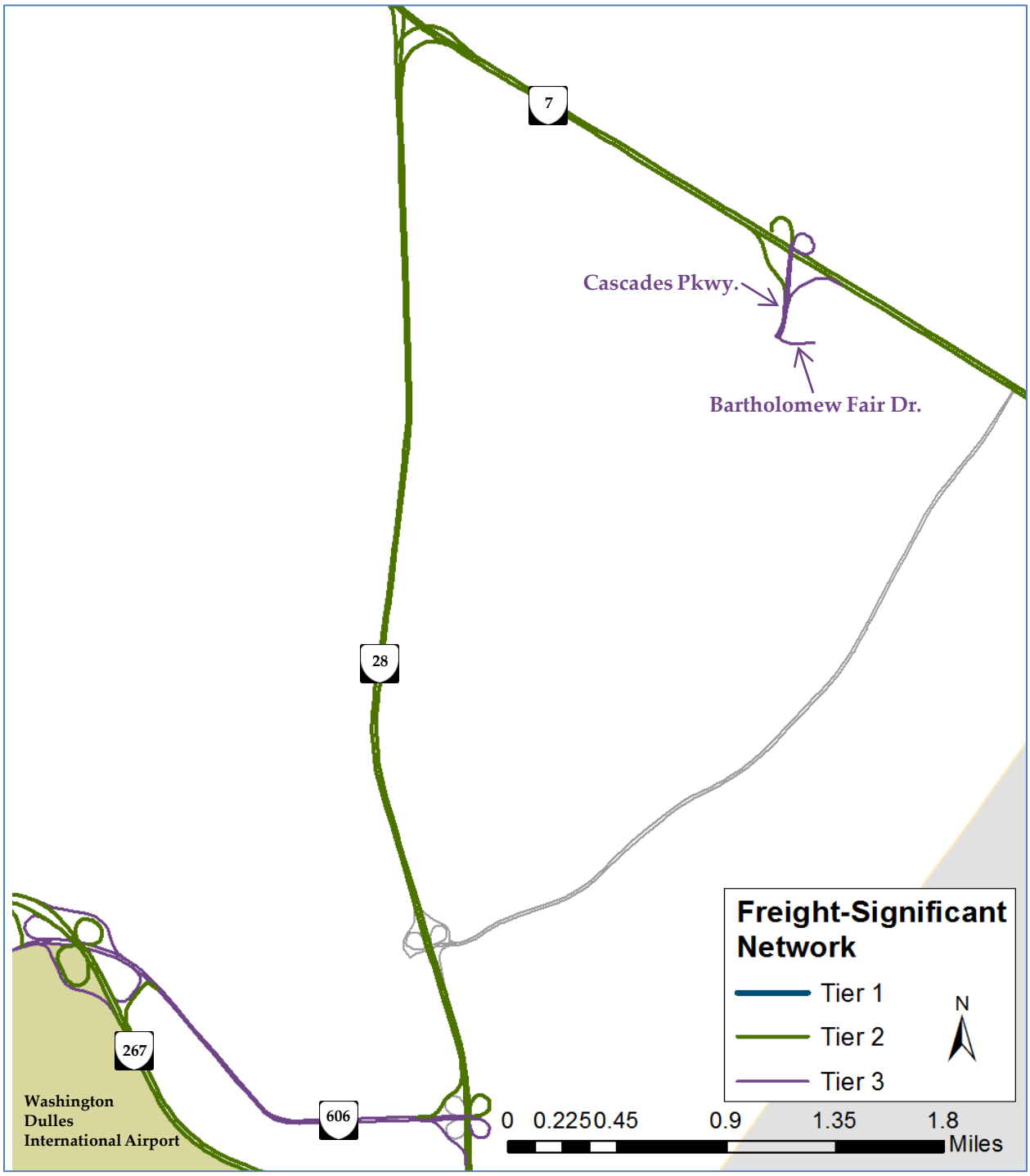


Figure B.14 Regional Freight-Significant Network – Fairfax County Area

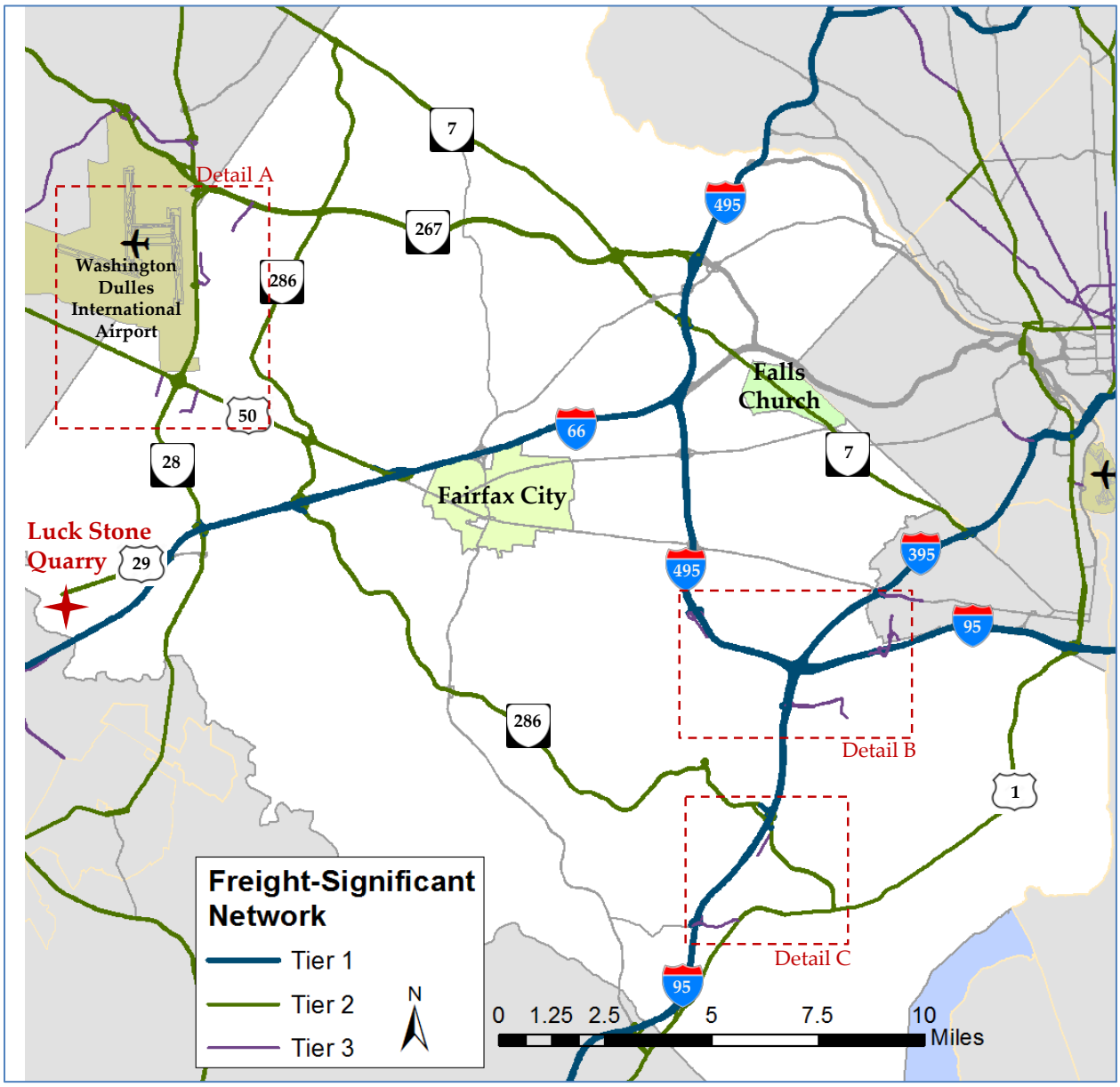


Figure B.15 Regional Freight-Significant Network – Fairfax County Detail A

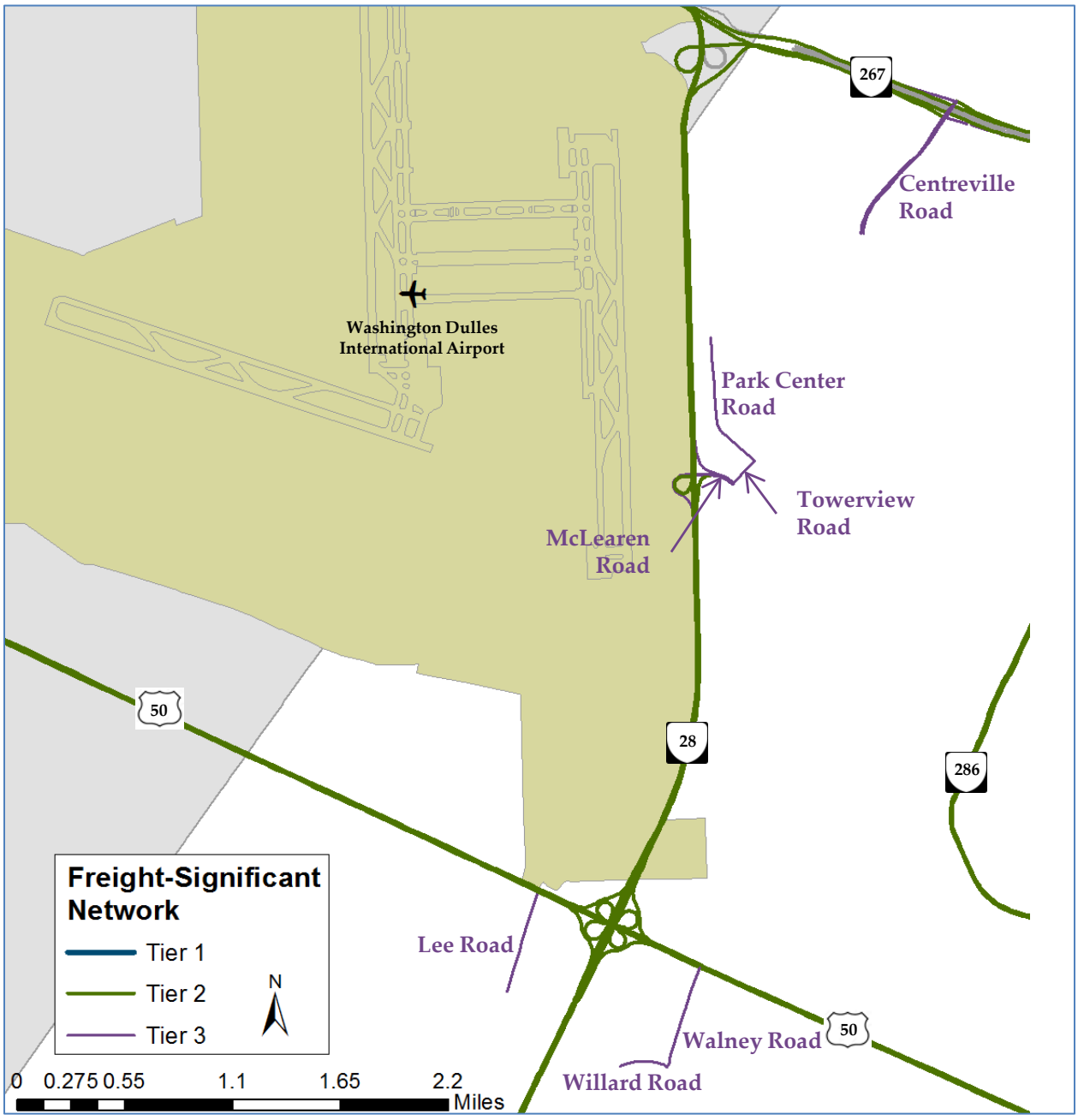


Figure B.16 Regional Freight-Significant Network – Fairfax County Detail B

Figure B.17 Regional Freight-Significant Network – Fairfax County Detail C

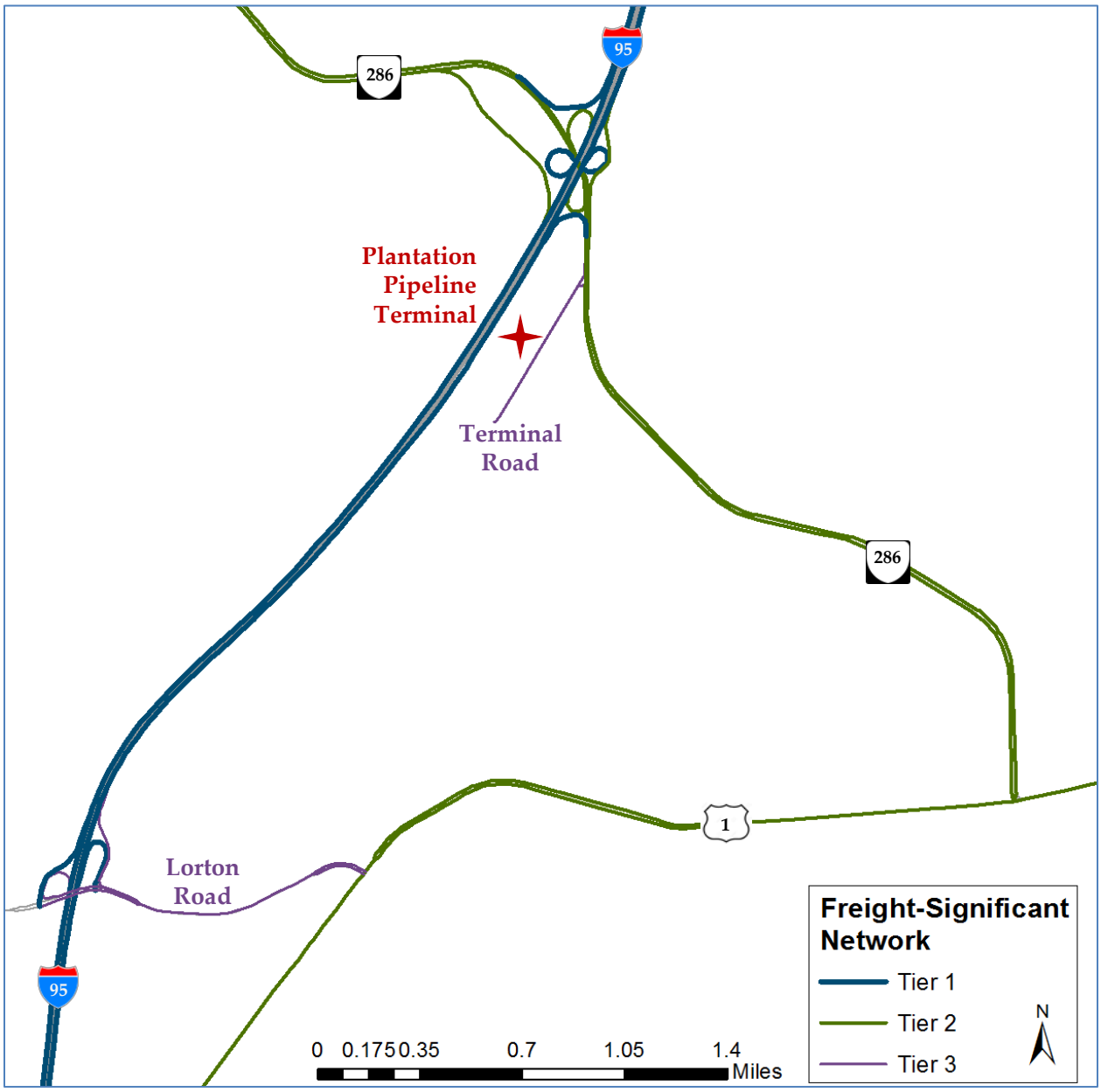


Figure B.18 Regional Freight-Significant Network – Prince William County Area

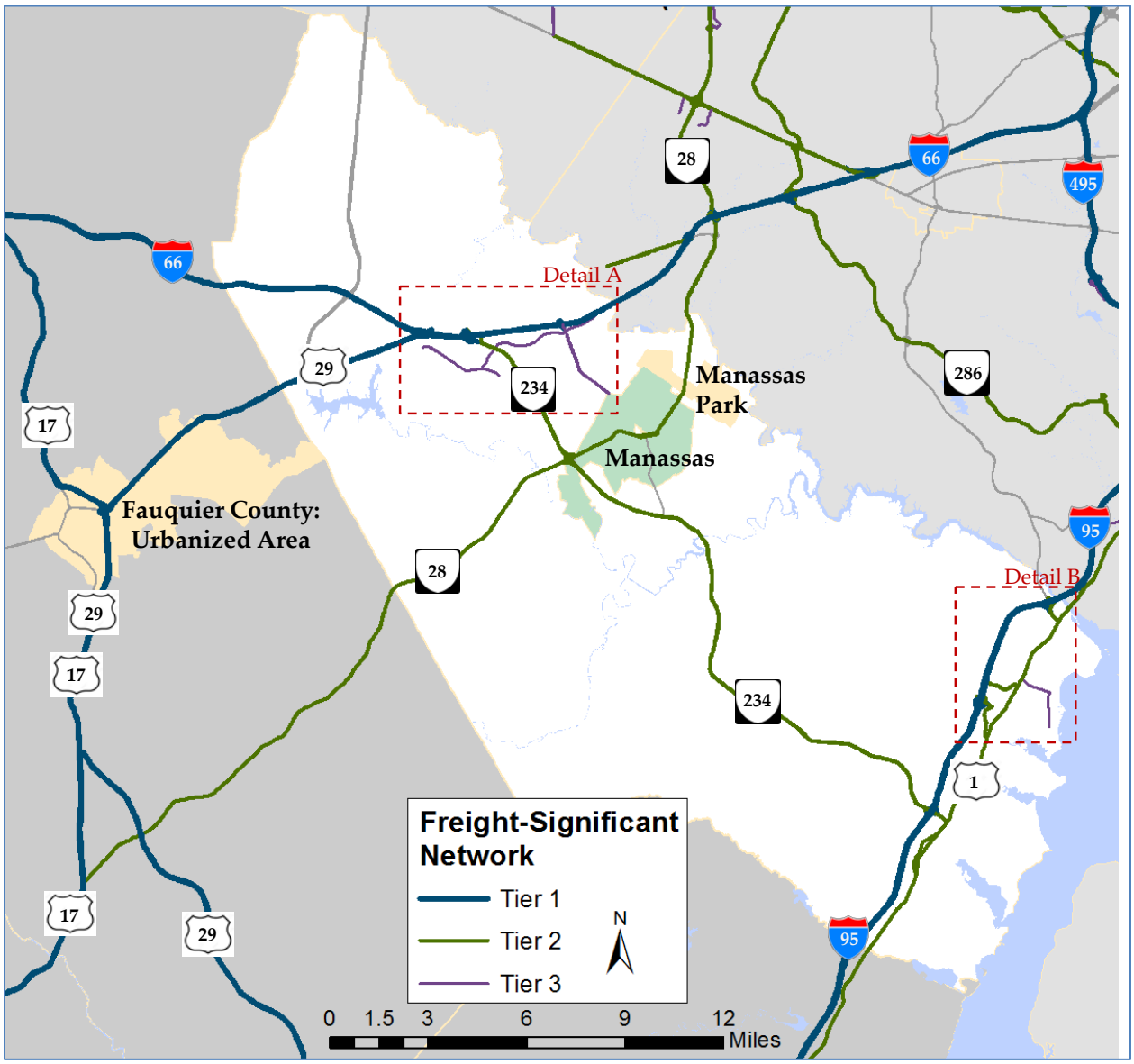


Figure B.19 Regional Freight-Significant Network – Prince William County Detail A

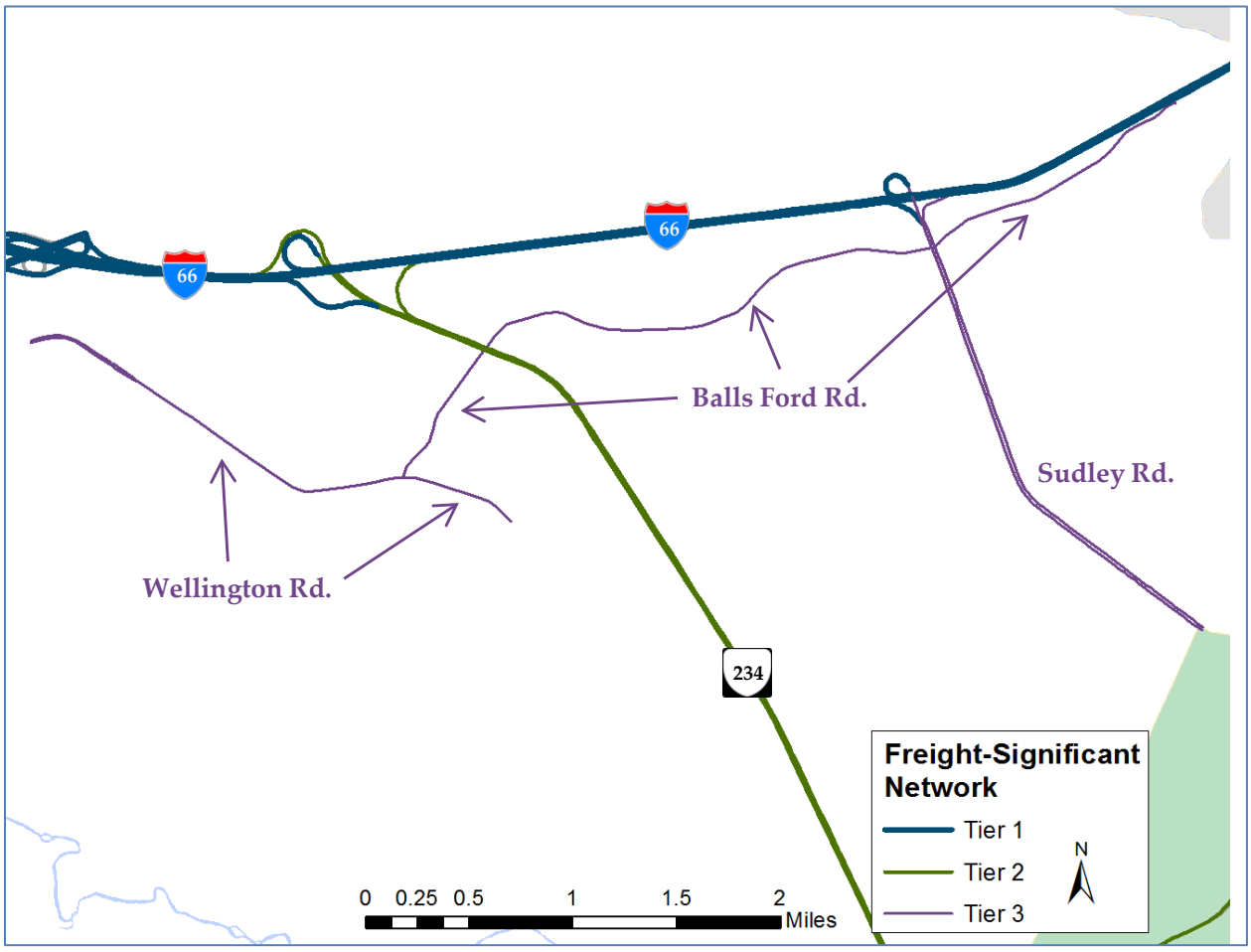


Figure B.20 Regional Freight-Significant Network – Prince William County Detail B

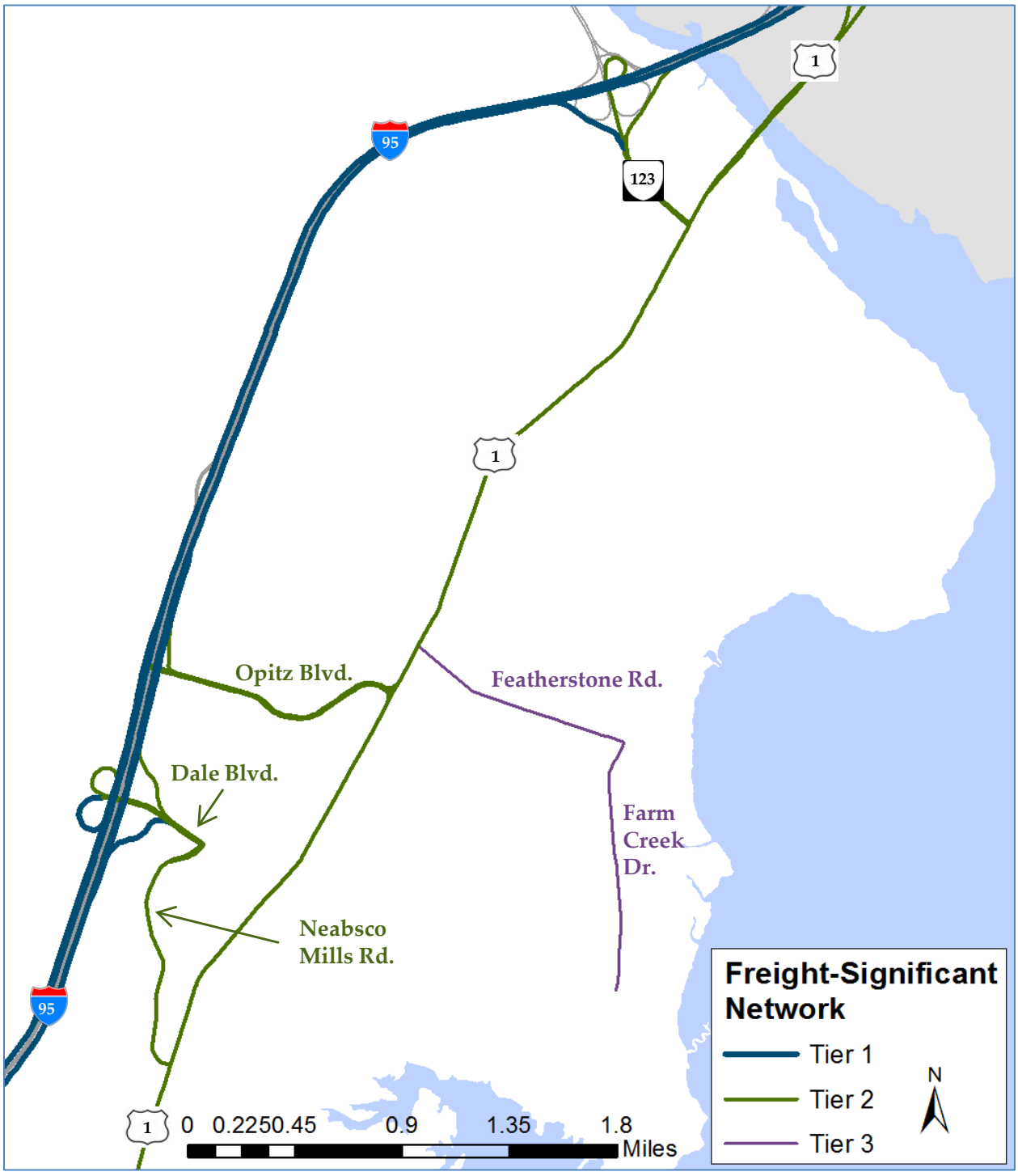


Figure B.21 Regional Freight-Significant Network – Arlington County

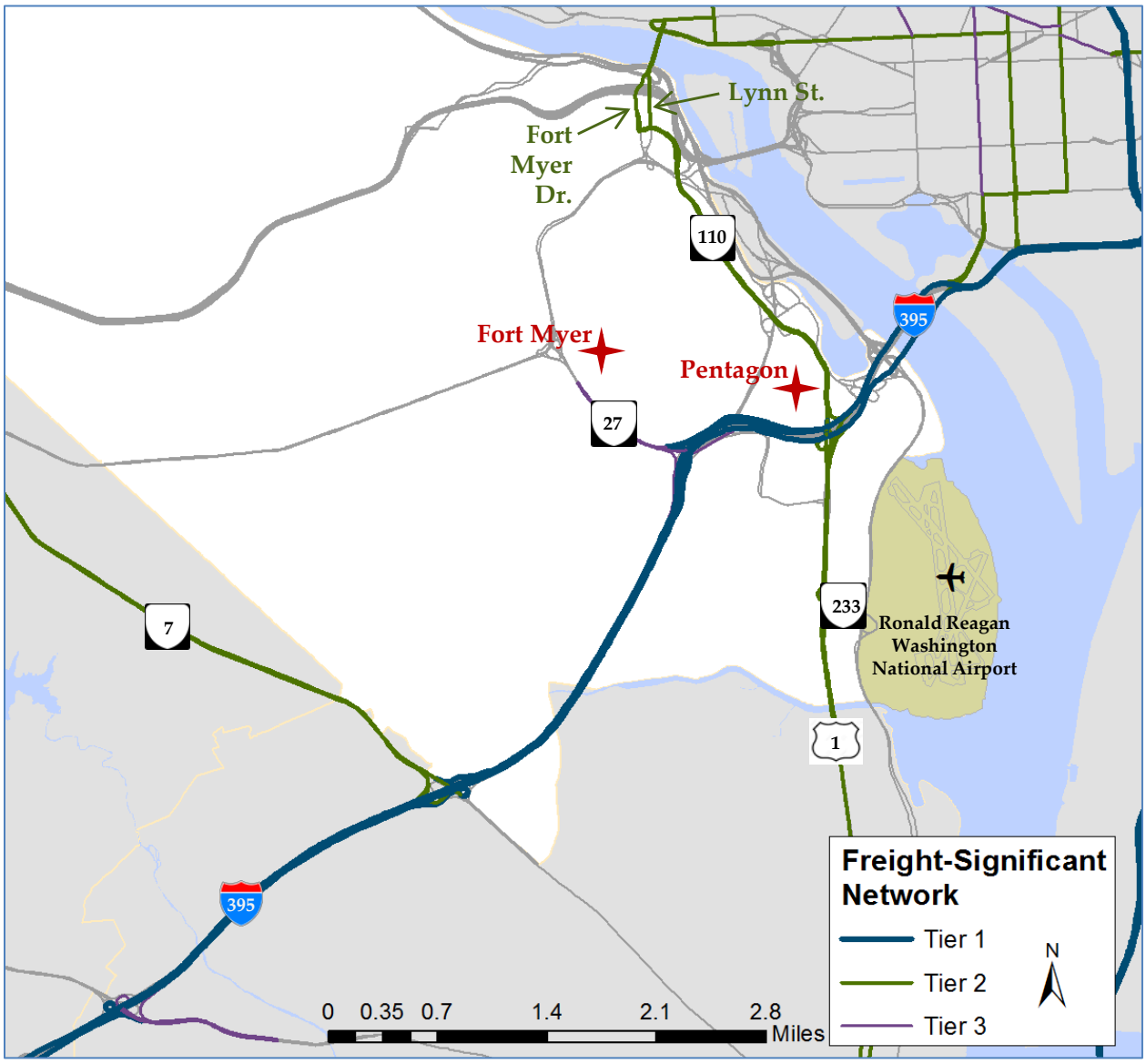


Figure B.22 Regional Freight-Significant Network – City of Alexandria