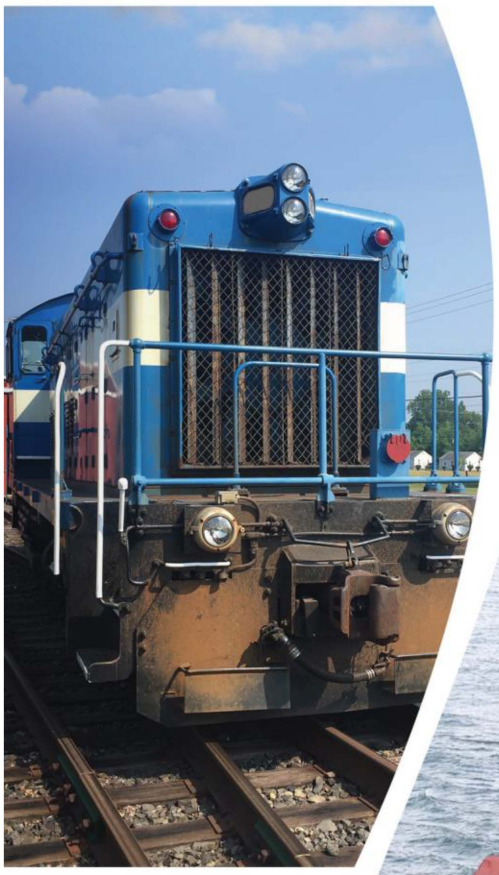
2017

# MARYLAND STRATEGIC GOODS MOVEMENT PLAN



MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION

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# CONTENTS

# FIGURES

# TABLES

# APPROVAL LETTER FROM FHWA

U.S. Department of Transportation
**Federal Highway Administration**

**Maryland Division**

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http://www.fhwa.dot.gov/mddiv/

November 20, 2017

In Reply Refer To:
HDA-MD

Mr. Gregory Slater, Administrator
Maryland State Highway Administration
707 North Calvert Street
Baltimore, Maryland 21202

Dear Mr. Slater:

The Federal Highway Administration ("FHWA") Maryland Division Office ("Division Office") has reviewed the Maryland Department of Transportation's Maryland Strategic Goods Movement Plan ("Plan") dated 2017 and received by the Division Office on October 13, 2017.

The Division Office finds that the Plan contains all elements required by 49 U.S.C. § 70202. The State has, therefore, met the prerequisite in 23 U.S.C. § 167(i)(4) that it develop a State Freight Plan in accordance with 49 U.S.C. § 70202 before it may obligate funds apportioned to the State under 23 U.S.C. § 104(b)(5). The State may now obligate such funds for projects that meet all National Highway Freight Program ("NHFP") eligibility requirements described in 23 U.S.C. § 167, and all other applicable Federal requirements.

Please be advised that the Division Office's finding that the Plan satisfies the requirements of 49 U.S.C. § 70202 and 23 U.S.C. § 167(i)(4) is not a determination that the projects listed in the freight investment plan component of the Plan required by 49 U.S.C. § 70202(b) meet all other NHFP eligibility requirements set forth in 23 U.S.C. § 167, or any other applicable Federal requirement.

If you have any questions regarding NHFP eligibility requirements, please contact Kwame Arhin at 410-779-7158 or via email (Kwame.Arhin@dot.gov).

Sincerely,

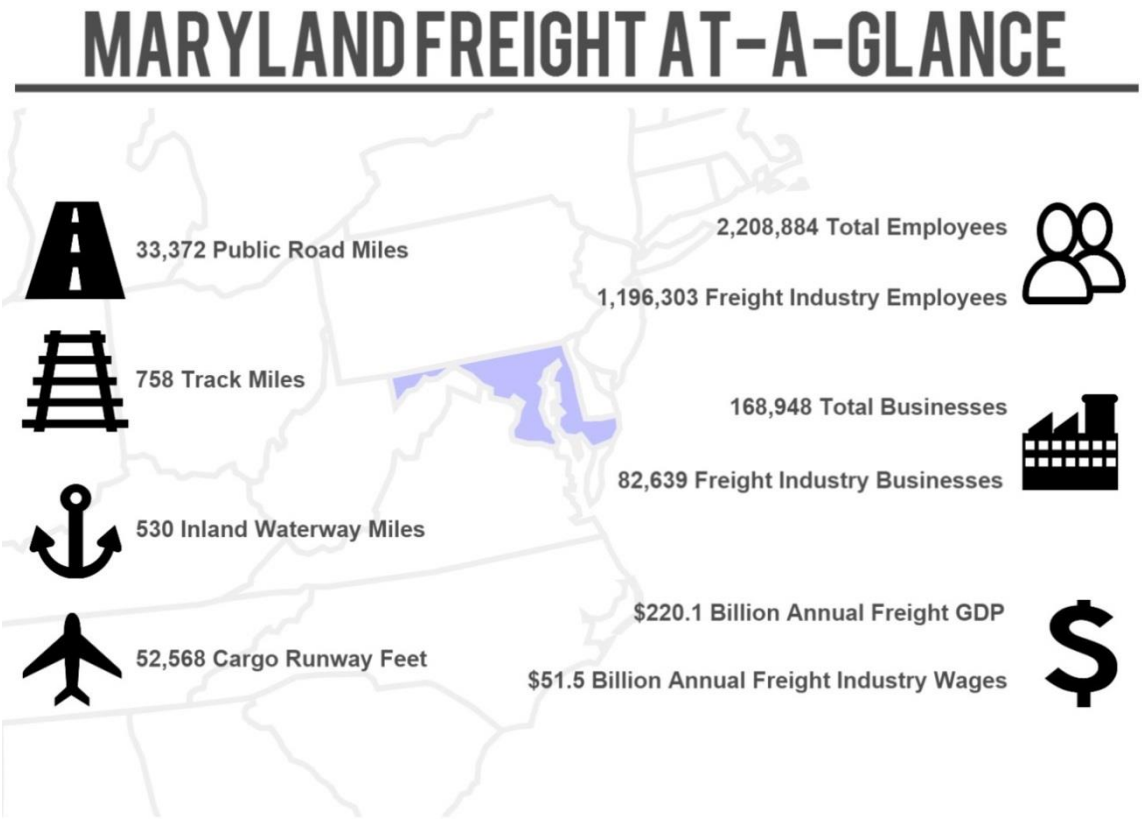
Gregory Murrill
Division Administrator

cc:
Mr. Scott Pomento, SHA
Ms. Caitlin Rayman, FHWA
Ms. Tiffany Julien, FHWA

# 1.0 INTRODUCTION

The Maryland Strategic Goods Movement Plan (Freight Plan) is an addendum to the State's Long-Range Transportation Plan (LRTP) to both meet the federal requirements of the Fixing America's Surface Transportation (FAST) Act and to provide a comprehensive overview of freight movement in Maryland. This Plan describes the policies and strategies in place to ensure the efficient movement of freight in Maryland. It follows the 2035 Maryland Transportation Plan vision and goals and incorporates national freight goals specified in federal surface transportation authorization Moving Ahead for Progress in the 21st Century Act (MAP-21) and the FAST Act.

Ensuring the safe and efficient movement of freight is critical for Maryland businesses and the economy. Freight planning and coordination with freight stakeholders is of utmost importance for the success of Maryland commerce. Goods in Maryland travel on a high-quality multimodal freight transportation network that supports diverse companies and institutions not only in Maryland, but regionally and nationally. Maryland is a significant crossroads of goods and people movement as it provides nationally and regionally significant highway, rail, marine and aviation links.

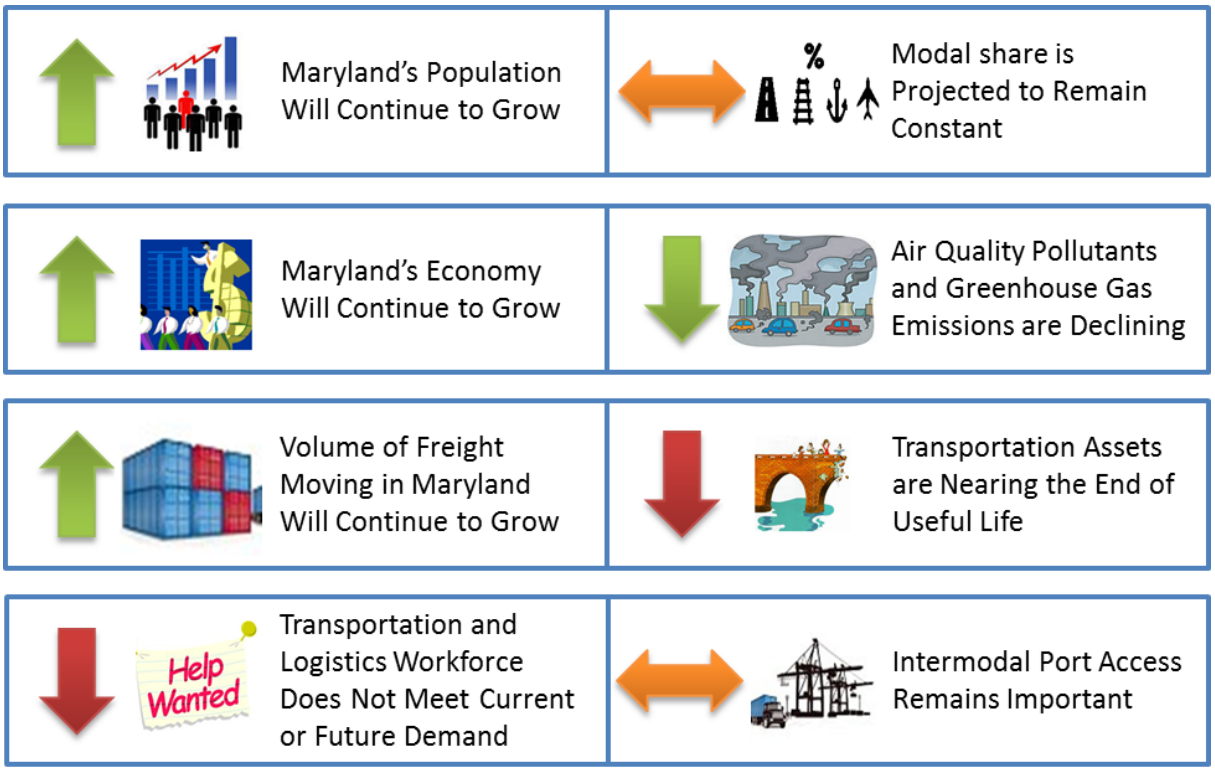



Reliable access to the air and water ports, highways, and rail networks enable businesses to meet their customers' needs in the State and beyond. A free-flowing freight system leads to lower costs of goods that consumers and companies need for good quality of life and successful enterprise. Ensuring that the network of highways, railways, waterways, and airports are ready to handle the current level and anticipated growth of goods movement is a priority of the Maryland Department of Transportation (MDOT).

## 1.1 PLAN PURPOSE

This Strategic Goods Movement Plan examines existing conditions and long-range projections, and establishes policy positions, strategies, and identifies freight projects over the next five years to improve freight movement efficiency and safety. Maryland's multimodal transportation system for goods movement provides a critical support structure for the economic vitality of the State and surrounding region. The volume of goods moving into, out of, and through Maryland continues to grow, and the needs of logistics chains of Maryland industries continue to evolve. It is important that Maryland's transportation agencies are well-equipped to understand current goods movement patterns, monitor trends and projections, be flexible to respond swiftly, and anticipate future needs.

The Strategic Goods Movement Plan acknowledges several key trends that are drivers for goods movement demand and performance of the goods movement transportation system, including:




This Plan is an update to the 2015 Maryland Strategic Goods Movement Plan and the original 2009 Maryland Statewide Freight Plan. It is produced and aligned as an addendum to the 2035 Maryland Transportation Plan. MDOT and freight stakeholders have implemented many of the policies and guidance recommended in the 2009 Plan, such as establishing freight performance measures, and have planned, designed, or constructed several significant projects. This Plan addresses federal compliance required in the FAST Act, as well as MAP-21.

**What is "Goods Movement?"**

The term "goods movement" in the context of the Freight Plan describes the conveyance of raw materials and finished goods from supplier to end user. Raw materials are heavy cargo such as energy products, construction materials, and agricultural products. These types of cargo move through industrial, manufacturing, and agriculture supply chains. Finished goods are business materials and consumer items that are moved via a range of transportation services through wholesale, retail, and service support supply chains. Use of the term "goods movement" in the Freight Plan is an attempt to capture the broad variety of items that rely on a strong transportation system to fuel Maryland's economy and support Marylanders' quality of life.

Each of MDOT's transportation business units (TBU)[1] develop freight projects and programs in their own freight-related planning documents that align with the strategic direction specified in this document. MDOT considers these modal plans together with this Plan as a complete MDOT freight plan package. This modular format is comparable to other transportation planning efforts within MDOT that stem from the 2035 Maryland Transportation Plan, which provides overarching policy direction, goals and objectives that are then delivered through the TBUs' functional plans and business plans.

This Plan recognizes that goods movement relies on private infrastructure in addition to public infrastructure. The strategies in this document will help Maryland reach its goals only through the engagement and participation of the private sector. Private sector freight providers and system owners should use the Plan to understand MDOT's intended strategic direction for goods movement as they develop programs and projects. MDOT maintains a strong relationship with the State Freight Advisory Committee (SFAC), described later in this document.

## 1.2 Advancement of State and National Goals

The Strategic Goods Movement Plan follows the overarching Strategic 2035 Maryland Transportation Plan vision and goals, as well as goals and objectives of each TBU. Additionally, the Plan aims to advance national freight goals specified in federal surface transportation authorization MAP-21 and the FAST Act. The goals set forth coalesce around several key themes, including:

- Economic competitiveness;
- Quality of service;
- Transportation system performance;
- Safety and security;
- Environmental stewardship; and
- Community vitality.

[1] Transportation Business Units: State Highway Administration (SHA), Maryland Transportation Authority (MDTA), Maryland Transit Administration (MTA), Maryland Port Administration (MPA), Maryland Aviation Administration (MAA), Motor Vehicle Administration (MVA)

| FAST Act | MAP-21 | Strategic Goods Movement Plan | 2035 Maryland Transportation Plan Goals |
|---|---|---|---|
| •Strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States<br>•Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network<br>•Reduce the cost of freight transportation<br>•Improve the year-round reliability of freight transportation<br>•Increase productivity, particularly for domestic industries and businesses that create high-value jobs<br>•To improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas<br>•To improve the state of good repair of the National Highway Freight Network<br>•To use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Highway Freight Network<br>•To improve the efficiency and productivity of the National Highway Freight Network<br>•To improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address highway freight connectivity | •Improving the contribution of the freight transportation system to economic efficiency, productivity, and competitiveness<br>•Reducing congestion on the freight transportation system<br>•Improving the safety, security, and resilience of the freight transportation system<br>•Using advanced technology, performance management, innovation, competition, and accountability in operating and maintaining the freight transportation system<br>•Reducing adverse environmental and community impacts of the freight transportation system | •Maintain and improve Maryland's economic competitiveness<br>•Maintain and improve the performance of Maryland's multimodal freight system<br>•Improve the safety and seccurity of goods movers, the public at large, transportation assets and cargo<br>•Maintain and enhance the service experience for users of Maryland's multimodal freight system<br>•Support environmental stewardship<br>•Support the vitality of Maryland's communities | •Economic Prosperity: Support a healthy and competitive Maryland economy<br>•System Preservation: Preserve and maintaint the State's existing transportation infrastructure and assets<br>•Quality of Service: Maintain and enhance the quality of service experienced by users of Maryland's transportation system<br>•Safety and Security: Enhance the safety of transportation system users and provide a transportation system that is resilient to natural or man-made hazards<br>•Environmental Stewardship: Ensure that the delivery of the State's transportation infrastructure program conserves and enhances Maryland<br>•Community Vitality: Provide options for the movement of people and goods that support communities and quality fo lif |

## 1.3 POLICY DEVELOPMENT THROUGH COLLABORATION

The development of the policies identified in the Strategic Goods Movement Plan was a collective effort led by the Secretary's Office with contributions from the TBUs. The Plan also benefits from input from external stakeholders, such as private sector freight service providers and system users, and representatives from other State, regional, and local agencies such as Metropolitan Planning Organizations. Opinions on the direction and needs for freight transportation in Maryland were captured through extensive stakeholder engagement. These inputs, along with data and information analysis, helped to affirm and refine the goals and strategies that are reflected in this Plan.

## 1.4 STAKEHOLDERS AND PARTNERSHIPS

Goods movement relies on an intrinsic partnership between the freight transportation system owners and the users. The freight network consists of public and privately owned and maintained infrastructure. Efficient and safe transport of goods requires that MDOT and private sector partners work together to assess issues and toward developing/ implementing mutually beneficial solutions. MDOT encourages all freight stakeholders to take an active interest and demonstrate a dynamic effort to meet goals and implement the strategies identified in this Plan. The following describes MDOT's stakeholders and partnership roles throughout the development of this Plan.

### Interagency Advisory Committee (IAC)

The IAC represents offices throughout MDOT TBUs and is the public agency freight voice for Maryland. It has met at key milestones during the development of the Plan. Members represent their constituencies' economic, environmental, and transportation needs relative to goods movement. The committee seeks ways to enhance freight mobility in Maryland; increase Maryland's global connectivity and competitiveness; enhance safety and security of the freight system; and balance freight demand with environmental preservation. The committee supports the analysis of statewide, multi-jurisdictional, regional, and corridor freight movement challenges beyond the capacity of individual agencies, MPOs and local jurisdictions. Table 1-1 shows the freight activities of the MDOT TBUs and Offices.

## Table 1-1: Freight Activities of MDOT Transportation Business Units and Offices

| MDOT Transportation Business Units/ Offices | Freight Activities |
|---|---|
| The Secretary's Office (TSO) - Office of Planning and Capital Programming | Statewide multimodal planning and coordination |
| TSO- Office of Freight & Multimodalism | Motor carrier support, freight rail support, regional coordination and planning |
| State Highway Administration | Commercial vehicle safety, commercial vehicle permits, highway planning and analysis |
| Maryland Transportation Authority | Commercial vehicle operations and tolling on MDTA facilities, facilities planning |
| Maryland Port Authority | Oversight, planning, administration of Port of Baltimore |
| Maryland Aviation Administration | Air cargo planning, management, promotion at BWI and other airports |
| Maryland Motor Vehicle Administration | Commercial vehicle operator licenses |

### Freight Stakeholder Advisory Committee (FSAC)

The other important institutional body that supports freight planning activities in Maryland and advocates for implementation is the Freight Stakeholder Advisory Committee (FSAC). This group was formed during the Statewide Freight Plan development and convened several times at important milestones. Members include representatives from all MDOT TBUs, executive-level representatives of trucking companies, freight-rail carriers, steamship lines, major shippers, and facility operators. In addition, USDOT representatives of FHWA and FRA participate in this committee. In the future, the FSAC should meet on a more regular basis to inform MDOT, other State agencies, or the General Assembly of private sector freight needs.

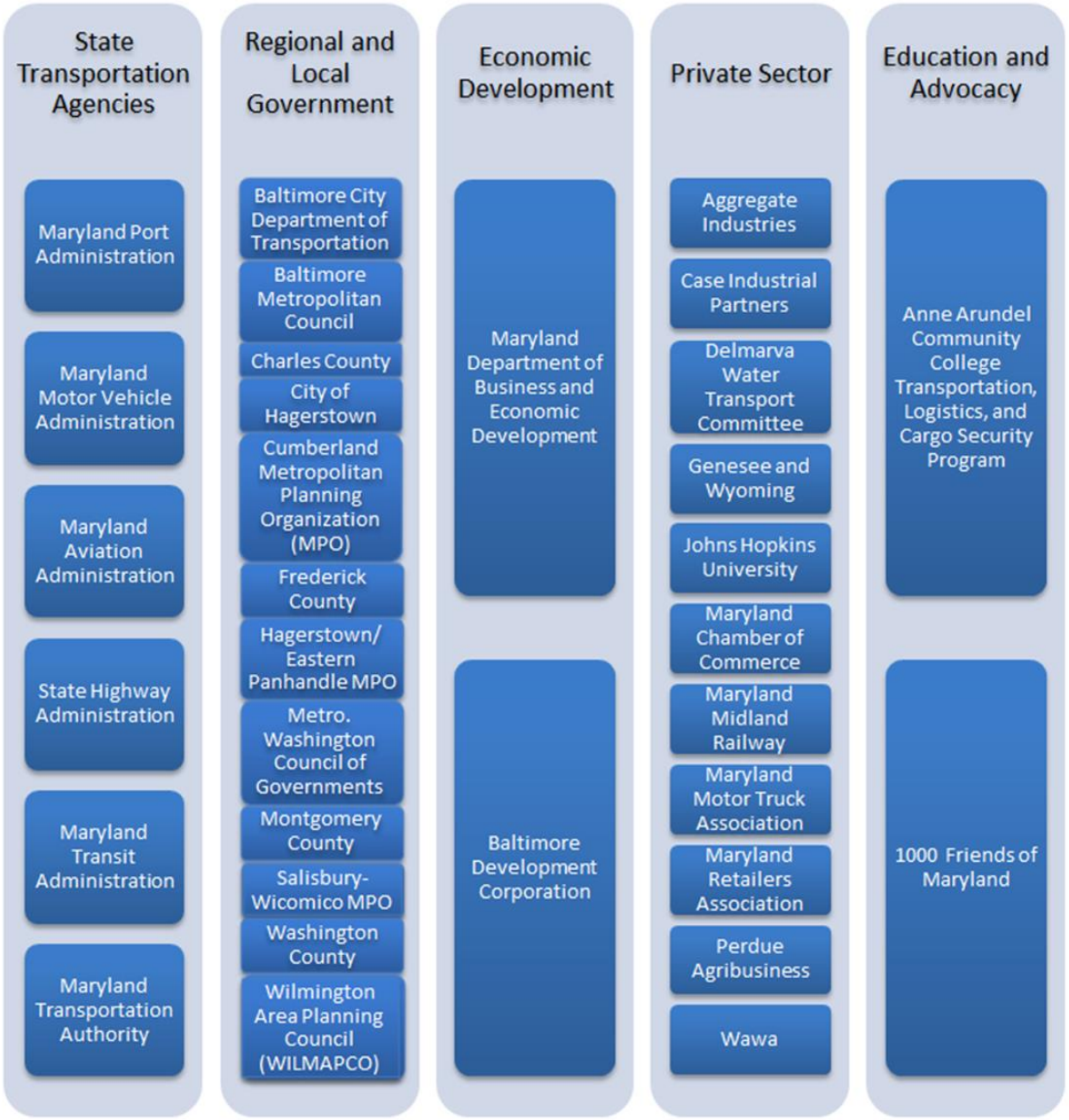
**Freight Stakeholder Advisory Committee (FSAC) Mission**

*Freight Stakeholder Advisory Committee (FSAC) is a high-level group of freight industry leaders representing the best interests of Maryland businesses and consumers. Members represent diverse commercial and business interests that, through their operations and ownership, determine how the State's freight system is used and---in some cases---improved with private capital. Members also represent the diverse geographies and local communities that are impacted by freight movement. Like the Interagency Advisory Committee (IAC), the FSAC will seek ways to enhance freight mobility in Maryland; increase Maryland's global connectivity and competitiveness; enhance safety and security of the freight system; and balance freight demand with environmental preservation. The Committee will support the analysis of private freight operations in Maryland and provide insight into future goods movement patterns and needs.*

## External Stakeholders

In addition to the IAC and FSAC, MDOT relies on partnerships with other public and private entities. These are reflected in Table 1-2.

## Table 1-2: Public and Private Partnerships



# 2.0 MULTIMODAL GOODS MOVEMENT NETWORK

Businesses in Maryland generate products that are shipped throughout the world while simultaneously demanding goods that are produced across the globe and shipped to Maryland. Domestic and international goods move through the Port of Baltimore or other seaports in the US, BWI/Marshall Airport or other airports in the US, and by truck or rail. Maryland's goods movement transportation network is composed of the State's highway network, freight rail network, air cargo airports, waterways, seaports, and intelligent transportation systems.

Logistics networks often span thousands of miles over land, sea, and air, and require critical multimodal connections. At a state level, Maryland's logistics network includes freight shippers and receivers, freight handling facilities, waterborne freight terminals, and air cargo facilities. The highway and rail networks provide vital connections between generating, receiving, and handling facilities.

Maryland's goods movement transportation network is comprised of 32,372 public road miles, 758 rail miles, 530 inland waterway miles, and over 50,000 feet of air cargo runways. Together, these modes moved nearly 631 million tons of freight worth $835 billion, in 2012, the most recent year of available data. Table 2-1 shows the percent of shipments by mode by weight and value of commodities. By 2040, more than 1 billion tons of freight worth close to $1.6 trillion, is expected to move within and through Maryland. This section describes the components of each of these networks, including the locations of key links and nodes along with an overview of performance indicators.

## Table 2-1: Percent of Shipments by Domestic Mode, 2012

| Mode | Total | Within Maryland | From Maryland | To Maryland | Through Maryland |
|---|---|---|---|---|---|
| Truck Tonnage | 83.9% | 96.4% | 92.0% | 56.7% | 84.6% |
| *Truck Value* | 97.7% | 97.9% | 93.7% | 94.4$ | 99.3% |
| Rail Tonnage | 12.8% | 0.5% | 5.1% | 42.2% | 11.1% |
| *Rail Value* | 0.9% | <0.5% | 0.7% | 3.2% | 0.5% |
| Domestic Water Tonnage* | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| *Domestic Water Value** | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| Domestic Air Tonnage** | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| *Domestic Air Value*** | 0.5% | <0.5% | 2.0% | 1.5% | 0.0% |

*Domestic water Includes shallow draft, deep draft, Great Lakes, and intra-port shipments, but does not include international waterborne trade through the Port of Baltimore. The domestic (landside) moves of Port of Baltimore trade are accounted for in other modes.

**Domestic air includes air cargo between U.S. and domestic origin-destination pairs. The domestic portions of international air cargo movements are accounted for in the appropriate domestic modes.

Maryland's roadway system consists of 32,372 centerline miles including: 785 miles of Interstates and freeways; 1,534 miles of principal arterials; 7,342 miles of minor arterials and collectors; and 22,713 miles of local roads. There are also more than 5,000 bridges across the State, including 2,712 on the State Highway system. Maryland roadways handled 529 million tons of freight worth $816 Billion in 2012.[2] By 2040, more than 850 million tons of freight worth $1.5 trillion is expected to travel on Maryland roads and highways. Table 2-2 shows the percent of shipments by truck in 2012.

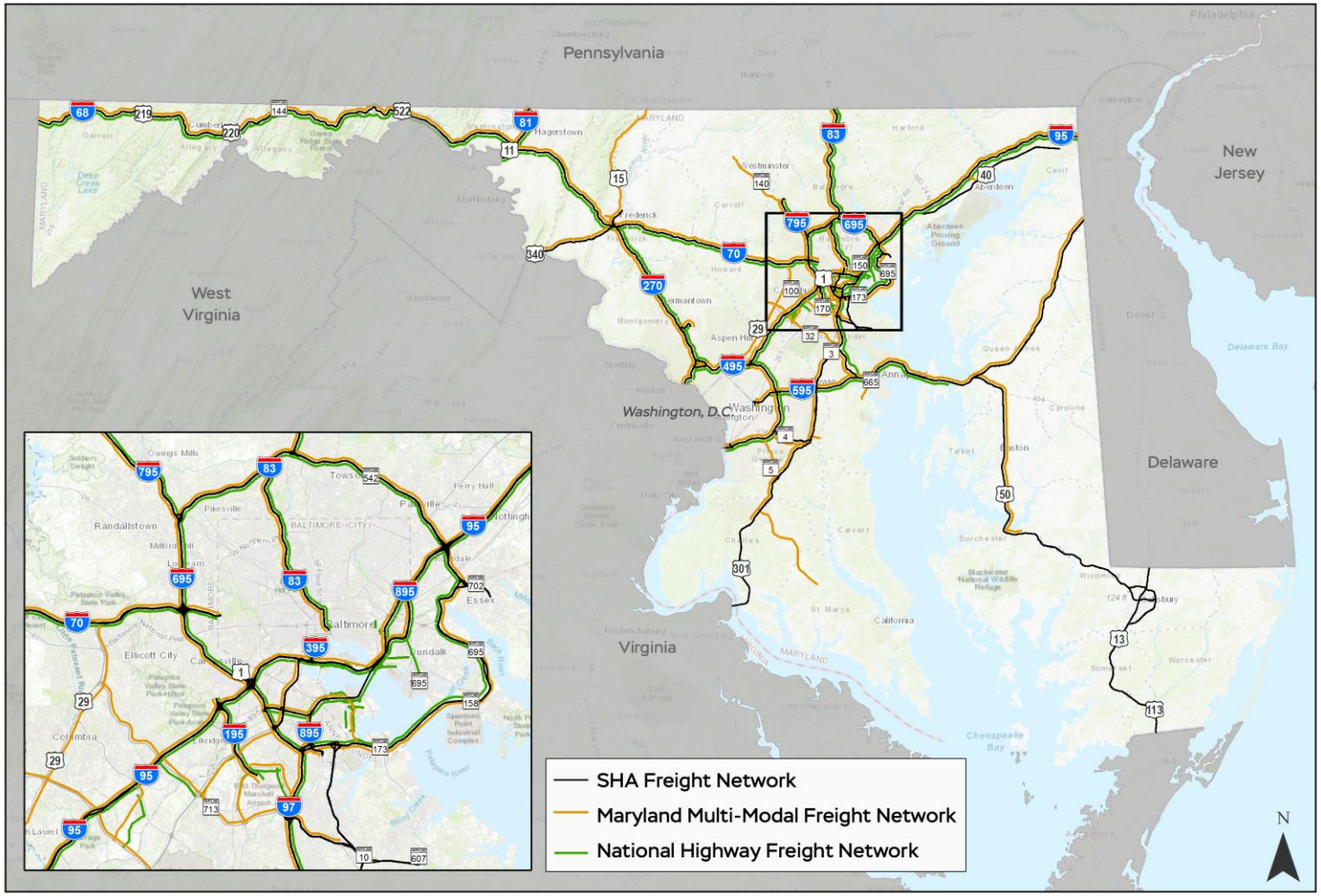
## Table 2-2: Percent of Shipments by Truck, 2012 Weight and Value

| Mode | Total | Within Maryland | From Maryland | To Maryland | Through Maryland |
|---|---|---|---|---|---|
| Truck Tonnage | 83.9% | 96.4% | 92.0% | 56.7% | 84.6% |
| *Truck Value* | 97.7% | 97.9% | 93.7% | 94.4$ | 99.3% |

While goods move along the entire roadway network, the majority of freight by both weight and value utilizes the Maryland Truck Route System (Figure 1).[3] The Maryland Truck Route System is approximately 900 miles long and includes all Interstate segments in Maryland (481 miles), six segments of the US highway system (320 miles), and eight segments of the Maryland State highway network (99 miles). [4] Figure 2-1 shows the Maryland Truck Route system.

[2] Based on Freight Analysis Framework figures.
[3] 2035 Maryland Transportation Plan
[4] Ibid.

## Figure 2-1: Maryland Truck Routes[5]




[5] The routes shown in this figure are those designated as part of the National Truck Network authorized under the Surface Transportation Assistance Act (STAA) of 1982. Trucks may travel on any road in Maryland, except where expressly prohibited, for local deliveries and pick-up.

## 2.1 RAILROAD INFRASTRUCTURE

Maryland's rail network consists of approximately 1,152 miles of track and is comprised of two Class I freight railroads, four Class III short line freight carriers, one switching/terminal railroad, and one passenger railroad.[6] Four of these railroads, CSX, Norfolk Southern (NS), Maryland and Delaware Railroad (MDDE), and Amtrak own 76 percent of the entire network. The other 24 percent of the rail network consists of short lines, rail operating within ports, and track banked by MDOT for future use. Other freight and passenger rail carriers, such as MARC, operate via trackage rights and do not contribute to track system mileage.

Maryland railroads carried nearly 90 million tons of freight worth $5.4 Billion in 2012. By 2040, nearly 141 million tons of freight worth $10 Billion is expected to move by rail in Maryland.[7] Table 2-3 shows the percent of shipments by rail in 2012. Figure 2-2 through Figure 2-4 show the rail lines and terminals in Maryland.

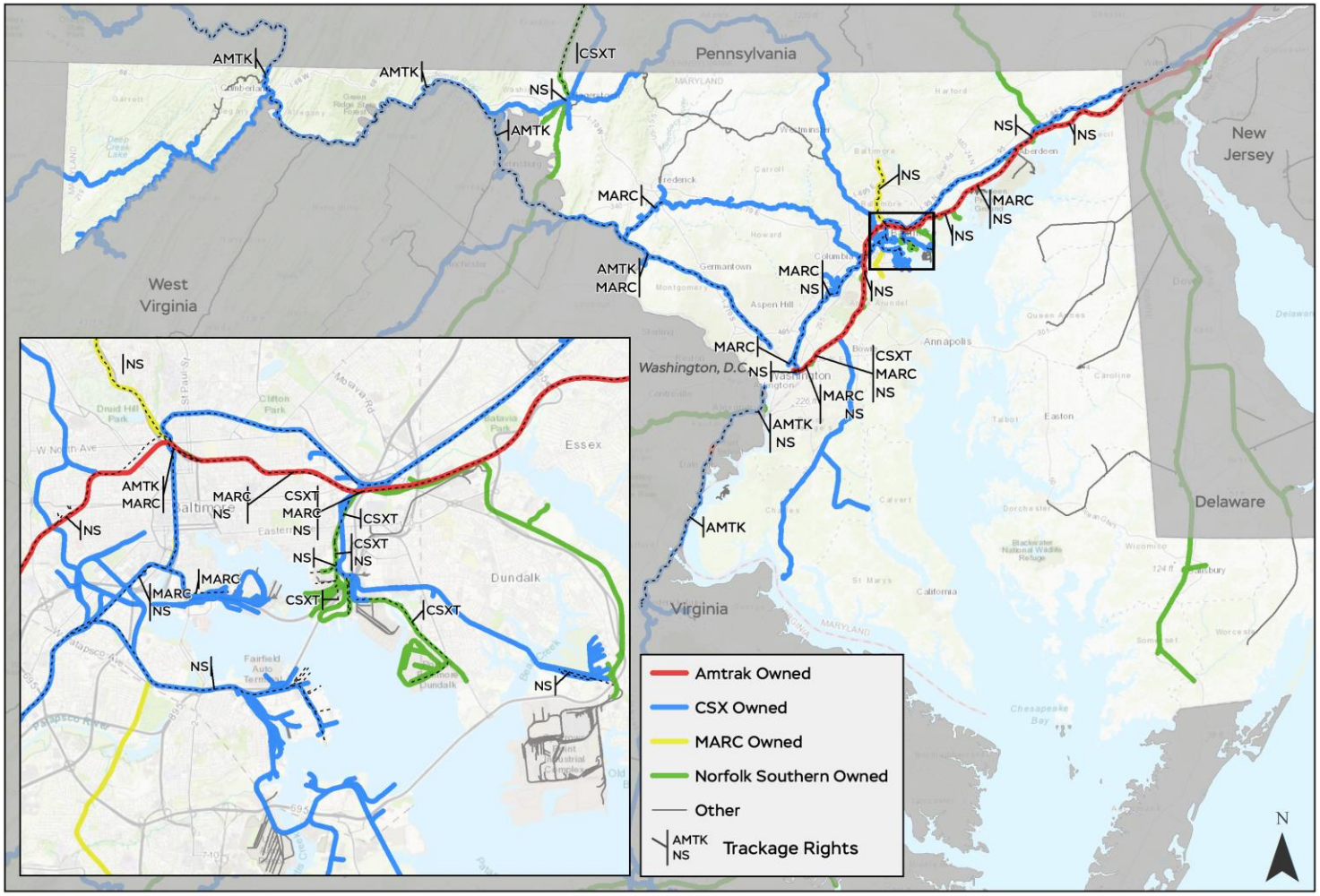
### Table 2-3: Percent of Shipments by Rail, 2012 Weight and Value

| Mode | Total | Within Maryland | From Maryland | To Maryland | Through Maryland |
|---|---|---|---|---|---|
| Rail Tonnage | 12.8% | 0.5% | 5.1% | 42.2% | 11.1% |
| *Rail Value* | 0.9% | <0.5% | 0.7% | 3.2% | 0.5% |

[6] Railroad classifications are based on annual operating revenue. After adjusting for inflation, annual operating revenues must exceed $250 million to be classified as Class I, be less than $250 million but in excess of $20 million for Class II, and $20 million or less for Class III.

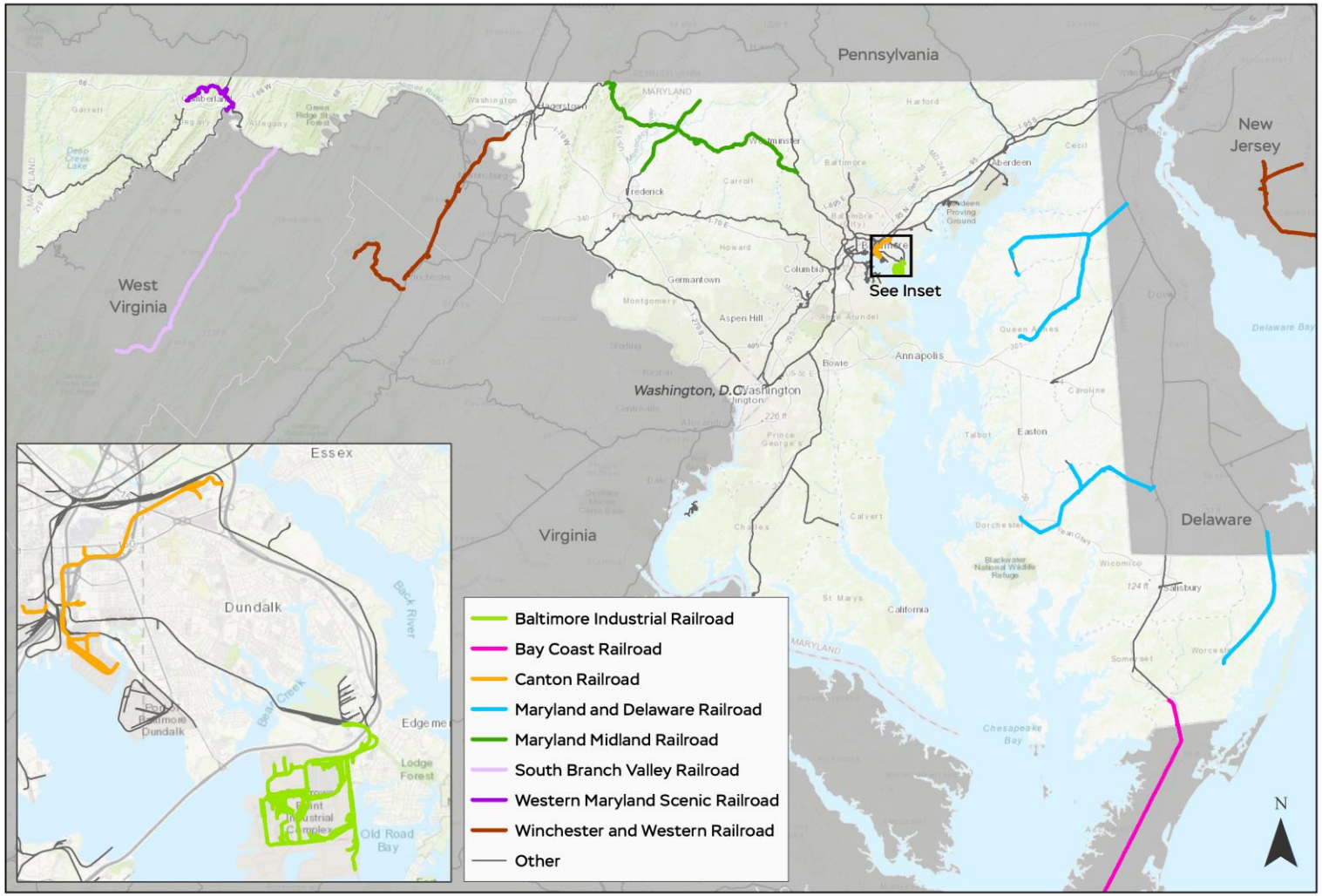
[7] Based on Freight Analysis Framework figures.

## Figure 2-2: Maryland's Class I Freight and Passenger Railroads[8]



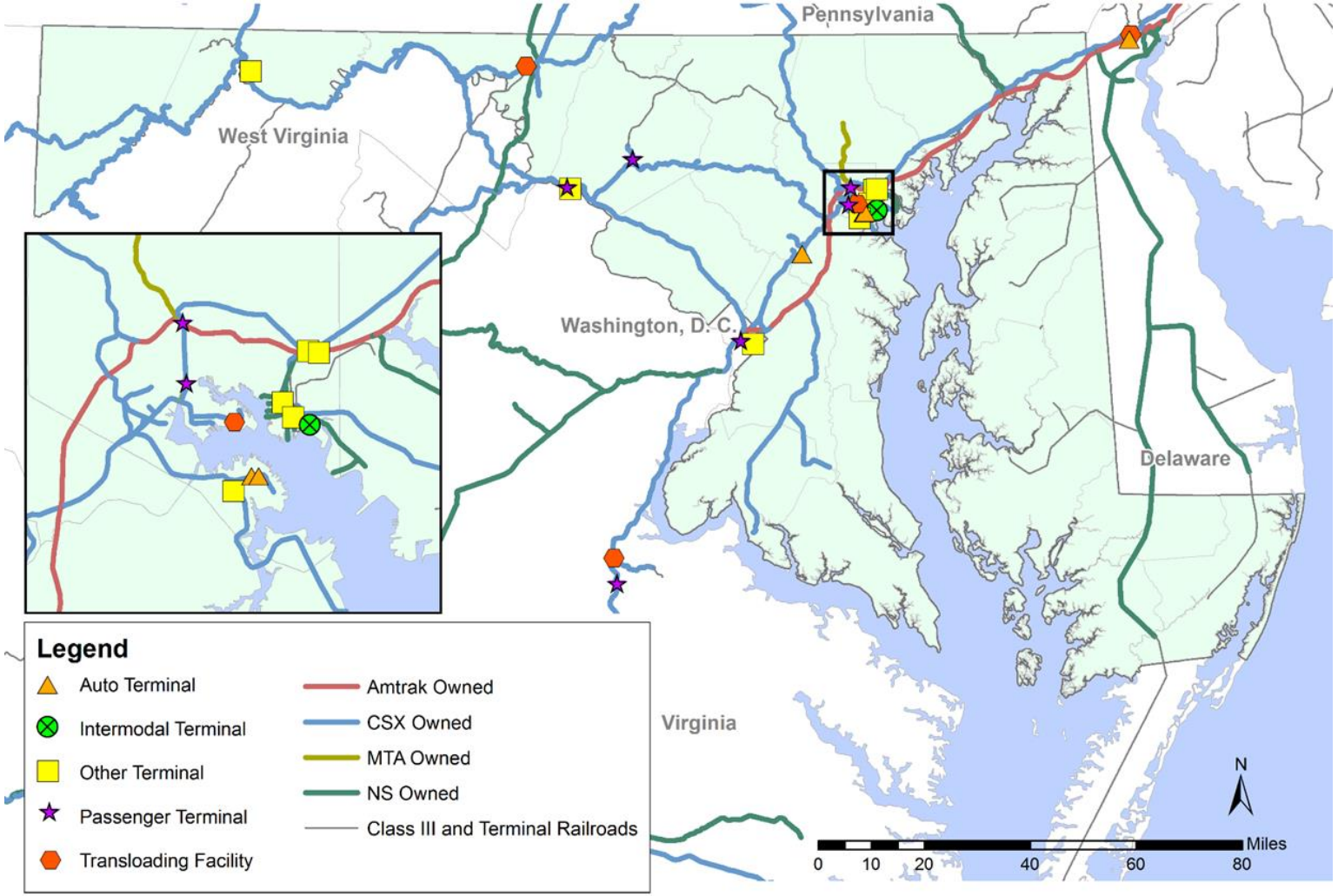

[8] Source: Maryland Statewide Rail Plan, 2014

## Figure 2-3: Maryland's Class III and Terminal Railroad Operators[9]




[9] Source: Maryland Statewide Rail Plan, 2014

## Figure 2-4: Rail Terminals Within and Around Maryland[10]

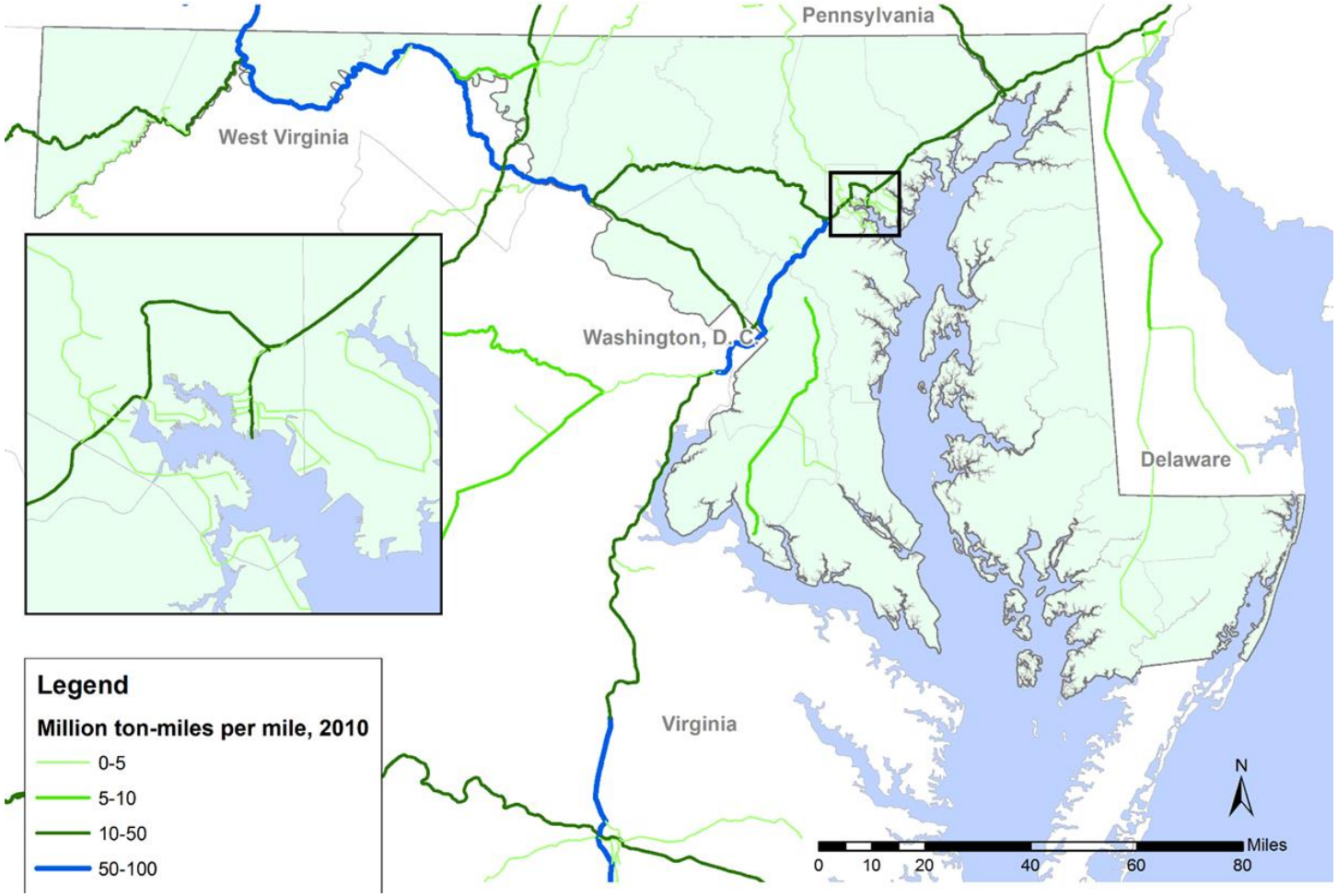



[10] Source: Maryland Statewide Rail Plan, 2014

## Rail Network and Density

The rail lines in Maryland with the highest freight density are the CSX Capital subdivision between Washington, D.C. and Baltimore, and the CSX Metropolitan, Cumberland, and Keystone subdivisions between Washington, D.C. and the Pennsylvania border just north of Cumberland. The latter of these two segments carries large volumes of coal and other mined materials. Both CSX and NS are investing in their rail lines in Maryland. CSX has developed the National Gateway, a double-stack clearance route linking Mid-Atlantic ports with the Midwest. Similarly, NS's Crescent Corridor provides double-stack access between New York and New Jersey and the Southeast and includes a major intermodal terminal in Greencastle, PA, just north of Hagerstown. Figure 2-5 shows the freight density along the Class I lines in Maryland.

## Figure 2-5: Class I Railroad Freight Density, 2010[11]




[11] Source: Maryland Statewide Rail Plan, 2014

## 2.2 PORT AND WATERWAY INFRASTRUCTURE

Cargo is the lifeblood of the Port of Baltimore. As one of the nation's top ports for total cargo tonnage and overall dollar value of cargo, the Port of Baltimore is also one of the most diverse ports in the United States. The key commodities handled at the Port's public marine terminals include autos, roll on/roll off, containers, forest products, and project cargo. The Port of Baltimore has an outstanding operations system that includes quality control programs, connectivity to land-side transportation, and a productive labor force.

The Port of Baltimore includes seven State-owned public terminals that are managed by the Maryland Port Administration (MPA) plus many privately-owned terminals. It is a vital link for raw materials and manufactured goods moving into and out of Maryland. The Port of Baltimore ranks at or near the top of all US ports in a number of categories including handling farm and construction machinery, automobiles, imported forest products, imported sugar, imported gypsum, and exported coal. Total general cargo at MPA's public terminals reached 9.6 million tons in FY 2014.[12] Table 2-4 shows the percent of shipments by water in Maryland. Figure 2-6 shows the Port of Baltimore Marine Terminals.

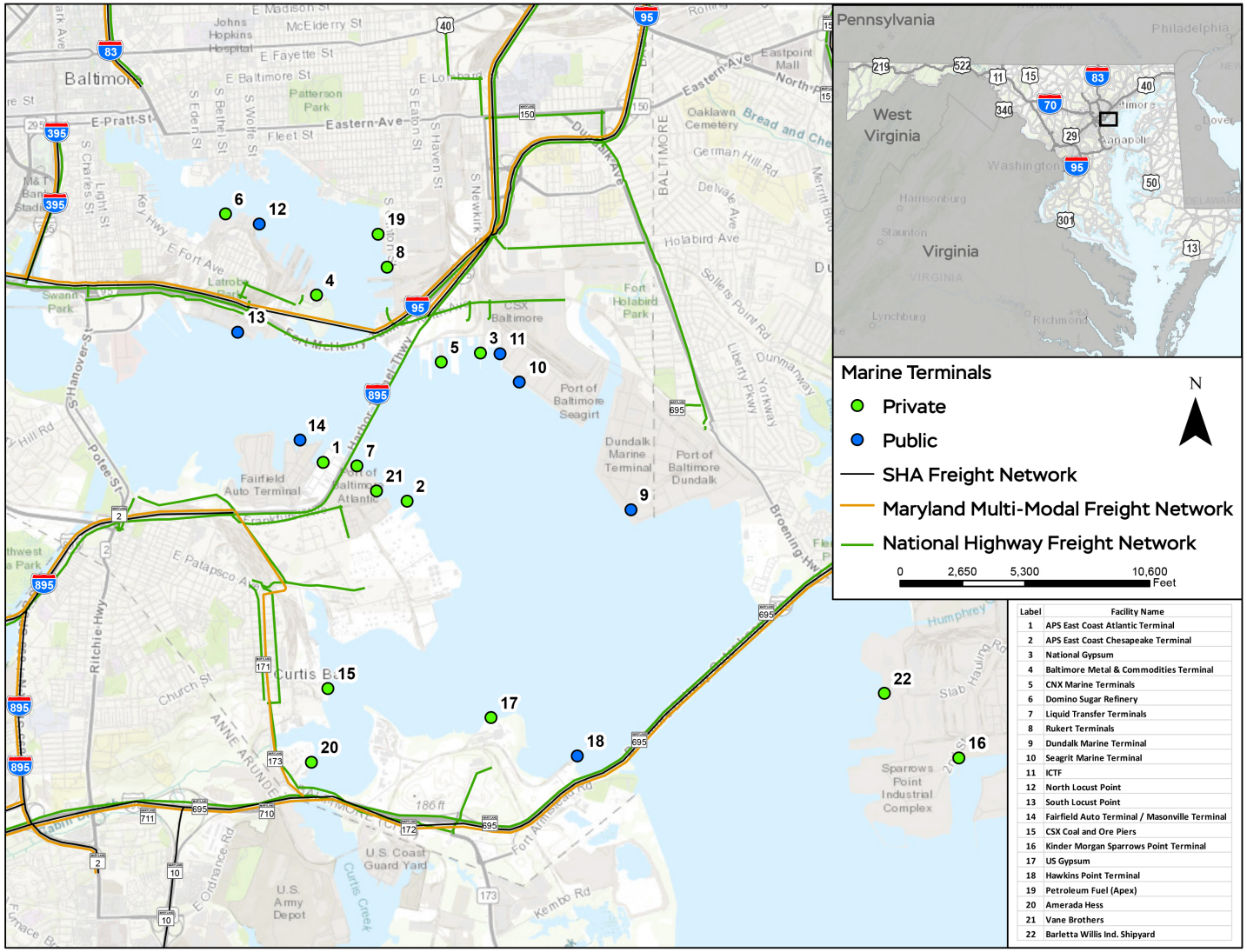
**Table 2-4: Percent of Shipments by Domestic Water, 2012 Weight and Value, and Port of Baltimore Foreign Trade Statistics, 2014**

| Mode | Total | Within Maryland | From Maryland | To Maryland | Through Maryland |
|---|---|---|---|---|---|
| Domestic Water Tonnage* | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| Domestic Water Value* | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| Port of Baltimore Foreign Trade Statistics, 2014 | | | Export | Import | Total |
| Port of Baltimore Foreign Trade by Tons (millions) | | | 16.8 | 12.8 | 29.5 |
| Port of Baltimore Foreign Trade by Value (billions of dollars) | | | 18.6 | 33.9 | 52.5 |
| | | | Foreign | Domestic | Total |
| Port of Baltimore Container Trade by Trade Type | | | 90.9% | 9.1% | 100.0% |

*Domestic water includes shallow draft, deep draft, Great Lakes, and intra-port shipments, but does not include international waterborne trade through the Port of Baltimore.

[12] Source: 2035 Maryland Transportation Plan

## Figure 2-6: Port of Baltimore Marine Terminals[13]

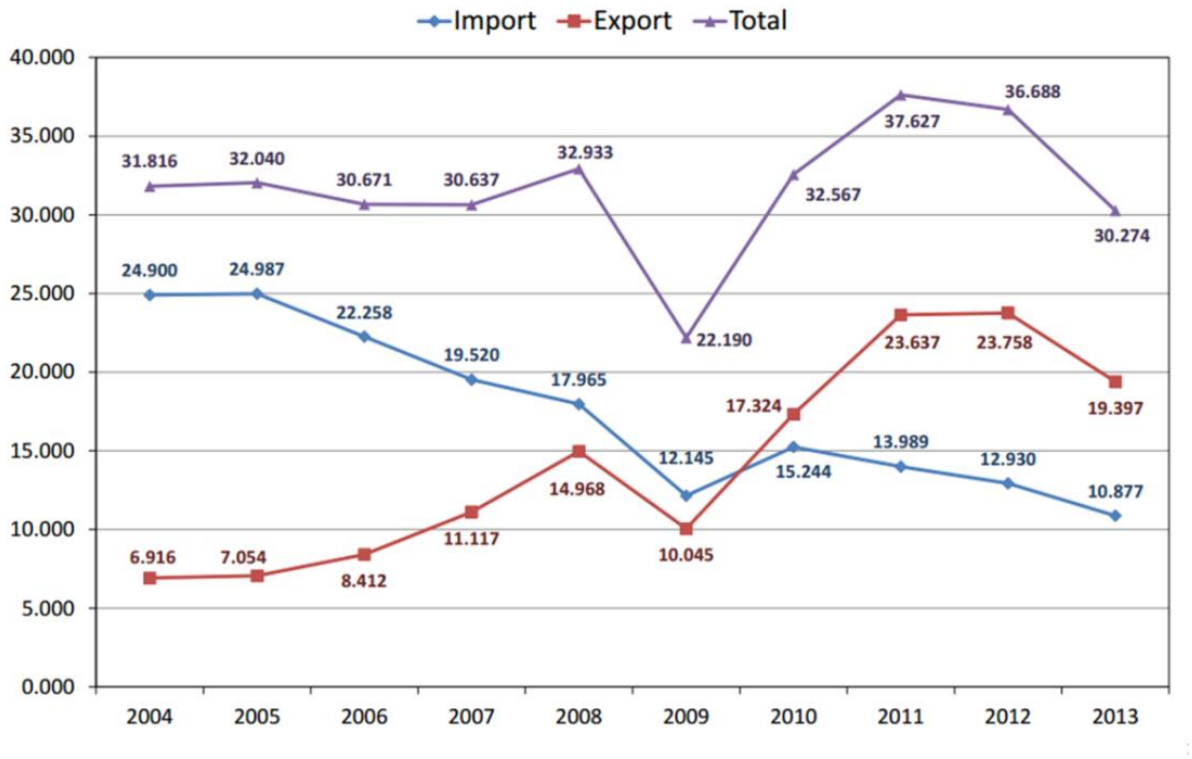



[13] Source: Maryland Port Administration

## Marine Terminal Throughput

The Port of Baltimore is the top-ranked port in the US by volume of automobiles and roll-on/roll-off heavy equipment, such as farm, construction, and transportation equipment. The Port imports foreign automobiles and equipment for consumption in the US and exports American-made automobiles and equipment to consumers throughout the world. On the East Coast, the Port of Baltimore is one of a few ports that are able to handle larger vessels traveling through the expanded Panama Canal. Figure 2-7 shows the imports and exports of waterborne trade at the Port of Baltimore.

### Figure 2-7: Import/Export Balance for Foreign Waterborne Trade, Port of Baltimore (Millions of Tons), 2004-2013[14]



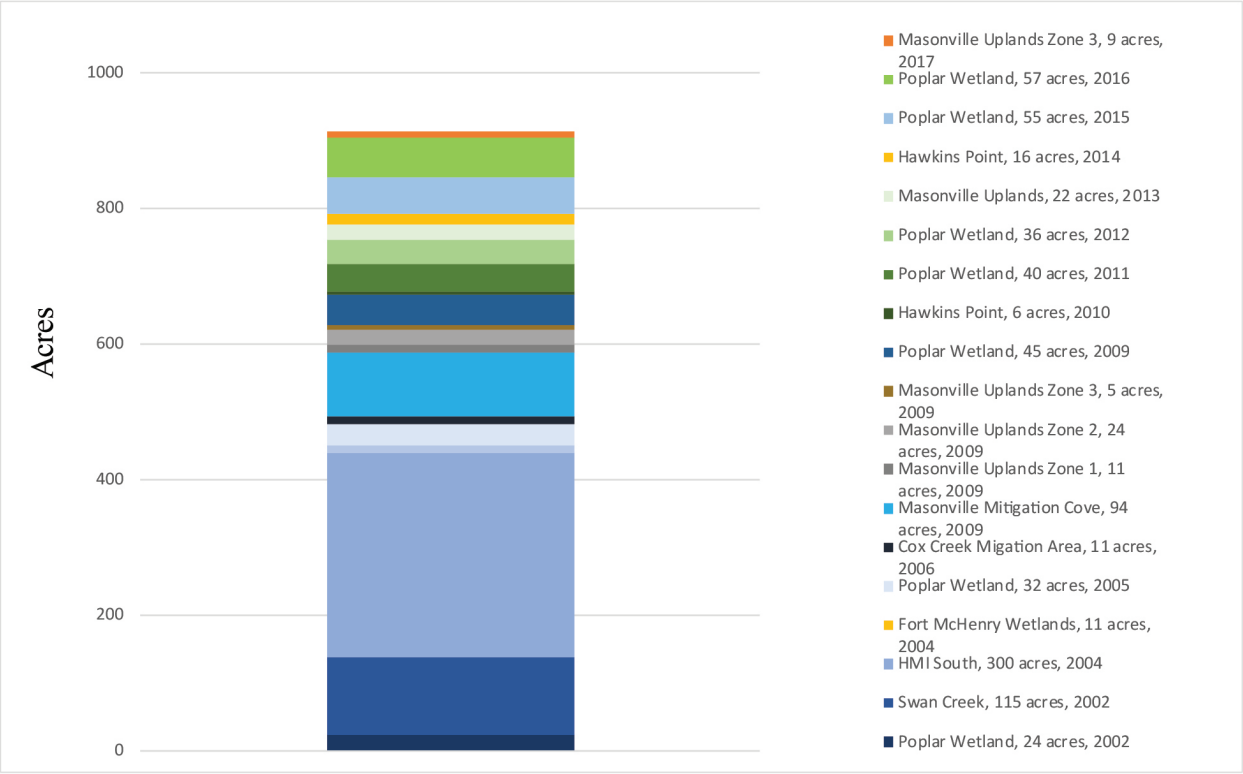

## Dredging for Safe Passage

To maintain 50-foot-deep shipping channels that are necessary for large Post-Panamax vessels, approximately 1.5 million cubic yards of material must be dredged from the Baltimore Harbor annually. Maryland's Dredged Material Management Program strives to provide adequate dredged material placement capacity for harbor and bay dredging through preferred management options. "Beneficial use" means using dredged material for environmental benefits, such as creating wildlife habitat and restoring eroded islands. Beneficial use projects exist at Poplar Island, Hart-Miller Island, and Cox Creek. "Innovative reuse" transforms dredged material into usable products for construction and agriculture. Port demonstration projects are underway to test the feasibility of using Harbor material to produce a lightweight aggregate,

[14] Source: Maryland Port Administration

construction fill, and soil amendments. Figure 2-8 shows the acres of wetlands or wildlife habitat created, restored, or improved since 2000.

## Figure 2-8: Acres of Wetlands or Wildlife Habitat Created, Restored, or Improved since 2000[15]



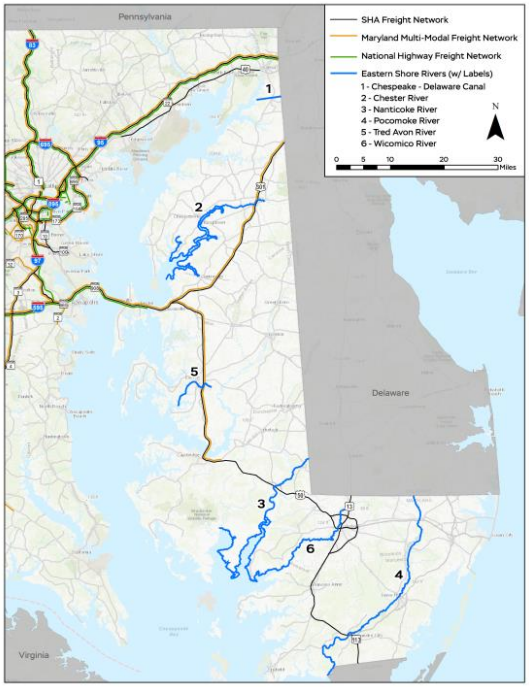

## Eastern Shore Rivers

On Maryland's Eastern Shore, the Chester, Pocomoke, Tred Avon, Wicomico, Choptank, and Nanticoke rivers are vital goods movement corridors. Figure 2-9 shows the Eastern Shore Rivers. On these waterways, approximately 2.5 million tons of petroleum, grain, and aggregates are moved annually.[16] About 43 percent of these goods move on the Wicomico River, including via the Port of Salisbury, Maryland's second-largest port. Key issues confronting waterborne commerce on Maryland's Eastern Shore include dredging to maintain adequate channel depths, securing appropriate dredge materials disposal sites, need for truck and rail access improvements, and encroachment of residential development near waterborne industrial facilities.

[15] Source: Maryland Port Administration.

[16] Source: Delmarva Freight Plan, Chapter 4

**Figure 2-9: Eastern Shore Rivers**




## 2.3 Air Cargo Infrastructure

Maryland Aviation Administration is responsible for airport regulation in the State. There are 18 publicly owned general aviation airports and 18 private airports open for public use in Maryland. Three of these airports are capable of cargo shipments: Hagerstown (HGR), Salisbury (SBY), and Baltimore/Washington International Thurgood Marshall Airport (BWI/Marshall). BWI/Marshall Airport is the largest cargo airport in Maryland with approximately 415,000 square feet of air cargo warehouse space in ten buildings[17]. Table 2-5 shows the percent of shipments by air in Maryland by weight and value. Figure 2-10 shows Maryland Cargo Airports.

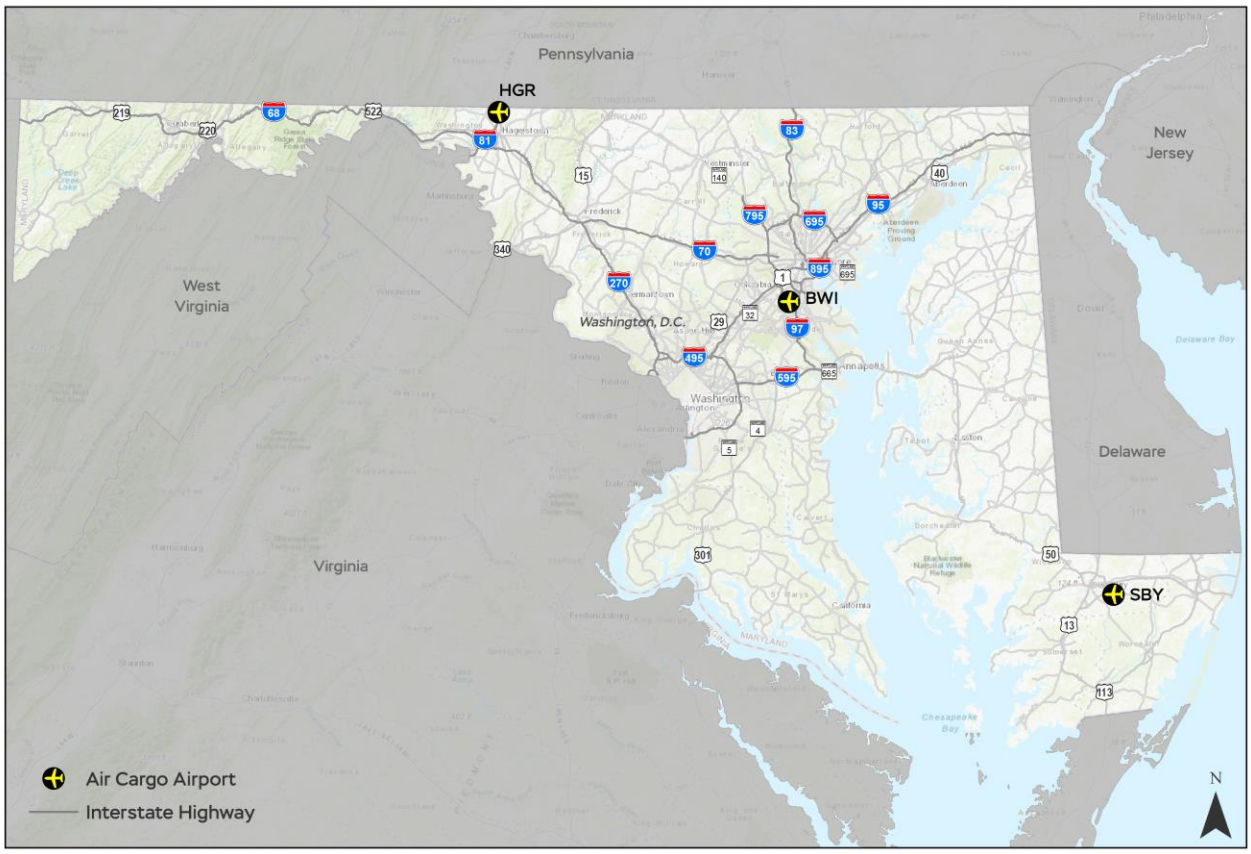
**Table 2-5: Percent of Shipments by Domestic Air, 2012 Weight and Value**

| Mode | Total | Within Maryland | From Maryland | To Maryland | Through Maryland |
|---|---|---|---|---|---|
| Domestic Air Tonnage* | <0.5% | <0.5% | <0.5% | <0.5% | 0.0% |
| *Domestic Air Value** | 0.5% | <0.5% | 2.0% | 1.5% | 0.0% |

*Domestic air includes air cargo between U.S. and domestic origin-destination pairs. The domestic portions of international air cargo movements are accounted for in the appropriate domestic modes.

[17] Source: http://www.bwiairport.com/en/about/cargo/factsheet.

## Figure 2-10: Maryland Air Cargo Airports



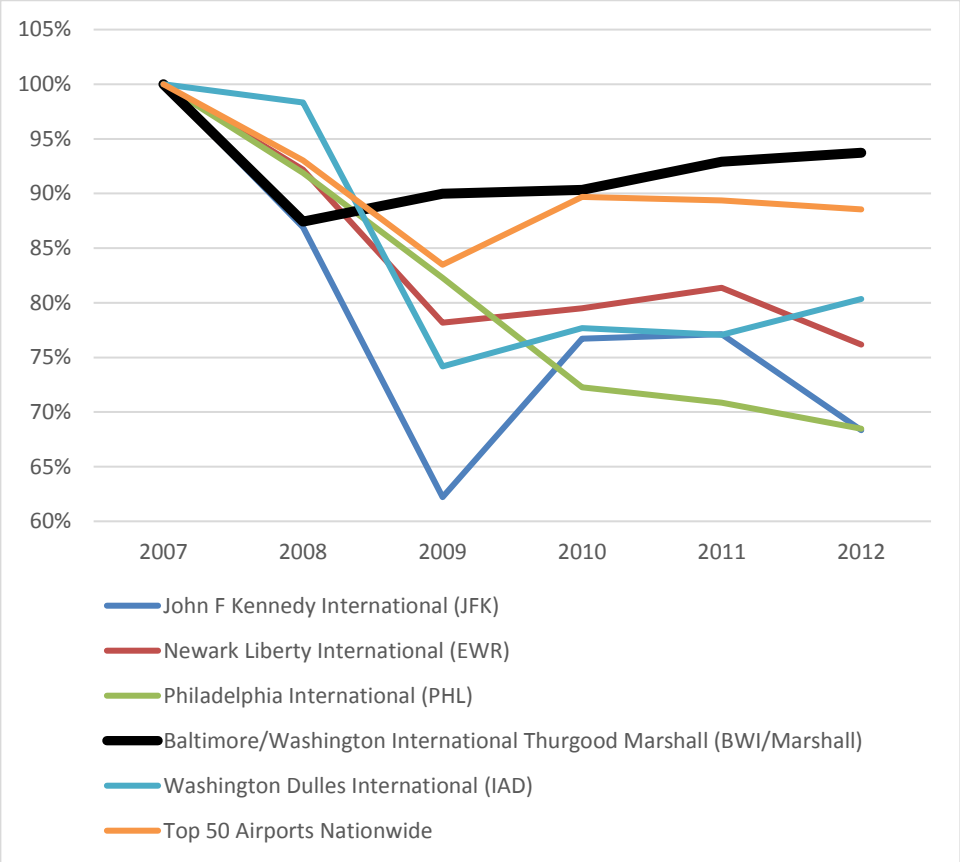

## Air Cargo Performance

Air cargo is important in moving high value, time-sensitive shipments. Pharmaceuticals, certain manufacturing or health care equipment, electronics, and packages and parcels move by air. In 2012, approximately 57,000 tons of air freight and mail enplaned on all-cargo flights at Maryland airports (Table 2-6). BWI/Marshall leads all Maryland airports with approximately 61,500 tons of cargo and mail landed (1st in Maryland, 33rd in the nation). BWI/Marshall has also outpaced all major Mid-Atlantic Air Cargo Airports since 2009 (Figure 2-11).

## Table 2-6: Scheduled and Non-Scheduled Air Freight and Mail Enplaned in Maryland, in Short Tons, 2004-2012[18]

| Year | Scheduled Freight | Nonscheduled Freight | Scheduled Mail | Nonscheduled Mail | Total |
|---|---|---|---|---|---|
| 2004 | 53,377 | 5,867 | 7,230 | 1 | 66,475 |
| 2006 | 49,095 | 4,746 | 5,924 | 0 | 59,765 |
| 2008 | 46,407 | 2,265 | 4,881 | 0 | 53,553 |
| 2010 | 47,093 | 707 | 3,245 | 0 | 51,045 |
| 2012 | 51,603 | 1,966 | 3,096 | 65 | 56,730 |

## Figure 2-11: Annual Landed Air Cargo Volume Percent-Change, 2007-2012[19]



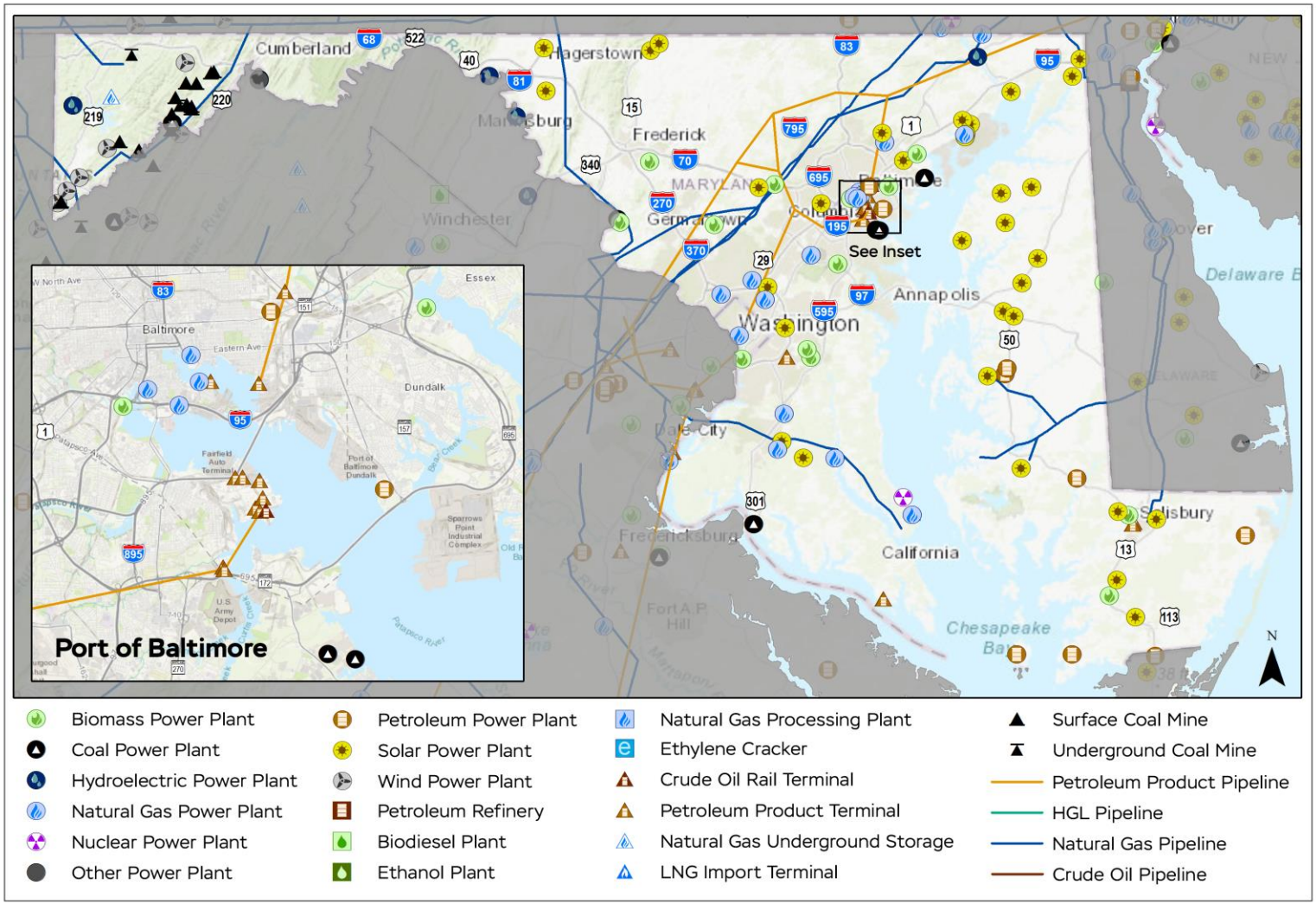

[18] Source: US Department of Transportation, Bureau of Transportation Statistics, TranStats Database, T-100 Market (All Carriers)

[19] Note: Annual Landed Air Cargo Volume (Short Tons) as a Percent of 2007 Landed Air Cargo Volume at Major Mid-Atlantic Air Cargo Airports, 2007-2012. Cambridge Systematics, using US Department of Transportation, Bureau of Transportation Statistics, TranStats Database, T-100 Market (All Carriers)

## 2.4 ENERGY INFRASTRUCTURE

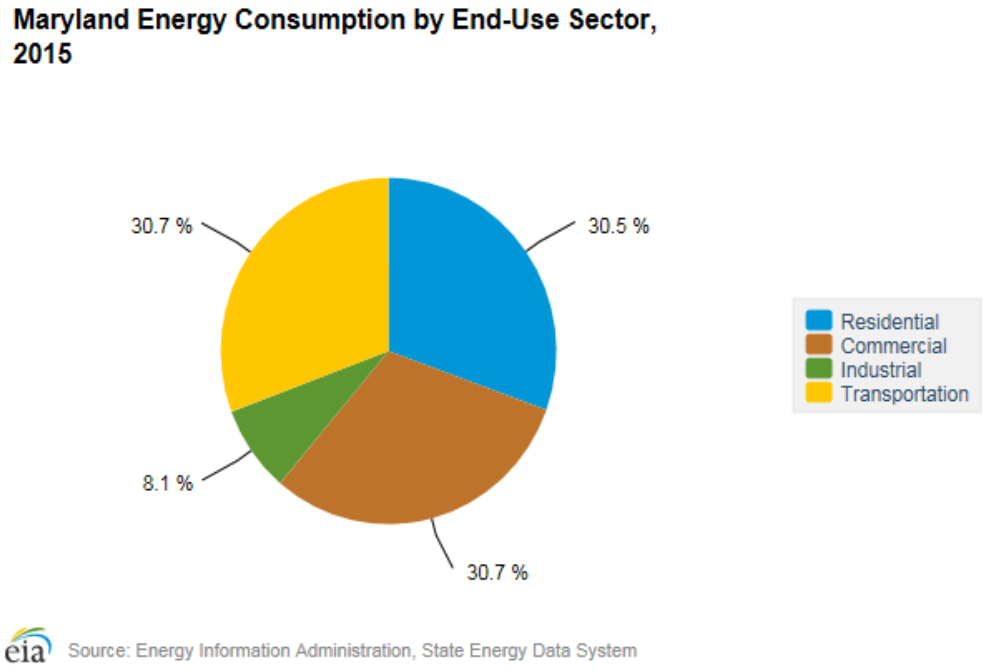
More than four-fifths of the energy consumed in Maryland comes from out of state. The Port of Baltimore, one of the top 20 ports in the nation, is a bustling seaport, handling both coal and petroleum products. Maryland's per capita energy consumption ranks in the lowest one-fourth of states. The Appalachian region is where the state's only fossil fuel resources are found. Maryland's renewable energy resources, on the other hand, are distributed widely across the state. Almost all of Maryland's currently used biomass resources, primarily landfill gas and municipal solid wastes, are found in the state's most densely populated areas. However, Maryland also has biomass resources from agriculture, fishing, aquaculture, and forestry. The state's greatest wind resources are in the western mountains and off Maryland's eastern Atlantic Ocean and southern Chesapeake Bay shorelines. The eastern two-thirds of Maryland has the state's greatest solar resource, and rivers flowing down from the north and the west provide the state with hydropower resources as shown in Figure 2-12: Maryland's Energy Infrastructure. Figure 2-13 and Figure 2-14 provide estimates of the consumption of energy in Maryland.

## Figure 2-12: Maryland's Energy Infrastructure



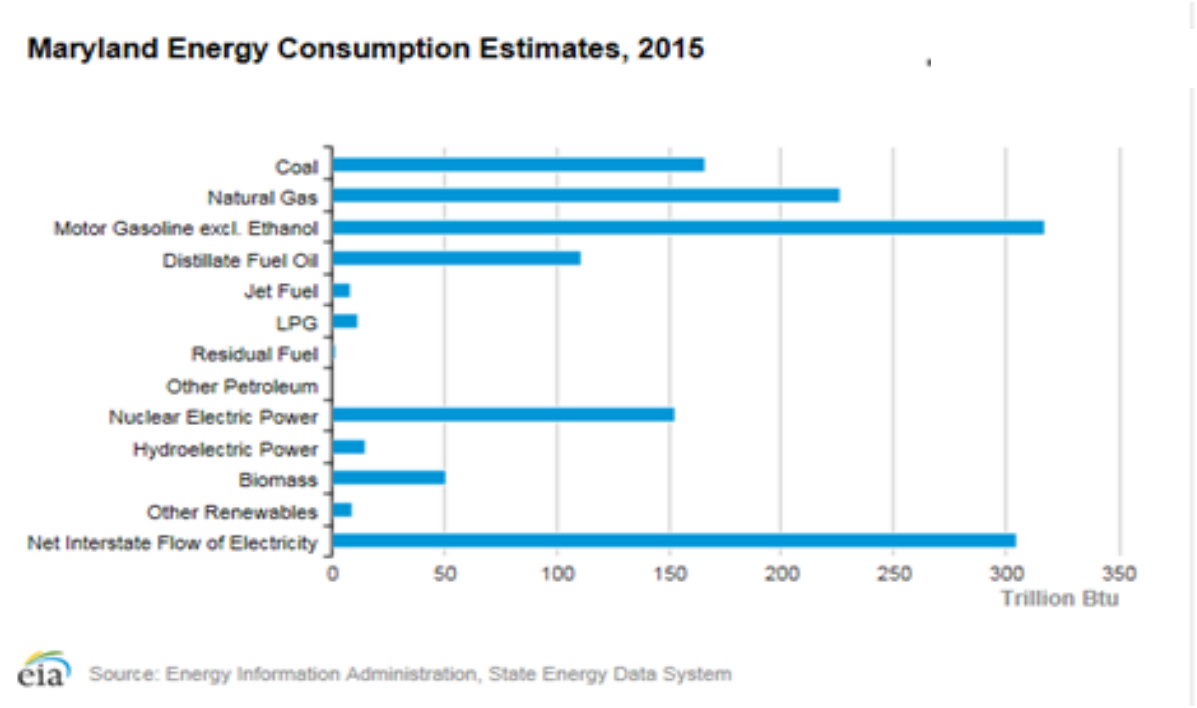

Source: U.S. Energy Information Administration

## Figure 2-13: Maryland Energy Consumption by User, 2015




Source: U.S. Energy Information Administration, 2015

## Figure 2-14: Maryland Energy Consumption Estimates, 2015




Source: U.S. Energy Information Administration, 2015

# 3.0 GOODS MOVEMENT AND THE ECONOMY

Measures of the economic benefit of goods movement to the State of Maryland consist of the economic output of industries that move goods or are dependent upon goods movement, as well as the tax revenue generated from business income tax, sales and use tax receipts from freight-generating businesses, and revenues generated from commercial vehicle operations, including International Registration Plan (IRP) registration fees and International Fuel Tax Agreement (IFTA) apportionments.

Goods movement is essential to the economy. A healthy economy is directly connected to its relationship to transportation system performance. The need for the supply chain to have the capacity to provide reliable and cost-effective transportation is an integral component of this relationship. Simply put, the freight transportation network keeps commerce flowing. Figure 3-1 shows the economic impact of freight dependent industries in Maryland.

Maryland's population is characterized by steady growth and high density. Between 1990 and 2016, Maryland's population grew by 27 percent to 6.0 million, representing approximately 1.9 percent of the U.S. population. Between 2015 and 2040, the Maryland Department of Planning, Projections and State Data Center projects that the State's population will increase by an additional 14 percent to 6.8 million.[20] Overall, Maryland's population growth has been consistent with the national average, and this trend is expected to continue into the future.

At the same time, population density in Maryland (594.8 people per square mile) far exceeds the national average (87.4 people per square mile). While Maryland currently is the 19th most populated State in the country, only four other states and the District of Columbia have higher population densities.[21] This population density brings both opportunities and challenges to the State's freight transportation system.

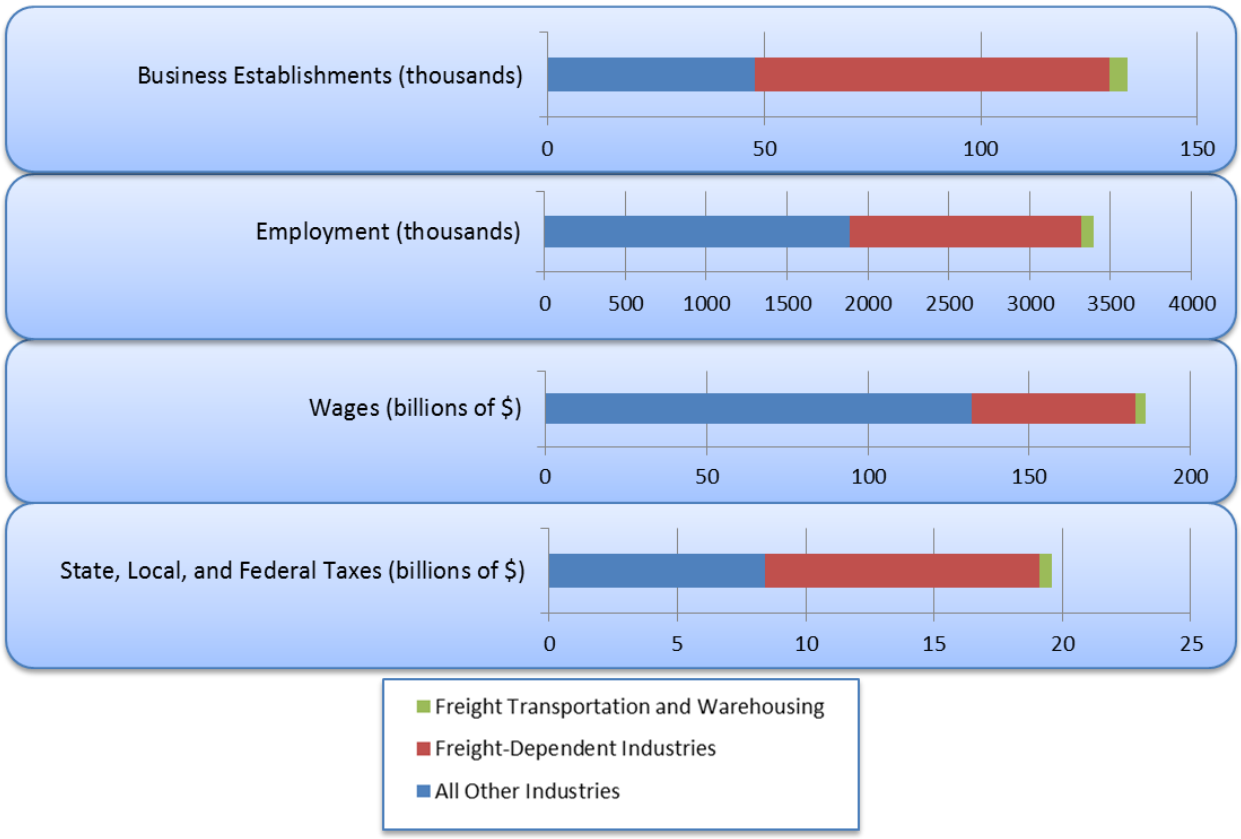
Similar to population, the Maryland economy also has experienced consistent growth. Despite the recent global economic downturn, Maryland is well-positioned to realize steady long-term growth, with total GSP reaching $483 billion by 2040.[22] The Bureau of Economic Analysis (BEA) data shows that Maryland GDP grew at a higher rate (3.6 percent) compared to the national growth rate of 3.4 percent between 2006 and 2016.

[20] Maryland Department of Planning, Projections and State Data Center, August 2017

[21] U.S. Census Bureau, Statistical Abstract of the United States: 2012.

[22] U.S. Bureau of Economic Analysis, Moody's Analytics

**Figure 3-1: Role of Freight Transportation and Warehousing and Freight-Dependent Industries on Maryland's Economy, 2012[23]**




Goods movement contributes to the State government coffers, paying an estimated $4 billion in annual taxes and fees, as Table 3-1 shows.

[23] Source: IMPLAN; US Census, Bureau of Labor Statistics, analyzed by Maryland Department of Business and Economic Development and Cambridge Systematics, Inc.

## Table 3-1: Annual State Revenues from the Maryland Freight Industry, Fiscal Year 2013

| Revenue Source | Amount | |
|---|---|---|
| Motor Carrier Fuel Tax Temporary Permit Fees | $ | 134,000 |
| Motor Carrier Fuel Tax Gross Revenue | $ | 4,526,000 |
| Toll Revenue[1] | $ | 150,258,000 |
| Sales and Use Tax[2] | $ | 3,501,139,000 |
| Income Taxes[3] | $ | 405,410,000 |
| Total Freight Industry-Generated State Revenues | $ | 4,061,467,000 |

Notes:

[1] Toll Revenue for vehicles with three or more axles.

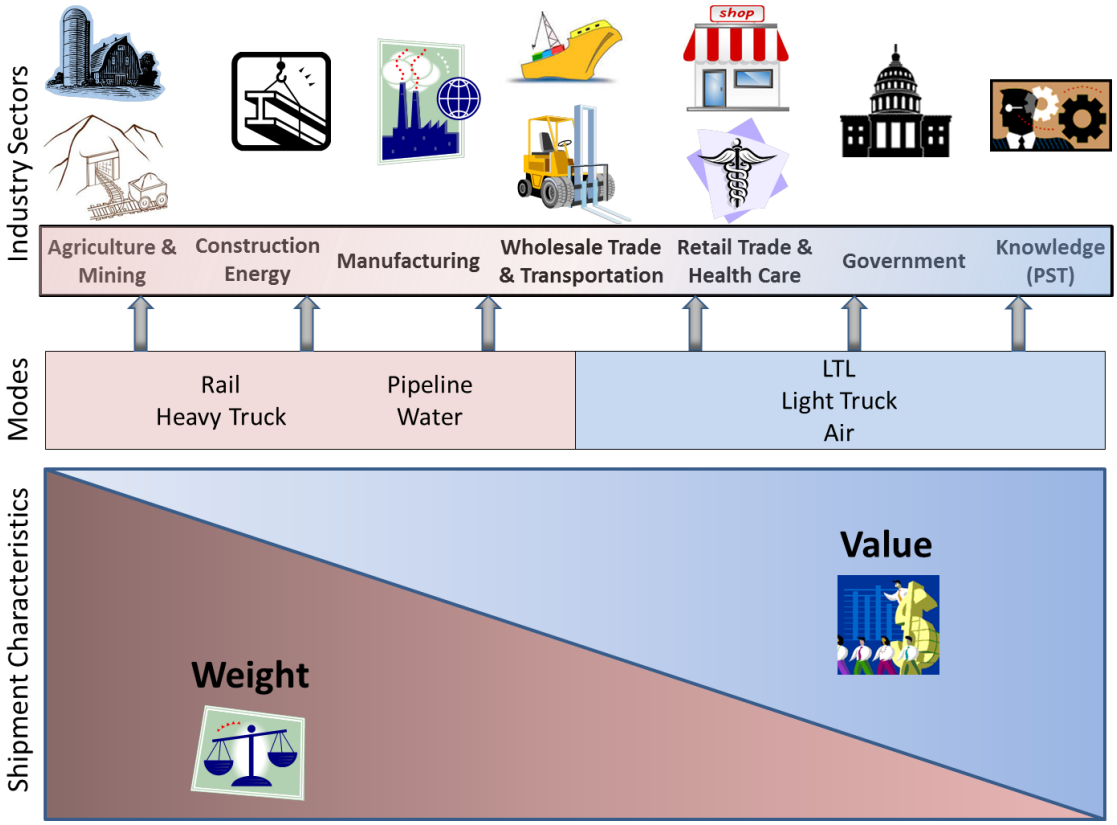
[2] Includes sales and use tax on freight transportation and freight-generating industries, including food and beverage, apparel, general merchandise, automotive, furniture and appliances, building and contractors, utilities and transportation, and hardware machinery & equipment.

[3] Tax Year 2011, includes tax liability on agriculture, mining, utilities, construction, manufacturing, wholesale trade, retail trade, transportation and warehousing, health care, and food services.

Sources:
Comptroller of Maryland, Motor Fuel Tax Annual Report 2013; Maryland Transportation Authority as reported on http://www.mdta.maryland.gov/about/finances/traffic_and_toll_revenue.html; Comptroller of Maryland, Consolidated Revenue Report Fiscal Year 2013; Comptroller of Maryland, Corporate Income Tax Statistics of Income Tax Year 2011; Partners for Economic Solutions, 2014.

Safe and efficient goods movement benefits the economy beyond the impact on the freight industry. Maryland's economy spans an array of industry sectors and each has a unique supply chain that depends on a reliable freight transportation system. Figure 3-2 illustrates broadly the spectrum of industries and how they use the goods movement transportation system.

## Figure 3-2: Freight Across Industries




- Raw material-intensive industries such as agriculture and mining, construction, energy, and manufacturing require the movement of heavy commodities that are relatively low in value on a per-ton basis. These heavy commodities tend to move in bulk by water, rail, pipeline, or in permitted oversize/overweight trucks.
- Wholesale trade and transportation industries, shown in the center of the graphic, are engaged in the movement of both heavy and light commodities. These industries' supply chains are balanced in terms of inbound and outbound movements and weight-to-value ratios. These goods move by all modes, including combinations of movements by various modes.
- Service industries such as retail trade, health care, government, and public administration, as well as knowledge industries such as professional, scientific, and technical services (PST), require frequent supply of food, office supplies, instruments and equipment, and parcels. These lighter-weight, higher-value goods often move by truck as less-than-truckload (LTL) or parcel shipments, or by air.

Through rigorous data analysis and input from stakeholders, the Strategic Goods Movement Plan aims to better understand and address the needs of Maryland's industry sectors that engage in different types of economic activities. The specific transportation challenges and needs of the

industry sectors are different from one another. The key issues that affect the performance of the transportation network these industry sectors rely upon are accounted for in the Plan's recommendations.

The following profiles illustrate the supply chains of the industry sectors noted above. The profiles are intended to illustrate through broad strokes how industries throughout the State receive and send raw materials and products, the demands on Maryland's multimodal freight transportation system, and the industry-specific challenges and needs that are incorporated in the policies and strategies set forth in this Plan. The profiles do not explain the whole of all economic activity, and every individual business has a unique approach to their logistics needs.

## 3.1 AGRICULTURE AND MINING

Agriculture in Maryland accounts for just below 16,000 jobs and approximately $927 million in Gross State Product (GSP). While total agricultural employment and GSP are less than one percent of the state total, the agriculture sector is vitally important to the State. Perdue Farms, the State's largest agriculture employer, employs more than 1,600 Marylanders.

Just under 5,000 mining and extraction jobs in Maryland contribute close to $12 billion in GSP, accounting for less than 1 percent of the State's employment and 3.7 percent of the State's GSP. Two of the largest mining companies in the State, Vindex Energy and Tri-Star Mining, employ 175 people combined. Figure 3-3 shows the agriculture and mining establishments in Maryland.

**Agriculture and Mining Modes:**

- Class I rail
- Short line rail
- Barge
- Container vessels
- Trucks

**Agriculture Inbound and Outbound Needs:**

- **Animal feed**
  Approximately half of the 1,000,000 tons of feed needed by Maryland farms is grown on the Delmarva Peninsula and shipped via truck. The other half are imported from Pennsylvania and the Midwest on Class I railroads, short line railroads, and trucks. These inbound flows are expected to grow by nearly 70 percent by 2040.
- **Fertilizer**
  More than 70 percent of the fertilizer shipments terminating in Maryland originate in-state. The top out-of-state origins include Pennsylvania, the South Atlantic states, and the Midwest. About 1 million tons of fertilizer were consumed in Maryland in 2012. A 2 percent reduction in fertilizers consumed in Maryland is expected by 2040.
- **Farm machinery**
  Tractors, combines, and other agriculture equipment arrive from domestic and international manufacturers through the Port of Baltimore, via Class I rail, and by truck.

- **Food products**

  Chickens are transported to production facilities throughout Maryland and from there to consolidation facilities via truck. Some of the chicken products are transported via truck for international export through the Port of Baltimore, the Port of Virginia (Norfolk), and the Port of New York and New Jersey to the growing middle-class consumers in East Asia, South Asia, and other parts of the world. Fruits, vegetables, dairy, and artisanal items are delivered to supermarket distribution centers and ethnic food wholesalers in the major consumer markets in the Baltimore-Washington metropolitan region, New York, New Jersey, Pennsylvania, and New England. The "to market" shipments are via truck. About 17 million tons of food products worth about $11 billion were exported from Maryland in 2012. By 2040 the aggregate weight of food product shipments is expected to grow by 30 percent and the value by 39 percent.

- **Ag Tourism**

  The agriculture industry promotes "ag" tourism which brings people to farms instead of farm products to people. Wine and ice cream trails on farms and vineyards exist across the State. While this might reduce the number of freight trips leaving agricultural businesses, it increases the number of total vehicle trips to the area. This means that both the freight transportation and non-freight transportation networks are vital for sustaining agriculture businesses.

**Mining Outbound Needs:**

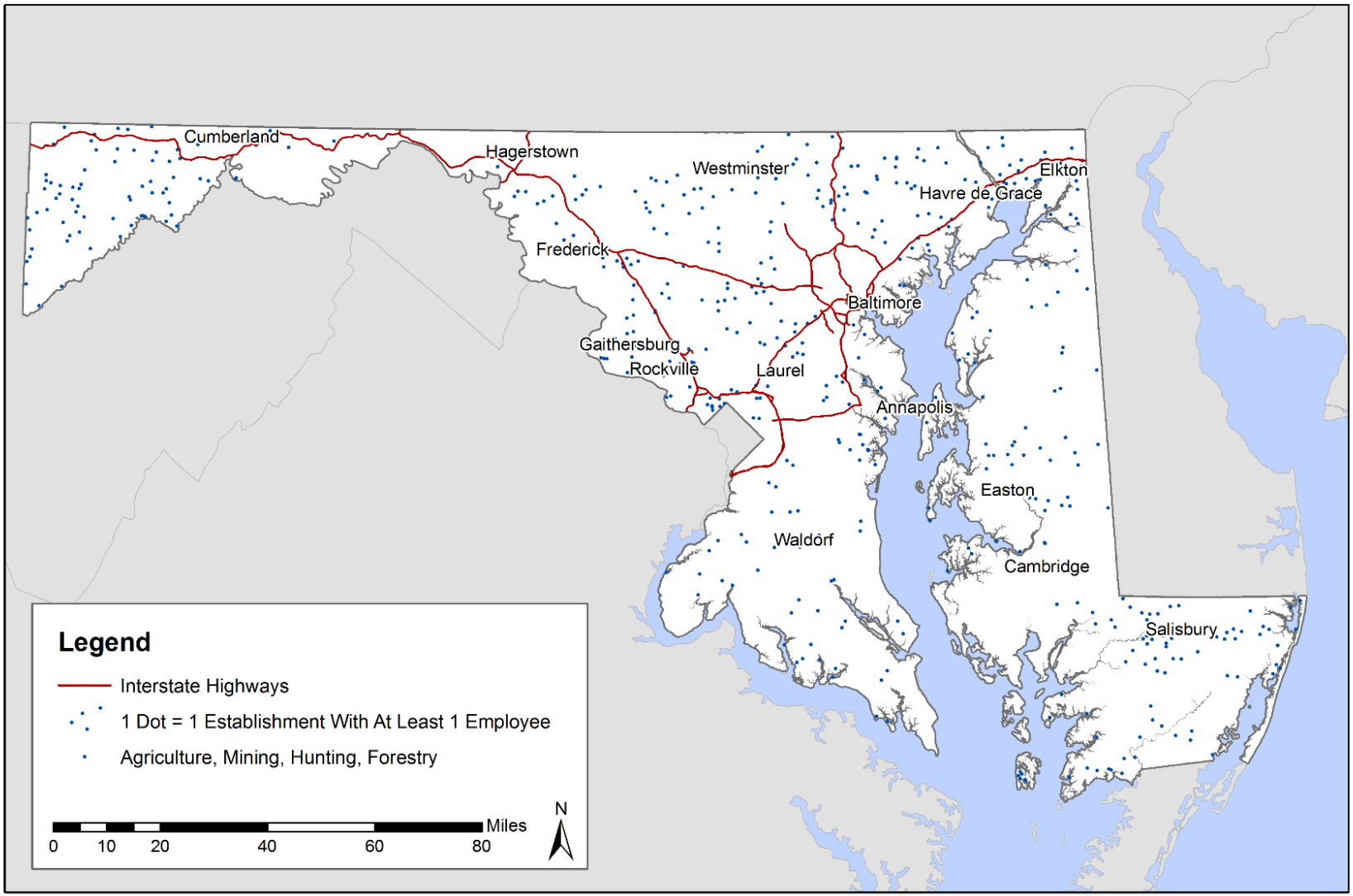
- Stone, Sand, Metallic Ores, and Salt
  Raw materials extracted from the earth include stone, sand, metallic ores, and salt, used for construction, industrial processes, or as ingredients to manufacture finished goods. More than 50 million tons of these materials, worth about $1 billion, were shipped from or within Maryland in 2012. By 2040, the volume of material is projected to decline 7 percent by weight yet increase more than 60 percent by value.
- Coal
  Coal mined in Western Maryland is transported to destinations throughout the world via truck, rail, and by water via the Port of Baltimore. Approximately 1.9 million tons of outbound coal shipments worth $78 million originated in Maryland in 2012. This does not include coal that was mined in other states, but passes through Maryland on its way to other destinations. These shipments are expected to decline 7 percent by weight and by value through 2040.

**Agriculture and Mining Challenges:**

- The demand for locally sourced fresh food means that freight transportation networks need to operate smoothly to allow for timely arrival to market.
- To ensure that traditional domestic markets and the emerging overseas markets can be served, the highway and rail systems that carry inbound feed, fertilizer, and outbound product must be maintained for efficient and reliable travel times.
- Federal highways operate at a weight limit that may differ for Maryland and other State roadways, which complicates interstate movement.

- The transportation networks that serve farmland along the shores of the Chesapeake Bay and river system may be vulnerable to sea level change.
- The Food Safety Modernization Act (FSMA) of 2010 introduced more stringent controls on the movement of food products. The lack of qualified truck operators is impacting all segments of the truck transport nationwide, and the increased food safety regulations may make it particularly difficult to find food processing drivers.
- Increasing competition from other fossil fuel sources, such as Marcellus shale, and renewable energy sources could decrease the use of coal, thus limiting the need for rail shipments of coal.
- Most quarries and mines in Maryland extract materials that serve the State's construction industry, and therefore, the mining industry is sensitive to growth and decline in construction.
- Infrastructure maintenance, especially bridges, is a priority due to the heavy weight of mined materials.
- Goods moving on rail sometimes share the lines with passenger service, limiting freight to late night travel and slower speeds. Increasing need of passenger service may curtail freight operations.

## Figure 3-3: Agriculture and Mining Establishments with at Least One Employee – 2012



## 3.2 CONSTRUCTION AND ENERGY

Construction activity provides almost 205,000 jobs in Maryland (6 percent) and is responsible for $14.9 billion in GSP, or approximately 4.6 percent of the total state GSP. The top three employers in Maryland's construction sector are Facchina Construction, NVR, and American Infrastructure, which employ 550, 450, and 445 people, respectively.

The energy sector in Maryland includes power generation from any source, sewage treatment, and distribution networks for natural gas, oil, water, and electricity. This sector produces over $7 billion in GSP and employs 10,393 persons. The largest single subsector is "Electric power generation, transmissions, and distribution," which accounts for 94 percent of the energy workforce and 94.5 percent of GSP generated by the energy sector. Exelon is Maryland's largest firm in the energy sector, employing approximately 4,100 people. Figure 3-4 shows the construction and utility establishments in Maryland.

**Construction and Energy Modes:**

- Pipeline
- Class I rail
- Short line rail
- Barge
- Tanker vessels
- Trucks

**Construction Inbound and Outbound Needs:**

- **Building materials and machinery**
  Inbound materials include nonmetallic minerals, gravel, sand, building stone, and lumber. Many of these goods arrive on truck, although some are shipped in bulk on rail. Heavy machinery comes through the Port of Baltimore via rail. Shipments from outside of Maryland are projected to grow slightly by 2040, rising 19 percent by weight and 10 percent by value. Construction goods from within Maryland utilize a similar network as noted above. Final delivery to sites for both intra- and interstate shipments occurs on local truck routes and roads throughout the region. Shipments from within Maryland are projected to hold steady at around 500,000 tons and $35 million.
- **Construction waste and scrap metal**
  The major outbound commodities from the construction industry are waste and scrap metals. These materials travel by truck and rail. By volume, these shipments are projected to grow by 19 percent by 2040.

**Energy Inbound and Outbound Needs:**

- **Coal, coal ash, and oil**
  The major inbound commodities for the energy sector are coal, coal ash, and oil for energy production facilities. These shipments arrive via Class I rail, short line rail, barge, and pipeline, with a small amount of coal shipped via truck. Tonnage and value of commodities from other states are projected to decrease by 2040.

Small amounts of coal ash transport via pipeline within Maryland. Shipments within Maryland, including coal, coal ash, and petroleum products are expected to double by weight and triple by value by 2040.

- **Liquefied Natural Gas (LNG)**
  LNG is imported from overseas markets via ship then piped to facilities onshore where it is stored before being distributed by pipeline. Approximately 3.9 million tons of LNG are consumed in Maryland annually.[24] At the time of this report, one energy supplier was converting from importing to exporting LNG.
- **Gypsum**
  Gypsum is a by-product of burning coal that is used in producing wallboard. The Morgantown Generating Station, as an example, produces 210,000 tons of gypsum "on-specification," that is shipped to New York for use in wallboard manufacturing. An additional 5,000 tons of "off-specification" gypsum is sent to a landfill in Virginia.[25] These shipments move by truck and by barge.[26]

**Construction and Energy Challenges:**

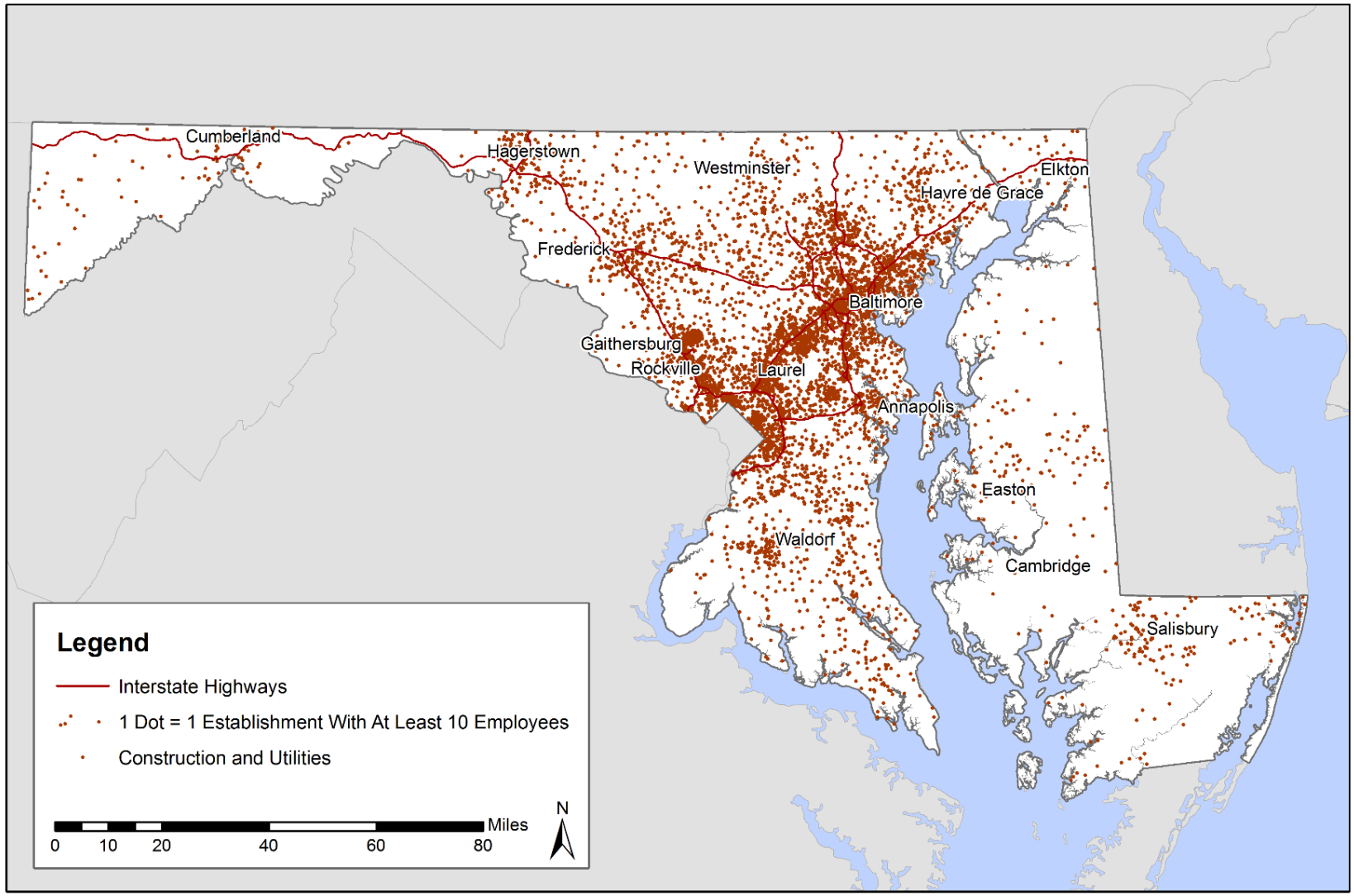
- New construction is needed to keep up with growing residential and commercial demand, thus there will be more freight needs for this sector.
- The main issues facing transportation in the construction sector are infrastructure maintenance, especially bridges, and road congestion.
- Goods moving on rail sometimes share the lines with passenger service, limiting freight to late night travel and slower speeds. Increasing need of passenger service may curtail freight operations.
- The increasing demand for energy consumption leads to the need for more production facilities, which generates more construction.
- Growing demand for renewable energy resources may create an increase in shipments of solar cells and wind turbines. Some of these energy generation components require permitted heavy hauling, which can complicate the logistics chain.
- Increased reliance on renewable sources could decrease the use of fossil fuels, thus limiting the need for rail shipments of coal and oil.
- The transportation networks that serve energy production facilities along the shores of the Chesapeake Bay and river system may be vulnerable to sea level change.

[24] Source: US Energy Information Administration, "Maryland State Energy Profile," available from: http://www.eia.gov/state/print.cfm?sid=MD.

[25] Source: http://www.flyash.info/2013/111-Sebastian-2013.pdf p.13

[26] Source: http://dlslibrary.state.md.us/publications/Exec/DNR/PPRP/ERMCBGLP_2010.pdf p.9

## Figure 3-4: Construction and Utilities Establishments with at Least 10 Employees - 2012



## 3.3 MANUFACTURING

Manufacturing is a large and important sector in Maryland's economy, despite the decline in jobs throughout the nation over the last two decades. This sector includes traditional manufacturing such as plastics, paper mills, or engine construction, and technology manufacturing such as search, detection, and navigation instruments. It also includes food processing such as ice cream and dessert manufacturing, and bakeries. For the entire State, manufacturing generates $19.7 billion in GSP and provides nearly 116,000 jobs, representing 6.1 percent of the GSP and 2.7 percent of Maryland's workforce. Northrop Grumman, which employs nearly 9,900 people in Maryland, is the largest manufacturing company in the State.

**Manufacturing Modes:**

- Air
- Class I rail
- Short line rail
- Container vessels
- Roll-on/roll-off vessels
- Trucks

**Manufacturing Inbound and Outbound Needs:**

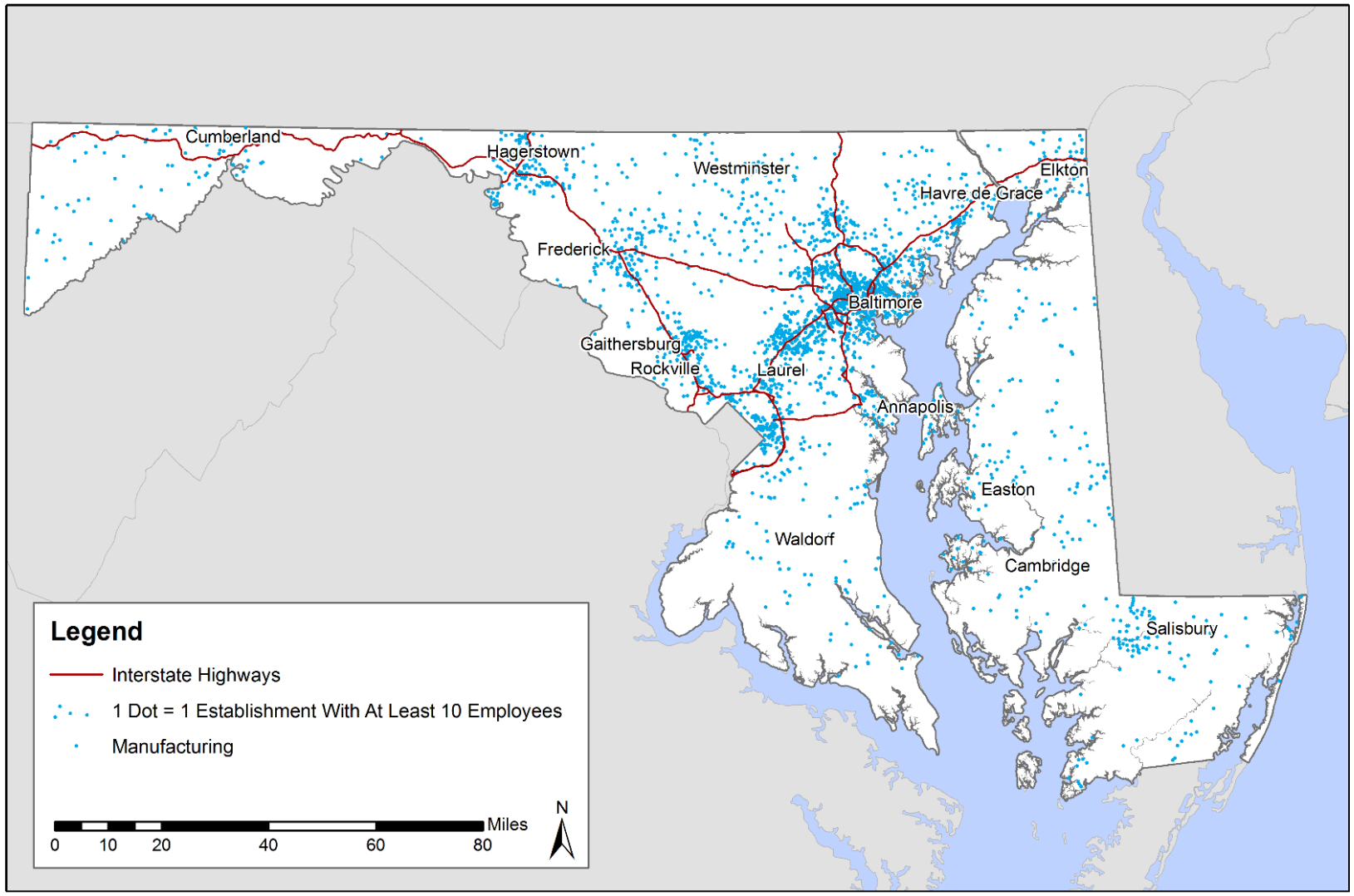
- **Glass, base metals, chemicals, and lumber**
  Inbound commodities for the manufacturing industry mostly consist of raw materials needed for manufacturing processes. These goods arrive on trucks, Class I rail, and short line rail. A 19 percent increase in shipments by weight and 36 percent increase in value are expected for interstate shipments.
- **Equipment, tools, machinery, and precision instruments**
  Items that are needed for the manufacturing process arrive on truck, Class I rail, and short line rail. About 4 million tons of these goods moved into or within Maryland in 2012. By 2040, more than 10 million tons are expected. A near three-fold growth in value of these goods, from $30 billion to nearly $90 billion, is projected between 2012 and 2040.
- **Finished goods**
  The outputs of manufacturing are a variety of goods that are used by other manufacturing facilities, business, and consumers. Finished goods are transported by truck, Class I rail, short line rail directly to the end user or to distribution centers. Some finished goods, such as precision instruments, are shipped to international markets via air. Larger finished goods, such as machinery, are shipped to locations in the United States and abroad on rail and roll-on/roll-off vessels. Outbound shipment by the manufacturing industry is projected to grow slightly by tonnage but decrease 27 percent by value by 2040.

**Manufacturing Challenges:**

- The major issues facing manufacturing revolve around truck movements. Congestion and significant weather events can close or severely hamper movement, jeopardizing just-in-time deliveries.

- Bridge infrastructure conditions are also a concern. Several manufacturing processes use hazardous material, and these goods are moved near or through communities causing safety and security concerns.
- A lack of qualified drivers is a nationwide issue that is felt by the manufacturing industry. Without enough drivers to move commodities and goods through the supply chain, business deadlines can be at risk.
- In addition to a shortage of truck drivers, manufacturers are in need of qualified freight and logistics support staff.

## Figure 3-5: Manufacturing Establishments with at Least 10 Employees – 2012



## 3.4 WHOLESALE TRADE AND TRANSPORTATION

The Wholesale Trade sector statewide generates 93,361 jobs and $14 billion in GSP, representing 2.8 percent of the state's workforce and 4.3 percent of GSP. Wholesale Trade is often associated with warehousing. Goods are typically stored by wholesalers, either before their intended use or after their production. Goods may include agriculture and mining outputs, material needed for manufacturing processes, as well as manufactured products of any type. Maryland's top employers in the wholesale trade sector include Sysco Foods, C&S Wholesale Grocers/Collington Services, and Penguin-Random House, which employ approximately 1,400, 900, and 750 people, respectively.

The Transportation and Warehousing sector contributes nearly 98,000 jobs and $7.2 billion in GSP to Maryland's economy, representing 2.9 percent of the state's jobs and 2.2 percent of the GSP. Excluding passenger, transit, and scenic transportation services, the sector contributes approximately 75,000 jobs and $6.5 billion, representing 2.2 percent of the Maryland's workforce and 2.0 percent of the Maryland's GSP. The top employers in the transportation and warehousing sector include United Parcel Service (UPS), which employs more than 6,000 people, Southwest Airlines, which employs 3,200 people, and CSX Transportation, which employs 900. Figure 3-6 shows the wholesale trade, warehousing and freight transportation establishments in Maryland.

**Wholesale Trade and Transportation Modes:**

- Air
- Class I rail
- Short line rail
- Container vessels
- Roll-on/roll-off vessels
- Trucks

**Wholesale Trade and Transportation Inbound and Outbound Needs:**

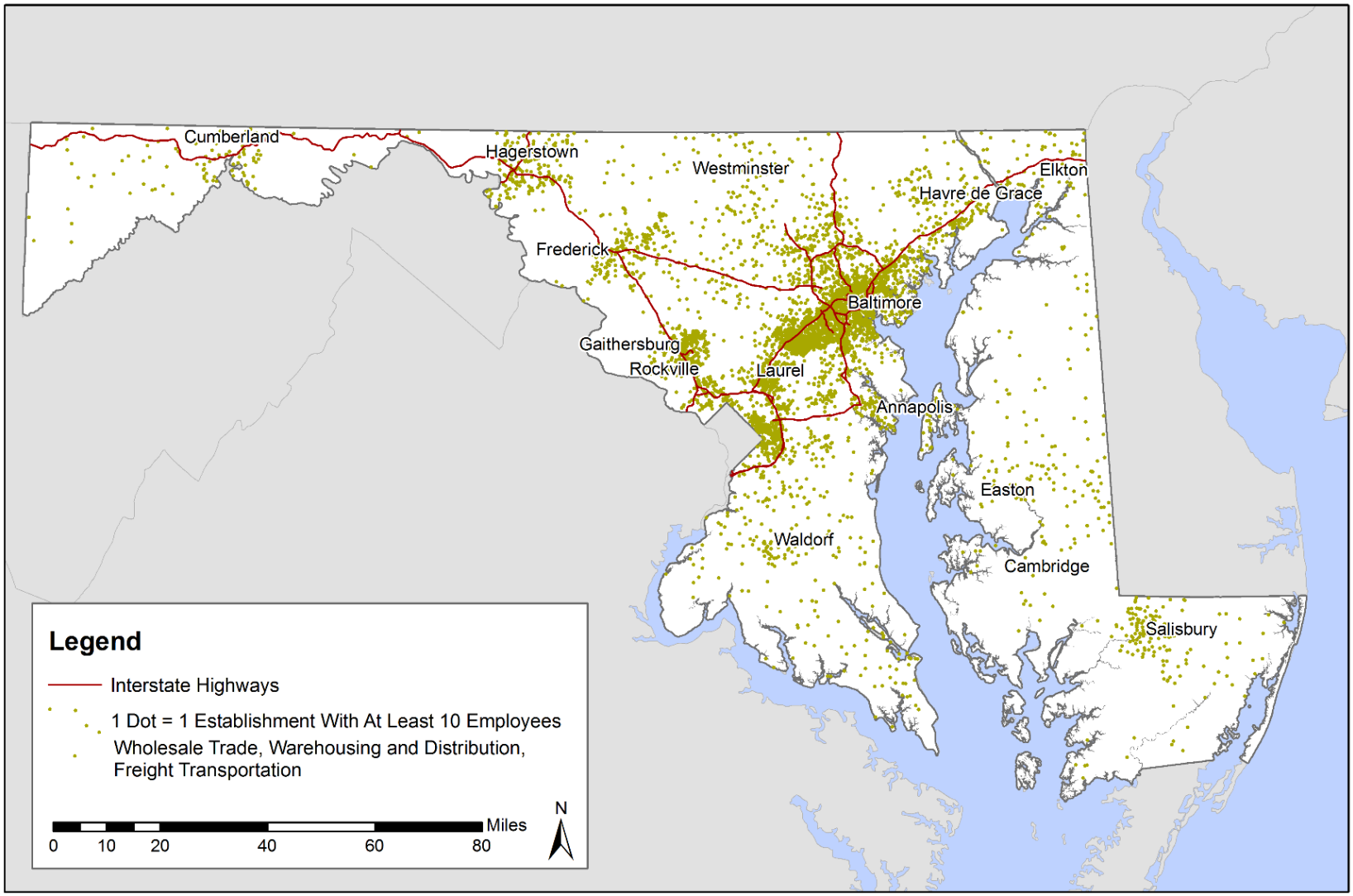
- **Imported goods**
  A major source of imports to the region is from countries in the Pacific Rim. These goods move by ship to the Port of Baltimore, a major intermodal hub that imported nearly 11 million tons of goods in 2013. Other shipments arrive via Class I railroads or long-distance trucking from the West Coast ports to cross the US, or by regional trucking from the Midwest, South, and Northeast. Nearly all of these shipments travel to distribution centers.
- **Exported goods**
  Wholesale trade produces a significant amount of outbound goods, which are projected to reach over 14 million metric tons by 2040. This includes both export goods and shipments destined for retailers. Goods bound for retailers and other outbound commodities such as machinery, transportation equipment, and durable goods move by truck, Class I rail, and short line rail to final domestic destination or to the Port of Baltimore for overseas shipment.
- **High end goods**
  High end goods, such as fashion and perishable items, are a small segment of wholesale trade. These goods move by truck to final domestic destination or to airports for overseas

shipment. In 2012, approximately 6 million tons of high end goods moved to or from Maryland, and the volume of these goods is expected to exceed 11 million tons by 2040. The value of high end goods, worth $51 billion in 2012, is projected to increase to $88 billion by 2040.

**Wholesale Trade and Transportation Challenges:**

- This industry utilizes a complex logistics network composed of multiple transportation modes. Interconnectedness and reliability of all segments of the freight transportation system is imperative.
- The expansion of the Panama Canal may fuel future growth, as the Port is one of two ports on the US East Coast that can currently accommodate Post-Panamax vessels. Congestion on the road network slows the flow of goods. For an industry segment that supports the retail market—a market heavily reliant on just-in-time supply chains—delays on the road can be a major inhibitor of growth. Further, congestion limits the number of trips that trucks can make within the region, hurting drayage operators that bring goods from the Port of Baltimore to warehouses for sorting prior to final delivery.
- Double stack capability on rail from and to the Port of Baltimore is a critical issue. The Class I railroads serving the Port currently lack direct double stack connection to the national rail network, as the rail tunnels through the City of Baltimore are not high enough to accommodate two stacked containers.
- A lack of qualified drivers is a nationwide issue that particularly impacts the wholesale trade industry. Without enough drivers to move goods just-in-time, business deadlines can be at risk.
- In addition to a shortage of truck drivers, businesses are in need of qualified freight and logistics support staff.
- Goods moving on rail sometimes share the lines with passenger service, limiting freight to late night travel and slower speeds. Increasing need of passenger service may curtail freight operations.

**Figure 3-6: Wholesale Trade, Warehousing, and Freight Transportation Establishments with at Least 10 Employees – 2012**



## 3.5 RETAIL TRADE AND HEALTH CARE

The retail trade sector is vitally important to Maryland's economy. Goods must reach shelves in urban neighborhoods, small towns, and large malls, and the continued growth in e-commerce necessitates deliveries directly to consumers. The vitality of the State's commercial and residential centers relies on people being able to access goods. Retail is responsible statewide for employing nearly 342,000 persons and producing $16.4 billion in GSP. This represents 10.1 percent of the State's workforce and 5.1 percent of GSP. Walmart/Sam's Club is Maryland's largest retail trade employer, with more than 17,000 employees statewide. Giant Food, which employs 12,000, is the second-largest retail trade employer.

The health care sector includes a wide range of facilities including hospitals, clinics, doctor's offices, psychiatric facilities, community care, child and youth services, child care, and home health care providers. These facilities are found throughout the State of Maryland, with major clusters in the Washington, D.C. suburbs and the Baltimore Region. The health care industry is a major contributor to Maryland's economy, employing just over 413,100 persons and producing over $25.1 billion in GSP. Those numbers represent 12.2 percent of Maryland's workforce and approximately 7.8 percent of the GSP. It is a growing consumer and generator of economic activity and goods movement throughout the State. University of Maryland Medical Systems and Johns Hopkins Hospital and Health System, each of which employs 23,000 people, are the largest employers in the health care sector. Figure 3-7 and Figure 3-8 show retail and health care establishments in Maryland.

**Retail Trade and Health Care Modes:**

- Air
- Class I rail
- Trucks

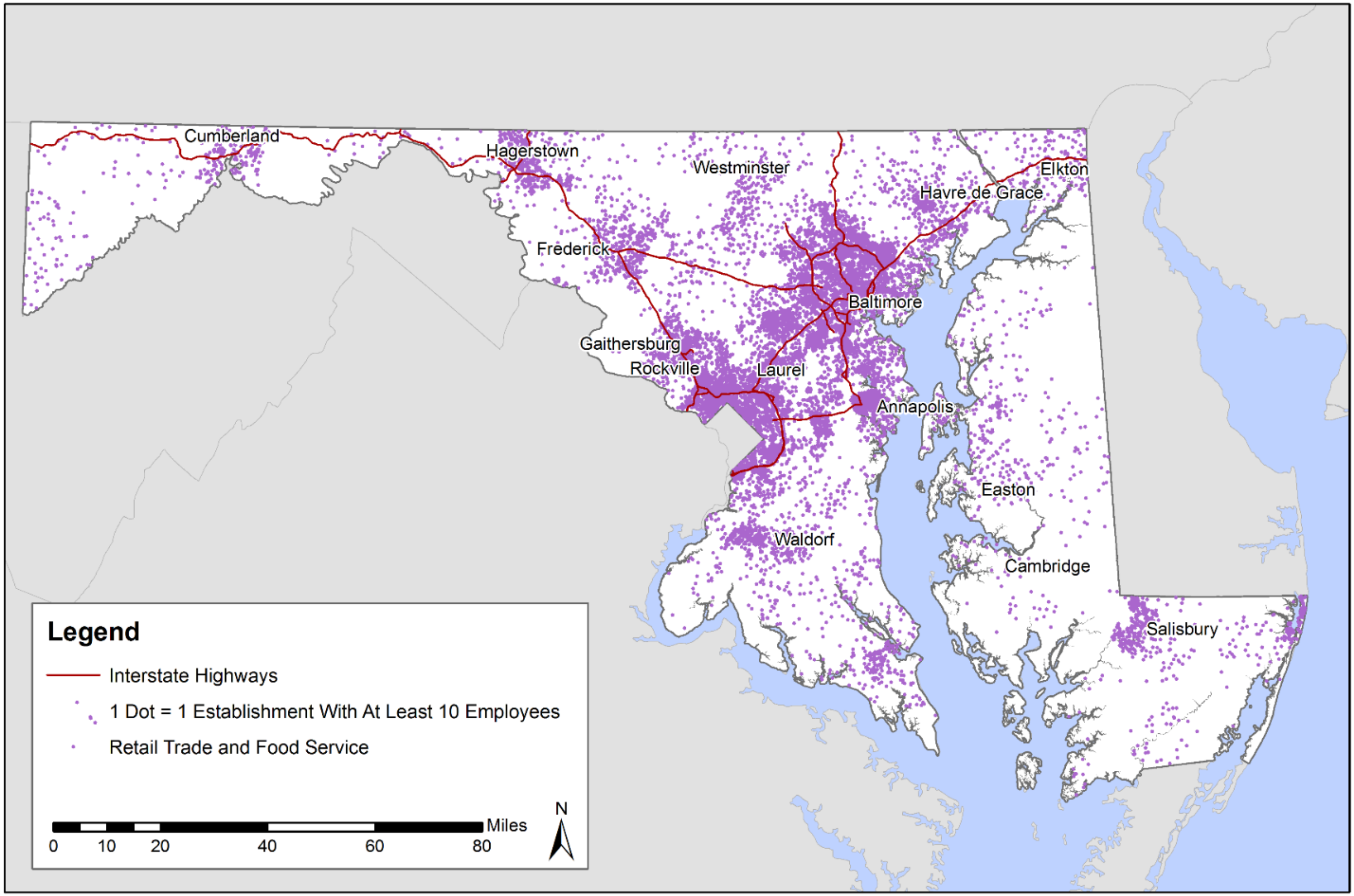
**Retail Trade Inbound and Outbound Needs:**

- **Consumer goods**
  The retail and wholesale sectors are closely linked with one another, as most goods bound for retail establishments utilize the wholesale industry supply chain for the first part of the journey. Consumer goods are the dominant inbound delivery to retail establishments. These arrive from distribution centers via truck and Class I railroads. Approximately 11 million tons of consumer goods worth $55 billion flowed into or within Maryland in 2012. The volume of consumer goods is projected to be 86 percent greater by weight and 72 percent greater by value in 2040.
- **Fulfillment centers**
  Fulfillment centers are part of a growing logistics chain that moves consumer goods directly to consumers that have been reached through omni-channel retailing. Omni-channel retailing is an approach that allows consumers to interact with a retailer seamlessly across multiple "channels," including in-store, online, mobile devices, television, catalogs, etc. Fulfillment centers are where customer orders are processed and shipments are prepared for delivery. Purchased items move to consumers via truck, particularly package and delivery vehicles.

- **Reverse logistics**
  Reverse logistics describes the process of moving product returns from the consumer back to a wholesale fulfillment center or warehouse. Trucks move product returns along local streets and highways.
- **Material waste**
  Discarded packaging accounts for most of the material waste produced by retail establishments. Trucks move material waste along local truck routes to reach consolidation centers. Bulk material waste is transported to recycling facilities or landfills via truck and Class I railroads. Retail establishments, along with other businesses and residences, contributed to the 12.3 million tons of solid waste generated in Maryland in 2012.[27]

[27] Source: Maryland Department of the Environment, "Maryland Solid Waste Management and Diversion Report, 2013," available from: http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/CountyCoordinatorResources/Documents/%2713%20MSWMR.pdf.

## Figure 3-7: Retail Trade Establishments with at Least 10 Employees – 2012



**Health Care Inbound and Outbound Needs:**

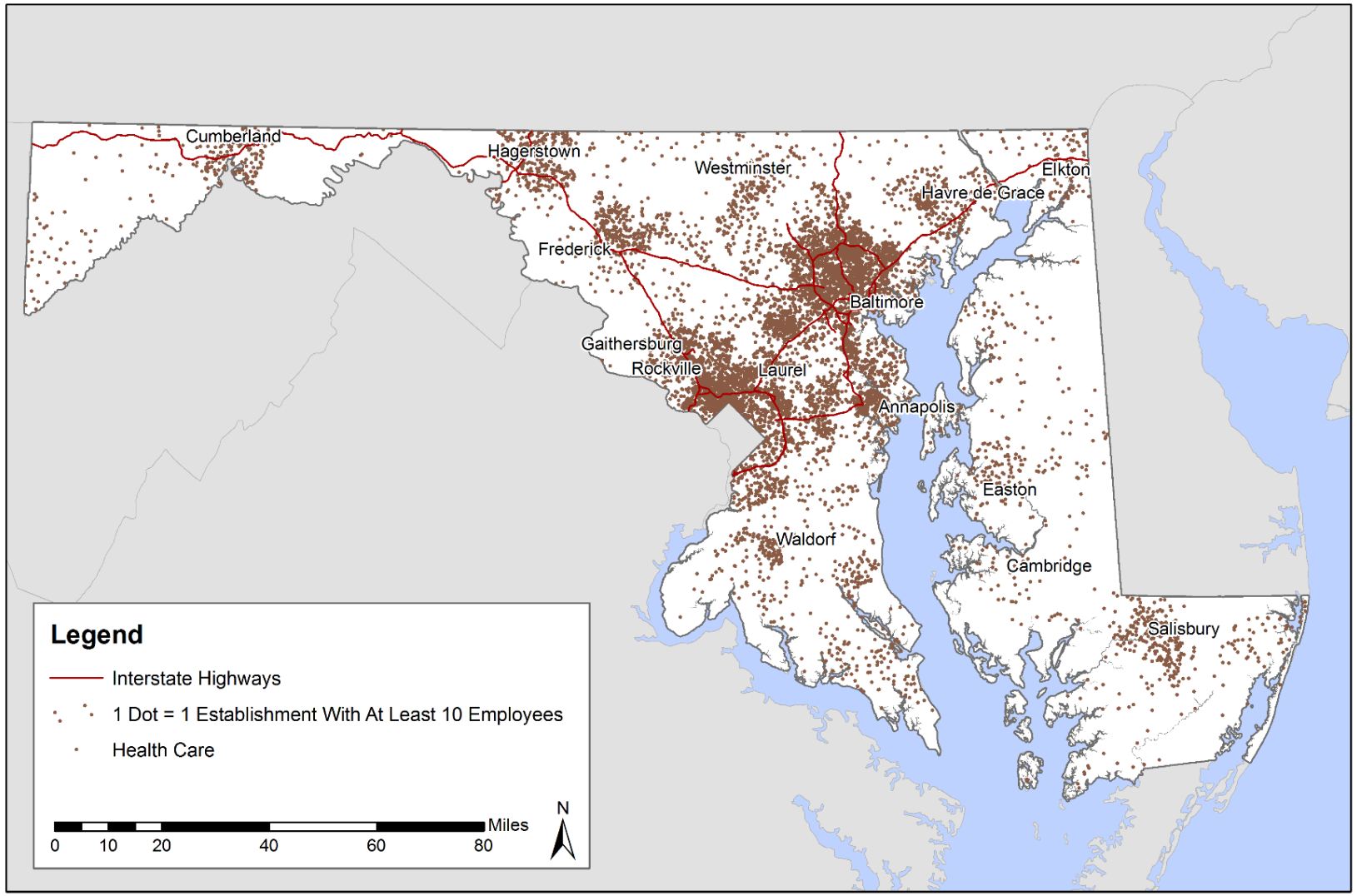
- **Operational supplies**
  These facilities require an enormous amount of goods in order to operate. Goods that must reach these facilities on a regular basis include linens, sheets, gowns, towels; medical supplies including gauze, bandages, wrappings, instruments; food; office supplies and documents; and pharmaceuticals and other specialty items (blood, plasma, etc.). Many of the bulk items needed to likely arrive to distribution centers via import through the Port of Baltimore or via truck. Delivery to each health care location is by truck. In 2012, about 400,000 tons of medical supplies worth $37 billion, moved into or within Maryland. The volume of medical supplies is expected to increase more than two-fold by 2040.
- **Outbound parcels and packages**
  Outgoing freight needs include parcels and packages, medical samples, or pharmaceuticals, including many of the commodities described above. These shipments are typically smaller and lower weight products that travel by truck to the final destination or to BWI/Marshall Airport for overseas shipment.
- **Material and Bio-hazard Waste**
  Waste shipments travel almost entirely by truck, first to local consolidation centers, and then to in-state or out-of-state recycling facilities and landfill sites, as appropriate. Pennsylvania and Virginia are the primary out-of-state destinations for exported medical waste. Bio-hazardous material moving out of health care facilities requires special routing. Health care establishments, along with other businesses and residences, contributed to the 12.3 million tons of solid waste generated in Maryland in 2012.[28]

**Retail Trade and Health Care Challenges:**

- As the share of sales made online and via mobile devices expands, some retailers are devoting some of the distribution center space, previously used to supply retail stores, for order fulfillment and preparing shipments for delivery to customers. Delivery from fulfillment centers to customer occurs on all segments of the highway network. This is increasingly a concern for retailers along roadways that have traffic calming measures, as these streets may not be able to accommodate large trucks.
- Congestion and reliability are the dominant goods movement transportation issues, particularly because shipments are extremely time sensitive. Delays create additional costs for shippers, transporters, and customers.
- As portions of the State continue to urbanize, increasing numbers of truck deliveries to retail establishments will be made in close proximity to vulnerable road users. Promoting vibrant, pedestrian friendly development in these areas while also enabling efficient goods movement will be of increasing concern for business owners and residents and should be considered in the urban planning and development process. Connected with this issue is the need for truck parking/staging facilities to accommodate drivers who are waiting for retailers' delivery acceptance times.

[28] Ibid.

## Figure 3-8: Health Care Establishments with at Least 10 Employees - 2012



## 3.6 GOVERNMENT AND KNOWLEDGE

Discussion of the Government sector and the Knowledge industry (Professional, Scientific, and Technical Services) industry sectors has been combined in this section, because both sectors have similar goods movement needs and supply and logistics chains supporting them. Combined, the two sectors account for 25.6 percent of Maryland's workforce and approximately 24.1 percent of its GSP.

Government is a major component of Maryland's economy. At the local, state, and federal level, government, including the US Postal Service, employs just over 518,000 persons in the State and produces $62.2 billion in GSP. This represents 15.3 percent of the State's workforce and 19.3 percent of its GSP. The National Institute of Health employs more than 17,000 people in Maryland, the US Social Security Administration employs 14,500, and the US Food and Drug Administration employs nearly 13,000.

The Professional, Scientific, and Technical (PST) industry, which includes jobs in the legal services, architecture and engineering, computer systems work, advertising, and marketing fields, among others is another major contributor to Maryland's economy. With approximately 351,500 jobs and $31.5 billion in GSP output statewide, 10.4 percent of jobs and 9.8 percent of GSP in Maryland is within this sector. Maryland's largest employers in this sector include Lockheed Martin, Johns Hopkins University Applied Physics Laboratory, and Booz Allen Hamilton, which employ 7,600, 5,000, and 3,100 people, respectively.

**Government and Knowledge Modes:**

- Air
- Class I rail
- Trucks

**Government and Knowledge Inbound and Outbound Needs:**

- **Operational supplies**
  The major inbound goods for these industry sectors are office supplies and equipment, food, and parcels and packages. The majority of these goods move by truck. Inbound parcels and packages arrive by air. BWI/Marshall Airport is an intermodal hub where goods on the planes are transferred to truck, sorted at a nearby facility, and sent by truck for delivery. Approximately 7 million tons of such goods were shipped to Maryland office and government establishments in 2012. The volume of these goods is projected to grow 73 percent by 2040.
- **Outbound parcels and packages**
  Outgoing freight needs include parcels and packages. These shipments are typically smaller and lower weight products that travel by truck to the final destination or to BWI/Marshall Airport for overseas shipment. These shipments totaled more than 6 million tons in 2012, and are projected to increase in volume to more than 10 million tons by 2040.
- **Material Waste**
  Waste shipments travel by truck to local consolidation centers, and then by truck or Class I railroads to landfill sites. Government and knowledge establishments, along with other

businesses and residences, contributed to the 12.3 million tons of solid waste generated in Maryland in 2012.[29]

**Government and Knowledge Challenges:**

- Both of these industry sectors are projected to grow through 2040, Government by 73.6 percent and PTS by 81 percent in the Washington, D.C. region. This growth will drive the need for construction and service material as new office space is built or existing space is rehabilitated or converted. Construction material will mostly use the freight infrastructure outlined above.
- As development continues to increase the number of establishments, it will be important to consider truck access in development plans and to maintain a map that keeps up with the changing streetscapes. Connected with this issue is the need for truck parking/staging facilities to accommodate drivers who are waiting for delivery acceptance times.
- A transportation issue facing these industries is congestion, as delays lead to increased operating costs for carriers that is passed on to the customer.
- Another issue, especially for the Government sector, is the lack of available drivers to operate trucks. Since many government complexes and knowledge facilities require additional security clearance, the number of available drivers is even more restricted.

[29] Source: Maryland Department of the Environment, "Maryland Solid Waste Management and Diversion Report, 2013," available from: http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/CountyCoordinatorResources/Documents/%2713%20MSWMR.pdf.

# 4.0 GOODS MOVEMENT STRATEGIC DIRECTION

MDOT's vision for goods movement:

*Freight travels freely and safely through an interconnected network contributing to economic viability and growth for Maryland businesses.*

The strategies noted on the following pages are based on data analysis, the challenges and needs of private sector freight providers and users, interagency input and advice. These strategies will guide the development of programs and projects throughout MDOT and public and private stakeholders.

| **Goal: Quality of Service**<br>*Maintain and enhance the service experience for users of Maryland's multimodal freight system* | | |
|---|---|---|
| **Issue** | **Desired Outcome** | **Strategy** |
| There are significant costs to maintain, upgrade, and improve State-owned short line rail infrastructure and assets. | Reliable and safe transport on State-owned short line rail system through investment that yields a return on investment or public benefits such as emissions reductions, safety improvements, or improved system performance. | • TSO, MTA, and MDTA in cooperation with shippers and receivers should identify the competitive and strategic redundancy benefits that all could gain from more effective use of State-owned rail assets. Where justified, the State should proceed with projects to maintain, rehabilitate, and improve State-owned assets as identified in the MTA Freight Lines Strategic Plan. |
| Traffic congestion increases truck travel times and reduces reliability of delivery time which leads to higher transport costs for businesses that are passed on to consumers. | Reliability improvements and congestion mitigation that positively impact supply chain costs associated with driver and truck delay and fuel consumption. Improved air quality and lower climate impacts due to lower truck emissions. | • SHA and MDTA should continue to advance appropriate measures to reduce or mitigate the effects of congestion on industry supply chains. |
| Projected increase in passenger and freight rail demand could exacerbate conflicts over available rail network capacity. | Rail network that can meet freight and passenger demand now and in the future. | • Freight and passenger rail owners and operators should collaborate with TSO and MTA to forecast future passenger and freight rail volume on shared corridors, identify practical operating capacity on shared corridors, and detect locations where future volume may exceed capacity. Collaboration between all groups is necessary to identify, plan and implement solutions. |

| **Goal: System Preservation**<br>*Maintain and improve the performance of Maryland's multimodal freight system* | | |
|---|---|---|
| **Issue** | **Desired Outcome** | **Strategy** |
| There is little public-sector assistance available to short line railroads relative to other modes of freight transportation. | Robust short line railroad aid through transportation and economic development, and agriculture partnerships that could lead to innovative programs. | • TSO, MTA, and MDTA should coordinate with public and private short lines to seek innovative funding and financing sources and leverage available public resources with public-private partnerships where possible to fund projects that will advance the public benefit. |
| The advent of industry specific hauling permits may lead to a new, yet-to-be-established standard for truck size and weight in practice without the proper policy considerations. | Established, formal policy on truck size and weight for permitted and non-permitted loads based on statewide engineering and operational information. | • SHA and MDTA should conduct a study of the effects of truck size and weight for permitted and non-permitted loads on safety, infrastructure, and the economy, and the impact of inconsistent regional and national size and weight thresholds as a basis for developing a formalized policy. |
| The "true cost" of oversize/overweight (OS/OW) loads traveling on Maryland highways, such as police escort, road or lane closures, and other operational disruptions, may not be captured by the permit fee. | Cost-benefit analysis of OS/OW that will reveal whether there is a need to increase permitting fees, or if the "true costs" are captured through economic benefits of the activity that requires the heavy cargo. | • SHA and MDTA should conduct a study to evaluate the costs of accommodating OS/OW loads (pavement and bridge damage, lost economic activity due to delay to other traffic, etc.) and the economic effects of the activity the OS/OW loads support, and, if there is an evident need, identify potential strategies to capture revenue. Information sharing from shippers and carriers is critical to success. |
| Significant dredge placement capacity is necessary to maintain safety and viability of channels. | An effective dredging program that maintains and improves shipping channels to the Port, | • MPA should continue its strategies for innovative and beneficial use of dredged material with stakeholder input. |

| **Goal: Safety & Security**<br>*Improve the safety and security of goods movers, the public at large, transportation assets, and cargo* | | |
|---|---|---|
| **Issue** | **Desired Outcome** | **Strategy** |
| Freight transportation-related incidents resulting in property damage, injuries, and fatalities are threats to public safety and represent costs to Maryland businesses. | Reduction in incidents involving freight carriers, especially on the highways and railroads. | • MDOT should continue to collaborate with, MSP, local law enforcement agencies, and the trucking industry, to maintain truck safety enforcement and monitoring programs.<br>• Freight rail owners and operators should continue to maintain rail safety enforcement and monitoring programs. |
| Truck drivers need safe and secure locations to park and obtain mandated amount of rest. Truck parking supply is not sufficient to meet current demand and projected need. | Expanded supply of truck parking statewide in public and private facilities, and maximum utilization of all truck parking capacity. | • TSO, SHA, and MDTA should collaborate with private travel services providers to seek innovative project delivery solutions to expand truck parking capacity and availability.<br>• TSO, SHA, and MDTA should develop additional truck parking capacity throughout the State in public facilities.<br>• TSO, SHA, and MDTA should evaluate current state-of-the-practice in truck parking availability technology systems and potential for implementation in Maryland. |
| **Goal: Economic Prosperity**<br>*Maintain and improve Maryland's economic competitiveness* | | |
| **Issue** | **Desired Outcome** | **Strategy** |
| The vertical clearance through privately owned rail tunnels prohibits double-stacking of domestic and international containers, impacting the region's economic competitiveness, particularly that of the Port of Baltimore relative to other ports. | Suitable double-stack intermodal rail access to and from the Port to improve its market share. | • In the short term, MDOT should evaluate creative solutions to overcome the current deficiencies.<br>• Long term solutions require leadership from the rail infrastructure owners, namely CSX and Amtrak, to work with MDOT and regional public and private partners to determine the feasibility of creating a double-stack rail network into and out of the Port of Baltimore. Cooperation from CSX, Amtrak, and partners, will be critical in planning and funding any future projects. |

| | | |
|---|---|---|
| There are well-paying truck driving jobs that are not filled because of a shortage of qualified drivers. | Higher rate of driver recruitment and retention in the trucking industry. | • The trucking industry should continue to promote careers in the industry through public outreach. Independent and small fleet carriers should communicate to the State their specific needs and concerns and work with the state and community colleges to devise solutions.<br>• TSO and MVA can play an advisory role in the development of driver education and development programs.<br>• State, county, and municipal public work agencies should consider instituting heavy equipment apprentice programs to provide on the job training. |
| Freight-generating businesses (warehousing and distribution, transportation, manufacturing, etc.) seek skilled workforce. | Increased availability and enrollment of freight services degree and continuing education programs. | • Maryland Higher Education Commission, community colleges, and industry should partner to further define the need for college degrees and continuing education programs in freight and logistics<br>• TSO can play an advisory role in the development of programs. |
| **Goal: Community Vitality**<br>*Support the vitality of Maryland's communities* | | |
| **Issue** | **Desired Outcome** | **Strategy** |
| Some truck drivers will travel along inappropriate or prohibited routes because of a lack of timely information through mapping and routing systems (i.e. GPS). The wrong routing can lead truck drivers into neighborhoods or along size/weight restricted bridges. | Current and reliable truck routing that is communicated to all truck drivers in various ways, e.g. maps, GPS systems, and road signs. | • Trucking companies should educate drivers of proper truck routing and plan trips that avoid non-freight routes.<br>• SHA should release the updated truck route map, and establish a process for periodic review and update.<br>• TSO should partner with MPOs and municipalities to establish localized truck routing and mapping. |
| In urban settings and densely developed areas, the interactions among freight vehicles, the built environment, and vulnerable road users, create a challenging | Technical guidance for planning agencies that informs planners about the specific needs of pick-up/delivery trucking operations in urban and densely developed areas. | • MDP should develop technical guidance for local land use agencies. Input from carriers, architects, and other stakeholders should be sought.<br>• MDP should encourage local land use regulatory agencies to address goods movement and loading and delivery needs in zoning, subdivision regulations, and the site plan review process. MDP should develop a technical guidance with input from developers, carriers, and MDOT. |

| | | |
|---|---|---|
| environment with many competing claims on limited roadway and curb space. | | |
| **Goal: Environmental Stewardship**<br>Support environmental stewardship | | |
| **Issue** | **Desired Outcome** | **Strategy** |
| Portions of the freight transportation network are, or could be, vulnerable to flooding and inundation. | An inventory of freight transportation network elements, and a process for updating the inventory, that are vulnerable to the threats of sea level change and other environmental resources. | • MDOT should identify and inventory assets that are vulnerable to flooding and inundation, and develop adaptation strategies such as reconstruction, relocation, and protective infrastructure to address existing and potential future weaknesses. |

# 5.0 TRACKING PERFORMANCE

Maryland values tracking performance of the transportation network to engage in process improvement and to provide a better experience for our customers. In 2012, MDOT began tracking performance measures for freight and has been able to grow the performance measures capturing freight issues in the various performance reporting efforts currently used at MDOT.

Below are the leading indicators that MDOT tracks that point to how the freight transportation system is changing as strategies and tactics are put into place. These measures are reported in the Freight System Performance Annual Report holistically, but they are also used in MDOT's Excellerator program, the Maryland Attainment Report and other TBU performance programs. They are intended to further the understanding of freight needs and benefits and create a common point of reference for the discussion of improvements. Performance measures, no matter how sophisticated, can never tell the full story and should not substitute for detailed analysis of freight operations and planning. Nevertheless, the continued and enhanced use and reporting of freight performance measures is a key feature of the strategic direction in this Plan.

| Goal Area | Performance Measure |
|---|---|
| **Quality of Service - Highway** | Truck Congestion Cost (in $ millions) on freeways/expressways in the Baltimore/Washington region |
| | Amount of delay for trucks due to congestion on freeways/expressways |
| | **Wasted fuel for trucks** |
| | Truck user cost savings due to recurring congestion relief projects on State highways |
| | Percentage of the Maryland SHA network in overall preferred maintenance condition (AR) |

| | |
|---|---|
| **Quality of Service – Marine** | Average truck turn-around time at Seagirt Marine Terminal (AR) |
| **Safety and Security – Highway** | Number of fatalities in traffic crashes involving heavy trucks on all roads in Maryland |
| | Number of persons injured in traffic crashes involving heavy trucks on all roads in Maryland |
| | Annual number of commercial vehicle safety inspections performed |
| | Number of available truck parking spaces |
| | Peak Overnight Truck Parking volume |
| **Safety and Security – Rail** | Number of non-fatal crashes at at-grade rail crossings |
| | Number of fatal crashes at at-grade rail crossings |
| | Number of public and private at-grade highway-rail crossings |
| | Number of hazardous materials release incidents |
| **Safety and Security – Marine** | MPA compliance with the Maritime Transportation Security Act of 2002 |
| **System Preservation and Performance – Highway** | Number or percent of bridges that are structurally deficient (AR) |
| | Percent of roadway miles with acceptable ride quality (AR) |
| | Weighed vehicles found to be overweight |
| **System Preservation and Performance – Marine** | Dredge material placement capacity remaining for Harbor and Bay sections |
| **Economic Prosperity – Rail** | Number of short line carloads on Maryland owned rail |
| **Economic Prosperity – Marine** | Port of Baltimore Foreign Cargo (AR) |
| **Economic Prosperity – Marine** | MPA General Cargo Tonnage (AR) |
| **Economic Prosperity – Air** | Total air tonnage at BWI/Marshall Airport |
| | Number of nonstop airline markets served by BWI/Marshall |
| **Environmental Stewardship – Marine** | Mid-Atlantic Dray Truck Replacement Program |
| | **Acres of wetlands and wildlife habitat created, restored, or improved since 2000** |
| **Community Vitality** | **Intermodal containers moved by rail through the Port of Baltimore (AR)** |
| | **Domestic intermodal containers moved by rail.** |

(AR) indicates that the measure is currently reported in the Annual Attainment Report.

More information about Maryland's freight performance can be found in Maryland's Annual Attainment Report, the Excellerator, Maryland's Freight System Performance Annual Report and the Maryland State Highway Mobility Report published separately. Much of this information is captured in this Plan related to the system trends, issues and needs.

Tables 5-1 through 5-6 show a snapshot of some of these measures including baseline and target information. For additional multimodal measures please refer to the 2015 MDOT Freight System Performance Annual Report and 2017 MDOT Attainment Report.

LEGEND: PERFORMANCE TRENDS YEAR OVER YEAR

 Improved  Declined  Steady

## Table 5-1: Quality of Service

| | |
|---|---|
| **Objective:** Maintain and enhance the service experience for users of Maryland's multimodal freight system | |
| **Measure Defined:** Measured by the reliability of the freight system and the cost of congestion to truckers | |
| **Measure:** Percentage of the SHA network in overall preferred maintenance condition | **Measure:** Average truck turnaround time at Seagirt Marine Terminal |
| **Baseline:** 85.1 percent in 2012 | **Baseline:** 30.2 percent in 2012 |
| **Target**: 85 percent annually (AR[a]) | **Target:** 30 minutes (AR[b]) |
| **2015:** 78.8 percent | **2015:** 28.4 percent |
| **Score:**  | **Score:**  |
| **Analysis:** This is a decrease from 85.1 in 2012, due in part to the impact of extreme winter weather snow conditions over the previous three years on roadway maintenance. | **Analysis:** This is a decrease in truck turnaround time from 30.2 percent in 2012 and therefore an improvement. Performance changed due to many factors, including improved terminal layout and expanded storage areas, improvements to truck drive lanes, and improved planning to maintain staffing levels on heavy days. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, Cambridge Systematics, Inc. update of performance measures.

[a] AR=Attainment Report published by MDOT each year to document transportation performance.
[b] Ibid, AR 2017, p. 42.

## Table 5-2: Safety and Security

| | | |
|---|---|---|
| **Objective:** Improve the safety and security of goods movers, the public at large, transportation assets and cargo | | |
| **Measure Defined:** Measured by the effectiveness of regulations and enforcement programs to ensure safety | | |
| **Measure:** Number of fatalities in traffic crashes involving heavy trucks on all Maryland roads | **Measure:** Peak Overnight Truck Parking Volume | **Measure:** Number of Highway-rail incidents involving Class I freight railroads |
| **Baseline:** 70 in 2012 | **Baseline:** 3503 in 2012 | **Baseline:** 17 in 2012 |
| **Target:** Further coordination required with enforcement, engineering, education and freight stakeholders – SHSP program | **Target:** Further coordination required with enforcement, engineering, education and freight stakeholders – SHSP program | **Target:** Further coordination required with enforcement, engineering, education and freight stakeholders – SHSP program |
| **2015:** 51 Trucks | **2015:** 3865 | **2015:** 16 incidents |
| **Score:**  | **Score:**  | **Score:**  |
| **Analysis:** This is a decrease from 70 large trucks involved in fatalities in 2012 and therefore an improvement. MDTA Police, in coordination with MSP, AAA, and | **Analysis:** This is an increase from 3503 trucks parked overnight in 2012 and therefore a decrease in the overall score. | **Analysis:** This is a slight decrease from 17 incidents in 2012. Railroad Police, MSP, and Operation Lifesaver continue to promote rail safety campaigns with outreach to |

| | | |
|---|---|---|
| AT&T, launched a coordinated statewide campaign to reduce crashes related to the distractions of handheld cell phones. MDTA installed 26 signs, alerting motorists the "It can wait" prior to 13 rest areas. | | reduce highway-rail grade crossing incidents. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, NHTSA Truck Safety Facts (Feb 2017), Cambridge Systematics, Inc. update of performance measures.

## Table 5-3: System Preservation

| | | |
|---|---|---|
| **Objective:** Maintain and improve the performance of Maryland's multimodal freight system | | |
| **Measure Defined:** Measured by the freight infrastructure condition and capacity | | |
| **Measure:** Number of bridges that are structurally deficient on Maryland Truck Routes  | **Measure:** Percent of roadway miles with acceptable ride quality  | **Measure:** Dredge Material placement capacity remaining for harbor and bay sections  |
| **Baseline:** 97 in 2012 | **Baseline:** 86 percent in 2012 | **Baseline:** 19.5 mcy in 2012 |
| **Target:** Less than 70 total bridges by CY 2017 | **Target:** 87 percent by 2018 | **Target:** Maintain a rolling 20-year plan for adequate dredged material placement capacity |
| **2015:** 69 | **2015:** 87 percent | **2015:** 16.5 mcy |
| **Score:**  | **Score:**  | **Score:**  |
| **Analysis:** In 2015 the number of structurally deficient bridges decreased to 69, which is an improvement SHA continues to invest in maintaining structurally deficient bridges, including the I-695 Baltimore Beltway Bridge over Crosby Road, I-83 Harrisburg Expressway bridge over Padonia Road and I-81 Maryland Veterans Memorial Highway Bridge over the Potomac River. | **Analysis:** In 2016, the percentage also was 87 percent. SHA continues to focus on improving roadways with deficient ride quality and increased use of nontraditional pavement preservation treatments. MDTA has enhanced their inspection program to better address inspection findings. MDTA performed needed preservation improvements to all facilities, including resurfacing travel lanes and ramps, rehabilitating and/or painting of bridges, and upgrading signs and lighting | **Analysis:** The dredged material placement capacity remaining is decreasing slightly from previous years. However, the MPA continues to manage the dredging program to maintain and improve shipping channels, removing access channel restrictions and improving the navigational system. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, Cambridge Systematics, Inc. update of performance measures.

## Table 5-4: Economic Prosperity

| | | |
|---|---|---|
| **Objective:** Maintain and improve Maryland's economic competitiveness | | |
| **Measure Defined:** Measured by the tonnage and value of freight moving in, out, and through Maryland | | |
| **Measure:** Port of Baltimore Total Foreign Cargo | **Measure:** MPA General Cargo Tonnage | **Measure:** Air Cargo Tonnage at BWI Airport |
| **Baseline:** 36.7 Million tons in 2012 | **Baseline:** 9.6 Million Tons in 2014 | **Baseline:** 112,939 Tons in 2012 |
| **Target:** Keep working with MDOT and CSX to enable high cubed double-stack train access to Seagirt Marine terminals. | **Target:** Make rail and terminal improvements to facilitate heavy lift cargoes and expansion of project cargo. | **Target:** Enhance service |
| **2015:** 32.4 million tons | 2015: 9.8 million tons | **2015:** 105,153 tons |
| **Score:**  | **Score:**  | **Score:**  |
| **Analysis:** In 2015, the Port handled 32.4 million tons of foreign cargo, a decrease from 36.7 million tons in 2012. Roll-on/Roll-off volumes fell 3.5 percent due to weakness in overseas markets and the strong U.S. dollar. However, this year marked the arrival of the first big ship container ship from the newly expanded Panama Canal. New contracts with logistics and paper companies bode well for future foreign cargo demand. Highway and rail improvements to the port will make Baltimore more competitive for container cargo. | **Analysis:** For the fifth consecutive year, the Port of Baltimore handled increasing volumes of general cargo, with 9.8 million tons in 2016 serving as the highest volume to date. Highway and rail improvements to the port will help to improve general cargo operations and logistics. | **Analysis:** Air cargo volumes were impacted by the economic downturn in 2008. BWI Officials will continue to meet with cargo carriers to identify potential for enhanced service to and from BWI Marshall Airport. Relative to other major Mid-Atlantic region airports, BWI/Marshall has made a slightly greater recovery since the 2008 to 2009 recession. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, Cambridge Systematics, Inc. update of performance measures.

[a] There are multiple strategies to improve foreign cargo, including but not limited to: targeting auto and machinery manufacturers to provide long-term contracts, and continue to work with all stakeholders to develop the Duke property and Sparrows Point as Distribution Centers.

[b] There are multiple strategies to improve general cargo, including but not limited to: continue to coordinate roadway permit issues with SHA and the City of Baltimore to facilitate cargo movement and positive community relations, and Work with the City of Baltimore to encourage land use practices and zoning efforts that preserve industrial land and freight routes leading to/from the Port's terminals.

## Table 5-5: Environmental Stewardship

| |
|---|
| **Objective:** Support and enhance Maryland's natural, historical and cultural resources |
| **Measure Defined:** Measured by the connection between freight and clean air and water |
| **Measure:** Transportation-related greenhouse gas (GHG) emissions |
| **Baseline:** 31.31 Million Metric Tons (MMT) in 2006 |
| **Target:** Reduce emissions by 40 percent below 2006 emissions by 2030 |
| **Score:**  |
| **Analysis:** Per the EPA National Emissions Inventory, criteria pollutant emissions in Maryland's nonattainment areas have steadily decreased since 2002, primarily as a result of improved vehicle technology and fuel programs. Data developed for the Maryland Annual Attainment Report on Transportation System Performance provides VMT and GHG emissions by on-road vehicle type. Heavy-duty vehicles account for 7.2 percent of the total on-road VMT, which equates to 22 percent of total on-road emissions. In 2016, GHG emissions continue to trend downward and dropped to 28.78 MMT, down 3 percent from 29.69 MMT in 2015 and 8 percent from 31.31 MMT in 2006. As of 2016, MDOT is 20 percent of the way toward achieving the goal of 40 percent GHG reduction by the year 2030. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, Cambridge Systematics, Inc. update of performance measures.

## Table 5-6: Community Vitality

| |
|---|
| **Objective:** Support Maryland's communities and quality of life |
| **Measure Defined:** Measured by the number of intermodal containers moved by rail through the Port of Baltimore |
| **Measure:** Number of intermodal containers moved through the Port of Baltimore |
| **Baseline:** 17,900 in 2015 |
| **Target:** Work with Public-Private partnership (P3) partner, Ports America Chesapeake (PAC), to attract additional containerized cargo to the Port. |
| **Score:**  |
| **Analysis:** In 2016, a total of 23,000 containers moved by rail through the Port of Baltimore. While this figure is preliminary as of this writing and subject to change, a 12 percent increase represents a significant change in container moves in one year. With the expansion of the Panama Canal in 2016 to allow deeper and wider lanes for larger ships to pass through, Baltimore and other Atlantic coastal ports now can receive the larger cargo carriers, often from the Far East, that previously were limited to the Pacific Coast. On July 19, 2016, the *Ever Lambent*, a cargo carrier from Taiwan, was the first supersized container ship to reach Baltimore through the Panama Canal. Finally, the MPA is beginning an intermodal rail incentive program to provide parity in the rail costs associated with Baltimore compared to competing ports despite not currently having double-stack capabilities. MDPT/MPA and CSX are committed to creating double-stack clearance through the Howard Street Tunnel. |

Source: Maryland's Annual Attainment Report 2017, Maryland Freight Performance Measures 2015, Cambridge Systematics, Inc. update of performance measures.

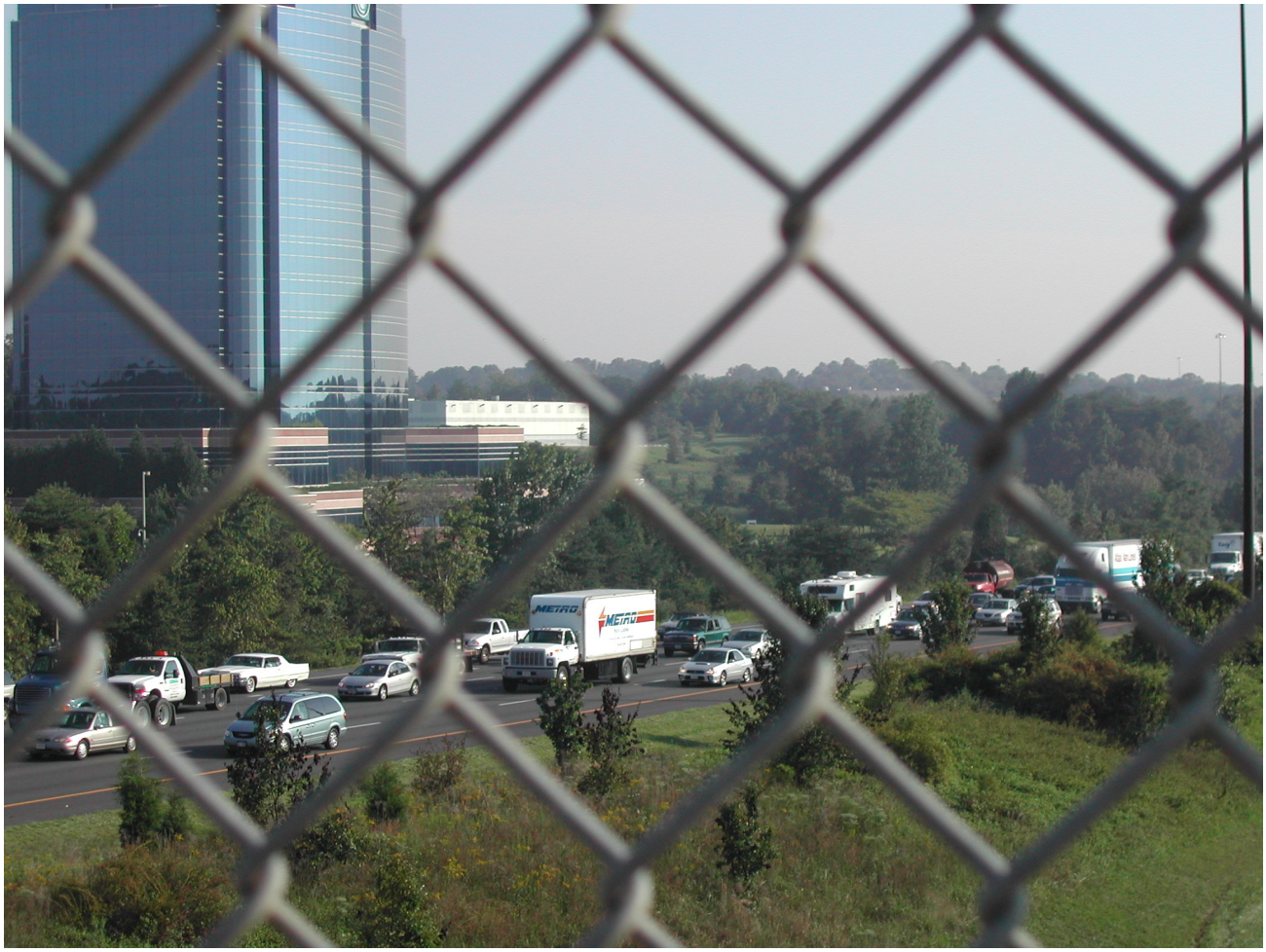
- In April 2016, Governor Larry Hogan signed SB 323, enhancing the 2009 Greenhouse Gas Emissions Reduction Act, which requires Maryland to reduce statewide gas emissions by 40 percent from 2006 levels by 2030.

# 6.0 CONGESTION MEASUREMENT AND BOTTLENECKS STRATEGIES

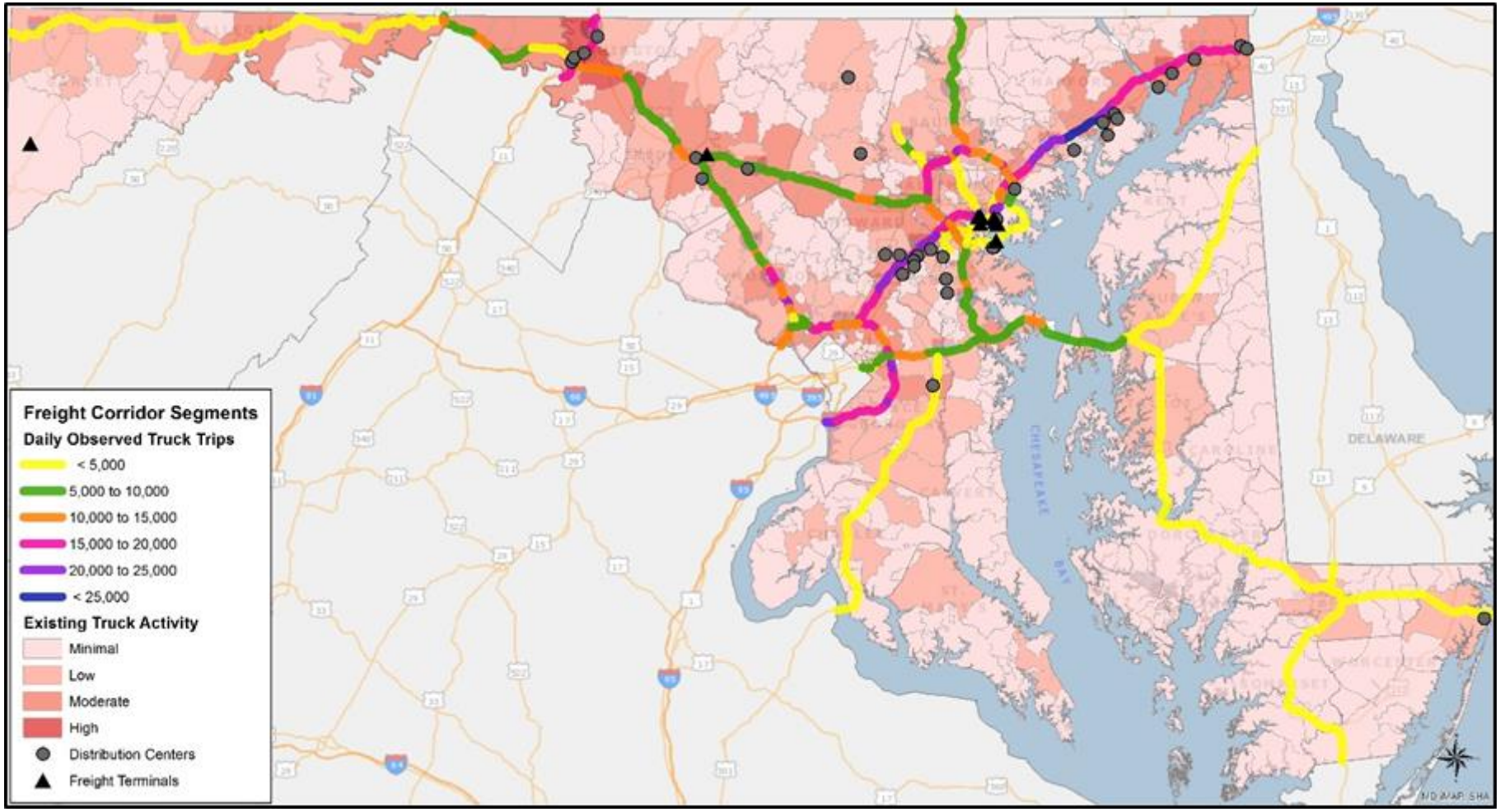
Since Maryland is a crossroads for freight movement and is nationally and regionally significant, MDOT monitors congestion and reliability routinely through freight planning, the Annual Mobility Report published by SHA, and the application of the MAP-21 performance measures.

## 6.1 TRUCK DEMAND ON MARYLAND HIGHWAYS AND MAJOR TRUCK CORRIDORS

Figure 6-1 shows the existing truck demand on Maryland's major freight corridors. Truck volumes were obtained from current count locations and were developed in conjunction with Maryland's annual submittal to FHWA as part of the Highway Performance Monitoring System (HPMS). The evaluation of major freight corridors in Maryland included breaking up longer corridors in more logical corridor segments. This allows for a more equitable comparison of corridors throughout the State. Table 6-1 and Figure 6-2 show the major logical freight corridor segments. Table 6.2 shows the highest truck volume and truck percentage locations.



## Figure 6-1: Existing Truck Demand *2015*



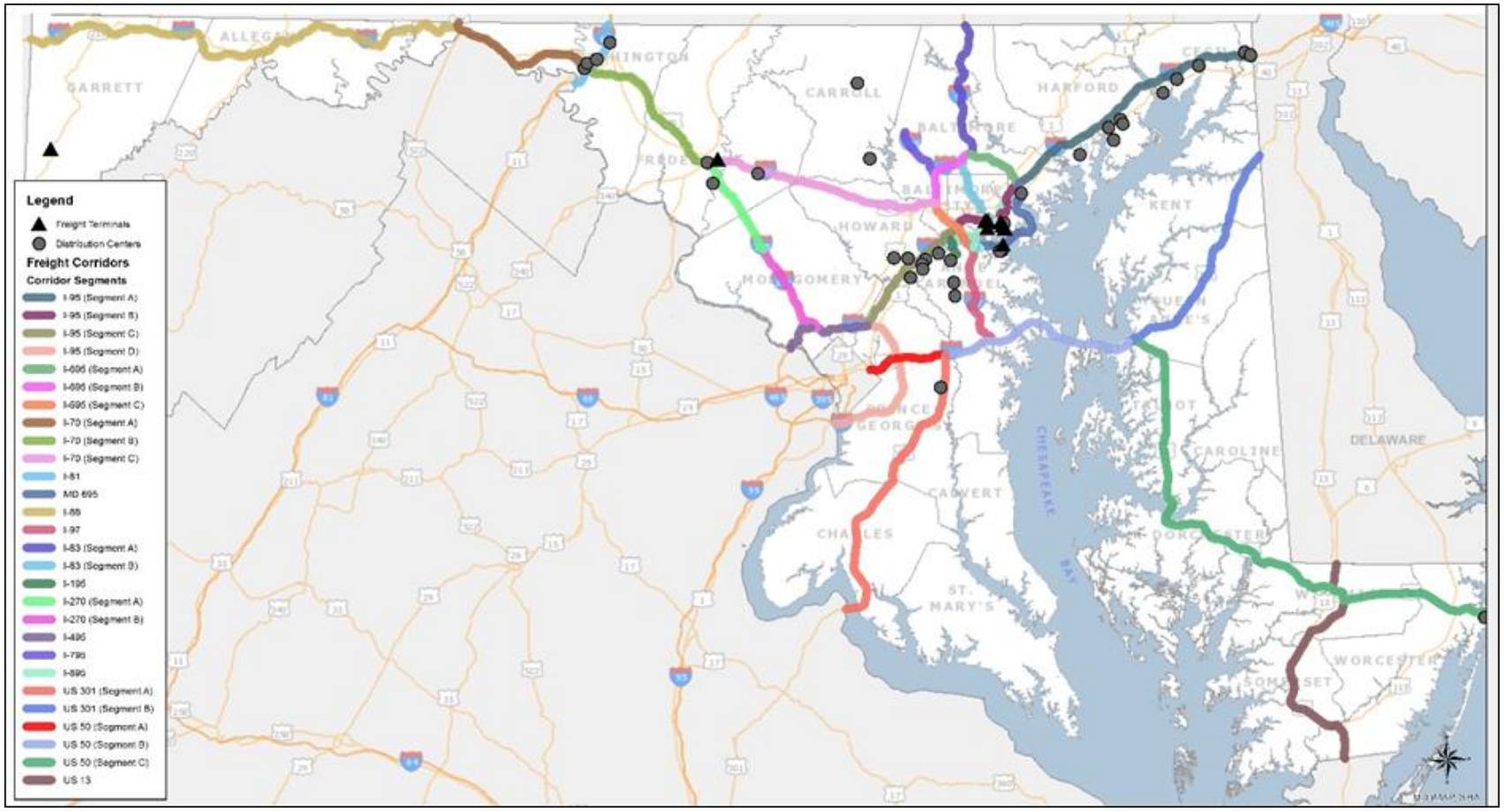

Source: SHA Traffic Monitoring System

## Table 6-1: Existing Truck Demand on Major Freight Corridor Segments *2015*

| Corridor | Limits | Length (miles) | AADT Range | Truck AADT Range |
|---|---|---|---|---|
| I-95 a | Delaware State Line to I-695 | 45.5 | 72,800-176,200 | 16,900-26,700 |
| I-95 c | I-695 to I-495 | 22.6 | 175,800-207,200 | 15,900-24,100 |
| I-95 d | East side of Capital Beltway | 25.8 | 154,500-224,800 | 12,600-23,700 |
| I-70 c | I-270 to I-695 | 38.6 | 63,200-100,500 | 6,400-12,000 |
| I-68 | West Virginia State Line to I-70 | 87.5 | 11,400-49,100 | 2,900-5,100 |
| I-70 b | I-81 to I-270 | 27.2 | 61,400-89,700 | 8,800-11,900 |
| U.S. 50/301 | U.S. 301 (S. leg) to U.S. 301 (N. leg) | 32.8 | 68,000-158,600 | 5,500-10,500 |
| I-95 b | Though Baltimore Beltway | 14.9 | 70,400-183,500 | 11,400-21,000 |
| U.S. 50 b | U.S. 301 Split to Ocean City | 94.1 | 14,000-48,000 | 800-4,600 |
| I-270 b | MD 27 (Fr. Hurley Boulevard) to I-495 | 19.5 | 107,000-255,600 | 4,600-20,600 |
| I-81 | Pennsylvania State Line to West Virginia State Line | 12.1 | 54,150-76,900 | 12,000-20,600 |
| I-495 | Potomac River to I-95 | 16.2 | 107,500-252,800 | 8,000-17,600 |
| I-83 a | Pennsylvania State Line to I-695 | 23.1 | 41,400-132,400 | 6,700-15,300 |
| I-70 a | Pennsylvania State Line to I-81 | 25.7 | 20,600-47,000 | 4,300-10,800 |
| I-695 b | I-83 to I-70 | 11.1 | 171,500-216,900 | 10,800-20,700 |
| I-695 c | I-70 to I-97 | 9.9 | 97,200-196,000 | 10,500-21,700 |
| U.S. 301 b | Virginia State Line to U.S. 50 | 50.2 | 98,000-88,300 | 500-5,800 |
| I-97 | I-695 to U.S. 50 | 17.6 | 24,200-136,700 | 1,200-10,100 |
| I-695 a | I-95 to I-83 | 9.9 | 124,100-196,300 | 8,300-15,700 |
| I-270 a | I-70 to MD 27 (Fr. Hurley Boulevard) | 16.7 | 80,000-112,400 | 5,700-8,900 |
| U.S. 301 b | U.S. 50 to Delaware State Line | 39.3 | 7,800-28,600 | 2,100-4,100 |
| U.S. 50 a | D.C. City Line to U.S. 301 Split | 13.0 | 75,100-148,000 | 4,700-11,500 |
| MD 695 | I-95 to I-97 | 20.2 | 22,500-137,700 | 14,000-26,200 |
| U.S. 13 | Delaware State Line to Virginia State Line | 39.0 | 12,500-29,000 | 1,000-2,800 |
| I-895 | I-95 to MD 695 | 17.2 | 5,200-82,600 | 200-4,000 |
| I-83 b | Inside I-695 | 9.7 | 10,500-132,000 | 3,000-3,500 |
| I-195 | I-95 to Airport Loop | 2.9 | 30,600-45,600 | 1,200-1,800 |

Source: SHA Traffic Monitoring System

**Figure 6-2: Existing Truck Demand on Major Freight Corridor Segments**
***2015***




Source: SHA Traffic Monitoring System

## Table 6-2 Highest Truck Volume and Percentage Locations

| Rank | Location | Average Annual Daily Truck Volume | Location | Truck Percentage |
|---|---|---|---|---|
| 1 | I-95 South of U.S. 50 | 28,000 | I-81 South of PA Line | 32% |
| 2 | I-95 South of MD 175 | 26,800 | U.S. 301 South of Kent Co. Line | 32% |
| 3 | I-95 South of MD 543 | 26,700 | I-81 South of U.S. 11 | 32% |
| 4 | I-495 East of MD 650 | 24,200 | I-70 South of PA Line | 31% |
| 5 | I-270 South of Montrose Rd | 22,600 | I-68 West of U.S. 219 | 30% |

Source: SHA Traffic Monitoring System,

## 6.2 Congestion Facts and Trends for Freight Movement on Maryland Freeways and Expressways

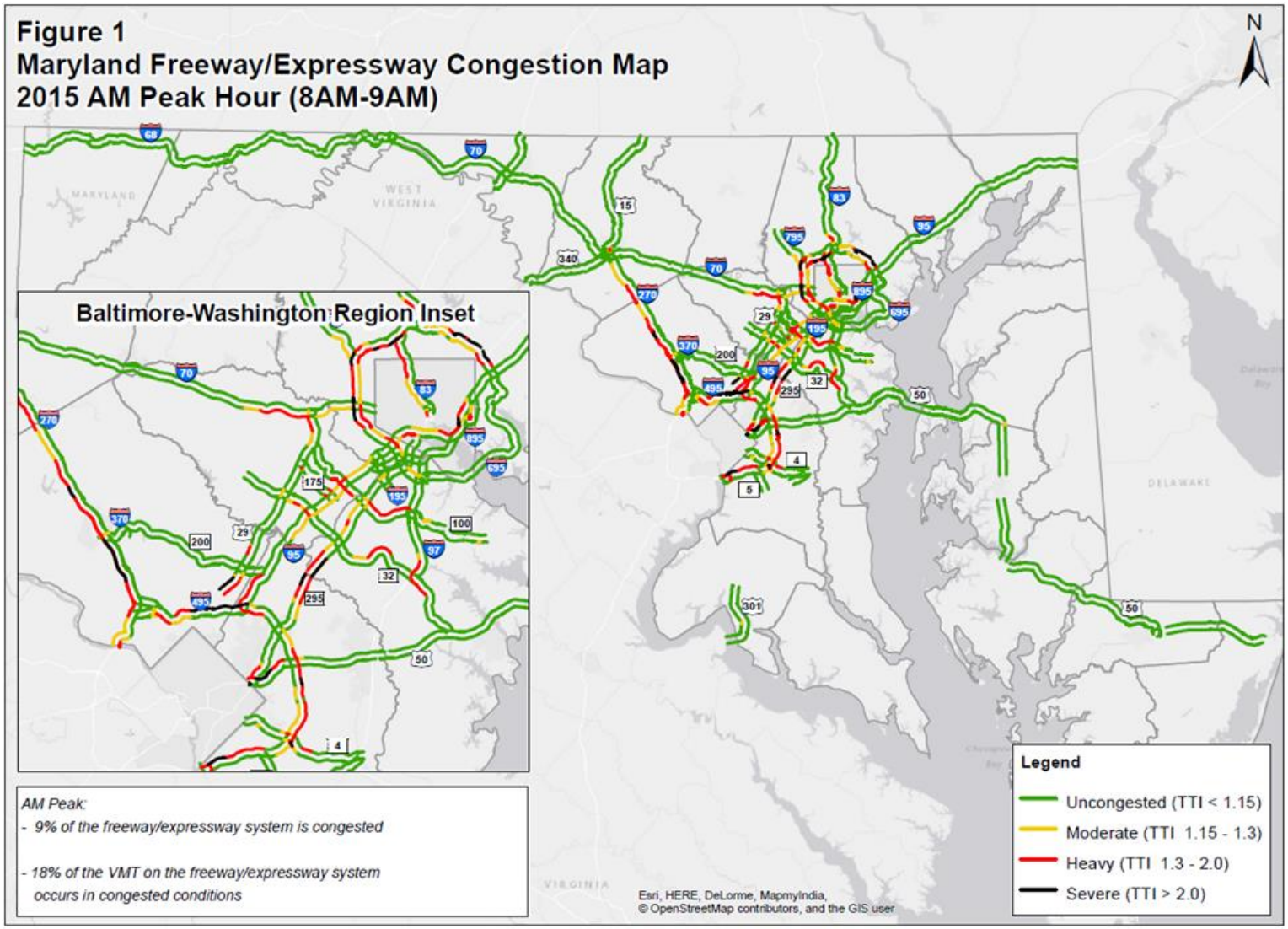
SHA uses the Travel Time Index (TTI) as one of the primary measures of congestion on freeways/ expressways. The TTI compares the 50th percentile travel time of a trip on a segment of freeway/ expressway for a particular hour to the travel time of a trip during off peak (free-flow or uncongested) conditions. For example, a TTI of 2.0 indicates that a trip that takes 10 minutes in light traffic will take twice as long, or 20 minutes in congested conditions.

SHA defines the various levels of congestion in four categories based on TTI.

- Uncongested (TTI < 1.15).
- Moderate Congestion (1.15 < TTI < 1.3).
- Heavy Congestion (1.3 < TTI < 2.0).
- Severe Congestion (TTI > 2.0).

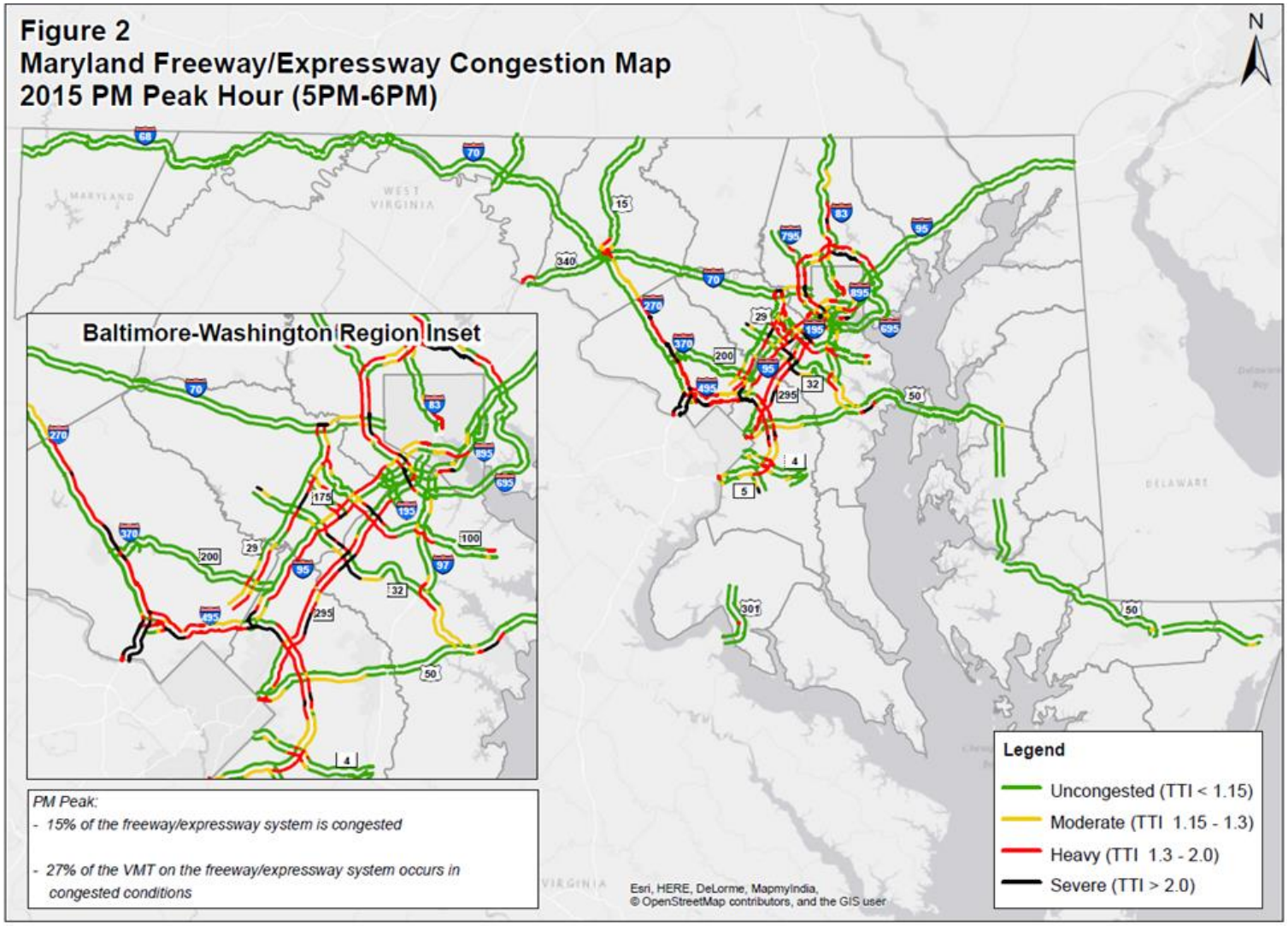
The TTI for each highway segment is calculated to provide a comprehensive picture of the statewide freeway/expressway network for average weekday peak-hour conditions. Figure 6-3 and Figure 6-4 show the TTI of the Maryland Freeway/Expressway system in the morning and evening peak hours on an average weekday. Even though trucks are part of the same traffic stream, it should be noted that they experience slower operating speeds compared to autos with constraints on acceleration and lane changing operations, particularly in heavy traffic conditions.

**Figure 6-3: Maryland Freeway/Expressway Congestion Map – 2015 AM Peak Hour (8:00 AM to 9:00 AM)**




Source: 2016 Maryland State Highway Annual Mobility Report

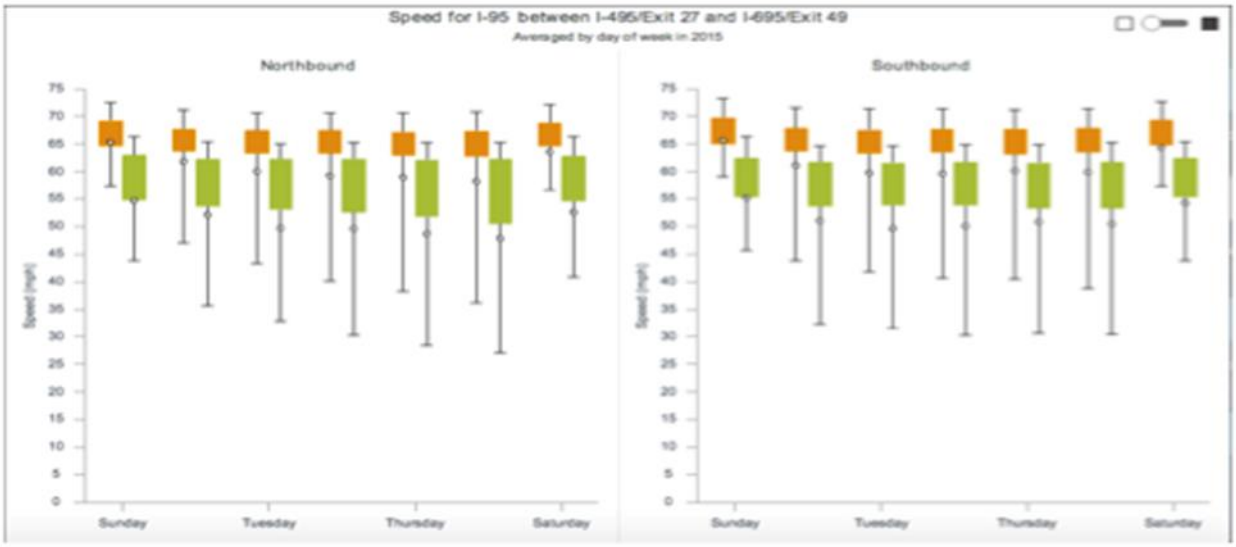
**Figure 6-4: Maryland Freeway/Expressway Congestion Map – 2015 PM Peak Hour (5:00 PM to 6:00 PM)**




Source: 2016 Maryland State Highway Annual Mobility Report

Figure 6-5 shows an example of the comparison of average operating speed ranges of trucks compared to all vehicles for different days of the week. The vehicle probe data clearly demonstrates that trucks experience a slower operating speed compared to all vehicles. Moreover, trucks experience wider spread of speed fluctuations (shown in green bars) compared to all vehicles (shown in orange bars).

## Figure 6-5: Comparison of 2015 All Vehicles and Trucks *Speeds*




Source: UMD RITIS Vehicle Probe Project Suite

SHA utilizes three key metrics to measure congestion on freeways/expressways:

1. Percent System Congested.
2. Percent Peak-Hour VMT in Congested Conditions.
3. Annual Cost of Congestion.

Table 6-3 shows the Percent System Congested and the Percent Peak-Hour VMT in Congested Conditions from the SHA Mobility Report for 2013, 2014, and 2015.

## Table 6-3: Statewide Freeway/Expressway Network
### *Average Weekday AM and PM Peak Hour Heavy to Severe Congestion Summary*

| Heavy to Severe Congestion | 2013 | | 2014 | | 2015 | | Change 2014 to 2015 | |
|---|---|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM | AM | PM |
| Roadway Miles | 130 | 209 | 136 | 224 | 149 | 252 | +13 | +28 |
| Percent of Roadway Miles | 8 | 12 | 8 | 13 | 9 | 15 | +1 | +2 |
| Percent of Peak-Hour VMT Impacted | 16 | 22 | 16 | 24 | 18 | 27 | +2 | +3 |

Source: 2016 Maryland State Highway Annual Mobility Report

The statewide cost of congestion was estimated based on the auto delay, truck delay, and wasted fuel and emissions that occur on the freeway/expressway system on a statewide and region-wide basis. Table 6-4 shows the annual cost of congestion statewide and various regions in the State for years 2013, 2014, and 2015.

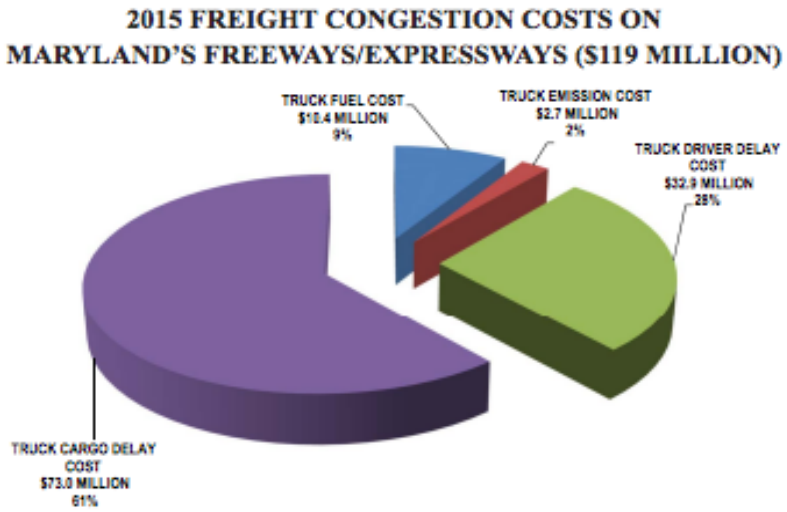
## Table 6-4: Total Cost of Congestion on Maryland Freeways/Expressways
### *In Millions*

| Region | 2013 | 2014 | 2015 | Change 2014 to 2015 |
|---|---|---|---|---|
| Statewide | $1,676 | $1,698 | $2,052 | +324 |
| Baltimore Region | $681 | $686 | $806 | +120 |
| Washington Region | $949 | $954 | $1,222 | +268 |
| Eastern Shore Region | $31 | $47 | $20 | -27 |
| Southern Region | $4 | $5 | $1 | -4 |
| Western Region | $11 | $6 | $3 | -3 |

Source: 2016 Maryland State Highway Annual Mobility Report

Figure 6-6 shows the cost of congestion on the freeway/expressway system experienced by truckers includes driver delay costs, cargo delay costs, diesel costs, and increased emissions, amounting to an estimated $119 million in 2015.

**Figure 6-6: 2015 Freight Congestion Costs on Maryland's Freeways/Expressways *$119 Million***

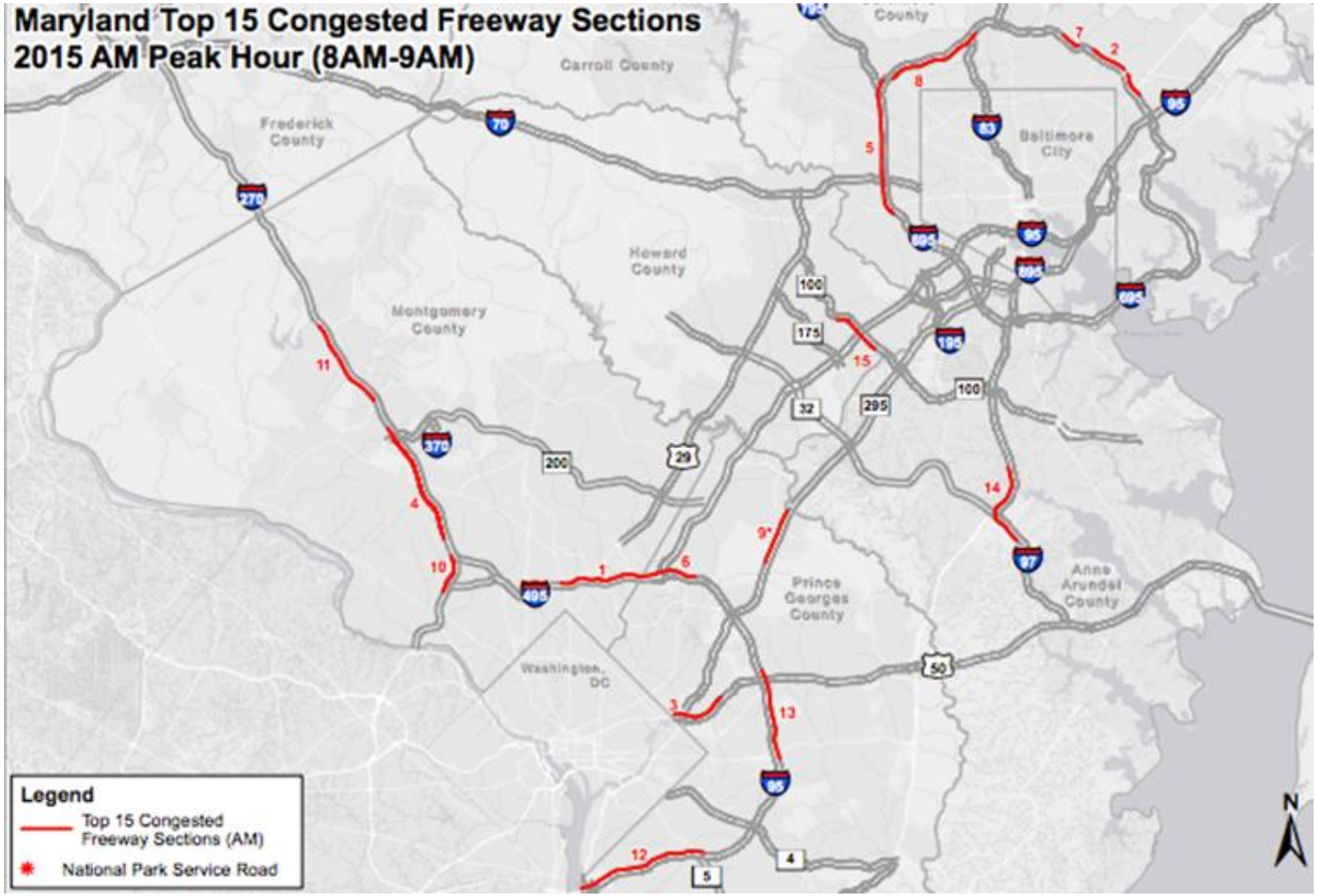



Source: 2016 Maryland State Highway Annual Mobility Report

## 6.3 Inventory of Freight Facilities with Mobility Issues

MDOT uses congestion analysis to identify the freight facilities with the most serious congestion challenges or bottlenecks. Below describes an inventory of the most significant freight bottlenecks. Figure 6-7 and Table 6-8 and Table 6-5 and Table 6-6 show the most congested segments in the morning and afternoon peak hours on average weekdays in 2015.

**Figure 6-7: Maryland Top 15 Congested Freeway Sections**
***2015 AM Peak Hour (8:00 a.m.-9:00 a.m.)***

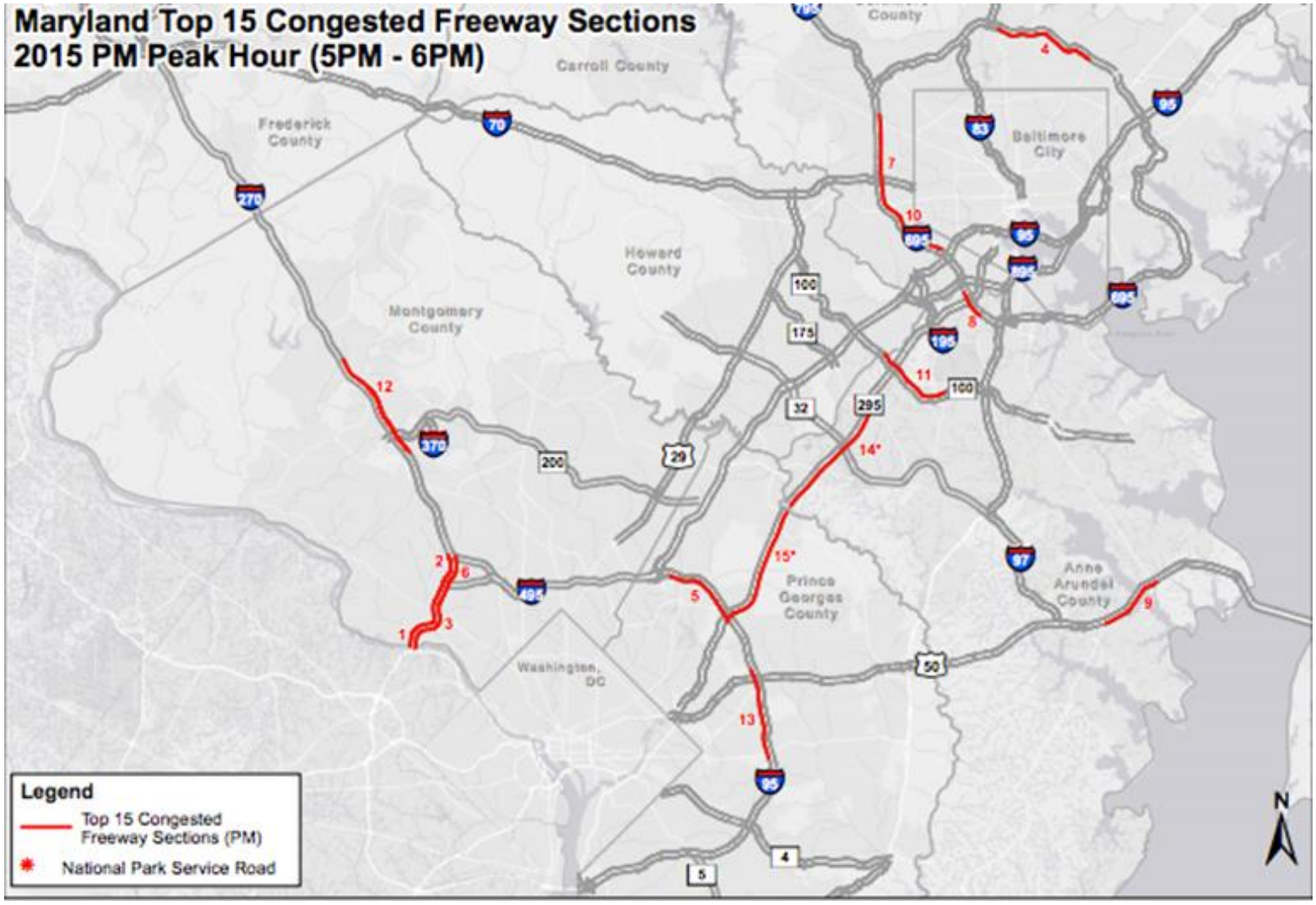


## Table 6-5: 2015 Most Congested Freeway/Expressway Sections
### *AM Peak Hour*

| Rank | Route | Locations | TTI Value | County | Mileage |
|---|---|---|---|---|---|
| 1 | I-495 Outer Loop | Prince George's County Line to MD 97 | 3.64 | Montgomery | 4.2 |
| 2 | I-695 Outer Loop | U.S. 1 to MD 41 | 2.42 | Baltimore | 4.1 |
| 3 | U.S. 50 Westbound | MD 202 to MD 201 | 2.18 | Prince George's | 4.3 |
| 4 | I-270 Southbound | I-370 to Montrose Rd | 2.03 | Montgomery | 6.4 |
| 5 | I-695 Outer Loop | I-795 to U.S. 40 | 2.01 | Baltimore | 7.5 |
| 6 | I-495 Outer Loop | U.S. 1 to Montgomery County Line | 1.94 | Prince George's | 3.5 |
| 7 | I-695 Outer Loop | MD 542 to Providence Rd | 1.91 | Baltimore | 2.0 |
| 8 | I-695 Inner Loop | MD 140 to MD 25 | 1.89 | Baltimore | 5.3 |
| 9 | MD 295 Southbound | Prince George's County Line to Powder Mill Rd | 1.80 | Prince George's | 3.0 |
| 10 | I-270 Spur Southbound | I-270 to I-495 | 1.74 | Montgomery | 2.0 |
| 11 | I-270 Southbound | Father Hurley Blvd to MD 124 | 1.72 | Montgomery | 7.0 |
| 12 | I-495 Inner Loop | MD 5 to Virginia State Line | 1.65 | Prince George's | 8.2 |
| 13 | I-495 Outer Loop | MD 214 to U.S. 50 | 1.51 | Prince George's | 7.5 |
| 14 | I-97 Southbound | Benfield Blvd to MD 178 | 1.39 | Anne Arundel | 6.4 |
| 15 | MD 100 Eastbound | MD 103 to U.S. 1 | 1.39 | Howard | 2.9 |

Source: 2016 Maryland State Highway Annual Mobility Report.

**Figure 6-8: Maryland Top 15 Congested Freeway Sections**
***2015 PM Peak Hour (5:00 p.m.-6:00 p.m.)***




Source: 2016 Maryland State Highway Annual Mobility Report

## Table 6-6: 2015 Most Congested Freeway/Expressway Sections
### *PM Peak Hour*

| Rank | Route | Locations | TTI Value | County | Miles |
|---|---|---|---|---|---|
| 1 | I-495 Inner Loop | Virginia State Line to I-270 West Spur | 2.95 | Montgomery | 3.9 |
| 2 | I-270 West Spur Southbound | I-270 to I-495 | 2.71 | Montgomery | 2.0 |
| 3 | I-495 Outer Loop | I-270 West Spur to Virginia State Line | 2.46 | Montgomery | 3.9 |
| 4 | I-695 Inner Loop | MD 139 to MD 41 | 2.42 | Baltimore | 5.7 |
| 5 | I-495 Inner Loop | I-95 to MD 295 | 2.23 | Prince George's | 5.5 |
| 6 | I-270 West Spur Northbound | I-495 to I-270 | 2.09 | Montgomery | 2.0 |
| 7 | I-695 Inner Loop | U.S. 40 to MD 26 | 2.03 | Baltimore | 5.8 |
| 8 | I-695 Outer Loop | Nursery Rd to MD 170 | 2.01 | Anne Arundel | 1.9 |
| 9 | U.S. 50 Eastbound | MD 2 (Solomon's Island Rd) to MD 2 (Ritchie Highway) | 1.94 | Anne Arundel | 2.2 |
| 10 | I-695 Inner Loop | I-95 to U.S. 40 | 1.94 | Baltimore | 4.9 |
| 11 | MD 100 Westbound | MD 170 to Coca Cola Dr | 1.89 | Anne Arundel | 3.5 |
| 12 | I-270 Northbound | Shady Grove Rd to Middlebrook Rd | 1.78 | Montgomery | 7.4 |
| 13 | I-495 Inner Loop | U.S. 50 to MD 214 | 1.78 | Prince George's | 5.0 |
| 14 | MD 295 Northbound | Prince George's County Line to MD 175 | 1.77 | Anne Arundel | 6.8 |
| 15 | MD 295 Northbound | I-495 to Anne Arundel County Line | 1.75 | Prince George's | 8.5 |

Source: 2016 Maryland State Highway Annual Mobility Report

## 6.4 Reliability Fact and Trends for Freight Movement on Maryland Freeways/Expressways

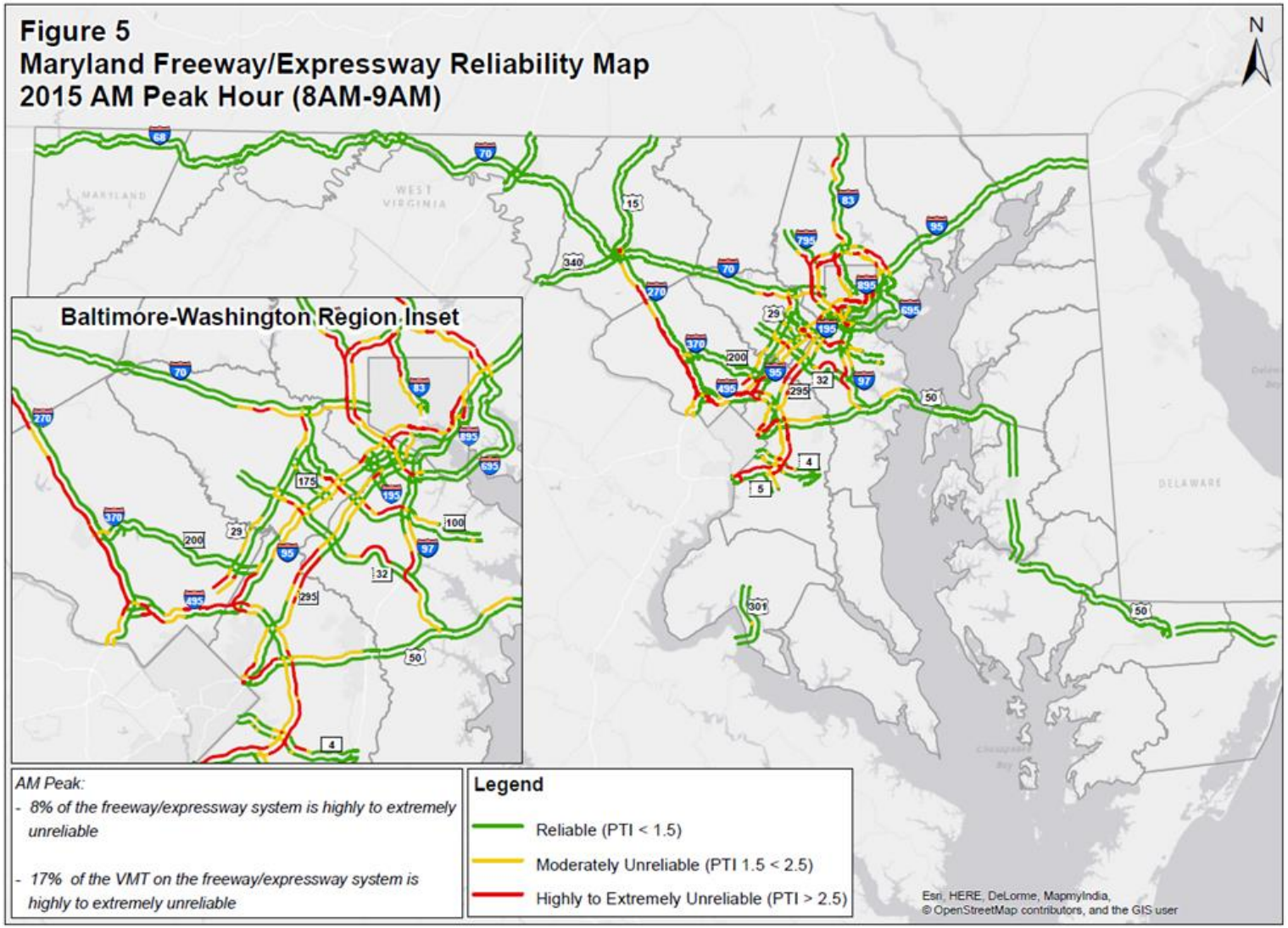
The unreliability or variability of travel time on any road is caused by incidents, vehicular breakdowns, crashes, weather, and lane reductions through work zones. MDOT measures trip reliability using the Planning Time Index (PTI). The PTI is the ratio of 95$^{th}$ percentile travel time and free-flow travel time. PTI represents the total time motorists and trucks should allow to ensure on-time arrival at their destination taking into account the potential impacts due to nonrecurring congestion.

For reporting purposes, PTI for freeways/expressways is categorized as:

- Reliable (PTI < 1.5).
- Moderately Unreliable (1.5 < PTI < 2.5).
- Highly to Extremely Unreliable (PTI > 2.5).

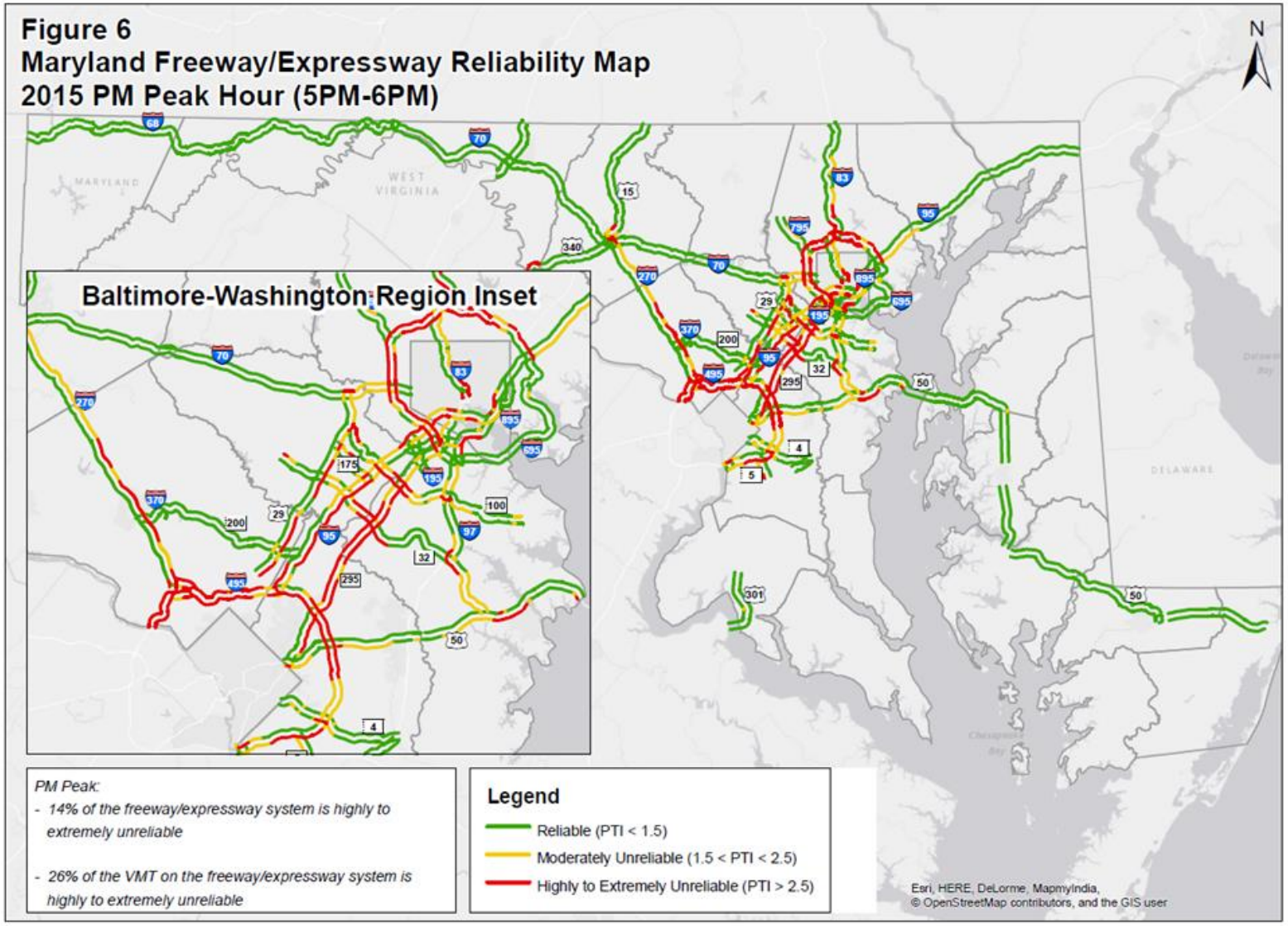
Figure 6-9 and Figure 6-10 show the PTI of the Maryland Freeway/Expressway system in the morning and evening peak hours on an average weekday for all vehicles (autos and trucks). It should be noted that trucks with constraints on acceleration and lane changing operations experience higher degree of unreliability compared to autos (even though they are part of the same traffic stream).

**Figure 6-9: Maryland Freeway/Expressway Reliability Map - 2015 AM Peak Hour (8:00 AM to 9:00 AM)**




Source: 2016 Maryland State Highway Annual Mobility Report

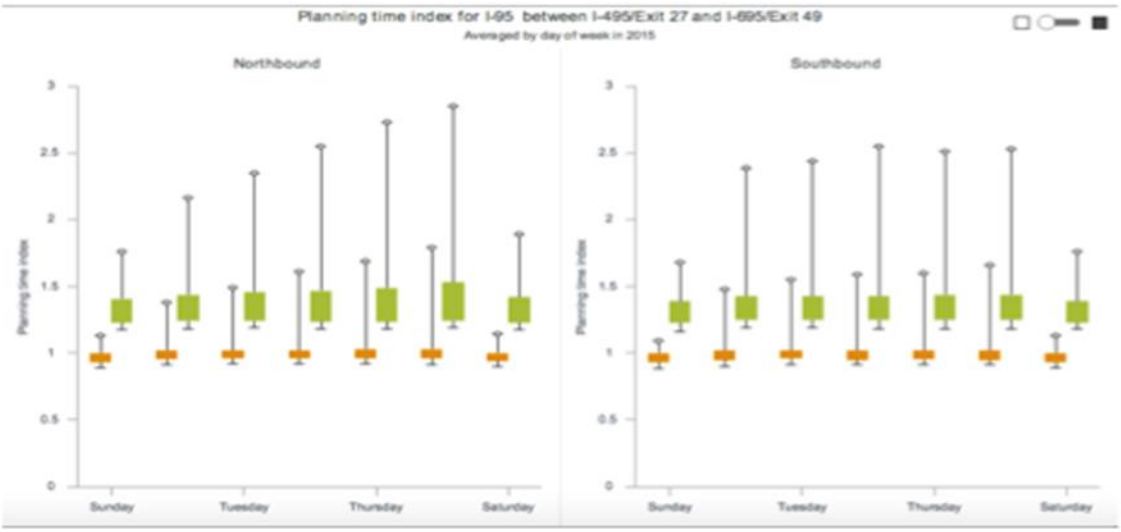
## Figure 6-10: Maryland Freeway/Expressway Reliability Map – 2015 PM Peak Hour (5:00 PM to 6:00 PM)




Source: 2016 Maryland State Highway Annual Mobility Report

Figure 6-11 shows an example of the comparison of PTI of trucks compared to all vehicles for different days of the week. The vehicle probe data clearly demonstrates that trucks experience higher PTI compared to all vehicles. Moreover, trucks experience wider spread of speed fluctuations (shown in green bars) compared to all vehicles (shown in orange bars).

## Figure 6-11: Comparison of 2015 All Vehicles and Trucks *PTI*




Source: UMD RITIS Vehicle Probe Project Suite

Table 6-7 shows the two - reliability metrics that are tracked for the Maryland Freeway/Expressway system:

- Statewide Freeway/Expressway Peak-Hour Reliability.
- Percent VMT in Unreliable Conditions.

## Table 6-7: Statewide Freeway/Expressway Network Average Weekday AM and PM Peak-Hour Reliability Summary

| Highly to Extremely Unreliable Conditions | 2013 | | 2014 | | 2015 | | Change 2014 to 2015 | |
|---|---|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM | AM | PM |
| Roadway Miles | 145 | 213 | 141 | 211 | 139 | 232 | -2 | +21 |
| Percent of Roadway Miles | 9 | 13 | 9 | 13 | 8 | 14 | -1 | +1 |
| Percent of Peak-Hour VMT Impacted | 17 | 22 | 16 | 23 | 17 | 26 | +1 | +3 |

Source: 2016 Maryland State Highway Annual Mobility Report

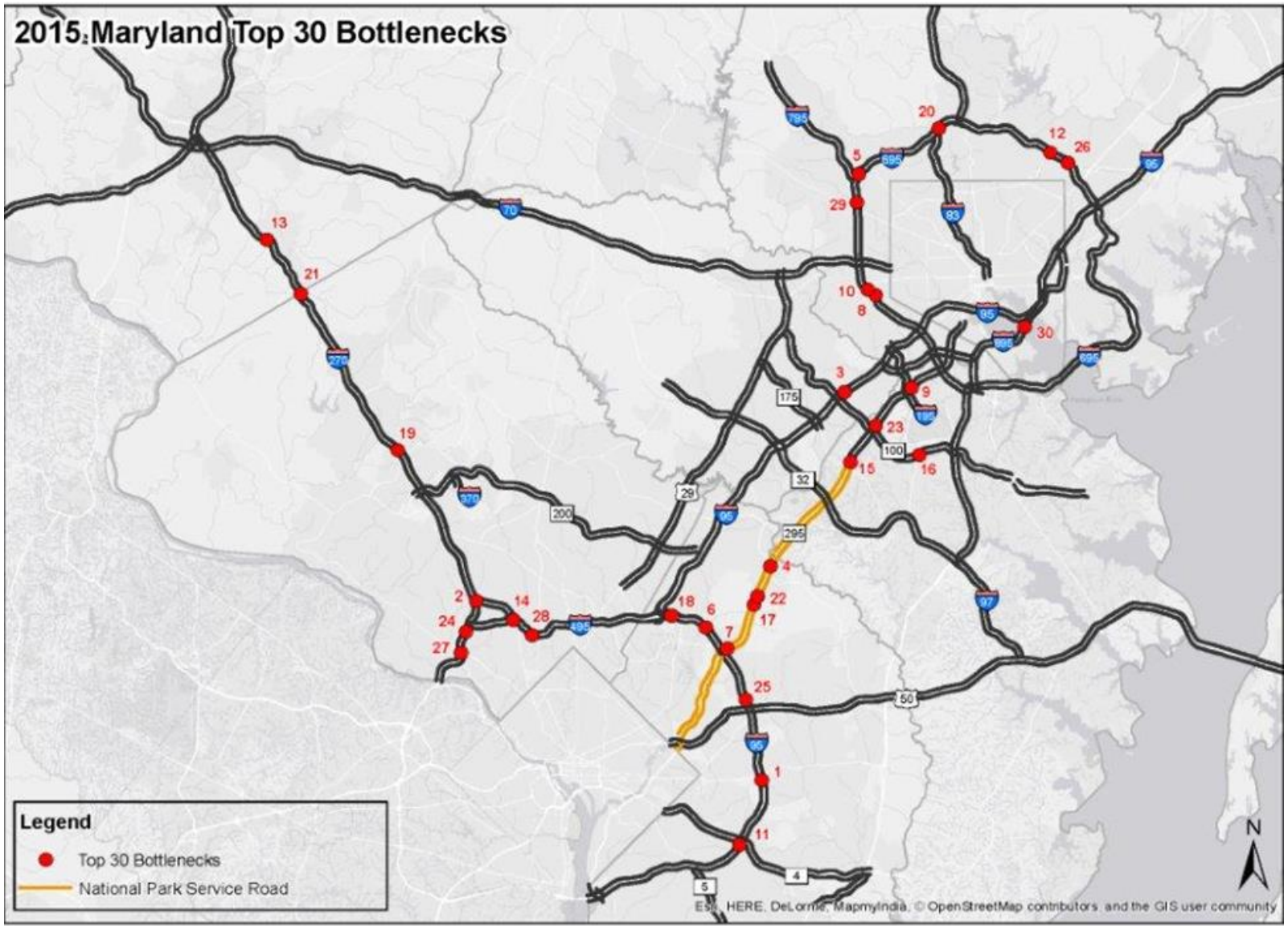
## 6.5 TWENTY-FOUR-HOUR BOTTLENECKS ON MARYLAND FREEWAYS/EXPRESSWAYS

Maryland adopts the bottleneck definition from the University of Maryland RITIS Vehicle Probe Project (VPP). A bottleneck occurs when, "the speeds observed for a roadway segment drop below 60 percent of the free-flow speed for a period greater than 5 minutes. Adjacent roadway segments meeting this condition are joined together to form a bottleneck queue. The duration of the bottleneck is calculated until the time speeds are greater than 60 percent for more than 10 minutes. This definition uses minute-to-minute vehicle probe speeds available across the state highway system to determine congestion patterns for the entire day.

The 24-hour top 30 bottlenecks on Maryland Freeways/Expressways are based on INRIX vehicle probe speed data available through the VPP Suite. This is based on speed observations used to calculate the number of bottleneck occurrences. The ranking of the segments is performed by computing the duration, intensity, and frequency with which the bottlenecks occur during an entire average weekday. This is calculated by determining an impact factor (computed as the number of times a bottleneck occurs on a particular segment, times its duration times the average queue length).

Figure 6-12 and Table 6-8 show the locations of 2015 Top 30 bottleneck locations. As noted before, although autos and trucks are part of the same traffic stream, trucks experience relatively slower speeds and higher unreliability due to their size, weight, and operating characteristics.

**Figure 6-12: Maryland Top 30 Bottlenecks**



## Table 6-8: Maryland Top 30 Bottlenecks

| Rank | Location | Road | Direction | Q1 | Q2 | Q3 | Q4 | Impact Factor | 2014 Rank |
|---|---|---|---|---|---|---|---|---|---|
| 1 | I-495 CW @ MD-214/Central Ave/Exit 15 | I-495 | Inner Loop | 125 | 251 | 187 | 151 | 829547 | 15 |
| 2 | I-270 South @ I-270 Spur | I-270 | Southbound | 94 | 122 | 107 | 128 | 743795 | |
| 3 | I-95 North @ MD-100/Exit 43 | I-95 | Northbound | 130 | 234 | 177 | 116 | 624504 | 3 |
| 4 | MD-295 North @ MD-197/Exit 11 | MD-295 | Northbound | 101 | 104 | 111 | 70 | 544151 | 10 |
| 5 | I-695 CW @ I-795/Exit 19 | I-695 | Inner Loop | 184 | 86 | 73 | 77 | 504455 | 8 |
| 6 | I-495 CCW @ Greenbelt Metro Dr/Exit 24 | I-495 | Outer Loop | 206 | 286 | 188 | 255 | 440089 | 2 |
| 7 | MD-295 South @ MD-193 | MD 295 | Southbound | 102 | 104 | 82 | 90 | 403577 | 16 |
| 8 | I-695 CCW @ Edmondson Ave/Exit 14 | I-695 | Outer Loop | 95 | 103 | 55 | 116 | 399332 | 7 |
| 9 | MD-295 North @ I-195 | MD 295 | Northbound | 65 | 90 | 66 | 67 | 384731 | 5 |
| 10 | I-695 CCW @ U.S. 40/Exit 15 | I-495 | Outer Loop | 107 | 184 | 181 | 102 | 380852 | 19 |
| 11 | I-495 CW @ MD-4/Penn Ave/Exit 11 | I-495 | Inner Loop | 65 | 71 | 60 | 70 | 367155 | 21 |
| 12 | I-695 CW @ MD-41/Perring Pkwy/Exit 30 | I-695 | Inner Loop | 146 | 174 | 137 | 169 | 366519 | 11 |
| 13 | I-270 North @ MD-80/Exit 26 | I-270 | Northbound | 91 | 116 | 113 | 89 | 357953 | 20 |
| 14 | I-495 CW @ I-270/Exit 35 | I-495 | Inner Loop | 196 | 199 | 176 | 204 | 341322 | 1 |
| 15 | MD-295 North @ MD-175 | MD-295 | Northbound | 92 | 83 | 83 | 84 | 329145 | 6 |
| 16 | I-495 CW @ Clara Barton Pkwy/Exit 41 | I-495 | Inner Loop | 71 | 176 | 118 | 106 | 312580 | 62 |
| 17 | MD-295 South @ Powder Mill Rd | MD-295 | Southbound | 112 | 150 | 164 | 114 | 306499 | 17 |
| 18 | I-95 South @ I-495/Exit 27-25 | I-95 | Southbound | 231 | 214 | 187 | 213 | 300510 | 14 |
| 19 | I-270 Local North @ I-270 (North) | I-270 | Northbound | 185 | 154 | 140 | 163 | 296907 | 13 |
| 20 | I-695 CW @ I-83/MD-25/Exit 23 | I-695 | Inner Loop | 108 | 154 | 149 | 101 | 287956 | 18 |
| 21 | I-270 North @ MD-109/Exit 22 | I-270 | Northbound | 63 | 70 | 72 | 42 | 270729 | 25 |
| 22 | MD-295 North @ Powder Mill Rd | MD-295 | Northbound | 139 | 180 | 173 | 207 | 257734 | 27 |

| Rank | Location | Road | Direction | Q1 | Q2 | Q3 | Q4 | Impact Factor | 2014 Rank |
|---|---|---|---|---|---|---|---|---|---|
| 23 | MD-295 North @ MD-100 | MD-296 | Northbound | 89 | 148 | 140 | 85 | 251031 | 22 |
| 24 | I-495 CW @ I-270 Spur | I-495 | Inner Loop | 61 | 90 | 97 | 94 | 250521 | |
| 25 | I-495 CW @ U.S. 50 Exit 19 | I-495 | Outer Loop | 94 | 164 | 0 | 0 | 247109 | 12 |
| 26 | I-695 CW @ MD-147/Harford Rd/Exit 31 | I-695 | Inner Loop | 84 | 33 | 45 | 58 | 247005 | 9 |
| 27 | I-495 CW @ MD-190/River Rd/Exit 39 | I-495 | Inner Loop | 175 | 0 | 0 | 0 | 222444 | |
| 28 | I-495 CCW @ MD-185/Conn Ave/Exit 33 | I-495 | Outer Loop | 84 | 76 | 95 | 77 | 218714 | 26 |
| 29 | I-695 CW @ MD-26/Exit 18 | I-695 | Inner Loop | 33 | 98 | 113 | 71 | 215686 | 30 |
| 30 | I-895 North @ Harbor Tunnel Thruway North | I-895 | Northbound | 0 | 57 | 102 | 94 | 207436 | |

Source: 2016 Maryland State Highway Annual Mobility Report

The American Transportation Research Institute (ATRI) developed the 2015 Congestion Impact Analysis of Freight Significant Highway Locations for the US. This report identifies a "total freight congestion value." The following four Maryland interstate to interstate junction locations have been identified in the top 100 locations:

- I-95 @ I-495.
- I-95 @ I-695 (South)
- I-95 @ I-395.
- I-495 @ I-270.

Among the locations not at the junction of two interstate highways, where truckers experience the greatest amount of delay included:

- I-95 Inner Loop @ MD 214.
- I-95 Northbound @ MD 100.
- I-95 Outer Loop @ U.S. 1/Greenbelt Metro.
- I-695 Outer Loop @ Edmondson Ave.

Maryland was rated 4th highest among all states in congestion costs per National Highway System (NHS) segment mile and 11th in overall total congestion cost.

## 6.6 MARYLAND TOP TRUCK INCIDENT LOCATIONS

Maryland joined other states and organizations in adopting the goal of the national initiative Toward Zero Deaths: A National Strategy on Highway Safety, to reduce traffic fatalities by half by 2030. Maryland supports the long-term goal of zero deaths and is committed to adopting strategies to achieve that purpose. Maryland receives federal funds to conduct additional commercial vehicle inspections, traffic enforcement, compliance reviews and educational outreach. The purpose of this comprehensive program is to reduce fatalities and injuries resulting from crashes involving commercial vehicles. The Top 20 Truck Incident Locations from 2011-2015 are shown in Table 6-9, Table 6-10, and Table 6-11.

### Table 6-9: Maryland Top 20 Truck Incident Locations (2011-2015)

| Rank | County | Route | Beg MP | End MP | Severity Index |
|---|---|---|---|---|---|
| 1 | MO | I - 495 | 5.51 | 8.51 | 2,415 |
| 2 | BA | MD 26 | 6.07 | 9.07 | 2,182 |
| 3 | MO | MD 97 | 0.89 | 3.89 | 2,133 |
| 4 | MO | I - 495 | 9.78 | 12.78 | 2,029 |
| 5 | PG | I - 95 | 15.74 | 18.74 | 1,875 |
| 6 | PG | I - 95 | 10.47 | 13.47 | 1,761 |
| 7 | CH | US 301 | 21.96 | 24.96 | 1,732 |
| 8 | PG | I - 95 | 20.86 | 23.86 | 1,719 |
| 9 | BA | US 1 | 15.69 | 18.69 | 1,654 |
| 10 | MO | US 29 | 0.18 | 3.18 | 1,641 |
| 11 | WO | MD 528 | 4.47 | 7.47 | 1,636 |
| 12 | MO | MD 650 | 2.33 | 5.33 | 1,632 |
| 13 | AA | MD 2 | 37.74 | 40.74 | 1,620 |

| Rank | County | Route | Beg MP | End MP | Severity Index |
|---|---|---|---|---|---|
| 14 | AA | MD 3 | 1.48 | 4.48 | 1,602 |
| 15 | PG | I - 95 | 7.00 | 10.00 | 1,596 |
| 16 | MO | MD 193 | 3.72 | 6.72 | 1,529 |
| 17 | BA | I - 695 | 0.42 | 3.42 | 1,518 |
| 18 | PG | MD 214 | 0.78 | 3.78 | 1,515 |
| 19 | AA | MD 2 | 29.93 | 29.93 | 1,499 |
| 20 | BA | I - 695 | 4.91 | 7.91 | 1,490 |

## Table 6-10: Maryland Interstate Top 20 Truck Incident Locations (2011-2015)

| Rank | County | Route | Beg MP | End MP | Severity Index |
|---|---|---|---|---|---|
| 1 | MO | I - 495 | 5.51 | 8.51 | 2,415 |
| 2 | MO | I - 495 | 9.78 | 12.78 | 2,029 |
| 3 | PG | I - 95 | 15.74 | 18.74 | 1,875 |
| 4 | PG | I - 95 | 10.47 | 13.47 | 1,761 |
| 5 | PG | I - 95 | 20.86 | 23.86 | 1,719 |
| 6 | PG | I - 95 | 7.00 | 10.00 | 1,596 |
| 7 | BA | I - 695 | 0.42 | 3.42 | 1,518 |
| 8 | BA | I - 695 | 4.91 | 7.91 | 1,490 |
| 9 | HO | I - 95 | 5.78 | 8.78 | 1,432 |
| 10 | BA | I - 695 | 18.34 | 21.34 | 1,370 |
| 11 | BA | I - 695 | 10.09 | 13.09 | 1,364 |
| 12 | MO | I - 270 | 6.41 | 9.41 | 1,363 |
| 13 | PG | I - 95 | 1.53 | 4.53 | 1,327 |
| 14 | PG | I - 95 | 24.19 | 27.19 | 1,316 |
| 15 | BA | I - 695 | 24.25 | 27.25 | 1,287 |
| 16 | HO | I - 95 | 1.12 | 4.12 | 1,185 |
| 17 | MO | I - 270 | 1.29 | 4.29 | 1,154 |
| 18 | AA | I - 97 | 13.27 | 16.27 | 1,130 |
| 19 | PG | I - 95 | 28.03 | 31.03 | 1,122 |
| 20 | BA | I - 95 | 0.00 | 3.00 | 1,098 |

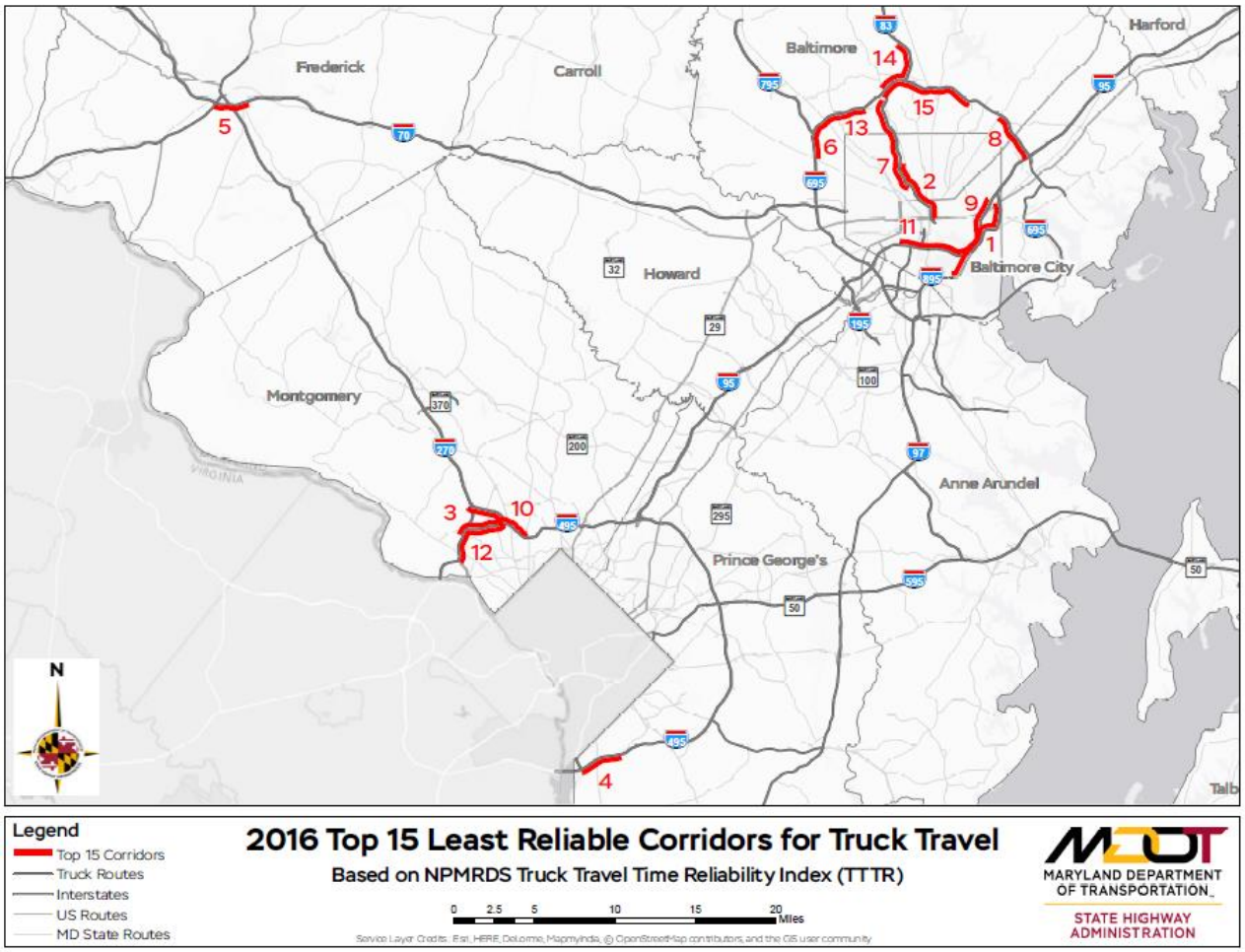
**Table 6-11: Maryland Routes / US Routes Top 20 Truck Incident Locations (2011-2015)**

| Rank | County | Route | Beg MP | End MP | Severity Index |
|---|---|---|---|---|---|
| 1 | BA | MD 26 | 6.07 | 9.07 | 2,182 |
| 2 | MO | MD 97 | 0.89 | 3.89 | 2,133 |
| 3 | CH | US 301 | 21.96 | 24.96 | 1,732 |
| 4 | BA | US 1 | 15.69 | 18.69 | 1,654 |
| 5 | MO | US 29 | 0.18 | 3.18 | 1,641 |
| 6 | WO | MD 528 | 4.47 | 7.47 | 1,636 |
| 7 | MO | MD 650 | 2.33 | 5.33 | 1,632 |
| 8 | AA | MD 2 | 37.74 | 40.74 | 1,620 |
| 9 | AA | MD 3 | 1.48 | 4.48 | 1,602 |
| 10 | MO | MD 193 | 3.72 | 6.72 | 1,529 |
| 11 | PG | MD 214 | 0.78 | 3.78 | 1,515 |
| 12 | AA | MD 2 | 29.93 | 29.93 | 1,499 |
| 13 | MO | MD 97 | 4.11 | 7.11 | 1,479 |
| 14 | PG | MD 5 | 11.78 | 14.78 | 1,474 |
| 15 | MO | MD 355 | 6.33 | 9.33 | 1,442 |
| 16 | BA | MD 140 | 3.71 | 6.71 | 1,429 |
| 17 | BA | MD 140 | 0.18 | 3.18 | 1,374 |
| 18 | BA | MD 45 | 0.76 | 3.76 | 1,357 |
| 19 | MO | MD 586 | 2.66 | 5.66 | 1,350 |
| 20 | BA | MD 150 | 2.65 | 5.65 | 1,342 |

## 6.7 MAP-21 AND FAST ACT PERFORMANCE METRICS

To address MAP-21 and FAST Act requirements, Performance Metric (PM) 3.2 was established to address national goals regarding identifying ways to improve freight movement and economic vitality. State DOTs and MPOs are required to establish targets for Truck Travel Time Reliability (TTTR) along the Interstate System within the State or each MPA. State DOTs are required to report freight movement metrics by June 15, 2018 for the previous calendar year's data. MDOT SHA coordinated with the University of Maryland's CATT LAB to run the new metric using the NPMRDS Truck Travel Time Reliability Index (TTTR) for baseline results. Further coordination is scheduled to begin in the Fall 2017 with the MPOs. local jurisdiction planners and freight stakeholders to validate the locations, establish targets and determine schedules for performance and target reporting. The Top 15 Least Reliable Corridors for Truck Travel (2016) are shown in Figure 6-13 and Table 6-12 shows the corresponding list of routes.

## Figure 6-13: Top 15 Least Reliable Corridors for Truck Travel (2016)



## Table 6-12: Top 15 Least Reliable Corridors for Truck Travel (2016)

| Rank | County | Route | Miles | Truck Travel Reliability Index (TTTR) |
|---|---|---|---|---|
| 1 | BA | I-895 SB: Moravia Rd to Harbor Tunnel | 5.30 | 15.13 |
| 2 | BA | I-83 NB: Gay St to Cold Spring Ln | 4.90 | 6.78 |
| 3 | MO | I-495 IL: I-270 West Spur to MD 185 | 5.50 | 5.74 |
| 4 | PG | I-495 IL: MD 414 to I-295 | 5.70 | 5.38 |
| 5 | FR | I-70 WB: MD 355 to US 15/US 340 | 3.00 | 5.33 |
| 6 | BA | I-695 OL: MD 140 to MD 26 | 3.60 | 5.12 |
| 7 | BA | I-83 SB: MD 133 to MD 25 | 6.20 | 5.10 |
| 8 | BA | I-695 OL: I-95 to MD 147 | 4.30 | 5.02 |
| 9 | BA | I-95 SB: US 40 to Key Hwy | 6.20 | 4.97 |
| 10 | MO | I-270 East Spur: I-270 to I-495/MD 355 | 3.10 | 4.94 |
| 11 | BA | I-95 NB: Washington Blvd to Fort McHenry Tunnel | 7.10 | 4.40 |
| 12 | MO | I-495 OL: MD 355 to Cabin John Pkwy | 6.00 | 4.12 |
| 13 | BA | I-695 IL: MD 140 to Greenspring Ave | 3.40 | 3.98 |
| 14 | BA | I-83 SB: Padonia Rd to I-695 | 3.60 | 3.93 |
| 15 | BA | I-695 IL: I-83/MD 25 to MD 542 | 7.50 | 3.90 |

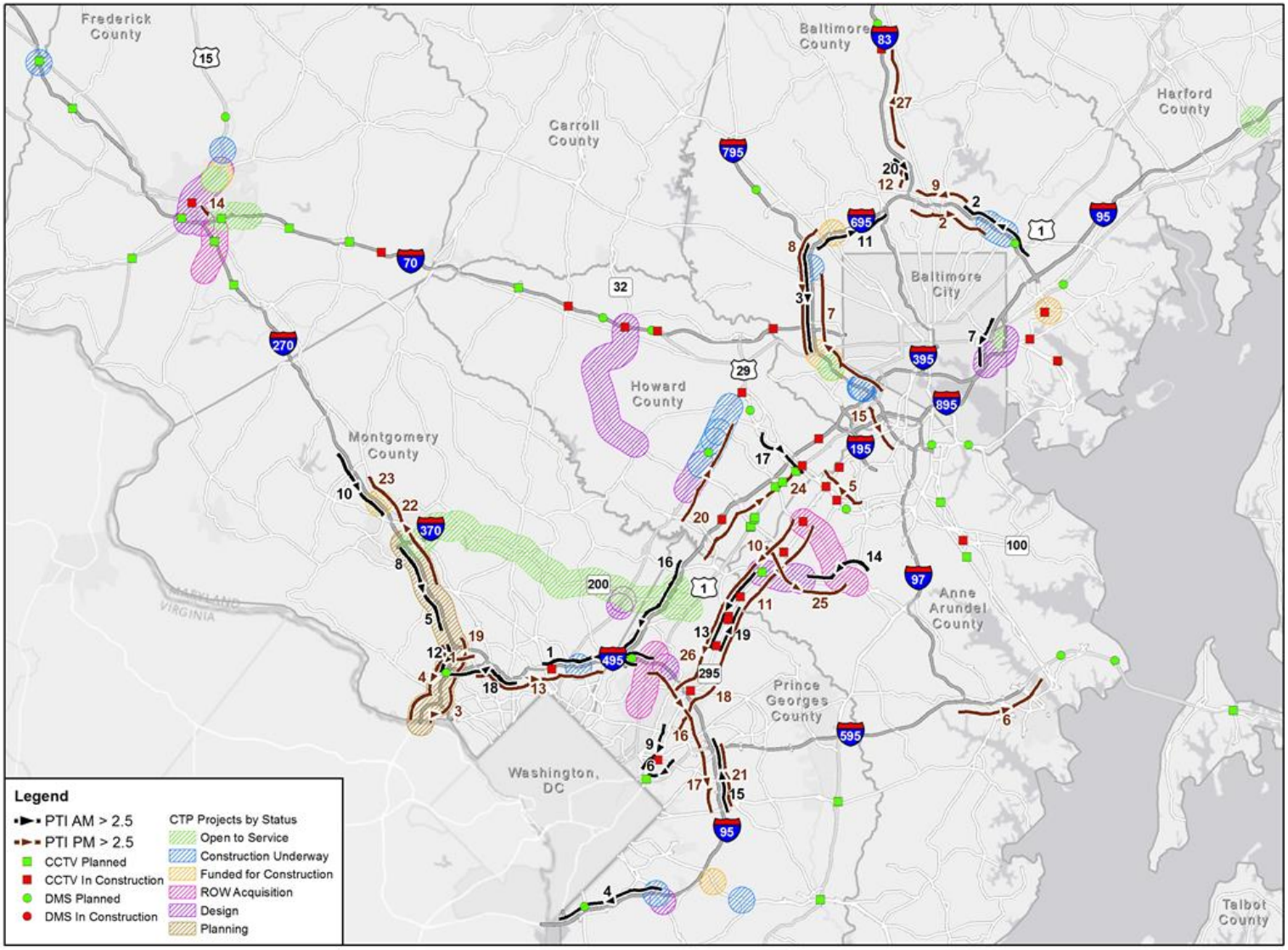
Source: UMD Catt Lab NPMRDS (2016)

## 6.8 MDOT Efforts to Address Congestion, Unreliability and Bottlenecks

Traffic volumes and congestion continue to increase in Maryland. In order to address these mobility issues faced by autos and trucks, MDOT employs a variety of multimodal strategies to address short, mid- and long-term needs for safe, efficient, and reliable person and freight movement. These include major and minor capital improvements (i.e., capacity expansion, grade separation, geometric improvements etc.), operational strategies, including incident management, motorist assistance and traveler information systems through the MDOT Coordinated Highway Action Response Team (CHART), signal systems operations and multimodal and demand management strategies (i.e., Park and Ride Lots, HOV lane operations, reversible lane operations etc.).

For example, MDOT focuses on segments that have PTI>2.5 in the morning or, evening peak hours with a host of capital and operational strategies. Figure 6- shows the segments that experience extremely unreliable conditions (PTI>2.5) either in the AM or PM peak hour. The graphic also maps the ongoing/planned projects in/around these segments to address unreliability challenges.

## Figure 6-14: Maryland 2015 Segments with PTI > 2.5



It should be noted that there is a strong correlation between the most congested segments, most unreliable segments, and 24-hour bottleneck locations. Although trucks and autos share these same facilities, the travel experience for a truck appears to be disproportionately higher compared to the auto traveler. This could be due to a combination of various factors, including size, weight, travel distance, travel restrictions, time of day, day of week, seasonality, etc. The congestion and reliability metrics generated with all vehicle probe data sources is a good indicator of travel; however, it is fair to state that the truck experience is worse than the auto traveler experience.

# 7.0 CRITICAL FREIGHT CORRIDORS

## 7.1 CRITICAL FREIGHT CORRIDOR DESIGNATIONS

Under the FAST Act, the National Highway Freight Program (NHFP) was established to improve the efficient movement of freight on the National Highway Freight Network (NHFN). As part of the NHFN, state DOTs are required to establish critical urban and rural freight corridors as part of the Primary Highway Freight System (PHFS). The NHFP provides federal funding eligibility for a wide range of activities including planning, engineering, and construction along the NHFN.

The NHFN consists of four components:

- Primary Highway Freight System (PHFS);
- Portions of the Interstate System (IS) not on the PHFS;
- Critical Rural Freight Corridors (CRFC); and
- Critical Urban Freight Corridors (CUFC)

The FAST Act designated the first two components (PHFS and other IS not on the PHFS) of the NHFN through Congress. The FAST Act also requires that state DOTs and MPOs establish critical urban and rural freight corridors as part of the NHFN. This section describes how the urban and rural freight corridors in Maryland were established during the Plan update process (between December 2016 and June 2017).

## 7.2 CRITICAL URBAN AND RURAL FREIGHT CORRIDOR REQUIREMENTS

**Critical Urban Freight Corridors** (CUFC) must be located within urbanized areas in the State and represent the "last mile" for freight transportation. CUFCs must not exceed a combined total of 75 miles and meet the following criteria:

- Supported by MPOs.
- Connected to an intermodal facility to the PHFS or Interstate Highway.
- Located within corridor of a route on the PHFS and provides redundancy.
- Serves a major freight generator, logistics center, or manufacturing/warehouse.

**Critical Rural Freight Corridors** (CRFC) must be located outside urbanized areas and not exceed a combined total of 150 miles. CRFCs must meet one or more of the following seven criteria:

- Principal arterial roadway with minimum 25 percent of the Annual Average Daily Traffic in trucks class 8 to 13.
- Provides access to energy exploration, development, installation, or production areas.
- Connects to Primary Highway Freight System or Interstate from facilities that handle more than 50,000 20-foot equivalent units a year and/or 500,000 tons per year of bulk commodities.
- Provides access to grain elevator, agricultural facility, mining facility, forestry facility, or intermodal facility.
- Connects an international port of entry.
- Provides access to significant air, rail, water or other freight facilities within the State or
- Is vital to efficient movement of freight importance to the economy of the State.

## 7.3 CORRIDOR PRIORITY TOOL METHODOLOGY

To establish a transparent and efficient method of prioritizing critical freight corridors, MDOT utilized a Corridor Priority Tool to provide the quantitative analysis. The tool consisted of a spreadsheet with all of Maryland's roadways and attributes. The following steps outline the methodology and metrics used to establish urban and rural corridor priorities:

- **Truck Volume:** Used SHA 2014 Average Annual Daily Truck Traffic (AADTT) for trucks in classes 8 to 13 for each network segment. In cases where multiple segments were combined into a single corridor for evaluation purposes, the largest segment AADTT was applied to the score.
- **Freight Density:** Used data for businesses from the U.S. Census to determine freight-related businesses density, which is provided at the zip code level.[30] A freight density score was applied to each roadway segment and then segments were aggregated using route identification numbers (Route ID) to establish corridor score. This resulted in several corridors with multiple Route IDs that were screened.
- **Intermodal Connections:** Established a quarter-mile buffer around intermodal facilities and calculated how many times each corridor intersected with those buffers. If a corridor connected with more than one facility, it received a higher score.
- Congestion and Delay: SHA provided congestions maps for each county using a combination of INRIX data and Level of Service (LOS) data. This provided a planning lens overlay to screen priority corridor sections.

## 7.4 CRITICAL URBAN CORRIDOR PRIORITY RECOMMENDATIONS

After reviewing the initial results of the Corridor Priority Tool and overlaying the planning lens, SHA and the MPO Planners coordinated to identify the initial draft urban priority corridors. Based on the initial routes identified, the results showed that the larger MPOs (500,000± population) should have 25 miles each (Central MD) and the smaller MPOs should have 5 miles each (Western MD, Southern MD and Eastern Shore). Table 7.1 shows the recommended corridor mileage for designation per MPO.

30 County Business Patterns Database from the 2012 U.S. Economic Census.

### Table 7-1: Urban Freight Corridor Mileage Distribution

| Metropolitan Planning Organization | Mileage |
|---|---|
| Baltimore Regional Transportation Board (BRTB) | 25 |
| Cumberland MPO | 5 |
| Hagerstown/Eastern Panhandle MPO | 5 |
| Metropolitan Washington Transportation Planning Board (TPB) | 25 |
| Salisbury/Wicomico County MPO | 5 |
| St. Mary's/Calvert County MPO | 5 |
| Wilmington Area MPO (Wilmapco) | 5 |
| **Total** | **75** |

## 7.5 Critical Rural Freight Corridors Preliminary Assessment

The corridor priority tool also identified critical rural freight corridors in Maryland, many of which were rural freight corridors extending outside of the urban areas. The most significant mileage for the rural corridor designation spanned much of Maryland's Eastern Shore along US 50 and US 301. The tool prioritized miles of potential rural corridors, from which MDOT- SHA, TSO and county planners needed to identify 150 miles. Table 7-2 shows the preliminary list of critical rural freight corridors identified from the tool. Through further post processing and coordination with the county planners and MPOs, the final list of critical rural corridors was identified and total 148.7 rural miles statewide. Figures 7-1 through 7-4 show the locations of the critical rural corridors. The list of critical rural freight corridors is shown in Appendix A in Table A-1.

### Table 7-2: Critical Rural Freight Corridor Preliminary List

| Route ID | Corridor Length | Intermodal Facilities | Rural Mileage | Rural Limit 150 Miles |
|---|---|---|---|---|
| US 50 | 141 | 1 | 80 | 80 |
| US 301 | 93 | 0 | 56 | 136 |
| MD 28 | 37 | 0 | 20 | 156 |

Source: Corridor Priority Tool.

## 7.6 Critical Urban and Rural Corridor Post Processing Methodology

To ensure the proposed designations met the federal criteria and multimodal goals, multiple iterations of analyzing the routes were conducted. The following post processing methodology was developed by the MPOs (TPB) to further analyze the final list of critical urban/rural routes:

- TPB staff scored each urban link within their Maryland portion of the National Capital Region to normalize the truck volumes and freight density scores before combining them into a 'total score'.
- The links were sorted based on highest to lowest total scores
- The highest scoring corridor segments (total score) were identified by iteratively querying the geodatabase.
- The results (50 miles of CUFC corridor candidates) were compared to project locations that fell within the MDOT 2017-2022 CTP.
- The candidates (less than 25 miles in total length) were advanced to the final stage.
- The highest scoring remaining candidates were further advanced in the final stage to meet to 25 miles allotted (for the Washington Region).
- The 'final' CUFCs are shown in the full list of CUFCs proposed for designation.

TPB's post processing methodology was applied statewide to identify a list of priority routes for the other MPOs. The MPO planners provided feedback on which routes to designate based on the criteria, planning lens overlays, Consolidated Transportation Plan (CTP) projects underway and proposed development needs. The results are shown in the final CUFC proposed designation list in Table 7-4.

Moving forward, BMC has proposed to assist SHA in developing and piloting a more user-friendly version of the Critical Priority Tool which would combine the original methodology and post processing methodology. SHA plans to incorporate the user - friendly version into a statewide application to be used internally and by the MPOs for future critical route screenings and designations.

## 7.7 STAKEHOLDER OUTREACH

Throughout the critical freight corridors establishment/designation process, a key component included outreach to stakeholders. SHA staff initiated in-person meetings with the seven MPOs in Maryland between December 2016 and January 2017 (Winter 2016/2017). The initial meetings were held to discuss any previous freight studies or analysis conducted within the MPO regions and to identify potential critical freight corridor recommendations for designation.

Presentations were provided to MDOT – TSO and Transportation Business Units (TBUs), MPO Freight Committees and the Freight Stakeholder Advisory Committee (FSAC) in February 2017. The purpose of these meetings was to explain the latest FAST Act requirements, what MDOT needed to add to the 2015 Strategic Goods Movement Plan to make it compliant and discuss the initial CUFC/CRFC designations coordination.

An initial list of critical urban and rural freight corridors was presented to MDOT – TSO and Transportation Business Units (TBUs), in March using the outputs from the Critical Priority Tool. The preliminary critical freight corridors were presented to the MPOs in April. Early in the establishment/designation process, feedback from the internal and external freight stakeholders varied between suggestions to consider last/first mile connections, understanding the supply chains in Maryland and the Megaregion, connectivity to the NHFN (including Southern Maryland and

Eastern shore) to expand coverage, tying into surrounding State Freight Plans (i.e., Delaware DOT), and challenges/solutions regarding illegal truck parking.

Further coordination through webinars and stakeholder meetings provided opportunities to present updates to the initial findings, clarify the methodology used for the Critical Priority Tool, and discuss any route changes that occurred as a result of applying the planning lens overlays. These planning lens comprised of GIS overlays for Level of Service (LOS), Fatal/Sever Crash Incidents (2013-2015), the Consolidated Transportation Plan (CTP) Freight Related Projects list, the Federal Aid Network, and Functional Classifications. During this qualitative assessment, multiple iterations of the critical routes were screened, developed and reviewed to ensure freight multimodal connectivity issues were identified and being addressed.

In May, SHA/MDOT staff presented draft CUFCs to BMC's Baltimore Regional Transportation Board (BRTB) and Technical Committee, Hagerstown/Eastern Panhandle Metropolitan Planning Organization's (HEPMPO) Policy and Technical Advisory Committees and the MWCOGs Transportation Planning Board (TPB) - National Capital Region's Freight Subcommittee and Technical Committee. At these meetings, SHA gained feedback from the local jurisdictions on development and planning activities that may impact the freight network or proposed critical routes and recommendations to include roadways that were not on the list of proposed critical routes to improve connectivity and accessibility.

Follow-up attendance to the MPO Board and Technical Committee meetings continued until a resolution was provisionally approved or approved to designate the identified CUFCs. The BMC BRTB granted an approved resolution in June to designate CUFCs for the Baltimore region. In the National Capital Region, TPB provided a provisional approval for Maryland until the Fall when Virginia and the District of Columbia DOTs have identified their list of CUFCs. TPB plans to provide approvals for the National Capital Region at the same time. Although HEPMPO is within the smaller MPO category, their committees meet quarterly, therefore the provisional approval for the CUFC routes resolution was granted in May. Their final approval was granted in August. The remaining smaller MPOs have concurred with the CUFCs identified for designation within their regions.

SHA applied the planning lens overlays to assess where infrastructure and investment needs would have the most mobility and multimodal benefits in Maryland. The NHFN that FHWA provided ended at the US 50 Bay Bridge and at US 301 in Prince George's County, therefore the existing Maryland Truckers (Highway) Network and Freight Planning Network were reviewed to address the gaps in Southern Maryland and along the Eastern Shore. Routes were reviewed with the MPOs and County planning staff during the stakeholder outreach for further recommendations. The designation meetings are shown in Table 7-3.

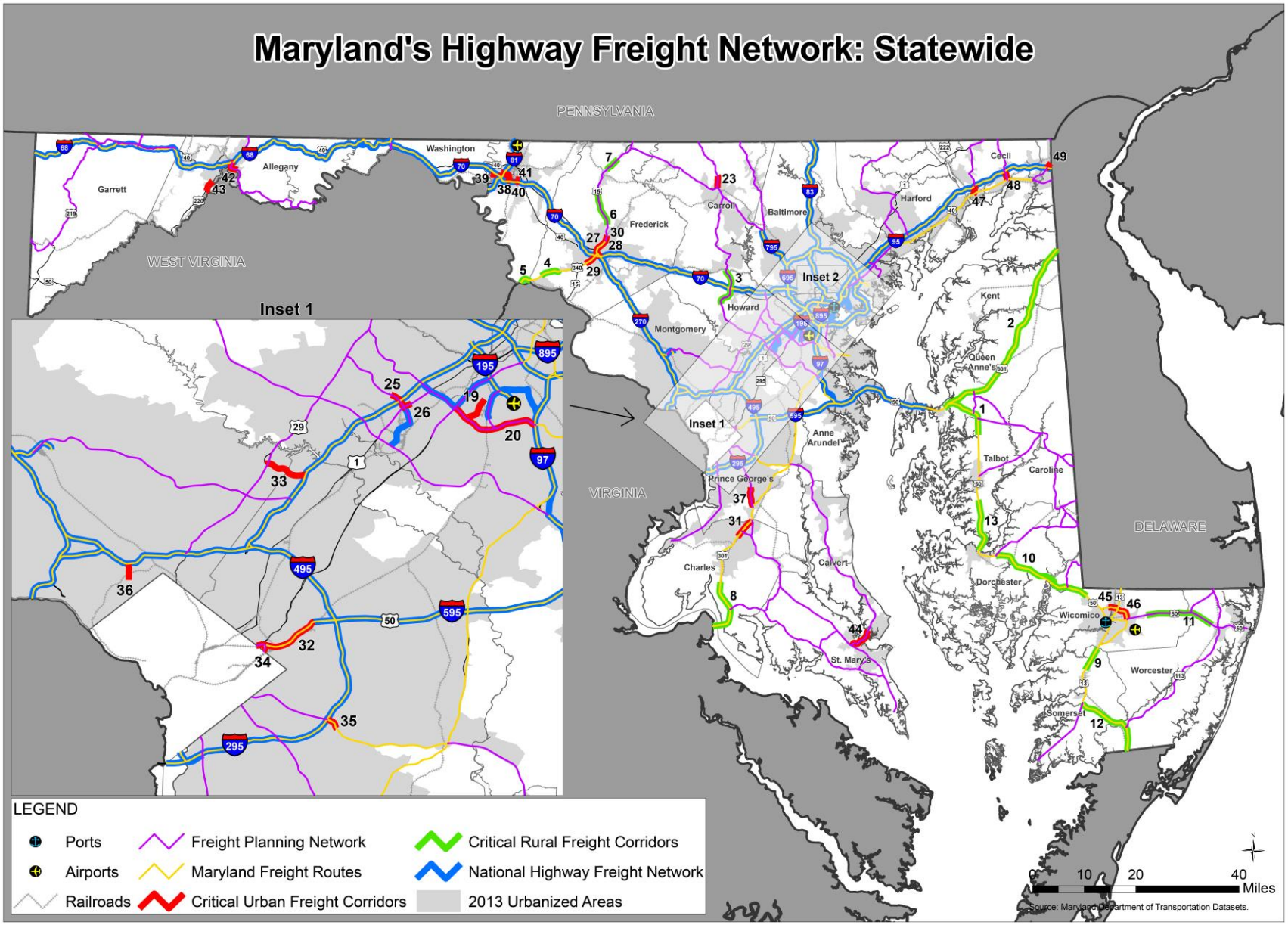
## Table 7-3: Critical Urban and Rural Designations Meetings

| Date | MPO | Meeting |
|---|---|---|
| November 2016 | BMC | Initial MPO Meeting |
| December 2016 | MWCOG,<br>Wilmapco,<br>HEPMPO<br>Cumberland MPO,<br>St. Mary's – Calvert Co. MPO | Initial MPO Meeting |
| January 2017 | Salisbury – Wicomico MPO | Initial MPO Meeting |
| February 2017 | MDOT – TSO and TBUs | MDOT TBUs Meeting – SFP Update and Critical Freight Routes |
| | MDOT, MPOs and Freight stakeholders | Freight Stakeholder Advisory Committee Meeting – SFP Update and Critical Freight Routes |
| March 2017 | BMC, Baltimore City DOT,<br>local planners and Freight Stakeholders | Baltimore Symposium |
| April 2017 | All MDOT, MPOs and surrounding state DOTs/MPOs | FHWA Freight Peer 2 Peer Exchange – SFP Update and Critical Freight Routes |
| | All MPOs | Webinar - Follow-up Meeting: Critical Freight Routes (Urban) |
| | All MPOs | Follow-up Meeting: Critical Freight Routes (Urban) |
| May 2017 | HEPMPO | Technical Committee and Policy Board Meeting |
| | MWCOG | Freight Subcommittee Meeting |
| | BMC | Technical Committee Meeting and Work Session for Technical Committee |
| June 2017 | BMC | Baltimore Regional Transportation Board Meeting |
| | MWCOG | Technical Committee Meeting and Steering Committee Meeting |
| August 2017 | HEPMPO | Technical Committee and Policy Board Meeting |

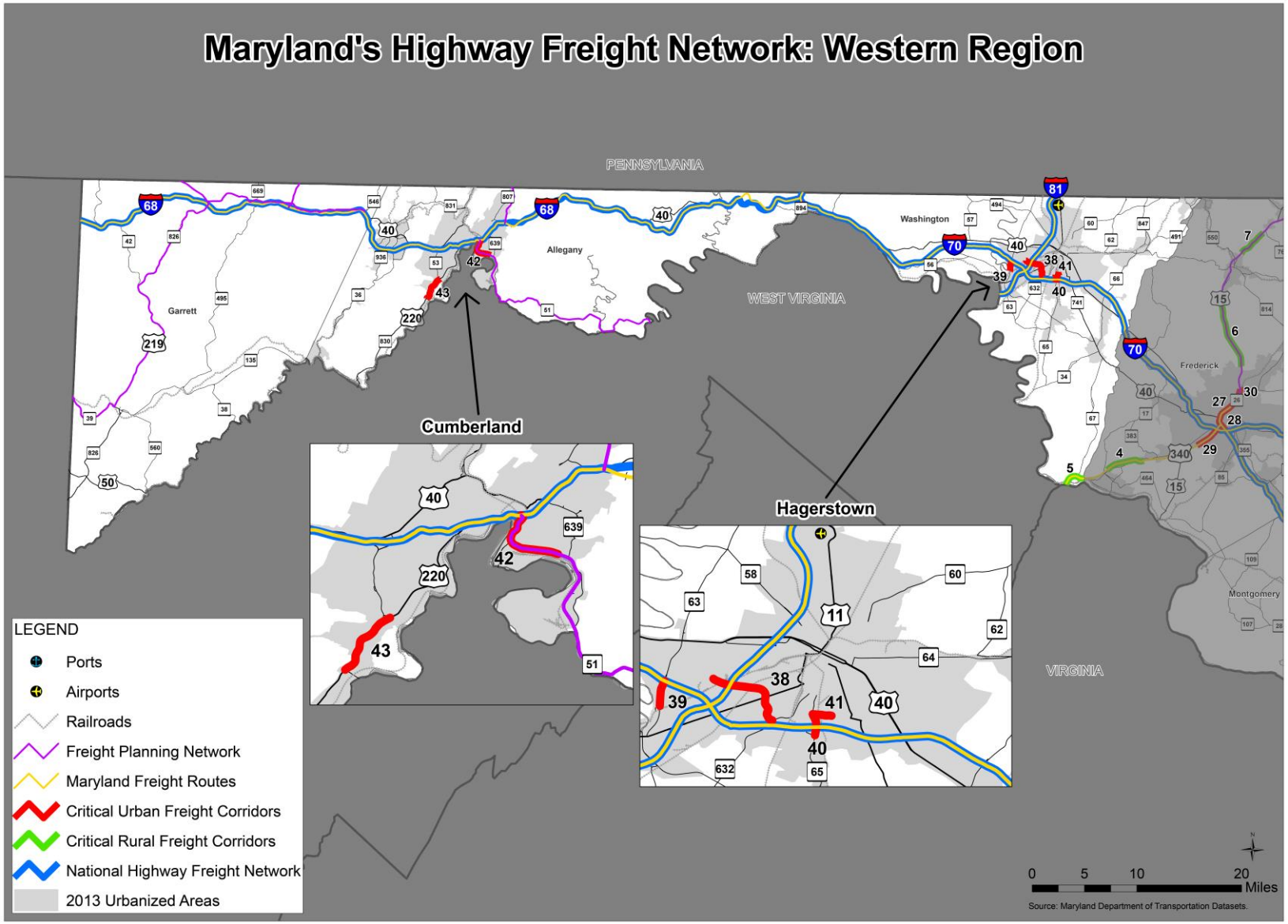
## 7.8 CUFC AND CRFC LOCATIONS

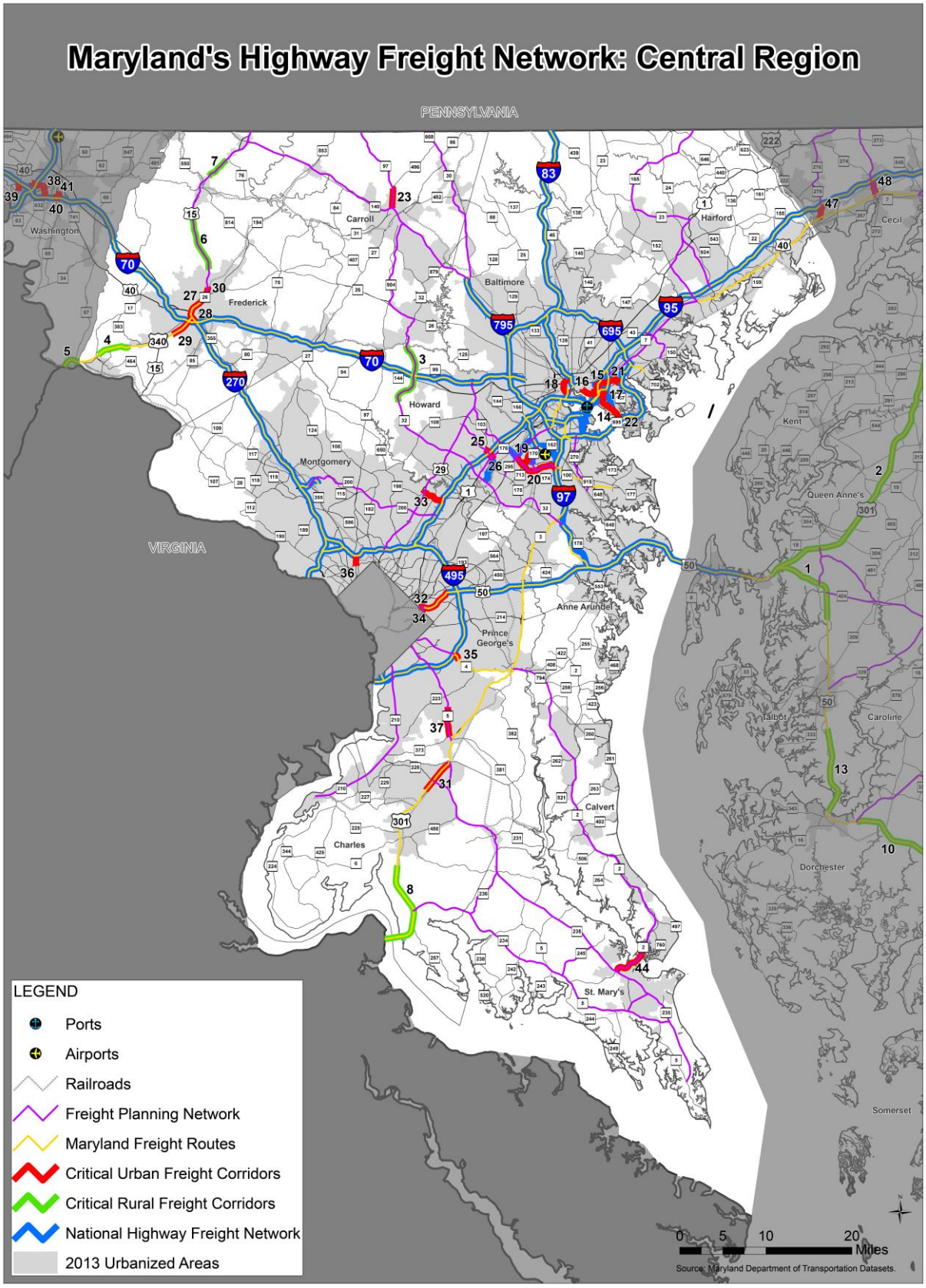
Maryland was allocated 150 miles for Critical Rural Freight Corridors (CRFC) and 75 miles for Critical Urban Freight Corridors (CUFC) to include in the National Highway Freight Network (NHFN). As a result of statewide coordination with freight internal and external stakeholders, and receiving approval from each of the MPOs, MDOT was able to designate the CRFC/CUFC routes. A total of 73 miles were designated for the Critical Urban Freight Corridors and 148.7 miles were designated for the Critical Rural Freight Corridors. The CRFC and CUFC location maps are shown in Figure 7-1 through Figure 7-5. The full list of the locations is in Appendix Table A-1.

## Figure 7-1: Critical Urban and Rural Locations

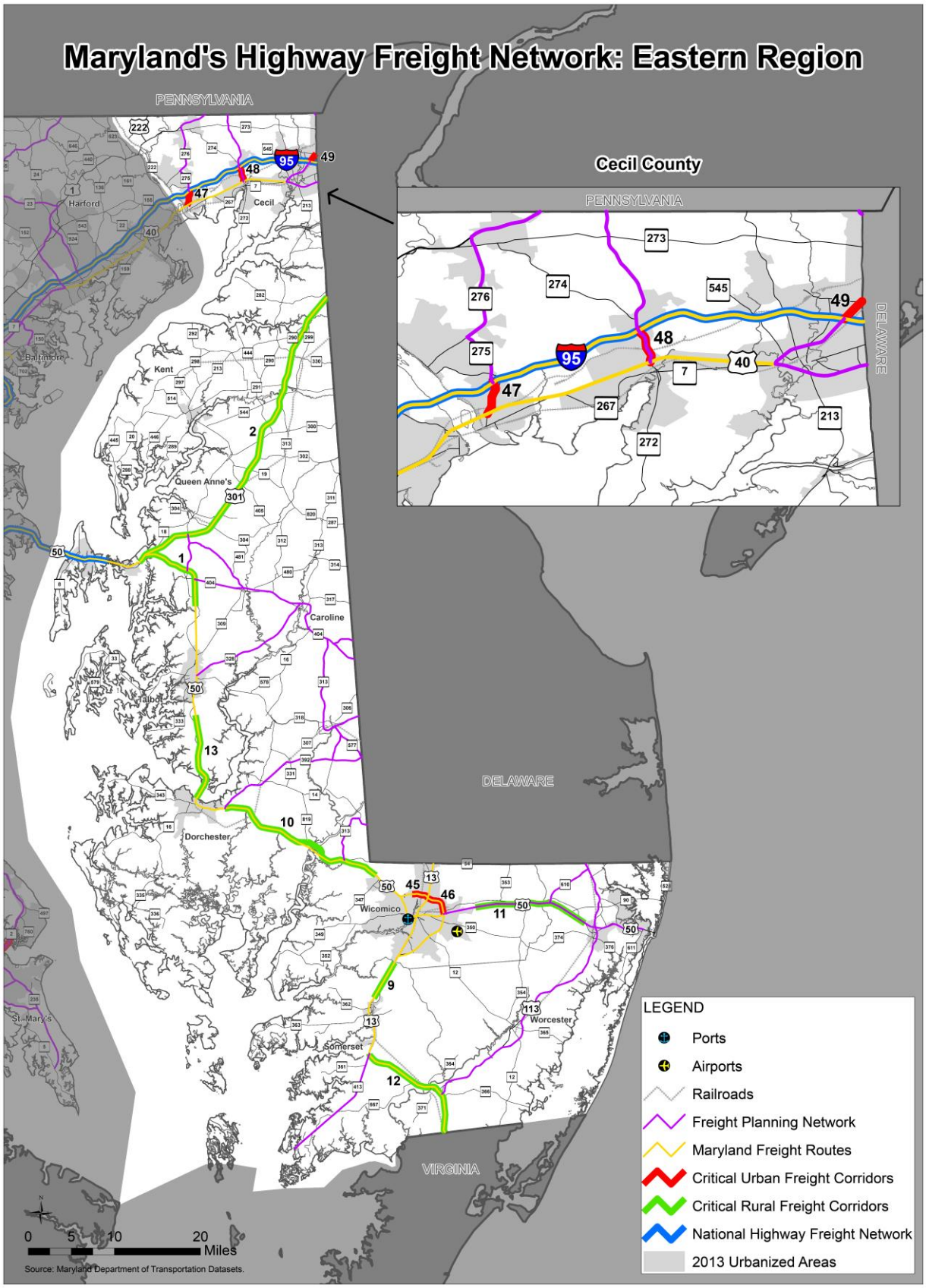


## Figure 7-2: Western Region - Critical Urban and Rural Locations

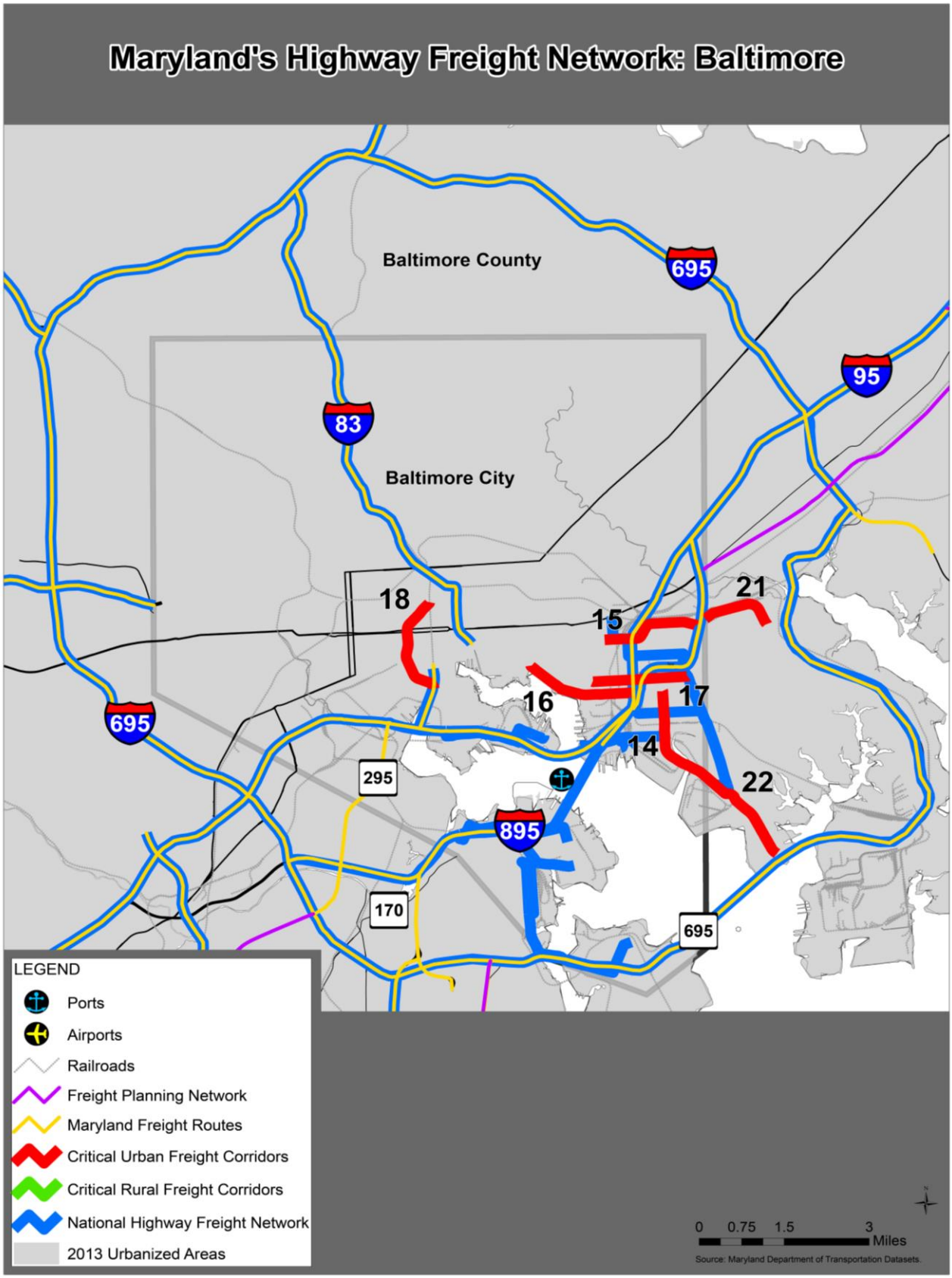



Maryland's Highway Freight Network: Central Region
PENNSYLVANIA
VIRGINIA
Washington
Carroll
Frederick
Baltimore
Harford
Cecil
Howard
Montgomery
Kent
Queen Anne's
Anne Arundel
Prince George's
Talbot
Caroline
Calvert
Charles
Dorchester
St. Mary's
Somerset
LEGEND
Ports
Airports
Railroads
Freight Planning Network
Maryland Freight Routes
Critical Urban Freight Corridors
Critical Rural Freight Corridors
National Highway Freight Network
2013 Urbanized Areas
0 5 10 20 Miles
Source: Maryland Department of Transportation Datasets.

## Figure 7-4: Eastern Region - Critical Urban and Rural Locations



## Figure 7-5: Baltimore - Critical Urban and Rural Locations



## 7.9 MULTI-MODAL FREIGHT NETWORK

MDOT continues to work with public and private sector stakeholders to address impediments to the movement of goods and to prepare for the demands that continued population and economic growth will place on the State's transportation system in the future. Maryland's transportation infrastructure is as dynamic as its citizens and economy. As the population grows and changes, the demand for transportation changes with it. To improve the movement of freight and support growth in the flow of goods within Maryland, transportation system investments and improvements must evolve to respond to the demand.

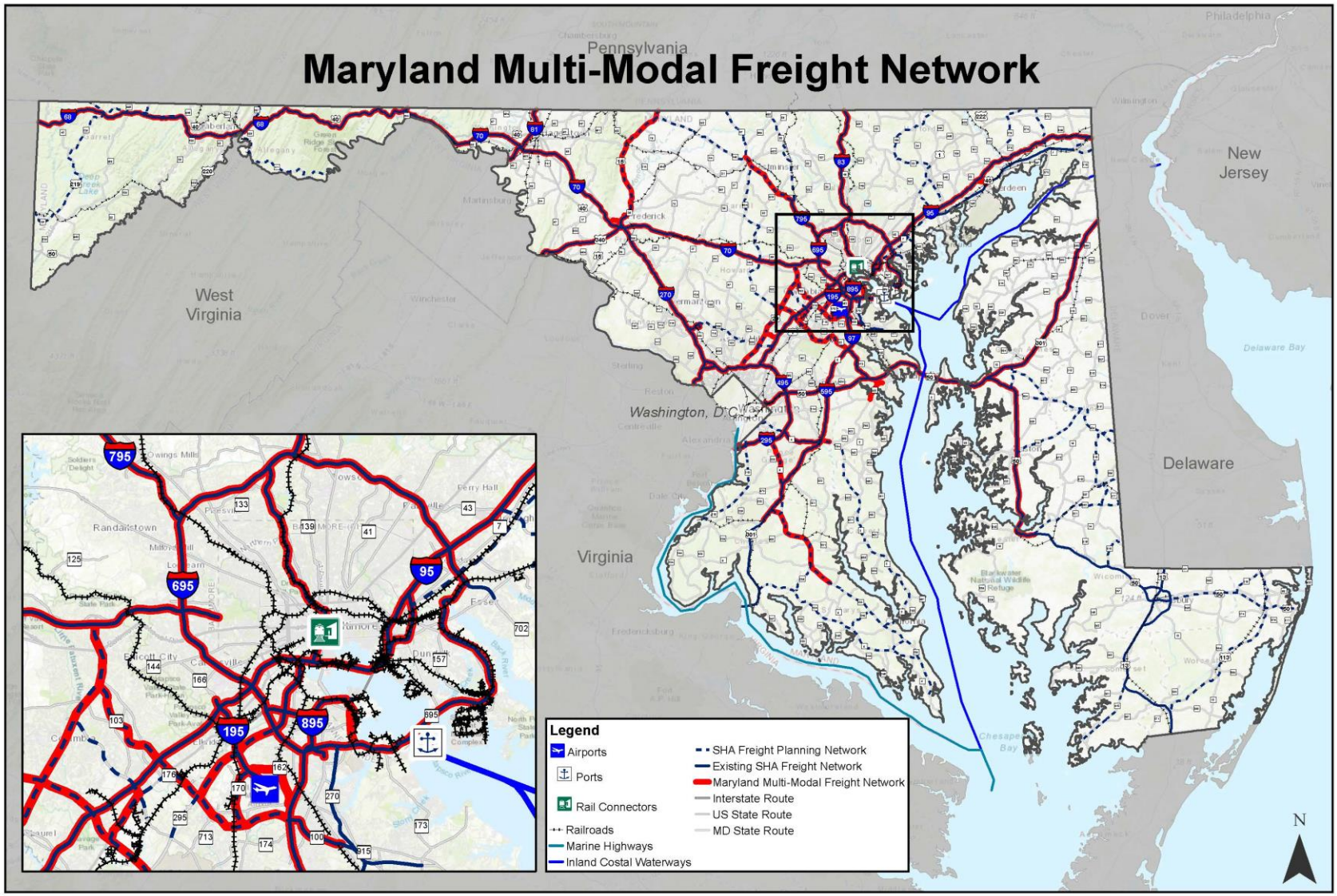
Along the multimodal freight network, coordination and collaboration on studies with the I-81 and I-95 Corridor Coalitions ensure we address intermodal congestion, bottlenecks and other freight related concerns. In Maryland, I-95 carries the majority of the state's freight volumes through the Baltimore -Washington regions and headed north and south along the East Coast. I-95 is also identified as a Marine Highway Corridor due to its connection to the Atlantic Ocean coastal waters, Atlantic Intercoastal waterway, and connecting commercial navigation channels, ports (Port of Baltimore) and harbors along the East Coast. Multimodal improvement strategies and improvements are underway and expected to improve multimodal freight mobility. As we continue to evaluate the network locally, regionally and as a megaregion, it will be imperative to identify more opportunities to partner and collaborate to address the growing congestion issue holistically.

While identifying critical urban and rural critical freight routes, MDOT overlapped the Maryland Truck Network with the National Multimodal Freight Network for Maryland. To capture the most recent freight generators, the Freight Planning network (developed to address the previous MAP-21 freight network requirements) was included as an overlay to ensure MDOT would be able to strategically serve growing regions and expanding markets as travel demand increases. Multimodal Critical Rural Freight Facilities in Maryland are shown in Table 7-4. Maryland's Multimodal Freight Network is shown in Figure 7.6.

### Table 7-4: Multimodal Critical Rural Freight Facilities

| Jurisdiction | Freight Facility | Roadway |
|---|---|---|
| Cumberland | Greater Cumberland Regional (CBE)<br>CSX<br>Other Railroads | I-68, I-70 |
| Hagerstown | Hagerstown Regional (HGR)<br>Norfolk Southern<br>CSX<br>Other Railroads | I-81, I-70, US 340,<br>US 40, I-270, I-695 |
| Salisbury | Port of Salisbury<br>Salisbury-Ocean City<br>Wicomico Regional<br>Norfolk Southern | US 13, US 50,<br>US 301 |

**Figure 7-6: Maryland – Multi-Modal Freight Network**




Source: MDOT 2016

# 8.0 FREIGHT FINANCIAL PLAN

MDOT appreciates the opportunity to focus funds on freight improvements as provided by the FAST Act. Previous freight planning studies identified over $35 billion in freight project needs. These needs continue to grow, and MDOT works diligently to apply funds and strategies to alleviate freight bottlenecks, address safety, congestion and mobility.

All states are mandated to create a State Freight Plan (SFP) within two years of the enactment of the FAST Act. Within those SFPs, states are also required to develop a freight investment plan to obligate the NHFP formula funds. The formula funds are intended to be used to improve the efficient movement of freight on the National Highway Freight Network (NHFN) as prescribed in 49 U.S.C. § 70202.

The National Highway Freight Program (NHFP) – freight formula funds should address the following:

- Shall include a 5-year forecast period and must be updated not less than every 5 years;
- Must include a list of priority projects and be financially constrained;
- Must describe how funds made available to carry out section 167 of Title 23 would be invested and matched

Program eligibilities and attributes include:

- Limiting States to the use of no more than ten percent of apportioned funds on certain non-highway projects, such as governmental costs associated with rail and intermodal connectors.
- Project development activities
- Construction, reconstruction rehabilitation, and land acquisition
- Intelligent Transportation Systems (ITS), including freight ITS
- Environmental mitigation related to freight impact
- Rail-highway grade separation
- Geometric design improvements
- Truck-only lanes
- Runaway and climbing truck lanes
- Shoulder widening
- Truck Parking Facilities
- Real-time information systems
- Electronic screening and credentialing
- Traffic signals
- Work Zone management

- Ramp metering
- ITS and other technologies for intermodal facilities and border crossings
- Additional road capacity for highway freight bottlenecks
- Any project that improves flow of freight to the NHFN
- Diesel retrofits
- Data collection and analysis
- Performance Target development

MDOT coordinated with internal and external freight stakeholders to gain an understanding of the priority freight projects to incorporate into the freight financial list. Through information gathered from stakeholder interviews, Bi-annual FSAC meetings, statewide MPO coordination and feedback from the local jurisdictions, MDOT established a list that addressed a significant amount of freight existing needs as well as delve into strategic concepts to mitigate future freight needs.

To establish a base list of freight needs, MDOT OFM and SHA began with the following sources and activities:

- Freight stakeholder outreach and industry interviews;
- 2009 Maryland Statewide Freight Plan;
- 2012 SHA/MDTA Strategic Freight Plan;
- Maryland's 2017 Consolidated Transportation Plan (CTP);
- 2015 SHA Highway Needs Inventory (HNI);
- 2015 Maryland Statewide Rail Plan;
- 2015 Maryland Freight System Performance Annual Report;
- 2017 Attainment Report;
- State Freight Advisory Committee Meeting(s);
- MDOT, SHA, MDTA, MPA and statewide MPO personnel

To identify statewide freight projects, SHA solicited locations during MPO coordination and public outreach to freight stakeholders during interviews and the FSAC meetings. Additional projects were selected from previous planning documents which identified Statewide freight related projects. As a result, a multimodal list was developed based on bottlenecks, congestion along major freight corridors, intermodal chokepoints and routes where freight related growth is anticipated.

Funds apportioned to the State for the National Highway Freight Program (NHFP), must address one or more of the eligible attributes listed above. To address this requirement, MDOT identified a List of Multimodal Freight Eligible Projects – Funded and Unfunded located in Appendix A: A-2.

This list includes projects of statewide significance that may either facilitate the movement of goods to a major freight activity center (e.g., Port of Baltimore) to enhance the mobility of internal and multistate freight flows. Many projects are mid to long-term improvements which address specific modal priorities or smaller projects that may include geometric or technology investments to improve access to freight generated facilities statewide. This list of projects has been a collective effort based on feedback from local governments, MPOs and MDOTs Transportation Business Units (TBUs). MDOT also took into consideration the feedback received during the Freight Stakeholder Advisory Committee (FSAC) Meetings conducted throughout both the 2015 and 2017 Updated Strategic Goods Movement Plan processes. This list will be used annually to further discuss which freight projects should advance through the Consolidated Transportation Program (CTP)/development process and received freight formula funds.

The Freight Financial Plan is located in Appendix A: A-3, and covers the five-year period from fiscal years 2018 through 2022. This Plan was vetted between the MDOT TBUs and feedback received from the statewide MPOs and FSAC during the 2015 and 2017 Updated Strategic Goods Movement Plan processes.

In Maryland, MDOT is responsible for approving federal apportions to Baltimore City's Department of Transportation (BCDOT) during their annual funding request. As stated in the FAST Act, each State may also obligate up to ten percent of the total apportionment for freight intermodal or freight rail projects. During the coordination for this year's Freight Financial Plan, it was decided that the majority of the Freight Formula funds would fund highway construction projects, Transportation Systems Management and Operations (TSMO) plans, and Pre-Planning activities which include the Annual Truck Parking Overnight Parking study, research and development and freight analysis studies.

In Fiscal Year 2017, approximately $13 million in freight formula funds were allocated for the I-695 – Widening of the Outer Loop from US 40 to MD 144 and I-695 – Replacement of bridge 03113 on the Inner Loop over Benson Avenue and bridge 03114 on the Inner Loop over Leeds Avenue, US 1, AMTRAK and Herbert Run construction projects in Baltimore County. This Freight Financial plan follows the CTP assumption that Congress will appropriate the FAST Act authorized amounts in the transportation bills for Fiscal Year 2018 through Fiscal Year 2020 and that the freight formula funds will continue this inflated funding through Fiscal Year 2023. However, Totals were authorized by MDOT-SHA Office of Finance and are based on adjusted amounts from the appending rescission in FY 18 that will be put in by Congress in 2019.

Since projects listed in the Freight Financial Plan were identified in the most recent 2018-2023 CTP, the next step is to submit or update/revise STIP/TIPs to show the new funds allocated and their state matches. This list will be reviewed and adjusted annually to ensure projects are strategically identified that address mobility, congestion and safety multimodal freight issues and as new opportunities to spend the funding are identified.

# 9.0 INNOVATION AND TECHNOLOGY OPPORTUNITIES

Maryland's multimodal transportation network is directly linked to the state's economic success. An effective transportation system reliably moves both goods and people, supporting the state economy and strengthening businesses by enabling commerce and the day-to-day activities of its communities. MDOT's 2015 Strategic Goods Movement Plan provided policy and strategies, including the use of ITS, to improve the efficiency and safety of the state's multi-modal freight system. This section provides highlights from the previous plan and the latest initiatives underway.

From a data, analytics and performance management perspective, MDOT is well positioned to lead innovation and leverage technology for various freight applications. These are the following freight focus areas that MDOT plans to implement:

- TSM&O and ConOps implementation
- MD One Permit system
- LIDOS - Freight Asset Inventory
- Sea Level Change/Risk Assessments
- Truck Parking ITS opportunities
- Hours of Service Impacts to Truck Parking Shortages
- Annual Truck Parking Surveys
- Connected and Automated Trucking applications such as truck platooning testing

## 9.1 INTELLIGENT TRANSPORTATION SOLUTIONS

MDOT is dedicated to innovative and effective strategies to improve freight movement and has been a leader in applying Transportation System Management and Operations (TSM&O) approaches with collaboration with FHWA, MPOs and other stakeholders.

MDOT has an Intelligent Transportation Systems (ITS) Committee that identifies areas where advanced technology can address freight safety, efficiency and reliability. The Maryland State Police Commercial Vehicle Enforcement Division (MSP-CVED) and Maryland Transportation Authority Police Commercial Vehicle Safety Unit (MdTAP-CVSU) use advanced technology at the Truck Weigh and Inspection Stations (TWIS), with permanent scales and Virtual Weigh Stations (VWS) to monitor commercial vehicle weights on Maryland highways.

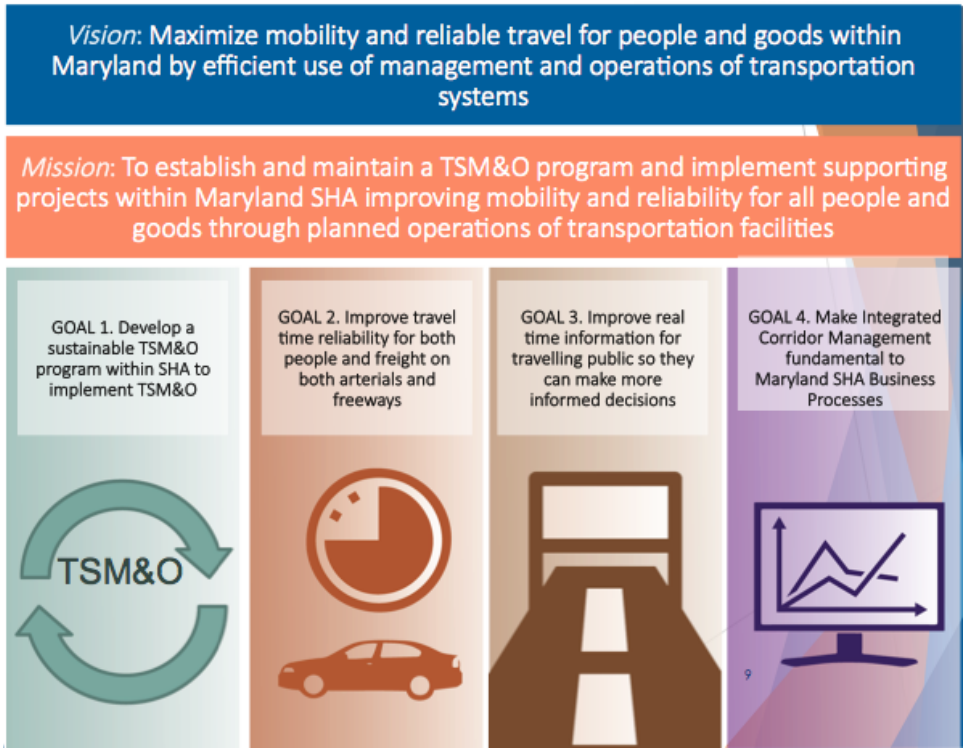
In Maryland, there are permanent TWIS scales at 13 locations. Six of these stations are located on Interstate highways, and the remaining seven are located on Maryland and U.S. highway routes. In addition, several Virtual Weigh Stations (VWS) have been deployed to augment fixed facilities and to provide coverage of otherwise unmonitored routes. MDOT plans to have 11 virtual weight stations by end of 2018.

## 9.2 Maryland Transportation Systems Management & Operations (TSM&O) Strategic Implementation Plan

MDOT SHA has developed a Maryland TSM&O Plan that offers an "**integrated approach to programmatic optimization of planning, operations, and maintenance"** The TSM&O Plan aims to implement new and existing multi-modal systems, services, and projects to **preserve capacity and improve the security, safety, and reliability** of our transportation system.

Figure 9-1 shows the high-level framework of the TSM&O Plan that identifies goals, objectives, strategies and performance measures:

### Figure 9-1: Maryland TSM&O Plan Framework




Freight Movement is identified as a key element of the TSM&O Plan throughout the Plan. Specifically, Goal 2 calls to "Improve travel time reliability for both people **and freight** on both arterials and freeways." Key strategies under Goal 2 that relates to freight are:
*Strategy 2.1e. Establish a framework for an institutionalized approach to support funding and deployment of operational improvements (including those targeting freight movement) on freeways and arterials*
*Strategy 2.2b. Ensure consistent consideration of ICM on corridors that possess attributes necessary to apply ICM including freight*

Under the implementation part of the TSM&O Plan, action items, deliverables and outcomes have been identified for above strategies.

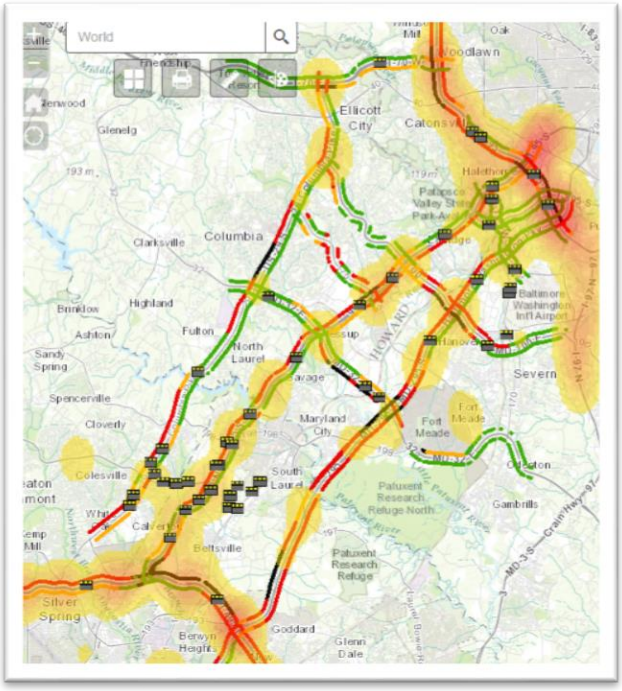
## 9.3 MARYLAND INTEGRATED CORRIDOR MANAGEMENT & ACTIVE TRAFFIC MANAGEMENT APPLICATIONS

Over the past few years, MDOT has adopted various cutting-edge technology and innovative solutions to facilitate safe, reliable and efficient movement of people and goods. These include:

- Emphasis on Innovations & Technology Solutions
- Performance based Practical Transportation
- Innovative Procurement Strategies – Progressive Design Build
- Expedited Project Delivery – A+B Contracting

For example, SHA is developing a Concept of Operations in the Baltimore-Washington region using FHWA grants (shown in Figure 9-2). Working with various stakeholders including freight stakeholders and businesses, the ConOps identifies freight needs and high level functional requirements,

### Figure 9-2: Baltimore-Washington Region Integrated Corridor Management Pilot Area




As with the I-270 Innovative Congestion Management Project, MDOT is adopting new procurement mechanisms like the Progressive Design Build approach for expedited project delivery. These recent experiences have positioned MDOT to develop, implement and deliver freight programs and projects to its freight customers and businesses.

## 9.4 MARYLAND ADVANCED BEHAVIOR BASED FREIGHT MODELS & ANALYTICS

MDOT has coordinated with the Baltimore MPO on a Strategic Highway Research Project (SHRP2) freight modeling project and Comprehensive Freight Multimodal Database. Using advanced behavior based supply chain models and truck touring models, MDOT collaborates with MPOs and other stakeholders to understand freight flows, impact of freight policies, programs and investments.

MDOT has been an advanced user of the state of the art Data and Performance Management Analytical Tools for data driven decision-making in the Freight arena. These include various Enterprise GIS solutions developed at SHA like the Freight Story Map, Freight Dashboard, Mobility and Economy Dashboard etc. MDOT is a power user of various UMD Center for Advanced Transportation Technology (CATT) tools and has partnered with the UMD to develop VWS applications, video analytics, visualization and communication tools.

MDOT has been on the forefront of innovative supply chain applications and has partnered with the UMD CATT and Texas A&M Transportation Institute (TTI) to study freight fluidity in Maryland.

## 9.5 MULTIMODAL ADVANCES IN MARYLAND

The MDOT-SHA is responsible for permitting loads that exceed the legal size and/or weight limits on state highways. To efficiently accomplish this requirement MDOT-SHA developed an agreement between the City of Baltimore and the Maryland Port Authority to develop a GIS based system that is designed to:

- Provide a more efficient and effective hauling permit process to allow certain oversize and/or overweight cargo carrying vehicles improved access to and from the port,
- Allow for the SHA to issue Port related permits on behalf of the City,
- Provide for timely and accurate permit fee collection and disbursement between the City and SHA.
- Improve the exchange of hauling permit information between the Port, City and SHA
- Improve customer service for users of the Port.

The MD One Permit System has significantly reduced the time required for processing and issuing Containerized Cargo permits for Port users and special hauling permits for all users.

The Motor Vehicle Administration (MVA) has made scheduling commercial driver license (CDL) road tests faster and easier by launching an online appointment scheduling system increasing efficiency and reducing wait times for commercial drivers.

MDOT SHA is investigating the benefits of incorporating LIDAR into the data collection process. Mobile Light Detection and Ranging (LIDAR) has been proven in other states to be an effective and efficient technology to collect and create geospatial information. From the 3D point cloud and high definition imagery, data will be extracted so it can be compared to existing data maintained by various MDOT SHA offices. With the use of Mobile LIDAR, MDOT SHA will be able to update and enhance the highway mapping base, create new asset layers and update

existing ones within the Asset Data Warehouse (ADW) GIS layer. Other needed information can be captured, such as structure clearances over roadways, line striping, mowable areas or grade and cross slope from a three - dimensional surface created from the LIDAR data. From the base layer, freight assets can be identified and incorporated into a freight assets inventory to identify maintenance, improvements, and other related projects along the freight highway network.

## 9.6 SEA LEVEL RISE: RISK ASSESSMENT

MDOT utilizes sea level change and extreme weather event data to look at climate impacts on freight infrastructure and vulnerability of freight flows. An analysis was conducted to determine the vulnerability of the Maryland freight network to the 25-year storm event in the coastal areas. This analysis also used the 2050 sea level rise projections for Maryland which are approximately two feet above current mean sea level.

The Sea Level Rise: Risk Assessment analysis was conducted to evaluate the Freight Network for potential future flooding. The analysis utilized MDOT/State Highway's Hazard Vulnerability Index (HVI) for the 25-year storm with the year 2050 sea level change. HVI is a calculation of risk to the roadway network by utilizing three factors (functional class, emergency evacuation route designation, and depth of water for the modeled condition) to generate a score. This data is based on the best available LiDAR and projections from the US Army Corps of Engineers: Sea Level Change Considerations for Civil Works Programs, October 2013.

The 25-year storm was utilized for this analysis because it is a minimum level of precipitation that stormwater design takes into account on the freight network. The 25-year storm term, refers to rainfall totals that have a four percent probability of occurring at that location in that year. This means there is a 1 in 25 or 4% chance that a storm will reach this intensity in any given year. The probability of precipitation also has its own criteria for each location as to how much rain must fall within 24 hours to classify as a particular rain event.

### Figure 9-3: Sea Level Rise Impacts to Freight Routes – 2050

| Freight Route Inundation at Mean Sea Level in 2050 during 4-Percent Annual Chance Event | | | |
|---|---|---|---|
| | Queen Anne's County | Wicomico County | |
| Water on Roadway | US 50 (ft) | US 13 (ft) | US 50 (ft) |
| > 0.1' and <= 0.5' | 0 | 93 | 170 |
| > 0.5' and <= 1.0' | 2 | 65 | 274 |
| > 1.0' and <= 2.0' | 12 | 0 | 174 |
| > 2.0' | 27 | 0 | 0 |

Source: Sea Level Rise: Risk Assessment

## Figure 9-4: US 50 EB (Business)/ US 13 NB (Business) in Salisbury, MD – 2050 Network Impacts

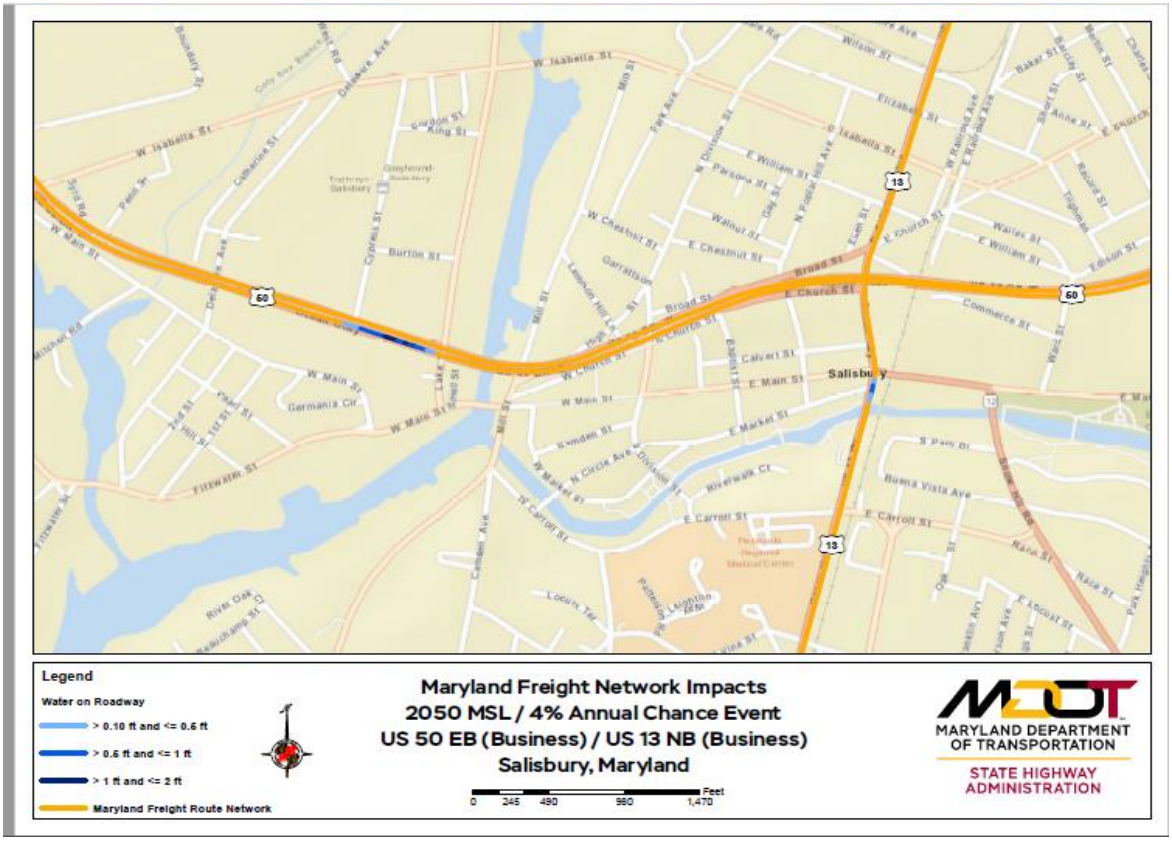
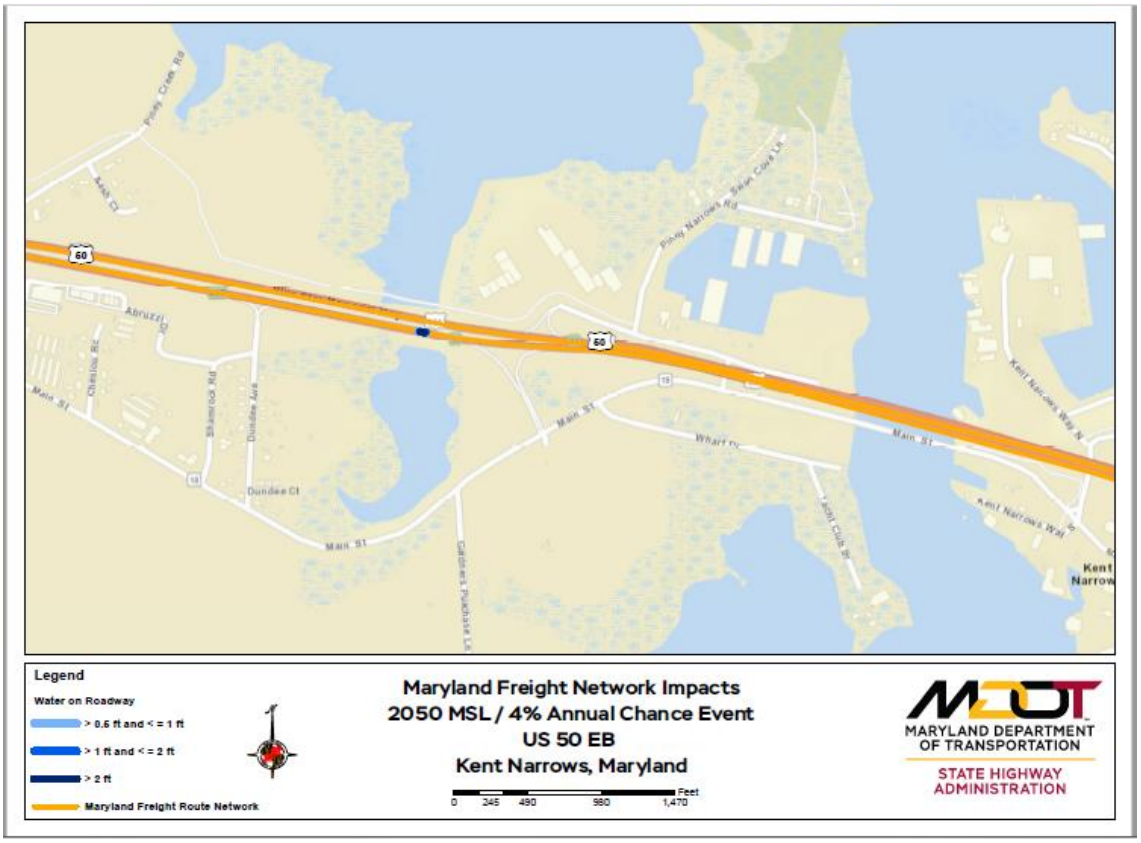



**Figure 9-5: US 50 EB in Kent Narrows, MD – 2050 Network Impacts**




## 9.7 TRUCK PARKING ITS OPPORTUNITIES

The approval of the MAP-21 Jason's Law requirements, allowed states to focus on truck parking. Under the FAST Act funding was also allocated to address truck parking. Since 2012, MDOT-SHA has collected Annual Truck Parking Surveys to determine how many trucks were parked illegally along the Maryland Truck Network. Our surveys have shown that an average of 700+ trucks are parked overnight either directly on or near the Maryland Truck Route System. Through MDOT's MD Excellerator – Business Plan, Maryland has identified the Reduction of Illegal Truck Parking performance measure as a goal. Key locations include:

- I-68 Youghiogheny Overlook (Garrett County)
- I-70 Eastbound and Westbound Welcome Areas (Frederick County)
- I-95 Northbound Welcome Center (Howard County) I-70 Eastbound Truck Rest Area (Frederick County)

To address the parking shortage, MDOT works to address the issue by identifying locations statewide for truck parking expansion on inclusion within our existing Welcome Center, Truck Rest Area and Park and Ride facilities.

Other methods to increase truck parking that are being explored include:

- Identifying areas along freight corridors that have sizable right-of-way that can serve as a possible truck holding area.
- Investigating P3 truck parking opportunities with developers.
- Researching the use of Truck Weigh and Inspection Stations for overnight truck parking when the station is closed.
- Reviewing possible expansion of park and ride facilities to include truck parking.

MDOT will continue to conduct studies through research and development to better understand truck analytics and identify why truck drivers park at certain locations throughout the state.

Additional efforts, such as the I-95 Corridor Coalitions Truck n' Park pilot project, introduced intelligent transportation systems to address these challenges. MDOT SHA is working with MPA and MDTA to explore innovative, efficient and cost - effective methods of capturing truck parking availability through a combination of existing data sources and crowd sourcing sites. As federal regulations to implement Electronic Logging Devices (ELDs) are implemented in December 2017 to address Hours of Service (HOS) regulations, truck parking needs are anticipated to increase for all states.

MDOT is actively addressing truck parking shortages by incorporating truck parking in the MD Excellerator, and taking steps to expand public facilities in areas where illegal parking is a concern. Maryland also depends on frequent communication with the trucking industry to help identify potential sites for truck parking throughout the state. MDOT ultimately strives to work closer with the private developers to develop public-private partnerships that will ultimately benefit the truck drivers by providing safe parking options.

# 10.0 FREIGHT AND ASSET MANAGEMENT

The FAST Act requires states to consider the deterioration of roadways on which heavy vehicles supporting activities such as mining, agriculture, energy and timber movement occur. In Maryland, this is considered as part of the asset management and planning programs.

## 10.1 ASSET MANAGEMENT PROGRAM

MDOT has always applied asset management strategies to best manage assets and plan for improvements. Maryland has robust pavement and bridge programs, as well as an Asset Data Warehouse to collect and analyze data on other assets. MDOT SHA is currently developing an Enterprise Asset Management System which will advance the way MDOT SHA does asset management and combine state of the art ITS, data collection and analytical tools to inform the planning, engineering, design and construction and maintenance and operations processes.

Additionally, MDOT SHA is finalizing the required MAP-21 Transportation Asset Management Plan (TAMP), which includes a detailed description of MDOT SHA's asset management activities, performance information and improvement or advancement plans.

## 10.2 PERFORMANCE OF MDOT'S ASSETS

Maryland's transportation business units operate as "ONE MDOT," working together to deliver safe and efficient transportation solutions and services. As ONE MDOT, the Department has a comprehensive, integrated approach to managing the performance of Maryland's multi-modal transportation network, which includes both system-level and business process management strategies. This helps in focusing on areas such as those where heavy freight operations deteriorate the system more rapidly than other activities. These areas can be targeted and solutions such as different pavement materials or maintenance strategies can be applied.

As part of MDOT's approach, MDOT routinely reports, analyzes and strategizes on performance improvement. This occurs as part of our long range and capital planning process and federal planning requirements, which includes coordination with the Metropolitan Planning Organizations (MPOs) and federal agencies such as the FHWA. It also occurs as part of state budget requirements for performance based budgeting. MDOT's business units also have some unique performance programs to focus on their specific modal activities. And, MDOT has embarked upon a new Department-wide focus on performance through the MDOT Excellerator performance management system. The MDOT Excellerator is a customer driven review of MDOT's performance based on ten "Tangible Results," that include elements such as using resources wisely, being good stewards of the environment, supporting economic opportunity, and being a good neighbor. MDOT's business units engage in continuous conversation and examination of performance as part of this initiative. It is helping MDOT to improve business processes from procurement to project delivery, as well as identifying where MDOT can best focus resources to improve our products and services, and meet our customers' expectations. In addition, MDOT has a well-established framework, business processes and culture of performance management within its business units. Highway related programs include:

- Maryland Highway Safety Improvement Program
- Maryland Strategic Highway Safety Plan
- Maryland State Highway Annual Mobility Report
- MDOT Strategic Goods Movement Plan (Freight Plan)
- Maryland State Highway Asset Data Warehouse
- Maryland Transportation Asset Management Plan

For bridges and pavement impacted by heavy trucks, MDOT-SHA maintains a strong bridge and pavement quality focus and is dedicated to the safety and level of performance of these assets. Information submitted this year to the National Bridge Inventory, for which SHA is required to submit condition data, included 69 structurally deficient bridges, or 2.7 percent of a total of 2,564 bridges on the state system. Also, as reported to FHWA in HPMS using full extent data for the NHS, MDOT SHA submitted the following pavement condition data:

- Preliminary estimates of roughly 78 percent of Interstates in good condition
- Preliminary estimates of roughly 6 percent of Interstates in poor condition
- Preliminary estimates of roughly 53 percent of non-Interstate NHS in good condition
- Preliminary estimates of roughly 20 percent of non-Interstate NHS in poor condition.

MDOT SHA continues to work with MPO, local and other stakeholders to ensure the integrity and safety of our assets. Both the bridge and pavement offices have documented procedures for evaluating condition on a yearly basis. As part of the TAMP effort previously described, these processes are being further documented and are discussed as part of the MPO and stakeholder collaboration required as part of that process.

# 11.0 TRUCK PARKING

## 11.1 JASON'S LAW – WHY TRUCK PARKING IS A PRIORITY

Jason's Law was named in honor of Jason Rivenburg, who in 2009 was murdered while parked for the night in his truck at a recommended location before completing his delivery the next day. His widow, Hope Rivenburg, has worked diligently since then to bring attention to the national truck parking shortage problem. Her efforts, along with those of countless family members, friends, and representatives from the trucking industry, helped to push forth legislation to focus national attention on the issue. Jason's Law was finally incorporated into MAP-21 in 2014. Specifically, Jason's Law required the USDOT to conduct a survey to evaluate truck parking supply, assess truck volumes and to measure truck parking adequacy in each state. Jason's law sparked a National Coalition on Truck Parking of which MDOT is a member, as well as an effort to develop new truck parking analysis and solve for truck parking challenges.

## 11.2 NATIONAL COALITION ON TRUCK PARKING

The National Coalition on Truck Parking was formed by FHWA in 2016 to continue the dialogue on national truck parking needs and help to resolve truck parking problems. Members of the NCTP include FHWA, FMCSA, MARAD, AASHTO, CVSA, the Owner-Operator Independent Drivers

Association (OOIDA), the National Association of Truck Stop Operators (NATSO), and the American Trucking Association (ATA and ATRI).

## 11.3 Truck Parking – Shortages and Future Needs

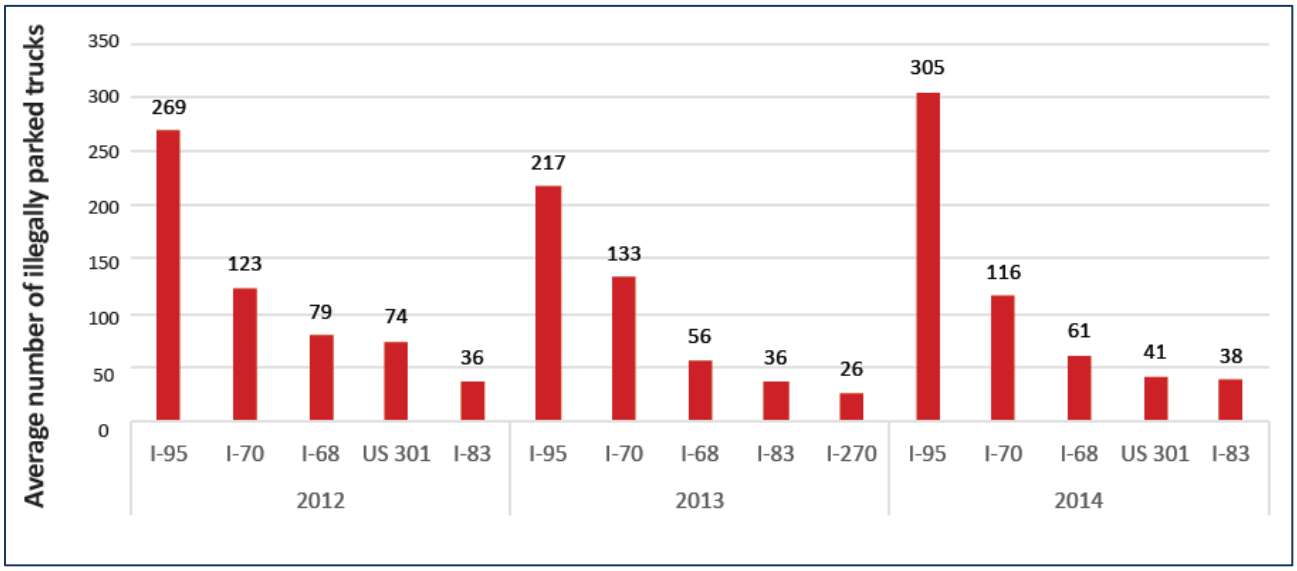
Truck parking has become a nationwide challenge, as truck freight volumes increase, and parking supply cannot keep pace. With the projected growth of truck traffic, the demand for truck parking will continue to exceed the supply of parking facilities in Maryland and around the nation. In 2014, estimated truck parking demand (volume) exceeded parking supply (available spaces) by 36 percent. This was even after MDOT constructed 21 new truck parking spaces at the I-95 Welcome Center (northbound) with the Chesapeake House renovations. Maryland is taking steps to construct more rest areas to accommodate the additional demands from truck parking.

## 11.4 Amount of Illegal Truck Parking on Maryland State Roadways

Past studies conducted by MDOT have determined that the number of legal parking spaces in Maryland for CMVs is insufficient. The Federal Highway Administration (FHWA) Jason's Law survey (2014) found that truck parking is a major challenge in every state, and Maryland's I-95 Corridor section was among the most problematic areas in the nation. The shortage of legal truck parking results in high volumes of illegally parked CMVs at truck stops, rest areas, truck weigh and inspection stations, ramps, shoulders and other locations that may be prohibited to truck parking and has been a cause of serious accidents on Maryland's highways. Additionally, lack of parking is a challenge for drivers who must maintain hours of service regulations but have no place to park near where they need to deliver. This presents safety, economic and congestion issues.

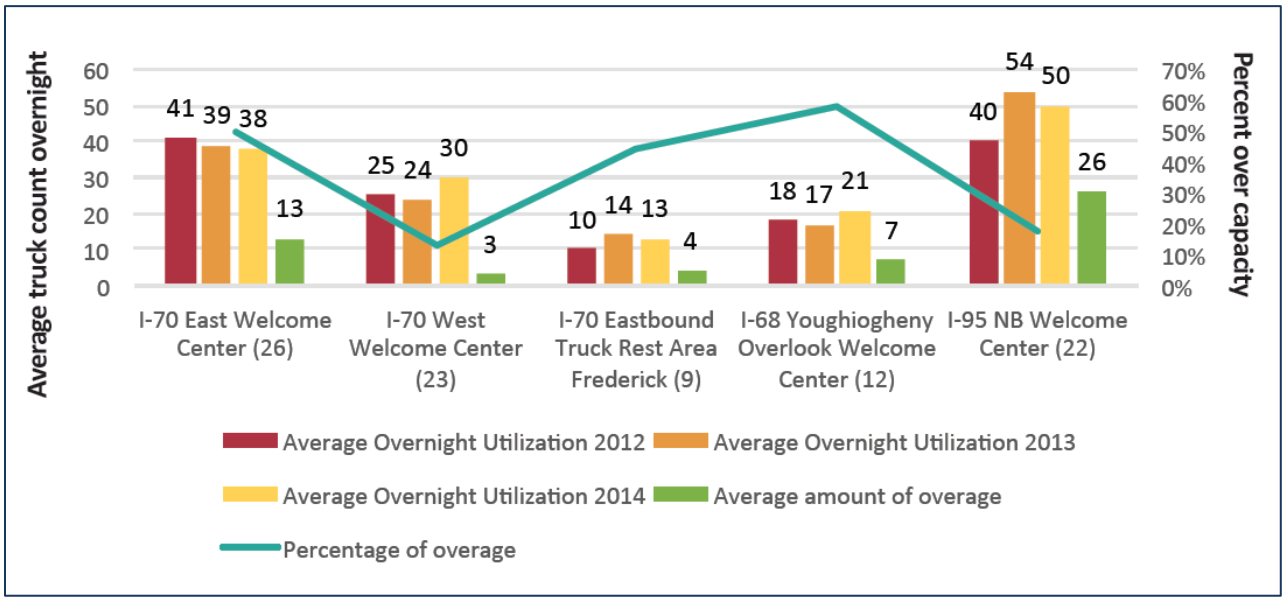
The Maryland Freight Strategic Plan was developed in 2012 to address the anticipated increase of truck traffic on the statewide freight roadway network. This plan included Annual Overnight Truck Parking counts, which have been conducted since 2012. Since then, the annual Maryland Freight Network Truck Parking Survey has been used to track trends related to illegal truck parking on the Maryland Truck Route system. The top five high volume locations have consistently included I-95, I-70 and I-68 along with US 301, I-83 and I-270 varying within the list over the last 3 years. Figure 11-1 shows the highest truck parking locations by route. Figure 11-2 shows average overnight utilization rates. Figure 11-3 through Figure 11-5 show illegal truck parking locations from 2012 to 2014.

## Figure 11-1: Top Highest Truck Parking Locations by Route (2012-2014)



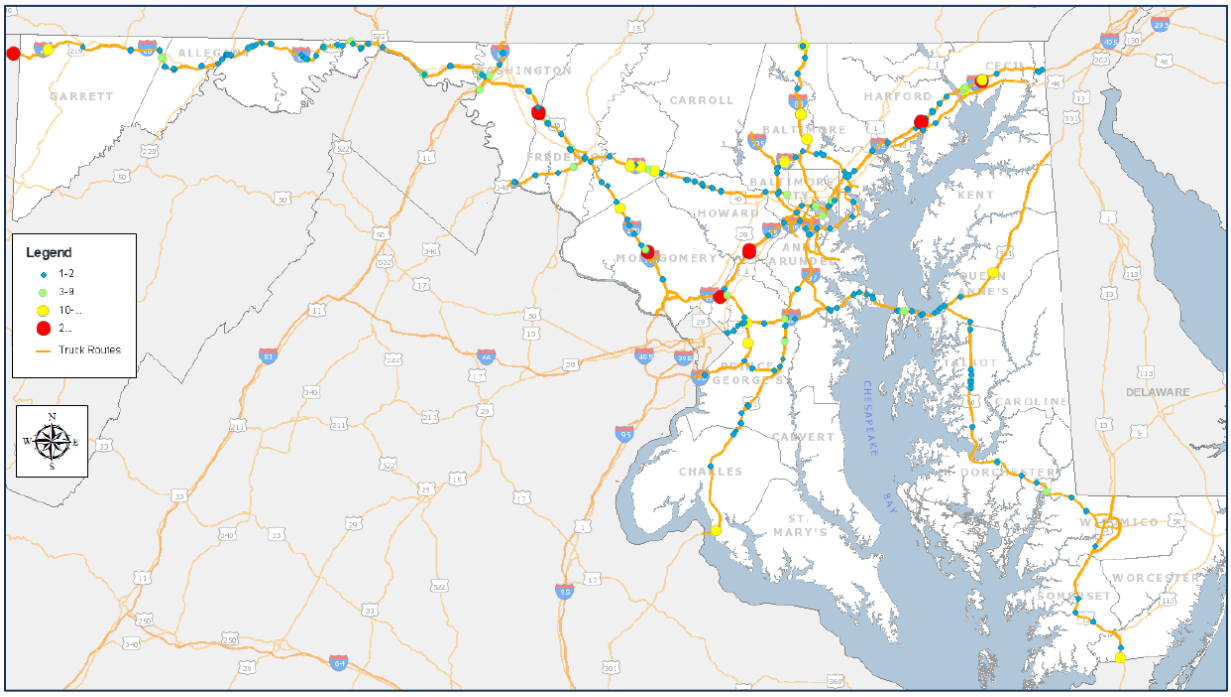

Source: MDOT

## Figure 11-2: Average Overnight Utilization of State Truck Parking Facilities Over Capacity



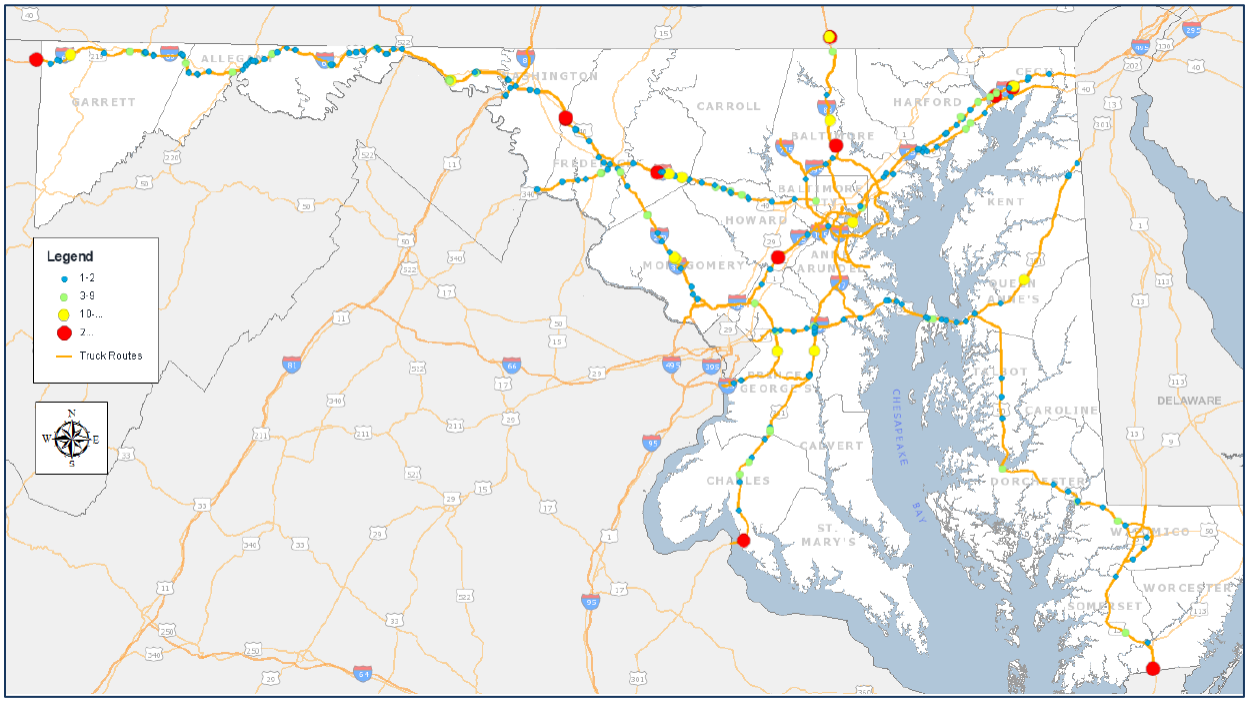

Source: MDOT Annual Truck Parking Studies (2012-2014)

## Figure 11-3: 2012 - Illegal Truck Parking Along Maryland State Roadways



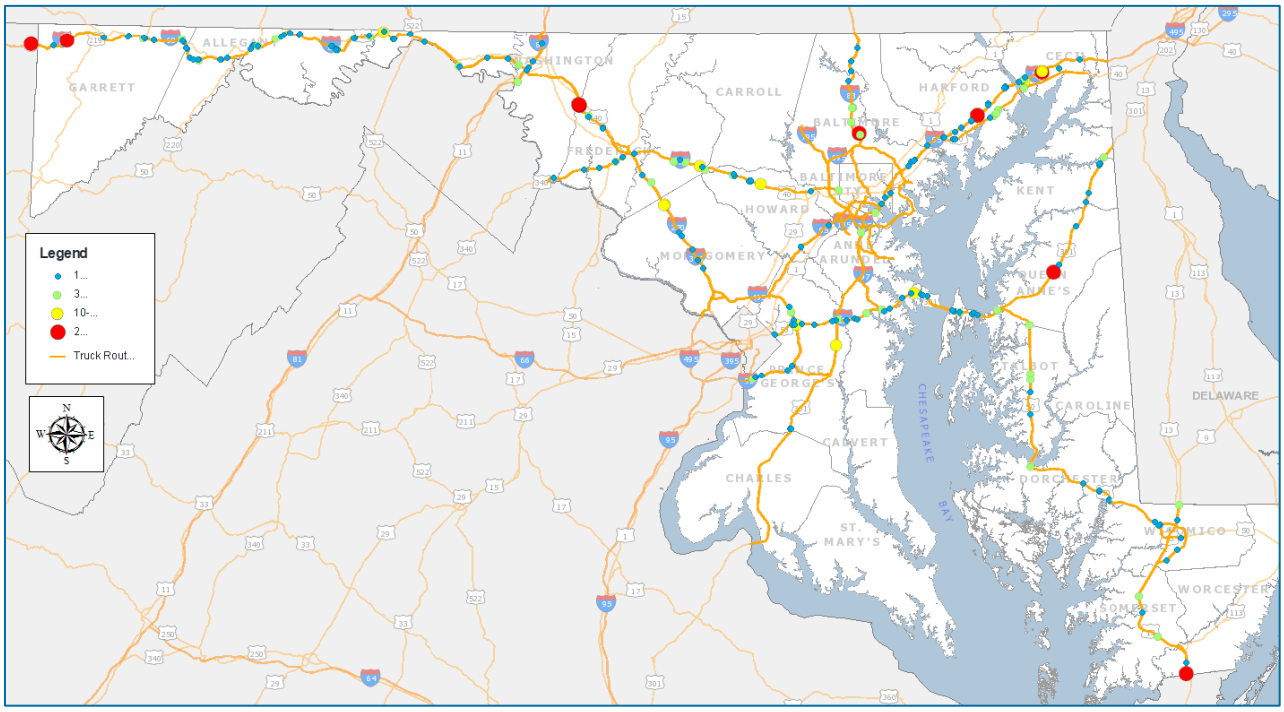

Source: MDOT Annual Truck Parking Studies (2012-2014)

## Figure 11-4: 2013 – Illegal Truck Parking Along Maryland State Roadways



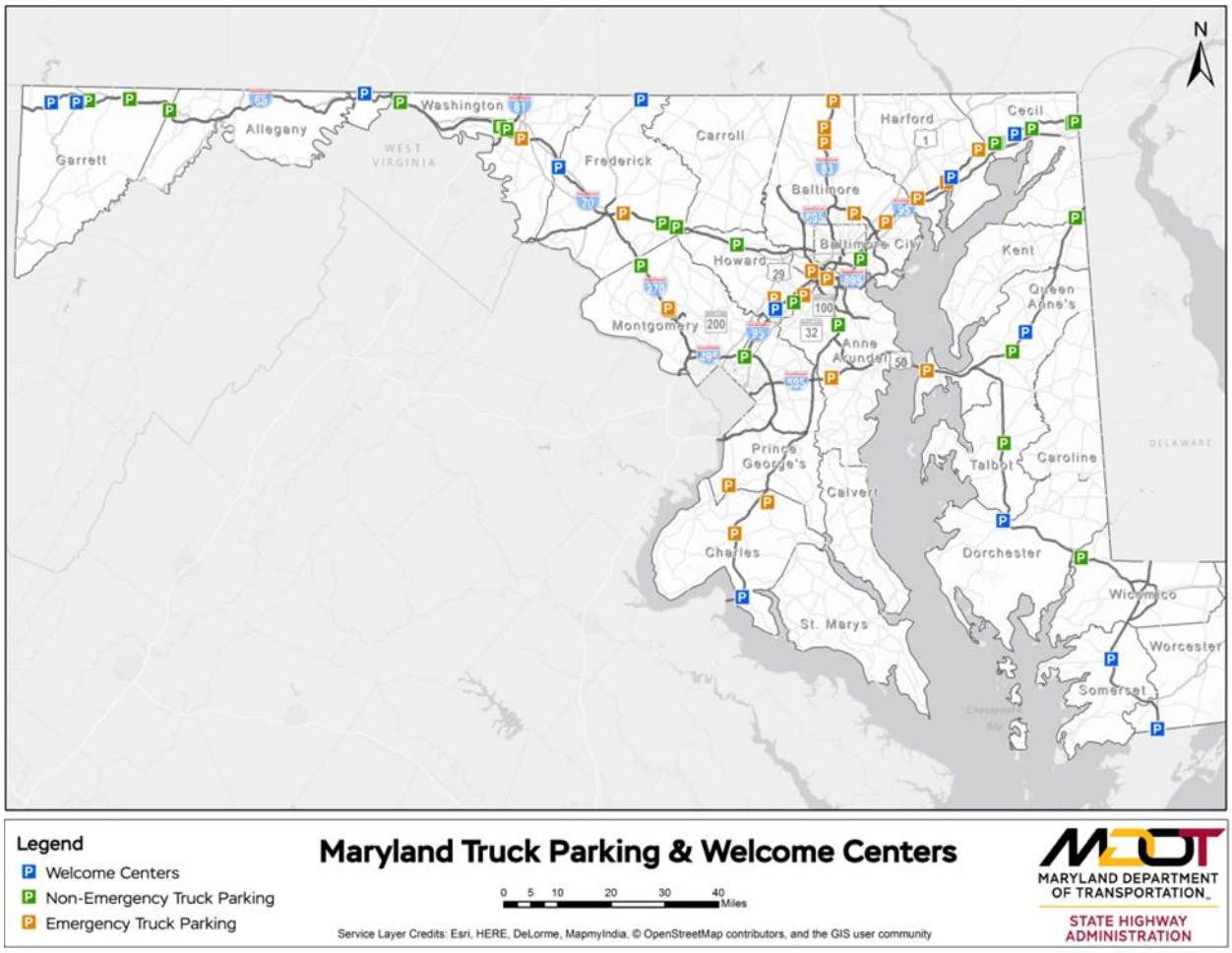

Source: MDOT Annual Truck Parking Studies (2012-2014)

## Figure 11-5: 2014 – Illegal Truck Parking Along Maryland State Roadways




Source: MDOT Annual Truck Parking Studies (2012-2014)

## Figure 11-6: Truck Parking Public Facilities Along Maryland State Roadways




Source: MDOT

# 12.0 IMPLEMENTING THE PLAN

Reaching the desired outcomes noted above will require programs and projects from MDOT and public and private stakeholders. Each of MDOT's Transportation Business Units (TBUs) will develop freight projects and programs in their own freight-related planning documents that advance the strategic direction. Private sector freight providers and system owners should use the Plan to understand MDOT's intended strategic direction for goods movement as they develop programs and projects.

Successful implementation will depend on three tactics: planning and programming, data and analysis, and communication, working in concert to meet the goals of the Strategic Goods Movement Plan. MDOT is participating in numerous studies, collaborative efforts and pilots that advance our understanding of freight and how it moves in and around Maryland.

| |
|---|
| **Planning and Programming** |
| MDOT and public and private stakeholders should emphasize projects and programs that facilitate safe and efficient freight movement in the programming process. Freight should be a relevant category in project selection and prioritization. |
| Short line technical expertise should be centralized within MTA for the benefit of efficiency and expediency of projects. Policy guidance and program oversight should be provided by TSO. |
| MDOT should identify alternative sources of public and private funding for freight projects, and seek to leverage available resources with private investments. |
| **Data and analysis** |
| MDOT should monitor economic, trade and logistics, environment, technology, energy, and land use trends and assess implications, especially for MDOT capital investment programs. |
| The Freight Data Workgroup should continue to share information, identify data and analysis capability gaps, and to develop data and analysis tool concepts that meet the needs of member agencies. In partnership with other State agencies, MDOT should develop and acquire economic and freight data as needed. |
| MDOT should continue developing freight modeling capabilities that account for potential changes in state or global economic conditions, logistics patterns, transportation infrastructure or funding, and land use scenarios. The State and private sector should collaborate to better understand industry supply chains, and incorporate their impact into freight modeling and data analysis. |
| **Communication and partnerships** |
| Freight transportation and the State's environmental, economic development, safety and security goals should be mutually supportive. MDOT should continue ongoing communication with sister agencies and MPOs, keep them engaged in MDOT plans and studies, and be an engaged participant in their plans and studies to ensure that the goals of all agencies are mutually-supportive and avoid potential conflicts. |
| TSO should conduct ongoing outreach with private sector to identify and map supply chains, and communicate with neighboring states to address freight needs one-on-one, and through forums such as the I-95 Corridor Coalition, I-81 Corridor Coalition, Delmarva Freight Planning effort, MPOs' freight committees, and others. The private sector both within and outside Maryland should be an engaged partner in the discussion in order to identify nodes, modes, and routes that are critical to the State. |
| MDOT should disseminate brochures or other documents summarizing federal and State safety regulations and important changes over time. MDOT should ensure all information regarding safety and security regulations on MDOT's websites are maintained and up-to-date, and develop a web based customer service tool for answering technical questions and referencing to appropriate agency experts |
| State and Class I railroads should develop long-standing cooperative relationships that help to facilitate projects and programs. Led by TSO and MTA, the State should establish a standing outreach program, using meetings or other forms of open communication and information-sharing. Class I railroads and Amtrak should reciprocate, and become engaged partners with the State. |

MDOT, in cooperation with other State agencies and private stakeholders, will develop and implement projects or programs to advance the strategies set forth in this Plan. Examples of such projects or programs include:

- Completion of the High Speed Intercity Passenger Rail Studies, which may address rail capacity and operations issues in the State of Maryland, particularly along the Northeast Corridor.
- Continue to convene the FSAC to examine freight system challenges and recommend near- and long-term freight projects and initiatives.
- Development of a "Maryland Freight Finder" geographic database of freight transportation facilities, terminals, handling centers, and major freight-generating industry clusters in order to help decision-makers and the public at large better understand the connection between freight transportation observed in communities and the economic activity that transportation is supporting;
- Updating the Diesel Vehicle Emissions Control Program in cooperation with the Maryland Department of the Environment;
- Establishment of a "trucking business incubator," in partnership with the motor carrier industry and Maryland's higher education community, which would assist owner-operators and small motor carrier firms to develop skills necessary to manage their business and to survive in a dynamic and competitive environment;
- Improve truck parking in Maryland using advanced data analysis to identify parking needs and to partner with Waze and other types of crowd sourcing entities to promote sharing of parking information and additional collection of data.

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# 13.0 LIST OF ACRONYMS

| | |
|---|---|
| **CSX** | CSX Corporation |
| **DBED** | Maryland Department of Business and Economic Development |
| **HOS** | Hours of Service |
| **ITS** | Intelligent Transportation Systems |
| **MAP-21** | Moving Ahead for Progress in the 21st Century |
| **MDA** | Maryland Department of Agriculture |
| **MDDE** | Maryland and Delaware Railroad |
| **MDE** | Maryland Department of the Environment |
| **MDOT** | Maryland Department of Transportation |
| | *MAA Maryland Aviation Administration* |
| | *MPA Maryland Port Administration* |
| | *MTA Maryland Transit Administration* |
| | *MVA Motor Vehicle Administration* |
| | *TSO The Secretary's Office* |
| | *SHA Maryland State Highway Administration* |
| | *MDTA Maryland Transportation Authority* |
| **MDP** | Maryland Department of Planning |
| **MPO** | Metropolitan Planning Organization |
| **MSP** | Maryland State Police |
| **NS** | Norfolk Southern Corporation |
| **OS/OW** | Oversize/Overweight |
| **USDOT** | United States Department of Transportation |

# 14.0 GLOSSARY

| | |
|---|---|
| **Arterial** | A main road with many roads branching off of it. A type of road as defined by the Federal Highway Administration. |
| **Barge** | A marine vessel that is pushed or towed by tugboats used to transport freight. They are usually unpowered. |
| **Carriers** | Organizations or individuals that transport people or freight. |
| **Clearance** | The amount of space needed for a moving object to safely pass a stationary object. Vertical clearance is the space from the ground to the underside of a bridge or overpass. Double-stack clearance is the vertical clearance needed for a double-stacked rail freight car to pass through. |
| **Cluster** | A close geographic grouping. |
| **Commercial vehicle** | Any motor vehicle that is designed, used and maintained for the transportation of goods or property, (this does not include passenger vehicles) |
| **Commodities** | Description of the types of goods that are bought and sold. |
| **Congestion** | When movement or flow on a roadway is restricted (typically) due to the number of other vehicles. |
| **Container** | A rectangular storage unit commonly used to transport goods. Commonly associated with Intermodal transportation. |
| **Distribution center** | Central warehouse where goods are housed prior to delivery to individual stores. |
| **Drayage** | Movement of goods by truck over a short distance, often as part of a longer overall move (such as between a port and a rail terminal). These trips are normally completed within a single day. |
| **Export** | Movement of goods out of an area or region. |
| **Freight** | Goods or materials moved by truck, ship, train, pipeline, or plane. |
| **Freight volume** | Space designed to store, transfer, and/or transport freight. |
| **Freight-generating industry** | An industry that is involved in the production or transport of goods. |
| **Fulfillment center** | Central warehouse where goods are housed prior to delivery directly to individuals or businesses. Typically associated with online commerce (e-commerce). |

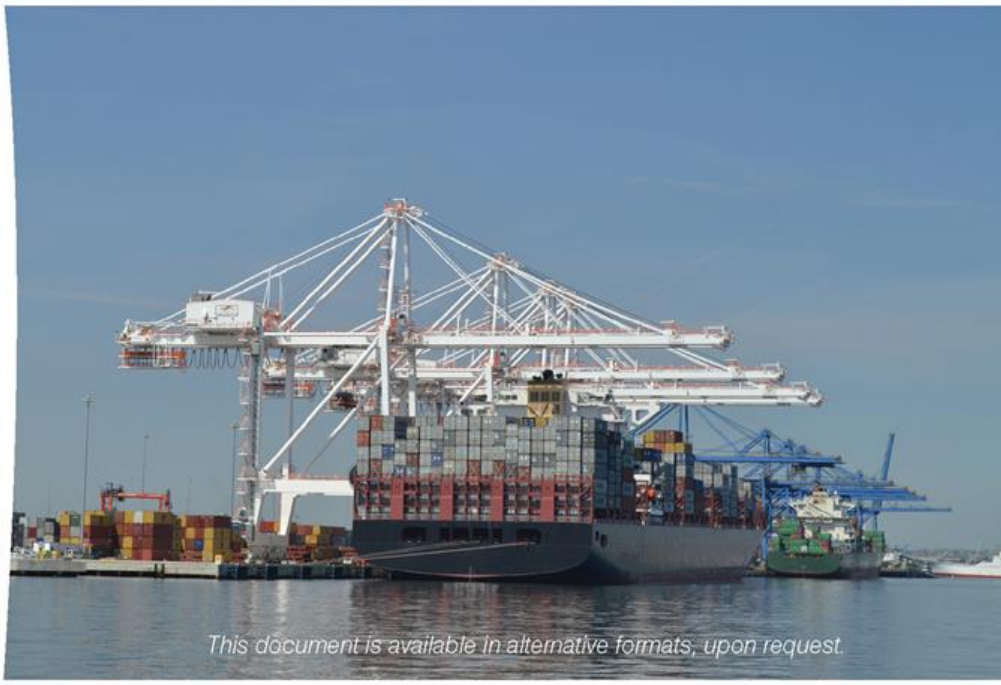
| | |
|---|---|
| **Goods movement (also freight transportation)** | The movement of any product that is used in the economy. This includes "freight" which is typically identified with raw material, energy products, waste, and other "heavy" goods, as well as packages, parcels, and other "consumer" shipments. |
| **Hours of Service (HOS)** | Federal rules governing the work hours for commercial drivers. |
| **Import** | Movement of goods into an area or region. |
| **Infrastructure** | Services and facilities necessary for the economy to function. |
| **Intelligent Transportation Systems (ITS)** | Information-sharing technology integrated into the transportation system infrastructure, and in vehicles. It is designed to help monitor and manage traffic flow, reduce congestion, and provide alternate routes. |
| **Intermodal terminal** | A facility where freight is transferred between modes. |
| **Loading zone** | Locations designed for the loading and unloading of freight. They may be on-street or off-street; Loading Docks are structures which allow a truck to load/unload directly from the bed of the truck. |
| **Logistics** | The management of the freight movement system; making sure the right amount of the right products are shipped to and from the correct location. |
| **Motor carrier** | A highway passenger or freight carrier operating for compensation. |
| **Moving Ahead for Progress in the 21st Century (MAP-21)** | Federal surface transportation spending bill passed in 2012. |
| **Multimodal** | A shipment of goods utilizing several modes of transportation (air, truck, ship, etc.) combined with the connections between them (port, airport, etc.) |
| **Omni-channel retail** | A marketing approach that allows consumers to interact with a retailer seamlessly across multiple "channels," including in-store, online, mobile devices, television, catalogs, etc. |
| **Oversize/Overweight (OS/OW)** | Truck shipments that are above legal size and/or weight limits |
| **Over-the-road** | Long-distance truck moves often requiring multiple days of travel. |
| **Railroads** | Operators of rail transportation systems, including:<br>*Class I – railroads with annual operating revenues above $250 million*<br>*Shortline- railroads with annual operating revenues under $20 million*<br>*Commuter- railroads move passengers during peak times to/from or within a metropolitan area; and* |

| | |
|---|---|
| | *Intercity Passenger- railroads that move passengers longer distances, often from one metropolitan area to another or from one state to another.* |
| **Resiliency** | Ability to withstand or overcome changes or challenges |
| **Shipper and Receiver** | The shipper is responsible for sending cargo. A receiver is the party to which the goods are transported. |
| **Supply chain** | The sequence of movements needed to move raw materials through production and to the final consumer. |
| **Trading partners** | Regions that are origins or destinations for goods. |
| **Trip** | Movement of goods from one location to another. |
| **Truck parking** | Facilities located on-highway (such as a state-operated rest area) or off-highway (such as a private truck stop), which provide spaces for trucks to park and drivers to rest. |

# MARYLAND
## STRATEGIC GOODS
### MOVEMENT PLAN

MARYLAND DEPARTMENT OF TRANSPORTATION

**Maryland Department of Transportation**
7201 Corporate Center Drive
Hanover, Maryland 21076




# APPENDIX A

## Table A-1: CRITICAL URBAN AND RURAL FREIGHT CORRIDOR DESIGNATIONS

| MAP ID | CRFC | COUNTY | MPO AREA | DESIGNATING PARTY | START | END | PHFN CONNECTIVITY | INTERSTATE CONNECTIVITY | INTERMODAL CONNECTIVITY | FREIGHT GENERATOR | SIGNIFICANT FREIGHT | MILES | FHWA REQUIREMENTS (CRFC_ID/CUFC_ID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | US 50 | Queen Anne, Talbot | BMC / Wilmapco | *MDOT | Nesbit Rd | Skipton Landing Rd | | | | X | X | 11.1 | D, G |
| 2 | US 301 | Queen Anne, Kent, Cecil | BMC / Wilmapco | *MDOT | US 50 | MD / DE State Line | | | | X | X | 39.4 | D, F, G |
| 3 | MD 32 | Howard | BMC | *MDOT | West Friendship Rd | Triadelphia Rd | X | X | X | | X | 7.9 | D, F, G |
| 4 | US 340 | Frederick | HEPMPO | *MDOT | Gene Hemp Rd | Burkittsville Rd | | | X | | X | 3.7 | D, F, G |
| 5 | US 340 | Washington | MEPMPO | *MDOT | Keep Trust Rd | MD / VA State Line | | | X | | X | 2.2 | D, F, G |
| 6 | US 15 | Frederick | MWCOG | *MDOT | Catoctin Furnace Rd | Sundays Lane | | | | X | X | 6.3 | D, G |
| 7 | US 15 | Frederick | MWCOG | *MDOT | Motters Station Rd | Fitzgerald Rd | | | | X | X | 2.9 | D, G |
| 8 | US 301 | Charles | MWCOG | *MDOT | Sadie Lane | MD / VA State Line | | | X | | X | 11.6 | D, F, G |
| 9 | US 13 | Somerset | Salisbury / Wicomico MPO | *MDOT | Jones Rd | MD 675 | | | X | | X | 4.8 | D, F, G |
| 10 | US 50 | Wicomico, Dorchester | Salisbury / Wicomico MPO | *MDOT | MD 16 | Porter Mill Rd | | | | | X | 20.6 | D, G |
| 11 | US 50 | Wicomico, Worcester | Salisbury / Wicomico MPO | *MDOT | Forest Grove Rd | Caleb Rd | | | | | X | 13.4 | D, G |
| 12 | US 13 | Somerset, Worcester | Salisbury / Wicomico MPO | *MDOT | MD 413 | MD / VA State Line | | | X | | X | 14.5 | D, F, G |
| 13 | US 50 | Talbot, Dorchester | Salisbury / Wicomico MPO | *MDOT | Bat Acres Dr | Byrn St | | | | | X | 10.3 | D, G |
| **TOTAL** | | | | | | | | | | | | **148.7** | |

| MAP ID | CUFC | COUNTY | MPO AREA | DESIGNATING PARTY | START | END | PHFN CONNECTIVITY | INTERSTATE CONNECTIVITY | INTERMODAL CONNECTIVITY | FREIGHT GENERATOR | SIGNIFICANT FREIGHT | MILES | FHWA REQUIREMENTS (CRFC_ID/CUFC_ID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Broening Hwy | Baltimore City, Baltimore Co | BMC | BMC | Boston St | Belcare Rd | X | | X | X | | 2.5 | H, I, J, K |
| 15 | E. Lombard St | Baltimore City | BMC | BMC | Haven St | Kane St | X | X | X | X | X | 1.8 | H, I, J, K |
| 16 | Boston St | Baltimore City | BMC | BMC | Fleet St | I-895 | X | X | X | X | X | 2.0 | H, I, J, K |
| 17 | O'Donnell St | Baltimore City | BMC | BMC | South Conkling St | Dundalk Ave | X | X | X | X | X | 1.7 | H, I, J, K |
| 18 | MLK Jr. Blvd | Baltimore City | BMC | BMC | North Howard St | I-395 | X | X | X | X | | 2.0 | H, I, J, K |
| 19 | New Ridge Rd | Anne Arundel | BMC | BMC | MD 100 | Stoney Run Rd | | | X | X | | 1.9 | H, I, J, K |
| 20 | MD 100 | Anne Arundel | BMC | BMC | MD 295 | I-97 | X | X | X | X | X | 5.5 | H, I, J, K |
| 21 | Rolling Mill Rd | Baltimore Co | BMC | BMC | Erdman Ave | Eastern Blvd | | | X | X | | 1.3 | H, I, J, K |
| 22 | Broening Hwy | Baltimore Co | BMC | BMC | Belcare Rd | I-695 | X | | X | X | | 1.4 | H, I, J, K |
| 23 | MD 97 | Carroll | BMC | BMC | MD 140 | Bachmans Valley Rd | | | X | X | | 2.4 | H, I, J, K |
| 24 | MD 543 | Harford | BMC | BMC | I-95 | I-95 | X | X | X | X | X | 0.0 | H, I, J, K |
| 25 | MD 175 | Howard | BMC | BMC | US 1 (Washington Blvd) | MD 108 | X | X | X | X | X | 1.2 | H, I, J, K |
| 26 | US 1 | Howard | BMC | BMC | Montevideo Rd | Assateague Rd | X | | X | X | | 0.7 | H, I, J, K |
| 27 | US 15 | Frederick | MWCOG | MWCOG | MD 26 | US 40 / South Jefferson St (US 340) | | | X | X | | 3.2 | H, I, J, K |
| 28 | US 40 | Frederick | MWCOG | MWCOG | US 15 / US 340 | I-70 / I-270 | X | X | | X | X | 0.6 | H, I, J, K |
| 29 | US 15 / US 340 | Frederick | MWCOG | MWCOG | I-70 | Mt. Zion Rd | X | X | | X | X | 2.5 | H, I, J, K |
| 30 | US 15 | Frederick | MWCOG | MWCOG | Hayward Rd | MD 26 | | | X | | | 1.0 | H, I, J, K |
| 31 | US 301 | Charles | MWCOG | MWCOG | Mattawoman Rd | Smallwood Dr | | | X | | X | 4.0 | H, I, J, K |

| MAP ID | CUFC | COUNTY | MPO AREA | DESIGNATING PARTY | START | END | PHFN CONNECTIVITY | INTERSTATE CONNECTIVITY | INTERMODAL CONNECTIVITY | FREIGHT GENERATOR | SIGNIFICANT FREIGHT | MILES | FHWA REQUIREMENTS (CRFC_ID/CUFC_ID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | US 50 | Prince George's | MWCOG | MWCOG | DC / MD State Line | MD 410 | X | | X | X | X | 4.1 | H, I, J, K |
| 33 | MD 198 | Montgomery , Prince George's | MWCOG | MWCOG | Old Columbia Pike | I-95 | X | X | | | X | 2.6 | H, I, J, K |
| 34 | MD 201 (Kenilworth Ave) | Prince George's | MWCOG | MWCOG | US 50 | MD State / DC Line | | X | X | | X | 0.5 | H, I, J, K |
| 35 | MD 4 | Prince George's | MWCOG | MWCOG | I-95 | MD 337 | X | X | | | X | 0.9 | H, I, J, K |
| 36 | MD 185 (Conn. Ave) | Montgomery | MWCOG | MWCOG | I-495 | MD 410 (East West Hwy) | X | X | X | | X | 1.2 | H, I, J, K |
| 37 | MD 5 | Prince George's | MWCOG | MWCOG | Surratts Rd | MD 373 | | X | | | | 3.5 | H, I, J, K |
| 38 | Halfway Blvd | Washington | HEPMPO | *MDOT | Hopewell Rd | I-70 / MD 632 | X | X | X | X | X | 2.7 | H, I, J, K |
| 39 | MD 63 | Washington | HEPMPO | *MDOT | I-70 | Elliott Pkwy | X | X | X | X | X | 0.9 | H, I, J, K |
| 40 | MD 65 | Washington | HEPMPO | *MDOT | Col Henry K Douglas Dr | Oak Ridge Dr | X | X | X | | X | 0.8 | H, I, J, K |
| 41 | East Oak Ridge Dr | Washington | HEPMPO | *MDOT | MD 65 | Villa Ridge Dr | | | X | | | 0.5 | H, I, J, K |
| 42 | MD 51 | Allegany | Cumberland MPO | *MDOT | I-68 | Old Town Rd | X | X | X | X | X | 2.5 | H, I, J, K |
| 43 | US 220 | Allegany | Cumberland MPO | *MDOT | MD 956 (Patriot Pkwy) | Potomac St | | X | X | X | | 2.4 | H, I, J, K |
| 44 | MD 4 | St. Mary's, Calvert | St. Mary's / Calvert MPO | *MDOT | Patuxent Point Pkwy | MD 235 | | | | X | | 5.0 | J, K |
| 45 | US 50 (Salisbury Bypass) | Wicomico | Salisbury / Wicomico MPO | *MDOT | US 13 BU (N Salisbury Blvd) | Jersey Rd | | | X | | X | 1.9 | H, I, J, K |
| 46 | US 13 (Salisbury Bypass) | Wicomico | Salisbury / Wicomico MPO | *MDOT | US 13 BU (N Salisbury Blvd) / US 50 (Salisbury Bypass) | US 50 BU | | | X | | X | 3.1 | H, I, J, K |
| 47 | MD 222 | Cecil | Wilmapco | *MDOT | I-95 | US 40 (Pulaski Hwy) | X | X | X | X | X | 1.7 | H, I, J, K |

| MAP ID | CUFC | COUNTY | MPO AREA | DESIGNATING PARTY | START | END | PHFN CONNECTIVITY | INTERSTATE CONNECTIVITY | INTERMODAL CONNECTIVITY | FREIGHT GENERATOR | SIGNIFICANT FREIGHT | MILES | FHWA REQUIREMENTS (CRFC_ID/CUFC_ID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | MD 272 | Cecil | Wilmapco | *MDOT | I-95 | US 40 (Pulaski Hwy) | X | X | X | X | X | 1.8 | H, I, J, K |
| 49 | MD 279 | Cecil | Wilmapco | *MDOT | I-95 | MD /DE Line | X | X | X | X | X | 1.2 | H, I, J, K |
| | **TOTAL** | | | | | | | | | | | **73.0** | |

*MDOT designated routes were coordinated with individual MPO's.

### A-2: LIST OF MULTIMODAL FREIGHT ELIGIBLE PROJECTS – FUNDED AND UNFUNDED

# HIGHWAY – FUNDED PROJECTS

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| 10 Virtual Weigh Stations | Statewide | 10 Virtual Weigh Stations | Maryland Freight Route | Construction | N/A | MDTA | $3,920 |
| Weigh Station and Bridge Upgrades | Baltimore City, Baltimore, Harford | Weigh Station Upgrades, Kennedy, Bay and Hatem Bridges | Maryland Freight Route | Construction | N/A | MDTA | Open to Service |
| I-95 JFK Memorial Highway | Baltimore | Express Toll Lanes from I- 895 to MD 43 | Maryland Freight Route, NHFN | Project Planning / Engineering / Right-of-Way | N/A | MDTA | $9,676 |
| I-95 JFK Memorial Highway | Baltimore County | I-95 Bridge over Little Northeast Creek | Maryland Freight Route, NHFN | Engineering | N/A | MDTA | $13,349 |
| I-95 JFK Memorial Highway | Baltimore City | Port Covington Access to I-95. Improvements being evaluated include potential changes to the I-95 ramps between Hanover Street and Key Highway. | Maryland Freight Route, NHFN | Planning (***INFRA 2017 Submission***) | N/A | MDTA | $33,000 |
| I-95 JFK Memorial Highway | Baltimore, Harford, Cecil | Resurface I-95 northbound and southbound from MD 43 to the Maryland/Delaware state line. Phase I is from MD 43 to MD 24. | Maryland Freight Route, NHFN | Engineering | N/A | MDTA | $19 |
| I-95 JFK Memorial Highway | Baltimore, Harford, Cecil | Repair substructure and superstructure of thirty-one bridges on I-95 in Baltimore, Harford, and Cecil counties. The work includes structural weld repairs, structural steel repairs, roadway joint repairs, and application of protective coatings. | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $6,921 |
| I-95 JFK Memorial Highway | Baltimore, Harford, Cecil | Update and replace sign structures along the John F. Kennedy Memorial Highway. | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $13,761 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-95 JFK Memorial Highway | Cecil | Rehabilitate the decks on three bridges on I-95 in Cecil County. Bridges included are I-95 over MD 824, I-95 over MD 545 and Little Elk Creek, and I-95 over MD 279 | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $21,054 |
| I-95 Fort McHenry Tunnel | Baltimore City | Replace the Fort McHenry Tunnel lighting systems. | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $15,500 |
| I-95 Fort McHenry Tunnel | Baltimore City | This project will reconfigure I-95 to provide four continuous mainline lanes in each direction from north of the Fort McHenry Toll Plaza to the southern end of the I-95 ETL. | Maryland Freight Route, NHFN | Engineering/ Construction | N/A | MDTA | $47,230 |
| MD 695 | Baltimore City, Anne Arundel, Baltimore | Perform substructure and superstructure rehabilitation at twenty bridges on MD 695 | Maryland Freight Route | Construction | N/A | MDTA | $10,541 |
| I-895 | Baltimore City | Replace Canton Viaduct | Maryland Freight Route, NHFN | Engineering/ Right-of-Way/ Construction | N/A | MDTA | $323,110 |
| I-895 | Baltimore City | Replace the deck and superstructure of the bridge over the Patapsco Flats. | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $41,527 |
| I-895 | Baltimore City, Anne Arundel, Baltimore, | Rehabilitate substructure and superstructure of various bridges on I-895 north and south of the Baltimore Harbor Tunnel including the Glen Burnie spur. | Maryland Freight Route, NHFN | Construction | N/A | MDTA | $14,915 |
| US 50/301 Harry W. Nice Memorial Bridge | Charles | Replace the current bridge with a new 4-lane bridge. | Maryland Freight Route | Engineering / Right-of-Way/ Construction | N/A | MDTA | $729,066 |
| US 50/301 Harry W. Nice Memorial Bridge | Charles | Structural Repairs and Miscellaneous Modifications | Maryland Freight Route | Engineering / Construction | N/A | MDTA | $43,153 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| US 50/301 Harry W. Nice Memorial Bridge | Charles | Rehabilitate Suspension Spans Westbound Bridge | Maryland Freight Route | Engineering / Construction | N/A | MDTA | $27,004 |
| US 50/301 Bay Bridge | Anne Arundel | Rehabilitate Eastbound Bridge Deck | Maryland Freight Route, NHFN | Engineering | N/A | MDTA | $6,770 |
| US 50/301 Bay Bridge | Anne Arundel | Tier 1 NEPA Study including Complete traffic, engineering, and environmental analyses | Maryland Freight Route, NHFN | Planning | N/A | MDTA | $4,500 |
| MD 200 InterCounty Connector | Montgomery, Prince George's | Constructed a new east-west, multi-modal highway in Montgomery and Prince George's counties between I-270 and I-95/US 1. | Maryland Freight Route | Right-of-Way/ Construction | N/A | MDTA | $15,431 |
| Railroad Crossings | Statewide | Safety and Spot Improvements | Maryland Freight Route, NHFN | Engineering/ Construction | S/F | SHA | $17,500 |
| Truck Weigh Program | Statewide | Program to install and maintain Truck Weigh Stations | Maryland Freight Route, NHFN | Engineering | S/F | SHA | $38,100 |
| US 220 | Allegany | Study to upgrade and/or relocate US 220 and/or MD 53 from I-68/US 40 to Cresaptown/WV Line | NHFN | Project Planning | S/F | SHA | $5,926 |
| MD 295 | Anne Arundel | Study Widen to 6 lanes from MD 100 to I-195, | Maryland Freight Route | Project Planning | S/F | SHA | *PLANNING COMPLETE* |
| US 50 | Anne Arundel | MD 70 to MD 2, including Severn River / Pearl Bridges | Maryland Freight Route, NHFN | Project Planning / Engineering / Right-of-Way | S/F | SHA | $19,688 |
| MD 3 | Anne Arundel/ Prince George's | Study to upgrade from US 50 to MD 32 to address safety and capacity concerns | Maryland Freight Route | Project Planning | S/F | SHA | *PROJECT ON HOLD* |
| MD 175 | Anne Arundel | Study to identify/ improve traffic flow from MD 295 to MD 170 including the MD 175/MD 295 (BRAC) | Maryland Freight Route | Partial Engineering | S/F | SHA | $495 |
| MD 198 | Anne Arundel | Study to address capacity needs on MD 198 from MD 295 to MD 32 (2.7 miles). Bicycle and pedestrian access will be provided where appropriate. (BRAC) | Maryland Freight Route | Engineering | S/F | SHA | $656 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-83 | Baltimore | Replace Bridge 03062 over Padonia Rd | Maryland Freight Route, NHFN | Engineering/ Construction | S/F | SHA | $35,841 |
| I-695 | Baltimore | Traffic Management Strategies | Maryland Freight Route, NHFN | Engineering | S/F | SHA | $17,000 |
| I-695 | Baltimore | Widening OL from US 40 to MD 144 Upgrade to 8 lanes | Maryland Freight Route, NHFN | Engineering/ Right-of-Way/ Construction | S/F | SHA | $103,586 |
| I-695 | Baltimore | This project will provide a continuous auxiliary lane on both the IL and OL between MD 41 (Perring Pkwy) and MD 147 (Harford Rd). Includes wider median shoulders on I-695; replacement of existing Old Harford Rd bridge over I-695 and ramp modifications on the IL at the MD 147 interchange. Traffic Management Strategies | Maryland Freight Route, NHFN | Engineering/ Construction | S/F | SHA | $543 |
| I-695 | Baltimore | Replace Bridge 03125 on Crosby Rd over I-695 | Maryland Freight Route, NHFN | Engineering / Right-of-Way | S | SHA | $7,539 |
| I-695 | Baltimore | Replace Bridge 03140 over Milford Mill Rd | Maryland Freight Route, NHFN | Construction | S/F | SHA | $3,558 |
| I-695 | Baltimore | Replace Bridge 03113 on IL over Benson Ave and Bridge 03114 on IL over Leeds Ave., US 1, AMTRAK and Herbert Run. This project also includes the realignment of the access to the I-695 on-ramp from Leeds Ave. to US 1 | Maryland Freight Route, NHFN | Right-of-Way/ Construction | S/F | SHA | $22,350 |
| I-695 | Baltimore | Widening from I-95 to MD 122 Upgrade to 8 Lanes | Maryland Freight Route, NHFN | Engineering | S/F | SHA | *PROJECT ON HOLD* |
| I-695 | Baltimore | Widening from I-83 (JFX) to I-95 (JFX) Upgrade to 8 Lanes | Maryland Freight Route, NHFN | Planning | S/F | SHA | $245 |
| I-795 | Baltimore | Study to develop interchange options at Dolfield Boulevard. Includes widening of I-795 from Owings Mills Boulevard (MD 940) to Franklin Boulevard from 4 to 6 lanes. | Maryland Freight Route, | Engineering | S/F | SHA | $4,152 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-70 | Baltimore | I-695 Interchange Study to replace/rehabilitate bridges, 0312703, 0312704, 0312805, 0312903 and 0312904 | Maryland Freight Route, NHFN | Planning | S | SHA | $21 |
| US 40 | Baltimore | Replace and widen substructure on Bridges 0303403 and 0303404 over Little Gunpowder Falls and Bridges 0303503 and 0303504 over Big Gunpowder Falls. | Maryland Freight Route, | Engineering / Right-of-Way/ Construction | S/F | SHA | $26,083 |
| MD 4 | Calvert | Study to upgrade MD 4 between MD 2 and MD 235, including the Governor Thomas Johnson Memorial Bridge (Bridge 04019) over the Patuxent River and the intersection at MD 235. | Maryland Freight Route, | Engineering | S/F | SHA | $14,319 |
| MD 140 | Carroll | Study to consider capacity improvements along MD 140 between Market Street and Sullivan Road through Westminster | NHFN | Planning | S/F | SHA | *PLANNING COMPLETE* |
| MD 222 | Cecil | Replace Bridge 07027 over Rock Run. | NHFN | Open to Service | S/F | SHA | $352 |
| MD 272 | Cecil | Replace Bridge 7036 over Amtrak | NHFN | Construction | S/F | SHA | $29,064 |
| US 301 | Charles/Prince George's | The South Corridor Transportation Study includes highway and transit improvements between the Potomac River/ VA State Line and I-595/US50. | Maryland Freight Route | Planning | S/F | SHA | *PROJECT ON HOLD* |
| US 301 | Charles | Study to upgrade US 301 intersections at MD 5 and MD 228/MD 5BU. | Maryland Freight Route | Planning | S/F | SHA | $4,013 |
| I-270 | Frederick, Montgomery | Implementation of innovative congestion management (ICM) tools to reduce congestion on I-270, including the east I-270 and west I-270 spurs. Improvements will include a series of roadway and technology-based improvement. | Maryland Freight Route | Construction | S | SHA | $108,240 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-270 at US 15 | Frederick, Montgomery | Multimodal corridor study to consider highway and transit improvements in the I-270/US 15 corridor in Montgomery and Frederick Co.'s from Shady Grove Metro Station to north of Biggs Ford Rd (32.5 miles) | Maryland Freight Route | Planning | S/F | SHA | *PROJECT ON HOLD* |
| US 15 / US 40 | Frederick | Planning and preliminary engineering study to improve safety and mainline operations along US 15 and US 40 from I-270 to MD 26. | Maryland Freight Route, NHFN | Planning / Engineering | S/F | SHA | $3,809 |
| US 15 / US 40 | Frederick | Improvement study to construct a grade-separated interchange and park and ride lot at Monocacy Blvd. | Maryland Freight Route, NHFN | Right-of-Way/ Construction | S/F | SHA | $18,345 |
| US 15 | Frederick | Replace Bridge 10097 over MD 26 | Maryland Freight Route, NHFN | Engineering / Construction | S/F | SHA | $2,427 |
| I-70 | Frederick | Widen to 6 lanes between Mount Phillip Rd to I-270 (3 miles). Phase 4 of the 4-phase project to upgrade I-70 from Mount Phillip to east of MD 144FA. | Maryland Freight Route, NHFN | Engineering | S/F | SHA | *PROJECT ON HOLD* |
| I-70/US 40 | Frederick | Study to construct interchange improvements at Meadow Rd, MD 144A and Old National Pike | Maryland Freight Route, NHFN | Engineering | S/F | SHA | County & Developer Funded |
| US 40 | Harford | Intersection improvements at MD7/MD 159 (Phase 2). (BRAC) | Maryland Freight Route | Construction | S/F | SHA | $33,180 City of Aberdeen, Harford Co. funds for CO. |
| I-70 | Howard | Study to address existing/future capacity needs between MD 32 and US 29. | Maryland Freight Route, NHFN | Planning | S/F | SHA | *PROJECT ON HOLD* |
| I-95 | Howard | Active Traffic Management (ATM). Construct facilities to accommodate peak hr shoulder use between MD 32 to MD 100 | Maryland Freight Route, NHFN | Engineering | S | SHA | $1,800 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-95 / I-495 | Montgomery | Managed Lanes Study to widen I-495 and determine the feasibility of managed lanes from the American Legion Bridge to the Woodrow Wilson Bridge. | Maryland Freight Route, NHFN | Planning | S/F | SHA | *PLANNING ON HOLD* |
| I-95 / I-495 | Montgomery | Planning Study of I-495 improvements from the I-270 eastern spur to the current terminus of High Occupancy Toll (HOT) lane facilities in VA, including the Bridge to the Woodrow Wilson Bridge | Maryland Freight Route, NHFN | Planning | S | SHA | $3,920 |
| I-495 | Montgomery | Resurface Inner Loop from I-270Y to Seminary Rd | Maryland Freight Route, NHFN | Construction | S | SHA | $1,063 |
| I-270 | Montgomery | Multimodal Corridor Study. Construct new interchange at Watkins Mill Rd | Maryland Freight Route | Right-of-Way/ Construction | S/F | SHA | $103,116 |
| Seminary Rd | Montgomery | Bridge 1512900 over I-495; Bridge deck replacement | Maryland Freight Route | Construction | S/F | SHA | $7,097 |
| I-95 / I-495 | Prince Georges | Improvements. Phase 2 Access improvements from MD 5 (Branch Ave.) to the Branch Ave Metro Station including improvements to the Access Rd, ped bridge and the County Roads (Auth Rd, Auth Place and Auth Way). | Maryland Freight Route, NHFN | Open to Service | S/F | SHA | $823 |
| I-95 / I-495 | Prince Georges | Construct a full interchange at the Greenbelt Metro Station. | Maryland Freight Route, NHFN | Engineering | S/F | SHA | $1,394 *PROJECT ON HOLD* |
| I-95 / I-495 | Prince Georges | Replace Bridges 1616205 and 1616206 over Suitland Rd | Maryland Freight Route, NHFN | Construction | S/F | SHA | $28,712 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-95 / I-495 | Prince Georges | Replace Bridges 1616005 and 1616006 over Suitland Pkwy. | Maryland Freight Route, NHFN | Engineering | S/F | SHA | $53,400 |
| I-95 / I-495 | Prince Georges | Study to widen I-495 and determine the feasibility of managed lanes from the American Legion Bridge to the Woodrow Wilson Bridge | Maryland Freight Route, NHFN | Planning | S/F | SHA | PROJECT ON HOLD |
| I-495 | Prince Georges | Planning study of I-495 improvements from the current terminus of high occupancy toll (HOT) lane facilities in Virginia to the Baltimore Washington Parkway, including the American Legion Bridge. | Maryland Freight Route, NHFN | Project Planning | S | SHA | $3,920 |
| I-95 | Prince Georges | Widening/Managed Lanes from American Legion Bridge to Woodrow Wilson Bridge. | Maryland Freight Route, NHFN | Planning | | SHA | *PLANNING ON HOLD* |
| I-95 | Prince Georges | Replace Bridge 1615305 and 1612306 over MD 214 | Maryland Freight Route, NHFN | Engineering | S/F | SHA | $63,649 |
| US 50 | Prince Georges | Construct safety and resurfacing improvements from east of Lottsford Vista Rd to AA Co. Line (WB) | Maryland Freight Route, NHFN | Construction | S/F | SHA | $7,501 |
| US 50 | Prince Georges | Feasibility study to investigate improving traffic capacity and operations from the D.C. Line to MD 704 | Partial - Maryland Freight Route, NHFN | Planning | S/F | SHA | PLANNING COMPLETE |
| MD 4 | Prince Georges | Construct a new interchange at Suitland Pkwy. (BRAC) | Maryland Freight Route | Construction | S/F | SHA | $175,032 |
| MD 4 | Prince Georges | Upgrade to a multilane freeway from MD 223 to I-95/I-495 | Maryland Freight Route | Project Planning | S/F | SHA | PLANNING COMPLETE |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| US 301 | Prince Georges | Study to upgrade and widen from north of Mount Oak Rd to US 50, and MD 197 from US 301 to Mitchellville Rd. | Maryland Freight Route | Project Planning | S/F | SHA | *PROJECT ON HOLD* |
| US 301 | Prince Georges | Study to upgrade intersections at MD 228/ MD 5BU | Maryland Freight Route | Project Planning | S/F | SHA | $4,013 |
| US 301 | Queen Anne's | Construct a new interchange at MD 304. J-turns at the intersection of US 301 and MD 304 are also being constructed as a part of the project. | Maryland Freight Route | Construction | S/F | SHA | $4,807 |
| US 50 | Queen Anne's | Widen to 6 lanes from US 301 at Queenstown to MD 404, acquire access controls and replace at-grade intersections with interchanges. | Maryland Freight Route | Right-of-Way | S/F | SHA | $51 |
| MD 4 | St Mary's | Study to upgrade MD 4 between MD 2 and MD 235, including the Governor Thomas Johnson Memorial Bridge (Bridge 04019) over the Patuxent River and the intersection at MD 235 | NHFN | Engineering | S/F | SHA | $14,319 |
| I-70 | Washington | Interchange improvements study at MD 65. (bridge replacement and capacity improvements) | Maryland Freight Route, NHFN | Project Planning | S/F | SHA | $642 |
| I-81 | Washington | Upgrade and widen from US 11 in WVA to north of MD 63/MD 68. Phase 1 of a 4 Phase project to widen I-81 from the Potomac River/ WVA State Line to the PA State Line. | Maryland Freight Route, NHFN | Construction | S/F | SHA | $112,566 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| I-81 | Washington | Study to upgrade and widen to a 6-lane divided highway between the Potomac River/ WVA State Line and PA State Line | Maryland Freight Route, NHFN | Engineering ***(INFRA 2017 Submission)*** | S/F | SHA | $7,560 |
| US 50 | Worcester | Study to replace Bridge 23007 over Sinepuxent Bay. This study will investigate options to eliminate/upgrade the drawspan structure | Maryland Freight Route | Planning | S/F | SHA | PLANNING COMPLETE |

*Costs reflect status costs only from FY18 CTP.

# HIGHWAY – UNFUNDED PROJECTS

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|
| I-97 – No Name | Anne Arundel | US 50/301 to N. of MD 32 - Freeway Reconstruct/ Managed Lanes | Maryland Freight Route, NHFN | HNI | SHA | $657,700 |
| I-97 – No Name | Anne Arundel | N. MD 32 to I-695 - Freeway Reconstruct/ Managed Lanes | Maryland Freight Route, NHFN | HNI | SHA | $770,500 |
| I- 195 - Metropolitan Boulevard | Anne Arundel | MD 170 to MD 295 - Freeway Reconstruct (includes Interchange at MD 170) | Maryland Freight Route, NHFN | HNI | SHA | $213,800 |
| I-695 - Baltimore Beltway | Anne Arundel | W. of MD 648E to Baltimore County line - Freeway Reconstruct (includes Interchange at MD 295) | Maryland Freight Route, NHFN | HNI | SHA | $304,600 |
| MD 100 - No Name | Anne Arundel | Howard County line to MD 10 - Freeway Reconstruct (Includes Interchange at MD 295 and MD 713) | Maryland Freight Route, | HNI | SHA | $1,518,300 |
| US 50 - Blue Star Memorial Highway | Anne Arundel | MD 70 to Begin Toll Maintenance - Freeway Reconstruct/Managed Lanes | Maryland Freight Route, NHFN | HNI | SHA | $1,025,400 |
| I -70 - Interstate 70 | Baltimore | Howard County line to I-695 - Freeway reconstruct | Maryland Freight Route, NHFN | HNI | SHA | $280,600 |
| I-83 - Harrisburg Expressway | Baltimore | Belfast Road to Pennsylvania line - Freeway reconstruct | Maryland Freight Route, NHFN | HNI | SHA | $597,900 |
| I -695 - Baltimore Beltway | Baltimore | MD 140 to I-83 North - Freeway reconstruct | Maryland Freight Route, NHFN | HNI | SHA | $585,900 |
| I- 795 - Northwest Expressway | Baltimore | I-695 to MD 940 (Owings Mills Blvd.) - Freeway reconstruct | Maryland Freight Route | HNI | SHA | $525,900 |
| I- 795 - Northwest Expressway | Baltimore | MD 940 to MD 140 - Freeway reconstruct | Maryland Freight Route | HNI | SHA | $335,800 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|
| I- 795 - Northwest Expressway | Baltimore | At Dolfield Boulevard - Interchange construct | Maryland Freight Route | HNI | SHA | $110,400 |
| MD 295 - Baltimore Washington Parkway | Baltimore | Anne Arundel County to Baltimore City line (s) Freeway reconstruct | Maryland Freight Route | HNI | SHA | $131,300 |
| US 50 - The Ocean Gateway | Dorchester | MD 16 north to Old Ocean Gateway - Freeway reconstruct (includes interchanges) | Maryland Freight Route | HNI | SHA | $131,900 |
| I- 70 - Eisenhower Memorial Highway | Frederick | Washington County Line to west of Mt. Phillip Road - Freeway reconstruct (includes interchanges) | Maryland Freight Route, NHFN | HNI | SHA | $656,100 |
| US 15 - Jefferson National Pike | Frederick | US 340 West Split to I-70 - Freeway reconstruct (includes interchanges) | Maryland Freight Route, NHFN | HNI | SHA | $156,200 |
| US 340 - Jefferson National Pike | Frederick | St. Mark Road to US 15 - Freeway reconstruct (includes interchanges) | NHFN | HNI | SHA | $303,900 |
| US 40 - Pulaski Highway | Harford | MD 543 to MD 715 - Multi-lane reconstruct | Maryland Freight Route | HNI | SHA | $120,200 |
| I- 95 | Howard | Prince George's County to Baltimore County line - Freeway reconstruct (includes Managed lanes, interchanges) | Maryland Freight Route, NHFN | HNI | SHA | $1,292,900 |
| I-270 - Eisenhower Memorial Highway | Montgomery | I-495 to I-370 - Freeway reconstruct (includes managed lanes/interchange) | Maryland Freight Route, NHFN | HNI | SHA | $199,700 |
| I- 270 Y - Eisenhower Memorial Highway | Montgomery | I-495 to I-270 - Freeway Reconstruct (includes managed lanes/interchanges) | Maryland Freight Route, NHFN | HNI | SHA | $1,181,600 |
| I- 95 - Rd | Prince Georges | I-495 to Howard County line - Freeway reconstruct (includes managed/CD lanes, and interchanges) | Maryland Freight Route, NHFN | HNI | SHA | $621,800 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|
| MD 4 - Pennsylvania Avenue | Prince Georges | Patuxent River to I-95 - Freeway reconstruct (includes interchanges) | Maryland Freight Route | HNI | SHA | $802,400 |
| MD 201 - EX | Prince Georges | Cherrywood Lane to Cherry Lane - Multi-lane construct | Maryland Freight Route | HNI | SHA | $773,600 |
| US 13 - Ocean Gateway | Somerset | MD 673A to MD 413 - Access control improvements | Maryland Freight Route | HNI | SHA | $10,300 |
| US 13 - Ocean Gateway | Somerset | MD 362 to Wicomico County line - Divided highway reconstruct | Maryland Freight Route | HNI | SHA | $445,400 |
| US 50 - Ocean Gateway | Talbot | MD 404 to MD 322 north of Easton - Divided highway reconstruct with access control improvements | Maryland Freight Route | HNI | SHA | $650,600 |
| US 50 - Ocean Gateway | Talbot | MD 322 N. of Easton to MD 322 South of Easton - Divided highway reconstruct | Maryland Freight Route | HNI | SHA | $242,400 |
| US 50 - Ocean Gateway | Talbot | MD 322 south of Easton to Choptank River Bridge - Access control improvements | Maryland Freight Route | HNI | SHA | $119,100 |
| US 340 - Jefferson Pike | Washington | Virginia State line to West of Keep Tryst Road (West Junction) Divided highway reconstruct (includes Potomac River Bridge) | Maryland Freight Route | HNI | SHA | $47,200 |
| US 13 - North Salisbury Blvd/Ocean Highway | Wicomico | Salisbury Bypass to Delaware State line - Divided highway reconstruct | Maryland Freight Route | HNI | SHA | $316,900 |
| US 50 - Ocean Gateway | Wicomico | MD 731A to White Lowe Road - Access control improvements | Maryland Freight Route | HNI | SHA | $214,500 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|
| US 13 – Ocean Highway | Worcester | Virginia State line to US 113 - Access control improvements | Maryland Freight Route | HNI | SHA | $125,100 |

*Estimated Costs only.

# PORT – FUNDED PROJECTS

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | FEDERAL/STATE FUNDED | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| Hart-Miller Island Project | Baltimore City | DNR approved the design for wildlife habitat at the North cell of the island; dewatering and site improvements are underway. | Marine | Construction | MPA | S | $25,106 |
| Dredge Material Placement | Baltimore City | This project involves the placement and monitoring of material dredged from the Port of Baltimore channels. | Marine | Planning/ Construction | MPA | S/F | $197,651 |
| Reconstruct Dundalk Berths 1-6 | Baltimore City | This project will (in a phased approach) replace and deepen the berths to meet future cargo and vessel needs. The berths will be designed to allow dredging to an eventual depth of 50 feet. The first phase funded reconstruction of Berths 5 and 6. Phase II funds activity at Berth 4; Phase III funds Berth 3 (and a portion of Berth 2). | Marine | Construction | MPA | S | $31,211 |
| Pearce Creek Waterline Project | Baltimore City | The project will construct a waterline from Cecilton to communities near the Pearce Creek Dredged Material Containment Facility (DMCF) in Cecil County. Project is constructed with the assistance of an *MDOT Secretary's Grant*. | Marine | Construction | MPA | S | $13,098 |
| Chrome Ore Proc Residue Remediation | Baltimore City | This project is to implement enhanced isolation and containment of the COPR at Dundalk Marine Terminal (DMT). This requires relining storm drains in the COPR areas and installing enhanced long-term monitoring and maintenance of the site. | Marine | Planning/ Construction | MPA | S | $28,174 |
| Marine Terminal Property Acquisition | Baltimore City | Purchase parcel(s) of land adjacent to or in the vicinity of existing marine terminals at the Port of Baltimore. | Marine | Right-of-Way | MPA | S | $1,435 |

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | OWNERSHIP | FEDERAL/STATE FUNDED | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| Port Expansion Project | Baltimore City | MPA's *TIGER* project has three portions: provide rail access to Fairfield Marine Terminal; widening and straightening the navigation channel to Seagirt Marine Terminal; and filling the Fairfield Basin to develop seven acres of new land for cargo storage. Includes work at the Fairfield (Beverley Slip) and South Locust Point terminals (Fruit Slip). Also, the derelict Pier 5 at Fairfield terminal will be demolished. | Marine | Construction | MPA | S/F | $15,665 |
| Dredge Material Management | Baltimore City | This project conducts detailed studies with the US Army Corps of Engineers to identify and assess potential dredged material placement sites consistent with Maryland's Dredged Material Management program emphasizing beneficial uses of dredged material for projects such as island and shoreline restoration. | Marine | Planning/ Engineering | MPA | S | $52,781 |
| Cox Creek Dredged Material Containment Facility Expansion and Related Projects | Anne Arundel/ Baltimore City | The Cox Creek Dredged Material Containment Facility (DMCF) is being expanded into the adjacent 93-acre upland area (owned by MPA) in order to ensure adequate capacity to accommodate material dredged from the Port of Baltimore's Harbor shipping channels as part of the State's 20-Year Dredged Material Management Plan (DMMP). The dikes at the existing 144-acre DMCF are also being raised as part of the expansion. | Marine | Planning/ Engineering/ Right-of-Way/ Construction | MPA | S | $198,986 |

*Costs reflect status costs only from FY18 CTP.

# PORT – UNFUNDED PROJECTS

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| Fairfield – Kurt Iron Site | Baltimore City | Develop Terminal | Marine | Contracts Awarded | TBD | MPA | $17,000 |
| DMT | Baltimore City | Elevate Lots 200/300 (Resiliency) | Marine | Not in CTP | TBD | MPA | $10,000 |
| DMT Lot 94 | Baltimore City | Improve SWM (Resiliency) | Marine | Not in CTP | TBD | MPA | $7,000 |
| (North & South side of River) | Baltimore City | Acquire property for Dredged Material Containment | Marine | Not in CTP | TBD | MPA | $40,000 |
| Dundalk Berths 7 & 8 | Baltimore City | Reconstruct | Marine | Berth 7 Complete Not in CTP | TBD | MPA | $40,000 |

*Estimated Costs only.

# RAIL PROJECTS

| PROJECT | NETWORK | OWNERSHIP | ESTIMATED COST * (MILLIONS) |
|---|---|---|---|
| Howard Street Tunnel Expansion | CSX | CSX | $445 |
| Amtrak Susquehanna River Bridge Replacement | NEC | Amtrak | $1,700 |
| Amtrak B&P Tunnel Replacement | NEC | Amtrak | $4,500 |
| Rosedale Grade Crossings Project | CSX | CSX | $1.4 |
| Canton Railroad Improvements | Canton | Canton | $4 |
| Upgrade MDDE Snow Hill Line | MDDE Snow Hill | MDDE | $12 |
| Amtrak Bush River Bridge Replacement | NEC | Amtrak | $400 |
| Amtrak Gunpowder River Bridge Replacement | NEC | Amtrak | $555 |
| Tradepoint Atlantic rail improvements | Sparrows Point | Tradepoint Rail | TBD |
| New bridge over Susquehanna (CSX) | CSX | CSX | TBD |
| Various rehabilitation and capacity improvements – statewide | CSX | CSX | TBD |
| Various rehabilitation and capacity improvements – statewide | NS | NS | TBD |
| CSX Old Main Line Subdivision – improve clearances to allow double-stack | CSX | CSX | TBD |
| BWI Station center platform and fourth track configuration (Grove to Winans) | NEC | Amtrak | $650 |
| Potential transload facility for Lehigh Cement | Maryland Midland | Genesee and Wyoming | $9 |
| Freight Option from north to Baltimore (non-NEC) | NS | NS | TBD |

| PROJECT | NETWORK | OWNERSHIP | ESTIMATED COST * (MILLIONS) |
|---|---|---|---|
| Various Amtrak bridge improvements | NEC | Amtrak | TBD |
| Various Amtrak signal improvements | NEC | Amtrak | TBD |
| Upgrade/renew various Amtrak interlockings | NEC | Amtrak | TBD |
| Various capacity improvements | NEC | Amtrak | TBD |
| Upgrade Winchester and Western Railroad bridge over the Potomac River | Winchester and Western | Winchester and Western | $5 |
| Track rehabilitation and upgrades – Delmarva Central | Delmarva Secondary | NS | TBD |
| Bridge and culvert rehabilitation and upgrades – Delmarva Central | Dlemarva Secondary | NS | TBD |
| Potential transload facility for Propane | Maryland Midland | Genesee and Wyoming | $1 |
| Potential rehab on MDOT sub north from MP 18.6 to MP 22.6 | Maryland Midland | Genesee and Wyoming | $0.5 |
| New interchange between Maryland Midland Railway and York Railway (Taneytown MD – Hanover PA) | Maryland Midland | Genesee and Wyoming | $0.5 |
| Bay Coast Railroad improvements | Bay Coast | ANTDC | TBD |
| Rehabilitation and upgrade of active short lines | MDDE | MTA | TBD |
| Rehabilitation of grade crossings | Statewide | MTA | $10 |
| Repair rail freight bridges and culverts (Eastern Shore) | MDDE | MTA | $10 |
| Freight facilities – sidings, transload facilities, engine houses, etc. (Eastern Shore) | MDDE | MTA | $20 |
| Stabilize inactive lines to maintain safety and drainage | MTA | MTA | TBD |

*Costs reflect status costs only from FY18 CTP. Other costs are Estimate Costs only.

# AIRPORT –FUNDED PROJECTS

| PROJECT | JURISDICTION | DESCRIPTION | NETWORK | STATUS | FEDERAL / STATE FUNDED | OWNERSHIP | ESTIMATED COST* (MILLIONS) |
|---|---|---|---|---|---|---|---|
| Midfield Cargo Area Improvements at BWI Marshall Airport | Anne Arundel | This project consists of the design and construction of improvements to the Midfield Cargo Complex facilities, apron, and aircraft parking positions to support new cargo operations. Improvements include security, building modifications, apron rehabilitation, additional aircraft parking positions, and tenant relocation costs. | Airport | Construction | S | MAA | $17,525 |
| Runway Safety Area, Standards and Pavement Improvements Phase 4 at BWI Marshall | Anne Arundel | This project consists of the design and construction of the Pavement Management Program (PMP) improvements, other Facility Airport Layout Plan (ALP) improvements, and airfield pavement reconstruction to meet Federal Aviation Administration (FAA) standards. Improvements will include Runway 15L-33R, as well as, new exit taxiways, taxilanes, and a dual parallel taxiway around the terminal. | Airport | Open for Service | S | MAA | $0 |
| Runway Safety Area, Standards and Pavement Improvements Phase 2 at BWI Marshall | Anne Arundel | The project represents the second phase of the Runway Safety Area (RSA), Standards Compliance and Pavement Management Program (PMP) Improvements. This project consists of the design and construction of the Runway 10-28 RSA compliance, standards and PMP improvements to meet Federal Aviation Administration (FAA) standards. Runway improvements will include grading, pavement rehabilitation, pavement markings, and lighting relocation, as well as, connecting taxiways, and property acquisitions. | Airport | Right-of-Way | S/F | MAA | $495 |

*Costs reflect status costs only from FY18 CTP.

## A-3: FREIGHT FINANCIAL PLAN (5 Years) - FISCALLY CONSTRAINED (2018-2022)

| MODAL or JURISDICTION | Project | FY2018 ($000s) | FY2019 ($000's) | FY2020 ($000's) | FY2021 ($000's) | FY2022 ($000's) | Total Est Costs ($000's) | Fund /City Match (CM) or State Match (SM) | Project Status |
|---|---|---|---|---|---|---|---|---|---|
| **BCDOT APPORTIONMENT** | | | | | | | | | |
| BCDOT | Baltimore City Southeast Freight Corridor/Colgate Creek Bridge TIGER VII project | $ 560 | $ 560 | $ 560 | $ *560* | $ *560* | $ 2,800 | NHFP; $10M TIGER Grant; CM -$336 | |
| **STATEWIDE OPERATIONS** | | | | | | | | | |
| SHA | CHART | $ 590 | $ 590 | $ 590 | $ *590* | $ *590* | $ 2,950 | NHFP SM -$354 | TSM&O Plans on the NHFN ; PP, PE |
| **PRE- PLANNING** | | | | | | | | | |
| SHA | Freight Planning | $ 500 | $ 500 | $ 500 | $ *500* | $ *500* | $ 2,500 | NHFP SM- $300 | |
| **CONSTRUCTION** | | | | | | | | | |
| SHA-BA | I-695 - Replace Bridge 03125 on Crosby Road over I-695 (Bridge replacement, widening, safety improvements) | $ 377 | $ 376 | $ - | $ - | $ - | $ 753 | NHFP SM- $151 | CO underway |
| SHA-BA | I-695 - From US 40 to MD 144 to improve the mobility and safety by widening the OL to provide a 4th lane | $ 1,000 | $ 2,605 | $ 2,605 | $ *2,605* | $ - | $ 8815 | NHFP SM- $1,763 | CO underway |

| MODAL or JURISDICTION | Project | FY2018 ($000s) | FY2019 ($000's) | FY2020 ($000's) | FY2021 ($000's) | FY2022 ($000's) | Total Est Costs ($000's) | Fund /City Match (CM) or State Match (SM) | Project Status |
|---|---|---|---|---|---|---|---|---|---|
| SHA-BA | I-695 - Replacement of Bridge 03113 on the IL over Benson Ave. and Bridge 03114 on the IL over Leeds Ave., US 1, AMTRAK, and Herbert Run. This project also includes the realignment of the access to the I-695 on-ramp from Leeds Ave. to US 1 | $ 651 | $ - | $ - | $ - | $ - | $ 651 | NHFP SM- $130 | CO underway |
| SHA-BA | I-83 Replace Bridge over Padonia Rd | $ - | $ 1,000 | $ 1,000 | $ - | $ - | $ 2,000 | NHFP SM- $400 | CO to begin in FY19 |
| SHA - PG | I-95 - Replace Bridge 1615305 and 1612306 over MD 214 | $ 250 | $ 1,675 | $ 1,672 | $ *1,672* | $ - | $ 5,269 | NHFP SM- $1,053 | CO underway |
| SHA - PG | I-95/I-495 - Replace Bridge 1616005 and 1616006 over Suitland Pkwy | $ - | $ 1,500 | $ 1,500 | $ *6,057* | $ - | $ 9,057 | NHFP SM- $1,811 | CO underway |
| SHA - PG | MD 4 - Construct a new interchange at Suitland Pkwy. BRAC (capacity) | $ 4,000 | $ 2,816 | $ 2,816 | $ *2,816* | $ - | $ 12,448 | NHFP SM- $2,490 | ROW/CO underway |
| SHA- WA | I-81 - Study to upgrade and widen the roadway from US 11 in WVA State Line to north of MD 63/MD 68. This is Phase 1 of a four-phase project to upgrade and widen from Potomac River/WVA State Line to the PA State Line. | $ 12,340 | $ 6,178 | $ 3,557 | $ - | $ - | $ 22,075 | NHFP SM- $4,415 | CO underway |
| **Total** | | **$ 20,268** | **$ 17,800** | **$ 14,800** | **$ *14,800*** | **$ *1,650*** | **$ 69,318** | | |

*NOTES: Underlined routes have a Critical Freight Corridor within the limits.
*Italicized amounts* are assumptions as Freight Funds last until 2020 under the FAST Act.
Totals were authorized by MDOT-SHA Office of Finance and are based on adjusted amounts from the appending rescission in FY 18 that will be put in by Congress in 2019.