DRAFT

Freight System Annual Report

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Maryland Department of Transportation

DRAFT report

Maryland Freight System Performance Annual Report

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Maryland Department of Transportation

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1.0 About the Report

The Maryland Statewide Freight Plan identifies policies and projects to guide Maryland's development and stewardship of the freight system. This Freight System Annual Performance Report identifies freight performance measures to support the State's efforts to ensure projects and programs are developed and deployed to the greatest effect. Performance measurement has become an increasingly important way for transportation agencies to benchmark, track, and communicate progress toward goals. The Maryland Department of Transportation continues to be a national leader in the use of performance measurement in transportation.

1.1 PREFACE

Maryland's economy moves by multiple transport forms on a balanced freight network. Ensuring that the network of highways, railways, waterways, and airports is ready to handle the current level of goods movement as well as anticipated growth is a priority of the Maryland Department of Transportation (MDOT) and its modal administrations: State Highway Administration (SHA), Motor Vehicle Administration (MVA), Maryland Port Administration (MPA), Maryland Aviation Administration (MAA), Maryland Transit Administration (MTA), and the Maryland Transportation Authority (MDTA). To facilitate this effort, MDOT published in 2009 the Maryland Statewide Freight Plan, a comprehensive overview of the State's current and long-range freight system performance and outline of the investments and policies needed to ensure the efficient movement of freight.

1.2 FREIGHT PERFORMANCE MEASUREMENTS IN POLICY AND PROGRAM DEVELOPMENT

Both passenger and freight transportation performance measures are reported in the Maryland Annual Attainment Report. This report provides a logical addition to that foundation, building on the freight related measures described in the Attainment Report and introducing new measures that are intended to more comprehensively capture the needs and goals of the freight transportation system. The report seeks not to comprehensively inventory all freight activity and initiatives but rather to focus on the leading indicators that point to how the freight system is changing and how the department might respond. The following section of the report describes the importance and ubiquity of freight in the Maryland economy.

The current and proposed performance measures included within this document are intended to further the understanding of freight amongst stakeholders and create a common point of reference for the discussion of improvements. The report identifies performance measures for each mode within MDOT and shows the interconnectivity of freight performance measures among the modes. Future performance measure reports will detail these modal interconnections and the connections to economic development and investment to provide a fully realized picture of the freight impact in Maryland.

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 of freight performance measures is a key feature of the current national policy discussion. Of particular relevance in the future will be the use of performance measures to track the effectiveness of federal investments. The highly visible TIGER program, for example, has codified categories of transportation costs and benefits that could logically be translated into performance metrics following the issuance of a grant. This type of after-analysis can help justify continued investment in the freight transportation system by demonstrating which infrastructure projects meet their promised targets. The future of performance measures will be impacted by the increasing availability of real time information on freight activity. GPS records of truck movements, along with operational data for rail and marine systems will help to paint a more complete picture of freight activity. Public and private sector entities are developing new visualization tools that display existing data sources in new ways.

1.3 RECENT SUCCESSES

Partnering on Priorities

Beyond tracking performance, MDOT continues to coordinate with the private sector to work through the state's freight challenges. One of the most important efforts currently underway is the CSX plan to develop a new freight rail-to-truck transfer facility (the Baltimore-Washington Rail Intermodal Facility) in central Maryland. MDOT is also a partner in CSX's National Gateway initiative, a partnership between the Federal government, six states, the District of Columbia, and the railroad to create a double-stack rail network connecting the Mid Atlantic and Midwest regions. These projects will improve freight rail connectivity and capacity and will ensure that freight rail plays its appropriate role in a balanced freight transportation system.

Another project of critical importance to Maryland and the national economy is the replacement of the Susquehanna River Bridge on the Northeast Corridor

(NEC). In September 2011, the United States Secretary of Transportation authorized $22 million for MDOT to complete preliminary engineering and environmental work for replacement and expansion of the Susquehanna River Bridge. The 105 year-old bridge is a major rail chokepoint for passengers traveling along the NEC and requires significant and constant maintenance.[1] Replacement of the bridge will not only expand functionality for MARC and Amtrak trains but also improve efficiency for freight trains. MDOT's Office of Freight and Multimodalism (OFM) assists freight entities by helping to leverage federal grant opportunities. In total, the OFM received High Speed Intercity Passenger Rail Grants totaling $92 million to improve capacity and safety on the NEC. Additionally, OFM works to preserve shortline corridors to sustain access to rail transportation for shippers across Maryland.

Enhancing Safety and Preserving Infrastructure

Maryland is a national leader in implementing truck safety programs and enforcement initiatives that have improved truck safety and will continue to use performance measures to track progress on this front. Maryland's commercial vehicle safety program – one of the most aggressive in the nation – recently received recognition from the Commercial Vehicle Safety Alliance and American Transportation Research Institute for actions to reduce fatal crashes. Maryland consistently ranks in the top 10 states for commercial vehicle inspections. State officials continually reach out to the trucking and traveling community at large to educate them about truck safety.

MDTA Police Commercial Vehicle Safety Unit (CVSU) partners with Federal, State, and local agencies to perform joint inspection and enforcement operations. The unit addresses concerns regarding commercial vehicles using local roadways to avoid inspection and weight enforcement. These efforts help to safeguard the general public, as well as prevent damage to roadways from excessive vehicle weights or unsecured cargo.

Infrastructure preservation and truck safety are also being addressed through technology. "Virtual weigh stations" are real-time automated tools capable of conducting measurements and certifications of commercial vehicles that are traditionally conducted manually at fixed weigh stations. Virtual weigh stations are being installed at key locations statewide. The State of Maryland has developed and implemented a web-enabled oversize/overweight hauling permit system that allows trucking companies to order, pay for, and receive special hauling permits in minutes rather than hours.

[1] http://www.fra.dot.gov/roa/press_releases/fp_FRA%2023-11.shtml

1.4 FOUNDATION BUILDING

By compiling the performance measures that are already tracked through the various modal plans, this report demonstrates that MDOT has a significant pre-existing body of viable freight performance measures. The report also indicates that to comprehensively assess the Maryland Freight System new measures will need to be developed, particularly with respect to the rail system. Practicality has been and will continue to be a key concern in determining which freight measures to track. It is also important that the measures ultimately align with the needs and priorities of MDOT, the modal administrations, and system users.

2.0 Maryland's Freight Story

Maryland's freight system is an integral part of the state's history and economy. The Port of Baltimore and many key freight corridors were established long before Maryland was a state. The freight system today represents a multigenerational accumulation of assets that has been integrated into an efficient and safe network of major highways and minor connectors, Class I and shortline railroads as well as a diverse maritime infrastructure.

The system that moves goods represents jobs for tens of thousands of Marylanders. Freight jobs are tied to location and hard to outsource. Workers from stevedores at the Port of Baltimore to logistics engineers at the Aberdeen Proving Grounds help the system to run smoothly.

Most of the freight sector activity driving the economy occurs behind the scenes and is rarely seen by the public. While the growth of freight has made it more visible in some quarters, it is difficult to fully convey the magnitude of freight activity or its centrality to everyday life. On average, 39 tons of freight terminate in Maryland for each person every year, freight that includes everything from low value scrap paper to pharmaceutical shipments worth millions of dollars per trailer load. The seemingly simple act of keeping retail and grocery shelves stocked is an intricately and internationally coordinated effort. Maryland's freight system is quite effective at accommodating this demand. Future population and economic growth will place increasing demands on the freight system. This report identifies freight performance indicators that will help the department understand the changing needs of the freight system and effectively respond to them.

3.0 Maryland's Freight System

This section provides information about the Maryland Freight System and performance measures for each transportation mode: highways, rail, marine, and air cargo. Individual subsections provide descriptions of the modes addressed, discussions on how modal performance is tracked, and a list of the performance measures. A summary table of all freight performances measures reported is at the end of the section.

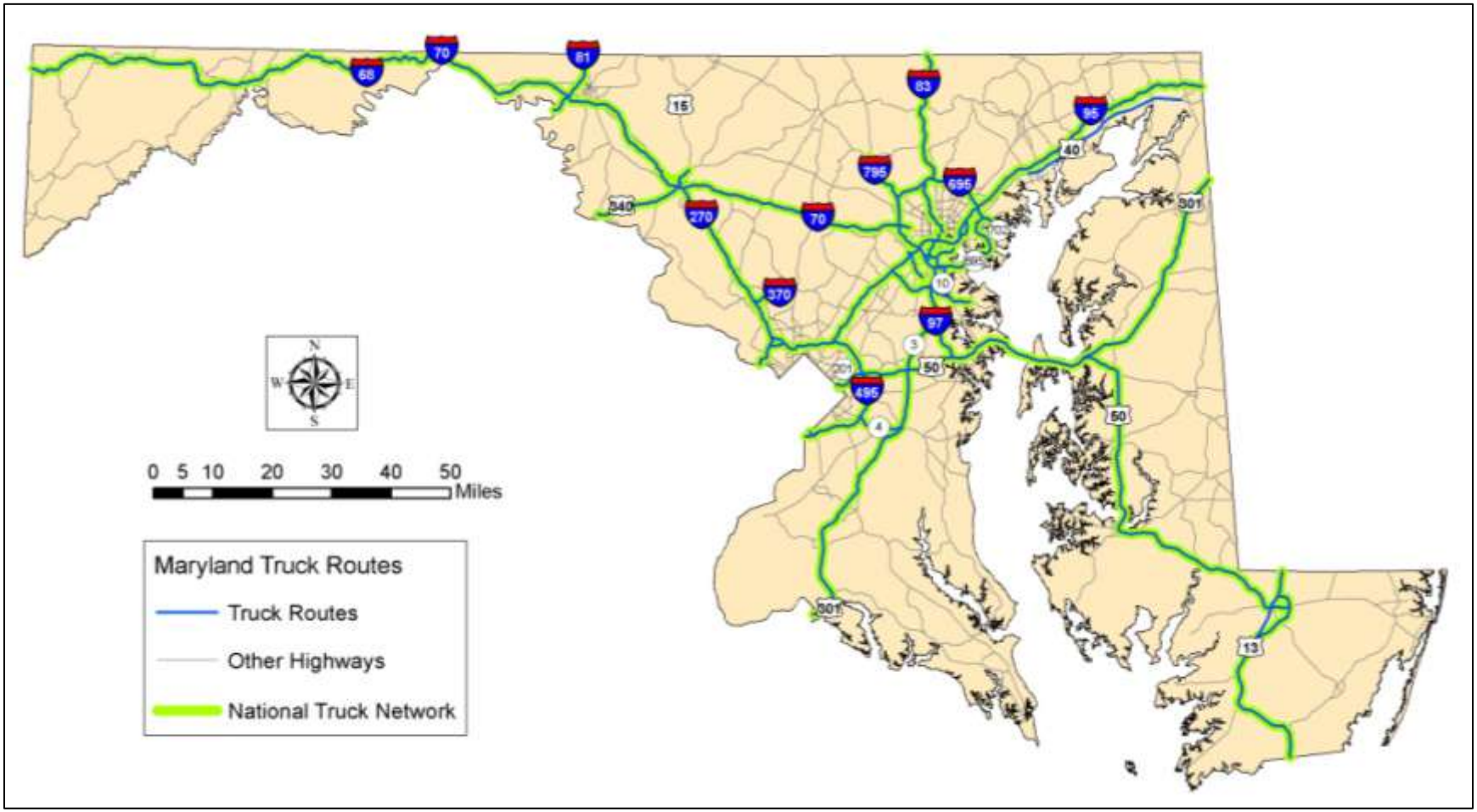
3.1 HIGHWAY FREIGHT SYSTEM

Maryland's highway freight system provides mobility for trucked freight, connectivity to the State's freight generating facilities, and critical links to all other modes, including marine, air, and rail. The highway freight system also provides the final link in all supply chains that end with consumer goods on store shelves. Efficient goods movement across the highway freight system is critical to Maryland's economy. In 2007, 74 percent of freight that originated or terminated within Maryland was hauled by truck, highlighting the importance of the highway freight system to the State's economy.

Description of Highway Freight System

The Highway Freight System consists of all roadways over which it is possible to transport freight, from the largest oversize load to the smallest parcel. In Maryland, this 30,987 mile network is comprised of Interstate, primary, secondary, and municipal systems. A smaller subsystem of Federal and State highways particularly important for interstate and through freight transportation has been designated as the Maryland Truck Route System (see Figure 3.1).

Figure 3.1 Maryland Truck Route System



Source: Cambridge Systematics map using information from the Maryland Motor Carrier Handbook 2007

Tracking Performance of the Highway Freight System

Because the highway freight system is critical to the efficient movement of goods within and through the State, it is important to gauge how well that system is working. The development and application of performance measures is a proven way to monitor system performance and drive investments to programs and projects that have the greatest impact. MDOT and the modal administrations have already developed many freight performance measures and are collecting a variety of data that can be used to develop additional performance measures.

The highway freight system performance measures outlined below are grouped according to the goals adopted within the Maryland Transportation Plan (MTP).[2] Many of the measures apply to the movement of both goods and people because the highway system is shared by both sets of users. For example, tracking ride quality provides information about how well-maintained the highway system is for both truck and automobile traffic.

Tables 3.1a through 3.1e list the highway freight system performance measures along with the principal agency responsible for monitoring the associated data and the current status within existing planning documents. Some measures have already been incorporated into official documents such as the Maryland Attainment Report. Others are proposed for further consideration based on currently available data.

Quality of Service

Providing "reliable and predictable travel time across modal options for people and goods"[3] is one of the quality of service objectives within the MTP. Since a severely congested highway system is unreliable, increases the cost of moving freight, and inhibits economic growth, performance measures related to congestion, delay, and trucker time savings are used to assess the highway freight system. Unpredictable, non-recurring, congestion also adds to logistics costs because truckers have to build in extra time to deliver goods in order to meet the schedule requirements of businesses. The measures are:

[2] Grouping by MTP goal is similar to the project evaluation approach described in the Maryland Statewide Freight Plan.

[3] Maryland Transportation Plan, 2009

Table 3.1a Highway Freight System Performance Measures – Quality of Service

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Quality of Service	Amount of delay ('000 hours) for trucks due to congestion along the statewide freight network	Provide reliable and predictable travel times across modal options for people and goods	SHA	Data available in fall 2012 / SHA	N/A
	Truck Congestion Cost (in $ millions) on the MD Freight Network	Provide reliable and predictable travel times across modal options for people and goods	SHA	Data available in fall 2012 / SHA	N/A
	Percent of statewide freight network congested in peak hours (on average weekdays)	Provide reliable and predictable travel times across modal options for people and goods	SHA	Data available in fall 2012 / SHA	N/A
	Percent of freeways/ expressways reliable in peak hours (on average weekdays)	Provide reliable and predictable travel times across modal options for people and goods	SHA	Data available in fall 2012 / SHA	N/A
	Amount of time savings for trucks due to delay reduction gained by implementing the CVISN program	Provide reliable and predictable travel times across modal options for people and goods	SHA	Measure listed in SHA business plan – data availability unknown / SHA	N/A

Source: SHA, MDTA, and MDOT

Notes: Data points from listed agency documents unless otherwise noted.

Safety and Security

Reducing fatalities and serious injuries related to highway goods movement is a key safety and security objective. The measures are:

Table 3.2b Highway Freight System Performance Measures – Safety and Security

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Safety & Security	Annual number of fatalities in traffic crashes involving heavy trucks on all roads in Maryland	Reduce the number and rate of transportation related fatalities and injuries	SHA	Data currently available / SHA	43* (2010)
	Annual number of persons injured in traffic crashes involving heavy trucks on all roads in Maryland	Reduce the number and rate of transportation related fatalities and injuries	SHA	Data likely available / SHA	N/A
	Annual number of commercial vehicle safety inspections performed	Reduce the number and rate of transportation related fatalities and injuries	SHA	Data currently available / SHA	98,582 (2010)
	Number of truck parking spaces	Reduce the number and rate of transportation related fatalities and injuries	SHA	Maryland Truck Parking Study provides one data point	2,292** (2004)
	Annual number roadways (statewide or planned for improvements) improved to address/reduce crash types				
	Annual number of safety measures used on roadways where crashes/fatalities are severe				

Source: SHA, MDTA, and MDOT

Notes: Data points from listed agency documents unless otherwise noted.
* NHTSA Fatality Analysis Reporting System (FARS)
** Maryland Truck Parking Study

The supply of truck parking spaces supports the safety and security goal by providing places for truck drivers to pull over and rest without creating dangerous conditions for other drivers.

System Preservation & Performance

Keeping roadways, roadway right-of-way, and bridges in a state of good repair decreases the risk of damage to both trucks and cargo and helps ensure the highway freight system is safe and provides a high level of service. Of the four measures related to system preservation and performance, three are currently tracked in the Attainment Report. The measures are:

Table 3.3c Highway Freight System Performance Measures – System Preservation & Performance

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
System Preservation & Performance	Percentage of the Maryland SHA network in overall preferred maintenance condition	Enhance customer experience and service	SHA	Currently tracked in Attainment Report	82.2% (2011)
	Number of bridges and percent that are structurally deficient	Preserve and maintain the existing transportation network	SHA/ MDTA	Currently tracked in Attainment Report	110 / 3.9% (2011)
	Number of bridges being rehabilitated that are structurally deficient or functionally obsolete				
	Percent of roadway miles with acceptable ride quality	Preserve and maintain the existing transportation network	SHA/ MDTA	Currently tracked in Attainment Report	86% (2010)
	Ratio of overweight vehicles to number of vehicles weighed	Preserve and maintain the existing transportation network	SHA	Data currently available / SHA	17.4% (2010)
	Number of virtual weigh stations added to the statewide truck network				

Source: SHA, MDTA, and MDOT

Notes: Data points from listed agency documents unless otherwise noted.

Overweight vehicles cause greater damage to roadways and bridges than vehicles within the legal limits do. This measure identifies the proportion of overweight to non-overweight trucks among those trucks actually weighed. To the degree that the trucks weighed are a representative sample of all trucks, this measure can be an indication of the overall proportion of overweight vehicles operating in the state.

Environmental Stewardship

There are two environmental stewardship measures each relating to vehicle emissions. They are:

Table 3.4d Highway Freight System Performance Measures – Environmental Stewardship

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Environmental Stewardship	Annual reduction in GHG resulting from congestion management projects	Preserve and enhance Maryland's natural, community, and historic resources	SHA	Data available in fall 2012 / SHA	N/A
	Percent of IRP registered trucks that are model year 2007 or newer	Preserve and enhance Maryland's natural, community, and historic resources	MDOT	Data currently available / IRP	36%*** (2012)

Source: SHA, MDTA, and MDOT

Notes: Data points from listed agency documents unless otherwise noted.
*** Analysis of International Registration Plan (IRP) data

EPA emission standards for diesel engines became very stringent in 2007. Tracking the percentage of Maryland trucks registered in 2007 provides some indication of how clean truck diesel emissions are for Maryland trucks, even though it does not provide any data on the substantial number of non-Maryland registered trucks passing through the state.

Connectivity for Daily Life

One objective within the Connectivity for Daily Life MTP goal is to strategically expand network capacity to manage growth. While this is very similar to the congestion-related objectives within the Quality of Service goal, it focuses on

reducing congestion through provision of additional capacity. The performance measure, currently tracked in the Attainment Report, is:

Table 3.5e Highway Freight System Performance Measures – Connectivity for Daily Life

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Connectivity for Daily Life	Percent of freeway lane-miles and arterial lane-miles with average annual volumes at or above congested levels	Provide balanced, seamless, and accessible multimodal transportation options for people and goods	SHA/ MDTA	Currently tracked in Attainment Report	Freeway: 29% Arterial: 14% (2010)

Source: SHA, MDTA, and MDOT

Notes: Data points from listed agency documents unless otherwise noted.

3.2 RAIL FREIGHT SYSTEM

Due to the transportation efficiency advantages offered by rail transportation, access to rail is a key determining factor where industries and businesses locate. Rail plays a dominant role in the movement of certain commodities and a supporting role in the transportation of others.

Description of Rail Freight System

Maryland's freight rail system includes tracks, terminals, switching yards, sidings, and intermodal facilities. The railroad network is approximately 1,157 miles long, comprised of two Class I freight railroads, four Class III shortline freight carriers, one switching/terminal railroad, and two passenger railroads (Amtrak and MARC). Three railroads, CSX Transportation (CSX), Norfolk Southern Railway, and the Maryland & Delaware Railroad (MDDE), account for roughly three quarters of the freight network. The remaining is owned by other shortlines, rail operating within ports, or track that is banked by MDOT for future use. Additional freight and passenger rail carriers operate in the State exclusively with trackage rights on the other rail lines, and therefore do not contribute additional mileage to the railroad network.

Tracking Performance of the Rail Freight System

The private ownership and operation of freight railroads makes measuring the performance of the freight rail system more challenging from a public sector perspective. Some of the information that would be required to comprehensively measure performance is proprietary. Furthermore, the shared use of a significant percentage of Maryland's rail infrastructure between passenger and freight operations impacts the freight handling capacity of the rail network. A portion of the 1,157 miles of total track is weight restricted and cannot accommodate fully laden cars carrying certain commodities (see Figure 3.3). Other portions of the track are impacted by the lack of vertical clearance and are restricted to single stack cars. Furthermore, some track segments are impacted by at grade crossings or other operational restrictions. These factors limit the capacity and versatility of the Maryland freight rail network.

Quality of Service

The Federal Railroad Administration sets the speed limit for freight railroads. Line improvements allow the line to be upgraded in class, which improves the efficiency and effective capacity of the system. MDOT uses the following performance measure to assess rail quality of service.

Table 3.6a Rail Freight System Performance Measures – Quality of Service

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Quality of Service	Percent of rail network (track miles) with track speeds greater than 25 mph (FRA class 2)	Provide reliable and predictable travel times across modal options for people and goods	MDOT	Data likely available / Railroads	N/A

Source: MDOT

Safety and Security

Metrics involving rail safety are reported by public agencies and relate to efforts to reduce fatalities. They also illustrate the types of investments that railroads and the public sector are making to improve safety. MDOT uses the following two performance measures to assess rail safety and security.

Table 3.7b Rail Freight System Performance Measures – Safety and Security

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Safety & Security	The number of fatal crashes at at-grade rail crossings	Reduce the number and rate of transportation related fatalities and injuries	SHA	Data currently available / FRA	4 (2011)
	Percent of rail system under positive train control	Reduce the number and rate of transportation related fatalities and injuries	MDOT	Data likely available / Railroads	N/A

Source: MDOT

By tracking the implementation of PTC, MDOT can benchmark the degree to which Maryland railroads are fulfilling the Federal mandate and, more importantly, how they are achieving improvements in safety.

The annual number of fatal crashes at at-grade crossings is an indicator of the effectiveness of the State's efforts at improving rail crossing infrastructure and modifying driver behavior.

System Preservation & Performance

Rail system preservation and performance is assessed by tracking the network's ability to handle rail cars of a certain weight and configuration. MDOT uses the following performance measure to evaluate rail system preservation and performance.

Table 3.8c Rail Freight System Performance Measures – System Preservation & Performance

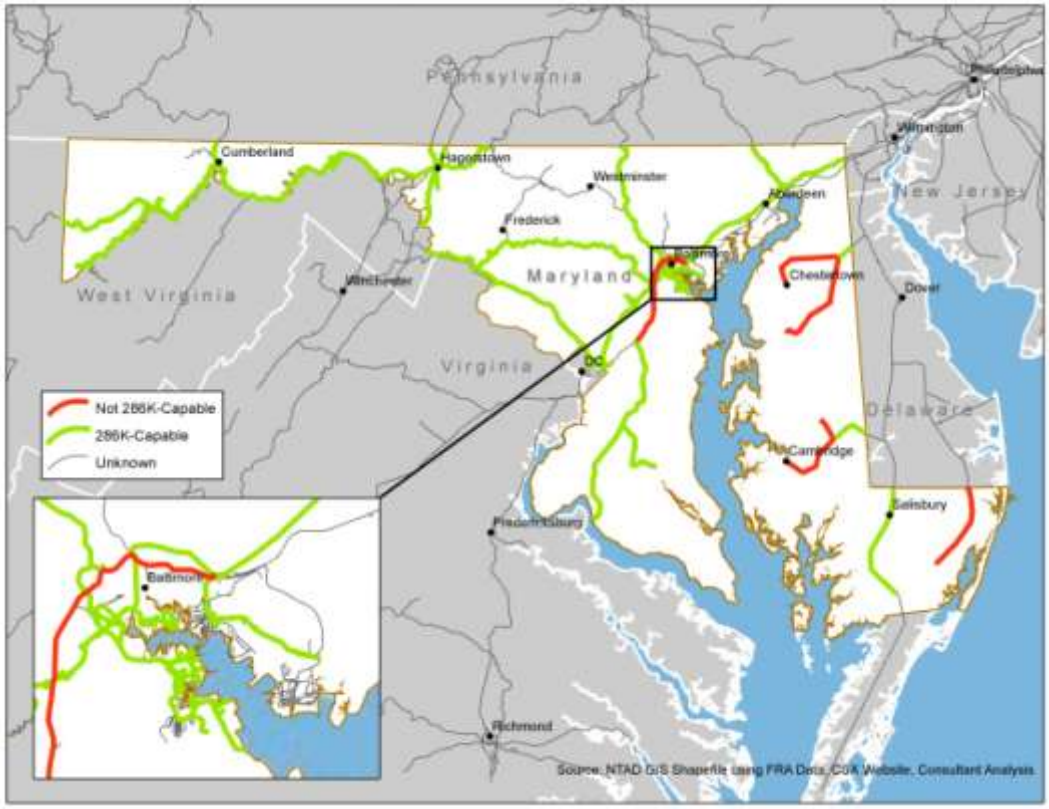
MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
System Preservation & Performance	Percent of rail network capable of supporting 286k	Preserve and maintain the existing transportation network	MDOT	Data likely available / Railroads	N/A

Source: MDOT

Rail shipments that offer the highest transportation savings per ton mile are those that are fully loaded to 286K. The percentage of the network that is able to handle 286K is thus considered an indication of how capable the network is to handle a diverse profile of freight. As illustrated in Figure 3.2 below, almost all

of the Class I network is approved for handling 286K, however many short lines cannot handle cars of this weight.

Figure 3.2 286,000 Pound Rail Network



Source: CSX and Cambridge Systematics

Environmental Stewardship

Tier 3 and 4 locomotive standards are designed to substantially reduce diesel engine emissions of particulate matter (PM) and nitrogen oxides (NOx). Given the long life of diesel locomotives, the replacement of older locomotives with cleaner alternatives is expected to take many years. By tracking the systematic replacement of these older engines, MDOT can determine whether the turnover rate is sufficient to meet air quality goals.

Table 3.9d Rail Freight System Performance Measures – Environmental Stewardship

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Environmental Stewardship	Number of Tier 3 and 4 locomotives	Preserve and enhance Maryland's natural, community, and historic resources	MDE	Data likely available / Railroads/ MDE*	N/A

Source: MDOT

Notes: * Locomotive modernization is an important air quality goal to which substantial CMAQ funding has been devoted around the country. To calculate the percentage, the total number of locomotives would also have to be known and it is unclear if MDE currently has this information.

Connectivity for Daily Life

One way to assess the connectivity of the rail system is to estimate the degree to which it serves Maryland industries. To this end, MDOT uses the following performance measure.

Table 3.10e Rail Freight System Performance Measures – Connectivity for Daily Life

MTP Goal	Performance Measure	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Connectivity for Daily Life	Percent of major freight generators with appropriate rail access	Provide balanced, seamless, and accessible multimodal transportation options for people and goods	MDOT	Data collection likely required / MDOT, DBED	N/A

Source: MDOT

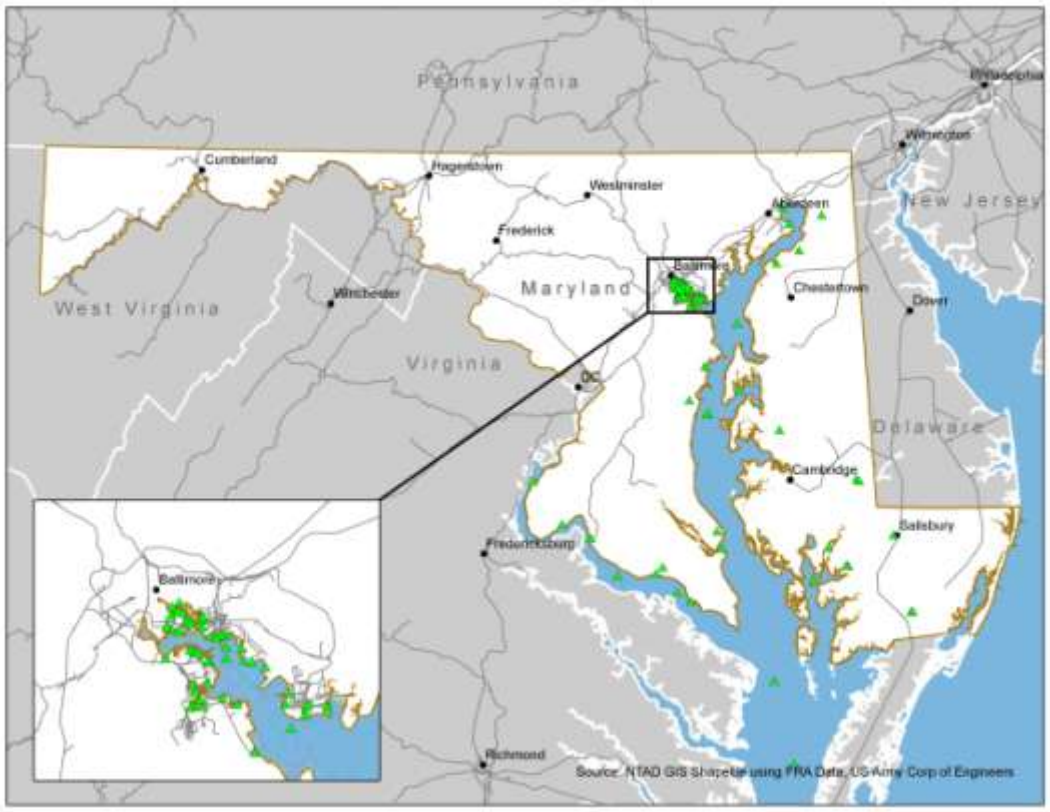
3.3 MARINE FREIGHT SYSTEM

Maritime freight is Maryland's connection to the world. Over 80 percent of global trade moves by water, and the freight that touches the docks at Baltimore radiates far beyond Maryland.

Description of Marine Freight System

Maritime activity in Maryland is heavily concentrated in the Baltimore area through the Port of Baltimore. There are a number of other commercial maritime locations in the state. The United States Army Corps of Engineers Waterborne Commerce Statistics Center produced estimates for MDOT showing that for calendar year 2010, the most recent year for which data is available, Maryland had 90 active commercial docks statewide, of which 56 were located near the Port of Baltimore.

Figure 3.3 Active Docks and Open Water positions



The Port of Baltimore achieved a 15 percent rate of growth in 2011, which was the largest percent growth in foreign tonnage of any major American port. The recent success of the Port of Baltimore is driven by the diversity of its cargo base. Rather than focusing exclusively on bulk and containerized trade, the Port has expanded the role of bulk and roll on roll off cargoes. In 2011, it processed the highest volume of auto units of any US port. The Port of Baltimore is one of the only two East Coast ports capable of handling vessels requiring 50 feet of draft, which are expected to come to the region in increasing numbers after the completion of the Panama Canal expansion in 2015. This extra depth will provide the port with a critical advantage in attracting liner services, and is one

of the main reasons why PortsAmerica Chesapeake constructed a new berth and installed four super post-Panamax cranes at Seagirt Marine Terminal. In addition to improving seaside operations, the Port is also striving to improve its landside connections and performance.

Quality of Service

MDOT assesses marine freight system quality of service by measuring how efficiently dray trucks service Seagirt Marine Terminal, the Port of Baltimore's container terminal. The State uses the following performance measure:

Table 3.11a Marine Freight System Performance Measures – Quality of Service

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Quality of Service	Average truck turn-around time at Seagirt Marine Terminal	Provide reliable and predictable travel times across modal options for people and goods	MPA	Currently tracked in Attainment Report	Single moves: 39.5 minutes Double moves: 54.8 minutes (2011)

Source: MPA and MDOT

High truck turn-around times are associated with truck idling inside of the port gates, which contributes to air pollution. It also impacts the number of pick-ups and deliveries that dray drivers can complete within a day, which translates into competitively priced truck service from the terminal.

Safety and Security

The performance measure used by MDOT for assessing port safety is compliance with the Maritime Transportation Security Act of 2002. Conformance with this standard is required due to numerous security concerns such as the potential smuggling of contraband or persons, or attacks on critical transportation infrastructure. Cruise ship safety is another area that the Government Accountability Office (GAO) is beginning to study to supplement existing data on cargo ships. The Port of Baltimore's increasing role as an origin for passenger cruises makes this area of study particularly relevant. The Coast Guard either certifies or does not certify a port as in compliance. MPA either met or exceeded its most recent Coast Guard inspection in all areas.

Table 3.12b Marine Freight System Performance Measures – Safety and Security

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Safety & Security	MPA compliance with the Maritime Transportation Security Act of 2002	Secure transportation assets for the movement of goods and people	MPA	Currently tracked in Attainment Report	MPA is currently in compliance

Source: MPA and MDOT

System Preservation & Performance

Marine freight system preservation and performance is determined by assessing whether or not enough capacity exists to manage dredge material. MPA evaluates performances in this area through the following measure.

Table 3.13c Marine Freight System Performance Measures – System Preservation & Performance

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
System Preservation & Performance	Adequate dredge material placement capacity remaining for Harbor and Bay maintenance and new work dredging	Preserve and maintain the existing transportation network	MPA	Currently tracked in Attainment Report	Bay material: 2 years Harbor Material: 0 years (2011)

Source: MPA and MDOT

The state of Maryland is charged with a dual responsibility for providing safe passage to the large cargo vessels that travel the Chesapeake Bay and for protecting its sensitive ecosystem.[4] Dredging, which refers to the artificial deepening of maritime channels for navigation, is required because the natural depth of the Baltimore harbor is insufficient to accommodate shipping. Dredged

[4] www.mpasafepassage.org/dmmpHome.html

material consists of benthic sediments - clay, silt, and mud - that are cleared from the bottom of shipping channels in the Chesapeake Bay and its rivers.

Maryland's Dredged Material Management Program is aimed at ensuring the availability of adequate and sustainable dredged material placement capacity remaining for harbor and bay dredging.

Environmental Stewardship

MDOT is working to reduce the environmental footprint of the marine freight system by replacing older dray trucks with new trucks that emit less air pollution. This is assessed through the following performance measure.

Table 3.14d Marine Freight System Performance Measures – Environmental Stewardship

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Environmental Stewardship	Number of trucks replaced - Mid-Atlantic Dray Truck Replacement Program	Preserve and enhance Maryland's natural, community, and historic resources	MPA	Data likely available by 2013 / MARAMA*	N/A

Source: MPA and MDOT

Notes: * The Mid-Atlantic Regional Air Management Association, Inc. (MARAMA) receives the applications and is the likely best data source

This Mid-Atlantic Dray Truck Replacement Program was introduced in 2011 and provides up to $20,000 toward the purchase or lease of a newer vehicle with an engine that meets or exceeds 2007 EPA emissions standards. The goal of the program is to reduce emissions by lowering the average age of the drayage fleet serving Mid Atlantic ports in Virginia, Maryland, Pennsylvania and Delaware. Because dray vehicles typically operate in an urban environment, each older dray truck that is replaced with a newer model can produce substantial improvement in air quality. This program has started to pay out grants. Initial results should be available within the next year.

Connectivity for Daily Life

Marine freight system connectivity is assessed through tracking foreign and general cargo tonnage. MDOT uses the following performance measure to assess connectivity.

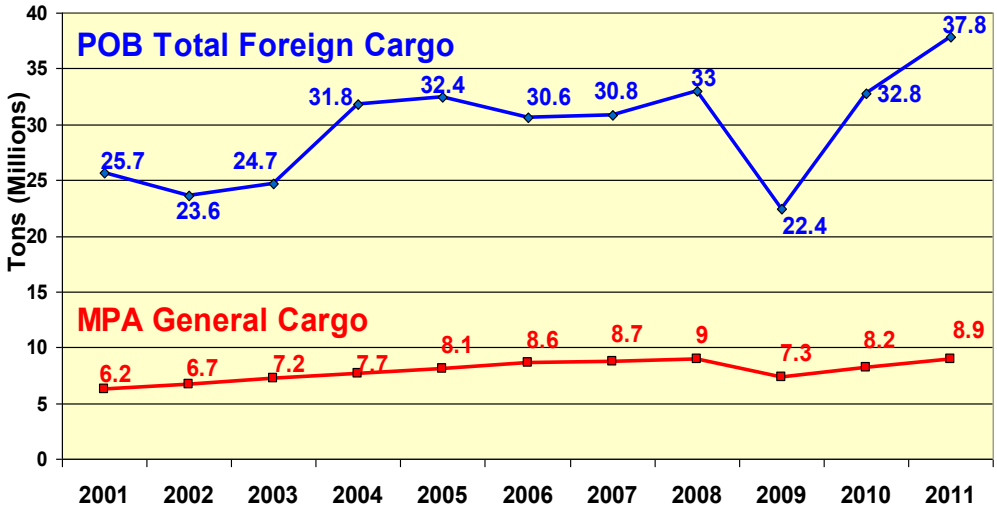
Table 3.15e Marine Freight System Performance Measures – Connectivity for Daily Life

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point (year)
Connectivity for Daily Life	Port of Baltimore Foreign Cargo & MPA General Cargo Tonnage	Facilitate linkages within and beyond Maryland to support a healthy economy	MPA	Currently tracked in Attainment Report	Foreign Cargo: 37.8 million tons MPA General Cargo: 8.9 million tons (2011)

Source: MPA and MDOT

In 2011, the Port of Baltimore handled nearly 38 million tons of foreign cargo. This total tonnage was the third highest for the Port and it shows that the Port has rebounded from the Recession of 2009. Tracking the Port's tonnage trends helps MDOT to understand the magnitude of the Port's impact on the freight system (see Figure 3.3). It helps in foreseeing potential capacity constraints at the port and on the highway and rail systems that support maritime activity.

Figure 3.4 Cargo Tonnage at the Port of Baltimore



Source: MPA and MDOT

3.4 AIR CARGO SYSTEM

The air cargo system is responsible for facilitating some of the most dynamic trade in high value goods and cutting edge technology. Ready access to air cargo options allows freight shippers to access every corner of the world.

Description of Air Cargo System

The Maryland Aviation Administration (MAA), a modal administration within MDOT, owns and operates Baltimore/Washington International Thurgood Marshall (BWI Marshall) and Martin State Airport. The MAA also coordinates State aviation matters with the owners and operators of the 34 other public-use airports. Scheduled cargo service is only offered from three of these airports: BWI Marshall (BWI), Salisbury-Ocean City Wicomico Regional (SBY), and Greater Cumberland Regional (CBE).

Tracking Performance of the Air Cargo System

Air cargo is typically not as price sensitive as maritime or rail cargo. The most important factors for success in air cargo development are comprehensiveness of access and timeliness of delivery. Air cargo is split between dedicated air service that use specialized cargo planes and "belly freight" that is moved in the belly of passenger aircraft. Because of the ability of air freight to share space on passenger routes, the penetration of air cargo service in Maryland is directly correlated with the comprehensiveness of passenger air services from Maryland's major airports, principally BWI Marshall.

System Preservation & Performance

The following two performance measures are already tracked within the Annual Attainment Report and can assess system preservation and performance for the State's air cargo system.

Table 3.16 Air Cargo System Performance Measures

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point
System Preservation & Performance	Total Air Tonnage at BWI	Maximize operational performance and efficiency of existing systems	MAA	Data currently available / MAA	108,644 tons* (Mar 2011 – Feb 2012)

MTP Goal	Performance Measures	Objective Associated with MTP Goal	Agency	Status / Data Source	Most Recent Data Point
	Number of Nonstop Airline Markets Served	Facilitate linkages within and beyond Maryland to support a healthy economy	MAA	Currently tracked in Attainment Report	75 (2011)

Source: MDOT

Notes: * MAASTAT February 2012

3.5 FREIGHT MEASURES SUMMARY

The table below lists the freight performance measures for all modes with the most recently available data points and historical data points, if available.

Table 3.5 Freight Performance Measure Summary

Performance Measure	2008	2009	2010	2011
Amount of delay ('000 hours) for trucks due to congestion along the statewide freight network	N/A	N/A	N/A	N/A
Truck Congestion Cost (in $ millions) on the MD Freight Network	N/A	N/A	N/A	N/A
Percent of statewide freight network congested in peak hours (on average weekdays)	N/A	N/A	N/A	N/A
Percent of freeways/ expressways reliable in peak hours (on average weekdays)	N/A	N/A	N/A	N/A
Amount of time savings for trucks due to delay reduction gained by implementing the CVISN program	N/A	N/A	N/A	N/A
Annual number of fatalities in traffic crashes involving heavy trucks on all roads in Maryland	52	50	43	N/A
Annual number of persons injured in traffic crashes involving heavy trucks on all roads in Maryland	N/A	N/A	N/A	N/A

Performance Measure	2008	2009	2010	2011
Annual number of commercial vehicle safety inspections performed	107,696	106,512	98,582	108,863
Number of truck parking spaces	2,292*	N/A	N/A	N/A
Percentage of the Maryland SHA network in overall preferred maintenance condition	81.7%	86.9%	85.8%	82.2%
Number of bridges and percent that are structurally deficient (number / percent)	133 / 4.7%	117 / 4.1%	111 / 3.9%	110 / 3.9%
Percent of roadway miles with acceptable ride quality	86%	86%	87%	86%
Ratio of overweight vehicles to number of vehicles weighed	26.1%	22.2%	17.4%	N/A
Annual reduction in GHG resulting from congestion management projects	N/A	N/A	N/A	N/A
Percent of IRP registered trucks that are model year 2007 or newer	N/A	N/A	N/A	35.6%**
Percent of freeway lane-miles and arterial lane-miles with average annual volumes at or above congested levels (freeway / arterial)	30.4% / 15.0%	25.0% / 14.0%	29.0% / 14.0%	N/A
Percent of rail track miles with track speeds greater than 25 mph (FRA class 2)	N/A	N/A	N/A	N/A
The number of fatal crashes at at-grade rail crossings	0	0	0	4
Percent of rail system under positive train control	N/A	N/A	N/A	N/A
Percent of rail system with track capable of supporting 286k	N/A	N/A	N/A	N/A
Number of Tier 3 and 4 locomotives	N/A	N/A	N/A	N/A
Percent of major freight generators with appropriate rail access	N/A	N/A	N/A	N/A
Average truck turn-around time at Seagirt Marine Terminal (single moves / double moves)	39.0 min / 57.0 min	30.5 min / 54.4 min	30.9 min / 56.2 min	39.5 min / 54.8 min

Performance Measure	2008	2009	2010	2011
MPA compliance with the Maritime Transportation Security Act of 2002	N/A	N/A	N/A	In Compliance
Adequate dredge material placement capacity remaining for Harbor and Bay maintenance and new work dredging (harbor material / bay material)	1.5 yrs / 2.0 yrs	0.5 yrs / 1.0 yrs	0.0 yrs / 0.0 yrs	0.0 yrs / 2.0 yrs
Number of trucks replaced - Mid-Atlantic Dray Truck Replacement Program	N/A	N/A	N/A	N/A
Port of Baltimore Foreign Cargo & MPA General Cargo Tonnage (foreign tons / MPA general tons)	33.0 million / 9.1 million	22.4 million / 7.8 million	32.8 million / 7.6 million	37.8 million / 8.9 million
Total Air Tonnage at BWI	N/A	N/A	N/A	108,644***
Number of Nonstop Airline Markets Served	69	70	72	75

Source: MDOT, MPA, SHA, MDTA, MAA

Notes: * data from 2004
** as of 2012
*** March 2011 through Feb 2012

4.0 Freight Demand

This section discusses freight demand performance and volumes. There are multiple drivers of demand for freight. In a state like Maryland with a strong industrial legacy, freight movement is driven not only by the population's consumption but also by demand in other states and other countries.

4.1 FREIGHT DEMAND BY MODE

Data from the Federal Highway Administration's Freight Analysis Framework (FAF3) shows that the state of Maryland has a diversified freight cargo profile. The dominance of trucking is apparent when examining freight movement measured in terms of tonnage or value. Trucking constitutes 74% of total freight value and 76% of total freight tonnage.

Table 4.1 Originating and Terminating Freight in Maryland

Method for Moving Freight	Total Value (Millions of Dollars)	Total Weight (Thousands of Tons)
Air**	4,492	112
Other***	52,058	9,501
Rail	6,594	22,569
Truck	294,198	236,809
Water****	41,500*****	32,840 foreign; 9,900 domestic
All Freight	398,842	311,371

Source: U.S. Department of Transportation Freight Analysis Framework (FAF3) Version 3. Other, Rail, and Truck value and tonnage data is estimated based on FAF3 data. The data is adjusted yearly to account for previous year actual data and a 2% annual growth rate consistent with the Federal Highway Administration's Freight Summary 2008. The 2% growth rate reflects a conservative estimate of domestic and international freight growth given current economic conditions.
** Source: BWI Marshall report to Airports Council International (2010).
*** Freight consists largely of postal and courier shipments weighing less than 100 pounds and other intermodal combinations.
**** Source: MPA and U.S. Army Corps of Engineers (2010).
***** Value of international cargo only.

4.2 FREIGHT DEMAND BY COMMODITY

While Maryland's small size and unique geography make intrastate tonnage flows a modest component of total flows, cargo that both originates and terminates in Maryland is an indicator of the degree to which the state provides the commodities and products needed from within its own borders. In terms of tonnage, a few commodities stand out as major drivers of the state's internal freight tonnage including gravel, scrap and non-metallic mineral products. (see Table 4.2) It is also notable that total gravel shipments, state's largest internal commodity by tonnage, are expected to fall by 2020 while coal shipments are expected to increase robustly. Shipments of mixed freight, which includes restaurant and grocery supplies, are expected to see robust growth. In terms of value, machinery, mixed freight and pharmaceuticals are the most important intrastate commodities. The value of intrastate machinery shipments is expected to grow slowly with mixed freight and pharmaceuticals growing more robustly.

Table 4.2 Intrastate Commodities

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Gravel	21,729.53	18,476.98	236.14	198.98
Waste/scrap	20,803.21	21,178.25	1,428.08	1,466.76
Nonmetal min. prods.	15,328.51	15,630.77	2,111.05	2,150.58
Coal-n.e.c.	11,807.83	16,009.30	4,306.80	5,454.39
Natural sands	8,896.60	8,134.84	110.24	110.07
Nonmetallic minerals	7,931.10	9,470.24	262.13	311.84
Other foodstuffs	4,470.26	4,897.48	4,617.04	5,064.06
Gasoline	4,228.11	4,745.25	2,770.66	3,111.53
Metallic ores	3,825.35	3,792.90	156.39	148.26
Fuel oils	3,672.15	4,567.64	2,098.20	2,727.64
Unknown	3,082.68	3,513.42	3,773.38	4,376.21
Mixed freight	2,862.78	3,742.14	7,134.06	9,369.53
Wood prods.	2,703.72	3,035.29	1,797.31	2,097.49
Logs	2,671.74	3,083.29	174.07	245.44
Machinery	2,313.44	2,379.69	18,476.32	18,983.32
Cereal grains	1,783.12	2,245.81	285.40	364.43
Other ag prods.	1,611.99	1,866.39	986.57	1,157.70
Animal feed	1,485.34	1,137.74	559.04	419.12
Basic chemicals	1,462.01	1,309.14	929.41	967.99
Articles-base metal	1,304.61	1,413.10	3,692.21	4,006.64

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Base metals	1,233.96	1,447.48	1,903.43	2,051.74
Coal	1,208.28	1,715.40	56.23	85.61
Building stone	1,114.43	1,105.64	128.32	136.98
Alcoholic beverages	1,000.11	1,144.03	2,162.12	2,390.17
Milled grain prods.	911.81	1,063.52	936.02	1,092.34
Fertilizers	836.83	739.68	137.05	120.31
Motorized vehicles	756.80	931.76	5,227.52	6,960.73
Misc. mfg. prods.	515.66	585.50	2,454.64	2,827.52
Meat/seafood	434.30	411.05	1,463.59	1,327.85
Newsprint/paper	427.63	496.39	545.93	656.30
Plastics/rubber	379.05	407.10	1,117.40	1,209.83
Printed prods.	378.39	294.73	1,599.08	1,250.42
Chemical prods.	347.04	290.56	1,240.23	1,023.63
Furniture	335.74	328.89	1,355.81	1,266.63
Paper articles	318.20	359.39	495.60	517.16
Electronics	246.33	256.01	3,827.73	3,941.82
Textiles/leather	232.17	382.43	2,851.62	4,881.50
Live animals/fish	177.34	178.80	252.26	259.59
Pharmaceuticals	83.58	101.63	6,024.78	9,493.27
Precision instruments	42.24	167.3	640.79	2,177.68
Tobacco prods.	26.13	16.91	600.21	383.82
Transport equip.	9.89	10.99	877.05	633.43
Crude petroleum	0.10	0.10	0.05	0.05

Source: *U.S. Department of Transportation Freight Analysis Framework (FAF3) Version 3*

Table 4.3 shows commodities that terminate in Maryland in terms of tons and dollars. Growth in coal shipments is projected to offset losses in gravel shipments. The growth in coal exports has been one of the most significant trends at the Port of Baltimore. If this trend continues, it may eclipse the projected growth assumptions in FAF. The FAF forecasts an impressive surge in high value goods such as precision instruments and pharmaceuticals.

Table 4.3 Inbound Commodities

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Gravel	28,516.01	25,836.80	321.61	284.42
Coal	25,695.69	35,529.77	1,488.80	2,134.18
Waste/scrap	22,492.64	24,430.37	1,815.26	2,312.11
Coal-n.e.c.	19,449.59	22,290.23	7,981.79	8,106.92
Nonmetal min. prods.	18,455.07	19,277.03	3,988.97	4,003.38
Natural sands	11,447.14	10,284.74	162.60	152.94
Nonmetallic minerals	10,194.86	10,507.03	455.98	394.23
Other foodstuffs	8,993.98	10,985.14	9,867.47	12,093.22
Mixed freight	6,468.87	8,736.09	20,084.65	27,599.48
Wood prods.	6,219.79	6,190.57	4,047.24	3,956.17
Fuel oils	6,099.63	6,511.61	3,612.53	3,940.58
Gasoline	5,626.22	5,516.24	3,663.70	3,598.25
Machinery	4,250.61	4,941.82	28,908.10	33,292.35
Base metals	4,105.02	4,984.98	6,384.98	7,173.49
Metallic ores	4,030.34	4,018.07	434.98	434.23
Other ag prods.	3,323.61	4,456.43	2,730.82	3,895.32
Unknown	3,287.15	3,804.73	4,097.46	4,869.81
Cereal grains	3,149.09	3,917.50	492.87	626.78
Logs	2,821.97	3,167.37	221.37	265.40
Animal feed	2,746.60	3,318.14	1,285.38	1,582.76
Basic chemicals	2,679.13	2,911.32	2,477.91	3,055.72
Articles-base metal	2,621.29	2,927.22	8,144.10	9,252.99
Motorized vehicles	2,162.35	2,474.82	19,050.80	24,367.77
Plastics/rubber	2,075.74	2,514.07	6,427.07	7,787.59
Newsprint/paper	2,000.32	2,587.18	1,763.82	2,394.96
Milled grain prods.	1,844.73	2,397.58	2,220.70	3,032.21
Alcoholic beverages	1,816.67	2,154.34	3,230.51	3,840.91
Chemical prods.	1,722.71	2,420.14	6,241.69	10,660.48
Misc. mfg. prods.	1,487.25	2,088.64	8,824.53	12,087.31
Electronics	1,454.99	1,806.72	25,030.03	31,302.97
Meat/seafood	1,375.51	1,764.77	4,547.01	5,697.27
Fertilizers	1,268.73	1,265.74	236.35	217.11

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Building stone	1,218.55	1,162.62	160.33	153.90
Printed prods.	1,041.73	821.65	4,244.51	3,288.81
Paper articles	986.68	1,155.25	1,697.01	1,972.85
Textiles/leather	952.23	1,326.66	11,487.79	16,101.86
Furniture	919.36	966.79	4,660.88	4,921.57
Live animals/fish	739.43	852.21	896.26	1,054.19
Pharmaceuticals	504.33	914.64	38,567.82	66,167.50
Transport equip.	91.28	123.57	3,829.71	5,633.99
Precision instruments	76.29	322.64	4,583.20	24,325.66
Tobacco prods.	36.56	21.02	850.11	501.66
Crude petroleum	0.10	0.11	0.05	0.05

Source: *U.S. Department of Transportation Freight Analysis Framework (FAF3) Version 3*

Table 4.4 shows tonnage that originates in Maryland and terminates in all destinations. One of the sharpest projected changes between 2007 and 2020 is the growth in the category of Coal (not elsewhere classified) which refers to SCTG commodity class 19 "Other Coal and Petroleum Products". This category also includes liquid natural gas. It is also notable that machinery shipments are the top commodity by value yet the FAF does not project significant growth in this category.

Table 4.4 Outbound Commodities

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Gravel	30,680.30	28,496.86	323.50	294.64
Waste/scrap	25,527.30	24,230.27	2,295.45	1,956.42
Nonmetal min. prods.	23,489.01	22,894.93	3,795.66	3,792.50
Coal-n.e.c.	17,824.09	23,667.20	6,501.05	8,174.14
Other foodstuffs	15,072.95	16,108.28	11,023.18	11,407.52
Natural sands	11,776.29	11,040.60	154.11	162.87
Nonmetallic minerals	9,050.98	12,300.97	431.99	1,077.02
Basic chemicals	6,972.83	5,646.71	4,207.35	3,867.55
Wood prods.	6,155.38	7,039.62	4,200.56	4,973.90
Mixed freight	5,930.23	7,153.02	19,696.65	23,668.06
Base metals	5,386.28	6,323.25	6,282.87	7,102.26
Cereal grains	4,948.68	6,105.85	853.40	1,042.34

Commodity	2007 (Thousands of Tons)	2020 (Thousands of Tons)	2007 (Millions of Dollars)	2020 (Millions of Dollars)
Gasoline	4,549.29	5,395.79	2,984.53	3,530.80
Metallic ores	4,146.76	4,155.76	1,778.91	2,276.75
Fuel oils	4,039.46	5,988.05	2,293.69	3,436.24
Unknown	3,870.36	4,228.52	4,660.89	5,205.24
Machinery	3,821.93	3,910.25	29,379.13	29,946.33
Coal	3,053.76	3,747.05	143.40	184.26
Logs	3,050.44	3,774.16	226.72	429.54
Chemical prods.	2,702.20	2,321.47	5,492.62	4,799.52
Other ag prods.	2,600.22	2,942.10	2,043.84	2,292.32
Newsprint/paper	2,325.62	1,813.97	1,862.11	1,480.94
Motorized vehicles	2,229.65	2,546.74	14,519.04	16,784.77
Milled grain prods.	2,182.54	2,276.71	2,303.30	2,405.38
Articles-base metal	2,181.37	2,288.82	7,148.68	7,419.14
Animal feed	2,072.59	1,539.03	927.67	680.18
Alcoholic beverages	1,716.50	1,848.86	3,398.87	3,639.30
Plastics/rubber	1,622.21	1,757.61	4,165.10	4,408.65
Building stone	1,429.94	1,438.38	159.70	185.61
Printed prods.	1,339.32	1,010.25	4,365.30	3,229.58
Fertilizers	1,336.23	1,085.94	217.12	176.19
Meat/seafood	1,146.65	1,163.67	3,461.26	3,218.97
Misc. mfg. prods.	1,089.82	1,124.97	6,114.54	6,488.00
Live animals/fish	964.39	972.16	1,099.76	1,112.36
Electronics	757.61	825.98	13,786.99	14,531.97
Furniture	741.33	738.86	2,600.26	2,504.99
Paper articles	679.38	781.72	1,059.49	1,089.31
Textiles/leather	427.46	688.18	7,771.18	13,690.76
Pharmaceuticals	306.30	466.49	15,656.76	25,032.52
Precision instruments	91.56	304.70	2,432.43	7,128.74
Tobacco prods.	32.91	20.59	798.70	485.72
Transport equip.	23.76	23.12	1,787.70	1,547.65
Crude petroleum	0.12	0.12	0.06	0.06

Source: *U.S. Department of Transportation Freight Analysis Framework (FAF3) Version 3*