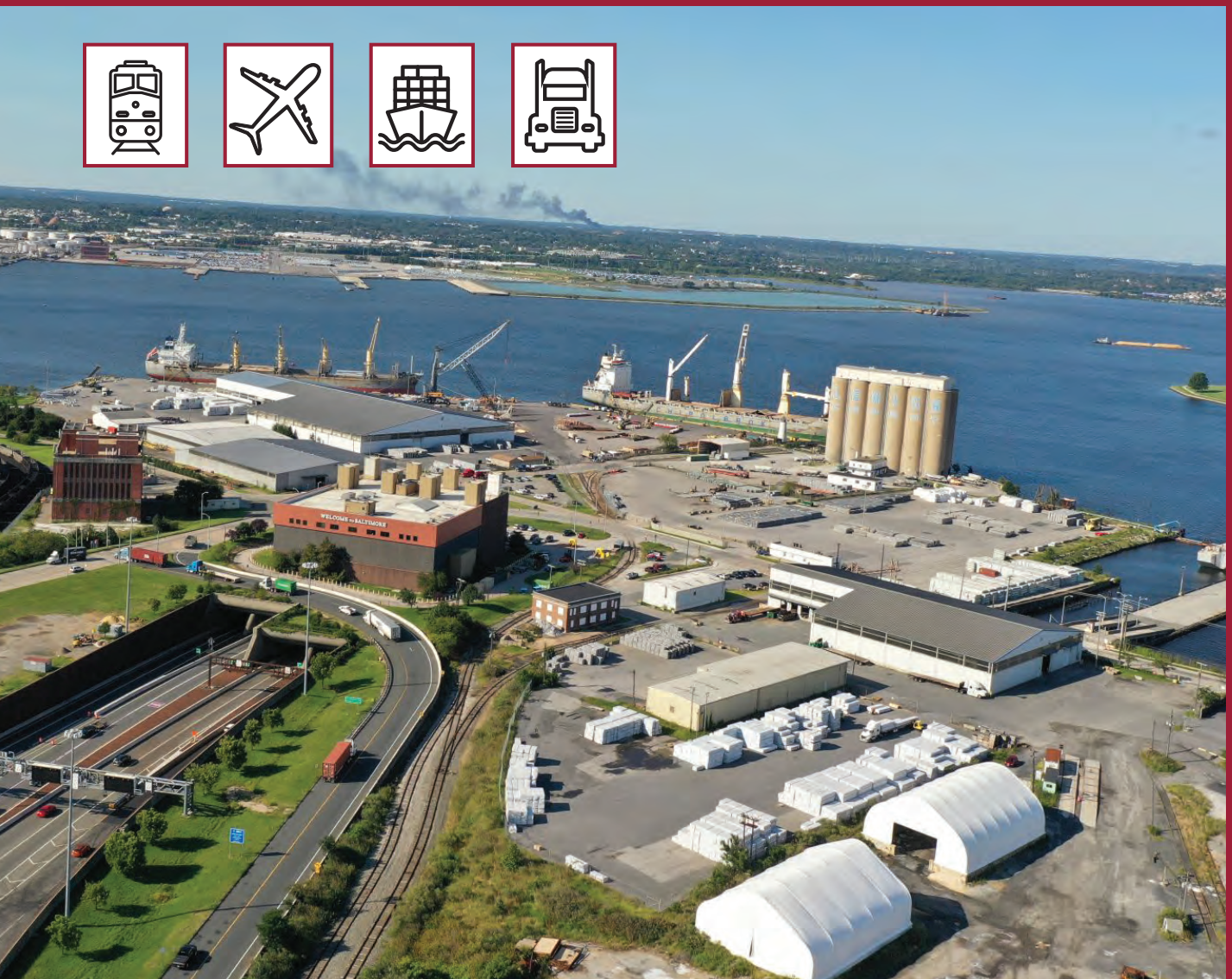
MARYLAND DEPARTMENT OF TRANSPORTATION

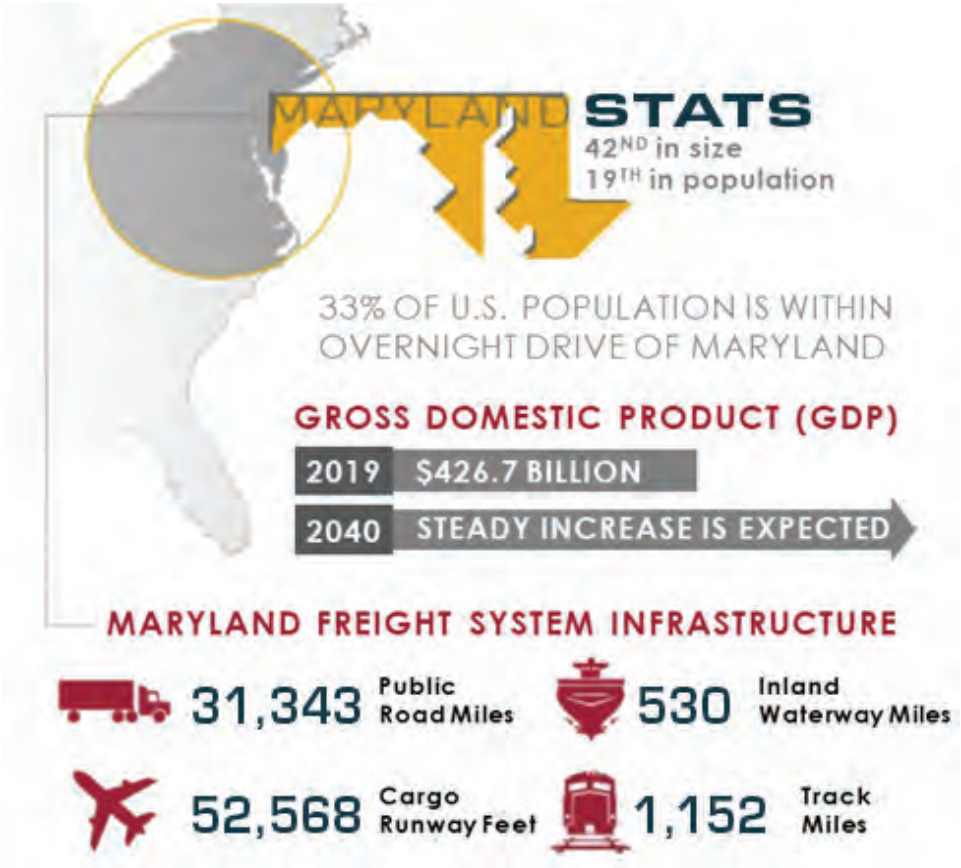
MARYLAND STATE FREIGHT PLAN
Excecutive Summary



INTRODUCTION

The 2022 Maryland Freight Plan assesses Maryland freight movements, multimodal networks, and related details to supplement and support the overarching vision, goals, and long-range transportation planning initiatives in the 2040 Maryland Transportation Plan (MTP). It also incorporates national freight goals and guidance from federal surface transportation authorizations including the 2015 Fixing America's Surface Transportation (FAST) Act and newer requirements per the 2021 Infrastructure Investment and Jobs Act (IIJA).

EXHIBIT ES-1 MARYLAND FREIGHT AT-A-GLANCE



A **safe** and **efficient** freight system helps **lower costs** of goods that consumers and companies need for **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 for the Maryland Department of Transportation (MDOT).

MARYLAND FREIGHT PLAN VISION

Freight travels freely and safely through a modern, resilient, and interconnected multimodal network contributing to sustainable economic viability and growth for Maryland businesses and communities

EXHIBIT ES-2 VISION, GOALS, AND OBJECTIVES

PURPOSE OF THE FREIGHT PLAN To examine existing and projected conditions, build consensus, and identify policy positions, strategies, and freight projects to improve freight movement efficiency and safety.

NATIONAL FREIGHT GOALS

NATIONAL FREIGHT STRATEGIC PLAN

SAFETY

Improve the safety, security, and resilience of the national freight system.

INFRASTRUCTURE

Modernize freight infrastructure and operations to grow the economy, increase competitiveness, and improve quality of life.

INNOVATION

Prepare for the future by supporting the development of data, technologies, and workforce capabilities that improve freight system performance.

49 U.S.C. §70101. (d) Goals (Multimodal Freight Policy)
23 U.S.C. §167. (b) Goals (Highway Freight Program)

2040 MARYLAND TRANSPORTATION PLAN (2040 MTP) GOALS

- Ensure a Safe, Secure, and Resilient Transportation System
- Facilitate Economic Opportunity and Reduce Congestion in Maryland through Strategic System Expansion
- Maintain a High Standard and Modernize Maryland's Multimodal Transportation System
- Improve the Quality and Efficiency of the Transportation System to Enhance the Customer Experience
- Ensure Environmental Protection and Sensitivity
- Promote Fiscal Responsibility
- Provide Better Transportation Choices and Connections

MARYLAND FREIGHT PLAN GOALS

Safety, Security, and Resilience
Ensure the safe, secure, and resilient movement of goods on Maryland's multimodal freight network

Economic Opportunity and Efficiency
Enhance economic competitiveness through freight industry opportunities, mobility improvement, and strategic system expansion

System Preservation and Modernization
Modernize Maryland's multimodal freight network and operations with innovative solutions from origin to destination

Quality of Service, Efficiency, and Customer Experience
Enhance transportation services and communications for users of Maryland's multimodal freight system

Environmental Protection and Sensitivity
Support sustainable freight infrastructure, community vitality, and environmental stewardship

Fiscal Responsibility
Ensure responsible freight system investment and management through performance-based decision-making and innovative funding mechanisms and partnerships

Transportation Choices and Connections
Support alternative transportation choices and goods delivery options by improving multimodal and last-mile connections

EXHIBIT ES-2 VISION, GOALS, AND OBJECTIVES (CONTINUED)

MARYLAND FREIGHT PLAN OBJECTIVES

EXHIBIT ES-3 FEDERAL FREIGHT PLANNING REQUIREMENTS

FEDERAL REQUIREMENTS FOR STATE FREIGHT PLANS
1 Freight System Trends, Needs, and Issues
2 Freight Policies, Strategies, and Performance Measures
3 Multimodal Freight Facilities and Network
4 Alignment with National Freight Policy and Goals
5 Innovative Technologies and Operational Strategies
6 Asset Preservation and Improvements
7 Freight Bottlenecks, Mobility Issues, and Mitigation
8 Freight Induced Congestion and Mitigation
9 Freight Investment Plan
10 Truck Parking Facilities Assessment **(IIJA)**
11 Supply Chain Cargo Flows **(IIJA)**
12 Commercial Ports Inventory **(IIJA)**
13 Multi-state Freight Compact Consideration **(IIJA)**
14 E-Commerce Impacts **(IIJA)**
15 Military Freight Considerations **(IIJA)**
16 Freight Resilience and Environmental Impacts **(IIJA)**
17 State Freight Advisory Committee (SFAC)

Table Notes:
(IIJA) – reflects new requirements introduced by IIJA, building onto the 10 requirements listed previously in the FAST Act

The 2022 Maryland Freight Plan contains all elements to meet federal freight planning requirements established by the FAST Act and expanded by the IIJA. These details require that the Plan cover an eight-year forecast period, be fiscally-constrained, include a freight investment plan with a list of priority projects, and describe how the state will invest and match its National Highway Freight Program (NHFP) funds. Additionally, including the expanded requirements under the IIJA, 49 U.S.C. §70202 outlines 17 required freight plan elements.

From an economic perspective, 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 logistics-related needs of Maryland industries and their supply chains continue to evolve, especially in the wake of the COVID-19 pandemic. Now more than ever, 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. To this end, the 2022 Maryland Freight Plan acknowledges key trends that drive goods movement demand and influence the performance of the goods movement transportation system.

RECENT FREIGHT ACTIONS AND RESOURCES

This update to the 2022 Maryland Freight Plan incorporates, where applicable, many of the recent freight-related actions or resources (at right) that have been advanced by MDOT and other freight stakeholders since completion of the 2017 Plan. Such actions include the implementation of recommended policies or guidance, advancements in freight data tools and performance measurement, the planning, design, or construction of significant projects, and updates to companion freight-related documents such as the 2022 Maryland State Rail Plan.

STAKEHOLDERS AND PARTNERSHIPS

Goods movement relies on a partnership between the freight transportation system owners and its users. The freight network consists of publicly 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 develop and implement 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 2022 Maryland Freight Plan. The following describes MDOT's stakeholders and partnership roles throughout the development of this 2022 Maryland Freight Plan.

MDOT TRANSPORTATION BUSINESS UNITS

Development of the policies identified in the 2022 Maryland Freight Plan is a collective effort led by MDOT. The Freight Transportation Business Units (TBU) Roundtable represents offices throughout the MDOT TBUs and is the public agency freight voice for Maryland. It has met at key milestones during the development of the 2022 Maryland Freight Plan.

STATE FREIGHT ADVISORY COMMITTEE

Maryland's SFAC is another important institutional body that supports freight planning activities in Maryland and advocates for implementation of projects, programs, and policies to address freight-related priorities, issues, and funding needs. The SFAC represents the freight community at large and advises the state on project and program priorities, freight experience and performance, freight bottlenecks and solutions, next generation supply chain operations and technology, and how the state can support industry.

EXTERNAL STAKEHOLDERS

In addition to the MDOT Freight TBU roundtable and the SFAC, MDOT relies on partnerships with other public and private entities to help inform freight planning efforts and the 2022 Maryland Freight Plan updates.

Recent Freight Actions and Resources

- Maryland Freight Story
- Maryland Freight Economy Dashboard
- SHRP2 C20 Freight Modeling in Maryland
- Maryland Transportation Systems Management and Operations (TSMO) Strategic Plan
- Maryland Port Administration Strategic Plan
- Maryland State Highway Mobility Report
- Maryland Statewide Truck Parking Study
- BWI Marshall Airport Master Plan
- Maryland Connected and Automated Vehicles (CAV) Strategic Framework
- MDOT SHA Truck Parking Analysis
- Maryland Truck Platooning Legislation
- Maryland Personal Delivery Device Legislation
- Maryland State Rail Plan
- MDOT Attainment Report on Transportation System Performance (AR)
- Maryland Roadway Performance Tool
- Other Maryland Key Freight Projects and Studies

For links to these and other resources, refer to MDOT's Maryland Freight Plan website:

https://mdot.maryland.gov/freightplan

EXHIBIT ES-4 MDOT TBUS/OFFICES AND RELATED FREIGHT ACTIVITIES

MDOT TBUs/OFFICES		FREIGHT ACTIVITIES
MDOT TSO OPCP RIF TEAM	The Secretary's Office Office of Planning and Capital Programming, Rail and Intermodal Freight Team	Statewide multimodal planning and coordination; motor carrier support, freight rail support, regional coordination, and planning
MDOT SHA	State Highway Administration	Commercial vehicle safety, commercial vehicle permits, highway planning and analysis
MDTA	Maryland Transportation Authority	Commercial vehicle operations and tolling on MDTA facilities, facilities planning
MDOT MPA	Maryland Port Administration	Oversight, planning, administration at the state-owned marine terminals within the Port of Baltimore
MDOT MAA	Maryland Aviation Administration	Air cargo planning, management, promotion at BWI Marshall Airport and other airports
MDOT MVA	Motor Vehicle Administration	Commercial vehicle operator licenses, support for truck platooning regulations and Personal Delivery Device (PDD) regulations, and co-lead for the Connected and Automated Vehicles (CAV) Working Group
MDOT MTA	Maryland Transit Administration	Coordination between passenger rail service and Class I railroad freight operations; and Class III railroad engineering support and property management

State Freight Advisory Committee and Mission

The Maryland **SFAC** is a high-level group of freight industry leaders* that represent the freight community at large, including the best interests of Maryland businesses and consumers, diverse geographies, and local communities that are impacted by freight movement. The SFAC helps to advise the State on freight-related priorities, policies, issues, projects, and funding needs in order to advance freight goals and objectives in Maryland.

Along with MDOT, the SFAC helps to drive the analysis of private freight operations in the state and provide insights into future goods movement patterns and needs. This group also plays an active role in directly supporting State Freight Plan updates and convened several times at important milestones throughout the 2021-2022 Maryland Freight Plan update process. Prior to the latest update, SFAC membership was revised and expanded to ensure active and engaging participation.

*** SFAC Membership List:**
www.mdot.maryland.gov/SFAC

FREIGHT DEMAND AND THE ECONOMY

MARYLAND COMMODITY FLOWS

Businesses in Maryland produce and consume raw materials and finished goods that are shipped to and from locations across the globe. Maryland's freight transportation system must be ready to handle the current and future levels and types of goods movement. To help provide an understanding of the state's commodity flows, the Maryland Freight Plan summarized freight data based on Federal Highway Administration (FHWA)'s Freight Analysis Framework Version 5 (FAF5) database. Key findings include the amount of Maryland freight by **tonnage** or dollar **value**; the **commodity types** being transported, ranging from raw resources to finished goods; the **mode** of transportation used, including truck, rail, water, air, pipeline, and multiple modes; and the origin-destination of freight movements to and from the state, including **domestic flows** inside the U.S., as well as **import/export flows** that begin or end in foreign countries.

Commodity Flow Key Findings

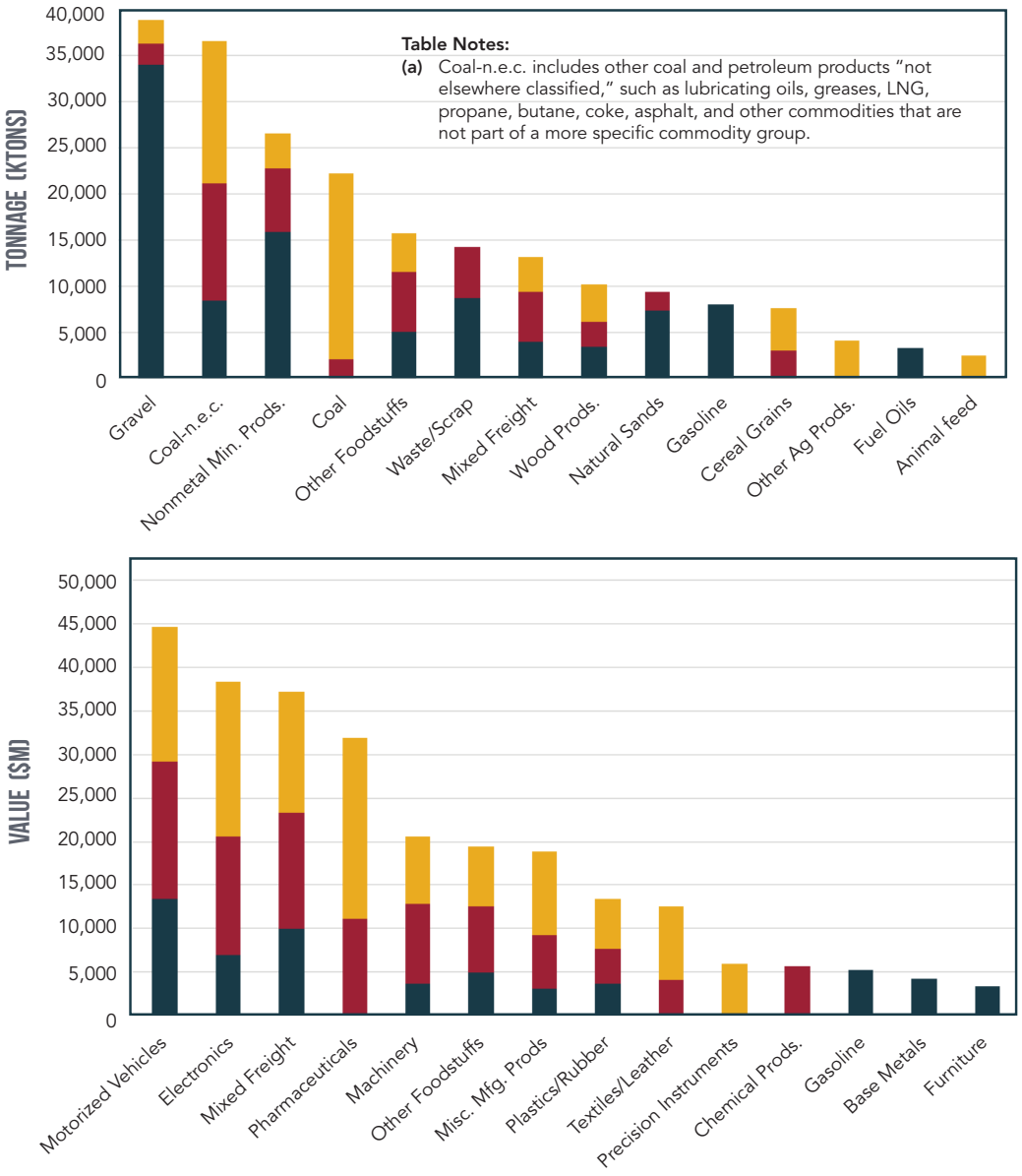
- **Domestic Trade Partners:** Approximately 90% of Maryland's domestic freight tonnage and 70% of its domestic freight value move within Maryland and between the surrounding states, plus New York and California.
- **Foreign Trade Partners:** Europe, Canada, and Eastern Asia may be considered among Maryland's leading international trade partners in terms of total import/export freight tonnage or value.
- **Freight Mode:** Truck is the dominant mode, carrying 78% of total freight tonnage and 76% of total freight value.
- **Commodity Types:** Maryland's freight tonnage typically consists of bulk or heavy materials such as gravel, coal and petroleum products, or nonmetallic mineral products, while freight value is more diverse, spanning motorized vehicles, electronics, mixed freight, pharmaceuticals, machinery, and other commodities.

In **2020**, freight moving to, from, or within Maryland amounted to nearly **281 million tons** worth nearly **$376 billion** (2020 FAF5).

By **2050**, freight tonnage is expected to increase by **53%** to nearly **429 million tons**, while value will increase **108%** to nearly **$781 billion** (2020-2050 FAF5).

Moreover, these estimates do not reflect substantial **pass-through freight** that historically accounts for nearly **two-thirds** of the total goods carried on the state's multimodal freight transportation systems.

EXHIBIT ES-5 MARYLAND COMMODITY FLOWS – 2020 LEADING COMMODITIES BY TONNAGE OR VALUE



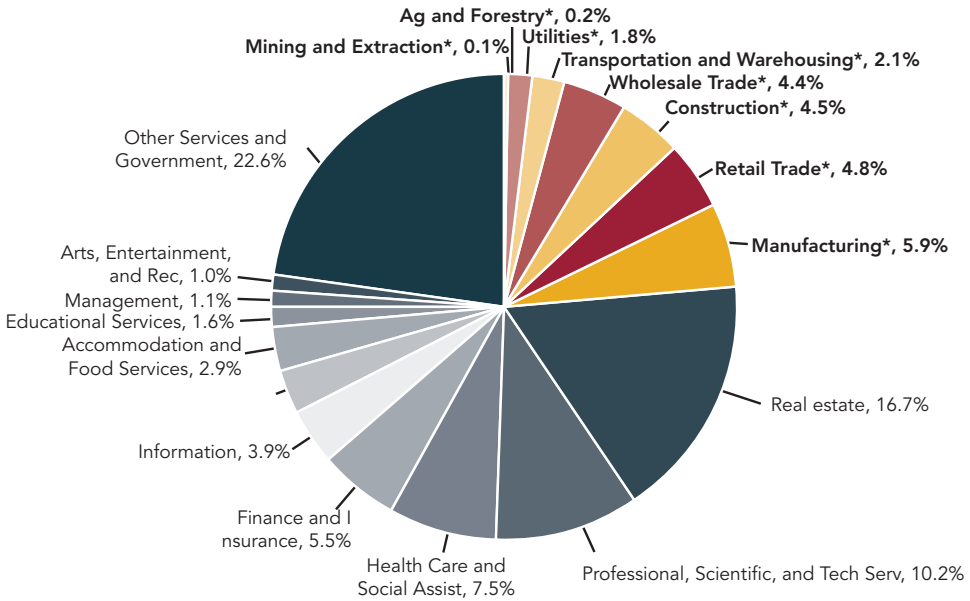
MARYLAND FREIGHT ECONOMIC INFLUENCES

Goods movement is essential to a healthy Maryland economy, and potential freight economic growth (or constraint) can be directly influenced by the quality and performance of the state's multimodal freight transportation, infrastructure, and support systems. Reliable and cost-effective transportation is an integral component to ensuring capacity and efficiencies within critical supply chains that keep the state's commerce flowing. Beyond infrastructure itself, this flow of commerce influences (and is influenced by) Maryland's steadily growing population, freight-related business and employment activities, and the characteristics of key freight industry sectors.

AGRICULTURE

The agriculture sector is vitally important to Maryland and the United States for the supply chain resources it provides as part of a much broader agribusiness industry within the state and nation. Typical commodity groups in the agriculture sector account for 9% of Maryland's total domestic freight tonnage, and just over 5% of total freight value, with demands expected to increase steadily. Maryland has more than 12,250 farms across the state and, with major producers such as Perdue Farms and McCormick, is the third largest poultry producer in the U.S. and the first in spice making in the world.

EXHIBIT ES-6 MARYLAND FREIGHT ECONOMIC INFLUENCES — INDUSTRY SECTORS AS PERCENT OF MARYLAND GDP (2019)



MINING

Mines and quarries are an important element of Maryland's economic history, and operations continue today with over 300 active mines statewide. Mining locations include coal field regions in Allegany and Garrett counties in western Maryland and, as of 2020, 285 non-coal mines that are mostly located in Charles, Prince George's, and St. Mary's counties in southern Maryland. While typical mining commodity groups reflect over $3.3 billion of materials, this reflects less than 1% of Maryland's total freight value due to their relatively low value-to-weight ratios. However, as extremely heavyweight materials, they account for more than 28% of Maryland's domestic tonnage.

CONSTRUCTION AND UTILITIES

The construction and utilities sector is directly influenced by the type and pace of infrastructure and residential, commercial, or industrial development throughout Maryland. Typical commodity groups in the construction sector overlap materials that may be captured in other sectors (e.g., raw materials such as sand or gravel), plus miscellaneous building products (e.g., wood, stone, or block) and waste or scrap elements. This collective sample accounts for just over 36% of Maryland's total domestic freight tonnage, and approximately 4% of total freight value. Demand through 2050 is expected to increase steadily.

ENERGY

While Maryland ranks among the 10 lowest states in the U.S. in per capita energy consumption, it also consumes more than five times as much energy as it produces. The energy industry in Maryland encompasses power generation; distribution networks for natural gas, oil, and electricity; and renewable energy sources including hydropower, solar, wind, and biomass. Typical commodity groups may include coal, gasoline, fuel oils, and other coal and petroleum products such as liquefied natural gas, propane, and coke. Such materials comprise over 26% of Maryland's total domestic freight tonnage, but only 5% of total freight value. Changes through 2050 show significant tonnage growth specifically in the coal and petroleum products category, but overall growth is otherwise offset by notable declines in coal, gasoline, and fuel oils. Such declines are likely based on anticipated shifts in future energy sources, such as switchovers from coal to gas-fired power plants, expanded use of electric or fuel-efficient vehicle technologies, or other increased reliance on alternative energy sources.

MANUFACTURING

The manufacturing sector in Maryland reflects diverse elements ranging from traditional manufacturing (e.g., plastics, paper mills, or engine construction) to technology manufacturing (e.g., search, detection, and navigation instruments). Maryland has 4,000 manufacturing companies across the state, and the University of Maryland ranks 14th in the nation in undergraduate supply chain management/ logistics. Sample commodity groups in the manufacturing sector account for just over 6% of Maryland's total domestic freight tonnage, but almost 23% of total freight value.

WHOLESALE TRADE, TRANSPORTATION AND WAREHOUSING, AND RETAIL TRADE

Though they represent distinctly separate industries, the wholesale trade, transportation and warehousing, and retail trade sectors together encompass a broad array of resources, products, and interrelated supply chain interests. These interests include materials for manufacturing processes, the output of those processes, and all manner of products from foodstuffs to manufactured goods to paper and publishing materials. Their supply chains cover wholesale markets and warehousing/distribution activities, retail goods to stock in-store shelves, and e-commerce deliveries directly to consumers.

Materials and products in these sectors contribute significantly to Maryland's economy, with typical commodity groups comprising more than 17% of Maryland's total domestic freight tonnage, but nearly 53% of total freight value. Demands are expected to increase steadily with growth of 82% in tonnage and almost a doubling in value through 2050 (2020-2050 FAF5).

FREIGHT NETWORK AND INFRASTRUCTURE

Domestic and international goods move to, from, or through Maryland by way of truck, Class I and short line rail, via coastal ports and inland waterways, by air, and by pipeline. The broader freight transportation systems also include logistics networks that often span thousands of miles over land, sea, and air with critical multimodal connections through hubs such as the Port of Baltimore, BWI Marshall Airport, or other domestic seaports and airports. At a state level, Maryland's logistics network encompasses freight shippers and receivers, freight handling facilities, waterborne freight terminals, and air cargo facilities. The collective multimodal networks provide vital connections between freight generating, receiving, and handling facilities.

Maryland's overall goods movement transportation network is composed of the state's highway network, freight rail network, waterways, seaports, air cargo airports, and energy-related infrastructure, as well as supporting elements such as intelligent transportation systems (ITS).

ROADWAYS

Maryland roadways collectively handled approximately 78% of the total freight tonnage and 76% of the total freight value moving to, from, or within the state, amounting to approximately 218 million tons worth approximately $286 billion (2020 FAF5).

NATIONAL HIGHWAY FREIGHT NETWORK

While goods generally move along the entire roadway network, the majority of freight utilizes portions of the NHFN or other significant freight routes throughout Maryland. The NHFN is a federally designated network initially set forth by the FAST Act in 2017 and consists of the Primary Highway Freight System (PHFS) and non-PHFS interstate routes, as well as sate/MPO-designed Critical Urban Freight Corridors (CUFC) and Critical Rural Freight Corridors (CRFC).

MARYLAND FREIGHT NETWORK

31,343 Public Road Miles

1,152 Track Miles

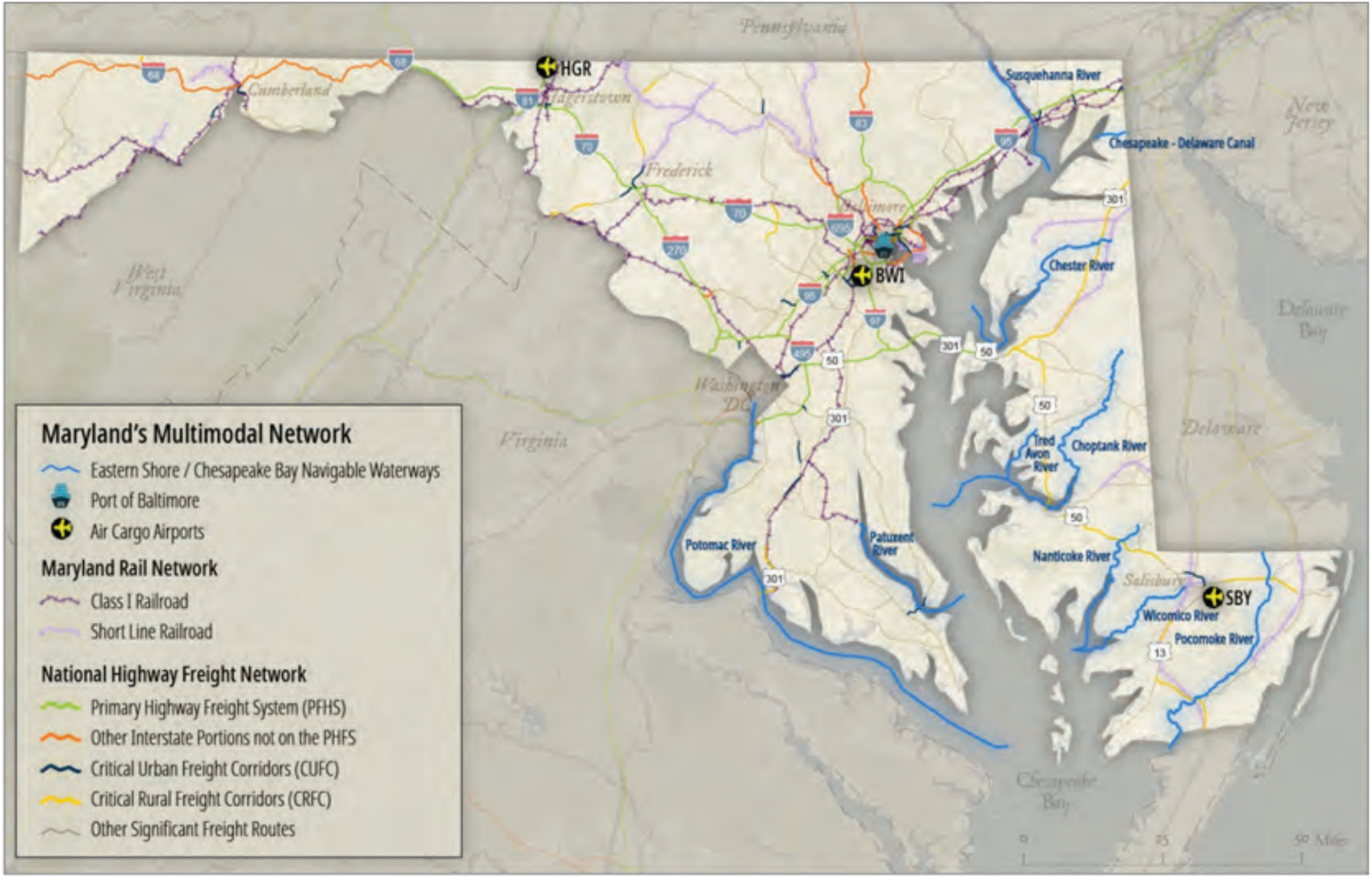
530 Inland Waterway Miles

52,568 Cargo Runway Feet

16,478 Pipeline Miles

Newer provisions in the **2021 IIJA** double the state's mileage caps to **150** total CUFC miles and **300** total CRFC miles. As such, future network expansion will occur as MDOT and MPO's coordinate and designate additional CUFCs and CRFCs for the newly allotted mileage.

EXHIBIT ES-7 MARYLAND MULTIMODAL FREIGHT NETWORK



RAILROADS

RAIL NETWORK

Maryland's rail network includes about 886 miles of active rail lines and more than 15 different rail operators of various types. Freight operations include two Class I, one Class II, and seven Class III (or short line) freight rail operators.

Freight rail transportation plays an important role in Maryland with major rail flows along the Class I lines, as well as critical first/last-mile connectivity and rural area access provided by the state's Class III operators. Maryland railroads collectively handled approximately 9% of total freight tonnage and 4% of total freight value moving to, from, or within the state, amounting to more than 25 million tons and over $13 billion in 2017.

PORTS AND WATERWAYS

PORT OF BALTIMORE

Cargo is the lifeblood of the Port of Baltimore, which handled more than 44.2 million tons of freight in CY 2019. 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. Key commodities handled at the Port's state-owned 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 marine terminals managed by MDOT MPA plus many privately-owned terminals. It is a vital link for raw materials and manufactured goods moving into and out of Maryland, the Mid-Atlantic region, and into the Midwest United States. The Port of Baltimore ranks at or near the top of all U.S. ports in several categories, including handling farm and construction machinery, automobiles, imported forest products, imported sugar, imported gypsum, and exported coal. Total general cargo at the MDOT MPA state-owned terminals reached 10.3 million tons in FY 2020.

Containerized Freight Opportunities:

Opportunities at the Port will continue to grow with significant expansion efforts such as the 2021 arrival of four additional Neo-Panamax cranes at Seagirt Marine Terminal, and the 2021 ground-breaking for the Howard Street Tunnel project that, upon completion, will facilitate double-stacked container trains to and from the Port.

INLAND WATERWAYS

Beyond the Port of Baltimore, various inland waterways also provide vital goods movement corridors that support Maryland industries. These corridors include the Chesapeake and Delaware Canal, numerous rivers on Maryland's Eastern Shore, and other locations such as the Susquehanna, Patuxent, and Potomac Rivers

EASTERN SHORE RIVERS

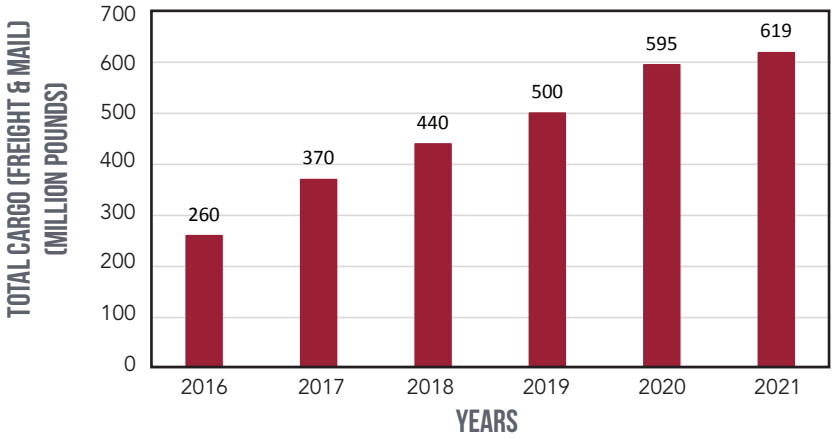
At least five rivers on Maryland's Eastern Shore actively provide important goods movement connections including, from north to south, the Tred Avon, Choptank, Nanticoke, Wicomico, and Pocomoke rivers. A sixth location along the Chester River may also see intermittent freight traffic, such as the transport of waterway improvement materials, but based on USACE data appears to have had little to no reported freight tonnage in several years. Key issues confronting waterborne commerce on Maryland's Eastern Shore include dredging to maintain adequate channel depths, securing appropriate dredge materials disposal sites, the need for truck and rail access improvements, and encroachment of residential development near waterborne industrial facilities.

AIR CARGO

MDOT MAA is responsible for airport regulation in the state and owns and operates two airports: Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall Airport) and Martin State Airport (MTN). There are 35 public use airports in Maryland; three are capable of cargo shipments including BWI Marshall Airport, Hagerstown (HGR), and Salisbury (SBY). On a much smaller scale, Martin State Airport also periodically handles charter and corporate flights that deliver supplies and materials (e.g., medical supplies) to local businesses.

BWI Marshall Airport is the state's largest cargo airport with a Foreign Trade Zone and two air cargo complexes. Air cargo (including freight and mail) is important in moving high value, time-sensitive shipments. Primary freight commodities shipped from BWI Marshall Airport include machine parts, electrical machinery, aircraft/spacecraft components, seafood, chemicals, and pharmaceutical/biological products. With the expansive growth of e-commerce and online shopping, BWI Marshall Airport has become a significant hub for small package sorting and distribution to last-mile delivery service. In 2021, BWI Marshall Airport set its annual cargo record by transporting almost 619 million pounds, which accounted for over 55% of the freight transported in the U.S. Capital Region.

EXHIBIT ES-8: ANNUAL CARGO (FREIGHT & MAIL) AT BWI MARSHALL AIRPORT (2016-2021)[36]



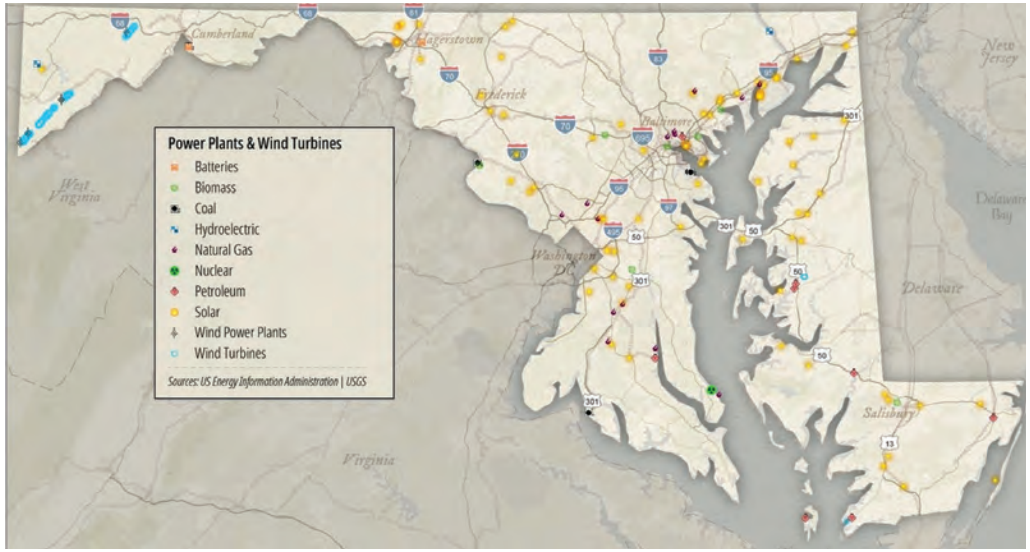
ENERGY INFRASTRUCTURE

The energy industry in Maryland encompasses power generation, distribution networks for natural gas, oil, and electricity, and renewable energy sources including hydropower, solar, wind, and biomass. The location of energy infrastructure varies across the state with clusters of activity based on resources, plant locations, and transportation links.

With these networks in mind, Maryland's overall multimodal freight network includes the NHFN and other significant highway freight routes throughout Maryland, the state's railroad network, key freight airports, the Port of Baltimore, and the inland waterway system. It also includes multimodal critical rural freight facilities based on FAST Act and IIJA criteria identified in conjunction with the prior iteration of Maryland's state freight plan based on an overlay and review of key freight routes and facilities in comparison to USDOT's initial Interim NMFN.

Viewing Maryland's overall freight network from a multimodal perspective will help to support the subsequent consideration and development of multimodal improvement strategies; partnership or collaboration opportunities; and local, regional, or megaregional connectivity needs and opportunities. Such perspectives will help to serve growing regions throughout Maryland as markets shift or expand, as freight demands increase, and as overall multimodal freight connectivity and accessibility needs evolve, particularly in light of future bottlenecks or congestion that may influence freight mobility issues.

EXHIBIT ES-9 MARYLAND POWER GENERATION SITES



FREIGHT SYSTEM PERFORMANCE, TRENDS, AND NEEDS

The Maryland Freight Plan includes an evaluation of more than 50 freight-relevant performance measures that leverage new data resources and relate to the state's ongoing freight planning initiatives. These measures provide insight into how the freight transportation system is reacting as freight movement patterns or volumes change, or as strategies and tactics are put into place. They also work holistically alongside other performance reporting efforts currently used at MDOT, including:

- MDOT AR on Transportation System Performance
- MDOT Transportation Asset Management Plan (TAMP)
- MDOT Managing for Results (MFR) Program
- MAP-21 performance measures required per federal Transportation Performance Management (TPM) Policy
- Other MDOT TBU performance programs

Performance-based trends in Maryland generally imply steady or improving conditions across a healthy, well-managed, and successful multimodal freight transportation system. However, some challenges remain and will continue to be monitored. The Maryland Freight Plan combines performance data, background planning research, and extensive agency/stakeholder coordination to compile an overarching set of statewide freight needs by goal, as well as specific needs and stakeholder interests by region (see **Exhibit ES-9**). The assessment of freight needs and related focus areas (see sidebar) summarizes the overall state of affairs for goods movement and multimodal freight transportation systems and related planning in Maryland. This knowledge is used to support the project and strategy related implementation details that are ultimately set forth by the plan.

Freight Focus Areas

Providing a deeper dive into the identified freight needs, and with direct reference to the latest IIJA requirements for state freight planning, Section 6 of the Maryland Freight Plan explores a diverse set of freight interests, activities, data insights, program areas, and other freight topics that encompass:

- ☑ Safety and security
- ☑ Operational programs and innovative/ disruptive technologies
- ☑ Asset preservation and improvement programs
- ☑ Freight congestion and reliability
- ☑ Truck parking facilities
- ☑ Supply chain cargo flows
- ☑ Commercial ports
- ☑ Multistate freight coordination
- ☑ E-commerce and related planning considerations
- ☑ Military freight considerations
- ☑ Freight resilience, environmental, and equity considerations

EXHIBIT ES-10 MARYLAND SUMMARY FREIGHT NEEDS BY GOAL

ECONOMIC OPPORTUNITY AND EFFICIENCY

- Public-private collaboration
- Multimodal system capacity
- Workforce development
- Congestion and bottleneck reduction
- Supply chain resilience
- Opportunity marketing

TRANSPORTATION CHOICES AND CONNECTIONS

- Multimodal accessibility
- Multimodal connectivity
- Urban loading and delivery
- Land use planning
- Technology integration
- Outreach and education

SAFETY, SECURITY, AND RESILIENCE

- Fatality reduction
- Injury reduction
- Incident management
- Rail crossing safety
- Truck parking capacity
- Facility security
- Cargo security
- Cyber security
- Freight system resilience

ENVIRONMENTAL PROTECTION AND SENSITIVITY

- Energy efficiency
- Dredged material management
- Emissions reduction
- Electric vehicle (EV)infrastructure
- Community engagement
- Quality of life

QUALITY OF SERVICE, EFFICIENCY, AND CUSTOMER EXPERIENCE

- Policy coordination
- Program coordination
- Truck route guidance
- Truck parking information
- Real-time information
- System reliability

SYSTEM PRESERVATION AND MODERNIZATION

- CAV technology
- OS/OW vehicles
- Truck platooning
- State of good repair
- Traffic signal systems
- UAV technology
- PDD technology

FISCAL RESPONSIBILITY

- Alternative project delivery
- Data driven planning
- Public-private collaboration
- Funding opportunities
- Innovative programs
- O&M cost reduction

EXHIBIT ES-11 MARYLAND SUMMARY FREIGHT NEEDS BY REGION

WESTERN MARYLAND

- Congestion on US 219, US 40, MD 135
- Freight issues around Hagerstown and the junction of I-70/I-81
- Freight impacts along I-68, US 210, MD 51, and MD 63
- Undesignated truck parking improvements
- Multimodal freight opportunities
- Incident management
- Expansion of logistics and warehousing activities

WASHINGTON METRO REGION

- Statewide and nationally ranked truck bottlenecks, particularly on I-495 and I-270
- Congestion along I-70, US 301, US 340
- Truck parking needs
- Strategic access for military freight
- Impact of freight routing and truck travel on local roads
- Community freight impacts

BALTIMORE METRO REGION

- Statewide and nationally ranked truck bottlenecks, particularly on I-95 and I-695
- Truck bottlenecks on I-70, US 50 near the Bay Bridge, US 29, I-195
- Multimodal freight project activities related to critical rail, port, and air freight assets
- Truck parking needs
- Multimodal access and connectivity
- Roadway/pavement maintenance
- Community freight impacts

SOUTHERN MARYLAND

- Congestion on MD 2, MD 4, MD 5, MD 235, and US 301
- Congestion around highway junctions in California and Waldorf
- Coordination of freight activities/access related to CSX rail
- Freight access to Patuxent Naval Air Station
- MDTA Nice/Middleton Bridge widening and replacement

EASTERN SHORE

- Congestion on US 50, MD 213, MD 404
- Freight connections along US 50 and US 301
- Undesignated truck parking improvements
- Freight opportunities in Salisbury and Cambridge
- Dredging and multimodal access for Eastern Shore rivers
- Truck toll and weight enforcement
- Climate change impacts on freight infrastructure
- Rail/truck transloading opportunities

FREIGHT PROJECTS AND INVESTMENT PLAN

The 2022 Maryland Freight Plan comprehensively addresses the state's freight planning activities and investments to qualify for funding under the NHFP. The Plan also identifies additional projects and funding opportunities to advance freight goals and strategies. MDOT welcomes the opportunity to invest in freight improvements using additional resources provided by the IIJA. The IIJA will provide Maryland and neighboring state Departments of Transportation (DOTs) approximately 50% more annual transportation spending over the next five years, including 30% more in formula funds. Using these resources, MDOT will continue to diligently apply funds and strategies to alleviate freight bottlenecks and address freight safety, congestion, and mobility.

NHFP DESCRIPTION AND ELIGIBILITY

Per the IIJA, all states are required to update their state freight plan every four years and develop a freight investment plan to obligate their apportionment of NHFP formula funds. The NHFP formula funds are specifically intended to be used to improve the efficient movement of freight on the NHFN as prescribed in 49 U.S.C. §70202.

Maryland NHFP Projected Funding

Maryland's NHFP funding projections for FY22-FY26 total approximately **$103.45 million**, allocated initially to:

- $**75M** for capital improvement projects
- **$6.9M** for truck parking facility improvements
- **$0.9M** for freight-related innovative planning and performance management
- **$11.8M** for CAV/TSMO related technology improvements
- **$8.85M** for upgrading virtual weight stations (VWS) and other Motor Carrier Division (MCD) resources

NHFP Candidate Projects

Over 20 major capital improvement projects were considered for NHFP funding to improve freight related safety, congestion, and mobility.

MARYLAND'S NHFP FREIGHT INVESTMENT PLAN

This Maryland Freight Plan updates a five-year fiscally constrained Freight Investment Plan for FY22 through FY26. Project and funding details are compiled within **Appendix 7B** of the overal Maryland Freight Plan and include a focus on the following major projects and initiatives:

- I-695 TSMO from I-70 to MD 43
- I-695, Baltimore Beltway at I-70 (Triple Bridges)
- MD 4 Suitland Parkway Interchange
- Truck Parking at the I-70 Welcome Center
- Improvements to the Maryland Statewide Transportation Model (MSTM) to advance model calibration and freight-specific enhancements for trucks and freight CAV
- Advancements in mapping and GIS tools related to the freight network, truck parking, and other freight related data
- CAV/TSMO projects that encompass freight CAV implementation planning, pilot programs for freight EV charging, statewide truck parking technology enhancements, and freight-related data exchange platforms
- Virtual Weigh Station and related static scale and equipment upgrades

OTHER PROJECT FUNDING AND IMPLEMENTATION OPPORTUNITIES

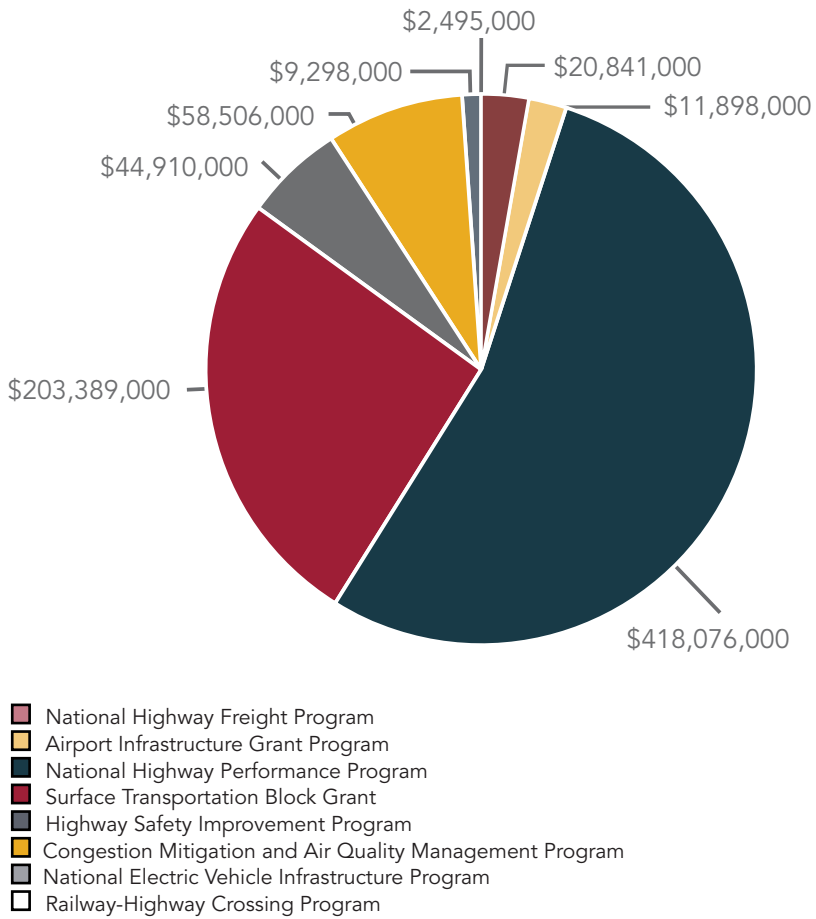
Beyond the NHFP resources, Maryland will continue to pursue other project funding and implementation opportunities through a variety of federal formula programs and discretionary grant opportunities. The IIJA notably expanded eligibility criteria of certain programs to include freight-related improvements, such as truck parking and alternative fuel initiatives. MDOT will continue to pursue funding opportunities to advance freight projects and initiatives, focusing on major formula and discretionary grant programs as listed to the right.

DISCRETIONARY GRANT FUNDING PROGRAMS

Discretionary grant funding is awarded on a competitive basis. Thus, estimating discretionary grant funding for freight projects in Maryland is challenging. However, MDOT will continue pursuing discretionary grant funding opportunities to advance freight investments identified in the Maryland Freight Plan. Notable programs and opportunities are summarized below.

- Nationally Significant Freight and Highway Projects Grant Program (Infrastructure for Rebuilding America [INFRA])
- Mega Projects (formerly National Infrastructure Project Assistance ([NIPA])
- Reduction of Truck Emissions at Port Facilities Program
- Consolidated Rail Infrastructure and Safety Improvements (CRISI)
- Rural Surface Transportation Grant Program
- Rebuilding American Infrastructure with Sustainability & Equity (RAISE)/ Local and Regional Project Assistance Program
- Railroad Crossing Elimination Grant program
- Port Infrastructure Development Program (PIDP)
- Motor Carrier Safety Assistance Program
- Bureau of Transportation Statistics (BTS)

EXHIBIT ES-12 MARYLAND FY 2022 ESTIMATED FORMULA FUNDING



ADDITIONAL UNFUNDED NEEDS/PRIORITIES

The Maryland Freight Plan also establishes a broader list of Multimodal Freight Eligible Projects to summarize funded and unfunded project needs from MDTA, MDOT SHA, MDOT MTA, MDOT MPA, and MDOT MAA (**Appendix 7C**).

Despite the increases in Federal funding programs, the total freight needs exceed the forecasted funding allotments for Maryland. This list of unfunded projects will be periodically updated through continuous coordination with the SFAC, MDOT TBUs, and other stakeholders to reflect ongoing changes in freight needs and advancement of projects.

Additional projects from the detailed list in Appendix 7C will be advanced and prioritized as funding opportunities are identified through other formula programs or discretionary grants.

FREIGHT IMPLEMENTATION PLAN

The final overall Freight Implementation Plan consists of the freight projects and funding opportunities, as well as overarching strategies and next step action items.

SUMMARY FREIGHT STRATEGIES

Summary freight strategies are intended as overarching guidance to support the development and execution of freight programs, projects, and related planning efforts throughout MDOT and in collaboration with its public and private partners.

SAFETY, SECURITY, AND RESILIENCE

Strategies under this goal strive to reduce the number of lives lost or injured due to freight activities; secure the movement of people, goods, and data; provide a resilient multimodal system; and improve roadway clearance to facilitate emergency response.

- **1.01** Infrastructure Safety Improvements
- **1.02** Railroad Crossing Upgrades
- **1.03** Truck/Rail Safety Monitoring Programs
- **1.04** Airport Zoning Permit Process
- **1.05** Security Infrastructure Upgrades
- **1.06** Vulnerability Assessments and Adaptation Strategies
- **1.07** Incident Management Technologies
- **1.08** Rail Safety, Security, and Resilience Strategies
- **1.09** Truck Parking Improvement Strategies

SUMMARY FREIGHT STRATEGIES (CONTINUED)

ECONOMIC OPPORTUNITY AND EFFICIENCY

Strategies aligned with this goal invest in and pursue opportunities to promote system improvements that support economic development, reduce congestion, and improve the movement of people and goods. These strategies promote economic opportunity and efficiency by pursuing capital improvements to improve economic growth opportunities, alleviate major bottlenecks, and reduce overall congestion in the multimodal system.

- **2.01** Performance Reporting
- **2.02** Economic Modeling
- **2.03** Significant Corridor Congestion Reduction
- **2.04** Supply Chain Congestion Reduction
- **2.05** Key Freight Bottleneck Improvements
- **2.06** Property Acquisition for Port/Terminal Expansion
- **2.07** Identification of Rail Capacity Constraints
- **2.08** TSMO Improvements
- **2.09** Air Cargo Facility Expansion
- **2.10** Freight and Logistics Workforce Development
- **2.11** Freight and Logistics Educational Programs
- **2.12** Truck Industry Career Outreach
- **2.13** Truck Driver Education Programs
- **2.14** Heavy Equipment Apprentice Programs
- **2.15** Port Growth Strategies

SYSTEM PRESERVATION AND MODERNIZATION

Strategies under this goal focus on maintaining state of good repair, leveraging new and innovative technologies and practices, and optimizing public investment to ensure a sustainable transportation system.

- **3.01** Truck Size and Weight Studies
- **3.02** Airport Facility and Runway Maintenance
- **3.03** Navigation Channel Maintenance
- **3.04** State-Owned Rail Asset Maintenance
- **3.05** CAV Deployment
- **3.06** Truck Platooning Opportunities
- **3.07** Rural Freight Needs and Funding Opportunities
- **3.08** PDD/UAV/Future Technology Assessments
- **3.09*** Rail Infrastructure Modernization
- **3.10** Planning to Support Technology

SUMMARY FREIGHT STRATEGIES (CONTINUED)

QUALITY OF SERVICE, EFFICIENCY, AND CUSTOMER EXPERIENCE

Strategies under this goal focus on improving the transportation system's reliability and predictability through enhanced communications relaying real-time information.

- **4.01** Truck Size and Weight Studies
- **4.02** Airport Facility and Runway Maintenance
- **4.03** Navigation Channel Maintenance
- **4.04** State-Owned Rail Asset Maintenance
- **4.05** CAV Deployment
- **4.06** Truck Platooning Opportunities
- **4.07** Rural Freight Needs and Funding Opportunities
- **4.08** PDD/UAV/Future Technology Assessments
- **4.09** Rail Infrastructure Modernization
- **4.10** Planning to Support Technology

FISCAL RESPONSIBILITY

Fiscal responsibility strategies focus on accelerating project completion through alternative project delivery methods, strategic partnerships, and identifying consistent revenue or funding opportunities.

- **6.01** TSMO Program Coordination
- **6.02** Collaboration for Double Stack Rail-Port Connectivity
- **6.03** Partnerships/Funding to Expand Truck Parking
- **6.04** Partnerships/Funding to Enhance Short Line Rail
- **6.05** Partnerships/Funding to Maximize Rail Investment Benefits
- **6.06** Discretionary Grant Funding

ENVIRONMENTAL PROTECTION AND SENSITIVITY

Strategies under this goal focus on understanding the infrastructure risks associated with climate change, employing conservation and innovative use/reuse/recycle materials, and promoting initiatives to reduce fossil fuel consumption.

- **5.01** Infrastructure Vulnerability, Risk, and Adaptation Studies
- **5.01** Sustainable Seaport Strategies
- **5.02** Dredging Program Management and Priorities
- **5.03** Dredging Program Outreach and Education
- **5.04** Fuel Efficient Truck Technologies
- **5.05** Rail Diesel Engine Retrofits/Replacements
- **5.06** Port Environmental, Energy, and Social Responsibility Goals
- **5.07** Alternative Energy Applications

TRANSPORTATION CHOICES AND CONNECTIONS

Strategies under this goal seek to improve transportation connectivity and support alternative transportation options for the movement of people and goods in a manner that balances freight needs alongside environmental and community interests in the state.

- **7.01** Multimodal Connectivity and Access Improvements
- **7.02** Inland Transportation Capabilities for Port Operations
- **7.03** Landside and Freight Rail Capabilities for Port Access
- **7.04** Freight Transportation and Land Use Planning Guidance
- **7.05** Public/Private Sector Plan Coordination
- **7.06** Last Mile Logistics Considerations
- **7.07** Curb Management Strategies
- **7.08** Land Use Planning/Zoning for Truck Parking

IMPLEMENTATION TACTICS

Reaching the Maryland Freight Plan's desired outcomes will require the implementation of projects and programs by MDOT and public and private stakeholders. Each of MDOT's TBUs will help to advance the strategic direction of the plan through the planning and development of freight projects and programs in their own freight-relevant planning documents and related operations. Public and private sector freight stakeholders, freight providers, and system owners should also reference the Maryland Freight Plan to better understand MDOT's intended strategic direction as they develop programs and projects.

Successful implementation of the Maryland Freight Plan will rely, in part, on three overarching sets of implementation actions or tactics that emphasize (1) planning and programming, (2) data and analysis, and (3) communication. As MDOT takes these steps, they will continue to participate in studies, collaborative efforts, and pilot programs that advance the state's understanding of freight and how it moves in and around Maryland.

CLOSING AND NEXT STEP PRIORITIES

Completion of the 2022 Maryland Freight Plan should not be construed as an end, or even a pause, in MDOT's freight planning efforts. Rather, the compilation of projects, strategies), implementation tactics, and other details within this Plan should serve as a resource to help MDOT, in cooperation with other state agencies and private stakeholders, continue efforts that will manage and enhance Maryland's multimodal freight transportation systems and related opportunities.

To help support the continuation of the state's freight planning efforts, there are several near-term "next steps" that could be prioritized for completion as time and resources become available. Notable efforts that would continue to advance the vision, goals, and objectives of the Maryland Freight Plan include, but are not limited to, the following specific actions:

1. **CUFC/CRFC Expansion:** Evaluate expansion opportunities for additional mileage authorized by the IIJA and coordinate the nomination and approval process with MDOT SHA and Maryland's MPOs.
2. **Intermodal Connectors:** Review Intermodal Connector designations on the NHS, PHFS, or other facilities throughout Maryland to leverage opportunities that support critical first/last-mile links between major port, rail, airport, and intermodal freight facilities, including potential refinement or expansion of Maryland's designated connections in coordination with FHWA and with reference to FHWA's 2017 Freight Intermodal Connectors Study.
3. **Project Implementation Opportunities:** Prioritize freight-related capital project programming efforts, as well as the pursuit of discretionary grant opportunities for notable candidate freight projects.
4. **SFAC Coordination:** Continue to convene the SFAC to examine freight system challenges, monitor evolving freight influences, and recommend near-term and long-term freight projects or initiatives.
5. **Freight Data Insights** Continue utilizing freight data to help decision-makers and the public better understand the connection between freight transportation observed in communities and the economic activity that transportation is supporting.
6. **Alternative Fuel Funding** Coordinate with the Maryland Department of the Environment and the Maryland Department of Energy to explore and leverage alternative fuel funding opportunities.
7. **Truck Parking Improvements** Improve truck parking throughout Maryland by continuing to implement recommendations from the 2020 Maryland Statewide Truck Parking Study, including advanced data analysis to identify parking needs and promote sharing of parking information and additional collection of data.
8. **Technology Integration** Continue developing frameworks and guidance to manage impacts or opportunities related to new, evolving, innovative, and disruptive technologies that influence freight transportation, such as truck platooning, freight CAV, personal delivery devices, or drone/UAV deliveries.
9. **Technology Integration** Continue to coordinate multi-state opportunities that may influence major freight corridors.
10. **Environmental Performance Measures** Review/refine MDOT's performance measurement approach related to GHG emissions and/or other environmental justice details in coordination with the implementation of the federal government's Justice40 Initiative and future updates to MDOT's annual Attainment Report or other applicable plans.
11. **Rail Studies** Complete the High-Speed Intercity Passenger Rail Studies, which address rail capacity and operations issues in Maryland, particularly along the Northeast Corridor.

With Federal approvals of the Plan anticipated by late 2022, the next (four-year) formal update of the Maryland Freight Plan will be required by the end of 2026. Prior to the 2026 update, MDOT will continue monitoring and evaluating freight needs and investment priorities, and may periodically update the NHFP-focused Freight Investment Plan, as needed.