2024 MAINE INTEGRATED FREIGHT STRATEGY

MaineDOT

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EXECUTIVE SUMMARY

Maine's freight system plays a critical role on a daily basis for every resident and business. In 2019, just over 90 million tons of goods worth just over $90 billion traveled on Maine's roads, over its railroad tracks, through its ports and airports, and in its pipelines. The freight system delivers raw materials from forest, field, and quarry to manufacturers and finished products through warehouses to store shelves and front doors in order to serve Maine's businesses and residents.

The State's freight infrastructure faces continually changing demands due to statewide, national, and global trends, including:

- Vulnerability of the State to climate change impacts.
- Massive growth in e-commerce.
- Long-term employment shift from goods-dependent industries to service industries.
- Dramatically increasing containerized trade through the Intermodal Marine Terminal (IMT) at the Port of Portland.
- Industry shifts in the energy and forest products sectors.

As Maine adapts to these changing conditions in an environment where needs exceed resources, how does MaineDOT identify and prioritize projects in order to support economic opportunity and quality of life by responsibly providing Maine citizens and customers the safest most reliable transportation system possible.

MaineDOT conducts freight planning in order to acknowledge these trends as it prioritizes investments. Further, this Maine Integrated Freight Strategy (MIFS) fulfills Federal freight planning requirements found in the Bipartisan Infrastructure Law (BIL/IIJA) of 2021 – as well as prior Federal legislation – allowing Maine to access Federal freight funds and competitive grant opportunities. A table summarizing this compliance is included on the prior page.

ES.1 Plan Goals

This MIFS is a part of MaineDOT's "Family of Plans", which also includes the Long-Range Transportation Plan (LRTP), the Active Transportation Plan, the Transit Plan, and the Rail Plan. As established in the LRTP in 2023, MaineDOT's overall vision statement includes:

VISION		
	**Highway and Bridge Network**	Roads have a purpose and identity with standardization of features that match customer expectations
	**Ports and Supply Chain Routes**	Attract investment and good jobs, including emerging opportunities such as offshore wind power generation
	**Airports**	Enhance the quality-of-life; provide critical services; and support local, regional, and statewide economies
	**Freight Rail System**	Enable Maine businesses to reach current and future markets and sources with timely and reliable services

As part of the Family of Plans, these goals are intended to be directly applicable to the MIFS and to Maine's multimodal freight system. The goals of MaineDOT's Family of Plans reflect national multimodal and highway freight program goals, as shown in Exhibit E.1.

Exhibit E.1 **Crosswalk of National and Maine Program Goals**

FEDERAL GOAL	MAINE GOAL
Invest in infrastructure improvements and implement operational improvements on the highways of the United States that...	
• *Strengthen the contribution of the National Highway Freight Network (NHFN) to the economic competitiveness of the United States.*	*Invest in transportation initiatives that support economic opportunity for Maine people, communities, and businesses.*
• *Reduce congestion and bottlenecks on the NHFN.*	*Improve system performance for customers.*
• *Reduce the cost of freight transportation.*	*Reduce disparities in accessibility.*
• *Improve the year-round reliability of freight transportation.*	*Improve system performance for customers.*
• *Increase productivity, particularly for domestic industries and businesses that create high-value jobs.*	*Support job and economic growth.*
Improve the state-of-good-repair of the NHFN.	Maintain a state-of-good-repair.
Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Highway Freight Network.	Improve the customer experience through technology.
Improve the efficiency and productivity of the NHFN.	Improve supply chain efficiency.
Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address highway freight connectivity.	Expand connections to global economies.
Reduce the environmental impacts of freight movement on the NHFN.	Invest in practical transportation solutions that mitigate impacts on the natural world and prepare for the realities of climate change.

ES.2 Maine Freight System

The freight system in Maine is an essential resource for the State's key industries and serves as a strategic gateway to the Northeastern United States, Canada, and global markets. It is multifaceted and multimodal, incorporating an extensive highway network, a rail network, airports, seaports, intermodal facilities, and international border crossings.

» **Highway and Truck Parking |** The overwhelming majority of people and goods in Maine are moved over the State's 22,000 miles of public roads. Trucking is still the dominant mode for freight shipments, accounting for 75% of all freight tonnage and 63% of freight value moved to from, or within the State. Other modes of transporting freight in and through Maine complement the highway network, meeting the needs of specific industries and providing alternatives for shippers and receivers.

  Commercial motor vehicles in Maine can take advantage of five State-owned parking and rest facilities, all owned by the Maine Turnpike Authority and located alongside I-95. Fourteen private truck parking facilities also provide at least 10 truck parking spaces, while several provide over 50 spaces.

» **Rail |** Maine's network of railroads connects the State to the North American and Canadian rail systems and plays a particularly important role in shipping for the forest products industry. Rail service is an underutilized but important component of the transportation network in Maine and is particularly cost-effective when moving high-volume, low-value commodities over long distances.

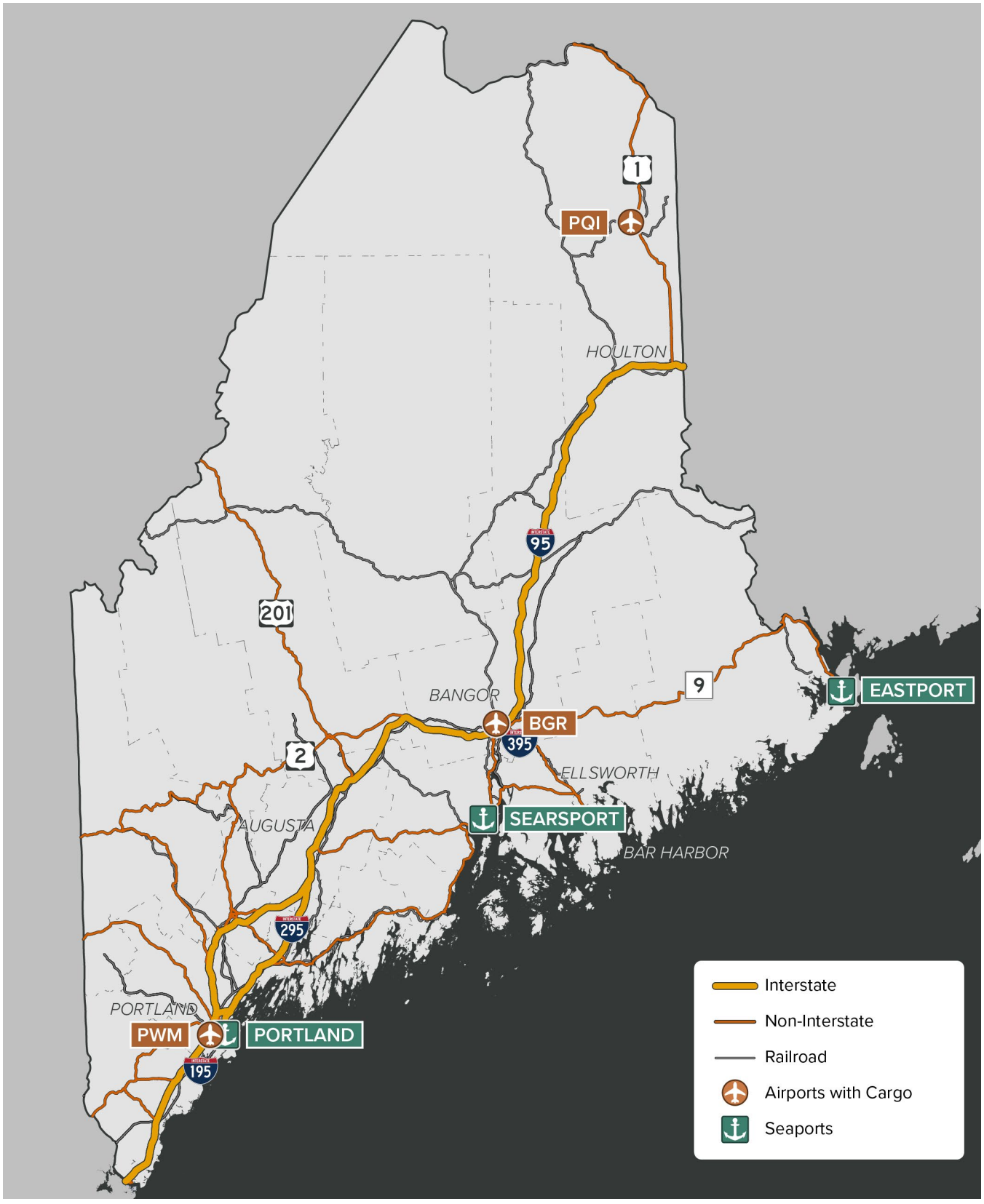
» **Maritime |** Maine's long Atlantic coastline is vital to many industries and the State's ports serve as hubs for maritime goods movement and connections among modes. Maine has three major cargo ports: Portland, Searsport, and Eastport; along with several major cruise ports and private terminals on the coast and on major rivers.

» **Air Cargo |** Airports are particularly important for the transportation of low-weight, high-value commodities such as semiconductors, perishable materials such as seafood, and cargo that is both such as medical research samples. Air cargo is an important means of transporting loads to and from inland locations in Maine or to and from overseas destinations.

» **Pipeline and Hazardous Material (HazMat) |** Pipelines transport petroleum products and natural gas to the State, or in some cases through the State to inland destinations. They provide the safest means of importing some HazMat (such as crude oil, refined fuel, natural gas) to power Maine's economy. HazMat is also moved by highway, rail, and sea in Maine.

Along with two active **intermodal connectors** – the IMT in Portland and the Pan-Am/CSX intermodal terminal in Waterville – and inactive intermodal terminals in Auburn and Presque Isle, these modes form a system that provides capacity, flexibility, and reliability to shippers and receivers. Strategic investment in maintaining and expanding it has the potential to stimulate the State's economy. Exhibit E.2 provides a snapshot of freight facilities in Maine in 2024.

Exhibit E.2 **Multimodal Freight System in Maine**

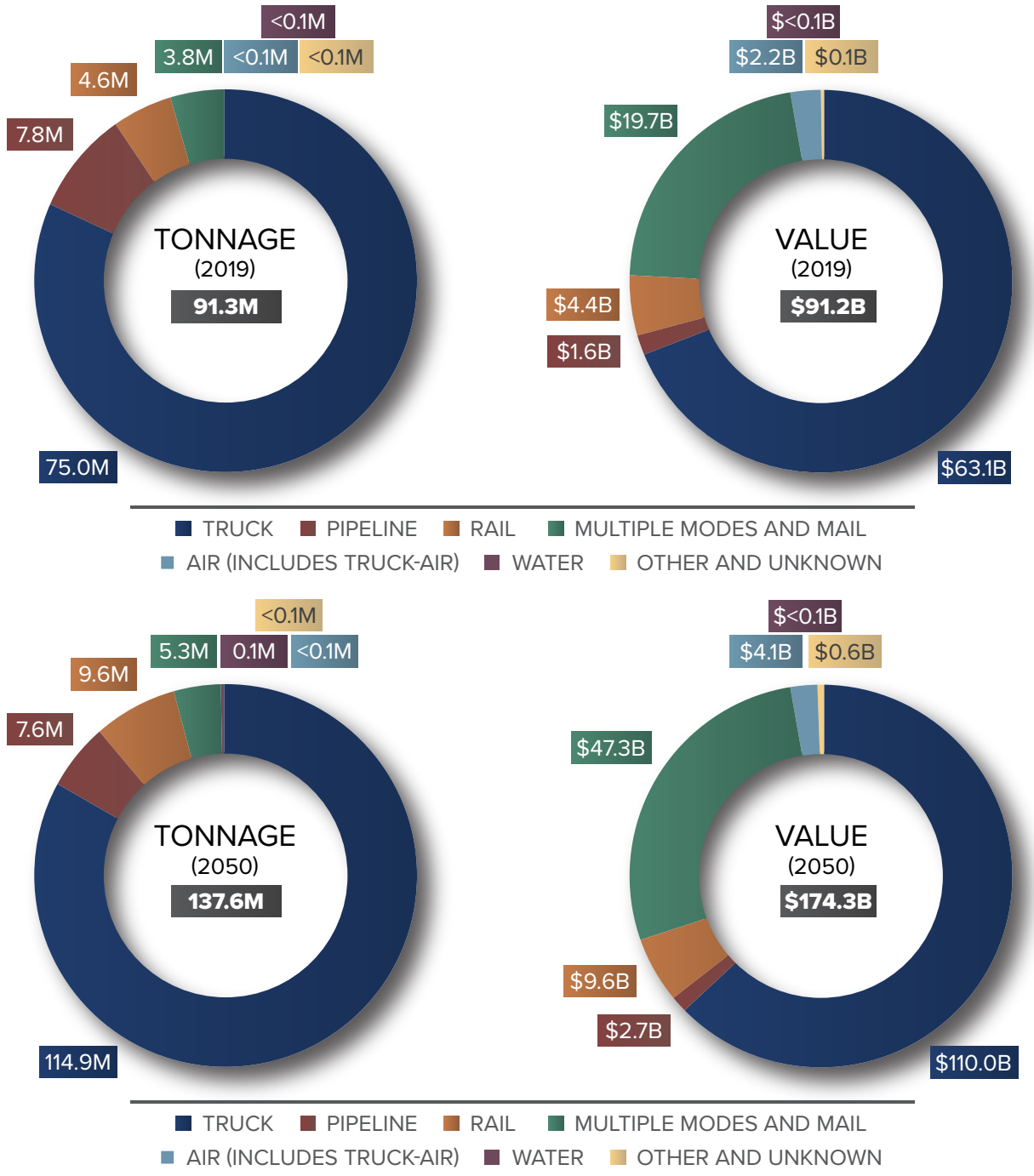


ES.3 Freight Activity and Demand

In 2019, about 90 million tons of freight valued at $91 billion moved over Maine's transportation system. As in most states, trucks are the dominant mode of freight transportation in Maine, with about 75% of total freight tonnage and 63% of freight value moving by truck in 2019; this heavy reliance on trucks has important implications for the State's infrastructure and the ability to sustain growth.

Exhibit E.3 shows that the next-highest modal categories by weight are pipeline (8%), rail (5%), and multiple modes, including mail (4%). The modal split by freight value is somewhat different, though truck is still the dominant mode; multiple modes, mail, and air (all of which include truck freight) tend to carry lower-weight, higher-value commodities, while pipeline and rail tend to carry higher weight, lower-value commodities.

Exhibit E.3 **Modal Split of Freight Moved in Maine, 2019 and 2050**



Source: Freight Analysis Framework 5 (FAF5) (all modes but rail); STB Waybill (rail)

Note: Does not include through flows

TRADING PARTNERS

Maine's primary domestic trade partnerships in 2019 were in the Northeast region. New Hampshire accounted for 36% of Maine's inbound freight tonnage (10% by value) and 24% of Maine's outbound freight tonnage (12% by value). Maine's next-biggest trading partners are Massachusetts and Vermont, accounting for about 17% and 12% of all inbound and outbound trade by weight. Altogether, the Northeastern states (New Hampshire, Massachusetts, Vermont, New York, New Jersey, Pennsylvania, and Connecticut) account for 83% of Maine's inbound and outbound freight by weight and 61% by value.

Maine has a unique position with Canada on three sides. Northern Maine sees substantial flows of forestry, fuel, and other products both to and from processing and port facilities in the Saint John area. Many trains on Maine's railroads are "through traffic" transiting the State from Canada to Canada.

International trade comprised 14% of total tonnage and 19% of total value of Maine's total trade in 2019. Canada is Maine's top trading partner both in terms of tonnage (11 million tons) and value ($15 billion), followed by East Asia and Europe. Other partners include Mexico, Southeast Asia and Oceania, and Southwest and Central Asia.

Full statistics on domestic and international trade in 2019 are provided in Exhibit E.4.

Exhibit E.4 **Total Tonnage and Value of Trade by Region, 2019**

TRADING PARTNER	TONNAGE (THOUSANDS)	VALUE ($MILLIONS)
Total – All Trade	**91,249**	**$91,226**
Total – Domestic Trade	**37,783**	**$65,736**
New Hampshire	10,861	$7,238
Massachusetts	6,349	$14,242
Vermont	4,307	$1,834
New York	3,186	$4,439
All others	13,080	$37,983
Total – International Trade	**12,340**	**$17,251**
Canada	11,210	$15,406
Eastern Asia	410	$652
Europe	410	$317
Americas (other than Canada and Mexico)	153	$361
Mexico	57	$157
Southeast Asia and Oceania	50	$66
Southwest and Central Asia	45	$202
Africa	5	$89

COMMODITIES

Exhibit E.5 shows the top commodities by tonnage in 2019 and forecast in 2050. Exhibit E.6 shows the top commodities by value in 2019 and forecast in 2050.

Exhibit E.5 **Top Commodities Moved in Maine by Tonnage, 2019 and 2050**

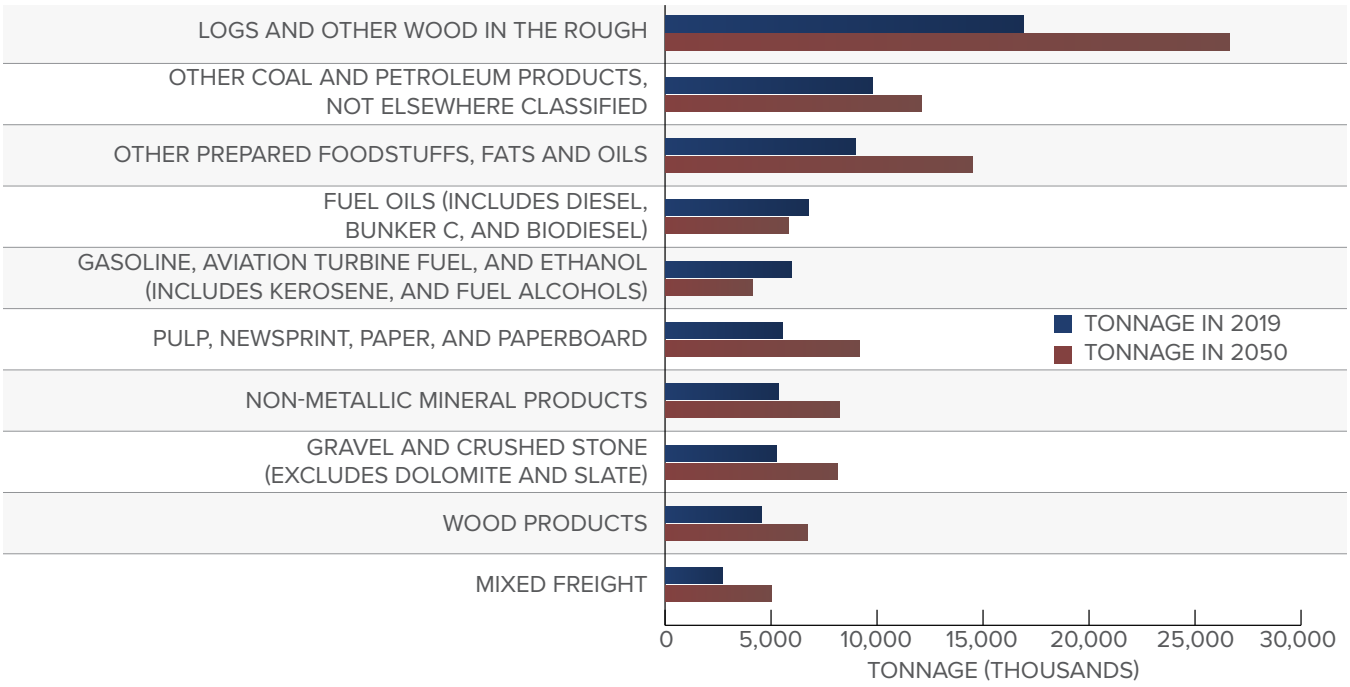
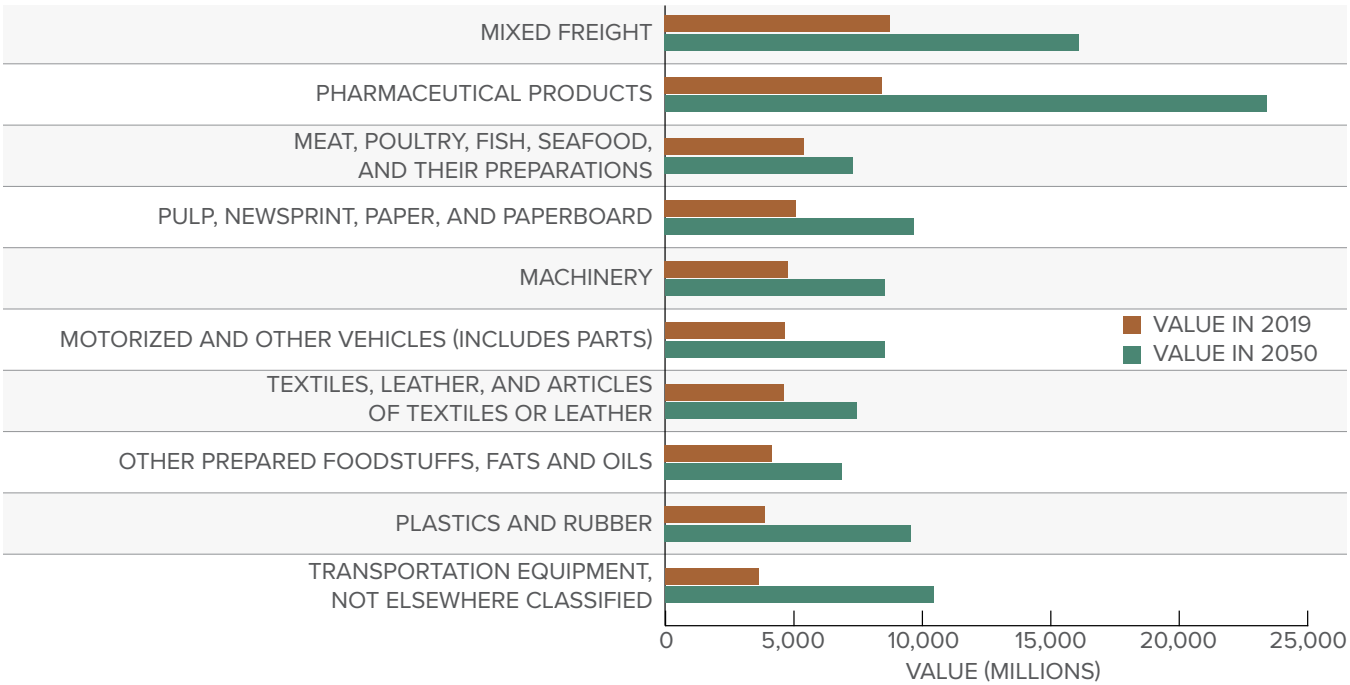


Exhibit E.6 **Top Commodities Moved in Maine by Value, 2019 and 2050**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Note: Does not include through flows

ES.4 Key Trends and Vulnerabilities

In recent years, the Maine freight transportation system has been challenged by extreme changes. The COVID-19 Pandemic, climate change, and shifts in workforce availability and global trade have had rippling effects across the supply chain and within industries. The 2024 MIFS identifies trends and vulnerabilities that affect the Maine freight system and discusses their recent history and potential future.

TRENDS		
INDUSTRY TRENDS AND IMPLICATIONS OF GROWTH		
	**Wood Products**	Wood products provide $8.5 billion – 5% – of Maine's gross domestic product (GDP), and one out of every 24 jobs in Maine. Maine provides sawn lumber to support housing construction and is serving growing demand for packaging, labeling, and tissue paper to support e-commerce. The industry reports difficulty acquiring labor and has been impacted by new US tariffs on lumber exports.
	**Pharmaceutical Products**	Pharmaceutical products have grown to provide $8.6 billion to Maine's GDP. They have high value relative to their weight, and their importance has grown with the COVID-19 Pandemic. The sector seeks an efficient and reliable supply chain that may require augmented infrastructure and handling capacities to meet the industry's unique regulatory requirements.
	**Agricultural and Aquacultural Products**	Maine's food sector contributed a combined $3.4 billion to Maine's GDP. Shipments of these products are time-sensitive and require strengthened supply chains to support what are overwhelmingly small family businesses (in 2017, 96% of Maine's farms were family-owned).
SUPPLY CHAIN TRENDS AND IMPACTS		
	**Impacts of COVID-19**	The Pandemic caused major impacts on economic activity and supply chains that shifted constantly, varied among regions and countries, and are still not fully-resolved. A surge in e-commerce and large swings in demand for different types of goods strained the freight transportation system and exacerbated longstanding shortages in the freight and logistics workforce.
	**Trucking**	The trucking industry is facing a shortage of skilled labor – not only drivers, whose average age is 46 and for whom turnover at large fleets was 92% in 2020 – but also mechanics and technicians whose skills take decades to acquire and hone.
	**Freight Rail**	Most Class I carriers (the largest railroads) significantly reduced their operational workforce leading up to the Pandemic, making it difficult to provide adequate service to customers in response to fluctuations in demand and service interruptions. They also implemented Precision Scheduled Railroading (PSR), running fewer, longer long-haul trains. New management at these companies has shifted strategy toward growing their business through providing a more competitive product.
	**Ocean Container Movement**	The Pandemic caused a visible backlog of containers at US deepwater ports and a large increase in maritime freight costs. These impacts have substantially been resolved as of 2024 – from its height of approximately $11,000, the global average price of shipping containers has fallen to approximately $3,000.
	**E-commerce**	E-commerce grew at 150% of the rate of overall retail between 2018 and 2023, with many customers now expecting immediate or same-day deliveries. Average truck trip lengths have decreased by 37% but the number of truck trips has increased overall, as has demand for warehousing. Throughout Maine, tree branches and low-hanging utility lines (which sag with age) can both damage trucks and pose threats to safety and quality of life when hit.
	**Zero-Emissions Transition**	Transportation is Maine's biggest contributor (54%) to greenhouse gas emissions. Maine has proposed a staged approach to electric vehicle infrastructure investment, funded by the Bipartisan Infrastructure Law. Medium and heavy-duty vehicles present particular challenges, and the State will begin preparing a roadmap for electrifying these vehicles in 2024.

TRENDS		
VULNERABILITIES		
	**Climate Change and Extreme Weather**	Maine's transportation system will experience impacts of climate change, including flooding from extreme rains, coastal flooding and erosion from sea level rise, and damage to forest roads from reduced ground freeze. Maine's key industries, including wood products and fishing, could also be substantially affected by changing temperatures and water availability as well as ocean acidification.
	**Workforce, Labor, and Automation**	Many transportation and transportation-dependent industries, including trucking and rail, are struggling to maintain a workforce of skilled mechanics and technicians, particularly as new technologies such as alternative fuels and automation enter the arena. 2022 and 2023 also saw several high-profile labor disputes in the transportation industry.
	**Equity Impacts**	Increased freight activity and infrastructure investments benefit communities by increasing employment opportunities. However, neighborhoods adjacent to freight activity face greater environmental burdens, such as compromised air quality, higher noise levels from freight operations, and unsafe road conditions. Freight related facilities, like ports and truck transfer sites, often tend to be situated in low-income and other historically marginalized neighborhoods. The Federal Government requires MaineDOT to prioritize these communities.
	**Reliance on Trucks and Modal Diversion**	75% of Maine's total freight shipment tonnage was truck-based in 2019. This modal dominance impacts the State and its residents through increased highway construction needs; higher costs to transport some goods; reduced market opportunities for Maine-based companies; increased use of fossil fuels and increased carbon emissions and air quality issues; and truck-involved highway crashes. MaineDOT will invest in rail and water transportation to expand the use of these more efficient modes where it makes economic sense.

ES.5 Recommendations

The key conclusions of the 2024 MIFS were:

- The highway freight system currently performs well and is projected to continue providing a high level-of-service to motor carriers in the future.
- Though Maine's long-term employment trends see a shift away from freight-intensive, goods-dependent industries, activity on the Maine freight system is projected to increase, sometimes in ways that are novel in the 2020s (e.g., domination of e-commerce and autonomous drone delivery to islands).
- The Maine transportation system will require significant investment of public and private dollars to maintain existing infrastructure and improve freight connectivity and mobility.
- The Maine freight system will need to face and address its vulnerability to human-caused climate change. Maine will also need to ensure that it equitably distributes both the benefits and costs of its freight system, specifically avoiding further harm to disadvantaged communities.

Based on these conclusions, the MIFS makes a set of comprehensive short and long-term recommendations for both infrastructure and policy changes:

INFRASTRUCTURE AND OPERATIONAL IMPROVEMENTS

EXPAND OR PHYSICALLY ENHANCE THE STATE'S TRANSPORTATION INFRASTRUCTURE AND OPERATIONS.

- Identify quick-fix projects for highway
- Reduce congestion and improve travel time reliability on major truck routes
- Expand and enhance truck parking along I-95
- Continue to develop a robust Innovative Technology Development (ITD) program for State Police commercial vehicle enforcement efforts
- Continue and expand programs to improve, separate, and consolidate highway-rail grade crossings
- Collaborate with CSX on planning and feasibility for upgrading the mainline to double-stack clearance from the New Hampshire state line to the Portland IMT
- Develop and utilize State and Federal resources to expand the rail mode
- Continue to invest in maintenance and upgrades for Maine's ports
- Explore dredging of the Fore River shoreline
- Build an offshore wind port in the Port of Searsport
- Continue to invest in maintenance and upgrades for Maine's cargo airports
- Advance autonomous, electrified air cargo service to Maine's islands
- Maintain major highway freight routes to a state of good repair (SGR)
- Build the Gorham Connector
- Study truck parking capacity in Auburn-Lewiston
- Maintain major rail lines to SGR
- Upgrade major rail lines to 286K
- Direct state investments in rail infrastructure toward intermodal hubs
- Explore the appropriate role of the State in addressing rail equipment needs
- Observe the completion of projects to enhance the Portland IMT
- Advance infrastructure enhancements to the Port of Searsport
- Advance infrastructure enhancements to the Port of Eastport
- Explore improvements to multimodal connections at Maine's cargo airports

POLICY STRATEGIES

SEEK TO OPTIMIZE GOVERNMENTAL REGULATIONS OR INCENTIVES TO BETTER MANAGE FREIGHT TRAFFIC ON THE EXISTING TRANSPORTATION NETWORK

- Maintain the Freight Advisory Council (FAC)
- Utilize technology to manage transportation and distribution functions (such as load matching and backhauls) more efficiently
- Develop policies to increase and improve intermodal freight transportation
- Explore innovative funding sources, including public-private partnerships, multi-state initiatives, and tax increment financing
- Maintain interagency coordination with State economic development and planning agencies
- Build a dedicated offshore wind port
- Pursue relevant strategies in *Maine Won't Wait* in 2020 to prepare for the impacts of climate change
- Through the FAC, engage more private-sector stakeholders in the statewide transportation planning and programming process and provide a forum for public agencies, industry groups and local business chambers to coordinate and integrate freight efforts
- Think beyond Maine's borders to improve the freight system
- Improve railroad safety and security
- Establish predictable, reliable funding sources to address the need for ongoing program and project operating costs and future acquisitions of railroad rights-of-way
- Encourage multicarrier projects that enhance intercarrier moves
- Preserve rail corridors for current and/or future transportation needs
- Coordinate with responsible State agencies and industry groups to promote skilled workforce development.
- Ensure that the burdens and benefits of freight movement in Maine fall equitably and do not further harm disadvantaged communities
- Continue to focus on improving relationships with neighboring Canadian provinces and making improvements to Maine's border crossings


SAFETY FIRST
NT:3165
NO SMOKIN

1 INTRODUCTION

This section provides an introduction to the Maine Integrated Freight Strategy (MIFS); explains the goals of this Plan and how they relate to National Multimodal and Highway Freight Network Goals; and describes the organization of the remainder of this document.

1.1 Why Develop an Integrated Freight Strategy

Maine's freight system plays a critical role on a daily basis for every resident and business. In 2019, just over 90 million tons of goods worth just over $90 billion traveled on Maine's roads, over its railroad tracks, through its ports and airports, and in its pipelines. The freight system delivers raw materials from forest, field, and quarry to manufacturers and finished products through warehouses to store shelves and front doors in order to serve Maine's businesses and residents.

The State's freight infrastructure faces continually changing demands due to statewide, national, and global trends, including:

- **Vulnerability of the State to climate change impacts** including sea level rise, inland and coastal flooding, and extreme heat. These impacts uniquely challenge freight infrastructure in Maine, as many ports-of-entry – seaports, border crossings, and air cargo facilities – are on the waterfront. In response to climate change, government and industry are initiating a transition to zero-emission vehicles.
- **Massive growth in e-commerce,** including demand for same-day and next-day deliveries, driven in part by the COVID-19 Pandemic.
- **Long-term employment shift from goods-dependent industries to service industries,** driven in part by new technologies such as artificial intelligence and automation.
- **Dramatically increasing containerized trade through the Port of Portland,** driven by Maine's Eimskip container service between Portland and Europe. This has provided Maine opportunities for growth and expansion in international and domestic trade.
- **Industry shifts in the energy and forest products sectors** and the impacts to the types and volumes of commodities being shipped in Maine and on many of the supporting freight and logistics operations in the State.

As Maine adapts to these changing conditions in an environment where needs exceed resources, how does MaineDOT identify and prioritize projects in order to "manage the transportation system to the greatest benefit of Maine's citizens and MaineDOT's customers? [1]

[1] MaineDOT. Strategic Plan 2016 Update.

MaineDOT conducts freight planning in order to acknowledge these trends as it prioritizes investments. The Department developed its first Integrated Freight Plan in 1998 and has updated it in 2011, 2014, and 2017 (when the document was renamed the "Integrated Freight Strategy"). All of these efforts have gathered information on existing and future freight assets, issues, needs, and trends at the local, national, and global level, allowing MaineDOT to shape statewide freight policy and investment activities to respond to public and private-sector freight needs.

Further, this MIFS fulfills Federal freight planning requirements found in the Bipartisan Infrastructure Law (BIL) of 2021 – as well as prior Federal legislation – allowing Maine to access Federal freight funds. BIL is a ten-year, $1.2 trillion law that provides funding for the nation's planning and infrastructure investments. It includes provisions specifically geared to improving the performance of the national freight network and to supporting investment in freight-related surface transportation projects. It builds on the Fixing America's Surface Transportation (FAST) Act of 2015 in expanding and revising the National Multimodal Freight Policy, National Freight Strategic Plan, and National Multimodal Freight Network. It also designates $7.15 billion over five years for projects in the National Highway Freight Program (NHFP) and billions of dollars more in discretionary grants for which projects on the freight system may be eligible – both those sponsored by MaineDOT and those sponsored by metropolitan planning organizations (MPOs), local governments, and other entities.

The MIFS was developed in compliance with BIL requirements for state freight plans to ensure that Maine has access to Federal funding streams and competitive grant opportunities. A table summarizing this compliance is included as the cover page of this document.

1.2 Vision, Goals, and Regulatory Context

This MIFS is a part of MaineDOT's "Family of Plans", which also includes the Long-Range Transportation Plan (LRTP), the Active Transportation Plan, the Transit Plan, and the Rail Plan. As established in the LRTP in 2023, MaineDOT's overall vision statement includes:

VISION		
	**Highway and Bridge Network**	Roads have a purpose and identity with standardization of features that match customer expectations
	**Ports and Supply Chain Routes**	Attract investment and good jobs, including emerging opportunities such as offshore wind power generation
	**Airports**	Enhance the quality-of-life; provide critical services; and support local, regional, and statewide economies
	**Freight Rail System**	Enable Maine businesses to reach current and future markets and sources with timely and reliable services

The LRTP articulated goals, objectives, and strategies to achieve the overall vision, as shown in Exhibit 1.1.

Exhibit 1.1 **Goals, Objectives, and Strategies from the Maine LRTP**

GOALS	OBJECTIVES	STRATEGIES
Provide a safe transportation system for all users and modes of transportation	Reduce fatalities and serious injuries Reduce crashes involving vulnerable users	Reduce crashes, fatalities, and serious injuries for all transportation users and promote safe and connected active transportation options
Effectively manage Maine's existing transportation system within reliable funding levels to provide levels of service that are acceptable to our customers	Maintain a state of good repair Improve system performance for customers Support and pilot innovation Leverage funding opportunities	Maintain and make targeted or strategic improvements to asset condition Enhance the overall travel experience for customers using Maine's highways Diversify and stabilize funding sources to enhance sustainability Enhance the transportation system Improve the customer experience through technology
Invest in transportation initiatives that support economic opportunity for Maine people, communities, and businesses	Support job and economic growth Improve supply chain efficiency Expand the transportation workforce Expand connections to global economies	Improve freight connections, reliability, and efficiency Connect Maine to the world Improve system mobility to grow the economy
Invest in practical transportation solutions that mitigate impacts on the natural world and prepare for the realities of climate change	Reduce greenhouse gas emissions Mitigate environmental impacts Reduce disruptions	Position for an electric vehicle future Prepare for climate change Lead by example
Ensure all Maine people have access to safe and reliable transportation regardless of who you are or where you are	Improve access for all Mainers Reduce disparities in accessibility	Provide reliable and connected mobility solutions Support communities across Maine Foster opportunities for flexible commuting

As part of the Family of Plans, these goals are intended to be directly applicable to the MIFS and to Maine's multimodal freight system. For example, reducing the rate of crashes, injuries, and fatalities will improve highway performance for all users, including trucks. Adding a freight lens, reducing the rate of *truck-involved* crashes, injuries, and fatalities will directly enhance freight mobility; improve the safety of the freight system; and reduce the adverse impacts of freight movement on communities.

The goals of MaineDOT's Family of Plans reflect national multimodal and highway freight program goals, as shown in Exhibit 1.2.

Exhibit 1.2 Crosswalk of National and Maine Program Goals

FEDERAL GOAL	MAINE GOAL
Invest in infrastructure improvements and implement operational improvements on the highways of the United States that...	
• *Strengthen the contribution of the National Highway Freight Network (NHFN) to the economic competitiveness of the United States.*	*Invest in transportation initiatives that support economic opportunity for Maine people, communities, and businesses.*
• *Reduce congestion and bottlenecks on the NHFN.*	*Improve system performance for customers.*
• *Reduce the cost of freight transportation.*	*Reduce disparities in accessibility.*
• *Improve the year-round reliability of freight transportation.*	*Improve system performance for customers.*
• *Increase productivity, particularly for domestic industries and businesses that create high-value jobs.*	*Support job and economic growth.*
Improve the state-of-good-repair of the NHFN.	Maintain a state-of-good-repair.
Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Highway Freight Network.	Improve the customer experience through technology.
Improve the efficiency and productivity of the NHFN.	Improve supply chain efficiency.
Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address highway freight connectivity.	Expand connections to global economies.
Reduce the environmental impacts of freight movement on the NHFN.	Invest in practical transportation solutions that mitigate impacts on the natural world and prepare for the realities of climate change.

1.3 Freight Performance Measures

State and Federal transportation agencies have long used asset and performance management techniques to assess, measure, and gauge infrastructure and operational capabilities of their systems. Each state has traditionally individually interpreted how, if, and which performance measures should be incorporated into their planning and programming processes. While these approaches differ, agencies tend to measure the same basic physical and operational elements, including safety, infrastructure condition, and system efficiency.

In an effort to incorporate uniformity in these measures and emphasize a performance-based approach in applying the NHFP, FHWA – following BIL and the FAST Act – has both required and proposed several performance measures across key management areas, including safety, pavements, bridges, freight, emissions, performance, and congestion.

Current MaineDOT freight performance measures are outlined in Exhibit 1.3 under each goal area. Measures of system efficiency (including Truck Travel Time Reliability, or TTTR) are discussed in more detail in Section 2.3 and safety measures specific to freight are discussed in Section 2.4.

Exhibit 1.3 MaineDOT Freight Performance Measures

PERFORMANCE MEASURE	REFERENCE	SOURCE
Safety and Resiliency		
Number and rate of truck-involved fatalities, serious injuries, and overall crashes on public roads.	MIFS Section 2.4.1	MaineDOT
Number of fatalities, serious injuries and overall crashes at highway-rail grade crossings.	MIFS Section 2.4.2	FRA and MaineDOT
Number of rail safety incidents not taking place at grade crossings.	Grade Crossing Safety Action Plan	FRA
Asset Preservation		
Percent of Interstate pavements in good and poor condition.	Transportation Asset Management Plan	MaineDOT
Percent of non-Interstate NHS pavements in good and poor condition.	Transportation Asset Management Plan	MaineDOT
Percent of National Bridge Inventory (NBI) bridges in good and poor condition, by deck area.	Transportation Asset Management Plan	MaineDOT
Mobility and Reliability		
Truck Travel Time Reliability.	MIFS Section 2.3.2	National Performance Management Research Dataset
Delay at border crossings.	MIFS Section 2.3.3	US Customs and Border Protection

1.4 Summary of Outreach

MaineDOT conducted outreach to inform and support the MIFS, including meetings of the Freight Advisory Council (FAC), an industry survey, and industry interviews.

1.4.1 FREIGHT ADVISORY COMMITTEE (FAC)

The FAC consists of public and private sector advisors and stakeholders with industry experience. FAC members were asked to share their vision and goals; offer insight on local and regional freight issues, trends and needs; act as a conduit to the institutions and organizations they represent; and inform recommendations, solutions, and strategies for freight and goods movement in Maine. Some FAC members participated in developing the 2020 MIFS and opted to continue their involvement for 2024. The members of the FAC are listed in Exhibit 1.4.

Exhibit 1.4 Freight Advisory Committee Membership

PRIVATE SECTOR	PUBLIC SECTOR
• Maine Better Transportation Association	• Bangor Area Comprehensive Transportation System
• Bison USA	• FHWA
• Canadian Pacific Railroad	• Northern Maine Development Commission
• CSX	• Southern Maine Planning and Development Commission
• Genesee and Wyoming Railroad	
• Maine Forest Products Council	
• Maine International Trade Center	
• Maine Motor Transportation Association	
• NBM Railways	
• Professional Logging Contractors of Maine	
• Sprague Energy	

Meetings with the FAC were held on September 26, 2023 and January 17, 2024 in order to obtain input from stakeholders. The meetings were attended by stakeholders virtually. Highlights from the meetings included:

» **Meeting 1 |** The agenda included an overview of the 2024 MIFS timeline and its proposed vision and goals. MaineDOT and the consultant team also presented on the existing conditions and economic forecast analysis. Members were asked for key trends and recommendations, and made several specific observations, including an aging workforce (particularly in skilled trades); the need for fiber cars on railroads; opportunities for Maine in shifting post-Pandemic supply chains; the importance of the Industrial Rail Assistance Program; and challenges to movement of goods beyond Maine from Northeast Corridor congestion and Federal customs policies.

» **Meeting 2 |** The agenda included discussion of key trends and vulnerabilities for the Maine Freight System, as well as proposed recommendations. Members were asked for their thoughts on the recommendations and were generally supportive, with minor comments that MaineDOT has incorporated.

1.4.2 INDIVIDUAL INDUSTRY OUTREACH

MaineDOT conducted eight interviews with public and private-sector industry representatives in Autumn 2023. These organizations are listed in Exhibit 1.5.

Exhibit 1.5 Individual Industry Outreach Interview Participants

PRIVATE SECTOR	PUBLIC SECTOR
• Bison USA	• Maine Turnpike Authority
• Dunham Group	• Portland International Jetport
• Eimskip	• Port of Portland
• PAF Transportation	
• Sprague Energy	

While the questions in each interview were specific to the participant and the conversation was designed to flow freely among topics, all participants were asked about: the volume and types of commodities (if any) that they or their customers move in Maine; the mode chosen for those movements and why; observed trends in 2022 and 2023 that might impact patterns in freight movement; historic coordination and contact with MaineDOT; and perceived gaps, challenges, and bottlenecks in the Maine freight network.

1.4.3 SURVEY OF INDUSTRY PARTNERS

MaineDOT surveyed a wide range of industry partners for their feedback on the freight network in October and November, 2023. The survey covered the same ground as the interview questions discussed above.

1.5 Organization of this Report

The remainder of this report is divided into four chapters:

- **Chapter 2** summarizes existing conditions on and around the freight system in terms of demographics (population and employment); freight activity and demand (flows); key freight corridors already defined; network usage and performance; and safety.
- **Chapter 3** profiles the Maine freight system's primary modes: highway and truck parking, rail, maritime, air cargo, and pipeline and hazardous material. In doing so, it inventories the assets and infrastructure for each mode, discusses current and anticipated demand for the mode, and summarizes high level investment needs.
- **Chapter 4** discusses potential futures for the Maine freight system. It begins by assessing local, regional, national, and global trends that impact goods movement in Maine, then discusses the system's vulnerabilities and the state of its funding.
- **Chapter 5** establishes recommendations for both infrastructure and operations and policy.

In addition, this report has three appendices:

- **Appendix A.1** is a glossary.
- **Appendix A.2** discusses how critical urban freight corridors (CUFCs) and critical rural freight corridors (CRFCs) were selected by MaineDOT.
- **Appendix A.3** provides a constrained freight investment plan for Maine.

HIGHLIGHT: ADVANCED DRIVER-ASSISTANCE SYSTEMS

In 2014, *Toward Zero Deaths*, a collaborative effort supported by the American Association of Motor Vehicle Administrators (AAMVA) and seven other national transportation, engineering, and medical organizations, identified "safer vehicles" as a key initiative for reducing road fatalities.

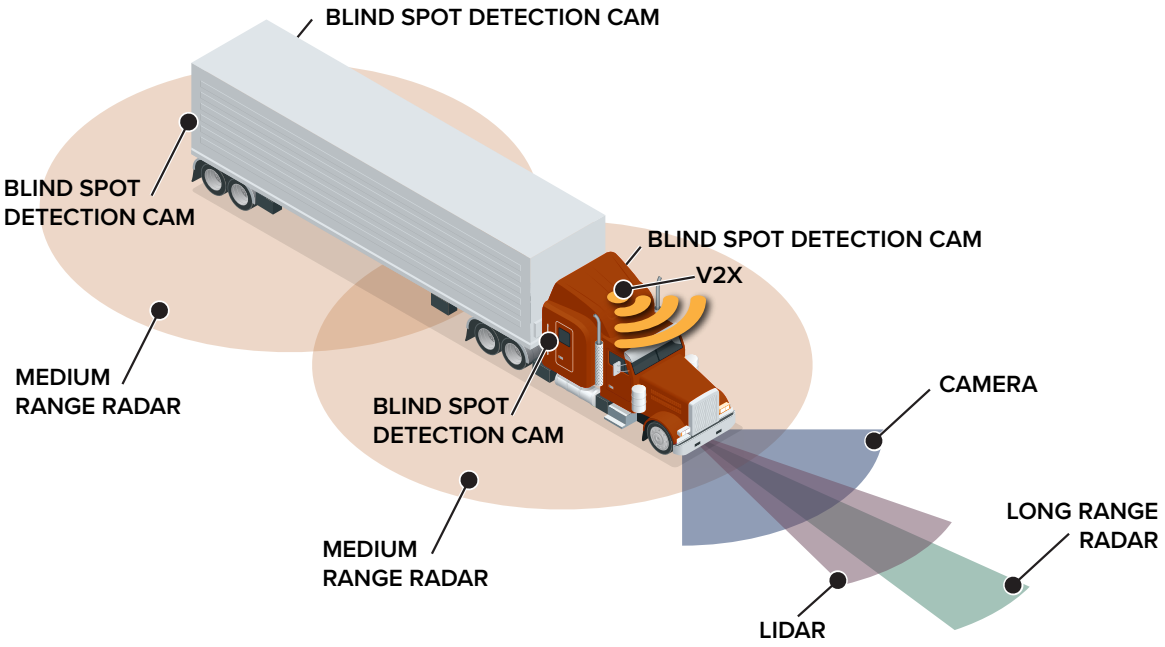
Key to making vehicles safer in the years since has been the proliferation of Advanced Driver-Assistance Systems (ADAS) that alert drivers to risks; assist drivers who are at risk of a crash; protect vehicle occupants during crashes; enable communication with other vehicles and with the roadway; and ensure vehicles continue to perform as designed.

ADAS represents a significant opportunity to make roads safer – the National Highway Traffic Safety Administration (NHTSA) states that most vehicle crashes are tied to human error that could be reduced by ADAS. The Federal Motor Carrier Safety Administration (FMCSA) finds that ADAS can help truck drivers avoid crashes, whether they result from driver error or from circumstances outside of the driver's control.

FMCSA recognizes four types of ADAS solutions on commercial trucks:

- **ADAS-Braking,** which includes automatic braking and adaptive cruise control
- **ADAS-Steering,** which includes lane-keeping, lane-centering, and adaptive steering control
- **ADAS-Warning,** which includes warnings for lane departure, forward collision, and blind spot
- **ADAS-Monitoring,** which uses cameras to enhance driver field-of-view and provide feedback to the driver

ADAS Systems Currently Available for Commercial Trucks



2 EXISTING CONDITIONS

This chapter summarizes the current state of goods movement in Maine, including the demographic and economic context; the nature of freight flows into, out of, and within the State; the usage and performance of the transportation network for freight; and the safety of freight in Maine.

2.1 Demographics and Economics

2.1.1 POPULATION

One of the largest drivers of freight demand is population. Residents desire good and services and provide a workforce for Maine's companies. **Maine's total population has grown slightly over the past five years and stood at 1.36 million in 2020.**[2] Population growth has been highest in Southern Maine, with Cumberland, Sagadahoc, and York Counties combining for 6% population growth between 2015[3] and 2020, which the State of Maine forecasts to continue with a further 5% population growth between 2020 and 2040. The Aroostook region of Northern Maine has seen the most substantial decline in population, with Aroostook County seeing -4.3% change in population between 2015 and 2020, which the State of Maine expects to stabilize by 2040.

2.1.2 EMPLOYMENT

Employment in the State stood at approximately 625,000 in 2022, a 6.8% increase from 2013. Employment fell during the COVID-19 Pandemic, dropping to 2013 levels (585,000) in 2020 before recovering rapidly – Maine's 2022 employment exceeded its 2019 employment.[4]

Employment data can be reported by industry, and some industries use and rely on freight transportation more than others. Sectors such as manufacturing, construction, natural resources, and mining rely on the transportation system and logistics services to receive raw supplies and manufactured goods and to send their finished/refined products to market. Certain service sectors that are not production-oriented, such as retail and wholesale trade or transportation and warehousing, are also highly dependent on the movement of physical goods. By contrast, other service-providing industries such as education, health care, hospitality, and professional services use the freight transportation system less intensively for shipment of materials, office products, and other goods that support their operations. **While service industries provided more new jobs in Maine between 2013 and 2022 (25,000 vs. 15,000), goods producing industries grew more in employment by percentage (16% vs. 5%).**

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2 Maine State Economist Demographic Projections | https://www.maine.gov/dafs/economist/demographic-projections

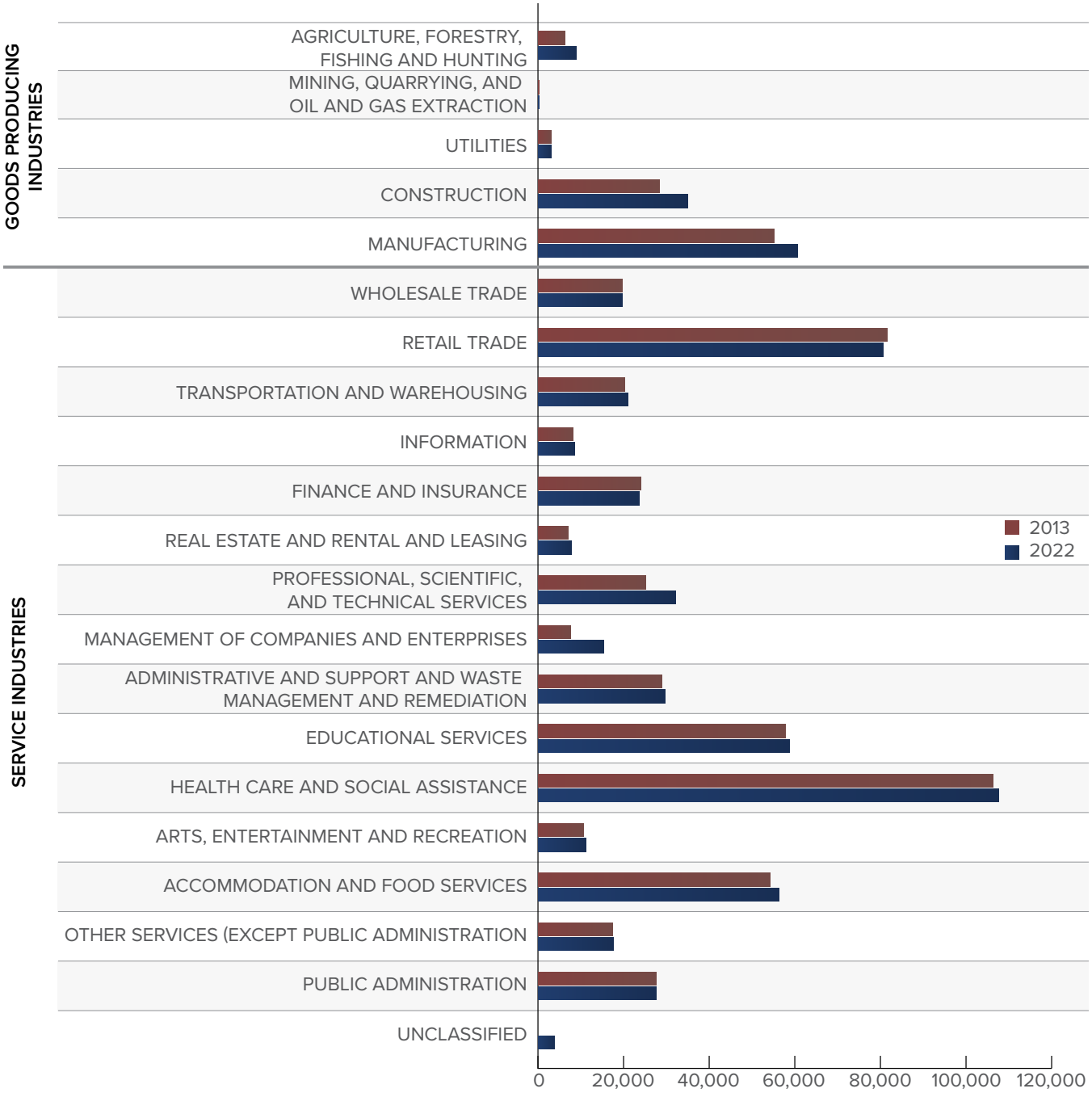
3 U.S. Census Bureau American Community Survey, 2015 5-year estimates

4 Maine Center for Workforce Research and Information, Quarterly and Annual Industry Employment and Wages | https://www.maine.gov/labor/cwri/qcew1.html

Note that employment is driven by an intersection of demand for different goods and services, competition inside and outside of the State, and the level of automation and technological efficiency of each sector – an industry undergoing technological change may have declining employment but growing output. As a result, employment does not necessarily reflect the composition of freight activity in Maine, as is discussed in Section 2.2.

Exhibit 2.1 shows average sector employment in 2013 and 2022.

Exhibit 2.1 **Employment in Maine by Sector, 2013 and 2022**



2.1.3 GROSS DOMESTIC PRODUCT

The value of goods and services produced in Maine is the Gross Domestic Product (GDP). The percentage that the GDP grew or shrank from one period to another is an important way for Mainers to gauge how their economy is doing.[5] **Maine's GDP across all industries has grown by 22% between 2013 and 2022, adjusted for inflation.**

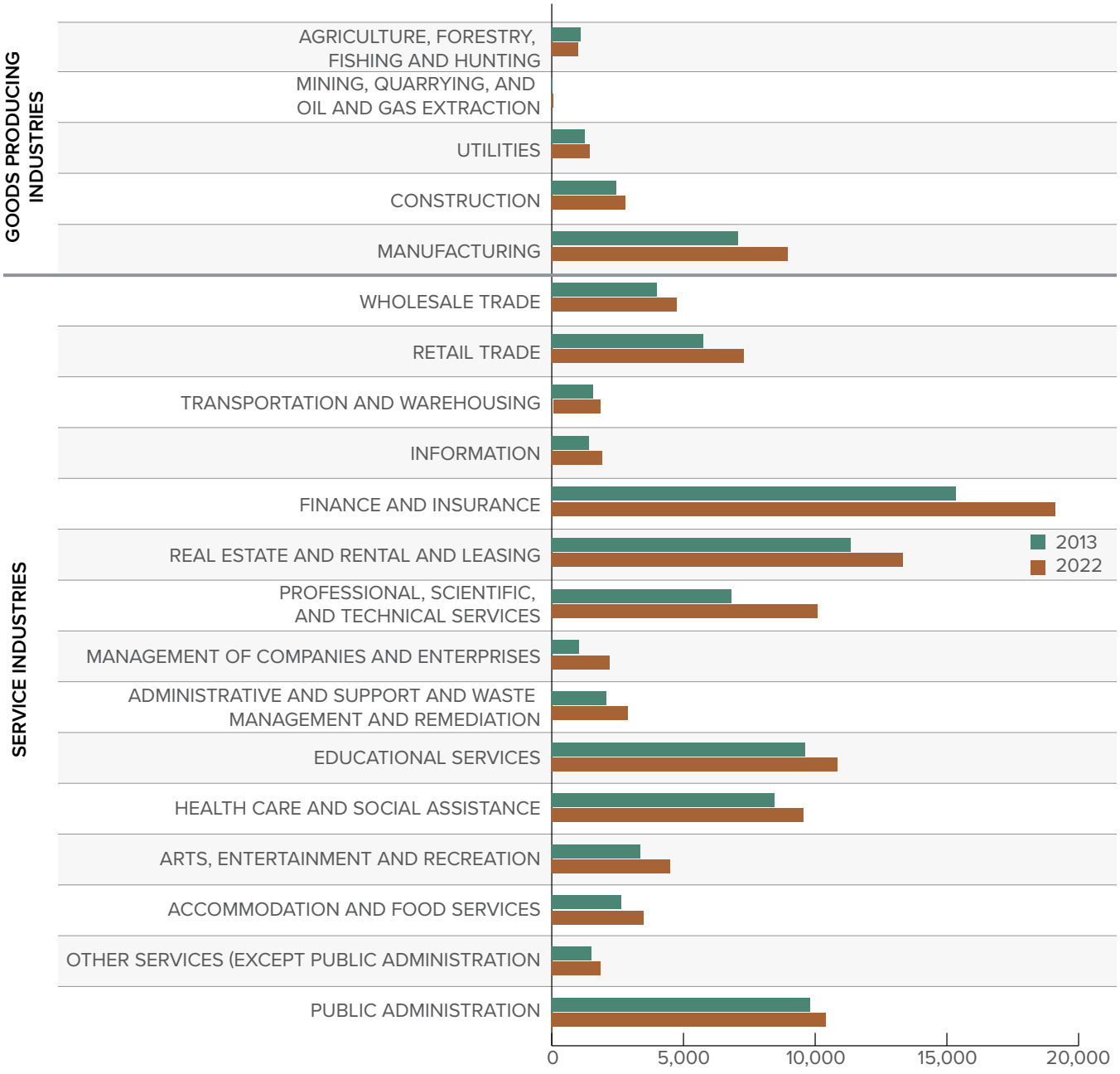
GDP is useful for comparing economic health across time, across geographies, and across industries. GDP by Industry in Maine in the years 2013-2022 is illustrated in Exhibit 2.2. **GDP growth in goods producing industries (21%) and service industries (25%) were relatively close between 2013 and 2023.[6,7]**

[5] https://www.bea.gov/resources/learning-center/what-to-know-gdp

[6] Data was sourced from the Bureau of Economic Analysis Interactive Data Tables | https://apps.bea.gov/itable

[7] Data was sourced in current dollars. Conversion to 2023 dollars used the Consumer Price Index (CPI) Inflation Calculator from the Bureau of Labor Statistics, using multipliers from June of the data year to June 2023 | https://data.bls.gov/cgi-bin/cpicalc.pl

Exhibit 2.2 **GDP in Maine by Sector, 2013 and 2022 (millions of 2023 dollars)**



2.2 Freight Activity and Demand

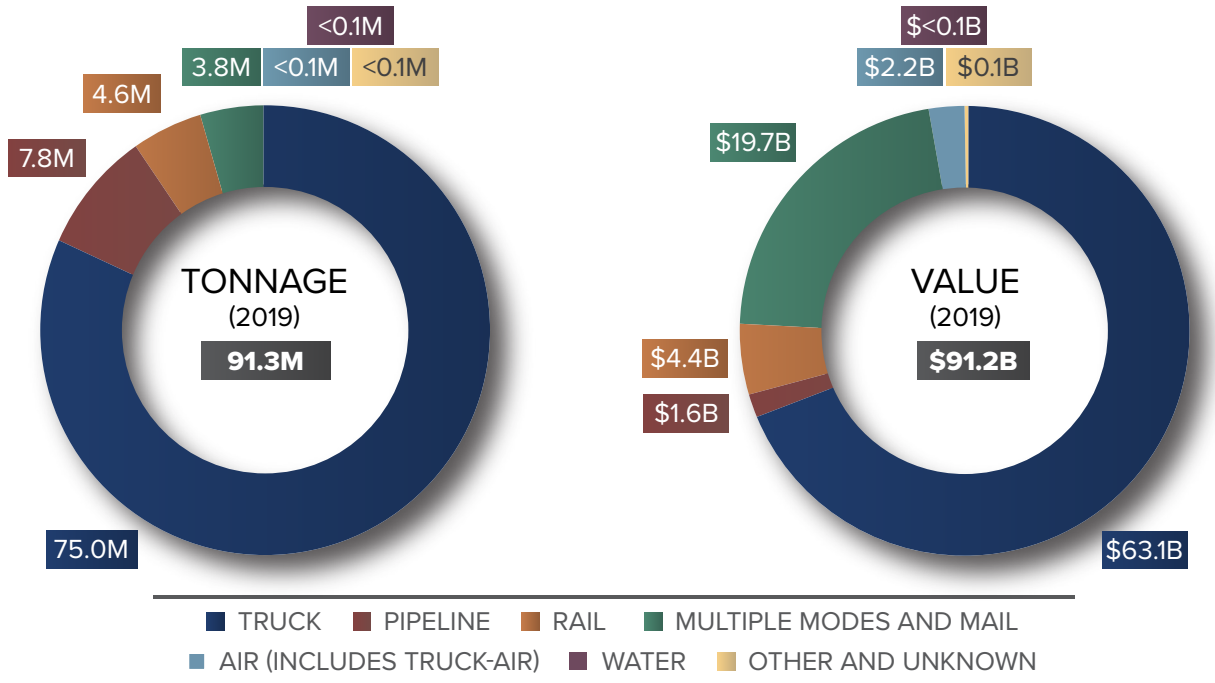
Statewide commodity flows provide an overall picture of the freight moving into, out of, within, and through the State of Maine. FHWA's Freight Analysis Framework Version 5 (FAF5) data was disaggregated to obtain estimated county-level flows for 2019 by mode (for all but rail), direction, commodity type, origin, and destination. Data on freight moved by rail were obtained from the Surface Transportation Board (STB) Confidential Waybill.

2.2.1 MODAL SPLIT

In 2019, about 90 million tons of freight valued at $91 billion moved over Maine's transportation system. As in most states, trucks are the dominant mode of freight transportation in Maine, with about 75% of total freight tonnage and 63% of freight value moving by truck in 2019; this heavy reliance on trucks has important implications for the State's infrastructure and the ability to sustain growth.

Exhibit 2.3 shows that the next-highest modal categories by weight are pipeline (8%), rail (5%), and multiple modes, including mail (4%). The modal split by freight value is somewhat different, though truck is still the dominant mode; multiple modes, mail, and air (all of which include truck freight) tend to carry lower-weight, higher-value commodities, while pipeline and rail tend to carry higher weight, lower-value commodities. Exhibit 2.4 shows projected modal split in 2050.

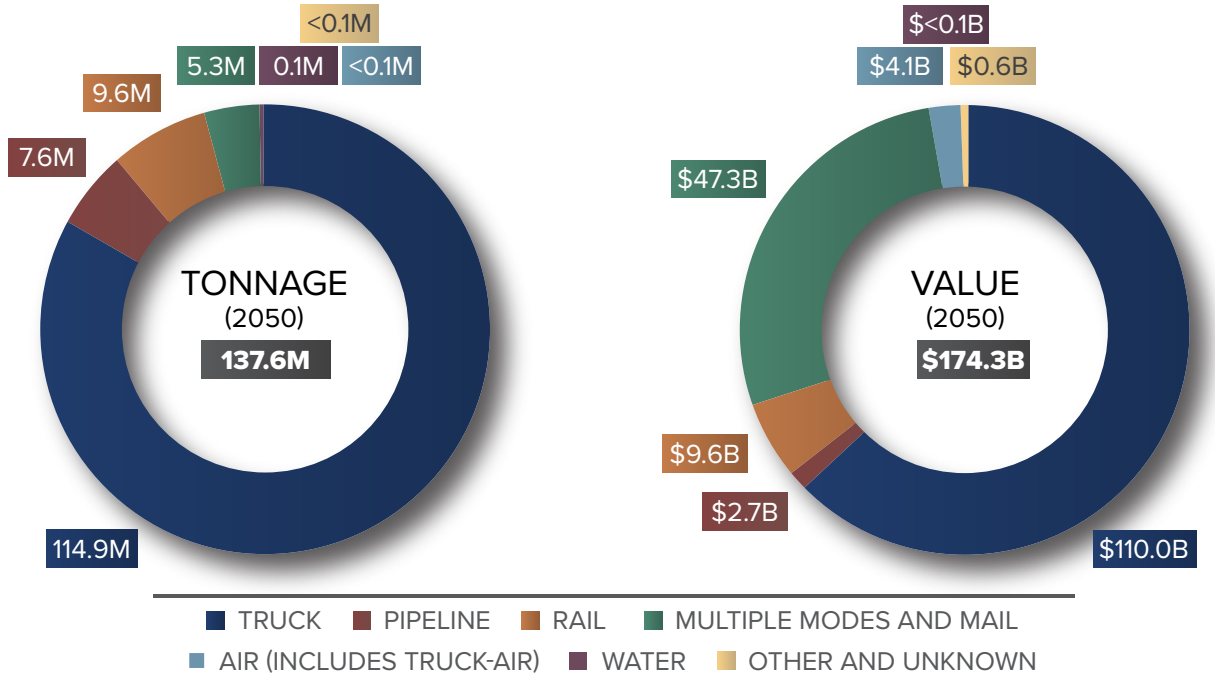
Exhibit 2.3 **Modal Split of Freight Moved in Maine, 2019**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Note: Does not include through flows.

Exhibit 2.4 **Modal Split of Freight Moved in Maine, 2050**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Note: Does not include through flows

2.2.2 DIRECTIONAL SPLIT

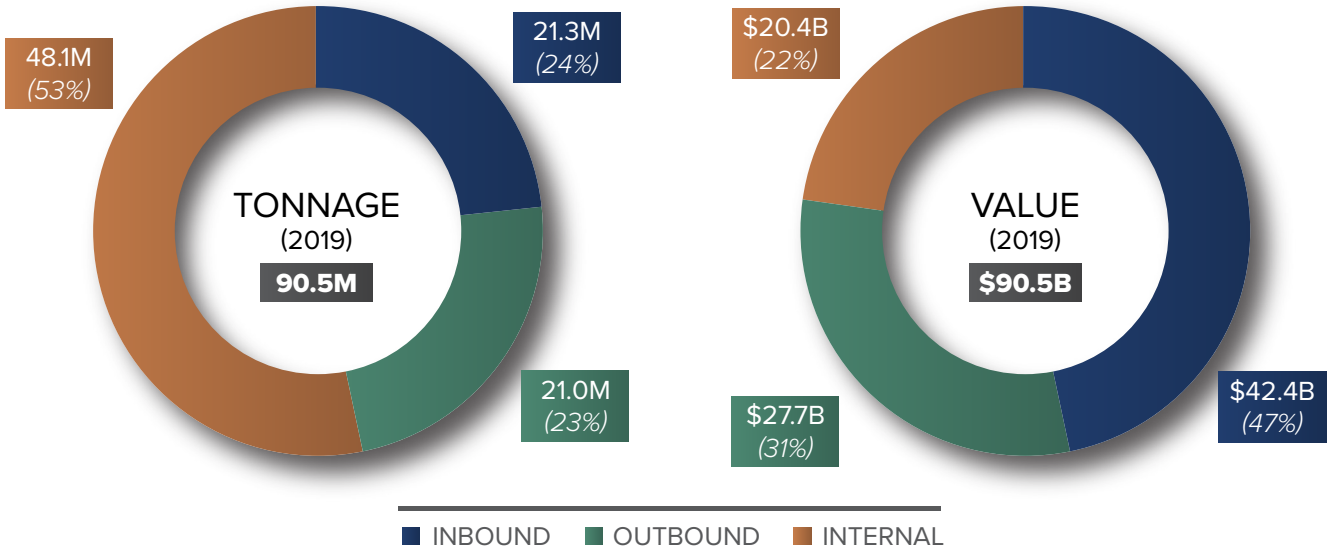
Freight flows in the State of Maine are assigned to one of three directions based on their domestic origin and destination:[8]

- **Inbound:** Freight moving from another state to a destination inside Maine, or entering Maine at a border crossing.
- **Outbound:** Freight moving from Maine to a destination in another state, or leaving Maine at a border crossing.
- **Internal:** Freight moving between two locations within the State.

Exhibit 2.5 shows that the vast majority of freight traffic in Maine either originates and/or terminates in the State, with only a small share of freight passing through it as a result of its location in the north-eastern corner of the country. **Inbound flows account for nearly half (47%) of Maine's freight tonnage as well as value (51%).** Outbound flows account for another 30% of Maine's freight tonnage and slightly more in value (31%). Internal freight movement within Maine takes the rest of the share. Exhibit 2.6 shows projected directional flow in 2050.

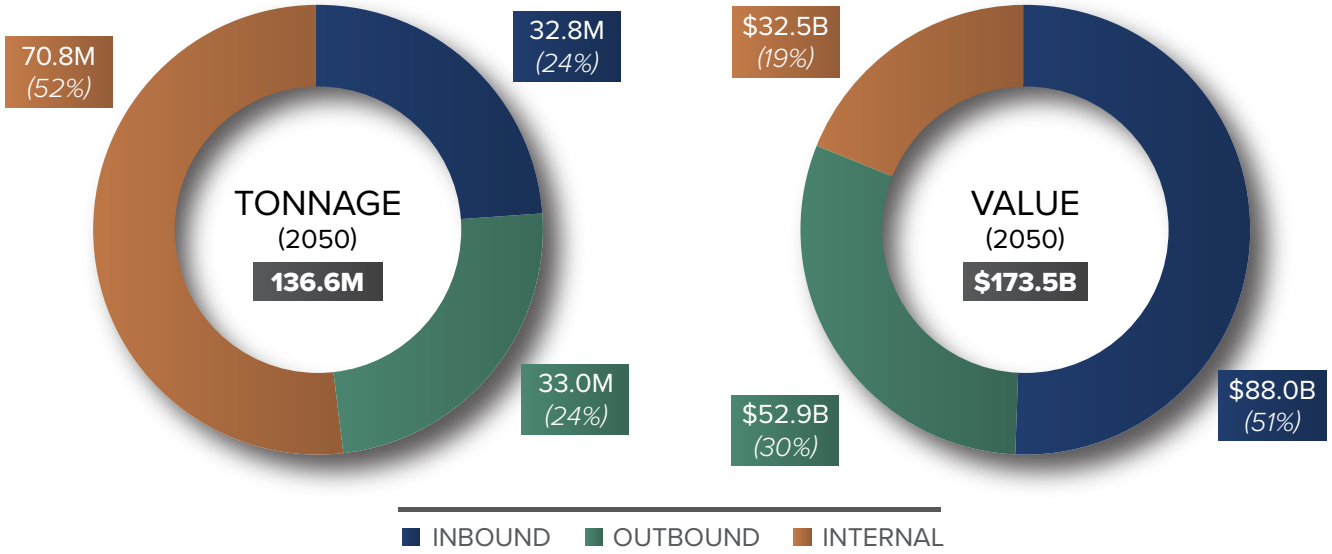
[8] Note that international flows are categorized by their domestic entry or exit points. For example: a freight flow from New Hampshire to Maine would be an inbound flow, likewise, a flow from New Hampshire to Canada with a border crossing in Maine would also be an inbound flow, based on the exit point in Maine. A flow from Maine to Canada would be an internal flow because both the origin and exit points are in Maine.

Exhibit 2.5 **Direction of Flows by Weight and Value in Maine (2019)**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Exhibit 2.6 **Direction of Flows by Weight and Value in Maine (2019)**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

2.2.3 TOP COMMODITIES

Exhibit 2.7 shows the top commodities by tonnage in 2019 and forecast in 2050. Exhibit 2.8 shows the top commodities by value in 2019 and forecast in 2050.

Exhibit 2.7 **Top Commodities Moved in Maine by Tonnage, 2019 and 2050**

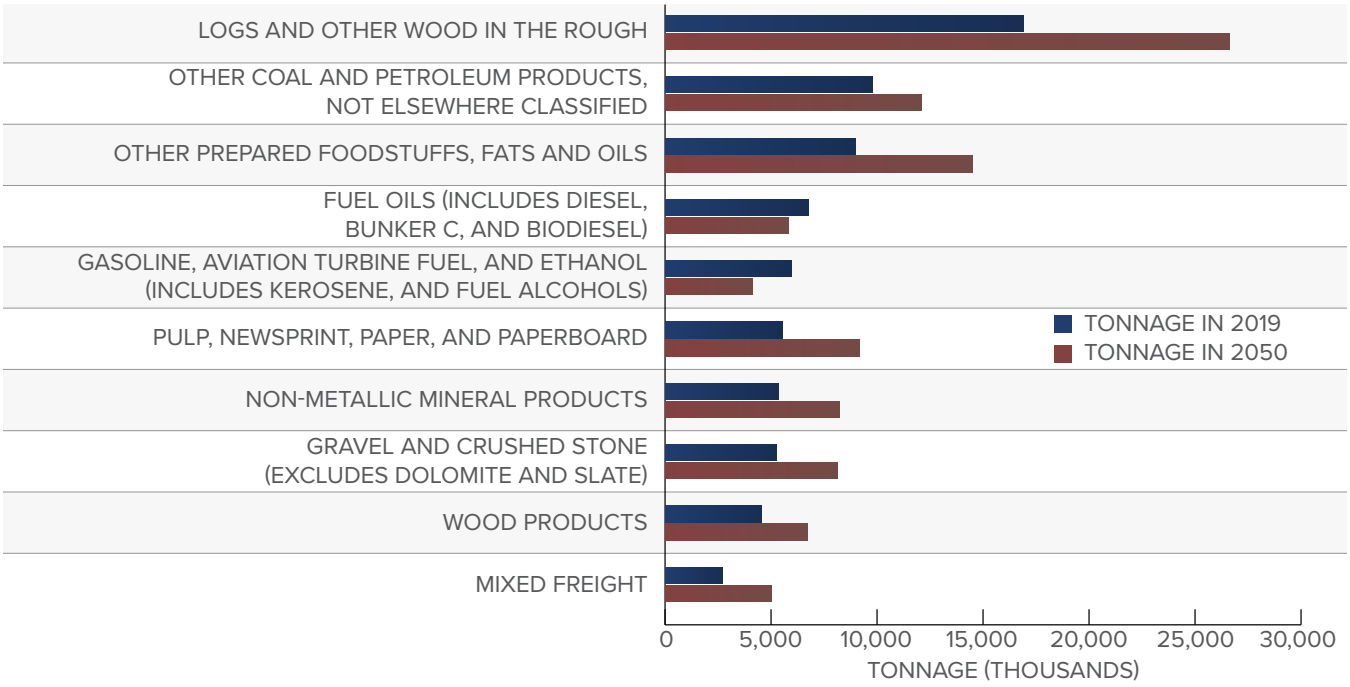
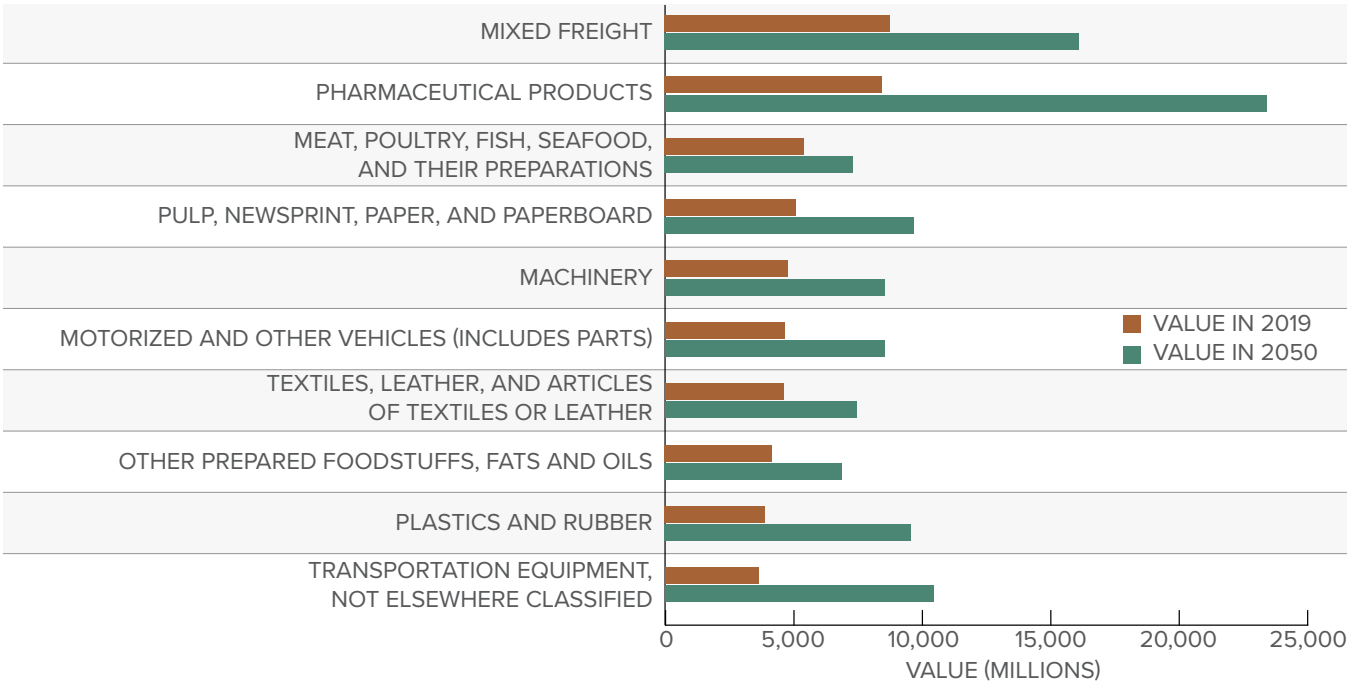


Exhibit 2.8 **Top Commodities Moved in Maine by Value, 2019 and 2050**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

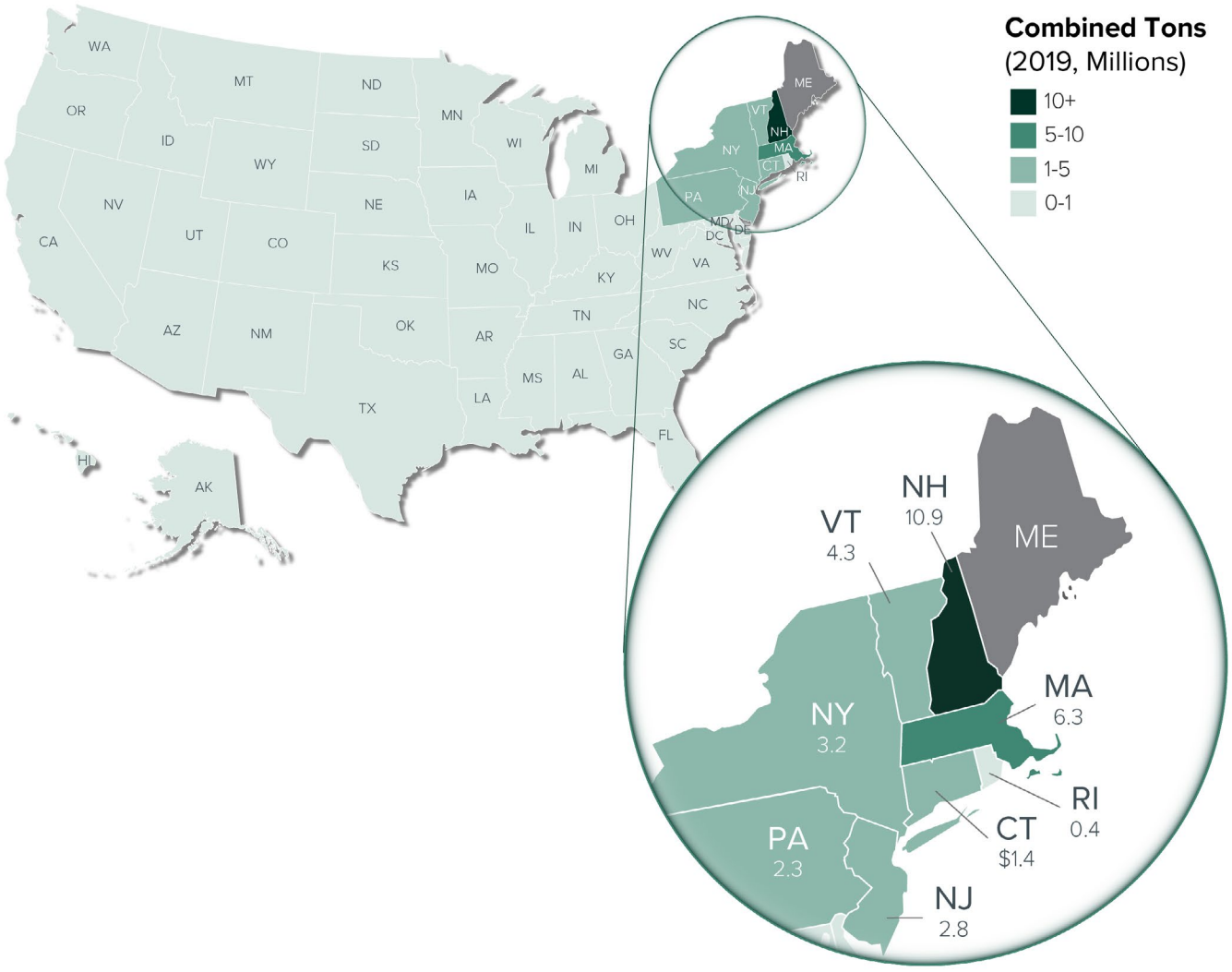
Note: Does not include through flows

2.2.4 DOMESTIC TRADING PARTNERS

Maine's primary domestic trade partnerships in 2019 were primarily in the Northeast region. New Hampshire accounted for 36% of Maine's inbound freight tonnage (10% by value) and 24% of Maine's outbound freight tonnage (12% by value). Maine's next-biggest trading partners are Massachusetts and Vermont, accounting for about 17 percent and 12 percent of all inbound and outbound trade by weight. Altogether, the Northeastern states (New Hampshire, Massachusetts, Vermont, New York, New Jersey, Pennsylvania, and Connecticut) account for 83 percent of Maine's inbound and outbound freight by weight and 61 percent by value.

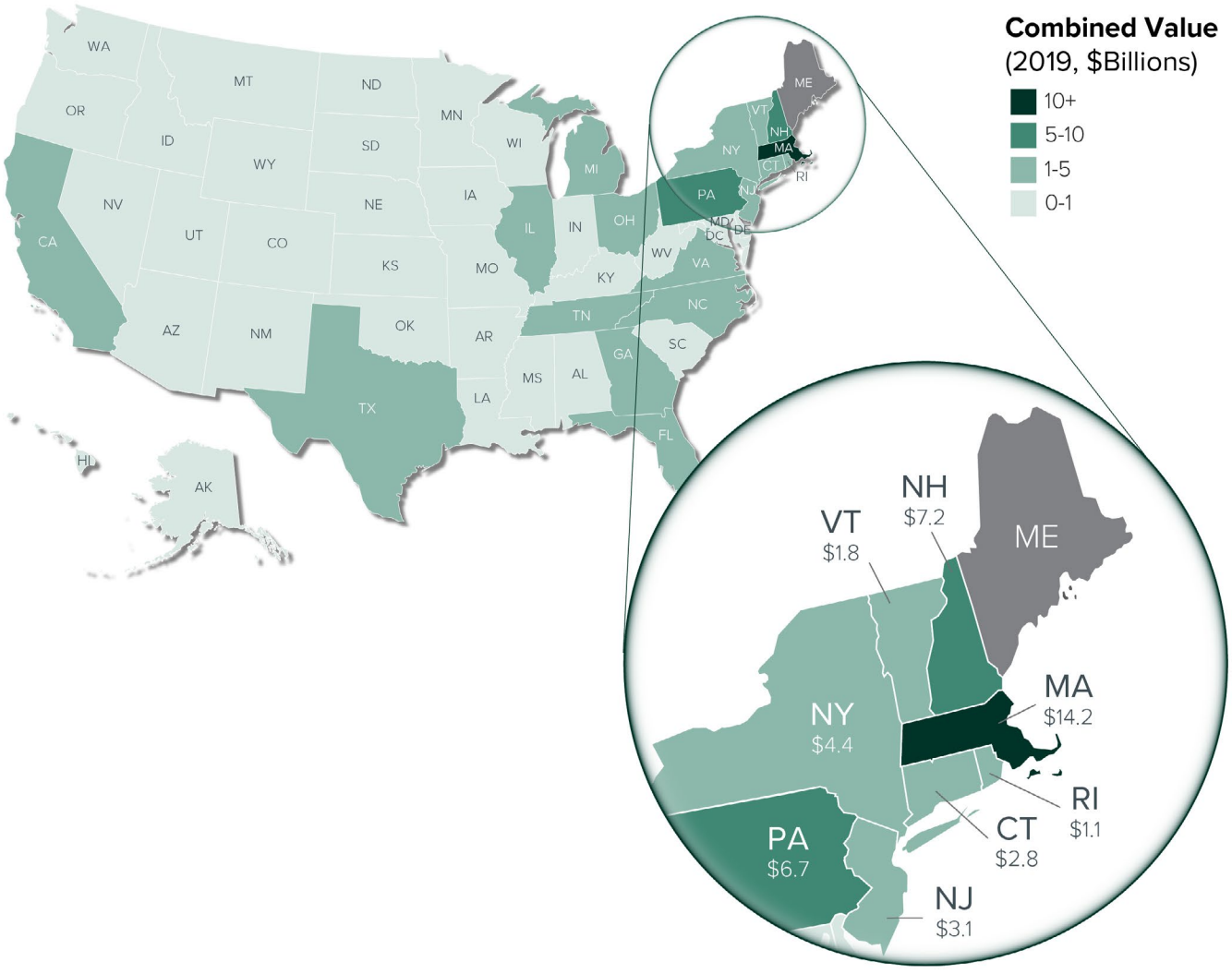
Exhibits 2.9 and 2.10 map Maine's imports and exports domestic and North American trading partners in 2015.

Exhibit 2.9 **Combined Tons (Originating and Terminating) in Maine by State, 2019**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Exhibit 2.10 **Combined Value (Originating and Terminating) in Maine by State, 2019**



Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

2.2.5 INTERNATIONAL TRADE

Maine has a unique position with Canada on three sides. Northern Maine sees substantial flows of forestry, fuel, and other products both to and from processing and port facilities in the Saint John area. Many trains on Maine's railroads are "through traffic" transiting the State from Canada to Canada.

International trade comprised 14% of total tonnage and 19% of total value of Maine's total trade in 2019. Canada is Maine's top trading partner both in terms of tonnage (11 million tons) and value ($15 billion), followed by East Asia and Europe. Other partners include Mexico, Southeast Asia and Oceania, and Southwest and Central Asia. Full statistics on international trade in 2019 are provided in Exhibit 2.11.

Exhibit 2.11 **Total Tonnage and Value of Trade by International Region, 2019**

TRADING PARTNER	TONNAGE (THOUSANDS)	VALUE ($MILLIONS)
Total – All Trade	**91,249**	**$91,226**
Total – International Trade	12,340	$17,251
Canada	11,210	$15,406
Eastern Asia	410	$652
Europe	410	$317
Americas (other than Canada and Mexico)	153	$361
Mexico	57	$157
Southeast Asia and Oceania	50	$66
Southwest and Central Asia	45	$202
Africa	5	$89

Source: FHWA FAF5 (all modes but rail); STB Waybill (rail)

Trade with Canada can further be broken down by province. Of Maine's ports-of-entry, all but Jackman – paired with Saint-Théophile, Quebec – provide access to and from New Brunswick. Exhibit 2.12 breaks down outbound flows of tucks by province for the years 2013-2022.

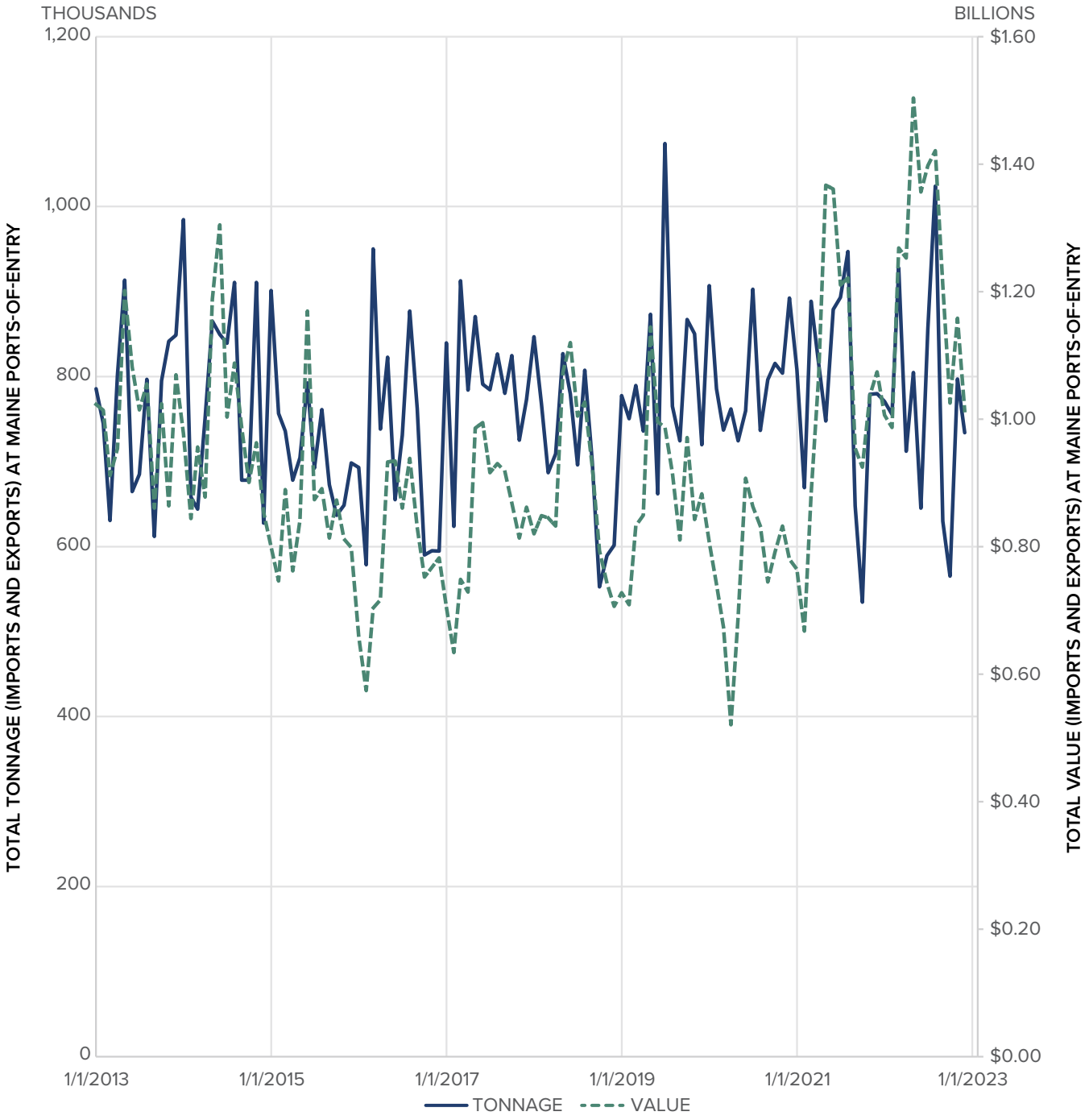
Exhibit 2.12 **Outbound Trucks by Canadian Province from Maine, 2013-2022**

PROVINCE	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total	**319,567**	**302,993**	**305,340**	**296,197**	**292,353**	**284,735**	**280,311**	**261,940**	**260,294**	**251,674**
NB	229,648	218,238	217,010	217,345	215,767	211,479	207,273	191,365	194,958	187,724
QC	89,919	84,755	88,330	78,852	76,586	73,256	73,038	70,575	65,336	63,950

Source: Bureau of Transportation Statistics, https://explore.dot.gov/#/views/BorderCrossingData/Annual

Exhibit 2.13 shows the trend in tonnage and value of total imports and exports at Maine's ports-of-entry in the period 2013-2022.

Exhibit 2.13 **Tonnage and Value of Total Imports and Exports in Maine, 2013-2022**



Source: Bureau of Transportation Statistics, https://data.bts.gov/stories/s/myhq-rm6q

2.3 Network Usage and Performance

In order to develop highway-based performance measures for motor carriers operating throughout Maine, this analysis primarily utilizes travel time data from the National Performance Management Research Data Set (NPMRDS).[9] The NPMRDS, a Federal Highway Administration (FHWA) product, contains travel times in five-minute increments for the roadways that comprise the National Highway System (NHS). Travel times in the NPMRDS are given for passenger vehicles, trucks, and for all vehicles combined.

Though the NPMRDS aims to provide full coverage of the NHS, data is sometimes missing from various links and must be interpolated. Furthermore, the data set sometimes contains travel time data on limited portions of roadways that are not located on the NHS. For this analysis, data was collected from the January 2022 through December 2022 time period for weekdays only (Monday through Friday).

2.3.1 TRUCK CONGESTION

Congestion faced by motor carriers is captured by examining average truck speeds relative to free-flow reference speeds, which are assumed to be the speed of trucks along a particular segment if there was no congestion and a minimal volume of other vehicles.[10] This analysis was completed separately for Interstate Highways and Non-Interstate Highways, owing to the different standards of performance for each roadway system.

While high vehicle volumes may be the primary factor that affects truck congestion on the routes in this section, additional factors that could impact truck travel speeds include weather and terrain. Disruptions due to weather in the winter months, tourism-related traffic in the peak summer months, and disruptions from wildlife collisions, especially in rural and forested areas, may impact overall truck speed on these roads.

For all exhibits in this section, “peak” hours are between 6:00 and 10:00 AM and between 3:00 and 7:00 PM.

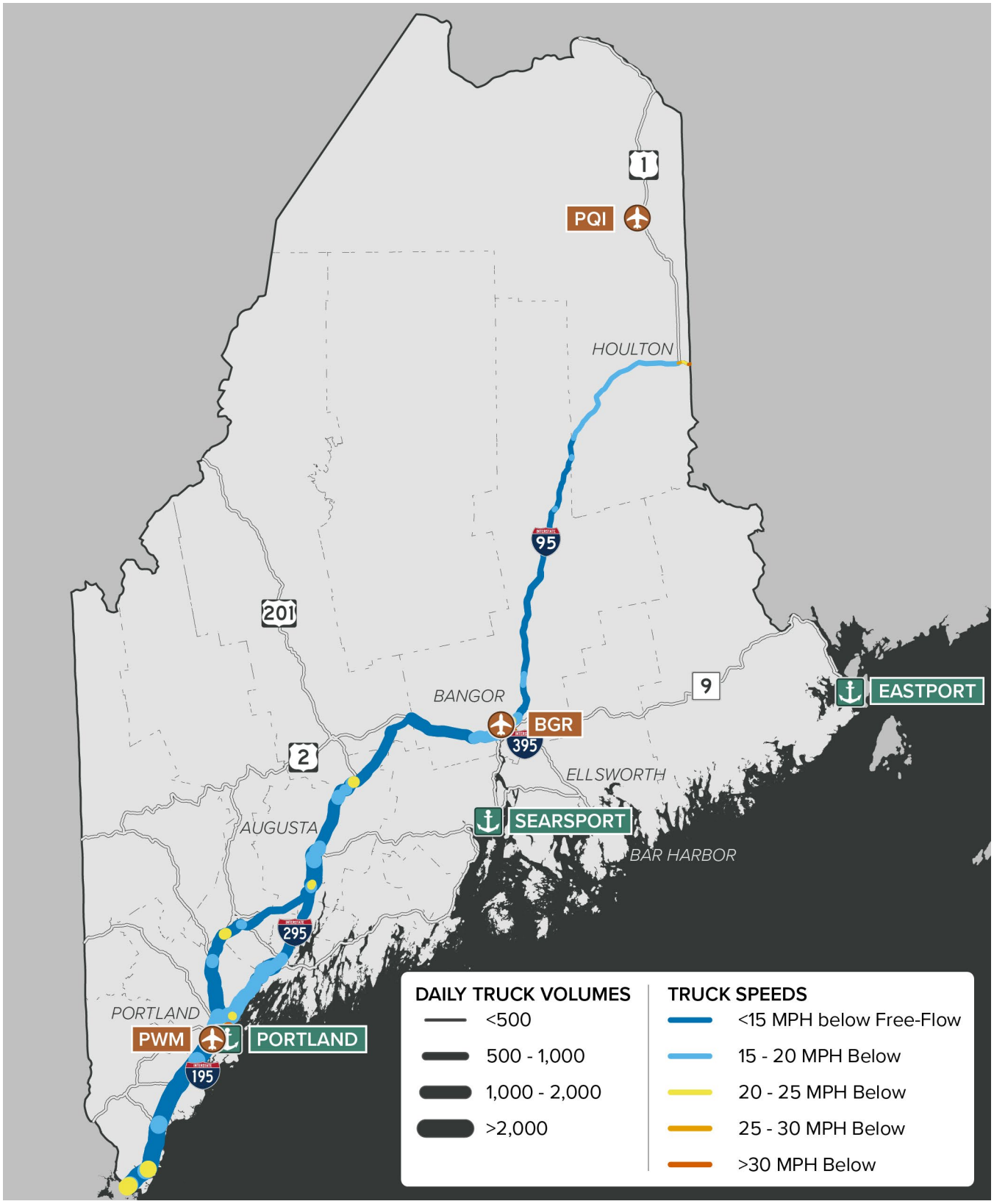
INTERSTATE TRUCK CONGESTION

Exhibits 2.14 and 2.15 (next pages) shows the average truck speeds for Interstates on a map of Maine. In this map, the color of the highway segment indicates the truck speed relative to free-flow conditions and the thickness of the line represents the daily truck volume. Areas that have high volumes and the slowest speeds would be the areas of most concern on Maine Interstates.

[9] https://npmrds.ritis.org/analytics/

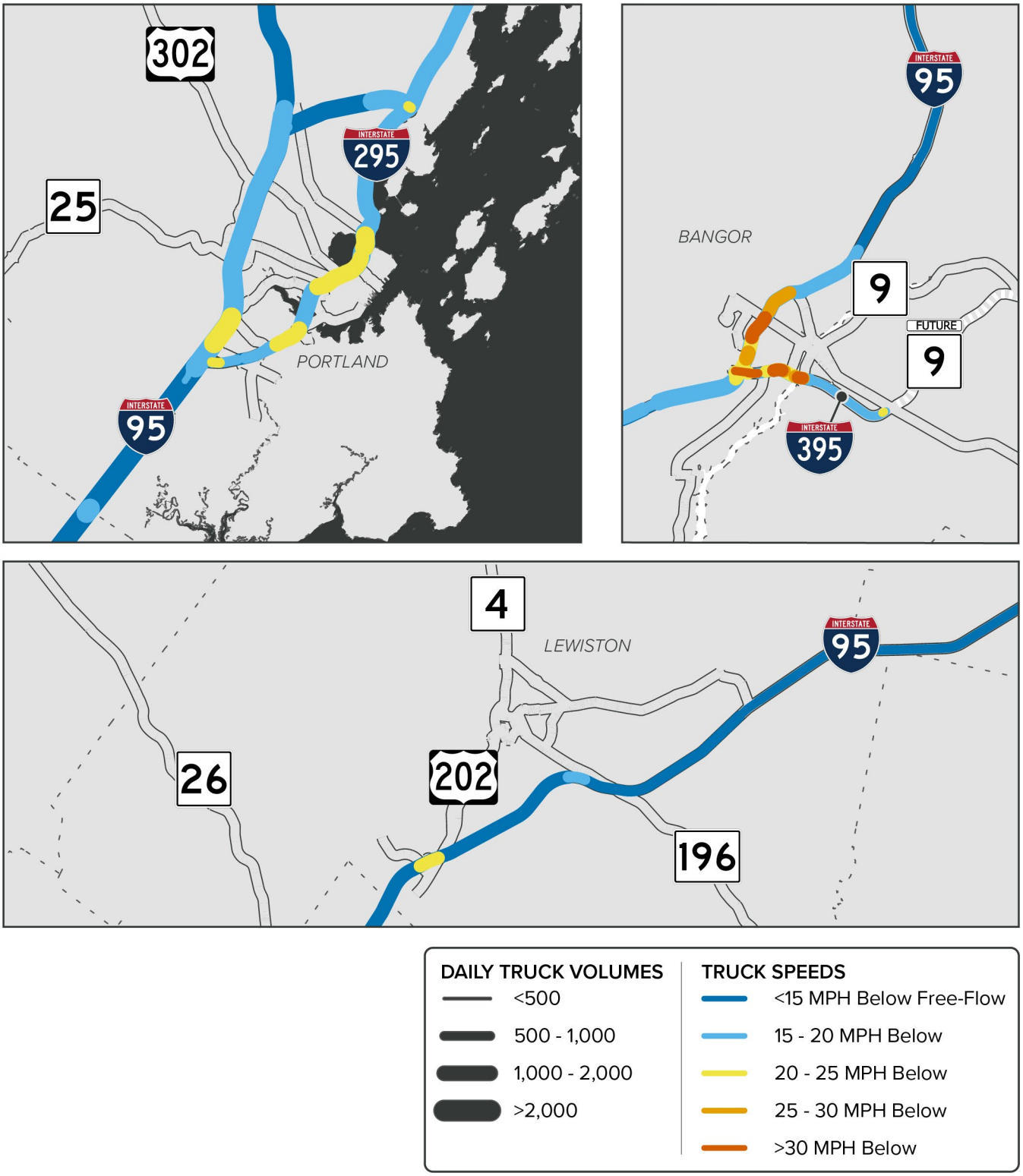
[10] NPMRDS calculates free-flow speeds as the 85th-percentile point of observed off-peak speeds on a particular segment. This is normally close to the speed limit of a road, but could be slightly above or below depending on if that speed limit is obeyed, the condition of the roadway, and other factors.

Exhibit 2.14 **Average Peak Truck Speeds on the Interstate System in Maine, 2022**



Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Exhibit 2.15 **Average Peak Truck Speeds on the Interstate System in Maine, 2022; Callout**



Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Average truck speeds on Interstates in Maine are usually close to free-flow speeds during peak times. **As shown in Exhibit 2.16, over 95% of Interstate mileage across the AM and PM peaks is within 10 mph of free-flow conditions, with over 75% being within 5 mph.**

Exhibit 2.16 **Average Peak Truck Speeds on the Interstate System in Maine, 2022**

SPEEDS RELATIVE TO FREE-FLOW	% OF ROADWAY MILEAGE
Less than 5 mph below free-flow	76.2%
5-10 mph below free-flow	20.7%
10-15 mph below free-flow	2.3%
15-20 mph below free-flow	0.4%
Over 30 mph below free-flow	0.4%

Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Segments of the Interstate system close to the Canadian border and major urban areas are slower, with average truck speeds at least 15-20 mph below free-flow speeds during peak periods. In urban areas, these lower speeds may be caused by congestion. Near the border, delays at crossing stations could also contribute to slower speeds. Volume of trucks on the urban segments is higher than on the border segments.

NON-INTERSTATE TRUCK CONGESTION

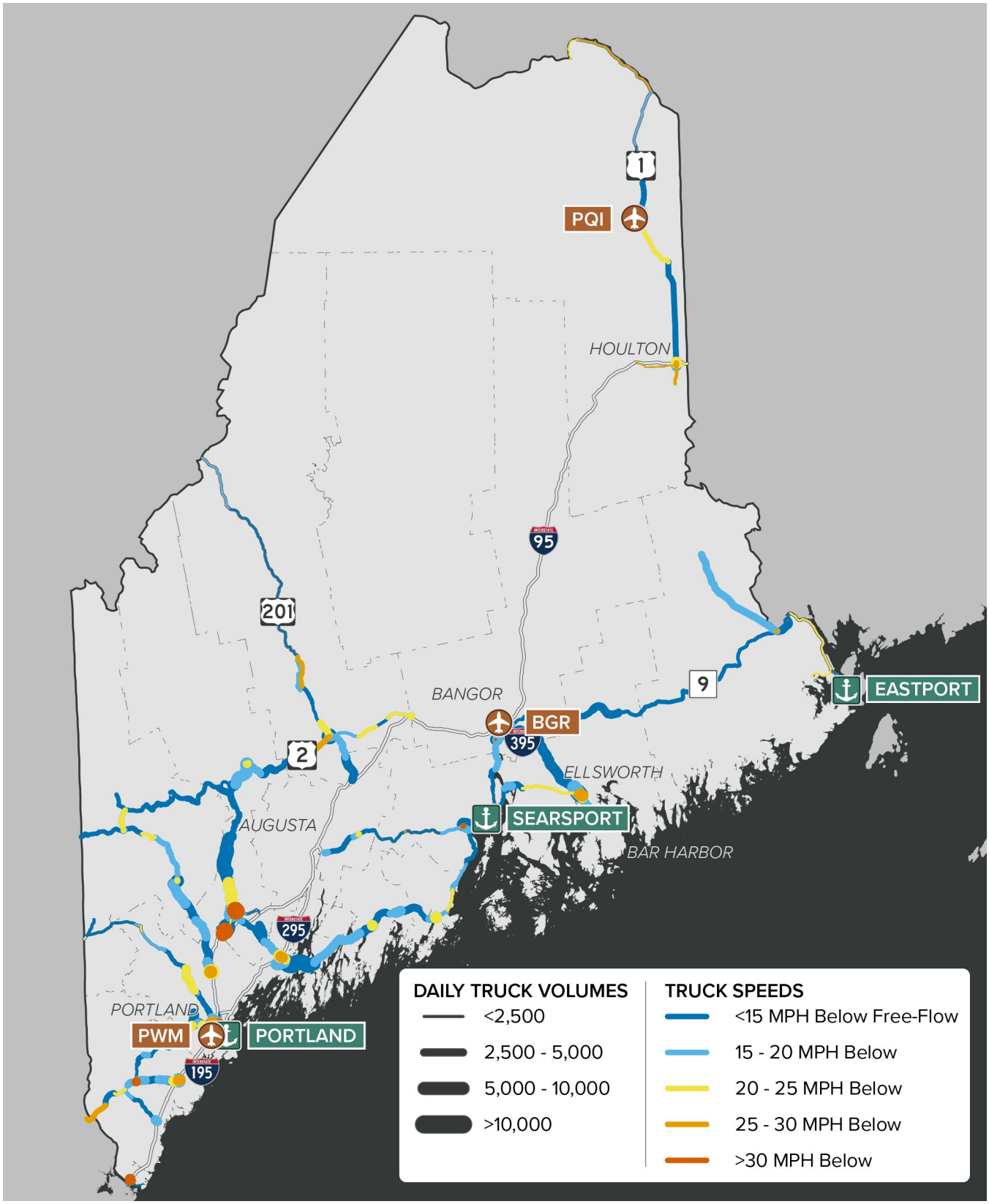
Average speeds on non-Interstate NHS are typically much lower than those observed on the Interstate system, reflecting the lower design speed of the roads (incorporating steeper grades, tighter curves, and at-grade intersections, among other elements). As shown in Exhibit 2.17 and on maps in Exhibits 2.18 and 2.19 (next pages), 65% of roadway mileage is within 15 mph of free-flow (compared to 99% for Interstates), and over 15% of mileage is greater than 20mph below free-flow (compared to less than 1% for Interstates).

Exhibit 2.17 **Average Peak Truck Speeds on the Non-Interstate NHS in Maine, 2022**

SPEEDS RELATIVE TO FREE-FLOW	% OF ROADWAY MILEAGE
Less than 15 MPH below Free-Flow	64.8%
15-20 MPH below	19.4%
20-25 MPH below	11.5%
25-30 MPH below	3.9%
Over 30 MPH below	0.4%

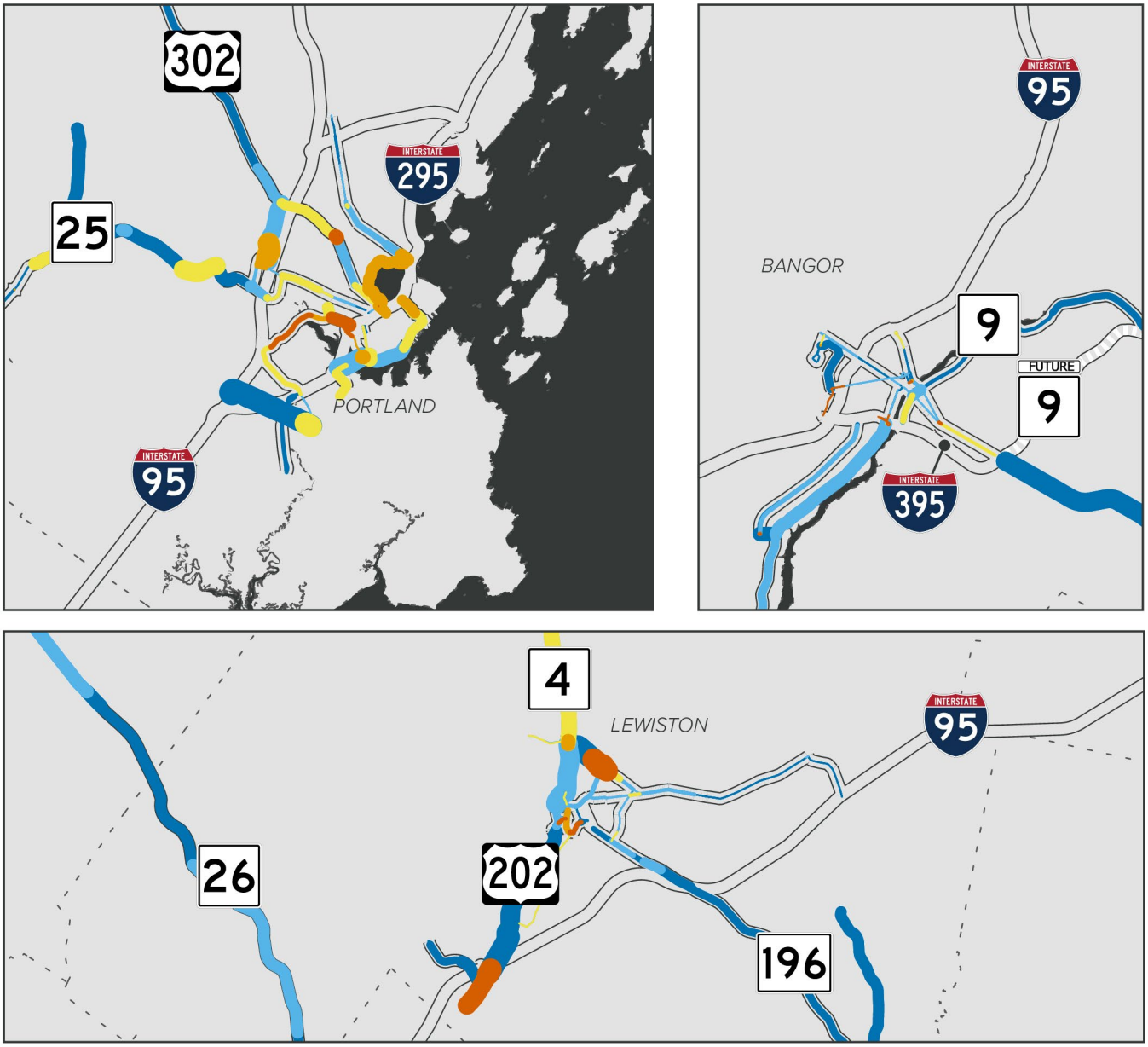
Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Exhibit 2.18 **Average Peak Truck Speeds on the Non-Interstate System in Maine, 2022**



Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Exhibit 2.19 **Average Peak Truck Speeds on the Non-Interstate System in Maine, 2022; Callout**



Source: National Performance Management Research Data Set (NPMRDS), 2022; Analysis by Cambridge Systematics, 2023.

Similar to the Interstate system, the slowest non-Interstate highways are in urban areas and near the Canadian border, such as US-1 on the eastern border of the State that carries a substantial amount of truck traffic but operates in some sections over 20 mph below free-flow speeds. In the peak periods, ME-9 generally operates closer to free-flow speeds than the rest of the NHS routes. This could be because ME-9 is relatively flat and provides access to a more sparsely populated region of the State, which limits congestion. **MaineDOT is currently constructing an extension of I-395 to ME-9 to bypass the town of Brewer.**

2.3.2 TRUCK TRAVEL TIME RELIABILITY

Truck travel time reliability (TTTR) is an index that gives an idea of how variable travel times are on roadways.[11] Highly variable (unreliable) truck travel times can increase costs to motor carriers as they budget additional time into their schedules. This translates to higher transportation costs that may be passed on to shippers. Wasted time also reduces available hours of service for truck drivers. TTTR has a minimum value of 1.00. Low TTTR indicates more reliable travel times and high TTTR values indicate unreliable travel times. For example, a TTTR equal to 2.00 indicates that trucks may need to plan for a travel time double what is typical when scheduling.

MaineDOT and MPOs in Maine report a generalized performance measure based on TTTR annually to FHWA.[12] MaineDOT exceeds FHWA requirements by computing TTTR for Non-Interstate NHS highways in addition to Interstates, statewide and for each MPO. Exhibit 2.20 shows the trend in this data for the years 2018-2022. **MaineDOT has set a target that statewide TTTR should not exceed 1.40 in either 2023 or 2025.** MaineDOT has not exceeded (or approached) this target at any point during the period when TTTR has been measured (since 2016).

Exhibit 2.20 **TTTR on NHS Roads in Maine, 2018-2022**

REGION	2018	2019	2020	2021	2022
Statewide	**1.20**	**1.23**	**1.21**	**1.20**	**1.21**
Auburn/Lewiston	1.29	1.31	1.28	1.32	1.28
Bangor	1.30	1.50	1.26	1.41	1.25
Southern Maine	1.28	1.31	1.19	1.25	1.21
Portland	1.24	1.27	1.20	1.24	1.24

Source: MaineDOT analysis

[11] TTTR is computed as the ratio of the 95th percentile travel time for trucks on a segment (the slowest time in 20) to the 50th percentile time (the median). Per FHWA regulation, DOTs and MPOs must measure TTTR for each segment of Interstate over five time periods, averaged over each year: morning peak; midday; afternoon/evening peak; overnight; and weekends. The highest TTTR over these five periods is taken as the segment's overall TTTR for the year. For segments where congestion is rare, the highest TTTR value may be overnight, as truck drivers may reduce speed in darkness.

[12] FHWA instructs DOTs and MPOs to average TTTR across the Interstates in their jurisdiction, weighted by mileage. As the governing TTTR period varies by segment, the values being averaged will not all be from the same time-of-day.

2.3.3 USAGE AND PERFORMANCE AT BORDER CROSSINGS

Live and historical data on wait times at major us border crossings is available from US Customs and Border Protection (CBP).[13] Three of these crossings are located in Maine and have a commercial lane:

- **Calais, at International Avenue.** The sibling crossing on the Canadian side is St. Stephen, New Brunswick, at New Brunswick Route 1.
- **Houlton, at the northern terminus of I-95.** The sibling crossing on the Canadian side is Belleville, New Brunswick, at New Brunswick Route 95.
- **Madawaska, at Bridge Avenue connecting to US-1.** The sibling crossing on the Canadian side is Edmundston, Madawaska, New Brunswick, at New Brunswick Route 144.

Exhibit 2.21 presents total delay in minutes at these three border crossings for the average weekday, Saturday, and Sunday from October 2022 to October 2023. Houlton is by a wide margin the border crossing in Maine with the most substantial delay, but even over the course of a full day it generates less than one hour of delay, on average.

Exhibit 2.21 **Average Daily Delay at Major Border Crossings in Maine, 2022-2023**

REGION	SUNDAY	WEEKDAY	SATURDAY
Total	**23.4 minutes**	**31.7 minutes**	**18.4 minutes**
Calais International Avenue	0.0 minutes	0.2 minutes	0.5 minutes
Houlton	22.2 minutes	31.0 minutes	17.3 minutes
Madawaska	1.2 minutes	0.5 minutes	0.6 minutes

Source: US Customs and Border Protection

[13] https://bwt.cbp.gov/historical

2.4 Safety

In the 2023 LRTP, safety remains MaineDOT's top priority. MaineDOT's goal is to provide a safe transportation system for all users and modes of transportation. The primary safety impacts of goods movement are crashes involving trucks and incidents at railroad grade crossings.

2.4.1 CRASHES INVOLVING TRUCKS

Commercial vehicle safety is a key concern for freight movement. Crashes can injure both truck drivers and other road users. Crashes create delay, reducing reliability in a corridor and can potentially cause shipments to miss their delivery window, adding cost. Finally, goods in transit can also be damaged or destroyed, again creating additional cost, and often generating additional trips.

Between 2017 and 2021, 9,625 total truck crashes occurred in Maine.[14] Exhibit 2.22 provides the breakdown of these crashes by year and by severity. Across fatalities and most injury categories, crashes experienced a mixture of moderate rises and falls over the five-year period. MaineDOT collaborates with industry and safety groups to identify potential safety improvements and the department invests in measures to reduce further crashes such as centerline and shoulder rumble strips on key routs with runoff or lane crossing issues.

Exhibit 2.22 **Crashes Involving Trucks in Maine by Severity, 2017-2021**

YEAR	TOTAL	FATAL	SERIOUS INJURY	MINOR INJURY	POSSIBLE INJURY	PROPERTY DAMAGE
Total	**9,625**	**84**	**193**	**610**	**1,041**	**7,697**
2017	**1,998**	21	53	95	204	1,625
2018	**2,035**	14	36	134	232	1,619
2019	**2,156**	16	41	122	246	1,731
2020	**1,617**	17	31	101	181	1,287
2021	**1,819**	16	32	158	178	1,435

Truck driver actions that contributed to highway truck crashes in Maine in the 2017-2021 period (total) are summarized in Exhibit 2.23. Note that 4,782 of 10,375 truck drivers (46%) involved in incidents were not found to have taken any action that contributed to the crash.

[14] For this and all other statistics in this section, see MaineDOT's "State of Maine Truck & Bus Crash History, 2017-2021" | https://www.maine.gov/mdot/safety/docs/2023/Truck%20and%20Bus%20Crash%20History%202017-2021.pdf

Exhibit 2.23 **Truck Driver Actions in Crash Incidents, 2017-2021**

TRUCK DRIVER ACTIONS	CRASHES
Total	**10,375**
No contributing action	4,782
Failed to yield right-of-way	598
Improper backing	577
Failed to keep in proper lane	570
Followed too closely	568
Ran off roadway	539
Improper turn	466
Drove too fast for conditions	454
Unknown	237
Operated motor vehicle in erratic, reckless, careless, negligent, or aggressive manner	156
Swerved or avoided due to wind, slippery surface, motor vehicle, object, non-motorist in roadway	156
Over-correcting/over-steering	115
Improper passing	99
Disregarded other traffic sign	78
Ran red light	44
Exceeded posted speed limit	38
Disregarded other road markings	29
Ran stop sign	24
Wrong way	11
Other contributing action	834

The geographic distribution of truck-involved crashes in Maine is shown in Exhibits 2.24 and 2.25. The counties in Southern Maine have experienced the largest number of truck crashes among the regions (4,095), which is commensurate with the higher population and amount of commerce that takes place in that part of Maine. Per-capita, Aroostook County as a region had the highest rate of crashes (8.91 per 1,000 population), though as a county it was exceeded by Franklin and Somerset. Kennebec Valley had the highest crash rate among multi-county regions (7.75 per 1,000 population), driven largely by Somerset County (9.76 per 1,000 population).

In general, counties through which I-95 (and to a lesser extent I-295) run have higher numbers of truck-related crashes per capita, while counties with denser development (e.g., Cumberland and Androscoggin) had higher numbers of truck related crashes by VMT.

Exhibit 2.24 **Truck Crashes by Severity and by County per Thousand People, 2017-2021**

COUNTY	2020 POP	TOTAL	TOTAL PER THOUSAND PEOPLE	FATALITY	FATALITY PER THOUSAND PEOPLE	INJURY	INJURY PER THOUSAND PEOPLE	PDO	PDO PER THOUSAND PEOPLE
Total	**1,362,280**	**9,625**	**7.07**	**84**	**0.06**	**1,844**	**1.35**	**7,697**	**5.65**
So. Maine[a]	552,089	**4,095**	**7.42**	25	0.05	759	1.37	3,311	6.00
Tri-County[b]	198,306	**1,425**	**7.19**	17	0.09	291	1.47	1,117	5.63
Kennebec Vy.[c]	174,158	**1,350**	**7.75**	10	0.06	255	1.46	1085	6.23
Northeast[d]	255,297	**1,600**	**6.27**	15	0.06	328	1.28	1257	4.92
Aroostook[e]	66,994	**597**	**8.91**	5	0.07	106	1.58	486	7.25
Mid Coast[f]	115,436	**558**	**4.83**	12	0.10	105	0.91	441	3.82
Androscoggin	111,039	**794**	**7.15**	8	0.07	154	1.39	632	5.69
Aroostook	66,994	**597**	**8.91**	5	0.07	106	1.58	486	7.25
Cumberland	303,312	**2,408**	**7.94**	12	0.04	419	1.38	1,977	6.52
Franklin	29,418	**292**	**9.93**	4	0.14	64	2.18	224	7.61
Hancock	55,460	**313**	**5.64**	3	0.05	64	1.15	246	4.44
Kennebec	123,754	**858**	**6.93**	4	0.03	146	1.18	708	5.72
Knox	40,609	**176**	**4.33**	4	0.10	31	0.76	141	3.47
Lincoln	35,192	**173**	**4.92**	3	0.09	39	1.11	131	3.72
Oxford	57,849	**339**	**5.86**	5	0.09	73	1.26	261	4.51
Penobscot	152,007	**1,032**	**6.79**	5	0.03	207	1.36	820	5.39
Piscataquis	16,768	**77**	**4.59**	2	0.12	11	0.66	64	3.82
Sagadahoc	36,688	**207**	**5.64**	2	0.05	42	1.14	163	4.44
Somerset	50,404	**492**	**9.76**	6	0.12	109	2.16	377	7.48
Waldo	39,635	**209**	**5.27**	5	0.13	35	0.88	169	4.26
Washington	31,062	**178**	**5.73**	5	0.16	46	1.48	127	4.09
York	212,089	**1,480**	**6.98**	11	0.05	298	1.41	1,171	5.52

[a] *Southern Maine includes Cumberland, Sagahadoc, and York Counties*

[b] *Tri-County includes Androscoggin, Franklin, and Oxford Counties*

[c] *Kennebec Valley includes Kennebec and Somerset Counties*

[d] *Northeast includes Hancock, Penobscot, Piscataquis, and Washington Counties*

[e] *Aroostook includes Aroostook County*

[f] *Mid Coast includes Knox, Lincoln, and Waldo Counties*

Exhibit 2.25 **Truck Crashes by Severity and by County per Million VMT, 2017-2021**

COUNTY	MVMT	TOTAL	TOTAL PER MVMT	FATALITY	FATALITY PER MVMT	INJURY	INJURY PER MVMT	PDO	PDO PER MVMT
Total	**1,111.14**	**9,625**	**8.66**	**84**	**0.08**	**1,844**	**1.66**	**7,697**	**6.93**
So. Maine	356.95	**4,095**	**11.47**	25	0.07	759	2.13	3,311	9.28
Tri-County	154.29	**1,425**	**9.24**	17	0.11	291	1.89	1,117	7.24
Kennebec Vy.	198.84	**1350**	**6.79**	10	0.05	255	1.28	1085	5.46
Northeast	245.34	**1600**	**6.52**	15	0.06	328	1.34	1257	5.12
Aroostook	81.45	**597**	**7.33**	5	0.06	106	1.30	486	5.97
Mid Coast	74.27	**558**	**7.51**	12	0.16	105	1.41	441	5.94
Androscoggin	62.23	**794**	**12.76**	8	0.13	154	2.47	632	10.16
Aroostook	81.45	**597**	**7.33**	5	0.06	106	1.30	486	5.97
Cumberland	181.72	**2,408**	**13.25**	12	0.07	419	2.31	1,977	10.88
Franklin	38.43	**292**	**7.60**	4	0.10	64	1.67	224	5.83
Hancock	56.50	**313**	**5.54**	3	0.05	64	1.13	246	4.35
Kennebec	121.76	**858**	**7.05**	4	0.03	146	1.20	708	5.81
Knox	18.72	**176**	**9.40**	4	0.21	31	1.66	141	7.53
Lincoln	24.88	**173**	**6.95**	3	0.12	39	1.57	131	5.26
Oxford	53.63	**339**	**6.32**	5	0.09	73	1.36	261	4.87
Penobscot	131.39	**1,032**	**7.85**	5	0.04	207	1.58	820	6.24
Piscataquis	18.34	**77**	**4.20**	2	0.11	11	0.60	64	3.49
Sagadahoc	35.38	**207**	**5.85**	2	0.06	42	1.19	163	4.61
Somerset	77.08	**492**	**6.38**	6	0.08	109	1.41	377	4.89
Waldo	30.66	**209**	**6.82**	5	0.16	35	1.14	169	5.51
Washington	39.11	**178**	**4.55**	5	0.13	46	1.18	127	3.25
York	139.85	**1,480**	**10.58**	11	0.08	298	2.13	1,171	8.37

Source: Million Vehicle Miles Traveled (MVMT) is computed as the sum of the single and combination truck VMT reported by MaineDOT by county for 2020: https://www.maine.gov/dep/air/mobile/data/VMT%20by%20County.xlsx

2.4.2 FREIGHT RAIL SAFETY INCIDENTS IN MAINE

Railroad safety incidents are reported to and tracked by the Federal Railroad Administration (FRA).[15,16] The primary groups of accidents and incidents reported by railroads to FRA are incidents at grade crossings; rail equipment incidents (e.g., derailments); and casualties to persons (i.e., death and non-fatal injuries caused by trains and occupational illnesses involving railroad employees).This latter category includes injuries to trespassers and railroad workers and contractors. Exhibit 2.26 shows incidents by category from 2013 to 2022 for incidents involving freight operations.[17]

Exhibit 2.26 **Freight Rail Safety Incidents in Maine by Category, 2013-2022**

INCIDENT CATEGORY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	TOTAL
Total	**38**	**37**	**15**	**19**	**19**	**27**	**28**	**27**	**38**	**38**	**286**
Incidents at Grade Crossings	3	3	2	0	1	3	0	4	1	2	**19**
Rail Equipment Incidents (excluding grade crossings)	11	7	1	1	2	1	6	5	2	7	**43**
Hazmat Releases (excluding rail equipment incidents)	0	1	0	0	0	1	0	0	1	3	**6**
Other Incidents Resulting in Injuries/Illnesses (subtotal of two below)	12	13	6	9	8	11	11	9	17	13	**109**
Trespassers	2	1	0	0	0	1	0	0	2	1	**7**
Railroad Workers and Contractors	10	12	6	9	8	10	11	9	15	12	**102**

Source: Federal Railroad Administration, Form 6180.57, Form 6180.54, Form 6180.55a. PHMSA Hazmat Incident Reporting.

Trespassers are individuals who access rail property without permission. While individuals who circumvent grade crossing gates in the down position are also technically trespassers, the term trespassers or trespassing is generally reserved for incidents occurring away from grade crossings. Studies of trespassing behavior have shown that large portions of trespassing injuries and fatalities are suicides or suicide-attempts.[18] In Maine between 2013 and 2022, there were seven freight rail trespassing incidents with three fatalities and four non-fatal injuries. Two of the three deaths were suicides. Half of the non-fatal injuries were individuals attempting to jump onto moving trains. Trespassing is a complex issue that occurs for many reasons and is the cause of the only freight rail fatalities in Maine in the past ten-years. All freight rail incidents involving fatalities or non-fatal injuries and the total number of fatalities and non-fatal injuries are summarized by incident category in Exhibit 2.27.

15 https://railroads.dot.gov/railroad-safety/accident-data-reporting-and-investigations

16 https://railroads.dot.gov/safety-data

17 Incidents involving freight or other equipment were categorized as a freight operations and incidents involving passenger or commuter equipment were excluded. If an incident involved other equipment owned by a passenger rail company then the incident was excluded from the freight summary. https://safetydata.fra.dot.gov/OfficeofSafety/Documents/Railroad%20Safety%20Data%20Frequently%20Asked%20Questions.pdf

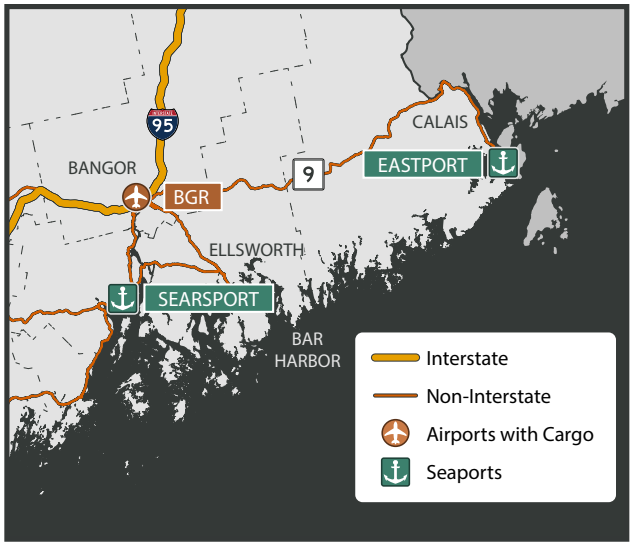
18 https://trespasstoolkit.fra.dot.gov/

Exhibit 2.27 **Freight Rail Safety Incidents with Casualties in Maine by Category, 2013-2022**

INCIDENT CATEGORY	FATAL INCIDENTS	NON-FATAL INJURY INCIDENTS	INCIDENTS WITHOUT CASUALTIES	TOTAL FATALITIES	TOTAL INJURIES	TOTAL CASUALTIES
Total	**3**	**112**	**62**	**3**	**115**	**118**
Highway-rail Grade Crossing Incidents	0	5	14	0	5	**5**
Train Accidents	0	1	42	0	2	**2**
Hazmat Releases (excluding rail equipment incidents)	0	0	6	0	0	**0**
Other Incidents Resulting in Injuries/Illnesses (subtotal of two below)	3	106	0	3	108	**111**
Trespassers	3	4	0	3	4	**7**
Railroad Workers and Contractors	0	102	0	0	104	**104**

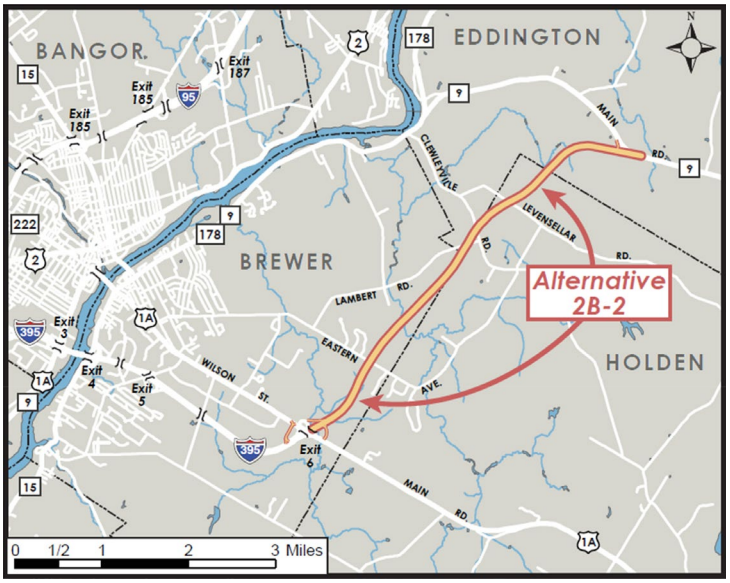
In addition to FRA's reporting of incidents occurring directly at a grade crossing, MaineDOT records additional crashes nearby to a crossing that do not involve on-track equipment. MaineDOT published the *MaineDOT Grade Crossing State Action Plan* in December 2021, providing a detailed data analysis and discussion of goals, objectives, and strategies. Maine's overall goal is to drive safety performance toward zero deaths and zero crashes on its entire road network of which grade crossings form a part.

HIGHLIGHT: I-395/ROUTE 9 CONNECTOR PROJECT



MaineDOT has developed the I-395/Route 9 Connector project to complete a "missing link" in Central Maine. As can be seen in Section 2.3.1, the Bangor Area has the most widespread congestion on its Interstate and Non-Interstate highways for trucks and for other road users.

I-95 makes the connection from Bangor to Southern Maine, including to Augusta, Auburn-Lewiston, and Portland. I-395 is a short highway that crosses the Penobscot River as an alternative to US-1A for approximately three miles, providing access toward Bar Harbor, Searsport, and other points on the Central Maine coast. ME-9 connects Bangor with Eastport and a major border crossing at Calais. It is a major trucking route, but it is linked to the I-395 using city streets in the Town of Brewer.



To divert truck traffic from Brewer while making the freight link from Bangor to the east more efficient, MaineDOT selected "Alternative 2B-2" in 2016. The new road is a "super-2" configuration with one lane in each direction. While it will be appended directly to I-395, the designation will not be extended, and the connector will be signed as a rerouted ME-9 (the existing ME-9 in Brewer will become ME-9 Business).

Construction on the $106 million, six-mile project began in 2022 and is anticipated to open in 2025. It supports several of MaineDOT's stated goals around levels-of-service and economic opportunity. Specifically, the area served by ME-9 (though not the project itself) sits in communities identified by FHWA's Justice40 program as disadvantaged, serving MaineDOT's goal to **ensure that all Maine people have access to safe and reliable transportation regardless of who you are or where you are**.

3 MODES

The freight system in Maine is an essential resource for the State's key industries (described in Chapter 4) and serves as a strategic gateway to the Northeastern United States, Canada, and global markets. It is multifaceted and multimodal, incorporating an extensive highway network, a rail network, airports, seaports, airports, intermodal facilities, and international border crossings. This chapter addresses the existing state and condition of infrastructure, as well as key issues and needs for each of these modes in turn:

- **Highway and Truck Parking |** The overwhelming majority of people and goods in Maine are moved over the State's 22,000 miles of public roads. Trucking is still the dominant mode for freight shipments, accounting for 75% of all freight tonnage and 63% of freight value moved to, from, or within the State, as discussed in more detail in Section 2.2. Other modes of transporting freight in and through Maine complement the highway network, meeting the needs of specific industries and providing alternatives for shippers and receivers.

- **Rail |** Maine's network of railroads connects the State to the North American and Canadian rail systems and plays a particularly important role in shipping for the forest products industry. Rail service is an underutilized but important component of the transportation network in Maine and is particularly cost-effective when moving high-volume, low-value commodities over long distances.

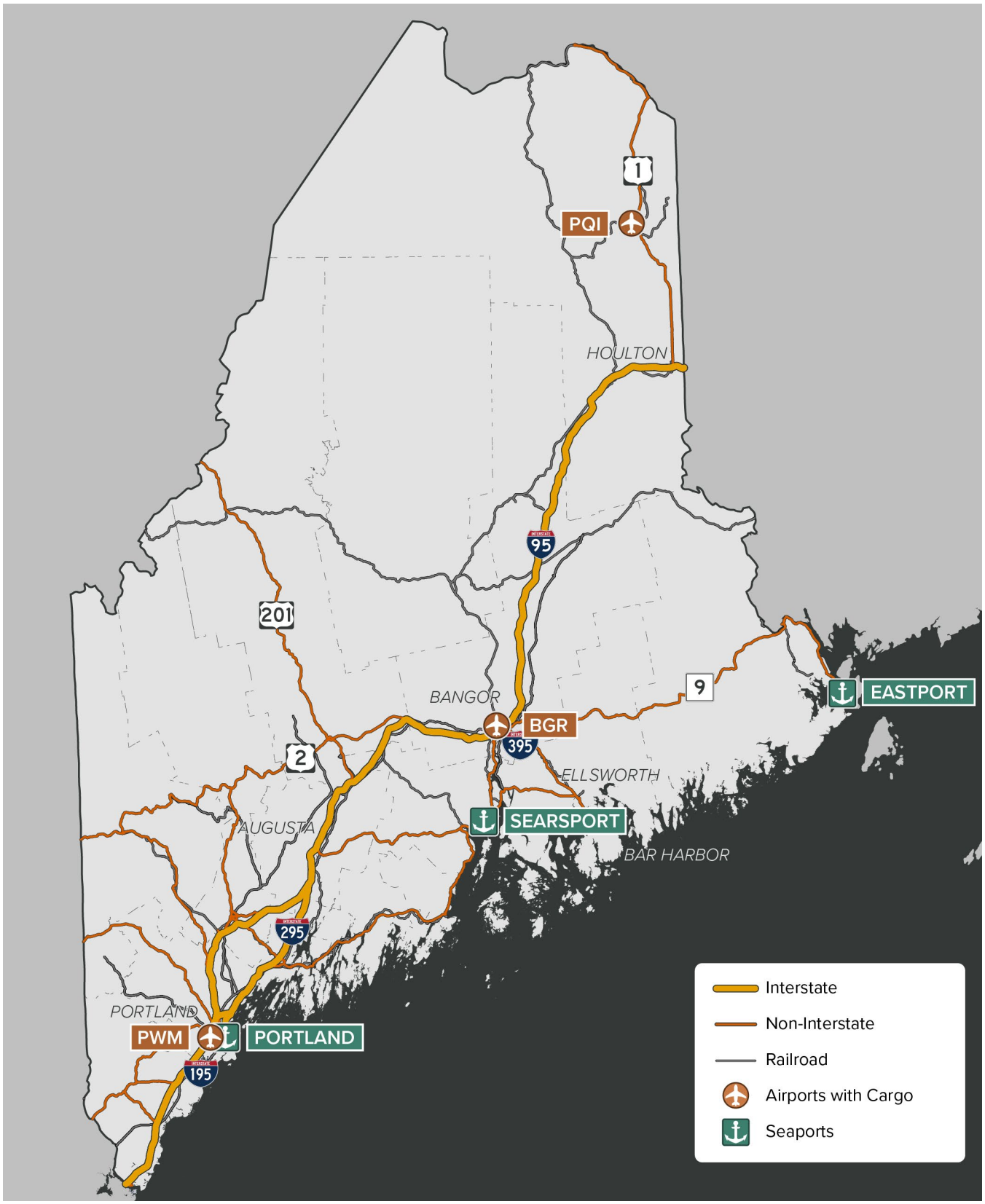
- **Maritime |** Maine's long Atlantic coastline is vital to many industries and the State's ports serve as hubs for maritime goods movement and connections among modes. Maine has three major cargo ports: Portland, Searsport, and Eastport; along with several major cruise ports and private terminals on the coast and on major rivers.

- **Air Cargo |** Airports are particularly important for the transportation of low-weight, high-value commodities such as semiconductors, perishable materials such as seafood, and cargo that is both such as medical research samples. Air cargo is an important means of transporting loads to and from inland locations in Maine or to and from overseas destinations.

- **Pipeline and Hazardous Material (HazMat) |** Pipelines transport petroleum products and natural gas to the State, or in some cases through the State to inland destinations. They provide the safest means of importing some HazMat (such as crude oil, refined fuel, natural gas) to power Maine's economy. HazMat is also moved by highway and by sea in Maine.

Along with two active intermodal connectors – the International Marine Terminal in Portland and the Pan-Am/CSX intermodal terminal in Waterville – and inactive intermodal terminals in Auburn and Presque Isle, these modes form a system that provides capacity, flexibility, and reliability to shippers and receivers. Strategic investment in maintaining and expanding it has the potential to stimulate the State's economy. Exhibit 3.1 provides a snapshot of freight facilities in Maine in 2024, and the remainder of this chapter provides more details on the modes that comprise Maine's freight system.

Exhibit 3.1 **Multimodal Freight System in Maine**



3.1 Highway and Truck Parking

Highway transport is the primary mode of goods movement in Maine. By far, it accounts for the largest share of overall tonnage by mode representing 75% of total outbound, inbound, internal, and through flows of all modes combined in the State. Goods with a primary mode of transport other than highway – rail, air, ship, or pipeline – typically rely on trucks for at least the first or last mile of travel.

There are 47,360 lane-miles of roadway in the State of Maine. MaineDOT uses a five-level classification system to describe and prioritize responsibility for these roadways. Exhibit 3.2 presents definitions and total mileage for each priority level, and Exhibit 3.3 (next page) is a map of the State's highway system by classification.

Exhibit 3.2 **MaineDOT's Roadway Priority Classifications**

PRIORITY	DEFINITION	LANE-MILES	PERCENT OF TOTAL LANE-MILES
Priority 1	The Maine Turnpike (tolled I-95 from Kittery to Augusta); the Interstate System; and key principal arterials such as US-1 in Aroostook County, the "Airline" (ME-9), US-2 west of Newport, and US-302.	3,944	8%
Priority 2	Non-Interstate, high-value arterials, including all National Highway System (NHS) highways that are not Priority 1.	2,621	6%
Priority 3	Remaining arterials and most significant major collector highways.	2,524	5%
Priority 4	Remainder of the major collector highways, often also part of the Maine's unique State Aid system, in which road responsibilities are shared between the State and municipalities.[19]	9,460	20%
Priority 6	Local roads and streets – these roads are the year-round responsibility of municipalities.	28,811	61%

Source: MaineDOT

Exhibits 3.4 and 3.5 (following page) show freight flows along Maine's highways in terms of tonnage (from FAF5) and truck VMT (from NPMRDS).

[19] 23 MSRA §1803-B. Local Road Assistance Program. https://legislature.maine.gov/statutes/23/title23sec1803-B.html

Exhibit 3.3 **Highways by Classification in Maine**

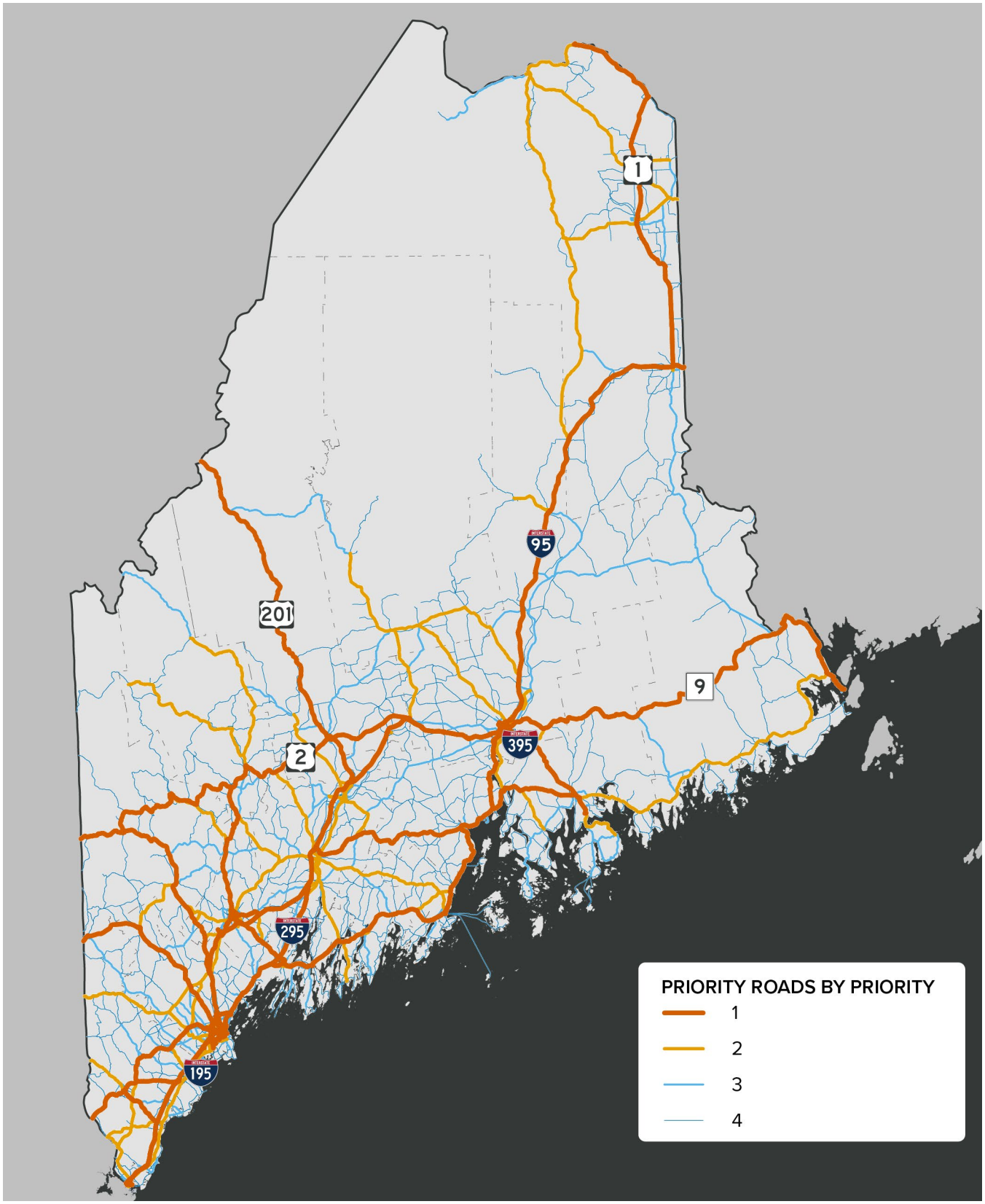
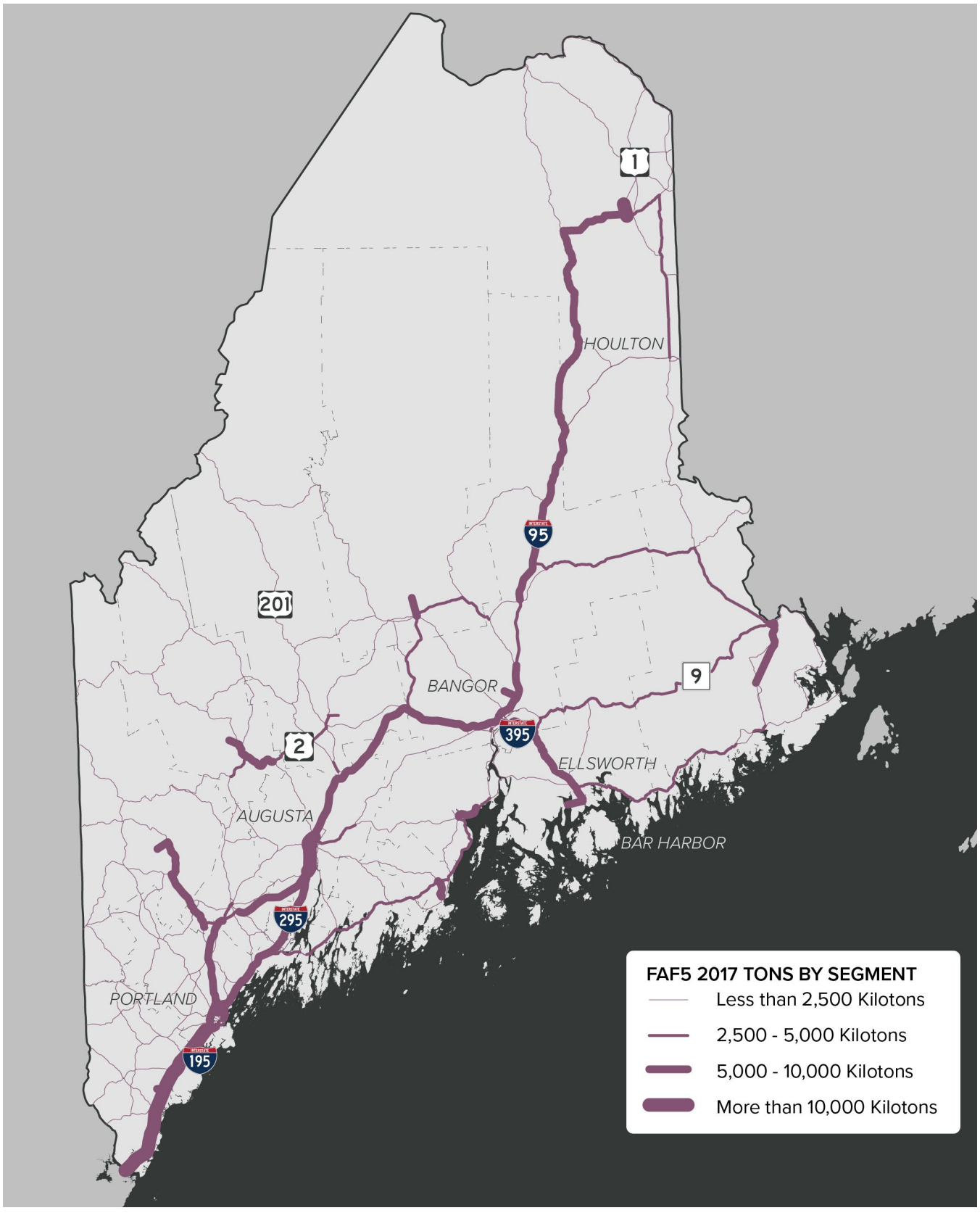


Exhibit 3.4 **Highways by Freight Tonnage in Maine**



3.1.1 KEY FREIGHT CORRIDORS

FHWA has identified a set of highways that are important for freight movement in a National Highway Freight Network (NHFN), which is one component of the National Multimodal Freight Network (NMFN). The NHFN was established as part of the Fixing America's Surface Transportation (FAST) Act of 2015 with the purpose of strategically directing Federal resources and policies toward improved performance of highway portions of the US freight transportation system. The NHFN consists of four subsystems of roadways:

- **Primary Highway Freight System |** A network of highways identified as the most critical highway portions of the US freight system according to national data. In Maine, I-95 and US-201 are on the PHFS.
- **Other Non-PHFS Interstate Highways |** These are the remainder of Interstate highways not included in the PHFS. In Maine, I-295 is an Interstate not on the PHFS.

  In 2012, the truck weight limit on Maine's Interstate highways (most notably I-95) was raised from the national standard of 80,000 pounds to 100,000 pounds to account for the unique challenges associated with Maine's forest industry, such as loading logging trucks in remote locations.

  While this change in weight limits permitted additional freight trucking use, it also created additional wear on Maine's most important roadway system. In response to this concern, MaineDOT developed an Interstate Operating Plan in 2016[20] to maintain and manage the State's Interstates and further study the effects of the increased weight limit.
- **Critical Rural Freight Corridors (CRFCs) |** MaineDOT has identified these roadways that are not in an urbanized area, which provide access to the PHFS and Interstate Highway System with other important freight or public transportation facilities. A provision of BIL calls for each state to establish CRFCs up to 300 miles or 20% of the PHFS mileage in the State[21,22] These are listed in Appendix A.2.
- **Critical Urban Freight Corridors (CUFCs) |** These roadways perform the same functions of the CRFCs in urbanized areas. BIL calls for each state to establish CUFCs up to 150 miles or 10% of the PHFS mileage in the State. These are listed in Appendix A.2.

Exhibit 3.6 illustrates all four categories of roads listed above. Many other highways play an important role in the State's freight network. Maine contains several Interstate spurs connected to I-95. The longest of these, I-295, provides an alternative, non-tolled route between Portland and Augusta. Maine also has a number of important US highway routes, including US-1, US-2, and US-201, as well as an extensive State Highway System, including key routes such as ME-4 and ME-9.

[20] https://www.maine.gov/mdot/publications/docs/plansreports/Interstate-RIO-10-5-18_web.pdf

[21] https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhfp.cfm

[22] This represents an increase from 150 miles under the FAST Act. CUFC mileage has increased from to 150 miles from 75.

Exhibit 3.5 **Critical Rural Freight Corridors in Maine**

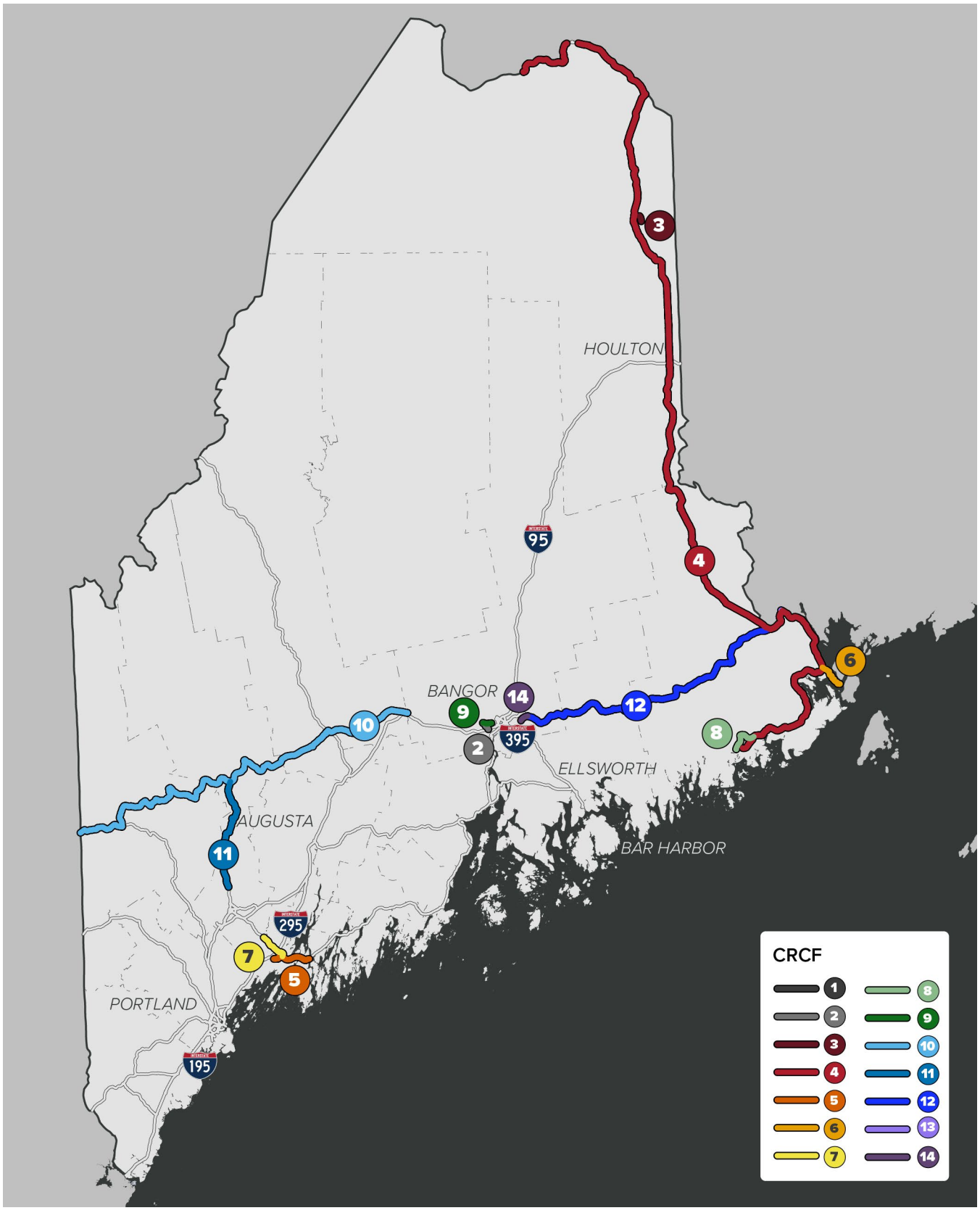
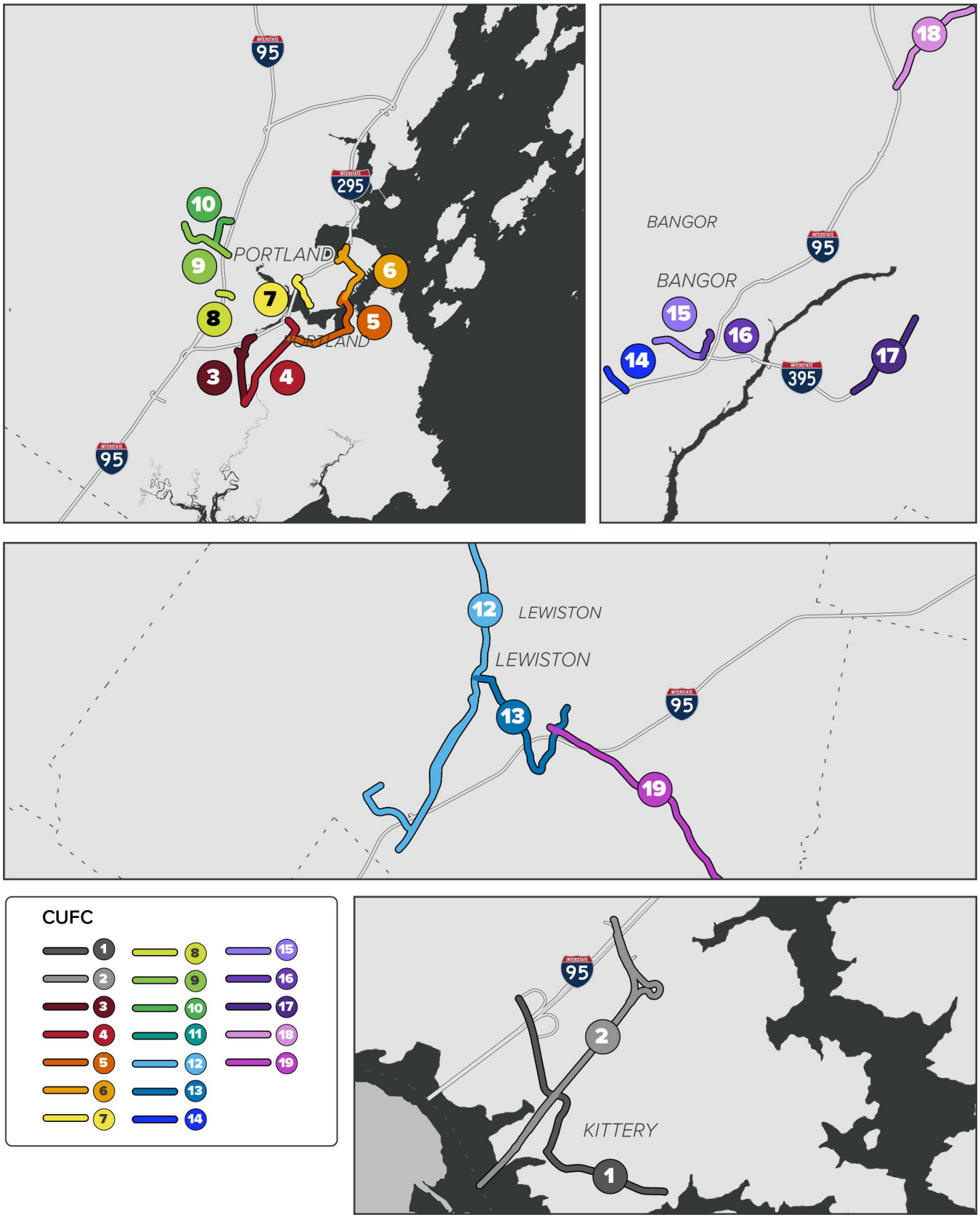


Exhibit 3.6 **Critical Urban Freight Corridors; Callout**



3.1.2 FREIGHT INTERMODAL CONNECTORS

Intermodal connectors are short roadway segments that connect different modes, typically the highway system to a terminal, port, airport, or other non-highway facility. These connectors help facilitate the transfer of goods by multiple modes and provide alternatives for shippers and receivers. Maine has a number of intermodal connectors serving airports, trick/rail transload terminals, truck/pipeline terminals, and ports.

All but two of the facilities are located in Portland, making it the most important intermodal hub in the State. As will be discussed in Section 3.4, Portland International Jetport is the largest freight airport in the State. In addition to facilities in Portland, the Auburn International Truck/Rail Transfer Facility provides rail-to-rail and rail-to-truck accessibility and is the only inland port-of-entry in Maine, offering on-site US Customs and Border Protection.

Some connectors are designated by the FHWA as NHS "Intermodal Connectors" based on freight volume thresholds. According to FHWA and MaineDOT, there are eight freight-related facilities[23] with intermodal connectors in Maine, four of which have connectors that also are included in the PFHS, NHFN and NMFN.[24] These facilities and connectors are summarized in Exhibit 3.7.

As with highways designated by FHWA, this is not an exhaustive list of important intermodal facilities and connectors. Movement of freight in Maine also depends on many other nodes with intermodal connectors such as Mack Point at the Port of Searsport, Estes Head at the Port of Eastport, the Loring Commerce Center, and the Auburn Walmart distribution center.

Exhibit 3.7 **Intermodal Connectors in Maine**

FACILITY	TYPE	NUMBER OF CONNECTORS	MILEAGE OF CONNECTORS
Acadia Gateway Center	Public Transit Station	1	6.2
Auburn Intermodal Truck/Rail Transfer Fac	Truck/Rail Facility	1	2.2
Bangor International Airport	Airport	2	4
Casco Bay Ferry (CBITD) and Ocean Gateway Terminals	Ferry Terminal	1	1.1
Merrill Marine Terminal (Port)	Port Terminal	2	2.4
Merrill Marine Terminal (Rail)	Truck/Rail Facility	2	0
Portland Bus Terminal	Intercity Bus Terminal	1	1
Portland Freight Terminal District	Truck/Rail Facility	1	2.1
Portland International Marine Terminal	Port Terminal	1	1
Portland Jetport	Airport	3	4.51
Portland Transportation Center	Public Transit Station	1	0

Sources: FHWA NHS Intermodal Connector Tables *https://www.fhwa.dot.gov/planning/national_highway_system/intermodal_connectors/maine.cfm*

3.1.3 CONSIDERATIONS OF MILITARY FREIGHT

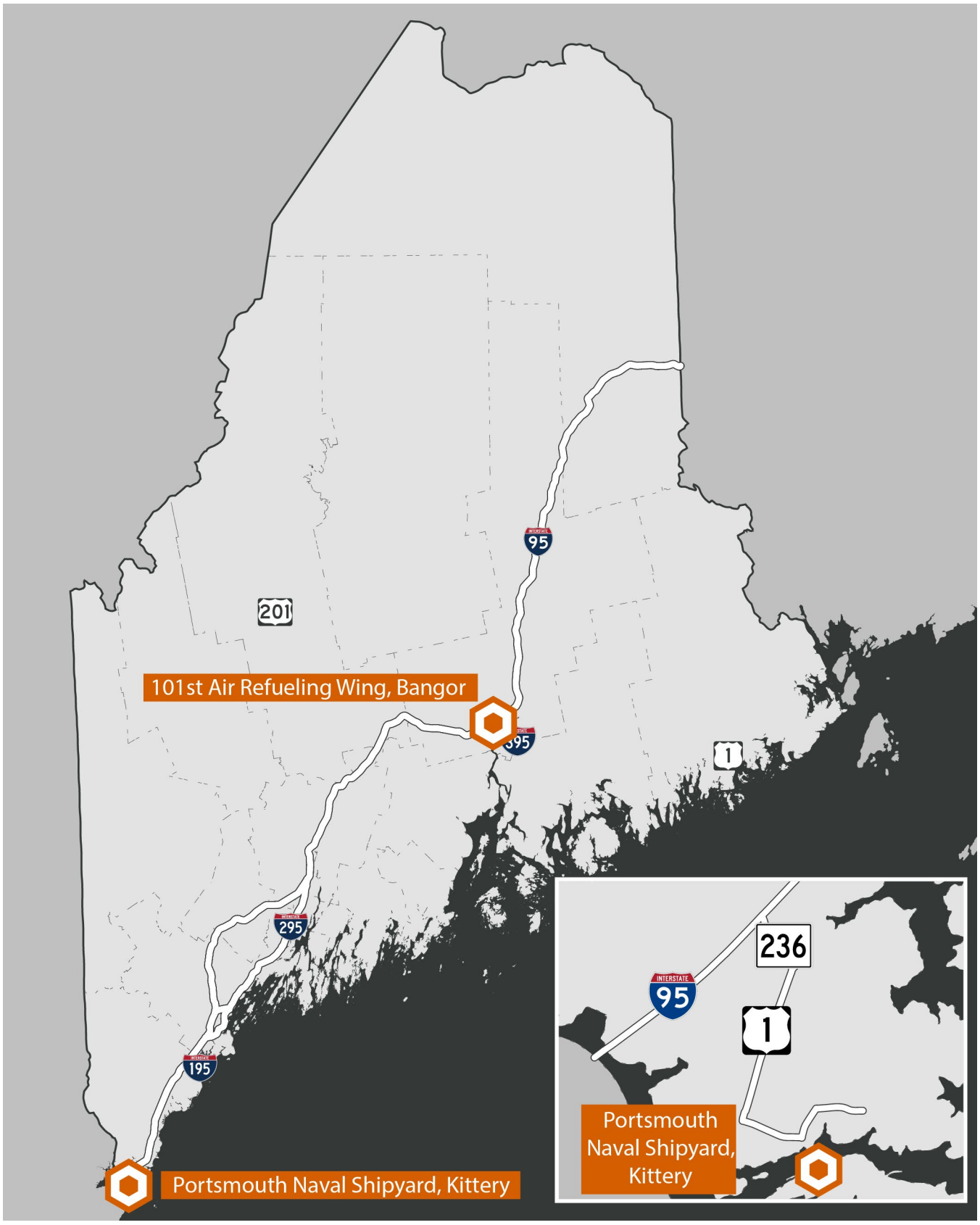
FHWA and the Department of Defense have identified 63,000 miles of highways that are important to military transportation on the Strategic Highway Network (STRAHNET) as primary links or connectors.[25] Exhibit 3.8 (next page) shows these highways, which are comprised of Maine's Interstates and a set of non-Interstate roads that connect I-95 to the Portsmouth Naval Shipyard in Kittery. That facility is also identified on the Military Strategic Rail Corridor Network (STRACNET) as a defense installation requiring rail service.

[23] FHWA designates four types of intermodal connectors: Airport; Ferry Terminal; Intercity Bus Terminal; Port Terminal; Public Transit Station; and Truck/Rail Facility. Exhibit 3.5 includes Airport; Port Terminal; and Truck/Rail Facility.

[24] This excludes transit stations, ferry terminals, and intercity bus terminals, which serve passengers rather than freight.

[25] https://www.fhwa.dot.gov/policy/2004cpr/chap18.cfm

Exhibit 3.8 **STRAHNET in Maine**



3.1.4 TRUCK PARKING

BIL requires that Maine include a commercial vehicle parking assessment in this MIFS. The prior assessment of truck parking performed by MaineDOT took place in 2010. Specifically, this assessment will discuss the capability of agencies of the State of Maine, together with Maine's private industry, to provide adequate parking and rest facilities for commercial motor vehicles engaged in interstate transportation; the volume of commercial motor vehicle traffic in the State; and whether gaps in truck parking capacity exist in Maine.[26]

Commercial motor vehicles in Maine can take advantage of five State-owned parking and rest facilities, all owned by the Maine Turnpike Authority and located alongside I-95. These include two pairs of matched facilities – in Kennebunk both northbound and southbound – and in Cumberland and Gray where the town border runs through the highway. In addition to these facilities, MaineDOT and the Maine Turnpike Authority collaborated to build a parking facility in West Gardiner accessible from both directions of I-95 and I-295 near the intersection of those highways.

A large number of private truck stops in Maine provide at least some informal truck parking. **In particular, 14 facilities provide at least 10 truck parking spaces, several provide over 50 parking spaces:** Dysart's outside of Bangor (the largest truck parking facility in Maine), and Irving locations in Houlton, Kittery, Auburn, and Fairfield. All of these locations are also adjacent to I-95. A full list of truck parking facilities in Maine is provided in Exhibit 3.9.

Exhibit 3.9 **Truck Parking Facilities in Maine**

NAME	MUNICIPALITY	OWNER	SPACES
Dysart's	Hermon	Private	80
Irving	Houlton	Private	75
Maine Turnpike Authority – Kennebunk SB	Kennebunk	Public	75
Irving	Kittery	Private	75
Maine Turnpike Authority – Kennebunk NB	Kennebunk	Public	72
Irving	Auburn	Private	60
Irving	Fairfield	Private	60
Irving	Newport	Private	45
Murray's Truck Stop	Turner	Private	40
Maine Turnpike Authority – West Gardiner	West Gardiner	Public	35
Circle K	Sherman	Private	25
Citgo	Turner	Private	20
Irving	Baileyville	Private	15
Maine Turnpike Authority – Cumberland SB	Cumberland	Private	15
Irving	Farmington	Private	15
Maine Turnpike Authority – Gray NB	Gray	Public	15
Doc's Place	Houlton	Private	15
Quik Stop	Richmond	Private	15
Sunoco	Lincoln	Private	10

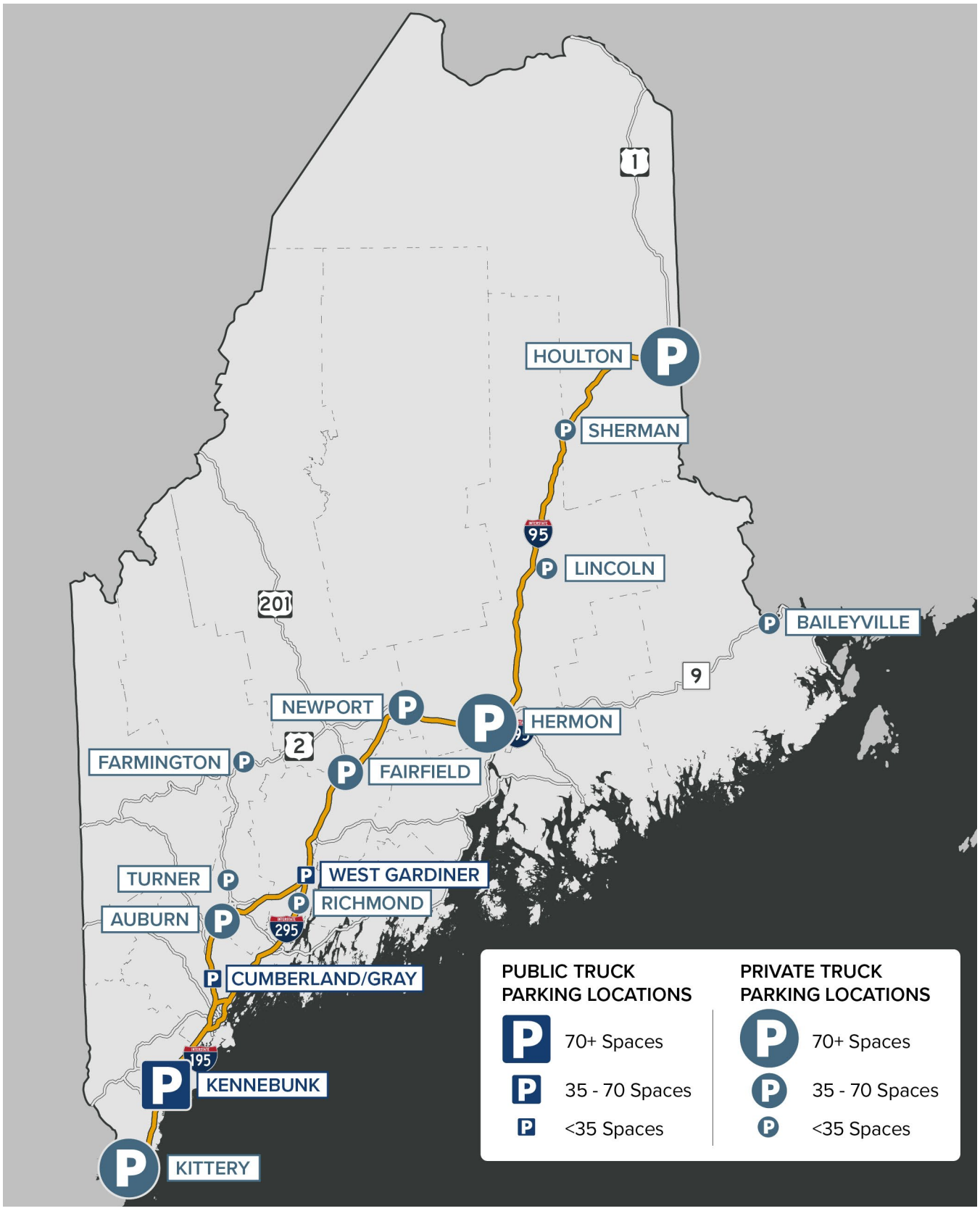
[26] https://highways.dot.gov/public-roads/winter-2023/05

MaineDOT and the Maine Turnpike Authority report that the gap in truck parking in Maine exists on I-95 south of Portland to the New Hampshire border. Though served by three large truck parking facilities (two in each direction), this is also where truck traffic is most dense in the State, and the area does not have the density of private facilities found north of Portland. Truck parking is a critical asset because truck drivers who cannot find parking before their mandated rest may choose to park unsafely on the side of roads or ramps, creating hazards both for themselves and for other motorists. While neither MaineDOT nor the Maine Turnpike Authority have undertaken regular usage and capacity surveys, anecdotal evidence has shown that the Kennebunk facilities that serve the southernmost stretch of I-95 are more likely to be overfilled than other facilities.

The Maine Turnpike Authority's current 30-year plan identifies investments to be made at the Kennebunk lots, which are constrained by freeway and ramps on all sides, in the 2034 timeframe. In addition, the West Gardiner lot was designed with a "Phase II" to double its size to 70 spaces – this investment has not been formally programmed.

A map of truck parking locations in Maine is provided in Exhibit 3.10 (next page).

Exhibit 3.10 **Truck Parking Facilities in Maine**



3.2 Rail

Maine's freight rail network includes 1,072 miles operated by eight carriers. These rail carriers range from large Class I railroads, which operate extensive national and international rail systems, to small switching and terminal railroads, which provide vital rail support functions. As of 2023, two of the six North American Class I railroads operate in Maine. Exhibit 3.11 summarizes the extent of Maine's freight rail network. Exhibit 3.12 (next page) provides a map of the network.

Exhibit 3.11 **Summary of the Rail Network in Maine**

2 CLASS I (MAJOR) RAILROADS
DEFINED AS HAVING MINIMUM OPERATING REVENUES OF $489.9 MILLION OR MORE IN 2018

5 CLASS III (LOCAL) RAILROADS
DEFINED AS HAVING OPERATING REVENUES OF $39.2 MILLION OR LESS

1 TERMINAL RAILROAD
CATEGORIZED AS A CLASS III (LOCAL) CARRIER REGARDLESS OF OPERATING INCOME

RAILROAD	REPORTING MARK	PARENT COMPANY/ OWNERSHIP	OPERATED MILES	OWNED MILES
Class I Railroads			762	732
Canadian Pacific	CP		205	201
CSX	CSX		557	531
Class III (Local) Railroads			556	231
Maine Northern Railway	MNR	Irving/NBM Railways	223	0
Eastern Maine Railway	EMRY	Irving/NBM Railways	176	173
St. Lawrence and Atlantic Railroad	SLR	Genesee & Wyoming	93	63
Midcoast Railservice, Inc	Midcoast	Finger Lakes Railway	59	0
New Hampshire North Coast Railroad	NHN	Boston Sand and Gravel	0.3	0.3
Terminal & Switching			1.57	1.57
Turner's Island LLC	TI	Turner's Island, LLC	1.57	1.57

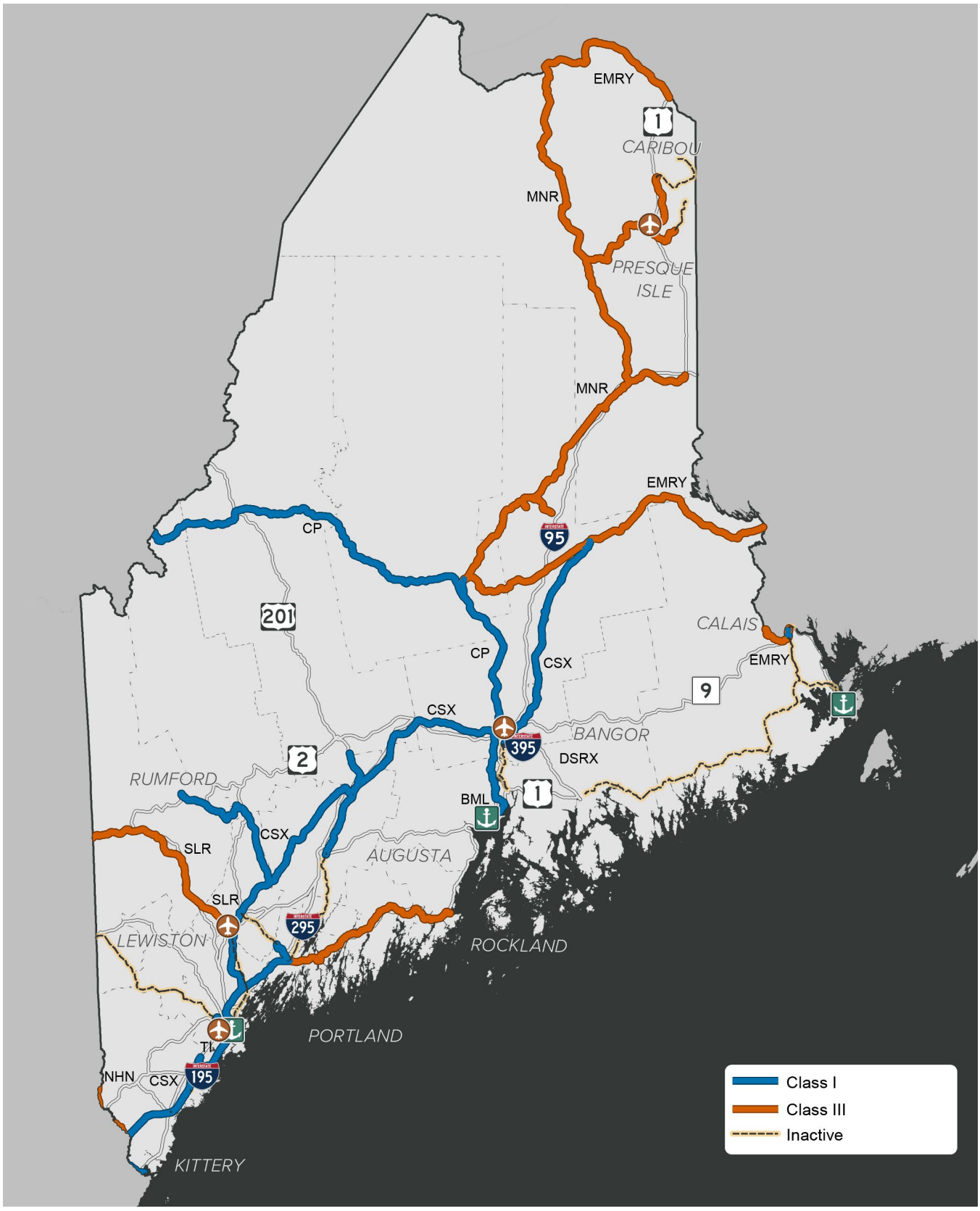
A substantial change in Maine's freight rail operations was finalized in 2022, when Pan Am Railways was purchased by CSX. Since the acquisition, CSX has improved infrastructure throughout the former Pan Am network. In Maine, CSX rebuilt tracks in the Rigby Yard in South Portland, and is currently in the midst of improvements that include new ties, rail, and trackside detectors on its mainline from Portland to Mattawamkeag.[27]

This merger has already borne fruit for Maine's freight rail network. In December 2023, CSX ran a train between Old Town and Mattawamkeag along the former Maine Central Railroad corridor for the first time in five years. CSX improved the line from out-of-service to FRA Class II and Class III track standards (permitting speeds up to 25 and 40 miles-per-hour, respectively). CSX has also upgraded trackage between Waterville and Old Town.[28]

[27] https://www.trains.com/trn/news-reviews/news-wire/a-year-after-acquisition-csx-continues-making-improvements-to-former-pan-am-railways-trackage/

[28] https://www.trains.com/trn/news-reviews/news-wire/csx-track-improvements-allow-restoration-of-direct-pan-am-new-brunswick-southern-interchange-in-maine/

Exhibit 3.12 **Freight Rail Network in Maine**

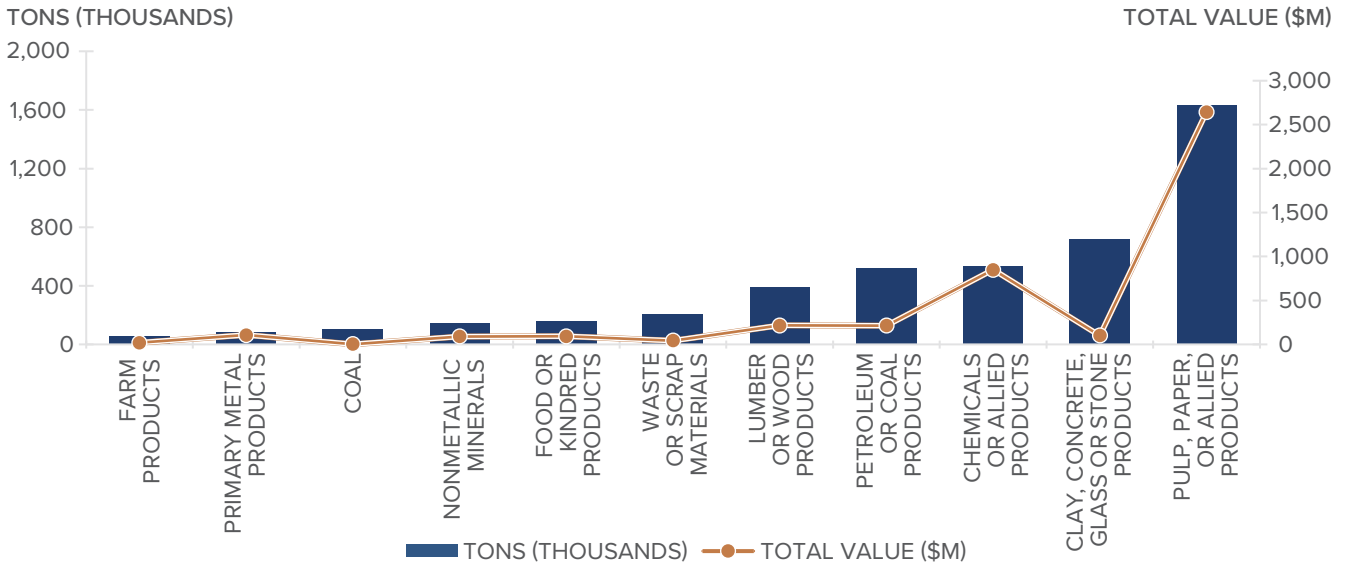


As discussed in Section 2.2.1, in 2017 rail moved 4.4% of freight tonnage (compared to 10% nationwide) and 1.6% of freight value. Nonetheless, freight rail service is a central element of logistics for key freight-intensive industries. In 2019, total freight rail volumes in Maine reached approximately 4.5 million tons of goods, valued at $4.4 billion. Freight rail supports key industries throughout Maine including forestry, agriculture, manufacturing, aggregates, and energy; it also provides Maine businesses with access to domestic and global markets.

Approximately 74% of rail freight tonnage is associated with shipments either originating or terminating in Maine, with through traffic accounting for 17%. Through movements by rail in Maine include a substantial volume originating or terminating in Canada, and some that pass through Maine between locations in Canada. When measured by value, outbound traffic accounted for more than half of the rail shipments moving in Maine, a reflection of the relatively higher value of goods—such as pulp and paper products—moving out of the State versus into the State.

The top commodities by both tonnage and value transported by rail in Maine are shown in Exhibit 3.13. Together, these commodities comprise 99% of all rail tonnage and value across the State. More than a third of rail tonnage and 60% of the rail freight value is comprised of pulp, paper, and allied products.

Exhibit 3.13 **Top Commodities Moved in Maine by Rail, Tonnage and Value, 2019**



Source: US Surface Transportation Board (STB) Confidential Waybill Sample

3.3 Maritime

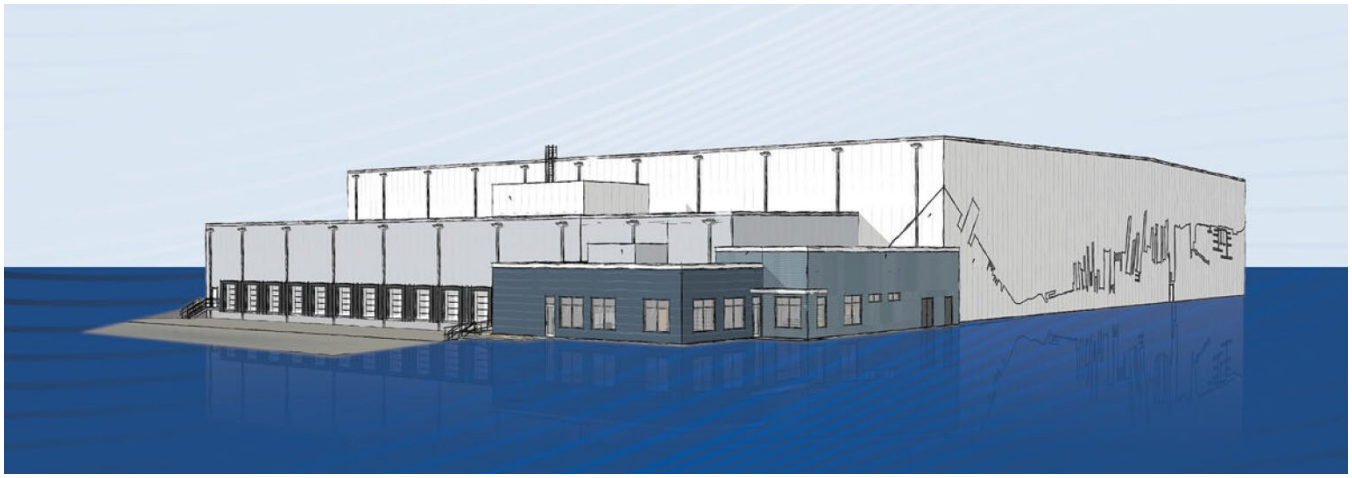
Maine's maritime freight network comprises more than its marine terminals and includes waterways; links to highways and to the rail network; and inland production logistics, and distribution centers that support the maritime trade. **There are currently three major seaports in Maine: Portland, Searsport, and Eastport, as shown in Exhibit 3.14**.

» **The Portland International Marine Terminal (IMT)** is operated and owned by the Maine Port Authority (MPA), which is governed by a seven member Board of Directors led by a full-time Executive Director.

Portland is Maine's largest cargo port and supports nine marine terminals, seven of which include refined petroleum products. The IMT specializes in containerized freight and project cargo and offers nearby intermodal connections to the highway system, CSX-owned rail lines, and the Portland International Jetport. Since 2013, the Icelandic shipping company Eimskip has used the IMT as its North American logistics hub, and container service from Portland to Europe via Eimskip has dramatically increased containerized shipping at the port, provided an anchor to port operations, and stimulated additional investment at the IMT.

MPA is currently partnering with private investors to construct the Maine International Cold Storage Facility (MICSF) on land assembled by MaineDOT and MPA to expand the IMT. The MICSF, rendered in Figure 3.12, will support growth in throughput of refrigerated commodities to support Maine's food industry.

Exhibit 3.14 **Illustration of the Maine International Cold Storage Facility (MICSF)**



Source: https://tficapital.com/project/maine-international-cold-storage-facility-micsf/

A rail spur from the Port of Portland to the CSX mainline has been used by Poland Spring for truck to rail transloading and supports maritime rail shipping and additional industries. Exhibit 3.15 lists Portland's nine operating marine terminals.

Exhibit 3.15 **Operating Freight Terminals at the Port of Portland**

TERMINAL NAME	PRIMARY CARGO SERVICES
Citgo/Turner's Island	Petroleum, bulk, break bulk
Global	Petroleum
Gulf Oil	Petroleum
International Marine Terminal (IMT)	Containerized, project
Merrill	Petroleum, bulk, break bulk
Mobil	Petroleum
Portland Pipeline Pier #1	Petroleum
Portland Pipeline Pier #2	Petroleum
Sprague Energy	Petroleum

» **The Port of Searsport, Mack Point Terminal** is operated by Sprague Energy. It handles several categories of materials: bulk materials such as scrap metal and components used in cement manufacturing; break-bulk such as seaweed, wood pulp, and project cargoes (such as wind turbine components); and liquids, primarily heating oil, diesel, kerosene, gasoline, and clay slurry. Interest exists in an expanding market for the export (potentially to Europe) of wood biomass and other renewable fuels. MPA and MaineDOT are partnering to review two locations within the Port of Searsport to construct a dedicated offshore wind port. Searsport is linked to the NHS highway system, though it is not served by an Interstate. It also has direct rail access.

» **The Port of Eastport** operations are coordinated by a Port Director who reports to the Eastport Port Authority, like the MPA, the Eastport Port Authority is governed by a seven-member Board of Directors with representation from the City of Eastport and elected members, led by a Executive Director. Eastport features two terminals with three berths accommodating large ships, open storage, and warehousing. At present Eastport does not have rail access.

Maine has other smaller ports that support the fishing industry; fuel distribution; state-operated ferry service to coastal island communities; and tourism, including cruises.[29] There are two ports on the Penobscot River: Bucksport and Bangor; and a number of the private terminals and ports (such as Bucksport) that could play a larger role in maritime freight in the future.

All of Maine's ports work closely with the MPA in regard to infrastructure improvements. The MPA has bonding authority and collaborates with MaineDOT to help finance large infrastructure projects for Maine ports. The MPA has offices in Augusta and Portland and maintains a close working relationship with MaineDOT, including sharing staffing responsibilities in planning and finance.

3.4 Air Cargo

Air has the least physical capacity of any freight mode in Maine, but plays a vital role in the State's freight network. Air cargo is particularly competitive for shipping low-volume, low-weight, high-value goods over long distances.

There are three airports in Maine with freight activity recorded by the Bureau of Transportation Statistics (BTS), mapped in Exhibit 3.1.[30] The primary companies dedicated to moving air cargo to and from Maine are Federal Express (FedEx), Wiggins Air, and Portland Air Freight. FedEx is the only shipper currently operating large jet aircraft to Portland International Jetport (PWM), the only such service to a Maine airport. FedEx transfers shipments to Wiggins Air for shipment to other airports in the State. In addition to FedEx and Wiggins Air, passenger airlines also carry cargo in the compartment with baggage, referred to as "belly freight". The capacity of belly freight to airports is tied to the size and frequency of passenger aircraft dispatched – PWM management report in 2023 that capacity for belly freight at the airport is currently growing.

In 2022, PWM handled 71% of the inbound and outbound air cargo tonnage (excluding mail) in Maine, shown in Exhibit 3.16. PWM's facilities include an apron currently shared with other non-passenger functions but planned for expansion and dedication to cargo in the PWM Sustainable Airport Master Plan.[31] Bangor International Airport (BGR), which also sees cargo traffic, maintains cargo facilities including on-airport warehousing and apron space.[32] It is notable that BGR grew substantially in freight tonnage from 2016 (618 tons) to 2022 (3,324 tons).

[29] https://www.cruisemaine.org/our-ports-1

[30] Bureau of Transportation Statistics, 2022 T-100 Air Cargo Market Data.

[31] https://portlandjetport.org/sustainable-airport-master-plan, see in particular Exhibit B (p.13) for a map.

[32] https://flybangor.com/cargo-services/cargo-information/

Exhibit 3.16 **Tonnage of Air Cargo in Maine, 2022**

AIRPORT	2022 TONS ORIGINATING	2022 TONS TERMINATING	2022 TONS TOTAL	PERCENTAGE OF MAINE TOTAL
Total	**5,376**	**7,418**	**12,794**	**100%**
Portland International Jetport (PWM)	3,941	5,099	9,040	71%
Bangor International Airport (BGR)	1,376	1,948	3,324	26%
Presque Isle International Airport* (PQI)	59	371	430	3%

**Note: The 2017 MIFS used the then-current name "Northern Maine Regional Airport" for this facility.*

**Source: Bureau of Transportation Statistics, 2022 T-100 Air Cargo Market Data.*

3.5 Pipeline and Hazardous Material

3.5.1 PIPELINES

Pipelines are used to transport petroleum products, natural gas, and other hazardous materials (HazMat) in Maine. Five companies maintain three types of pipelines used to transport refined petroleum products, crude oil, and natural gas in Maine: Buckeye Partners (BPL); the Portland Pipeline Company; Portland Natural Gas Transmission System, the Maritime and Northeast Pipeline System, and Unitil. The Maine Pipeline System is shown in Exhibit 3.17 (next page).

- **The Portland-Bangor Pipeline owned by BPL** is used to transport refined petroleum products. BPL has 115 active terminals in the United States that provide bulk storage and throughput services with respect to liquid petroleum products and renewable fuels, including ethanol and have an aggregate storage capacity of over 55 million barrels. In Maine, BPL maintains a 124-mile pipeline that runs from Portland to Bangor. The Bangor terminal has approximately 140,000 barrels of storage capacity. In 2014, Irving entered a joint venture with BPL to buy the South Portland terminal from ExxonMobil. The jointly-owned Portland marine terminal has approximately 725,000 barrels of storage capacity.

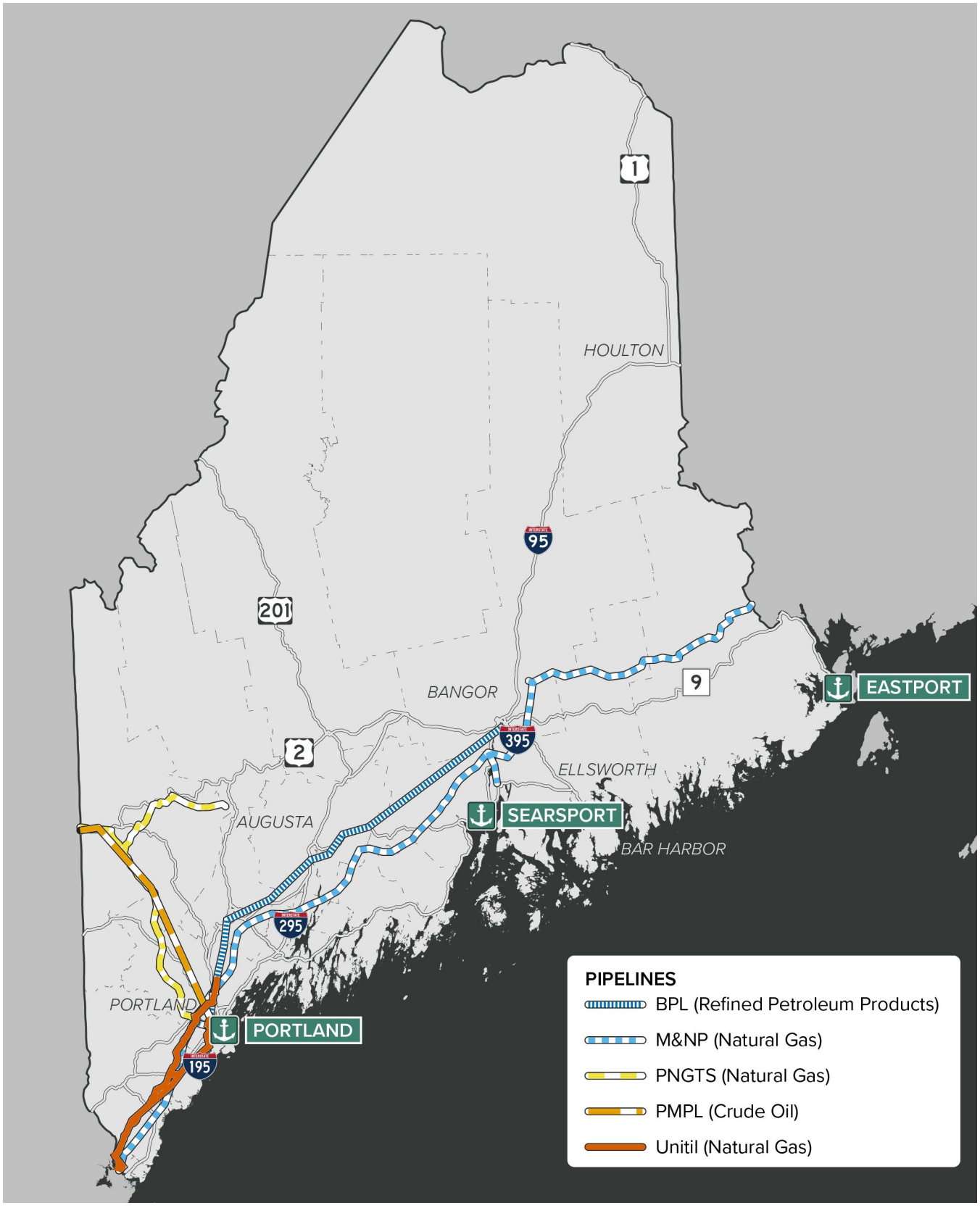
- **The Portland-Montreal Pipeline Company (PMPL)** operates two crude oil pipelines – 18 inches and 24 inches in diameter, respectively – that move oil 236 miles from Portland to Montreal, Canada. PMPL also owns and operates a tanker unloading facility; two tank farms – South Portland (23 tanks with 3.5 million barrels of storage capacity) and Montreal; and eight pump stations in South Portland to push oil toward Canada.

- **The Maritimes and Northeast Pipeline System (M&NP)** is a 685-mile mainline transmission pipeline for natural gas that connects Nova Scotia through Maine to Massachusetts. Its infrastructure consists of an underground mainline measuring between 24 and 30 inches in diameter from Goldsboro, Canada, across the border in Baileyville, Maine, through Maine and New Hampshire to Dracut, Massachusetts.

- **The Portland Natural Gas Transmission System (PNGTS)** primarily provides natural gas to utilities, paper mills, and power plants in Maine, New Hampshire, and Massachusetts. Its infrastructure begins in northern New Hampshire and proceed to Wells, Maine, where it merges with M&NP.

- **Unitil** provides natural gas to customers in Maine. Having purchased the Granite State Gas Transmission Company and Northern Utilities, Unitil has infrastructure that enters southern Maine from New Hampshire and extends to Augusta. In 2022, Unitil began replacing over 100 miles of its pipeline in Portland and Westbrook in its "System Upgrade for Reliable Energy (SURE)" project.

Exhibit 3.17 **Pipeline Facilities in Maine**



3.5.2 PETROLEUM TERMINALS

Marine petroleum terminals in the Port of Portland and Port of Searsport receive ships and barges and provide storage areas for gasoline, motor fuels, ethanol, kerosene, jet fuel, and other refined products. Smaller terminals exist to receive petroleum products by barge at other locations such as Bangor and Bucksport.

- **In the Port of Portland,** eight of nine operating marine terminals receive petroleum products, as shown in Exhibit 3.15. Inland motor fuel terminals are located primarily in Portland, Auburn, Waterville, and Searsport. Some of these are supported by pipeline and rail, while all are supported by truck.
- **The Port of Searsport** has a 1.6-million gallon active tank farm for storing liquid cargo and two liquid cargo piers with a multipurpose hose platform shared between them. The piers are served by multiple truck and rail loading racks, a 90,000 square foot warehouse, and 70 acres nearby for development.
- **Major propane terminals** that serve Maine are located in Biddeford, Auburn, and Portland, as well as in Portsmouth, New Hampshire, Smaller propane facilities throughout the State maintain year-round fuel supply and storage. Propane is moved to and within Maine both by truck and by rail.

3.5.3 HAZARDOUS MATERIALS

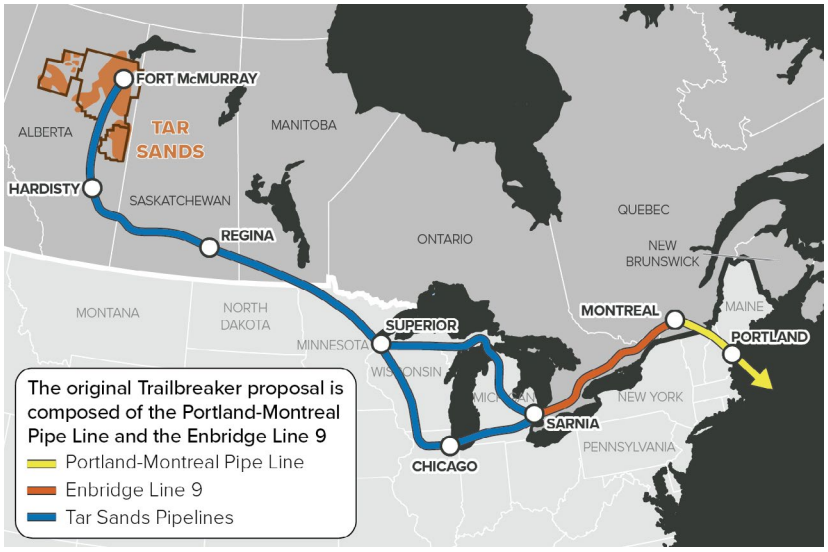
In addition to pipelines, HazMat are also transported by ship or barge, by rail, and by truck. Air transport occurs routinely but only in limited quantities with strict packaging requirements (shipping of many specific chemicals by air is forbidden for safety). HazMat are defined in two categories: petroleum products and extremely hazardous substances (EHS). A large number of chemicals and compounds are listed as EHS – the full list is provided in 40 CFR §355.[33] They include chlorine gas (for water treatment) and anhydrous ammonia (for refrigeration) among others.

[33] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-J/part-355

HIGHLIGHT: SOUTH PORTLAND CLEAN SKIES ORDINANCE

The Town of South Portland is home to a tank farm, pumping stations, and petroleum port facilities associated with the Portland-Montreal Pipeline Company (PMPL), as well as similar facilities operated by others. Residents of South Portland have reported adverse impacts to air quality, and the Maine Department of Environmental Protection has tested levels of some volatile organic compounds (VOCs) in the community.

As discussed in Section 3.5, PMPL operates a crude oil pipeline connecting South Portland to Quebec. In 2013, the company and its partners proposed to expand the South Portland terminal and reverse the flow of the pipeline. Where before oil had been landed in South Portland and pumped to Canada, oil extracted in Western Canada would now flow to Maine. The project required construction of two vapor combustion towers.



After a grass-roots effort by residents to oppose the project on the grounds that it would worsen emissions, the Town of South Portland in 2014 passed the Clean Skies Ordinance, which banned the loading of crude oil within the town limits.

Demand for PMPL's facilities flowing toward Canada had already begun to fall, as Canada's oil supply was increasingly sourced domestically – the same Canadian crude oil PMPL had sought to ship from Maine. By 2016, changes in infrastructure on the Canadian side of the border had already formalized the effective retirement of the pipeline by PMPL.

After eight years in Federal Court, PMPL withdrew its last legal challenge to the Clean Skies Ordinance in 2022, and the pipeline sees minimal use today.

MaineDOT has established a goal to Invest in practical transportation solutions that mitigate impacts on the natural world and prepare for the realities of climate change, with an objective of mitigating environmental impacts. South Portland's past decade of effort and continuing pursuit of cleaner air are a reminder of the adverse impacts that the freight transportation system can have on Maine's communities, and of the importance of mitigating those impacts.

Sources:
https://www.bostonglobe.com/2021/06/16/magazine/is-there-something-wrong-with-air-south-portland-maine/
https://www.pressherald.com/2018/08/24/federal-court-rules-south-portland-ordinance-does-not-violate-u-s-constitution/
https://www.pressherald.com/2016/03/08/portland-to-montreal-crude-oil-pipeline-shut-down/

4 FUTURES

In recent years, the Maine freight transportation system has been challenged by extreme changes. The COVID-19 Pandemic, climate change, and shifts in workforce availability and global trade have had rippling effects across the supply chain and within industries. This chapter identifies trends and vulnerabilities that affect the Maine freight system and discusses their recent history and potential future.

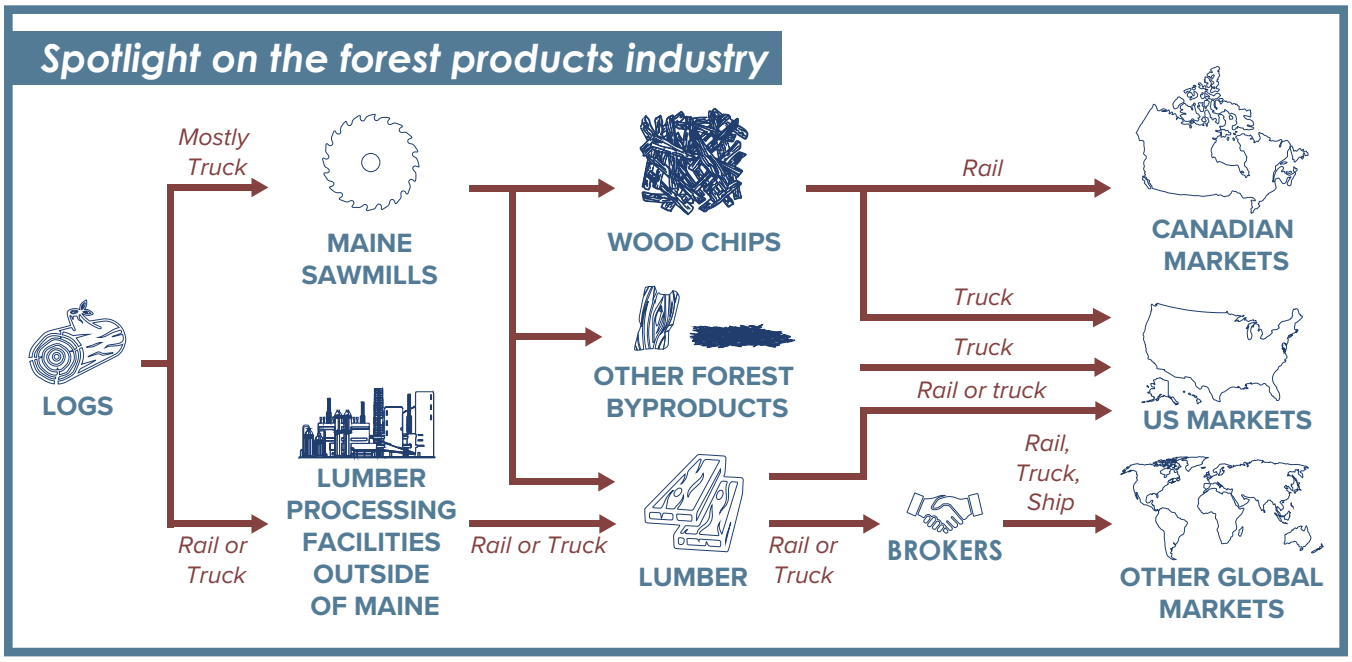
4.1 Freight System Trends

4.1.1 INDUSTRY TRENDS AND IMPLICATIONS OF GROWTH

WOOD PRODUCTS

Maine has abundant forest resources. Nearly 90% of the State, or 17 million acres, is forested, and these forests include a diverse mix of 56% hardwood (e.g., aspen, oak, and maple) and 44% softwood (e.g., pine, spruce and fir). Particularly in Maine's more rural counties, forest products comprise the backbone of the economy. In 2016, the economic impact of the forest products industry was estimated at $8.5 billion, one out of every 20 dollars of the State's GDP. The industry sustains more than 33,500 jobs which amounts to one out every 24 jobs in Maine. Exhibit 4.1[34] spotlights the forest products supply chain.

Exhibit 4.1 **Spotlight on the Forest Products Industry**



[34] Forest Opportunities Roadmap/Maine (FOR/Maine), 2018. https://formaine.org/wp-content/uploads/2020/09/FORMaine_Report_DL_041119.pdf.

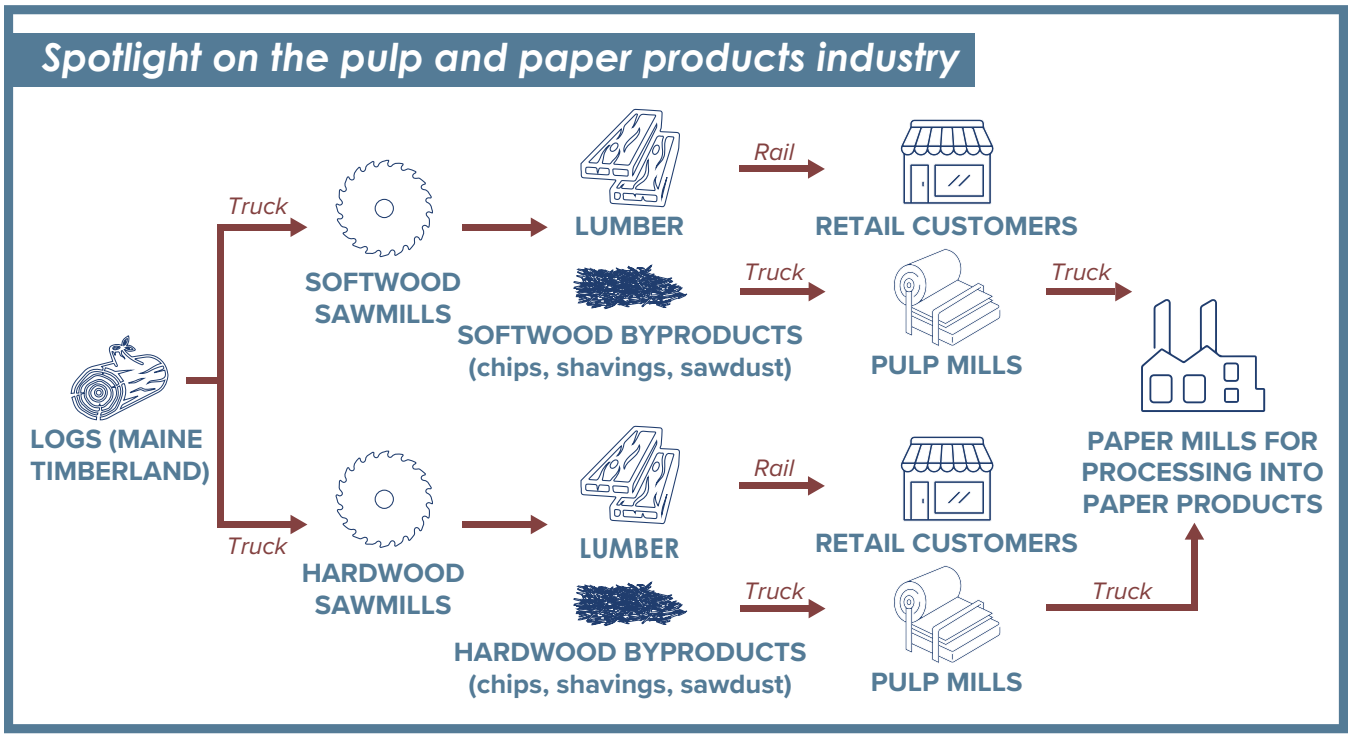
Wood-related products, which include logs, pulp, newsprint, paper, account for about one third of total tonnage transported in Maine and provide between $8 to $10B in direct economic impact.[35] In 2019, 28 million tons of wood products were transported in Maine, projected to increase to over 44 million tons in 2050.

Pulp and paper manufacturing continue to dominate Maine's forest economy. Maine's paper mills are shifting production from print media into tissue, labeling, and packaging grades of paper. Sawn timber continues to be the highest value to landowners of industry, while pulp and paper provide the greatest return to Maine's economy.

Worldwide, demand for newsprint, printing, and writing papers has declined during the 21st Century. These rapid marketplace changes led to the closure of six Maine pulp and paper mills and substantial job losses during the 2010s, which have begun to be recovered in the current decade.

Even as some markets shrink, other paper products have begun to fill market gaps. Global demand for packaging, labeling, and tissue paper is growing (partly due to the growth of e-commerce), providing new opportunities for Maine's paper industry.[36] Use of cross-laminated timber (CLT) is growing in the construction industry both internationally and domestically.[37,38,39] Exhibit 4.2[40] spotlights the forest products supply chain.

Exhibit 4.2 **Spotlight on the Pulp and Paper Products Industry**



35 https://www.maine.gov/climateplan/climate-impacts/central-zone

36 https://formaine.org/wp-content/uploads/2020/09/FORMaine_Report_DL_041119.pdf

37 https://www.costar.com/article/592439438/mass-timbers-growing-popularity-reflected-in-record-breaking-us-building

38 https://www.maine.gov/decd/sites/maine.gov.decd/files/inline-files/Market%20Profile%20%20-%20Cross%20Laminated%20Timber.pdf

39 https://www.portlandmuseum.org/magazine/2023/6/16/commentary-mass-timber-makes-sense-for-new-building-in-maine

40 Pulp and Paper Market Profile, 2022: https://www.maine.gov/decd/sites/maine.gov.decd/files/inline-files/Market%20Profile%20%20-%20Pulp%20and%20Paper%20Products%20-%20State%20of%20Maine%20DECD.pdf

In the post-Pandemic environment, Maine's forest products industries report that labor has been harder to acquire and manufacturing costs have increased significantly, which has led to fluctuations in production and transportation capacity of wood products. The industry has identified key haul roads that it believes MaineDOT must particularly maintain to ensure the health of their industry. These are mapped in Exhibit 4.3 (next page). MaineDOT continues to take input from the forest and wood products industry groups on condition of their priority roads and use this input as part of programming proper treatments and treatment cycles on these key arteries.

The industry has also been impacted by the trade policies of the United States and other countries, as new tariffs on exports of lumber were introduced by the US and European regulations opened new opportunities for Maine's wood products to be used as fuel there.[41]

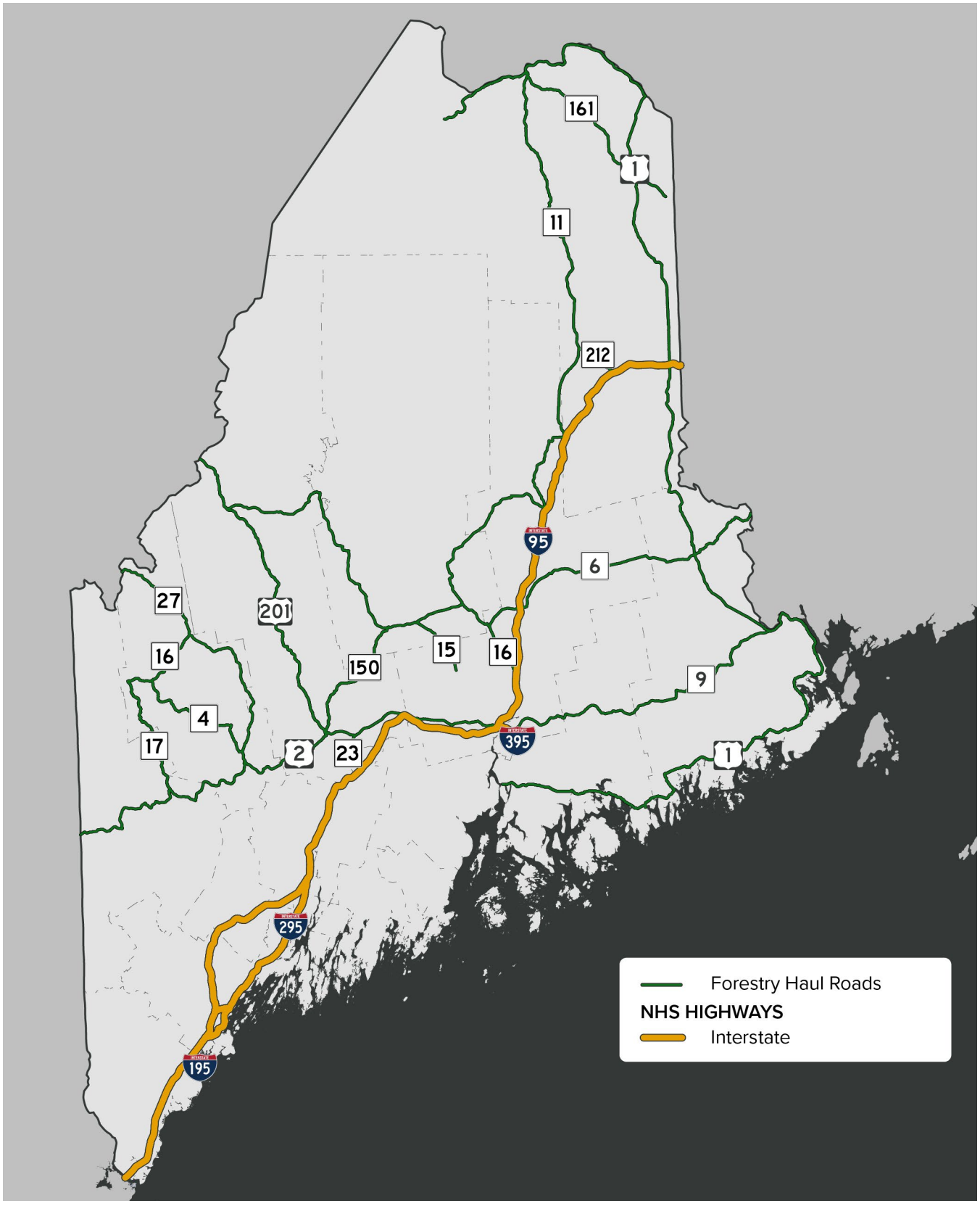
As part of a study on forest products completed in 2018,[42] Maine developed 5 goals and 17 strategies that outline the future of the forest industry in Maine and identify opportunities to keep that industry thriving. Specific strategies that particularly relate to freight transportation include:

- **Strengthen and optimize existing wood products manufacturing in Maine.** Attract investments in existing technologies that are at commercial scale but aren't yet in Maine. Additionally, there is a need for policies that encourage new facility construction and co-location of new product manufacturing at existing facilities (such as CLT).
- **Improve transportation and logistics infrastructure for moving Maine wood and value-added wood products to markets.** MaineDOT is working with partners to identify priorities for capital investments as well as securing long-term funding to fund these investments that allow businesses to cost-effectively move wood of the forest and wood products from manufacturing facilities to market.
- **Encourage community efforts to create conditions that attract diverse investment, including efforts to redevelop mill sites, and improving broadband and other infrastructure.** Support the Rural Manufacturing and Industrial Site Redevelopment Program at the Maine Rural Development Authority and support community efforts to improve quality of place and make Maine communities places where people want to live and work.

[41] https://www.dw.com/en/eu-weighs-up-future-of-wood-burning-as-renewable-energy-source/a-64985113

[42] https://formaine.org/wp-content/uploads/2020/09/FORMaine_Report_DL_041119.pdf

Exhibit 4.3 **Rural Haul Routes from the Forest Products Industry in Maine**



PHARMACEUTICAL PRODUCTS

Pharmaceutical products – comprising vaccines, drugs, medical devices, and related products – are high value, low volume commodities that typically require fast and reliable transportation. In 2019, pharmaceutical products contributed $8.6 billion to Maine's economy, ranking as the second highest freight commodity moved in Maine in terms of value. Future projections suggest a more than two-fold increase, reaching $23.4 billion by 2050, positioning pharma products as the top-most freight commodity in terms of value that year. This anticipated surge align well with broader shifts in healthcare logistics and national economies in the post-Pandemic era.

In order to meet the future needs of the rapidly growing pharmaceutical industry, Maine's freight transportation network could pursue the following supportive approaches:

- **Ensure a robust freight transportation network** to accommodate the increased volume of pharmaceutical goods and ensure temperature-controlled timely deliveries to the State's urban and rural communities alike. Maine's rapidly growing elderly population further necessitates focused investments in fast and safe movement of pharmaceutical products. In addition, the pharmaceutical industry requires the reliable transportation of office supplies and other office-based products to urban and suburban areas, where their offices (or the home-offices of their employees) are located.
- **Augment infrastructure and handling capacities keeping in mind the regulatory requirements for pharmaceutical transportation**[43]**:** Compliance with stringent regulations, maintaining temperature-controlled environments, and upholding uninterrupted cold chain logistics are paramount and require freight partners to continuously evolve and adapt to the needs of the industry.
- **Ensure resilient and efficient supply chains:** Given the critical nature of pharmaceuticals, establishing resilient supply chains and robust contingency plans to address unforeseen disruptions, such as natural disasters or pandemics, is imperative. Ensuring continuity in the transportation of essential pharmaceutical goods is crucial for public health.[44]

Addressing the above concerns would require a collaborative effort among stakeholders, including government entities, freight carriers, pharmaceutical companies, and logistics providers in the long term. Striking a balance between economic growth, logistical efficiency, healthcare accessibility, environmental sustainability, and regulatory compliance is vital for fostering a resilient and responsive pharmaceutical logistics network in Maine.

[43] https://usatruckloadshipping.com/transporting-pharmaceutical-products/

[44] https://www.mckinsey.com/industries/life-sciences/our-insights/four-ways-pharma-companies-can-make-their-supply-chains-more-resilient

AGRICULTURAL AND AQUACULTURAL PRODUCTS

Maine's food sector plays an important role in the State's trade and economy, showcasing high concentrations of employment in agriculture, sea food, as well as food manufacturing. In 2019, Agricultural Products (excluding Animal Feed, Cereal Grains, and Forage Products) contributed 1.9 million tons in the State's freight movement, contributing $1.1 billion in terms of value which is further expected to grow to $1.6 billion by 2050. Additionally, movement of Cereal grains (including seed) and Milled Grain Products and Preparations added another $0.9 billion to Maine's economy, expected to see a twofold increase ($1.8 billion) by 2050.

Similarly, Maine's Aquaculture industries and products also show positive growth trends. **According to a September 2023 study, Maine's fishing and aquaculture industries support almost 18,000 jobs, $736.9 million of labor income, $1.1 billion of value added, and $1.4 billion of gross output to Maine's economy (note that these categories differ slightly from those used in Section 2.2).**[45] Meat, Poultry, Fish, Seafood, and their Preparations is one of the State's strongest commodities for trade. With a contribution of $5.4 billion to State's economy in 2019, Meat, Poultry, Fish, Seafood, and their Preparations ranked as the third highest commodity by value in 2019, projected to rise to $7.3 billion by 2050. Animals and Fish (live) contributed an additional $1.0 billion in 2019, which is expected to grow to $3 billion by 2050 – a threefold increase from 2019.

The phenomenal growth in the sector's trade volumes and related value pose several challenges and warrant strategic improvements for Maine's freight networks and systems.

- **Improved access of Maine's farms to markets |** Maine's farms are predominately small and family-based. In 2017, 96% of farms were family-owned and about two-thirds of farms had market value of crops under $10,000.[46] Despite the small operations, the sector exhibits strong trade activity with nearly 72% of sector sales exported outside the State.[47] However, the expected increase in trade activities from the agricultural sector would require sufficient production volumes at the farm level, further supported by adequate warehousing and logistical support. Robust and efficient supply chains would be critical to help producers access new markets, processing units, and distribution networks.

- **Strengthen freight networks to ensure fast and time-sensitive deliveries |** Many agricultural and aquacultural products – including meat, poultry, seafood, milk and dairy products, vegetables and fruits – are perishable in nature and require temperature controlled environments when being transported.[48] Improved refrigeration processes and more efficient freight networks would help maximize shelf life of these products and enable farms to ship their products greater distances, increasing the size of the market farms can serve.

- **Develop efficient and resilient supply chains to avoid climate related or other disruptions |** Given time-sensitive nature of deliveries required in the agricultural and aquacultural products, hardening supply chains against climate change and other disruptions would be critical.

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45 https://www.maine.gov/decd/sites/maine.gov.decd/files/inline-files/Final%20Report%20-%20Master%20Food%20Sector%20-%20DECD.pdf

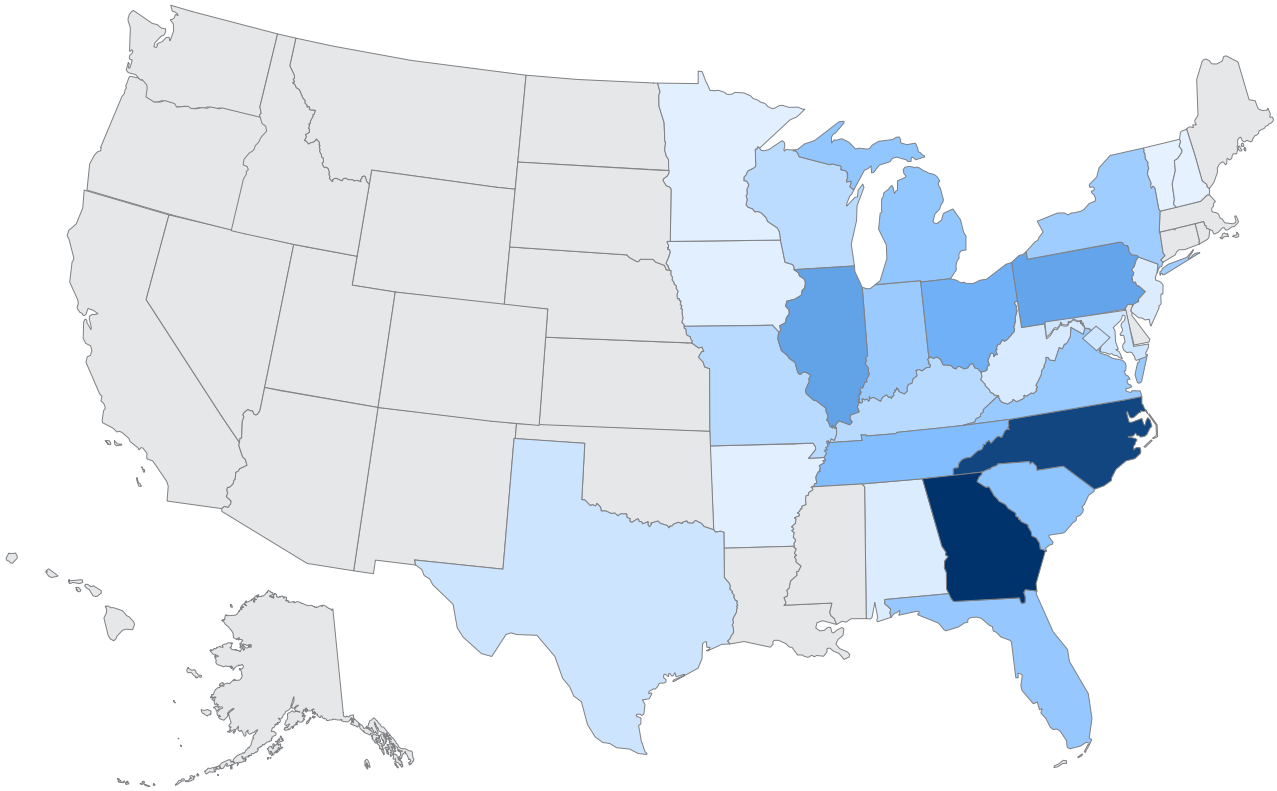
46 https://www.maine.gov/labor/docs/2023/mwaw/MaineAgOverview9_23.pdf

47 https://www.maine.gov/decd/sites/maine.gov.decd/files/inline-files/Final%20Report%20-%20Master%20Food%20Sector%20-%20DECD.pdf

48 https://highways.dot.gov/public-roads/summer-2019/farm-table

Currently, the South Atlantic makes up one of Maine's largest markets for seafood, as shown in Exhibit 4.4. This includes states like Georgia, North Carolina, South Carolina, Florida, and Virginia. The East North Central region of the Midwest is another major market, including states like Illinois, Ohio, Michigan, and Indiana.[49]

Exhibit 4.4 **Top Out-of-State Buyers of Maine Fish and Seafood, 2021**



As agricultural and aquacultural supply chain involve several components (e.g., farms, processing centers, warehouses, distribution centers, grocery stores, restaurants, schools, and direct e-commerce deliveries to people's homes) it is important that all these components are well connected by different modes and function efficiently to maximize output and reduce waste from the sector's trade activities.

4.1.2 SUPPLY CHAIN TRENDS AND IMPACTS

The COVID-19 Pandemic exposed the fragility of the global supply chain, which continues its recovery from disruptions resulting from labor shortages; equipment availability and scarcity; and ripple effects caused by bottlenecks. Manufacturers, shippers, governments, and carriers have sought solutions to improve overall resilience of production and distribution of commodities (this became a household topic during the Pandemic as shortages of common household items hit businesses and consumers). This section discusses recent developments impacting supply chains that are relevant to Maine, using the latest available research, findings from recent plans and studies, Freight Advisory Committee (FAC) member feedback, industry interview feedback, and industry survey responses.

[49] https://www.maine.gov/decd/sites/maine.gov.decd/files/inline-files/Final%20Report%20-%20Master%20Food%20Sector%20-%20DECD.pdf

IMPACTS OF COVID-19

The Massachusetts Department of Transportation (MassDOT) commissioned a report entitled *Understanding the Impacts of the COVID-19 Pandemic on the Massachusetts Freight Network and Planning* in 2022.[50] Many of its findings apply to Maine's supply chain, including those below. Several of these topics will be discussed in more detail in later sections of this chapter.

- **The pandemic caused major shifts in economic activity and impacts on supply chains that shifted constantly and are still not fully resolved.** After an initial slowdown in economic activity caused by shutdowns, ongoing social isolation increased demand for consumer goods. Ports and airports across the United States saw their volumes sharply increase from late 2020 to early 2021, tapering off thereafter. Continuing waves of infections led to frequent slowdowns and interruptions in global goods movement, resulting in shortages of intermediate and manufactured goods.
- **Impacts from the Pandemic were geographically uneven and shifted across the US and the World in waves.** Unprecedented Federal "rescue" spending supported consumer spending and recovery in employment, but these impacts were uneven as waves of COVID swept through. Other nations pursued far different policies than the US, with China maintaining a "zero-covid" policy until January 2023 with substantial detrimental impacts to economic productivity in that country and dependent international trade.[51]
- **The Pandemic caused a surge in e-commerce.** As will be discussed in more detail in the next section: with the cessation of in-person retail sales during lockdown phases of the Pandemic, sales of both consumer and business-to-business goods shifted to e-commerce platforms. This had cascading effects across the e-commerce logistics chain including escalating demand for ocean container shipping, truck, rail, warehousing, and local delivery. In Maine, however, e-commerce warehousing demand has not seen the same growth as in other states.
- **The Pandemic strained the freight transportation system.** Large swings in demand for goods caused demand spikes that led to high shipping rates, congestion at terminals, equipment and labor shortages, and slow transit times across all geographies, including Maine. In turn, the combination of unreliability in the supply and logistics chains and elevated demand caused over-ordering, worsening operational performance and increasing demands on labor, equipment, and warehousing.
- **Longstanding shortages in the freight and logistics workforce were exacerbated.** As will be discussed in more detail in Section 4.2.2., persistent labor and workforces challenged nearly every sector of the economy during the Pandemic. This put pressure on many industries and forced shippers and carriers to quickly adapt to massive shifts in demand. The pressures on the transportation sector were unique and substantial: the collapse in demand at the beginning of the Pandemic drove workforce reductions; when demand recovered the combination of an aging workforce, working conditions, compensation levels, and continuing waves of infections complicated recovery.

The effects of the Pandemic will linger for years, including waves of infection, lasting health issues for some sufferers, and rapidly-evolving macroeconomic and geopolitical impacts. The Russo-Ukrainian War that began in 2022 fed fears of an energy crisis in Europe and drove short-term spikes in fuel costs. As a consequence of the War, China's aforementioned "zero-covid" policy, consumer spending growth driven by stimulus checks, and other factors, inflation hit a 40-year high of 9.1% in the US in June, 2022 before declining to 3.1% in November, 2023.[52]

[50] https://www.mass.gov/lists/freight-planning-documents

[51] https://www.eastasiaforum.org/2022/07/09/supply-chains-catch-a-breath-as-china-lifts-zero-covid/

[52] U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers.

INTERMODAL SHIPPING

Intermodal shipping logistics are complex due to the multiple entities that ship goods to and from different facilities. As shown in Exhibit 4.5, these entities include ocean carriers, port operators, chassis suppliers, brokers, truckers, warehouse operators, retailers, manufacturers, and railroads. Cooperation between these entities is crucial, given their interdependence to ensure the successful movement of goods. If there is a bottleneck anywhere in the system, the impacts ripple across the supply chain. Three principal elements of the supply chain in Maine – trucking, freight rail, and ocean container movement – are discussed in the following sections.

TRUCKING

Nearly every good consumed in the US is moved by a truck at some point in the supply chain. The trucking industry is therefore impacted by current events and macroeconomic forces as well as specific challenges.

Truck driver attraction and retention has been an issue for the trucking industry for many years. In the past, it has been referred to as a shortage of drivers, but it is a multifaceted one. The average truck driver is 46 years of age,[53] and the minimum age is Federally-mandated at 21.[54] Beyond drivers, the trucking industry struggles to maintain its workforce of skilled mechanics and technicians (a challenge shared by other modes, as is discussed in Section 4.4.2). The industry has struggled with early retirement of seasoned drivers and retention of new drivers. According to the American Trucking Association, driver turnover at large truckload fleets was 92% at the end of 2020.[55]

Exhibit 4.5 **Example Supply Chain**

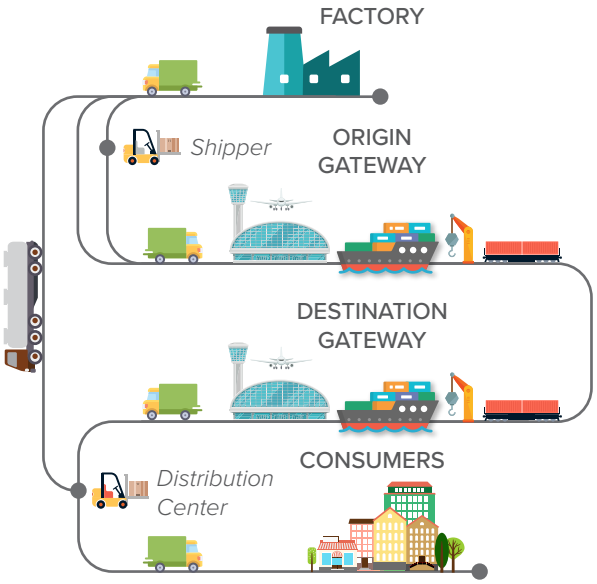


Exhibit 4.6 **Trucks Parked Informally near Walmart in Lewiston**

[53] https://www.trucking.org/news-insights/ata-releases-updated-driver-shortage-report-and-forecast

[54] As an element of BIL, FMCSA established an apprenticeship pilot program for individuals aged 18-20. See 49 USC Section §23022 and https://www.fmcsa.dot.gov/safedriver

[55] American Trucking Association. "Turnover Remained Unchanged at Large Truckload Fleets in Fourth Quarter." Press Release. March 29, 2021.

Truck drivers are required to comply with Federal hours-of-service (HOS) requirements, which are designed to increase safety on the roadways and prevent truck drivers from driving while fatigued. Drivers need designated parking for staging, breaks, emergencies, and mandated rest. Other factors that influence where and when a driver chooses to park include strict delivery windows, congested roadways, and fines or penalties for a missed appointment. Maine's truck parking inventory is considered potentially insufficient for demand south of Portland, as is discussed in Section 3.1.3. In addition, a specific need for truck parking adjacent to the "just-in-time" Walmart distribution center in Lewiston results in trucks lining local roads, as shown in Exhibit 4.6.

FREIGHT RAIL

As will be discussed in more detail in Section 4.2.4, pandemic-driven pressure on manufacturing, transportation, and logistics forced shoppers and carriers to pivot their operations to move essential freight by truck rather than by rail.

Most Class I carriers had significantly reduced the size of their operational workforce leading up to the Pandemic, making it difficult to provide adequate service to customers in response to fluctuations in demand and service interruptions. These reductions had occurred as all but one Class I carrier officially implemented **Precision Scheduled Railroading (PSR)**[56] **to streamline and simplify operations and to better match demand with capital assets.** Elements of PSR include operating fewer and longer line-haul trains, minimizing enroute switching, and simplifying routing networks. The net result has been a substantial increase in profitability and a major reduction in the railroad workforce.

For shippers during the Pandemic, inconsistent and unreliable freight service meant tight car supply and unfilled car orders, delays in transportation for carload, bulk and intermodal traffic, less frequent service, increased dwell times at various locations, missed switches, and ineffective customer assistance. Rail traffic volumes recovered rapidly from the depths of the Pandemic in May 2020 through mid-2021, at which time severe operational issues caused primarily by labor shortages brought growth to a halt. This trend continued in 2022, when shifting economic activity and the ongoing labor shortage resulted in a decline in rail traffic compared to 2021 for all but four commodities – coal, farm products, motor vehicles and parts, and nonmetallic minerals.[57]

Post-Pandemic, following a five-year trend of declining traffic, pressure has grown on the railroad industry to reconsider its business strategies from multiple angles. The increased length of trains has been blamed for safety lapses and derailments, most notably the East Palestine, Ohio derailment in February, 2023.[58] Workforce reductions have led to heightened tensions between management and labor, as will be discussed further in Section 4.2.2. Furthermore, the contraction in traffic volume has raised questions about the ongoing viability of freight rail in the transportation marketplace, and its ability to evolve to meet current needs.

As of late 2023, new senior management at three of the four Class I's serving the eastern US – CSX, Norfolk Southern, and Canadian National – have all announced shifts in strategy towards growing their business through delivering a more competitive product.

[56] Currently, PSR is in use by the following Class I railroads: Canadian National (adoption of PSR in 1998), Canadian Pacific (adoption of PSR in 2012), CSX (adoption of PSR in 2017), Kansas City Southern (adoption of PSR in 2018), Norfolk Southern (adoption of PSR in 2018), and Union Pacific (adoption of PSR in 2018).

[57] Association of American Railroads. https://www.aar.org/wp-content/uploads/2023/01/2023-01-04-railtraffic.pdf

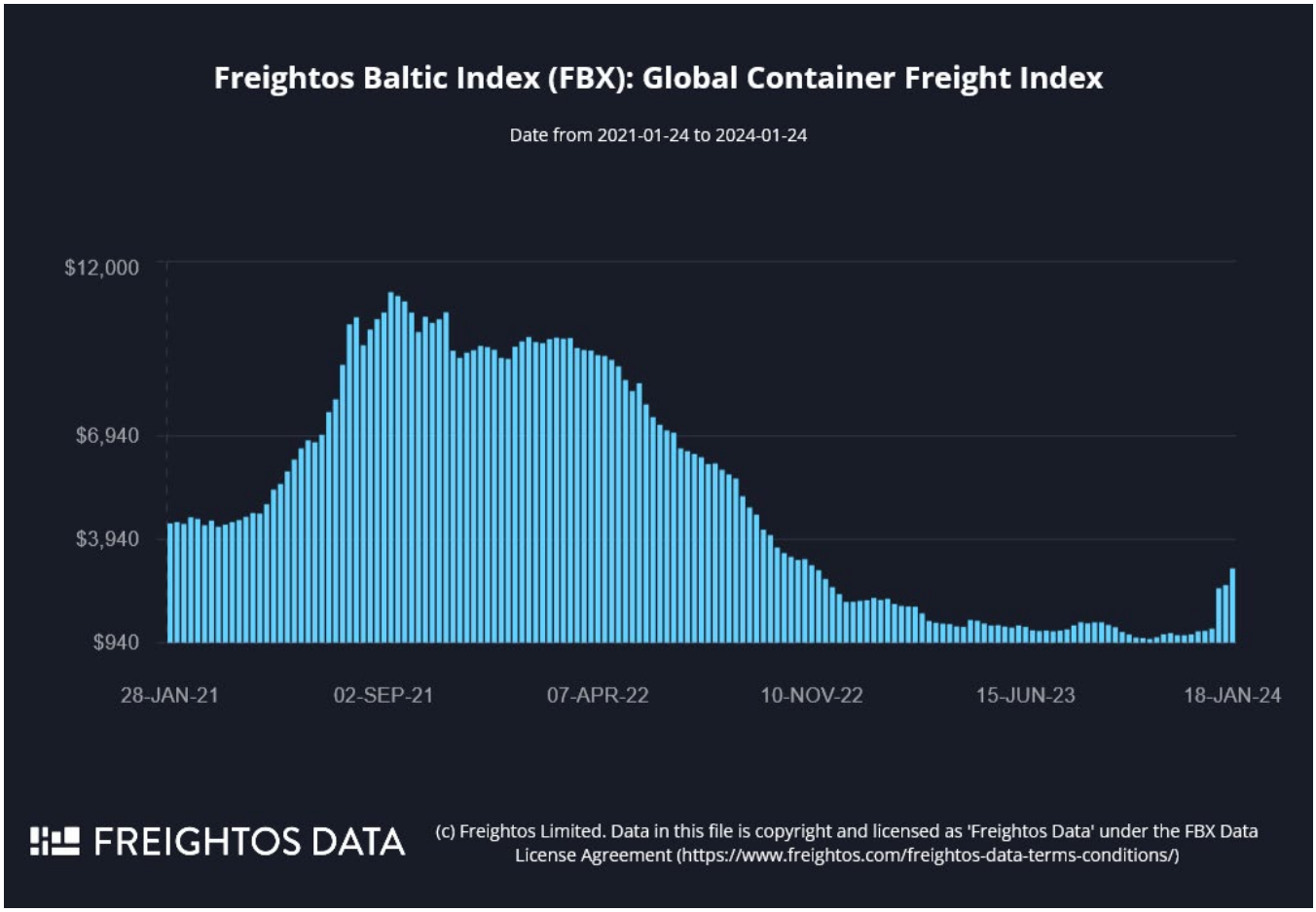
[58] https://www.propublica.org/article/train-derailment-long-trains

OCEAN CONTAINER MOVEMENT

One of the most visible impacts of the Pandemic on the supply chain was the backlog of containers at US deepwater ports. Once manufacturers were able to catch up on demand after lockdowns eased, ports were swiftly overwhelmed by the flow of container ships. This led to long wait times, shortages of containers, and rising shipping prices. Even after containers were unloaded, many sat for weeks unclaimed because of shortages of both equipment and drivers needed to transport containerized cargo to warehouses.

Maritime freight costs increased significantly during the Pandemic. The Freightos Baltic Index (FBX), which measures global container freight rates daily, indicated that the price to ship a container from China to the US East Coast increased by 86% between January and December 2020, while on the West Coast the increase was 180% over that period. The global average price for shipping containers peaked in September 2021 at $10,996 and has since fallen. In January 2024, the cost is $3,094. The past three years of FBX data are shown in Exhibit 4.7.

Exhibit 4.7 **FBX Global Container Freight Index, 2020-2024**



E-COMMERCE

E-commerce has grown rapidly and significantly over the past decade, and even more so during the Pandemic when it replaced trips to brick-and-mortar retail locations. **E-commerce grew at 150% of the rate of overall retail between 2018 and 2023.**[59] These changes, combined with the rise of immediate or same-day deliveries, has decreased average truck trip lengths by 37% but increased the number of truck trips overall, particularly in urban areas. Deliveries are now often directed to consumers rather than to retail stores, reducing economies of scale and increasing VMT.[60] As customers have ordered more deliveries, they have also returned them more frequently: 18% of all e-commerce orders were returned in 2022.[61] Retailers and shippers are not only seeking to maximize efficiency of distribution and "last-mile" logistics, but also to reduce the cost of the "reverse logistics" of returns.

According to the Urban Freight Lab at the University of Washington: the last 50 feet of commercial delivery accounts for about 25-50% of total transportation supply chain cost. The just-in-time nature of e-commerce creates significant issues for ground logistics and the built environment:

- In Maine's urban areas, congestion and any lack of well-managed short-stay curb parking can be major impediments. Where curb space is unavailable, trucks may be more likely to stop in travel lanes, block bicycle lanes, or otherwise obstruct streets than to relocate to alternate delivery locations.
- In suburban and rural areas near distribution centers, concerns are raised about impacts to local quality-of-life and economic vitality from noise pollution, carbon emissions, and congestion from commercial delivery trips. As was discussed in the prior section, prominent distribution centers in Maine lack necessary truck parking and holding areas, leading trucks to line local roadways, with impacts to safety, operations, and quality-of-life.

In all parts of Maine, residential streets may not be designed for tall heavy-duty delivery vehicles. **Tree branches and low-hanging utility lines (which sag with age) can both damage trucks and pose threats to safety and quality-of-life when hit.** The weight of delivery vehicles can also contribute to the degradation of streets and they can pose unique safety challenges for all road users. Large vehicles can obstruct visibility, making it harder to see people walking and bicycling, and collision severity is correlated with vehicle mass.

Nationwide, Some infrastructure owners have favored widening streets and turning radii to meet the needs of freight and utility vehicles (including those in municipal and state fleets), but these changes in roadway and streetscape design pose their own externalities for livability and local character.[62]

[59] Retail Indicators Branch, US Census Bureau. Calculated for Q1. https://www.census.gov/retail/ecommerce.html

[60] https://www.portland.gov/sites/default/files/2021/2040freight_stakeholder_summary.pdf

[61] https://nrf.com/research/2022-consumer-returns-retail-industry

[62] https://www.mapc.org/wp-content/uploads/2021/02/Feb2021-Ecommerce-Report.pdf

4.1.3 ZERO-EMISSIONS TRANSITION

Maine intends to make progress toward reducing emissions of carbon dioxide from vehicles traveling Maine roads. This is in line with the Federal Government's vision of a national electric vehicle (EV) charging network that will help put the US on a path to net-zero emissions by no later than 2050.[63] Maine's goals related to electrification were laid out in the *Maine Won't Wait* report, published in 2020.[64]

- Strengthen the Maine economy by reducing Maine drivers' energy costs for transportation and by promoting tourism from neighboring provinces and states.
- Advance Maine's progress toward reducing emissions of carbon dioxide from vehicles traveling Maine roads, as transportation is Maine's biggest contributor (54%) to greenhouse gas (GHG) emissions. Maine has set goals of reducing GHG emissions by 45% by 2030 and by 80% by 2050 and to achieve carbon neutrality by 2045. Furthermore, Maine has set a goal that 80% of the electricity that powers EVs (and the rest of the State) will be renewable by 2030.

Maine has begun investing in charging infrastructure for light-duty vehicles using a strategy outlined in the *Maine Plan for Electric Vehicle Infrastructure Deployment (PEVID)*, in 2022.[65] The PEVID was developed in response to the National Electric Vehicle Infrastructure (NEVI) program introduced in BIL. The NEVI program made Federal formula funds available for states to install charging infrastructure and mandated that each state prepare an investment plan for Alternative Fuel Corridors (AFCs).

Maine has proposed a staged approach to EV infrastructure investment that will provide spacing of no more than 50 miles between charging stations along AFCs for light-duty vehicles. This spacing is designed to mitigate Maine's cold climate, which reduces EV range and increases charging times.

Medium and heavy-duty vehicles in Maine present particular challenges for electrification. Compared to a 12,000 VMT-per-year average for light-duty vehicles, a long-haul combination truck averages 78,000 VMT-per-year. This leaves less downtime for charging. Trucks carry higher payloads than light-duty vehicles, requiring larger batteries that take longer to charge. Furthermore, challenges in bringing heavy-duty electric trucks to market have delayed their adoption by the US trucking industry further into the 2020s and 2030s. Finally, the skilled workforce to maintain heavy-duty EVs does not yet exist and will need to be developed alongside the fleet and charging infrastructure.

Recognizing the unique challenges of moving to a zero-emission truck fleet, the State of Maine will develop a *Clean Transportation Roadmap for Medium and Heavy Duty Vehicles* by the end of 2024.

63 https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

64 https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait_December2020.pdf

65 https://www.maine.gov/mdot/climate/electrification/

4.2 Freight System Vulnerabilities

4.2.1 CLIMATE CHANGE AND EXTREME WEATHER

In 2020, the Maine Climate Council produced a climate action plan for the State called *Maine Won't Wait*.[66] The plan has a four-year horizon and set Maine of the path to decreasing greenhouse gas emissions by 45% by 2030 and 80% by 2050 with the additional goal of achieving carbon neutrality by 2045. The plan identified potential future impacts of climate change on the transportation system:

- **With intense downpours on the rise in Maine, small watersheds can more easily flood and damage culverts, roads, and bridges.** Hundreds of statewide culverts are not designed for the expected future precipitation extremes. Damaged infrastructure along major freight bottlenecks without the proper resiliency planning may challenge the ability to deliver freight in certain areas of the State.
- **Sea level rise can cause erosion and damage to roads, bridges, and other coastal infrastructure.** Maine has already experienced eight inches of sea level rise, and expectations for the future are 1.5 more feet of rise by 2050 and four more feet by 2100. Entire communities and economies along the coast and on islands may have their ways of life forever changed by sea level rise.
- **Travel on Maine's unpaved roads will be riskier with warmer winters and increasingly intense downpours affecting the number of days the roads remain frozen.** Fewer frozen days puts the forest floor and roads at higher risk of rutting and soil compaction from heavy machines.

Maine Won't Wait also identified impacts for areas outside of the transportation system. While these impacts do not directly affect the supply chain network in the State, the continued evolution of markets as they respond to climate change will may have impacts on the freight transportation network. These included:

- **Maine's farms will experience unpredictable seasons which will affect the ability to consistently grow crops.** Decreases in agricultural output due to climate change would have proportionate impacts on agricultural jobs. Long-term, the type of crops suitable for Maine's climate may change.
- **The changing water availability and changing temperatures can affect the ability for Maine's forests to survive.**
- **Ocean warming, acidification, and sea level rise are already affecting ecosystems and coastal areas.** Commercial species like the Maine lobster are shifting northward to follow their preferred environmental conditions while non-native and harmful species such as green crab and invasive seaweed are shifting towards Maine from the south. These factors could drastically reduce the lobster and fish industry in Maine. Nearly 30,000 Mainers are employed in the commercial fishing industry that is already seeing climate-related fluctuations in employment.

[66] https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait_December2020.pdf

4.2.2 WORKFORCE, LABOR, AND AUTOMATION

Building Maine's skilled workforce to support goods movement is a core challenge for the State over the next decade. The freight workforce includes truck drivers; train drivers; skilled maintenance workers; construction workers; dock workers; and smaller-scale delivery drivers; among many others.

Industry managers and executives reported to MaineDOT in 2023 that a shortage in skilled maintenance, not a shortage in driving, posed the greatest workforce threat to the freight system, as these skills may take decades to acquire and hone.

Worker pay is one factor that influences the availability and stability of the labor pool for freight-intensive sectors. However, for many low-income and entry-level workers, there are significant barriers that hinder their ability to access and maintain employment, particularly in rural areas. These represent a variety of socioeconomic and geographic factors that incur costs or present logistical challenges for job seekers, including:

- **Access to training and certification.** As discussed above, Maine has taken action to expand access to CDL training and licensure, but as long as the minimum age to obtain a license remains at 21, a pool of younger employees remains unable to access the industry.
- For workers with children, **childcare** can be challenging to secure for lower-income households. Many struggle to earn the money necessary for childcare so that they can leave the home to go to work. They require access to childcare facilities that are affordable, that are close to home and the workplace, and that offer services at times that align with their workday.
- **Transportation** is itself the most significant barrier to accessing employment. Warehousing and manufacturing jobs are often located in areas far away from other land uses, lengthening commutes. In addition, low-income workers are less likely to have access to a vehicle and spend a higher share of their income on transportation than higher-income households. In Maine, with its relatively low population density, transit may not be available to fill this gap.

The immediate post-Pandemic period has seen several high-profile labor disputes in the transportation industry. These were driven in part by desire for increased quality-of-life benefits (such as sick time) and a pay increase that reflects freight workers' elevation as "essential workers" during the COVID-19 period. These include:

- In December 2022, rail workers were on the verge of a nationwide strike, but Congressional intervention through the 1926 Railway Labor Act required workers to continue operations. The narrowly-missed labor strike highlighted key workforce issues, such as the lack of sick leave and tight work scheduling, and four of the eight rail labor unions opposed the deal before Congress intervened.[67]
- In August 2023, the International Longshore and Warehouse Union and the Pacific Maritime Association ratified an agreement in the West Coast port labor dispute which covers 29 ports collectively responsible for a majority

[67] https://www.nytimes.com/2022/11/21/business/economy/freight-rail-union-contract.html?searchResultPosition=2

of US imports, including the Ports of Los Angeles, Long Beach, Seattle-Tacoma, and Oakland. Key points of dispute included not only a 32% wage increase and one-time "hero bonus" for working through the Pandemic, but increasing automation of port infrastructure and operations, as discussed below.[68]

- In August 2023, UPS workers affiliated with the Teamsters averted a strike with a deal that eliminated forced overtime, improved in-vehicle conditions, granted Martin Luther King Jr. Day as a full holiday, and raised wages.[69]
- Labor Negotiations for East Coast and Gulf Coast ports – between the International Longshormen's Association and United States Maritime Alliance are proceeding prior to contract expiration on September 30, 2024. These talks had been on a "fast track" but were suspended in June, 2023.[70]

Workers in transportation are also joining with those in other industries in seeking influence over the increasing automation of work (most visibly illustrated by Hollywood's actors and writers going on strike largely over artificially-generated content rights in 2023). While fully-automated trucks, trains, and ships have not yet reached wide adoption,[71] elements of autonomous operations have begun to infiltrate the landscape, including:

- **Autonomous ports,** which take advantage of the controlled, contained portside environment to allow predictable movements and operations to be performed by robotic tugs, lifts, and cranes.[72]
- **Autonomous warehouses,** famously widely implemented by companies such as Amazon, in which robotic forklifts and racks move at rapid speeds and provide elements of an order for packing.
- **Truck platooning,** in which an instrumented roadway and connected vehicles allow for a truck at the front of a line with a human driver to lead trucks that follow autonomously behind and enjoy enhanced aerodynamic and fuel economy advantages due to coordinated movements and closer following.[73]

68 https://www.wsj.com/articles/east-coast-ports-hit-speed-bump-in-fast-track-labor-talks-29c42177

69 https://www.cbsnews.com/news/ups-teamsters-ratify-contract/

70 https://www.wsj.com/articles/east-coast-ports-hit-speed-bump-in-fast-track-labor-talks-29c42177

71 https://www.theverge.com/23981006/autonomous-truck-semi-driverless-aurora-kodiak-infrastructure

72 https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/the-future-of-automated-ports

73 https://highways.dot.gov/research/laboratories/saxton-transportation-operations-laboratory/Truck-Platooning

4.2.3 EQUITY IMPACTS

Freight movement is vital to Maine's economy, yielding both positive and negative impacts on communities. Increased freight activity and infrastructure investments benefit communities by increasing employment opportunities. However, neighborhoods adjacent to freight activity face greater environmental burdens, such as compromised air quality, higher noise levels from freight operations, and unsafe road conditions.

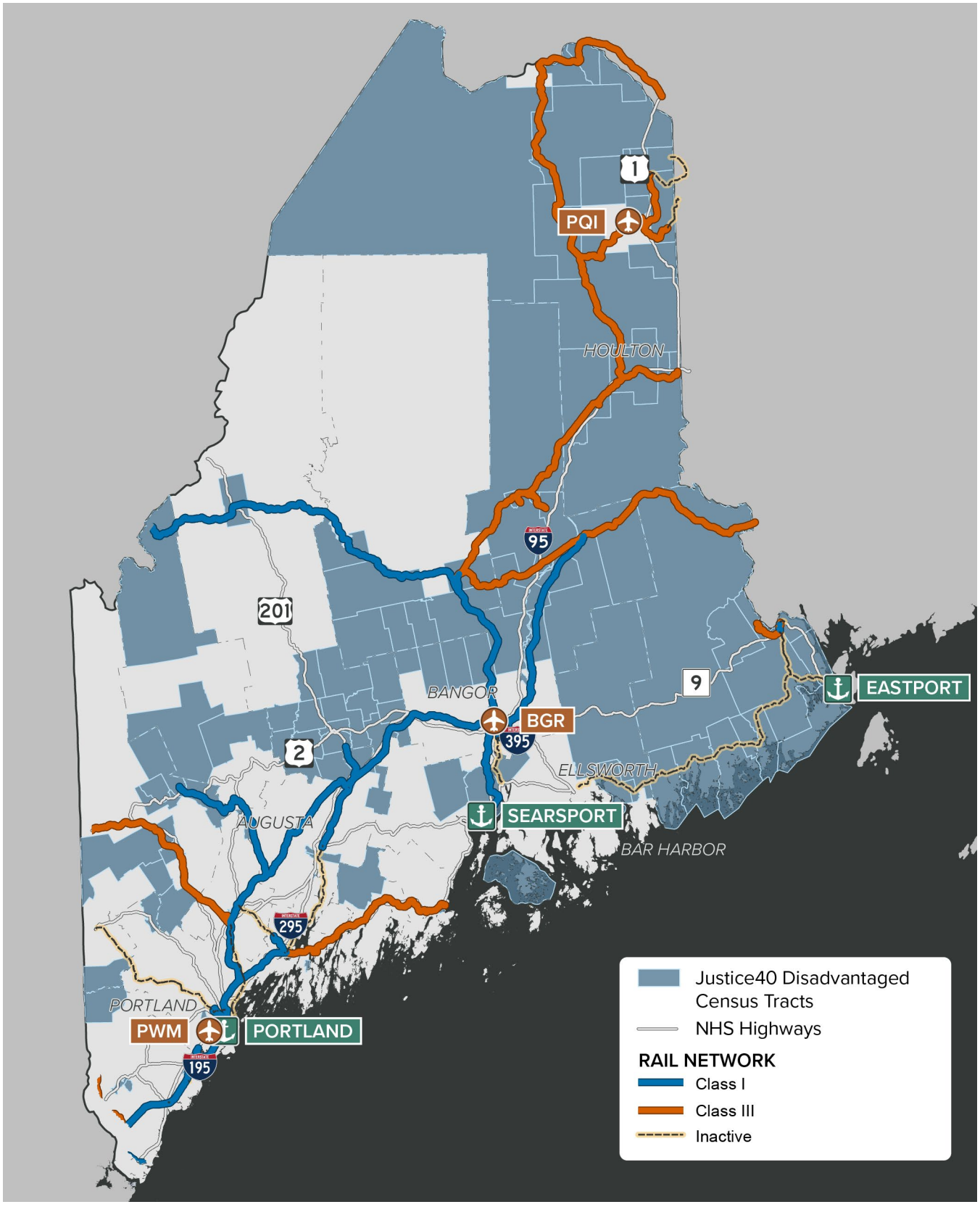
The US Department of Transportation (USDOT), through its State Freight Guidance on State Freight Plans (2022), urges states "to identify policies and strategies that address environmental justice and equity concerns arising from freight movements, particularly those affecting low-income and disadvantaged populations."[74] MaineDOT's 2022 Statement on Equity[75] discusses the Department's commitment to equity of access to transportation for Maine's residents. Several factors warrant consideration when assessing the equity implications of freight movement and operations in Maine:

- **Southeastern Maine has witnessed the highest population growth in the State.** Proximate to major freight corridors and the State border, it is poised for heightened demand and activity.
- **Freight related facilities, like ports and truck transfer sites, often tend to be situated in low-income and other historically marginalized neighborhoods** due to lower property values and rents, and low influence of these groups in regional development activities. Consequently, residents living in close proximity to these facilities and trucking routes face disproportionate exposure to environmental hazards, such as diesel emissions and excessive noise from engine activities and frequent braking.
- **As Maine primarily relies on Interstate Highways I-95 and I-295 for trucking and freight movement, the regions adjacent to or in close proximity to these two corridors face higher environmental burdens from freight movement.** Several census tracts in close proximity to I-95 and I-295 are also identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST), which captures various socio-economic, climate, and other category of burdens at the census tract level in the U.S. A map showing Maine's Justice40 Census tracts is provided in Exhibit 4.8 (next page).
- **As previously highlighted in Section 3.1.3, some segments of I-95 and areas nearby to Poland Spring and Walmart distribution centers in Lewiston lack adequate truck parking facilities.** This leads trucks to park in undesignated areas, including shoulders and along lower-grade roadways. Illegally parked trucks impact local congestion and road safety. In addition, truck parking areas without plug-in facilities require trucks to idle to maintain heat and power for overnighting drivers, creating noise and impacting air quality.

[74] https://www.transportation.gov/mission/office-secretary/office-policy/guidance-state-freight-plans-and-state-freight-advisory

[75] https://www1.maine.gov/mdot/publications/docs/2022/MaineDOTEquityStatement6-5-22.pdf

Exhibit 4.8 **Justice40 Census Tracts in Maine**



4.2.4 RELIANCE ON TRUCKS AND MODAL DIVERSION

As discussed in Section 2.2.1, 75% of Maine's total freight shipment tonnage was truck-based in 2019. This modal dominance impacts the State and its residents through increased highway construction needs (as heavy trucks exact more wear on roads); higher costs to transport some goods; reduced market opportunities for Maine-based companies; increased use of fossil fuels and increased carbon emissions and air quality issues; and truck-involved highway crashes.

As a result of these negative externalities, there have been calls for more heavy freight to be handled by more efficient rail and water transportation modes when they make economic sense. The 2023 Maine State Rail Plan identified a critical need for rail system investment and support for modal diversion to benefit the entire Maine freight transportation system. Lack of investment in the system would degrade the business climate and contribute to congestion, emissions, and crashes as shippers opt for trucks. Specifically, it noted that if 25% of the truck traffic moving at least 750 miles were diverted to rail, annual greenhouse gas (GHG) emissions would fall by approximately 13.1 million tons, with the benefits increasing proportionally with modal shift. Railroads account for 40% of long-distance freight but only 1.9% of transport-related GHG emissions.

Resistance to efforts toward modal shift derives from trucking's position as the dominant mode not just in Maine but throughout the Northeastern United States. Compared to much of the broader region, Maine experiences light highway congestion, which allows trucking in the State to overcome the price advantage of rail by providing a reliable and competitive service to customers. The primary customer base for the freight rail industry in Maine is in forest products, accounting for 44% of rail tonnage in 2019.[76] **The lack of other traffic has left railroads exposed to the changing fortunes and conditions in a single sector.**

MaineDOT believes in investing in transportation options that lower the cost-of-doing-business in response to the needs of Maine industries. Investment in railroad infrastructure to improve efficiency and reliability is the best way to encourage modal shift from truck to rail. **At a statewide level – as will be discussed in Chapter 5 – this includes investing in SGR for rail infrastructure and in enhancements to the network including upgrading the weight and height clearances and capabilities of lines.** It may also include investment by MaineDOT in railcars to ensure that the supply for equipment meets demand.

At a local level, MaineDOT's Industrial Rail Access Program (IRAP) has been enthusiastically received by businesses seeking direct access to the rail network on their properties. MaineDOT has encouraged public-private partnerships that engage shippers, consumers, and carriers in project planning, funding, and cost-sharing. It must also be acknowledged that carriers' own investment decisions are often made on a national level and are driven by national market and supply chain forces.

[76] STB Waybill

4.3 Freight System Funding

Obtaining dedicated funding for freight projects has long been an issue for MaineDOT, a situation not unique among DOTs. As in many states, the cost to maintain and expand the freight system in Maine often exceeds available funds. However, the passage of BIL in 2021 expanded on the FAST Act of 2015 in providing dedicated formula funding for freight. This section discusses this and other Federal and State sources of funding for the freight network.

4.3.1 FREIGHT INVESTMENT STRATEGY

MaineDOT prioritizes projects for investment during the annual development of its Statewide Transportation Improvement Program (STIP). Most projects listed in the STIP have been through or are involved in a public involvement process and are closely linked to the preparation of MaineDOT's State-initiated calendar year Work Plan. In support of MaineDOT's biennial budget request and prior to preparing the STIP, MaineDOT submits its Work Plan to the Maine State Legislature.

FHWA-funded projects within the STIP are ranked, prioritized and selected based on MaineDOT's own Highway Corridor Priorities (HCPs - see Exhibit 3.2) and Customer Service Levels (CSLs) as well as on FHWA's performance measures for safety (PM1), asset condition (PM2), and system performance (PM3).

Freight projects are almost exclusively FHWA-funded, and some are funded through the National Highway Freight Program (NHFP – see below). Following FHWA's standards, MaineDOT selects projects for the NHFP that:

- Invest in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity.
- Improve the safety, security, efficiency, and resiliency of transportation in rural and urban areas.
- Improve the state of good repair of the NHFN.
- Use innovation and advanced technology to improve NHFN safety, efficiency, and reliability.
- Improve the efficiency and productivity of the NHFN.
- Reduce the environmental impacts of freight movement on the NHFN.

4.3.2 FEDERAL FUNDING SOURCES

NATIONAL HIGHWAY FREIGHT PROGRAM FORMULA FUNDS

The primary source of funding for freight projects is the NHFP, established as part of the FAST Act, which identified formula funds for investments on the National Highway Freight Network (NHFN) with up to 10% available for intermodal projects.[77] Maine's share of these formula funds contain the NHFP apportionment for the period spanning 2023-2026 totaling $13,222,658, or $3.3 million per year on average. **Appendix A.3 provides a short-term, fiscally constrained Freight Investment Plan for the NHFP and NHFN.**

[77] Federal Highway Administration, Freight-FAST-Act Factsheet, from https://cms.dot.gov/sites/dot.gov/files/docs/Freight-FAST-Act-Factsheet.docx

FHWA DISCRETIONARY GRANT FUNDS

In addition to formula funds, the FAST Act created a new $4.5 billion discretionary freight-focused grant program that allows states, MPOs, local governments, tribal governments, special-purpose districts, public authorities (including port authorities) and other parties to apply for funding to complete projects that improve safety and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements for a five year period. This program is officially called the Nationally Significant Multimodal Freight and Highway Projects Program, but is informally referred to as Infrastructure for Rebuilding America (INFRA).[78] States can leverage their own dedicated transportation funding with these Federal sources, as well as with other local, regional, and private-sector funding.

In addition to INFRA, MaineDOT and its partners can compete for funding from other Federal discretionary programs, including FHWA's Rebuilding American Infrastructure with Sustainability and Equity (RAISE, formerly called TIGER and BUILD)[79] program and Rural Surface Transportation Grant Program (RURAL),[80] MARAD's Port Infrastructure Development Program (PIDP),[81] FRA's Consolidated Rail Infrastructure and Safety Improvements (CRISI) program,[82] and the Federal Aviation Administration's Airport Improvement Program (AIP).[83]

Maine has pursued these Federal funds to great success in recent years:

- **2022 INFRA Grant Award: Presque Isle Corridor Project |** MaineDOT was awarded $44.1 million to complete Phase II of the commercial two-lane bypass route of US-1 in Presque Isle. It includes a new interchange at US-1 and Conant Road; truck climbing lanes; four new overpasses to grade-separate the bypass from Henderson Road, Easton Road, Conant Road, and the rail line; box culverts; and multiuse trail crossings and Conant Road and Henderson Road.
- **2022 RURAL Downeast Coastal US-1 Rehabilitation Project |** MaineDOT was awarded $33 million to rehabilitate 68 miles of US-1 in Washington Count; including shoulder widening; replacing drainage structures; making safety improvements; installing new county guardrails and rumble strips; and preparing the corridor for electric vehicle chargers.
- **2022 RAISE Interstate 95 at Hogan Road Improvement Project |** MaineDOT was awarded $24.6 million to replace Maine's busiest diamond interchange at I-95 and Hogan Road in Bangor with a safer and more modern diverging diamond interchange.
- **2023 PIDP Portland IMT Reefer Yard Modernization Project |** MaineDOT was awarded $14.2 million to modernize a yard at the IMT that is used for refrigerated cargoes. Work includes the construction of racks to store containers with refrigerated cargoes, steel frames to house stairs to access containers, lighting, and electrical infrastructure to enable containers to be connected to shore power.
- **2022 CRISI Tri-State Regional Rail Upgrade Project |** MaineDOT, in partnership with Vermont and New Hampshire, was awarded $9.7 million to develop and construct track-related improvements (improving to 286K) and grade crossing upgrades.

78 https://www.transportation.gov/grants/infra-grant-program

79 https://www.transportation.gov/RAISEgrants/about

80 https://www.transportation.gov/grants/rural-surface-transportation-grant-program

81 https://www.maritime.dot.gov/PIDPgrants

82 https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/consolidated-rail-infrastructure-and-safety-2

83 https://www.faa.gov/airports/aip/aip_supplemental_appropriation

SECTION 130 HIGHWAY/RAIL GRADE CROSSING PROGRAM

BIL provides $245 million over Federal fiscal years (FFY) 2022-2026 for safety improvements at grade crossings across the United States.[84] This total includes $7,912,366 for Maine in FFY 2023-2026. Traditionally these funds have been used for improvements to signals and roadway surfaces. Of the Section 130 funding, approximately 80% targets major rail crossing improvements using criteria developed by MaineDOT and local and municipal officials. MaineDOT directs the remaining 20% of its Section 130 funding to low-cost updates to warning systems on key highway corridors throughout the State.

MaineDOT is working to improve communication and coordination with the State's major rail carriers as it undertakes this program. Besides the normal signal and service improvements traditionally associated with Section 130, MaineDOT will look to customize the program to provide flexible funding in areas such as crossbuck replacement, LED light replacement, and pavement markings that will provide enhanced safety benefits at a reasonable cost.

INTELLIGENT TRANSPORTATION SYSTEMS AND COMMERCIAL VEHICLE ENFORCEMENT

BIL provides $60 million for each of FFY 2022-2026 for the Advanced Transportation Technologies and Innovative Mobility Deployment program (also known as Advanced Transportation Technology and Innovation, or ATTAIN), established under a different name by the FAST Act.[85] This competitive grant program focuses on the development of pilot projects and model deployment sites for the installation and operation of advanced transportation technology. Eligible uses include vehicle-to-vehicle and vehicle-to-infrastructure communications and other ADAS and autonomy systems; real-time driver information systems (such as truck parking availability); integrated corridor management systems; and electronic pricing and payment systems.

Maine also benefits from the Innovative Technology Deployment (ITD) program managed by the FMCSA,[86] an information-sharing initiative involving government agencies, motor carriers, and other stakeholders.

The Performance and Registration Information Systems Management (PRISM) is a related program that explores the potential benefits of using State commercial vehicle registration sanctions as an incentive to improve motor carrier safety.[87] PRISM allows enforcement personnel to access Federal safety ratings information for all participating states. These programs seek to establish information systems architecture for commercial vehicle operations which will streamline credentials administration; focus safety enforcement on high-risk carriers; reduce motor carrier congestion costs through automated commercial vehicle operations; and enhance intrastate and interstate information exchange.

OTHER FEDERAL FUNDING

Freight movements can be enhanced by projects funded through other sources in BIL, many of which are continuations of programs found in the FAST Act. Projects that are not explicitly freight-related could be considered for funding through these "general" highway programs. For example, safety improvements that benefit both trucks and passenger

[84] https://highways.dot.gov/safety/hsip/xings/railway-highway-crossing-program-overview

[85] https://www.transportation.gov/rural/grant-toolkit/advanced-transportation-technologies-and-innovative-mobility-deployment

[86] https://www.fmcsa.dot.gov/itd

[87] https://www.fmcsa.dot.gov/PRISM

vehicles (such as a truck climbing lane) or projects that reduce heavy truck delay and this limit idling and decrease GHG emissions could obtain funds from nonfreight sources including the National Highway Performance Program (NHPP),[88] the Congestion Mitigation and Air Quality (CMAQ) Program,[89] the Carbon Reduction Program,[90] the Highway Safety Improvement Program,[91] and the Surface Transportation Block Grant (STBG) Program.[92]

There are a number of potential funding sources for non-highway freight projects administered by other Federal agencies, including:

- US Army Corps of Engineers Harbor Maintenance Trust Fund.
- FRA Railroad Rehabilitation and Improvement Financing.
- Department of Housing and Urban Development Community Development Block Grants.
- Department of Commerce Economic Development Administration Grants.
- Environmental Protection Agency Brownfield Assessment Grants, Brownfield Revolving Loan Fund Grants, and Brownfield Cleanup Grants.
- Environmental Protection Agency Clean Diesel Program.
- Internal Revenue Service Qualified Railroad Track Maintenance Credit.
- Department of Agriculture Rural Development Community Facilities Grants and Direct and Guaranteed Loans.
- MARAD Small Shipyard Grants.
- Fish and Wildlife Boating Infrastructure Grants.

4.3.3 STATE FUNDING SOURCES

SMALL HARBOR IMPROVEMENT PROGRAM (SHIP)

The goals of the SHIP program are to:

- Promote public access, economic development, and a commitment to preserving coastal infrastructure.
- Help municipalities make improvements to public wharves, landings, and boat ramps.
- Protect a dwindling asset through a successful state/local partnership.
- Preserve natural resource-based industries.

88 https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhpp.cfm

89 https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm

90 https://www.fhwa.dot.gov/bipartisan-infrastructure-law/crp_fact_sheet.cfm

91 https://highways.dot.gov/safety/hsip

92 https://www.fhwa.dot.gov/specialfunding/stp/

In 1995 the MaineDOT received their first block of funding for the SHIP. Since 1995, several rounds of grants have dispersed millions of dollars to several coastal municipalities for various projects. Examples of successful initiatives under this program include a pier reconstruction, float installations, boat ramp rehabilitation, new hoist installation, and gangway replacement. Since 2014, MaineDOT has funded 28 projects.[93]

SHIP supports the approximately 18,000 licensed commercial fishermen and related industries along the Maine coast that increasingly rely on these public facilities for access to resources. Without this program, municipalities would likely forsake such important projects or be forced to carry out the project with only local resources. Subsequently, the program enjoys widespread support from coastal municipalities and statewide commercial fishing and marine interests.

INDUSTRIAL RAIL ACCESS PROGRAM (IRAP)

The Industrial Rail Access Program (IRAP) is a MaineDOT program to encourage economic development and employment through the increased use of rail transportation. IRAP provides 50/50 matching funds to private businesses that are looking to upgrade sidings, switches and other rail infrastructure in order to provide new or more efficient connections between businesses and the general rail network. Increased funding will help protect the public interest in rail operations in the State and will assist with meeting the backlog of interest in IRAP projects. This will create new traffic and job opportunities, allow businesses to be more competitive, reduce greenhouse gases and maintain state-owned track and connections to national Class I carriers.

MaineDOT has programmed $4 million in funding (including $2 million from MaineDOT and $2 million in private matching funds) for the next round of IRAP projects that will be available beginning in early 2024 – applications were due in October, 2023.[94] Overall, the 2023-2025 MaineDOT Work Plan[95] provides $12.2 million in funds for IRAP.

93 https://www.maine.gov/mdot/pga/ship/

94 https://www.maine.gov/mdot/ofps/docs/irap/2023/2024%20IRAP%20Announcement.pdf

95 https://www.maine.gov/mdot/projects/workplan/

GENERAL FUNDS AND BONDS

Freight needs (especially highway-related) can often be addressed through non-freight spending. For example, road maintenance and repair that is paid for through general highway funds also has a positive impact on freight movement in the State. Funds used on maintenance and operations – including snow plowing – reduce delays and improve safety for all road users.

Maine's State Highway Fund is the foundational state source of revenue for MaineDOT capital investments and operations. The Highway Fund is derived from Maine's per-gallon fuel tax. Other revenue comes from motor vehicle registration fees, inspection fees, miscellaneous taxes and fees, fines, and earnings on investments.

- Maine fuel taxes are currently $0.30/gallon for gasoline and $0.312/gallon for diesel fuel. These rates have been in place since July 2013. Alternative fuels are also taxed with a variable set of rates, including both transportation and non-transportation fuels. In FY 2022, 64.6% of Highway Fund revenues ($222.78 million) came from fuel taxes.
- Motor vehicle registration fees include staggered annual registrations, title fees, inspection fees, and vanity plate fees. The combination of these sources in FY 2022 generated 30.6% of Highway Fund revenues ($105.38 million).
- Additional sources include miscellaneous taxes and fees, fines, earnings on investment, and other sources totaling the remaining 4.8% of Highway Fund revenues ($16.69 million).

Other sources include bonding capacity and matching funds from Maine municipalities and other transportation partners. In November 2021, more than 70% of Maine voters approved an annual $100-million transportation bond, which will be used to match federal and other funds. This followed approvals of similar bonding for transportation by the voters on a roughly annual basis since 2005.[96]

Matching funds are derived through agreements with municipalities, reflecting the local benefit of projects and activities in the Work Plan. This includes local funding for transit operations, local bicycle and pedestrian project funding, airports, and MaineDOT's popular Municipal Partnership Initiative (MPI).[97]

Funding for operations and management of the Maine Turnpike are supported by toll revenues. The Maine Turnpike Authority is separately funded and not related to MaineDOT.

[96] https://www.maine.gov/treasurer/debts-bonds/bonds-on-the-ballot

[97] https://www.maine.gov/mdot/pga/docs/2020/MPI2020.pdf

HIGHLIGHT: PORTLAND INTERNATIONAL MARINE TERMINAL

In November 2023, the Maine Port Authority was awarded a Port Infrastructure Development (PIDP) Grant of $14 million from the US Maritime Administration (MARAD) to build rack storage for containers at the International Maritime Terminal (IMT) in Portland. The section of the IMT on which the new storage will be built currently has limited functionality for storing containers due to its use of permeable pavement to reduce the environmental impacts of the facility – rack storage will vastly improve its utility. In addition, the rack storage will accommodate refrigerated containers, a key priority for Eimskip, the Icelandic firm that provides container service to the IMT.

This innovative solution to container storage at the IMT is particularly welcome as volume at the terminal has surged in recent years. Since Eimskip began weekly service to Maine in 2017, year-over-year growth has exceeded 25%. Substantial growth in demand for the service occurred during the COVID-19 Pandemic, when supply chain challenges in global shipping allowed the nimble operations and strong customer service of the Maine-based operation to out-compete larger competitors.

The Maine Port Authority (MPA), MaineDOT, Eimskip, and other stakeholders are responding to the opportunity by maximizing a limited geographic footprint, particularly for cold storage. Eimskip and several partners are currently building a dedicated cold storage facility on the property, and as noted above the new storage racks will be designed to accommodate refrigerated containers.

For future growth of the IMT, MPA is keen to develop intermodal transfers from rail to ship, taking advantage of a rail terminal at the IMT that is in excellent condition. Doing so may require investment in bridges on Cassidy Point Drive to accommodate taller trains. In addition, **Eimskip and the MPA also remain invested in reducing congestion, noise, and pollution impacts from trucking along Commercial Street.** Using rail to move containers to the port could alleviate these negative impacts.

The Portland International Marine Terminal and Planned Projects

5 RECOMMENDATIONS

The analysis in this MIFS leads to some key conclusions:

- Maine's highways are the backbone of its freight system as the majority of goods are moved within and throughout the State over the road. **The highway freight system currently performs well and is projected to continue providing a high level-of-service to motor carriers in the future.** There is room for improvement in some major corridors, notably including I-95 and I-295 in the Portland and Bangor areas.
- Though Maine's long-term employment trends see a shift away from freight-intensive, goods-dependent industries, **activity on the Maine freight system is projected to increase, sometimes in ways that are novel in the 2020s (e.g., domination of e-commerce and autonomous drone delivery to islands).** Industries such as manufacturing, construction, natural resources, and mining rely on freight transportation more than others. Service sectors such as retail, wholesale trade, warehousing, and e-commerce also create a critical economic need for the efficient movement of goods.
- **The Maine transportation system will require significant investment of public and private dollars to maintain existing infrastructure and improve freight connectivity and mobility.** These investments will fuel the Maine economy by improving industry competitiveness and productivity, creating jobs, and reducing economic losses due to time delays and excess fuel consumption.
- **The Maine freight system will need to face and address its vulnerability to human-caused climate change.** Infrastructure with specific resiliency needs, specifically on coasts and rivers, will need to be addressed in the coming decades. In addition, the freight industry will need to shift toward electrification and alternative fuels to reduce emissions to meet State, national, and global targets. Through all of this, Maine will need to ensure that it equitably distributes both the benefits and costs of its freight system, specifically avoiding further harm to disadvantaged communities.

Based on these conclusions, the MIFS makes a set of comprehensive short and long-term recommendations for both infrastructure and policy changes:

- **Infrastructure and Operational Improvements** expand or physically enhance the State's transportation infrastructure and operations.
- **Policy Strategies** seek to optimize governmental regulations or incentives to better manage freight traffic on the existing transportation network.

The 2024 MIFS retains continuity with solutions and recommendations that remain relevant from the 2020 document, while updating detail and insight where it provides value and context. **Appendix A.3 provides a short-term, fiscally constrained Freight Investment Plan for the NHFP and NHFN.**

5.1 Infrastructure and Operational Recommendations

5.1.1 HIGHWAY AND TRUCK PARKING

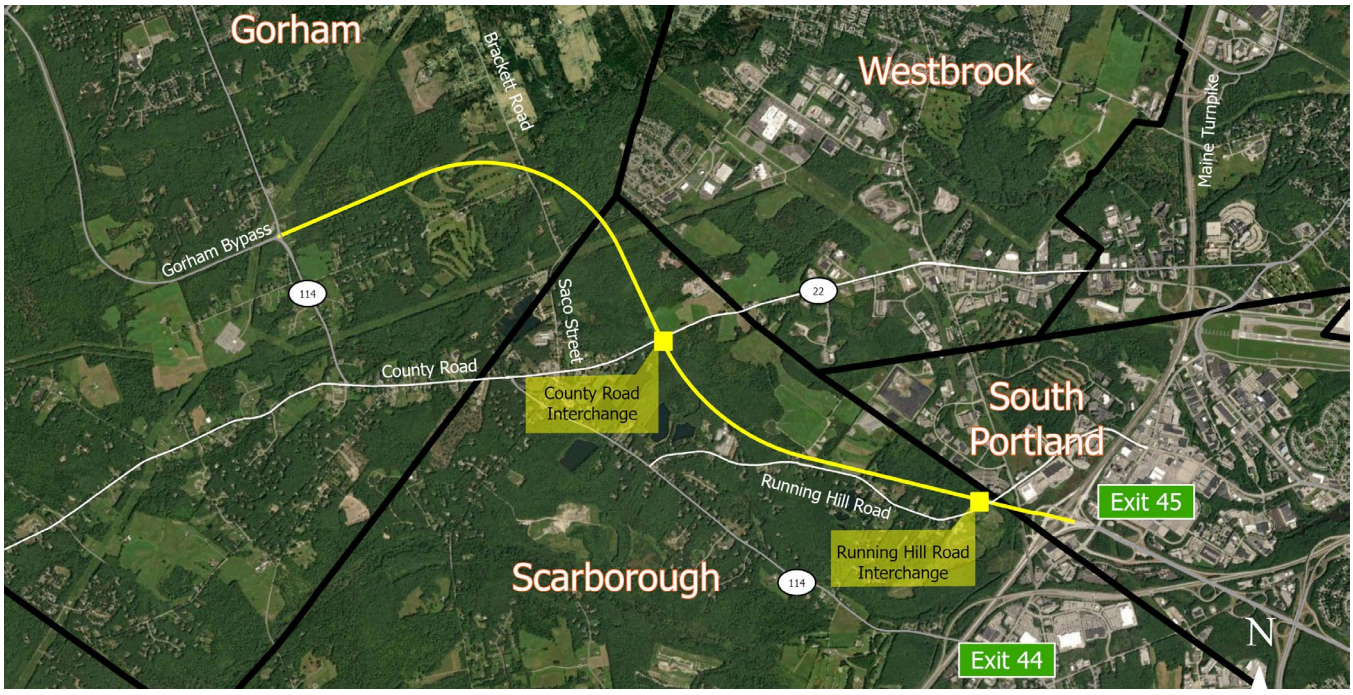
» **Identify quick-fix projects |** MaineDOT should continue to work with the private sector to identify small, easily-implementable projects that can be accomplished quickly and at relatively low-cost.

» **Maintain major freight routes to SGR |** Trucks place a greater amount of stress on roadways than passenger vehicles, resulting in damage to pavements, sidewalks, and gutters. It is important to monitor and maintain the physical condition of major freight routes at greater frequencies than the general highway network. Lower-volume routes that are last-mile connectors to seaports, rail terminals, airports, and intermodal terminals should be high-priority roadways for maintenance.

» **Reduce congestion and improve TTTR on major non-Interstate truck routes |** As discussed in Section 2.3.2, Maine's Interstates operate at a high level of reliability for trucks. Efforts to improve reliability should be focused on the non-Interstate NHS, including access routes to Searsport and Eastport.

» **Build the Gorham Connector |** The Maine Turnpike Authority announced in February 2024 that it will construct a four-lane tolled highway to link Exit 45 on the Maine Turnpike (Samantha Smith Way in South Portland) to the existing Gorham Bypass (ME-112) at its intersection with ME-114 in Gorham Village. The connector is intended to remove traffic from town centers and local roads, its route (see Exhibit 5.1) has been designed to skirt environmentally sensitive areas, and implementation is planned to include multimodal alternatives on the corridor.[98]

Exhibit 5.1 **Conceptual Schematic of the Proposed Gorham Connector**



[98] https://www.maineturnpike.com/News/Recent-News/Proposed-Regional-Connector-Road-Between-Gorham-an.aspx

- **Expand and enhance truck parking along I-95 |** As discussed in Section 3.1.3, the Maine Turnpike Authority has identified two locations where additional investments should be made in truck parking capacity: Kennebunk (both directions) and Gardiner. The former is currently programmed for the 2034 timeline, while the latter – a doubling of capacity at the lot to 70 spaces – has not been formally programmed.

- **Study truck parking capacity in Auburn-Lewiston |** The Poland Spring and Walmart facilities in the Lewiston area currently place many trucks on the roadside while they wait to be accommodated for just-in-time deliveries. MaineDOT should study potential convenient accommodations for these trucks not located in the right-of-way.

- **Continue to develop a robust Innovative Technology Development (ITD) program for State Police commercial vehicle enforcement efforts |** Targeted and technologically-advanced enforcement of commercial vehicles removes unsafe/damaging trucks and carriers from the road. MaineDOT has collaborated, and should continue to collaborate, with the Maine State Police to implement their Federal grants for oversize/overweight permitting, routing, and enforcement. *The State Truck Size and Weight Enforcement Plan* details the methods and technology used for truck size and weight enforcement.

5.1.2 RAIL

This section provides high-level recommendations, with discussion focused on benefits to the general movement of goods in Maine. A more granular discussion of recommendations for improving Maine's rail network is provided in the *2023 Maine Rail Plan*.[99]

- **Maintain major rail lines to SGR |** MaineDOT should partner with rail carriers and owners to ensure that the rail network remains in a physical state to provide viable and sustainable service to Maine-based shippers and consignees. The priority for public funds should be State-owned infrastructure, followed by private infrastructure that provides essential services through public-private partnerships. MaineDOT should also actively encourage private investment to achieve these goals.

- **Continue and expand programs to improve, separate, and consolidate highway-rail grade crossings |** As discussed in Section 2.4.2, MaineDOT should make use of the Federal "Section 130" program to resolve unsafe and unnecessary grade crossings. For more detail, see the 2021 MaineDOT Grade Crossing State Action Plan.

- **Upgrade major rail lines to 286K |** One defining characteristic of a rail line is the load that it is permitted to carry. The current US standard is that a rail line be rated for rail cars weighing up to 286,000 pounds, known as the "286K" standard. MaineDOT should continue coordination with railroads to achieve this standard through public-private partnerships and private investment.

- **Collaborate with CSX on planning and feasibility for upgrading the mainline to double-stack clearance from the New Hampshire state line to the Portland IMT |** Rail lines are rated for height based on the clearance underneath bridges. Accommodating intermodal freight to its full potential requires that bridges

[99] https://www.maine.gov/mdot/ofps/docs/railplan/MaineDOT_Rail%20Plan_May23_ACCESSIBLE.pdf

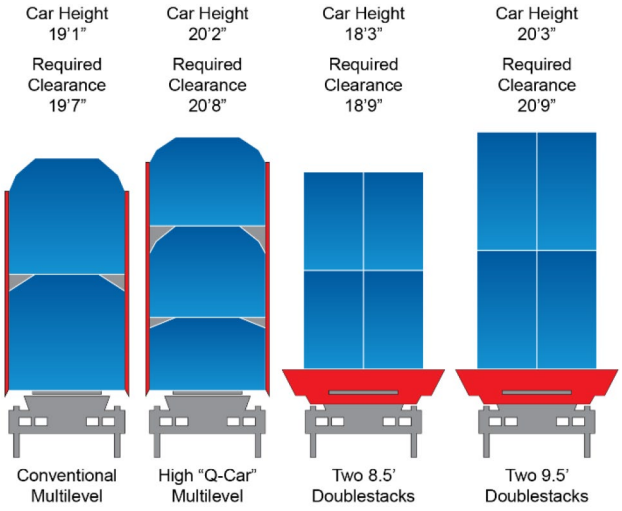
over a line be high enough to accommodate "double-stacking" as shown in Exhibit 5.2.[100] MaineDOT should collaborate with CSX on the complex effort to address the portion of the approximately 20 bridges on its mainline from Massachusetts north to Portland that prevent these operations, in order to improve prospects for intermodal freight both in Southeastern Maine generally and at the Portland IMT specifically.

» **Direct state investments in rail infrastructure toward intermodal hubs** | In addition to the ports (discussed in Section 5.1.3), these include the Presque Isle Commerce Center and the Auburn area distribution center, as well as the CSX Rigby Yard in South Portland.

» **Develop and utilize State and Federal resources to expand the rail mode** | MaineDOT should support efforts to shift volume from trucks to rail wherever possible to realize the benefits of reduced emissions and congestion. MaineDOT should continue its cooperative efforts with railroads, shippers, and regional planning agencies to identify underused rail served facilities and sites that could be developed to grow rail opportunities. MaineDOT should also explore expanding the role of rail in moving new energy commodities, including biofuels, equipment for wind turbines, and propane. Finally, **MaineDOT should continue its successful Industrial Rail Access Program (IRAP)** to fund new access to the rail network for Maine businesses.

» **Explore the appropriate role of the State in addressing rail equipment needs** | Specifically, MaineDOT should explore investing in fiber cars to address a shortage that is impacting the viability of Maine's forest products industry.

Exhibit 5.2 **Clearance Requirements for Doublestack Rail**



[100] Exhibit adapted from Dean Wise, 2019

5.1.3 MARITIME

» **Continue to invest in maintenance and upgrades for Maine's ports |** In particular, ensure that port equipment is maintained and upgraded as needed, including electrification in the short-to-medium-term.

» **Observe the completion of projects to enhance the Portland IMT |** As discussed in Section 3.3 and on the focus page prior to this chapter, these include the Maine International Cold Storage Facility and new container racks. Moving forward, and dependent on the double-stacking improvements to the CSX main line, MaineDOT should collaborate with MPA, CSX, and Eimskip to begin rail-based intermodal operations at the IMT using the existing high-quality rail terminal on-site.

» **Explore dredging of the Fore River shoreline |** While Federal funding was not secured for this project in the 2023 round of PIDP grants, MaineDOT should continue to partner with MPA to explore ways to complete this work of substantial benefit to the local fishing industry.

» **Advance infrastructure enhancements to the Port of Searsport |** These include continuing and completing efforts to collaborate with the US Army Corps of Engineers to dredge the Federal Navigation Channel; continuing to advocate for Federal grant funds to plan supportive facilities for offshore wind power generation; and collaborating with Canadian Pacific and Sprague to promote the use of rail infrastructure already in-place at the port.

» **Build an offshore wind port in the Port of Searsport |** At the direction of Maine's Governor, MaineDOT and the MPA are working to design, permit, and construct a purpose-built floating offshore wind marshaling port facility in Searsport by the late 2020s. This facility would allow for the fabrication, staging, assembly and maintenance of complete floating offshore wind turbines at a commercial scale.

» **Advance infrastructure enhancements to the Port of Eastport |** These include continuing to advocate for Federal grant funds for improvements to the breakwater and fish pier.

5.1.4 AIR CARGO

This section provides high-level recommendations, with discussion focused on benefits to the general movement of goods in Maine. A more granular discussion of recommendations for improving Maine's airports is provided in the 2021 Maine Aviation System Plan.[101]

» **Continue to invest in maintenance and upgrades for Maine's cargo airports |** Explore ways in which MaineDOT can continue to coordinate for needed upgrades to SGR maintenance and improvements for pavement, facilities, and equipment at PWM, BGR, and PQI. PWM has short-term plans to rehabilitate its cargo apron and long-term plans to expand it substantially to the east and south of the current location.

» **Explore improvements to multimodal connections at Maine's cargo airports |** MaineDOT should coordinate with airport management to ensure that bottlenecks do not exist or develop between cargo facilities and the Interstate and non-Interstate NHS highways.

[101] https://www11.maine.gov/mdot/aviation/docs/2021/MaineSASP%20Ph%20I%20-Final%20Technical%20Report-%20October%202021.pdf

» **Advance autonomous, electrified air cargo service to Maine's islands** | Advanced Air Mobility (AAM) range from small uncrewed aircraft systems to electric vertical takeoff and landing (eVTOL) aircraft designed to support regional transport and cargo delivery. AAM can open new markets previously unserved by legacy commercial aviation and ushering in a new era of connectivity and accessibility. MaineDOT should begin preparing now to support AAM when it is ready to fly. This may include exploring expansions to the network of charging stations for AAM.

5.2 Policy Recommendations

Policy recommendations are presented in short-term and long-term categories. Short-term recommendations address current or near-term needs. They are worthwhile to pursue in any environment, even as the State changes in the future. Like infrastructure and operational recommendations, many of the strategies identified in the 2017 MIFS are still relevant and are therefore included in the update.

5.2.1 SHORT-TERM POLICY RECOMMENDATIONS

» MaineDOT should continue to **maintain the FAC** and use it as a forum for discussion, coordination, and information-sharing.

» **Market Maine's maritime and rail assets** to North Atlantic and Maine companies competing in those markets to assist those companies but also improve the economics and use of those assets.

» Work with decision-makers to **think beyond Maine's borders** in regards to transportation and work with partners both regionally and internationally to **improve the freight system.**

» Work closely with the trucking and shipping community to **utilize technology to manage transportation and distribution functions (such as load matching and backhauls)** more efficiently.

» Work closely with private rail carriers and Federal agencies to **improve railroad safety and security**.

» Continue to implement existing policy that **allow limited access for higher-weight Canadian trucks to travel short distances inside the State border** to access Maine-based rail reload/transload facilities or mill sites.

» In conjunction with private sector and other local stakeholders, **develop policies to increase and improve intermodal freight transportation**.

» Work with the Administration and Legislature to **establish predictable, reliable funding sources** to address the need for **ongoing program and project operating costs and future acquisitions of railroad rights-of-way** and other facilities.

» Explore **innovative funding sources, including public-private partnerships, multi-state initiatives, and tax increment financing**. Continue partnerships for Environmental Protection Agency (EPA)-funded opportunities to acquire lower-emission equipment.

» Encourage **multicarrier projects that enhance intercarrier moves** to improve rail services, reduce transit time, and increase rail system reliability.

» **Maintain interagency coordination with State economic development and planning agencies** to provide a unified, statewide approach to goods movement planning and analysis.

- **Preserve rail corridors for current and/or future transportation needs.** State acquisition of a rail corridor is justified when State ownership is the most efficient means of preserving it.
- Coordinate with MPA, the Governor's Energy Office and private developers to **build a dedicated offshore wind port**.

5.2.2 LONG-TERM POLICY RECOMMENDATIONS

- **MaineDOT should coordinate with responsible State agencies and industry groups to promote skilled workforce development.** The labor and workforce challenges resulting from the Pandemic have combined with overall economic and industry trends to make a workforce strategy for freight-related jobs imperative. Before the Pandemic, the aging and retirement of skilled technical labor across all freight modes and a lack of effort (or legal restriction) obstructing the recruitment of young people put pressure on supply chains across the US. Automation and artificial intelligence play an increasing role in fulfillment and distribution centers, impacting labor relations.
- **MaineDOT should pursue relevant strategies in *Maine Won't Wait* in 2020 to reduce emissions and prepare for the impacts of climate change.** These include growing Maine's clean energy economy through improvements to port facilities that could be used for the wind power industry; investing in climate-ready freight infrastructure; supporting State efforts to assess the vulnerability of its infrastructure; encouraging the adoption of electrification and alternative fuels; and advancing mode-shift from trucks to rail.
- **MaineDOT should ensure that the burdens and benefits of freight movement in Maine fall equitably and do not further harm disadvantaged communities.** MaineDOT should honestly assess the benefits and burdens of freight investments in relation to identified disadvantaged communities. In addition, MaineDOT should seek and explore opportunities for public feedback from areas impacted by the negative externalities of freight movement, such as air pollution, noise pollution, and congestion.
- **Through the FAC, MaineDOT should engage more private-sector stakeholders in the statewide transportation planning and programming process and provide a forum for public agencies, industry groups and local business chambers to coordinate and integrate freight efforts.** As part of its outreach, MaineDOT should continue to work to market the State's transportation assets to the private sector.

  The performance-based planning and programming framework places emphasis on target-setting and repeating performance results to the public and to key stakeholders. Regarding freight performance, MaineDOT should engage the FAC on the State's freight performance results and their implications for achieving MaineDOT's freight targets. Not only would their insights provide valuable information to MaineDOT for assessing the potential impact of projects under planning and construction, but collecting them would engage an important constituency in the freight planning process.
- **MaineDOT should continue to focus on improving relationships with neighboring Canadian provinces and making improvements to Maine's border crossings.** Canada continues to be the State's top international trading partner by a wide margin, **accounting for approximately 90% of Maine's international freight trade both by tonnage and by value.** As discussed in Section 2.3.3, border crossings can act as bottlenecks, and MaineDOT should engage CBP to make physical and administrative investments as needed.


OVERSIZE LOAD

A APPENDICES

A.1 Glossary

TERM	DEFINITION
286K	The current US standard for freight rail lines that requires them to be rated for rail cars weighing up to 286,000 pounds
Advanced Air Mobility (AAM)	A range of technologies for small aircraft to sup-port regional transport and cargo delivery
Advanced Driver-Assistance Systems (ADAS)	Automated sensor-based systems to alert drivers to risks, assist drivers at risk of a crash, protect vehicle occupants during crashes, enable communication with other vehicles and with the roadway, and ensure vehicles perform as designed
Advanced Transportation Technology and Innovation Program (ATTAIN)	An FHWA discretionary grant program that selects projects for funding that pilot or model advanced transportation technology, including ADAS
Airport Improvement Program	An FAA discretionary grant program that provides funds to both public and private agencies for the planning of public-use airports
American Association of Motor Vehicle Administrators (AAMVA)	An international (including Canada) organization of departments of motor vehicles from states and provinces
Bipartisan Infrastructure Law (BIL)	An infrastructure investment bill signed into law in 2021 and enacted in the Infrastructure Investment and Jobs Act (IIJA)
Consolidated Rail Infrastructure and Safety Improvements Program (CRISI)	An FRA discretionary grant program that selects projects for funding that improve the safety, efficiency, and reliability of intercity passenger and freight rail
Critical Urban Freight Corridor (CRFC)	A set of important roads for freight in rural areas designated by states that are included in the NHFN and prioritized for Federal investment
Critical Urban Freight Corridor (CUFC)	A set of important roads for freight in urban areas designated by states that are included in the NHFN and prioritized for Federal investment
Family of Plans	An effort to develop MaineDOT's statewide long-range transportation plans with aligned vision and goals
Federal Aviation Administration (FAA)	An agency of the US Department of Transportation that oversees investment in and regulates the US aviation system
Federal Highway Administration (FHWA)	An agency of the US Department of Transportation that oversees investment in the nation's roadways
Federal Motor Carrier Safety Administration (FMCSA)	An agency of the US Department of Transportation that regulates the trucking industry in the United States
Federal Railroad Administration (FRA)	An agency of the US Department of Transportation that oversees investment in the nation's railways
Fixing America's Surface Transportation (FAST) Act	A transportation investment bill signed into law in 2015
Freight Advisory Council (FAC)	A group of public and private sector stakeholders with industry experience that advises MaineDOT on the MIFS and other decisions
Freight Analysis Framework 5 (FAF5)	An FHWA-produced dataset that estimates tonnage and value of freight flows by origin, destination, commodity type, and mode for 2019 and 2050
Gross domestic product (GDP)	The monetized market value of goods and services produced in a region or jurisdiction over a specific period of time

TERM	DEFINITION
Highway/Rail Grade Crossing Program (Section 130)	An apportioned FHWA investment program that funds improvements and elimination of highway/rail grade crossings
Hours-of-Service (HOS) Requirements	Limits set by FMCSA on how many consecutive hours a truck driver can be driving and requirements for how long they must rest
Industrial Rail Assistance Program (IRAP)	A public/private partnership program to provide financial assistance to businesses and shippers looking to improve infrastructure to access the rail system
Infrastructure for Rebuilding America (INFRA)	An FHWA discretionary grant program that selects projects for funding that improve safety and hold the greatest promise to eliminate freight bottle-necks and improve critical freight movements for a five-year period
Innovative Technology Deployment Program (ITD)	An FMCSA information-sharing initiative that includes public and private sector stakeholders
Justice40 Initiative	An effort across the Federal Government to direct 40% of the benefits for certain investments to dis-advantaged communities that are marginalized, underserved, and overburdened by pollution
Long-Range Transportation Plan (LRTP)	A document that traditional has a 20-year planning horizon that defines a DOT's vision and goals and ties them to project prioritization
Maine Integrated Freight Strategy (MIFS)	Maine's statewide freight plan
Military Strategic Rail Corridor Network (STRACNET)	A system of rail lines deemed necessary for emergency mobilization and peacetime movement of commodities to support US military operations
Moving Ahead for Progress in the 21st Century Act (MAP-21)	A transportation investment bill signed into law in 2012
National Electric Vehicle Infrastructure (NEVI) Pro-gram	An apportioned FHWA investment program established by BIL to construct charging infrastructure along designated alternative fuel corridors (AFCs)
National Highway Freight Network (NHFN)	FHWA's current set of important roads for freight that is used to prioritize Federal investment
National Highway Freight Program (NHFP)	An apportioned Federal investment program to improve efficient movement of freight on the NHFN
National Highway System (NHS)	A network of strategic highways in the United States that includes Interstates and other key access routes and is used to prioritize Federal in-vestment
National Highway Traffic Safety Administration (NHTSA)	An agency of the US Department of Transportation that enforces regulations on vehicle safety
National Multimodal Freight Network (NMFN)	FHWA's upcoming set of important roads, rail lines, terminals, ports, and airports for freight that will be used to prioritize Federal investment
National Performance Management Research Dataset (NMPRDS)	An FHWA-funded product that contains travel times in five-minute increments for NHS roadways
Performance and Registration Information Systems Management (PRISM)	An FMCSA information-sharing initiative that allows enforcement personnel to access Federal safety ratings information for trucking companies
Port Infrastructure Development Program (PIDP)	A MARAD discretionary grant program that selects projects for funding that improve the safety, efficiency, or reliability of the movement of goods in-to, out of around, or within a port
Precision Scheduled Railroading (PSR)	A management approach in which railroads run fewer, longer long-haul trains on simplified networks to streamline operations and save operating costs and which has been associated by safety advocates with compromises to rail safety
Primary Highway Freight System (PHFS)	A network of highways identified as the most critical on the US freight system by FHWA that are included in the NHFN and prioritized for Federal investment

TERM	DEFINITION
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	An FHWA discretionary grant program that selects critical freight and passenger transportation infra-structure projects for funding
Rural Surface Transportation Grant Program (RURAL)	An FHWA discretionary grant program that selects projects for funding that improve and expand the surface transportation infrastructure in rural areas
Small Harbor Improvement Program (SHIP)	A Maine state investment program that funds access and improvement at wharves, landings, and boat ramps
State-of-good-repair (SGR)	The condition an asset needs to be in to operate at its full level of performance
Strategic Highway Network (STRAHNET)	A system of roads deemed necessary for emergency mobilization and peacetime movement of commodities to support US military operations
Surface Transportation Board	An independent US Federal Agency that regulates railroads in the United States and maintains a data-base of rail flows by origin, destination, and commodity type called the “confidential waybill”
Truck Travel Time Reliability (TTTR)	A unitless metric that represents the additional time truck drivers need to build into their schedule to accommodate unreliable travel times
US Maritime Administration (MARAD)	An agency of the US Department of Transportation that oversees investment in the nation’s merchant marine and provides funding to ports
Vehicle-Miles Traveled (VMT)	A core measure of traffic volume

A.2 Critical Urban and Rural Freight Corridors

To qualify for Federal freight funding under the National Highway Freight Program (NHFP) as well as some Federal discretionary grant programs, freight projects must be located on – or improve freight movement on – the National Highway Freight Network (NHFN).

The NHFN is comprised of four component systems. The first two are designated by FHWA. The last two are identified by MaineDOT in consultation with regional and local planning partners.

- **Primary Highway Freight System |** A network of highways identified as the most critical highway portions of the US freight system according to national data. In Maine, I-95 and US-201 are on the PHFS.
- **Other Non-PHFS Interstate Highways |** These are the remainder of Interstate highways not included in the PHFS. In Maine, I-295 is an Interstate not on the PHFS.

  In 2012, the truck weight limit on Maine's Interstate highways (most notably I-95) was raised from the national standard of 80,000 pounds to 100,000 pounds to account for the unique challenges associated with Maine's forest industry, such as loading logging trucks in remote locations.

  While this change in weight limits permitted additional freight trucking use, it also created additional wear on Maine's most important roadway system. In response to this concern, MaineDOT developed an Interstate Operating Plan in 2016[102] to maintain and manage the State's Interstates and further study the effects of the increased weight limit.
- **Critical Rural Freight Corridors (CRFCs) |** MaineDOT has identified these roadways that are not in an urbanized area, which provide access to the PHFS and Interstate Highway System with other important freight or public transportation facilities. A provision of BIL calls for each state to establish CRFCs up to 300 miles or 20% of the PHFS mileage in the State.[103]
- **Critical Urban Freight Corridors (CUFCs) |** These roadways perform the same functions of the CRFCs in urbanized areas. BIL calls for each state to establish CUFCs up to 150 miles or 10% of the PHFS mileage in the State.

A CRFC or CUFC must be certified by FHWA before NHFP funds may be authorized for a freight project. As a result, MaineDOT will continually evaluate and update corridor designations based on identified needs. In addition, as noted above, BIL doubled the mileage of CRFCs and CRFCs that states can designate, so it was necessary for MaineDOT to designate new corridors as part of its compliance with the new law. The designation and redesignation process takes place on an ongoing basis in close coordination with stakeholders and FHWA.

A.2.1 FAST ACT REQUIREMENTS FOR DESIGNATING CRITICAL URBAN AND RURAL FREIGHT CORRIDORS

A CRFC must meet one or more of the following seven criteria:

1. Rural principal arterial roadway with a minimum of 25% of the annual average daily traffic of the road measured in passenger vehicle equivalent units from trucks.

[102] https://www.maine.gov/mdot/publications/docs/plansreports/Interstate-RIO-10-5-18_web.pdf

[103] https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhfp.cfm

2. Provides access to energy exploration, development, installation, or production areas.
3. Connects the PHFS or the Interstate System to facilities that handle more than: 50,000 20-foot equivalent units per year; or 500,000 tons-per-year of bulk commodities.
4. Provides access to a grain elevator, an agricultural facility, a mining facility, a forestry facility, or an intermodal facility.
5. Connects to an international port of entry.
6. Provides access to significant air, rail, water, or other freight facilities.
7. Is vital to improving the efficient movement of freight of importance to the economy of the State.

A CUFC must meet one or more of the following four criteria:

1. Connects an intermodal facility to the PHFS, the Interstate System, or an intermodal freight facility.
2. Located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement.
3. Serves a major freight generator, logistic center, or manufacturing and warehouse industrial land.
4. Is important to the movement of freight within the region, as determined by the MPO or the State.

Maine has currently designated 557.94 miles of CRFC, as listed in Exhibit A.1 and mapped in Exhibit A.2. Maine has currently designated 72.64 miles CUFC, as listed in Exhibit A.3 and mapped in Exhibit A.4.

Exhibit A.1 **List of Critical Rural Freight Corridors in Maine**

MAP ID	DESCRIPTION	CORRIDOR MILES
1	Coldbrook Road	Hermon Urban Line to Hammond Street	1.24
2	Coldbrook Road	Hermon Urban Line to I-95 Exit 180	0.15
3	Presque Isle Bypass	full extent	9.24
4	US-1	Jonesboro/Whitneyville town line to the Fort Kent Border Crossing	274.38
5	US-1	I-295 Exit 28 to Washington Street	18.27
6	ME-190	US-1 in Perry to endpoint in Eastport	7.09
7	ME-196	I-295 in Topsham to Lisbon Urban Line	5.58
8	ME-1A	US-1 in Jonesboro to US-1 in Machias	8.03
9	ME-2	Bangor town line to Coldbrook Road	2.28
10	ME-2	Maine/NH state line to I-95 in Newport	117.32
11	ME-4	Turner/Auburn town line to Wilton Route 4/2 Intersection	30.89
12	ME-9	ME-9/I-395 Connector to US-1 in Baileyville	80.39
13	ME-9	US-1 in Calais to the Canada Border	0.40
14	ME-9/I-395 Connector	full extent	2.69
		Total	**557.94**

Exhibit A.2 **Critical Rural Freight Corridors in Maine**

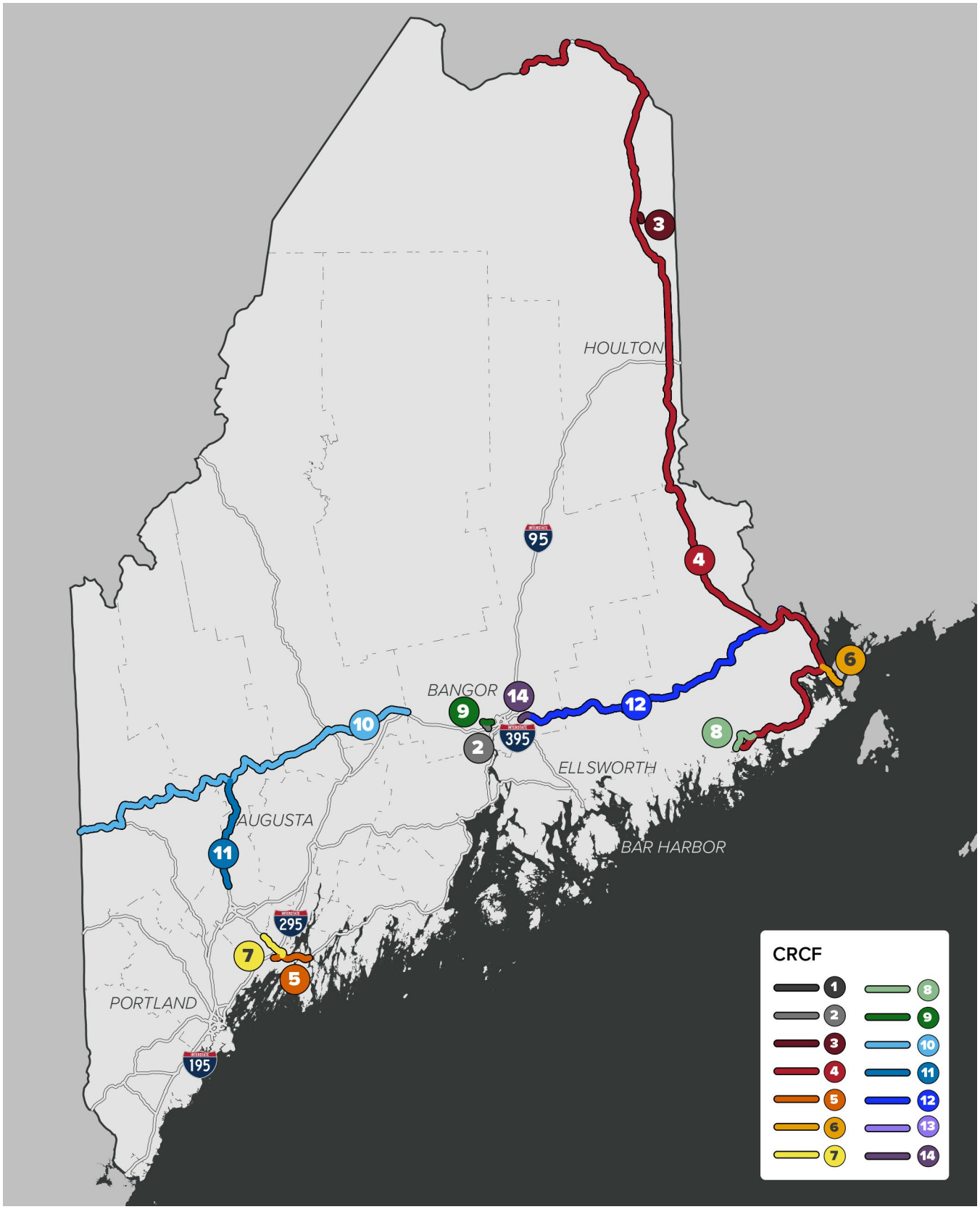
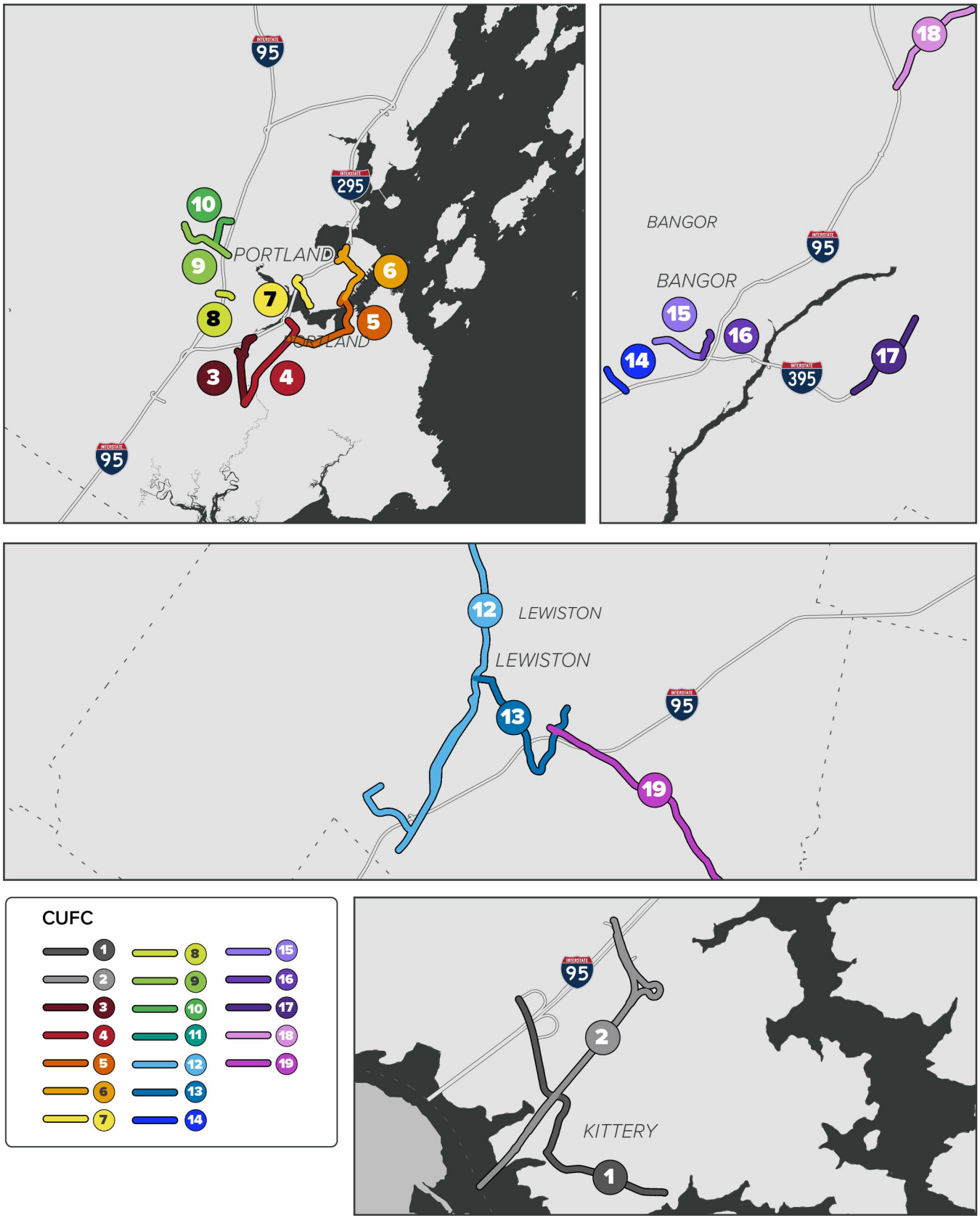


Exhibit A.3 **List of Critical Rural Freight Corridors in Maine**

MAP ID	MPO	DESCRIPTION	CORRIDOR MILES
1	KACTS	ME-103	I-95 Exit 1 to Shipyard Entrance	1.51
2	KACTS	US-1 Bypass	Maine/NH state line to I-95 Exit 2 via traffic circle	2.49
3	PACTS	Scarborough Connector	US-1 to I-295 Exit 2	4.83
4	PACTS	US-1	Scarborough Connector to I-295 Exit 4	3.80
5	PACTS	Broadway/Casco Bay Bridge	ME-12 (Commercial Street) to US-1	4.84
6	PACTS	Commercial and Franklin Streets	ME-12 to I-295 Exit 7	3.53
7	PACTS	Fore River Parkway	ME-23 (Congress Street) to ME-4	1.81
8	PACTS	Skyway Drive	ME-2A to I-95 Exit 46	0.41
9	PACTS	Westbrook Arterial	I-95 Exit 47 to ME-25B	3.03
10	PACTS	Larrabee Road	Westbrook Arterial to I-95 Exit 49	1.15
11	ATRC	ME-4	Auburn/Turner town/urban line to I-95 Exit 75	16.84
12	ATRC	Kitty Hawk Avenue	Airport/Train Depot to I-95 Exit 75	2.54
13	ATRC	Lincoln Street and Alfred Plourde Parkway	ME-4 to Webster Street	6.06
14	BACTS	Coldbrook Road	Urban line near I-95 to urban line near RRX	0.86
15	BACTS	ME-2	Hermon/Bangor town line to I-95 Exit 182	1.62
16	BACTS	Odlin Road	Hammond Street to I-395	0.94
17	BACTS	ME-9	ME-9/I-395 Connector to Brewer/Eddington town/urban line	2.96
18	BACTS	ME-2A	I-95 on Stillwater Avenue to Center Street to Main Street	3.43
19	ATRC	ME-196	I-95 Exit 80 to Lisbon urban line	10.00
			Total	**72.64**

Exhibit A.4 **Critical Urban Freight Corridors; Callout**



A.3 Freight Investment Plan

A.3.1 NHFP FREIGHT INVESTMENT PLAN

In addition to being located on – or improving movement on – the National Highway Freight Network, projects must be listed in a Freight Investment Plan (FIP) to qualify for funding under the National Highway Freight Program (NHFP) as well as under related discretionary grant programs.

Federal eligibility covers investments in:

- Planning, feasibility, preconstruction, mitigation and construction activities for highway, bridge, and multimodal capacity, safety, and operational projects.
- Technology, safety, operations, parking, security, and alternative fuels to improve system performance.
- Strategic planning, analysis, and data collection efforts.

Each fiscal year, up to 10% of NHFP funds may be used for intermodal or freight rail projects, including improvements located within private facilities.

The FIP must be fiscally constrained and document an investment approach for Federal funding, including sources of State matching funds. This appendix addresses these requirements and provides a framework for spending the approximately $42.44 million in Federal freight money expected through FY2028. Exhibit A.5 details the 2023-2028 projects funded within the NHFP and a breakdown of their costs by year and source.

Exhibit A.5 **Maine Freight Investment Plan, 2023-2027**

PROJECT	DESCRIPTION	PROJECT COST	SOURCE	FFY 2023	FFY 2024	FFY 2025	FFY 2026	FFY 2027
Bangor – Brewer, I-395 Westbound		$9,000,000	NHFP		$4.8M	$2.4M		
			Match		$1.2M	$0.6M		
Bangor – Brewer, I-395 Eastbound		$2,250,000	NHFP		$1.0M	$0.8M		
			Match		$0.25M	$0.2M		
West Gardiner – Topsham I-295 Southbound		$9,000,000	NHFP		$4.8M	$2.4M		
			Match		$1.2M	$0.6M		
Topsham – Gardiner I-295 Northbound		$9,000,000	NHFP		$4.8M	$2.4M		
			Match		$1.2M	$0.6M		
Palmyra – Pittsfield I-95 Southbound		$6,325,000	NHFP			$3.06M	$2.0M	
			Match			$765K	$500K	
Brunswick – Freeport I-295		$10,000,000	NHFP			$5.0M	$3.0M	
			Match			$1.25M	$0.75M	
Augusta – Waterville, Interstate 95		$7,475,000	NHFP				$4.0M	$1.98M
			Match				$1.0M	$495K

A.3.2 FEDERAL DISCRETIONARY GRANTS

Maine has pursued Federal discretionary grants to great success in recent years:

- **2022 INFRA Grant Award: Presque Isle Corridor Project |** MaineDOT was awarded $44.1 million to complete Phase II of the commercial two-lane bypass route of US-1 in Presque Isle. It includes a new interchange at US-1 and Conant Road; truck climbing lanes; four new overpasses to grade-separate the bypass from Henderson Road, Easton Road, Conant Road, and the rail line; box culverts; and multiuse trail crossings and Conant Road and Henderson Road.
- **2022 RURAL Downeast Coastal US-1 Rehabilitation Project |** MaineDOT was awarded $33 million to rehabilitate 68 miles of US-1 in Washington Count; including shoulder widening; replacing drainage structures; making safety improvements; installing new county guardrails and rumble strips; and preparing the corridor for electric vehicle chargers.
- **2022 RAISE Interstate 95 at Hogan Road Improvement Project |** MaineDOT was awarded $24.6 million to replace Maine's busiest diamond interchange at I-95 and Hogan Road in Bangor with a safer and more modern diverging diamond interchange.
- **2023 PIDP Portland IMT Reefer Yard Modernization Project |** MaineDOT was awarded $14.2 million to modernize a yard at the IMT that is used for refrigerated cargoes. Work includes the construction of racks to store containers with refrigerated cargoes, steel frames to house stairs to access containers, lighting, and electrical infrastructure to enable containers to be connected to shore power.
- **2022 CRISI Tri-State Regional Rail Upgrade Project |** The Vermont Agency of Transportation was awarded $9.7 million to develop and construct track-related improvements (improving to 286K) and grade crossing upgrades.

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Learn more about MaineDOT's Freight and Passenger Services