Freight Moves New Jersey:

2023 Statewide Freight Plan

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Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Author(s) and do not necessarily reflect the view of the Federal Highway Administration.

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ACRONYMS/ABBREVIATIONS

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
ABE	Lehigh Valley International Airport
ACT	Advanced Clean Truck
ACY	Atlantic City International Airport
AMHP	American's Marine Highway Program
ATA	American Trucking Associations
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
BSMP	Bridge Safety Management Program
BTS	Bureau of Transportation Statistics
CBP	County Business Pattern
CFS	Commodity Flow Survey
CHANJ	Connecting Habitat Across New Jersey
CMAQ	Congestion Management and Air Quality
COG	Councils of Government
CRFC	Critical Rural Freight Corridors
CSXT	CSX Transportation
CRFC	Critical Rural Freight Corridor
CUFC	Critical Urban Freight Corridors
DelDOT	Delaware Department of Transportation
DEP	Department of Environmental Protection
DERA	Diesel Emission Reduction Program
DOT	Department of Transportation
DRBA	Delaware River and Bay Authority
DRJTBC	Delaware River Joint Toll Bridge Commission
DRPA	Delaware River Port Authority
DVRPC	Delaware Valley Regional Planning Commission
EDI	Electronic Data Interchange
EJ	Environmental Justice
ELD	Electronic Logging Devices
EOH	East of Hudson
EPA	Environmental Protection Agency
EWR	Newark Liberty International Airport
FAA	Federal Aviation Administration
FAC	Federal Advisory Committee
FAF	Freight Analysis Framework
FAST	Fixing America's Surface Transportation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FMS	Freight Management System
FRA	Federal Railroad Administration
FRIO	Freight Rail Industrial Opportunity
FTA	Federal Transit Administration
GCT	Global Container Terminal
GDP	Gross Domestic Product
GIS	Geographic Information System
GMAP	Goods Movement Action Program
GMSC	Goods Movement Strategies for Communities
GSOE	Garden State Offshore Energy
GVWR	Gross Vehicle Weight Rating
GW	Gigawatts
GWB	George Washington Bridge

HM .... Hazard Materials
HMP .... Hazard Mitigation Plan
HOS .... Hours of Service
HPMS .... Highway Performance Monitoring System
HSIP .... Highway Safety Improvement Program
ICW .... Inter-Coastal Waterway
IIJA .... Infrastructure Investment and Jobs Act
IMF .... International Motor Freight
IMO .... International Maritime Organization
IND .... Indianapolis International Airport
INFRA .... Infrastructure for Rebuilding America
IPaC .... Information for Planning and Consultation
ISTEA .... Intermodal Surface Transportation Efficiency Act
JFK .... John F. Kennedy International Airport
LEP .... Limited English Proficiency
LFIF .... Local Freight Impact Fund
LNG .... Liquefied Natural Gas
LRTP .... Long-Range Transportation Plan
LUST .... Leaking Underground Storage Tank
LVPC .... Lehigh Valley Planning Commission
MAP .... Metropolitan Area Planning
MAPONYNJ .... Maritime Association of the Port of New York and New Jersey
MARAD .... Maritime Administration
MCO .... Orlando International Airport
MEM .... Memphis International Airport
MFT .... Motor Fuels Tax
MPDG .... Multimodal Project Discretionary Grant
MPO .... Metropolitan planning organizations
MP .... Milepost
MW .... Megawatts
NAAQS .... National Ambient Air Quality Standards
NAICS .... North American Industry Classification System
NAIOP .... National Association for Industrial and Office Parks
NCHRP .... National Cooperative Highway Research Program
NFSP .... National Freight Strategic Plan
NG .... Natural Gas
NGL .... Natural Gas Liquids
NHFN .... National Highway Freight Network
NHFP .... National Highway Freight Program
NHP .... Natural Heritage Program
NHS .... National Highway System
NJAC .... New Jersey Administrative Code
NJCU .... New Jersey City University
NJDEP .... New Jersey Department of Environmental Protection
NJDOT .... New Jersey Department of Transportation
NJEDA .... New Jersey Economic Development Authority
NJFAC .... New Jersey Freight Advisory Committee
NJMTA .... New Jersey Motor Truck Association
NJOEM .... New Jersey Office of Emergency Management
NJRRA .... New Jersey Railroad Association
NJTA .... New Jersey Turnpike Authority
NJTPA .... North Jersey Transportation Planning Authority
NMFN .... National Multimodal Freight Network
NMFP .... National Multimodal Freight Program
NPMRDS .... National Performance Management Research Data Set
NS .... Norfolk Southern
NYCDOT .... New York City Department of Transportation

NYCEDC ... New York City Economic Development Corporation
NYG ... New York Gateway
NYMTC ... New York Metropolitan Transportation Council
NYNJR ... New York New Jersey Rail
NYSDOT ... New York State Department of Transportation
O&M ... Operations & Maintenance
OEM ... Office of Emergency Management
OFP ... Office of Freight Planning
OGM ... Office of Grants Management
OS ... Oversize
OSW ... Offshore Wind
OW ... Overweight
PANYNJ ... Port Authority of New York and New Jersey
PATCO ... Port Authority Transit Corporation
PATH ... Port Authority Trans-Hudson
PDX ... Portland International Airport
PennDOT ... Pennsylvania Department of Transportation
PFN ... Primary freight network
PHFS ... Primary Highway Freight System
PortNYNJ ... Port of New York and New Jersey
PPGRT ... Petroleum Products Gross Receipts Tax
PPP ... Power Projection Platform
PROTECT ... Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation
PSR ... Precision Scheduled Railroading
PTP ... PortTruckPass
QCEW ... Quarterly Census of Employment and Wages
RFAP ... Rail Freight Assistance Program
RHC ... Railway Highway Crossings
RHCT ... Red Hook Container Terminal
RMP ... Risk Management Plan
RTP ... Regional Transportation Plan
SAP ... State Action Plan
SBC ... Southbound Connection
SCTG ... Standard Classification of Transported Goods
SDF ... Louisville International Airport
SEPTA ... Southeastern Pennsylvania Transportation Authority
SFP ... Statewide Freight Plan
SJPC ... South Jersey Port Corporation
SJTA ... South Jersey Transportation Authority
SJTPO ... South Jersey Transportation Planning Organization
SLD ... Straight Line Diagram
SMART ... Strengthening Mobility and Revolutionizing Transportation
STB ... Surface Transportation Board
STBG ... Surface Transportation Block Grant Program
STIP ... Statewide Transportation Improvement Program
STRAHNET ... Strategic Highway Network
T&E ... Threatened and Endangered
TEB ... Teterboro Airport
TEU ... Twenty-foot Equivalent Units
TIPS ... Terminal Informational Portal System
TLD ... Transportation Logistics and Distribution
TMA ... Transportation Management Associations
TMC ... Traffic Message Channel
TOSS ... Transportation Operations Systems and Support
TTFA ... Transportation Trust Fund Authority
TTN ... Trenton Mercer Airport
TTTR ... Truck Travel Time Reliability

UA........ Urban Area
UAS .... Unmanned Aircraft Systems
ULCV .... Ultra-Large Container Vessels
UPS .... United Parcel Service
USACE........ U.S. Army Corps of Engineers
USDOT .... U.S. Department of Transportation
USPS........ U.S. Postal Service
UST .... Underground Storage Tanks
VHET .... Vehicle Hours of Excess Travel
VHU .... Vehicle Hours of Unreliability
VMT........ Vehicle-Miles Traveled
WILMAPCO........ Wilmington Area Planning Council
WIM........ Weigh-in-Motion
WRI .... McGuire Air Force Base
WTG .... Wind Turbine Generator

Executive Summary: Freight Moves New Jersey

New Jersey's national economic competitiveness and excellent quality of life for its nearly 9.3 million residents are rooted in a strong and reliable freight distribution system. The State's geographic location positions it as a critical link in the national freight network and provides direct access to the major metropolitan markets of New York City and Philadelphia, serving as a gateway to global markets to the rest of the world. Major manufacturing firms and more than 230,000 businesses depend on New Jersey's freight infrastructure and network to provide functional and efficient operations.

The New Jersey Department of Transportation's (NJDOT) role in the safe and efficient movement of freight is to collaborate, coordinate, plan, partner when in the state's interest, and ensure that New Jersey's supply chain is sound, functional, reliable and resilient. NJDOT accomplishes this by utilizing subject matter expertise in research and data gathering to understand how, where, and why freight moves within the State. The 2023 Statewide Freight Plan (SFP) supports the NJDOT's efforts with the understanding that freight planning and freight investments must uphold New Jersey's vision of safety for all system users.

NJDOT manages a $3.063 billion capital program that strives to reduce congestion, improve air quality, and reduce impacts on historically impacted Environmental Justice communities, while also maintaining an infrastructure network that supports New Jersey's freight economy.

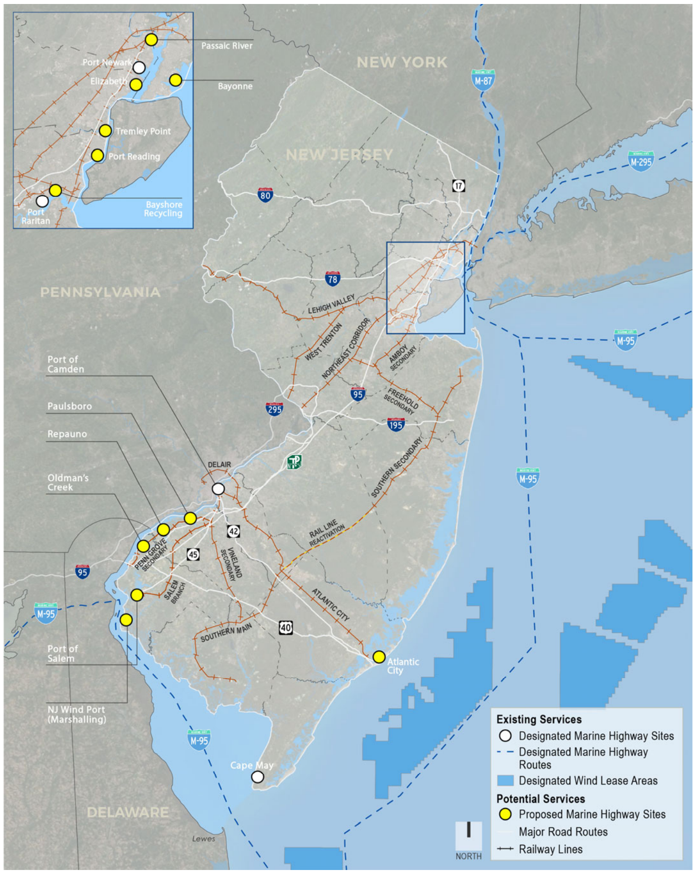
NJDOT oversees a 2,330-mile highway network, including the state's most critical freight arteries (I-78, I-80, I-287, I-295, NJ 17). NJDOT's Rail Freight Assistance Program (RFAP) provides state funding for rail projects that support the advancement of a robust multimodal rail network. Directly related to freight investment, NJDOT manages the Local Freight Impact Fund, a grant program dedicated to assisting local communities in need of funding for transportation projects focused on supporting freight and all users on local roadways.

Freight and goods movement are central to New Jersey's clean air strategy, *Clean Air NJ*. NJDOT is working directly with the New Jersey Economic Development Authority and wind port planners and developers to prepare for the movement of large, oversize and overweight wind power components by rail and water. Maritime growth is a critical link to ensure the success of the multimodal wind port network, especially when linked to New Jersey's highway and rail networks.

Section 5: Freight Trends – Wind Energy and Freight Transportation

New Jersey's wind power development sector is a key growth industry that requires investment in waterborne infrastructure to support the manufacture, assembly, or shipping of major wind components – which in many cases are too large or heavy to ship via roadway.

There is a growing need for a multimodal network to serve the state's future wind port planning needs – including landside rail and marine highway improvements, as shown in the map below.

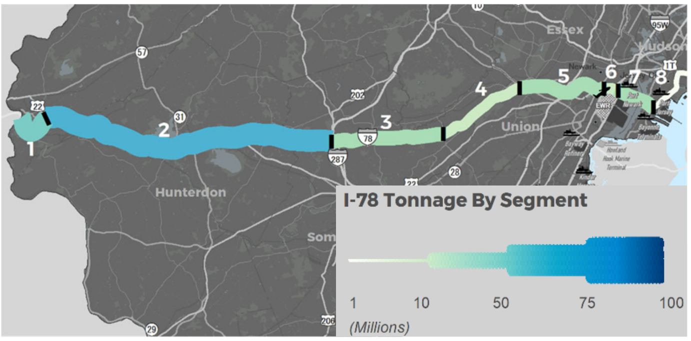


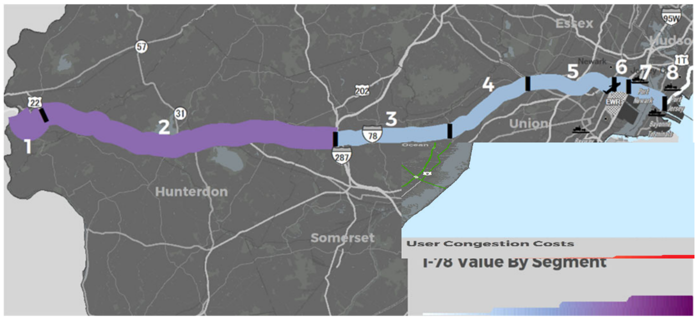
While the Statewide Freight Plan became a requirement passed as part of FAST (Fixing America's Surface Transportation) Act Legislation, the IIJA (Infrastructure Investment and Jobs Act) mandates that NJDOT must update its statewide freight plan once every four years. This requirement is directly tied to New Jersey receiving its National Highway Freight Program funding (currently $402M through FY2029).

Over the last five years of the 2017 Statewide Freight Plan implementation, the NJDOT worked to integrate freight needs, requirements, and improvements into NJDOT planning, operational, and capital program processes.

Section 7: Where Freight Moves - Highway Corridor Commodity Flows

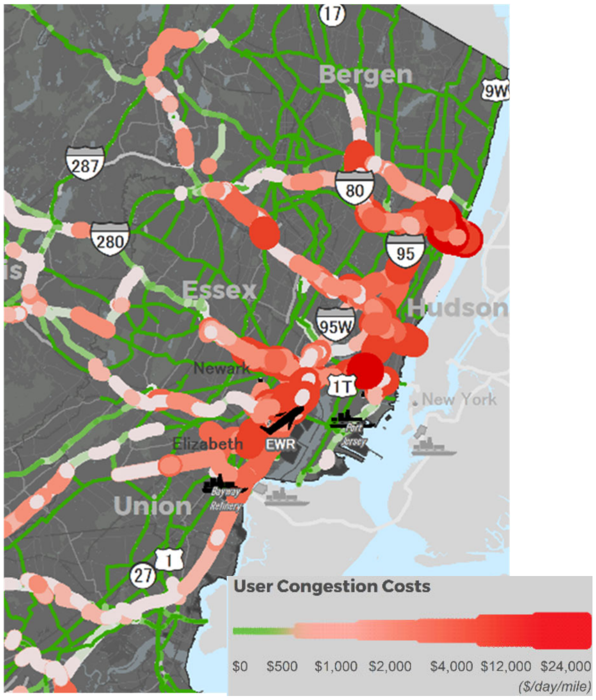
The Plan includes an analysis of specific commodity (tonnage and value) flows along several of the state's key highways. This provides NJDOT with a focused understanding of the volume and makeup of goods flowing within the state, allowing the ability to proactively target investments at locations where the need is most critical. For example, a review of I-78 shows the massive amount of cargo (tonnage and value) moving west of I-287 – indicative of the draw of the Lehigh Valley for freight flows.





Section 7: Where Freight Moves - Cost of Truck Congestion

For the first time, the Statewide Freight Plan identifies monetized impacts of congestion for roadways and commodities, allowing the state to clearly understand financial impacts of congestion on specific freight-centric industries.



With the development of the 2023 Statewide Freight Plan, the NJDOT engaged with internal and external partners to substantively understand the on-going work of others, regional freight needs, and perspectives. This outreach laid the framework for the actions and priorities identified in Section 3 (Next Steps) of this SFP.

Over the next four years, NJDOT plans to:

- Engage with partners on current trends and challenges, develop plans and opportunities.
- Develop freight-centric problem statements, based on robust and comprehensive data, which can be adopted into the NJDOT project delivery pipeline.
- Facilitate agency coordination to understand and plan for freight needs, including those specific to resiliency, air quality, and sea-level rise impacts.

- Work regionally with public and private sector partners to reduce freight impacts and move freight from road to rail and marine highway services.
- Plan collaboratively with the Port Authority of New York and New Jersey and the South Jersey Port Corporation to ensure facility throughput that reduces local community impacts.
- Promote NJDOT driven freight improvements, including education and safety efforts.
- Develop Best Management Practices that serve the public and private sector, design community and planners.
- Look to the future, planning for electric trucks, marine vessels and innovative technologies.

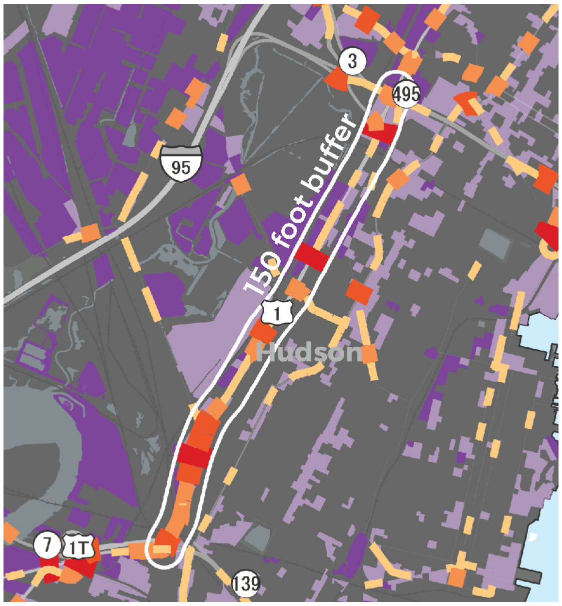
Going forward, NJDOT will improve upon the successes of New Jersey's current freight planning program, while continuing to expand the visibility of freight to a more diverse group of stakeholders and throughout the state. We also intend to think more broadly, partnering with Federal decision makers, leveraging their institutional knowledge and understanding.

This SFP is a comprehensive and encyclopedic document that lays out challenges, actions, and opportunities. It details how, where, why, and when cargo moves along New Jersey's multimodal freight network. NJDOT is proud to deliver the 2023 Statewide Freight Plan and looks forward to its implementation over the next four years. **Freight Moves New Jersey.**

SECTION 7: New Jersey's Freight Network – Analyzing Truck Crashes and Industrial Land Use Clusters

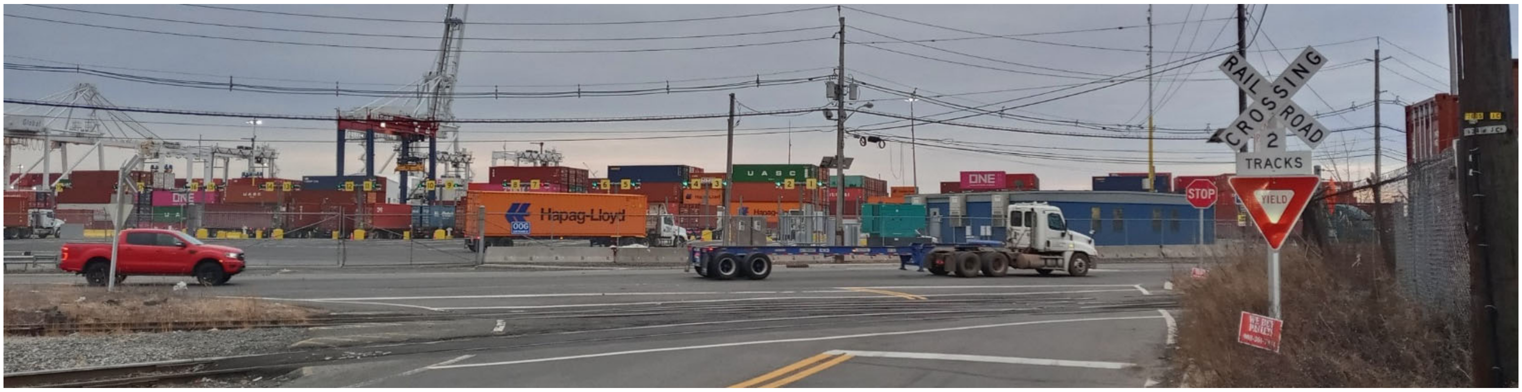
Enhanced and new datasets afford NJDOT the ability to more closely review truck crash clusters adjacent to industrial and commercial land use clusters. This pinpoints locations for a more targeted analysis and the identification of improvements to mitigate existing challenges.

For example, Tonnelle Avenue between Routes 139 and 495 in Hudson County, a known truck corridor lined by commercial and industrial uses, exhibits truck crash clusters along nearly the entire corridor.



With this broad background in mind, the 2023 Statewide Freight Plan lays out nine distinct sections, each with a specific theme – illustrating elements critical to New Jersey's freight infrastructure:

Section 1 Freight in New Jersey	An overview of why freight is critical for New Jersey and how this plan aligns with current Federal policy.	An economic analysis detailing the value and tonnage of freight in New Jersey, freight employment and GDP, key commodity groups for New Jersey and freight industry clusters.	Section 6 What We're Moving
Section 2 Guiding Principles	The Plan is defined by the goals and objectives, which inform the policies and actions outlined in Section 8. These align with Federal freight (Highway and Multimodal) goals.	Reviewing mode-specific (highway, rail, maritime, air, and pipeline) network performance, challenges, and unique needs.	Section 7 Where Freight Moves
Section 3 The Path Forward	How can NJDOT improve conditions for the goods movement industry and balance the need to reduce or minimize impacts on existing infrastructure and communities. This is the framework for the state's freight planning program that will continue after plan adoption.	Understanding how the goods movement industry is modernizing vehicles, facilities, and ultimately the supply chain.	Section 8 The Next Trends
Section 4 What We've Done	A summary of and links to 64 freight-focused Initiatives completed since 2017 within or adjacent to New Jersey.	An outline of how, when, and where New Jersey is currently investing existing transportation funds, as outlined within the State Transportation Investment Program.	Section 9 Building our Infrastructure
Section 5 State of Freight	Key trends that directly impact New Jersey's freight industry, its residents, and the built and natural environments.		



1 Freight in New Jersey: Introduction and Overview

Why freight is critical for New Jersey and how this plan aligns with current Federal policy.

The 2023 Statewide Freight Plan (SFP or the Plan) will advance strategies and actions for multimodal freight and infrastructure improvements, provide regional connectivity, and support planning partners and freight industry stakeholders serving New Jersey (NJ) and the New Jersey Department of Transportation (NJDOT). This Plan updates the State's current freight plan, adopted by the Federal Highway Administration (FHWA) in 2017. The 2017 Plan documented the role freight plays in the state's economy and its reliance on New Jersey's multimodal freight network. The 2023 Plan updates that discussion with current and more detailed data elements and will guide the state's freight planning program through 2026. More importantly, the Plan presents actions aimed at reinforcing New Jersey's status as the world's premier freight and logistics nexus, advancing innovative technologies and state of the art infrastructure, and supporting the growth of the nation's most advanced transportation workforce. Finally, the Plan provides a roadmap for future investments, including opportunities advanced through the Infrastructure Investment and Jobs Act (IIJA).

NJDOT Office of Freight Planning (OFP) Mission Statement

Through Planning, Projects and Partnerships the Office of Freight Planning facilitates the safe and efficient movement of freight through New Jersey.

The landscape of the goods movement industry has shifted and evolved since the completion of New Jersey's last Freight Plan in 2017. Shifts in how goods are obtained and consumed have reinforced the focus on policies and regulations that determine or impact transportation investments. New Jersey experienced unprecedented growth in freight volumes and industrial development. A global pandemic underscored the need and urgency of maintaining supply lines in the face of disruptions. It also introduced the public to a clearer understanding of supply chains, as shortages of everyday goods impacted normal daily life. Freight is primarily a private-sector function that can be improved and facilitated by planning for and making operational improvements that ultimately benefit the state's system and its users. NJDOT is the agency ultimately responsible for supporting, maintaining, and expanding the integrity of an integrated multimodal system.

1.1 BACKGROUND

This Plan is structured to meet the requirements of the Fixing America's Surface Transportation (FAST) Act and subsequently, the requirements of the Infrastructure Investment and Jobs Act, passed in November 2021. It is a multimodal plan reflective of New Jersey's locally, regionally, and globally critical freight network; including highways, railroads, intermodal facilities, air cargo, waterways, and pipelines. Through its compliance with Federal policy (49 USC 70202), the Plan provides New Jersey with access to freight-specific federal funding opportunities and enhances its ability to acquire competitive grant resources. The analyses and recommendations detailed within the Plan are aligned with Federal guidance, and address key requirements outlined within that policy, as detailed in Table 1, which also outlines specifically where those requirements are addressed within this Plan.

Table 1. Freight Plan Requirements, IIJA

State Freight Plan Requirement	How this Plan Addresses the Goal
Identification of significant freight system trends, needs, and issues;	▪ Previously Completed Work (p.17) ▪ Current Trends (p. 73)
Freight policies, strategies, and performance measures that will guide the freight-related transportation investment decisions of the State.	▪ Priorities and Actions (p.18) ▪ Investment Plan (p. 421)
A listing of-critical rural freight facilities and corridors designated within the State (when applicable)	N/A
A listing of-critical rural and urban freight corridors designated within the State (when applicable)	▪ Network Performance: Highway; Identification of Network (p. 214)
How the Plan will improve the ability of the State to meet the national multimodal freight policy goals and the national highway freight program goals	▪ Goals and Objectives (p. 12)
Innovative technologies and operational strategies, including freight intelligent transportation systems, which improve the safety and efficiency of freight movement	▪ Innovative Technologies and Strategies (p. 413)
Improvements that may be required to reduce or impede the deterioration of roadways traveled upon by heavy vehicles	▪ Network Performance: Highway; Oversize/Overweight Vehicles (p. 296)
Inventory of facilities with freight mobility issues (bottlenecks) within the State, and for state-owned facilities, a description of strategies the State is employing to address the freight mobility issues	▪ Network Performance: Highway; Truck Congestion and Bottlenecks (p. 224) ▪ Network Performance: Rail; Limitations of New Jersey's Rail Network (p. 353) ▪ Network Performance: Maritime (p. 362)
Consideration of significant congestion or delay caused by freight movements and strategies to mitigate that congestion or delay	▪ Network Performance: Highway; Truck Travel Time Reliability (p. 222) ▪ Network Performance: Highway; Truck Congestion and Bottlenecks (p. 224)
Freight investment plan that includes a list of priority projects and describes how funds will be invested and matched	▪ Investment Plan (p. 421)
Consultation with the State Freight Advisory Committee	▪ New Jersey Freight Advisory Committee (p. 8)
A recent commercial motor vehicle parking facilities assessment	▪ Network Performance: Highway; Truck Parking (p. 216)
Recent supply chain cargo flows in the State, by mode	▪ New Jersey's Freight Economy: Modes Utilized for Key Commodities (p. 185)
Inventory of commercial ports in the State	▪ Freight Land Uses (p. 103) ▪ Freight Industry Clusters (p. 190) ▪ Network Performance: Maritime (p. 360) ▪ Network Performance: Air (p. 379)
Consideration of the findings or recommendations made by any multi-State freight compact to which the State is a party	N/A
Impacts of e-commerce on freight infrastructure in the State	▪ Freight Trends: Advancements in e-Commerce (p. 88)
Considerations of military freight	▪ Network Performance: Military Freight (p. 407)
Strategies and goals to decrease the severity of impacts of extreme weather and natural disasters on freight mobility	▪ Freight Trends: Freight Land Uses (p. 103)
Strategies and goals to decrease the impacts of freight movement on local air pollution	▪ Freight Trends: Equity and Freight (p. 110)
Strategies and goals to decrease the impacts of freight movement on flooding and stormwater runoff	▪ Freight Trends: Freight Land Uses (p. 103)
Strategies and goals to decrease the impacts of freight movement on wildlife habitat loss	▪ Freight Trends: Freight Impacts to New Jersey's Wildlife Habitats (p. 100)

Of the 21 elements detailed in Table 1, 11 are consistent with previous guidance issued as part of the FAST Act. Elements **bolded** in Table 1 are new requirements added following the passage of the IIJA.

Through the implementation of policies and actions outlined in this plan, NJDOT intends to expand its freight planning program, emphasizing on four key themes:

Thought Leadership	Collaboration	Institutional Leadership	Funding

Within these four themes, the plan sets forth numerous intentions, including:

- Prepare cooperatively for New Jersey's freight future.
- Engage with partners on current trends and challenges, develop plans and opportunities.
- Develop freight-centric problem statements, based in robust and comprehensive data, which can be adopted into the NJDOT project delivery pipeline.
- Facilitate agency coordination to understand and plan for freight needs, including those specific to resiliency, air quality, and sea-level rise impacts.
- Document the State Freight Plan requirements outlined in the IIJA,
- Leverage available multimodal federal funds that support freight planning, programming, and project development.
- Identify freight-related opportunities to support grant funding requests, including regional MEGA projects.
- Humanize the efforts of the trucking and freight delivery community.
- Work regionally with public and private sector partners to reduce freight impacts and move freight from road to rail and marine highway services.
- Look to the future, planning for electric trucks, marine vessels, and innovative technologies.
- Investigate public-private partnerships and innovative opportunities that benefit the Department and can be Federally supported.
- Where it benefits the state system, support transportation partners in their endeavors to obtain federal funding specific to their modes.
- Plan collaboratively with the Port Authority of New York and New Jersey and the South Jersey Port Corporation to ensure facility throughput that reduces local community impacts.
- Continue significant state investments in rail freight that support both short-line and national freight movement.
- Integrate freight, where sensible, in local planning such as in Complete Streets policies and implementation.
- Develop a truck parking strategy for New Jersey that improves highway safety and integrates private sector investment.
- Promote NJDOT driven freight improvements, including education and safety efforts.
- Develop Best Management Practices that serve the public and private sector, design community and planners.

1.2 THE INFRASTRUCTURE INVESTMENT AND JOBS ACT (IIJA)

As noted above, the IIJA, passed in 2021, replaced the FAST Act and reauthorized Federal surface transportation programs through 2026. The IIJA is not limited to transportation needs, but addresses a variety of infrastructure needs as well, authorizing $550 billion in new funding in addition to the $650 billion in current funding programs. There are three types of programs funding freight-supportive projects in the IIJA:

- Authorization of existing programs with freight eligibility
- Authorization of previously appropriated discretionary grant programs
- New freight-related funding programs

1.2.1 Authorization of Existing Programs

Two formula funding programs are expanded by IIJA with new freight related features relevant to New Jersey, and are noted in Table 2:

- **National Highway Freight Program (NHFP):** Expands mileage for designation of critical rural and urban freight corridors for state and local agencies; raises cap for multimodal projects to 30% of program; adds lock, dam, and marine highway projects as eligible if the projects are functionally connected to the National Highway Freight Network (NHFN) and are likely to reduce on-road mobile source emissions.
- **Congestion Mitigation and Air Quality Improvement Program (CMAQ):** Allows states to spend up to 10% of Congestion Management and Air Quality Improvement funds on certain lock and dam modernization or rehabilitation projects and certain marine highway corridor, connector, or crossings projects if such projects are functionally connected to the Federal-aid highway system and are likely to contribute to the attainment or maintenance of a national ambient air quality standard.

Table 2. Existing Freight Supportive Funding Programs

Program	IIJA Section	Funding ($B)	Type	Recipients
National Highway Freight Program	11114	$7.15	Formula	▪ States
Congestion Mitigation and Air Quality Improvement Program	11115	$13.20	Formula	▪ States

1.2.2 Authorization of Existing Appropriated Programs

Two discretionary grant programs with extensive freight impacts were originally created through appropriations bills but have now been authorized by statute in IIJA. Both programs were partially funded through IIJA advance appropriations in Division J of the bill and are summarized in Table 3:

- **Nationally Significant Freight and Highway Projects:** This program (formerly INFRA), now raises the cap for multimodal projects to 30% of the annual program, sets aside $150M for projects that maximize match; 10% of program for multistate corridor organizations; 15% of program for small projects, 30% of which should be rural.
- **Local and Regional Project Assistance:** RAISE grants (BUILD grants in previous administration); includes highway or bridge projects, passenger or freight rail projects, port infrastructure projects, and surface transportation components of airport projects, among other surface transportation projects.

Table 3. Existing Discretionary Grant Programs

Program	IIJA Section	Funding ($B)	Type	Recipients
Nationally Significant Freight and Highway Projects (INFRA)	11110	$7.25	Competitive Grant	▪ States ▪ MPOs ▪ Local government ▪ Authorities ▪ Tribes
Local and Regional Project Assistance Grants (RAISE)	21202	$7.50	Competitive Grant	▪ States ▪ Local government ▪ Authorities ▪ Tribes ▪ Amtrak partnerships

1.2.3 New Freight-Related Funding Programs

Six funding programs relevant to New Jersey with freight impacts were created in the IIJA, summarized in Table 4:

- Reduction of Truck Emissions at Port Facilities: Program to coordinate and fund projects through competitive grants that reduce port-related emissions from idling trucks; included in advanced appropriations.
- Formula Carbon Reduction Program: Formula grant program to reduce transportation emissions and develop carbon reduction strategies. Advanced truck stop electrification is an eligible project.
- National Infrastructure Project Assistance: Program for "megaprojects" includes highway or bridge projects, freight intermodal or freight rail projects, railway-highway grade separation or elimination projects, intercity passenger rail projects, and certain public transportation projects; 50% of program goes to projects of $500 million or more, 50% to projects between $100 million to $500 million; this program is included in advanced appropriations.
- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT): Formula program and discretionary grants to support planning, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure. Formula funding goes to state DOTs, but the discretionary grants have broader eligibility. This program can support highway, transit, and certain port projects.
- Railroad Crossing Elimination Program: Grant program administered by the Federal Railroad Administration that will include improvements to highway and pathway rail crossings, such as eliminating highway-rail at-grade crossings that are frequently blocked by trains, adding gates or signals, relocating track, or installing a bridge.
- Strengthening Mobility and Revolutionizing Transportation Grants (SMART): The "SMART" program establishes a grant program for city or community demonstration projects that incorporate innovative transportation technologies or uses of data, including coordinated automation, connected vehicles, and intelligent sensor-based infrastructure; commercial vehicle projects are eligible.

Table 4. New Freight-Related Funding Programs Authorized

Program	IIJA Section	Funding ($B)	Type	Recipients	
Reduction of Truck Emissions at Port Facilities	11402	$0.40	Competitive Grant	▪ Unspecified	
Carbon Reduction Program	11403	$6.41	Formula	▪ States	
National Infrastructure Project Assistance	21201	$5.00	Competitive Grant	▪ States ▪ Local government ▪ Authorities	▪ Tribes ▪ Amtrak partnerships
Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation (PROTECT)	11405	$7.30	Formula	▪ States	
Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation (PROTECT)	11405	$1.40	Competitive Grant	▪ States ▪ MPOs ▪ Local government	▪ Authorities ▪ Tribes
Railroad Crossing Elimination Program	22104	$3.00	Competitive Grant	▪ States ▪ MPOs ▪ Local government	▪ Authorities ▪ Tribes
Strengthening Mobility and Revolutionizing Transportation (SMART) Grant Program	25005	$0.50	Competitive Grant	▪ States ▪ Authorities ▪ Tribes	▪ Transit/Toll Authorities ▪ MPOs

1.2.4 State Freight Planning Provisions

The IIJA makes changes to freight planning requirements that NJDOT must meet as it updates its state freight mobility plan. The IIJA increases the frequency of freight plan updates from once every five years to once every four years. States have authority to designate slightly larger National Multimodal Freight Networks, 30% of total mileage designations, up from 20% in the FAST Act. The IIJA also adds issues and topics for consideration in state freight plans, as detailed in Table 1.

The IIJA expands membership of state freight advisory committees to include representation of additional freight stakeholders and agencies than the FAST Act (as applicable) including:

- Freight industry workforce
- State environmental protection agencies
- Air resources boards
- State economic development agencies
- Non-profit and community organizations

1.3 WHY IS FREIGHT SO IMPORTANT TO NEW JERSEY?

Port Jersey, Bayonne, Hudson County (Source: WSP)

Freight plays an important and critical role in New Jersey, serving the needs of local and regional deliveries as well as domestic and international trade. The State's geographic location uniquely positions it as a critical link in the national freight network and provides direct access to the major metropolitan markets of New York City and Philadelphia, as well as serving as a gateway to global markets, linking North American markets to the rest of the world. The State is within a day's drive of 40% of the U.S. population. A 500-mile radius of the Newark and Elizabeth waterfront area includes most of the northeastern U.S. and major Canadian metropolitan areas (Montreal, Ottawa, and Toronto).

New Jersey's extensive multimodal freight network includes highways, rail lines, air routes, marine waterways, and pipelines. The State contains some of the country's most heavily utilized marine ports and airport facilities including the Port of New York and New Jersey (PortNYNJ) and Newark International Airport. The State is home to major manufacturing firms and numerous businesses dependent on the freight infrastructure and network to provide functional and efficient operations. Freight is essential in New Jersey to maintain the State's economic competitiveness and quality of life, by providing goods to support the entire population of nearly 9.3 million people and supporting more than 230,000 businesses in New Jersey.[1] The State's freight network transports raw materials for production; manufactured goods for distribution; consumer goods for retail; agricultural products and food for consumption; pharmaceuticals for medical purposes; materials for construction; supplies for businesses; waste for disposal; fuel for transportation; and utilities for energy to residential homes and businesses.

The State's economy and job market depend heavily on the freight network that is associated with businesses and employment across many industry sectors. The safety and efficiency of the State's freight transportation network is vital to the sustenance and growth of all sectors of New Jersey's economy. Freight-dependent industries accounted for approximately 32% of the State's GDP and employ almost two million people, representing 45% of the total employed workforce of 4.4 million people in New Jersey.[2] [3] During initial shutdowns associated with the COVID-19 pandemic, freight operation was essential to transporting goods and necessities. In 2021, freight-dependent industries recovered faster than most other industries, with nearly a 6.5% growth in freight employment compared to the statewide growth rate of 3.25% across all industries.

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1 U.S. Census 2020

2 Bureau of Economic Analysis

3 U.S. Bureau of Labor Statistics - Current Population Survey (CPS)

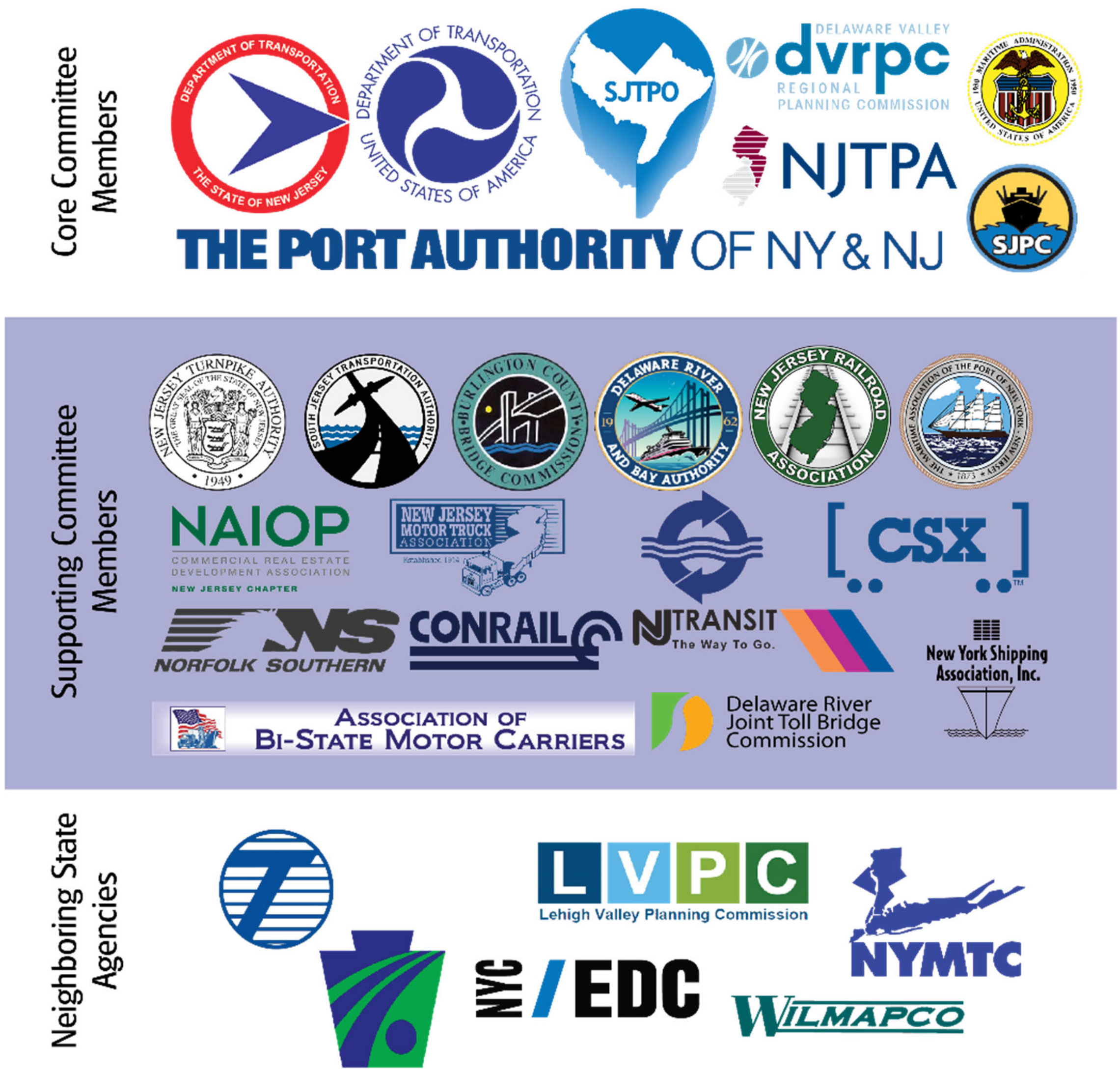
Port Newark Container Terminal, Newark, Essex County (Source: © David Sailors)

1.4 NEW JERSEY FREIGHT ADVISORY COMMITTEE

NJDOT coordinates and oversees the New Jersey Freight Advisory Committee (NJFAC) to advance the needs of and provide support for the state's goods movement industry. NJFAC members reflect a diverse cross-section of public and private sector stakeholders reliant on New Jersey's freight infrastructure. NJFAC members include many of the organizations summarized below, including partners from several neighboring states and multi-state organizations. Ultimately the NJFAC facilitates a conversation amongst partners throughout New Jersey and adjacent jurisdictions, taking a unified and regional approach to the planning process. Organizations participating in the NJFAC are illustrated in Figure 1; a brief summary of each follows.

Following the onset of the COVID-19 pandemic, the NJFAC shifted from in-person meetings to a virtual format. NJDOT leadership remains committed to supporting New Jersey's freight industry and extending this dialogue with local communities and stakeholders.

Figure 1. New Jersey Freight Advisory Committee



1.4.1 *Members of the Freight Advisory Committee*

CORE COMMITTEE MEMBERS

- New Jersey Department of Transportation (NJDOT): Public transportation agency with jurisdiction over freight-related infrastructure and activity throughout the State; one of the three Goods-Movement Action Program (G-MAP) founding partner-agencies, along with the New York State Department of Transportation (NYSDOT) and the Port Authority of New York and New Jersey (PANYNJ).
- Federal Highway Administration (FHWA): Provides guidance and direction to State DOTs that are planning, developing, and maintaining State Freight Plans, and oversees coordination of state efforts with national policy. Additionally, the FHWA helps prioritize funding for multimodal transportation capital investments.
- United States Maritime Administration (MARAD): The USDOT agency responsible for oversight of the nation's maritime transportation infrastructure, including ports, vessel operations, safety, and marine highways.
- Delaware Valley Regional Planning Commission (DVRPC): The MPO for the greater Philadelphia region, representing counties in both New Jersey and Pennsylvania; are active in freight planning studies and guiding freight planning

efforts across the region, including supporting the Delaware Valley Goods Movement Task Force, which meets quarterly to discuss freight trends within the region.

- **North Jersey Transportation Planning Authority (NJTPA):** The MPO for northern New Jersey; has produced freight-related planning studies, modeling tools, and activity profiles in support of freight development in the State. NJTPA also supports the region by hosting the Freight Initiatives Committee, a group of regional freight stakeholders that meets six times annually to discuss freight trends within the region.
- **Port Authority of New York and New Jersey (PANYNJ):** A bi-state authority that owns, builds, operates, and maintains key transportation infrastructure critical to the New York/ New Jersey region's trade and transportation network. Within New Jersey, this includes the Port Newark-Elizabeth Marine Terminal, Newark Liberty International Airport (EWR), the Goethals and Bayonne Bridges, and the Outerbridge Crossing.
- **South Jersey Port Corporation (SJPC):** Operates marine shipping terminals in the South Jersey Port District, including the Port of Camden. Additionally, SJPC maintains facilities at the Port of Paulsboro and Port of Salem.
- **South Jersey Transportation Planning Organization (SJTPO):** The MPO for the southern portion of the State; it oversees transportation planning initiatives in Atlantic, Cape May, Cumberland, and Salem counties.

SUPPORTING COMMITTEE MEMBERS

Bridge and Toll Commissions

- **Delaware River and Bay Authority (DRBA)** A bi-state agency tasked with overseeing transportation links between New Jersey and Delaware. The DRBA operates the Delaware Memorial Bridge (I-295/U.S. 40), the Cape May-Lewes Ferry (U.S. 9), the Forts Ferry Crossing, the Salem County Business Center and two regional airports in New Jersey (Cape May Airport, Millville Airport).
- **Delaware River Joint Toll Bridge Commission (DRJTBC):** A bi-state public agency operating and maintaining 20 bridges over the Delaware River between Pennsylvania and New Jersey, including the Delaware Water Gap Toll Bridge (I-80) and the Interstate 78 Toll Bridge.
- **Delaware River Port Authority (DRPA):** A bi-state agency overseeing transportation linkages between New Jersey and Pennsylvania, including four bridges over the Delaware River within the Philadelphia region, ferry services, and the Port Authority Transit Corporation (PATCO) passenger rail service.
- **New Jersey Turnpike Authority (NJTA):** An autonomous agency operating and maintaining the New Jersey Turnpike and the Garden State Parkway, including bridge structures on the two roadways.
- **South Jersey Transportation Authority (SJTA):** A public entity overseeing operations and maintenance of key transportation infrastructure in southern New Jersey, including the Atlantic City Expressway and Atlantic City International Airport.

Rail Industry

- **Conrail:** A private rail operator that primarily functions as a switching and terminal railroad, operating in New Jersey and Philadelphia, owned by CSX and Norfolk Southern.
- **CSX:** A Class I railroad, which, along with Norfolk Southern, comprises all east-west freight railroad traffic east of the Mississippi River, as well as north-south freight railroad traffic along the I-95 corridor.
- **New York, Susquehanna, and Western Railway (NYS&W):** A private rail operator whose rail line covers portions of New Jersey, New York, and Pennsylvania; distributes bulk supplies and materials for customers throughout the three states.
- **New Jersey Railroad Association:** An advocacy group comprised of 11 railroads and rail freight stakeholders serving the State of New Jersey, with the purpose of addressing issues facing short line railroads through collective efforts and cooperation.

- **NJ TRANSIT**: A state agency that provides the majority of rail passenger service in the State, as well as bus services. It coordinates with the NJDOT and MPO partners to oversee freight service operating over its rail lines.
- **Norfolk Southern (NS)**: A Class I railroad, which, along with CSX, comprises all east-west freight railroad traffic east of the Mississippi River, as well as north-south connections to the southeastern United States.

Maritime Industry

- **Maritime Association of the Port of New York and New Jersey (MAPONY/NJ)**: An advocacy group that promotes and represents maritime interests specific to the Port of NY/NJ area.
- **Maritime Exchange for the Delaware River and Bay:** Advocates for the Delaware River commercial maritime industry, promoting local and Federal policy guidance aimed at ensuring the continued viability of the Delaware River as an economic generator.
- **New York Shipping Association**: Represents terminal operators, ocean carriers, stevedores, and marine-related businesses operating in the Port of New York and New Jersey.
- **NY/NJ Foreign Freight Forwarders/Brokers**: Represents ocean transportation intermediaries; provides input and facilitates discussion on policy and regulatory decision-making impacting international trade.

Trucking Industry

- **Association of Bi-State Motor Carriers**: An organization of trucking industry owners and operators, dedicated to serving the needs of its members in intermodal transportation, especially at the Port of New York and New Jersey.
- **New Jersey Motor Truck Association (NJMTA)**: Represents the trucking community in New Jersey, with the purpose of promoting sound economical and efficient service by motor carrier transportation and fostering and supporting beneficial regulations affecting the motor industry.

Freight Industry

- **National Association for Industrial and Office Parks (NAIOP) New Jersey Chapter**: Represents developers, owners, and related professionals in office, industrial and mixed-use real estate, who advocate for and contribute to infrastructure improvements supporting commercial and industrial development. Efforts support economic and job growth in the State, and promotion of the State's port regions.

Neighboring State Agencies

- **Lehigh Valley Planning Commission (LVPC)**: The MPO for Lehigh and Northampton counties within the Commonwealth of Pennsylvania. The LVPC represents a key nationally significant freight node that is directly adjacent to New Jersey.
- **New York Metropolitan Transportation Council (NYMTC):** The MPO for New York City, Long Island, and three Hudson Valley counties (Putnam, Rockland, Westchester). The NYMTC region is directly adjacent to northern New Jersey and includes multiple highway, rail, and maritime connections that traverse the Hudson River.
- **New York State Department of Transportation (NYSDOT):** Oversees transportation operations in New York State; one of the three G-MAP agencies.
- **Pennsylvania Department of Transportation (PennDOT):** Oversees transportation operations and provides regulatory oversight for freight-related transportation and infrastructure across Pennsylvania.
- **Wilmington Area Planning Council (WILMAPCO)**: The MPO for New Castle County, Delaware and Cecil County, Maryland. WILMAPCO represents the planning area for the region directly south of New Jersey, including the Delaware Memorial Bridge, a key regional link carrying I-295 across the Delaware River.

2 Guiding Principles: Goals and Objectives

The Plan is defined by the goals and objectives, which align with Federal freight (Highway and Multimodal) goals.

The SFP is defined by the goals and objectives outlined below. These goals provide a framework for developing strategies and actions to advance the Plan. The goals were developed in consultation with FAC members to ensure that they reflect the needs and priorities of freight stakeholders statewide. The guiding principles of the New Jersey Statewide Freight Plan are:

The 2023 New Jersey Statewide Freight Plan is an actionable plan that supports New Jersey's status as the world's premier freight and logistics nexus, advancing innovative technologies and state of the art infrastructure, and providing opportunities for the growth of the nation's most advanced transportation workforce.

The goals and objectives for the Statewide Freight Plan are:

<u>Enhance System and Supply Chain Safety and Security</u>: Modernize and improve New Jersey's freight infrastructure to support the reliable and safe movement of cargo.

<u>Strengthen System and Supply Chain Competitiveness and Productivity</u>: Support New Jersey's goods movement industry, including existing and growth industries through a reliable and efficient multimodal freight transportation network.

<u>Advance System Reliability, Efficiency, Redundancy, Fluidity, and Connectivity</u>: Improve interconnections between freight modes to allow for the seamless movement of goods throughout all modes within New Jersey.

<u>Enhance System Resiliency and Sustainability</u>: Proactively identify opportunities to ensure New Jersey's freight transportation network can withstand or quickly recover from industry-related or natural disasters, including from extreme weather and stormwater runoff/flooding. Support ongoing state initiatives aimed reducing greenhouse gas emissions, including vehicle electrification goals outlined in NJDEP's Global Warming Response Act 80x50 Report.

<u>Maintain and Renew State Highway Infrastructure</u>: Advance highway projects that improve conditions for freight.

<u>Maintain and Renew Multimodal Infrastructure</u>: Identify and prioritize state of good repair investments.

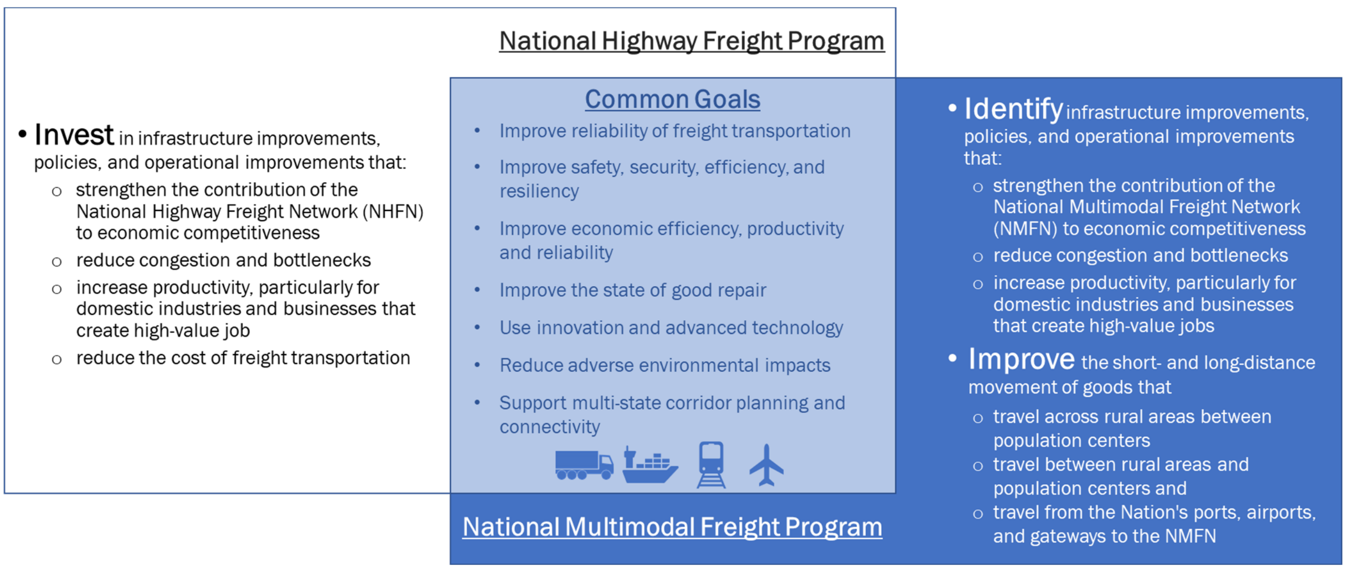
<u>Advance Freight as a Good Neighbor through Environmental Stewardship, Equitable Policy Decisions, Responsible Development, and Quality of Life</u>: Improve or reduce the impacts of freight on New Jersey's communities, including noise or air quality, as well as wildlife habitats. Improve existing tools (including the NJDOT Freight Management System) to include equity measures to better prioritize future transportation investments.

<u>Facilitate Intra-, Inter-, and Multi-state agency Coordination and Governance and Actions:</u> Continue to advance multi-agency relationships to assist in the prioritization of policies and investments. Promote open communication between state and private sector partners to understand and prioritize investment needs.

Leverage Advanced Technology, Multimodal Freight Transportation, and Public-Private Partnership Opportunities and Practices: Embrace and invest in burgeoning technologies that will enhance New Jersey's economic competitiveness.

Recent state and regional freight plans, studies, and initiatives were reviewed to ensure concurrence and continuity across existing plans and policies. Current Federal guidance was confirmed during the assembly of the goals and objectives, including the National Highway Freight Program (NHFP) and National Multimodal Freight Program (NMFP), illustrated in Figure 2. Key elements of these goals are highlighted and are the framework for the SFP goals and objectives, and ultimately the goals of the SFP align with the NHFP and NMFP goals, as illustrated in Table 5. Each of the SFP goals and objectives is linked to policies and actions that are the outcome of this plan, detailed and summarized in Section 3.1. Where practicable, for each of these policies and actions, a supporting performance measure has been identified, to assist NJDOT in quantifying its successes, while also allowing the state to understand areas where continued improvements may be needed.

Figure 2. NHFP and NMFP Goals



Source: https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhfp.cfm; https://uscode.house.gov/view.xhtml?path=/prelim@title49/subtitle9/chapter701&edition=prelim

Table 5. Linking SFP Goals with National Highway and Multimodal Freight Program Goals

SFP Goal	National Highway Freight Program Goal	National Multimodal Freight Program Goal
Enhance System and Supply Chain Safety and Security	Improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.	Improve the safety, security, efficiency, and resiliency of multimodal freight transportation.
Strengthen System and Supply Chain Competitiveness and Productivity	Improve the efficiency and productivity of the National Highway Freight Network.	Improve the economic efficiency and productivity of the National Multimodal Freight Network.
		Identify infrastructure improvements, policies, and operational innovations that: (A) strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States (B) reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network (C) increase productivity, particularly for domestic industries and businesses that create high-value jobs.
Advance System Reliability, Efficiency, Redundancy, Fluidity, and Connectivity	Improve the efficiency and productivity of the National Highway Freight Network.	Improve the economic efficiency and productivity of the National Multimodal Freight Network.
		Improve the reliability of freight transportation.
	Invest in infrastructure improvements and implement operational improvements on the highways of the United States that: (A) strengthen the contribution of the National Highway Freight Network to the economic competitiveness of the United States (B) reduce congestion and bottlenecks on the National Highway Freight Network (C) reduce the cost of freight transportation (D) improve the year-round reliability of freight transportation (E) increase productivity, particularly for domestic industries and businesses that create high-value jobs.	Improve the short- and long-distance movement of goods that: (A) travel across rural areas between population centers; (B) travel between rural areas and population centers; (C) travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network.
Enhance System Resiliency and Sustainability	Improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.	Improve the safety, security, efficiency, and resiliency of multimodal freight transportation.
Maintain and Renew State Highway Infrastructure	Improve the state of good repair of the National Highway Freight Network.	
Maintain and Renew Multimodal Infrastructure		Achieve and maintain a state of good repair on the National Multimodal Freight Network.
Advance Freight as a Good Neighbor through Environmental Stewardship, Equitable Policy Decisions, Responsible Development, and Quality of Life	Reduce the environmental impacts of freight movement on the National Highway Freight Network.	Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network.

SFP Goal	National Highway Freight Program Goal	National Multimodal Freight Program Goal
Facilitate Intra-, Inter-, and Multi-state agency Coordination and Governance and Actions	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.	Pursue national goals in a manner that is not burdensome to State and local governments.
		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 multimodal freight connectivity.
Leverage Advanced Technology, Multimodal Freight Transportation, and Public-Private Partnership Opportunities and Practices	Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Highway Freight Network.	Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network.

Source: 2020 National Freight Strategic Plan

Additionally, the National Freight Policy Strategic Goals outlined in the 2020 National Freight Strategic Plan (NFSP), illustrated in Table 6 were consulted. As with the NHFP and NMFP, these Federal goals were used to inform the SFP project team in the development of the SFP goals and objectives.

Table 6. National Freight Policy Strategic Goals

GOAL	STRATEGIC OBJECTIVES
Safety Improve the safety, security, and resilience of the national freight system.	▪ Support the development and adoption of automation, connectivity, and other freight safety technologies ▪ Modernize safety oversight and security procedures ▪ Minimize the effects of fatigue and human error on freight safety ▪ Reduce conflicts between passenger and freight traffic ▪ Protect the freight system from natural and human-caused disasters and improve system resilience and recovery speed
Infrastructure Modernize freight infrastructure and operations to grow the economy, increase competitiveness, and improve quality of life.	▪ Fund targeted investments in freight capacity and national goals ▪ Improve consideration of freight in transportation planning ▪ Prioritize projects that improve freight intermodal connectivity, and enhance freight flows on first- and last-mile connectors and at major trade gateways ▪ Develop a methodology for identifying freight bottlenecks across modes ▪ Advance freight system management and operation practices ▪ Stimulate job growth and economic competitiveness in rural and urban communities ▪ Mitigate the impacts of freight movement on communities
Innovation Prepare for the future by supporting the development of data, technologies, and workforce capabilities that improve freight system performance.	▪ Support the development and adoption of automation and connectivity, including V2X technologies ▪ Support the safe deployment of unmanned aircraft systems (UAS) technology ▪ Streamline or eliminate regulations to improve governance, efficiency, and economic competitiveness ▪ Improve freight data, modeling, and analytical tools and resources ▪ Strengthen workforce professional capacity ▪ Invest in freight research ▪ Support regulatory frameworks that foster freight innovation

Source: 2020 National Freight Strategic Plan

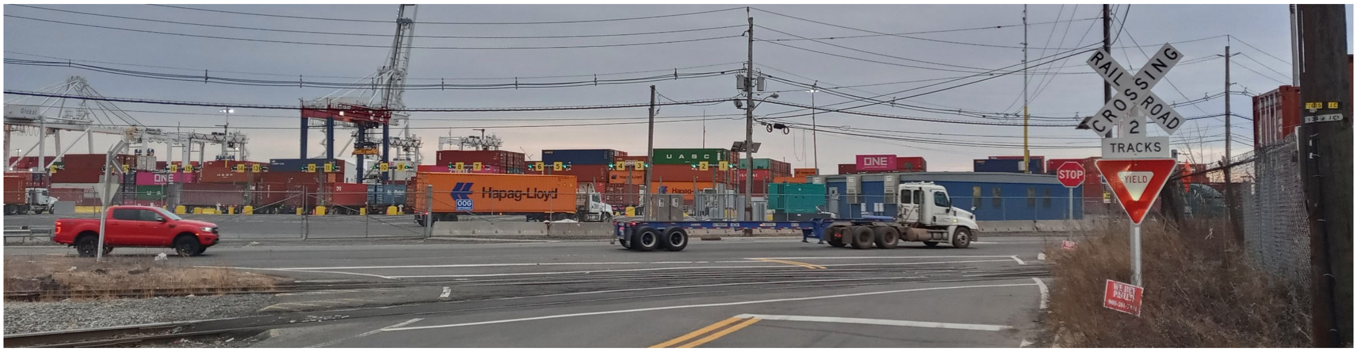
Finally, the project team reviewed previously completed New Jersey plans (2017 SFP and Long-Range Transportation Plan) and other state freight plan goals and objectives to identify common themes being advanced nationally. The results of this high-level review are summarized in Table 7 and Table 8.

Table 7. Summary of State Freight Plan Goals and Objectives

Keyword	NHFP	NMFP	2020 NFSP	2017 NJSFP	NJ LRTP
Safety/Security/Efficiency/Resilience	■	■	■	■	■
Economic	■	■	■	■	
Productivity	■	■	■	■	
Congestion	■	■	■	■	
Reliability	■	■	■	■	■
State of Good Repair	■	■	■	■	■
Innovation/Technology	■	■	■	■	
Efficiency/Productivity	■	■	■	■	■
Mobility/Connectivity/Access	■	■	■	■	■
Cooperation	■	■	■	■	■
Environment/Communities	■	■	■	■	■
Costs	■				

Table 8. Other State Freight Plans

Keyword	CA	CO	FL	HI	IN	MA	MD	MN	NH	NY	OH	TN	TX	VA	WV	WI
Safety/Security/Efficiency/Resilience	■	■	■	■			■	■	■	■	■	■	■	■	■	■
Economic	■	■	■		■	■	■	■	■	■	■	■	■	■	■	
Productivity							■	■		■	■	■		■		
Congestion	■		■		■		■	■		■	■	■	■			
Reliability	■		■	■			■	■	■	■	■	■	■			■
State of Good Repair	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
Innovation/ Technology			■			■			■	■	■	■		■		
Efficiency Productivity						■						■				■
Mobility Connectivity Access				■	■	■						■	■		■	■
Cooperation			■			■		■	■	■	■				■	
Environment Communities		■	■	■		■			■			■	■		■	
Costs								■			■		■			



Port Jersey, Hudson County, NJ (Source: WSP)

3 The Path Forward: Priorities, Actions, and Performance Measures

How can NJDOT improve conditions for the goods movement industry and balance the need to reduce or minimize impacts on existing infrastructure and communities. This is the framework for the state's freight planning program that will continue after plan adoption.

Freight plays an important and critical role in New Jersey, serving the needs of local and regional deliveries as well as domestic and international trade. The State's geographic location uniquely positions it as a critical link in the national freight network. **This section of the plan presents targeted actions that, when implemented, will reinforce New Jersey's status as the world's premier freight and logistics nexus, advancing innovative technologies and state of the art infrastructure, and supporting the growth of the nation's most advanced transportation workforce.**

A highly performing logistics network must be reliable, productive, safe, and secure; it is leveraged daily through freight operations and fortified through capital investments and policies by the public and private sectors. A high-quality transportation system benefits from multiple transportation modes because modal options contribute to system redundancy, system resilience and keep competition sharp, thus contributing to lower costs. A variety of modes accommodate a range of shipments whose volume, time commitments, and physical characteristics are diverse. The New Jersey multimodal freight system does all these things. Moreover, it performs these functions for people beyond its borders (nationally and internationally) through the large quantity of goods that enter, exit, and pass-through New Jersey on its highways, railroads, and waterways.

NJDOT has issued four statewide freight plans to date. The 2023 SFP sets forth the following over a four-year period:

- A vision, goals, and objectives
- Strategies and actions to achieve the objectives
- Measures to track achievement
- Investments selected to support SFP goals

The Statewide Freight Plan affords NJDOT the opportunity to reinforce the advancement of freight needs internally at the Department and externally with the state's many public and private freight partners. This is illustrated by the comprehensive outreach performed as part of this effort to develop this Plan's goals and actions. Activities included internal discussions with the Office of Grants Management, Transportation Operations System and Support, Railroad Engineering Safety Unit, Capital Investment and Program Coordination, Environmental Resources, Transportation Mobility, Statewide Planning, Communications, and Local Aid. Beyond NJDOT, the project team coordinated with the state's three Metropolitan Planning Organizations, the Port Authority of New York and New Jersey, South Jersey Port Corporation, and the Federal Highway Administration (New Jersey Division). Additional outreach to partner agencies beyond New Jersey included the USDOT Maritime Administration and rail industry partners.

The development of this Plan and identification of priority investments, including those addressing freight bottlenecks, represent NJDOT's commitment to multimodal freight transportation institutionalized in several important ways:

- Through performance measures, NJDOT will monitor progress toward freight goals.
- Through incorporation of additional elements, including an equity score, into the Freight Management System, using the process adopted and documented through this Plan, NJDOT will ensure that the influence of investments on freight transportation is accounted for.
- Through continued and deepened outreach with the Freight Advisory Committee, partner agencies, and the private sector, NJDOT will:
  - Remain abreast of freight industry developments and retain direct input on multimodal concerns.

  - Communicate performance to stakeholders, share information, and incorporate substantiated responses and input.
  - Solicit stakeholder views on freight projects in the process of updating the Statewide Transportation Improvement Program.
  - Build and strengthen cooperative regional and interagency relationships.
  - Collaborate on regional investments and policies.
- Develop internal best practices at NJDOT for the future prioritization and selection of freight-focused projects to be advanced in future Statewide Transportation Improvement Plans. This includes enhancing and leveraging the state's Freight Management System to focus project selection on locations where the impacts and needs of the state's goods movement industry are most significant. An initial scan of current potential project locations is outlined in Section 3.2.
- Through pursuit of federal competitive grants that emphasize freight and are typically opened through annual Notice of Funding Opportunities (NOFOs), NJDOT may augment its resources for freight investment and cultivate a platform for public-private partnerships.
- Through ongoing coordination with MPOs in their freight planning, NJDOT will ensure that local and regional freight efforts are supported.
- Through ongoing coordination with adjacent states who also develop multimodal freight plans, NJDOT can align selected investments with neighbors to improve performance contiguously along freight corridors, illustrating a desire to participate in multi-jurisdictional collaborations for projects that are regionally or nationally significant.

This section of the plan will outline the proposed next steps and actions for the NJDOT and its Office of Freight Planning, from infrastructure improvements to planning and policy actions. The section is organized first by Planning and Policy actions, and then by mode, including Maritime, Highway, and Rail actions.

Subsequent sections within this plan outline a comprehensive review of modal-specific and multimodal data. These analyses are the driving force behind the actions, priorities, and projects outlined within Section 3.

3.1 STATEWIDE FREIGHT PLAN ACTIONS

This section outlines a list of the actions that NJDOT and the Office of Freight Planning will pursue to strive to meet the goals and objectives set forth in this plan in Section 2 and outlined in Table 5. Actions and associated performance measures are outlined in Table 9. Actions may meet multiple goals and/or objectives. A summary timeframe for each action is included within the matrix, with short-term (less than one year), mid-term (one to four years), and long-term (more than four years) actions included.

Through the implementation of policies and actions outlined in this plan, NJDOT intends to expand its freight planning program, emphasizing on four key themes:

Thought Leadership	Collaboration	Institutional Leadership	Funding

Table 9. New Jersey State Actions and Performance Measures

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
1. Enhance System and Supply Chain Safety and Security	Reduce rates of truck-involved crashes, injuries, and fatalities on the New Jersey Freight Network.	Develop Best Management Practices (BMPs) for Freight and Complete Streets, as well as presentation materials for stakeholders.	5.2	Share BMPs on NJDOT website and social media platforms, and provide copies of presentation materials to stakeholders	Mid
		Incorporate Freight into NJDOT Complete Streets policy, design solutions, and trainings.	5.2	Share updated policy and trainings on NJDOT website	Mid
	Reduce the number of rail-related incidents, including crashes at at-grade highway/rail crossings.	Partner with NJDOT Office of Railroad Engineering to track and evaluate rail/motor vehicle crash hot spots and identify opportunities for crash reduction.	3.4.1.1, 4.2.10 9.2.8	NJDOT to track rail/motor vehicle crash hot spots and develop memorandum of crash reduction opportunities.	Mid
	Increase the resiliency and security of the state's freight transportation system in response to multi-hazard threats, including extreme weather, and man-made threats.	Identify key supply chains as well as freight facilities and corridors at risk of weather events and evaluate interventions in collaboration with agency partners.	5.8	NJDOT to develop report highlighting key freight facilities at risk of extreme weather and identifying potential interventions. NJDOT to hold collaboration meeting with agency partners to inform report.	Mid
		Collaborate with NJDOT Transportation Operations Systems and Support (TOSS), the NJ Dept. of Homeland Security, South Jersey Port Corporation and the Port Authority of New York and New Jersey to identify shared actions to improve supply chain security.	4.1.7 7.6.5	NJDOT to set up discussion with these agencies and develop memorandum of identified shared security actions.	Short
	Support the deployment of innovative technologies to enhance the safety and efficiency of the New Jersey Multimodal Freight Network.	Leverage New Jersey Freight Advisory Committee membership and transportation non-profit organizations such as The Eastern Transportation Coalition, to stay current with emerging technologies being deployed within New Jersey, nationally, or globally.	1.4 4	NJDOT OFP to track involvement with FAC members and other groups.	Short
2. Strengthen System and Supply Chain Competitiveness and Productivity	Strengthen New Jersey's position as a global trade and logistics nexus by improving and maintaining its multimodal freight network infrastructure and connectivity.	Explore the use of USDOT Maritime Administration (MARAD) funding sources in public relationships that benefit the overall transportation system in New Jersey.	4.1.6 5.5	NJDOT OFP will track MARAD funding awarded to NJ entities.	Mid
	Expand public-private and public-public partnerships to facilitate investments in freight improvements that enhance economic development and global competitiveness.	Participate and coordinate with the NJDOT Office of Grants Management to effectuate Rail Freight Assistance Program and Congestion Management/Air Quality (CMAQ) projects.	3.4.3 3.4.6 4.1.9 5.9 9.2.6	NJDOT will track number of freight supportive projects funded by RFAP and CMAQ.	Short
	Identify critical freight infrastructure improvements and policies necessary to support future supply chains and logistics needs, and consumer demands.	Develop a statewide Truck Parking Policy aimed at codifying the need to protect existing safe truck parking locations, facilitating the improvements of existing parking, and collaborating on new parking locations that serve public and industry interest.	5.1 7.1.2	NJDOT will publish statewide Truck Parking Policy and share with NJFAC.	Mid

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
2. Strengthen System and Supply Chain Competitiveness and Productivity		Identify gaps in available data regarding regional and statewide truck parking demand, including facility utilization levels and evaluate possible opportunities.	7.1.2	NJDOT to develop research report on truck parking demand data, facility utilization levels, and opportunity evaluation. The report will include a stakeholder involvement component to understand current uses and future needs. It will assess statewide truck parking needs and propose and evaluate potential solutions and next steps.	Mid
		Identify issues and industry trends that could affect the limit or increase the supply of truck parking statewide.	5.1		Long
		Utilize existing freight associations, operators and organizations involved in trucking and parking to evaluate and incorporate their input on limitations, issues, and considerations while anticipating future needs.	5.1		Mid
		Communicate with the state partners and stakeholders to develop an open dialogue to understand questions, issues, and concerns related to truck parking.	5.1		Short
		Assess statewide need, identify the challenges - which may be regionally different, articulate the challenges and identify and/or facilitate potential solutions.	5.1		Long
		Evaluate potential solutions and identifying steps necessary to incorporate plan in reducing/solving identified issues and prioritize truck parking opportunities and solutions on a statewide level.	5.1		Mid
	Conduct outreach activities, including on social media, and develop educational programs to increase awareness of the importance of freight to the New Jersey economy.	Continue to develop the Office of Freight Planning's Social Media program to improve public outreach about freight, logistics, and truck parking.	4.1.4	NJDOT will prepare at least one topical social media post per quarter and develop additional video and interactive content to communicate the value of freight. Prepare and share BMPs across social media platforms.	Short
	Support strategic transportation investments to address the rapid increase in key industries, such as wholesale and retail trade, chemical products manufacturing, computer electronics, and construction.	Conduct a nationwide review of warehouse/supply chain operating practices in terms of truck parking and analyze the information/operating parameters with New Jersey's transportation system, supply chain and geography in mind. Once refined, a BMP promoting existing and potential opportunities could be shared publicly through social media, at relevant forums, and through FAC and MPO participation.	5.1 7.1.2	NJDOT will write a report summarizing the findings of a nationwide review of supply chain operating practices and their impact on truck parking in relation to NJ.	Mid
			7.1.2	NJDOT will share truck parking BMPs on website and social media platforms.	Mid
		Coordinate with NJDOT Capital Program Management to review and plan for access improvements that involve freight and/or freight development. Develop related BMPs to be shared publicly through social media, at relevant forums, and through FAC and MPO participation.	5.4.3 5.7 5.9 5.10	NJDOT will share BMPs for access improvements across social media platforms and with FAC and MPO partners.	Mid

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
3. Advance System Reliability, Efficiency, Redundancy, Fluidity, and Connectivity	Improve travel time reliability on the New Jersey Highway Freight Network.	Add Cost of Congestion metric to FMS to assist in prioritizing areas with the most significant cost to the movement of NJ's top commodities.	4.1.5	NJDOT and NJIT develop Cost of Congestion scoring measure and criteria for inclusion into the FMS and launch updated FMS.	Mid
		Support improvements to marine highway and rail freight connections to facilities at PANYNJ and SJPC through coordinated transportation planning efforts, state-funded improvements such as through the RFAP and federal grant support when in the interest of the NJDOT.	3.4.5.2 4.1.6 5.5.4	NJDOT to track freight supportive funding awarded to maritime partners, from federal or state awards.	Short
	Improve system capacity and reliability through targeted infrastructure and ITS investments.	Work across NJDOT, including with CPM, TOSS, Local Aid or other relevant units to coordinate efforts to leverage formula and discretionary Federal funding opportunities for freight supportive projects.	9.2.4	NJDOT to track use of federal funds for freight supportive projects.	Short
	Identify key multimodal connectors for investment to improve throughput; partner with relevant public and private sector stakeholders.	Coordinate with the FHWA and MPO partners to revisit current Critical Urban and Critical Freight Corridor designations and identify additional candidate roadways based on further analysis of highway data contained within this Plan.	7.1.1	NJDOT to provide FHWA with updated CUFC and CRFC designations following coordination efforts with MPOs.	Short
4. Enhance System Resiliency and Sustainability	Reduce adverse environmental and community impacts of the New Jersey Multimodal Freight Network.	Facilitate mode shift to the Marine Highway to realize carbon reduction and Environmental Justice benefits, and air quality improvements in areas of Environmental Justice concern:	3.4.5.2 5.9.3	NJDOT will create a report summarizing the commodity flow mix along the state's most congested highway routes; the O/D of key commodities, and develop a list of opportunities to expand marine highway service based on the findings. NJDOT OFP will review and support grant applications for viable marine highway services.	Long
		Review commodity flow mix along the most congested corridors, such as I-80 and I-95, and identify potential options for marine highway services.	7.2		Mid
		Conduct a review of the origins and destinations (O/D) of freight using up-to-date O/D data to assess potential options for marine highway services.	7.4.2 7.4.3		Mid
		Support and develop grant applications that support viable marine highway services.	3.2 3.4.6 4.1.6		Mid
		Provide SME support to interested parties wishing to advance resilient, equitable and sustainable capital improvements.	3.2 5.10	NJDOT OFP will track when SME support is provided to outside partners regarding resiliency and sustainability in freight.	Mid
	Improve air quality by incentivizing alternative fuels adoption for trucks, maritime vessels, and aircraft.	Support freight-related CMAQ projects managed by OGM and investigate regional and/or public-private opportunities for emissions reductions.	5.9.3 9.2.6	NJDOT to track freight supportive projects funded by CMAQ, as well as develop memorandum on how to reduce freight emissions.	Mid

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
5. Maintain and Renew Multimodal Infrastructure	Increase New Jersey supply chain efficiencies by improving connectivity between modes.	Leverage the Local Freight Impact Fund for localized facility improvements, including for last mile solutions.	4.1.10 9.3.2	NJDOT OFP to track and document funds awarded through LFIF.	Mid
	Improve first/last mile connectivity between freight modes and major freight generators and gateways.	Leverage Rail Freight Assistance Program funds to facilitate public-private partnerships to support rail freight development throughout New Jersey.	3.4.3 3.4.6 4.1.9	NJDOT OFP to track and document funds awarded through RFAP.	Mid
	Improve access into and out of New Jersey's seaports to facilitate projected future growth.	Collaborate with PANYNJ and the NJ Turnpike Authority on planning efforts for the Turnpike Extension and connections to the Port Jersey Port Authority Marine Terminal, which includes former Military Ocean Terminal Bayonne and Exit 14a.	3.4.5.2 4.5 7.4.1 9.2.10	NJDOT to track and document coordination with PANYNJ on NJ projects.	Long
	Improve ground access to commercial airports to enhance truck access and connectivity.	Use the FMS to identify potential project segments connecting commercial airports to the surrounding roadway network.	4.1.5 7.5 7.5.2	NJDOT to create list of project segments based on connections to commercial airports.	Mid
	Improve multimodal connectivity to major freight gateways and generators through increased capacity improvements.	Facilitate planning assistance that advances private investments where benefits accrue to the state's transportation system.	3.2 3.4 4.1.6 5.1.4 5.5 7.1.2 8.2	NJDOT OFP to track involvement with private stakeholders where investments may positively impact the NJ freight system.	Long
	Leverage multi-state organizations to increase multimodal freight connectivity across state lines.	Continue to partner with the MAP Forum (Multi-State Freight Working Group), Port Authority's Goods Movement Action Plan (G-MAP) group, the Lehigh Valley Planning Commission and its Freight Advisory Committee, the Eastern Transportation Coalition, the Maritime Exchange for the Delaware River and Bay, and other organizations as needed.	1.4 4.5.9	NJDOT OFP to track involvement with regional freight planning partnerships.	Mid
		Expand NJDOT's involvement with the MAP Forum Freight Working Group.	3.4.5.2 4.8	NJDOT will attend MAP Forum meetings and participate in freight planning activities.	Short
6. Advance Freight as a Good Neighbor through Environmental Stewardship, Equitable Policy Decisions, Responsible Development, and Quality of Life	Partner with public and private sector stakeholders to enhance workforce recruitment and retention in the transportation and logistics industry.	Participate in interagency efforts, and with the Department of Labor and Workforce Development, to identify opportunities to provide improved transit access to freight industry jobs. Assist programs that highlight and promote careers within freight.	5.9.3	NJDOT to track involvement with NJDOL regarding access to freight industry jobs.	Mid

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
6. Advance Freight as a Good Neighbor through Environmental Stewardship, Equitable Policy Decisions, Responsible Development, and Quality of Life	Partner with public and private sector stakeholders to enhance workforce recruitment and retention in the transportation and logistics industry.	Develop BMPs for access to freight related employment to share with municipalities and employers.	5.9.3	NJDOT will circulate BMPs on its website and social media platforms.	Mid
	Support statewide efforts to increase the percentage of zero emission commercial vehicles.	Identify opportunities to better promote and deploy existing tools, including NJDEP Land Use Mapping and Connecting Habitat Across New Jersey (CHANJ), that will improve how freight development interacts with existing habitats.	5.6.2	NJDOT will share existing tools on its website and social media platforms, as well as share with FAC partners where applicable.	Long
		Support freight-related CMAQ efforts to improve emissions and air quality. Develop multi-agency partnerships to assist the transition of freight transportation vehicles and facilities to alternative fuel technologies .	5.9.3 5.11 8.1 8.2 9.2.6	NJDOT will establish an interagency partnership on advancing emission reduction opportunities in freight transportation.	Mid
		Participate in and coordinate efforts to advance new technologies that may be applicable in New Jersey's port areas such as unmanned and/or zero-emission vessels. Research related BMPs in Europe and elsewhere that can be brought to the region.	8.1 8.2	NJDOT to draft memorandum summarizing best practices in new and emission reducing freight technologies.	Mid
		Participate in multi-agency partnerships to produce tools and guidance that support municipal land-use decision-making specific to the siting of warehouses or logistics-related developments.	5.4.3 5.7 5.9 5.10	NJDOT to track participation in multi-agency/multi-state partnerships and outcomes from those relationships.	Mid
		Encourage the use of regional and MPO tools to support freight as a good neighbor.	4.2.7 4.4.3 5.8 5.9	NJDOT will share existing tools on its website and social media platforms, as well as share with FAC partners where applicable.	Short
	Integrate equity measures and considerations into freight policies and projects.	Add an Equity measure into the FMS scoring system to enable equity to be considered in each potential freight projects.	4.1.5	NJDOT and NJIT will develop Equity scoring measure and criteria for inclusion into the FMS and launch updated FMS.	Mid
		Develop BMPs for truck parking for municipalities and the private sector to assist them in better managing the impacts of truck parking and providing safe rest locations for drivers. This set of BMPs would facilitate and encourage private warehousers and manufacturers to allow for on-site truck parking and related amenities. While voluntary, this BMP would support the state's interest in promoting roadway safety and be integral to the overall safety on our nation's roadways.	5.1 7.1.2	Share BMPs on NJDOT website and social media platforms.	Mid
		Identify opportunities for the development of additional public use truck rest areas throughout the state.	7.1.2	NJDOT to develop memorandum documenting opportunities for public use rest areas in NJ.	Short

Goals	Objectives	Actions	Freight Plan Location	Performance Measures	Timeframe
7. Facilitate Intra-, Inter-, and Multi-state agency Coordination and Governance and Actions	Develop and sustain partnerships with private sector industries, communities, agencies, metropolitan planning organizations (MPOs) and other transportation stakeholders and partners.	Support the PANYNJ and SJPC with implementing deepening and other significant navigation improvement projects.	7.4.2 7.4.3	NJDOT OFP to provide material or SME support for maritime freight supportive projects.	Long
		Collaborate with state agencies on developing best practices for including freight considerations in municipal freight planning.	4.1.10 5.1.3 5.6.2 5.10	NJDOT will draft BMPs to share with municipal planning partners and track coordination activities.	Mid
		Support federal grant applications for freight supportive projects through partnerships with public and private stakeholders.	9.2	NJDOT to track letters of support provided to partners for grant applications, as well as track amount of grant funds awarded.	Mid
		Coordinate with and support identification and advancement of goods movement needs and strategies in MPO Congestion Management Processes.	9.2.6	NJDOT OFP will track projects and funds awarded for freight supportive projects under CMAQ.	Mid
	Support tracking and development of NJDOT Transportation Performance Measures	Partner with NJDOT Statewide Planning to provide Freight SMEs in support of the state's Transportation Performance Management reporting.	4.1.15	NJDOT OFP will provide SME support for the analysis of data related to transportation performance analyses.	Mid
8. Leverage Advanced Technology, Multimodal Freight Transportation, and Public-Private Partnership Opportunities and Practices	Support innovative freight strategies through public-private policy coordination and investment.	Partner across NJDOT offices to identify weigh-in-motion (WIM) scales and traffic count site improvements and/or additions.	7.1.4	NJDOT to develop memorandum summarizing existing WIM and traffic count sites and identifying opportunities for improvements and additions.	Short
		Partner with NJDOT Office of Transportation Mobility to automate communication and reservation of truck parking availability via mobile applications and Smart Parking Systems.	5.1.4	NJDOT OFP to hold regular coordination meetings with OTM and document opportunities for collaboration or grant applications for demonstration projects. This may include collaboration with public or private real-time (e.g., NJ 511) information providers.	Mid
	Partner with New Jersey academic and research institutions to advance innovative technology applications for freight.	Partner with FAC stakeholders to provide NJDOT Bureau of Research with SME support for Innovation Program efforts.	9.2.5 9.2.6	NJDOT to document meetings between BOR and FAC representatives for Innovation Program activities.	Mid
	Strategically advance the development of connected and automated vehicle technologies.	Participate with the TETC and others to plan for new and emerging freight technology suitable for scale in New Jersey.	8.1 8.2	NJDOT OFP to track involvement in TETC or other organizations regarding emerging freight technology.	Short

3.2 MARITIME PROJECTS

The NJDOT Office of Maritime Resources (OMR) manages the state-funded State Channel Dredging Program and a Berth and Terminal Access Program, both of which construct and maintain navigation dredging and dredged material management projects. OMR also oversees NJDOT's Ferry Program which is primarily Federally funded through the FHWA Ferry Boat Program and constructs and maintains infrastructure related to navigation access and safety improvements.

OMR staff have a unique set of subject matter expertise which is applied through non-funded cooperative efforts such as working in regional partnerships with Federal agencies and supporting Harbor Operations in both the northern and southern port areas. OMR does not typically fund freight-related maritime improvements but supports maritime and multimodal planning and investment through working with the public and private sector to advance maritime benefits which align with traditional Department goals. The reduction of VMT, air quality improvements, equity benefits, supply-chain redundancy and congestion mitigation directly align, for example, with the outcomes of Marine Highway planning and development. Marine Highway planning and project submissions to MARAD meet all these goals while achieving the intention for increased modal split among freight and goods movement. OMR works closely with maritime partner agencies to maintain a strong understanding of Harbor/River operations and a close and coordinated nexus between the state's Marine Transportation System and the landside/multimodal transportation system. More recently, OMR is engaging in wind industry development as staff SME can provide a timely and prompt understanding of marine transportation system impacts, wind industry marine operations, modal movement of oversize/overweight components and the nexus between offshore development and shoreside maritime improvements.

3.3 HIGHWAY PROJECTS

The identification of priority highway links in need of freight improvements (illustrated in Figure 3 focuses on the need to efficiently move goods, maintain the state's economic competitiveness, and continue to serve New Jersey's businesses and residents. This section outlines priority locations identified as being most critical to freight mobility throughout the state. These segments have been identified through an analysis of the state's Freight Management System, a review of recently completed or to-be-completed projects identified in the Statewide Transportation Improvement Program (STIP), and the application of the congestion cost measure for each link (previously detailed in Section 7.1.4).

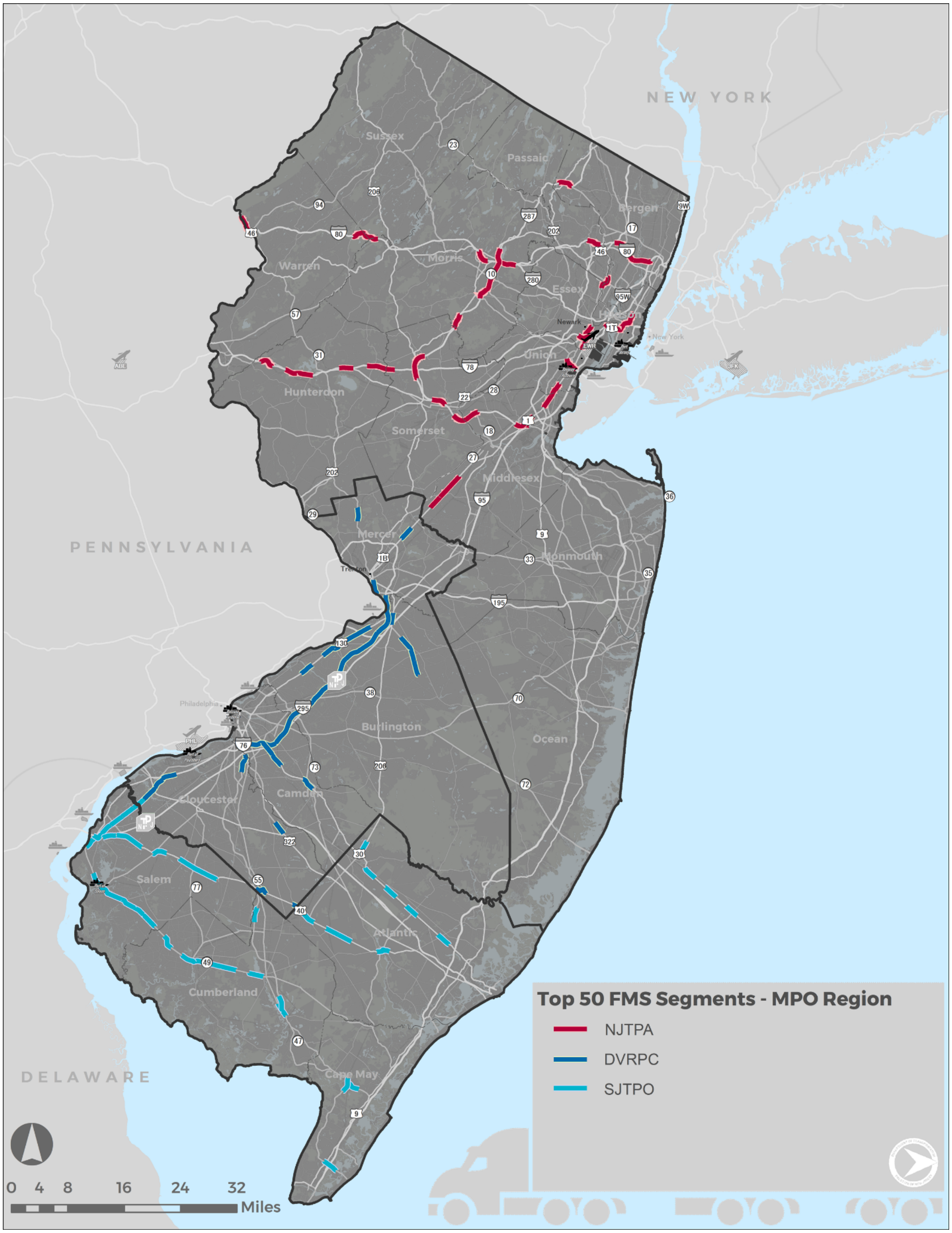
The goal of this effort is to identify locations to advance as problem statements, in coordination with other NJDOT departments and MPO partners. Doing so will assist the NJDOT to identify specific deficiencies and improvements needed within these segments. NJDOT's FMS system is now being leveraged to score each NJDOT capital project prior to progressing through the Department's project development pipeline process and project review. OFP staff is actively participating in project scoping meetings as freight subject matter experts, including leveraging data from the State Freight Plan to support project development. Finally, OFP continues to work with the Capital Investment and Program Coordination unit to integrate freight concerns into the selection of NHFP funded projects.

Three data sources provided the basis for the identification of the priority freight highway links. New Jersey's Freight Management System (FMS), detailed in Section 4.1.5, was compiled and updated to reflect two-mile segments, highlighting freight data along New Jersey's state highway network. These segments have priority scores and rankings based on roadway characteristics such as Safety, Accessibility, and Mobility. The FMS two-mile segment list was further screened to remove locations where recently completed or current projects on the New Jersey STIP (FY2016 and FY2020) overlap with FMS priority corridors. Priority FMS segments were then reviewed for their associated Total User Congestion Cost (as detailed in Section 7.1.4) to monetize the impact of congestion on freight, further illustrating the need for improvements along those segments. These segments reflect potential freight-focused highway projects for which future investments can targeted, with a refocused energy on how the NJDOT OFP can leverage the FMS to select freight-focused projects to be advanced to concept development.

The top 50 priority FMS highway segments for all MPO regions are illustrated in Figure 3. The top-50 two-mile segments (as scored using the FMS) for each MPO region are included in Figure 4 and Table 10 (NJTPA),Figure 5 and Table 11

(DVRPC), and Figure 6 and Table 12 (SJTPO). These locations reflect areas for further review by OFP staff to determine specific priorities for each, including but not limited to the development of location-specific problem statements. Total User Congestion Cost, as detailed above, is included for each link identified within each MPO table.

Figure 3. Top 50 Priority FMS Highway Segments, All MPO Regions



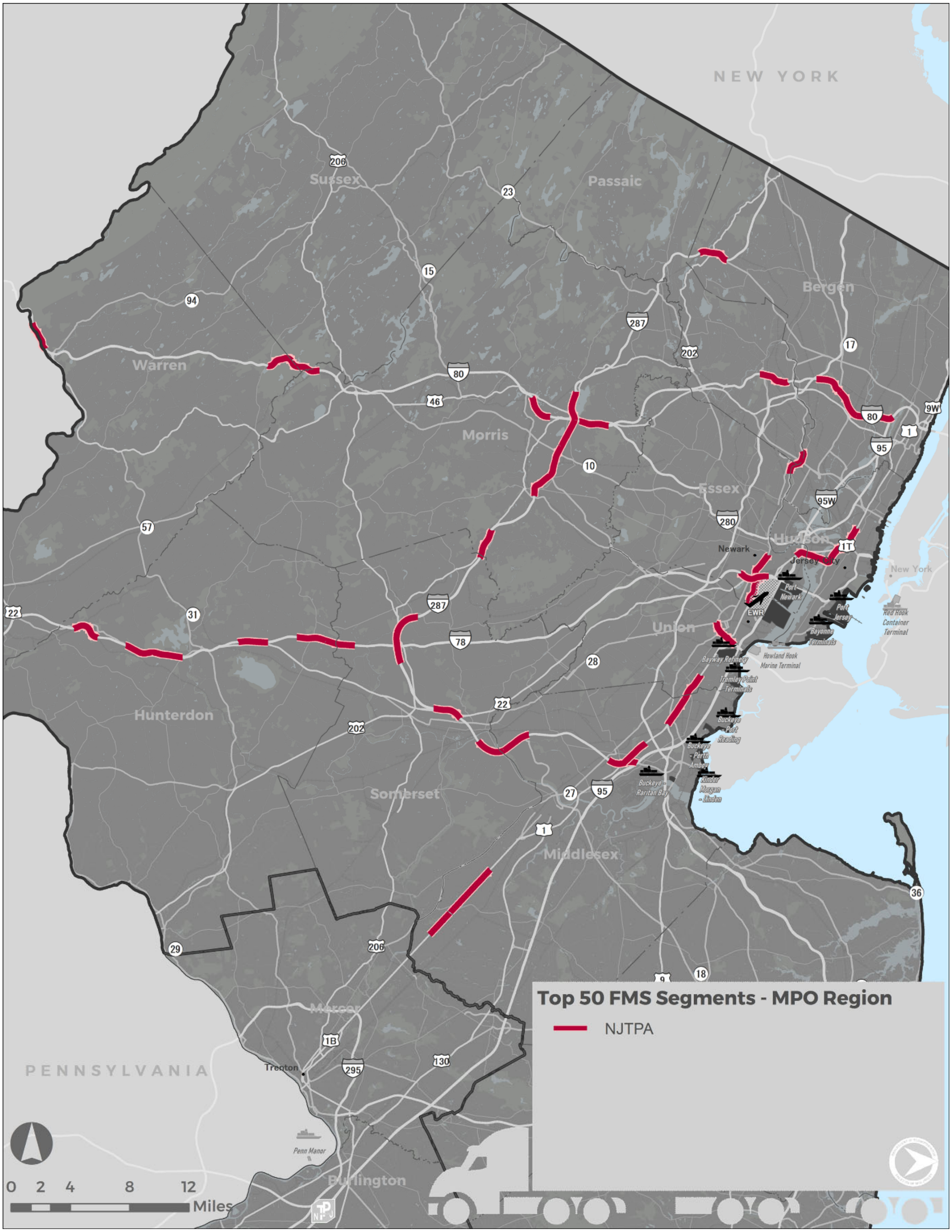
Source: NJDOT Freight Management System

Table 10. Top 50 Priority FMS Highway Segments, NJTPA Region

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
1	1	94.80	I-80	EB	66.00	68.00	Bergen	$26,560
2	2	86.76	I-80	EB	64.00	66.00	Bergen	$18,588
3	4	83.79	I-80	EB	62.00	64.00	Bergen	$12,615
4	5	83.74	I-80	WB	64.00	66.00	Bergen	$62,588
5	6	82.8	I-80	EB	68.00	68.54	Bergen	$26,665
6	8	82.00	U.S. 1/9T	WB	0.00	1.94	Essex/Hudson	$24,544
7	9	80.80	I-80	WB	66.00	68.00	Bergen	$107,206
8	10	80.75	I-80	WB	62.00	64.00	Bergen	$16,755
9	12	78.79	I-80	WB	68.00	68.54	Bergen	$40,913
10	15	77.85	I-287	NB	10.00	12.00	Middlesex/ Somerset	$16,207
11	18	76.91	U.S. 1/9	NB	46.00	48.00	Union/Essex	$15,258
12	18	76.91	U.S. 1/9	SB	46.06	48.06	Union/Essex	$33,465
13	20	76.81	I-287	NB	0.00	2.00	Middlesex	$13,109
14	22	75.87	I-287	NB	36.00	38.00	Morris	$5,035
15	24	75.83	I-80	WB	20.00	22.00	Warren	$6,865
16	25	75.82	I-78	EB	8.00	10.00	Hunterdon	$5,479
17	26	75.81	I-287	NB	38.00	40.00	Morris	$15,751
18	31	75.03	U.S. 1/9T	EB	0.00	2.00	Essex/Hudson	$24,368
19	33	74.81	I-78	WB	8.00	10.00	Hunterdon	$7,500
20	33	74.81	I-80	WB	40.00	42.00	Morris	$18,680
21	33	74.81	I-287	SB	22.00	24.00	Somerset	$5,850
22	37	74.80	I-287	NB	40.00	42.00	Morris	$10,185
23	40	74.00	U.S. 1/9T	EB	2.00	4.00	Hudson	$25,265
24	40	74.00	NJ 21	SB	8.00	10.00	Essex/Passaic	$6,863
25	42	73.99	U.S. 1	NB	18.00	20.00	Middlesex	$14,703
26	42	73.99	NJ 21	NB	0.00	2.00	Essex	$31,884
27	45	73.84	I-78	WB	14.00	16.00	Hunterdon	$6,397
28	46	73.83	I-80	WB	22.00	24.00	Warren/Sussex/ Morris	$5,230
29	46	73.83	I-80	WB	58.00	60.00	Passaic	$24,895
30	48	73.81	I-287	NB	30.00	32.00	Somerset/Morris	$1,905
31	49	73.80	I-287	NB	42.00	44.00	Morris	$3,305
32	55	73.00	U.S. 1	NB	36.00	38.00	Middlesex	$11,822
33	55	73.00	U.S. 1	NB	38.00	40.00	Middlesex, Union	$19,965
34	60	72.99	U.S. 1	NB	32.00	34.00	Middlesex	$18,197
35	60	72.99	U.S. 1/9	NB	54.00	56.00	Hudson	$84,734
36	60	72.99	U.S. 1	SB	16.06	18.06	Middlesex	$14,960
37	65	72.97	U.S. 1	NB	14.00	16.00	Middlesex	$7,933
38	66	72.84	I-78	EB	12.00	14.00	Hunterdon	$2,499

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
39	66	72.84	I-78	EB	24.00	26.00	Hunterdon	$4,256
40	66	72.84	I-78	EB	26.00	28.00	Hunterdon/ Somerset	$5,469
41	69	72.80	I-287	NB	8.00	10.00	Middlesex	$26,886
42	72	72.20	NJ 439	NB/SB	0.00	2.00	Union	$21,056
43	83	71.83	I-80	EB	44.00	46.00	Morris	$9,808
44	83	71.83	I-80	WB	2.00	4.00	Warren	$19,090
45	83	71.83	I-287	SB	14.00	16.00	Somerset	$11,693
46	87	71.82	I-287	NB	58.00	60.00	Bergen	$5,877
47	88	71.81	I-287	SB	38.00	40.00	Morris	$6,150
48	90	71.80	I-78	WB	56.00	58.00	Essex	$60,975
49	93	71.79	I-78	EB	20.00	22.00	Hunterdon	$4,133
50	93	71.79	I-287	SB	20.00	22.00	Somerset	$7,760

Figure 4. Top 50 Priority FMS Highway Segments, NJTPA Region



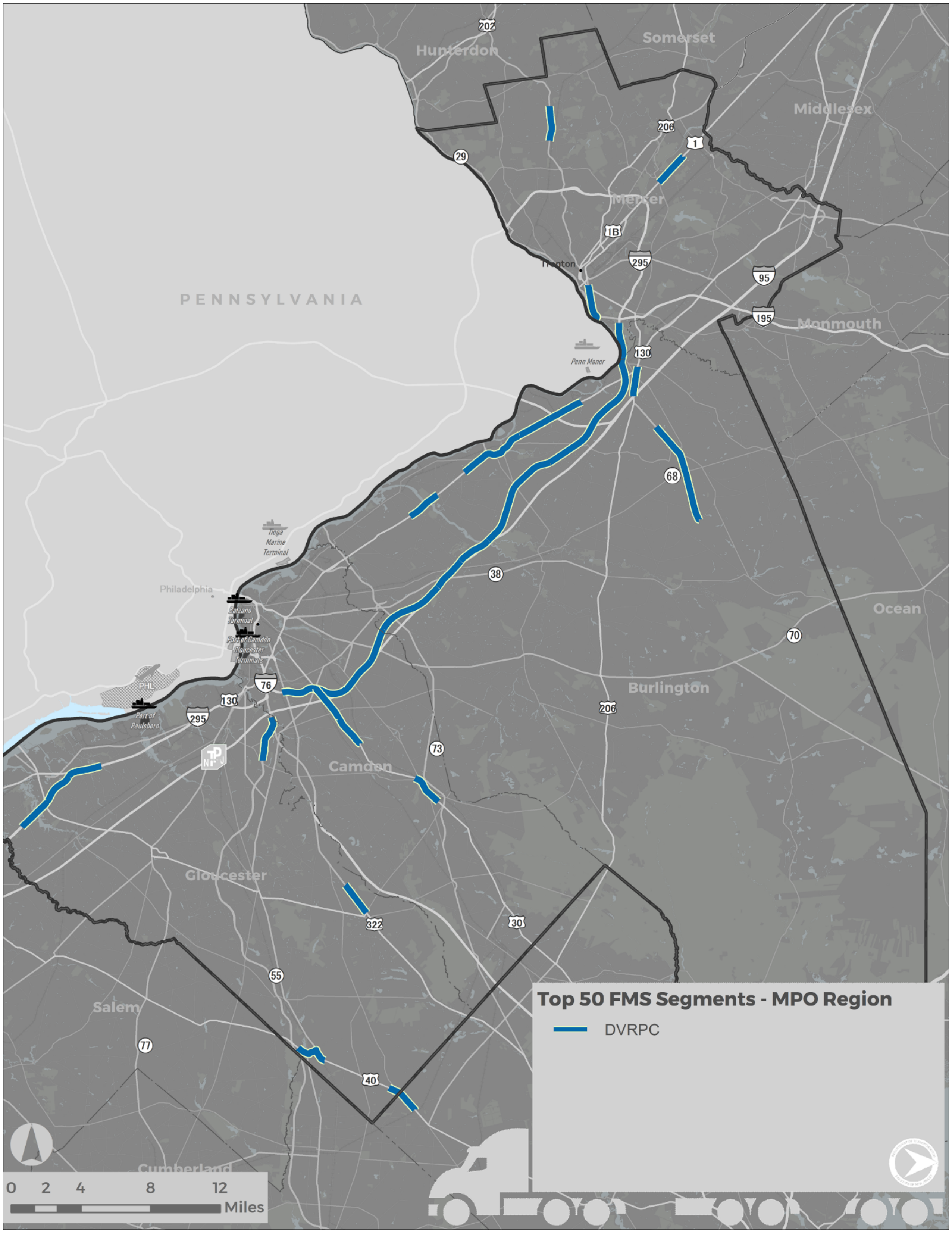
Source: NJDOT Freight Management System

Table 11. Top 50 Priority FMS Highway Segments, DVRPC Region

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
1	3	84.07	U.S. 40	EB/WB	32.00	34.00	Gloucester/Atlantic	$2,035
2	11	78.83	I-295	SB	30.00	32.00	Camden	$23,352
3	13	78.06	NJ 55	NB	60.00	60.54	Gloucester	$9,191
4	14	77.89	I-295	NB	46.00	48.00	Burlington	$2,332
5	23	75.84	I-295	SB	34.00	36.00	Camden/Burlington	$8,663
6	28	75.80	I-295	SB	28.00	30.00	Camden	$40,365
7	30	75.09	NJ 55	NB	58.00	60.00	Gloucester	$19,403
8	32	75.00	NJ 129	NB	0.00	2.00	Mercer	$3,967
9	37	74.80	I-295	NB	28.00	30.00	Camden	$7,796
10	49	73.80	I-295	NB	52.00	54.00	Burlington	$1,998
11	49	73.80	I-295	SB	36.00	38.00	Burlington	$8,474
12	76	71.99	NJ 68	NB	0.00	2.00	Burlington	$435
13	88	71.81	I-295	NB	44.00	46.00	Burlington	$2,544
14	98	71.75	I-295	NB	38.00	40.00	Burlington	$2,108
15	111	70.99	NJ 129	SB	0.00	2.00	Mercer	$7,344
16	116	70.98	U.S. 30	EB	8.02	10.02	Camden	$14,633
17	118	70.87	I-295	NB	10.00	12.00	Gloucester	$3,416
18	131	70.75	I-295	SB	50.00	52.00	Burlington	$2,386
19	146	69.99	U.S. 30	WB	8.00	10.02	Camden	$6,577
20	147	69.98	U.S. 30	WB	16.02	17.95	Camden	$7,765
21	150	69.87	I-295	SB	14.00	16.00	Gloucester	$1,809
22	152	69.84	I-295	NB	56.00	58.00	Burlington/Mercer	$3,198
23	164	69.78	I-295	NB	30.00	32.00	Camden	$6,596
24	167	69.76	I-295	NB	42.00	44.00	Burlington	$2,982
25	193	68.80	I-295	NB	32.00	34.00	Camden	$4,983
26	196	68.79	I-295	NB	54.00	56.00	Burlington	$1,799
27	196	68.79	I-295	SB	46.00	48.00	Burlington	$2,381
28	203	68.78	I-295	NB	36.00	38.00	Burlington	$3,720
29	231	67.99	U.S. 40	EB/WB	26.00	28.00	Gloucester	$1,210
30	231	67.99	U.S. 130	NB	49.98	51.98	Burlington	$10,471
31	231	67.99	U.S. 130	SB	48.00	50.00	Burlington	$4,750
32	231	67.99	U.S. 130	SB	50.00	52.00	Burlington	$4,090
33	241	67.98	U.S. 30	EB	10.02	12.02	Camden	$10,615
34	258	67.79	I-295	NB	34.00	36.00	Camden/Burlington	$3,924
35	258	67.79	I-295	SB	32.00	34.00	Camden	$9,783
36	266	67.78	I-295	NB	58.00	60.00	Mercer	$2,738
37	266	67.78	I-295	SB	48.00	50.00	Burlington	$1,998
38	279	67.01	U.S. 1	SB	8.06	10.06	Mercer	$8,358
39	282	67.00	NJ 31	NB/SB	8.00	10.00	Mercer	$3,461
40	282	67.00	NJ 42	SB	0.00	2.00	Gloucester	$11,610

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
41	282	67.00	U.S. 130	NB	39.98	41.98	Burlington	$5,601
42	282	67.00	U.S. 130	NB	45.98	47.98	Burlington	$3,945
43	282	67.00	U.S. 206	NB/SB	34.00	35.61	Burlington	$9,024
44	291	66.99	NJ 68	NB	2.00	4.00	Burlington	$531
45	291	66.99	NJ 68	SB	4.00	6.00	Burlington	$4,236
46	291	66.99	U.S. 130	NB	43.98	45.98	Burlington	$10,368
47	305	66.83	I-295	SB	38.00	40.00	Burlington	$5,390
48	312	66.79	I-295	NB	12.00	14.00	Gloucester	$1,390
49	312	66.79	I-295	NB	48.00	50.00	Burlington	$1,719
50	312	66.79	I-295	SB	10.00	12.00	Gloucester	$2,644

Figure 5. Top 50 Priority FMS Highway Segments, DVRPC Region



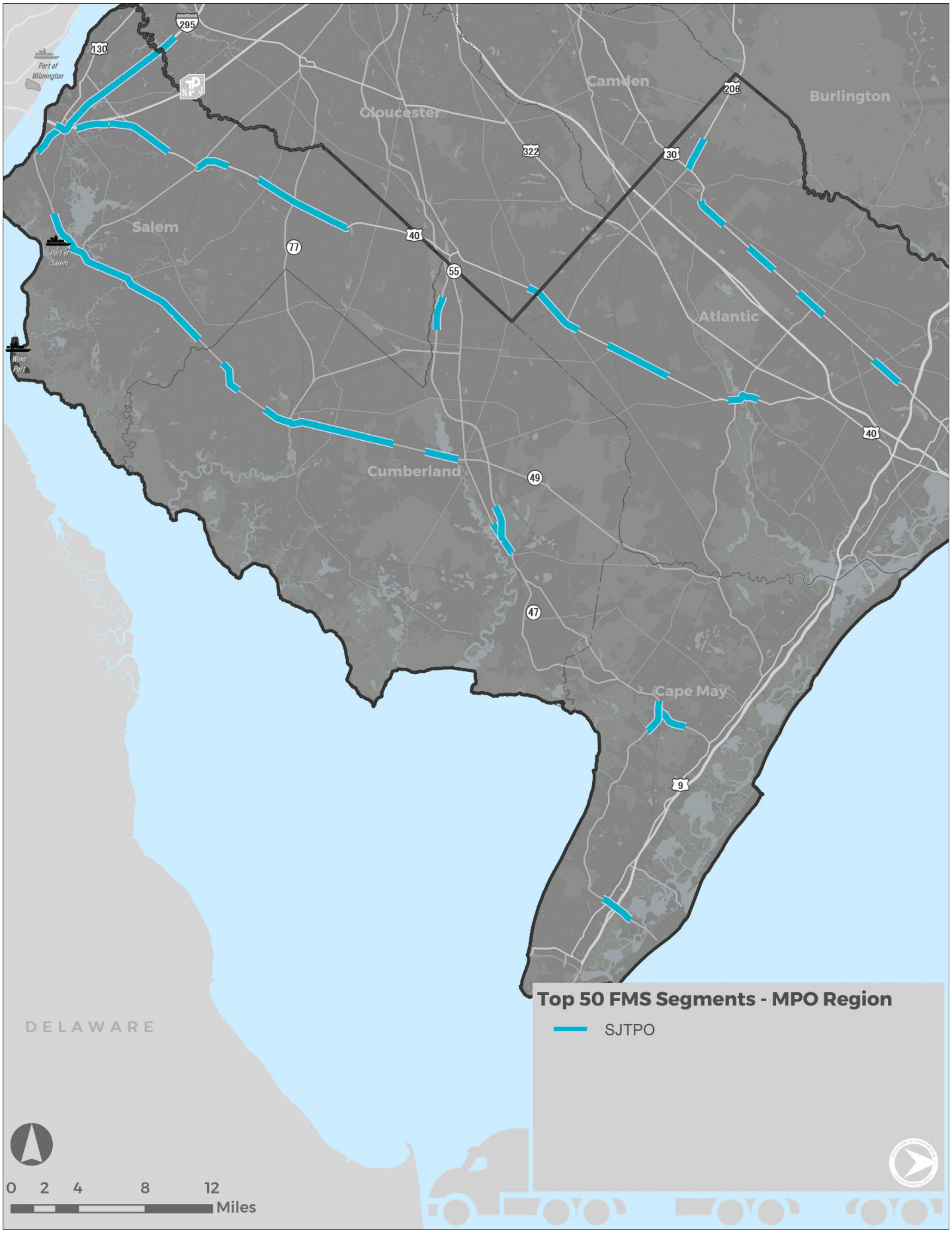
Source: NJDOT Freight Management System

Table 12. Top 50 Priority FMS Highway Segments, SJTPO Region

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
1	3	84.07	U.S. 40	EB	32.00	34.00	Gloucester/Atlantic	$2,035
2	29	75.78	I-295	NB	0.70	2.00	Salem	$1,418
3	44	73.98	U.S. 40	EB	16.00	18.00	Salem	$1,595
4	54	73.03	NJ 49	WB	16.00	18.00	Salem	$657
5	55	73.00	U.S. 40	EB	10.00	12.00	Salem	$5,171
6	60	72.99	U.S. 30	EB	46.02	48.02	Atlantic	$2,053
7	64	72.98	NJ 49	EB	6.00	8.00	Salem	$2,442
8	69	72.80	I-295	NB	2.00	4.00	Salem	$1,452
9	76	71.99	NJ 49	EB	28.00	30.00	Cumberland	$807
10	76	71.99	NJ 49	EB	34.00	36.00	Cumberland	$2,985
11	90	71.80	I-295	NB	4.00	6.00	Salem	$1,210
12	101	71.72	I-295	SB	2.00	4.00	Salem	$1,082
13	111	70.99	U.S. 40	WB	4.00	6.04	Salem	$2,297
14	111	70.99	NJ 49	EB	24.00	26.00	Cumberland	$5,002
15	134	70.03	NJ 47	NB	34.00	36.00	Cumberland	$1,145
16	134	70.03	NJ 49	EB	10.00	12.00	Salem	$1,762
17	134	70.03	NJ 49	EB	12.00	14.00	Salem	$1,049
18	134	70.03	NJ 49	EB	14.00	16.00	Salem	$911
19	134	70.03	NJ 49	EB	26.00	28.00	Cumberland	$2,689
20	160	69.80	I-295	SB	0.70	2.00	Salem	$838
21	172	69.03	U.S. 30	EB	40.02	42.02	Atlantic	$5,440
22	172	69.03	U.S. 40	EB	34.00	36.00	Atlantic	$2,689
23	180	68.99	NJ 49	EB	20.00	22.00	Cumberland	$897
24	185	68.98	U.S. 30	EB	36.02	38.02	Atlantic	$5,814
25	185	68.98	NJ 47	NB	16.00	18.00	Cape May	$1,276
26	211	68.75	I-295	SB	4.00	6.00	Salem	$860
27	216	68.04	U.S. 40	EB	34.00	36.00	Atlantic	$5,961
28	217	68.03	U.S. 30	EB	32.02	34.02	Atlantic	$1,317
29	217	68.03	NJ 49	EB	8.00	10.00	Salem	$4,214
30	231	67.99	U.S. 40	EB	6.00	8.00	Salem	$1,599
31	241	67.98	U.S. 40	EB	40.00	42.00	Atlantic	$721
32	244	67.95	U.S. 40	EB	18.00	20.00	Salem	$1,878
33	282	67.00	U.S. 40	EB	46.00	48.00	Atlantic	$7,047
34	336	66.03	NJ 83	EB/WB	0.00	2.00	Cape May	$1,403
35	354	65.98	U.S. 40	EB	14.00	16.00	Salem	$2,376
36	354	65.98	NJ 47	NB	2.00	4.00	Cape May	$2,499
37	354	65.98	NJ 49	EB	30.00	32.00	Cumberland	$754
38	362	65.91	NJ 49	EB	0.00	2.00	Salem	$4,500
39	365	65.86	I-295	NB	8.00	10.00	Salem/Gloucester	$1,267
40	365	65.86	I-295	SB	8.00	10.00	Salem/Gloucester	$1,208

FMS MPO Rank	FMS Statewide Rank	FMS Score	Route	Direction	MP Start	MP End	County	Total User Congestion Cost
41	388	65.04	U.S. 40	EB	38.00	40.00	Atlantic	$557
42	395	65.00	NJ 55	NB	34.00	36.00	Cumberland	$1,547
43	395	65.00	U.S. 206	NB/SB	0.00	2.00	Atlantic	$2,226
44	411	64.98	U.S. 40	EB	16.00	18.00	Salem	$1,621
45	411	64.98	U.S. 40	WB	18.00	20.00	Salem	$2,048
46	416	64.97	NJ 55	NB	20.00	22.00	Cumberland	$1,504
47	481	63.97	U.S. 40	WB	1.99	3.90	Salem	$3,038
48	512	63.03	U.S. 30	WB	40.02	42.02	Atlantic	$4,660
49	512	63.03	NJ 49	EB	24.00	26.00	Cumberland	$5,662
50	567	62.83	I-295	SB	6.00	8.00	Salem	$985

Figure 6. Top 50 Priority FMS Highway Segments, SJTPO Region



Source: NJDOT Freight Management System

3.4 RAIL PROJECTS

3.4.1 Obstacles to Freight Rail Movement

The New Jersey Statewide Freight Plan analyzed the existing freight rail network in New Jersey and identified needs that, if fulfilled, would improve the efficiency of freight rail. The assessment of needs and identification of projects was not constrained by considerations of cost, operational complexity, or political feasibility, and as a result was comprehensive, spanning from single grade-crossing updates to comprehensive state-of-good-repair and policy revisions that would facilitate the movement of freight by rail.

To achieve this comprehensive assessment, rail stakeholders, including the owners, operators, NJDOT, MPOs and other relevant governments and agencies, identified specific locations within New Jersey and adjacent states where freight rail service was compromised in the existing condition. The incorporation of regional and interstate issues reflects the reality of freight rail transport - fixing an impediment on one side of the Delaware or Hudson River does little for network mobility if the corresponding issues are not resolved on the other side. Furthermore, federal funding programs support and incentivize regional problem solving. Identifying these interstate issues in the freight plan facilitates their application for competitive grants, which may leverage local matches from multiple public and private partners.

Stakeholder input resulted in the identification of 76 constraints throughout New Jersey and connecting to the New Jersey freight rail network. Analysis of these constraints identified major themes common to the challenges of maintaining efficient and reliable freight rail transportation in New Jersey: state of good repair/safety, clearance and structural capacity, congestion and system capacity, policy constraints, and resiliency/redundancy. The following sections summarize these themes:

3.4.1.1 State of Good Repair/Safety

For rail projects, state of good repair (SOGR) references tracks, bridges, or grade crossings. SOGR is associated with wear and degradation of rail infrastructure and may be improved through asset management and investment programs managed by NJDOT, such as the Rail Freight Assistance Program (RFAP) administered by the OGM and the FHWA's Rail Highway Crossings Program with resources administered through NJDOT Bureau of Structures and Railroad Engineering Services (S&RES).

With regard to safety, on December 14, 2020, the Federal Railroad Administration (FRA) issued a final rule requiring 40 States and the District of Columbia to develop and implement highway-rail grade crossing action plans in response to the Fixing America's Surface Transportation (FAST) Act of 2015, Section 11401. The Highway-Railway Grade Crossing New Jersey State Action Plan (NJ SAP) was developed to conform to the final rule. Developed and managed by the S&RES, the main goal of the NJ SAP is to achieve zero crashes (injuries and fatalities) at at-grade railroad crossings. To achieve this goal, the following long-term and short-term goals have been established for New Jersey:

Long-term (10-year) goals:

- Reduce the number of railroad grade crossings
- Incorporate a new technology of an automated detection system of unsafe behavior at railroad grade crossings

Short-term (5-year) goals:

- Coordinate and collaborate with railroads, road authorities and other stakeholders to improve railroad crossing safety.
- Strengthen education and outreach about railroad crossing safety through NJ Operation Lifesaver.
- Strengthen enforcement of illegal and dangerous behavior near railroad crossings.
- Apply engineering solutions for improvements.

- Balance safety with quality of life.
- Reduce the number and rate of crossing crashes, injuries, and fatalities.

The NJ SAP is currently under review by the FRA and details their priorities for improving safety at the state's grade crossings.

3.4.1.2 Clearance and Structural Capacity

Clearance can be either horizontal or vertical; substandard conditions of either can prohibit the passage of the minimum current standard of Plate F rail cars requiring a minimum vertical clearance of 17-ft, 6-in. While numerous structures exist that create smaller horizontal clearances, Conrail standards generally require a minimum of 9-ft between the centerline of track and any structure adjacent to the track for any new work.

Structural capacity refers to the structural loading limit of undergrade bridges. Bridges that were not designed to carry 286,000-pound (286K) railcars or have deteriorated over time due to wear and exposure, present a constraint that affects the efficiency of modern freight rail service. In certain cases, depending on the bridge, trains with 286k cars may pass over the bridge if the cars are sufficiently spaced apart and train speed is reduced; however, moving slower than the posted speed of the rail line reduces locomotive efficiency, contributes air quality criteria pollutants, and adversely affects freight rail scheduling, particularly in the context of passenger rail demand on shared use tracks.

The resolution of clearance and capacity constraints involves capital investment through physical alteration of the infrastructure. Undergrade bridge improvements, which can raise bridges to resolve truck or emergency service vehicle strikes and strengthen bridges to rate for 286K service, typically improve freight rail operations with only minor and temporary impacts to roadways. Overhead clearance constraints are often complicated by jurisdictional matters and right-of-way needs. In the case of electrified passenger lines, it involves raising the catenary. Overhead bridges carry surface roadways used by other modes of transportation and under local, county, or state jurisdiction. Neither the railroads nor the local jurisdictions, particularly smaller municipalities and rural counties, have the budget to accommodate drastic changes in the roadway network often needed to improve overhead clearance issues. In some instances, these clearance issues involve roadways that cross state lines, creating a greater regional need for cooperation and cost-sharing. Nonetheless, clearance and structural capacity improvements can provide some of the best returns on investment for air quality, operational efficiencies, system redundancy and hinterland connectivity.

3.4.1.3 Congestion and System Capacity

Freight rail congestion is the result of several factors. While some factors may relate to operational decision-making by the operators themselves or supply-chain impacts from regional or world events, others are specific to freight rail infrastructure and can compound issues discussed previously. The most obvious are those circumstances where freight rail service is confined to a single track serving bi-directional rail traffic. An incident on a single track effectively stops freight rail movement because alternate routes are not available. Related to single-track limitations is the need for direct connections between rail lines that allow for continuous forward movement into and out of port and yard facilities, and the lack of controlled passing sidings in busy freight corridors.

System capacity also takes the form of reliability. Moveable bridges accommodate rail traffic and maritime traffic; however, many of New Jersey's moveable bridges have or are reaching the end of their useful life and are prone to malfunction. A moveable bridge stuck in the open position delays the movement of rail traffic, which reduces system capacity and creates congestion.

Projects "outside the gates" of PANYNJ and SJPC facilities will help eliminate bottlenecks and operational issues allowing ExpressRail in the north and direct rail to port facilities in the south, to achieve their full potential. Such projects are addressed individually in the issue identification and scoring, for example in the project group "Docks".

Capital investment in additional rail infrastructure could also serve to alleviate congestion constraints. In many industrial areas and in the vicinity of ports and yards, rail operators and public transportation agencies own right-of-way that can be developed with additional siding tracks and connections without displacing businesses and residential uses.

Increasing freight rail capacity across the rail system can require more involved environmental analysis and may necessitate other network improvements. Consideration for the potential impact of additional freight traffic through at-grade crossings in residential and central business districts would need careful analysis, and/or mitigation, if required. In these instances, where a congestion management solution would increase freight rail traffic, coordination with regional planning agencies, local jurisdictions, and the freight rail operators would be imperative to address secondary and cumulative impacts.

3.4.1.4 Limits on Trackage Rights

Operation of freight rail over passenger tracks creates potential conflict with Amtrak and NJ TRANSIT's missions and fiscal resources; however, much of New Jersey's carload freight rail service relies on trackage rights over NJ TRANSIT and Amtrak rail. Generally, NJ TRANSIT's system can only accommodate 263K freight cars due to the existing conditions of the rail infrastructure, specifically structures. The heaviest passenger rail car used by Amtrak weighs about 85 tons, or about 60% as much as a 286K freight rail car. Heavy freight trains cause more wear to railroad infrastructure than lighter passenger rail trains.

The 286K standard was adopted in the early 1990's, after transit agencies like NJ TRANSIT had been created to assume responsibility for commuter rail operations on the former freight railroads. The rail infrastructure in these territories was designed to meet the operational needs of the rail equipment then in use, which in many cases is insufficient for 286K operation. In some instances, achieving this national freight rail standard requires physical retrofit of existing infrastructure.

NJTPA identified the impediments to national standard freight rail service in the agency's region in their 2019 Freight Rail Industrial Opportunities (FRIO) Corridors program. As part of NJTPA's ongoing Freight Concept Development program, the agency also studied and advanced improvements on the Washington Secondary line which is owned by Norfolk-Southern but leased and controlled by NJ TRANSIT. It was shown that some structures would rate as 286K compliant if the freight traffic crossed at a lower speed and was distributed evenly throughout the train. As the affected section of the line is utilized by freight rail only, NJ TRANSIT agreed to permit 286K rail cars in limited volumes and at reduced speeds. Passenger service only operates on the section of the Washington Secondary between Dover and Hackettstown during peak commuter hours with freight services typically operated between the passenger rail peaks. While in this case this was a relatively simple solution, in the case of mixed-use lines with significant passenger service, the significantly slower speed of freight trains pulling 286K railcars may have a negative impact on scheduled passenger operations such that 286K railcars would remain restricted or at least be restricted to off hours when passenger service frequency is reduced.

Coordination and dialogue amongst the stakeholders, including the freight service providers and intermodal facility operators, is required to identify solutions that will address the long-term needs of both passenger and freight operators.

3.4.1.5 Resiliency and Redundancy

Coastal and low-lying infrastructure has been facing growing threats from climate change and sea-level rise. When freight goods movement is impeded by infrastructure damage, industrial production and availability of critical energy products are compromised, leading to shortages and related adverse ripple effects through the region. The Port Elizabeth/Port Newark complex and freight rail facilities located in the Meadowlands of New Jersey are uniquely vulnerable. Recognition of the increasing importance of system resiliency and the creation of redundant routes in maintaining the flow of goods on the freight rail network led to incorporation of Resiliency and Redundancy as an evaluation criteria in identifying priority projects and actions to enhance the freight rail network.

New Jersey's densely developed landscape imposes some practical limits on the development of new rights-of-way for freight rail to provide redundancy, but there remain other solutions, such as expanding storage capacity in yards and eliminating points of congestion that hamper emergency movement of freight trains out of harm's way. Policy considerations can also improve resiliency—during an event, allowing freight on passenger rail and vice versa optimizes the use of the existing infrastructure for the benefit of all stakeholders.

Projects such as the southbound connection at Greenville Yard to the National Docks would provide an additional route, which improves operational efficiency and flexibility while simultaneously providing redundancy.

3.4.2 Completed and On-Going Projects and Prior Investments

Between 2017 and 2022, several freight rail projects were either completed or advanced to construction, indicating imminent realization. Many of these projects were funded either wholly or in part with funds provided through the NJDOT Rail Freight Assistance Program (RFAP). The advancement of priority projects benefits the rail network beyond the point of the discreet project. Additionally, private freight rail owners, regional transportation agencies, and regional government agencies have contributed improvements to the freight rail network. These improvements nonetheless demonstrate a commitment to freight rail and would benefit from/be benefitted by the improvement needs identified in the SFP. While many rail freight improvements have recently been completed or are on-going, a few of the priority projects are listed below:

3.4.2.1 Waverly Loop Capacity Constraints – Double Track Connection

Line Name: Oak Island Yard
The Waverly Loop tracks connected CP Stock and CP Pike, facilitating through movements and alleviating some capacity constraints at Oak Island Yard. Additionally, the installation of an updated and expanded signal system places the loop under direct dispatcher control, further improving efficiency.

The Oak group was identified as a priority set of projects because the projects collectively serve the Port Elizabeth complex and connect the Garden State Secondary and National Docks Secondary, all critical components of the northeastern New Jersey freight rail network and critical contributors to interstate commerce. Priority projects benefitting from the Waverly Loop Double Track Connection include those seeking capacity enhancements to move freight trains more efficiently between terminals and yards in the Port Elizabeth region, including projects on the National Docks Secondary, Passaic & Harsimus Line, Oak Island tracks and Oak Island Yard capacity constraints. In fiscal 2020 this project received a 50% match of $12,903,050 from the RFAP.

3.4.2.2 Point-no-Point Bridge

Line Name: Passaic and Harsimus
At the time of the writing of the 2023 Plan, the construction contract for the replacement of the existing and unreliable swing span with a single-leaf bascule has been awarded. Construction has started but is not yet complete. Demonstration of commitment via construction funding was sufficient to identify the Point-No-Point Bridge improvement as a "completed" project.

The existing swing span was beyond its useful life and subject to failure, leaving the bridge stuck in either the closed position, prohibiting the movement of ships on the Passaic River, or open, prohibiting the movement of freight trains along the P&H enroute to the National Docks Secondary and or west out of the port complex to the Lehigh Line. The improvement of Point-No-Point facilitates freight train movement on the P&H Line as well as maritime freight movement. The benefits of this investment were counted toward the scoring of projects on the P&H Line. Just under $20 million was awarded for the Point-No-Point bridge construction across FY 2021 and FY 2022.

3.4.2.3 South Main Street Bridge over the Washington Secondary

Line Name: Washington Secondary
The South Main Street Bridge is the westernmost undergrade bridge on the Washington Secondary before crossing the Delaware River into Pennsylvania and connecting to western freight rail routes. The Washington Secondary connects to the Morristown line and provides freight rail service through Warren County and into the industrial areas of Morris County serving customers along the main line and the three Morris County owned branch lines. The South Main Street Bridge's clearances were not sufficient to accommodate Plate F rail cars, and consequently, no Plate F cars coming from points west could access the Morristown Line. Similarly, producers on the Morristown Line could not serve customers west of New Jersey with Plate F outbound shipments.

The Washington Secondary and Morristown Line are encumbered by other weight and clearance limitations impeding the movement of Plate F/286K cars between points west and East Hanover. The improvement of the South Main Street Bridge is the first step is opening this corridor to 286K Plate F service, and as a result, the scoring of other improvement projects on the Washington Secondary and Morristown Line received the benefit of this improvement.

3.4.2.4 Raritan Bay Bridge – River Draw

Line Name: North Jersey Coast Line
The bridge is the only rail access to the coast area over the Raritan River. It is used jointly by Conrail for freight as well as NJ TRANSIT Coast Line service. It was heavily damaged by Hurricane Sandy in 2012. It was built as a swing span in 1908. Federal matching funding has been received for a complete replacement with a new vertical lift bridge which will also raise the base level higher over the river as well as be 286K and double-stack compliant. In May 2020 NJ TRANSIT awarded a $248 million contract for Phase 1, expected to be completed in October 2024, which includes landside and bridge approaches and substructure. Phase 2 addressing construction of the superstructure is in the procurement phase.

3.4.2.5 Paulsboro Wye

Line Name: Vineland Secondary
The access to the port of Paulsboro from the Vineland Secondary was a single switch that faced south. This required a backup move for freight accessing the port, with subsequent delays and blocking of road-rail crossings.

The project was completed in 2019 with funding assistance of $8.1 million from the RFAP.

3.4.2.6 South Jersey Port Corporation, Conrail, USDOT: TIGER III Grant

The South Jersey Port Corporation (SJPC) was the applicant and prime recipient of a TIGER III Grant awarded by USDOT for the improvement of the Port of Paulsboro and the Delair Bridge in Philadelphia/Camden metropolitan area. Conrail further leveraged efficiencies from the Delair Bridge project to address freight rail needs in the general footprint of the grant's project area, including replacement of stick rail with continuously welded rail and improvement of railroad overpasses in the city of Camden. The total federal contribution to these projects was approximately $18.5M, matched 1:1 by Conrail and SJPC for their respective projects for a total prior investment of at least $37M in port-rail connections in South Jersey.

3.4.2.7 PANYNJ and Conrail: Southbound Connector and Garden State Secondary Improvements

Conrail has been working with PANYNJ on design concepts for a Southbound Connection (SBC) out of Maher Terminals to Conrail's Garden State Secondary Track (GSS). The SBC & GSS improvements will allow more efficient use of Port Newark Yard, increasing capacity for all terminal operators. Project is in preliminary design with potential 2023 construction.

3.4.2.8 Conrail: Barb Siding and Wye Track at CP Ron

These projects add storage capacity for freight rail cars without interfering with passenger rail connections and provide additional flexibility for port connections.

3.4.3 NJ Rail Freight Assistance Program

Since the 2017 Freight Plan the state funded RFAP has granted almost $141 million to the various railroads, leveraged by owner/operator matching funds, as illustrated in Table 13. Most of these projects are state of good repair and 286K related. Very few were included in the 2017 freight plan as FHWA mandated freight plans are intended to leverage Federal funding, however it is important to highlight the significant state-funded investment in freight rail in New Jersey.

Three of the completed / work-in-progress projects listed above were the beneficiaries of state funding from the RFAP.

Table 13. RFAP Project Awards, 2017-2022

	Grant Recipients	Project Description	RFAP Funding
FY2017	New York, Susquehanna & Western Rail Corp.	North Bergen Capacity and Interchange Improvements	$1,278,200
	New York, Susquehanna & Western Rail Corp.	Installation of Welded Rail in Various Curve	$949,961
	Winchester & Western Railroad	Welded Rail S. Main Phase IV	$842,205
	Belvidere & Delaware River Railway Co. Inc.	Hunterdon County Mainline Mile 41	$380,250
	Consolidated Rail Corporation	Removal of two bridges in Camden	$855,000
	Winchester & Western Railroad	Fairton Welded Rail C&M	$486,212
	County of Morris	Dover & Rockaway Repair	$875,952
		FY2017 Total	$5,667,780
FY2018	New Jersey Seashore Lines	New Jersey Seashore Lines - Southern Division phase 2	$1,669,680
	Winchester & Western Railroad	Welded Rail S. Main Phase 5	$1,071,405
	Port Authority of New York and New Jersey	Port Street Lead Reconstruction	$2,188,863
	County of Salem	FY2018 Salem County Railroad Rehabilitation Program	$6,014,192
	New York, Susquehanna & Western Rail Corp.	Replace Bridge #26.02, Midland Park	$1,176,750
	Winchester & Western Railroad	S.Main Landis Welded Rail	$660,943
	New York, Susquehanna & Western Rail Corp.	Replace and Rehabilitate Bridge #71.5, Rt. 23, Hamburg	$2,551,500
	Cape May Seashore Lines	Dennisville run-around	$1,786,500
	Consolidated Rail Corporation	Paulsboro Marine Terminal Rail Link	$3,915,509
	South Jersey Port Corporation	Paulsboro Wye Track - Permanent Easement	$4,227,989
	Belvidere & Delaware River Railway Co. Inc.	BRW Bridges 286	$337,531
	County of Morris	High Bridge Branch Resurfacing Project	$1,941,984
		FY2018 Total	$27,542,845
FY2019	Consolidated Rail Corporation	Waverly Loop Connection	$12,903,050
	Winchester & Western Railroad	Timber Bridge 43.23 Rehabilitation	$658,869
	New York, Susquehanna & Western Rail Corp.	Rehabilitation of Bridge #13.31	$3,409,000
	Somerville Business Park, LLC	The Somerville Business Park Rail Freight Project	$3,099,920
	Consolidated Rail Corporation	286k Upgrades on the Freehold Secondary	$2,700,000
	Winchester & Western Railroad	Rail Replacement Seashore Branch	$621,136
		FY2019 Total	$23,391,975

	Grant Recipients	Project Description	RFAP Funding
FY2020	Woodbridge Township	Raritan Center North American Beverage Packing Company, LLC Rail Facility	$7,609,062
	SMS Rail Lines	Pureland Transload Expansion & Track Rehab	$1,563,300
	New York, Susquehanna & Western Rail Corp.	Rehabilitation of Bridge #26.02 Midland Park	$1,167,975
	City of Linden	The Linden Rail Freight Project	$2,302,443
	Winchester & Western Railroad	Concrete Bridge Rehab 45.99	$810,352
	Winchester & Western Railroad	Seashore Rail Replacement Phase II	$847,786
	New York, Susquehanna & Western Rail Corp.	North Bergen Serving Yard Track	$1,958,814
	Salem County	Chestnut Run Culvert Replacement	$834,480
	Dover and Delaware River Railroad LLC	Washington Yard Improvements	$1,472,072
	Somerville Business Park, LLC	The Somerville Business Park Rail Freight Project: Phase 2	$1,757,021
	South Jersey Port Corporation	Balzano Marine Terminal Rail Improvements	$6,010,650
	County of Morris	Dover & Rockaway Runaround Track	$737,550
		FY2020 Total	$27,071,504
FY2021	Delaware & Raritan River Railroad LLC	F&S Connection and Upgrade - Phase I	$4,365,000
	Consolidated Rail Corporation	Point-No-Point Bridge Replacement, Phase 1	$9,365,000
	Raritan Central Railway	Sweetwater Rail Spur Extension	$2,974,431
	Dover and Delaware River Railroad LLC	Stockton Street Curve and Interchange Improvement	$1,035,870
	New York, Susquehanna & Western Rail Corp.	Sparta Serving Yard Track	$1,738,021
	Belvidere & Delaware River Railway Co. Inc.	Copper Hill Track Upgrade	$673,828
	New Jersey Rail Carrier, LLC (Interstate Waste Services)	New Jersey Rail Carrier Rail Freight Project - Phase I	$3,451,956
	New York, Susquehanna & Western Rail Corp.	Install Ties, Ballast & Surface NYSW Main Line Track	$1,888,650
	Kinkisharyo International	Kinkisharyo Rail	$1,752,768
	County of Morris	Dover & Rockaway Rail Realignment Project Design	$1,820,495
		FY2021 Total	$29,066,018
FY2022	Somerville Business Park, LLC	Somerville Business Park Rail Freight Project: Phase 3	$2,610,480
	Consolidated Rail Corporation	Point-No-Point Bridge Replacement, Phase 2	$10,000,000
	Winchester & Western Railroad	Millville Transload, Phase I	$2,187,581
	Port Authority of New York and New Jersey	ExpressRail Southbound Connector	$851,400
	County of Salem	FY2022 Railroad Improvements	$2,500,000
	New Jersey Seashore Lines	New Jersey Seashore Lines - Southern Division Phase 2	$2,194,200
	Cape May Seashore Lines	Cape May Branch - Phase 1	$2,488,928
	New Jersey Rail Carrier, LLC (Interstate Waste Services)	New Jersey Rail Carrier Rail Freight Project: Phase 2	$3,556,834
	South Jersey Port Corporation	Rail Integration Project	$974,929
	Belvidere & Delaware River Railway Co. Inc.	Ringoes Curve Upgrade	$830,039
		FY2022 Total	$28,194,388

Source: NJDOT OGM

Prior investment in freight rail infrastructure indicates multiple positive factors for future freight rail investment, not the least of which are political and community support for freight rail-served industry. Federal grant programs look to related prior investment when considering the award of infrastructure grants, as well. This was added as a new evaluation criterion in recognition of the increased emphasis on programmatic improvements that build upon prior investments. For this evaluation category, projects were awarded one point for any completed or under-construction freight effort undertaken between 2017 and 2022 that has a direct relationship with the identified need. Major investments made prior to 2017 were considered, as well, since the 2017 plan did not specifically evaluate needs based on the proximity or relationship with prior investments. For example, the railcar float bridge operation by PANYNJ counts as a prior investment in freight movement in the Northern New Jersey port complex.

3.4.4 Project Evaluation and Issue Prioritization

The 2023 Plan revisits the issues identified in the 2017 plan and additional issues and priorities through the lens of evolving local, regional, national, and global concerns and uncertainties. The 2017 plan was primarily focused on achieving the greatest benefit for the freight rail network, but as described above, the 2017 plan's evaluation of needs was made without constraint for practical matters—it was a list of what needed to be fixed, regardless of the cost or logistics.

The 2023 Plan considers a more incremental approach, where making progress demonstrates commitment that will lead to more progress and improvement, ideally a positive snowball-effect of freight-rail supportive actions and policies. That is, whereas the 2017 Plan established the facts, the 2023 Plan is action-oriented: it identifies those projects that are the most beneficial *and* most likely to be completed in the short-term, taking a "bird in the hand" approach that prioritizes and protects what is known, and builds on that to identify the best next steps for future growth.

The Office of Freight Planning is also now fully staffed and prepared to leverage the studies and research conducted by MPOs, as well as work closely with the NJDOT Office of Grants Management, to support a more comprehensive approach to statewide freight improvements.

3.4.4.1 Rail Priority Scoring Methodology

Because of this revised approach to priority assessment, the 2023 Plan has adjusted its scoring matrix. The general framework of analysis presented for the 2017 Plan continues to be valid, and as a result, the majority of evaluation categories included in the 2017 Plan are carried through to the 2023 Plan.

The primary change to the previously established scoring methodology was to include categories that evaluate an improvement's ability to "Support retention, attraction, and growth of rail-served industries in New Jersey." This singular category has been broken into two:

- Support retention in rail-served industries within New Jersey; and,
- Support attraction and growth in rail-served industries in New Jersey.

This change is a direct result of the publication of the North Jersey Transportation Planning Authority's (NJTPA) Freight Rail Industrial Opportunity (FRIO) Corridors Program research. FRIO provided an in-depth analysis of existing freight rail-served industries, the challenges facing service to these customers, and the potential for the development of additional customers should the challenges be resolved.

The 2023 Plan evaluation used FRIO's industrial acreage data to identify which projects served the greatest existing real-estate investment by industrial customers and scored those needs higher than those that served a smaller existing customer base. Future growth was considered separately, with areas identified as containing large tracts available for future rail-served industrial development scored higher than those that were built out. As a result, a corridor that already serves a large base of freight customers and has additional land to accommodate future growth (of either the existing customers or of new, additional customers) would be ranked higher than either a corridor that has many existing customers and little additional land, or significant additional land and few existing customers. In either case, the revised evaluation categories place emphasis on existing freight rail customers: retention is obvious in this regard; attraction assumes that there are already customers there who will anchor the additional growth.

It is important to note that the 2023 Plan does not rank the passenger rail operator projects against the freight rail operator only projects—this would be unrealistic and not helpful in identifying action items for the short term. Rather, the 2023 Plan considers each of the three categories independently, ranking the projects by the 2017 and 2022 evaluations within the stakeholder policy group.

In practice, the maximum score achievable by the 2017 evaluation categories was 70 points. That scoring methodology was carried through to the 2023 Plan. For this plan, the same projects, scored by the 2017 methodology (with some adjustments reflecting changed conditions) were layered with a numerical score representing the policy category: All Passenger Rail Operator projects were given 1000 points; All Local/Regional Governments were given 750 points; and All Freight Rail Only projects were given 500 points. As a result, a 2017 project that scored nearly perfect at 68 points but requires coordination with NJ TRANSIT would now be scored 1068 and would be the #1 project recommended to be addressed by a passenger-freight working group. If the #2 ranked project in 2017 scored 67 points and required only freight rail coordination, it would be scored 567, and would be the #1 ranked project requiring only freight rail operator investment. This type of project may be a good choice for NJDOT sponsorship for a federal grant for freight rail operators.

3.4.5 Project Evaluation Categories - Tiers

In keeping with the identified need to prioritize achievable projects and demonstrate investment that will assist in resolving policy challenges, the 2023 Plan segregated the priority needs into three categories or Tiers. The new grouping by stakeholders identifies the priority projects by the relative potential challenges of advancing the project to construction or implementation. This allows the transportation agencies to sort and prioritize efforts relative to budget or funding source and may assist in developing long-range planning and coordination committees comprised of key stakeholders. The revised scoring system reflected the passage of time between 2017 and today and gave credit for developments manifested both in physical improvements (new rail connections, reduced physical constraints) and a greater understanding of the geographic, economic, and political context of the priority needs.

3.4.5.1 TIER Descriptions

The 2023 Plan incorporates priority tiering based on the level of involvement required of additional stakeholder groups. This tiering acknowledges the reality by scoring projects on the basis of the stakeholders involved in executing an improvement project. Stakeholder categories were identified in terms of the complexity of issues and range of voices that need to be heard to address the freight rail needs. These project tiering categories were identified as:

- Tier 1: Passenger rail operators – freight supporting improvements on infrastructure owner/controlled by passenger rail service providers.
- Tier 2: Local/regional governments – improvements of freight lines potentially requiring right of way acquisition and support from the host municipalities.
- Tier 3: Freight rail operators only – localized infrastructure improvements on freight-only rail lines not requiring right of way acquisition or host municipality coordination/support.

Passenger rail operators represent the stakeholders with influence over large, regional projects, and bring with them the concerns of elected officials, safety groups, and the traveling public. Local/regional governments represent smaller jurisdictions who may need to cope temporarily with impacts to local infrastructure because of a freight rail improvement, such as a roadway detour to allow improvement of a rail underpass. While they would hear the concerns of residents over additional noise and rail traffic, they are also aware of the economic benefits to their communities of retaining and developing rail-served industry. Lastly, “freight rail operators only” projects typically represent the least complicated stakeholder group and the projects that face the least potential opposition.

3.4.5.2 TIER 1 Specific Recommendations

Advancement of Tier 1 projects, listed in Table 14, will require coordination of multiple stakeholders and infrastructure owners/operators. These stakeholders currently participate and coordinate efforts through the NJ Freight Advisory

Committee (FAC). The FAC will be leveraged to establish a Rail Freight Sub-Committee (RFSC) under the FAC consisting of a working group of NJ TRANSIT, Amtrak, MPOs (using the MAP Forum), Port Authorities, New Jersey Railroad Association (NJRRA), and the freight rail companies and operators. The RFSC will be charged with identifying policy and project solutions to address the rail freight needs on those lines that are primarily passenger and have freight rail capacity constraints, be they weight or clearance. Three principal topics are envisioned to require stakeholder coordination to achieve the specific goals and to help meet the group's mission.

- Topic 1 of the RFSC would be to address policy issues and develop interim workarounds to allow 286K railcars to move along lines that are currently restricted. This would be a similar collaborative approach as has been implemented on the Washington Secondary and would serve as a model of how to resolve these issues in terms of operational and funding limitations. The interim workarounds could include but not be limited to reduced speed for freight trains, possibly operating off hours so as not to slow down passenger service, spacing of 286K cars, subsidies to freight rates such that the shipper does not pay a penalty for underloading to only 263K, etc.
- Topic 2 would be an Inter-State Collaboration Working Group focusing on the cross-state border issues. The first set of these projects are identified under the PA-NJ grouping above as both weight and clearance issues on the Delair Branch. The mission would be to work across jurisdictions with Pennsylvania including PennDOT, DVRPC, Amtrak, SEPTA and other stakeholders, to come up with solutions to the impediments on the PA side that effect NJ operations but in themselves are not issues for PA. Additionally the issue of the lack of direct connectivity (beyond the car float operation at Greenville) with the east side of the Hudson would be a focus of the group working with the PANYNJ, NYMTC and the MAP Forum, as well as the rail companies.
- Topic 3 would advance modal shift from road to rail across all port facilities in NJ with attention given to how marine highway can serve improved rail linkages. It would advance the marine highway connections between Port Raritan and other sites in New York City such the South Brooklyn Marine Terminal / 65th Street, Red Hook, Newtown Creek, and Hunts Point – and wind energy sites in New Jersey. The benefit would be a noticeable reduction of heavily loaded regional truck trips that would otherwise be on the key connectors between Northern New Jersey and the five boroughs of New York City. This could manifest itself in a myriad of ways such as trailer on barge.

Table 14. Tier 1 Rail Project Recommendations

Score	Number *	Constraint	Line Owner	Line Name
1023	5	HX Draw Bridge 286k	NJ TRANSIT	Bergen County Line
1023	20	Capacity Constraints on Lehigh Line between CP Aldene and NK	Conrail	Lehigh Line
1023	35	286k Limitations on NEC	Amtrak	Northeast Corridor
1021	3	286k Request	NJ TRANSIT	Raritan Valley Line
1021	4	286k Request	NJ TRANSIT	Bergen County Line
1021	27	Drain Bridge	NJ TRANSIT	Morristown Line
1021	28	Shippenport Road Bridge	NJ TRANSIT	Morristown Line
1021	30	Bridge over Franklin Road	NJ TRANSIT	Morristown Line
1021	31	East Hanover Avenue Bridge	NJ TRANSIT	Morristown Line
1021	40	286k Request	NJ TRANSIT	North Jersey Coast Line
1020	2	286k Request	NJ TRANSIT	Main Line
1020	53	Vertical Clearance Restrictions on Delair Bridge	Conrail	Delair Branch
1019	1	286k Request	NJ TRANSIT	Atlantic City Line
1018	25	Grand Avenue Bridge	NJ TRANSIT	Morristown Line
1018	26	Cattle Pass Bridge	NJ TRANSIT	Morristown Line
1018	29	Bridge over Mill Brook	NJ TRANSIT	Morristown Line
1017	39	Vertical Clearance on NEC	Amtrak	Northeast Corridor
1016	36	Capacity and Operation Constraints on the Mid-Line Loop near North Brunswick, NJ	Amtrak	Northeast Corridor
1014	61	Upper Hack Lift Bridge	NJ TRANSIT	Main Line
1014	62	Lower Hack Lift Bridge	NJ TRANSIT	Morristown Line
1014	67	Vertical Clearance Issues. Overhead Roadway Bridges in Perth Amboy	NJ TRANSIT	Garden State Secondary
1013	69	286k Access to Middlesex County South of Raritan River	NJ TRANSIT	North Jersey Coast Line
1011	54	Vertical Clearance at G Street (19'10")	Conrail	Delair Branch
1011	55	Vertical Clearance at Front Street (20'2")	Conrail	Delair Branch
1011	56	Vertical Clearance at 2nd Street (18'8")	Conrail	Delair Branch
1011	57	Vertical Clearance at 5th Street (19'3")	Conrail	Delair Branch
1011	58	Vertical Clearance at Margie Street (18'10")	Conrail	Delair Branch
1011	59	Vertical Clearance at Ridge Avenue (18'11")	Conrail	Delair Branch
1011	60	Vertical Clearance at Cecil B. Moore Avenue (18'0")	Conrail	Delair Branch
1010	78	Freehold Secondary reconnection to Southern Secondary (no longer Conrail operated)	NJ TRANSIT	Freehold Secondary

Source: Jacobs Engineering

3.4.5.3 TIER 2 Specific Project Recommendations

Similar to the process for advancing Tier 1 policies and actions, the RFSC will need to be involved for Tier 2 projects (listed in Table 15), especially the coordination with public sector stakeholders and the freight railroads. Tier 2 projects are on freight only lines but are more extensive in nature requiring improvements over longer segments or even creating new connections between existing lines (#9). For example, the Lehigh line is the main east-west freight line in New Jersey. It is owned on the inner section by Conrail such that the two owners (CSX and NS) each have access to their lines running west and south of Manville. The capacity constraints on the NS owned portion of the Lehigh line west of Manville to the PA border at Phillipsburg is treated as a single issue to be resolved together.

Table 15. Tier 2 Rail Project Recommendations

Score	Number *	Constraint	Line Owner	Line Name
775	51	Capacity Constraints at Marion Junction, Single Tracks National Docks	Conrail	Passaic & Harsimus Line/Northern Branch
773	21	Capacity Constraints Lehigh Line (CP Aldene to Manville)	Conrail	Lehigh Line
771	9	No Northward Connection Between National Docks and Greenville Yard	Conrail	National Docks Secondary, Greenville Yard to Upper Bay
771	22	Capacity Constraints through Musconetcong Tunnel	NS	Lehigh Line
771	72	North Jersey & South Jersey Connection	NJDOT	Blue Comet Line
770	10	Capacity Constraints - Support Tracks Required - 4 between Upper Bay & CP Garden. Two tracks already constructed. Needed to pass trains from increased Greenville Yard traffic	Conrail	Oak Island Yard
769	23	Capacity Constraints Lehigh Line (Manville to Phillipsburg)	NS	Lehigh Line
767	7	Capacity Constraints CP Green to Linden Ave Second Track (Linden Ave Bridge)	Conrail	National Docks Secondary
767	52	Harsimus Branch Lift Bridge (Hack Bridge)	Conrail	Passaic & Harsimus Line
766	15	Limited Capacity on West Trenton Line	CSX	CSX Trenton Line
766	43	Oak Island Yard Capacity Constraints	Conrail	Oak Island Yard
764	68	Single-Track Constraints, Lack of Connection to the Raritan Industrial Track. Opening to 286K avoids need to run on Amtrak.	Conrail	Garden State Secondary (formerly Chemical Coast)
763	8	Capacity Constraints with increase Port Volume - Greenville Yard Redevelopment - Add Greenville RT siding tracks	Conrail	Greenville Yard
763	63	Upper Bay Bridge (Lehigh Valley Drawbridge)	Conrail	National Docks Secondary
759	34	Limited Track Storage	NS	Croxton R.T.
759	65	E-Rail	NS-Conrail	Garden State Secondary
756	73	Rail Crossing at Route 601	CSX	CSX Trenton Line
755	33	Engine Track Ramp Extension	NS	Croxton R.T.

Source: Jacobs Engineering

3.4.5.4 TIER 3 Specific Project Recommendations

Tier 3 projects (listed in Table 16) are the projects that involve only freight lines, are short sections or single point projects and are expected to be lower-cost solutions that are easier to fund and implement. The ones achieving the highest scores are generally safety improvements at grade crossings, however 286K requests for two of the shortline operators also rose to the top.

Routine inspection, maintenance and upgrades to existing grade crossings falls under the jurisdiction of the NJDOT Rail Engineering Unit. The OFP and OGM will help to facilitate the prioritization of grade crossing improvements and assist in the management of obtaining grants and funding to implement these improvements such as under the Railway-Highway Crossings Program (RHCP). While it is expected that advancement of improvements to the below listed grade crossings will be coordinated and overseen by the NJDOT Rail Engineering Unit, the potential exists for other agencies to seek funding for larger scale grade crossing improvement projects such as grade crossing eliminations that typically are more complex and costly to implement.

Table 16. Tier 3 Rail Project Recommendations

Score	Number *	Constraint	Line Owner	Line Name
522	14	Limited Capacity on River Line	CSX	CSX River Line
522	24	286k Request	M & E	Whippany Line
520	70	286k Restrictions & Needed repairs	Salem Co	Salem Running Track
510	16	Croxton Yard Access Improvements	NS	Croxton R.T.
510	75	Port Elizabeth Southern Leg of the Wye at Bay Ave	Conrail	Garden State Secondary (formerly Chemical Coast)
510	76	CP Ron Southern Leg of the Wye	Conrail	Garden State Secondary (formerly Chemical Coast)
509	13	Rahway River Bridge	Conrail	Garden State Secondary (formerly Chemical Coast)
507.5	6	Belden Brick Crossing	NJ TRANSIT	Bergen County Line
507	46	Crooks Avenue Crossing	NS	Passaic Spur
506	45	West Belt Parkway Crossing	NS	Totowa Spur
506	49	Highfield Lane Crossing	NS	Newark I.T.
506	77	Barb Siding Extension - Motiva to Wood Interlocking	Conrail	Garden State Secondary (formerly Chemical Coast)
505	47	Bunge Oil Crossing	NS	Harrison I.T.
505	48	Bunge Oil Lead	NS	Harrison I.T.
504	12	Harrison Industrial Track	NS	Harrison I.T.
504	17	Landsdown Wye	NS	Lehigh Line
504	18	Bridge Ballast (LE57.1 and 57.17)	NS	Lehigh Line
504	79	Penns Grove Secondary Signaling (south of Paulsboro)	Conrail	Penns Grove Secondary
503	19	Crash Beam at LE 36.4 Bridge	NS	Lehigh Line

Source: Jacobs Engineering

3.4.6 Funding Opportunities

The ***state funded*** RFAP was established in 1994 to provide funding for improvements to the freight rail network. The annual funding limit was initially $10 million, dropped to $8 million for three years 2015-17, then raised significantly to $25 million. Prior, the category of projects available for funding was slightly narrowed by more specific regulations, which have now been improved. As the rail system ages, the need still far outweighs the resources available. Each year the department receives more requests for funding than are available. The New Jersey Railroad Association (NJRRA) is the ideal venue for both promoting the program and working with the political decision makers for increased funding. In addition, the current regulations (NJAC 16:53C) under which the RFAP operates are up for re-adoption in July 2023.

Under the IIJA the pre-existing NHFP has been extended at essentially the same level of funding, with the addition of a Carbon Reduction Program that defines a range of eligible projects, including projects that shift transportation demand to other transportation modes. Accordingly, freight rail infrastructure improvement projects that would encourage a modal shift from truck to rail would have standing and eligibility under this program.

In addition subject to certain limitations, a State may transfer up to 50% of funds made available each fiscal year from each other apportionment of the State to NHFP.[4] The total amount of NHFP funding available has been increased from 10% to 30% of the state's apportionment, and added a category: a marine highway corridor, connector, or crossing (including an inland waterway corridor, connector, or crossing), which might be applied to a project such as the Northward Connection Between National Docks and Greenville Yard, as the latter is served by NYNJ Rail's carfloat service to Brooklyn.

Grade crossing improvements that involve infrastructure upgrades or replacement can be addressed either through RFAP or federal programs that attend to the interaction between rail and federal aid. Other grade-crossing issues require more intensive engineering solutions, including physical grade separation or complete realignment of the tracks to move them away from sources of conflict and improve operational capacity and efficiency. The changes to Railway-Highway Crossings Program (RHCP) includes an increase from 90% to 100% for the Federal share, so no state funds need to be matched. Another large increase is the maximum incentive payment that a State may pay a local government for closing a public at-grade railway-highway crossing from $7,500 to $100,000. Over $35M in RHCP funding is included in projects in the STIP thru FY 2029.

The INFRA grant program continues to aid projects of national and regional significance which could be applied to cross-jurisdictional projects such as the Delair Branch impediments on the PA side of the Delaware River that are significant to NJ, but do not impact PA's own rail freight network.

The summary of funding opportunities available under the infrastructure law can be found in https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf

[4] FHWA Fact sheet: https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhfp.cfm

4 What We Have Done: Freight Projects Within the Region

A summary of and links to 64 freight-focused Initiatives completed since 2017 within or adjacent to New Jersey.

Since the completion of the 2017 Statewide Freight Plan, the NJDOT Office of Freight Planning (OFP) has been proactive in advancing a comprehensive and multimodal freight planning program, not only within New Jersey, but in collaboration with regional partners. This requires coordination across municipal, county, and state boundaries. The following sections highlight the breadth of studies completed during the last five years focusing on how and where freight moves into, out of, and within New Jersey. This diverse and long list of agencies and stakeholders focused on goods movement illustrates one of the challenges to moving freight within New Jersey. Given the complex nature of many of these agencies, communication and coordination amongst freight stakeholders is imperative. The NJFAC, detailed above, has continued to facilitate discussions about the needs and interests of New Jersey's freight partners, helping to coordinate the advancement of freight initiatives that directly support or benefit the goods movement industry.

4.1 NJDOT INITIATIVES

NJDOT's OFP, located within the Division of Multimodal Services, is involved in several ongoing initiatives that collectively aim to improve infrastructure conditions for the goods movement industry in New Jersey.

4.1.1 North-South Rail Analysis

This effort was one of four planning studies identified within the 2017 Statewide Freight Plan aimed at addressing freight-specific needs. This task involved coordination with New Jersey's three MPOs, rail operators, and stakeholders to prepare a concept screening report for the North-South Rail Connector project. This includes defining the project purpose and need; identifying study area limits; designing concept-level alternatives based on readily available data and/or previous studies; preparing high-level cost approximations; documenting known or anticipated demand from existing industries (based on readily available data and/or previous studies) and future land development (with input from NJTPA's FRIO project); and conducting high-level screening for potential environmental issues.

Project outreach was supported by a substantial data analysis effort, including a review of Surface Transportation Board (STB) Confidential Waybill Data and 2014 Freight Analysis Framework (disaggregated) truck volumes to identify commodities currently moving by rail between North and South Jersey, as well as "rail friendly" commodities currently moving by truck between these two regions.

As the study progressed, this analysis found little near-term market utility for the reactivation of the former "Blue Comet" line. However, the advancement of offshore wind power generation suggests the rail connection has utility. These initial findings and recommendations are being reviewed and updated to reflect new opportunities.

4.1.2 NJ Pandemic Response

The COVID-19 national and global pandemic that struck New Jersey and the New York (NY) metropolitan region in the Spring of 2020 underscored the need and urgency of maintaining supply lines in the face of disruptions. The purpose of this effort is to create straightforward guidelines that improve NJDOT's freight preparedness for future disruptions, and a set of relevant data to support them. This work is centered around two key pieces:

- **National Performance Management Research Data Set (NPMRDS) Lockdown Analysis** – A review of key routes for essential goods using the NPMRDS. This analysis has reinforced the importance of New Jersey's state highway network in moving critical goods.
- **Disruption Response Playbook** – This document will provide NJDOT with a primer/workflow that will allow the OFP to cultivate and maintain agency and stakeholder relationships to be fully prepared in advance of and during supply chain disruptions.

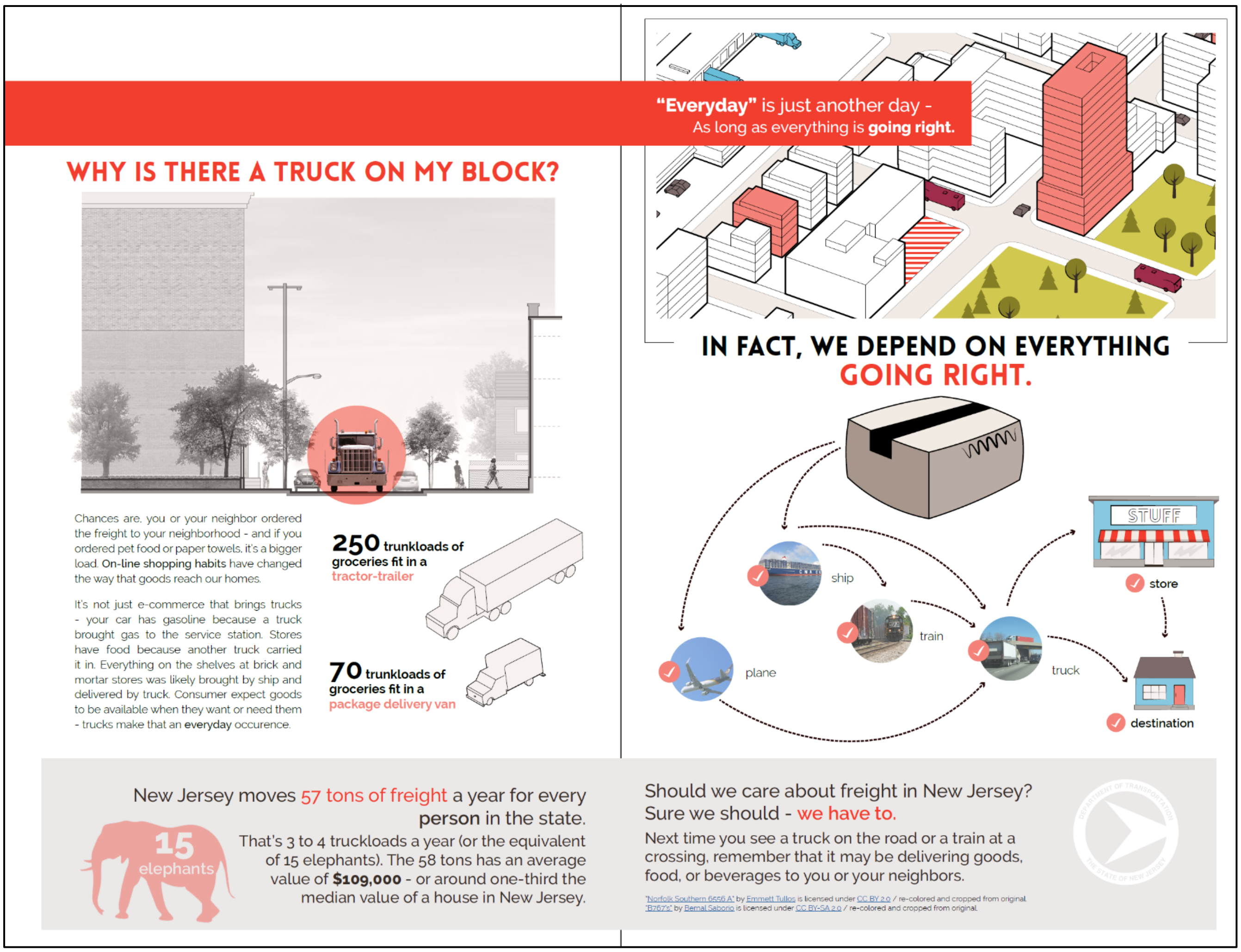
4.1.3 *Freight Rail Guidance*

This effort provided the NJDOT Office of Freight Planning and Office of Grants Management (OGM) freight rail development guidance to assist in determining where best to prioritize and invest in freight rail improvements for the benefit of the state. The guidance document included an existing condition and needs assessment and will provide guidelines for future freight rail investment.

4.1.4 *"Freight Moves New Jersey" Campaign*

This effort began in 2016 with the creation of the New Jersey Freight Summary Infographic, which served as a snapshot of existing data, highlighting the importance of freight for New Jersey. In 2019, the focus of this campaign shifted to be more educational, highlighting the importance of freight to New Jersey's residents and economy. As initial elements began to be created, a theme for future efforts coalesced: **Freight Moves New Jersey**. This theme continues as the title of the 2023 Statewide Freight Plan. The resultant initial document (illustrated in Figure 7) focused on the question "Why is There a Truck on My Block?"

Figure 7. Freight Moves New Jersey Infographic



Source: NJDOT, WSP

In 2021, NJDOT OFP coordinated interviews with two truck drivers made available by the American Trucking Associations (ATA). This connection was made possible through outreach with the New Jersey Motor Truck Association. Each 30-minute interview touched on the daily life of a truck driver, including routines, experiences in New Jersey, and how they believe the public perceives their industry. These interviews provided enough content to allow for the development of short (30-90 second) videos that will be shared via NJDOT's social media outlets. The first such video was shared by NJDOT via Facebook[5] and Twitter[6] on October 26, 2022.

Ultimately a key goal of the interviews and subsequent social media content is to "humanize" the trucking industry. Truck drivers are a critical element in the supply chain, and are often our neighbors, friends, or family members, representing the links between consumers and the goods they demand.

4.1.5 Freight Management System

NJDOT maintains several management systems to support asset management and prioritize project locations for future investments. NJDOT has developed and continues to refine a statewide Freight Management System (FMS) that will assist the state in better prioritizing the needs of freight at highway locations on the statewide highway network. Ongoing revisions to the FMS include improvements to current datasets, the expansion of the database to include additional roadway links, and the inclusion of equity data to prioritize locations in historically underserved communities.

Additionally, NJDOT will use the FMS to actionably select future freight-focused projects. Currently, NJDOT leverages the FMS to score projects within the capital pipeline, but through the ongoing FMS update, the NJDOT OFP is working on how to better navigate and prioritize an internal freight project selection process.

The FMS is referenced multiple times within this document and was leveraged as the basis of the identification of highway links most in need of improvements, as detailed in Section 3.3. The FMS is currently undergoing further refinements, including addressing known secondary directional reporting issues and updates to include newly available datasets.

4.1.6 Port Raritan/Marine Highway

Located on the Raritan River in Edison and Woodbridge, NJ, the former Raritan Arsenal – now known as Raritan Center – is owned by Federal Business Centers Inc. (a private-sector entity). Much of the site has been developed as a state-of-the-art business park hosting some of the top freight generating and transporting companies in the country. The site has outstanding highway and rail access; the site's maritime capability remains undeveloped, as the historic 2000-foot wharf and associated backland is in extremely poor repair.

The location now referred to as Raritan Center was put into service as a military installation following World War I. The United States War Department (now known as the United States Department of Defense) exercised eminent domain to assemble property for the creation of the Raritan Arsenal based upon a range of criteria including the existence of a navigable waterway (Raritan River) and access to the national rail network. During the Kennedy Administration, the arsenal was deemed too small for a modern military facility, decommissioned, and offered up for sale. In 1965, Federal Storage Warehouses (now Federal Business Centers) bought the approximately 2,350-acre property with the vision of creating a world class center of business and industry. Direct access to the Interstate Highway System combined with the existing rail and wharf, made the site of the former Raritan Arsenal an ideal location for the creation of a multimodal freight hub.

Regional planning agencies have long sought to restore the site to active maritime use. In response to an application prepared by the NJDOT OFP, a key milestone was MARAD's 2019 formal designation of Port Raritan™ as a Marine Highway Project serving the M-95 Corridor. Since that time, Federal Business Centers and NJDOT have moved ahead

[5] https://www.facebook.com/watch/?v=521541402762172&ref=sharing
[6] https://twitter.com/NewJerseyDOT/status/1585354819984052224

with site planning and permitting investigations, focusing on developing a facility to support a range of market opportunities – trailer-on-barge, truck ferry, wind energy, and other lift-on/lift-off cargo.

Advancing the project will require many governmental permits and approvals. Each permit will require accomplishing various tasks (bathymetric and land survey, engineering, geophysical, preliminary design, environmental and municipal permitting, etc.). With the support of NJDOT (the original project designation applicant), Federal Business Centers, Inc. (a private-sector entity) is submitting this funding application to secure funding for the investigations and other tasks necessary to secure all necessary federal, state, and local permits and approvals.

4.1.7 HazMat Transportation in NJ – Annual Report

New Jersey universal citation (NJ Rev Stat § 39:5B-28 - 2014) established a requirement that NJDOT, in consultation with the Department of Environmental Protection, the Department of Labor, the Department of Commerce and Economic Development, the Divisions of Motor Vehicles and State Police of the Department of Law and Public Safety, and other appropriate State departments and agencies, shall annually prepare and submit to the Governor and the Legislature a report detailing the incidence and means of the transportation of hazardous materials (HM) in New Jersey, evaluating the protection afforded New Jersey citizens by all relevant federal and State statutes and regulations, and recommending executive or legislative actions necessary to insure the safe and proper transportation of hazardous materials.

The NJDOT OFP prepares this annual report to:

- Detail the source and breadth of the state’s HM transport system across all modes.
- Describe all modes and associated defined routes.
- Describe current inspection levels and procedures across all modes.
- Identify existing regulations/Federal and State statutes that afford transport of HM protections and evaluate their effectiveness.
- Identify gaps in safety oversight, if any.
- Recommend measures to insure the safe and proper transport of hazardous materials.

4.1.8 FHWA Freight and Complete Streets Workshop

The FHWA and NJDOT co-sponsored a workshop in January 2022 titled *Freight in Our Neighborhoods: Toward a More Complete Street.* The workshop aimed to expand on how freight and complete streets efforts can complement one another. The workshop included presentations by local and national experts including Alison Conway of the City College of New York. Professor Conway’s presentation delved into numerous topics relevant to freight and Complete Streets, including the following:

- Selecting a proper design vehicle based on current and expected traffic flows and land uses.
- Engaging local and regional freight stakeholders and leaders.
- Adjusting signal phasing to improve traffic flow and safety.
- Vehicle-based solutions to safety problems which improve visibility.
- Operational solutions to promote delivery efficiency, including centralized delivery locations and improved enforcement.

4.1.9 Rail Freight Assistance Program

The NJDOT has a vital interest in preserving and improving the rail freight part of its transportation network. NJDOT supports New Jersey's economic activity by providing a strong, multimodal transportation system that makes rail service available, safe, and effective for as many businesses as possible. One of the primary tools for providing support to the freight rail industry is the Rail Freight Assistance Program (RFAP). The New Jersey Statewide Freight Rail Strategic Plan, completed in 2014, was developed for the purpose of maintaining and supporting an efficient freight rail system in the State of New Jersey.[7] The Plan assessed the state and efficiency of the existing system; projected future freight rail demands; and prioritized a series of improvements and actions to ensure the efficiency and effectiveness of New Jersey's freight rail system.

Consistent with the Statewide Freight Rail Strategic Plan, the RFAP supports the preservation, rehabilitation, and enhancement of New Jersey's freight railroad network. The RFAP provides funding for capital improvements that result in the continuation of economically viable rail freight services. The purpose of the program is to support a safe, efficient, and effective rail freight system in the State of New Jersey through the provision of financial assistance to preserve, rehabilitate, and enhance rail freight facilities.

Projects receiving financial support through the RFAP must show a positive cost benefit ratio, taking into consideration such factors as job creation and increased railroad revenues. Recipients of financial support are also required to continue freight service on the improved line for at least five years after completion of the project.

Financial assistance under the RFAP is available to Class I, Class II, and Class III railroads as defined by regulations of the Interstate Commerce Commission (49 CFR Part 1201; General Instructions 1-1). Financial assistance may be made to owners of rail properties, operators of rail freight service, or responsible public agencies or authorities for projects included in the annual list of projects eligible for participation in the RFAP. Financial assistance provided through the RFAP may be utilized for the design, construction, reconstruction, rehabilitation, land acquisition, and environmental mitigation of freight rail projects that are significant to port commerce connectivity; eliminate rail freight missing links to port facilities; or upgrade freight rail tracks to a 286,000-pound load carrying capacity. The RFAP is one component of a wide range of activities undertaken by the NJDOT to advance:

- **Economic Development**: Retention and generation of jobs, helping maintain and enhance the State's competitive position.
- **Mobility**: Improve access to the national freight system and improve the efficiency of goods movement.
- **Sustainable Investment**: Cultivate and protect freight initiatives which provide lasting returns on public investment.
- **Community and Environment**: Promote freight as a good neighbor and the movement of freight in a socially and environmentally responsible manner.
- **Safety and Security**: Protect people, cargo, and infrastructure.

Through the RFAP, the NJDOT solicits proposals for new rail projects annually. Those that meet the minimum criteria are entered into the program. Then NJDOT selects those it will be able to fund in the current fiscal year and those that it will consider for funding within the next two years. Providing nearly $30 million annually in financial support to eligible projects, the RFAP continues to be a major factor in supporting short line viability, providing choices in transportation for New Jersey businesses, and reducing truck traffic on our highways. A summary of recent RFAP awards is detailed later in this document, Section 3.4.3 outlines the individual recipients of the nearly $140 million in RFAP funding awarded between FY 2017 and 2022, inclusive.

[7] New Jersey Statewide Freight Rail Strategic Plan, June 2014: https://www.state.nj.us/transportation/freight/plan/pdf/FRSP.pdf

4.1.10 Local Freight Impact Fund

NJDOT's Division of Local Aid and Economic Development administers the state's Local Freight Impact Fund (LFIF), a competitive grant program ($30.1 million annually). This program helps New Jersey's municipalities and counties fund projects that mitigate the impacts of freight, while enhancing the safe movement of large truck traffic, rehabilitate structures that carry large truck traffic, or support new transportation opportunities.

The Route 44 Bypass project, funded by New Jerseys' Local Freight Impact Fund, included the construction of a new 0.60-mile truck bypass roadway that ties into the existing Route 44 roadway in western Gibbstown. The truck bypass diverts existing through movements of trucks away from the Route 44 and Broad Street intersection in downtown Gibbstown and provides direct access for the DuPont/Repauno site. The project also included the design of a new at-grade railroad crossing. The project team worked closely with the Railroad Diagnostic Team, various NJDOT Subject Matter Experts, County Engineers, Local Emergency Management Officials, Conrail, and DuPont Port Owners.

Under the program, projects that fall into four categories are eligible for funding:

- **Pavement Preservation:** Improvements to deficient or deteriorating pavement conditions in support of freight travel on municipal/county transportation infrastructure.
- **Truck Safety and Mobility:** Improvements to large truck access, routing, or mobility along municipal or county routes.
- **Bridge Preservation**: Improvements to deficient or deteriorating structures that support freight travel on municipal/county highway network.
- **New Construction:** Promoting new construction in support of freight travel on the municipal/county highway network.

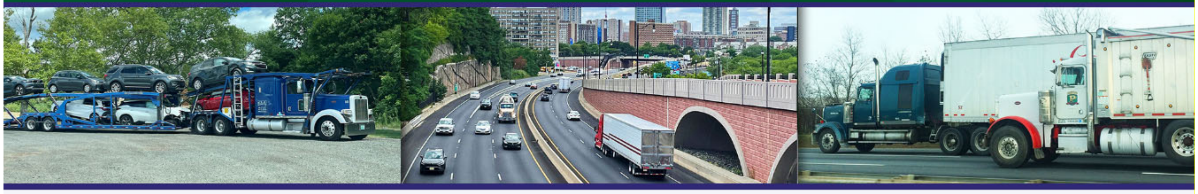
A review of requested projects by NJDOT staff includes the evaluation of several criteria including but not limited to: existing conditions, overall traffic volume, percentage of large truck traffic, crash frequency, and connectivity to freight nodes.

4.1.11 Commercial Vehicle Guidebook

NJDOT provides motor carriers with information regarding size and weight limits, the types of permits that are required for heavy or over dimensional loads, and other relevant safety and regulatory information to help motor carriers maintain compliance with state and federal regulations and to keep New Jersey roadways safe for all users. The information is available on the GotPermits website (https://nj.gotpermits.com/) and in the New Jersey Commercial Vehicle Size and Weight Guidebook. A recent research scan of all 50 states found that New Jersey is one of only a few states that provide a comprehensive guidebook on size and weight regulations and permitting. NJDOT is presently updating the Guidebook to include the latest federal and state regulatory information and to help clear up common misunderstandings regarding emergency permit types and applicability. The Guidebook is accompanied by a Reference Guide (Figure 8) brochure which includes a map of designated travel routes for large trucks (102-inch wide and double-trailer truck combinations), a list of bridges with low vertical clearances, and summary-level information about size and weight requirements and permits. When completed, these materials will be available for review and download on the GotPermits website.

Figure 8. Commercial Vehicle Size and Weight Reference Guide

NEW JERSEY
Commercial Vehicle Size
and Weight Reference Guide



LEGAL HAULING LIMITS

- The following tables outline the statutory size and weight limits in the State of New Jersey.
- Maxi-Cube: combination vehicle consisting of a straight truck and trailer unit, both designed to carry cargo.
- Truck: is a single unit motor vehicle designed, used or maintained for the transportation of property.
- Tractor: a motor vehicle primarily used for drawing other vehicles and not so constructed as to carry a load other than a **PART** of the weight of the vehicle and load so drawn.
- Trailer: a vehicle with or without motive power, designed for carrying property, being drawn by a motor vehicle, and so constructed that **no part** of its weight rests on the towing vehicle.
- Semitrailer: Is a trailer constructed so that **SOME** part of its weight and its load rests upon or is carried by another towing vehicle.
- Tandem Trailer: two connected trailers with no load weight resting upon the towing vehicle.
- Traditional Automobile Transporter: is an automobile transporter wherein the fifth wheel is located on the frame of the truck tractor over the rear axle(s).
- Stinger Steer Automobile Transporter: an automobile transporter consisting of a truck tractor-semitrailer wherein the fifth wheel is located on a drop frame behind and below the rearmost axle.

Axle Grouping	Maximum Allowable Weight
Overall Gross	80,000 lbs.
Single Axle	22,400 lbs.
Tandem Axle	34,000 lbs.
Other Axle Configuration	Apply Federal, Bridge Formula

SIZE AND WEIGHT PERMITS

- Commercial vehicles, and vehicle combinations, operating on highways within the State of New Jersey must operate within the size and weight limitations outlined in Title 39 of New Jersey State Statute, specifically N.J.S.A. 39:3-84. All commercial vehicles exceeding the legal size and weight limitations in the State of New Jersey require the carrier to obtain an oversize/overweight (OS/OW) hauling permit. These permits allow for a carrier hauling qualifying loads to temporarily exceed size and weight limitations outlined in N.J.S.A. 39:3-84. The permit must be in the possession of the operator of the vehicle for which the permit was issued. The authority to issue these permits is outlined in the New Jersey Administrative Code (N.J.A.C. 13:18).
- In order to obtain an OS/OW hauling permit, the vehicle, or load being carried must be "non-divisible". A "non-divisible" load is a load that cannot be dismembered, dismantled or divided in such a manner, so that the weight and dimensional limitations prescribed in N.J.S.A. 39:3-84 are not exceeded. This provision is outlined in N.J.A.C. 13:18-1.9.

Nondivisible Loads(Can Permit)	Divisible Loads(Cannot Permit)
Construction Equipment, Mobile/Modular Homes, Large Generators, Milk, etc.	Sand, Gravel, Garbage, Mulch, Fuel, Stone, etc.

PERMIT TYPES

There are four different types of OS/OW permits available for hauling loads above legal size and weight limits. They are as follows:

1. Single-Trip Permit (5 day): Used for the transport of any non-divisible OS/OW load.
2. Code 23 Overdimensional Trailer Permit (Lifetime): Used for the movement of oversize Code 23 trailers up to certain dimensional limits. (8-10 feet wide; 55-70 feet long)
3. Code 23 Permit (30 day): traditionally used for the transport of heavy construction equipment or machinery. No excess weight fees apply.
4. Ocean Borne Container Permit (Annual): Used for the transport of sealed ocean borne containerized cargo.

The New Jersey Department of Transportation (NJDOT) is now issuing oversize and overweight permits on behalf of the New Jersey Motor Vehicle Commission. Carriers may apply for permits on-line 24 hours a day, 7 days a week, by visiting NJDOT's OS/OW permit web site http://nj.gotpermits.com. Permits also can be obtained on the carrier's behalf through a permit service company. A list of permit service companies currently registered with NJDOT's OS/OW permitting system can be found on this website. Further information on the permitting process and associated fees can also be found in the "Commercial Vehicle Size and Weight Guidebook." For further information on legal hauling size and weight limitations, please refer to the statute or the "Commercial Vehicle Size and Weight Guidebook."

EMERGENCY PERMITS

Emergency Permit	Description	Typical Uses	Limitations
Preplanned Non-Divisible Load Emergency Permit	Allows for the transport of oversize, overweight, and non-divisible loads along state roadways.	Transport of equipment or provision of service for major unforeseen event or accident.	Preparation for an emergency situation such as a storm, major accident, or utility outage
Unplanned Non-Divisible Load Emergency Move Permit	Allows for the transport of oversize, overweight, and non-divisible loads along state roadways.	Transport of equipment or machinery.	State-Declared Emergency
Unplanned Divisible Load Emergency Move Permit	Allows for the transport of oversize, overweight, and divisible loads along state roadways.	Transport of emergency items such as food, fuel, and relief supplies.	Federal-Declared Emergency

TABLE OF STRUCTURES WITH MINIMUM CLEARANCES 13'6" OR LESS OVER STATE AND INTERSTATE HIGHWAYS

Trunkline	Trunkline Mile Point	Structure Number	Name of the Structure	Location	County	Clearance	Owner
NJ 4	4.31	206159	FOREST AVENUE (COUNTY ROUTE 59) OVER NJ 4	1.0 MI EAST NJ 17	BERGEN	13.5	State
NJ 4	6.75	206168	GARRISON AVENUE OVER NJ 4	3.4 MI EAST OF NJ 17	BERGEN	13.5	State
NJ 4	9.62	206182	JONES ROAD OVER NJ 4	6.2 MI EAST OF NJ 17	BERGEN	13.5	State
US 202	81.15	267170	NJ TRANSIT MAIN LINE/US ROUTE 202	AT NORTH END 202	BERGEN	9.92	NJ Transit
US 30	2.49	406156	BAIRD BOULEVARD (CR 608) OVER US 30	0.63 MI S OF 30-537 JCT	CAMDEN	13.5	State
NJ 73	15.93	415151	ATLANTIC CITY LINE OVER NJ 73	0.2M S OF RTS 73-534 JCT	CAMDEN	13.5	NJ Transit
US 130	25.61	419150	VINELAND SECONDARY OVER US 130	0.1 MI S OF JCT 130-47	CAMDEN	13.5	ConRail
NJ 495	1.6	917159	NEW YORK AVENUE OVER NJ 495	0.9 MI W OF LINCOLN TUN	HUDSON	13.5	State
NJ 35 NB	48.08	1222153	PINE AVENUE (CR 688) OVER NJ 35 NB	1.5 MI SO OF RT 9 JCT	MIDDLESEX	13.5	State
NJ 124	4.39	1406150	MORRISTOWN LINE OVER NJ ROUTE 124	AT RTS 24 - 623 JCT	MORRIS	13	State
NJ 53	4.13	1411150	ABANDONED BOONTON LINE/NJ ROUTE 53	0.5ML S OF RT 80	MORRIS	13.5	NJ Transit
NJ 53	4.19	1411151	BOONTON LINE OVER NJ ROUTE 53	0.37 M S OF ROUTE 80	MORRIS	13.25	NJ Transit
NJ 53	4.22	1483162	BOONTON LINE OVER NJ ROUTE 53	0.4 ML W OF RT 80 - 53	MORRIS	13.25	NJ Transit
NJ 439	1.94	2013151	ELIZABETH BRANCH OVER NJ 439	0.1M S OF RTS 28-439 JCT	UNION	12.33	ConRail

Dimension	Vehicle Type/ Combination	Dimensional Limit	Conditions	Example
Width	All	8' (96")	All Highways (Ref. N.J.A.C. 16:32)	96"
	All	8'6" (102")	All Highways except specific (Ref. N.J.A.C. 16:32)	102"
Height	All	13'6"	All Highways	13'6"
Length	Truck (Straight Truck)	40'	All Highways	40'
		50'	When hauling a non-divisible load	50'
	Truck-Semitrailer	62'	All Highways	62'
	Truck-Trailer	62'	All Highways	62'
	Tractor-Trailer	No Limit	All Highways	No Length Limit
	Tractor-Semitrailer	No Limit	All Highways	No Length Limit
	Trailer	48'	All Highways	48'
	Semitrailer	53' (41' kingpin)	All Highways	41' 53'
		63'	When hauling a non-divisible load	63'
	Maxi-Cub Vehicle	65'	34' maximum cargo box	34' Maximum 60' 65'
	Tandem Trailer	28'	Maximum of two trailers	28" 28"
	Traditional Automobile Transporter	65'	All Highways	3' Front Cargo Overhang 4' Rear Cargo Overhang 65' Maximum Overall Length
	Stinger Steered Automobile Transporter	75'	All Highways	4' Front Cargo Overhang 6' Rear Cargo Overhang 80' Maximum Overall Length

FOR MORE INFORMATION...
New Jersey Department of Transportation, Bureau of Aeronautics and Federal and State Safety Programs
address: **1035 Parkway Avenue, Trenton, NJ 08625** | phone: **609-963-2085** | email: **Superload.Permits@dot.nj.gov** | website: **https://nj.gotpermits.com**

http://nj.gotpermits.com/

4.1.12 NJDOT Owned Railroad Bridge Inspections and Maintenance

In compliance with the Federal Railroad Administration's (FRA) Bridge Safety Management Regulations (49 CFR Part 212 and 237), the NJDOT OFP prepared a Bridge Safety Management Program (BMP) in compliance with section 237.31 of the regulations. The BMP includes the inventory of railroad bridges, the recording of the safe load bearing capacity of the bridges, design document (as available), and the detail to carry out bridge inspections.

As set forth in the Bridge Safety Management Regulations, two types of inspections are required depending upon whether the bridge actively carries live loads (i.e.: trains crossing a bridge).

- **Periodic Inspections** are conducted at inactive bridges and include visual observations of all components of the bridge. The primary objective of the Periodic Inspections is to identify changes in the condition of the bridge compared with previous inspections. Periodic Inspections should occur every five years or as required. While a majority of the NJDOT-owned inactive bridges have previously been inspected, inspection at a total of thirty (30) inactive bridges remains required.
- **Fracture Critical Inspections** are conducted once every two years at active bridge locations. Currently, NJDOT owns a total of four active bridges for which fracture critical inspections are required.

4.1.13 Preparation and Maintenance of the Statewide Rail Network GIS and Online Viewer

The NJDOT OFP developed and maintains a statewide rail system geodatabase. The database was developed as a repository for information related to the rail network in New Jersey pertinent to a wide array of planning and infrastructure management activities. Attributes defined within the database include such operational descriptors as:

- Operation type – freight, passenger, shared
- Status – active, inactive, out of services
- Weight limits – 286K
- Grade crossings
- Owner
- Rail yards and passenger stations
- Ongoing and planned infrastructure improvement projects

Attributes are routinely updated as the system or its operations are modified. Any additional information in the database can be added as required. The database is shared with outside agencies such as the MPO's and the Port Authorities for use in collaboration of efforts and projects to improve the statewide rail network and the service it supports.

The database is currently being transformed into a Straight Line Diagram (SLD) style interface, allowing representation of the network in a style similar to track charts that are maintained by the individual railroads.

https://njdot.maps.arcgis.com/apps/webappviewer/index.html?id=ac867c7103e144dbae1d6aa70289796e.

4.1.14 NJ Truck Network Map

NJDOT OFP also maintains a map depicting the designated travel routes for double-trailer truck combinations and 102-inch-wide standard trucks as defined under *NJAC Title 16. Transportation, Chapter 32-Truck Access*. The map is maintained and updated to reflect periodic changes made to the segments of roadways designated as part of the National Network, the NJ Access Network, and roadways where travel by double trailer truck combinations and 102-inch-wide trucks is prohibited (with the exception of trucks making local deliveries that require travel along those routes).

The network is defined at three levels:

- **National** - consisting of the interstates and toll routes with some additions for connectivity.

- **Access Routes** - consisting of the U.S., NJ, and County 500 numbered routes.
- **Blue Routes** - exclusions from the Access network where regulatable trucks (102-inch-wide and double-tractor trailers) are prohibited from through travel along that section.

Periodic revisions to the map are made when regulations are re-adopted or changed which can include additions or deletions from the network. Additionally, the map is updated when a new road is added, built, or relocated.

https://www.state.nj.us/transportation/freight/trucking/pdf/largetruckmap.pdf

4.1.15 Statewide Performance Measures

In line with the mandate under Federal legislation (the latest being the IIJA), state DOTs are required to establish freight performance targets as well as report on a 2- and 4-year basis on meeting those targets with detailed reporting on the performance of the interstate system for freight. NJDOT OFP is responsible for tracking a wide range of freight performance measures and reporting to the FHWA. Additional performance measures are highlighted in the Policies, Actions, and Performance Measures section of this report (Section 3.1).

In addition to freight performance targets, each state is required to provide FHWA with a biennial performance report that summarizes transportation conditions for 2- and 4-year time periods.[8] The most current summary of New Jersey's performance measures and targets is summarized in Table 17. While NJDOT OFP is focused on tracking freight performance, the office's subject matter expertise and understanding of transportation data will support the state's overall Transportation Performance Management program.

[8] FHWA State Performance Dashboard – New Jersey: https://www.fhwa.dot.gov/tpm/reporting/state/state.cfm?state=New%20Jersey

Table 17. Summary of New Jersey's Transportation Performance Measures and Targets

Performance Measures	Baseline	2-Year Condition/ Performance	2-Year Target	4-Year Condition/ Performance	4-Year Target
Percentage of Pavements of the Interstate System in Good Condition	62.1%			75.7%	50.0%
Percentage of Pavements of the Interstate System in Poor Condition	1.8%			0.1%	2.5%
Percentage of Pavements of the Non- Interstate NHS in Good Condition (IRI Only)	41.9%	44.4%	25.0%	50.6%	25.0%
Percentage of Pavements of the Non- Interstate NHS in Good Condition (Full Distress + IRI)		33.0%	25.0%	41.6%	25.0%
Percentage of Pavements of the Non- Interstate NHS in Poor Condition (IRI Only)	26.5%	26.9%	2.5%	19.8%	15.0%
Percentage of Pavements of the Non- Interstate NHS in Poor Condition (Full Distress + IRI)		10.7%	2.5%	4.8%	15.0%
% of NHS Bridges Classified as in Good Condition	21.7%	22.1%	19.4%	21.3%	21.3%
% of NHS Bridges Classified as in Poor Condition	6.5%	6.8%	6.5%	6.6%	6.8%
Percent of the Person-Miles Traveled on the Interstate That Are Reliable	82.1%	80.6%	82.0%	94.0%	82.0%
Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable	86.2%			92.2%	84.1%
Truck Travel Time Reliability (TTTR) Index	1.82	1.89	1.90	1.56	1.95
Annual Hours of Peak Hour Excessive Delay Per Capita: New York–Newark, NY–NJ–CT	22.3			20.9	22.0
Annual Hours of Peak Hour Excessive Delay Per Capita: Philadelphia, PA–NJ–DE–MD	14.6			13.1	17.2
Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel: New York–Newark, NY– NJ–CT	51.6%	51.6%	51.6%	52.4%	51.7%
Percent of Non-Single Occupancy Vehicle (Non-SOV) Travel: Philadelphia, PA–NJ– DE–MD	27.9%	28.2%	28.0%	30.6%	28.1%
Total Emission Reductions: PM2.5	9.572	162.020	4.290	178.800	8.520
Total Emission Reductions: NOx	244.301	1500.520	114.401	1572.321	231.850
Total Emission Reductions: VOC	44.493	157.750	17.682	179.176	36.324
Total Emission Reductions: PM10					
Total Emission Reductions: CO	67.376	707.710	31.927	1080.681	63.010

Source: NJDOT Statewide Planning.

4.2 NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY (NJTPA)

NJTPA, the MPO for northern New Jersey, has produced freight-related planning studies, modeling tools, and activity profiles in support of freight development. NJTPA also supports the region by hosting the Freight Initiatives Committee, a group of regional freight stakeholders that meets six times annually to discuss freight trends within the region.

4.2.1 The COVID-19 Pandemic and North Jersey Freight (2021)

This effort addressed the implications of the Pandemic Crisis for the NJTPA Region's Supply Chains and Freight Transportation System. The final report summarizes how the COVID-19 pandemic disrupted the NJTPA region's supply chains and the longer-term implications for the region. Ultimately, it focuses on several key elements unique to the COVID-19 pandemic, as well as best practices for how to limit future supply chain impacts. These elements include an understanding of how the pandemic differed from previous major events within New Jersey, including Superstorm Sandy, initial responses from public agency and private freight industry partners, an understanding of growing challenges following the initial shutdown phase, and a summary of long-term changes and future implications for New Jersey's freight infrastructure. This report is included as an appendix to the NJTPA's Long Range Transportation Plan, Plan 2050.

https://www.njtpa.org/NJTPA/media/Documents/Planning/Plans-Guidance/Planning%20for%202050/njtpa_Covid-19_freight_report.pdf

4.2.2 Pilot Freight Concept Development Program (2020)

Numerous potential freight projects have been identified through planning studies completed in the NJTPA region. A consistent challenge following the completion of the planning phase is the identification of next steps and ultimately implementation. To formalize this process, NJTPA developed the Freight Concept Development Program to provide an avenue to advance freight projects in the spirit of the NJTPA's Local Concept Development program, establishing a clearer path forward to implementation.

https://www.njtpa.org/PilotFCDP.aspx

As part of the creation of this program, two pilot projects were completed:

- *Hackettstown Bridge over Drain Weight Restriction Elimination Project (2020)* – This study identified a preferred alternative to eliminate constraints to moving 286,000-pound (286K) railcars across the drain bridge located at milepost 57.25 on the Washington Secondary/Morristown Line Corridor (Washington Secondary). In addition to weight constraints, there are also height constraints (less than industry standard: Plate F/17 feet) along the corridor limiting the rail line's utility and ability to effectively serve the freight rail-served businesses located along the corridor and the connecting branch lines.

  https://www.njtpa.org/NJTPA/media/Documents/Planning/Regional-Programs/Studies/Pilot%20Freight%20Concept%20Development%20Program/HACKET~1.PDF

- *Dover and Rockaway Rail Realignment Project (2020)*– This study identified a preferred alternative to eliminate active freight rail service on the section of the Dover & Rockaway Railroad's Rockaway Branch through downtown Dover while maintaining service to multiple industrial businesses in Rockaway Township served via the Dover & Rockway Railroad.

  https://www.njtpa.org/NJTPA/media/Documents/Planning/Regional-Programs/Studies/Pilot%20Freight%20Concept%20Development%20Program/Dover-and-Rockaway-Railroad-Realignment-Project-CDR.pdf

Two additional projects are currently being advanced as part of the Fiscal Year (FY) 2021 Freight Concept Development Program with a scheduled completion date of June 2023:

- *Berkshire Valley Road Truck Circulation Project* – This project will look at improving truck circulation along Berkshire Valley Road in Roxbury (Morris County). Two specific issues will be reviewed: low overhead clearance where the Morris County-owned Chester Branch rail bridge crosses over Berkshire Valley Road, and challenging operational issues associated with the intersection of North Dell Avenue and Berkshire Valley Road adjacent to where the Chester Branch crosses over Berkshire Valley Road. The project will result in a more direct truck route avoiding residential areas. Freight mobility and safety will be improved by preventing truck collisions with the rail bridge which often results in the bridge being taken out of service for repairs impacting rail operations.

  http://berkshirevalleyroadstudy.com/

- *Port Reading Secondary South Main Street Grade Crossing Elimination Project* – This project will investigate the potential elimination of the Port Reading Secondary grade crossing at South Main Street (Queens Bridge) in Bound Brook (Somerset County).

  http://southmainstreetgradecrossing.com/

4.2.3 2020 Report on the Economic Value of the New York-New Jersey Port Industry

This briefing quantified the scale of the impact (jobs, income, production of goods and services, and revenue) of the maritime industry at the Port of New York and New Jersey (PortNYNJ). The growth in PortNYNJ activity is directly linked to the nearly $3 billion in public and private investment within the region, including the raising of the Bayonne Bridge.

https://nysanet.org/wp-content/uploads/2020_NYSA_Economic_Impact_Study.pdf

4.2.4 2050 Freight Industry Level Forecasts Study (2020)

The 2050 Freight Industry Forecasts serve as an update to work previously completed in 2012 (2040 Forecasts). This effort quantifies current and projected freight demand through 2050 for use in the freight planning activities of NJTPA as well as its regional and state partners. A primary outcome of the effort is a set of 28 stand-alone freight profiles for the NJTPA region, highlighting each of the NJTPA's subregions and the top regional commodity bundles, including e-commerce deliveries.

4.2.5 Freight Rail Industrial Opportunities (FRIO) Program (2019)

The Freight Rail Industrial Opportunity (FRIO) Corridors Program was created to foster collaboration amongst public and private entities to address physical barriers to freight access to industrial properties along some of New Jersey's railroad lines. The FRIO program is the first comprehensive assessment of the physical restrictions precluding national standard freight rail service to many of the NJTPA's industrial areas and the associated value with addressing these impediments.

Two databases were developed:

- **Industrial Opportunity database**: Potential properties that could benefit through improved railroad access.
- **Restriction Location database**: Inventory of physical restrictions on the rail lines impacting current railroad operations.

https://www.njtpa.org/NJTPA/media/Documents/Planning/Regional-Programs/Studies/Freight%20Rail%20Industrial%20Opportunity%20(FRIO)%20Corrido/190610-NJTPA-FRIO-Final-Report.pdf?ext=.pdf

4.2.6 Freight Activity Locator

This online tool provides access to freight data developed and gathered by NJTPA during its freight planning activities. The application presents maps of the region's freight transportation network and major freight facilities including the port, intermodal yards, and distribution centers. It contains interactive applications, dashboards, and statistics on freight related data in the NJTPA region.

https://www.njtpa.org/Data-Maps/Tools/Freight-Locator.aspx

4.2.7 NJTPA's Goods Movement Strategies for Communities (GMSC) Tool

The GMSC tool is designed to help communities and decisionmakers address questions and issues regarding moving goods in the region. The database provides users with practical and innovative techniques and information to help consider solutions and strategies.

https://goodsmovement.njtpa.org/home

4.2.8 Truck Parking Study

This ongoing (as of Fall 2022) study is evaluating truck parking shortages within the region and the implementation of federally mandated Electronic Logging Devices (ELD) which digitally monitor truck drivers' compliance with Hours-of-Service regulations. NJTPA is continuing to update this database, identify needs and trends, and monitor future developments throughout the region.

4.2.9 Plan 2050 (2021)

NJTPA's Plan 2050 focuses on three themes: Transportation, People, and Opportunity, each reflecting a key element of a fully functioning region. The plan outlines existing conditions for the region's infrastructure and its residents, detailing a vision and blueprint for future investments that will ensure a more efficient and sustainable transportation future.

https://www.njtpa.org/plan2050

4.2.10 Freight Rail Grade Crossing Assessment Study Update (Scheduled Completion: 2023)

The purpose of this study is to update previously completed work (2008) and document current conditions and operations at grade crossings along major freight rail lines within the NJTPA region. This assessment will score and prioritize the grade crossings in terms of need and develop recommendations for addressing issues at the top ten grade crossings. The update is expected to be completed by June 2023.

https://www.njtpa.org/Planning/Regional-Programs/Studies/Active/Freight-Rail-Grade-Crossing-Assessment-Update.aspx

4.2.11 Union County Truck Mobility Study (2021)

Union County initiated the Truck Mobility Study to better understand how and where trucks are moving on its roadway network; to identify barriers to efficient and safe regional freight movement; and to recommend potential strategies to address those barriers. The goals of the Study were predominantly focused on freight-centered safety improvements to support the economic vitality of the County. However, the Study outcomes also balance the needs of other users, including cyclists and pedestrians.

The County is the center of freight activity in New Jersey. With this volume of freight activity comes substantial truck traffic that relies on the County's roadway network to travel between freight origins or destinations and the regional highway network. At the same time, this area is also home to numerous walkable and bikeable communities where the main shopping district is on a county road. The Study assumes trucks will remain a constant presence in Union County. The outcomes and improvements identified within this Study will ultimately optimize the County roadway network to allow for truck circulation where it is most needed, while ensuring that other modes, including non-motorized modes, are accommodated, and supported.

This study was funded through the NJTPA Subregional Studies Program, a program providing funding to MPO member counties and municipalities (subregions) to conduct local studies in support of Plan 2050, the MPO Long Range Transportation Plan.

https://www.njtpa.org/Planning/Subregional-Programs/Studies/Active-Studies/Union-County-Truck-Mobility-Study.aspx

4.2.12 Moving Mindfully: Monmouth/Mercer (2019)

The Moving Mindfully: Monmouth/Mercer study focused on three municipalities in central New Jersey with different needs and priorities. Allentown Borough is a historic and compact community with structures built before the American Revolution; Robbinsville Township is a suburban bedroom community dealing with continued residential and commercial growth; and Upper Freehold is a rural community committed to maintaining its agriculture makeup. These three municipalities share borders and roadways, but each has its own distinct identity and views on freight-related traffic. This study focused on mitigation measures aiming to improve conditions for all users, reducing negative effects associated with freight-related traffic without placing an undue burden on a single community.

This study was funded through the NJTPA Subregional Studies Program, a program providing funding to MPO member counties and municipalities (subregions) to conduct local studies in support of the Plan 2050, the MPO Long Range Transportation Plan.

https://www.njtpa.org/NJTPA/media/Documents/Planning/Subregional-Programs/Studies/Monmouth%20County%20-%20Moving%20Mindfully/Moving-Mindfully-Monmouth-Mercer-Final-Report.pdf?ext=.pdf

4.2.13 Southern Middlesex County Freight Movement Study (Scheduled Completion June 2023)

This ongoing effort, also a subregional study funded by the NJTPA, will identify travel needs and impacts stemming from freight movement in the southern area of Middlesex County surrounding Interchange 8A. Following a detailed analysis of the study area, recommendations will include improvements to existing facilities and routing, addressing congestion, safety, multi-modal mobility, accessibility, traffic operations, and impacts of regional traffic on local communities.

https://www.njtpa.org/Planning/Subregional-Programs/Studies/Active-Studies/Southern-Middlesex-County-Freight-Movement-Study.aspx

4.2.14 Hudson County Truck Routes Assessment (Scheduled Completion June 2023)

This ongoing study, also a subregional study funded by the NJTPA, will assess the effects of trucking on Hudson County communities, emphasizing environmental justice populations, identifying best practices for roadway design, exploring new technologies for truck transportation, and developing policy recommendations to reduce negative impacts.

https://www.njtpa.org/Planning/Subregional-Programs/Studies/Active-Studies/Hudson-County-Truck-Routes-Assessment.aspx

4.3 SOUTH JERSEY TRANSPORTATION PLANNING ORGANIZATION (SJTPO)

SJTPO is the MPO for the southern portion of the State, overseeing transportation planning initiatives in Atlantic, Cape May, Cumberland, and Salem counties.

4.3.1 Regional Transportation Plan (RTP) 2050: Moving South Jersey Forward (2021)

This regional transportation plan for South Jersey included both long and short-range strategies and actions leading to the development of an integrated transportation system that facilitates the efficient movement of people and goods.

4.3.2 Truck Route Identification Study for Cumberland County (Western and Eastern) (2020)

This effort identified existing and potential truck routes within and through Cumberland County that will link the regional highway network with facilities generating a significant volume of truck traffic. It also identified potential projects and provided an implementation strategy for pursuit of future funding opportunities under the NJDOT Local Freight Impact Fund (LFIF).

- Western:

  https://www.sjtpo.org/wp-content/uploads/2022/06/fy2021-truck-route-study-cumberland-county-2021-06-30.pdf

- Eastern:

  https://www.sjtpo.org/wp-content/uploads/2022/06/fy2020-truck-route-study-cumberland-county.pdf

4.3.3 Port of Salem Corridor Freight Rail Intermodal Study (2018)

This rail study proposed a program of improvements aimed at upgrading the Port of Salem, the Salem Branch rail line, and the area's roadway network, with the objective of increasing commercial activity at the Port and fostering regional economic development.

https://www.sjtpo.org/wp-content/uploads/2021/08/Salem-Port-Study-May-2018.pdf

4.3.4 South Jersey Freight Plan

This regional plan will identify the region's relevant freight generators and analyze regional freight corridors. It will evaluate the freight corridors, using a performance-based approach, to screen the network for issues hindering freight movement and will include data collection to assess volume and classification information of regional freight corridors. It will work toward a multimodal transportation network that contributes to the region's economic development and better integrate freight into its transportation planning process.

https://www.sjtpo.org/wp-content/uploads/2022/07/sjtpo-freight-final-report-2022-07-26.pdf

Supporting documents:

- Regional Core Freight Dataset Memo:

  https://www.sjtpo.org/wp-content/uploads/2022/07/sjtpo-freight-tech-memo-1-regional-core-freight-data-2022-06-29.pdf

- Freight Performance Memo

  https://www.sjtpo.org/wp-content/uploads/2022/07/sjtpo-freight-tech-memo-2-freight-performance-measures-2022-06-29.pdf

- Interactive Map of Regional Freight Data:

  https://storymaps.arcgis.com/stories/bba17754c23340358fca4160cc2e9cc3

4.4 DELAWARE VALLEY REGIONAL PLANNING COMMISSION (DVRPC)

DVRPC is the MPO for the greater Philadelphia region, representing Mercer, Burlington, Camden, and Gloucester counties in New Jersey as well as five counties in Pennsylvania. DVRPC is active in freight planning studies and guiding freight planning efforts across the region, including supporting the Delaware Valley Goods Movement Task Force, which meets quarterly to discuss freight trends within the region.

4.4.1 Freight Movement Around NJ Turnpike Interchange 6A Study (2018)

This study, updated in 2018, examined traffic circulation along the U.S. 130 corridor in the industrial area near NJ Turnpike Interchange 6A, one of DVRPC's designated Freight Centers. It encompasses parts of Florence Township, Burlington Township, and Burlington City zoned for light/heavy industry and manufacturing. The primary focus of the study was to identify roadway improvements that can support existing traffic volumes, as well as increased traffic volumes generated by new development in this burgeoning freight node.

https://www.dvrpc.org/Reports/18008.pdf

4.4.2 Delaware River Port Security Study

This internally circulated effort examined the security of Delaware River ports. It focused on an examination of security, emergency preparedness, and threat and vulnerability assessments. It will ensure an appropriate procedure in place to ensure an efficient, dynamic security and emergency preparedness program for safe, secure, and resilient port operation.

4.4.3 Philly Freight Finder

Philly Freight Finder is an interactive freight data portal for the Delaware Valley. This framework is intended to improve access to freight facility data throughout the region to improve planning, economic development, and public awareness around freight in the Delaware Valley. Available data includes:

- **Trucking & Highway** - truck parking, National Highway System (NHS) connectors and highway river crossings.
- **Freight Rail** - freight rail lines, rail yards, intermodal rail terminals, and railroad river crossings.
- **Port & Waterway** - navigable river, anchorages, port terminals.
- **Airport & Aviation** - commercial and reliever airports.
- **Freight Center** - the five center typologies are international gateway, heavy industrial, distributions & logistics, high tech manufacturing, and local manufacturing & distribution.
- **Energy & Utilities** - pipelines moving natural gas, oil, and petroleum products. The three types of pipelines are gathering (tanks or wells to processing facility), transportation (between cities and across countries) and distribution (products to home, businesses, tanks, and storage facilities).

https://www.dvrpc.org/webmaps/phillyfreightfinder/

4.4.4 Impacts of e-Commerce in Greater Philadelphia

This ongoing study examines the impacts of e-commerce and online shopping in the Greater Philadelphia region. This work will explore strategies and considerations for accommodating new forms of distribution activity to assist the region and municipalities as they plan for new patterns of development and accommodate shifts in retail activity. E-commerce has grown in recent years and stay-at-home orders in place during the pandemic necessitated consumers and retailers rely almost exclusively on digital sales. The ongoing growth and evolution of retail trade has been a key trend driving freight transportation and development patterns in recent years that is expected to continue.

4.4.5 Freight Rail Access to Southern New Jersey

This effort is examining freight rail access in southern New Jersey. Given the variety and continued expansion of freight activities in southern New Jersey, a focused assessment of freight transport and logistics in the South Jersey region is essential. The study will examine and prioritize transportation needs to support the maintenance, improvement, and expansion of key freight, logistics, and industrial clusters across the South Jersey region which includes Atlantic, Burlington, Camden, Gloucester, Cape May, Cumberland, and Salem counties.

4.4.6 Camden Urban Freight Strategies and Implementation Guidebook

This community-focused effort explores the challenges facing communities as they work to better integrate urban deliveries in the design and operation of their buildings and streets and aims to provide guidance and strategies to address freight deliveries in Camden. It will provide resources to understand and plan for the impacts to the transportation infrastructure caused by the new trips generated by combined land developments and increased urban freight activities.

4.4.7 City of Philadelphia Truck Route Planning Guidebook

This study will help identify routes for truck and commercial vehicles in Philadelphia. The best practices are grounded in stakeholder outreach and offer near-term solutions and immediate fixes to help treat and guide truck freight delivery activity. While the geographic focus of this document is the City of Philadelphia, the principles, findings, and strategies contained herein have direct application to other cities and communities located in the Delaware Valley.

4.5 PORT AUTHORITY OF NEW YORK AND NEW JERSEY (PANYNJ)

The PANYNJ is a bi-state authority that owns, builds, operates, and maintains key transportation infrastructure critical to the New York/ New Jersey region's trade and transportation network. Freight movement is a key facet of the Port Authority's facilities. Within New Jersey, major freight facilities include Port Newark/Elizabeth - Port Authority Marine Terminal, Port Jersey - Port Authority Marine Terminal, Newark Liberty International Airport, George Washington Bridge, Lincoln Tunnel, Holland Tunnel, Goethals Bridge, Bayonne Bridge, and the Outerbridge Crossing.

In addition to the facilities in New Jersey, PANYNJ operates several other regionally significant facilities for freight in New York State, including John F. Kennedy International Airport, Howland Hook Marine Terminal, Brooklyn Marine Terminal, Red Hook Container Terminal, and New York Stewart International Airport.

PANYNJ also operates two railroads: the Port Authority Trans-Hudson Corporation (PATH) which is passenger commuter service, and a freight service New York New Jersey Railroad LLC (NYNJR). NYNJR is a short Line Marine Railroad operating between Greenville Yard in Jersey City, New Jersey, and 65th Street Yard in Brooklyn, New York. NYNJR provides the only remaining car float service on New York Harbor, while also providing warehouse switching services in Port Jersey.

4.5.1 2050 Port Master Plan (2019)

The 2050 plan is a comprehensive and flexible roadmap charting the course for future growth and development at the PortNYNJ. The study took a holistic look at the PortNYNJ, including cargo container facilities, automobile terminals, dry and liquid bulk cargo operations, cruise terminals and ferry landings, mapping out the next generation of land-use and infrastructure development projects, allowing the port to remain among the nation's leading maritime gateways. It included short- and long-term actions proposed for each of the port's five facilities, focusing on safety, sustainability, and resiliency.

https://www.panynj.gov/port/en/our-port/port-development/port-master-plan.html

4.5.2 Truck Origin-Destination Data Analysis (2018)

This effort is a support document in the development of the Long-Range Master Plan for the PANYNJ and established current and future capacities of key infrastructure elements of the PANYNJ which lays the foundation for evaluating and prioritizing the list of long-term investment options presented in the Master Plan. A key focus of the document is a description of the approach and methodology used to evaluate the critical landside transportation network facilities.

https://www.panynj.gov/content/dam/port/customer-library-pdfs/truck-origin-destination-data-analysis.pdf

4.5.3 PortTruckPass (PTP) featuring Terminal Informational Portal System (TIPS)

This is a service provided by Sustainable Terminal Services, Inc. a nonprofit corporation created by marine terminal operators to promote secure, environmentally sensitive, and efficient marine terminal operations by PANYNJ. TIPS is a tool for motor carriers and cargo interests to permit entities to efficiently manage and deploy their resources when delivering or picking up cargo at the PortNYNJ.

https://www.porttruckpass.com/

4.5.4 Clean Truck Replacement Program

This program promotes the usage of newer, more environmentally friendly vehicles by providing applicants with grant funding for replacement trucks funded by the federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program and the United States Environmental Protection Agency's (EPA) Diesel Emission Reduction Act Program (DERA). It covers up to 50% of the cost of a replacement truck up to a maximum of $25,000, with the requirement to scrap the older truck.

https://www.panynj.gov/port/en/our-port/sustainability/truck-replacement-program.html

4.5.5 Clean Vessel Incentive Program

This project intends to reward operators making voluntary engine, fuel, and technology enhancements to their vessels that reduce emissions beyond regulatory environmental standards. The program helps reduce greenhouse gas emissions and improve local air quality due to the reduction in emissions of Nitrogen Oxides (NOx), Sulphur Oxides (SOx) and particulate matter. The enhancements reduce emissions beyond the regulatory environmental standards set by the International Maritime Organization (IMO).

https://www.panynj.gov/port/en/our-port/sustainability/clean-vessel-incentive-program.html

4.5.6 Cargo Handling Equipment Modernization Incentive Program

This program offers incentives for eligible tenants of New Jersey Marine Terminals to purchase new Cargo Handling Equipment equipped with Tier IV engines or alternative power to replace their older fleet. It is funded by a federal CMAQ grant. Eligible Port Authority tenants can purchase new equipment and get reimbursed 20% of the purchase price, up to $20,000 per unit replaced, with a requirement that old equipment be scrapped.

https://www.panynj.gov/port/en/our-port/sustainability/cargo-handling-equipment-modernization-program.html

4.5.7 Cross Harbor Freight Program Tier II EIS (2016)

This effort is a detailed analysis of the environmental effects and potential mitigation measures for two preferred alternatives: a dedicated rail freight tunnel between New York and New Jersey, or the expansion of the PANYNJ's existing railcar float operation. It aims to induce a modal shift away from trucks to reduce vehicles miles traveled and the attendant wear and tear on the region's roadways and bridges.

https://www.panynj.gov/port/en/our-port/port-development/cross-harbor-freight-program.html

4.5.8 Wharf Investment Program

This program focuses on replacing mission-critical, timber-supported wharf structures vital to marine cargo activities at five port facilities. The study phase of the program reviews best practices in wharf design taking into account: examination of international port trends in design, consideration of impacts of climate change and sea level rise on the design, determination of and accommodation for the ultra or very large container carriers that are beginning to call on the Authority, potential impacts to revenue, and a sensitivity exercise examining the potential to design the berths for multiple business uses. Reconstructing or rehabilitating the 60-90 years old wharves will help ensure the safe, efficient, and reliable movement of cargo, and is expected to require multiple billions of dollars in capital investment. The program's goal is to complete the replacement of the majority of the wharves by 2050.

https://www.panynj.gov/port/en/our-port/port-development/wharf-replacement.html

4.5.9 Goods Movement Action Program (G-MAP)

A joint initiative of PANYNJ, NJDOT and NYSDOT, G-MAP aims to create a 21st century goods movement network serving the New York-New Jersey Metropolitan Region, ultimately linking it with domestic and global markets. The program developed an online interactive Core Freight Network Map highlighting the key port terminals, airports, and intermodal facilities of the major freight movements and their intermodal connections.

https://www.panynj.gov/port-authority/en/about/G-MAP.html

4.5.10 4Net Zero Roadmap (2022)

PANYNJ is currently (as of December 2022) preparing its strategy for achieving its net zero goal across all emissions scopes by 2050. This will address all modes of goods movement at PANYNJ facilities.

4.6 NEW JERSEY COUNTY PROJECTS

4.6.1 Warren County Light Industrial Site Assessment (2020)

The *Warren County Light Industrial Site Assessment* was completed in 2020 and arose from ongoing warehouse development in the County. The study was undertaken to understand the potential long-term impact of such development on the rural county's roadway network. Locations with large clusters of land available for industrial zoning were identified for analysis. Environmentally sensitive sites within the Highlands Preservation area were excluded from consideration. Based on the initial findings, fifteen sites with the potential for industrial development (4,000 acres and 45 million square feet of gross floor area, which could potentially be developed) were identified for a detailed review of impacts on existing transportation infrastructure. Projected traffic volumes were estimated based on existing volumes, land uses, and demographics. Numerous mitigation measures were recommended to mitigate the expected traffic increase, including low-cost solutions such as optimizing stop bars and higher-cost investments such as roadway widening.

https://www.nj.gov/njhighlands/warren_county/county/wc_lightindustrial_2020.pdf

4.7 NEW JERSEY MPO LONG RANGE TRANSPORTATION PLANS

The long-range transportation plan (LRTP) establishes goals and objectives and identifies current and potential projects aimed at improving an MPO's transportation system. Developing and regularly updating an LRTP is a prerequisite to receiving federal transportation funding. Further, it helps ensure that transportation investment decisions are made strategically and considered in light of their short-, mid-, or long-term effect on an MPO region. An LRTP helps provide a blueprint for future investments that can guide the county in a cohesive and focused direction for the future.

Specifically, the LRTP inventories and assesses current land use, transportation patterns, community development, and operations of each transportation mode in the county. An LRTP identifies needed improvements to the multimodal transportation system—highway/bridge, rail, air, transit, bicycle, and pedestrian facilities. A summary of the current LRTP for each of New Jersey's three MPOs is below.

DVRPC – *Connections 2050* (Adopted September 2021): Connections 2050 outlines an equitable, resilient, and sustainable Greater Philadelphia Region that:

- Preserves and restores the natural environment.
- Develops inclusive, healthy, and walkable communities.
- Grows an innovative and connected economy with broadly shared prosperity.
- Maintains a safe, multimodal transportation network that serves everyone.
- The Plan includes strategies to achieve the vision and a fiscally-constrained financial plan for investing in regional transportation infrastructure.

NJTPA – *Plan 2050* (Adopted November 2021): Plan 2050 provides a framework for setting priorities for workable and cost-effective solutions to complex transportation challenges. The NJTPA's planning activities focus on the earliest stages of project development where problems are explored, and solutions identified. Working with its partners, the NJTPA allocates federal funds to projects that reach the implementation stage. The supplemental Project Index at the back of the plan lists planned improvements in the near- and mid-term, and those under study that could be realized in the long-term.

SJTPO – *Regional Transportation Plan 2050* (Adopted January 2021): RTP 2050 identifies the region's long-term needs and the projects and activities which seek to address them. Future needs may require more detailed studies, which provide the technical and environmental analyses needed to enter projects into the federal and state funding pipeline. RTP 2050 emphasizes maintenance of the existing transportation system while addressing the future problems and needs of the region. It takes a focused look at operations and performance-based planning, supported by performance measures, and the establishment of performance targets.

4.8 MAP FORUM

The Metropolitan Area Planning (MAP) Forum is a consortium of ten Metropolitan Planning Organizations (MPOs) and Councils of Government (COGs) from Connecticut, New Jersey, New York, and Pennsylvania that have entered into an agreement to better coordinate planning activities in the multi-state region. The MAP Forum was initially created in 2008 as a result of Federal Transit Administration (FTA) and Federal Highway Administration recommendations that the five MPOs of the Greater New York Metropolitan Transportation Management Area formalize the manner in which they coordinate the development of transportation planning documents, as well as how they coordinate to meet the attainment of the National Ambient Air Quality Standards (NAAQS).

Recent MAP Forum projects include a survey of truck drivers in 2020, and several truck parking studies, including the ongoing NJTPA Truck Parking Study. The MAP Forum also includes a Multi-State Resilience Working Group which builds on FHWA's post-Hurricane Sandy Transportation Resilience Study of New York, New Jersey, and Connecticut, completed in 2017 to expand vehicle electrification, greenhouse gas mitigation, and transportation impacts from health-related events.

4.9 NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION (NYCEDC)

The New York City Economic Development Corporation is a mission-driven, non-profit organization aimed at leveraging New York City's assets to create good jobs and drive growth, ensuring equitable and sustainable development citywide. Concerning freight, NYCEDC's PortNYC group plans for growth, forges strategic industry partnerships, and manages the city's port facilities.

4.9.1 Freight NYC Plan (2018)

This study examined freight industry trends in New York City. The Freight NYC Plan identified programs that will overhaul the aging freight system by creating jobs, modernizing infrastructure, and reducing shipping costs. Its goals were to modernize facilities, increase efficiency, and improve sustainability.

https://edc.nyc/freight-nyc

4.9.2 Delivering Green: A vision for a sustainable freight network serving New York City (2021)

The study focuses on restructuring freight distribution and reducing overreliance on diesel trucks. It promotes shifting freight from road to water and a new Blue Highways pilot program, a joint effort between NYCDOT and NYCEDC to spur private investments in marine vessels to transport goods into and around New York City. It promotes greening last-mile connections by supporting the transition to zero-emission truck fleets, helps shift goods off trucks and onto commercial cargo bicycles and explores other sustainable small delivery methods.

https://www1.nyc.gov/html/dot/downloads/pdf/freight-vision-plan-delivering-green.pdf

4.10 LEHIGH VALLEY PLANNING COMMISSION

LVPC is the MPO for Lehigh and Northampton counties within the Commonwealth of Pennsylvania. The LVPC represents a key nationally significant freight node directly adjacent to New Jersey.

4.10.1 Lehigh Valley Truck Parking Action Plan (2020)

This project examined truck parking issues specific to the LVPC region, focusing on the development of actionable solutions. It discussed the issues, actions, and short, mid, and long-term opportunities. This plan was the result of the Lehigh Valley Truck Parking Roundtable in August 2020 which included nearly 60 public and private freight industry stakeholders.

https://lvpc.org/pdf/2020/Transportation/Lehigh%20Valley%20Truck%20Parking%20Action%20Plan.pdf

4.10.2 Lehigh Valley International Airport Area Freight Study (2019)

The Lehigh Valley International Airport Area Freight Study examined the area immediately surrounding the Airport and included 13 municipalities within Lehigh and Northampton counties. The effort developed strategies for diverting traffic, identifying needed roadway and bridge improvements, and recommending changes in local land use policy to prevent future freight-related land developments from overburdening the area highway network.

https://www.lvpc.org/pdf/LVIA%20Area%20Freight%20Study%20Draft%20Report%208-7-19.pdf

4.11 WILMINGTON AREA PLANNING COUNCIL (WILMAPCO)

WILMAPCO is the MPO for New Castle County, Delaware and Cecil counties, Maryland. WILMAPCO represents the planning area for the region directly south of New Jersey, including the Delaware Memorial Bridge, a key regional link carrying I-295 across the Delaware River

4.11.1 Delaware Statewide Truck Parking Study (2021)

This effort addressed overnight parking as well as more localized, shorter-term truck parking and staging needs within the State of Delaware. It also included regular engagement with the local trucking community to help validate future strategies and recommendations.

4.11.2 Impact/Benefit Analysis of Proposed Truck Access Improvements in the Port of Wilmington Area (2022)

In partnership with DelDOT, this current project seeks to evaluate and recommend a series of improvements to truck circulation in and around the Port of Wilmington. The study is evaluating possible roadway improvements based on their effectiveness in addressing the needs of the community and businesses in the area around the Port.

4.12 NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

NYMTC is the MPO for New York City, Long Island, and the lower Hudson Valley (Putnam, Rockland, and Westchester counties). The NYMTC region is directly adjacent to northern New Jersey and includes multiple highway, rail, and maritime connections traversing the Hudson River.

4.12.1 NYMTC 2050 Freight Element (2021)

The New York Metropolitan Transportation Council (NYMTC) adopted its most recent Long Range Transportation Plan – Moving Forward 2050 – in September 2021. Appendix H of Moving Forward 2050 is a full Regional Freight Plan for the ten counties within the NYMTC planning area (the five boroughs of New York City plus Nassau, Suffolk, Westchester, Rockland, and Putnam counties). The Regional Freight Plan consists of seven chapters addressing: Commodity Flows; Regional Economy; Trends and Disruptors; Freight Transportation Infrastructure; Truck Network Performance and Needs; Multimodal Performance and Needs; and Shared Vision Goals and Action Items including nearly 40 specific recommendations for programs, policies, and strategies to address freight needs and opportunities. The Regional Freight Plan was developed in collaboration with planners from adjoining MPOs and state departments of transportation in New Jersey, New York, and Connecticut, and includes a number of multi-state recommendations involving New Jersey.

https://www.nymtc.org/movingforward/pdfs/app_h.pdf

4.12.2 Clean Freight Corridors Study (2022)

This effort assesses opportunities for the designation and development of Clean Freight Corridors within the NYMTC planning area and across several states (including portions of New Jersey). The study is identifying a series of roadways to best advance high-efficiency, low-emission alternative transportation technologies for all types of vehicles shipping freight. The roadways to be assessed include high-speed traffic highways, local roads that support the connection of two modes of freight, trucking “hubs”, and areas of concentrated goods movement activity.

https://www.nymtc.org/Regional-Planning-Activities/Freight-Planning/Clean-Freight-Corridors-Study

4.12.3 Regional Freight Land Use Study (2022)

This study is focused on collecting and analyzing freight and industrial land use data in the NYMTC planning area and larger multi-state metropolitan region (including portions of New Jersey). The study will use these data to define current, recent, and projected future land use designations and locations of freight businesses. The study is assessing potential changes in freight-related and industrial land uses across the region by developing a freight land use “typology” that identifies and describes key categories of freight land use. This typology also identifies examples across the region and describes trends and key issues specific to each category. The study will be completed in 2022.

https://www.nymtc.org/Regional-Planning-Activities/Freight-Planning/Regional-Freight-Land-Use-Study

4.13 NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYCDOT)

The New York City Department of Transportation manages 6,300 miles of streets and highways, 12,000 miles of sidewalk, 13,250 signalized intersections, 350 million linear feet of markings, and 800 bridges and tunnels in New York City. NYCDOT’s Freight Mobility unit is responsible for advancing policies and programs that mitigate the adverse impacts of trucks on infrastructure and communities, while also improving truck delivery efficiency with an overall mission of supporting the City’s economic competitiveness.

4.13.1 Delivering New York: A Smart Truck Management Plan for New York City (2021)

The goals outlined in this plan will help manage truck movement to ease congestion, and create innovative opportunities for safe deliveries, all while considering City priorities such as bus lanes, cycling infrastructure, pedestrian spaces, and active curb utilization. The plan also recognizes the need to incentivize and support upgrading trucks with safety features such as sideguards, as well as cleaner technologies, and thereby ensure that communities adjacent to major truck generating infrastructure do not continue to be disproportionately adversely impacted.

https://www1.nyc.gov/html/dot/downloads/pdf/smart-truck-management-plan.pdf

5 State of Freight: Freight Trends

Key trends that directly impact New Jersey's freight industry, its residents, and the built and natural environments.

Tullo Truck Stop, Kearny, Hudson County (Source: WSP)

5.1 TRUCK PARKING

The inability to find suitable, reliable, and safe parking continues to be one of the top issues for commercial truck drivers (FHWA Class 6 or above) nationwide. The lack of parking availability at parking, commercial, and industrial facilities, particularly in and around urban areas, often forces drivers to spend a considerable amount of time searching for a space, which translates directly into lost productivity, higher trucking costs, air quality impacts, and increased stress for drivers. It is not uncommon for drivers to run out of hours of service (HOS, or just "hours") trying to find parking, forcing them to park in undesignated locations on roadway shoulders, ramps, or public lots. Truck parking challenges are also aligned with equity concerns as well, given that, as of 2019, nearly 40% of the 3.5 million truck drivers in the United States are racial or ethnic minorities.[9] The sections below describe the causes of truck parking demand in New Jersey, and the benefits of ensuring that suitably located capacity is available to meet this demand. Going forward, newly available data will allow NJDOT to strategically identify and share information related to the quantity of spaces and locations in need. Previous research is subsequently synthesized to identify truck parking needs and conceptualize solutions. While this section focuses on national and state truck parking policy trends, Section 7.1.2 outlines an analysis of truck parking demand within New Jersey.

5.1.1 Cause of Truck Parking Demand

Truck drivers have many reasons for needing to park in New Jersey, including:

- Loading or unloading at a shipper or receiver establishment.
- Taking breaks to meet Federal HOS rest requirements or have access to safe and secure amenities (such as restaurants, bathrooms, showers, or fuel).
- Staging to avoid arriving too early for their delivery window, but to be certain of arriving on time.
- Parking overnight at truck terminals or industrial or commercial establishments if the establishments are running a private truck fleet.
- Overnight parking for owner-operators.
- Emergencies, potentially involving the driver, vehicle, or cargo.

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9 American Trucking Associations, American Trucking Trends, 2019.

Table 18 summarizes truck operators preferred parking locations based on activity. Parking demand is present at shipping and receiver facilities, as well as at airport cargo and rail intermodal terminals. Parking availability at these locations is often strictly dependent on delivery windows and loading/unloading times. Overnight parking often occurs at fenced-in secure truck terminals.

Table 18. Truck Parking Reasons and Locations

Reasons for Parking/Parking Location	Rest Area or Truck Stops	Shipper or Receiver Establishments	Multimodal Facilities	Undesignated Locations	Truck Terminals
Loading or unloading		■	■		
30-minute required rest break	■	■	■	■	
Overnight required rest break	■			■	
Staging	■			■	
Overnight Storage				■	■
Waiting for next load	■			■	■
Emergency	■	■	■	■	■

Source: Guerrero, S.E. et al (2022) Modeling Truck Parking Demand at Commercial and Industrial Establishments, to be published.

There is also demand for truck parking at rest areas and commercial truck stops. Though parking at these facilities is often free, many facilities near urban areas operate at capacity during peak hours. Fee-based reservation systems are only present at a small number of locations. When no other options are feasible, truck operators also park in undesignated locations along roadway shoulders, and in vacant or public use lots.

In densely populated states such as New Jersey, there are two factors that exacerbate truck parking challenges: congestion and delivery windows.

- Congestion: Truck drivers often prefer to park overnight near where they are making a delivery. While the demand for parking is high in urban areas, the supply is often restricted by high land values, land use regulations, and other barriers, which leads parking facilities in urban areas to have high utilization rates. This often forces drivers to park in undesignated locations.[10]
- Delivery windows: Delivery windows, which have become ubiquitous in modern supply chains, place pressures on truck drivers that exacerbate the need for urban parking. The emphasis on meeting the delivery window leads truck drivers to have a strong incentive to plan to arrive early in case of congestion or unforeseen circumstances. In some instances, trucks might be allowed to enter the receiver facility early, but this is not typical, as found in the survey of the Tennessee statewide truck parking study.[11] These establishments are generally built with only the truck parking capacity to meet fleet turnover. Even when capacity exists to park on-site, managers often discourage this for liability and operational reasons (e.g., not having adequate facilities to accommodate third-party personnel), which translates into greater undesignated parking and queuing outside the establishment. This is often called staging parking. If there are no truck stops, rest areas or on-street parking nearby, trucks must park in undesignated locations prior to their appointment.

10 Another cause of undesignated parking is the need for truck drivers to meet specific delivery windows. Industrial or commercial facilities receiving freight typically have a fixed number of docks and dock workers, and a limited area for trucks to park because land is expensive, so they schedule deliveries within certain windows. These windows are typically one to three hours long but often are as tight as 15 minutes. The receiver's operations and production count on the delivery arriving during this time, especially in just-in-time supply chains that carry minimal inventories, and therefore place a high premium on the shipment arriving during the allotted window. Walmart's new "on-time, in-full" program requires suppliers (and the truck lines they hire) to meet delivery windows 98 percent of the time, or face fines equivalent to 3 percent of the value of goods.

11 Golias, M., Mishra, S., Cherry, C., Kohls, A., Murray, D., Giampouranis, D., Liatsos, V. (2020) Truck Parking Needs in Tennessee, RES#:2019-16 Tennessee Department of Transportation.

5.1.2 Benefits of Safe Truck Parking

The role that truck drivers play in ensuring that packages arrive on time and keep stores well stocked is a critical element of the supply chain. Providing drivers with safe and secure parking, with comfortable facilities, ultimately will allow them to continue to provide the services that we all rely upon every day. Having sufficient truck parking capacity to accommodate the types of parking described above and allow drivers to deal with operational pressures created by traffic congestion and deliveries will generate the following benefits:

Safety 	Improving truck parking availability would have a significant positive impact on safety. Trucks would be less likely to park in undesignated or prohibited locations, such as roadway shoulders, thereby reducing the risk of crashes associated with incursion into through lanes, blocking of shoulders, obstruction of sight lines, and blocking of bike lanes. Parking in locations not designed to accommodate large vehicles poses safety risks to the driver of the truck and other roadway users. In Tennessee, undesignated parking at the entry or exit ramps of parking facilities leads to increases in crashes.[12] This research found a higher incidence of truck crashes on ramps adjacent to full truck parking facilities. Approximately one third of the collisions on interchange ramps were at ramps with adjacent parking facilities with utilization of 90% or greater. Additionally, difficulty finding parking leads truck drivers to rush to reach available parking within their hours-of-service, or opt to violate these rest regulations altogether, which poses a clear safety risk to them and other drivers on the road. Making it easier for truck drivers to get needed rest in safe locations is critical for roadway safety. Difficulty in finding places to rest, combined with increased pressures to maximize revenues, can lead truck drivers to undertake risky behavior by driving while fatigued, creating a safety risk even when the trucks are on the road.[13]
Trucking Externalities 	Given their size and weight, trucks may impact communities with pollutant emissions, deterioration of pavement, congestion, and incremental crash risks. The inability to find parking will increase these negative impacts by forcing trucks to take lengthy detours to reach parking, or by having to drive through or park in locations not designed to accommodate their vehicles or support driver needs. The best way to reduce trucking externalities is to improve the fluidity and efficiency of trucking operations.
Trucking Productivity and Costs 	Difficulties finding parking reduce the efficiency and productivity of truck operations, increasing transportation costs for businesses in the region. Over time, this makes those businesses less competitive and hurts economic growth. The main way that trucking costs are increased is through drivers having to stop earlier in the day than they would prefer to secure a parking spot. Surveys show that drivers often stop 30 minutes to one hour before the end of their HOS due to lack of available truck parking where they need it. This translates into lost productivity for the sector and higher costs for consumers. Additionally, detours to find parking spaces are also costly in terms of vehicle operations, including fuel, wear and tear, and other expenses.

An expanded discussion of the benefits of truck parking facilities in urban areas will be included in the forthcoming FHWA Truck Parking Development Handbook. This handbook will also include methodologies for quantifying the benefits of truck parking projects and overcoming some of the most common challenges faced in these types of projects.

12 Boggs, A., Hezaveh, A.M., Cherry, C.R. 2019. Shortage of commercial vehicle parking and truck-related interstate ramp crashes in Tennessee. In: 98th Annual Meeting of the Transportation Research Board. Washington DC.

13 Thompson, J., Newnam, S., Stevenson, M. 2015. A model for exploring the relationship between payment structures, fatigue, crash risk, and regulatory response in a heavy-vehicle transport system. Transportation Research Part A, 82, 204–215.

5.1.3 Truck Parking Guidance for New Jersey

In 2021, as part of the "Freight Moves New Jersey" campaign, the NJDOT OFP developed a two-page Truck Parking Primer. This issue-specific document was initiated in response to stakeholder concerns regarding the hesitation of local governments to consider or improve access to truck parking within their communities. The document, illustrated in Figure 9, is intended to be a summary document for county and municipal decision makers to better understand many of the concepts detailed above.

Figure 9. NJDOT Truck Parking Primer

Why is truck parking an important issue?

The availability and shortage of truck parking is a major issue for the trucking sector, the traveling public, and communities throughout New Jersey. Difficulties finding parking force trucks to park in undesignated locations, which poses a safety risk to other vehicles, pedestrians, cyclists, and the truck driver themselves. The limited availability of parking spaces also decreases the productivity of trucking by forcing drivers to take longer detours to reach an open space and end their work day earlier than desired.

In 2020, the American Transportation Research Institution (ATRI) identified truck parking as the top issue for commercial drivers. Increased enforcement of hours of service regulations has brought this issue to the forefront. Truck parking challenges are expected to grow as truck volumes continue to increase. Higher land prices, particularly in urban areas, make the construction of new truck parking capacity more challenging. In fact, in many communities around the country there exists pressure to redevelop truck parking facilities into other uses that are perceived as being more desirable. Much of this pressure stems from a lack of awareness of the role that truck parking facilities play in the safety and efficiency of supply chains that get products into consumers hands.

The American Transportation Research Institution (ATRI) identified truck parking as the main issue for driver, ahead of compensation.

Drivers need the basic conveniences (clean bathrooms and safe parking areas) to ensure they are rested and ready to deliver the goods we all need in our daily lives.

Why invest in trucking?

Freight and the trucking industry are essential for quality of life, economic competitiveness, and job creation. Day-to-day activities depend on freight generators and trucking, such as going to the grocery store and receiving deliveries. Freight and trucks are also essential to other commercial and industrial activities that support jobs. In the last year and a half, the COVID-19 pandemic demonstrated the importance of supply chains and having access to basic goods and necessities. Disruptions in these supply chains, some of which persist until today, have led to significant publicy felt disruptions in many sectors. Investments that facilitate the flow of freight throughout our economy, such as improving the availability of parking, will contribute towards ensuring the reliability and safety of these supply chains.

84% of trucks park in **undesignated locations** at least once a week, 10% do so daily.

Office of Freight Planning

What are the impacts of truck parking projects?

The benefits of projects that improve the availability of parking include:

- **Safety:** Improving the availability of truck parking has a significant positive impact on safety. It decreases the need for trucks to park in undesignated or prohibited locations, such as roadway shoulders, thereby reducing the risk of crashes, blocking of shoulders, obstruction of sight lines, and blocking of bike lanes.
- **Trucking Externalities:** Given their size and weight, trucks may impact communities with emissions of pollutants, deterioration of pavements, congestion, or incremental crash risks. An inability to find parking will increase all of these negative impacts, by forcing trucks to take lengthy detours to reach a spot, or by having to park in locations that were not designed to accommodate their vehicles or support driver needs. The best way to reduce trucking externalities is to improve the efficiency of trucking operations, including increased parking opportunities.
- **Trucking Productivity and Costs:** Difficulties finding parking reduce the efficiency and productivity of truck operations, increasing transportation costs for businesses in the region. Over time, this will make those businesses less competitive. Trucking costs are increased when drivers have to stop earlier in the day than they would prefer in order to secure a parking spot. This translates into lost productivity for the sector and higher costs to consumers. Additionally, detours to find parking spaces are also costly in terms vehicle operations, including fuel, wear and tear, and other expenses.

Wide-ranging benefits of truck parking projectsinclude improvements:

- Safety
- Security
- Reduced emissions of criteria pollutants
- Reduced emissions of greenhouse gases
- Trucking costs and productivity
- Reduced congestion
- Infrastructure deterioration
- Driver satisfaction
- Better rested drivers and increased compliance with rest regulations

ATRI estimates that **drivers lose an average of 56 minutes of available drive time per day parking early** to avoid risking limited parking closer to their destination.

How do truck parking projects benefit the local economy?

Truck parking projects may generate broader economic development impacts. This includes jobs, income, and taxes generated in the economy from: (1) reductions in transportation costs that enhance the regional competitive of businesses, (2) from establishments that serve truck drivers locating in the surrounding area, and (3) from the operations of the parking facility.

Office of Freight Planning

5.1.4 NJDOT Truck Parking Priorities

In early 2022, the NJDOT OFP worked with state and federal partners to identify priorities regarding truck parking in New Jersey. Driven by New Jersey's maritime centric geography and attendant northern and southern port districts, as well as dense consumer driven demand, commercial motor vehicles, or trucks, comprise a significant portion of vehicles that utilize New Jersey's highway systems. The Federal Motor Carrier Safety Administration (FMCSA) mandates that nearly all truck drivers rest at periodic intervals, necessitating accessible and secure truck parking solutions that are adjacent to the highway systems. Adequate and strategic truck parking solutions help to ensure the reliability of the supply chain, during both routine and emergency conditions, upon which the state economy depends. The management and advancement of truck parking solutions requires a coordinated statewide if not regional approach.

NJDOT OFP intends to partner with Federal agencies, MPOs, regional coalitions, and private sector stakeholders to develop an actionable plan that can identify and leverage available funding sources to improve availability and quality of statewide truck parking. This plan will assess current conditions, and coordinate, facilitate, and amplify any opportunities to add to or improve truck parking.

This coordinated planning effort will support needs addressed in the SFP and will support future Office of Freight Planning Program elements. Specifically, key OFP roles, include:

- Identifying gaps in available data regarding regional and statewide truck parking demand, including facility utilization levels and evaluate opportunities.
- Highlighting locations and corridors where truck parking is most needed, including the potential to redevelop existing sites to support these facilities.
- Identifying issues and industry trends capable of affecting the limit or increase of the supply of truck parking statewide.
- Utilizing existing freight associations, operators, and organizations involved in trucking and parking to evaluate and incorporate their input on limitations, issues, and considerations while anticipating future needs.
- Communication with state partners and stakeholders to develop an open dialogue to understand questions, issues, and concerns related to truck parking.
- Assessing statewide needs, identifying the challenges - which may be regionally different, articulating the challenges and identifying and/or facilitating potential solutions.
- Evaluating potential solutions and identifying steps necessary to reduce/solve identified issues and prioritizing statewide truck parking opportunities and solutions, including private sector involvement.
- Development of private-side Best Management Practices (BMP) and expectations for trucking companies and owners/operators.

Best Management Practice in Truck Parking – The Delivery Experience at Arizona Beverages in Woodbridge New Jersey

Efficient product delivery, whether it be incoming raw materials, or outgoing product, is critical to Arizona's business. Truck drivers, many of whom are independent owner/operators, all with their own rolling small businesses, have a grueling and challenging job. Without the role they provide in the supply chain, Arizona would not be in business. None of our lives would be the same. Finding facilities to support drivers is always a challenge – due in part to a national shortage of truck stops and truck parking in the specific locations where truckers typically need them. At Arizona, they approach truck parking differently.

Arizona's intention is to lead by example, providing drivers with basic accommodations aimed at improving their daily experience. If a driver arrives early (for example, after a 9-hour drive) they aren't rejected at the gate, and forced to park in an insecure, unsafe or prohibited area. Instead, those drivers are welcomed into Arizona's property – allowed to make their delivery when they arrive. If they are at the end of their hours of service, they have the option to rest on site. They further have the option to utilize a snow scraper, obtain a current scale ticket or conduct rig maintenance at a freight service facility. Currently, Arizona is converting an on-site construction trailer to a safe and secure modern driver lounge – with Wi-Fi, showers, vending machines and places to heat food, rest and talk with fellow drivers. Here they can have the ability to run their businesses, confirm their next stop, or safely take a break without causing congestion on local roadways.

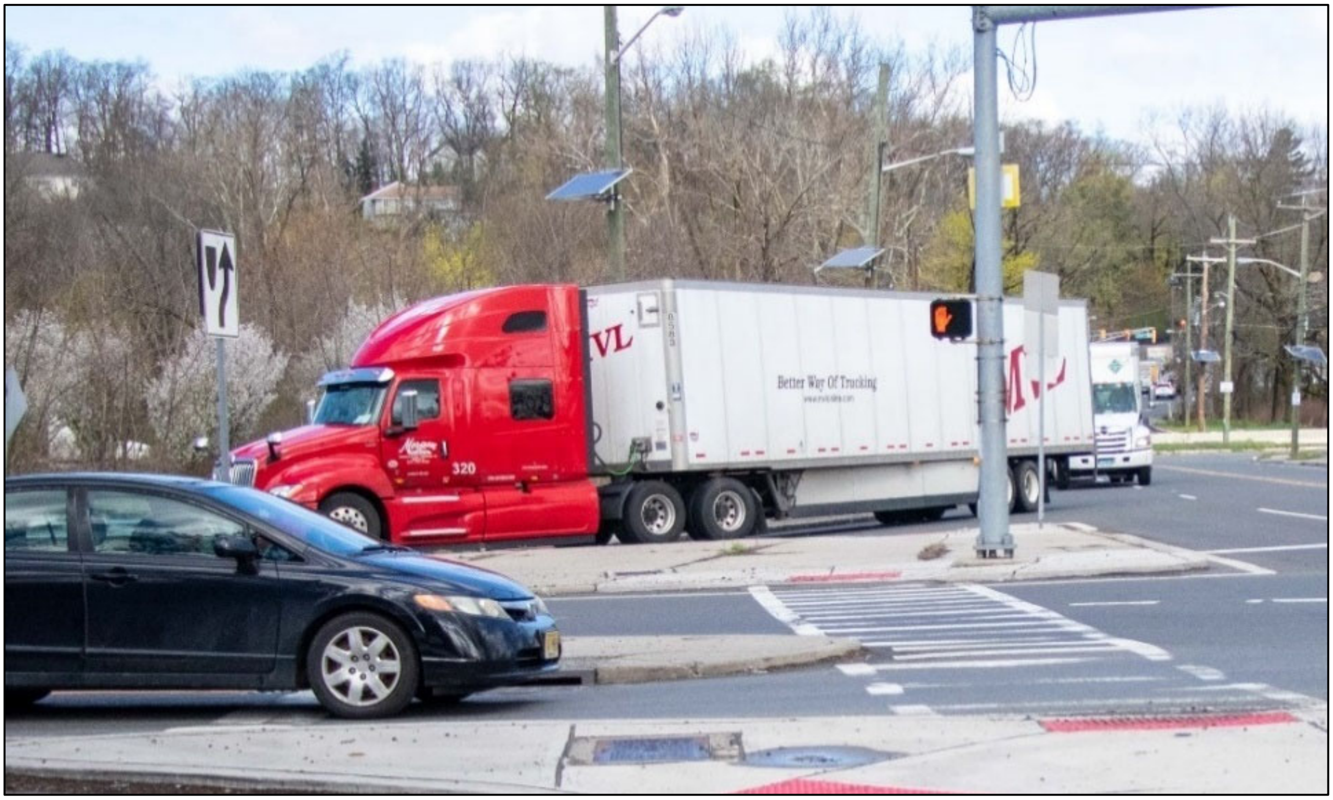
Arizona is considering expanding access to this facility beyond only drivers doing business with Arizona; the future plan includes app development offering on-site parking for a nominal fee. Arizona believes that there is an opportunity to aggregate available space throughout the supply-chain; there is enough room, if private companies work in a direction to offer positive change. The opportunity exists to transform truck parking; to create a network, to have deliveries occur smoothly, to reduce congestion, to avoid conflicts with neighboring land uses. Instead of looking at truckers (and by extension deliveries) as an imposition, Arizona embraces their role in the supply chain. From there, private companies will receive better service, ultimately improving the entire supply chain.

Update and maintain the Statewide Truck Parking map in coordination with New Jersey's MPOs. Truck parking capacity is a nationwide problem. Continued growth in truck traffic is outpacing the supply of public and private parking facilities needed for driver rest, decreasing safety for truck drivers and other vehicles on the road. Safety is FHWA's top priority and helping to ensure that commercial drivers have a safe place to rest is part of that goal. USDOT, in collaboration with major stakeholders engaged in truck parking, established the Coalition in August 2015 in response to the "Jason's Law Truck Parking Survey Results and Comparative Analysis." The National Coalition on Truck Parking has developed numerous work products and other information specific to truck parking.

NJDOT OFP is engaging with the state's MPOs and regional partners such as the American Trucking Associations (ATA), TETC and the National Coalition on Truck Parking to share information, learn from other states and develop planning guidance and strategies for truck parking in New Jersey. These groups connect state and regional decision-makers, stakeholders from the public sector, transportation organizations, the freight industry, and other groups to advance safe truck parking to:

- Collaborate nationally and among regions to identify opportunities and solutions for truck parking needs.
- Share data and new analyses developed by stakeholders to understand needs and trends in truck parking.
- Encourage partnerships among stakeholders to implement solutions.
- Identify opportunities to use existing and new programs to support truck parking implementation.

5.2 CONSIDERING FREIGHT IN OUR COMPLETE STREETS PLANNING, POLICIES & ACTIONS



Park Avenue at New Providence Road, Scotch Plains, Union County (Source: WSP)

Many of New Jersey's busiest corridors for trucks and automobiles today were initially laid out for pedestrians, cyclists, and horse and buggy traffic, including U.S. Route 1, parts of which were originally constructed in the early 19th century. Communities continued to grow along and at the junction of major transportation corridors and employment centers. With the advent and flourishing of motor vehicles (automobiles, buses, and trucks), the state's roadway network was expanded and reinforced to accommodate heavier and higher-speed vehicles. However, these changes tended to occur piecemeal, with communities and technology advancing at a faster pace than infrastructure and policy could be implemented, built, and maintained.

As the demand for freight has increased, so too have crashes involving trucks, buses, and pedestrians. According to the Insurance Institute for Highway Safety, the number of pedestrians, cyclists, and motorcyclists killed in large truck crashes rose 44% nationwide from 2009 to 2020. This trend occurred while the number of motorists killed in large truck crashes decreased. In many places, demand for walking and biking has increased because of the COVID-19 pandemic, placing more vulnerable roadway users on the road.

According to the USDOT:

> *Complete Streets are streets designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are travelling as drivers, pedestrians, bicyclists, or public transportation riders. The concept of Complete Streets encompasses many approaches to planning, designing, and operating roadways and rights of way with all users in mind to make the transportation network safer and more efficient. Complete Street policies are set at the state, regional, and local levels and are frequently supported by roadway design guidelines.*[14]

The Complete Streets movement was born out of a need for the safe accommodation of all people who use a roadway, including those who walk, bike, drive, and deliver goods. It is important for any "complete" street to acknowledge all users, including the truck movements associated with the businesses that attract pedestrians, cyclists, and automobiles with parking needs. In recent years, trucks at all scales (from large tractor trailers to smaller Amazon and USPS vans) are increasingly found in communities of all characters and development patterns. Goods are delivered directly to homes, as well as to businesses of all sizes, and to larger intermodal fulfillment centers and transportation facilities. New Jersey 's diverse land-use mix includes urban, suburban, and rural residential, commercial, and recreational areas, intermodal facilities, and an increasing number of shipping and distribution centers. Regardless of whether each roadway user group is considered collectively during the planning process, drivers of vans and trucks will need to travel and park on roads where there are pedestrians and cyclists, and people will need to walk and bike on streets where freight is moved. Planning for freight and active transportation should not occur independently of one another; rather they are necessary elements of a thriving community. While the efficient movement of goods is essential to the state and region's economy, safety is more critical to the needs of New Jersey residents, particularly the most vulnerable roadway users who bike and walk, often out of economic necessity. Many of New Jersey's communities with the highest poverty rates also have the lowest automobile ownership rates, including the cities of Trenton, Newark, Paterson, and Camden. The safety of these vulnerable roadway users should not be sacrificed to facilitate goods movement, instead designs must be developed to provide safe active transportation mobility along with freight access to the local businesses reliant on the daily delivery of goods and materials. ***No street is complete without freight.***

> Complete streets can sometimes be misinterpreted as only focused on "active transportation," which refers to active forms of movement, including walking and biking.

The e-commerce boom began shortly after the advent of the Complete Streets movement, which promoted safe roadways for all road users, with an emphasis on non-motorized modes. There is often a disconnect between complete streets and freight advocates, competing for space allocation and infrastructure improvements. Municipal and state governments often separate active transportation and freight users, seeing them as conflicting. While always existing in the same plane, the shared presence of active transportation and freight has become a significant focus area for transportation planners as e-commerce continues to grow, alongside the needs and demands for expanded mobility for cyclists and pedestrians. Often, freight and non-motorized transportation users must share infrastructure not created for either user group, leading to challenging conflicts and inefficient movement for all users. In order to improve bicycle and pedestrian safety, freight must be considered and included in the design of any complete street. The two user groups should be considered collectively, creating a design that accommodates all users safely. Nearly every item we own, as large as a car or as small as a pencil, was once shipped as freight, likely via multiple modes, including one or more trucks. Safe and efficient freight movement helps the multitude of users of all forms of transportation – pedestrians, bicyclists, vehicle drivers, and transit users; all of us - by delivering the goods we rely on and purchase in stores, as well as the products we ship to our homes.

While some complete streets design changes such as road diets, new pedestrian spaces, and bike lanes do improve circulation for non-motorized transportation modes, there is a distinct need to advance them in a way that does not

[14] https://www.transportation.gov/mission/health/complete-streets

impact local businesses or residential consumers' freight delivery demands. This can be in the form of parking spaces dedicated to deliveries or designated marked loading zones that are available and accessible for multiple businesses.

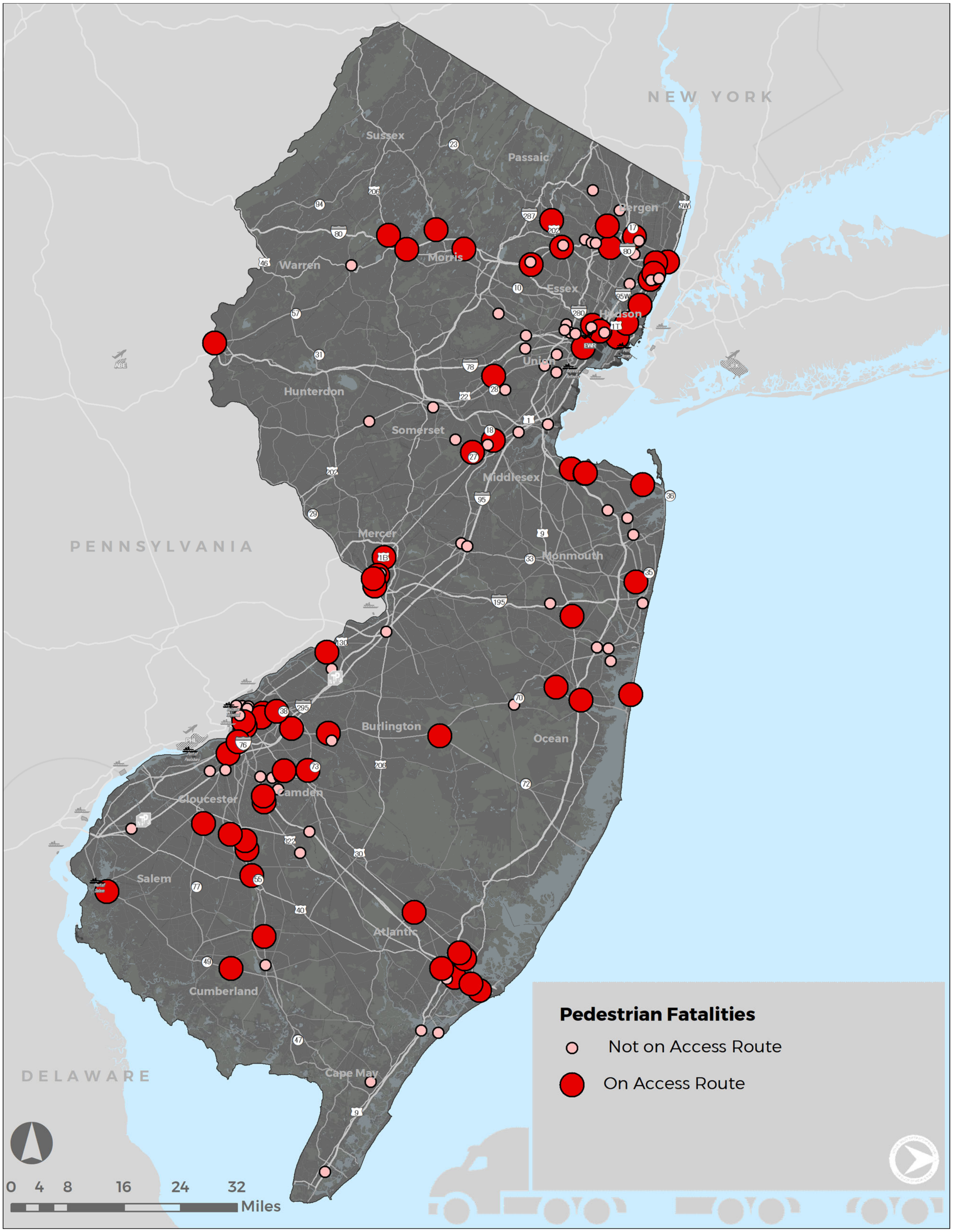
Education campaigns are also important. Cyclists and pedestrians often frequent the local coffee shop with fresh items delivered daily or order goods with the expectation that they arrive directly on their doorstep within a day or two. The trucks used by delivery services should not be seen as separate from the user that placed that order or the visitor to the store – the person doing the ordering or consuming is “using” space on that street with their expectation of or demand for delivery, just as the delivery person is using space on that street making the delivery. This will create an understanding of the need for those freight deliveries and therefore community support to implement improvements that will increase safety of that delivery.

5.2.1 Bicycle and Pedestrian Crashes

The NJDOT has joined several states in the Toward Zero Deaths initiative, which views all traffic deaths as preventable and aims to reduce the number of traffic deaths to zero. This effort also aims to reduce serious crashes, many of which have the potential to result in a fatality. In 2019, there were 524 fatal crashes with 558 fatalities in New Jersey. Pedestrians accounted for nearly one-third of these fatalities (138 total), while cyclists accounted for two percent. Tractor-trailer drivers represented a significant portion of fatalities as well (six percent). The 2020 Statewide Strategic Highway Safety Plan contains seven emphasis areas, one of which is bicyclists and pedestrians.

Of the 138 pedestrian fatalities reported in New Jersey in 2019, more than half (70) occurred on a truck route (part of the New Jersey Access Network). These locations are shown in red in Figure 10. Designated Access Routes tend to be in higher-density and higher-demand destinations, often with higher bicycle and pedestrian demand. These fatalities tend to be in the more densely populated areas of the State, including 21 in Camden County, 14 in Bergen County, and ten each in Monmouth and Essex counties. Additionally, 11 pedestrian fatalities occurred in Gloucester County. An additional 33 pedestrian fatalities were within a mile of the New Jersey Access Network. The location of pedestrian fatalities in relation to the NJ Access Network is shown in Figure 10. Only 14 of the 138 crashes resulting in a pedestrian fatality occurred more than one mile from a New Jersey Access Route.

Figure 10. Pedestrian Fatalities on the NJ Access Network



Source: 2019 NJDOT Safety Voyager, WSP

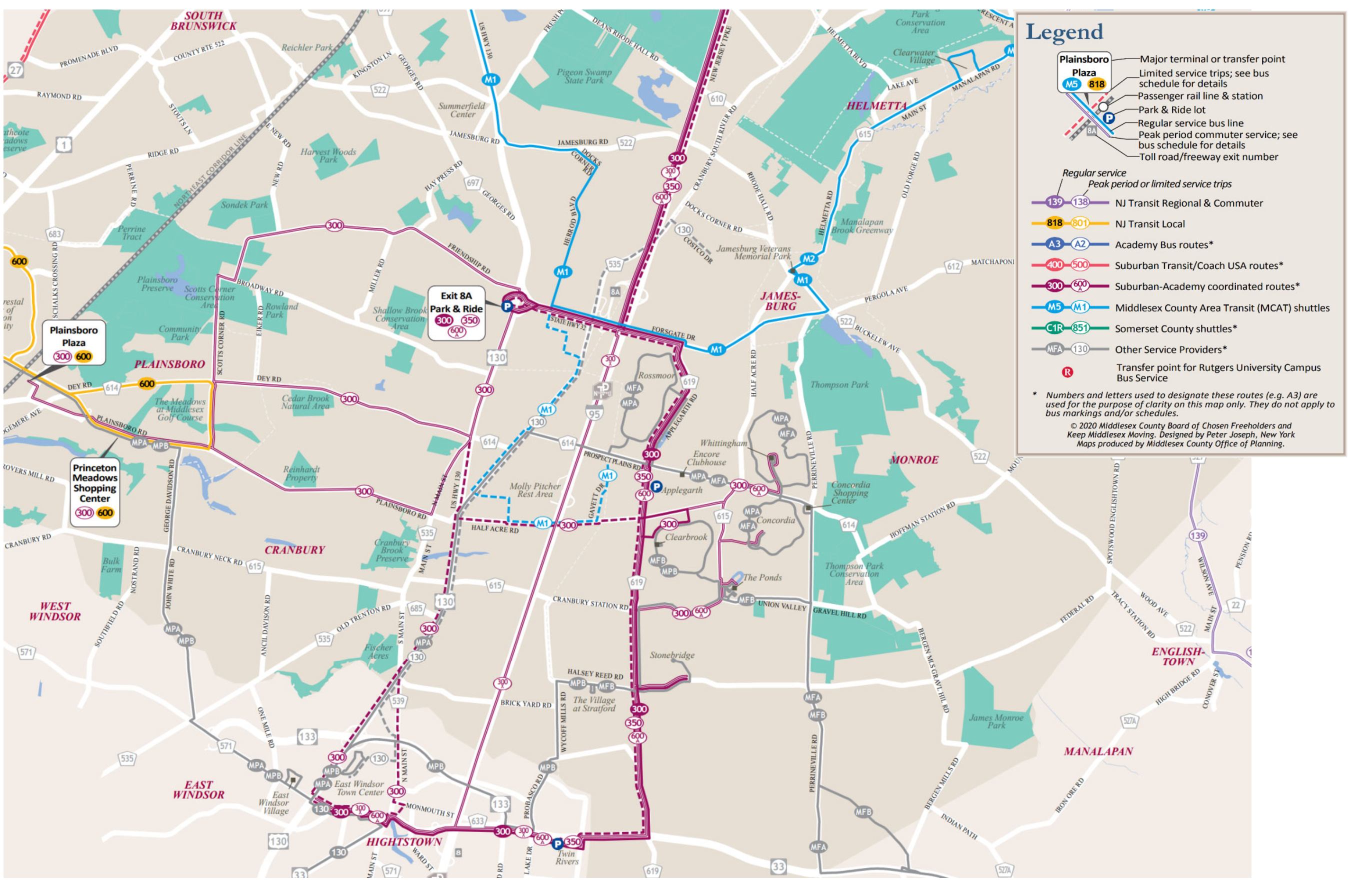
5.2.2 Employment Access

Larger scale freight-generating land use development is focused in lower-density areas where land is less expensive, where there is room for expansion, and where there is direct or convenient access to interstate or regional highways. These locations provide access for trucks moving goods but present challenges for employees to access. While freight-generating land uses can employ a variety of positions at a range of income levels, many positions located at these facilities are often lower wage jobs. These workers may face challenges accessing a personal vehicle due to income or other extenuating circumstances. Access for these potential employees is made further challenging as facilities located in low-density areas may lack public transit service, further complicated by the need for off-peak or overnight shifts where existing transit service may operate with limited or no service.

Freight-dependent businesses were reviewed for their proximity to public transit, as illustrated in Figure 11. Of the 46,155 freight-generating businesses in New Jersey, only one-third (16,753) are located within ½ mile of a rail station or ¼ mile of a bus stop. Tens of thousands of these freight-dependent businesses are inaccessible from public transit for employees.

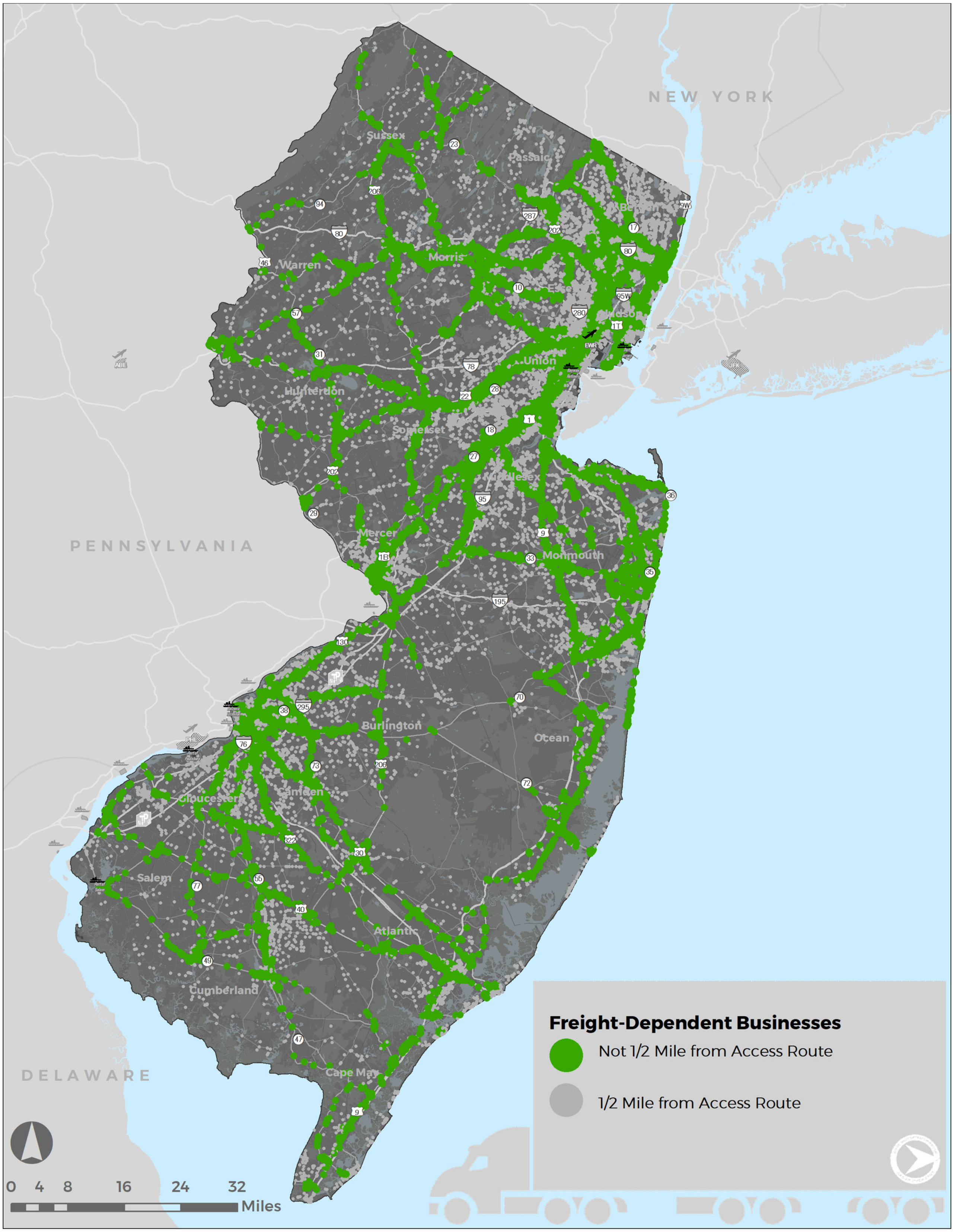
Middlesex County is currently investigating methods to improve freight flow, minimize negative impacts to community members, and plan for future industrial growth as part of the *Southern Middlesex County Freight Movement Study.* This four-municipality area (Cranbury, Jamesburg, Monroe, and South Brunswick) includes a large and growing industrial area near interchange 8A of the New Jersey Turnpike but lacks frequent bus or rail public transit access for the many employees traveling to their freight-dependent jobs. Most transit service in the area aims to serve commuters traveling from the study area to New York City or serves local shopping and medical trips at certain times of the day. The study includes a last mile analysis, reviewing existing transit conditions and needs and identifying means of enhancing the ability for employees in the study area's freight industry to commute to work by transit.

Figure 11. Public Transit in Southern Middlesex County



Source: Keep Middlesex Moving, Middlesex County Transit Guide, 2019

Figure 12. Freight-Dependent Businesses and NJ Access Routes



Source: NJDOT, 2020 New Jersey Department of Labor and Workforce Development, WSP

5.2.3 Best Practices

In 2019, NJDOT developed an *Integrating Complete Streets and Freight* technical memorandum to summarize the desire and need for freight to be incorporated into complete streets planning and design. This document outlines specific ways freight can be incorporated into NJDOT's *Complete Streets Design Guide* by supplementing existing text and creating new content that includes freight-focused recommendations. This section of the SFP will provide an overview of some of the known challenges facing freight and complete streets. The complete document can be found in Appendix A.

Downtown centers are among the most challenging areas for freight and active transportation, separately or together. New Jersey has experienced growth within its many mixed-use walkable downtowns located around the state, including high-density urban areas in Newark and Jersey City, suburban centers like Morristown or Westfield, and seasonal Shore destinations such as Cape May or Belmar. These downtown areas should consider how freight and active transportation interact in dense locations where conflicts between trucks and non-motorized users are prevalent. Issues frequently present in these communities include limited space available to provide dedicated biking or walking infrastructure (such as bike lanes, curb extensions, and pedestrian plazas) while also allowing ample space for appropriately-scaled trucks to maneuver or make deliveries.

The need to design roadways that provide mobility for all users is a challenge for engineers and planners. Ensuring that freight needs are understood and accounted for will provide an ultimately safer design for all users. Balancing the needs of each user early in the planning and design of roadway improvements, with freight, bicycle, and pedestrian subject matter experts participating collaboratively is a critical first step in better incorporating freight into complete streets designs.

> Beginning March 2, 2022, New Jersey's Safe Passing Law went into effect, first signed by Governor Murphy in August 2021. This law is based on the State's existing "Move Over Law," which requires drivers to either move over one lane, if safe to do so, or slow down when approaching a tow truck, first responder, or other emergency vehicle stopped on a shoulder.
>
> Similarly, the Safe Passing Law requires drivers to move over one lane when passing, if safe to do so, or allow four feet of space between the car and person being passed (unless the cyclist/pedestrian is traveling in a dedicated lane, such as a painted bike lane). If it is not safe to provide four feet of space, the motorist is required to pass at 25 mph. Based on the specific violation, motorists disobeying the law can be fined between $100 and $500 and face up to two motor vehicle points. While many in the bicycle/pedestrian community are aware of the law, many drivers, including truck drivers, may not be aware of it. NJ TRANSIT has provided training for bus drivers about the new law, assuring the 2,220 NJ TRANSIT buses found on the state's roadways comply and safely pass cyclists and pedestrians.

5.2.4 Education and Training

The experience of driving a fully loaded tractor trailer is substantially different than traveling on a bicycle or crossing the street on foot, but these roadway users must often share the same space. Many agencies have successfully offered training programs educating specific roadway users about the perspective or experiences of other users. These efforts have helped allow roadway users to better understand the view of those with which they share New Jersey's roads, with the goal of impacting how they behave.

Many agencies provide focused training that aims to understand these challenges. The New York City Department of Transportation's "Truck Eye View" program educates the public about truck blind spots by allowing people to sit in the driver's seat of a truck and learn about the vehicle's blind spots from a professional truck driver. While similar trainings would be useful for communities within New Jersey, training can also be provided to large vehicle operators (such as municipal garbage truck drivers) to improve their knowledge and familiarity of active transportation users and infrastructure.

Freight considerations can also be incorporated into everyday transportation infrastructure, such as the instructions for cycling near large vehicles placed on Citi Bikes in New York City, Hoboken, and Jersey City (Figure 13). These instructions include warnings about truck blind spots directly on the handlebars of bikes. Similar rules and guidelines should be considered on bike share stations in New Jersey and other places where cyclists and pedestrians frequently interact with motor vehicles.

Figure 13. Guidance for Biking with Trucks Placed on Basket of Citi Bike, New York City

Source: WSP

Freight needs and perspectives should also be incorporated into NJDOT's Complete Streets curriculum, which aims to educate state, county, and municipal planners, and engineers about Complete Streets issues. Understanding how to design for locations where large vehicles may interact with non-motorized transportation modes would be a valuable addition to these trainings.

5.2.5 Policy

The development of formal policies is a useful tool to promote the integration of freight into complete streets. Policy changes include not only state and municipal legislation but also incorporating freight concerns into routine complete streets decision-making. Several potential policy considerations and recommendations are summarized below.

The development of formal planning or design policies is most successful with a clear understanding of existing challenges to propose a responsive course of action. This is often accomplished through outreach or discussions, which include government agencies, private industry, the public, or academic partners. Working groups can offer local or statewide guidance about relevant issues and provide research or insight into best practices.

Bicycle and pedestrian planners and advocates have historically focused on promoting improved cycling and walking infrastructure. More recently, their focus has expanded to actively engage experts and advocates in other fields, including equity, environmental justice, and public health. Active bicycle and pedestrian groups in New Jersey, including the Bicycle and Pedestrian Advisory Council and Voorhees Transportation Center at Rutgers University, should continue to actively engage freight advocates, experts, and stakeholders.

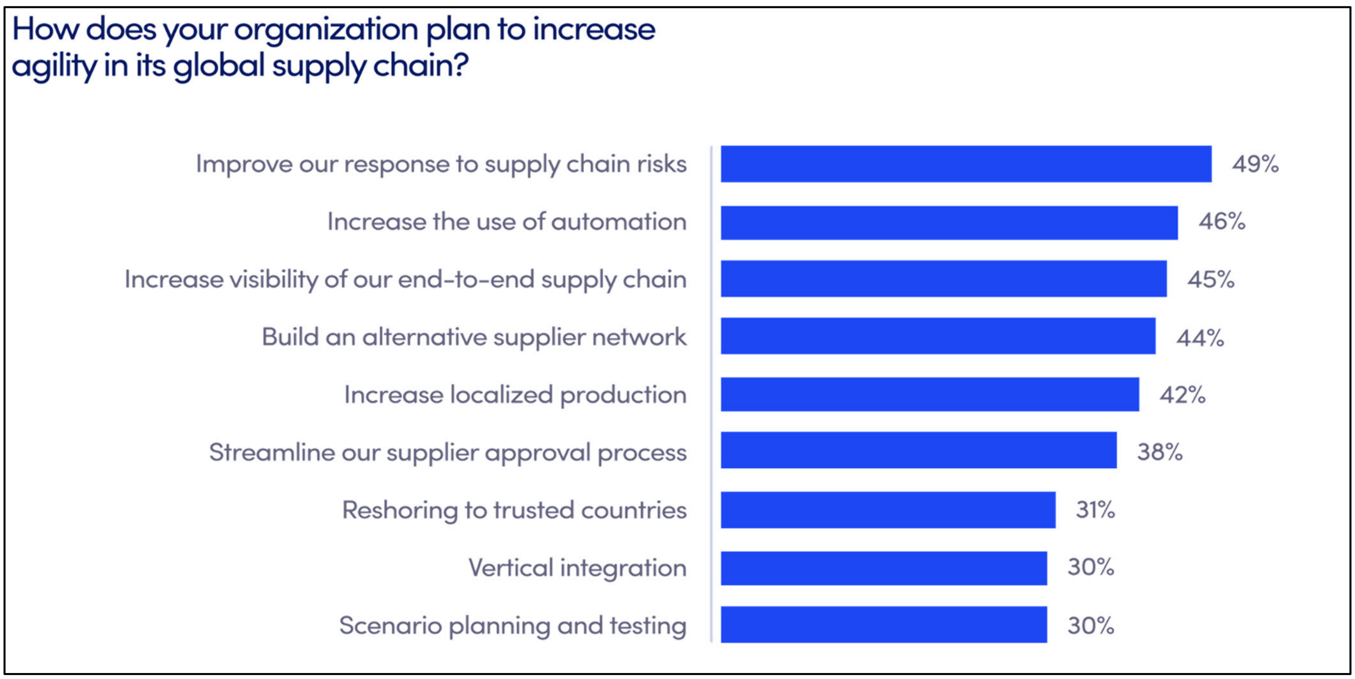
Freight deliveries on congested streets are challenging for all users. Densely populated locations where trucks spend a significant amount of time parked often overlaps with locations where pedestrian or cyclist traffic is heaviest and where road space for all users is most scarce. Tactics to optimize delivery zones through improved curbside management would be beneficial. This can take the form of offering off-peak deliveries, using dynamic parking regulations, and improving enforcement. Municipalities should work with businesses to determine the most efficient time for deliveries, adjusting parking regulations as needed. These efforts would increase flexibility for deliveries and reduce the time spent making deliveries, lowering costs for truck operators and improving safety.

5.3 IMPACTS FROM THE COVID-19 PANDEMIC

The COVID-19 pandemic exposed many vulnerabilities in existing supply chains. Low inventory logistics strategies, dependence on China for manufacturing, international trade wars, and inadequate safety protocols created risks in supply chains which the pandemic laid bare. The supply chain and logistics sectors were unprepared for the unprecedented shifts in consumer demand toward essential household goods and labor shortages in many sectors, including food production. Despite the initial difficulties, suppliers and manufacturers have pivoted and e-commerce channels have been bolstered.

In the medium term, supply chain resilience strategies include understanding and activating alternative sources of supply. Companies are also requiring greater inbound material visibility from logistics providers, preparing for plant closures, and focusing on production scheduling agility. They are also evaluating alternative outbound logistic options and securing capacity as they conduct global scenario planning. As shown in Figure 14, these and other strategies were popular in a survey of businesses conducted during the pandemic.

Figure 14. Survey Responses Regarding Supply Chain Agility



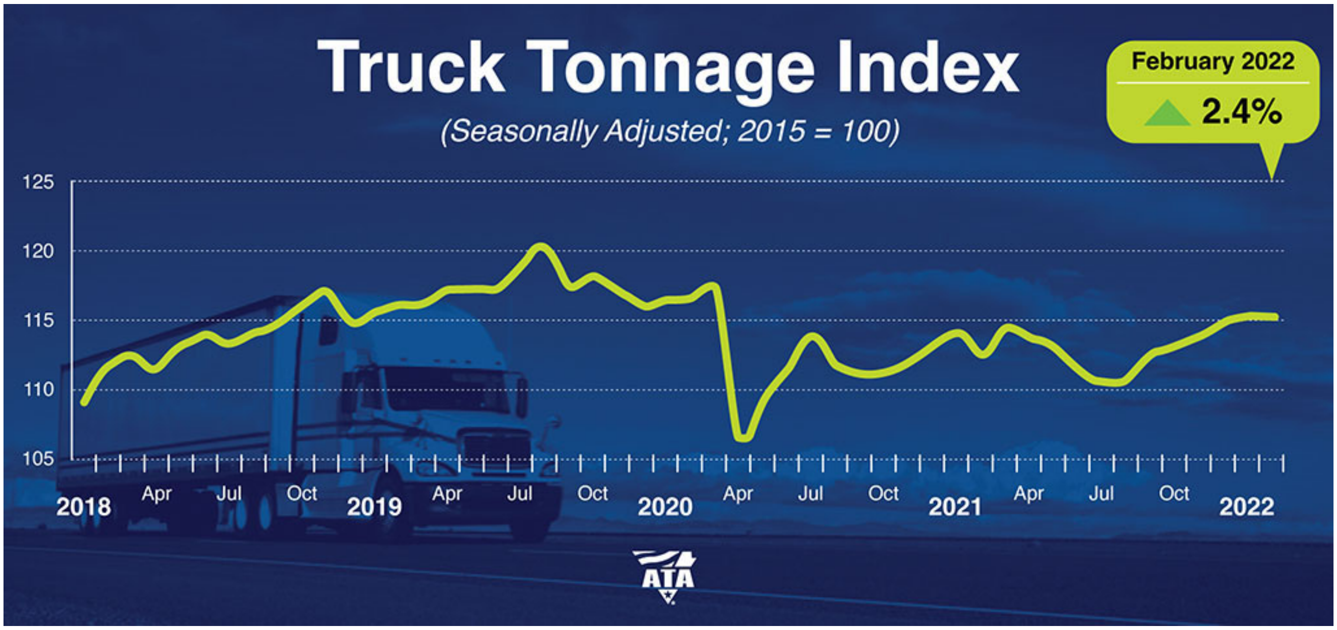
Source: Interos, 2020, COVID Resilience Report: The Impact of COVID-19 on Supply Chains and How Businesses are Preparing for the Next Shock

The COVID-19 pandemic has exposed U.S. reliance on manufacturing capacity in China. With 60% of global manufacturing capacity in China, supply chain managers have accepted the importance of diversifying manufacturing capacity and bringing some production closer to the point of consumption. Additionally, suppliers are exploring alternative capacity in Mexico, Vietnam, and India, among other places. In addition, increased automation and small batch production are making onshoring more economically feasible.

Trucking volumes nationally are still down compared to 2019. The American Trucking Associations (ATA) compiles an index of truck tonnage (indexed to 2015 levels), and ATA found the February 2022 index was 1.8% lower than March

2020, and 4.2% lower from the all-time high of August 2019.[15] As shown in Figure 15, a sharp decline was observed in April 2020, followed by a recovery that has yet to reach the pre-pandemic peak. This is likely caused by supply issues related to the driver shortage and other operational constraints. Research by the American Trucking Research Institute suggests these declines were associated almost entirely with reductions in long-haul (over 1,000 miles) shipments. Before the pandemic, 32.7% of driver trips were over 1,000 miles, compared to 22.7% during the pandemic. In contrast, 7.8% of driver trips were local (<100 miles) before the pandemic, compared to 18.2% during the pandemic. This shift in trucking distance is consistent with the increased utilization of e-commerce, which depends heavily on trucking for regional distribution and last-mile delivery.

Figure 15. American Trucking Associations Truck Tonnage Index through February 2022



Source: American Trucking Associations
https://www.trucking.org/news-insights/ata-truck-tonnage-index-unchanged-february

The year 2019 was a challenging year nationally for the rail freight industry, primarily because of declining volumes in coal (due to lower domestic and export demand) and grain (due to lower export demand), as well as supply chain challenges associated with decreased staffing levels. COVID-19 decreased rail volumes further. Rail volumes began to recover in the third quarter of 2020, and many railroad markets have since recovered to pre-pandemic levels. Rail intermodal is hitting all-time highs, with strong international trade and consumer spending.

5.3.1 Post COVID-19 Economy

The pandemic accelerated pre-existing trends in several areas. While the dependence on e-commerce during the pandemic will recede to some degree; it is anticipated that e-commerce will retain a significant portion of the market share gains. Retail outlets were already forced to be nimble, offering a combination of in-person and online service. The pandemic has shuttered many retail locations and retailing dependent on brick-and-mortar stores will be even more precarious in the future. Additionally, businesses have witnessed the success of telecommuting, and many anticipate reducing their office requirements going forward. This will reduce commuting and change the style of office products required.

[15] https://www.trucking.org/news-insights/ata-truck-tonnage-index-unchanged-february

Manufacturers are likely to increase their reliance on regional production. The COVID-19 pandemic combined with other factors, such as higher fuel costs and a premium on speed and reliability, have incentivized production taking place closer to end-markets, possibly through re-shoring or near-shoring. Visibility into supply chains has become crucial, and producers may reach back several tiers to manage risks. Tracking and performance will gain an increased focus.

In the long run, re-shoring or near-shoring is likely to decrease business for carriers involved in overseas trade. Container lines—many with pre-existing strains on their balance sheets—may be in the most precarious position. Class I railroads have experienced positive financial gains as an outgrowth of Precision Railroad Scheduling. The turnover of companies in the trucking industry will continue in the near term but should not be a lasting issue. There may be more regulation for priority national supply chains due to security concerns.

On the positive side, public understanding of the importance of supply chains and appreciation for freight has risen dramatically. The term “supply chain” itself has entered the common vernacular. This could lead to an improved climate for freight-friendly policies and freight-centric investment, and reinforce the value placed on resiliency and modal redundancy. It is also possible that attitudes bred by social distancing may linger, improving the acceptance of automation, for example, or favoring carriage with less face-to-face interaction, such as carload rail and drop-and-hook trucking, or even supporting reduced train crew sizes.

Two recently completed efforts focused on direct impacts and outcomes from the COVID-19 pandemic on New Jersey’s freight industry. *The COVID-19 Pandemic and North Jersey Freight*, completed by the NJTPA and referenced in Section 4.2.1, summarized how the industry initially reacted to the pandemic, how it maintained the movement of goods as the initial shutdown languished, and provided long-term actions to proactively plan for future similar disruptions. The North Jersey region was particularly well prepared to respond to the initial shutdown based on past disruption experiences, including use of the Council on Port Performance (CPP), which was created following Superstorm Sandy. The CPP is a group of public and private freight partners that collectively understand the unique needs and priorities of the goods movement industry. Leveraging this broad group of stakeholders as shutdowns were initiated allowed for an open dialogue and collective discussions about how best to ensure that the most critically needed goods were still made available to the state’s residents.

The MAP Forum (detailed in Section 4.8) served as a conduit for a survey to help understand the early pandemic experience of truck drivers within a four-state region (New Jersey, Pennsylvania, New York, and Connecticut). The survey highlighted several challenges that drivers faced during initial shutdowns, particularly the availability of parking and rest areas. While truck parking shortages within the region are well documented, even during “normal” working conditions, the closure of restaurants, gas stations, and parking areas exacerbated challenges for drivers that worked continuously to move goods on New Jersey’s roads.

5.4 ADVANCEMENTS IN E-COMMERCE

The U.S. Census Bureau defines and tracks e-commerce as the goods and services sold online whether over open networks such as the Internet, or over proprietary networks running systems such as Electronic Data Interchange (EDI), excluding agriculture, mining, construction, agents, brokers, and electronic markets in wholesale trade.[16] E-commerce shipments consist of online orders accepted for manufactured products from customers, including shipments to other domestic establishments of the same company for further manufacture, assembly, or fabrication. Payment for these goods and services does not have to be made online. E-commerce is therefore defined by the nature of the transaction, rather than the nature of the transportation means employed. The actual delivery of goods may be accomplished by trucking between two companies, direct delivery to homes or businesses, or pickups by customers at retail locations (known as “buy online pickup in store”) or lockers or other non-home locations.

16 https://www.census.gov/programs-surveys/e-stats/about.html

Major businesses have utilized the EDI to buy and sell their goods and services for decades, and because the U.S. Census Bureau's e-commerce sales data include EDI sales, these sales are reported as e-commerce sales. A significant proportion of wholesale trade sales are conducted using EDI, which leads these types of transactions to represent the largest component of e-commerce. Direct-to-consumer sales of manufactured goods have emerged more recently as a substantial share of e-commerce activity. According to the e-commerce platform development firm BigCommerce, the primary business models in e-commerce include the following:[17]

- **Business-to-Business (B2B):** Businesses sell goods or services to other businesses
- **Business-to-Consumer (B2C):** Businesses sell goods or services to consumers
- **Consumer-to-Consumer (C2C):** Consumers sell goods or services to other consumers (e.g., on eBay)
- **Consumer-to-Business (C2B):** Consumers sell goods or services to businesses
- **Government-to-Business (G2B):** Governments sell goods or services to businesses (e.g., business license renewals)
- **Government-to-Citizen (G2C):** Governments sell goods or services to citizens (e.g., driver's license renewals)

Warehouses and Distribution Centers in Middlesex County, NJ (Source: WSP)

The most common types of e-commerce, and the ones with the greatest transportation system impacts, are B2B, B2C, and C2C. Major B2C companies include Amazon, Walmart, Target, and Home Depot; Amazon is also a leading B2B company, accounting for approximately 40% of the U.S. e-commerce market. Examples of C2C companies (some of which also handle B2C transactions) include eBay and Etsy. Some e-commerce companies operate retail stores; these are known as "bricks and clicks" players and include Walmart, Target, Home Depot, etc. Others do not operate retail stores; these are known as "pure players" and include Amazon, eBay, Etsy, etc. However, there has been some crossover with Amazon acquiring stores through its purchase of the Whole Foods grocery chain several years ago.

In some cases, B2C is a mechanism to facilitate traditional multi-level sales (with a company selling to a retailer or one or more "middlemen" before reaching the customer); but an important value of B2C is its ability to support "Direct to Consumer" (D2C) sales without intermediary parties.

B2C supply chains typically involve the receipt of goods from factories (domestic or international), storage and handling at one or more national/regional/local warehouses or distribution centers, and delivery to the customer. C2C supply chains tend to be direct moves between sellers and buyers using self-pickup/delivery or purchased transportation services. The final move to the customer is known as "last-mile" delivery, and is accomplished using:

17 https//www.bigcommerce.com/articles/ecommerce/#types-of-ecommerce.

- United States Postal Service (USPS)
- FedEx or United Parcel Service (UPS)
- "Delivery Service Partners" (networks of regional affiliates, essentially franchisees)
- Traditional trucking companies (for larger/heavier items)
- In-house or dedicated contract fleets, such as those used by Amazon

The principal front of competition is the B2C market, pitting traditional storefront retailers against e-commerce merchants in pursuit of consumer spending. This segment is also forcing major changes in transportation patterns, replacing large, consolidated truck deliveries to stores with small, dispersed deliveries to residences, eliminating some consumer shopping trips, and altering the origins of shipments. These changes, discussed further below, have significant impacts in New Jersey.

5.4.1 Rapid Growth

E-commerce has been growing rapidly for two decades; however, the COVID-19 pandemic rapidly accelerated this growth, particularly B2C. From 2002 to 2018, e-commerce sales grew at 7.1% per year for wholesale, 11% per year for manufacturing, and 16.6% per year for retail. The growth was especially dramatic for retail— in 2002, e-commerce retail sales were less than $45 million, and by 2018 they had grown more than ten-fold to $520 million.[18]

Technological advances supported online sales growth by allowing consumers greater access to product information, quick and easy price comparisons, and faster, cheaper, personalized delivery options. Moreover, as same-day delivery and free shipping on returns became more commonplace, the traditional value of brick-and-mortar stores diminished further, and many brick-and-mortar stores began accommodating the pickup of orders placed online, along with in-store e-commerce returns.

The start of the COVID-19 pandemic led to a dramatic increase in e-commerce, from an 11.8% share in the first quarter of 2020 to 16.1% in the second quarter (as can be seen in Figure 16). In subsequent quarters, the seasonally adjusted share of e-commerce has decreased slightly, and even stabilized at around 13% of retail sales. This stabilization suggests that the pandemic had a mostly transitory effect on e-commerce sales, with the share of retail returning to levels only slightly higher than predicted by pre-pandemic forecasts. It is too early to assess with confidence the effect of the pandemic on the long-term prospects of the e-commerce sector. It is possible that the share of e-commerce will continue to increase at pre-pandemic rates until market absorption is maximized. Some analysts expect e-commerce growth to continue strongly, accelerated by changes in customer attitudes precipitated by the pandemic, reaching half of all retail sales in the near future.[19] However, these projections seem overly optimistic given data from the past year.

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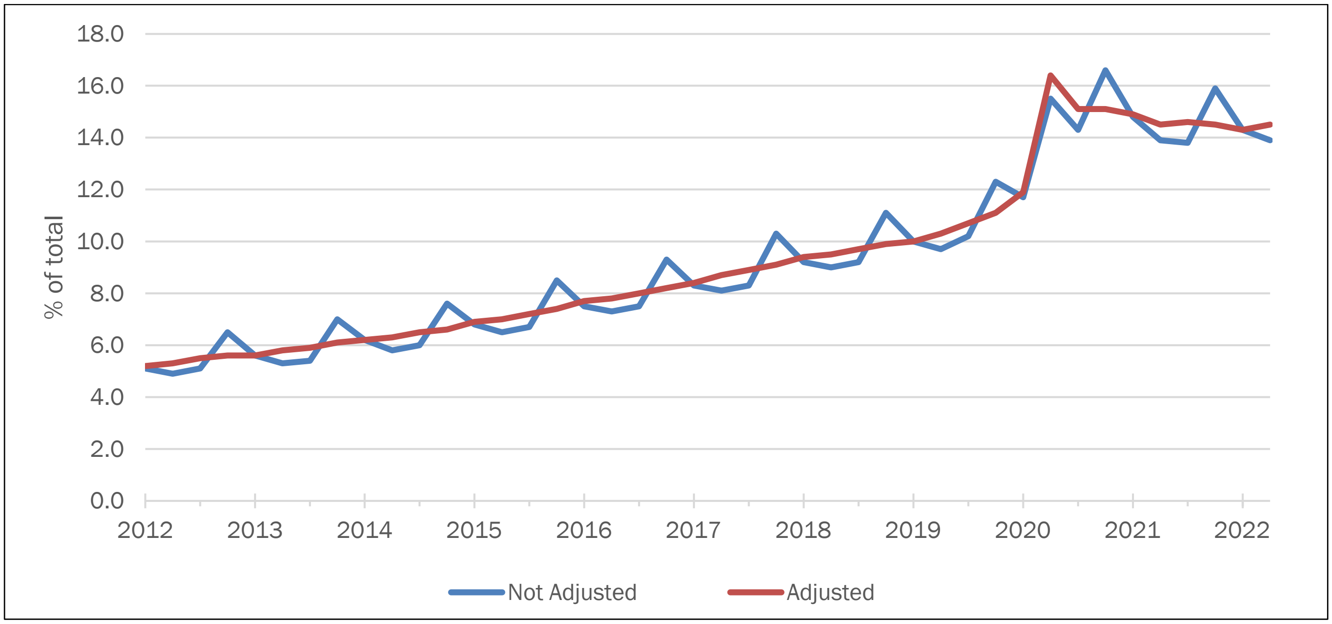
[18] U.S. Census Bureau, https://www.census.gov/data/tables/2018/econ/e-stats/2018-e-stats.html

[19] https://www.mckinsey.com/industries/retail/our-insights/solving-the-paradox-of-growth-and-profitability-in-e-commerce

Figure 16. Estimated Quarterly U.S. Retail E-commerce Sales as a Percentage of Total Quarterly Retail Sales, Q1 2012 – Q1 2022



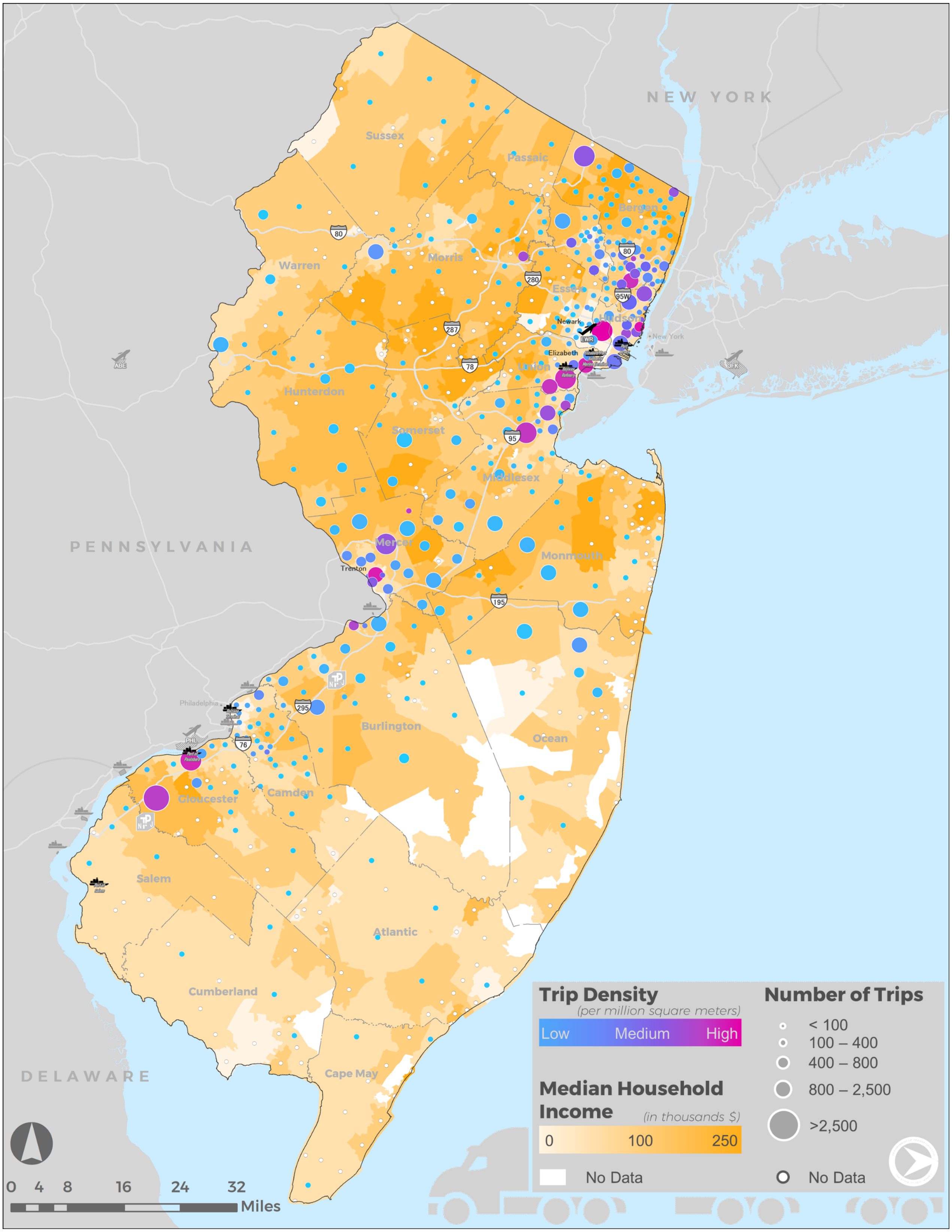
Source: U.S. Bureau of the Census, Quarterly Retail E-Commerce Sales. 2nd Quarter 2022. https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

5.4.2 Transportation Impacts of e-Commerce

Significant increases in truck trip generation. Truck trip generation consists of three parts: inputs to primary warehouse/distribution facilities; moves between primary and secondary warehouse/distribution facilities; and direct-to-customer deliveries to residential addresses, largely by parcel delivery companies. The rise in e-commerce and direct-to-consumer retail is having significant repercussions for product distribution and delivery, with shipments increasingly moving directly to individual residences, rather than brick-and-mortar storefronts, on smaller trucks. This will have the effect of increasing the size of the truck fleet and mileage traveled for retail. Other factors increasing trip generation include returns of wrong-sized or otherwise unwanted merchandise purchased electronically; failed delivery attempts requiring multiple trips; and replacement of damaged, lost, or stolen items.

Shifts in truck traffic in New Jersey. The rapid growth of e-commerce has been accompanied by the growth of a sprawling direct-to-consumer logistics system delivering goods to people's homes. Despite the importance of these developments, transportation planners currently have virtually no information about direct-to-consumer logistics, where demand is concentrated and how it is being served, representing a critical gap in our understanding of the freight transportation system. To address this gap, NJDOT acquired data from Geotab describing the activity and patterns of trucks that make frequent short stops in residential areas. To hone in on the types of trucks typically used in direct-to-consumer logistics in New Jersey, the analysis focused on trucks with a GVWR of 10,000 lbs. to 26,000 lbs., and excluded trucks owned by waste management agencies, such as those used to collect garbage. While Geotab does not reveal who owns the trucks in their dataset, USPS parcel delivery trucks would be included in the analysis as they typically have a GVWR of 14,000 to 16,000. The results of this analysis can be found in Figure 17, which shows the number of residential deliveries (times that trucks stop) by zip code (blue dots), overlayed over a map of median household income. From this map direct-to-consumer logistics is most prevalent in the urbanized areas of the state with the highest incomes. These results are confirmed by the USPS Household Diary (Table 19), which reports that nationwide demand for packages per household is twice as high for households with incomes over $100,000 relative to household with income under $35,000, and the highest in urban areas. The table below shows the types of goods that are most commonly delivered through USPS.

Figure 17. E-commerce Direct-to-Consumer Delivery Trip Concentrations in New Jersey



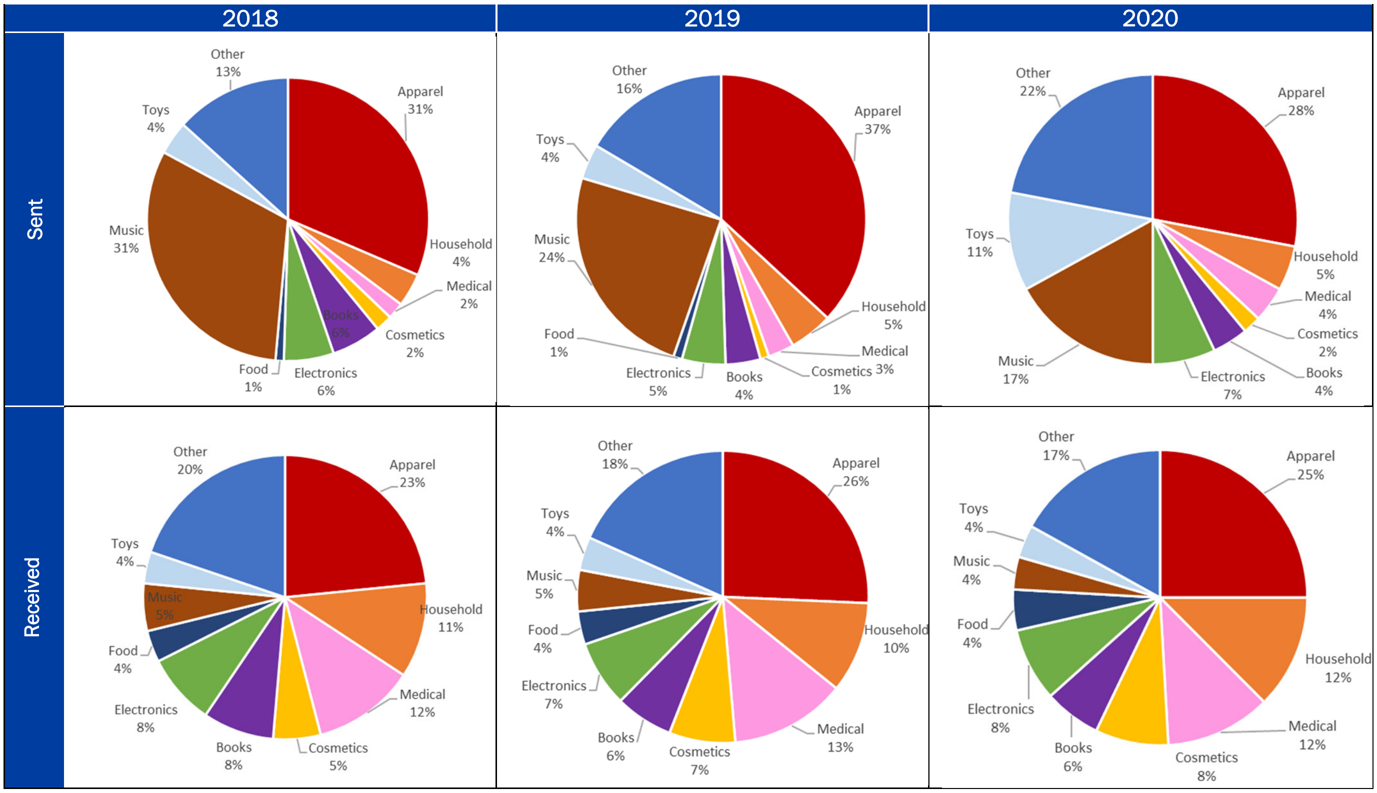
Source: Geotab, U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates, WSP

Table 19. USPS Household Diary Survey Results, Contents of Postal Service Sent/Received Packages, 2018-2020

Contents	Percent of Pieces					
	2018		2019		2020	
	Sent	Received	Sent	Received	Sent	Received
Clothing/Footwear/Shoes	33%	26%	38%	28%	28%	28%
Household/Kitchen/Lawn and garden products	4%	12%	5%	11%	5%	14%
Health/Medical/Dental/Vision products	2%	13%	3%	14%	4%	13%
Cosmetics/Beauty products/Toiletries	2%	6%	1%	8%	2%	9%
Book(s)	6%	9%	4%	7%	4%	7%
Electronic equipment	4%	6%	4%	5%	6%	6%
Food Products	1%	4%	1%	4%	0%	5%
Music/Video	33%	6%	25%	5%	17%	4%
Toys	4%	4%	4%	4%	11%	4%
Computer hardware, software, or accessories	2%	3%	1%	3%	1%	3%
Photos/Film	0%	1%	0%	1%	0%	1%
Travel products or information	1%	1%	0%	1%	0%	1%
Checkbooks	0%	1%	0%	0%	0%	0%
Other Contents	13%	19%	17%	18%	22%	17%
Total Packages	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: https://www.prc.gov/docs/119/119244/Final%20HDS%202020%20Annual%20report.pdf

Note: Contents questions are multiple response; as such, total packages do not equal the sum for each column. Does not include contents for which no answer was given.



Source: https://www.prc.gov/docs/119/119244/Final%20HDS%202020%20Annual%20report.pdf

Increasing presence of delivery trucks on local streets and in residential areas. As previously noted, the primary last-mile delivery services are USPS, UPS, FedEx, and Amazon's delivery service and partners. With more delivery vehicles on residential urban and suburban streets, there are increased safety risks from constrained geometries and road use conflicts, increased curb use/management pressures, and more quality of life (congestion, emissions, noise, etc.) effects.

Pressures for rapid and reliable order fulfillment place a premium on transportation reliability. Amazon continues to dramatically impact consumer expectations regarding product delivery standards, particularly given their introduction of Prime and 2-day/1-day delivery. A 2020 survey found that 67% of consumers now expect same-day or next-day delivery.[20] Given Amazon's significant market presence, other retailers have had little choice but to follow suit, offering a combination of free and/or faster delivery. This "Amazon effect" is leading traditional retailers to pursue omnichannel supply chain strategies to increase customer loyalty.[21]

Crowd-sourced services are increasingly attractive for last-mile deliveries. Like ride-hailing services, crowd-sourced services involve technology-enabled companies dispatching individual contractors who use their own personal vehicles for deliveries. As of now, this method is often used for meal and grocery delivery, as well as medical supplies, but a handful of successful startups, including Deliv, Instacart, and UberRush, have moved into other areas of retail. Additionally, Amazon has its own crowd-sourced delivery service called Amazon Flex. While such systems allow for fast, localized delivery with limited overhead to the company, there are costs to the overall transportation system (including increases to freight vehicle trips and miles of travel, freight-related congestion, unregulated vehicles, lack of training and certification, and reduced coordination of delivery services) in addition to the gig-based labor costs.

Alternative last-mile modes are being piloted. Cargo bikes are used to make deliveries in denser cities with bike infrastructure. Another possibility that has received considerable attention is drone delivery. Multiple groups are in various testing stages, including smaller companies like Workhorse and Matternet, as well as larger corporations like Google and Wal-Mart. Additionally, Amazon has patented mobile drone delivery hubs capable of traveling along railroads, seaways, and roads.

5.4.3 Land Use Impacts of e-Commerce

Substantial demand for additional warehouse space to serve e-commerce. The D2C market translates into fewer goods kept in retail stores and greater volumes of goods on warehouse racks for delivery. CBRE Research estimates that for every $1 billion increase in e-commerce sales, an estimated 1.25 million square feet of warehouse space is needed to keep up with demand. Prologis estimates that e-commerce requires three times the amount of warehouse space as traditional retail channels. There is growing interest in repurposing suburban shopping malls, urban parking lots, and other underutilized spaces during the COVID-19 pandemic for warehouse/distribution operations.

Trend towards smaller closer-to-market distribution facilities. There is a notable shift away from the practice of using a small number of enormous facilities located a considerable distance from the urban areas they serve, toward using more numerous, smaller industrial spaces located closer to the end consumer. This allows for faster transit time and higher service reliability. Demand for smaller, closer-in space is being met largely through urban infill. This means development or redevelopment in areas that are mainly built out, representing a major shift from practices of past decades. The supply of new urban infill properties has been flat while vacancy rates have rapidly declined across the country. This is leading to several adaptations, such as repurposing of existing facilities and companies leasing out portions of underutilized space. In New Jersey, former big box stores are being turned into fulfillment centers, such as the conversion of a former Burlington Coat Factory site in Vineland into a fulfillment center operated by Power Warehouse, an online battery retailer.

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20 USDOT, 2022. Supply Chain Assessment of the Transportation Industrial Base: Freight and Logistics. https://www.transportation.gov/supplychains

21 Cavallo, A. 2018. More Amazon Effects: Online Competition and Pricing Behaviors, National Bureau of Economic Research, Working Paper 25138, https://www.nber.org/papers/w25138

5.5 WIND ENERGY AND FREIGHT TRANSPORTATION

As states along the U.S. coastline position for the development of wind energy resources, each is facing new challenges. These include the need for: suitable port facilities for vessels that will install and maintain offshore wind towers and equipment; manufacturing capacity or access to the necessary components and equipment; and the ability to efficiently and safely move steady streams of vessel, rail, and truck traffic between manufacturing locations, port facilities, and offshore installations.

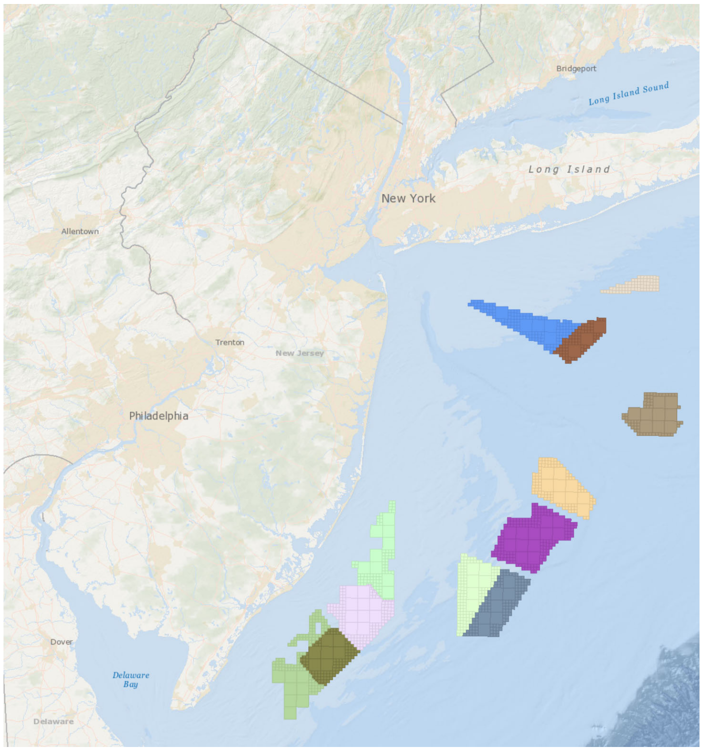
The state of New Jersey is committed to the development of offshore wind energy (OSW) production capacity. Doing so will place specific demands on the state's transportation system to accommodate receipt and shipment of materials and oversize/overweight components between manufacturing sites and "marshalling" sites where various components are gathered and then moved to their final installation locations. To prepare for the installation process, and for sustaining and expanding wind energy capacity into the future, this Plan identifies key components of a multimodal "Wind Energy Network" to be implemented through a combination of state action, federal assistance, and private sector investment.

5.5.1 Development Targets

In 2018, OSW production targets for states on the northeast coastline totaled approximately 28 gigawatts (GW) of production capacity, with about 13 GW expected to be operational by 2026. New Jersey's target was for 3.5 GW of installed capacity by 2030. In 2019, that goal was revised to 7.5 GW installed capacity by 2035, assisting the state in achieving a goal of 100 percent clean energy by 2050 with 23% of that being from OSW production.

Currently, NJ OSW projects are planned for three operating areas: Atlantic Shores Offshore Wind; Ocean Wind; and Garden State Offshore Energy (GSOE). Leases have been awarded for Ocean Wind I (Ørstead, 1.1 GW), Atlantic Shores (EDF/Shell, 1.51 GW), and Ocean Wind II (Ørstead, 1.148 GW). The offshore wind operating areas in the proximity of New Jersey in the Atlantic Ocean is illustrated in Figure 18.

Figure 18. Offshore Wind Operating Areas



Source: https://www.northeastoceandata.org/data-explorer/?energy-infrastructure|planning-areas

5.5.2 Freight Movement Requirements

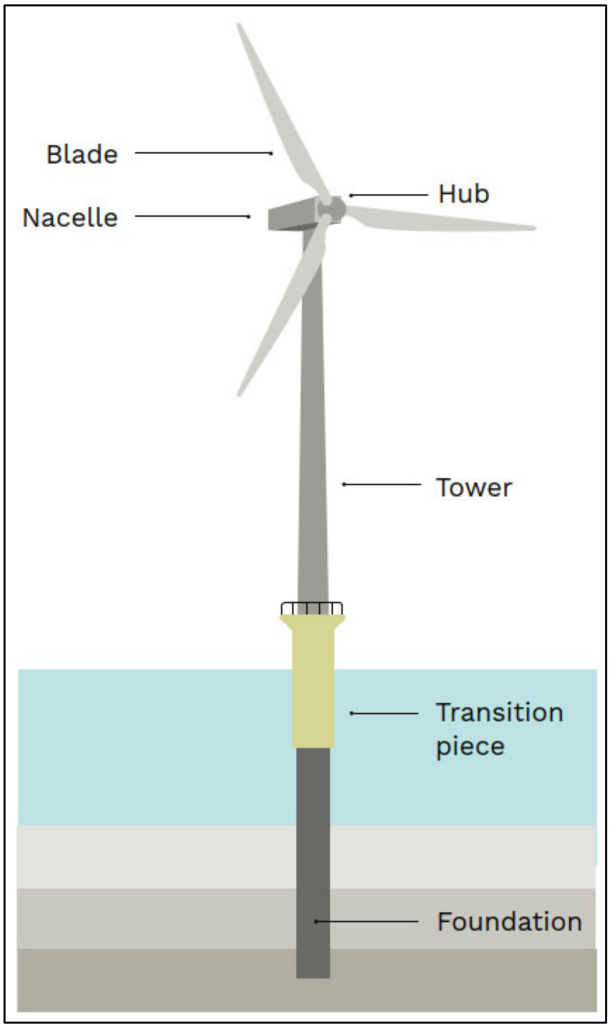
A Wind Turbine Generator (WTG) consists of Tier I components (major structural elements) and Tier II components. As shown in Figure 19, Tier 1 components are primarily large, heavy pieces, consisting of: the foundation; transition piece; tower; nacelle and hub; and blades. Tier 2 components are light weight, smaller pieces, including ladders, electrical components, transformers, and weather sensing devices.

The manufacturing and assembly process generally follows a prescribed path:

- Raw materials (steel, concrete, etc.) are received by Tier 1 and Tier 2 processors, which fabricate components.
- Components are moved from various manufacturing locations to a "marshalling yard" where they are collected and staged for installation.
- WTG components are moved by vessel to installation locations offshore.

The freight movements necessary to support this process depend on the locations where materials are sourced, manufacturing occurs, and marshalling is provided. Raw materials may be from New Jersey, other states, or international sources; and various components may be produced in state, in other states, or imported.

Figure 19. Wind Tower Generator Components



Source: https://www.boem.gov/New-Jersey-State-Offshore-Wind-Update/

Ultimately, raw materials need to get to manufacturers, and components need to get to marshalling sites. For the currently awarded New Jersey leases, the estimated production needs are:

- 314 WTGs
- 314 Nacelles
- 942 Tower sections (3 per tower)
- 942 Blades (3 per tower)
- 314 Monopiles and Transition Pieces
- Tier 2 components

5.5.3 Wind Energy Sites

Three kinds of sites are needed to support OSW installation and operations, as illustrated in Table 20.

Table 20. Wind Energy Sites

Marshalling	Manufacturing facility (port or inland)	Operations & Maintenance (O&M)
Staging of Tier 1 components	Manufacturing of Tier 1 components	For crew support, operations and maintenance of project site
Handling of installation vessels	Requires heavy pavement	
Requires heavy pavement	Can serve multiple projects	Handling of service vessels
Serves few nearby projects	May ship or receive by vessel, if capable	

Multiple functions can be combined at single locations – for example, marshalling ports can include on-site manufacturing or O&M operations. However, both marshalling and O&M operations must be at operating ports capable of handling ocean-going vessels and equipment. Marshalling activities generally need to be within a 100-mile radius of the offshore lease areas.

The New Jersey Economic Development Authority (NJEDA), state planners, and New Jersey's ports have identified a number of wind energy supporting sites which are (as of Summer 2022) operating, in the development stages, planned, or potential developments.

Operations are underway or in development at the following locations.

- New Jersey Wind Port: The Wind Port, currently under development in Lower Alloways Creek, will be amongst the nation's leading offshore wind supply chain hubs, serving as a manufacturing center and marshalling launchpad for wind farms along the entire U.S. East Coast. The Wind Port is strategically located along the East Coast wind belt – within a day's steaming distance of over 50% of all mid-Atlantic and northeast lease areas. Encompassing more than 200 acres, the Wind Port will house several Tier 1 component manufacturers and will support concurrent marshalling activities. By enabling co-location of manufacturing and marshalling, the Wind Port reduces the transportation distance between Tier 1 manufacturing and marshalling operations. Targeted manufacturing components include tower sections and nacelles. NJEDA estimates the Port will create up to 1,500 direct jobs and will boost state GDP by over $500 million per year. Phase 1 of the project has an estimated cost of $550 million. Phase 2 remains at a concept design stage but is expected to be in a similar cost range to Phase 1. The Port is being designed, built, and operated solely for offshore wind – it will not be used for containerized freight or conventional break bulk, but will be capable of receiving components not manufactured onsite via water as well as truck.
- Paulsboro: The Port of Paulsboro is planned to receive pre-bent steel sections that will be welded into monopiles on the site. Design is underway to strengthen the wharf to accommodate higher load weights of completed monopiles so they can be loaded to vessels and barges. Future plans call for developing a facility that bends steel sheets into the required shapes on-site.
- Allentown: Concrete forms are being fabricated at an inland site in Allentown Borough (Monmouth County).
- Atlantic City: Atlantic City is planned as the Operations and Maintenance facility for Ocean Wind I and could potentially fill that role for continuing development.

At this time, a New Jersey manufacturing location for blades has not been identified. There are several sites that could accommodate blade manufacturing, supplemental manufacturing of other Tier 1 components, manufacturing of Tier 2 components, and receipt of inbound components or materials by vessel to support New Jersey operations. These include:

- **South Jersey Port Corporation**: SJPC operates marine terminal facilities with rail access at Camden and Salem. Both sites can accommodate vessel, rail, and truck transfer, as well as on-site manufacturing of components not available from other New Jersey sources.
- **Port Newark/Elizabeth/Bayonne/Jersey City:** The marine terminals at Port Newark, Elizabeth, and Bayonne/Jersey City offer the largest concentration of container capacity on the U.S. East Coast. They can further support receipt of essential imported components and products.
- Port Raritan™: As outlined in Section 4.1.6, the former Raritan Arsenal property, now owned by Federal Business Centers Inc., is located on the Raritan River. Plans are underway to reactivate an historic 2000-foot cargo dock, and the site offers excellent truck and rail access as well as wind energy manufacturing facility development potential. The concept was recently designated by the USDOT Maritime Administration as a Marine Highway Project.
- **Repauno** and **Oldmans Creek** locations offer additional manufacturing potential.
- **Cape May** could supplement Atlantic City as an operations and maintenance base for offshore services.

5.5.4 Wind Energy Component Transportation Network Vision

Ports and manufacturing facilities located in New Jersey may serve not only New Jersey OSW needs but also to some degree the needs of installations being managed by other states. Conversely, in some cases New Jersey may benefit by utilizing resource inputs and manufactured components produced in other states or countries that would be difficult to source within the state. New Jersey therefore needs to consider the movement of WTG components to, from and between a network of functional locations within the state, as well as movements to/from other states and import/export needs.

Conversations with wind facility operators have emphasized the value of a larger plan for handling offshore wind components, connecting the State's and wider region's wind ports and manufacturing hubs to existing/backbone freight links as well as to each other.

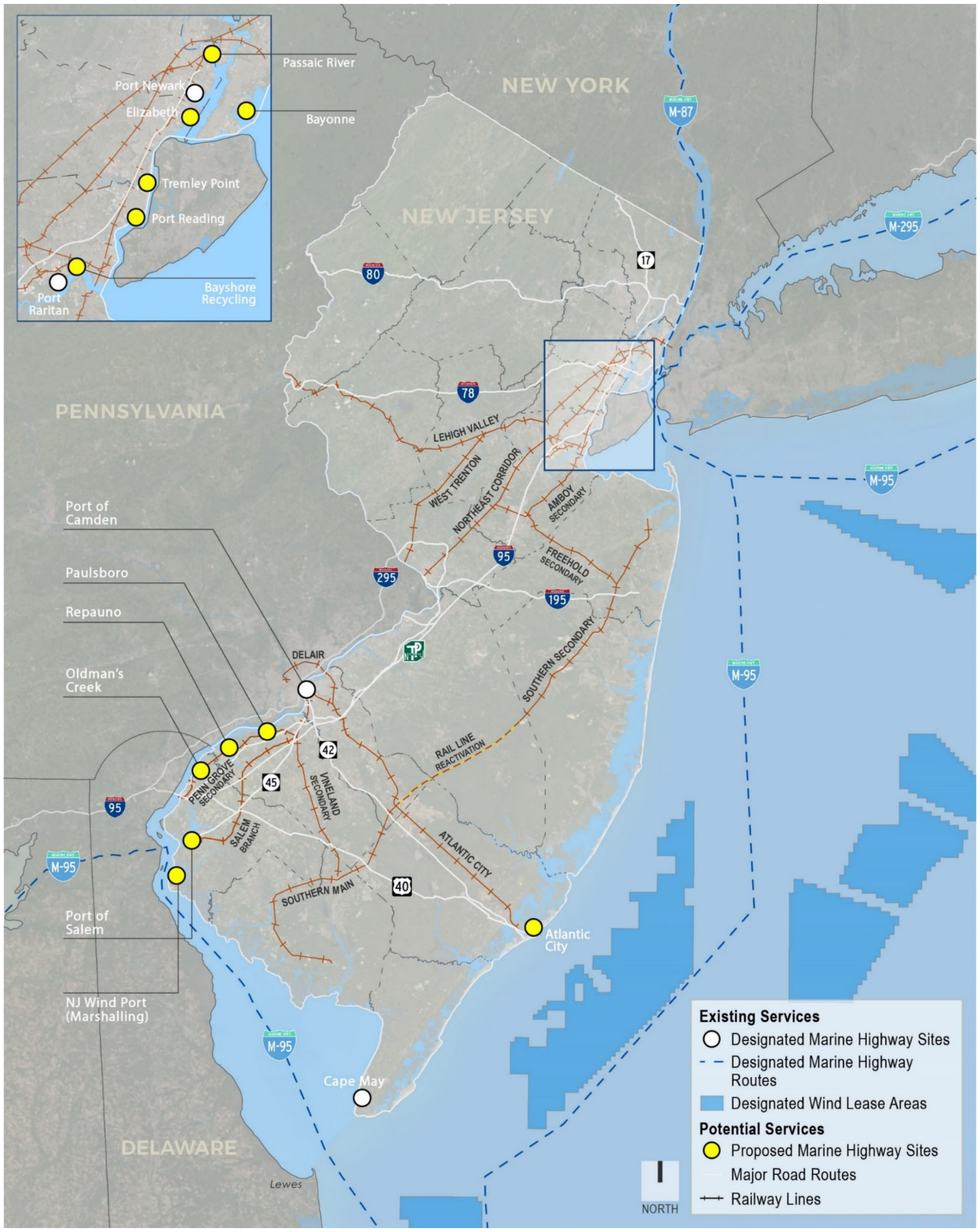
While the full extent and location of operations is not yet determined, it is expected that at the center of operations, marshalling for Wind Port would generate between 100 and 150 truck deliveries per week. Raw materials (steel, wood, fiber glass) used by Tier 1 manufacturers at the Wind Port would arrive by rail into the Port of Salem or Paulsboro before forwarding to the Wind Port. Components manufactured at other locations will be moved to the Wind Port by truck or rail where they will be arranged for marshalling. Finished components will be installed from the Wind Port or shipped from the Wind Port to other marshalling ports up and down the U.S. East Coast.

From this concept, the two main planning implications are:

- **The need for better landside connectivity for Wind Port**: Today, the site is not well connected to the existing highway or rail network. There is a clear need to consider a freight corridor connecting the Port with I-295 (a distance of approximately 20 miles). This does not necessarily require new roads but rather road, signage, and signaling upgrades, and possibly future electric truck support. One project identified as a priority by the local municipality is the reconstruction of a new bridge (County Route 623 on Alloway Creek). Currently there is only one bridge into/out of Lower Alloways Creek Township. This bridge (Hancocks Bridge) is rated at an operational max load of 50 tons which is insufficient for permitted loads and anecdotal information suggests that it is subject to flooding. The lack of redundancy is compounded by the nearby nuclear plant and the need to quickly evacuate workers and residents. An upgraded freight corridor connecting I-295 and the Port of Salem to the Wind Port would also be useful.

- **The need for multimodal connectivity among and between the various locations involved in wind energy operations:** As shown in Figure 20, one concept would:
  - Create Marine Highway connections between Wind Port, Salem, Camden, Raritan, Port Newark/Elizabeth, and other marine-capable sites, reducing the need for trucking, particularly for oversize and overweight components.
  - Complete a "missing link" in New Jersey's rail system by restoring freight service between Woodmansie and Winslow Junction. Currently there is no direct connection between the North Jersey and South Jersey rail systems, except by traversing dimensionally constrained routes in Pennsylvania. Restoring the connection would allow heavy materials to move by rail from Port Newark/Elizabeth and Port Raritan to rail-served ports in South Jersey without leaving the state.

Figure 20. Wind Energy Component Transportation Network



Source: NJDOT, US DOT, NJDEP, WSP

5.6 FREIGHT IMPACTS TO NEW JERSEY'S WILDLIFE HABITATS

Reducing the impact to wildlife and their habitat from freight development within the state of New Jersey requires planning infrastructure around natural areas providing for both general wildlife and critical threatened and endangered (T&E) species. Data showing both T&E and general wildlife habitat is readily available from public datasets provided by both state and federal environmental agencies and can be used to develop plans to mitigate habitat loss from both a facility perspective as well as improvements to the freight roadway network.

Truck operations adjacent to the Gateway Confined Disposal Facility, Pleasantville, Atlantic County (Source: WSP)

5.6.1 For Facilities

At the state level, the New Jersey Department of Environmental Protection (NJDEP) provides nonspecific habitat tools that can be used for planning purposes, such as NJDEP's Land Use mapping. General land use data can be a high-level tool to determine the land cover and land use of an area such as urban, forested, wetlands, or barren ground. This information allows for the identification of general habitat of common species such as deer, turkey, raccoons, general game, etc.

When more specific species and habitat information is required, the New Jersey Department of Environmental Protection (NJDEP) Office of Natural Lands Management maintained database of sensitive habitat for both flora and fauna known as the Natural Heritage Program (NHP) can be consulted. The database reports land use, specific species, and ranks the habitat based on sensitivity or status. Spatially delineated and ranked habitat boundaries, mapped as "The Landscape Project," can be leveraged and viewed on the NJDEP Land Resource Protection Web Application, downloadable as a standalone Geographic Information System (GIS) shapefile, or as a hardcopy paper report that can be requested from the NHP.[22][23] Rare plant information is also available via the hardcopy report. The NHP data will also report proximity to highly sensitive areas known as Natural Heritage Priority Sites. 343 Natural Heritage Priority Sites exist within NJ and contain some of the best remaining habitat for rare species and rare ecological communities.

The U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) is an important Federal tool used to identify wildlife habitat.[24] Reports can be generated using the IPaC mapping tool. Project shapefiles can be uploaded to the tool and a user specified buffer can be applied to fully encompass any potential habitat within and adjacent to the development footprint. The output will include documented habitat for federally listed T&E and critical habitats, including bats and migratory birds.

22 https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=5934a6e010a942f7a33c76427f71c751

23 Additional resources include: NJ-GeoWeb, individual GIS layers, and the Landscape Project interactive map viewer :Bureau of GIS (nj.gov) ; NJ-GeoWeb (arcgis.com); NJDEP| Fish & Wildlife | New Jersey's Landscape Project; NJDEP Landscape 3.3 Viewer (arcgis.com)

24 https://ipac.ecosphere.fws.gov/location/index

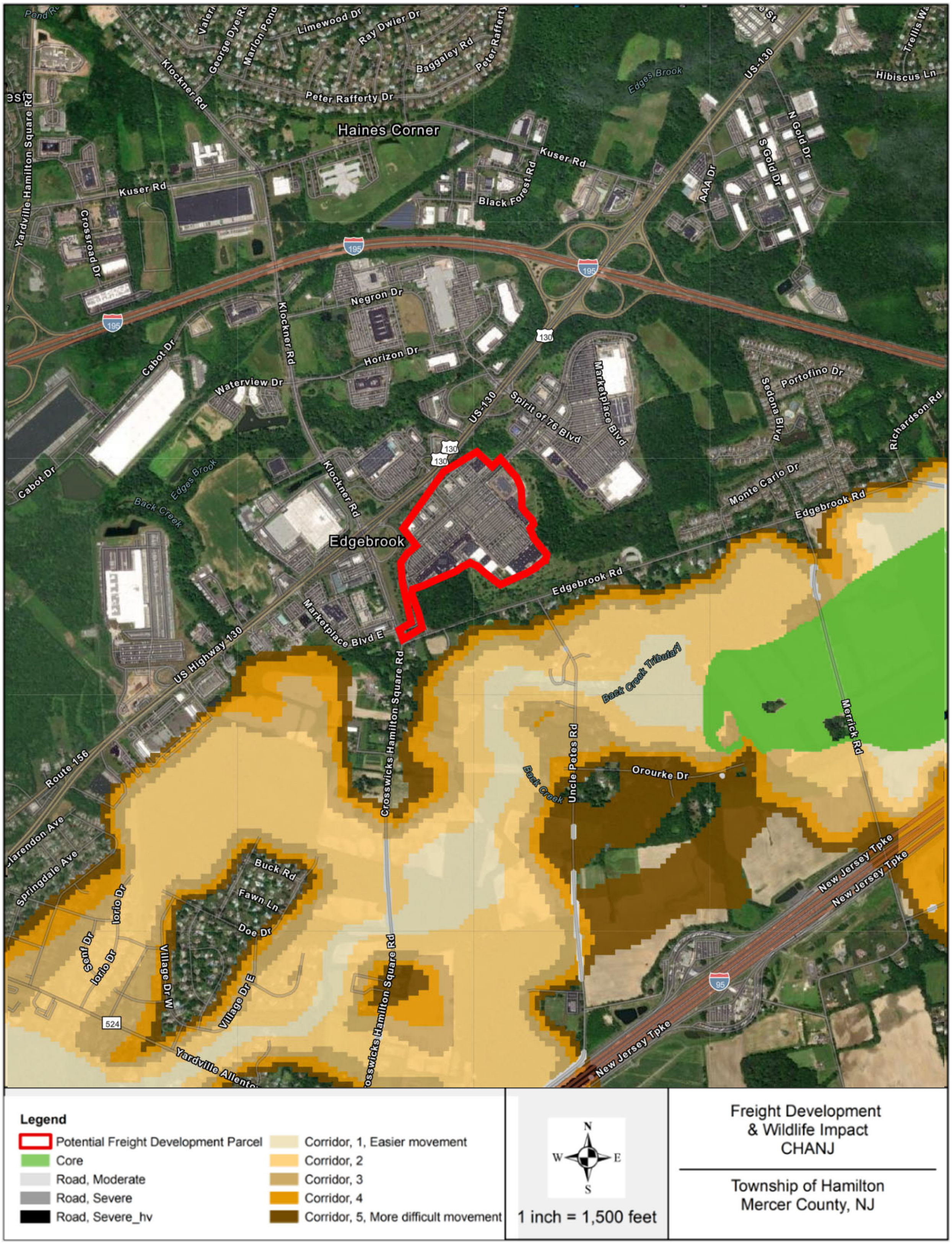
5.6.2 For Roadway Planning

In addition to land use impacts from freight developments, roadway impacts may be present due to increased traffic, particularly large trucks. Roadways are the primary contributor to habitat fragmentation which can result in both a loss of habitat and a higher risk of vehicular strikes. While the tools mentioned above can be used to assess habitat within and adjacent to the existing roadway network, the NJDEP Division of Fish and Wildlife has developed the Connecting Habitat Across New Jersey (CHANJ) tool to identify and rank roadway segments that are barriers to wildlife movement and have the potential for increased wildlife-vehicular crashes. CHANJ uses a web viewer platform to display core habitat areas and the corridors that connect them.[25] If a project is within a mapped core or corridor and is identified as a barrier to wildlife movement, potential mitigation should be planned to include wildlife passage over or under roadway infrastructure. Additionally, NJDEP has laid out guidelines on how to mitigate the development of a wildlife crossing associated with a specific development during the planning and design phases.[26] An example of the CHANJ mapping tool is illustrated in Figure 21.

Given the existence of these statewide tools, it is imperative that municipalities and counties leverage them early in the process of approving freight or industrial developments to ensure impacts to known key habitats are minimized and/or mitigated.

25 https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=53339ff12f27488d8462e5e2c4c21b5c
26 https://www.nj.gov/dep/fgw/ensp/chanj_guidance.pdf

Figure 21. CHANJ Output – Hamilton, NJ



Source: Connecting Habitat Across New Jersey, NJDEP: https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=53339ff12f27488d8462e5e2c4c21b5c

5.7 FREIGHT LAND USES

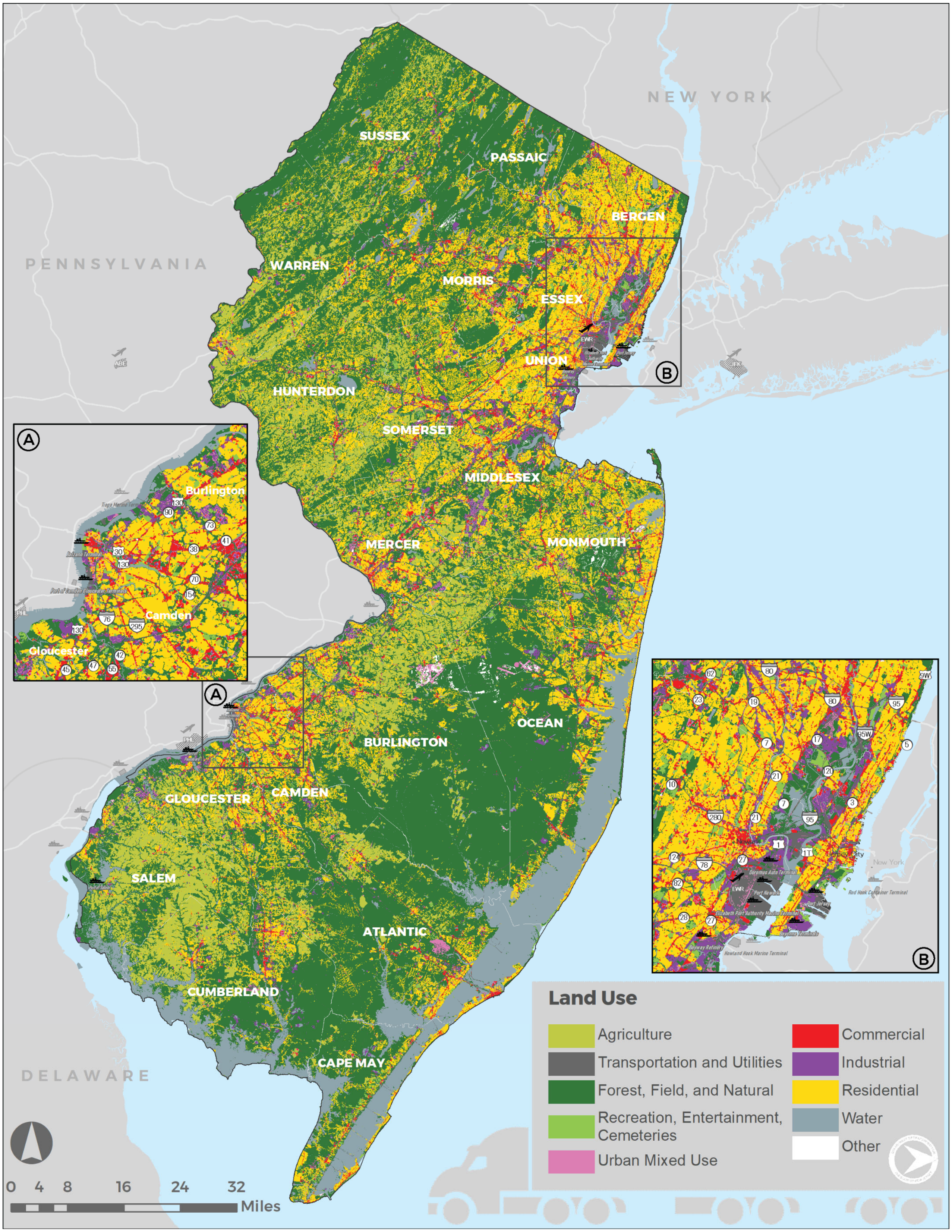
Most developed land uses have a relationship to freight transportation. The dozens of land use classification codes used in urban planning and environmental analysis can be consolidated into three broad categories in relation to how the land is used for the movement of freight, and/or for the production or receipt of freight shipments:

- **Freight-handling** - includes transportation land uses that facilitate the movement of freight on the transportation network
- **Freight-generating** - includes industrial and agricultural land uses that produce outbound shipments of freight; and
- **Freight-receiving** - includes residential, commercial, institutional, and other uses that are typically final destinations of freight shipments, although it is important to note that some commercial spaces also generate outbound shipments

Figure 22 shows all freight land use categories in the State of New Jersey. Figure 23 through Figure 25 show the distribution of freight-handling land uses, freight-generating land uses, and freight-receiving land uses across New Jersey, respectively.

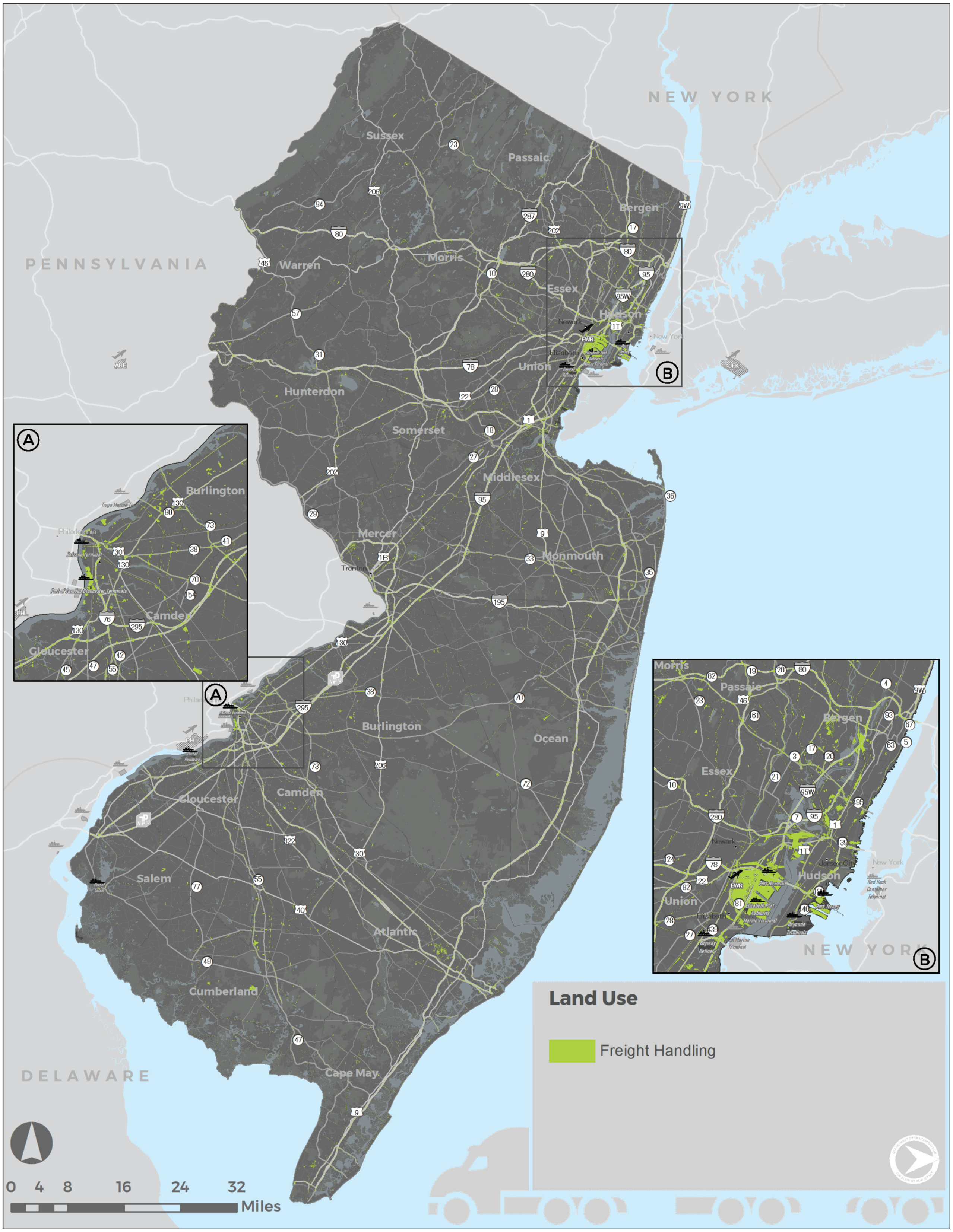
While these three “freight land use” categories capture general characteristics, it is important to note that there are exceptions and nuances that may depart from the functions defined above. For example, commercial retail uses are categorized as freight-receiving because retail stores receive inbound shipments of products that are sold to consumers in the store. However, some retail establishments are shipping customer orders from the store, resulting in outbound parcel packages that are then delivered to customers’ homes. This is a freight-generating activity; however, it accounts for a small share of overall retail sales at present. That share could increase if more retailers adopt this model of e-commerce order fulfillment in the future.

Figure 22. New Jersey Land Use Overview



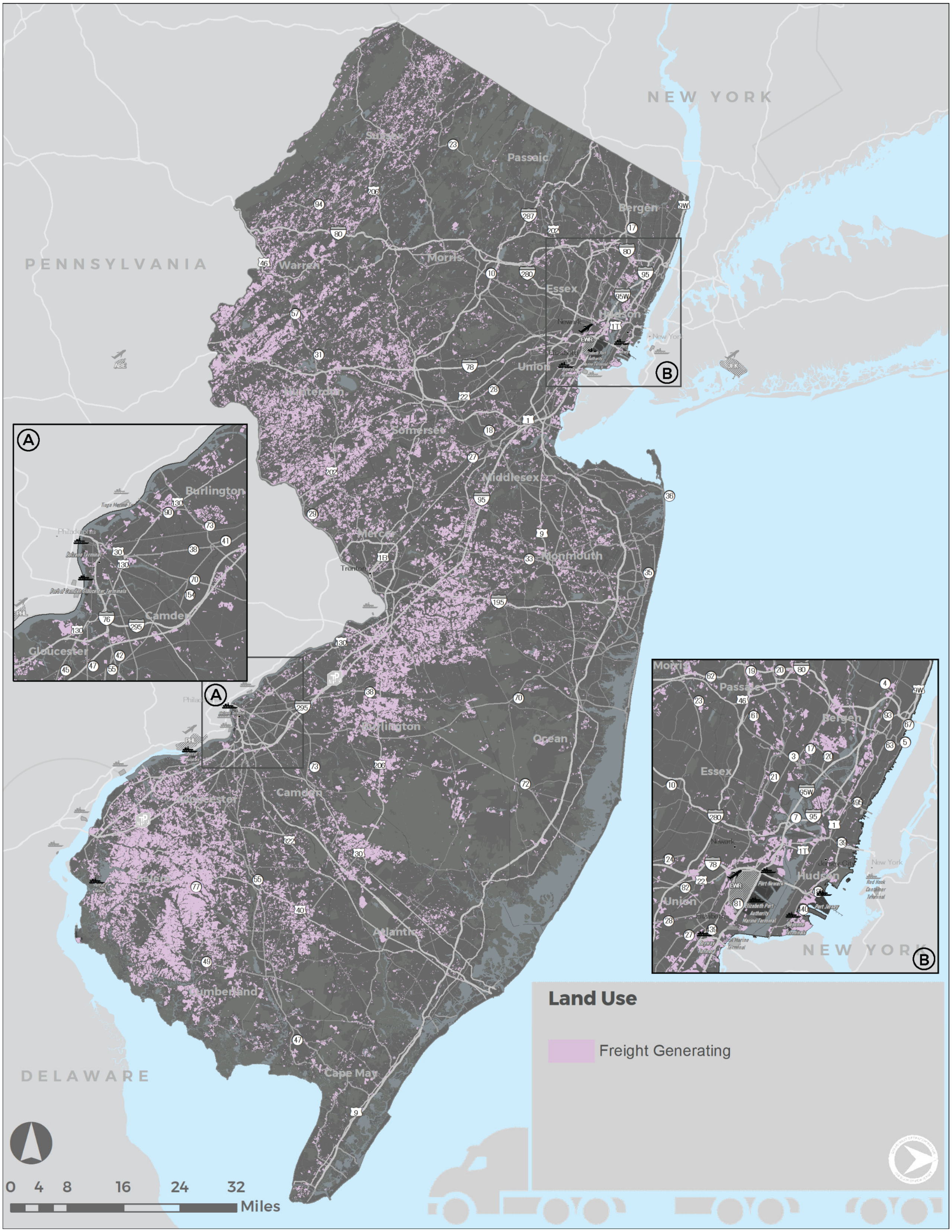
Source: 2015 NJDEP, 2019 NJDOT, WSP, Cambridge Systematics

Figure 23. Freight-Handling Land Use in New Jersey



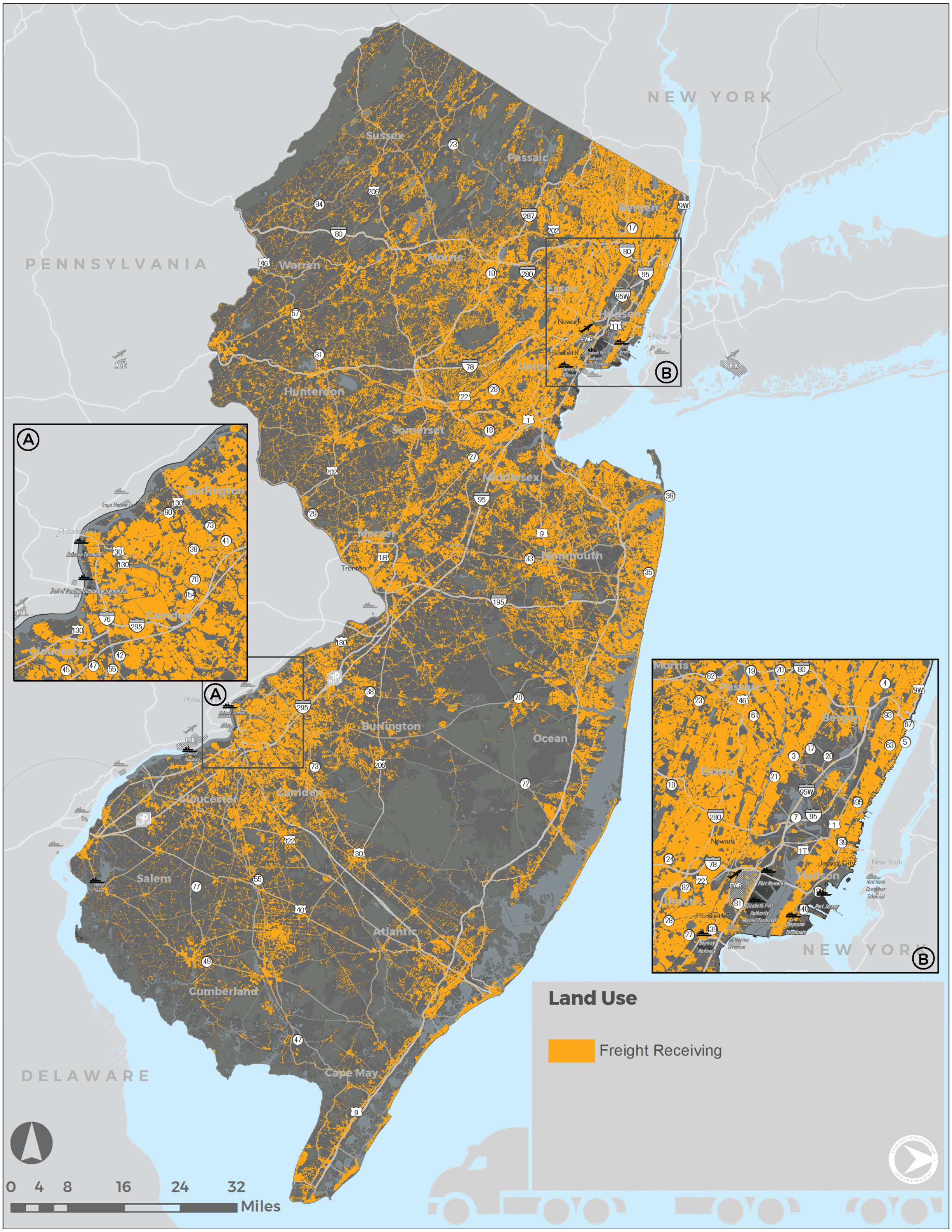
Source: 2015 NJDEP, 2019 NJDOT, WSP, Cambridge Systematics

Figure 24. Freight-Generating Land Use in New Jersey



Source: 2015 NJDEP, 2019 NJDOT, WSP, Cambridge Systematics

Figure 25. Freight-Receiving Land Use in New Jersey



Source: 2015 NJDEP, 2019 NJDOT, WSP, Cambridge Systematics

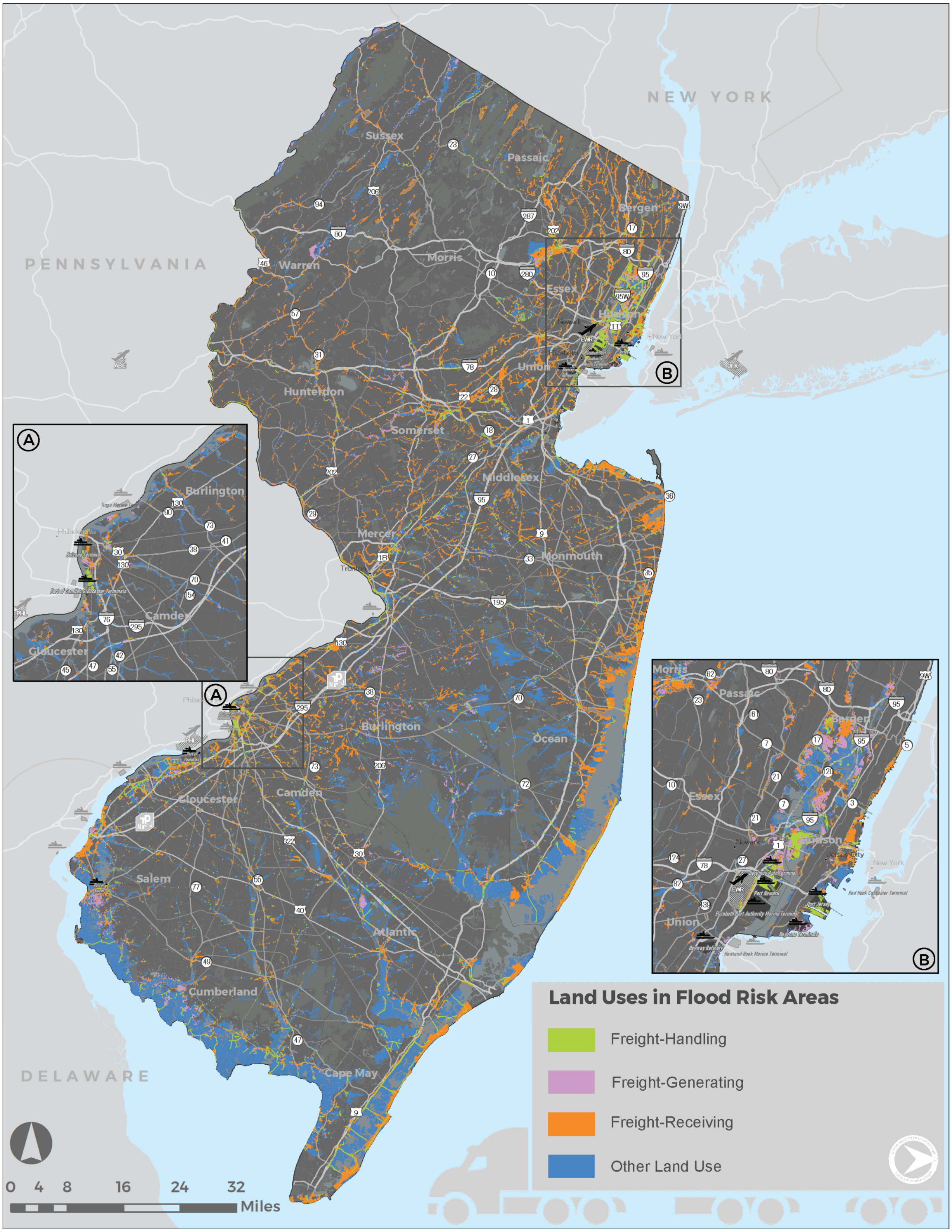
5.8 RESILIENCE FOR FREIGHT LAND USES

Flooding due to heavy rains and inundation due to sea level rise present risks to the lands that New Jersey's freight-generating, freight-handling, and freight-receiving facilities sit upon. According to the Federal Emergency Management Agency (FEMA), nearly 967 square miles (13%) of New Jersey's total land area is in a high-risk flood zone, which has a one percent risk of annual flooding (often referred to as the "100-year flood plain"). Approximately 69 square miles of New Jersey's freight-generating land use (six percent of the state's total freight-generating land use area), 16 square miles of freight-handling land use area (13% of the state's total freight-generating land use area), and 99 square miles of freight-receiving land use area (five percent of the state's total freight-receiving land use area) are in the high-risk flood zones. The distribution of these high-risk flood areas by freight land use type are shown in Figure 26. Most of the land shown in the "other land uses in high-risk flood areas" is undeveloped.

Rising seas also pose risks to some of New Jersey's freight assets and land uses. A six-foot rise in sea levels, which is an upper-limit scenario considered by some expert organizations by the end of this century would inundate about 51 square miles or 0.7% of the state's total land area.[27] This includes three square miles, or 0.3% of the state's total freight-generating land use area, a little more than one square mile, or 1.2% of the state's total freight-handling land use area, and six square miles or 0.3% of the state's total freight-receiving land use area. These areas would be covered by seawater, and the effects of storm surge and tidal flooding would extend beyond these areas.

27 https://earthobservatory.nasa.gov/images/148494/anticipating-future-sea-levels

Figure 26. Freight Land Uses and Flood Zones



Source: Cambridge Systematics analysis of 2015 NJDEP and 2019 NJDOT data, WSP

5.9 EQUITY AND FREIGHT

5.9.1 Why Consider Equity in a Freight Plan?

New Jersey is particularly impacted by the intersection of freight and equity. New Jersey is consistently ranked as one of the wealthiest states in the United States by multiple indicators. This wealth is largely derived from immediate proximity to major urban centers (New York and Philadelphia), as well as numerous companies and corporations positioned across the state. However, poverty remains a pressing issue, especially across New Jersey's urban centers, which are also home to large proportions of the state's minority, and especially Black and Hispanic, populations. In fact, in New Jersey, the poverty rate of Blacks and Hispanics is nearly three times higher than that of the state's White population. When measured by median family net worth in New Jersey, Blacks and Hispanics are nearly 50 times poorer than Whites.[28]

In relation to freight, New Jersey's position within the center of the Northeast Corridor has spurred growth in many freight-producing industries, especially within urban areas along the I-95 corridor. This economic growth along with proximity to major ports of entry, produces job opportunities for all skill levels, but many of the negative externalities associated with freight disproportionately affect these urban communities, characterized by large minority populations. These externalities include increased truck and freight traffic, increased vehicular emissions, discharges from industrial facilities and freight terminals, and increased impervious surface coverage.

Examples of this are prevalent in communities such as Newark and Elizabeth, home to Newark Liberty International Airport, Port Newark and Elizabeth Marine Terminal, and local economies reliant upon manufacturing and distribution. Despite these assets, numerous issues create challenges for residents. In 2020, after concerns about a large purple plume of smoke coming from its smokestacks, an industrial waste management firm agreed to stop accepting iodine waste to its waste-to-energy facility in Newark.[29] In the same neighborhood, residents are currently protesting plans to construct a backup power plant for an adjacent sewage facility. As of 2017, Newark residents held only 18% of the city's jobs.

5.9.2 Guidelines for Identifying Vulnerable Communities

The Federal government provides two resources to legislate and guide equity efforts. Title VI of the Civil Rights Act of 1964 requires NJDOT, as a federal-aid recipient, and its sub-recipients and contractors to prevent intentional or unintentional discrimination in all programs and activities. Further, the Environmental Justice (EJ) Executive Order 12898 requires that all federal agencies and state agencies that receive federal funding identify and address the effects of its programs and policies on minority and low-income populations.

Following the passage of the IIJA in 2021, USDOT has addressed equity in recent Notice of Funding Opportunities (NOFOs) by giving priority consideration to applications that advance or address barriers to racial equity. Multiple resources are available to assist policymakers in identifying communities vulnerable to the negative externalities of environmental decision making, including several focusing on freight planning. These include tools, guidelines, and thresholds established at the federal and state levels, as described below.

Minorities, particularly Black and Hispanic populations, and economically disadvantaged communities are often disproportionately affected by the negative externalities of freight, reinforcing the need for increased environmental justice in freight planning and decision making. The FHWA defines Environmental Justice as "identifying and addressing disproportionately high and adverse effects of the agency's programs, policies, and activities on minority populations and low-income populations to achieve an equitable distribution of benefits and burdens.[30]

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28 https://www-doh.state.nj.us/doh-shad/indicator/view/Demographics.Poverty.html

29 https://www.njspotlightnews.org/2020/04/covanta-says-it-has-stopped-accepting-waste-that-caused-a-purple-plume-over-newark/

30 https://www.environment.fhwa.dot.gov/env_topics/environmental_justice.aspx

FEDERAL TOOLS & GUIDANCE

The United States Environmental Protection Agency developed a screening and mapping tool known as EJScreen to serve as an update to EJView, taking into consideration new recommendations from the National Environmental Justice Advisory Council. The updated tool allows users to overlay key socioeconomic indicators with key EJ climate change vulnerability factors and pollution sources. Key parameters considered in EJScreen are shown in Table 21. Through this tool, users can overlay demographics with environmental parameters, measured and normalized by percentile.

Table 21. EJScreen Parameters

Parameter		Description
Demographic	People of Color	The percent of individuals in a block group who list their racial status as a race other than White alone and/or list their ethnicity as Hispanic or Latino
	Low-Income	The percent of a block group's population in households where the household income is less than or equal to twice the federal poverty level.
	Unemployment Rate	Those who did not have a job at all during the reporting period, made at least one specific active effort to find a job during the prior 4 weeks, and were available for work (unless temporarily ill).
	Linguistic Isolation (Limited English Proficiency)	Percent of people in a block group living in linguistically isolated households. A household in which all members aged 14 years and over speak a non-English language and also speak English less than "very well" (have difficulty with English) is linguistically isolated.
	Less than High School Education	Percent of people aged 25 or older in a block group whose education is short of a high school diploma.
	Population Under Age 5	Percent of people in a block group under the age of 5.
	Population Over Age 64	Percent of people in a block group over the age of 64.
Environmental	Particulate Matter- 2.5	PM2.5 levels in air, µg/m^3 annual average.
	Ozone	Ozone summer seasonal average of daily maximum 8-hour concentration in air in parts per billion.
	Diesel Particulate Matter	Diesel particulate matter level in air, µg/m^3.
	Toxic Air Cancer Risk	Lifetime cancer risk from inhalation of air toxins.
	Toxic Respiratory Cancer Risk	Ratio of exposure concentration to health-based reference concentration.
	Traffic Proximity and Volume	Count of vehicles (AADT, average annual daily traffic) on major roads within 500 meters (0.31 miles), divided by distance in meters.
	Lead Paint	Percent of housing units built pre-1960, as indicator of potential lead paint exposure.
	Superfund Proximity	Count of proposed or listed NPL - also known as Superfund - sites within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers. (5 km=3.1 mi)
	Risk Management Plan (RMP) Facility Proximity	Count of RMP (potential chemical accident management plan) facilities within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers.
	Hazardous Waste Proximity	Count of hazardous waste facilities (TSDFs and LQGs) within 5 km (or nearest beyond 5 km), each divided by distance in kilometers.
	Underground Storage Tanks (UST) and Leaking UST (LUST)	Count of LUSTs (multiplied by a factor of 7.7) and the number of USTs within a 1,500-foot buffered block group.
	Wastewater Discharge	RSEI modeled toxic concentrations at stream segments within 500 meters, divided by distance in kilometers (km).

Separate from *EJScreen*, the United States Department of Transportation (USDOT) has established criteria for ‘Areas of Persistent Poverty’ and ‘Historically Disadvantaged Communities.’ These designations are considered in assessing Mega, RAISE, and INFRA discretionary grant applications. Evaluated at the county or census tract level, the following criteria have been established for these designations:

Area of Persistent Poverty:

- The County in which the project is located consistently had greater than or equal to 20% of the population living in poverty in all three of the following datasets: (a) the 1990 decennial census; (b) the 2000 decennial census; and (c) the 2020 Small Area Income Poverty Estimates; or
- The Census Tract in which the project is located has a poverty rate of at least 20% as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census; or
- The project is located in any territory or possession of the United States

Historically Disadvantaged Community:[31]

- The project is located in certain qualifying census tracts as designated through the federal government's Justice40 Initiative; or
- The project is located on Tribal land; or
- The project is located in any territory or possession of the United States

For projects being considered for USDOT discretionary funding, the ability to demonstrate key benefits to designated Areas of Persistent Poverty and/or Historically Disadvantaged Communities results in increased points during the evaluation and selection process.

STATE TOOLS & GUIDANCE

In recent years, New Jersey has taken multiple steps to address EJ needs, in part by providing additional tools and establishing additional guidelines to assist policymakers. On September 18, 2020, Governor Phil Murphy signed the New Jersey Environmental Justice Law. The first of its kind in the United States, this law requires New Jersey's Department of Environmental Protection (DEP) to evaluate the environmental and public health impacts of certain facilities on *overburdened communities* when reviewing certain permit applications. According to the New Jersey DEP, overburdened communities are defined as any census block group in which:

- At least 35% of the households qualify as low-income households (at or below twice the poverty threshold as determined by the United States Census Bureau); or
- At least 40% of the residents identify as minority or as members of a State recognized tribal community; or
- At least 40% of the households have limited English proficiency (LEP), defined as households without an adult that speaks English "very well" according to the United States Census Bureau.

Correspondingly, New Jersey's new law requires the NJDEP to evaluate the public health impacts of the following facilities when considering permit applications:

- Major sources of air pollution (i.e., gas fired power plants and cogeneration facilities)
- Resource recovery facilities or incinerators; sludge processing facilities
- Sewage treatment plants with a capacity of more than 50 million gallons per day
- Transfer stations or solid waste facilities
- Recycling facilities that receive at least 100 tons of recyclable material per day
- Scrap metal facilities
- Landfills
- Medical waste incinerators, except those attendant to hospitals and universities

31 A map of Historically Disadvantaged Communities, currently in the beta testing phase of deployment can be found at https://screeningtool.geoplatform.gov/en/methodology#3/33.47/-97.5. Additional information on the Justice40 Initiative can be found at https://www.transportation.gov/equity-Justice40.

The law does not apply to roadway projects nor mobile sources of air pollution. However, mobile sources associated with the operations of the eight facility types may be included as stressors in the EJ impact statement for those facilities under the NJ Environmental Justice Law. Within this context, consideration of equity is increasingly commonplace in transportation planning as well. NJDOT's Strategic Highway Safety Plan was the first plan to be commissioned following the law's passage. As per the Strategic Highway Safety Plan:

> *Equity in transportation seeks fairness in mobility and accessibility needs of all community members. It includes evaluating circumstances that impact a community's mobility, connectivity, and safety in determining the measures needed to develop an equitable network. Further, it recognizes the importance to provide residents in traditionally underserved communities access to opportunities (p.8).*

Also, since the law passed, the NJDOT has placed an additional focus on equity as part of its Local Aid and Economic Development Program, primarily through the inclusion of this equity-focused scoring criteria.[32]

In recent years, following key initiatives and federal and state guidance, EJ initiatives are increasingly recognized as a crucial component in the development, implementation, and enforcement of environmental laws, regulations, and policies. Given the magnitude of positive and negative externalities associated with freight, and the associated balance between environmental and economic needs, EJ considerations are necessary, especially at the state level. State and federal guidance, outlined in the following sections, can inform freight analyses and future project prioritization.

5.9.3 Overlay Analysis: Equity Areas and Freight Network, Assets, and Generators

Utilizing the guidance and thresholds established by New Jersey's Environmental Justice Law, this analysis identifies statewide low income, LEP, and minority census block groups. The location and distribution of these various census block groups are then compared against the locations of freight assets and generators. These freight assets and generators include New Jersey's major roadways, railroads, ports, airports, truck parking locations, and land used for industrial purposes. There are numerous benefits to these assets and freight generators, including the facilitation of economic activity, and the direct provision of jobs. However, there are multiple concerns and potential negative externalities associated with each. Some of these concerns are shown in Table 22. Given the proximity of New Jersey to major urban centers such as New York and Philadelphia, as well as a growing population statewide, construction and development of these freight assets and generators is both beneficial and a necessity. However, there is a need to ensure that vulnerable populations are not disproportionately overburdened with the negative impacts.

Table 22. Key Concerns of Local Freight Assets and Generators

Asset	Key Concerns
Major Roadways	Noise; Impacts of vehicular emissions in adjacent neighborhoods.
Railroads	Noise; Transport of potentially hazardous materials through residential neighborhoods.
Ports	Increased truck traffic and corresponding vehicular emissions in adjacent neighborhoods.
Airports	Noise; Increased vehicular traffic, and corresponding emissions in adjacent neighborhoods.
Truck Parking	Vehicular emissions from idling trucks in adjacent neighborhoods.
Industrial Land	Environmental concerns including discharges of hazardous materials, increased impervious surface coverage, and generating of increased truck traffic.

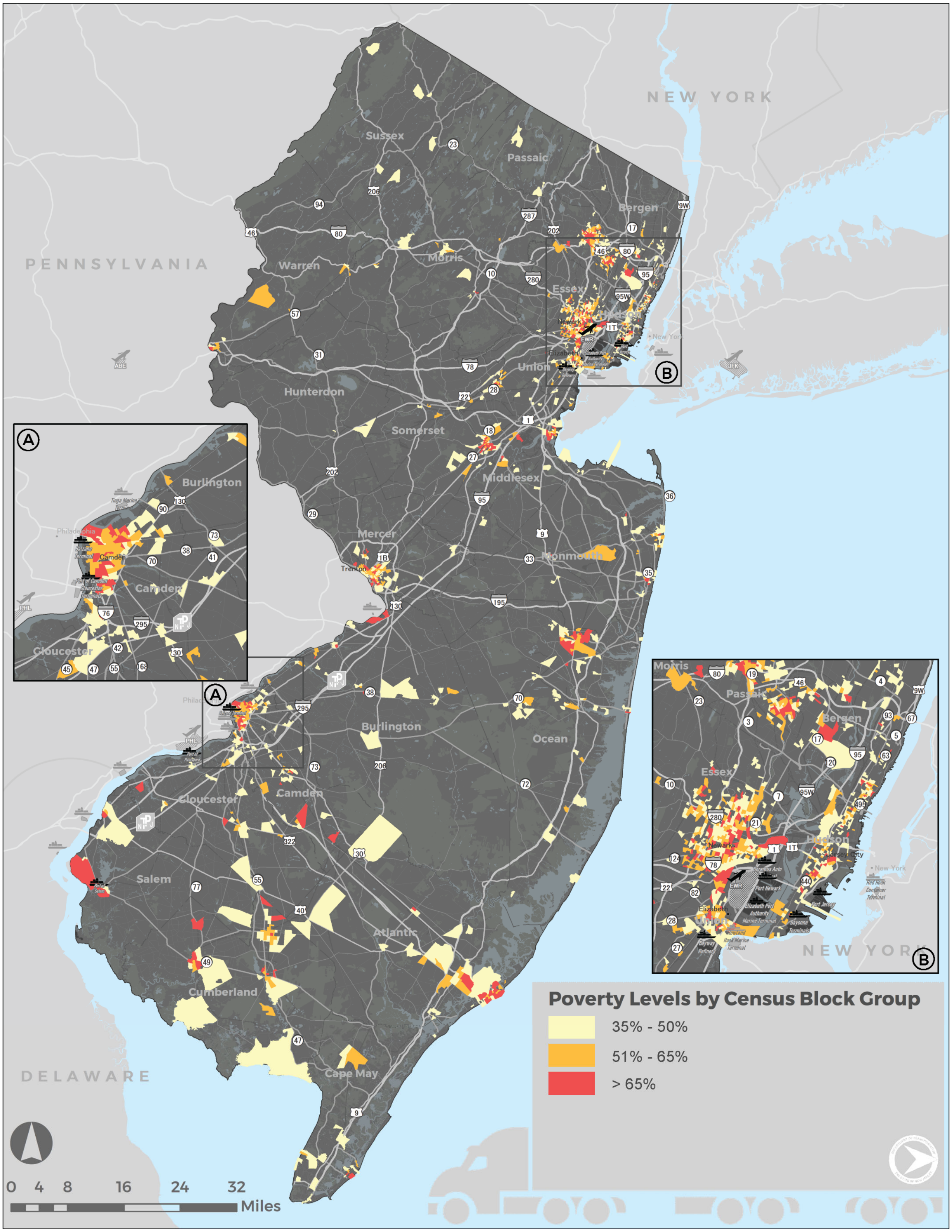
In addition to freight assets and generators, the overlay analysis includes transit, in the form of statewide bus and rail lines. Transit availability is a particularly critical need for impoverished communities, providing access to education, employment, services, and other opportunities. Access to the job opportunities supported by freight is key to ensuring disadvantaged communities share in the economic benefits of freight.

32 NJDOT Local Aid Resource Center. https://njdotlocalaidrc.com/equity

LOW INCOME POPULATIONS

Designated low-income levels based on New Jersey's Environmental Justice Law thresholds are shown in Figure 27. In northern New Jersey, the largest concentrations of low-income populations can be found in and around the urban centers of Newark, Elizabeth, and Paterson, as well as some points south along the I-95 corridor, including Perth Amboy, New Brunswick, and Trenton. Further south, the largest concentrations of low-income populations can be found in the urban centers of Camden and Atlantic City. Across these locations, there are multiple clusters of census block groups with poverty rates above 50%. Additionally, several rural areas within southern New Jersey have notable concentrations of low-income populations, including Pennsville, Salem, and additional portions of Cumberland and Atlantic counties. In comparison to urban block groups, although rural poverty and low-income block groups are less clustered and concentrated, this dispersion across wider and more isolated geographies creates unique challenges especially in relation to accessibility and economic opportunity.

Figure 27. EJ Low-Income Levels by Census Block Group



Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics

MINORITY POPULATIONS

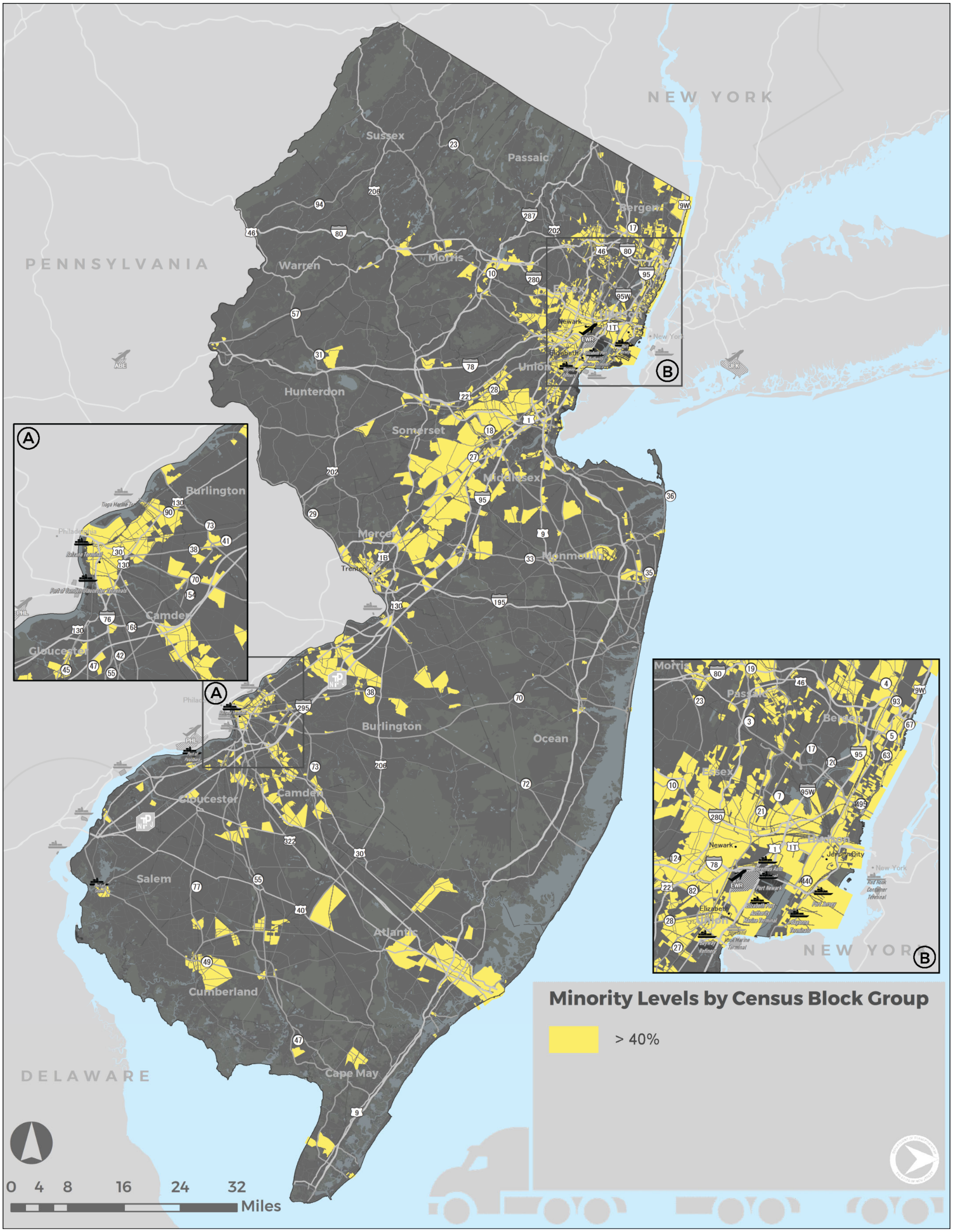
When considering the distribution of New Jersey's minority population (Figure 28), a few trends are evident. Overall, most of New Jersey's minority population can be found throughout the I-95/New Jersey Turnpike corridor, where most of the state's urbanized communities are located. Additional concentrations of minorities can be found in and around Atlantic City and Vineland in southern New Jersey. In relation to low-income metrics shown in Figure 27, the majority of concentrations in census block groups can be found in areas with large proportions of minorities. This is especially true in and around urban centers with large Black populations such as Newark, Elizabeth, and Camden. To a slightly lesser extent, this is also the case for heavily Hispanic communities such as Union City and Dover in northern New Jersey. Conversely, several other census block groups with high proportions of minorities have higher incomes. These census block groups, typically characterized by residents of Asian and South Asian backgrounds can be found in central New Jersey in and around Princeton, as well as throughout Bergen County in northern New Jersey.

These conditions are not unique to New Jersey. Nationally, minority populations are more likely to be located near highways or other transportation infrastructure that can reduce air quality. The USDOT provides the following strategies to address these challenges:[33]

- Improving pedestrian or bicycle infrastructure or increasing public transportation service in low-income or minority communities to improve safety and connectivity
- Using roadside barriers or vegetation to reduce the impacts of pollution on communities located near high-volume roads

[33] USDOT. Health and Equity. https://www.transportation.gov/mission/health/health-equity

Figure 28. EJ Minority Population by Census Block Group



Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics

LIMITED ENGLISH PROFICIENCY POPULATIONS

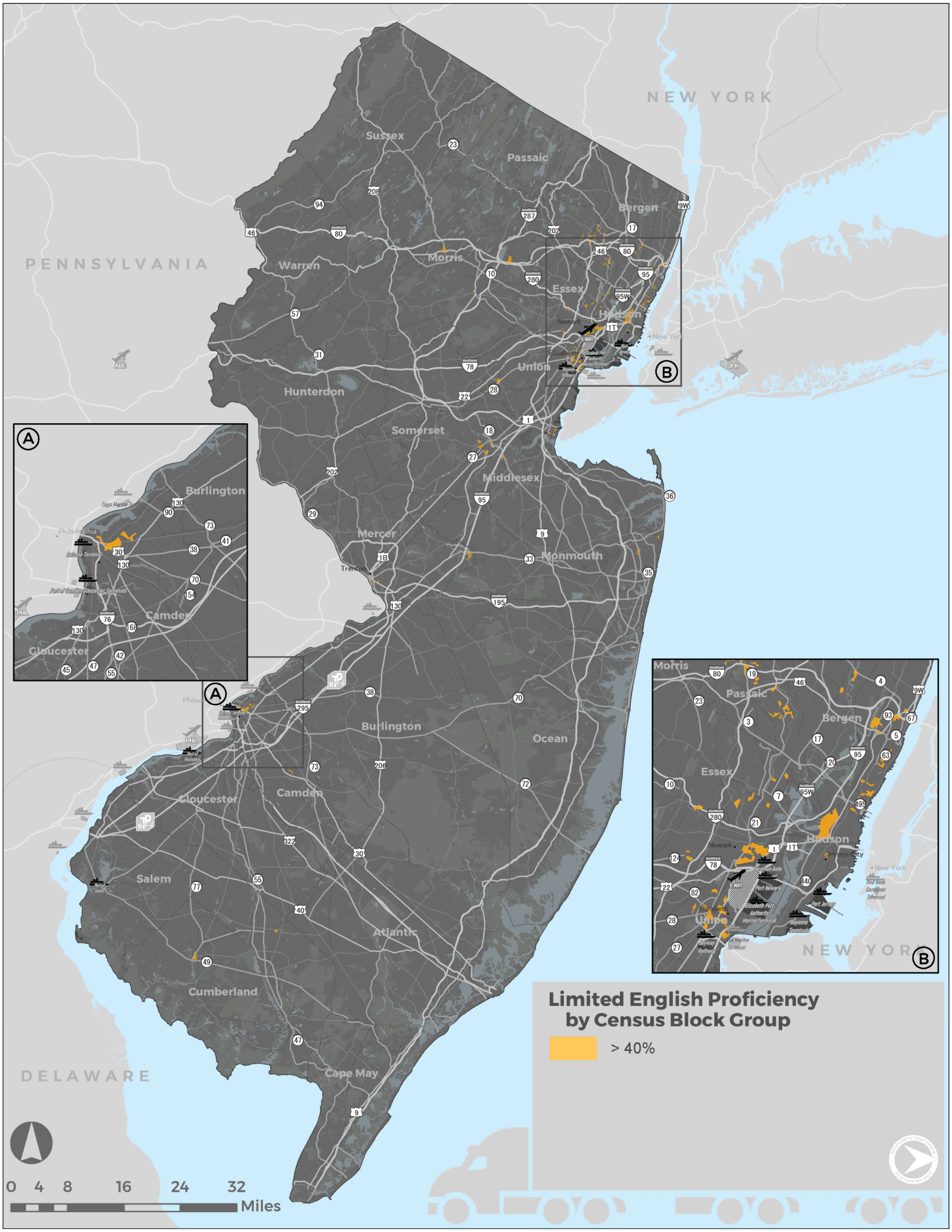
Overall, a comparatively small amount of census block groups exhibit a limited English proficiency (LEP) population greater than 40%. As Figure 29 shows, by geographic area these census block groups comprise a very small area. However, the locations of these populations often overlap with the State's gateways and ports. Located primarily in the urban areas of Newark, Elizabeth, Paterson, and Camden, these block groups are primarily comprised of Spanish-speaking individuals in heavily Hispanic neighborhoods. Freight clusters, particularly near intermodal facilities operate within or near these communities.

Outreach and public engagement efforts regarding transportation infrastructure projects that will affect these populations must consider language in communications. USDOT offers (and NJDOT has incorporated) the following considerations:

- Identify LEP populations
- Develop language assistance measures
- Ensure staff is trained
- Monitor and evaluate efforts

The most recent update to published LEP guidance in the state is from 2014. Given the State's new law on Environmental Justice focusing on LEP populations, guidance can be further developed to evolve from past and current efforts, evaluating best practices, and measuring success with input from LEP populations.

Figure 29. EJ LEP Population by Census Block Group

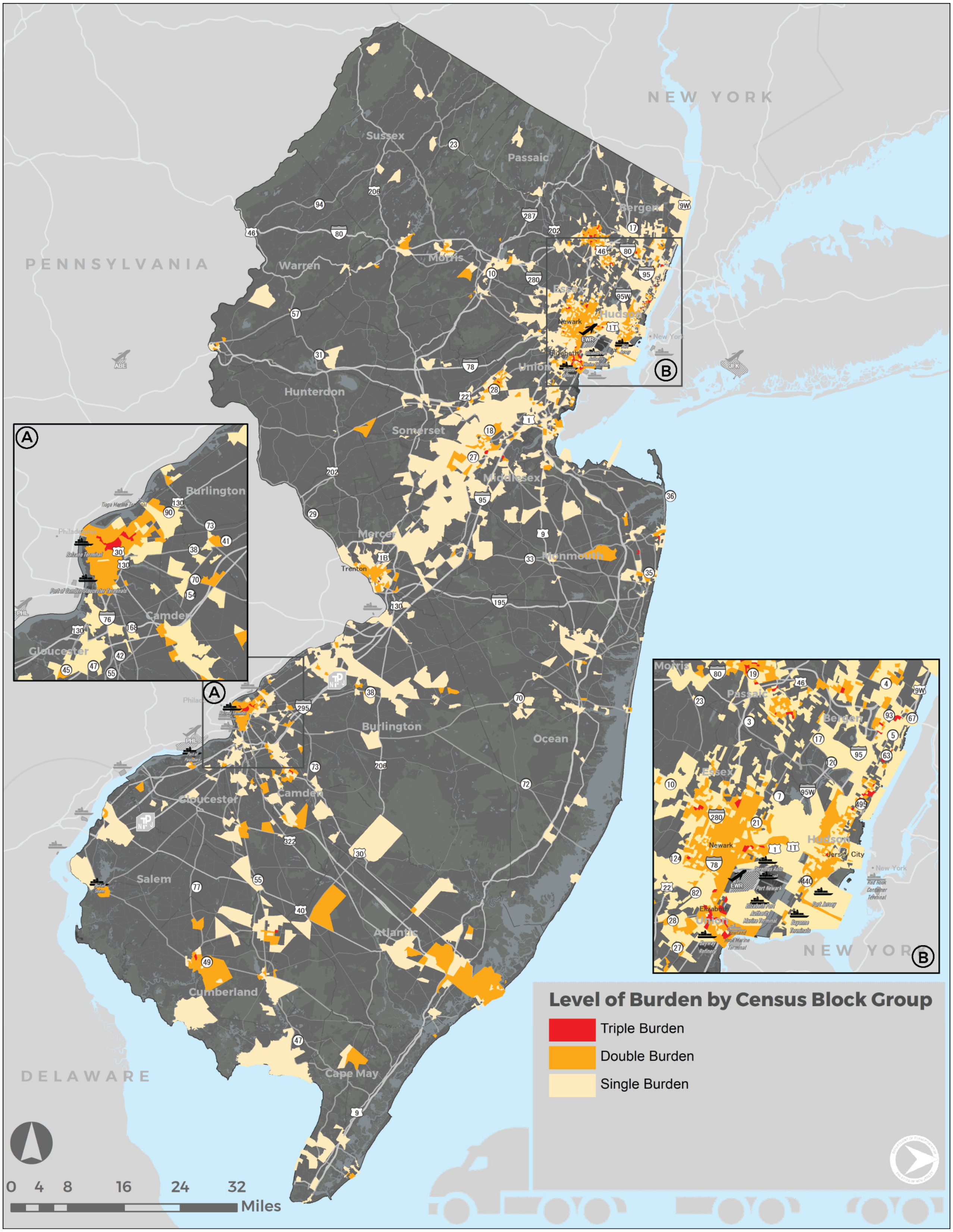


Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics

LEVEL OF BURDEN

Figure 30 depicts the overlay of all three overburdened communities across low-income, minority, and LEP populations statewide. The map shows concentrations of triple-burdened census block groups in high-density areas in and around Newark, Elizabeth, Camden, Trenton, and Atlantic City. There are also double-burdened areas centered and around Vineland, Atlantic City, and Bridgeton. Given guidance advanced by New Jersey's Environmental Justice Law, strategies to invest in mitigation efforts or to realize the benefits of freight should be focused in those double- and triple-burdened communities.

Figure 30 New Jersey Environmental Justice Overburdened Communities by Level of Burden



Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics

FREIGHT ASSETS AND GENERATORS

The extent of New Jersey's key freight assets and generators and their proximity to equity focus communities, is shown in Figure 31.[34]

In addition to freight assets and generators, this overlay analysis includes transit, in the form of statewide bus and rail lines. For low-income communities, transit availability is important for employment accessibility, particularly for jobs associated with freight.

On the basis of geographic coverage, there is a strong degree of transit availability across the state's disadvantaged communities. This includes a dense network of local bus transit routes operated or contracted by NJ TRANSIT, as well as additional routes into and out of New York or Philadelphia. Local bus transit routes appear to effectively serve key urban centers including Newark, Trenton, Camden, and Atlantic City, with regular scheduled service around these communities and to surrounding areas. Each of these locations contain at least one major transfer point or terminal to access other routes.

Additionally, passenger rail service operates along several corridors. Although coverage is dependent on proximity to stops, disadvantaged communities appear to be well-served. This includes frequent service along NJ TRANSIT's Northeast Corridor to Newark, Elizabeth, Rahway, New Brunswick, and Trenton, as well as along the Main Line to Paterson. Secaucus Junction provides a major transfer point for several rail lines in North Jersey. Beyond New Jersey's urban centers, transit availability is less consistently available. This is especially the case in the northwest portion of the state, as well as many portions of southern New Jersey outside of Camden and Atlantic City.

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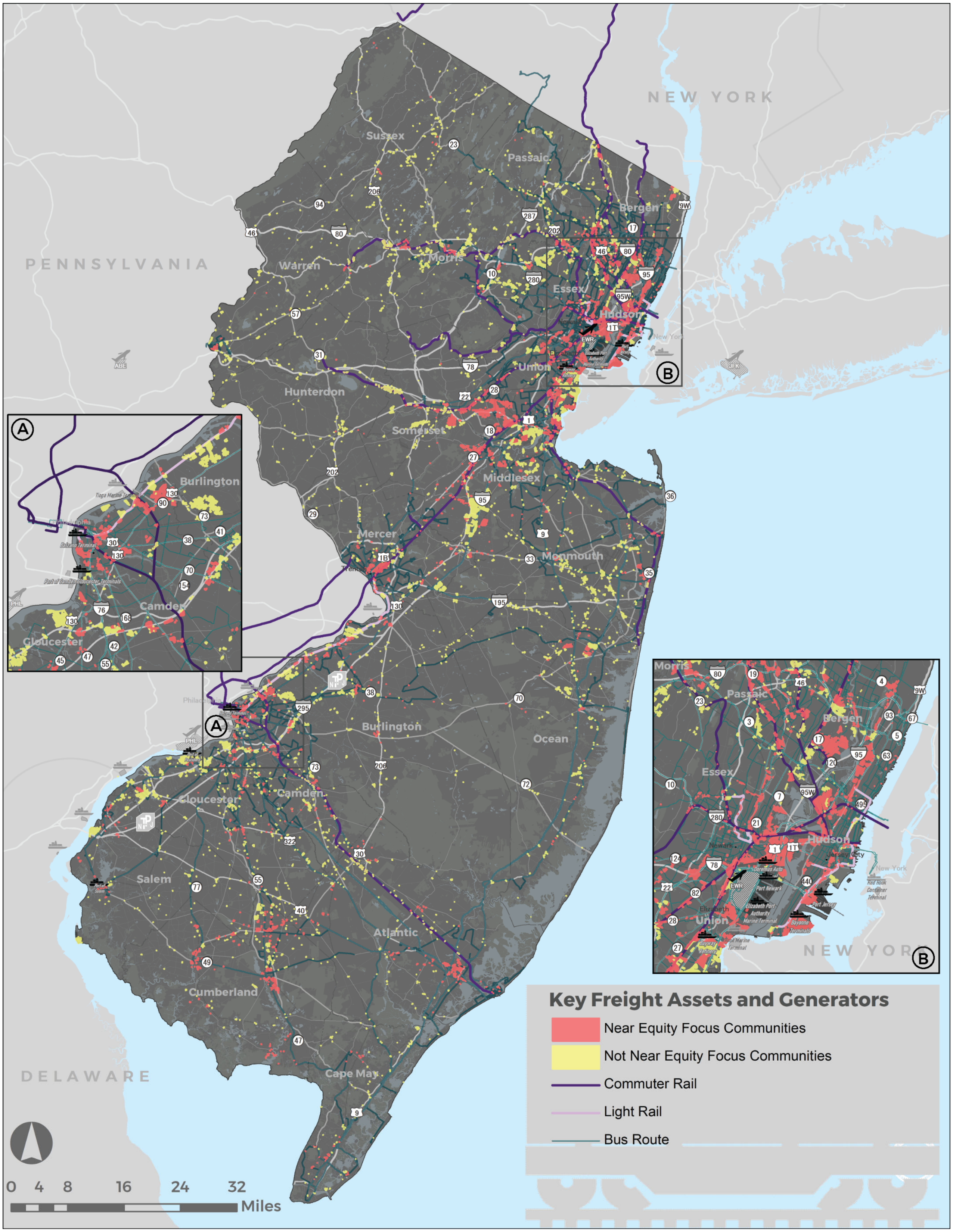
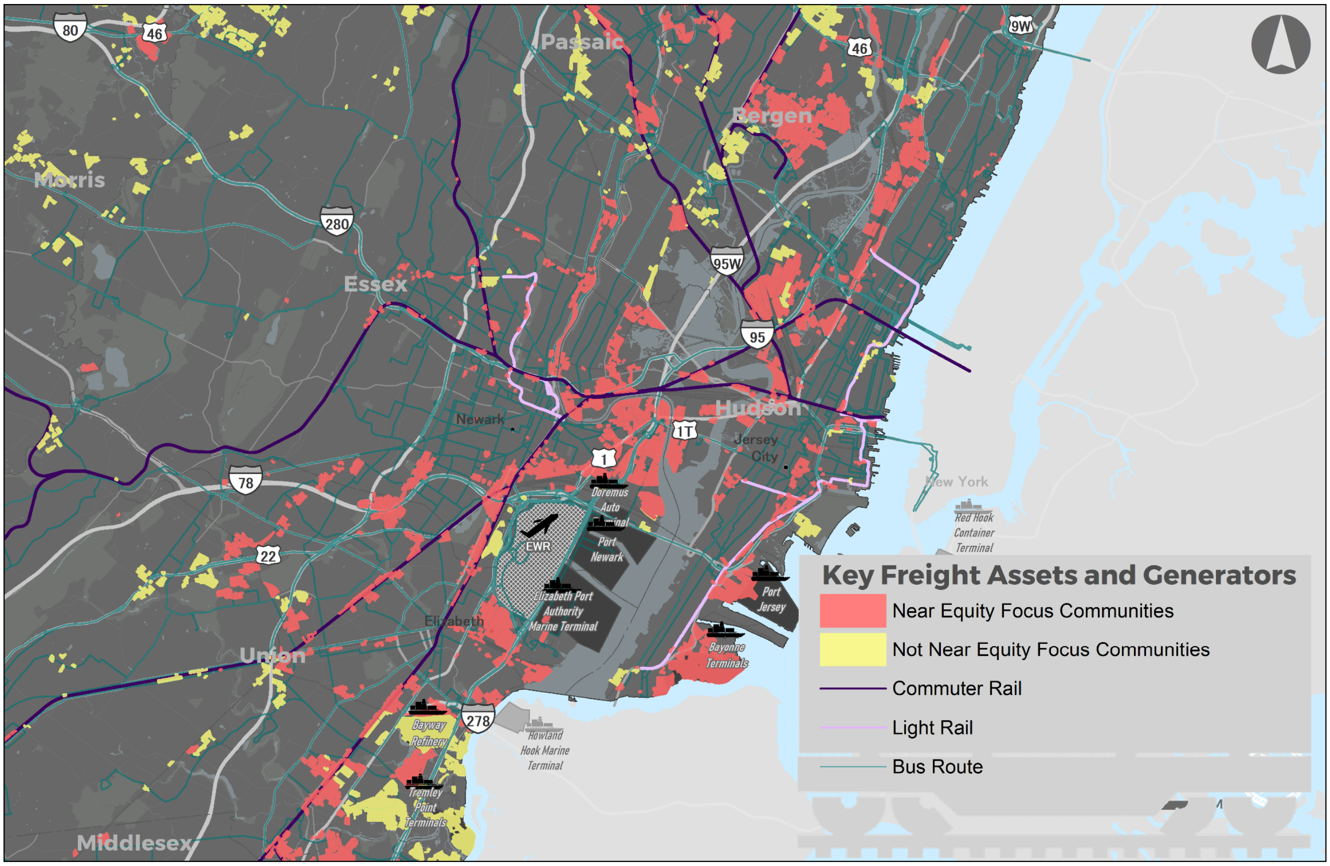
[34] Defined as areas with historically marginalized communities or communities facing disparities, including minority or low-income populations.

Figure 31. New Jersey Key Freight Assets and Generators



Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics



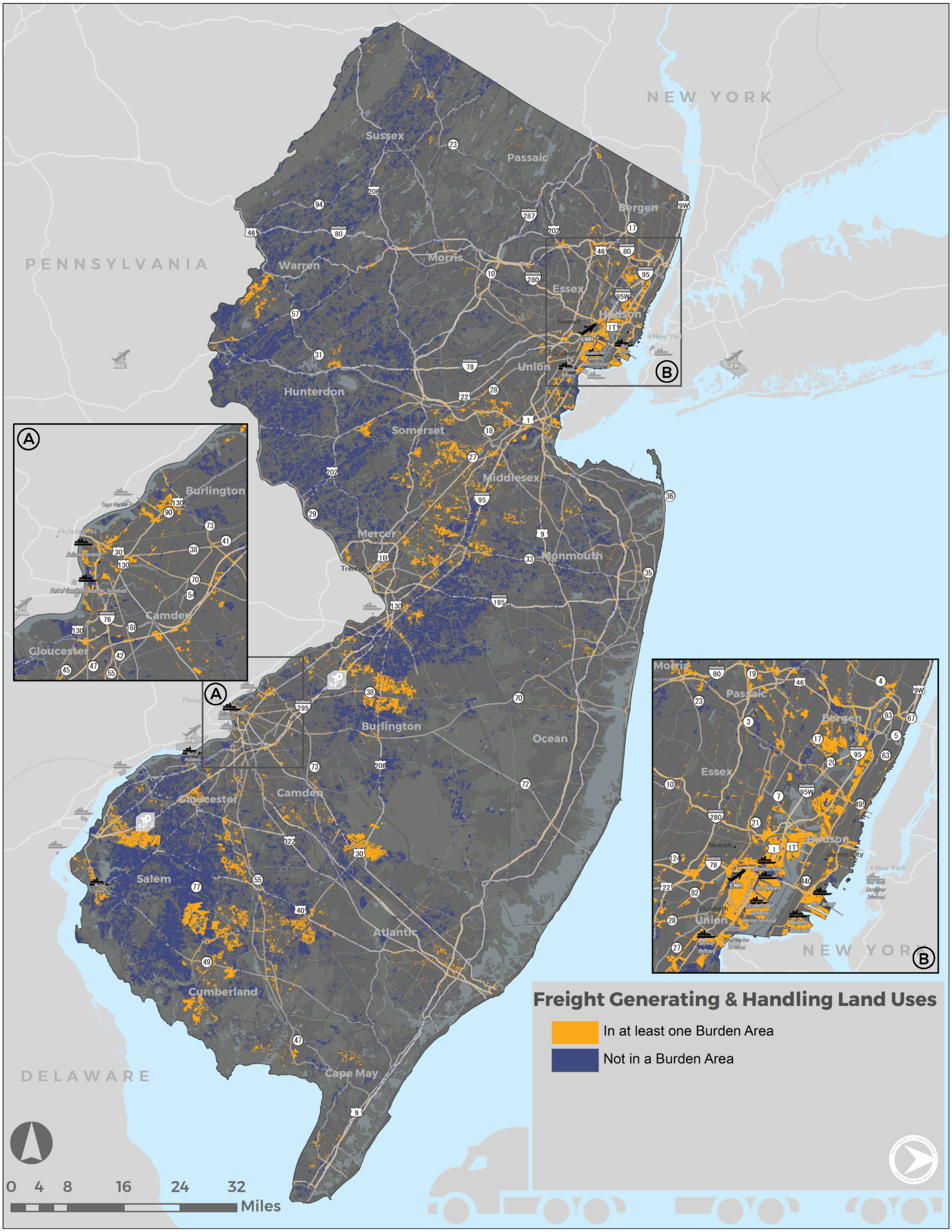
Source: U.S. Census Bureau American Community Survey 2020 5-Year Estimates, WSP, Cambridge Systematics

While New Jersey has freight generators located throughout the state, a significant number of its freight assets are located in close proximity to the I-95 spine. At a more localized scale, this clustering of freight assets is expected given these portions of New Jersey are also the most populated. This also means that many of New Jersey's freight assets and generators are in state-designated overburdened communities. This is especially the case in relation to many of New Jersey's truck parking and industrial properties. Particularly striking is that the majority of the state's industrial lands are located in and around EJ-identified census block groups. Figure 32 shows industrial land use in overburdened community census block groups. Analysis found 61% of industrial land use overlaps with overburdened population areas.

The overlaying of EJ data with transit and freight assets or generators produces multiple inferences. First, a strikingly high proportion of the state's freight facilities and generators are located in disadvantaged communities, as identified by the state's EJ indicators. This indicates a potentially high exposure to the negative externalities of freight facilities and generators. When considering transit availability and accessibility however, these communities appeared to be well-served. To ensure that this transit access provides an effective and opportunistic link between disadvantaged communities and freight facilities that generate economic opportunities, additional analysis is warranted.

A review of transit and freight connections within many disadvantaged communities, especially around Newark, Elizabeth, and Perth Amboy indicates that despite immediate proximity of transit nodes, freight facilities can be difficult to access. For example, many freight facilities stretching from Kearny and Newark through Perth Amboy are separated from residential disadvantaged communities by large infrastructure links which are difficult to cross, especially for those traveling on foot or by bicycle. This includes the New Jersey Turnpike, U.S. 1/9, and the Northeast Corridor rail line. Additionally, these facilities are located primarily in locations designed to accommodate freight and truck traffic, as opposed to transit. Together, these factors can limit overall mobility, safety, and accessibility, especially for those individuals with limited access to personal vehicles.

Figure 32. Industrial Land Use in Overburdened Communities



Source: New Jersey Department of Environmental Protection Bureau of GIS, WSP, Cambridge Systematics

The concerns of transit accessibility to freight generators are evident throughout New Jersey. Given the significant growth of e-commerce, demand for warehousing space has rapidly increased in recent years across New Jersey. This is particularly evident in the vicinity of numerous interchanges along the New Jersey Turnpike and I-295, particularly those south of I-195. This demand is also high along the Turnpike and U.S. 130 between New Brunswick and Trenton, where the growth of distribution centers and warehouses continues. Many of the higher concentrations of low-income communities are less affected by corresponding increases in truck traffic to these relatively high-income locations, but the suburban and exurban locations of these facilities make transit accessibility a challenge, especially for disadvantaged communities such as those in Trenton and New Brunswick.

61%

Industrial land use that overlaps overburdened community areas.

As the most urban industrialized portions of New Jersey become built out, there is a likelihood for increased freight growth along alternate corridors. Such freight growth is already occurring along I-78 and I-80 in Hunterdon and Warren counties, as well as I-195 in Monmouth and Ocean counties. Conversions of outdated office spaces are also occurring, particularly in areas such as Mahwah, Franklin Township (Somerset County), and Mount Olive. From the perspective of EJ and negative externalities, these locations are relatively far from disadvantaged communities. However, the challenges of accessibility and economic opportunity are further magnified given that many of these locations and corridors lack substantial transit coverage.

Based on the socioeconomic and geographic intersections of freight and vulnerable communities, there is a need for additional analysis of mobility and accessibility for the purposes of opportunity access.

OPPORTUNITIES TO MITIGATE COMMUNITY BURDENS

In setting the stage for investment decisions, data analysis on New Jersey's thresholds on equity areas demonstrate that:

- Nearly a third of the state's census block groups have populations where 40% of the population are ethnic and racial minorities;
- 22% of New Jersey's census block groups have low-income populations of 40% or more;
- A much smaller percentage (two percent) of census block groups are LEP-heavy households (at least 40%), though these are highly concentrated in urban areas;
- Nearly two-thirds (61%) of industrial land uses are located in these equity areas.

There are opportunities to mitigate the negative externalities of industrial land use and also improve access to its economic benefits.

METHODS OF ADDRESSING EJ DISPARITIES IN RELATION TO FREIGHT

The intersection of freight and equity is complex, especially in relation to vulnerable communities, but strategies are available to mitigate negative externalities and increase economic opportunity. The Environmental Protection Agency (EPA) has developed resources for addressing EJ issues in near-port communities.[35] The EPA advocates for proactive communication, collaborative solutions, and quantifiable benefits such as workforce programs. Additional strategies include transportation access, air quality improvement, and broadband expansion. Within New Jersey, the Workforce Development Implementation Team of the Council on Port Performance has been working on this collaboratively with numerous academic institutions, communities, and employers since 2017.

35 https://www.epa.gov/community-port-collaboration/environmental-justice-primer-ports-considering-near-port-communities

In relation to skill development, given the current tight labor market (as of Summer 2022), there is a growing need for skilled workers in freight-based positions. Given that economic opportunity and employment are some of the most significant positive externalities associated with freight, the provision of skills and workforce development in equity areas is a potentially effective method of addressing EJ disparities. In these scenarios, tailoring programs at colleges or other post-secondary education institutions can help improve economic opportunities for vulnerable communities, while addressing ongoing industry-wide labor shortages. While many community colleges offer manufacturing courses and programs, there are comparatively fewer programs offered to provide "middle skill" education and training to address transportation, logistics, and distribution skillsets.[36]

One example of a college program addressing this need is New Jersey City University (NJCU) in the disadvantaged neighborhood of Greenville in Jersey City. NJCU's Center for Workforce and Community Development aims to provide training for middle skill jobs, which according to the program's literature, compose 53% of New Jersey's jobs. The Transportation Logistics and Distribution (TLD) and Maritime Workforce Development programs are housed within the Center for Workforce and Community Development at NJCU. NJCU has partnered with 25 companies and labor unions, and the curricula are developed and modified frequently to keep pace with changing industry needs. Students receive "upskill" training in areas such as warehouse operations, supply chain management, inventory cycle counting, and AutoCAD. The program boasts a 70% placement rate of students in jobs with partnering employers.[37]

As the development patterns of freight uses and generators extend further away from established urban centers, there is a need for tailored transportation solutions, especially to and from vulnerable communities. For example, the Trenton area provides a potentially effective labor pool for many of the warehouses and distribution centers along the New Jersey Turnpike/I-95. Given that many of these facilities are located 10 to 20 miles away from Trenton, and existing connecting transit service is limited (see Figure 31), additional options beyond the existing fixed route service are needed. One potential option is the use of employer-launched vanpools operating between employers and employees. Such services could work particularly well as a method of serving dense communities such as Trenton. To further incentivize employers to manage these services, there are resources available, especially from county transportation management associations (TMAs). For example, the Greater Mercer TMA provides guidance and support to employers looking to develop such a program. This also includes certain subsidies provided by NJ TRANSIT, as well as guidance on tax benefits.[38]

Improving air quality is paramount for all residents of New Jersey, and for EJ communities especially. NJDOT commits its Congestion Management Air Quality (CMAQ) funding to locally sponsored projects aimed at reducing air pollution and congestion.

Additionally, mode shift from truck to rail or barge is a proven method of decreasing toxic emissions, as well as excess noise and traffic, in or adjacent to EJ communities. Expansion of New Jersey's marine highway system could offer emission reduction opportunities by consolidating truck movements bound for similar destinations, putting them on barges or vessels between the North Jersey Port Complex and the South Jersey Port Complex or other regional locations. Facilitation of marine system improvements for public and private partners can provide direct congestion mitigation and air quality improvements on the state highway system and in EJ communities. Marine Highway and Port Development planning and funding opportunities are available through MARAD and close coordination with USDOT, MARAD and the new Office of Multimodal Freight Infrastructure and Policy, and should be prioritized by OFP.

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36 Middle skill is defined as jobs requiring more than a high school education, but less than a four-year degree.

37 https://www.njcu.edu/academics/professional-education-and-lifelong-learning/workforce-development-programs/logistics

38 https://gmtma.org/rideshare/

The most recent LEP guidance was published in 2014. Given the new state environmental justice law focusing on LEP populations and recent federal activity regarding equity, LEP guidance may evolve to discuss in more detail how LEP communities are receiving past engagement efforts, how to evaluate and measure outreach efforts, and how NJDOT can reach LEP communities regarding freight projects.

Lastly, improving broadband access could be an important method for reducing EJ disparities. High-speed internet access is largely necessary for identifying and accessing employment opportunities. In comparison to other states, broadband access in New Jersey is very high, including in the state's urban centers. However, there are portions of rural southern New Jersey, including Salem and Cumberland counties where gaps in broadband access exist. In Cumberland County for example, more than six percent of residents do not have access to broadband internet, the highest such number for any New Jersey county.[39] Although these locations are predominantly rural and relatively sparsely populated, key areas of these counties are also considered to be disadvantaged communities, described above. Along the U.S. 130 corridor through Salem County, there is a growing presence of warehousing and industrial uses. Further south and east into Cumberland County, agricultural and seafood production are key economic drivers. As such, broadband access could play a key role in encouraging workforce development and reducing EJ disparities.

5.10 LAND USE AND WAREHOUSE DEVELOPMENT

Much of the industrial land use in New Jersey is warehousing and distribution center space used to store and facilitate the distribution and delivery of goods to stores and consumers. Industrial land covers about four percent of New Jersey's developed land area (approximately 65,000 acres).

Between 1995 and 2015 the total land area used for industrial uses decreased by 1.5%, while other developed land increased by 16.9%. Among the 34 municipalities with the greatest amounts of acres in industrial use (500 acres or more), slightly more than half (18) have seen their total industrial acreage decrease between 1995 and 2015, including Jersey City, Newark, and Elizabeth.[40] However, there are several municipalities where there has been a transition of land previously used for other purposes to industrial use.

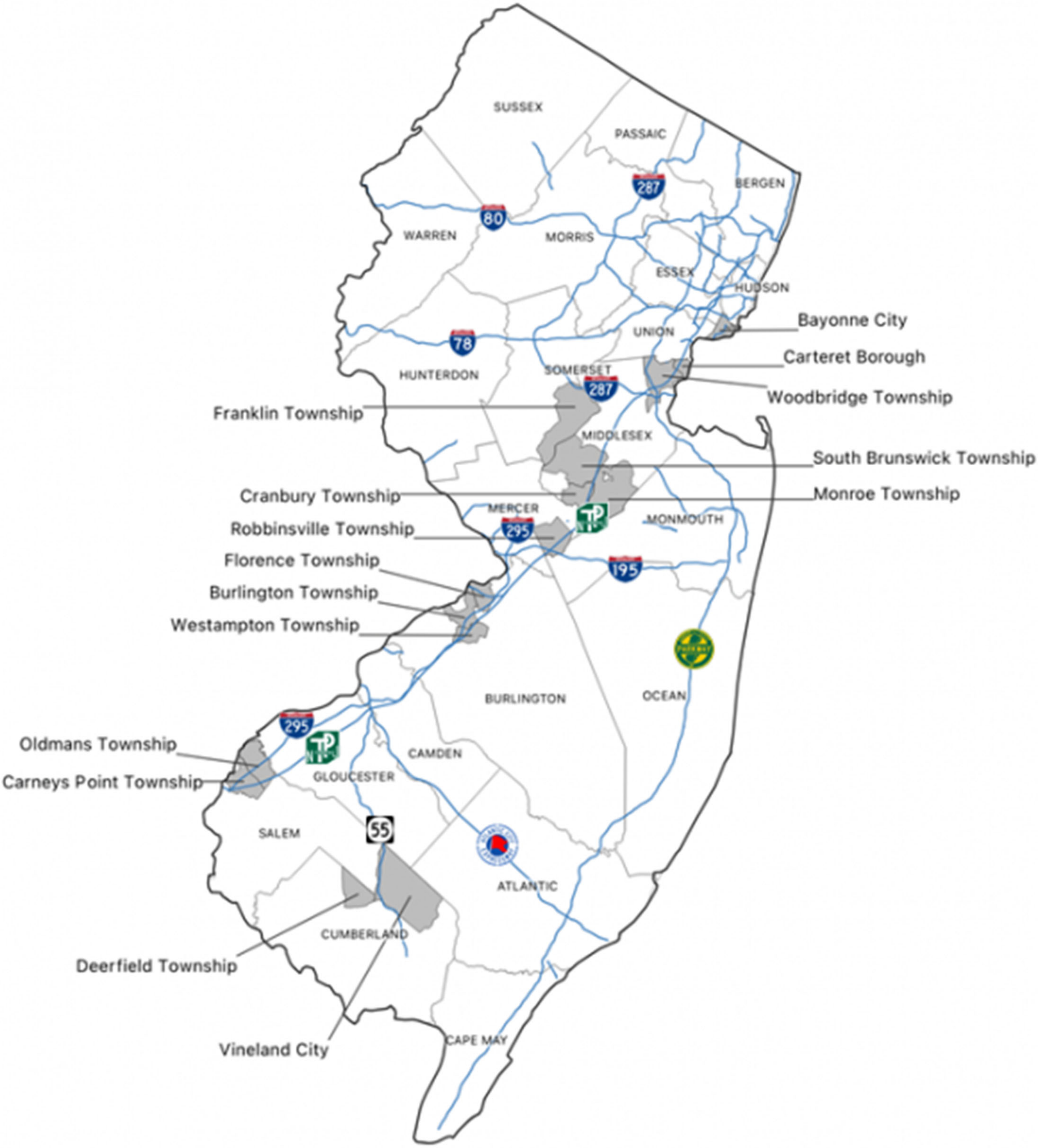
Figure 33 shows areas where the industrial land area footprint has expanded substantially between 1995 and 2015. These 15 municipalities experienced warehouse growth or warehousing has consumed the largest amounts of previously undeveloped acreage since 1995. These municipalities are those in which:

- Industrial uses account for at least 10% of all non-residential developed acres as of 2015,
- Industrial acreage has increased by at least 20 acres from 1995 to 2015 and is greater in 2015 than in 2007, and
- Employment in the two goods-movement NAICS codes (wholesale trade and transportation/warehousing) accounts for at least 12.2% of total private-sector employment, or
- Has increased by at least 10% from 2003 to 2019.

[39] https://www.fcc.gov/reports-research/maps/connect2health/#ll=40.336775,-74.897461&z=8&t=insights&inb=in_bb_access&inh=in_diabetes_rate&dmf=none&inc=none&slb=90,100&slh=10,22&zlt=county

[40] https://www.njfuture.org/research-reports/warehouse-sprawl-plan-now-or-suffer-the-consequences/

Figure 33. Industrial Land Expansion



Source: https://www.njfuture.org/research-reports/warehouse-sprawl-plan-now-or-suffer-the-consequences/

Extensive warehousing and fulfillment sites continue to be developed throughout New Jersey. Many communities may not have planning and zoning codes that adequately prepare for these types of developments. Before purchasing or leasing such sites, developers often have expectations of how the site will be used and how trucks will access the site. Municipalities, counties, and metropolitan planning organizations should discuss these matters with developers to plan for any needed transportation improvements, such as roadway widening, pedestrian safety improvements, intersection reconfiguration, and signal retiming, and consider their impacts on air, water, and noise quality.

In September 2021, New Jersey's Office of Planning Advocacy has adopted statewide policy guidance on the siting of warehouses and distribution centers.[41] Several regional, county. or municipal studies included elements that aimed to proactively address warehouse development have recently been undertaken in New Jersey (i.e., *Union County Truck Mobility Study*, *Southern Middlesex County Freight Movement Study*, *Moving Mindfully: Monmouth Mercer*, *Warren County Light Industrial Site Assessment*). Communities undertaking these studies have benefited from a better understanding of existing freight infrastructure and development patterns, providing opportunities to proactively consider the future of freight in their communities and better allowing them to shape their future through design, education, enforcement, or policy changes.

Municipalities should work with regional organizations to plan for speculative development, where appropriate. Speculative development can create additional challenges in lacking clarity of the traffic, utility, and emergency needs of a site and occupant. Rather than merely respond to applications or problems, municipalities should maintain proactive and ongoing discussions with freight stakeholders and subject matter experts with their respective county, metropolitan planning organization, and NJDOT.

All members of planning and zoning boards in New Jersey must complete a land use review process training within 18 months of being appointed to a board. This training should consider materials specific to the development review process for warehousing. This has become increasingly important as the proliferation of large warehouses throughout New Jersey has provided unique transportation and land use benefits and challenges. Including such materials in existing required trainings would support community members in making informed decisions about provisions of development activities.

Municipalities should also work with developers to ensure adequate public transit is provided to the site to better serve a larger pool of potential employees. Coordination between NJ TRANSIT, county and transportation management associations, and developers can help improve job access, and ultimately make the site more attractive to potential employers and employees. Where public transit is infeasible, businesses can consider shuttle services for employees, potentially in tandem with nearby employers or in conjunction with transit operators.

Statewide analyses have identified that much of the warehousing development in New Jersey occurs on land previously used for industrial purposes (including manufacturing or other warehousing purposes) in industrial parks and clusters of industrial land uses. While New Jersey is a freight state, dependent on goods movement and logistics for jobs and commerce, growth in e-commerce and warehousing has been concentrated in and is a challenge for several of New Jersey's communities.

5.11 TRANSITION TO ZERO-EMISSIONS ENERGY

While Section 8.2 outlines national trends regarding vehicle electrification (trucks and vessels), there is a distinct focus on understanding how the freight industry and its individual stakeholders will transition away from fossil fuels The evolution of freight infrastructure and technology will create additional energy demands that may exceed current or future capacity. Those developments, including such things as automated equipment systems, computer software and hardware to manage the automation, conversion of forklifts, cargo equipment, and conversion of other equipment to

[41] https://nj.gov/state/planning/assets/pdf/warehouse-guidance.pdf

electric batteries, as well as stricter efficiency requirements for building systems, will collectively create greater energy demands from the electric grid.

In 2021, Governor Murphy signed Executive Order 274 which established an interim greenhouse gas reduction target of 50 percent below 2006 levels (approximately 60.6 MMTCO2e) by 2030. Meeting the ambitious goals of reducing emissions 50% by 2030 and 80% by 2050 will require an economy-wide transformation that demands all economic sectors, levels of government, companies, communities, and individuals to accept and adopt changes that will reduce the adverse effects of climate change. One of the three main strategies mentioned in NJDEP's Global Warming Response Act 80x50 Report[42] to reduce GHG emissions in the report is replacing internal combustion vehicles with electric vehicles.

Truck electrification has reached the point of being viable and cost-effective in several commercial vehicle applications. As the costs have continued to decrease, and governments increase incentives for electrification and raise standards for diesel-powered trucks, the electrification of truck fleets has become a possibility in recent years. Truck electrification includes a wide range of technologies, each with different advantages. Truck electrification using batteries is much more common currently (battery-only electric, hybrid electric, and plug-in hybrid electric); however, significant development and testing are underway for fuel-cell electric trucks, which essentially use hydrogen to store energy. Section 8.2 focuses on the potential and opportunities created by truck electrification through batteries, which is more viable in the short term.

The PANYNJ has committed to net zero emissions by 2050 and is currently developing an agencywide Net Zero Roadmap. They are investing in electrification and identifying opportunities to encourage tenants and customers to make similar infrastructure and equipment investments. The PANYNJ is also advancing a number of initiatives internally (detailed in Section 4.5), including the Truck Replacement program, Cleaner Cargo Handling program, and Electrification of Ground Support Equipment.[43]

While the agency's programs strive to encourage the general public, customers, and partners to transition to zero-carbon vehicles and equipment, electrification of the freight transportation sectors (especially aviation, maritime, and long-distance trucking) may be challenging. There will be a fundamental need for the development of alternative net-zero fueling options (hydrogen, ammonia, or e-fuels), particularly when considering distances covered and the amount of space required to store energy.

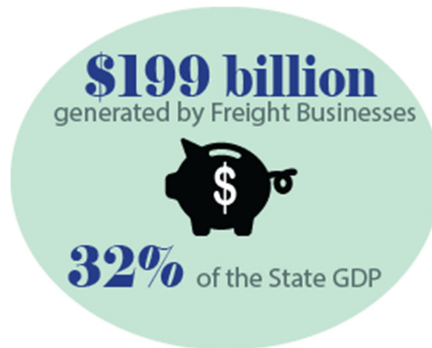
[42] New Jersey's Global Warming Response Act 80x50 Report: https://www.nj.gov/dep/climatechange/docs/nj-gwra-80x50-report-2020.pdf

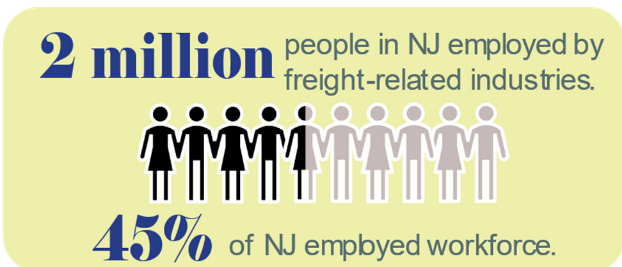
[43] Environmental Initiatives Information | Port Authority of New York and New Jersey (panynj.gov): https://www.panynj.gov/port-authority/en/about/Environmental-Initiatives.html

6 What We're Moving: New Jersey's Freight Economy

An economic analysis detailing the value and tonnage of freight in New Jersey; freight employment and GDP; key commodity groups and freight industry clusters.

The freight transportation network plays a vital role in the overall economy of the entire state of New Jersey; job and GDP growth depends on this network. With a population of nearly 9.3 million people in 2020, New Jersey is home to an enormous consumer market attracting goods from domestic and international sources.[44] New Jersey is also home to major manufacturers and suppliers which rely on the state's freight infrastructure. Freight movements are associated with businesses and employment across many industry sectors, from manufacturing to agriculture to retail and construction. In this Plan, freight-dependent industries (identified below in Section 6.1.1) refer to those industry sectors that are directly engaged in the production, transport, and handling of freight.





The freight network and the efficient movement of goods are critical to the economic competitiveness of New Jersey. In 2020, freight-dependent industries accounted for approximately 32% of the State's GDP.[45] These businesses indirectly employ almost two million people in 2020, representing 45% of the total employed workforce of 4.4 million people in New Jersey.[46]

New Jersey's transportation network serves the needs of local deliveries, regional goods movement, and national and international trade. Its geographic location uniquely positions the State as a critical link in the national freight network and provides direct access to the major metropolitan markets of New York City and Philadelphia, as well as serving as a gateway to global markets, linking North American markets to the rest of the world.

New Jersey's extensive multimodal freight network includes highways, rail lines, air routes, marine waterways, and pipelines. New Jersey's portion of the Interstate Highway System provides critical regional, national, and international connections. The roadways comprising the National Highway System provide for movement within and beyond the State. Connections to the NHS are made via approximately 39,000 miles of public roadways that trucks use to transport freight goods into, out of, through, and within New Jersey. Located between New York City and Philadelphia, New Jersey is within a day's drive of 40% of the U.S. population. A 500-mile radius of the Newark and Elizabeth waterfront area includes most of the northeastern U.S. and several major Canadian metropolitan areas, including Montreal, Ottawa, and Toronto.[47]

> To develop an overall picture of New Jersey's freight economy, the most recent available datasets from the U.S. Census, U.S. Bureau of Labor Statistics, County Business Patterns (CBP), U.S. Bureau of Economic Analysis (BEA), and other national datasets were analyzed. The Federal Highway Administration's Freight Analysis Framework (FAF) version 5.3 provided data on freight commodity groups in tonnage and value.

New Jersey is home to some of the country's most heavily utilized marine ports and airport facilities. The Port of New York and New Jersey is the busiest East Coast port in the United States, handling more than $211.6 billion (12%) of the nearly $1.8

44 U.S. Census 2020
45 Bureau of Economic Analysis
46 U.S. Bureau of Labor Statistics - Current Population Survey (CPS)
47 New Jersey Department of Labor & Workforce Development. Office of Research & Information. Bureau of Labor Market Information. New Jersey's Transportation Distribution & Logistics Industry Cluster. Winter 2021–2022.

trillion of U.S. international freight and serves as the gateway to one of the most concentrated consumer markets in North America. It is the largest container port on the Atlantic Coast, third largest in the United States, and 23rd largest globally. This is a measure of both the size of the New Jersey-New York metropolitan market and its importance to the U.S. economy. One-third of the nation's GDP is produced within 250 miles of the PortNYNJ. It serves the world's major ocean carriers and global alliances, with over 70% of the first port of call. It has six container terminals and can handle nine vessels simultaneously, including ships with capacities up to 14,000 TEU. In 2020, the PortNYNJ experienced the fastest growth of imports in the country, up 8.1% from the prior year.[48]

South Jersey Port Corporation operates domestic and international freight services at the Port of Camden, the Port of Paulsboro, and the Port of Salem. SJPC is a national leader in bulk and breakbulk cargoes, shipping and receiving to and from Africa, Asia, Latin America, and Europe, handing more than four million tons of bulk, breakbulk and container cargoes annually. With dockside rail services, cargo can be transloaded between rail, ship, and warehouses at SJPC's marine terminals. The seaport facilities offer over two million square feet of covered and open-air warehousing and storage. Paulsboro Marine Terminal is located directly across from Philadelphia International Airport and has direct access to I-295 and Class I freight railroads. The Port of Salem is in Foreign Trade Zone 142 in combination with nearby Millville Executive Airport, allowing business to import and store goods duty-free.[49]

Newark Liberty International Airport ranked 12th among U.S. airports (2021) by landed weight of all-cargo operations. In 2019, the airport handled nearly 780,000 tons of air cargo. In 2020, with passenger travel diminished due to the COVID-19 pandemic, the PANYNJ presented an initiative for prequalified firms to lease, operate, and maintain two of the airport's major cargo buildings through renovations to dramatically enhance EWR's air cargo operations.[50] New Jersey is also near John F. Kennedy International Airport (JFK), the busiest airport for freight in the northeastern United States and second busiest on the East Coast after Miami.

New Jersey also has a network of more than 1,300 miles of freight rail owned by CSX, Norfolk Southern, and Conrail, as well as 17 regional or short line operators. New Jersey's rail infrastructure connects the state with the regional, national, and international rail network. Pipelines are also an integral part of the freight movement system. An interconnected pipeline network of more than 70,000 miles of pipeline carries petroleum products, natural gas, and crude oil to, from, and within New Jersey.

This section of the Plan examines the New Jersey freight industry and economic conditions and addresses critical freight trends, needs, and issues by examining national economic and commodity datasets and trends. The purpose is to develop a comprehensive picture of how New Jersey's freight activity fits within the national and international context – what it consumes and produces, what transportation modes it relies on, how its critical industries are using the transportation system, how current conditions are forecast to change, and how key national and global factors will affect the state's near-term and long-term freight future.

A safe and efficient freight system is vital to the State's economic growth and to the creation of jobs. This section also examines the distribution of freight activities and employment by county in New Jersey. This provides a better understanding of the distribution of freight employment and business establishments. This analysis also identifies the fastest growing and declining freight industries in each county to determine where there may be potential job growth and development of freight-improvement projects.

48 New Jersey Department of Labor & Workforce Development Office of Research & Information. Bureau of Labor Market Information. New Jersey's Transportation Distribution & Logistics Industry Cluster. Winter 2021–2022.

49 South Jersey Port Corporation. https://www.southjerseyport.com/

50 New Jersey Department of Labor & Workforce Development Office of Research & Information. Bureau of Labor Market Information. New Jersey's Transportation Distribution & Logistics Industry Cluster. Winter 2021–2022.

6.1 GROSS DOMESTIC PRODUCT AND EMPLOYMENT

6.1.1 Freight Industries

As illustrated in Table 23, individual freight-dependent industries were identified as the basis for this Plan's analysis of New Jersey's overall freight industry trends. These industries are based on the 2012 North American Industry Classification System (NAICS) and an overall understanding of employment and industry trends. They are ranked by GDP in Table 23.

The top freight-dependent industries identified in New Jersey based on GDP are wholesale trade, retail trade, manufacturing, construction, utilities, transportation, and food/agriculture, as shown with their respective icons in Figure 34 and Table 23. This organization of icons and colors are used throughout this chapter. When combined, these seven industries account for more than 75% of freight industry gross domestic product (GDP) in New Jersey in 2020. Given the dominance of these seven freight-dependent industries, the freight industry analysis within this section focuses on those key trades.

Figure 34. Top Freight Industries

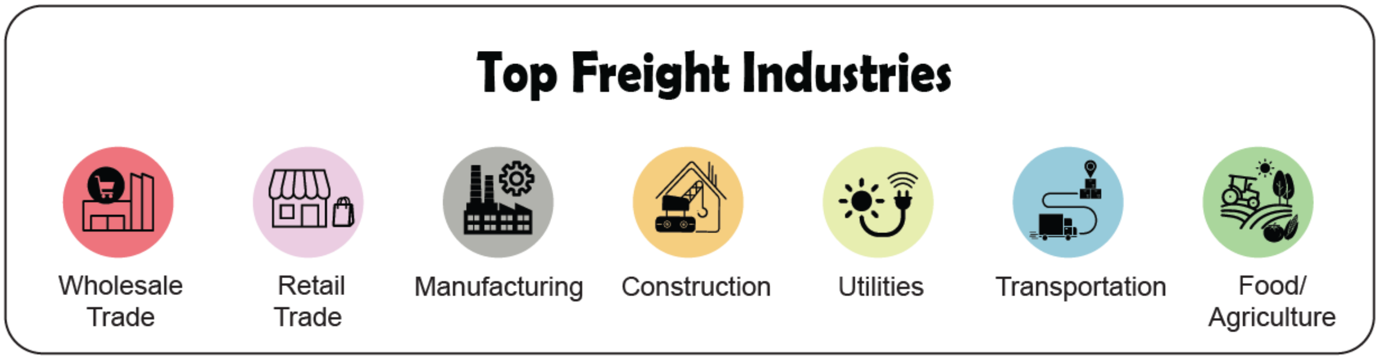


Table 23. Freight-Dependent Industries

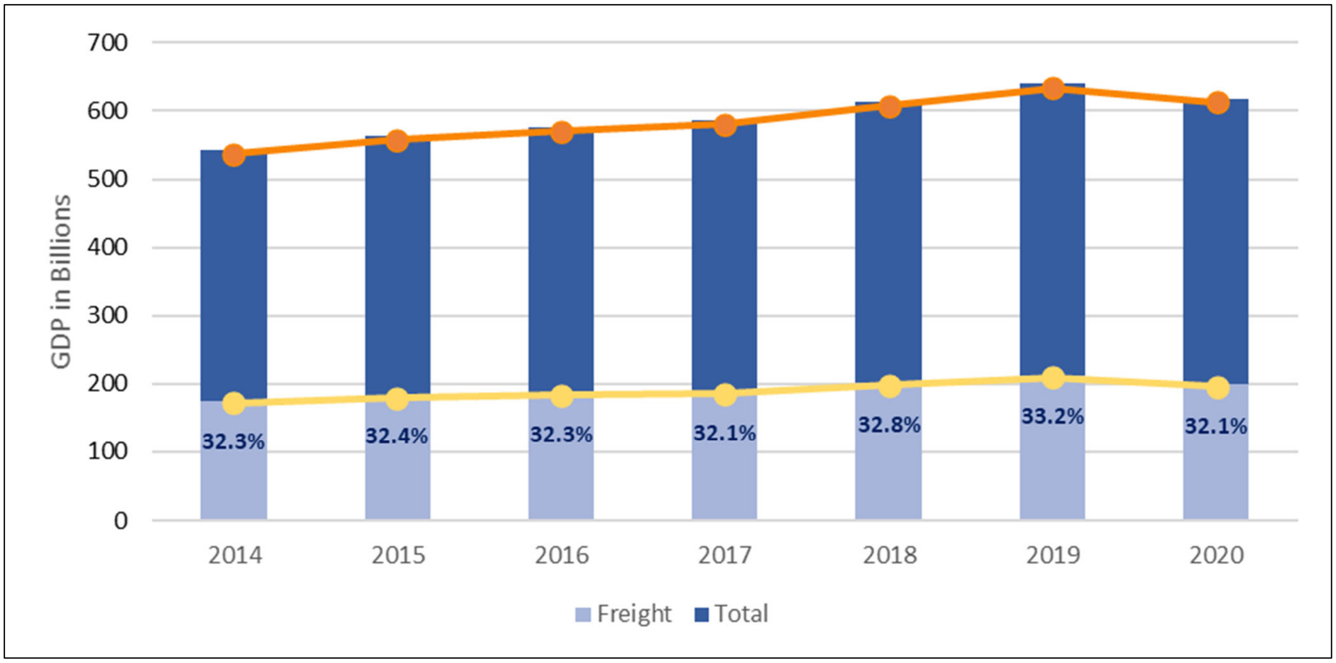
Wholesale trade	Retail trade	Chemical products manufacturing
Construction	Utilities	Miscellaneous manufacturing
Food, beverage, tobacco products	Truck transportation	Electrical equipment manufacturing
Food services and drinking places	Air transportation	Primary metals manufacturing
Farms	Rail transportation	Machinery manufacturing
Forestry, fishing, and related activities	Water transportation	Plastics and rubber products manufacturing
Warehousing and storage	Pipeline transportation	Paper products manufacturing
Fabricated metal products	Computer and electronic products	Wood products manufacturing
Waste management and remediation services	Furniture and related products	Mining, except oil and gas
Nonmetallic mineral products	Textile mills and textile product mills	Support activities for mining
Motor vehicles, bodies and trailers, and parts	Apparel and leather products	Oil and gas extraction
Other transportation equipment	Petroleum and coal products	

6.1.2 GDP Data

Gross Domestic Product (GDP) is the total monetary or market value of all finished goods and services produced within an area during a specific period. GDP is a good measure of the economic health of a region and is often used to estimate the size of an economy and growth rate. GDP by industry provides important insights into an industry's contribution to the overall economy. GDP also represents the labor and capital value used to produce gross output. GDP by industry is also measured as the sum of an industry's compensation of employees, taxes on production and imports, fewer subsidies, and gross operating surplus.

Figure 35 illustrates GDP trends between 2014 and 2020 in New Jersey based on data from the Bureau of Economic Analysis (BEA).[51] The Freight GDP includes all freight-dependent industries listed in Table 23.

Figure 35. Freight GDP (2014-2020)



Source: U.S. Bureau of Economic Analysis

Freight industry GDP accounted for nearly 32% of total GDP in New Jersey from 2014 to 2020. In general, freight GDP has followed total GDP trends within New Jersey, experiencing a steady growth between 2014 and 2019. In 2020, GDP decreased slightly because of impacts of the COVID-19 pandemic, including the closure of businesses and mandated social distancing limiting capacity at restaurants, brick-and-mortar stores, gyms, theaters, and other indoor facilities. Consumer spending also decreased due to contagion concerns and an increase in telecommuting during the pandemic. Transportation, especially public transit and air transportation, decreased substantially during the pandemic. Anecdotal trends within 2021 and 2022 indicate that GDP has recovered slowly.

Specific freight-dependent industries in New Jersey were analyzed to understand the significance each freight industry plays in New Jersey's economic growth. Table 24 shows GDP trends from 2014 to 2020 for freight-related industries.

51 GDP is a key element of BEA's National Income and Product Accounts (NIPA), which measures the value and makeup of the output, the types of income generated, and how that income is used.

Table 24. Freight Dependent Industries GDP (2014-2020)

Industry	2020	Total Growth 2014-2020	Compound Annual Growth Rate 2014-2020
Wholesale trade	$51,530	11%	1.8%
Retail trade	$36,525	18%	2.9%
Chemical products manufacturing	$22,372	19%	2.9%
Construction	$21,588	14%	2.2%
Utilities	$10,045	-7%	-1.1%
Food services and drinking places	$8,581	4%	0.6%
Computer and electronic products	$5,544	38%	5.6%
Petroleum and coal products	$5,473	6%	0.9%
Food, beverage, tobacco products	$4,821	28%	4.2%
Truck transportation	$4,610	18%	2.7%
Miscellaneous manufacturing	$4,109	44%	6.3%
Warehousing and storage	$3,847	92%	11.5%
Fabricated metal products	$2,450	31%	4.6%
Waste management and remediation services	$2,130	18%	2.8%
Machinery manufacturing	$1,907	17%	2.7%
Air transportation	$1,757	-59%	-13.8%
Nonmetallic mineral products	$1,720	53%	7.4%
Plastics and rubber products manufacturing	$1,617	29%	4.4%
Printing and related support activities	$1,374	-1%	-0.2%
Paper products manufacturing	$1,109	-2%	-0.3%
Electrical equipment manufacturing	$991	13%	2.0%
Farms	$723	32%	4.7%
Primary metals manufacturing	$586	-1%	-0.1%
Furniture and related products	$575	50%	7.0%
Rail transportation	$323	-6%	-1.0%
Mining, except oil and gas	$314	38%	5.5%
Other transportation equipment	$309	-10%	-1.7%
Forestry, fishing, and related activities	$305	50%	7.0%
Textile mills and textile product mills	$292	-28%	-5.4%
Motor vehicles, bodies and trailers, and parts	$256	53%	7.4%
Wood products manufacturing	$254	89%	11.1%
Apparel and leather products	$220	-6%	-1.1%
Pipeline transportation	$197	35%	5.1%
Water transportation	$183	-70%	-18.1%
Oil and gas extraction	$67	405%	31.0%
Support activities for mining	$39	42%	6.0%
TOTAL	**$198,741**	**13%**	**2.1%**

Source: U.S. Bureau of Economic Analysis

Overall, most freight industries experienced positive growth in GDP between 2014 and 2020. Large industries experiencing the most significant changes in GDP between 2014 and 2020 include construction (14%), computer and electronic products (38%), warehousing and storage (92%), and air transportation (-59%).

Increases in selected freight-dependent industry GDP such as warehousing and storage (92%) and computer and electronic products (38%) can be attributed to daily behavioral changes. An increase in the demand for technology and the usage of computers, mobile devices, and other electronic products have become a common and necessary part of life. There is also an increase in e-commerce and online shopping leading to an increase in warehousing and storage.

Declines in selected freight-dependent industry GDP can be attributed to two general causes: industry trends and COVID-19-related challenges. The freight industry with the steepest decline in growth is water transportation (-70%), air transportation (-59%) and utilities (-7%), which are largely attributed to COVID-related reductions in cruises and sea travel, air travel, overall daily behavioral changes and an increased awareness of sustainability and environmental concern for the usage of utilities and fossil fuels. Other industry declines, like textile mills (-28%), paper product manufacturing (-2%) or printing (-1%) are evidence of decreasing consumer demand or increasing reliance on automation and other technologies.

The GDP in New Jersey is forecasted to continue to grow. According to Michael L. Lahr, a research professor and director of Rutgers Economic Advisory Service (R/ECON) at the Bloustein School of Planning and Public Policy, the New Jersey Economic Forecast for between 2020 and 2030 is a 1.3% growth in real GDP and an increase of 0.78% in non-agricultural employment.[52] It is important when reviewing forecasts to consider the effect of the COVID-19 pandemic and the economic lockdown imposed during that time. Although the economy slowed during this time, it has been steadily recovering. The economy is forecasted to continue to grow.

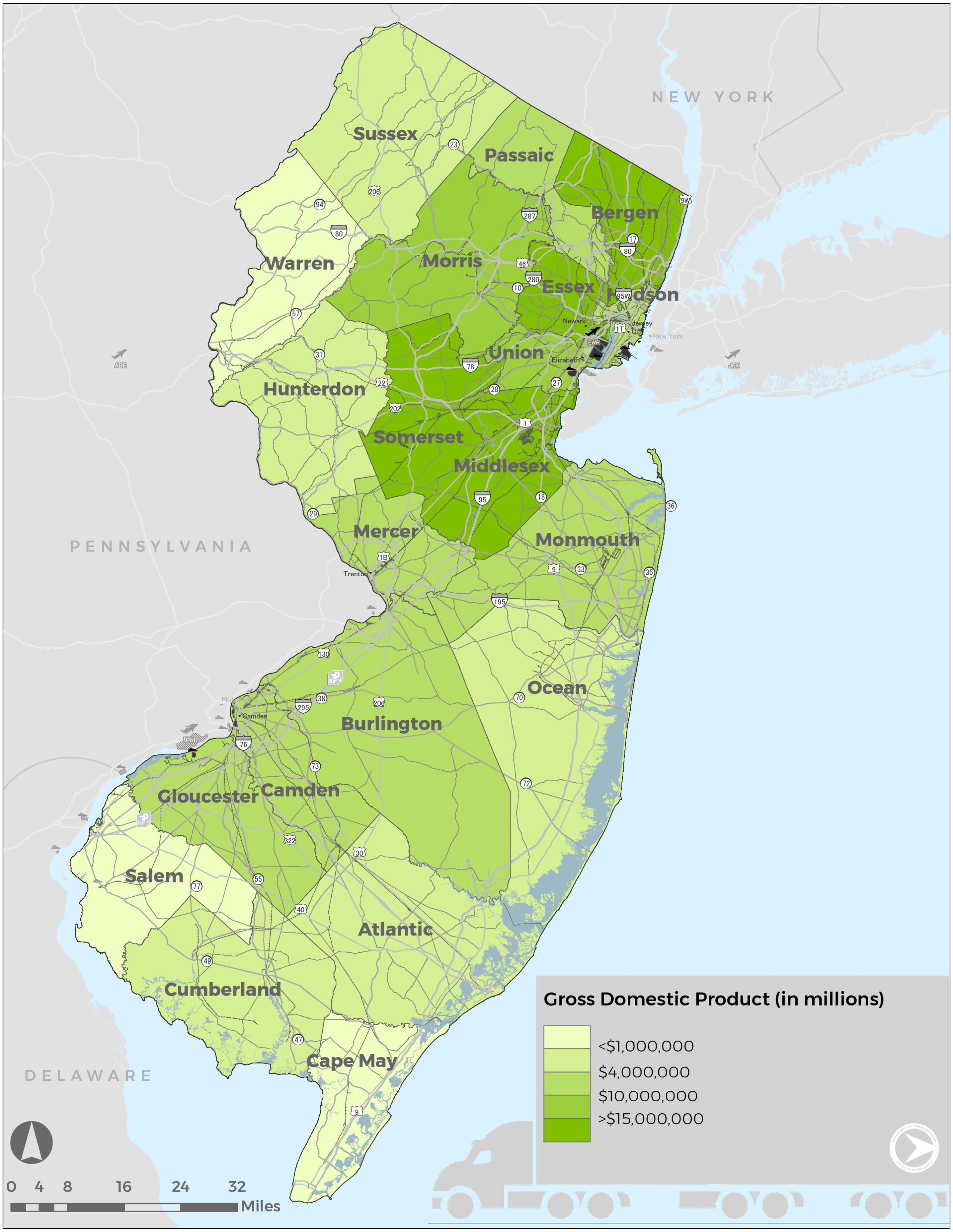
GDP trends between 2014 to 2020 (based on BEA data) were analyzed for each of New Jersey's counties. Summary charts of the GDP by the freight-dependent industries for each New Jersey county can be found in Table 24, while Table 26 shows the freight GDP in New Jersey by county for 2017.

The New Jersey counties with the highest freight GDP ($GDP) are predominantly located in northeastern New Jersey (Bergen, Hudson, Essex, Middlesex, Morris, and Union), as illustrated in Figure 36. Nearly every county within New Jersey experienced GDP growth between 2014 and 2020. Gloucester County experienced the highest percentage of GDP growth (56%), primarily attributed to increased transportation and warehousing development. Somerset County had an increase in freight GDP growth of 48%, largely attributable to an 111% increase in nondurable goods manufacturing. Salem County experienced the highest freight GDP decline at -24%, associated with a 12% decrease in manufacturing. Hunterdon County also experienced a 12% decline in freight GDP.

Predominant industries vary throughout the State, as shown in Figure 37. Each predominant industry maintains a different role in each county, with some comprising the majority of freight-dependent GDP and others a small portion. For instance, while utilities and Salem County occupy a relatively small share of GDP in the State, utilities in Salem County comprise 54% of freight industry GDP. This contrasts with more densely populated areas like Bergen County where the top freight industry (Wholesale Trade), has nearly five times the GDP of Salem County's wholesale trade but occupies a much smaller portion of freight-dependent GDP in the County. Manufacturing is the primary industry in the urban-suburban counties of Camden, Gloucester, Mercer, Passaic, and Union. Retail trade is predominant in lower density counties and those along the Shore, including Cape May, Monmouth, Ocean, and Sussex. The highly urbanized counties of Essex and Hudson have transportation and warehousing as their predominant industry. Wholesale trade is predominant in Bergen, Burlington, Hunterdon, and Middlesex counties.

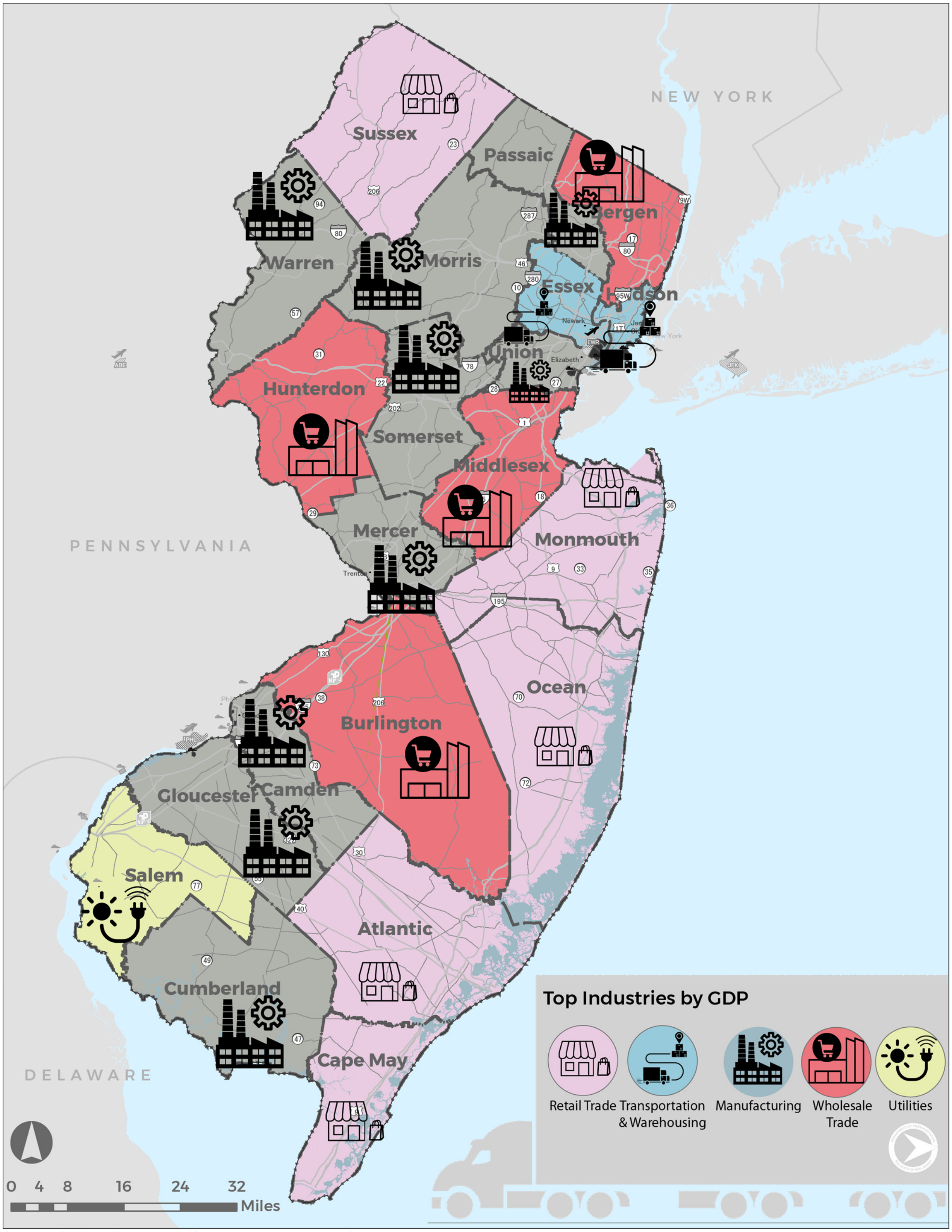
52 Lahr, Michael L. (Aug 2020) "New Jersey Economic Forecast - NJ's Pandemic Recovery and the Revised State Budget." R/ECON. Rutgers University - Edward J. Bloustein School of Planning and Public Policy.

Figure 36 GDP by County



Source: 2017 U.S. Bureau of Economic Analysis, WSP

Figure 37 Top Industry (by GDP) by County



Source: 2017 U.S. Bureau of Economic Analysis, WSP
Note: In some instances, icon sizes were adjusted for legibility. Icon sizes do not correspond to GDP.

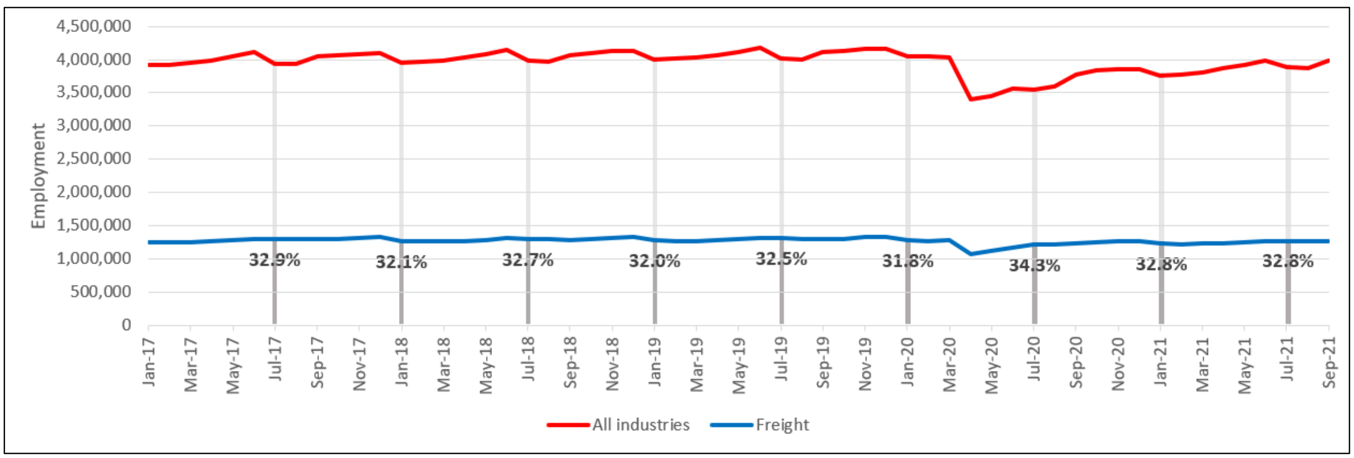
6.1.3 Employment

The analysis of employment in freight-dependent industries is based on the Quarterly Census of Employment and Wages (QCEW) database, maintained by the Bureau of Labor Statistics (BLS).[53] Employment, as defined by the QCEW, is only the count of filled jobs, whether full or part-time, and temporary or permanent, by place of work and who worked during or received pay for the pay period that included the 12th day of the month.

The QCEW provides an employment benchmark for other BLS programs, as well as a basis for estimating the wage and salary component for the Bureau of Economic Analysis Personal Income statistic. Standard sources used by the QCEW program are the North American Industry Classification System (NAICS) for industry detail; Federal Information Processing Standards, for geographic area codes; and the Office of Management and Budget for size classes.

Figure 38 illustrates New Jersey's employment trends from 2017 Q1 to 2021 Q3.[54] Between 2017 and 2021, the total employment in New Jersey increased at a steady 1% to 2% annual rate, including consistent seasonal fluctuations. A noticeable decrease is evident in 2020 Q2 due to COVID-related reductions in employment due to the economic lockdown and imposed restrictions during the pandemic. Many business establishments experienced temporary closures or limited capacity operations during this time which led to job furloughs, cuts in workers' hours, and job terminations. Many workers were unable to work due to illness or caring for someone who was sick. Some parents were unable to work in order to care for children when remote schooling became a necessity. By early 2021, with the economic reopening and recovery, employment started to increase. In 2021, the annual employment grew approximately 3.25% and began to normalize to pre-pandemic levels.

Figure 38. Freight Employment



Source: BLS, Quarterly Census of Employment and Wages, WSP

Figure 38 also shows the number of people employed in freight-dependent industries and their percentage of the total employment in New Jersey between 2017 Q1 and 2021 Q3.[55] Freight-dependent industries accounted for approximately one-third of the total employment in New Jersey during this period. The employment in the freight-dependent industries

53 QCEW consists of a monthly count of employment, quarterly counts of wage levels and business establishments, and a count of workers' average weekly wages at multiple levels of geographic and industrial detail. QCEW employment data are summarized from quarterly reports submitted by 10 million U.S. establishments. Unlike datasets such as the Current Population Survey (CPS) that only count employed people, the QCEW program counts covered workers who earned wages during the pay period which includes the 12th of the month. Consequently, the CPS includes people "with a job but not at work" who earn no wages, for example, workers on extended unpaid leaves of absence. QCEW data, by contrast, exclude unpaid workers. QCEW excludes self-employed people and unpaid family workers employed 15 or more hours during the survey period. CPS data exclude people under 16 years old, while QCEW counts all covered workers, regardless of age.

54 Quarterly Census of Employment and Wages

55 Quarterly Census of Employment and Wages

depends on similar factors of all industries in New Jersey and tends to fluctuate simultaneously. Freight-dependent employment grew at approximately 0.5-0.7% annually, slightly lower than the 0.9% annual growth rate of New Jersey in all industries between 2017 and 2019. The freight-dependent employment decreased nearly 6% in 2020 due to the economic lockdown and COVID-19 pandemic. In 2021, the freight industries recovered faster than other industries, with nearly a 6.5% growth in freight employment compared to the statewide growth rate of 3.25% in all industries.

The top freight-dependent industries in New Jersey by employment include wholesale trade, retail trade, manufacturing, construction, utilities, transportation, and food/agriculture. Construction and transportation employment each grew significantly from 2010 to 2020. Construction rose 2.8% annually and transportation 2.9% annually. Overall employment growth for freight industries is expected to be slower between 2020 and 2030. Construction is expected to grow 0.4% annually, transportation 1.1% annually, and construction, and retail trade 0.4% annually. Several sub-industries experienced faster growth in employment from 2020-2030, including motor vehicle manufacturing (2.1% annually), beverage manufacturing (4.7% annually), and motor vehicle and parts dealers (1.6% annually). Sub-industries experiencing declines during this period include seafood product preparation (-1.6% annually), tobacco manufacturing (-3.9% annually), and printing services (-2.5% annually).

Employment data in each county from 2015 to 2019 was analyzed using data from U.S. Census - County Business Patterns to examine the statewide distribution of overall employment by industry.[56] The same freight-dependent industries were reviewed as part of this dataset as was used in the previously cited Bureau of Economic Analysis data. Because of its geographic granularity, CBP was used to analyze freight GDP at the county level.

Most freight-dependent jobs are centered in higher-population/higher-density counties (Bergen, Middlesex, Essex, Union, Morris, and Hudson), as illustrated in Figure 39. Key industry clusters are evident in manufacturing (Bergen and Middlesex counties), wholesale trade (Bergen, Middlesex, Morris, and Somerset counties), retail trade (Bergen, Middlesex, and Monmouth counties). Transportation/warehousing employment clusters are centered in Hudson, Middlesex, and Essex counties. Other key industry clusters include mining, quarrying, oil, and gas extraction (Somerset County, and to a lesser extent in Morris and Cumberland counties), and agriculture (Burlington, Cape May, and Hunterdon counties). The primary freight-dependent industries for each County by employment are shown in Figure 40. The freight industries employing the most people in New Jersey are retail trade (39.2%) and wholesale trade (24.1%).

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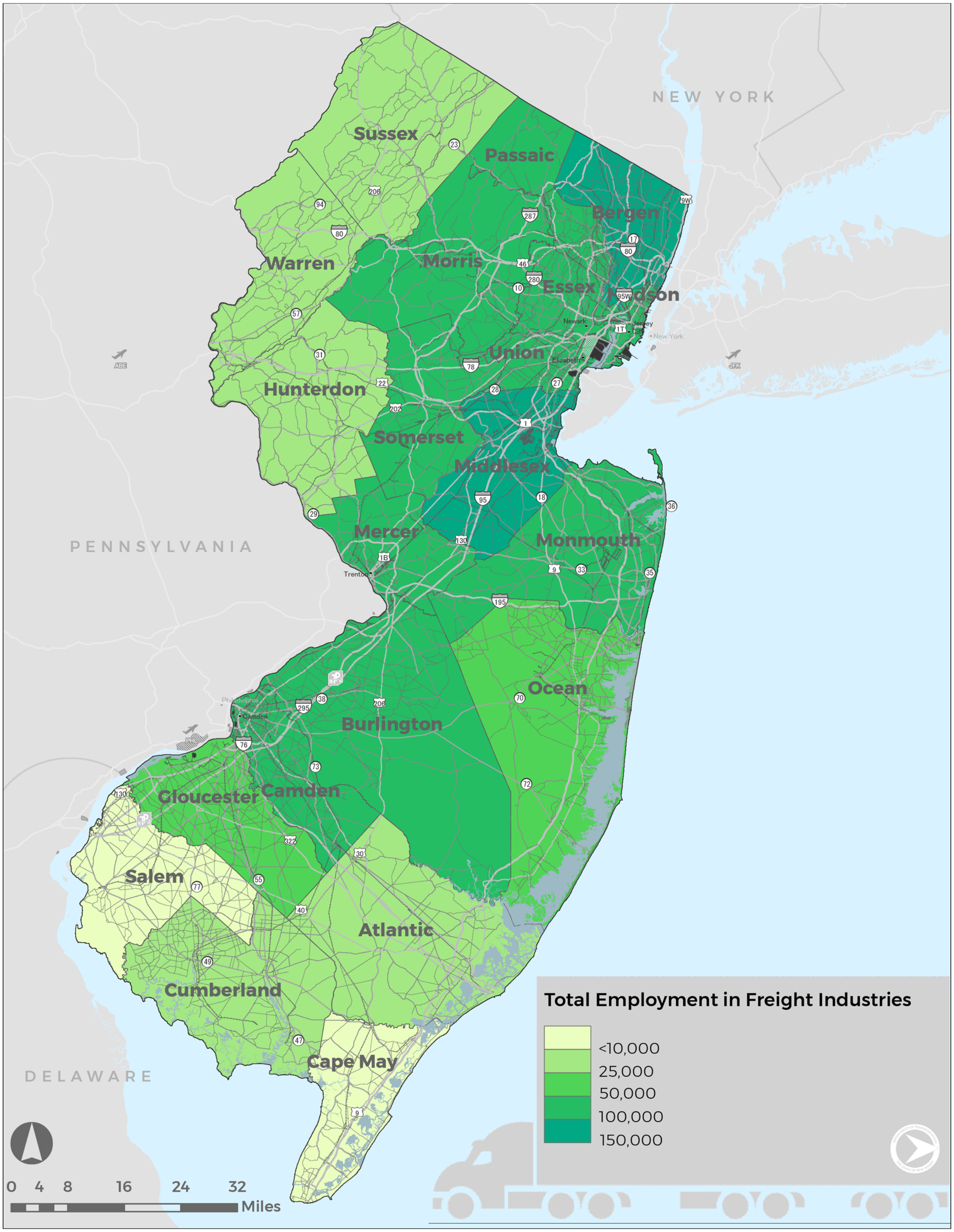
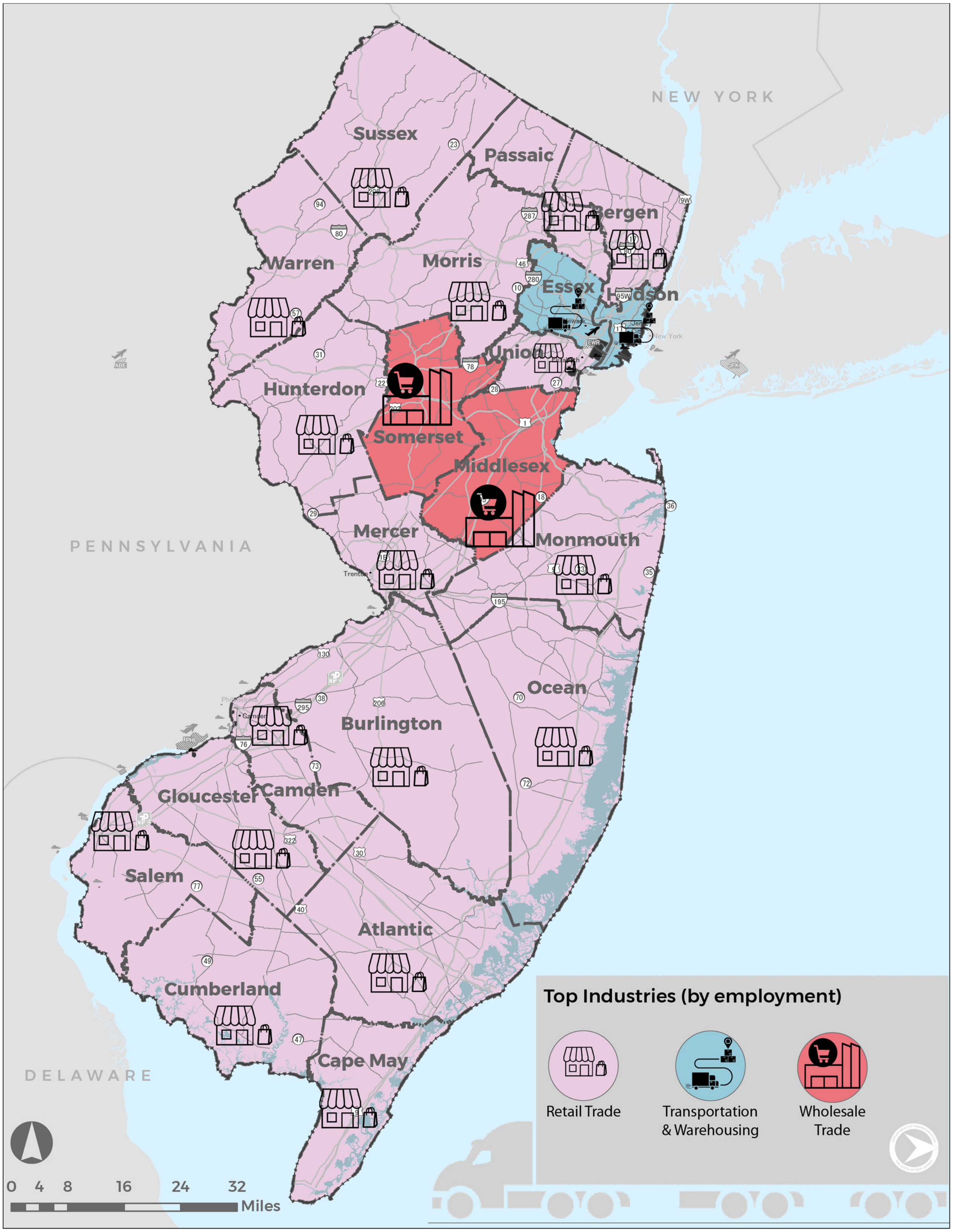
56 U.S. Census - County Business Patterns examines the statewide distribution of economic growth. County Business Patterns (CBP) is an annual series providing subnational economic data by industry. This series includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll. CBP basic data items are extracted from the Business Register (BR), a database of all known single and multi-establishment employer companies maintained and updated by the U.S. Census Bureau. CBP only includes private businesses and excludes government establishments. CBP covers most NAICS industries, excluding crop and animal production; rail transportation; Postal Service; pension, health, welfare, and vacation funds; trusts, estates, and agency accounts; office of notaries; private households; and public administration.

Figure 39. Freight Employment by County



Source: 2017 U.S. Census - County Business Patterns, WSP

Figure 40. Top Industry (by Employment) by County



Source: 2017 U.S. Bureau of Economic Analysis, WSP
Note: In some instances, icon sizes were adjusted for legibility. Icon sizes do not correspond to employment.

6.2 PRODUCTIVITY AND EFFICIENCY

6.2.1 Growth of Freight GDP and Freight Employment (2015-2019)

New Jersey freight GDP and freight employment growth were analyzed based on data from the Bureau of Economic Analysis (BEA) and Quarterly Census of Employment and Wages (QCEW), respectively. Statewide, the percentage of growth in freight GDP (12%) nearly mirrored that of freight employment (11%) between 2015 and 2019. However, the growth trend of individual freight industries varied. Changes in employment and GDP between 2015 and 2019 of the top freight-dependent industries in New Jersey are summarized in Table 25.

Table 25. GDP and Employment of Top Freight Industries

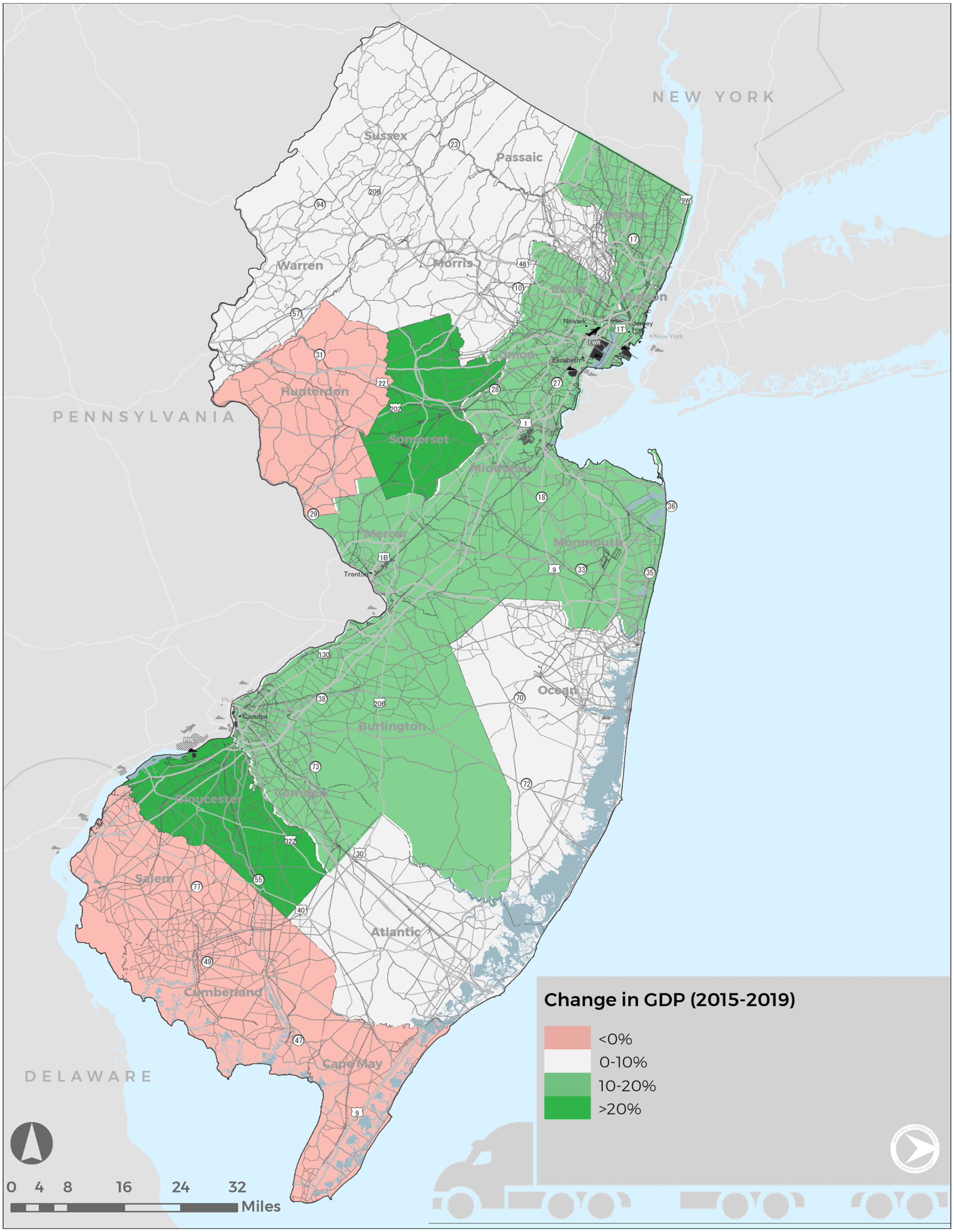
Freight Industry	GDP	Employment
Agriculture, Forestry, Fishing, and Hunting	16%	-3%
Manufacturing	19%	2%
Wholesale Trade	10%	12%
Retail Trade	14%	-2%
Transportation and Warehousing	26%	20%
Construction	11%	12%
Utilities	-5%	32%

Source: U.S. Bureau of Economic Analysis and Quarterly Census of Employment and Wages

Several industry groups showed growth in GDP that substantially outpaced growth (or decline) in employment, indicating increased productivity or efficiency for specific commodity groups. Despite a decrease in agricultural employment, agricultural GDP grew 16%. Similarly, retail trade experienced an employment decline, but GDP grew 14%. Manufacturing employment grew by three percent, while GDP increased by 19%. There was a significant increase in mining employment but only a slight increase in GDP.

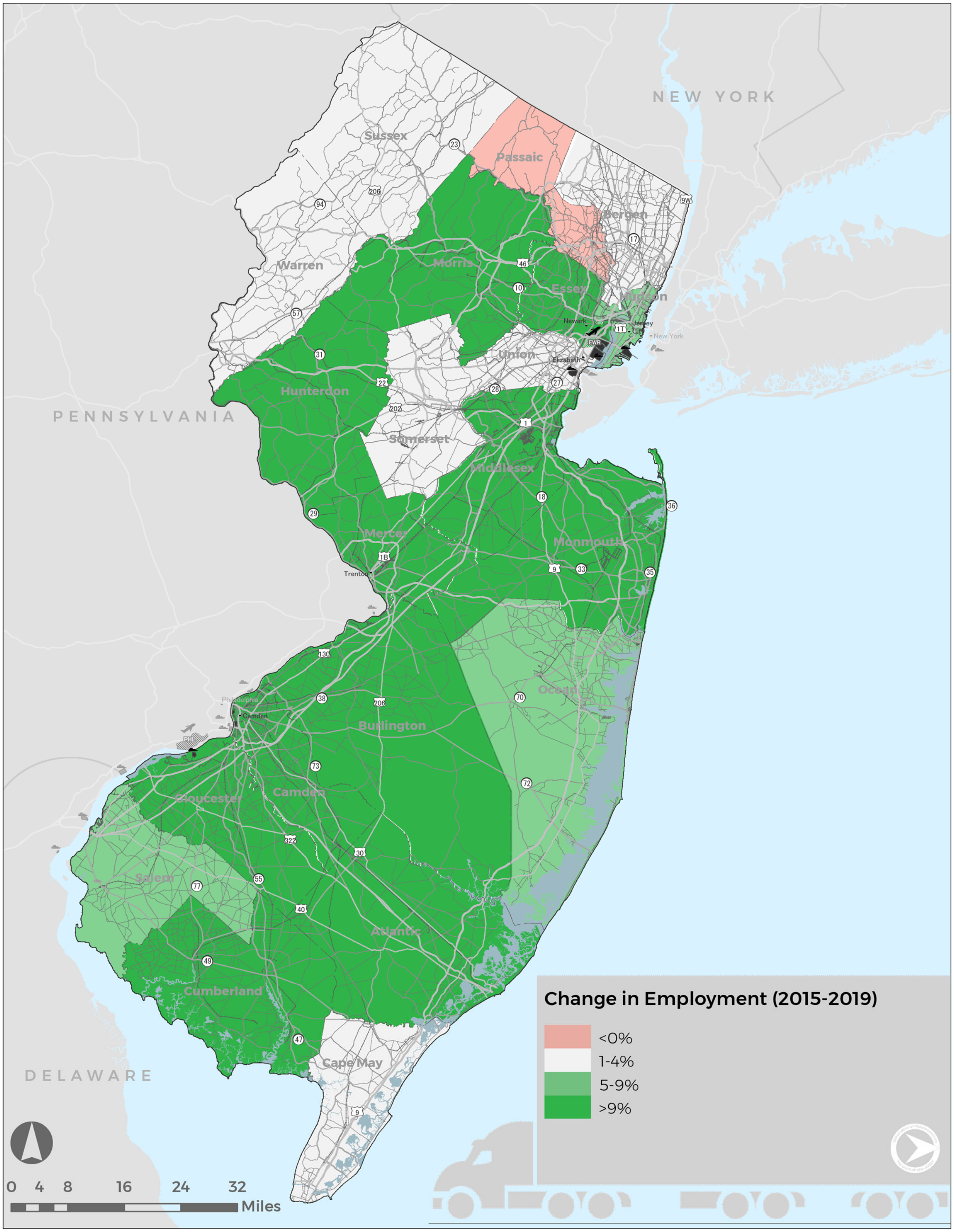
Using data from the U.S. Census County Business Pattern (CBP), employment and GDP at the County level were also compared for data between 2015 and 2019 and shown in Figure 41 and Figure 42.

Figure 41. Change in GDP (2015-2019)



Source: U.S. Bureau of Economic Analysis, WSP

Figure 42 Change in Employment (2015-2019)



Source: U.S. Bureau of Economic Analysis, WSP

GDP rose at a higher rate than employment in 13 counties (Bergen, Burlington, Camden, Essex, Gloucester, Mercer, Middlesex, Monmouth, Morris, Somerset, Sussex, Union, Warren). Passaic County experienced a growth in freight GDP despite a decrease in freight employment. Freight GDP continued to grow faster than freight employment and may indicate productivity and efficiency in the freight system. Change in GDP is shown in Table 26.

Table 26. Freight GDP and Employment by County

County	Total		County	Total	
	GDP	Employment		GDP	Employment
Atlantic	7%	7%	Middlesex	11%	8%
Bergen	12%	2%	Monmouth	13%	7%
Burlington	14%	5%	Morris	9%	7%
Camden	14%	9%	Ocean	9%	11%
Cape May	-8%	4%	Passaic	3%	-1%
Cumberland	-8%	6%	Salem	-24%	14%
Essex	12%	6%	Somerset	48%	3%
Gloucester	56%	9%	Sussex	7%	2%
Hudson	14%	14%	Union	10%	1%
Hunterdon	-12%	6%	Warren	3%	2%
Mercer	19%	6%	**Statewide**	**12%**	**11%**

Source: U.S. Census County Business Pattern

There was a decrease in freight GDP growth despite an increase in freight employment in Cumberland, Hunterdon, and Salem counties. These counties have a higher portion of low-paying jobs in mining (Cumberland) and agriculture, forestry, fishing and hunting (Hunterdon) which may indicate why an increase in employment would not lead to a parallel increase in GDP.

6.2.2 Commodity Flows

This section describes 2017 commodity flows and forecasted flows through 2050 for New Jersey. The commodity flow analysis examines inbound, outbound. and internal flows for domestic and international freight. The Freight Analysis Framework (FAF) version 5.3 provided the data for this section's freight commodity groups analysis.[57] FAF provides estimates of freight tonnage (thousands of tons or KTons) and freight value (millions of dollars or M$), with the ability to distinguish the following:[58]

- **Commodity Type** – Commodity groups classified at the 2-digit level of the Standard Classification of Transported Goods (SCTG)
- **Direction** – Classified by their origin and destination at the FAF region, state, and international, regional level. International regions are listed in Table 27
- **Trade Type** – Classified as domestic, import, or export (the definition of each trade type is explained in more detail in the "Summary of Trade Types" section)
- **Transportation Modes** – The seven modes of transportation from the Commodity Flow Survey (CFS) are included, plus an extra category pertaining only to imports. A description of each mode is provided in Table 28

57 FAF is produced by FHWA and is based on 2017 Commodity Flow Surveys performed by the Census. FAF represents the results of a freight model and is not a comprehensive survey or empirical accounting of commodity flows. Even with known limitations and deficiencies, it represents the best available approximation of multimodal freight flows.

58 Additional details about each of the variables can be found at https://faf.ornl.gov/faf5/data/FAF5%20User%20Guide.pdf.

Domestic modes are the modes used between domestic origins and destinations, modes used between zones of entry and domestic destinations for imports, and modes used between domestic origins and zones of exit for exports. Foreign modes comprise the mode of arrival to zones of entry within the U.S. for imports or mode of departure from zones of exit within the U.S. for exports. Import Flows contains data associated with freight moved from foreign origins to domestic destinations. Export Flows contains data associated with freight moved from domestic origins to foreign destinations.

One of the modes, "Multiple Modes and Mail," includes both containerized cargos moving between multiple modes as well as goods shipped through parcel delivery services. Containerized cargo often moves between ship and surface modes or truck and rail, Inclusion of goods moved by "mail" recognizes that shippers using parcel delivery services typically do not know what modes were involved after the shipment was picked up.

Table 27. FAF International Regions

Code	FAF Region
801	Canada
802	Mexico
803	Rest of Americas
804	Europe
805	Asia
806	Southwest and Central Asia
807	Eastern Asia
808	Southeast Asia and Oceania

Table 28. FAF Transportation Modes

Code	Mode	Description
1	Truck	Includes private and for-hire trucks.
2	Rail	Includes any common carrier or private railroad.
3	Water	Includes shallow draft, deep draft, Great Lakes, and intra-port shipments.
4	Air (includes truck-air)	Includes shipments moved by air or a combination of truck and air in commercial or private aircraft. Includes air freight and air express. In the case of imports and exports by air, domestic moves by ground to and from the port of entry or exit are categorized as Truck.
5	Multiple Modes and Mail	Includes shipments by multiple modes and by parcel delivery services, U.S. Postal Service, or couriers (capped at 150 pounds). This category is not limited to containerized or trailer-on-flatcar shipments.
6	Pipeline	Includes crude petroleum, natural gas, and product pipelines. It also includes pipeline flows from offshore wells to land which are counted as Water moves by the U.S. Army Corps of Engineers.
7	Other and Unknown	Includes movements not elsewhere classified, such as flyaway aircraft, and shipments for which mode cannot be determined.
8	No Domestic Mode	Includes shipments that have an international mode but no domestic mode and is limited to import shipments of crude petroleum transferred directly from inbound ships to a U.S. refinery at the zone of entry.

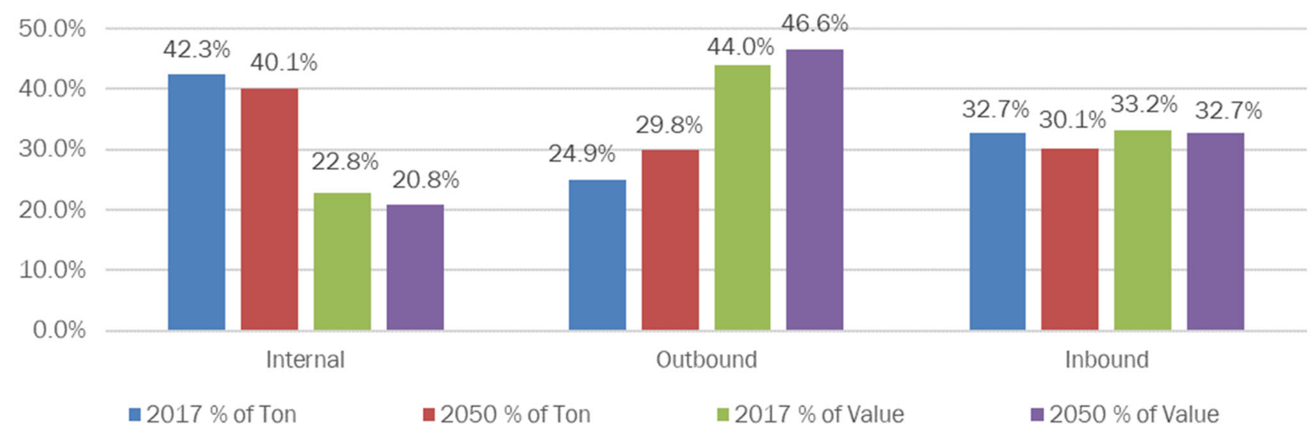
6.2.3 Analysis by Direction

In domestic state-to-state flows, outbound refers to the domestic freight commodity groups originating in New Jersey traveling to the rest of the United States. In domestic state-to-state flows, inbound refers to the domestic freight commodity groups originating in the United States (but not in New Jersey) and traveling into New Jersey as its destination. Internal refers to freight commodity groups produced and distributed within New Jersey. In New Jersey, outbound goods tend to be higher value items than goods moving inbound. Commodities by direction are shown in Figure 43.

The following trends are found between value and tonnage, between outbound and inbound goods:

- Almost half of all the commodities by value are outbound or transported out of the state, while about a third of all commodities by value are inbound or transported into the state
- About a quarter of all commodities by weight are outbound or transported out of the state. About a third of all commodities by weight are inbound or transported into the state
- The majority of high tonnage commodities moved internally in part because of the high cost of importing or exporting heavier goods
- While goods moved internally comprise a majority, they are often lower value goods. Conversely, outbound goods are lower tonnage but higher value

Figure 43. Total Commodities by Direction

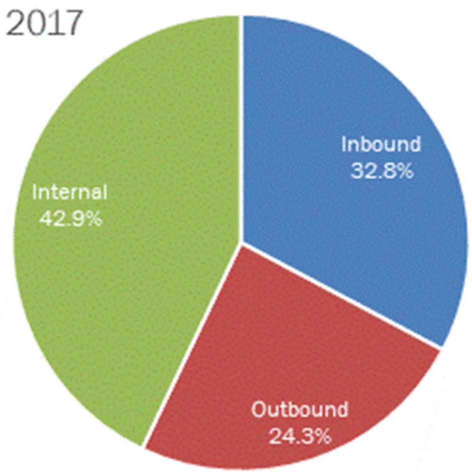


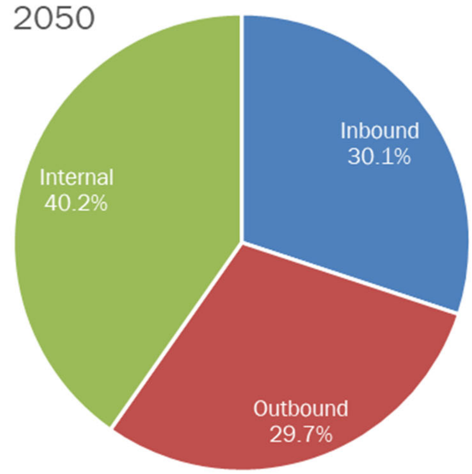
Source: FAF 5.3, WSP

New Jersey's freight transportation system moved more than 533 million tons of freight worth nearly one trillion dollars in 2017, as seen in Table 29 and Table 30, respectively. FAF projections indicate that New Jersey is projected to move an additional 282 million tons of goods by 2050, a 53% increase at a compounded annual growth rate of 1.4% per year. Outbound tonnage is expected to grow 86%, a slightly slower pace than inbound and internal tonnage. FAF projections also indicate that the state is projected to more than double the value of goods moved into, out of, and within New Jersey by 2050 (annual growth of approximately 2.2%). The most substantial growth is evident in outbound goods (118%), but considerable growth is projected for the value of inbound (103%) and internal (87%) cargo as well.

Table 29. Commodity Flows by Direction (Tonnage)

State to State Flows	Tons 2017 (Millions)	% of Total	Tons 2050 (Millions)	% of Total	Tonnage CAGR	Total Growth
Inbound	176.2	32.8%	246.6	30.1%	1.1%	40.0%
Outbound	130.8	24.3%	243.3	29.7%	2.1%	86.0%
Internal	230.6	42.9%	330.0	40.2%	1.2%	43.1%
Total	**537.6**	**100%**	**819.8**	**100%**	**1.4%**	**52.5%**

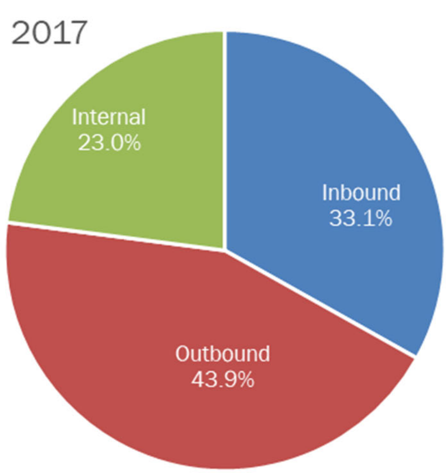


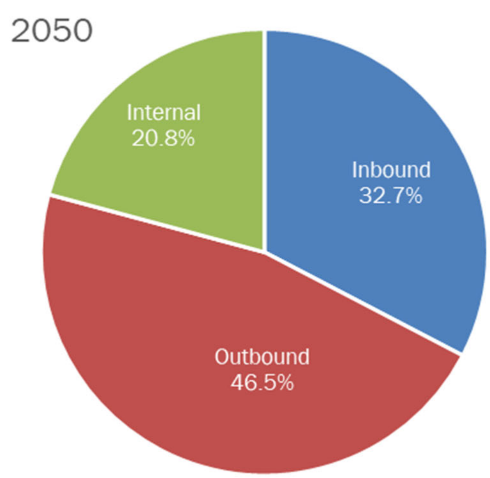


Source: FAF 5.3, WSP

Table 30. Commodity Flows by Direction (Value)

State to State Flows	Value 2017 ($Millions)	% of Total	Value 2050 ($Millions)	% of Total	Value CAGR	Total Growth
Inbound	$323,356	33.1%	$654,375	32.7%	2.2%	102.5%
Outbound	$428,612	43.9%	$932,223	46.5%	2.4%	117.6%
Internal	$224,059	23.0%	$417,242	20.8%	1.9%	87.3%
Total	**$976,027**	**100%**	**$2,003,840**	**100%**	**2.2%**	**105.7%**





Source: FAF 5.3, WSP

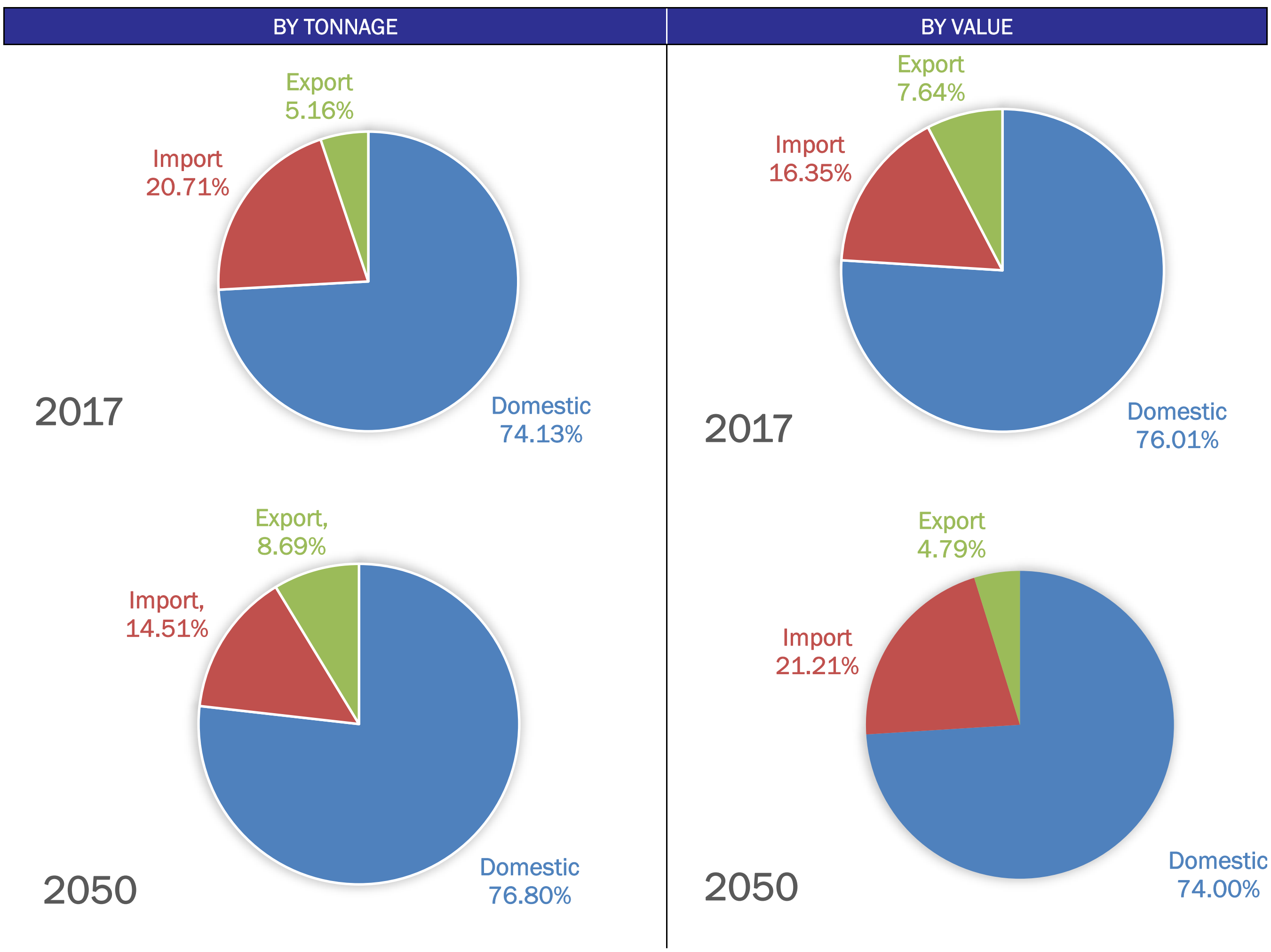
SUMMARY OF TRADE TYPES

FAF data accounts for three trade types: domestic (origin and destination within the United States), import (origin outside of the United States and destination inside the United States), and export (origin in the United States and destination outside the United States).

In 2017, New Jersey's domestic shipments accounted for 76% of tonnage and 74% of value, as shown in Table 31. Imports to New Jersey accounted for 16% of tonnage, while exports from New Jersey accounted for eight percent of tonnage. Overall, tonnage is projected to increase 53% through 2050, with exports experiencing the most substantial increase (71.5%). Growth in domestic tonnage is projected to outpace international tonnage (54% vs 51%) through 2050. Growth in value of goods is projected to increase at a higher rate than tonnage, more than doubling by 2050.

Table 31. Tons and Value by Trade Types

Trade Type	2017 Tons (Thousands)	2050 Tons (Thousands)	Tonnage Change	2017 Value ($Millions)	2050 Value ($Millions)	Value Change
Domestic	408.6	627.5	53.6%	$723,527	$1,482,026	**104.8%**
Import	87.9	121.8	38,6%	$202,163	$426,509	**111.0%**
Export	41.1	70.5	71.5%	$50,337	$95,305	**89.3%**
Total	**537.6**	**819.8**	**52.5%**	**$976,027**	**$2,003,840**	**105.3%**



Source: FAF 5.3, WSP

DOMESTIC TRADE

Outbound

Outbound refers to the domestic freight commodity groups originating in New Jersey traveling to the rest of the United States. Based on tonnage, 63% of outbound domestic goods are ultimately destined to states adjacent to New Jersey (primarily New York and Pennsylvania), as shown in Table 32 and Figure 44.

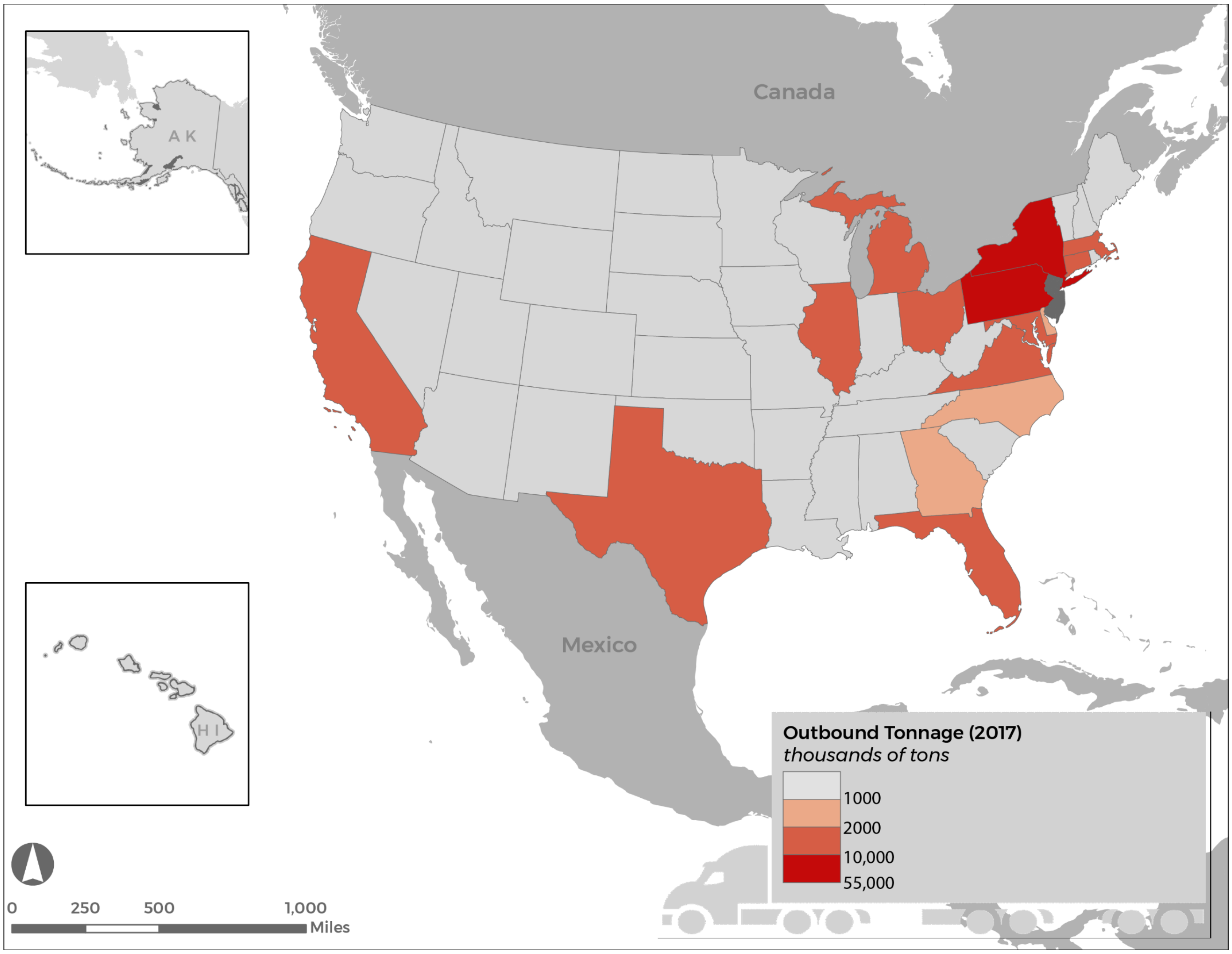
Table 32. Outbound Domestic Trading Partners by Tonnage

State	2017 Tons (Millions)	2017 Percentage of Total	2050 Tons (Millions)	2050 Percentage of total
New York	51.24	39.2%	97.24	40.0%
Pennsylvania	31.66	24.2%	45.30	18.6%
Texas	4.09	3.1%	7.43	3.1%
Ohio	3.96	3.0%	6.32	2.6%
Maryland	3.84	2.9%	5.97	2.5%
Connecticut	3.45	2.6%	7.17	2.9%
Illinois	3.19	2.4%	6.97	2.9%
Virginia	3.07	2.3%	4.31	1.8%
Massachusetts	2.83	2.2%	5.41	2.2%
California	2.80	2.1%	5.72	2.4%
Florida	2.16	1.6%	4.07	1.7%
Michigan	2.15	1.6%	3.86	1.6%
Washington	0.76	0.6%	12.95	5.3%

Source: FAF 5.3, WSP

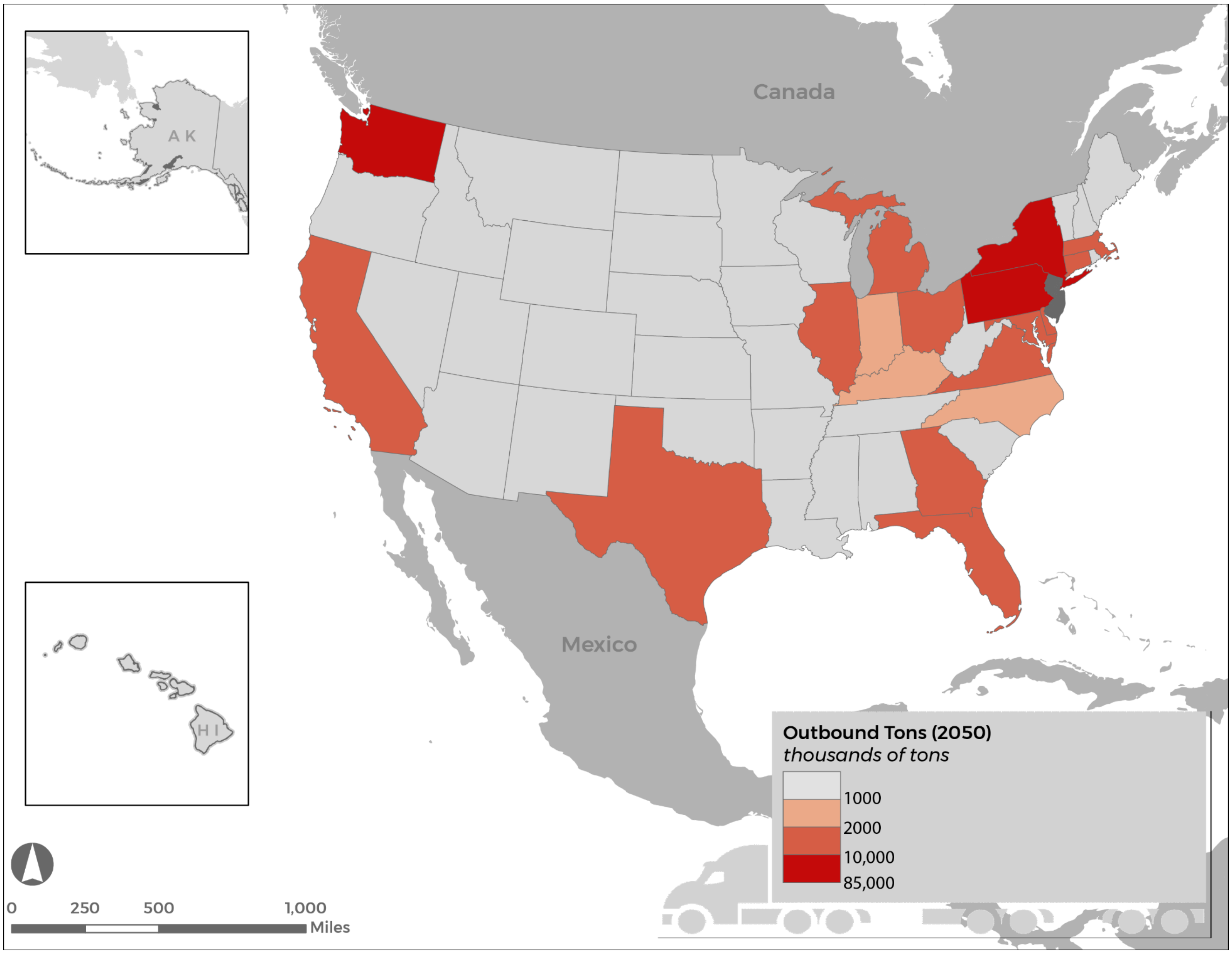
The remaining outbound tonnage is destined for numerous other states, with no more than three percent of tonnage destined for each. In 2050, New York and Pennsylvania are projected to continue to account for the majority of outbound tonnage, as shown on Figure 45. Substantial growth is evident for tonnage destined to Washington state, which is projected to increase from less than one percent of tonnage to more than five percent. Almost all of this growth is from projected increases in agricultural and livestock products moving by rail to Washington state for export.

Figure 44. Destination States for Outbound Tonnage (2017)



Source: FAF 5.3, WSP

Figure 45. Destination States for Outbound Tonnage (2050)



Source: FAF 5.3, WSP

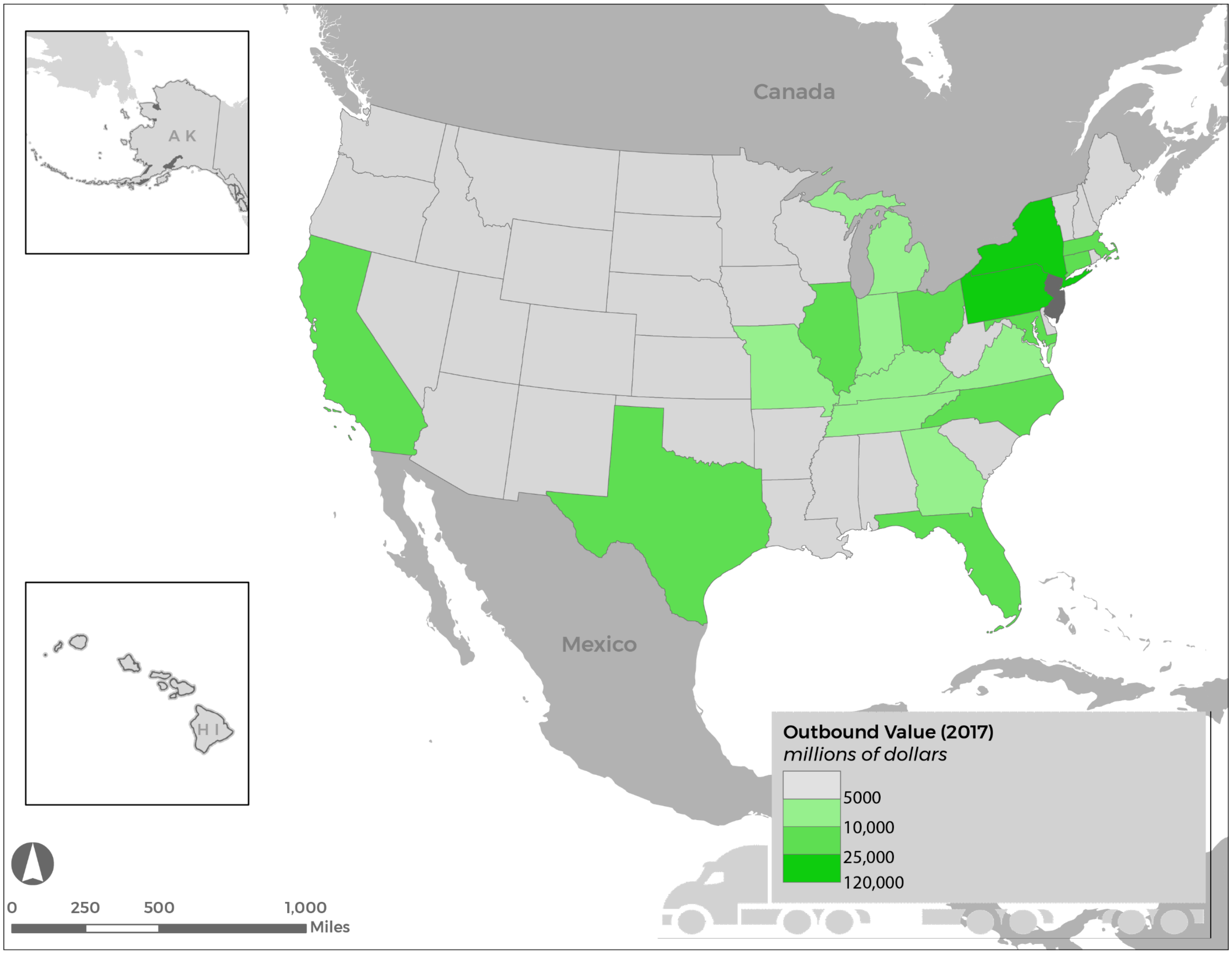
Based on value, 42% of outbound domestic goods are ultimately destined for New York and Pennsylvania, as shown in Table 33 and Figure 46. California and Ohio are also projected to each receive more than five percent of goods by value. By 2050, the value of most outbound domestic goods is projected to double with the portion of goods destined for each state staying relatively stable, shown in Figure 47.

Table 33. Outbound Domestic Trading Partners by Value

State	2017 Value ($Millions)	2017 (Percentage of Total)	2050 Value ($Millions)	2050 (Percentage of Total)
New York	116,560	27.2%	243,667	26.1%
Pennsylvania	62,302	14.5%	132,004	14.2%
California	24,786	5.8%	52,948	5.7%
Ohio	19,442	4.5%	49,162	5.3%
Texas	16,299	3.8%	35,985	3.8%
Maryland	15,717	3.7%	34,985	3.8%
Florida	14,021	3.3%	29,213	3.1%
Massachusetts	13,896	3.2%	28,586	3.1%
Connecticut	13,275	3.1%	28,303	3.0%

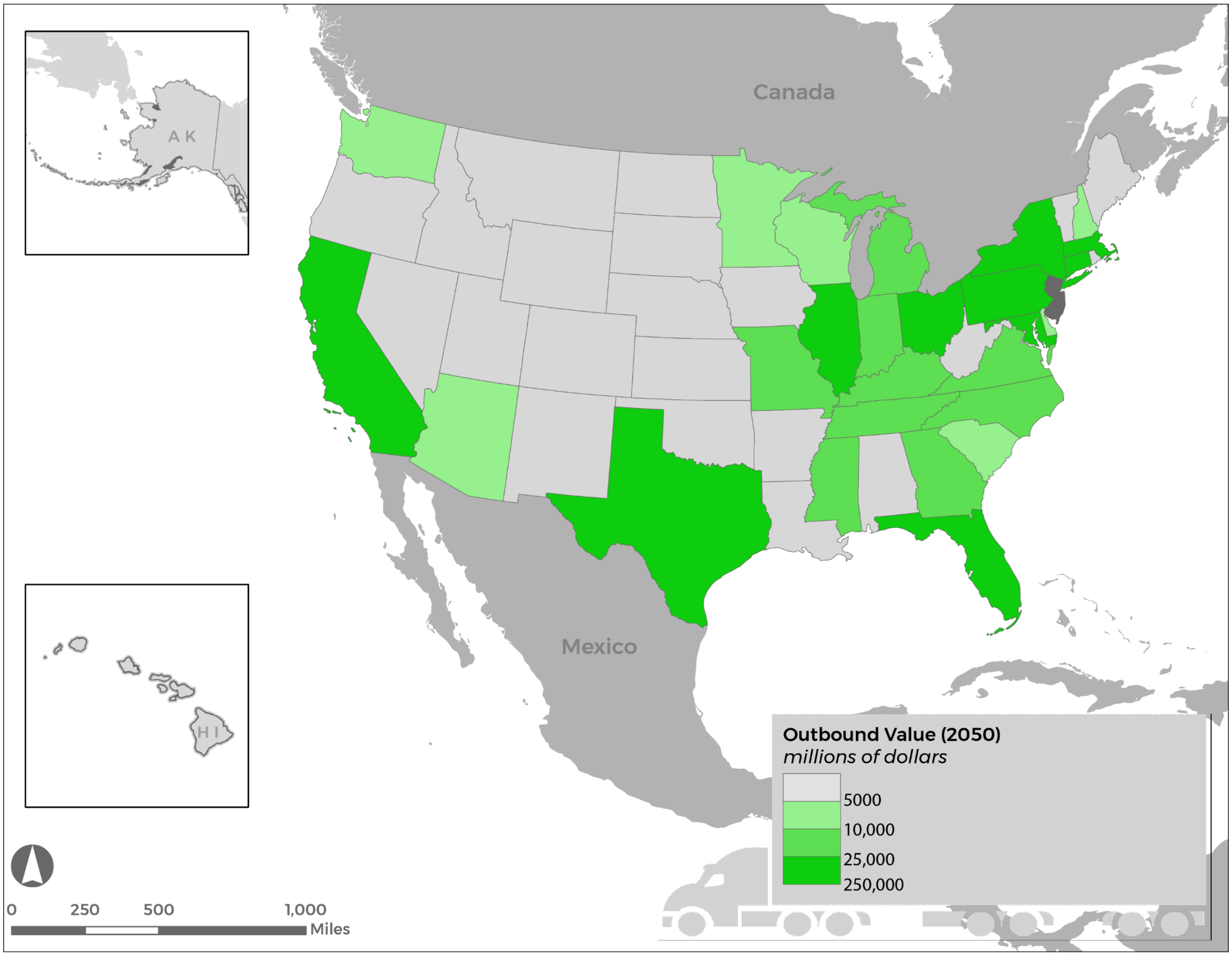
Source: FAF 5.3, WSP

Figure 46. Destination States for Outbound Value (2017)



Source: FAF 5.3, WSP

Figure 47. Destination States for Outbound Value (2050)



Source: FAF 5.3, WSP

Inbound

Inbound refers to the domestic freight commodity groups originating in the United States (but not in New Jersey) and traveling into New Jersey as its destination. Nearly half of inbound tonnage to New Jersey originates in Pennsylvania, with an additional 12% each from West Virginia and New York, as shown in Table 34 and Figure 48.

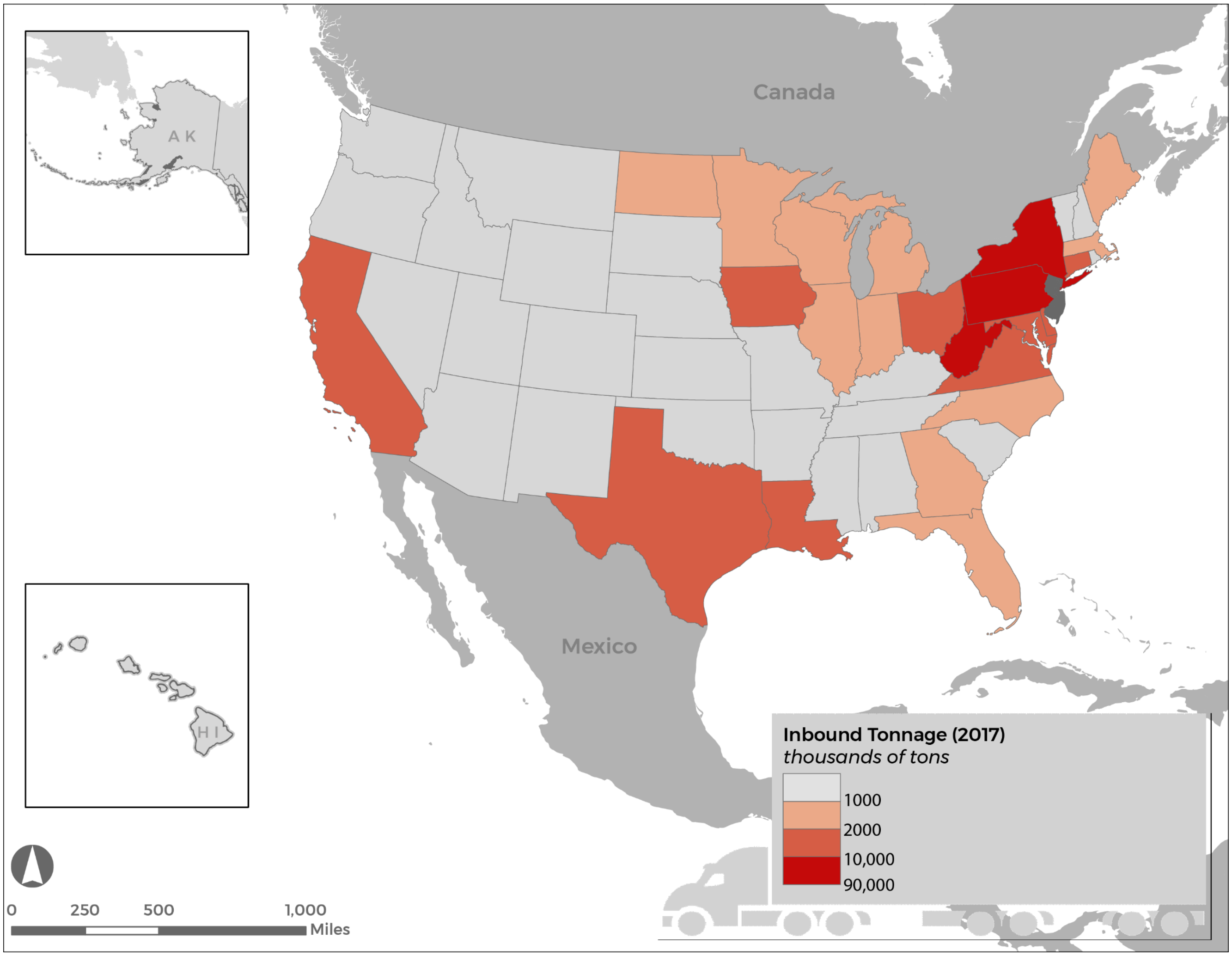
By 2050, the tonnage of goods from West Virginia is projected to decline by nearly 60%, accounting for only four percent of inbound tonnage compared to 12% in 2017. Pennsylvania and New York are each projected to experience a significant increase in inbound tonnage to New Jersey, with New York increasing in its share of all inbound tonnage from 12% to 14%. Inbound tonnage from New York is projected to increase more than 70%, while other states, including Texas and Louisiana, are projected to more than double, albeit with a significantly smaller tonnage share than New York. Inbound tonnage for 2050 is shown in Figure 49.

Table 34. Inbound Domestic Trading Partners by Tonnage

State	2017 Tons (Millions)	2017 (Percentage of Total)	2050 Tons (Millions)	2050 (Percentage of Total)
Pennsylvania	86.01	48.8%	112.01	45.5%
West Virginia	21.35	12.1%	9.45	3.8%
New York	20.27	11.5%	34.83	14.1%
Texas	4.62	2.6%	10.52	4.3%
California	3.23	1.8%	6.01	2.4%
Louisiana	2.70	1.5%	6.79	2.8%
Iowa	2.64	1.5%	4.78	1.9%
Delaware	2.60	1.5%	5.01	2.0%
Maryland	2.35	1.3%	4.67	1.9%
Connecticut	2.27	1.3%	3.46	1.4%
Ohio	2.09	1.2%	3.87	1.6%
Virginia	2.05	1.2%	3.69	1.5%

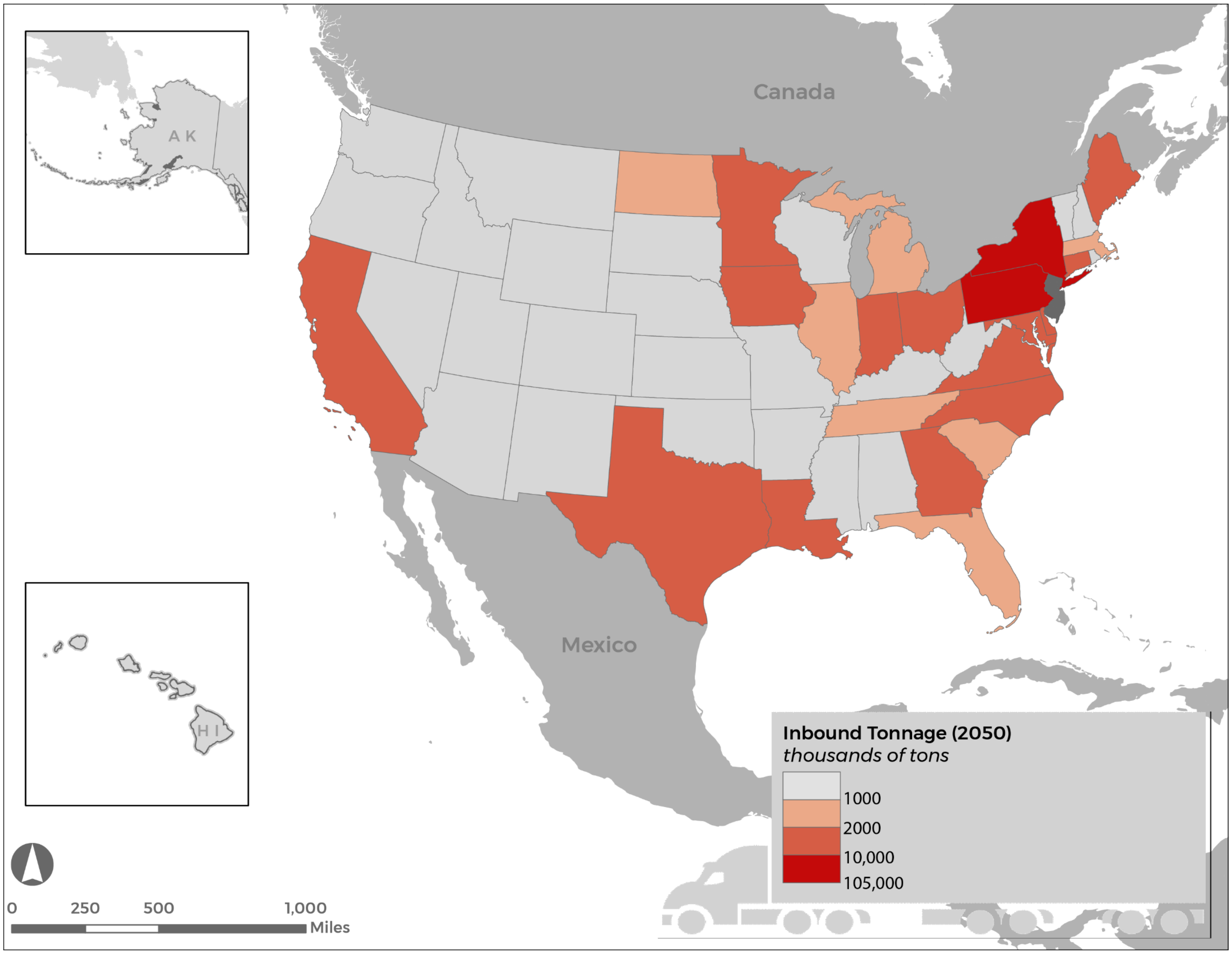
Source: FAF 5.3, WSP

Figure 48. Origin States for Inbound Tons (2017)



Source: FAF 5.3, WSP

Figure 49. Origin States for Inbound Tons (2050)



Source: FAF 5.3, WSP

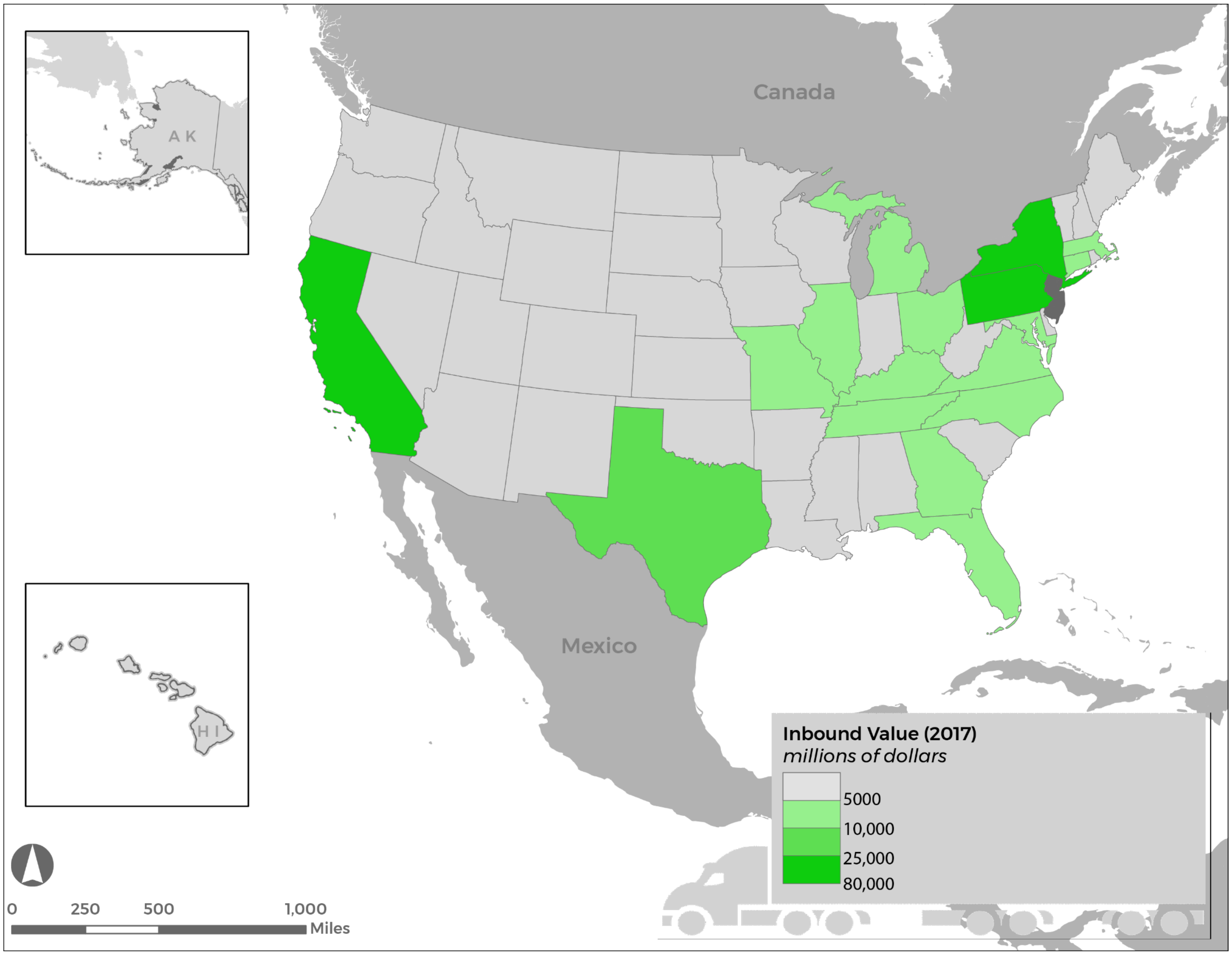
Based on inbound value, Pennsylvania and New York are responsible for nearly one-half of the value of all goods destined to New Jersey, as shown in Table 35 and Figure 50. California is also the origin of 8% of goods by value. By 2050, the value of most inbound domestic goods is projected to double with the portion of goods destined to each state staying relatively stable. Despite West Virginia currently being the source of 12% of inbound tonnage in 2017, these goods account for less than one percent by value.

Table 35. Inbound Domestic Trading Partners by Value

State	2017 Value ($Millions)	2017 (Percentage of Total)	2050 Value ($Millions)	2050 (Percentage of Total)
Pennsylvania	75,394	23.3%	146,369	22.4%
New York	66,877	20.7%	137,088	20.9%
California	27,144	8.4%	56,947	8.7%
Texas	12,266	3.8%	29,232	4.5%
Illinois	9,484	2.9%	18,590	2.8%
Tennessee	8,827	2.7%	21,865	3.3%
Connecticut	8,156	2.5%	13,839	2.1%
Ohio	7,804	2.4%	16,039	2.5%
Missouri	6,765	2.1%	17,335	2.6%
Michigan	6,373	2.0%	9,367	1.4%
Maryland	6,344	2.0%	13,769	2.1%
West Virginia	2,541	0.8%	2,046	0.3%

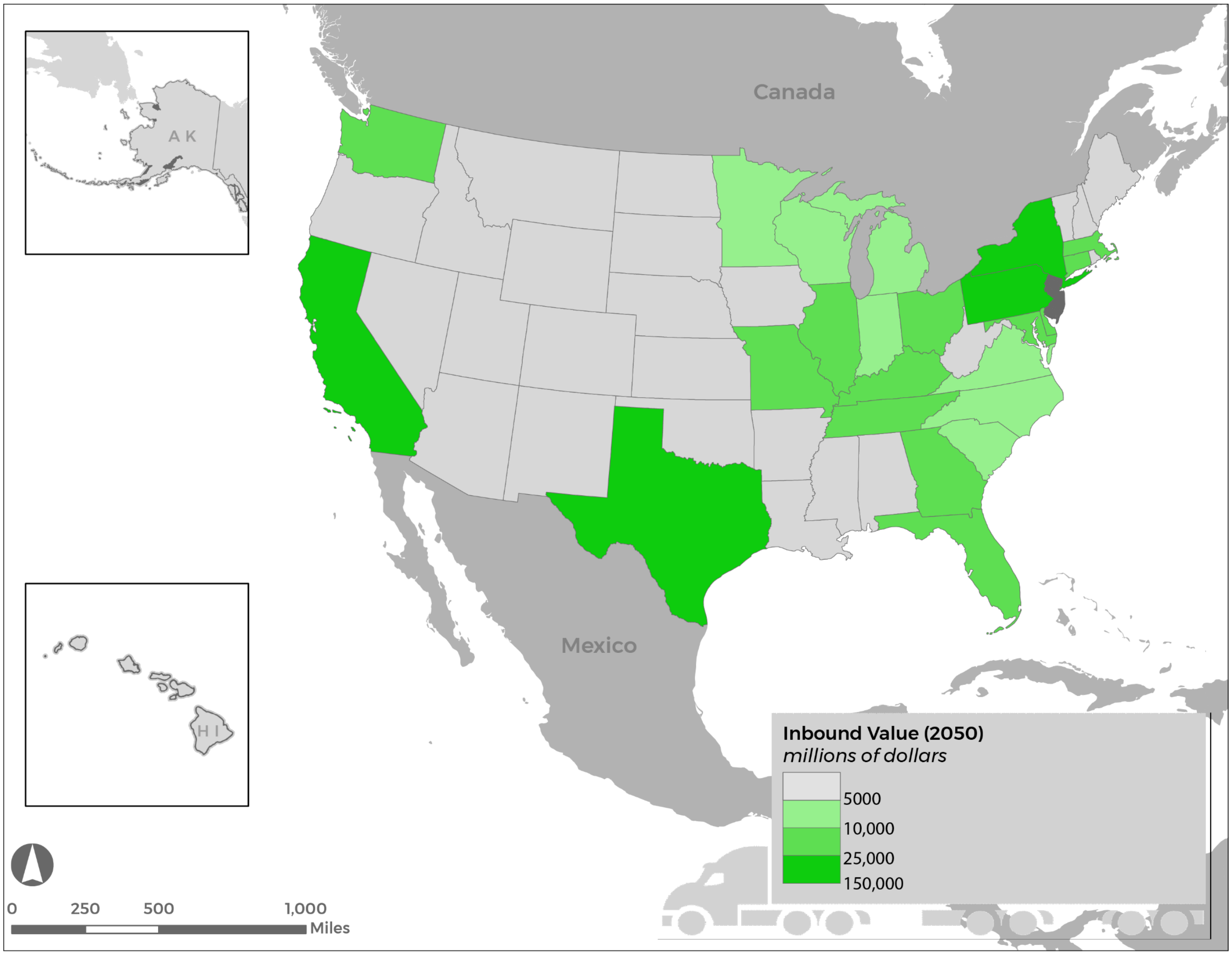
Source: FAF 5.3, WSP

Figure 50. Origin States for Inbound Value (2017)



Source: FAF 5.3, WSP

Figure 51. Origin States for Inbound Value (2050)



Source: FAF 5.3, WSP

INTERNATIONAL TRADE

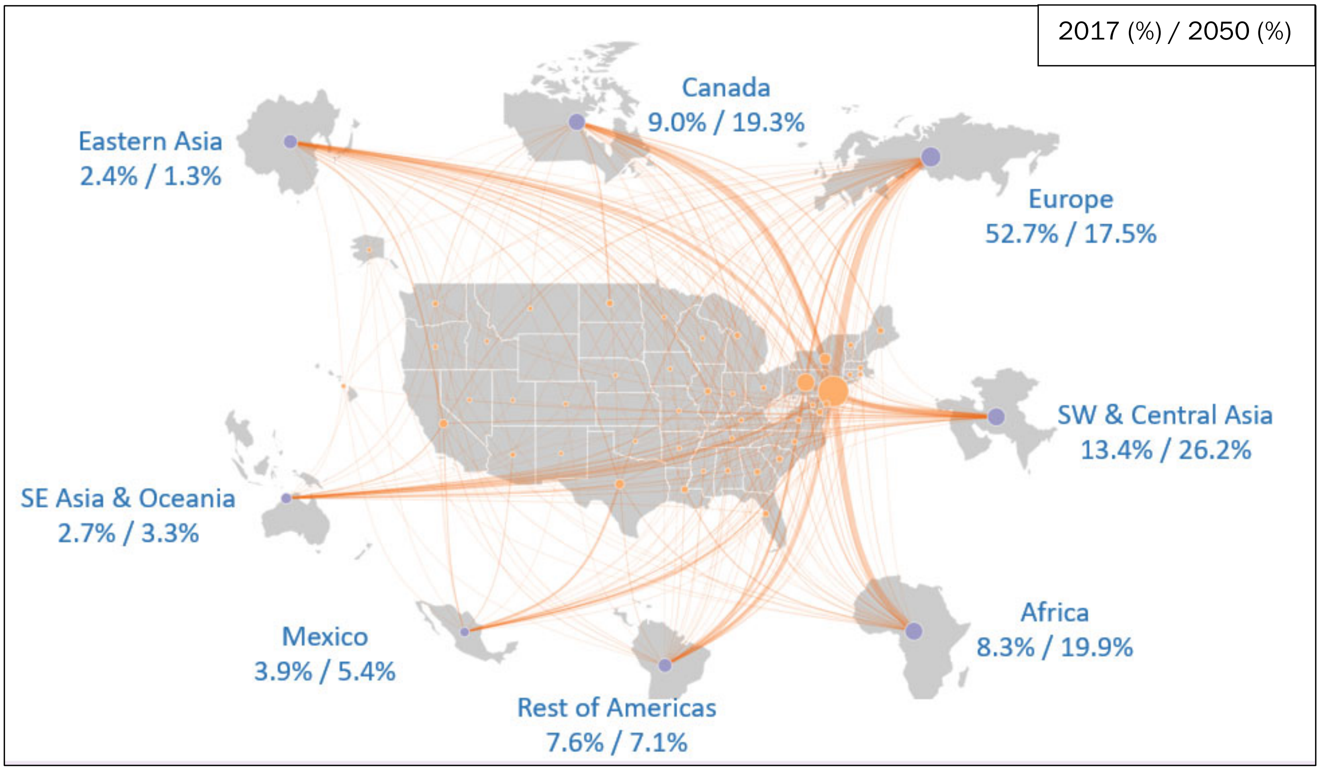
New Jersey plays a substantial role in international trade, as evident in the analysis of the tonnage and value moving to and from New Jersey from all parts of the globe. For the purpose of this analysis, international trade is separated into eight categories. In 2017, Europe accounted for more than half of export tonnage from New Jersey, followed by Rest of Americas, Europe, and SW & Central Asia, which each accounted for at least 14%. By 2050, export tonnage is projected to increase the most to SW & Central Asia, Africa, and Canada, with SW & Central Asia projected to account for 26% of export tonnage, Africa 20%, and Canada 19%. Export tonnage to Africa is projected to increase by more than 10 times and SW & Central Asia is expected to nearly quadruple. Export tonnage to Canada, Mexico, and SE Asia & Oceanic is projected to double. Export tonnage to Europe, and Eastern Asia is projected to decline. Export tonnage is shown in Figure 52 and Figure 56.

In 2017, 32% of export value was shipped to Europe, followed by 15% each to Canada and SW & Central Asia. Eastern Asia also accounted for nearly 15% of export goods by value. The distribution of export goods value is projected to maintain relatively stable into 2050. The value of goods exported to Africa is projected to increase more than 300% and to more than double to Canada, Mexico, and SW & Central Asia. No region is projected to experience a decrease in the total value of goods, despite projected decreases in tonnage. Export value is shown in Figure 53 and Figure 57.

Between 13% and 27% of import tonnage in 2017 originated in Canada, Europe, Africa, and SW & Central Asia, with Europe providing the most goods. The distribution of goods from each region is projected to be stable in 2050 with a slight increase in the share of goods from Europe and Eastern Asia and slight decreases from Europe and SW & Central Asia. The total tonnage of goods imported from Mexico, and SE Asia & Oceania are projected to more than double while total goods from Africa is projected to be cut in half, with a slight decrease in goods from SW & Central Asia. Import tonnage is shown in Figure 54 and Figure 58.

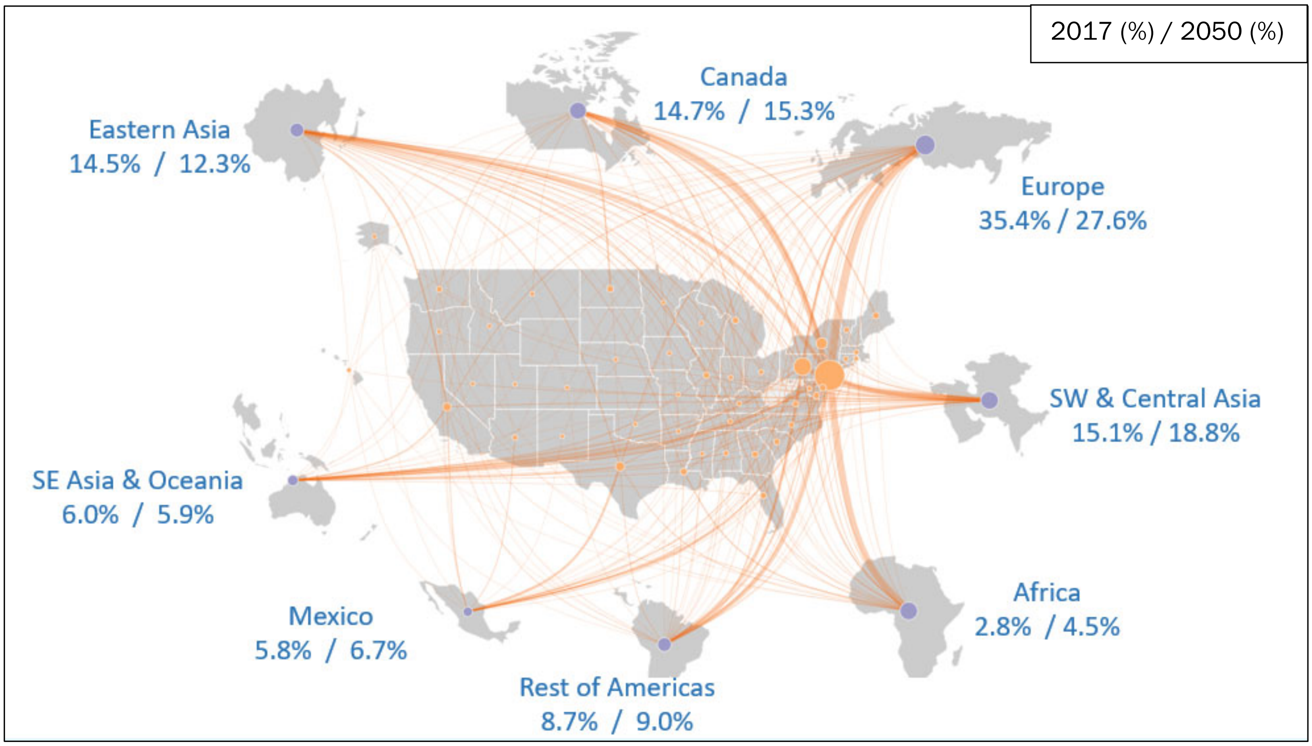
Nearly 37% of goods by value are imported from Europe, followed by 28% from Eastern Asia. Distribution of import goods by value is projected to remain the same into 2050. Total value of imported goods is projected to double for Canada, Mexico, Europe, Eastern Asia, and SE Asia and Oceania. The value of goods imported from Africa is projected to decline by three percent. Import value is shown in Figure 55 and Figure 59.

Figure 52. Global Export Trade Partners by Tonnage (2017/2050)



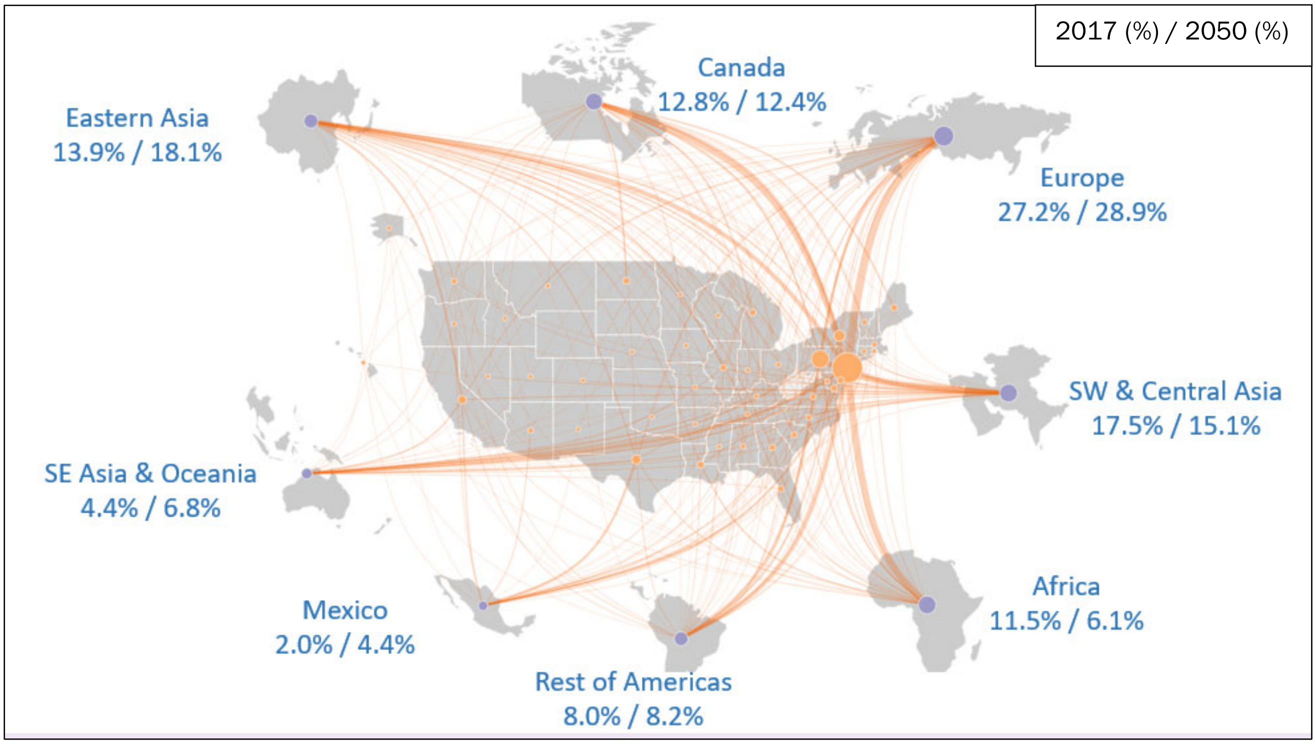
Source: FAF 5.3
Note: Lines in above graphic display 2017 flows

Figure 53. Global Export Trade Partners by Value (2017/2050)



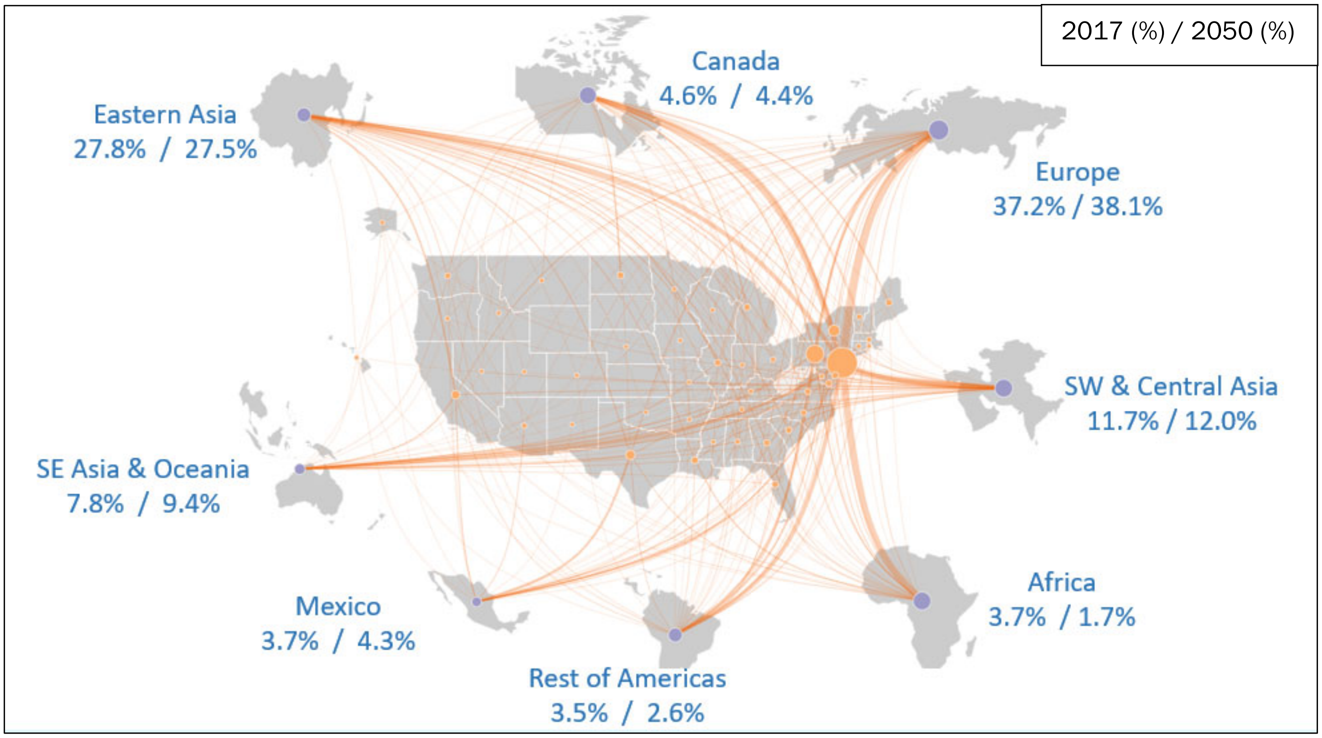
Source: FAF 5.3
Note: Lines in above graphic display 2017 flows

Figure 54. Global Import Trade Partners by Tonnage (2017/2050)



Source: FAF 5.3
Note: Lines in above graphic display 2017 flows

Figure 55. Global Import Trade Partners by Value (2017/2050)



Source: FAF 5.3
Note: Lines in above graphic display 2017 flows

Figure 56. Export Tons (Millions)

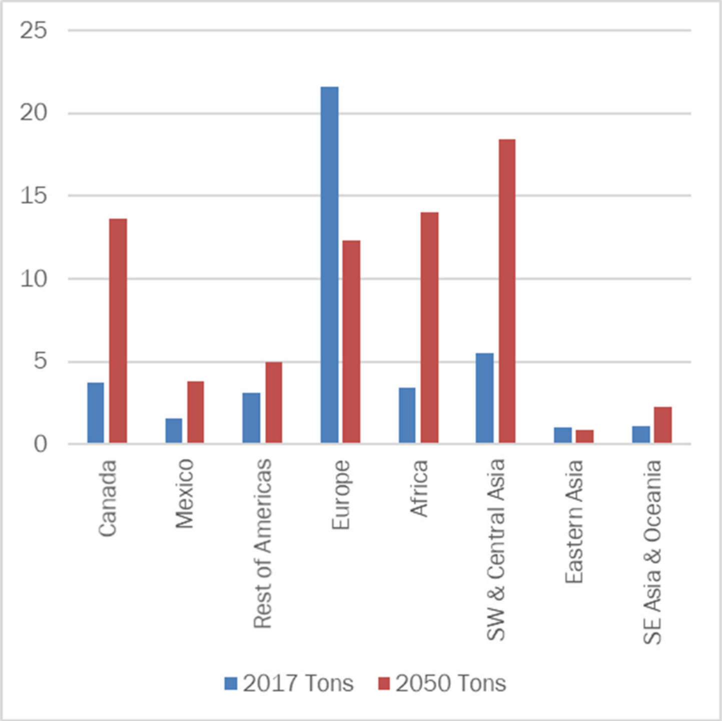


Figure 57. Export Value ($ Billions)

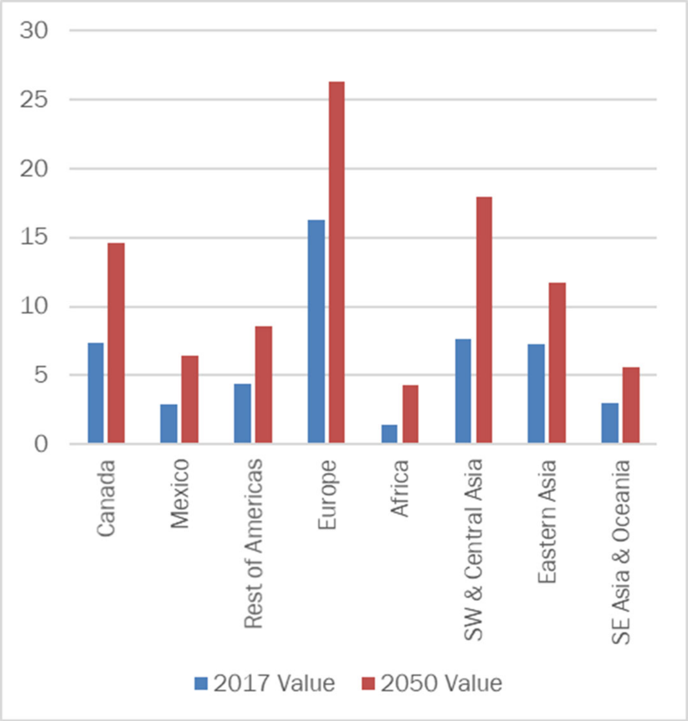


Figure 58. Import Tons (Millions)

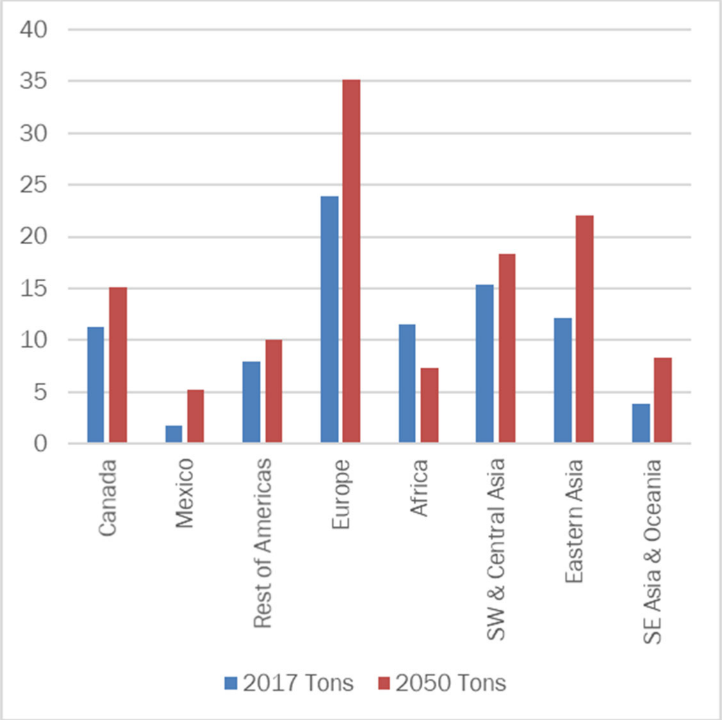
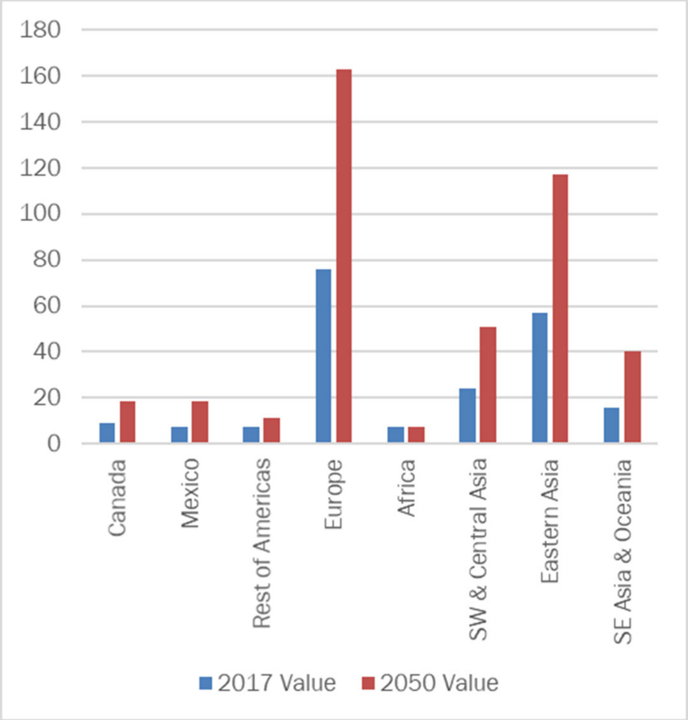


Figure 59. Import Value ($ Billions)



Source: FAF 5.3, WSP

PORT OF ENTRY/ EXIT ANALYSIS

Trade with international partners for New Jersey is dependent to a large extent on the domestic partners acting as a port of entry or port of exit, where the foreign leg of the journey ends or begins, respectively. Delineating between export and import activities taking place at the marine facilities directly within the State and those that need to travel to outside states can provide valuable insights on domestic freight traffic. The FAF-MSA Designations are listed in Appendix B.

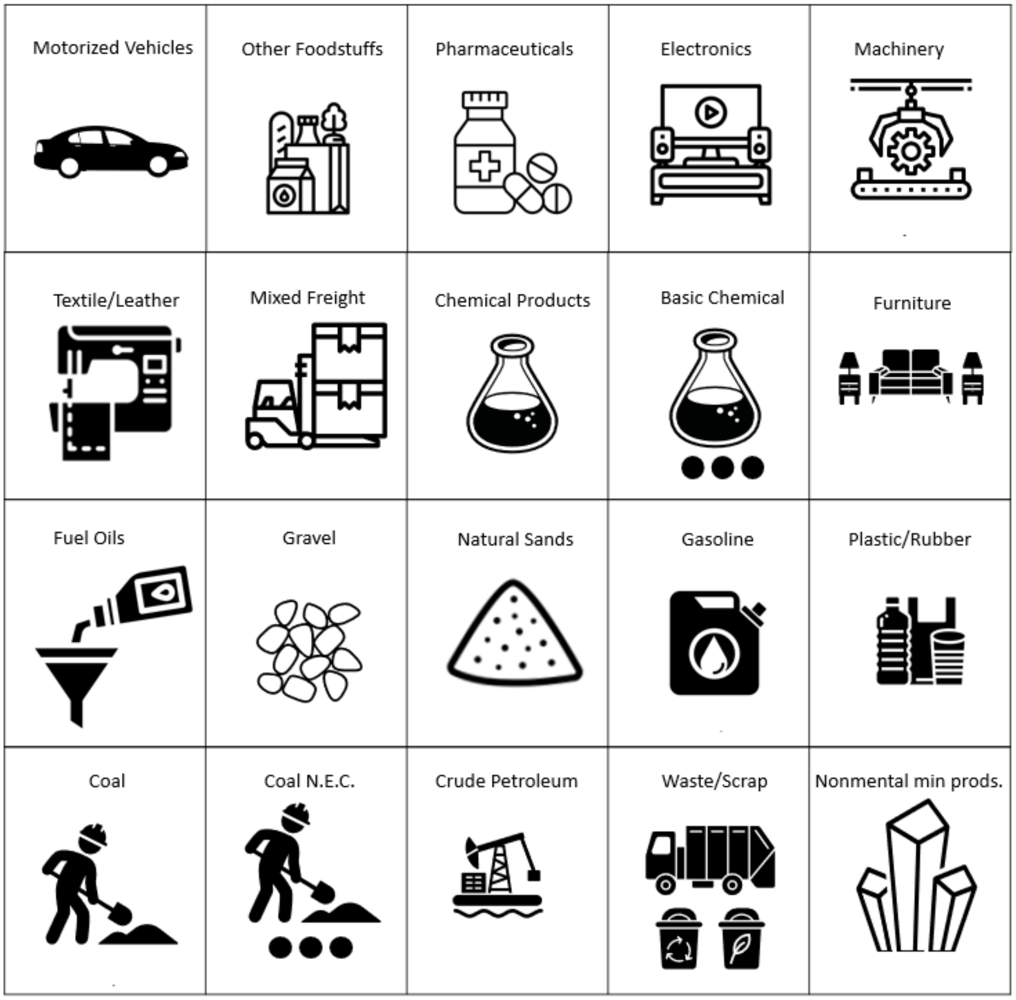
6.3 TOP COMMODITY GROUPS

6.3.1 Analysis by Commodity Groups

Using the data from FAF-5.3, current and forecasted growth by commodity group (tonnage and value) were analyzed, as summarized in Table 36 and Table 37, respectively. These commodities include internal, domestic, and international trade across all transportation modes.

The top commodity groups in New Jersey’s freight industry by tonnage and value are analyzed in this section. These top commodity groups are illustrated in Figure 60. Several commodities fall within both groups. The top ten commodity groups account for a combined 72% of goods by tonnage and 67% of value.

Figure 60. Top Commodity Groups



Source: WSP

Table 36. Forecast Tons by Commodity Group

Commodity	Tons 2017 (Millions)	Tons 2050 (Millions)	Tons Added (Millions)	Tonnage CAGR
19-Coal-n.e.c.[59]	98.2	159.0	60.8	1.5%
17-Gasoline	42.8	35.6	-7.2	-0.6%
12-Gravel	38.2	60.3	22.1	1.4%
41-Waste/scrap	35.3	49.8	14.4	1.0%
07-Other foodstuffs	34.1	55.9	21.8	1.5%
31-Nonmetal min. prods.	32.2	46.5	14.3	1.1%
18-Fuel oils	24.0	21.5	-2.5	-0.3%
15-Coal	21.2	9.0	-12.2	-2.6%
11-Natural sands	20.9	29.1	8.1	1.0%
16-Crude petroleum	20.7	10.8	-9.9	-1.9%
43-Mixed freight	17.8	35.1	17.3	2.1%
20-Basic chemicals	11.5	31.8	20.4	3.1%
24-Plastics/rubber	11.4	27.3	15.9	2.7%
32-Base metals	10.8	13.7	3.0	0.7%
03-Other ag prods.	9.9	12.7	2.8	0.8%
26-Wood prods.	9.6	18.1	8.5	1.9%
23-Chemical prods.	8.9	22.1	13.2	2.8%
06-Milled grain prods.	8.6	18.2	9.6	2.3%
27-Newsprint/paper	6.3	9.9	3.6	1.4%
36-Motorized vehicles	6.2	12.4	6.3	2.1%
30-Textiles/leather	5.8	12.6	6.8	2.4%
08-Alcoholic bev.	5.7	10.9	5.3	2.0%
34-Machinery	5.7	11.5	5.9	2.2%
13-Nonmetallic minerals	5.4	13.3	7.9	2.8%
35-Electronics	4.7	9.4	4.6	2.1%
40-Misc. mfg. prods.	4.6	13.0	8.3	3.2%
05-Meat/seafood	4.5	6.7	2.3	1.2%
33-Articles-base metal	4.5	6.6	2.1	1.2%
02-Cereal grains	4.3	16.1	11.8	4.1%
28-Paper articles	4.2	7.2	3.0	1.6%
39-Furniture	3.7	7.7	4.0	2.3%
29-Printed prods.	2.4	2.4	0.0	0.1%
04-Animal feed	2.0	3.6	1.6	1.8%
25-Logs	1.8	3.0	1.2	1.6%
21-Pharmaceuticals	1.7	5.2	3.5	3.4%
09-Tobacco prods.	0.8	0.8	0.0	-0.1%
10-Building stone	0.8	1.6	0.8	2.0%
22-Fertilizers	0.8	1.9	1.2	2.9%
38-Precision instruments	0.6	1.5	0.9	2.7%
01-Live animals/fish	0.5	1.5	1.0	3.6%
14-Metallic ores	0.5	0.8	0.3	1.6%
37-Transport equip.	0.3	0.5	0.2	1.7%

Source: FAF 5.3, WSP

[59] Other Coal and Petroleum Products, not elsewhere classified (LNG, Propane, Petroleum Asphalt, etc.)

Table 37. Forecast Value by Commodity Group

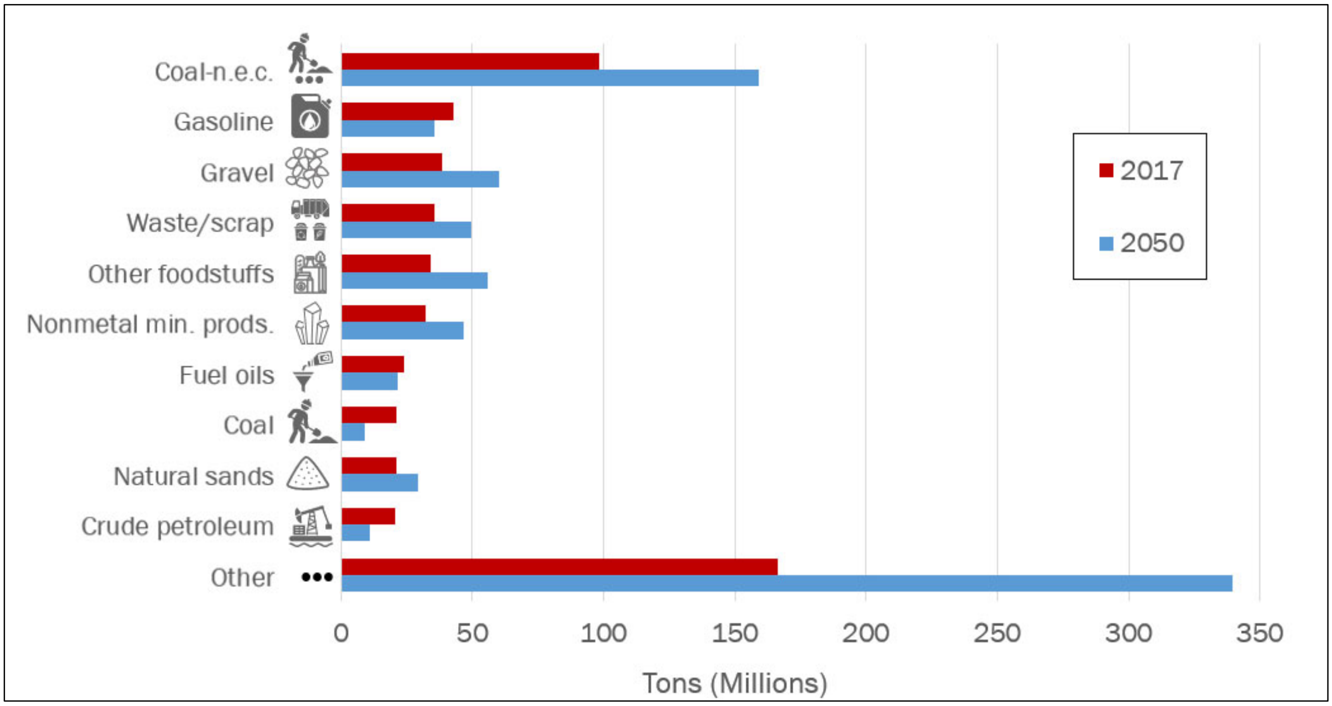
Commodity	Value 2017 ($Millions)	Value 2050 ($Millions)	Value Added (Millions)	VALUE CAGR
21-Pharmaceuticals	102,583	310,692	208,110	3.4%
35-Electronics	94,682	182,514	87,832	2.0%
36-Motorized vehicles	70,259	141,479	71,220	2.1%
30-Textiles/leather	69,331	150,954	81,624	2.4%
43-Mixed freight	63,945	126,758	62,813	2.1%
07-Other foodstuffs	58,687	97,064	38,378	1.5%
40-Misc. mfg. prods.	53,778	145,326	91,548	3.1%
23-Chemical prods.	51,388	125,638	74,250	2.7%
34-Machinery	43,620	88,688	45,068	2.2%
24-Plastics/rubber	40,845	97,538	56,693	2.7%
38-Precision	33,444	78,822	45,378	2.6%
19-Coal-n.e.c.	23,185	36,416	13,231	1.4%
20-Basic chemicals	22,622	57,328	34,707	2.9%
05-Meat/seafood	22,531	34,123	11,592	1.3%
17-Gasoline	22,167	17,826	-4,341	-0.7%
32-Base metals	21,288	28,289	7,002	0.9%
39-Furniture	20,326	41,375	21,049	2.2%
33-Articles-base metal	17,883	26,186	8,303	1.2%
03-Other ag prods.	17,128	23,102	5,974	0.9%
06-Milled grain prods.	16,810	35,597	18,787	2.3%
08-Alcoholic beverages	14,471	27,593	13,122	2.0%
31-Nonmetal min.	14,113	19,742	5,628	1.0%
29-Printed prods.	11,186	10,979	-206	-0.1%
18-Fuel oils	10,484	9,355	-1,129	-0.3%
28-Paper articles	8,907	15,234	6,327	1.6%
26-Wood prods.	8,850	16,476	7,626	1.9%
16-Crude petroleum	6,664	3,483	-3,181	-1.9%
27-Newsprint/paper	6,475	9,965	3,490	1.3%
37-Transport equip.	5,978	11,816	5,838	2.1%
41-Waste/scrap	5,002	9,278	4,276	1.9%
09-Tobacco prods.	4,089	3,632	-456	-0.4%
04-Animal feed	2,975	5,316	2,341	1.8%
15-Coal	2,015	1,107	-909	-1.8%
13-Nonmetallic minerals	1,584	2,721	1,138	1.7%
25-Logs	997	1,759	762	1.7%
02-Cereal grains	838	2,734	1,896	3.6%
01-Live animals/fish	759	2,533	1,773	3.7%
14-Metallic ores	433	494	61	0.4%
10-Building stone	406	814	409	2.1%
11-Natural sands	371	524	153	1.1%
22-Fertilizers	366	969	603	3.0%
12-Gravel	342	555	212	1.5%

Source: FAF 5.3, WSP

6.3.2 *Top Commodity Groups - Tonnage*

Figure 61 summarizes New Jersey's top commodity groups by tonnage in 2017. These commodity groups include internal, domestic, and international trade across all transportation modes. The top ten commodity groups, listed individually, account for a combined 72% of all goods by tonnage.

Figure 61. Tons and Shares by Commodity



Source: FAF 5.3, WSP

While the shares of tonnage by commodity are projected to be stable for most commodity groups from 2017 to 2050, worldwide, national and regional shifts in energy sources are projected to lower goods flows through New Jersey for several commodity groups[60] including: coal (58% decrease), crude petroleum (48% decrease), gasoline (17% decrease) and fuel oils (11% decrease). Other goods in the top ten are projected to increase 40-60% from 2017 to 2050. Due to the decrease in the listed energy sources, the share of "Other" goods is projected to rise from 31% of all goods movements to 42%. Overall goods tonnage in New Jersey is projected to double, with no other commodity groups projected to experience a substantial increase or decrease.

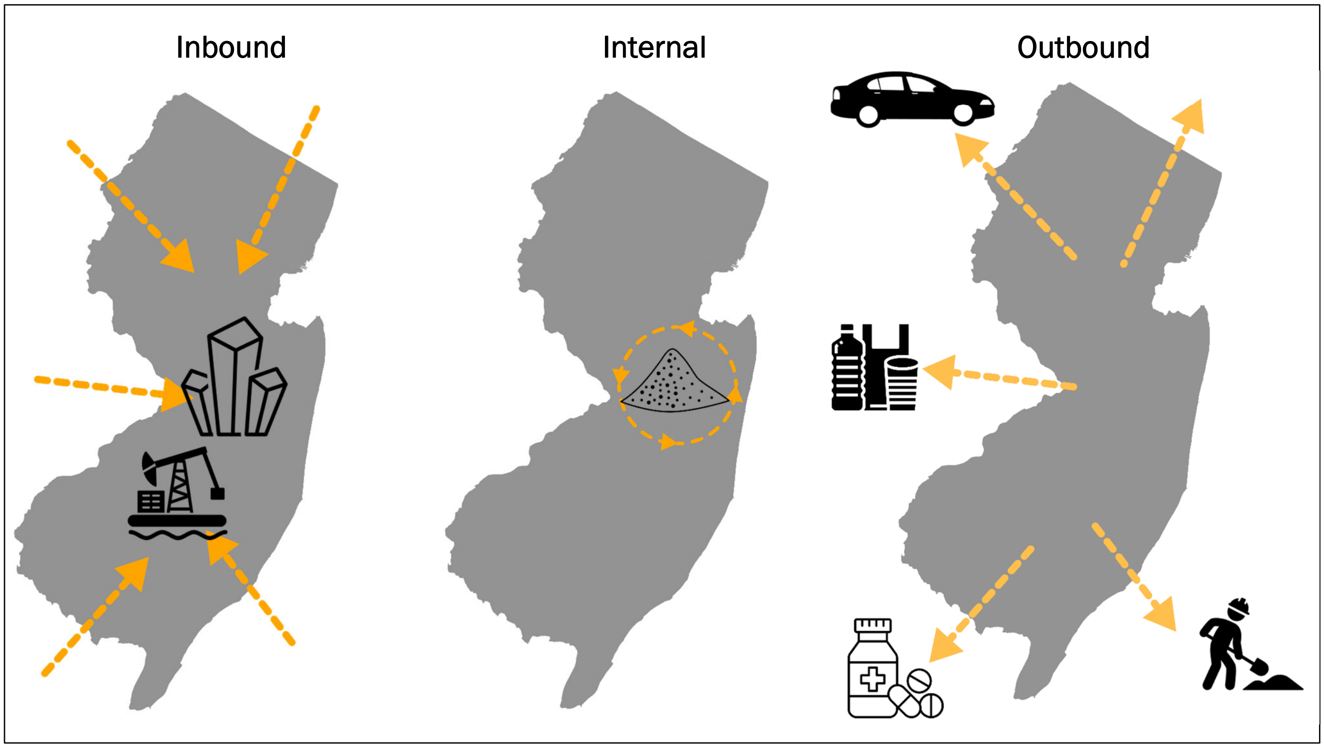
Overall, goods movement by tonnage is evenly distributed between the three direction types, with 31% of tonnage moved internally, 37% inbound and 33% outbound. Many of the top goods are primarily moved internally within New Jersey. For goods outside of the top ten commodity groups in tonnage, there is little change projected in distribution of direction patterns.

A slight shift in directional movement patterns is anticipated by 2050, with outbound tonnage increasing to a larger extent than internal and inbound tonnage. This is reflected in the outbound tonnage share, which will increase from 33% to 36%. Some notable commodity-specific directional shifts projected by 2050 include:

60 FAF projections may not be reflective of current Federal or statewide energy policies and may not reflect expected potential shifts in cargo types within these sectors.

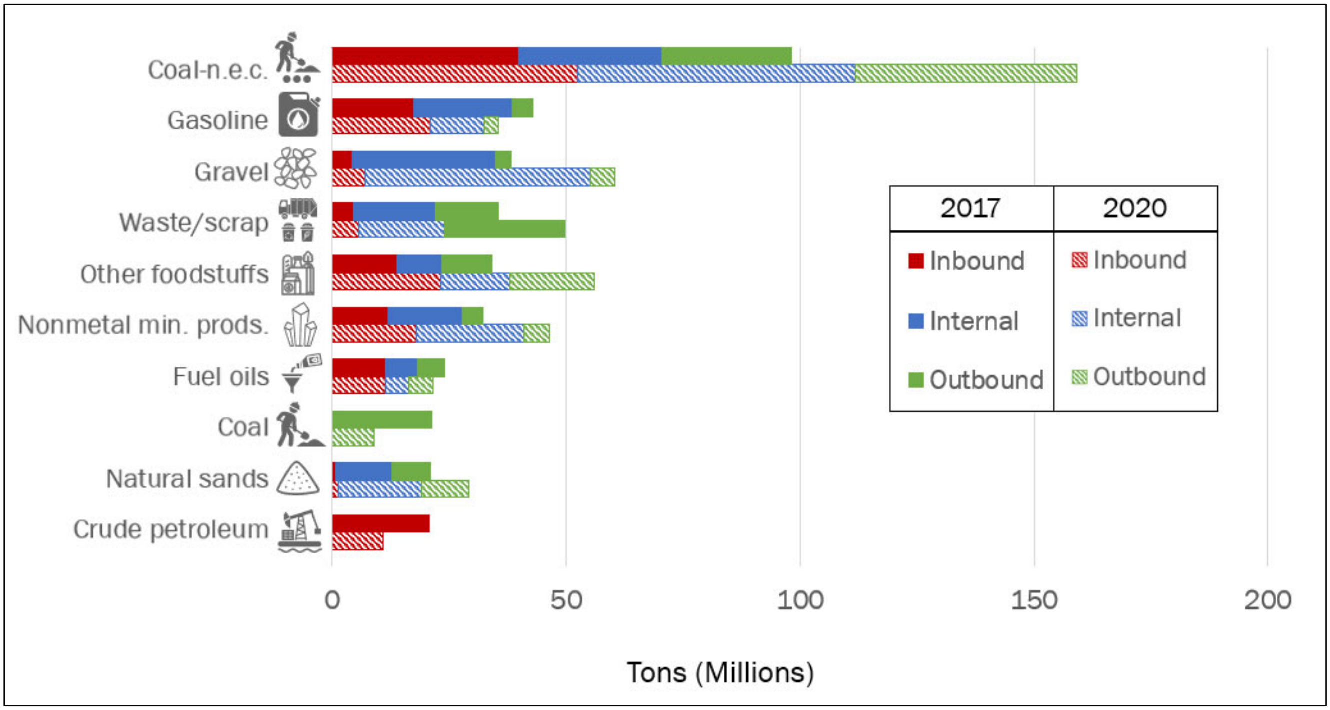
- Coal n.e.c.: primarily inbound to primarily internal
- Gasoline: primarily internal to primarily inbound
- Waste/scrap: primarily internal to primarily outbound
- Commodities where tonnage primarily moves in a single direction (internal, inbound, or outbound) based on 2017 data are shown in Figure 62. This includes the following commodities:
  - Inbound: Crude Petroleum and Nonmetal Mineral Products
  - Internal: Natural Sand
  - Outbound: Coal, Motorized Vehicles, Pharmaceuticals, and Plastic/Rubber

Figure 62. Directional Commodities by Tonnage



Source: FAF 5.3, WSP

Figure 63. Tons and Shares by Commodity and Direction



Source: FAF 5.3, WSP

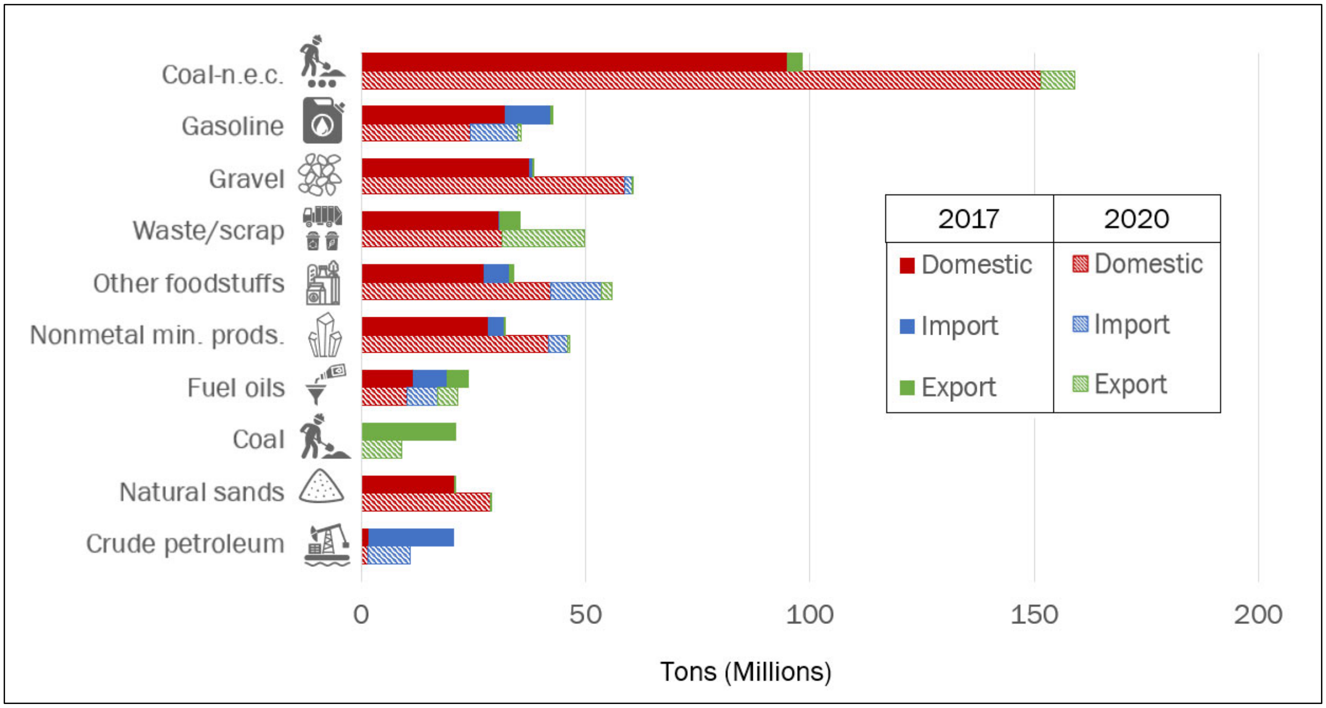
Figure 64 shows the distribution of commodity groups in 2017 and 2050 by trade type. 77% of tonnage in New Jersey is moved domestically. This percentage is projected to remain stable into 2050. Among the top ten commodity groups, the following are projected to experience significant shifts in trade type distribution:

- Gasoline is projected to increase six percentage points in imports and decrease seven percentage points in domestic
- Waste/scrap is projected to increase 24 percentage points in exports and decrease 24 percentage points in domestic
- Crude petroleum is projected to increase six percentage points in domestic and decrease six percentage points in imports

Commodity groups outside of the top ten projected to experience significant shifts in trade type distribution include:

- Import growth in nonmetallic minerals is projected to increase five times faster than domestic
- Domestic growth in basic chemicals is projected to increase six times faster than imports
- Import growth in machinery is projected to increase twice as fast as domestic
- Import growth in transportation equipment is projected to increase four times faster than domestic

Figure 64. Tons and Shares by Commodity and Trade Type



Source: FAF 5.3, WSP

6.3.3 *Top Commodity Groups - Value*

This section discusses the top commodity groups by value. The top ten commodity groups by value account for 67% of all goods moving in New Jersey (shown in Table 38 and Figure 65).

Table 38. Top Ten Commodity Groups by Value

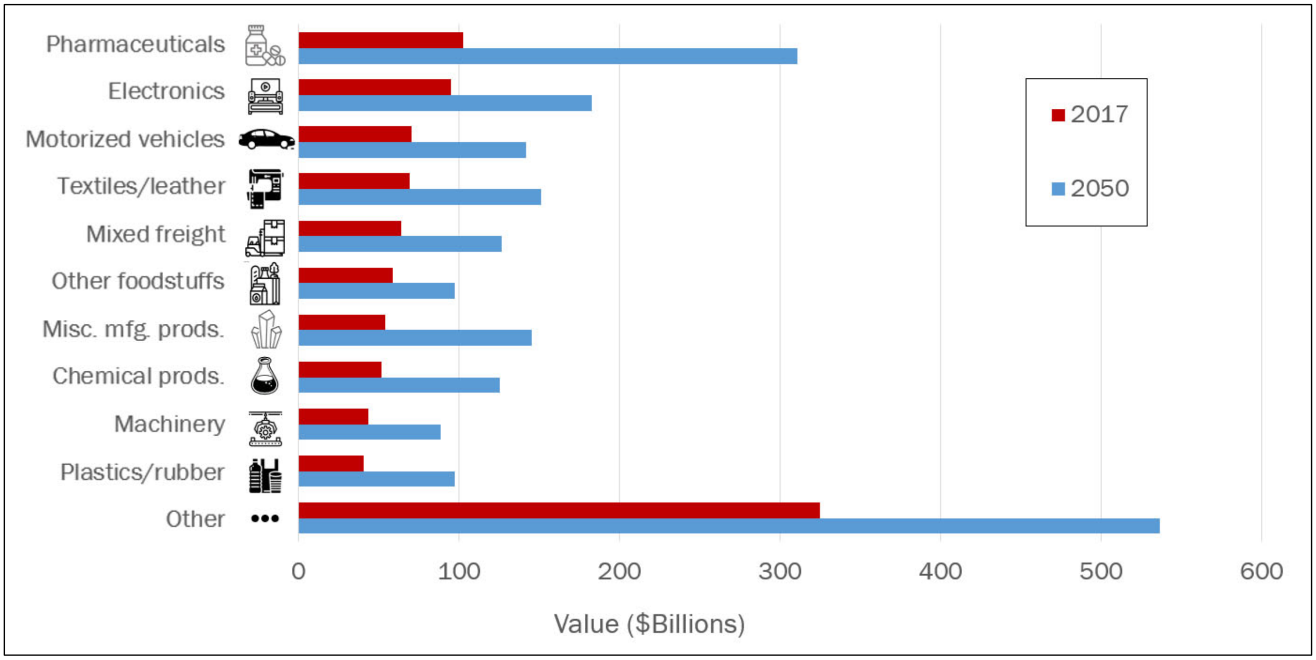
Commodity	Value (in billions)	Percent of total value
Pharmaceuticals	103	11%
Electronics	94	10%
Motorized Vehicles	70	7%
Textiles/Leather	69	7%
Mixed Freight	64	6%
Other Foodstuffs	59	6%
Miscellaneous Manufacturing Products	54	6%
Chemical Products	51	5%
Machinery	44	4%
Plastics/Rubber	41	4%

Source: FAF 5.3, WSP

Of note, only one commodity group (other foodstuffs) falls within the top ten for both tonnage and value in New Jersey.

Total value is not projected to decrease for any of the top ten value commodity groups. Overall, value is projected to more than double between 2017 and 2050 as shown in Figure 65. Among the top ten value goods, value is projected to grow significantly faster than average for electronics (203%), miscellaneous manufacturing products (170%), chemical products (144%) and plastics/rubber (139%). Value is projected to grow significantly slower than average for other foodstuffs (65%). The top ten value goods share is projected to remain relatively stable with pharmaceuticals exhibiting the most substantial growth, increasing from 11% of total value to 16% of total value. Additional goods not reflected in the top ten categories that are projected to increase in value more than 150% include live animals/fish (233%), cereal grains (226%), basic chemicals (153%), and fertilizers (165%).

Figure 65. Value and Shares by Commodity

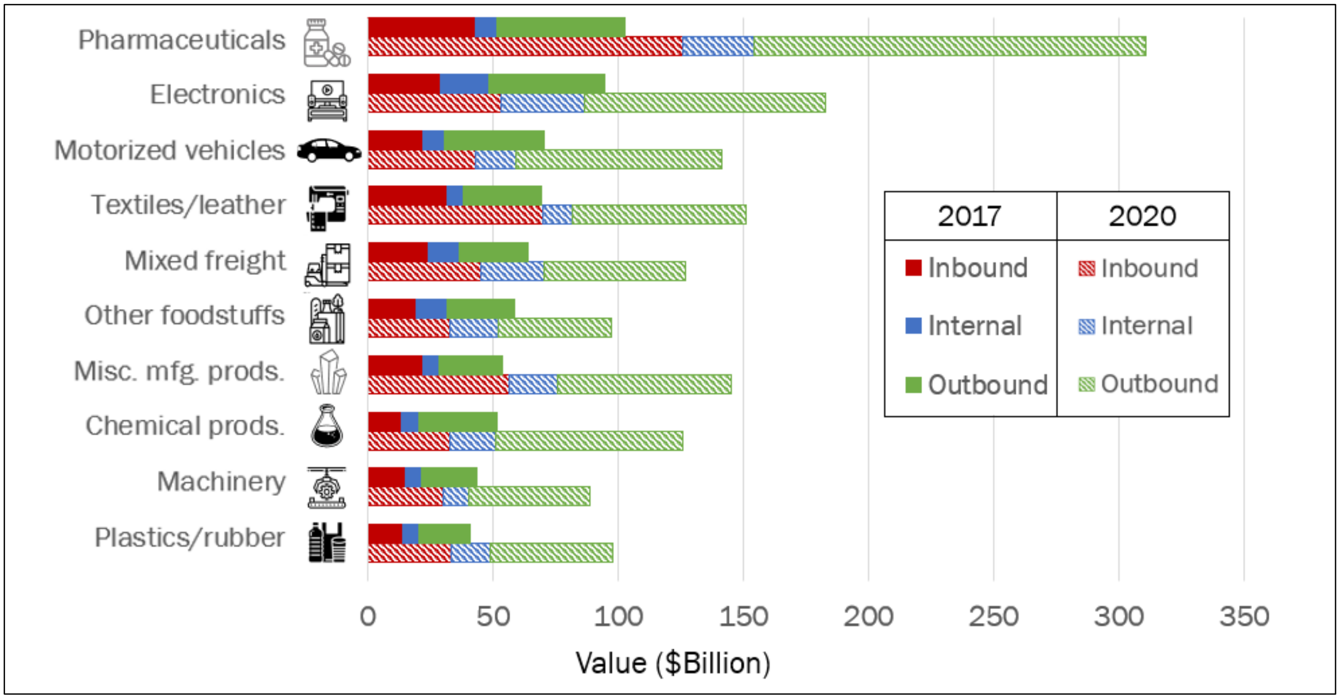


Source: FAF 5.3, WSP

Figure 66 shows the directional movement of the top ten goods by value in 2017 and 2050. Compared to high tonnage goods, high-value goods tend to move inbound/outbound more than internally. When considering value, 46% of goods in New Jersey move outbound, 38% inbound, and 16% internally. This breakdown is not projected to change significantly by 2050.

Between 2017 and 2050, the directional distribution of top ten commodity groups is not projected to change significantly. Commodity groups not reflected in the top ten groups that are projected to experience a significant change in directional breakdown include gasoline (value moving internally decreasing by nearly half) and waste/scrap (outbound value increasing by 136%).

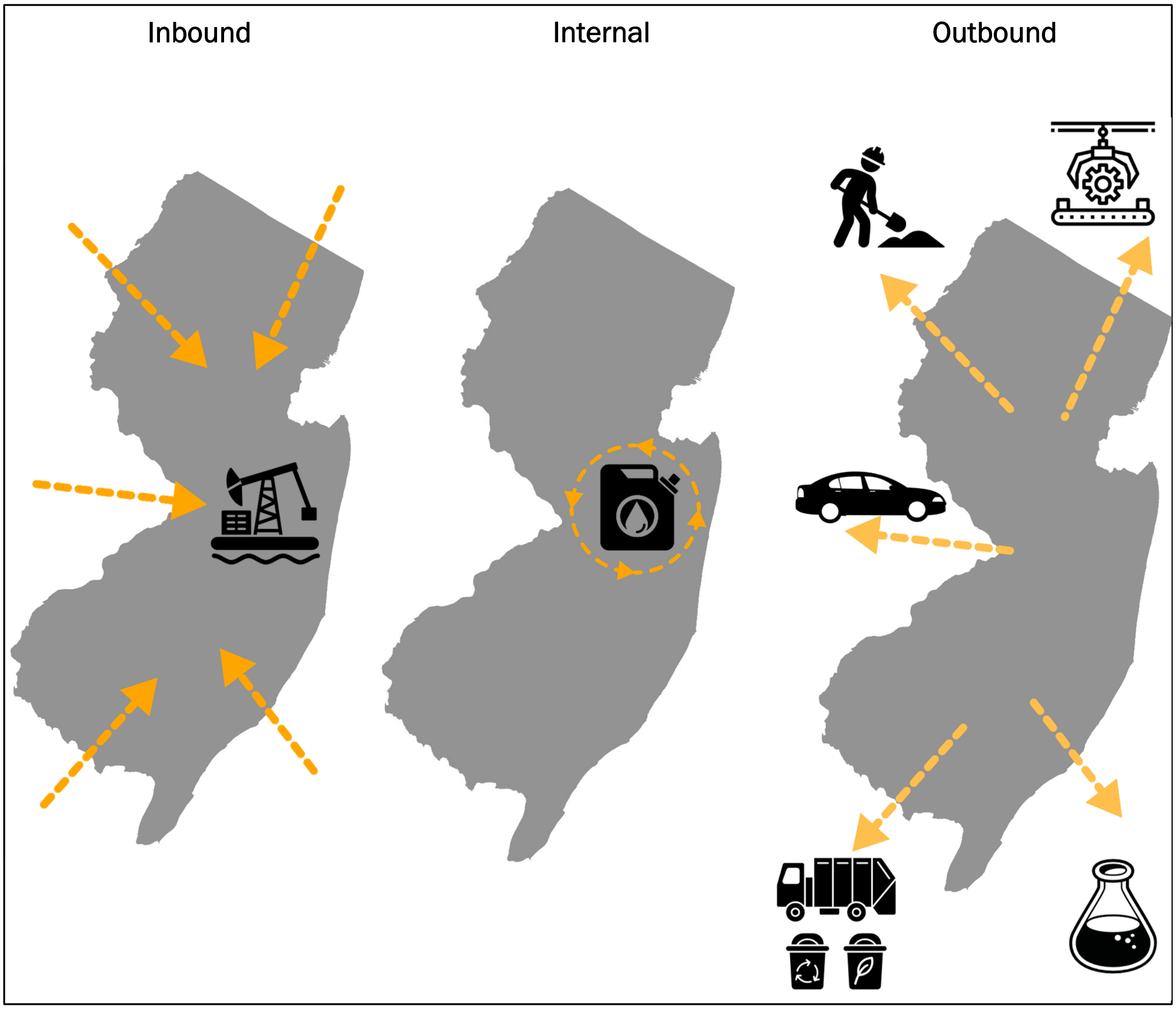
Figure 66. Value and Shares by Commodity and Direction



Source: FAF 5.3, WSP

Figure 67 illustrates goods relying primarily on specific movement types (internal, inbound, and outbound) based on value.

Figure 67. Directional Commodities by Value



Source: FAF 5.3, WSP

6.3.4 Top Commodity Groups – Trade Type

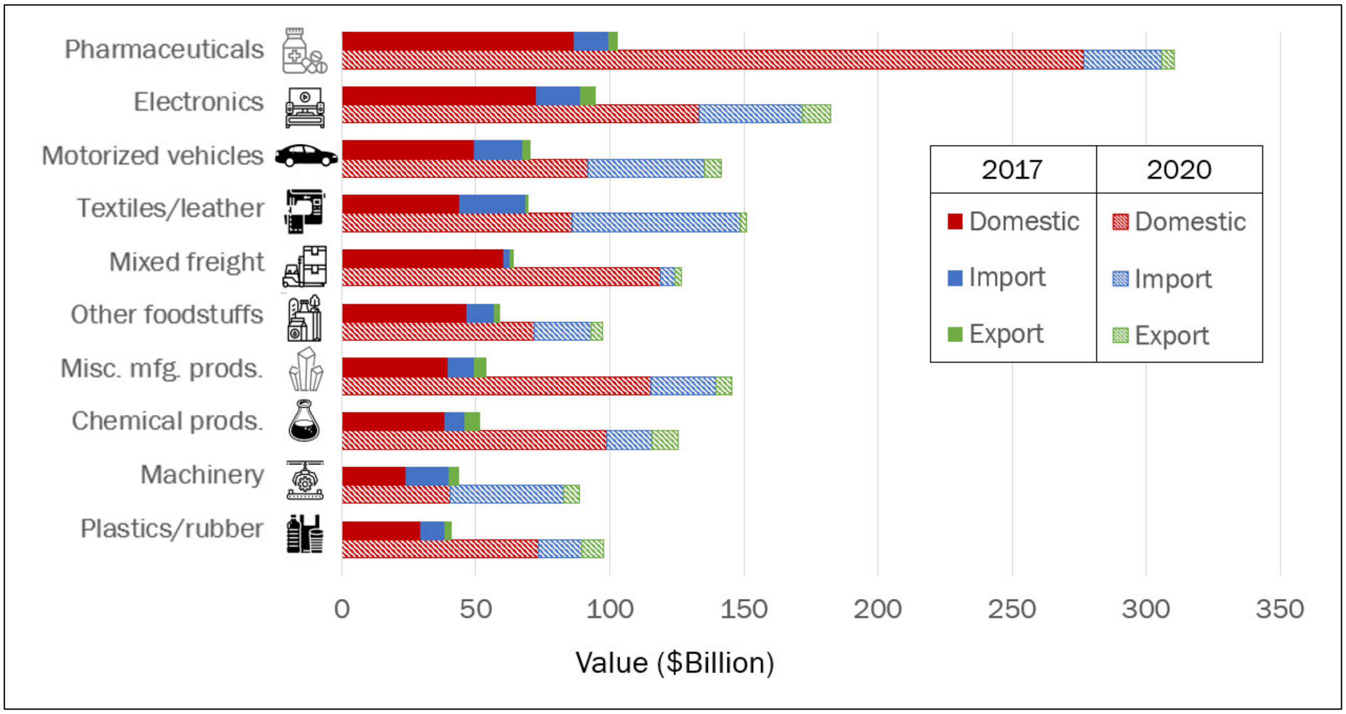
Figure 68 shows the distribution of commodity groups in 2017 and 2050 by trade type. In 2017, 74% of value is moved domestically, 21% are imports, and five percent are exports (compared to 77%, 15% and eight percent of tonnage, respectively). This indicates that New Jersey's imports tend to be higher tonnage and lower value and its exports tend to be lower tonnage and higher value. The distribution of value by trade type is projected to remain stable through 2050. Commodity groups within the top ten value goods overrepresented in specific trade types include:

- 85% of Pharmaceuticals by value are moved domestically
- 35% of Textiles/Leather by value are imports
- 94% of Mixed Freight by value is moved domestically
- 37% of Machinery by value are imports

Other commodity groups highly represented in certain trade types include:

- Domestic, greater than 90% share – Tobacco Products, Building Stone, Natural Sands, Gravel, Coal n.e.c, and Logs
- Imports, greater than 35% share – Alcoholic Beverages, Crude Petroleum (86%), Articles of Base Metal, and Furniture
- Exports, greater than 10% share – Cereal Grains (86%), Coal (100%), Fuel Oils, Fertilizers, Transportation Equipment, and Waste/Scrap (65%)

Figure 68. Value and Shares by Commodity and Trade Type



Source: FAF 5.3, WSP

Top ten commodity types in terms of value that are projected to experience a significant shift in trade type distribution include:

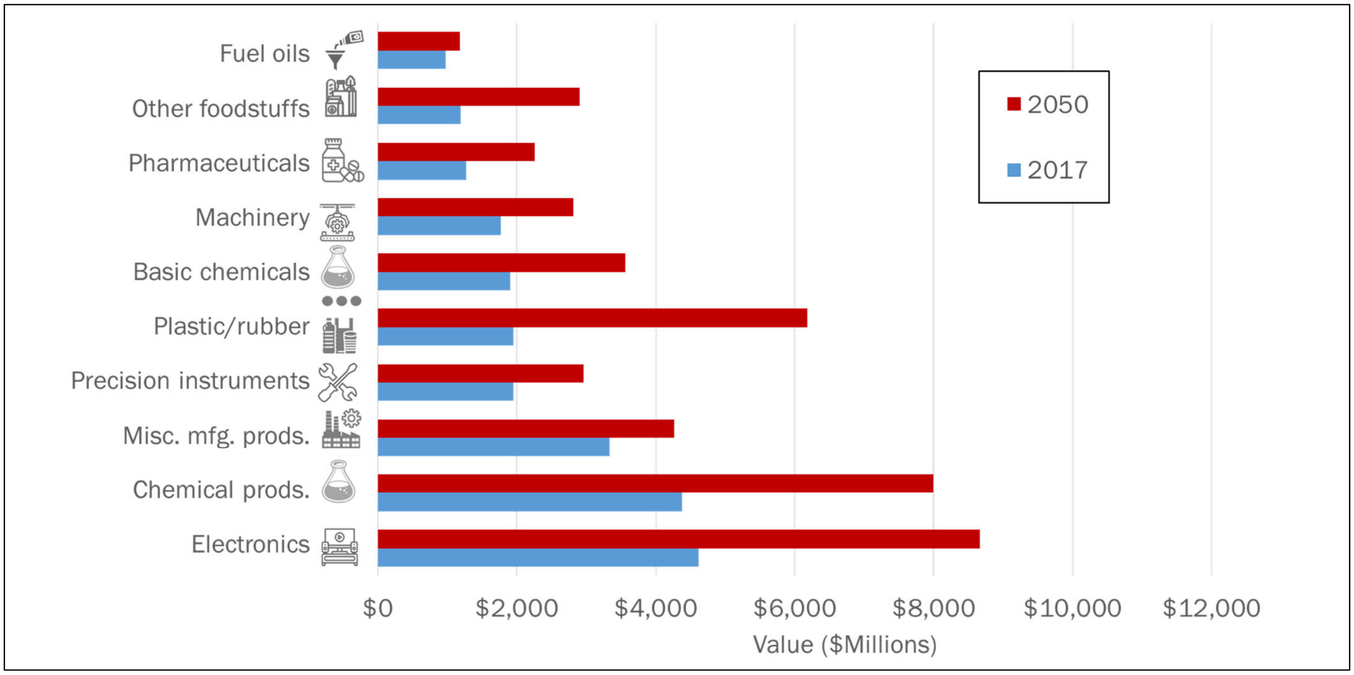
- Pharmaceuticals – domestic value to increase 219% (compared to 126% for imports and 54% for exports)
- Motorized Vehicles – import value to increase 141%, export value 131% (compared to 85% for domestic)
- Textiles/Leather – export value to increase 213%, import value 157% (compared to 94% for domestic)
- Miscellaneous Manufacturing Products – domestic value to increase 190%, import value to increase 152% (compared to 29% for exports)
- Machinery – import value to increase 165% (compared to 69% for domestics and 61% for exports)

Other commodity groups projected to experience a significant shift in trade type breakdown include:

- Cereal Grains – exports increase 741%, domestics and imports decrease in total value, shifting from 33% exports to 86% exports
- Nonmetallic Minerals – imports increase 275%, domestics increase 52% and exports decrease 12%, shifting from 9% imports to 21% imports
- Basic Chemicals – domestics increase 235%, compared to less than 100% for imports and exports, shifting from 54% domestics to 72% domestics
- Waste/Scrap – exports increase 182% compared to less than 30% for domestics and imports, shifting from 42% exports to 65% exports

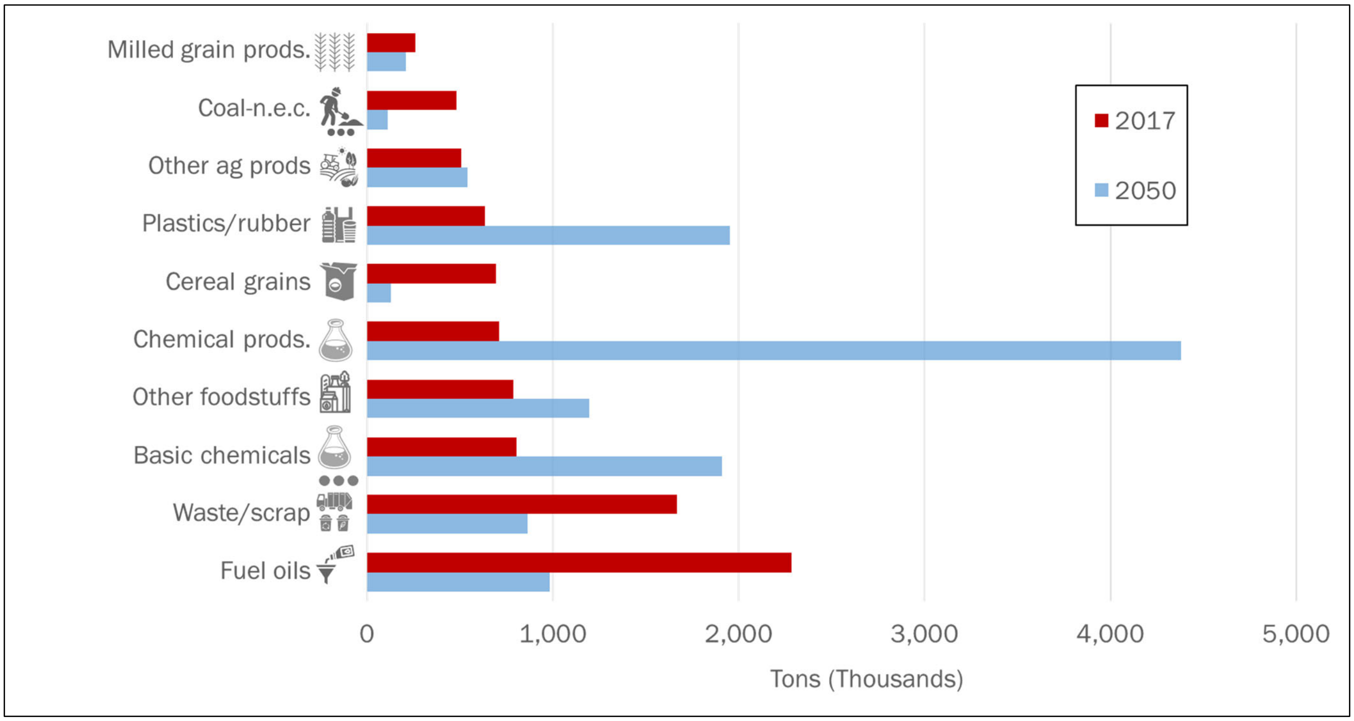
The domestic inbound and outbound flow of commodities groups were also analyzed. The top ten commodity groups by value and tonnage for exports moving through domestic partners are shown in Figure 69 through Figure 72. The top ten commodity groups by value and tonnage for imports are shown in Figure 73 through Figure 76. This analysis indicates the variety of different commodities moving to and from New Jersey, as well as the expected growth for nearly all commodities through 2050. Conversely, Figure 71 and Figure 72 indicate the substantial expected decline in coal exports through 2050.

Figure 69. Top 10 Export Commodity Groups through Domestic Partners (Port of Exit) by Value



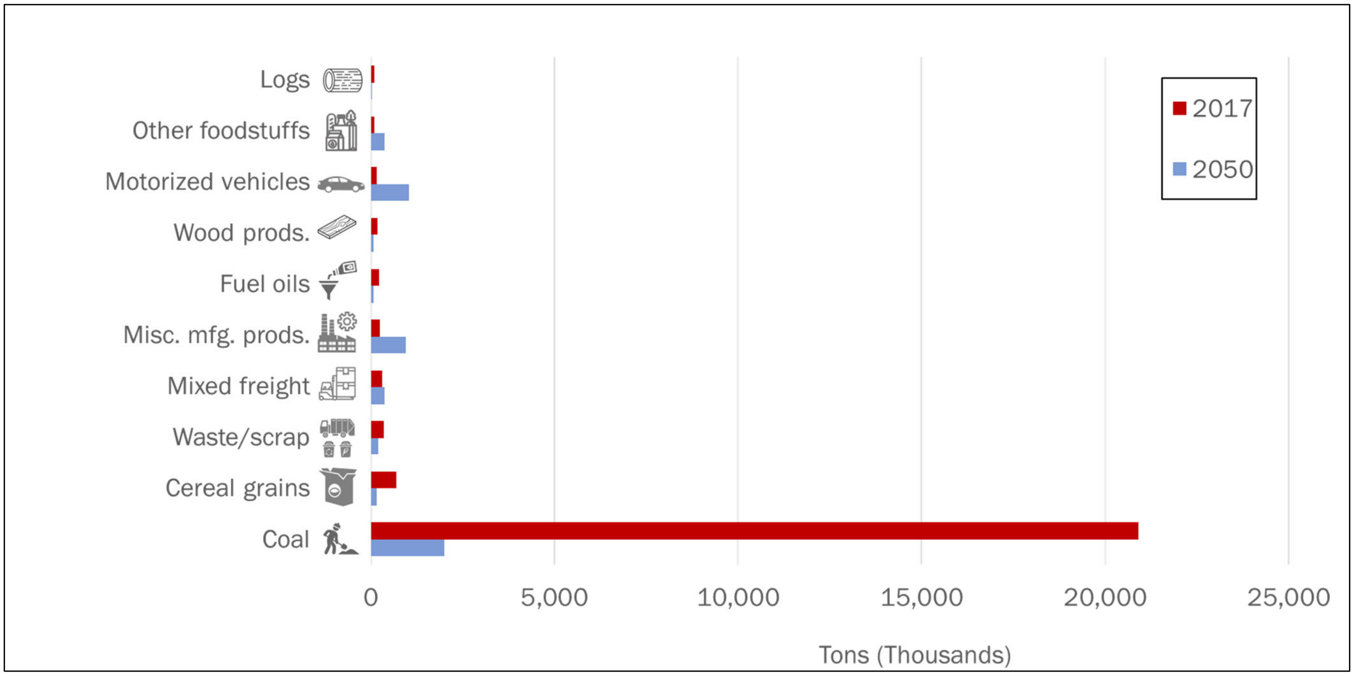
Source: FAF 5.3, WSP

Figure 70. Top 10 Export Commodity Groups through Domestic Partners (Port of Exit) by Tonnage



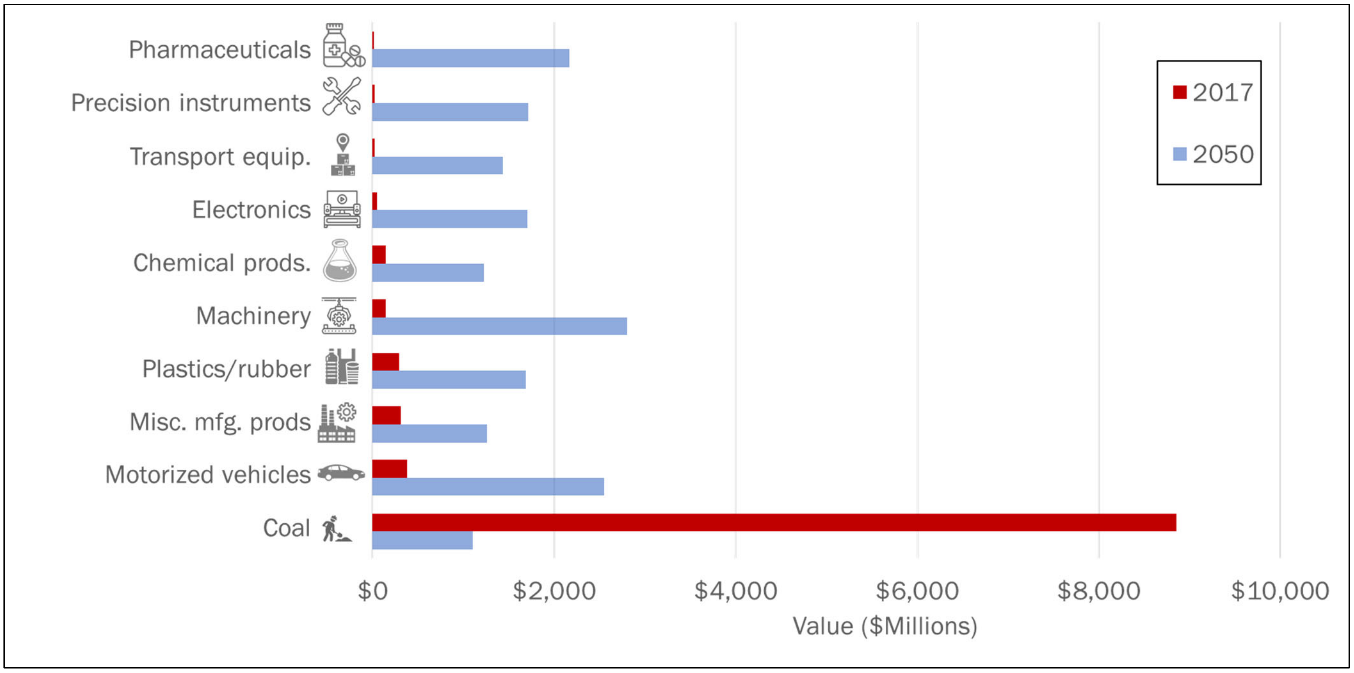
Source: FAF 5.3, WSP

Figure 71. Top 10 Export Commodity Groups for New Jersey as the Port of Exit by Tonnage



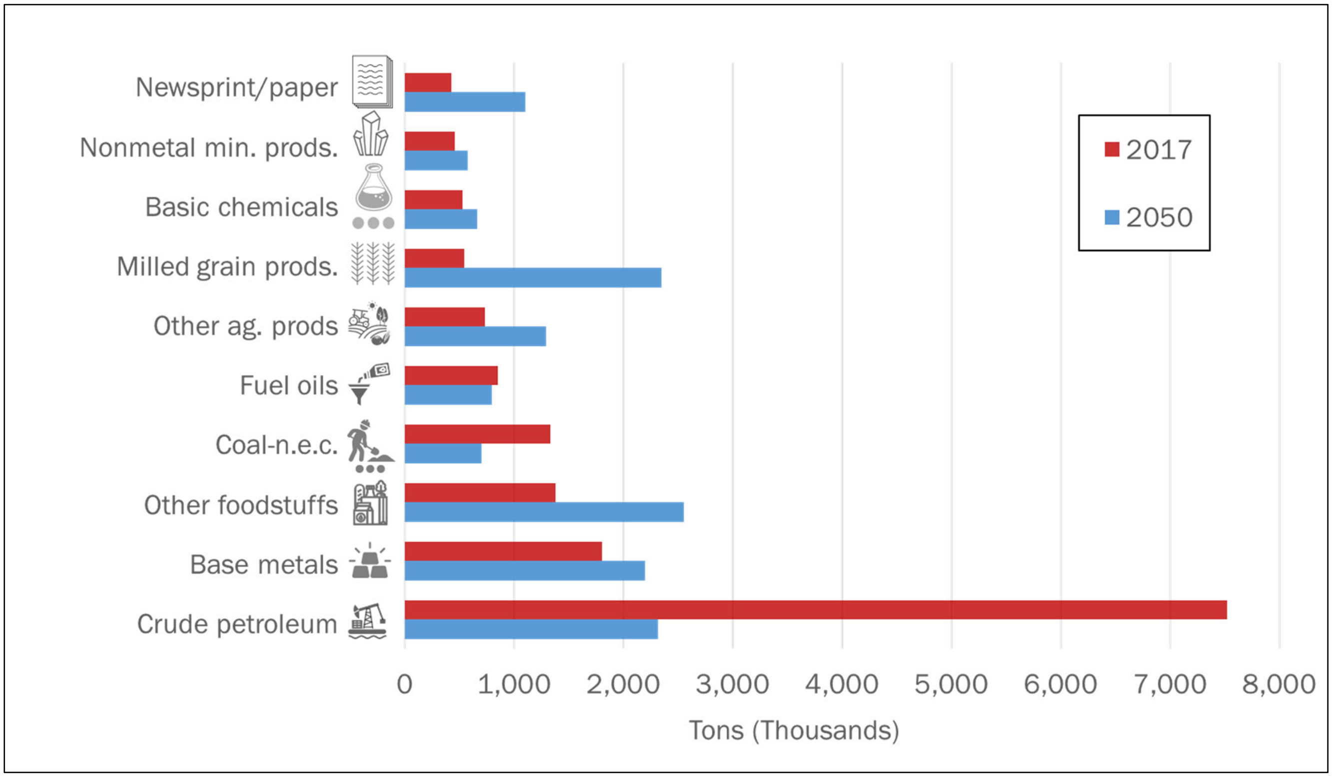
Source: FAF 5.3, WSP

Figure 72. Top 10 Export Commodity Groups for New Jersey as the Port of Exit by Value



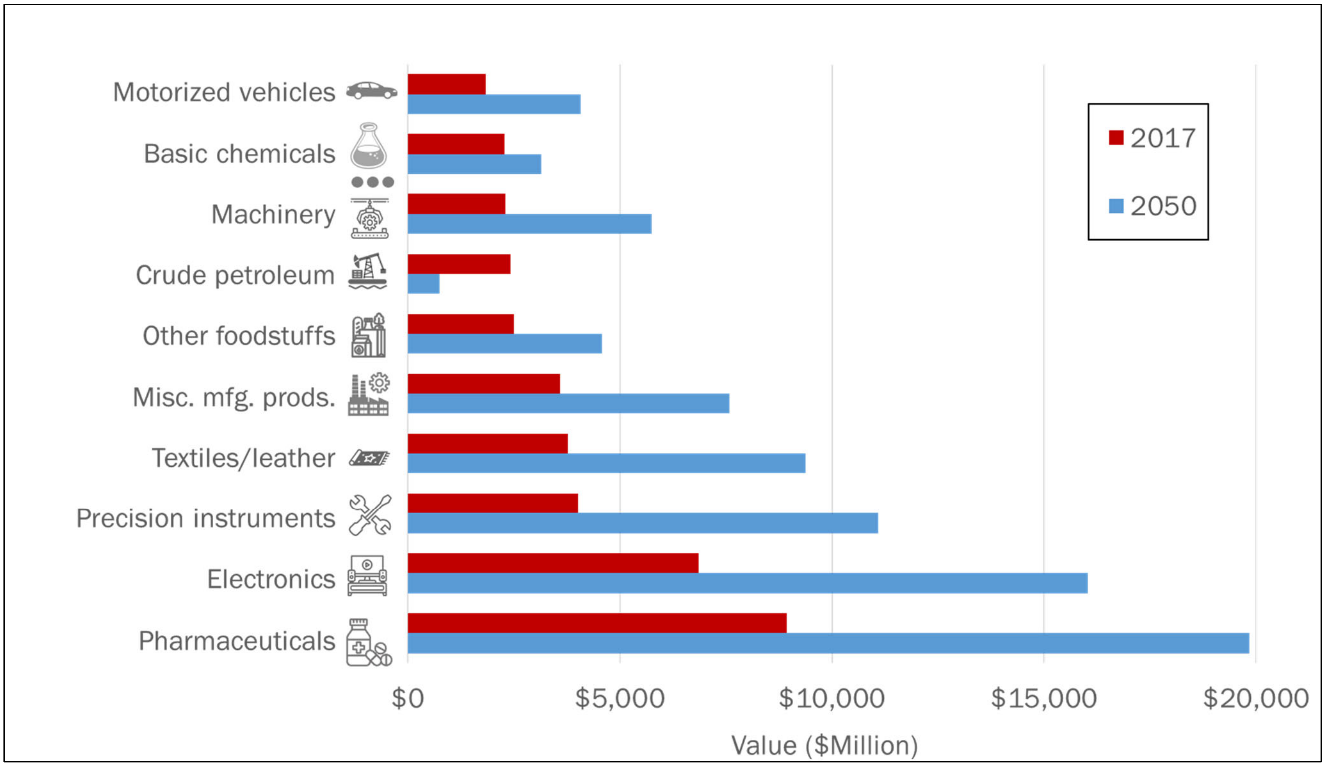
Source: FAF 5.3, WSP

Figure 73. Top 10 Import Commodity Groups through Domestic Partners (Port of Entry) by Tonnage



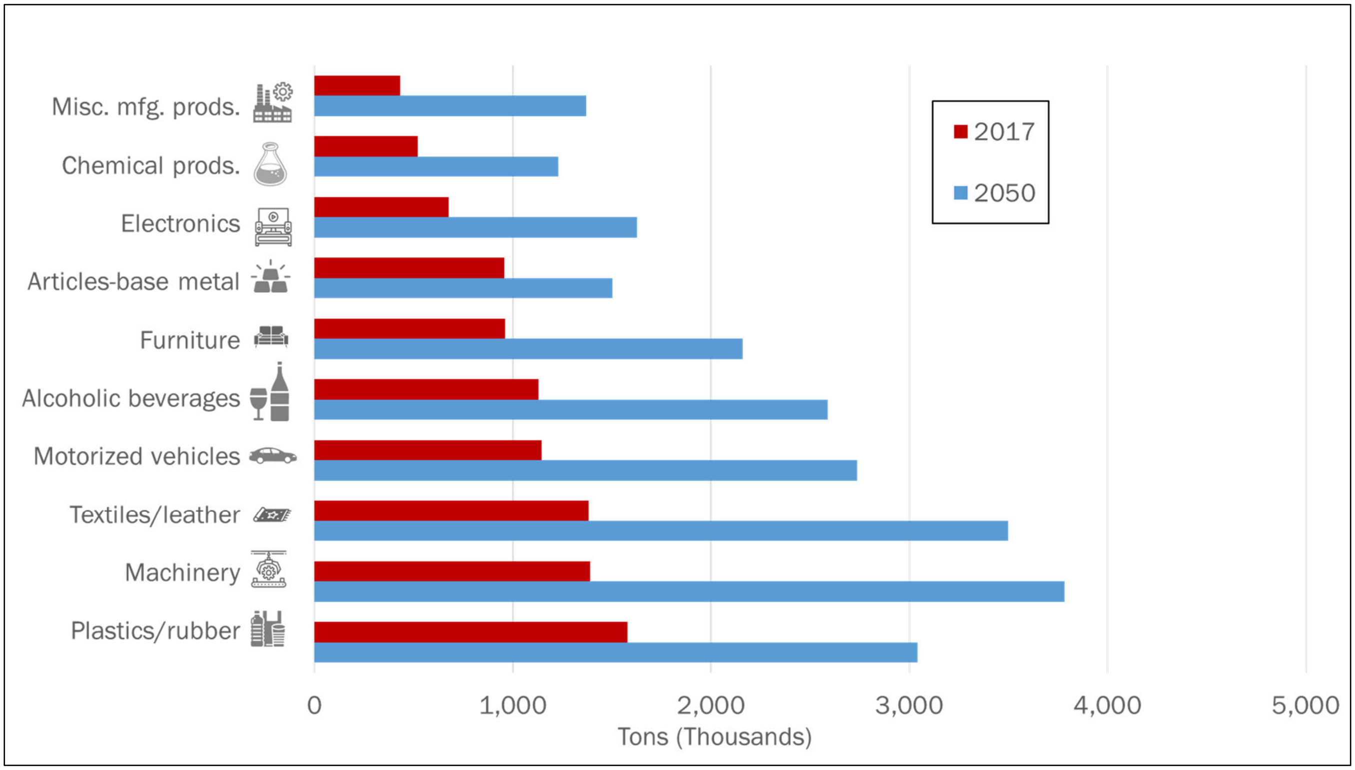
Source: FAF 5.3, WSP

Figure 74. Top 10 Import Commodity Groups through Domestic Partners (Port of Entry) by Tonnage



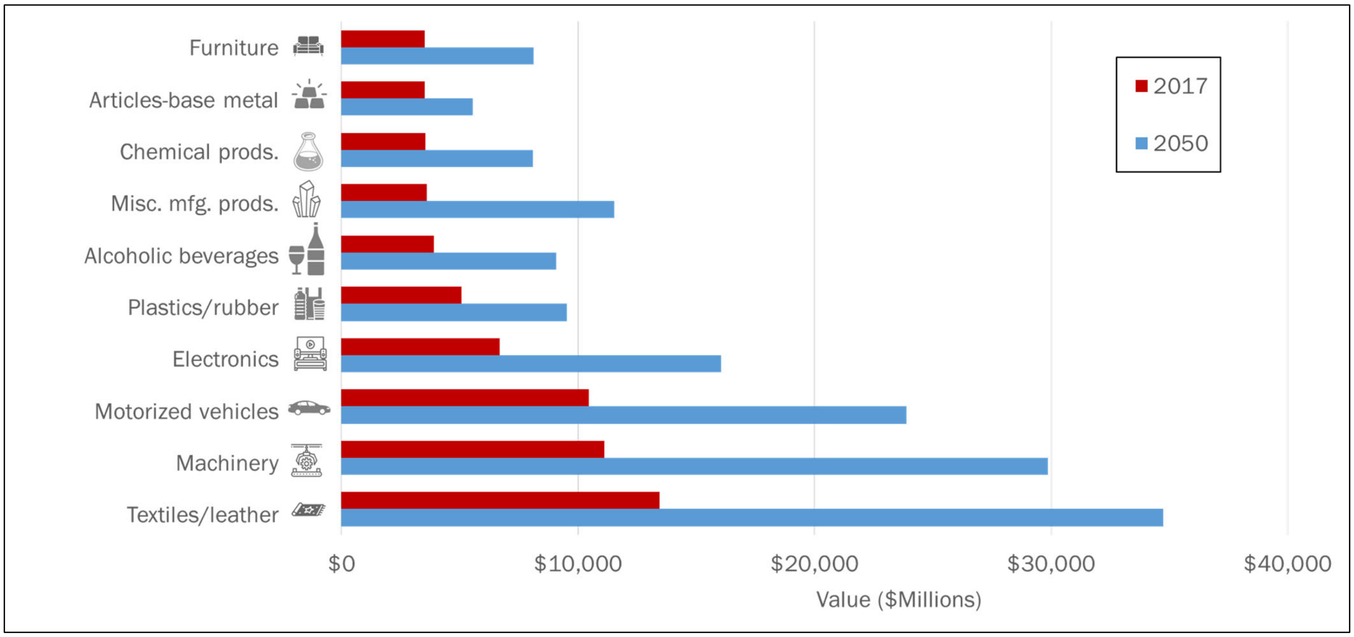
Source: FAF 5.3, WSP

Figure 75. Top 10 Import Commodity Groups for New Jersey as the Port of Entry by Tonnage



Source: FAF 5.3, WSP

Figure 76. Top 10 Import Commodity Groups for New Jersey as the Port of Entry by Value



Source: FAF 5.3, WSP

6.3.5 Top Commodity Groups - Mode

The FAF forecast is commodity driven – it looks at national and global changes in demand and product sourcing, and estimates changes in production and consumption by region. The FAF forecasts are generally policy-neutral and reflect one possible future, absent direct or concerted action to grow certain industries or to encourage the use of certain modes through transportation system investments or other means.

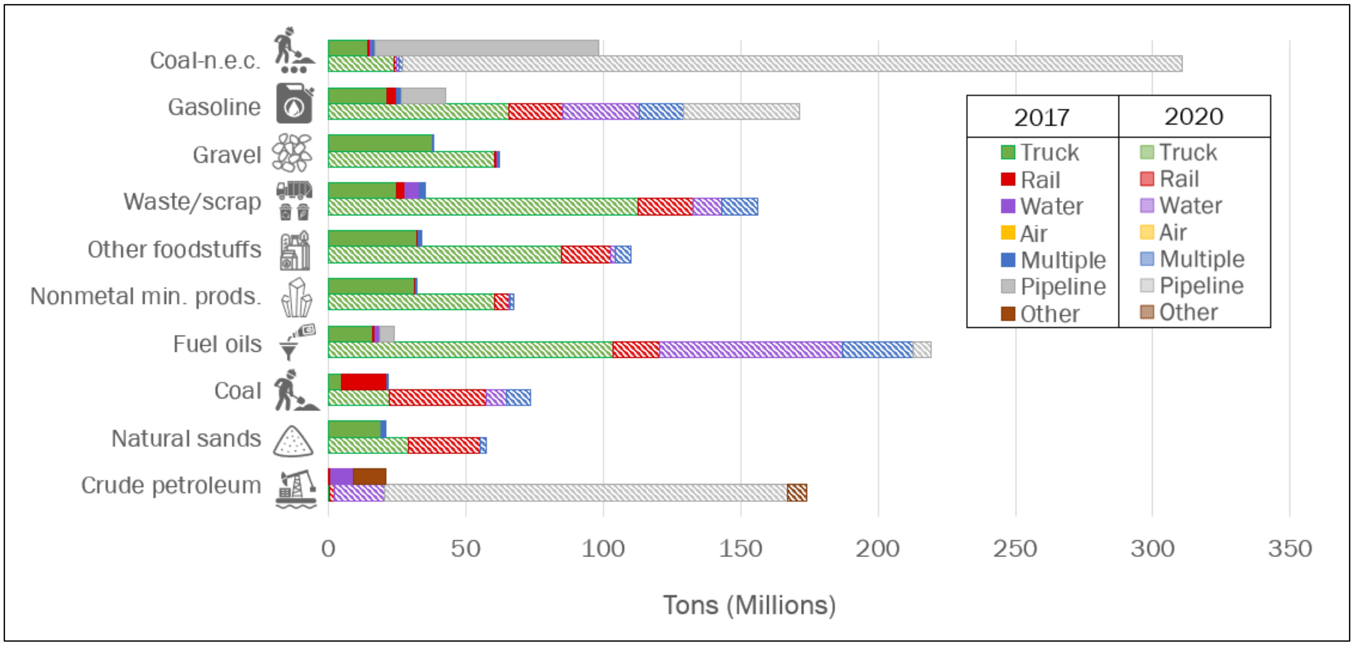
Commodity groups are heavily dependent on specific transportation modes. The seven modes of transportation include truck, rail, water, air, pipeline, multiple modes, and others or unknown. Details on each transportation mode are provided in Table 28. Movement by truck is by far the most common mode. The only top commodities not primarily moved by truck are coal (primarily moved by rail), crude petroleum (moved by water and "others/unknown"), gasoline (mix of truck and pipeline), and coal not elsewhere classified (primarily moved by pipeline).

Figure 77 shows the distribution of commodity groups by mode. In 2017, 65% of total tonnage in New Jersey is moved by truck, followed by 19% by pipeline and six percent by rail. These figures are projected to slightly shift by 2050 to 68%, 18%, and five percent, respectively.

Additionally, the following top ten commodity groups are projected to experience significant shifts in mode distribution from 2017 to 2050:

- Gasoline: truck to decrease 9%; rail to increase 7%
- Fuel oils: truck to decrease 6%
- Coal: truck to increase 8%; rail to decrease 8%
- Crude petroleum: water to decrease 14%; "none" to increase 9%

Figure 77. Tons and Shares by Commodity and Mode



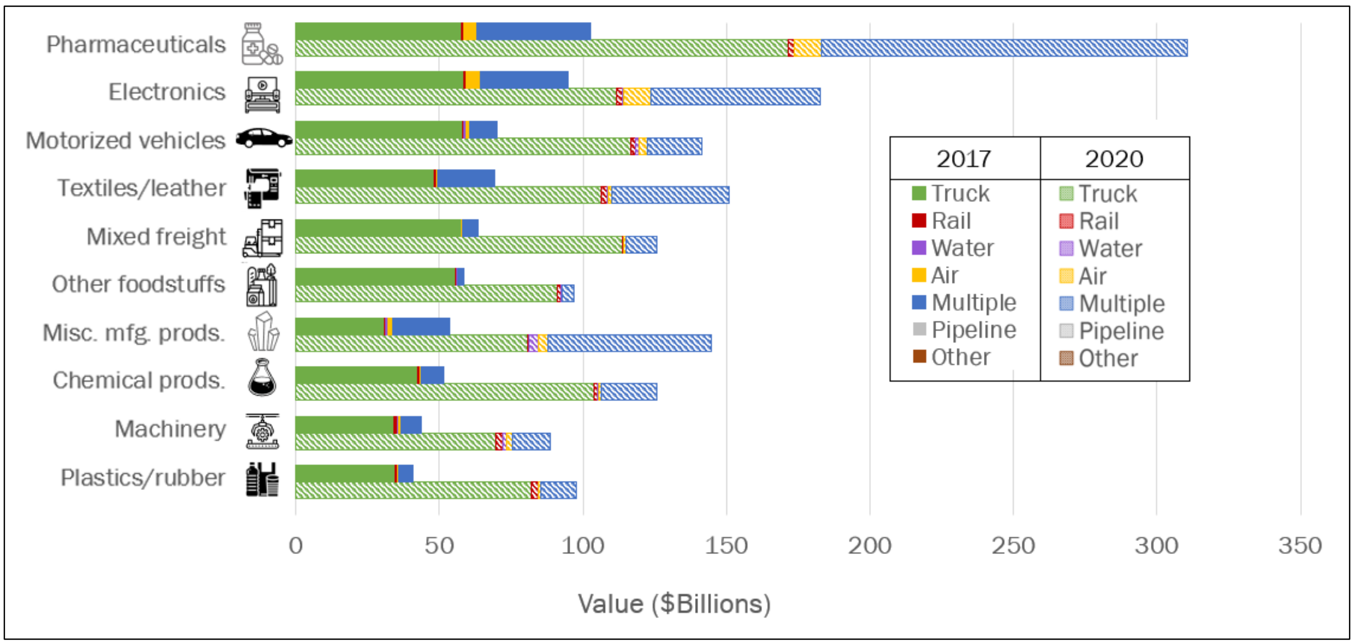
Source: FAF 5.3, WSP

The leading tonnage commodity groups are served by multiple transportation modes, but each has a single dominant mode, as Figure 77 illustrates. Additionally, while movements by multiple modes are less important for high-tonnage commodity groups, it is extremely important for higher-value commodity groups including electronics, manufactured products, textiles and leather, machinery, and vehicles and parts.

Figure 78 shows the mode distribution of top value commodity groups. 73% of commodities by value are moved by truck, 19% by multiple modes, and less than four percent by each of other modes. This distribution is not projected to change significantly in 2050. Top ten value commodity groups dependent on specific modes are shown below:

Moved by Truck	• Motorized Vehicles – 82% of value • Mixed Freight – 90% of value • Other Foodstuffs – 95% of value • Chemical Products – 83% of value • Plastics/Rubber – 84% of value
Moved by Multiple Modes	• Pharmaceuticals – 39% of value • Electronics – 32% of value • Textiles/Leather – 29% of value • Miscellaneous Manufacturing Products – 37% of value

Figure 78. Value and Shares by Commodity and Mode



Source: FAF 5.3, WSP

Other commodity groups highly represented in specific modes include:

- Truck (more than 90%)– live animals/fish, milled grain foods, building stone, logs
- Rail (more than 10%) – cereal grains, coal, fertilizers, waste/scrap
- Water (more than 20%) – crude petroleum (39%), waste/scrap (22%)
- Air (more than 5%) – waste/scrap (22%)
- Multiple Modes – precision instruments (43%)
- Pipeline (more than 20%) – gasoline (38%), fuel oils (22%), coal n.e.c (67%)
- None – crude petroleum (56%)

None of the top ten value goods are projected to significantly change their modal distribution. Other goods projected to significantly alter their modal distribution include:

- Cereal Grains – 1549% increase in rail, stagnant in other modes; shift from 15% rail to 75% rail
- Crude Petroleum – 66% decrease in water and slight increase in rail; shift from 4% rail to 9% rail and 56% none to 64% none
- Gasoline – 56% increase in rail, 34% decrease in truck, shift from 7% rail to 14% rail

6.4 MODES UTILIZED FOR KEY COMMODITIES

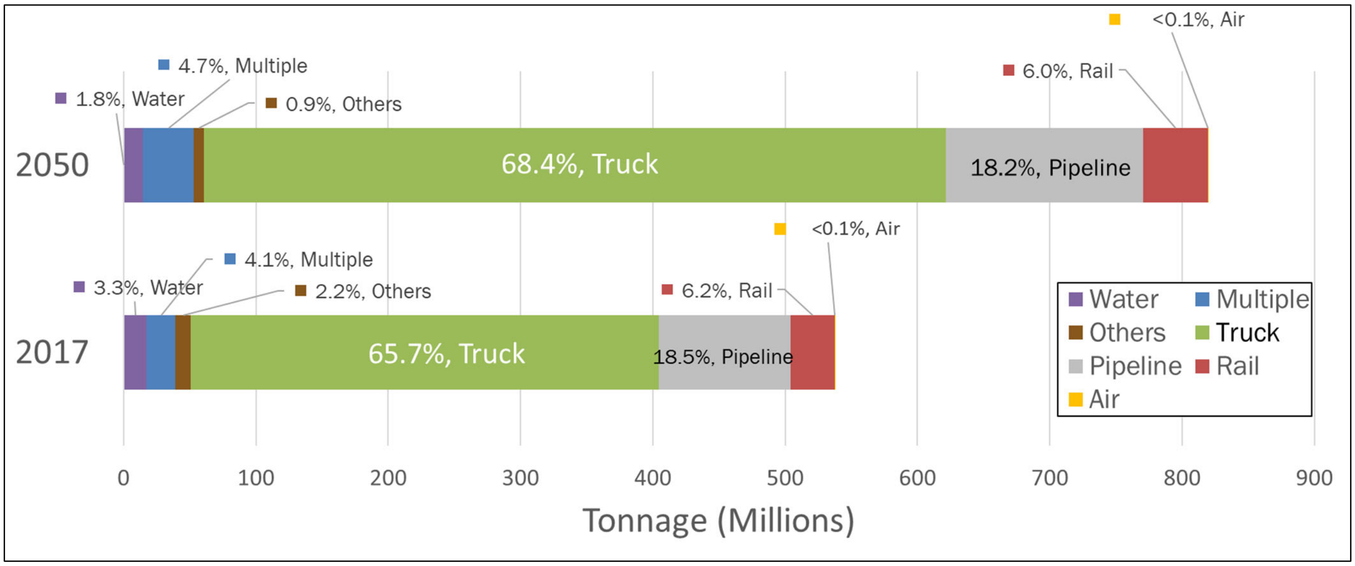
FAF reports transportation modes in two ways: as 'domestic' modes, which are more properly understood as 'state-to-state' modes because they handle the collection and distribution of import and export freight; and as 'international' modes, which are the modes of entering or leaving the U.S. The discussion below first addresses the domestic or state-to-state modes and then addresses international modes. Domestic modes are the modes used between domestic origins and destinations within the United States. International modes comprise the mode of origins or destinations with a foreign region. International modes contain import and export flows. Import Flows contains data associated with freight moved from foreign origins to domestic destinations. Export Flows contains data associated with freight moved from domestic origins to foreign destinations.

6.4.1 Overview of Domestic State-to-State Modes

New Jersey is served by a full range of modal options for state-to-state freight transportation. Commodity flow by mode type by tonnage, and value are illustrated in Figure 79 and Figure 80, respectively. Key findings include:

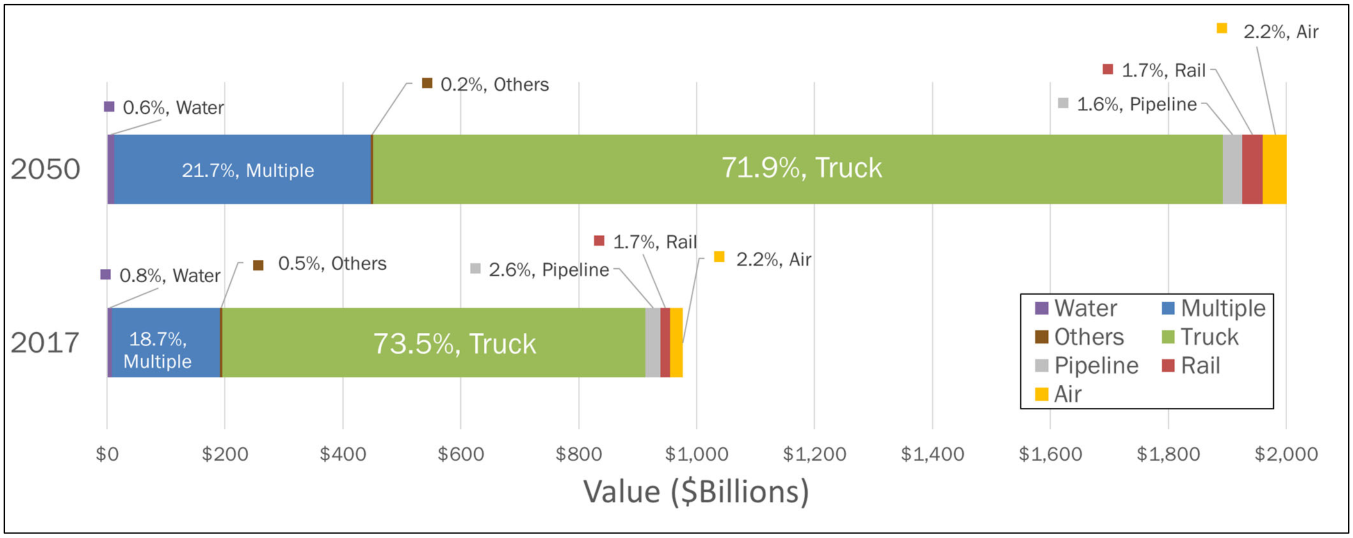
- Trucking handles 353 million tons (68% of total) and $717 billion in value (73% of total)
- Pipeline handles 100 million tons (18% of total) and $26 billion in value (3% of total)
- Rail handles 33 million tons (6% of total) and $16 billion in value (2% of total)
- Water handles 18 million tons (2% of total) and $8 billion in value (1% of total)
- Multiple modes handle 22 million tons (5% of total) and $183 billion in value (19% of total)
- Air handles less than 1 million tons (less than 1% of total) and $21 billion in value (2% of total)
- Other modes represent 12 million tons (1% of total) and $4 billion in value (less than 1% of total)

Figure 79. Commodity Flow by Mode Type (by tonnage)



Source: FAF 5.3, WSP

Figure 80. Commodity Flow by Mode Type (by value)



Source: FAF 5.3, WSP

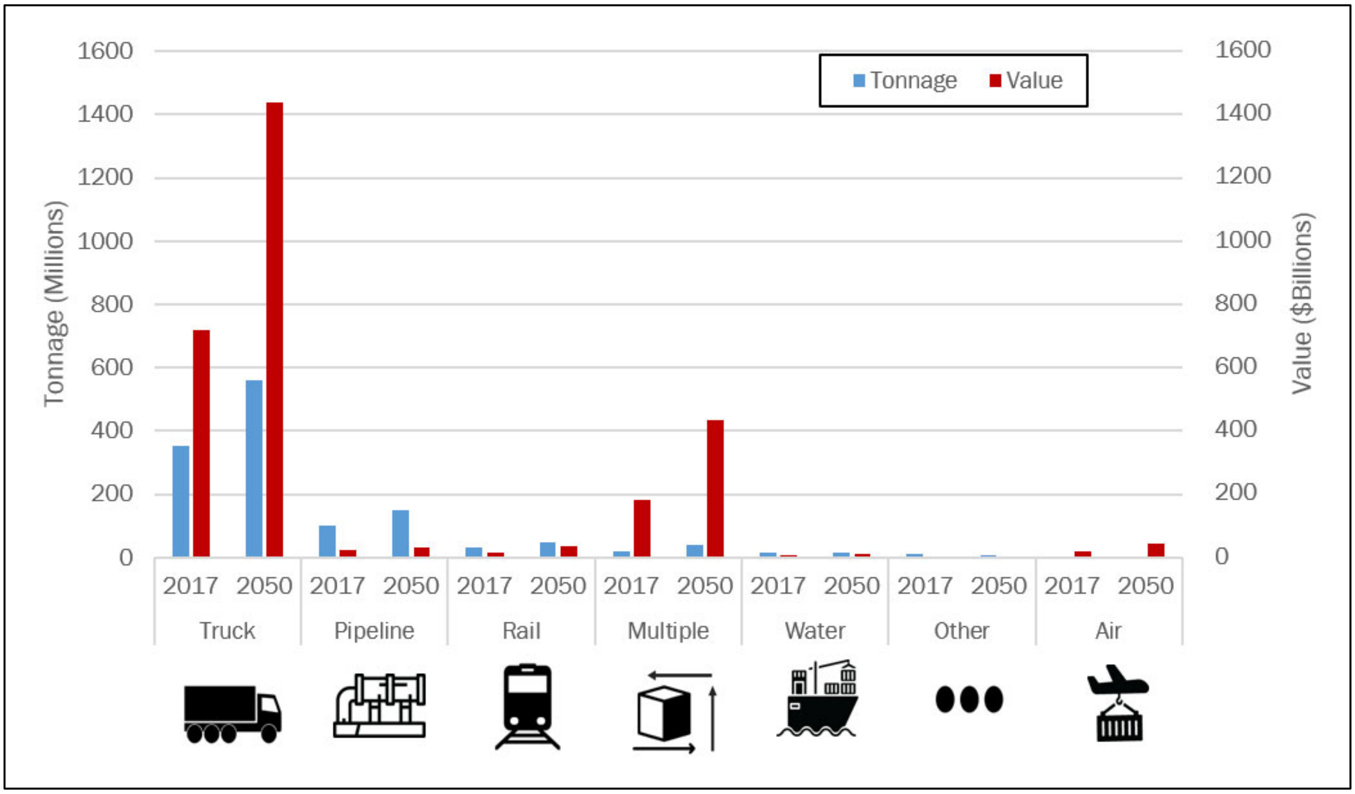
Profiles of domestic tonnage and value are presented in Table 39 and Figure 81 As the table shows, in 2017, 68% of tonnage is moved by truck followed by 18% by pipeline. Overall, tonnage is projected to increase 53% by 2050. Air freight tonnage is projected to grow at the fastest pace, more than doubling, but accounts for less than one-tenth of one percent of overall tonnage. Tonnage moved by water and "other modes" are both projected to decrease. The value of freight moved by multiple modes is projected to grow at the fastest rate (138%) while the value of freight moved by other modes is projected to decline overall.

Table 39. Commodity Flow by Mode Type

Mode	By Tonnage			By Value		
	2017 Tons (Millions)	2050 Tons (Millions)	2017-2050 % Change	2017 Value ($Millions)	2050 Value ($Millions)	2017-2050 % Change
Truck	353.4	561.1	58.8%	$717,431	$1,438,643	100.8%
Pipeline	99.7	148.8	49.2%	$25,657	$33,843	28.1%
Rail	33.3	49.0	47.1%	$16,339	$34,828	113.3%
Multiple	21.8	38.7	77.5%	$182,843	$434,975	137.9%
Water	17.5	14.5	-17.1%	$8,114	$12,484	54.6%
Other	11.7	7.3	-37.6%	$4,612	$4,033	-12.6%
Air	0.2	0.4	100.0%	$21,032	$43,989	109.2%
Total	537.6	819.8	52.5%	$976,027	$2,003,840	105.3%

Source: FAF 5.3, WSP

Figure 81. Commodity Flow by Mode Type

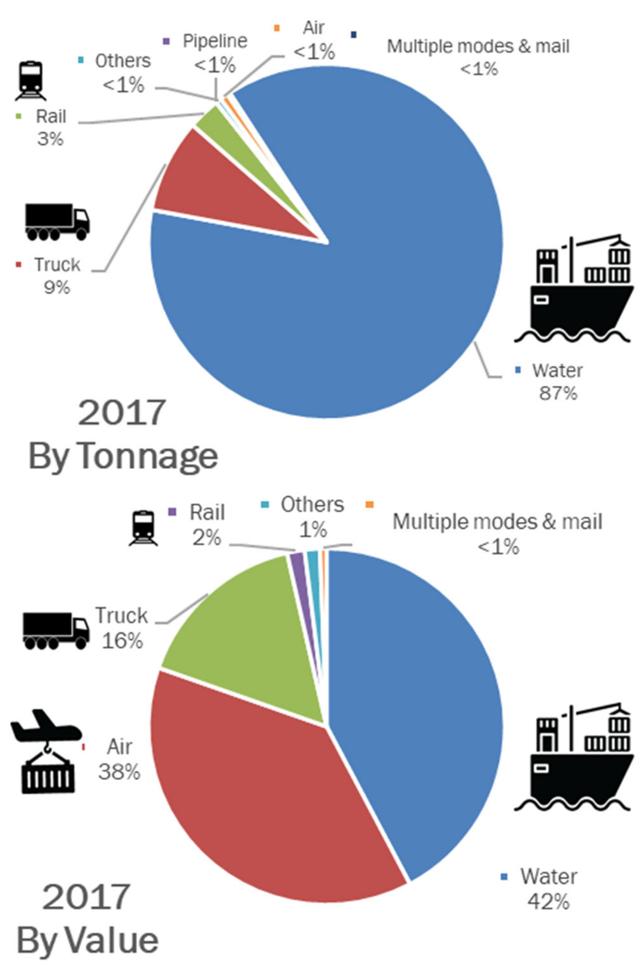


Source: FAF 5.3, WSP

6.4.2 International Trade

The distribution of mode type for global exports are displayed in Figure 82, As with imports, the majority of global exports were transported by water (87% by tonnage and 42% by value) in 2017. While air transported less than one percent of global export by tonnage, air transported 38% of global export by value in 2017. The ratio of value to tonnage for air cargo is not surprising given that goods moved by air are predominantly lightweight, high value, and/or time-sensitive goods. Trucks transported nine percent of global exports by tonnage and 16% by value in 2017. The percentage of global tonnage exports transported by water is projected to decrease substantially from 87% in 2017 to 76% in 2050. Pipeline export tonnage is expected to increase from less than one percent in 2017 to nine percent in 2050.

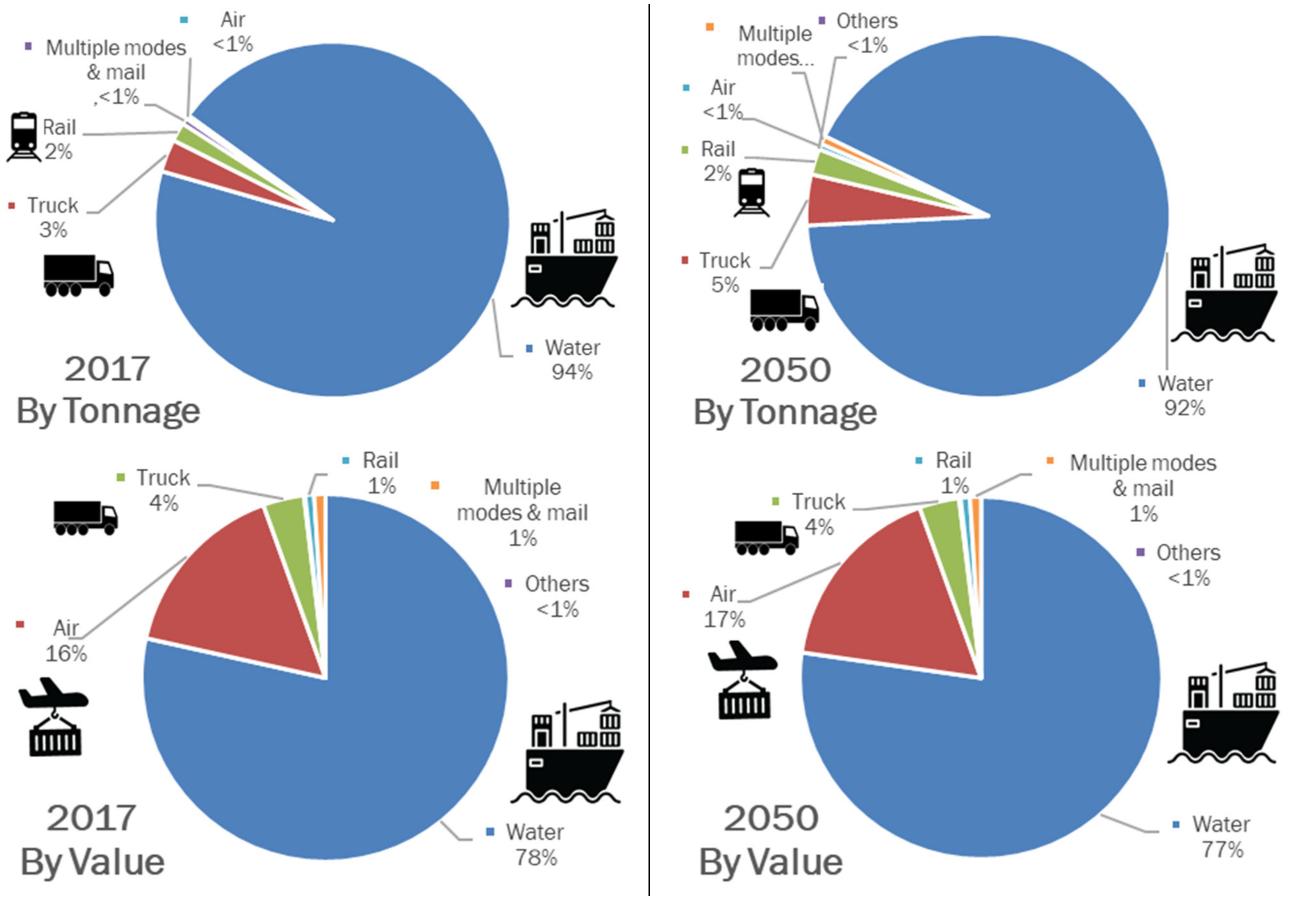
Figure 82. Global Exports by Mode Type (2017 and 2050)



Source: FAF 5.3, WSP

The distribution of mode type for global imports by tonnage and value are displayed in Figure 83. The majority of global imports are transported by water with 94% by tonnage and 78% by value in 2017. Notable projections through 2050 indicate that by 2050, transport by tonnage via water will decrease slightly to 92% with transport by truck increasing from 3% to 5%.

Figure 83. Global Import by Mode Type (2017 and 2050)



Source: FAF 5.3, WSP

6.5 FREIGHT INDUSTRY CLUSTERS

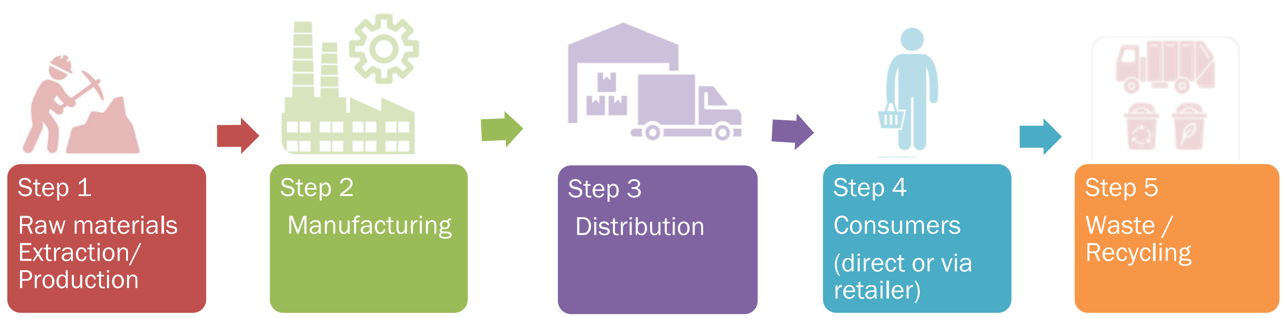
6.5.1 Supply Chains

This section describes the freight movement between the extraction, production, distribution, consumption, and waste stages. Understanding the supply chain process better informs planners and policymakers of how the transportation system operates.

Durable and non-durable consumer goods are goods produced for household or business consumption. They include durable goods, such as furniture and machinery, and non-durable goods, such as food and apparel. Durable consumer goods have a relatively long lifespan. Nondurable consumer goods have a relatively short lifespan and are typically consumed more frequently.

Figure 84 illustrates the general supply chain stages and links for durable and nondurable goods. Each stage is connected by freight transportation via various mode types depending on the commodity being moved. The supply chain begins with the extraction of raw materials used to produce the goods. This stage also includes mining, logging, agricultural production, fishing, and hunting. The extracted raw materials are transported to manufacturing plants and factories to produce the finished products. The finished products are transported to warehouses and distribution centers. These products are distributed and delivered to retailers or directly to consumers. Consumer sales are generally via retail and wholesale stores, e-commerce, or direct-to-consumer sales. Some commodities, including custom-order products, are transported directly from manufacturers to consumers, bypassing wholesale, and retail establishments. Lastly, waste is transported to landfill and/or recycling facilities. The freight transportation is influenced by factors such as the weight and value of the commodity, origin locations of the source of raw materials, locations of manufacturing facilities and distribution centers, and the location of wholesale and retail stores.

Figure 84. Supply Chain Process



Source: WSP

The supply chain descriptions for durable and non-durable consumer goods, construction materials, and energy and chemicals focus on steps one and two, and the transportation of goods in step three. The distribution supply chain describes flows of goods through step three to step four. The waste supply chain describes the final step, moving waste from consumers to recycling or disposal sites.

6.5.2 Durable and Non-Durable Consumer Goods

Durable consumer goods are products used in homes and business establishments and have a relatively long lifespan. Industry sectors producing, handling, and/or distributing durable goods include the following:

- Furniture and Home Goods Manufacturing
- Furniture and Home Goods Retailers
- Transportation Equipment Manufacturing
- Machinery Manufacturing, Automotive, and Transportation Equipment Sales
- Machinery and Equipment Rental and Leasing

These sectors rely on moving goods to and from their respective business establishments and job sites. Figure 87 through Figure 95 show clusters of several top freight-dependent industries in New Jersey. Clusters primarily exist in urban areas in the northeastern part of the state and along the New Jersey Turnpike corridor.

Nondurable consumer goods include commodities lasting a relatively short lifespan. Industry sectors producing or distributing these goods include the following:

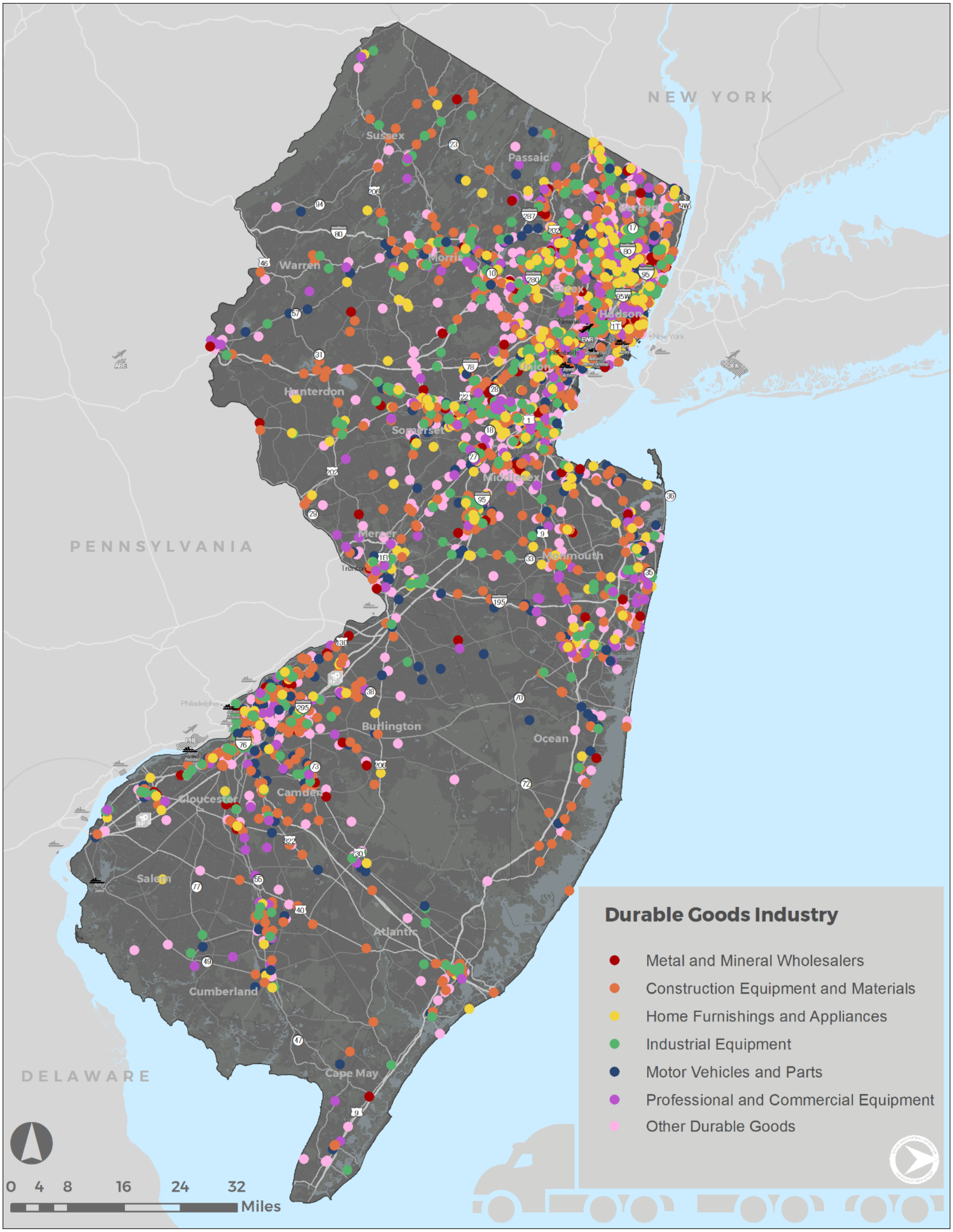
- Agriculture
- Food/Beverage Manufacturing
- Food/Beverage Retail
- Restaurants and Hospitality Venues
- Textiles and Apparel Manufacturing
- Fabric or Rug Mills
- Clothing Wholesale and Retail Trades
- Book Wholesale and Retail Trades
- Printing, Labeling and Shipping
- Office Supply

These sectors rely on the movement of raw materials and manufactured goods to and from their respective business establishments and job sites and to their consumers. As shown in Figure 86, business establishments in these sectors are clustered primarily in and around the major population centers throughout the state. Non-durable goods are usually consumed very quickly, meaning consumers need a continued supply of them, so business establishments tend to be closer to consumers and high-density areas, as seen on the maps in this section.

An establishment is commonly understood as a single economic unit that produces goods or services, such as a farm, mine, factory, or store. Establishments are typically at one physical location and engaged in one, or predominantly one, type of economic activity for which a single industrial classification may be applied. An establishment contrasts with a firm, or a company, which is a business and may consist of one or more establishments, where each establishment may participate in a different predominant economic activity.

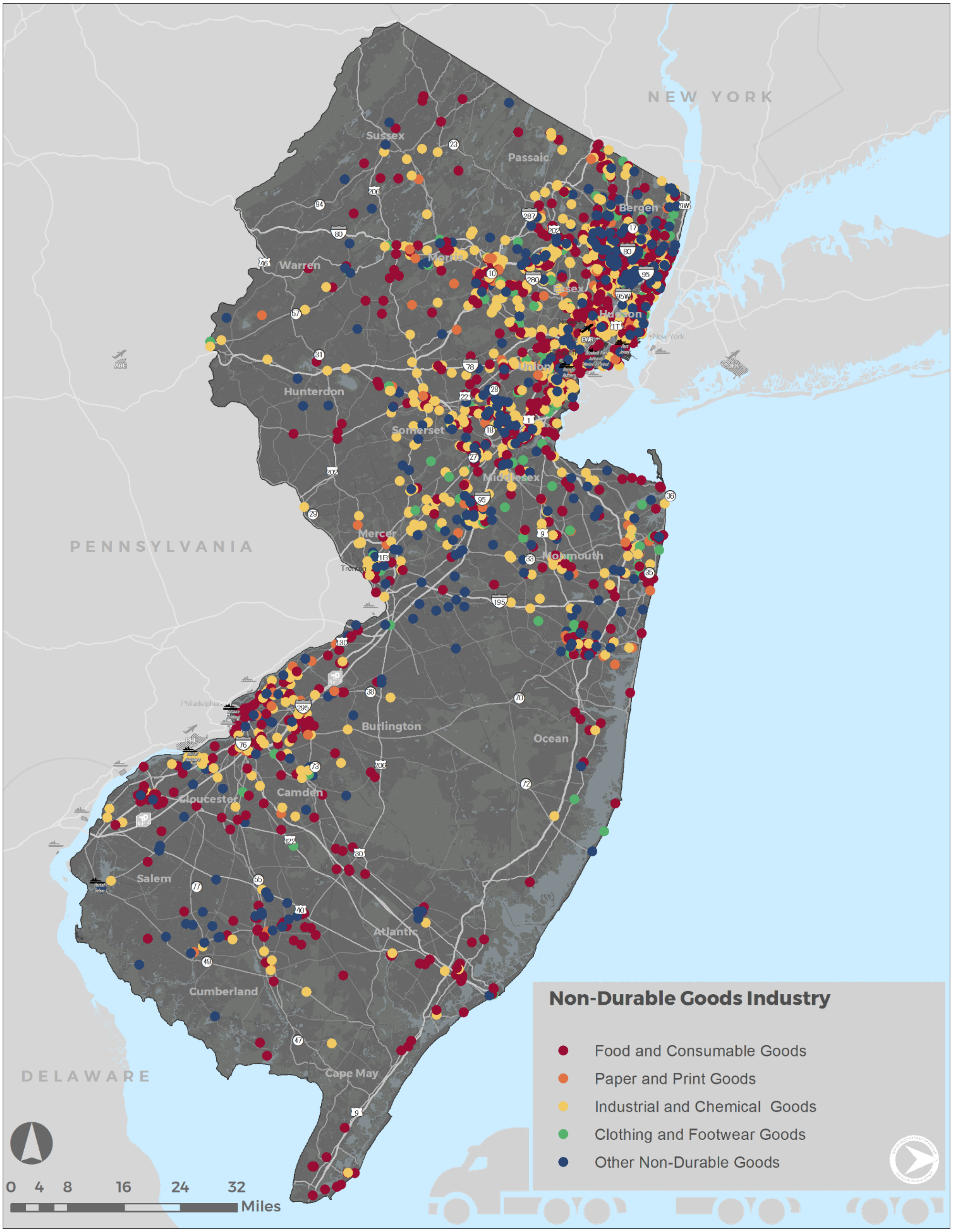
Figure 85 and Figure 86 show the location of durable and non-durable goods, respectively. The statewide distribution for durable and non-durable goods are generally similar to one another, with the highest concentrations found in northeast New Jersey within Bergen, Hudson, Essex, and Union counties and smaller clusters around Camden and Lakewood.

Figure 85. Durable Goods Businesses



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

Figure 86. Non-Durable Goods Businesses



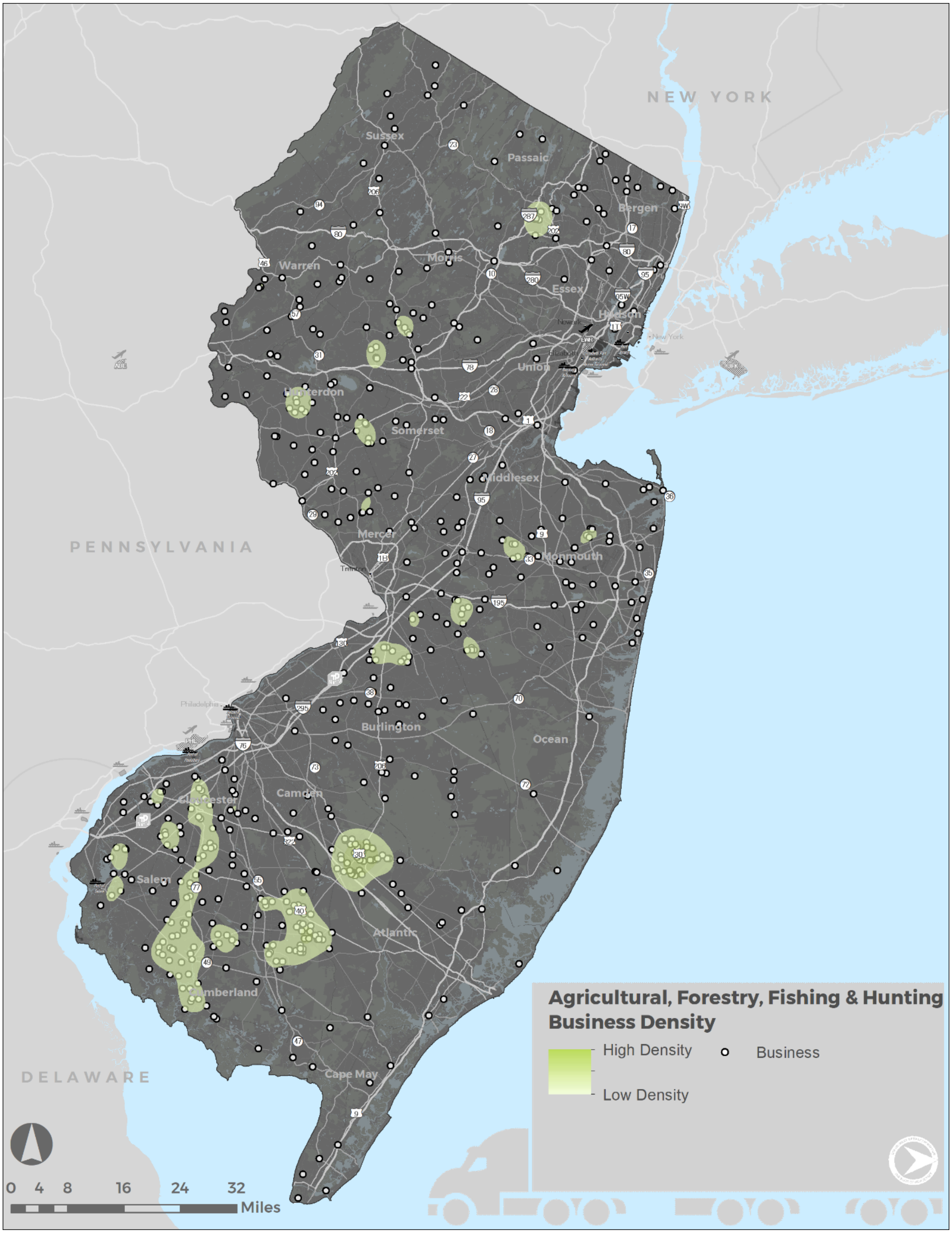
Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.3 Agriculture, Forestry, Fishing & Hunting

Agriculture remains an important industry in New Jersey, particularly in the southern counties of Cumberland, Salem, and Atlantic, as shown in Figure 87. Agriculture is largely dependent on transportation and the freight system to deliver agricultural and food products to urban centers and coastal export facilities, most of which are distant from the producing regions. Raw agricultural products also need to be moved to processing facilities such as grain mills, fruit and vegetable processors, and meat processors. New Jersey grows more than 100 varieties of fruits, vegetables, and herbs and is ranked nationally in the top ten as a producer of such items as blueberries, peaches, bell peppers, squash, tomatoes, and cranberries.[61]

61 Jersey Fresh. NJ Department of Agriculture https://findjerseyfresh.com/facts/statistics/

Figure 87. Agriculture, Forestry, Fishing & Hunting Business Clusters



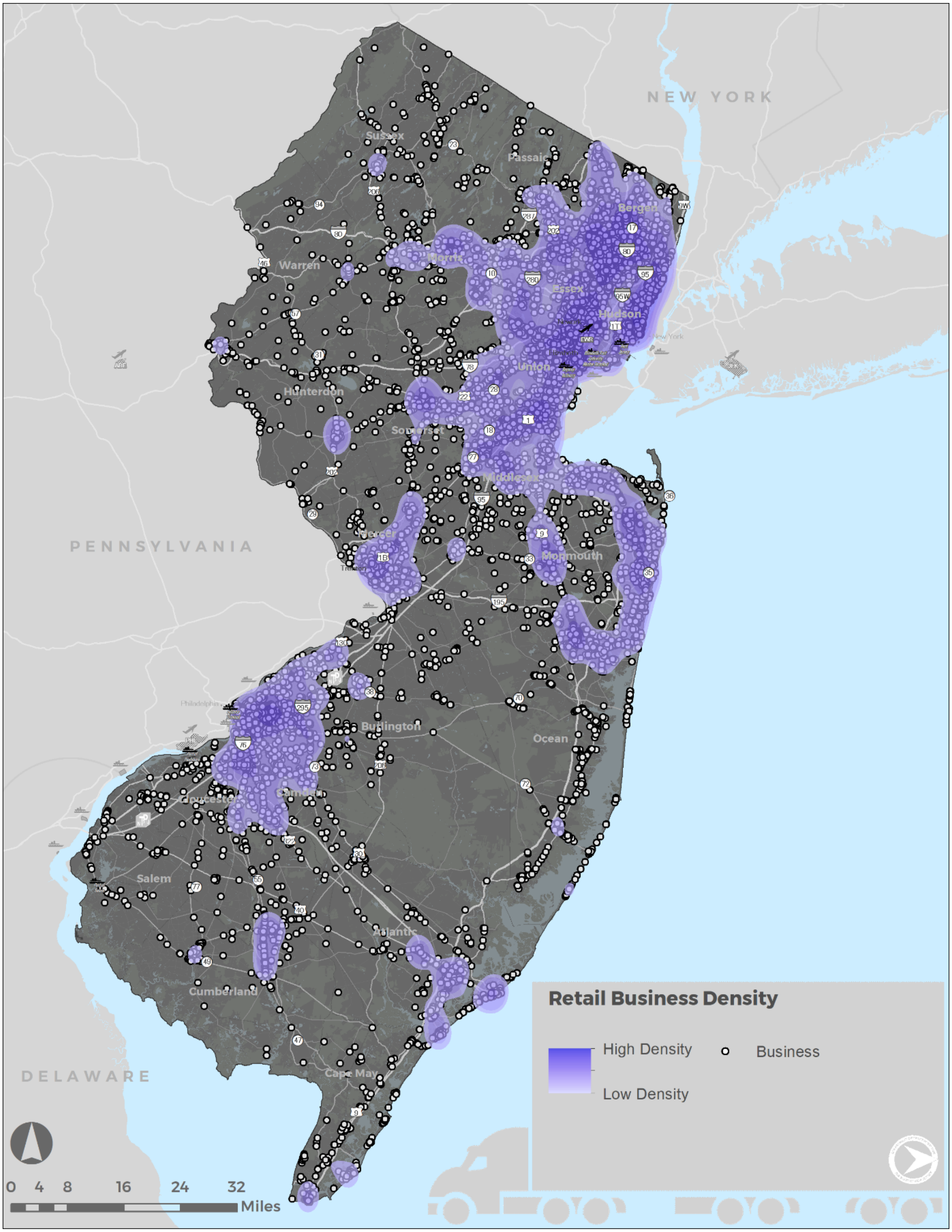
Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.4 Retail Trade

Retail establishments provide a vital commercial activity, allowing customers goods and services from various types of merchants. These establishments range from small mom-and-pop stores and independent retailers to large superstore chains. Food and beverage stores, including supermarkets and other grocery stores are the top retail sector accounting for 26.9% of retail industry establishments. Nearly 3 out of 10 jobs (28.4%) in retail trade in New Jersey are located in Bergen, Middlesex, and Monmouth counties.[62] Clusters of retail businesses are generally found in close proximity to population density, with the most significant clusters in Hudson, Bergen, Essex, and Camden counties and smaller clusters found in other population centers including Atlantic City, the northern Jersey Shore, and Trenton, as shown in Figure 88.

62 New Jersey Department of Labor and Workforce Development. Office of Research & Information. Bureau of Labor Market Information. New Jersey's Retail Trade Industry Sector. Winter 2021- 2022.

Figure 88. Retail Business Clusters

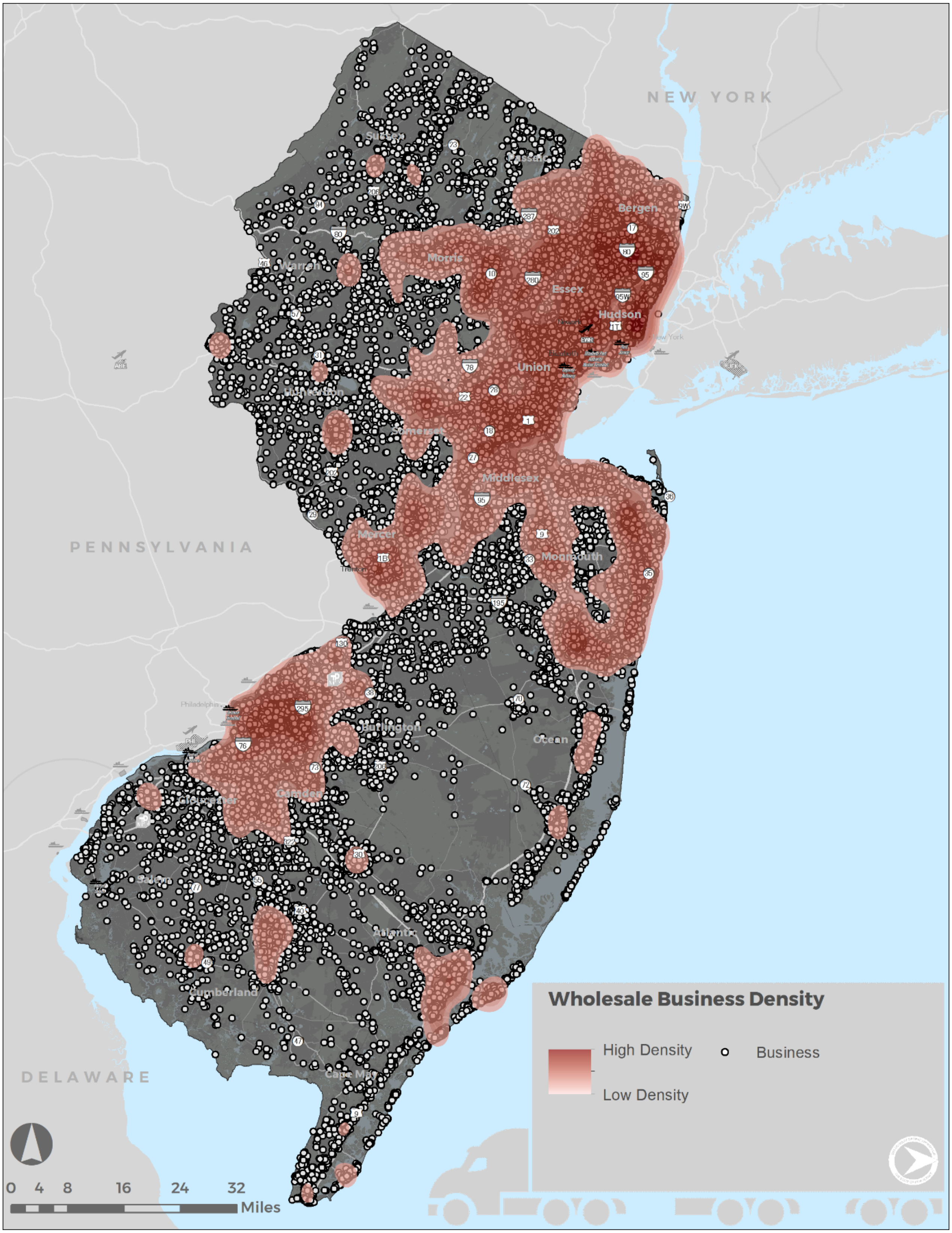


Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.5 Wholesale Trade

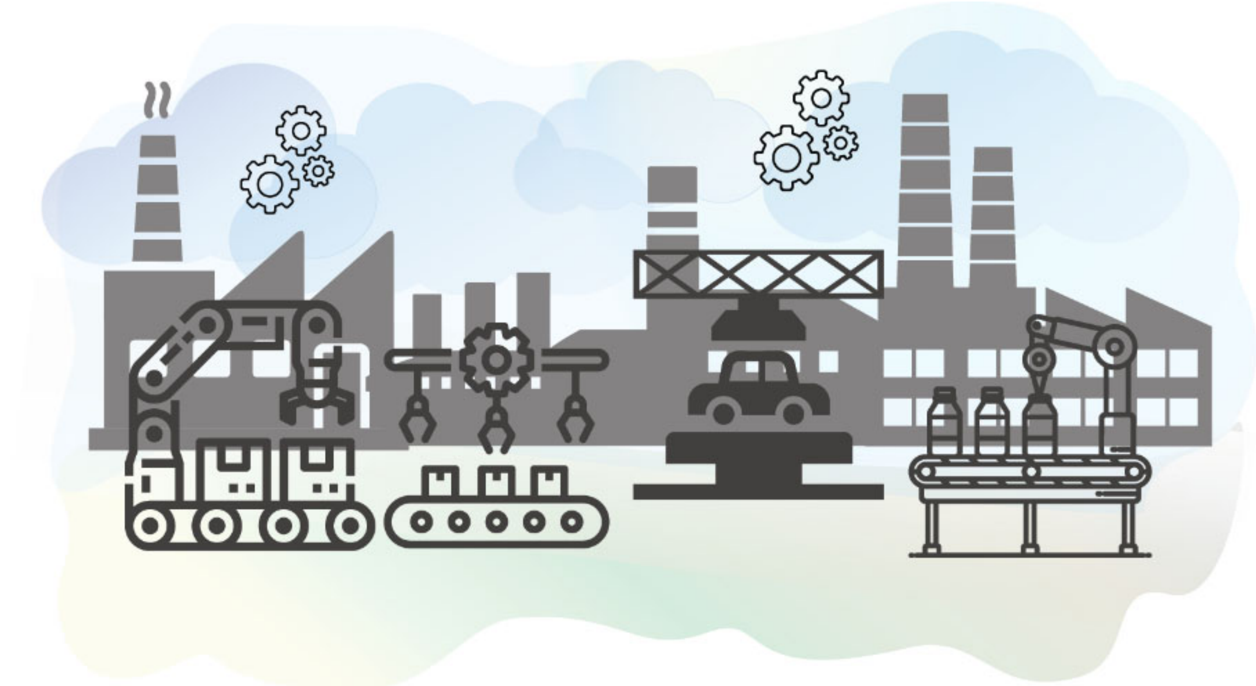
The Wholesale Trade sector comprises establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The wholesaling process is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of goods for resale, capital or durable non-consumer goods, and raw and intermediate materials and supplies used in production. Wholesalers sell merchandise to other businesses and normally operate from a warehouse or office. Wholesale businesses are found throughout the State, as shown in Figure 89, though the densest clusters appear in Hudson, Bergen, Union, and Essex counties, with smaller clusters evident in Camden and Ocean counties.

Figure 89. Wholesale Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.6 Manufacturing



There were nearly 9,000 establishments in New Jersey employing nearly 236,000 people in the manufacturing sector in 2020. Employment is distributed throughout the state and includes establishments ranging from very large pharmaceutical firms to small machine shops. Large clusters of manufacturing businesses are found in the northeastern part of the state and along the New Jersey Turnpike corridor.[63]

The occupational composition within manufacturing industries is continuously changing as more technical skills are required to operate more advanced processes. The expectation of higher skills has resulted in many higher-paying jobs, especially among chemical manufacturing firms.

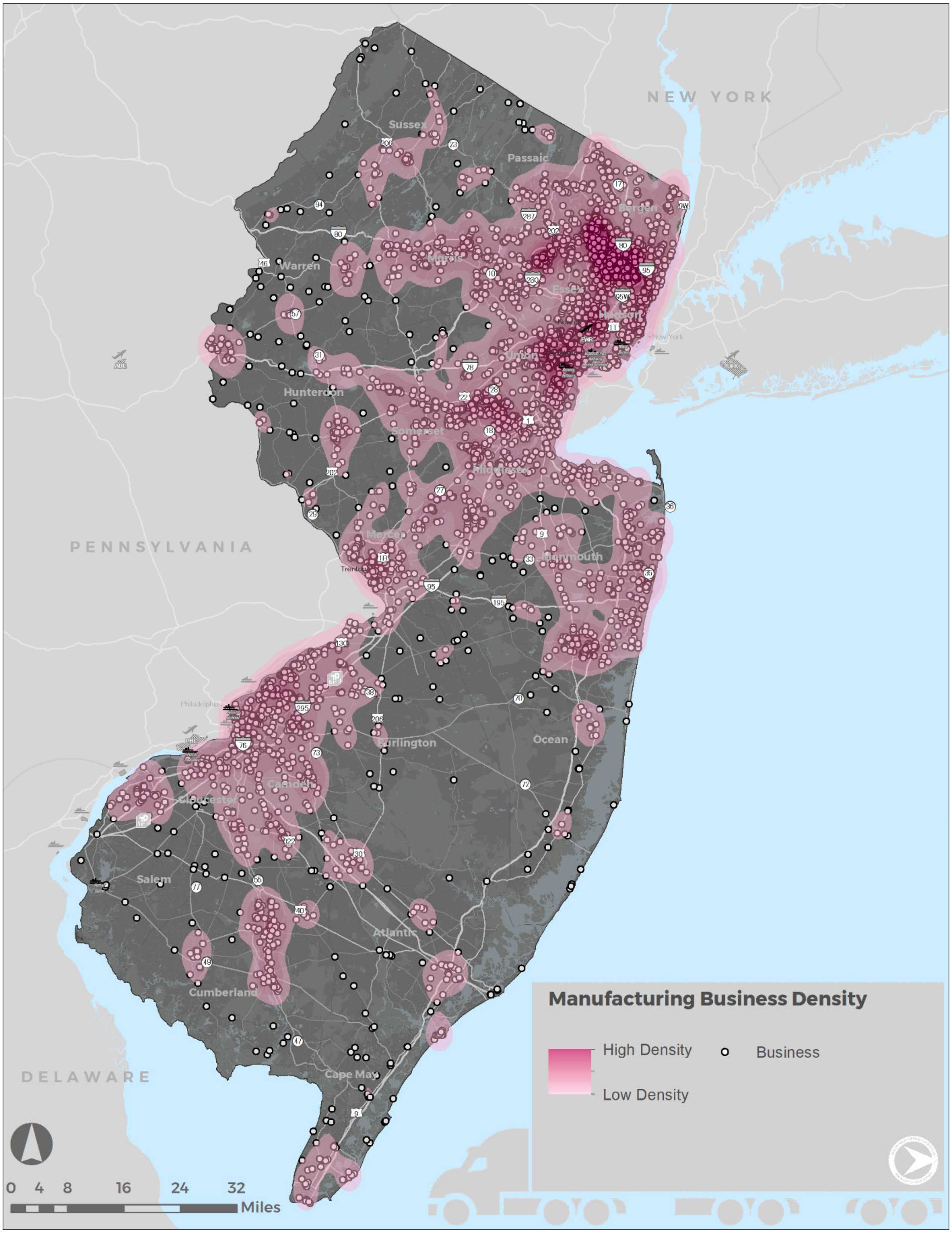
New Jersey ranked third in manufacturing GDP among these states in 2020. Chemical manufacturing (19%), food manufacturing (15%), computer and electronic product manufacturing (ten percent), and fabricated metal product manufacturing (nine percent) are the top contributors to the manufacturing industry GDP in New Jersey. The Tri-state (New Jersey, New York, Pennsylvania) area combined accounted for nearly 15% of the nation's chemical manufacturing GDP. Chemical manufacturing employment in New Jersey accounted for 5.2% of the nation's total chemical manufacturing employment in 2019.[64]

Manufacturing businesses are clustered in northeast New Jersey and other population centers, as shown in Figure 90. Clusters are also found along major freight corridors, including I-287, I-80, and I-78, as well as in Camden and Gloucester counties, Lakewood, and Vineland.

63 New Jersey Department of Labor and Workforce Development. Office of Research & Information. Bureau of Labor Market Information. New Jersey's Manufacturing Industry Cluster. Winter 2021- 2022.

64 New Jersey Department of Labor and Workforce Development. Office of Research & Information. Bureau of Labor Market Information. New Jersey's Manufacturing Industry Cluster. Winter 2021- 2022.

Figure 90. Manufacturing Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.7 Construction Materials

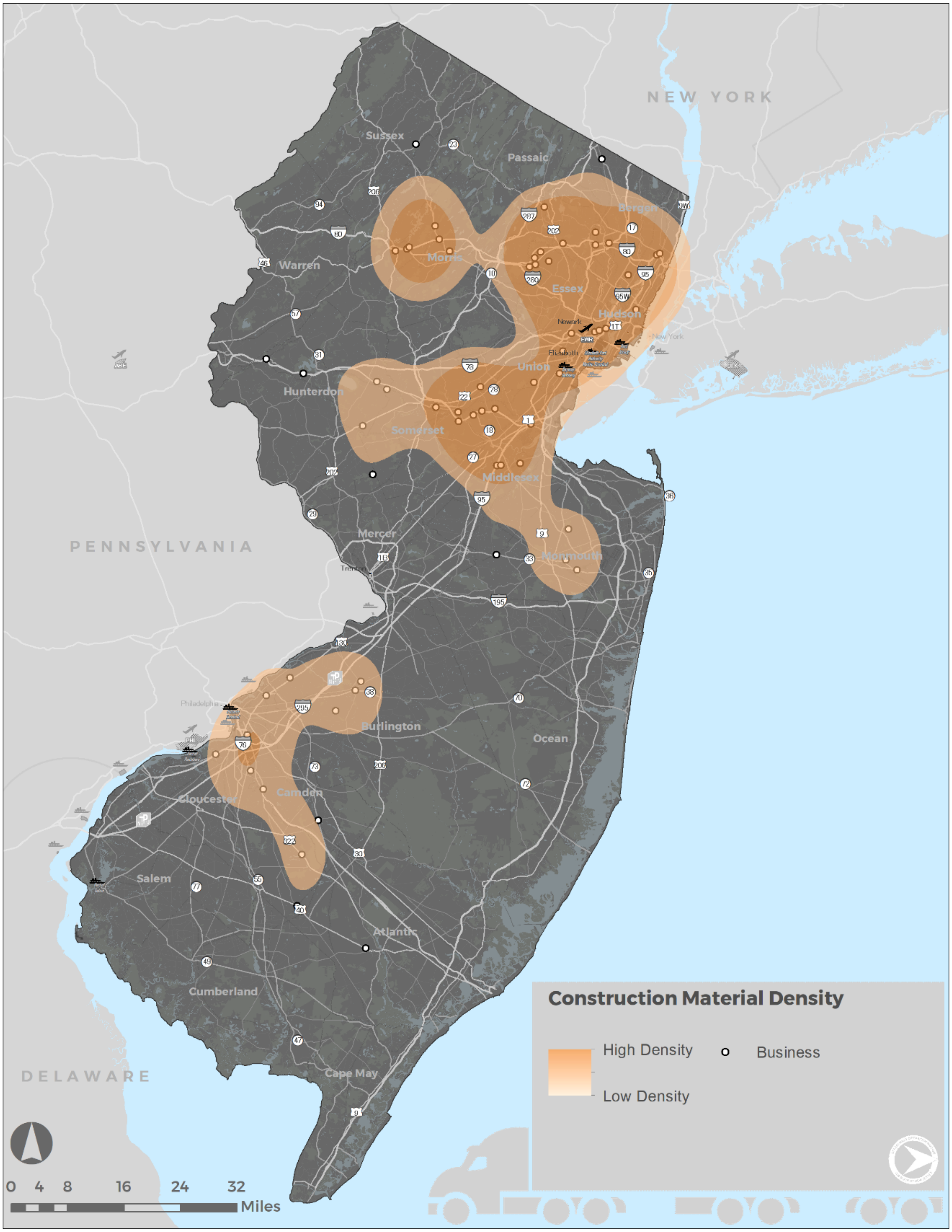
Construction materials include stone, concrete, glass, lumber, and metal products used to construct buildings and other infrastructure.

The supply chain for construction materials begins with the extraction of raw materials. Some grades of sand, soils, and stone are not manufactured and are sent to job sites or to consumer markets directly from the point of extraction. For manufactured goods, such as dimensional lumber products or stone products, the raw materials are transported to manufacturing facilities. Manufactured goods are transported directly to job sites, consumer markets, or through distribution channels before ultimately reaching the job sites and consumer markets.

Because construction materials tend to be heavy and bulky, they are typically transported by rail, truck, or barge between the stages of the supply chain. Some materials, such as sand or clay, can be transported directly from the point of extraction to the construction site, most often by dump truck. Other products, such as dimensional lumber, screws and nails, and crushed stone or gravel, must be transported to a manufacturing or processing facility to be transformed into consumer-grade products before proceeding to construction sites or retail stores for sale. Trucks usually provide the last-mile connection to job sites and retail stores.

As shown in Figure 91 the densest clusters of construction material businesses appear in Hudson, Bergen, Union, and Essex counties, with smaller clusters evident in Camden and Ocean counties.

Figure 91. Construction Material Industry Business Clusters



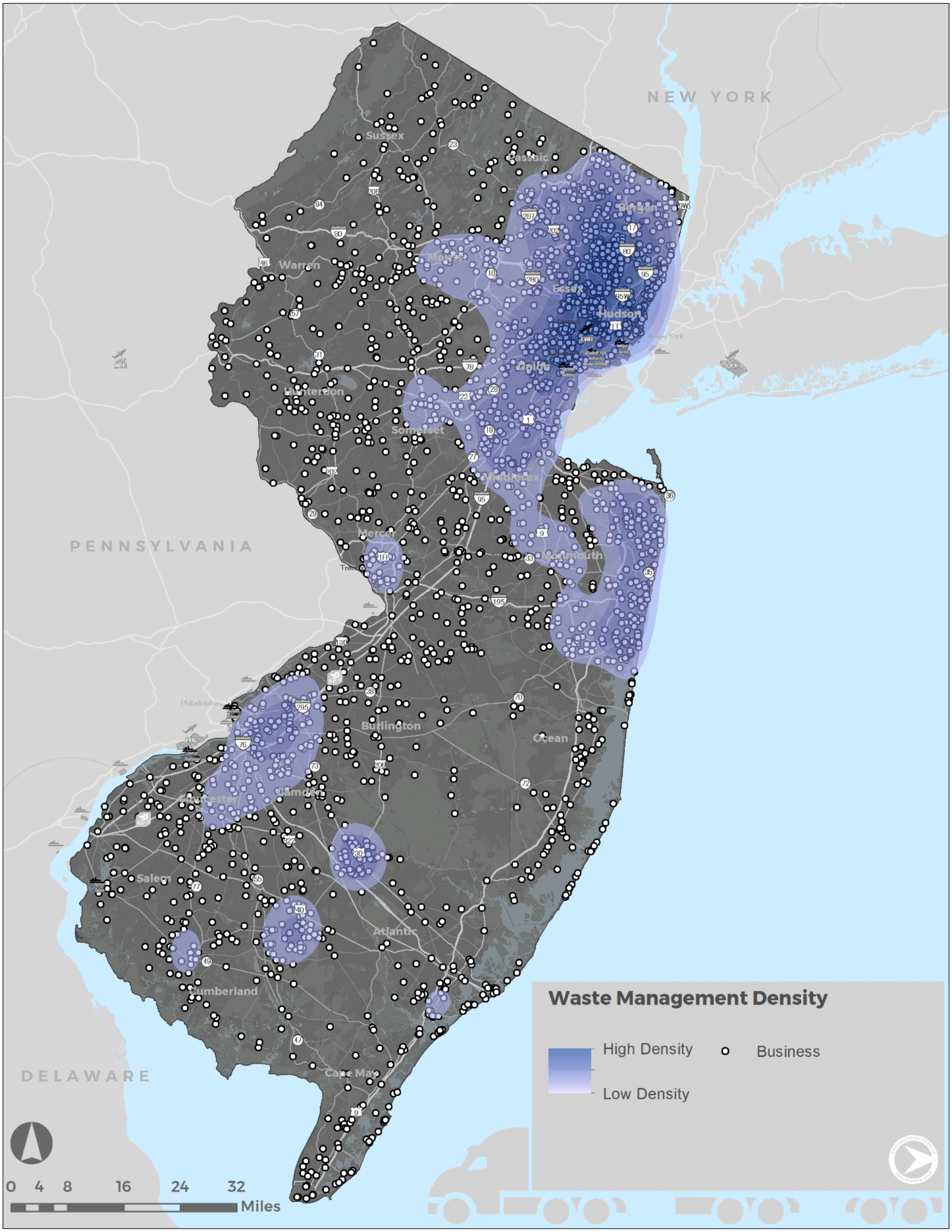
Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.8 Waste

Waste includes waste and scrap materials, and municipal solid waste. The progression of waste begins at the point of pickup from residential and commercial sources. Waste collection vehicles bring waste to local transfer stations, where the waste is consolidated into larger truckloads for transport to resource recovery facilities, where waste is separated into various recycling streams, waste-to-energy streams, or set aside for disposal in a landfill. In some areas, resource recovery occurs at local transfer stations. Waste that is to be recycled or converted to energy is transported to facilities where those activities occur. Other waste is disposed of at landfills in New Jersey and adjacent states.

As shown in Figure 92, waste industry businesses are concentrated in the northeast part of the State, in Bergen, Essex, and Hudson counties.

Figure 92. Waste Industry Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

6.5.9 Utilities / Energy and Chemicals

Commodity groups within the energy and chemicals group include coal, crude petroleum, refined petroleum products, industrial chemicals, agricultural chemicals, and pharmaceuticals.

The supply chain for goods in energy and chemical begins with raw materials extraction used to create energy, and chemical products, including coal, crude petroleum, natural gas, minerals, salts, and water. These materials are mined or extracted and transported by rail, water, pipeline, or truck to facilities manufacturing energy, petroleum, or chemical products. These products are transported directly to institutional, commercial, or private consumers directly, or may be moved through distribution centers or held in storage facilities before advancing to consumers.

Utilities encompass a wide range of subcategories to meet our energy requirements. Utilities has multiple classifications of establishments that produce fossil fuel, nuclear, solar, and wind energy. The utilities sector has very few establishments and accounts for 0.1% of the total establishments in New Jersey. In 2020, electric power generation, transmission, and distribution made up nearly half (48.1%) of the utilities industry employment. Over the past ten years (2010-2020), the utilities industry experienced a declining workforce rate of three percent. Approximately 44% of utility establishments are in northern New Jersey.[65]

Establishments in the utilities industry increased 9.5% from 2015 to 2020 in New Jersey. However, the total utilities employment has seen a slight decrease in its annual average employment of 1.8% per year. Power generation and supply which represented nearly half the total utility industry had an employment decrease of 16.9% between 2015 and 2020 in New Jersey. This decrease in labor may be attributed to the increase in automation in the utilities industry.

Utilities businesses are concentrated in northeast New Jersey, as well as along I-295 in Burlington, Camden, and Gloucester counties, as shown in Figure 93.

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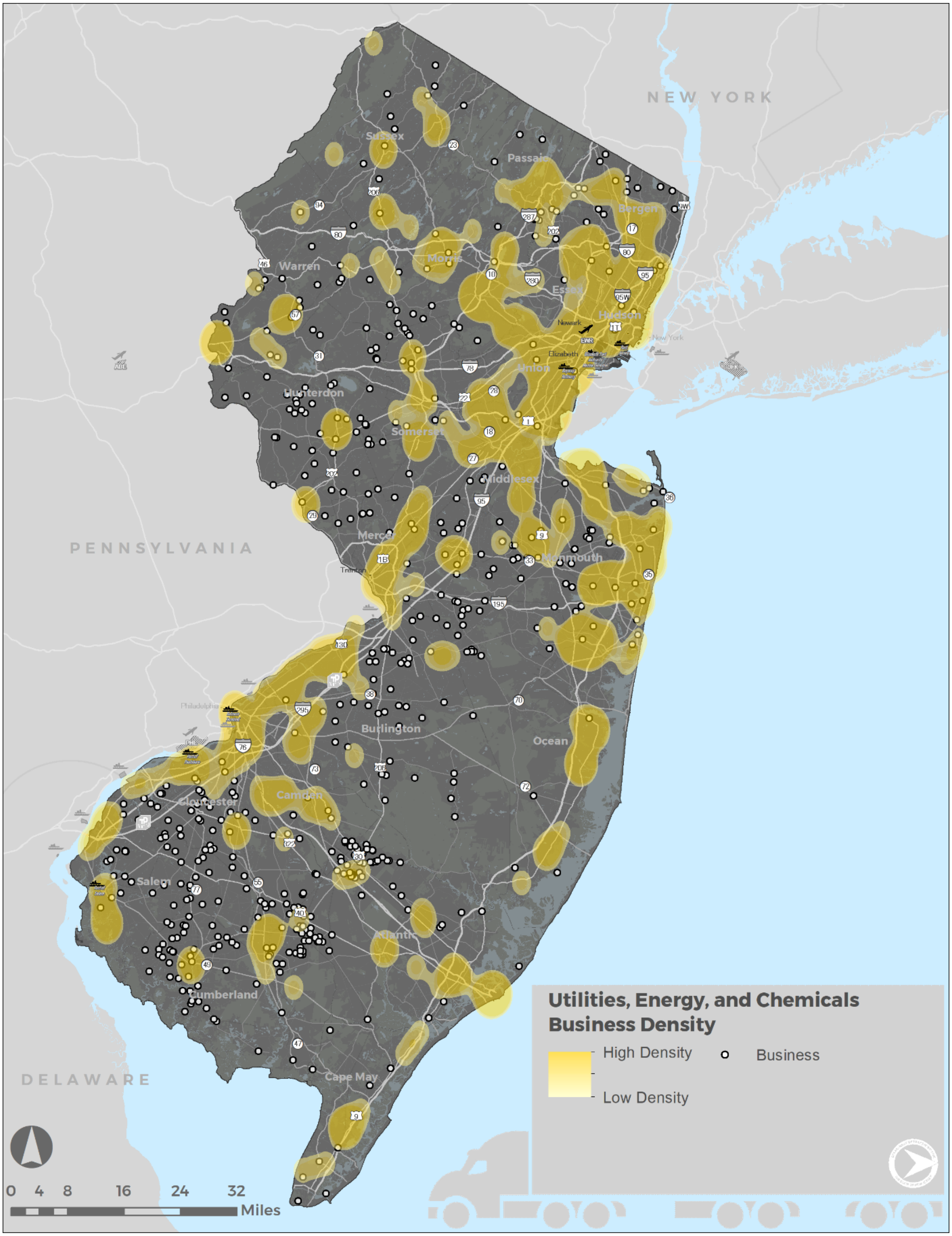
65 New Jersey Department of Labor and Workforce Development. Office of Research & Information. Bureau of Labor Market Information. New Jersey's Construction & Utilities Industry Sector. Winter 2021–2022.

Figure 93. Utilities, Energy, and Chemical Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

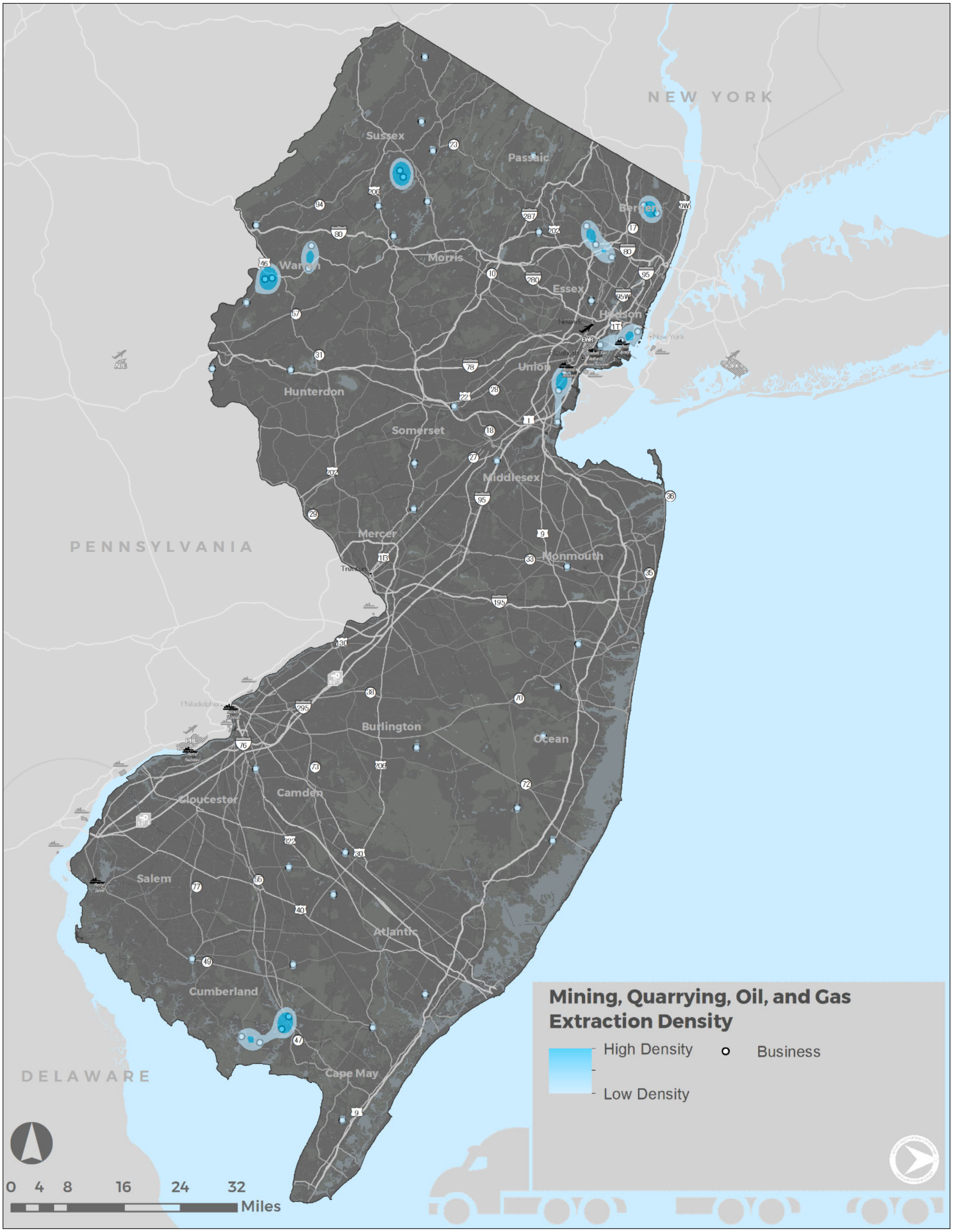
6.5.10 Mining, Quarrying, and Oil and Gas Extraction

Within the mining industry, New Jersey mainly produces construction sand and gravel, and crushed stone. It also produces industrial sand and gravel, and peat.[66] The state's varied geology plays a large role in the location of the business establishments in the mining, quarrying, and oil and gas extraction sector. North Jersey is home to most of the State's rock quarries, where stone is blasted and broken to make gravel products, while South Jersey is mainly home to sand mines. New Jersey, particularly South Jersey, has some of the best silica sand in the country, used to build homes, businesses, and roads, and to provide traction on icy roads. Commodities such as sand and gravel are raw materials that need to be extracted and then transported to construction sites and processing facilities.

The State has relatively few mining businesses, as shown in Figure 94. Small concentrations are found in Bayonne, Jersey City, Union County, Passaic County, Cumberland County, Warren County, and Sussex County.

66 "The Mineral Industry of New Jersey." National Minerals Information Center. U.S. Geological Survey (USGS)

Figure 94. Mining Quarrying and Oil and Gas Extraction Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

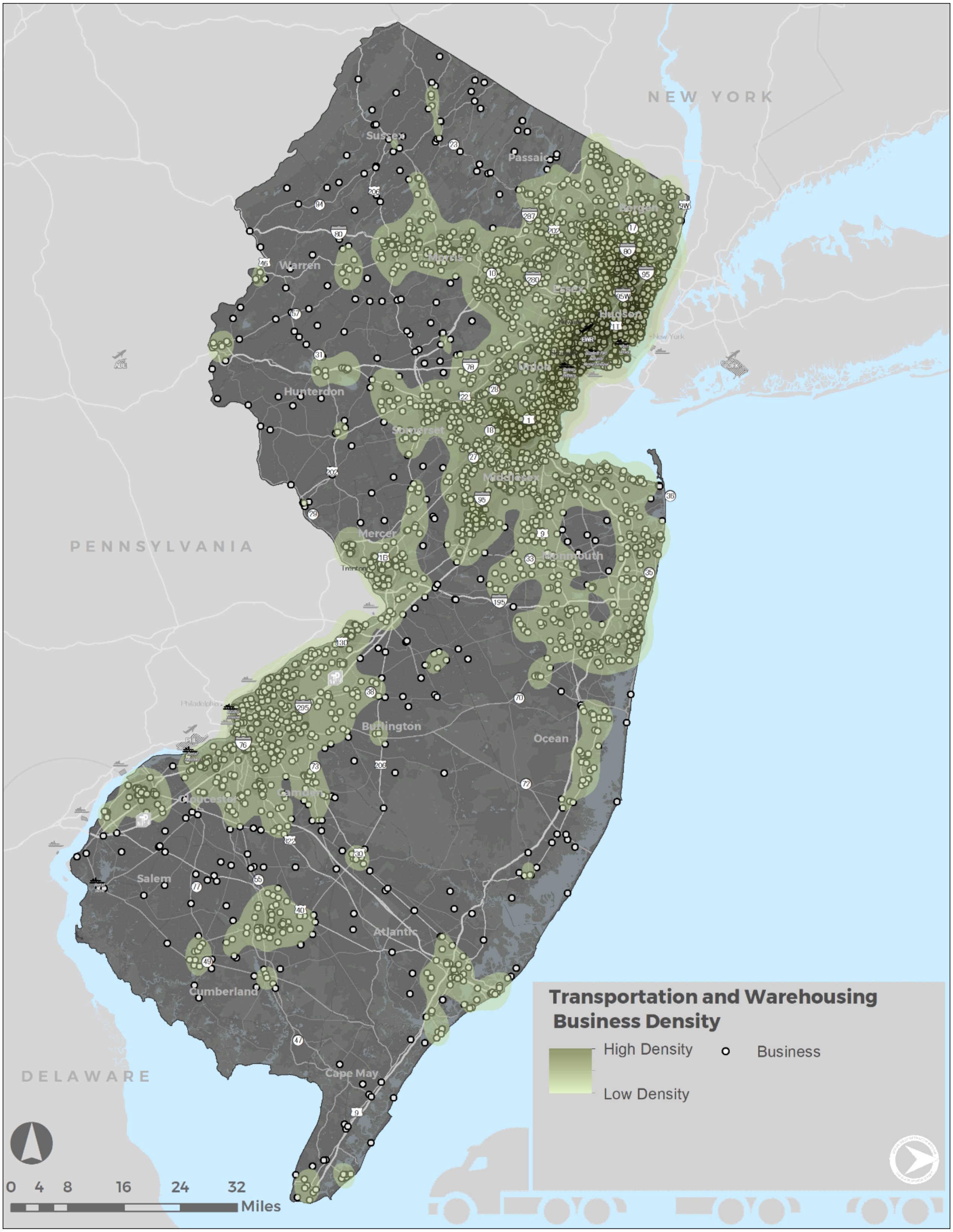
6.5.11 Transportation and Warehousing

The transportation and warehousing sector consists of a broad mix of commodities, parcels, and mail, which are transported through warehouses, distribution centers, and fulfillment centers en route to retail establishments or directly to consumers. This group also includes drayage from ports or intermodal rail terminals to warehouses, distribution, and fulfillment centers. This sector focuses on planning controls for effective and efficient storage and transportation for moving people and products from one place to another.

Goods produced domestically or overseas in manufacturing facilities are transported to distribution centers and warehouses owned by a wholesaler, who distribute to retailers or a retailer's distribution center. The wholesaler distribution center sends shipments to retail distribution centers, or directly to retail stores or consumers. The retailer's distribution centers, or fulfillment centers send shipments to retail stores or fulfills e-commerce orders shipped directly to consumers.

Transportation and warehousing businesses are concentrated near population centers, including Bergen, Hudson, Essex, and Union counties, as shown in Figure 95. Smaller clusters are evident in Camden, Cumberland, Gloucester, and Monmouth counties as well.

Figure 95. Transportation and Warehousing Business Clusters



Source: 2020 New Jersey Department of Labor and Workforce Development, WSP

7 Where Freight Moves: New Jersey's Freight Network

A review of mode-specific (highway, rail, maritime, air, and pipeline) network performance, challenges, and unique needs.

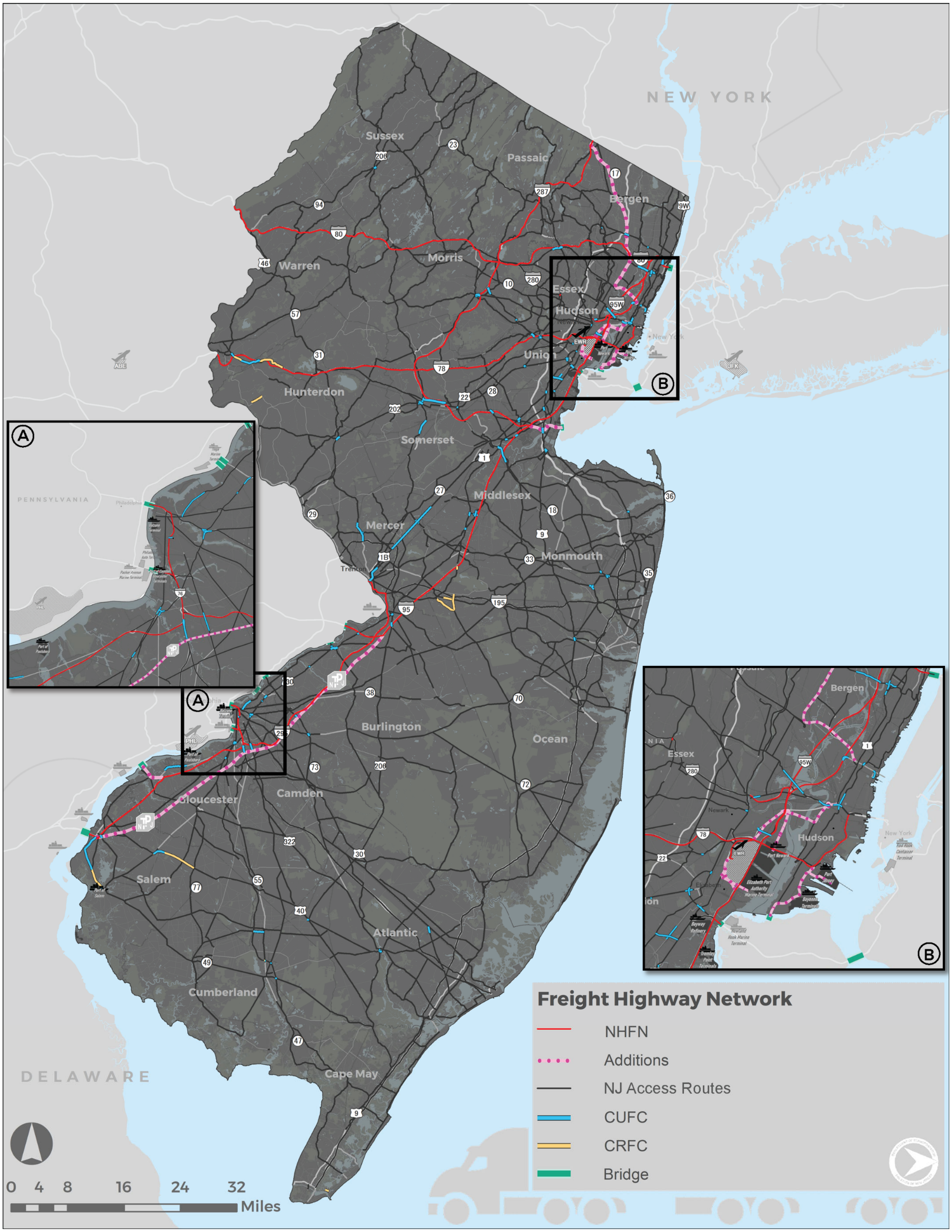
This chapter provides an assessment of New Jersey's multimodal freight transportation infrastructure. The inventory of the state's transportation freight network includes highways, railroads, maritime, aviation, and pipeline assets. This chapter includes an analysis of network performance, primarily focusing on highway congestion, reliability, and safety, as well as issues specific to the rail and maritime industries. The performance of each of these networks is critical to the state's goods movement industry serving not only New Jersey, but regional, national, and global markets as well.

7.1 HIGHWAY

New Jersey's highway freight network is crucial to the state's economy. As noted earlier, over 68% of goods in New Jersey move by truck via the highway freight network. Previous state freight plans have focused on the importance of the state's most critical corridors to serve New Jersey's businesses and residents. As with the 2017 Statewide Freight Plan, this effort takes a holistic look at the state highway freight network, encompassing key freight-related interstate, U.S., state, county, and local roadways throughout New Jersey. The highway freight network evaluated in this Plan consists of the approved National Highway Freight Network, proposed additions/deletions to that network, the New Jersey Highway Freight Network (NJ Access Network), and currently identified Critical Urban/Critical Rural Freight Corridors (CUFC/CRFC) as discussed below and illustrated in Figure 96.

Middlesex County, New Jersey (Source: WSP)

Figure 96. New Jersey Freight Highway Network



Source: NJDOT, FHWA, DVRPC, WSP

7.1.1 Identification of Network

New Jersey's NHFN roadways have been established by the FHWA in collaboration with states and MPOs to strategically direct Federal resources and policies towards improved performance of highway freight transportation. The NHFN includes Primary Highway Freight System (PHFS) and non-PHFS Interstates. The initial designation of the PHFS was defined as the highway-only primary freight network (PFN) identified under MAP-21, a 41,518-mile nationwide network. The non-PHFS Interstates portion of the NHFN includes the entirety of the interstate highway system not already identified as a part of the PHFS. Within New Jersey, the initial NHFN covers approximately 433 miles of roadway, including:

- Interstates: 76, 78, 80, 95, 195, 276, 278, 280, 287, 295, 676
- U.S. Routes: 1, 1/9
- NJ Routes: 21, 29
- Intermodal Connector: Newark Airport (NJ16A)[67]

Note that the current NHFN (as defined by FHWA) includes references to two roadways that are no longer correctly designated:

- Interstate 276: This refers to the Pearl Harbor Memorial Extension between the Pennsylvania Turnpike and New Jersey Turnpike (Interchange 6). This section of roadway was redesignated as I-95 in 2018 upon the completion of the Pennsylvania Turnpike/I-95 Interchange Project.
- Interstate 95 (PA/NJ Line/Scudder Falls Bridge to I-295 Interchange with U.S. 1): This former section of I-95 was redesignated as I-295 upon the completion of the Pennsylvania Turnpike/I-95 Interchange Project.

[67] As part of the PHFS re-designation process, NJDOT has noted in correspondence with USDOT that no route designated "NJ16A" is present on the state's highway network.

PHFS RE-DESIGNATION (2021)

In 2016, NJDOT, the state's three MPOs, and the PANYNJ proposed additional key PHFS segments for inclusion in the NHFN. Based on an analysis of existing freight volumes and an understanding of how and where freight moves on New Jersey's roadways, a series of proposed additions was identified. In 2021, in response to USDOT's supplemental request for an updated list of PHFS additions or updates, NJDOT provided a single, unified response from the department and MPO partners.

While the proposed changes total a net addition of less than four miles, the changes are substantial, including the removal of the PHFS designation of the included New Jersey Turnpike (85.87 miles), given that it is a tolled and self-financed roadway, rendering it ineligible for NHFP funding. A summary of the proposed PHFS re-designation is summarized in Table 40.

Table 40. PHFS Re-Designation Roadways

Current National Highway Freight Network				Recommended Redesignation				Proposed Change in Mileage	Comment
Route	From	To	Miles	Route	From	To	Miles		
I-276	PA/NJ Border	NJ Turnpike	5.77	Remove from PHFS			0	-5.77	Segment has been redesignated as NJ Turnpike. Part of NJ Turnpike - toll road not eligible for NHFP funding.
NJ Turnpike	NJ 700	NY/NJ Border	80.1	Remove from PHFS			0	-80.1	Part of NJ Turnpike - toll road not eligible for NHFP funding.
I-287	NJ Turnpike	NY/NJ Border	67.46	I-287	NJ Turnpike	NY/NJ Border	67.46	0	No changes recommended
I-78	PA/NJ Border	NJ Route 139	66.42	I-78	PA/NJ Border	NJ Turnpike	58.57	-7.85	Remove Newark Bay Extension - Part of NJ Turnpike - toll road not eligible for NHFP funding
I-80	PA/NJ Border	NJ Turnpike	71.22	I-80	PA/NJ Border	NJ Turnpike	71.22	0	No changes recommended
U.S. Route 1/9	NJ Route 16A	NJ Route 21	1.05	Remove from PHFS			0	-1.05	NJ Route 16A does not exist - unclear what this link reflects.
NJ Route 21	U.S. Route 1	I-78	3.43	Remove from PHFS			0	-3.43	This is not considered a critical link for EWR
Addition to PHFS			0	NJ Route 81	NJ Turnpike	U.S. Route 1/9	1.18	1.18	Primary connector for EWR
I-278	NJ Turnpike	NY/NJ Border	0.59	I-278	NJ Turnpike	NY/NJ Border	0.59	0	No changes recommended
I-295	DE/NJ Border	NJ Route 29	60.25	I-295	DE/NJ Line	PA/NJ Border	76.56	16.31	Extend I-295 to reflect redesignated portion of NJ Turnpike to Scudder Falls Bridge
I-76	PA/NJ Border	I-295	2.93	I-76	PA/NJ Border	I-295	2.93	0	No changes recommended
I-676	PA/NJ Border	I-76	4.34	I-676	PA/NJ Border	I-76	4.34	0	No changes recommended
I-280	NJ Turnpike	2.81 miles west of NJ Turnpike	2.81	Remove from PHFS			0	-2.81	This is not considered a critical link for freight
NJ Route 29	I-295	U.S. Route 1	0.18	Remove from PHFS			0	-0.18	This is not considered a critical link for freight
U.S. Route 1	PA/NJ Border	NJ Route 29	0.1	Remove from PHFS			0	-0.1	This is not considered a critical link for freight
Addition to PHFS			0	I-195	I-295	NJ Turnpike	6.25	6.25	Connect I-295 with NJ Turnpike in Mercer County
Addition to PHFS			0	NJ Route 440	NJ Turnpike	NY/NJ Border	5.15	5.15	Continuation of I-287 east of NJ Turnpike with Outerbridge Crossing
Addition to PHFS			0	NJ Route 17	U.S. Route 46	I-287	18.37	18.37	NJ Route 17 is a primary freight corridor
Addition to PHFS			0	NJ Route 3	U.S. Route 46	NJ Route 495	10.84	10.84	NJ Route 3 is a primary freight corridor
Addition to PHFS			0	NJ Route 208	U.S. Route 46	I-287	10.07	10.07	NJ Route 208 is a primary freight corridor
Addition to PHFS			0	NJ Route 4	NY/NJ Border	NJ Route 208	8.59	8.59	NJ Route 4 is a primary freight corridor
Addition to PHFS			0	U.S. Route 1/9T	U.S. Route 1/9	U.S. Route 1/9	4.35	4.35	U.S. Route 1/9T is a designated truck route
Addition to PHFS			0	U.S. Route 1/9	North Avenue	U.S. Route 1/9T	5.56	5.56	U.S. Route 1/9 in vicinity of EWR
Addition to PHFS			0	NJ Route 42	Atlantic City Expwy	I-295	7.96	7.96	NJ Route 42 is a primary freight corridor
Addition to PHFS			0	U.S. Route 1/9	NJ Turnpike	U.S. Route 1/9T	10.4	10.4	U.S. Route 1/9 south of GWB
Current Total:			366.7	Recommended Total:			370.4	3.74	

NEW JERSEY HIGHWAY FREIGHT NETWORK (NJ ACCESS NETWORK)

The most comprehensive statewide highway freight network includes roadways defined as the NJ Access Network (codified under NJAC 16:32). It includes approximately 2,010 miles of U.S., NJ, county, and local routes traversing New Jersey. The State's highway freight network is an underpinning of the State's economy, providing important truck routes linking industries and businesses with suppliers, raw materials, and consumers in the State, as well as connections to the NHFN.

CRITICAL URBAN AND CRITICAL RURAL FREIGHT CORRIDORS

The FAST Act created the Critical Urban and Critical Rural Freight Corridor (CUFC and CRFC) designations. As part of the development of the NHFN, states and MPOs are responsible for designating CUFCs and CRFCs. These roadways are identified as important freight corridors providing linkages between key nodes (e.g., port facilities, warehousing and distribution centers, industrial centers). Designation of CUFC and CRFC roadways also increases the State's NHFP mileage, allowing for increased opportunities for grant program funds for eligible projects. FAST Act guidance stipulated that New Jersey may designate up to 150 miles of public roadways as CRFC and up to 75 miles as CUFC for roadways not already part of the NHFN.

New Jersey's initial list of CUFC and CRFC were identified as part of the 2017 Statewide Freight Plan and were ultimately approved by FHWA in December 2017. A list of the current CRFC and CUFC designated roadways is included in Appendix C.

With the passage of the IIJA, mileage allowances per state for CUFC and CRFC have been doubled, to 150 and 300 miles, respectively. Upon approval of the 2023 Statewide Freight Plan, NJDOT will work with the FHWA and its MPO partners to revisit its current CUFC and CRFC designations and identify additional candidate roadways based on further analysis of highway data contained within this document. Additionally, NJDOT will leverage its Freight Management System to support this process.

7.1.2 Truck Parking

Figure 97 shows truck parking locations inventoried throughout the State and a summary of the number of available spaces at each location. Parking locations were identified using multiple sources. Locations within the NJTPA region were obtained by querying the Truck Parking Map Viewer application.[68] Within the DVRPC region, locations were obtained using the DVRPC GIS Data portal.[69] Other locations within the state were queried through an online directory for truckers, www.truckstopsandservices.com. Additional guidance was provided from OFP staff. Where available, each source was queried on the available number of truck parking spaces. For several locations, the number of parking spaces was unknown. This was particularly the case at locations where parking spaces were unmarked within an open area for trucks to park. The three consulted datasets revealed a total of 76 unique truck parking locations, summarized in Table 41, with 2,865 total parking spaces. Locations with confirmed truck services are bolded in Table 41.

To understand the utilization of truck parking locations within the state, truck telematics data from Geotab (for three months: March, June, and October 2021) was acquired and analyzed. Demand was analyzed at parking facilities identified in the inventory as having ten or more truck parking spaces. Figure 98 shows the results of the demand analysis at these locations. The size of the dots represents the average number of trucks that park at these facilities each day. Expansion factors from Geotab were used to estimate the total demand for parking activity. These expansion factors were calculated by comparing Geotab counts to published roadway volumes. In Figure 98, the color of the dots represents the ratio of parking demand to available spaces. Therefore, higher ratios indicate locations where truck drivers are likely to have difficulty finding spaces. The following insights can be drawn from this analysis:

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68 https://njtpa.maps.arcgis.com/apps/webappviewer/index.html?id=a39f06745a084418aeba2da3a246810f
69 https://dvrpc-dvrpcgis.opendata.arcgis.com/datasets/dvrpcgis::truck-parking/explore

NJ Truck Stop, Kearny, Hudson County (Source: WSP)

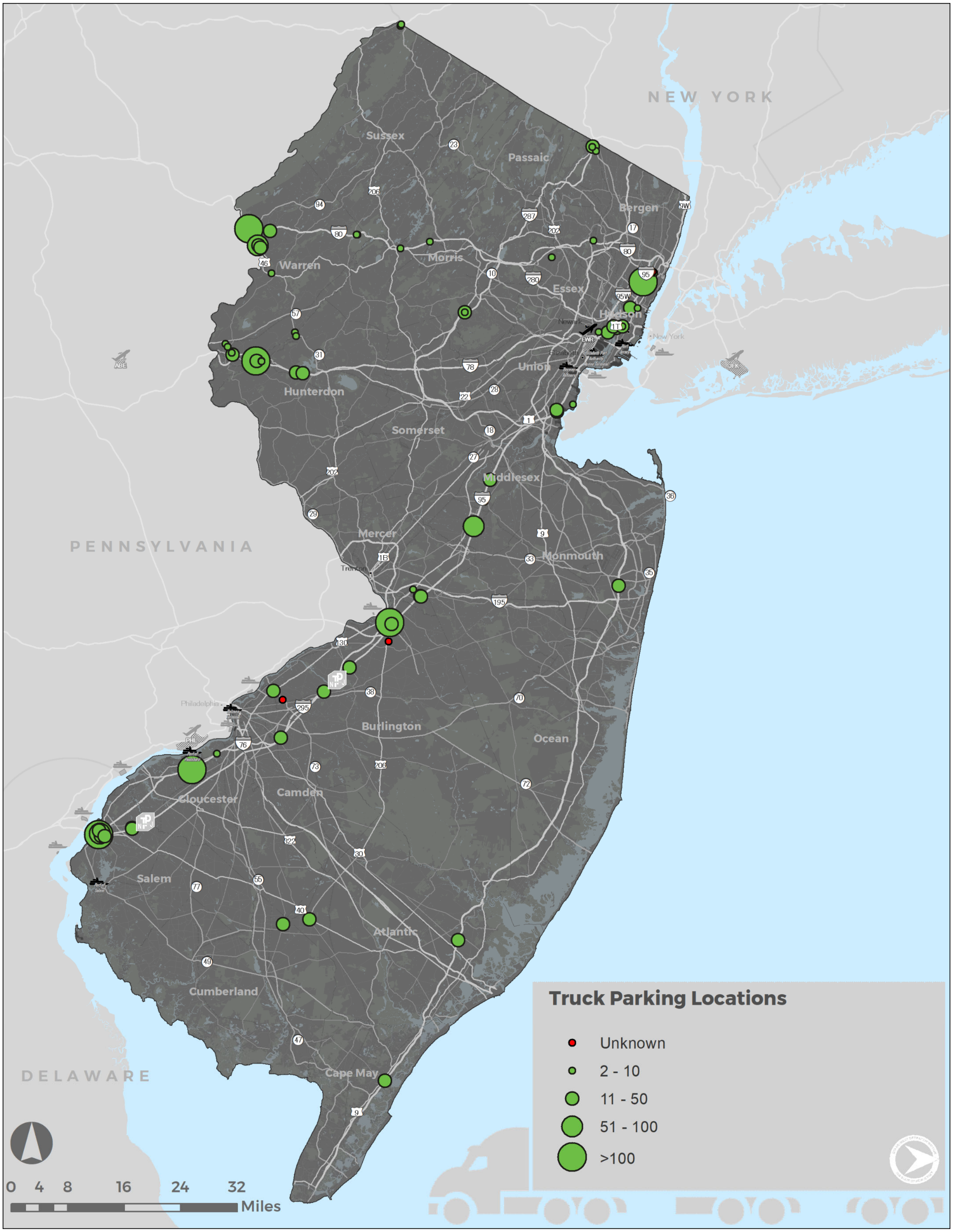
The demand for truck parking is the highest approaching the larger urban areas of New York City and Philadelphia. These areas have the largest concentration of commercial and industrial facilities, generating a substantial amount of truck trips. At the same time, these areas are congested, leading truck drivers to prefer to park close to their destinations so they can limit exposure to congestion and make morning deliveries. The entire I-95 corridor also sees moderately high truck parking demand in New Jersey.

Significant demand for truck parking is also observed on I-78 and I-80 towards the Lehigh Valley, as these are critical corridors connecting warehousing and distribution facilities to population centers along the East Coast.

The availability of parking is most limited at facilities located in the areas surrounding large metropolitan areas. While the demand is the highest at these locations, building parking facilities in these areas is the most expensive because of competing land uses and high property values.

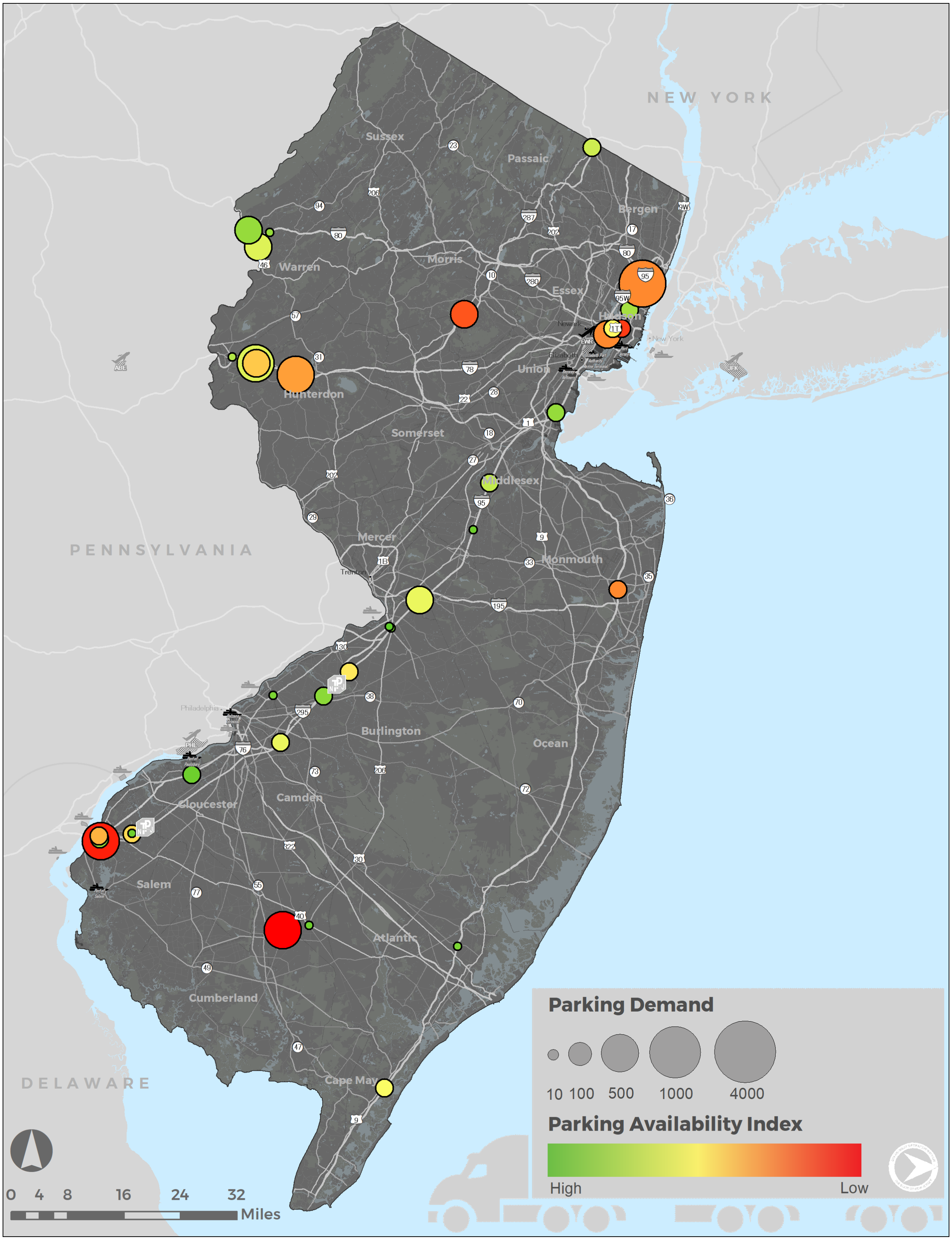
Section 5.1 (beginning on page 73) summarizes current trends associated with truck parking, particularly the shortage of available truck parking throughout the region. Further, NJTPA is currently studying truck parking challenges specific to the North Jersey region, including an analysis of currently unmet parking demands and future needs for the industry.

Figure 97. Truck Parking Locations, New Jersey



Source: NJTPA, DVRPC, DC Brook Co., WSP

Figure 98. Demand at New Jersey Truck Parking Facilities



Source: Geotab Data, WSP

Table 41. Truck Parking Locations, New Jersey

County	Name	Available Spaces	Fuel	Truck Service	Public/ Private
Atlantic	Atlantic City Service Area	15	Yes	No	-
Atlantic	**Vineland Truck Stop**	**20**	**Yes**	**Yes**	**-**
Bergen	46 Truck Stop	-	Yes	No	-
Bergen	Kings Mahwah Truck Stop	5	Yes	No	-
Bergen	**Pilot Travel Center #210**	**8**	**Yes**	**Yes**	**Private**
Bergen	Power Gas & Truck Stop	4	Yes	No	-
Bergen	Vince Lombardi Travel Plaza	196	Yes	No	-
Bergen	U.S. Gas & Diesel	3	Yes	No	-
Bergen	Sunoco	6	Yes	-	Private
Bergen	Liberty Quick Stop Deli	15	Yes	No	Private
Burlington	Columbus Gulf	-	Yes	-	-
Burlington	Valero Fuel Stop	-	Yes	-	-
Burlington	Love's Travel Stop Bordentown	20	Yes	No	Private
Burlington	**Petro Shopping Center Bordentown**	**490**	**Yes**	**Yes**	**Private**
Burlington	**James Fenimore Cooper Service Plaza**	**47**	**Yes**	**Yes**	**Public**
Burlington	Valero	20	Yes	No	-
Camden	Betsy Ross BP	20	Yes	No	-
Camden	Walt Whitman Service Plaza	18	Yes	Yes	Public
Cape May	Ocean View Service Area	12	Yes	No	-
Cumberland	Major Auto/Truck Stop	20	Yes	No	-
Essex	Jack's Friendly Service	2	Yes	No	-
Essex	**Pilot Travel Center #1098**	**33**	**Yes**	**Yes**	**Private**
Essex	Delta Fairfield	10	Yes	No	Private
Essex	**Power Oil**	**5**	**Yes**	**Yes**	**Private**
Gloucester	TravelCenters of America Paulsboro	185	-	-	Private
Gloucester	**Crown Point Truck Stop**	**10**	**Yes**	**Yes**	**-**
Hudson	K & G Truck Stop	12	Yes	No	-
Hudson	**New Jersey Truck Stop**	**40**	**Yes**	**Yes**	**Private**
Hudson	Sunoco 7016 Alexander Hamilton Travel Plaza	29	Yes	No	Public
Hudson	**Tullo Truck Stop**	**28**	**Yes**	**Yes**	**Private**
Hudson	**Shell**	**5**	**Yes**	**Yes**	**Private**
Hudson	**Gulf**	**10**	**Yes**	**Yes**	**Private**
Hunterdon	Hampton BP	2	Yes	-	-
Hunterdon	**Pilot Travel Center #190**	**50**	**Yes**	**Yes**	**Private**
Hunterdon	**Pilot Travel Center #280**	**30**	**Yes**	**Yes**	**Private**
Hunterdon	**Travel Centers of America # 048**	**122**	**Yes**	**Yes**	**Private**
Hunterdon	I-78W Rest Stop	7	No	No	Public
Hunterdon	I-78E Rest Stop	7	No	No	Public
Hunterdon	Clinton Truck Stop	25	Yes	No	Private
Mercer	Garden State Fuel	10	Yes	No	-

County	Name	Available Spaces	Fuel	Truck Service	Public/ Private
Mercer	**Woodrow Wilson Service Plaza**	**41**	**Yes**	**Yes**	**Public**
Mercer	Richard Stockton Service Plaza	44	-	-	Public
Middlesex	7 Eleven Jamesburg	5	Yes	No	-
Middlesex	**Conoco Truck Plaza**	**7**	**Yes**	**Yes**	**-**
Middlesex	Molly Pitcher Service Area	80	Yes	No	Public
Middlesex	Sunoco #7704	4	Yes	No	Private
Middlesex	Joyce Kilmer Service Area	50	Yes	No	Public
Middlesex	Grover Cleveland Service Area	50	Yes	No	Public
Middlesex	Thomas Edison Service Area	43	Yes	No	Public
Monmouth	Monmouth Service Area	12	Yes	No	Public
Morris	Pilot Travel Center #891	10	Yes	No	Private
Morris	Roxbury (I-80 WB) Truck Parking Area	10	No	No	Public
Morris	Harding Township (I-287 NB) Rest Area	20	No	No	Public
Passaic	**21st Avenue Service Center**	**6**	**Yes**	**Yes**	**-**
Salem	Deepwater Truck Terminal	22	Yes	No	-
Salem	**Flying J 688**	**350**	**Yes**	**Yes**	**-**
Salem	**G-Fuel**	**18**	**Yes**	**Yes**	**-**
Salem	Pilot Travel Center #253	25	Yes	No	-
Salem	Sunoco 7005 Clara Barton Plaza	20	Yes	No	-
Salem	Sunoco 7006 John Fenwick Plaza	15	Yes	No	-
Salem	**Sunoco Carney's Point**	**100**	**Yes**	**Yes**	**-**
Sussex	Montague Citgo	3	Yes	No	Private
Sussex	Pilot Dealer #880	4	Yes	No	Private
Warren	ACI Truck Stop	27	Yes	No	Private
Warren	Hampton Mobil	6	Yes	No	Private
Warren	**Penn Jersey Truck Stop**	**15**	**Yes**	**Yes**	**Private**
Warren	Route 46 Truck Center	86	Yes	No	Private
Warren	**Travel Centers of America #006**	**172**	**Yes**	**Yes**	**Private**
Warren	**22 Fuel Stop**	**5**	**Yes**	**Yes**	**Private**
Warren	Tauro	3	Yes	No	Private
Warren	U.S. Gas Truck Stop	10	Yes	No	Private
Warren	Belvidere Diner	5	No	No	Private
Warren	**Delaware Truck Stop (U.S. Gas & Diesel)**	**15**	**Yes**	**Yes**	**Private**
Warren	Knowlton Tourist Welcome Center	23	No	No	Public
Warren	Allamuchy (I-80 EB) Parking Area	9	No	No	Public
Warren	Allamuchy (I-80 WB) Parking Area	9	No	No	Public

Note: This table includes data as provided from multiple sources. Relevant data is provided where available. **Truck specific services are in bold.**

7.1.3 Truck Travel Time Reliability

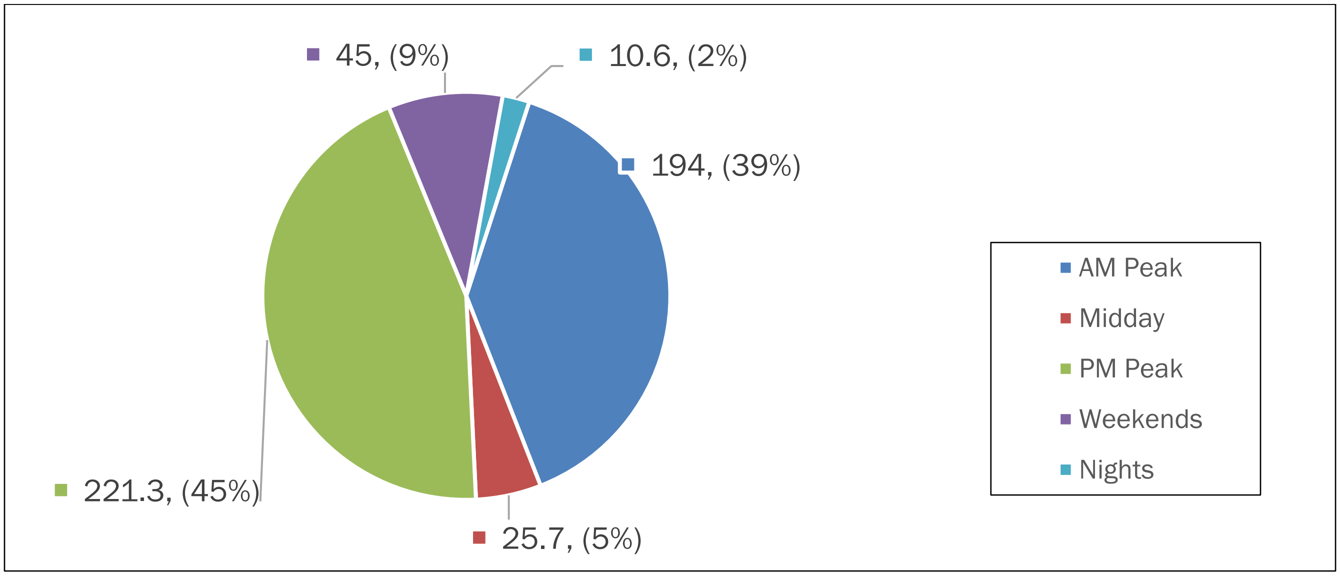
Truck Travel Time Reliability (TTTR) is a metric prescribed by the USDOT to quantify how roadway congestion causes unreliability for trucks. The FHWA defines the TTTR metric as the 95th percentile truck travel time divided by the 50th percentile truck travel time (i.e., the median travel time) for each reporting segment of the Interstate roadway network for the following five time periods:

- AM Peak –6:00 a.m. – 10:00 a.m. on weekdays
- Midday – 10:00 a.m. – 4:00 p.m. on weekdays
- PM Peak –4:00 p.m. – 8:00 p.m. on weekdays
- Nights – 8:00 p.m. – 6:00 a.m. on all days
- Weekends – 6:00 a.m. – 8:00 p.m. on weekends

The maximum TTTR in the five time periods is reported as the TTTR for the roadway segment. This represents how much longer travel times are at the 95th percentile relative to median travel times during periods when traffic operations are the most unreliable.

While what is considered a high TTTR varies throughout the country, a value of 1.5 (i.e., where the 95th percentile travel time is 50% greater than the median travel time) is generally accepted as a reasonable threshold to denote a roadway segment experiencing unreliability. An analysis of New Jersey Interstate roadway segments (2019 NPMRDS data) with TTTR greater than 1.5 shows that 45% of unreliable segments mileage experience the highest unreliability during the PM peak period (see Figure 99). The AM peak period is the next most unreliable, with 39% of unreliable segment mileage experiencing highest unreliability during this period.

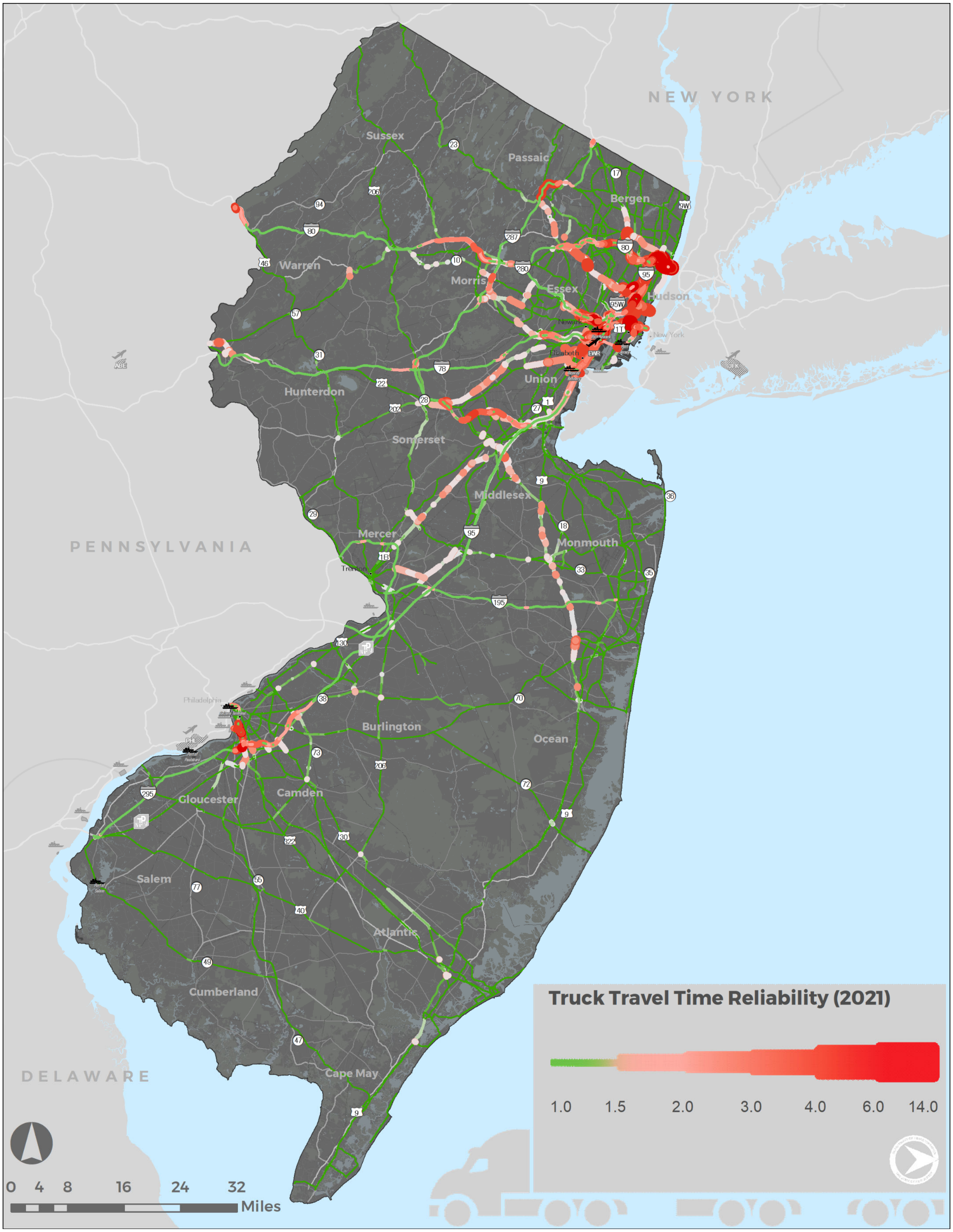
Figure 99. Miles of Unreliable Interstate



Source: WSP Analysis of New Jersey NPMRDS

Figure 100 illustrates how the maximum TTTR varies along New Jersey's Interstate system. Urban areas see higher TTTR measurements than rural areas, with many Interstate segments in the New York and Philadelphia areas showing TTTRs greater than 3.0, indicating travel times can be three times as high at the 95th percentile level than during median traffic. There is overlap between the roads with a high TTTR measure and the places that accumulate the most congestion costs, however the TTTR treats congestion on all Interstates equally, and does not give priority to segments with high truck volumes, as done in the estimation of congestion costs.

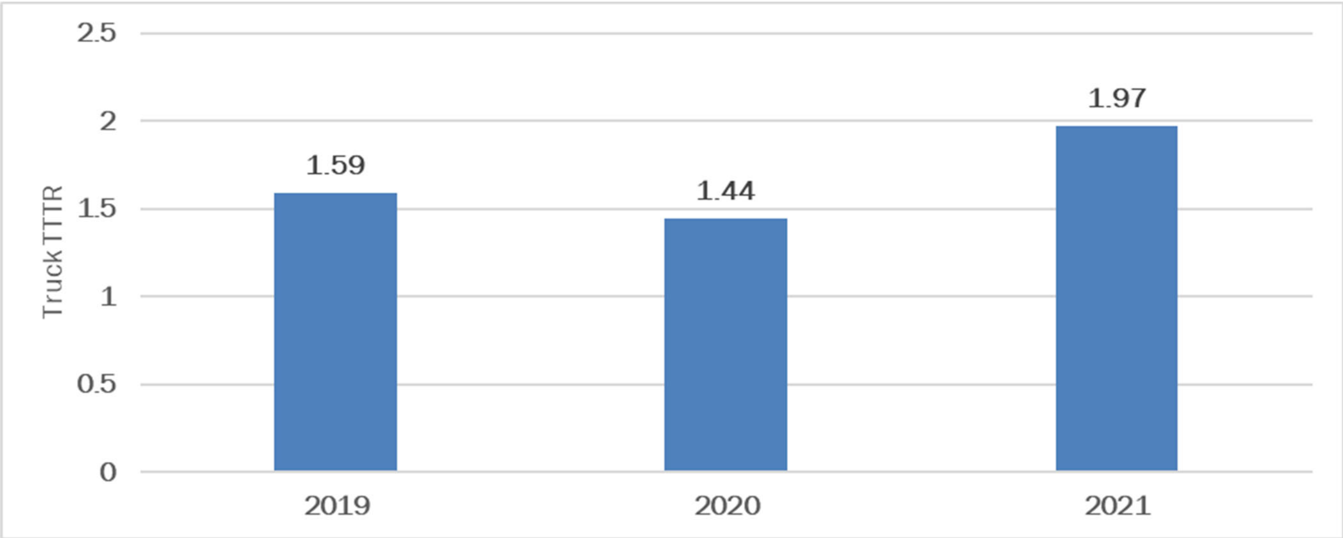
Figure 100. Max TTTR on New Jersey Interstates (2021)



Source: WSP Analysis of New Jersey NPMRDS (2021)

Figure 101 illustrates the miles-weighted maximum TTTR on the Interstate network in 2019, 2020, and 2021. The systemwide TTTR was lowest in 2020, indicating that the lower volumes and higher speeds observed in that year (largely due to COVID-19 pandemic related travel shifts) also led to a decrease in unpredictable delays. The TTTR rose again in 2021, exceeding the 2019 level.

Figure 101. Miles-weighted Max TTTR comparison for 2019, 2020 and 2021



Source: WSP Analysis of New Jersey NPMRDS

7.1.4 Truck Congestion and Bottlenecks

OVERVIEW

A data-driven analysis was used to identify truck bottlenecks in New Jersey. The analysis used findings from the recently published NCHRP Report 925 to estimate the costs that congestion generates for trucking companies and businesses using trucking services; this represents an improvement over analyses that estimate costs only to trucking companies and ignores broader supply chain impacts.[70] The assessment presented here identifies bottlenecks through a more complete estimation of congestion costs to supply chains and the broader economy, which is critical for prioritizing and right-sizing solutions.

Table 42 lists the steps in the analysis. First, 2021 travel-time data from the National Performance Management Research Data Set published by the FHWA was combined with hourly truck volume data to calculate the two congestion metrics NCHRP Report 925 recommends: Vehicle Hours of Excess Travel (VHET) and Vehicle Hours of Unreliability (VHU). The first metric quantified the impact of recurring congestion while the latter metric quantified non-recurring congestion. The monetization parameters from NCHRP Report 925 were then used to estimate the user costs incurred by trucks as they face recurring and non-recurring congestion.

[70] Guerrero, S. E., Hirschman, I., Bryan, J., Noland, R., Hsieh, S., Schrank, D., and Guo, S. 2019. NCHRP Research Report 925: Estimating the Value of Truck Travel Time Reliability, Transportation Research Board, National Academies of Science, Engineering and Medicine.

Table 42. Bottleneck Identification Methodology

Objective	Steps
Calculation of Congestion Metrics	Processed National Performance Management Research Data Set
	Approximated hourly truck volumes
	Estimated recurring congestion and non-recurring congestion metrics
	Estimated user costs
Bottleneck Identification	Categorize by Urban NY-Gateway Region, Urban Philadelphia Region, Urban Other, and Rural
	Set bottleneck thresholds
	Cluster bottlenecks
Assessment of Causes	Construction work zones

Source: NCHRP Report 925 and WSP Methodology

The estimated user costs were then used to evaluate delay at congested locations, generating high costs to the movement of freight and representing bottlenecks for truck operations. The roadway network was divided into four regions: Urban NY-Gateway, Urban Philadelphia Region, Urban Other, and Rural categories, so that congested roads are prioritized relative to other roads of similar types and traffic characteristics. Table 43 lists the county and roadway designation assigned to each sub-region. This segmentation of the network normalizes the analysis; otherwise bottlenecks in the NY-Gateway region would dominate the statewide analysis. The thresholds used to identify bottlenecks were set at the 95^{th} percentile user costs per mile (top five percent of segments generating congestion costs). Once segments were identified as bottlenecks, they were aggregated into clusters.

Finally, the top bottlenecks were analyzed to determine whether they were caused by roadway construction work zones, which would exclude them from project development considerations. Work zone data was collected by analyzing NJDOT records of construction logs for the year 2021.

CONGESTION METRICS

Roadway bottlenecks were identified as the places on the roadway system resulting in the highest user costs to the movement of freight. This perspective is useful for the following reasons:

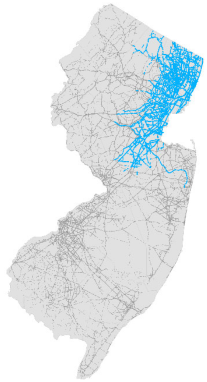
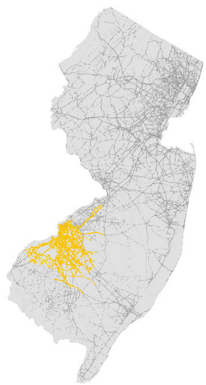
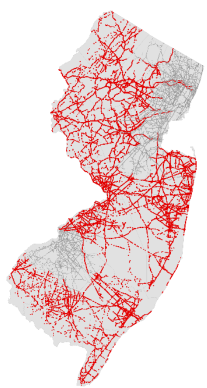
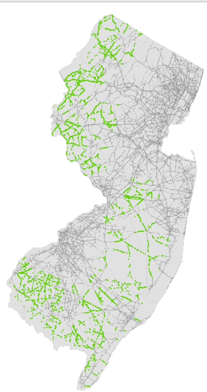
- It considers not just the costs of delays on trucking—in terms of driver wages and additional fuel consumed—but also considers the costs that congestion generates for shippers and receivers, from late shipments and increasing buffers throughout the supply chain.
- It adopts the perspective of system users, capturing how congestion affects businesses and industries, as opposed to relying on ad-hoc travel time ratios or indices.
- It prioritizes bottlenecks and develops solutions that are proportional to bottleneck magnitude.

This section describes how to estimate the user costs of congestion.

TRAVEL TIME DATA

NPMRDS data was acquired that report the travel times of trucks in New Jersey at 15 minutes intervals throughout 2021, resulting in 144 million travel time observations. INRIX compiled this data set from providers of location services for truck fleets.

Table 43. Counties and Roadway Segment Definition by Sub-Region

Sub-region		Counties		Roadway Category
New York Gateway Area		Bergen	Middlesex	Urban
		Essex	Passaic	
		Hudson	Union	
Philadelphia Gateway Area		Camden	Gloucester	Urban
All Other Urban Areas		Atlantic	Ocean	Urban
		Burlington	Salem	
		Cape May	Somerset	
		Cumberland	Sussex	
		Hunterdon	Warren	
		Mercer	Morris	
		Monmouth		
All Rural Areas		Atlantic	Salem	Rural
		Burlington	Somerset	
		Camden	Sussex	
		Cape May	Warren	
		Cumberland	Morris	
		Gloucester	Middlesex	
		Hunterdon	Atlantic	
		Mercer	Burlington	
		Monmouth	Camden	
		Ocean	Cape May	

Source: NJDOT, WSP

Several steps were taken to process the NPMRDS following guidance from NCHRP Report 925 so that the congestion metrics could be calculated accurately and consistently.

Travel time records were excluded from the analysis if they took place on weekends or during major holidays (New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving, and Christmas). Traffic operations during these days do not reflect travel patterns experienced during typical weekday operations.

Travel time records were averaged at the 15-minute level to reduce the influence of idiosyncratic variation on congestion estimates (this helps exclude the fact that different people tend to drive at different speeds when estimating roadway congestion and reliability). Roadway segments that had fewer than 300 records per direction were excluded.

Records calculated from historical averages were excluded because they would artificially reduce the measure of non-recurring congestion.

HOURLY VOLUMES

The congestion metrics considered how truck volumes vary throughout the network and for different hours of the day. It is possible, and even likely, that roads with poor speeds and reliability see few trucks, because truck drivers avoid known bottlenecks. When able to do so, truck drivers also avoid driving during congested periods. The congestion metrics therefore considered truck volumes at the hourly level, so that the identified bottlenecks reflect where trucks are traveling and not just where congestion occurs on the roadway network.

Data describing how truck volumes vary on the National Highway System throughout the day do not exist. However, these volumes were approximated using New Jersey data. First, daily truck volumes were obtained from NPMRDS, which reports the daily volume of single-unit and combination trucks for every roadway segment. These volumes come from data NJDOT submitted to the FHWA as part of the Highway Performance Monitoring System (HPMS). The FHWA then assigns these volumes to the NPMRDS network and packages the information alongside the travel time records. While these data are useful for statewide planning analyses, two key sources of uncertainty could lead the reported volumes to differ from actual volumes on the ground.

The vehicle volumes reported by NJDOT as part of HPMS represent coarse approximations. Each state develops these estimates differently; however, no state can count volumes on every road every day, leading states to rely on models or mesoscopic approximations to interpolate volumes between observed counts. Traffic engineers lead this manual process in some states. All this directs the daily volumes included in NPMRDS to provide a reasonable description of traffic patterns statewide; however, it might miss specific roads that have high truck volumes because of nearby freight generators (e.g., intermodal facilities, warehouses) or are located along popular truck routes.

The translation of volumes from the HPMS network to the NPMRDS network is not an exact process; errors are possible. The geometry, segmentation, and level of detail of these two networks are different, making it difficult to translate information between them. The process used by the FHWA and their contractor has improved over the years; however, cases have been found in other states where the volumes were miscoded. To mitigate this, a random sample of the volume data was validated with NJDOT sources.

Once the daily truck volumes were processed and validated, they were disaggregated to the hourly level. Hourly volumes were approximated using time-of-day volume data from 75 Weigh-in-Motion (WIM) sensors throughout New Jersey. These recorders noted the volumes observed throughout the day for specific vehicle classes (classes 5+ were assumed to represent trucks). Different approaches could have been taken to join these data to the NPMRDS network. In congestion analyses that focus on urban areas, capturing traffic patterns in detail—by direction of travel—is important.

However, in a statewide analysis, the most important factors are whether the road is in an urban or rural area and its functional class. Each of the roadway segments in the NPMRDS was joined to the nearest automatic traffic recorder of comparable roadway class. The daily volumes from the NPMRDS were then multiplied by the share of volume in each hour, producing hourly truck volumes for use in the congestion metrics.

RECURRING AND NON-RECURRING CONGESTION METRICS

The congestion metrics used to identify bottlenecks were developed by NCHRP Report 925, which outlines an approach for quantifying recurring and non-recurring congestion using travel time data and estimating associated user costs. Distinguishing between recurring and non-recurring congestion is important because research shows that freight users are much more concerned about non-recurring congestion. Trucking companies account for recurring congestion—typical slowdowns during peak time of the day—in their delivery schedules; however, they have difficulty anticipating and managing non-recurring congestion. Moreover, most shippers and receivers place a premium on delivery schedules being met, because late shipments can disrupt production, result in empty shelves at stores, or lead to a missed intermodal transfer at an airport, seaport, or rail terminal. On-time performance, which is one of the most important factors in modern-day supply chains, becomes much more difficult to achieve with high levels of non-recurring congestion.

Quantifying recurring and non-recurring congestion separately enables the full costs of congestion to be estimated. Other congestion metrics reliant on travel time indices or ratios do not distinguish between these two separate phenomena, which means that they cannot be used to estimate the costs of congestion. Many studies seeking to estimate the costs of congestion in freight transportation consider only the impacts of delays on vehicle operating costs (e.g., driver wages, fuel consumption) and do not consider the broader supply chain implications of increasing uncertainty in travel times. These broader implications, which research shows are critical for costing the full impacts of congestion, are considered by the congestion metrics used in this study.

To estimate the recurring and non-recurring congestion metrics, the following calculations need to be conducted using the travel time data for each roadway segment:

- The average travel time during hour h, defined as τh
- The free-flow travel time, taken as the 10th percentile travel time across all hours of the day, defined as τFF
- The 95th percentile travel time during hour h—representing how slow travel times could get five percent of the time (1 in 20)—defined as $95\%\tau h$

Figure 102 illustrates these metrics for a representative roadway segment. This figure also includes a plot of truck volumes for each hour of the day, defined as D_h.

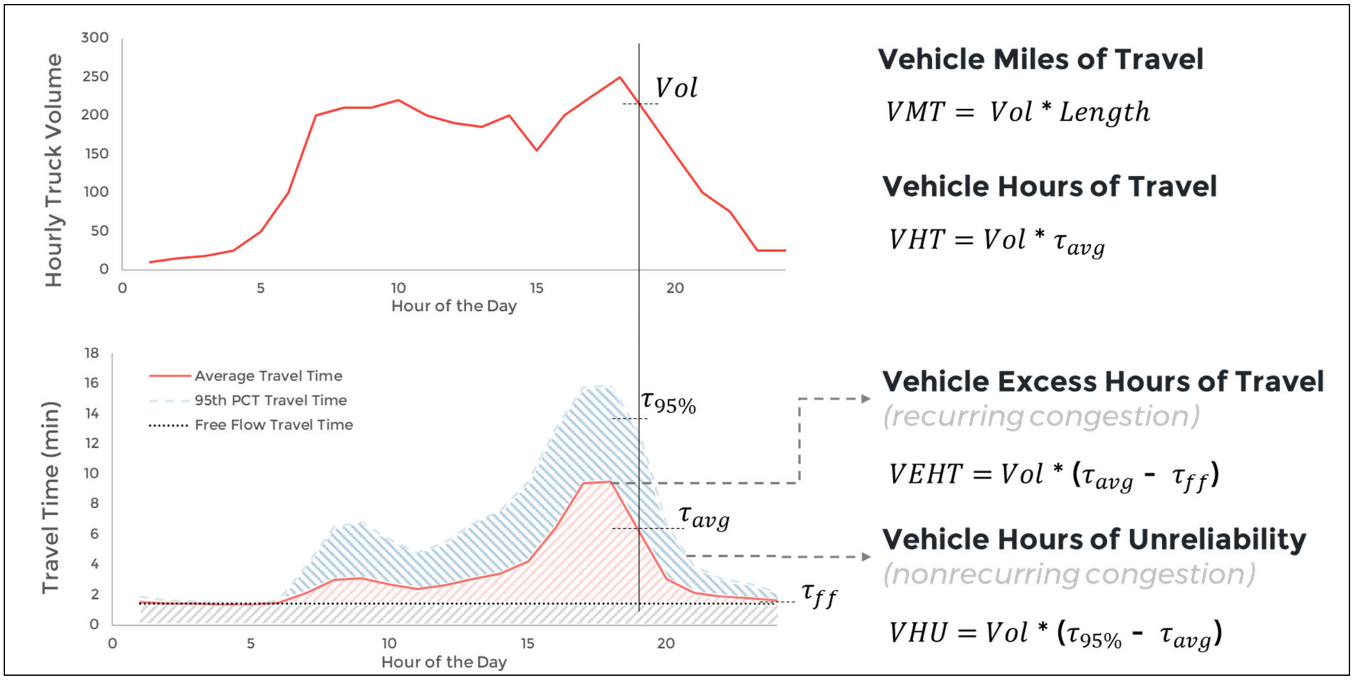
The congestion metrics were calculated as:

- Recurring congestion (dark blue shaded area in Figure 102 was quantified as VEHT (the number of hours of travel above free flow conditions). VEHT was estimated by comparing average travel times to the free-flow travel time, and then summing as follows:

$$VEHT = \sum(\tau h - \tau FF\ )Dh\ /\ l$$

  The metric was divided by the centerline length l of the segment to be able to compare between segments of different lengths.

Figure 102. Example Calculation of Congestion Metrics



Source: NCHRP 925, WSP

- Non-recurring congestion (orange shaded area Figure 102) was quantified as VHU accumulated in each segment, which was calculated as the difference between the 95th percentile travel time and the average travel time, and summing for each hour of the day as follows:

$$VHU = \sum(95\%\tau h - \tau \text{h})Dh \,/\, l$$

  This measure sums the hours of uncertainty that trucks face while traveling throughout the day. This is a superior way of measuring unreliability to the often-used travel time indices or ratios, because it is additive and focuses on non-recurring congestion. The other metrics do not distinguish clearly between recurring and non-recurring congestion, making it difficult to interpret and monetize.

USER COSTS

The congestion metrics were translated into costs using monetization factors from NCHRP Report 925. This study conducted a stated-preference survey in the United States to quantify how motor carriers and shippers value travel time unreliability, relative to expected travel times and shipment costs. This represents the largest survey conducted to estimate how roadway congestion affects the freight sector. The advantage of using these monetization factors is that the costs caused by recurring congestion can be added to the costs caused by non-recurring congestion, leading to a single user cost metric combining both effects. The total congestion cost per mile for each segment was calculated as:

$$C = \$66 * VEHT + \$160 * VHU$$

In this calculation, $66 is the cost of operating a truck for one hour based on American Transportation Research Institute Operational Cost of Trucking Report, and $160 is the costs incurred for each hour of unreliability.

INDUSTRY GROUP COMPOSITION

Commodity-level data from Transearch and STB Waybill was categorized into distinct industry groups to assist in analyzing impacts of freight congestion and demand for specific New Jersey supply chains. The commodity-level composition of these industry groups is listed in Table 44.

Table 44. Commodity Composition of Industry Groups

Industry Group	Commodity	
Automotive & Transportation Equipment	▪ Electrical Equipment ▪ Fabricated Metal Products ▪ Carburetors, Pistons, etc. ▪ Ordinance or Accessories	▪ Primary Metal Products ▪ Rubber or Miscellaneous Plastics ▪ Transportation Equipment
Chemicals & Plastics	▪ Chemicals or Allied Products ▪ Rubber or Miscellaneous Plastics	▪ Waste or Scrap Materials
Construction	▪ Clay, Concrete, Glass or Stone ▪ Electrical Equipment ▪ Fabricated Metal Products	▪ Machinery ▪ Nonmetallic Minerals ▪ Petroleum or Coal Products
Distribution	▪ Secondary Traffic	▪ Mixed Miscellaneous Shipments
Electronics & Electrical Goods	▪ Electrical Equipment ▪ Instruments, Photo Equip, Optical Eq	▪ Machinery
Energy	▪ Coal ▪ Crude Petroleum or Natural Gas	▪ Petroleum or Coal Products
Food & Agriculture	▪ Agricultural Chemicals ▪ Farm Products ▪ Food or Kindred Products ▪ Fresh Fish or Marine Products	▪ Farm Machinery ▪ Fertilizer ▪ Tobacco Products
Furnishings & Clothing	▪ Apparel or Related Products ▪ Chemicals or Allied Products ▪ Furniture or Fixtures ▪ Leather or Leather Products	▪ Machinery ▪ Miscellaneous Manufacturing Products ▪ Rubber or Miscellaneous Plastics ▪ Textile Mill Products
Health	▪ Pharmaceutical Products	▪ Health-related Instruments, Optical Equipment
Lumber & Paper	▪ Forest Products ▪ Lumber or Wood Products ▪ Paper and Woodworking Machinery ▪ Paper Waste and Scrap	▪ Clay, Ceramic ▪ Printed Matter ▪ Pulp, Paper or Allied Products
Metals & Machinery	▪ Clay, Concrete, Glass or Stone ▪ Fabricated Metal Products ▪ Machinery ▪ Waste or Scrap Materials	▪ Metallic Ores ▪ Ordnance or Accessories ▪ Primary Metal Products
Miscellaneous	▪ All other commodities not elsewhere classified	

IDENTIFICATION AND CLUSTERING

The thresholds used to identify bottlenecks were set at the top five percent of user costs per mile in each bottleneck area (Urban NY-Gateway, Urban Philadelphia Region, Urban Other, and Rural). Different thresholds for the user cost metric were used to identify bottlenecks in rural areas versus urban areas. Bottlenecks in urban areas typically have different magnitude and characteristics than bottlenecks in rural areas. If the same threshold was used throughout the state, the highly congested roads in metropolitan areas would dominate the results. Table 45 shows these thresholds. Roads were classified as being Urban Other or Rural based on the distinction made in NPMRDS (originally coming from the U.S. Census Bureau). Urban NY-Gateway was defined as urban roads in the counties of Middlesex, Union, Passaic, Hudson, Essex, and Bergen. Urban Philadelphia Region was defined as urban roads in the counties of Camden and Gloucester.

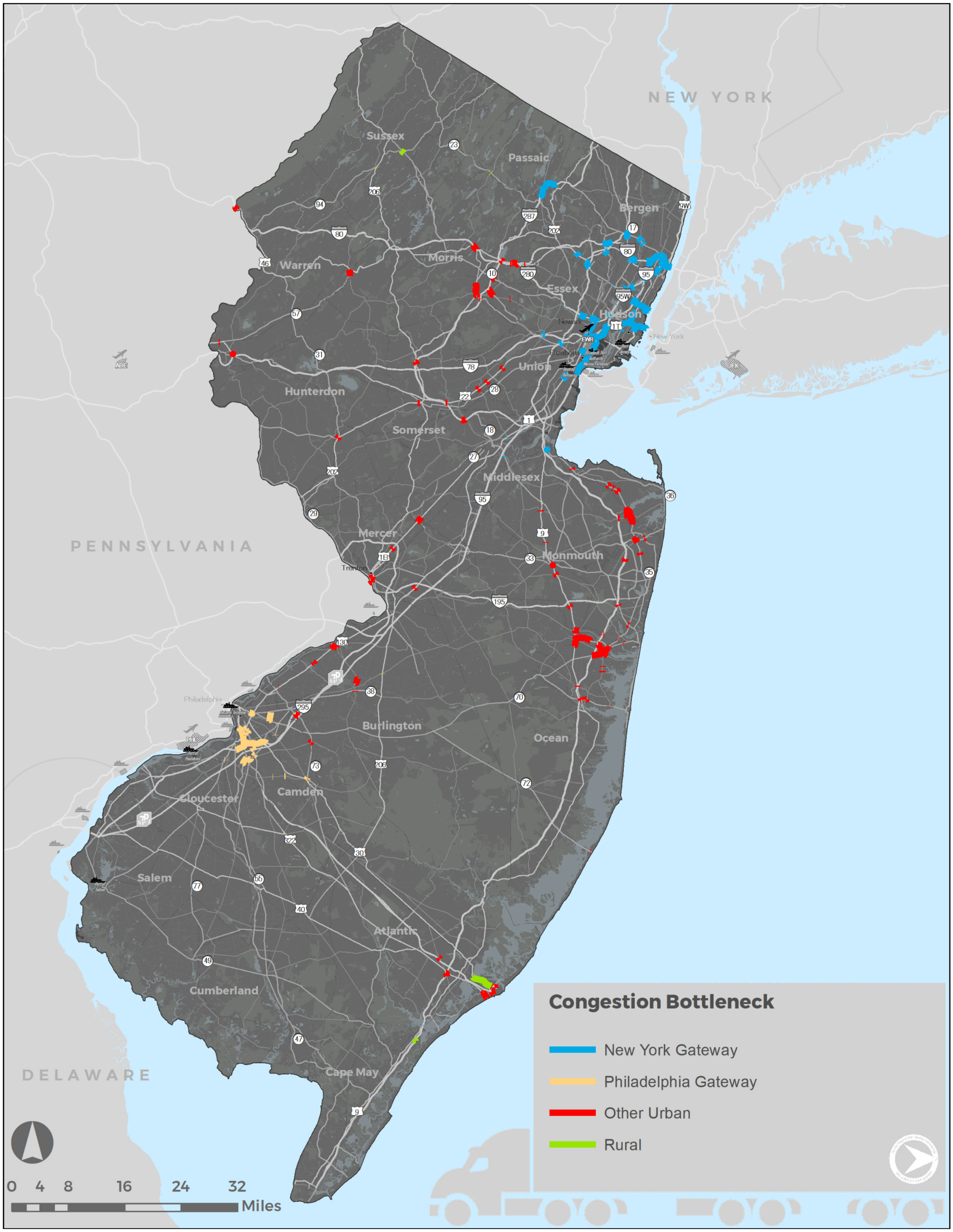
There were 223 Urban NY-Gateway roadway segments with user costs higher than the threshold (in NPMRDS each segment is defined by a unique Traffic Message Channel TMC), totaling 73 centerline miles of roadway. In the Urban Philadelphia Region, 47 roadway segments were above the threshold, combining for 13 centerline miles of roadway; 191 Urban Other roadway segments were above the threshold, combining for 41 centerline miles of roadway; Finally, 17 Rural roadway segments were above the threshold, combining for seven miles of roadway. In total, roughly 95% of the bottleneck distance was identified in urban areas and five percent in rural areas. Figure 103 displays a map of the bottlenecks, showing identified segments across New Jersey, but concentrated in urban regions, as highlighted in Figure 104.

Table 45. Truck Bottleneck Thresholds and Totals

Bottleneck Location	User Cost Threshold ($/mile-day)	Bottleneck Centerline Roadway Miles	Number of Bottleneck Segments (TMCs)
Urban NY-Gateway	$20,876	73	223
Urban Philadelphia Region	$11,519	13	47
Urban Other	$11,048	41	191
Rural	$5,572	7	17
Total	**$49,015**	**134**	**478**

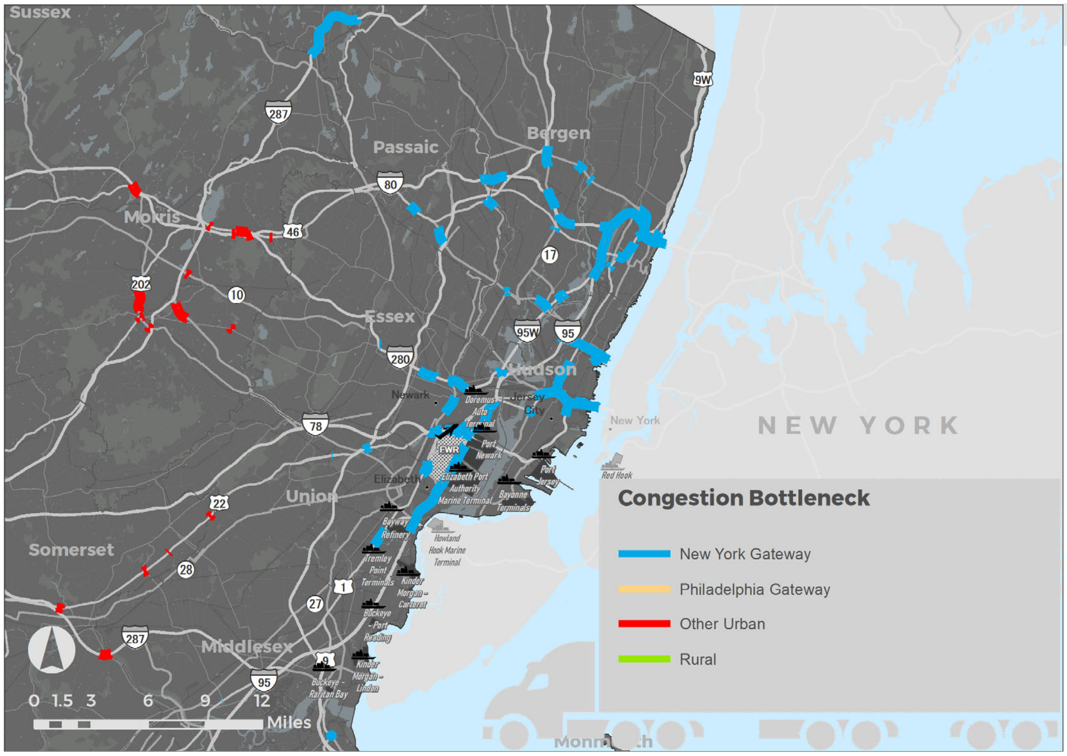
Source: NPMRDS and NCHRP Report 925, WSP

Figure 103. Truck Bottlenecks, by Location Type - Statewide

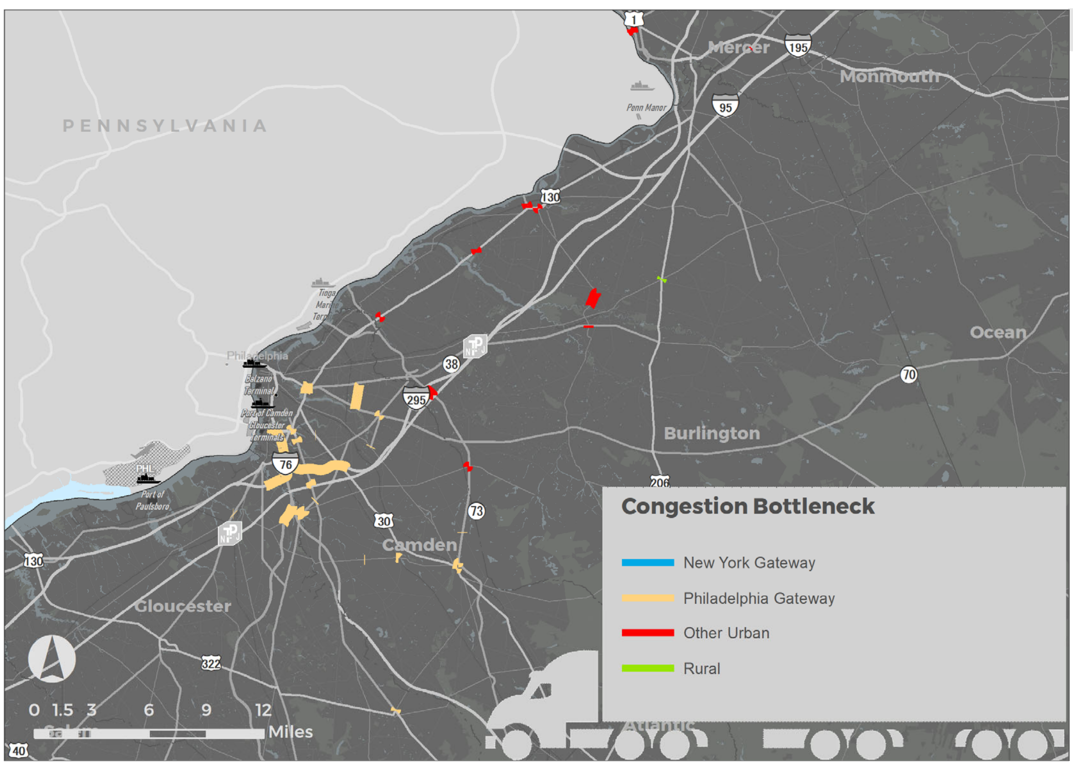


Source: NPMRDS and NCHRP Report 925, WSP

Figure 104. Truck Bottleneck Locations – Highlighted Metropolitan Areas



New York



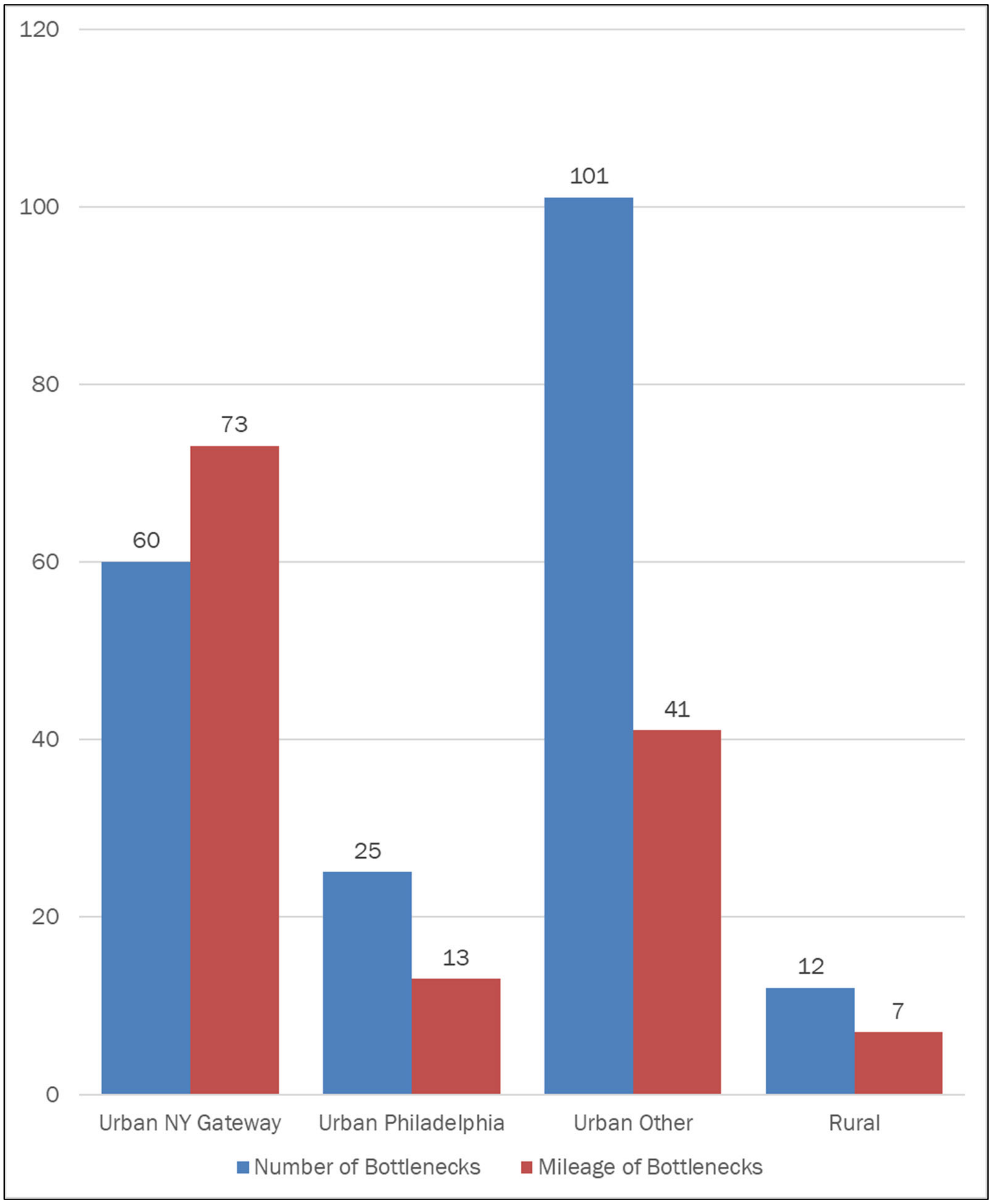
Philadelphia

Source: NPMRDS and NCHRP Report 925, WSP

A manual process was conducted to combine consecutive bottlenecks into bottleneck clusters, particularly in urban areas where the network is segmented into numerous consecutive segments. For simplicity and ease of interpreting the results, consecutive and near consecutive segments were combined into bottleneck clusters. In some cases, nearby non-consecutive roads were combined into the same cluster if the underlying cause of the bottleneck was determined to be the same. As shown in Figure 105 this resulted in 198 total bottleneck clusters:

- Urban NY-Gateway – 60
- Urban Philadelphia Region – 25
- Urban Other – 101
- Rural – 12

Figure 105. Number of Bottleneck Clusters



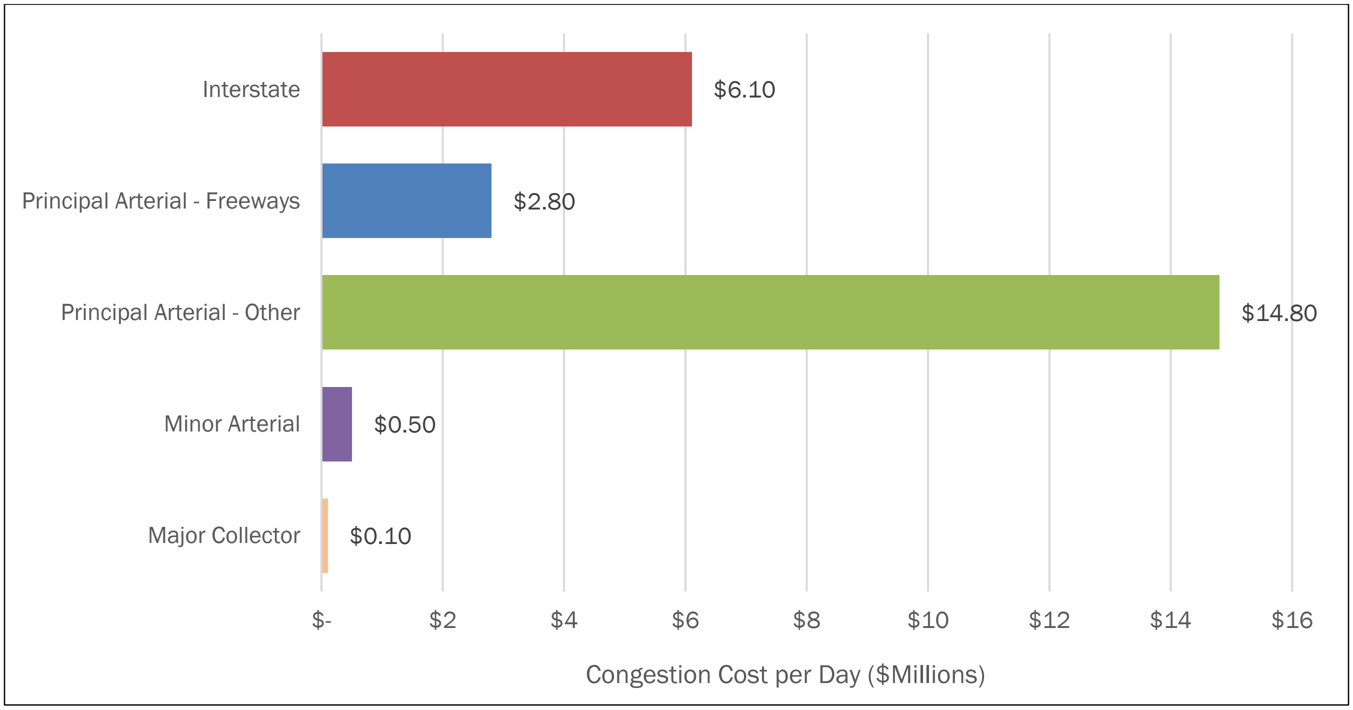
Source: NPMRDS and NCHRP Report 925, WSP

ECONOMIC COSTS

Roadway congestion is a major source of unreliability and added costs in modern supply chains. All aspects of production, warehousing, and retailing have been optimized and streamlined to reduce costs and improve customer service, while the transport of products by truck between these stages is exposed to significant risks and uncertainties. Not only does roadway congestion slow down the supply chain and generate costs for businesses and consumers, but it also constrains how much further production, warehousing, and retailing can be improved, stifling the competitiveness of businesses. Roadway congestion makes it hard for trucking companies to set and meet delivery schedules.[71] A missed delivery window can lead to production disruptions, stock-outs at retail establishments, and delays that cascade throughout the supply chain. Most businesses receiving freight place a high value on timely deliveries; therefore, trucking companies do their best to be on time. This often involves building slack in their delivery plans, which translates into lost productivity as trucks wait for their delivery appointment near their destination. Even if shipments arrive on time, roadway congestion generates costs to supply chains from the slack and redundancy required to prevent disruptions.

The costs that congestion causes trucks and supply chains was estimated not just at the top bottlenecks, but throughout the National Highway System in New Jersey (which is the system monitored by NPMRDS). Interstates were found to contribute to almost 25% of all congestion costs, even though they account for approximately 17% of the total mileage of the NHS network. Other freeways and arterials (excluding interstates) account for 72% of total congestion costs and 80% of mileage. Congestion costs by functional class are shown in Figure 106.

Figure 106. Congestion Costs per day ($) by Roadway Functional Class



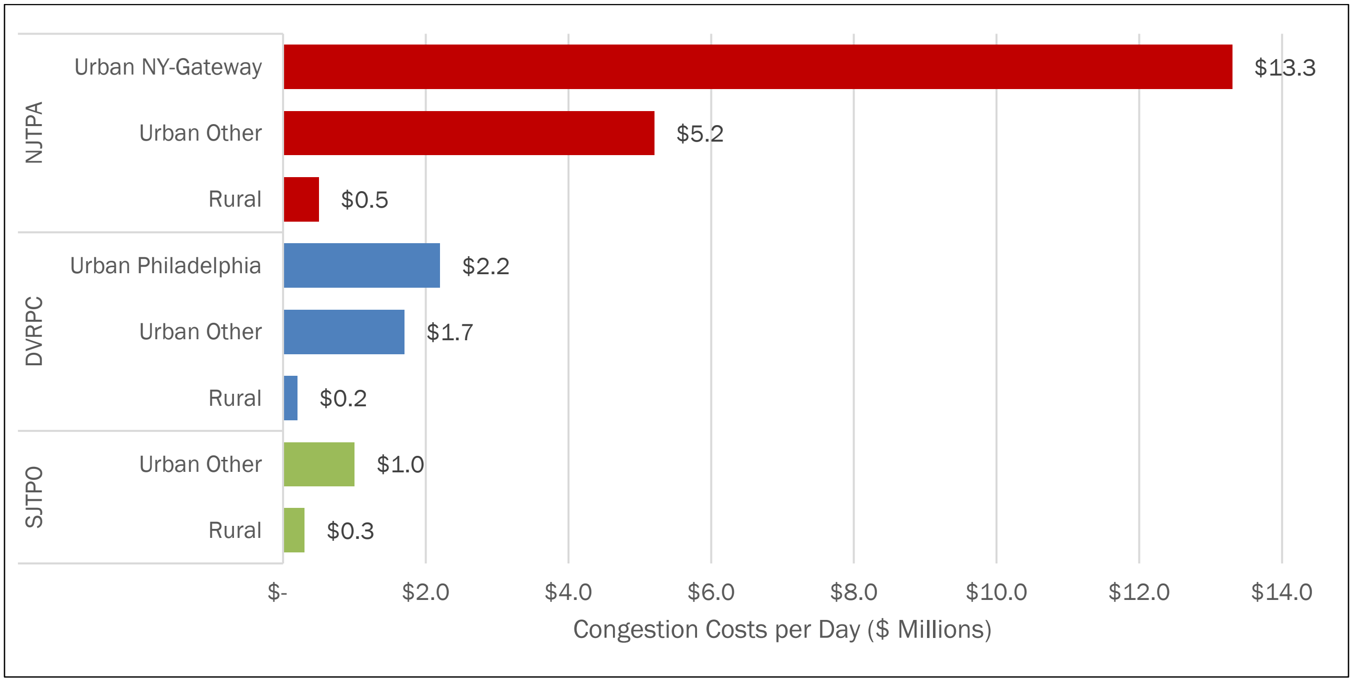
Source: NPMRDS and NCHRP Report 925, WSP

Across the country, urban areas experience significant congestion costs. These areas have a higher density of freight activity (such as a concentration of industry or consumer retail), as well as co-location of transportation facilities such

71 Guerrero, S. E., Hirschman, I., Bryan, J., Noland, R., Hsieh, S., Schrank, D., and Guo, S. 2019. NCHRP Research Report 925: Estimating the Value of Truck Travel Time Reliability, Transportation Research Board, National Academies of Science, Engineering and Medicine.

as ports, airports, and rail terminals. In New Jersey, urban areas overlapping with the NY-Gateway region account for 55 percent of total congestion, at approximately $13.3M per day in recurring and non-recurring congestion impacts (see Figure 107). Other urban segments in the NJTPA region account for 21% of total impacts at $5.2M per day in congestion costs. In total, NJTPA accounts for over 78% of New Jersey congestion costs. The DVRPC region accounts for 17% of total New Jersey congestion costs at $4.1M per day, and the SJTPO region accounts for five percent of total costs at $1.4M per day. Within DVRPC, urban segments in the Philadelphia region account for $2.2M per day of congestion impacts. The figures reported here include congestion costs accrued both at identified truck bottlenecks as well as the rest of the roadway network.

Figure 107. Congestion Costs per day ($) by MPO, region and urban/rural



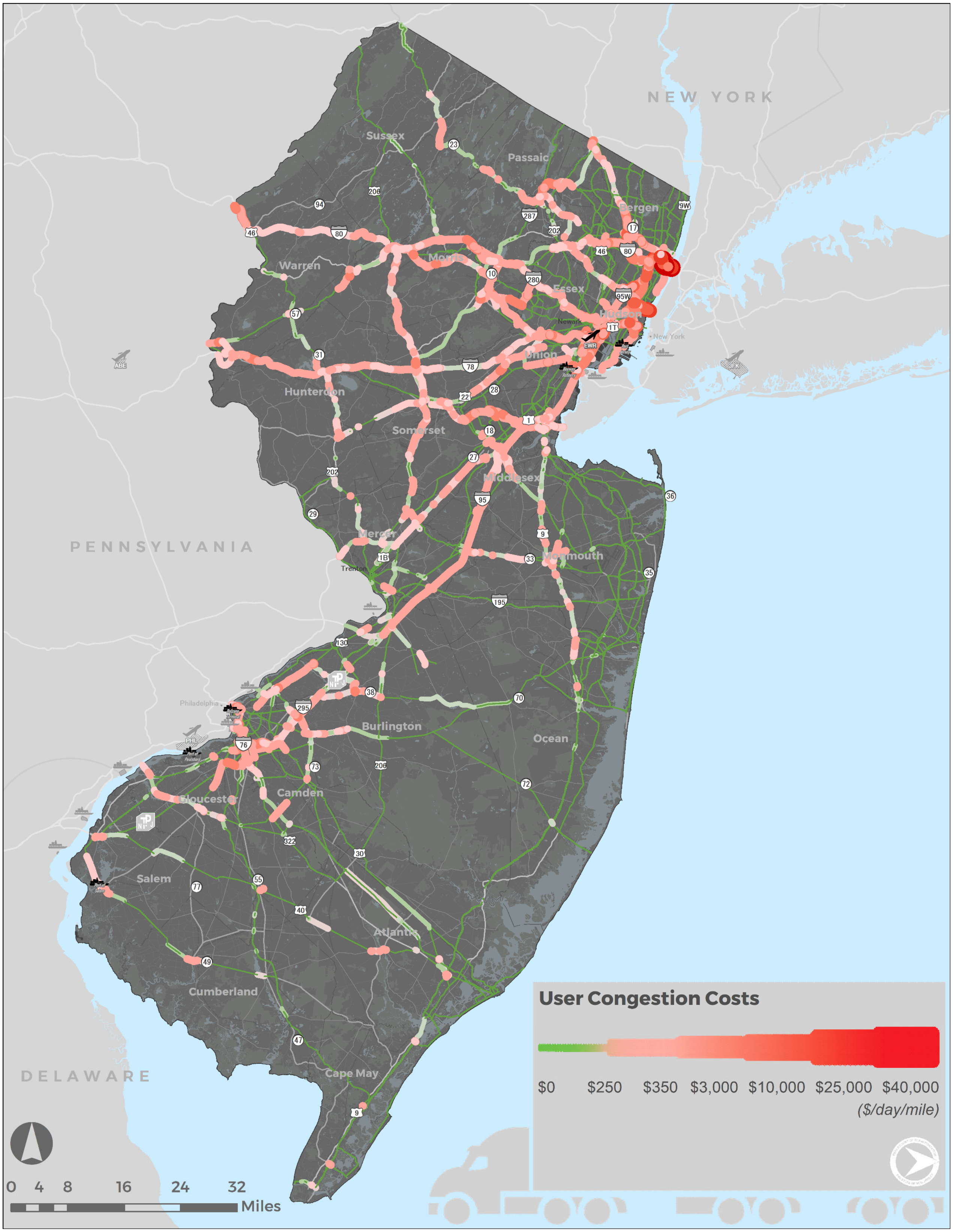
Source: NPMRDS and NCHRP Report 925, WSP

The geographic variations in congestion seen above (Figure 107) differentially impact the supply chains in New Jersey, as these supply chains have different freight demand patterns across the state. Supply chain-specific impacts were estimated by apportioning the total congestion costs at any given location based on the relative value of goods for supply chains flowing through that roadway segment.[72]

The highest value supply chains face significant localized congestion costs (as highlighted by high congestion costs per mile metrics) in the NY-Gateway region as well as in bottlenecks across the state (Figure 108). The food and agriculture supply chain faces the biggest congestion impact in New Jersey, with congestion costs totaling $2.5M per day across the state roadway network (Figure 110). Owing to the dispersed nature of production in this supply chain – with farms, processors, and warehouses across the state - the congestion costs experienced are a function not only of localized impacts but also the high relative length of truck trips in this industry. As such, over 75% of the congestion costs (approximately $1.9m) impacting this supply chain are accrued at locations that are not considered bottlenecks. These flows are impacted by congestion on interstates to and from the NY-Gateway region, notably I-95, I-80, I-78 and I-280.

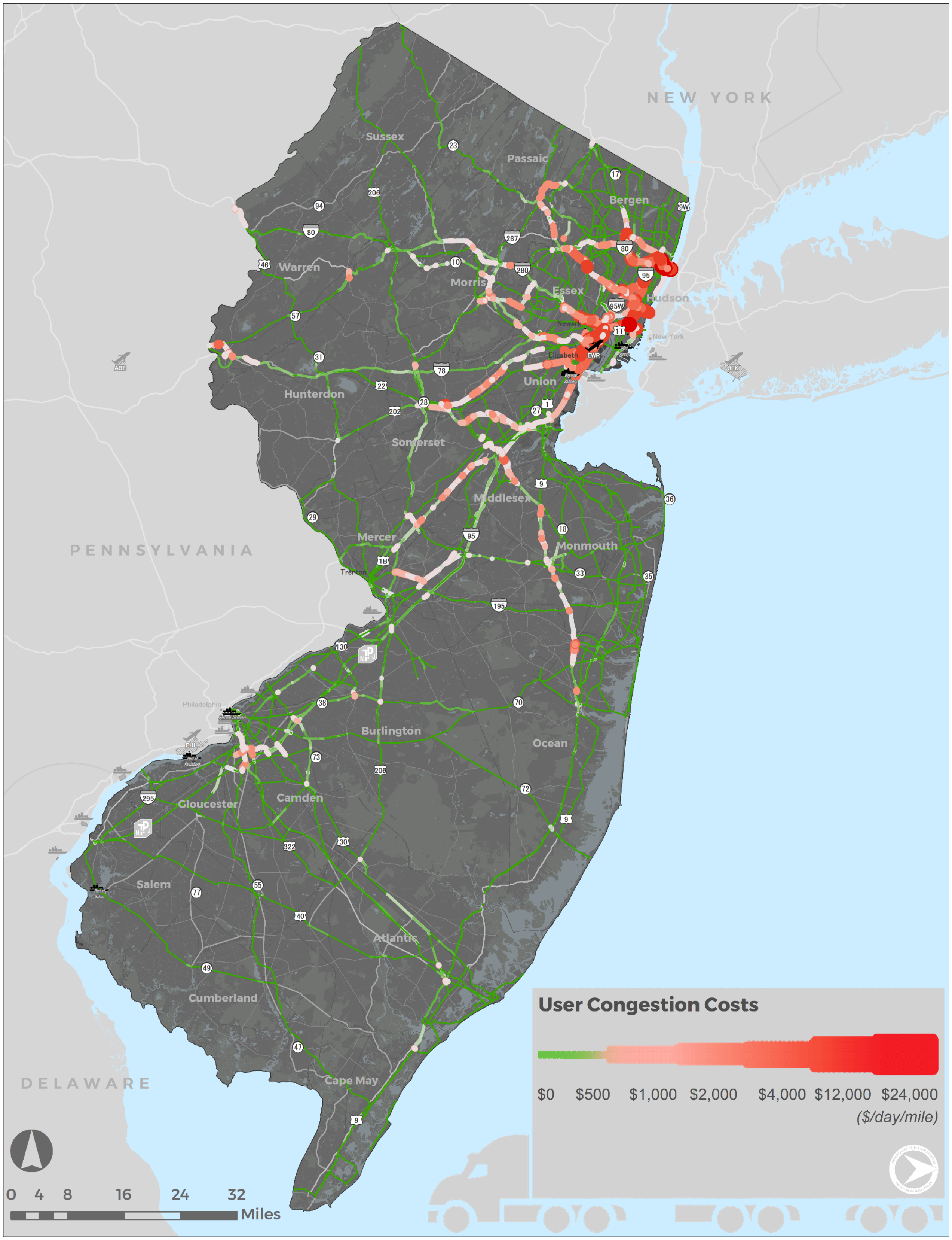
72 Supply chain values were derived from commodity movements obtained from Transearch, routed onto the Transearch highway network and then conflated with the NPMRDS network by means of a spatial join in GIS software.

Figure 108. Value and Congestion Costs per mile for Food & Agriculture Supply Chain



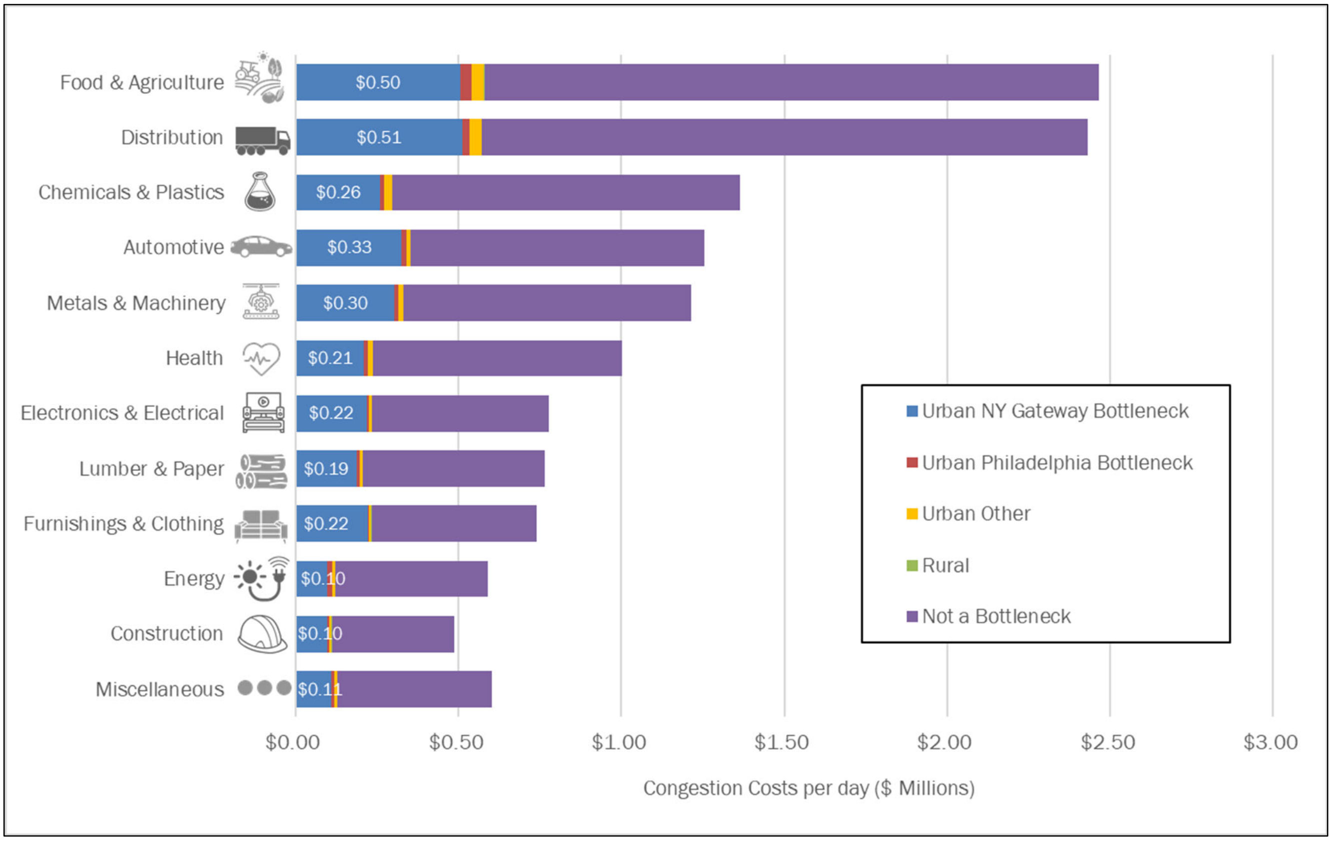
Source: Transearch and NPMRDS, WSP

Figure 109. Value and Congestion Costs per mile for Distribution Supply Chain



Source: Transearch and NPMRDS, WSP

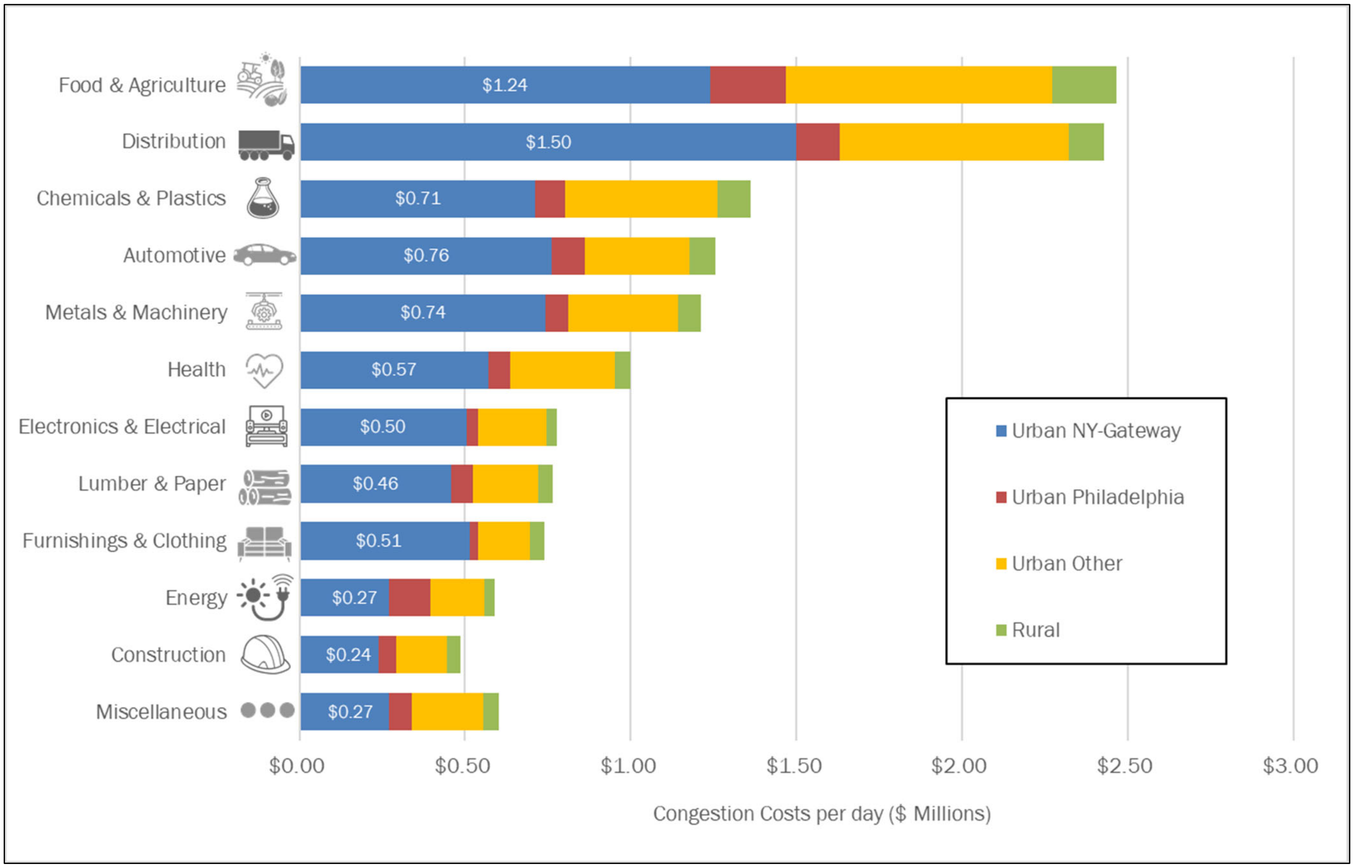
Figure 110. Daily Congestion Costs ($) of the Top Five Percent Bottlenecks by Supply Chain



Source: Transearch and NPMRDS, WSP

The automotive and distribution supply chains, however, see lower average trip lengths in the state but higher localized congestion costs accruing from the NY-Gateway region (above 60% of statewide congestion costs as compared to below 50% for food & agriculture) (Figure 111). The distribution supply chain, which comprises flows connecting industry warehouses and other fulfilment centers to major freight corridors, is particularly impacted by congestion on highways within Hudson, Union, Essex, and Bergen counties, as well as other arterial and connector roadways providing access to freight clusters in the NY-Gateway region.

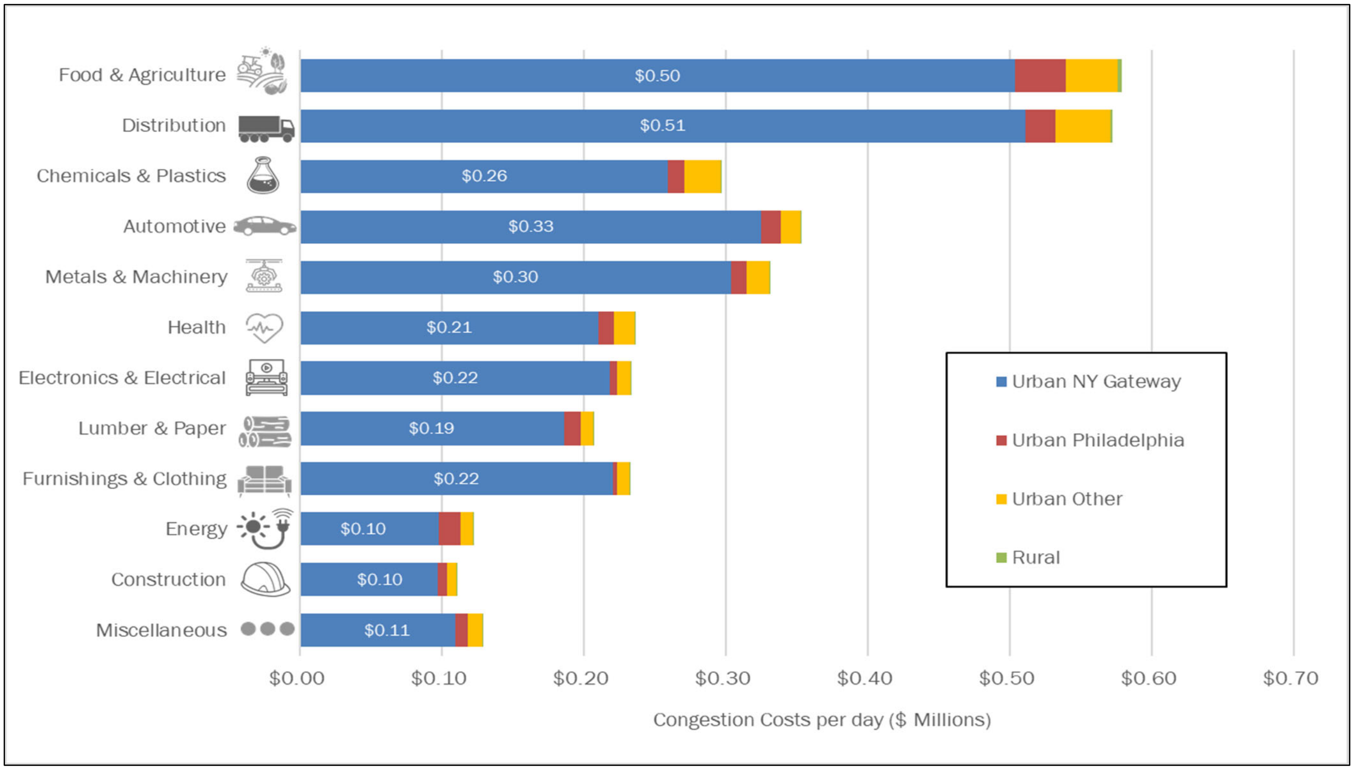
Figure 111. Daily Congestion Costs ($) of Supply Chains by Region



Source: Transearch and NPMRDS, WSP

A similar situation is evident when looking only at truck bottleneck locations across the state (Figure 112). The food and agriculture industry is most impacted (congestion costs of over $580k per day), followed by distribution, automotive, metals and machinery, and chemicals and plastics. Bottlenecks in the NY-Gateway region account for over two-thirds of statewide bottleneck costs accrued by each of the supply chains analyzed.

Figure 112. Congestion Costs per day ($) by Supply Chain (bottleneck locations only)



Source: Transearch and NPMRDS, WSP

TOP FREIGHT BOTTLENECKS

This section describes the top 20 freight bottleneck clusters in New Jersey for each of the bottleneck groups (Urban NY-Gateway, Urban Philadelphia, Urban Other, Rural) and the estimated costs they generate. A limitation of the analysis is that the routed commodity flow data does not distinguish by direction of travel, therefore directional imbalances may be underrepresented.

URBAN NY-GATEWAY REGION

The top 20 bottleneck clusters in the NY-Gateway region are listed in Table 46 and mapped in Figure 113 (with mapped ID numbers corresponding to the table). In total, these bottlenecks represent 56 centerline miles of roadway generating $3.02 million of user costs to trucks and supply chains each day. About a third of these user costs accrue to the top ranked bottleneck cluster on I-95 NB/EB from I-80 to GWB, because this is a heavily congested corridor and the longest defined urban NY bottleneck (accruing more congestion costs). As indicated by the northbound and eastbound notations in the bottleneck names, the mileage and user costs listed in this table are for specific direction of travel. In a few instances the direction of travel is not included, which implies that both directions of travel are part of the same bottleneck cluster.

The supply chains most impacted by these top 20 urban NY-Gateway bottlenecks include food and agriculture, construction, and distribution (Table 47). Through trucks and empty units contribute significantly to congestion at these bottlenecks, with close to half the impact in some cases. This measure is consistent with numbers seen in other states. It illustrates that a significant source of congestion on New Jersey roads is caused by movements that do not directly impact the state's economy (through trucks) or by movements associated with regular distribution operations/equipment balance movements (empties).

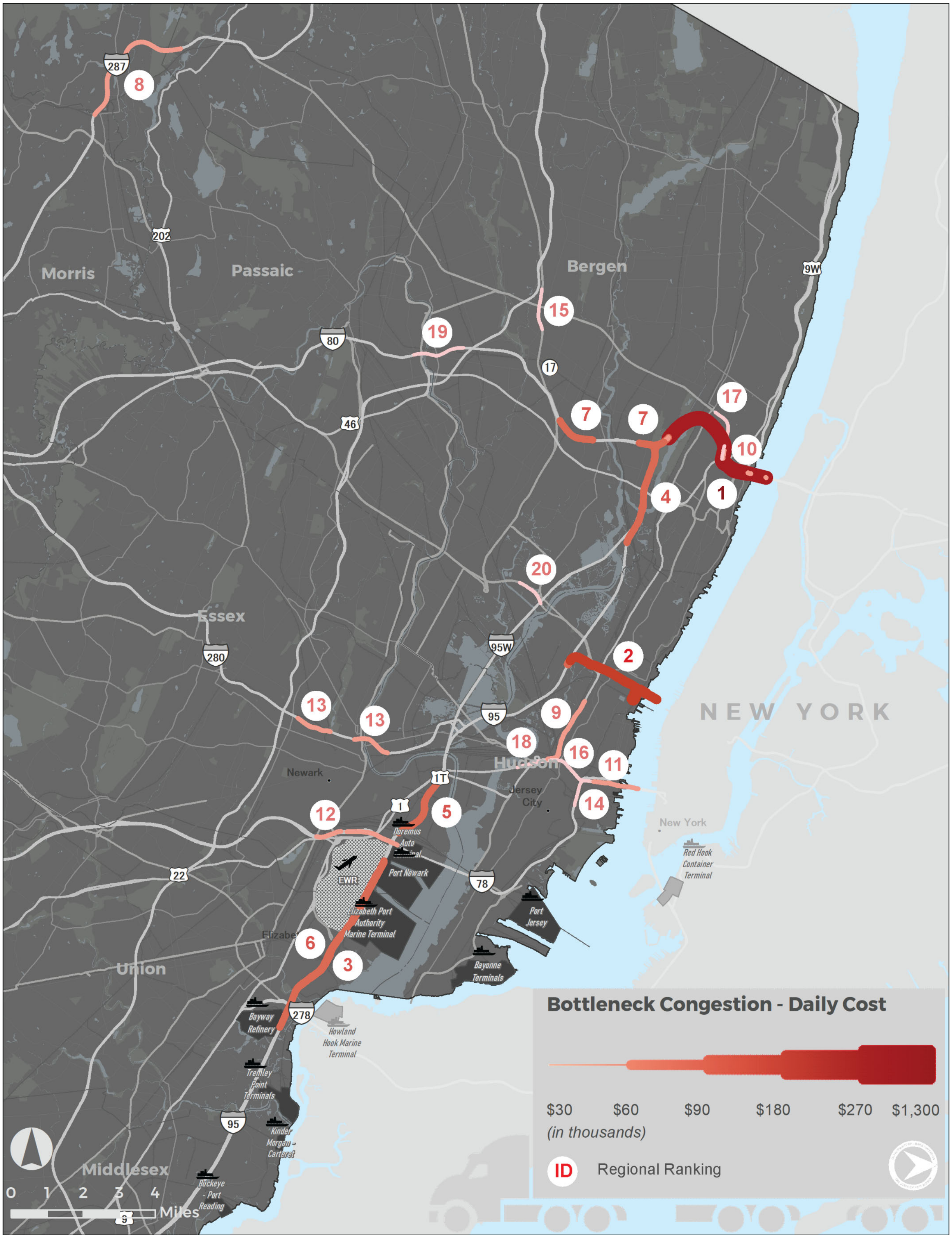
All top 20 bottleneck locations are projected to see at least 85% growth in truck traffic from 2019 to 2050.

Table 46. Top 20 Bottlenecks in Urban NY-Gateway Region

Rank	ID	Bottleneck Name	County	Total Miles	Average Daily Truck Volume	Congestion Costs in 2019 ($/day)
1	44	I-95 EB from I-80 to GWB	Bergen	3.67	230,727	$1,289,348
2	46	NJ 495 EB from I-95 to Lincoln Tunnel West	Hudson	3.44	45,286	$277,305
3	58	I-95 SB @ I-78 to I-278	Union	5.10	82,003	$177,381
4	45	I-95 from I-495 to I-80	Bergen	7.02	151,546	$140,005
5	54	I-95 NB @ 78 to Raymond Boulevard	Essex	2.03	57,205	$127,570
6	70	I-95 NB@ I-78 to I-278	Union	4.19	39,103	$111,780
7	40	I-80 WB @ Exits 63-67	Bergen	3.21	67,404	$110,563
8	101	I-287 @ Skyline Dr/Exit 57	Passaic	3.73	4,215	$93,331
9	50	NB Tonnelle Ave from NJ 139 to Secaucus Rd	Hudson	2.03	6,840	$91,759
10	62	I-95 WB from I-80 to GWB	Bergen	4.21	80,576	$74,848
11	47	Holland Tunnel EB	Hudson	1.06	10,935	$72,776
12	55	I-78 @ E of I-95	Essex	2.33	37,888	$71,828
13	52	I-280 @ Exit 13 to 16	Essex	2.78	35,616	$67,302
14	48	I-78 @Holland Tunnel	Hudson	1.14	5,441	$58,655
15	39	NJ 17 @ NJ 4	Bergen	1.13	11,878	$51,645
16	49	NJ 139 @ U.S. 1/9	Hudson	1.15	9,641	$48,230
17	61	NJ 4 @ I-95/New Jersey Turnpike	Bergen	1.47	4,284	$46,871
18	66	U.S. 1/9 NB @ NJ 139	Hudson	1.08	5,035	$40,635
19	38	I-80 @ NJ 20/Exits 59-61	Passaic/Bergen	1.43	29,717	$34,860
20	42	NJ 3 @ NJ 120	Bergen	0.84	9,806	$33,515
Total				55.69	–	$3,020,207

Source: Transearch and NPMRDS

Figure 113. Top 20 Bottlenecks in Urban NY-Gateway-Region



Source: NPMRDS and NCHRP Report 925, WSP

Table 47. Supply Chains Affected by Top 20 Bottlenecks in Urban NY-Gateway Region

Rank	Bottleneck Name	Automotive	Chemicals & Plastics	Construction	Distribution	Electronics & Electrical	Energy	Food & Agriculture	Furnishings & Clothing	Health	Lumber & Paper	Metals & Machinery	Miscellaneous	Through Trucks	Empty Trucks
1	I-95 EB from I-80 to GWB	2.0%	4.3%	21.7%	6.3%	0.7%	4.3%	11.4%	1.3%	0.4%	4.1%	3.0%	5.1%	5.3%	30.0%
2	I-495 EB from I-95 to Lincoln Tunnel West	1.8%	4.0%	18.4%	6.6%	0.8%	4.4%	12.7%	1.6%	0.2%	5.9%	2.5%	7.1%		34.0%
3	I-95 SB@ I-78 to I-278	1.5%	3.3%	14.3%	11.2%	0.5%	4.2%	10.8%	1.1%	0.2%	3.5%	2.3%	4.4%	4.9%	37.8%
4	I-95 from I-495 to I-80	1.8%	3.8%	15.8%	9.2%	0.7%	4.9%	11.4%	1.4%	0.3%	3.5%	2.7%	4.6%	5.4%	34.5%
5	I-95 NB @ I-78 to Raymond Boulevard	1.7%	4.0%	16.8%	8.3%	0.6%	3.7%	12.2%	1.1%	0.3%	4.4%	2.7%	5.3%	4.9%	33.8%
6	I-95 NB @ I-78 to I-278	1.5%	3.2%	14.2%	11.4%	0.5%	4.3%	10.6%	1.1%	0.2%	3.5%	2.3%	4.4%	5.0%	37.9%
7	I-80 WB @ Exits 63-67	1.6%	3.7%	20.7%	8.9%	0.5%	3.0%	10.6%	0.9%	0.3%	4.0%	2.5%	4.2%	1.9%	37.3%
8	I-287 @ Skyline Dr/Exit 57	1.5%	3.5%	26.5%	4.3%	0.4%	2.9%	12.3%	0.7%	0.3%	4.2%	2.6%	5.4%	4.2%	31.3%
9	NB Tonnelle Ave from NJ 139 to Secaucus Rd	0.8%	1.8%	7.9%	15.1%	0.6%	6.3%	7.1%	2.2%	0.2%	1.7%	1.8%	3.3%	0.0%	51.1%
10	I-95 WB from I-80 to GWB	2.0%	4.3%	21.7%	6.4%	0.7%	4.3%	11.4%	1.3%	0.4%	4.1%	3.0%	5.1%	5.3%	30.0%
11	Holland Tunnel EB	1.8%	4.0%	18.4%	6.6%	0.8%	4.4%	12.7%	1.6%	0.2%	5.9%	2.5%	7.1%		34.0%
12	I-78 @ E of I-95	1.9%	4.9%	18.1%	11.5%	0.9%	1.7%	14.3%	1.3%	0.3%	5.5%	3.6%	5.9%	0.2%	29.9%
13	I-280 @ Exit 13 to 16	4.8%	1.9%	6.7%	16.5%	0.3%	7.3%	6.8%	1.0%	0.3%	2.0%	2.0%	1.7%		48.8%
14	I-78 @ Holland Tunnel	1.2%	2.9%	8.1%	6.3%	1.1%	13.0%	11.2%	4.0%	0.3%	5.0%	4.0%	5.6%		37.4%
15	NJ 17 @ NJ 4	1.3%	3.4%	10.9%	13.8%	0.4%	2.4%	12.4%	0.6%	0.2%	3.4%	2.0%	2.1%		46.9%
16	NJ 139 @ U.S. 1/9	1.0%	2.3%	6.9%	16.8%	0.7%	8.2%	9.0%	2.6%	0.2%	3.2%	3.3%	3.8%	0.0%	41.9%
17	NJ 4 @ I-95/New Jersey Turnpike	2.2%	4.6%	21.7%	6.5%	0.6%	4.7%	10.7%	1.1%	0.4%	4.5%	2.8%	4.6%	4.4%	31.0%
18	U.S. 1/9 NB @ NJ 139	0.9%	1.8%	5.7%	27.1%	0.4%	3.4%	6.9%	1.3%	0.1%	1.4%	2.6%	2.0%	0.0%	46.5%
19	I-80 @ NJ 20/Exits 59-61	1.6%	4.3%	26.1%	6.0%	0.5%	1.3%	12.1%	0.6%	0.3%	4.7%	2.8%	4.3%		35.3%
20	NJ 3 @ NJ 120	1.6%	3.6%	14.5%	9.8%	0.6%	4.3%	10.2%	1.0%	0.3%	3.2%	2.6%	3.8%	5.8%	38.7%

Source: Transearch and NPMRDS, WSP

URBAN PHILADELPHIA-REGION

The top 20 bottleneck clusters in the urban Philadelphia region of the state are listed in Table 48 and mapped in Figure 114. In total, these bottlenecks constitute 13 centerline miles of roadway in the urban regions around the Philadelphia region (defined as roadways located in Camden and Gloucester counties), generating $0.23 million of user costs to trucks each day. About 50% of these user costs accrue to the three top ranked bottleneck clusters I-295 SB North of I-76, I-76 EB Gloucester City, I-295 South of I-76. Most bottleneck locations are projected to see at least 50% growth in truck traffic from 2019 to 2050.

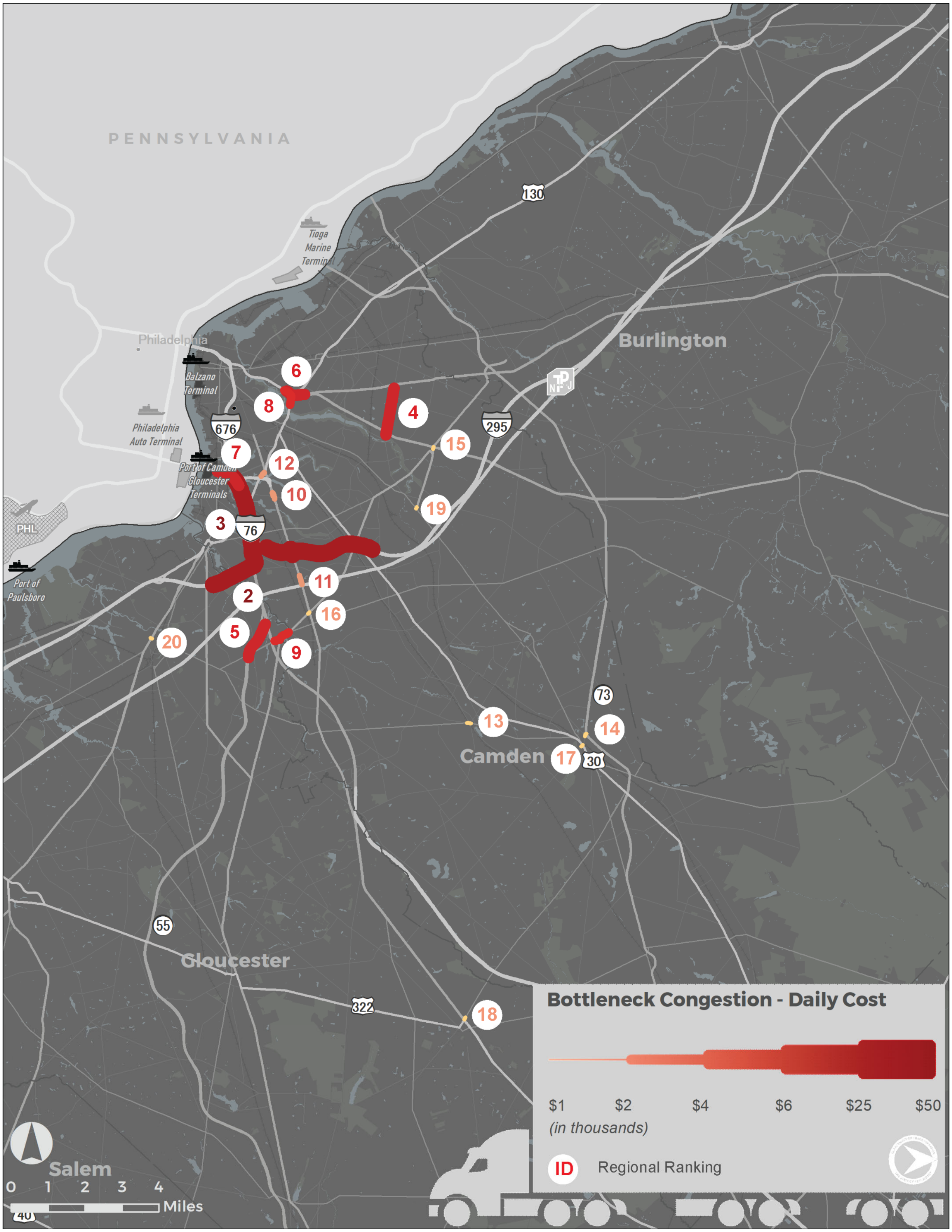
The supply chains most impacted by these top 20 Urban Philadelphia-Region bottlenecks include food and agriculture, and construction (Table 49). Through-trucks and empty units contribute significantly to congestion at these bottlenecks, with share of total congestion costs ranging from 30% to 60%.

Table 48. Top 20 Urban Philadelphia Bottlenecks

Rank	ID	Bottleneck Name	County	Total Miles	Average Daily Truck Volume	Congestion Costs in 2019 ($/day)
1	1	I-295 SB North of I-76	Camden	2.81	19,830	$47,856
2	2	I-295 South of I-76	Camden	1.58	7,249	$37,482
3	3	I-76 EB Gloucester City	Camden	2.36	38,244	$37,220
4	5	Haddonfield Road in Cherry Hill	Camden	1.44	1,989	$23,495
5	204	NJ 55 @ NJ 42	Gloucester	1.03	1,665	$20,500
6	6	NJ 38 Airport Circle in Pennsauken	Camden	0.53	2,866	$17,238
7	85	I-76 WB Gloucester City	Camden	0.73	10,745	$15,260
8	83	U.S. 30 Airport Circle in Pennsauken	Camden	0.49	1,150	$6,252
9	220	CR 544 @ NJ 41/W Clements Bridge Rd	Gloucester	0.47	683	$5,937
10	210	NJ 168 @ CR 635/W Nicholson Rd	Camden	0.27	1,346	$3,460
11	236	NJ 168 @ New Jersey Turnpike	Camden	0.25	491	$3,229
12	240	U.S. 130 @ NJ 168/Mt Ephraim Ave/Crescent Blvd	Camden	0.14	891	$2,566
13	205	CR 534 @ CR 686/Gibbsboro Rd/Erial Rd	Camden	0.11	594	$1,852
14	217	NJ 73/Walker Ave	Camden	0.09	447	$1,723
15	238	NJ 154 @ NJ 70/Marlton Pike E	Camden	0.06	519	$1,172
16	215	NJ 41 @ NJ 168/Black Horse Pike	Camden	0.05	513	$1,130
17	239	CR 689 @ U.S. 30/CR 534/White Horse Pike	Camden	0.06	616	$976
18	212	CR 536 @ U.S 322/S Black Horse Pike	Gloucester	0.07	415	$909
19	224	NJ 154 @ CR 561/Berlin Rd	Camden	0.05	512	$809
20	226	CR 534 @ NJ 45/Broad St	Gloucester	0.05	888	$716
Total				13.03	–	$229,782

Source: Transearch and NPMRDS

Figure 114. Top 20 Urban Philadelphia Bottleneck Clusters



Source: NPMRDS and NCHRP Report 925, WSP

Table 49. Contribution of Supply Chain to Top Urban Other Bottleneck Clusters

Rank	Bottleneck Name	Automotive	Chemicals & Plastics	Construction	Distribution	Electronics & Electrical	Energy	Food & Agriculture	Furnishings & Clothing	Health	Lumber & Paper	Metals & Machinery	Miscellaneous	Through Trucks	Empty Trucks
1	I-295 SB North of I-76	0.6%	1.8%	19.9%	5.5%	0.1%	4.7%	9.8%	0.2%	0.1%	2.3%	1.4%	3.2%	-	50.2%
2	I-295 South of I-76	0.4%	1.6%	23.9%	5.7%	0.0%	6.0%	8.4%	0.1%	0.1%	1.9%	1.1%	3.4%	-	47.3%
3	I-76 EB Gloucester City	1.2%	3.0%	25.3%	3.7%	0.2%	12.2%	14.3%	0.4%	0.2%	3.5%	2.8%	4.2%	-	29.1%
4	Haddonfield Road in Cherry Hill	1.2%	3.0%	25.3%	3.7%	0.2%	12.2%	14.3%	0.4%	0.2%	3.5%	2.8%	4.2%	-	29.1%
5	NJ 55 @ NJ 42	0.2%	1.2%	17.9%	6.7%	0.0%	7.8%	7.8%	0.1%	0.1%	1.7%	0.7%	3.7%	-	52.0%
6	NJ 38 Airport Circle in Pennsauken	1.2%	3.0%	25.3%	3.7%	0.2%	12.2%	14.3%	0.4%	0.2%	3.5%	2.8%	4.2%	-	29.1%
7	I-76 WB Gloucester City	1.3%	2.6%	26.2%	3.3%	0.2%	10.4%	10.8%	0.3%	0.2%	2.9%	2.2%	3.7%	-	36.0%
8	U.S. 30 Airport Circle in Pennsauken	1.3%	2.6%	26.2%	3.3%	0.2%	10.4%	10.8%	0.3%	0.2%	2.9%	2.2%	3.7%	-	36.0%
9	CR 544 @ NJ 41/W Clements Bridge Rd	1.3%	2.6%	26.2%	3.3%	0.2%	10.4%	10.8%	0.3%	0.2%	2.9%	2.2%	3.7%	-	36.0%
10	NJ 168 @ CR 635/W Nicholson Rd	1.0%	2.8%	17.3%	9.1%	0.4%	4.0%	12.9%	0.7%	0.2%	3.2%	1.5%	5.3%	3.4%	38.1%
11	NJ 168 @ New Jersey Turnpike	1.0%	2.8%	17.3%	9.1%	0.4%	4.0%	12.9%	0.7%	0.2%	3.2%	1.5%	5.3%	3.4%	38.1%
12	U.S. 130 @ NJ 168/Mt Ephraim Ave/Crescent Blvd	1.0%	2.8%	17.3%	9.1%	0.4%	4.0%	12.9%	0.7%	0.2%	3.2%	1.5%	5.3%	3.4%	38.1%
13	CR 534 @ CR 686/Gibbsboro Rd/Erial Rd	0.0%	0.6%	29.0%	3.5%	0.0%	-	2.0%	0.1%	0.1%	0.6%	0.3%	6.5%	-	57.3%
14	NJ 73/Walker Ave	0.0%	0.6%	29.0%	3.5%	0.0%	-	2.0%	0.1%	0.1%	0.6%	0.3%	6.5%	-	57.3%
15	NJ 154 @ NJ 70/Marlton Pike E	1.0%	2.8%	17.3%	9.1%	0.4%	4.0%	12.9%	0.7%	0.2%	3.2%	1.5%	5.3%	3.4%	38.1%
16	NJ 41 @ NJ 168/Black Horse Pike	0.0%	0.6%	29.0%	3.5%	0.0%	-	2.0%	0.1%	0.1%	0.6%	0.3%	6.5%	-	57.3%
17	CR 689 @ U.S. 30/CR 534/White Horse Pike	1.0%	2.8%	17.3%	9.1%	0.4%	4.0%	12.9%	0.7%	0.2%	3.2%	1.5%	5.3%	3.4%	38.1%
18	CR 536 @ U.S. 322/S Black Horse Pike	0.1%	0.4%	21.1%	0.8%	-	16.7%	1.0%	-	0.0%	0.5%	0.2%	0.5%	-	58.7%
19	NJ 154 @ CR 561/Berlin Rd	1.3%	2.6%	26.2%	3.3%	0.2%	10.4%	10.8%	0.3%	0.2%	2.9%	2.2%	3.7%	-	36.0%
20	CR 534@ NJ 45/Broad St	1.3%	2.6%	26.2%	3.3%	0.2%	10.4%	10.8%	0.3%	0.2%	2.9%	2.2%	3.7%	-	36.0%

Source: Transearch and NPMRDS

URBAN OTHER

The top 20 bottleneck clusters in the other urban regions of the state are listed in Table 50 and mapped in Figure 115 (with mapped ID numbers corresponding to the table). In total, these bottlenecks constitute 26 centerline miles of roadway in the urban regions around the state (excluding NY-Gateway and Philadelphia), generating $0.40 million of user costs to trucks each day. About 32% of these user costs accrue to the top ranked bottleneck cluster, the Red Bank Cluster, which is also the longest Urban Other cluster at 8.2 miles (approximately 30% of mileage). Most bottleneck locations are projected to see at least a 50% growth in truck traffic from 2019 to 2050.

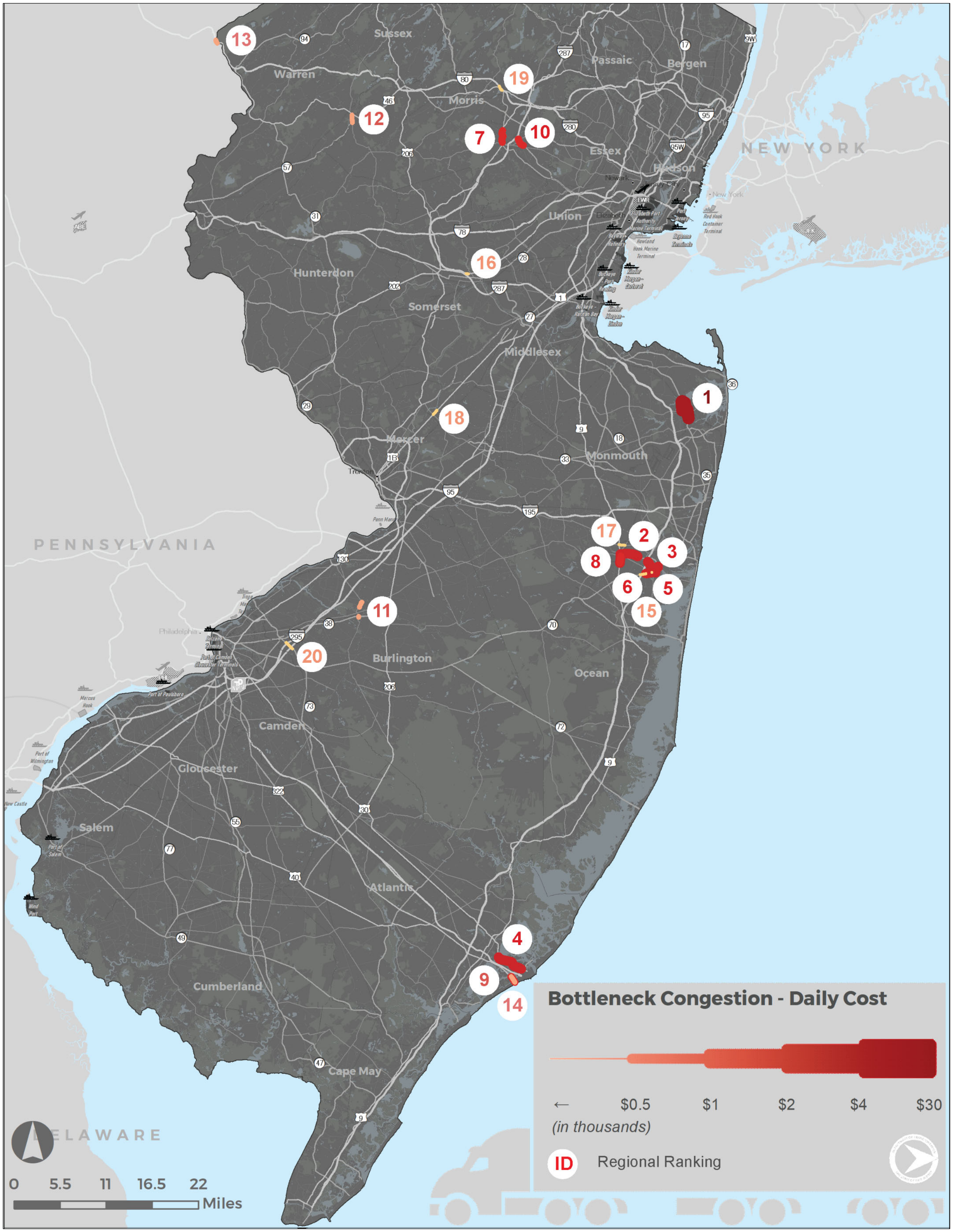
The supply chains most impacted by these top 20 other urban bottlenecks include food and agriculture, construction, and distribution (Table 51). Through trucks and empty units contribute significantly to congestion at these bottlenecks, with share of total congestion costs ranging from 35% to 65%.

Table 50. Top 20 Urban Other Bottlenecks

Rank	Bottleneck Name	County	Total Miles	Average Daily Truck Volume	Congestion Costs in 2019 ($/day)
1	Red Bank Cluster*	Monmouth	4.06	5,808	$127,005
2	NJ 88 @ U.S. 9/CR 547/Madison Ave	Ocean	2.15	329	$24,269
3	NJ 70 EB between Garden State Pkwy and Princeton Ave	Ocean	1.78	2,767	$22,347
4	U.S. 30 Atlantic City EB	Atlantic	0.12	657	$22,338
5	SB Chambers Brg Road between Garden State Pkwy and Brick Blvd	Ocean	1.28	1,421	$21,393
6	U.S. 9 NB @ Pine St	Ocean	0.84	1,428	$20,283
7	U.S. 202 @ CR 650/Hanover Ave	Morris	1.45	408	$17,860
8	I-9 SB @ Pine St	Ocean	0.85	1,428	$14,674
9	U.S. 40 EB Atlantic City	Atlantic	0.81	3,025	$13,293
10	NJ 24 @ CR 511/Exit 1	Morris	1.01	4,364	$13,058
11	SB Mt Holly Bypass between High St and NJ 138	Burlington	0.73	2,355	$11,561
12	NJ 182 @ U.S. 46/CR 517/Main St/Mill St	Warren	0.92	518	$11,119
13	I-80 @ CR 606	Warren	0.43	35,289	$11,117
14	U.S. 40 WB Atlantic City	Atlantic	0.83	2,628	$10,336
15	NJ 70 WB between Garden State Pkwy and Princeton Ave	Ocean	0.69	2,004	$9,651
16	I-287 and U.S. 22	Somerset	0.31	3,478	$9,443
17	CR 526 @ U.S. 9/Madison Ave	Ocean	0.75	329	$8,829
18	U.S. 1 @ CR 526/CR 571/Washington Rd	Mercer	0.70	5,666	$8,414
19	I-80 @ U.S. 46/Exit 38	Morris	0.68	11,421	$8,225
20	NJ-73 @ I-295	Burlington	0.43	1,194	$8,106
Total			**25.8**	–	**$393,321**

Source: Transearch and NPMRDS
Note: * The Red Bank Cluster includes the following roadways: NJ Route 35, CR 13, CR 520.

Figure 115. Top 20 Urban Other Bottleneck Clusters



Source: NPMRDS and NCHRP Report 925, WSP

Table 51. Contribution of Supply Chain to Top Urban Other Bottleneck Clusters

Rank	Bottleneck Name	Automotive	Chemicals & Plastics	Construction	Distribution	Electronics & Electrical	Energy	Food & Agriculture	Furnishings & Clothing	Health	Lumber & Paper	Metals & Machinery	Miscellaneous	Through Trucks	Empty Trucks
1	Red Bank Cluster	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
2	NJ 88 @ U.S. 9/CR 547/Madison Ave	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
3	NJ 70 EB between Garden State Pkwy and Princeton Ave	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
4	U.S. 30 Atlantic City EB	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
5	SB Chambers Brg Rd between Garden State Pkwy and Brick Blvd	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
6	U.S. 9 NB @ Pine St	0.4%	3.0%	21.7%	8.6%	0.1%	5.1%	3.7%	0.4%	0.1%	1.4%	0.7%	8.6%	-	46.3%
7	U.S. 202 @ CR650/Hanover Ave	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
8	U.S. 9 SB @ Pine St	0.4%	3.0%	21.7%	8.6%	0.1%	5.1%	3.7%	0.4%	0.1%	1.4%	0.7%	8.6%	-	46.3%
9	U.S. 40 EB Atlantic City	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
10	NJ 24 @ CR 511/Exit 1	1.7%	3.6%	15.9%	9.7%	0.6%	1.8%	13.3%	1.7%	0.2%	4.1%	3.3%	2.3%	-	41.9%
11	SB Mt Holly Bypass between High St and NJ 138	1.4%	2.4%	23.1%	4.8%	1.0%	3.5%	7.8%	0.7%	0.1%	2.2%	2.6%	4.8%	-	45.6%
12	NJ 182 @ U.S. 46/CR 517/Main St/Mill St	1.7%	6.3%	35.3%	7.0%	0.8%	1.2%	9.9%	0.8%	0.3%	4.0%	2.8%	6.1%	-	23.8%
13	I-80 @ CR 606	2.3%	5.2%	21.5%	5.8%	0.7%	1.3%	16.4%	1.1%	0.3%	5.0%	4.0%	4.8%	-	31.6%
14	U.S. 40 WB Atlantic City	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
15	NJ 70 WB between Garden State Pkwy and Princeton Ave	0.0%	1.6%	23.8%	2.6%	0.0%	0.0%	0.8%	0.0%	0.1%	0.2%	0.1%	6.1%	-	64.5%
16	I-287 and U.S. 22	0.4%	2.4%	4.2%	16.9%	0.5%	2.7%	5.2%	1.5%	0.5%	1.4%	1.5%	0.8%	-	62.1%
17	CR 526 @ U.S. 9/Madison Ave	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
18	U.S. 1 @ CR 526/CR 571/Washington Rd	0.8%	2.0%	14.2%	8.4%	0.2%	6.9%	6.2%	0.6%	0.2%	2.3%	2.7%	4.6%	-	51.0%
19	I-80 @ U.S. 46/Exit 38	2.4%	4.6%	22.0%	6.3%	0.6%	1.2%	14.9%	0.9%	0.3%	5.0%	3.8%	5.1%	-	32.9%
20	NJ-73 @ I-295	1.0%	3.3%	23.5%	6.8%	0.6%	2.9%	7.4%	0.6%	0.1%	2.2%	2.0%	6.9%	-	42.7%

Source: Transearch and NPMRDS

RURAL

The top 12 bottleneck clusters in the rural regions in the state are listed in Table 52 and mapped in Figure 116 In total, these bottlenecks constitute seven centerline miles, generating $0.061 million of user costs to trucks each day. The majority of these user costs (84% of total rural costs) accrue to the top two ranked bottleneck clusters, U.S. 30 Atlantic City WB and U.S. 30 Atlantic City EB which are the longest clustered rural bottlenecks in the analysis at 6.2 miles combined (84% of rural mileage).

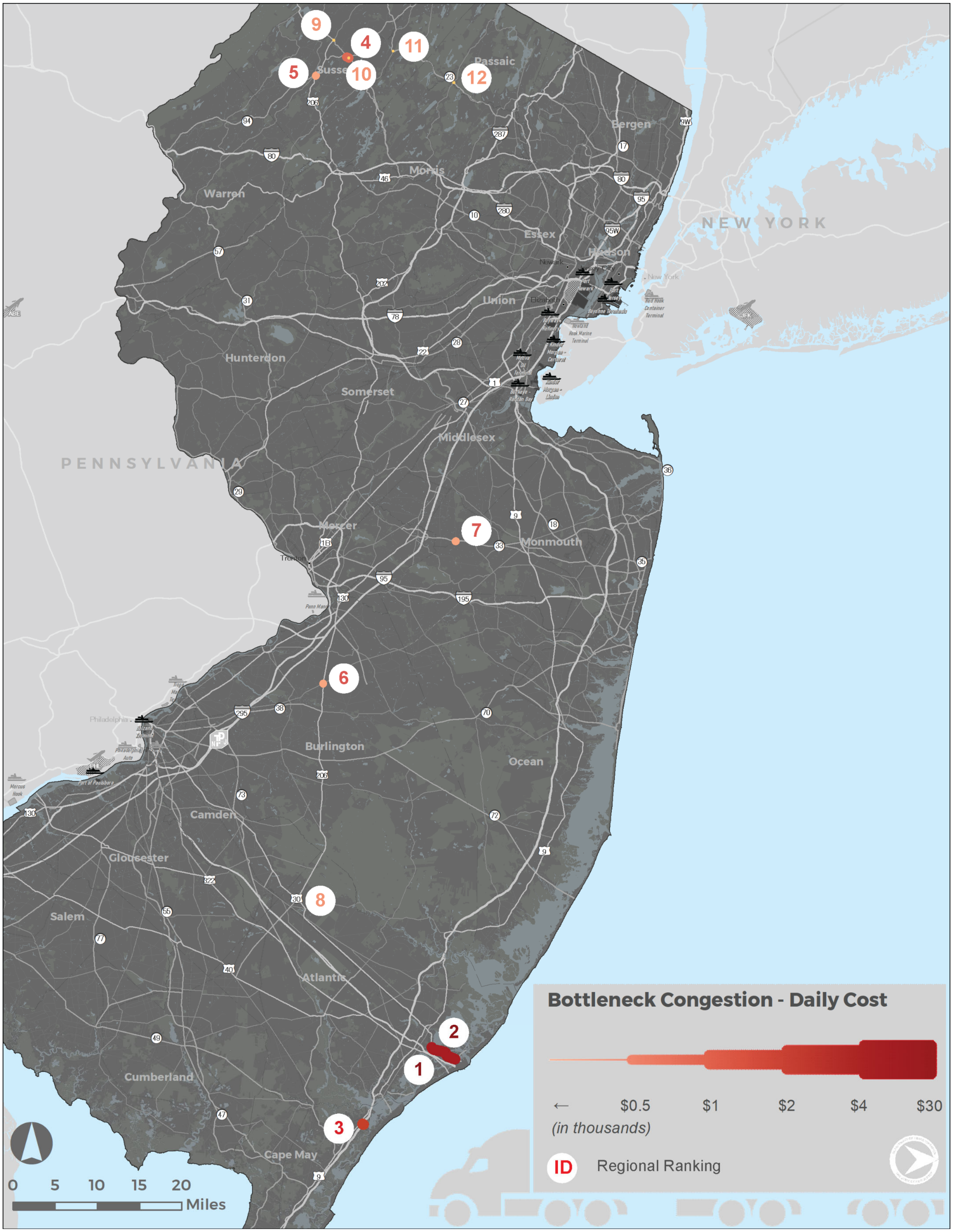
The supply chains most impacted by these top 20 rural bottlenecks include food and agriculture, construction, and distribution (Table 53). Through-trucks and empty units contribute significantly to congestion at these bottlenecks, with share of total congestion costs ranging from 35% to 55%.

Table 52. Top 15 Rural Bottlenecks

Rank	ID	Bottleneck Name	County	Total Miles	Average Daily Truck Volume	Congestion Costs in 2019 ($/day)
1	78	U.S. 30 Atlantic City WB	Atlantic	3.12	1,685	$29,235
2	10	U.S. 30 Atlantic City EB	Atlantic	3.10	1,691	$22,338
3	213	U.S. 9 @ Garden State Parkway	Cape May	0.35	1,338	$4,214
4	159	NJ 15 @ NJ 94/CR 623/Sunset Inn Rd	Sussex	0.30	1,678	$2,123
5	251	NJ 94 @ U.S. 206/NJ 94/Water St/Trinity St	Sussex	0.09	528	$1,176
6	223	U.S. 206 @ CR 537/Monmouth Rd	Burlington	0.11	1,494	$653
7	193	NJ 33 @ Prodelin Way/Perrineville Rd	Middlesex	0.06	2,276	$536
8	207	U.S. 206 @ U.S. 130	Burlington	0.05	478	$301
9	160	NJ 15 @ U.S. 206/CR 565/Ross Corner-Sussex Rd	Sussex	0.03	654	$279
10	120	NJ 15 @ NJ 94/CR 623/Sunset Inn Rd	Sussex	0.03	762	$204
11	256	CR 517 @ NJ 23 (South)	Sussex	0.03	562	$184
12	124	NJ 23 @ Old RT 23	Passaic	0.03	780	$182
Total				**7.30**	–	**$61,425**

Source: NPMRDS and NCHRP Report 925

Figure 116. Top 12 Rural Bottleneck Clusters



Source: NPMRDS and NCHRP Report 925, WSP

Table 53. Contribution of Supply Chain to top Rural Bottleneck Clusters

Rank	Bottleneck Name	Automotive	Chemicals & Plastics	Construction	Distribution	Electronics & Electrical	Energy	Food & Agriculture	Furnishings & Clothing	Health	Lumber & Paper	Metals & Machinery	Miscellaneous	Through Trucks	Empty Trucks
1	U.S. 30 Atlantic City WB	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
2	U.S. 30 Atlantic City EB	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
3	U.S. 9 @ Garden State Parkway	0.1%	0.3%	33.1%	5.8%	0.0%	1.8%	3.3%	0.1%	0.0%	0.7%	0.1%	0.9%		53.7%
4	NJ 15 @ NJ 94/CR 623/Sunset Inn Rd	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
5	NJ 94 @ U.S. 206/NJ 94/Water St/ Trinity St	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
6	U.S. 206 @ CR 537/Monmouth Rd	0.6%	2.0%	24.7%	7.9%	0.5%	2.6%	5.6%	0.3%	0.1%	1.9%	1.7%	4.2%	-	47.7%
7	NJ 33 @ Prodeline Way/Perrineville Rd	1.3%	3.3%	26.5%	5.4%	0.5%	2.0%	8.5%	0.7%	0.2%	2.1%	1.5%	5.8%	-	42.2%
8	U.S. 206 @ U.S. 130/S White Horse Pike	0.3%	1.7%	27.9%	9.9%	0.0%	4.0%	3.3%	0.2%	0.1%	1.3%	0.3%	1.7%	-	49.3%
9	NJ 15 @ U.S. 206/CR 565/Ross Corner-Sussex Rd	1.6%	3.9%	19.8%	7.9%	0.6%	2.8%	12.7%	1.0%	0.3%	4.1%	2.7%	4.9%	3.0%	34.7%
10	NJ 15 @ NJ 94/CR 623/Sunset Inn Rd	0.2%	1.9%	32.8%	5.2%	0.1%	0.6%	9.7%	0.4%	0.1%	2.4%	2.1%	3.1%	-	41.3%
11	CR 517 @ NJ 23 (South)	0.2%	1.9%	32.8%	5.2%	0.1%	0.6%	9.7%	0.4%	0.1%	2.4%	2.1%	3.1%	-	41.3%
12	NJ 23 @ Old RT 23	0.2%	1.9%	32.8%	5.2%	0.1%	0.6%	9.7%	0.4%	0.1%	2.4%	2.1%	3.1%	-	41.3%

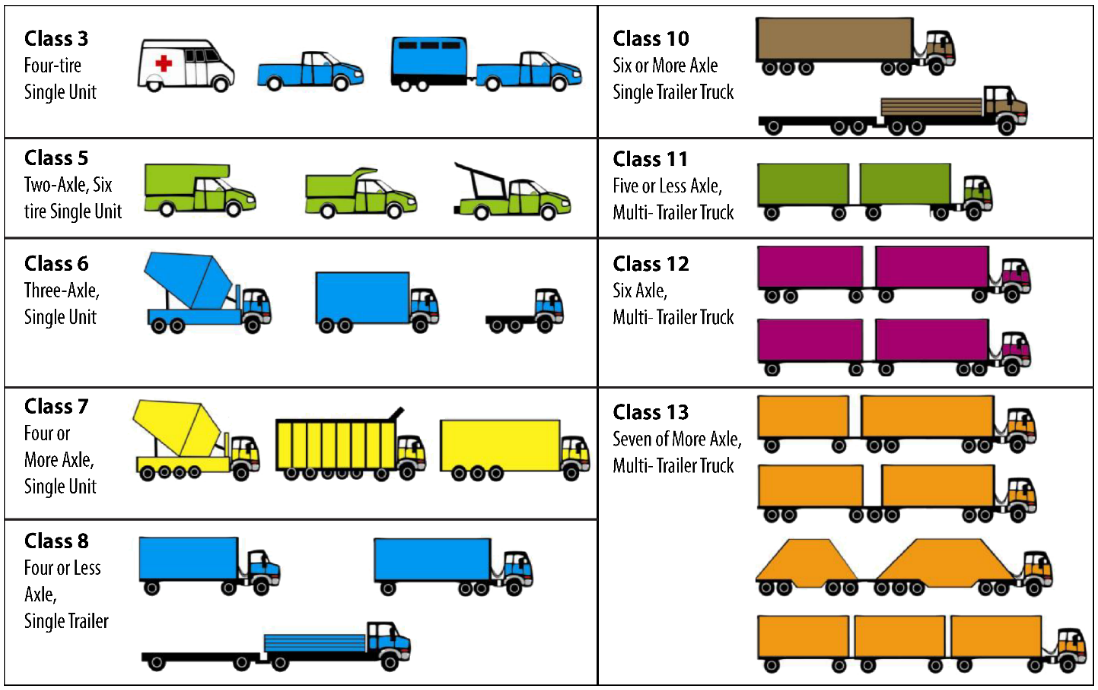
Source: Transearch and NPMRDS

7.1.5 Truck Crashes

Statewide crash records for all incidents occurring in 2019 on Interstate, U.S., State, and County routes were collected from NJDOT's website and subsequently mapped. Both accident and vehicle crash table databases were obtained.[73]

The vehicle and accident tables were linked (using the Case Number Code) before mapping to identify crashes involving truck vehicles. Following the FHWA's 13 Vehicle Category Classification (Figure 117), vehicles classified as Class 3 or higher (excluding Class 4, buses) were considered trucks for this analysis.

Figure 117. Vehicle Classification - Federal Highway Administration



Source: FHWA

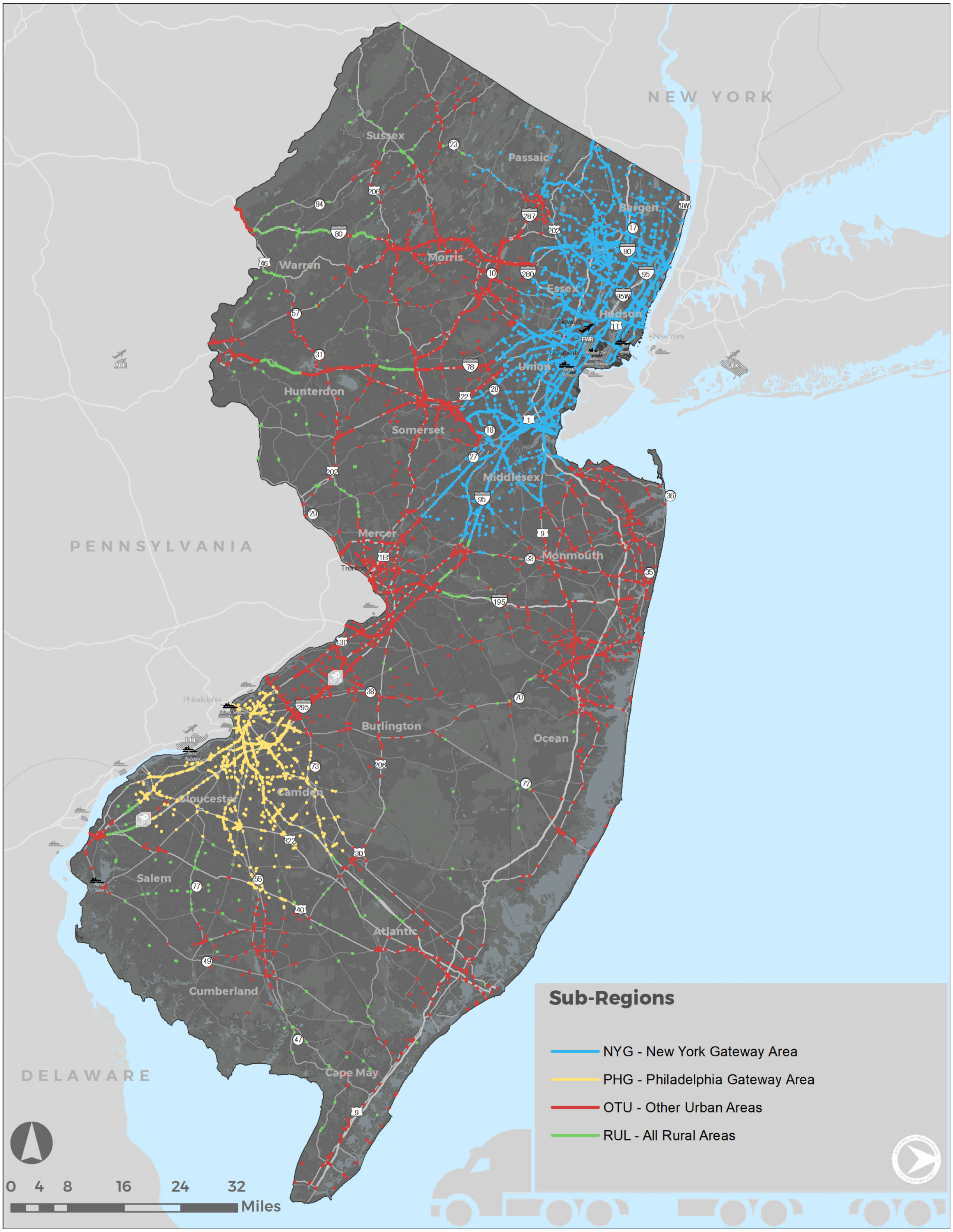
Crash characteristics differ with variations in roadway characteristics, such as volume, access control, the number of lanes, posted speed limit, and roadway designation (i.e., municipal, county, state, etc.). These variables add detail and context to the more significant crash characteristics.

In addition, differing land use, demographics, and topography across the various sub-regions of New Jersey also influence driving patterns and traffic characteristics in several ways. This results in a wide variation in crash characteristics amongst these regions within the State and by road category within those areas. To normalize the resultant analysis, the roadway network within the State was subdivided into four sub-regions based on land use, demographics, travel behaviors, and terrain characteristics, as follows. The location of truck crashes in the four regions is shown in Figure 118.

- New York Gateway Sub-region (NYG)
- Philadelphia Gateway Sub-region (PHG)
- All Other Urban Area (IOTU)
- All Rural Areas (RUL)

73 Crash record data can be aggregated via multiple tables, including crash, driver, vehicle, occupant, or pedestrian. Each table includes different specific information for each crash record.

Figure 118. Roadway Segments with Truck Crashes, by Sub-Region



Source: NJDOT Safety Voyager, WSP

CRASHES BY ROADWAY DESIGNATION AND SUB-REGION

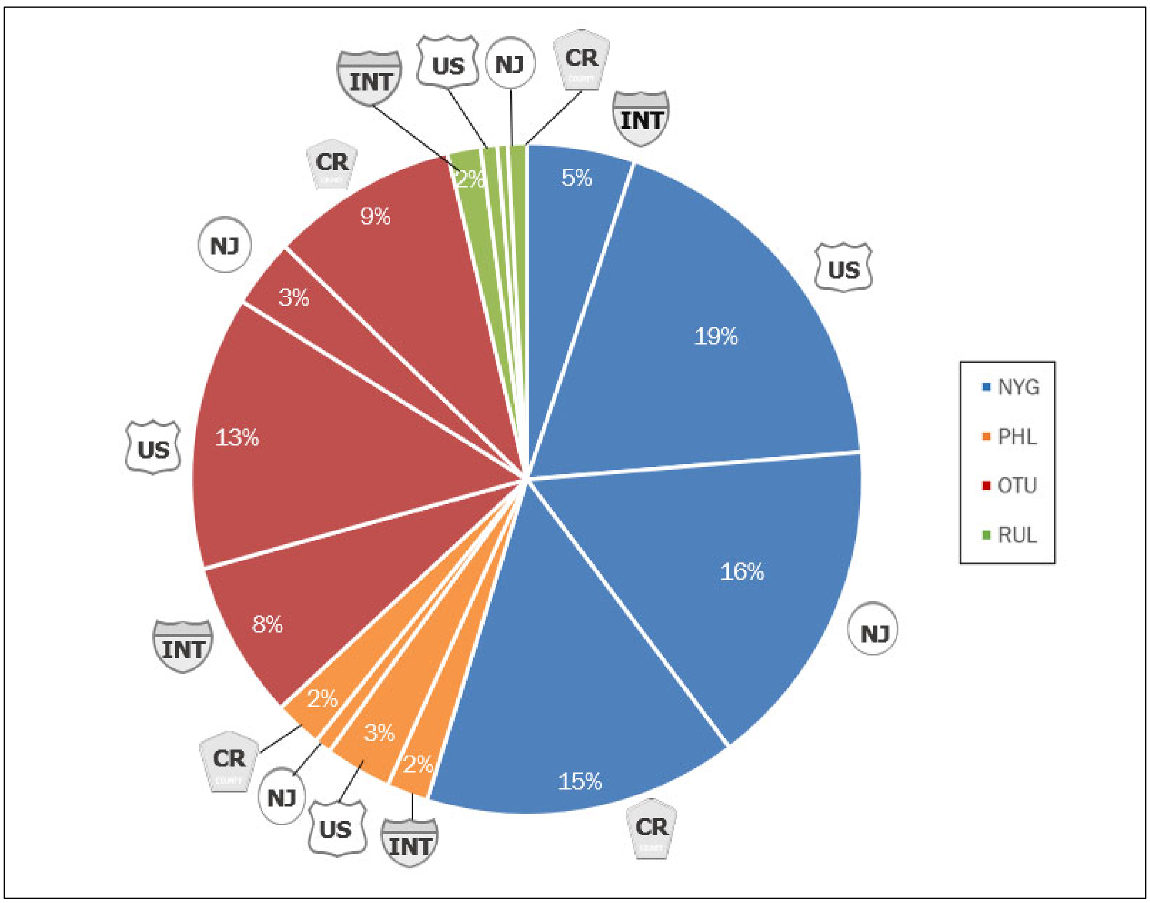
In 2019 there were 174,810 crashes statewide involving all vehicles, of which 14,349 involved trucks (approximately 8% of all crashes). Table 54 shows the breakdown of the number of truck crashes and their breakdown by roadway designation and sub-region, which are further illustrated in Figure 119.

U.S. Routes account for 36% of all truck crashes, the highest across all designations, while Interstates (16%) had the lowest share. However, a review of crashes by each road type within each sub-region indicates that the NYG sub-region accounts for more than half (55%) of all truck crashes, followed by the OTU sub-region (33%). Most crashes on U.S., State, and County Routes also occur in the NYG sub-region. Nearly half of Interstate crashes occur In the OTU sub-region. Roughly 30% of crashes in the NYG sub-region occurred each on U.S., State, and County routes, with a smaller portion on Interstates. In the other three sub-regions, crashes on U.S. Routes and Interstates account for most crashes.

Table 54. Truck Crash Distribution by Roadway Designation and Sub-Region

Roadway Designation	All Sub-Regions		NYG		PHG		OTU		RUL	
	Number	%	Number	%	Number	%	Number	%	Number	%
Interstate	2,355	16.4%	753	5.2%	286	2.0%	1,088	7.6%	228	1.6%
U.S.	5,121	35.7%	2,652	18.5%	460	3.2%	1,889	13.2%	120	0.8%
State	2,952	20.6%	2,301	16.0%	108	0.8%	468	3.3%	75	0.5%
County	3,921	27.3%	2,166	15.1%	336	2.3%	1,288	9.0%	131	0.9%
Total	14,349	100.0%	7,872	54.9%	1,190	8.3%	4,733	33.0%	554	3.9%

Figure 119. Truck Crashes by Sub-Region, and by Roadway Designation



Source: NJDOT, WSP

FATAL CRASHES

Seventy-two crashes (0.5% of all crashes involving trucks) resulted in a fatality. Fatal crashes by roadway designation and sub-region are illustrated in Table 55.

Table 55. Fatal Crashes by Roadway Designation and by Sub-Region

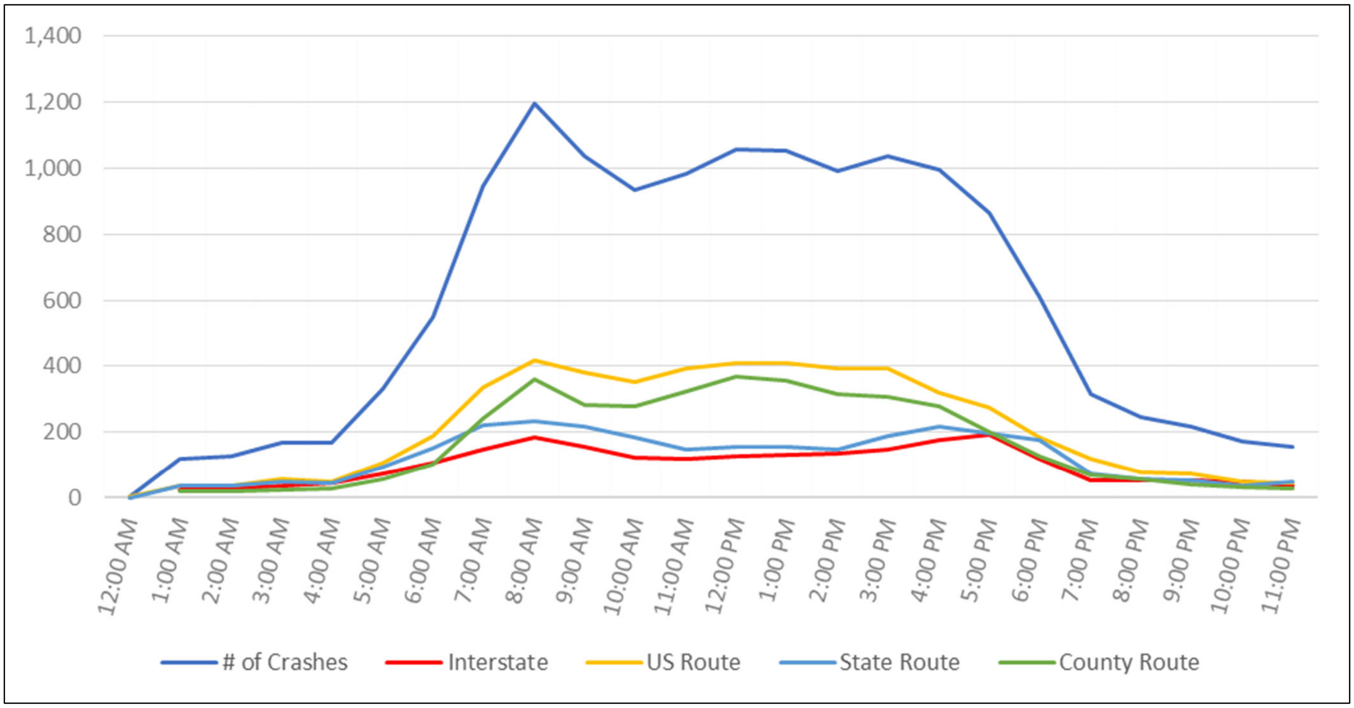
Roadway Designation	Sub-Region				Total
	NYG	PHL	OTU	RUL	
Interstate	1	0	9	0	10
U.S. Route	12	3	14	2	31
NJ Route	6	0	7	1	14
County Route	4	4	4	5	17
Total	**23**	**7**	**34**	**8**	**72**

Source: NJDOT, WSP

CRASHES BY TIME OF DAY AND HOUR

Truck crash characteristics vary not only by the time of day but also by day of the week. Statewide, across roadway designations, a majority (65%) of truck crashes occur between 5 am and 5 pm, as shown in Figure 120, with slight deviations between days.

Figure 120. Truck Crashes by Time of Day



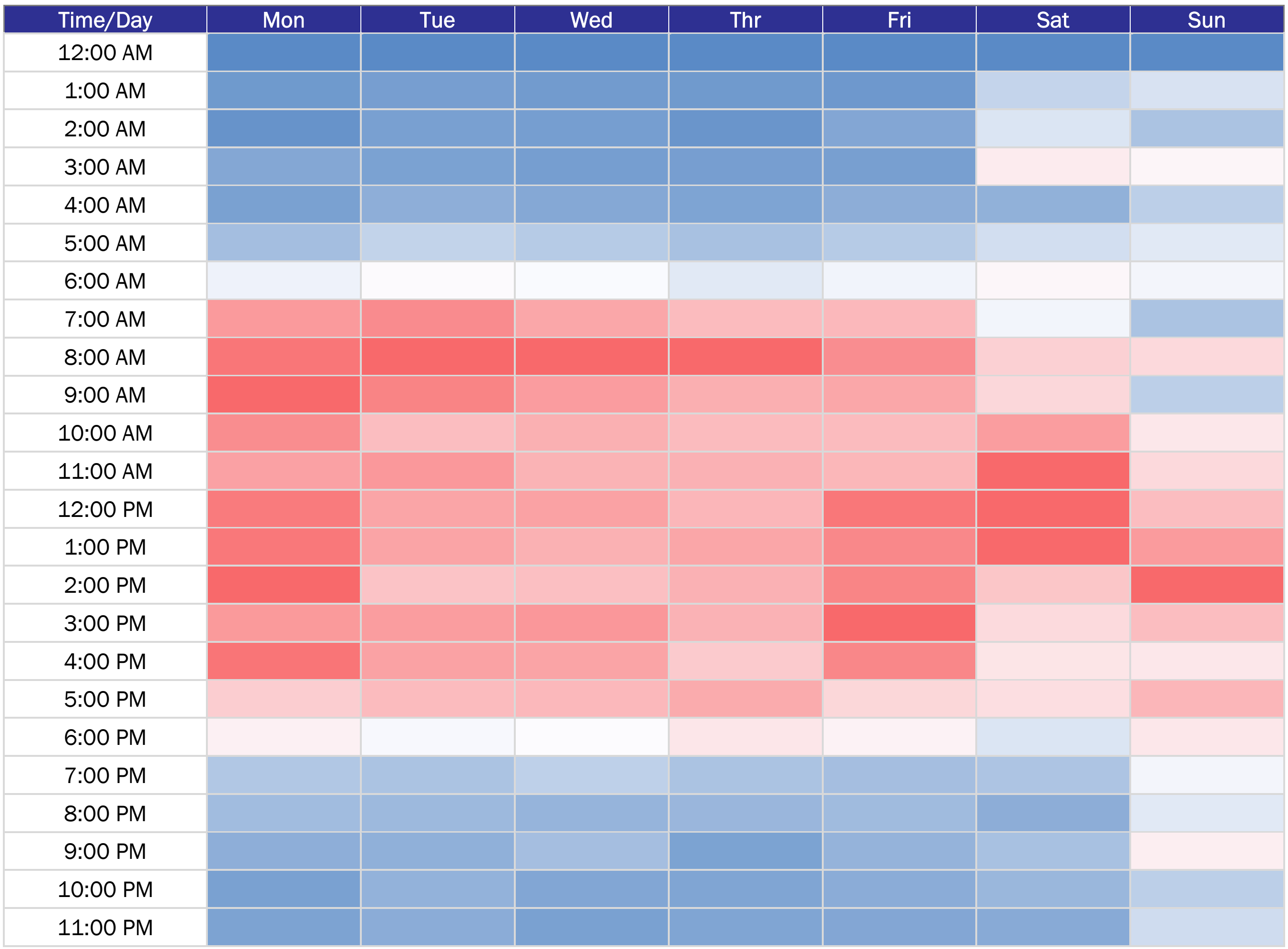
Source: NJDOT, WSP

An analysis of the day of the week distribution indicates that most (80%) crashes statewide occur during weekdays (Monday – Friday) between 7 am and 6 pm, with slight peaks during the AM and PM peak periods. During weekends, a large percentage of crashes occur during this period, 69% and 58% on Saturday and Sunday, respectively. Other high crash periods outside the daily weekday peaks include Friday afternoon between 12 pm and 5 pm (accounting for 40% of the crashes) and Saturday between 10 am and 3 pm (accounting for 40% of the crashes).

Figure 121 shows the percentage of crashes throughout the day and week. Darker red areas indicate a higher rate of crashes during that time slot compared to other hours of that day.

Statewide, Interstate and State Routes have a higher concentration of crashes during the AM and PM peak periods, while U.S. and County Routes have a higher concentration in the afternoon, after, and before the AM and PM peaks. This same analysis was conducted for each sub-region, and the results were similar. In the RUL sub-region, County roads have the highest concentration of crashes between 3 pm and 5 pm, while the NYG sub-region has the highest concentration during the midday (12 pm – 2 pm). Statewide, crashes on State roads also show a midday peak (12 pm – 2 pm), except in the NYG sub-region.

Figure 121. Heatmap – Percentage of Truck Crashes by Time of Day and Day of Week



Source: NJDOT, WSP

GENERAL CRASH STATISTICS

Interstate Routes

On Interstate Routes, more than half (50.8%) of all truck-involved crashes are same-direction sideswipes, nearly double the statewide average (25.6%) for all crashes. Other crash types on Interstate Routes where crashes involving trucks are higher compared to percentages of all crashes of that type include non-fixed objects, backing, overturns, striking a parked vehicle, and striking a pedestrian.

> The most predominant crash type (same direction-sideswipes) at the statewide level is concentrated during the AM and PM peak periods, pointing to the influence of congestion on truck crashes.

Two of the eight fatalities involving trucks on Interstate Routes occurred during the morning peak period (0.6%), which is higher than the statewide average for all crashes (0.2%).

U.S. Routes

On U.S. Routes, same direction–sideswipe crashes involving trucks were the most commonly reported type (41.6%), more than double the statewide average (20.3%) for all crashes on U.S. Routes. Other overrepresented crash types involving trucks (compared to all crashes, by type) include non-fixed objects, backing, overturns, striking a parked vehicle, and opposite direction crashes.

Most crashes on U.S. Routes occurred on dry road surface conditions (82.9%) and during daytime hours (81.9%); both higher than statewide averages (Dry – 75.1%, Day – 69.5%). Twenty-eight fatalities involving trucks occurred on U.S. Routes, including three during the morning peak period and two during the evening peak period, higher than the Statewide average (0.26%).

State Routes

Crash characteristics on State Routes are similar to those found on U.S. Routes. However, they exhibit a lower percentage of crashes involving pedestrians (0.14%) compared to U.S. Routes (0.21%). Crashes involving pedestrians are less likely to involve a truck (0.14%) when compared to the percentage for all vehicles (0.84%) on state routes.

New York Gateway Sub-Region

Most (57%) crashes involving trucks in the NYG sub-region are same direction-sideswipes (more than double the statewide average for all crashes – 25.6%), with 81% occurring on dry road surface conditions (Statewide average – 75%), 78% during the day (Statewide average – 70%), and one resulting in a fatality (0.13% vs. Statewide average – 0.22%).

Most truck crashes in the NYG sub-region are on U.S. and State Routes, but their characteristics are generally similar to those on Interstate Routes. Compared to State Routes, U.S. Routes are more likely to have fatal crashes (10 vs. 6) and crashes involving a pedestrian or cyclist (7 vs. 0). County roadways in the NYG sub-regions had eight pedestrian and eight bicyclist crashes as well as overrepresentations of crashes involving fixed objects (14%), parked vehicles (13%), and backing (5.7%).

Philadelphia Gateway Sub-Region

The PHL sub-region had significantly fewer crashes on Interstates Routes compared to the NYG sub-region, including zero fatalities. Crashes on U.S. and State Routes in the PHL sub-region had similar crash characteristics to the NYG sub-region besides overrepresentation in fatalities (three fatalities, 0.65% of crashes) on U.S. Routes.

County Routes had only one pedestrian and zero bicyclist crashes out of 336 total crashes involving a truck in the PHL sub-region. County roads had overrepresentations in crashes involving fixed objects (18%), parked vehicles (8%), and backing (8%) compared to other roadway designations.

Other Urban and Rural Areas Sub-Regions

Within the OTU sub-region, characteristics of crashes on Interstate Routes were similar to those in the other urban sub-regions, except for seven fatal crashes (0.64% vs. 0.22% statewide). In contrast, there were no fatal crashes on RUL sub-region Interstate Routes.

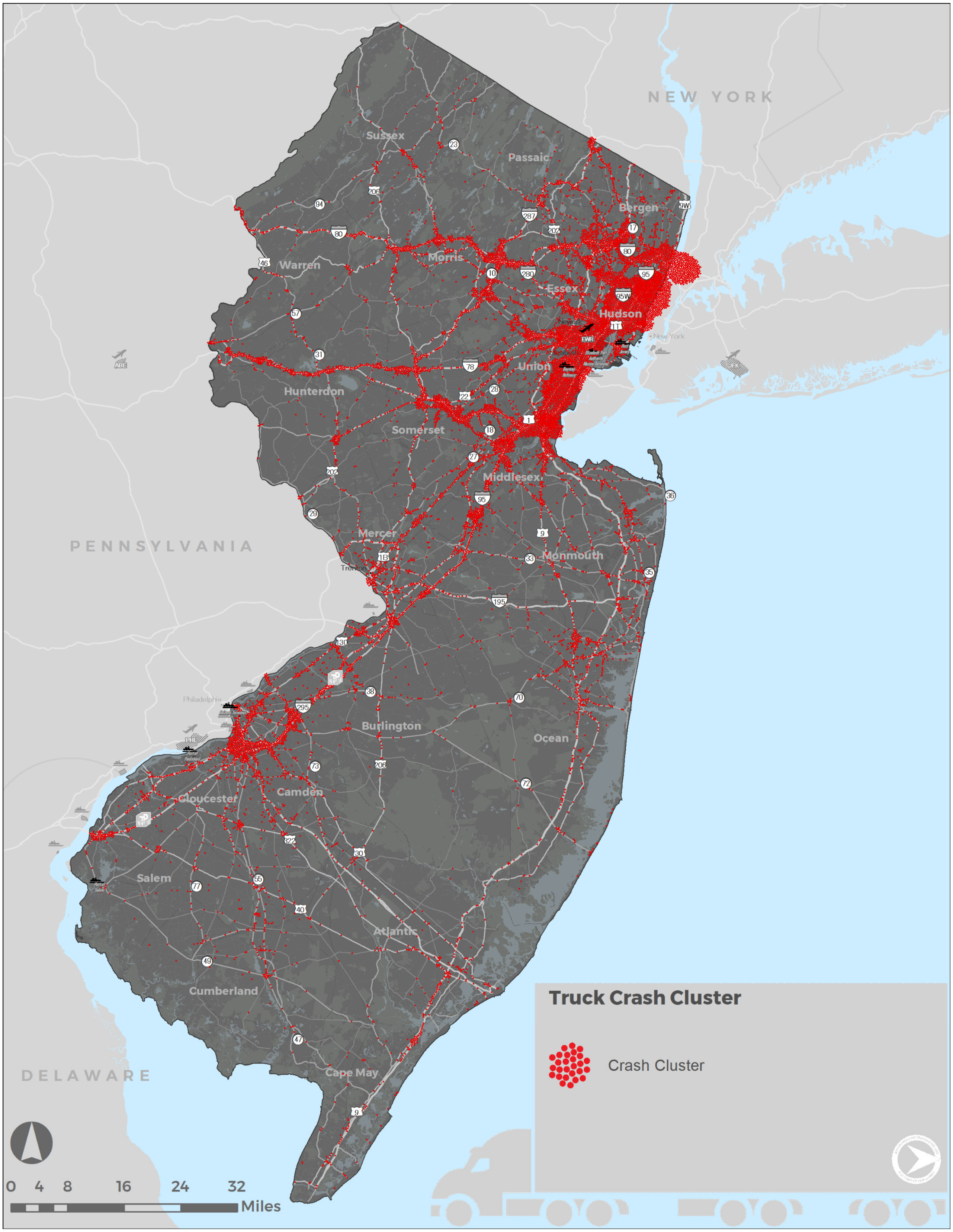
RUL U.S. and State Routes had similar crash characteristics as that of the County Routes in the urban areas. Across all roadway designations, OTU and RUL sub-regions had a lower share of same direction-sideswipe crashes compared to the urbanized NYG and PHL sub-regions.

7.1.6 Identification of High-Crash Locations

A cluster analysis was performed to identify high crash locations. To perform this analysis, crash rates were calculated to normalize the disparity and correlation between the number of crashes and the traffic volume of each roadway segment. In addition, the overall roadway segment was subdivided into a standard unit of length (one tenth of a mile), to have equal segments across the dataset. From this, crash rates were calculated by dividing the number of trucks involved in crashes in each segment by the Annual Average Daily Truck Traffic (AADTT). Statewide truck crash clusters are illustrated in Figure 122.

Identified high-crash locations will help identify policy and engineering priorities and actions as part of NJDOT's goal of reducing the number of people who are killed and severely injured on New Jersey's roads, evidenced by NJDOT's inclusion in the national *Toward Zero Deaths* initiative. In addition to efforts to reduce truck crashes, the NJDOT has created several programs devoted to reducing other types of crashes including the agency's Safe Routes to School, Safe Routes to Transit, Pedestrian Safety Improvement, Intersection Improvement, Safe Corridor, Highway-Railroad Grade Crossing, and Work Zone Safety programs.

Figure 122. Truck Crash Clusters



Source: NJDOT, WSP

Multiple roadway segments with high crash numbers over a long corridor were flagged and aggregated as individual corridors to define crash clusters. Fatal and injury crashes were considered for the clustering of the segments. To identify high crash roadway segments, a methodology was developed. This considered the following variables and weights for scoring and ranking each cluster:

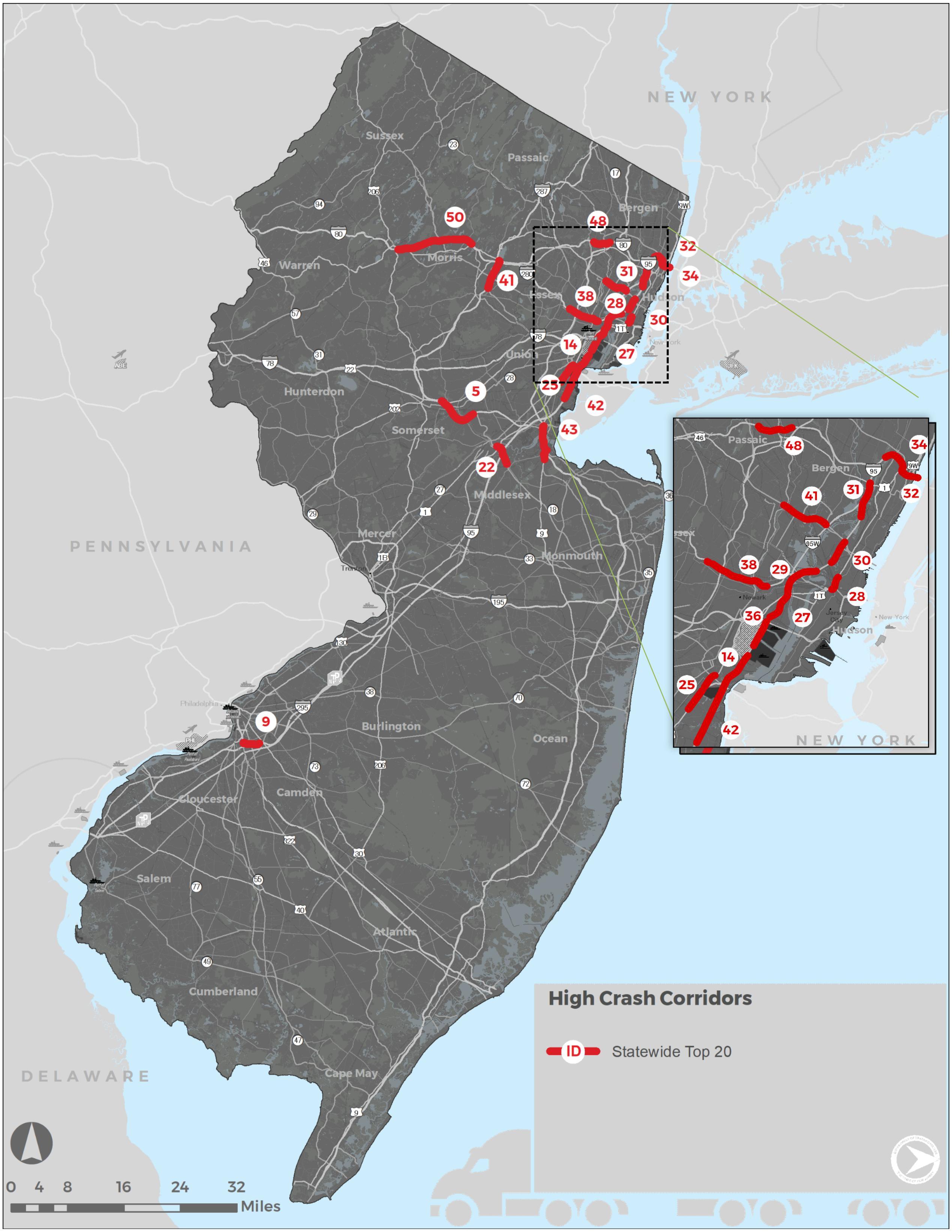
- Total number of crashes (5%)
- Number of trucks involved in the crashes (25%)
- Fatalities (20%)
- Injured (10%)
- Crash Rate for all vehicles (10%)
- Truck Rate for trucks involved in crashes (20%)
- Length of each corridor (10%)

Table 56 presents the summary of this screening process. The top 20 corridors based on the score are listed. Figure 123 displays the corridors and corresponding corridor ID statewide, while Figure 124 provides an inset of the New York Gateway Aera. The corridor ID is not associated with each segment's rank or score.

Table 56. Statewide 20 Top High Crash Corridors

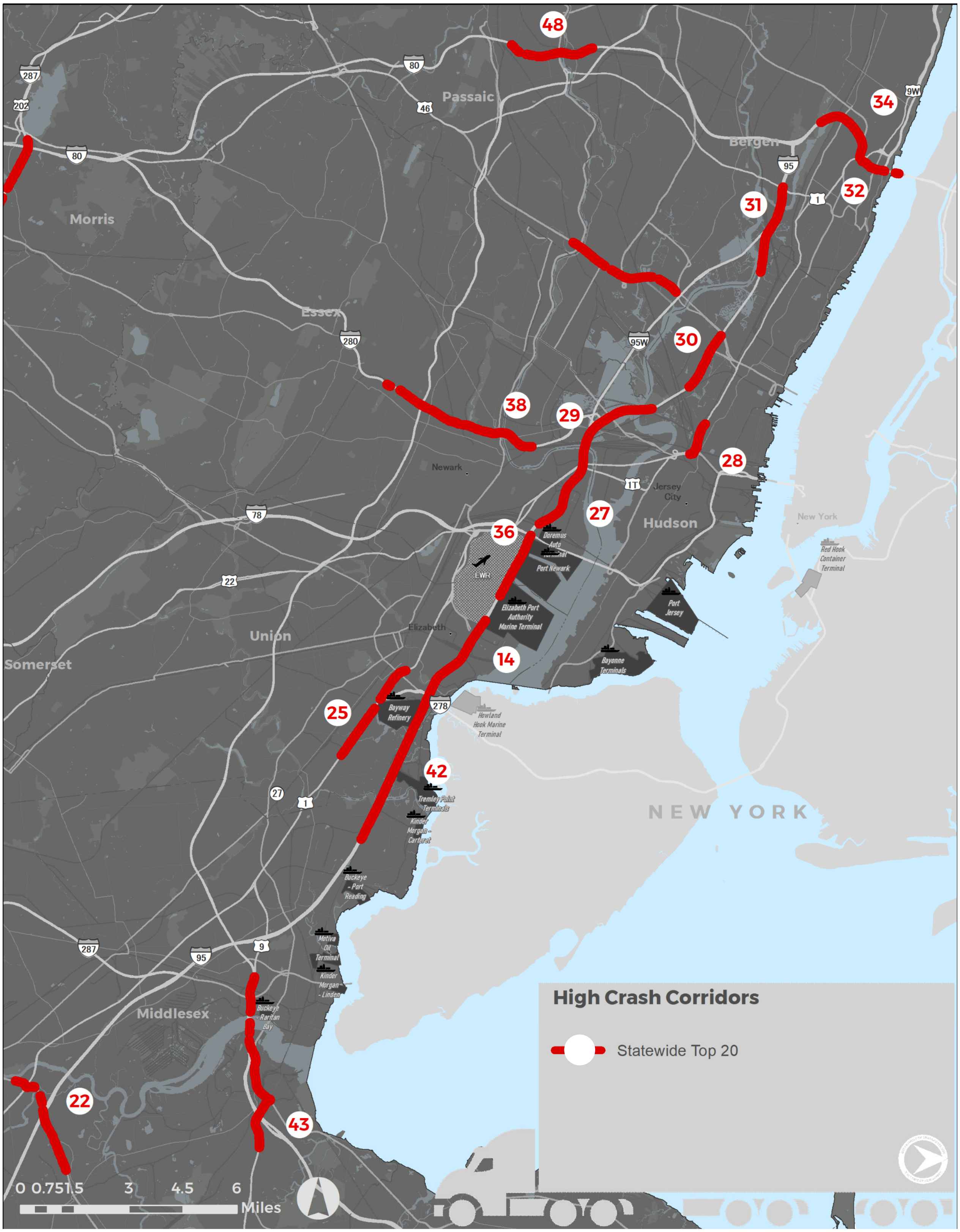
Corridor ID	SRI	County	Total Crashes	Truck Crashes	Killed	Injured	Crash Rate	Truck Rate	Length
5	I-287	Somerset	583	125	0	120	0.846	1.222	4.10
7	NJ Route 24	Morris	436	91	0	90	0.562	0.844	3.00
9	I-295	Camden	399	85	0	88	0.982	1.797	1.70
14	I-95	Union	547	322	1	116	0.334	0.952	3.20
22	NJ Route 18	Middlesex	480	65	0	144	1.813	2.649	2.00
25	U.S. 1/9	Union	332	79	0	128	1.387	4.112	2.20
27	I-95	Essex	404	200	1	95	0.684	1.759	2.20
28	U.S. 1/9	Hudson	387	67	0	113	3.062	6.061	1.11
29	I-95	Hudson	507	142	0	145	0.817	1.082	2.70
30	I-95	Hudson	334	161	1	53	0.946	2.747	1.50
31	I-95	Bergen	277	143	2	116	0.368	0.930	2.40
32	I-95	Bergen	517	265	0	111	1.494	4.772	0.70
34	I-95	Bergen	335	138	1	137	0.371	1.019	2.00
36	I-95	Essex/Union	298	187	0	68	0.403	1.171	1.80
38	I-280	Essex/Hudson	780	112	1	259	1.482	1.285	3.20
41	NJ Route 3	Essex/Bergen	502	76	0	175	0.740	1.180	2.60
42	I-95	Middlesex/Union	256	134	1	74	0.157	0.406	3.40
43	U.S. 9	Middlesex	657	132	0	145	1.019	2.420	4.20
48	I-80	Passaic/Bergen	414	51	3	148	0.948	0.731	1.70
50	I-80	Morris	564	115	1	159	0.462	0.649	5.40

Figure 123. Top 20 High Crash Corridors



Source: NJDOT, WSP

Figure 124. Top 20 High Crash Corridors – New York Gateway Area



Source: NJDOT, WSP

Following concerns surrounding the safety of roadways near concentrated freight uses, a land use crash analysis was conducted to identify concentrated areas of truck crashes around freight uses. Here, freight use land areas are defined as those coded as Commercial or Industrial uses, which range from large retail establishments or malls to manufacturing or warehousing facilities.

Eleven such segments were identified as priority safety concerns and are summarized in Table 57 and illustrated in Figure 125. These corridor segments exhibited high concentrations of truck crashes throughout their length and were adjacent to commercial or industrial uses. Segments transition points were identified where freight uses abutted other uses, such as a roadway transitioning from industrial to residential uses or from a commercial district to a major interchange. These transition points often exhibited concentrated areas of truck crashes.

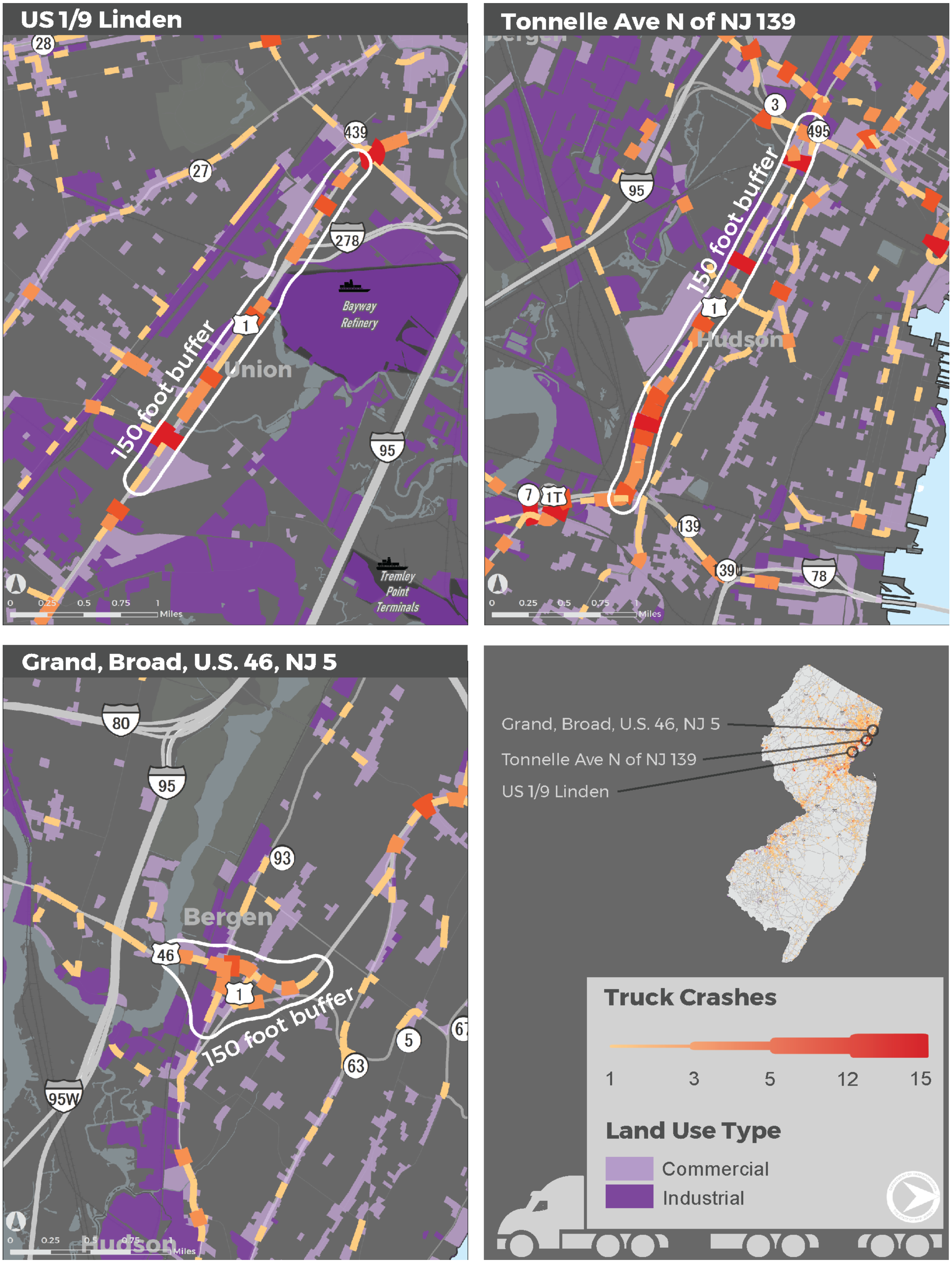
Table 57. Top Freight Land Use Locations and Associated Corridor Crashes

Name	Route	Start MP	End MP	Length	County	Municipalities	Total Truck Crashes	Crash Rate
U.S. 130 Pennsauken	U.S. 130	30.58	32.78	2.2	Camden	Pennsauken, Camden	48	5.39
NJ 70 @ TPKE	NJ 70	4.5	6.7	2.2	Camden	Cherry Hill Township	21	2
NJ 73 @ NJ TPKE	NJ 73	26.58	28.28	1.7	Burlington	Mount Laurel Township	31	2.68
CR 535 Cranbury	CR 535	17.34	20.94	3.6	Middlesex	Monroe Twp, South Brunswick Township	55	7.21
U.S. 130 Florence	U.S. 130	49.34	50.94	1.6	Burlington	Florence Township	15	6.33
U.S. 22 Springfield	U.S. 22	51.04	54.51	3.47	Union	Union Township, Springfield Township	39	3.89
NJ 18 East Brunswick	NJ 18	37.86	40.06	2.2	Middlesex	East Brunswick Township	45	2.54
U.S. 1/9 Linden	U.S. 1/9	40.3	42.9	2.6	Union	Linden City	73	4.38
Tonnelle Ave N of 139	U.S. 1/ Tonnelle Ave	54.5	57.4	2.9	Hudson	Jersey City, North Bergen Township	112	5.79
NJ 17 from I-80 to NJ 4	NJ 17	10.06	12.35	2.29	Bergen	Paramus Borough, Rochelle Park, Maywood	75	2.32
Grand, Broad, U.S. 46, NJ 5	U.S. 46, U.S. 1, NJ 5, NJ 93	Various	Various	1.8	Bergen	Ridgefield Borough, Palisades Park Boro	47	7.43

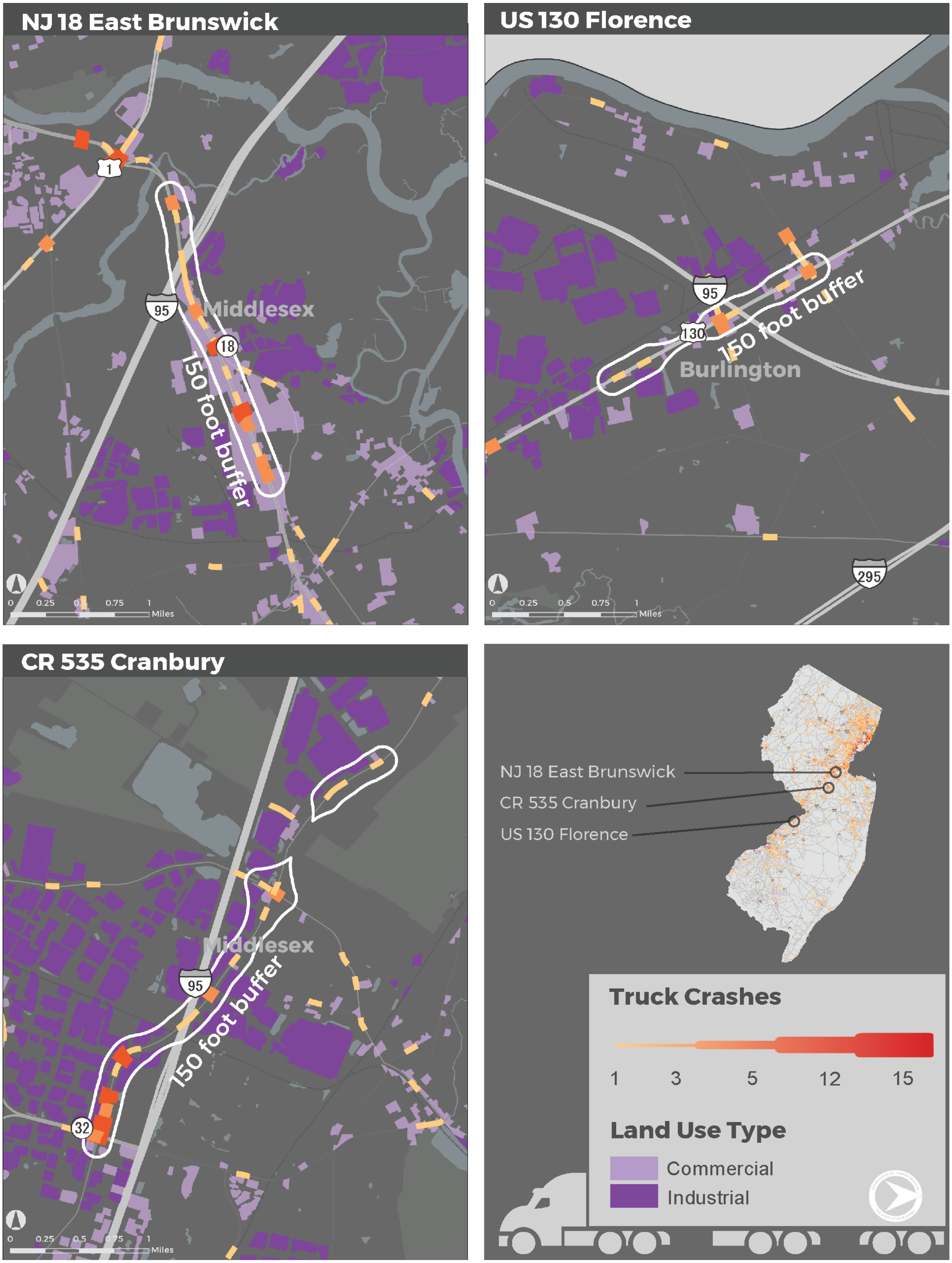
Source: NJDOT, WSP

The methodology used to determine these areas used New Jersey roadway and land use data. The truck crash data was calculated by dividing roadways into 1/10-mile segments and summarizing the number of crashes, injuries, and fatalities on each segment, specific to trucks and total vehicles. The crash data was then filtered to only include crashes involving trucks on U.S., State, and County roadways. Interstate and toll roads were not part of this analysis as they lack direct local access. The final corridors were identified through an examination of the datasets detailed above by region: Urban NY-Gateway, Urban Philadelphia Area, Urban Other, and Rural. The examination focused on identifying industrial and commercial corridors, and then identifying roadway segments with consistently high truck crash rates along these corridors. Across the four regions, seven of the eleven priority corridors were identified in the Urban NY-Gateway region, two were identified in the Urban-Philadelphia region, and two were identified in the Urban-Other region. None were identified in the Rural region.

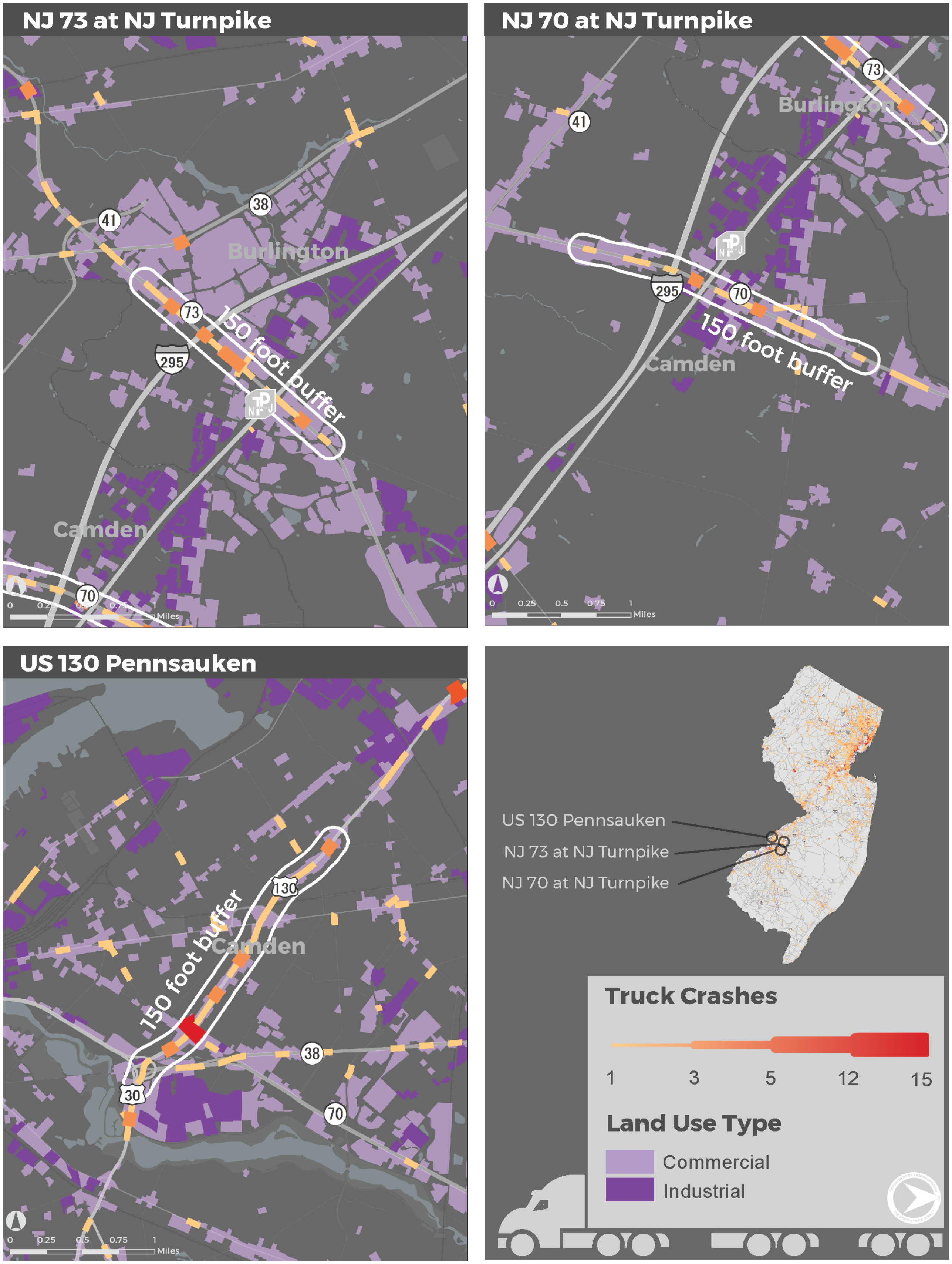
Figure 125. Top Freight Land Use Crashes



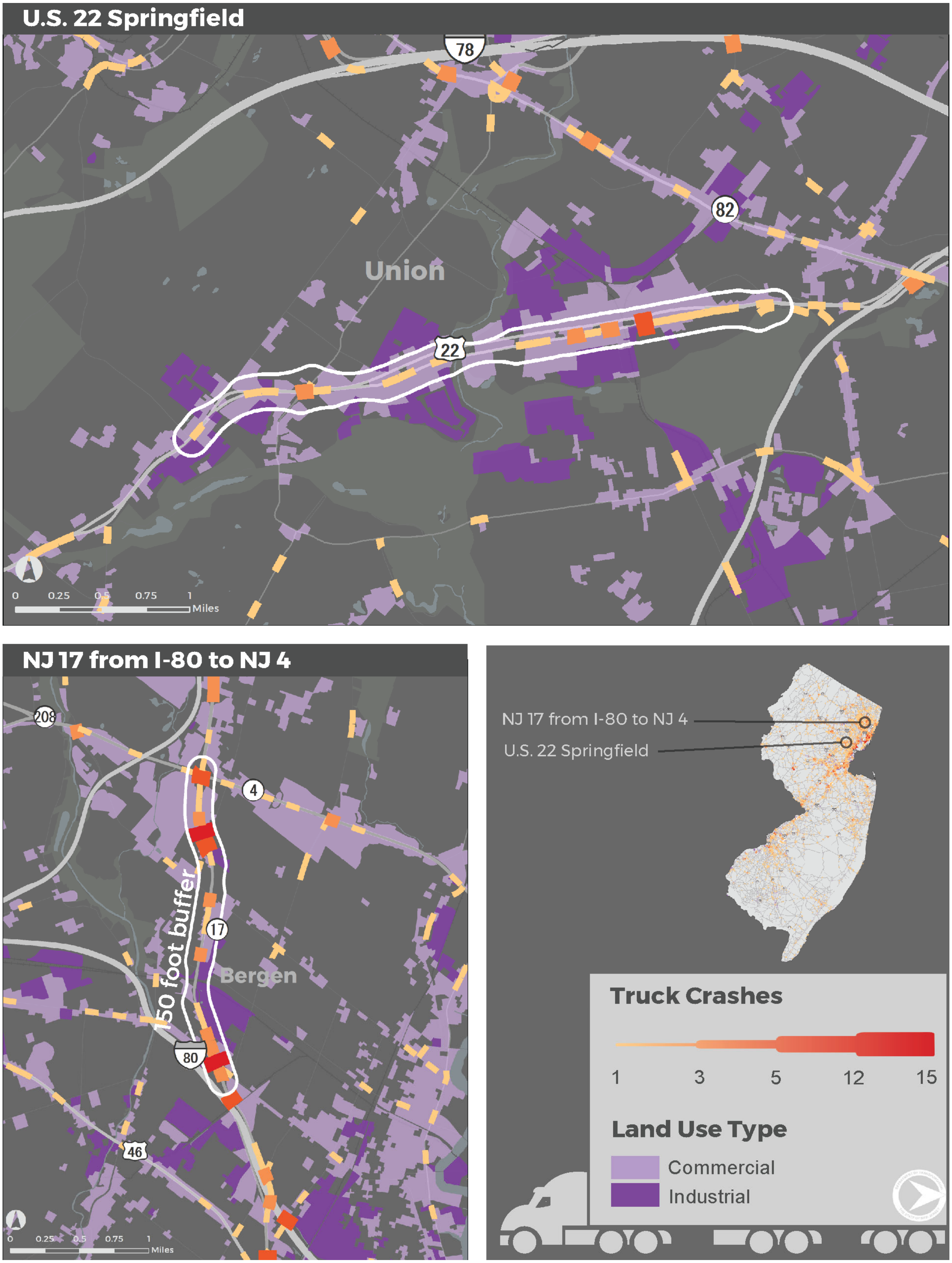
Source: WSP Analysis of NJDEP and NJDOT Safety Voyager data



Source: WSP Analysis of NJDEP and NJDOT Safety Voyager data



Source: WSP Analysis of NJDEP and NJDOT Safety Voyager data



Source: WSP Analysis of NJDEP and NJDOT Safety Voyager data

7.1.7 Traffic Volumes

ANNUAL AVERAGE DAILY TRUCK TRAFFIC

NJDOT Annual Average Truck Traffic (AADTT) datasets were obtained for 2019 and 2020.[74] While the 2020 data is the most current available statewide dataset, due to COVID-19 and its effects on traffic volumes, the 2019 year dataset was used to assess the state of the highway system. A review of 2020 data is included within this analysis to illustrate resultant changes to travel patterns stemming from COVID-19.

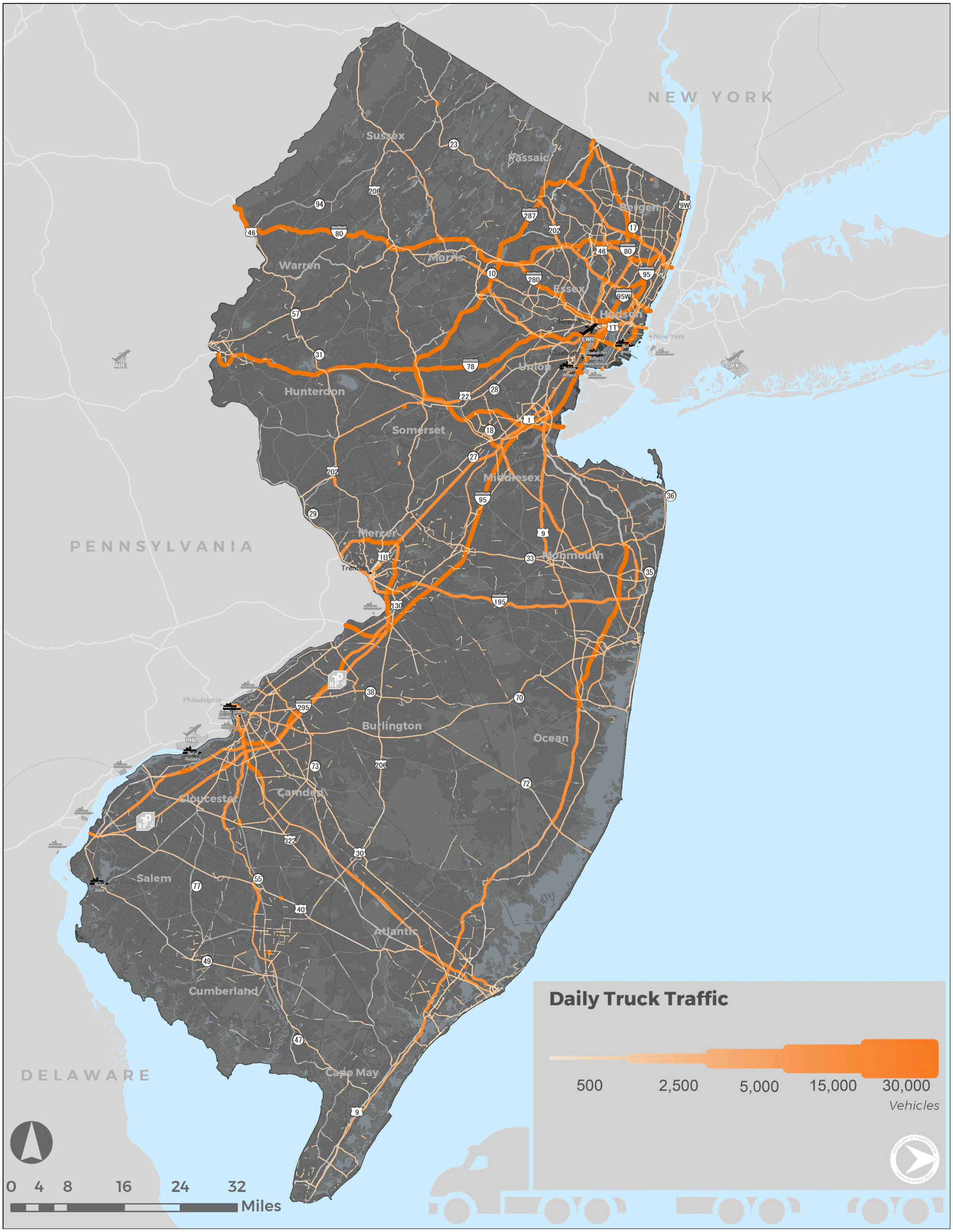
The AADTT metric is an annualized measure of the amount of daily traffic on a roadway segment, normalized by averaging daily traffic volumes over a twelve-month period. Thus, the seasonal changes, typically observed in traffic are normalized.

BASE (2019) ANNUAL AVERAGE DAILY TRUCK TRAFFIC

The interstate highway system carries the highest truck volumes in the State, as depicted in Figure 126. As one of the major backbones of the National and State highway systems, I-95 (New Jersey Turnpike) carries the largest volume of truck traffic. As an alternate route around the inner New York City suburbs, I-287 carries the next largest volume of truck traffic traveling in the north-south direction. I-78 and I-80 carry the highest east-west truck volumes, linking North Jersey with New York City and Eastern Pennsylvania. I-295 carries the largest truck volumes around the Trenton area, while the New Jersey Turnpike (Route 700) and I-76, which connects directly with Center City, Philadelphia, carry the highest truck volumes in South Jersey. Finally, the Garden State Parkway carries the highest amount of truck traffic along the Shore.

[74] As of the completion of this document, 2021 AADTT data had not yet been released for analysis.

Figure 126. 2019 Annual Average Daily Truck Traffic



Source: NJDOT, WSP

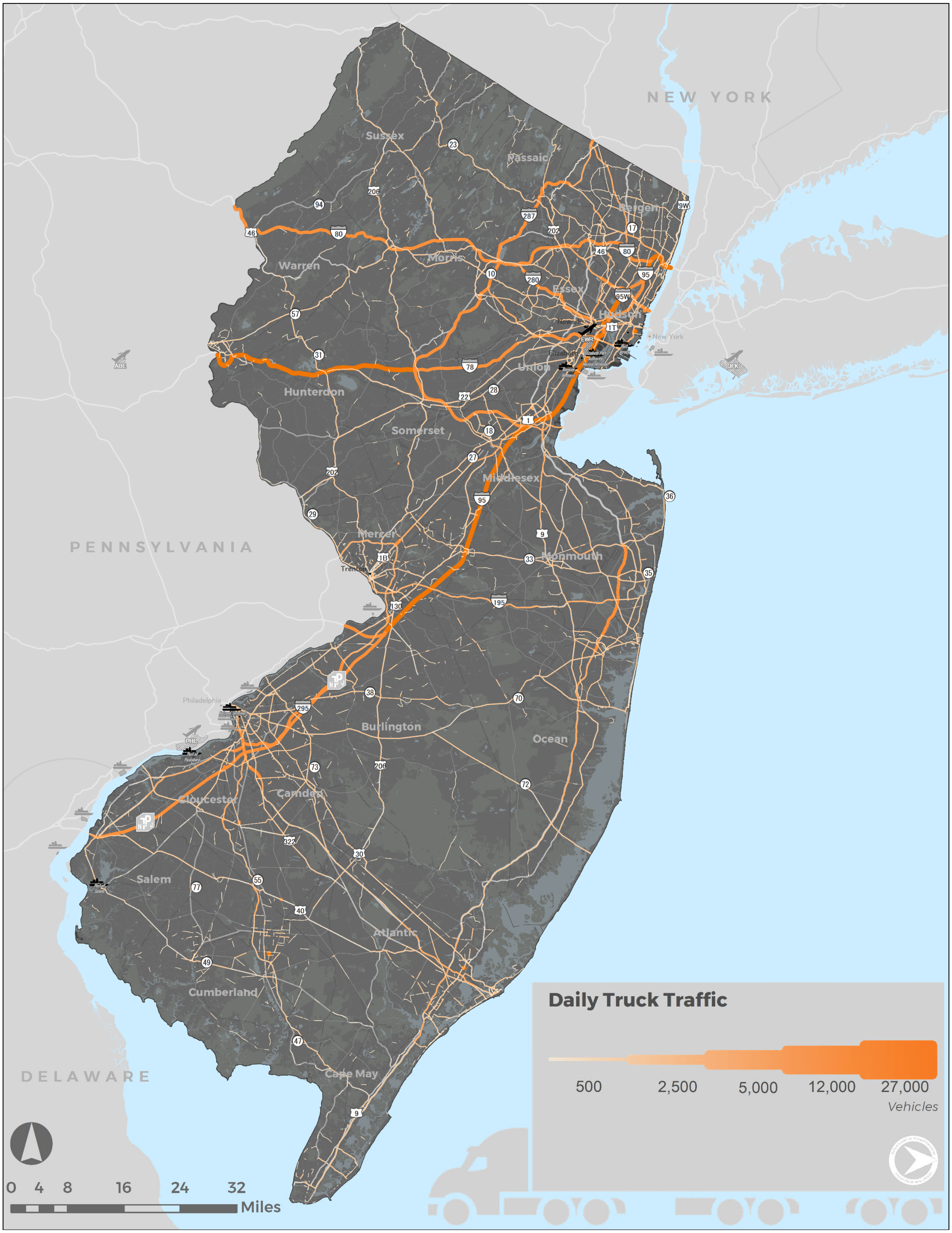
TRENDS IN TRUCK TRAFFIC

The COVID-19 pandemic impacted all traffic within New Jersey, including truck trips. Overall, 2020 truck traffic was reduced in the State, but the Interstate highway system continued to display similar patterns as in the previous year, carrying the largest volume of trucks, as seen in Figure 127. A review of freight movements associated with the stages of the early COVID-19 pandemic confirmed that the state's most critical freight roadways (Interstates 78, 80, 95, 287, 295 and NJ 17) all continued to move vital goods during initial supply chain disruptions.

Comparing the 2019 and 2020 year datasets, the overall reduction in truck traffic is clear (Figure 128). Overall, most routes saw an average reduction in truck volumes of approximately 11%. The greatest decrease in truck traffic occurred on I-95 with a 67% reduction, followed by NJ 31 (63%), and U.S. 206 (57%). Other routes including I-78, I-80, U.S. 30, U.S. 322, NJ 23, NJ 47, and NJ 173 saw reductions in truck traffic of more than 45%. However, there were several roads where truck traffic increased including sections of I-95 (Western Spur), I-295, and NJ 48, showing increases of more than 44%. Other routes including U.S. 9, U.S. 322, NJ 38, NJ 55, NJ 70, and NJ 72 saw increases of more than 35%.

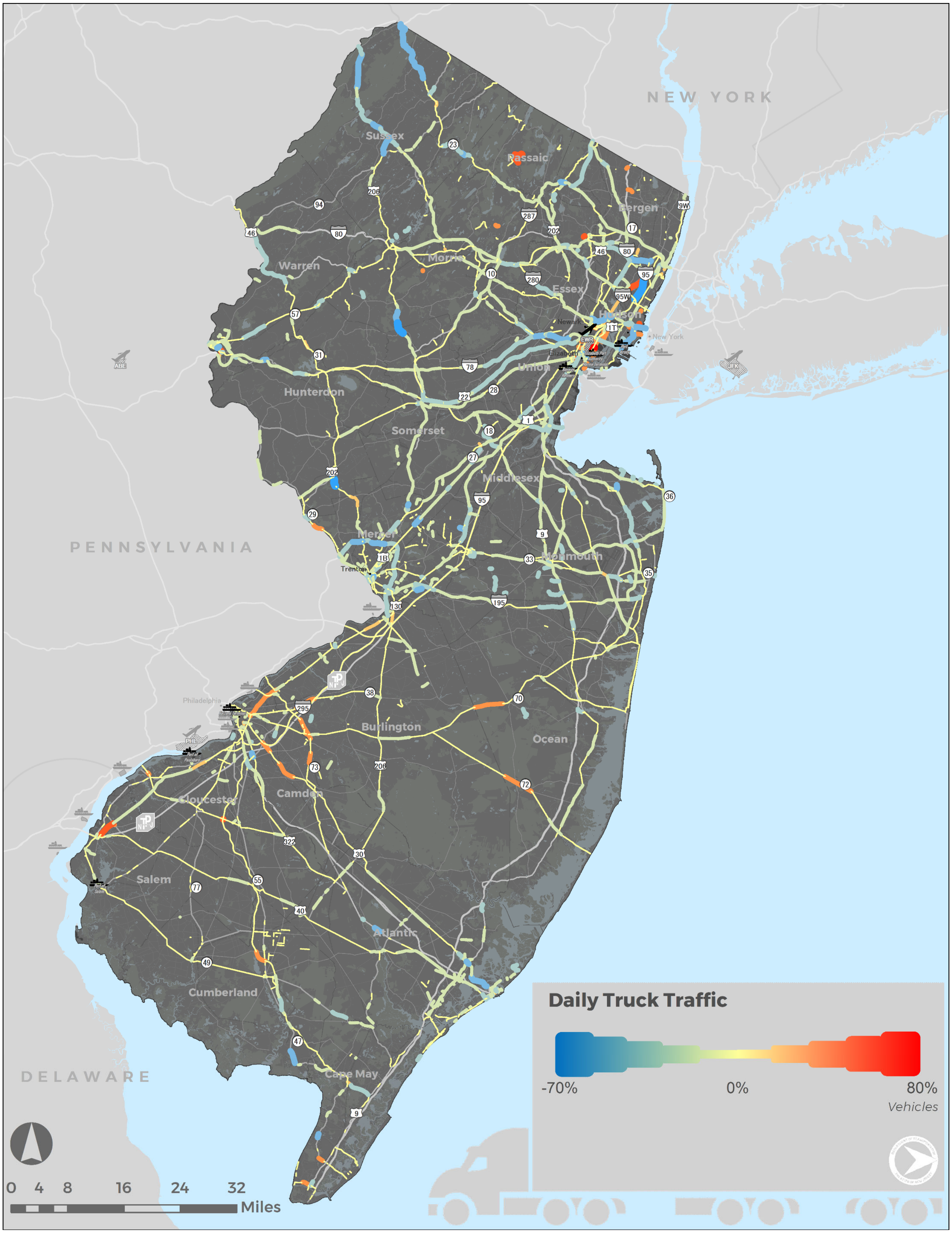
The State's present Statewide Transportation Improvement Program (STIP) presents a comprehensive guide to major transportation improvements planned over the present decade. Projects include statewide efforts to maintain and improve infrastructure for all roadway users. Statewide efforts targeted toward freight include the Local Freight Impact Fund (approximately 30 million dollars allocated annually), and the New Jersey Rail Freight Assistance Program (approximately 25 million dollars allocated annually). Several projects are funded in North Jersey to enhance truck movement, including 12 million dollars for the Kapkowski Road-North Avenue East Improvement Project (Elizabeth), several hundred million dollars for the Lincoln Tunnel Access Project (Jersey City, Newark and Kearny), 90 million dollars for the Route 9/35 Main Street Interchange (Sayreville and South Amboy), and more than 100 million dollars for the I- 80/15 Interchange (Wharton and Rockaway). A complete list of these current investments is included in Chapter 9 (Investment Plan).

Figure 127. 2020 Annual Average Daily Truck Traffic



Source: NJDOT, WSP

Figure 128. Change in Daily Truck Traffic



Source: NJDOT, WSP

7.1.8 COVID-19 Impacts on New Jersey Truck Traffic

INTRODUCTION

The COVID-19 global pandemic that struck the United States in early 2020 has underscored the need and urgency of maintaining supply lines in the face of disruptions. Panic buying and sudden shifts in consumer demand strained supply chains. Internet home delivery grew tremendously, with approximately 40 million American households trying grocery delivery for the first time.[75] At the same time, fewer cars and commuters on the roads meant the temporary reduction or elimination of freight bottlenecks across the United States. New Jersey and much of the U.S. shut down production and distribution businesses that were not involved in essential goods from March to May, with the result that the roadways still used by freight during the lockdown revealed the network of essential goods. The objective of this section is to understand and describe the pandemic-induced changes to New Jersey roadway network usage by commercial vehicles and to identify corridors that are critical to improving preparedness for future disruptions, including impacts to traffic (congestion) and safety (crashes) noted elsewhere within this analysis.

NATIONAL CONTEXT

COVID-19 first emerged in Wuhan, China, in late 2019 and by the end of January 2020, the region and country were entering a period of localized lockdowns. For U.S. industries, the implications of the virus were initially restricted to disruptions to supply chains exposed to China. Parcel volume fell 2.4% year-over-year among manufacturing customers nationwide in February 2020.[76] Healthcare parcel volume and automotive and auto parts parcel volume dropped 1.8% and 2.2%, respectively. The Port of Los Angeles, where approximately half the imports and exports are exposed to trade with China, experienced a 25% year-over-year drop in cargo traffic in February 2020.[77]

As the virus spread across the U.S. in February and March, state and local governments nationwide introduced a series of rolling lockdowns. These lockdowns affected passenger and freight travel differently. While the degree and timing of lockdown and stay-at-home orders varied across the country in spring 2020, passenger travel fell dramatically beginning in March, before gradually recovering into the summer (Figure 129).

Freight demand, on the other hand, was pushed and pulled by changes in aggregate demand for goods as well as changes in demand patterns induced by a shift to e-commerce. Early disruptions were felt in the automotive sector with Ford, General Motors, and others having to cut production. Freight demand across the auto sector fell due to the just-in-time nature of industry supply chains. The food distribution industry also saw severe imbalances in supply chains when outbound freight orders from food-service distributors suddenly stopped because of government-mandated closures of bars and restaurants, even though inbound orders of food kept coming in from farmers, food-service producers, and processors.

Many other supply chains were also affected as consumers worked from home rather than offices. By the second quarter of 2020, U.S. retail e-commerce reached $211.5 billion, up 31.8% from the first quarter, and 44.5% year-over-year.[78] E-commerce also accounted for 16.1% of total retail sales in the second quarter, up from 11.8% in the first quarter of 2020. On the other hand, department store sales and those from other "non-essential" retailers declined by 25% and 75% in the first and second quarters of 2020, respectively.

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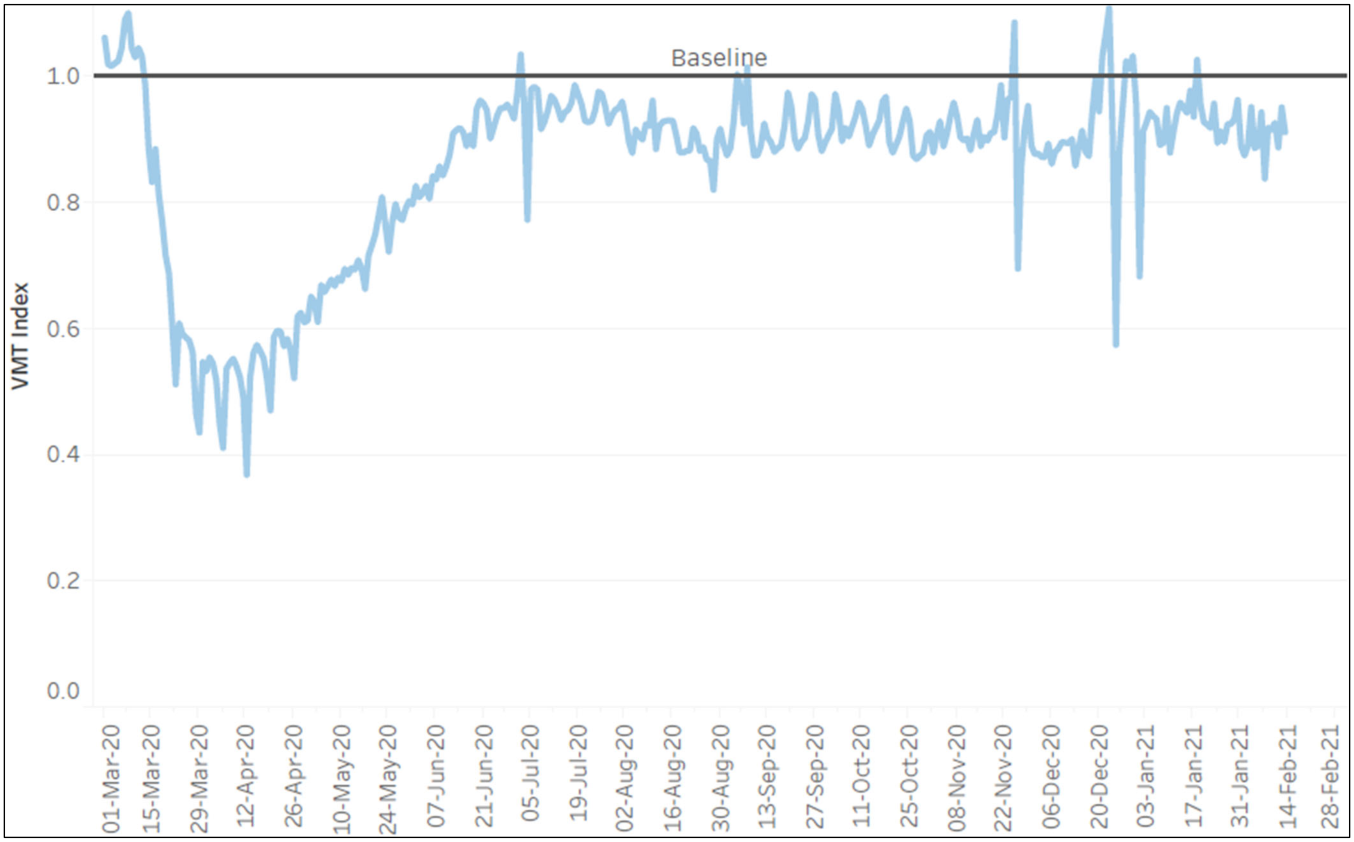
[75] https://www.mercatus.com/newsroom/announcements/online-grocery-sales-may/
[76] https://www.wsj.com/articles/parcel-carriers-slashed-jobs-in-february-11583525096
[77] https://www.bloomberg.com/news/articles/2020-02-25/biggest-u-s-port-sees-drag-from-coronavirus-though-most-of-2020
[78] U.S. Census Quarterly Retail e-Commerce Sales, 2nd Quarter 2020 https://www2.census.gov/retail/releases/historical/ecomm/20q2.pdf

Figure 129. Passenger Vehicle-Miles Traveled in Context (seasonally adjusted)

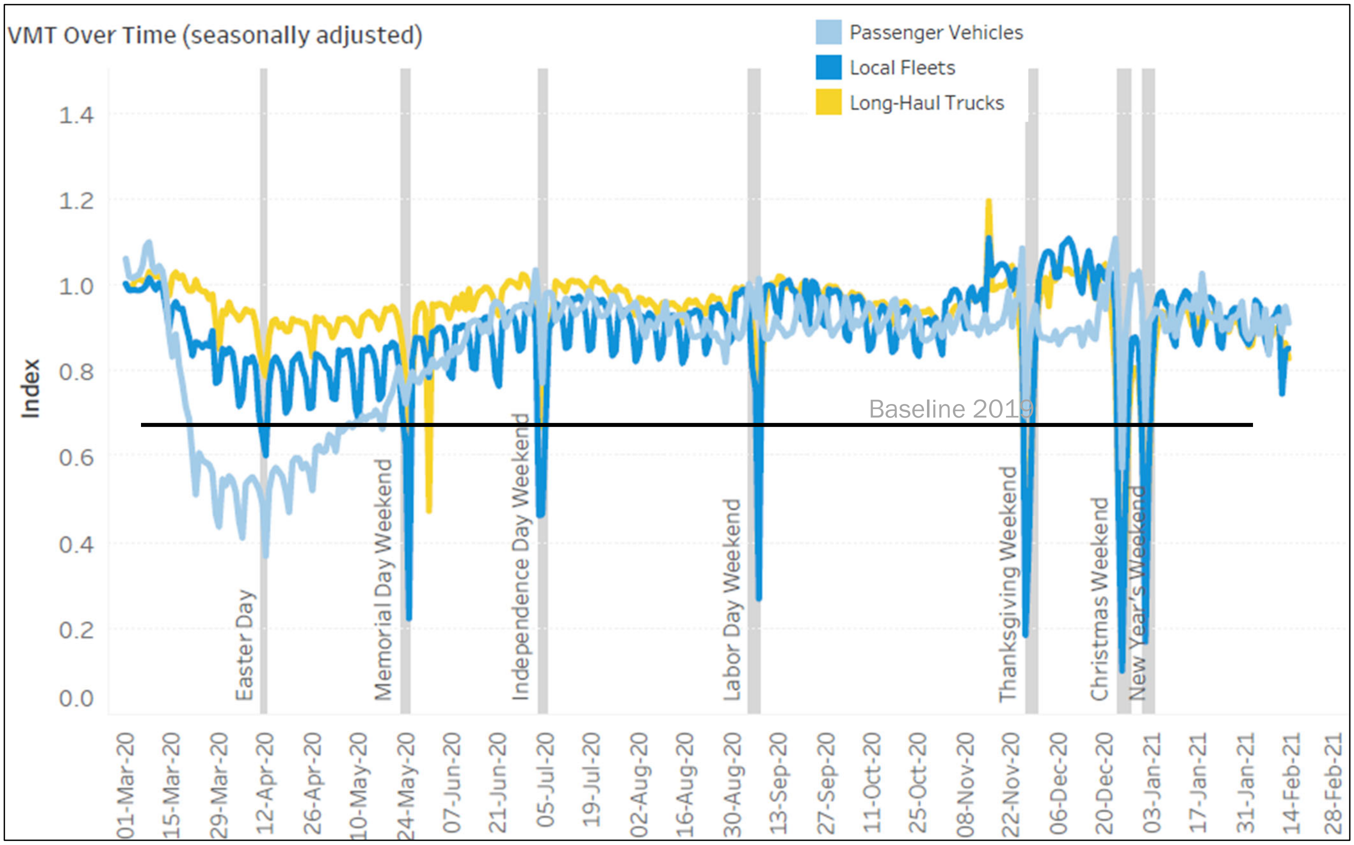


Source: Bureau of Transportation Statistics dashboard, "Daily Vehicle Travel During the COVID-19 Public Health Emergency"

The Bureau of Transportation Statistics (BTS), in conjunction with INRIX, developed a series of indices to track the impact of the pandemic on vehicle-miles traveled (VMT) and trip counts. To normalize the metrics, INRIX established a range of pre-pandemic dates to represent typical travel behavior (all non-holiday days between January 20 to February 28, 2020, inclusive). Trip figures from this period were then seasonally adjusted, using prior-year daily travel patterns, to project expected median trip count, VMT, and other metrics for the lockdown period and beyond (i.e., expected metrics in the absence of COVID-19).

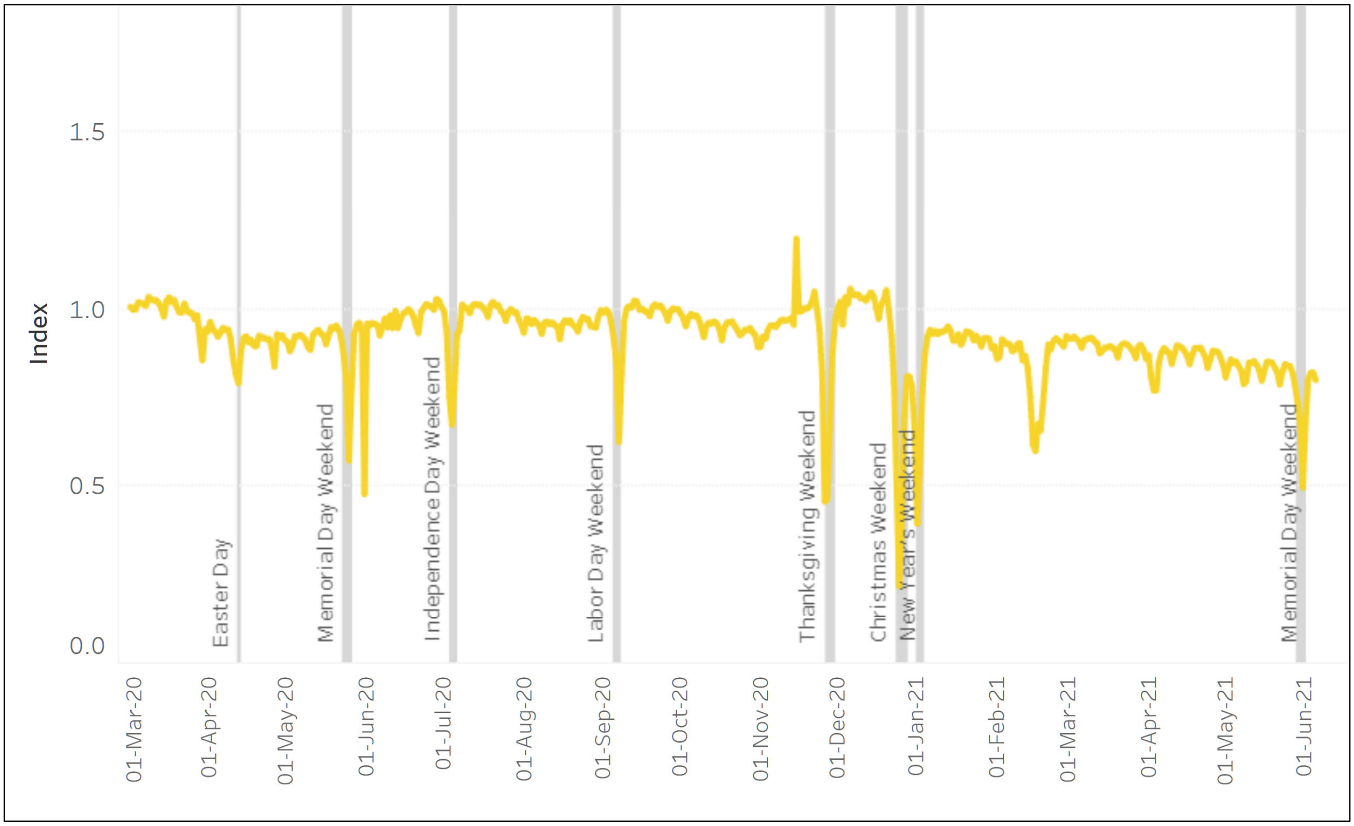
Figure 130 shows VMT trends across the U.S. tracking daily travel of passenger vehicles, local-fleet (service and local delivery vehicles weighing between 14,000 and 26,000 lbs.) and long-haul trucks (defined as commercial vehicles weighing more than 26,000 pounds). Long-haul truck volumes dipped slightly through March 2020, bottoming out during the week of Easter, before recovering gradually into the summer months. The dip in March was likely caused by reduced aggregate freight demand after some industries were mandated to shut down and consumers stocked up on food and essentials earlier in the month and in February (Figure 131). Local fleets saw a much more pronounced drop in traffic, with overall VMT levels not fully recovering until the fall season. These fleets, as defined by INRIX, consist primarily of service vehicles and local deliveries and are heavily concentrated in metropolitan areas. One potential factor affecting the more sustained dip in local delivery as compared to long-haul delivery may be that, in aggregate, this category of truck traffic is more exposed to smaller businesses and food distributors (such as restaurants) than long-haul trucks. Local service industries saw lower levels of economic activity than normal for most of 2020. Nonetheless, the drop in freight traffic in aggregate was much smaller than the drop in passenger traffic, which was heavily affected by stay-at-home orders in effect in various states in the spring.

Figure 130. Vehicle-Miles Traveled Changes by Vehicle Type (2020)



Source: Bureau of Transportation Statistics dashboard, "Daily Vehicle Travel During the COVID-19 Public Health Emergency"

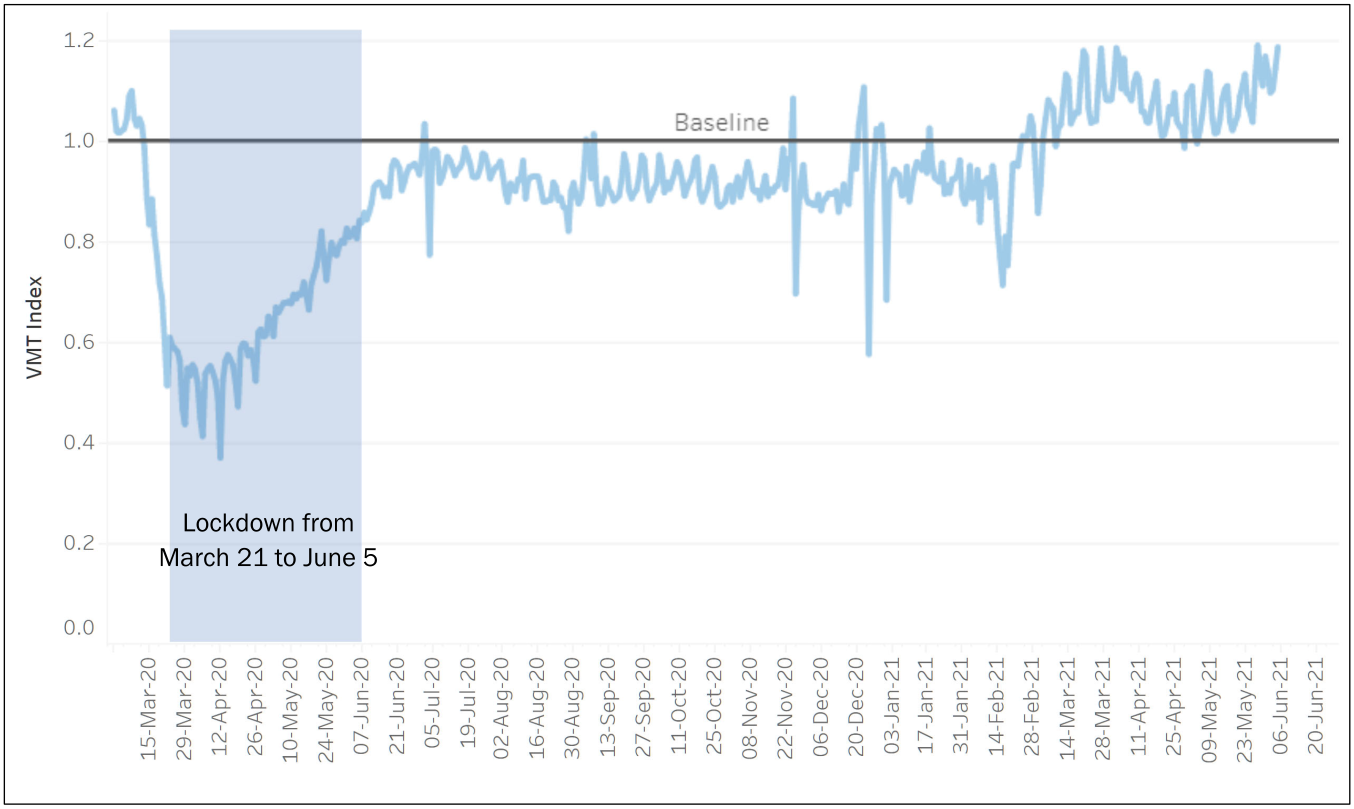
Figure 131. Long-Haul Trucks Vehicle-Miles Traveled in the United States (2020)



Source: Bureau of Transportation Statistics dashboard, "Daily Vehicle Travel During the COVID-19 Public Health Emergency"
Note: Indexed to expected vehicle-miles traveled based on prior-year patterns.

The BTS Daily Vehicle Travel dashboard also provides a snapshot of the change in passenger VMT in New Jersey induced by the pandemic. New Jersey saw reductions in passenger VMT broadly in line with the patterns observed nationally (Figure 132), with traffic dropping to approximately 60% of the expected level by early April, before recovering by July. However, BTS does not provide data on equivalent trends in commercial vehicle traffic in New Jersey. This section develops an analysis of freight-specific travel patterns in New Jersey using the National Performance Management Research Data Set as described below.

Figure 132. Passenger Vehicle-Miles Traveled in New Jersey (2020)



Source: Bureau of Transportation Statistics dashboard, "Daily Vehicle Travel During the COVID-19 Public Health Emergency"
Note: Indexed to expected vehicle-miles traveled based on prior-year patterns.

ANALYSIS METHODOLOGY

NPMRDS is a national dataset of average travel times on the National Highway System published by the FHWA. This dataset includes observed measurements collected 24 hours per day and provides average travel times for commercial and passenger vehicles in 5-minute intervals at the traffic message channel (TMC) level. TMCs are directional roadway segments serving as the basic spatial unit of analysis for the NPMRDS. Further, commercial vehicles that make up the NPMRDS include both long-haul trucks as well as local fleets.

While this dataset does not directly provide traffic volumes, the relative number and category of travel-time records every 5 minutes is an effective proxy for traffic volumes on the road (referred to as data density). These NPMRDS data-density records are divided into three categories of volume proxies:

- 1 to 4 reporting vehicles (assumed to average 2 vehicles in this analysis)
- 5 to 9 reporting vehicles (assumed to average 7 vehicles in this analysis)
- 10 or more reporting vehicles (assumed to average 20 vehicles in this analysis)

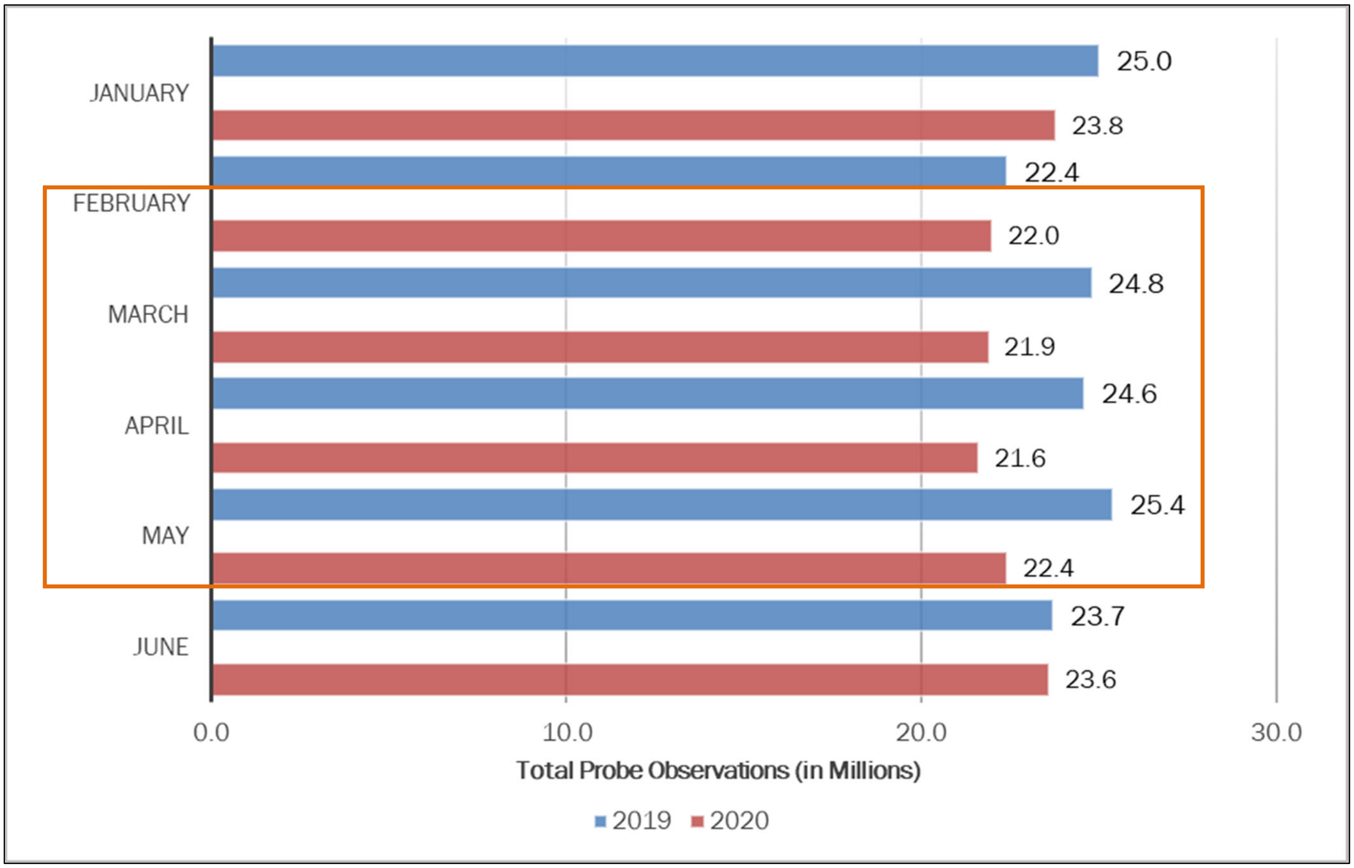
These data density (and average speed) records are collected for the lockdown period in New Jersey (March 21, 2020 – June 5, 2020) as well as the corresponding period in 2019 (hereafter called the study periods) and prepared for comparison. While this dataset does not carry information on the type of commodities being transported, they can be presumed to be essential goods during lockdown in keeping with the regulations: household staples, medical supplies and other critical goods. As presented in the following sections, this traffic data has been analyzed to reveal changes in freight travel patterns during the lockdown, as well as to surface the National Highway System roadways in New Jersey most critical to transport essential goods across the state.

ANALYSIS RESULTS

Data-Density Trends

More data-density records were found in the 2019 NPMRDS relative to 2020, both during and prior to the pandemic (Figure 133, with lockdown months outlined in red). While the data may indicate reduced aggregate freight demand during the lockdown in 2020, care must be taken when interpreting these results. NPMRDS can have year-on-year variations in the number of probe data providers contributing to the dataset, resulting in variations in the total number of data records that may not be related to actual changes in traffic counts on the roadway network. Further, the use of individual roadway segments by probe data sources may itself have been affected by the traffic pattern changes caused by the pandemic. These are caveats in interpreting comparisons of data density across 2019 and 2020.

Figure 133. Data-Density Records in Dataset (2019 and 2020)



Source: WSP analysis of NPMRDS

Freight traffic trends in New Jersey, as measured by data density, mirrored that of long-haul trucks in the United States (Figure 131) and passenger vehicles in New Jersey (Figure 132). There is a sharp drop in the early days of the lockdown, bottoming out during the week of Easter, and then recovering gradually into the summer months (Figure 134). This drop in freight traffic in New Jersey appears more severe than what was observed nationally for either long-haul trucks or local fleets (Figure 130), Part of the difference could be explained by the nature of New Jersey's lockdown and stay-at-home orders, which were among the earliest and most substantial in the nation, leading to more defined impacts on freight traffic and logistics operations.

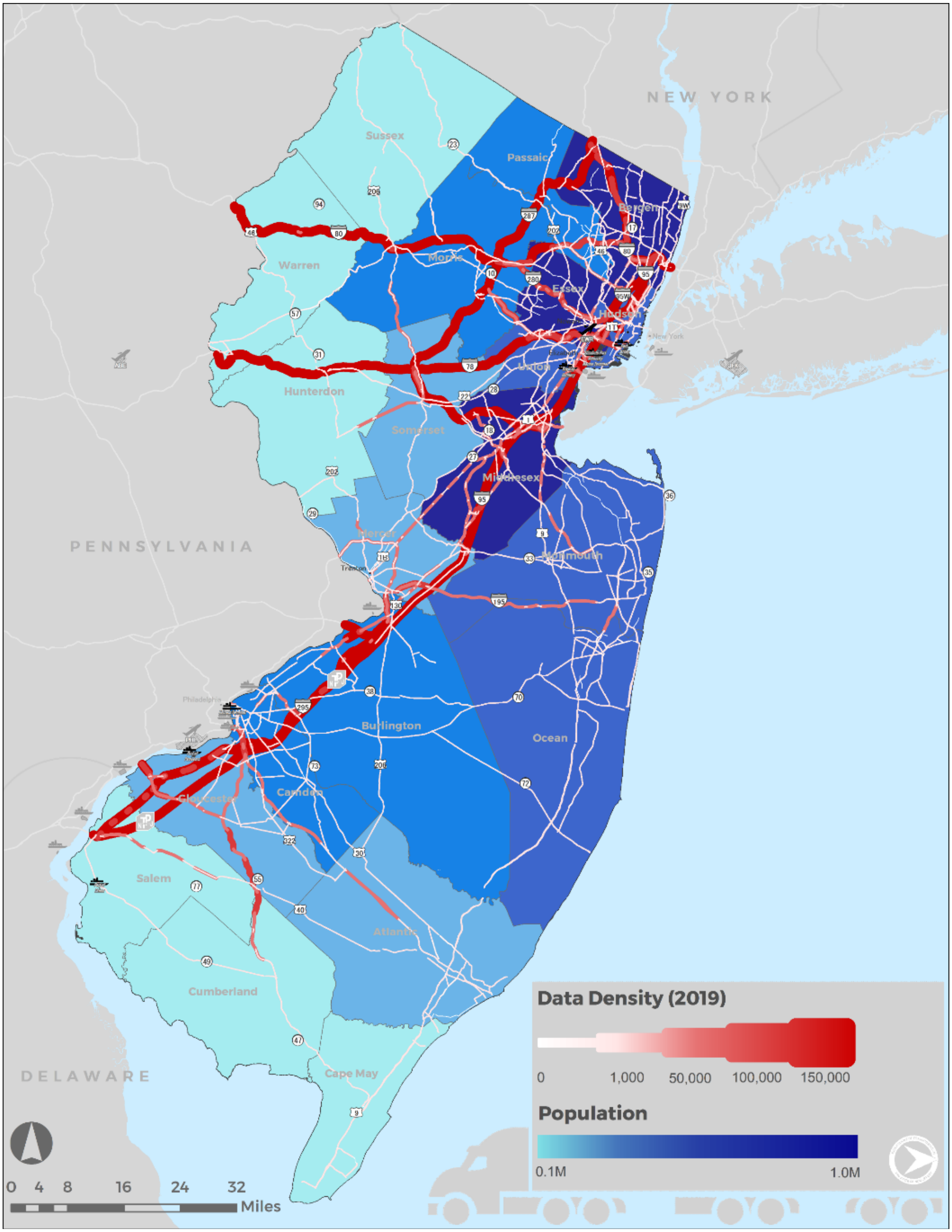
Figure 134. Weekly Data Density (as proxy for freight-vehicle count estimates) (2020, indexed to 2019 values)

Source: WSP analysis of NPMRDS

Geographic Freight Patterns

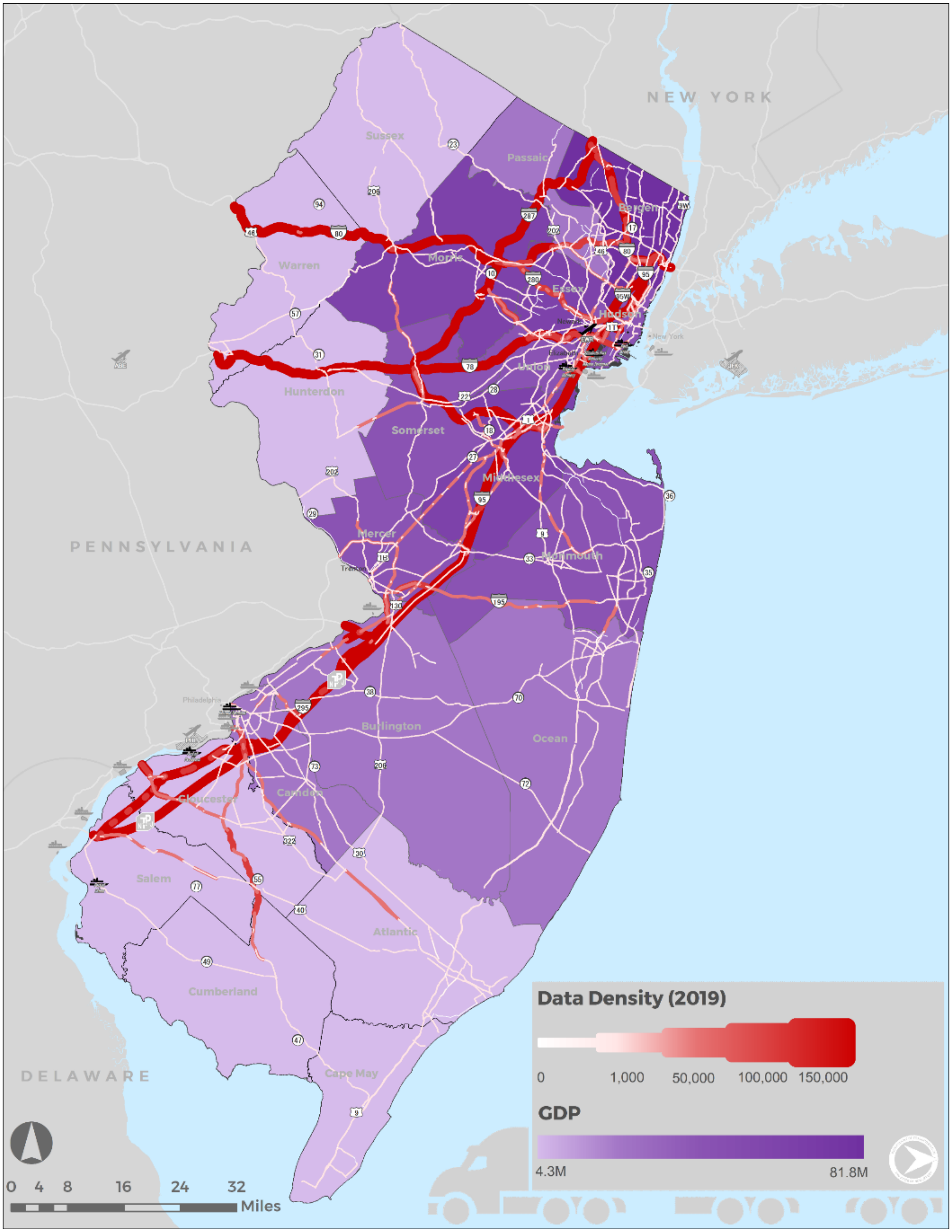
Pre-pandemic, the volume and patterns of freight traffic in New Jersey generally correlated with the Regional Core Freight Network connecting the economic and population centers in the northern and central regions of the state. As shown in Figure 135 and measured by 2019 data density, freight traffic was predominant on National Highway System highways such as I-95, I-78, and I-80, amongst others. According to Transearch data reported elsewhere in the Freight Plan, the supply chains most contributing to truck traffic on these highways are those associated with construction, distribution, food and agriculture, energy, and lumber and paper.

Figure 135. Data Density Overlaid with Population by County (2019)



Source: WSP analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)
Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

Figure 136. Data Density Overlaid Gross Domestic Product by County (2019)



Source: WSP analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)

Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

Overall, the geographical pattern of freight traffic flows in the aggregate did not differ materially between 2019 and 2020 during the study periods, even though the volume of traffic (based on the number of data records) declined (Figure 137). The geographic trends in the data indicate that the New York and Philadelphia metro areas remained the key generators and attractors of national and international freight passing through New Jersey. Other prominent origins and destinations continued to include counties such as Middlesex, Morris, and Somerset. Distribution warehouses in these metropolitan regions are some of the most significant generators of freight in these origin-destinations.

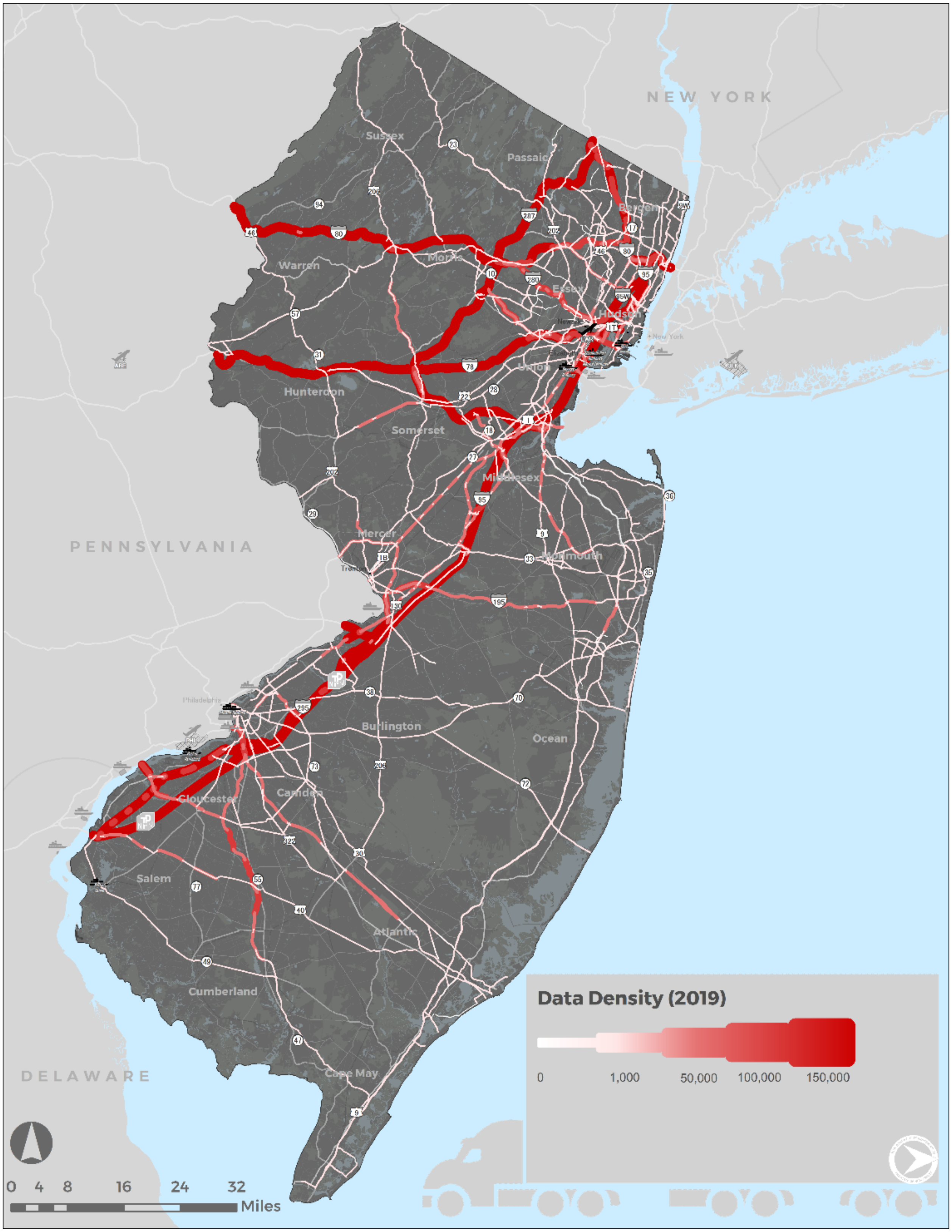
In 2020, as in 2019, statewide freight traffic was primarily concentrated along interstate and statewide corridors that were designated as the Regional Core Freight Network as part of G-MAP (Goods Movement Action Program for New York-New Jersey Metropolitan Region). Among the corridors with the highest freight traffic in the NPMRDS in both 2019 and 2020 were the following:

- Interstate Highways
  - New Jersey Turnpike (I-95)
  - I-78 between Warren and Essex counties
  - I-80 between Warren and Morris counties
  - I-287 between Bergen and Somerset counties
- State Highways
  - NJ Route 17 in Bergen County

This reconfirms the importance these corridors play in New Jersey's goods movement industry. With the notable exception of I-295, this list mirrors the list of corridors studied as part of the Freight Plan II (Priority Highway Freight Corridors) in 2012.

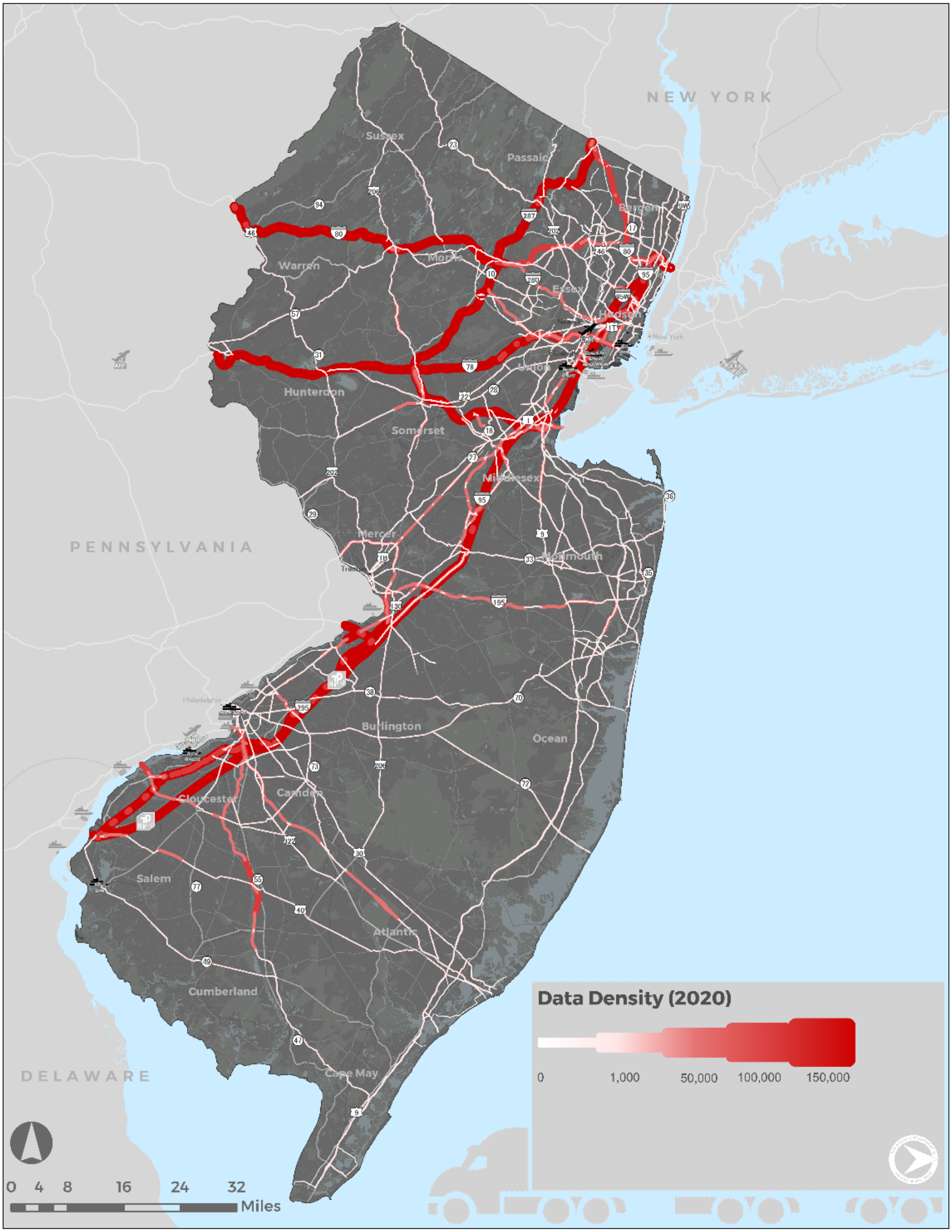
The roadways remaining in use by truck traffic during New Jersey's lockdown are mapped in Figure 138. Allowing for the source data caveats cited above, this map can be regarded as a reasonable depiction of the New Jersey road network for essential goods.

Figure 137. Data-Density Trends in the New Jersey NPMRDS Network (2019)



Source: WSP analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)
Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

Figure 138. Data Density for Statewide Roadway Network, (2020 Lockdown)



Source: WSP analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)
Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

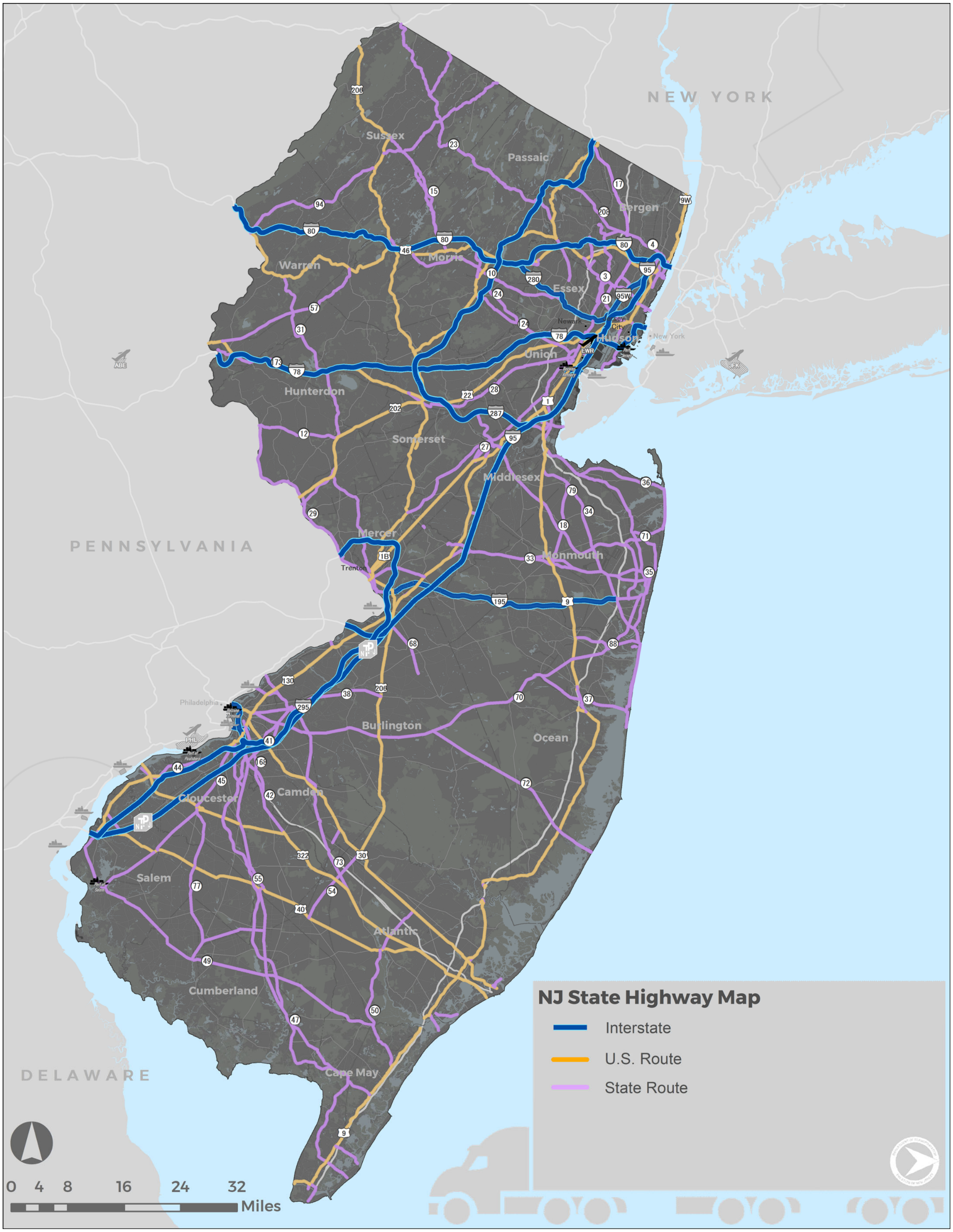
The top 10 percentile of TMCs for freight traffic during the lockdown in 2020 are in the Regional Core Freight Network of the state, as defined by G-MAP (Figure 139), similar to the pattern observed in 2019 (Figure 140). These TMCs accounted for 60% of all vehicle counts (as estimated by data density) observed statewide during the study period, despite accounting for only 13% of the total network mileage. The transportation of essential goods depends mostly on the following key six corridors comprising most of the top 10 percentile TMCs with the highest vehicle counts:

- New Jersey Turnpike (I-95)
- I-78
- I-80
- I-287
- I-295
- NJ Route 17

In addition to these critical routes, I-195, I-76 and NJ Route 55 are important routes, providing connections between the primary freight highway network south and east towards Shore Points, as well as a key link between New Jersey and Philadelphia (I-76 – Walt Whitman Bridge).

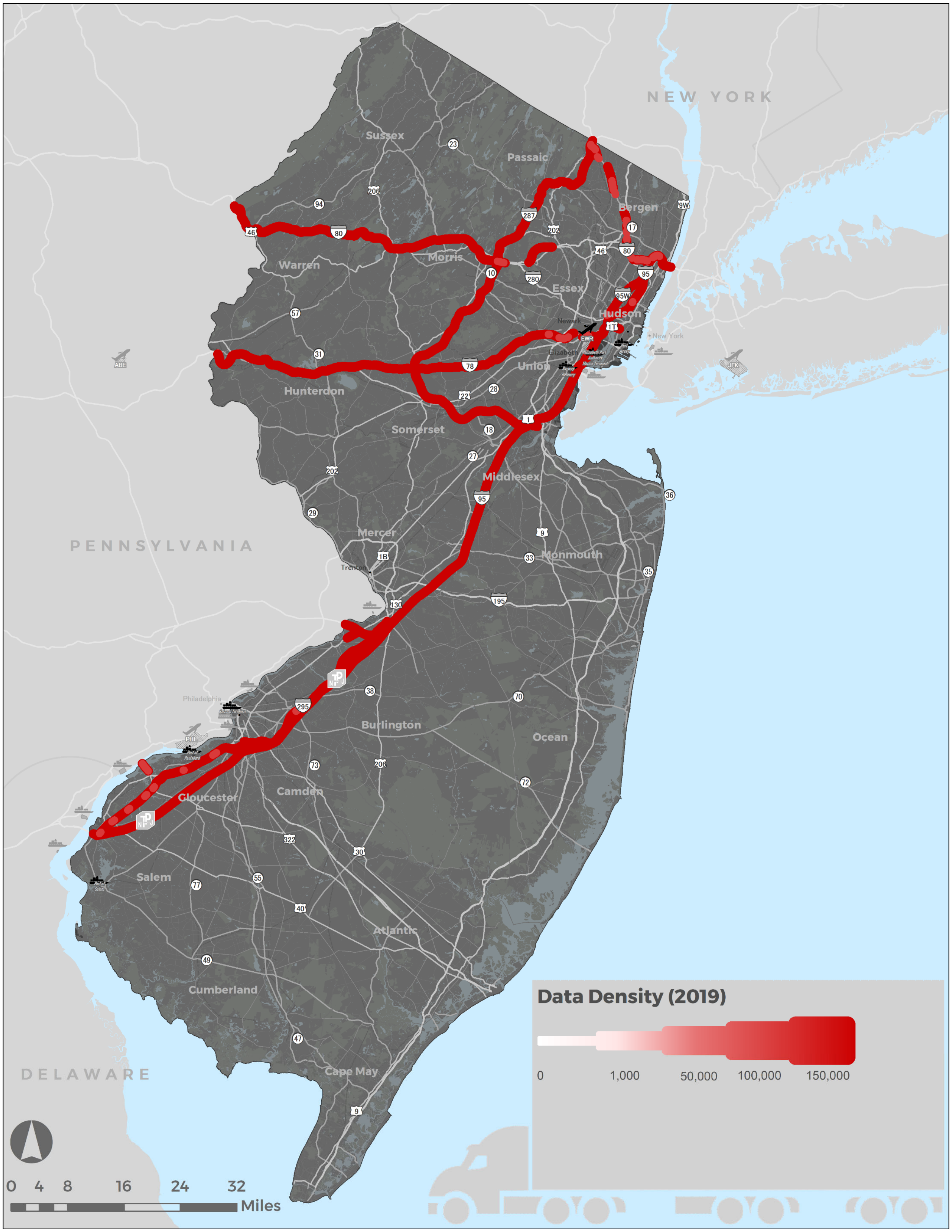
As suggested earlier, the same six corridors also contained most of the top 10 percentile TMC segments in 2019 and 2020 (Figure 140 and Figure 141). Efforts to improve the resiliency of the roadway freight network should prioritize these six corridors.

Figure 139. Regional Core Freight Network (G-MAP)



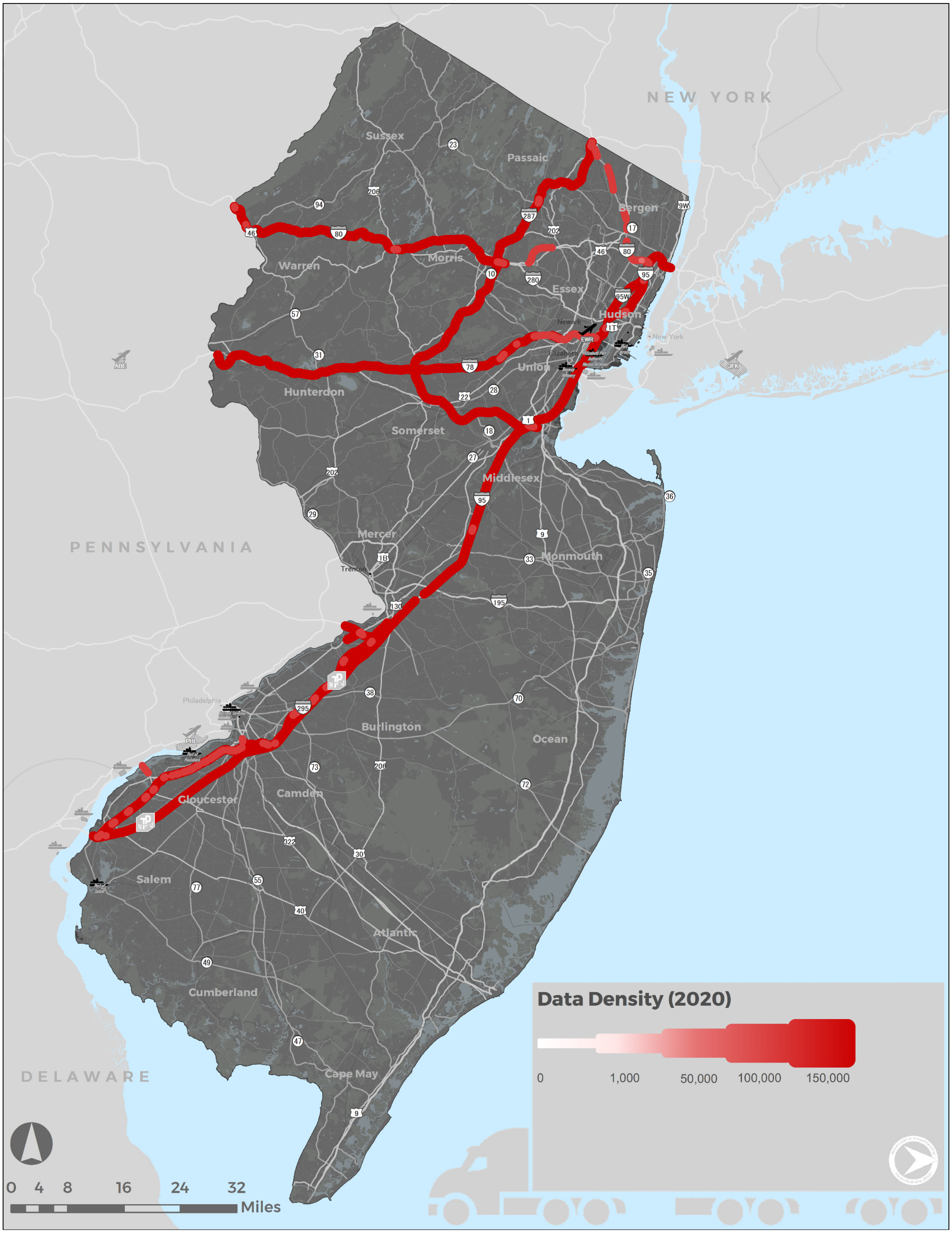
Source: NJDOT, FHWA, WSP

Figure 140. Top 10 Percentile Traffic Message Channel Segments for Freight Traffic (2019)



Source: WSP analysis of New Jersey NPMRDS (minimum of 100 probe observations per traffic message channel)
Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

Figure 141. Top 10 Percentile Traffic Message Channel Segments for Freight Traffic (2020)



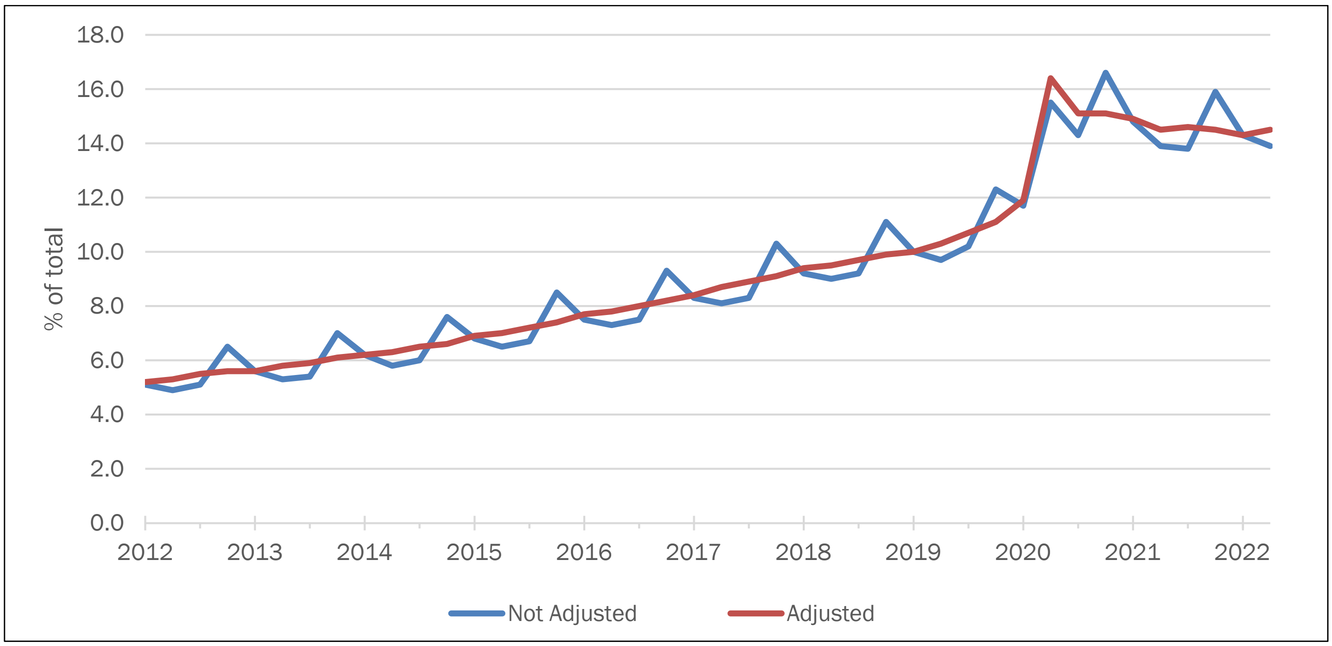
Source: WSP analysis of New Jersey NPMRDS (minimum of 100 probe observations per traffic message channel)
Note: Figure represents data density as proxy for freight traffic, using minimum of 100 data-density records per traffic message channel.

Relative Importance of Roadway Segments to NPMRDS Network

A direct one-to-one comparison between 2019 and 2020 vehicle counts (as estimated by data density) at the individual TMC level or at the statewide aggregate may lead to biased findings. One workaround is to calculate the relative proportion of data-density records within each individual TMC to the total number of data-density records in the New Jersey network, once for 2019 and again for 2020. Calculating this metric separately for each year is more likely to eliminate bias introduced by variations in the number of data-density records collected year-over-year. An increase in relative importance of a TMC segment to the overall network in 2020 (as compared to its relative importance in 2019) may indicate that the roadway segment experienced more intense freight traffic in 2020.

E-commerce sales nationwide grew 44% year-over-year, marking a significant increase in the adoption trend observed over the past decade (Figure 142). It is likely that New Jersey experienced a similar jump and that transportation of e-commerce products in New Jersey expanded substantially, utilizing state and national freeway corridors for goods movement between distribution warehouses and local hubs.

Figure 142. E-Commerce Sales as a Percentage of Total Retail Sales

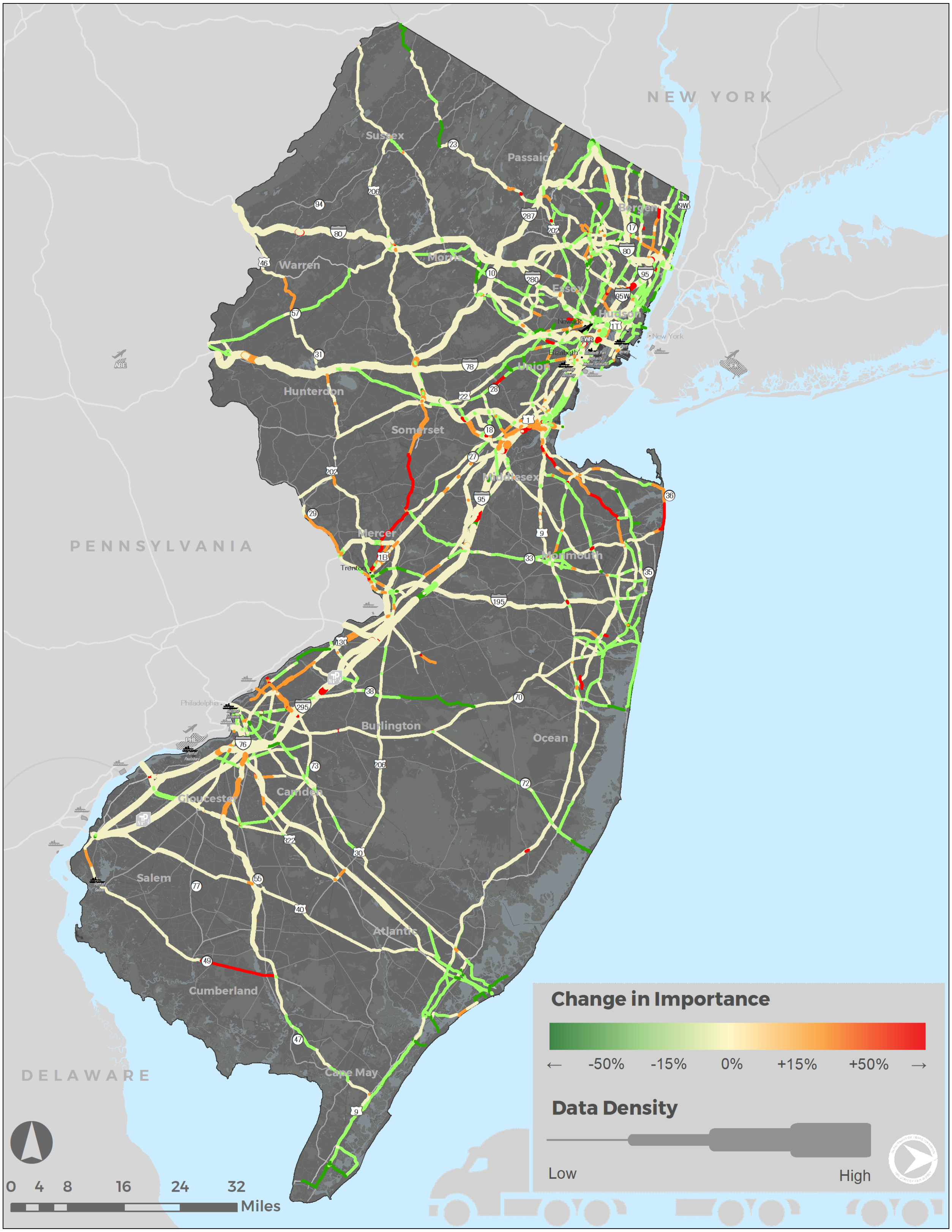


Source: U.S. Census Bureau, Quarterly E-Commerce Sales. 2nd Quarter 2020. Adjustments are for seasonality.

Figure 143 indicates that most roadway segments experienced largely unchanged levels of traffic in 2019 and 2020. Increases on some segments of I-95 and U.S.-206 are evident, but these are offset by decreases in the relative importance of urban roadway segments, particularly in the New York metro region. One probable explanation for this finding is the closure of non-essential construction and retail businesses statewide until mid-May 2020 as a result of the initial pandemic measures adopted by the governor in March 2020. These businesses were reopened only in the week of May 18 after a two-month pandemic-induced lockdown. As such, freight traffic and supply chains associated with the construction and retail industries, two of the most important freight-generating industries within New Jersey, were greatly diminished during the months of March, April, and May.

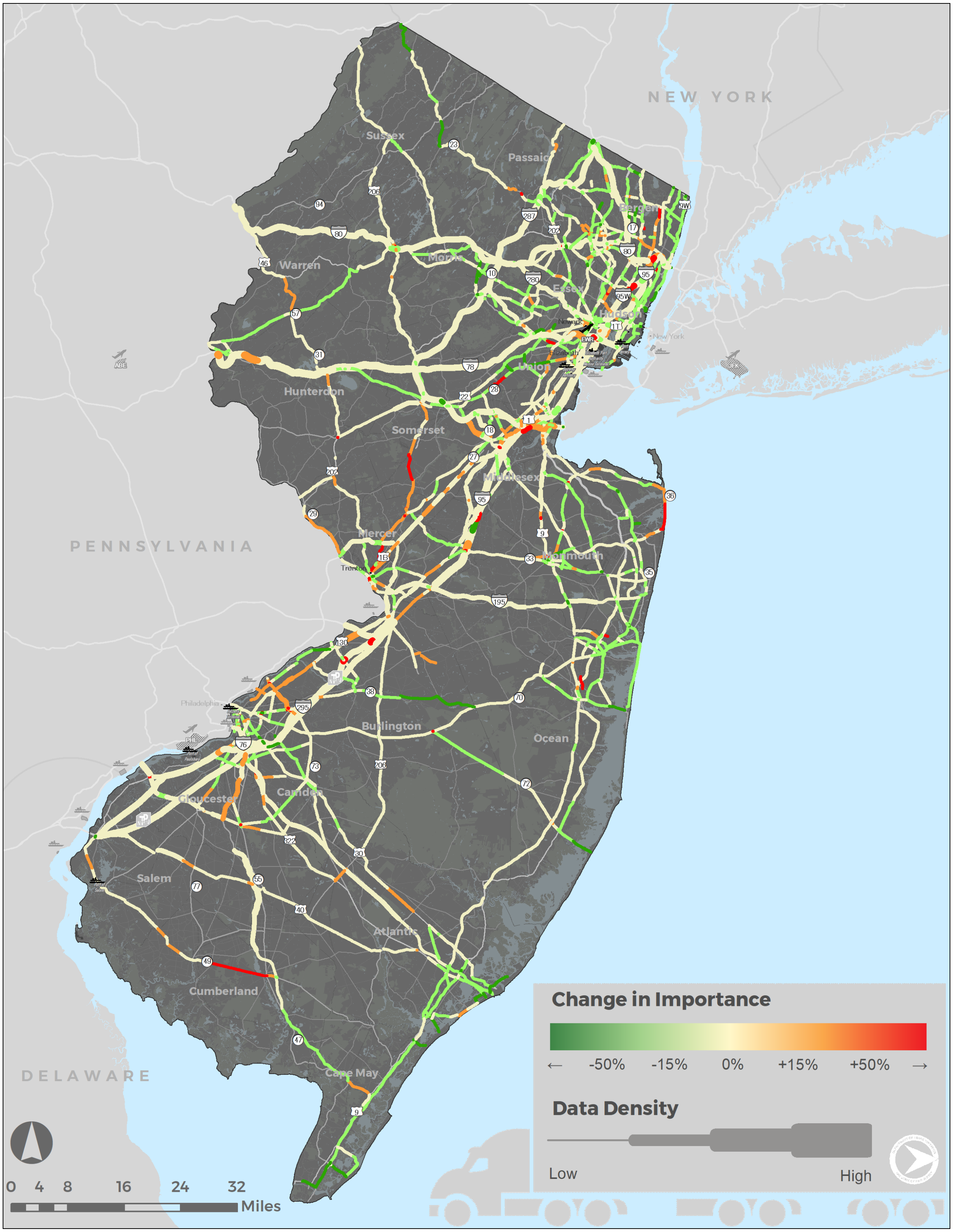
Figure 144 and Figure 145 illustrate changes in relative importance of TMCs in 2020 by direction of traffic. Northbound and eastbound traffic on U.S. 206 and I-95 (amongst others) saw relative increases in traffic, while southbound and westbound saw relatively muted impacts aside from those evident on U.S. 206.

Figure 143. Change in Relative Importance of Traffic Message Channel Segment to Overall Freight Traffic on Statewide Network (2019 to 2020, during the lockdown period)



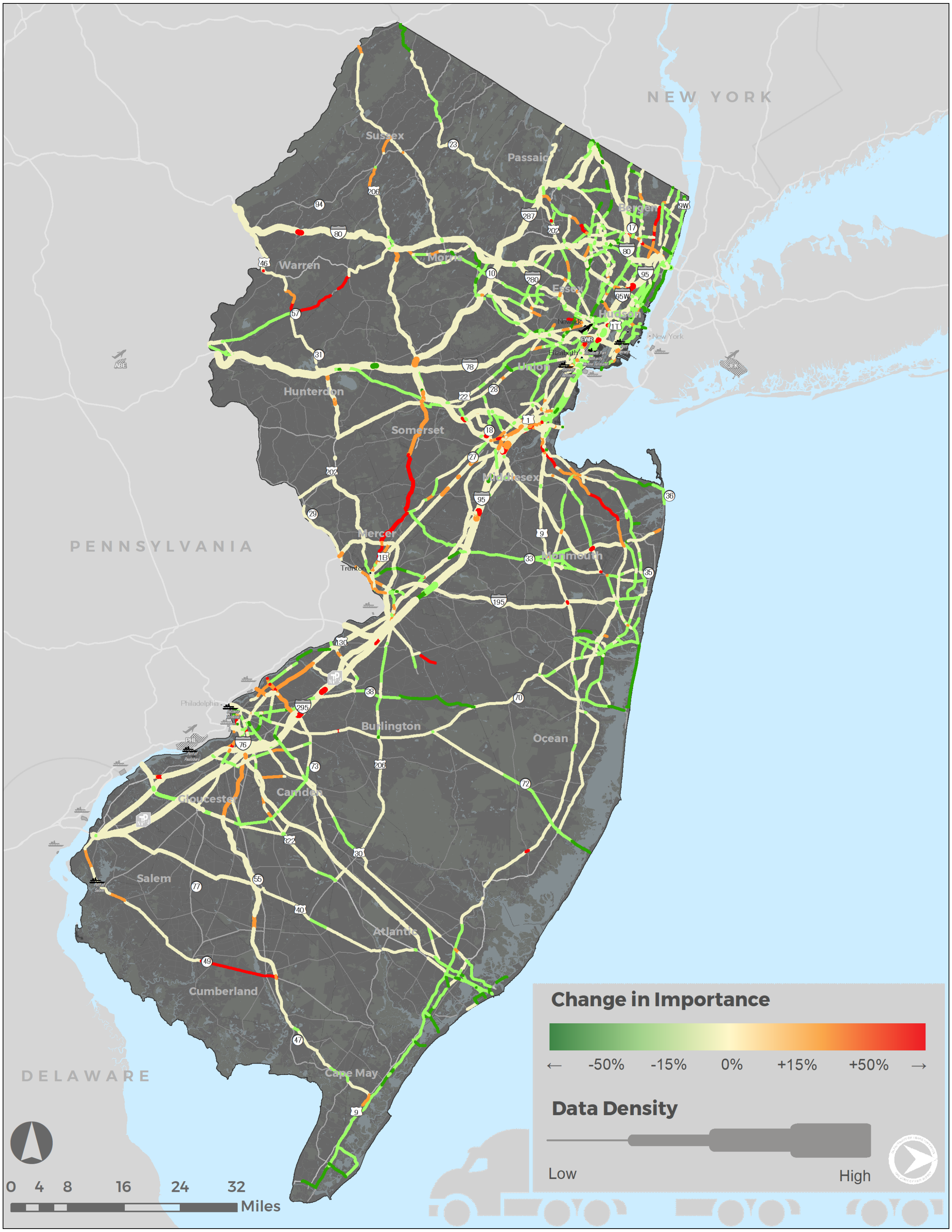
Source: WSP analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)

Figure 144. Change in Relative Importance of Traffic Message Channel Segment in relation to statewide network, Northbound and Eastbound Traffic



Source. WSP Analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)

Figure 145. Change in Relative Importance of Traffic Message Channel Segment in relation to statewide network, Southbound and Westbound Traffic



Source. WSP Analysis of New Jersey NPMRDS (minimum of 100 data-density records per traffic message channel)

Roadway segments with the highest relative increases are good candidates for further traffic flow analysis. Some of the non-interstate facilities may be relatively low-volume routes. If possible, the observed increase in proportion of freight traffic on these segments should be validated with data from other sources to understand whether these changes translated to real increases in roadway traffic counts on those segments. Further, a traffic-speed analysis could clarify whether these traffic changes accounted for real impacts on congestion on these segments. A significant decrease in traffic flow speed could indicate which segments were at or approaching capacity.

Summary

The COVID-19 pandemic decreased activity across most sectors of the economy but increased demands on sectors related to healthcare, supplies of necessities, and e-commerce. The e-commerce shipments should have consisted chiefly of essential goods because production of other goods was shut down and imports fell off. These unprecedented shifts in the economy led to similarly unprecedented changes in the amount and types of freight that move through our highways. Preliminary evidence shows trends underway for a decade or longer in the e-commerce and delivery services space have accelerated dramatically, leading to significant shifts in how consumers purchase goods and particularly for groceries and meals.

The analysis of NPMRDS on New Jersey roadways indicates that New Jersey experienced freight traffic trends broadly in line with those observed nationwide during the COVID-19 pandemic-induced lockdown period (March 21, 2020 – June 5, 2020). A sharp drop in freight traffic estimates was observed in the early days of the lockdown, bottoming out during the early April, before recovering gradually into the summer months.

Nationally, lower levels of long-haul freight activity were observed March to May 2020 and preliminary evidence from the New Jersey NPMRDS suggest similar trends in the state. However, due to year-over-year variations in the number of data-density records in NPMRDS, directly comparing the levels of freight activity observed during the lockdown period in 2020 and the corresponding period in 2019 could lead to biased findings.

> In short—and importantly for resiliency planning—the New Jersey roadway network for essential goods coincides with the Regional Core Freight Network, and investments in the strategic network will help protect the supply of goods to households and health care providers.

On the other hand, the data does allow for a comparison of relative changes in traffic flow geographically within the state. A substantial shift to non-urban interstate and other freeway traffic was observed during the lockdown period in 2020 relative to 2019, likely caused by the increase in e-commerce shipments and potentially related to increased remote work. This was offset by substantial reductions in the proportion of freight traffic on urban roads, particularly in the Metro New York region. With the construction and retail industries and their suppliers under a two-month pandemic-induced shutdown, supply chains in these industries remained depressed throughout this period, leading to lower levels of freight activity in urban regions. Further, remote work trends as well as disruptions to the hospitality and tourism industries may have reduced freight demand in other regions.

Statewide, freight traffic was primarily concentrated along interstate and state highway corridors designated as part of the Regional Core Freight Network. This pattern was observed in both 2019 and 2020, which indicates that the most significant pre-pandemic traffic corridors were also the routes that were most critical during the lockdown.

Corridors with the highest NPMRDS freight traffic during lockdown included the following:

- New Jersey Turnpike (I-95)
- I-78
- I-80
- I-287
- I-295
- NJ Route 17
- I-195
- I-76
- NJ Route 55

7.1.9 Oversize/Overweight Vehicles

The specific needs of oversize (OS) and overweight (OW) vehicles on New Jersey's highways is an important consideration when identifying locations for targeted freight-specific improvements. NJDOT is advancing several initiatives to better understand how and where OS/OW vehicles are moving throughout the state. This includes:

- Updating the Commercial Vehicle Guidebook, as outlined in Section 4.1.11
- Reconfirming statewide data for substandard bridge clearances
- Working with law enforcement agencies to increase enforcement and encourage higher permit compliance.

NJDOT tracks the presence of overweight vehicles via their SUPERLOAD permitting process. The most recent three-year overweight permit data (2019-2021) were obtained directly from NJDOT. 2020 data coincided with the peak of the COVID-19 pandemic, and 2019 represents pre-pandemic patterns. Thus, 2021 data was reviewed and mapped to understand and track current trends as typical travel patterns return to normal. Each corridor is composed of several dozen segments of varying lengths. Segments were merged based on the similarity of permit data to form a more consistent dataset for the purposes of a statewide analysis. All segments with more than 4,000 OS or OW permits are shown in Table 58 and Table 59, respectively. Figure 146 and Figure 147 illustrate the number of OS and OW permits, highlighting those listed in the tables.

Table 58. Oversize Permits

ID	Route	Counties	MP Start	MP End	Length (mi)	OS Permits
287-D	I-287	Morris/Somerset	21.27	43.64	22.37	6,890
78-A	I-78	Warren/Hunterdon	0	17.60	17.60	5,910
287-C	I-287	Morris	43.64	53.15	9.51	5,180
78-C	I-78	Hunterdon	17.60	20.78	3.18	5,148
287-B	I-287	Bergen/Passaic/Morris	53.15	59.70	6.55	5,117
78-B	I-78	Hunterdon/Somerset	20.78	30.22	9.44	5,097
287-A	I-287	Bergen	59.70	67.53	7.83	4,989
287-E	I-287	Somerset	17.66	21.24	3.58	4,747
295-E	I-295	Mercer	60.17	64.84	4.67	4,361
295-D	I-295	Burlington/Mercer	56.63	60.20	3.57	4,360
295-B	I-295	Camden/Burlington	28.17	40.61	12.44	4,229
295-C	I-295	Burlington	40.59	56.63	16.04	4,206
295-A	I-295	Camden	27.11	28.24	1.13	4,027

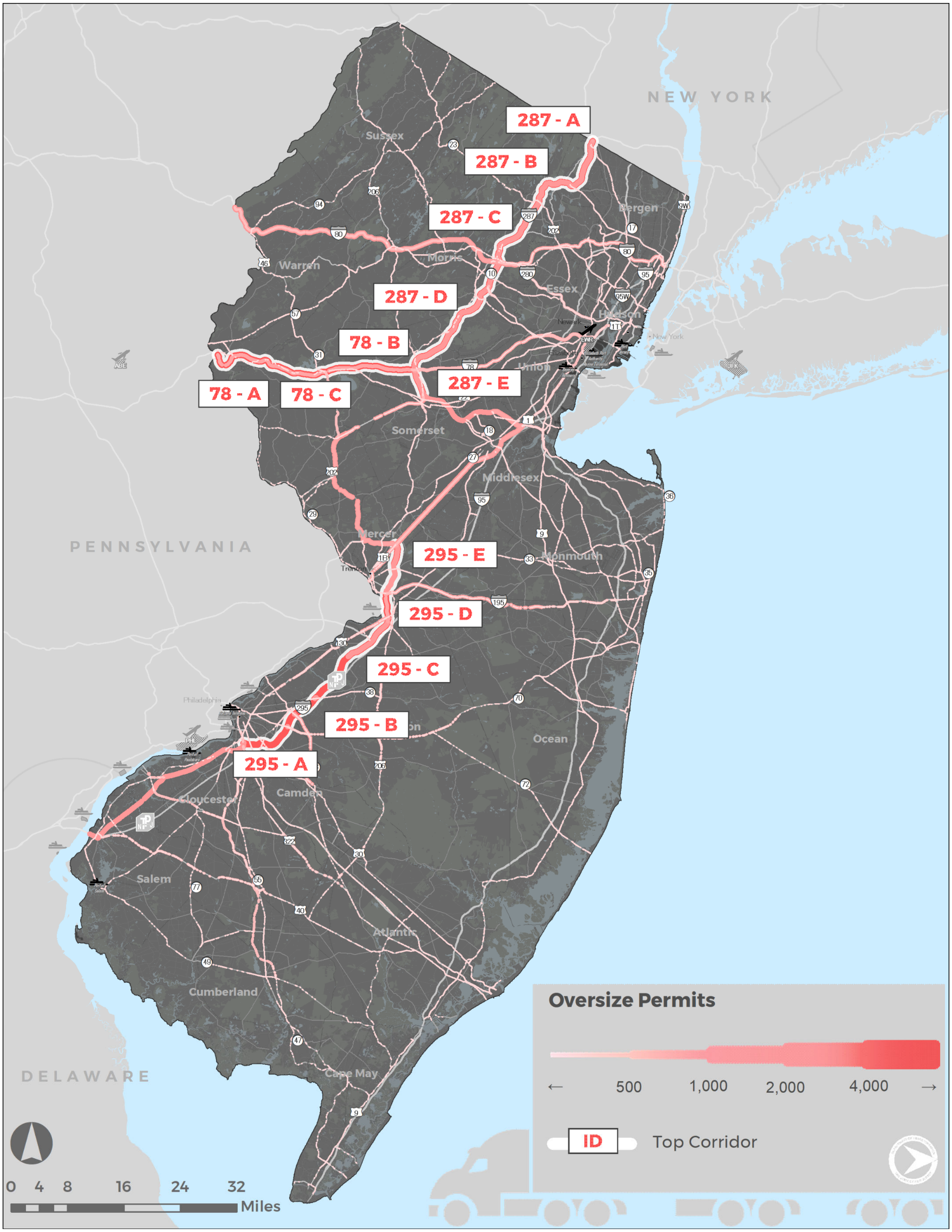
Source: NJDOT

Table 59. Overweight Permits

ID	Route	Counties	MP Start	MP End	Length	OW Permits
78-A	I-78	Warren/Hunterdon/Somerset/Union/Essex	0	56.63	56.53	6,043
287-B	I-287	Morris	38.00	42.52	4.52	4,435
78-B	I-78	Essex	56.74	57.07	0.33	4,334
295-B	I-295	Camden	28.16	34.80	6.64	4,286
287-A	I-287	Somerset	17.67	22.58	4.91	4,240
295-D	I-295	Burlington/Camden	36.86	40.81	3.95	4,220
295-A	I-295	Camden	27.11	28.16	1.05	4,188
295-C	I-295	Camden/Burlington	34.80	36.86	2.06	4,086
295-E	I-295	Camden/Burlington	40.81	57.69	16.88	4,085

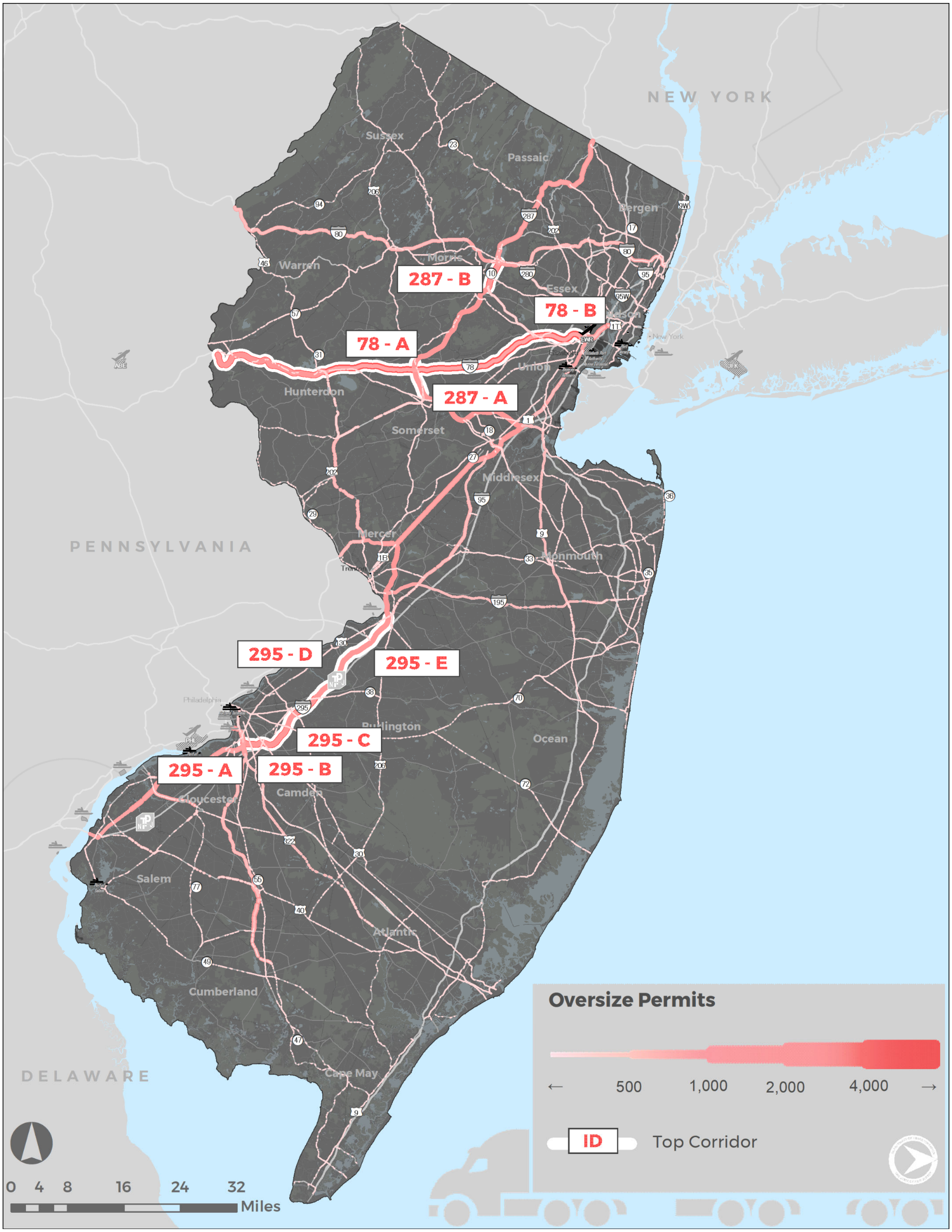
Source: NJDOT

Figure 146. Oversize Permits



Source: 2021 NJDOT, WSP

Figure 147. Overweight Permits



Source: 2021 NJDOT, WSP

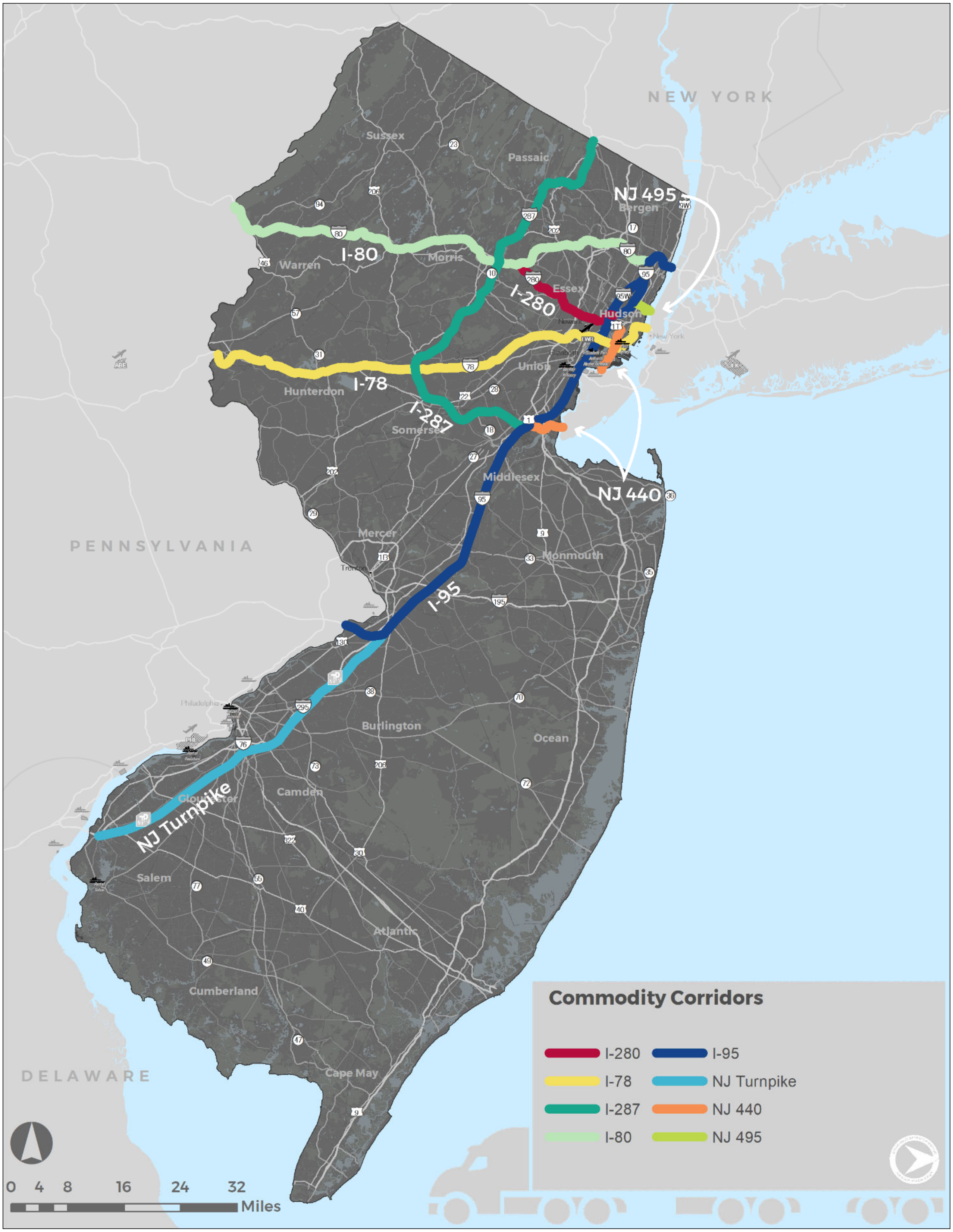
7.2 HIGHWAY CORRIDOR COMMODITY FLOWS

To understand roadway-specific commodity flows, data was compiled from Transearch and categorized into distinct industry groups to assist in analyzing impacts of freight commodity flow and demand. This data was routed onto the Transearch highway network and conflated with the National Performance Management Research Data Set network by means of a spatial join in GIS software.

Transearch provides commodity group data, detailed below, split into Tons, and Value (dollars), as well as these data points for semi-trailers returned empty. Data in this section mainly concerns tons and value.

Nine corridors were selected for the roadway-based commodity analysis. Corridors were chosen based on their importance to the State and region's freight network and amount of freight moved (in tons). The nine selected corridors are shown in Figure 148. Note that NJ Route 17 is not included in this analysis, as existing data does not provide a conclusive representation of expected flows.

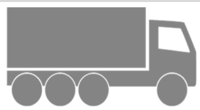
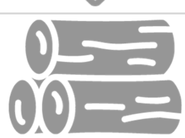
Figure 148. Corridors for Analysis



Source: WSP

Data throughout this section is split into the commodity groups listed in Table 60, along with their color and icon as used in subsequent charts in this section, and a representative sample of industries falling within the Commodity Group (note, industries can fall within multiple commodity groups).

Table 60. Commodity Groups

Commodity Group	Color & Icon	Example Industry Groups
Automotive & Transportation Equipment		▪ Electrical Equipment ▪ Carburetors, Pistons, etc. ▪ Transportation Equipment
Chemicals & Plastics		▪ Chemicals or Allied Products ▪ Rubber of Miscellaneous Products ▪ Waste or Scrap Materials
Construction		▪ Clay, Concrete, Glass and Stone ▪ Nonmetallic Minerals ▪ Petroleum or Coal Products
Distribution		▪ Secondary Traffic ▪ Mixed Miscellaneous Shipments
Electronics & Electrical Goods		▪ Electrical Equipment ▪ Instruments, Photo & Optical Equipment
Energy		▪ Coal ▪ Crude Petroleum or Natural Gas ▪ Petroleum or Coal Products
Food & Agriculture		▪ Agricultural Chemicals ▪ Food or Kindred Products ▪ Tobacco Products
Furnishings & Clothing		▪ Apparel or Related Products ▪ Leather or Leather Products ▪ Textile Mill Products
Health		▪ Pharmaceutical Products ▪ Health-related Instruments ▪ Optical Equipment
Lumber & Paper		▪ Forest Products ▪ Paper Waste and Scrap ▪ Printed Matter
Metals & Machinery		▪ Fabricated Metal Products ▪ Metallic Ores ▪ Primary Metal Products
Miscellaneous		▪ All other commodities not elsewhere classified

7.2.1 I-280 Corridor Analysis

I-280 traverses 17.44 miles between I-80 in Morris County to I-95 in Hudson County, passing through Essex County. The corridor exhibits high truck volumes traveling east-west between the suburbs to the west and core of the New York metropolitan area to the east, as well as to the nearby Newark Liberty International Airport, Port Newark, and additional industrial sites along I-95. The corridor is part of the New Jersey Access Network and National Highway Freight Network's Primary Highway Freight System. Given the available commodity flow data, particularly that based on tonnage, the I-280 corridor is divided into four segments, ranging in length from ½ mile to eight miles, labeled by segment number and corridor extents, as shown in Table 61 and Figure 150.

Table 61. I-280 Segment Location Summary

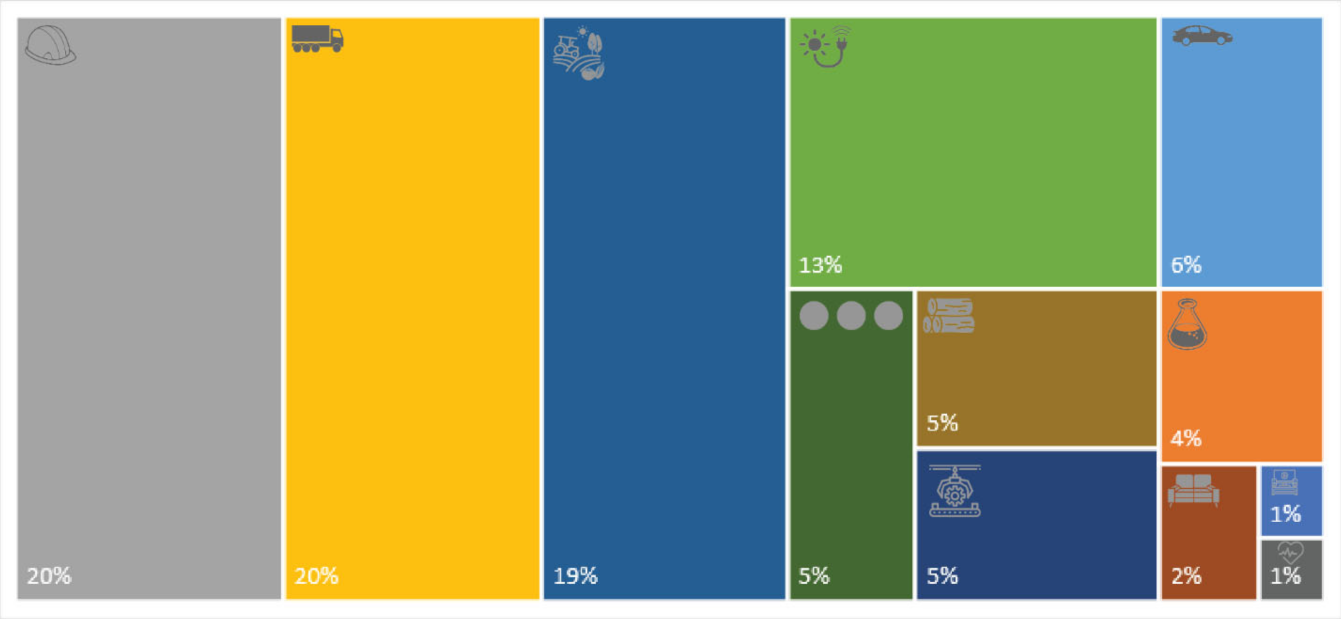
Segment	West End	East End	Length (mi)	Counties
1	I-80	Exit 4	3.4	Morris / Essex
2	Exit 4	Exit 10	6.0	Essex
3	Exit 10	Exit 17	7.6	Essex / Hudson
4	Exit 17	I-95	0.4	Hudson

TONNAGE

Figure 149 shows the breakdown of commodity by tonnage across I-280's four segments. Cumulatively, construction, distribution, and food account for 59% of tonnage. Segment 3 caters to particularly high tonnage of distribution and energy commodities compared to other segments.

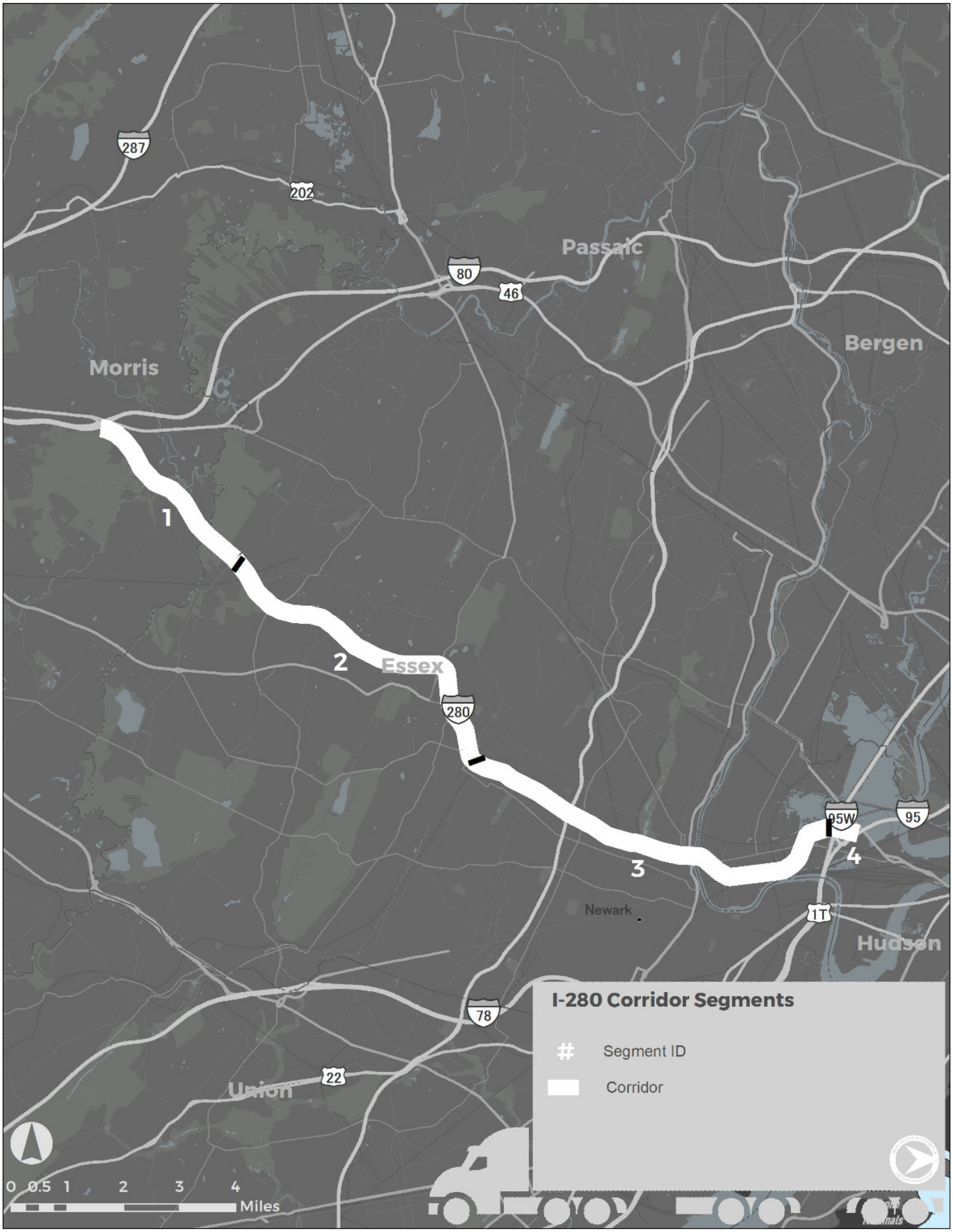
Total tonnage along the corridor is highest along Segment 3, carrying 18 million tons. Tonnage drops significantly to the east and west, as shown in Figure 151.

Figure 149. I-280 Tonnage by Commodity



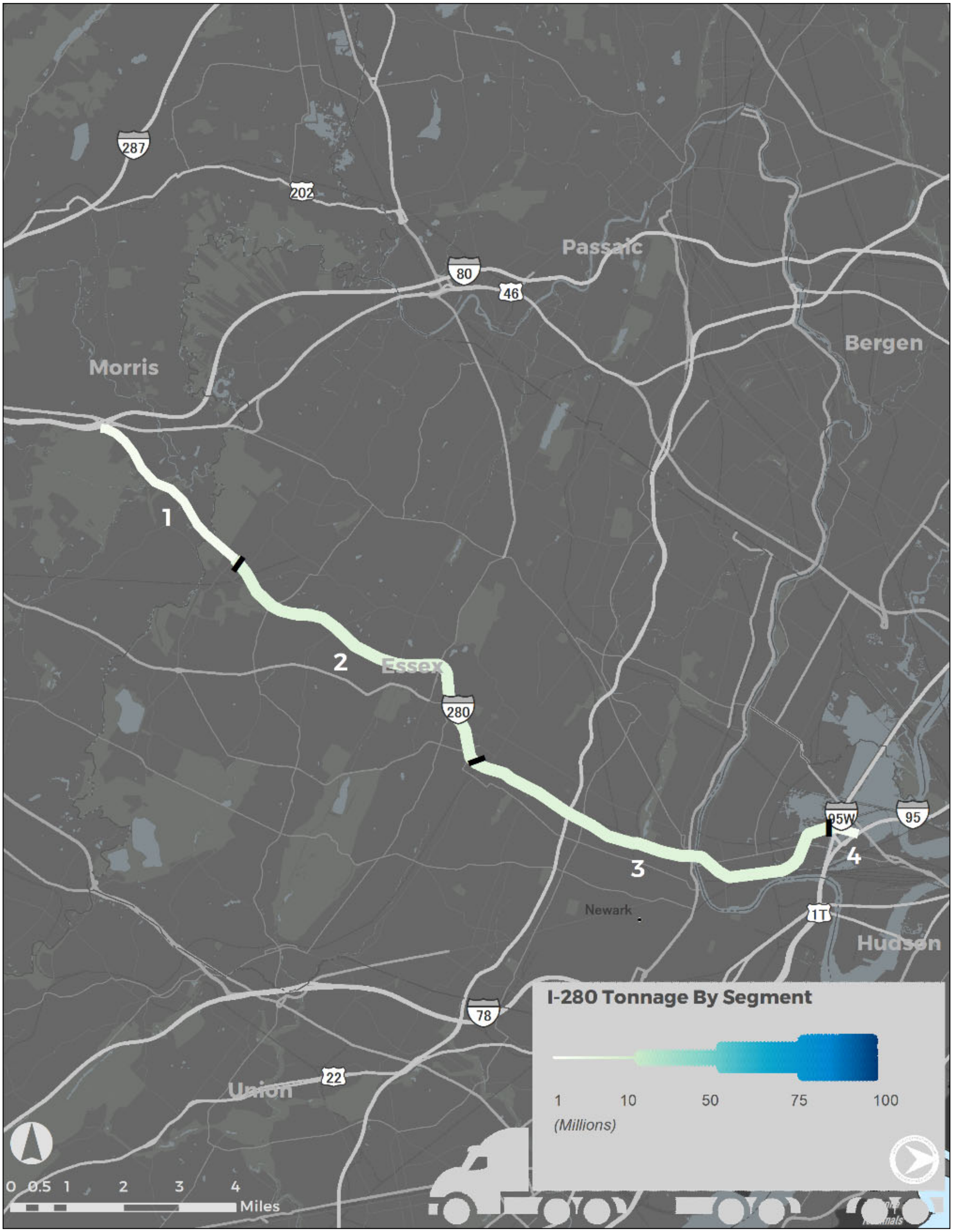
Source: Transearch

Figure 150. I-280 Corridor Segments



Source: WSP

Figure 151. I-280 Total Tonnage

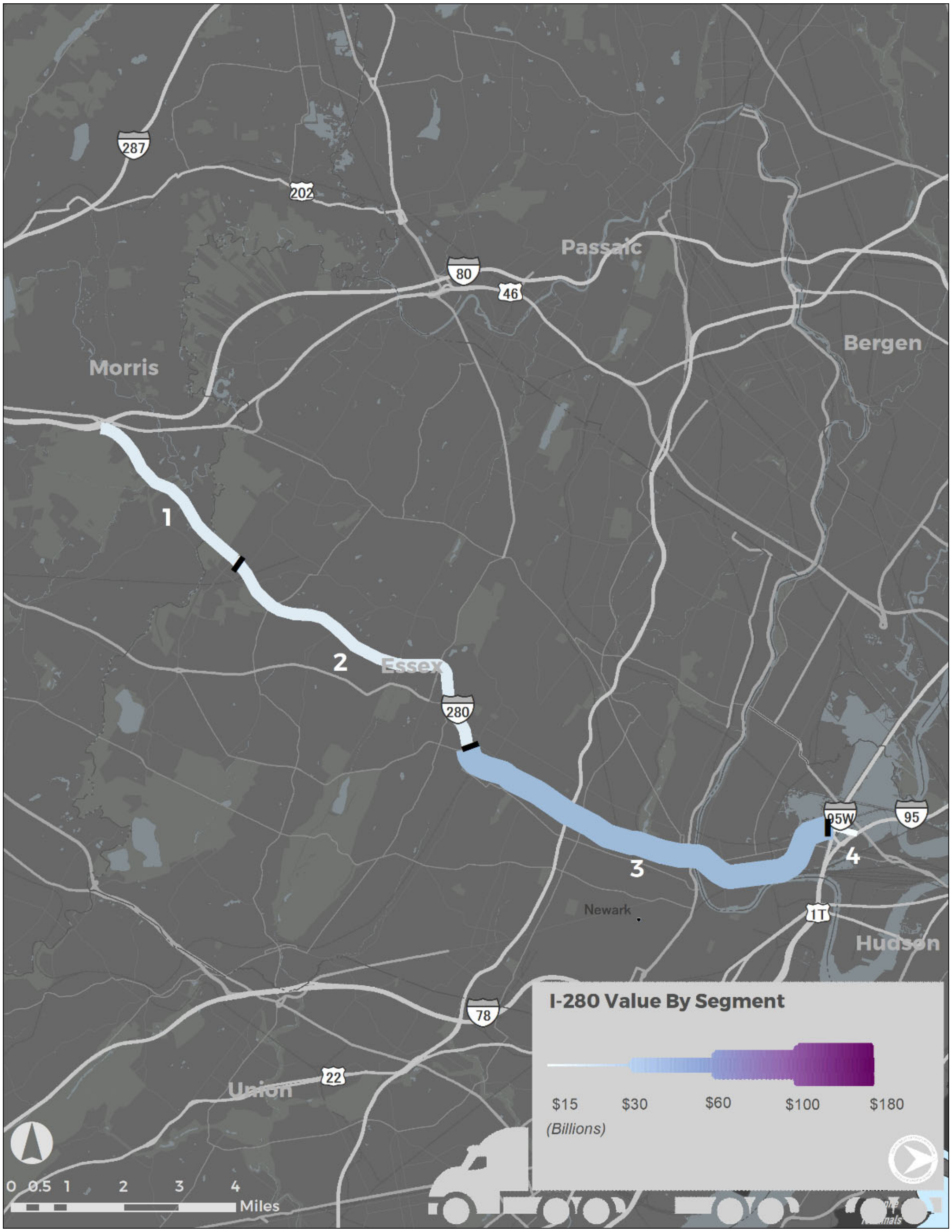


Source: Transearch, NJDOT

VALUE

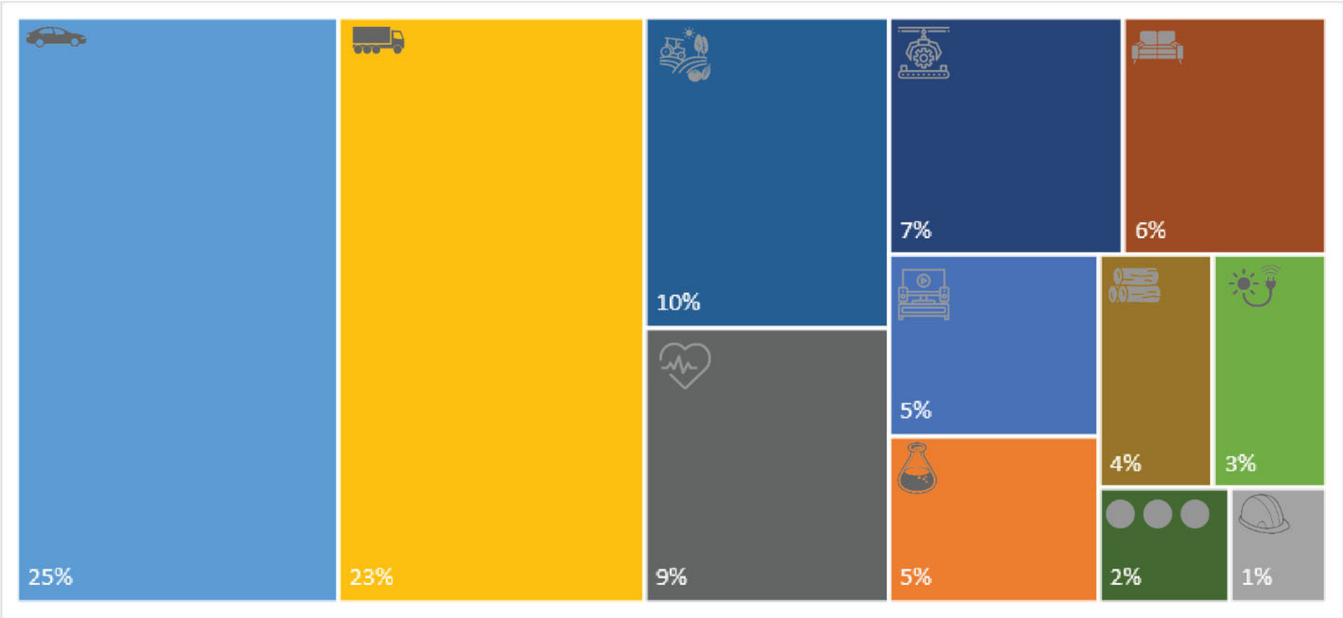
Total value along the corridor is highest on Segment 3, carrying $56 billion of goods. Value significantly drops to the east and west, as shown in Figure 152 and Figure 153.

Figure 152. I-280 Total Value



Source: Transearch, NJDOT

Figure 153. I-280 Value by Commodity



Source: Transearch

SUMMARY

Table 62 provides a summary of data for the I-280 corridor, including tonnage, value, and predominant commodities by segment.

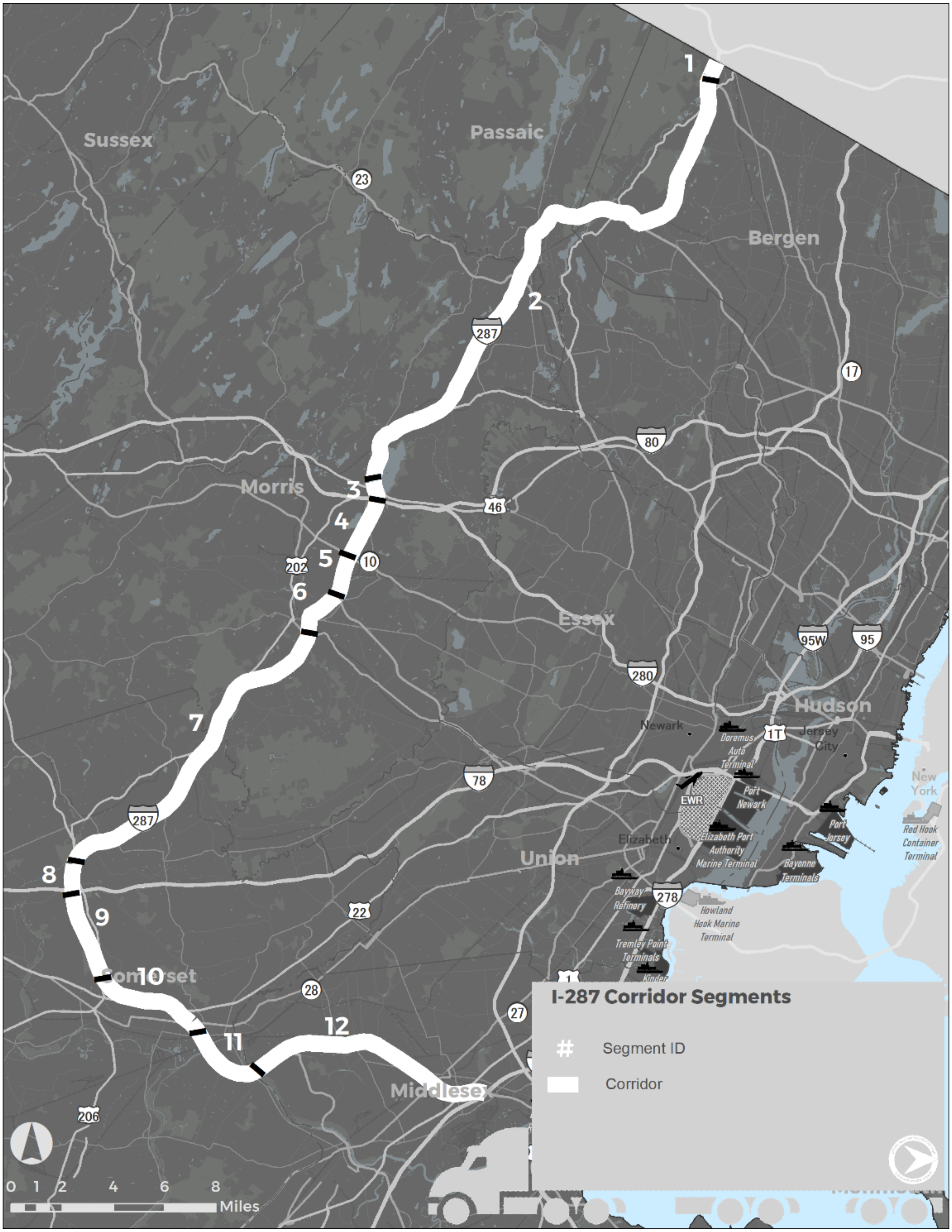
Table 62. I-280 Summary

Segment	West End	East End	Tonnage	Value (000s)	Predominant Tonnage	Predominant Value
1	I-80	Exit 4	8,774,026	$16,949,157	Construction - 29%	Automotive - 24%
2	Exit 4	Exit 10	11,881,202	$24,380,859	Construction - 27%	Automotive - 25%
3	Exit 10	Exit 17	18,075,844	$56,379,655	Distribution - 29%	Distribution - 32%
4	Exit 17	I-95	1,963,364	$8,427,058	Energy - 41%	Automotive - 27%

7.2.2 I-287 Corridor Analysis

I-287 extends for 67.3 miles between I-95 (New Jersey Turnpike) in Middlesex County and the New York State Line at Rockland County, passing through Somerset, Morris, Passaic, and Bergen counties. Operating as a semi-circle half loop through New Jersey's suburbs, I-287 connects to numerous additional truck routes, including several key corridors reviewed within this analysis. The corridor is part of the National Highway Freight Network's Primary Highway Freight System. Given the commodity flow data, particularly that based on tonnage, the I-287 corridor is divided in 12 segments, ranging in length from ¾ mile to 24 miles, labeled by segment number and corridor extents, as shown in Figure 154 and Table 63.

Figure 154. I-287 Corridor Segments



Source: WSP

Table 63. I-287 Segment Location Summary

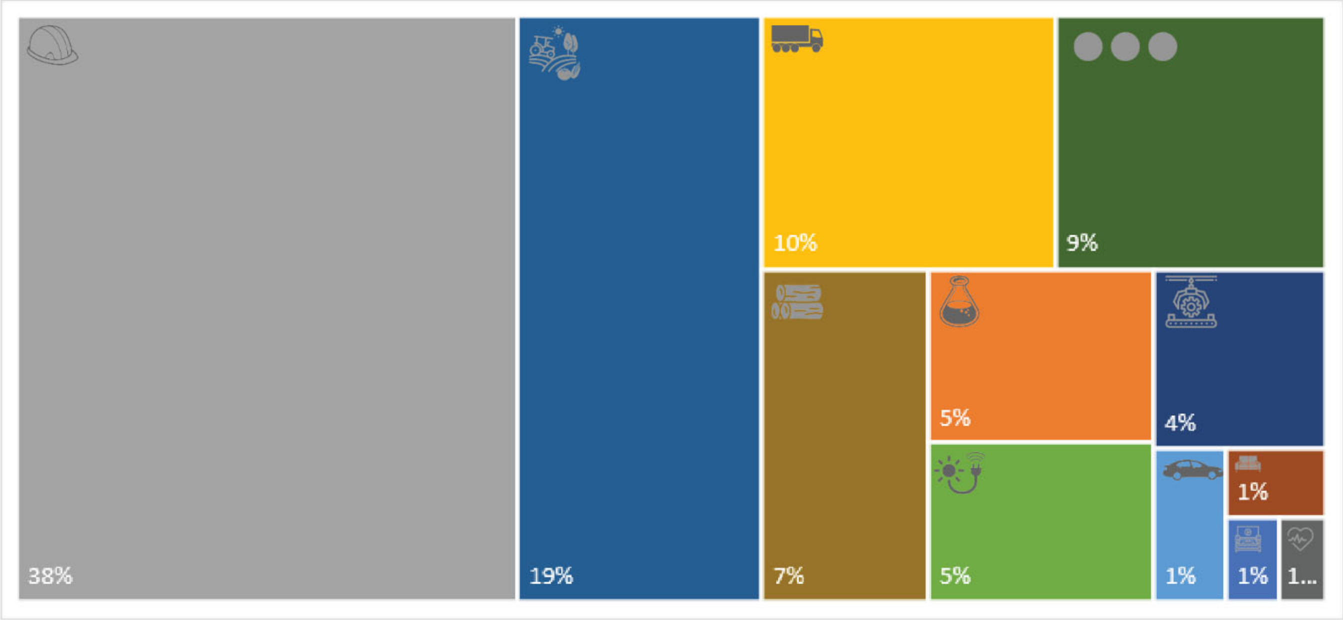
Segment	West End	East End	Length (mi)	Counties
1	NY State Line	NJ 17	0.6	Bergen
2	NJ 17	U.S. 46	24.1	Bergen / Passaic / Morris
3	U.S. 46	I-80	0.8	Morris
4	I-80	NJ 10	2.5	Morris
5	NJ 10	NJ 24	1.6	Morris
6	NJ 24	NJ 124	2.0	Morris
7	NJ 124	U.S. 202	13.6	Morris / Somerset
8	U.S. 202	I-78	1.1	Somerset
9	I-78	U.S. 202	3.5	Somerset
10	U.S. 202	NJ 28	4.1	Somerset
11	NJ 28	CR 622	3.6	Somerset / Middlesex
12	CR 622	I-95	9.8	Middlesex

TONNAGE

Table 62 shows the breakdown of commodity by tonnage across I-287's 12 segments. Cumulatively, construction and food account for 57% of tonnage.

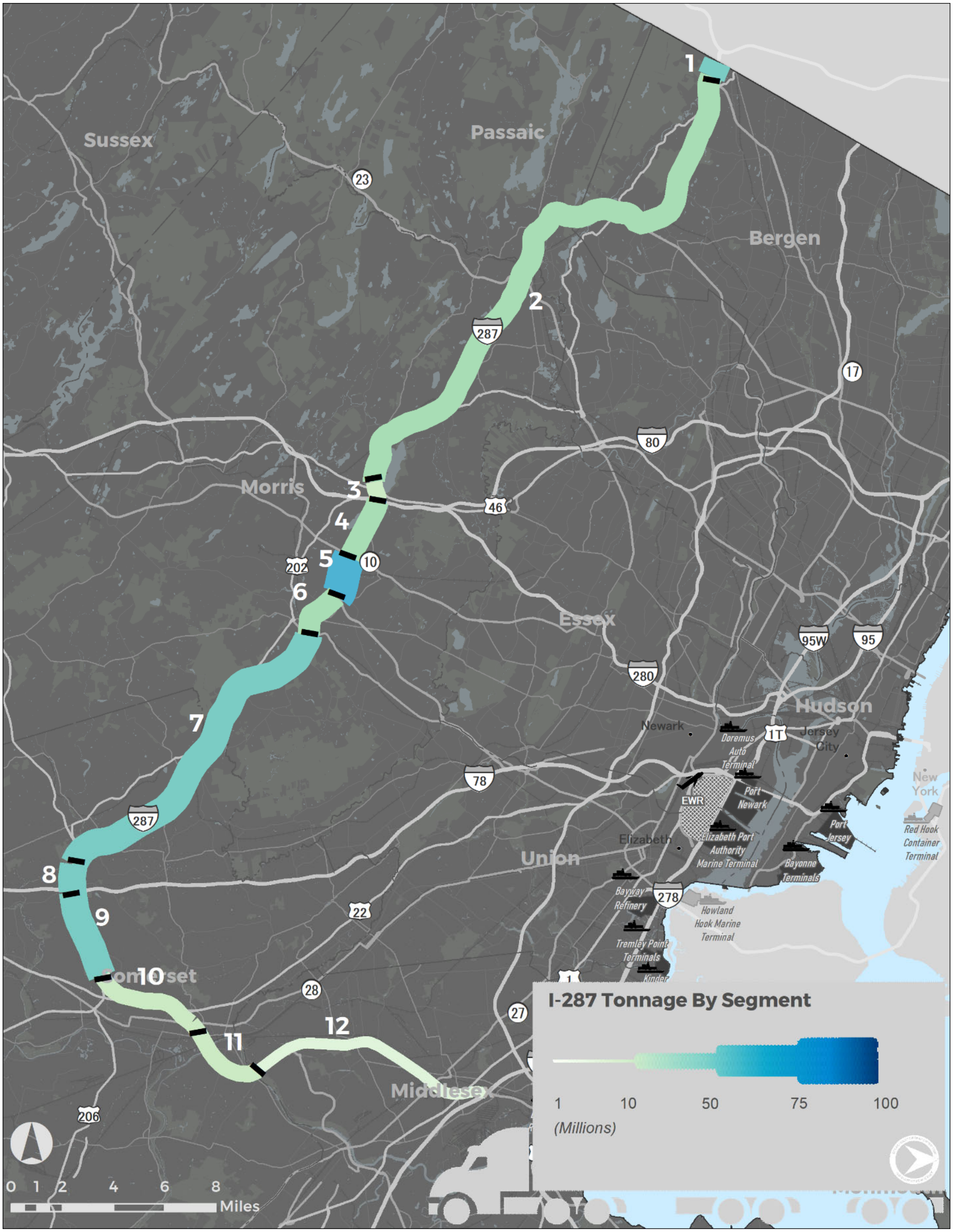
Total tonnage along the corridor varies with peaks south of Interchange 39 (NJ 10 - 54 million tons), at the northern border with New York, and near Interchange 21 (I-78). Tonnage declines south of I-78 as I-287 nears its southern terminus at the New Jersey Turnpike, as shown in Figure 156.

Figure 155. I-287 Tonnage by Commodity



Source: Transearch

Figure 156. I-287 Total Tonnage

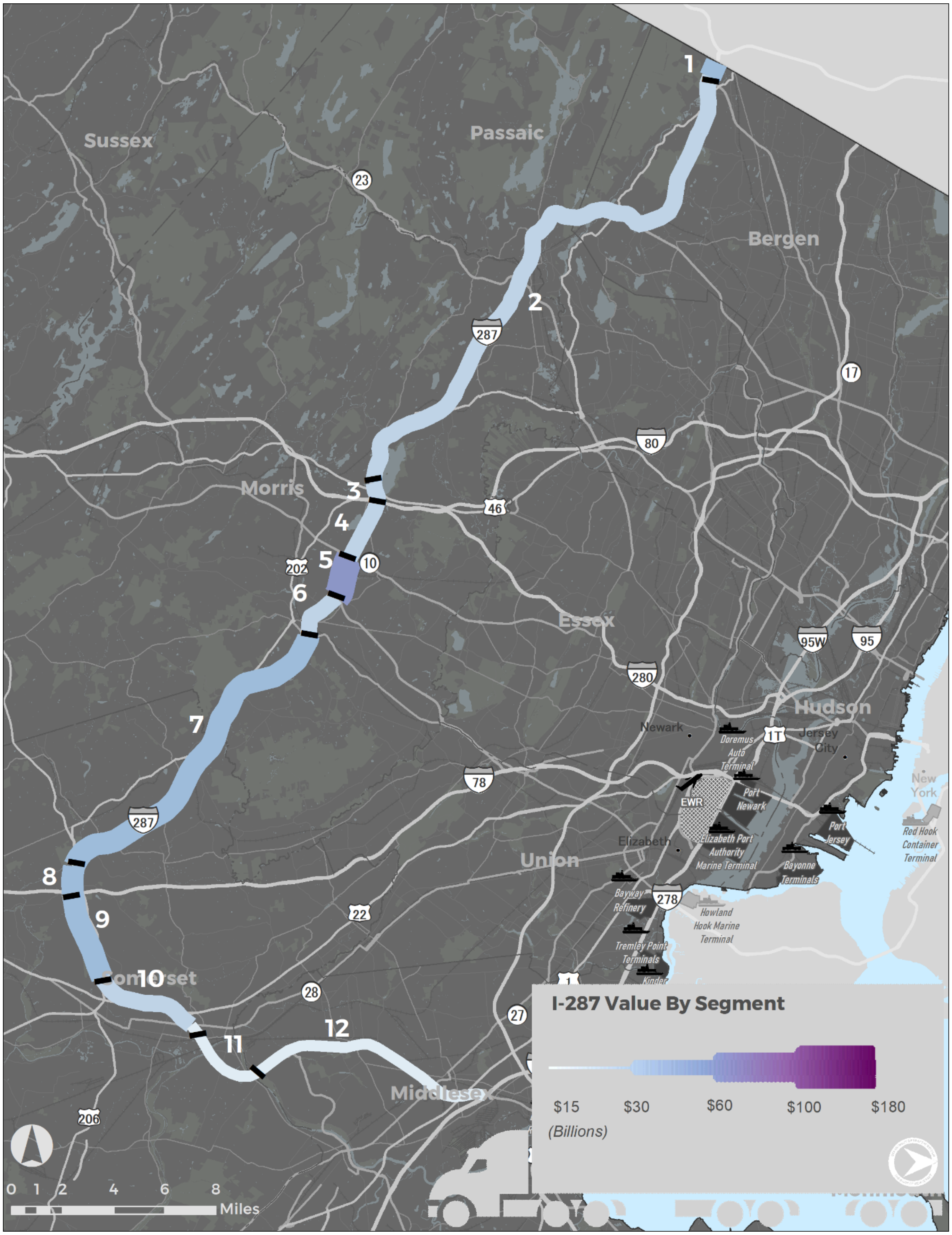


Source: Transearch, NJDOT

VALUE

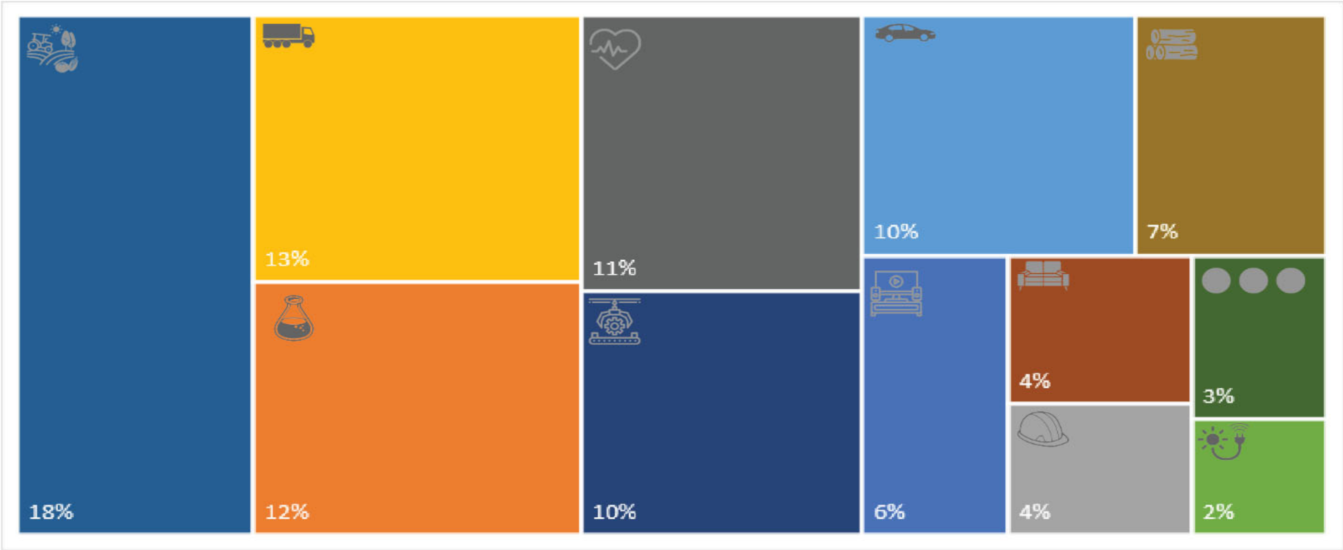
Total value along the corridor is highest south of Interchange 39 (NJ 10 - $68 billion) near I-80. Other peaks are located in the vicinity of the Interchange 21 (I-78) and the northern terminus of the corridor at the New York border. Value is lowest approaching the southern terminus of I-287 at the New Jersey Turnpike, as shown in Figure 157 and Figure 158.

Figure 157. I-287 Total Value



Source: Transearch, NJDOT

Figure 158. I-287 Value by Commodity



Source: Transearch

SUMMARY

Table 64 provides a summary of data for the I-287 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

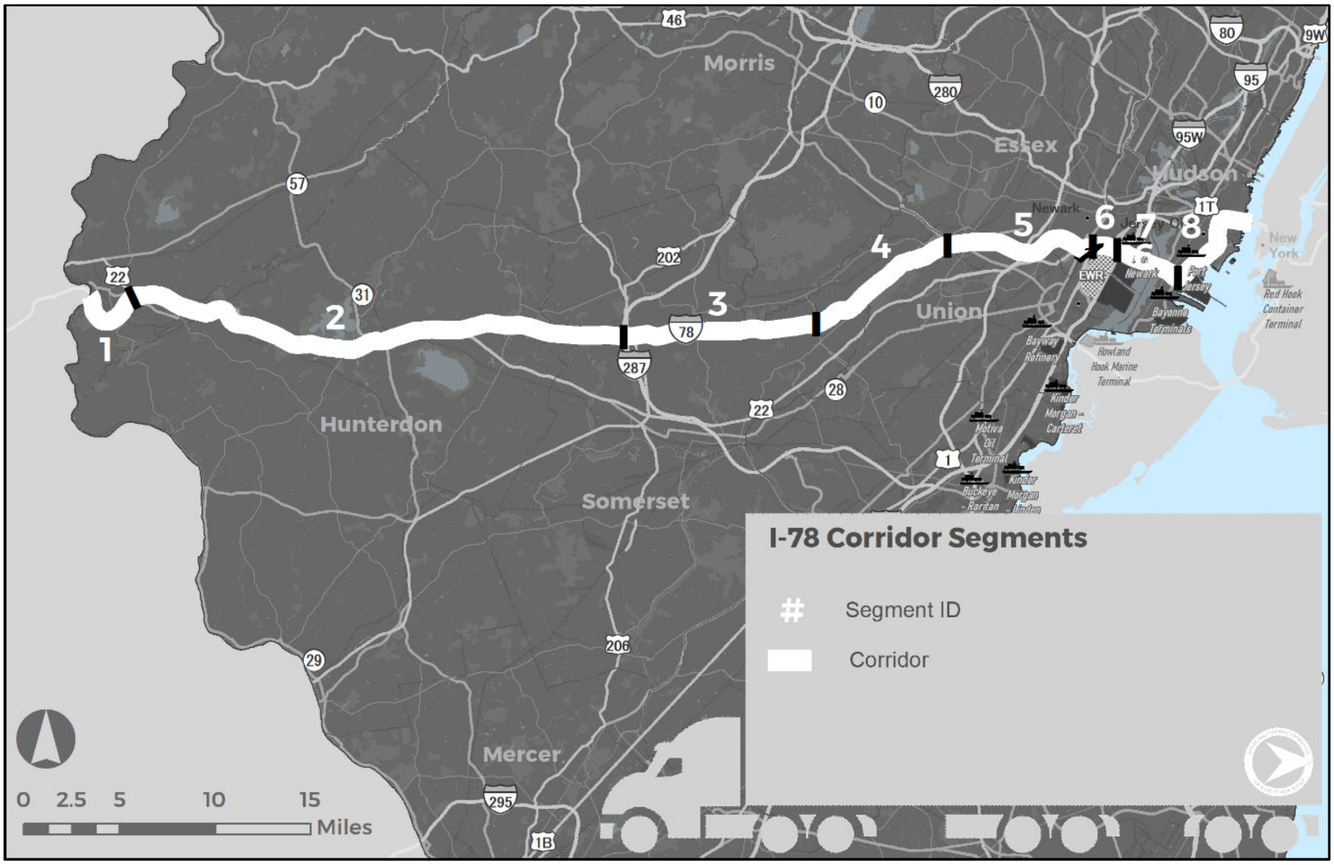
Table 64. I-287 Summary

Segment	North End	South End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	NY State Line	NJ 17	45,551,877	$48,743,100	1,228,105	36%	Construction – 43%	Food – 20%
2	NJ 17	U.S. 46	33,134,435	$37,232,241	699,026	31%	Construction - 42%	Food - 21%
3	U.S. 46	I-80	29,664,991	$32,876,622	626,535	31%	Construction - 43%	Food - 20%
4	I-80	NJ 10	32,188,933	$38,717,319	641,151	29%	Construction - 35%	Food - 21%
5	NJ 10	NJ 24	53,877,044	$67,683,230	1,437,759	36%	Construction - 37%	Food - 18%
6	NJ 24	NJ 124	38,329,263	$42,577,649	886,154	33%	Construction - 40%	Food - 19%
7	NJ 124	U.S. 202	41,436,439	$50,009,351	958,468	33%	Construction - 38%	Food - 18%
8	U.S. 202	I-78	48,770,839	$59,219,090	1,141,236	33%	Construction - 39%	Food - 18%
9	I-78	U.S. 202	43,591,453	$51,147,814	1,170,706	36%	Construction - 38%	Food - 17%
10	U.S. 202	NJ 28	23,442,859	$32,713,655	733,467	40%	Construction - 36%	Health - 18%
11	NJ 28	CR 622	20,981,319	$28,473,921	668,967	40%	Construction - 34%	Chemicals - 17%
12	CR 622	I-95	15,155,116	$23,839,225	446,611	38%	Construction - 28%	Chemicals - 17%

7.2.3 I-78 Corridor Analysis

I-78 traverses 67.3 miles between the New York State Line (connecting with the Holland Tunnel) and the Pennsylvania State Line entering Northampton County, passing through Hudson, Union, Somerset, Hunterdon, and Warren counties. Commercial vehicles with four or more axles are prohibited from the Holland Tunnel. The corridor carries high truck volumes given links to industrial areas in and around Newark Liberty International Airport and port facilities in Essex County, connecting with industrial areas to the west, as well as to the Lehigh Valley in Pennsylvania. The corridor is part of the National Highway Freight Network's Primary Highway Freight System. Given the available commodity flow data, the I-78 corridor is divided in eight segments, ranging in length from one mile to 27 miles, labeled by segment number and corridor extents, as shown in Figure 159 and Table 65.

Figure 159. I-78 Corridor Segments



Source: WSP

Table 65. I-78 Segment Location Summary

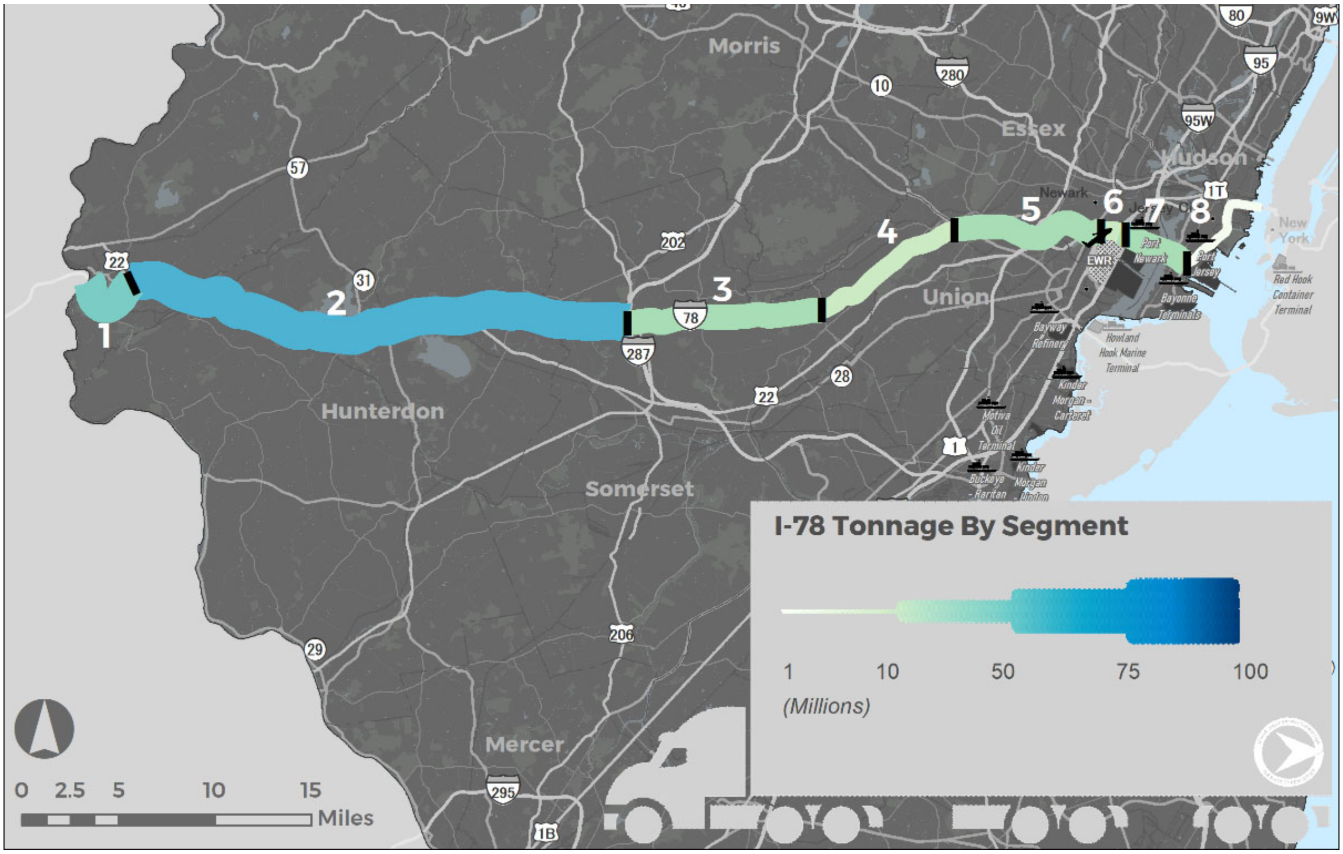
Segment	West End	East End	Length (mi)	Counties
1	PA State Line	U.S. 22	3.8	Warren
2	U.S. 22	I-287	26.7	Warren / Hunterdon / Somerset
3	I-287	CR 531	10.0	Somerset
4	CR 531	CR 636	8.2	Somerset / Essex
5	CR 636	U.S. 1	8.1	Essex
6	U.S. 1	U.S. 1	1.0	Essex
7	U.S. 1	NJ 440	3.7	Essex / Hudson
8	NJ 440	NY State Line	5.8	Hudson

TONNAGE

Total tonnage along the corridor is highest in the west, peaking along Segment 2 (57 million tons). Tonnage drops substantially east of I-287, as shown in Figure 160. Tonnage drops to very low levels on Segment 8 connecting with the Holland Tunnel where larger vehicles are prohibited.

> The peaks of tonnage in the west, indicate a substantial amount of the volume on I-78 is connected with facilities in Pennsylvania or areas west.

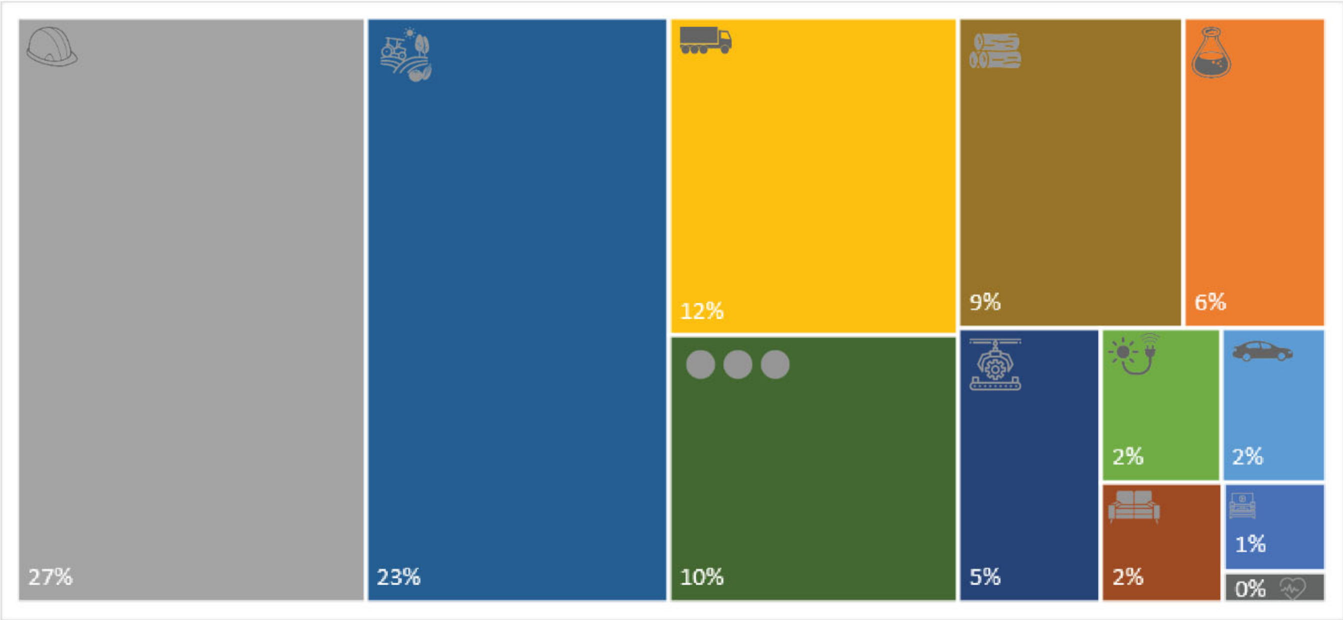
Figure 160. I-78 Total Tonnage



Source: Transearch, NJDOT

Figure 161 shows the breakdown of commodity by tonnage across I-78's eight segments. Cumulatively, construction and food account for 50% of tonnage.

Figure 161. I-78 Tonnage by Commodity

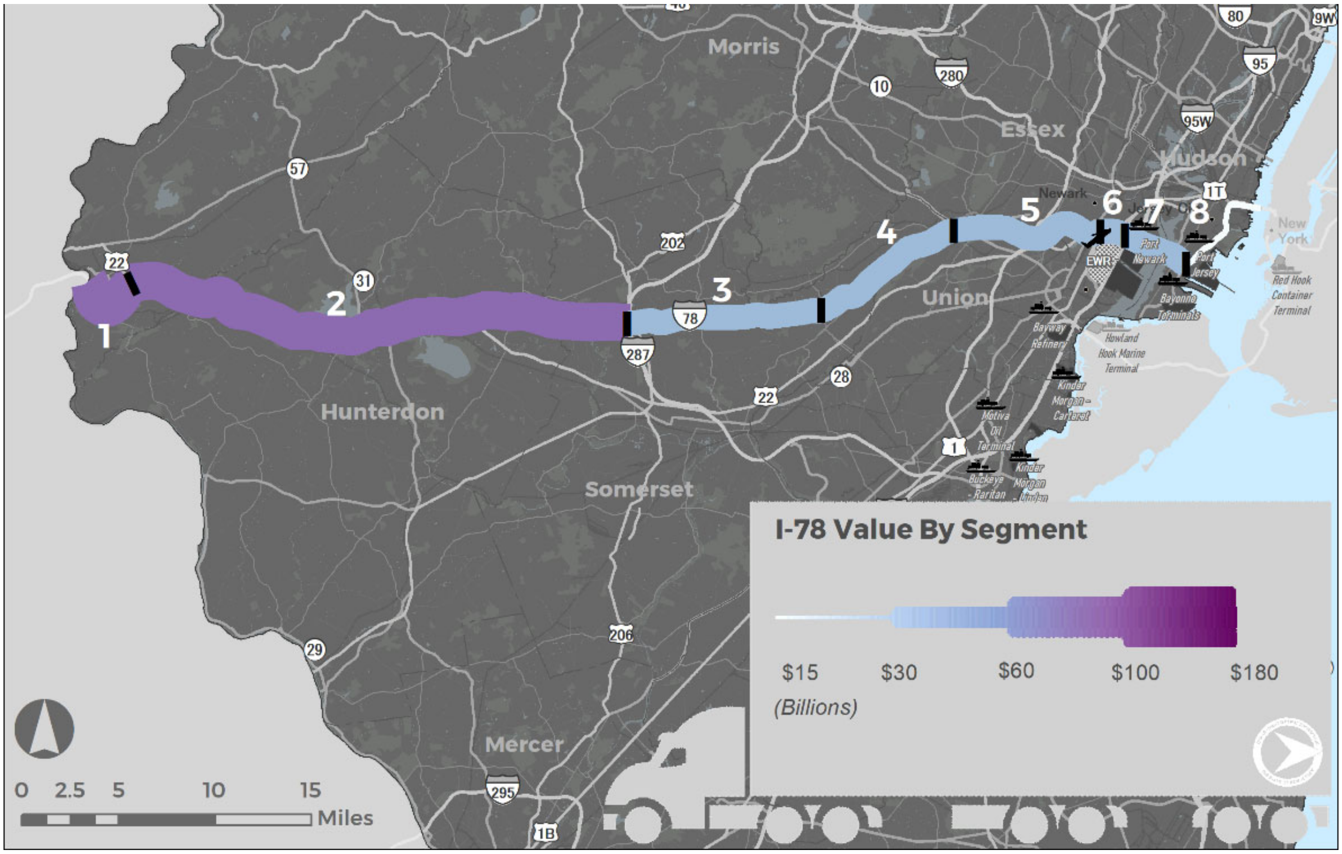


Source: Transearch

VALUE

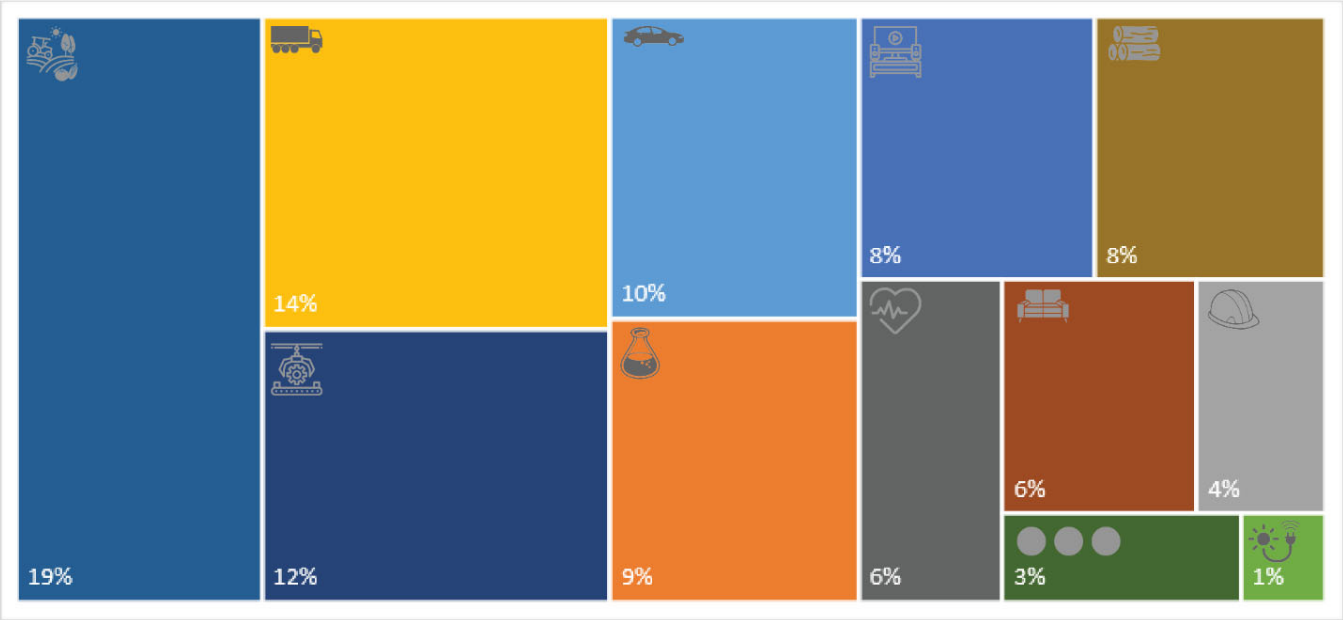
Total value along the corridor is highest on Segment 2 ($96 billion) with the corridor west of I-287 carrying higher value when compared to segments east of I-287. As with tonnage, total value drops substantially connecting with the Holland Tunnel, as shown in Figure 162 and Figure 163.

Figure 162. I-78 Total Value



Source: Transearch, NJDOT

Figure 163. I-78 Value by Commodity



Source: Transearch

SUMMARY

Table 66 provides a summary of data for the I-78 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

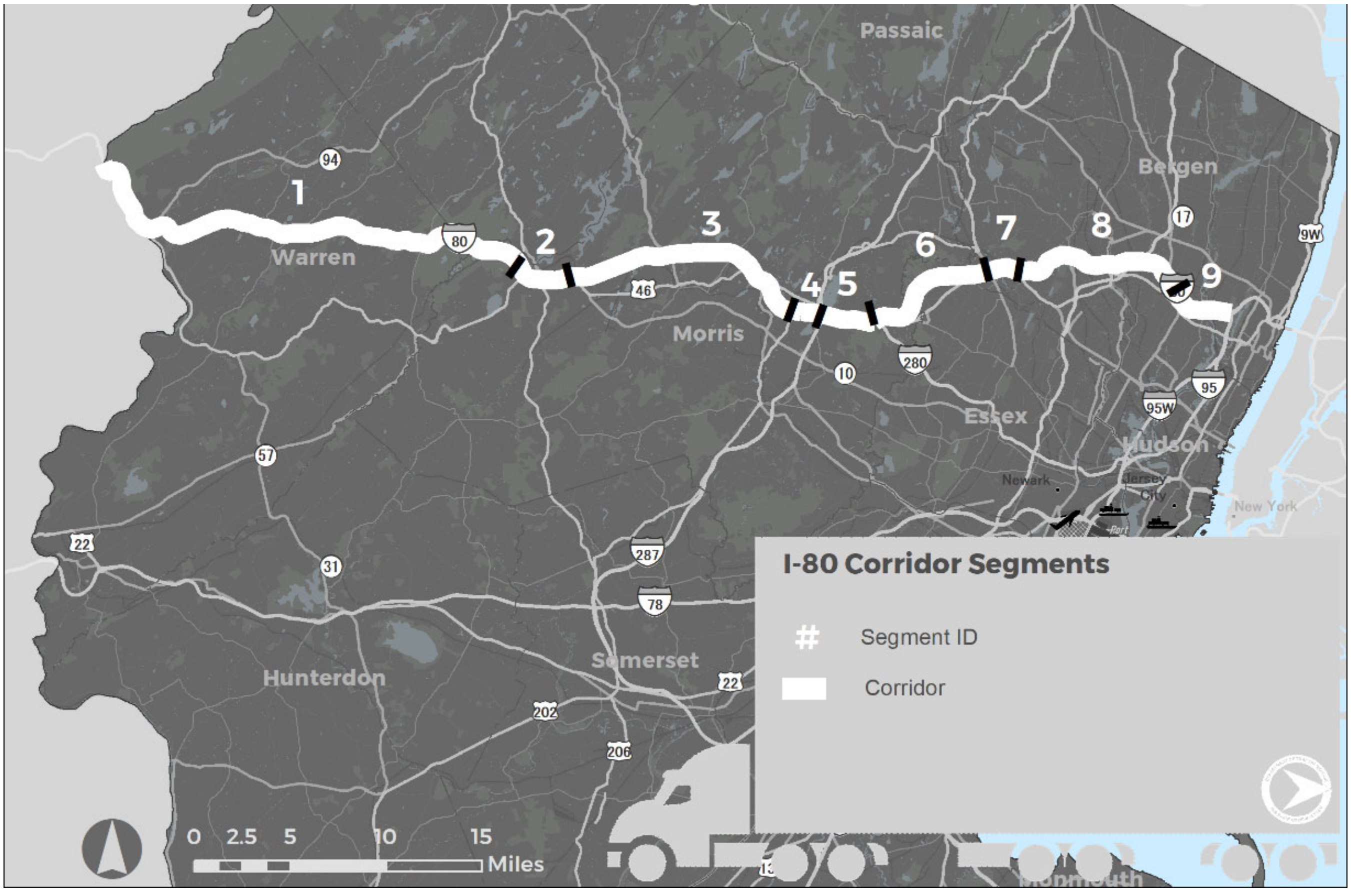
Table 66. I-78 Summary

.Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	PA State Line	U.S. 22	47,359,839	$83,704,783	643,127	21%	Construction - 27%	Food - 20%
2	U.S. 22	I-287	57,306,072	$95,766,104	1,003,484	26%	Construction - 28%	Food - 18%
3	I-287	CR 531	31,183,948	$55,565,865	495,424	24%	Construction - 26%	Food - 18%
4	CR 531	CR 636	26,925,478	$45,461,250	424,104	24%	Construction - 27%	Food - 19%
5	CR 636	U.S. 1	36,500,957	$59,206,447	740,101	29%	Construction - 28%	Food - 19%
6	U.S. 1	U.S. 1	28,575,289	$48,860,264	519,584	27%	Construction - 27%	Food - 18%
7	U.S. 1	NJ 440	33,592,902	$56,751,791	816,988	33%	Construction - 24%	Distribution - 20%
8	NJ 440	NY State Line	2,942,906	$64,240,146	84,319	37%	Food - 20%	Food - 19%

7.2.4 I-80 Corridor Analysis

Within New Jersey, I-80 traverses 67.7 miles between I-95 (New Jersey Turnpike) in Bergen County and the Delaware Water Gap in Monroe County, PA, passing through Passaic, Essex, Morris, and Warren counties. The corridor operates as an alternate parallel route to I-78, providing access to the State's northern suburbs and industrial areas, as well as to the George Washington Bridge entering New York City. The corridor is part of the National Highway Freight Network's Primary Highway Freight System. Given the available commodity flow data, particularly based on tonnage, the I-80 corridor is divided into nine segments, ranging in length from one mile to 25 miles, labeled by segment number and corridor extents, as shown in Figure 164 and Table 67.

Figure 164. I-80 Corridor Segments



Source: WSP

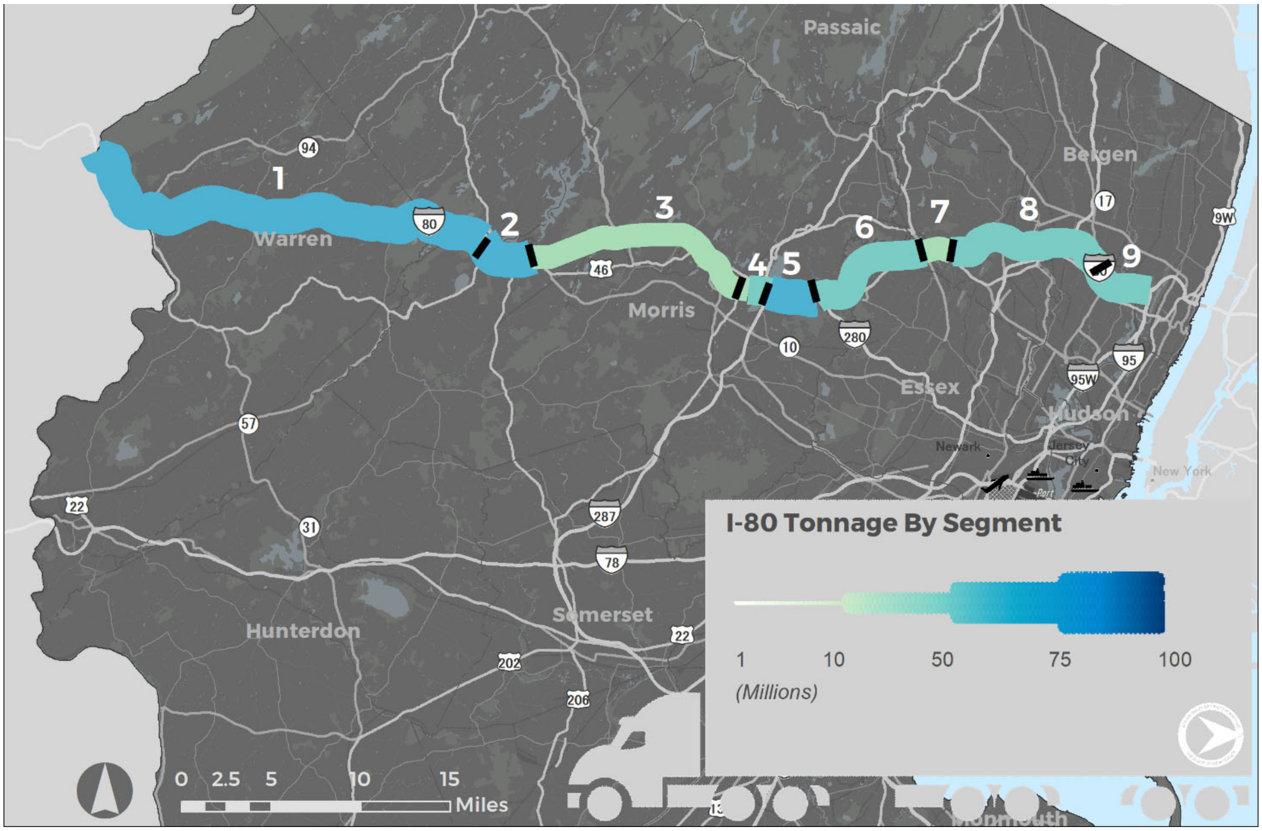
Table 67. I-80 Segment Location Summary

Segment	West End	East End	Length (mi)	Counties
1	PA State Line	U.S. 206	25.1	Warren / Morris
2	U.S. 206	U.S. 46	3.5	Morris
3	U.S. 46	U.S. 202	13.6	Morris
4	U.S. 202	I-287	1.2	Morris
5	I-287	I-280	2.7	Morris
6	I-280	NJ 23	7.3	Morris / Essex
7	NJ 23	U.S. 46	1.6	Essex / Passaic
8	U.S. 46	NJ 17	9.3	Passaic / Bergen
9	NJ 17	I-95	3.5	Bergen

TONNAGE

Total tonnage along the corridor is highest on the western-most segment (59 million tons) with a smaller peak east of Interchange 43 (I-287) with generally consistent volumes continuing east towards the New Jersey Turnpike, as shown in Figure 165.

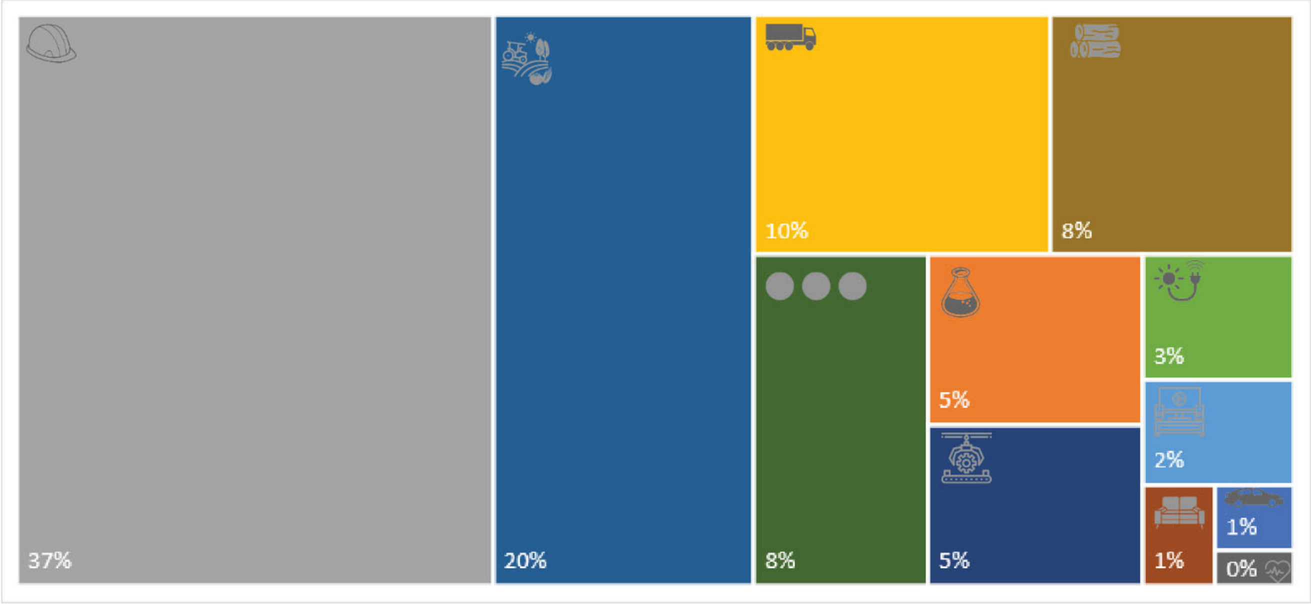
Figure 165. I-80 Total Tonnage



Source: Transearch, NJDOT

Figure 166 shows the breakdown of commodity by tonnage across I-80's nine segments. Cumulatively, construction and food account for 57% of tonnage.

Figure 166. I-80 Tonnage by Commodity

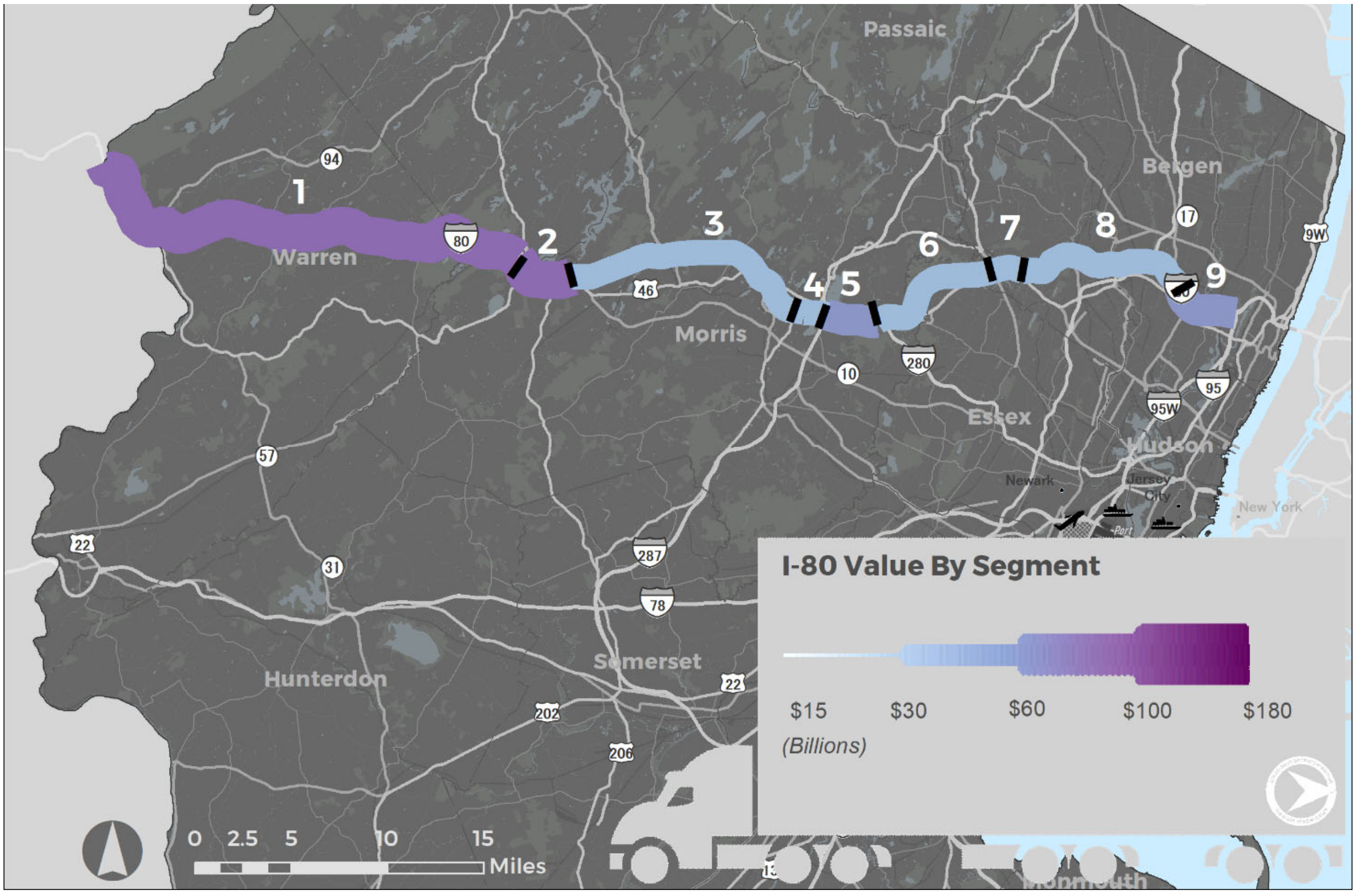


Source: Transearch

VALUE

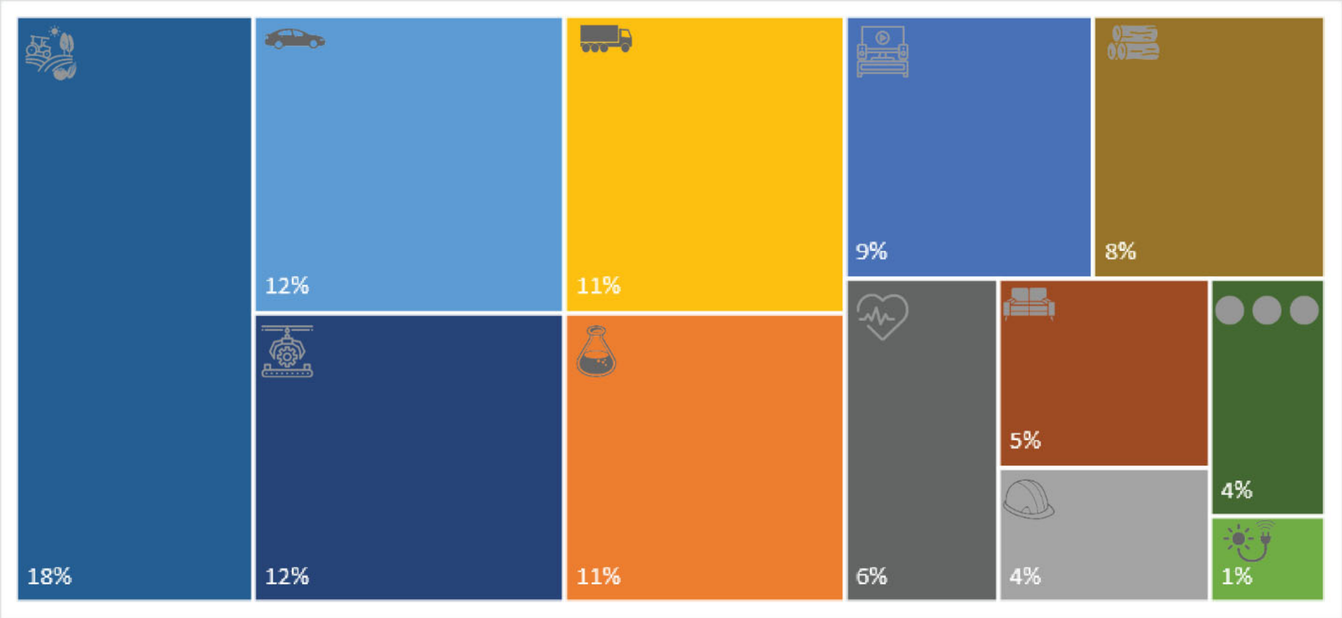
Total value along the corridor is highest on the western-most segment connecting with Pennsylvania ($86 billion). The entire corridor carries high value throughout with peaks in Warren County and connecting with the New Jersey Turnpike in Bergen County, as shown in Figure 167 and Figure 168.

Figure 167. I-80 Total Value



Source: Transearch, NJDOT

Figure 168. I-80 Value by Commodity



Source: Transearch

SUMMARY

Table 68 provides a summary of data for the I-80 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

Table 68. I-80 Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	PA State Line	U.S. 206	58,752,536	$86,421,608	1,326,132	32%	Construction - 33%	Food - 19%
2	U.S. 206	U.S. 46	53,510,685	$79,922,860	1,211,143	32%	Construction - 33%	Food - 19%
3	U.S. 46	U.S. 202	37,198,807	$55,867,305	833,791	31%	Construction - 32%	Food - 19%
4	U.S. 202	I-287	46,687,383	$59,138,064	1,316,724	37%	Construction - 43%	Food - 17%
5	I-287	I-280	50,853,155	$68,469,395	1,413,336	37%	Construction - 38%	Food - 18%
6	I-280	NJ 23	43,290,443	$54,466,403	1,180,036	36%	Construction - 40%	Food - 18%
7	NJ 23	U.S. 46	36,585,639	$46,614,336	911,505	34%	Construction - 40%	Food - 19%
8	U.S. 46	NJ 17	40,361,410	$49,832,299	1,056,369	35%	Construction - 42%	Food - 18%
9	NJ 17	I-95	47,060,413	$64,808,094	1,533,259	40%	Construction - 36%	Distribution - 19%

7.2.5 I-95 Corridor Analysis

I-95 traverses 88 miles between the Delaware River-Turnpike Toll Bridge in Burlington County and the George Washington Bridge in Bergen County. Within New Jersey, the southernmost segment of I-95 is the Pearl Harbor Memorial Turnpike Extension, linking the Pennsylvania Turnpike with the New Jersey Turnpike mainline at Interchange 6. North of Interchange 6, I-95 is the mainline of the New Jersey Turnpike. The I-95 corridor includes the two segments which split near Secaucus, including the Eastern Spur and Western Spur (officially designated as Route 95W). The corridor diverges for approximately nine miles. I-95/New Jersey Turnpike is the most heavily travelled freight corridor in New Jersey serving as the main connection with New York via the George Washington Bridge, passing Newark Liberty International Airport, port facilities in Newark/Elizabeth, and many other industrial areas throughout the State. The corridor also provides access to numerous other freight routes, including I-80, I-78, I-287 and I-295. The corridor is part of the National Highway Freight Network's Primary Highway Freight System. Given the available commodity flow data, particularly that based on tonnage, the I-95 corridor is divided in 13 segments, ranging in length from ½ mile to 16 miles, labeled by segment number and corridor extents, as shown in Figure 169 and Table 69.

Table 69. I-95 Segment Location Summary

Segment	West End	East End	Length (mi)	Counties
1	PA State Line	U.S. 130	2.6	Burlington
2	U.S. 130	NJ Tpke	3.1	Burlington
3	NJ Tpke	NJ 33	16.4	Burlington / Mercer
4	NJ 33	NJ 18	15.5	Mercer / Middlesex
5	NJ 18	NJ 440	5.5	Middlesex
6	NJ 440	NJ 439	10.9	Middlesex / Union
7	NJ 439	I-78	7.1	Middlesex / Essex
8	I 78	U.S. 1T	0.5	Essex
9	U.S. 1T	NJ 7	1.9	Essex
10	NJ 7	NJ 3	6.2	Hudson
11	NJ 3	U.S. 46	4.2	Hudson / Bergen
12	U.S. 46	U.S. 46	7.6	Hudson
13	U.S. 46	NY State Line	6.6	Bergen

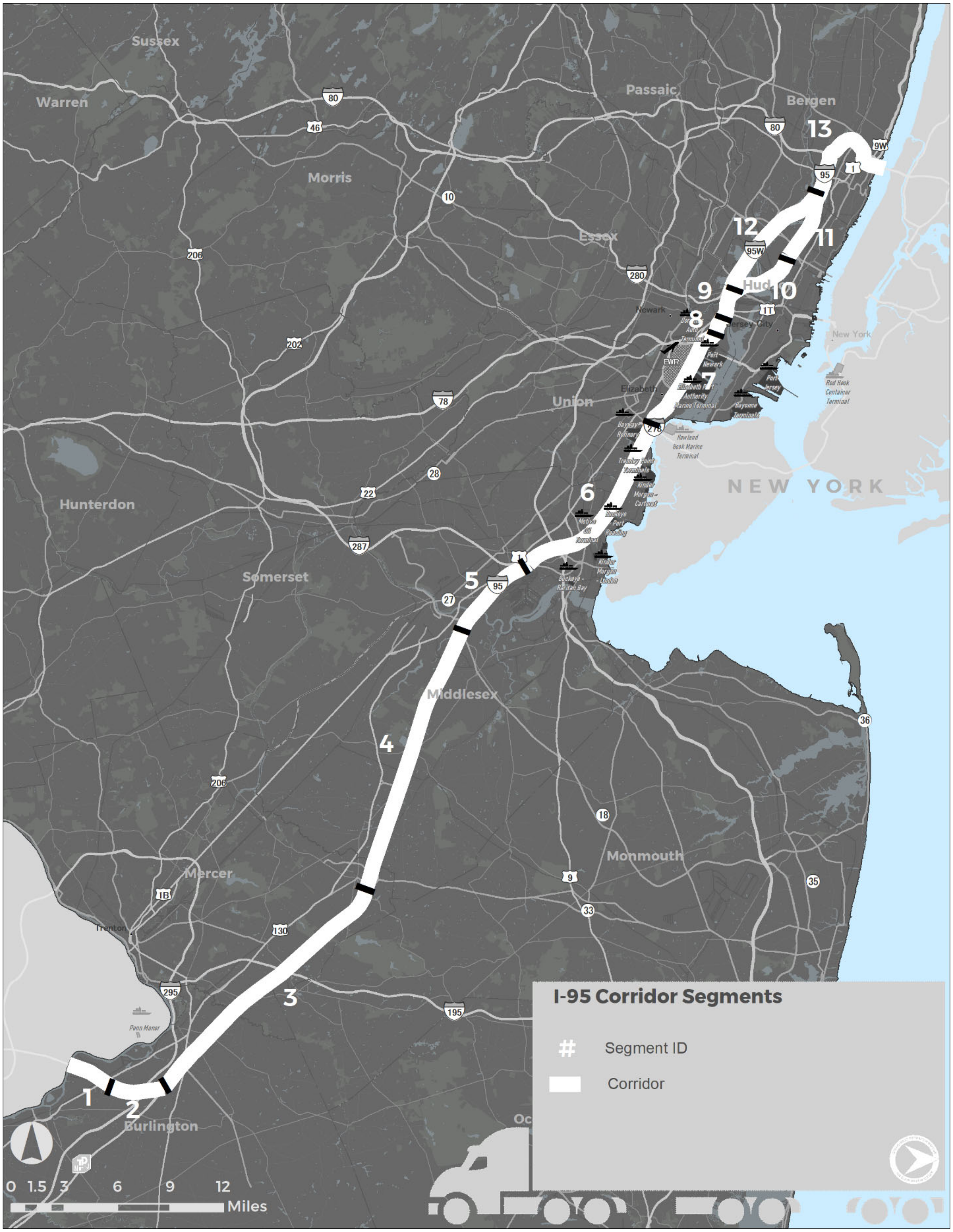
TONNAGE

Total tonnage along the corridor is highest in Middlesex County at 119 million tons on Segment 5, near Interchange 10 (I-287) with a smaller peak connecting with the George Washington Bridge (93 million tons). A review of tonnage on the Eastern and Western spurs indicates that most tonnage travels along the Western Spur, as shown in Figure 170.

> The substantial tonnage that moves along the NJ Turnpike is one example of an opportunity to consider alternative modes to ease congestion on New Jersey's most critical arteries.

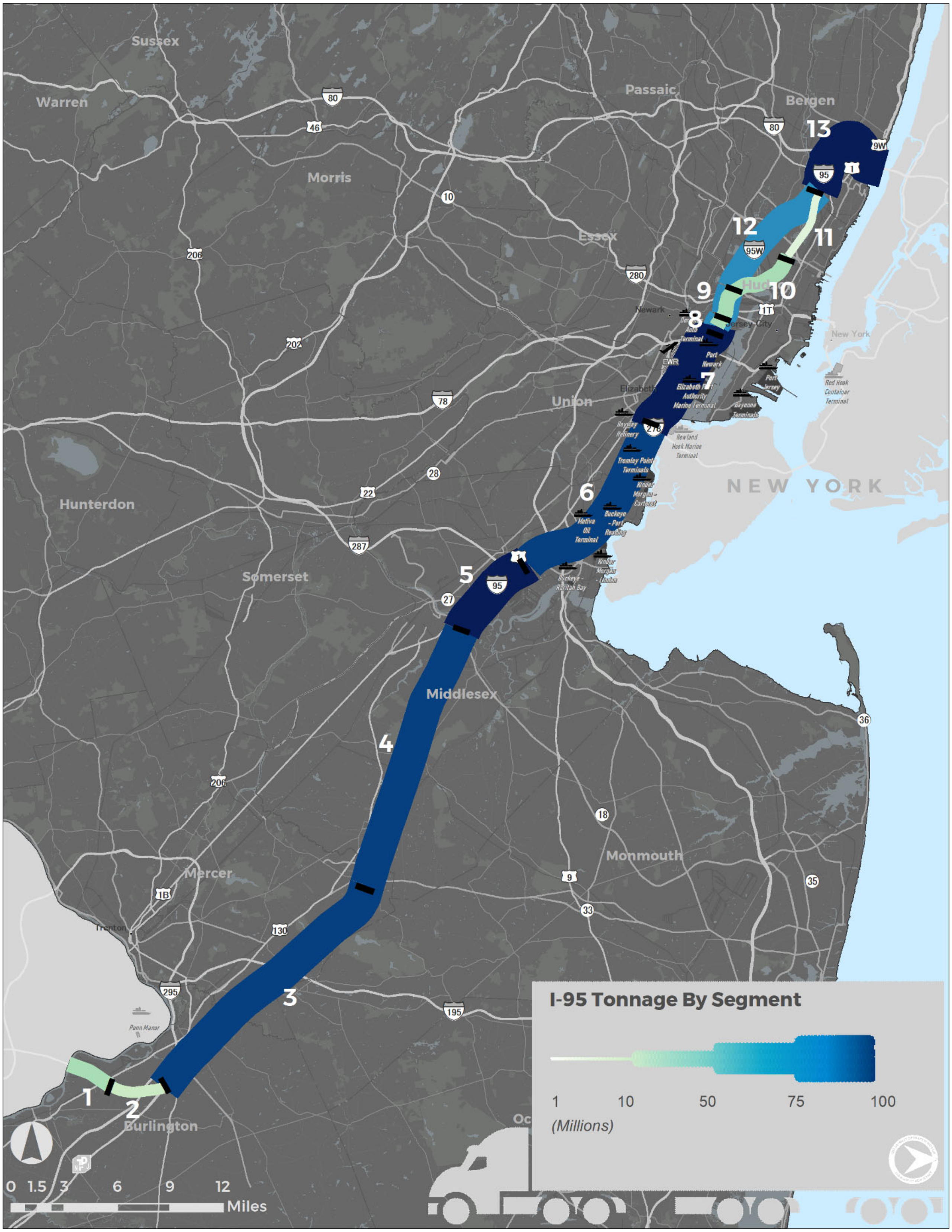
Figure 171 shows the breakdown of commodity by tonnage across I-95's 13 segments. Cumulatively, construction, food, and distribution account for 62% of tonnage.

Figure 169. I-95 Corridor Segments



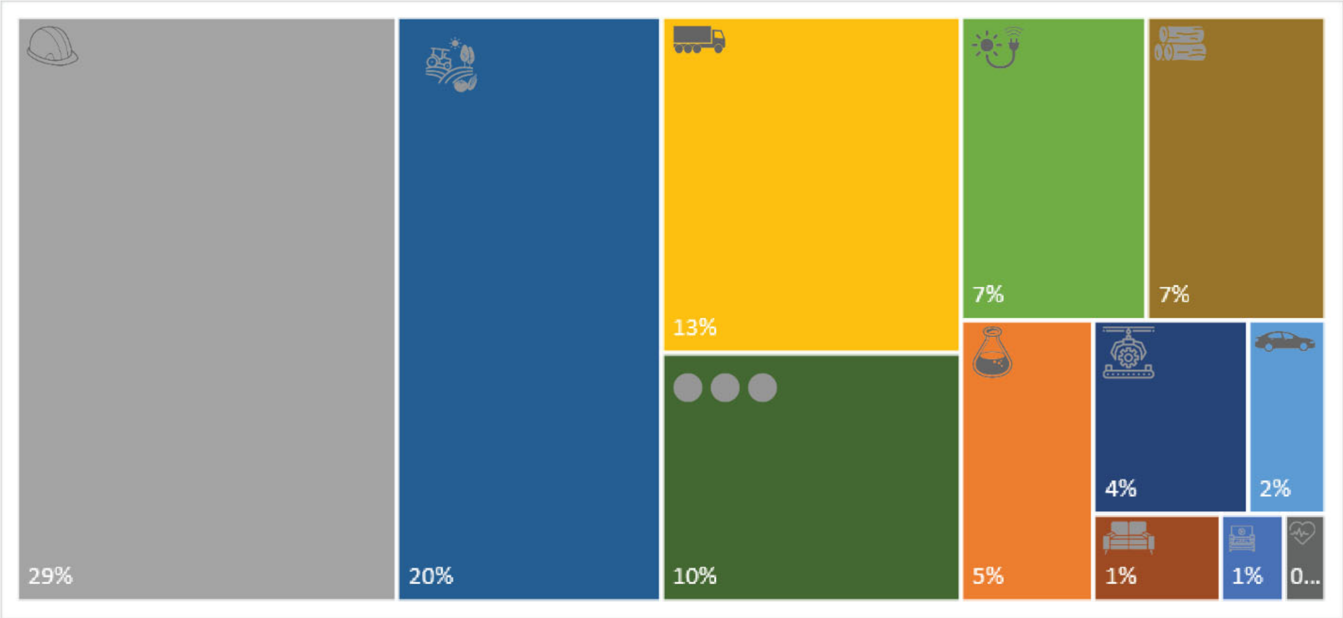
Source: WSP

Figure 170. I-95 Total Tonnage



Source: Transearch, NJDOT

Figure 171. I-95 Tonnage by Commodity

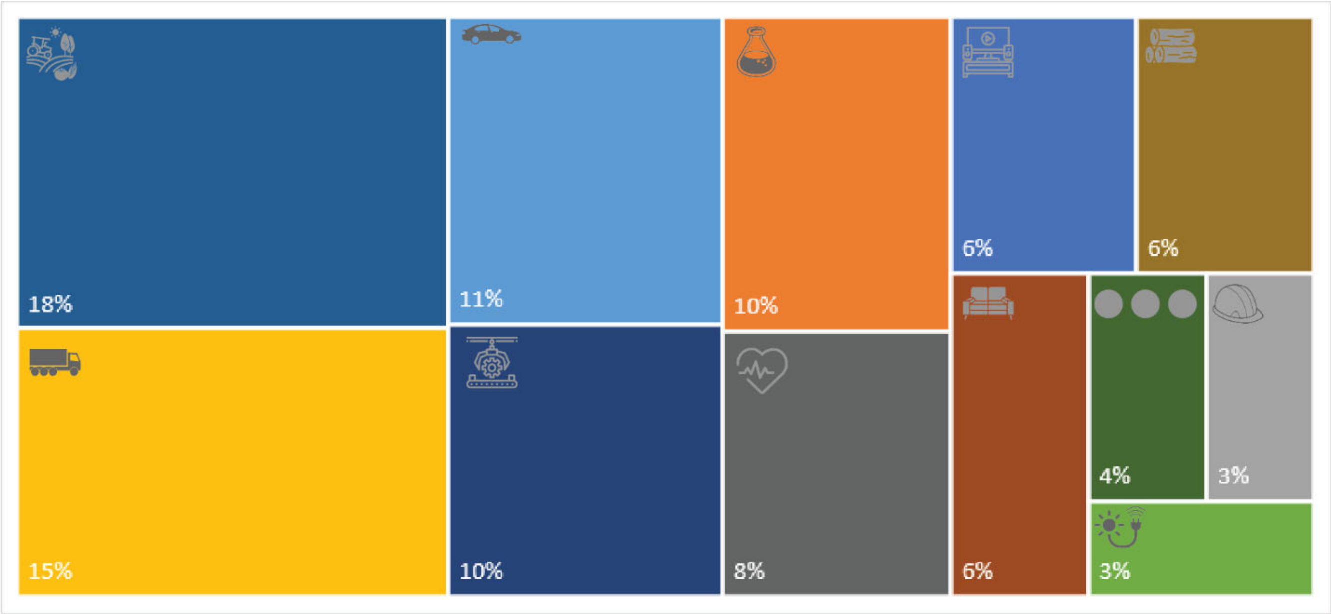


Source: Transearch

VALUE

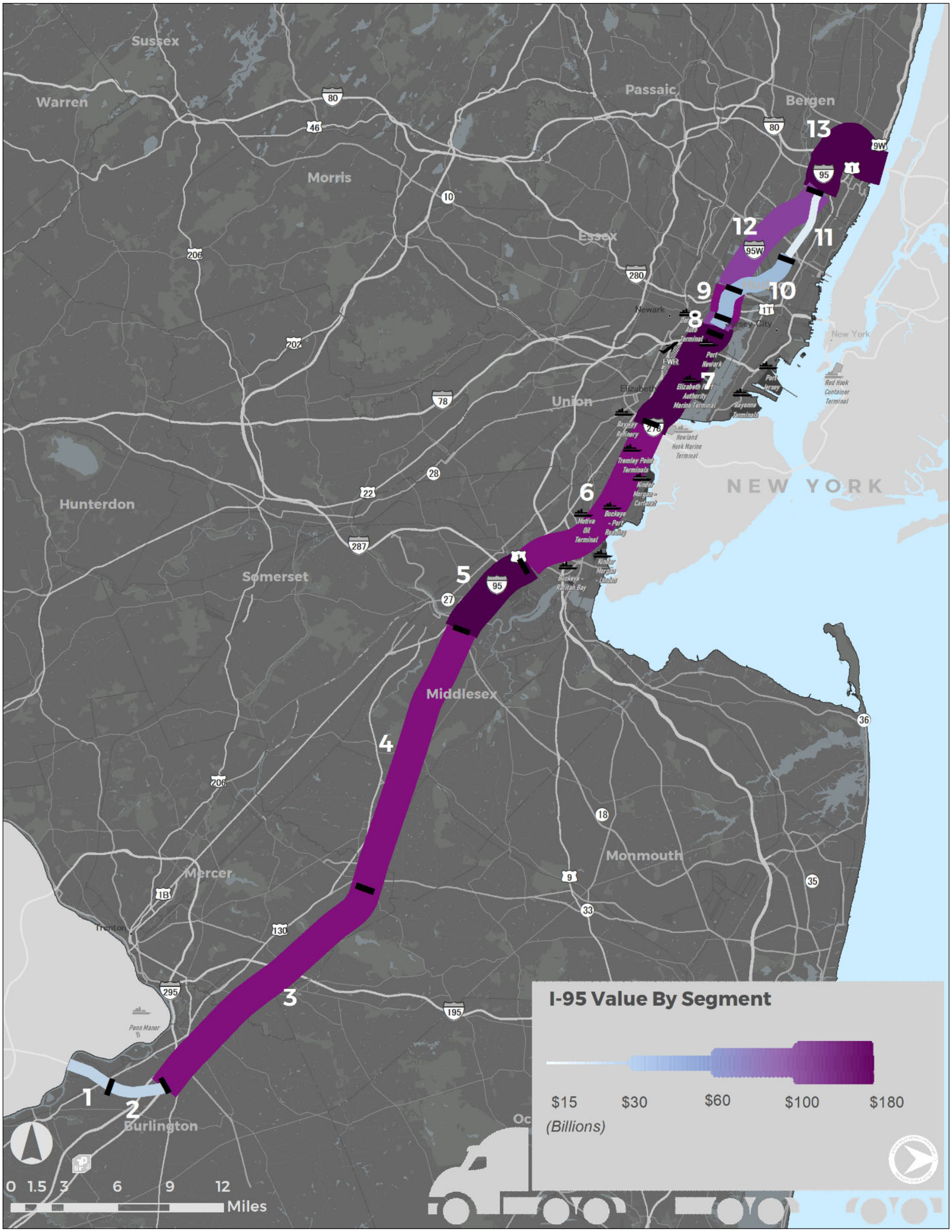
Total value along the corridor is highest on Segment 5 in Middlesex County ($182 billion). Value remains high along most of the corridor, with less value carried along the New Jersey Turnpike Extension and Eastern Spur, as shown in Figure 173 and Table 70.

Figure 172. I-95 Value by Commodity



Source: Transearch

Figure 173. I-95 Total Value



Source: Transearch, NJDOT

SUMMARY

Table 70 provides a summary of data for the I-95 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

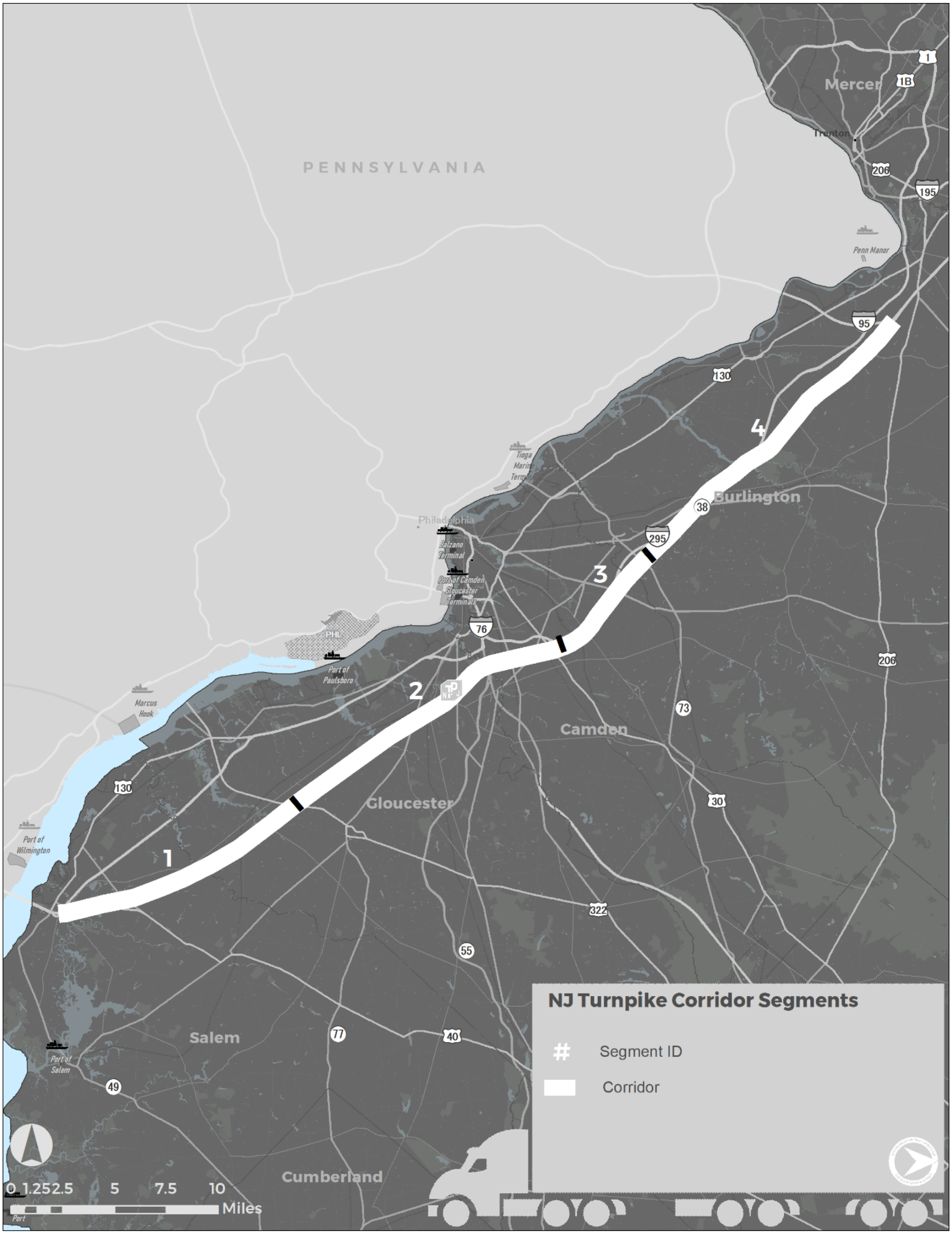
Table 70. I-95 Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	PA State Line	U.S. 130	34,714,898	$41,883,794	1,144,502	41%	Const. - 40%	Food - 17%
2	U.S. 130	NJ Tpke	27,665,769	$34,179,575	882,891	40%	Const. - 39%	Food - 17%
3	NJ Tpke	NJ 33	85,956,237	$132,909,000	1,815,539	30%	Const. - 31%	Food - 21%
4	NJ 33	NJ 18	83,807,747	$130,728,000	1,814,441	31%	Const. - 30%	Food - 20%
5	NJ 18	NJ 440	118,735,426	$181,566,000	3,531,314	38%	Const. - 29%	Food - 18%
6	NJ 440	NJ 439	81,158,417	$131,269,000	2,445,401	38%	Const. - 25%	Distribution - 20%
7	NJ 439	I-78	94,190,976	$153,786,000	2,333,023	34%	Const. - 27%	Food - 18%
8	I 78	U.S. 1T	64,716,392	$109,113,000	1,684,710	35%	Const. - 26%	Distribution - 17%
9	U.S. 1T	NJ 7	69,482,238	$120,794,000	1,906,072	36%	Const. - 26%	Distribution - 22%
10	NJ 7	NJ 3	31,437,948	$53,099,615	686,068	31%	Const. - 27%	Food - 20%
11	NJ 3	U.S. 46	13,319,189	$29,084,560	595,899	48%	Distribution - 24%	Distribution - 28%
12	U.S. 46	U.S. 46	62,514,912	$107,853,000	1,484,327	33%	Const. - 27%	Food - 16%
13	U.S. 46	NY State Line	92,922,300	$151,459,000	1,965,617	30%	Const. - 34%	Food - 17%

7.2.6 New Jersey Turnpike (Route 700) Corridor Analysis

The segment of the New Jersey Turnpike south of Interchange 6 is designated as Route 700. It traverses 51 miles between the New Jersey Turnpike/I-95 (Interchange 6) in Burlington County and I-295 just north of the Delaware Memorial Bridge, passing through Burlington, Camden, Gloucester, and Salem counties. The corridor generally runs parallel to I-295, which provides local freight access for South Jersey, including access to port and distribution facilities located along the Delaware River as well as connections to Philadelphia via several Delaware River crossings. Given the available commodity flow data, particularly that based on tonnage, the New Jersey Turnpike corridor is divided in four segments, ranging in length from six miles to 17 miles, labeled by segment number and corridor extents, as shown in Figure 174 and Table 71.

Figure 174. NJ Turnpike Corridor Segments



Source: WSP

Table 71. NJ Turnpike Segment Location Summary

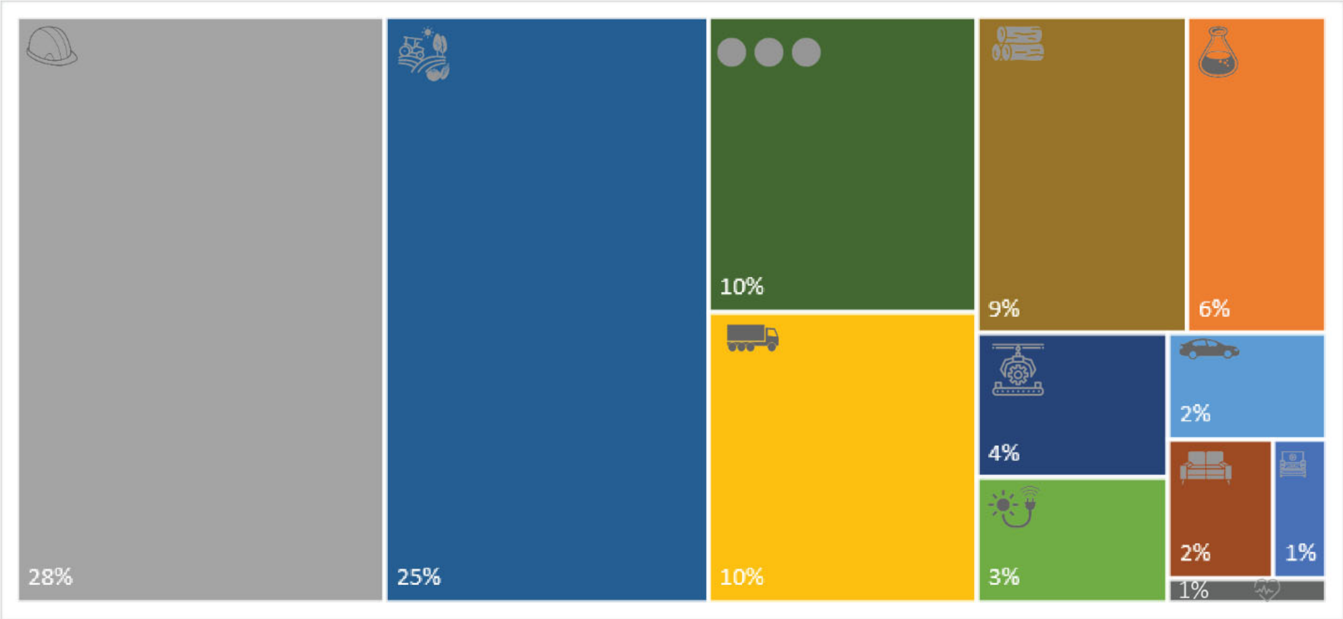
Segment	South End	North End	Length (mi)	Counties
1	I-295	U.S. 322	12.7	Salem / Gloucester
2	U.S. 322	U.S. 30	15.3	Gloucester / Camden
3	U.S. 30	NJ 73	6.0	Camden
4	NJ 73	I-95	16.6	Burlington

TONNAGE

Total tonnage along the corridor is highest along Segment 3 (68 million tons) near Camden, as shown in Figure 176. Tonnage remains relatively consistent along the entire corridor, indicating the importance of this corridor as a through route between Delaware and I-95.

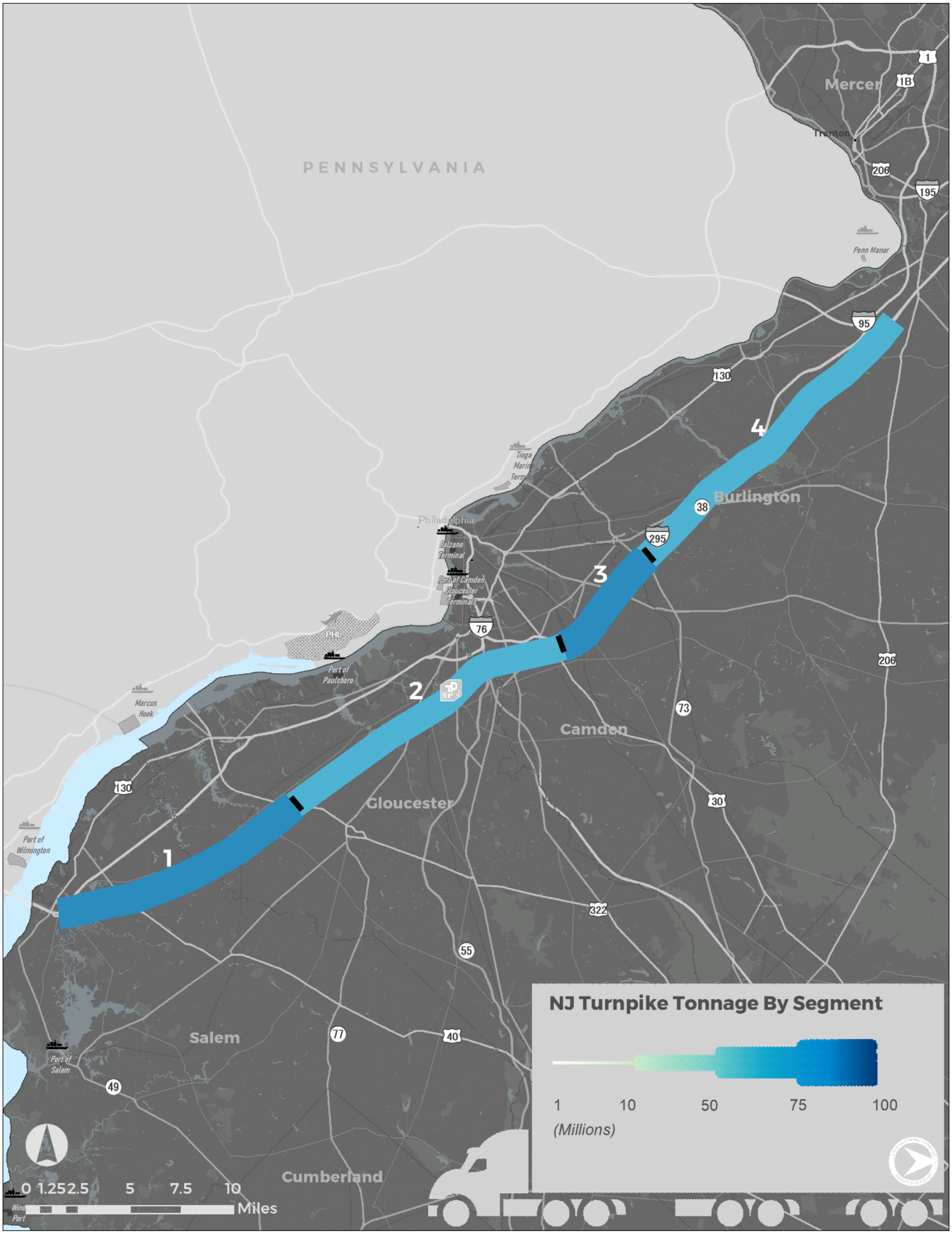
Figure 175 shows the breakdown of commodity by tonnage across the New Jersey Turnpike's four segments. Cumulatively, construction and food account for 53% of tonnage.

Figure 175. New Jersey Turnpike Tonnage by Commodity



Source: Transearch

Figure 176. New Jersey Turnpike Total Tonnage

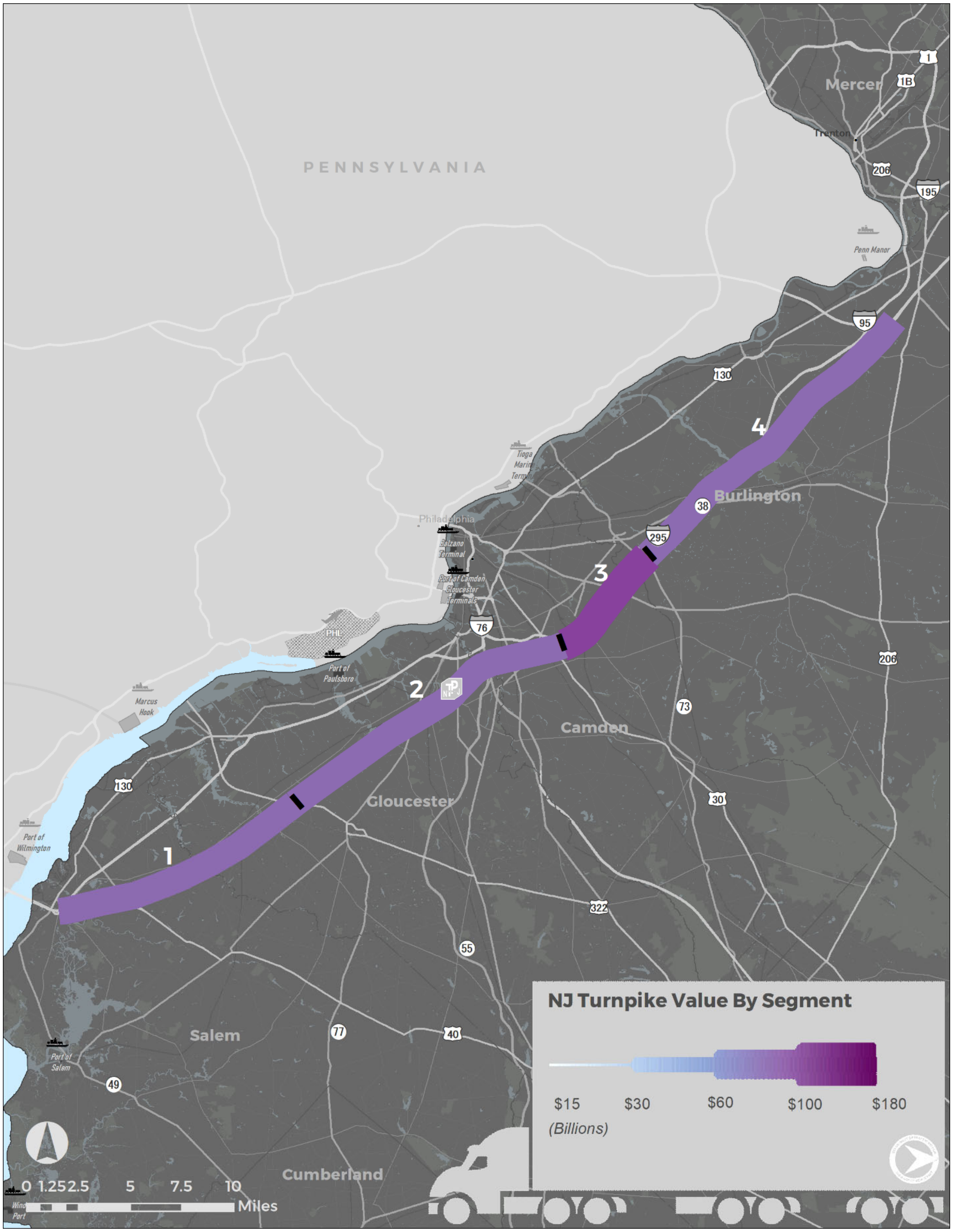


Source: Transearch, NJDOT

VALUE

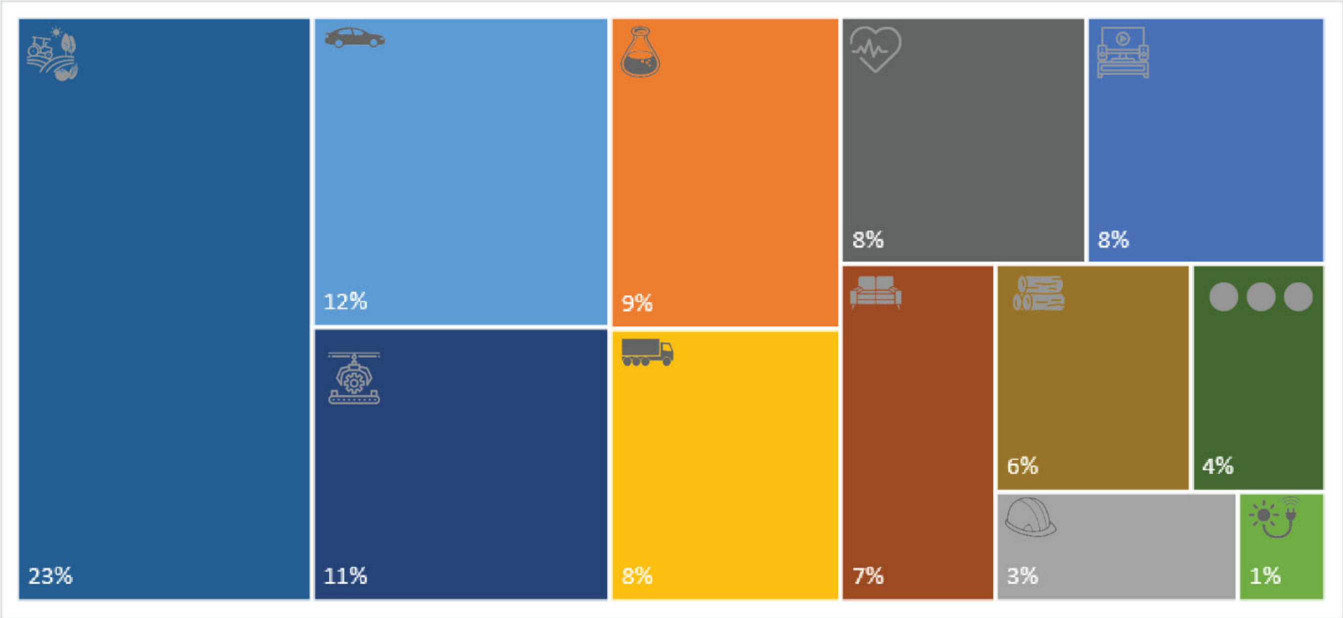
Total value along the corridor remains consistent throughout with only slight deviations. Value peaks on Segment 3 ($109 billion) near Camden and I-76 to Philadelphia, as shown in Figure 177 and Figure 178.

Figure 177. New Jersey Turnpike Total Value



Source: Transearch, NJDOT

Figure 178. New Jersey Turnpike Value by Commodity



Source: Transearch

SUMMARY

Table 72 provides a summary of data for the New Jersey Turnpike corridor, including tonnage, value, empty rates, and predominant commodities by segment.

Table 72. New Jersey Turnpike Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	Delaware Memorial Bridge	U.S. 322	64,276,809	$104,150,000	752,467	19%	Construction - 30%	Food - 23%
2	U.S. 322	U.S. 30	59,336,388	$100,476,000	687,506	19%	Construction - 28%	Food - 23%
3	U.S. 30	NJ 73	67,562,541	$108,861,000	1,211,365	27%	Construction - 28%	Food - 22%
4	NJ 73	I-95	58,290,468	$98,729,273	932,648	25%	Construction - 26%	Food - 23%

7.2.7 I-295 Corridor Analysis

Within New Jersey, I-295 extends 76 miles between the Scudder Falls Bridge in Ewing Township (Mercer County) and the Delaware Memorial Bridge in Pennsville Township (Salem County). The corridor largely parallels both the Delaware River and New Jersey Turnpike, providing local, un-tolled access through suburbs and cities surrounding Trenton, Camden, and Philadelphia. The corridor is part of the National Highway Freight Network's Primary High Freight System. Given available commodity flow data, particularly that based on tonnage, the I-295 corridor is divided into 14 segments, ranging in length from less than one mile to 15 miles, labeled by segment number and corridor extents, as shown in Figure 179 and Table 73.

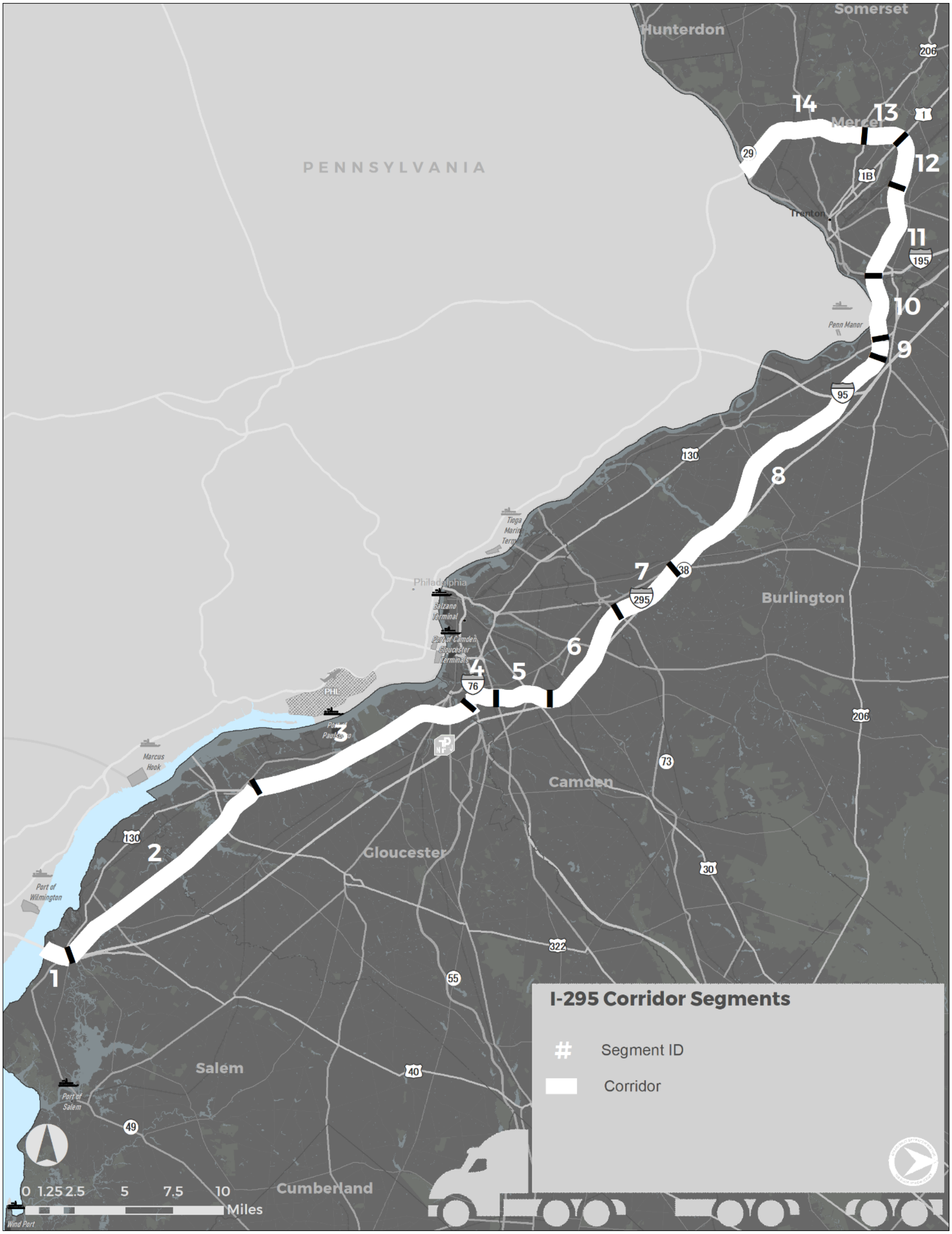
Table 73. I-295 Segment Location Summary

Segment	West End	East End	Length (mi)	Counties
1	Delaware Memorial Bridge	U.S. 40	0.7	Salem
2	U.S. 40	U.S. 130	1.4	Salem / Gloucester
3	U.S. 130	NJ 55	1.6	Gloucester / Camden
4	NJ 55	NJ 168	2.0	Camden
5	NJ 168	Exit 31 (Woodcrest Station)	2.5	Camden
6	Exit 31 (Woodcrest Station)	NJ 73	2.9	Camden
7	NJ 73	NJ 38	3.4	Burlington
8	NJ 38	Rising Sun Rd	3.7	Burlington
9	Rising Sun Rd	U.S. 130	5.0	Burlington
10	U.S. 130	NJ 29	5.7	Burlington / Mercer
11	NJ 29	NJ 33	7.1	Mercer
12	NJ 33	U.S. 1	12.2	Mercer
13	U.S. 1	U.S. 206	12.8	Mercer
14	U.S. 206	Scudder Falls Bridge	15.5	Mercer

TONNAGE

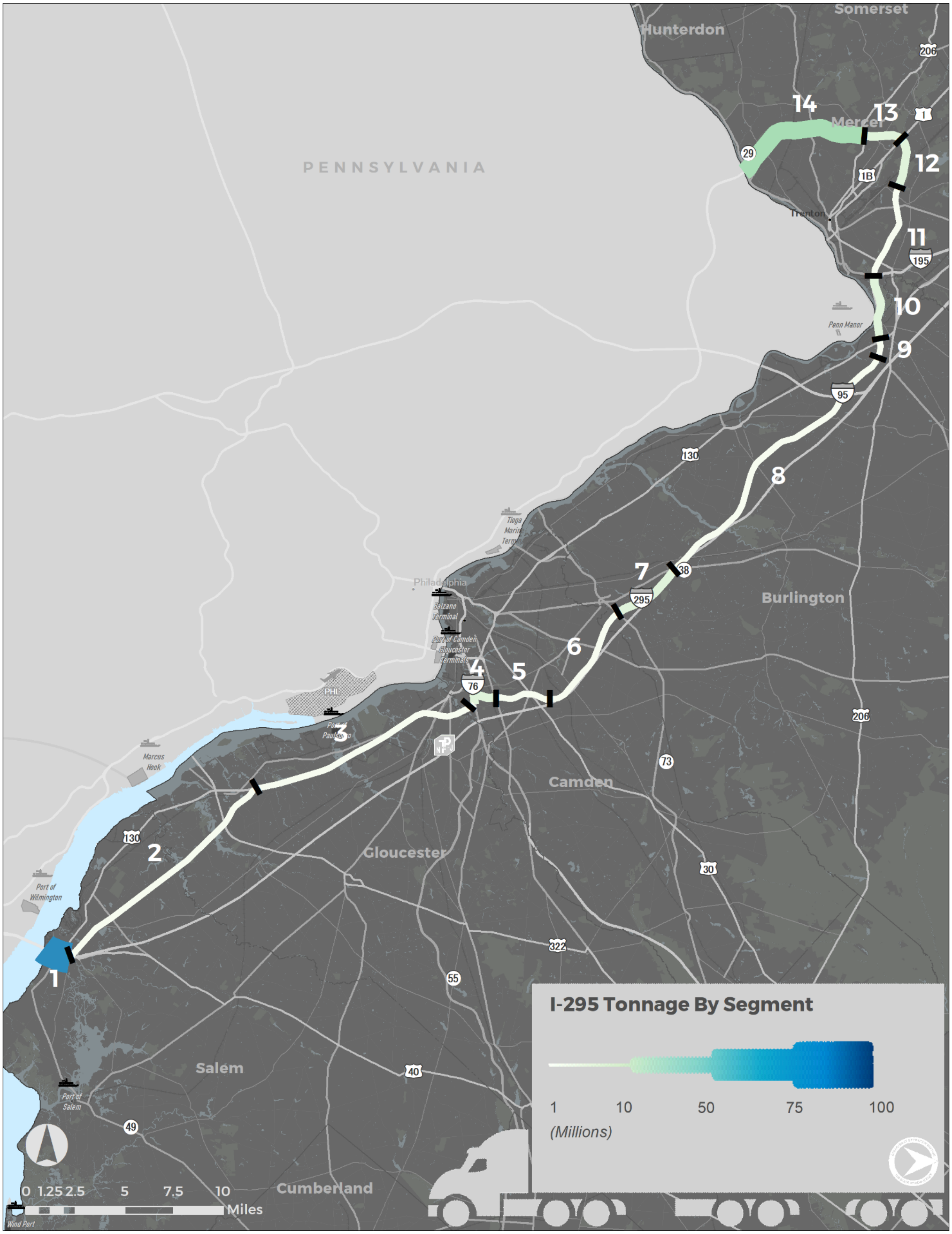
Total tonnage is highest near Delaware River crossings (Scudder Falls Bridge, Delaware Memorial Bridge) and in Camden near I-76 approaching the Benjamin Franklin Bridge and Walt Whitman Bridge, as shown in Figure 180. Tonnage crossing the Delaware Memorial Bridge is twice as high as any other segment of the corridor.

Figure 179. I-295 Corridor Segments



Source: WSP

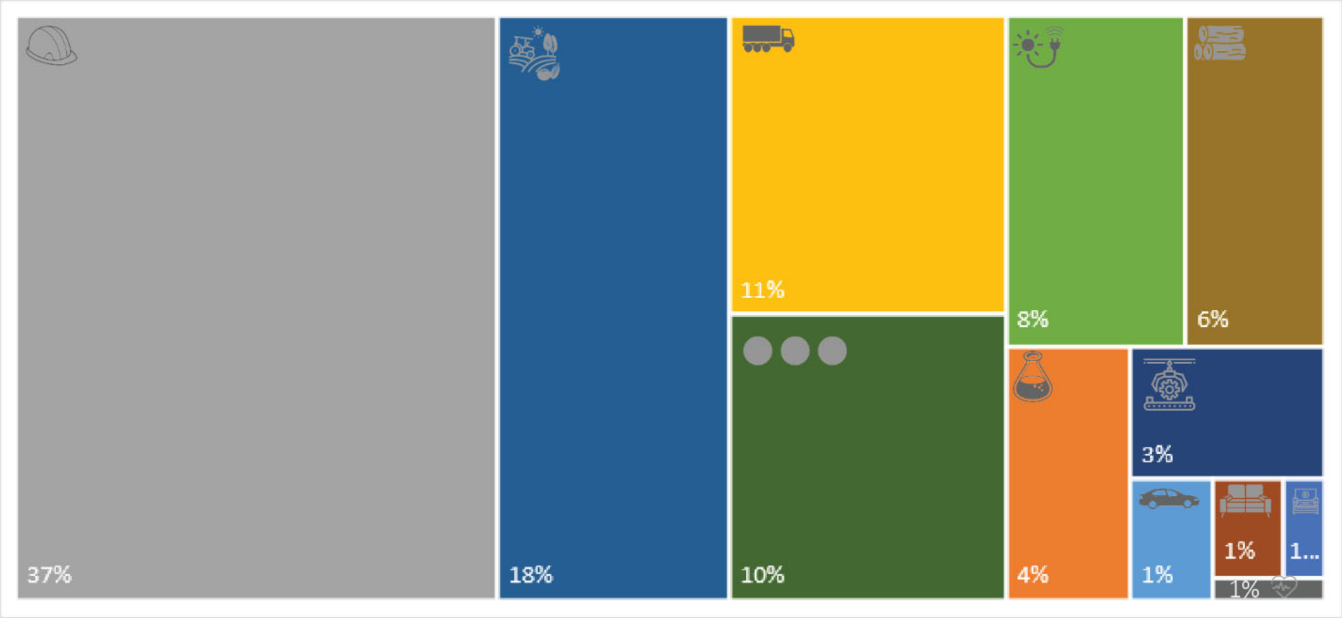
Figure 180. I-295 Total Tonnage



Source: Transearch, NJDOT

Figure 181 shows the breakdown of commodity by tonnage across I-295. Cumulatively, construction and food account for 55% of tonnage.

Figure 181. I-295 Tonnage by Commodity

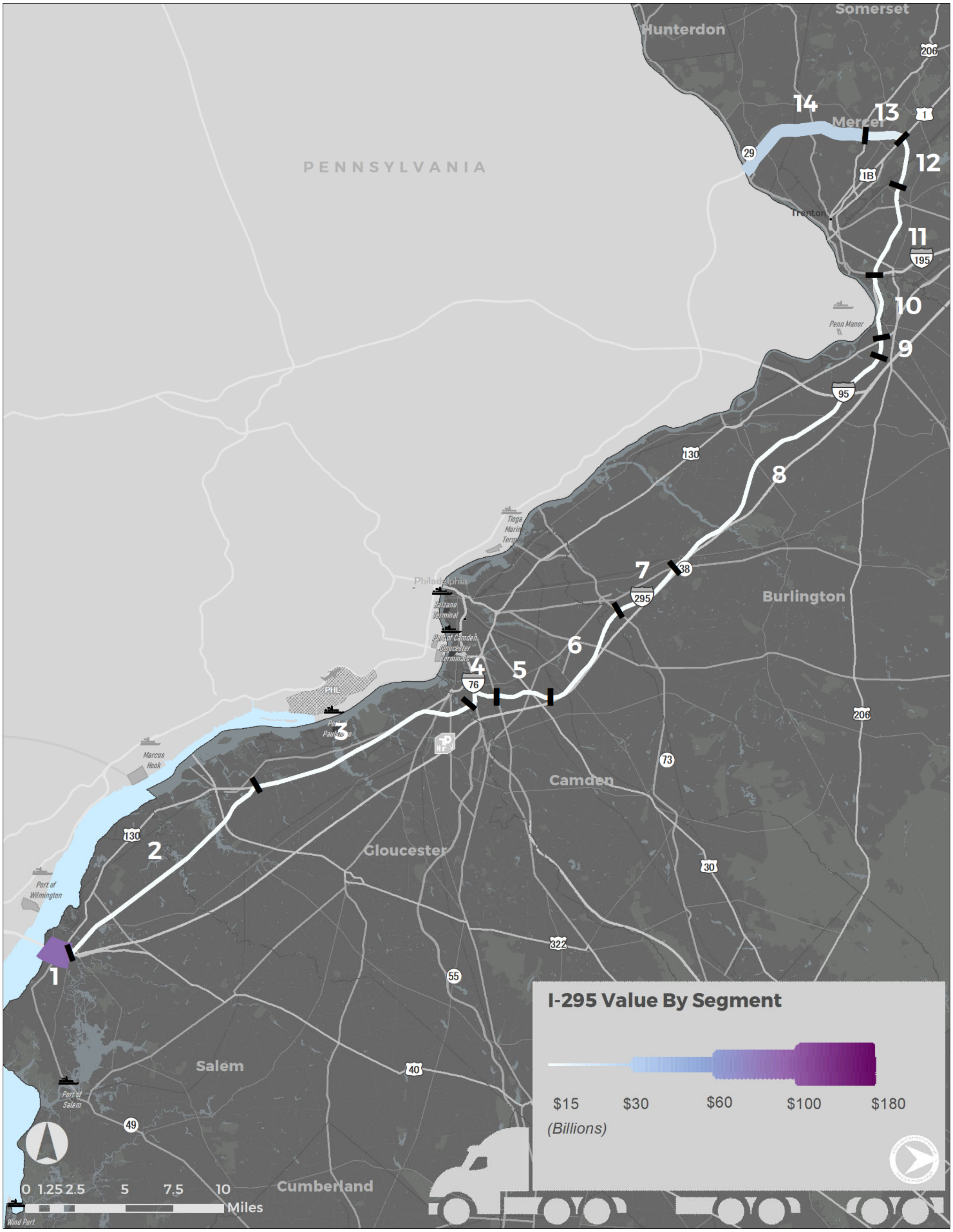


Source: Transearch

VALUE

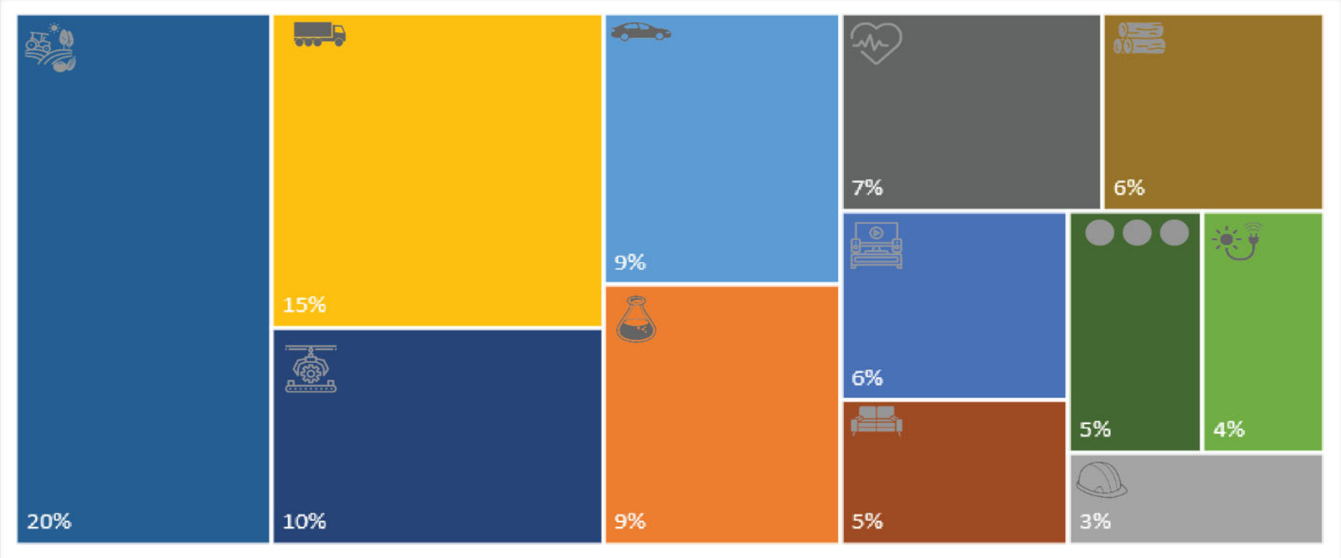
As with tonnage, total value along the corridor is highest near Delaware River crossings with the highest total value goods crossing the Delaware Memorial Bridge, as shown in Figure 182. As seen in Figure 183, the three highest valued goods transported are food, distribution, and machinery, accounting for 45% of value.

Figure 182. I-295 Total Value



Source: Transearch, NJDOT

Figure 183. I-295 Value by Commodity



Source: Transearch

SUMMARY

Table 74 provides a summary of data for the I-295 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

Table 74. I-295 Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	Del. Mem. Bridge	U.S. 40	69,224,799	$106,958,000	866,372	21%	Const. - 48%	Distribution – 24%
2	U.S. 40	U.S. 130	574,415	$231,702	19,500	41%	Const. - 32%	Food - 23%
3	U.S. 130	NJ 55	1,889,082	$1,309,321	53,032	37%	Const. - 37%	Food - 24%
4	NJ 55	NJ 168	14,039,106	$13,360,653	672,869	50%	Const. - 36%	Distribution – 26%
5	NJ 168	Exit 31 (Woodcrest)	9,126,568	$8,499,827	445,794	50%	Const. - 32%	Distribution – 26%
6	Exit 31 (Woodcrest)	NJ 73	2,846,489	$2,043,317	207,633	60%	Const. - 41%	Food – 23%
7	NJ 73	NJ 38	10,147,118	$10,044,249	425,488	47%	Const. - 44%	Distribution – 21%
8	NJ 38	Rising Sun Rd	6,489,109	$5,584,015	275,275	47%	Const. - 42%	Distribution/Food – 16%
9	Rising Sun Rd	U.S. 130	9,259,062	$7,119,594	437,020	50%	Const. - 41%	Distribution – 20%
10	U.S. 130	NJ 29	11,626,779	$9,936,105	534,111	50%	Const. - 46%	Distribution – 25%
11	NJ 29	NJ 33	9,919,085	$9,010,524	418,632	48%	Const. - 36%	Distribution – 19%
12	NJ 33	U.S. 1	13,943,837	$12,565,713	617,570	49%	Const. - 60%	Food - 25%
13	U.S. 1	U.S. 206	17,015,613	$21,316,112	906,278	53%	Const. - 53%	Chemicals – 35%
14	U.S. 206	Scudder Falls Bridge	31,556,115	$38,412,246	1,231,254	45%	Const. - 41%	Distribution – 22%

7.2.8 NJ 440 Corridor Analysis

NJ 440 traverses 12 miles in two disconnected segments. A 5-mile segment within Middlesex County connects the New Jersey Turnpike/I-95 with the Outerbridge Crossing, linking New Jersey with Staten Island. An approximately 6 mile segment within Hudson County connects the Newark Bay Extension/I-78 in Jersey City (Hudson County) with the Bayonne Bridge, also linking New Jersey with Staten Island. Both crossings into Staten Island prohibit vehicles taller than 14' and wider than 8'6''. The corridor carries substantial truck volumes destined for points east of the Hudson River via Staten Island. The corridors also provide access to port and distribution facilities in Middlesex and Hudson counties. Given available commodity flow data, particularly that based on tonnage, the NJ 440 corridor is divided into three segments, ranging in length from two miles to seven miles, labeled by segment number and corridor extents, as shown in Figure 184 and Table 75.

Figure 184. NJ 440 Corridor Segments

Source: WSP

Table 75. NJ 440 Segment Location Summary

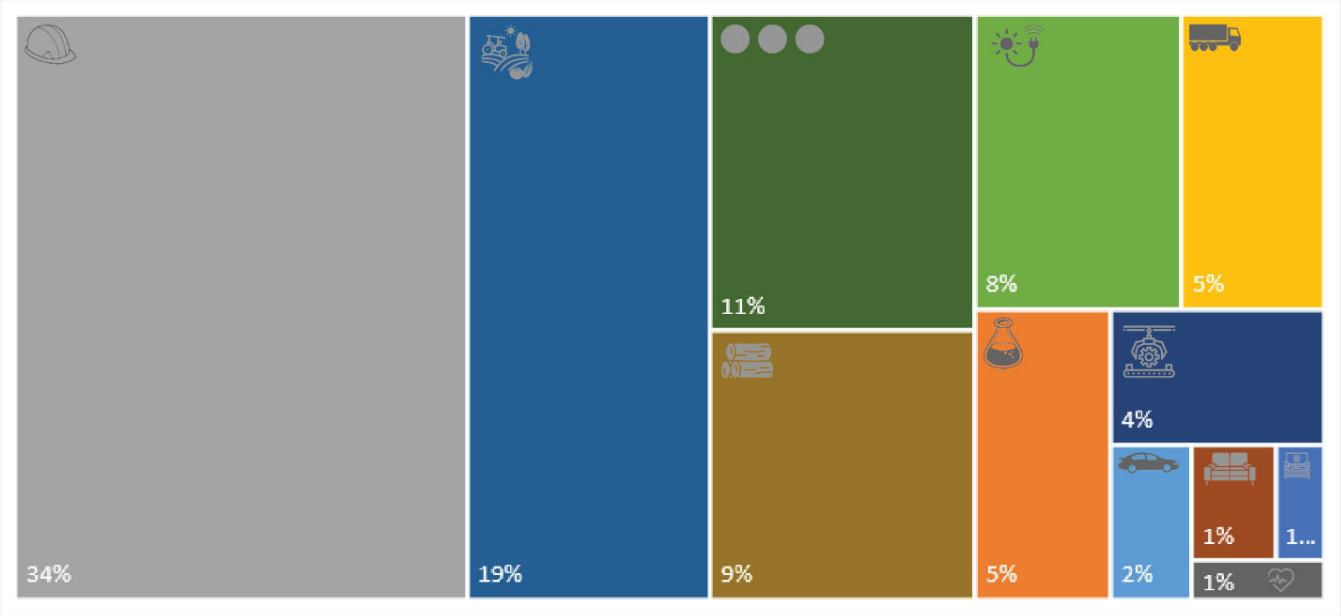
Segment	South End	North End	Length (mi)	Counties
1	I-95	U.S. 9	2.0	Middlesex
2	U.S. 9	NY State Line	3.1	Middlesex
3	NY State Line	NJ 440	6.7	Hudson

TONNAGE

Figure 185 shows the breakdown of commodity by tonnage across NJ 440's three segments. Cumulatively, construction and food account for 53% of tonnage.

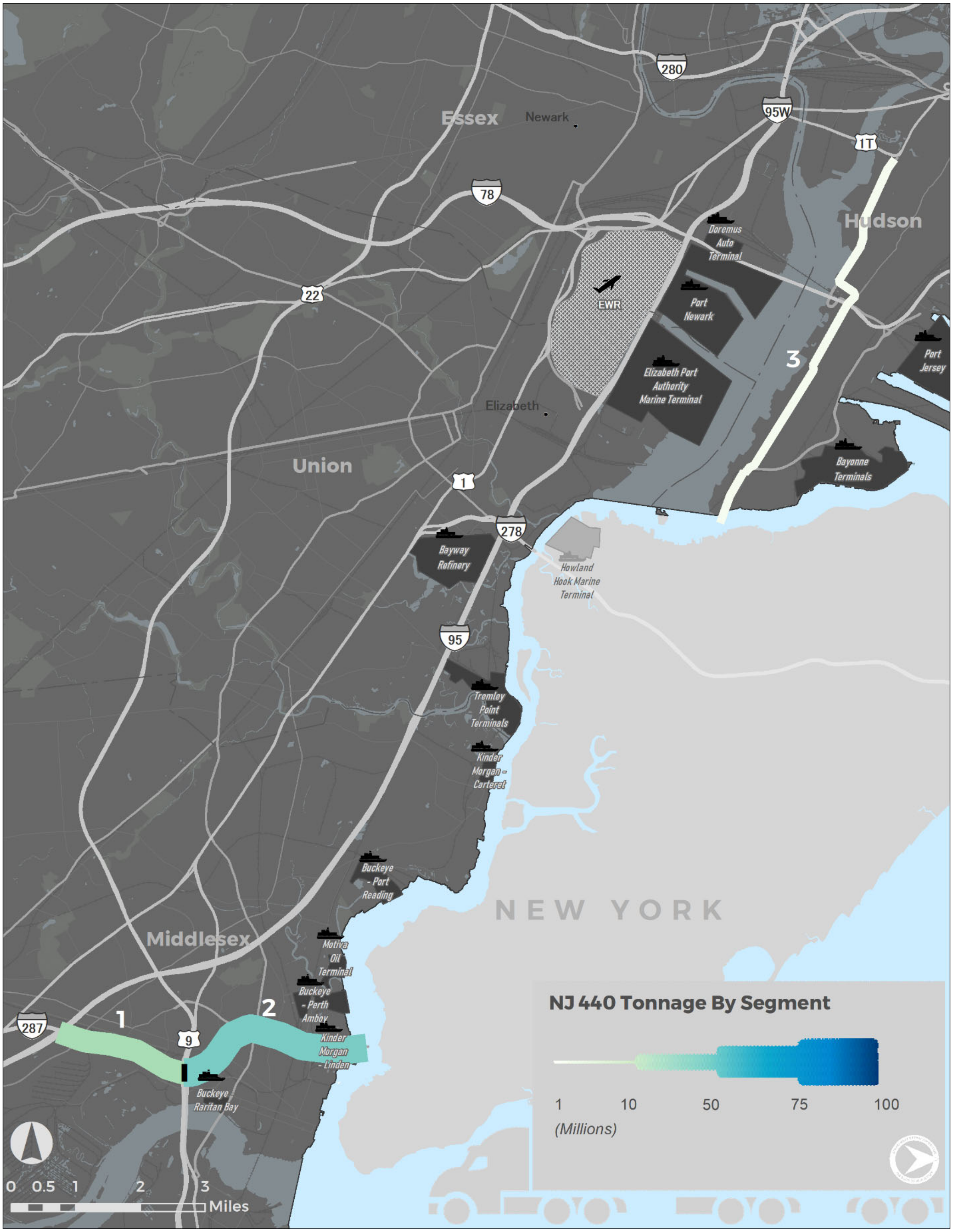
Total tonnage along the corridor is highest on Segment 2 (43 million tons) entering Staten Island via the Outerbridge Crossing. Tonnages on the Middlesex County segments are substantially higher than those observed on the Hudson County segment, as shown in Figure 186.

Figure 185. NJ 440 Tonnage by Commodity



Source: Transearch

Figure 186. NJ 440 Total Tonnage

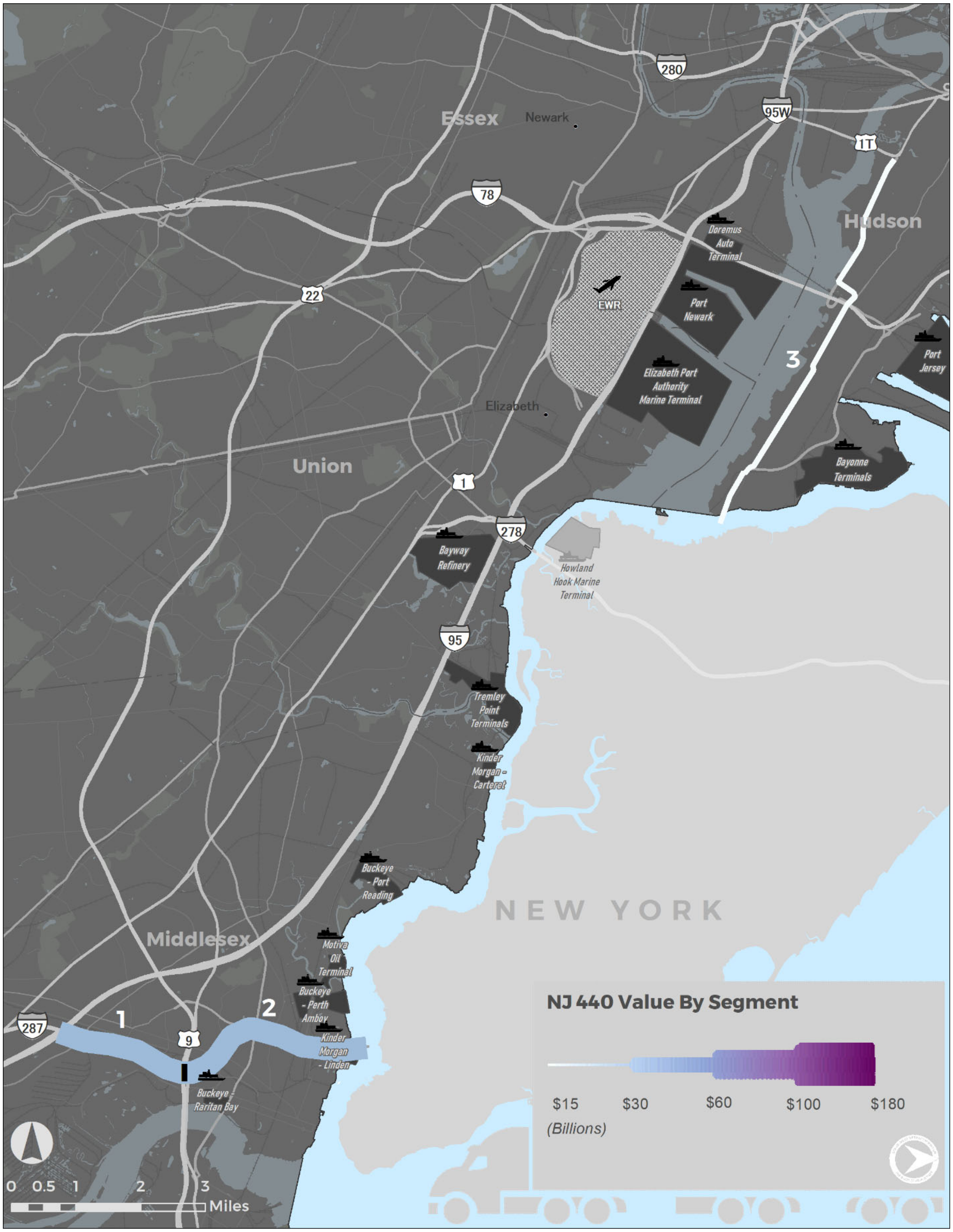


Source: Transearch, NJDOT

VALUE

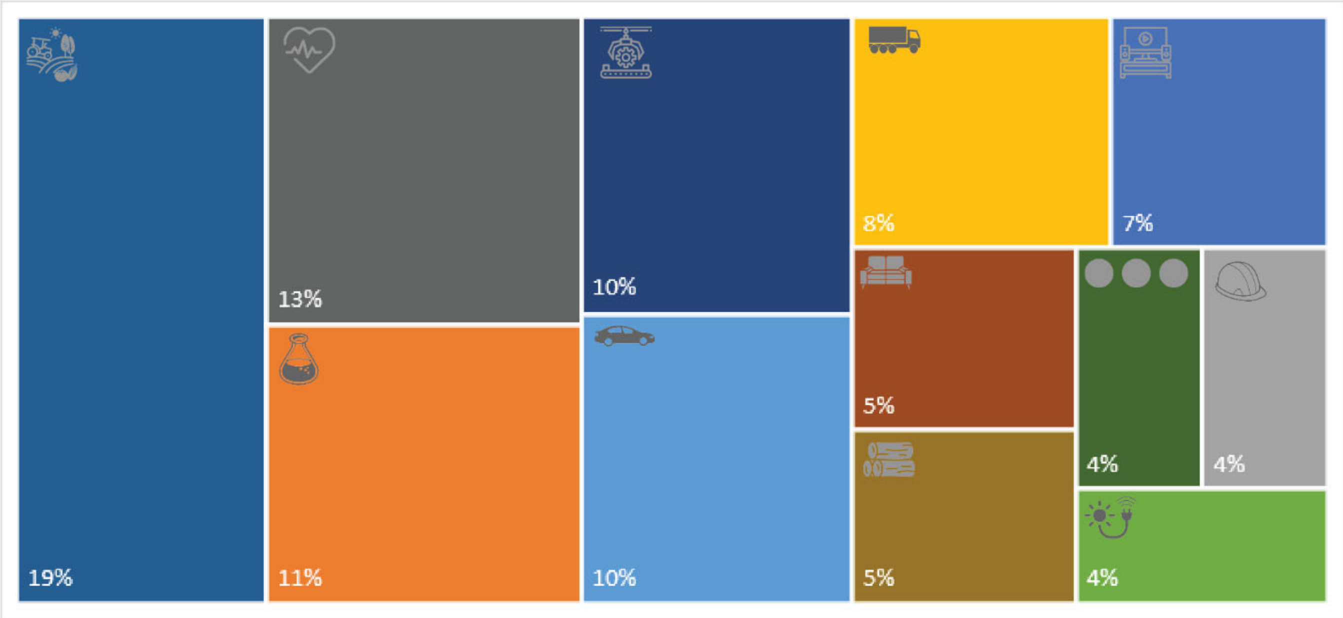
Total value along the corridor is highest in the south connecting with Outerbridge Crossing on Segment 2 ($59 billion). Value along the segment in Hudson County is significantly lower, as shown in Figure 187 and Figure 188.

Figure 187. NJ 440 Total Value



Source: Transearch, NJDOT

Figure 188. NJ 440 Value by Commodity



Source: Transearch

SUMMARY

Table 76 provides a summary of data for the NJ 440 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

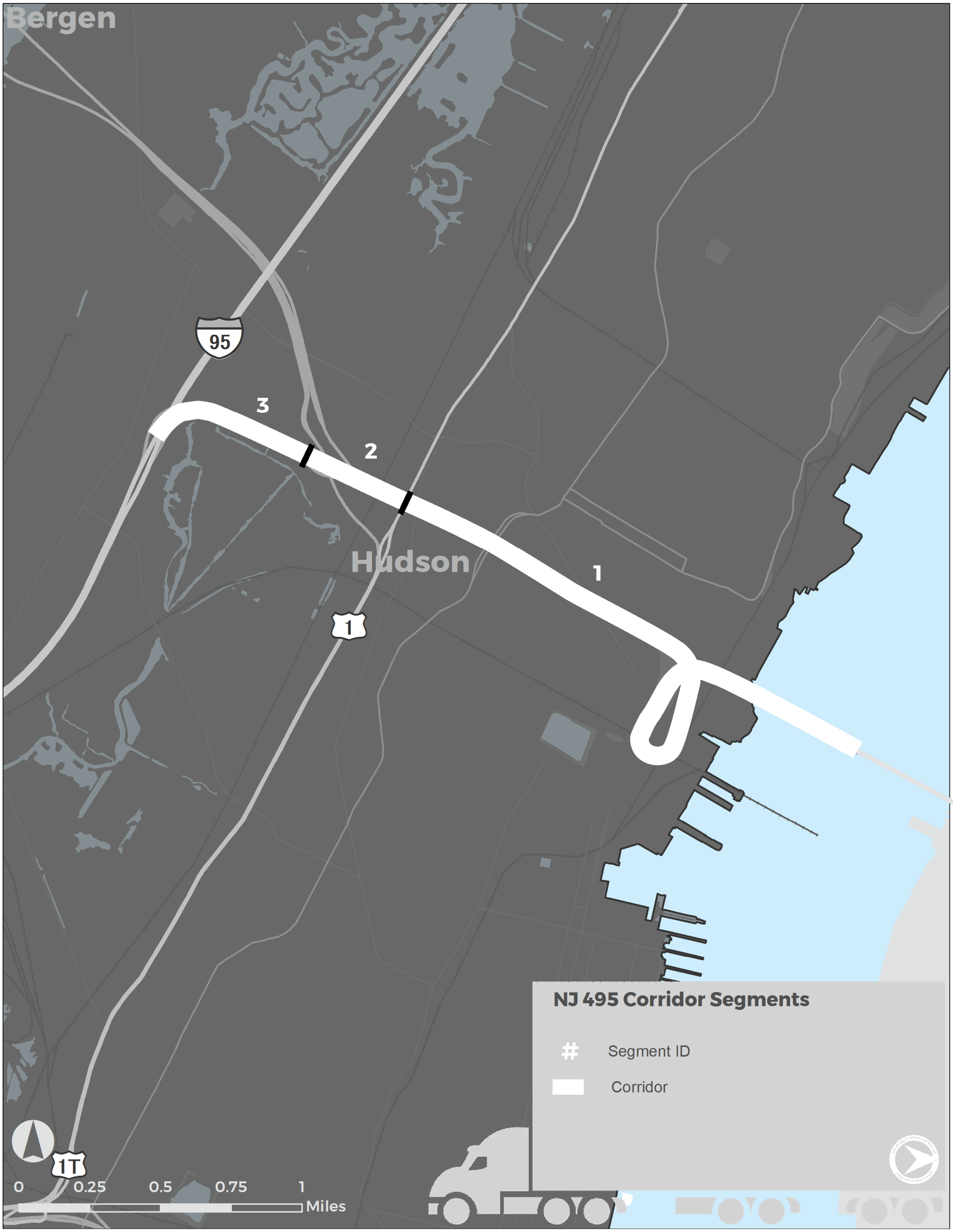
Table 76. NJ 440 Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	I-95	U.S. 9	39,568,261	$56,678,883	1,074,318	36%	Const. - 35%	Food - 19%
2	U.S. 9	NY State Line	42,538,584	$58,930,678	1,175,726	37%	Const. - 36%	Food - 19%
3	NY State Line	NJ 440	2,942,906	$6,424,014	84,319	37%	Energy - 24%	Food - 19%

7.2.9 NJ 495 Corridor Analysis

NJ 495 extends 3.4 miles between I-95 (New Jersey Turnpike) in Secaucus (Hudson County) and the Lincoln Tunnel connecting Weehawken and Manhattan. Vehicles greater than 13' in height and 8'6'' wide are prohibited from the Lincoln Tunnel. The corridor provides direct access to Midtown Manhattan and freight facilities in Hudson County. The corridor is part of the National Highway Freight Network's Critical Urban Corridors. Given available commodity flow data, particularly that based on tonnage, the NJ 495 corridor is divided in three segments, ranging in length from one-third of a mile to 2.5 miles, labeled by segment number and corridor extents, as shown in Figure 189 and Table 77.

Figure 189. NJ 495 Corridor Segments



Source: WSP

Table 77. NJ 495 Segment Location Summary

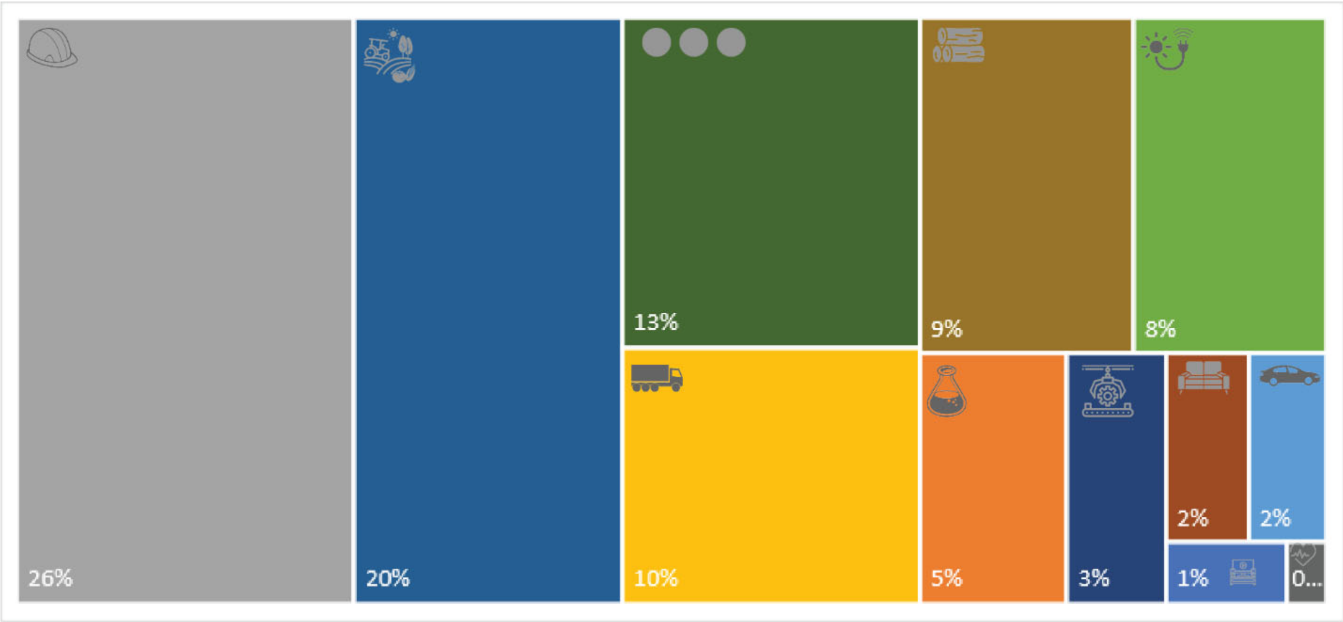
Segment	West End	East End	Length (mi)	Counties
1	U.S. 1	NY State Line	2.5	Hudson
2	NJ 3	U.S. 1	0.3	Hudson
3	I-95	NJ 3	0.6	Hudson

TONNAGE

Figure 190 shows the breakdown of commodity by tonnage across NJ 495's three segments. Cumulatively, construction, food, and miscellaneous account for 59% of tonnage.

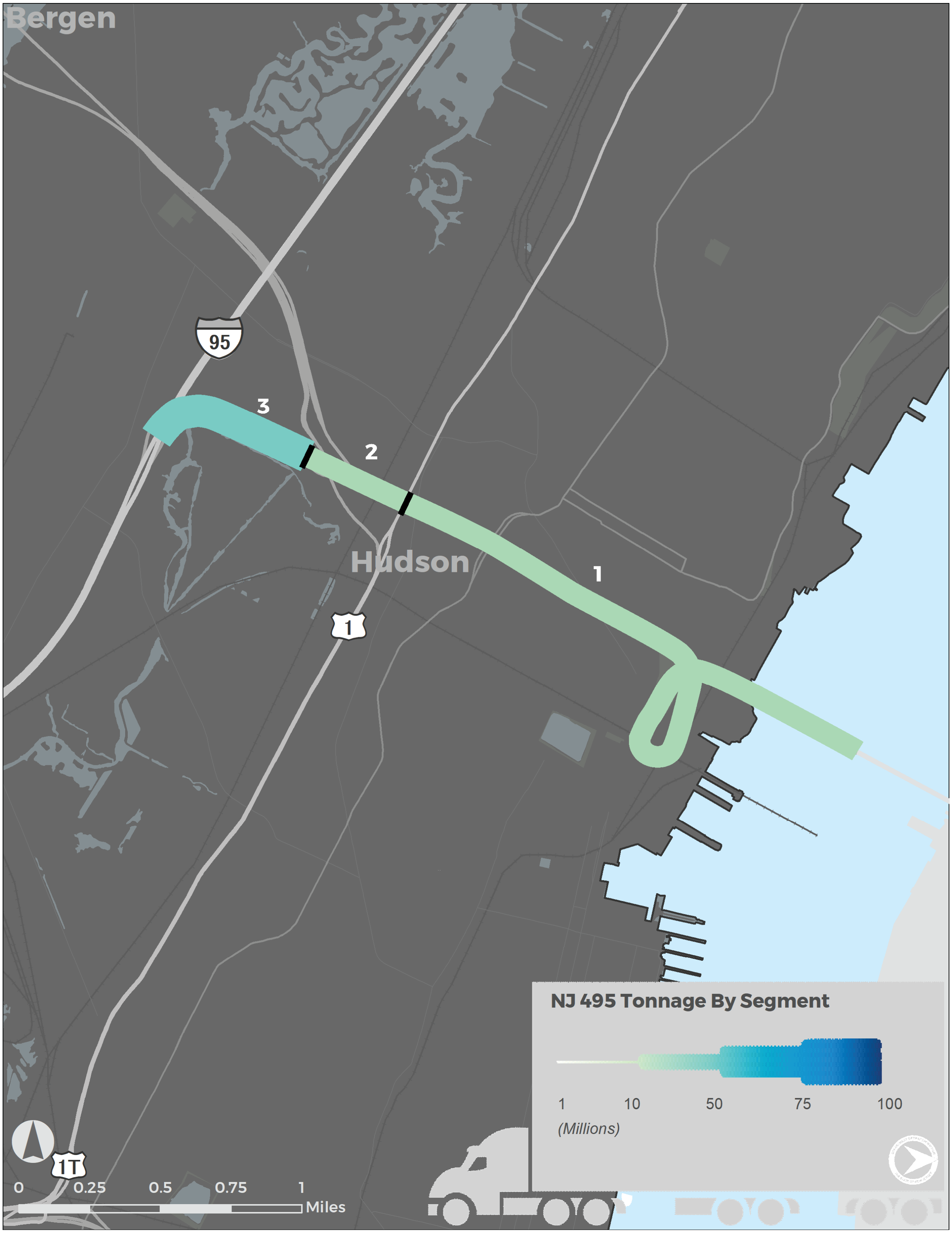
Total tonnage increases east of U.S. Route 1/9, with 45 million tons evident as the corridor connects with the Lincoln Tunnel, as shown in Figure 191.

Figure 190. NJ 495 Tonnage by Commodity



Source: Transearch

Figure 191. NJ 495 Total Tonnage

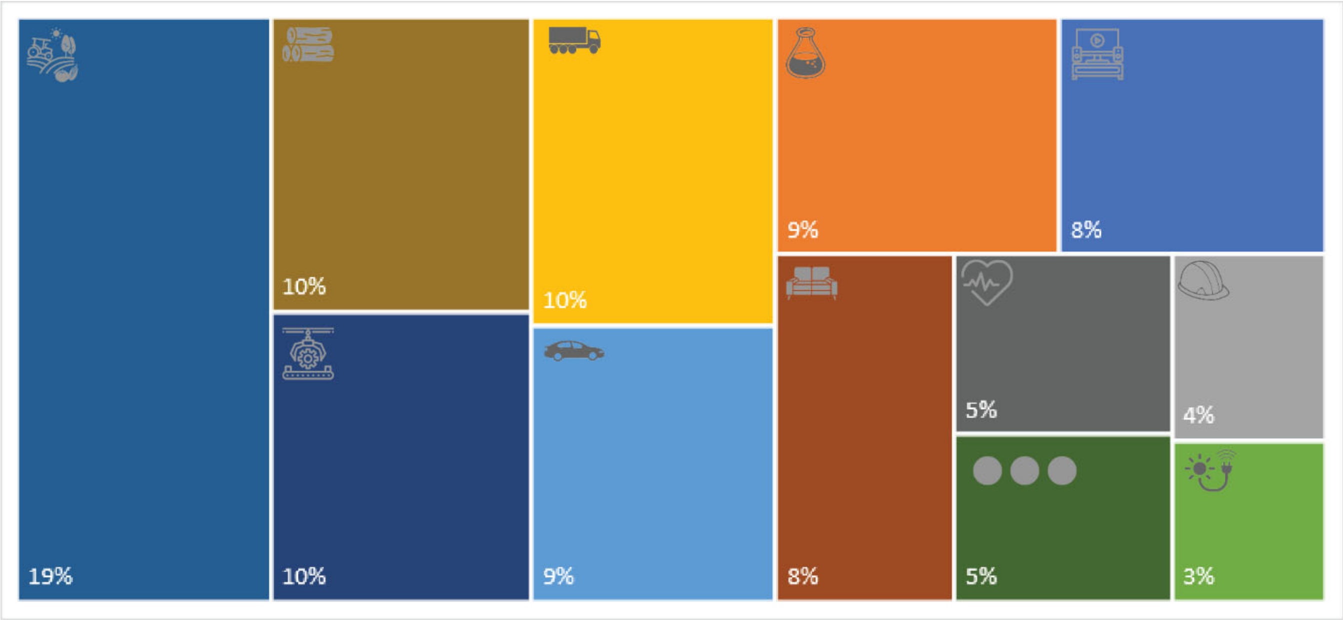


Source: Transearch, NJDOT

VALUE

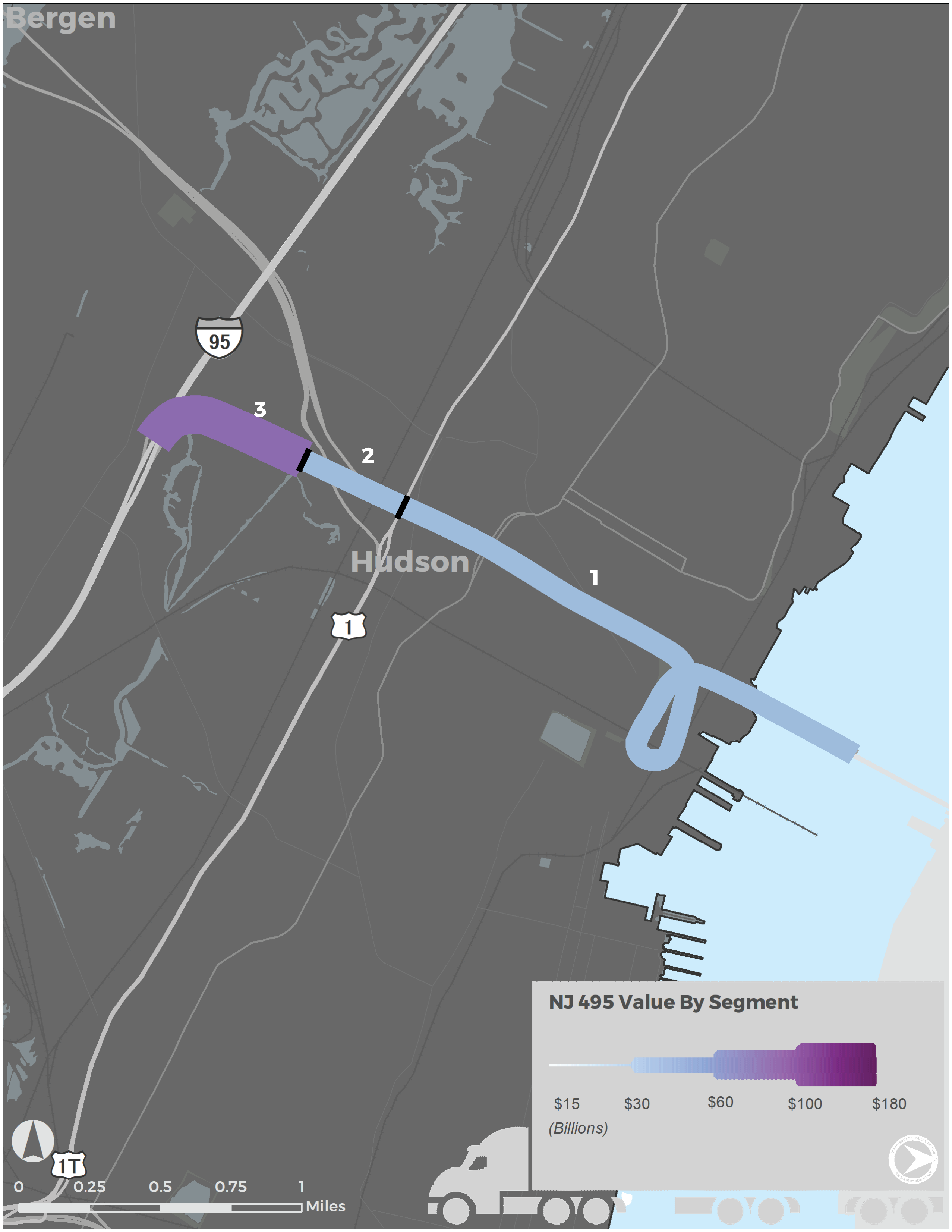
As with tonnage, total value along the corridor is highest on Segment 3 ($82 billion), linking U.S. Route 1/9 with the Lincoln Tunnel, however significantly high values are evident along the entire corridor, as shown in Figure 192 and Figure 193.

Figure 192. NJ 495 Value by Commodity



Source: Transearch

Figure 193. NJ 495 Total Value



Source: Transearch, NJDOT

SUMMARY

Table 78 provides a summary of data for the NJ 495 corridor, including tonnage, value, empty rates, and predominant commodities by segment.

Table 78. NJ 495 Summary

Segment	West End	East End	Tonnage	Value (000s)	Empty Units	Empty Units	Predominant Tonnage	Predominant Value
1	I-95	NJ 3	32,201,206	$54,805,039	785,999	33%	Const. - 27%	Food - 20%
2	NJ 3	U.S. 1	31,437,948	$53,099,615	686,068	31%	Const. - 27%	Food - 20%
3	U.S. 1	NY State Line	44,757,137	$82,184,176	1,281,967	37%	Const. - 24%	Food - 18%

7.3 RAIL

7.3.1 Freight Rail Operators

Twenty freight railroads operate within New Jersey including two Class I Railroads - Norfolk Southern (NS), and CSX Transportation (CSXT); one Class II Regional Railroad - the New York, Susquehanna, and Western Railway; ten Class II and III Local Railroads, and seven Switching and Terminal Railroads, including New York New Jersey Rail, LLC (NYNJR), the only remaining trans-Hudson Car Float operation.[79] Portions of the track mileage operated by freight railroads are owned by freight railroads and portions are owned by passenger railroads. Regardless of ownership, many sections of track are shared with passenger operations operated by Amtrak, NJ TRANSIT, and the Southeastern Pennsylvania Transportation Authority (SEPTA). Port Authority Trans-Hudson (PATH) and PATCO also provide passenger service, but their systems do not connect with the freight system. NJ TRANSIT operates two similar light rail systems (in that they do not interact or connect with the main railroad system) in North Jersey, as well as a hybrid system in South Jersey that does operate in mixed freight company, but under an FRA temporal separation agreement, holding that the two types of service do not operate at the same time. Figure 194 displays the New Jersey rail network.

There are currently approximately 1,000 freight rail employees in the state, a substantial reduction from over 1,700 in 2003 as reported in the 2007 New Jersey Freight Plan. The United States Bureau of Labor Statistics cites operational changes, primarily Precision Scheduled Railroading (PSR), along with uncertainties in the trade environment for the decline in employment. PSR is a shift away from single-commodity consists to mixed goods consists that pick up and deliver goods to a variety of suppliers and customers and are not held back by the economies of scale that would delay or cancel single-commodity trains.[80]

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With greater efficiency in train movement came a reduced need for staffing, and employees who left the industry through retirement or attrition and have not been replaced at the same rate as in the past. Precision scheduled

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79 Association of American Railroads, New Jersey Statistics for 2016.

80 Ryan Ansell, "Employment in rail transportation heads downhill between November 2018 and December 2020," Monthly Labor Review, U.S. Bureau of Labor Statistics, October 2021, https://doi.org/10.21916/mlr.2021.21

81 Association of American Railroads, New Jersey Statistics for 2016.

82 Ryan Ansell, "Employment in rail transportation heads downhill between November 2018 and December 2020," Monthly Labor Review, U.S. Bureau of Labor Statistics, October 2021, https://doi.org/10.21916/mlr.2021.21

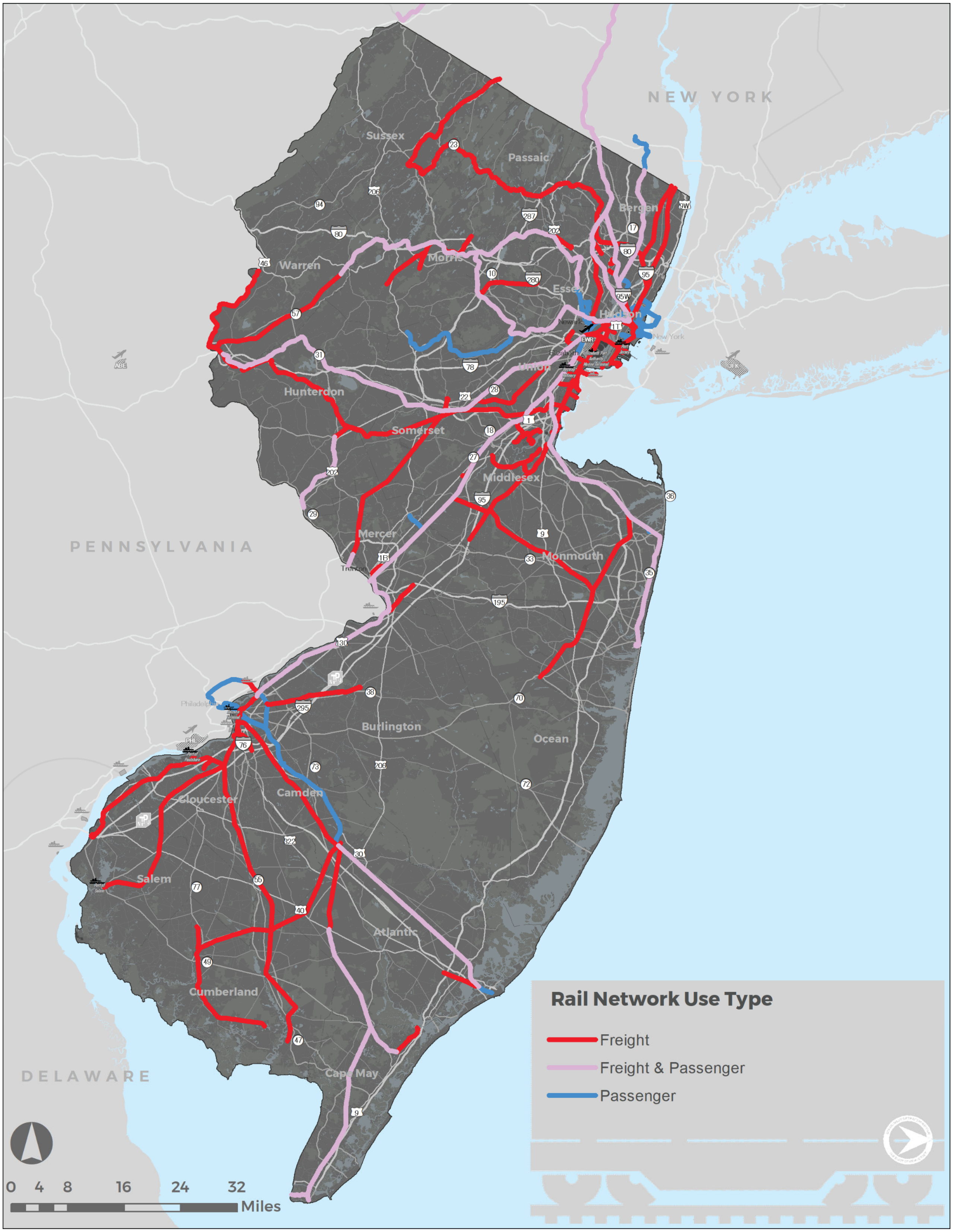
railroading (PSR) is a concept in freight railroad operations adopted by nearly every North American Class I railroad. It shifts the focus from older practices, such as unit trains, hub and spoke operations, and individual car switching at hump yards, to emphasize point-to-point freight car movements on simplified routing networks. Under PSR, freight trains operate on fixed schedules instead of being dispatched whenever a sufficient number of loaded cars are available. In the past, container trains and general merchandise trains operated separately. Under PSR they are combined as needed. Inventories of freight cars and locomotives are reduced, and fewer workers are employed for a given level of traffic. The result is often improvement in railroad operating ratios.

PSR advocates note that shippers benefit in the long run from reduced costs and more reliable schedules. However, PSR brings new challenges to the industry, including delays and reduced service, safety concerns associated with longer trains (up to three miles), leading to increased chance of derailments, increased crew stress and fatigue, as the North American railroad network was not for designed trains of this length. Under PSR, service is typically eliminated on shipping lanes and origin-destination pairs that have low traffic levels. Intermodal terminals have been consolidated, with the railroad relying on trucks for the last hundred miles.

Due to the shared-use circumstance in New Jersey, it is important to understand the difference between "track miles owned and operated" and "trackage rights." Freight railroads own and control portions of the rail network in New Jersey, and over these portions of the network, they set operating policies and are responsible for dispatching on and maintaining the tracks, signals, and associated infrastructure. Trackage rights are operating agreements between a railroad operator and a railroad owner, similar to a rental agreement. Typically, a railroad with trackage rights has the right to operate over tracks owned by another. The other is responsible for maintenance, policy, and dispatching. A freight railroad owner can have trackage rights over another freight railroad's tracks as well as passenger rail tracks, and vice versa. Table 79 summarizes freight rail tracks owned and operated as well as trackage rights and includes passenger service (Amtrak and NJ TRANSIT). Some parts of the freight rail system may also be under lease to an operator, which then is also responsible for maintenance.

Table 80 confirms the generalizations presented earlier: freight rail is interdependent within its own sector and with the passenger railroads. The freight railroads themselves own a total of 1,039 miles of the total 1,671 track miles representing New Jersey's heavy rail network (light rail and subway systems are not included), or about 62% of the rail network. The trackage rights of the Class I freight railroads represent approximately 8.5 times the freight rail miles owned. That is, Class I freight operators operate not only over their own tracks, but other freight rail tracks and the passenger lines owned by NJ TRANSIT and Amtrak.

Figure 194. New Jersey's Rail Network



Source: 2015 New Jersey State Rail Plan, WSP, Jacobs Engineering

Table 79. Railroad Miles, Ownership, and Trackage Rights in New Jersey

Railroad Type	Number of Operators	Track Miles: Owned & Operated	Track Miles: Trackage Rights (includes owned miles)
Class I	2	186	1,545
Regional (Class II)	1	91	91
Local (Class III)	10	298	298
Switching and Terminal	7	493	493
Total Track Miles Owned by Freight Operators		**1,068**	
Total Track Miles Owned by NJ TRANSIT and Amtrak		**603**	
Total Track Miles Owned, Passenger and Freight Combined		**1,671**	
Total Track Miles Operated by Freight Operators		**2,427**	

Table 80. Summary of Freight Operators and Mileage in New Jersey

Class/Type	Railroad Name	Miles Operated
Class I	CSX Transportation	641
	Norfolk Southern Corporation	904
Class II and Class III (Regional)	New York, Susquehanna, and Western Railway	91
Class III (Local)	Belvidere and Delaware River Railway Company	19
	Dover and Delaware	109
	Dover and Rockaway	17
	Black River and Western	17
	Morristown and Erie Railway, Inc.	9
	New Jersey Rail Carrier, LLC	2
	Cape May Seashore Line	13
	SMS Rail Service, Inc.	18
	Southern Railroad Company of New Jersey	47
	Winchester and Western Railroad	47
Switching and Terminal Railroads	Bayway Terminal Switching Co	1
	Conrail, Inc.	469
	East Jersey Railroad and Terminal Company	3
	Hainesport Industrial Railroad	1
	Hainesport Secondary, LLC	1
	New York New Jersey Rail, LLC	1
	Raritan Central Railway, LLC	17

Source: Association of American Railroads, New Jersey Statistics for 2019

7.3.2 Limitations of New Jersey's Rail Network

The railroad industry switched from a standard maximum railcar weight of 263,000 pounds to 286,000 pounds in the 1990s. Moving from a 263,000-pound standard to a 286,000-pound standard enables 10-11% more freight to be carried per railcar, reducing operating costs. For many railcar types (e.g., hopper cars, box cars, tankers, etc.), a 263,000-pound car can carry around 100 tons of freight, whereas a 286,000-pound car can carry around 110 to 112 tons of freight. Because fewer railcars are needed to carry the same freight, fewer railcars need to be loaded, acquired, maintained, and moved into and out of trains.[83] Less weight in railcars is needed to haul the same amount of freight. This reduction in railcar weight per ton transported also reduces fuel consumption and provides emissions savings. The weight limit occurs almost exclusively on bridges that are old and exist primarily on lines with both passenger and freight operation, where the passenger operation does not require a higher weight limit.

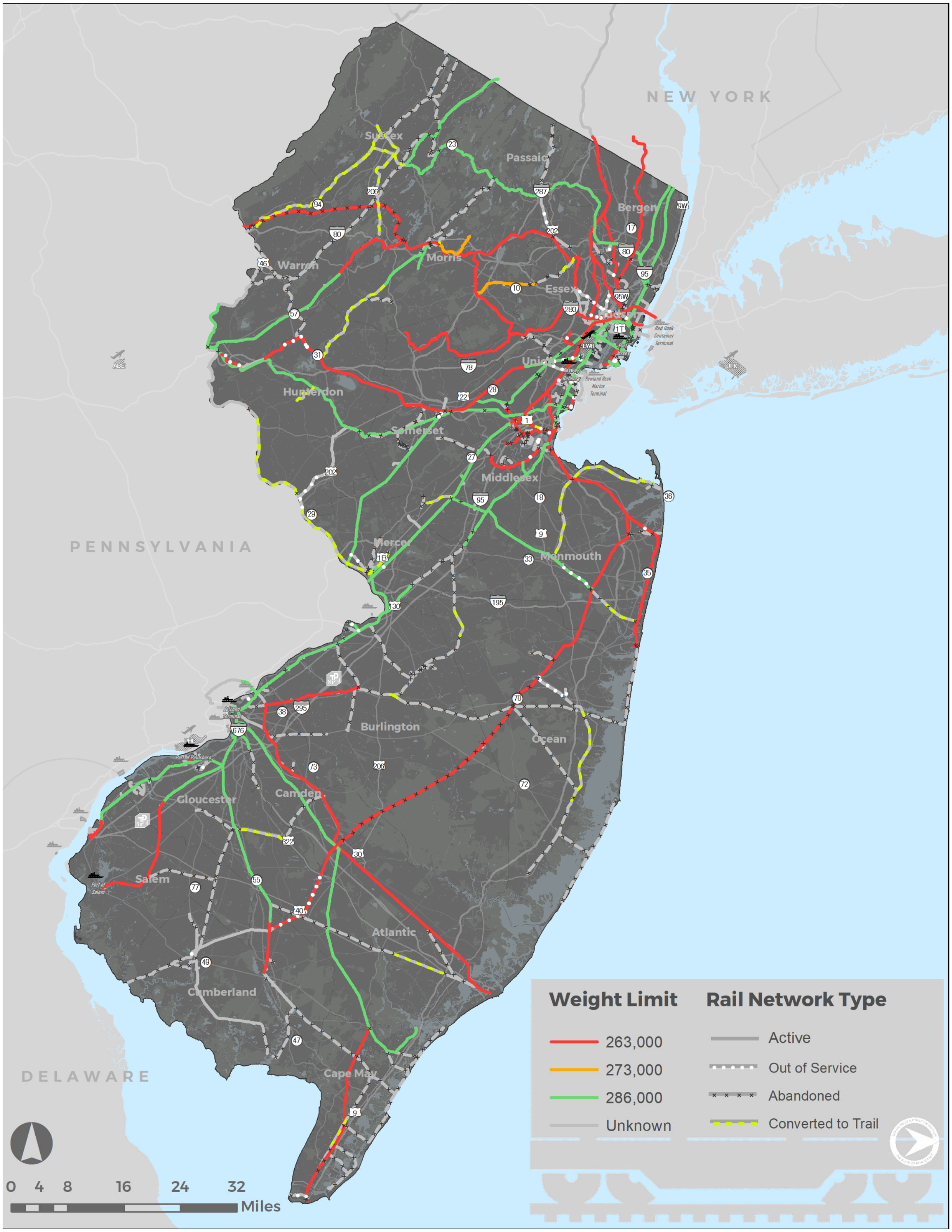
Where rail lines cannot accommodate 286,000-pound railcars, it places railroads and shippers at a competitive disadvantage. In many cases shippers pay the same rates per carload regardless of railcar size. Therefore, if the shipper cannot load railcars to 286,000 pounds, that shipper must pay the same per railcar but use more railcars to haul the same volume of freight. Railroad moves are typically long distances. Most rail moves handled by the New Jersey rail network originate and/or terminate in other states and other parts of the country. According to the STB Carload Waybill Sample, the average distance of a rail move that is handled in New Jersey is 972 miles. Because most of the rail network can accommodate 286,000-pound railcars and because it would be prohibitively expensive to shift freight from one railcar to another, a segment unable to accommodate 286,000-pound railcars will often present a bottleneck to an entire rail move. Put another way, if only 10 miles of rail line cannot accommodate 286,000-pound railcars out of a move of 972 miles, the shipper will be limited over the entire rail move even if the other 962 miles of track covered are compatible with the 286,000-pound standard. The problem is expected to become worse in the future because smaller railcars are being taken out of service and replaced with larger railcars, so shippers will need to use more expensive high-capacity railcars but then be forced to short load them. The 2015 New Jersey State Rail Plan identified major portions of the New Jersey rail network that were unable to accommodate industry standard railcars as shown in Figure 195.

Another limitation of New Jersey rail lines relates to the available clearance above rails. When New Jersey's rail lines were built, railcars did not require as high a vertical clearance as they do today. The Association of American Railroads designates dimensions of railcars using "plates" or diagrams. Figure 196 displays two relevant standards, Plate F and Plate H. Plate H is a requirement for railcars that are 20' 2" above rails. They often require an additional buffer in case the railcar jostles up and down, as shown as a six-inch jump in Figure 196, so that the total clearance requirement for passage of Plate H railcars is 20' 8". This standard is applicable to double stack intermodal railcars. Hi cube domestic intermodal containers are 9' 6", so when they are stacked on each other the total is 19'. With the height of the well car on which they sit, the total is 20' 2". Certain trilevel auto racks (multilevel flat cars used for carrying automobiles) also require Plate H clearance. These standards are applicable only if rail lines are to be used for intermodal service or for transporting automobiles, which is not relevant to all rail lines. While the focus of studies reviewed was on Plate F clearance, Plate H clearance could be needed sometime in the future.

While a vertical clearance of 20' 8" may be acceptable for the passage of Plate H and hi cube domestic intermodal containers, CSX and Norfolk Southern require that new overhead bridges (including existing bridge replacements) clear span their right of way and have a minimum 23' vertical clearance above top of rail.

83 While the total gross weight of 286,000-pound railcars is 8.7 percent higher than that of 263,000-pound railcars, the percentage increase allowable payload is higher than 8.7 percent because the ratio of lading weight (payload weight) to tare weight (weight of the railcar) is more favorable for 286,000 pound railcars than for 263,000-pound railcars. When shifting to the higher capacity, the cubic dimensions of the railcar increase more than the weight of railcar needed to hold that capacity.

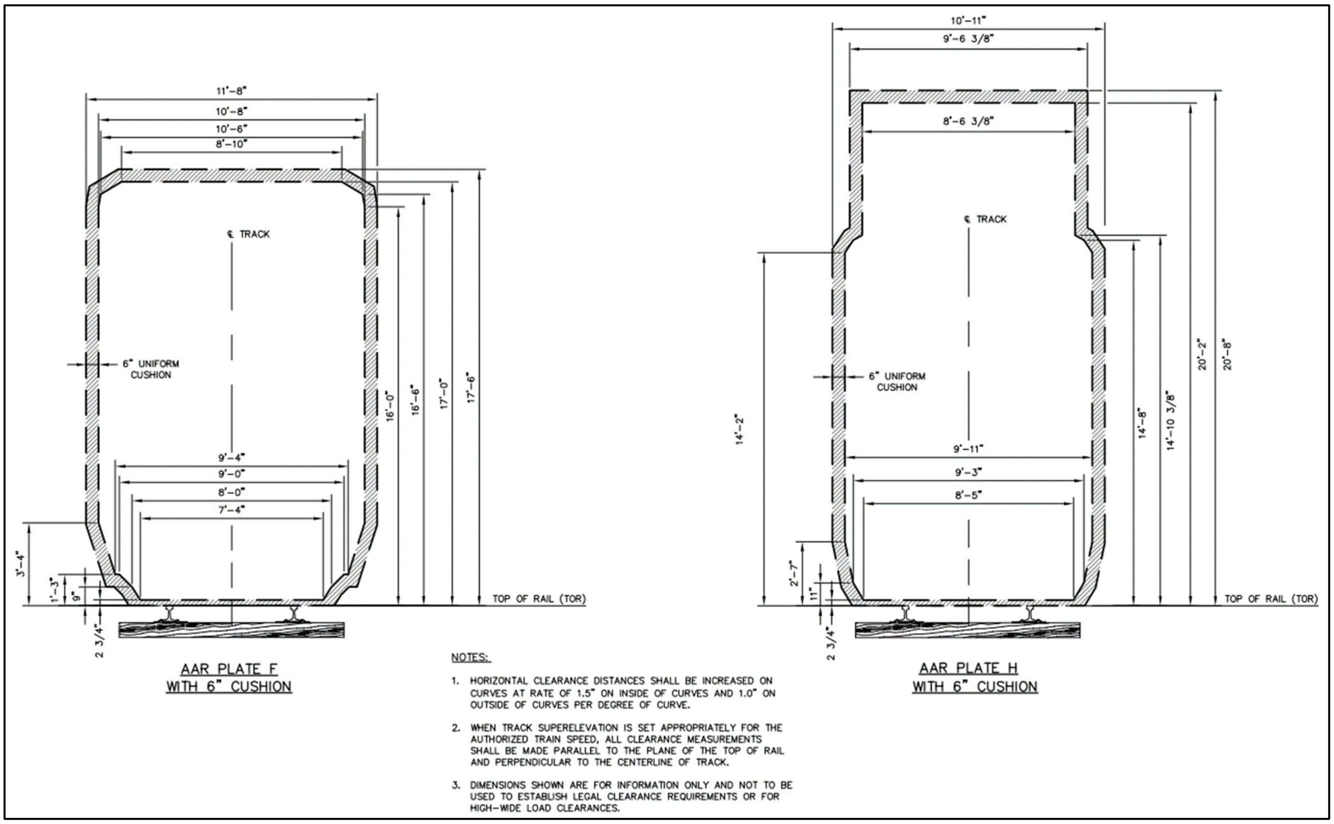
Figure 195. Weight Restricted Rail Lines in New Jersey



Source: 2015 New Jersey State Rail Plan, WSP, Jacobs Engineering

Rail lines are further limited by lacking Plate F clearance, which is 17’ 0” above rail or 17’ 6” with a six-inch buffer. For example, hi-cube boxcars require Plate F clearance. While only certain rail routes are expected to carry intermodal or automotive railcars, any rail line should be expected to carry hi-cube boxcars. Rail lines that do not allow Plate F railcars are not operating to modern standards.

Figure 196. AAR Plate F and Plate H



Source: Caltrain

Several recent studies have identified the removal of these limitations as top priority improvements to the New Jersey rail network. Upgrading rail lines to 286,000 and removing clearance restrictions were identified as top priorities in the 2014 *New Jersey Freight Rail Strategic Plan* and reconfirmed in the 2017 *New Jersey Statewide Freight Plan*. NJTPA commissioned several studies to assess the impact of removing height and weight restrictions on freight rail corridors in northern New Jersey.

> New Jersey is not only impacted by limitations of rail lines within the state, but also rail lines of adjoining jurisdictions. For example, the Delair Bridge between New Jersey and Pennsylvania was recently improved to accommodate 286,000-pound Plate F railcars. To accommodate larger railcars, such as Plate H, not only would the bridge need to be further modified, but obstructions would need to be cleared west of the bridge in Philadelphia where the rail line runs parallel to the Northeast Corridor.

In addition with the retirement of older 50’ boxcars, the newer 60’ boxcars may not line up with warehouses served by rail. Older rail-served warehouses frequently have their doors spaced to accommodate 50-ft boxcars. As those 50-ft boxcars are retired and replaced by 60-ft (or larger) boxcars, the warehouse door spacing doesn't align with the railcars. This results in fewer railcars spotted per operation than if the cars and the doors lined up correctly. Providing assistance for retrofitting old warehouses to accommodate new railcars may be a program for the state of NJ to consider in order to encourage the use of rail in the state.

Hudson County, NJ (Source: WSP)

7.3.3 Passenger Rail Network

Much of the challenge of improving the efficiency of freight rail is rooted in the constrained rights-of-way shared with passenger rail service. As described above, finding land to acquire for right-of-way for new alignments in New Jersey is very difficult on account of the densely developed landscape. Coordinating freight and passenger service puts in conflict the needs of the traveling public and economic stability and development. To fully appreciate the complexity of this issue, it is useful to understand the operating parameters of the passenger rail services that share the tracks with freight.

AMTRAK

In 2019, the last year of Amtrak data available for New Jersey, Amtrak operated approximately 110 trains a day in New Jersey along the Northeast Corridor between New York/Newark and Trenton, including the Acela Express, Northeast Regional, and Keystone Corridor trains. Amtrak also operates several long-distance trains that service New Jersey including the Crescent (from New York, through New Jersey to New Orleans), the Cardinal (from New York, through New Jersey to Chicago), the Palmetto (from New York, through New Jersey to Savannah), the Silver Meteor (from New York through New Jersey to Jacksonville then Miami), the Silver Star (New York through New Jersey to Tampa then Miami) the Carolinian (from New York, through New Jersey to Charlotte), the Pennsylvanian (from New York, through New Jersey to Pittsburgh), and the Vermonter (from Washington D.C., through New Jersey to St. Albans, Vermont). Amtrak stations in New Jersey experienced over 1.75 million boardings and alightings in 2019 over 730,000 of which occurred at the Newark station – the busiest in New Jersey and the 13th busiest in the Amtrak system. Amtrak owns the Northeast Corridor track (approximately 58 miles in New Jersey), on which it operates its trains. The Northeast Corridor between Philadelphia and New York is used for freight rail service as well, operated by Conrail, who serves as a switching and terminal agent for Norfolk Southern and CSX.

NEW JERSEY TRANSIT

NJ TRANSIT provides regional passenger rail services on 12 commuter lines throughout New Jersey that connect to New York and Philadelphia.[84] In 2021, NJT operated an average of 681 daily revenue trains during weekdays and an average of about 396 trains on the weekends.[85] There were more than 109.8 million unlinked passenger trips in FY 2021.[86]

84 2016, NJ TRANSIT. NJ TRANSIT Facts at a Glance, Fiscal Year 2016

85 Trains carrying paying passengers

86 Unlinked passenger trips refer to passengers who board public transit vehicles, even if the boarding is the result of a transfer from another vehicle.

The northern routes on the Main and Bergen County Lines and Pascack Valley Line serve Hudson and Bergen counties. The Montclair-Boonton and Morristown Lines serve the counties of Essex, Morris, and Warren with the Gladstone Branch serving Union and Somerset counties to the west and south of Newark. The Raritan Valley Line serves Union, Middlesex, Somerset, and Hunterdon counties to the southwest. The Northeast Corridor Line, North Jersey Coast Line, River Line, and Atlantic City Line service points south and west of New York City, with destinations of Trenton, Philadelphia, and Atlantic City. The North Jersey Coast Line serves passengers in Middlesex, Monmouth, and Ocean counties. The Northeast Corridor Line serves Hudson, Essex, Union, Middlesex, and Mercer counties from Newark to Trenton. The River Line continues from Trenton south to Camden and the Atlantic City Line runs from Philadelphia to Atlantic City in the southern part of the state through Camden and Atlantic counties. Freight service operates over several lines owned by NJ TRANSIT, as summarized in Table 81.

Table 81. Freight Service Operating on NJ TRANSIT-owned Lines

Line Name	From MP	To MP	Miles
Pascack Valley Line	7.70	19.57	11.87
Atlantic City Line	27.14	56.09	28.95
Bergen County line	3.09	18.75	15.69
N. Jersey Coast Ln (No.)	0.00	6.70	6.7
N. Jersey Coast Ln (Mid)	20.18	22.01	1.83
N. Jersey Coast Ln (So.)	0.40	16.07	15.67
Northeast Corridor Line	13.51	57.66	44.15
RiverLine	35.70	66.80	31.1
Morristown Line	1.00	57.02	56.02
Montclair-Boonton Line	11.70	34.00	22.3
Main Line (ST W)	69.60	87.83	18.23
Main Line	2.00	76.66	74.66

Source: NJ TRANSIT

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

SEPTA operates commuter rail trains in New Jersey, Pennsylvania, and Delaware, making 771 trips per day throughout their system.[87] Most of this activity is concentrated in Pennsylvania with New Jersey stations in Trenton and West Trenton (Ewing Township) and Delaware stations in and around Newark and Wilmington. The former of these trains operate on Amtrak's Northeast Corridor tracks, which also serve rail freight.

7.3.4 Existing Operating Context

The following sections provide details on the existing operating context as it affects freight rail service in New Jersey.

RAIL DEMAND

The primary driver of freight demand across all modes, including rail, is economic growth. Economic growth, coupled with population growth and the expansion or improvement of rail freight generating facilities (such as ports, intermodal yards, coal-fired power plants, chemical manufacturing facilities, etc.) and modal competitiveness contribute to increases in freight rail flows. The following sections highlight future demographic, economic, and supply chain management trends impacting rail freight in New Jersey.

[87] SEPTA Operating Facts, FY 2015

CONGESTION ON THE TRANSPORTATION NETWORK

As described above, population, economic, and income growth all drive increased freight demand and contribute to congestion on New Jersey's transportation system. With limited resources to build new capacity, it becomes especially important to select the most beneficial infrastructure projects to fund and effectively manage the existing multimodal transportation infrastructure to accommodate freight growth. Analysis of the FAF-4 data indicates that overall freight demand (all modes) will likely grow by about 53% (in terms of tonnage) between 2020 and 2050 with rail freight demand expected to grow by about 47% during the same period. (See Section 6.2.2 for further information on FAF analysis.)

7.3.5 Freight Volume Trends

The freight rail system, initially developed in the 1830s, expanded rapidly in the 1800s and early 1900s with system mileage reaching its peak of about 380,000 miles of track in the 1920s.[88] As a result of improvements and expansion of highway infrastructure, increased competition from the trucking industry, increased regulation, and due in part to the passage of the Staggers Rail Act in 1980, the railroad industry has consolidated and divested itself of lines that were unable to generate enough revenues to cover operating and maintenance costs. The end result is that the core rail network today has been reduced to about 172,000 miles.

Rail freight volumes (U.S. Ton-Miles) increased substantially between 2000 and 2008 due in part to rising global trade combined with freight railroad expansion into new markets such as intermodal trade. The economic downturn of 2008 saw these gains erased, with a return of growth to pre-2008 levels seen in 2011. Growth resumed thru 2014 followed by a period of fluctuating decline and growth culminating in 2000 with volumes dipping below 2000 levels.

Intermodal rail traffic has quadrupled over the last 25 years and increased by about a third during the past decade.[89] Domestic economic growth and geologic finds leading to domestic energy production during the same period led to increases in consumption commodities such as domestic crude oil (which largely replaced coal as the freight rail energy commodity) and bulk food products. More recently, due in part to PSR, rail freight volume has plateaued and in some instances, railroads have lost market share to trucking. Recent reductions in freight rail ton-miles have also resulted from shift in consumer spending from commodities to services, with a commensurate reduction in the demand for the movement of consumer goods and the materials used to manufacture them.

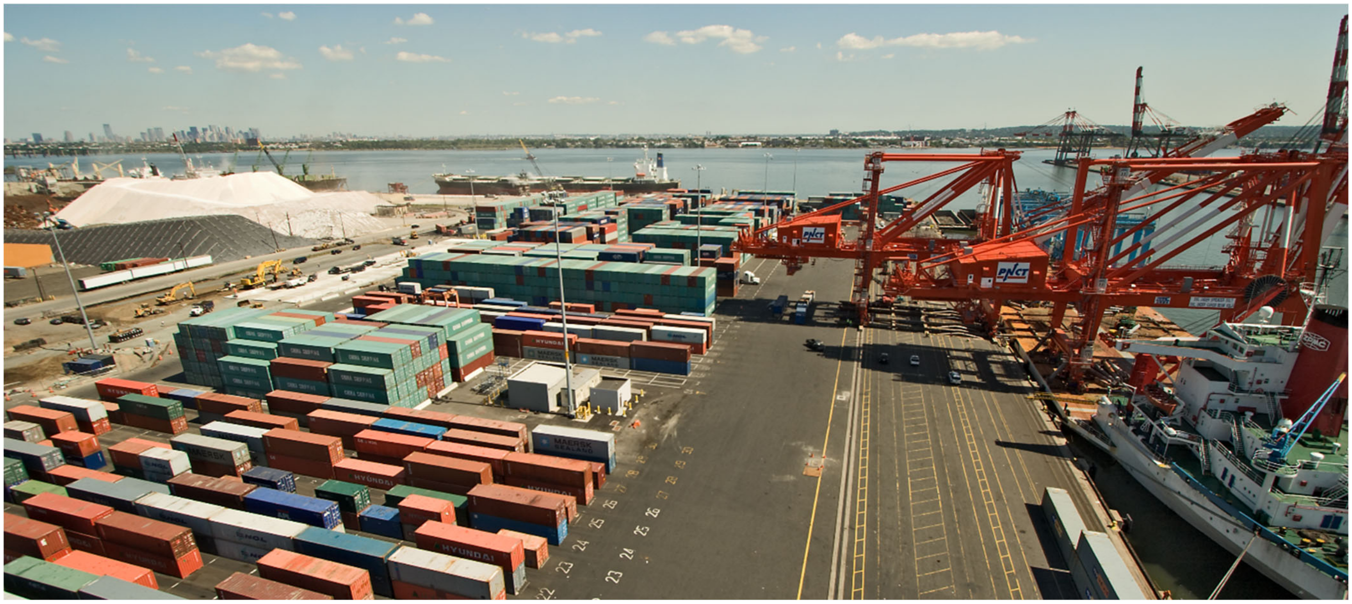
[88] American Association of State Highway and Transportation Officials (AASHTO), Freight Rail Bottom Line Report, 2003
[89] American Association of Railroads, Facts and Figures: https://www.aar.org/facts-figures

7.4 MARITIME

New Jersey's geography, history, and economy are dominated by water and maritime trade. New Jersey's geographic boundaries are largely defined by waterways -- the Delaware River and Delaware Bay to the west and south; and the Atlantic Ocean, Raritan Bay, Arthur Kill, and Hudson River to the East. Ports along these waterways connect New Jersey to other parts of the U.S. and to world regions via waterborne trade.

Spanning Newark Bay and the Hudson River, the Port of New York and New Jersey is the largest major U.S. East Coast port gateway to the rest of the world. Ports on the Delaware River in Southern New Jersey and Pennsylvania also trade with international markets, as well as serve New Jersey, Pennsylvania, and other states.

Both the South and North Jersey port complexes move high volumes of bulk cargo and containers (TEUs) as illustrated in Figure 197.[90] [91]

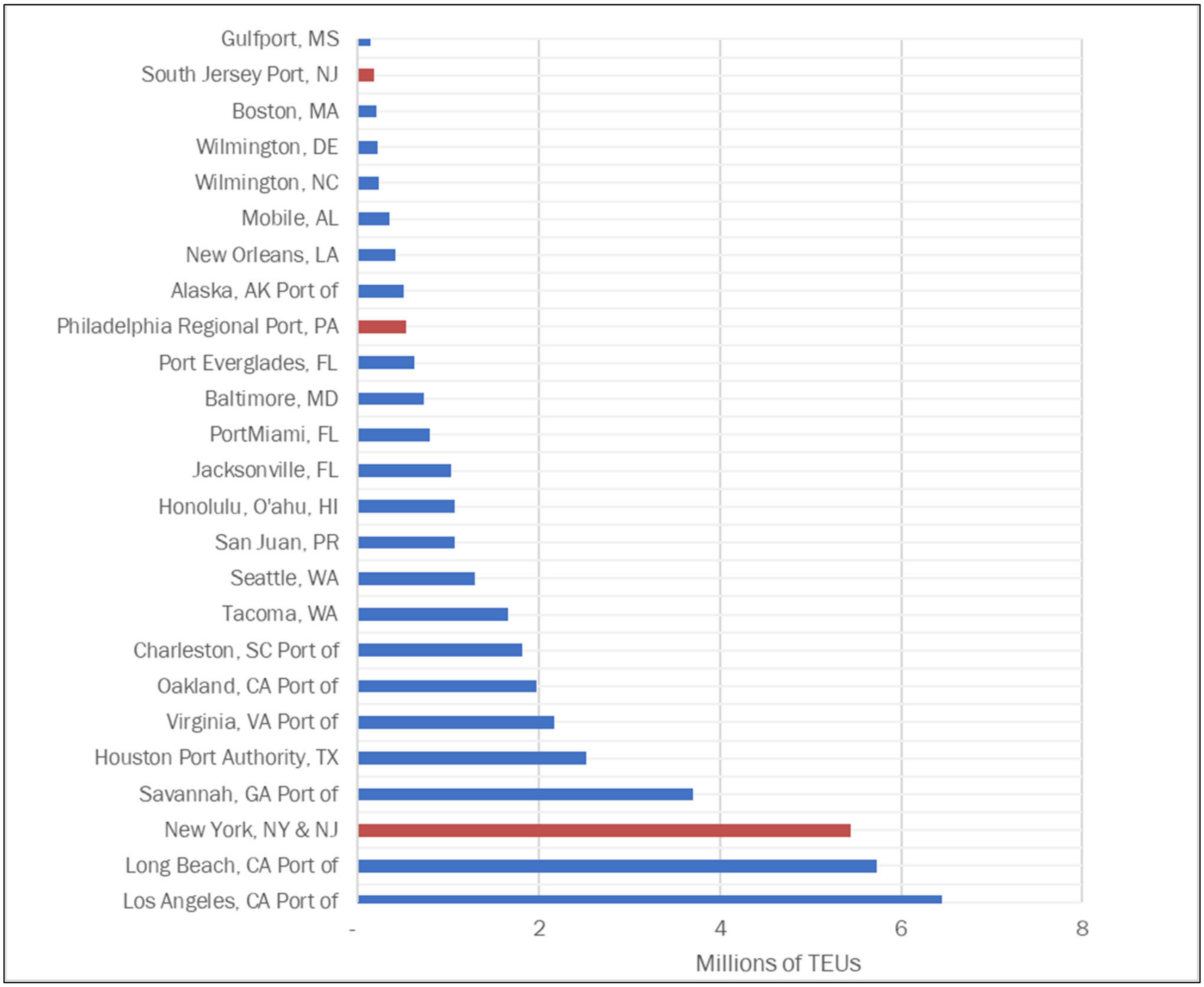


Port Newark Container Terminal, Newark (Source: © David Sailors)

90 Port Performance Freight Statistics Program (PPFSP) Annual Report to Congress, USDOT Bureau of Transportation Statistics, January 2022

91 https://www.bts.gov/content/tonnage-top-50-us-water-ports-ranked-total-tons

Figure 197. Top 25 U.S. Water Ports by TEU, 2020



Source: Bureau of Transportation Statistics, Waterborne Commerce Statistics

New Jersey's maritime ports are a gateway for international trade, connecting New Jersey and the U.S. to markets worldwide. The New Jersey maritime freight network is critical for international trade. Domestically, New Jersey's waterways support the charter and commercial fishing industry, as well as a growing share of New Jersey's goods movement in terms of tonnage and value. The Inter-Coastal Waterway (ICW) and the Atlantic near-shore maritime traffic lane provide an opportunity to help address landside congestion issues, reduce greenhouse gas emissions, and lower landside infrastructure maintenance costs.

New Jersey has made significant investments towards those ends, such as expanding the Port of Salem and developing the New Jersey Wind Port at Lower Alloways. The Port of Salem, operated by the South Jersey Port Corporation (SJPC), is one of the oldest ports on the East Coast and has an advantageous location in South Jersey. In 2021, the Port of Salem was awarded $9 million in INFRA grant funding to expand its vessel capacity and intermodal rail connectivity. Additionally, the New Jersey Wind Port, developed by the New Jersey Economic Development Agency (NJEDA) and located in Lower Alloways Creek, will serve as a hub for staging, assembly, and manufacturing activities to support East Coast offshore wind projects. The 200-acre Wind Port has facilities to manufacture and assemble wind turbine components, as well as shipping facilities to deliver turbines for installation in the Atlantic Ocean. These facilities include the EEW American Offshore Structures facility located at the Port of Paulsboro.

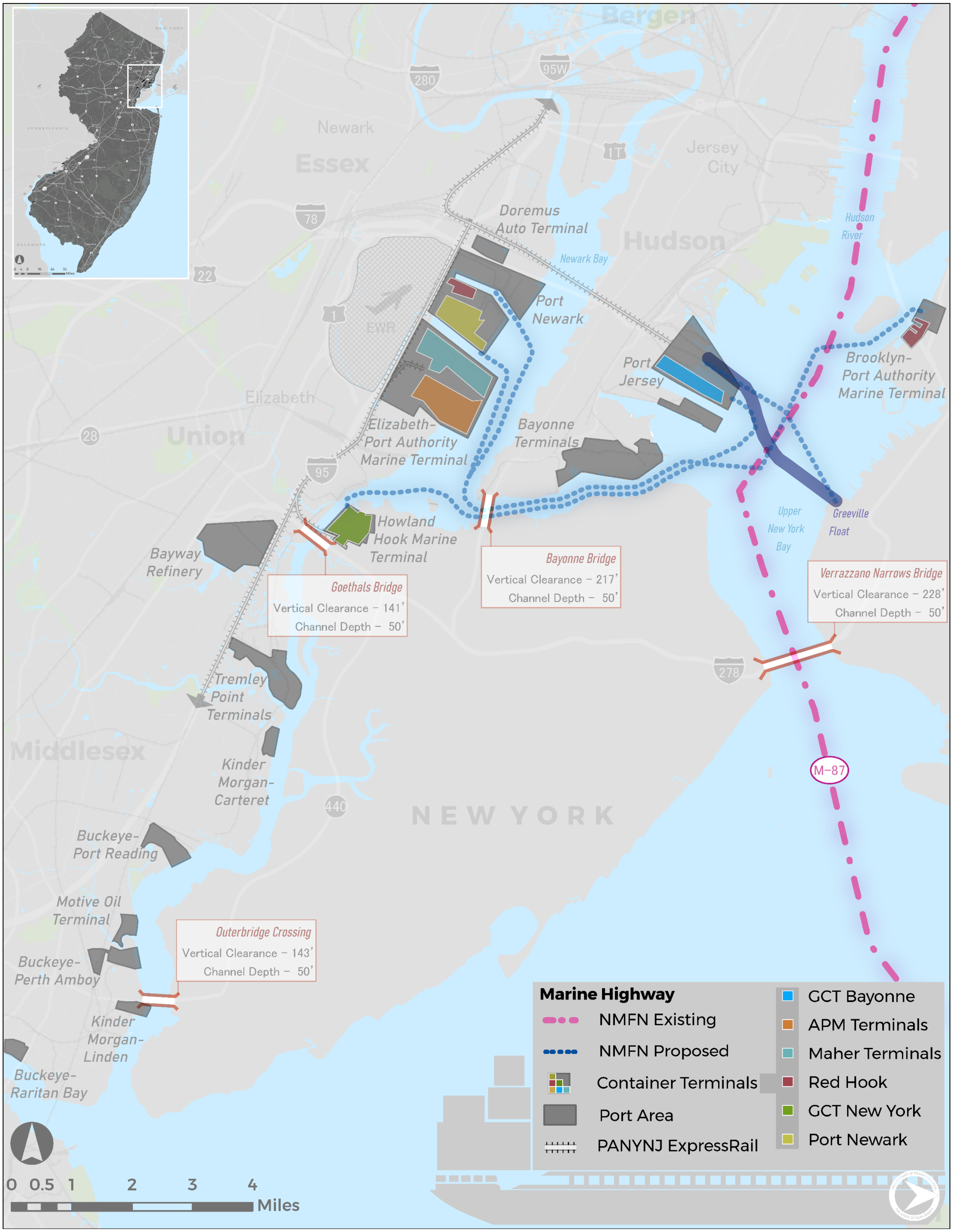
Port of Paulsboro Wind Facility, 2022 (Source: WSP)

7.4.1 The Maritime Network

The maritime freight network detailed in this Plan consists of the following facilities, as described below, and illustrated in Figure 198, Figure 199, and Figure 200.

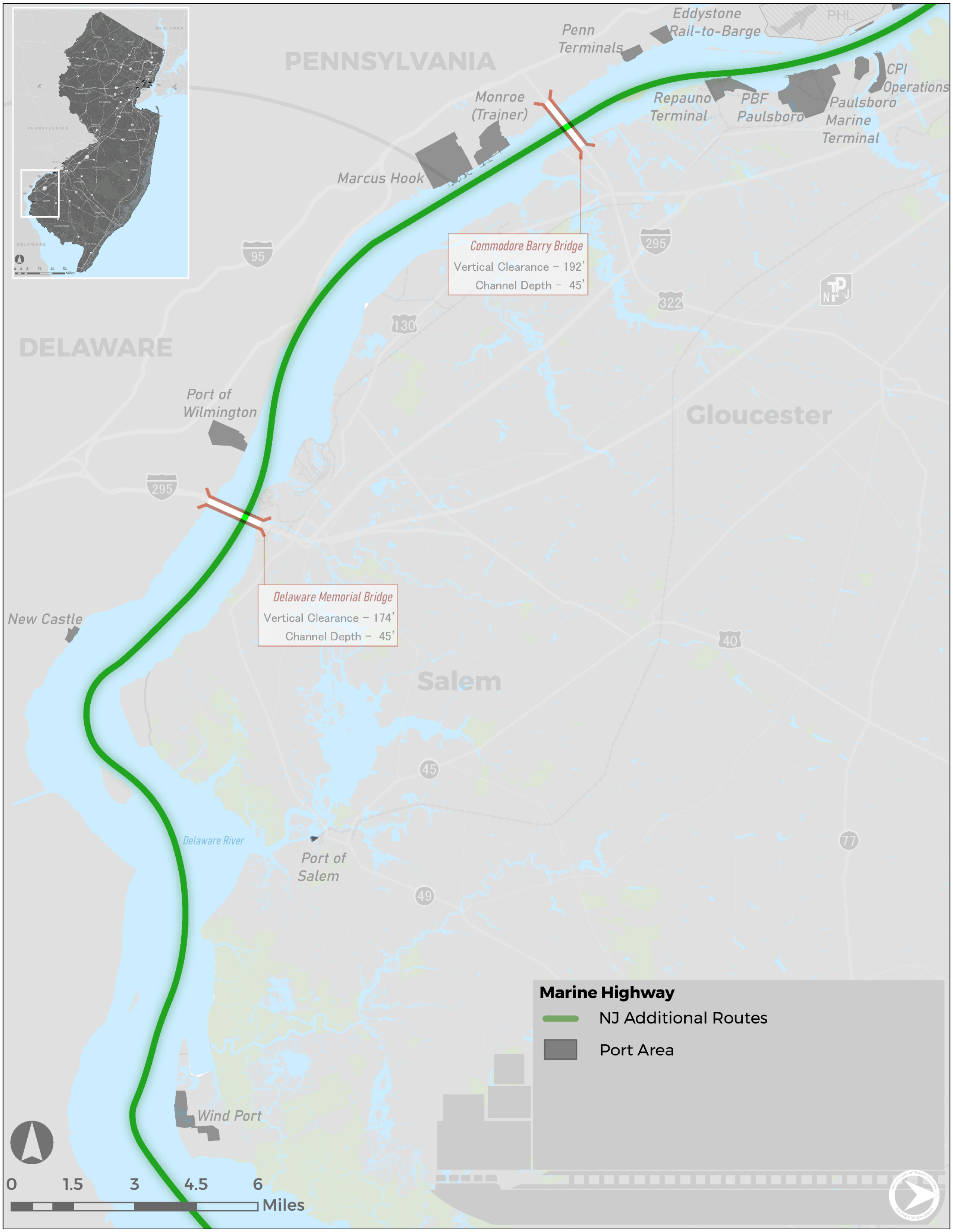
- New Jersey Marine Highways;
- Bridges impacting waterborne freight;
- Marine Ports; and
- Terminals

Figure 198. Northern New Jersey Maritime Network and Facilities



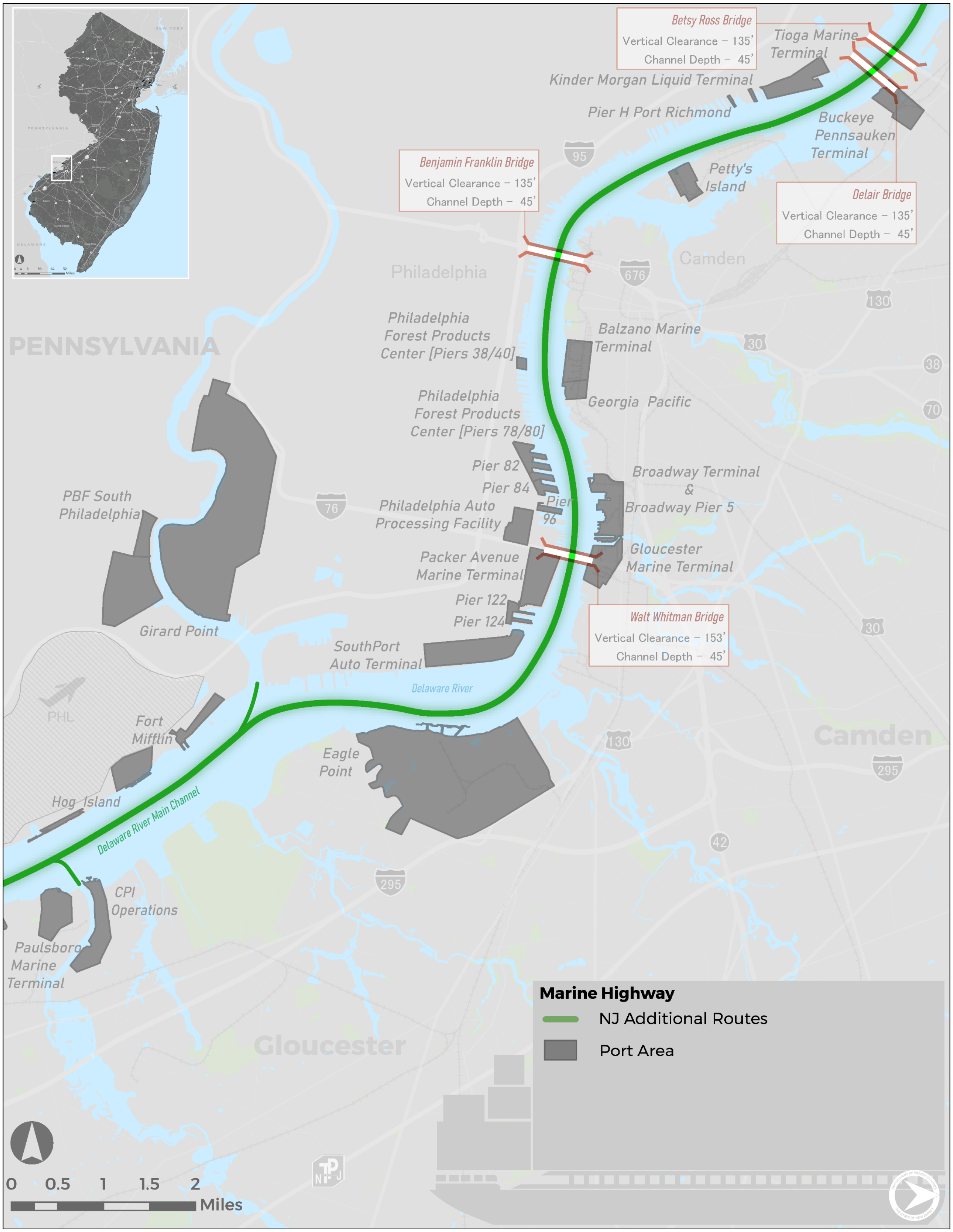
Source: NJDOT, PANYNJ, FHWA, U.S. DOT, Torto Wheaton Research, WSP

Figure 199. Southern New Jersey Maritime Network and Facilities



Source: NJDOT, FHWA, U.S. DOT, DVRPC, DRBC, DRPA , WSP

Figure 200. Southern New Jersey and Philadelphia Area Maritime Network and Facilities



Source: NJDOT, FHWA, U.S. DOT, DVRPC, DRBC, DRPA , WSP

APPROVED NATIONAL MULTIMODAL FREIGHT NETWORK

The National Multimodal Freight Network (NMFN) was developed in 2015 by USDOT with input from each state. Facilities on the NMFN may be advantaged in seeking federal programmatic and discretionary funding. The NMFN includes two marine highways serving New Jersey ports: the M-87 and M-95 Marine Highway Corridors, as illustrated in Figure 201. The M-95, paralleling I-95, runs along the entire eastern seaboard, connecting ports from Portland, ME, to Miami, FL. The M-87 serves the New York-New Jersey metropolitan area. It connects with the M-95 at New York City and traverses the Hudson River to Albany, NY and points north, parallel to I-87.

PROPOSED ADDITIONS TO NMFN

Through the study process and input from the FAC, this Plan identified additional key marine highways for inclusion in the NMFN, as illustrated in Figure 201. They enable cross-harbor waterborne freight movement, connecting the region's ports and alleviating demand on the region's congested highway freight network.

The proposed additions include:

- NYNJ Rail Float, connecting freight railroad in Jersey City, NJ, to freight railroad in Brooklyn, NY and the East of Hudson (EOH) market
- Red Hook Barge Terminal, barge service connecting the Red Hook Terminal to the Port of Newark
- Port Newark Container Terminal, barge service connecting the Red Hook Terminal to Port Newark
- Global Container Terminal NY-NJ, connecting Global Container Terminals on New York Bay

NEW JERSEY MARINE HIGHWAYS

In addition to the NMFN and marine highways supporting waterborne goods movement at the national scale, other marine highways primarily support goods movement within New Jersey and the surrounding region. Based on input from the FAC, the Delaware River Main Channel was identified as an additional New Jersey Marine Highway, serving the entire South Region and ports in both New Jersey and Pennsylvania.

BRIDGES

Bridge structures pose potential barriers to waterborne freight movement due to vertical clearance issues. The maps below illustrate the location of bridge crossings of shipping channels, as well as their vertical clearance and channel depth, to identify existing constraints and impediments within the marine highway network.

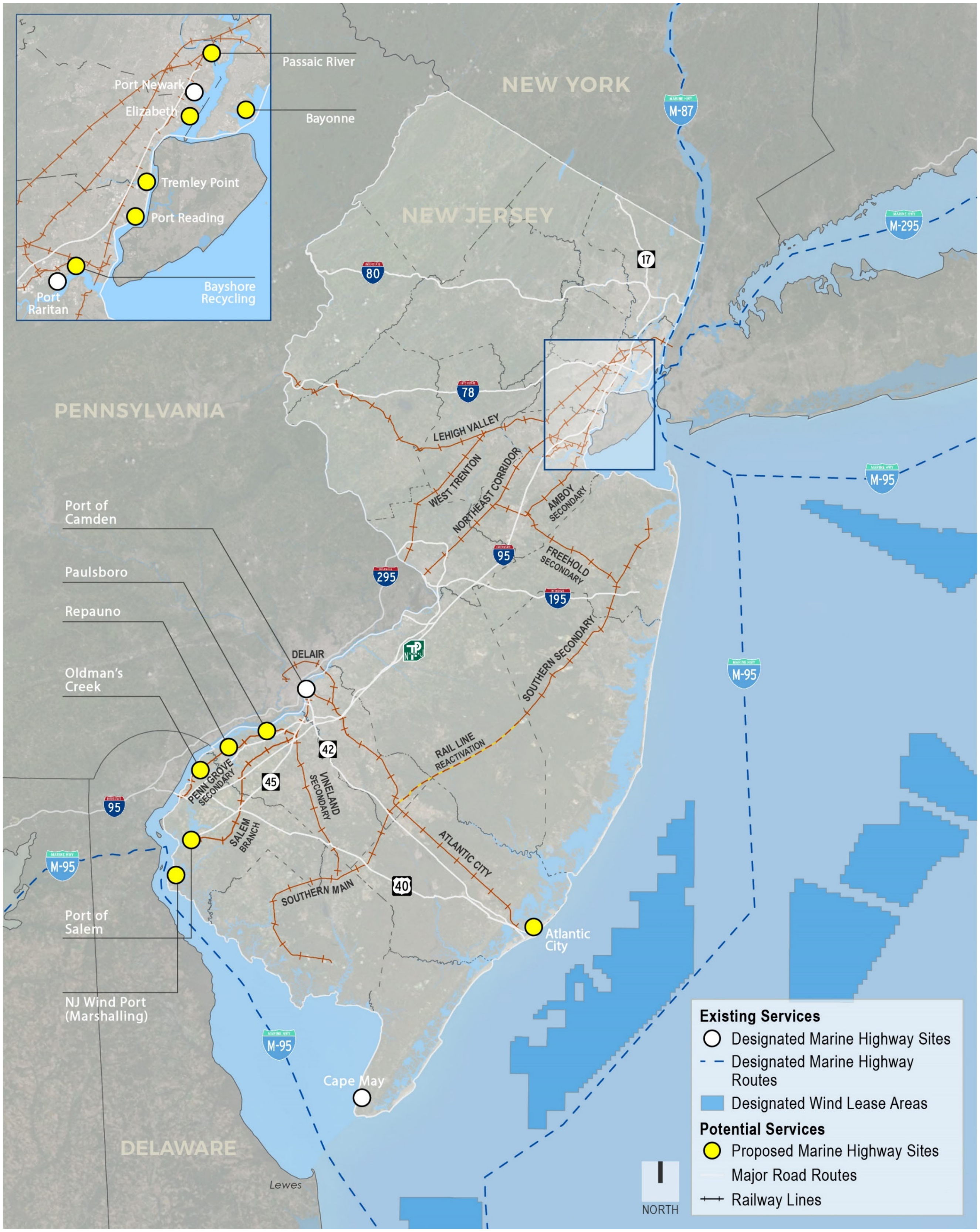
MARINE PORTS

New Jersey's marine ports are intermodal hubs, with access to rail and highway connections and operating in close proximity to warehousing, manufacturing, and light industrial operations. The port facilities are predominantly located in two areas:

- North Region: along Newark Bay and the Hudson River / New York Bay, including the Port of New York and New Jersey facilities
- South Region: along the Delaware River, including the Port of Camden terminals and Port of Paulsboro, as well as ports in the Philadelphia region, which also serve the New Jersey market

Profiles of these three ports from the Bureau of Transportation Statistics annual report are included in Appendix D.

Figure 201. Existing and Proposed Marine Highway Sites



Source: NJDOT, FHWA, U.S. DOT, WSP

MARINE TERMINALS

Whereas "port" is the general term for maritime facilities where ships can dock, "terminals" are public or private commercial wharves dedicated to the storing, handling, transferring, or transporting of goods to and from vessels. The port complexes of northern and southern New Jersey are comprised of terminals engaging in a wide variety of commercial activities. Some of these terminals are managed by port authorities, while others operate independently or under the auspices of other state or federal agencies.

The sections which follow describe freight flows, port facilities, and factors affecting port development for:

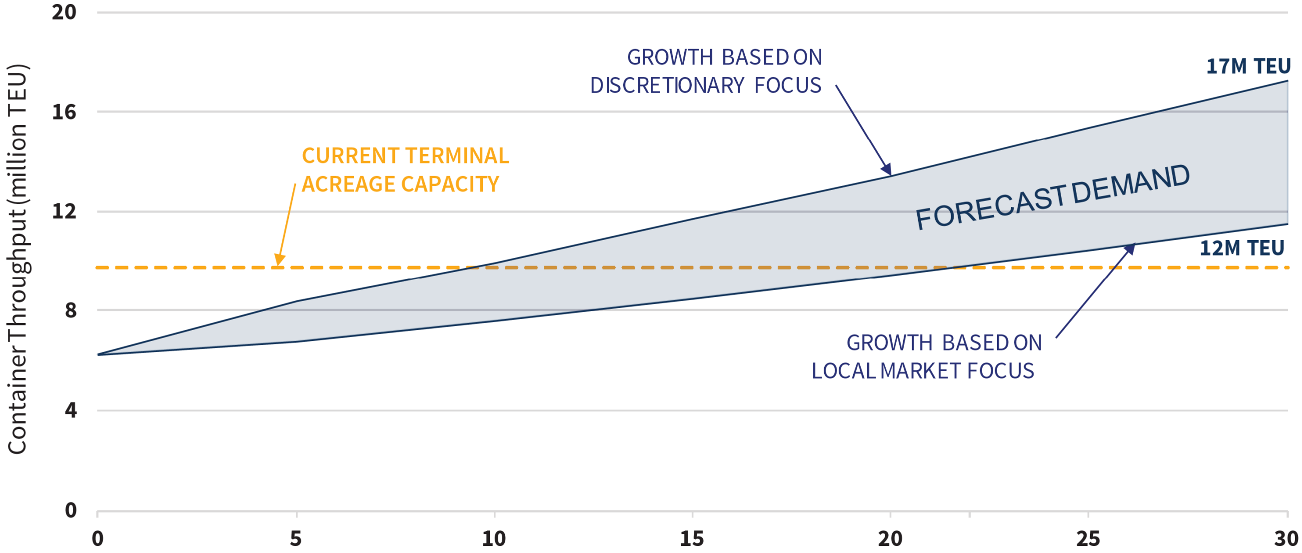
- Northern New Jersey
- Southern New Jersey
- Philadelphia

7.4.2 Northern New Jersey

The coast of northern New Jersey is lined with bulk, oil, vehicle, cruise, and container terminals, as well as maritime vessel maintenance facilities. The Port of New York and New Jersey (PortNYNJ), illustrated in Figure 202, is one of the largest concentrations of containerized and non-containerized marine freight in the world. The PortNYNJ includes facilities in both New Jersey and New York. In New Jersey, these facilities are owned by the Port Authority of New York and New Jersey (PANYNJ) and leased to private marine terminal operators for the handling of containers, automobiles, bulk, and breakbulk cargo, as well as cruise operations. The diverse array of private terminals and tenants handle the majority of PortNYNJ tonnage in the form of crude and refined petroleum, industrial chemicals, construction materials, and other bulk materials. While PANYNJ primarily leases and maintains port properties and facilities, a variety of entities work together in the management of the New York –New Jersey Harbor. Key agencies and organizations include the U.S. Army Corp of Engineers, the U.S. Coast Guard, NJDOT, the Waterfront Commission, the NYC Waterfront Management Advisory Board, and others. These agencies have many separate and intersecting interests but at the forefront they ensure collaboration towards economic development, environmental planning, and emergency response.

In 2019, PANYNJ published *Port Master Plan 2050*, which evaluates potential improvements and actions needed to prepare the Port for the freight volumes anticipated by 2050. The forecast, shown in Figure 202, roughly expects that by 2050, PortNYNJ will need to accommodate 2.8 million intermodal rail lifts, 1.3 million autos, 5.5 million tons of bulk cargo, and 17 million TEUs. This projected increase will have significant implications for freight throughput into New Jersey, especially via I-95, I-78, NJ Route 9, and NJ Route 440. Expanded rail and maritime connections could help take the strain off of the highway system as well as reduce emissions. The Plan outlines two phases of investment for increasing container capacity; the first to maximize recent investments by making primarily road and rail improvements, and the second to create new investment in either East or West of the Kill Van Kull. Starting in 2025, PANYNJ will expand Port Newark in a phased series of improvements.

Figure 202. PANYNJ Container Throughput Forecast



Source: PANYNJ Port Master Plan 2050

INTERNATIONAL FREIGHT FLOWS

Total waterborne imports into New Jersey ports exceeded 67 million tons in 2017 according to FHWA's Freight Analysis Framework estimates. Northern New Jersey was the domestic destination of the majority of that freight, as shown in Table 82. Of total waterborne exports from New Jersey, northern New Jersey was the domestic origin of 4.2 million tons, or 16%, as shown in Table 82.

Table 82. Domestic Destination Region of New Jersey Waterborne Imports by Tonnage (thousands of tons), 2017

Commodity	Northern NJ	Southern NJ	Other Regions	Total
Petroleum Products Total	**24,698**	**2,270**	**957**	**27,925**
Crude petroleum	11,174	-	-	11,174
Gasoline	8,214	1,376	413	10,003
Fuel oils	5,311	893	545	6,749
All other commodities Total	**15,509**	**2,589**	**21,043**	**39,141**
Coal-n.e.c.	3,957	663	319	4,939
Other foodstuffs	2,305	386	1,701	4,392
Nonmetal mineral products	1,510	253	1,208	2,971
Plastics/rubber	735	123	1,564	2,422
Alcoholic beverages	891	149	1,125	2,165
Nonmetallic minerals	578	97	1,447	2,122
Textiles/leather	573	96	1,356	2,025
Basic chemicals	824	138	916	1,878
Machinery	258	43	1,367	1,668
Furniture	576	95	942	1,613
Motorized vehicles	366	61	1,140	1,567
Articles-base metal	341	57	932	1,330
Base metals	181	30	783	994
Total	**40,207**	**4,859**	**22,001**	**67,068**

The top three import commodities, measured by tonnage, were crude petroleum, gasoline, and fuel oils, which together accounted for 61% of northern New Jersey import tonnage. Note that the FAF measures destination by the first stop the freight makes, not necessarily the final destination. This means that northern New Jersey serves as the first stop for the majority of waterborne imports, stored in the region's network of warehouses, distribution centers, and bulk storage facilities, such as those in Bayonne. These facilities in turn forward these goods to regional and nationwide destinations via truck, rail, and pipeline, as well as by ship and barge.

Tank Terminal in Bayonne, NJ (Source: International-Matex Tank Terminal)

Tons exported from northern New Jersey comprise far less tonnage than imports, totaling 280 thousand tons in 2017. Exports are heavily concentrated in just two commodity groups, fuel oils and waste/scrap, which together represented 95% of total export tons.

Overall, a large majority of exported tons (81%) originate outside New Jersey. This volume is primarily coal, which originates in West Virginia, as illustrated in Table 83.

Table 83. Domestic Origin Region of New Jersey Waterborne Exports by Tonnage, 2017 (thousands of tons)

Commodity	Northern NJ Tons	Southern NJ Tons	Other Region Tons	Total Tons
Coal	208	35	20,897	21,139
Waste/scrap	2,122	330	350	2,802
Fuel oils	1,921	323	207	2,451
Cereal grains	1	0	682	683
Motorized vehicles	182	30	148	360
Mixed freight	2	0	277	280
Gasoline	227	38	7	273
Basic chemicals	2	0	230	233
Misc. mfg. prods.	126	21	69	217
Wood products	1	0	172	173
All other commodities	280	47	799	1,126
Total	**4,250**	**688**	**21,454**	**26,391**

Source: FAF 5.3

DOMESTIC FREIGHT FLOWS

According to the Bureau of Transportation Statistics' Port Freight Statistics Program, the Port of New York and New Jersey's domestic tonnage was much smaller than international, 33% of the 2019 total (see Appendix D).

As shown in Table 84, for northern New Jersey terminals, total domestic inbound tonnage by water in 2017 was largely comprised of waste/scrap, comprised of over 5.3 million tons originating in New York.

Outbound domestic tonnage was almost entirely waste/scrap, about 3.3 million tons in 2017.

Table 84. Domestic Inbound and Outbound Tonnage, Northern NJ, 2017 (thousands of tons)

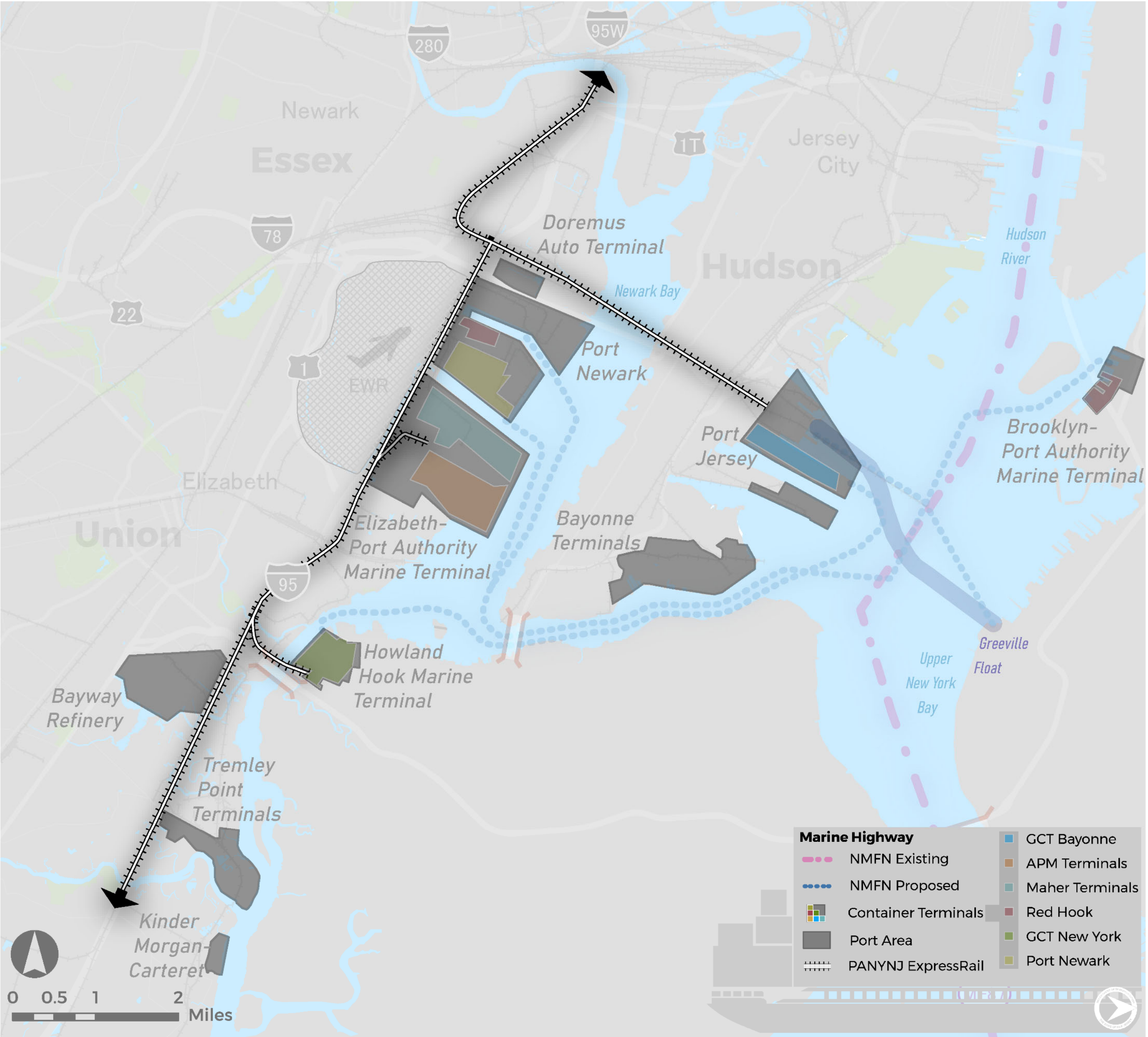
Domestic Inbound Tonnage		Domestic Outbound Tonnage	
Crude petroleum	332.00	Transport equip.	0.24
Waste/scrap	5,269.00	Waste/scrap	3,365.00
Chemical prods.	14.00	Fuel Oils	<0.01
Total	**5,615.00**	**Total**	**3,365.49**

Source: FAF 5.3

PORT FACILITIES AND SERVICES

There are four major container terminals in New Jersey -- Port Newark Container Terminal, Maher Terminal, APM Terminals, and Global Container Terminal (GCT) Bayonne, and two in New York – GCT New York and Red Hook Container Terminal as shown in Figure 203. Container services are handled at the terminals shown in Figure 203, with the great majority of volume occurring at the four New Jersey-based container terminals.

Figure 203. Map of PANYNJ Marine Terminals



Source: NJDOT, PANYNJ, FHWA, U.S. DOT, Torto Wheaton Research, WSP

Bulk and breakbulk cargos are largely handled at Elizabeth and Newark terminals, along with a variety of private terminals along the Kill van Kull, Arthur Kill, the Passaic and Hackensack Rivers, and northern Newark Bay.

The PortNYNJ is one of the largest in the U.S. for automobile imports and exports. Autos are loaded and unloaded at the Port Jersey-Port Authority Marine Terminal in Jersey City and at the northern portion of Port Newark. Automobiles can undergo value-added processing at three dock-side facilities: FAPS Inc. (a 120-acre terminal at Port Newark with the capacity to handle a half million vehicles per year); Toyota Motor Logistics Center at Port Newark; and BMW at Port Jersey.

PORT CONNECTIVITY

Port connectivity refers to the movement of goods into and out of ports, separate from the movements within port terminals. There are three critical aspects of port connectivity:

- Waterway
- Rail
- Trucking (including freight moving between ports and airports, e.g., Newark Airport)

WATERWAYS AND BIG SHIP CAPABILITIES

The expansion of the Panama Canal has enabled the passage of much larger ships through a new set of locks and deeper channels. The size of container ships able to move through the Canal has nearly tripled, from 5,000 twenty-foot equivalent units (TEUs) capacity to over 14,000 TEUs. For the past fifteen years, PANYNJ, in cooperation with Federal and state agencies, has been developing its capabilities to handle the bigger ships introduced by shipping companies to reduce per unit transportations costs and that can now transit the Panama Canal. These efforts have included 1) deepening of some regional channels to 50 feet and 2) raising the deck of the Bayonne Bridge which inhibits passage of large ships into Newark Bay. Each of these is briefly discussed below.

PORT CHANNELS

In September 2016, the United States Army Corps of Engineers (USACE) and PANYNJ announced the completion of the decades-long NY/NJ Harbor Deepening Project. USACE continues to address other navigation issues related to the handling of larger container and liquid bulk vessels, including the depth and dimensions of anchorages, turning basins, and bends in navigation channels. Additionally, in 2022, a USACE study conducted jointly with PANYNJ to assess the merits of further deepening of the NY/NJ Harbor to 55 feet was completed. USACE subsequently recommended in its "Chief's Report" submitted to the US Congress that the federal channels into the Port be deepened by 5 feet and that certain other constraints on the navigation of Ultra-Large Container Vessels (ULCVs) be addressed, such as widening of certain bends and channels in the region.

In addition, through its NY-NJ Harbor and Tributaries Study, USACE is working to develop a regional approach to manage coastal risk from storm surge events. The *Draft Integrated Feasibility Report and Tier 1 Environmental Impact Statement*, released in September 2022, identified a Tentatively Selected Plan that includes storm surge barriers across Arthur Kill and Kill van Kull that will help protect critical infrastructure along these waterways and in Newark Bay. As design work for the Kill van Kull barrier advances, navigability of the shipping channel will be a key design requirement.

BAYONNE BRIDGE

The deck of the Bayonne Bridge, crossing the Kill van Kull and connecting Bayonne with Staten Island has been raised from 151 feet to 215 feet above mean high water, matching the height of the Verrazano-Narrows Bridge under which container ships also pass to reach Port Newark/Elizabeth and Howland Hook Marine Terminal on Staten Island. This project was fully completed in 2019. In 2021, the CMA CGM Marco Polo, the largest container ship (16,022 TEU capacity) to ever dock on the East Coast, sailed under the Bayonne Bridge.

The CMA CGM Marco Polo Sailing Under the Bayonne Bridge, 2021 (Source:nj.com)

RAIL

Figure 203 illustrates the PANYNJ Marine Terminals including the PANYNJ's ExpressRail System. This system provides near-dock rail connections to the national rail network via the CSX and Norfolk Southern railroads and has the capacity for 1.5 annual rail lifts. Four ExpressRail terminals serve the container terminals in Elizabeth, Newark, and Jersey City, and HHMT on Staten Island. Usage of the ExpressRail system has grown from about 540,000 container lifts in 2016 to over 709,000 in 2021.

NEW YORK NEW JERSEY RAIL (NYNJRR)

NYNJRR operates a rail car float service between Greenville Yard in Jersey City and the 65th Street Rail Yard in Brooklyn, NY. Since purchasing NYNJR in 2008, the PANYNJ has made significant investments to improve NYNJRR's infrastructure to expand the capacity of the operation. These investments, funded in part through funds appropriated in the 2005 SAFETEA-LU legislation and administered by the FHWA, include higher-capacity car floats, environmentally friendly Tier 4 locomotives, a new transfer bridge, and a redeveloped rail yard.

CONTAINER BARGE

To facilitate the movement of containers between terminals on different sides of New York Harbor, a lift-on/lift-off container barge operates between Port Newark and the Red Hook Container Terminal (RHCT) in Brooklyn. In 2021, RHCT was awarded $1.47 million from the Maritime Administration's (MARAD) American's Marine Highway Program (AMHP) to begin a Trailer-on-Barge Package Delivery Service. This service is projected to transport up to 36 trailers per round trip.

7.4.3 Southern New Jersey

Southern New Jersey ports are located along the Delaware River and Delaware Bay. Delaware River ports also include those across the river in Pennsylvania. Delaware River ports include:

- Public port terminals managed by the South Jersey Port Corporation, with three terminals in Camden and one in Salem City
- Privately operated ports and terminals in Camden-Gloucester and Paulsboro
- The Ports of Philadelphia, Marcus Hook, and Chester in Pennsylvania

INTERNATIONAL FREIGHT FLOWS

International waterborne freight flows through southern New Jersey ports are dominated by the presence of petroleum refining in the region, particularly in the Paulsboro area. According to FAF data summarized in Table 82, about 50% of international imports to southern New Jersey are petroleum products. In contrast, as shown in Table 83, over 95% of waterborne export tons originating in southern New Jersey are fuel oils and waste/scrap.

DOMESTIC FREIGHT FLOWS

As is the case for northern New Jersey ports, domestic tonnage through southern New Jersey ports is much smaller than international volumes, as shown in Table 85. According to the BTS annual report the Port of Camden- Gloucester (the Army' Corps of Engineers' definition) domestic tonnage was just over 2 million tons compared to 3.2 million foreign tons in 2019 (see Appendix D).

Table 85. Domestic Inbound and Outbound Tonnage, Southern NJ, 2017 (Thousands of Tons)

Domestic Inbound		Domestic Outbound	
Crude petroleum	322	Coal-n.e.c.	586
Fuel oils	1,581	Fuel oils	200
Gasoline	55	Gasoline	55
Transport Equipment	<1		
Total	**1,959**	**Total**	**841**

Source: FAF 5.3

PORT FACILITIES AND SERVICES

The SJPC owns and operates the Balzano (Beckett Street) and Broadway Marine Terminals in the Port of Camden, the Salem Marine Terminal at the Port of Salem, and the Paulsboro Marine Terminal.

CAMDEN

The Port of Camden's Balzano Terminal handles breakbulk and bulk cargoes including steel and wood products, cocoa beans, project cargoes, iron ore, scrap metal, and containers. The Broadway Terminal handles bulk and breakbulk cargoes including petroleum coke, furnace slag, wood and steel products, dolomite, minerals, fresh fruit, and cocoa beans.

Broadway Terminal, SJPC (Source: American Journal of Transportation)

GLOUCESTER

The Gloucester Marine Terminal in Gloucester City, operated by Holt Logistics/Gloucester Terminals LLC handles perishables, forest products, heavy-lift and project cargoes, steel, as well as containers. Holt Logistics also operates the Packer Avenue Terminal in Philadelphia.

> In response to increased demand for steel in South Jersey, SJPC has facilitated barge shipments from South Carolina to Broadway Terminal in Camden. These US-manufactured steel coils have moved by barge to supply material for Camden Yards Steel's manufacturing operation at SJPC's Broadway Terminal. This mode shift occurred in reaction to railcar/truck supply shortages within the Southeast United States. SJPC is actively tracking the potential for future similar barge shipments.

PAULSBORO

The SJPC Paulsboro Marine Terminal, located across the Delaware River from the Philadelphia International Airport, is the first major marine terminal developed on the river in over 50 years. Originally a liquid bulk tank farm, the new terminal began operation in March 2017. The terminal includes 200 acres, on-dock rail access to Class I railroads, an 850-foot berth and a limited access roadway to I-295. The terminal is operated by Holt Logistics, LLC.

In addition to the SJPC Paulsboro Marine Terminal, the Port of Paulsboro has a number of privately owned facilities, operated by companies largely involved in crude oil and petroleum products. These companies include Sunoco (jet fuel), the PBF Energy refinery (gasoline, heating oil and jet fuel), and AXEON Specialty Products refinery (asphalt and related products). In 2021, Ocean Wind, New Jersey's first offshore wind project, broke ground on a facility to manufacture monopiles. This facility is operated by EEW and (as of Fall 2022) is currently operational; two additional steel plants were under construction.

PORT OF SALEM

The Port of Salem is located on the Salem River in Salem County. It is part of Foreign Trade Zone #142 and is owned and operated by the South Jersey Port Corporation. It generally handles smaller barge and container ships. In 2021, the Port of Salem was awarded $9 million in INFRA grant funding to expand its vessel capacity and intermodal rail connectivity.

MIDDLE THOROFARE BRIDGE

The Middle Thorofare Bridge, built in 1939, has been identified previously as an obstacle to the fisheries industry operating in South Jersey. While the structure itself, a bascule bridge built in 1939, is structurally deficient (load posted for 15 tons) and functionally obsolete, additional concerns for the goods movement industry are associated with waterborne clearances. The low vertical clearance (26 feet) requires a substantial number of daily openings (5,500 per year), while the narrow channel width (50 feet between existing abutments) results in frequent vessel strikes. The Cape May County Bridge Commission completed a rehabilitation project for this bridge in December of 2021 (construction shown in following image) and plans a complete replacement in the future.

Middle Thorofare Bridge Rehabilitation, 2021 (Source: American Journal of Transportation)

7.4.4 Philadelphia

Philadelphia region facilities, principally the Port of Philadelphia, also serve New Jersey, and have a close trade and operations relationship with the southern New Jersey ports and terminals. A quarter of Philadelphia region ports' imports are destined to New Jersey locations, as shown in Table 86. The largest volume commodity group by weight imported into Philadelphia region ports is crude oil, with 25% of total volumes going to southern New Jersey. The second largest import is base metals, with 29% of tons going to New Jersey, mostly to northern New Jersey.

Table 86. Philadelphia Area Ports' Waterborne Imports in 2017 (Thousands of Tons)

Commodities by Tonnage (Thousands of Tons)	Northern NJ	Southern NJ	Other Regions	Total
Crude petroleum	30	7,383	21,888	**29,301**
Base metals	822	138	2,353	**3,313**
Other ag prods.	203	34	2,269	**2,506**
Other foodstuffs	258	43	1,229	**1,529**
Coal-n.e.c.	776	130	382	**1,288**
Nonmetallic minerals	173	29	831	**1,033**
Newsprint/paper	10	2	953	**965**
Fuel oils	664	111	92	**867**
Waste/scrap	0	0	666	**666**
Pharmaceuticals	2	0	653	**656**
Other	614	103	3,047	**3,764**
Total	**3,552**	**7,973**	**34,363**	**45,888**

Source: FAF 5.3

Philadelphia is a major importer of refrigerated goods, and other agricultural products (e.g., produce) is the third largest import product group, with 9% of volume to New Jersey going to southern New Jersey. From the Philadelphia region, Other foodstuffs is the fourth third largest port import, with most 20% of volumes product going to New Jersey, primarily to northern New Jersey.

Other coal and petroleum products not elsewhere classified, was the fifth largest Philadelphia region port import, with 70% of tons destined to New Jersey, 60% to northern New Jersey.

As shown in Table 87, Philadelphia area ports' exports of 7.0 million tons were about 15% the volume of imports in 2017. The top export in 2017 was fuel oils, which comprised about 28% of Philadelphia ports' total export tons in 2017, with most volume originating in northern New Jersey. The second largest Philadelphia region export was "other coal and petroleum products not elsewhere classified", but only minimal volumes originated from northern New Jersey.

Table 87. Philadelphia Area Ports' Waterborne Exports in 2017 (Thousands of Tons)

Commodities by Tonnage (Thousands of Tons)	Northern NJ	Southern NJ	Other Regions	Total
Fuel oils	1,337	224	411	**1,972**
Coal-n.e.c.	33	6	1,769	**1,807**
Waste/scrap	534	90	562	**1,186**
Basic chemicals	14	2	879	**896**
Other	75	13	1,028	**1,116**
Total	**1,994**	**334**	**4,648**	**6,976**

Source: FAF 5.3

Waste/scrap was the third largest export from Philadelphia ports in 2017, with over half of volume originating from New Jersey, primarily from northern New Jersey.

7.5 AIR CARGO

Air cargo serves a critical role in New Jersey's supply chain. Since air freight tends to be the highest unit cost to move cargo, commodities that move by air are generally time sensitive, light in weight and high in value. These types of goods include perishable shipments (such as fresh fish and flowers), pharmaceuticals, documents and packages, electronics, high-end apparel and jewelry, or artwork. Just-in-time shipments of parts needed to keep assembly lines and offices functioning, where inventory costs may be higher than the cost to ship may also move by air.

In its simplest form, air cargo is comprised of freight and mail. Airmail in the United States is contracted out by the USPS and travels in the belly of commercial passenger aircraft and on freighters operated by contractors. Air freight refers to all cargo other than mail. Air cargo carriers can be divided into several categories: Passenger airlines, traditional all-cargo carriers, and service oriented integrated/express all-cargo carriers.

7.5.1 Airports

There are three primary airports in New Jersey, including Newark Liberty International Airport (EWR), Atlantic City International Airport (ACY) and Trenton Mercer Airport (TTN). With respect to freight, New Jersey's air cargo market is primarily served by Newark Liberty International Airport, which has consistently ranked within or near the top ten airports in the United States for air cargo (based on annual tonnage), though growth at other airports nationwide have pushed Newark into the top 15 for the last five years. In 2021, Newark ranked 12th in the United States and 37th in the world for total cargo (freight and mail) handling nearly 800,000 tons of cargo.[92] Despite the declines associated with the COVID-19 pandemic, cargo volumes rebounded in 2021, though not yet returning to pre-pandemic levels. Table 88 summarizes New Jersey's largest airports, including smaller secondary facilities, as well as McGuire Air Force Base.

Table 88. Airports in New Jersey

Category	Name	Type	Code
Primary Airports	Atlantic City International Airport	International	ACY
	Newark Liberty International Airport	International	EWR
	Trenton Mercer Airport	Domestic	TTN
Secondary Airports	Cape May Airport	Passenger	WWD
	Millville Airport	Passenger	MIV
	Morristown Municipal Airport	Passenger	MMU
	Teterboro Airport	Passenger	TEB
Military Airports	McGuire Air Force Base	Military	WRI

In addition to cargo movements at Newark Liberty International Airport, a significant amount of air cargo within the region moves through John F. Kennedy International Airport (JFK), which ranked 9th in the United States and 23rd in the world in 2021.

The importance of EWR serving New Jersey's air cargo market is evident in Table 89. Overall, EWR is responsible for 99.5% of all air cargo moving through New Jersey. The remainder is split between Teterboro (TEB), McGuire Air Force Base (WRI), and Atlantic City International (ACY). When cargo associated with military facilities is removed, the dominance of EWR is even higher, controlling 99.997% of all air cargo moved through New Jersey public airports in 2021.

[92] Airports Council International - Worldwide Airport Traffic Report - Calendar Year 2021

Table 89. Percent of Air Freight Domestic & International Cargo through New Jersey Airports (2021)

Airport Name	Code	Domestic (Pounds)	Percent of Domestic	International (Pounds)	Percent of International	Total Freight Movement
Atlantic City International Airport	ACY	1,200	< 0.01%	0	0.00%	0.00%
Newark Liberty International Airport	EWR	1,146,348,365	99.97%	290,541,440	98.88%	99.5%
Morristown Municipal Airport	MMU	12,099	< 0.01%	0	0.00%	0.00%
Teterboro Airport	TEB	22,019	< 0.01%	0	0.00%	0.01%
McGuire Air Force Base	WRI	261,944	0.02%	3,300,106	1.12%	0.49%

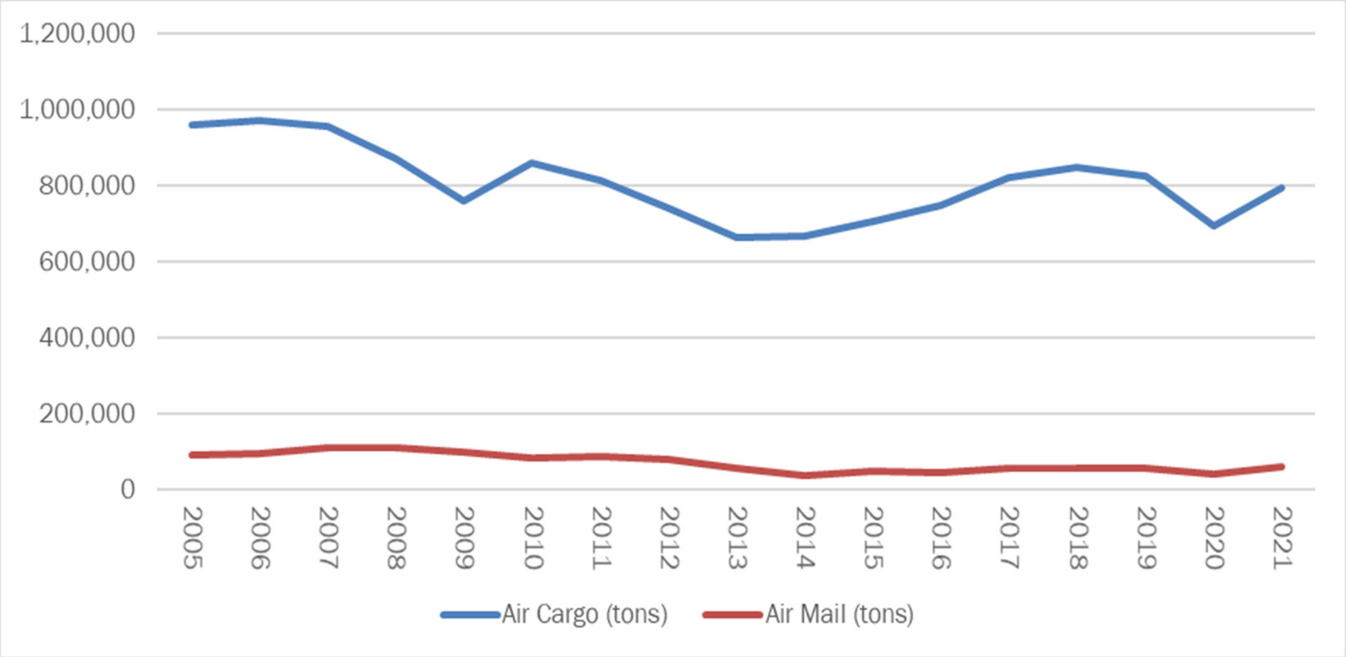
Source: FAA, Air Cargo World, IATA
Note: Imports and Exports include combination of Freight and Mail weight

7.5.2 Newark International Airport

As shown in Figure 204 and Table 90, EWR's overall air cargo has declined since 2005, but had shown growth prior to the pandemic. EWR has maintained a consistent cargo market within the region but has been outpaced by growth at airports within the region, including JFK and Lehigh Valley International (ABE). Major challenges to growth at EWR are primarily associated with land-side highway connections, particularly those with the Lincoln Tunnel and the Newark Bay Extension. Additionally, there is a distinct lack of staging and storage areas off-site within close proximity of the airport, particularly for smaller operations and Third-Party Logistics companies. The construction of a UPS Regional Hub at MOTBY in Bayonne, an approximately 9-mile drive from EWR, will provide opportunities for air cargo growth.

Newark International Airport, (Source: flickr, © Doc Searls)

Figure 204. Newark International Airport (EWR) Air Cargo Trends 2005-2021



Source: FAA, Air Cargo World, IATA, PANYNJ

Table 90. Newark International Airport (EWR) Domestic & International Air Cargo Tonnage 2005-2021

Year	Air Cargo (tons)	Air Mail (tons)	U.S. Rank	Global Rank
2005	957,603	90,169	9	21
2006	969,271	95,658	9	22
2007	953,556	109,062	9	22
2008	869,448	108,565	9	22
2009	758,152	97,441	9	23
2010	860,845	82,479	9	23
2011	811,989	84,603	9	25
2012	741,277	79,393	9	27
2013	662,422	54,677	9	33
2014	666,841	36,366	10	37
2015	704,687	49,029	10	38
2016	746,770	45,798	11	37
2017	822,589	55,623	12	35
2018	848,161	56,738	14	37
2019	825,266	57,171	14	36
2020	695,345	41,665	12	37
2021	792,513	58,547	-	-

Source: FAA, Air Cargo World, IATA
Note: 2021 rankings were not available at the time of publication

7.5.3 Domestic Air Cargo

Table 89 indicates that nearly all domestic air cargo in New Jersey moves through EWR. In 2021, EWR moved a total of 573,174 tons domestically, accounting for 99.97% of all domestic air cargo moving into and out of New Jersey. The remainder (less than 0.1%) moved through Teterboro Airport (TEB), McGuire Air Force Base (WRI), and Atlantic City International (ACY), accounting for 17.5 tons in 2021.

Given that Newark Liberty International Airport controls nearly all air cargo movements within New Jersey, the following sections highlight the movement of freight through EWR only.

AIRLINE CARRIERS

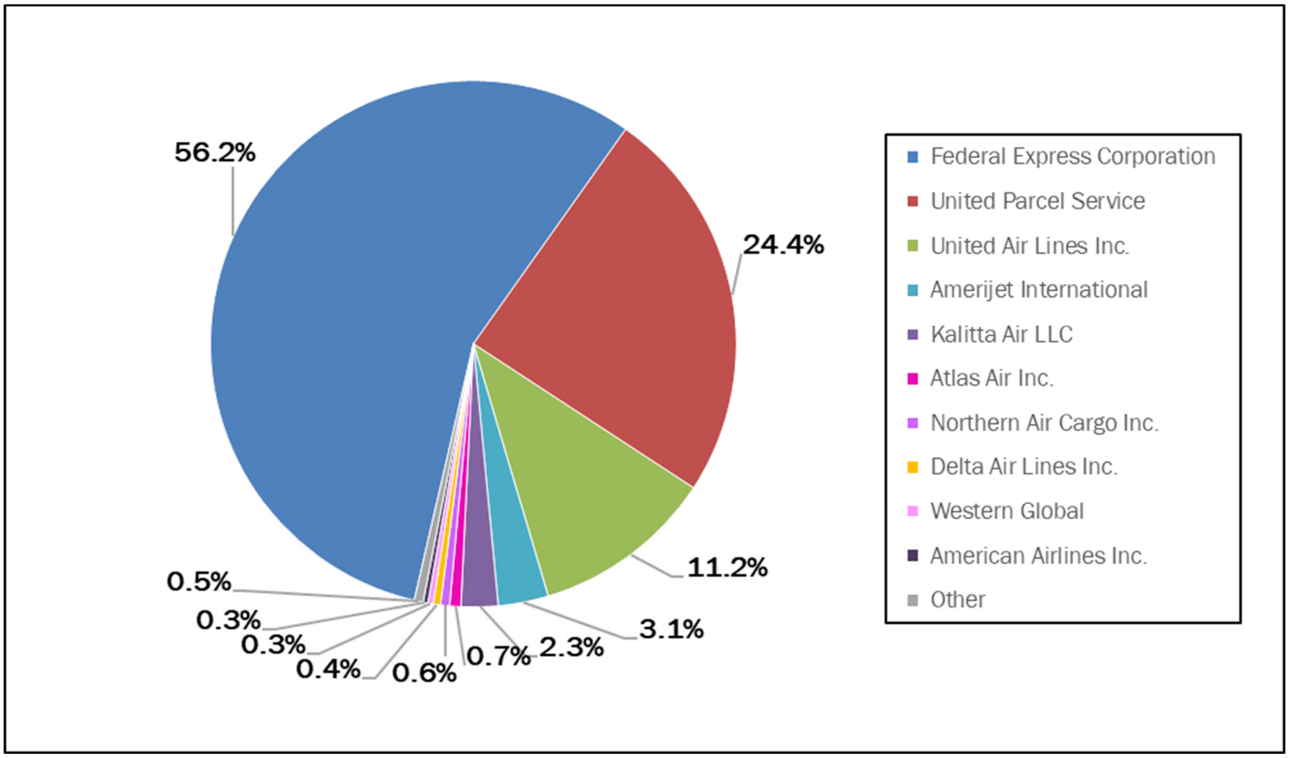
An analysis of T-100 Data from the Bureau of Transportation Statistics (BTS) highlights the top carriers and origins/destinations for air cargo associated with EWR. Table 91 lists and Figure 205 illustrates the top carriers for freight and mail, indicating the dominance of freighter service (6 of the top 7 carriers), with FedEx (56%) and UPS (24%) carrying more than 80% of all cargo associated with EWR. Belly cargo moving on passenger flights accounts for a much smaller share of cargo and is primarily carried by United Airlines, whose primary East Coast hub is located at EWR.

Table 91. Top Airline Carriers for Domestic Freight through New Jersey (pounds)

	Carriers	Freight	Mail	Freight and Mail
1	Federal Express Corporation	672,159,110	66,000	672,225,110
2	United Parcel Service	274,666,712	16,901,879	291,568,591
3	United Air Lines Inc.	108,038,558	25,880,109	133,918,667
4	Amerijet International	36,868,154	-	36,868,154
5	Kalitta Air LLC	27,010,462	138,869	27,149,331
6	Atlas Air Inc.	8,165,970	-	8,165,970
7	Northern Air Cargo Inc.	3,613,008	2,987,966	6,600,974
8	Delta Air Lines Inc.	2,607,801	2,770,835	5,378,636
9	Western Global	3,889,869	-	3,889,869
10	American Airlines Inc.	1,296,951	2,212,248	3,509,199
	Other	3,279,234	3,208,176	6,487,410

Source: Bureau of Transportation Statistics, T-100 Data

Figure 205. Domestic Freight and Mail through New Jersey by Airline Carriers

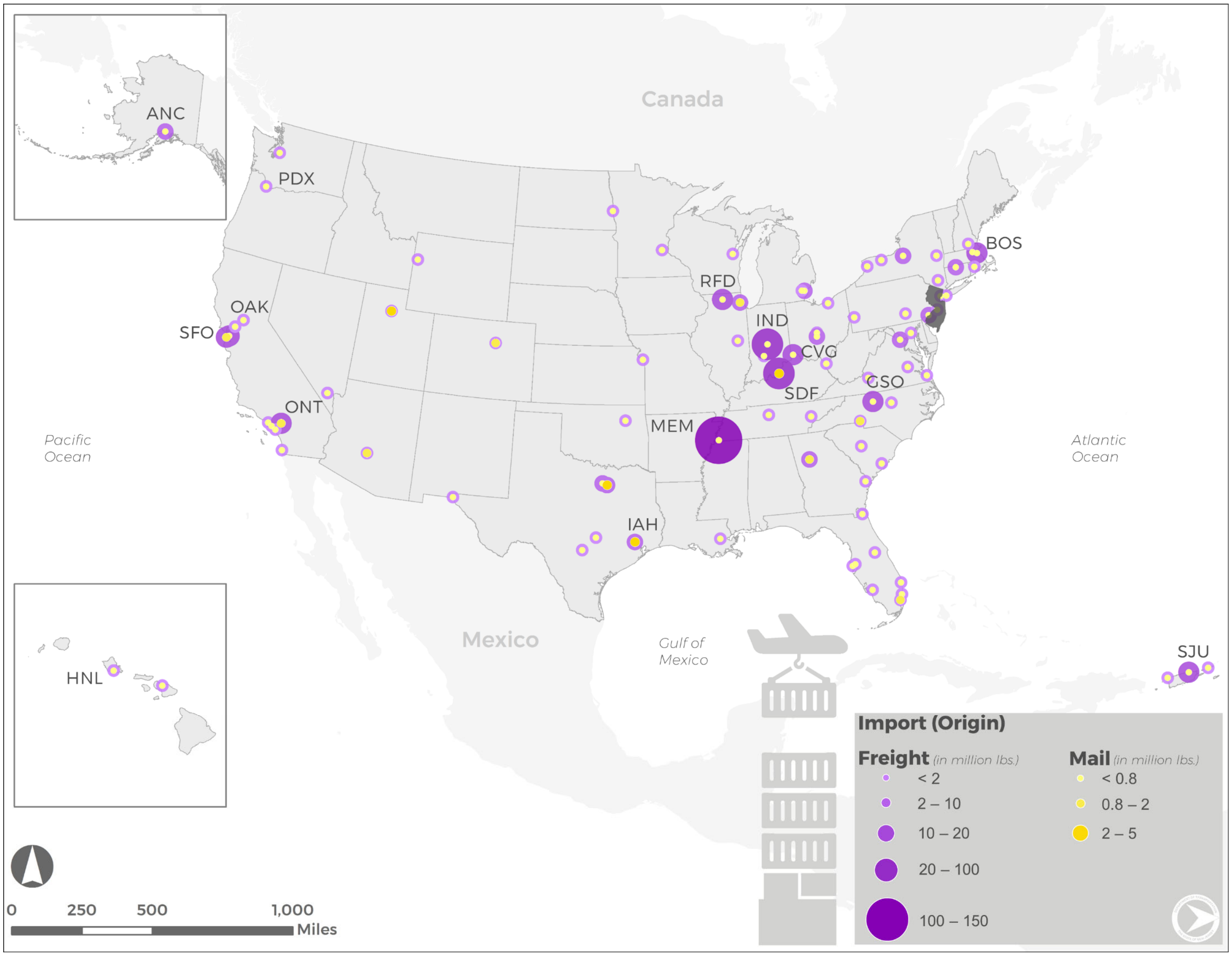


Source: Bureau of Transportation Statistics, T-100 Data

Figure 206 shows the origin and weight of all air cargo imports into New Jersey in 2021. The most significant imports originate in the Mid-West/South Central Region. The top three airports are Memphis (MEM), Louisville (SDF), and Indianapolis (IND), reflective of key integrator hubs for FedEx and UPS. Collectively those markets account for 57% of all air cargo destined to EWR. Figure 207 and Figure 208 show the top domestic integrator and belly import locations, respectively.

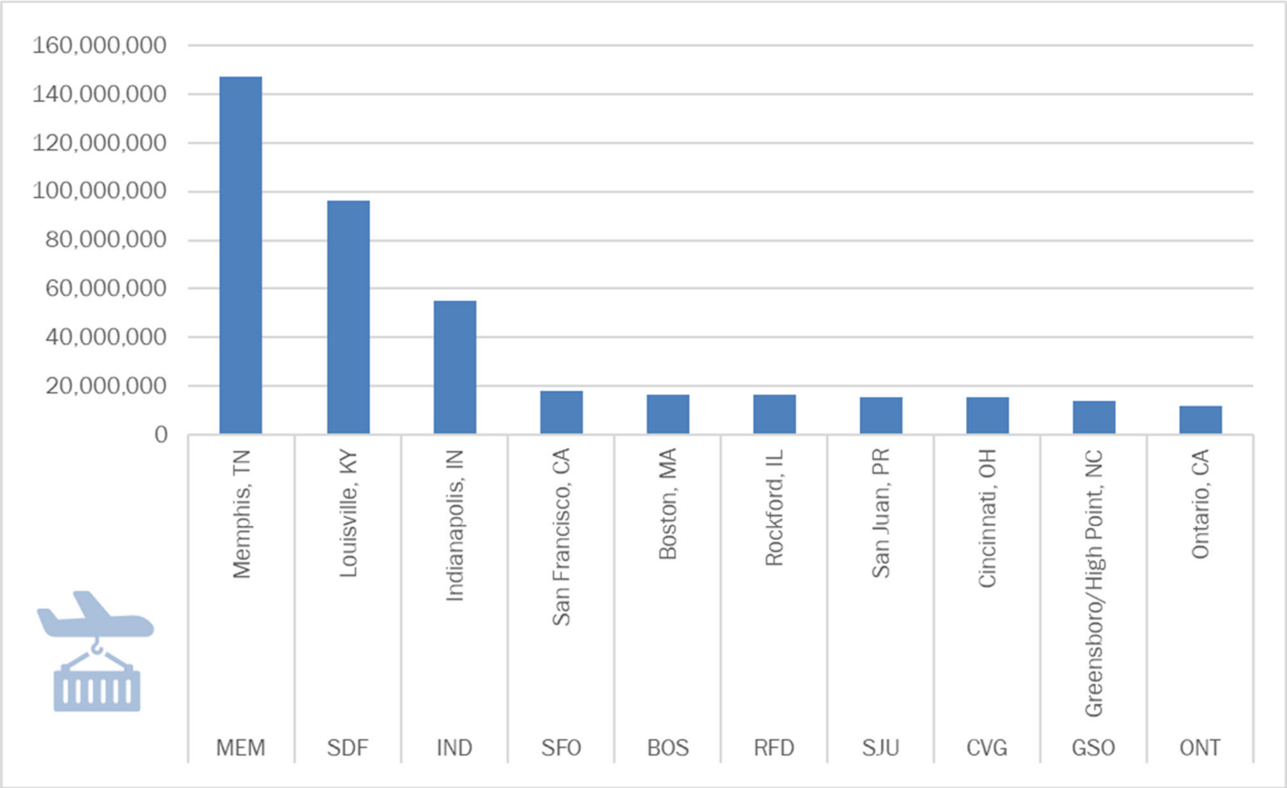
FedEx Operations at Newark Liberty International Airport (Source: © Aero Icarus - imgur.com)

Figure 206. Origin Airports of Domestic Imports



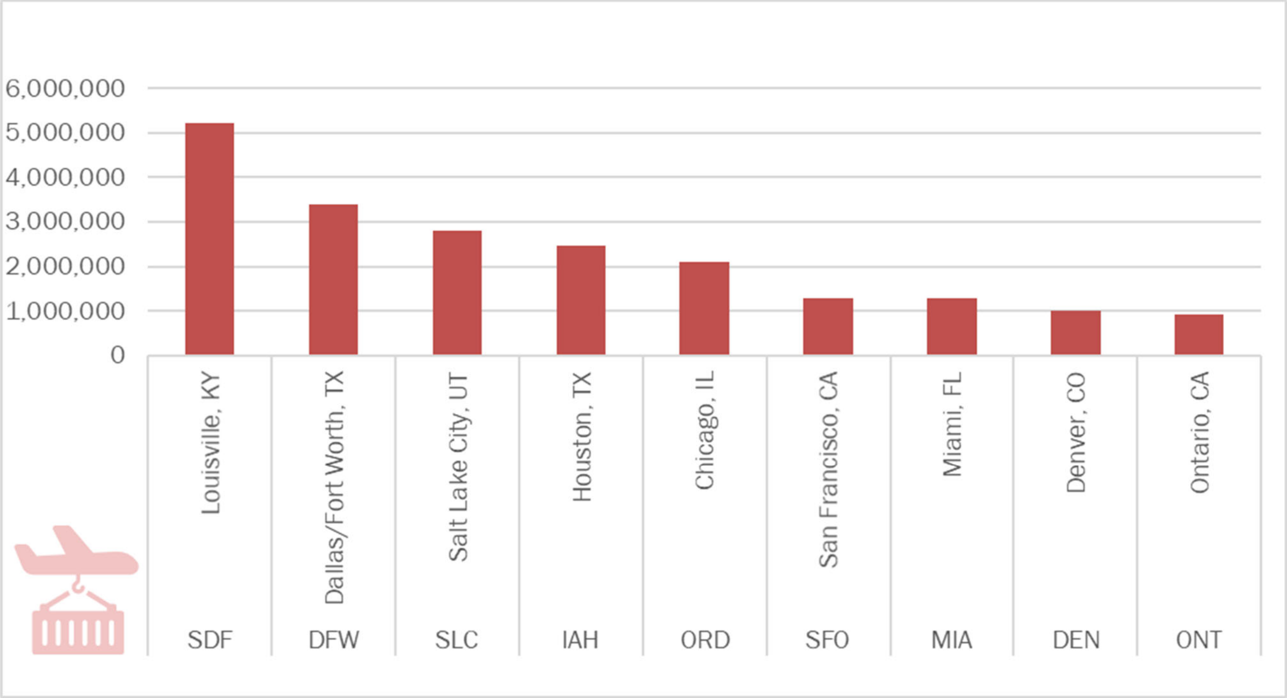
Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 207. Top Domestic Integrator Import Locations (2021)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

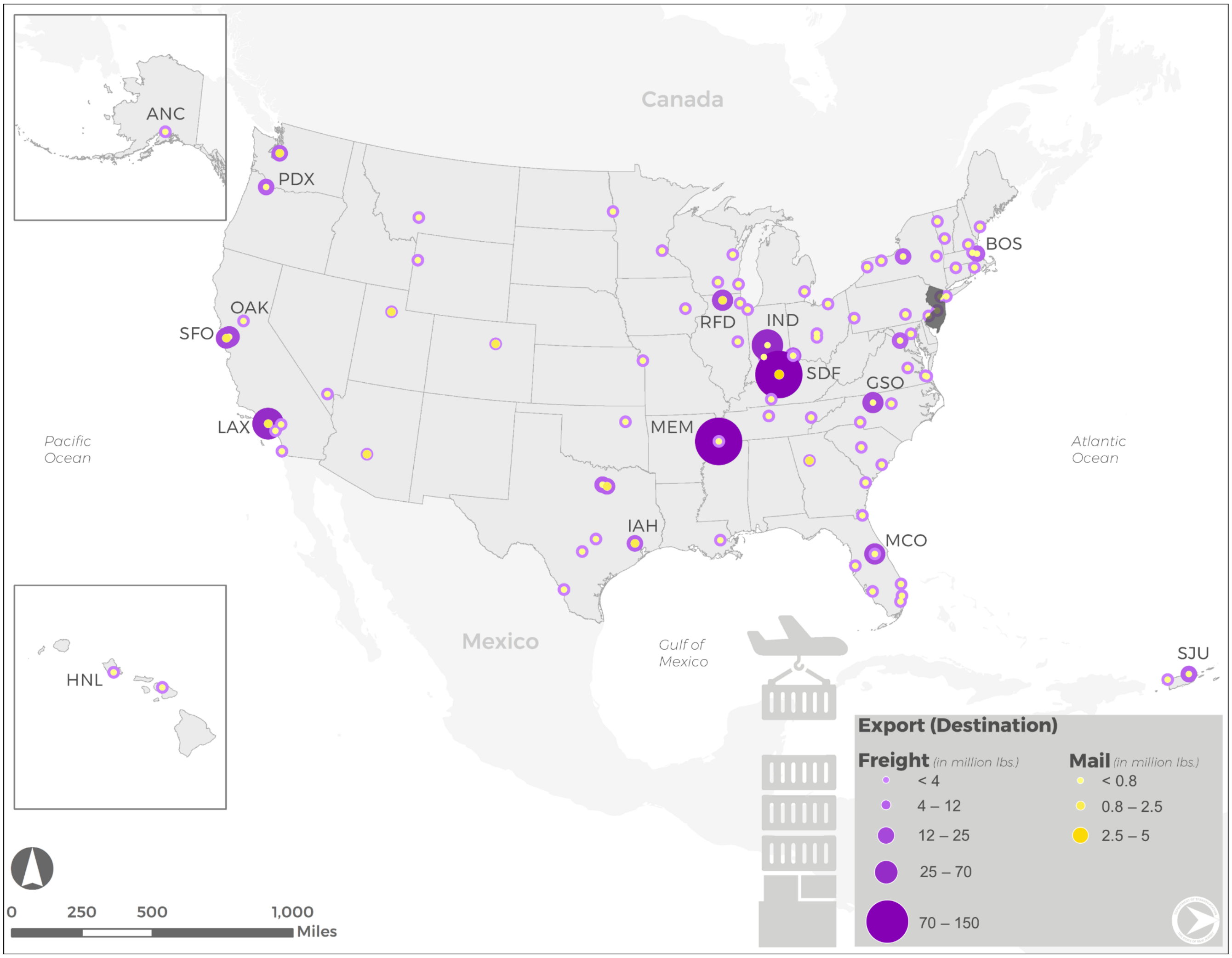
Figure 208. Top Domestic Belly Import Locations (2021)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

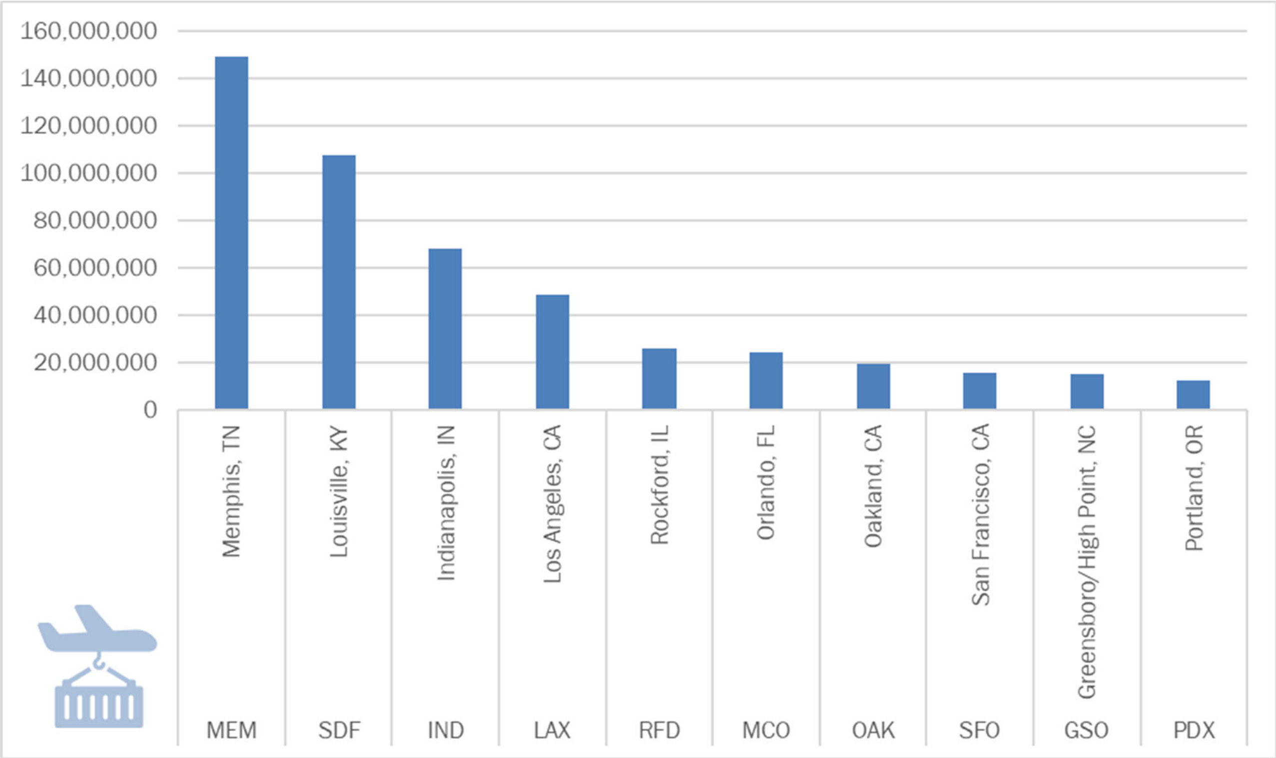
The destination of domestic air cargo exports is shown in Figure 209 and reflects the top destinations of integrator cargo with MEM, SDF, and IND controlling 55% of all air cargo departing EWR. Notable export destinations that differ from import volumes are Orlando (MCO) and Portland (PDX), each of which exhibited low import tonnage into EWR but reflect significant cargo originating at EWR. Figure 210 and Figure 211 show the top domestic and integrator export destinations, respectively.

Figure 209. Destination of Domestic Exports (2021)



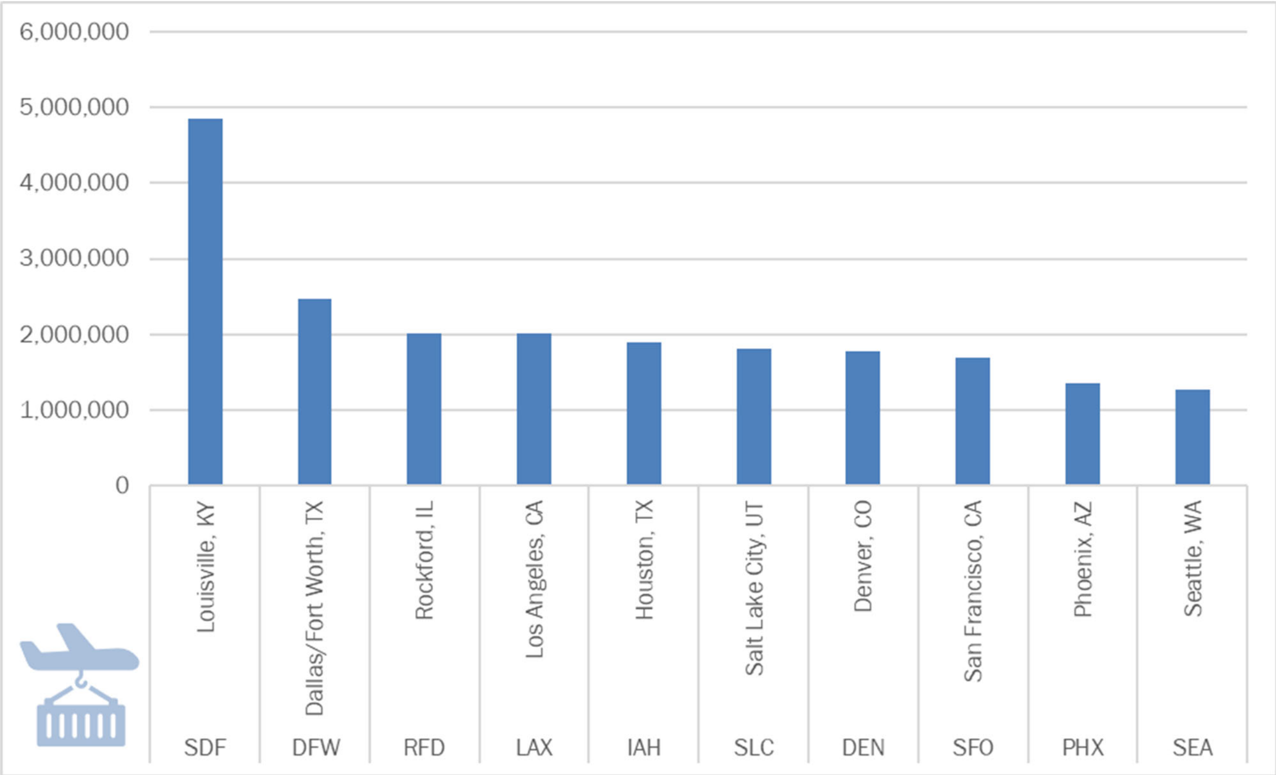
Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 210. Top 10 Domestic Integrator Export Destinations (2021)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 211. Top 10 Domestic Belly Export Locations (2021)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

7.5.4 International Air Cargo

New Jersey received nearly 300 million pounds of import and export air cargo in 2021, with import tonnage (200.7 million pounds) reflecting more than double export tonnage (93.1 million pounds). Europe is the top market for EWR imports and exports, followed by Asia, as illustrated in Table 92. Combined, Europe and Asia account for more than 90% of all international air cargo tonnage at EWR.

Table 92. Regional Freight (New York and New Jersey) In Short Tons

Year	Europe	Asia	South America	Africa	Australia & Oceania	Central America	North America	Region
2012	565,331	621,806	43,753	30,078	17,673	12,543	2,260	1,293,608
2013	561,468	610,777	44,997	27,928	15,728	12,240	2,659	1,276,275
2014	587,241	608,036	46,844	27,657	12,493	10,802	2,262	1,295,754
2015	598,781	609,514	46,058	26,221	11,807	12,130	2,029	1,306,540
2016	597,782	590,336	47,796	21,147	10,108	14,531	1,534	1,283,233
2017	636,982	636,821	52,615	22,147	10,752	14,373	1,838	1,375,528
2018	654,106	628,433	56,417	24,650	10,871	12,658	1,875	1,389,011
2019	639,421	572,040	51,575	26,983	9,478	11,934	1,373	1,312,804
2020	518,216	509,389	24,215	19,733	6,839	5,285	5,179	1,088,856
2021	687,629	606,126	36,036	27,786	8,065	8,974	6,047	1,380,663

Source: U.S. Customs Data: Annual Totals 2012-2021 by International Market

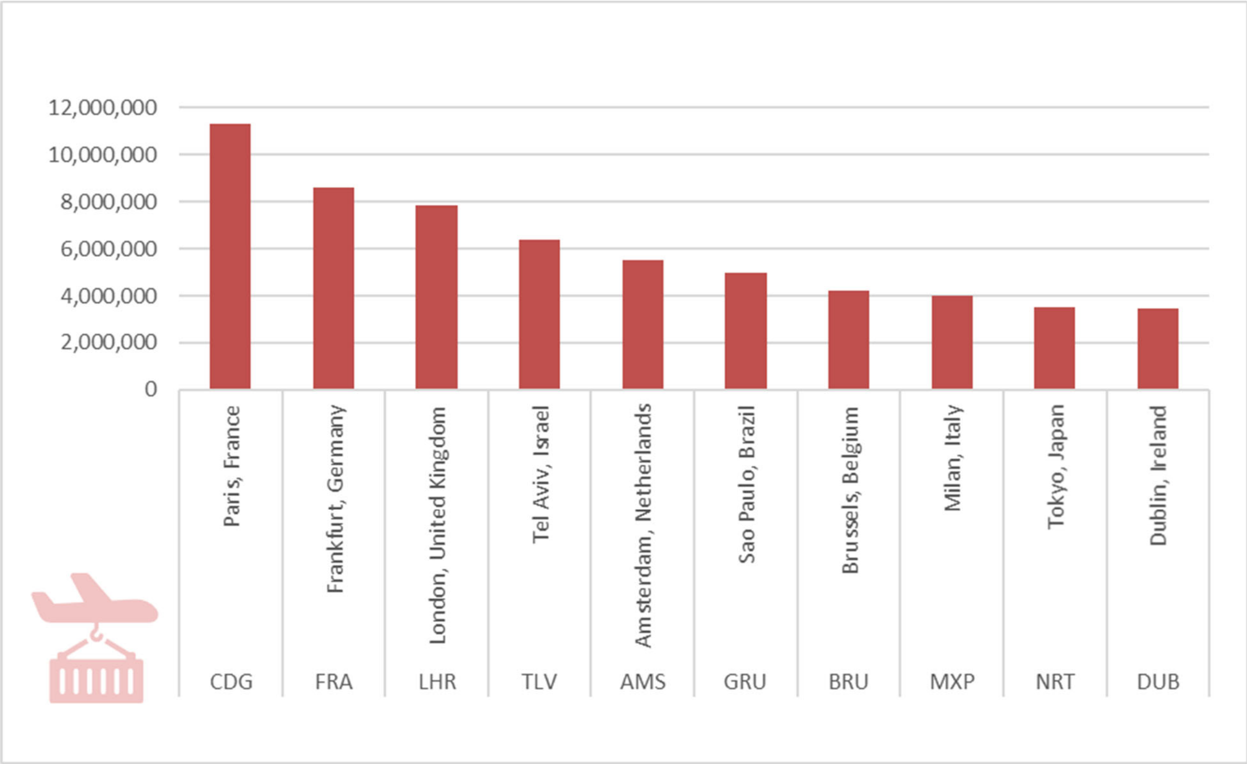
Figure 212 indicates the market distribution of export tonnage from EWR in 2021. This indicates that tonnage to Europe is spread amongst substantially more destinations (18 markets) than tonnage headed to Asia (4 markets). Markets within the rest of the world exhibit far smaller tonnages when compared with European or Asian markets. Many of the top (6 of 10) export locations are in Europe. Additional airports within the top ten are located in Asia (Japan and Israel) and South America (Brazil).

The air cargo import market exhibits similar trends to the export market, as illustrated in Figure 213 through Figure 217. Approxiamtely 200 million pounds of cargo was imported to EWR in 2021. Most of the cargo orginated from European airports., comprising seven of the top ten airports, including two in Germany. The remaining are from Asia (Tel Aviv and Tokyo) and South America (Sao Paulo). Overall, the breakdown of all international imports by region generally reflects the export market airports detailed above.

Figure 212. International Export Destinations

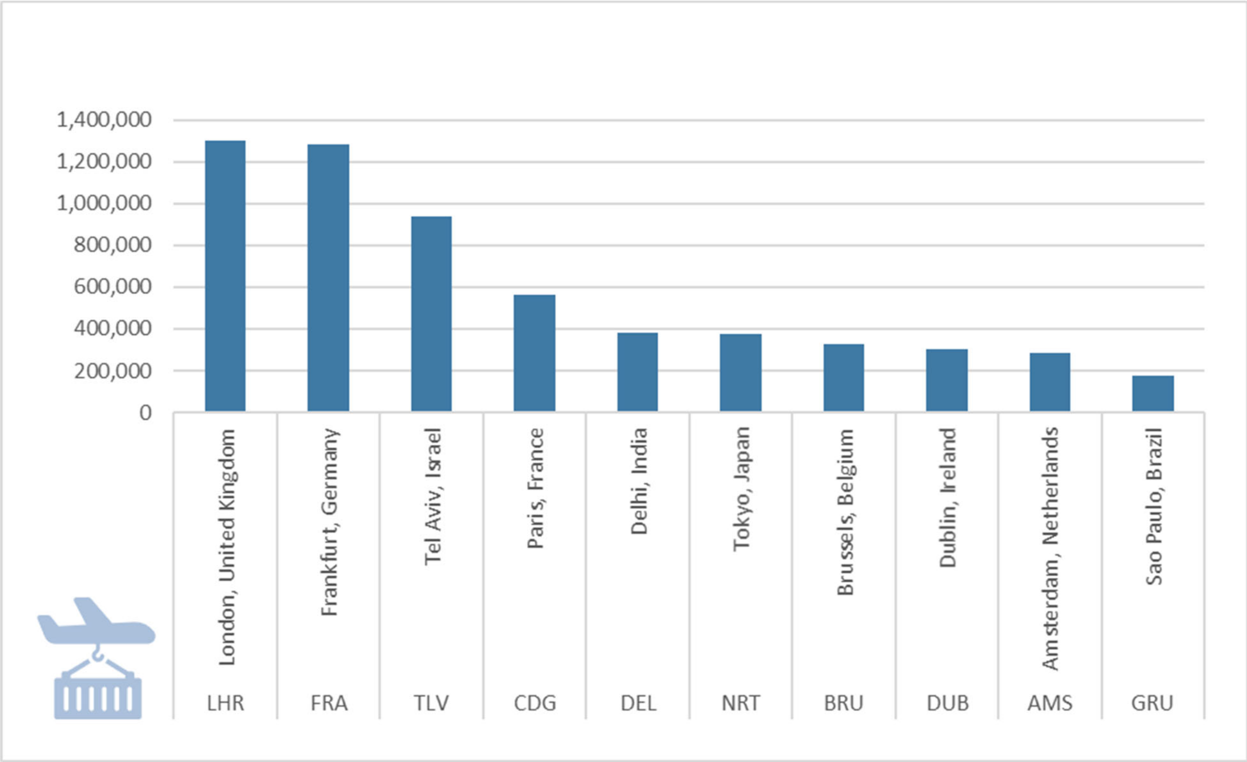
Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 213. Top 10 International Integrator Export Destinations (by Pounds)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 214. Top 10 International Belly Export Destinations (by Pounds)

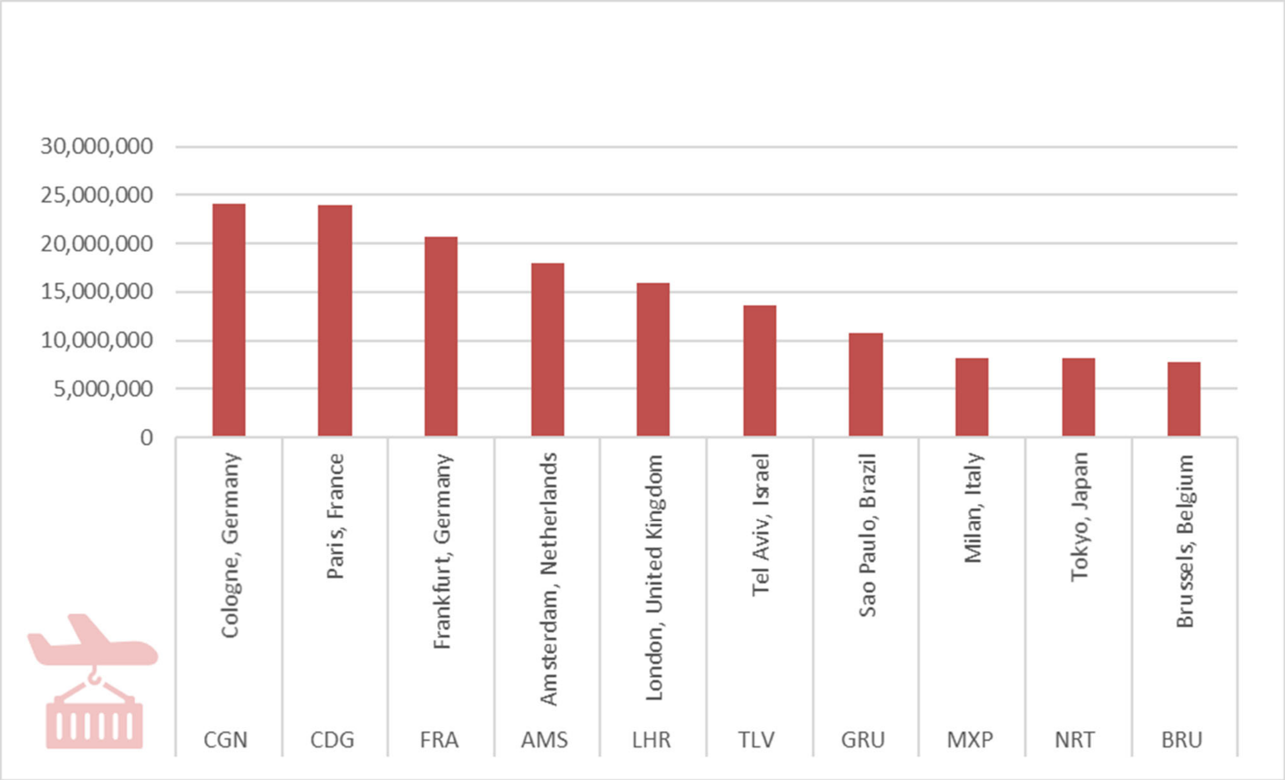


Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 215. International Import Origins

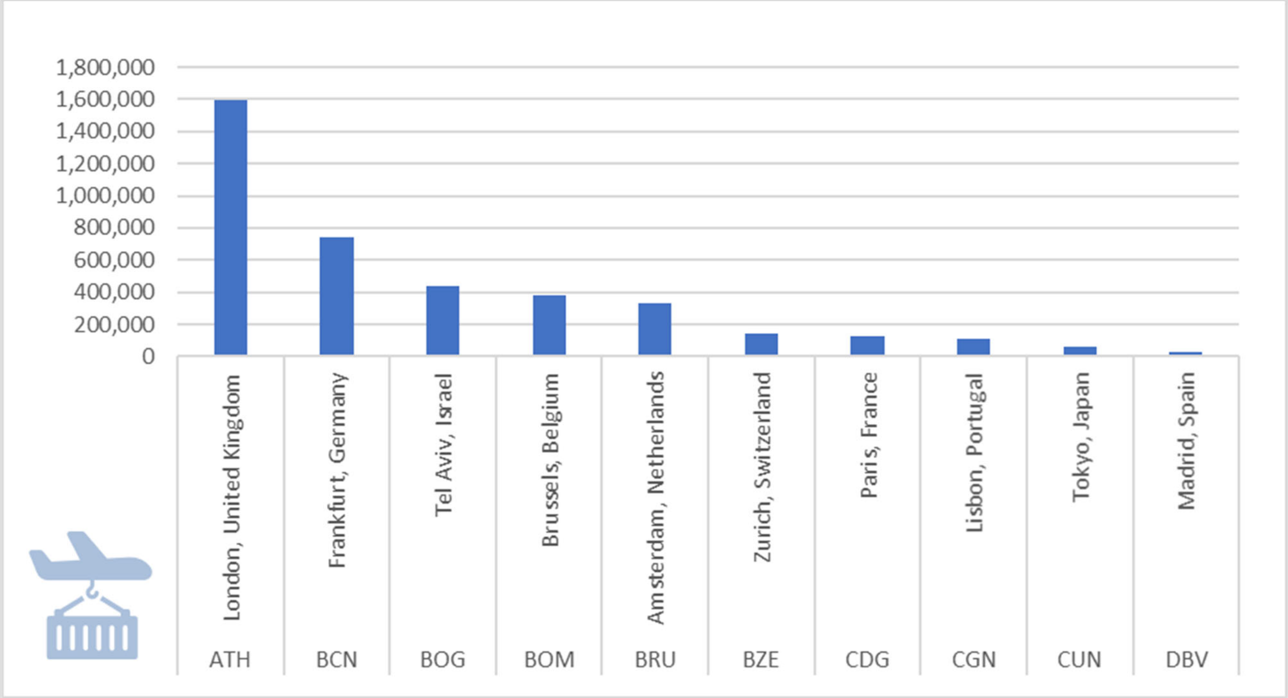
Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 216. Top 10 International Integrator Import Origins (by Tonnage)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

Figure 217. Top 10 International Belly Import Origins (by Pounds)



Source: Bureau of Transportation Statistics, T-100 Data, WSP

7.6 PIPELINE

Pipelines are used to transport large volumes of liquid or gas over long distances. Commodities typically moved by pipeline include crude oil, refined petroleum products such as gasoline and diesel fuel, and volatile liquids products such as pressurized natural gas, propane, and ethane.

Pipelines are typically used to transport these commodities because they:

- Are more cost-effective than moving large quantities of these products by truck or rail;
- Require less energy to operate than trucks or rail, and generate fewer carbon emissions; and
- Pipelines, especially those buried underground, operate with less risk of incidents (compared to trucks or rail, which are exposed to greater risk of crashes, leaks, and spills).

While there are various types of pipelines moving a variety of commodities around the country, most pipelines in New Jersey are transporting natural gas or hazardous liquids (such as fuel oil).

7.6.1 Natural Gas Pipelines

About 77% of natural gas products moved in the United States travel by pipeline,[93] and almost all natural gas is shipped by pipeline to end users. Natural gas products moved by pipeline in the United States consist mostly of methane, with ethane and butane composing small proportions of natural gas flows nationwide.

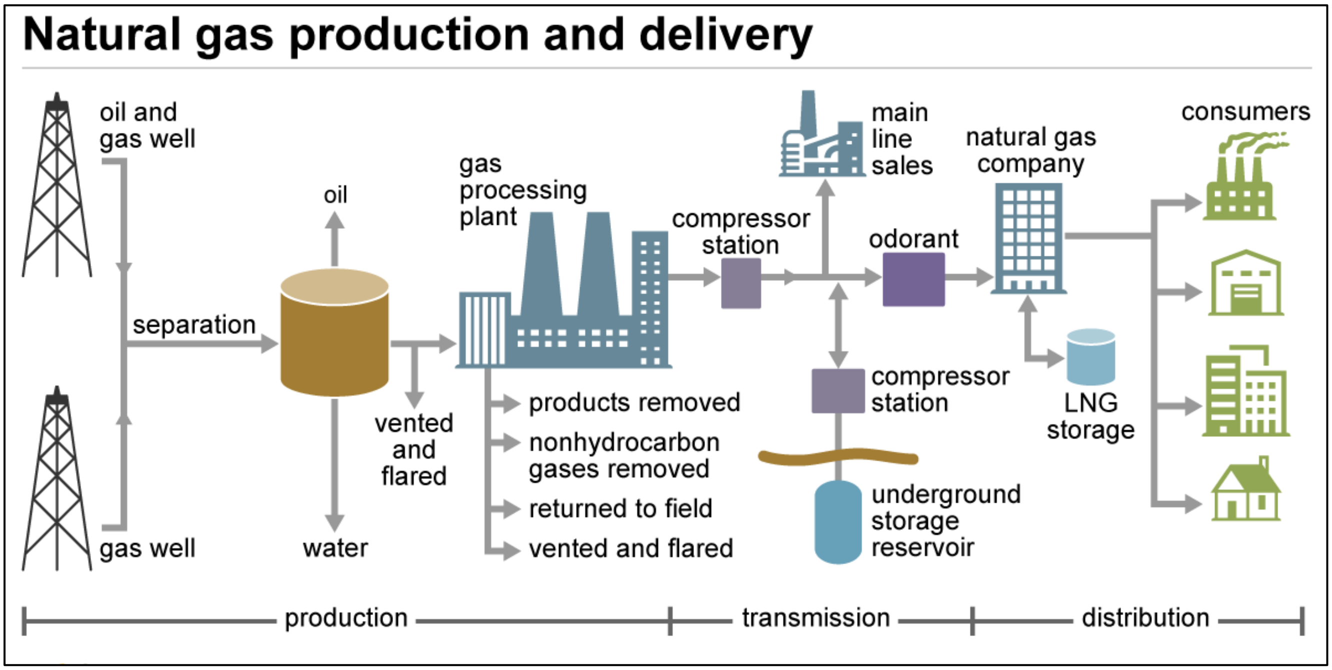
There are three primary types of natural gas pipelines:

- **Gathering pipelines** gather unprocessed natural gases from production wells and transport it to a gas processing facility, where water and other impurities are removed.
- **Transmission pipelines** transport processed natural gas products thousands of miles across many parts of the continental United States.
- **Distribution pipeline** systems deliver natural gas products for the "last mile" to end users' homes and businesses.

Figure 218 is an example of the journey that natural gas products make from wells where crude materials are extracted, through various stages of storage and processing, to the end consumer using networks of pipelines. The left side of the diagram shows natural gas products entering the pipeline system from wells, offshore drilling platforms, or tanker ships that deliver products from overseas. Natural gas products are then transported to processing and treatment plants where water and other impurities are removed. The transmission lines carry natural gas across the country. Compressor stations help to maintain adequate pressure within the pipeline system and keep gas flowing at a rate of 3-8 miles per hour. At the right side of the diagram, the distribution pipelines connect to individual homes, businesses, and other end users.

93 FAF, version 5, 2017 data.

Figure 218. Natural Gas Pipeline Systems (From the Wellhead to the Consumer)



Source: https://www.eia.gov/energyexplained/natural-gas/images/Industry.png

7.6.2 Hazardous Liquid Pipelines

Hazardous liquid pipelines transport crude oil; refined petroleum products (gasoline, diesel, jet fuel, and home heating oil); highly volatile liquids or natural gas liquids (NGLs), including butane, ethane, and propane; carbon dioxide; and anhydrous ammonia.

Pipelines are the primary mode of transportation for crude oil and petroleum products. Approximately 66% of crude oil and petroleum products in the United States are shipped by pipeline. Tanker and barge traffic accounts for 31% of oil shipments, trucking and rail account for about 2% each.[94]

There are two primary types of hazardous liquid pipelines—gathering lines and transmission lines:

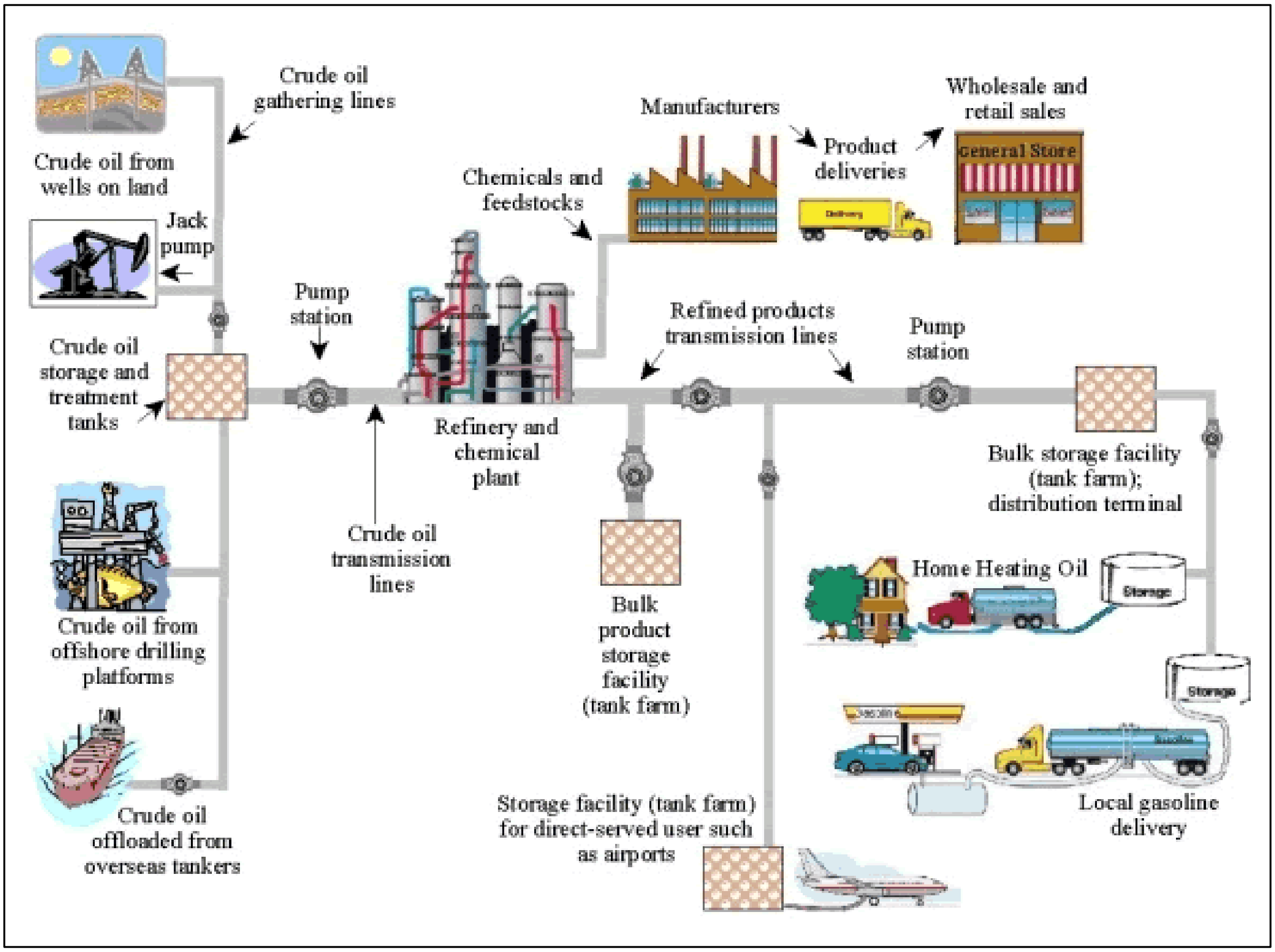
- **Gathering pipelines** gather crude oil from production wells and move it to central gathering facilities. From there, crude oil is transported from the gathering facilities to refineries, the facilities that convert the crude oil into petroleum products through various refining processes. There are no gathering pipelines in New Jersey.
- The largest pipelines are called **transmission lines** and they transport crude oil and other products across the country.[95]

Powerful pumps spaced along the pipeline move liquid through the pipe at approximately 3 – 8 miles per hour. Some hazardous liquid pipelines transport different types of commodities in the same pipeline. To do so, the pipeline operator sends different products in "batches," where each batch of liquid is pushed along at the same speed along the pipe.

Figure 219 is an example of the journey that hazardous liquids make from wells where crude materials are extracted, through various storage and processing stages, to the end consumer using networks of pipelines.

94 FAF, version 5, 2017 data.
95 Pipelines 101 - Tip of the Mitt Watershed Council

Figure 219. Hazardous Liquid Pipeline Systems (from the Wellhead to the Consumer)



Source: PHSMA, 2017 Hazardous Liquid Pipeline Systems: From the Wellhead to the Consumer | PHMSA (dot.gov).

7.6.3 New Jersey's Pipeline Network

According to the Pipeline and Hazardous Materials Safety Administration, New Jersey has nearly 72,000 miles of pipelines throughout the state, as Table 93 shows. The majority of those miles (97%) are natural gas distribution pipelines, which connect nearly 2.4 million New Jersey natural gas customers in homes and businesses throughout the state to natural gas services. 60% of the distribution pipeline miles in New Jersey are made of plastic, 31% are made of steel, 9% are made of iron, and less than 1% are made from copper or other materials.

Table 93. Miles of Pipeline by Type in New Jersey (2021)

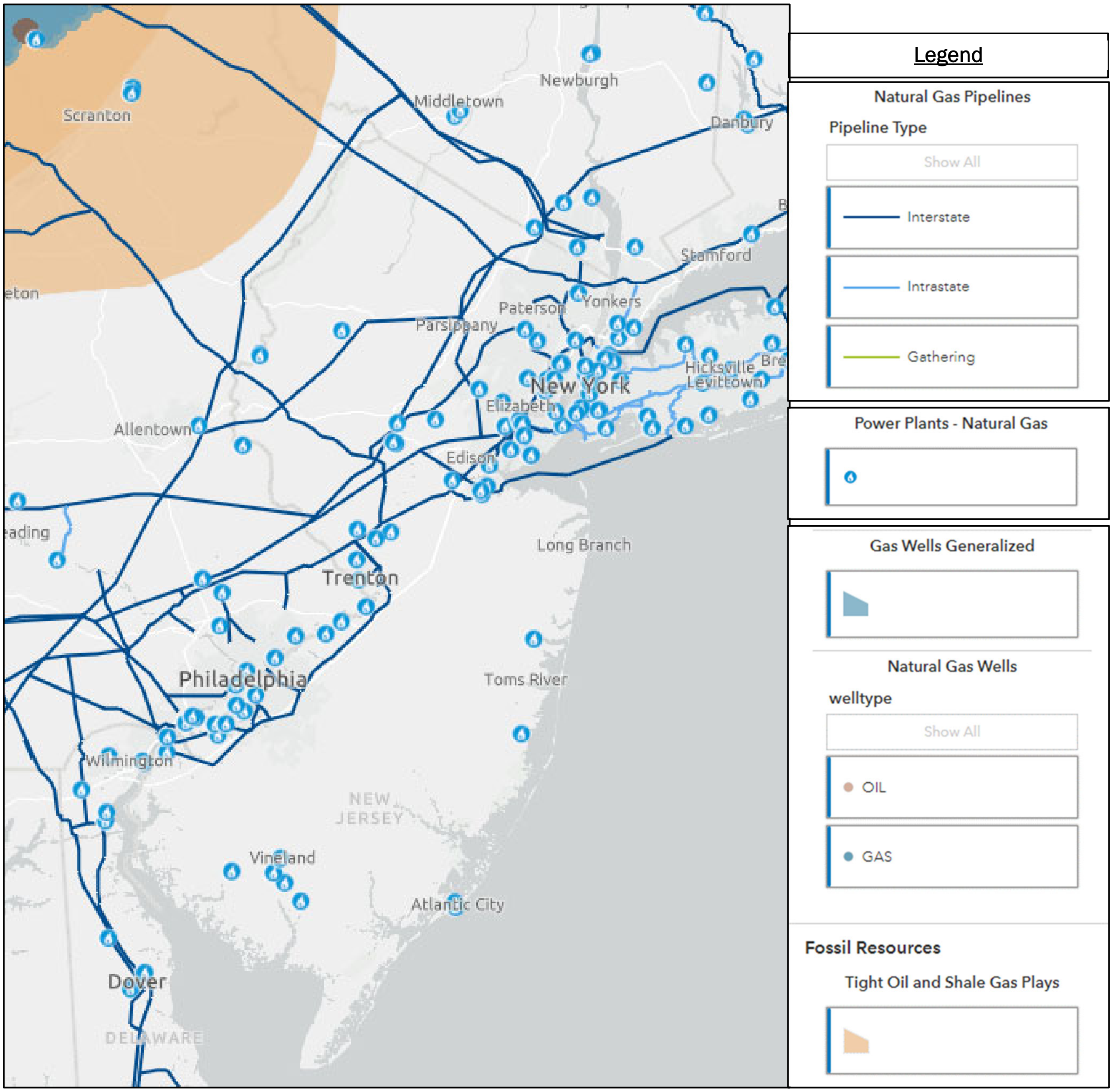
Pipeline Type	Miles of Pipeline in New Jersey
Natural Gas Transmission	1,603
Natural Gas Distribution	69,819
Hazardous Liquid Transmission	568
Total	**71,990**

Source: Pipeline and Hazardous Materials Safety Administration

The distribution network is fed by a system of more than 1,600 miles of intrastate and interstate natural gas transmission lines, which connect New Jersey and the rest of the northeastern United States with the gas-producing regions of Texas and Louisiana and the Gulf of Mexico. Figure 220 shows the network of natural gas transmission lines in New Jersey. Major interstate natural gas transmission lines within New Jersey include:

- Transcontinental Pipeline, which extends from the Texas and Louisiana Gulf Coast to New Jersey, New York, and eastern Pennsylvania via the southeastern and Mid-Atlantic states;
- Texas Eastern Pipeline, which extends from the Texas and Louisiana Gulf Coast to New Jersey via the Midwestern states;
- Algonquin Gas Transmission Pipeline, which connects the Texas Eastern Pipeline to New England;
- Columbia Gas Transmission Pipeline, which is a network of pipelines in the Mid-Atlantic and Midwestern states that connects to other pipelines that reach the Gulf Coast region; and
- Tennessee Gas Pipeline, which connects New Jersey, New York, and New England with the Texas and Louisiana Gulf Coast via a network of pipelines.

Figure 220. Natural Gas Transmission Pipelines in New Jersey



Source: U.S. Energy Atlas, Energy Information Administration, accessed May 23, 2022.

As shown in Figure 220, there are 53 natural gas power plants located in New Jersey. A list of those power plants is provided in Table 94, including the capacity of each facility in megawatts (MW), the nameplate, or nominal rated capacity, and the net summer capacity, which is the peak load that each plant can support after accounting for the power required to operate the plant and to cool water supplies.

Table 94. Natural Gas (NG) Power Plants in New Jersey

Facility Name	Utility Name	City	County	Technology	Total Nameplate Capacity (MW)	Total Net Summer Capacity (MW)
DTE Atlantic, LLC	DTE Atlantic, LLC	Atlantic City	Atlantic	NG Fired Combustion Turbine	7.5	7.1
ACM - Midtown Thermal	ACM Energy, LLC	Atlantic City	Atlantic	NG Fired Combustion Turbine	5.5	5.2
Bergen Generating Station	PSEG Fossil LLC	Ridgefield	Bergen	NG Fired Combined Cycle	1,400.8	1,245.0
Haworth Water Treatment Plant	EPP Renewable Energy	Haworth	Bergen	NG Internal Combustion Engine	16.0	15.8
PSEG Burlington Generating Station	PSEG Fossil LLC	Burlington	Burlington	NG Fired Combustion Turbine	242.0	168.0
DCO Burlington	DCO Burlington	Burlington	Burlington	NG Fired Combustion Turbine	3.5	2.7
Camden Plant Holdings, LLC	Camden Plant Holdings, LLC	Camden	Camden	NG Fired Combined Cycle	172.9	145.0
Cumberland	Calpine New Jersey Generation LLC	Millville	Cumberland	NG Fired Combustion Turbine	231.2	183.4
Clayville	City of Vineland	Vineland	Cumberland	NG Fired Combustion Turbine	73.0	55.0
Sherman Avenue	Calpine New Jersey Generation LLC	Vineland	Cumberland	NG Fired Combustion Turbine	112.8	86.9
Howard Down	City of Vineland	Vineland	Cumberland	NG Fired Combustion Turbine	68.2	55.0
Carlls Corner	Calpine New Jersey Generation LLC	Upper Deerfield Twp	Cumberland	NG Fired Combustion Turbine	83.8	76.8
PSEG Essex Generating Station	PSEG Fossil LLC	Newark	Essex	NG Fired Combustion Turbine	93.6	81.0
Rutgers Biomedical and Health Cogen	Rutgers, The State University of New Jersey	Newark	Essex	NG Fired Combustion Turbine	10.5	10.2
Essex County Correctional Facility Cogen	Essex County Correctional Facility Cogen	Newark	Essex	NG Internal Combustion Engine	6.2	6.0
Newark Bay Cogeneration Partnership LP	Newark Bay Cogeneration Partnership LP	Newark	Essex	NG Fired Combined Cycle	152.0	120.2
Newark Energy Center	Newark Energy Center LLC	Newark	Essex	NG Fired Combined Cycle	735.0	705.1
Hoffman LaRoche	PB Nutclif Master, LLC	Nutley	Essex	NG Fired Combustion Turbine	10.6	8.2
Mickleton Station	Calpine New Jersey Generation LLC	Mickleton	Gloucester	NG Fired Combustion Turbine	71.2	63.7
Paulsboro Refinery	Paulsboro Refining Company, LLC	Paulsboro	Gloucester	NG Fired Combustion Turbine	78.5	67.6
West Deptford Energy Station	West Deptford Energy, LLC	West Deptford	Gloucester	NG Fired Combined Cycle	754.6	734.7

Facility Name	Utility Name	City	County	Technology	Total Nameplate Capacity (MW)	Total Net Summer Capacity (MW)
Eagle Point Power Generation	Eagle Point Power Generation, LLC	Westville	Gloucester	NG Fired Combined Cycle	251.8	244.0
Bayonne Energy Center	Bayonne Energy Center LLC	Bayonne	Hudson	NG Fired Combustion Turbine	644.0	600.1
PSEG Kearny Generating Station	PSEG Fossil LLC	Kearny	Hudson	NG Fired Combustion Turbine	605.0	456.4
EQX003 Secaucus Rd Fuel Cell	2016 ESA Project Company, LLC	Secaucus	Hudson	Other NG	2.0	2.0
EQX012 Harz Fuel Cell	2016 ESA Project Company, LLC	Secaucus	Hudson	Other NG	2.5	2.5
EQX002 Secaucus Rd Fuel Cell	2016 ESA Project Company, LLC	Secaucus	Hudson	Other NG	1.5	1.5
Gilbert	Gilbert Power, LLC	Milford	Hunterdon	NG Fired Combined Cycle	512.0	444.0
Vicinity Energy Trenton, L.P.	Vicinity Energy Trenton, L.P.	Trenton	Mercer	NG Internal Combustion Engine	6.0	5.8
College of New Jersey	The College of New Jersey	Ewing	Mercer	NG Internal Combustion Engine	6.2	4.2
Hopewell Cogeneration NJ	Hopewell Campus Owners LLC	Pennington	Mercer	NG Internal Combustion Engine	4.0	4.0
Bristol Myers Squibb Lawrenceville	Bristol-Myers Squibb Co.	Lawrenceville	Mercer	NG Fired Combustion Turbine	10.9	9.9
Princeton University Cogeneration	Trustees of Princeton University	Princeton	Mercer	NG Fired Combustion Turbine	20.0	20.0
PSEG Sewaren	PSEG Fossil LLC	Sewaren	Middlesex	NG Fired Combined Cycle	609.5	538.0
Woodbridge Energy Center	Woodbridge Energy Center	Keasbey	Middlesex	NG Fired Combined Cycle	772.9	723.0
Bristol Myers Squibb New Brunswick	Bristol-Myers Squibb Co.	New Brunswick	Middlesex	NG Fired Combustion Turbine	10.5	9.4
Parlin Power Plant	Consolidated Edison Energy, Inc.	Parlin	Middlesex	NG Fired Combined Cycle	135.0	114.6
Red Oak Power LLC	Red Oak Operating Services LLC	Sayreville	Middlesex	NG Fired Combined Cycle	821.1	775.9
Sayreville Cogeneration Facility	North Jersey Energy Assoc LP	Sayreville	Middlesex	NG Fired Combined Cycle	430.2	292.0
Forked River	Forked River Power, LLC	Forked River	Ocean	NG Fired Combustion Turbine	76.8	65.0
NAEA Lakewood LLC	Essential Power Operating Company, LLC	Lakewood	Ocean	NG Fired Combined Cycle	236.8	247.9
NAEA Ocean Peaking Power LLC	Essential Power Operating Company, LLC	Lakewood	Ocean	NG Fired Combustion Turbine	383.0	325.6
Montclair State University Cogen	UMM Energy Partners LLC	Little Falls	Passaic	NG Fired Combustion Turbine	11.8	10.8
Pedrickstown Cogeneration Company LP	Pedrickstown Cogeneration Company LP	Pedrickstown	Salem	NG Fired Combined Cycle	140.2	112.8
IIV000 Mt. Bethel Fuel Cell	2016 ESA Project Company, LLC	Warren	Somerset	Other NG	2.6	2.6

Facility Name	Utility Name	City	County	Technology	Total Nameplate Capacity (MW)	Total Net Summer Capacity (MW)
CIP II/AR Bridgewater Holdings - NJCOE	COE Bridgewater LLC c/o Thor Equities, LLC	Bridgewater	Somerset	NG Fired Combustion Turbine	5.0	4.1
Raritan OMP	Janssen Pharmaceutical Co	Raritan	Somerset	NG Internal Combustion Engine	5.4	5.4
LabCorp Engine	AEP Onsite Partners, LLC	Raritan	Somerset	NG Internal Combustion Engine	3.2	3.2
Overlook Medical Center	Overlook Medical Center	Summit	Union	NG Internal Combustion Engine	4.0	4.0
Kenilworth Energy Facility	E F Kenilworth LLC	Kenilworth	Union	NG Fired Combined Cycle	28.8	24.5
Linden Cogen Plant	EFS Cogen Holdings LLC	Linden	Union	NG Fired Combined Cycle	974.1	954.7
PSEG Linden Generating Station	PSEG Fossil LLC	Linden	Union	NG Fired Combined Cycle	1,740.0	1,636.2
Mars Wrigley Confectionary U.S., LLC	Mars Wrigley Confectionary U.S., LLC	Hackettstown	Warren	NG Fired Combined Cycle	12.3	9.5
Total					12,798.5	11,496.2

Source: U.S. Energy Atlas, U.S. Energy Information Administration

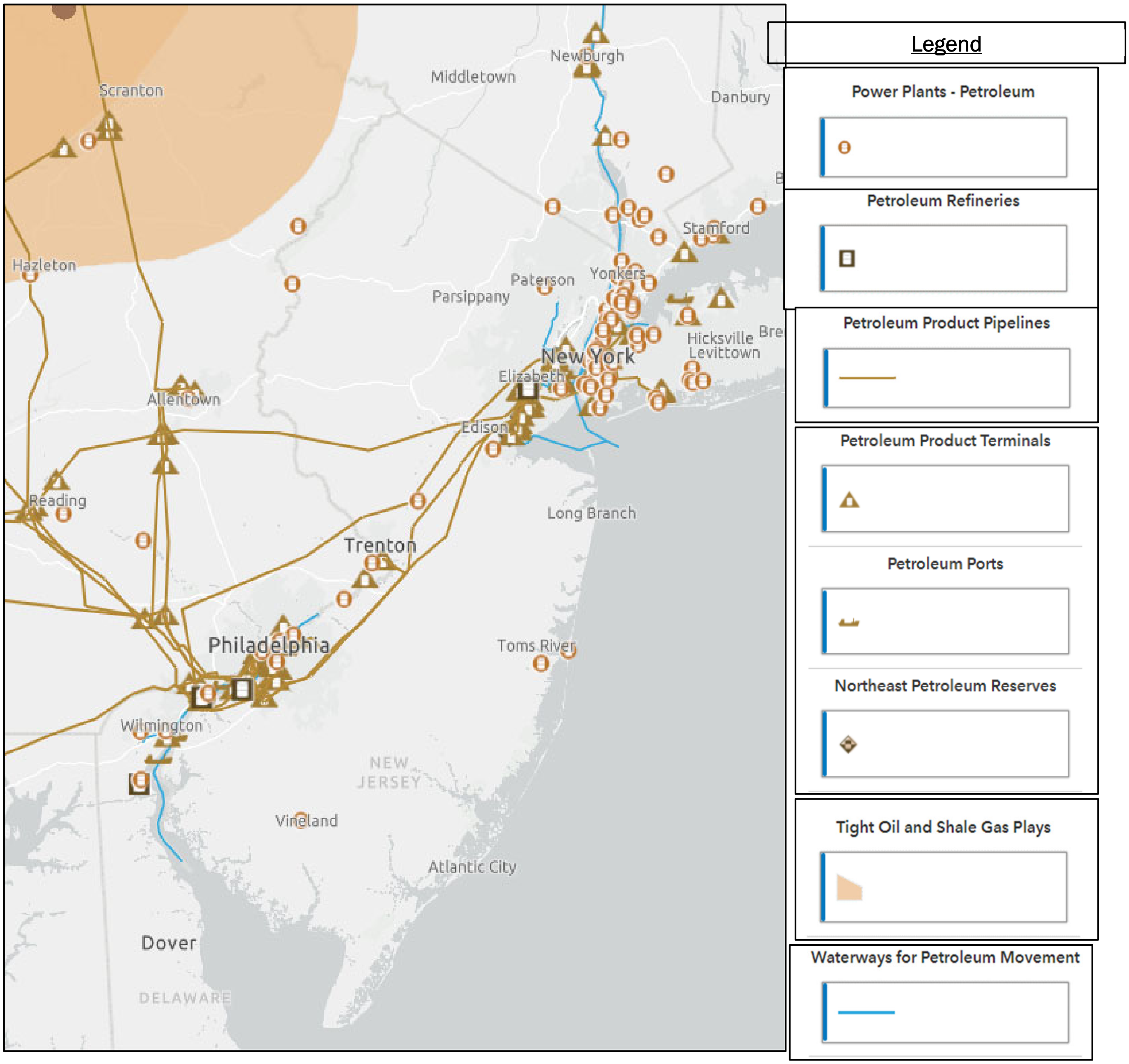
There are 568 miles of hazardous liquids pipeline in New Jersey as well. These pipelines include 24 miles of pipeline moving highly volatile liquids, flammable, and toxic liquids, including propane, ethane, butylene, and anhydrous ammonia. The remaining 543 miles are used to transport refined petroleum products, primarily gasoline, diesel, jet fuel, kerosene, and fuel oil. Hazardous liquid pipelines in New Jersey are shown in Figure 221. These pipelines include:

- Buckeye Pipeline, which originates in Pennsylvania and supplies jet fuel to John F. Kennedy International Airport in New York;
- Twin Oaks-Newark Pipeline, which extends from Philadelphia to Newark;
- Harbor Pipeline, which extends from Woodbury in Gloucester County to Linden in Union County; and
- Colonial Pipeline, which extends from Houston, Texas to Newark in Essex County.

In addition, Figure 221 includes designated waterways for petroleum product movement. These include the Delaware River, Hudson River and New York Bay, Passaic River and Newark Bay, Kill Van Kull, Arthur Kill, and Raritan Bay.

Table 95 lists the petroleum facilities that are shown in Figure 221, organized by facility type and location.

Figure 221. Hazardous Liquids Pipelines in New Jersey



Source: U.S. Energy Atlas, Energy Information Administration, accessed May 23, 2022.

Table 95. Petroleum Facilities in New Jersey

Facility Type	Facility Name	Municipality	County
Petroleum Refinery	Paulsboro Refining Co LLC	Paulsboro	Gloucester
Petroleum Refinery	Phillips 66 Company	Linden	Union
Petroleum Product Terminal	Buckeye Terminals LLC - Pennsauken	Pennsauken	Camden
Petroleum Product Terminal	Sunoco Logistics	Newark	Essex
Petroleum Product Terminal	Petroleum Fuel & Terminal Co	Newark	Essex
Petroleum Product Terminal	Shell Oil Products U.S.	Newark	Essex
Petroleum Product Terminal	Buckeye Terminals LLC - Newark Delancy	Newark	Essex
Petroleum Product Terminal	BKEP Materials LLC	Gloucester City	Gloucester
Petroleum Product Terminal	Sunoco Logistics	Westville	Gloucester
Petroleum Product Terminal	Sunoco Logistics - Eagle Point Tank Farm	Westville	Gloucester
Petroleum Product Terminal	Gulf Oil LP - Woodbury	Woodbury	Gloucester
Petroleum Product Terminal	CPI Operations LLC	Thorofare	Gloucester
Petroleum Product Terminal	PBF Logistics Products Terminals LLC	Paulsboro	Gloucester
Petroleum Product Terminal	Sunoco Logistics - Paulsboro	Paulsboro	Gloucester
Petroleum Product Terminal	Nustar Energy LP - Paulsboro	Paulsboro	Gloucester
Petroleum Product Terminal	Exxon Mobil - Paulsboro	Paulsboro	Gloucester
Petroleum Product Terminal	Delaware River Partners LLC - Repauno Port and Rail Terminal	Greenwich	Gloucester
Petroleum Product Terminal	Owens Corning	Kearny	Hudson
Petroleum Product Terminal	Buckeye Terminals LLC - Bayonne	Bayonne	Hudson
Petroleum Product Terminal	IMTT - Bayonne	Bayonne	Hudson
Petroleum Product Terminal	Gordon Terminal Service Co.	Bayonne	Hudson
Petroleum Product Terminal	Consumers Oil Corp	Trenton	Mercer
Petroleum Product Terminal	Kinder Morgan	Carteret	Middlesex
Petroleum Product Terminal	Buckeye Terminals LLC - Port Reading	Carteret	Middlesex
Petroleum Product Terminal	Shell Oil Products U.S. - Sewaren Blending Terminal	Woodbridge	Middlesex
Petroleum Product Terminal	Buckeye Terminals LLC - Perth Amboy	Perth Amboy	Middlesex
Petroleum Product Terminal	Kinder Morgan	Perth Amboy	Middlesex
Petroleum Product Terminal	Buckeye Terminals - Raritan Bay	Perth Amboy	Middlesex
Petroleum Product Terminal	Phillips 66 Company	Linden	Union
Petroleum Product Terminal	Nustar Energy LP - Linden	Linden	Union
Petroleum Product Terminal	Gulf Oil LP	Linden	Union
Petroleum Product Terminal	Nustar Energy LP - Northville Linden	Linden	Union
Petroleum Power Plant	West Station City of Vineland	Vineland	Cumberland
Petroleum Power Plant	Sayreville Power LLC	Sayreville	Middlesex
Petroleum Power Plant	Princeton Energy Plant	Plainsboro	Middlesex
Petroleum Power Plant	Bayville Central Facility - Ocean Co. Utilities Authority	Bayville	Ocean
Petroleum Power Plant	Seaside Heights Power Plant	Seaside Heights	Ocean
Petroleum Power Plant	St. Josephs Regional Medical Center	Paterson	Passaic
Petroleum Port	Camden-Gloucester	Camden	Camden
Petroleum Port	New York-New Jersey	Newark	Essex
Petroleum Port	Paulsboro	Paulsboro	Gloucester

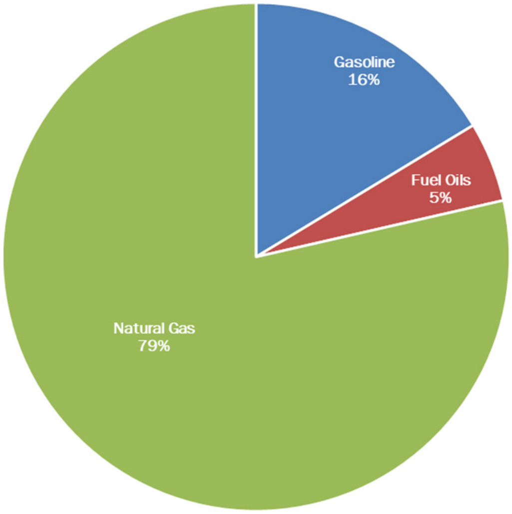
Source: U.S. Energy Atlas, U.S. Energy Information Administration

7.6.4 Commodity Flows

According to USDOT's Freight Analysis Framework, New Jersey's pipeline network was used to transport 99.7 million tons of freight in 2017.

The distribution of pipeline tons by commodity group is illustrated in Figure 220. Close to 80% of the volume of material moved via pipeline consisted of natural gas products, including liquid natural gas, propane, and butane. About 16% consisted of gasoline, which includes aviation fuel and kerosene. About 5% consisted of fuel oils, which includes heating oil, diesel, and biodiesel.

Figure 222. Distribution of Pipeline Tons by Commodity Group, 2017



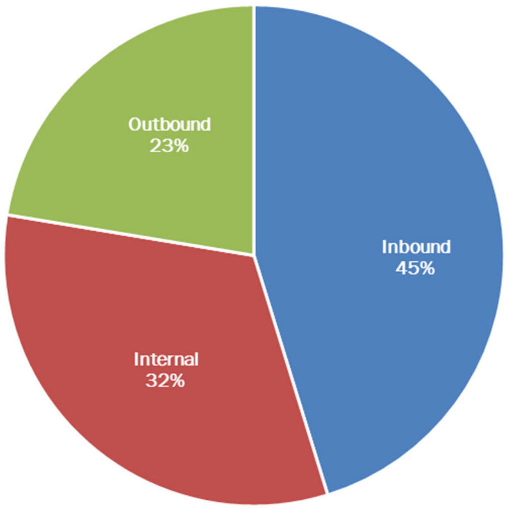
Source: FAF 5

The distribution of pipeline tons by direction flow is illustrated in Figure 223. Nearly half (45%) of the product moved by pipeline in New Jersey in 2017 was traveling into the state from points of origin outside the state. Nearly one-third (32%) traveled between origin and destination points within New Jersey, and 23% traveled outbound from New Jersey to locations outside the state.

Pennsylvania is the origin of the vast majority (98%) of flows that entered New Jersey by pipeline. About 1% originated in Arkansas, 0.6% originated in Indiana, and less than 0.1% originated in Massachusetts or Texas.

New York is the top destination for outbound flows via pipeline (86.8%). Other destinations include Pennsylvania (13.2%), Michigan (less than 0.1%), and Texas (less than 0.1%).

Figure 223. Distribution of Pipeline Tons by Direction of Flow, 2017



Source: FAF 5

7.6.5 Pipeline Safety and Security

Moving liquid commodities through a vast network of pipelines requires the operation of pump stations located along the pipeline. Natural gas is pressurized into a liquid, known as Natural Gas Liquid, and pumped through natural gas pipelines. The movement of natural gas via pipeline has two key areas of potential risk:

- Safety– due to the potentially hazardous qualities of the commodities transported through them
- Security – due to the safety concerns noted above, as well as the fact that pipelines can be targeted for terrorism or military attacks to disrupt the movement of energy products and/or instill fear among the public

Over the past 10 years (2012-2021), New Jersey has experienced an average of 13 pipeline incidents per year. One of those incidents resulted in a fatality in 2014, and 22 injuries have been reported between 2012 and 2021. In 2021, 10 incidents were reported, and no fatalities or injuries were associated with those incidents.[96]

Pipeline incidents observed in New Jersey have several identified causes, including corrosion, excavation that disturbs a pipeline, pump malfunction, weld or other material failure, or "other" improper operation.[97]

The Governor of New Jersey has the overall responsibility for Emergency Management activities in the State. On behalf of the Governor all activities and departments are coordinated, directed, and controlled from the New Jersey Office of Emergency Management (NJOEM) Emergency Operations Center.[98]

NJOEM develops New Jersey's Hazard Mitigation Plan (HMP). The HMP captures historic disaster experiences and reflects the natural and human-caused hazards New Jersey faces, based on current science and research. The HMP outlines a strategy to reduce risks from hazards and serves as the basis for prioritizing future project funding. The HMP must be approved by the Federal Emergency Management Agency (FEMA) and updated every three years for the State to be eligible for disaster recovery assistance and mitigation funding. NJOEM produced its most recent HMP in 2019. The HMP includes overviews of infrastructure, including pipelines that transport hazardous materials. This HMP identifies hazard mitigation strategies, and categorizes them into four types of mitigation actions:

96 Oracle BI Interactive Dashboards - SC Incident Trend (dot.gov)
97 Oracle BI Interactive Dashboards - SC Incident Trend (dot.gov)
98 Our History | NJOEM

1. Structure and infrastructure projects;
2. Natural systems protection;
3. Local plans and regulations; and
4. Education and awareness programming

NJOEM's Training and Exercise Unit offers training to Emergency Management Coordinators and other officials who have responsibilities in some aspect of emergency management. The Unit designs, develops, conducts, and evaluates emergency management exercises that test the State's overall preparedness for a variety of threats and hazards. Additionally, the Unit provides guidance to counties, municipalities, and other agencies who are planning their own exercises.[99]

7.6.6 Future Demands

According to FHWA's FAF, the quantity of natural gas, crude oil, and fuel oils moving through pipelines in New Jersey is expected to increase by 49% between 2017 and 2050. This forecast, however, anticipates that transportation and energy sectors will continue to use the same sources of fossil fuels they use today.

However, state policy is promoting alternative energy. Implementation of New Jersey's Energy Master Plan, unveiled in 2020, may change the trajectory of growth in natural gas, heating oil, and fuel used in New Jersey going forward. The Energy Master Plan aims to reduce the use of fossil fuels, reduce energy consumption, and to transition the energy and transportation sectors to using renewable energy and fuel sources. The plan outlines seven key strategies:

- Reducing energy consumption and emissions from the transportation sector
- Accelerating deployment of renewable energy and distributed energy resources
- Maximizing energy efficiency and conservation, and reducing peak demand
- Reducing energy consumption and emissions from the building sector
- Decarbonizing and modernizing New Jersey's energy system
- Supporting community energy planning and action in underserved communities
- Expanding the clean energy innovation economy[100]

The Energy Master Plan sets targets for transitioning 100% of the state's energy production to renewable sources and reducing natural gas consumption in the state by more than 80% by 2050, while accommodating a doubling in electricity load. The Plan also aims to facilitate the transition of personal automobile and other vehicle fleets to renewable fuels in lieu of petroleum-based fuels.[101] As presented previously in this section, these commodities make up the majority of flows through New Jersey pipelines.[102]

Reductions in demand for these commodities in New Jersey would likely reduce the volume of goods moving via pipeline in the state. In addition, similar energy policies and goals adopted by several other states in the Northeastern region, could impact the flows of energy products through New Jersey.[103]

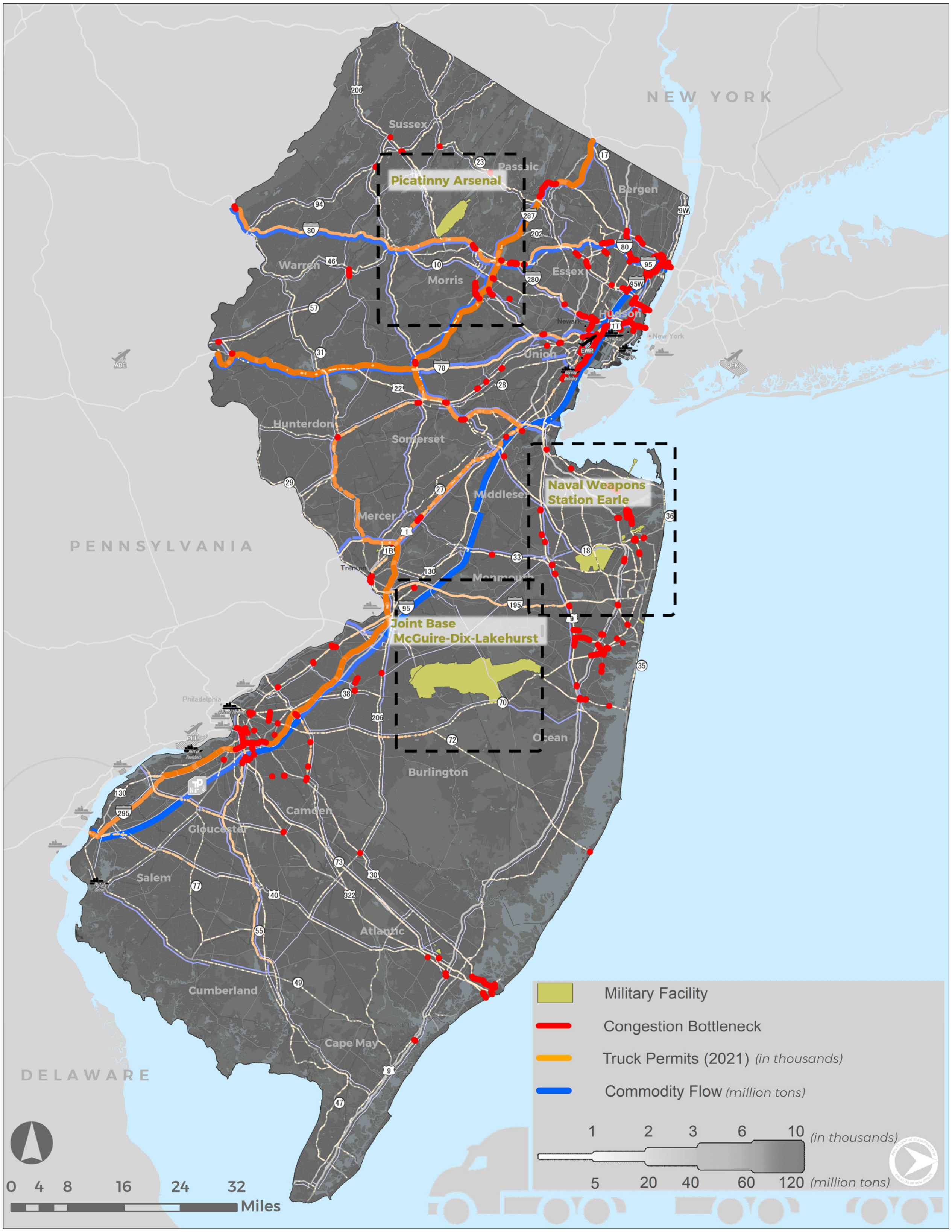
In addition to goals impacting commodity demand, the New Jersey Energy Master Plan includes a goal to maintain New Jersey's existing gas pipeline system reliability and safety while planning for future reductions in natural gas consumption. This goal keeps New Jerseyans safe from exposure to hazardous materials and keeps most of those materials off of highways and rail lines, where risks of spills or release are greater.

99 Emergency Management Training | NJOEM
100 Energy Master Plan | About the Energy Master Plan (nj.gov)
101 https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf
102 FAF version 5.
103 State Renewable Energy: Policies | U.S. EPA; Clean Freight Corridors Study (nymtc.org), Chapter 3.

7.7 MILITARY FREIGHT

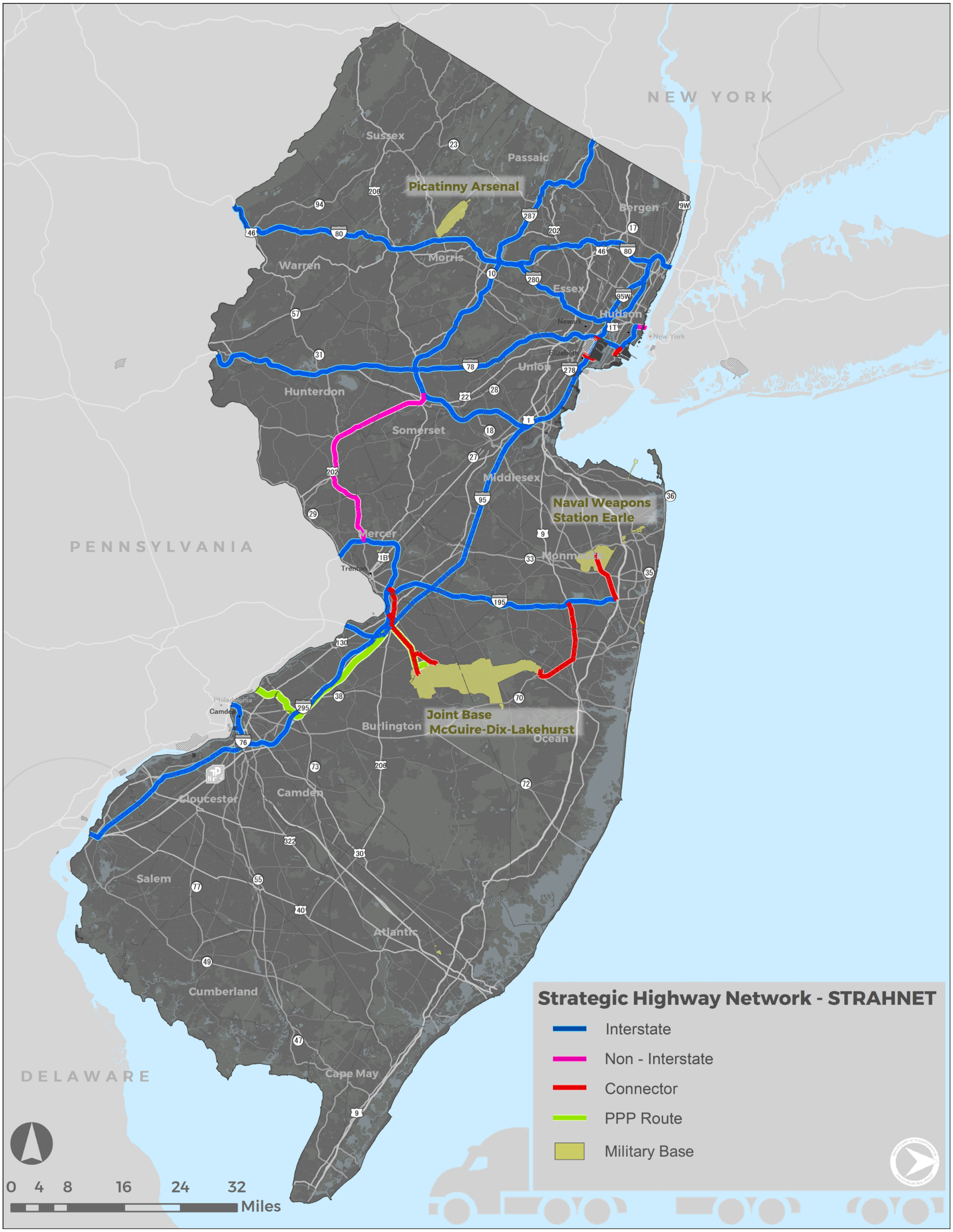
Military activity within New Jersey is primarily focused at three facilities: Joint Base McGuire-Dix-Lakehurst, Naval Weapons Station Earle, and the Picatinny Arsenal, as shown in Figure 224. Freight activity and transportation challenges associated with each are summarized below. These facilities are in turn connected to the New Jersey transportation system through the Strategic Highway Network (STRAHNET), which is a designation applied to roads are deemed necessary by the Department of Defense for the movement of heavy armor, ammunition, repair parts, personnel and other items in emergency mobilizations and peacetime. Heavy equipment is also moved by rail and by water. Joint Base McGuire-Dix-Lakehurst is a critical facility, serving as a Power Projection Platform (PPP). Each Army and Marine Corps PPP has a designated seaport and aerial port. The PPP connection to the South Jersey waterfront is shown in Figure 225, along with the STRAHNET.

Figure 224. Major Military Installations in New Jersey



Source: NJDOT, FHWA, WSP Analysis of New Jersey NPMRDS

Figure 225. Strategic Highway Network and Power Projection Platform Routes



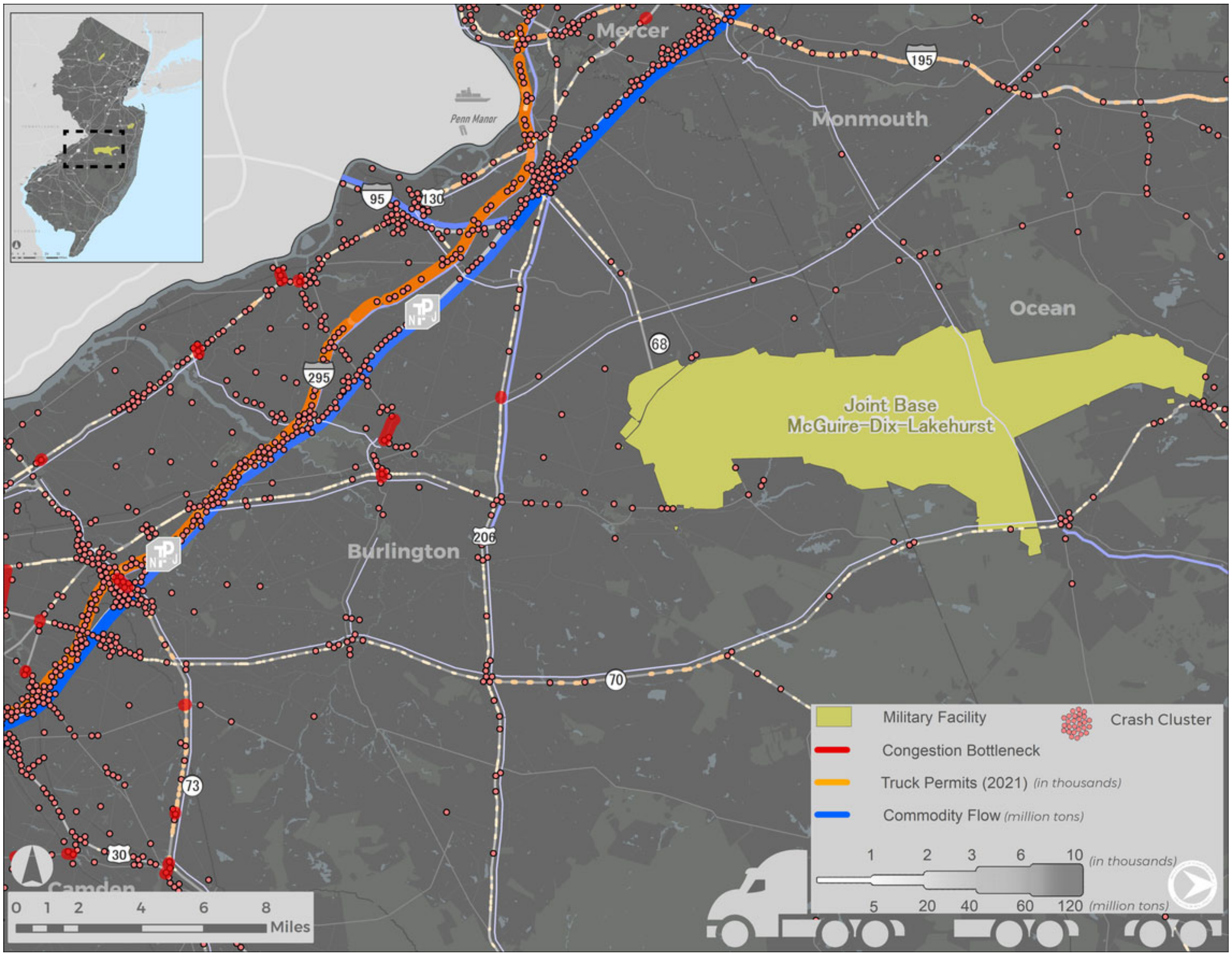
Source: NJDOT, FHWA, WSP Analysis of New Jersey NPMRDS

7.7.1 Joint Base McGuire-Dix-Lakehurst

Joint Base McGuire-Dix-Lakehurst is located in Ocean and Burlington counties, encompassing nearly 42,000 acres within eight municipalities. The facility is comprised of three installations (McGuire, Dix, and Lakehurst), and was the Department of Defense's first joint base and currently is the only joint base with consolidated Air Force, Army, and Navy installations. The joint base is one of the state's largest employers, with approximately 45,000 employees amongst enlisted and civilian staff. As Figure 226 illustrates, the base is primarily connected to the regional highway network via NJ Route 68 and several county routes.

Some Army and Marine Corps bases are considered Power Projection Platforms (PPP). Each PPP has a designated seaport (SPOE) and airport (APOE). The SPOE for Fort Dix is the Port of New York/New Jersey, and the APOE is McGuire AFB, which is part of the joint base. To access PortNYNJ, military vehicles utilize the STRAHNET roadway network, on which the key route between Fort Dix and PortNYNJ is I-95.

Figure 226. Joint Base McGuire-Dix-Lakehurst

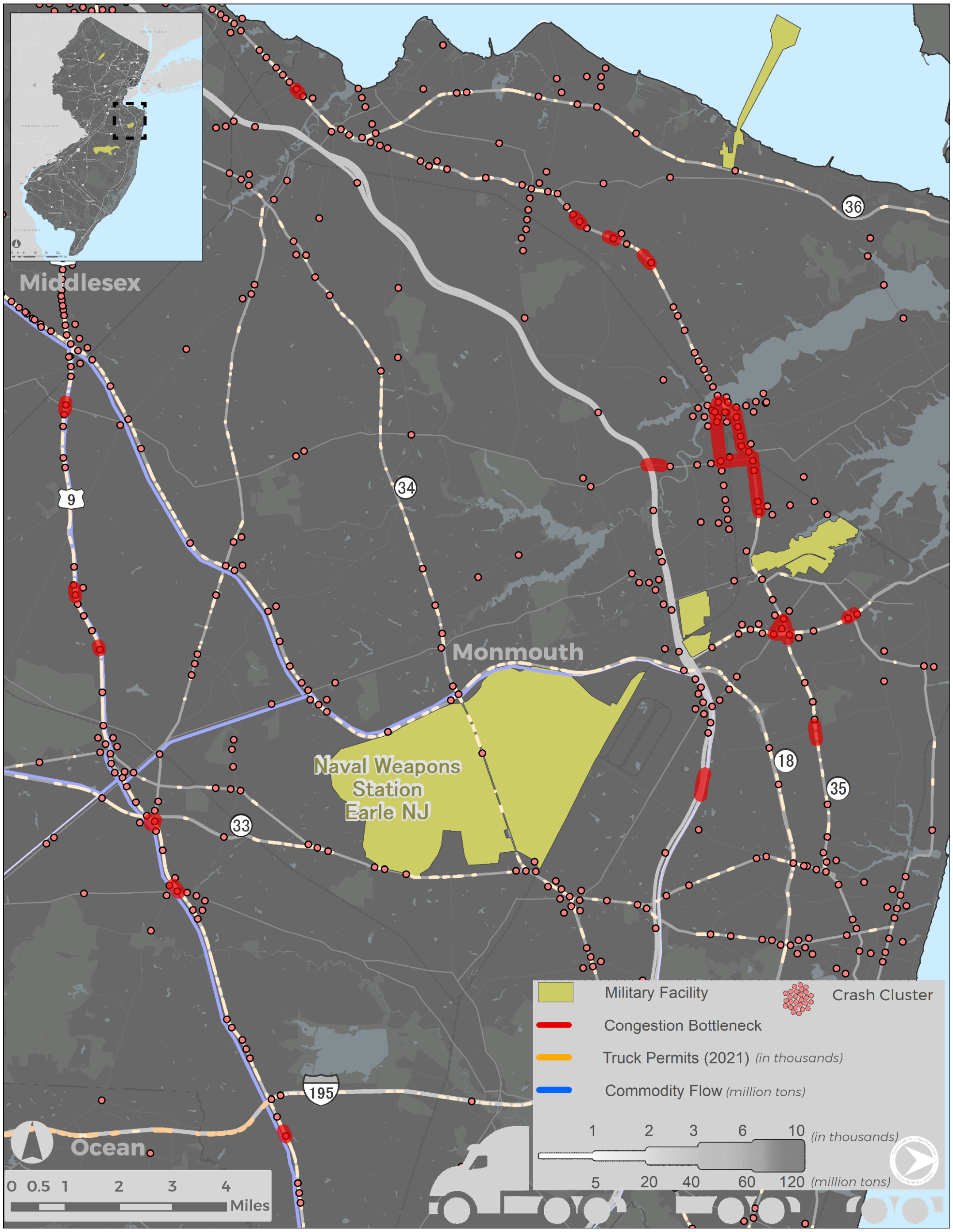


Source: NJDOT, FHWA, WSP Analysis of New Jersey NPMRDS

7.7.2 Naval Weapons Station Earle

Naval Weapons Station Earle is located in Monmouth County and is comprised of more than 11,000 acres primarily in Colts Neck Township. The complex includes the Pier Complex located in Sandy Hook Bay, connected to the main complex via Normandy Road and the Earle Navy rail line. As Figure 227 illustrates, the main facility is primarily connected to the regional highway network via NJ Routes 18, 33, and 34. The Pier Complex is located adjacent to NJ Route 36.

Figure 227. Naval Weapons Station Earle

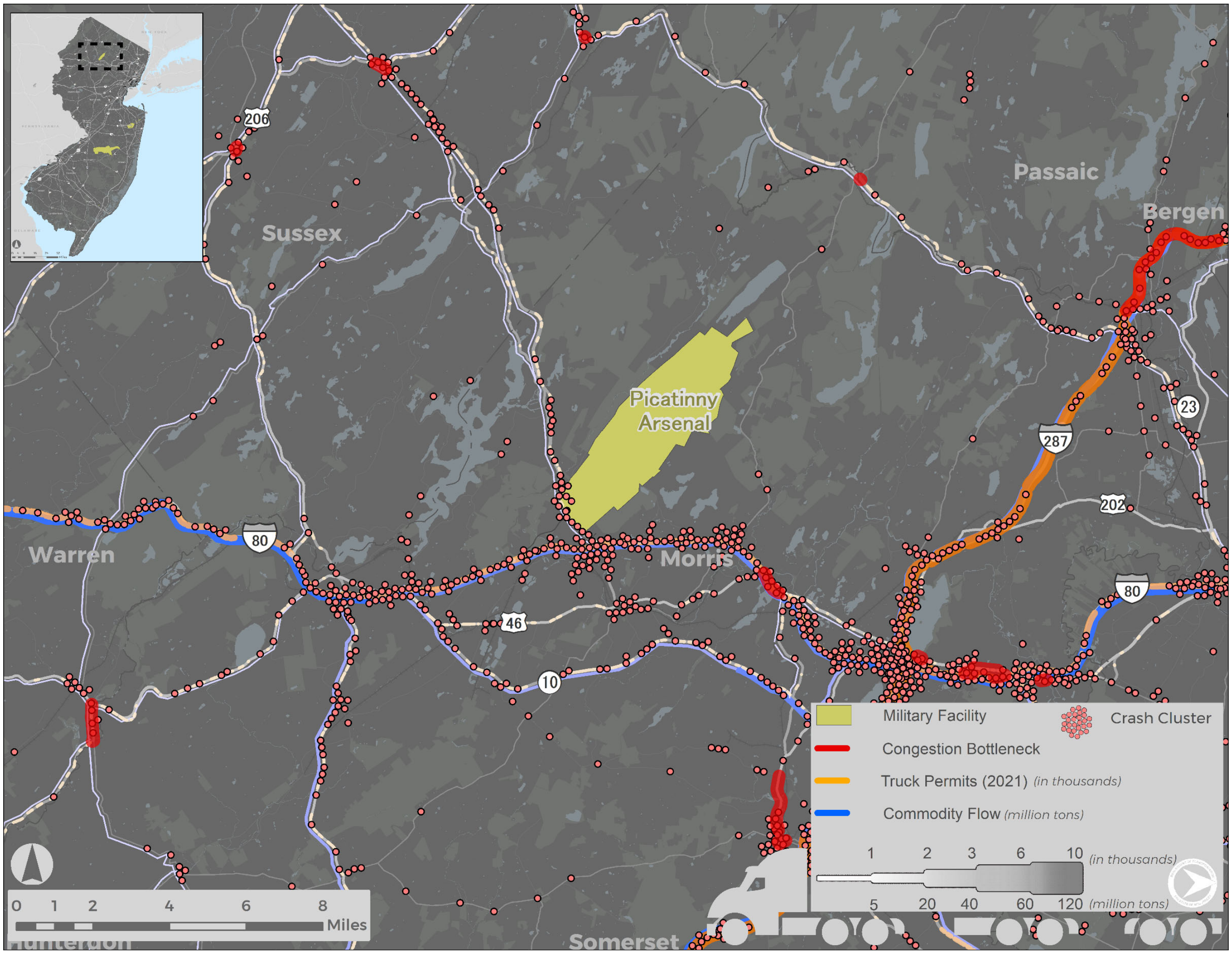


Source: NJDOT, FHWA, WSP Analysis of New Jersey NPMRDS

7.7.3 Picatinny Arsenal

The Picatinny Arsenal is a 6,000-acre facility located in Morris County, primarily within Jefferson and Rockaway Townships. The Arsenal is a research and development facility for weapons and ammunition. The main entrance of the Arsenal, shown in Figure 228, is located on NJ Route 15 less than one mile north of its interchange with Interstate 80.

Figure 228. Picatinny Arsenal



Source: NJDOT, FHWA, WSP Analysis of New Jersey NPMRDS

8 The Next Trends: Innovative Technologies and Strategies

Understanding how the goods movement industry is modernizing vehicles, facilities, and the supply chain.

8.1 VEHICLE AND VESSEL AUTOMATION

8.1.1 Vehicle Automation

Advanced vehicle technologies for trucking, including driver assistance, autonomous vehicles, and connected vehicles, are evolving quickly. Automation could substantially reduce fuel, labor, and/or equipment costs for trucking, thereby potentially reducing the cost of truck transportation for the region's freight customers. For example, predictive cruise control, which combines cruise control with GPS and topographical data, can optimize fuel performance across varying terrains, while platooning can also improve fuel efficiency.

Automation could provide meaningful transportation safety benefits by reducing truck crashes. Most commercial truck crashes are caused or worsened by human error, typically by a truck driver, or other drivers. There is some evidence that technologies such as forward collision warnings, camera systems, and automatic emergency braking systems do enhance safety. However, higher levels of automation have not yet been proven in real world applications. In New Jersey, current law prevents truck platooning, by mandating a following distance of not less than 100 feet.

While there are many theoretical cost savings and societal advantages to the deployment of automation in trucking, widespread adoption of high levels of automation is unlikely in the medium term. Many barriers remain for this technology to be commercially viable, and to realize the benefits described above. These include challenges navigating roadway work zones, perceptual challenges during adverse weather, and operational requirements for staff to travel with their shipment even if they are not driving for loading/unloading, refueling, vehicle breakdowns, other emergencies, etc.

Figure 229 Rendering of Tesla Semi Electric Truck

Source: @chesky – stock adobe.com

8.1.2 *Automation of Maritime Equipment and Terminals*

In 2021, the International Maritime Organization (IMO), developed a roadmap for regulation of autonomous maritime vessels. The term autonomous vessel encompasses a variety of technologies, from manned vessels with sensor and self-navigation capabilities, to fully automated, unmanned ships. With over 1,000 maritime autonomous surface ships (MASS) operated worldwide, the technology is being developed and adopted, but regulations have not necessarily kept pace. Within New Jersey, current legal frameworks support limited remote and autonomous systems on board vessels, including engine room automation and navigation controls that maintain a track-line. Additional regulations around landside power and automated technologies on board ships to connect to power sources when docking, could set the stage for adoption in the mid-to-long term.

8.2 VEHICLE ELECTRIFICATION

Truck electrification has reached the point of being viable and cost effective in several commercial vehicle applications. As the costs have continued to decrease, and governments increase incentives for electrification and raise standards for diesel-powered trucks, the electrification of truck fleets has become a possibility in recent years. Truck electrification includes a wide range of technologies, each with different advantages. Truck electrification using batteries is much more common currently (battery-only electric, hybrid electric, and plug-in hybrid electric); however, significant development and testing is underway for fuel-cell electric trucks, which essentially use hydrogen to store energy. The remainder of this section focuses on the potential and opportunities created by truck electrification through batteries, which is more viable in the short term.

There are currently 48 medium-duty electric truck models and 29 heavy-duty electric truck models in the market today (2021), with many more expected to be introduced in the next few years.[104] The largest manufacturers include Mitsubishi Fuso Truck & Bus Corp., Nikola Motor Co., Tesla Inc., Ford Motor Co., General Motors Co., and BYD Co. Ltd. However, production levels are still relatively low, leading to significant order backlogs. A business that places an order for a heavy-duty truck today is unlikely to receive it earlier than several years. This backlog exists despite heavy-duty electric trucks costing $350,000 to $450,000, which is significantly higher than conventional diesel trucks at $100,000 to $150,000. However, for many applications battery-electric trucks have similar lifetime costs of ownership to conventional trucks.[105] [106]

Table 96 describes the results of three studies that looked at the cost competitiveness of battery-electric and fuel cell electric trucks. In general, smaller trucks are expected to reach parity with conventional trucks in the near term, with heavier trucks reaching parity in 2035 for most applications.

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[104] M.J. Bradley & Associates (April 2021). "Electric Vehicle Market Status Update." https://www.mjbradley.com/sites/default/files/EDF_EV_Market_Report_April_2021_Update.pdf

[105] Atlas Public Policy (2020) "Assessing the Financial Barriers to Adoption of Electric Trucks: A total Cost of Ownership Analysis." https://atlaspolicy.com/wp-content/uploads/2020/02/Assessing-Financial-Barriers-to-Adoption-of-Electric-Trucks.pdf

[106] Ledna, C., Muratori, M., Yip, A., Jadun, P., and Hoehne, C. (2022) Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicle Cost Analysis, https://www.nrel.gov/docs/fy22osti/82081.pdf

Table 96. Cost Competitiveness of Battery Electric (BEV) and Hydrogen Fuel Cell Electric (FCEV) Trucks

Vehicle Class	TEMPO-Central Scenario	Islam et al, Forthcoming	Hunter et al. 2021
Light-Medium (Class 3, 10,000-14,000 lbs.)	BEVs: majority reach TCD parity with ICEV before 2030; FCEVs before 2035	BEVs: parity by 2027; FCEVs before 2035	Not included
Medium (Class 4-6, 14,000-26,000 lbs.)	BEVs: majority reach parity between 2025 and 2035; FCEVs before 2035	BEVs achieve parity before 2035; FCEVs before 2050	Single-shift BEVs: parity by 2025; FCEVs: parity assuming ultimate targets met; multi-shift BEVs do not achieve parity
Heavy (Class 7-8. 26,000+ lbs.)	BEVs & FCEVs: parity between 2030 and 2035	BEVs: approach parity by 2035; FCEVs achieve, or almost achieve parity by 2050	Parity depends on usage; short-haul single-shift BEVs: by 2025; long-haul BEV & FCEV: if ultimate targets & optimistic fuel prices achieved

Source: TEMPO[107]; Islam et al. (forthcoming), Hunter et al. (2021)[108]

The cost competitiveness of electric trucks is expected to drive adoption throughout the fleet. However, there exists considerable uncertainty about the rate of this adoption, which depends on a wide range of factors. Below are some of the more reliable projections conducted by the government and private sectors.

- The National Renewable Energy Laboratory forecasts that by 2030 approximately 40% of trucks (light-medium, medium, and heavy) are expected to be battery-electric, and two percent are expected to be hydrogen fuel-cell electric.[109] By 2050 these shares are expected to increase to 83% and 17%, respectively.
- MarkNtel Advisors forecasts that the U.S. electric truck market will grow 60% annually from 2021 to 2026.[110] They expect heavy-duty trucks to see the fastest growth, which contradicts other studies finding that smaller trucks are more likely to electrify.
- ACT Research projects that battery-electric trucks will make up half of Class 4 through 8 vehicles sold in the United States by 2035, as shown in Figure 230.[111] Their cost analysis found that battery-electric medium-duty trucks currently have cheaper total cost of ownership than comparable diesel trucks;, this advantage is expected to increase as battery technology continues to improve and new regulations are introduced to curtail diesel emissions. The highest adoption rates are forecasted for Class 6 through 7 trucks (60% in ten years), while Class 4 through 5 trucks are more likely to switch to gasoline engines. Class 8 trucks are likely to favor diesel engines until emission regulations are tightened.
- McKinsey & Company estimates that the existing federal mandate would lead to an increase of electric trucks to 30,000 in 2025 and 338,000 by 2030.[112] Meeting this demand is expected to require significant investments in charging infrastructure.

While for passenger vehicles the majority of chargers are expected to be located at people's homes, trucks will require an extensive public and commercial charging system, to supply the 23 terawatt-hours of electricity required by trucks in 2030.

[107] Ledna, C., Muratori, M., Yip, A., Jadun, P., and Hoehne, C. (2022) Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicle Cost Analysis, https://www.nrel.gov/docs/fy22osti/82081.pdf

[108] Hunter et al. (2021) Spatial and Temporal Analysis of the Total Cost of Ownership for Class 8 Tractors and Class 4 Parcel Delivery Trucks, https://www.nrel.gov/docs/fy21osti/71796.pdf

[109] Ledna, C., Muratori, M., Yip, A., Jadun, P., and Hoehne, C. (2022) Decarbonizing Medium- & Heavy-Duty On-Road Vehicles: Zero-Emission Vehicle Cost Analysis, https://www.nrel.gov/docs/fy22osti/82081.pdf

[110] MarkNtel Advisors LLP, USA Electric Truck Market Research Report: Forecast (2021-2026), https://www.businesswire.com/news/home/20211202005429/en/United-States-Electric-Truck-Market-Growth-Forecasts-to-2026-60-Compound-Annual-Growth-Forecast-During-2021-2026---ResearchAndMarkets.com#:~:text=The%20US%20Electric%20Truck%20market,the%20road%20freight%20transport%20sector

[111] https://www.truckinginfo.com/10161524/act-half-of-class-4-8-sales-to-be-bev-by-2035

[112] https://www.mckinsey.com/industries/public-and-social-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs

The factors driving growth in truck electrification include:

- Lower total cost of ownership for some applications, including lower maintenance costs
- Governmental incentives and regulations intended to reduce greenhouse gas emissions and nitrogen oxides (NOx) emissions. This includes both incentives facilitating electrification and more stringent requirements for traditional diesel or gasoline trucks. Many analyses find that the cost competitiveness of the technology in the short term depends critically on these governmental actions.
- Continued improvements in truck electrification and battery technology
- Further developments and testing of battery technology by truck manufacturers
- Surge in e-commerce increasing demand for light electric truck for deliveries, which are more conducive to electrification
- Significant interest from businesses to take advantage of cost savings and lead technology adoption
- Some businesses see truck electrification as a way of showcasing environmental stewardship. Amazon ordered 100,000 electric delivery vans from Rivian with the intention of deploying them by 2030.[113] Ikea has plans to use electric trucks to perform all home deliveries in New York and Los Angeles by 2025.[114] Walmart also has significant plans to roll out electric trucks in the coming year. FedEx has committed to replacing their entire fleet with electric trucks by 2040.[115]

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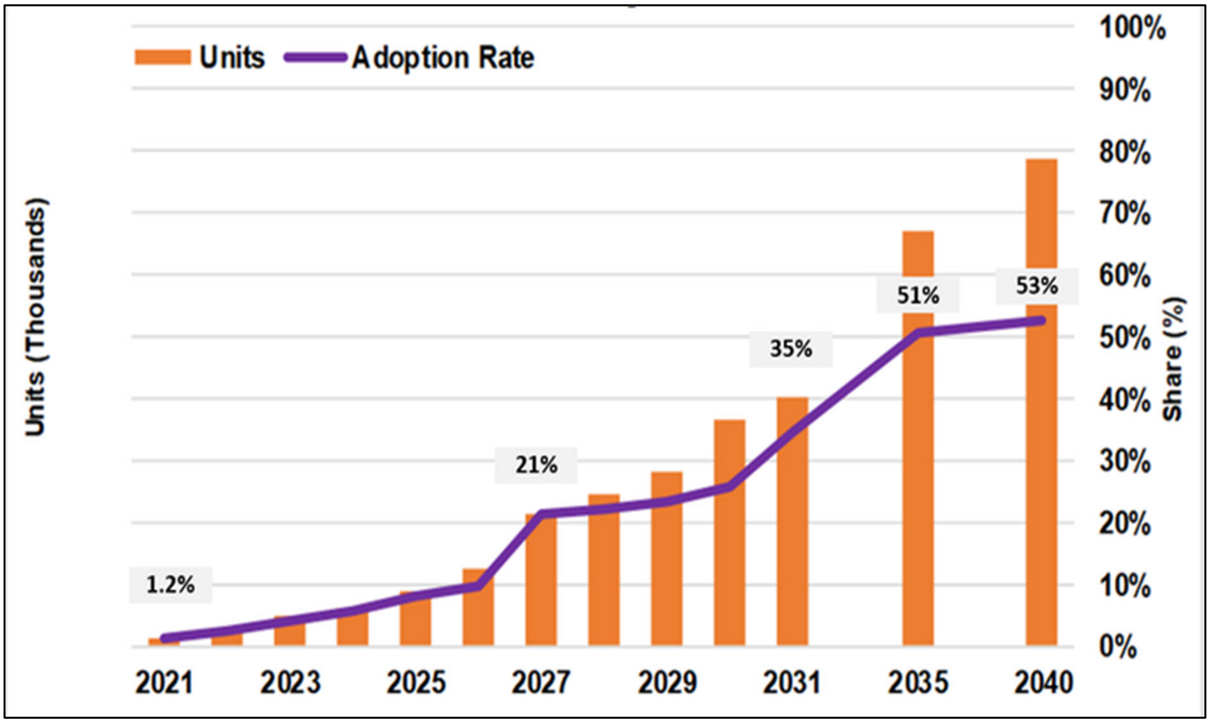
[113] Lambert, Fred. "Closer Look at Rivian's Electric Delivery Van for Amazon." Electrek, 6 Feb. 2020, electrek.co/2020/02/06/rivian-amazon-electric-delivery-van-closer-look/.

[114] Zero Emissions for Home Deliveries. about.ikea.com/en/sustainability/ becoming-climate-positive/zero-emissions-for-home-deliveries.

[115] https://www.mjbradley.com/sites/default/files/EDF_EV_Market_Report_April_2021_Update.pdf

Figure 230. North America Class 4-8 Battery Electric Vehicles, 2021 to 2040



Source: ACT Research Co. LLC, 2021. (https://www.truckinginfo.com/10161524/act-half-of-class-4-8-sales-to-be-bev-by-2035)

The main barriers slowing the electrification of the truck fleet include:

- High capital costs relative to conventional trucks
- Difficulties securing loans for more expensive electric trucks, especially without governmental support
- Slowness of recharging requires significant changes in how many trucks are operated compared to today
- Lack of charging infrastructure and electric grid capacity
- Significantly less service support available for maintenance and repairs
- Concerns about longevity and depreciation, particularly with batteries

Given the characteristics of the technology, the following are the trucking applications favorable to electrification, particularly for a dense and compact state like New Jersey:

- Urban delivery applications that require frequent braking and slow speeds, allowing benefits from regenerative breaking
- Applications where the truck returns to home base, facilitating rapid charging, and operate within a range of 100-150 miles
- Drayage applications where the truck cycles back and forth, ideally less than 100-150 miles each way (e.g., rail intermodal terminals or airports)

In theory there are significant advantages to hydrogen fuel cell technology relative to battery technology in freight applications. Hydrogen is currently 24 times more energy dense than batteries, which would allow trucks to carry larger payloads.[116] More importantly, hydrogen trucks can be used more intensely than battery trucks, by offering a longer range

[116] Deloitte (2020) The Future of Mobility: Hydrogen and Fuel Cell Solutions for Transport. https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/finance/deloitte-cn-fueling-the-future-of-mobility-en-200101.pdf

and significantly shorter refueling times. Theoretically, hydrogen trucks could be operated competitively in a wider range of applications than battery trucks. This has led several government agencies and private companies to test and develop fuel cell and fuel cell battery hybrid technology. This includes UPS and FedEx, which are testing delivery applications for delivery vans powered by hydrogen.[117 118] However, there remain significant challenges to the commercial adaptation of hydrogen fuel cell trucks, including durability, infrastructure needs, and costs. Many believe that when these challenges are considered, hydrogen fuel cell trucks are unlikely to outperform battery-electric trucks long-term.[119]

8.2.1 Marine Vessel Electrification

According to the International Maritime Organization (IMO), maritime transportation results in 2.5% of global greenhouse gas emissions, and recent IMO guidance as well as local regulations have sought to decrease vessel emissions through several means, including electrification, utilization of LNG and solar, and installation of emissions scrubbers. Electrification efforts vary by type of vessel, such as container ship, cruise ship, oil tanker, or ferry, all of which call on New Jersey ports and terminals. Ferries offer an opportunity for full electrification, due to their relatively smaller size and shorter trips. Improvements in rechargeable batteries will be a leading determinant in the future success of electrification of larger ships. Vessel electrification will require either new ships or retrofits, as well as land side infrastructure to connect to shore power. Landside improvements are an opportunity for public-private partnerships to develop new infrastructure and meet environmental and economic demands.

Vessel electrification is supported by federal funding, and the City of Elizabeth, NJ, was awarded $5 million in RAISE grant funding in 2022 for a study of the feasibility of constructing a ferry terminal and incorporating electric ferry service between Elizabeth and Manhattan, NY. Currently, a portion of the New York and New Jersey ferry fleets operate hybrid diesel-electric vessels, and electric ferries are being used in Niagara for the Maid of the Mist service as well. Europe is leading the way with vessel electrification and automation and NJDOT OFP has begun to collaborate with partners in Norway, including Massterly, to learn more about the available technologies and best practices.

Figure 231. Maid of the Mist Electric Ferry

Source: NY State Parks

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117 Fuel Cell Hybrid Electric Delivery Van Project 2017 DOE Annual Merit Review

118 Supply Chain Dive, FedEx tests hydrogen fuel cell van for deliveries. https://www.supplychaindive.com/news/FedEx-hydrogen-fuel-cell-vanpilot/522449/

119 ACT Research Co. LLC https://www.truckinginfo.com/10161524/act-half-of-class-4-8-sales-to-be-bev-by-2035

8.2.2 Other State Initiatives

New Jersey is in prioritizing the reduction of truck emissions. In 2021, NJDEP announced the Advanced Clean Truck (ACT) Rule and Fleet Reporting Requirement. The ACT Rule will increase the utilization of medium and heavy-duty electric trucks in the state. The Fleet Reporting Requirement will require a one-time collection of data about in-state operations of trucks fleets with vehicles over 8,500 pounds to inform future emissions reduction policies. NJEDA also manages its NJ Zero Emission Incentive Program (NJZIP), a pilot with $90M in funding to provides replacement vouchers for medium and heavy-duty zero emission vehicles. As of November 2022, $3.2M in vouchers had been redeemed.

Other government agencies across the country are taking steps to accelerate the electrification of the truck fleet. Some of the key initiatives include:

- The New York Clean Trucks Program provides incentives for replacing diesel trucks with electric trucks, with a goal of reaching 4,000 electric trucks by 2025 (from 2,100 in 2020).[120]
- California's Low Carbon Fuel Standard generates millions in credits each year and reached over $2 billion in transactions in 2019.
- California's Advanced Clean Truck Regulation approved new rules in June 2020 requiring a certain percentage of trucks sold each year to be of zero-emission vehicles, at an increasing percent from 2024 to 2035, with the goal of reaching 75% of Class 4 through 8 straight trucks and 40% of tractor trailers. This regulation also requires large fleet owners to provide information about their operations to inform future rulemaking.[121] This initiative taking place in California is expected to have a significant impact on the electric truck market nationwide, given the size of the California trucking market.

8.3 ADDITIVE AND DISTRIBUTIVE MANUFACTURING

8.3.1 Growth of Additive Manufacturing/3D Printing

3D printing technology continues to advance rapidly. 3D printing is a type of additive manufacturing (AM) by which products are formed by layering materials, as opposed to subtractive (cutting away) or formative (molding) techniques. 3D production machinery is loosely referred to as "printers" and does include inkjet printers used with ceramics and concrete, although they are just one of a half dozen types. Similarly, while the raw materials may be referred to metaphorically as "inks"; the actual materials include plastics, metals, and even food in various forms. Fused Deposition Modeling of plastics is the most common and probably best-known production method, utilizing melted filaments extruded through a nozzle. 3D printers are operated from software containing the design specifications. The size of the AM industry was $12.6 billion worldwide in 2020, growing 21% over 2019 and forecast to grow at a compound annual rate of 17% through 2023. The growth rates cited above imply that the size of the 3D market will double within five years, reaching a value of $37.2 billion in 2026.

8.3.2 3D Printing Location Networks

3D printing location networks are being established in current freight-handling locations. Future 3D printing locations may be in homes, or at commercial locations throughout the region. A network of desktop models (defined as costing less than $5,000) was launched by UPS in 2016, in a joint venture with the enterprise software systems company SAP

120 P&S Intelligence. "U.S. Electric Truck Market Growth Forecast Report, 2030." March 2022 https://www.psmarketresearch.com/market-analysis/us-electric-truck-market

121 California Air Resources Board. "Advanced Clean Trucks Fact Sheet." https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet

and the 3D printing specialists Fast Radius. The network originally had 60 UPS store locations, and while the partnership locations have decreased since, Fast Radius was added to the NASDAQ in January of 2022.

8.3.3 Changes in Warehouse and Factory Siting

Parts warehouses could be supplemented at least in part by printing sites, and factory location decisions may become less dependent on the labor costs for components. New Jersey, with its dense network of warehousing, fulfillment, and finishing operations, could be an attractive location for additive manufacturing and component assembly operations. More parts could be made to order or finished on-site instead of being imported and decrease the need for warehousing space to store imported parts.

8.3.4 Transportation of 3D Printing Inks

There will be growing demand for the transportation of inks to feed 3D processes. Many of them are heavy (e.g., metals, ceramics, concrete) and might be suitable for bulk transport as demand grows, although some sort of protective packaging seems likely in many cases. One possibility is the development of local depots that break down bulks into consumable bundles for regional delivery, in addition to direct deliveries in volume to factories. The sources of inks are not well defined, because they are specialty items thus far. Presumably, the industries producing plastics, metals, ceramics, and other inputs will be able to serve the new and growing demand, although from which plants in which states remains to be seen. One type of input is plastic resins, which are by-products of petroleum refining; New Jersey is home to two oil refineries that can produce these resin byproducts, which could be used locally and/or exported.

8.3.5 Distributed Manufacturing

The length and complexity of supply chains for product deliveries may be generally reduced, meaning more goods can be delivered with lower per-unit transportation impacts. 3D processes will enable and facilitate systems of "distributed manufacturing." Distributed manufacturing refers to the potential for efficient production of components and goods near the points of demand, leading to many small factories situated in and serving many local markets. This contrasts with the long-standing imperative for factories to achieve economies of scale through mass production, and to locate large plants in limited numbers where the availability of raw materials, affordable skilled labor, vendors, or other factors of production make the achievement most efficient.

8.3.6 Modal Shifts from Additive Manufacturing

Flows by water are not likely to be heavily impacted in the near term, as ink stocks are imported, generally from China, and imports are currently lower cost than domestic feedstocks. In the longer term, seaports could face losses of international trade if more materials and products are made domestically, or air cargo could be reduced if high-value goods are made locally, although in both cases other business opportunities could offset any losses. For example, inks could grow as import or export commodities by water, and air will remain vitally important as a fail-safe system for supply chain breakdowns and disruptions.

Rail will be viable for containerized transport of inks if 3D printing operations reach an industrial scale or export becomes economically viable. Otherwise, transport will be most effective by truck. Local trucking will be increasingly important to link distributed manufacturing locations with users. Trucks will be important for delivery of inks and finished products, especially where volumes are small, or producers are regional, or for intermodal drayage.

9 Building our Infrastructure: Investment Plan

An outline of how, when, and where New Jersey is currently investing existing transportation funds, as outlined within the State Transportation Investment Program.

A strategic and targeted investment plan is critical to carry out the vision and goals outlined throughout the SFP. An investment plan is a federally mandated and fiscally-constrained requirement of all statewide freight plans, but more importantly facilitates NJDOT's desire to provide an effective transportation system that supports the state's robust supply chains. This section highlights state and Federal funding sources for the implementation of freight-centric improvements within New Jersey for the upcoming eight years. Updates or revisions to the SFP will be conducted when required to accommodate additional projects and programs to ensure a monitored approach to plan implementation.

The Investment Plan provides an overview of available funding sources for freight projects. For this plan, the New Jersey State Transportation Improvement Program (STIP) was reviewed to identify freight-related projects. Since freight plays an important role in New Jersey's economy, as outlined throughout the SFP, many of the projects in the STIP can be identified as freight-related projects, however **the Investment Plan focuses on those projects specifically linked to trucks, rails, ports, and major corridors along the National Highway Freight Network (NHFN).** All the identified projects were also reviewed on the Electronic Statewide Transportation Improvement Program (e-STIP) which reflects all modifications and amendments to the approved FY2022 STIP. The project information in this Investment Plan is current as of November 14, 2022. Each of the identified projects was categorized according to its funding code, described in more detail in later sections. For each funding source, a table was created to summarize the total funding for freight projects within that source, followed by a listing of projects within each MPO region. More detail on funding levels and project descriptions can be found in Appendix E.

Data collection and outreach performed as a part of previous statewide freight plans completed in 2007, 2011, and 2017 have supported the selection of STIP projects over time as well as the current slate of STIP projects. Numerous freight-related STIP projects have been developed through collaborative input from multiple NJDOT groups, OFP subject matter experts, freight plan data and analyses, FMS rankings or data, and participation from NJFAC partners (including MPOs, the PANYNJ, and SJPC). This concerted and iterative process has resulted in the advancement of projects like the Portway Program, which was initiated before the completion of the State's first Freight Plan in 2007. The OFP supported the development of individual Portway projects, which are now funded and moving forward, such as the Fish House Road effort.

9.1 NEW JERSEY STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

The State annually outlines transportation projects and programs that are intended to rebuild the state's bridges, roads, and other infrastructure, improve transit services, reduce congestion, and improve safety. In compliance with Federal legislation, New Jersey creates a 10-year STIP to guide transportation investments for the State. Although the STIP must be updated every four years at a minimum, New Jersey updates it biennially. The current FY 2022-2031 STIP was reviewed to compile this Investment Plan.

The STIP serves as the reference document approving the expenditure of federal funds for transportation projects in New Jersey by the FHWA and FTA per federal regulations (23 CFR 450.216). The STIP is also a guide to major transportation improvements planned in the State for NJDOT, NJ TRANSIT, and other implementing agencies in New Jersey. Each of these agencies independently analyzes the TIP presented by each MPO and assigns a priority ranking based on how each project would advance regional and statewide objectives. NJDOT and NJ TRANSIT develop revenue projections for each MPO based on available federal and state funds, and then, in consultation with the three MPOs, negotiate a list of deliverable transportation projects that best meet the statewide and regional priorities within the fiscally constrained program. The STIP also includes statewide projects and programs and incorporates the regional Transportation Improvement Programs (TIPs) developed by the state's three MPOs.

Federal laws require that the STIP be fiscally constrained for the first four years, listing the priority projects planned for the first four years and a list of priority projects to be funded over the next six years. This amount constitutes the funding expected to be available to support the whole 10-year STIP. As such, funding that is listed through the year 2026 in the 2022 STIP is within the fiscally constrained plan and apportioned. Funding listed beyond those years are subject to change when the STIP is next updated.

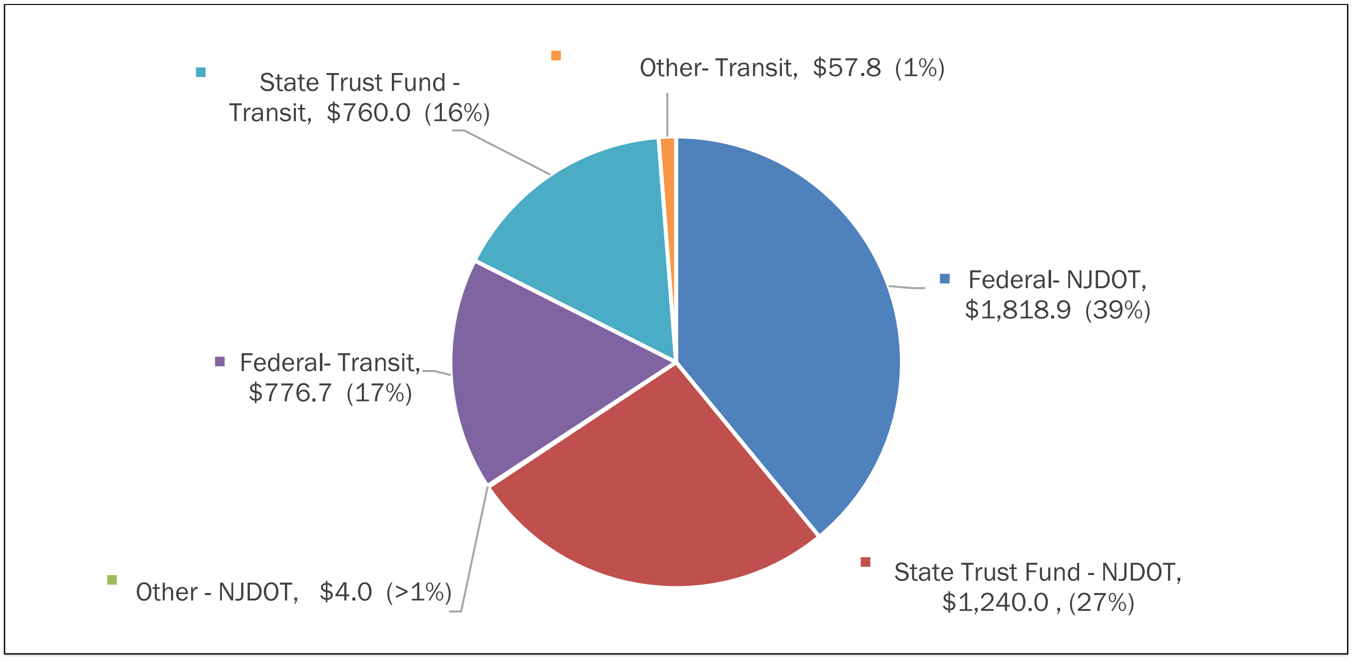
In addition to an analysis of the most recent STIP, the FY 2023 Transportation Capital Program was reviewed as well. The Transportation Capital Program for each year represents the annual component of the STIP. The FY2023 Transportation Capital Program describes the planned capital investments for the State fiscal year beginning July 1, 2022.

In New Jersey, public sector transportation funding comes from the following sources:

- Federal funding – FHWA and FTA
- State funding – Transportation Trust Fund (TTF)
- Others – NJDOT, NJ TRANSIT, Casino Revenue Funds

As shown in Figure 232, the FY 2023 Transportation Capital Program totals $4.657 billion and is funded primarily by Federal, state, and other third-party resources. This program includes $3.063 billion for NJDOT and $1.595 billion for NJ TRANSIT. Federal revenues for FY 2023 are projected at $2.596 billion ($1.819 billion allotted to NJDOT and $777 million allotted to NJ TRANSIT), while State TTF funds total $2 billion ($810 million allocated to NJDOT, $430 million to Local Aid, and $760 million to NJ TRANSIT). The ‘Other’ source of funding for NJDOT is $4 million and refers to match funds provided by NJDOT toll-financed funds. The other sources of funding for Transit include $30.9M Casino Revenue Funds, $1.9M Match Funds, and $25M NJ Turnpike Funds. Match funds from non-federal sources are required to receive federal funds for some federal grant programs. These match funds are provided by NJDOT, NJ TRANSIT and other local funding sources.

Figure 232. Sources of Funds ($ Millions)



Source: NJDOT Transportation Capital Program FY 2023 Overview https://www.nj.gov/transportation/capital/tcp23/

The projected 8 years (FY 2023-FY 2030) sources of funding by categories are listed in Table 97 by year in millions.

Table 97. NJ STIP (FY 2023-FY2030) Sources of Funding ($ Millions)

Funding Category		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
Federal	NJDOT	$1,818.90	$1,096.50	$1,090.60	$1,108.60	$1,123.40	$1,140.30	$1,158.10	$1,176.00	$9,712.40
	NJ TRANSIT	$776.70	$715.50	$715.50	$709.00	$615.50	$615.50	$615.50	$615.50	$5,378.70
	Subtotal Federal	**$2,595.60**	**$1,812.00**	**$1,806.10**	**$1,817.60**	**$1,738.90**	**$1,755.80**	**$1,773.60**	**$1,791.50**	**$15,091.10**
State (TTF)	NJDOT	$1,240.00	$640.00	$1,233.00	$1,233.00	$1,233.00	$1,233.00	$1,233.00	$1,233.00	$9,278.00
	NJ TRANSIT	$760.00	$760.00	$767.00	$767.00	$767.00	$767.00	$767.00	$767.00	$6,122.00
	Subtotal State	**$2,000.00**	**$1,400.00**	**$2,000.00**	**$2,000.00**	**$2,000.00**	**$2,000.00**	**$2,000.00**	**$2,000.00**	**$15,400.00**
Other	NJDOT	$4.00	$20.90	$22.40	$90.60	$0.00	$0.00	$0.00	$0.00	$137.90
	NJ TRANSIT	$57.80	$50.20	$50.20	$50.20	$50.20	$50.20	$50.20	$50.20	$409.20
	Subtotal Other	**$61.80**	**$71.10**	**$72.60**	**$140.80**	**$50.20**	**$50.20**	**$50.20**	**$50.20**	**$547.10**
	Total	**$4,657.40**	**$3,283.10**	**$3,878.70**	**$3,958.40**	**$3,789.10**	**$3,806.00**	**$3,823.80**	**$3,841.70**	**$31,038.20**

Source: NJDOT 2022 STIP

9.2 FEDERAL TRANSPORTATION FUNDING

The FHWA and FTA require states to provide a share of funding to maintain facilities on the designated federal aid system, including those under jurisdiction of NJDOT, NJ TRANSIT, counties, and certain municipalities or authorities. In FY 2023, federal funds made up approximately 56% of New Jersey's total transportation funding.

Many Federal grant programs require a non-federal match fund. NJDOT is permitted to use toll-financed investments for state matching funds on federal-aid projects. This provision dates back to ISTEA and has since been modified by TEA-21 and SAFETEA-LU. It permits the non-federal share of a project's cost to be met through a "soft match" of toll credits. This soft match means that no project costs are incorporated into the project as part of the non-Federal share. Rather, the use of toll credits meets the matching requirements required under law, and increases the Federal cash outlay up to 100% of project costs. This is the case for some projects programmed to use Federal funds such as NHFP-Rail funds where the other funding source would represent the match required by the non-federal agency.[122]

9.2.1 Fixing America's Surface Transportation Act (FAST Act)

The FAST Act, passed in 2015, provides funding for highway, roadway and motor vehicle safety, public transportation, ferry, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. For the first time, this Act provides a dedicated source of federal dollars for freight projects. These funds are intended to support critical transportation projects, ease congestion, and facilitate freight movement on interstates and major roads that are part of the NHFN. The programs part of the FAST Act that serve as potential sources of funding to the New Jersey Freight System such as the National Highway Performance Program (NHHP), National Highway Freight Program (NHFP), and INFRA will be discussed in more detail in this Investment Plan.

9.2.2 Infrastructure Investment and Jobs Act (IIJA)[123]

The Infrastructure Investment and Jobs Act (IIJA), passed in 2021, continued and increased funding to many of the programs established by the FAST Act. The IIJA also created new programs that will help fund transportation projects including the Rural Surface Transportation Grant Program (RURAL) and the National Infrastructure Project Assistance (Mega) program. The programs that serve as potential sources of funding for the New Jersey Freight System will be discussed in this Investment Plan. A description of the IIJA was provided in Section 1.

The IIJA will invest $110 billion of new funds for roads, bridges, and major projects, and reauthorize the surface transportation program for the next five years (FY 2022-2026). This includes a total of $40 billion of new funding for bridge repair, replacement, and rehabilitation, which is the single largest dedicated bridge investment since the construction of the interstate highway system. The bill also includes approximately $16 billion for major projects that are too large or complex for traditional funding programs but will deliver significant economic benefits to communities.

The legislation invests $66 billion over the next 5 years in passenger and freight rail. Within the total funding, $22 billion would be provided as grants to Amtrak, $24 billion as federal-state partnership grants for Northeast Corridor modernization, $12 billion for partnership grants for intercity rail service, including high-speed rail, $5 billion for rail improvement and safety grants, and $3 billion for grade crossing safety improvements.

The bill invests $17 billion over the next five years in port infrastructure and $25 billion in airports to address repair and maintenance backlogs, reduce congestion and emissions near ports and airports, and drive electrification and other low-carbon technologies. Modern, resilient, and sustainable port, airport, and freight infrastructure will support U.S. competitiveness by removing bottlenecks and expediting commerce, and will reduce the environmental impact on

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122 In order to receive the federal grant, the project must receive a match fund from another source of funds (nonfederal). For example. the federal grant may pay for 90% of a project, so 10% is the match fund financed by a non-federal source.

123 UPDATED FACT SHEET: Bipartisan Infrastructure Investment and Jobs Act - The White House. https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-investment-and-jobs-act/

neighboring communities. The freight projects in New Jersey identified to receive funds from the programs maintained by IIJA are discussed in this investment plan. Additionally, the IIJA created new grant programs which may be a potential source of funds for future freight projects in New Jersey. These programs are described in more detail later in this section.

9.2.3 National Highway Performance Program (NHPP)[124]

This program was established under Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012, funded by the FAST Act through FY 2021, and continued by the IIJA, with approximately $148 Billion for states over the next 5 years (FY 2022-2026). New Jersey freight projects with NHPP as a potential funding source were reviewed as part of this Investment Plan.

- The purposes of the NHPP are to provide support for:
- the condition and performance of the National Highway System (NHS)
- the construction of new facilities on the NHS; to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established by New Jersey's asset management plan for the NHS; and activities to increase the resiliency of the NHS to mitigate the cost of damages from sea level rise, extreme weather events, flooding, wildfires, or other natural disasters.

Eligible projects include:

- Construction, reconstruction, resurfacing, restoration, rehabilitation, preservation, or operational improvements of NHS segments
- Construction, replacement (including replacement with fill material), rehabilitation, preservation, and protection (including scour countermeasures, seismic retrofits, impact protection measures, security countermeasures, and protection against extreme events) of NHS bridges and tunnels
- Bridge and tunnel inspection and evaluation on the NHS and inspection and evaluation of other NHS highway infrastructure assets
- Training of bridge and tunnel inspectors
- Construction, rehabilitation, or replacement of existing ferry boats and facilities, including approaches that connect road segments of the NHS
- Construction, reconstruction, resurfacing, restoration, rehabilitation, and preservation of, and operational improvements for, a Federal-aid highway not on the NHS, and construction of a transit project eligible for assistance, if the project is in the same corridor and in proximity to a fully access-controlled NHS route, if the improvement is more cost effective (as determined by a benefit-cost analysis) than an NHS improvement, and will reduce delays or produce travel time savings on the NHS route and improve regional traffic flow
- Bicycle transportation and pedestrian walkways
- Highway safety improvements on the NHS
- Capital and operating costs for traffic and traveler information, monitoring, management, and control facilities and programs

124 Bipartisan Infrastructure Law - National Highway Performance Program (NHPP) Fact Sheet | Federal Highway Administration. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhpp.cfm

- Development and implementation of a State Asset Management Plan for the NHS including data collection, maintenance and integration, software costs, and equipment costs
- Infrastructure-based ITS capital improvements
- Environmental restoration and pollution abatement
- Control of noxious weeds and establishment of native species
- Environmental mitigation related to NHPP projects
- Construction of publicly owned intracity or intercity bus terminals servicing the NHS
- Installation of vehicle-to-infrastructure communication equipment
- Reconstruction, resurfacing, restoration, rehabilitation, or preservation of a bridge on a non-NHS Federal-aid highway (if Interstate and NHS Bridge Condition provision requirements are satisfied)
- A project to reduce the risk of failure of critical NHS infrastructure (defined to mean a facility, the incapacity or failure of which would have a debilitating impact in certain specified areas)
- At a State's request, the USDOT may use the State's Surface Transportation Block Grant (STBG) funding to pay the subsidy and administrative costs for Transportation Infrastructure Finance and Innovation Act (TIFIA) credit assistance for an eligible NHPP project or group of projects

Annual freight-related funding ($M) in the NJ STIP from NHPP is listed below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
NHPP	$94.91	$119.34	$166.84	$185.66	$317.69	$239.61	$168.87	$517.25	$1,810.17

Source: NJDOT 2022 STIP

Annual funding ($M) for freight projects that are funded through the NHPP are summarized in Table 98.

Table 98. NHPP Freight Projects ($ Millions)

Project	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Route 3 & Route 495 Interchange	12386	–	$10.00	–	$17.25	–	–	–	$7.15	$34.40
Route 80, Bridges over Howard Boulevard (CR 615)	15351	$1.50	–	–	–	–	–	–	–	$1.50
Route 80, Riverview Drive (CR 640) to Polify Road (CR 55)	11415	–	–	$30.00	$4.00	$9.00	$44.61	–	–	$87.61
Route 287, River Road & Easton Avenue Interchange Improvements	9169Q	–	$1.34	$2.85	$1.07	$38.16	–	–	$45.00	$88.41
Route 280, WB Ramp over 1st & Orange Streets, Newark Subway & NJ TRANSIT	12318	–	$15.00	$16.10	–	–	–	–	–	$31.10
Route 440, Route 95 to Kreil St	14355	–	$3.00	–	$7.00	$7.00	–	–	$130.50	$147.50
Route 295/42/I-76, Direct Connection, Contract 4	355E	–	–	$65.37	$79.77	$43.91	–	–	–	$189.04
Hamilton Road, Bridge over Conrail RR	14416	$2.80	–	–	–	–	–	–	–	$2.80
Oak Tree Road Bridge, CR 604	99316	–	–	–	$2.00	–	–	$22.86	–	$24.86
Pavement Preservation DVRPC & SJTPO	X51	$13.00	$10.23	$10.84	$12.00	$12.00	$12.00	$12.00	$12.00	$94.07
Pavement Preservation NJTPA	X51B	$33.75	$66.56	$18.07	$20.00	$20.00	$20.00	$20.00	$20.00	$218.37
Route 1, Alexander Road to Mapleton Road	17419	–	–	–	$7.50	$11.20	–	–	$19.00	$37.70
Route 1, NB Bridge over Raritan River	15303	–	–	–	–	–	–	–	$84.65	$84.65
Route 1&9, Interchange at Route I-278	95023	–	$3.30	$5.00	–	$9.85	–	–	–	$18.15
Route 23, Route 80 and Route 46 Interchange	9233B6	–	$3.80	–	–	–	–	–	$63.50	$67.30
Route 295/42, Missing Moves, Bellmawr	355A	$20.00	–	–	–	–	–	–	–	$20.00
Mobility and Systems Engineering Program	13306	$10.41	$5.11	$5.42	$6.00	$6.00	$6.00	$6.00	$6.00	$50.95
Resurfacing, Federal	99327A	$1.00	$1.00	$1.00	$10.00	$145.00	$145.00	$96.01	$32.18	$431.19
Traffic Monitoring Systems	X66	–	–	$12.19	$11.57	$11.57	$12.00	$12.00	$12.00	$71.34
Route 9/35, Main Street Interchange	079A	$4.60	–	–	$7.50	$4.00	–	–	$85.27	$101.37
Route 439, Route 28 (Westfield Ave) to Route 27 (Newark Ave)	15395	$7.85	–	–	–	–	–	–	–	$7.85
Total		$94.91	$119.34	$166.84	$185.66	$317.69	$239.61	$168.87	$517.25	$1,810.17

Source: NJDOT 2022 STIP

9.2.4 National Highway Freight Program (NHFP)[125]

To improve efficient movement of freight on the National Highway Freight Network (NHFN), the FAST Act established a new National Highway Freight program (NHFP). IIJA continues funding for the NHFP with $7.149 Billion for the next 5 years (FY 2022-2026). States may use up to 30% (vs. 10% under the FAST Act) of NHFP funding on freight intermodal or freight rail projects.

The intention of the NHFP is to improve the efficient movement of freight on the NHFN and support several goals including:

- investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity
- improving the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas
- improving the state of good repair of the NHFN
- using innovation and advanced technology to improve NHFN safety, efficiency, and reliability
- improving the efficiency and productivity of the NHFN
- improving State flexibility to support multi-State corridor planning and address highway freight connectivity
- reducing the environmental impacts of freight movement on the NHFN

A State may transfer up to 50% of NHFP funds made available each fiscal year to any other apportionment of the State, including the National Highway Performance Program, Surface Transportation Block Grant Program, Highway Safety Improvement Program, Congestion Mitigation and Air Quality Improvement Program, Carbon Reduction Program, and Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Formula Program. Conversely, subject to certain limitations, a State may transfer up to 50% of funds made available each fiscal year from each other apportionment of the State to NHFP. NJDOT intends to use all the NHFP funds designated to the state. If funding for all qualifying NHFP projects is accounted for, remaining funds may be transferred to other programs to fund freight projects that may not qualify for NHFP but can be advanced via other programs.

In FY 2022, NJ was granted $39.4 million through the NHFP to fund projects listed in Table 99. Eligible project types include:

- Development phase activities, including planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering and design work, and other preconstruction activities
- Construction, reconstruction, rehabilitation, acquisition of real property (including land relating to the project and improvements to land), construction contingencies, acquisition of equipment, and operational improvements directly relating to improving system performance
- Intelligent transportation systems and other technology to improve the flow of freight, including intelligent freight transportation systems
- Efforts to reduce the environmental impacts of freight movement
- Environmental and community mitigation for freight movement
- Railway-highway grade separation
- Geometric improvements to interchanges and ramps
- Truck-only lanes

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125 Bipartisan Infrastructure Law - National Highway Freight Program (NHFP) Fact Sheet | Federal Highway Administration. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhfp.cfm

- Climbing and runaway truck lanes
- Adding or widening of shoulders
- Truck parking facilities eligible for funding under section 1401 (Jason's Law) of MAP-21
- Real-time traffic, truck parking, roadway condition, and multimodal transportation information systems
- Electronic screening and credentialing systems for vehicles, including weigh-in-motion truck inspection technologies
- Traffic signal optimization, including synchronized and adaptive signals
- Work zone management and information systems
- Highway ramp metering
- Electronic cargo and border security technologies that improve truck freight movement
- Intelligent transportation systems that increase truck freight efficiencies inside the boundaries of intermodal facilities
- Additional road capacity to address highway freight bottlenecks
- Physical separation of passenger vehicles from commercial motor freight
- Enhancement of the resiliency of critical highway infrastructure, including highway infrastructure that supports national energy security, to improve the flow of freight
- A highway or bridge project, other than a project described above, to improve the flow of freight on the NHFN
- Any other surface transportation project to improve the flow of freight into and out of an eligible intermodal freight facility
- Diesel retrofit or alternative fuel projects under the CMAQ Program for class 8 vehicles
- Conducting analyses and data collection related to the NHFP, developing, and updating freight performance targets, and reporting to the Administrator to comply with the freight performance targets

Annual freight funding ($M) in the STIP from the NHFP is below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
NHFP	$33.88	-	$80.72	$50.68	$52.87	$56.91	$61.25	$65.94	$402.24

Source: NJDOT 2022 STIP

There are currently four freight projects within the STIP funded by the NHFP. Table 99 shows the projects allocation of NHFP funds by year in millions. More detail on funding levels and full project descriptions can be found in Appendix F. As an outcome of the 2017 Freight Plan, NJDOT's OFP has become actively involved in the selection and advancement of STIP projects, as noted on page 421, particularly through the use of the FMS and collaboratively illustrating freight concerns associated with the selection of NHFP funded projects. Going forward, data from this plan and data collected through on-going OFP efforts will inform NJDOT project selection related to freight improvements and the allocation of NHFP funds.

Table 99. NHFP Freight Projects ($ Millions)

Project	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Route 80, Riverview Drive (CR 640) to Polify Road (CR 55)	11415	–	–	–	–	$52.87	$56.91	$61.25	$65.94	**$384.334**
Route 295/42/I-76, Direct Connection, Contract 4	355E	–		$80.72	$50.68	–	–	–	–	**$131.40**
Portway, Fish House Road/ Pennsylvania Avenue, CR 65	97005B	$24.88	–	–	–	–	–	–	–	**$24.88**
Route 46, Route 23 (Pompton Avenue) to Route 20, ITS	06366C	$9.00	–	–	–	–	–	–	–	**$14.50**
	TOTAL	$33.88	$0.00	$80.72	$50.68	$52.87	$56.91	$61.25	$65.94	$402.24

Source: NJDOT 2022 STIP

9.2.5 *Surface Transportation Block Grant Program (STBG)*[126]

The Surface Transportation Program (STP), which was established under Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and encompasses funding previously made available under various smaller federal-aid categories as well as a broad, flexible component. The FAST Act converted STP to the STBG program which continues to provide funding to be used by the state or local municipalities to improve highways, bridges, tunnels, bicycle and pedestrian infrastructure, and transit capital projects on the federal aid system. The IIJA will provide approximately $72 billion funding to STBG in FY2022-2026. IIJA also requires a set aside of 10% of STBG funds for Transportation Alternatives, with State shares determined by statutory formula.

Similar to the FAST Act, the IIJA directs FHWA to apportion funding as a lump sum for each State then divide that total among apportioned programs. Each State's STBG apportionment is calculated based on a percentage specified in law. New Jersey sub-allocations are made to urbanized and non-urbanized areas among the three MPOs:

- STBGP-ALLEN, STBGP-NY/NWK, STBGP-PGH/NWB, funding provided to NJTPA
- STBGP-PHILA, STBGP-TRENTON, funding provided to DVRPC
- STBGP-AC, funding provided to SJTPO

The following are to be set aside from a State's STBG apportionment:

- 2% for State Planning and Research
- An amount equal to at least 20% (vs. 15% under the FAST Act) of the State's FY 2009 Highway Bridge Program apportionment for use on certain types of projects related to bridges and low water crossings on public roads other than

[126] Bipartisan Infrastructure Law - Surface Transportation Block Grant (STBG) Fact Sheet | Federal Highway Administration. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/stbg.cfm

Federal-aid highways (otherwise known as “off-system bridges”). The Secretary, after consultation with State and local officials, may reduce this set-aside requirement if the State has inadequate off-system bridge needs.

- 55% of a State’s STBG apportionment (after the set-aside for Transportation Alternatives) is to be obligated in the following areas, in proportion to their relative shares of the State’s population:
  - Urbanized areas with population greater than 200,000: This portion is to be divided among those areas based on their relative share of population unless the Secretary approves a joint request from the State and relevant MPO(s) to use other factors.
  - Urbanized areas with population of at least 50,000 but no more than 200,000: the State is to establish a process to consult with relevant metropolitan planning organizations and describe how funds will be allocated equitably.
  - Urbanized areas with population of at least 5,000 but no more than 49,999: the State is to consult with regional transportation planning organizations, if any, before obligating funds for projects in these areas.
  - Areas with population of less than 5,000: the State is to consult with regional transportation planning organizations, if any, before obligating funds for projects in these areas.
- The remaining 45% of the State’s STBG apportionment may be obligated in any area of the State.

STBG promotes flexibility in State and local transportation decisions and provides flexible funding to best address state and local transportation needs including to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. Many of the STBG projects will make improvements to infrastructure that serves freight and benefit the overall freight system.

Eligibility for the STBG program is highly flexible and the IIJA reaffirms FAST Act project eligibilities while adding additional eligibilities. Freight-focused eligibilities include:

- Construction, reconstruction, rehabilitation, resurfacing, restoration, preservation, or operational improvements for highways
- Replacement, rehabilitation, preservation, protection, and anti-icing/deicing for bridges and tunnels on any public road, including construction or reconstruction necessary to accommodate other modes
- Construction of new bridges and tunnels on a Federal-aid highway
- Capital and operating costs for traffic monitoring, management and control facilities and programs, including advanced truck stop electrification
- Construction of ferry boats and terminals
- Border infrastructure projects
- Truck parking facilities
- Development and implementation of State asset management plan for the NHS, and similar activities related to the development and implementation of a performance-based management program for other public roads
- Surface transportation infrastructure modifications within port terminal boundaries, only if necessary to facilitate direct intermodal interchange, transfer, and access into and out of the port
- Construction and operational improvements for a minor collector in the same corridor and in proximity to an NHS route if the improvement is more cost-effective (as determined by a benefit-cost analysis) than an NHS improvement and will enhance NHS level of service and regional traffic flow
- Measures to protect an eligible transportation facility from cybersecurity threats

Annual freight-related funding ($M) in the STIP from STBG is summarized below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
STBG	$10.76	$62.98	$63.85	$33.94	$9.00	$4.36	$5.43	$4.50	$194.82

Source: NJDOT 2022 STIP

STBG funding is widely used by NJDOT for transportation projects. The freight-related projects using STP funding are listed, by year in millions in Table 100. For the purpose of this investment plan, freight-related projects refer to projects specifically linked to freight infrastructures, trucks, rails, ports, and major corridors along the National Highway Freight Network (NHFN).

Table 100. STBG Freight Projects ($ Millions)

Project	DBNUM	Funds	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Portway, Fish House Road/ Pennsylvania Avenue, CR 65	97005B	STBGP-FLEX		$19.52							**$19.52**
CR 622 (North Olden Ave), NJ 31 (Pennington Rd) to New York Ave	D2014	STBGP-TRENTON	$1.16		2.00			4.36	5.43	4.50	**$17.45**
Route 71, Bridge over NJ TRANSIT (NJCL)	15449	STBGP-FLEX		$1.92	$1.00	$20.32				$8.88	**$32.12**
Route 76, Bridges over Route 130	11326A	STBGP-OS-BRDG		$26.39	$26.39						**$52.78**
Route 166, Bridges over Branch of Toms River	14324	STBGP-OS-BRDG		$17.64	$6.00						**$23.64**
Route 206, South Broad Street Bridge over Assunpink Creek	L064	STBGP-TRENTON		$4.92	$3.01	$4.41					**$12.34**
US 322/CR 536 (Swedesboro Rd), Woolwich-Harrison Twp Line to NJ 55	D2211	STBGP-PHILA	$9.13								**$9.13**
D&R Canal Bridges	15322	STBGP-FLEX, STBGP-OS-BRDG	$7.76	$7.67	$8.13	$9.00	$9.00	$0.00	$0.00	$0.00	**$41.56**
Hamilton Road, Bridge over Conrail	14416	STBGP-OS-BRDG				$13.85					**$13.85**
Oak Tree Road Bridge, CR 604	99316	STBGP-FLEX	$2.80								**$2.80**
Pavement Preservation NJTPA	X51B	STBGP-FLEX, STBGP-NY/NWK	$28.59	$1.71	$1.81	$2.00	$2.00	$2.00	$2.00	$2.00	**$42.10**
Mobility and Systems Engineering Program	13306	STBGP-FLEX	$6.50	$16.82	$1.18	$1.45	$1.50	$1.50	$1.50	$1.50	**$31.94**
Resurfacing, Federal	99327A	STBGP-FLEX	$1.14				$1.00				**$2.14**
		Total	**$57.08**	**$96.59**	**$49.51**	**$51.03**	**$13.50**	**$7.86**	**$8.93**	**$16.88**	**$301.37**

Source: NJDOT 2022 STIP

9.2.6 *Congestion Mitigation and Air Quality Improvement Program (CMAQ)*[127]

Administered by FHWA, the CMAQ program was created as part of ISTEA in 1991 and has been reauthorized under every successive Transportation Bill including the FAST Act and IIJA. CMAQ provides a flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. IIJA continues all funding features that applied to CMAQ under the FAST Act. This program is used to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas). Under the IIJA, CMAQ will make approximately $10.6 billion in funding available in FY2022-2026 throughout the United States.

Continuing FAST Act guidance, the IIJA directs FHWA to apportion funding as a lump sum for each State, then divide that total among apportioned programs. Each State's CMAQ apportionment is calculated based on a ratio specified in law. Within NJDOT, freight-related CMAQ projects are coordinated through the Bureau of Statewide Planning and transferred to the Office of Grants Management for administration and oversight.

Set-asides include:

- 2% for State Planning and Research (SPR)
- For a State that has a nonattainment or maintenance area for fine particulate matter (PM2.5), IIJA requires that 25% of the State's CMAQ apportionment attributable to the weighted population of such nonattainment areas must be used for projects targeting PM2.5 reductions, including for diesel replacements (in addition to retrofits). States are also required to prioritize benefits to disadvantaged communities or low-income populations living in or adjacent to such area, to the extent practicable. States with low population density are not subject to this set-aside under certain conditions.

Eligible projects include:

- those likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution
- verified technologies for non-road vehicles and non-road engines that are used in port-related freight operations located in ozone, PM10, or PM2.5 nonattainment or maintenance areas
- installation of vehicle-to-infrastructure communications equipment
- electric vehicle and natural gas vehicle infrastructure
- projects to reduce fine particulate matter emissions in a PM2.5 nonattainment or maintenance area, including:
  - diesel retrofits;
  - installation of diesel emission control technology on nonroad diesel equipment or on-road diesel equipment that is operated on highway construction projects; and
  - the most cost-effective projects to reduce emissions from port-related landside nonroad or on-road equipment that is operated within the boundaries of the area.

IIJA adds four new eligibilities:

- shared micromobility, including bike sharing and shared scooter systems;

[127] Bipartisan Infrastructure Law - Congestion Mitigation and Air Quality (CMAQ) Improvement Program Fact Sheet | Federal Highway Administration (dot.gov) https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm

- the purchase of diesel replacements, or medium-duty or heavy-duty zero emission vehicles and related charging equipment;
- modernization or rehabilitation of a lock and dam, or a marine highway corridor, connector, or crossing if functionally connected to the Federal-aid highway system and likely to contribute to attainment or maintenance of national ambient air quality standards (capped at 10% of CMAQ apportionment);
- in alternative fuel projects, vehicle refueling infrastructure that would reduce emissions from nonroad vehicles and nonroad engines used in construction projects or port-related freight operations.

Annual freight funding ($M) in the NJ STIP from CMAQ is summarized below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
CMAQ	$18.18	$11.58	$19.59	$14.82	$15.35	$15.35	$15.35	$15.35	$125.57

Source: NJDOT 2022 STIP

CMAQ funding is widely used by the state for transportation projects including four current freight related projects, as summarized in Table 101 by year in millions.

Table 101. CMAQ Freight Projects ($ Millions)

Project	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Intelligent Traffic Signal Systems	15343	$8.68	$11.23	$11.80	$14.47	$15.00	$15.00	$15.00	$15.00	**$106.18**
New Jersey Regional Signal Retiming Initiative	D1601	$0.35	$0.35	$0.35	$0.35	$0.35	$0.35	$0.35	$0.35	**$2.80**
Route 57/182/46, Hackettstown Mobility Improvements	9237	$5.89	–	–	–	–	–	–	–	**$5.89**
Route 202, First Avenue Intersection Improvements	02372B	$3.27	–	$7.43	–	–	–	–	–	**$10.70**
Total		**$18.18**	**$11.58**	**$19.59**	**$14.82**	**$15.35**	**$15.35**	**$15.35**	**$15.35**	**$121.40**

Source: NJDOT 2022 STIP

NJDOT's Office of Freight Planning also manages and administers CMAQ funds to several freight projects that are listed in Table 102.

Table 102. NJDOT OFP CMAQ Projects ($ Million)

Recipient/Sponsor	Project	Grant Amount
PANYNJ	Cargo Handling Equipment Fleet Modernization and Replacement – Phase II	$2.00
PANYNJ	Truck Replacement Program – Phase III	$4.00
PANYNJ	Onshore Exhaust Capture and Control System	$3.20
Norfolk Southern (NS)	Eco Locomotive	n/a
International Motor Freight Inc (IMF)	Zero Emission Goods Movement	$4.03
	Total	**$13.23**

Source: NJDOT 2022 STIP

9.2.7 Highway Safety Improvement Program (HSIP)[128]

The Highway Safety Improvement Program (HSIP) was originally established under SAFETEA-LU with the purpose of significantly reducing traffic fatalities and serious injuries on all public roads including non-state-owned public roads and roads on tribal land, in a comprehensive and strategic manner consistent with the State's Strategic Highway Safety Plan. The FAST Act continues the HSIP to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads. The IIJA continues the HSIP to require a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. Approximately $15.6 billion in grant funding is available to states. Currently, ten freight-related projects in the NJ STIP are funded by HSIP and listed in Table 103 by year in millions.

Annual freight funding ($M) in the NJ STIP from HSIP is below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
HSIP	$79.76	$35.82	$46.73	$57.84	$39.78	$40.00	$40.00	$40.00	$379.93

Source: NJDOT 2022 STIP

128 Bipartisan Infrastructure Law - Highway Safety Improvement Program (HSIP) Fact Sheet | Federal Highway Administration. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/hsip.cfm

Table 103. HSIP Freight Projects ($ Millions)

Project	MPO	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Highway Safety Improvement Program Planning	9388	$13.00	$3.52	$3.48	$3.86	$4.00	$4.00	$4.00	$4.00	**$39.89**
Safety Improvement Projects and Pedestrian Safety Improvement Projects	19370	$23.31	$12.30	$12.19	$10.50	$13.78	$14.00	$14.00	$14.00	**$109.09**
Local Safety/ High Risk Rural Roads Program	4314	$21.83	$18.51	$19.05	$18.33	$19.00	$21.04	$22.00	$22.00	**$161.75**
Parkway Avenue (CR 634), Scotch Road (CR 611) to Route 31 (Pennington Road)	D1910	–	$1.50	–	$3.00	$3.00	$0.96	–	–	**$7.41**
Rail-Highway Grade Crossing Program, Federal	X35A1	$14.48	–	–	–	–	–	–	–	**$14.48**
Sicklerville Road (CR 705) and Erial Road (CR 706) Systemic Roundabout	D1913	$0.17	–	$0.50	–	–	–	–	–	**$0.67**
Route 7, Mill Street (CR 672) to Park Avenue (CR 646)	12408B	–	–	$11.50	–	–	–	–	–	**$11.50**
Route 15 and Berkshire Valley Road (CR 699)	13350	$6.13	–	–	–	–	–	–	–	**$6.13**
Route 66, Jumping Brook Road to Bowne Road/Wayside Road	14357	–	–	–	$22.15	–	–	–	–	**$22.15**
Route 439, Route 28 (Westfield Ave) to Route 27 (Newark Ave)	15395	$0.85	–	–	–	–	–	–	–	**$0.85**
Total		**$79.76**	**$35.82**	**$46.73**	**$57.84**	**$39.78**	**$40.00**	**$40.00**	**$40.00**	**$379.93**

Source: NJDOT 2022 STIP

9.2.8 Railway Highway Crossings (RHC) Program / Section 130 [129]

The Railway Highway Crossings (RHC) program (Section 130) provides funds for safety improvements to reduce the number of fatalities, injuries, and crashes at public railway-highway grade crossings. The funds for the RHC Program are set-aside from the HSIP apportionment.

Eligible activities include:

- signing and pavement markings at crossings
- active warning devices; crossing surface improvements
- sight distance improvements; grade separations
- the closing and consolidation of crossings
- relocation of highways to eliminate railway-highway grade crossings
- projects at railway-highway grade crossings to eliminate hazards posed by blocked crossings due to idling trains

IIJA continues the annual set-aside for railway-highway crossing improvements, which is funded via a set-aside from the HSIP. The annual set-aside will be $245 million from FY2022 through FY 2026 for a total of $1.225 billion to all states. FHWA apportions program funds among States based on the following factors:

- 50% based on the formula for the Surface Transportation Program under SAFETEA-LU; and
- 50% based on the ratio of public railway-highway crossings in the State to public railway-highway crossings in all States.

Each state shall receive a minimum of 0.5% of the program funds. The IIJA eliminates the program requirement to set aside 50% of RHCP funds (each FY) for installation of protective devices at crossings. The IIJA also clarifies that program funds may be used for the elimination of hazards, the installation of protective devices at railway-highway crossings, the replacement of functionally obsolete warning devices, and for projects to reduce pedestrian fatalities and injuries from trespassing at grade crossings.

The funds can be used as incentive payments for local agencies to close public crossings provided there are matching funds from the railroad. The funds can also be used for local agencies to provide matching funds for State-funded projects.

Annual funding ($M) in the NJ STIP from the RHC program is summarized below:

	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
RHC	X35A1	$7.58	$4.00	$4.01	$4.03	$4.04	$4.08	$4.09	$4.10	$35.93

Source: NJDOT 2022 STIP

The distribution of RHC funds to the MPOs (including sub-allocations to urbanized areas) is detailed in Table 104 by year in millions.

129 Railway-Highway Crossings (Section 130) Program - Safety | Federal Highway Administration. https://safety.fhwa.dot.gov/hsip/xings/

Table 104. RHC Freight Projects ($ Millions)

Fund	MPO	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
RHC	DVRPC		$0.92	$0.92	$0.93	$0.93	$0.94	$0.94	$0.94	**$6.52**
RHC-PHILA	DVRPC	$0.62								**$0.62**
RHC	NJTPA	$1.57	$2.80	$2.81	$2.82	$2.83	$2.85	$2.86	$2.87	**$21.40**
RHC-NY/NWK	NJTPA	$3.29								**$3.29**
RHC	SJTPO	$0.10	$0.28	$0.28	$0.28	$0.28	$0.29	$0.29	$0.29	**$1.98**
RHC-FLEX	Statewide	$2.00								**$2.00**
	Total	**$7.58**	**$4.00**	**$4.01**	**$4.03**	**$4.04**	**$4.08**	**$4.09**	**$4.10**	**$35.93**

Source: NJDOT 2022 STIP

9.2.9 *Multimodal Project Discretionary Grant (MPDG)*[130]

The Multimodal Project Discretionary Grant (MPDG) program, established under the IIJA, will provide a combined total of up to $15 billion for FY2022 through FY2026 for major infrastructure projects. It will provide a combined $2.9 billion of funding in FY2022. The MPDG combined the following three major discretionary grant programs into one grant:

- **INFRA Grants** - Infrastructure for Rebuilding America known statutorily as the Nationally Significant Multimodal Freight and Highway Projects program
- **RURAL Surface Transportation Grant**
- **Mega Grants** - known statutorily as the National Infrastructure Project Assistance program

Combining the three major discretionary grant programs listed above into one Multimodal Projects Discretionary Grant opportunity reduces the burden for state and local applicants and increases the pipeline of projects. Applicants are allowed to use one application to apply for up to three of these discretionary grant programs under a common set of criteria that started in 2022. MPDG is a newly created program that can be a source of funding for future freight projects.

9.2.10 *Infrastructure for Rebuilding America (INFRA) Grants*[131]

The FAST Act established the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) program, rebranded as INFRA (known statutorily as the Nationally Significant Multimodal Freight & Highway Projects). INFRA awards competitive grants for multimodal freight and highway projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people in and across rural and urban areas. Under the IIJA, this program has been updated to include new eligibilities, set-asides, and other programming changes including a more than 50 percent increase in this year's funding.

The INFRA grant program of $7.25 billion over five years (FY2022-FY2026) provides monetary assistance to nationally or regionally significant highway, rail, port, and intermodal freight and highway projects that have goals to improve safety, generate economic benefits, reduce congestion, enhance resiliency, and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements. These grants advance the priorities of rebuilding America's infrastructure and creating jobs by funding highway, multimodal freight, and rail projects that position America to be economically competitive. Eligible projects will improve safety, generate economic benefits, reduce congestion, enhance resiliency, and hold the greatest promise to eliminate supply chain bottlenecks and improve critical freight movements.

[130] MPDG - Announcement | US Department of Transportation. https://www.transportation.gov/grants/mpdg-announcement
[131] The INFRA Grants Program | US Department of Transportation. https://www.transportation.gov/grants/infra-grants-program

Eligible projects for application to these grants include those that are:

- A highway freight project on the National Highway Freight Network
- A highway or bridge project on the National Highway System, including:
  - A project to add capacity to the Interstate System to improve mobility; or
  - A project in a national scenic area;
  - A freight project that is:
  - A freight intermodal or freight rail project; or
  - A project within the boundaries of a public or private freight rail, water (including ports), or intermodal facility and that is a surface transportation infrastructure project necessary to facilitate direct intermodal interchange, transfer, or access into or out of the facility, provided that the project will make a significant improvement to freight movements on the National Highway Freight Network, that the Federal share of non-highway portions of the project funds only elements of the project that provide public benefits, and that the total of Federal FASTLANE grants for non-highway portions of these projects does not exceed $500 million for fiscal years 2016 through 2020; or
  - A railway-highway grade crossing or grade separation project.

Annual freight-related funding ($M) in the STIP from INFRA is summarized below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
INFRA	$14.83	$14.77	$10.50	$6.41	$5.64	$0.86	$0.00	$0.00	**$53.00**

Source: NJDOT 2022 STIP

Currently, no NJDOT OFP projects are receiving INFRA funds, but it can be a source for future freight projects. There are currently two INFRA-funded projects in the STIP that are freight-focused, listed, by year in millions in Table 105.

Table 105. INFRA Freight Projects (in $Millions)

Project	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Port of Salem Improvements	PS2201	$9.00	–	–	–	–	–	–	–	**$9.00**
Port Street Corridor Imp. Project	PA2201	$5.83	$14.77	$10.50	$6.41	$5.64	$0.86	–	–	**$44.00**
Total		**$14.83**	**$14.77**	**$10.50**	**$6.41**	**$5.64**	**$0.86**	–	–	**$53.00**

Source: NJDOT 2022 STIP

PANYNJ was awarded a $10 million FASTLANE grant in 2016 for two rail construction projects related to the Cross Harbor Freight Program (CHFP), the Port Jersey Second Track Improvements (2nd Lead Project) in Jersey City, NJ and the 65th Street Yard Improvements (65th Street Transload) in Brooklyn, NY. The 2nd Lead Project, which added an additional lead track to the PANYNJ-owned NYNJR's Port Jersey Division, was completed and brought into service in early 2021. The 65th Street Transload project was delayed by the pandemic's impacts to the PANYNJ's capital plan but is now scheduled to start construction in 2023.

Finally, it was recently announced that under the INFRA grant program, PANYNJ will be awarded $44 million for the Port Street Corridor Improvement Project to modernize an approximately 2.9-mile section of roadway at the north entrance of Port Newark and the Elizabeth-Port Authority Marine Terminal.

SJPC was awarded a $9 million INFRA grant for the Port of Salem Improvements to improve intermodal rail connectivity and to expand vessel capacity. The project will refurbish multi-modal rail connectivity to interstate highways, bridges, and barges. It will expand vessel capacity by rehabilitating and extending a 150-linear-foot bulkhead to 400 linear feet. This supports the port's existing sand and concrete shipments while strengthening New Jersey's leadership in building, supporting, and manufacturing key components for the offshore wind industry off the Atlantic Coast.

9.2.11 Rural Surface Transportation Grant Program (RURAL)[132]

The Rural Surface Transportation Grant Program (RURAL) was created within the IIJA to support projects that improve and expand the surface transportation infrastructure in designated rural areas or urbanized area with low population, as defined later in this section, to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve quality of life. Eligible projects for RURAL grants include highway, bridge, or tunnel projects that help improve freight, safety, and provide or increase access to agricultural, commercial, energy, or transportation facilities that support the economy of a rural-designated area. RURAL will award up to $300 million in grants in FY2022—part of the $2 billion included in IIJA over five years (FY2022-2026).

For a project to be eligible for the RURAL program it must be designated as a rural area which is located:

- In an Urbanized Area (UA) with a population less than 200,000 in the 2010 Census; or
- In a Census designated Urban Cluster (consisting of a central core and adjacent densely settled area with a population between 2,500 and 49,999; or
- Outside an UA.

For projects that include expenditures in both urban areas and rural areas, the Department will designate the project as urban or rural based on where the majority of project funds will be spent.

RURAL is a new program beginning in 2022. Applications opened in the first quarter of 2022 and were received until May 23, 2022. RURAL is a potential source of funding for New Jersey freight projects.

9.2.12 National Infrastructure Project Assistance (Mega) program[133]

The National Infrastructure Project Assistance (Mega) program, known statutorily as the National Infrastructure Project Assistance program, was created as part of IIJA and will make $5 billion available in FY2022-FY2026 to fund major projects that are too large or complex for traditional funding programs. The Mega program will award up to $1 billion in FY2022 and will make award decisions to provide multi-year funding to projects based on a potential awarded project's schedule and availability of funds. USDOT will award 50 percent of funding to projects greater than $500 million in cost, and 50 percent to projects costing between $100 million and $500 million.

Mega is a new program beginning in 2022. Applications opened in the first quarter of 2022 and were received until May 23, 2022. Mega is a potential source of funding for New Jersey freight projects.

The Mega program will provide grants on a competitive basis to support multijurisdictional or regional projects of significance that may also cut across multiple modes of transportation. Eligible projects could include highway, bridge,

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[132] The Rural Surface Transportation Grant | US Department of Transportation. https://www.transportation.gov/grants/rural-surface-transportation-grant

[133] The Mega Grant Program | US Department of Transportation. https://www.transportation.gov/grants/mega-grant-program

freight, port, passenger rail, and public transportation projects of national and regional significance. These could be bridges or tunnels connecting two states; new rail and transit lines that improve equity and reduce emissions; and freight hubs integrating ship, train, and truck traffic while improving environmental justice.

Projects eligible under the Mega projects program include:

- a highway or bridge project carried out on—
  - the National Multimodal Freight Network of Title 49, United States Code;
  - the National Highway Freight Network, United States Code; or
  - the National Highway System, United States Code;
- a freight intermodal (including public ports) or freight rail project that provides a public benefit;
- a railway-highway grade separation or elimination project;
- an intercity passenger rail project; and
- certain public transportation projects that are eligible for Federal Transit Administration funding of title 49, United States Code, and is a part of one of other eligible project types above.

Statutorily, the Mega grant program must ensure geographical diversity among recipients and a balance between rural and urban communities among recipients. A project is designated as urban if it is located within or on the boundary of a 2010 Census-designated UA, and that UA had a population greater than 200,000. If a project is not designated as urban, it is designated as rural. For projects including expenditures in both urban areas and rural areas, the Department will designate the project as urban or rural based on where the majority of project funds will be spent.

9.3 STATE TRANSPORTATION FUNDING

9.3.1 *Transportation Trust Fund* [134]

The New Jersey Transportation Trust Fund Authority ("TTFA" or "Authority") finances the State funded portion of NJDOT and NJ TRANSIT capital programs as well as the state's Local Aid transportation programs. The TTFA is funded through annual State appropriations of revenues received from the Motor Fuels Tax (MFT), Petroleum Products Gross Receipts Tax (PPGRT), sales and use tax, toll road contributions, investment earnings, and the incurrence of debt. The FY 2022 Appropriations Act reflected an annual Statewide Transportation Capital Program of $2.0 billion. The FY 2023 Governor's Budget Message recommends a Statewide Transportation Capital Program of $2.0 billion. TTF funds cover about 43% of FY 2023 transportation funding for the State. Table 106 details the TTF for capital transportation projects for FY 2023 in millions.

Table 106. New Jersey Capital Transportation Plan - FY 2023 ($ Millions)

TTF Spending Authority:	
TTF	$2,000
Total	**$2,000**
Programmatic Distribution:	
NJDOT	$810
NJ TRANSIT	$760
Local Aid	$430
Total	**$2,000**

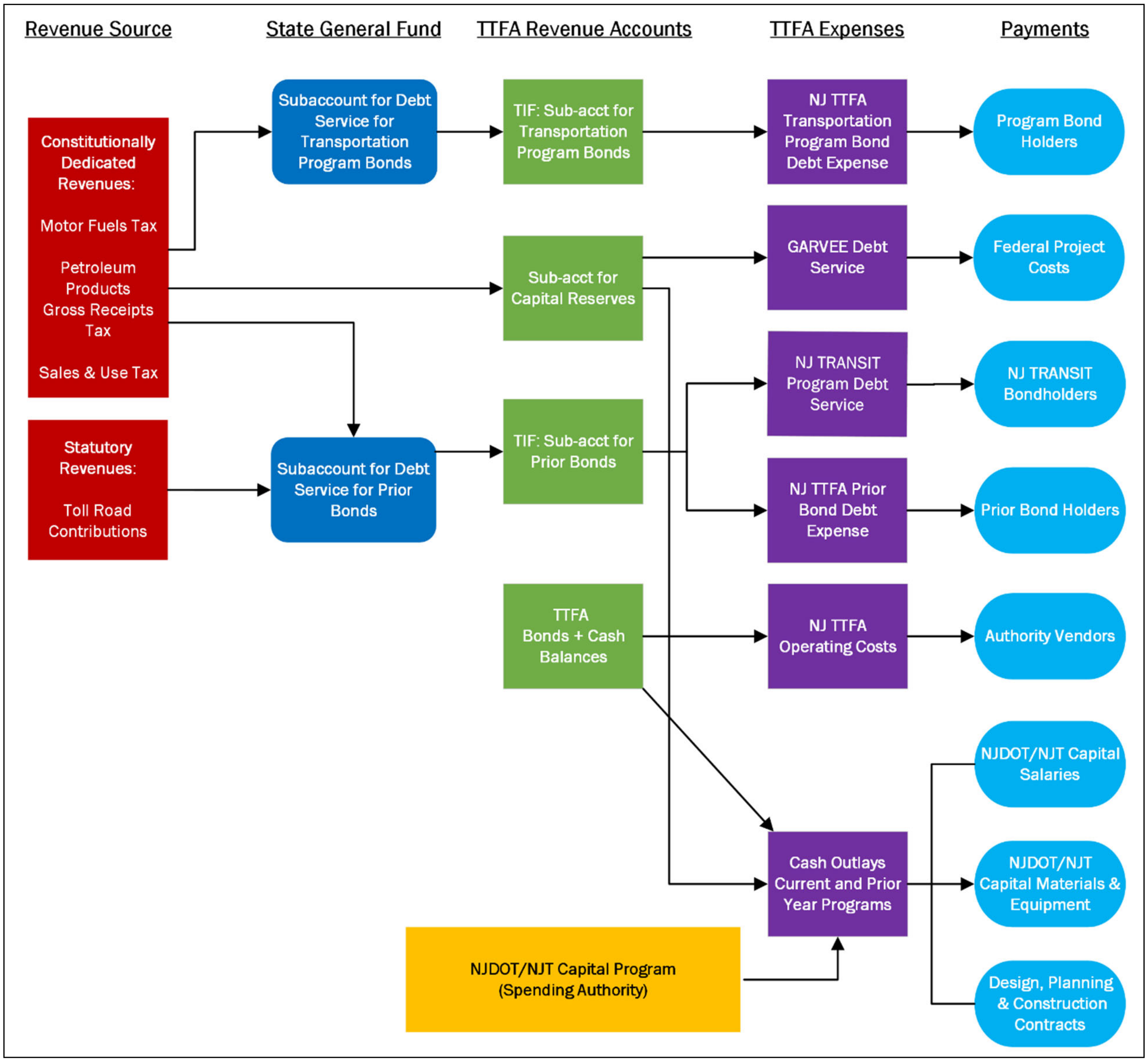
Source: NJ TTFA FY2023 Financial Plan

134 NJ Transportation Trust Fund Authority Fiscal Year 2023 Financial Plan https://www.nj.gov/ttfa/future/documents/NJTTFAFiscalYear2023FinancialPlan.pdf

The New Jersey Transportation Trust Fund Authority Act of 1984 dedicated 2.5 cents per gallon of the motor fuel tax to transportation purposes. Several subsequent amendments have reinforced initial funding allotments. In October 2016, the TTFA Act (also known as Chapter 57) legislated an 8-year, $16.0 billion program, funded by a combination of current revenues (also referred to as Pay-As-You-Go or PAYGO) and $12.0 billion in bonding authorization, both of which are supported by the Motor Fuels Tax (MFT) and the Petroleum Products Gross Receipts Tax (PPGRT). The Program Bonds are issued as "state contract" debt backed by a contract between the State Treasurer and the TTFA. The $12.0 billion in total bonding authorization to finance transportation projects beginning in Fiscal Year 2017 through Fiscal Year 2024. The PPGRT was increased in October 2018 by 4.3 cents per gallon and again in October 2020 by 9.3 cents per gallon. In October 2021, the PPGRT decreased by 8.3 cents per gallon. These periodic changes reflect a provision of the 2016 Amendment directing the State Treasurer to adjust the PPGRT contingent upon revenues meeting the Highway Fuel Cap revenue target for the fiscal year.

The flow of TTF funds is graphically depicted in Figure 233.

Figure 233. Transportation Trust Fund Financing



Source: New Jersey Transportation Trust Fund Authority - Flow of Funds. https://www.nj.gov/ttfa/financing/flowfunds.shtm

Annual funding ($M) in the NJ STIP from the TTF is summarized below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
TTF	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	**$16,000.0**

Source: NJDOT 2022 STIP

Freight-related funding ($M) in the STIP from the TTF is summarized below:

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
TTF	$225.17	$228.57	$61.31	$256.72	$256.72	$248.72	$248.72	$248.72	**$1,774.68**

Source: NJDOT 2022 STIP

Freight-related projects ($M) funded by the TTF within the STIP are listed in Table 107.

Table 107. State-funded/TTF Freight Projects ($ Millions)

Project	DBNUM	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Total
Lincoln Tunnel Access Project (LTAP)	11407	$65.00	$65.00	$16.00	$100.00	$100.00	$100.00	$100.00	$100.00	**$646.00**
Maritime Transportation System	1309	$20.00	$15.00	$5.00	$15.00	$15.00	$15.00	$15.00	$15.00	**$115.00**
New Jersey Rail Freight Assistance Program	X34	$25.00	$25.00	$5.00	$25.00	$25.00	$25.00	$25.00	$25.00	**$180.00**
Rail-Highway Grade Crossing Program, State	X35A	$2.90	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	**$37.90**
Resurfacing Program	X03E	$88.93	$91.13	$16.00	$90.00	$90.00	$90.00	$90.00	$90.00	**$646.07**
Rail Support Facilities and Equipment	T37	$18.60	$18.80	$10.87	$17.98	$17.98	$9.98	$9.98	$9.98	**$114.19**
Route 1, NB Bridge over Raritan River	15303		$4.40	$0.20						**$4.60**
Mobility and Systems Engineering Program	13306	$2.50	$2.50	$1.50	$2.00	$2.00	$2.00	$2.00	$2.00	**$16.50**
Traffic Monitoring Systems	X66	$1.49	$1.49	$1.49	$1.49	$1.49	$1.49	$1.49	$1.49	**$11.92**
Highway Safety Improvement Program Planning	19370	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25	**$2.00**
Route 7, Mill Street (CR 672) to Park Avenue (CR 646)	12408B	$0.50	–	–	–	–	–	–	–	**$0.50**
	Total	**$225.17**	**$228.57**	**$61.31**	**$256.72**	**$256.72**	**$248.72**	**$248.72**	**$248.72**	**$1,774.68**

Source: NJDOT 2022 STIP

9.3.2 *Local Aid Funding* [135] [136]

The TTF also provides $430 million to Local Aid in FY 2023, split amongst several funding categories, as summarized in

Table 108. The Capital Program and STIP both assume continued flat TTF funding levels for the next ten years. The annual distribution for future years is summarized below, indicating that the TFF will continue to provide approximately $400 million annually to local governments to fund road, bridge, and other transportation projects through FY 2030 as summarized below. Local Aid Funding is a diverse group of funds, highlighted below, that includes the Local Freight Impact Fund, which "provides funds to the counties and municipalities who are committed to the advancement of freight projects and movement of large truck traffic that emphasize and enhance safety, renew aging infrastructure, promote economic development and support new transportation opportunities."[137] The Local Freight Impact Fund is a competitive grant program; a summary of FY 2022 grant recipients is included in Table 108.

The Local Aid funding sources are:

- **Local Freight Impact Fund** (LFIF) was established in 2016 to assist counties and municipalities with the mitigation of impacts on the local transportation system associated with the State's freight industry. The program is dedicated to the advancement of freight projects and movement of large truck traffic that emphasize and enhance safety, renew aging infrastructure, promote economic development, and support new transportation opportunities. Eligible projects are in the following categories:
    1. <u>Pavement Preservation</u> - to improve pavement conditions in support of freight travel on municipal/county transportation infrastructure
    2. <u>Truck Safety and Mobility</u> - to improve large truck access, routing, and mobility along the municipal/county roadway system
    3. <u>Bridge Preservation</u> - to improve bridge ratings/conditions in support of freight travel on municipal/county transportation infrastructure
    4. <u>New Construction</u> - to promote new construction in support of freight travel on municipal/county transportation infrastructure
    5. <u>Pedestrian Safety</u> - to improve pedestrian access to freight nodes, address pedestrian safety, and promote equity for those without the option to drive

Grants recipients for FY 2022 LFIF are listed in Table 108.

- **Municipal Aid** includes road improvement projects for infrastructure under municipal jurisdiction; such as, resurfacing, rehabilitation, reconstruction, and signalization. Projects involving bridge improvements, pedestrian safety improvements and bikeway improvements are also eligible to receive funds under Municipal Aid.
- **Urban Aid** is additional municipal aid given to qualifying urban municipalities.
- **County Aid** is for the improvement of public roads and bridges under county jurisdiction. Public transportation and other transportation projects are also included.
- **Local Bridges Fund** provides funding for improvement on county bridges. Currently, the state focuses on preventive maintenance, rehabilitation, and selective replacement of bridges.

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[135] Funding Programs, Local Aid and Economic Development, Doing Business (state.nj.us) https://www.state.nj.us/transportation/business/localaid/funding.shtm

[136] Transportation Trust fund Authority Act State Aid Handbook https://www.state.nj.us/transportation/contribute/business/localaid/documents/StateAidHandbookJuly2022.pdf

[137] NJDOT Local Freight Impact Fund Handbook, 2022: https://www.state.nj.us/transportation/contribute/business/localaid/documents/LocalFreightImpactFundHandbookFY2022.pdf

- **Local Aid Infrastructure** helps fund emergency and regional needs throughout the state at the county or municipal level.
- **Transportation Infrastructure Bank Fund** is used to provide financial assistance to public or private entities for the planning, acquisition, engineering, construction, reconstruction, repair, and rehabilitation of a transportation project or for any other purpose permitted under the program.

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total
Local Aid	$430	$400	$400	$400	$400	$400	$400	$400	$3,230

Table 108. Local Aid Funding - FY 2023

Fund	Amount ($M)
Local Freight Impact Fund	$30.10
Municipal Aid	$151.25
Urban Aid	$10.00
County Aid	$161.25
Local Bridges Fund	$47.30
Local Aid Infrastructure Fund	$7.50
Transportation Infrastructure Bank Fund	$22.60
Total	**$430.00**

Source: NJDOT Local Aid and Economic Development. https://www.state.nj.us/transportation/business/localaid/funding.shtm

Table 109. Local Freight Impact Fund Grant Recipients - FY 2022

Counties	Applicant	Project Title	Type of Improvement	Total Estimated Cost	Grant Amount
Atlantic County	Hamilton Township	Atlantic Avenue 2022	Pavement Preservation	$317,430	$300,000
Bergen County	Ridgefield Borough	Pleasant View Terrace and Surrounding Roadways Improvements Project	Pavement Preservation	$1,076,354	$950,000
Burlington County	Cinnaminson Township	FY 2022 LFIF Resurfacing of Taylor's Lane	Pavement Preservation	$1,210,040	$1,000,000
Burlington County	Lumberton Township	Berry Drive Roadway Improvements	Pavement Preservation	$623,277	$500,000
Camden County	Bellmawr Borough	Improvements to Heller Place	Pavement Preservation	$603,455	$500,000
Camden County	Camden County	Camden City Port Access Truck Route Project	Pavement Preservation	$25,506,087	$3,000,000
Cape May County	Middle Township	Magnolia Drive Roadway Preservation	Pavement Preservation	$326,151	$300,000
Cumberland County	Commercial Township	Reconstruction of High Street and Yock Wock Road	Pavement Preservation	$931,910	$900,000
Cumberland County	Commercial Township	Mill and Overlay of Main Street (CR 553) from Strawberry Avenue to Ogden Avenue	Pavement Preservation	$1,085,000	$900,000
Cumberland County	Cumberland County	Resurfacing of CR 649 (Mauricetown Bypass)	Pavement Preservation	$1,350,000	$1,000,000
Cumberland County	Cumberland County	FY 2022 LFIF Road Program II – CR 640 (Friesburg Rd.)	Pavement Preservation	$900,000	$800,000
Cumberland County	Vineland	Resurfacing of Landis Avenue Phase 5 & Signal Upgrades	Pavement Preservation	$3,667,035	$3,500,000
Essex County	Newark	2022 Avenue P – Port Newark Connect	Pavement Preservation	$3,031,572	$3,000,000
Essex County	Newark	McClellan Street Local Freight Impact Fund	Pavement Preservation	$1,451,622	$110,000
Gloucester County	Clayton Borough	Cenco Boulevard Roadway Improvements	Pavement Preservation	$989,121	$900,000
Gloucester County	South Harrison Township	Improvements to Porches Mill Road	Pavement Preservation	$547,792	$500,000
Gloucester County	West Deptford Township	Improvements to Forest Parkway	Pavement Preservation	$943,344	$750,000
Hudson County	Bayonne	Peninsula at Bayonne Harbor Port Access Road Project	New Construction	$5,783,241	$3,850,000
Hudson County	North Bergen Township	Dell Avenue Improvements Project	Pavement Preservation	$589,200	$500,000
Mercer County	Robbinsville Township	2022 West Manor Way and Applegate Drive Resurfacing	Pavement Preservation	$523,573	$500,000
Middlesex County	Carteret Borough	Truck Route Improvements to Port Carteret Drive	Pavement Preservation	$1,308,942	$1,000,000
Middlesex County	Old Bridge Township	Old Water Works Road Improvements	Pavement Preservation	$829,484	$640,000
Morris County	Parsippany-Troy Hills Township	Jefferson Road Improvement Project	Pavement Preservation	$813,824	$760,000
Passaic County	City of Passaic	8th Street Improvement Project	Pavement Preservation	$98,0835	$950,000
Salem County	Salem County	Acton Station Road, CR 653 Reconstruction and Safety Improvements	Pavement Preservation	$2,397,639	$2,000,000
			Total	$105,276,990	$30,100,000

Source: NJDOT Local Aid and Economic Development. https://www.state.nj.us/transportation/business/localaid/localfreight.shtm

9.4 OTHER SOURCES OF FUNDING

Transportation funding is also provided by other sources, including but not limited to, bi-state and autonomous authorities, private entities, and local governments. Other sources of funding are non-federal match funds that are required in order to receive federal funding for some federal grant programs. These other sources provide approximately 1.3% of New Jersey's total transportation funding, including (for FY 2023) $4 million NJDOT Toll-Financed Funds, $30.9 million Casino Revenue Funds, $1.9 million NJ TRANSIT Match Funds[138], and $25 million NJTA Funds.

9.5 USE OF FUNDS

New Jersey uses Federal and state funds for asset management, pairing available funding to investment needs associated with maintaining specific assets to a desired condition. The relative proportion of funding needed for various asset categories will vary from one year's STIP to another. The project type categories that have been used to fund the freight portions of the STIP include:

- Infrastructure Preservation – this may be classified as either road, bridge, or multimodal assets. Road preservation types include highway resurfacing, rehabilitation, or reconstruction. Bridge preservation includes rehabilitation and replacement, deck rehabilitation/replacement, or culverts.
- Mobility and Congestion Relief – these are aimed at relieving congestion through highway operational improvements, major widenings, removing bottlenecks, and missing link projects.
- Safety Management – these include projects that address safety as it relates to vehicle conflicts, weaving, acceleration/deceleration lanes, and intersection improvements, including those for bicycle and pedestrian users.

The sections below identify freight related STIP projects within each MPO region. Identified STIP projects have been categorized into one of nine project types, based on the project description included within the STIP. Project types include:

- Bottleneck: Projects aimed at relieving congestion at decision points (ramp, signal, lane drop/add)
- Bridge: State of good repair maintenance for structures, including but not limited to deck or superstructure replacement
- Capacity: Congestion-focused projects that increase roadway throughput through lane addition or bypass construction
- Drainage: Projects that address existing drainage/flooding concerns
- ITS: Projects that are wholly focused on traffic operation and safety improvements through the use of technology, including adaptive traffic control systems or real-time traffic monitoring and signage
- Operations: Projects aimed at improving geometric deficiencies, including substandard acceleration/deceleration lanes, tight turn radii, narrow cartway widths, or climbing lanes
- Pavement: State of good repair maintenance for roadways focused on resurfacing projects.
- **Safety:** Projects aimed at counteracting existing safety concerns at high crash locations
- **Maritime:** Projects aimed at improving maritime operations and state of good repair in state channels

[138] Match funds (from another non-federal source) are required in order to receive federal funds for some federal grant programs.

9.5.1 DVRPC

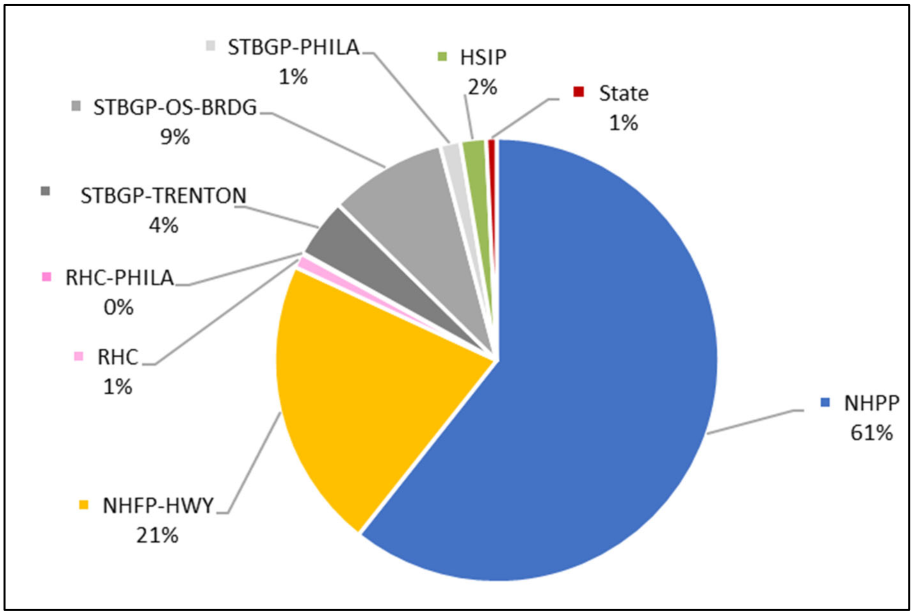
For 2022 through 2029 (inclusive), DVRPC is expected to receive approximately $619 million in funding for freight-related projects within New Jersey from various sources as shown in Table 110 and Figure 234.

Table 110. DVRPC Funding Sources

Funding Source	Amount ($M)
NHPP	$375.36
NHFP-HWY	$131.40
STBGP-OS-BRDG	$52.78
STBGP-TRENTON	$26.62
STBGP-PHILA	$9.13
HSIP	$11.65
RHC	$6.52
RHC-PHILA	$0.62
State	$4.63
Total	$618.71

Source: NJDOT 2022 STIP

Figure 234. DVRPC Funding Distribution (New Jersey Projects)



Source: NJDOT 2022 STIP

Table 111 includes a list of the STIP projects receiving these funds. More detail on funding levels and project descriptions can be found in Appendix E.

Table 111. DVRPC Freight Projects

County	DBNUM	Project Name	Project Type	Funding Source(s)
Camden	355E	Route 295/42/I-76, Direct Connection, Contract 4	Bottleneck	NHPP. NHFP
Various	X51	Pavement Preservation	Pavement	NHPP
Mercer	17419	Route 1, Alexander Road to Mapleton Road	Bottleneck	NHPP
Camden Gloucester	355A	Route 295/42, Missing Moves, Bellmawr	Capacity	NHPP
Various	99327A	Resurfacing, Federal	Pavement	NHPP
Various	X35A1	RHC	Safety	RHC, RHC-PHILA, HSIP
Mercer	D2014	CR 622 (North Olden Ave), NJ 31 (Pennington Rd) to New York Ave	Operations	STBGP-TRENTON
Camden	11326A	Route 76, Bridges over Route 130	Bridge	STBGP-OS-BRDG
Mercer	L064	Route 206, South Broad Street Bridge over Assunpink Creek	Bridge	STBGP-TRENTON
Gloucester	D2211	US 322/CR 536 (Swedesboro Rd), Woolwich-Harrison Twp Line to NJ 55	Pavement	STBGP-PHILA
Mercer	D1910	Parkway Avenue (CR 634), Scotch Road (CR 611) to Route 31 (Pennington Road)	Safety	HSIP
Camden	D1913	Sicklerville Road (CR 705) and Erial Road (CR 706) Systemic Roundabout	Safety	HSIP
Various	T37	Rail Support Facilities and Equipment	Operations	State

Source: NJDOT 2022 STIP

9.5.2 *NJTPA*

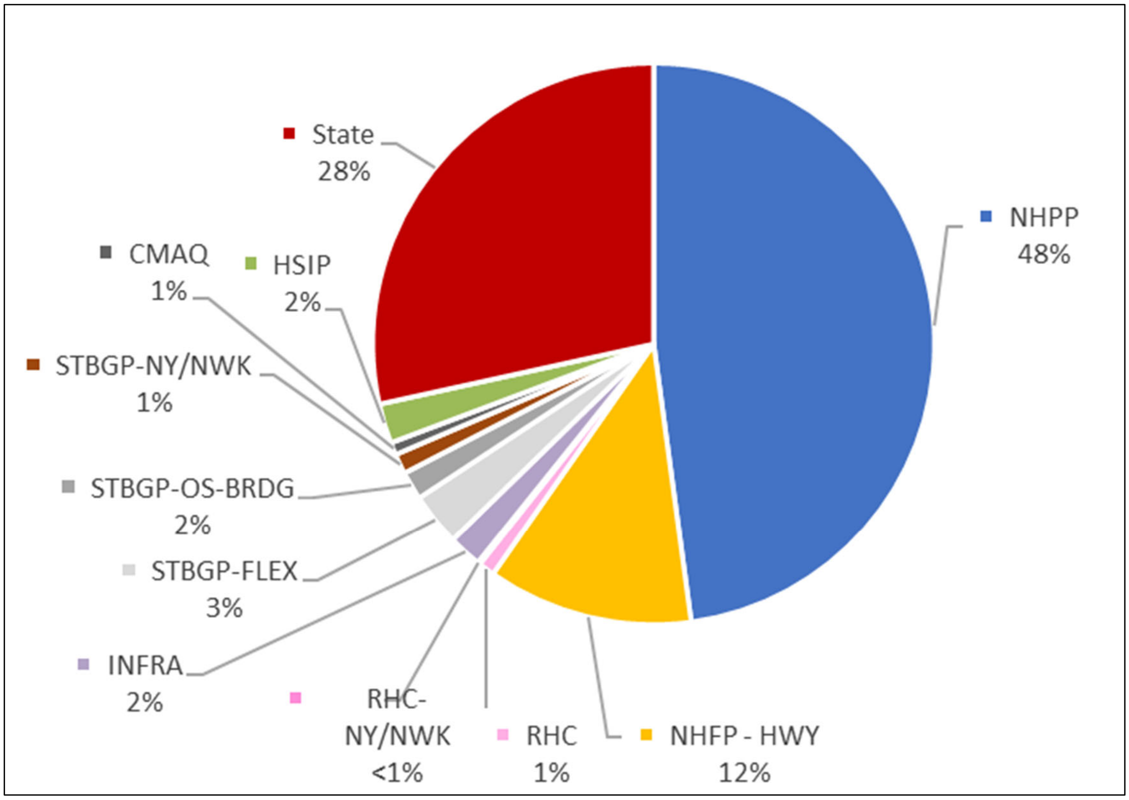
For 2022 through 2029 (inclusive), NJTPA is expected to receive $2,290 million in funding for freight-related projects from various sources as shown in Table 112 and Figure 235.

Table 112. NJTPA Funding Sources

Funding Source	Amount ($M)
NHPP	$1,095.82
NHFP-HWY	$270.84
INFRA	$44.00
STBGP-FLEX	$69.96
STBGP-OS-BRDG	$37.49
STBGP-NY/NWK	$26.59
HSIP	$52.31
RHC	$21.41
RHC-NY/NWK	$3.29
CMAQ	$16.59
State	$652.00
Total	**$2,290.30**

Source: NJDOT 2022 STIP, NJTPA Online Transportation Information System (NOTIS)

Figure 235. NJTPA Funding Sources Distribution



Source: NJDOT 2022 STIP, NJTPA Online Transportation Information System (NOTIS)

Table 113 includes a list of the STIP projects receiving these funds. More detail on funding levels and project descriptions can be found in Appendix E.

Table 113. NJTPA Freight Projects

County	DBNUM	Project Name	Project Type	Funding Source(s)
Hudson	12386	Route 3 & Route 495 Interchange	Operations	NHPP
Morris	15351	Route 80, Bridges over Howard Boulevard (CR 615)	Bridge	NHPP
Passaic, Bergen	11415	Route 80, Riverview Drive (CR 640) to Polify Road (CR 55)	Operations	NHPP, NHFP-HWY
Middlesex, Somerset	9169Q	Route 287, River Road & Easton Avenue Interchange Improvements	Bottleneck	NHPP
Essex	12318	Route 280, WB Ramp over 1st & Orange Streets, Newark Subway & NJ TRANSIT	Capacity	NHPP
Middlesex	14355	Route 440, Route 95 to Kreil St	Pavement	NHPP
Somerset	14416	Hamilton Road, Bridge over Conrail RR	Bridge	NHPP
Middlesex	99316	Oak Tree Road Bridge, CR 604	Bridge	NHPP, STBGP-FLEX
Various	X51B	Pavement Preservation NJTPA	Pavement	NHPP, STBGP-FLEX, STBGP-NY/NWK
Middlesex	17419	Route 1, Alexander Road to Mapleton Road	Bottleneck	NHPP
Middlesex	15303	Route 1, NB Bridge over Raritan River	Bridge	NHPP. State
Union	95023	Route 1&9, Interchange at Route I-278	Operations	NHPP
Passaic Essex	9233B6	Route 23, Route 80 and Route 46 Interchange	Bottleneck	NHPP
Various	99327A	Resurfacing, Federal	Pavement	NHPP. STBGP-FLEX
Various	T37	Rail Support Facilities and Equipment	Operations	State
Middlesex	079A	Route 9/35, Main Street Interchange	Bottleneck	NHPP
Hudson	97005B	Portway, Fish House Road/Pennsylvania Avenue, CR 65	Capacity	NHFP-HWY, STBGP-FLEX
Passaic	06366C	Route 46, Route 23 (Pompton Avenue) to Route 20	ITS	NHFP-HWY
Essex	PA2201	Port Street Corridor Improvement Project	Maritime	INFRA
Various	X35A1	RHC	Safety	RHC, RHC-NY/NWK, HSIP
Monmouth	15449	Route 71, Bridge over NJ TRANSIT (NJCL)	Bridge	STBGP-FLEX
Ocean	14324	Route 166, Bridges over Branch of Toms River	Bridge	STBGP-OS-BRDG
Somerset	14416	Hamilton Road, Bridge over Conrail RR	Bridge	STBGP-OS-BRDG
Warren, Morris	9237	Route 57/182/46, Hackettstown Mobility Improvements	Bottleneck	CMAQ
Somerset	02372B	Route 202, First Avenue Intersection Improvements	Capacity	CMAQ
Essex	12408B	Route 7, Mill Street (CR 672) to Park Avenue (CR 646)	Pavement	HSIP, State
Morris	13350	Route 15 and Berkshire Valley Road (CR 699)	Safety	HSIP
Monmouth	14357	Route 66, Jumping Brook Road to Bowne Road/Wayside Road	Pavement	HSIP
Union	15395	Route 439, Route 28 (Westfield Ave) to Route 27 (Newark Ave)	Pavement	NHPP, HSIP
Hudson, Essex	11407	Lincoln Tunnel Access Project (LTAP)	Capacity	State

Source: NJDOT 2022 STIP

9.5.3 SJTPO

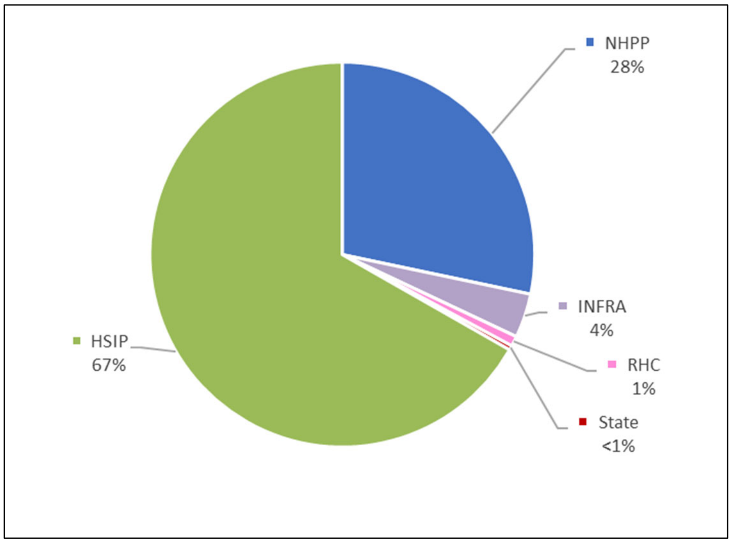
For 2022 through 2029 (inclusive), SJTPO is expected to receive nearly $256 million in funding for freight-related projects from various sources as shown in Table 114 and Figure 236.

Table 114. SJTPO Funding Sources

Funding Source	Amount ($M)
HSIP	$162.03
NHPP	$68.70
INFRA	$9.00
RHC	$2.09
State	$0.90
Total	$255.92

Source: NJDOT 2022 STIP

Figure 236. SJTPO Funding Sources Distribution



Source: NJDOT 2022 STIP

Table 115 includes list of the STIP projects receiving these funds. More detail on funding levels and project descriptions can be found in Appendix E.

Table 115. SJTPO Freight Projects

County	DBNUM	Project Name	Project Type	Funding Source(s)
Various	X51	Pavement Preservation	Pavement	NHPP
Various	99327A	Resurfacing, Federal	Pavement	NHPP
Salem	PS2201	Port of Salem Improvements	Maritime	INFRA
Various	X35A1	RHC	Safety	RHC, HSIP
Various	4314	Local Safety/ High Risk Rural Roads Program	Safety	HSIP
Various	X35A1	Rail Support Facilities and Equipment	Operations	State

Source: NJDOT 2022 STIP

9.5.4 Statewide

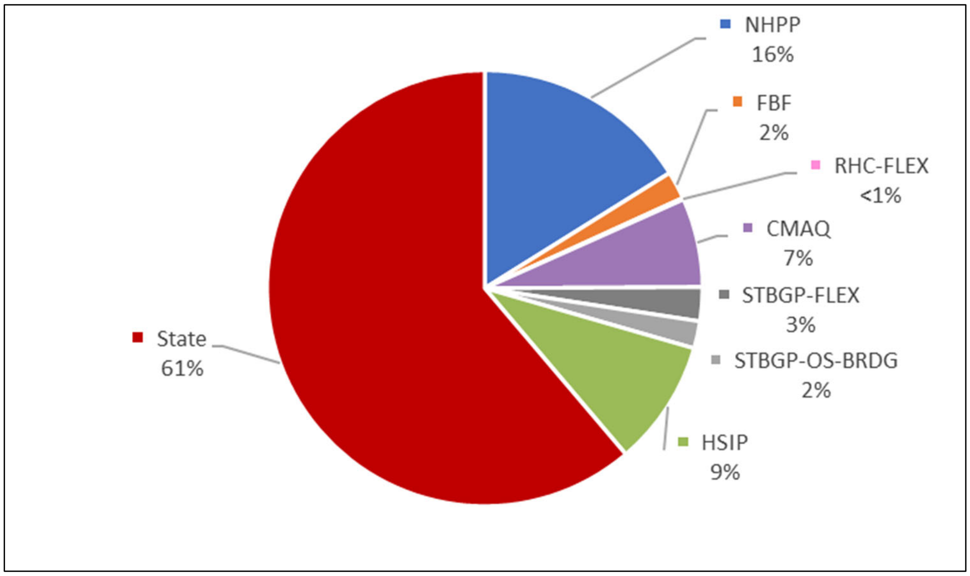
For 2022 through 2029 (inclusive), additional statewide freight projects are expected to receive nearly $1.649 billion in funding from various sources as shown in Table 116 and Figure 237.

Table 116. Statewide Funding Sources

Funding Source	Amount ($M)
NHPP	$265.98
HSIP	$153.95
CMAQ	$108.98
STBGP-OS-BRDG	$33.29
STBGP-FLEX	$8.27
FBF	$34.00
RHC-FLEX	$2.00
State	$1,009.39
Total	**$1,648.94**

Source: NJDOT 2022 STIP

Figure 237. Statewide Funding Sources Distribution



Source: NJDOT 2022 STIP

Table 117 includes a list of the STIP projects receiving these funds. More detail on funding levels and full project descriptions can be found in Appendix E.

Table 117. Statewide Freight Projects

County	DBNUM	Project Name	Project Type	Funding Source(s)	Years Funded
Various	13306	Mobility and Systems Engineering Program	ITS	NHPP, State, STBGP-FLEX	FY22-FY31
Various	99327A	Resurfacing, Federal	ITS	NHPP, STBGP-FLEX	FY22-FY31
Various	X66	Traffic Monitoring Systems	ITS	NHPP, State	FY22-FY31
Various	377	Ferry Program, Federal	Maritime	FBF	FY22-FY31
Various	X35A1	Rail-Highway Grade Crossing Program, Federal	Safety	RHC-FLEX	FY22-FY31
Various	15322	Delaware & Raritan Canal Bridges	Bridge	STBGP-FLEX, STBGP-OS-BRDG	FY22-FY26
Various	15343	Intelligent Traffic Signal Systems	ITS	CMAQ	FY22-FY31
Various	D1601	New Jersey Regional Signal Retiming Initiative	ITS	CMAQ	FY22-FY31
Various	9388	Highway Safety Improvement Program Planning	Safety	HSIP, State	FY22-FY31
Various	19370	Safety Improvement Projects and Pedestrian Safety Improvement Projects	Safety	HSIP	FY22-FY31
Various	X34	New Jersey Rail Freight Assistance Program	Operations	State	FY22-FY31
Various	X35A	Rail-Highway Grade Crossing Program, State	Operations	State	FY22-FY31
Various	X03E	Resurfacing Program	Pavement	State	FY22-FY31

Source: NJDOT 2022 STIP