

Moving Forward 2055

Connecting Communities, Creating Opportunities

APPENDIX D REGIONAL FREIGHT PLAN ELEMENT



NYMTC Regional Transportation Plan
Adopted on September 5, 2025

MOVING FORWARD 2055

REGIONAL FREIGHT PLAN ELEMENT

prepared by

THE NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

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INTRODUCTION

OUR REGION AND ITS NEEDS

As of 2022, the New York metropolitan region is home to 23.0 million people and 12.4 million jobs. Its economy accounts for nearly 10 percent of the United States' gross domestic product. The region's residents, workers, and visitors depend on safe, accessible, and efficient transportation. Movement of people and goods is vital to our region's economic health. To ensure continued vitality, our region needs reliable and well-maintained transportation infrastructure. It also needs to be safe, fair, human-centered and provide meaningful choices to individuals of all abilities. It needs to adapt to shifting travel patterns from trends such as telecommuting and e-commerce, prepare for new technologies, and contribute positively to a healthier environment. The transportation network is not limited to moving people. Every day, millions of tons of goods are being moved, delivered to residences, area stores, and restaurants. Cargo moves to and from intermodal centers, distribution centers, and warehouses, traveling within and outside of the region. Our region is on the move. While the communities in our vast region may move differently, we all collectively share our need to get around easily and safely. Our transportation network is, and will continue to be, an engine of regional opportunity for communities and commerce, and a connection hub for our country to the rest of the world. Our Vision and Goals

The Freight Element of *Moving Forward 2055* explores how addressing challenges and promoting opportunities to more effectively and efficiently move goods can advance the NYMTC member agencies' ability to reach their Shared Vision and associated goals and objectives. The Shared Vision states:

All people, regardless of race, disability status, age, or socioeconomic background have a right to live, work, and play in communities that are safe, healthy, and free of harmful environmental conditions. Our shared vision is one in which safe, accessible, and efficient mobility for people and goods is made possible by well-maintained and reliable infrastructure.

Furthermore, the members of NYMTC envision a future where transportation infrastructure and technology enhance community health, minimize harmful air pollutants, and where strategic investments in transportation drive continued economic growth.

To achieve this vision, *Moving Forward 2055* includes seven vision goals, shown in Figure 1.

As Section 7.1 of this Freight Plan explains in greater detail, supported by the data and research findings reported throughout this document, freight movement is relevant to each vision goal outlined in NYMTC's Shared Vision for Regional Mobility. The Freight Plan is also developed using the data developed and studies completed by NYMTC's member agencies and multi-state partners.

Figure 1 *Moving Forward 2055* Vision Goals

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Source: *Moving Forward 2055*, Chapter 1.

Two decades ago, in 2005, NYMTC completed its first Regional Freight Plan. That initial Plan included a comprehensive review of commodity flows, a prioritization of major freight corridors, an assessment of key infrastructure deficiencies and needs, and a series of outreach materials designed to help stakeholders and the public understand why freight is present in their communities and the activities it supports.

Since then, the Freight Plan has been updated every four years in keeping with federal requirements for NYMTC's Regional Transportation Plan. Subsequent Plans have defined emerging trends and potential disruptors that impact goods movement.

Key trends and disruptors that have emerged since the initial Freight plan include, but are not limited to, the following:

- » Consumer demand for online shopping and direct-to-consumer deliveries of packages and food soared during the COVID-19 pandemic. Although the growth of this demand has slowed, the level of demand continues to increase year-over-year. This affects warehouse and distribution center development throughout the planning area and beyond. This continuing growth impacts the number of products moving to fulfillment and delivery centers, usually by truck, as well as the level of delivery trips made by trucks, vans, and cargo bicycles.
- » Labor disruptions at ports, supply chain issues related to the lingering impacts of the pandemic, geopolitical changes and conflicts, and shifts in manufacturing locations across the globe have altered the trade routes that supply goods to consumers in the NYMTC planning area. For example, the Port Authority of New York and New Jersey (PANYNJ) handled record cargo volumes in 2022, due in large part to challenges and disruptions faced by West Coast ports. Though port volumes have returned to a more "normal" level post-pandemic, disruptions can still have significant impacts on the volume of goods moving through the PANYNJ and on the landside freight transportation systems that are used to distribute goods inland.
- » Developing technologies for last-mile delivery, connected and autonomous vehicles (CAV), and alternative fuel vehicles (AFV), have the potential to improve safety, reduce pollution and community impacts, and facilitate economic activity associated with improved goods movement.
- » Work-from-home trends have persisted post-pandemic and contributed to maintaining the growth of home delivery of goods, changing patterns of freight delay and other performance issues, emerging and evolving vehicular safety issues, and significant changes in commercial real estate markets.

These trends and disruptors, which are discussed in Chapter 5 of this Plan, necessitate a fresh look at regional goods movement. They also highlight the need to assess regional economic growth and optimize the transportation network for safe and efficient freight movement. Over the past several years, key relevant freight planning efforts have been initiated in the multi-state New York City metropolitan region (see Table 1.1). The findings of these plans and studies inform the development of this update to the Regional Freight Plan.

For more information on the freight system and how goods are moved through the NYMTC planning area, refer to the [Moving Forward 2055 Interactive Map](#).

Table 1 Key Freight Planning Activities (2021-Present)

Report	Agency	Year
New York State Freight Plan	New York State Department of Transportation (NSYDOT)	2024
2050 Freight Industry Level Forecasts Study Update	North Jersey Transportation Planning Authority	Ongoing
Eastern Pennsylvania Freight Infrastructure Plan	Eastern Pennsylvania Freight Alliance	2024
Statewide Freight Plan	New Jersey Department of Transportation	2023
Connecticut Statewide Freight Plan Update	Connecticut Department of Transportation	2022
Connecticut Truck Parking Study	Connecticut Department of Transportation	2023
Delivering New York: A Smart Truck Management Plan for New York City	New York City Department of Transportation (NYC DOT)	2021
Delivering Green: A vision for a sustainable freight network serving New York City	NYC DOT and New York City Economic Development Corporation (NYCEDC)	2021
Regional Freight Land Use Study	NYMTC	2022
Clean Freight Corridors Planning Study	NYMTC	2022
Regional Waste Movement Study	NYMTC	Ongoing
Last-Mile Facility Text Amendment	NYC Department of City Planning (DCP)	Ongoing

This Plan Element is organized as follows:

- » **SECTION 2: COMMODITY FLOWS** - Presents an overview of the quantity and value of goods moved now and, in the future, including analysis by transportation mode, direction, and origins and destinations. This analysis is presented at the multi-state metropolitan region and at the 10-county NYMTC planning area levels.
- » **SECTION 3: REGIONAL ECONOMY** - Describes population growth trends and employment in the region's economy, which are key drivers of freight travel demand.
- » **SECTION 4: FREIGHT TRANSPORTATION INFRASTRUCTURE** - Describes the modal transportation networks that freight moves on, their connections and relationships.
- » **SECTION 5: TRENDS AND DISRUPTORS** - Identifies and describes key technological, logistics, policy, and economic trends that are likely to affect the movement of goods in the future. This section also describes the effects that the COVID-19 pandemic had on the supply chain of goods that are critical to the continuity of life and economic activity in the region.
- » **SECTION 6: PERFORMANCE AND NEEDS** - Identifies and describes the performance of the region's freight transportation system now and in the future, and what interventions may be needed to preserve or improve the movement of goods.
- » **SECTION 7: SHARED VISION AND ACTION ITEMS** - The Regional Freight Plan Element concludes with the identification of recommended initiatives and actions that NYMTC members can take to address the needs, and high-level guidance for their implementation.



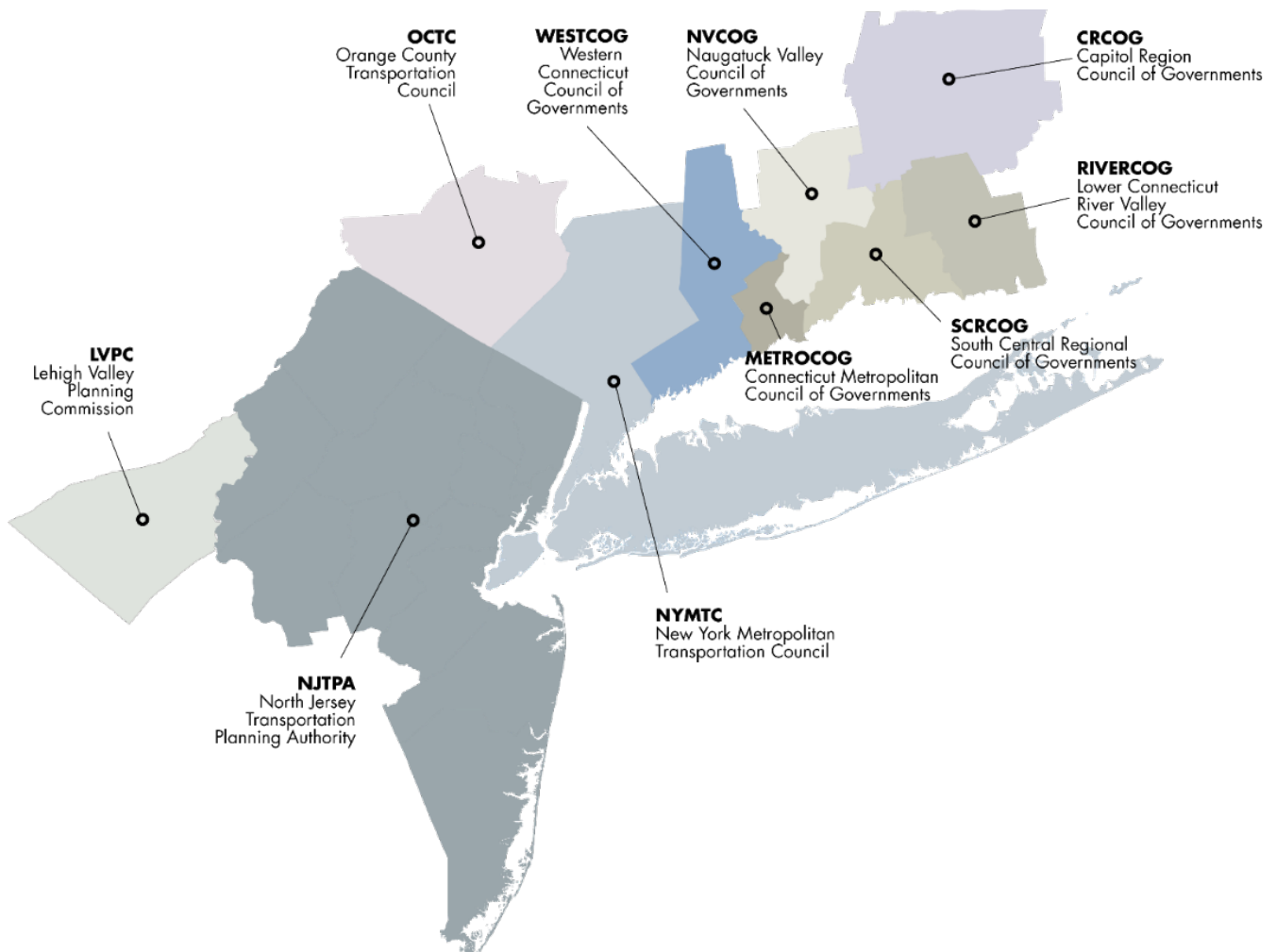
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COMMODITY FLOWS

Freight consists of goods transported in bulk by truck, train, ship, aircraft, or pipeline on the transportation network. It represents trade and economic activity. The 10-county NYMTC planning area is at the center of a large, complex, and multi-state metropolitan cluster of goods moving into, out of, through and within the area through economic relationships

Figure 2 shows the extent of the multi-state region which falls under the planning jurisdictions of the Metropolitan Area Planning (MAP) Forum's member MPOs and councils of governments (COGs).

Figure 2 Multi-State Metropolitan Region



Source: NYMTC

The multi-state region is home to more than 24 million people. This large population of consumers generate demand for food, clothing, and a vast array of other goods to be moved throughout the region. The region is home to more than 11 million jobs, many in economic sectors that produce or use freight commodities.ⁱ The region is also a major international trade gateway, including marine terminals in the NYMTC planning area and in neighboring New Jersey. Warehouses and distribution centers are being constructed across the region to support supply chains that span the globe and to meet consumers' demands for rapid, time-definite deliveries of goods they order online or shop for in stores.

Freight flows in the NYMTC planning area support the local population and economy while also connecting to economic activity across the multi-state region. To address this, an analysis of recent and projected commodity flows has been conducted at two geographic levels: the multi-state region and the NYMTC planning area.

Freight movements are evaluated by tonnage, value, direction of travel, commodity type, origin, and destination. This evaluation used Transearch data, a comprehensive database of North American commodity flows developed by S&P Globalⁱⁱ based on primary shipment data obtained from rail and truck freight carriers and information on all modes of freight transportation from public, commercial, and proprietary sources. Transearch provides a base-year estimate of freight flows at the county level and a future year forecast. The forecast evaluates underlying demand and grows it linearly based on economic forecasts. It does not include alternative scenarios that account for the potential effects of major disruptors, structural changes in the economy, or planned or proposed major capital projects that could affect where and how goods move in the region. Therefore, the trends, disruptors, and recommended actions in this plan could lead to a future that differs from the forecast described in this section.

The primary specifications of the Transearch dataset used in this Freight Plan are listed below:

- » **COVERAGE YEARS:** 2021 (base year), 2055 (forecast), consistent with the base year and forecast year used in the 2024 New York State Freight Plan;
- » **UNITS OF MEASURE:** Cargo by tonnage and monetary value of cargo;
- » **TRANSPORTATION MODES:** Truck, rail, water (domestic and with origin and/or destination in Canada or Mexico), air, pipeline, and other. Freight trips made using multiple modes (such as truck-to-rail or water-to-truck) are reported as separate modal trips. Truck volumes primarily reflect longer-distance moves by large trucks and may not capture smaller/local truck trips involved in redistributing goods for last-mile delivery;
- » **COMMODITIES:** Standard Transportation Commodity Code (STCC), 2-digit detail; and
- » **DIRECTION OF TRAVEL:** Inbound, outbound, internal, and through (Figure 3).

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Figure 3 Direction of Travel in Commodity Flow

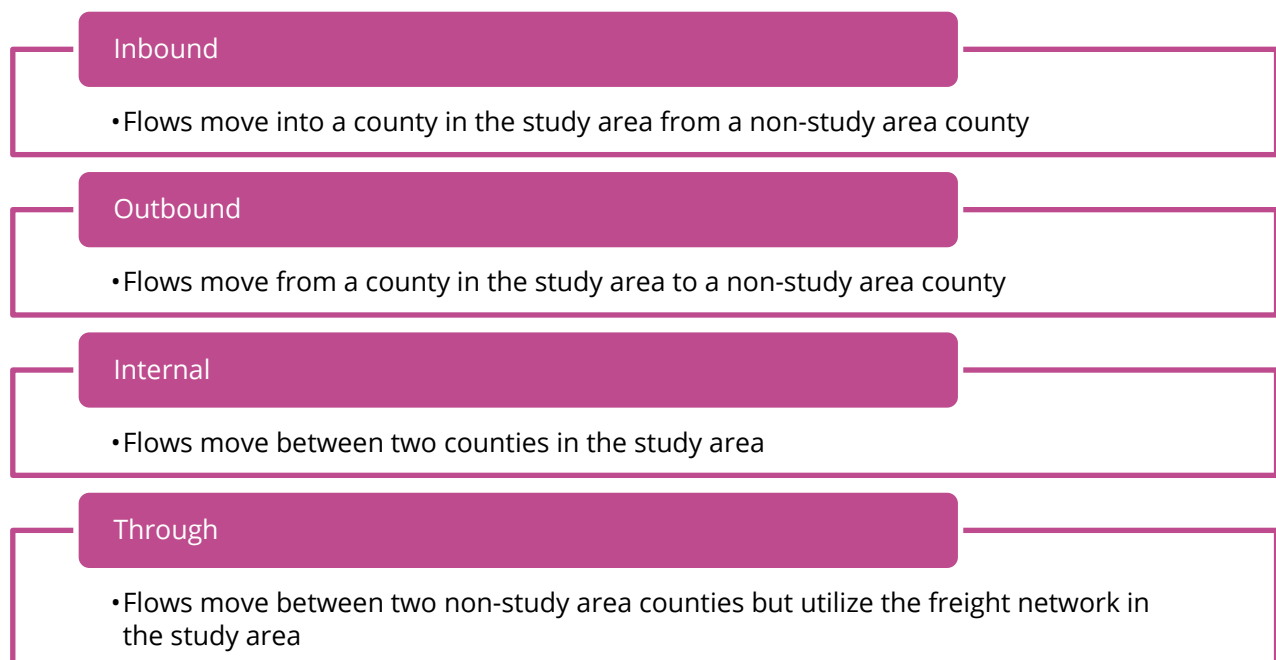


Table 2.1 provides an overview of the total tons and value in both the multi-state region and the NYMTC planning area in 2021 and forecasted in 2055. Section 2.1 describes commodity flows in the multi-state region defined by the multi-state region and Section 2.2 summarizes commodity flows in the NYMTC planning area.

Table 2 Total Freight Tons and Value, 2021-2055, Multi-State Region and NYMTC Planning Area

Geographic Region/Area	Total Tons of Freight in 2021	Total Value of Freight in 2021	Total Tons of Freight in 2055	Total Value of Freight in 2055	Change in Tons of Freight, 2021-2055	Change in Value of Freight, 2021-2055
Multi-State Region	769 million	\$1.3 trillion	1.1 billion	\$2.3 trillion	+352 million (+46%)	+\$1 billion (+82%)
NYMTC Planning Area	438 million	\$715 billion	646 million	\$1.4 trillion	+208 million (+47%)	+638 billion (+89%)

2.1 MULTI-STATE REGION FREIGHT FLOWS

2.1.1 SUMMARY OF 2021 FREIGHT FLOWS – MULTI-STATE REGION

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In 2021, 769 million tons of freight with a value of \$1.3 trillion moved throughout the multi-state metropolitan region. As shown in Table 2.2, 297 million tons of goods, more than one-third of the total freight tonnage and valued at \$430 billion, moved into the region. The tonnage moving through the multi-state region accounted for the smallest proportion (14 percent) of total tonnage and value. Though the inbound flow accounts for a large proportion of total tonnage, the average value per ton moving inbound (\$1,449 per ton) is lower than tonnage moving in the other directions. Outbound commodity flows have a higher average value (\$1,911 per ton) than flows moving in other directions.

Table 3 Multi-State Region Freight Movement by Direction (2021)

Direction	Tons 2021 (Million)	Tons 2021 Percent	Value 2021 (\$Billion)	Value 2021 Percent	Value/Ton (\$)
Inbound	297	39%	430	33%	\$1,449
Internal	236	31%	418	32%	\$1,769
Outbound	132	17%	252	20%	\$1,911
Through	104	14%	186	14%	\$1,784
Total	769	100%	1,285	100%	\$1,672

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Ninety percent of the total tonnage and value moves into, within, through, and out of the multi-state region by truck. Given the Port Authority's central location within the multi-state region, six percent of the total freight tonnage moves by water, which is higher than the national average of four percent.ⁱⁱⁱ However, since movement by water is an ideal mode for heavy and bulk commodities, the waterborne tonnage only accounted for three percent of total freight value moving in the multi-state region (Table 2.3). As mentioned in the overview of data attributes in the Section 2 introduction, multimodal trips are reported as separate trips for each modal segment. Many of the trips reported as rail or water trips link to a truck trip on one or both ends of that journey. The truck trip provides the connection to or from a shipper or receiver's door.

Table 4 Multi-State Region Freight Movement by Mode (2021)

Mode	Tons 2021 (Thousand)	Tons 2021 Percent	Value 2021 (\$Million)	Value 2021 Percent
Truck	688,541	90%	1,166,179	91%
Water	49,786	6%	35,049	3%
Rail	22,828	3%	67,496	5%
Pipeline	6,250	1%	1,058	0.1%
Air	1,376	0.2%	15,523	1%
Other	4	0.0005%	74	0.01%
Total	768,785	100%	1,285,378	100%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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Goods of every commodity type are moved on the multi-state region's transportation network. Table 2.4 lists the primary commodity groups moving in the region and some examples of goods that are classified in each group.

Table 5 Commodity Groups and Examples of Goods Classified in Each

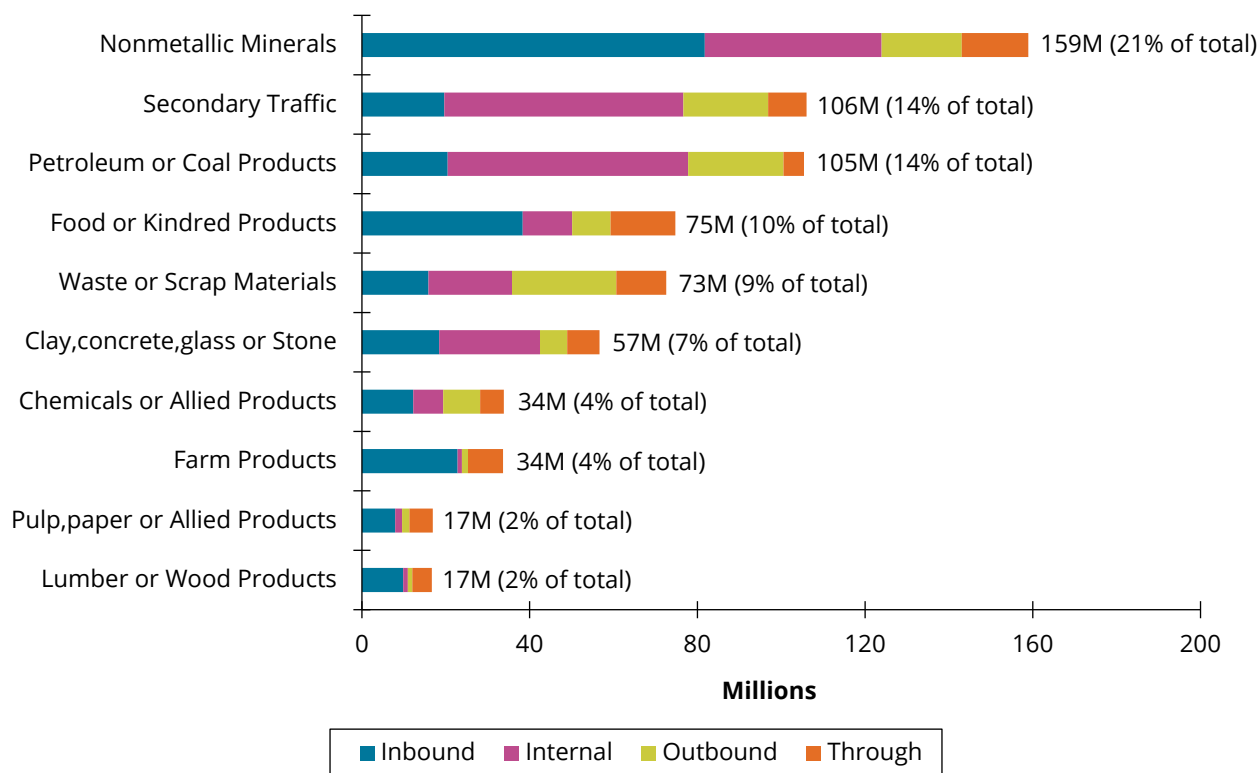
Commodity Group	Examples of Goods
Chemicals or Allied Products	Industrial chemicals, plastics and synthetic resins, drugs and pharmaceutical products, soaps and cleaning chemicals, paints, agricultural chemicals and chemical fertilizers, etc.
Clay, Concrete, Glass, or Stone	Flat glass, structural clay products (e.g., bricks), pottery, concrete gypsum, cut stone and glass products, abrasives
Electrical Equipment	Household appliances, televisions, electronic devices, communication equipment
Fabricated Metal Products	Metal cans, cutlery, plumbing and heating fixtures, fabricated structural metal products, bolts, screws, nuts, fabricated wire, valves and pipe fittings
Farm Products	Field crops, fresh fruits and tree nuts, fresh vegetables, livestock, poultry, eggs, other horticultural specialties
Food or Kindred Products	Typically, processed or prepared food products, including meat and poultry products, dairy products, canned and preserved food, grain mill products, baked products, beverages, etc.

Commodity Group	Examples of Goods
Lumber or Wood Products	Pulpwood logs, dimensional lumber, millwork, veneer and plywood, wooden containers, creosoted or treated wood
Machinery	Engines and turbines, farm machinery, construction and mining equipment, metalworking machinery, industrial machinery
Miscellaneous Mixed Shipments	Miscellaneous or combined shipments of two or more commodities
Nonmetallic Minerals	Unprocessed mineral products, such as dimension stone, crushed or broken stone, sand and gravel, crude clay, crude rock salt, crude gypsum, etc.
Petroleum or Coal Products	Gasoline, jet fuel, kerosene, lubricating oils, asphalt, roofing materials, coal and coke briquettes, etc.
Primary Metal Products	Pig iron, steel, iron or steel castings, nonferrous smelter or shaped products made from copper, brass, bronze, or aluminum
Pulp, Paper or Allied Products	Pulp, printing paper, newsprint, paper bags, paperboard, paperboard containers, wallboard
Rubber or Miscellaneous Plastics	Tires and inner tubes, rubber and plastic footwear, hosing, belting, other plastic and rubber products
Secondary Traffic	Shipments of mixed commodities transported between to or from warehouses, distribution centers, rail terminals, or other intermodal hubs
Transportation Equipment	Motor vehicles and parts, aircraft and parts, ships and boats, railroad equipment
Waste or Scrap Materials	Municipal solid waste, construction and demolition debris, paper waste and scrap, ashes, etc.

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

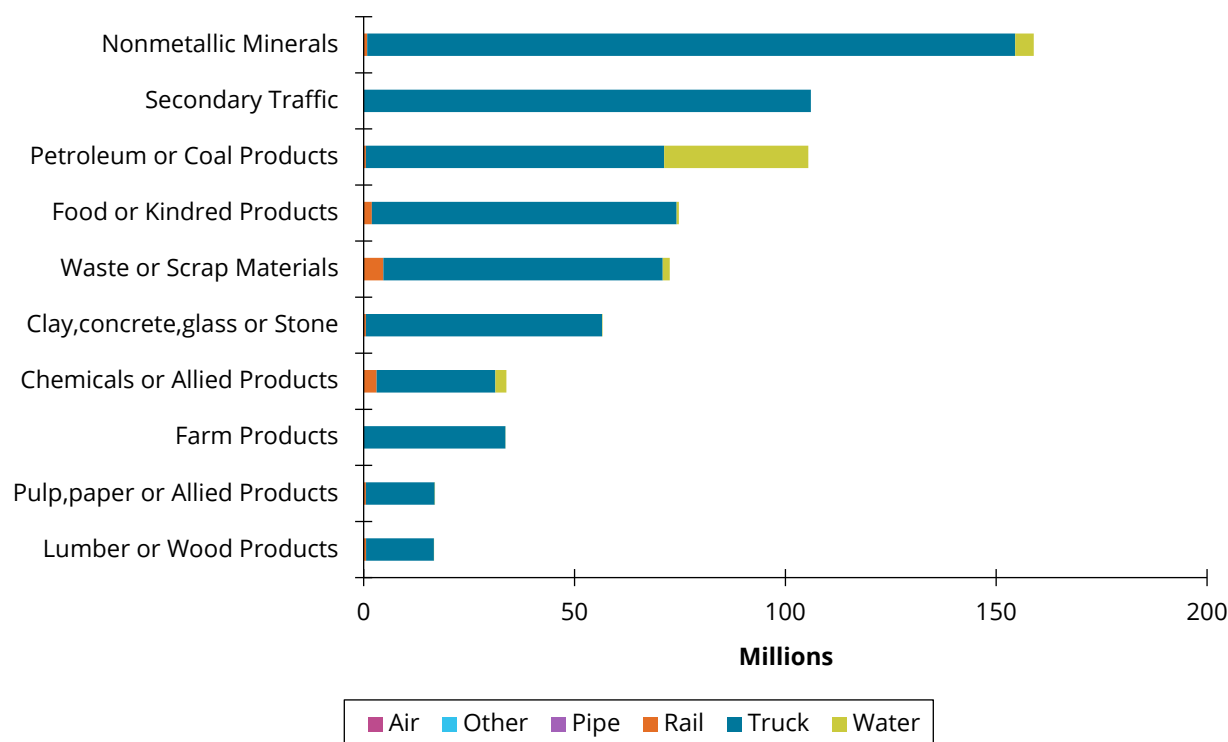
The top commodities by tonnage and value vary. Figure 4 through Figure 7 summarize the top ten commodities moving on the network by tonnage in 2021 and the value of these commodities by direction and mode. Nonmetallic minerals (e.g., sand, rock) total 159 million tons moved, which is 21 percent of the total tonnage on the network. More than half of this tonnage moved inbound to the region and 97 percent of that inbound movement was transported by truck. Secondary traffic amassed 57 million tons, more than half of which moved internally within the study area via trucks. Secondary traffic refers to the movement of goods between distribution centers, warehouses, or retail locations within a supply chain, as opposed to their initial transport from production sites. Petroleum products accounted for 14 percent of total freight tonnage and moved primarily within the region by truck and water modes. These three commodities accounted for 49 percent of total freight tonnage in 2021. The top ten commodities shown in Figure 4 together represent 88 percent of freight tonnage moving in the multi-state region in 2021.

In terms of value, at \$258 billion, secondary traffic accounted for 20 percent of the total value of tonnage moved in 2021. Chemicals and allied products, essential in manufacturing, are the second-largest commodity moved by value at \$169 billion. Most of this commodity moved within or outbound from the region. Food product is the third-largest commodity by value at \$130 billion, or nearly 10 percent of total value of tonnage moved. More than 95 percent of the top three commodities by value were transported by truck. The top 10 commodities by value accounted for 78 percent of total value of goods moved in the multi-state region in 2021.

Figure 4 Multi-State Region Top Commodities by Tonnage and Direction (2021)

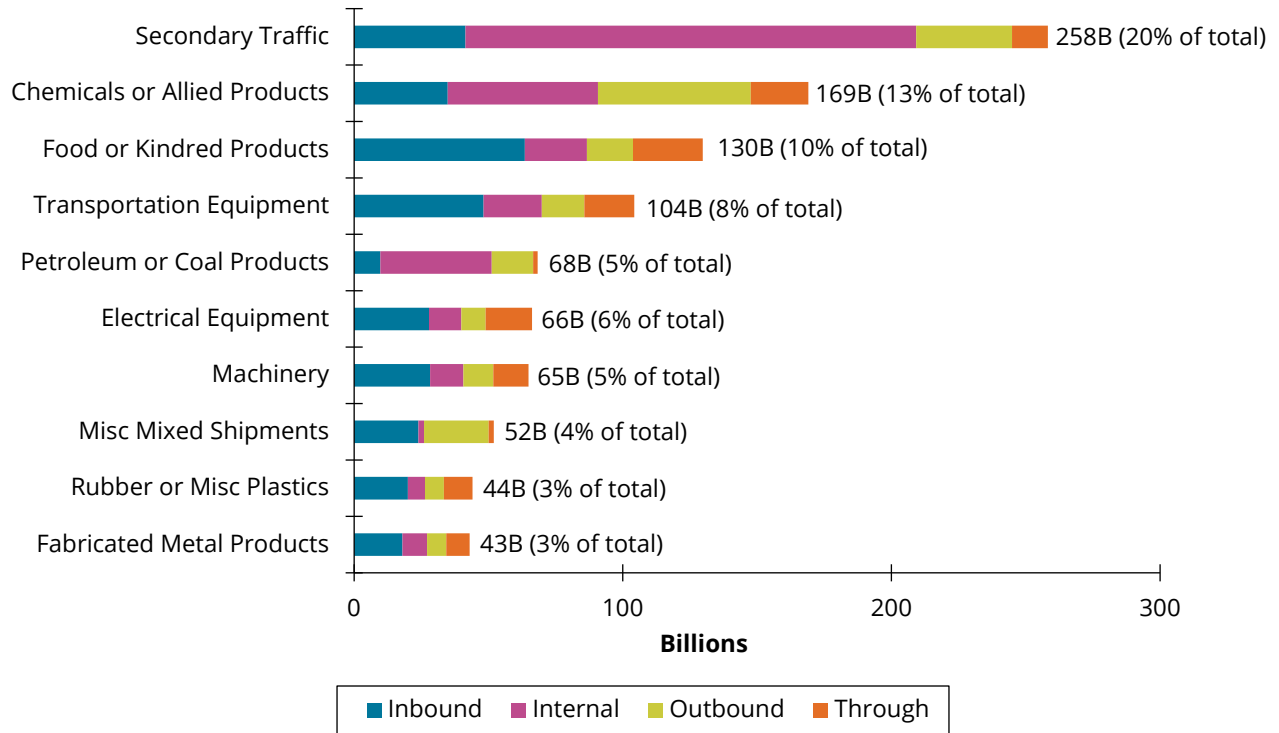
Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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Figure 5 Multi-State Region Top Commodity by Tonnage and Mode (2021)

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

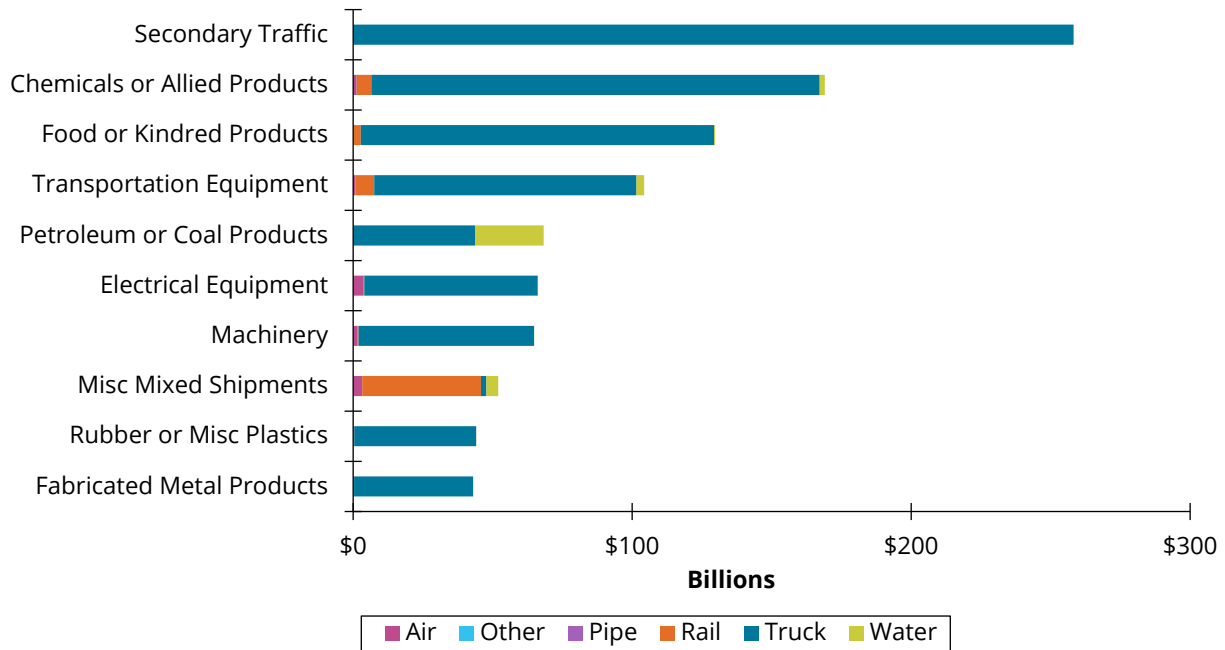
Figure 6 Multi-State Region Top Commodities by Value and Direction (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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Figure 7 Multi-State Region Top Commodities by Value and Mode (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

2.1.2 2055 FORECASTED FREIGHT FLOWS – MULTI-STATE REGION

By 2055, 1.1 billion tons of goods worth \$2.3 trillion are expected to move into, within, through, and out of the multi-state region.

Inbound movement will account for 40 percent of the total 2055 tonnage and 32 percent of total value. The estimated growth rate of goods moved within the region (internal) is expected to be lower than the rate of growth for flows into, out of and through the region. As a result, internal goods movements are forecast to represent 28 percent of the tonnage and 31 percent of the value of goods moved in 2055 (See Table 2.5).

Trucks are estimated to carry more than 90 percent of the total 2055 freight volume and value. All goods movement modes are expected to show an annual growth except waterborne, which is forecasted to decline annually by 0.1 percent in tonnage and 0.04 percent in value (See Table 2.6). This decline is related to the anticipated decrease of petroleum or coal products during the forecast period. Between 2021 and 2055, waterborne petroleum is forecasted to decline by approximately 8 million tons, and the value is estimated to decrease by \$5.8 billion.

Table 6 Multi-State Region Forecast by Mode (2055)

Direction	Tons 2055 (Million)	Tons 2055 Percent	Tons CAGR (2021–2055)	Value 2055 (\$Billion)	Value 2055 Percent	Value CAGRiv (2021–2055)
Inbound	445	40%	1.2%	756	32%	1.7%
Internal	319	28%	0.9%	724	31%	1.6%
Outbound	195	17%	1.2%	489	21%	2.0%
Through	162	14%	1.3%	364	16%	2.0%
Total	1,121	100%	1.1%	2,333	100%	1.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

Table 7 Multi-State Region Forecast by Direction (2055)

Mode	Tons 2055 (Thousand)	Tons 2055 Percent	Tonnage CAGR (2021–2055)	Value 2055 (\$Million)	Value 2055 Percent	Value CAGR (2021–2055)
Truck	1,019,708	91%	1.2%	2,142,984	92%	1.8%
Water	47,820	4%	-0.1%	34,591	1%	-0.04%
Rail	36,183	3%	1.4%	119,487	5%	1.7%
Pipeline	14,423	1%	2.5%	2,388	0%	2.4%
Air	2,654	0.2%	1.9%	33,488	1%	2.3%
Other	11	0.001%	3.2%	261	0%	3.8%
Total	1,120,799	100%	1.1%	2,333,199	100%	1.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

2.2 NYMTC PLANNING AREA FREIGHT FLOWS

The NYMTC planning area is a component of the multi-state region and includes ten counties across New York City, Long Island, and in the Hudson Valley. In New York City, counties include New York County (coextensive with the Borough of Manhattan), Bronx County (coextensive with the Borough of The Bronx), Kings County (coextensive with the Borough of Brooklyn); Queens County (coextensive with the Borough of Queens); and Richmond County (coextensive with the Borough of Staten Island). On Long Island, counties include Nassau County and Suffolk County. In the Hudson Valley, counties include Westchester County, Putnam County, and Rockland County.

2.2.1 SUMMARY OF 2021 AND FORECASTED 2055 FREIGHT FLOWS IN THE NYMTC PLANNING AREA

As part of the multi-state region, the ten-county NYMTC planning area accounts for approximately 30 percent of the multi-state region's land area. Approximately 438 million tons of goods valued at \$715 billion in 2021 moved into, within, through, and out of the NYMTC planning area.

Freight movements in the NYMTC planning area thus accounted for more than 55 percent of total freight tonnage and value in the multi-state metropolitan region.

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Like the entire multi-state region, most goods in the NYMTC planning area move inbound and account for 43 percent of total tonnage, 41 percent of total value. Tonnage moving through the NYMTC planning area is the second greatest, which underscores the role of the planning area as a corridor for goods destined elsewhere. Approximately 133 million tons of freight valued at \$249 billion utilize the transportation system in the NYMTC planning area to travel between origins and destinations outside the area. These through movements account for approximately 30 percent of freight tons and 35 percent of freight value moved in the planning area (Table 2.7).

In 2055, 646 million tons of freight, valued at \$1.3 trillion, are projected to move into, within, through, and out of the NYMTC planning area.

Goods movement through the planning area is forecast to have the largest annual growth through the 2055 horizon year (Table 2.8). In terms of transportation mode used to move goods, movement by truck is the predominant mode, accounting for 94 percent of all tonnage moved and 96 percent of the value of tonnage moved. Unlike the multi-state region, movement by water, although the next most used mode, accounts for only four percent of total freight tonnage moving in the NYMTC planning area and two percent of the value in 2021 (Figure 8). All modes are expected to show growth in both tonnage and value through 2055, except for waterborne. As with the multi-state region, the decrease in waterborne movements is likely related to phasing out petroleum and coal usage (Table 2.8).

Table 8 NYMTC Planning Area Freight Movement by Direction (2021)

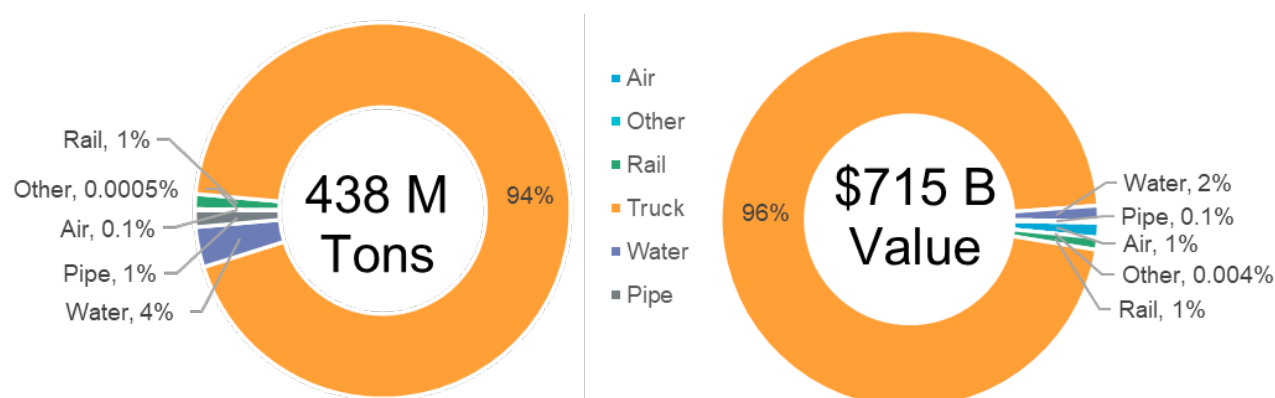
Direction	Tons 2021 (Million)	Tons 2021 Percent	Value 2021 (\$Billion)	Value 2021 Percent
Inbound	188	43%	297	41%
Internal	57	13%	81	11%
Outbound	61	14%	89	12%
Through	133	30%	249	35%
Total	438	100%	715	100%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Table 9 NYMTC Planning Area Forecast Freight Movement by Direction (2055)

Direction	Tons 2055 (Million)	Tons CAGR (2021–2055)	Value 2055 (\$Billion)	Value CAGR (2021–2055)
Inbound	273	1.1%	548	1.8%
Internal	83	1.1%	140	1.6%
Outbound	86	1.0%	161	1.8%
Through	204	1.3%	504	2.1%
Total	646	1.1%	1,353	1.9%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Figure 8 NYMTC Planning Area Freight Movements by Mode (2021)

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Table 10 NYMTC Planning Area Freight Movements by Mode (2055)

Mode	Tons 2055 (Thousand)	Tons CAGR (2021–2055)	Value 2055 (\$Billion)	Value CAGR (2021–2055)
Truck	609,961	1.2%	1,310,792	1.9%
Pipe	14,267	2.5%	2,360	2.4%
Water	14,116	-0.2%	8,553	-0.2%
Rail	6,403	0.4%	8,977	0.6%
Air	907	1.5%	22,245	2.6%
Other	6	3.1%	63	2.4%
Total	645,660	1.1%	1,352,989	1.9%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2055.

Figure 9 through Figure 12 present the top commodities moved in the NYMTC planning area by tonnage, value, and direction. A list of commodity groups and examples of goods classified in each group is provided in Table 2.4. Not surprisingly, the top commodities for the NYMTC planning area are identical to those for the multi-state region. In terms of tonnage, nonmetallic minerals are the leading commodity group, accounting for 21 percent of total tonnage (91 million tons). Over half of the volume is outbound from the NYMTC planning area, with 96 percent transported by truck.

Secondary traffic, including goods moved to or from warehouses and distribution centers, and petroleum or coal products, are the second and third leading commodity groups. Each account for 12 percent of total tonnage. Nearly 40 percent of secondary traffic moved within the NYMTC planning area, while approximately half of the petroleum products were moved inbound to the region by truck and water exclusively. The fourth leading group is food or kindred products (e.g., packaged food products, dairy products, and beverages) at 49 million tons. Trucks transported 98 percent of food products, with over half being inbound and nearly 40 percent passing through the NYMTC planning area. The fifth leading group is waste and scrap materials (including municipal solid waste, or MSW, plus metal, paper, glass, and other scrap materials or goods with resale value) at 45 million, accounting for 10 percent of total tonnage. 90 percent of the waste outcomes were moved by truck, and approximately half were outbound tonnage. The top 10 commodities accounted for 88 percent of total tonnage.

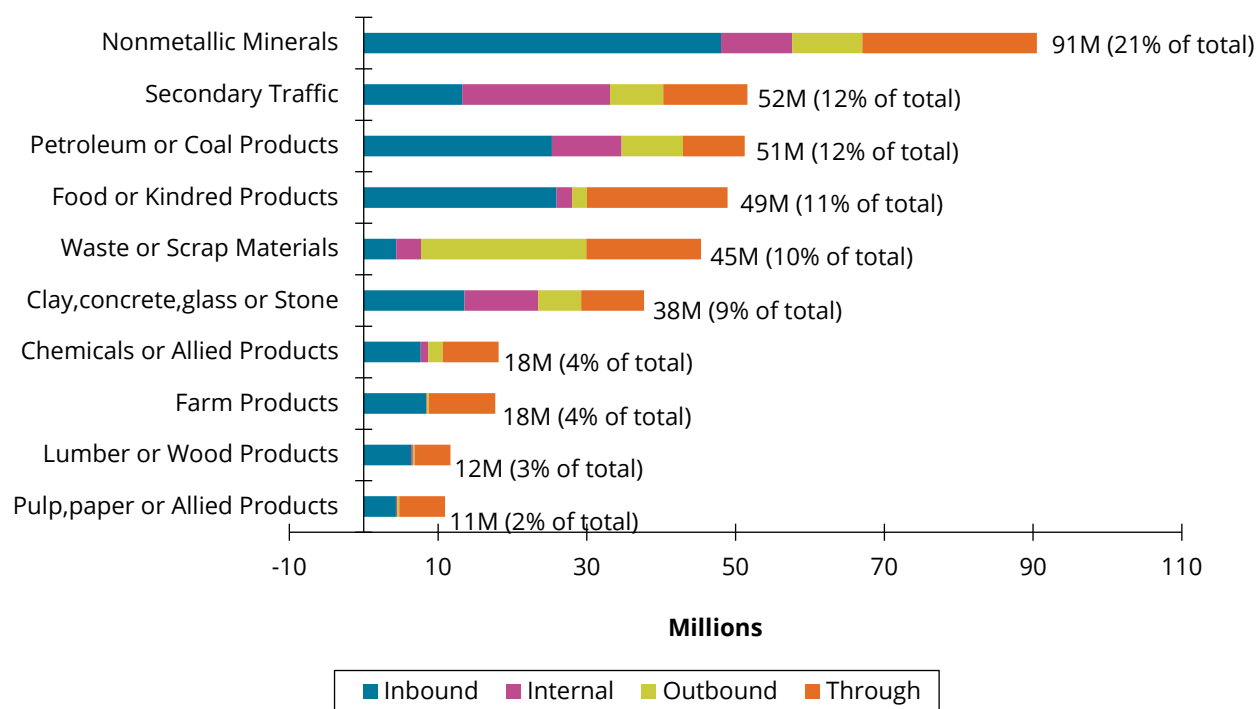
In terms of value, the 18 million tons of chemicals or allied products valued at \$103 billion, ranks the top-valued commodity group across all, accounting for 14 percent of the total value. Nearly all chemical product was carried by truck, and around a third of this value is inbound to the region. The second leading group is secondary traffic, at \$94 billion. Around 37 percent of the value is internal flow within, and 28 percent flowed inbound to the NYMTC planning area. The third leading group is food and kindred products, at \$85 billion, accounting for 12 percent of total value, and is dominated by inbound flows. The fourth leading group is transportation equipment, valued at \$59 billion, accounting for eight percent of total value, and inbound flows contribute to more than half of the value. The fifth leading commodity is electrical equipment, valued at \$46 billion, accounting for six percent of total value. Electrical equipment is mainly

transported by truck (96 percent) and air (four percent). The top 10 commodities by value contribute to 75 percent of the total 2021 value.

The top commodities moved in the NYMTC planning area by tonnage or value are expected to increase by 2055 except for petroleum or coal products. From 2021 to 2055, coal volume is anticipated to decline by both tonnage and value, 25 percent, and 29 percent respectively, representing an approximately one percent decrease annually. Other than the top commodities, printed matter (e.g., books, magazines, brochures, and advertising leaflets, etc.) is forecasted to have over 40 percent decrease in tonnage and value, reaching 1.8 million tons and \$5.6 billion in 2055. Tobacco products are estimated to decrease by more than 90 percent in tonnage and have a value of 25 thousand tons and \$602 million in 2055. Among growing commodities, electrical equipment is expected to increase the fastest, with an annual growth rate of four percent. In 2055, the NYMTC planning area is projected to handle 13 million tons, valued at \$162 billion in electric equipment (Table 2.10).

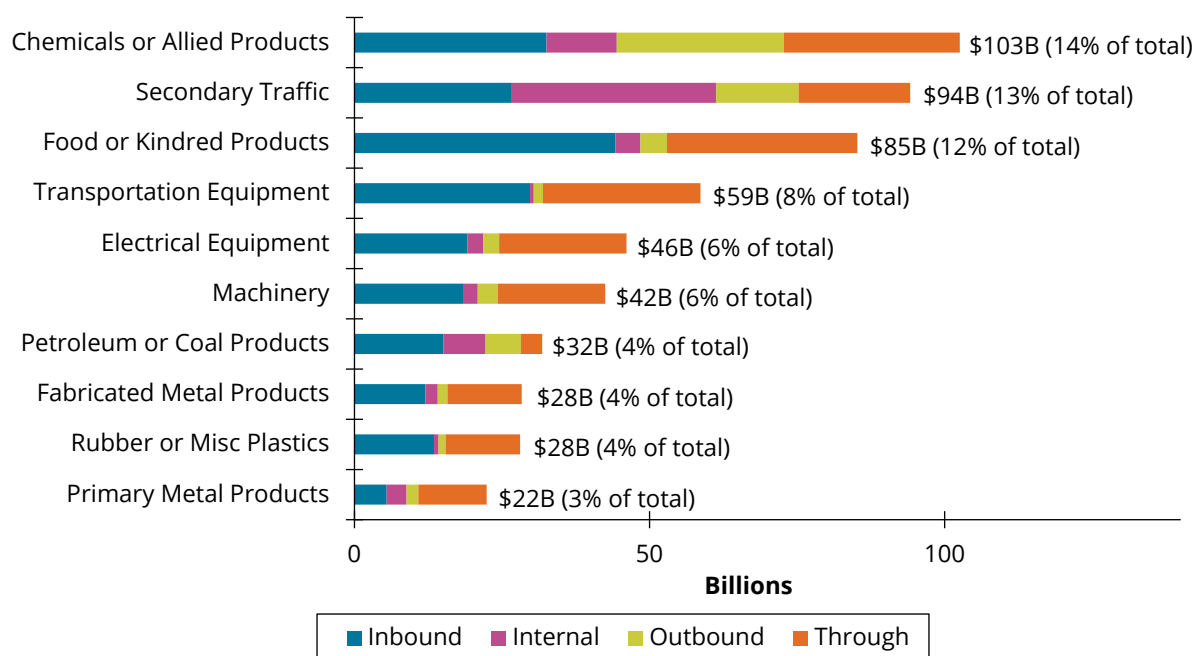


Figure 9 NYMTC Planning Area Top Ten Commodities by Tonnage and Direction (2021)



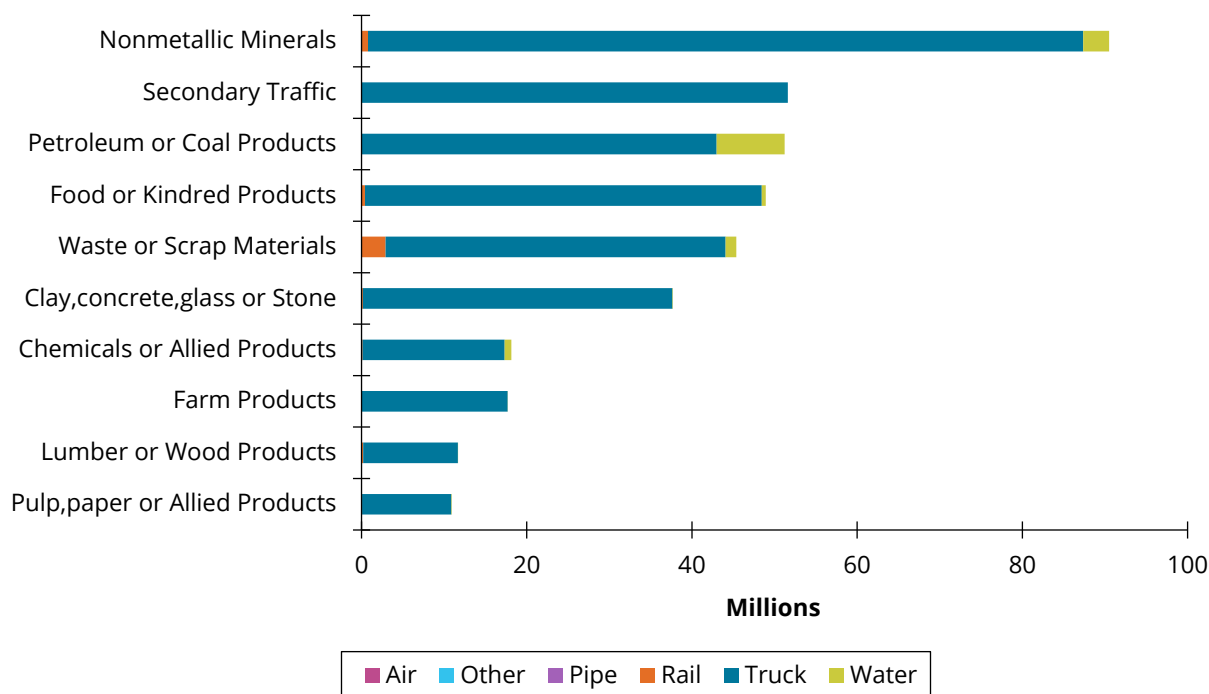
Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Figure 10 NYMTC Planning Area Top Ten Commodities by Value and Direction (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

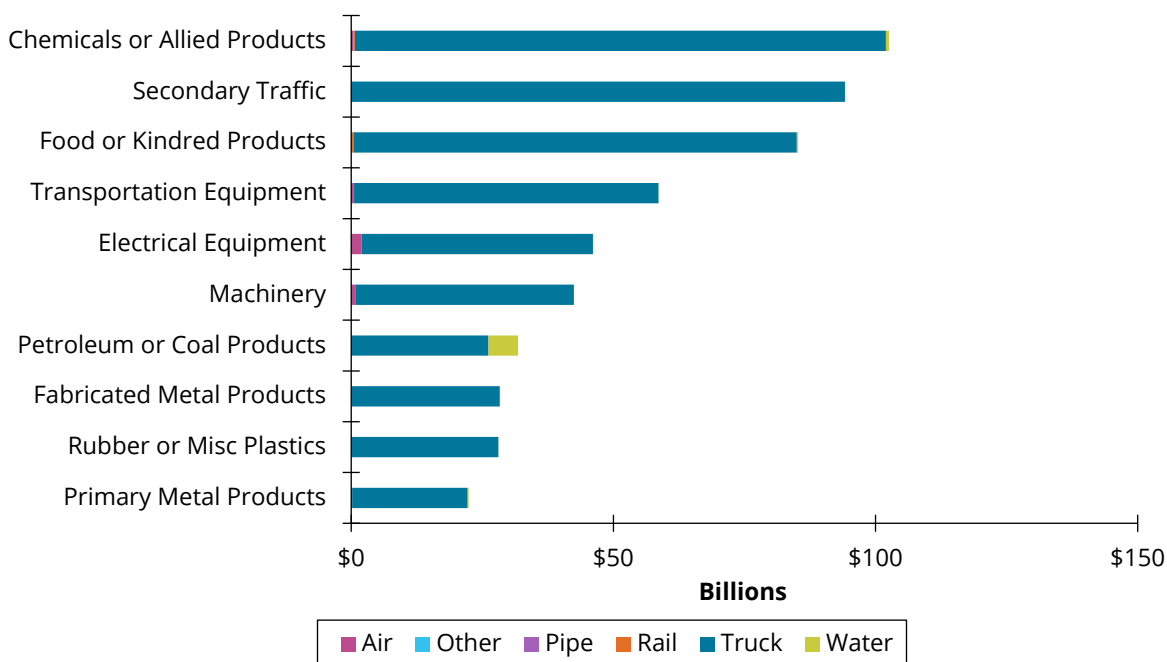
Figure 11 NYMTC Planning Area Top Ten Commodities by Tonnage and Mode (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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Figure 12 NYMTC Planning Area Top Ten Commodities by Value and Mode (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Table 11 NYMTC Planning Area Commodities Forecast Growth (2055)

Commodity	Tons 2055 (Million)	Value 2055 (\$Billion)	Tons Growth	Value Growth	Tons CAGR (2021–2055)	Value CAGR (2021–2055)
Unprocessed Nonmetallic Minerals	120	2	32%	47%	0.8%	1.1%
Secondary Traffic	84	145	63%	54%	1.5%	1.3%
Petroleum or Coal Products	38	23	-25%	-29%	-0.8%	-1.0%
Food or Kindred Products	85	152	74%	78%	1.6%	1.7%
Waste or Scrap Materials	62	22	36%	54%	0.9%	1.3%
Clay, Concrete, Glass, or Stone Products	55	19	45%	90%	1.1%	1.9%
Chemicals or Allied Products	36	211	99%	106%	2.0%	2.1%
Farm Products	29	24	65%	77%	1.5%	1.7%
Lumber or Wood Products	13	11	10%	8%	0.3%	0.2%
Pulp, Paper or Allied Products	13	22	18%	18%	0.5%	0.5%
Rubber or Miscellaneous Plastics	12	50	76%	77%	1.7%	1.7%
Primary Metal Products	12	38	90%	69%	1.9%	1.6%
Fabricated Metal Products	9	48	60%	68%	1.4%	1.5%
Transportation Equipment	11	122	113%	108%	2.2%	2.2%
Machinery	9	102	146%	141%	2.7%	2.6%
Electrical Equipment	13	162	274%	251%	4.0%	3.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

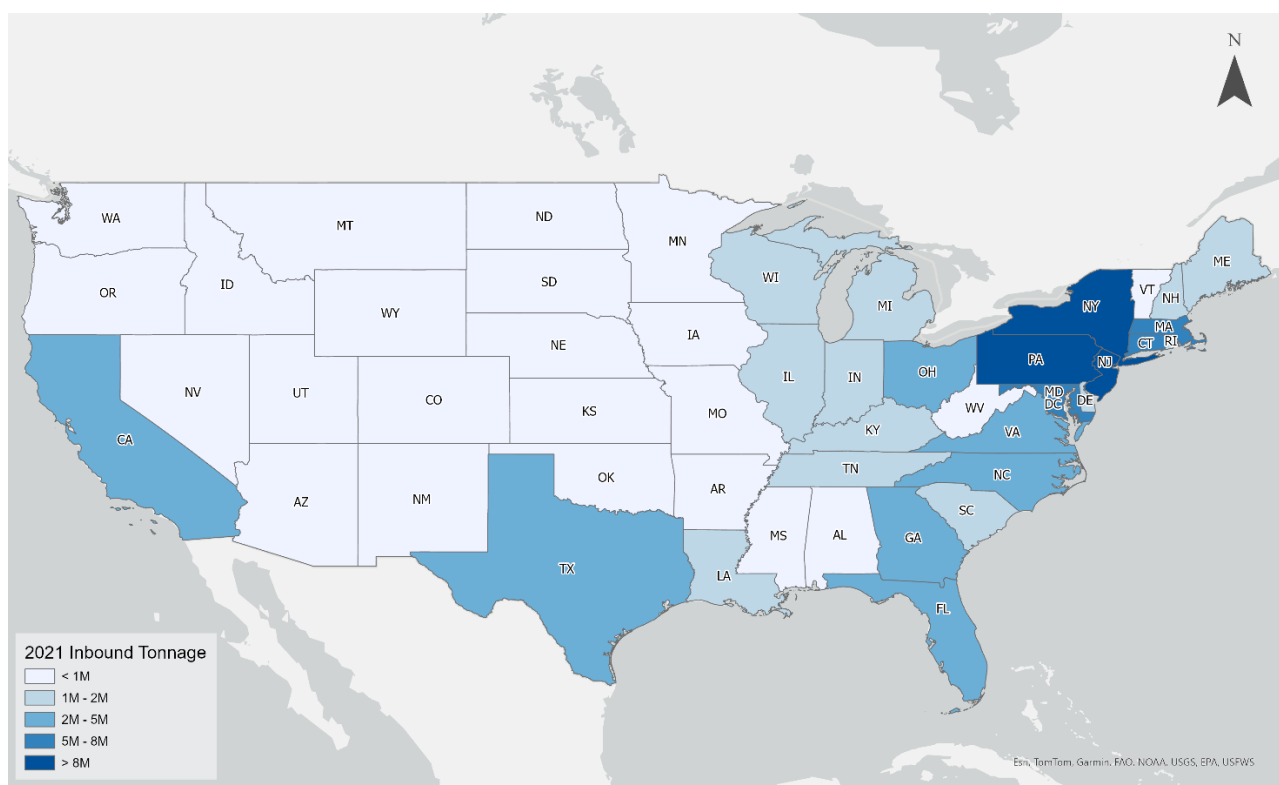
Historical trading relationships aid in assessing current and future goods movement and transportation system performance and needs. These relationships are also helpful in facilitating institutional and intergovernmental relationships for freight planning. As shown in Figure 13, New Jersey, Pennsylvania, and the rest of New York State are the major origin points for goods destined for the NYMTC planning area. Figure 14, shows these three areas are the top destinations for goods that move outbound from the NYMTC planning area as well.

New Jersey sent 49 million tons and received 23 million tons of goods to and from the NYMTC planning area in 2021. Inbound commodities included petroleum or coal (15 million tons), nonmetallic minerals (11 million tons), and food or kindred products (5 million tons), and the outbound commodities were waste or scrap materials (8 million tons), petroleum or coal (5 million tons), and nonmetallic minerals (5 million tons).

Pennsylvania sent 33 million tons and received 13 million tons of freight to and from the NYMTC planning area. The primary inbound commodities included nonmetallic minerals (15 million tons), food or kindred products (3 million tons), and clay, concrete, glass, or stone (3 million tons). The major outbound commodities were waste or scrap materials (7 million tons), secondary traffic (2 million tons), and nonmetallic minerals (1 million tons).

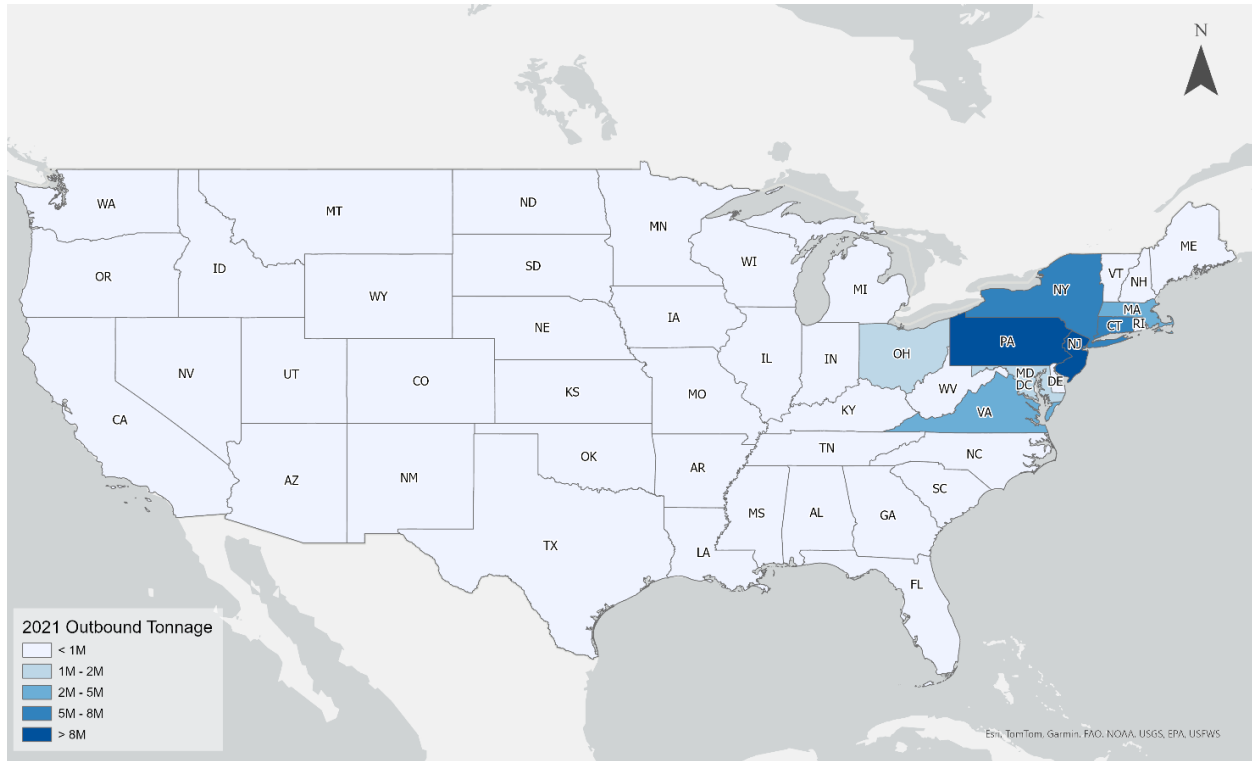
The balance of New York State sent 23 million tons and received 6 million tons of freight to and from the NYMTC planning area. The leading inbound commodities include nonmetallic minerals (9 million tons), secondary traffic (6 million tons), and farm products (2 million tons). The essential outbound commodities are waste or scrap materials (2 million tons), secondary traffic (2 million tons), and nonmetallic minerals (1 million tons).

Figure 13 NYMTC Planning Area Inbound Origins by Tonnage (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

Figure 14 NYMTC Planning Area Outbound Destinations by Tonnage (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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Measured by value, as shown in Figure 15, New Jersey, Pennsylvania, and the rest of New York State remain as the top inbound origins, each sending \$91 billion, \$32 billion, and \$20 billion of goods to the NYMTC planning area. As leading recipients of outbound movements by value, New Jersey and Pennsylvania sent \$24 billion and \$12 billion in goods respectively to the NYMTC planning area (see Figure 16). Connecticut sent \$6.4 billion in goods to the NYMTC planning area, slightly exceeding the rest of New York State in terms of value (\$6.1 billion).

New Jersey sent \$91 billion of goods to the NYMTC planning area in 2021, including chemicals or allied products (\$16 billion), petroleum or coal products (\$11 billion), food or kindred products (\$10 billion), transportation equipment (\$9 billion), and secondary traffic (\$8 billion). The top valued commodities destined for New Jersey include chemicals or allied products (\$7 billion), secondary traffic (\$4 billion), and petroleum or coal (\$4 billion).

Pennsylvania sent \$32 billion of goods to the planning area. This primarily included secondary traffic (\$5 billion), food or kindred products (\$5 billion), and chemicals or allied products (\$3 billion). The top-valued commodities sent to Pennsylvania include secondary traffic (\$4 billion), chemicals or allied products (\$3 billion), and waste or scrap materials (\$2 billion).

Secondary traffic accounted for more than 40 percent of the \$20 billion in goods sent to the NYMTC planning area from the **rest of New York State**. Food or kindred products (\$2 billion) and chemicals or allied products (\$2 billion) were the other top commodities inbound to the study area.

Connecticut sent \$8 billion of inbound goods to the planning area, including chemicals or allied products (\$1.5 billion), petroleum or coal products (\$1.2 billion), and secondary traffic (\$0.9 billion). The \$6.4 billion in goods destined for Connecticut were primarily composed of chemicals or allied products (\$1.4 billion), petroleum or coal (\$0.9 billion), and secondary traffic (\$0.8 billion).

Figure 15 NYMTC Planning Area Inbound Origins by Value (2021)

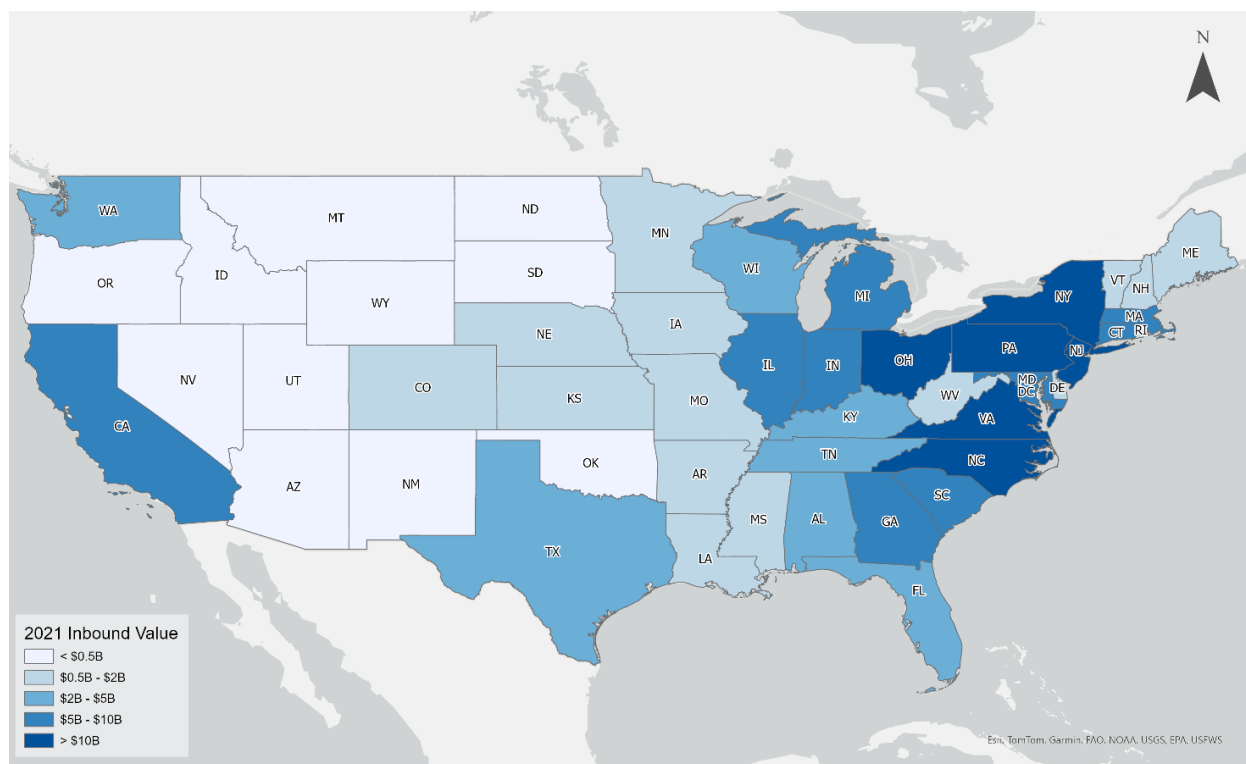
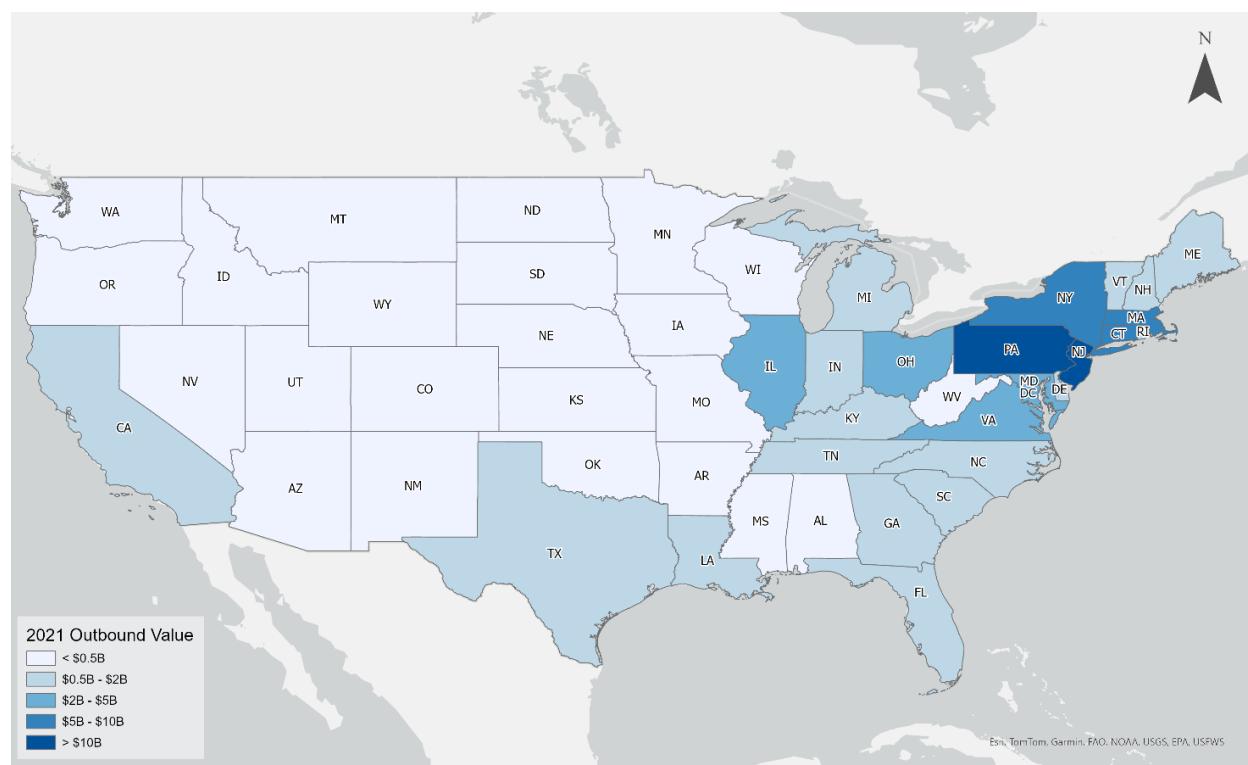


Figure 16 NYMTC Planning Area Outbound Destinations by Value (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.

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New Jersey, Pennsylvania, and the rest of New York State are projected to remain the predominant trading partners through 2055.

By tonnage, inbound movements from Pennsylvania and outbound movements to the rest of the New York area are expected to grow the fastest. By value, inbound goods from New Jersey are forecast to double by 2055 at a two percent annual growth rate (Table 2.11 and Table 2.12).

Table 12 Inbound Origins Growth (2021 and 2055)

Origin State	Tons 2055 (Million)	Tons Growth	Tons CAGR (2021–2055)	Value 2055 (\$Billion)	Value Growth	Value CAGR (2021–2055)
New Jersey	63	29%	0.8%	180	99%	2.0%
Pennsylvania	49	52%	1.2%	51	60%	1.4%
Rest of New York State	27	19%	0.5%	30	48%	1.2%
Inbound Total	273	46%	1.1%	548	85%	1.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

Table 13 Outbound Destinations Growth (2021 and 2055)

Destination State	Tons 2055 (Million)	Tons Growth	Tons CAGR (2021–2055)	Value 2055 (\$Billion)	Value Growth	Value CAGR (2021– 2055)
New Jersey	32	41%	1.0%	43	78%	1.7%
Pennsylvania	17	36%	0.9%	19	65%	1.5%
Rest of New York State	9	51%	1.2%	11	81%	1.8%
Outbound Total	86	41%	1.0%	161	82%	1.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

As shown in Table 2.13 and Table 2.14, most inbound goods destined for the NYMTC planning area arrive in Manhattan, Brooklyn, and Queens. These three boroughs together accounted for 56 percent of total inbound volume and 61 percent of inbound value in 2021 which are forecasted to grow slightly to 58 percent of total inbound volume and 62 percent of total inbound value in 2055.

Suffolk County, Queens, and Manhattan were the top three origins for outbound freight by tonnage and by value in 2021. Staten Island sends high-valued commodities, including miscellaneous mixed shipments, apparel, or related products, and chemical or allied products, to other parts of the multi-state region and beyond. Much of the forecasted increase in outbound movement is likely due to the international marine terminal at Howland Hook.

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Table 14 Inbound Destinations by Tonnage and Value (2021 and 2055)

Destinations	2021 Tons (Million)	2055 Tons (Million)	Tons CAGR (2021–2055)	2021 Value (\$Billion)	2055 Value (\$Billion)	Value CAGR (2021–2055)
Bronx	9	12	1.0%	\$ 13	\$ 23	1.8%
Brooklyn	35	57	1.5%	\$ 44	\$ 85	2.0%
Manhattan	43	61	1.0%	\$ 90	\$ 158	1.7%
Nassau County	17	25	1.1%	\$ 25	\$ 45	1.7%
Putnam County	1	2	0.9%	\$ 1	\$ 1	1.5%
Queens	28	41	1.1%	\$ 49	\$ 95	2.0%
Rockland County	4	6	1.0%	\$ 5	\$ 10	1.9%
Staten Island	11	16	1.3%	\$ 19	\$ 40	2.2%
Suffolk County	22	30	0.9%	\$ 30	\$ 54	1.7%
Westchester County	18	23	0.7%	\$ 21	\$ 38	1.7%
Total	188	273	1.1%	\$ 297	\$ 548	1.8%

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

Table 15 Outbound Origins by Tonnage and Value (2021 and 2055)

Origins	2021 Tons (Million)	2055 Tons (Million)	Tons CAGR (2021–2055)	2021 Value (\$Billion)	2055 Value (\$Billion)	Value CAGR (2021–2055)
Bronx	4	4	-0.04%	3	3	-0.1%
Brooklyn	7	11	1.4%	7	12	1.6%
Manhattan	8	19	2.5%	7	14	2.3%
Nassau County	4	6	0.8%	5	8	1.2%
Putnam County	1	1	-0.2%	0	1	1.8%
Queens	8	8	0.0%	21	49	2.6%
Rockland County	4	3	-0.7%*	5	5	-0.01%*
Staten Island	6	11	1.7%	11	21	2.0%
Suffolk County	12	16	0.9%	25	42	1.6%
Westchester County	6	7	0.5%	5	6	0.7%
Total	61	86	1.0%	89	161	1.8%

*The source data projects a decline in outbound broken stone and riprap that is disputed. Removing that commodity from the analysis, Rockland County's outbound tonnage among all other commodity groups would **increase** by 0.6% per year and value by 1% per year over the forecast period.

Source: Cambridge Systematics analysis of S&P Global Transearch, 2021 and 2055.

2.3 SUMMARY AND KEY FINDINGS

In 2021, the multi-state metropolitan region handled 769 million tons of freight valued at \$1.3 trillion. By 2055, freight tonnage is expected to increase by 46 percent and the value of goods moved is expected to increase by 82 percent.

Trucks dominate as the primary mode of transport, carrying over 90 percent of the total volume and value, with inbound flows making up the largest share. Petroleum and coal products are a primary commodity group, but due to the ongoing decline in coal production and use, tonnage and value are forecasted to decrease, leading to a corresponding decline in waterborne freight movement.

Like the multi-state region, trucks dominated freight movement in the NYMTC planning area, carrying 94 percent of the total tonnage and 96 percent of the value. Inbound flows accounted for over 40 percent of the volume and value, while through flows represented more than 30 percent. Although through flows have smaller impacts on local economic activity, these goods significantly impact infrastructure capacity.

The primary commodities moved into the NYMTC planning area included chemicals and allied products. As Section 5 will explain in greater detail, rising consumer demand from e-commerce and online shopping will generate more inter-warehouse movements of secondary traffic and last-mile delivery trips bringing

customer orders to their doorsteps which are excluded from commodity flow data. Relevant observations from this commodity flow analysis include the following:

- » The need to maintain connectivity between the NYMTC planning area and adjoining markets within the multi-state region and with other national and global markets is critical to accommodating the anticipated growth in the region's economy, population, and freight demand;
- » The proportion of freight trips made by truck in the multi-state region and NYMTC planning area exceed the truck share nationally, in part due to the limited capacity and utilization of freight rail east of the Hudson River, and in part due to the fact that the region's large consumer market generates a large volume of pickup/delivery and mid-mile distribution trips that are almost exclusively made by truck. Given the region's high dependence on trucking, **effective strategies to reduce or mitigate social and environmental impacts and costs of trucking will be especially important and valuable;**
- » The value of exploring or encouraging strategies to reduce the number of truck vehicle miles traveled associated with empty vehicular, barge and rail car movements, possibly through load-matching services and strategies; and
- » Water and rail, while relatively limited in tonnage and value, can provide viable alternatives to trucking for certain types of commodities and markets, and continuing to maximize their potential will be important.



3

REGIONAL ECONOMY

The commodity flows described in Chapter 2 are the measurable result of larger forces within the region's economy: the production and consumption of goods produced within the region and elsewhere. Demand for some types of goods may vary based on weather, economic conditions, or other factors, but the regional economy essentially determines the need to transport different types and quantities of goods. Most, but not all, goods production results in significant demand for freight movement with supply chains set up to handle distribution needs moving goods from production sites through international, national, regional, and local freight facilities to point(s) of consumption. Supply chains can span continents, involve multiple transportation modes, and include one or more stages of "intermediate handling" such as value-added processing, warehousing, transfer between different sized trucks, movement between large and small distribution centers, and/or movement between distribution centers and retail outlets.

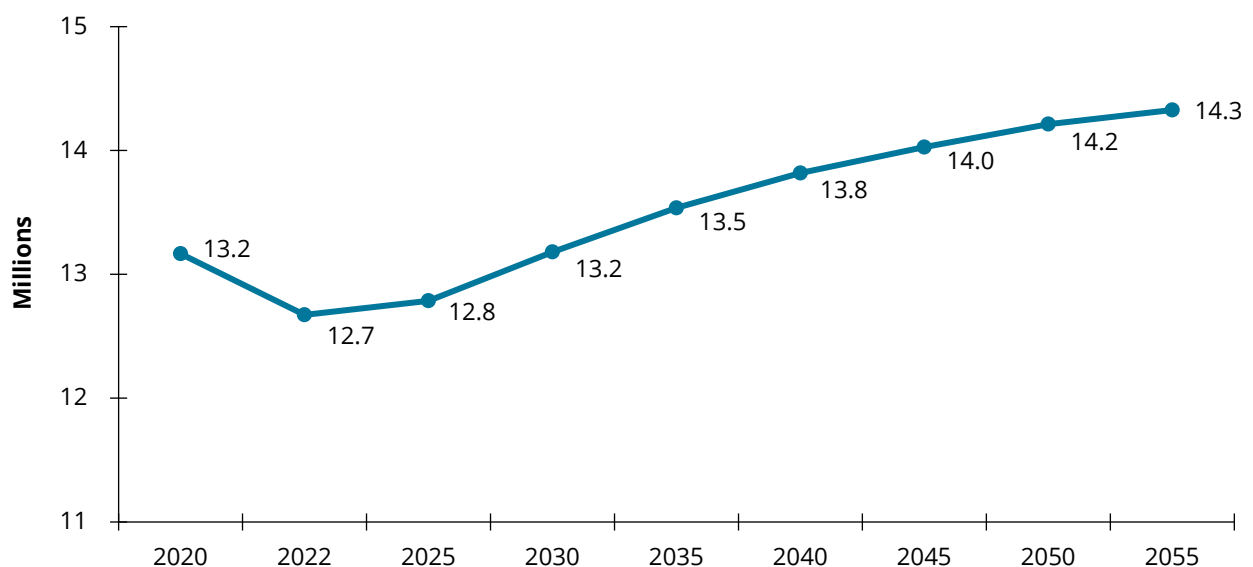
Supply chains develop to meet shipper and customer performance needs. These needs vary depending on the type of commodity, but generally involve achieving appropriate levels of delivery reliability, transportation cost, delivery time, material security, in-transit visibility, and special handling considerations (e.g., “cold chain” compliance, hazardous materials handling, oversize/overweight shipments). Supply chains look to take advantage of a region’s best-performing transportation assets and seek to avoid—where possible—its more expensive, congested, or inefficient routes and facilities. Thousands of overlapping, interwoven supply chains generate the freight transportation activity on the region’s major highways, local streets, and railroads, and at its seaports and airports.

Between 2020 and 2022, most companies’ supply chains faced disruptions as the COVID-19 pandemic triggered widespread economic and logistical ripple effects that impacted the freight transportation sector and the broader economy. This section outlines the planning area’s population and employment trends – which drive freight demand – along with the impacts of COVID-era supply chain disruptions.

3.1 POPULATION AND EMPLOYMENT

Population and employment trends are key indicators for assessing current and future freight demand, as well as forecasting infrastructure needs and guiding economic development. Appendix C of Moving Forward 2055 provides historical population and population projections until 2055 at the county level, and 2017 population is the baseline for projections. A more detailed analysis of NYMTC’s SED Forecast is available in Chapter 3 and Appendix C. Continued population and employment growth in the NYMTC areas will result in additional demands on the freight network. As shown in Figure 17, in 2022, the NYMTC planning area had a population of 12,672,582 in 2022, and it is projected to reach 14,327,135 in 2055, indicating a 0.4 percent annual growth. The population declined from 2020 to 2022 by an estimated 4 percent from the pandemic.

Figure 17 NYMTC Planning Area Population 2020–2055



Source: NYMTC 2055 SED Forecast

The 10-county NYMTC planning area had 7,220,326 people employed in 2022, and from 2022 to 2055, the total employment in the study area is expected to increase by nearly 1.1 million, representing a 0.4 percent annual rate of increase. At the county level, New York County has the greatest employment, with 2.6 million employed there in 2022. Kings County is second to New York County, with 1 million employed there in 2022. Queens County is projected to have the fastest growth rate over time (0.8 percent annual growth rate). Table 3.1 shows actual employment in 2020 and 2022 with estimated forecasts to 2055 for each county and borough in the NYMTC planning area.

Table 16 NYMTC Employment Projection

County	2020	2022	2055	2022–2055 CAGR
Bronx	381,977	398,189	503,495	0.7%
Kings (Brooklyn)	921,825	1,020,941	1,248,340	0.6%
New York (Manhattan)	2,496,980	2,626,116	2,849,244	0.2%
Queens	788,086	852,633	1,112,249	0.8%
Richmond (Staten Island)	144,574	157,644	189,267	0.6%
Nassau	665,739	728,178	834,637	0.4%
Suffolk	701,948	751,148	816,273	0.3%
Putnam	31,498	33,573	36,464	0.3%
Rockland	136,482	147,786	170,228	0.4%
Westchester	473,494	504,118	557,316	0.3%
NYMTC Total	6,742,602	7,220,326	8,317,514	0.4%

Source: NYMTC 2055 SED Forecast

4

FREIGHT TRANSPORTATION INFRASTRUCTURE

Chapters 2 and 3 of the Freight Plan describe the physical movements of freight and socio-economic drivers of these movements in the NYMTC planning area. Chapter 4 introduces the freight transportation infrastructure that accommodates these movements, considering the primary freight modes of truck, rail, air, water, and pipeline. Another key dimension of the region's freight network is land use. Drawing upon the Regional Freight Land Use Study completed in 2022, this Plan presents a more comprehensive understanding of the drivers of industrial real estate, and the types of freight land uses that exist in the NYMTC planning area and across the multi-state region.

4.1 TRUCK FREIGHT

4.1.1 NETWORK ELEMENTS

Strategic freight highways, a subset of the planning area's roadway network, are critical to goods movement. These highways serve as major freight gateways into and out of the NYMTC planning area and provide access to/from major freight-handling facilities, such as seaports and rail intermodal terminals, and provide connections to and between major industrial clusters. Strategic freight highways connect to manufacturing and resource-extraction sites and freight-handling hubs such as JFK Airport, intermodal terminals, warehouses, and distribution centers. They can also accommodate large, heavy loads to support emergency response efforts.

The limited-access highways, and lower road classification types that are most critical for NYMTC planning area truck movement comprise the strategic freight highway network. This network includes roadway segments within and outside the planning area itself. Figure 18 illustrates the major components of the region's strategic freight highway network within the NYMTC planning area. The types of highways included in the network include:

- » **National Highway Freight Network Routes:** The Fixing America's Surface Transportation (FAST) Act established this network to strategically direct Federal resources and policies toward the improved performance of the Nation's transportation system. The National Highway Freight Network includes all interstate highways and other roads determined to be especially important for freight movement.
- » **Federally Designated National Highway System Connectors:** These roadways provide "last mile" connections between the National Highway System and major freight facilities including airports, marine terminals, rail terminals, and freight-intensive land use clusters.
- » **New York City's Comprehensive Truck Route Network:** New York City has formally established a network of local and through truck routes. Local truck routes establish routes connecting to trucks' origins or destinations within one of the city's boroughs. Through truck routes establish connections for inter-borough trips and to or from locations outside the city. Because of their role in facilitating inter-county and regional trips, the Through Truck Routes are shown in Figure 18. Note that interstate highways within New York City are part of this system.^v Truck route networks are not designated in other parts of the NYMTC planning area.
- » **Over-Dimensional Emergency Response Routes:** These routes were specified by NYC DOT for Superstorm Sandy relief efforts, including movement of heavy and over-dimensional generators and other equipment to and from the relief coordination centers at Citi Field in Queens and Floyd Bennett Field in Brooklyn, delivery of food and supplies, and debris removal.

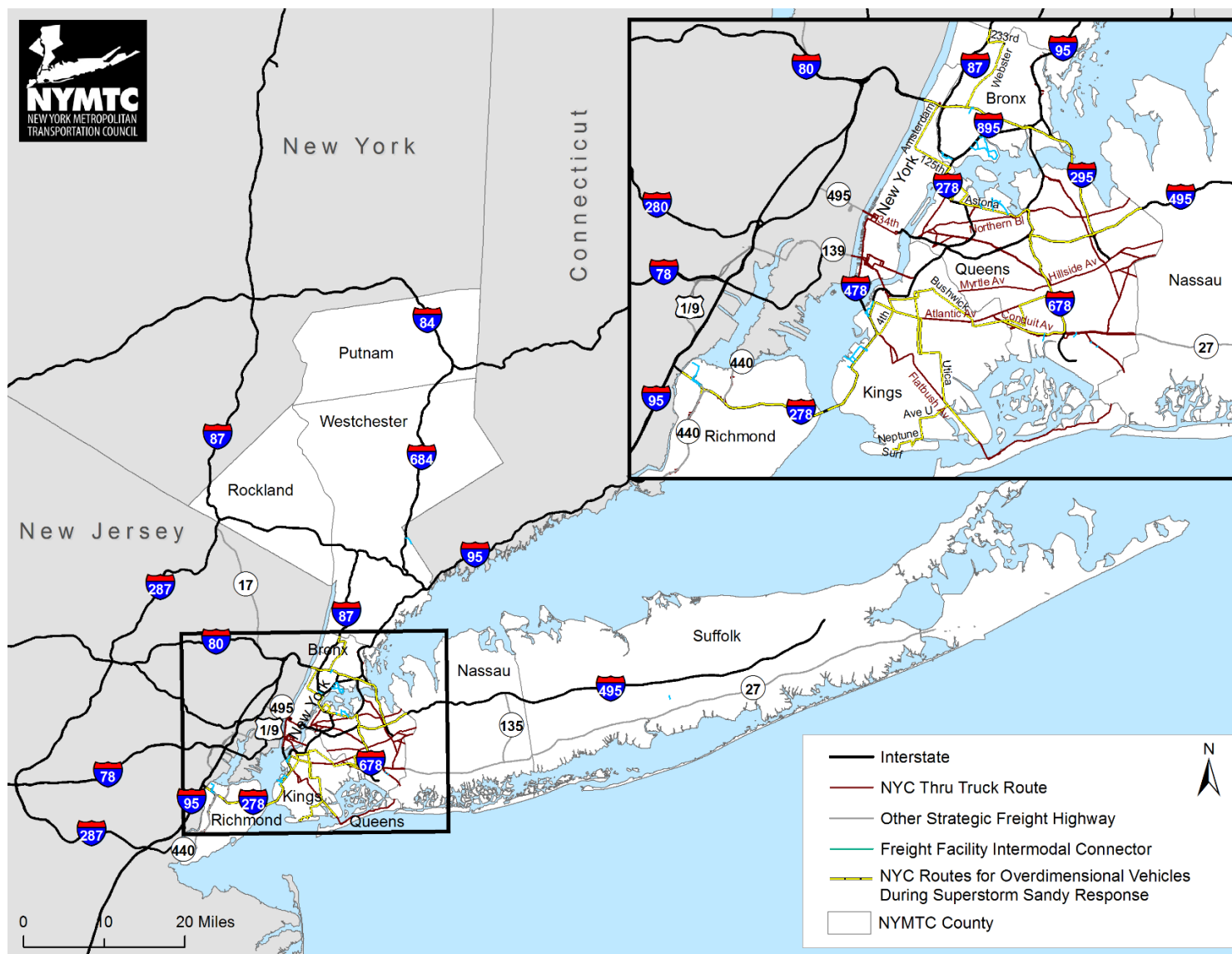
Outside the NYMTC planning area, facilities include:

- » **The National Highway System (NHS) surrounding the NYMTC Planning Area:** The interstate roadways of the NHS are the primary gateways by which trucks enter and exit the planning area and complete intra- and inter-county trips within the planning area.
- » **Interstate and State Highways throughout the Multi-State Region:** A network of major highways connect the NYMTC planning area to neighboring states and regions and beyond. In addition, several major facilities that generate shipments to or from the NYMTC planning area are located elsewhere in the multi-state region. Major highways outside the NYMTC planning area that provide connections to key freight facilities include: Hudson River crossings into Manhattan; Port Newark/Port Elizabeth in New Jersey; Newark Liberty International Airport in New Jersey; and rail intermodal yards, including Croxton, Little Ferry, North Bergen, and South Kearny in New Jersey.

For more information on how goods are moved through the NYMTC planning area, refer to the [Moving Forward 2055 Interactive Map](#).



Figure 18 NYMTC Planning Area Freight Highway Network

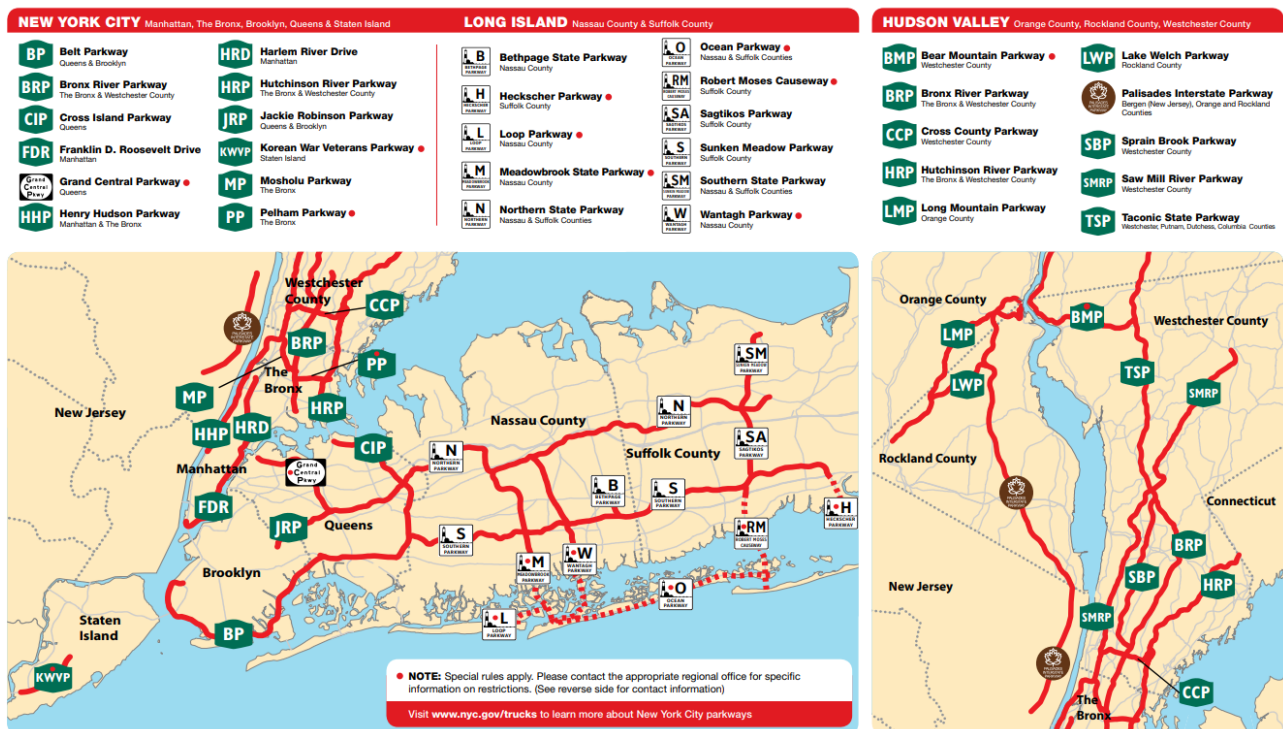


Source: NYMTC Regional Freight Land Use Study.

Trucks are not permitted to travel on several restricted routes throughout the NYMTC planning area, due to low vertical clearances below overpass bridges, weight restrictions, and/or other physical attributes that make certain routes unsuitable for trucks. Examples include:

- » **Parkways.** New York State parkways were designed and constructed for use by automobiles. They are incapable of accommodating trucks, due primarily to the low vertical clearance under overpass bridges. Trucks and other commercial vehicles are prohibited from using the parkways shown in Figure 19. Bridge strikes occur on many of New York's parkways, when truck drivers fail to comply with this prohibition.^{vi}
- » **53-foot trailer prohibition in New York City.** Tractor-trailer combinations using 53-foot-long trailers are not permitted in New York City. A 53-foot trailer may only pass through New York City to reach destinations on Long Island using the following routes:
 - I-95 from the Bronx/Westchester County line to I-295;
 - I-295 from I-95 to the Long Island Expressway (I-495); and
 - I-495 from I-295 to the Queens/Nassau County line.^{vii}

Figure 19 New York State Parkway, Where Trucks are Prohibited



Source: NYC DOT.

Trucks, tractor-trailers, and other vehicles or vehicle combinations must comply with Federal, state, and local laws governing vehicle size and weight limits. Vehicles or vehicle combinations over those limits may be eligible for permits from NYSDOT, NYC DOT, PANYNJ, and/or other agencies that manage highways. Truck drivers must consult those agencies to determine permit eligibility and the costs and procedures for

obtaining and using permits. The Highway Oversize/Overweight Credentialing System (HOOCS) is an online permitting system for obtaining permits from NYSDOT, the New York State Thruway Authority, and the New York State Bridge Authority.viii

4.1.2 PRIMARY TRUCK CORRIDOR PROFILES

The network elements in Figure 18 can be viewed as a set of primary corridors, each with certain characteristics and functions for the NYMTC planning area. These corridors are complemented by an extensive network of arterials and local last-mile roads, so numerous and diverse that detailing each one is impractical. As a general introduction to the region's truck network, the following section summarizes selected heavily used truck corridors based on average annual traffic volume as collected by NYSDOT. A summary of average daily traffic and truck volumes by corridor segment is provided in Table 4.1. In addition, the estimated tonnage of goods moved on each corridor, according to Transearch, are described below and illustrated in Figure 20.

- » **Interstate 84** is an important interstate truck route that runs through Putnam County and links the Hudson Valley with southwestern Connecticut, New England, and northeastern Pennsylvania. At the New York State/Connecticut state line, approximately 55 million tons of freight, valued at \$117 billion, moved on the I-84 corridor in 2021. More than 100 million tons of freight, valued at \$197 billion was transported on the I-84 corridor at the Dutchess/Putnam County line.
- » **Interstate 95** is one of the most important interstate truck routes in the country, running from the Canadian border in Maine to the tip of South Florida, linking the entire eastern seaboard. From the north, it enters the NYMTC planning area at the Connecticut/Westchester County line and traverses Westchester and the Bronx (as part of the Cross Bronx Expressway); crosses the northern tip of Manhattan; and exits to New Jersey via the George Washington Bridge, becoming the New Jersey Turnpike. The I-95 segments between the George Washington Bridge and the I-87 carried more than 103 million tons of freight, valued at more than \$201 billion in 2021. The segments between I-87 and the Westchester County/Connecticut state line carried nearly 78 million tons of freight, valued at \$136 billion in 2021.
- » **Interstate 87/287/NJ & NY-440** functions as a semi-circular beltway for the New York-New Jersey portion of the multi-state region. One end of I-287 begins in Westchester at its junction with I-95; from there, I-287 continues west across Westchester, joins with I-87, and crosses the Hudson River into Rockland County on the Governor Mario M. Cuomo Bridge. Then, I-287/I-87 continues west to the edge of Rockland County. At that point, I-87 turns north through New York while I-287 turns south and then east through New Jersey. I-287 eventually becomes NJ-440, crosses the Arthur Kill to Staten Island on the Outerbridge Crossing, and becomes NY-440. From there, NY-440 runs north as the Pearl Harbor Memorial Expressway, intersecting I-278 and then returning to New Jersey (as NJ-440) over the Bayonne Bridge. The I-287 corridor near the Governor Mario M. Cuomo Bridge and in Rockland County carried over 52 million tons of freight, value exceeding \$67 billion in 2021.
- » **Interstate 278** links all five New York City boroughs. It connects the boroughs with I-95 at both its southern and northern ends and directly serves all three of the NYMTC planning area seaports and

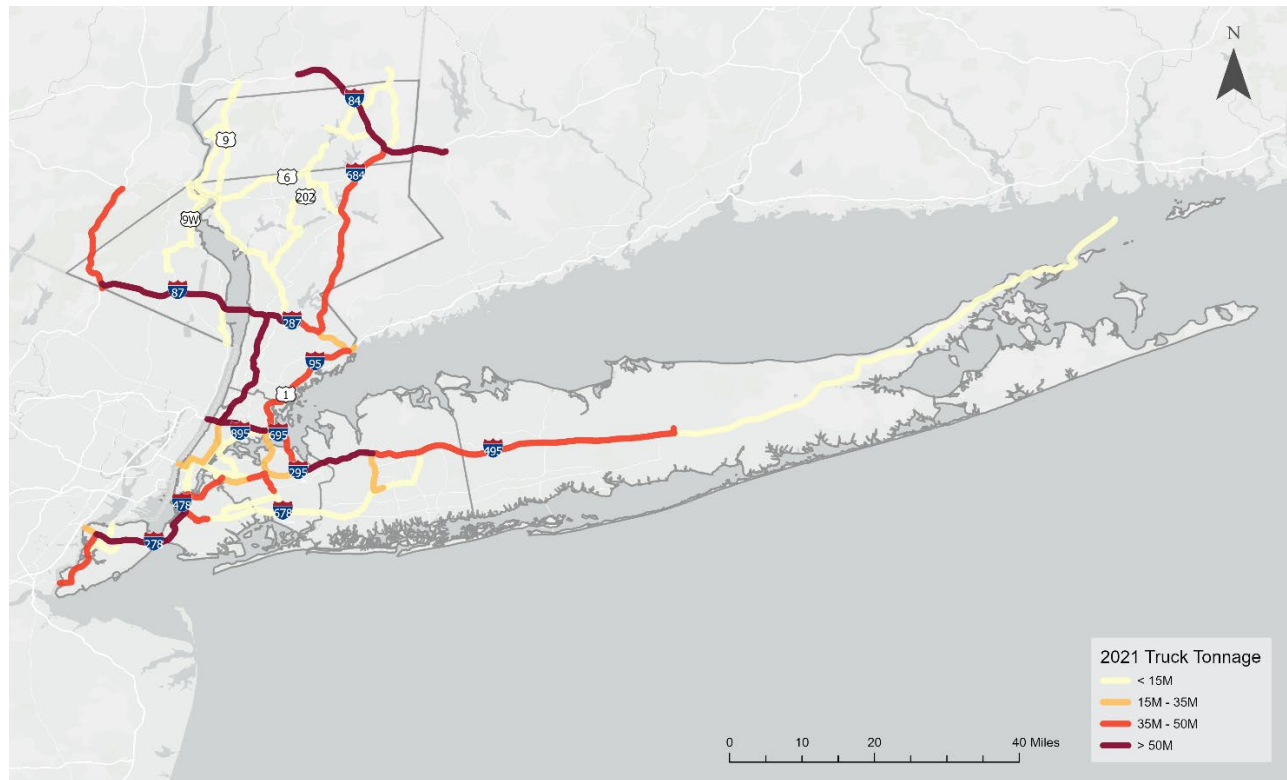
other major industrial clusters (e.g., South Brooklyn, Maspeth, Hunts Point). I-278 provides essential connections to major east-west routes running through Brooklyn, Queens, Nassau, and Suffolk. I-278 was developed in segments over time, often in extremely constrained rights-of-way requiring creative engineering solutions, and as a result, much of I-278 is not built to design standards suitable for modern large combination vehicles. Without I-278, however, it is difficult to envision how much of the NYMTC planning area could be served.

At its southern end, I-278 begins at U.S. 9 in Elizabeth, New Jersey, and crosses the Arthur Kill via the Goethals Bridge to Staten Island. I-278 continues east as the Staten Island Expressway and crosses New York Harbor via the Verrazzano Narrows Bridge to Brooklyn. In Brooklyn, I-278 continues north as the Gowanus Expressway, crosses the Gowanus Canal, and becomes the Brooklyn-Queens Expressway (BQE). The BQE continues north, crosses Newtown Creek into Queens on the Kosciusko Bridge, crosses I-495, joins the western segment of the Grand Central Parkway, and reaches the East River in Astoria, Queens.

I-278 then travels over a network of bridges, first the Robert F. Kennedy Bridge onto Randall's and Wards Islands, then onto a second bridge to connect to East Harlem in Manhattan and reaches a third bridge to bring I-278 mainline traffic north into the Bronx. After reaching the Bronx, I-278 intersects I-87 (the Major Deegan Expressway) running west, and itself continues northeast as the Bruckner Expressway. East of Westchester Creek in the Bronx, I-278 joins with the Cross Bronx Expressway, allowing traffic to continue northeast along I-95, or return to Queens via I-678 (to the Whitestone Bridge) and I-295 (to the Throgs Neck Bridge). Before reaching Westchester Creek, there is a connection between I-278 and the Cross Bronx via Sheridan Boulevard (NY-895), formerly the Sheridan Expressway (I-895).

- » **Interstate 495** serves a unique freight transportation function in the NYMTC planning area. It provides the only direct interstate highway access for Nassau and Suffolk counties and connects them via Queens to the rest of the national highway network. It also serves as the primary east-west truck route for Queens, connecting geographic Long Island to Manhattan (via tunnel), to the Bronx (via connections to the Throgs Neck, Whitestone, and Kennedy Bridges). Apart from I-495, the only major east-west truck route serving Nassau and Suffolk is NY-27 (Sunrise Highway). At its western end, I-495 begins in Manhattan and runs through the Queens-Midtown tunnel, then continues east (as the Long Island Expressway) for almost 75 miles to Riverhead, New York. It terminates at NY-25, which provides truck access further east to Orient Point at the eastern tip of Long Island's North Fork. Along the way, I-495 crosses (and connects) I-278, I-678, I-295, and dozens of important state and local roads. The I-495 corridor between the Clearview Expressway and Glen Cove Road carried more than 63 million tons of goods, valued at approximately \$97 billion, in 2021.

Figure 20 NYMTC Truck Freight Tonnage (2021)



Source: Cambridge Systematics analysis of S&P Global Transearch, 2021.



Table 17 Truck Counts on Key Truck Corridors, 2023¹

Corridor	Segment	County	AADT	Truck Percent	Single Unit Trucks	Combined Unit Trucks
I-84	NY 312 to I-684	Putnam	54,668	17%	2,026	7,362
I-95	George Washington Bridge	New York	252,160 ²	9%	22,694 (all trucks) ³	
I-95	US1 to Crotona Ave	Bronx	113,269	19%	8,542	13,359
I-95	North Ave to Chatsworth Ave	Westchester	120,835	13%	6,828	9,237
I-287	Palisades Interstate Parkway to NY59	Rockland	127,026	11%	4,209	9,208
I-287	Route 100 to Route 22	Westchester	133,724	12%	6,160	10,387
NY 440	I-278 to Forest Ave	Richmond	49,342	6%	2,214	722
I-278	Slosson Ave to Richmond Rd/ Hylan Boulevard	Richmond	164,787	8%	8,116	4,816
I-278	92 nd St to Ovington Ave	Kings	104,816	11%	6,631	5,230
I-278	Flushing Ave to Williamsburg Bridge Exit 32	Kings	136,909	12%	11,772	4,911
I-278	I-495 Long Island Expressway to Rt 25 Queens Blvd	Queens	116,866	8%	6,985	1,805
I-278	I-87 Major Deegan Expressway to I- 895 Sheridan Expressway	Bronx	108,464	6%	4,750	1,370
I-495	Grand Central Pkwy to Exit 23 Main St	Queens	139,691	7%	6,981	2,640
I-495	Exit 35 Shelter Rock Rd to Willis Ave	Nassau	181,411	8%	8,529	6,252
I-495	Exit 50 Bagatelle Rd to Exit 51 Route 231	Suffolk	164,470	10%	9,403	7,151

¹ Source for all records, except the George Washington Bridge, is the New York State Traffic Viewer, available from: <https://nysdottrafficdata.drakewell.com/publicmultinodemap.asp> (accessed November 6, 2024).

² Data for this segment was obtained from Port Authority of NY and NJ traffic data for 2023, derived from toll revenue data in the eastbound direction. These data were reported annually in the source data. CS converted annual volume to daily and then doubled the count to estimate bi-directional flows.

³ Trucks in the Port Authority of NY and NJ data were not separated by single/combined unit. The number in the table is the total truck volume estimated using the approach described in the footnote above.

4.2 RAIL FREIGHT

Most of the rail freight infrastructure within the New York metropolitan region is located west of the Hudson River in northern New Jersey. The largest carload freight yards, intermodal terminals, rail-served industries, and distribution centers are in this area. East of the Hudson River, limited infrastructure contributes to lower freight rail volumes; however, rail still serves an important role in carrying bulk commodities such as stone, sand, and liquids. A map of the lines where freight railroads own or have

operating rights, and associated terminals, is shown in Figure 21. Three Class I railroads have a presence in the New York metropolitan region, including:

- » **CSX Transportation (CSX)**, which operates along the River Line in Rockland County; Hudson Line in Putnam, Westchester, and Bronx counties; the Hell Gate Line; and Fremont Secondary from Bronx County into Queens County. CSX also provides local industry service to customers along the New Haven Line and to the Hunts Point Distribution Center in Bronx County;
- » **Norfolk Southern (NS)**, only serves the New York metropolitan region from the south and west. Its lines do not directly enter the NYMTC counties; and
- » **Canadian Pacific Railway (CP)**, which, until 2010, operated carload train service east of the Hudson to Oak Point Yard and Fresh Pond Yard, established a haulage agreement with CSX, with CSX handling Canadian Pacific Railway traffic in its trains south of Albany in 2014. Canadian Pacific Railway retains trackage rights in lieu of the haulage agreement but is not shown on in Figure 21.

In addition, Conrail Shared Assets, a switching carrier jointly owned by Norfolk Southern and CSX, operates in much of northern New Jersey and over the Arthur Kill Lift Bridge to Arlington Yard and the Travis Industrial Track in Richmond County (Staten Island).

Rail customers in the NYMTC planning area are also served by five short line railroads, including:

- » The **New York & Atlantic Railway (NY&A)** has held an exclusive franchise to provide freight service over trackage owned by the MTA Long Island Rail Road (LIRR) since 1997. The NY&A operates from a hub at Fresh Pond Junction in Queens. NY&A serves Brooklyn via the freight-only Bay Ridge Branch, and points west, east, and south on Long Island via MTA LIRR's Lower Montauk Branch, Main Line, Babylon/Montauk Branch, and Port Jefferson Branch.
- » **New York New Jersey Rail, LLC (NYNJR)**, which is owned by the Port Authority, operates a carfloat route across New York Harbor between Greenville Yard in Jersey City, New Jersey, and the 65th Street Yard in Brooklyn. NYNJR also provides rail service along 1st Avenue in Sunset Park to the 51st Street Rail Yard and South Brooklyn Marine Terminal (SBMT)/Sims Recycling.
- » The **Providence and Worcester Railroad**, which maintains trackage rights with CSX to operate over the Hell Gate Line via Metro-North's New Haven route. The only regular move by Providence and Worcester Railroad on this route is the handling of crushed rock in unit train service to Fresh Pond Junction on Long Island, which is the only commodity permitted under the railroad's limited trackage rights.
- » The **Housatonic Railroad**, which holds currently unused freight rights over Metro-North's Beacon Line, from Beacon east through Hopewell Junction to the New York-Connecticut state line.
- » The **South Brooklyn Railway**, a freight carrier owned by the MTA/New York City Transit that presently consists of isolated segments of track at 39th Street and 3rd Avenue.

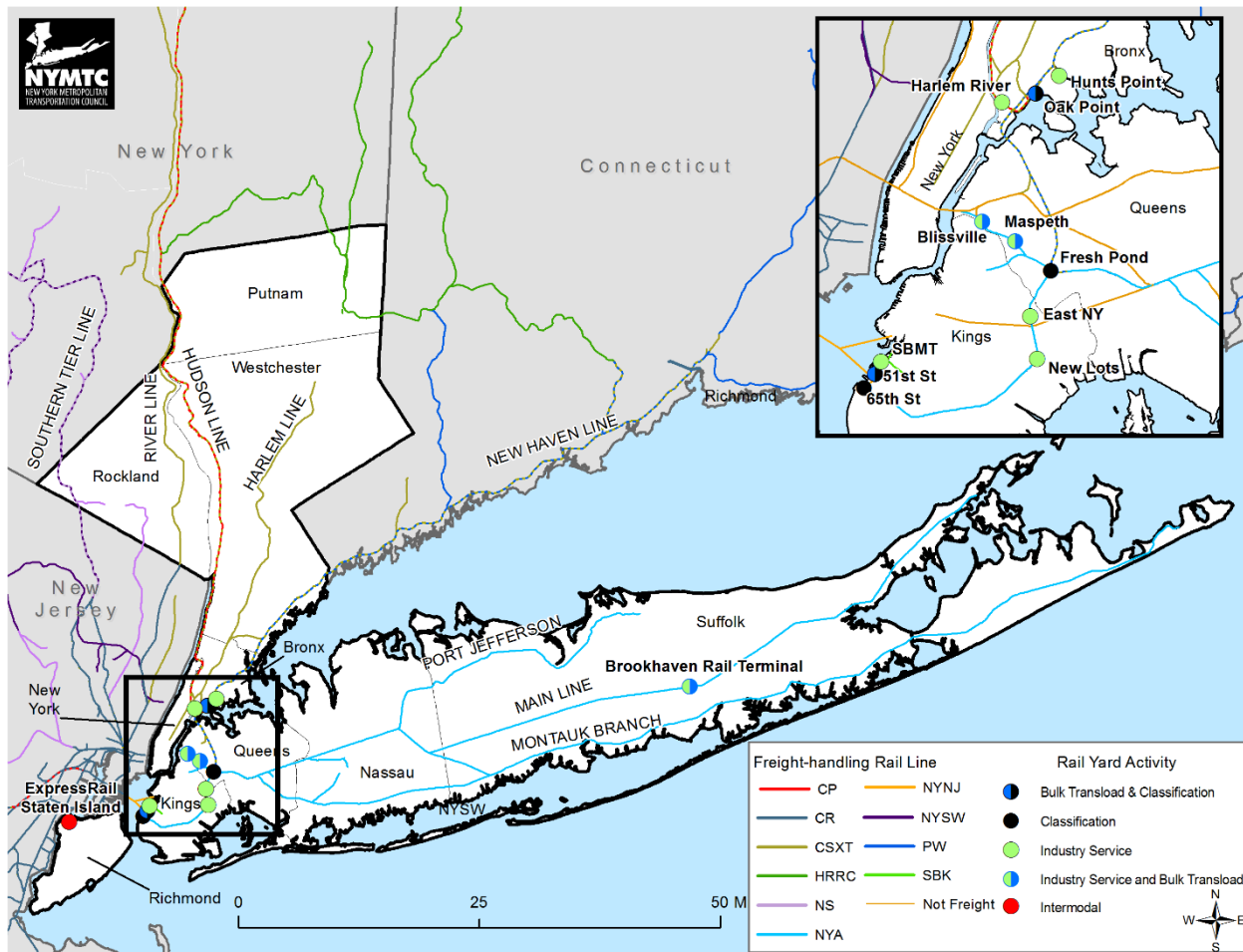
In addition, the New York, Susquehanna, and Western Railway maintains trackage rights with Norfolk Southern to operate on the Southern Tier Line between Warwick, New York, and Binghamton. The railway operates on its own tracks north of Binghamton to Syracuse, in the Utica area, and between Warwick and

Croton in Jersey City, New Jersey. Although this railway does not traverse or provide service to customers in the NYMTC planning area, some rail shipments handled by the New York, Susquehanna, and Western Railway originate or terminate by truck in the planning area. Within the NYMTC planning area, only a handful of carload service freight yards and terminals remain, with most previous facilities either converted to non-rail or non-freight rail uses. Each of the active terminals is mapped in in Figure 21 coded by their type of use. Terminals and yards are divided into the following service types:

- » **Intermodal yards** accommodate the transfer of intermodal containers, such as domestic trailers or international shipping containers, from truck to rail or vice versa. The only intermodal yard located in the NYMTC planning area is the ExpressRail Staten Island facility, which handles the transfer of international shipping containers that arrive and depart from New York Container Terminal, from ship to rail.
- » **Bulk Transload terminals** provide access to the rail network for shippers that do not have a rail siding immediately accessible on-site. The Brookhaven Rail Terminal currently handles construction materials and other bulk goods destined for central and eastern Long Island. The 65th Street Railyard terminates the NYNJR rail float operation in Brooklyn and accommodates bulk transload operation.
- » **Carload Classification/Interchange yards** sort rail cars by destination for assembling into outbound blocks and trains. Oak Point and Fresh Pond Junction yards are the primary classification/interchange yards in the NYMTC planning area.
- » **Industry Service yards and sidings** are designed to stage cars for the purpose of serving nearby industry. The largest industry yard in terms of activity is Hunts Point, which is on New York City's Hunts Point Peninsula; a thriving industrial area in the South Bronx. It is best known as the region's primary food distribution center and receives some food products by rail. NY&A also serves customers and properties between 65th Street and Fresh Pond Junction, including Glenwood Mason Supply, Favorite Plastics, Brooklyn Resource Recovery, Manhattan Beer, Brooklyn Terminal Market, Gershow Recycling, and CBS Foods.^{ix}

The most heavily used segments are the CSX Trenton Line and Norfolk Southern Lehigh Line, which run through New Jersey to Pennsylvania, and the CSX River Line, which connects to the CSX Mohawk Line running west (also known as the “water level route”) and the CSX Boston Line running east. A portion of the CSX River Line traverses the NYMTC planning area west of the Hudson River. The other lines in the NYMTC planning area—the Bay Ridge Branch between 65th Street and Fresh Pond Junction, the Fremont Secondary between Fresh Pond Junction and Amtrak's Hell Gate Bridge, and the Montauk Branch—are lightly used by comparison.

Figure 21 Rail Freight Network by Ownership



Source: Cambridge Systematics, from National Transportation Atlas Database and Oak Ridge National Laboratory National Rail Network.

The primary rail service to the NYMTC planning area is transfer from rail to truck at major carload and intermodal terminals in northern New Jersey. Direct service is considerably lower volume provided via:

- » CSX track serving terminals in the Bronx.
- » CSX track running over Amtrak's Hell Gate Bridge and down the Fremont Secondary to Fresh Pond Junction and then interchanging with the NY&A. CSX currently performs one round trip per day along the Fremont Secondary, and the Providence and Worcester Railroad also perform one round trip per day over Hell Gate in peak service periods.
- » NYNJR railcar float service. In 2021, over 4,000 railcars were interchanged between the NYNJR and NY&A at 65th Street. These railcars used the NYNJR carload float system between Greenville Yard in Jersey City, New Jersey and 65th Street Yard in Brooklyn, which provides a more direct route for traffic originating or terminating in the southeastern United States, avoiding the approximately 280-mile trip via Selkirk. Selkirk remains an efficient routing for CSX traffic from Chicago and points west,

because CSX uses Selkirk as a classification facility for traffic destined throughout New York and New England.

- » Conrail track running over the Arthur Kill Lift Bridge and terminating on Staten Island.

4.3 WATERBORNE FREIGHT

The Port Authority is the largest container port on the East Coast by container volume. In most of the past ten years, the Port Authority is ranked third in the nation by container volume behind Los Angeles and Long Beach. In 2022, however, the Port's container volume exceeded that of Long Beach.^{xi} The Port comprises public terminals under Port management, which leases property to private terminal operators, as well as privately owned/privately operated freight terminals and docks.

4.3.1 PORT AUTHORITY OF NEW YORK AND NEW JERSEY

In 2022, Port Authority marine terminals handled almost 9.5 million twenty-foot equivalent units (TEUs, a way to measure freight in terms of 20-foot ocean shipping containers). Among U.S. ports, the Port Authority saw a large 16.4 percent market share (by TEU volume); by value, the Port moved approximately \$271 billion worth of goods. 2022 was an exceptional year for the Port Authority due to ongoing supply chain and West Coast port operations anomalies in the aftermath of the COVID-19 pandemic. By 2023, port volumes settled to 7.8 million TEUs.^{xii}

4.3.2 PUBLIC MARINE FREIGHT TERMINALS

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There are three public marine freight terminals in the NYMTC planning area, shown in Figure 22:

- » **Howland Hook Marine Terminal** on Staten Island is owned by the Port Authority, which reached agreement with the City of New York in May 2024 to take control of all of Howland Hook's 345 acres in exchange for the City taking full control of the Brooklyn Marine Terminal. The City previously owned 225 of those acres and leased them to the Port Authority. The facility focuses on container movement but has also handled fruit, primarily bananas from South America. Howland Hook has access to/from I-278 and is served by a Port Authority ExpressRail intermodal facility, with rail connections over the Arthur Kill Lift Bridge to northern New Jersey and the national freight rail network. Howland Hook's operator, CMA CGM, committed to a \$200 million investment in 2023 to reconstruct and rehabilitate wharves and berths, upgrade cargo-handling equipment, and expand yard capacity. These investments through 2030 would allow Howland Hook to increase its annual capacity to 750,000 container lifts, a 50 percent increase.^{xiii}
- » **Brooklyn Marine Terminal** (generally referred to as **Red Hook Marine Terminal**) is partially owned by the City of New York. In May 2024, the City announced that it would be taking operational control of the terminal from the Port Authority in exchange for the Port Authority assuming ownership of all 345 acres of Howland Hook Marine Terminal, as noted above. The Brooklyn Marine Terminal complex includes the Red Hook Container Terminal operation as well as other facilities for handling and storing vehicles, salt, stone, palletized freight, "project cargo" (heavy-lift items), and other

commodities. The complex includes major facilities for beverage warehousing and distribution. Red Hook is accessible from 278 and is linked to New Jersey not only by trucking, but also by a cross-harbor container barge operation calling at Port Newark. Red Hook does not have rail service. The City of New York received a Federal grant in 2024 of \$164 million, and is investing \$95 million in City and State funds to stabilize and repair several of the complex's piers and to plan future improvements to cranes and cold storage facilities.^{xiv} The New York City Economic Development Corporation (NYCEDC) is embarking on an Environmental Impact Statement in 2025 to advance a broader multiple-use re-imagining of the complex to accommodate modern maritime activities, housing, and other uses.^{xv}

- » **South Brooklyn Marine Terminal (SBMT)** is owned by the City of New York and is located along the Brooklyn waterfront north of the 51st Street Railyard shown on Figure 22. It was an important container terminal in the 1980s, but after the ocean carrier (U.S. Lines) went bankrupt, operations ended, and the facility was idled for years. Facility reactivation began with construction of the Sims Recycling facility at the north end of the terminal (between 29th and 31st streets), state of good repair improvements to the terminal, and (most recently) execution of a lease agreement with a terminal operator. The terminal operator intends to handle a mix of commodities including project cargo related to wind energy facility installation and similar construction projects, building materials, vehicles, and other opportunity cargo. SBMT is accessible from I-278 and is served directly by rail along First Avenue, linking it to the New York-New Jersey Rail railcar float service at 65th Street. The location of the marine terminal in relation to other facilities is best illustrated in the "Phase I" development plan from the Port Authority's recent Port Master Plan 2050, shown in Figure 23.

Just outside the NYMTC planning area, in northern New Jersey, the marine terminals at **Port Liberty Bayonne** (formerly known as Port Jersey), **Port Newark**, and **Elizabeth** are the largest and busiest marine terminals in the Port Authority. These terminals are significant generators of freight activity in the multi-state region and account for 85-90 percent of the containerized cargo volumes that move in or out of the region's ports, as Figure 22 shows.

Figure 22 Marine Container Terminal Locations and Volume Shares



Source: Port Authority, Port Master Plan 2050. Note: As described in this memo, Brooklyn Marine Terminal is no longer a Port Authority facility, and is now controlled by the City of New York.



Figure 23 Locations of Brooklyn Marine Cargo Facilities with Reactivation of the South Brooklyn Marine Terminal



Source: Port Authority, Master Plan 2050. Note: As described in this memo, Brooklyn Marine Terminal is no longer a Port Authority facility, and is now controlled by the City of New York.

Other Marine Cargo Facilities: In addition to the public terminals noted above, the U.S. Army Corps of Engineers “Master Docks” database reports 132 other marine cargo facility locations in the NYMTC planning area (Table 4.2). This count includes facilities with a stated purpose of shipping or receiving waterborne freight and excludes facilities with occasional shipments or receipts; vessel fleeting or storage areas; and maritime support services such as repair, refueling, and drydocking. Publicly operated sanitation facilities for the movement of MSW by water are included in this tabulation. The data should be used with caution—although it was updated in 2019, much of the information dates from the original survey of 1997—and some facilities may be inactive or may have been redeveloped. The data are best interpreted as an estimate of facilities intended for, and likely capable of, handling marine cargo on a regular basis.

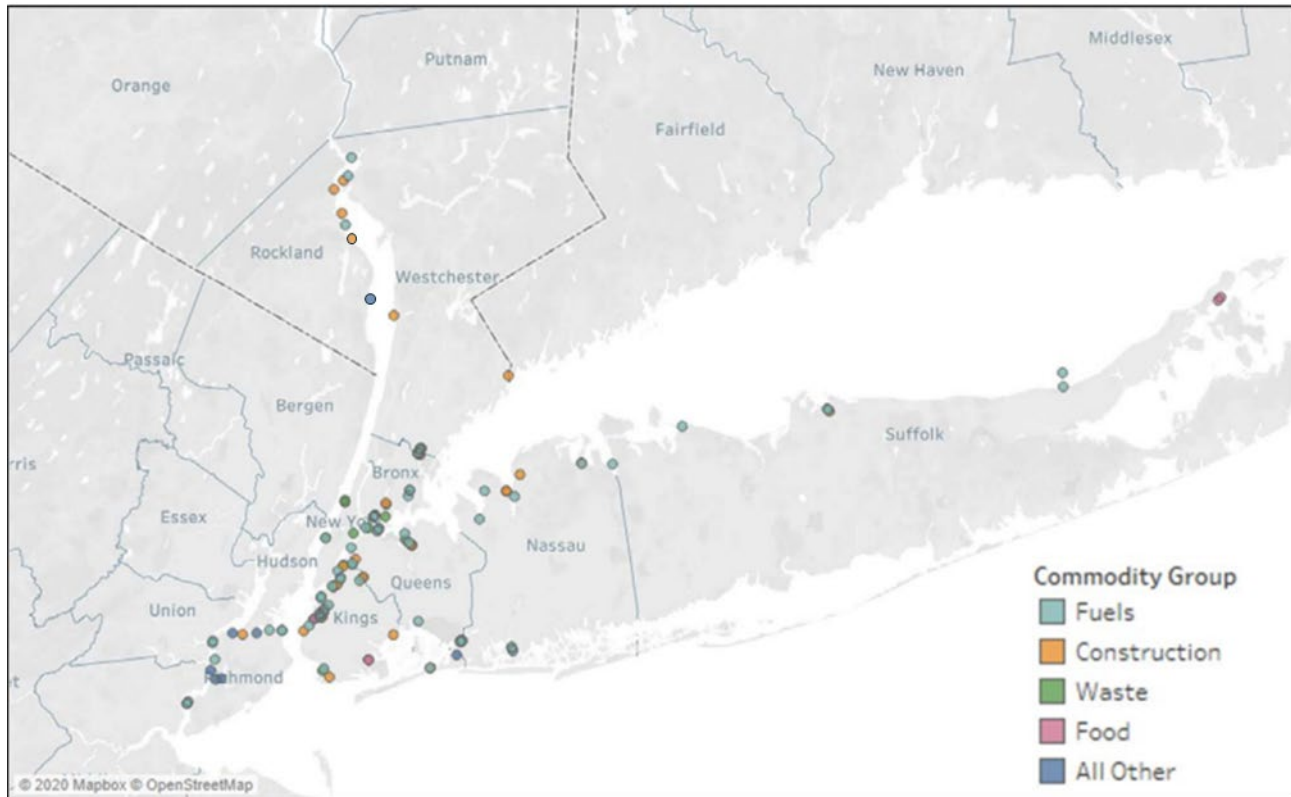
As shown in Table 4.2, more than half of the “other” marine cargo facilities are associated with the movement of fuels (e.g., petroleum, refined petroleum products, gasoline/diesel/aviation fuel, heating fuel oils). Construction materials (e.g., sand, stone, wood, iron and steel, concrete) is the next-leading category, followed by waste (including MSW, paper). Around one-fourth of these facilities are in Kings County, abutting New York Harbor, the East River, the Gowanus Canal, and Newtown Creek. Most other NYMTC planning area counties have a significant number of facilities, excepting Rockland and Putnam. Figure 24 illustrates the locations of these facilities by county and commodity group.

Table 18 Other Marine Cargo Facilities in the NYMTC Planning Area

County	Fuels	Construction	Waste	Food	All Other	Total
Kings	13	12	5	3	1	34
Nassau	10	6			1	17
Queens	9	6	2			17
Bronx	10	4	1		1	16
Richmond	9	1			5	15
Westchester	6	6				12
New York	5		4			9
Suffolk	6	1		2		9
Rockland	1	3			1	5
Total	69	38	12	5	8	134

Source: WSP analysis of U.S. Army Corps of Engineers “Master Docks” database.

Figure 24 Locations of Other Marine Cargo Facilities by Commodity Group



Source: WSP and Cambridge Systematics analysis of U.S. Army Corps of Engineers “Master Docks” database.

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4.4 AIR FREIGHT

Of the New York area airports in the NYMTC planning area—John F. Kennedy International (JFK), LaGuardia Airport (LGA), Westchester County Airport (HPN), Long Island MacArthur Airport (ISP), and Republic Airport (FRG)—only JFK has significant air cargo activity, and it is ranked among one of the top air cargo gateways in the country. LaGuardia Airport, while handling significant domestic passenger traffic, does not handle any significant amount of air cargo. Westchester County Airport is a regional commercial and general aviation airport with cargo incidental to local passenger and charter services. The NYMTC planning area is also served by air cargo through Newark Liberty International Airport (EWR) and Stewart International Airport (SWF), both of which have significant air cargo volumes but are outside the NYMTC planning area.

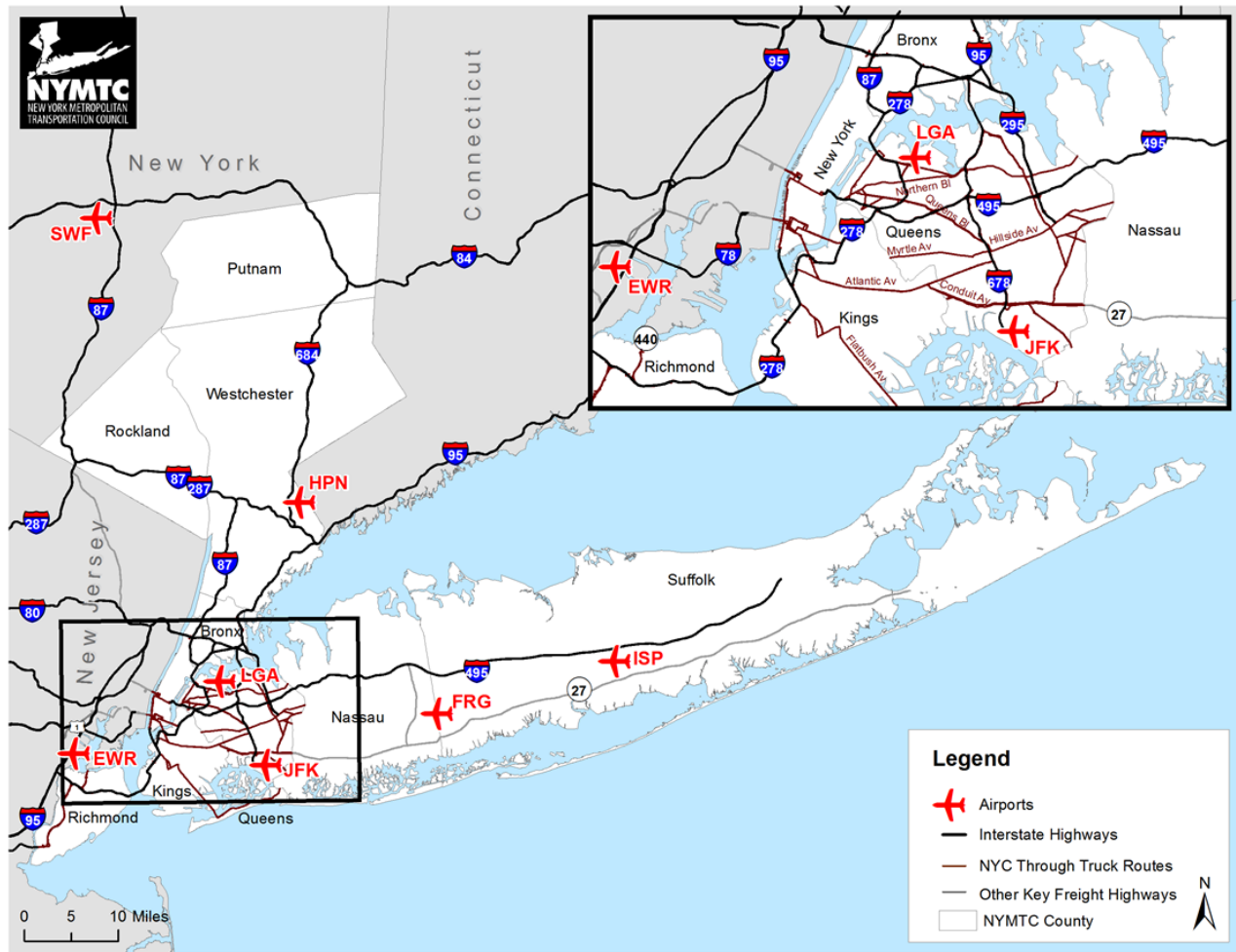
According to the Port Authority:

- » JFK covers a total of 4,930 acres and is served by around 80 airlines connecting it to around 170 nonstop destinations. Air cargo operations are supported by nearly 4 million square feet of warehouse and office space in a designated Foreign Trade Zone.
- » Services are provided by a combination of all-cargo aircraft and passenger aircraft carrying “belly cargo.” Key air cargo statistics for JFK, according to the Port Authority,^{xvi} are provided below:

- In 2023, 1,587,954 tons of freight and 42,938 tons of mail were moved through JFK, making it the region's busiest airport for cargo. The 2023 volume represents an increase in freight tonnage of 21 percent since 2019.
 - Approximately two-thirds (1 million tons) of the freight moved inbound, and one-third (546,000 tons) moved outbound.
 - 63.7 percent of the freight moving through JFK arrived or departed on freighter aircraft, and 36.3 percent arrived or departed as belly cargo.
 - 69.5 percent of the freight had an international origin or destination, and 30.5 percent had a domestic origin or destination.
 - The top markets for JFK air cargo include:
 - Transatlantic—658,000 tons (41 percent of total).
 - Domestic—481,000 tons (30 percent of total).
 - Transpacific—367,000 tons (23 percent of total).
 - The top airlines by tons of cargo carried included Delta (6.7 percent of total), Kalitta Air (6.4 percent), Atlas Air (5.1 percent), American (5.1 percent), FedEx (5.0 percent), and Air Transport, International (5.0 percent).
- » JFK ranked 9th among U.S. airports in cargo volume in 2022, behind Anchorage (a major refueling stop for trans-Pacific routes), Memphis (the FedEx hub), Louisville (the UPS hub), Los Angeles, Miami, Cincinnati, Chicago, and Indianapolis. The top three airports handle three-to-five times the cargo volume of JFK.^{xvii}
- » A new 350,000 square-foot air cargo facility at JFK Airport, developed by Aeroterm, was completed in 2024. The building includes greater ramp capacity to accommodate large, modern air cargo freighters. The building was also designed to improve and modernize the processing and transfer of cargo. This was the first new air cargo building built at JFK Airport in two decades.^{xviii}

Locations of airports in and near the NYMTC planning area are shown in Figure 25.

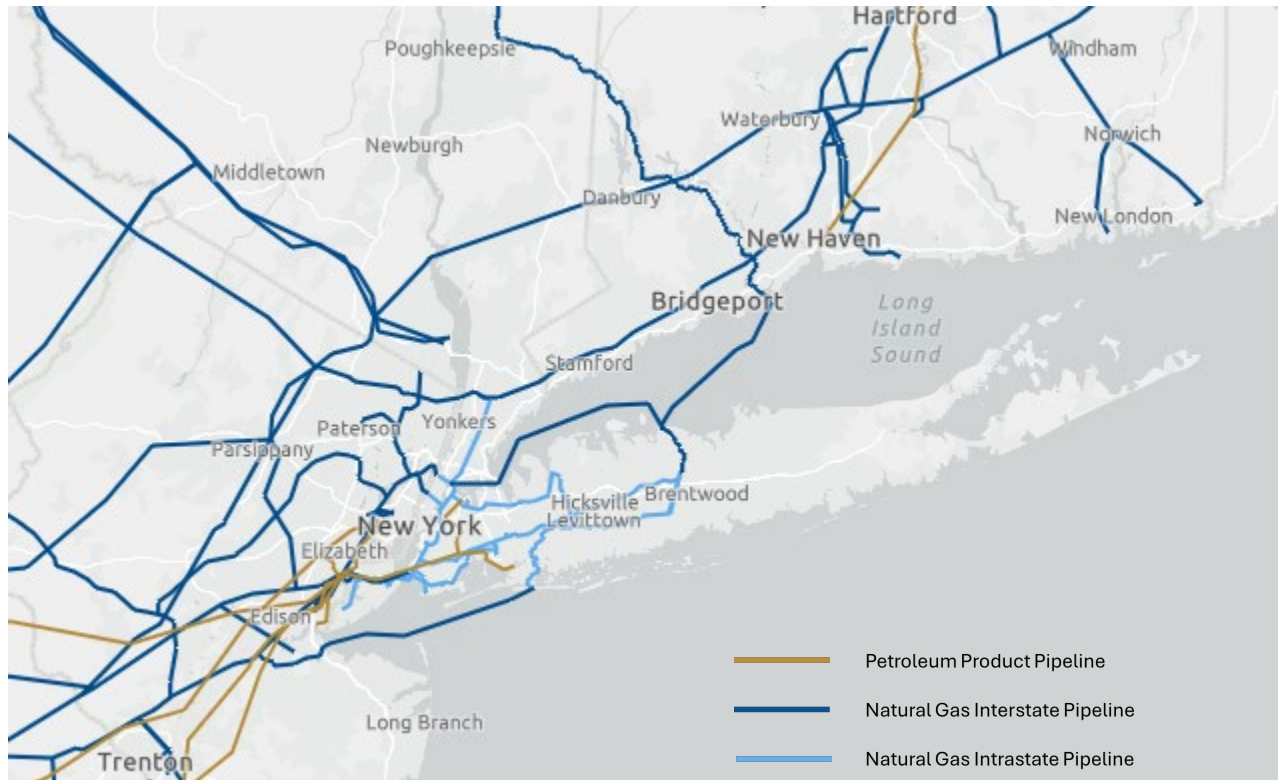
Figure 25 Airports in and Near the NYMTC Planning Area



Source: Cambridge Systematics, from the National Transportation Atlas Database.

4.5 PIPELINES

Pipelines are extremely important for certain commodities in much of the country, but pipeline networks and utilization in the NYMTC planning area are relatively limited. Buckeye Pipeline operates a petroleum products network from New Jersey, across Staten Island, and through Brooklyn and Queens, to supply aviation fuel to JFK and LaGuardia airports. Other counties are served by interstate and intrastate natural gas pipelines. Figure 26 shows the locations of petroleum product and natural gas pipelines in the NYMTC planning area.

Figure 26 Petroleum Product and Natural Gas Pipeline Networks

Source: U.S. Energy Information Administration, 2025.

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4.6 MULTIMODAL INFRASTRUCTURE

These multimodal networks—truck, rail, water, air, and pipeline—sometimes work independently, but often work together as part of a connected multimodal system, with freight handled multiple times by various transportation modes as it moves from origin to destination. Examples of intermodal facilities include Truck-to-Rail Terminals, Truck-to-Water Terminals, Rai-to-Water Terminals, and Air-to-Truck Terminals.

TRUCK-TO-RAIL TERMINALS

In a multimodal supply chain, trains carrying containers and trailers represent one link in the intermodal chain that connects shippers with receivers. For the connections to occur, intermodal rail terminals are established to facilitate the transfer of containers and trailers between modes (truck to rail, and vice versa). At present, there are no rail/highway intermodal terminals in the NYMTC planning area. Instead, intermodal rail trips begin or end at several terminals in New Jersey, with trucks hauling (draying) the trailers or containers between the terminals and the NYMTC planning area. Bulk commodities are often transloaded between railroads and trucks at rail yards and other facilities throughout the planning area. These bulk transload terminals provide access to the rail network for shippers that do not have a rail siding at their facility. The design of these terminals can range from simple to elaborate, depending on the types of commodities and volumes handled. The typical commodities being transloaded in the NYMTC planning area are waste and scrap materials, food, coal, lumber, building products, stone, and fuel.

TRUCK-TO-WATER TERMINALS

Although the number varies by year trucks generally carry around 85 percent of the containers that are imported or exported via Port Authority container terminals, and shipments are transloaded between water and truck at many of the bulk waterborne terminals in the planning area. In addition, trucks collect MSW across the region and transport it to MSW transload facilities in sealed containers. The containerized MSW is transferred from truck to rail or truck to barge and shipped out of the region. Ferries operating in Long Island Sound also accommodate trucks, but the volumes are relatively low. Currently, the existing year-round ferry services carrying trucks in the NYMTC planning area include the Bridgeport-Port Jefferson Ferry, the New London-Orient Point Ferry, and the North Ferry serving Shelter Island.

RAIL-TO-WATER TERMINALS

Marine terminals and ports with on-dock rail access in northern New Jersey and the NYMTC planning area move containers, railcars, and bulk commodities between New Jersey and New York by rail and barge. The ExpressRail System is an on-dock intermodal rail service offered at Port Newark, Port Elizabeth, Port Jersey, and Howland Hook. The ExpressRail facilities are supported by the Corbin Street Intermodal Support Yard, located to the west of the Port Newark/Port Elizabeth marine terminals. Between 1991 and 2023, ExpressRail volumes have increased 22-fold, from 27,700 containers to more than 629,000 containers.^{xix}

AIR-TO-TRUCK TERMINALS

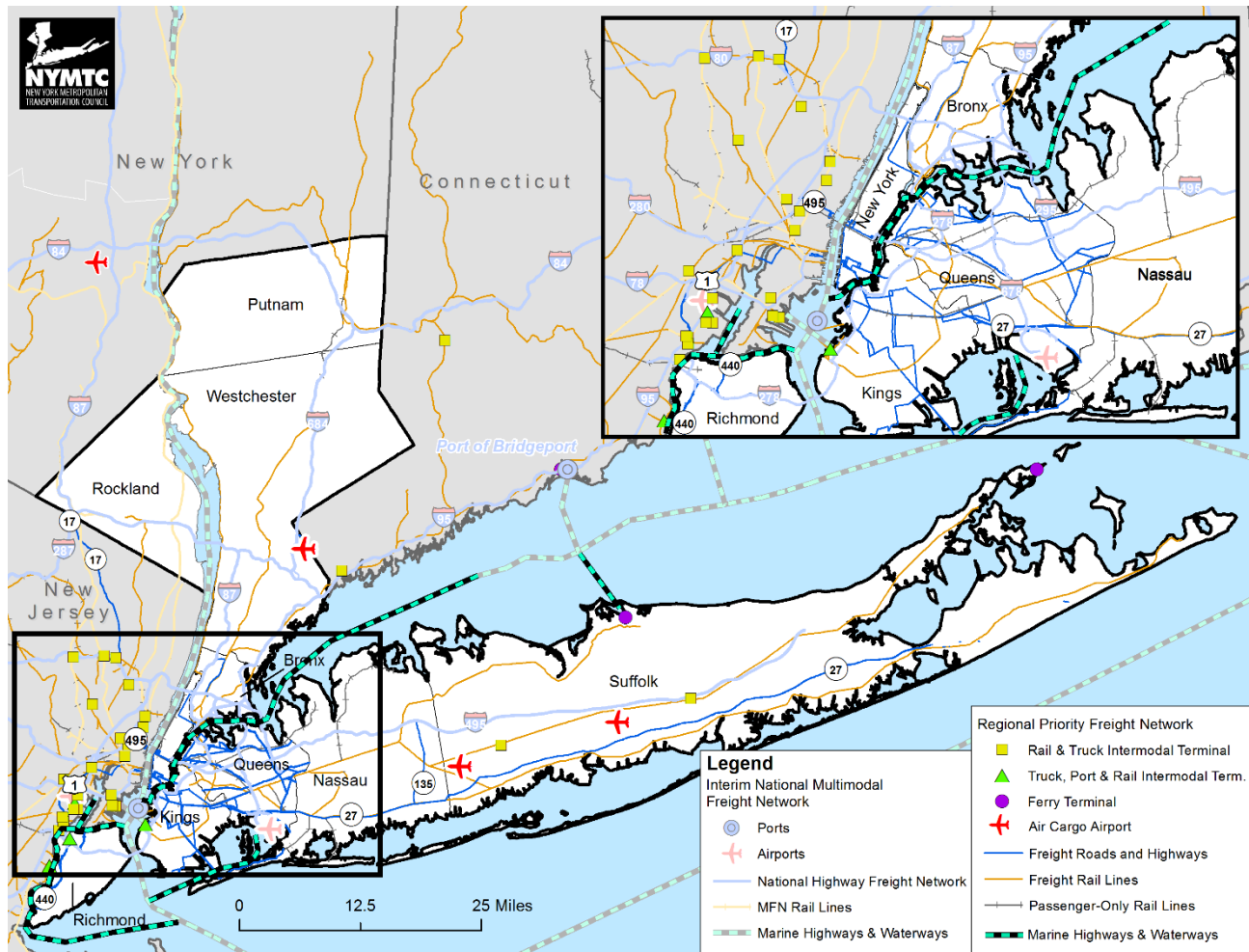
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Very few air cargo customers have access to their own air cargo facilities. The vast majority rely on trucks to perform air cargo pickups and deliveries at their facilities. The types of air cargo facilities present in the region include:

- » Integrator operations, which are highly automated, customized facilities with dedicated loading and aircraft positions for parcel delivery companies such as UPS and FedEx. These facilities are located near JFK and Newark Liberty International airports;
- » General cargo facilities, whether single-tenant use or multitenant, are generally large warehouse facilities, located on or adjacent to the region's air cargo-handling airports;
- » Freight forwarders combine cargo warehouse functions and office space for cargo brokers; and
- » Logistics centers and value-added facilities accommodate additional logistics and supply chain functions, sometimes including other cargo modes. Value-added operations process or repackage the product at the facility.

Mail centers can be stand alone or operations within cargo facilities and involve sortation equipment on various levels. Figure 27 illustrates the primary transfer points—or intermodal facilities—in this system.

Figure 27 Multimodal Freight Network



Source: Cambridge Systematics, from National Transportation Atlas Database, Oak Ridge National Laboratory National Rail Network, and U.S. DOT National Highway Freight Network.

4.7 FREIGHT LAND USE

NYMTC's Regional Freight Land Use Study reviewed a variety of data sources and engaged stakeholders to assess the mix of land uses related to goods movement in the region, assess recent and projected future trends that affect the region's supply and use of land to support freight-generating economic activity, and to develop a typology of freight land uses grouped by common characteristics.

Having a consistent typology of land uses helps to facilitate discussions and decision-making related to freight land use across the NYSMTC planning area and beyond. The freight land use typology includes three distinct categories that describe the ways that land is used for the movement of freight, and/or for the production or receipt of freight shipments:

- » **Freight-handling**, including transportation land uses that facilitate the movement of freight on the transportation network.

- » **Freight-generating**, including industrial and agricultural land uses that produce outbound shipments of freight. Within the freight-generating land use category, there are multiple subtypes.
- » **Freight-receiving** land uses, including 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.

Table 4.3 provides brief descriptions of each freight land use category and subtype, including the typical uses, or categories of uses, used in municipal zoning codes where their subtypes exist.

Figure 28 presents the three categories of freight land uses and the freight-generating land use subtypes, and where they are most often found on the rural-to-urban transect. The transect is a conceptual model commonly used in the urban planning discipline to categorize the transition from undisturbed natural areas to urban core areas and the spectrum of uses in between. The transect does not include “exurban” uses in transitional areas between suburban and rural zones on the periphery of metropolitan areas, where suburban development is expanding into formerly rural areas. However, exurban areas are mentioned in the descriptions of each of the freight land use categories and subtypes, as applicable.xx

Agricultural areas, for example, are most often found in the rural zone. Large, greenfield distribution centers are also often built in rural areas, but also in suburban areas and in some cases, they are encroaching upon or developed in the natural zone (thus changing the character of the area from natural to one of the developed zones). In urban areas, legacy industrial/manufacturing clusters, modernizing distribution clusters, endangered freight land use areas, and vacant storefronts converted to ecommerce fulfillment centers may be found. Some of these urban subtypes may also be found in suburban areas or special districts, as Table 4.4 shows.

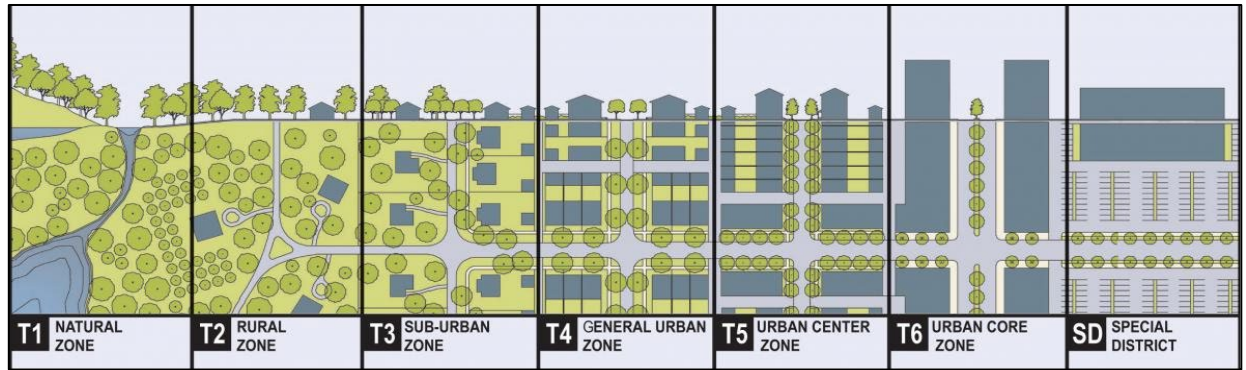


Table 19 Freight Land Use Typology Descriptions

Freight Land Use Types	Descriptions	Typical Use(s) in Municipal Zoning
Freight-Handling Centers	Seaports, cargo airports, carload and intermodal freight rail yards, tandem yards, container storage, and other facilities where freight is handled for import, export, transfer/transload, etc.	Transportation and Utilities
Agricultural Areas	Areas where agriculture generates shipments of freight (inbound fertilizers and equipment; outbound crops, livestock, and/or other agricultural products)	Agricultural
Large, Greenfield Distribution Centers	Concentrations of new, state-of-the-art distribution centers developed on previously unoccupied and relatively inexpensive land. Located in suburban areas with proximity to major highway corridors for access to urban core and major freight hubs (e.g., ports, intermodal facilities).	Industrial, warehousing, manufacturing
Modernizing and/or Redeveloping Distribution Clusters	Concentrations of legacy warehouses and industrial facilities in urban areas that are being redesigned to serve a large local market, typically for e-commerce. Modernized facilities may include multi-story buildings, advanced technology, efficient loading/unloading bays, multimodal connectivity, and other features. This subtype also includes redevelopment of brownfields (former industrial sites that require environmental remediation) for these purposes.	Industrial, warehousing, manufacturing
Legacy Industrial/Manufacturing Clusters	Concentrations of older, smaller warehouses and industrial facilities. Limited loading space and expansion potential. Located in urban or urban-adjacent areas. These areas may include brownfields in need of remediation and redevelopment.	Industrial, commercial/retail/office
Endangered Freight Land Use Areas	Historic or legacy industrial neighborhoods in urban areas that are experiencing higher rents, higher operating costs, and conflicts with adjacent uses due to increasing demand for residential, commercial, or other non-industrial uses.	Industrial, transitioning to residential, mixed use, etc.
Vacant Storefronts Converted to E-commerce Fulfillment Centers	Vacant storefronts (or "dark stores"), "dead malls," and other vacant retail facilities being converted to "micro" e-commerce fulfillment or distribution center use. This is an emerging trend and there are not very many examples in the region to date. These may require zoning or comprehensive plan amendments to accommodate the change in use.	Commercial (retail)
Freight-Receiving Land Uses	Residential communities, institutions (schools, hospitals, etc.), commercial (retail, office, etc.), and mixed-use districts are land uses that receive shipments of freight. Some commercial properties are being repurposed to generate freight shipments (e.g., vacant retail stores that are being repurposed as e-commerce distribution centers).	Residential, commercial (office, retail, etc.), institutional, mixed use

Source: NYMTC Regional Freight Land Use Study.

Figure 28 Freight Land Use Typology Overview with Rural-to-Urban Planning Transect



Freight Land Use Categories	Freight Land Use Sub-Types					
Freight-Handling	Freight-Handling Centers					
Freight-Generating		Agricultural Areas				
	Large, Greenfield Distribution Centers					
			Modernizing Distribution Clusters			
			Legacy Industrial/Manufacturing Clusters			
			Endangered Freight Land Use Areas			
			Vacant Storefronts Converted to E-Commerce Fulfillment Centers			
Freight-Receiving		Freight-Receiving Land Uses				

Source: NYMTC Regional Freight Land Use Study.

4.7.1 FREIGHT-HANDLING LAND USES

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Freight-handling land uses include land used to facilitate the movement of freight on the transportation network. Examples of freight-handling land uses include seaports, cargo airports, carload and intermodal freight rail yards, tandem yards, container storage, and other facilities where freight is handled for import, export, transfer/transload, etc. Freight-handling land uses may accommodate any single mode (e.g., rail freight handled in a rail classification yard), or combination of modes (e.g., freight transferred from ocean vessel to rail or truck at a marine terminal).

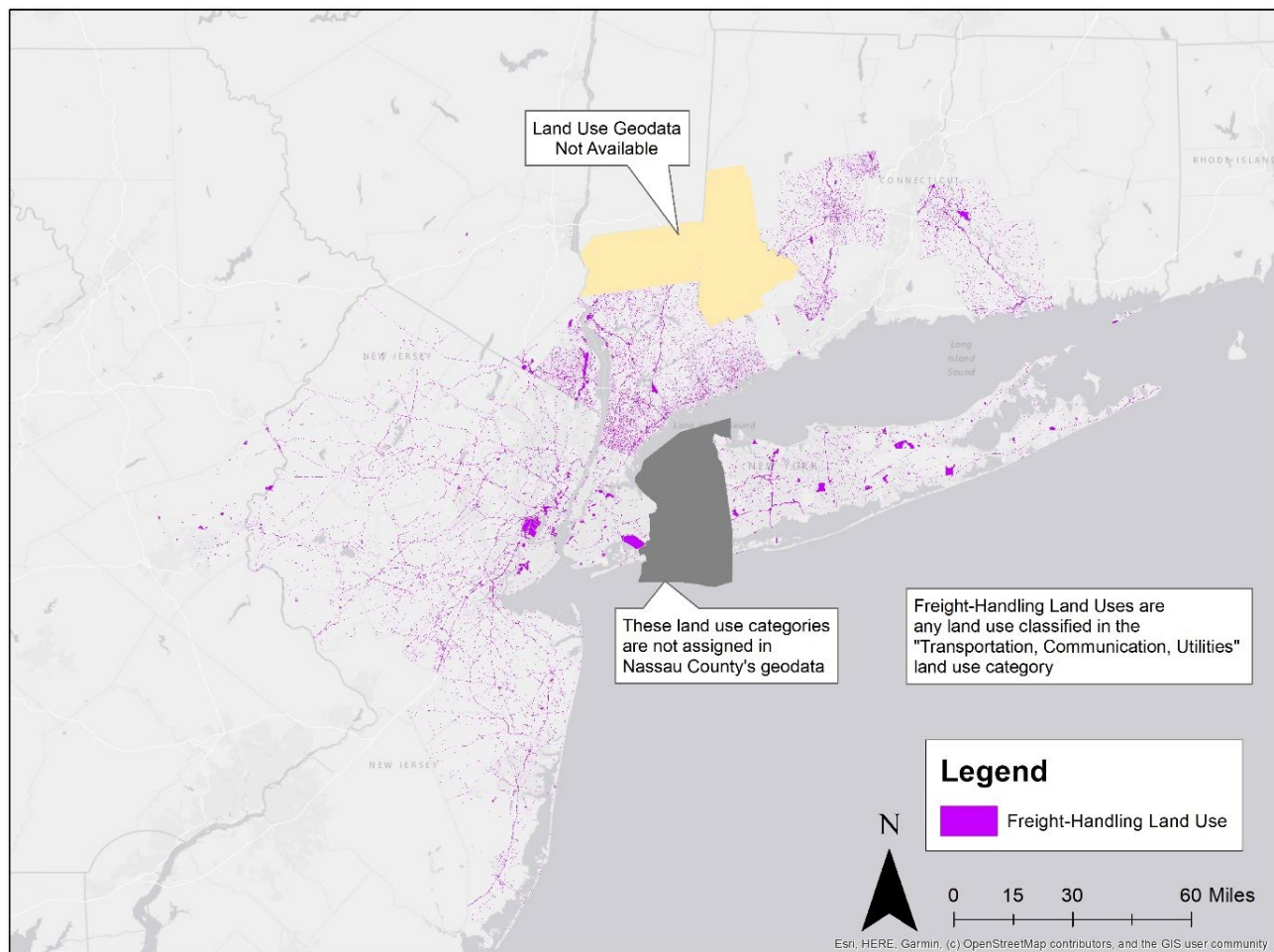
Freight-handling land uses may exist anywhere in the rural-to-urban transect, as transportation facilities and terminals are present in urban, suburban, exurban, rural, and natural environments. Within the multi-state region, there are many freight-handling facilities serving all transportation modes. Facility-level examples include:

- » **Marine Terminals**, including Port Newark/Port Elizabeth, New York Container Terminal (NYCT), Global Container Terminal (GCT) Bayonne, South Brooklyn Marine Terminal, Port of Bridgeport, Port of New Haven, etc.
- » **Air Cargo Airports**, including major air cargo hubs at John F. Kennedy International Airport and Newark Liberty International Airport, and airports that handle smaller volumes of cargo, such as LaGuardia International Airport, Lehigh Valley International Airport, Stewart International Airport, Bradley International Airport, and other airports throughout the Study Area.

- » **Intermodal Rail Terminals**, including South Kearny Yard, Croxton Yard, and North Bergen Yard, all in Hudson County, NJ; Little Ferry Yard in Bergen County, NJ; Port Authority of New York and New Jersey's Intermodal Container Transfer Facilities (ICTF) at the major marine terminals, and Bethlehem Intermodal in the Lehigh Valley.
- » **Rail Classification/Sorting Yards**, including Oak Island Yard in Essex County, NJ; Fresh Pond Yard in Queens, among others in the Study Area.
- » **Rail Transload Yards**, including Greenville Yard in Hudson County, NJ; Blissville Yard in Queens, Oak Point Yard and Harlem River Yard in the Bronx, etc.

Freight-handling facilities are mostly mature, meaning there is little development of new rail or highway rights-of-way, marine terminals, or airports anticipated. However, existing facilities may be upgraded, expanded, modernized, or otherwise improved through planned or programmed public projects and/or private investments over the next three decades. These investments could provide capacity to handle greater volumes of freight to keep up with regional and national population and economic growth. The distribution of land parcels categorized as freight-handling in the multi-state region is shown in Figure 29.

Figure 29 Freight-Handling Land Uses in the Study Area



Source: NYMTC Regional Freight Land Use Study.

4.7.2 FREIGHT-GENERATING LAND USES

Freight-generating land uses consist of industrial (including manufacturing and warehousing/distribution) and agricultural uses that are the points of origin for outbound shipments of freight. Due to the diversity of freight-generating land use types, and how the trends described in the Regional Freight Land Use Study have affected their development and distribution over time, several subtypes of freight-generating land uses have emerged. The subtypes, described in greater detail below, include:

- » Agricultural areas generate outbound shipments of goods and offer potential sites for future warehousing, distribution, and industrial development across the region;
- » Large, greenfield distribution centers;
- » Modernizing and/or redeveloping distribution clusters;
- » Legacy Industrial/manufacturing clusters; and
- » Endangered freight land use areas.

The distribution of freight-generating land uses throughout the planning area is shown in Figure 30.

Figure 30 Freight-Generating Land Uses in the Study Area

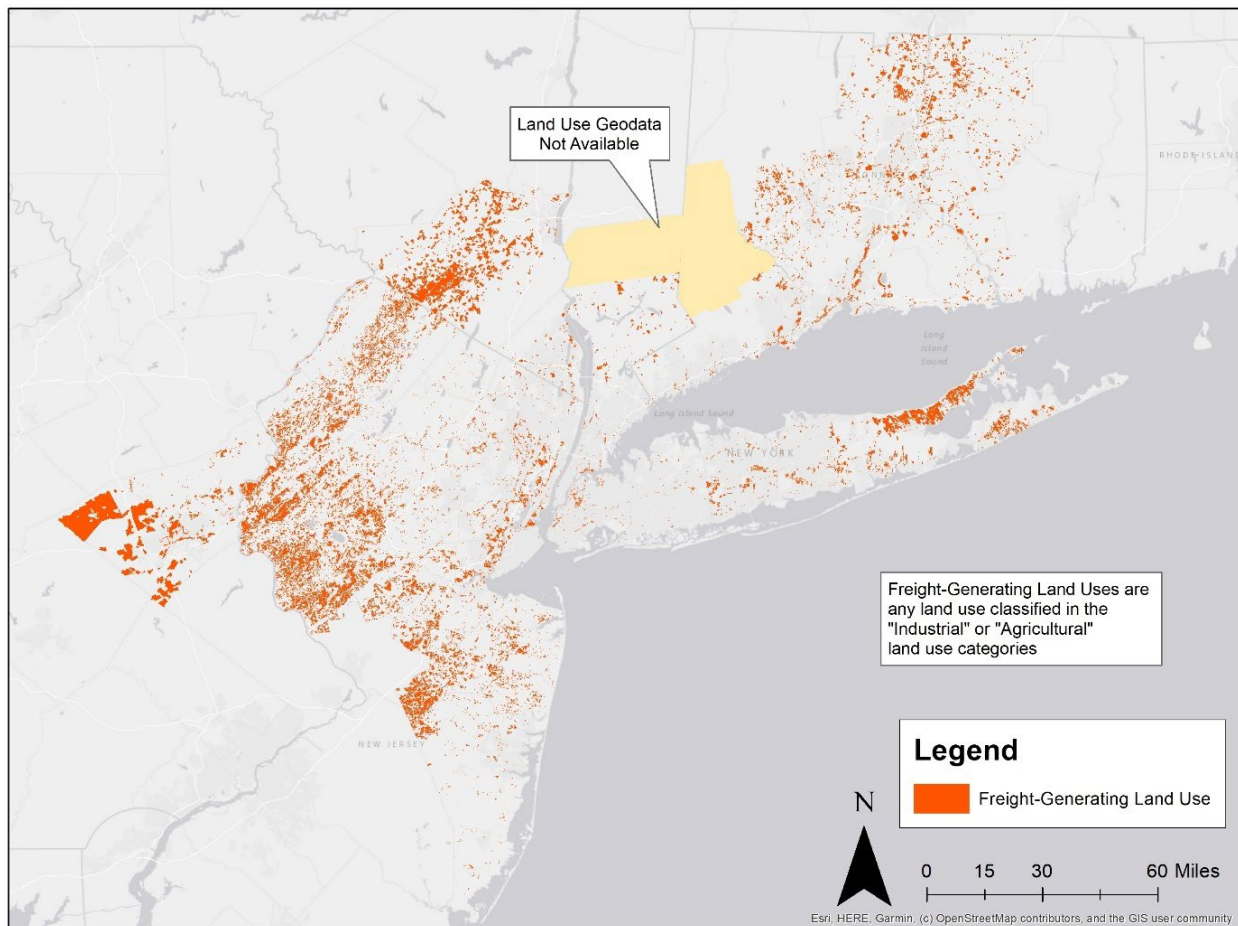


Table 20 Freight-Generating Land Use Sub-Categories

Name	Description	Development Stage	Land Use/ Zoning type(s)	Mode(s) Used	Examples in MAP Forum Region
Large Greenfield Distribution Centers	New, state-of-the-art distribution centers developed on previously unoccupied and relatively inexpensive land. Located in suburban or rural areas with proximity to major highway corridors for access to urban core and major freight hubs (e.g., ports and intermodal facilities). This type of development is sometimes referred to as “freight sprawl.” This can result in increased truck traffic in areas that may have not experienced much in the past.	Emerging, maturing	Industrial, warehousing, manufacturing	Mostly truck (some have rail access)	» "Exit 8A" area of Middlesex County, NJ » Breinigsville/Trexlerstown/Lower Macungie, PA » Smaller clusters throughout the region (Montgomery, NY; South Windsor, CT; Bloomfield, CT; etc.)
Modernizing Distribution Clusters	Concentrations of legacy industrial facilities in urban areas that are being redesigned to serve a large local market, typically for e-commerce. Modernized facilities may include multi-story buildings, advanced technology, efficient loading bays, multimodal connectivity, and other features.	Mature	Industrial, warehousing, manufacturing	Mostly truck (some have rail access)	» Maspeth, Queens, NY » Hunts Point, Bronx, NY » Secaucus/Meadowlands, NJ » Red Hook, Brooklyn, NY
Legacy Industrial-Manufacturing	Concentrations of older, smaller warehouses and industrial facilities. Limited loading space and expansion potential. Located in urban or urban-adjacent areas.	Mature	Industrial, warehousing, manufacturing	Mostly truck (some have rail access)	» South Kearny, NJ » Mount Vernon, NY » Carlstadt/Moonachie, NJ
Agricultural Areas	Areas where agriculture generates shipments of freight (inbound fertilizers and equipment, outbound crops, livestock, and/or other agricultural products).	Mature	Agricultural	Mostly truck (some have rail access)	» Rural areas throughout the region
Redeveloping/ Repurposing for Freight Use	Redeveloped or repurposed into a different use, e.g., mall to warehouse or office to warehouse conversion. Travel patterns may change (e.g., a retail store may have received inbound truckloads of product and attracted shoppers' automobile trips. As an e-commerce delivery center, it would receive inbound truckloads and dispatch outbound trips of delivery vehicles.)	Emerging	Industrial, commercial/ retail/office	Mostly truck (some have rail access)	» Office-to-warehouse conversion in Cranbury, NJ
Endangered Freight Land Use Areas	Historic or legacy industrial neighborhoods in urban areas that are experiencing higher rents, higher operating costs, and conflicts with adjacent uses due to increasing demand for residential, commercial, or other non-industrial uses.	Emerging	Industrial, transitioning to residential, mixed use, etc.	Mostly truck (some have rail access)	» Bushwick, Brooklyn » Long Island City, Queens

Source: NYMTC Regional Freight Land Use Study.

4.7.3 FREIGHT-RECEIVING LAND USES

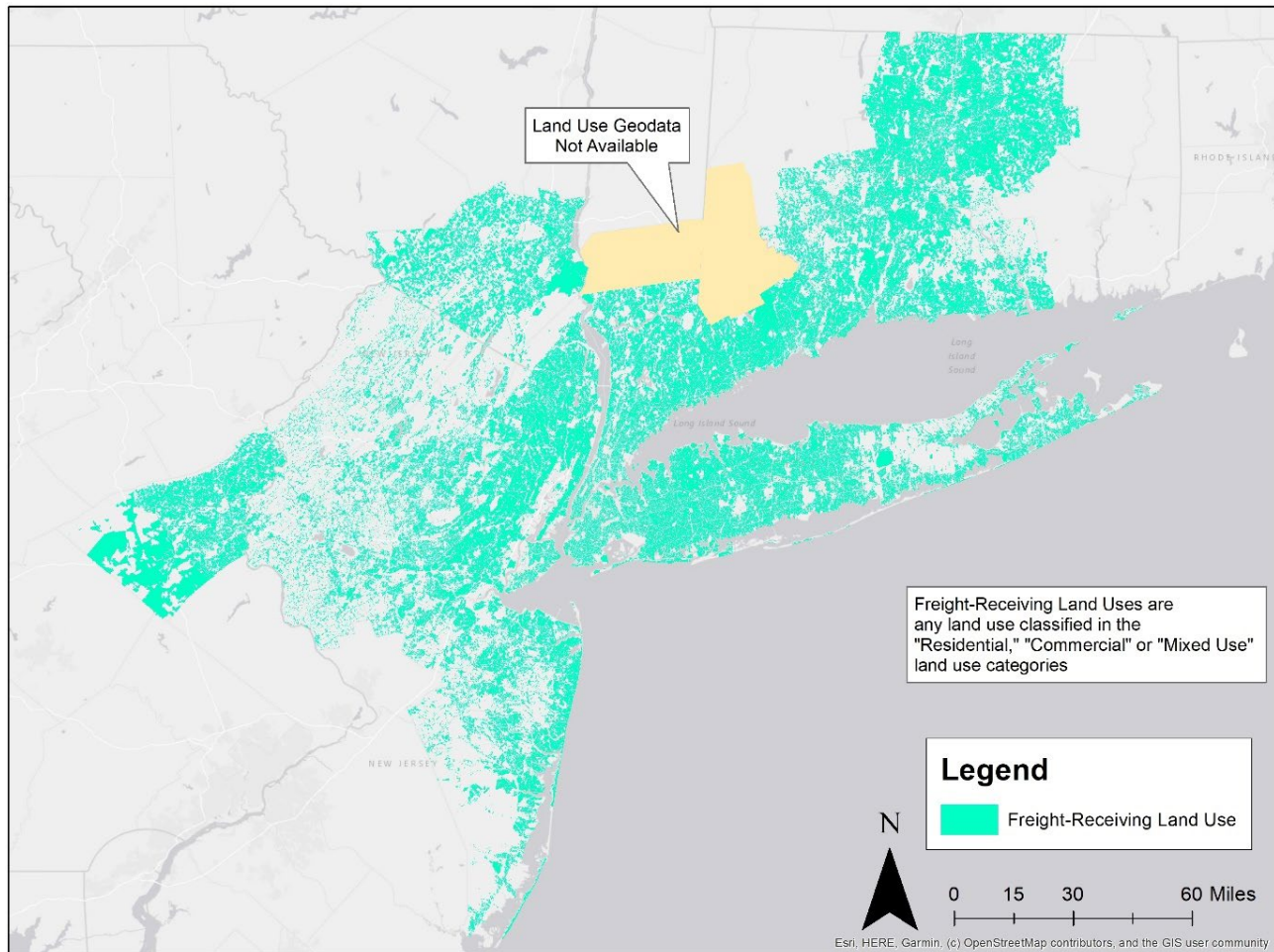
Freight-receiving land uses include lands used for a variety of primary purposes, but that tend to receive more shipments of freight than they generate. Land in this category may be zoned for uses that include residential, commercial (retail and/or office), institutional (schools, hospitals, government, etc.), or mixed-use developments that include a combination of these uses. Freight-receiving land uses exist in urban, suburban, exurban, and rural contexts.

Residential land uses may receive shipments of parcels that contain e-commerce delivery orders, deliveries of home furnishings, lawn and garden equipment, or supplies. Many residential parcels receive deliveries of groceries and/or prepared meals from restaurants. During the COVID-19 pandemic, increased e-commerce shopping resulted in more deliveries being made in residential areas. Residential areas produce outbound freight shipments as well, including household waste that is picked up for recycling and/or disposal.

Retail stores receive full truckloads of products or multiple less-than-truckload deliveries from various vendors. Most of the products sold in stores leave with the customer, either as they shop for items in the store, or as part of the growing “order online for in-store pickup” retail channel. Some retail stores ship purchased items to the customer’s home or fulfill online orders for shipment and delivery from the store’s stockroom. Retail stores therefore receive inbound shipments of products that are sold to consumers and generate a small but increasing volume of outbound shipments that are delivered to customers, as well as waste that is picked up for recycling and/or disposal. E-commerce is also enabling the repurpose of some retail storefronts into e-commerce fulfillment centers. In some vacant former big-box storefronts, especially, e-commerce retail giants such as Amazon, have developed fulfillment and delivery sorting centers to facilitate the movement of online orders to customers.xxi

Institutional land uses include schools, universities, hospitals, libraries, and government buildings. These facilities may receive inbound shipments of food to stock cafeterias, supplies and equipment to support operations, and construction materials used to construct, renovate, or rehabilitate the buildings themselves. These facilities are also likely to generate outbound shipments of waste that is picked up for recycling and disposal.

Mixed-use developments include buildings that contain two or more uses. Most often, the combination of uses is residential and commercial retail, but office and institutional uses could also be included in addition to, or in lieu of, one of the other uses. Mixed-use buildings exist in traditional urban or commercial center areas and are included in some newer developments. The freight delivery and generation characteristics of the component uses (residential, retail, etc.) described above would be observed in mixed-use settings. Figure 31 shows the distribution of freight-receiving land uses across the planning area.

Figure 31 Freight-Receiving Land Uses in the Study Area

Source: NYMTC Regional Freight Land Use Study.

4.8 SUMMARY AND KEY TAKEAWAYS

Commodity flows and supply chain operations in the NYMTC planning area are accomplished using a vast and mature set of modal networks—truck, rail, water, air, pipeline, and land use—operating both independently and as linked intermodal systems.

5

TRENDS AND DISRUPTORS

Several current and emerging trends (such as supply chain resiliency, decarbonization, e-commerce, and new technologies) can have a significant impact on the movement of freight in the multimodal freight network that serves New York City, Long Island, and the Lower Hudson Valley. Therefore, it is important to explore the potential impacts resulting from these trends, and how they can potentially influence future demand for freight transportation and the operation of freight vehicles. Such exploration can aid in the development of strategies and recommendations that can position NYMTC's 10-county region to effectively overcome or minimize disruptions, hedge against uncertain outcomes, and capitalize on potential opportunities for freight movement brought about by these trends.

This section provides an overview of freight-specific trends and disruptors, their significance to the NYMTC planning area, and what efforts are set in motion by NYMTC's member agencies to galvanize freight movement in the region. The list of trends and disruptors, summarized in Table 5.1, was developed based on input from NYMTC's staff and the Program, Finance and Administration Committee (PFAC) Freight Subcommittee, which consists of representatives from NYMTC's member agencies. This section includes a discussion of the trends and disruptors that were evaluated.

Table 21 Summary of Trends and Disruptors

Trends and Disruptors	Key Characteristics	Significance to NYMTC Region
Supply Chain Resilience	» Reshoring, nearshoring (described in this section of the Freight Plan Element) » Additive manufacturing, stockpiling of raw materials for quick local manufacturing	» Disruptions result in higher prices, lower supply » Manufacturing and distribution locations may change, resulting in changes to freight movement through region » Potential changes in warehousing needs
Freight Decarbonization	» Truck electrification and other alternative energy sources and fuels (slow, but more policies coming into effect soon)	» Large benefit of decarbonizing and reducing harmful air pollutants for Communities of Concern, especially in denser neighborhoods » Ongoing studies and policy support by NYMTC, member agencies, and New York State
Direct-to-Consumer Deliveries	» Huge growth in direct-to-consumer deliveries since pandemic » Huge growth in warehouses and freight traffic related to direct-to-consumer deliveries since pandemic » Maturation of e-commerce in manufacturing and wholesale	» More warehouses in New York City, not just suburbs » More food delivery » Local resistance, new permitting requirements » Ongoing studies by NYMTC member agencies
Automation Technologies	» Positive Train Control now implemented across U.S. » Other train and truck automation technologies still in development » Sidewalk delivery robots and warehouse & port automation have had unsteady growth » Federal rulemaking on drone use (expected in 2026) could lead to deliveries by unmanned aerial devices	» Early/incipient stages of implementation in the NYMTC planning area
Land Use Trends	» Rents in urban versus suburban areas shape demand for warehouse floor area and qualitative features » Tiered distribution networks » Repurposing or reconfiguration of suburban or exurban retail centers	» Distribution of growth in number of warehouses likely to follow population growth trends » Political pressure against warehouses in marginalized urban neighborhoods with relatively cheap land
Workforce Needs	» Need incentives for hiring » Need better workforce access provided at least in part by freight employers	» Many colleges and universities, and some high school programs in the NYMTC planning area, are developing innovative coursework, training, and job placement programs for careers in freight, warehousing, logistics and/or supply chain management. » Workforce access needs will depend on the distribution of relative growth rates of population and freight jobs

5.1 SUPPLY CHAIN RESILIENCE

A resilient supply chain is one that can easily adapt, rebound, or recover when faced with shocks that can have impacts that are either:

- » **Localized**, such as a local supplier plant shutdown or severe weather event. The NYMTC planning area is susceptible to several types of severe weather that can impact goods movement, including rain-induced river and stream flooding and washouts, coastal storms such as nor'easters and hurricanes that produce coastal flooding and wind damage, winter snow and ice events, and extreme summer heat that can affect pavement and rail conditions.
- » **Global**, such as international trade policies or the COVID-19 pandemic.^{xxii} As Section 5.1.1 describes, the pandemic disrupted connectivity across global supply chains resulting in an economic crisis, which illustrated the fragility of complex global supply chains.

5.1.1 WHY RESILIENCE MATTERS—A COVID-19 CASE STUDY

The COVID-19 outbreak in early 2020 disrupted global logistics and transportation networks, leading to widespread freight delays and heightened uncertainties around supply chain reliability and resilience. Growth in demand for consumer products and other goods, combined with the challenges of producing, transporting, and processing shipments of those goods in a COVID-19 environment, presented many challenges to logistics companies, carriers, and shippers. These challenges led many companies to reevaluate their sourcing, inventory, and distribution decisions to mitigate the risk of disruption.

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In the first half of 2020, the pandemic impacted the production and export of goods from China. Shipping lines, in response, reduced or consolidated ocean sailings and routes, reducing the capacity of trans-Pacific shipping. As U.S. consumer demand surged in the second half of 2020, these logistics changes, combined with high COVID-19 infection rates among workers at U.S. West Coast ports, contributed to lengthy delays in getting products onto store shelves and to consumers' doorsteps.^{xxiii}

Prior to the onset of the pandemic, an ocean container would travel from China to the West Coast of the United States in approximately two weeks. During 2020 and into 2021, the two-week transit time was followed by up to two weeks at anchorage awaiting an available berth at the ports. The marine terminal crunch appeared to be most acute at the ports of Los Angeles and Long Beach, but capacity was a challenge at many ports throughout the country. Vessels returning to Asia were met with crowded ports and long anchorage times there as well—sometimes weeks. East Coast ports, including the Port of New York and New Jersey, saw increasing volumes of freight during this period, as many cargo owners diverted shipments away from the congested West Coast ports.

As a densely populated region with over 13 million residents, the NYMTC planning area plays a crucial role in the national economy. It is home to critical freight infrastructure, including but not limited to John F. Kennedy International Airport and the Port of New York and New Jersey, which are vital for both domestic and international trade. During the pandemic, the region faced unprecedented challenges in meeting local production needs, and demand for essential goods, especially emergency response-related commodities

such as food and pharmaceuticals, while simultaneously continuing to serve as a critical freight hub that connects, not only to the rest of the country, but also to global markets.

As described in Chapter 2 of the Freight Element, the volume of inbound freight is greater than the volume of outbound freight moving in the NYMTC planning area. The planning area therefore depends upon transportation networks that connect to neighboring states and more distant places where freight destined for the planning area originates. New Jersey, for example, is the origin of more than 20 percent of the freight moving into the NYMTC planning area, and most of this freight is moved by truck because of the short distance.

Other than infrastructure and facility needs, the greatest issue facing the trucking system has been a shortage of labor. Labor availability has been an issue in the trucking industry for many years, but the pandemic exacerbated it.

As the primary method of movement, trucking faced increasing challenges during the pandemic. Due to a variety of factors, truck drivers tend to be of older age and the lifestyle can contribute to chronic health issues.^{xxiv} Many drivers susceptible to the virus and its health effects ceased driving during all or a portion of 2020. That left many drivers who continued driving to stay on the road, with many long-distance drivers reporting being away from home for months at a time, contributing to burnout and many drivers leaving the industry. As businesses reopened and e-commerce demand continued to surge in 2021 and 2022, the trucking industry scrambled to meet growing demand for moving freight. During this time, many states faced backlogs in commercial vehicle licensing, delaying the entry of new drivers into the industry. The following sections describe the effects of the pandemic across food, pharmaceuticals, and waste in the NYMTC planning area.

FOOD SECTOR

“Food products” are among the major commodities that the NYMTC planning area receives from elsewhere that are critical for the region’s sustenance during a time of emergency. As the pandemic progressed, the food supply chain was disrupted, and food insecurity was exacerbated due to skyrocketing unemployment and grocery prices. In April 2020, the price of groceries rose by 2.4 percent, the highest in the past 50 years.^{xxv} Panic buying behavior during the pandemic added pressure to the supply chain. As most of the food supply is transported in whole or in part by truck, the increasing demand for products resulted in higher demand for trucking, and the cost of transporting food also spiked.

Due to social distancing orders and practices implemented to limit the spread of the virus, food consumption shifted significantly from traditional retail to e-commerce, offering safer, contactless transactions. For instance, Kroger, one of the nation’s largest grocery chains, reported a 92 percent increase in online sales during the first quarter of 2020.^{xxvi} The altered demand for food highlighted the need for expanded food storage capacity, especially cold storage, across the supply chain. Lineage Logistics, the largest temperature-controlled warehousing and logistics company, expanded its San Valley Cold Storage in Swedesboro, New Jersey by five thousand pallets by 2023 to meet the potential future

warehousing needs.^{xxvii} The Brookhaven Rail Terminal, a freight rail transload facility in Yaphank, Suffolk County, observed that flour was one of the two commodities (the other being construction materials) that experienced substantial growth during the height of the pandemic. Flour moving through that terminal is destined for bakeries and retail outlets throughout Nassau and Suffolk counties.^{xxviii}

Several programs were initiated to maintain a sustainable food supply chain during the pandemic and to aid the system's recovery post-pandemic. In 2022, USDA announced the Framework to Transform the Food System, which aimed at strengthening the food supply chain and making the food system more resilient, fair, and competitive by investing in multiple programs related to food production, processing, distribution, and consumption.^{xxix}

At the state level, the New York State Department of Agriculture and Markets announced partnering with USDA Agricultural Marketing Service to award \$14.7 million in competitive grant funding for projects designed to build resilient supply chains. Eligible projects focus on expanding statewide capacity and infrastructure for the aggregation, processing, manufacturing, storage, transporting, wholesaling, or distribution of targeted local and regional agricultural food products, excluding meat and poultry products.^{xxx}

PHARMACEUTICALS

The COVID-19 pandemic significantly disrupted the global pharmaceutical supply chain, affecting every aspect of the process. During the pandemic, the demand for essential drugs, vaccines, and health-related products surged. For example, the Clorox Company reported an astonishing 500 percent increase in the demand for disinfectant products.^{xxxi} However, the supply chain faced significant challenges, including labor and raw material scarcities in manufacturing.

In 2021, leading vaccine manufacturers Pfizer and Moderna announced significant labor shortages, due to difficulty in attracting a skilled workforce necessary to meet the escalating demand for vaccines.^{xxxii} Other than staffing, there were shortages of critical raw materials. The United States imports pharmaceuticals and related raw materials from Europe, China, and India. Active pharmaceutical ingredients are heavily dependent on supplies from foreign countries since only 10 percent are produced domestically.^{xxxiii} However, widespread COVID-19 outbreaks and understaffing in these source regions, coupled with delayed shipping, resulted in slowed pharmaceutical production in the U.S., such that Pfizer had to reduce its production targets by half in 2020.^{xxxiv}

The concentration of pharmaceutical manufacturing in a few countries poses significant risks to the industry and the supply chain, especially when so many materials originate in Asia.

Far-flung supply chains have been more susceptible to disruptions affecting trans-oceanic trade, such as port labor availability issues, terminal congestion, and trade route disruptions due to piracy or situations like the Suez Canal blockage of 2021. Moving more production to the U.S. or to other nations closer to the U.S., a practice known as nearshoring, aids in reducing some risks. However, there are substantial investments in building facilities and logistics that are required to shift production locations.^{xxxv}

For individual pharmaceutical manufacturers, it is also crucial to expand their material sources. Meanwhile, companies are considering ways to manage their inventory more wisely. Most pharmaceutical manufacturers are employing the Just-in-Time (JIT) inventory strategy, such as Pfizer's distribution is built on a flexible JIT system. The JIT system aligns production volume with inventory level, enabling manufacturers to maintain only the stock necessary for near-term work while minimizing holding and supply costs.

However, during the pandemic, the Just-in-Case inventory management strategy, in which inventory purchases are not based on current demand, allowed companies to better accommodate unexpected demand spikes. To identify the best inventory strategies, many companies have conducted risk assessments and developed risk management plans to overcome the impact of potential uncertainties. These assessments weigh the potential effects of disruptions and the costs of producing and staging excess product for "just in case" situations.

WASTE

Waste includes waste and scrap materials, municipal solid waste (MSW), and construction and demolition debris. The supply chain for waste operates in a different sequence of events relative to the generic supply chain or the previously described supply chain examples. After being collected and streamed, waste is transported to recycling facilities within the U.S. or abroad to be converted into new products, sent to waste-to-energy plants where they are burned to generate energy, or taken to landfills for disposal. A large portion of the waste was outbound from the NYMTC planning area to New Jersey and Pennsylvania. Most of that waste moves by truck, but New York City agencies and other partners have invested in marine transfer stations and rail transfer stations that have been moving increasing shares of waste out of the region by water and rail.^{xxxvi}

During the pandemic, New York City sanitation observed a 4.2 percent uptick in residential waste collection tonnage (including garbage, recycling, and organics) in March 2020, compared to 2019, meanwhile, the metal, glass, plastic, and cartons were 11.7 percent higher, and organic waste increased by 13.3 percent.^{xxxvii} Meanwhile, the commercial waste volumes lowered. Most of New York City's non-recyclable garbage ends up in landfills in Pennsylvania, Ohio, and Virginia, while Manhattan's waste mainly ends up in New Jersey.^{xxxviii}

Like the other supply chains described above, solid waste logistics, or "disposal chain," also faced staffing shortages for licensed drivers, truck mechanics, and workers at the material recovery facilities. In early 2020, the New York Department of Sanitation (DSNY) reported more than 350 COVID-19 cases among its workforce.^{xxxix} To maintain workforce safety and ensure the ongoing operation of the sanitation system, the DSNY adjusted its service schedule and suspended non-critical services (e.g., electronic collection programs, and Food Scrap Drop-off sites) to reduce in-person contact.

Building resilient supply chains requires collaboration between the public and private sectors, each contributing unique strengths and perspectives essential for creating systems that can adapt and recover from economic shocks or global disruptions like the pandemic.

5.1.2 OVERVIEW OF SUPPLY CHAIN RESILIENCE TRENDS

To reduce supply chain fragility and increase resilience to mitigate disruptions like those caused by the pandemic, some manufacturers are shifting production closer to the U.S. This includes "reshoring"—bringing manufacturing back to the U.S.—and "nearshoring," moving production to nearby, lower-cost countries. These strategies help to diversify input sources, mitigate risks, and strengthen supply chain reliability.^{xi}

AT Kearny (a global management consulting firm) developed an index to track the manufacturing shift back to the U.S. from low-cost countries (LCC) in Asia.^{xii} Before the COVID-19 pandemic, the index reported that manufacturers were increasing their reliance on inputs from LCCs. However, corporate attitudes and strategies have changed. In their 2022 report, 78 percent of the executives answered "maybe" or "yes" when asked about reshoring, and in the 2023 report, 96 percent responded maybe or yes. Most notably, 84 percent of executives (with Chinese manufacturing operations) have moved some of their operations back to the U.S. within the past three years or plan to do so in the next three years.^{xiii} The survey identified five factors that drive the move to reshore manufacturing (see Figure 32).^{xiii}

Figure 32 Factors that Drive Reshoring

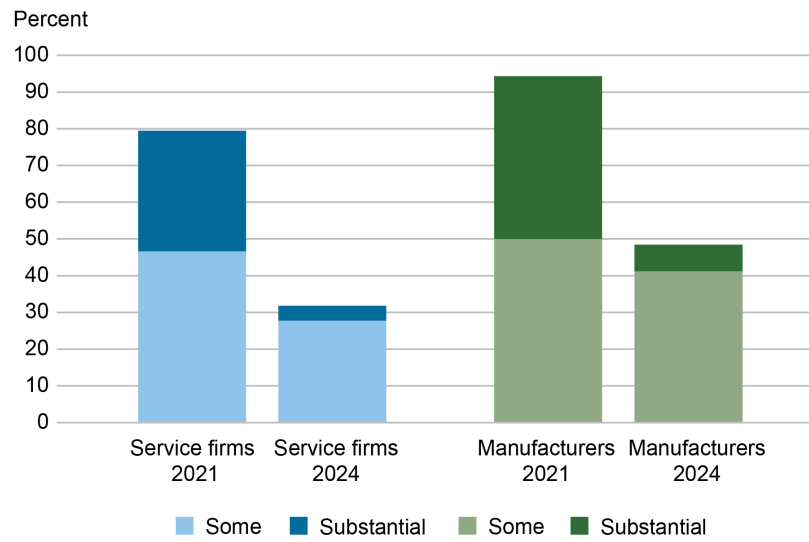


Source: AT Kearny.

5.1.3 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

Federal Reserve Bank of New York surveys in 2021 and 2024 asked businesses about the impact of supply chain disruptions on their services and manufacturing activities.^{xliv} As shown in Figure 33, while the number of supply chain disruptions has reduced significantly between 2021 and 2024, about a third of the firms surveyed indicated that such disruptions are still impacting their business. Substantial impacts were observed by a higher proportion of the manufacturing firms participating in the survey (over 40 percent) compared to service industry firms (about 32 percent) in 2021.

Figure 33 Supply Chain Disruptions as Reported by Firms in the State of New York, 2021 and 2024

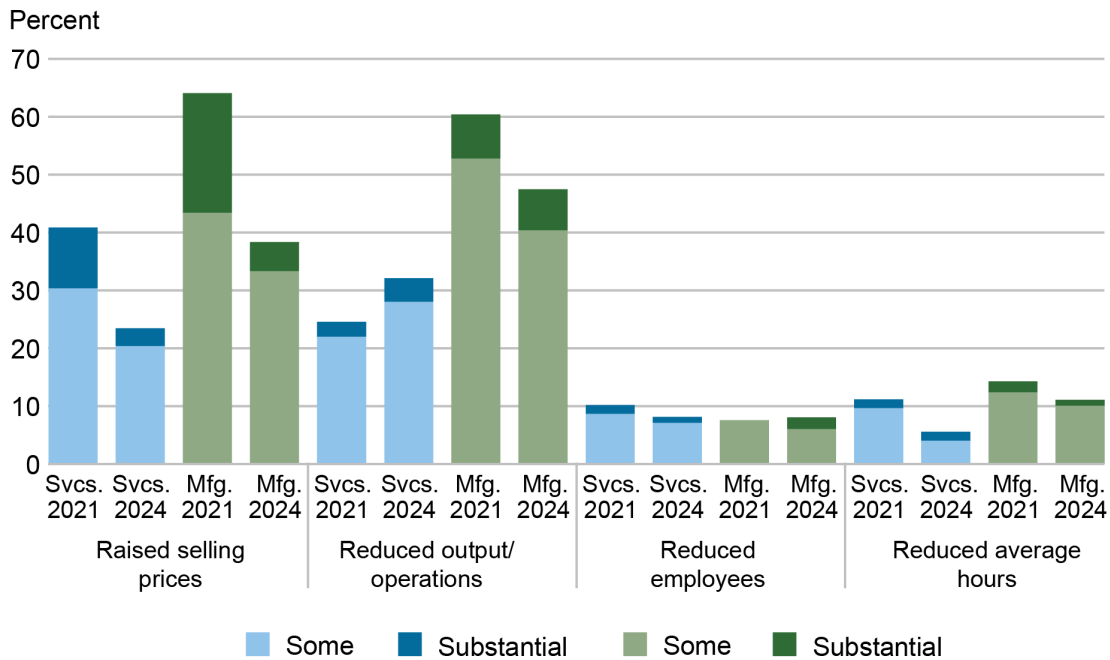


Source: Federal Reserve Bank of New York, October 2021 and May 2024 Supplement Surveys.

The surveys also asked businesses about their responses to supply chain disruptions, focusing on changes to prices, output, employment, and hours worked. As shown in Figure 34, the most common response is to raise selling prices, followed by reducing output or operations to mitigate supply chain disruptions.

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Figure 34 Actions New York Firms Took in Response to Supply Chain Disruptions, 2021 and 2024



Source: Federal Reserve Bank of New York, October 2021 and May 2024 Supplement Surveys.

Due to the recent increase in nearshoring/reshoring, the origin of supply chain inputs destined for the U.S. market has also varied. While historically supply chains relied on inputs from Asia, recent trends indicate that Mexico has surpassed China in terms of total goods traded.^{xlvi} These changes can affect the mode of transportation, port of entry, and routes used to move goods into the United States and into the NYMTC planning area.

Firms seeking to reduce risks by moving or diversifying the sourcing of materials or manufacturing activities are faced with other challenges, however. Moving production from one country to another can take years to implement, as factories must be planned and constructed, and transportation investments and workforce training may be needed. Other forces, such as materials and labor costs, shifts in foreign trade policy and associated costs, and economic cycles that could shift consumer demand, can pose risks to large-scale investments in relocating production.

Nearshoring and reshoring trends are also accompanied by a discussion of just-in-time (JIT) versus just-in-case (JIC) supply chain operations to prepare for disruptions. While JIT focuses on minimizing inventory levels by receiving and producing goods just in time to meet customer demand, JIC relies on stockpiling inventory to ensure readiness for unexpected fluctuations in demand or supply chain disruptions.^{xlvii} Other approaches also call for the use of technology in the sourcing and inventory of products, as exemplified by additive manufacturing and the advancements in 3D printing, which increase the ability to print and produce items on demand and reduce the reliance on global supply chains for key inputs.^{xlviii} Such changes may shift warehousing needs, including their quantities, locations, floor areas, and qualitative features (like cold storage), from storing large numbers of finished goods to storing large amounts of raw materials.

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While these approaches might vary from supply chain to supply chain, changes in how they operate—from JIC to additive manufacturing—and where inputs are sourced from—Mexico instead of Asia—can have significant impacts on the NYMTC planning area.

A qualified workforce is necessary to accommodate these different approaches, warehousing needs might vary based on how goods and services are sourced and inventoried, and freight transportation profiles in the region might change to respond to these trends. Therefore, while reshoring/nearshoring trends are beyond NYMTC's span of control, the public agencies in the NYMTC planning area can establish policies and make investments, based on the region's critical supply chains and the needs from firms in the region, to enhance the transportation system resiliency and reliability, strengthen emergency response, and enhance supply chain preparedness.

5.2 FREIGHT DECARBONIZATION

5.2.1 OVERVIEW OF FREIGHT DECARBONIZATION TRENDS

While light-duty vehicles have generated the most sales of decarbonized vehicles globally, freight decarbonization, particularly of zero-emission vehicle (ZEV) trucks or heavy-duty vehicles, is seen as vital to reducing business costs and the overall environmental impact of the transportation sector. For example, fuel typically represents the second highest cost to motor carriers (about 24 percent of total cost), behind driver wages, on a per-mile basis.^{xlix} Historically, electricity prices have been lower and more stable than gasoline and diesel prices, and freight decarbonization offers the possibility of capitalizing on other alternative fuel sources, such as hydrogen, natural gas, and propane (LGP). Thus, freight decarbonization offers the opportunity for an industry characterized by tight profit margins to achieve considerable cost savings over the service life of the equipment. In addition, studies have estimated that the total cost of ownership of battery electric day cab tractors is lower than their diesel counterparts over the long term. Day cabs for regional operations (i.e., an operating range of 250 to 300 miles) are expected to be the first application for ZEV trucks.

Besides the potential for freight vehicle decarbonization to reduce business costs, the potential to mitigate the negative externalities attributed to goods movement is a motivating factor. For example, trucks significantly contribute to pollution, and decarbonization would help achieve state pollution reduction goals.^{li} Decarbonization can also help to address a vital transportation challenge related to fairness in public health. Respiratory diseases attributed to harmful air pollutants released by tailpipe air and fuel residuals disproportionately affect underserved communities due to their proximity to major highways, rail yards, trucking terminals, and other freight-intensive land uses.^{lii} These outcomes are consistent with public policy in many jurisdictions, including the NYMTC planning area. In addition, many consumers consider factors such as pollution and environmental impact when deciding what to buy and from what companies. A McKinsey study from 2020, for example, found that 66 percent of consumers say that they consider a company's environmental sustainability practices when making a purchase.^{liii}

Decarbonizing freight can lead to desirable outcomes for businesses in the form of reduced cost and improved public/investor relations, and for the public sector in the form of improved public health and reduced pollution.

Despite the potential for freight decarbonization to generate industry cost savings and positive environmental and transportation fairness impacts, it is not without its challenges evident through the low market penetration of ZEV freight vehicles. Only 1,200 electric or ZEV trucks vehicles are estimated to have been sold in the U.S. in 2023, less than 0.1 percent of total truck sales in that year.^{liv} This low market penetration of ZEV medium- and heavy-duty vehicles, crucial for freight decarbonization, can be tied to a series of key barriers, summarized below in Table 5.2:^{lv}

Table 22 Barriers to Freight Decarbonization

Barriers	Related challenges
Higher Upfront Vehicle Costs	» Battery-electric trucks may be as much as 2 times the average cost of a diesel truck, with batteries being the most expensive component.¹ However, incentives and avoiding refueling costs can close that gap over time. » High upfront costs can burden smaller carriers and owner-operators as they are unlikely to have the capital or confirmed demand to invest in ZEVs.
Costly and Complex Charging Infrastructure Processes	» Electric vehicle charging stations vary in speed and cost and require motor carriers to coordinate siting, planning, permitting, commercial utility connections, and installation. » Automotive, utility, and infrastructure companies are testing dynamic charging technology that allows electric vehicles to charge while in motion via under-road pads or overhead wires.² However, the availability of public energy sources is considered key to supplement private investment in this technology.
Commercial and Industrial Electricity Rate Structures	» On average, electricity charging costs in the U.S. are much lower than comparative diesel fueling costs.³ Nonetheless, electricity demand requirements and limited downtime availability to charge heavy-duty vehicles, as well as utility market rate structures, can significantly reduce the financial savings of electricity over diesel. » Without greater flexibility in utility rate structures, it may be financially challenging for operators to consider electrifying their fleets as heavy-duty vehicles must be able to charge at reasonably priced rates that meet their operational needs.
Limited Availability of Certified Service Centers and Technicians	» The absence of certified facilities and technicians for ZEV compared to diesel vehicles can hinder freight decarbonization until operators are assured that timely repairs can be made to protect against extended periods of downtime and ensure operational efficiency.
Concerns with Grid Resiliency	» ZEVs have high electrical demand requirements, and their widespread deployment would create a large electricity demand. As decarbonized truck fleets become more common, local grid networks may be pushed beyond their current distribution capacity, requiring significant investments in utility upgrades to existing grid infrastructure.
Changing Policy Directives	» With uncertain or inconsistent policy direction, particularly at the Federal level, the pace of fleet transition to electric or other alternatives to diesel could be impacted. Uncertainty surrounding the continuation of incentive programs that help to offset some of the equipment acquisition costs and punitive trade policies can slow down the replacement cycle for many fleets.

Source: Electrification Coalition, with additions by Cambridge Systematics.

¹ This estimate is based upon an American Trucking Association study published in 2024.^{1vi}

² Hodari, D., "These Companies Want to Charge Your Electric Vehicle as You Drive," Wall Street Journal, January 18, 2021.

³ "Fuel Prices." Alternative Fuels Data Center: Fuel Prices, U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's Vehicle Technologies Office, afdc.energy.gov/fuels/prices.html.

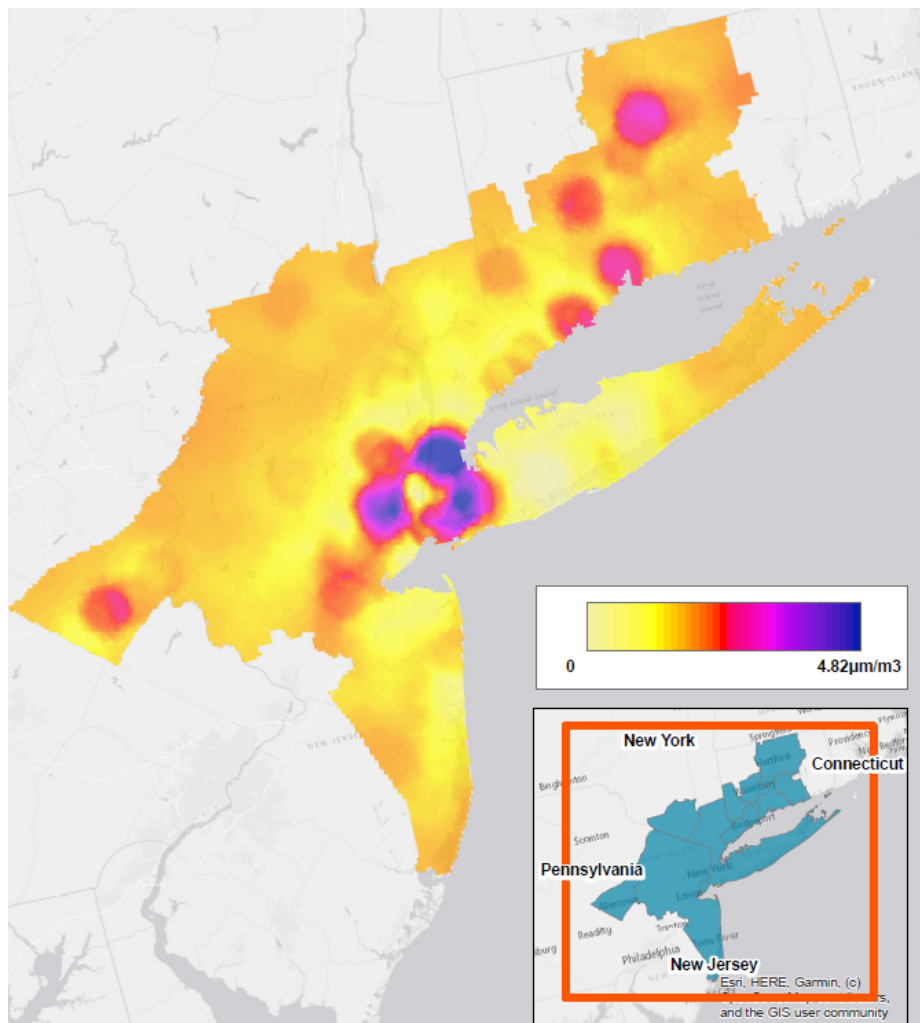
5.2.2 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

The NYMTC planning area's reliance upon trucks to move freight in the region (94 percent of freight tonnage moves by truck, according to the analysis in Chapter 2) highlights the significance of freight flows via trucks in the region from the perspectives of Communities of Concern, urban freight, and transportation-related pollution.

Compared to the rest of the nation, the greater New York City metropolitan region has high concentrations of particulate pollution, which have a negative impact on the health of its citizens due to the fine particulate matter in diesel exhaust.lvii

The most impacted areas appear as pollution “hotspots” corresponding to the most urbanized and/or port areas, namely New York City, Newark, New Haven, Hartford, and Bridgeport, as shown in Figure 35.

Figure 35 Concentration of Diesel Particulate Matter in the MAP Forum Region, Including NYMTC’s Planning Area



Source: NYMTC's Clean Freight Corridors Planning Study.

In the NYMTC planning area, denser and more highly urbanized areas tend to have greater concentrations of freight movement, and therefore significantly higher concentrations of diesel particulate matter. Consequently, measures of freight decarbonization in such areas, as well as thoroughfares that carry freight traffic within the 10-county region, have great potential to mitigate the impacts of freight-sourced air pollution like CO₂.

NYMTCs Clean Freight Corridors Planning Study identified steps to advance freight decarbonization through high-efficiency, LEV/ZEV technologies for vehicles that move goods. The study resulted in a roadmap identifying roadways suited to be designated as Clean Freight Corridors, and the infrastructure needed to advance freight decarbonization. NYMTC member agencies have individually implemented programs to promote freight decarbonization. Notably:

- » The New York City Department of Transportation (NYC DOT) has developed the New York City Clean Trucks Program to reduce pollutants caused by diesel exhaust and replaced over 600 older, heavy polluting diesel trucks.^{lviii} The program, which started in 2012 in Hunts Point, has now expanded to industrial business zones across New York City. Rebates offer incentives ranging from \$12,000 to \$215,000 per truck replacement, depending on fuel type and truck class. Replacement options include battery-electric vehicles, EPA-compliant alternative fuel trucks (such as compressed natural gas, diesel-electric hybrids, and plug-in hybrids), and diesel trucks that reduce the discharge of nitrogen oxides and particulate matter. Figure 36 shows an example of electric trucks procured through this program.
- » The PANYNJ has sponsored a truck replacement program targeting older (model year 1999 through 2009 engines) trucks used to dray containers into and out of the region's marine terminals. The program offers up to 50 percent of the replacement cost up to \$25,000 to help motor carriers acquire modern, more fuel-efficient diesel engines.^{lix}
- » The PANYNJ has also worked to facilitate the use of electric trucks through efforts such as the modernization of a truck parking facility at Port Newark. The project included the installation of four direct current fast chargers for electric trucks.^{lx}

Freight decarbonization can benefit from policy and legislative support to advance ZEVs in the region, from light- to heavy-duty vehicles.^{lxi} A total of 11 states, including the State of New York, which represents around one-quarter of heavy-duty vehicle sales in the U.S., have adopted California's Advanced Clean Trucks regulation, which sets the following ZEV sales targets for trucks:

- » Class 2b and Class 3 Trucks (e.g., small box trucks and commercial vans up to 14,000 lbs.): 55 percent
- » Class 4-8 trucks (over 14,000 lbs.): 75 percent; and
- » Tractor-trailers: 40 percent

The different targets acknowledge that there are varying levels of ease in manufacturing and procuring different types of ZEVs. ^{lxii}

Figure 36 **Electric Heavy-Duty Trucks in The Bronx, Obtained via the NYC Clean Trucks Program**



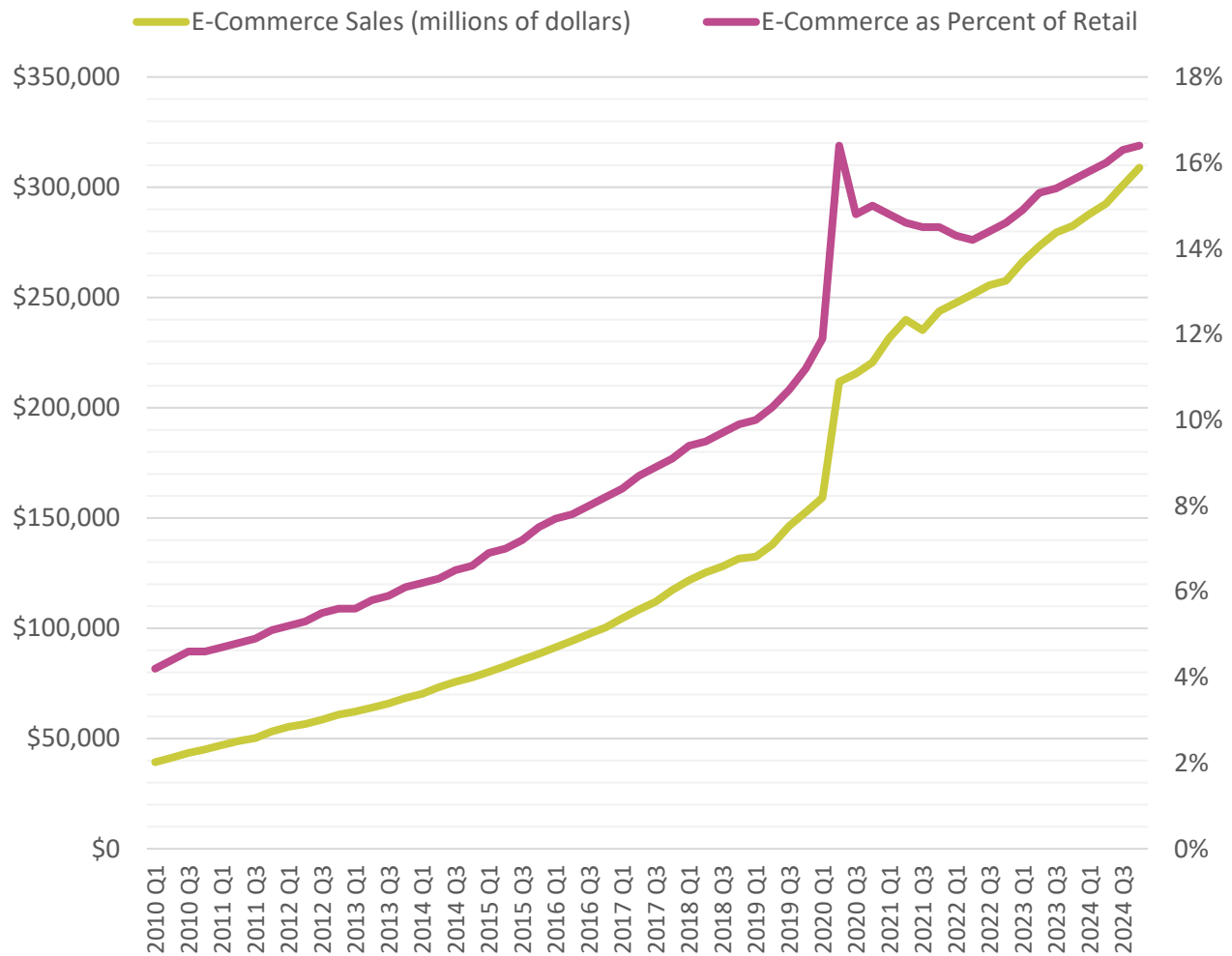
Source: NYC DOT

5.3 DIRECT-TO-CONSUMER DELIVERIES

5.3.1 OVERVIEW OF DIRECT-TO-CONSUMER RETAIL AND LOGISTICS TRENDS

Prior to the onset of the COVID-19 pandemic, e-commerce sales were increasing, both in terms of the value of sales and as a share of total retail sales in the United States, by double-digit margins year-over-year. As Figure 37 shows, between 2010 and the first quarter of 2020, the proportion of retail sales made through e-commerce increased from 4.4 percent to 11.9 percent. In the second quarter of 2020, as many brick-and-mortar retail stores were closed or operating with limited capacity during the height of the COVID-19 pandemic, e-commerce sales soared, increasing by 33 percent over the previous quarter. As many Americans returned to in-person work and shopping in 2021 and 2022, e-commerce ceded some market share back to in-store sales. However, from late 2022 through 2024, e-commerce sales once again outpaced growth in in-store sales. As of the fourth quarter of 2024, e-commerce represented 16.4 percent of retail sales in the United States, matching its mid-2020 high.

Figure 37 E-Commerce Sales in the United States, by Dollar Value and as a Percent of Total Retail Sales, 2010-2024



Source: Cambridge Systematics analysis of U.S. Census Bureau Quarterly Retail E-Commerce Sales, February 19, 2025

Growth in e-commerce sales has generated a greater volume of parcels that are delivered to consumers' doorsteps. The top four parcel carriers—UPS, FedEx, the United States Postal Service (USPS), and Amazon Logistics—represented 97 percent of the U.S. parcel delivery market in 2023. Combined, the top four companies delivered 21 billion parcels in the United States that year, a 50 percent increase since 2019.^{ixiii} This increased demand for parcel deliveries across the country is generating more trips of delivery vehicles, such as box trucks, commercial vans, and cargo bicycles, which, in turn, contributes to the volume of traffic on streets and roads and competition for curbside parking and loading zones. While data on local delivery patterns are not readily available in the NYMTC planning area, some public-sector agencies are seeking out data and analysis methods to quantify the scale and impact of e-commerce deliveries. Analysis efforts currently underway, including the North Jersey Transportation Planning Authority (NJTPA) 2050 Freight Industry Level Forecasts Update Study, which has acquired interesting data from consumer market research vendors and is modeling the effects of e-commerce deliveries on the regional highway network, could be useful in estimating the effects.^{ixiv}

Across the U.S., growth in direct-to-consumer delivery has been accompanied by an increase in the number of warehouses and fulfillment centers in urban and suburban areas. This growth, in turn, has been accompanied by an increase in freight traffic on roads for local and last-mile goods movement. The most growth in the last five years happened between 2020–2022.^{lxv} Since then, inflating costs of labor for freight deliveries and warehouse construction and materials for warehouse construction, inflating rents, and increasing interest rates affecting financing costs to acquire land and build new warehouses have together slowed the pace of building new warehouses and fulfillment centers.^{lxvi} Looking forward, while some forecasts anticipate continued growth in e-commerce sales nationwide,^{lxvii} rising costs associated with delivering goods and uncertain foreign trade policies could lead to slower growth in this and other retail sectors.



5.3.2 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

Warehouse and distribution center development in the NYMTC planning area mirrors growth trends across the country. New warehouses and distribution centers have emerged in New York City, in addition to those in the suburban counties. While a significant number of facilities are owned by large logistics companies like UPS, FedEx, and Amazon, many are operated by small businesses.^{lxviii} In response to warehousing growth, residents have raised concerns about increases in truck traffic on local streets. In some cases, these concerns have led to barriers in opening more warehouses. The rise in food deliveries during the COVID-19 pandemic led New York City to pass new laws supporting bicycle and e-bike delivery workers. However, there has also been a commensurate increase in road collisions and street crimes targeting delivery workers.^{lxix}

In 2022, NYMTC's Regional Freight Land Use Study included a real estate market analysis. This study discusses the impacts of e-commerce on broader freight issues as well as on specific land use issues in the NYMTC planning area, and it considers different scenarios for e-commerce growth (high, baseline, and low) through 2050 with respect to effects on total retail sales, e-commerce sales, and rentable building area for warehouses. The study estimated the warehousing and distribution center space needed to support e-commerce nationally could range from 3.1 billion square feet to as high as 24.6 billion square feet by 2050, depending upon how much consumer demand and logistics practices change over time. Warehousing needs would not require all new construction as some existing warehousing and distribution center space serving traditional retail or other purposes may shift into serving e-commerce logistics. In some cases, vacant or underutilized retail or office buildings may be repurposed to serve e-commerce logistics. Furthermore, some retail stores are dedicating portions of their floor area to fulfilling online orders. This repurposing activity may require zoning changes in some parts of the NYMTC planning area to address potential conflicts with regulations regarding use, form, and/or trip generation.^{lxx}

New York City's high population density, along with nearby suburban areas, led to phased bans on indoor dining and restrictions on indoor shopping during the COVID-19 pandemic in 2020 to protect public health.^{lxxi} This likely boosted delivery services during that time, a trend that has persisted even as their growth has slowed since the pandemic.

Local residents' concerns have resulted in policies that address the growth of freight facilities. In 2024, New York City began exploring a proposal that, if implemented, would require companies to apply for zoning special permits to build or expand last-mile delivery centers following concerns from residents, many of whom belong to socioeconomically marginalized groups, because warehousing has led to localized air pollution, noise, and increased risk of motor vehicle crashes.^{lxxii}

Over the last decade, New York City has conducted pilot programs to promote and support alternative forms of last-mile freight delivery, moving away from exclusive use of trucks.^{lxxiii} These include greater use of waterways, commercial cargo bicycles, and public lockers on sidewalks. New York City has worked with freight operators to encourage goods delivery outside of peak hours and is working on pilot programs to create microhubs, which are small curbside or off-street spaces meant for freight operators to transfer goods between trucks and smaller more sustainable modes like cargo bikes and hand-pushed carts.

5.4 AUTOMATION TECHNOLOGIES

5.4.1 OVERVIEW OF AUTOMATION TECHNOLOGIES TRENDS

Technologies for **truck driver assistance**—such as steering, automatic braking, and autonomous driving—have continued to advance. These technologies, combined with vehicle-to-vehicle communications technology, also support a truck operating concept called “**platooning**,” in which trucks may travel in closer proximity to one another to increase safety, decrease fuel consumption, and improve efficiency by occupying less space on the road, thus increasing road capacity. These technologies are especially utilized under certain conditions, where trucks follow short-, medium-, and long-haul routes that are well-defined and repeatedly used.

In 2023 and 2024, some autonomous vehicle technology companies shut down or deemphasized autonomous truck development, as rising inflation increased business costs, and high interest rates made financing more expensive for autonomous trucking businesses and their investors.^{lxxiv} This trend suggests that widespread deployment of these technologies for automated trucking remains years ahead.

Automation technologies in freight rail have been tested through various pilot projects. One example is automated track inspections, which can identify track geometry issues more quickly and accurately than manual inspections. For this reason, before 2022, the Federal Railroad Administration (FRA) allowed six out of the seven Class I railroads permission to pilot programs for automation of track inspections. Rail operators imagined that automation track inspections would free up manual inspectors to focus on tracks that could not be examined using automated technologies, resulting in cost savings. However, as a result of concerns that automation would result in eliminated jobs, the FRA denied requests by two of the railroads to continue their pilot programs, leading to lawsuits.^{lxxv} Due to legal uncertainty, progress on automating track inspections remains unclear.

Concerns regarding the impacts of automation on the railroading workforce have drawn criticism and skepticism from labor groups. Additionally, the limited cost savings of removing a few human drivers from long trains, compared to trucks, has slowed progress beyond the pilot phase^{lxxvi}. However, testing is underway for autonomous rail vehicles to move individual containers, which could allow freight rail to shift from relying solely on long trains.^{lxxvii} Finally, Positive Train Control—a system that helps prevent collisions, derailments, and unauthorized train movements—has been implemented on all U.S. railroads that are required by law^{lxxviii}

The deployment of **sidewalk delivery robots** (seen in Figure 38) has increased significantly since the last plan. In 2023, Serve Robotics partnered with Uber Eats to deploy 2,000 robots across the U.S.^{lxxix} In 2024, this partnership expanded to Shake Shack.^{lxxx} Several states have attempted to encourage the use of these robots by granting them the same sidewalk rights as pedestrians.^{lxxxi} However, pilot programs in cities like Pittsburgh and Detroit have shown that issues such as cracked sidewalks and wide roads can hinder robot performance, just as they do for human pedestrians.^{lxxxii} Additionally, major companies like Amazon and FedEx have discontinued their delivery robot programs.^{lxxxiii}

Figure 38 Sidewalk Delivery Robot in Jersey City, NJ

Source: Cambridge Systematics.

In the past few years, unmanned aerial vehicles (UAVs), also referred to as **aerial drones**, are getting closer to joining sidewalk delivery robots in the toolbox of last-mile delivery solutions. Companies such as UPS Flight Forward, Amazon, and DroneUp, which has been testing delivery drones with Walmart, 7-11, and Chick-Fil-A in a few locations of the country, have participated in the Federal Aviation Administration (FAA)'s Part 135 air carrier certification program.^{lxxxiv} These companies, and others, are preparing for a forthcoming rulemaking by the Federal Aviation Administration that will establish rules and standards for operating aerial drones beyond the visual line of sight (BVLOS) of an operator. The rulemaking, expected by January 2026,^{lxxxv} will have to ensure that the operation of aerial drones can be done safely if, and when there are many drones and other air traffic filling the nation's airspace. Many drones can travel distances of up to 50 miles and have sufficient payload capacity to carry consumers' e-commerce orders, which average about 2.5 pounds.^{lxxxvi}

While aerial drones can reduce the number of parcels that must be delivered by truck or other surface modes otherwise, there remain some limitations to this emerging solution. Drones can be impacted by foul weather such as high winds or heavy rains, clear "drop zones" for the drop-off of packages are needed.^{lxxxvii} Their carrying capacity (the FAA limits drones to 55 pounds, payload included) will not make them a solution for every customer order, and their flight range of 50 miles or less means they will not immediately be able to reach consumers in every part of the country unless or until a dense network of drone ports, or drone-served warehouses and distribution centers, are established. There may also be some limitations or challenges introduced by the FAA's forthcoming rulemaking, and there are restricted air space considerations, including near airports and sensitive public or government facilities throughout the region.

Warehouse automation is projected to grow by over 10 percent annually through 2030, driven by changes in the workforce and supply chains due to the COVID-19 pandemic.^{lxxxviii}

Automation technologies include unloading robots, automated forklifts, voice-controlled robots and systems, and computer-based warehouse management with electronic tagging and sensors, some of which have been enabled by computer vision and machine learning. However, many automation efforts have failed due to unclear strategies and reluctance to scale beyond small pilots.^{lxxxix}

Similarly, freight terminals, especially ports, have expanded automation, including the operation of cranes and machinery.^{xc} The large upfront costs of automating freight terminals and the high volume of containers at major U.S. ports make it too early to assess whether post-2015 automation investments have resulted in higher volumes, lower costs per container, or improved productivity as expected.^{xc}

5.4.2 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

The automation of freight terminals and the deployment of sidewalk delivery robots have achieved some traction in the NYMTC planning area and multi-state region, while the automation of trucks, locomotives, and other vehicles are facing some challenges. Given the dense network of sidewalks and high population density, the deployment of delivery robots should, in theory, lead to conflicts over limited sidewalk space between pedestrians, businesses (including restaurants with outdoor seating), and robots, as well as the need for legislation to regulate robot use. However, challenges in deploying sidewalk delivery robots elsewhere in the U.S. have resulted in a delay in large-scale deployment in New York City and surrounding suburban areas.

The ports of Newark and Elizabeth in New Jersey have a significant effect on freight volumes coming through the NYMTC planning area and are vital to the economy of the larger region. A few terminals in these ports have partial automation of cranes and other components, while others are still largely manually operated.^{xcii} Although evidence is mixed or inconclusive regarding the effects of automation of port functions on human jobs at ports, in 2024, port workers went on strike to protest automation of ports within the NYMTC area.^{xciii} The strike lasted for three days before being suspended for three months, pending negotiation over a new contract that would ban automation in those ports.^{xciv}

To anticipate a wider-spread deployment of automated vehicles on streets and highways, there are several actions public agencies can take to prepare the infrastructure and regulatory systems to accommodate them. The Manual on Uniform Traffic Control Devices (MUTCD) was updated in 2023 to provide clearer guidance for signs, pavement markings, and traffic signals.^{xcv} Regarding regulation, 19 states permit AV operations, though New York and New Jersey are not among them. Another 12 states, including Connecticut, permit, only testing or piloting of AVs. The states that permit AV operations have regulatory requirements that include compliance with federal motor vehicle safety regulations, compliance with state safety and traffic laws, and requirements that fully-autonomous vehicles be able to bring the vehicle to a safe condition (i.e., bringing the vehicle to a complete stop and activating the vehicle's hazard lamps) if the automated system fails or becomes inoperable.^{xcvi} If New York moves to permit the operation of

autonomous vehicles, similar requirements would likely be adopted. The PANYNJ launched a three-month pilot demonstration using AV shuttles that move passengers to and from the long-term parking lot starting in July 2024.xcvii The eight-passenger AVs were platooned in groups of two vehicles. Projects like this could demonstrate the potential for AVs to be used in broader applications, including the movement of goods.

5.5 LAND USE TRENDS

5.5.1 OVERVIEW OF LAND USE TRENDS

Historically, most industrial and freight-related space in the NYMTC planning area was concentrated in New York City. Among the counties in the multi-state region, Brooklyn still has the most industrial and freight-related space by rentable building area. However, since 2000, most industrial growth has shifted to suburban and exurban areas in Pennsylvania, New York, Connecticut, and New Jersey. Lehigh County, Pennsylvania, has experienced sustained growth, ranking fourth in rentable building area among counties in the forecasting region.

Most industrial space, both existing and newly added, consists of warehouses and production facilities, with less emphasis on food processing or cold storage. Larger, newly built facilities dominate in suburban and exurban counties, while New York City has focused on renovating smaller existing spaces. Prices per square foot are significantly higher in New York City—up to five times higher than in New Jersey counties like Somerset, Morris, and Hunterdon. From 2000 to 2020, prices per square foot in New York City rose by over 200 percent, compared to less than 60 percent in those New Jersey counties.xcviii

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To address the growth of e-commerce, freight companies are adopting tiered distribution networks, with large primary distribution centers in outlying areas and smaller secondary centers in urban and suburban locations.

This often involves repurposing large retail stores or shopping malls in suburban and exurban areas into warehouses. This includes reconfiguring parking and road connectivity to accommodate a mix of trucks taking goods from those warehouses to deliver directly to customers as well as customers coming on their own (usually in private vehicles) to pick up items that were ordered online (as opposed to coming to the store to see what is in stock and buying goods there).

Additionally, some urban warehouses and distribution centers are being developed as multi-story facilities to optimize vertical space. While new multi-story warehouses with advanced technology, such as the example shown in Figure 39, are costly to build, renovations of existing spaces are sometimes a more cost-effective approach.xcix

Figure 39 Multi-Story E-Commerce Delivery Center in Brooklyn



Source: Cambridge Systematics.

5.5.2 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

From 1980 through 2020, suburban and exurban areas in the broader forecasting region have grown steadily in population at a rate of three to seven percent per decade. New York City has experienced a similar average population growth rate, but the growth has varied more by decade, as suburban and exurban areas grew faster in the 1980s and 2000s, while New York City grew faster in the 1990s and 2010s.

As discussed in Chapter 3 and Appendix C of this Plan, the COVID-19 pandemic led to many people moving from New York City to suburban and exurban areas within the NYMTC forecasting area and to other parts of the country. Additionally, deaths from the pandemic led to population declines in New York City of 0.2 percent per year from 2020 through 2021. The distribution of population within the broader forecasting region and the change in the overall population over time will significantly affect demand for freight and land values, with both factors affecting the siting of freight-related facilities. The inflows and outflows of population in the broader forecasting region, as well as the NYMTC planning area within it, have largely returned to pre-pandemic trends, suggesting that long-term stagnation or loss of the overall population

purely because of the COVID-19 pandemic is unlikely. Long-term stagnation or loss of population may still occur due to the higher costs of living in the broader forecasting area compared to other parts of the U.S.

It remains to be seen if the long-term trend is the greater increase in the population of New York City compared to suburban or exurban areas seen in the 2010s, greater increase in the population of suburban and exurban areas compared to New York City seen during the COVID-19 pandemic, or continued oscillation each decade of the population growth rate of New York City around a more stable growth rate in the suburban and exurban areas seen over the whole time period considered since the 1980s.

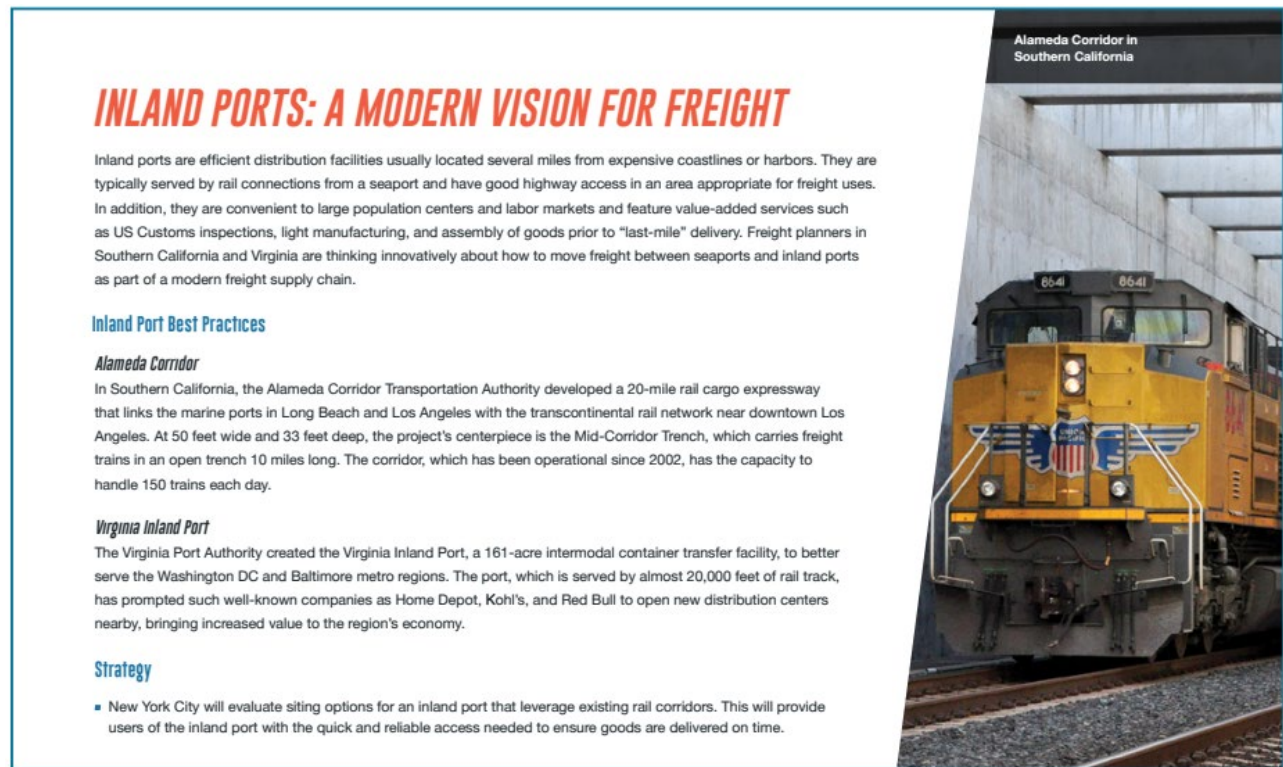
The siting of freight-related facilities will likely follow changes in the spatial distribution of population in the broader forecasting region, which could lead to one of three possibilities.

- » The first possibility is sustained greater growth in New York City, which will likely mean higher land and property costs for freight companies and more repurposing of existing facilities.
- » The second possibility is sustained greater growth in suburban and exurban areas, which will likely mean more new construction on cheaper land at the expense of neglecting broader redevelopment within New York City.
- » The third possibility is continued oscillation over decades of growth in New York City relative to growth in suburban and exurban areas, which will likely mean that freight companies will have to be nimble enough to account for changes occurring over time scales of approximately 10 years when deciding where to build facilities and what facilities to build.

Land use strategies aimed at facilitating the use of other modes of transportation include:

- » Strategies to facilitate a shift from truck to alternative modes for last-mile, local delivery. These include **urban consolidation centers** and/or **micro-distribution centers**, which receive inbound shipments from trucks (or by water, in the case of a waterfront facility), and dispatch outbound local delivery trips by smaller vehicles and/or ZEVs such as vans, cargo bicycles, or other modes; and
- » Strategies to facilitate a shift from truck to alternative modes for longer-distance moves. These include:
 - **Inland ports**, which typically include a rail service between a seaport and an inland rail terminal, where trucks can pick up or drop off containers or other shipments. Inland ports allow for the elimination of a truck trip to/from the seaport. Examples include the Virginia Inland Port or the Alameda Corridor in Southern California. Figure 40 describes the concept in greater detail.
 - **Freight Villages**, which are defined as hubs, typically served by more than one mode of transportation, where multimodal connections, warehousing and distribution space, and other support services are co-located to facilitate efficient goods movement and handling. NYMTC conducted a regional study of freight village opportunities more than a decade ago. The “freight hubs” envisioned in FreightNYC, or continued development of Brookhaven Rail Terminal could ultimately serve as local examples of the freight village concept.

Figure 40 Inland Port Concept, as Described in FreightNYC



» Source: FreightNYC, New York City Economic Development Corporation.

As discussed previously, in 2024, New York City began considering a requirement that companies apply for zoning special permits to construct or expand last-mile delivery centers due to residents' concerns.^{ci} Repurposing vacant or underused spaces for freight-related uses, particularly in socioeconomically marginalized neighborhoods, may face political resistance due to potential health and safety concerns, even if rezoning is not required.

New York City has secured funding from U.S. DOT to launch the Urban Freight Mobility Collaborative, which would financially and operationally support freight-related innovations,^{cii} including a pilot program for freight micro-hubs.^{ciii} These micro-hubs would be curbside or off-street places in the city to transfer freight from trucks to small electric vans or cargo bikes for last-mile or last-foot delivery, with the intent of reducing pollution and the exposure of active transportation mode users to unsafe conditions associated with truck traffic. This pilot program would include active partnerships with freight companies as well as an explicit permitting procedure for companies that wish to make use of these zones. This program advances the City's strategic vision detailed in *Delivering Green: A vision for a sustainable freight network serving New York City*.^{civ}

Vulnerability to natural disasters, such as flooding and coastal inundation, are necessary considerations for land use planning. Superstorm Sandy in 2012 and the heavy rains associated with the remnants of Hurricane Ida in 2021 demonstrated the severe economic and social burdens that extreme weather can inflict upon the region's freight infrastructure and economy. According to analysis performed in NYMTC's Regional Freight Land Use Study, approximately 9 percent of the land area in the multi-state region used to

generate or handle freight (i.e., industrial, agricultural, marine terminals, rail yards, and transportation infrastructure) is in a Special Flood Hazard Area, as defined by the Federal Emergency Management Agency (FEMA).^{cv}

Approximately 1 percent of freight-generating and 3 percent of freight handling land area in the multi-state region is at risk of inundation from a 5-foot rise or surge of seawater, according to geodata provided from the National Oceanic and Atmospheric Administration (NOAA).^{cvi}

Table 23 Percent of Land Area at Greatest Risk for Flooding and Sea Water Inundation

Land Use Category	Special Flood Hazard Area (Defined by FEMA)	Seawater Rise or Surge: 1 foot (According to NOAA)	Seawater Rise or Surge: 5 feet (According to NOAA)
Freight-Generating Lands (industrial, agricultural)	9.1%	0.2%	1.2%
Freight-Handling Lands (marine terminals, rail yards, airports, transportation infrastructure)	8.9%	0.6%	2.9%

Source: Cambridge Systematics analysis of FEMA and NOAA Data, Presented in NYMTC's Regional Freight Land Use Study, 2022

In response to the risks associated with flood events and potential coastal seawater inundation, there are two potential future scenarios regarding freight land use:

- » Industrial real estate developers, landowners, and others, invest in constructing flood walls or other preventative measures to protect land and facilities that generate, receive, and/or handle freight. This increases development and real estate costs.
- » Freight-generating and freight-handling land uses are relocated to areas less prone to flooding or sea level rise. This could spur new development in parts of the region that may or may not have clusters of freight-generating or freight-handling facilities at present.

A third scenario, involving a combination of both approaches, is also a potential outcome.

5.6 WORKFORCE TRENDS AND ISSUES

5.6.1 OVERVIEW OF WORKFORCE TRENDS

Employees in trucking companies, freight railroads, and seaports are aging out of the workforce, and there are currently not enough new workers to replace them. To this end, some public agencies, as well as nonprofit organizations, are experimenting with different programs to attract new workers in these industries. For example, the PANYNJ established a workforce development program in 2016 that helps to connect job openings in the maritime transportation, distribution and logistics industry with the community surrounding the seaport terminals. The program has established relationships with partner academic

institutions and hosts job fairs in the transportation and logistics fields to help job seekers find opportunities to work in these fields, and to encourage people to enter degree, certification, and/or apprenticeship programs to develop the qualifications necessary to fill jobs the industry needs filled.^{cvii}

Some workforce development programs spearheaded by companies in the industry offer financial incentives to individuals from socioeconomically marginalized groups, such as those experiencing homelessness, as well as those underrepresented in freight-related industries, including women and ethnic minorities. These financial incentives include hiring bonuses as well as cost reductions for obtaining commercial driving licenses.

New York City's public school system has over 530 high schools, 130 of which offer career and technical education (CTE) programs. Several of the CTE programs focus on transportation, trade, and logistics, including programs at Aviation High School in Queens, Transit Tech High School in Brooklyn, and Urban Assembly New York Harbor School on Governors Island in Manhattan. Programs combine rigorous academic education with work-based learning experiences preparing students technical trade careers. The schools also offer guidance and assistance in career placement and higher education preparation.^{cviii}

Once hired, freight workers must have reliable access to their workplaces to effectively perform their duties. Several studies have identified potential recommendations in facilitating employees in the freight industry's commute including:^{cix, cx}

- » Many freight-related job sites are designed in ways that are not conducive to active transportation mode users and public transit users. Sidewalks, bike paths, and bus stops are limited or nonexistent at many job sites.
- » Studies highlight the need for carpool and vanpool programs to connect commuters. These programs must incentivize workers with alternative transportation options to participate, ensuring reliable service for those who rely on them.
- » Freight employers and local agencies should create Emergency Ride Home programs to ensure that workers who do not drive and who depend on carpools or vanpools to get to or from work can have dependable alternatives. These programs would cover medical or family emergencies, as well as unavailable carpools or vanpools.
- » Freight employers, in partnership with local public transit agencies as appropriate, should provide shuttles for workers to get between job sites and nearby public transit stops, parking facilities, or even their homes, as appropriate to each job site in its regional or metropolitan context.

However, these studies disagree about the need to improve active transportation mode infrastructure as well as extend the coverage area or hours of operation of certain routes for fixed-route buses. In some cases, these improvements may be warranted given the needs of potential workers in the area and may be financially feasible for the local agencies to carry out.^{cx} In some cases, job sites may lack sufficient active transportation users to justify new infrastructure that could disrupt truck traffic and pose risks to pedestrians or cyclists. Similarly, there may not be enough public transit users to support creating or expanding routes or service hours to match non-standard shift schedules.^{cxii}

5.6.2 SIGNIFICANCE TO THE NYMTC PLANNING AREA AND ONGOING EFFORTS

With a plethora of local colleges and larger universities within the NYMTC planning area as well as in the broader region, the New York City metropolitan area has much of the basic educational infrastructure to train a new generation of the freight workforce, as long as those institutions continue to create interdisciplinary coursework that can allow freight workers to nimbly adapt to further changes in the freight landscape. Additionally, with high levels of population density, active mode transportation infrastructure density, and public transit service, along with informal transit services like jitneys and dollar vans in and near New York City, the New York City metropolitan area is well-positioned for freight job access to the extent that those jobs are in or near New York City.

However, future developments depend critically on the relative changes in population versus freight jobs in different parts of the forecasting area.

If New York City's freight employment grows commensurate with the residential population, then – bolstered by a supportive public transit and active transportation network – the city can position itself well as a regional freight employment center. This can be advanced through education, training, and commuting assistance.

By contrast, if population and freight jobs grow more in suburban and exurban parts of the forecasting area, or if there is a mismatch in either direction between population and freight job growth in urban versus suburban and exurban areas, then it will be critical to invest directly in programs promoting freight education access and freight job access across the forecasting area, not just within New York City, so that potential workers are not cut off from these educational and job opportunities.

Even if population and freight jobs grow at similar rates in suburban and exurban areas, it is not guaranteed that people in those areas can necessarily get to those jobs easily, especially if a person lives in one suburban area but must commute to a freight job in a different suburban area. Local governments would need to proactively work together to ensure that more potential freight workers can access educational and job opportunities across the forecasting area and not just within their local communities. This would mitigate the potential harm of individual freight employers in those local communities going out of business and of local educational institutions focusing too much on narrow skills relevant only to one or two freight employers in those respective communities.

In 2023, New York City announced plans to incentivize the movement of more freight using its waterways instead of roadways; as part of this, it announced plans to collaborate with local colleges and universities to develop training programs that will bring more students, many of whom are from local communities, into the marine freight workforce.^{cxiii} Similarly, in 2024, New York City won a grant from the U.S. DOT to build an electric truck charging depot in the Bronx, and that depot would include a multipurpose building where truck drivers could rest and which would host community events as well as events related to freight workforce development.^{cxiv}

5.7 IMPACTS OF TRENDS & DISRUPTORS

At the time of the development and adoption of NYMTC's previous long-range plan, *Moving Forward 2050*, in 2020 and 2021, the direct effects of the COVID-19 pandemic were still being felt. The NYMTC planning area, like the rest of the United States, was emerging from stringent lockdowns, mandates, and business capacity restrictions. However, there were still concerns over new and emerging COVID variants, supply chain disruptions, and major shifts in work patterns with the widespread adoption of remote work and hybrid work schedules, shifting housing demand and overall living preferences. Changes signaled a possible trend for living in lower density areas and increased migration outside of the metropolitan cores.

Taken together, these broad impacts, along with restrictions on immigration during the COVID-19 pandemic, contributed to a slight decline in population for the NYMTC region, compared to 2019 pre-pandemic figures. Despite this drop in population, much of the forecasting through 2055 assumes that each subregion will recover to its 2019 levels of population and resume some degree of pre-pandemic growth trend established in the late 2010s. Since 2022, population, employment, and overall traffic levels have rebounded. Depending on the metric and location, certain figures have neared, matched, or surpassed 2019 figures, indicating an overall recovery in relation to key transportation planning metrics.

By 2055, the region is expected to be home to a population of 26.1 million people, representing a population gain of 3.1 million over the 2022 base year, and 14.2 million jobs, an increase of 1.8 million from 2022.

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Beyond changes to the number and distribution of people and jobs in the NYMTC planning area, the pandemic significantly changed consumer behavior, with consumers engaging in much more e-commerce and home deliveries of hot prepared food, groceries, other perishable goods, and durable goods compared to before the pandemic. This will continue to significantly change decisions in the NYMTC planning area for warehouse siting, delivery routes, and implications for pollution and use of alternative last-mile delivery modes compared to what the case would have been with pre-pandemic consumer behaviors.

Generally, the NYMTC planning area will be best positioned from the perspectives of sustainability, efficiency, and workforce development to handle growth in freight needs if population growth and job growth are more centered on New York City, which can make use of existing active mode infrastructure, public transit assets, and high density to ensure continued efficiency in freight services. Significant suburbanization of urban-suburban mismatches between population and employment in the NYMTC planning area will require significant cooperation among local governments and potentially with the New York State government, and the neighboring states of New Jersey, Connecticut, and Pennsylvania, to ensure that the multi-state region's freight positioning remains competitive with the rest of the U.S.

Workforce development would also be made easier by further centralization of people and jobs in New York City, but tensions between technological developments in freight facilities, including automation of freight railroad operations, of freight railroad inspections, and of port operations, and current organized freight labor may complicate further long-range planning. If technological developments continue apace

without pushback from organized labor, then even education and training programs that account for these technological developments may end up educating or training potential freight workers for jobs that do not exist for very long afterwards. If organized labor pushes back enough to stall the deployment of such new technologies in freight facilities in the NYMTC planning area, then freight efficiency and sustainability may decrease in those facilities, putting them at a competitive disadvantage relative to other freight facilities in the U.S. with an attendant drop in demand.

Moreover, freight workers trained in the NYMTC planning area under the assumption of reduced deployment of automation technologies may be at a competitive disadvantage should they choose to move to other parts of the U.S. where such technologies are more widespread and standardized. Thus, it is incumbent on local governments in the NYMTC planning area, with NYMTC and New York State facilitating these collaborations, to work with each other, with freight operators, with local communities, and with organized labor to ensure mutually beneficial long-term solutions for stakeholders.



6

PERFORMANCE AND NEEDS

This section describes the deficiencies, requirements, and limitations of the freight transportation system in and around the NYMTC planning area, and to answer the question: “What needs to be accomplished in order to achieve the desired outcomes described in Section 1?” The needs assessment builds on the needs identified in previous planning cycles and studies which remain unresolved, or which have changed from global economic, demographic, technologic, or regulatory trends. Performance factors are discussed in this section and are crucial to the formulation of plan recommendations.

The performance of the modal networks and the intermodal facilities that connect them is critical to accomplishing safe, efficient, reliable, resilient, and fair freight transportation for the region.

Defining and assessing the NYMTC planning area’s freight transportation needs for the 2055 planning horizon has required reviewing the status of the planning area’s freight initiatives across the larger multi-state region along with identifying and cataloging key needs and deficiencies still to be addressed. Chapter 6 presents an overview of key performance indicators and needs for the region’s truck (i.e., roads and highways), ports and maritime, freight rail, air cargo, and land use systems organized around: 6.1: Truck-Related Performance and Needs; 6.2: Multimodal Freight Network Performance and Needs; 6.3: Warehouse, Distribution, and Land Use Needs; and 6.4: Multi-State Regional Planning Needs.

6.1 TRUCK-RELATED NETWORK PERFORMANCE AND NEEDS

This section addresses truck network performance and needs, i.e., the abilities and gaps of the NYMTC planning area's roads and highways for accommodating present and future truck freight demands. The analysis of truck network performance and needs must consider a broad range of factors. Some, such as infrastructure condition, safety, and resiliency, are addressed elsewhere in Moving Forward 2055. Section 6.1 supplements that material with analyses addressing truck bottlenecks and the impacts of related harmful air pollutants. Additional truck-related issues associated with access to multimodal facilities (ports, railyards, and airports) and logistics (warehouse/distribution, last-mile delivery, and truck operating restrictions) are addressed in Sections 6.2 and 6.3.

6.1.1 TRUCK MOBILITY: VOLUMES AND TRAVEL TIME RELIABILITY

This analysis identifies locations on the roadway network where the combination of high truck volumes and significant link-level delay and unreliability produce two effects: significant travel time delays for truck drivers and significant costs for freight customers due to delay and unreliability. The analysis culminates in the list of “truck mobility focus areas” in Table 6.1.

Why truck mobility matters: In some cases, roadway segments with significant delays may be lightly used by trucks due to location or operating restrictions.

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It is important to distinguish between performance issues that affect trucks and those that do not by understanding how truck travel is distributed over the network.

Why unreliability matters: Unreliability can have a bigger impact on freight operations than recurring congestion. If a highway segment is congested nearly every day, trucking companies and shippers plan their equipment and personnel utilization, pricing, and other strategies accounting for the impact of the congestion they experience on a regular basis. From a consumer's perspective, unreliability can affect the cost of goods, and whether goods are delivered to stores or e-commerce orders arrive at customers' doorsteps when expected and needed.

Congestion that occurs infrequently or irregularly is typically not planned for and can yield unexpected delays and costs.

TRUCK VOLUMES

As described in Section 4.1, the National Highway System, including Interstate highways, several major state highways and arterials, connectors to intermodal hubs such as marine terminals and rail transload facilities, and New York City's through truck routes, are key parts of the NYMTC planning area's freight network. The volume analysis presented in that section can be examined further to see the distribution of traffic by

different types of trucks. New York State DOT's Freight Atlas^{scv} shows average annual daily truck volumes for single unit trucks and combination trucks in 2022. Figure 41 shows examples of single unit and combination truck types.

A **single unit truck** is typically the smaller of the two configurations and has its power unit and chassis permanently attached to the vehicle. Examples include "box trucks," dump trucks, ready-mix concrete trucks, etc. These trucks are typically moving smaller-sized loads for shorter distances, e.g., to/from construction sites, performing store or last-mile deliveries, etc.

A **combination truck** has a power unit that is detachable from the vehicle(s) it is towing. Examples include a truck/trailer combination, truck/semi-trailer combination, or automobile carrier. These vehicle combinations are typically used to carry larger loads. Some combination truck trips may be short (e.g., moving a container load from a marine terminal to a nearby warehouse or distribution center), while others may be longer-distance trips to or from other regions of the country.

Figure 41 Single Unit vs. Combination Trucks



Single Unit Truck



Combination Truck

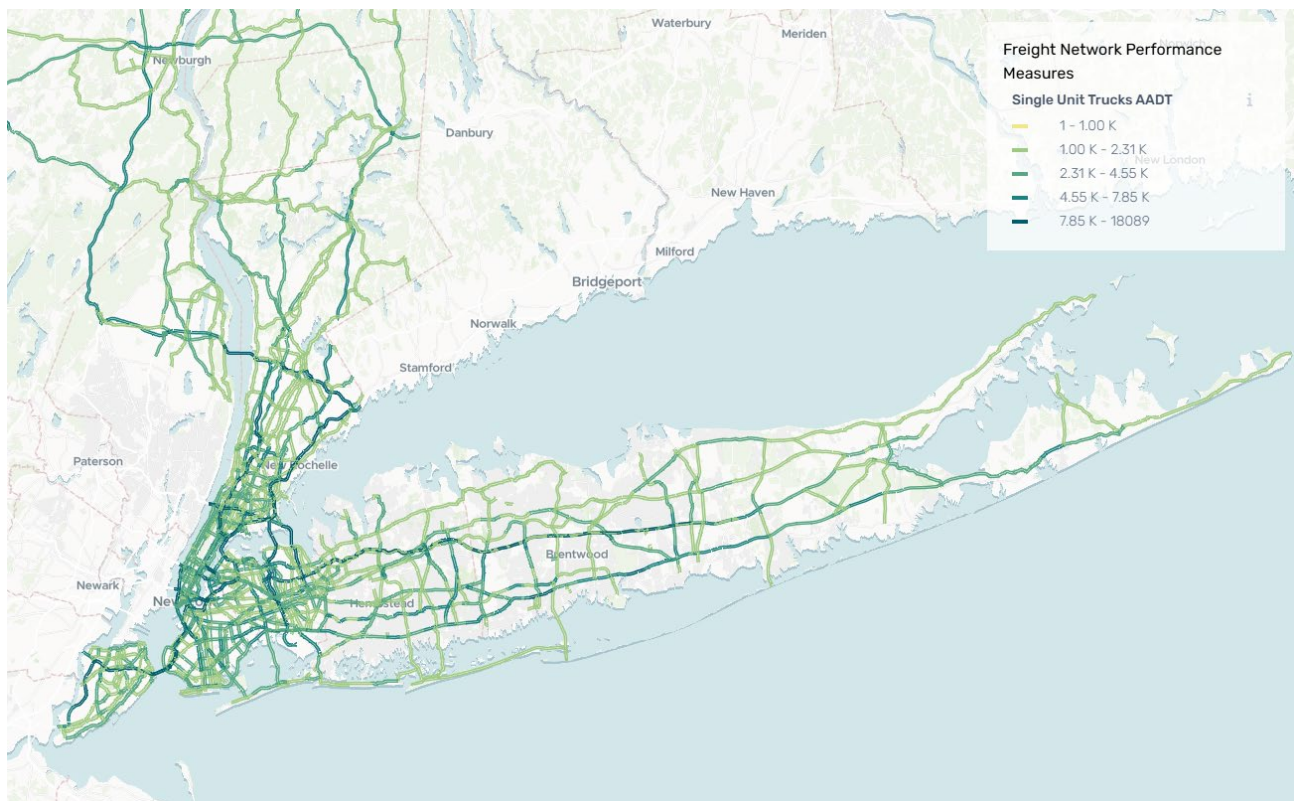
Source: Cambridge Systematics.

Figure 42 shows the average annual daily volume of single unit trucks on highways in the NYMTC planning area and surrounding areas of New York State in 2022. The George Washington Bridge carried the greatest volume of single unit trucks in the NYMTC planning area, averaging more than 18,000 per day in 2022. The Verrazano-Narrows Bridge carried nearly 12,000 single unit trucks per day, the Long Island Expressway carried 11,000, and the Gowanus Expressway in Brooklyn carried about 10,000. While the Mario Cuomo Bridge was the busiest link for combination trucks in the planning area, it only carried about 6,400 single unit trucks per day, on average, in 2022. The RFK Bridge and Queensboro/59th Street Bridge, both connecting Manhattan to other boroughs, carried greater volumes, 8,500 and 7,500, respectively.

Figure 43 shows the average annual daily volume of combination trucks on highways in the NYMTC planning area and surrounding areas of New York State in 2022. The Mario Cuomo Bridge carries the highest volume of combination trucks in the NYMTC planning area, averaging about 15,400 per day in 2022. Other high-volume segments for combination trucks include the Cross Bronx Expressway (over 13,000), George Washington Bridge (over 11,500), I-87 in Rockland County (approximately 10,000), and the Long Island Expressway in western Nassau County (approximately 10,000).

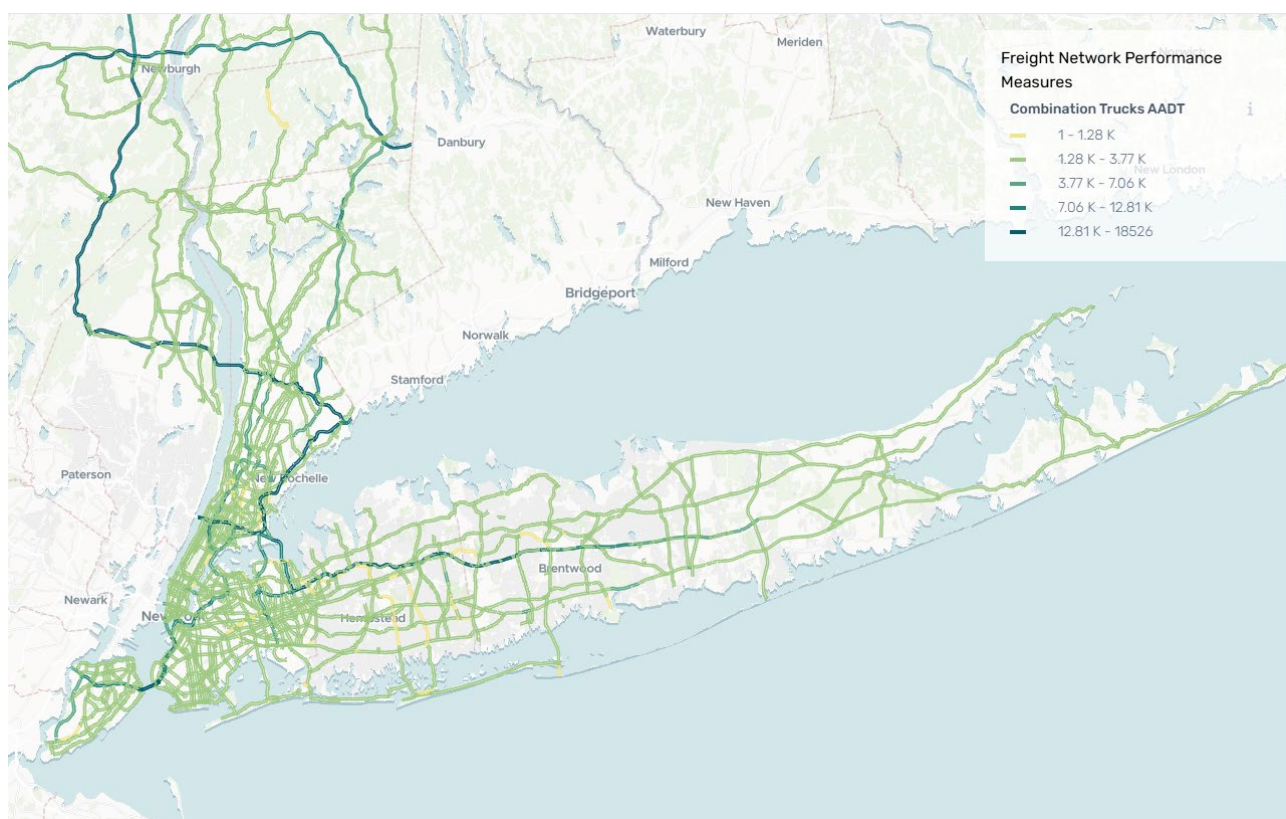
These observations suggest that combination trucks are traveling in greater numbers on interstate highways, particularly those that connect the NYMTC planning area with neighboring jurisdictions. Single unit trucks, meanwhile, are found in the greatest numbers on highway segments that provide access to or between New York City's five boroughs.

Figure 42 Average Annual Daily Single Unit Truck Volumes in and Surrounding the NYMTC Planning Area, 2022



Source: NYSDOT Freight Web Atlas.

Figure 43 Average Annual Daily Combination Truck Volumes in and Surrounding the NYMTC Planning Area, 2022



Source: NYSDOT Freight Web Atlas.

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TRUCK TRAVEL TIME RELIABILITY

Truck Travel Time Reliability (TTTR) represents truck travel time consistency or dependability from day to day or across different times of day calculated by dividing the 95th percentile travel time for a segment during peak travel times by the annual 50th percentile truck travel time. Benchmark TTTR values include:

- » **2.0 – mildly unreliable:** A reliability value of 2.0 suggests that, during the worst 5 percent of time periods, travel will take two times longer than the median travel time. A 30-minute trip may take 60 minutes to travel to be on time at least 95 percent of the time.
- » **4.0 – very unreliable:** A reliability value of 4.0 suggests that, during the worst 5 percent of time periods, travel will take four times longer than the median travel time. A 30-minute trip may take 120 minutes to travel to be on time at least 95 percent of the time.

The primary source of data used to determine the TTTR on highway segments in the region is the Albany Visualization and Informatics Labs System (AVAIL) tool. Developed by the State University of New York at Albany with funds from NYSDOT, AVAIL provides a web-based application to compile performance measures for the NYMTC planning area and its constituent counties and boroughs. It also provides visualization tools to define roadway network performance and analyze roadway corridors. AVAIL is sourced from the National Performance Management Research Data Set (NPMRDS). NPMRDS provides an

aggregated dataset compiled from data obtained from multiple sources, including mobile phones, vehicles, and portable navigation devices. Three different performance measures, described in subsequent sections, were obtained from AVAIL for the NYMTC planning area. AVAIL is being used to develop NYMTC's Congestion Management Process (CMP) Status Report for 2025.

The following paragraphs describe segments of the highway network that experience unreliable conditions for truck traffic during certain periods of the day or week. These segments are mapped by county/borough and time-of-day/week in Figure 44 through Figure 53. Note that large commercial vehicles are prohibited from traveling on parkways, as shown in Figure 19.

BRONX

Overall, the highest performance measures for TTTR occurred during the PM Peak and Off-Peak period, observed on segments of Bruckner Blvd, Southern Blvd, and Hutchinson River Pkwy.

The AM Peak TTTR has a high occurrence of mildly unreliable segments, especially along principal and minor arterials. This is more noticeable in the northern portion of the Bronx along the east-west connectors between I-87, the Bronx River Pkwy, and the Hutchinson Pkwy. The east-west connectors are less unreliable in the PM Peak compared to the AM Peak period, however, many other highway segments experience more unreliability during the PM Peak period, including segments that are concentrated around the interchanges between the Cross Bronx Expressway, I-678, Bruckner Blvd/I-278, and I-695.

Off-peak has a higher occurrence of highly unreliable segments compared to the AM and PM peak periods, though it is more concentrated on the major thoroughfares like the Cross Bronx Expressway, I-87, I-278/Bruckner Blvd, and the Hutchinson Pkwy. Like the AM Peak, the Weekend period has more mildly unreliable segments along the north-south principal arterials. There are spots of highly unreliable segments sporadically along I-87 south of US-1 and at the interchange with the Cross Bronx Expressway. Other notable unreliable segments include I-278/Bruckner Blvd and I-95/I-695 near north of the Hutchison Pkwy and around the Bruckner Blvd interchange.

BROOKLYN

Freight movement along Brooklyn's key corridors faces significant challenges across all time periods. During the AM Peak, I-278 exhibits moderate to high freight travel unreliability. East-west routes, including Atlantic Avenue, Jamaica Avenue, and Linden Blvd., also experience mild to moderate variability. In the PM Peak, freight unreliability intensifies along I-278 and Flatlands Avenue, with moderate unreliability observed on crosstown routes. The Off-Peak period sees moderate freight unreliability persisting along I-278 and key east-west routes, including Liberty Avenue. For the Weekend, freight travel faces unreliability along I-278, with moderate variability along Atlantic Avenue and Linden Blvd.

MANHATTAN

Freight travel faces significant unreliability along major north-south routes and key crosstown corridors, with the most unreliable segments concentrated on principal freight routes. During the AM Peak, moderate

unreliability is observed along NY-9A and crosstown routes. These patterns are likely driven by the convergence of freight and commuter traffic during peak hours.

The PM Peak period shows an increase in freight unreliability, particularly along NY-9A. Freight variability is further reflected along key crosstown corridors, where congestion at interchanges exacerbates unreliability. The Off-Peak period shows moderate freight unreliability along NY-9A, with variability influenced by local deliveries and through traffic. Crosstown corridors exhibit moderate unreliability, reflecting the continued presence of freight movements during midday hours. For the weekend, freight moderate unreliability persists along NY-9A and other key east-west routes like East 34th St and West St. These patterns reflect sustained freight activity despite reduced commuter traffic.

NASSAU COUNTY

Freight movement along key corridors in Nassau County faces notable challenges during the AM Peak, with I-495 experiencing moderate to high levels of unreliability near major interchanges and access points. Off-Peak periods present similar issues, with I-495 and NY-25A exhibiting moderate unreliability due to overlapping local and freight traffic demands. PM Peak unreliability for freight vehicles continue along I-495 and the NY-25A, reflecting shared roadway usage with commuter vehicles. Weekend freight reliability is inconsistent along I-495.

PUTNAM COUNTY

Freight movement in Putnam County is moderately affected by unreliability, particularly along I-84 and I-684 during the AM Peak period. The highest freight unreliability occurs near interchanges and major access points. In the PM Peak period, unreliability intensifies along I-684, NY-22 and US-6. During the Off-Peak period, moderate freight unreliability persists along US-6 and I-84. On weekends, freight reliability remains inconsistent along key corridors such as I-684 and I-84.

QUEENS

For the TTTR measurement during the AM Peak period Queens experiences a mix of mildly and highly unreliable travel segments, particularly on key corridors critical for both freight and commuter traffic. I-495 near the western portions of Queens displays highly unreliable segments, with TTTR values above 4. This severe unreliability indicates that during the worst 5 percent of travel times, freight vehicles and other traffic may face prolonged unreliability. The NY-25A and I-678 exhibit highly unreliable segments, particularly near their intersections with major roadways. Beyond these highly unreliable areas, several other corridors in Queens are classified as mildly unreliable, with TTTR values between 2 and 4.

During the Off-Peak period, Queens displays several segments with varying reliability levels. Highly unreliable segments with TTTR values above 4 are evident on key corridors such as I-495, particularly in the western sections. This suggests potential unreliability outside peak hours. Major roads like the I-678 and portions of the NY-25A near important intersections also exhibit high unreliability. Apart from these, several

other corridors across Queens are classified as mildly unreliable, with TTTR values between 2 and 4, suggesting moderately inconsistent travel times.

In the PM Peak period, travel reliability in Queens declines on certain key segments. The I-495, particularly in the western parts of the borough, as well as both the northbound and southbound segments of the I-678, shows high unreliability with elevated TTTR values. In addition, mildly unreliable corridors with TTTR values between 2 and 4 are spread throughout Queens.

On weekends, travel reliability in Queens shows distinct patterns with high unreliability on segments of the I-495, especially near busy interchanges, as well as on parts of I-678. These areas, marked with TTTR values above 4, indicate severe unreliability that could impact recreational and essential travel alike. Other segments, such as parts of the Union Turnpike and Cross Bay Blvd, fall into the mildly unreliable category, with TTTR values between 2 and 4. This suggests that weekend travel across these corridors can be moderately inconsistent.

ROCKLAND COUNTY

Freight reliability in Rockland County is most impacted along I-87/I-287 during the AM Peak period, where significant unreliability occurs near high-demand interchanges. Off-peak periods see mild to moderate unreliability for freight vehicles, particularly along NY-59. During the PM Peak are also mild to moderate unreliability on the I-87/I-287, US-202, and NY-59, with high variability near interchanges. Weekend freight reliability remains inconsistent along I-87/I-287 and NY-59.

STATEN ISLAND

Freight reliability is most impacted during the AM Peak period along I-278 in western and central Staten Island. Freight movements experience moderate unreliability, overlapping with commuter congestion. Victory Blvd also sees mild variability in freight movement. During the Off-Peak period, freight unreliability on I-278 are slightly reduced but still noticeable in central Staten Island.

In the PM Peak, freight travel is highly unreliable on I-278 and NY-440, with variability concentrated near major interchanges. Freight movements on Victory Blvd and Amboy Rd are mildly unreliable. The weekend period sees sustained freight unreliability on I-278 with secondary corridors like Richmond Ave and Hylan Blvd showing minimal impact.

SUFFOLK COUNTY

Freight reliability in Suffolk County faces significant challenges along I-495 and NY-27 during the AM Peak period, particularly near interchanges and densely developed areas. During the off-peak period, moderate unreliability is observed along NY-27 and I-495, likely reflecting a mix of local deliveries and through freight movement.

The PM Peak amplifies freight reliability issues, with I-495 and NY-27 exhibiting high variability due to shared commuter and freight usage. Weekend freight unreliability persist on NY-27.

WESTCHESTER COUNTY

Freight reliability in Westchester County is most impacted during the AM and PM Peak periods. Along I-287, freight movements face moderate unreliability due to congestion near interchanges. I-684 also experiences mild freight variability near its intersections with US-202 and local arterial roads.

During the off-peak period, freight unreliability slightly eases but is notable on the NY-9A. Key freight corridors like NY-119 and NY-22 also show minor variability during this period. The PM Peak period highlights significant freight travel issues on I-287 and Central Parkway Avenue. The weekend period shows fewer disruptions to freight, although some variability is observed along the I-95.

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Figure 44 Truck Travel Time Reliability, Bronx, 2023

Truck Travel Time Reliability
(AM Peak Period), Bronx
Source: AVAIL, 2023



Truck Travel Time Reliability
(PM Peak Period), Bronx
Source: AVAIL, 2023



Truck Travel Time Reliability
(Weekend Peak Period), Bronx
Source: AVAIL, 2023



Truck Travel Time Reliability
(Off Peak Period), Bronx
Source: AVAIL, 2023

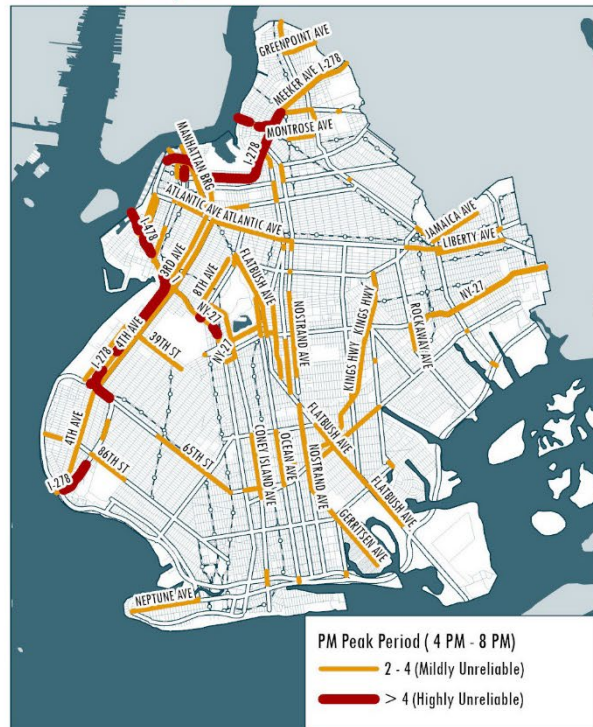


Figure 45 Truck Travel Time Reliability, Brooklyn, 2023**Truck Travel Time Reliability
(AM Peak Period), Brooklyn**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(PM Peak Period), Brooklyn**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(Weekend Peak Period), Brooklyn**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(Off Peak Period), Brooklyn**

Source: AVAIL, 2023



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Source: NYMTC Congestion Management Process Status Report, 2025.

**Truck Travel Time Reliability
(AM Peak Period), Manhattan**
Source: AVAIL, 2023



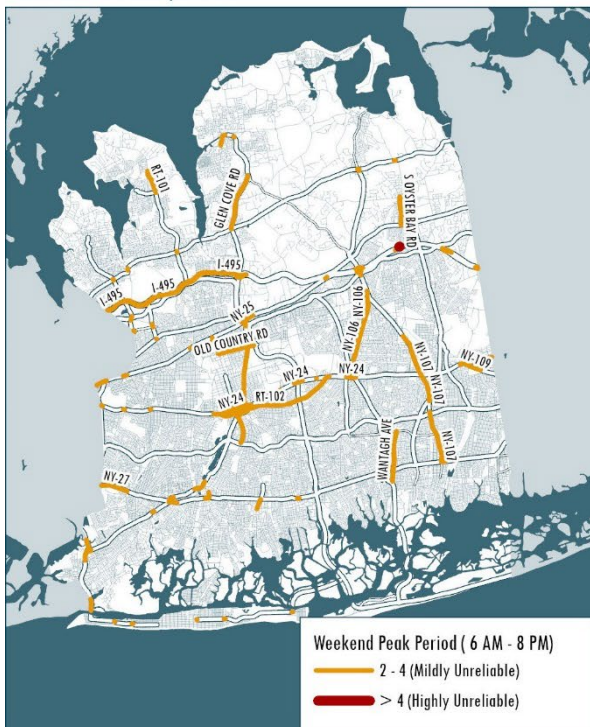
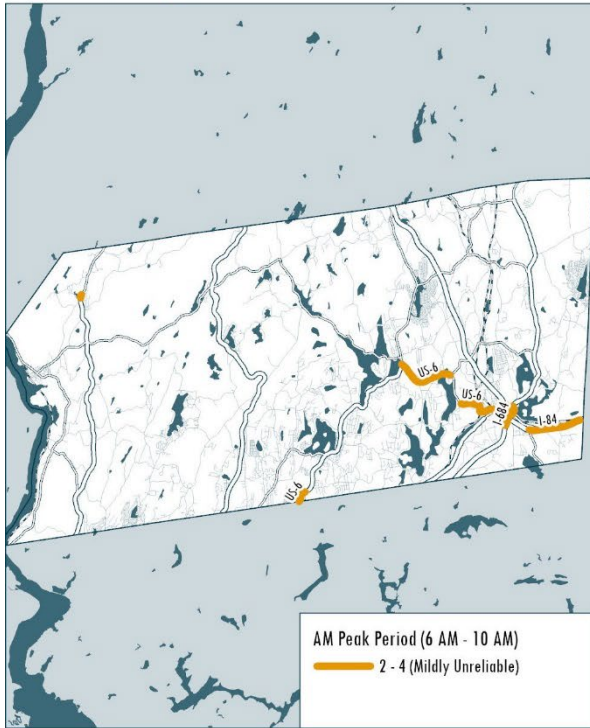
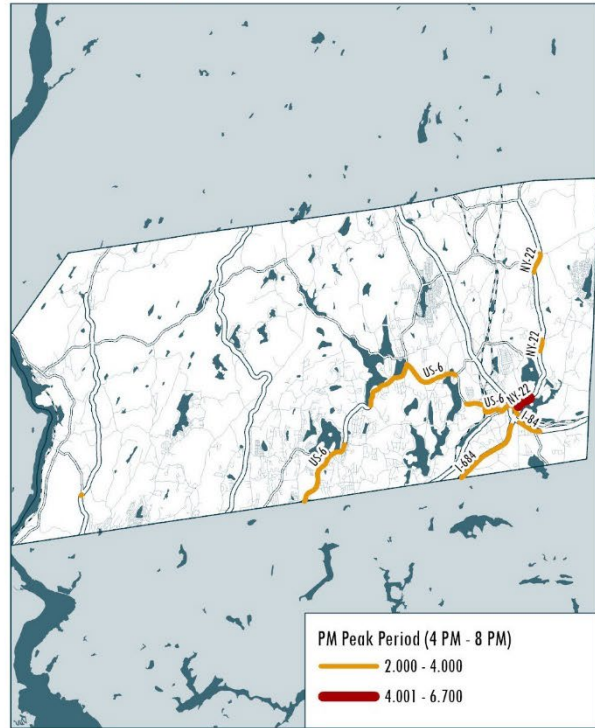
Figure 47 Truck Travel Time Reliability, Nassau County, 2023**Truck Travel Time Reliability
(AM Peak Period), Nassau County***Source: AVAIL, 2023***Truck Travel Time Reliability
(Weekend Peak Period), Nassau County***Source: AVAIL, 2023***Truck Travel Time Reliability
(PM Peak Period), Nassau County***Source: AVAIL, 2023*

Figure 48 Truck Travel Time Reliability, Putnam County, 2023

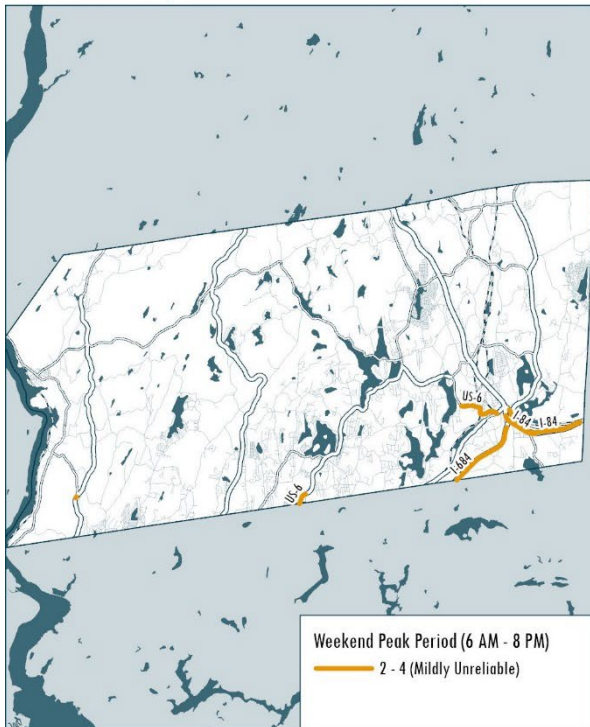
Truck Travel Time Reliability
(AM Peak Period), Putnam County
Source: AVAIL, 2023



Truck Travel Time Reliability
(PM Peak Period), Putnam County
Source: AVAIL, 2023



Truck Travel Time Reliability
(Weekend Peak Period), Putnam County
Source: AVAIL, 2023



Truck Travel Time Reliability
(Off Peak Period), Putnam County
Source: AVAIL, 2023

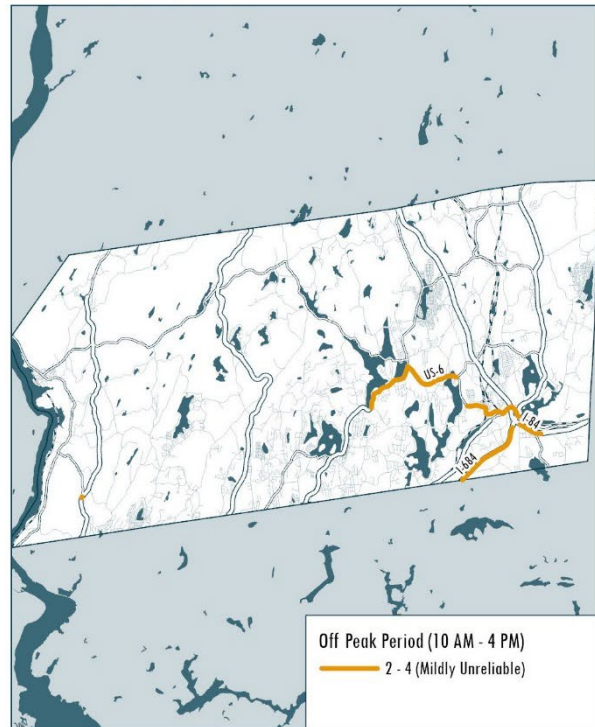


Figure 49 Truck Travel Time Reliability, Queens, 2023**Truck Travel Time Reliability
(AM Peak Period), Queens**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(PM Peak Period), Queens**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(Weekend Peak Period), Queens**

Source: AVAIL, 2023

**Truck Travel Time Reliability
(Off Peak Period), Queens**

Source: AVAIL, 2023

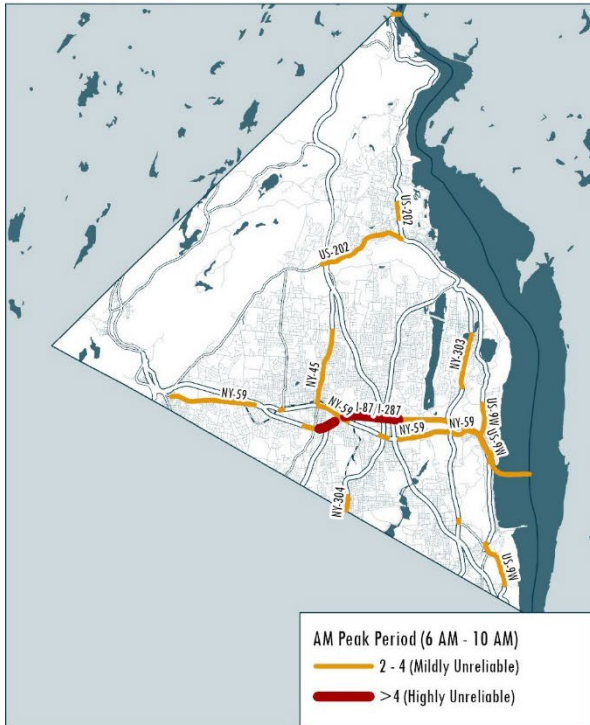


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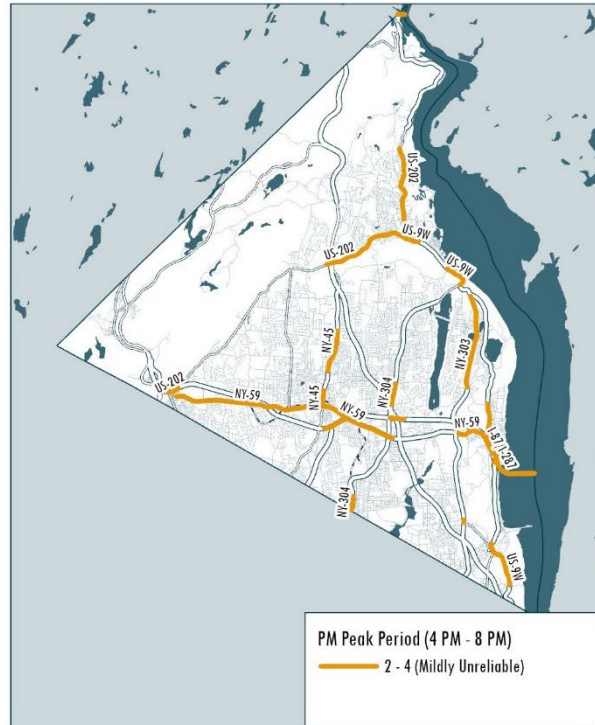
Source: NYMTC Congestion Management Process Status Report, 2025.

Figure 50 Truck Travel Time Reliability, Rockland County, 2023

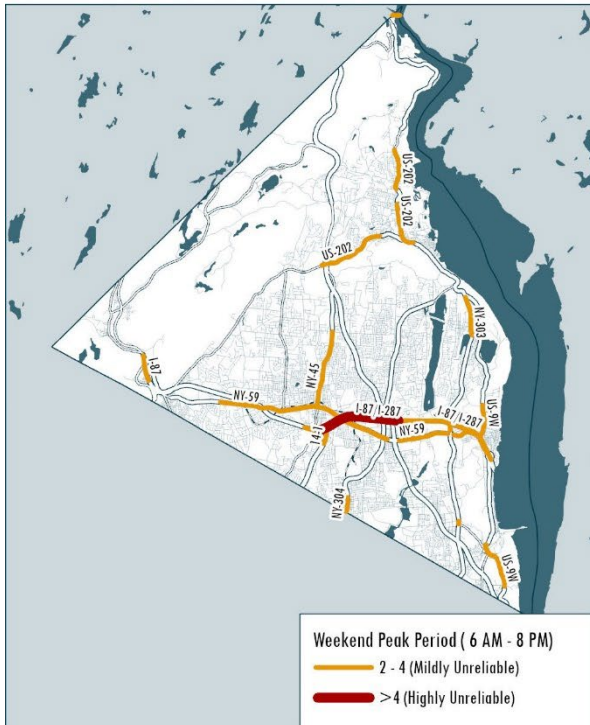
**Truck Travel Time Reliability
(AM Peak Period), Rockland County**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(PM Peak Period), Rockland County**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(Weekend Peak Period), Rockland County**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(Off Peak Period), Rockland County**
Source: AVAIL, 2023

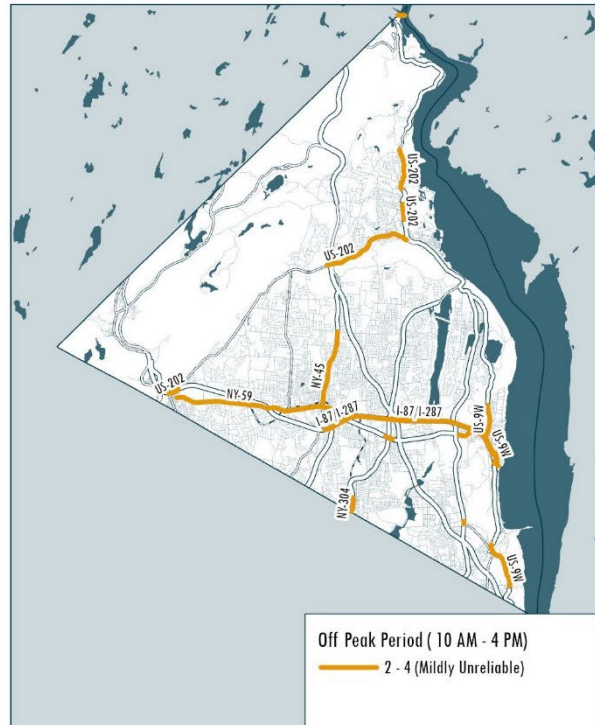


Figure 51 Truck Travel Time Reliability, Staten Island, 2023

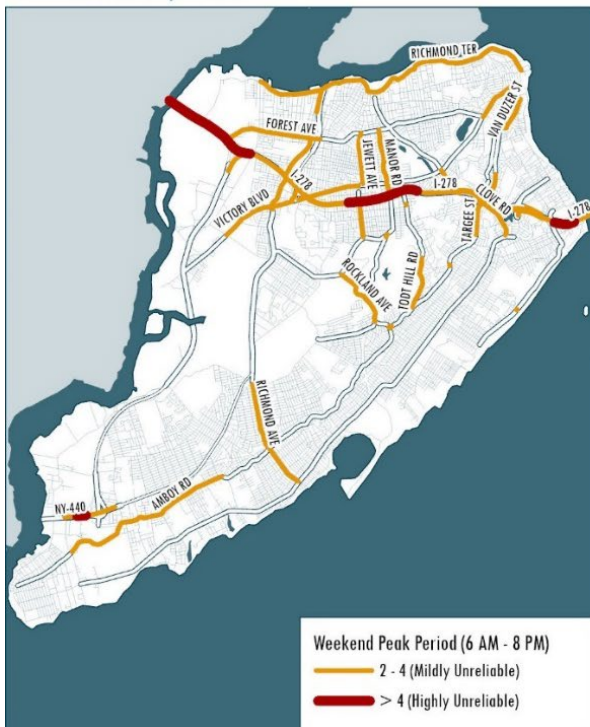
**Truck Travel Time Reliability
(AM Peak Period), Staten Island**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(PM Peak Period), Staten Island**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(Weekend Peak Period), Staten Island**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(Off Peak Period), Staten Island**
Source: AVAIL, 2023



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Source: NYMTC Congestion Management Process Status Report, 2025.

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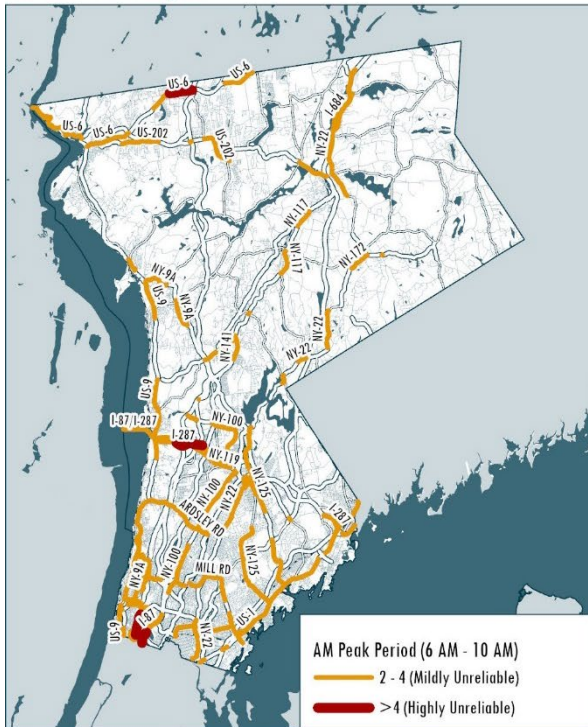
Off Peak Period (10 AM - 4 PM)

- 2 - 4 (Mildly Unreliable)
- >4 (Highly Unreliable)

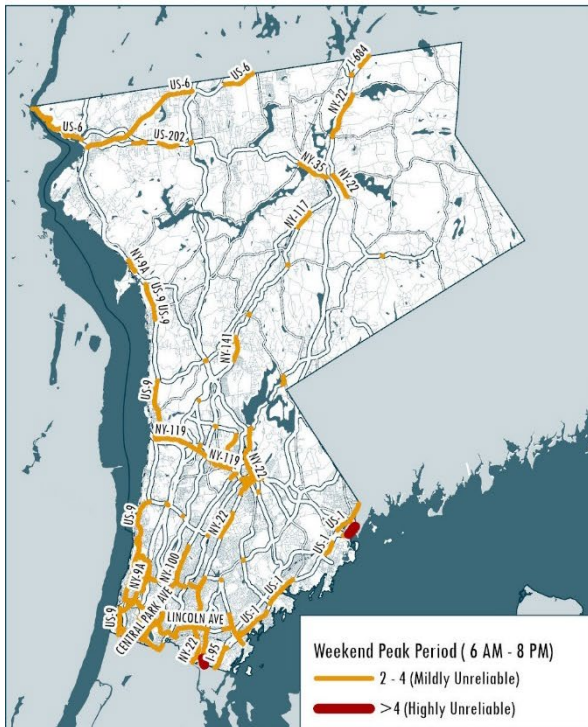
Source: NYMTC Congestion Management Process Status Report, 2025.

Figure 53 Truck Travel Time Reliability, Westchester County, 2023

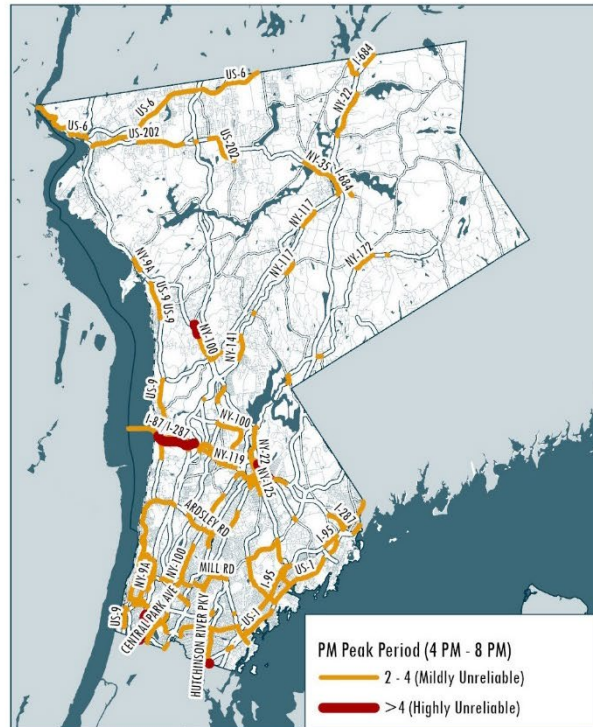
**Truck Travel Time Reliability
(AM Peak Period), Westchester County**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(Weekend Peak Period), Westchester County**
Source: AVAIL, 2023



**Truck Travel Time Reliability
(PM Peak Period), Westchester County**
Source: AVAIL, 2023



Among the highway segments experiencing truck travel time reliability issues, coupled with high volumes of single unit and/or combination trucks (>5,000 per day), Table 6.1 lists 27 truck mobility focus areas in the NYMTC planning area where these conditions are observed. The table includes average annual daily truck volumes sourced from the New York State Freight Atlas and indicators where morning (AM), evening (PM), weekend, and/or off-peak truck travel time reliability indices exceed 4.0 (very unreliable).cxvi

Table 24 Truck Mobility Focus Areas in the NYMTC Planning Area

County or Borough	Segment	Single Unit Truck AADT	Combination Truck AADT	Total Truck AADT	AM Peak Period TTTR > 4.0	PM Peak Period TTTR > 4.0	Weekend Peak Period TTTR > 4.0	Off-Peak Period TTTR > 4.0
Bronx	New England Thruway (I-95) between I-295 and Westchester Ave.	10,095	10,316	20,411	✓	✓	✓	✓
Bronx	Cross Bronx Expressway (I-95) between I-278 and I-895)	7,425	11,960	19,385		✓	✓	✓
Bronx	Throgs Neck Expressway (I-295) between I-695 and Throgs Neck Bridge)	5,783	7,812	13,595	✓	✓	✓	✓
Bronx	Major Deegan (I-87) between I-95 and Fordham Rd	8,205	3,552	11,757		✓	✓	✓
Bronx	Bruckner (I-278) between I-95 and I-895)	9,507	2,089	11,596	✓	✓	✓	✓
Bronx	I-678 between I-295 and Whitestone Bridge	6,521	3,366	9,887	✓	✓	✓	✓
Bronx	Major Deegan (I-87) between I-278 and Willis Ave	7,122	2,542	9,664	✓	✓	✓	✓
Bronx	I-278, RFK Bridge	5,401	3,447	8,848		✓		✓
Brooklyn	I-278 between Flushing Ave and Wythe Ave	12,918	5,145	18,063	✓	✓	✓	✓
Brooklyn	I-278 between Belt Parkway and I-478	10,073	4,822	14,895	✓	✓	✓	✓
Brooklyn	I-278 between Verrazano-Narrows Bridge and 3rd Ave	8,438	5,269	13,707	✓	✓	✓	✓
Manhattan	I-278 (RFK Bridge) on Randalls Island	8,499	2,238	10,737		✓		✓
Manhattan	59th Street/Queensboro Bridge	6,868	861	7,729	✓			✓
Nassau County	I-495 between Oyster Bay Rd and Suffolk County border	11,670	8,134	19,804	✓		✓	
Nassau County	I-495 between Queens border and Middle Neck Rd	9,428	6,911	16,339	✓			✓
Queens	I-495 between Cross Island Parkway and Nassau County border	11,424	10,298	21,722				✓
Queens	I-295 between Cross Island Parkway and I-495	7,462	6,472	13,934				✓

County or Borough	Segment	Single Unit Truck AADT	Combination Truck AADT	Total Truck AADT	AM Peak Period TTTR > 4.0	PM Peak Period TTTR > 4.0	Weekend Peak Period TTTR > 4.0	Off-Peak Period TTTR > 4.0
Queens	I-495 between 108th St. and Kissena Blvd.	8,847	4,010	12,857	✓	✓		✓
Queens	I-678 between Queens Blvd. and Northern Blvd.	9,129	3,371	12,500		✓	✓	✓
Queens	I-678 between Cross Island Pkwy and College Point Blvd.	5,867	2,461	8,328	✓	✓	✓	✓
Rockland	I-87/287 between Garden State Parkway and Palisades Interstate Parkway	4,448	9,731	14,179	✓		✓	
Staten Island	I-278 between Goethals Bridge and Richmond Ave.	8,827	5,015	13,842	✓	✓	✓	✓
Staten Island	I-278 between Jewett Ave. and Verrazano-Narrows Bridge	11,633	7,425	19,058	✓	✓	✓	✓
Suffolk	I-495 between Sagtikos Parkway and NY-111	8,289	6,076	14,365		✓		
Suffolk	I-495 between NY-454 and Nicolls Rd.	7,470	5,476	12,946	✓	✓	✓	✓
Westchester	I-287 between US-9 and NY-9A	4,647	9,635	14,282	✓	✓		
Westchester	I-87 between Bronx border and Yonkers Ave.	5,709	3,153	8,862	✓	✓		✓

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Source: Analysis of the NYSDOT Freight Atlas and AVAIL Tool performed by Cambridge Systematics.

Note: Truck Mobility Focus Areas are defined as highway segments where average annual daily truck traffic (AADTT) volumes exceeding 5,000 single unit and/or combination trucks, and “very unreliable” truck travel times (i.e., truck travel time reliability index exceeding 4.0) are observed in combination. The table lists the truck volumes and time(s) of day when very unreliable truck travel times are observed.

Needs related to truck bottlenecks include could be addressed by:

- » Exploring potential management and/or capital improvements to address causes of non-recurring congestion at bottleneck locations;
- » Reducing dependence upon trucking, by promoting the development of maritime and rail as modal alternatives, where possible;
- » Continuing to promote demand-management strategies, such as New York City's Off-Hours Delivery Program.

6.1.2 POLLUTION CAUSED BY TRUCKS

Traffic congestion on the truck route network creates delays in the movement of freight, which translate directly into costs for freight shippers and receivers, which can be passed on to consumers. Freight movement by truck creates other types of impacts, including societal impacts, such as vehicular pollutants and noise, increases in traffic congestion, vehicular safety issues, and infrastructure wear and tear. Reducing truck delay due to traffic congestion is one strategy to reduce vehicular pollution—the less time trucks spend on the road, and the less start-and-stop movements they perform, the lower the pollution. However, congestion reduction on truck routes is only one potential avenue for addressing truck pollution, and others will be needed.

Road transportation, in particular, makes up about 80 percent of transportation-related pollution and 19 percent of total pollution in the State of New York (see Figure 54), as measured in millions of metric tons of carbon dioxide equivalents. Road emissions have decreased by about 12 percent between 2018 and 2022, in part due to travel impacts associated with the COVID-19 pandemic. Diesel, the predominant fuel source used for heavy duty trucks, represented 23 percent of transportation sector pollution.^{cxvii}

Figure 54 Transportation Sector Pollution in New York State, 1990-2022, in millions of metric tons of carbon dioxide equivalents (mmt CO₂e)

Emission Category	1990	2005	2018	2019	2020	2021	2022
Road	60.21	74.86	64.51	64.51	52.99	56.48	57.18
Non-Road	9.81	11.59	12.64	13.43	9.51	11.77	13.59
Aviation	5.90	6.69	7.12	7.34	3.65	5.32	6.79
Rail	0.12	0.85	0.50	0.58	0.47	0.54	0.61
Marine	0.45	0.61	0.74	0.80	0.88	1.01	0.80
Other Transportation	3.19	2.98	3.10	3.37	3.31	3.24	3.54
Pipeline	0.26	0.57	1.45	1.64	1.47	1.96	2.18
Gross Total	70.13	86.55	77.43	78.24	62.76	68.54	71.10

Note: Totals may not sum due to independent rounding.

Source: 2024 Statewide GHG Emissions Report, NYS Department of Environmental Conservation

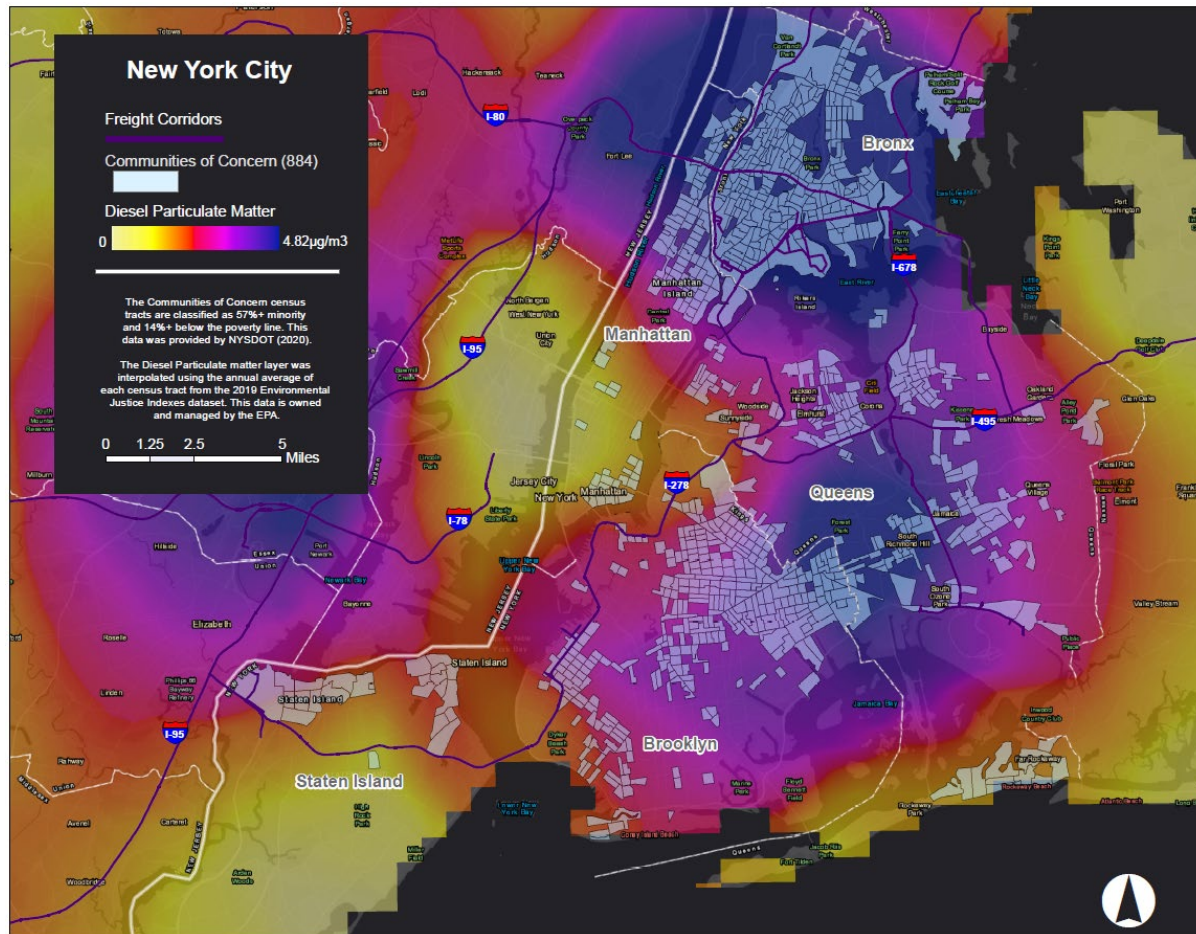
Because trucks have run predominantly on petroleum diesel for decades, they have contributed to pockets of high exposure to vehicular pollutants in communities near major roadways that serve as truck routes. Communities of Concern are those which NYMTC has delineated based on its non-discrimination program. Many of these communities are disproportionately burdened by these pollutants based on their location, suffering higher rates of exposure to vehicular pollutants without necessarily benefiting economically from the freight movements that contribute to the pollution burdens and exposure to diesel particulates specific to trucks. For more information on truck movement around the NYMTC planning area, refer to the Moving Forward 2055 interactive map [here](#).

Shifting a portion of current and future freight movement from on-road trucks to inherently more fuel-efficient modes on a per ton-mile basis, like rail and barge, can help to reduce the effects of freight transportation pollution. However, because trucks offer travel time, door-to-door service, and cost advantages for many types of movements, most freight movements are likely to be transported by trucks for the foreseeable future.^{cxviii} Therefore, it is especially imperative to transition trucks to cleaner energy sources. Facilitating a transition to alternative fuels, through strategic investments in supporting infrastructure, presents an exciting opportunity to improve air quality. Some of the key characteristics of pollution from diesel engines in the multi-state region include:

- » Compared to the rest of the nation, the greater New York City metropolitan region has high concentrations of diesel pollution, which has a strong and negative impact on the health of its citizens largely owing to the fine particulate matter in diesel exhaust. The most impacted areas appear as pollution “hotspots” corresponding to the most urbanized and/or port areas, namely New York City, Newark, New Haven, Hartford, and Bridgeport;
- » Diesel pollution disproportionately impact the Communities of Concern described above based on their locations near transportation infrastructure and major truck routes. Figure 55 through Figure 57 display the spatial relationships between these communities
- » Measures to reduce diesel pollution in the most highly urbanized and polluted areas of the NYMTC planning area, such as recommending the placement of alternative fueling infrastructure in industrial zones within New York City, will have the greatest potential to mitigate the negative impacts of particulate matter from diesel exhaust on Communities of Concern;
- » Although there is significant policy support for diesel alternatives within the multi-state region, policy emphases can change over time and additional actions must be taken to achieve the policy objectives (for pollution, air quality, and ZEV sales) of the states and cities in this region.

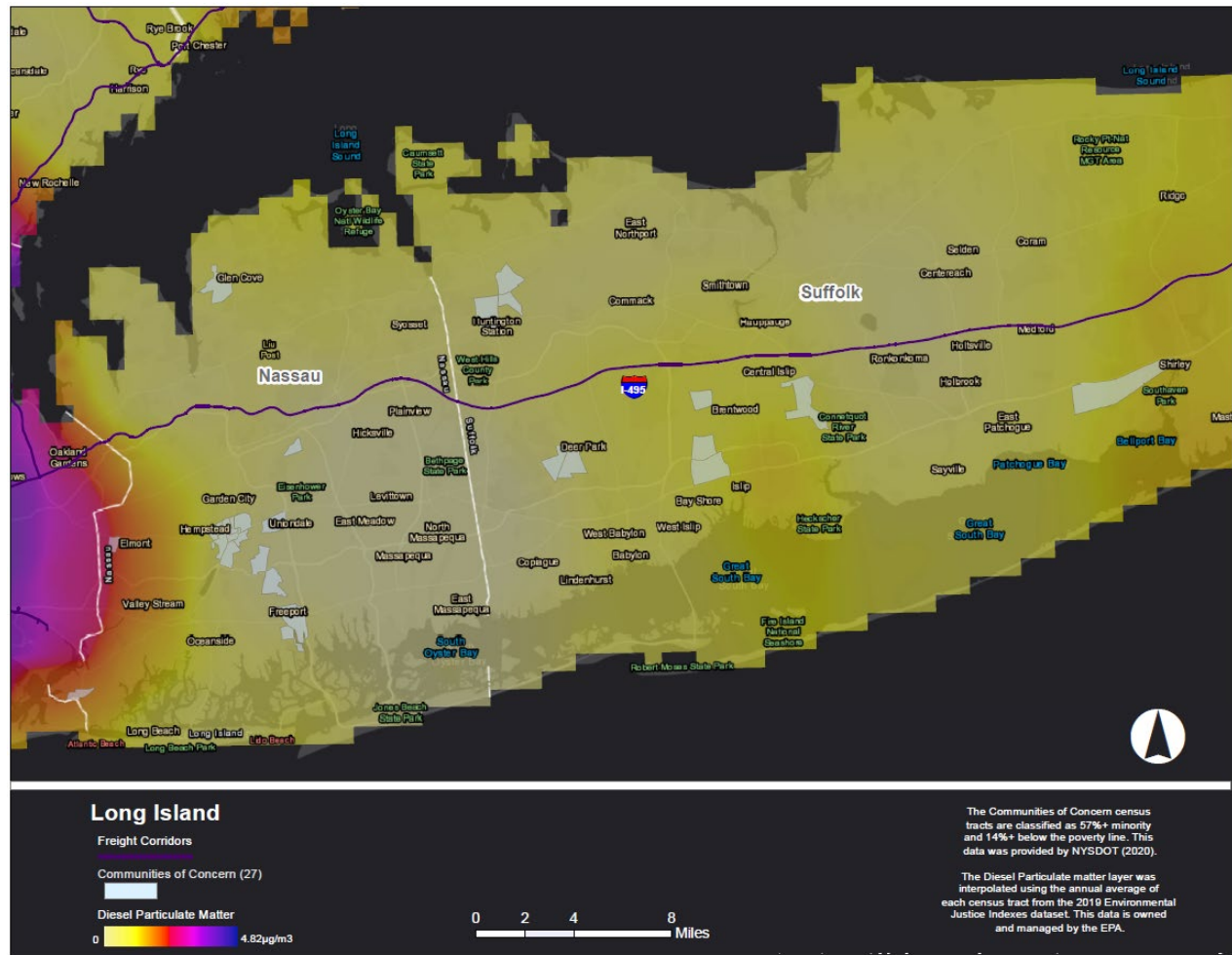
Intensity of air pollution caused by diesel particulate matter compared to the location of communities of concern by subregion is presented in Figure 55, Figure 56, and Figure 57.

Figure 55 Communities of Concern and Diesel Particulate Matter: New York City



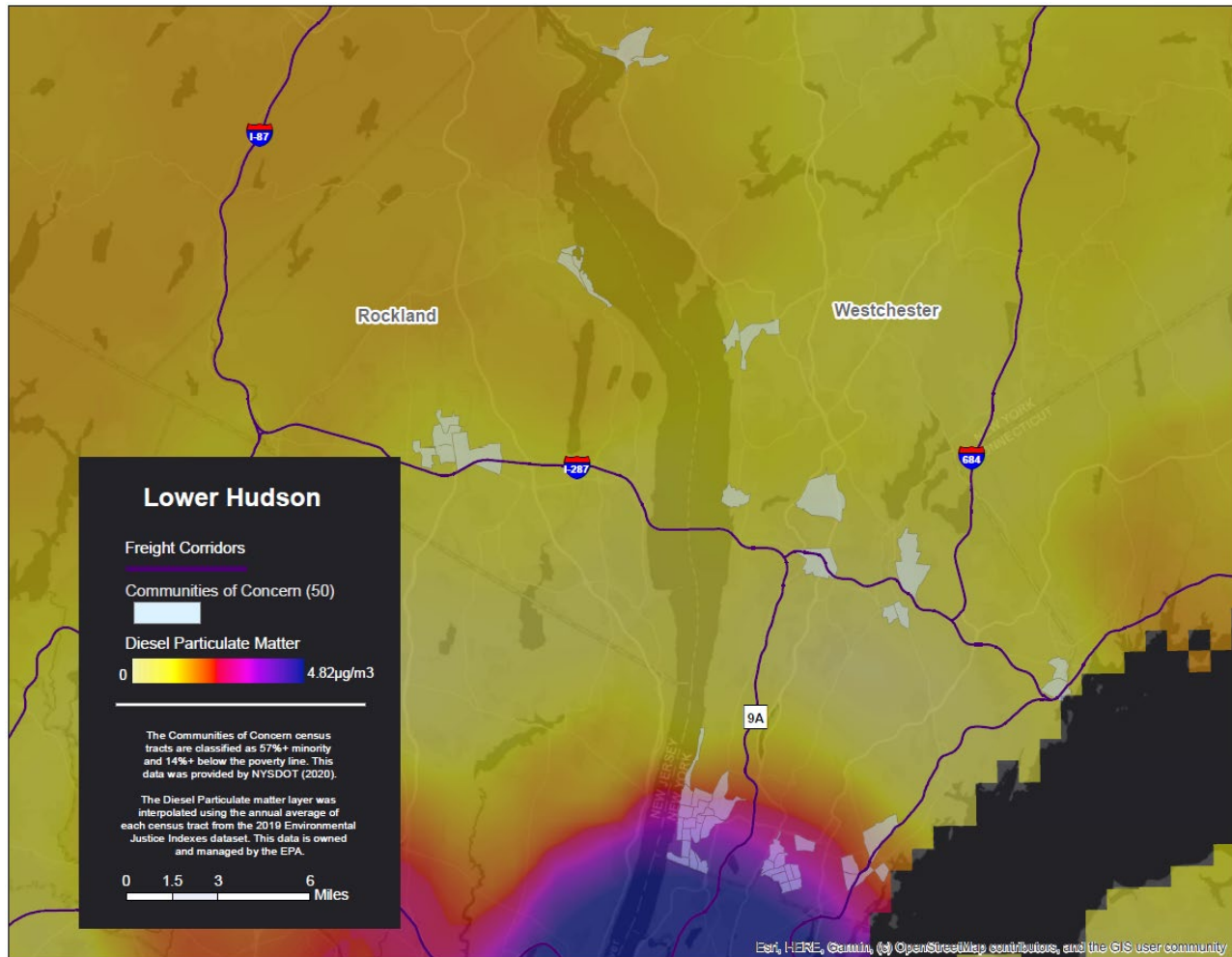
Source: NYMTC Clean Freight Corridors Planning Study, 2022

Figure 56 Communities of Concern and Diesel Particulate Matter: Long Island



Source: NYMTC Clean Freight Corridors Planning Study, 2022

Figure 57 Communities of Concern and Diesel Particulate Matter: Lower Hudson Valley



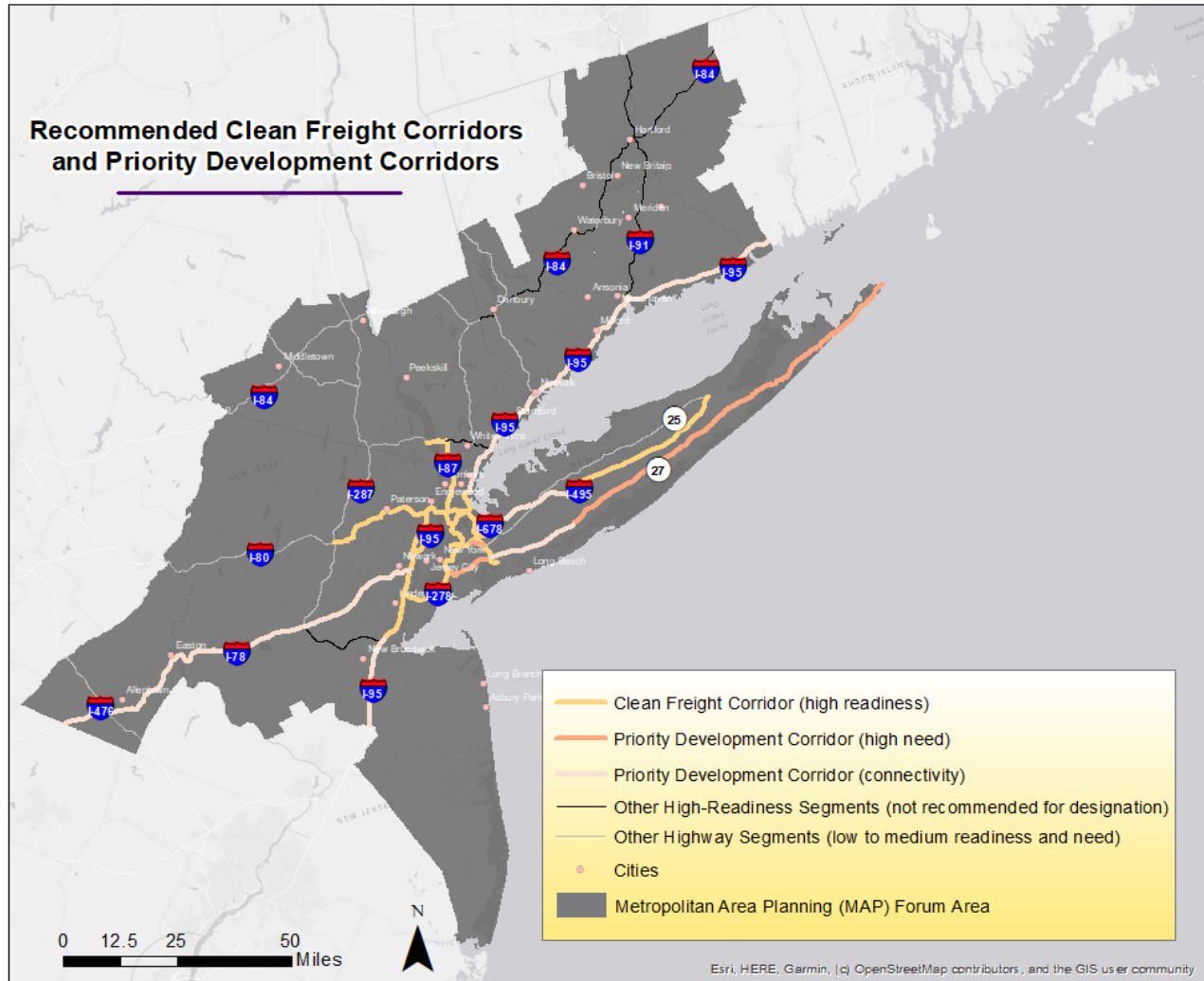
Source: NYMTC Clean Freight Corridors Planning Study, 2022

NYMTC's Clean Freight Corridors Planning Study calculated a corridor readiness score for each fuel type drawn from three weighted variables: fuel station coverage, proximity to freight demand clusters, and existing truck volume. In addition to the readiness score, a score was developed to estimate each corridor's need for clean fueling infrastructure. The need score included projected demand for each fuel type, as well as air quality in census tracts adjacent to the segment, based on diesel particulate pollution.

Eight corridors that ranked as high readiness and high need for two or more fuel types were designated as the strongest candidates for Clean Freight Corridor development. An additional three segments that ranked high in need for multiple fuel types, but low in readiness, were considered priorities for development of new fueling and/or electric charging capacity. The table also includes segments that should be considered for priority development to ensure a complete and connected network of infrastructure. The priority corridors for high readiness, high need, and/or connectivity are mapped in Figure 58 and listed in their respective priority groups in Table 6.2. Together, these corridors were recommended as the highest priority for

developing electric charging and/or alternative fueling stations to support the transition of medium- and heavy-duty trucks to non-diesel energy.

Figure 58 Clean Freight Corridors Planning Study: Recommended Clean Freight Corridors and Priority Development Corridors



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Source: NYMTC Clean Freight Corridors Planning Study, 2022

Table 25 Recommended Clean Freight Corridors and Priority Development Corridors

Corridor	Highway	Segment	High Readiness				High Need		
			EV	H2	CNG	LPG	EV	H2	CNG
Clean Freight Corridor (High Readiness, High Need)	I-278	Total length	X	X			X	X	X
	I-495	Queens	X	X	X		X	X	X
	I-495	Suffolk	X	X	X	X	X	X	X
	I-678	Total length	X		X		X	X	X
	I-80	New Jersey (east of 287)	X	X		X			
	I-87	Westchester and Bronx	X	X	X		X	X	X
	I-95	New Jersey (north of Exit 10)	X	X	X	X	X	X	X
	I-95	Manhattan and Bronx	X	X	X		X	X	X
Priority Development Corridor (High Need, Low Readiness)	NY 25	Queens			X		X	X	X
	NY 27	Kings and Queens			X		X	X	X
	NY 27	Suffolk					X	X	X
Priority Development Corridor (Connectivity)	I-95	New Jersey (south of Exit 10)	X			X			
	I-95	Westchester		X					
	I-95	Fairfield County				X			
	I-95	New Haven County							
	I-495	Nassau			X	X			
	I-78	Pennsylvania				X			
	I-78	New Jersey (east of 287)							
	I-78	New Jersey (west of 297)							
	NY 27	Nassau		X					
Other High Readiness Segments (not designated)	I-84	Connecticut		X		X			
	I-287	New Jersey (east of 78)	X						
	I-287	Rockland and Westchester			X				
	I-91	Connecticut				X			

Source: NYMTC Clean Freight Corridors Planning Study, 2022.

The following actions are needed to address pollution sourced from trucks, and their effects:

- » Address the recommended Clean Freight Corridors, by facilitating the development of electric charging and/or alternative fuel stations
- » Incorporate, where possible, fast charging and/or alternative fuel stations at existing or planned truck stops and fueling stations, and at large-scale industrial development sites; and
- » Continue and/or expand federal, state, and local programs, including NYC DOT's Clean Trucks Program described in Section 5.2, that help trucking companies transition their fleets to electric or alternative fuel vehicles. The NYC Clean Trucks Program can serve as a model for other jurisdictions and agencies in the planning area; and

Promote the use of alternative vehicles and modes (e.g., rail for long-distance moves or cargo cycles for last-mile deliveries) to reduce truck trips and associated pollutants.

6.1.3 TRUCK PARKING

The multi-state region has a limited supply of designated and safe truck parking areas, which creates a challenge for truck drivers seeking a place to park and rest. Truck drivers are required to comply with Federal Hours of Service requirements, which limit the number of consecutive hours drivers may be working behind the wheel. These regulations are in place to avoid situations in which drivers are fatigued while operating their vehicles.

In the NYMTC planning area, truck parking facilities on or immediately adjacent to major highways, include:

- » JFK Travel Plaza on the grounds of JFK Airport;
- » New York State Thruway travel plazas in Ardsley, Sloatsburg, and Ramapo;
- » I-684 rest areas in Brewster and Bedford;
- » Truck parking area on I-495 west by Exit 56 in Hauppauge;
- » Truck parking area I-495 east by exit 66 in Yaphank;
- » Truck parking area by Outerbridge in Staten Island.

Truck drivers may also find parking opportunities at commercial truck stops. In addition, some warehouses and other businesses that receive deliveries by truck may allow truck drivers who are delivering or picking up loads may also allow truck drivers to park and rest. Truck drivers going to or coming from parts of the NYMTC planning area may also seek limited parking spaces at rest areas and other facilities outside the area, such as along the New York State Thruway system, New Jersey Turnpike service areas, other designated areas along Interstate highways, and off-highway commercial truck stops throughout the multi-state region.

The Truck Parking Study completed as part of the New York State Freight Plan estimated that designated truck parking areas are not meeting demand for truck parking.^{cxix} The limited parking supply contributes to observed instances of trucks parking in inappropriate and unsafe locations, such as along highway entry

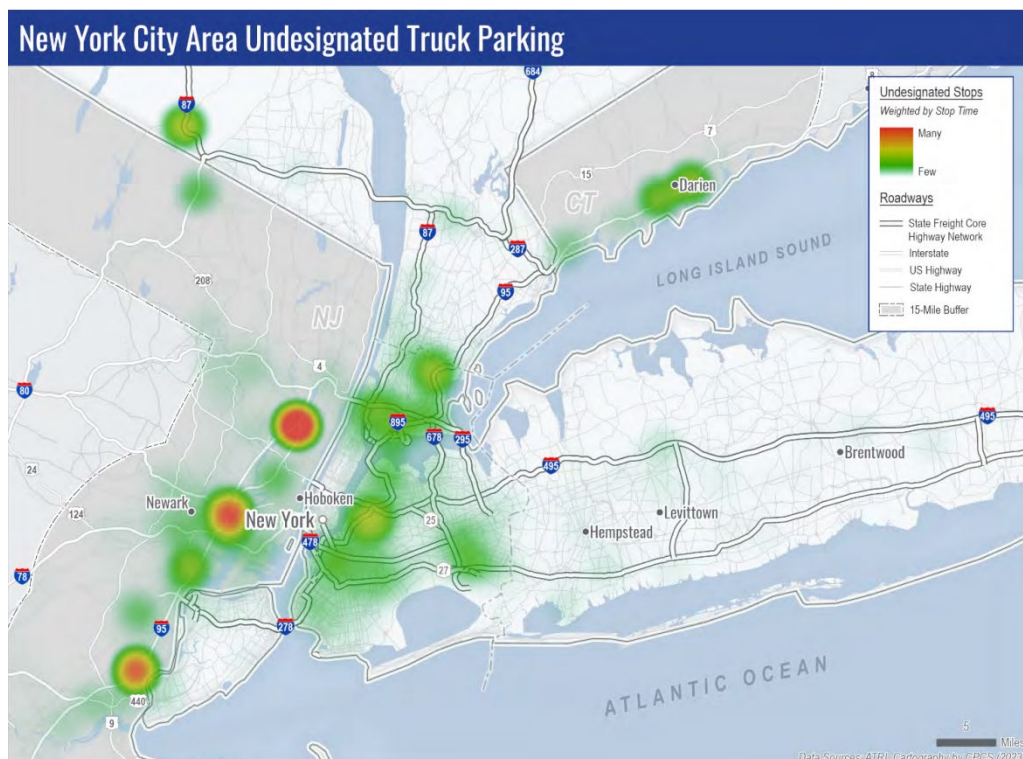
and exit ramps, in road shoulders, or along residential streets. Figure 59, an excerpt from the New York State Freight Plan, shows locations where trucks were observed parking in areas that are not designated as truck parking areas (i.e., truck stops, rest areas, service plazas, etc.) during a four-month observation period in 2022. This improper parking can create unsafe conditions, such as reducing visibility for other motorists.

In September 2023, the New York City Council passed a bill mandating the provision of three off-street parking facilities for tractor-trailer trucks on City-owned property by 2026. The City is also launching a pilot program to allow overnight truck parking in metered parking spaces in three Industrial Business Zones in Brooklyn, The Bronx, and Queens. Truck operators will be able to use the ParkNYC app to pay for parking, which will be available 24 hours a day in eight-hour increments at \$10 for each 8-hour session Monday through Saturday (there is no payment for parking citywide on Sundays).^{cxx} In November 2023, the PANYNJ approved a lease for a new truck parking facility that will triple the truck parking capacity at JFK Airport.^{cxxi}

Several needs have been identified to address truck parking shortfall relative to demand and to keep streets and highways safe for all users which include:

- » Continue to identify opportunities to develop truck parking supply on municipal or state-owned land and as part of private development, where and when possible;
- » Use data and information systems to share real-time truck parking availability with drivers who need this information; and
- » Reduce the impact and incidence of overnight truck parking in residential communities.

Figure 59 Undesignated Truck Parking in the New York City Area



Source: Appendix E: Truck Parking Study, New York State Freight Plan, 2024

6.1.4 TRUCK MANAGEMENT AND OTHER TRUCK-RELATED NEEDS

Truck management includes strategies that address safety, efficiency, sustainability, and improved cooperation between the public sector that manages the highway transportation system, and the private motor carriers and shippers that use the system. New York City's *Delivering New York: A Smart Truck Management Plan for New York City* outlines strategies and actions to advance safe, sustainable, fair, and efficient last-mile freight delivery system. The list of needs below includes needs derived from the City's plan. While some of these findings are relevant primarily in urban areas, many apply to the entire NYMTC planning area.cxxii

Other issues, such as driver shortages, long recognized as a major challenge for the trucking industry, have become even more acute in the aftermath of the pandemic, particularly for long-haul truck operators. The public sector cannot be responsible for private business labor issues or practices, but it can work to understand and assist in addressing factors contributing to truck driver shortages because labor failures that affect this critical service have significant negative public impacts on the region's producers and consumers.

One emerging response to the combination of high demand and labor availability is load-matching, which could reduce the number of empty backhaul truck trips by matching drivers with backhaul loads to take on their return trips. Some trucks (e.g., specialized tankers or trucks delivering to construction sites) are limited to one-way moves because there is nothing for them to bring back to their origins. However, other types of trucks, especially dry vans, can be loaded with a wide range of goods, but may travel loaded in only one direction because of the difficulty of finding a suitable return load near the delivery point.

The following actions are needed to address the truck management issues described in Section 6.1.1 through 6.1.4:

- » Need to address **safety** issues. This could be achieved, in part, through innovative street design, including new design standards based on best practices, especially in contexts where truck traffic interacts with pedestrian, cyclist, and other vulnerable street and road users.
- » Need to address **efficiency** issues. This could be achieved, in part, through exploring the use of managed-use lanes and improving access to major freight-generating facilities, streamlining regulations and reforming the over dimensional and overweight permitting processes (especially for multi-jurisdictional trips), and improving commercial vehicle access at the curb, especially in urban and village center contexts.
- » Need to address sustainability and community impact issues, achievable, in part, by identifying and promoting quiet delivery practices in order to reduce noise impacts, improving truck wayfinding, and using enforcement approaches that protect transportation infrastructure and public safety, thus promoting a culture of compliance with rules and regulations.
- » Need to build and improve partnerships and knowledge gaps, achievable by proactive and consistent engagement with public and private stakeholders, and improving the freight data, tools, and information that agencies in the region use to inform planning and decision-making.

6.2 OTHER FREIGHT MODES PERFORMANCE AND NEEDS

The multi-state region's reliance upon trucking, as described in Section 2.2, and the congestion of the highway network described in Section 6.1, underscores the relevance of increasing the utilization of rail, waterborne, and micro conveyances such as cargo bikes for goods movement. This section addresses performance and needs of these other freight modes, including:

- » 6.2.1: Waterborne Services;
- » 6.2.2: Rail Networks and Terminals; and
- » 6.2.3: Air Cargo

6.2.1 WATERBORNE SERVICES

The NYMTC planning area, and surrounding multi-state region, benefit from their strategic position on the U.S. East Coast, a large and deep natural harbor, Long Island Sound, and navigable rivers and estuaries. The region's waterways and ports are a major gateway facilitating international trade and support coastwise or domestic shipping by water. As described in Section 4.3, PANYNJ is the third largest (and in some years, the second-largest) container port in the United States, and largest on the East Coast. Proximity to the densely populated northeastern U.S. consumer markets, a large economic base, and landside transportation networks help PANYNJ to retain its competitive advantages. Maintaining those advantages and investing in measures to retain and/or increase waterborne freight volumes and services are key to the long-term primacy of PANYNJ as well as potential reduction in the growth of truck vehicle miles.

PORT FACILITY AND ACCESS IMPROVEMENTS

As described in Section 4.3, two of the region's major marine terminals—Howland Hook and Brooklyn Marine Terminal—are in the NYMTC planning area and are undergoing changes in ownership and investments for future development. The needs associated with each terminal are described below.

HOWLAND HOOK

The Port Authority, in a 2024 agreement with the City of New York, is taking full ownership control of all 345 acres of Howland Hook Marine Terminal. The terminal and its surrounding area include a diverse set of mutually supporting freight operations, including marine container handling; truck chassis storage; ExpressRail service for containers; adjacent expansion area for warehouse/logistics functions; the nearby Arlington Yard rail facility; and (south of I-278) the Matrix Global Logistics Park, which has seen significant development of warehouse and distribution space in the past decade including three buildings leased to Amazon. Identified issues related to performance and need, as well as actions currently planned or recommended by other agencies, include:

- » Completion of the terminal operator's \$200 million in investments through 2030, which include reconstructing and rehabilitating wharves and berths, upgrading cargo-handling equipment, and

expand yard capacity. These investments through 2030 would allow the terminal to increase its annual capacity to 750,000 container lifts per year, a 50 percent increase.

- » Improved roadway access, to be achieved by:
 - Realigning Forest Avenue;
 - Improving connectivity between facilities by realigning Western Avenue, realigning the terminal exit gate and outbound roadway extension, and designating the connection to the Matrix site as a Marine Terminal Highway; and
 - Reviewing existing container toll discount program to ensure fairness with New Jersey terminal access costs.

BROOKLYN MARINE TERMINAL

The Brooklyn Marine Terminal at Red Hook is in an area of the Brooklyn waterfront that has hosted marine cargo activity continuously for well over 150 years. This terminal is part of the land swap deal between the City of New York and the Port Authority. As part of the agreement, the City is assuming control of Brooklyn Marine Terminal from the Port Authority. Brooklyn Marine Terminal today includes a relatively small container terminal, warehouse and logistics space, and a cruise terminal. Roll-on/roll-off cargo, project cargo, and bulk cargo are also handled as opportunities arise. There is no rail access to this terminal. As mentioned in Section 4.3, the City of New York secured a Federal grant and is investing City and State funds to stabilize and repair several of the complex's piers and to plan and the New York City Economic Development Corporation (NYCEDC) is undertaking an Environmental Impact Statement to advance a broader multiple-use re-imagining of the complex to accommodate modern maritime activities, housing, and other uses.cxxiii Needs associated with the continued or improved movement of goods at Brooklyn Marine Terminal include:

- » Stabilize and improve piers, and plan for crane and cold storage needs.
- » Support and enhance current cargo operations, to ensure the continued economic benefits of the terminal's cargo functions, as well as preventing the shift of these goods movements to truck trips; and
- » Assess emerging market opportunities for modern maritime activities and implement infrastructure improvements as needed.

SOUTH BROOKLYN MARINE TERMINAL

The South Brooklyn Marine Terminal (SBMT) is owned by the City of New York and is expected to handle a wide range of cargo types, including offshore wind energy components and other project cargo, construction materials, and roll-on/roll-off cargo. SBMT is served by a single-track rail line running in the First Avenue right-of-way, connecting to a small railyard at 51st Street and a larger railyard at 65th Street. At 65th Street, SBMT rail traffic can move west to New Jersey via the NYNJ railcar float operation, or east and north along the Bay Ridge Branch. Primary truck access for both terminals is via I-278 and surface streets. Key issues and needs at SBMT include:

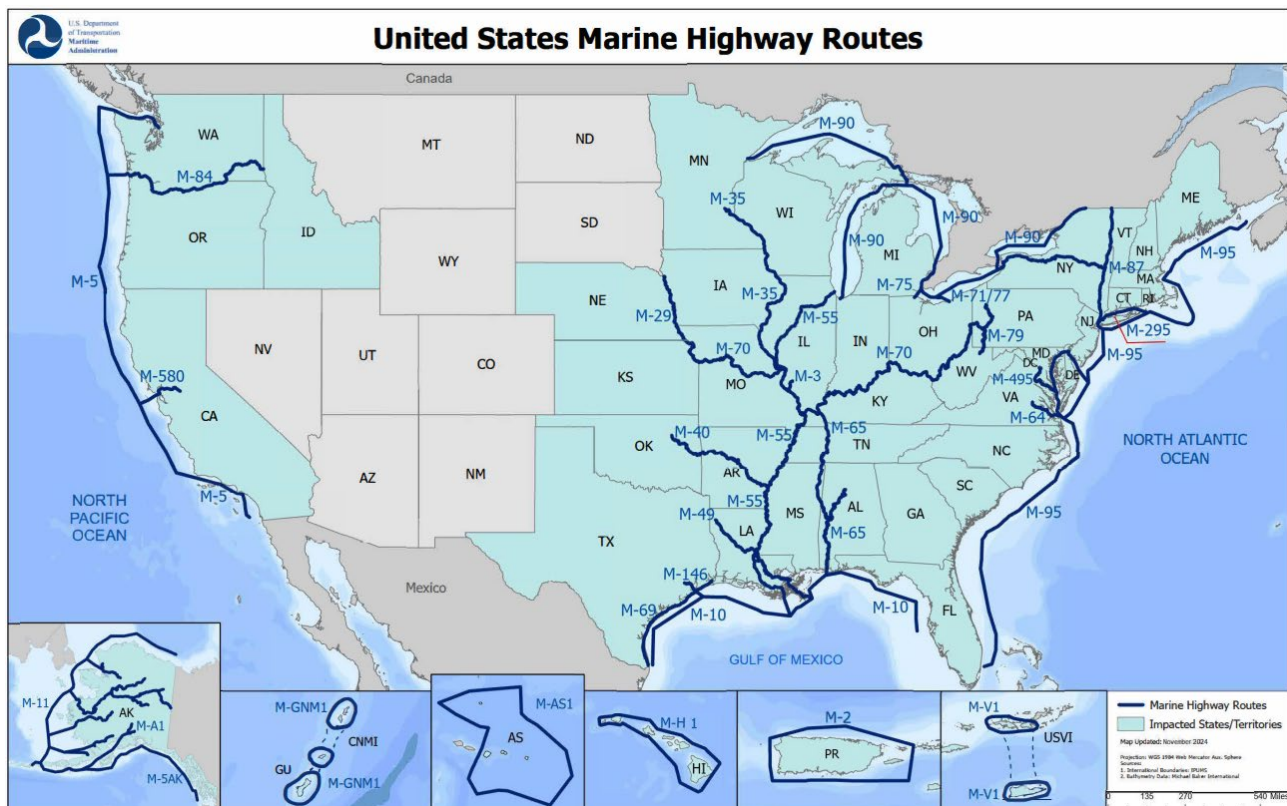
- » Terminal upgrades to support offshore wind and other cargo for near-term operations, accommodating future introduction of container handling operations;
- » Improved truck and rail access and operations, to be achieved by converting First and Second avenues to one-way pairs; and
- » Maintained connectivity to NYNJ Rail and potential for connectivity to the proposed Cross Harbor freight rail tunnel.

WATERBORNE SERVICES

The term “marine highway” is a formal designation by the U.S. Department of Transportation for waterborne services that provide alternatives to trucking along congested highway route and corridors.cxxiv Marine highway services can be provided by shallow-draft barges or deeper-draft self-powered vessels; they can operate over short or long distances; and they can handle containers and other unitized non-bulk commodities.

Three marine highway corridors have been designated in the NYMTC Planning Area, including M-95 along the U.S. East Coast, M-295 through Long Island Sound, and M-87 up and down the Hudson River and into the Lake Champlain system, as shown in Figure 60.

Figure 60 Marine Highway Route Designations



Source: Maritime Administration, U.S. Department of Transportation, November 2024.

The Marine Highway program also includes a discretionary transportation grant program that supports projects along designated Marine Highway routes that promote marine highway transportation. The New York-New Jersey region has received several of these grants within the past decade. Most recently, New York City received funding for improvements to six watercraft landing sites, including Stuyvesant Cove in Manhattan, Downtown Manhattan Heliport, Pier 36 in Manhattan, Oak Point in The Bronx, 29th Street Pier in Brooklyn, and 23rd Street Pier in Manhattan.cxxv

In addition to the designated marine highways, New York City's Blue Highways initiative is focused on the use the City's network of local waterways for the sustainable movement of goods.

Needs related to waterborne services include:

- » Completion of improvements to New York City's Blue Highways watercraft landing sites;
- » Further exploration of opportunities to develop and expand marine highway services between Port Raritan, New Jersey and New York City's watercraft landing sites;
- » Consideration and planning for last-mile connections between watercraft landing sites and ultimate points of origin or destination of shipments;
- » Consideration of potentially viable services to/from other points of origin and destination.

OTHER MARITIME NEEDS

VESSEL NAVIGATION IMPROVEMENTS

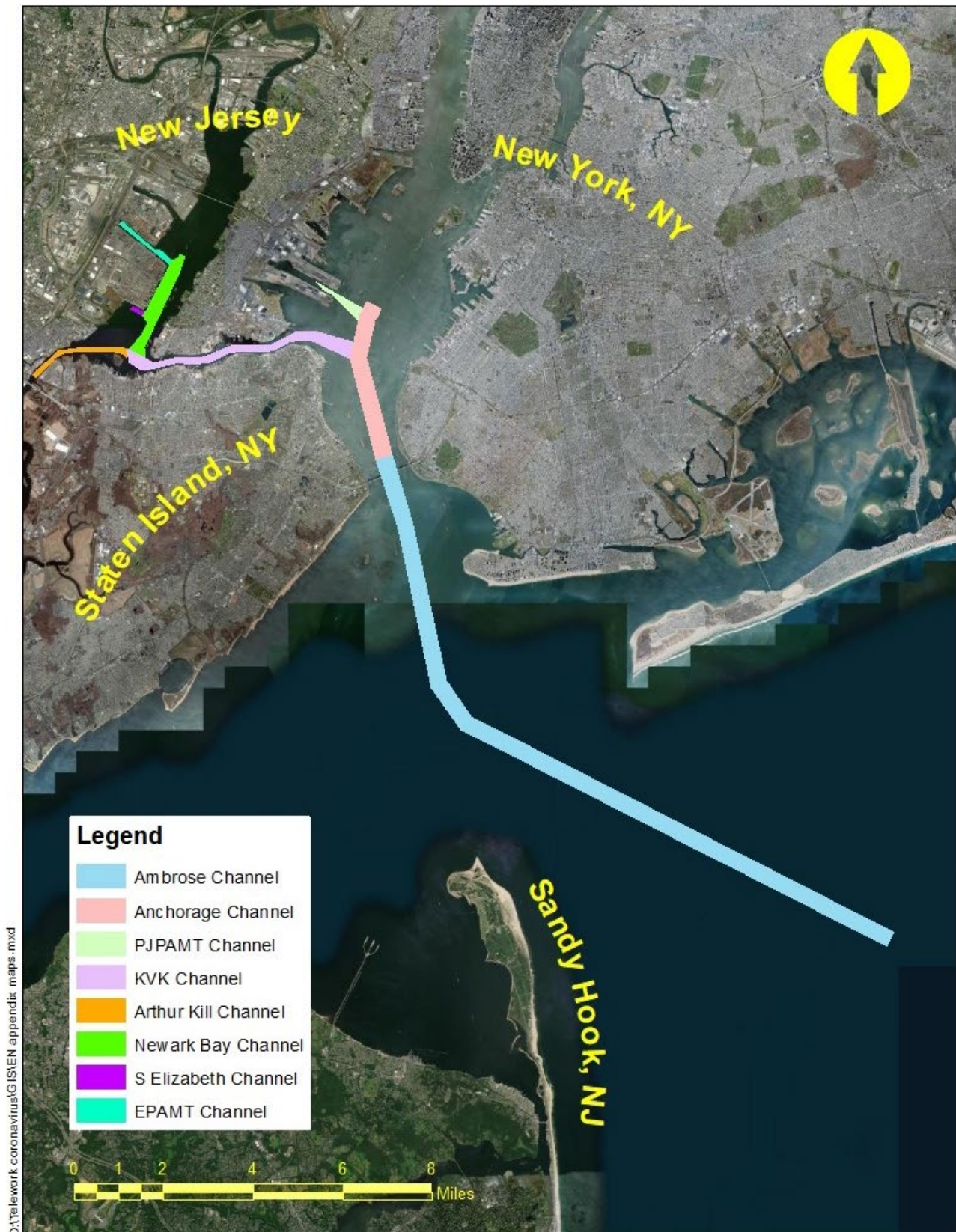
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As ocean-crossing cargo vessels become larger, they require deeper channels. Vessel owners and operators will concentrate the use of these vessels only at ports deep enough to accommodate them. The vessel navigation channels serving most of the traffic in the Port of New York and New Jersey (comprising facilities in the NYMTC planning area and northern New Jersey) were deepened to 50 feet in 2016. A 1,200-foot portion of Howland Hook wharf adjoins a 50-foot channel; the Buttermilk and Bay Ridge channels serving Red Hook and SBMT are currently 40-foot deep.

Following a feasibility and environmental assessment report completed by the U.S. Army Corps of Engineers in 2022, a Preconstruction, Engineering and Design navigation project is proceeding. The plan includes provisions for the deepening of the federal navigation channels by five feet to a maintained depth of 55 feet and widening some portions of the channel network. The channels that would be deepened are shown in Figure 61. This depth would allow the Port to accommodate Ultra Large Container Vessels carrying as many as 18,000 twenty-foot equivalent units (TEU) of containers.cxxvi Needs related to navigation improvements in the harbor include:

- » Completion of the Harbor Deepening Channel Improvements (HCDI) preconstruction, engineering, and design project; and
- » Secure necessary funding to proceed with construction.

Figure 61 Channels Recommended for Deepening in New York-New Jersey Harbor



Source: U.S. Army Corps of Engineers

FACILITY AND VESSEL POLLUTION

In 2023, the Port Authority released Net Zero Roadmap which included aggressive targets to reduce operational pollution by 2050.cxxvii The roadmap includes strategies related to all of the Port Authority's modes and facilities. In addition, EPA initiated a \$3 billion Clean Ports Program in 2024, which includes competitive grant programs aimed at helping port operations achieve its goal over time.cxxviii Related to maritime transportation, the Port Authority and other partners can work to address this need:

- » Promote the use of zero-emission ship fuel, equipment, and trucks at container terminals, supported with charging infrastructure and industry outreach.



6.2.2 RAIL NETWORKS AND TERMINALS

The rail network provides an opportunity to move more freight into, out of, and through the NYMTC planning area with reduced traffic congestion, vehicular pollutants, and other impacts. However, there are infrastructure, operational, and connectivity issues that have limited modal shifts from truck to rail. For more information on rail networks and terminals in the NYMTC planning area, refer to the [Moving Forward 2055 Interactive Map](#).

Opportunities to improve freight rail service for customers in the NYMTC planning area include providing transload terminals where rail freight can be loaded or off loaded, provision of direct rail sidings to customer properties, and the addition of passing tracks where needed to ensure more efficient movement of freight trains along single-track lines. Transload terminals can vary in size but must be directly served or accessed by a rail line or spur. There are few opportunities to develop transload terminals, but several sites show potential and include spaces in The Bronx (such as Oak Point and Hunts Point), Queens (such as Wheelspur Yard in Long Island City), and Brooklyn (several sites along the Bushwick Branch, First Avenue, and Bay Ridge Branch).

Freight rail operations in the NYMTC planning area are part of a much larger national rail network, and the effectiveness of local rail service depends in large part on the effectiveness of connections—both physical and operational—to the national network. For the East of Hudson region—Brooklyn, Queens, Nassau, and Suffolk—these connections are limited to the New York-New Jersey railcar float operation (running between 65th Street Yard in Brooklyn and Greenville Yard in Bayonne) and the Fremont Secondary (running between Queens and Bronx over Amtrak's Hell Gate Bridge). Moving north from the Bronx, the first place to cross the Hudson River to reach the West of Hudson region is at Selkirk, New York, near Albany, on the CSX line. Staten Island is connected to New Jersey and points west via the Arthur Kill Lift Bridge.

For decades, planners and policymakers have contemplated and studied a more direct rail connection between New Jersey and the East of Hudson to serve multiple railroads. Most recently, these efforts have been documented in the Cross Harbor Freight Program Tier I Environmental Impact Statement, and in the subsequent Tier II Environmental Impact Statement under development at the time of this writing. A significant Cross Harbor alternative is for a double-track, double-stack cleared freight rail tunnel generally paralleling the car float route between Greenville Yard and 65th Street, as shown in Figure 62. Planners have also considered the need for improvements on other critical segments and chokepoints in the regional rail network that affect service to the NYMTC planning area but are physically located in New Jersey. Rail traffic using the tunnel would connect to points east via the Bay Ridge Branch and then at Fresh Pond, traffic would be directed west via the Lower Montauk line into Maspeth, move east to Long Island, or north toward the Bronx via the Fremont Secondary. The MTA is currently studying a potential passenger rail service in the Bay Ridge Branch corridor, but intends to maintain freight access on the corridor, which will require close coordination to ensure that access to the tunnel and/or freight rail customers in the corridor is not compromised.

Figure 62 Alignment of Proposed Cross Harbor Freight Rail Tunnel



Source: Port Authority Port Master Plan.

Freight rail needs include:

- » East-of-Hudson transload terminals, such as proposed at Wheelspur, Maspeth, and sites along the Bay Ridge Branch to serve local freight customers;
- » Terminals to accommodate railcar handling and switching at locations such as Arlington Yard in Staten Island, Hunts Point in the Bronx, and 65th Street Yard in Brooklyn, and to improve railcar storage and handling capacity on the Fremont Secondary;
- » Vertical clearances in Brooklyn and Queens to accommodate double stack and autorack railcars;
- » Improved access to rail yards in the Sunset Park Industrial Business Zone;
- » Diversion of more of the planning area's exported solid waste from truck to rail or water modes;^{CXXIX}
- » Upgraded locomotive equipment to reduce pollution;
- » Delays associated with interchanges between railroads;
- » Limitations in Cross Harbor freight movement;
- » Freight access to the Bay Ridge Branch, and modernization of the Arthur Kill Lift Bridge;

- » Grade crossing issues, including community impacts and roadway traffic impacts associated with longer trains, particularly on the River Line in Rockland County; and
- » Community impacts of rail operations at yards and transload/transfer stations.

6.2.3 AIR CARGO

In addition to the recently-completed air cargo building at JFK mentioned in Section 4.4, JFK Airport is undergoing an ambitious redevelopment, that includes terminals 1 and 6, the now-completed expansion and modernization of terminals 4 and 8, new ground transportation facilities and parking structures, and roadways.^{cxxx} Figure 63 shows a barge-served facility built to support construction activities at the airport. This redevelopment project will modernize the airport and expand its gate capacity, which could bring more flights and air cargo to the airport.^{cxxxi}

Figure 63 Barge-Served JFK Construction Support Facility



Source: Port Authority of New York and New Jersey, 2023 Press Release.

There remain outstanding needs related to air cargo, to address ground transportation connections for cargo moving to or from JFK Airport. Key ground transportation challenges on the roadway network serving JFK include:

- » High traffic volumes and high-frequency truck traffic locations;

- » Deficient bridge and pavement conditions;
- » Limited charging/fueling facilities;
- » Poor connections between JFK and supporting off-airport facilities in adjacent Springfield Gardens; and
- » Limited truck access to the airport.
- » Capabilities of unmanned aerial vehicles for goods movement/delivery.

6.3 FREIGHT-RELATED LAND USES

New York City is advancing strategies to facilitate the establishment of urban consolidation and micro distribution centers that would shift last-mile deliveries to smaller ZEVs. The City's goal is to shift 25 percent of last-mile freight deliveries to smaller, sustainable delivery methods by 2040.cxxxii Figure 64 shows cargo bicycles, as an example of such a sustainable delivery method.

Figure 64 Cargo Bicycles Being Loaded in New York City



Source: Delivering Green, NYCEDC and NYC DOT.

Meanwhile, larger multi-level distribution facilities, like the example shown in Figure 39 in Section 5.5, are being developed in portions of New York City, and fulfillment and distribution facilities of a variety of sizes and functions in the supply chain are being developed throughout the NYMTC planning area and the multi-state region. During the surge in e-commerce demand during the COVID-19 pandemic, more industrial real estate development occurred across the country to accommodate what appeared to be an insatiable consumer demand for e-commerce orders, but as growth in e-commerce demand cooled in 2022 and 2023, it seemed a glut of industrial buildings would enter the marketplace. As the industrial real estate market absorbs available inventory, and as desired building specifications may change over time as technology and logistics practices change, the need for new development may increase in the future. It will be important for local and regional planners to understand the dynamics that influence the real estate market, site location decisions, the truck and passenger automobile trips generated, and if and how transit

and micromobility can be incorporated into future development to improve workers' access to jobs and reduce traffic impacts. Freight-related land use needs in the NYMTC planning area include:

- » Urban freight hubs/consolidation centers, and micro-distribution facilities, to facilitate the transfer of freight and parcel deliveries to smaller, LEV/ZEV vehicles;
- » "Inland port" or "freight village" concepts, which typically take advantage of multimodal connections, warehousing and distribution space, and other support services, where beneficial. Examples could include water-served, rail-served, or air cargo-adjacent clusters;
- » Extreme weather and climate risks to industrial lands and facilities, and invest in protecting those facilities and/or relocating some vulnerable facilities;
- » Truck parking and/or electric vehicle charging; and
- » Transportation services and infrastructure for access to freight-related job opportunities.

6.4 MULTI-STATE METROPOLITAN REGION PLANNING COORDINATION

Freight movements to, from, and through the NYMTC planning area are impacted by facilities and services throughout the multi-state region and the even larger Northeast megaregion. Given that, coordinated planning across jurisdictions and states is a specific necessity. The Metropolitan Area Planning (MAP) Forum, consisting of metropolitan planning organizations and councils of government across the multi-state region, is an important mechanism for this coordination. Other forums, such as New York State Association of Metropolitan Planning Organizations (NYSAMPO) and The Eastern Transportation Coalition also serve as venues for sharing information, data, and best practices with transportation planners and systems operators beyond the boundaries of the NYMTC planning area.

7

SHARED VISION AND ACTION ITEMS

7.1 SHARED VISION FOR REGIONAL MOBILITY

Moving Forward 2055 is built around a Shared Vision for Regional Mobility and related Vision Goals and objectives that serve as a strategic framework for the Plan's components. The Vision Goals and objectives are presented below.

All people, regardless of race, disability status, age, or socioeconomic background have a right to live, work, and play in communities that are safe, healthy, and free of harmful environmental conditions. Our shared vision is one in which safe, accessible, and efficient mobility for people and goods is made possible by well-maintained and reliable infrastructure.

Furthermore, the members of NYMTC envision a future where transportation infrastructure and technology enhance community health, minimize harmful air pollutants, and where strategic investments in transportation drive continued economic growth. The NYMTC members have resolved that the the following objectives will focus the vision and help target activities that will lead to the achievement of the goals. As we pursue our goals, the following objectives will focus our vision and help target activities:

1. A transportation system for which safety and security are maximized for people and goods across all uses and modes.



- a. Ensure that investments in transportation assets enhance the safety and security of passengers and freight systems.
- b. Prioritize safe streets, intersections, railroad grade crossings and shared-use right of ways, and establish road safety initiatives that follow a Safe System approach.
- c. Coordinate safety management, training, and safety education for all who share our streets across jurisdictional borders.
- d. Improve operational safety and security, incorporating the changing nature of transportation and technology so that transportation facilities safely accommodate all travelers.
- e. Strengthen connected vehicle programs and policies and champion driver assist programs and other technologies that contribute to overall system and individual user safety.
- f. Improve in-person and automated safety enforcement procedures.
- g. Prioritize the safety of transportation system operators, workers, and contractors through planning and coordinated management of work zones.

2. A transportation system for which infrastructure is maintained and improved in a sustainable manner.



- a. Maximize environmental/fiscal sustainability and minimize carbon intensity when maintaining, improving, modernizing, and/or replacing transportation infrastructure.
- b. Reimagine and repurpose the assets that comprise the region's transportation infrastructure to reconnect communities and improve accessibility across all modes.
- c. Rebuild, replace, and/or modernize needed transportation assets for passengers and freight.
- d. Invest in the integration of the region's multimodal transit network.
- e. Create efficient and environmentally sound freight networks, systems, and facilities.
- f. Plan and manage work zones and Maintenance and Protection of Traffic programs to efficiently advance infrastructure upkeep.
- g. Plan for the development and use of advanced technologies and materials.



3. **A transportation system for which resiliency is supported through mitigating, adapting to, and responding to chronic and acute stresses and disruptions.**

- a. Protect and fortify major transportation assets.
- b. Invest in extreme weather vulnerability analyses and material solutions for transportation assets.
- c. Improve regional coordination on emergency and long-term responses to system-wide extreme weather impacts and sea level rise.
- d. Enhance the transportation network's resiliency by increasing travel options and redundancies.
- e. Collaborate on resiliency projects that have significant transportation implications.
- f. Coordinate across jurisdictions to advance resiliency and sustainability.
- g. Prioritize resiliency and sustainability in a manner that considers the needs of designated Communities of Concern..
- h. Invest in future energy infrastructure to minimize the impact of grid events and supply chain disruptions on the transportation system and its users.
- i. Promote resiliency strategies that account for environmental determinants of health and their impact on vulnerable communities.



4. **A transportation system for which congestion is mitigated through investments and technology in support of healthier communities, more seamless travel, improved quality of life, and regional economic competitiveness.**

- a. Sustainably manage current and future demands, with an emphasis on expanding active transportation and transit.
- b. Support mobility for all users by encouraging active transportation, micromobility, complete streets, and other strategies.
- c. Modernize local freight networks to efficiently plan for growth in the volume of and change in product deliveries.
- d. Expand the reach of the system to emerging markets, addressing access to and incentivizing employment, social, and recreational opportunities.
- e. Incorporate emerging and innovative technologies, transportation services and tools into efficient network design, operations, and monitoring.
- f. Coordinate with governing bodies for clearer accountability, funding, and planning arrangements.

5. A transportation system for which land use decisions are encouraged in support of strategic transportation enhancements and improving modal choices.



- a. Encourage transit-oriented development as well as parking, curb, and property management, micro-mobility pathways, and other long-term sustainable land use strategies that support passenger and goods movement while reducing pollution.
- b. Encourage strategic distribution of growth throughout the region by prioritizing density over less dense development near transit, and by prioritizing transit investments where development is occurring.
- c. Help create/sustain vibrant communities through placemaking.
- d. Leverage land use mechanisms to improve access to destinations.
- e. Manage the First-Mile, Last-Mile planning process through collaboration with transportation and land use planning officials and affected stakeholders.
- f. Consider the impacts that transportation policies and projects will have on land values and proactively mitigate negative effects on existing communities.

6. A transportation system for which fairness in transportation is advanced and access to opportunities is improved for all communities.



- a. Improve first- and last-mile access to transit.
- b. Improve accessibility to the transportation system for users of all abilities.
- c. Provide more frequent and reliable transit service.
- d. Strategically expand transportation services and information to enhance mobility in communities with the greatest mobility needs.
- e. Improve access to social and economic opportunities for all populations, regardless of age, ability, race, ethnicity, or income.



7. A transportation system for which environmental impacts—including harmful air pollutants—are significantly reduced through technology applications, increased use of greener travel options, and improved system efficiency.

- a. Support land use sustainability through improved and efficient transportation services and facilities, which enable more efficient land uses.
- b. Practice environmental stewardship in the maintenance and enhancement of the transportation system.
- c. Promote and improve public transportation and active transportation modes, such as walking and cycling, to reduce pollution, improve air quality, and support public health.
- d. Support lower- and zero-emission alternatives to current trucking through vehicle technology and greater modal balance.
- e. Modernize public vehicle fleets to lower- and zero-emission vehicles and support the conversion of private vehicles.
- f. Efficiently manage limited roadway capacity to mitigate congestion and vehicular pollutants.
- g. Address the unequal impacts of transportation sector pollution on certain communities.

7.2 RECOMMENDED FREIGHT-RELATED STRATEGIES AND ACTIONS

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Using the strategic framework of the Shared Vision for Regional Mobility and the assessment of the needs and performance of the freight transportation system provided in earlier sections, the Freight Plan Element recommends strategies and actions for the future of freight movements in the NYMTC planning area. The action items are briefly summarized in Table 7.1 along with their relevance to the Vision Goal(s). Each action item is numbered for reference only; the numbers do not reflect any priority or ranking among the actions.

Table 26 Recommended Actions

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
1	Enhance the integrated regional freight data program in collaboration with MAP Forum partners.	Data	Multi-State Region	Multi-State Metropolitan Regional Planning (Section 6.4)	✓	✓	✓	✓	✓	✓	✓
2	Use data and research to monitor growth in e-commerce, and impacts on secondary traffic and last-mile deliveries	Data and Study	Multi-State Region	Direct-to-Consumer Deliveries (Section 5.3), Land Use Trends (Section 5.5), Truck Management Needs (Section 6.1.4)	✓	✓		✓	✓	✓	✓
3	Employ load matching web applications or software platforms to reduce truck VMT, empty truck backhauls, and empty container moves.	Program	NYMTC planning area	Truck Management Needs (Section 6.1.4)				✓			✓
4	Implement the recommendations of the Regional Waste Movement Study.	Study	Multi-State Region	Multimodal Freight Network Needs - Rail (Section 6.2.2)				✓		✓	✓
5	Continue implementation of the Port Authority's updated Goods Movement Action Program and forthcoming NYC freight plan(s).	Program and Study	Multi-State Region	Multi-State Regional Planning (Section 6.4) and Multimodal Freight Needs (Section 6.2)	✓	✓	✓	✓		✓	✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
6	Explore scenario-based multimodal freight forecasts and assessments.	Data	Multi-State Region	Multi-State Metropolitan Regional Planning (Section 6.4)		✓	✓	✓			✓
7	Advance the USDOT's Automated Vehicles Comprehensive Plan, including regulatory review and preparing the transportation system for automated vehicles.	Program	NYMTC planning area	Automation Technologies Trend (Section 5.4)	✓	✓		✓			
8	Assess and implement actions to expedite freight movements delayed due to identified freight bottleneck locations	Study	Multi-State Region	Truck Bottleneck Needs (Section 6.1.1)		✓		✓			✓
9	Address remaining access and performance issues for Howland Hook, Brooklyn Marine Terminal, and SBMT.	Program	New York City	Multimodal Freight Network Needs - Ports and Marine (Section 6.2.1)				✓			✓
10	Complete funded marine highway projects and continue exploring opportunities to develop and expand waterborne services.	Program	Multi-State Region	Multimodal Freight Network Needs - Ports and Marine (Section 6.2.1)		✓		✓			✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
11	Complete the Harbor Deepening and Channel Improvements preconstruction, engineering, and design, and secure funding needed to implement the project.	Project	Multi-State Region	Multimodal Freight Network Needs - Ports and Marine (Section 6.2.1)	✓	✓	✓				
12	Promote the use of zero-emissions marine vessels and support equipment.	Program	Multi-State Region	Multimodal Freight Network Needs - Ports and Marine (Section 6.2.1)			✓			✓	✓
13	Develop transload yards and industrial sidings to enhance regional freight rail volumes. Address vertical clearances and railcar storage capacity needs in order to support growth in rail freight movement.	Program	NYMTC planning area	Multimodal Freight Network Needs - Rail (Section 6.2.2)		✓	✓	✓	✓	✓	✓
14	Advance the Cross Harbor Freight Program Tier II Environmental Impact Statement.	Project	Multi-State Region	Multimodal Freight Network Needs - Rail (Section 6.2.2)		✓		✓			✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
15	Develop other regional and national rail freight connectivity projects, including CSX River Line second track and improvements between New Jersey and Albany.	Program	NYMTC planning area	Multimodal Freight Network Needs - Rail (Section 6.2.2)		✓	✓	✓		✓	✓
16	Address barriers to seamless rail operations. Some can be addressed with physical and operating improvements, while others are institutional and require partnership approaches.	Program	Multi-State Region	Multimodal Freight Network Needs - Rail (Section 6.2.2)				✓			✓
17	Preserve current and potential future freight rail use on existing facilities.	Program	NYMTC planning area	Multimodal Freight Network Needs - Rail (Section 6.2.2)	✓	✓		✓			✓
18	Prioritize grade crossing issues & needs, including addressing community and roadway traffic impacts, establishing quiet zones where possible and appropriate, etc.	Study and Program	NYMTC planning area	Multimodal Freight Network Needs - Rail (Section 6.2.2)	✓	✓		✓		✓	✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
19	Support a diversified program of JFK Airport freight access improvements in conjunction with the Van Wyck Expressway project.	Program	New York City	Multimodal Freight Network Needs - Air Cargo (Section 6.2.3)		✓		✓			✓
20	Complete JFK air cargo area redevelopment, including charging/fueling capacity, and other on-airport terminal and roadway improvements.	Project	New York City	Multimodal Freight Network Needs - Air Cargo (Section 6.2.3)	✓	✓	✓	✓			
21	Actively plan for the FAA's Beyond Visual Line-of-Sight (BVLOS) rulemaking expected in 2026 and for the impacts on UAS utilization for goods movement/delivery.	Planning	Multi-State Region	Multimodal Freight Network Needs - Air Cargo (Section 6.2.3)	✓			✓			✓
22	Develop urban and suburban freight hubs/consolidation centers, and micro-distribution facilities, to facilitate the transfer of freight and parcel deliveries to smaller, LEV/ZEV vehicles.	Program	NYMTC Planning Area	Warehouse, Distribution, and Land Use Needs (Section 6.3)		✓			✓		✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
23	Gather data and monitor freight-generating land use trends and market dynamics.	Data and Study	Multi-State Region	Warehouse, Distribution, and Land Use Needs (Section 6.3)		✓	✓	✓	✓	✓	✓
24	Advance “inland port” or “freight village” concepts, which typically take advantage of multimodal connections, warehousing and distribution space, and other support services, where beneficial. Examples could include water-served, rail-served, or air cargo-adjacent clusters.	Program	NYMTC planning area	Warehouse, Distribution, and Land Use Needs (Section 6.3)		✓			✓		✓
25	Protect industrial lands and facilities from extreme weather and climate risks.	Program	Multi-State Region	Warehouse, Distribution, and Land Use Needs (Section 6.3)		✓	✓		✓		
26	Plan to better connect workforce with job opportunities at freight-generating warehouses, distribution centers, and other facilities.	Program	Multi-State Region	Warehouse, Distribution, and Land Use Needs (Section 6.3)	✓			✓	✓	✓	

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
27	Reduce the severity and frequency of truck-involved crashes through innovative vehicle, street and facility design, including: Collaboration with Vision Zero programs; New design standards based on best practices; Increased awareness of truck obstructed vision areas; and Urban driving awareness initiatives for truck drivers.	Program	Multi-State Region	Truck Management Needs (Section 6.1.4)	✓	✓				✓	
28	Improve truck access to portions of the network, by implementing managed-use lanes using truck travel time reliability as a guide.	Program	NYMTC planning area	Truck Management Needs (Section 6.1.4)				✓			
29	Evaluate impacts of Manhattan Central Business District tolling on freight travel patterns, particularly related to community livability and economic impacts.	Study	NYMTC planning area & Multi-State Region	Truck Bottlenecks (Section 6.1.1) and Truck Management (Section 6.1.4)		✓		✓		✓	

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
30	Expand weigh-in-motion capacity to gather data and better manage heavy truck movements.	Program	New York City	Truck Management Needs (Section 6.1.4)				✓			
31	Coordinate regulations and restrictions between states and jurisdictions.	Program	Multi-State Region	Truck Management Needs (Section 6.1.4)	✓	✓					
32	Identify and promote quiet delivery practices for goods transporters and receivers, in order to reduce noise.	Program	NYMTC planning area	Truck Management Needs (Section 6.1.4)						✓	✓
33	Utilize enforcement and education to foster a culture of truck drivers' compliance with local rules and regulations.	Program	NYMTC planning area	Truck Management Needs (Section 6.1.4)	✓	✓					
34	Identify, pilot, and implement solutions to manage curb access and utilization in order to support safe and efficient deliveries.	Program	NYMTC planning area	Truck Management Needs (Section 6.1.4)	✓			✓		✓	
35	Continue development of Clean Freight Corridors to facilitate the expanded use of cleaner vehicles and energy sources.	Program	Multi-State Region	Truck Pollution Needs (Section 6.1.2)			✓			✓	✓

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
36	Expand permanent and emergency truck parking supply and include charging/fueling and driver amenities where feasible.	Program	Multi-State Region	Truck Parking Needs (Section 6.1.3)	✓	✓		✓			
37	Expand the use of alternative vehicles and modes (e.g., rail for long-distance moves or cargo cycles for last-mile deliveries) to reduce truck trips and associated pollutants.	Program	Multi-State Region	Truck Pollution Needs (Section 6.1.2); Rail Needs (Section 6.2.2)	✓			✓		✓	✓
38	Monitor state-level regulations and local traffic safety needs, and develop infrastructure improvements (signage, signals, markings, etc.) necessary to facilitate automated vehicles for freight applications.	Program	Multi-State Region	Automation Technology Trends (Section 5.4)	✓	✓					
39	Promote existing and new educational and training programs that prepare job-seekers with the skills and knowledge they need in order to fill jobs in the transportation and logistics industry.	Program	Multi-State Region	Workforce Trends and Issues (Section 5.6)			✓			✓	

Recommended Action Items					Relevance to Vision Goals						
No.	Action	Type	Scale	Need Areas Addressed							
40	Invest to preserve all modal networks (highway, rail, marine, and air cargo)	Program	Multi-State Region	Truck-Related Needs (Section 6.1) and Multimodal Needs (Section 6.2)	✓	✓	✓				
41	Explore regional and multi-state regional pooled funding approaches for critical freight investments in order to increase the availability of funds and the flexibility of using those funds. See the CREATE program in Chicago as an example.	Program	Multi-State Region	Truck-Related Needs (Section 6.1) and Multimodal Needs (Section 6.2)	✓	✓	✓	✓		✓	✓

7.3 FREIGHT ELEMENT IMPLEMENTATION

The implementation of the above recommended strategies and actions will be accomplished within the context of the full Plan's recommendations. Implementation of the freight transportation improvements and actions presented in this chapter will require coordinated efforts on the part of many public and private sector stakeholders. For more information on freight transportation networks and terminals in the NYMTC planning area, refer to the Moving Forward 2055 interactive map [here](#).

The process of developing the Freight Plan has engaged stakeholders in establishing a baseline of data about freight and goods movement in the region, identifying and assessing freight transportation needs, gathering information on potential alternatives for improving freight and goods movement, and selecting recommendations. NYMTC member agencies; their economic development, environmental, and planning partner agencies; and private sector stakeholders will need to continue to sustain the momentum that has been built during the development of this plan. The three keys to successful achievement of the Freight Element's recommendations are:

- » Continuing and expanding stakeholder engagement and partnerships;
- » Identifying and securing both traditional and new funding and financing options; and
- » Measuring and monitoring progress toward success.

7.3.1 CONTINUING AND EXPANDING STAKEHOLDER ENGAGEMENT

Various public and private stakeholders and participants are involved in the freight transportation planning process in different capacities depending on, for example, the type of infrastructure or policy being addressed; the scope of the project or policy change; and an alternative's stage in the planning, development, and implementation process. Throughout the process of planning, programming, and implementing projects, appropriate public agencies, stakeholders, and the public at large should be engaged in the process.

Ongoing communication and coordination with peer agencies, relevant elected officials and neighboring regions should be maintained. This coordination can be achieved through existing forums such as the MAP Forum's Multi-State Freight Working Group, the North Jersey Transportation Planning Authority's Freight Initiatives Committee, the New York State Association of Metropolitan Planning Organization's Freight Working Group, and The Eastern Transportation Coalition, and by ensuring a broad representation on project steering and technical advisory committees. Additionally, NYMTC has a significant role to play in informing state freight plan updates.

Given the critical roles in freight movement played by private interests, it is important to engage private sector stakeholders, including railroads, carriers, shippers and receivers, logistics professionals, and industry associations, because of their operational responsibilities and economic contributions. Through the forums identified earlier, NYMTC should conduct ongoing outreach with the private sector to advance the recommendations in this Freight Plan, including participating in the evaluation of alternatives and

funding discussions. By demonstrating the private sector benefits of freight investments, particularly as these investments affect the cost, speed, and reliability of freight transportation, a case can be made for private sector participation in the funding or financing of some freight projects.

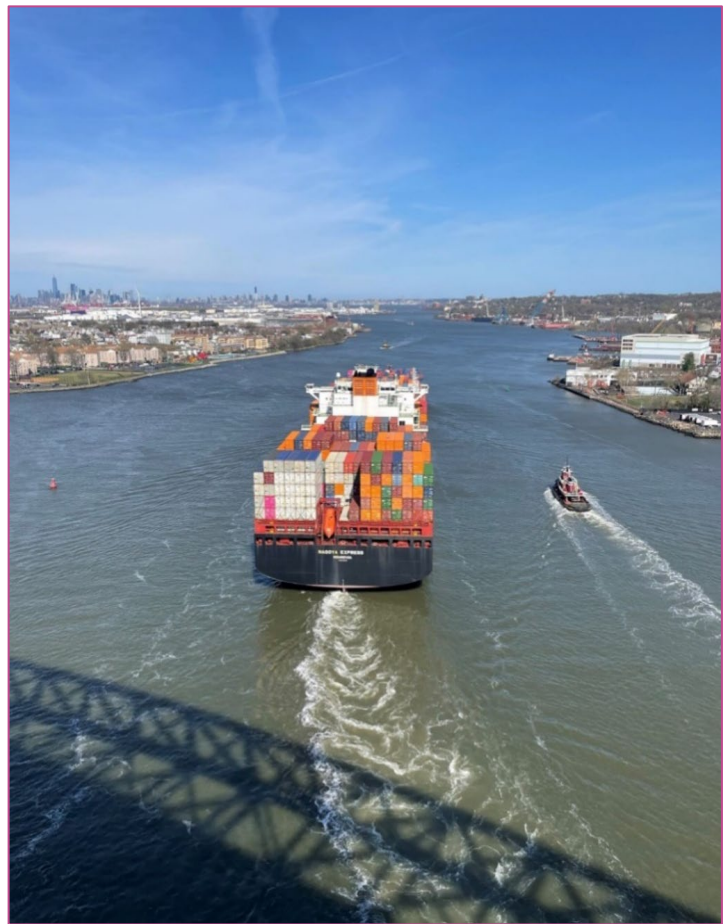
The public also has a stake in freight transportation as consumers. Many individuals are employed in industry sectors that are dependent on or produce freight shipments. Additionally, negative impacts associated with freight transportation affect communities throughout the NYMTC planning area. Dissemination of public education materials, such as the informative, though increasingly dated, *Basics of Freight Transportation in the NYMTC Region* brochure, can help foster increased public education on how freight operates in the NYMTC planning area, its needs and issues, and its community benefits and impacts.

7.3.2 FUNDING AND FINANCING OPTIONS

Several financing options are available to advance the recommendations presented in this chapter. While traditional funding programs are generally well known to NYMTC members, several financing tools have been created or modified through federal authorizing legislation that have been used to supplement traditional funding sources. Freight improvements can make use of non-traditional funding and financing mechanisms based on the geographic location of the improvement, the size of the project, its impact on key metrics like safety or job creation, its impacts beyond the region, and its attractiveness to private investors. A full description of alternative financing mechanisms proposed in the full Plan appears in Chapter 5.

7.3.3 MEASURING AND MONITORING PROGRESS TOWARD SUCCESS!

The Shared Vision for Regional Mobility (Chapter 1) provides a framework for the NYMTC planning process and, specifically, the future freight transportation system. The federally required process of establishing benchmarks and targets for mandated performance measures, and tracking performance over time using these measures, will allow NYMTC's members to observe the planning area's progress toward achieving the Shared Vision. The recommended strategies and actions put forth in this Freight Plan provide a framework for future freight studies and improvements consistent with the Shared Vision and related goals and objectives, as well as to inform current and ongoing regional freight planning activities in neighboring jurisdictions.



ACRONYMS AND ABBREVIATIONS

3D	Three-Dimensional	FDR	Franklin Delano Roosevelt Drive
AADT	Average Annual Daily Traffic	FEMA	Federal Emergency Management Agency
AADTT	Average Annual Daily Truck Traffic	FHWA	Federal Highway Administration
AVAIL	Albany Visualization and Infomatics Lab	FRA	Federal Railroad Administration
B	Billion	GDP	Gross Domestic Product
B2B	Business-to-business	GHG	Greenhouse Gas
B2C	Business-to-consumer	I	Interstate
BMT	Brooklyn Marine Terminal	ICM	Integrated Corridor Management
BOPIS	Buy Online, Pick-up in Store	JFK	John F. Kennedy International Airport
BQE	Brooklyn-Queens Expressway	JIC	Just-in-Case
BVLOS	Beyond Visual Line-of-Sight	JIT	Just-in-Time
C2B	Consumer-to-Business	LCC	Low-Cost Countries
CAGR	Compound Annual Growth Rate	LEV	Low Emission Vehicles
COG	Council of Governments	LIRR	Long Island Railroad
COVID-19	Novel Coronavirus	LTL	Less-than-truckload
CP	Canadian Pacific	M	Million
CSX	CSX Transportation	MAP Forum	Metropolitan Area Planning Forum
DC	Distribution Center	Misc.	Miscellaneous
DTC	Direct-to-Consumer	MOU	Memorandum of Understanding
EPA	Environmental Protection Agency (United States)	Mph	Miles per hour
FAF	Freight Analysis Framework	MPO	Metropolitan Planning Organization
FAA	Federal Aviation Administration		

MSW	Municipal Solid Waste	PFAC	Program, Finance, and Administration Committee
MTA	Metropolitan Transportation Authority	PM	Particulate Matter
MUTCD	Manual on Uniform Traffic Control Devices	PONYNJ	Port of New York and New Jersey
NAICS	North American Industry Classification System	RFK	Robert F. Kennedy Bridge
NJTPA	North Jersey Transportation Planning Authority	SBMT	South Brooklyn Marine Terminal
NOAA	National Oceanic and Atmospheric Administration	SCTG	Standard Classification of Transported Goods
NPMRDS	National Performance Measurement Research Data Set	STCC	Standard Transportation Commodity Code
NY&A	New York & Atlantic Railway	SED	Socioeconomic and Demographic
NYC DOT	New York City Department of Transportation	TEU	Twenty-foot Equivalent Unit
NYCEDC	New York City Economic Development Corporation	TTTR	Truck Travel Time Reliability
NYMTC	New York Metropolitan Transportation Council	UAV	Unmanned Aerial Vehicles
NYNJR	New York-New Jersey Rail	UPS	United Parcel Service
NYSDEC	New York State Department of Environmental Conservation	USACE	United States Army Corps of Engineers
NYSERDA	New York State Research and Development Authority	USDA	United States Department of Agriculture
PANYNJ	Port Authority of New York and New Jersey	USPS	United States Postal Service
		USDOT	United States Department of Transportation
		VMT	Vehicle-miles Traveled
		YTD	Year-to-Date
		ZEV	Zero Emission Vehicles

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