Accessibility & Mobility Regional Reassessment: **Needs Assessment and Strategy Identification Report**

Prepared for the North Jersey Transportation Planning Authority

Prepared by

ICF

With support from AECOM and Urbanomics

June 2025

NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

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1| INTRODUCTION: ACCESSIBILITY AND MOBILITY NEEDS

As the federally authorized Metropolitan Planning Organization (MPO) for the North Jersey region, the North Jersey Transportation Planning Authority (NJTPA) is required to periodically update the region's Congestion Management Process (CMP). The CMP update is a systematic approach used by MPOs to manage and alleviate traffic congestion. As part of this process, the NJTPA examines the region's complex travel patterns and seeks effective methods to enhance the transportation system's performance. In 2021, the NJTPA completed an update to the CMP named the Accessibility and Mobility Strategy Synthesis (AMSS) study. This study aims to better characterize and communicate the system's performance with regard to accessibility and mobility, and to support decision-making concerning the implementation of practical strategies. In May 2024, NJTPA started the CMP update called the Accessibility and Mobility Regional Reassessment. This update uses new approaches and datasets to refresh the AMSS's needs and strategy identification. The findings will be included in the next Long Range Transportation Plan, which is under development.

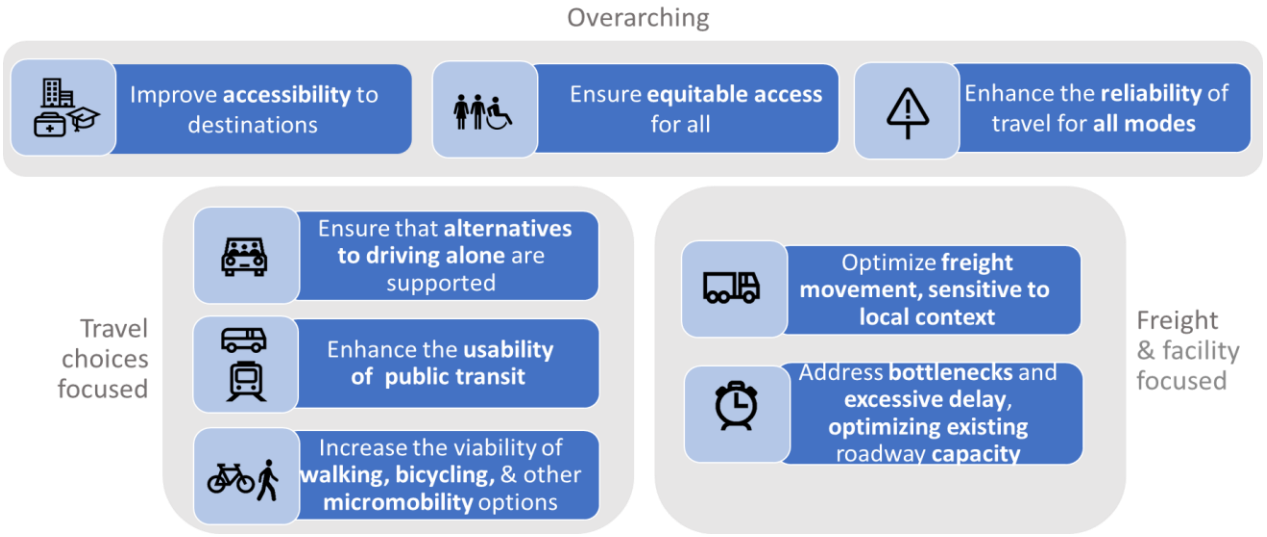
This report aims to document the updated needs and strategies for the AMRR study. The needs were identified based on objective data analysis, considering various performance measures and their thresholds, as well as feedback from stakeholders, including the CMP working group. The report outlines the areas identified during the needs assessment and the potential locations for applying strategies.

2| CMP OBJECTIVES

The AMSS study, completed in 2021, identified eight objectives aimed at achieving desired outcomes related to accessibility and mobility, aligning with the region's overarching planning goals. The emphasis was placed on the movement of people and goods rather than merely moving vehicles or addressing congestion issues.

Figure 1 summarizes the eight objectives as identified in the AMSS study.

Figure 1. NJTPA Congestion Management Process Objectives



3| IDENTIFIED NEEDS AND STRATEGIES

In the context of the Congestion Management Process (CMP), generally, needs reflect performance gaps or issues that have been identified within the transportation system. They highlight areas where the current performance is lacking and where improvements are necessary to meet established thresholds. In some cases, needs can also be seen as "opportunities for improvements", where there is potential for a significant positive impact through targeted interventions.

The AMRR study has identified areas of need and prioritized regions where strategies could be implemented to address the mobility and accessibility requirements of the region. Strategies denote actions that may yield benefits for the region through their incorporation into the long-range transportation plan, subsequent studies, funded projects or programs under the Transportation Improvement Program (TIP), or other ongoing initiatives. Although the NJTPA will advocate and promote cost-effective and advantageous strategies through its activities, many of these actions necessitate implementation by partner agencies.

Moreover, market characterization analysis was performed on regions identified as regional needs or prioritized for strategy implementation to better comprehend the characteristics of these communities. This analysis utilized specific evaluation metrics, including population and employment growth, vehicle availability, and adverse social, economic, and fiscal conditions.

Need Assessment

The AMRR study followed a systematic approach to identify needs based on performance measures, thresholds, and geographical levels. The process is outlined as follows:

1. **Identification of Performance Measures and Thresholds**: For each performance measure identified for the region, thresholds are determined to define acceptable and unacceptable performance levels. This step is crucial for pinpointing areas that need or could benefit from improvements.
2. **Geographical Levels of Needs Identification**: Needs are identified at various geographical levels, including regional, system level, corridor/roadway segment, census tract, block group, town, or locality. This multi-level approach ensures a comprehensive assessment across different areas.
3. **Consideration of Travel Patterns and NJTPA Place Types**: Travel patterns and NJTPA place types are analyzed to understand the usage and specific needs of different areas. This analysis helps tailor the needs assessment to the unique characteristics of each area. Consideration of travel patterns and place types helps in developing context-sensitive strategies.

Documenting Areas of Need

To document regional needs for performance-based planning by linking them with regional planning goals and investment strategies, the needs were recorded in the PRIME system (Planning Recommendations Integration Management Engine). The PRIME System is an online tool developed by the NJTPA. It functions as a comprehensive library of planning studies, needs, and recommendations identified by NJTPA and its partner agencies. The following steps were implemented to document the areas of need.

1. **Needs Assessment Using GIS Analysis**: The needs assessment is conducted using GIS analysis, which involves mapping and analyzing spatial data to identify areas that do not meet the performance thresholds. GIS analysis provides a visual representation of the needs, facilitating easier identification and prioritization.
2. **Organization of Needs in ArcGIS StoryMaps**: After identifying the needs, they were compiled in ArcGIS StoryMaps for review and presentation. StoryMaps provides an interactive format that helps stakeholders understand and examine the findings. Feedback was collected during the fourth CMP working group meeting, and adjustments were made to the methodology, performance measures, and thresholds where required to determine the final areas of need.
3. **Entry in the PRIME System**: Once the final areas of need are determined, the areas of need are documented in the PRIME system in the appropriate category.

Strategy Identification

In the AMSS, a menu of potential strategies for implementation was developed, along with a process for identifying and prioritizing these strategies. A series of analyses was conducted using performance measures and data from the needs assessment to prioritize promising locations for these strategies. In the AMRR, the process for identifying and prioritizing strategies was not reinvented; rather, the analyses were updated based on the latest available data and any updates to the performance measures.

Additionally, as part of the AMSS, a comprehensive series of strategy profile sheets was developed to provide valuable information on various strategies. These include details on assessment factors for prioritizing locations for strategy application, estimated impacts, equity considerations, target locations, related projects, and agencies with roles and responsibilities. Moreover, as part of the AMRR, these strategy profile sheets were updated where appropriate with supplementary guidance or identification of best practices to enhance the implementation of these strategies. The guidance encompasses implementation issues to consider, useful resources, and identification of potential funding sources.

Table 1 delineates the needs and strategies for each specified Strategy group, indicating their interrelationship within the respective groups. Connections to identified CMP strategies are noted in the 6th column. The table also identifies the PRIME category for the needs and strategies. Furthermore, an additional market characteristic analysis was conducted on some of the identified needs and strategies, denoted by asterisks (*). The market characterization analysis is performed using one or more of the following market evaluation metrics (MEMs) to better understand the needs in the region.

- Low ranking 2024 MRI scores of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions[1]
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050)[2]
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050)[2]
- Limited vehicle access by census tract (2019-2023 average: 20% or more households without a car)[3]
- Age of resident population by census tract, (2019-2023 average: 20% or more aged 65 or older)[3]
- Resident population disability status by census tract, (2019-2023 average: 14% or more with 1 or more disabilities)[3]

[1] New Jersey Department of Community Affairs, 2024 Municipal Revitalization Index (MRI)
[2] North Jersey Regional Transportation Model Enhanced (NJRTM E), a multimodal travel demand model developed by New Jersey Department of Transportation (NJDOT)
[3] United States Census Bureau, American Community Survey 5-Year Estimates (2019-2023)

- Proximity to primary, secondary, or higher education schools (2023 locations, 1/4-mile radius)[4]

[4] NJGIN Open Data, School Point Locations of NJ (Public, Private and Charter) and Integrated Postsecondary Education Data System (IPEDS)

Table 1. Needs and Strategies by Strategy Groups

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
Accessibility to destinations and land use 	Need – Less than appropriate accessibility based on place type	Number of jobs accessible by driving	• Within 45 minutes by driving	Localities	• Land use / urban design / transit-supportive development (LU) • Transit-priority / Transit supportive roads (TR-1) • Add/improve first mile/last mile access (TR-4) • Expand/enhance bus, rail, and ferry service (TR-7) (TR-8) (TR-9) • Arterial Operations and Freeway Operations/Regional System Management (SM-1) (SM2) • Roadway Geometry improvements (RC-1) • Managed Lanes (RC-2)	• Economic Activity • System Connections • Land Use •
		Number of jobs accessible by public transit	• Within 45 minutes by public transit			
		Area types	Overlay for area-type context			
	Need - Addressing the balance between low-	Locations with high disparity between the	Low-wage Jobs exceed low-income residences by 1,000; low-income	Census Tracts	• Demand management (DM)	• Economic Activity

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
	income worker residences and low-wage job locations, considering lengthy commutes*	number of low-income workers and low-wage jobs	residences exceed low–wage jobs by 400		• Land use / urban design /transit-supportive development (LU)	• System Connections • Land Use • Travel Affordability •
		Average commute transit travel time	>60 minutes			
Transit 	Need -Trans Hudson transit capacity	NYC-bound commuter flows	Highest flows to NYC from NJTPA counties	County and Transit service	• Transit preservation / resilience (TR-10) • Road and bridge preservation/resilience (RC-5) • Expand bridge, new bridge (RC-4)	• Roadway Access and Mobility • Transit Access and Mobility • State of Good Repair
	Need -Transit reliability	On-time performance	Bus – On-time performance below 50% Rail – On-time performance below 85%	Bus and rail routes	• Transit-priority / Transit supportive roads (TR-1) • Arterial Operations and Freeway Operations/Regional System Management (SM-1) (SM2) • Traveler information/trip planning (SM-3) • Transit preservation / resilience (TR-10)	• Reliability • Transit Access and Mobility

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
	Need - Limited Off-Peak Frequencies for Commuter Rail Service and Reverse Commute Challenge	Commuter rail frequency, Locations of jobs	> 60 minutes	Commuter rail routes	• Expand/enhance bus, rail, and ferry service (TR-7) (TR-8) (TR-9)	• Transit Access and Mobility • Economic Activity
	Need – Areas with limited access to public transportation	Number of households within half a mile of transit service	> 60% of households in Tract without access to a transit node within 0.5 miles	Census tract	• Support mobility-impaired accessibility (TR-3) • Add/improve first-mile/last-mile access (TR-4) • Park-and-ride enhancement/expansion (TR-5) • Expand/enhance bus, rail, and ferry service (TR-7) (TR-8) (TR-9)	• Transit Access and Mobility • Land Use
		Number of jobs within half a mile of transit service	> 60% of jobs in Tract without access to a transit node within 0.5 miles			
		Transit Score Index (TSI)	> 2.5			
	Need – Longer Commute Times for Transit alternatives*	Average commute times for Transit and Auto for OD pairs (Intra- County and Inter-County)	Average transit commute times / Average drive commute time > 3	Top OD census tract pairs	• Add/improve first mile/last mile access (TR-4) • Park-and-ride enhancement/expansion (TR-5)	• Transit Access and Mobility

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
					• Expand/enhance bus, rail, and ferry service (TR-7) (TR-8) (TR-9) • Demand management (DM)	
	Strategy – Suitable locations for Transit priority/transit-supportive roads/managed lanes	Bus peak frequency	<= 15 minutes	Roadway segments	• Transit-priority / Transit supportive roads (TR-1)	• Transit Enhancement • Transit Preservation
		On Time Performance (OTP)	TBD			
		Travel Time Index (TTI)	> 2 for AM and PM peak periods			
	Strategy – Suitable locations to expand/enhance transit service or transit options*	Locations with high transit scores but no access to high-frequency transit and limited access to rail within a half mile	TSI >2; Transit Headway >30 minutes	Census tracts	• Transit-priority / Transit-supportive roads (TR-1) • Improve bus stop infrastructure/amenities (TR-2) • Support mobility-impaired accessibility (TR-3 • Add/improve first mile/last mile access (TR-4)	• Transit Enhancement • Land Use
		Locations with high transit modes share and high average commute transit travel times.	Transit mode share (>15%); Average transit travel time > 45 minutes for commuters residing in the NJTPA region and working in the NJTPA region, and >90 minutes			

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
			for commuters residing in the NJTPA region and working in NYC		• Park-and-ride enhancement/expansion (TR-5 • Fare, system interconnectivity (TR-6) • Expand/enhance bus service (TR-7) • Expand/enhance rail (TR-8) • Expand/enhance ferry service (TR-9) • Transit preservation/resilience (TR-10)	
		Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile	Low-income Jobs exceed residences by 1,000; low-income residences exceed jobs by 400. and < 60% of jobs in Tract without access to a transit node within 0.5 miles			
		Locations with high transit scores that have relatively poor accessibility by transit	TSI > 2; and less than 50,000 jobs within 45 minutes of commute by transit			
Pedestrian, Bicycle, & Micromobility 	Need – Limited Viability of pedestrian, bicycle, and micromobility modes	Bicycle trip potential. Pedestrian trip potential	> 80	Census block group	• Sidewalks/pedestrian improvements (PB-1) • Bicycle facilities/ improvements (PB-2) • Complete streets (PB-3) • Safety countermeasures (S)	• Walk and Bike Mobility
		Average Walking trip length	> 0.7 miles (NJTPA Average)	County level		

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
	Strategy - Suitable locations for implementation of first-mile and last-mile access to transit strategies*	Number of commuters who have their work or job location within 1.5 miles of the station	> 1,500 boarding/ alighting in the Replica modeled typical Thursday of Fall 2023	Commuter rail and PATH stations	• Add/improve first mile/last mile access (TR-4) • Sidewalks/pedestrian improvements (PB-1) • Bicycle facilities/ improvements (PB-2) • Complete streets (PB-3) • Land use/urban design/transit-supportive development (LU)	• Pedestrian, Bicycle, Micromobility • Shared Ride
		Percent zero vehicle households (ZVH); Percent low-income households (Annual household income < $50,000)	% ZVH > 20% or % low-income households > 20%			
	Strategy – Suitable locations for the Implementation of Complete Streets with pedestrian and bicycle infrastructure improvements*	Bicycle Trip Potential Pedestrian Trip Potential Proximity of bus routes Bicycle and pedestrian crashes. NJTPA Equity Score	Bicycle Trip Potential and Pedestrian Trip Potential >80; Roadway on bus route; At least one Fatality or Serious injury	Roadway segments	• Sidewalks/pedestrian improvements (PB-1) • Bicycle facilities/ improvements (PB-2) • Complete streets (PB-3)	• Pedestrian, Bicycle, Micromobility • Shared Ride • Direct Safety

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
Roadway Operations 	Need - Congested and unreliable major roadways*	Level of Travel Time Reliability (LOTTR)	> 1.5	Roadway segments	• Demand management (DM) • Arterial Operations and Freeway Operations/Regional System Management (SM-1) (SM-2) • Roadway Geometry improvements (RC-1) • Managed Lanes (RC-2) • New road capacity (RC-3) • Expand bridge, new bridge (RC-4) • Road and bridge preservation/resilience (RC-5)	• Reliability • Roadway Access and Mobility • State of Good Repair
		Travel Time Index (TTI)	> 1.5			
		Planning Time Index (PTI)	>3			
		Concentration of bottlenecks	Top 20 in the region			
	Strategy - Suitable Locations that may benefit from roadway operations and geometric improvements	Vehicular traffic volume (AADT)	Interstates, Other Freeways, and Expressways > 100,000 Principal Arterials > 50,000 Minor Arterials and Major Collectors > 15,000	Roadway segments	• Demand management (DM) • Arterial Operations and Freeway Operations/Regional System Management (SM-1) (SM-2)	• Road Enhancement • Road Preservation • Road Expansion

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
		Level of Travel Time Reliability (LOTTR)	> 2		• Roadway Geometry improvements (RC-1) • Managed Lanes (RC-2) • New road capacity (RC-3) • Expand bridge, new bridge (RC-4) • Road and bridge preservation/resilience (RC-5)	
		Travel Time Index (TTI)	> 2			
		Concentration of bottlenecks	Top 20 in the region			
Freight 	Need - Congested and unreliable freight corridors	Travel Time Index (TTI) on CUFC, CRFC, and PHFS network segments.	> 2	CUFC/CRFC and PHFS network segments	• First Mile, Last Mile Truck Access (FR-1) • Rail freight (FR-2) • Freight operations / off-hours delivery (FR-3) • FR-4 New Truck Rest Areas/ Truck Parking Information Systems (TPIS)	• Freight Mobility
		Truck travel time reliability index (TTRI)	>2	CUFC/CRFC and PHFS network segments		
	Need – Improved truck access to warehouses and distribution centers	Proximity and connections to warehouses from the PHFS	Within 10 minutes of a major highway	Warehouse clusters	• First Mile, Last Mile Truck Access (FR-1) • Rail freight (FR-2)	• Freight Mobility

Need and Related Strategy Group	Identified Needs / Strategies within the Group	Performance Measures	Thresholds	Geographic Level	Connections to Identified CMP Strategies	PRIME Category
Safety 	Need - Unsafe areas for bicycles and pedestrians*	Bicycle Trip Potential	> 80	Census tract	• Safety countermeasures (S) • Sidewalks/pedestrian improvements (PB-1) • Bicycle facilities / improvements (PB-2)	• Safety/Security • Walk and Bike Mobility
		Pedestrian Trip Potential	> 80			
		Bicycle and pedestrian crashes	Fatal Crash - At least one fatal crash Serious Injury - At least 3 or more serious injuries			
	Need – Crash hotspots	Corridors with Automobile Crashes	Top 20 roadway segments/ corridors with automobile crashes	Roadway segments and corridors	• Safety countermeasures (S) • FR-4 New Truck Rest Areas/ Truck Parking Information Systems (TPIS)	• Safety/Security

1. Accessibility to Destinations and Land Use

1.1 Need – Less than appropriate accessibility based on place type.

Background

The Northern New Jersey region includes cities, suburban areas, and rural areas. Accessibility to various destinations refers to how easily people can reach places for activities such as work, study, leisure, recreation, shopping, healthcare, and social engagements. Accessibility to jobs serves as a useful indicator of accessibility for various purposes because it reflects the efficiency of transportation options, travel time, and infrastructure availability. Areas with high job accessibility often have better access to a wide range of services and activities, making them suitable locations for employment and other purposes. Accessibility to jobs from a location involves evaluating how easily people can access employment opportunities from a specific place. This measure can be affected by factors such as transportation options, travel time, and the availability of various types of jobs.

The majority of jobs in Northern New Jersey are concentrated in urban and suburban areas. Urban employment includes positions in finance, banking, technology, healthcare, retail, and the hospitality sector. In suburban areas, job opportunities are found in healthcare, education, retail, warehousing, and manufacturing. Additionally, there are some occupations in rural areas primarily related to agriculture, healthcare, and warehousing. The residents often have to commute long distances for jobs that match their industry and qualifications. The proximity to a major job market in New York City also significantly influences job accessibility.

When assessing job accessibility from different area types, it is anticipated that varying regions will have differing levels of accessibility. For instance, residents in rural areas typically have lower access to jobs compared to those in cities or suburban areas. This is due to fewer work opportunities and limited transportation infrastructure, particularly public transit, in rural areas. Rural regions often lack the population density necessary to support profitable transit systems.

Geographic Level / Focus Place Type

Accessibility for various localities and area types in North Jersey

Performance Measure

- Number of jobs accessible by driving and number of jobs accessible by transit for various area types

Data Source: Replica Fall 2023, Typical Weekday (Thursday), Home Location in NJTPA Region, Trip Purpose = Work, Mode = Private Auto or Carpool, and Transit; Previous Activity Type = Home and LEHD LODES (2021)

Unit of analysis: Census Block Group aggregated to uniformly sized hexagonal geometry (3060 hexes in total, and each hex is roughly 6.3 square miles)

Threshold

Within 45 minutes of driving and within 45 minutes of public transit

Different thresholds for the number of accessible jobs were evaluated for rural, suburban, and urban areas in the region. However, due to varying population and job densities within these area types, selecting a single threshold for each type did not yield meaningful results. Therefore, accessibility to the number of jobs within 45 minutes by driving or using transit was considered instead.

Job accessibility is influenced by various interconnected elements such as land use, housing, job-to-skill matching, and transportation access. Effective land use planning can reduce commuting distances by integrating residential and commercial areas, while affordable housing near job centers can lower travel costs and time. Even if jobs are physically accessible, a mismatch between the skills of job seekers and the qualifications required for available positions can lead to unemployment or underemployment.

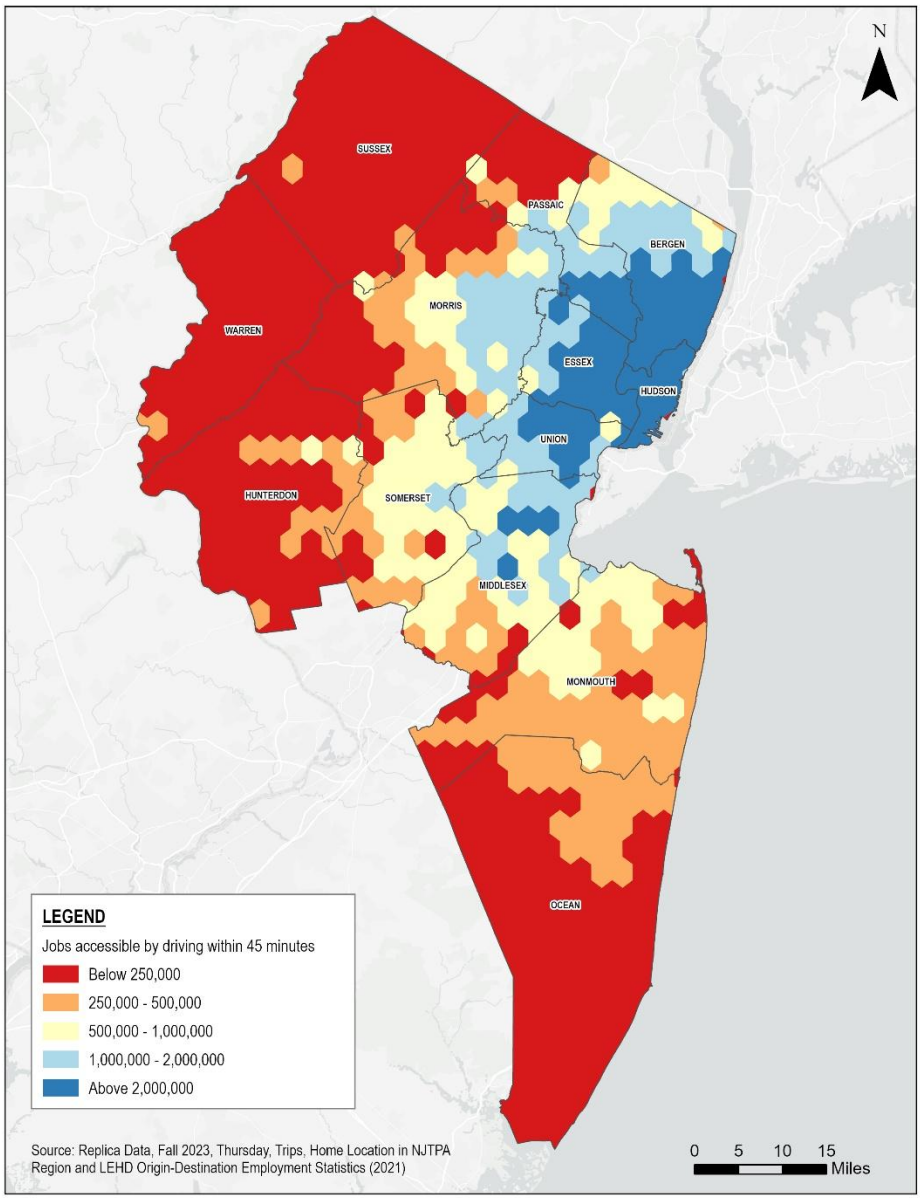
Due to the complexity of these factors, a thorough study is required to identify areas of need for improved job accessibility and develop targeted solutions to improve job accessibility.

Areas of Need

Access to Employment by Driving

In the Northern Jersey region, access to employment opportunities via driving is generally excellent, particularly in urban and suburban areas that have a high density of arterial roads and highways. However, in certain rural areas, accessibility to jobs by driving can be comparatively low. Specifically, rural regions within Sussex, Warren, Hunterdon, and Ocean counties exhibit relatively low accessibility to employment opportunities. Figure 2 shows the number of jobs accessible within 45 minutes of driving in the region. Maps showing the number of jobs accessible within 30 and 60 minutes of driving in the region are available in the Appendix of the report.

Figure 2. Number of jobs accessible within 45 minutes by driving



Access to Employment by Public Transit

In the Northern Jersey region, access to employment opportunities is typically high in areas serviced by commuter rail, PATH trains, Light Rail, Express buses, or Ferries. Areas served only by local buses have moderate job accessibility; however, there is a limitation on the number of jobs that can be accessed using local buses alone. Figure 3 shows the number of jobs accessible within 45 minutes of public transit in the region. Maps showing the number of jobs accessible within 30 and 60 minutes of public transit in the region are available in the Appendix of the report.

Below are some areas with relatively fewer accessible job opportunities using public transit.

Rural Areas

- Hunterdon County: Flemington, East Amwell Township, West Amwell Township
- Warren County: Phillipsburg
- Monmouth County: Millstone, Upper Freehold Township, Colts Neck, Wall Township
- Ocean County: Jackson Township, Little Egg Harbor
- Passaic County: Ringwood

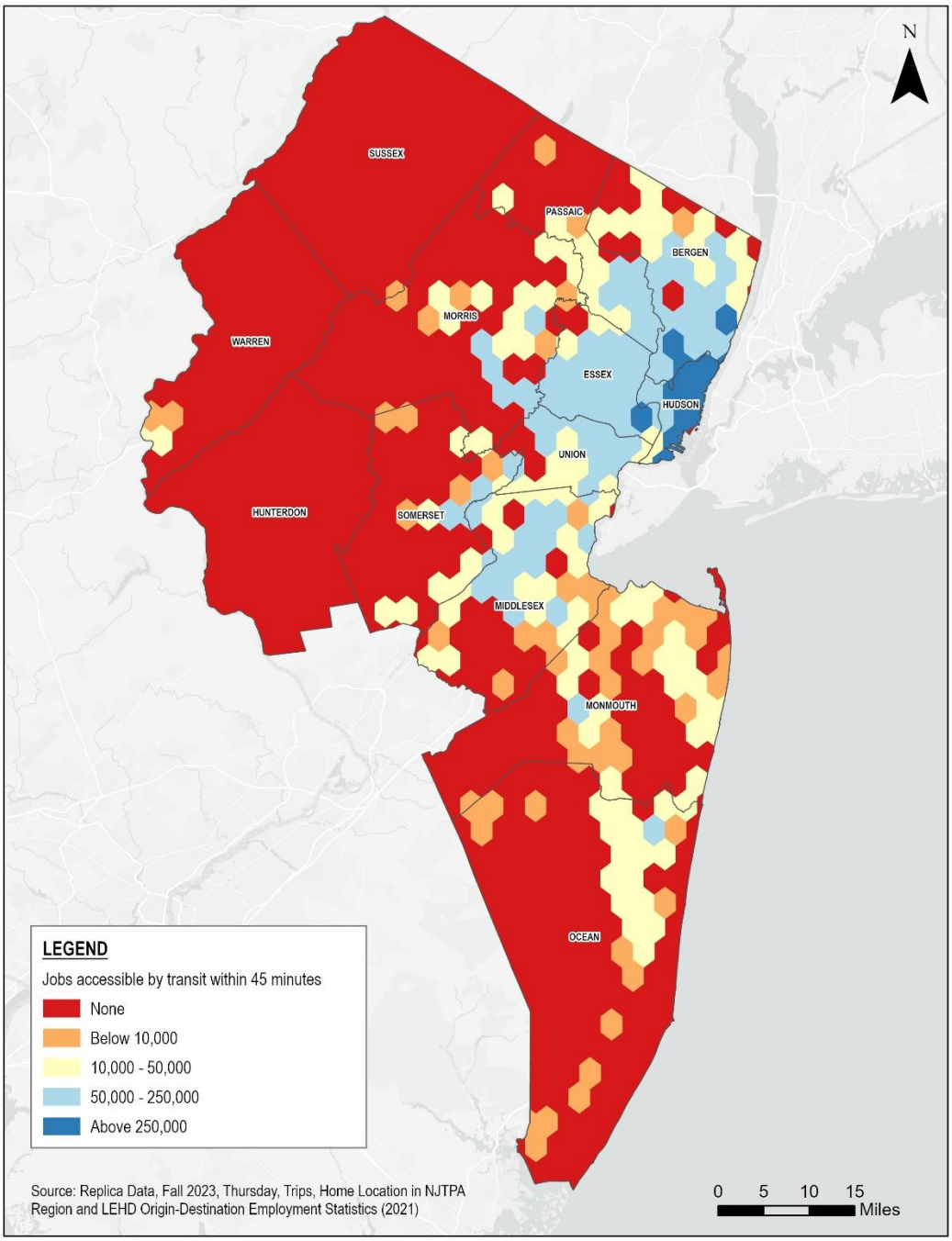
Suburban Areas

- Sussex County: Hopatcong
- Morris County: Roxbury Township, Dover, Denville, Mountain Lakes, Parsippany-Troy Hills Township, Hanover Township, Florham Park
- Somerset County: Bridgewater, Hillsborough Township, Franklin Township, Raritan Township, Rocky Hill
- Middlesex County: Plainsboro Township, Monroe Township
- Monmouth County: Aberdeen Township, Holmdel Township
- Ocean County: Lakewood Township, Toms River Township, Seaside Heights
- Union County: Carteret
- Bergen County: Westwood, Hillsdale, Tenafly
- Passaic County: Wayne Township, West Caldwell Township, Little Falls

Urban Areas

- Hudson County: Bayonne
- Bergen County: Englewood, Hackensack, Fair Lawn
- Union County: Summit, Plainfield, Linden
- Middlesex County: New Brunswick, Perth Amboy, South Amboy
- Monmouth County: Long Branch, Neptune Township
- Hunterdon County: Lambertville

Figure 3. Number of jobs accessible within 45 minutes by public transit



1.2 Need – Addressing the balance between low-income worker residences and low-wage job locations, considering lengthy commutes.

Background

Low-income workers need employment close to home to reduce transportation costs. However, jobs are often concentrated in urban areas where affordable housing is scarce, leading to longer commutes that affect their quality of life and increase expenses. Ideally, these low-income workers should find jobs near their homes or affordable housing near their workplaces to minimize commute time. If not, they should have access to reliable transit options without needing a car.

Geographic Level / Focus Place Type

Census Tract

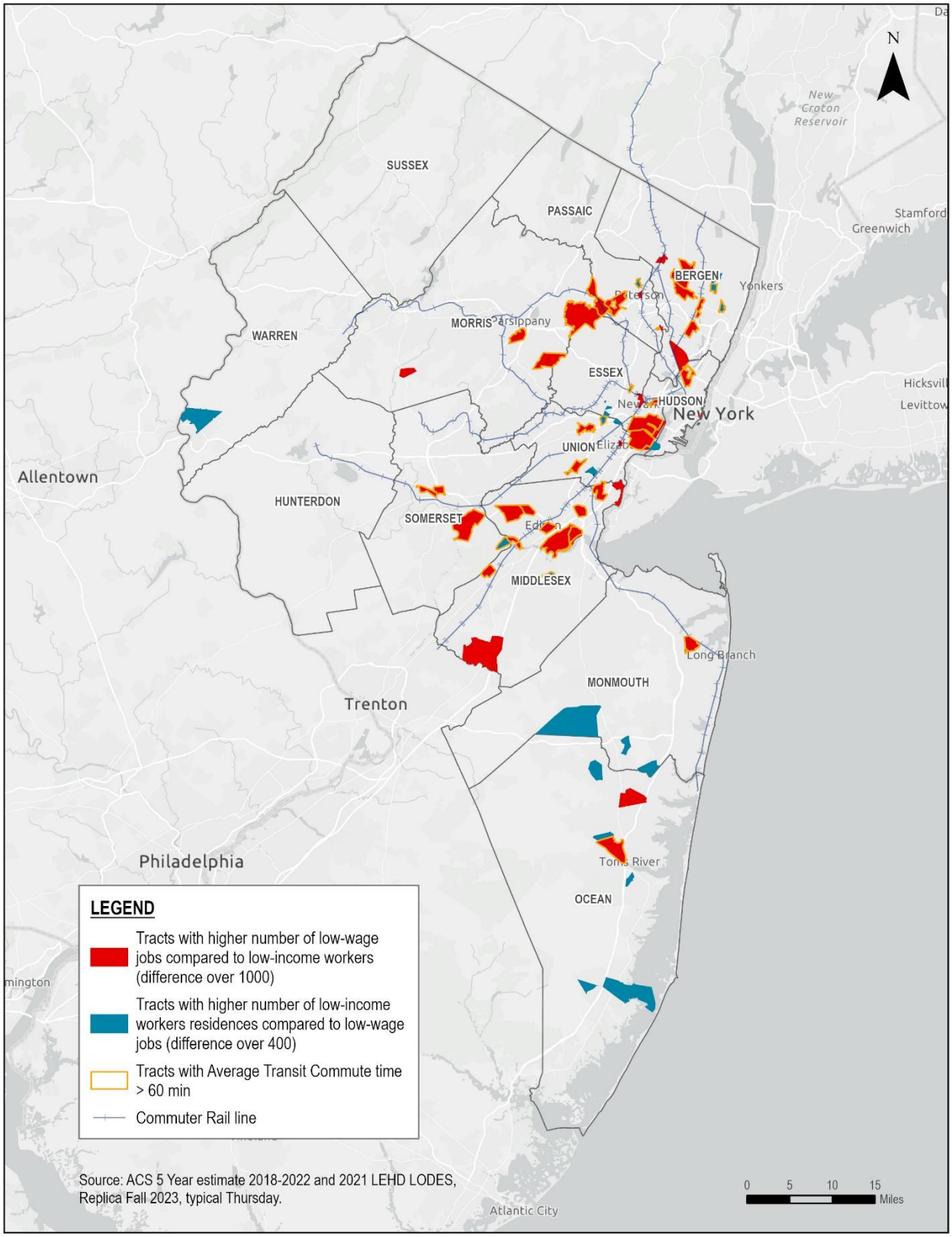
Performance Measures and Thresholds

- Census tracts where low-wage Jobs exceed low-income residences by 1,000* (Note that neighboring census tracts may make up for this disparity to some extent)
- Census tracts where low-income residences exceed low-wage jobs by 400* (Note that neighboring census tracts may make up for this disparity to some extent)
- Average commute transit travel time - Average transit travel times > 60 minutes

* Note – Due to the nature of job locations, employment opportunities tend to be geographically concentrated, whereas residences are more dispersed throughout the region. Consequently, the threshold for the number of jobs exceeding the number of residences is higher than the threshold for the number of residences exceeding the number of jobs.

Data Source: The number of low-wage jobs and the number of low-income worker residences are based on Work Area Characteristics and Residence Area Characteristics from the 2021 LEHD LODES dataset for the region. Per LEHD LODES, low-wage jobs or low-income workers have earnings of less than $ 1,250 a month.

Figure 4. Census tracts with transit commute times exceeding 60 minutes, where there is a significant disparity between the locations of low-income workers and low-wage job opportunities.



Areas of Need

The limited availability of affordable housing in areas with more job opportunities in the North Jersey region may lead to an imbalance between worker residences and job locations. Regions that include industrial parks, warehouses, malls, airports, and ports often have a higher concentration of low-wage employment opportunities and may not have housing affordable to low-income workers nearby. Note that the jobs/housing balance also affects higher-income jobs; however, workers with higher incomes are less sensitive to the higher costs associated with longer commutes.

Some census tracts to note include those that cover the Newark International Airport and Newark and Elizabeth Ports, Downtown Newark, and Fairfield (Essex County); Downtown Elizabeth (Union County); the Exchange Place and Paulus Hook neighborhoods of Jersey City (Hudson County); Meadowlands (Bergen County); Raritan Center and Keasbey neighborhoods of Woodbridge Township, North Brunswick, and the Cranbury neighborhood of South Brunswick (Middlesex County); parts of Parsippany, Chester, and Hanover Township (Morris County); Somerset (Somerset County); Lakewood Industrial Park and Toms River (Ocean County); and Shrewsbury (Monmouth County). Some of these census tracts also have transit commute times exceeding 60 minutes, as shown in Figure 4

Conversely, some tracts in Bayonne (Hudson County); Irvington, Newark (Essex County); Hillside, Rahway (Union County); Englewood, Bergenfield, Dumont (Bergen County); Prospect Park (Passaic County); New Brunswick (Middlesex County); Freehold Township, Howell (Monmouth County); Lakewood Township, Toms River (Ocean County); and Lopatcong Township (Warren County) have a higher number of worker residences than low-income jobs.). Some of these census tracts also have transit commute times exceeding 60 minutes, as shown in Figure 4.

Almost all of these census tracts with travel transit times over 60 minutes have a transit mode share exceeding 25 percent, with some tracts having a transit mode share over 50 percent.

Market Characterization Analysis

The census tracts with an imbalance between low-income worker residences and low-wage job locations were further compared against several key Market Evaluation Metrics (MEMs) to better understand the character of these communities of need. MEMs included:

- Low 2024 Municipal Revitalization Index (MRI)[5] rankings of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions,
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050),
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050), and

[5] The New Jersey Department of Community Affairs' 2024 Municipal Revitalization Index (MRI), which serves as the state's official measure and ranking of municipal stress.

- Limited vehicle access by census tract, (2019-2023 average: 20% or more households without a car).

Only MEMs showing correlations between the areas of need are discussed in the main body of this report. Additional maps of MEM relationships related to vehicle access and population growth are included in the appendix.

Tracts of need were concentrated in low-ranking MRI communities within the NJTPA Region's urban core, where low-income worker residences and low-wage job locations often overlapped with areas of high need, particularly in and around larger cities. Long average commutes for these tracts of need in low-ranked MRI communities were observed in Teterboro, Passaic, Newark, and New Brunswick, while job locations with long commutes and low-ranked MRIs included South River and Western Newark. See Figure 5.

Areas with both long commutes for tracts of need and projected job growth exceeding 300 jobs by 2050 were dispersed across the region, including Paramus, Hackensack, Parsippany-Troy Hills, Fairfield, Union, Newark, Elizabeth, Woodbridge, Edison, Piscataway, Franklin, North Brunswick, and Toms River. See Figure 6.

Clusters of tracts of need did not align with areas projected for significant population growth or with low rates of car ownership.

Figure 5. Census tracts with transit commute times exceeding 60 minutes, where there is a significant disparity between the locations of low-income workers and job opportunities versus the Revitalization Index, 2024

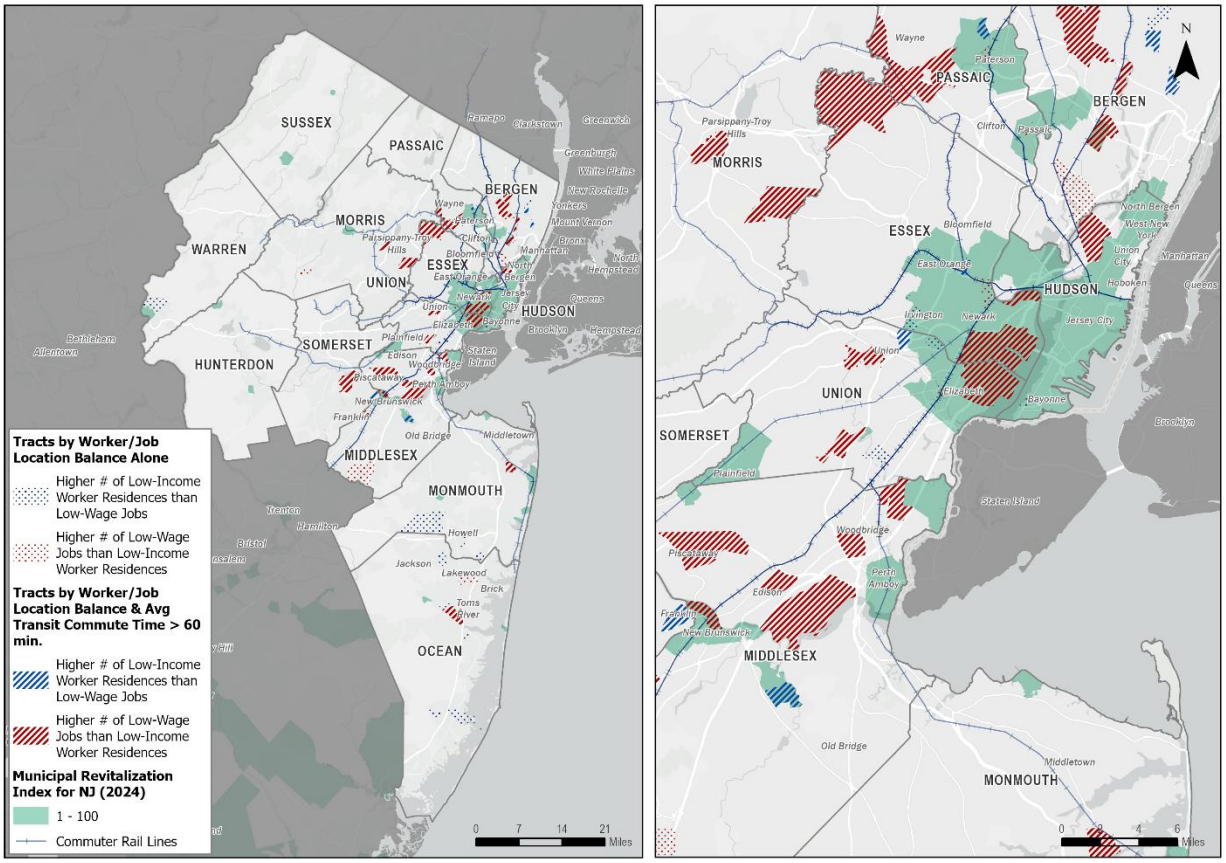
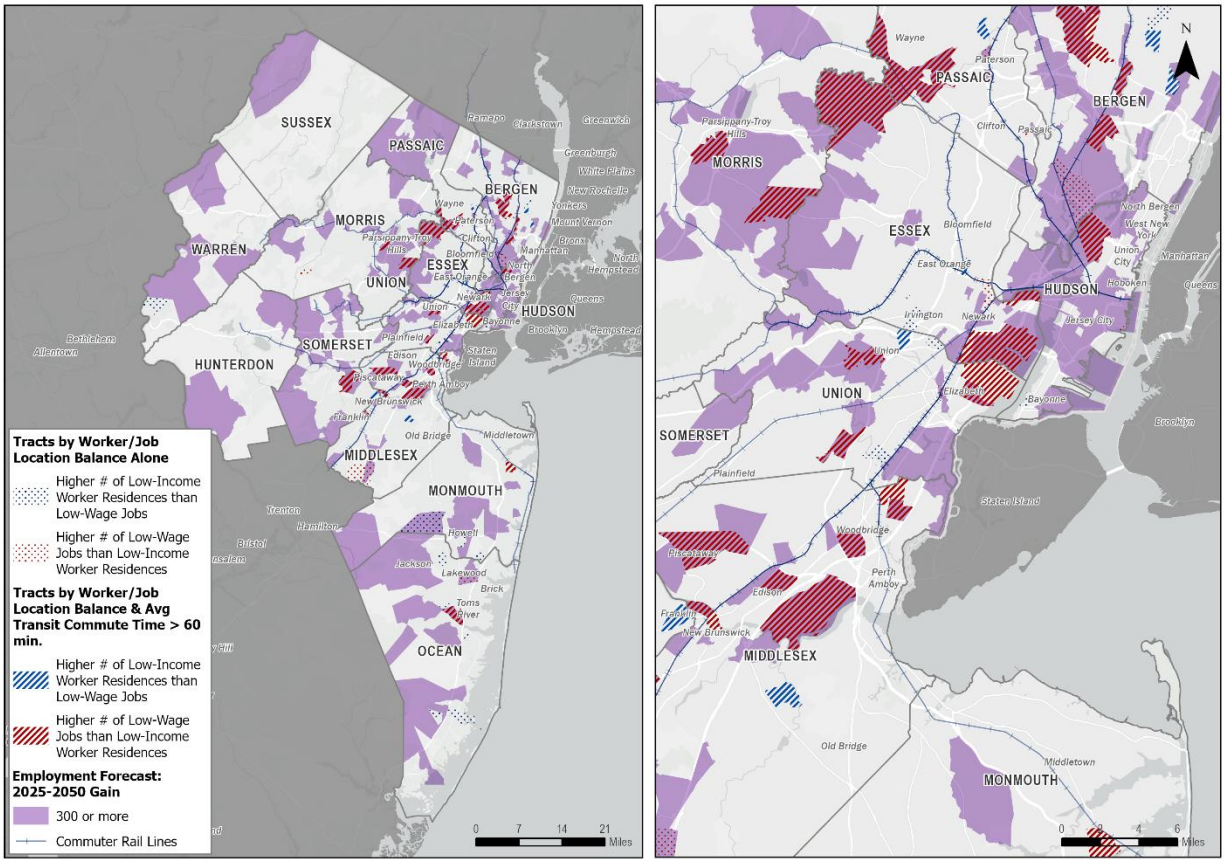


Figure 6. Census tracts with transit commute times exceeding 60 minutes, where there is a significant disparity between the locations of low-income workers and job opportunities versus TAZ employment growth, 2025-2050.



2. Transit

2.1 Need - Trans Hudson Transit Capacity

Background

Trans-Hudson transit capacity is a critical issue, marked by significant crowding and constraints on both rail and bus services to New York City. The Trans Hudson market is served by NJ Transit commuter rail, PATH rail, Amtrak, NJ Transit, and private buses and ferry services. The trans-Hudson travel market is essential for the economic and social connectivity between New Jersey and New York City, supporting a significant number of daily commuters and contributing to the region's overall mobility and economic vitality.

It is worth noting that the Gateway Program, led by Amtrak in collaboration with NJ TRANSIT, the Port Authority, and the Gateway Development Commission, is currently underway and aims to enhance rail capacity along a 10-mile stretch of the Northeast Corridor between Newark Penn Station and New York Penn Station. This program includes the construction of the Hudson tunnel project, expected to be completed in 2038, which will add two new track tunnels and

renovate the existing tunnel, Portal North and Sawtooth bridge replacement, dock bridge rehabilitation, and the addition of a fourth track at Harisson.

The Port Authority is piloting vehicle technologies to enhance the Lincoln Tunnel's Exclusive Bus Lane (XBL) and collaborating on Route 495's Integrated Corridor Management (ICM) with other agencies. They will continue improving bus operations with NJ TRANSIT, NJDOT, and other partners.

In addition, some projects that are in a less advanced stage of development, which would help trans-Hudson transit capacity, include Penn Station expansion, Portal South Bridge, Secaucus Junction, and Bergen Loop to provide a one-seat ride for various NJ transit lines to Penn Station. In addition, the Port Authority Bus Terminal replacement and PATH upgrade projects are underway.

The ferry service between northern New Jersey and NYC is being continuously enhanced, including the expansion of the existing ferry service between South Amboy and NYC and plans for new ferry services from Bayonne and Carteret to NYC.

Geographic Level / Focus Place Type

Regional and County level.

Performance Measure

Commuter flows to NYC.

Data Source: 2021 LEHD LODES Origin-Destination Dataset and NYMTC 2022 Hub Bound Travel Data Report

Between 1990 and 2015, total Trans-Hudson trips between New Jersey and New York grew by 44 percent, adding stress to roads, bridges, and tunnels.[6]

In 2023, PATH trains facilitated 50.5 million annual passenger trips, encompassing both inbound and outbound journeys. The primary stations in New Jersey included Newark, Harrison, Journal Square, and Hoboken, while notable destinations in Manhattan were the World Trade Center and 33rd Street.[7]

Express buses represent a critical mode of transportation for passengers traveling across the Hudson River. Especially during peak periods, the dedicated express bus lanes in the Lincoln Tunnel enable express buses to offer competitive travel times. According to the 2022 Hub Bound Travel Data report by the New York Metropolitan Transportation Council (NYMTC)[8], approximately 15.2% of all individuals entering the New York Hub on a typical fall business day

[6] NJ Transit, NJT2030 A 10 -Year Strategic Plan , June 2020; https://content.njtransit.com/sites/default/files/njtplans/NJT_2030-A_10-YearStrategicPlan.pdf

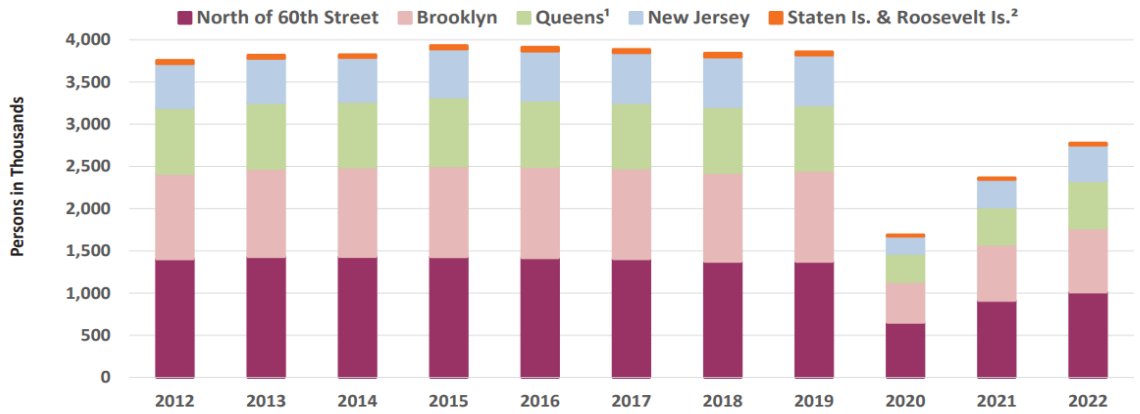
[7] Port Authority of New York and New Jersey , PATH Rail , About us , https://www.panynj.gov/path/en/about.html

[8] New York Metropolitan Transportation Council (NYMTC), Hub Bound Travel Data report ,2022, https://www.nymtc.org/Portals/0/Pdf/Hub%20Bound/2022%20Hub%20Bound/May%202022/2022%20Hub%20Bound%20Report-%205.17.24-FINAL%20corrected.pdf?ver=maKtK7lupDGBPWG3ZRuVIw%3d%3d

in 2022 came from New Jersey, considering all modes of transportation. Notably, around 74% of bus commuters were from New Jersey, primarily utilizing express buses.

Figure 7 shows the number of people entering the New York hub from 2012 to 2022. There was a notable dip in the number of people entering the New York hub during 2020 and 2021 due to travel restrictions and people working from home during the COVID-19 pandemic. In 2022, the number of people entering the hub went up. A Significant number of people commute to NYC from New Jersey.

Figure 7.Total number of people entering the Hub on a 2022 fall business day (Source: NYMTC 2022 Hub Bound Travel Data Report)



As per the LEHD LODES 2021 Data, around 13.8% of workers from the NJTPA region have their work location in NYC. Table 2 shows the number of workers from the NJTPA counties with work locations in NYC. Hudson County has the highest number of workers commuting to New York City, with 106,008 commuters, making up 26.0% of the total. Bergen County follows with 96,001 commuters (23.6%), and Essex County has 51,087 commuters (12.5%).

Table 2. Number of NJTPA workers with work locations in NYC (Source: 2021 LEHD LODES Origin-Destination Dataset)

NJTPA County	Workers with Work Locations in NYC	Percentage of Workers with Work Locations in NYC
Bergen	96,001	23.6%
Essex	51,087	12.5%
Hudson	106,008	26.0%
Hunterdon	2,359	0.6%
Middlesex	35,097	8.6%
Monmouth	31,822	7.8%
Morris	17,056	4.2%

Ocean	8,263	2.0%
Passaic	17,133	4.2%
Somerset	9,356	2.3%
Sussex	2,800	0.7%
Union	28,841	7.1%
Warren	1,377	0.3%
NJTPA Region	**407,200**	**100.0%**

Given the substantial number of commuters traveling from Hudson, Bergen, Essex, Middlesex, and Monmouth counties to New York City, it is essential to provide reliable transit options and sufficient capacity for these routes. Projects aimed at increasing the frequency and capacity of transit services from these counties should be prioritized. Enhancing the frequency of NJ Transit commuter rail, PATH rail, and express bus services, particularly during peak hours, will help accommodate more passengers. Additionally, investment in modernizing rail and bus infrastructure is crucial for improving reliability and reducing delays; this includes upgrading tracks, signals, and stations. Developing new transit routes and extending existing ones to underserved areas within these counties can also contribute to a more balanced distribution of the commuter load.

2.2 Need - Transit Reliability

Background

Transit reliability is crucial in regions such as North Jersey, where many individuals rely on public transportation for commuting and other activities. Ensuring dependable transit services enables people to adhere to schedules and plan their day effectively, making it a viable alternative to driving alone, which aligns with NJTPA's goal of reducing congestion.

However, transit faces numerous challenges, including aging infrastructure such as rolling stock, tracks, and signals that frequently break down, leading to delays. Additionally, NJ Transit shares tracks with Amtrak along some of the busiest rail corridors in North America, which can lead to further delays and complications. A shortage of crew and engineers also contributes to these delays.

Further compounding the issue are the delays experienced by NJ Transit trains traveling to NYC through the Hudson River tunnels. These tunnels, over 115 years old, have incurred significant damage from events such as Superstorm Sandy. Rain and other weather conditions can cause water to seep into the tunnels, impacting the third rail and catenary systems, resulting in power failures and subsequent delays. PATH trains are also affected by aging signal systems.

For buses, congested corridors and traffic accidents contribute to poor on-time performance. Bus routes traversing urban areas encounter significant delays during peak periods, further degrading their punctuality.

Geographic Level / Focus Place Type

System level and Route level

Performance Measure

On-time Performance – Systemwide for rail and Route level for buses

Data Source: NJ Transit Performance Data

Threshold

Bus – On-time performance below 50%

Rail – On-time performance below 85%

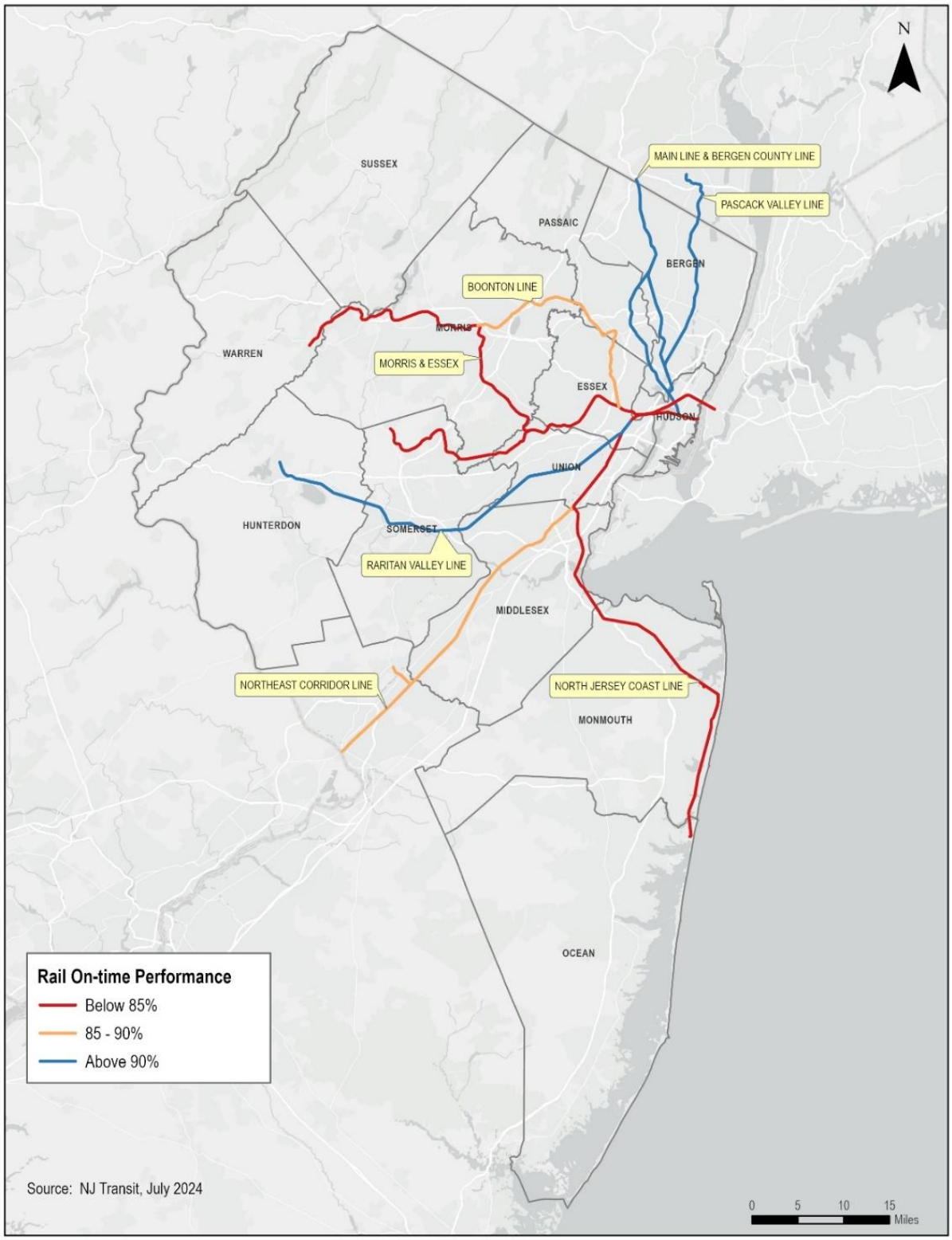
Areas of Need

Rail:

NJ Transit publishes monthly system-wide rail performance data on its website.[9] The July 2024 On-time performance data for NJ Transit commuter rail lines is displayed in Figure 8. The North Jersey Coastline, Morris and Essex rail lines, as well as the Montclair Boonton rail line, have an on-time performance below 85%.

[9] NJ Transit , NJ Transit Performance Dashboard - Rail (All Causes), https://www.njtransit.com/improve/on-time-performance/rail

Figure 8. NJ Transit Rail On-time performance data for July 2024.



Bus On-time Performance

NJ Transit tracks the on-time performance of buses using the Automatic Vehicle Location (AVL) systems. This technology helps them track on-time performance by comparing the actual arrival and departure times at bus stops with the scheduled times. NJ Transit provided the on-time performance of buses for October 2024. Out of the 254 bus routes, 127 reported an on-time performance of below 60%. Table 3 to Table 5 show the list of bus routes that have an on-time performance of below 50%.

Table 3. NJ Transit Buses to NYC with On-Time Performance below 50%, October 2024 (Source: NJ TRANSIT)

Route	On-Time	Early	Late	OT%
136: Lakewood - New York - Freehold Mall	227	106	551	26%
148: Midland Park - New York	87	9	165	33%
101: 101 West Orange-Montclair-New York	615	135	903	37%
105: 105 W Caldwell-CedarGrv-New York	554	162	761	38%
130: Lakewood - New York - Union Hill	1,187	410	1,534	38%
181: Union City - New York (GWB)	6,131	583	7,180	44%
117: Somerville - New York Express	903	482	652	44%
193: Willow Brook - New York Express	1,091	234	1,088	45%
145: Fair Lawn - New York	716	90	776	45%
154: Ft Lee - Palisades Park - New York	8,747	1,485	8,823	46%
168: Paramus - New York	23,087	3,676	22,889	47%
158: Fort Lee - Edgewater - New York	28,808	3,331	29,601	47%
159: Fort Lee - New York	52,776	6,682	51,951	47%
144: Fair Lawn - Hackensack - New York	5,057	288	4,905	49%
157: Teaneck - Ridgefield Pk - New York	742	104	652	50%
156: Englewood Cliffs - Ft Lee - New York	24,483	2,735	21,960	50%

Table 4. NJ Transit Regional buses within New Jersey with On-Time Performance below 50%, October 2024 (Source: NJ TRANSIT)

Route	On-Time	Early	Late	OT%
8: Bergen Avenue	3,984	760	7,669	32%
63: Lakewood - Jersey City - Weehawken	397	64	598	38%

Route	On-Time	Early	Late	OT%
14: Duncan - Mallory - NJ 400	4,824	1,676	5,541	40%
65: Newark - Somerville	2,396	467	2,464	45%
57: Tremley	3,487	1,474	2,684	46%
68: O Br - E Brunswick - JC - Weehawken	3,051	736	2,875	46%
86: Union City - JC - Newport Ctr Mall	4,513	958	4,129	47%
22: North Bergen - Union City - Hoboken	10,213	2,470	8,632	48%
67: Toms River - Lakewood - Newark	10,892	1,908	9,497	49%
97: East Orange - Montclair	3,033	172	2,988	49%

Table 5. NJ Transit Local Bus Contracts within New Jersey with On-Time Performance below 50%, October 2019 (Source: NJ TRANSIT)

Route	On-Time	Early	Late	OT%
822: Plainfield - N Plainfield	2,463	245	7,922	23%
819: Piscataway - Plainfield - Metuchen - South Plainfield	6,184	793	9,773	37%
810: New Brunswick - Woodbridge Ctr	7,289	1,666	10,228	38%
748: Paterson - Wayne	8,872	1,185	11,388	41%
813: Perth Amboy - Middlesex CC	6,238	371	7,058	46%
815: New Brunswick - E Brunswick - WBrCtr	11,521	4,152	9,388	46%
702: Paterson - Elmwood Park	10,774	2,286	9,585	48%
755: Paramus - Fort Lee - Edgewater	8,784	1,385	8,192	48%
751: Paramus - Cliffside Park - Edgewater	10,672	1,381	9,514	50%

2.3 Need - Limited Off-Peak Frequencies for Commuter Rail Service and Reverse Commute Challenge

Background

Within the Northern New Jersey Region, during the morning peak periods, transit is primarily focused on commuting to urban employment centers in northern New Jersey and to NYC, and in the evening peak hours, the service is oriented towards getting the workers back home. Jobs located in suburban and rural areas can be challenging to reach using transit due to insufficient service during peak periods. This is particularly true for jobs in warehousing, distribution

centers, and manufacturing, which are situated in these areas with limited transit availability during peak times. Additionally, jobs at warehouses, airports, and ports often do not align with traditional peak hours, complicating the provision of services.

NJ Transit and NJTPA provide assistance for the development of shuttle transportation services to connect low-income individuals to jobs and other employment-related services. Eligible services include shuttles and connector services to public transit or warehouse locations. Nonetheless, many regions could benefit from enhanced off-peak or increased frequencies during peak periods.

Geographic Level

Sections of commuter rail lines

Performance Measure

Commuter Rail headways from the NJTRM-E model and locations of jobs on a census tract level from the LEHD LODES 2021 data.

Threshold

Limited off-peak frequency

- Sections of commuter rail routes that operate with a high frequency during peak periods (headway of 30 minutes or less) and either have no service or significantly lower frequency (headway of 60 minutes or more) during off-peak periods.

Reverse commute challenge

- Substantially higher number of jobs (over 15,000 jobs in a census tract) in the suburbs (over 15,000 jobs in a census tract), with limited frequency of transit during peak periods

Areas of Need

Limited off-peak frequency

During peak periods, commuter rails operate with relatively high frequency. However, during off-peak periods, the frequency often decreases, which can affect commuters working irregular shifts or residents who require transit for non-commute purposes. The off-peak frequency is generally better on the Northeast Corridor, Main and Bergen Line, and between stations closer to the urban core on the North Jersey Coast Line, Montclair-Boonton, Morristown, Raritan, and Gladstone branch lines.

On certain commuter rail lines, the frequency is significantly high (30 minutes or better) during peak periods but drops to over 60 minutes during off-peak periods. Some segments that have been identified in Figure 9 on the commuter rail lines are

A) Newark Broad Street to Hoboken – This section is served by the Montclair-Boonton line, Morristown line, and Gladstone Branch lines, with extremely limited service during off-peak periods.

B) Lake Hopatcong to Dover – This section is served by the Montclair-Boonton line and Morristown lines, with limited service during off-peak periods.

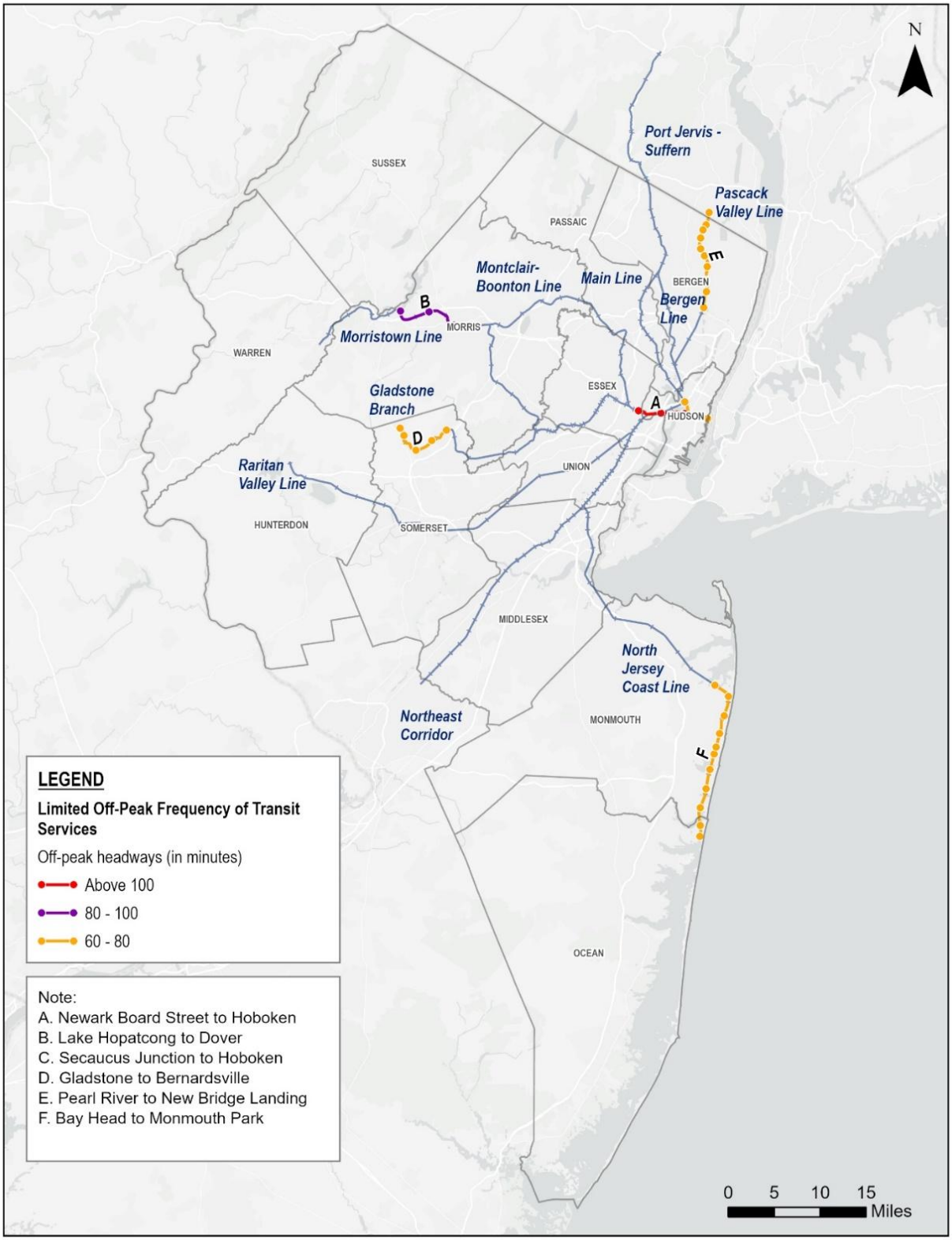
C) Secaucus Junction to Hoboken – This section caters to commuters working in the Hoboken and Jersey City area. The Main Line, Bergen Line, and Pascack Valley Line serve this section, while passengers from other lines can transfer at Secaucus Junction. Service on this section is available only during peak periods, with no off-peak service. An off-peak service between Secaucus and Hoboken could be considered.

D) Gladstone to Bernardsville – This section is served by the Gladstone Branch and has very low off-peak service.

E) Pearl River to New Bridge Landing – This section is served by the Pascack Valley Line and has very low off-peak service.

F) Bay Head to Monmouth Park – This section is served by the Pascack Valley Line and has very low off-peak service

Figure 9. Sections on Commuter rail routes that have high frequency during peak periods but limited frequency during off-peak periods.



Reverse commute challenge

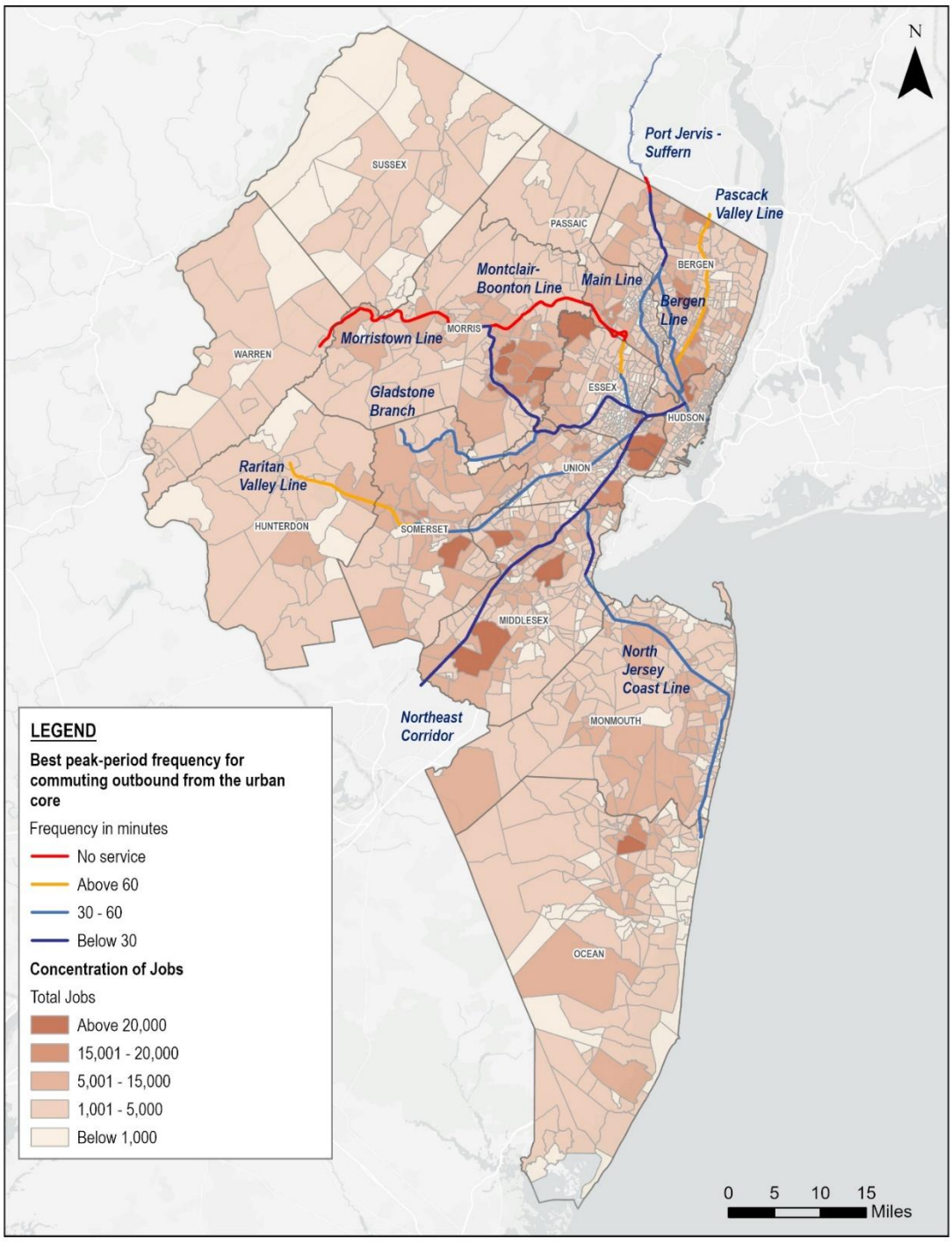
Most commuter services in the region are designed to transport commuters to the urban centers of northern New Jersey and New York during morning peak hours and back during evening peak hours. Only the Northeast Corridor, Main and Bergen Lines, and small sections of other rail lines offer a satisfactory frequency for reverse commuting.

However, there are a substantial number of jobs throughout the North Jersey region, as shown in Figure 10. Despite a robust transit network, reverse commuters face uncompetitive transit travel times from urban areas to some suburban job centers. These issues occur because of relatively limited reverse commute services and the less dense and suburban nature of employment locations, which creates local access issues.

Some examples of areas that could benefit from increased peak-period service frequencies to better accommodate commuters in these areas with jobs include:

- Middlesex County: Parts of South Brunswick, Piscataway, Edison, New Brunswick
- Somerset County: Parts of Somerset, Raritan, Bridgewater Township
- Union County: Parts of Linden, Rahway, Union
- Essex County: Parts of Newark near the port and the airport
- Morris County: Parts of Florham Park, Hanover Township, Morristown
- Bergen County: Parts of Fairfield, Paramus, Hackensack, South Hackensack
- Ocean County: Parts of Lakewood Township

Figure 10. Reverse Commute Challenge – Jobs in the Suburban parts of the region with limited commuter rail service during peak periods



2.4 Need - Areas with Limited Access to Public Transportation

Background

The North Jersey region has a diverse landscape made up of large and small cities, suburbs, towns, and rural towns and communities. The needs of these different place types are different when it comes to access to public transportation.

Access to public transportation in the Urban core of New Jersey is exceptional, ranking among the best in the USA. The mode share in this region is one of the highest, particularly in counties like Bergen, Essex, Hudson, and the urban parts of Passaic, including Paterson. Larger cities such as Newark, Jersey City, Elizabeth, and Patterson, as well as smaller cities like Hoboken, Union City, Bayonne, Passaic, Orange, and East Orange, benefit from extensive services provided by NJ Transit. This includes commuter rail, express and local buses, light rail, and the PATH system.

In Suburban regions, residents have access to NJ Transit rail and buses, particularly in Middlesex, Monmouth, Somerset, and Passaic counties. Despite the proximity to stations, the density of population or jobs in these areas is not as high as in the urban core. However, certain parts of the suburbs still maintain a substantially high density.

Rural areas in counties such as Sussex, Warren, Hunterdon, Somerset, and Ocean counties face significant challenges due to limited transit options. The population density in these regions is low, which further complicates the provision of extensive transit services. Some rural counties rely on limited transit services provided by NJ Transit and private operators. For example, Coach USA's B-line in Bergen County and Academy Bus have been crucial in these areas[10].

The COVID-19 pandemic exacerbated these challenges, where transit ridership dropped significantly during and after the pandemic. Post-pandemic, due to a lack of ridership for some private operators, maintaining service frequencies became difficult, with some services being curtailed. In June 2024, Coach USA declared bankruptcy and initiated voluntary Chapter 11 sale processes to maximize the value of its businesses.[11] This led to NJ Transit abruptly taking over bus routes that were dropped by Coach USA, ensuring that people continued to have access to necessary transit services.

The objective is to identify areas in the region with a higher likelihood of public transportation usage due to factors such as high residential and job density and a higher percentage of zero-vehicle households. However, these areas currently do not have a transit station (such as heavy rail or express buses) nearby.

A measure called the Transit Score Index (TSI) was used to evaluate the likelihood of transit usage. The TSI assesses the suitability of an area for various types of public transit services. Developed using LEHD Origin-Destination Employment Statistics (LODES) from 2021 and ACS 5-year Estimates (2018-2022), the TSI follows New Jersey Transit's methodology and is analyzed

[10] NJ Transit; Private Carriers, Contracted Service Carriers; https://www.njtransit.com/private-carriers
[11] Coach USA; Coach USA Initiates Voluntary Chapter 11 Sale Processes to Maximize Value of Its Businesses; https://www.coachusa.com/news-and-media/coach-usa-initiates-voluntary-chapter-eleven

at the census tract level. A TSI of over 2.5 means that there is a higher propensity for the use of transit.

Geographic Level / Focus Place Type

Census Tract

Performance Measure

- Number of households within a ½ mile of service, Number of jobs within a ½ mile of service, and

Data Source: The number of households within half a mile of transit nodes was analyzed using the Census 2018-2022 ACS 5-Year estimates and data from the NJTPA NJTRM-E model to determine the extent to which transit service may be a travel option for residents.

The number of jobs within half a mile of transit nodes was analyzed using the LEHD LODES, 2021, and data from NJTPA's regional travel demand model, NJTRM-E, to determine the extent to which transit service may be a travel option for employees.

- Transit Score Index (TSI)

Data Source: The Transit Score Index (TSI) measures the suitability of an area for various types of public transit services. Developed using LEHD Origin-Destination Employment Statistics (LODES) from 2021 and ACS 5-year Estimates (2018-2022).

The formula for calculating the Transit Score is:

(Population per acre * .41) + (Jobs per acre * .09) + (0-vehicle households per acre * .74)

NJ TRANSIT categorizes areas based on their Transit Scores, with zones scoring Medium or higher deemed "appropriate" for fixed-route bus service. The analysis revealed that 82% of census tracts have a Medium or High Transit Score Index. In comparison, an earlier AMSS study analyzed TSI at the TAZ level, finding that 81% of zones had Medium or High TSI.

Category	NJT Range
High	> 7.5
Medium-High	2.5 to 7.5
Medium	1.0 to 2.4
Marginal	0.6 to 0.9
Low	< 0.6

Threshold

- More than 60% of households in the census tract are without access to transit nodes within 0.5 miles, and
- More than 60% of jobs in the tract are without access to transit nodes within 0.5 miles.
- The Transit Score Index is greater than 2.5.

Areas of Need

In urban areas, most tracts with households and jobs that are highly likely to use public transportation have exceptional access to transit services, with transit nodes situated within a half-mile radius.

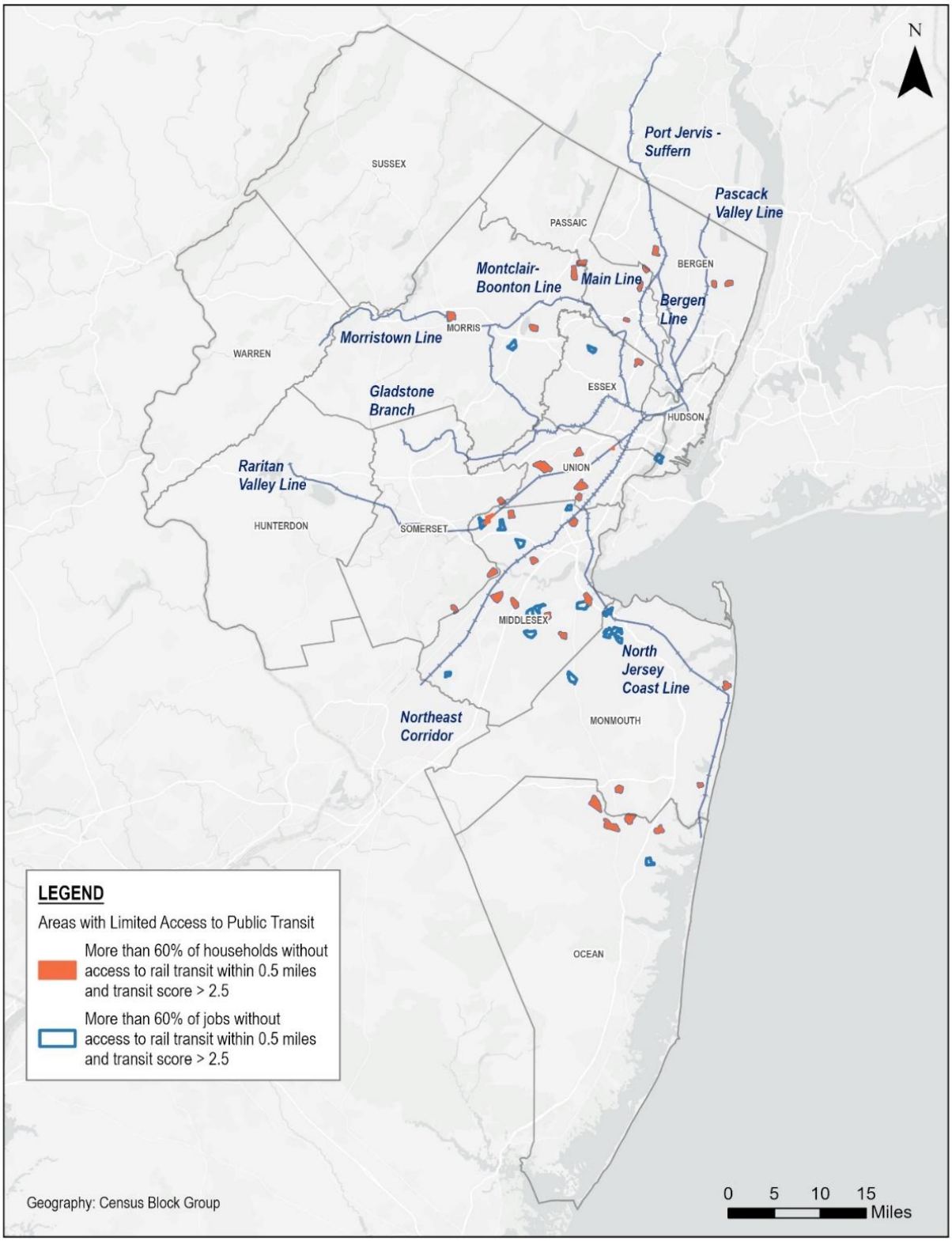
However, certain areas in both the old and new suburbs exhibit a high propensity for transit use but lack access to a transit node within 0.5 miles. Despite the extensive network of public transportation options available in Northern New Jersey, there are specific tracts that remain underserved.

Some examples shown in Figure 11 include tracts near

- Morris County: Parsippany, Lake Hiawatha
- Passaic County: Pompton Lakes, Pompton Plains, Pequannock Township
- Bergen County: Midland Park, Dumont, New Milford
- Essex County: Nutley
- Union County: Westfield, Rahway, Scotch Plains, Kenilworth
- Middlesex County: South Plainfield, New Brunswick, North Brunswick, East Brunswick, Green Brook
- Monmouth County: Aberdeen Township, Spotswood, Long Branch
- Ocean County: Lakewood Township, Brick Township, Howell Township

The absence of nearby transit nodes hampers the community's connectivity to the broader metropolitan region, compelling residents to rely heavily on personal vehicles or have to travel longer distances to access a transit node. This lack of infrastructure impacts the daily lives of many who depend on public transportation for their commutes. Some commuters have to drive significant distances to access rail service; for example, residents of Midland Park would have to drive to Ridgewood, Waldwick, or Ho-Ho-Kus to access the rail service. Establishing new transit nodes in these underserved areas can significantly improve accessibility, reduce reliance on personal vehicles, and promote a more integrated and efficient transportation network across the region.

Figure 11. Census tracts with high transit scores but lack access to rail transit stations (no station within 0.5 miles)



2.5 Need – Longer Commute Times for Transit Alternatives

Background

In northern New Jersey, despite the availability of various transit options such as commuter rail, local and express buses, and light rail, driving remains a more attractive alternative for commuting. Transit travel times are often extended due to factors like access and egress times, waiting periods, indirect routes requiring transfers, and limited-service frequencies. These elements collectively could make transit less competitive for certain origins and destinations in the region. As a result, commute times on transit are generally longer than those by automobile, leading many commuters to prefer driving for its convenience and efficiency.

In fact, in the region, for certain origin-destination census tract pairs with a high number of commuters between them, there is no available transit option. For some origin-destination census tract pairs, the ratio of transit travel time could be multiple times the auto travel time. For commuters traveling to New York City, transit times may be longer, particularly when a direct rail or express bus option is not available. However, there are certain origin-destination pairs where the average transit commute times are significantly higher compared to driving.

Geographic Level / Focus Place Type

Census tract

Performance Measures and Thresholds

Average travel times for Transit and Auto.

The average travel time to work by mode was analyzed using data from Replica. The travel times represent the Fall 2023 period, specifically Thursday, for work trips originating from home locations within the NJTPA region.

For thresholds, see the Areas of Need section for more details.

Areas of Need

Based on the thresholds noted above, Census tract pairs with a substantial number of auto commuters (exceeding 250) who travel distances greater than 5 miles by car yet lack available transit options between these census tract pairs. The identified census tract pairs are provided in the Appendix of the report.

Additionally, a list of census tract pairs where there are significant numbers of commuters (at least 25 transit trips) between the origin-destination pairs that are at least 5 miles apart. Furthermore, these pairs have an average commute time via transit that is more than three times longer than the average commute time by driving. The list of these origin-destination pairs is provided in the Appendix of the report.

Market Characterization Analysis

Both sets of origin-destination census tract pairs were further compared against MEMs to better understand the character of these communities of need. MEMs included:

- Low 2024 Municipal Revitalization Index (MRI)[12] rankings of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions,
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050, origins only),
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050 destinations only), and
- Limited vehicle access by census tract (2019-2023 average: 20% or more households without a car).

The first set of census tract pairs, which examined average driving distances between origin and destination tracts, showed little overlap with the study MEMs. Workers with long commutes by car typically had high levels of access to vehicles, lived in highly revitalized communities, and were located in areas with varying levels of employment and population growth.

In contrast, the second set of tract pairs, where driving was significantly faster than taking public transit, revealed a more meaningful overlap with MEMs, particularly in three areas: low MRI rankings, projected employment growth, and high rates of households without vehicle access. Of the 24 origin tracts analyzed, 18 were in low-MRI communities, indicating that both the commuters and their neighborhoods may lack the resources needed to support economic opportunity. Additionally, 15 tracts had high levels of households without access to a personal vehicle. Given that transit trips in these cases were more than three times longer than equivalent car trips, the lack of viable travel options presents a serious barrier to employment for residents with limited transportation access. Among destination tracts, 16 had high levels of projected employment growth from 2025 to 2050, indicating that transit service needs for these workers will likely increase in the coming years.

Table 6. Transit/Auto Trip Time Ratio Tract-to-Tract Flows: Origin/Destination Location Overlaps with MEMs (Yes/No)

	Revitalization Index: Less than 100		Population Growth 2025-2050: 750 Residents or More	Employment Growth 2025-2050: 300 Jobs or More	Households w/o Car Access: 20% or More	
	Origin	**Destination**	**Origin**	**Destination**	**Origin**	**Destination**
77 (Essex, NJ) + 323 (Richmond, NY)	Y	N/A	N	Y	Y	Y
192.02 (Bergen, NJ) + 203 (New York, NY)	N	N/A	N	Y	N	Y
8109 (Monmouth, NJ) + 8051 (Monmouth, NJ)	Y	N	N	Y	Y	N

[12] The New Jersey Department of Community Affairs' 2024 Municipal Revitalization Index (MRI), which serves as the state's official measure and ranking of municipal stress.

	Revitalization Index: Less than 100		Population Growth 2025-2050: 750 Residents or More	Employment Growth 2025-2050: 300 Jobs or More	Households w/o Car Access: 20% or More	
	Origin	Destination	Origin	Destination	Origin	Destination
68 (Essex, NJ) + 352 (Union, NJ)	Y	N	N	N	Y	N
129 (Essex, NJ) + 330 (Union, NJ)	Y	N	N	Y	Y	N
68 (Essex, NJ) + 9800 (Union, NJ)	Y	Y	N	N	Y	N
1809 (Passaic, NJ) + 425 (Bergen, NJ)	Y	N	Y	Y	N	N
127 (Essex, NJ) + 358 (Union, NJ)	Y	N	N	N	N	N
60.02 (Middlesex, NJ) + 66.05 (Middlesex, NJ)	Y	N	Y	N	Y	N
45 (Essex, NJ) + 200 (Essex, NJ)	Y	N	N	Y	Y	N
193.03 (Bergen, NJ) + 152 (Bergen, NJ)	N	N	Y	Y	N	N
159 (Hudson, NJ) + 600.01 (Bergen, NJ)	Y	N	Y	Y	Y	N
214 (Essex, NJ) + 186 (Essex, NJ)	N	Y	N	N	N	Y
376.01 (Union, NJ) + 217.02 (Essex, NJ)	N	N	N	N	N	N
551 (Bergen, NJ) + 299 (New York, NY)	N	N/A	Y	N	N	Y
193.05 (Bergen, NJ) + 203 (New York, NY)	N	N/A	N	Y	N	Y
79 (Essex, NJ) + 383 (Union, NJ)	Y	N	N	Y	Y	N
181.01 (Bergen, NJ) + 521 (Bergen, NJ)	Y	N	N	Y	Y	N
116 (Essex, NJ) + 200 (Essex, NJ)	Y	N	N	Y	Y	N
50 (Essex, NJ) + 452 (Bergen, NJ)	Y	N	N	N	Y	N
28 (Hudson, NJ) + 13 (New York, NY)	Y	N/A	Y	Y	Y	Y
94 (Essex, NJ) + 152 (Bergen, NJ)	Y	N	N	Y	Y	N
1752 (Passaic, NJ) + 425 (Bergen, NJ)	Y	N	Y	Y	Y	N
188 (Essex, NJ) + 31 (New York, NY)	Y	N/A	N	Y	N	Y

Note: N/A refers to no data available for this location.

As identified in the table 6, one tract pair (28 (Hudson, NJ) + 13 (New York, NY)) exceeded the MEM thresholds in five of the six evaluated categories and flow directions, and three pairs surpassed the thresholds in four of six categories, (77 (Essex, NJ) + 323 (Richmond, NY)), (159 (Hudson, NJ) + 600.01 (Bergen, NJ)), and (1752 (Passaic, NJ) + 425 (Bergen, NJ)) indicating compounded need for enhanced transportation alternatives to spur economic growth.

Figure 12. Census Tract pairs with uncompetitive Transit option (Longer Transit Commute times compared to Auto Commute times) (Based on Replica modeled trip data for a typical Thursday of fall 2023) versus the Revitalization Index, 2024

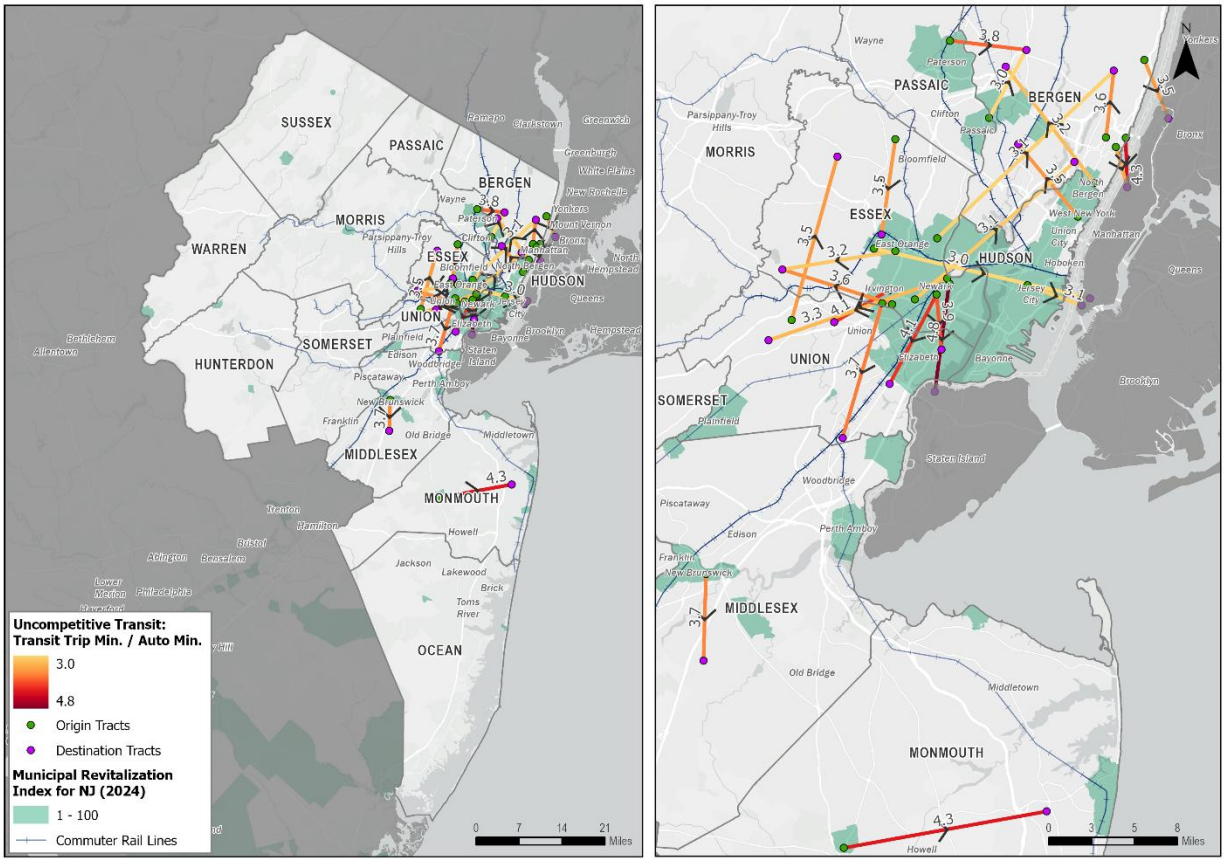


Figure 13. Census Tract pairs with uncompetitive Transit option (Longer Transit Commute times compared to Auto Commute times) (Based on Replica modeled trip data for a typical Thursday of fall 2023) versus Tracts by the Share of Households without Access to a Vehicle, 2023

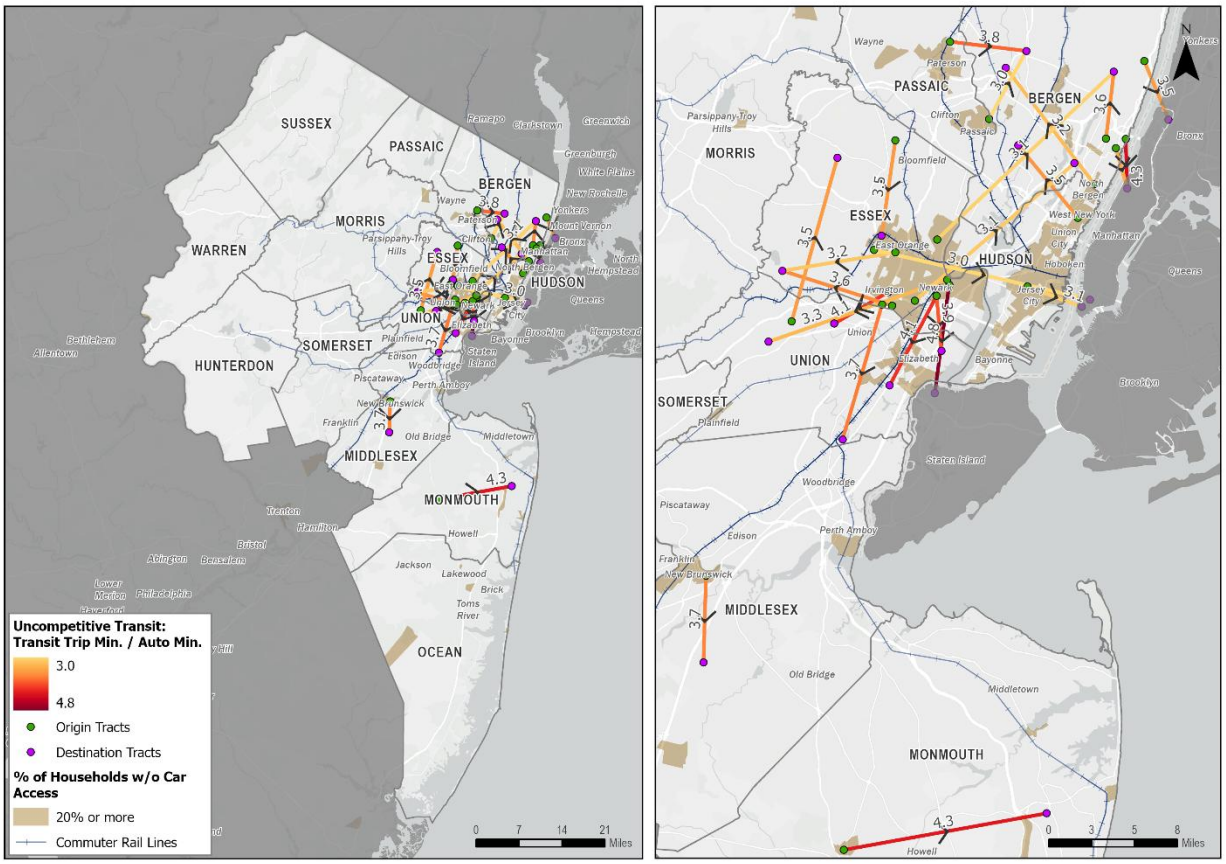
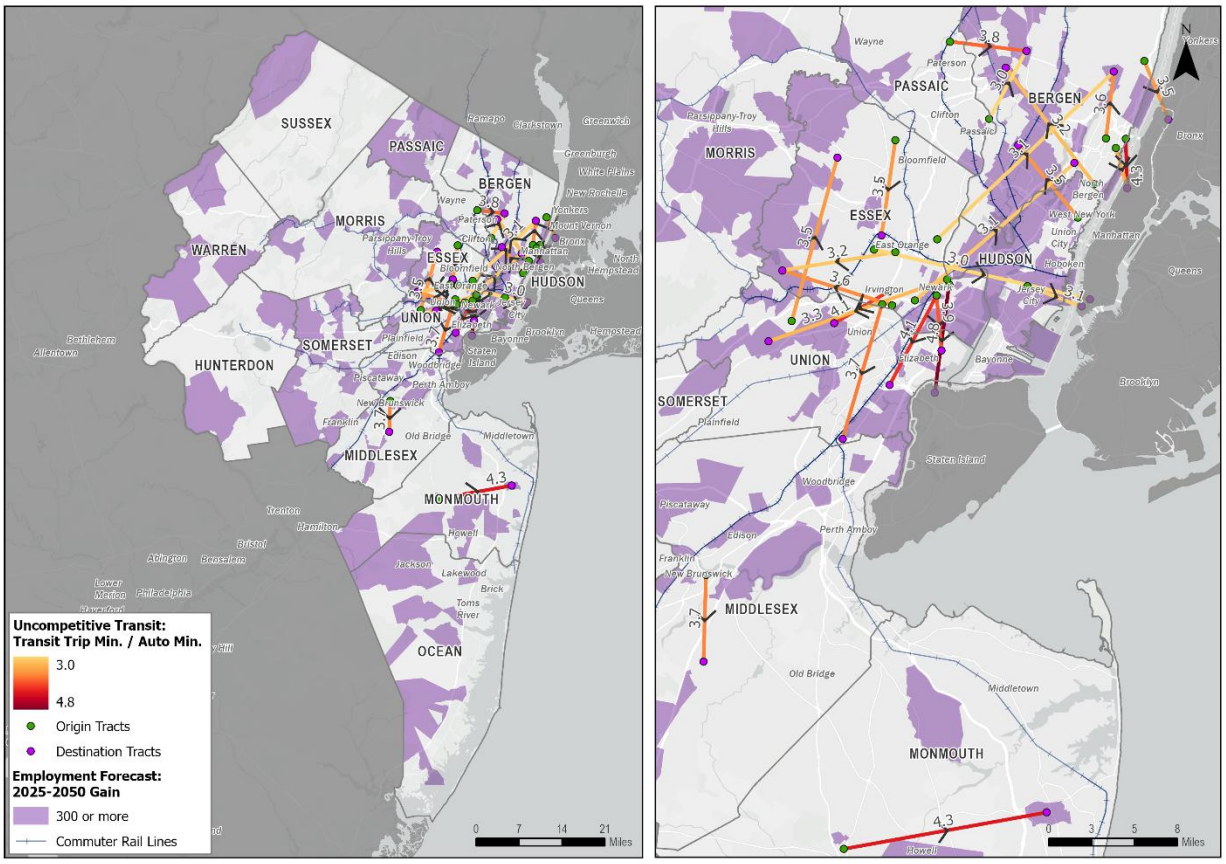


Figure 14. Census Tract pairs with uncompetitive Transit option (Longer Transit Commute times compared to Auto Commute times) (Based on Replica modeled trip data for a typical Thursday of fall 2023) versus TAZ employment growth, 2025-2050.



2.6 Strategy– Suitable locations for Transit Priority/Transit-Supportive Roads/Managed Lanes

Background

Transit priority strategies help minimize delays for transit vehicles and prioritize them over general vehicular traffic, particularly during peak periods when public transit usage is higher. These strategies can attract commuters to public transit and ensure that existing commuters experience minimal delays. Several strategies can be implemented, including Transit Signal Priority, dedicated bus lanes, queue jumps, utilization of shoulders during peak traffic conditions, Bus Rapid Transit, and express limited stop service.

Strategies may be implemented on roadways with high bus frequency and substantial traffic congestion. Such conditions can cause buses to become delayed in traffic, adversely affecting their reliability and leading to poor punctuality. Routes that meet both of these criteria are ideal candidates for bus priority treatments. These strategies are applicable to both freeway and arterial roadways, with the specific strategy employed varying based on individual circumstances. This analysis is intended solely to identify potential locations, and further detailed analyses should be conducted to assess the applicability and feasibility of these strategies.

Geographic Level / Focus Place Type

Roadway Segments and Corridors

Performance Measure and Threshold

- Relatively high frequency service: peak period frequency of every 15 minutes or better, the bus frequencies are based on the NJTRM-E model.
- Daily transit ridership from the NJTRM-E Model (over 200 passengers per day on an average weekday on a roadway segment) based on the NJTRM-E model.
- Relatively poor on-time performance: on-time performance less than 60% (based on data from NJ Transit Performance data from October 2024)
- Roadway with significant congestion during peak period - Travel Time Index (TTI) greater than 2 at 8 AM. The TTI data is from the 2023 TTI Dataset from RITIS NPMRDS.

Areas for Potential Application of Strategies

Based on the thresholds mentioned above, the candidate corridors were identified and shown in Figure 15 and listed in Table 7Table 7.

Figure 15. Candidate locations for potential applications of transit priority/transit-supportive roadways and managed lanes strategies

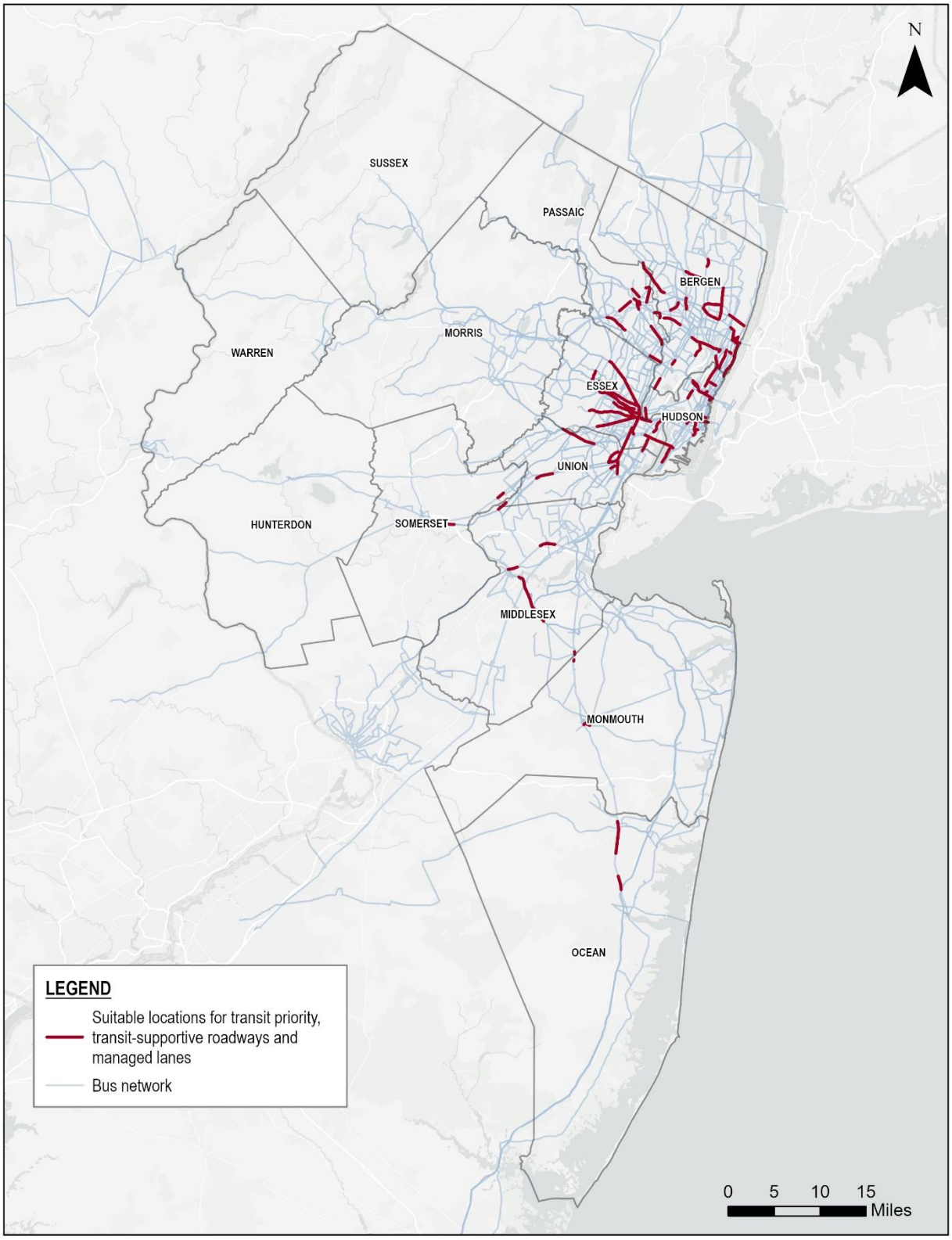


Table 7. Potential Roadway Segments and Corridors for consideration for application of Transit Priority Strategies

County	Municipality/ Town	Roadway Name	Bus Route	On-time Performance	AM Travel Time Index	Length of the Roadway Segment/ Corridor (Miles)
Bergen	Bergenfield, Dumont, Teaneck	Washington Ave	167	58%	2.27	1.031
	Elmwood Park, Saddle Brook, Lodi	Route 46	151	58%	2.38	0.605
	Englewood, Englewood Cliffs	CR 505 (E. Palisade Ave.)	756	55%	2.78	0.612
	Englewood, Fort Lee	Route 4	171	54%	3.6	0.746
	Fort Lee	Route 5	159	47%	2.41	0.084
		Route 67	156	50%	2.38	0.145
		Route 9W	159	47%	2.64	0.197
	Fort Lee, Edgewater Park	CR 505 (River Rd)	158	47%	2.31	1.166
	Little Ferry, Moonachie	CR 503 (Liberty St, Moonachie Rd)	161	57%	2.1	0.511
	North Arlington	Route 17	109	57%	2.02	0.387
	Oradell	Oradell Ave / Kinderkamack Rd	165	57%	2.17	0.884
	Palisades Park, Ridgefield	Route 1/9	83	52%	2.36	0.078
	Palisades Park, Ridgefield, Fairview	Route 63	154	46%	2.37	0.658
	Paramus	Route 17	145	45%	4.38	0.379
	Ridgefield Park	Route 46	83	52%	3.25	0.608
	River Edge, New Milford, Teaneck, Bergenfield	New Bridge Rd. / Roemer Ave.	756	55%	2.42	0.589
	Rutherford, East Rutherford	Route 17	163	56%	3.19	0.161
	Saddle Brook	Garden State Parkway	148	33%	4.96	0.382
	Teaneck, Hackensack	Route 4	165	57%	3.08	0.661
	Teterboro, S Hackensack, Little Ferry	Route 46	151	58%	2.21	0.335
	Westwood, Emerson	Kinderkamack Rd	165	57%	2.09	0.255
Essex	East Orange	CR 508 (Central Ave.)	24	54%	3.67	0.963
	Maplewood, Irvington, Newark	CR 603 (Springfield Ave.)	361	60%	3.59	1.31
	Newark	Corbin St.	40	58%	2.72	0.484
		NJ Turnpike	111	53%	3.61	0.511

		Market St	40	58%	2.56	0.34
		Raymond Blvd.	40	58%	2.77	0.165
		Bloomfield Ave. / Broad St.	29	56%	5.89	1.12
	Newark, East Orange	I-280	73	58%	5.07	0.588
	Newark, Orange, East Orange	CR 658 (Park Ave.)	41	55%	4.64	1.177
	South Orange, East Orange, Newark	CR 510	31	55%	3.91	1.55
	Verona, Montclair, Glen Ridge, Bloomfield, Newark	CR 506 (Bloomfield Ave.)	72	53%	2.24	1.665
	West Orange	Pleasant Valley Way	29	56%	2.63	0.411
		Northfield Ave.	73	58%	3.42	0.217
	West Orange, Orange, East Orange, Newark	Prospect Ave. / Mt. Pleasant Ave. / Main St.	97	49%	2.98	1.992
Essex, Hudson	Newark, Bayonne	I-78 (Newark Bay Bridge)	63	38%	8.56	1.027
Hudson	Bayonne	CR 501 (JFK Boulevard)	119	53%	2.27	0.613
	Harrison	CR 697 (Frank E. Rodgers Blvd.)	40	58%	2.98	0.365
	Hoboken, Jersey City	Observer Highway / Marin Blvd	63	38%	2.98	0.223
	Jersey City	I-78 / Route 139	120	59%	7.3	0.912
		Grand St	86	47%	3.29	0.122
		JFK Blvd	14	40%	3.5	0.342
		Newark Ave.	82	53%	3.47	0.184
		Sip Ave / Summit Ave	83	52%	3.65	0.415
	Secaucus	Paterson Plank Rd	87	59%	3.36	0.266
		CR 653	87	59%	2.5	0.291
	Secaucus, N, Bergen, Union City, Weehawken	Route 3 / 495	101	37%	5.23	1.085
	Union City	CR 501 (JFK Blvd)	88	52%	2.21	0.121
	W New York	60th St	89	59%	3.01	0.204
Hudson, Bergen	North Bergen, Fairview, Ridgefield	Route 1/9	83	52%	2.72	1.131
Middlesex	Metuchen	Route 27 (Middlesex Ave.) / CR 501 (Amboy Ave.)	810	38%	2.86	0.523
	New Brunswick, East Brunswick	Route 18	68	46%	3.9	1.754
	New Brunswick, Highland Park	Route 27 (Raritan Ave.)	810	38%	2.34	0.319
	Old Bridge	Route 9	63	38%	4.32	0.093
	Dunellen, Plainfield	Route 28	59	56%	2.06	0.343
Monmouth	Freehold Borough	Main St / Park Ave / South St	67	49%	2.28	0.448
	Marlboro	Route 9	67	49%	2.42	0.048

Ocean	Dover	Route 9	559	58%	3.68	0.468
	Lakewood	Route 9	559	58%	3.5	1.076
Passaic	Clifton	Route 3	101	37%	2.57	0.405
	Clifton, Passaic	CR 601	190	56%	2.44	0.726
	Hawthorne	CR 504 (Wagaraw Rd.)	722	52%	4.02	0.12
	Paterson	CR 673 (W Broadway) / CR 509 (Main St)	72	53%	3.91	0.409
		Memorial Dr / Ward St	722	52%	2.66	0.201
		CR 649 (Madison Ave.)	748	41%	2.31	0.45
	Paterson, Prospect Park, Haledon	CR 504 (Haledon Ave.)	744	51%	2.48	0.346
	Paterson, Totowa	CR 646 (Union Blvd.)	712	52%	2.19	0.483
	Totowa, Little Falls, Clifton	Route 46	193	45%	2.48	0.764
Passaic, Bergen	Hawthorne, Glen Rock, Fair Lawn	Route 208	148	33%	3.93	1.262
	Paterson, Elmwood Park	I-80 / River Drive	151	58%	3.33	0.34
Somerset	North Plainfield	Route 22	117	44%	2.6	0.248
	Somerville, Bridgewater	Route 28	65	45%	2.27	0.762
Union	Elizabeth	Route 439	113	58%	2.55	0.506
		Route 28	52	54%	2.28	0.303
		Broad St	52	54%	2.92	1.646
		Route 27 (Rahway Ave.)	48	59%	2.54	0.16
	Fanwood, Scotch Plains, Westfield	Route 28	113	58%	2.15	0.566
	Springfield, Union	Route 82 (Morris Ave)	52	54%	3.23	1.161

2.7 Strategy– Suitable locations to Expand/Enhance Transit Service or Transit Options

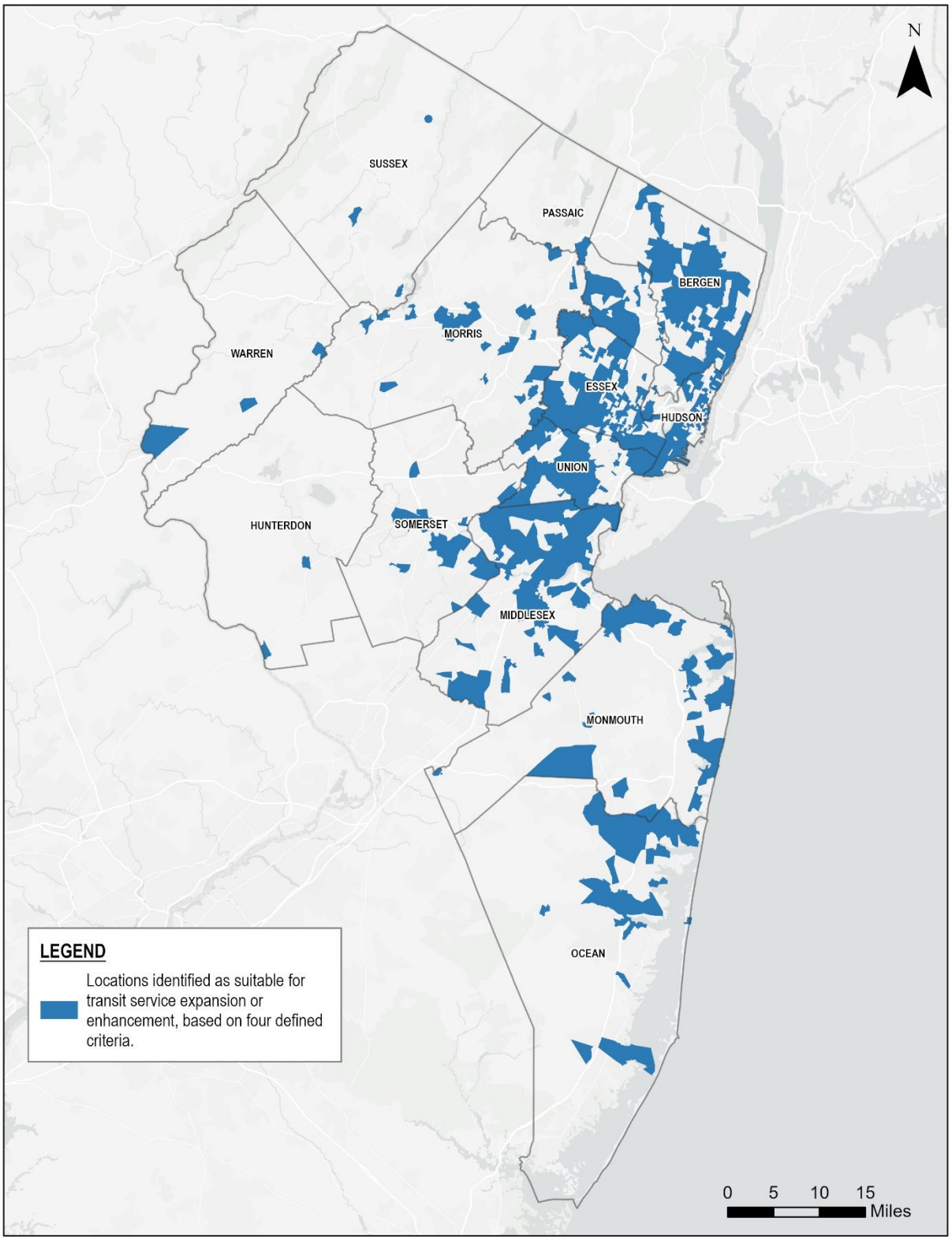
Expanding or enhancing bus services can involve various strategies, such as increasing the frequency of services, adjusting service routes, expanding coverage areas, and implementing express bus routes. The analysis was conducted to identify possible locations where these strategies can be applied; however, detailed analysis, including feasibility studies, is warranted for the implementation of specific strategies. In some cases, even if the needs assessment indicates a potential market, there may be insufficient demand to operate a transit service without significant subsidies. The analyses listed below take into account different aspects to identify potential locations to expand or enhance the transit service. Factors considered include the propensity of local users to use public transit, transit frequency, transit mode share, socio-demographic characteristics, and proximity or availability of a transit node. Potential locations for transit expansion and enhancement were identified using the following four evaluation criteria.

- Criteria 1: Locations with high transit scores but no access to high-frequency transit

- Criteria 2: Locations with high transit mode share with high average commute transit travel time.
- Criteria 3: Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile.
- Criteria 4: Locations with high transit scores that have relatively poor job accessibility by transit.

Figure 16 shows all locations identified as candidates for potential transit expansion and enhancement, based on the four evaluation criteria listed above.

Figure 16: Suitable locations for transit expansion/enhancement based on four criteria.



Criteria 1 – Locations with high transit scores but no access to high-frequency transit

Background

The Transit Score Index (TSI) is a metric used to evaluate the suitability of an area for various types of public transit services. TSI measures the likelihood or propensity of public transit use based on several factors, including residential density, job density, and the number of households without vehicles.

A TSI value above 2 indicates a higher propensity for the use of public transit. This suggests that areas with higher TSI are more likely to have residents who rely on public transportation for their daily commutes. However, it is important to note that some regions with high TSI may still lack access to high-frequency transit services, which can limit the effectiveness of public transit in those areas.

Geographic Level / Focus Place Type

Census Tract

Performance Measure and Threshold

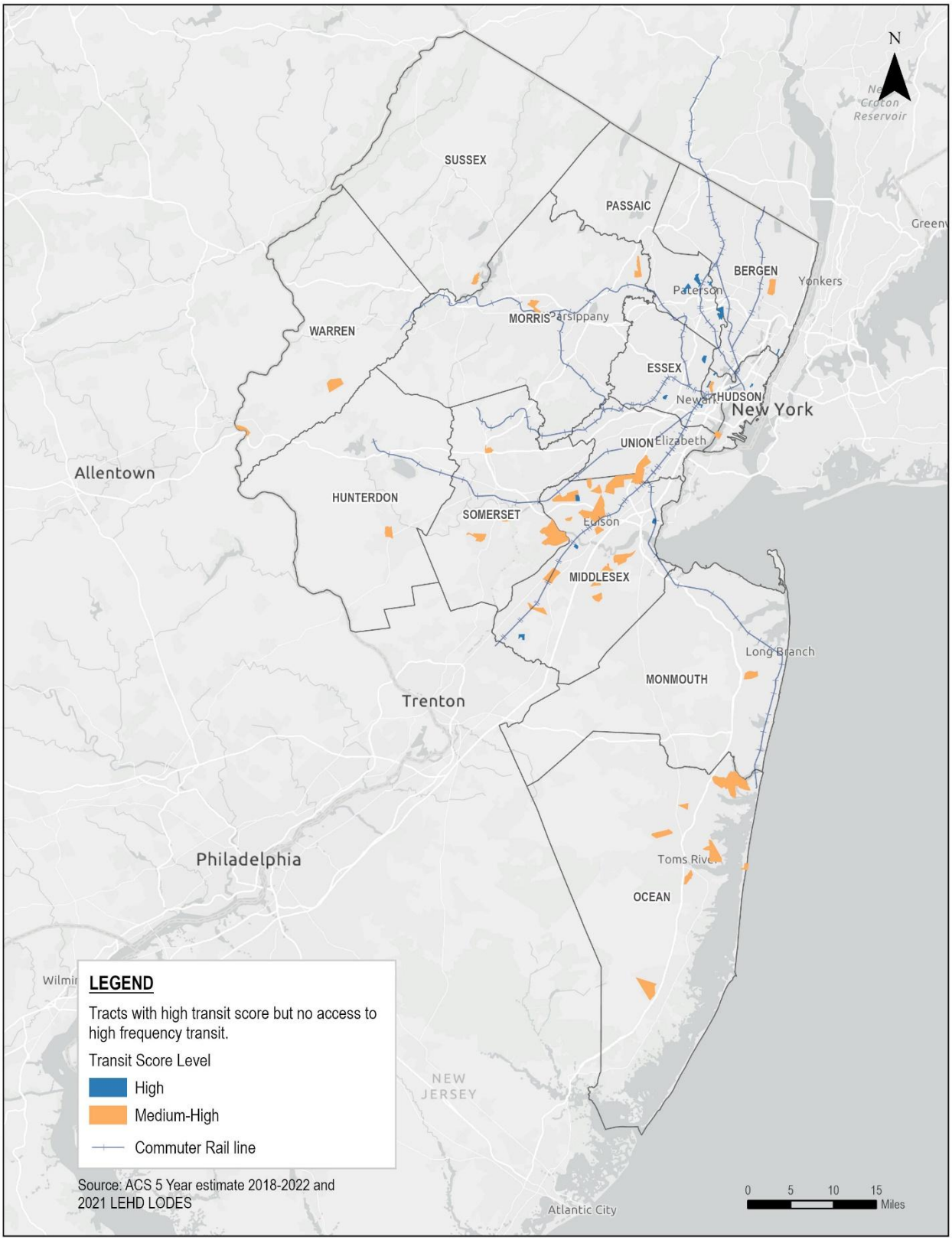
- Higher likelihood or propensity of public transit use measured using the Transit score index greater than 2 (i.e., High or Medium-High)
- Lower Transit frequency - less than 30-minute transit headways

Areas for Potential Application of Strategies

In Northern New Jersey, most urban areas with high public transportation usage have access to frequent rail or bus transit. However, some areas lack such access despite high demand. Figure 17 shows the communities where potential strategies could be applied are listed below.

- Bergen County: Parts of Bergenfield and New Milford
- Hunterdon County: Parts of Flemington
- Middlesex County: Parts of South Plainfield, Edison, East Brunswick, Plainsboro, and South Brunswick
- Monmouth County: Parts of Eatontown
- Morris County: Parts of Dover
- Ocean County: Parts of Point Pleasant, Stafford, and Toms River
- Passaic County: Parts of Prospect Park and Paterson
- Somerset County: Parts of Bridgewater and Hillsborough
- Sussex County: Parts of Hopatcong
- Warren County: Parts of Easton and Washington

Figure 17. Census tracts with high transit scores but no access to high-frequency transit



Market Characterization Analysis

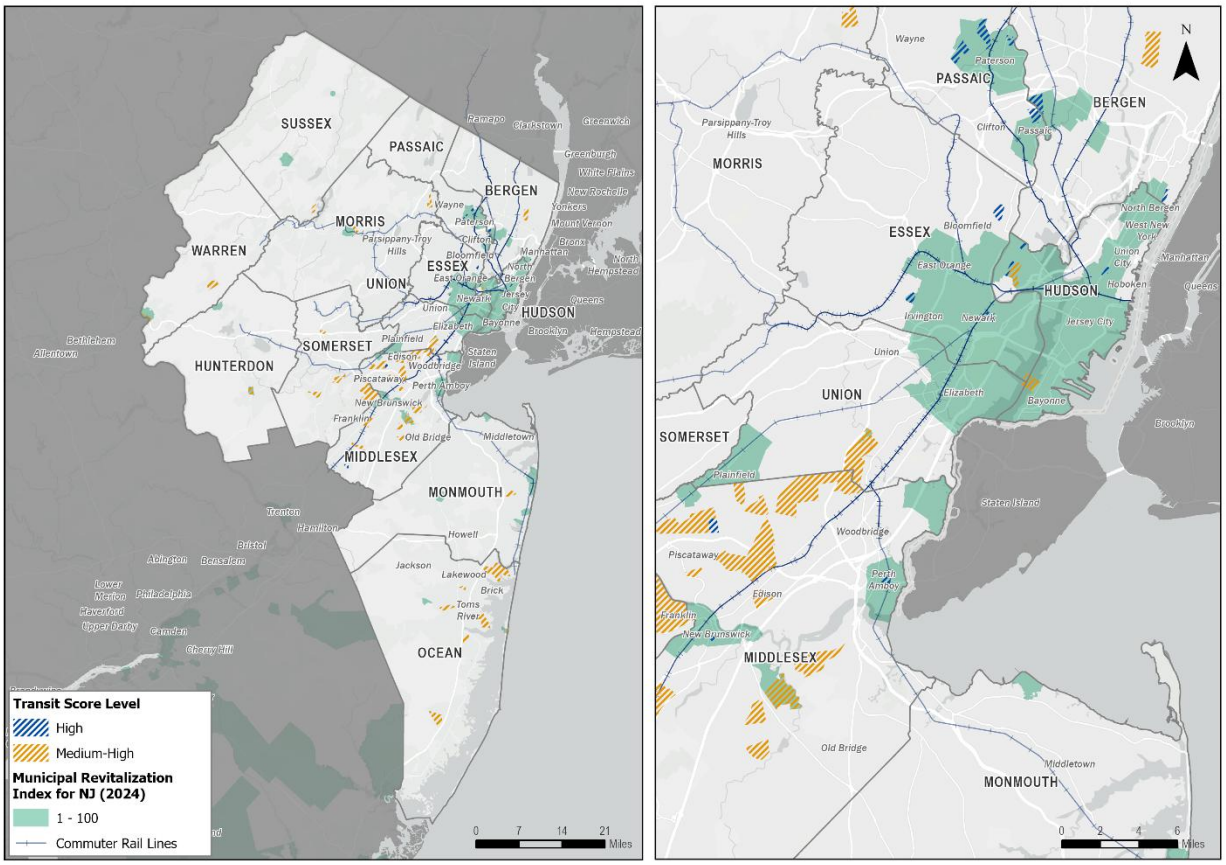
Tracts with High TSI scores and limited access to high-frequency transit were compared against four MEMs to better understand the demographic trends of affected communities. MEMs included:

- Low 2024 MRI rankings of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions,
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050),
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050), and
- Limited vehicle access by census tract (2019-2023 average: 20% or more households without a car).

There was limited overlap between study tracts and MEMs. However, low-ranking MRI communities in the NJTPA region's largest and densest cities—such as Newark, Jersey City, Paterson, Perth Amboy, Passaic, and New Brunswick—had high TSI scores, with medium-high scores in places like Kearny, Bayonne, and South River. These walkable, high-density areas, with concentrated jobs and housing, were especially well-suited for transit, contributing to their higher TSI scores.

Overlap with other MEM indicators was minimal. Areas with projected population growth and high TSIs included parts of Kearny, Jersey City, Garfield, Passaic, Bergenfield, Bayonne, Brick, and Toms River. Employment growth and high TSI scores coincided in only a few neighborhoods within Jersey City and Kearny. Meanwhile, areas with high rates of households without vehicle access aligned with strong TSI scores in New Brunswick, Newark, Passaic, Clifton, Paterson, and Bayonne.

Figure 18. Census tracts with high transit scores but no access to high-frequency transit versus the Revitalization Index, 2024



Additional maps of MEM relationships related to vehicle access, population, and employment growth are included in the Appendix of this report.

Criteria 2 – Locations with high transit mode share and high average commute transit travel time

Certain communities in the North Jersey region exhibit a significantly high transit mode share; however, commuters in these areas experience prolonged commute times. When examining census tracts with substantial transit mode share, there are two distinct travel markets: those commuting to New York City and those traveling within the NJTPA region.

The strategies aimed at enhancing public transit services to these areas of demonstrated need may vary based on the specific travel market. For commuters traveling to New York City, improvements may focus on increasing the frequency and reliability of regional rail services. Conversely, for those traveling within the NJTPA region, strategies may include enhancing local bus services, implementing transit signal priority, and expanding dedicated bus lanes.

Geographic Level / Focus Place Type

Census Tracts

Performance Measures and Thresholds

- Relatively high Transit mode share - over 15% transit mode share for the residents of the census tract,

- Longer transit commute times
    - Average Transit commute time is over 45 minutes for commuters residing in the NJTPA region and working in the NJTPA region.
    - Average Transit commute time is over 90 minutes for commuters residing in the NJTPA region and working in NYC.

Data Source – Transit mode shares and Average transit travel times are based on Replica, fall 2023, Typical Thursday modeled data.

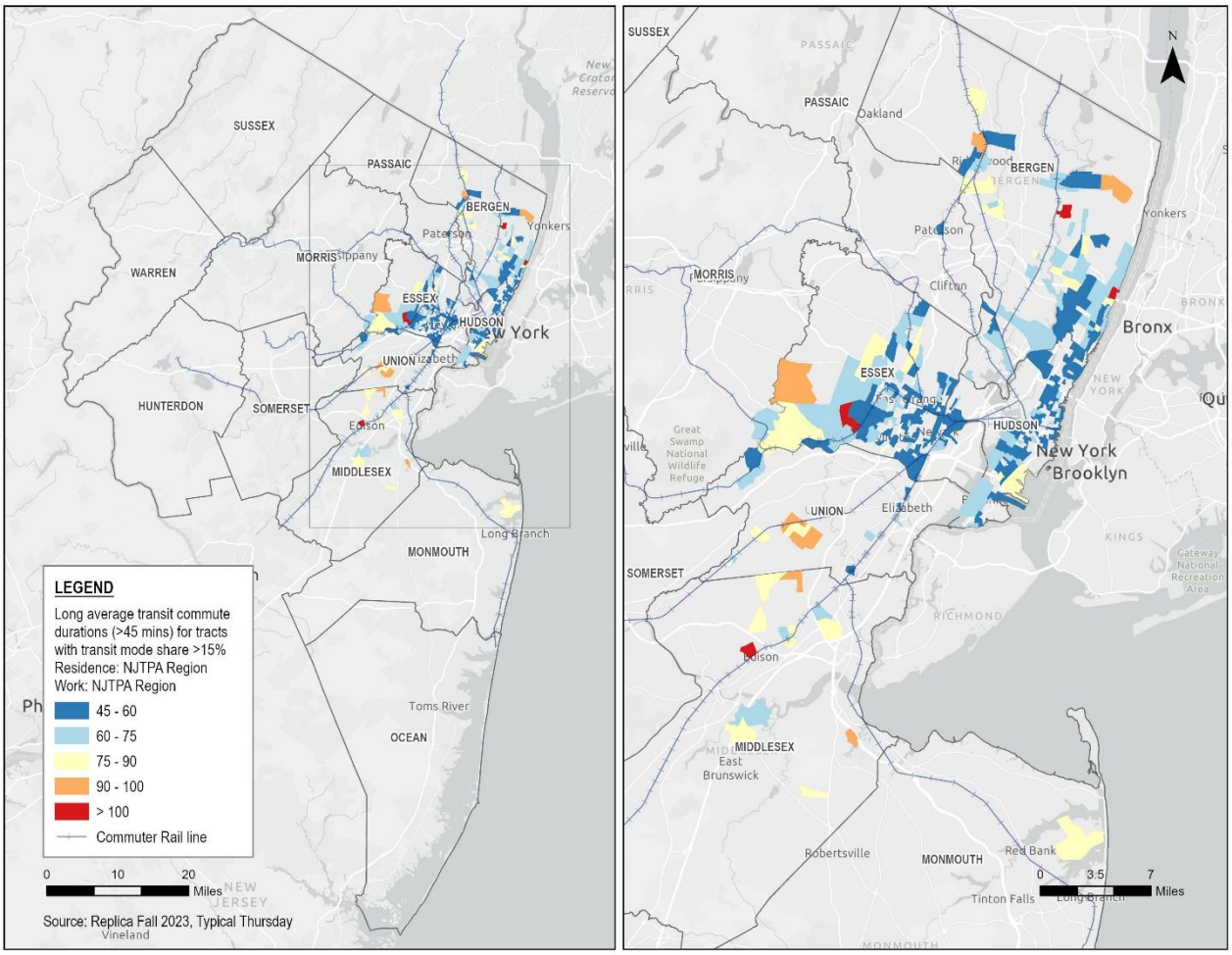
Areas for Potential Application of Strategies

Commuters residing in the NJTPA region and working in the NJTPA region.

Despite the high transit mode share among commuters in the NJTPA region, many experience extended commute times. This issue may be attributed to the lack of direct transit services or the need for multiple transfers to reach their workplaces. Additionally, some commuters may not have access to express buses and are required to use local bus services, resulting in longer travel durations. Figure 19 shows some communities that have longer than 45 minutes of transit commute times included.

- Bergen County – Parts of Allendale, Ho-Ho-Kus, Ridgewood, Glen Rock, Englewood Cliff, Bergenfield, Teaneck, Ridgefield Park, Fort Lee, Edgewater, Cliffside Park, Palisades Park
- Hudson County – Parts of North Bergen, Guttenberg, West New York, Rutherford, Secaucus, Weehawken, Hoboken, Jersey City, Bayonne
- Passaic County – Parts of Patterson
- Essex County – parts of Newark, Hillside, Irvington, Maplewood, East Orange, Orange, Short Hills
- Union County - Parts of Plainfield, Fanwood, Westfield, Elizabeth, Rahway, New Providence, Summit, Livingston
- Middlesex County – Parts of South Plainfield, Metuchen, Edison, East Brunswick, Old Bridge
- Monmouth County – Parts of Rumson

Figure 19. Tracts with high transit mode share and long average commute times (> 45 minutes) for NJTPA residents working in the NJTPA Region



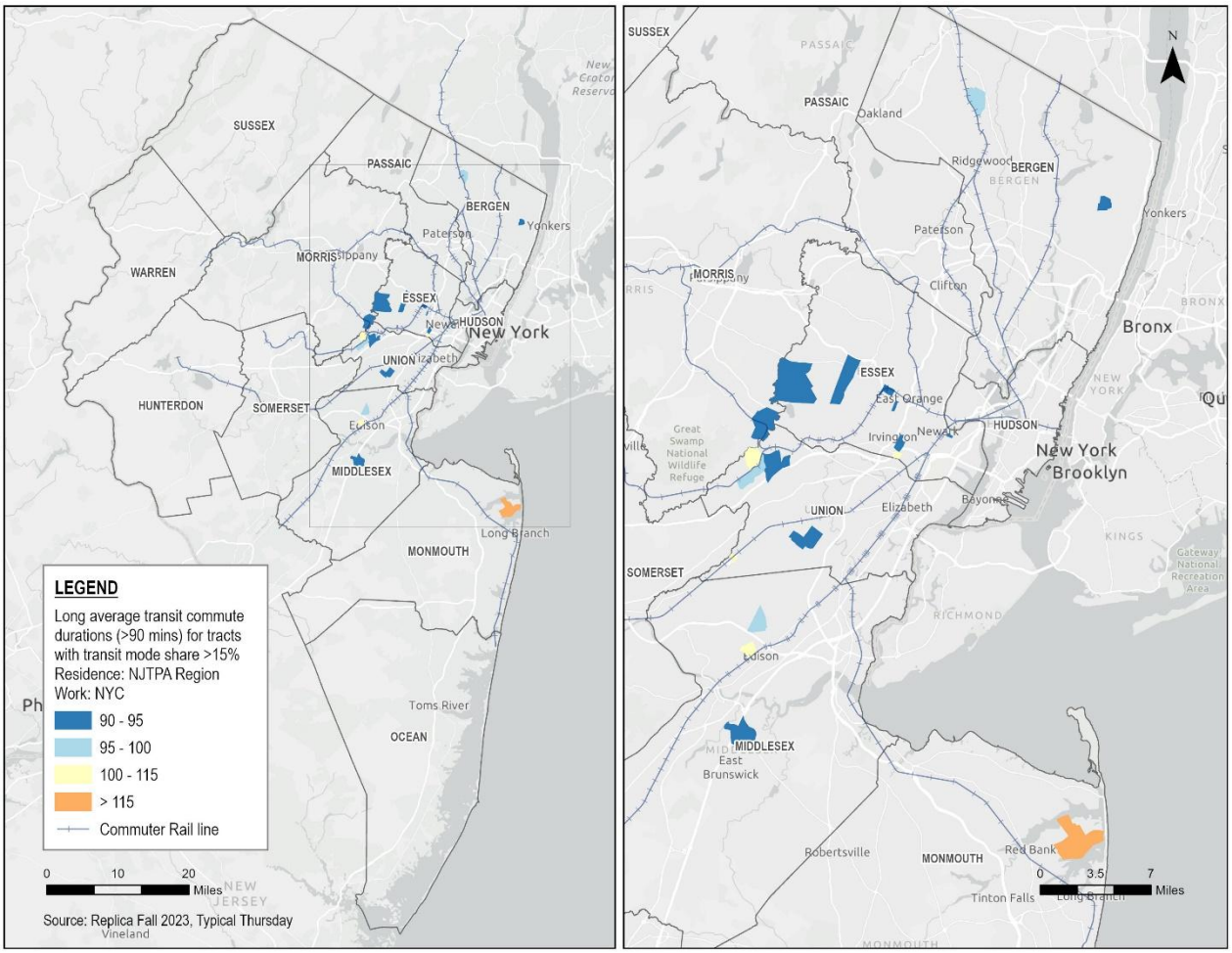
Commute from NJTPA to NYC with over 90 minutes of travel time

A significant number of commuters from the NJTPA region travel to NYC using public transit and experience notably long transit commute times. When commuters do not have a direct ride into NYC and must make transfers, commute times increase further. Strategies to address this issue include the provision of express buses to the city or frequent feeder buses to the nearest rail stations.

Some communities that have longer than 90 minutes of transit commute times are listed below and shown in Figure 20

- Bergen County – Parts of Allendale, Cresskill
- Essex County - Parts of Newark (Ironbound), Irvington, Orange, West Orange, Livingston
- Morris County - Parts of Chatham
- Union County – Parts of New Providence, Westfield, Plainfield,
- Middlesex County – Parts of Edison, South Plainfield, East Brunswick
- Monmouth County – Parts of Rumson

Figure 20. Tracts with high transit mode share and long average commute times (> 90 minutes) for NJTPA residents working in NYC.



Market Characterization Analysis

Tracts with High TSI scores and high average transit commute travel times were compared against the same four MEMs evaluated for criteria 1 to better understand the demographic trends of affected communities. The analysis of NJTPA region residents commuting over 90 minutes to NYC showed minimal overlap with MEM indicators. Some overlap with low MRI scores occurred in parts of Newark, Orange, East Orange, Irvington, and Plainfield. Population growth aligned with these commutes in areas like Livingston, Westfield, Summit, and New Providence, while job growth overlap was limited to Livingston. Similar to MRI patterns, lack of vehicle access was concentrated in the transit-dense areas of Irvington, Newark, and East Orange.

Commuters traveling over 45 minutes within the NJTPA region showed a broad overlap with all four MEMs. MRI overlaps were concentrated in dense urban core communities like Jersey City, Newark, Elizabeth, and Paterson, all heavily serviced public transit areas near major job centers in Newark, Jersey City, Hoboken, and the Meadowlands. Population MEMs spanned both inner-core cities and more suburban towns like Summit, Millburn, and Ridgewood, reflecting

communities with the existing transit infrastructure needed to support broader residential growth. Employment MEMs are aligned with key job hubs in both urban cores and major centers like Hackensack and Woodbridge. Limited car access was concentrated almost entirely in the urban core, where public transit usage is commonplace.

Figure 21. Tracts with high transit mode share and long average commute times (> 45 minutes) for NJTPA residents working in the NJTPA Region versus TAZ population growth, 2025-2050.

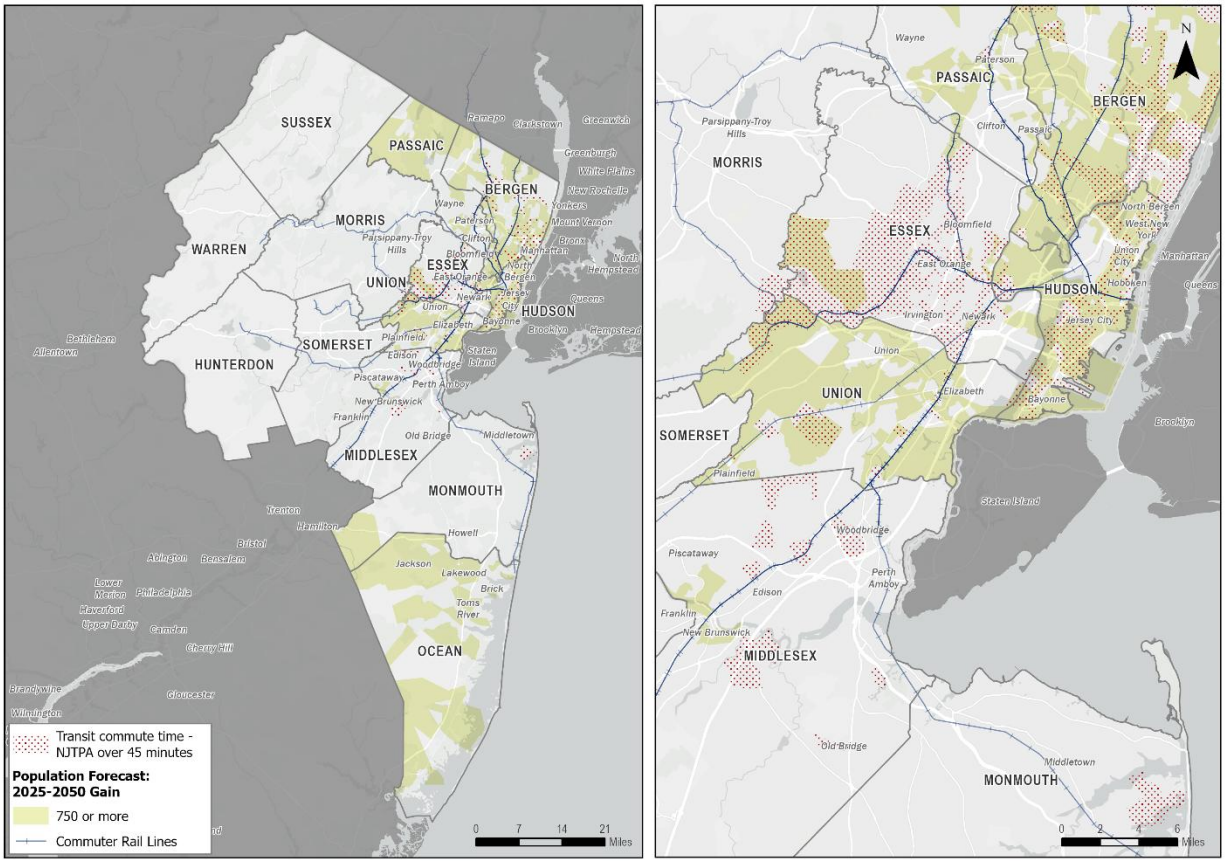


Figure 22. Tracts with high transit mode share and long average commute times (> 45 minutes) for NJTPA residents working in the NJTPA Region versus TAZ employment growth, 2025-2050.

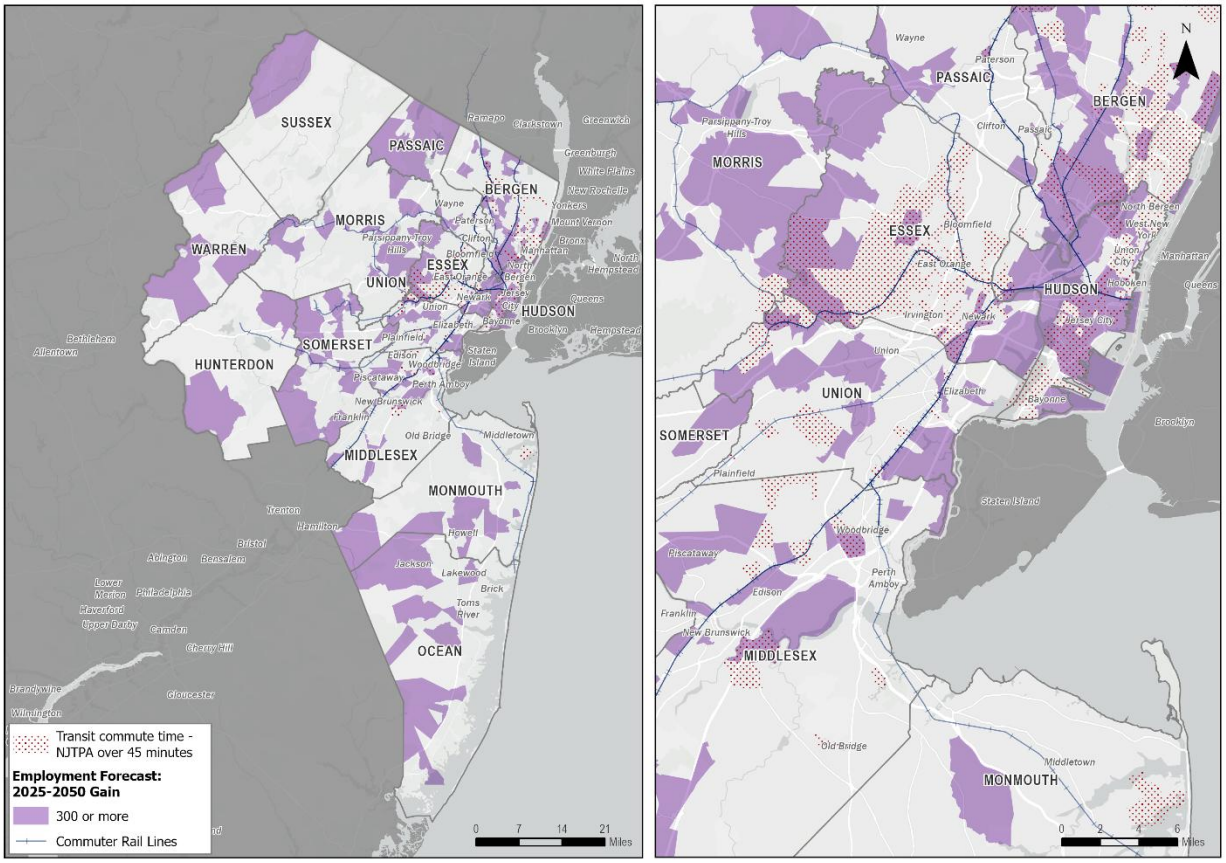
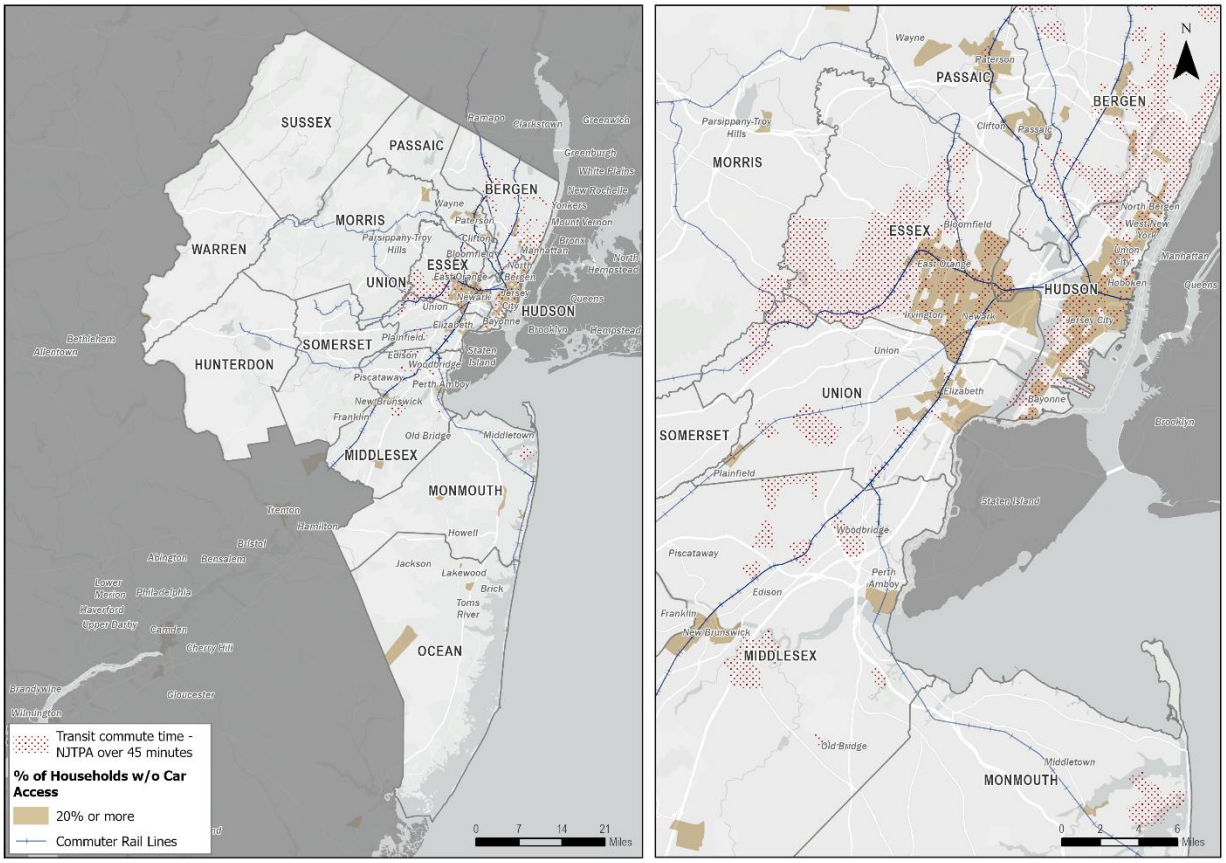


Figure 23. Tracts with high transit mode share and long average commute times (> 45 minutes) for NJTPA residents working in the NJTPA Region versus tracts by the share of households without access to a vehicle, 2023.



Criteria 3: Locations with high disparity between the number of low-income workers and low-wage jobs without having access to a transit node within half a mile.

Background

Within the region, certain communities have a disproportionate number of low-income residents compared to available low-wage jobs. Conversely, other communities have an abundance of low-income jobs but lack sufficient low-income workers. It is crucial for these communities to have adequate access to public transportation, allowing residents to efficiently commute to their workplaces, especially when employment opportunities are not readily available within close proximity.

Some communities do not have a transit node accessible within half a mile. Implementing strategies such as additional bus services in these areas or encouraging vanpools for workers traveling to the same destination for home or work could be beneficial.

Geographic Level / Focus Place Type

Census Tract

Performance Measure

- Low-wage jobs and Low-Income worker residence locations. The number of low-wage jobs and the number of low-income worker residences are based on Work Area Characteristics and Residence Area Characteristics from the 2021 LEHD LODES dataset for the region. Per LEHD LODES, low-income jobs and workers have earnings of less than $ 1,250 a month.
- Jobs and work locations that do not have access to a transportation node (Rail station) within a half mile.

Threshold

- Census tracts where low-wage Jobs exceed low-income residences by 1,000* (Note that neighboring census tracts may make up for this disparity to some extent)
- Census tracts where low-income residences exceed low-wage jobs by 400* (Note that neighboring census tracts may make up for this disparity to some extent)
- More than 60% of jobs and households are without access to a transit node within half a mile.

Note: Due to the nature of job locations, employment opportunities tend to be geographically concentrated, whereas residences are more dispersed throughout the region. Consequently, the threshold for the number of jobs exceeding the number of residences is higher than the threshold for the number of residences exceeding the number of jobs.

Areas for Potential Application of Strategies

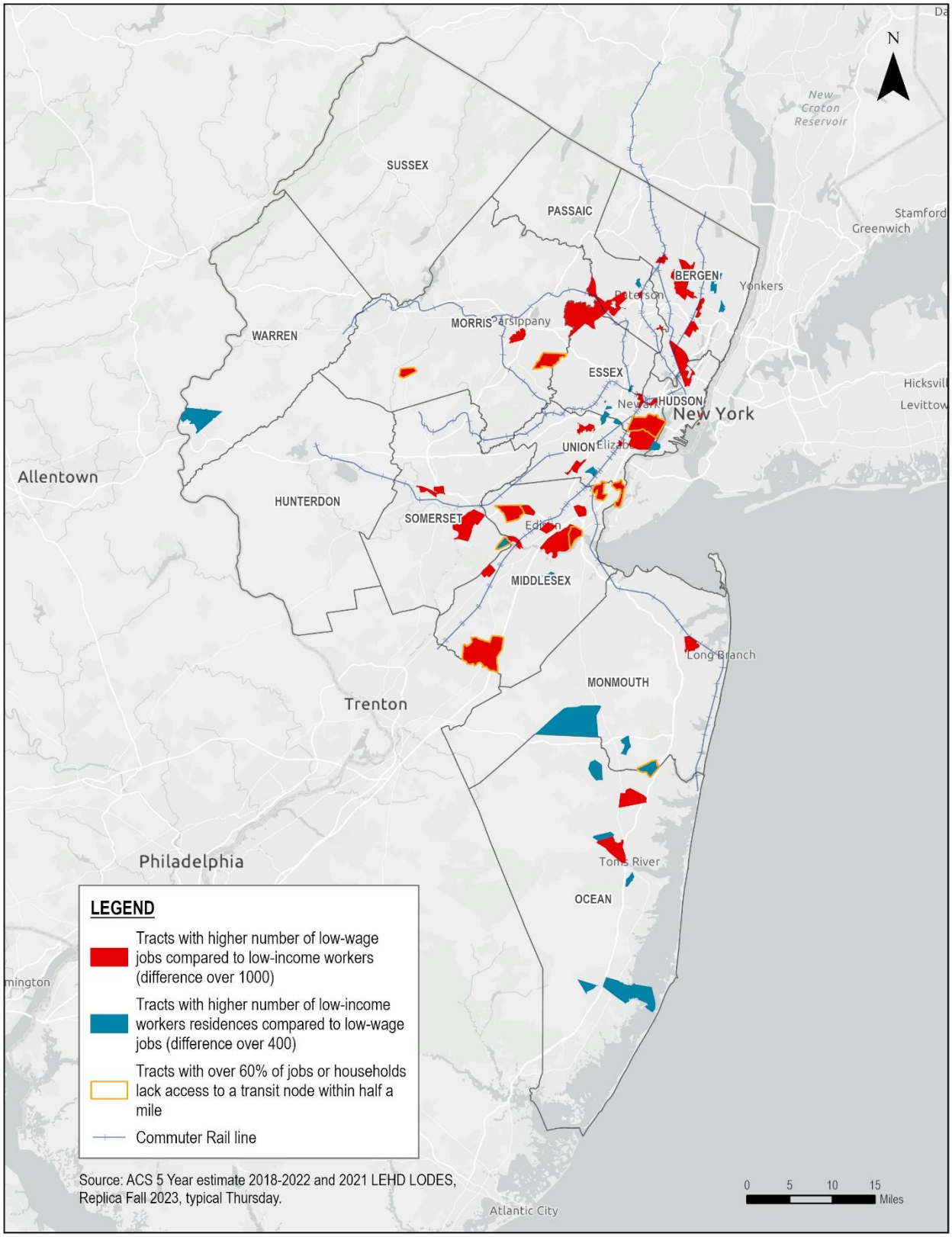
In areas where low-income workers struggle to find suitable employment or where there are low-income jobs without nearby available workers, individuals are often required to commute longer distances by automobile or transit. For those with low incomes, owning an automobile can be financially challenging, making them reliant on public transportation for commuting. However, if there is no rail station near their residence or worksite, it becomes particularly difficult for these workers to travel efficiently.

Addressing these challenges is crucial to improving the accessibility and efficiency of public transportation for low-income workers. Potential strategies include expanding bus services, creating more transit nodes, and implementing vanpool programs to better connect workers with their places of employment.

The communities where potential strategies could be applied are listed below and shown in Figure 24.

- Essex County - Parts of Newark Airport and Port of Newark
- Middlesex County – Parts of Piscataway, Carteret, and Woodbridge Township (Keasbey section), Cranbury
- Monmouth County – Parts of Lakewood Township
- Morris County – Parts of Hanover, Chester
- Ocean County– Parts of Howell Township (Ramtown)

Figure 24: Locations with a high disparity between the number of low-income workers and low-wage jobs without having access to a transit node within half a mile.



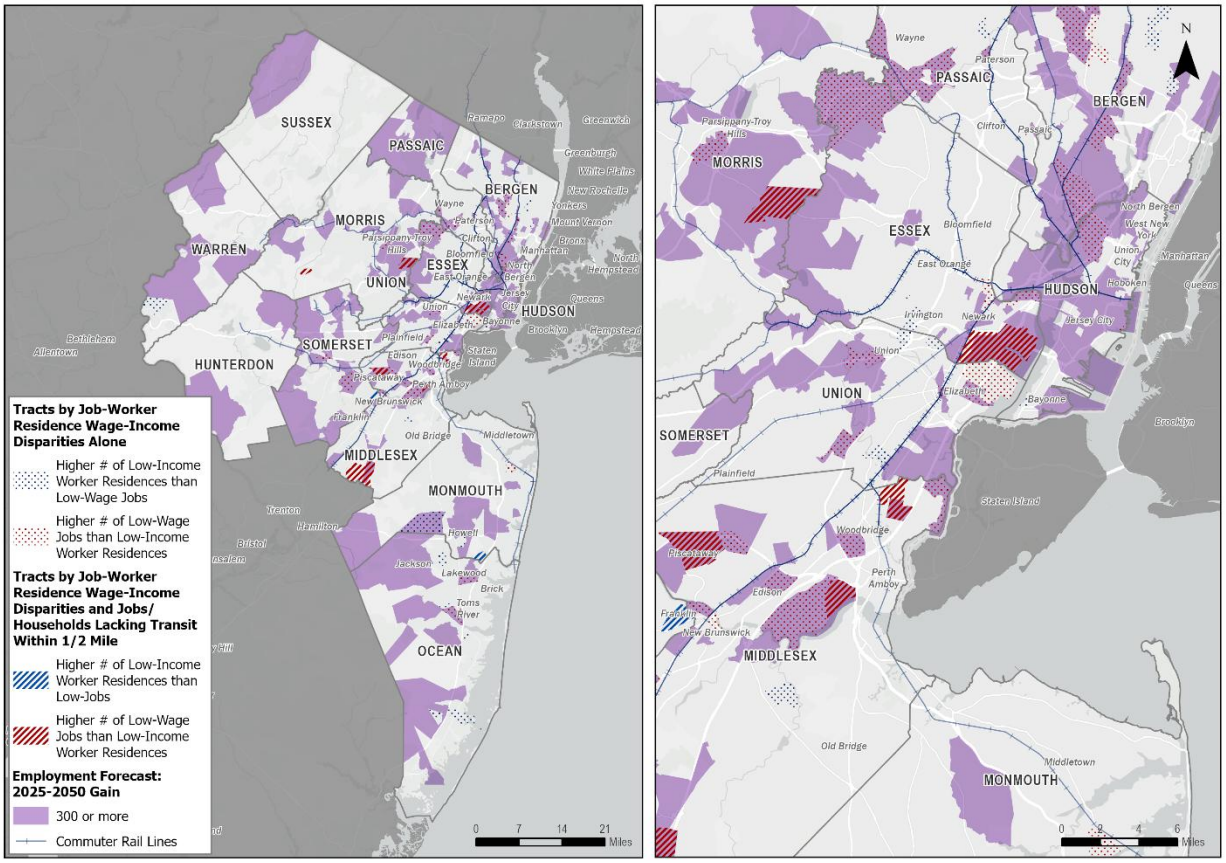
Market Characterization Analysis

Overlaps between high-disparity low-income workers and low-income job tracts vs MEMs were discussed in Section 1.2 of this study in the context of low transit commute times. When these same tracts were reviewed for distance to transit nodes using the same four MEMs, few notable overlaps emerged.

Few high-disparity tracts lacking local transit overlapped with low-ranking MRI areas were observed. Only Newark showed such correspondence. However, several overlaps were observed between high-employment growth MEMs and tracts where low-wage jobs exceeded low-income worker residences, including Newark, Woodbridge, Piscataway, Cranbury, and East Hanover, indicating that economic activity will continue to focus in these areas to the exclusion of residential areas without investment in mixed-use development.

As noted in Section 1.2, cases where low-income jobs exceeded worker residences, regardless of transit access, were limited. MRI overlaps were found in major job centers like Paterson, Elizabeth, Newark, Jersey City, and New Brunswick, as well as in smaller communities such as Carteret, Teterboro, and Passaic. Conversely, MRI overlaps where low-income worker residences exceeded available jobs, including parts of Jersey City, Irvington, East Orange, South River, Hillside, and Prospect Park.

Figure 25: Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile versus employment growth.



Additional maps of MEM relationships related to the revitalization index, vehicle access, and population growth are included in the Appendix of this report.

Criteria 4: Locations with high transit scores that have relatively poor accessibility to jobs by transit.

Background

Certain regions in northern Jersey exhibit a higher propensity for transit usage (TSI >2.5) but lack access to a substantial number of jobs via public transit. Many of these areas have significantly larger disadvantaged populations. These regions present an ideal opportunity for implementing strategies to expand transit services, as the local population is likely to support the use of public transportation for job access. This is particularly important for disadvantaged groups who rely on public transport for employment opportunities.

Geographic Level / Focus Place Type

Census Tract level

Performance Measure

TSI and the number of jobs accessible by transit, and a high level of disadvantaged populations

Threshold

- Locations with high transit scores that have high potential for transit use - TSI greater than 2.
- Access to fewer than 50,000 jobs within 45 minutes of commute travel time on transit

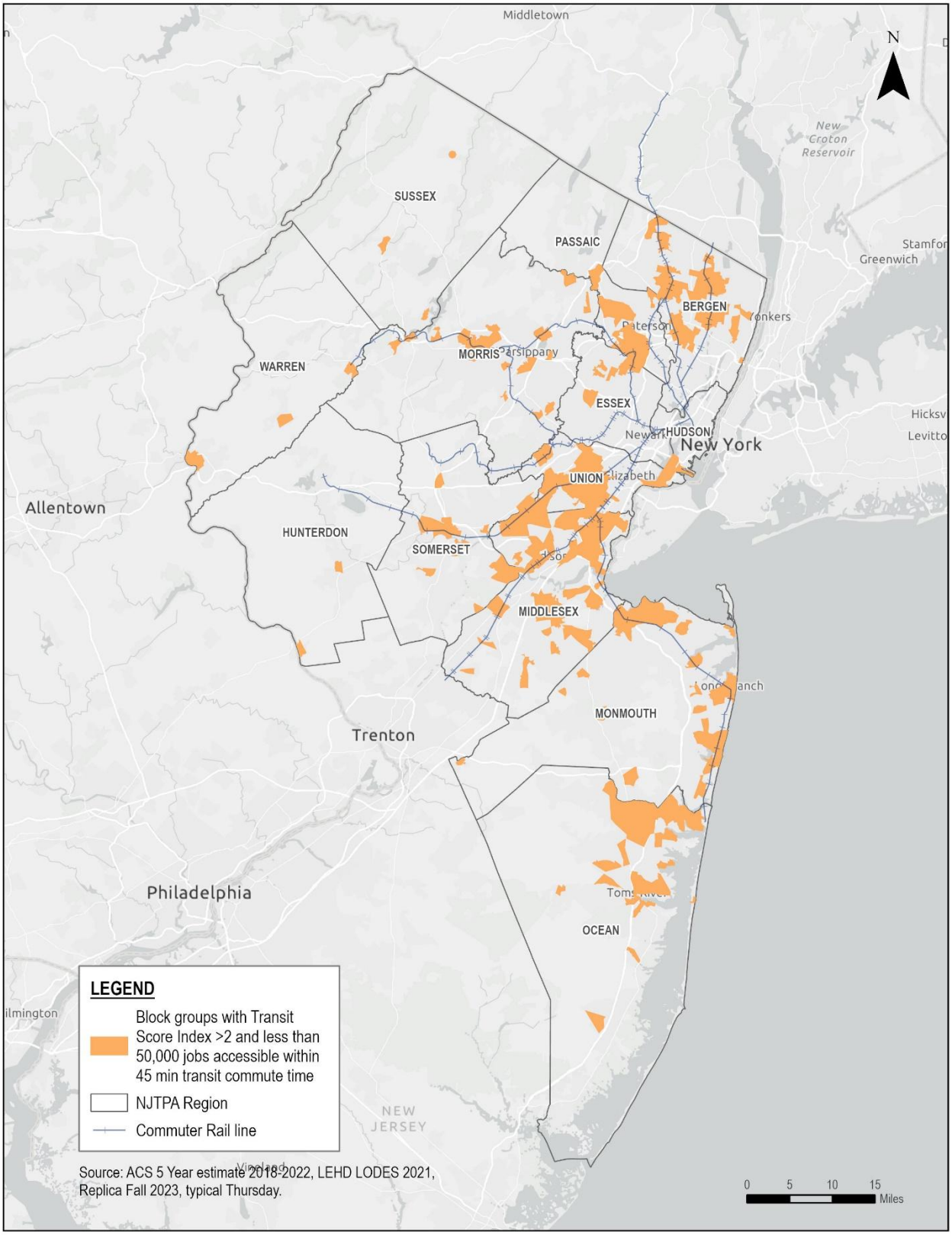
Areas for Potential Application of Strategies

The areas with a higher propensity for the use of transit can sometimes lack access to a substantial number of jobs via public transportation (fewer than 50,000 jobs). Some of the areas with low job accessibility by transit include (shown in Figure 26)

- Bergen County – Parts of Hillside, Ramsey, Westwood, Waldwick, Ridgewood, Ho-ho-Kus, New Milford, River Edge, Tenafly, Saddle Brook, Fair Lawn
- Passaic County – Parts of Pompton Lakes, Wayne, Woodland Park
- Morris County – Parts of Parsippany, Denville, Dover, Morristown, Hanover Township, Florham Park
- Essex County - Parts of Livingston, West Caldwell, Verona
- Hudson County – Parts of Bayonne
- Union County – Cranford, Westfield, New Providence, Plainfield, Rahway
- Middlesex County- Parts of Metuchen, Edison, New Brunswick, North Brunswick, East Brunswick, Sayreville, South Amboy, Old Bridge
- Monmouth County- Parts of Hazlet, Aberdeen, Red Bank, Middletown, Long Branch, Tinton Falls, Asbury Park, Belmar, Neptune Township
- Ocean County – Parts of Toms River, Lakewood Township, Seaside Heights
- Hunterdon County – Raritan Township, Lambertville
- Warren – Phillipsburg, Washington

It is essential to address these disparities to ensure that residents in high transit propensity areas have better access to employment opportunities. Strategies such as improving transit routes, increasing the frequency of services, and enhancing connectivity to major job centers can be beneficial.

Figure 26. Tracts with high transit scores that have relatively poor jobs accessible by transit and have a high level of disadvantaged populations.



Census tracts with high transit scores but poor job accessibility and disadvantaged populations include Bayonne in Hudson County, Union in Union County, Parsippany in Morris County, Long Branch in Monmouth County, Edison, Sayreville, Old Bridge in Middlesex County, and Lakewood in Ocean County.

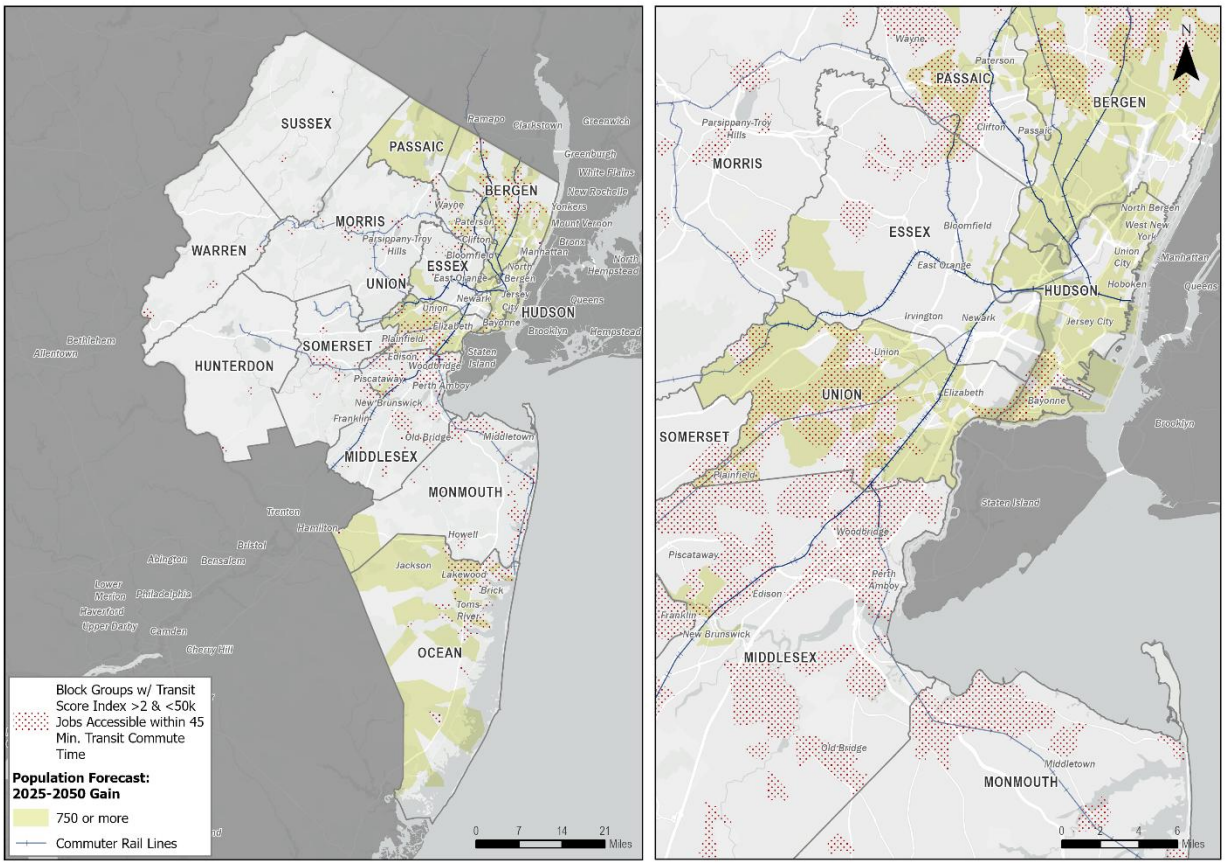
Market Characterization Analysis

Overlaps were studied among census tracts with both high transit scores and relatively few jobs accessible via public transit, using the same four MEMs evaluated in criteria 1 to 3.

A review of MRI overlaps identified several communities with limited local investment, high transit scores, but few available jobs. These included small cities and older, transit-accessible suburbs with limited local job bases such as Perth Amboy, Plainfield, Bayonne, New Brunswick, Long Branch, Asbury Park, Neptune City, Freehold, Dunellen, South River, Carteret, Elizabeth, Dover, and Lodi.

A much larger number of overlaps were observed with population growth MEMs, spanning a diverse set of communities. These included older, upper-income suburbs such as Ridgewood, Paramus, Cranford, Scotch Plains, Park Ridge, and Ramsey; inner-ring suburbs like Lodi, Rahway, Elmwood Park, and Saddle Brook; small cities and urban centers such as New Brunswick and Bayonne; and several coastal or resort communities including Point Pleasant, Toms River, Brick, and Lakewood. These areas of overlap indicate that the demand within the areas needed will continue to grow over the next 25 years.

Figure 27. Tracts with high transit scores that have relatively poor jobs accessible by transit versus population growth.



Additional maps of MEM relationships related to the revitalization index, vehicle access, and employment growth are included in the Appendix of this report.

3. Pedestrian, Bicycle, & Micromobility

3.1 Need – Limited Viability of Pedestrian, Bicycle, and Micromobility Mode

Background

Many North Jersey communities have high potential for biking and walking based on factors like population, employment, and intersection density. The NJTPA Active Transportation Plan identified areas with high pedestrian and bicycle trip potential by considering these factors, along with poverty, vehicle access, transit stops, and land use mix. However, in many counties, average walking trip lengths are low due to low development density. Rural areas typically have low walkability, and even downtown areas lack sufficient pedestrian and bicycle facilities. The absence of sidewalk networks raises concerns about pedestrian access, especially to destinations such as schools, parks, and transit stops and stations.

Geographic Level / Focus Place Type

Census Tracts and County-level

Performance Measure

Bicycle trip potential, Pedestrian trip potential, number of daily bike trips, and average walking trip length.

Data Source: The Bicycle and Pedestrian Trip potential is based on Trip Potential Analysis from the NJTPA Regional Active Transportation Plan and was aggregated to the census tract level. These scores are used to evaluate the potential for bicycle and pedestrian trips within the NJTPA region. The scores are calculated based on factors such as proximity to bus routes, bicycle and pedestrian crashes, and the NJTPA Equity Score.

The number of bike trips and average walking trip lengths for census tracts are based on modeled data for a typical Thursday of Fall 2023 in Replica.

Threshold

Bicycle trip potential and Pedestrian trip potential > 80, and with fewer than 25 daily bike trips, and counties where the average walking trip length is less than 0.7 miles (NJTPA Average walking trip length)

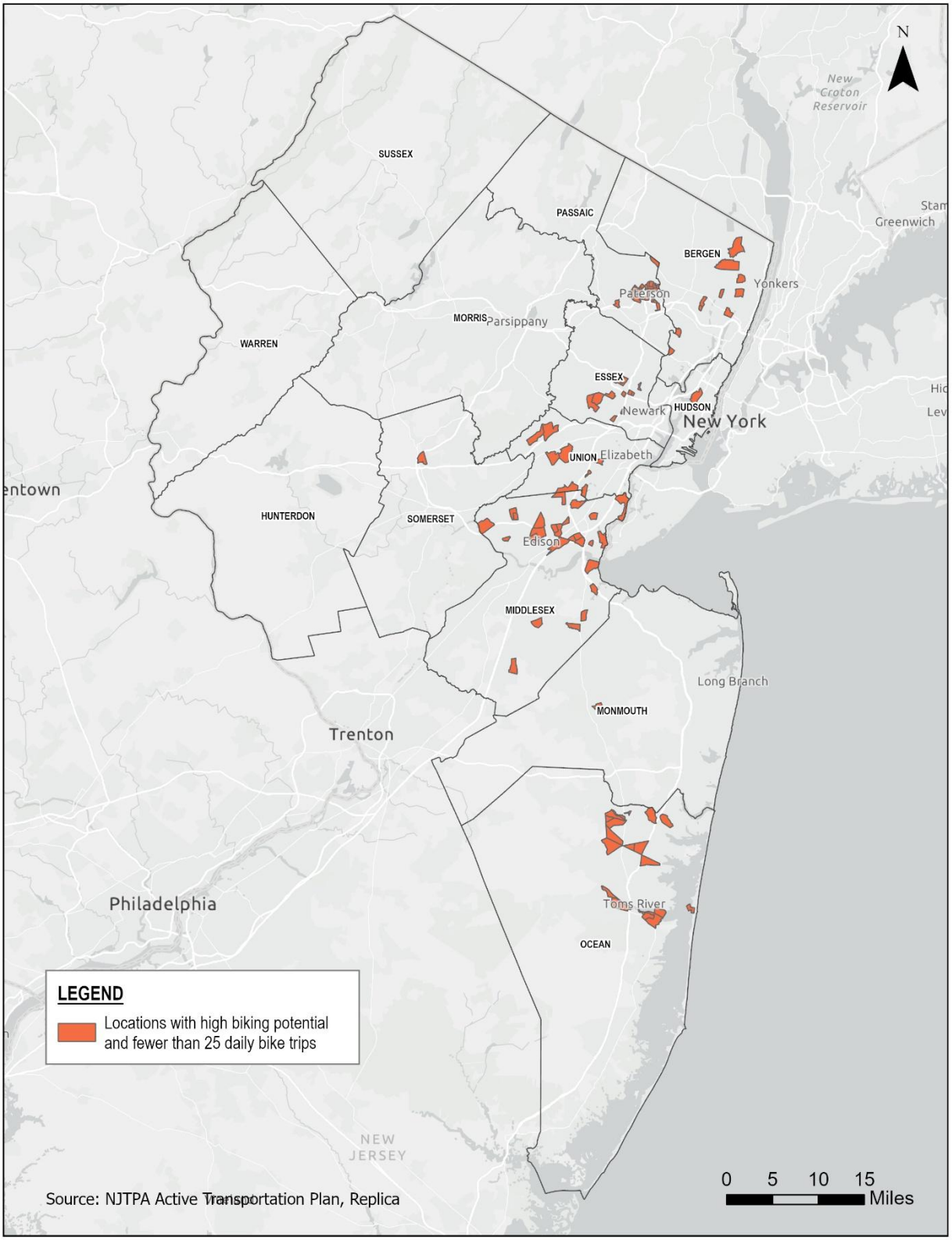
A trip potential over 80 means that the census tract has a very high potential for bicycle and pedestrian trips.

Areas For Potential Application of Strategies

There are some areas in rural and suburban areas in North Jersey that have good bicycle potential (over 80); however, they generally exhibit lower biking activities due to the lack of bicycle infrastructure. Some areas shown in Figure 28 include.

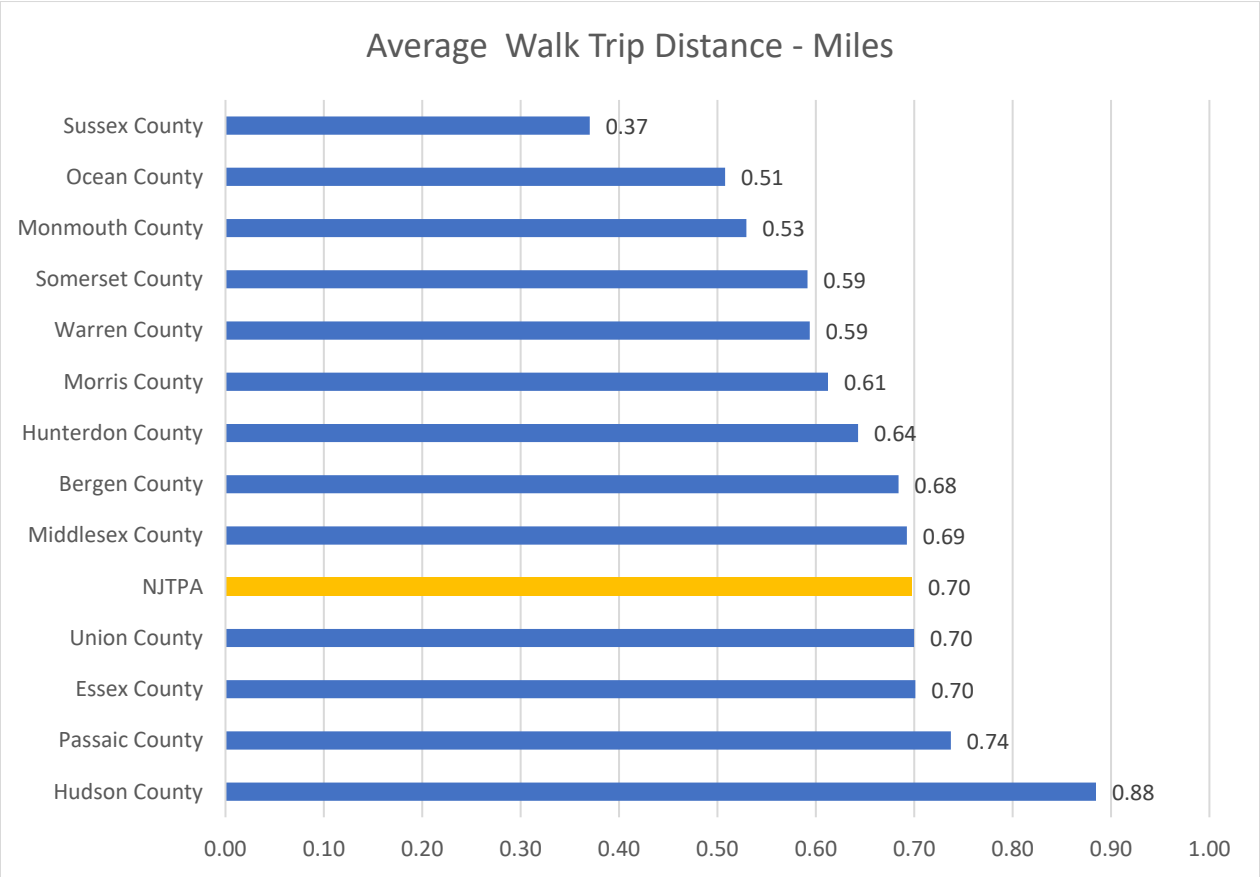
- Bergen County – Harrington Park, Haworth, Maywood, Bergenfield, Teaneck, Tenafly, Maywood, Glen Rock, Rutherford
- Essex County – Montclair, East Orange, South Orange, Maplewood, Irvington
- Passaic County – Paterson, Totowa
- Union County – Westfield, New Providence
- Middlesex County – Carteret, Edison, Metuchen, Perth Amboy, Piscataway, South Amboy, Old Bridge, Monroe Township
- Monmouth County – Freehold
- Ocean County – Lakewood, Toms River, Leisure Village, Beachwood

Figure 28. Areas with high biking potential, however, have fewer than 25 daily bike trips.



Some counties in the NJTPA region exhibit substantially lower walking trip lengths of less than 0.7 miles a day (Figure 29). These counties could benefit from improved pedestrian infrastructure that could help with pedestrian activities in the county. These counties include Warren, Sussex, Somerset, Ocean, Morris, Monmouth, Middlesex, Hunterdon, and Bergen County.

Figure 29.Average walking distance in NJTPA counties.



3.2 Strategy– Suitable Locations for Implementation of First Mile and Last Mile Access to Transit

Background

First-mile and last-mile connections to transit are essential for transit hubs, such as rail stations, as well as major transit stops at activity centers outside of rail stations. The analysis focuses on identifying rail stations that have a significant number of commuters residing or working within 1.5 miles of the station. These locations are prime candidates for the implementation of first-mile and last-mile strategies to enhance access to transit.

It is important to note that PANYNJ's Newark Airport Station Access Project which is underway will enhance bike and pedestrian accessibility by extending the pedestrian bridge over station

platforms to a new public access area off Frelinghuysen Avenue, creating dedicated access points for bicycles, and improving connectivity to Amtrak, NJT, and AirTrain Newark services.[13] This will benefit local residents, airport employees, and travelers by providing safer and more efficient access to the station.

Geographic Level / Focus Place Type

Rail Station

Performance Measure and Threshold

- Number of commuters who have their work or job location within 1.5 miles of the station - More than 1,500 boarding/ alighting* in the Replica modeled typical Thursday of Fall 2023
- Percent zero vehicle households (ZVH) and Percent low-income households (Annual household income is less than $50,000)
- Percent ZHV is greater than 20%, or the percentage of low-income households is greater than 20%.

*The number of boardings and alighting data for stations are based on modeled data for a typical Thursday of Fall 2023 in Replica. Replica does not include biking trips for boarding and alighting passengers. The Private Auto mode only includes auto trips that are parked at the station, excluding passengers who were dropped off or picked up, including shared rides or taxi rides.

Areas for Potential Application of Strategies

Rail stations were identified using boarding and alighting data modeled from Replica (LBS) for a typical Thursday in Fall 2023. The aim is to pinpoint potential stations that could benefit from first-mile last-mile strategies involving bicycling, scooters, or other micromobility options, as well as localized shuttles or coordination with private providers.

PATH stations such as Journal Square, Grove Street, Hoboken, Exchange Place, and Newport have a significant number of commuters who live or work within 1.5 miles of the station and currently walk, take a bus, use light rail, or drive to park at the station to get to or from their work or home.

Newark Penn Station has many commuters who live or work within 1.5 miles and use the bus to reach their home or workplace.

Elizabeth, Brick Church (in East Orange), East Orange, Paterson, and North Elizabeth stations have over 65% of commuters living in households with no vehicles.

[13] Port Authority advances plan to transform transit and airport access for underserved Newark, Elizabeth communities, PANYNJ, https://www.panynj.gov/port-authority/en/press-room/press-release-archives/2024-Press-Releases/port-authority-advances-plan-to-transform-transit-and-airport-access-for-underserved-newark-elizabeth-communities.html

Brick Church, East Orange, Orange, and Paterson stations have more than 40% of commuters with a household income of less than $50,000.

Figure 30. Rail stations suitable for the implementation of strategies related to first-mile and last-mile access to transit.

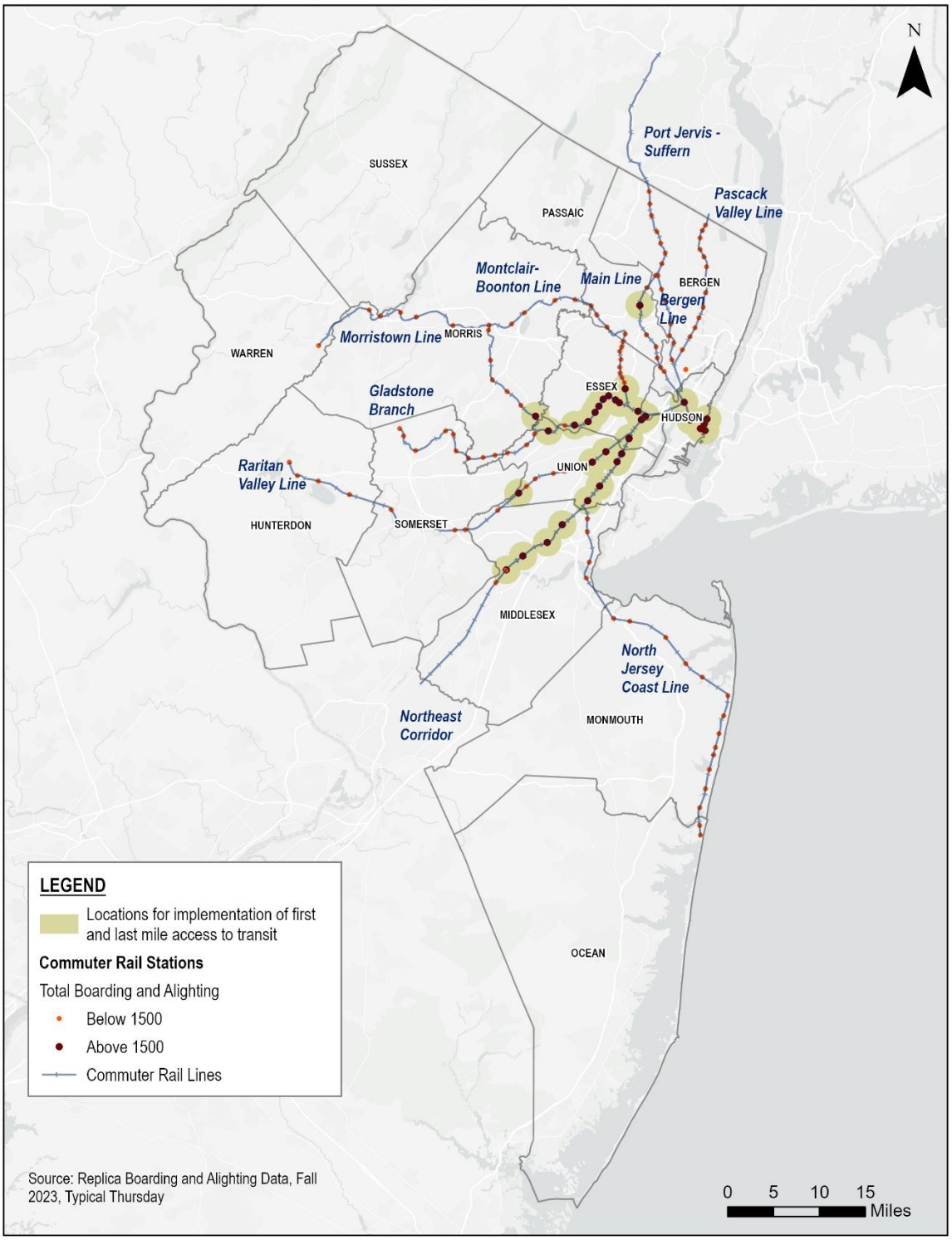


Table 8. Rail Stations where first-mile and last-mile strategies should be prioritized.

Stations	System	Total Boarding and Alighting	Bus %	Light Rail %	Private Auto %	Walking %	Zero Vehicle Household %	Household income < $50K %
Journal Square	PATH	29,185	32.0%	0.1%	0.4%	67.6%	58.1%	22.5%
Grove Street	PATH	21,408	14.1%	6.5%	0.2%	79.1%	57.5%	13.5%
Hoboken	PATH	20,732	10.0%	19.1 %	0.3%	70.6%	48.7%	13.8%
Exchange Place	PATH	19,601	9.0%	10.1 %	0.2%	80.6%	48.6%	9.5%
Newport	PATH	17,960	6.4%	32.7 %	0.2%	60.8%	57.4%	13.3%
Newark	PATH	10,438	42.0%	21.0 %	0.1%	36.9%	56.3%	28.1%
NEWARK BROAD ST	NJ Transit Commuter Rail	9,075	36.1%	9.6%	0.2%	54.1%	59.9%	32.2%
NEWARK PENN STATION	NJ Transit Commuter Rail	8,173	52.4%	0.0%	0.5%	47.1%	62.2%	30.4%
Harrison	PATH	5,886	9.4%	0.0%	1.5%	89.1%	61.6%	27.8%
ELIZABETH	NJ Transit Commuter Rail	4,765	13.1%	0.0%	0.6%	86.3%	70.8%	39.0%
FRANK R LAUTENBERG SECAUCUS LOWER LEVEL	NJ Transit Commuter Rail	4,281	3.8%	0.0%	1.6%	94.6%	47.4%	20.8%
METROPARK	NJ Transit Commuter Rail	3,807	19.3%	0.0%	2.1%	78.6%	36.7%	13.2%

NEW BRUNSWICK	NJ Transit Commuter Rail	3,763	4.7%	0.0%	8.2%	87.1%	55.1%	30.6%
SOUTH ORANGE	NJ Transit Commuter Rail	3,733	4.4%	0.0%	14.4%	81.2%	40.3%	25.9%
NEWARK AIRPORT RAILROAD STATION	NJ Transit Commuter Rail	3,603	14.1%	0.0%	9.7%	76.2%	73.7%	41.6%
METUCHEN	NJ Transit Commuter Rail	3,289	12.5%	0.0%	4.6%	82.9%	32.0%	15.8%
BRICK CHURCH	NJ Transit Commuter Rail	3,250	17.1%	0.0%	0.8%	82.2%	65.4%	40.2%
EDISON STATION	NJ Transit Commuter Rail	3,105	8.0%	0.0%	7.0%	85.0%	34.6%	16.6%
EAST ORANGE	NJ Transit Commuter Rail	3,041	16.3%	0.0%	0.0%	83.7%	67.3%	44.7%
RAHWAY	NJ Transit Commuter Rail	3,030	4.7%	0.0%	8.7%	86.6%	60.2%	26.0%
WATSESSING AVENUE	NJ Transit Commuter Rail	2,837	19.4%	0.2%	1.4%	79.0%	47.1%	30.8%
Newark Liberty International Airport	NJ Transit Commuter Rail	2,819	29.7%	0.0%	0.6%	69.7%	54.0%	25.6%
LINDEN	NJ Transit Commuter Rail	2,727	8.6%	0.0%	3.4%	88.0%	61.7%	31.8%

ORANGE	NJ Transit Commuter Rail	2,693	12.6%	0.0%	3.6%	83.8%	60.2%	42.3%
MAPLEWOOD	NJ Transit Commuter Rail	2,550	16.8%	0.0%	4.6%	78.5%	29.2%	12.9%
SUMMIT	NJ Transit Commuter Rail	2,320	8.1%	0.0%	10.6%	81.4%	24.9%	10.5%
MILLBURN	NJ Transit Commuter Rail	2,189	15.7%	0.0%	8.5%	75.8%	24.0%	10.3%
NORTH ELIZABETH	NJ Transit Commuter Rail	2,136	11.5%	0.0%	6.3%	82.3%	71.3%	39.8%
MOUNTAIN STATION	NJ Transit Commuter Rail	1,963	11.3%	0.0%	1.2%	87.6%	49.2%	26.0%
PATERSON	NJ Transit Commuter Rail	1,812	14.1%	0.0%	1.7%	84.2%	77.6%	50.8%
CHATHAM	NJ Transit Commuter Rail	1,771	4.9%	0.0%	7.7%	87.4%	25.0%	10.3%
Metropark Amtrak Station	NJ Transit Commuter Rail	1,727	11.3%	0.0%	1.8%	86.9%	34.9%	15.3%
PLAINFIELD	NJ Transit Commuter Rail	1,631	3.2%	0.0%	9.9%	86.9%	68.8%	27.9%
HIGHLAND AVENUE	NJ Transit Commuter Rail	1,585	6.4%	0.0%	2.6%	91.0%	40.5%	28.1%
ROSELLE PARK	NJ Transit Commuter Rail	1,556	7.6%	0.0%	1.6%	90.8%	55.9%	22.4%

UNION	NJ Transit Commuter Rail	1,519	19.1%	0.0%	1.9%	79.0%	63.2%	23.0%

Market Characterization Analysis

An analysis of MEM overlaps among the rail stations based on four MEM criteria (MRI, population, and employment growth as well as vehicle access) found that half (18 of 36) are located in low-ranked MRI municipalities, i.e., among the 100 least revitalized in New Jersey. The lowest MRI rankings were observed at stations in Paterson, followed by Newark, New Brunswick, and Orange. Ten stations are in TAZs projected to gain more than 750 residents from 2025 to 2050, including Union, Newport, Elizabeth, and Exchange Place, each forecasted to add over 1,000 residents. In terms of employment growth, 11 study stations are expected to add 300 or more workers over the same period, with the largest gains at Exchange Place, followed by Paterson, Secaucus (Frank R. Lautenberg), Metropark, and Grove Street. These MEM overlaps demonstrate that first and last-mile transit access will face rising demand in the coming decades, driven by significant population and employment growth around these stations and the continued need for transit options in communities with limited vehicle access.

Figure 31. Rail Stations where First mile last mile strategies should be prioritized versus the Revitalization Index, 2024

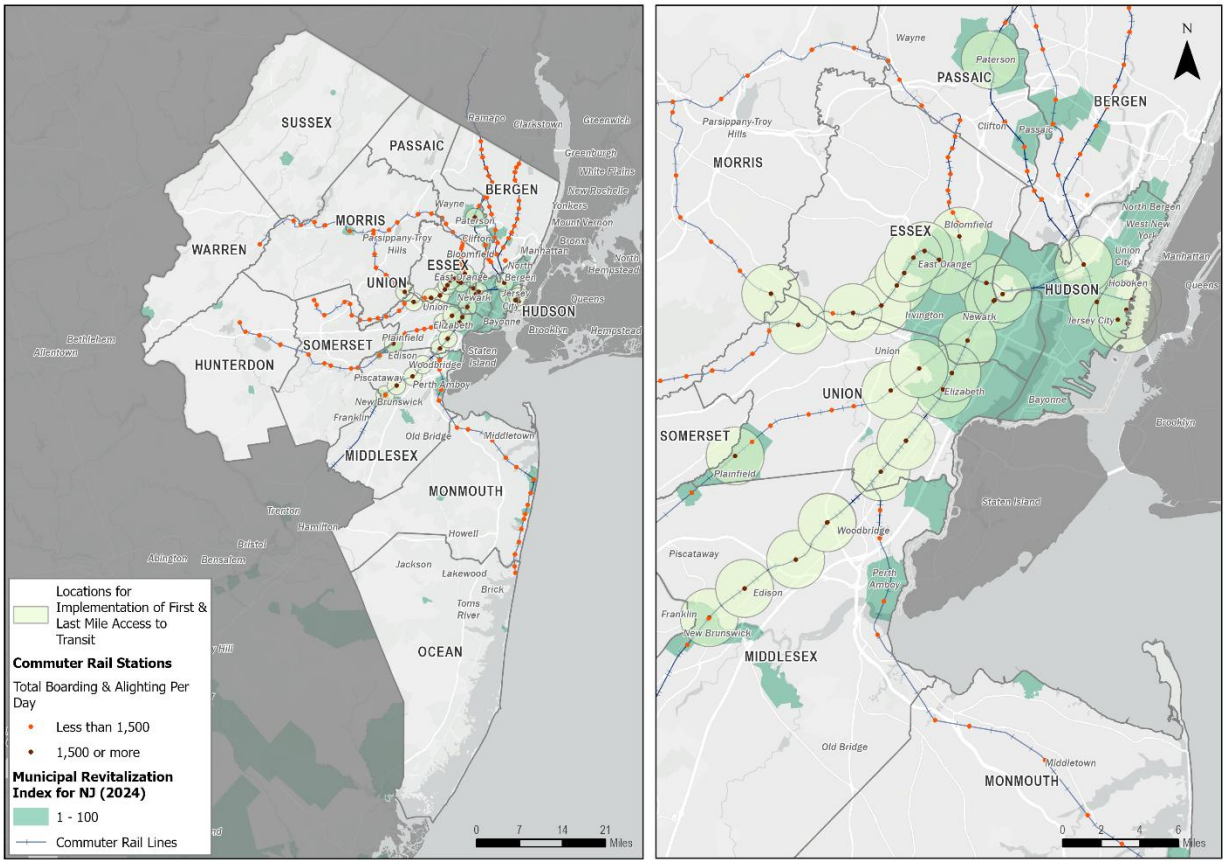
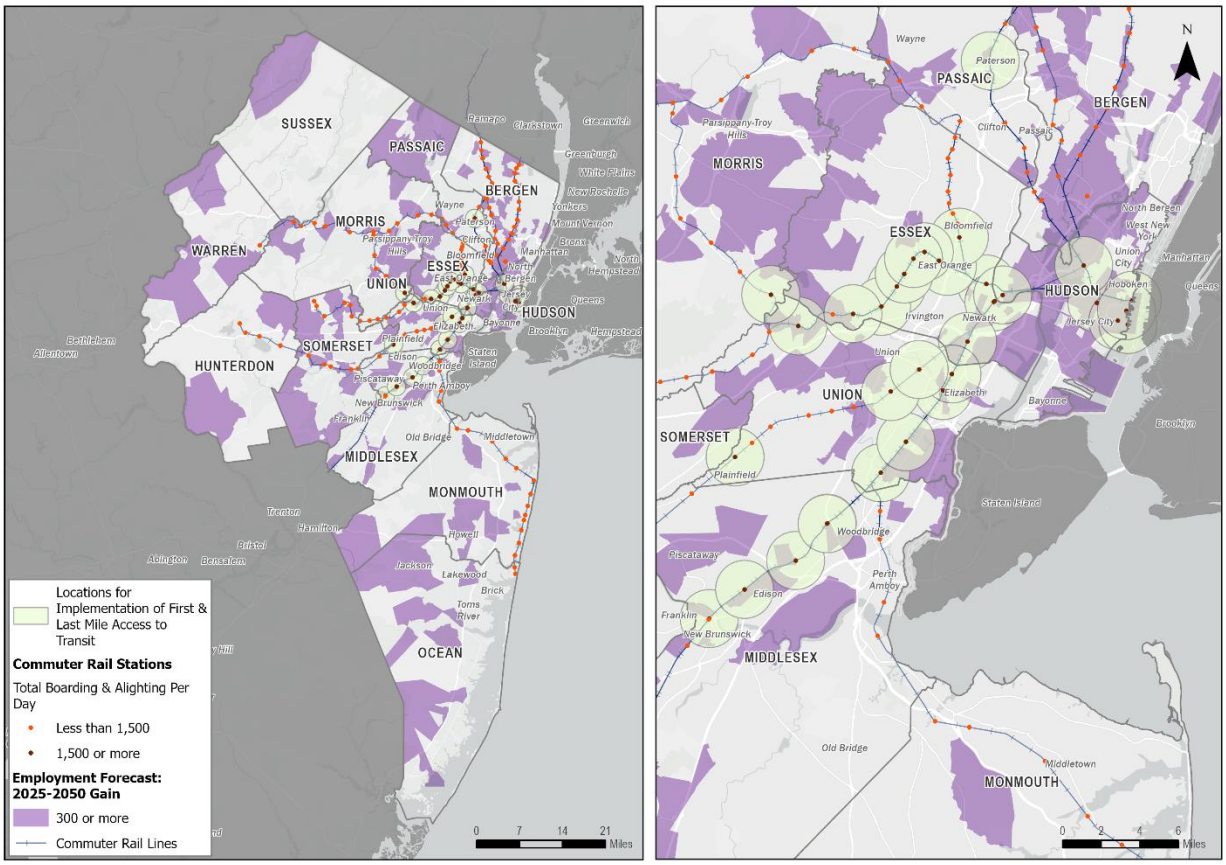


Figure 32. Rail Stations where First mile last mile strategies should be prioritized versus TAZ employment growth, 2025-2050.



Additional maps of MEM relationships relative to vehicle access and population growth are included in the Appendix of this report.

3.3 Strategy– Suitable locations for Implementation of Complete Streets with Pedestrian Bicycle Infrastructure Improvements

Background

Complete Streets is an effective strategy to enhance the safety, comfort, and accessibility of roadways for all users. This approach accommodates not only drivers but also pedestrians, bicyclists, users of micromobility options, and public transportation passengers. Complete Streets facilitate easy street crossings, promote walking and biking to various destinations, support the use of assistive devices, and ensure safe access to transit stops. The primary objective of Complete Streets is to create an environment where it is straightforward and secure to cross the street, walk, bike, use assistive devices, and access transit stops. This strategy guarantees that individuals of all ages and abilities can navigate their community safely and comfortably.

Geographic Level / Focus Place Type

Roadway segments or corridors

Performance Measure and Threshold

To identify locations suitable for Complete Streets strategies, the analysis focused on areas that typically have a variety of destinations within walking distance. These areas are situated along roadways with three or more lanes and speed limits of 30 miles per hour or higher. Additionally, these roadways include a bus route and have experienced at least one bicycle or pedestrian crash resulting in a fatality or serious injury, indicating a need for safety improvements. The performance measures and thresholds used were as follows-

- Areas with Higher Potential for Biking and Walking - Bicycle trip potential > 80 and Pedestrian trip potential >80
- Roadways with frequent bus service - Roadways that have a bus route with a peak frequency of 15 minutes or more.
- Roadways that are prone to bike/ped crashes – Roadways with at least one serious injury or fatal crash for bicycles or pedestrians
- Roadways with at least three lanes and a speed limit of at least 30 mph.

Areas for Potential Application of Strategies

The analysis identified 56 roadways that could be considered potential candidates for Complete Streets treatments, as shown in Figure 33 in Table 9. It is important to note that various local street factors and development contexts will influence the feasibility of implementing Complete Streets strategies.

Figure 33. Suitable corridors where complete streets strategies could be implemented.

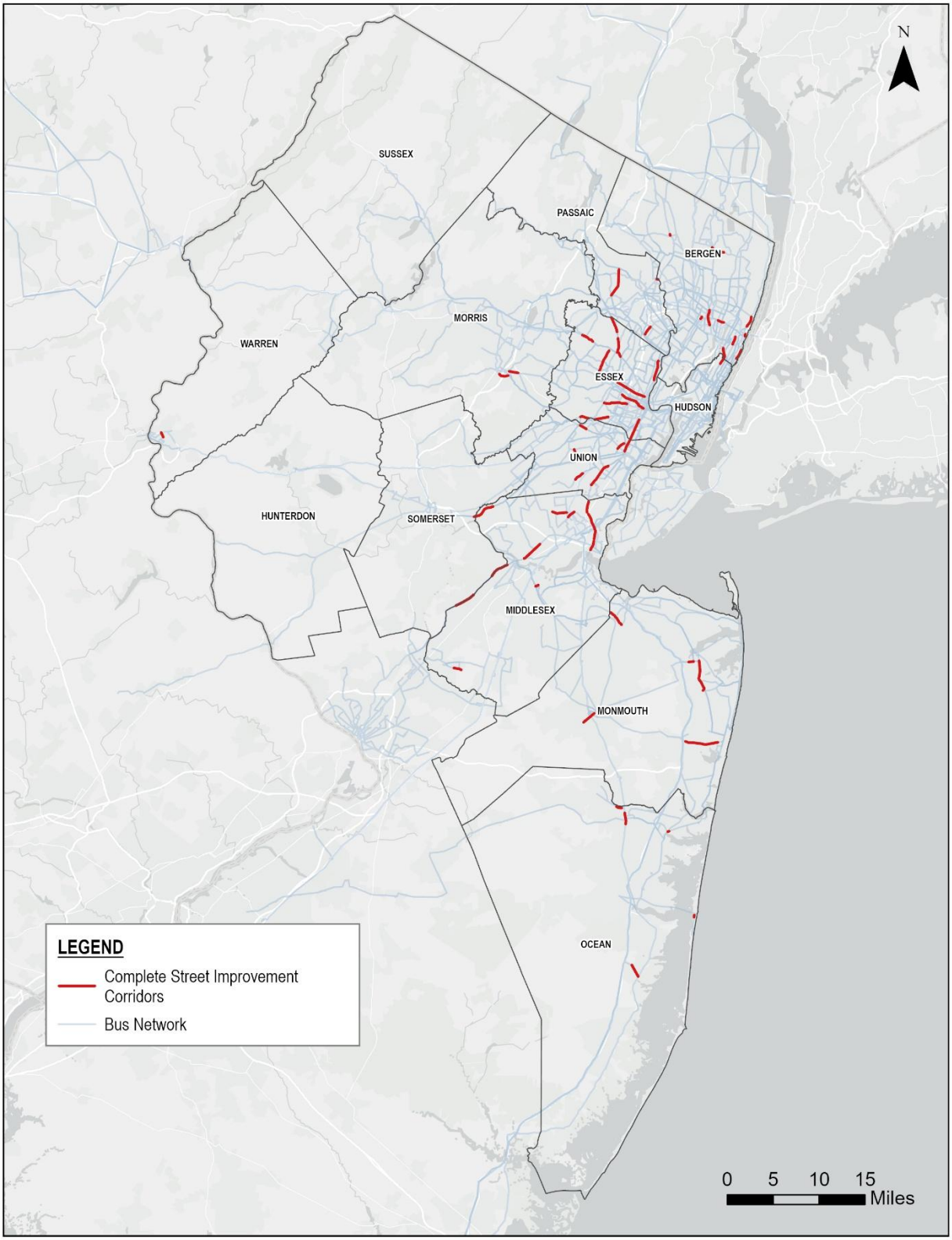


Table 9. Suitable Candidate Corridors for Complete Streets, based on CMP Analysis

County	Municipality/ Town	Roadway/ Corridor	START Milepost	End Milepost
Bergen	Edgewater	River Road	4.90	5.70
	Englewood Cliffs	Route 9W	1.25	2.60
	Hackensack	Polifly Road	4.30	4.55
	Hackensack	River St.	4.91	6.03
	Palisades Park	North Bergen Boulevard	1.92	2.90
	Teaneck	DeGraw Ave.	1.31	1.78
	Waldwick	Franklin Turnpike	21.35	21.48
	Westwood	Old Hook Road	17.05	18.67
Bergen, Hudson	Ridgefield, Fairview, North Bergen	Route 9	59.91	61.71
Essex	Cedar Grove	Pompton Avenue	2.07	3.60
	Cedar Grove, Verona	Pompton Ave.	0.53	1.35
	East Orange	Park Ave.	0.43	3.88
	Maplewood	Irvington Ave.	13.29	14.74
	Millburn	Millburn Ave.	0.00	1.43
	Newark	Market St.	3.00	4.10
	Newark	Frelinghuysen Ave.	35.80	38.06
	Nutley, Belleville	Washington Ave.	7.76	8.26
	Orange, East Orange, Newark	Central Ave.	8.27	9.94
	South Orange, Newark	S. Orange Ave.	24.60	27.10
	Verona, Montclair	Bloomfield Ave.	5.22	5.73
	Verona, West Orange	Lakeside Ave. / Pleasant Valley Way	2.48	4.88
	West Caldwell	Bloomfield Ave.	0.87	2.17
Hudson	Fort Lee	Hudson Terrace	7.27	7.52
Middlesex	East Brunswick	Tices Lane	2.00	2.45

County	Municipality/ Town	Roadway/ Corridor	START Milepost	End Milepost
	Edison	Oak Tree Road	1.41	2.96
	Edison, Woodbridge	Lincoln Highway (Route 27)	24.23	25.15
	Highland Park, Edison	Raritan Ave. / Lincoln Highway (Route 27)	17.41	19.74
	Perth Amboy	Convery Blvd. (Route 35)	52.18	53.25
	Plainsboro	Plainsboro Road	2.36	3.05
	Woodbridge	St. George's Ave. (Route 35)	56.57	57.90
	Woodbridge, Perth Amboy	Amboy Ave (Route 35)	53.49	56.24
Monmouth	Aberdeen, Matawan	Route 34	21.33	23.08
	Eatontown	Route 35 / CR 547 (Wyckoff St)	29.47	32.90
	Freehold Borough, Freehold Twp	Main St.	50.44	51.56
	Neptune Twp	Corlies Ave.	37.85	41.46
	Red Bank	Newman Springs Rd	15.72	16.21
Morris	Morris Twp	Morris St	13.18	14.06
	Morristown	Madison Ave.	0.46	1.48
Ocean	Brick	Route 88	0.00	0.19
	Lacey	Lacey Road	11.15	12.58
	Lakewood	West County Line Road	30.89	31.50
	Lakewood	Route 9 (Madison Avenue)	101.71	102.86
	Seaside Park	Central Avenue	2.04	2.20
Passaic	Clifton	Clifton Avenue	0.18	1.10
	Paterson	First Avenue	3.99	4.15
	Wayne	Valley Road	0.67	0.00
Somerset, Middlesex	Bound Brook, Middlesex	Route 28	8.09	10.55

County	Municipality/ Town	Roadway/ Corridor	START Milepost	End Milepost
	Franklin, North Brunswick	Route 27	13.34	15.34
	Franklin, South Brunswick	Route 27	8.13	10.41
Union	Clark	Raritan Road	1.22	2.29
	Cranford	Springfield Ave.	5.11	5.55
	Elizabeth	Newark Ave.	34.36	35.79
	Hillside, Union, Elizabeth	Route 439 (Elmora Ave)	2.70	3.48
	Rahway	St. George's Ave. (Route 27)	29.00	31.57
	Springfield, Union	Morris Ave. (Route 82)	0.00	0.78
Warren	Phillipsburg	Roseberry St.	1.25	1.89

Market Characterization Analysis

The candidate corridors for complete streets were further compared against seven Market MEMs to better understand which of these communities would benefit. MEMs included:

- Low ranking 2024 MRI scores of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions,
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050),
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050),
- Limited vehicle access by census tract (2019-2023 average: 20% or more households without a car),
- Age of resident population by census tract, (2019-2023 average: 20% or more aged 65 or older),
- Resident population disability status by census tract (2019-2023 average: 14% or more with 1 or more disabilities), and
- Proximity to primary, secondary, or higher education schools (2023 locations, 1/4-mile radius)

Across the seven MEM categories, the combined total mileage of candidate corridors for complete streets was highest near schools (33.3 miles), followed by tracts with older populations (23.1 miles), low-ranking MRI communities (17.2 miles), tracts with high rates of disability (16.9 miles), TAZs with high forecasted employment growth (14.9 miles), TAZs with

high forecasted population growth (14.8 miles), and tracts with limited vehicle access (12.9 miles).

Municipalities with the highest total mileage of candidate corridors generally include dense, urbanized areas like Newark (4.0 miles), East Orange (2.5 miles), and Elizabeth (1.5 miles). These cities have large student populations and high concentrations of K-12 and higher education schools. Larger suburban communities like Woodbridge (2.5 miles) and Edison (2.2 miles) also had high mileage of complete streets within close proximity to schools.

The table on the following pages shows how each segment performed relative to the MEM thresholds. The Market Street corridor in Newark had the highest number of MEMs meeting thresholds of need, with 6 out of 7. Seven other corridors each had 5 out of 7 MEMs meeting threshold levels, including:

- River Street in Hackensack;
- Frelinghuysen Avenue in Newark;
- Central Avenue in Orange, East Orange, and Newark;
- Main Street in Freehold Borough and Township;
- Route 27 in Franklin and North Brunswick;
- Newark Avenue in Elizabeth; and
- Route 439 (Elmora Avenue) in Hillside, Union, and Elizabeth.

Table 10. Candidate Corridors for Complete Streets, based on CMP Analysis versus MEM thresholds.

					MARKET EVALUATION METRIC (Meets Threshold, Yes/No)						
COUNTY	**Municipality/ Town**	**Roadway/ Corridor**	**START Milepost**	**End Milepost**	**MRI**	**Pop Growth**	**Emp Growth**	**Limited Vehicle Access**	**Age 65+**	**Disability Status**	**Proximity to Schools**
Bergen	Edgewater	River Road	4.9	5.7	N	N	Y	N	N	N	Y
	Englewood Cliffs	Route 9W	1.25	2.6	N	Y	Y	N	Y	N	Y
	Hackensack	Polifly Road	4.3	4.55	N	Y	Y	N	N	N	Y
	Hackensack	River St.	4.91	6.03	N	Y	Y	Y	N	Y	Y
	Palisades Park	North Bergen Boulevard	1.92	2.9	N	Y	N	Y	N	N	Y
	Teaneck	DeGraw Ave.	1.31	1.78	N	Y	N	N	Y	Y	Y
	Waldwick	Franklin Turnpike	21.35	21.48	N	Y	N	N	N	N	N
	Westwood	Old Hook Road	17.05	18.67	N	Y	Y	N	Y	N	N
Bergen, Hudson	Ridgefield, Fairview, North Bergen	Route 9	59.91	61.71	Y	Y	Y	N	N	N	N
Essex	Cedar Grove	Pompton Avenue	2.07	3.6	N	N	N	N	Y	N	N
	Cedar Grove, Verona	Pompton Ave.	0.53	1.35	N	N	N	N	Y	Y	Y
	East Orange	Park Ave.	0.43	3.88	Y	N	N	Y	N	Y	Y
	Maplewood	Irvington Ave.	13.29	14.74	N	Y	N	N	N	N	Y
	Millburn	Millburn Ave.	0	1.43	N	N	Y	N	N	N	Y
	Newark	Market St.	3	4.1	Y	N	Y	Y	Y	Y	Y
	Newark	Frelinghuysen Ave.	35.8	38.06	Y	Y	Y	Y	N	Y	N
	Nutley, Belleville	Washington Ave.	7.76	8.26	N	N	N	N	N	N	Y
	Orange, East Orange, Newark	Central Ave.	8.27	9.94	Y	N	N	Y	Y	Y	Y
	South Orange, Newark	S. Orange Ave.	24.6	27.1	Y	N	N	Y	N	Y	Y
	Verona, Montclair	Bloomfield Ave.	5.22	5.73	N	N	N	N	Y	Y	N
	Verona, West Orange	Lakeside Ave. / Pleasant Valley Way	2.48	4.88	N	N	N	N	Y	N	N
	West Caldwell	Bloomfield Ave.	0.87	2.17	N	N	Y	N	Y	N	Y
Hudson	Fort Lee	Hudson Terrace	7.27	7.52	N	N	N	N	N	N	N
Middlesex	East Brunswick	Tices Lane	2	2.45	Y	N	N	N	N	N	N
	Edison	Oak Tree Road	1.41	2.96	N	N	N	N	Y	N	Y
	Edison, Woodbridge	Lincoln Highway (Route 27)	24.23	25.15	N	N	N	N	N	N	Y
	Highland Park, Edison	Raritan Ave. / Lincoln Highway (Route 27)	17.41	19.74	N	N	Y	N	N	N	Y

	Perth Amboy	Convery Blvd. (Route 35)	52.18	53.25	Y	N	N	Y	Y	Y	N
	Plainsboro	Plainsboro Road	2.36	3.05	N	N	N	N	N	N	N
	Woodbridge	St. George's Ave. (Route 35)	56.57	57.9	N	N	N	N	N	N	N
	Woodbridge, Perth Amboy	Amboy Ave (Route 35)	53.49	56.24	Y	N	N	N	N	Y	Y
Monmouth	Aberdeen, Matawan	Route 34	21.33	23.08	N	N	N	N	N	N	Y
	Eatontown	Route 35 / CR 547 (Wyckoff St)	29.47	32.9	N	N	N	N	Y	Y	Y
	Freehold Borough, Freehold Twp	Main St.	50.44	51.56	Y	N	N	Y	Y	Y	Y
	Neptune Twp	Corlies Ave.	37.85	41.46	N	N	Y	Y	Y	Y	N
	Red Bank	Newman Springs Rd	15.72	16.21	N	N	N	N	N	N	N
Morris	Morris Twp	Morris St	13.18	14.06	N	N	N	N	Y	N	Y
	Morristown	Madison Ave.	0.46	1.48	N	N	Y	N	Y	N	Y
Ocean	Brick	Route 88	0	0.19	N	N	N	N	Y	Y	N
	Lacey	Lacey Road	11.15	12.58	N	N	N	N	Y	N	N
	Lakewood	West County Line Road	30.89	31.5	N	Y	N	N	N	N	Y
	Lakewood	Route 9 (Madison Avenue)	101.71	102.86	N	Y	N	Y	N	N	Y
	Seaside Park	Central Avenue	2.04	2.2	N	N	N	N	Y	N	N
Passaic	Clifton	Clifton Avenue	0.18	1.1	N	N	N	N	Y	N	N
	Paterson	First Avenue	3.99	4.15	Y	Y	N	N	N	N	Y
	Wayne	Valley Road	0.67	0	N	N	N	Y	Y	N	Y
Somerset, Middlesex	Bound Brook, Middlesex	Route 28	8.09	10.55	N	N	N	N	Y	Y	Y
	Franklin, North Brunswick	Route 27	13.34	15.34	Y	N	Y	Y	N	Y	Y
	Franklin, South Brunswick	Route 27	8.13	10.41	N	N	Y	N	N	N	N
Union	Clark	Raritan Road	1.22	2.29	N	Y	Y	N	Y	N	Y
	Cranford	Springfield Ave.	5.11	5.55	N	Y	N	N	N	N	Y
	Elizabeth	Newark Ave.	34.36	35.79	Y	Y	Y	Y	N	N	Y
	Hillside, Union, Elizabeth	Route 439 (Elmora Ave)	2.7	3.48	Y	Y	Y	Y	N	N	Y
	Rahway	St. George's Ave. (Route 27)	29	31.57	N	Y	N	Y	N	Y	Y
	Springfield, Union	Morris Ave. (Route 82)	0	0.78	N	Y	Y	N	Y	N	Y
Warren	Phillipsburg	Roseberry St.	1.25	1.89	Y	N	N	N	N	N	N

Figure 34. Suitable corridors where complete streets strategies could be implemented, versus proximity to schools.

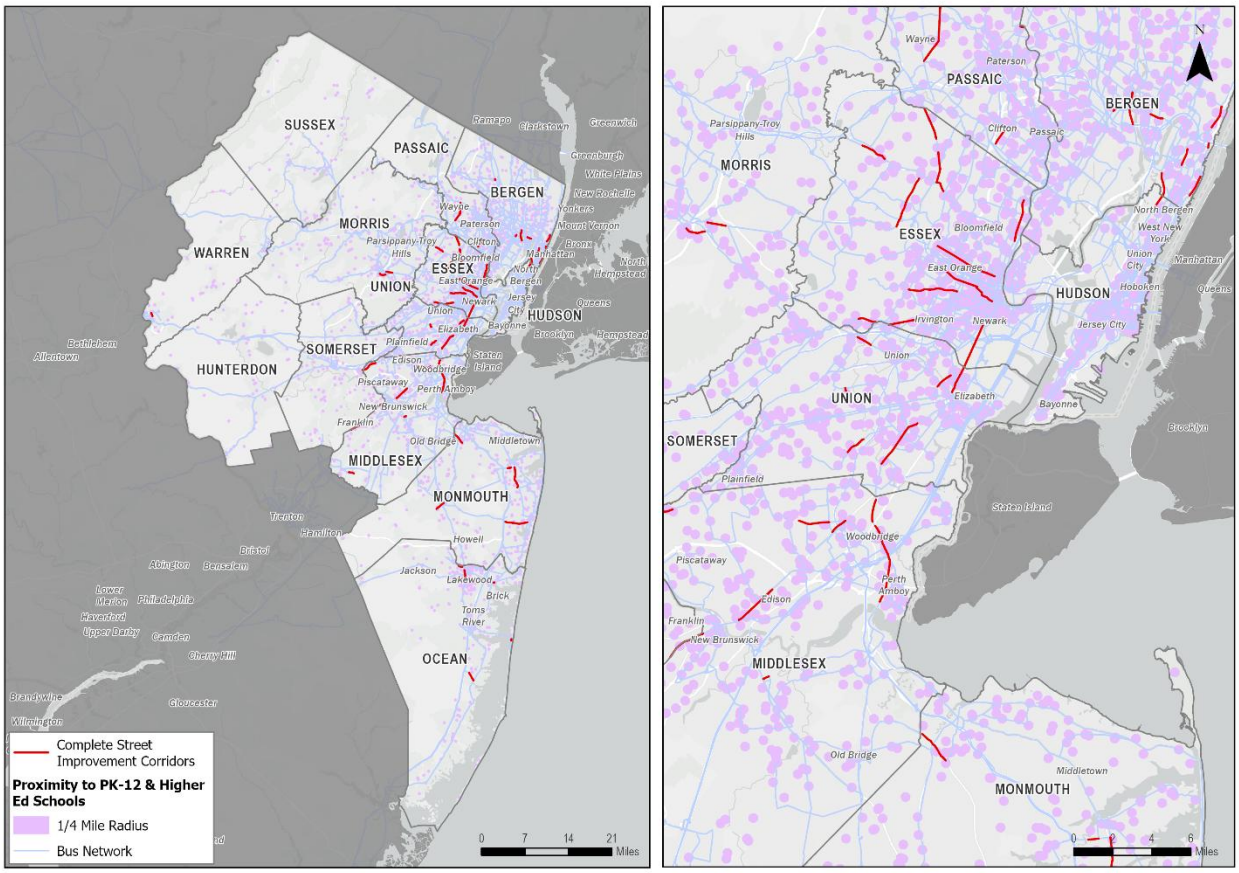
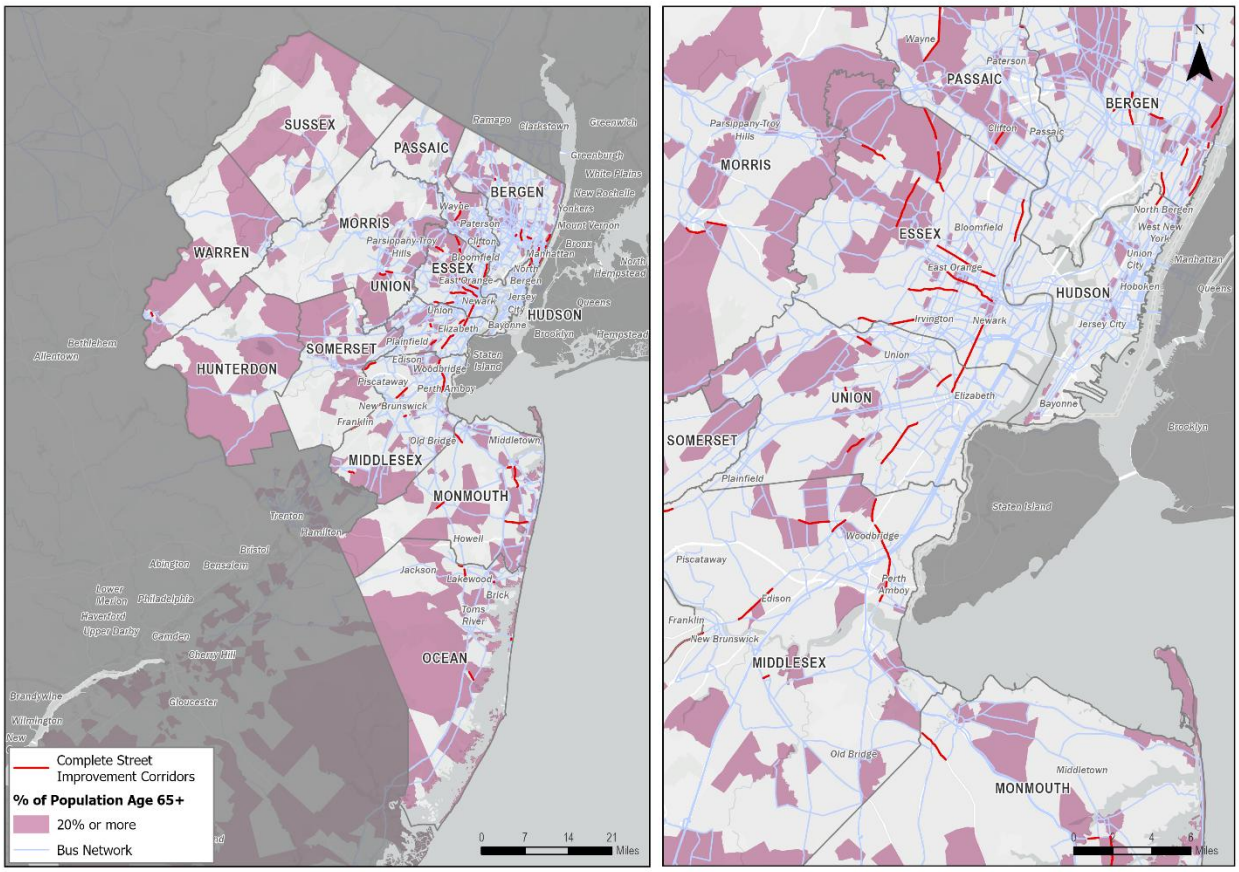


Figure 35. Suitable corridors where complete streets strategies could be implemented versus tracts by the share of adults aged 65 or older, 2023.



4. Roadway Operations

4.1 Need – Addressing Congested and Unreliable Major Roadways

Background

New Jersey has more miles of highway per square mile than any other state[14] .Out of 38,784 miles of roadways, 33,426 miles[15] of roadways are in urban areas of New Jersey, which are mostly in the Northern part of New Jersey.

Significant traffic congestion and roadway travel conditions occur regularly along major freeways that are critical to accessing large cities in North Jersey, and bottlenecks at tunnels and bridges between northern New Jersey and New York City are particularly acute. Roadway congestion and unreliability due to accidents, traffic signal timing, and other conditions contribute to both bus reliability issues and challenges for drivers in urban areas.

[14] NJDOT, State of New Jersey 2019 Hazard Mitigation Plan , Chapter 4; https://nj.gov/njoem/mitigation/pdf/2019/mit2019_section4_State_Profile.pdf

[15] NJDOT, Mileage by Jurisdiction and Public Mileage by Area types ,2023; https://www.nj.gov/transportation/refdata/roadway/vmt.shtm

Geographic Level / Focus Place Type

Roadway Segments and Corridors

Performance Measure

The level of travel time reliability is used to identify unreliable roadways. The travel time index, planning time index, and locations of top bottlenecks are utilized to identify congested roadways.

Threshold

- The level of travel time reliability is greater than 1.5
- Travel time index is greater than 1.5
- Planning time index is greater than 3
- Top 20 bottlenecks

Data Source: The Travel Time Index (TTI) measures the ratio of travel time during peak periods to travel time during free-flow conditions. The Planning Time Index (PTI) calculates the ratio of the 95th percentile travel time to the free-flow travel time, indicating the extra time needed to ensure on-time arrival for 95% of trips. The TTI and PTI in the NJTPA region were analyzed using the 2023 TTI and PTI Dataset from RITIS NPMRDS.

Areas of Need

As shown in Figure 36 and Figure 37, Congested and unreliable corridors encompass freeways such as the NJ Turnpike, I-278, I-280, I-287, I-80, US 1, US 9, and the Garden State Parkway. Significant arterial roads include MLK Boulevard, Central Avenue, Tonnelle Avenue, US 9, Route 37, and US 206 Maple Avenue.

Major bottlenecks in the region include I-95 to the George Washington Bridge, Garden State Parkway, US 22, NJ-21, NJ-17, and US 1&9.

Figure 36. Unreliable and congested roadways (LOTTR >1.5 and TTI >1.5)

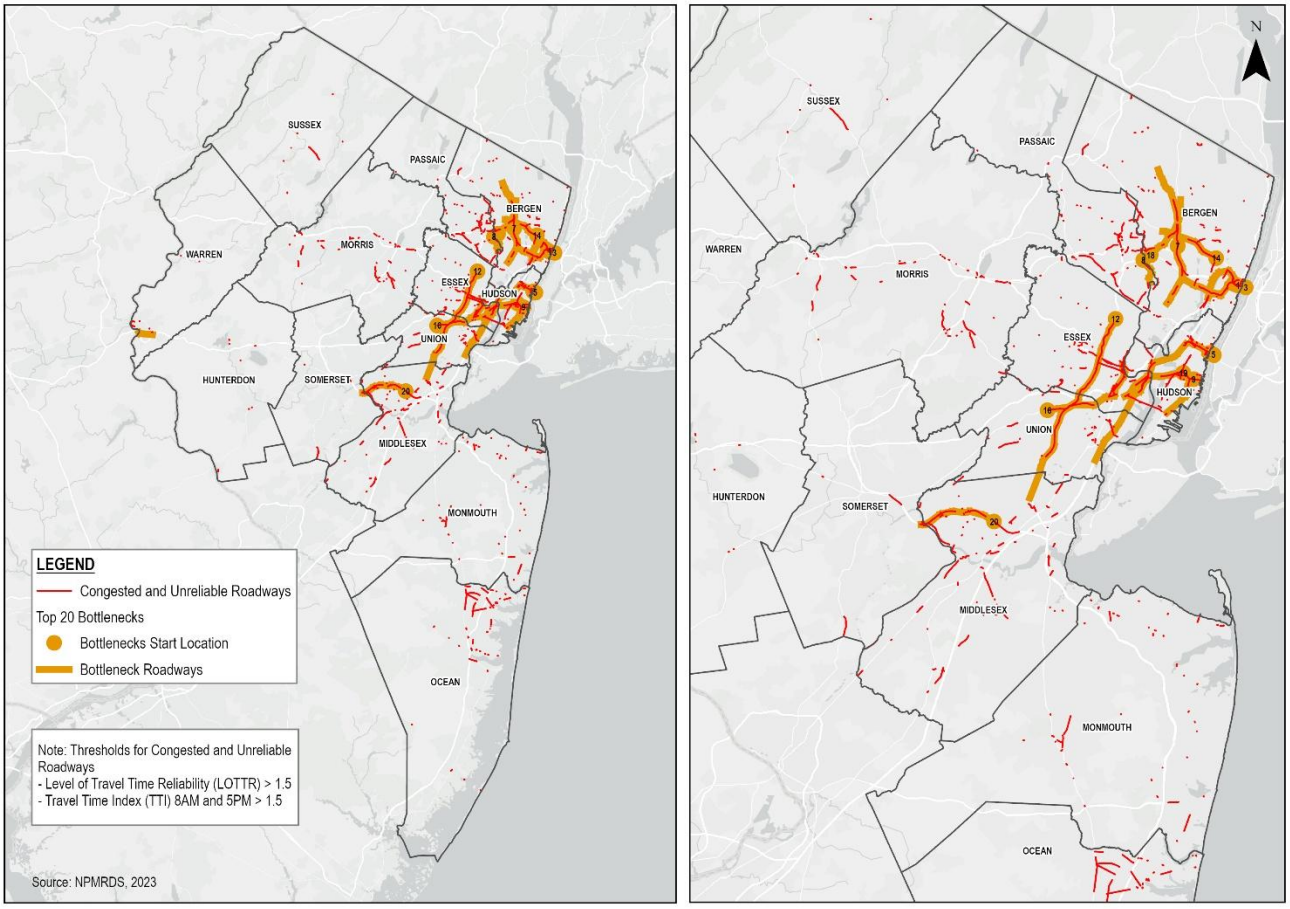


Figure 37. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0)

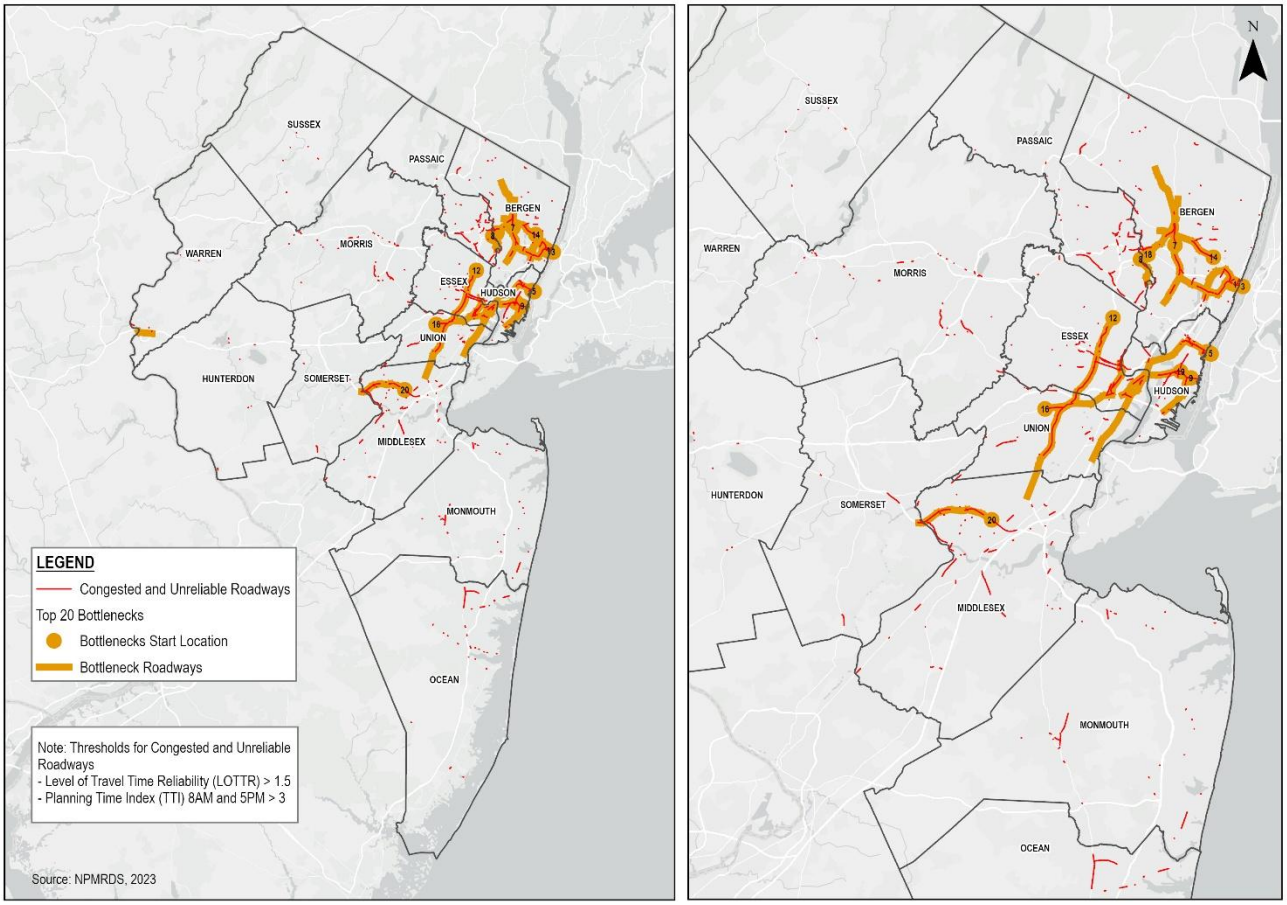


Table 11. Top 20 Bottlenecks in the NJTPA Region

Bottleneck Rank	Location of the Head of the Bottleneck
1	I-95 E @ CR-505/CENTER AVE/EXIT 73
2	I-95 N @ US-9/US-1/US-46/EXIT 72
3	I-95 E @ NEW YORK/NEW JERSEY STATE LINE
4	I-95 E @ CENTER AVE
5	RT-495 E @ NEW JERSEY/NEW YORK STATE LINE
6	NJ-495 E @ NEW JERSEY/NEW YORK STATE LINE
7	NJ-17 N @ PASSAIC ST
8	NJ-21 N @ US-46
9	I-78 E @ MONMOUTH ST
10	NJ-495 E @ LINCOLN TUNNEL WEST
11	NJ-17 S @ PASSAIC ST
12	GARDEN STATE PKY N @ HOOVER AVE/EXIT 150
13	I-95 E @ NY--NJ STATE BORDER

Bottleneck Rank	Location of the Head of the Bottleneck
14	NJ-4 E @ TEANECK RD
15	US-46 E @ I-95
16	US-22 W @ SPRINGFIELD RD
17	NJ-495 E @ NEW JERSEY/NEW YORK
18	GARDEN STATE PKY S @ US-46/EXIT 157
19	US-1-9 N @ US-1-9-TRUCK/TONNELE AVE
20	I-287 S @ CR-501/NEW DURHAM RD/EXIT 3

Market Characterization Analysis

Of the four MEMs, the longest stretches of congested and unreliable roadways (98.8 miles) were found in TAZs with forecasted fast-growing employment, followed by 91.3 miles in TAZs with forecasted fast-growing population, 87.0 miles in RIT communities, 63.3 miles in congested and unreliable roadways with expected growth in traffic volumes through 2050, and 58.5 miles in tracts with limited vehicle access.

The communities with the most congested roadways in fast-growing employment TAZs included Jersey City (13.0 miles), Newark (9.4 miles), Lakewood (8.8 miles), Piscataway (5.1 miles), Paramus (3.8 miles), Elizabeth (3.0 miles), and Kearny (2.8 miles). Expected job growth in future years will further increase congestion along these roadways. As employment growth drives more commuters onto the road, congestion is expected to increase not only in communities adding jobs but also in those located along key travel routes to expanding employment centers.

It is notable that Lakewood had 18.6 miles of congested roadway in areas with forecasted fast population growth, far more congested roadways than within its areas with fast-growing employment (8.8 miles).

Among freeways, expressways, and arterials with forecasted traffic volume increases of 30% or more (roughly equivalent to a 1.0% average annual increase) that overlapped with congested, unreliable, or bottleneck segments, the highest concentrations of congested roadways were in Newark (9.3 miles), followed by Jersey City (5.0 miles), Lakewood (4.2 miles), Paterson (3.3 miles), and Fort Lee (2.4 miles).

The region's top 20 bottlenecks were generally outside areas with low car ownership, forecasted employment growth, or low revitalization scores, but were concentrated in TAZs with significant population growth.

Figure 38. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0) versus TAZ employment growth, 2025-2050

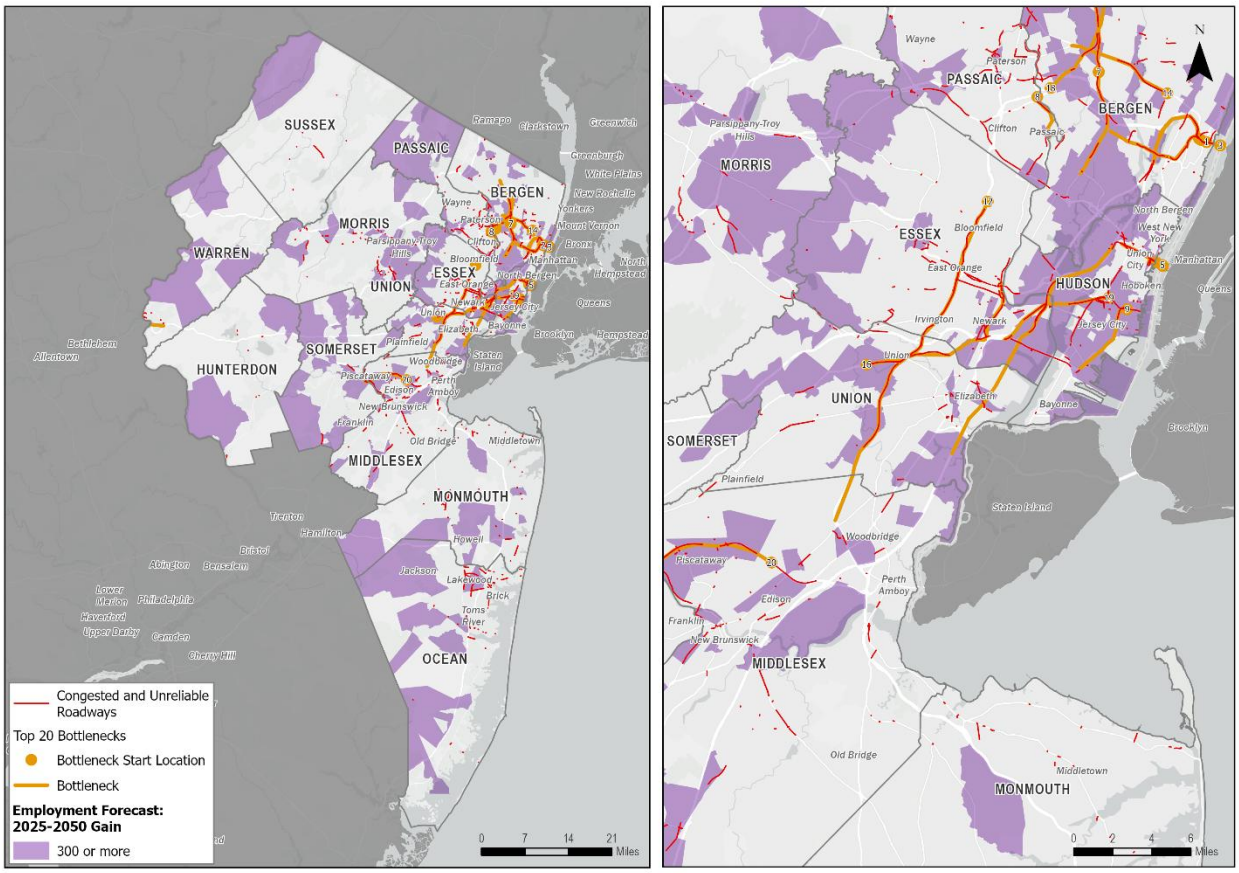


Figure 39. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0) versus TAZ population growth, 2025-2050

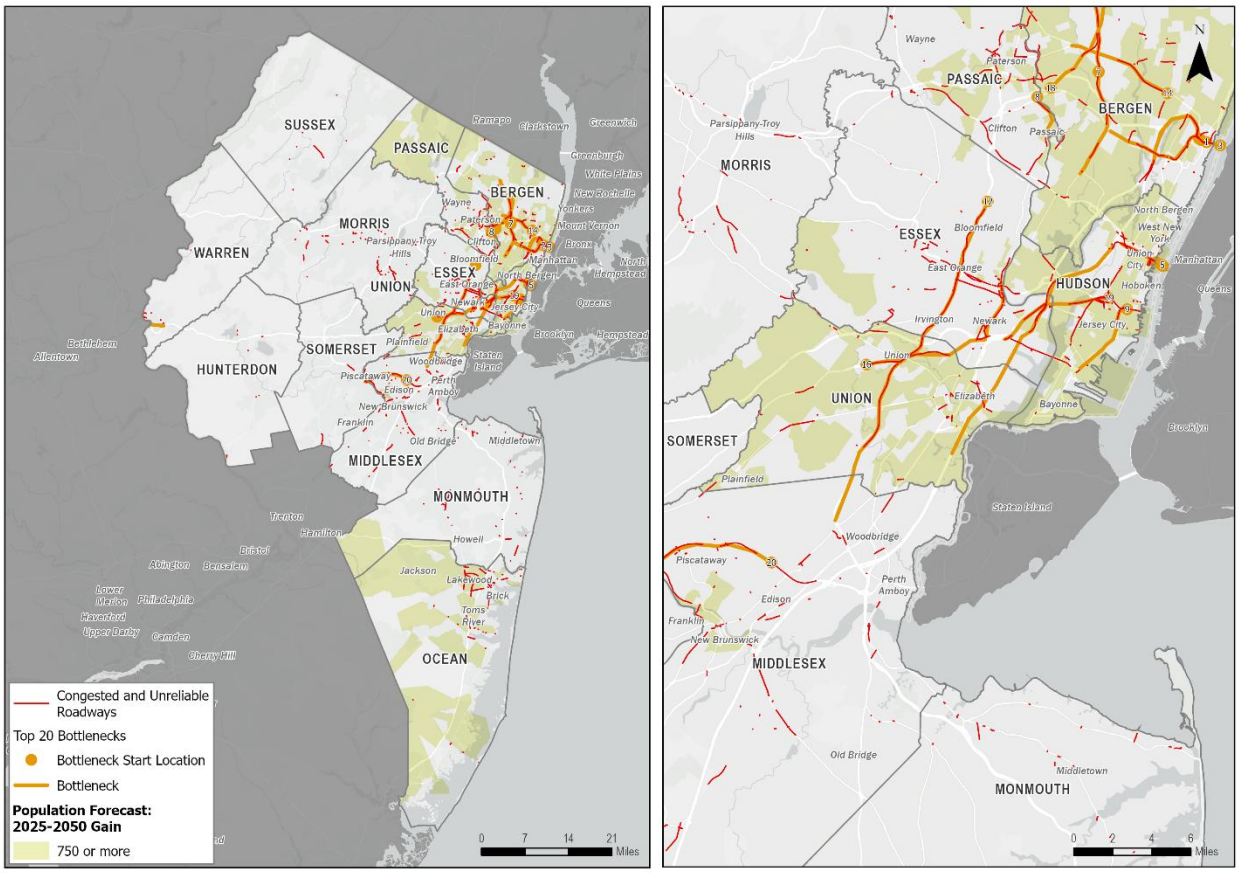
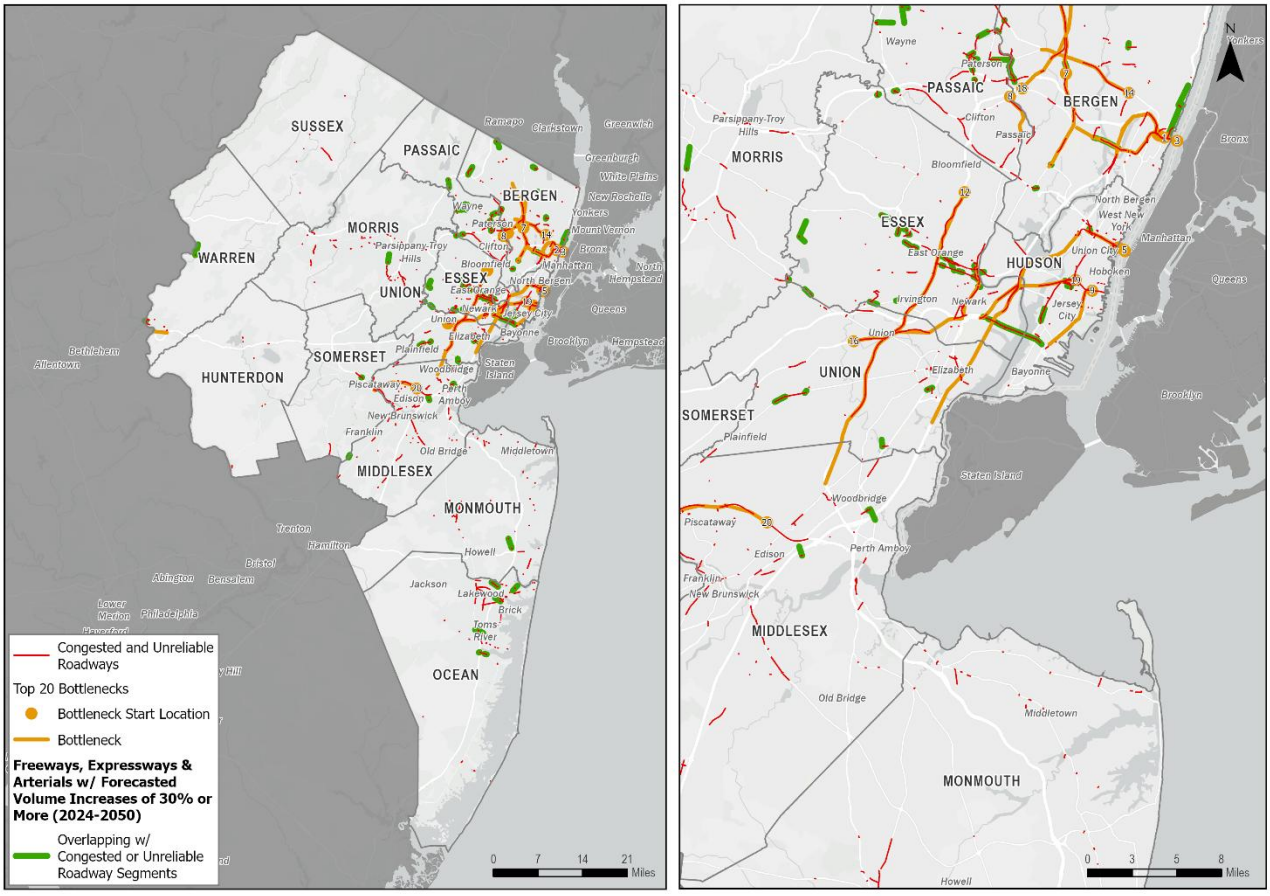


Figure 40. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0) versus roadway volume growth, 2024-2050



Additional maps of MEM relationships relative to the revitalization index and vehicle access are included in the Appendix of this report.

4.2 Strategy– Suitable Locations that May Benefit from Roadway Operations and Geometric Improvements

Background

Roadways with heavy traffic volumes, congestion, bottlenecks, and poor reliability are prime candidates for operational and/or geometric improvements. To identify locations that might benefit from these types of improvements, data addressing traffic congestion and roadway reliability were used to identify all segments.

Geographic Level / Focus Place Type

Roadways and Corridors

Performance Measure and Threshold

- Vehicular traffic volume (AADT)
    - Interstate, Freeways, and Expressways - greater than 100,000
    - Principal Arterials - greater than 50,000
    - Minor Arterials and Major Collectors - greater than 15,000

- Travel time index is greater than 1.5
- Top 20 bottlenecks

Areas for Potential Application of Strategies

Figure 41 and

Figure 42 illustrate the identified roadways, encompassing both freeways and arterial/collector roads. The specific treatments to be considered will depend on current operational conditions and geometric factors, along with considerations for other transportation modes, such as transit, bicycling, and walking. It is crucial to evaluate how any roadway improvement strategy impacts not only vehicle travel but also access and mobility across multiple modes, in line with the Regional Capital Investment Strategy's emphasis on enhancing transit, bicycling, walking, and other alternatives to driving. The roadways and corridors include part of I-78, I-80, I-95, I-287, Garden State Parkway, US 1, US 9, US 46, US 22, NJ 139, NJ 20, NJ 495, and NJ 21.

Figure 41. Potential Corridors for application of roadway Operations and Geometric Improvement Strategies – Congested Segments

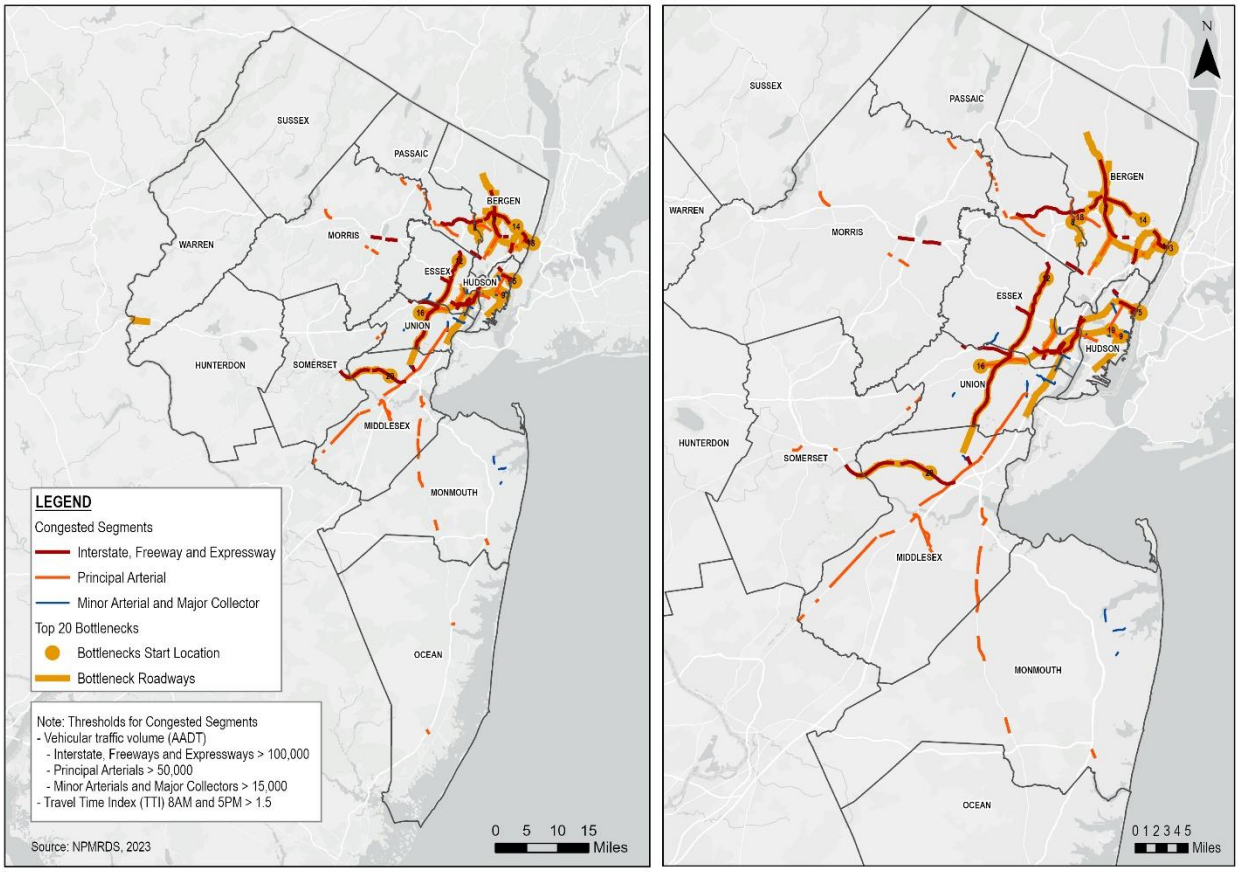
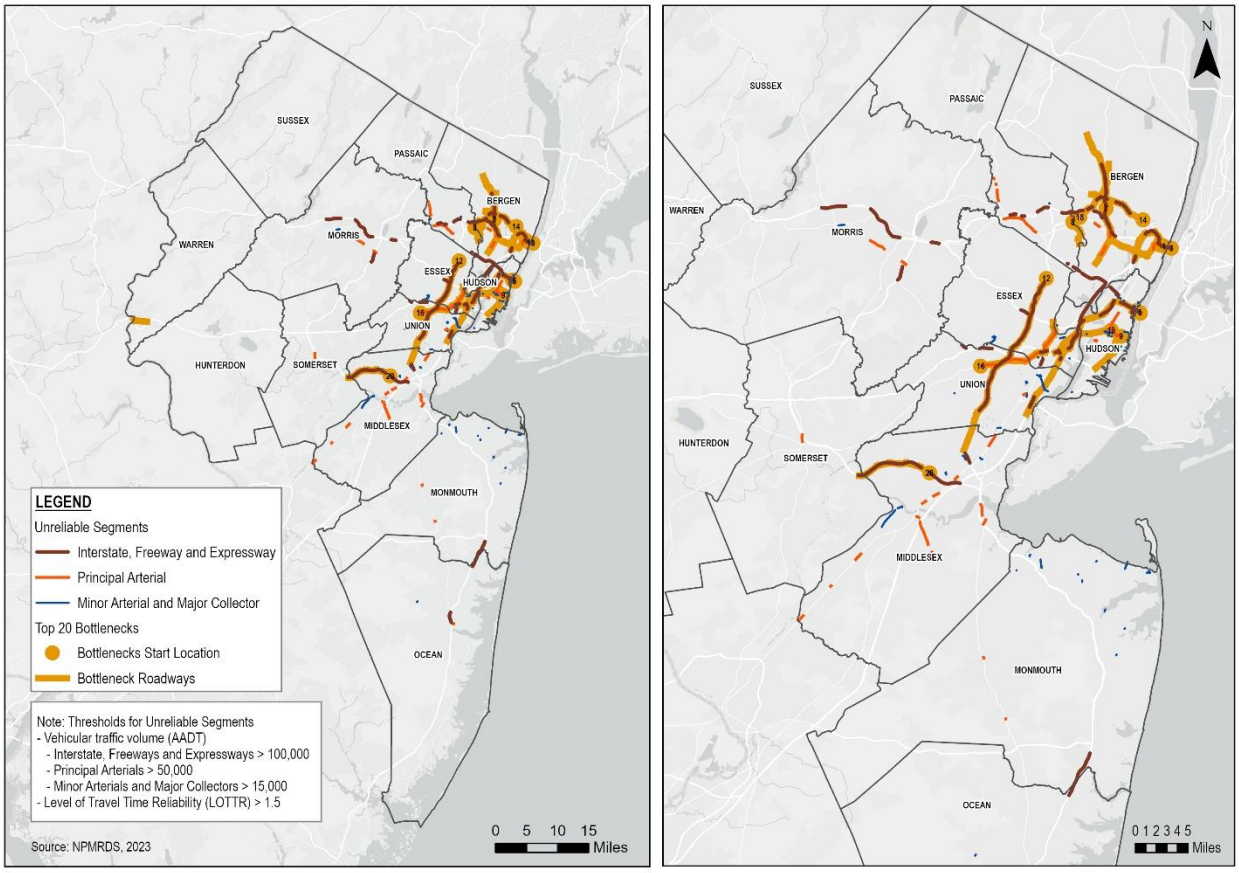


Figure 42. Potential Corridors for application of roadway Operations and Geometric Improvement Strategies – Unreliable Segments



5. Freight

5.1 Need – Congested and Unreliable Freight Corridors

Background

The Northern New Jersey region stands out for its extensive freight infrastructure, which plays a crucial role in the area's mobility and accessibility. This region is home to the Port of Newark and Elizabeth, one of the busiest ports in the United States, and several intermodal terminals served by major Class 1 railroads, including CSX and Norfolk Southern. Additionally, Newark International Airport handles a significant volume of air cargo, further enhancing the region's freight capabilities.

Complementing these facilities is a robust interstate network and primary highway freight system, which facilitates efficient goods movement. Northern New Jersey also boasts one of the largest concentrations of industrial properties in the nation, underscoring its importance as a hub for freight activity.

However, the movement of freight in this region is not without its challenges. It is essential to recognize that freight activity impacts community mobility, affecting not only drivers but also pedestrians and bicyclists. The region's strategic location within the Northeast Corridor results in a high volume of goods movement via ports, trucking, and rail freight. Therefore, it is imperative to accommodate these freight flows while carefully balancing the potential impacts on the community.

Addressing these challenges requires a comprehensive approach that considers the needs of all stakeholders. By doing so, Northern New Jersey can continue to thrive as a vital freight hub while ensuring a safe and accessible environment for all its residents.

Geographic Level / Focus Place Type

Roadways and Corridors on the Primary Highway Freight System (PHFS), Critical Urban Freight Corridors (CUFC), and Critical Rural Freight Corridors (CRFC) network.

Note: The Primary Highway Freight System (PHFS) is a network of highways identified as the most critical portions of the U.S. freight transportation system and designated by the US DOT. The Critical Urban Freight Corridors (CUFC) are public roads in urbanized areas that provide access and connection to the PHFS and other key freight facilities. The Critical Rural Freight Corridors (CRFC) are public roads in rural areas that provide access and connection to the PHFS and other key freight facilities.

Performance Measure and Threshold

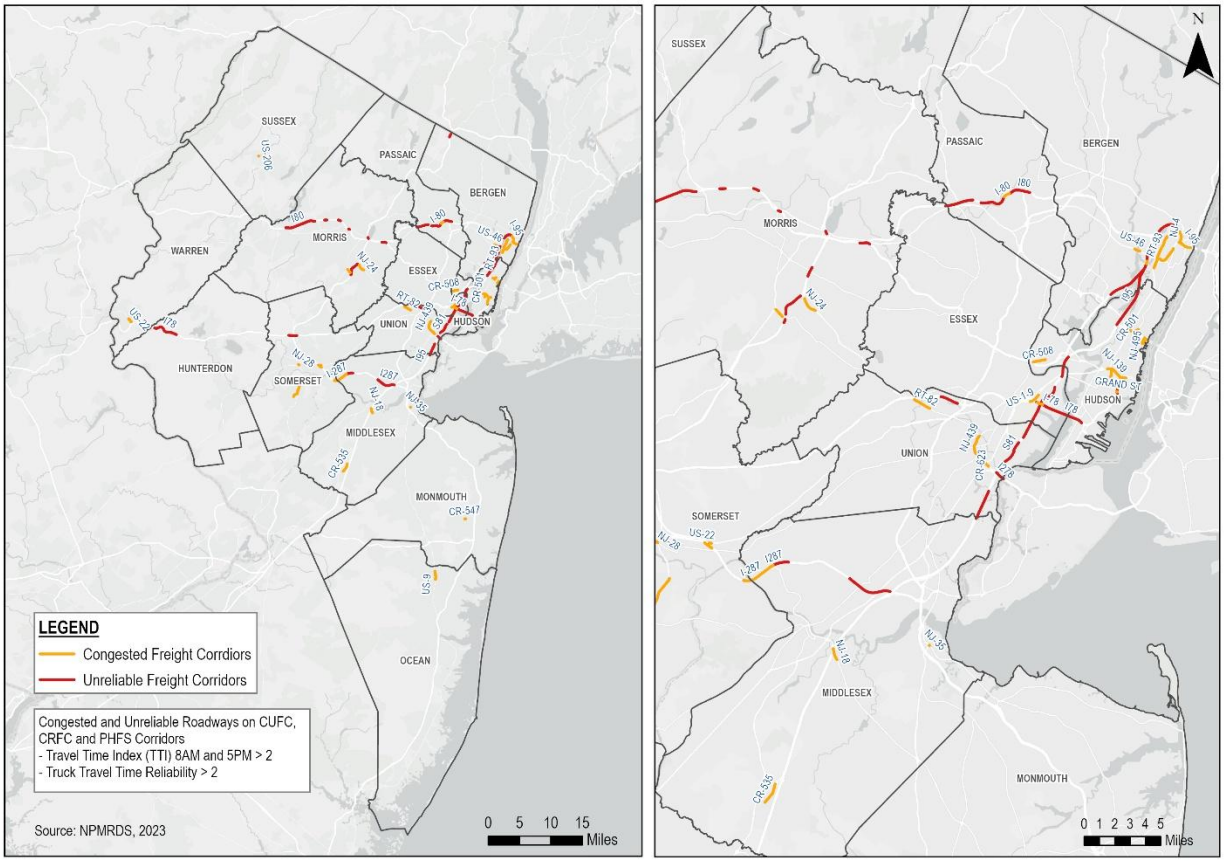
- The travel time index is greater than 2 and is on the CUFC, CRFC, and PHFS segments.
- The truck travel time reliability index is greater than 2 and is on the CUFC, CRFC, and PHFS segments.

Data Source: The Travel Time Index (TTI) measures the ratio of travel time during peak periods to travel time during free-flow conditions. The TTI in the NJTPA region was analyzed using the 2023 TTI Dataset from RITIS NPMRDS.

Areas of Need

Several segments of major freight corridors are known for their congestion and unreliability. Some of the examples include the NJ Turnpike, I-80, I-78, I-287, NJ 35, and US-22. It is worth noting that major arterials carrying major traffic flows may be missing in areas of need, as the analysis is limited to roadways that are on the CUFC, CRFC, and the PHFS Network. For Example, Route 17 in Bergen County, though it carries a substantial amount of truck traffic, is not designated on the PHFS, CUFC, or CRFC network and hence missing from the list.

Figure 43.Congested and unreliable Freight Corridors



5.2 Need - Improved Truck Access to Warehouses, Distribution, and Manufacturing Centers

Background

Highways provide convenient access for trucks to reach warehouse distribution centers and manufacturing centers. Having these industrial buildings near a highway can reduce travel times and enhance efficiency in logistics. Quicker access to major routes can decrease wear and tear on roadways because highways are better equipped to handle the impact of heavy trucks. If warehouses and distribution centers are located away from major highways, trucks have to use arterial and local streets that are not designed for heavy traffic. These roadways may also increase interactions between heavy trucks and other transportation modes, such as pedestrians and cyclists, raising safety concerns. Therefore, it is preferable for these types of land to be situated close to highways. Truck routes on arterial roads should be designated considering road

infrastructure, traffic patterns, and safety regulations. Size and weight restrictions for trucks must also be enforced to reduce impacts.

Geographic Level / Focus Place Type

Clusters of Warehouses, Manufacturing, and Distribution Centers

Performance Measure and Threshold

Locations of clusters of Warehouses, Manufacturing, and Distribution centers not accessible within 10 minutes of a highway

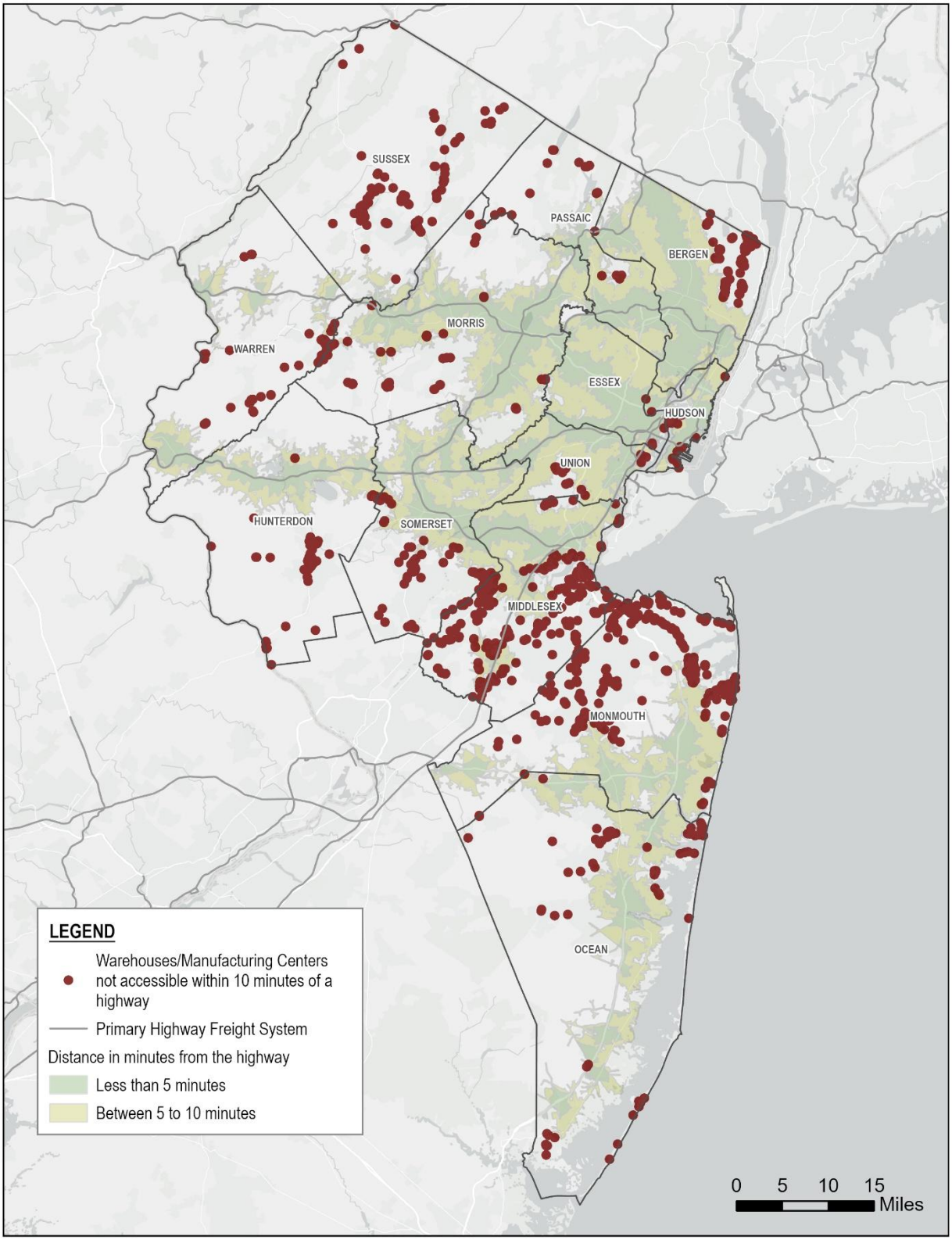
Data Sources: For the location of warehouses, a dataset developed using the following - CoStar, 2015; InfoGroup, 2019; Cambridge Systematics, 2020; NJOIT, 2008; Esri, 2024; NJTPA, 2024

Areas of Need

Various clusters of warehouses, manufacturing, and distribution centers are not within 10 minutes of a major highway, as illustrated in Figure 44. Some of these areas are as below.

- Bergen County - Clusters around Bergenfield, Tenafly and Cresskill, and Northvale
- Passaic County - West Milford, Hewitt
- Sussex County - Hampton township, Vernon township, clusters along CR 517
- Warren County - Washington, Belvidere, Hackettstown, Chester
- Hunterdon County - Flemington, Raritan Township, West Howell Township
- Somerset County - Hillsborough, Montgomery, Franklin Township
- Middlesex County - South Brunswick, Old Bridge
- Monmouth County - Manalapan, Marlborough, Aberdeen, Middletown, Red Bank, Long Branch
- Ocean County - Point Pleasant, Long Beach Island

Figure 44. Warehouses, Manufacturing Centers, and Distribution Centers that are not within 10 minutes of a major highway.



6. Safety

6.1 Need - Unsafe Areas for Bicycles and Pedestrians

Background

The NJTPA region encompasses a variety of urban, suburban, and rural areas. The safety needs for these different types of places vary due to differences in activity levels as well as the infrastructure for walking and biking.

In urban areas, the high density and mixed-use development often result in better walkability and more extensive pedestrian and bicycle infrastructure. However, the high volume of traffic and intersections can pose safety risks, necessitating measures such as improved crosswalks, traffic calming, and dedicated bike lanes. Safety concerns in urban contexts include ensuring safe routes to schools and parks, enhancing sidewalk networks, and implementing traffic calming measures to protect pedestrians and cyclists.

Suburban areas, with moderate development density, may have some pedestrian and bicycle facilities, but these are often fragmented and not well-connected. Due to relatively low development density, suburban areas typically have low walkability. The lack of sidewalk networks raises concerns over pedestrian access and safety, particularly for destinations like schools.

Rural areas, with their low development density, face unique challenges in providing safe and accessible pedestrian and bicycle infrastructure. The lack of sidewalks and long distances between destinations can make walking and biking impractical. Safety improvements in rural areas might focus on creating safe routes to key destinations like schools and community centers, and considering alternative transportation options such as shared-use paths and improved signage.

Geographic Level / Focus Place Type

Census Tracts

Performance Measure and Threshold

- Areas with Higher Potential for Biking and Walking - Bicycle trip potential > 80 and Pedestrian trip potential >80
- Areas that are prone to bike/ped crashes –
    - Locations of bike/ ped crashes with
        - At least one fatal crash
        - At least 3 or more serious injury crashes

Data Source – Bicycle and Pedestrian crashes are from the NJDOT Crash Database for a 5-year period between 2019 to 2023.

Data Source: The Bicycle and Pedestrian Trip Potential is based on Trip Potential Analysis from the NJTPA Regional Active Transportation Plan, performed at the census tract level. These scores are used to evaluate the potential for bicycle and pedestrian trips within the NJTPA

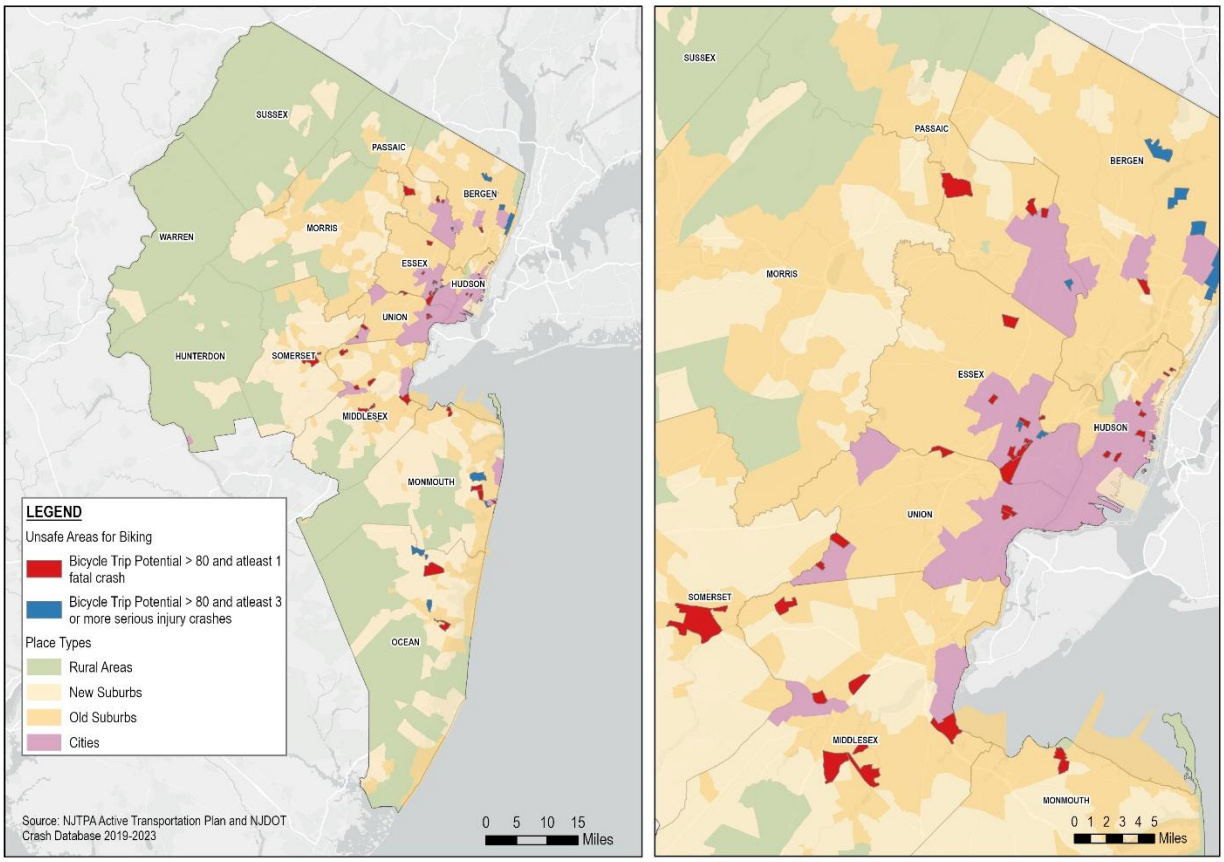
region. The scores are calculated based on factors such as proximity to bus routes, bicycle and pedestrian crashes, and the NJTPA Equity Score.

A trip potential over 80 means that the census tract has a very high potential for bicycle and pedestrian trips.

Areas of Need

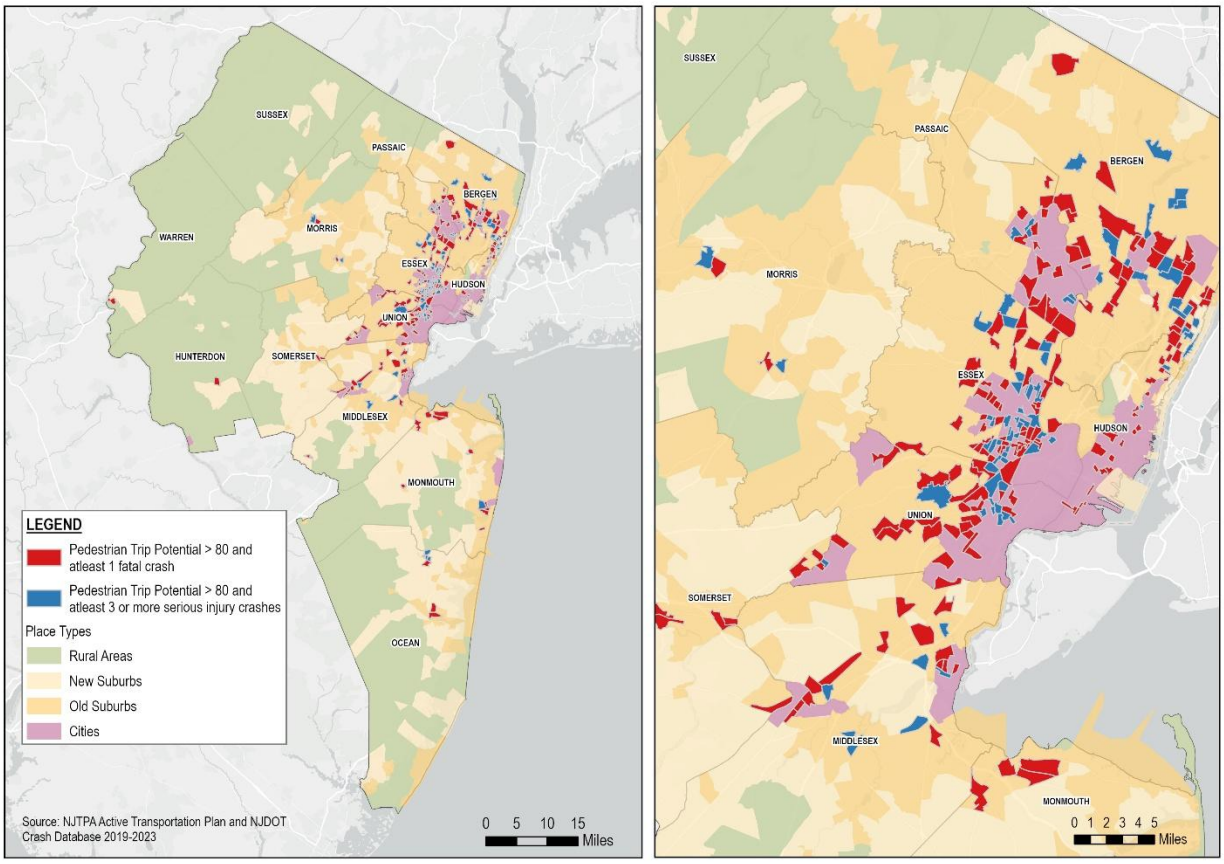
The analysis identified several locations with a high potential for fatal and serious bicycle crashes. These include Jersey City, Union City, and Harrison in Hudson County; Wayne and Prospect Park in Passaic County; Newark in Essex County; Elizabeth in Union County; East Brunswick in Middlesex County; and Lakewood Township in Ocean County.

Figure 45. Potentially unsafe locations for biking



The analysis identified several examples of potential unsafe locations for fatal and serious pedestrian crashes. These include Bayonne, Jersey City, Union City, Harrison, and North Bergen in Hudson County. Wayne, Prospect Park, Paterson, Passaic, and Clifton in Passaic County. Newark, West Orange, and Millburn in Essex County. Elizabeth, Cranford, and Westfield in Union County. East Brunswick, Woodbridge Township, Perth Amboy, and Avenel in Middlesex County. Lakewood Township, Toms River, Neptune Township, and Hazlet in Ocean County. Fort Lee, Teaneck, Hackensack, Westwood, and Ridgewood in Bergen County. Somerville and Bound Brook in Somerset County.

Figure 46. Potentially unsafe locations for walking



Market Characterization Analysis

The census tract areas of need were compared against seven MEMs to better understand which of these communities would benefit. MEMs included:

- Low ranking 2024 MRI scores of 1-100, reflecting unfavorable social, economic, physical, and fiscal conditions,
- High forecasted population growth (750+ gain) in Traffic Analysis Zones (2025–2050),
- High forecasted employment growth (300+ gain) in Traffic Analysis Zones (2025–2050),
- Limited vehicle access by census tract (2019-2023 average: 20% or more households without a car),
- Age of resident population by census tract, (2019-2023 average: 20% or more aged 65 or older),
- Resident population disability status by census tract (2019-2023 average: 14% or more with 1 or more disabilities), and
- Proximity to primary, secondary, or higher education schools (2023 locations, 1/4-mile radius)

Each area of need was evaluated for overlaps across the seven MEM categories. The largest number of MEM overlaps were identified with proximity to school, followed by the MRI, and population growth.

The municipalities with highest potential for fatal and serious pedestrian and bicycle crashes included a large number of dense cities and towns (Newark, Jersey City, Elizabeth, Paterson, West New York, East Orange, Clifton, Hackensack, Irvington, and North Bergen), as well as several suburban communities (Plainfield, Lakewood, and Teaneck) poised for population and employment growth in the years ahead. These communities have a large number of schools and are ranked low in the MRI index, resulting in large numbers of overlaps across most of the MEMs.

The table below highlights the top areas of need based on the number of overlaps with MEMs. For pedestrian safety, several areas in Newark, Jersey City, North Bergen, West New York, Hackensack, and Paterson ranked as top areas of need. Of particular concern is that the majority of these areas are located near schools and also have relatively high shares of disabled and/or elderly residents, all of whom are particularly vulnerable to traffic accidents.

Similarly, for bicycle safety, several of the same neighborhoods were identified, including Tracts 48.02, 67, and 79 in Newark, Tract 311 in Elizabeth, and Tract 1808 in Paterson. Additional high-need neighborhoods for bicyclist safety were found in Jersey City, North Bergen, and West New York.

Table 12. Top areas of need by type and number of MEM overlaps

Census Tract Areas of Need	Total Overlaps	MRI	Pop Growth	Emp Growth	Limited Vehicle Access	Age 65+	Disability Status	Proximity to Schools
Unsafe Areas for Pedestrians: 1+ Fatal Crashes								
Tract 48.02, Newark, Essex County	6	Y	Y	Y	Y	N	Y	Y
Tract 67, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 81, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 30, Jersey City, Hudson County	6	Y	Y	Y	Y	Y	N	Y
Tract 58.01, Jersey City, Hudson County	6	Y	Y	Y	Y	N	Y	Y
Tract 141.02, North Bergen, Hudson County	6	Y	Y	N	Y	Y	Y	Y
Tract 158.02, West New York, Hudson County	6	Y	Y	N	Y	Y	Y	Y
Tract 1832, Paterson, Passaic County	6	Y	N	Y	Y	Y	Y	Y
Tract 19, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 78, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 87, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 92, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 124, Irvington, Essex County	5	Y	N	N	Y	Y	Y	Y
Tract 228, Newark, Essex County	5	Y	N	N	Y	Y	Y	Y
Tract 5, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 13, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 14, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 17.01, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y

Census Tract Areas of Need	Total Overlaps	MRI	Pop Growth	Emp Growth	Limited Vehicle Access	Age 65+	Disability Status	Proximity to Schools
Tract 27, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 60, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 155, West New York, Hudson County	5	Y	Y	N	Y	N	Y	Y
Tract 1808, Paterson, Passaic County	5	Y	Y	N	Y	N	Y	Y
Tract 1829, Paterson, Passaic County	5	Y	Y	Y	Y	N	N	Y
Unsafe Areas for Pedestrians: 3+ Serious Injury Crashes								
Tract 48.02, Newark, Essex County	6	Y	Y	Y	Y	N	Y	Y
Tract 67, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 73, Newark, Essex County	6	Y	Y	Y	Y	N	Y	Y
Tract 81, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 1832, Paterson, Passaic County	6	Y	N	Y	Y	Y	Y	Y
Tract 236.02, Hackensack, Bergen County	5	N	Y	Y	Y	N	Y	Y
Tract 9, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 18, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 19, Newark, Essex County	5	Y	Y	N	Y	N	Y	Y
Tract 79, Newark, Essex County	5	Y	N	Y	Y	N	Y	Y
Tract 228, Newark, Essex County	5	Y	N	N	Y	Y	Y	Y
Tract 60, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 324, West New York, Hudson County	5	Y	Y	N	Y	N	Y	Y
Tract 311, Elizabeth, Union County	5	Y	Y	N	Y	N	Y	Y
Tract 399, Elizabeth, Union County	5	Y	Y	Y	Y	N	N	Y
Unsafe Areas for Bicyclists: 1+ Fatal Crashes								
Tract 48.02, Newark, Essex County	6	Y	Y	Y	Y	N	Y	Y
Tract 67, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 79, Newark, Essex County	5	Y	N	Y	Y	N	Y	Y
Tract 49, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 78, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 149, North Bergen, Hudson County	5	Y	Y	N	Y	N	Y	Y
Tract 157, West New York, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 1808, Paterson, Passaic County	5	Y	Y	N	Y	N	Y	Y
Tract 311, Elizabeth, Union County	5	Y	Y	N	Y	N	Y	Y
Unsafe Areas for Bicyclists: 3+ Serious Injury Crashes								
Tract 48.02, Newark, Essex County	6	Y	Y	Y	Y	N	Y	Y
Tract 67, Newark, Essex County	6	Y	N	Y	Y	Y	Y	Y
Tract 79, Newark, Essex County	5	Y	N	Y	Y	N	Y	Y
Tract 49, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 78, Jersey City, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 149, North Bergen, Hudson County	5	Y	Y	N	Y	N	Y	Y
Tract 157, West New York, Hudson County	5	Y	Y	Y	Y	N	N	Y
Tract 1808, Paterson, Passaic County	5	Y	Y	N	Y	N	Y	Y
Tract 311, Elizabeth, Union County	5	Y	Y	N	Y	N	Y	Y

Figure 47. Potentially unsafe locations for walking versus proximity to schools

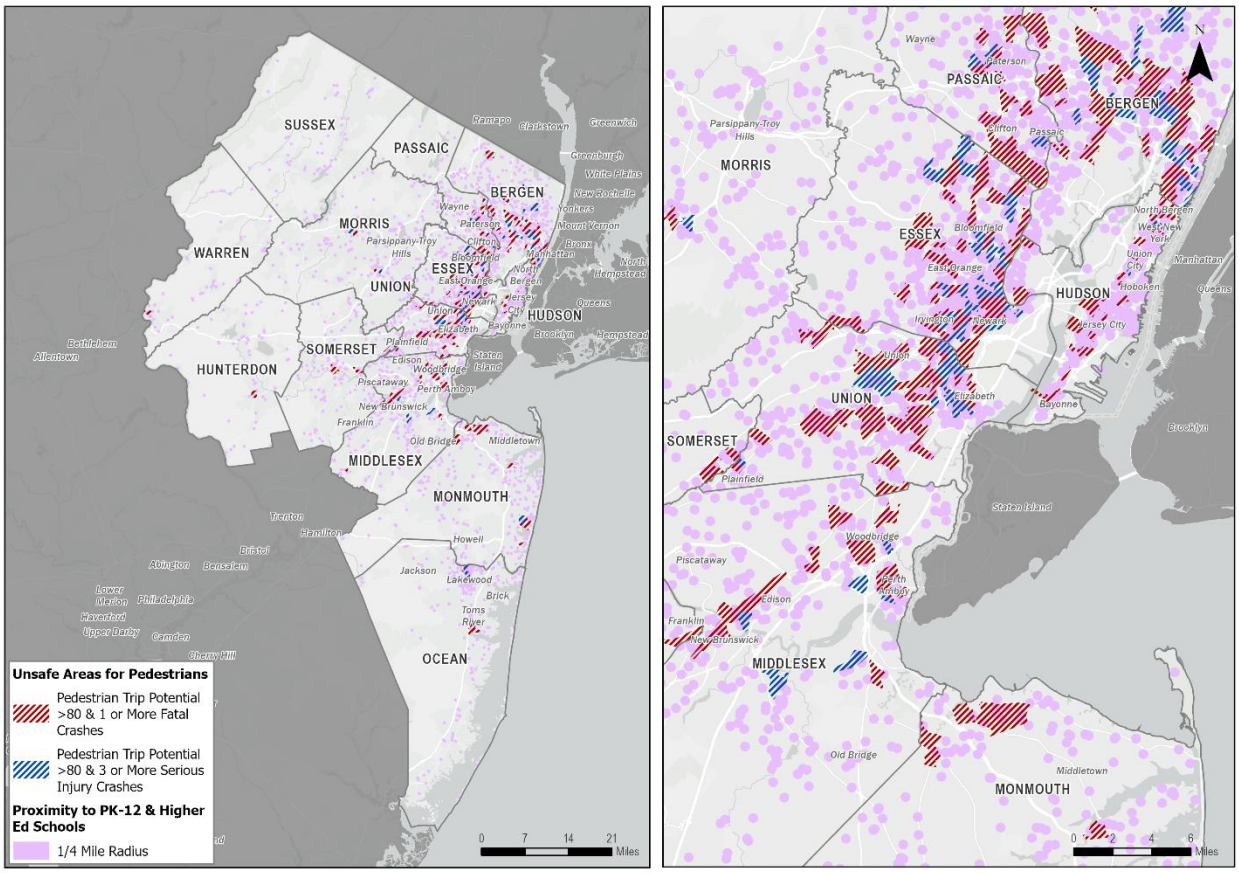


Figure 48. Potentially unsafe locations for walking versus the Revitalization Index, 2024

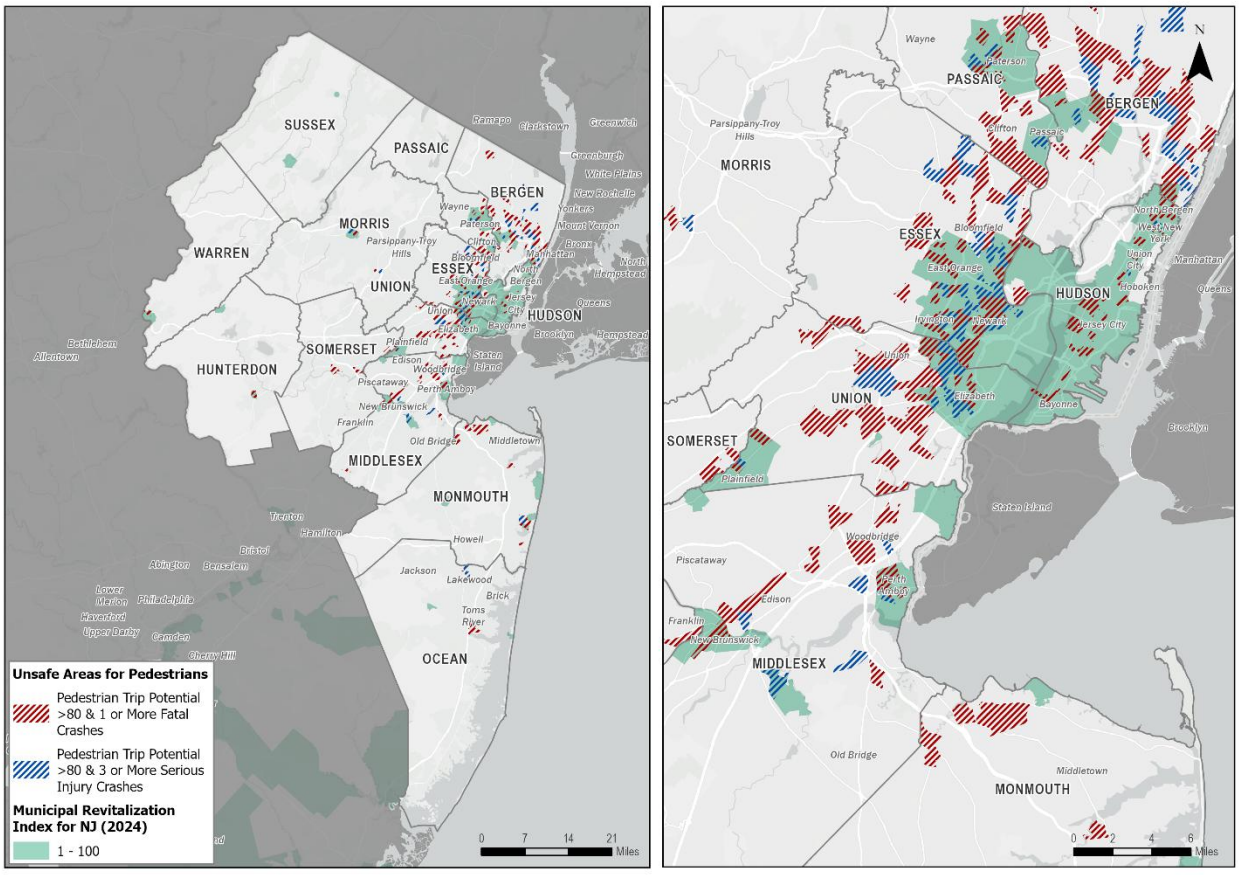


Figure 49. Potentially unsafe locations for biking versus proximity to schools

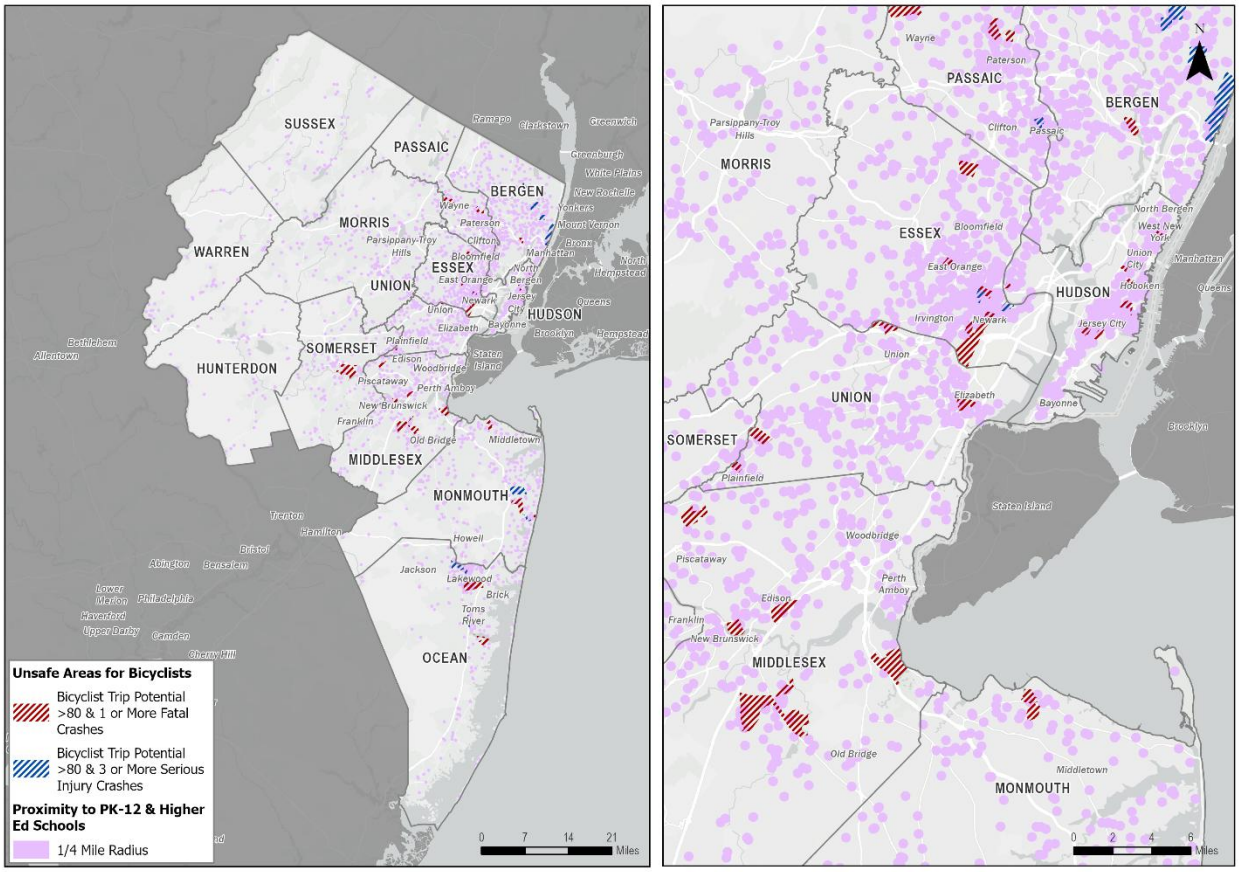
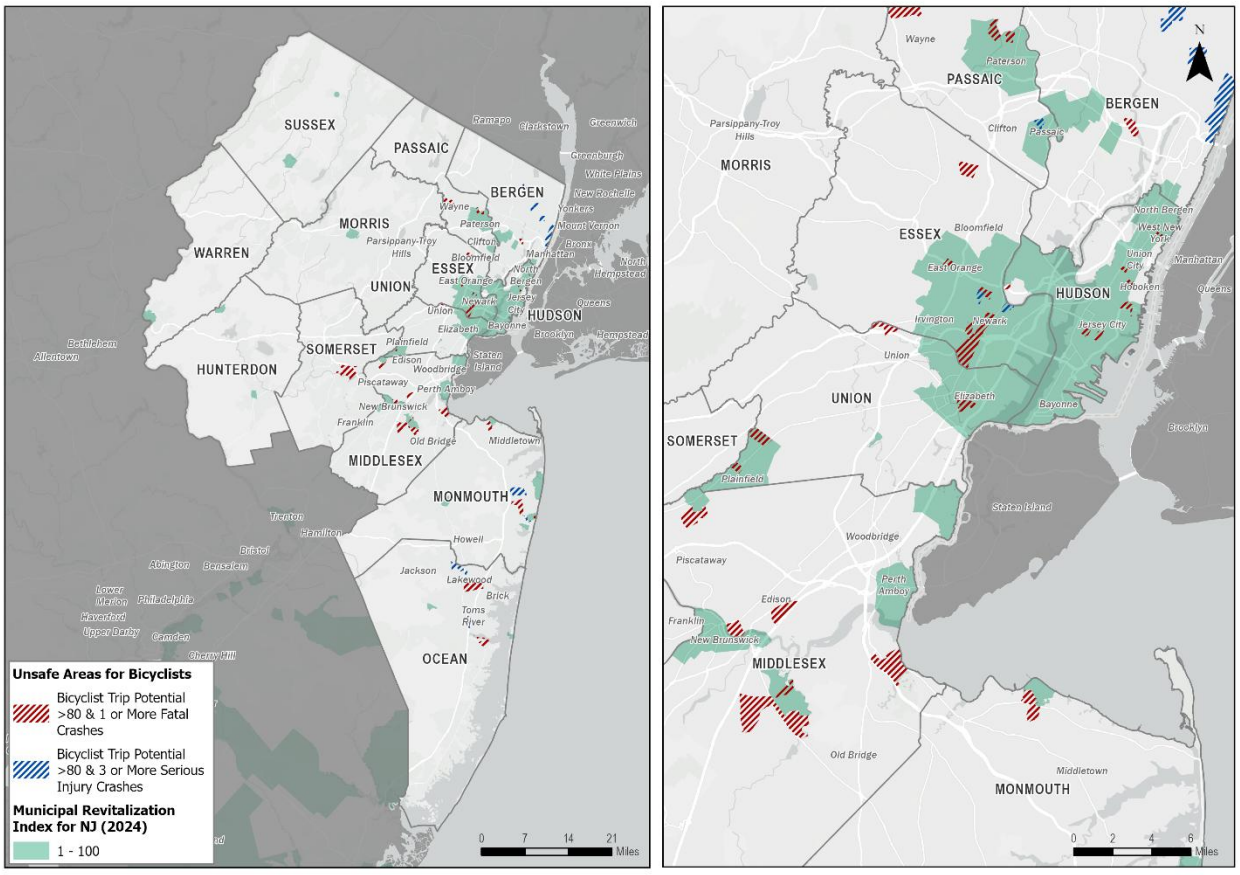


Figure 50. Potentially unsafe locations for biking versus the Revitalization Index, 2024



Additional maps of MEM relationships relative to vehicle access and population growth are included in the Appendix of this report.

6.2 Need - Automobile Crash Hotspots

Background

Automobile crashes have a substantial adverse effect on society, resulting in fatalities, injuries, economic costs, traffic disruptions, and supply chain interruptions. An analysis of automobile crashes was conducted using the NJTPA crash database for the years 2019 to 2023 to identify hotspots on roadways and highways in northern New Jersey.

Geographic Level / Focus Place Type:

Roadways and Highways in Northern New Jersey

Performance Measure

Crashes involving Automobiles.

Data Source: Automobile crashes are from the NJDOT Crash Database for 5 years, from 2019 to 2023.

Threshold

Top 20 Corridors in the Northern New Jersey Region with the highest number of crashes

Areas of Need

Based on the location of the crashes, the top corridors with the highest number of crashes were identified in the North Jersey region. Table 13 shows the top 20 locations with automobile crashes. Figure 51 shows the locations of hotspots for automobile crashes.

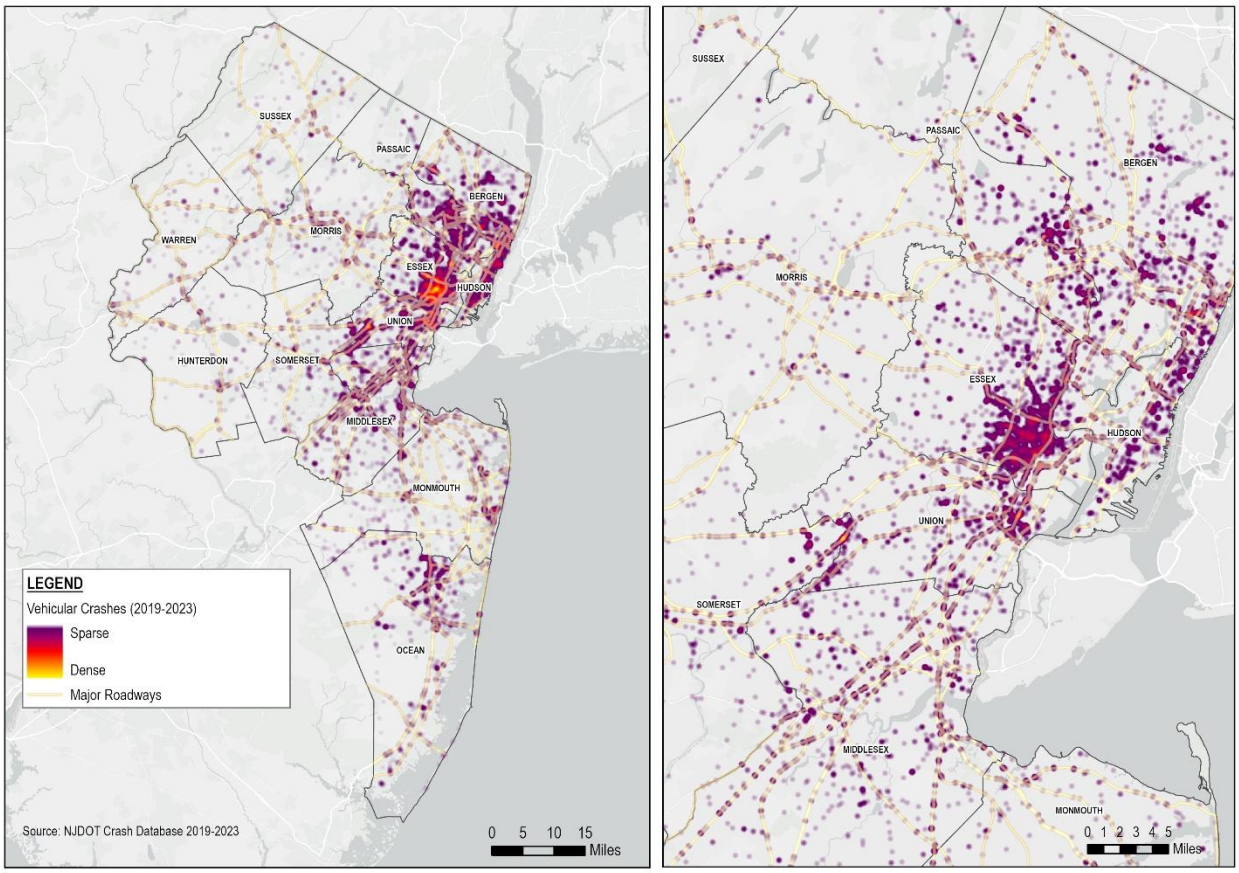
US 1 and US 9 are major thoroughfares carrying a substantial volume of automobile traffic. They serve as popular alternatives for north-south travel within the region, offering a toll-free option. These highways feature numerous signalized intersections that provide access to crossroads, commercial establishments, and residential areas along their corridors. Consequently, these intersections have contributed to an increased number of vehicular accidents on these routes. The Garden State Parkway experiences high traffic during peak periods and weekends, leading to more crashes. The I-95 NJ Turnpike is one of the busiest highways with heavy commercial traffic. I-80 and I-78 have high speed limits and heavy truck traffic, contributing to frequent crashes. US 22, NJ 27, NJ 35, and US 46 all have dense traffic and numerous intersections, increasing the likelihood of accidents.

Table 13. Top 20 Corridors with Automobile Crashes

Rank	Top 20 Corridors with Automobile Crashes	Number of Crashes (2019 – 2023)
1	US 1	367
2	Garden State Parkway	277
3	US 9	212
4	US 22	187
5	I-80	170
6	I-95 N J Turnpike	170
7	NJ 27	158
8	NJ 35	157
9	US 46	154
10	I-78	149
11	NJ 21	123
12	ROUTE 527	104
13	I-287	99
14	ROUTE 501	92
15	NJ 17	91
16	NJ 23	83
17	ROUTE 510	83

18	US 202	83
19	ROUTE 508	75
20	NJ 70	74

Figure 51. Automobile Crash Hotspots in the region.



APPENDIX OF ADDITIONAL MAPS DEVELOPED

1.1 Need - Less than appropriate accessibility based on place type.

Figure 52. Number of jobs accessible within 30 minutes by driving

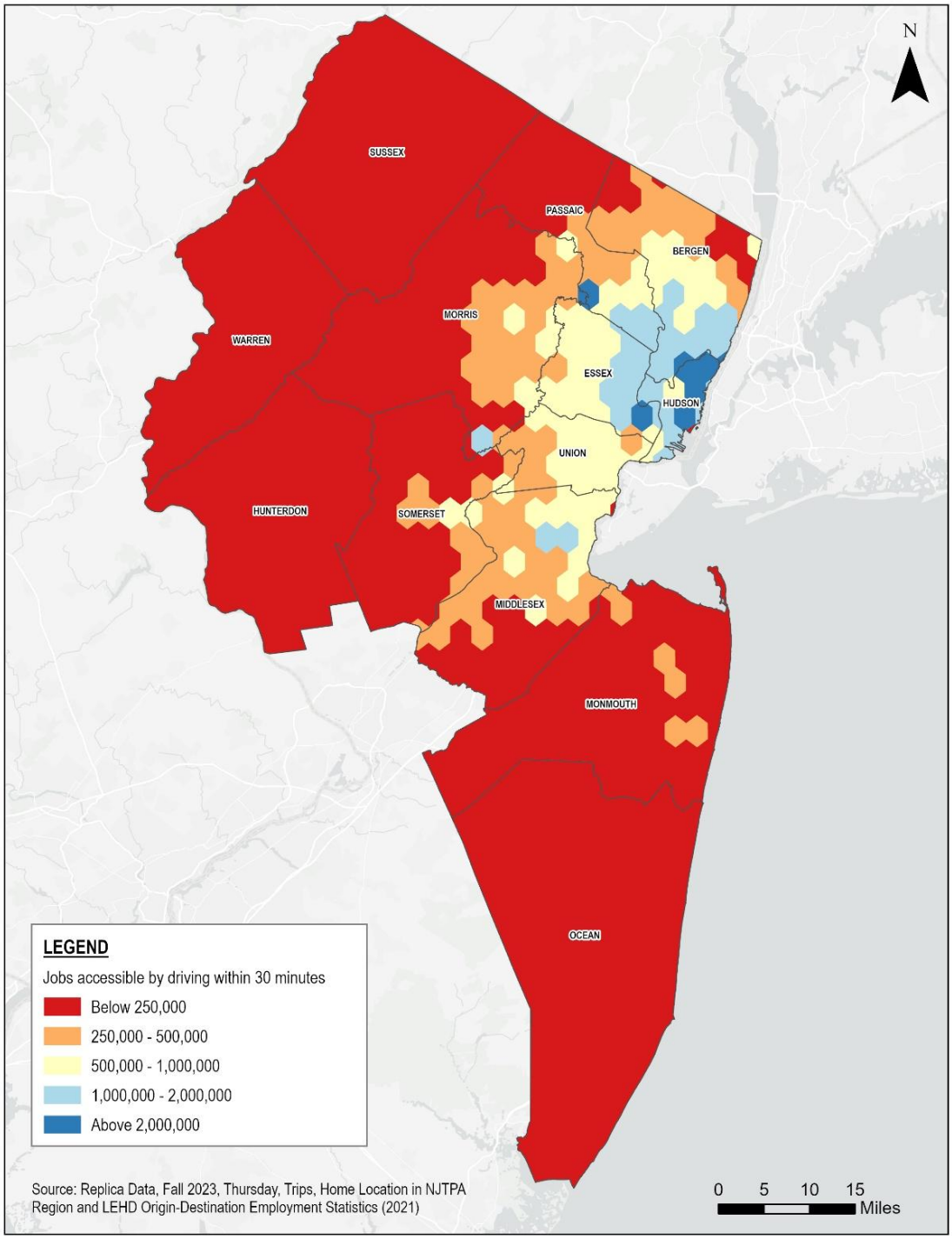


Figure 53. Number of jobs accessible within 60 minutes by driving

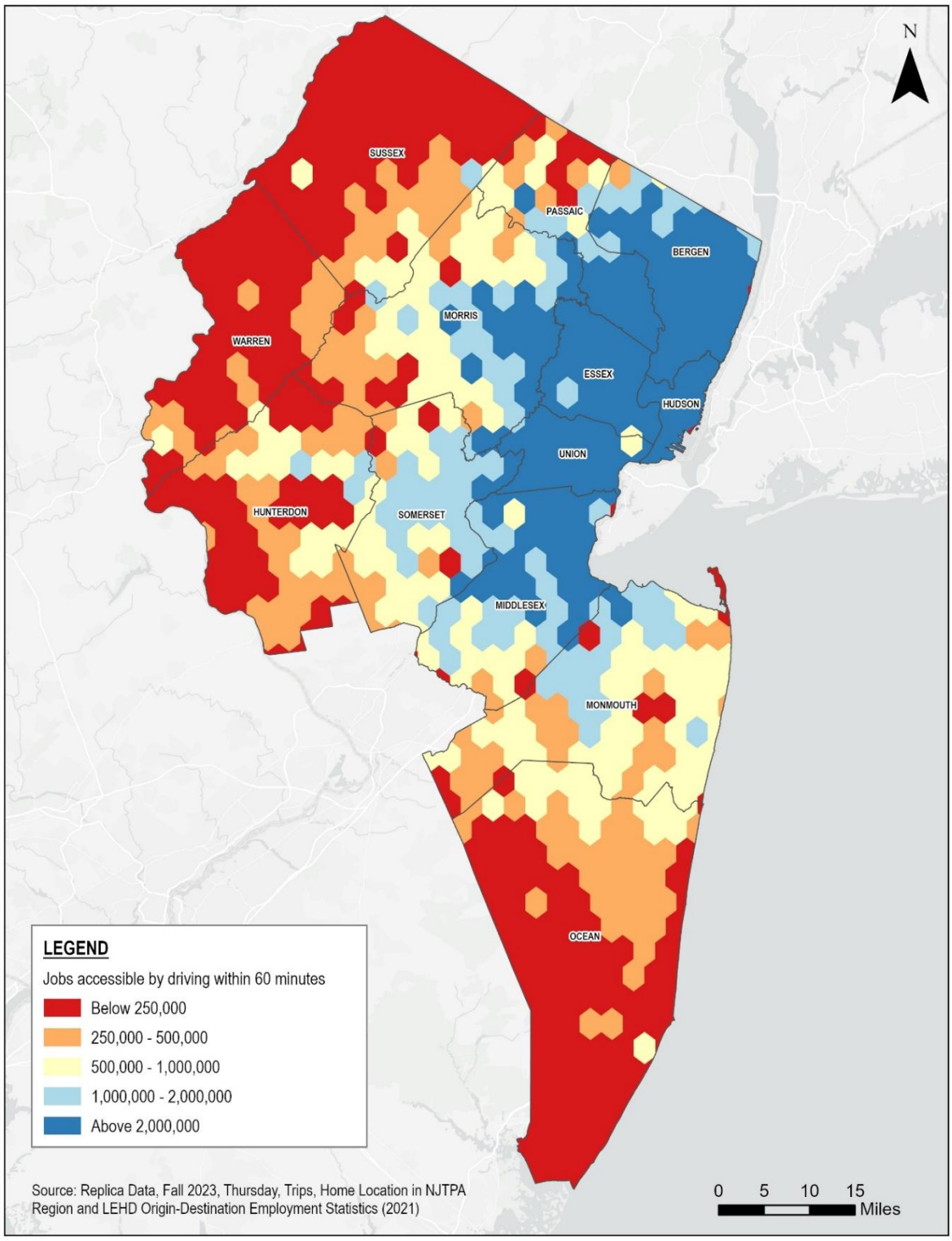


Figure 54. Number of jobs accessible within 30 minutes by transit

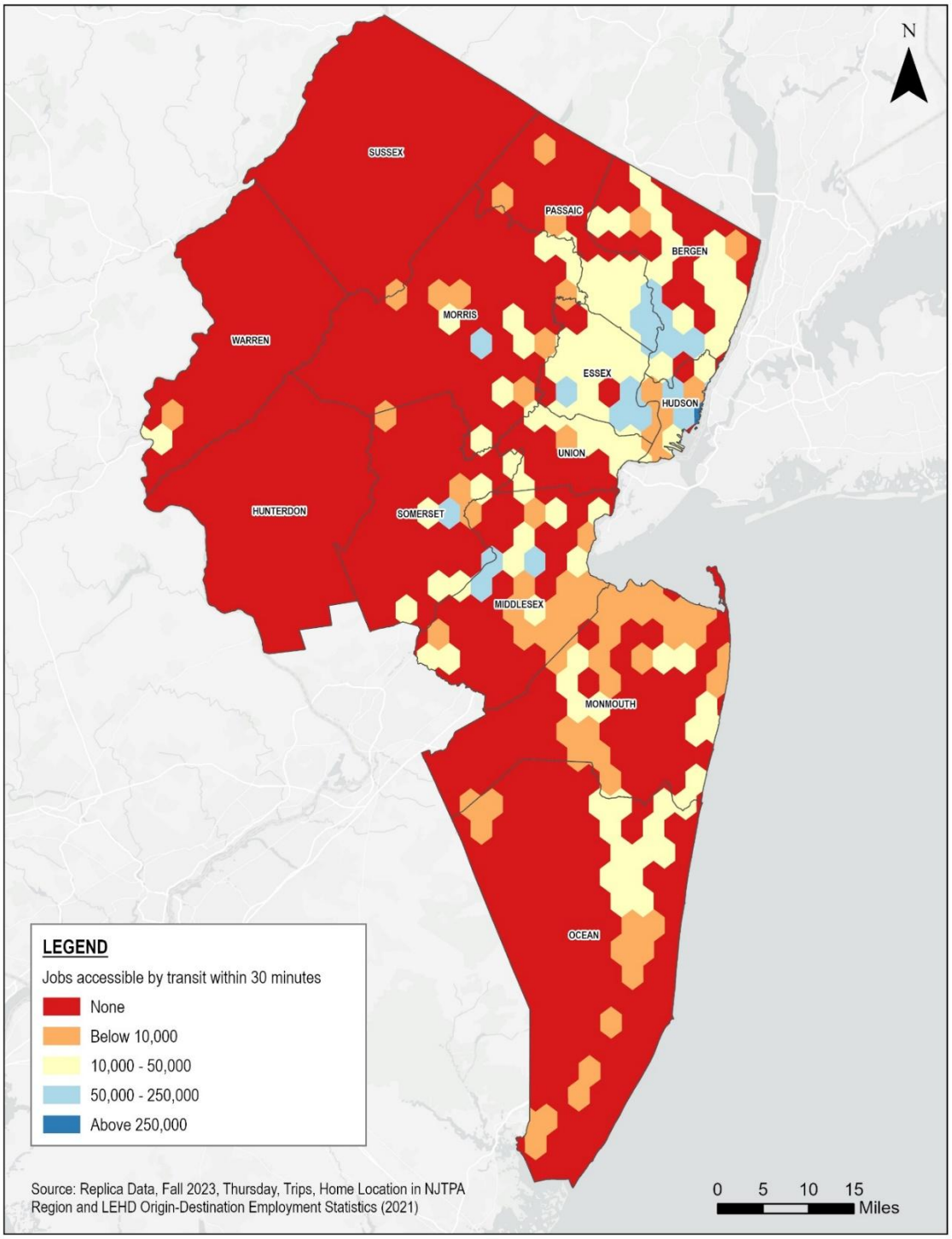
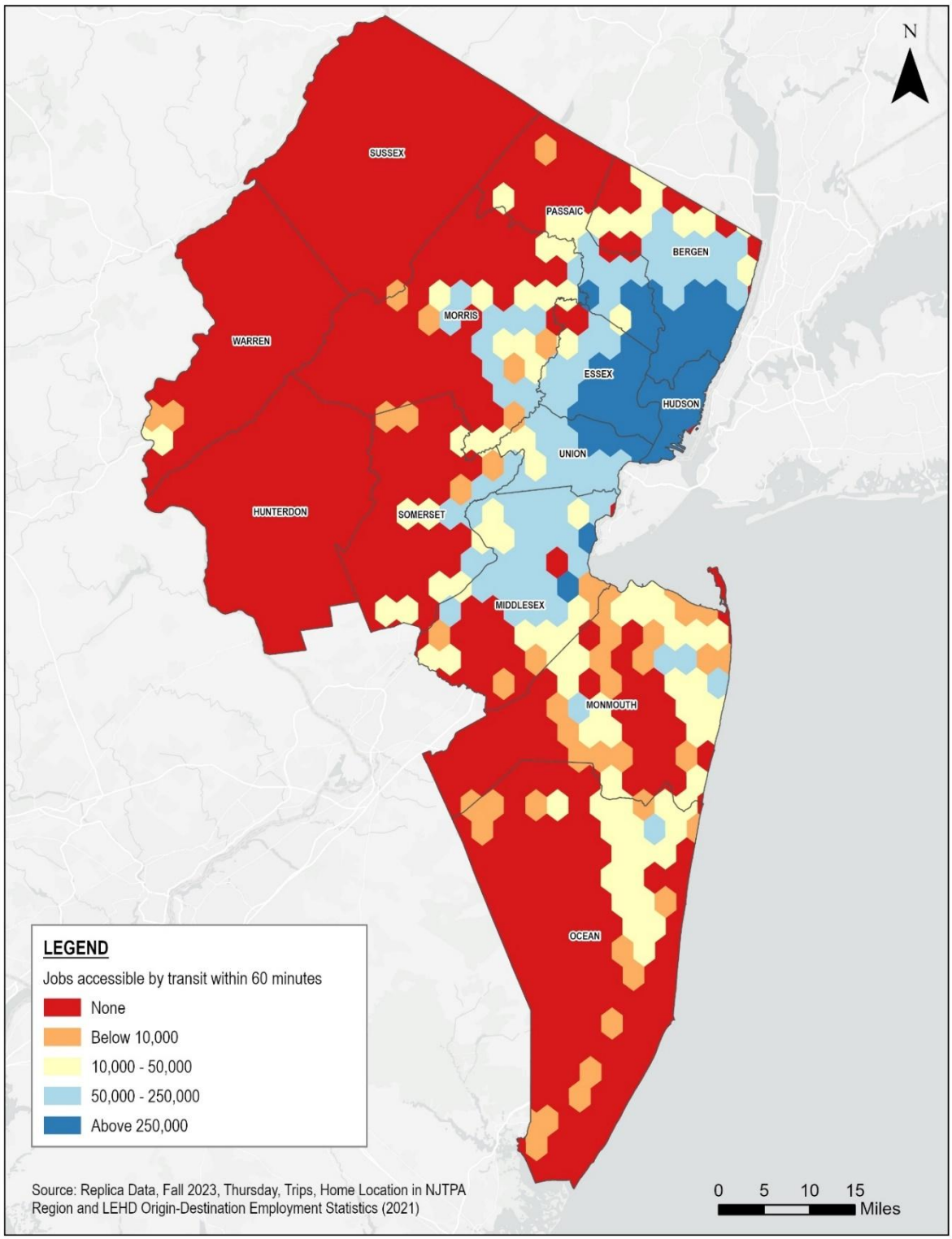


Figure 55. Number of jobs accessible within 60 minutes by transit



1.2 Need - Addressing the balance between low-income worker residences and low-wage job locations, considering lengthy commutes.

Figure 56. Census tracts with transit commute times exceeding 60 minutes, where there is a significant disparity between the locations of low-income workers and job opportunities versus TAZ population growth, 2025-2050

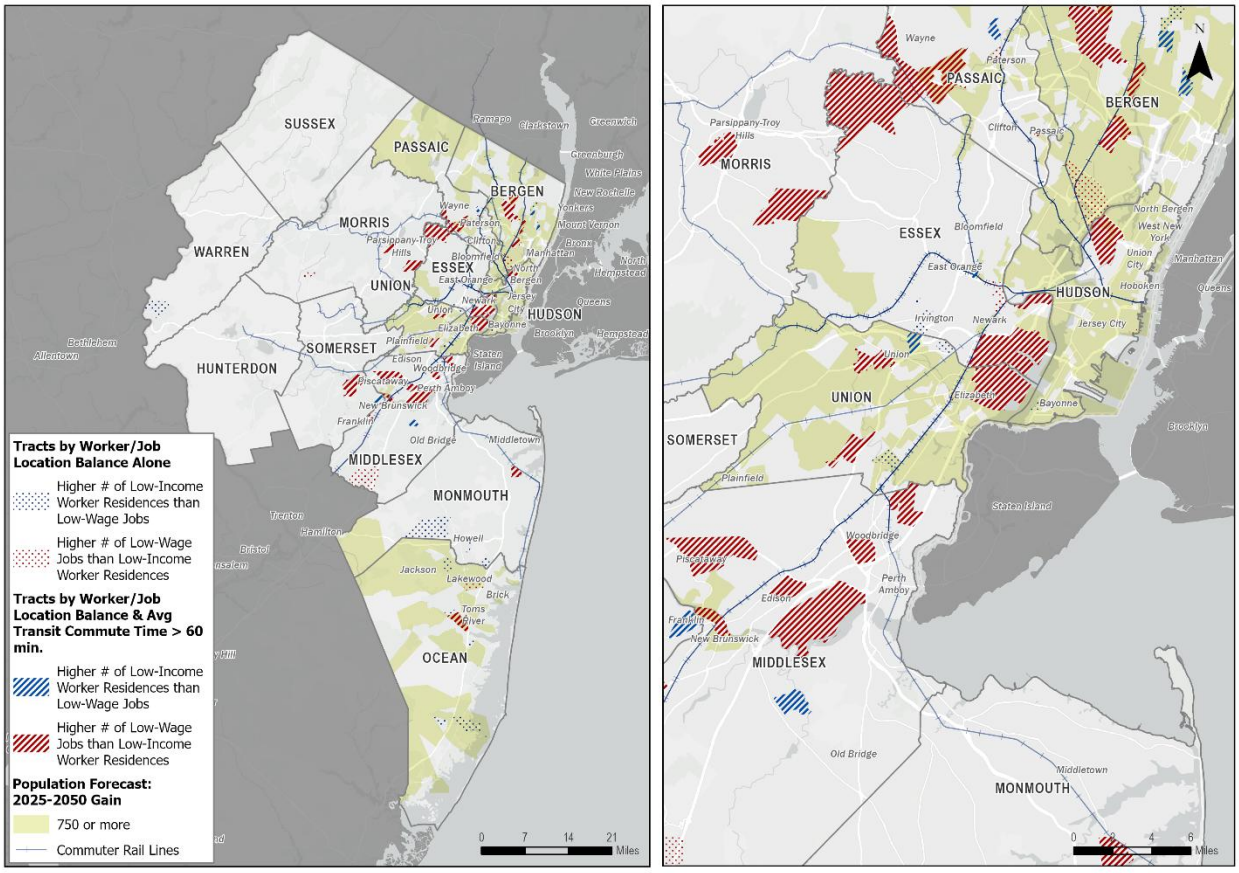
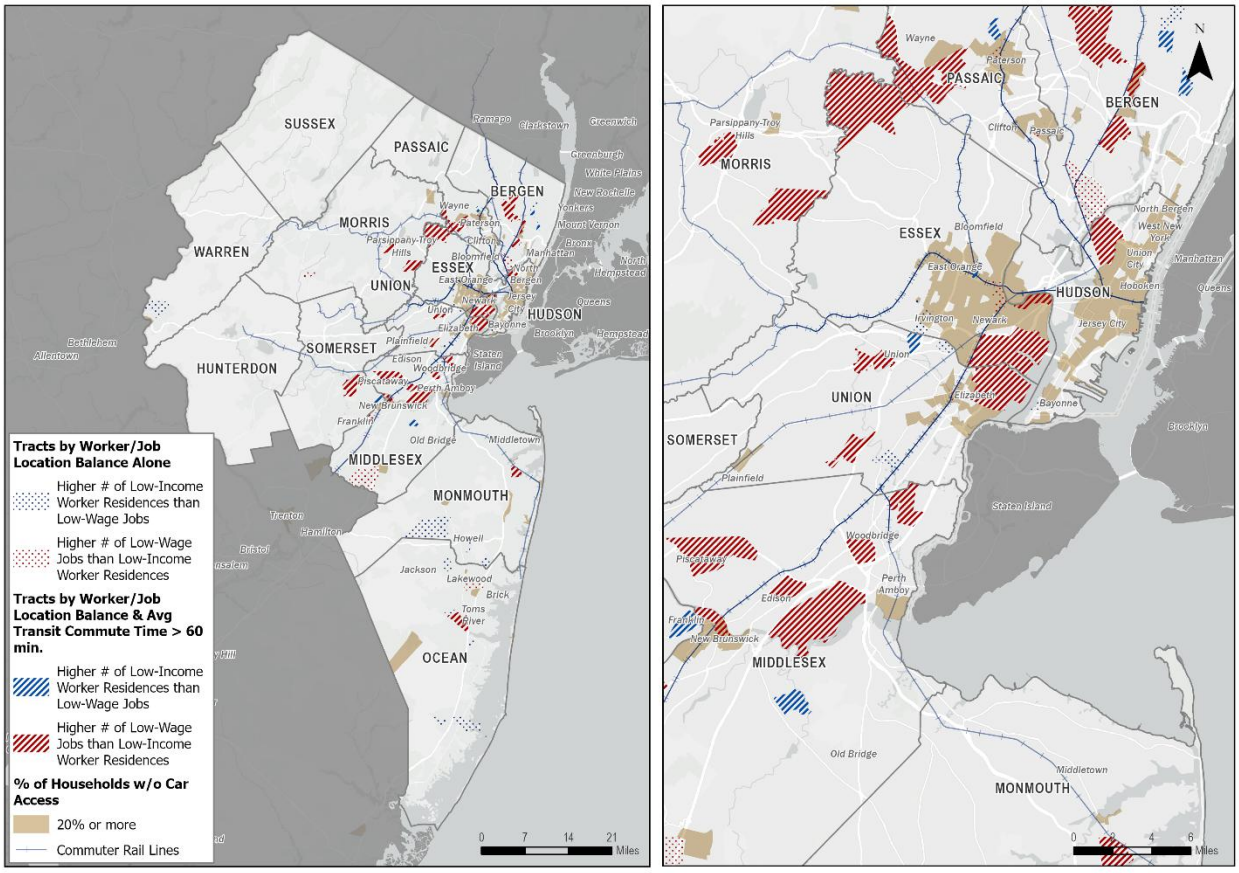


Figure 57. Census tracts with transit commute times exceeding 60 minutes, where there is a significant disparity between the locations of low-income workers and job opportunities, versus limited vehicle access



2.5 Need - Longer Commute Times for Transit Alternatives

Table 14. Census Tract pairs with Significant commuters driving, but Transit isn't a viable option (Based on Replica modeled trip data for a typical Thursday of fall 2023)

Census Tract Pairs	Origin Tract	Destination Tract	Average Distance between Tracts	Number of Commuters driving
34025801600+34025808600	8016 (Monmouth, NJ)	8086 (Monmouth, NJ)	22.55120643	373
34027041701+34027041902	417.01 (Morris, NJ)	419.02 (Morris, NJ)	8.735454545	330
34003031300+34003042500	313 (Bergen, NJ)	425 (Bergen, NJ)	11.59402985	268
34003025200+34003054500	252 (Bergen, NJ)	545 (Bergen, NJ)	5.836470588	255

34029735001+34029735104	7350.01 (Ocean, NJ)	7351.04 (Ocean, NJ)	5.839568345	417
34029713203+34025808701	7132.03 (Ocean, NJ)	8087.01 (Monmouth, NJ)	5.832806324	253
34039038400+34035053501	384 (Union, NJ)	535.01 (Somerset, NJ)	13.15921569	255
34023007103+34023008206	71.03 (Middlesex, NJ)	82.06 (Middlesex, NJ)	15.62761905	315
34027042200+34013015100	422 (Morris, NJ)	151 (Essex, NJ)	19.81226054	261
34035054100+34039037602	541 (Somerset, NJ)	376.02 (Union, NJ)	19.68097015	268
34037374500+34027046500	3745 (Sussex, NJ)	465 (Morris, NJ)	11.73127413	259
34019010100+34035050802	101 (Hunterdon, NJ)	508.02 (Somerset, NJ)	15.89003021	331
34041031500+34019011301	315 (Warren, NJ)	113.01 (Hunterdon, NJ)	26.64223108	251

Table 15. Census Tract pairs with uncompetitive Transit option (Longer Transit Commute times compared to Auto Commute times) (Based on Replica modeled trip data for a typical Thursday of fall 2023)

Census Tract Pairs	Origin Tract	Destination Tract	Average Transit Trip Time (Mins)	Average Drive Trip Time (Mins)	Transit / Auto Trip Time Ratio
34013007700+36085032300	77 (Essex, NJ)	323 (Richmond, NY)	113.7	23.6	4.8
34003019202+36061020300	192.02 (Bergen, NJ)	203 (New York, NY)	56.2	13.0	4.3
34025810900+34025805100	8109 (Monmouth, NJ)	8051 (Monmouth, NJ)	114.4	26.9	4.3
34013006800+34039035200	68 (Essex, NJ)	352 (Union, NJ)	67.6	16.6	4.1

Census Tract Pairs	Origin Tract	Destination Tract	Average Transit Trip Time (Mins)	Average Drive Trip Time (Mins)	Transit / Auto Trip Time Ratio
34013012900+34039033000	129 (Essex, NJ)	330 (Union, NJ)	49.4	12.1	4.1
34013006800+34039980000	68 (Essex, NJ)	9800 (Union, NJ)	55.5	14.3	3.9
34031180900+34003042500	1809 (Passaic, NJ)	425 (Bergen, NJ)	60.1	15.8	3.8
34013012700+34039035800	127 (Essex, NJ)	358 (Union, NJ)	85.5	23.1	3.7
34023006002+34023006605	60.02 (Middlesex, NJ)	66.05 (Middlesex, NJ)	63.5	17.3	3.7
34013004500+34013020000	45 (Essex, NJ)	200 (Essex, NJ)	71.7	19.7	3.6
34003019303+34003015200	193.03 (Bergen, NJ)	152 (Bergen, NJ)	63.9	17.8	3.6
34017015900+34003060001	159 (Hudson, NJ)	600.01 (Bergen, NJ)	77.2	21.8	3.5
34013021400+34013018600	214 (Essex, NJ)	186 (Essex, NJ)	72.8	20.7	3.5
34039037601+34013021702	376.01 (Union, NJ)	217.02 (Essex, NJ)	119.9	34.2	3.5
34003055100+36061029900	551 (Bergen, NJ)	299 (New York, NY)	87.2	25.0	3.5
34003019305+36061020300	193.05 (Bergen, NJ)	203 (New York, NY)	57.0	17.0	3.4
34013007900+34039038300	79 (Essex, NJ)	383 (Union, NJ)	80.0	24.4	3.3

Census Tract Pairs	Origin Tract	Destination Tract	Average Transit Trip Time (Mins)	Average Drive Trip Time (Mins)	Transit / Auto Trip Time Ratio
34003018101+34003052100	181.01 (Bergen, NJ)	521 (Bergen, NJ)	79.1	24.4	3.2
34013011600+34013020000	116 (Essex, NJ)	200 (Essex, NJ)	75.6	23.9	3.2
34013005000+34003045200	50 (Essex, NJ)	452 (Bergen, NJ)	99.9	31.8	3.1
34017002800+36061001300	28 (Hudson, NJ)	13 (New York, NY)	40.4	13.0	3.1
34013009400+34003015200	94 (Essex, NJ)	152 (Bergen, NJ)	115.6	37.5	3.1
34031175200+34003042500	1752 (Passaic, NJ)	425 (Bergen, NJ)	49.8	16.4	3.0
34013018800+36061003100	188 (Essex, NJ)	31 (New York, NY)	72.8	24.0	3.0

2.7 Strategy - Suitable locations to Expand/Enhance Transit Service or Transit Options

Criteria 1: Locations with high transit scores but no access to high-frequency transit

Figure 58. Census tracts with high transit scores but no access to high-frequency transit versus TAZ population growth, 2025-2050

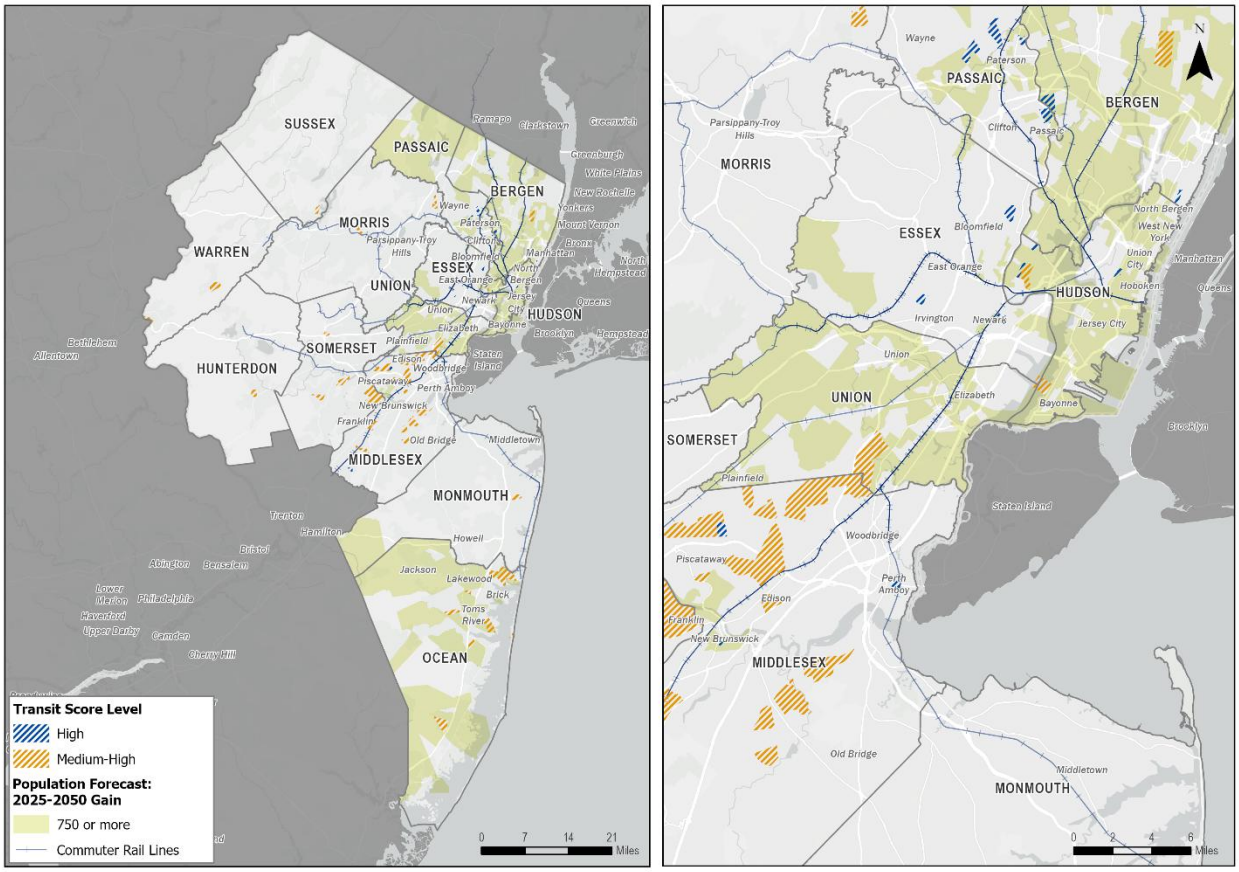


Figure 59. Census tracts with high transit scores but no access to high-frequency transit versus TAZ employment growth, 2025-2050

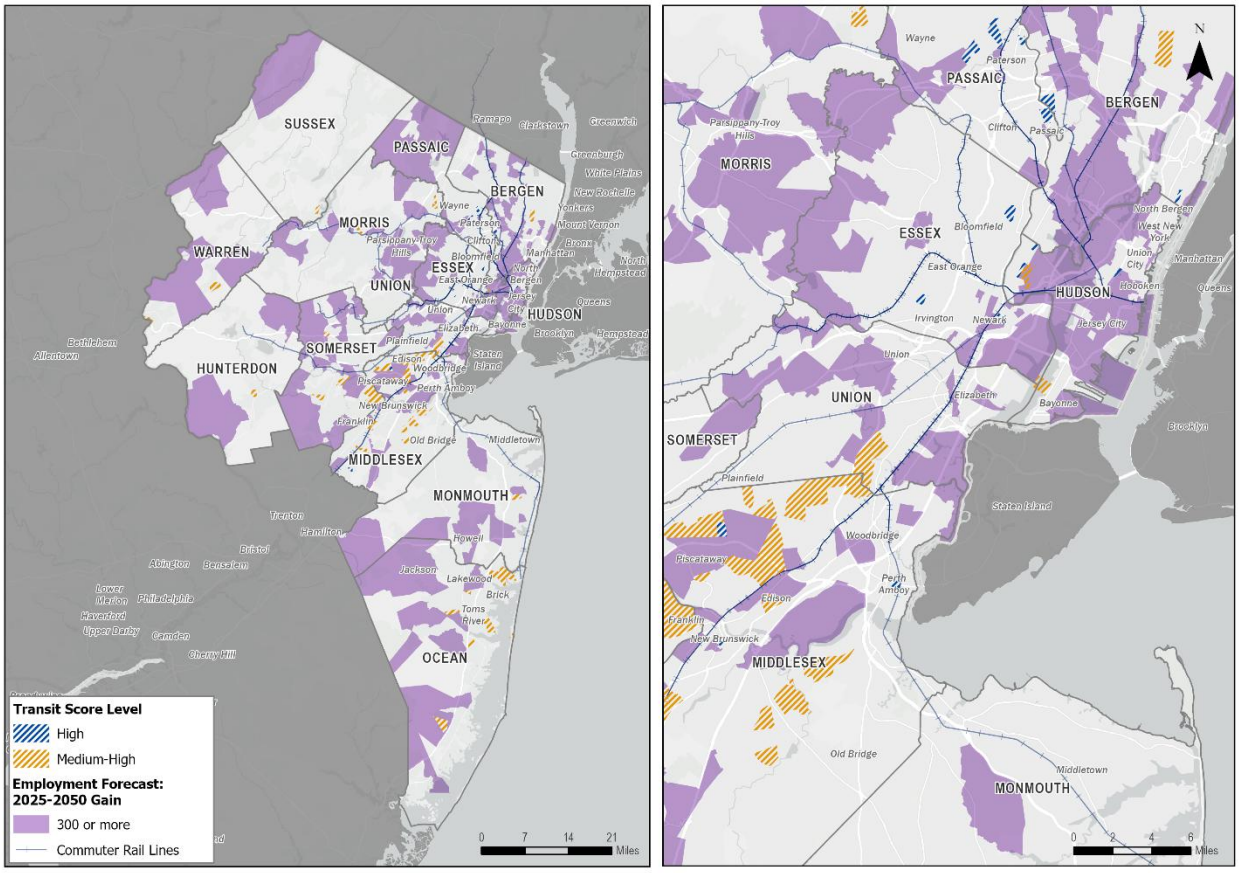
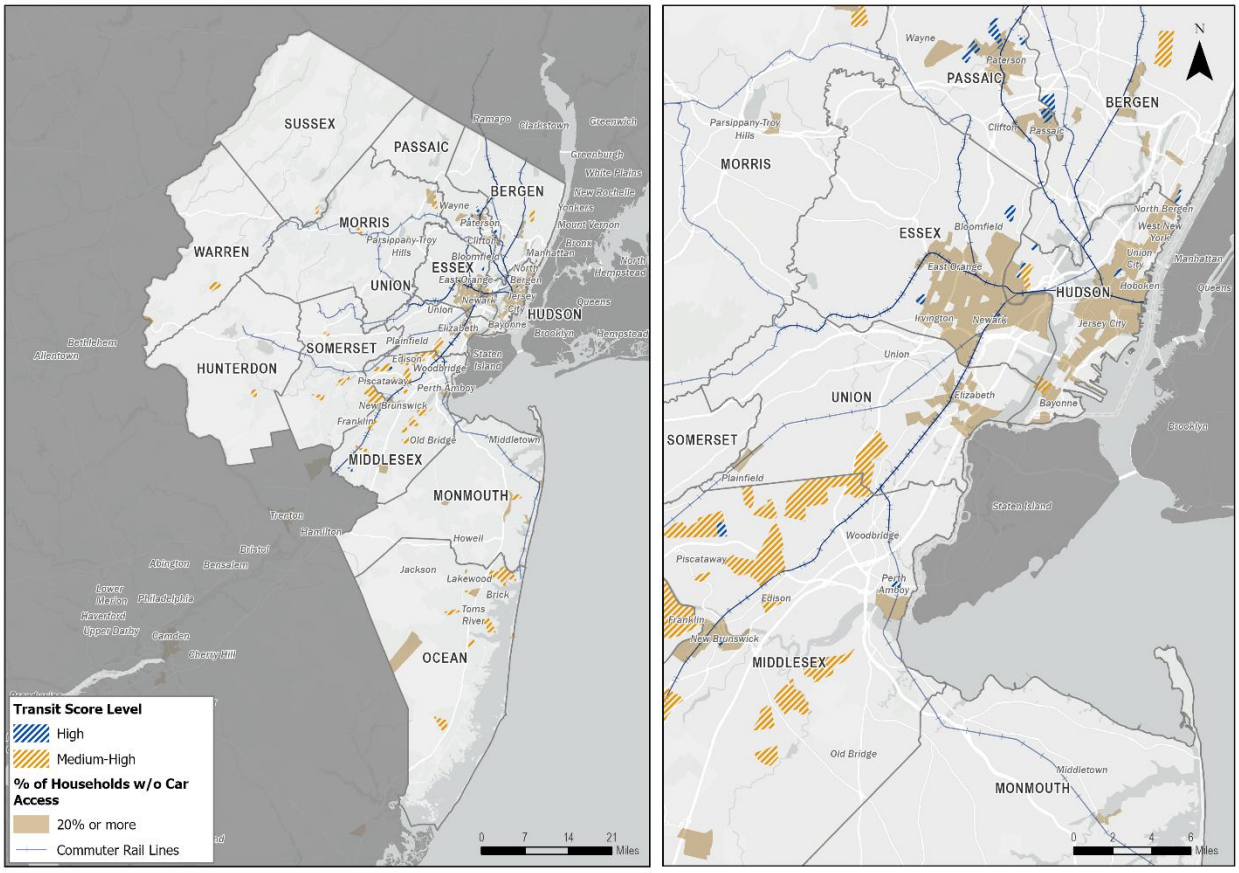


Figure 60. Census tracts with high transit scores but no access to high-frequency transit versus tracts by the share of households without access to a vehicle, 2023



Criteria 3: Locations with high disparity between the number of low-income workers and low-wage jobs without having access to a transit node within half a mile.

Figure 61. Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile versus the Revitalization Index, 2024

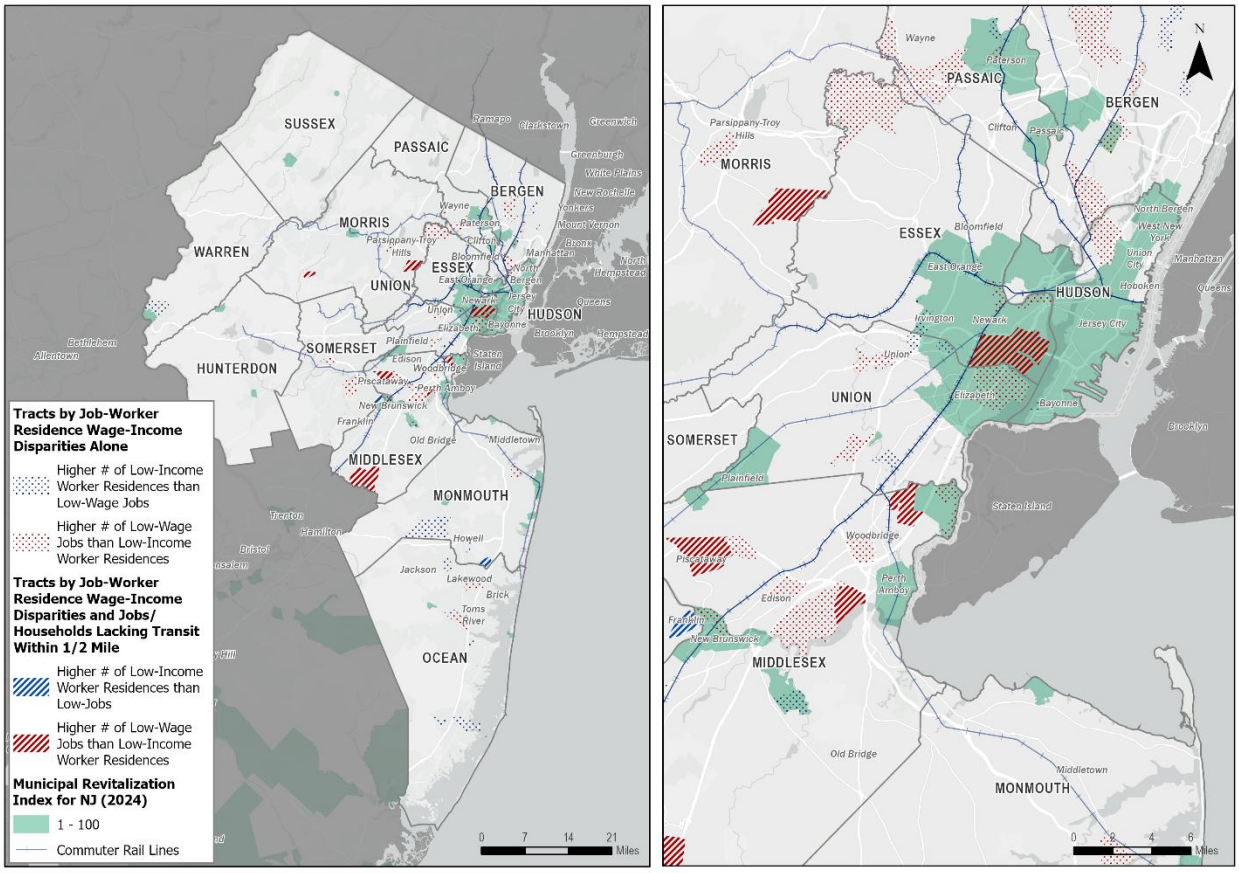


Figure 62. Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile versus TAZ population growth, 2025-2050

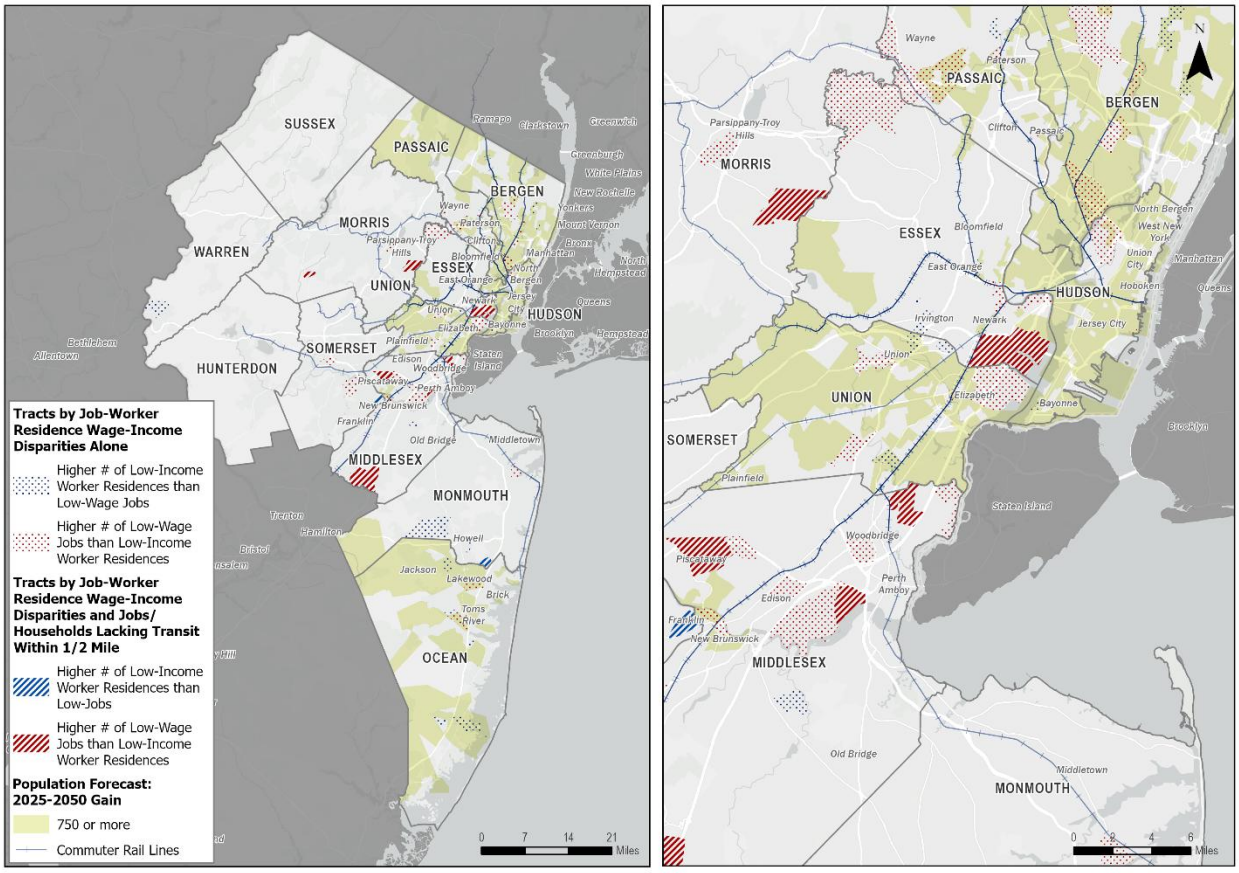
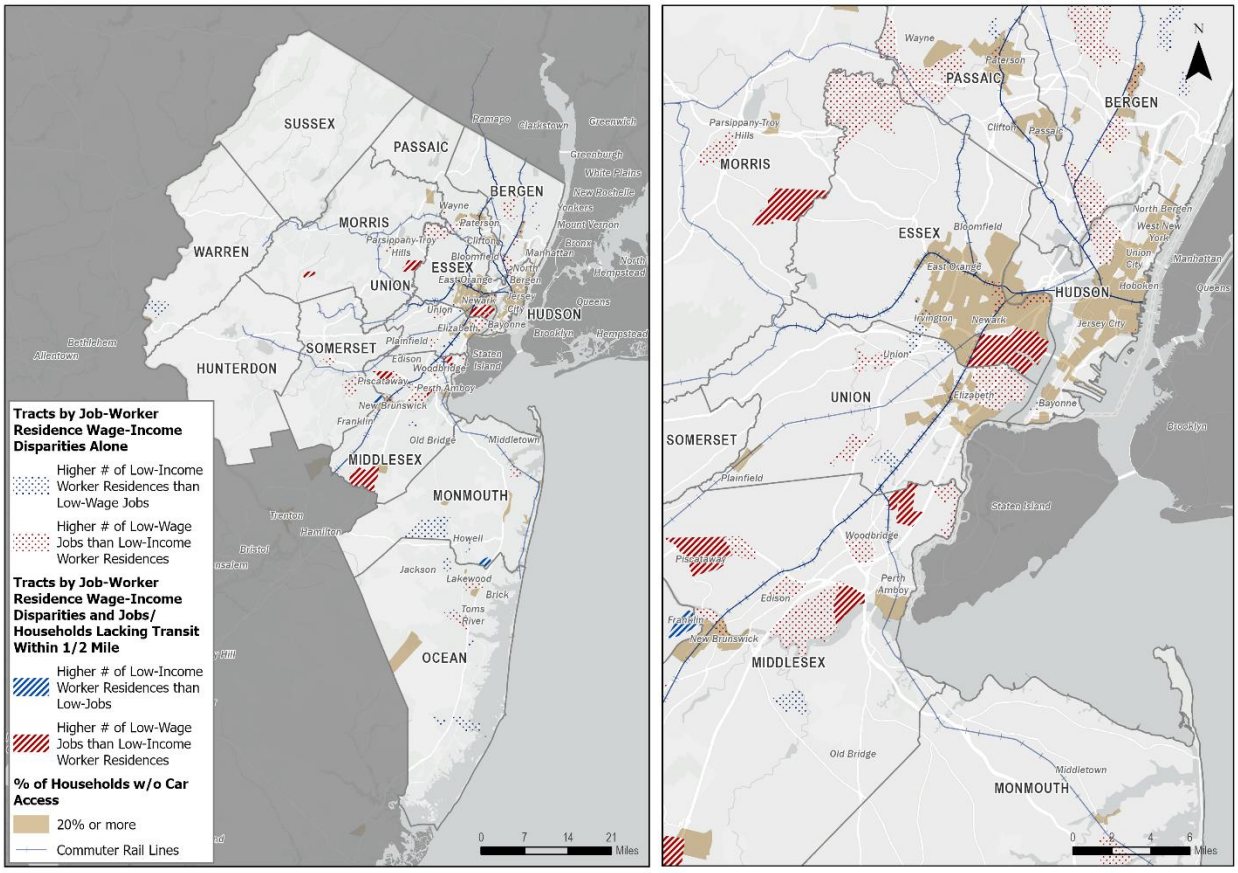


Figure 63. Locations with high disparity between the number of low-income workers and low-income jobs without having access to a transit node within half a mile versus tracts by the share of households without access to a vehicle, 2023



Criteria 4: Locations with high transit scores that have relatively poor accessibility to jobs by transit.

Figure 64. Tracts with high transit score that have relatively poor jobs accessible by transit versus the Revitalization Index, 2024

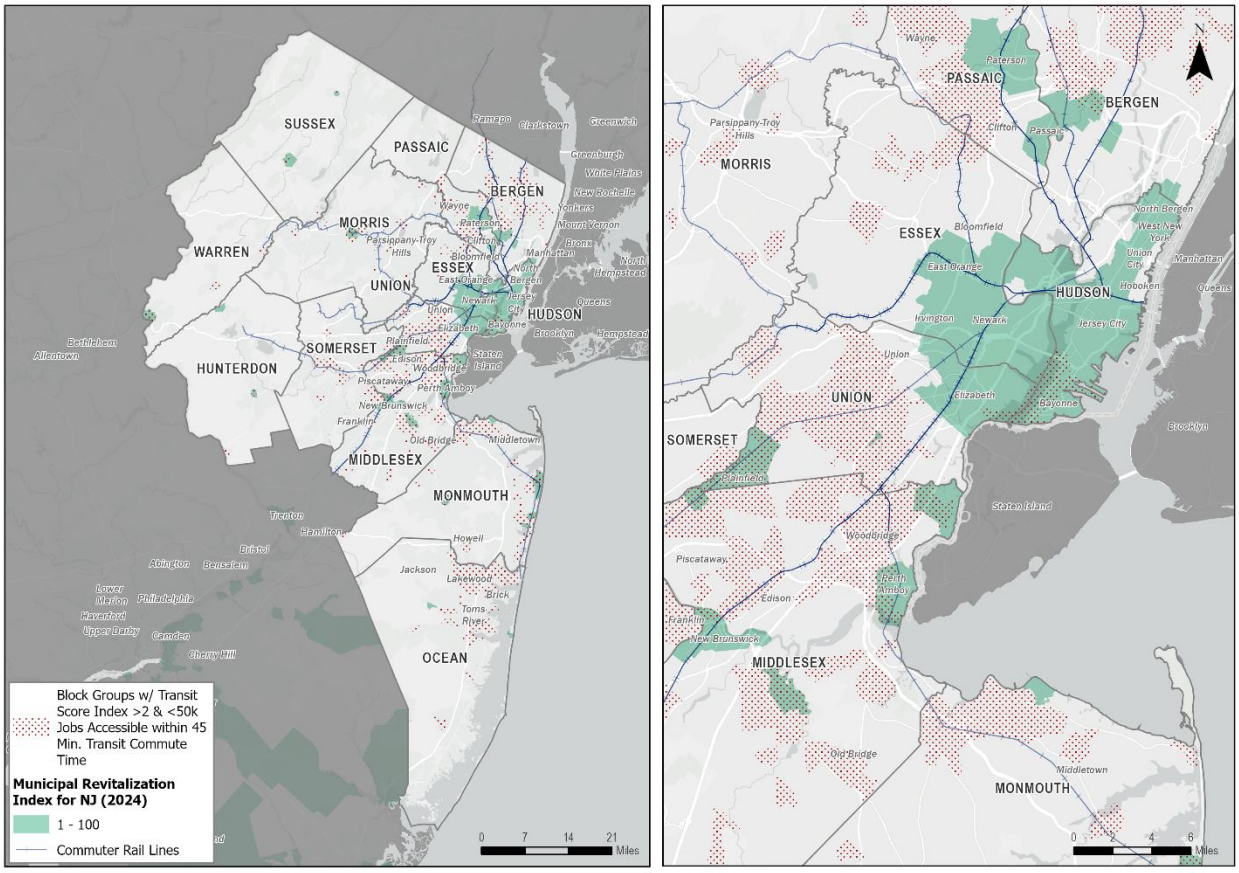


Figure 65. Tracts with high transit scores that have relatively poor jobs accessible by transit versus TAZ employment growth, 2025-2050

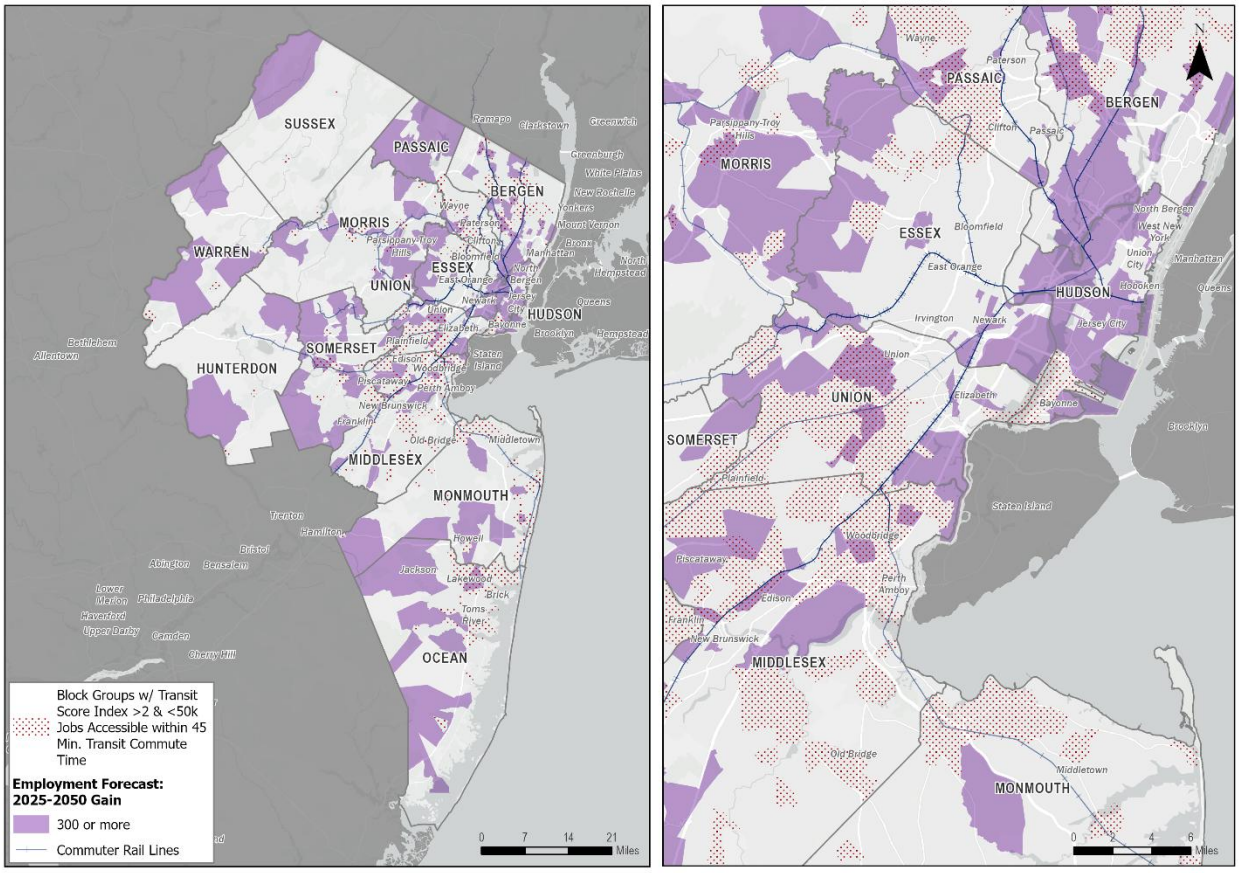
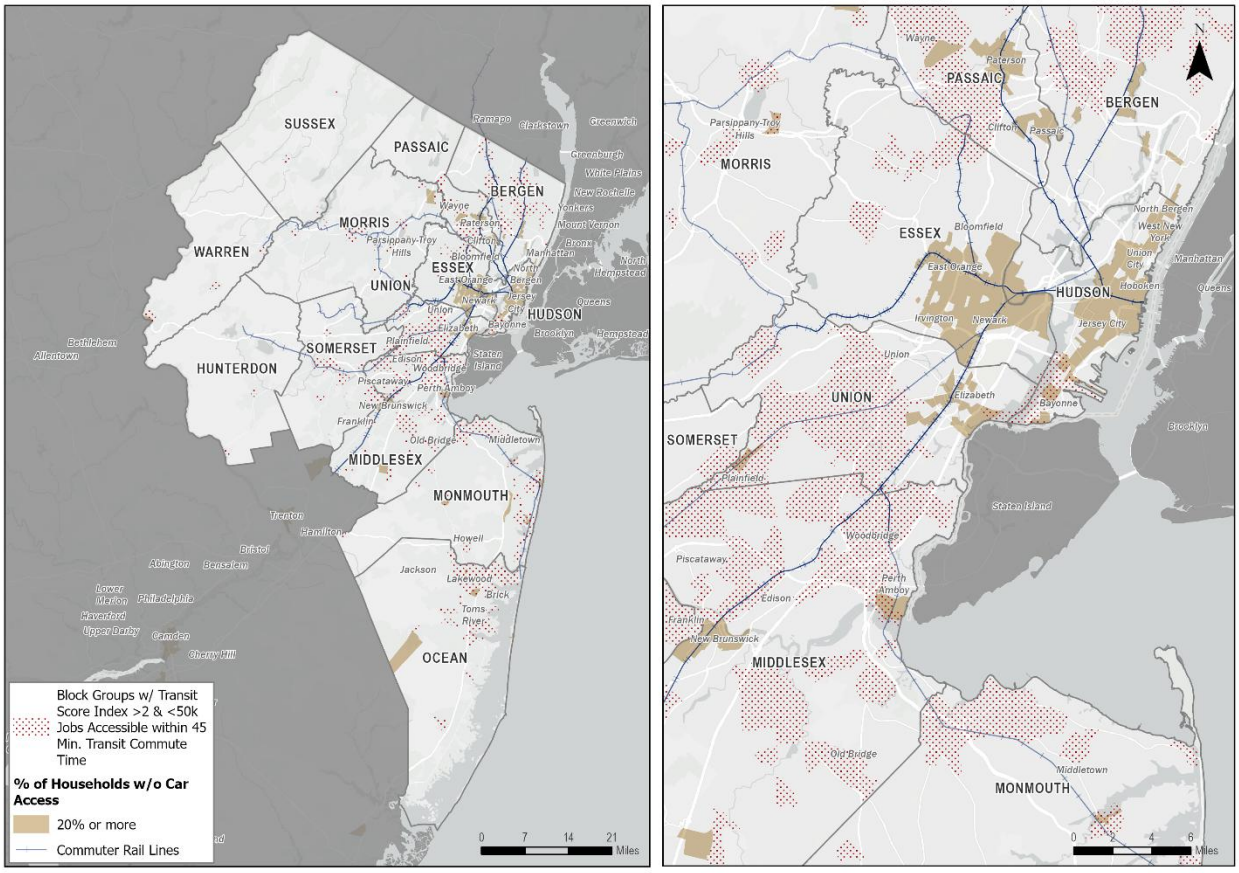


Figure 66. Tracts with high transit scores that have relatively poor jobs accessible by transit versus tracts by the share of households without access to a vehicle, 2023



3.2 Strategy - Suitable Locations for Implementation of First Mile and Last Mile Access to Transit

Figure 67. Rail Stations where First mile last mile strategies should be prioritized versus tracts by the share of households without access to a vehicle, 2023.

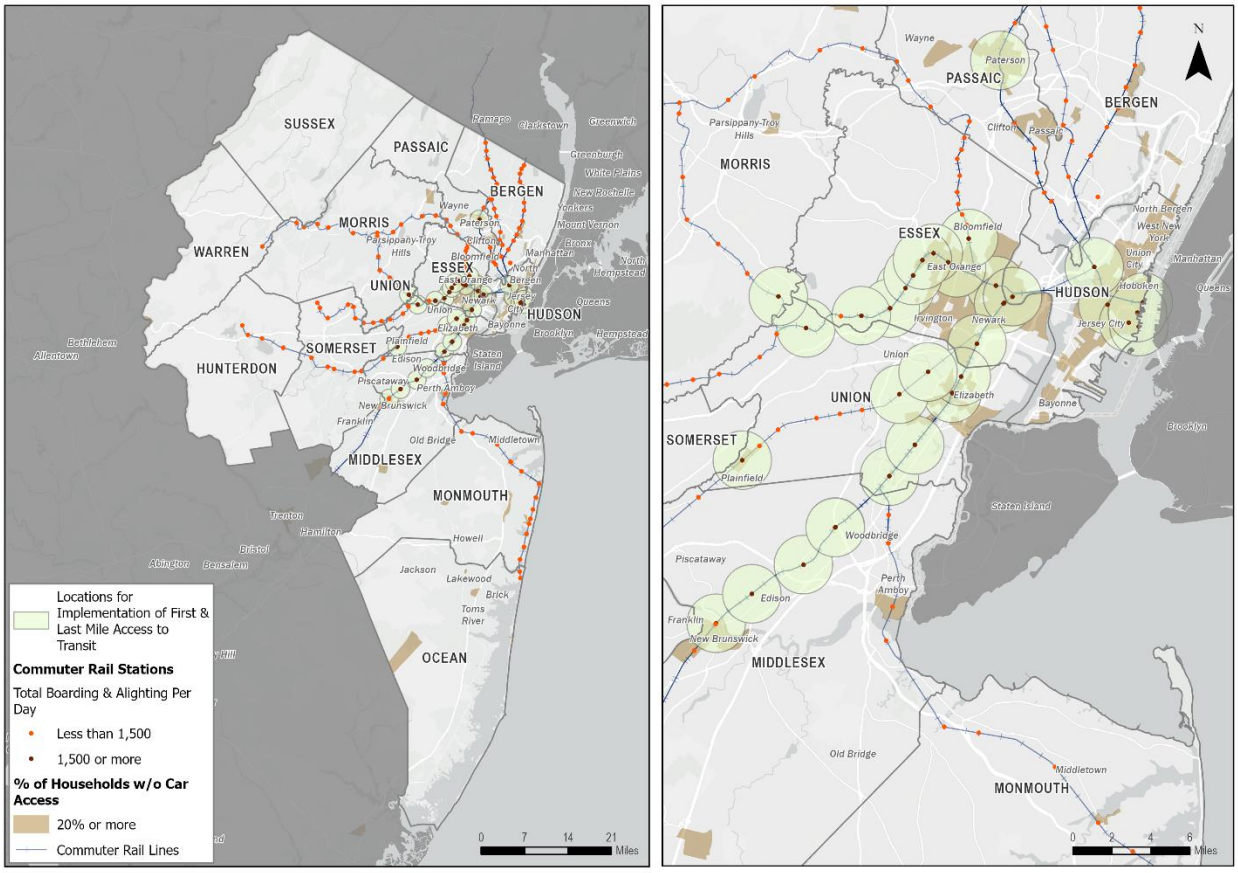
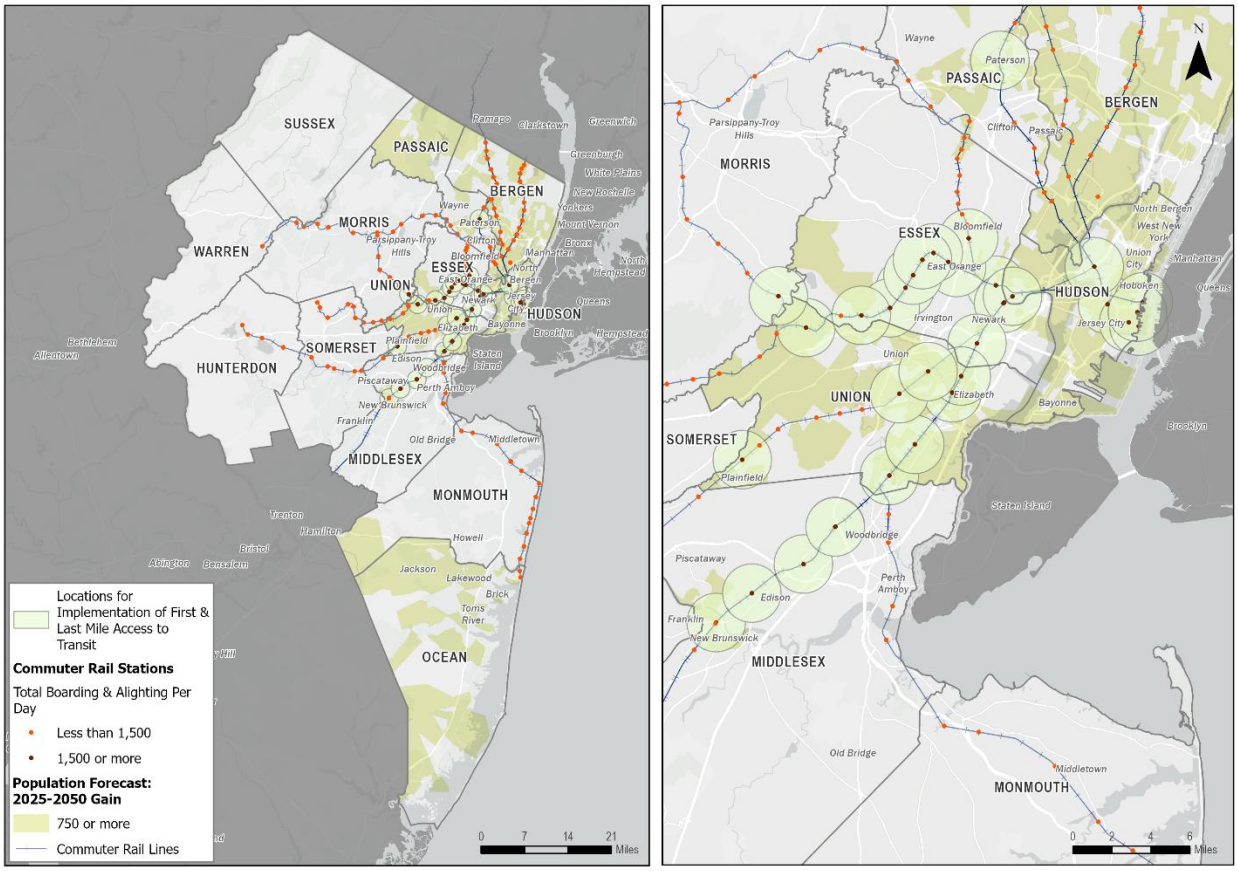


Figure 68. Rail Stations where First mile last mile strategies should be prioritized versus TAZ population growth, 2025-2050



4.1 Need - Addressing Congested and Unreliable Major Roadways

Figure 69. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0) versus the Revitalization Index, 2024

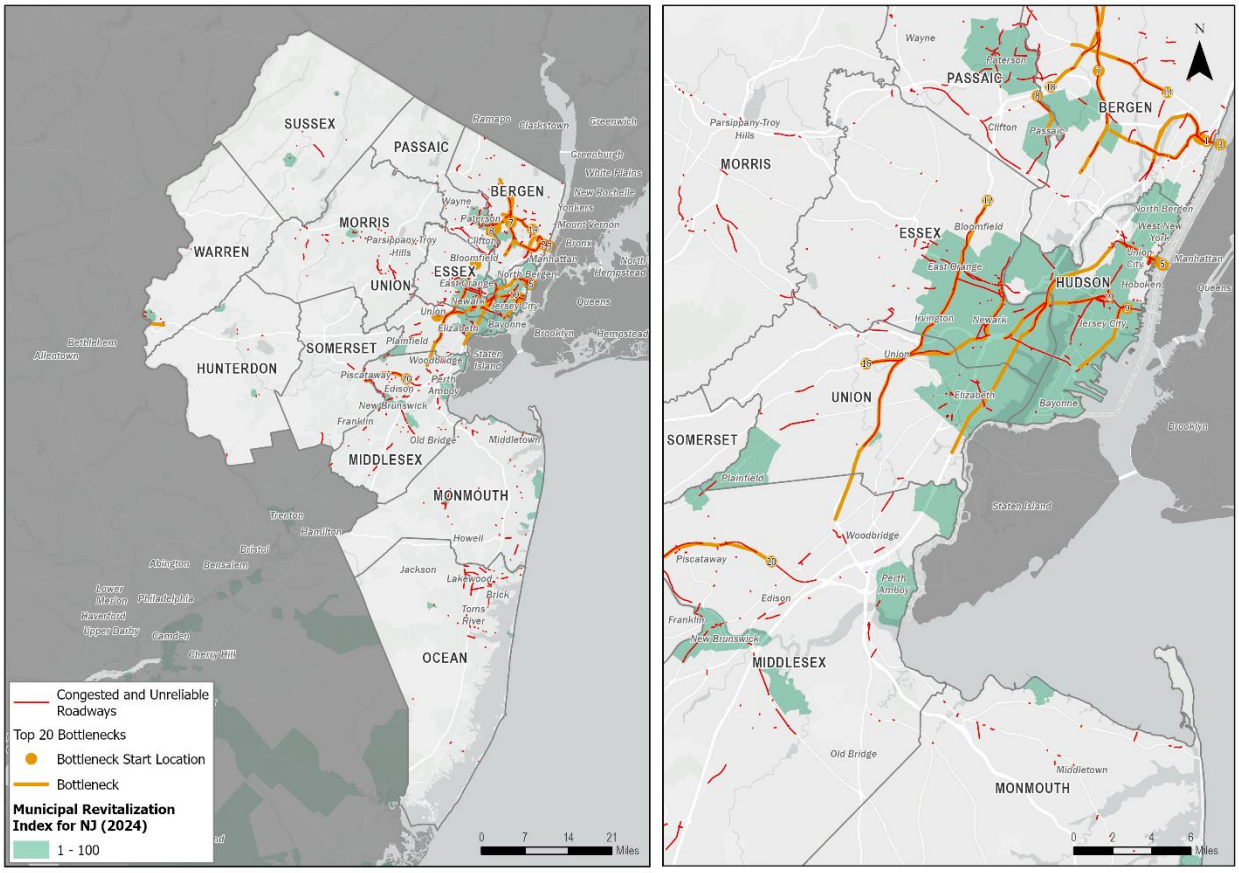
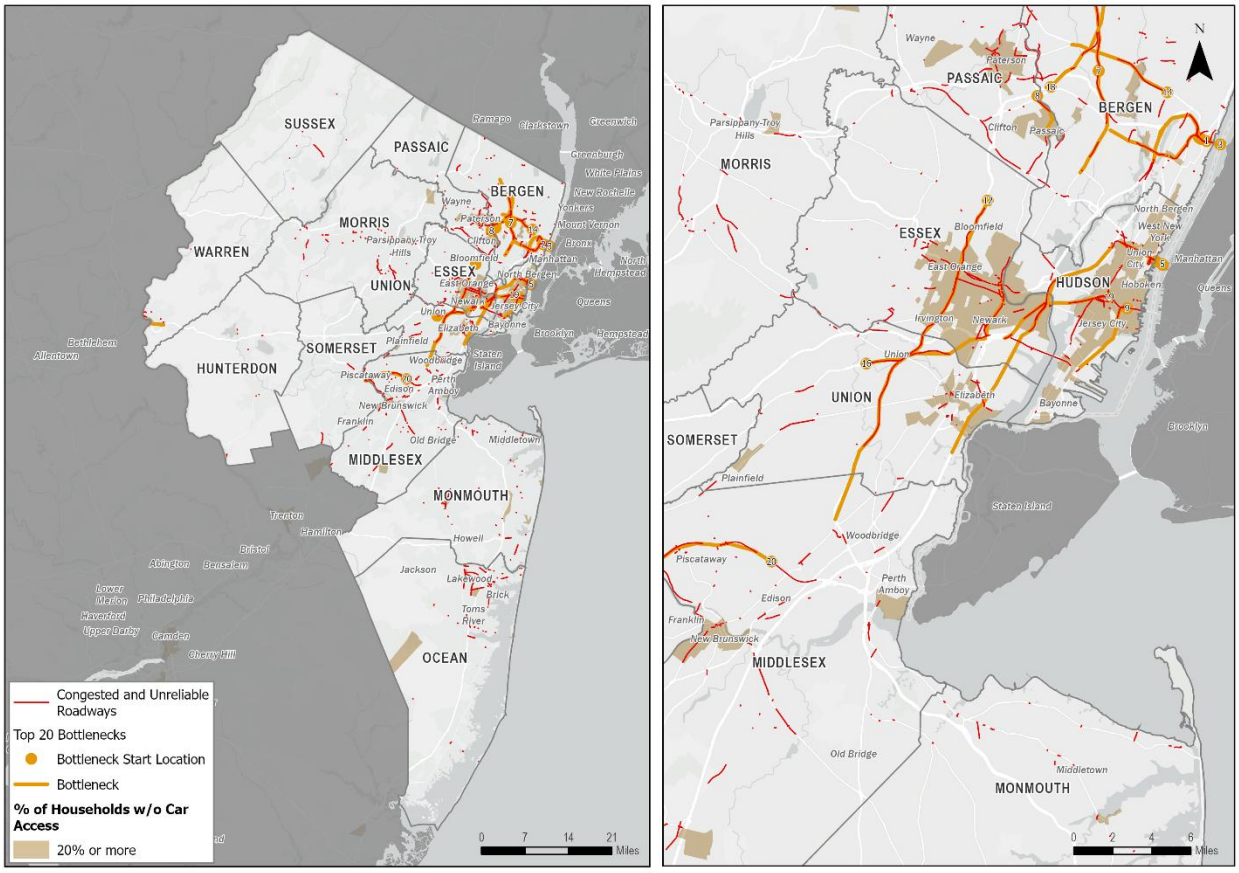


Figure 70. Unreliable and congested roadways (LOTTR >1.5 and PTI >3.0) versus tracts by the share of households without access to a vehicle, 2023



6.1 Need - Unsafe Areas for Bicycles and Pedestrians

Figure 71. Potentially unsafe locations for walking versus TAZ population growth, 2025-2050

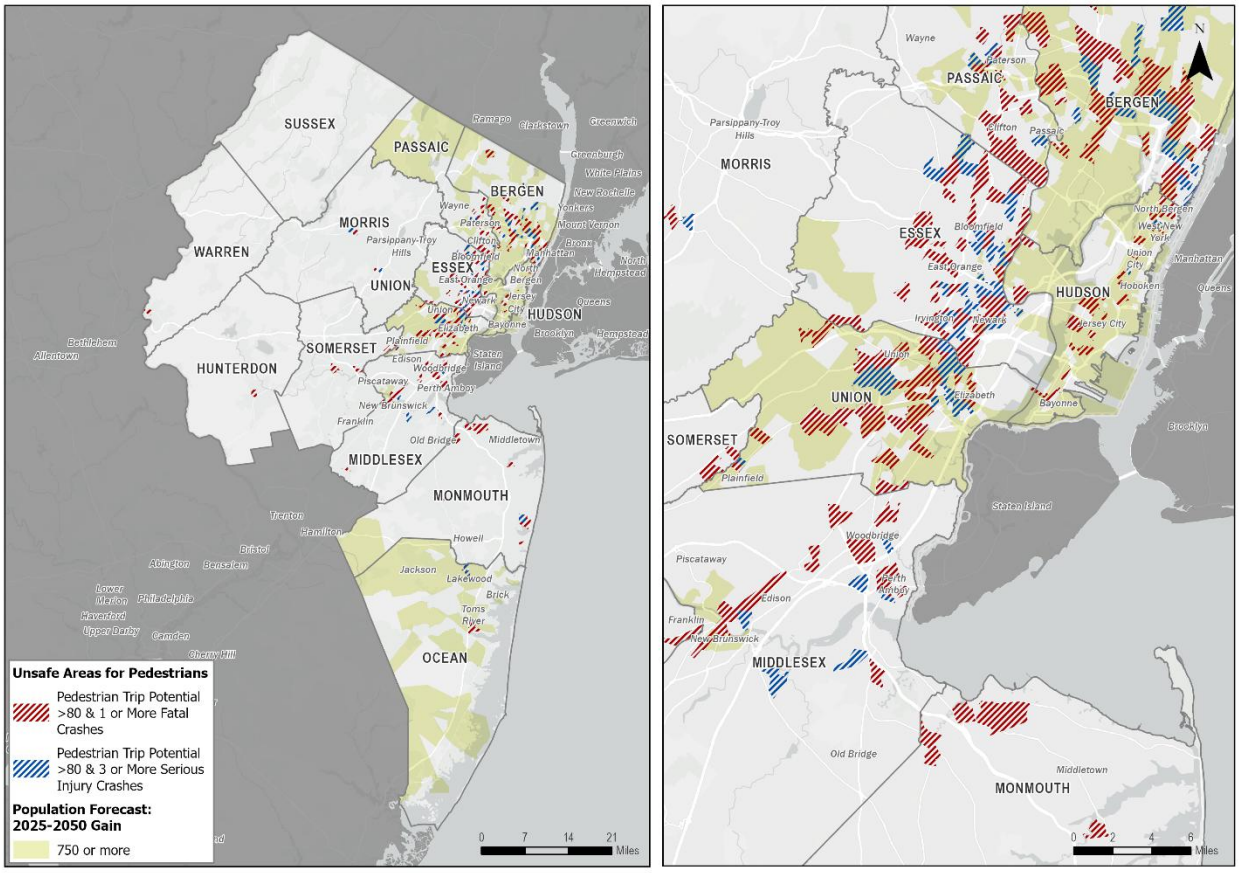


Figure 72. Potentially unsafe locations for walking versus tracts by the share of households without access to a vehicle, 2023

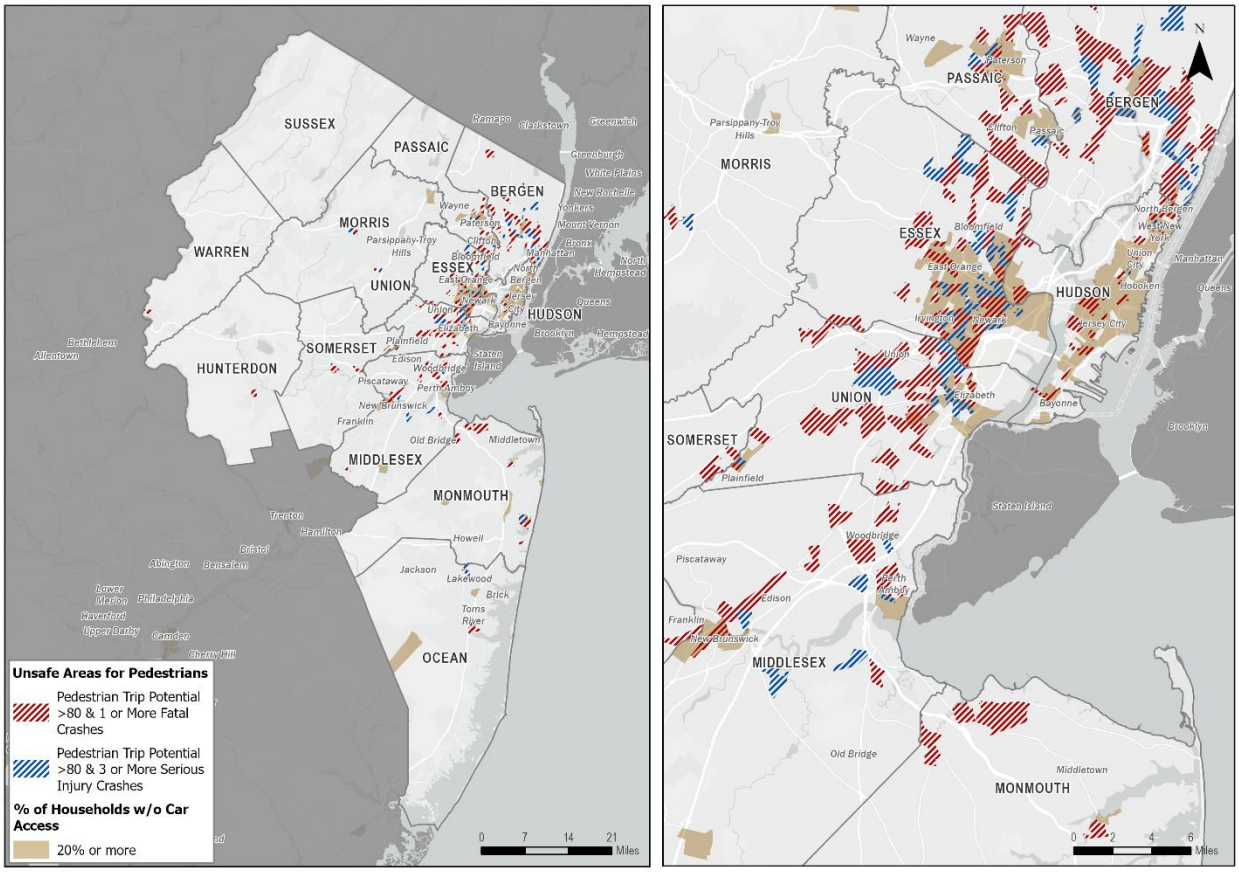


Figure 73. Potentially unsafe locations for biking versus TAZ population growth, 2025-2050

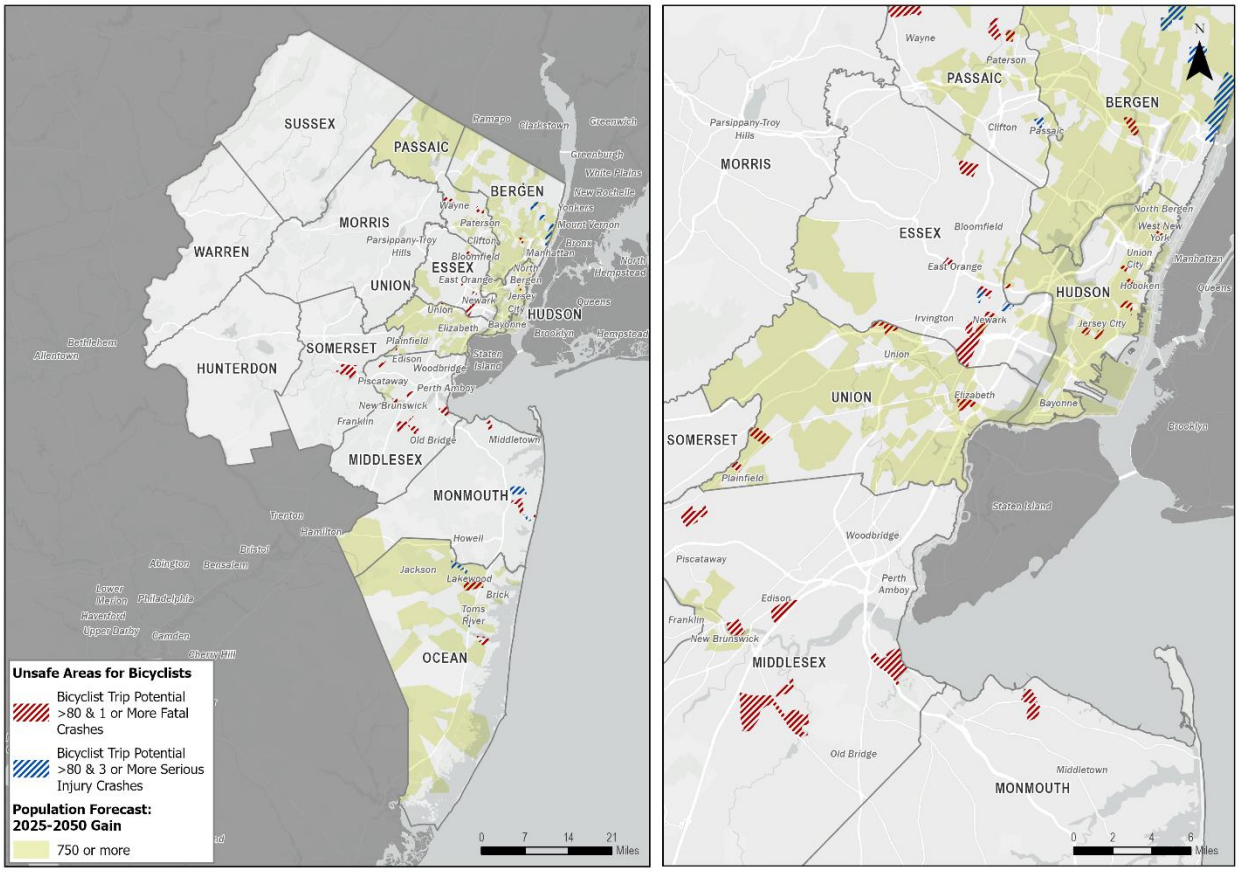


Figure 74. Potentially unsafe locations for biking versus tracts by the share of households without access to a vehicle, 2023