Accessibility & Mobility Strategy Synthesis: **Needs Assessment**

Prepared for the North Jersey Transportation Planning Authority

Prepared by

ICF

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NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

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1| INTRODUCTION: ACCESSIBILITY AND MOBILITY NEEDS

Transportation accessibility and mobility conditions, and associated needs, vary greatly across the NJTPA depending on place type and patterns of travel. The variety of place types, from cities (large and small) to suburbs (including both older suburbs and towns and newer suburbs), and rural towns and communities, each have different patterns in terms of land use, population density, employment, street network, and options for autos, transit, bicycling, walking. These conditions, in turn, affect mobility and accessibility for **local movements and shorter trips** within these places and local access to the regional transit and highway network. In addition, travel options and performance of the network for **regional movements** also differ significantly for trips between different origins and destinations, based on the availability and performance of transit, highways, and availability of connections between these modes, including park-and-ride facilities.

This document characterizes accessibility/mobility patterns and assesses associated needs, organized by the following types of travel patterns (reflecting needs related to both local and regional movement):

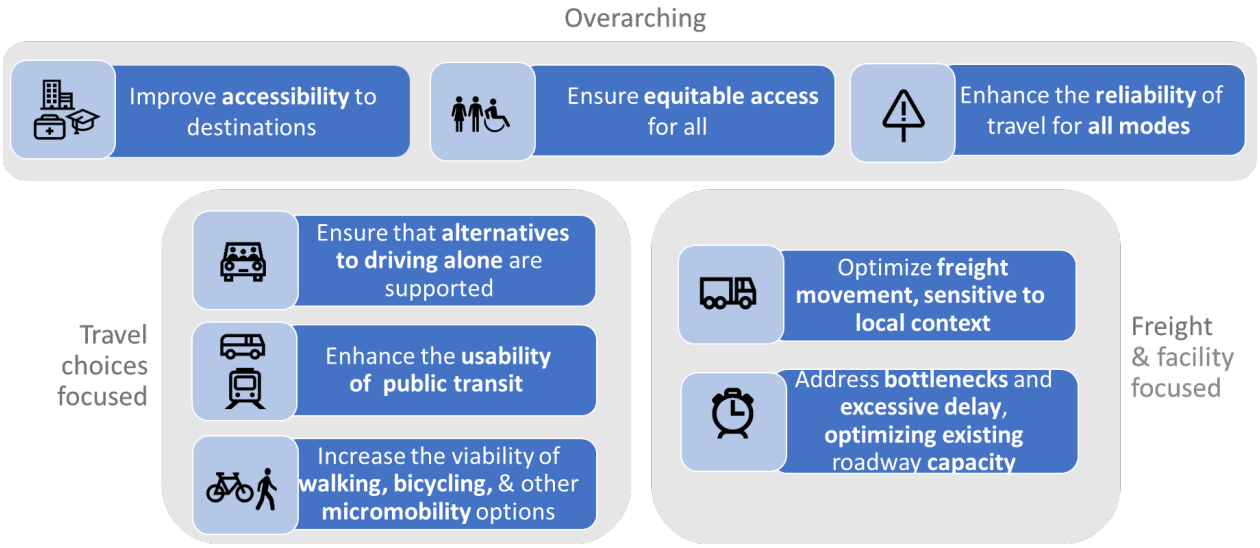
1) **To/from Urban Areas and New York City:** Focusing primarily on regional scale movements from within the NJTPA region to/from urban areas in New Jersey, such as Newark and Jersey City, between urban areas in New Jersey, and to/from New York City.
2) **Within Urban Areas of North Jersey:** Focusing primarily on local-scale accessibility needs within urban areas, both large and small cities.
3) **Between and within Suburban Areas:** Focusing on regional-level movements between suburbs and local-scale accessibility/mobility needs within suburbs (including older suburbs & towns and newer suburbs).
4) **To/from Rural Towns and Communities:** Focusing on both regional-level movements to/from rural towns and communities and local-scale issues and needs.
5) **For Freight/Goods Movement:** Reflecting the unique needs associated with goods movement, there is a separate discussion of freight-related issues and needs, reflecting both regional movements (across interstates and via rail/port), as well as local freight accessibility, relying primarily on existing NJTPA work.

The needs were identified based on an analysis of performance measures, combined with information from past studies and reports, and stakeholder input. On November 19, 2019, NJTPA held a CMP workshop to capture a "snapshot" of local and regional needs to help frame the analysis of the CMP study (Accessibility and Mobility Strategy Synthesis). The CMP workshop was attended by a majority of subregions as well as state partner agencies. The draft list of needs developed by NJTPA before the workshop as well as the inputs received from the stakeholders were considered while developing the needs. In addition, input from the CMP Working Group meeting held on August 8, 2020 was used to finalize the needs in this document.

In the following sections, information is provided on the context of accessibility and mobility in relation to the types of travel. Needs are then identified in relation to eight Congestion Management Process (CMP) objectives that have been developed for the region by the CMP Working Group, as shown in Figure 1 below. It is important to note that while "needs" generally reflect performance gaps or problems identified by regional stakeholders, they may also be characterized in regard to "opportunities" for improvement. Moreover, additional study is needed to assess the feasibility or costs of addressing these needs and to consider potential solutions.

Note that a separate technical report is focused on equity. That report explores and compares accessibility and mobility among different socio-economic population groups within the region and identifies specific needs for vulnerable populations. The equity analysis helps to inform needs related to the objective "Ensure equitable access for all."

Figure 1: Eight CMP Objectives for the NJTPA Region



The **appendix** provides a summary of accessibility and mobility performance using specific performance measures that formed the basis for the CMP analysis of needs. These performance measures and results are presented in relation to each of the eight CMP objectives. The exception is that the equitable access objective is being addressed through a separate Equity Assessment technical report.

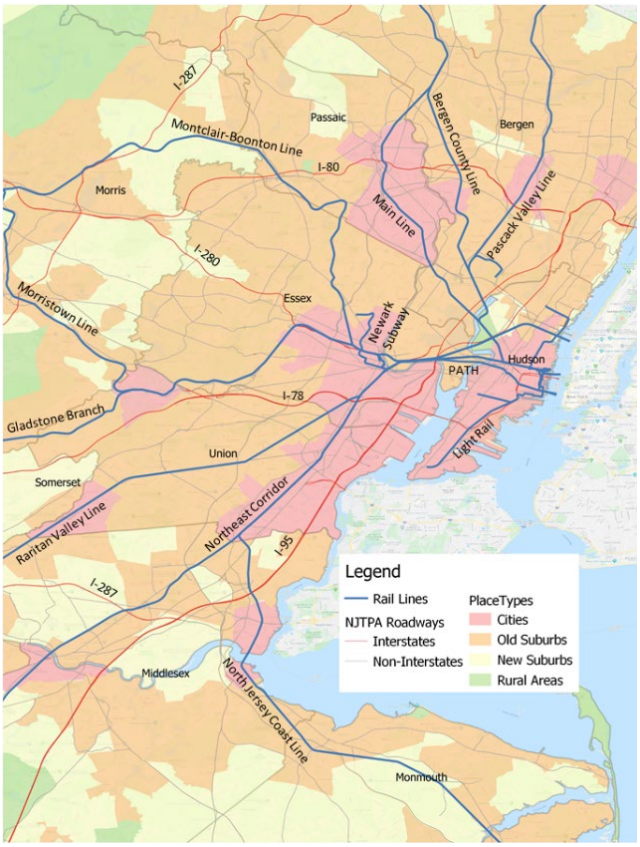
2 | MOBILITY TO/FROM URBAN AREAS AND NEW YORK CITY

Context

Regional travel to and from urban areas, including those in North Jersey and New York City make up a significant share of commute trips within the NJTPA region. Over 797,000 commuters, approximately 25% of the region's total, work in Hudson, Essex, and Union Counties, which contain the largest cities in the region.[1]

Moreover, regional trends have caused increasing travel demand between New Jersey and New York City, due to a growing number of people who work in New York and live in New Jersey. From 2001 to 2018, New York City added 363,000 more jobs than housing units, while North and Central New Jersey added 195,000 more housing units than jobs. These patterns have continued decades-old trends.[2] As a result, over 372,000 commuters, or approximately 11.8% of the region's total, travel to jobs in New York City.[3] In addition, significant travel to/from urban areas and New York City is associated with shopping, entertainment, and recreation for sporting events, shows, and other activities. There is a robust network of transit as well as highway options for travel to/from urban areas (see Figure 2).

Figure 2. Roadway and Rail Transit Network in Northeast NJTPA Region



Key observations about these regional travel movements include:

- **Frequent transit services with generally competitive transit travel times**: Public transit is available via many modes, including NJ TRANSIT commuter rail, PATH rapid transit, commuter buses, and ferry services across the Hudson. In addition, local circulation and connections within urban areas is provided via Newark subway and light rail (Hudson-Bergen, Newark light rail) and local bus services. Given the robust transit network and frequent services during peak hours, key destinations including Mid-town and Lower Manhattan are readily accessible by transit with transit travel times that are generally competitive with driving, at lower cost (considering costs of fuel, parking, tolls and vehicle maintenance). Transportation network components like the exclusive bus lane on Route 495, for instance, provide significant time savings for bus trips to Midtown Manhattan.

[1] American Community Survey 2011-2015, commuting flows. [Note: these are commuters living in the NJTPA area; maybe update with total employment?]
[2] From New Jersey Transit NJT2030: A 10-Year Strategic Plan
[3] American Community Survey 2011-2015, commuting flows.

- **Robust highway network, but with unpredictable roadway travel times and significant auto delays**: There is also a robust highway network providing access to the urban core areas, with major routes including the New Jersey Turnpike, Garden State Parkway, I-78, I-280, NJ-495, and others. These highways, however, experience significant congestion and unreliable travel times, and significant bottlenecks at Hudson River crossings to Manhattan (see more detail below).
- **High levels of transit use**: Given the high levels of transit service, destinations in urban areas and New York City have a high portion of travel on public transit.

Needs Identified

This section identifies possible needs, based on identified performance gaps or challenges. It is important to note that additional study is needed to consider potential solutions, as well as the feasibility or costs of addressing these accessibility or mobility needs.

Trans-Hudson Transit Capacity

Trans-Hudson transit capacity is a serious issue, with significant crowding and capacity constraints on the transit system, both in terms of rail service and bus service to New York City. As New Jersey has become a larger provider of housing for jobs in New York City, 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 and the transit network. Transit has increasingly taken on a larger share of trips, given capacity constraints on the roadway network. In 2015, 79 percent of Trans-Hudson trips between New Jersey and New York were taken using public transportation. [4] While overall NJ TRANSIT bus ridership in 2019 was essentially the same as in 2000, ridership on interstate bus service between New Jersey and New York City grew by 9 percent during this period.[5] NJ TRANSIT notes that since its peak Trans-Hudson service is already above capacity, and "without additional investment to meet the increases in demand, the system will face additional strain, potentially reducing economic opportunity, increasing congestion and lengthening commute times for the region."[6] These capacity constraints are a source of problems with transit crowding and reliability issues (described further below).

Transit Crowding

Transit crowding causes longer waiting time for passengers, longer overall trip times, and creates a less pleasant travel experience. Crowding is tied to issues related to Trans-Hudson capacity, as well as capacity issues at certain stations and locations. According to NJ TRANSIT, rail ridership on its system increased by 42 percent between fiscal years 2000 and 2019.[7] The increase in loading and off-loading

[4] From New Jersey Transit NJT2030: A 10-Year Strategic Plan.
[5] From New Jersey Transit NJT2030: A 10-Year Strategic Plan, page 11.
[6] From New Jersey Transit NJT2030: A 10-Year Strategic Plan, page 23.
[7] From New Jersey Transit NJT2030: A 10-Year Strategic Plan, page 12.

time due to crowding may prevent transit from adhering to schedules, and for buses may lead to bus bunching. Specific locations noted as having crowding and capacity issues [based on local input] are:

- ***Crowding on platforms at Journal Square and Grove Street*** during rush hours (noted by Jersey City, Hudson County).
- ***Train capacity on the Raritan Valley Line*** (noted by Middlesex County).
- ***Insufficient capacity on the Northeast Corridor***; standing room only at Metropark (noted by Middlesex County).
- ***Bus crowding along commuter routes*****:** Under normal operating conditions, NJ TRANSIT has significant bus crowding issues in many areas. Major areas of concern, where crowding can cause delays and significant inconvenience to passengers include, but certainly are not limited to trans-Hudson routes from Hudson County (such as routes from Hoboken, Bayonne, Union City and the River Road corridor), Bergen County (including routes from Fort Lee, Dumont, Teaneck, Englewood and others) and the Route 9 corridor from Middlesex and Monmouth counties. Crowding occurs on most trans-Hudson routes during the peak periods, and frequently occurs on local routes as well, particularly in Newark and Hudson County.

Bottlenecks and Unreliable Highways/Major Roadways

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. Figure 3 and Figure 4 shows a map of the top 1 to 10 and 11 to 20 biggest bottlenecks in the region, ranked based on total vehicle hours of delay, followed by Table 1 showing the top 20 bottlenecks within the entire NJTPA region during Q1 of 2019, which occur almost entirely within the most urbanized North Jersey area. Key issues include:

Bottlenecks at Tunnels and Bridges accessing New York City: Significant bottlenecks occur at the facilities accessing the Lincoln Tunnel (via I-95 to NJ-495) and the Holland Tunnel (via I-78) to New York, as well as the George Washington Bridge.

Other Key Highway Bottlenecks: Other key highway bottlenecks in the region in Q1 of 2019 occurred along the Garden State Parkway, on NJ-17 South toward I-80, along I-95/New Jersey Turnpike into Newark, and along I-287 into Edison.

Figure 3. Top Roadway Bottlenecks (Ranks 1-10) in the NJTPA Region (Source RITIS, 2019 Q1)

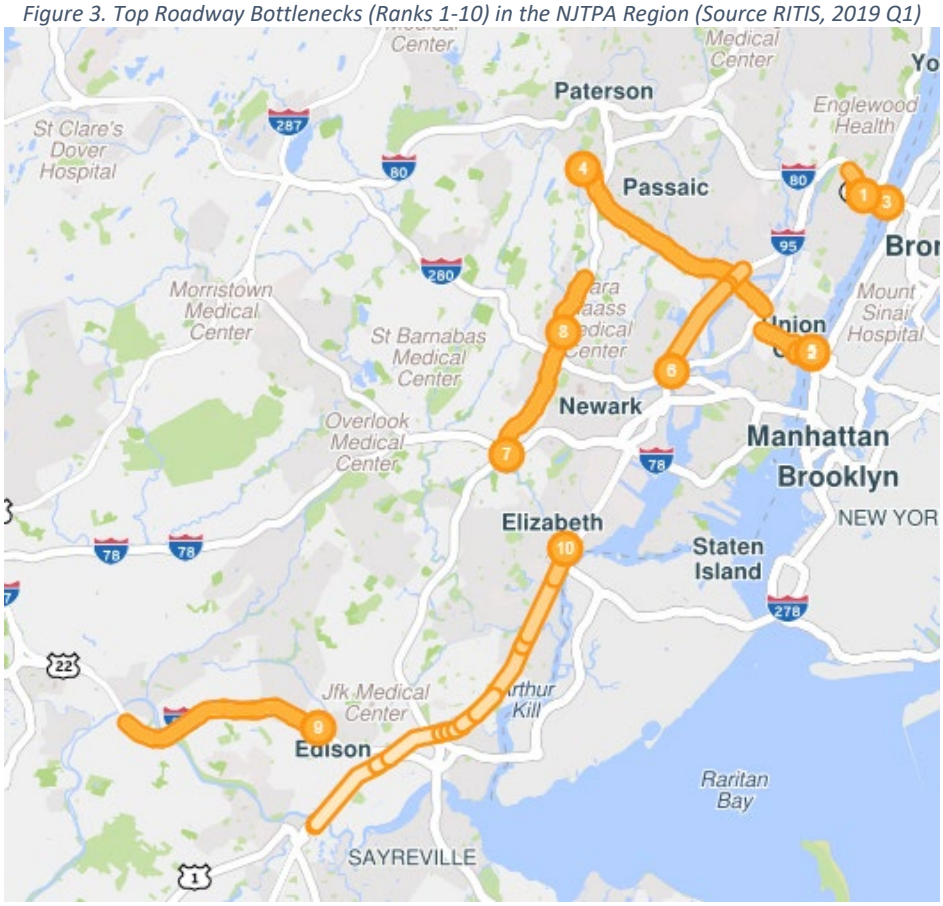


Figure 4. Top Roadway Bottlenecks (Ranks 11-20) in the NJTPA Region (Source RITIS, 2019 Q1)

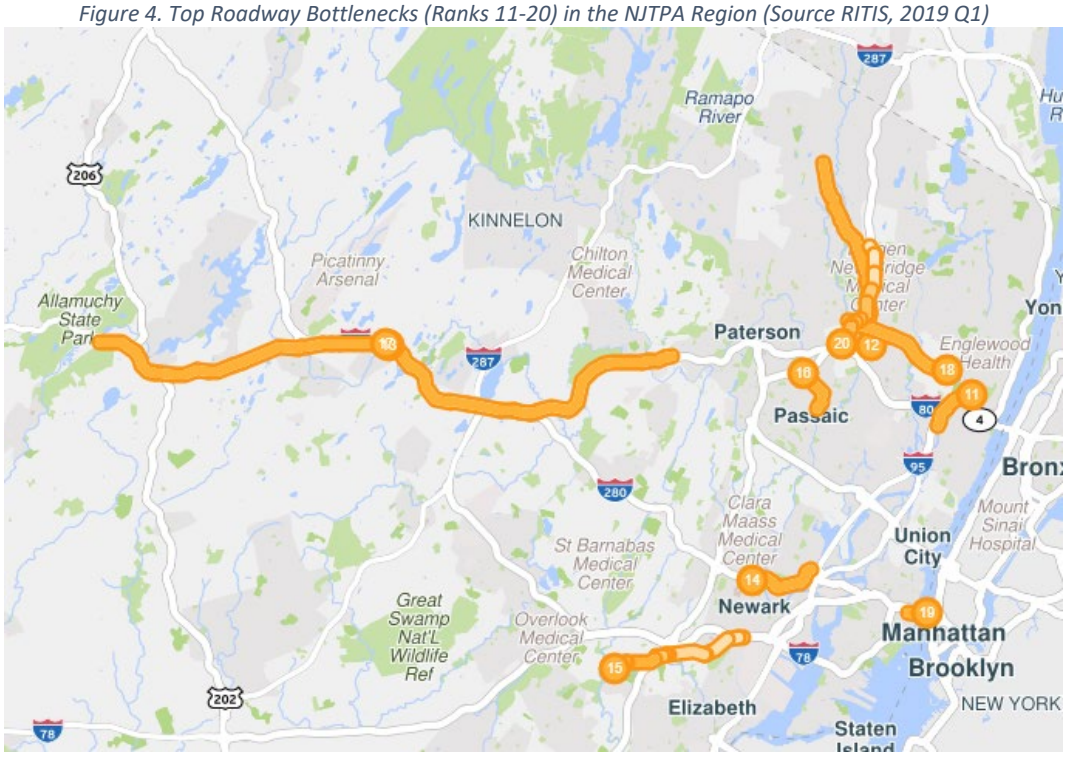


Table 1. Top 20 Highway Bottlenecks in the NJTPA Region, 2019 Q1, Ranked by Total Delay (Source: RITIS)

Rank	Bottleneck Head Location	TOTAL DELAY
1	I-95 E @ CENTER AVE	302,936,197
2	NJ-495 E @ NJ--NY STATE BORDER	252,810,999
3	I-95 E @ NY--NJ STATE BORDER	160,808,073
4	NJ-3 W @ VALLEY RD	91,283,263
5	RT-495 E @ NJ--NY STATE BORDER	74,085,999
6	I-95 S @ I-280/EXIT 15	73,287,927
7	GARDEN STATE PKY S @ UNION TOLL PLAZA	73,268,555
8	GARDEN STATE PKY S @ WALNUT ST/EXIT 147	69,702,359
9	I-287 S @ CR-501/NEW DURHAM RD/EXIT 3	67,130,412
10	I-95 N @ I-278/EXIT 13	64,746,889
11	I-95 E @ BROAD AVE/EXIT 71	64,092,943
12	NJ-17 S @ PASSAIC ST	63,089,757
13	I-80 W @ FORD RD	60,707,573
14	I-280 W @ MARTIN LUTHER KING JR BLVD/EXIT 14	58,736,542
15	US-22 W @ SPRINGFIELD RD	56,291,133
16	NJ-21 N @ US-46	45,658,648
17	I-80 E @ FORD RD	44,760,242
18	NJ-4 E @ TEANECK RD	42,194,427
19	HOLLAND TUNL E @ NJ--NY STATE BORDER	41,947,101
20	GARDEN STATE PKY S @ BERGEN TOLL PLAZA	41,236,758

Note: Total Delay is Base impact (length in miles for the duration of the bottleneck) weighted by the difference between free-flow travel time and observed travel time multiplied by the annual average daily traffic volume (AADT).

Unreliable travel times: In addition to recurring delays, many of the key highways accessing major cities in North Jersey and New York City experience significant unreliability (high levels of variability in travel time), making it difficult for travelers to predict the amount of time it will take to access destinations. Unreliable travel is an important issue for transit bus services, which rely on the road network, making it difficult for buses to stay on schedule and contributing to slow transit trips. Figure 5 shows the most unreliable road segments (level of travel time reliability [LOTTR] > 2) in areas within and accessing major cities, and also shows an overlay of the bus transit network. Table 2 highlights these road segments with poor reliability, and notes those that contain significant transit bus service.

Figure 5. Unreliable Road Segments overlaid with the Bus Transit Network (Source: RITIS, NJRTME Model)

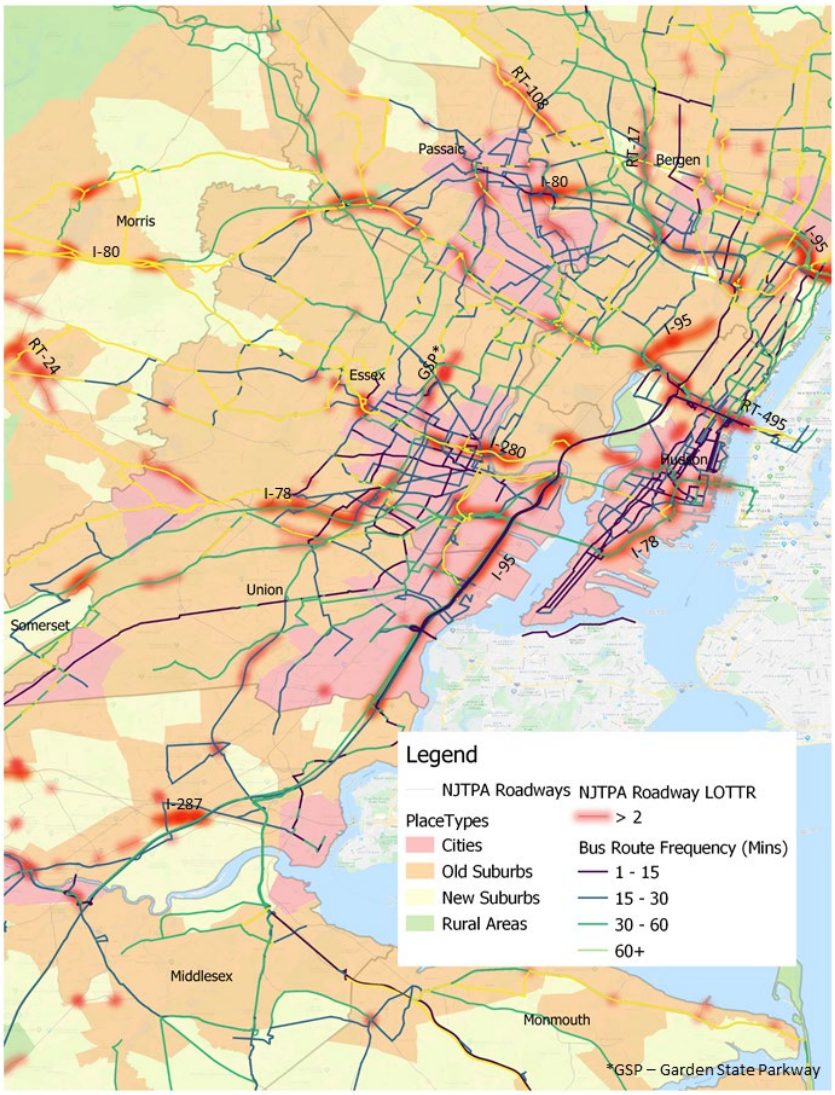


Table 2. Unreliable Road Corridors (Source: RITIS, NJRTME Model)

Unreliable Road Corridors	Bus Services Using Route
I-95	Yes, frequent
I-78 / US-22 to Garden State Parkway	Yes, frequent
NJ-495 (into Lincoln Tunnel)	Yes, frequent
I-78 (Bayonne to Jersey City, to Holland Tunnel)	Yes, limited
I-280 (Newark), I-280/I-95 Junction	Yes, limited
US-22	Yes, limited
NJ-7 (to Journal Square)	Yes, limited
I-287 (Piscataway/Edison)	No
US-1/US-9 (Jersey City, the Heights)	No

Note: These corridors are not ranked based on level of unreliability

Transit Reliability Issues

Bus reliability is a concern, associated with high levels of traffic congestion and poor roadway reliability. NJ TRANSIT buses going to New York City have some of the worst on-time performance of all bus routes, with 32 interstate bus routes having on-time performance of less than 60% during September 2019. Table 3 provides a listing of the NJ TRANSIT interstate routes with on-time performance of 55% or less and Table 4 lists those within NJ that are regional (longer-distance) with on-time performance less than 58%.

Table 3. NJ Buses to NYC with On-Time Performance at 55% or Less, September 2019 (Source: NJ TRANSIT)

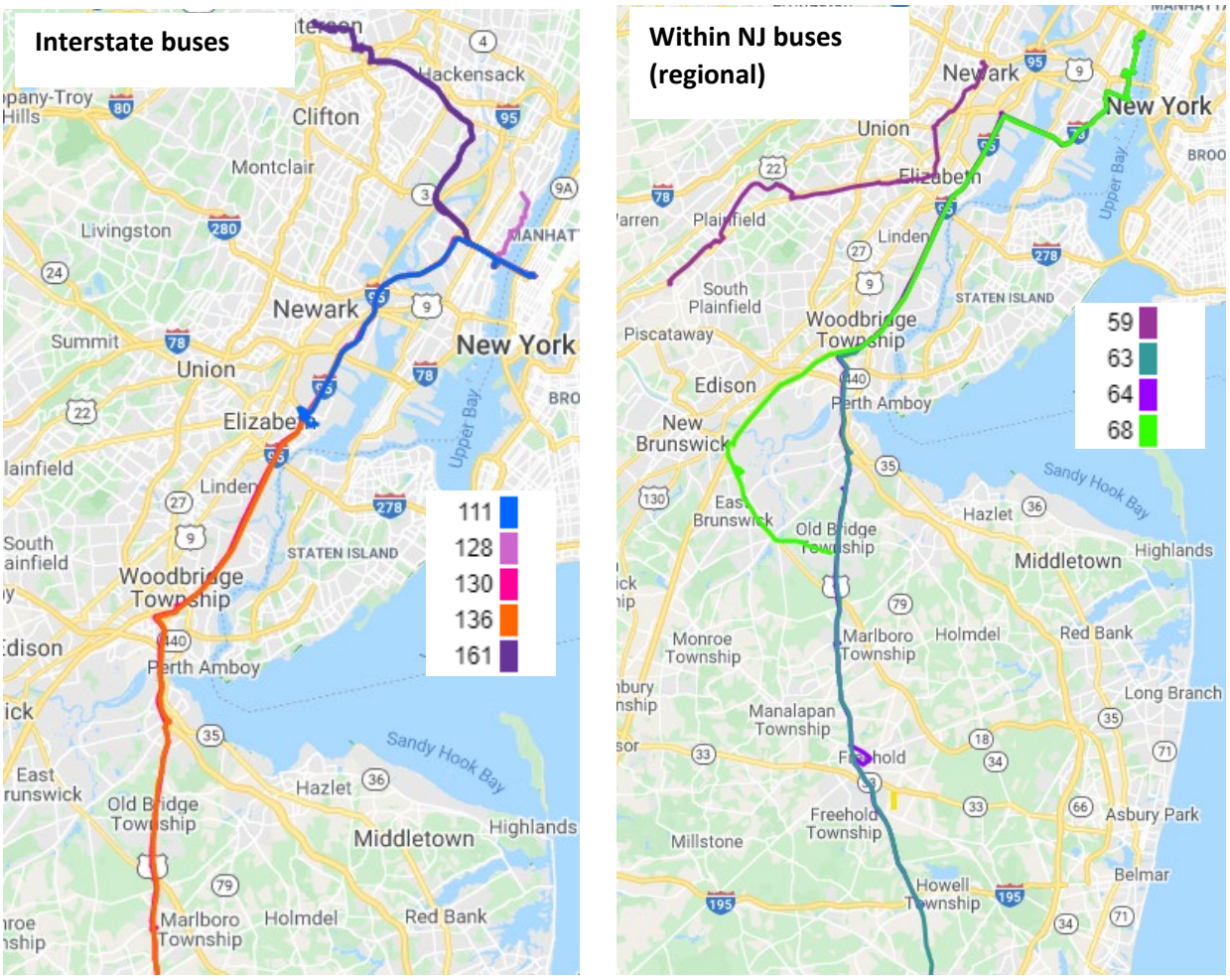
Bus Route	On Time	Early	Late	On Time %
130: Lakewood - New York - Union Hill	3,241	1,291	4,774	34.8%
136: Lakewood - New York - Freehold Mall	1,901	849	1,715	42.6%
128: North Bergen - Blvd E - New York	18,242	6,112	17,810	43.3%
161: Paterson - Passaic - New York	45,897	3,480	48,705	46.8%
111: New York - IKEA - Jersey Gardens	7,636	1,769	6,629	47.6%
138: Old Bridge - E Brunswick - New York	3,567	438	3,172	49.7%
193: Willow brook - New York Express	1,733	364	1,385	49.8%
190: Paterson - Secaucus - New York	77,488	13,162	60,675	51.2%
117: Somerville - New York Express	2,247	312	1,661	53.2%
132: Lakewood - NY - Gordons Corner Exp	4,524	1,134	2,791	53.5%
115: Rahway - New York	9,828	1,364	6,960	54.1%
131: Sayreville - New York	4,128	1,046	2,436	54.2%
108: Newark - New York	9,235	968	6,611	54.9%
164: Midland Pk - Fair Lawn - New York	32,778	6,590	20,267	55.0%

Table 4. Regional Buses within New Jersey with On-Time Performance under 58%, September 2019 (Source: NJ TRANSIT)

Bus Route	On Time	Early	Late	On Time %
63: Lakewood - Jersey City – Weehawken	1,284	48	1,842	40.5%
68: Old Bridge - E Brunswick - JC – Weehawken	7,356	653	6,439	50.9%
64: Lakewood - Jersey City – Weehawken	14,465	2,213	9,803	54.6%
59: Plainfield – Newark	51,802	2,734	35,668	57.4%

Figure 6 below maps those routes with the poorest reliability within each category.

Figure 6. Buses with Worst On-Time Performance, September 2019 (Source: NJ TRANSIT)



Assessments accounting for ridership, equity, access to jobs/healthcare, and road parameters could help identify and prioritize bus routes that might benefit from improvements such as transit signal-priority, bus-only lanes, or other improvements to address transit reliability.

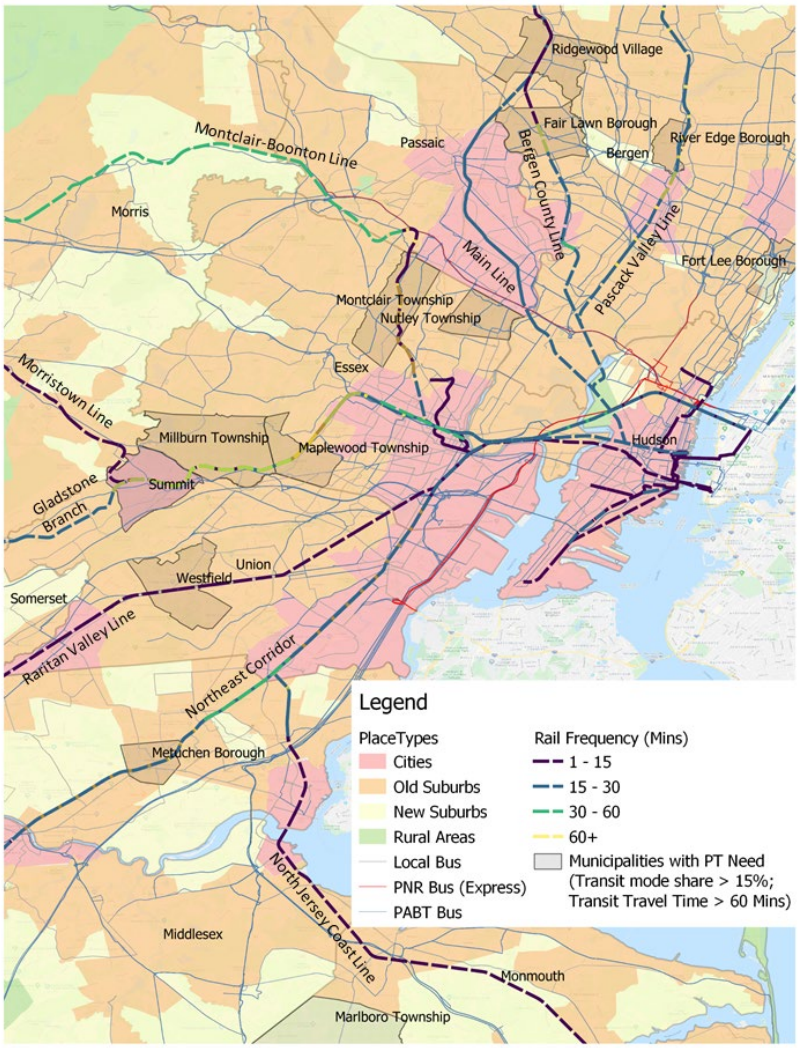
Rail reliability has also been a challenge, with reliability generally falling over the period of 2013 to 2017. Over the period from 2017 to 2019, the percentage of systemwide trains reporting within 6 minutes of schedule generally was between 86% and 93% each month (under the NJ TRANSIT target level of 94.7%); only in April and May 2020, after the COVID-19 pandemic began, has on-time performance exceeded the target level. [Note: These figures include the entire NJ TRANSIT system, including the Atlantic City line]. Reliability issues have been associated with a shortage of locomotive engineers, disruptions caused by the installation of Positive Train Control (PTC) and the age of the rail fleet.[8]

[8] New Jersey Transit on-time performance dashboard, available at: https://www.njtransit.com/improve/on-time-performance/rail

Long and Uncompetitive Transit Travel Times from Some Areas

Some commuters have long trips from suburban areas into the major cities and New York City. While transit trip times are often competitive with driving (and lower cost), these long-distance trips mean that many travelers have long transit trips, on often crowded trains and buses. Moreover, there are some locations from which transit travel times are considerably longer than typical drive times due to indirect connections. Figure 7 identifies 12 municipalities where a significant share of commuters use transit (over 15%) and where the average transit commute trip time is over 60 minutes, which may be an indicator of long or indirect transit trips.

Figure 7. Municipalities with High Transit Mode Shares with Average Transit Travel Time over 60 Minutes (Source: ACS)



While there may be many reasons for long transit travel times, some of the probable reasons for high travel time are noted below:

- **No direct access to rail without bus/drive connection** – Marlboro Township
- **Primarily local rail service (limited express trains)** – Metuchen, Summit, Montclair (limited off-peak hours)
- **Limited express bus service** – Fort Lee, Nutley

In addition, **indirect transit connections and the need to transfer** create long transit commutes compared to driving in some locations. For instance, the lower half of Passaic County and Bergen County do not have direct access to New York City, but need to transfer at Secaucus. Transit access times are particularly high for the northeast corner of Bergen County, which is predominantly served by bus routes on county and local roadways. Some examples of trip pairs where transit travel times are not competitive with auto travel times are noted below, drawing from the NJTPA Connectivity Study. Note that these are examples of trips between different origin-destination (O-D) pairs but are not a comprehensive list of O-D pairs with poor transit competitiveness.

Between some cities:

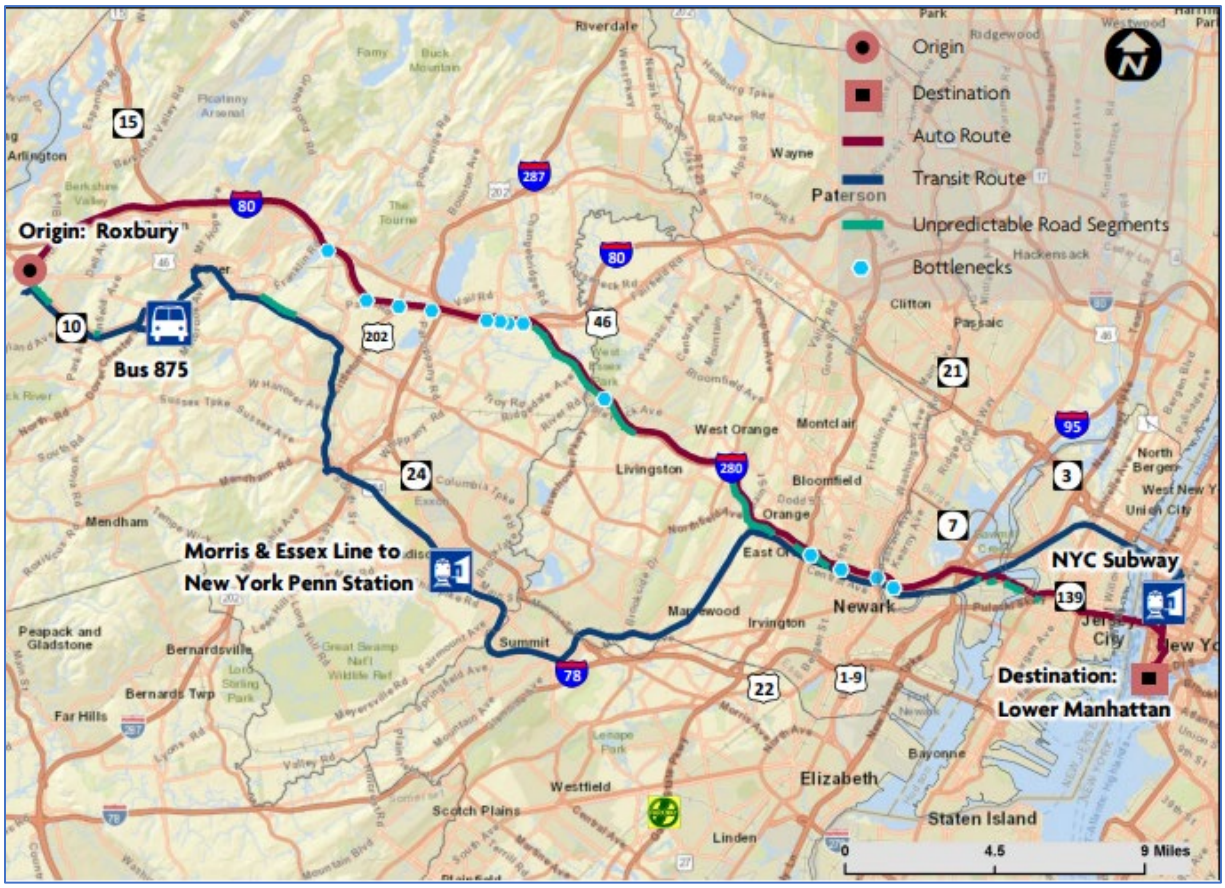
- ***Example: Englewood to Newark:*** Estimated average transit travel time of 84 minutes plus access to transit via Bus 166 and transfer to Bus 108, compared to an average travel time of 36.5 minutes by auto using I-95.

Figure 8. Travel Options from Englewood to Newark (Source: NJTPA Connectivity Study)

From outer suburbs:

- ***Example: Roxbury to Lower Manhattan:*** Estimated average transit travel time of 139 minutes plus access time to transit, via Bus 875 to the Morris & Essex Line to New York Penn Station to NYC subway, compared to average travel time of 97.5 minutes by auto using I-80 to I-280 to NJ 139 across the Holland Tunnel.

Figure 9. Travel Options from Roxbury to Lower Manhattan (Source: NJTPA Connectivity Study)



It is important to note that transit would not be expected to be competitive with auto for all trip pairs, and sufficient demand is needed for fixed route transit to operate cost-effectively. Individuals make decisions regarding household and employment locations, and often make tradeoffs regarding costs of housing, time and costs of commuting, and other quality of life factors. Demand-based analysis for individual corridors, outside the scope of this study, is needed to determine if new transit routes, connections, or alternative service arrangements are warranted in locations where transit travel times are significantly longer than driving.

Moreover, local access to and from transit stations and stops in suburbs is a significant issue, since much of the residential population is not within walking distance of rail stations or bus stops (See section on *Mobility and Accessibility between and within Suburban Areas* for more information on these needs).

Reverse Commute Challenges

The NJTPA region is served with a robust transit network, allowing travelers to make suburban to urban trips and visa-versa. However, there are connections for which reverse commuters face **uncompetitive transit travel times from urban areas to some suburban job centers**.

Reverse peak direction auto travel often faces uncongested conditions while transit services typically make local stops at the expense of travel time. Moreover, the level of demand for reverse commute trips

may not be enough to support express reverse peak transit service. The less dense and suburban nature of employment locations, often with auto-oriented design, also creates local access issues, including poor pedestrian environments that create challenges for transit riders (see section on *Mobility and Accessibility between and within Suburban Areas* for more information on these local access needs). Consequently, many reverse commuters without access to a private vehicle, including often low-income and minority populations, face long transit commutes and challenges accessing potential job opportunities. This issue is explored further in the Equity Assessment document.

Examples of such commutes include:

- ***From Newark to Western Essex County***. Essex County identified uncompetitive transit travel times compared to auto travel times from eastern Essex to western Essex as an issue (identified as part of the draft list of needs for the 2019 CMP workshop).
- ***From Jersey City to the New Brunswick-North Brunswick-Piscataway-Franklin corridor*** in Middlesex and Somerset Counties. This corridor includes Rutgers University's main campus, and nearby urban, industrial, and commercial uses. Average transit travel time to access this suburban activity center is 58 minutes plus access to transit using the Northeast Corridor/PATH (From Jersey City to Jersey Avenue), compared to average travel time of 30 minutes via auto using primarily I-95. While this is a direct transit route with travel time under 60 minutes, the difference in travel time may be an equity issue considering zero car households.

Figure 10. Travel Options from Jersey City to New Brunswick/North Brunswick/Piscataway/Franklin Area (Source: NJTPA Connectivity Study)

Connectivity between Transportation Service Payment Systems

The NJTPA region benefits from a wide array of transit and other transportation service providers, and many residents also travel to New York City, as well as use services from the Philadelphia area. While mobility to/from urban areas in New Jersey and to/from New York City and the Philadelphia metro area benefits from a wide array of services, there is a lack of connectivity from the perspective of payment. A lack of a unified one-payment fare system between different agencies such as NJ TRANSIT, PATH, MTA, SEPTA, Amtrak, private carriers and others (including ferries, bike sharing, and others) means that some travelers pay more since their trips connect between systems, compared to if an equivalent fare structure were in place that treated all services as one system. The longer process of payment across systems and need to purchase different fare media also can create inefficiencies with travel. It is important to recognize that developing a universal payment system is complex, as each provider has its own source of operating subsidy, as well as system-specific fare collection processes. However, this issue was identified as a challenge for some regarding regional mobility.

3| ACCESSIBILITY AND MOBILITY WITHIN URBAN AREAS

Context

Local travel within urban areas is characterized by significant transit services, including local buses, light-rail, and Newark subway, as well as a dense network of arterial and local roadways. Urban areas by nature are densely populated with a large number of jobs, and traffic volumes are relatively high in many urban locations because of the concentration of population and employment. In general, the density of development makes urban areas conducive to pedestrian activity, yet these areas have a relatively high number of pedestrian crashes involving fatalities and serious injuries, and bicycle level of comfort is not very high due to traffic volumes.

As centers of economic activity, urban areas also have a large amount of goods movement activity relating to ports, trucking, and rail freight, and there is a need to accommodate freight flows while balancing this need with potential community impacts (for more information, see section on *Freight and Goods Movement*.)

Needs Identified

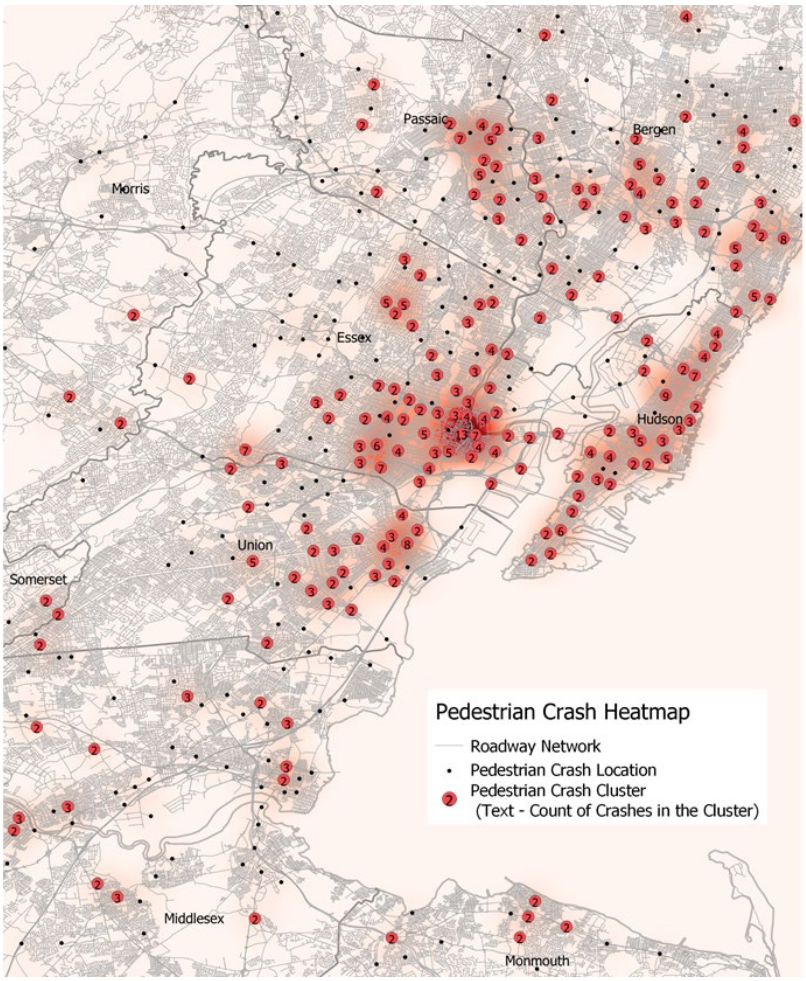
This section identifies possible needs, defined in terms of performance gaps or challenges, as well as potential opportunities for improvements. It is important to note that additional study is needed to consider potential solutions, as well as the feasibility or costs of addressing these problems.

Pedestrian Safety / Infrastructure Needs

While walkability in urban areas generally is good, urban areas have a relatively high number of **pedestrian crashes** that result in fatalities and serious injuries. As shown in Figure 11, among the clusters of such crashes in recent years are those along:

- ***the Market Street / Broad Street area of downtown Newark***
- ***Bloomfield Avenue in Newark through Bloomfield, Glen Ridge, and Montclair***, which has walkable infrastructure and many schools, shops, and businesses; and
- ***JFK Boulevard and Bergenline Avenue***, which are major arterial roadways, in Jersey City, Union City, and North Bergen, and includes a large number of businesses, schools, and transit stops.
- ***New Brunswick Avenue in Perth Amboy,*** and surrounding densely populated sections of Perth Amboy, where challenges include aging pedestrian signals and intersection infrastructure, lack of roadway shoulders, on-street parking, and travel speeds.

Figure 11. Pedestrian Crashes with Fatalities or Serious Injuries, 2014-2018



In addition, there are some parts of the cities with a **lack of adequate pedestrian facilities/crossings**. Examples of areas with possible needs (as identified as part of the draft list of needs for the 2019 CMP workshop) include:

- ***South Kearny***, where residents from throughout Hudson County commute via transit to access light industrial jobs and adequate pedestrian facilities are lacking.
- ***Newark outside of the Central Business District –*** While there are adequate sidewalks in the CBD, the condition and quality of sidewalks could be improved elsewhere in the city.
- ***Along JFK Boulevard in Jersey City***, which is a major arterial roadway extending through the central sections of the city – Pedestrian friendliness is poor, and speeding vehicles have been noted.
- ***Along NJ-440 in Jersey City***, which is a corridor with some new development, including the Hudson Mall. There are connectivity issues for pedestrians, leading to pedestrians trying to cross illegally. Moreover, walking is not comfortable due to the pedestrian unfriendly environment and concerns about speeding traffic. The road divides the community in the West Side of Jersey City from the Hackensack River waterfront.

Opportunities to improve the pedestrian environment also include **more installation of audible pedestrian signals** for visually impaired pedestrians (identified by City of Newark).

Bicycle Safety / Infrastructure Needs

In general, roads in urban areas have a relatively low bicycle level of comfort, due to high traffic volumes on roadways, and limited availability of bike lanes, bike routes, and trails in some areas. The difficulty of biking is compounded with speeding traffic, which creates a danger to bicyclists and pedestrians crossing streets. Within the urban areas, there is often competition for space between new bicycling infrastructure and existing on-street parking. While this can make it challenging to implement new infrastructure, there are opportunities for road diets and complete streets.

Figure 12. Bicycle Level of Comfort and Bicycle Crashes with Fatalities or Serious Injuries, 2014-2018 (Source: NJTPA)

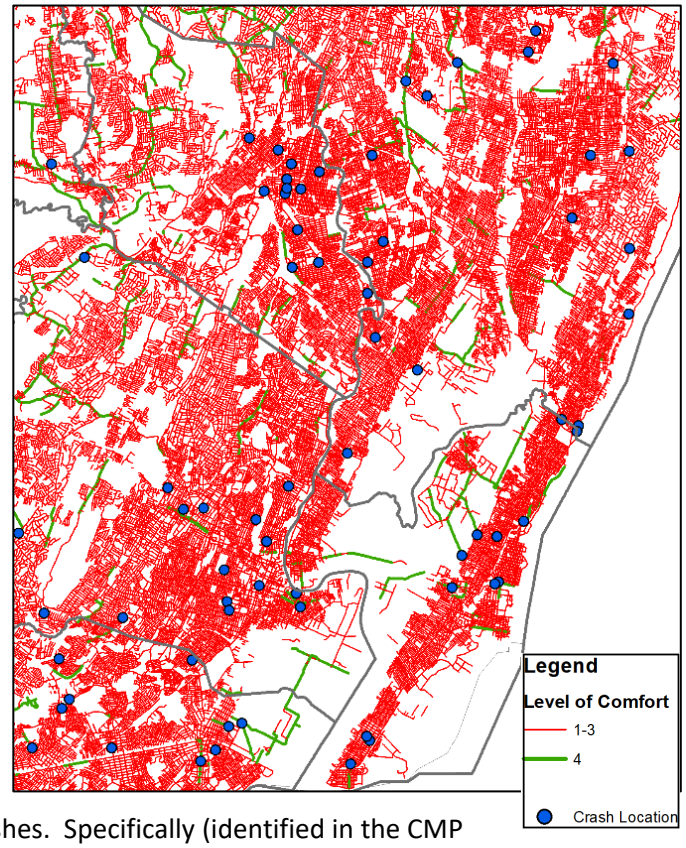


Figure 12 shows travel options with the highest bicycle level of comfort (rated 4, mapped in green), which reflect bike paths and roads with protected bike lanes along roads at 30 mph or less, and other roads with only moderate or low levels of bicycle comfort (mapped in red), along with locations of fatal or serious injury bicycle crashes. Specifically (identified in the CMP workshop):

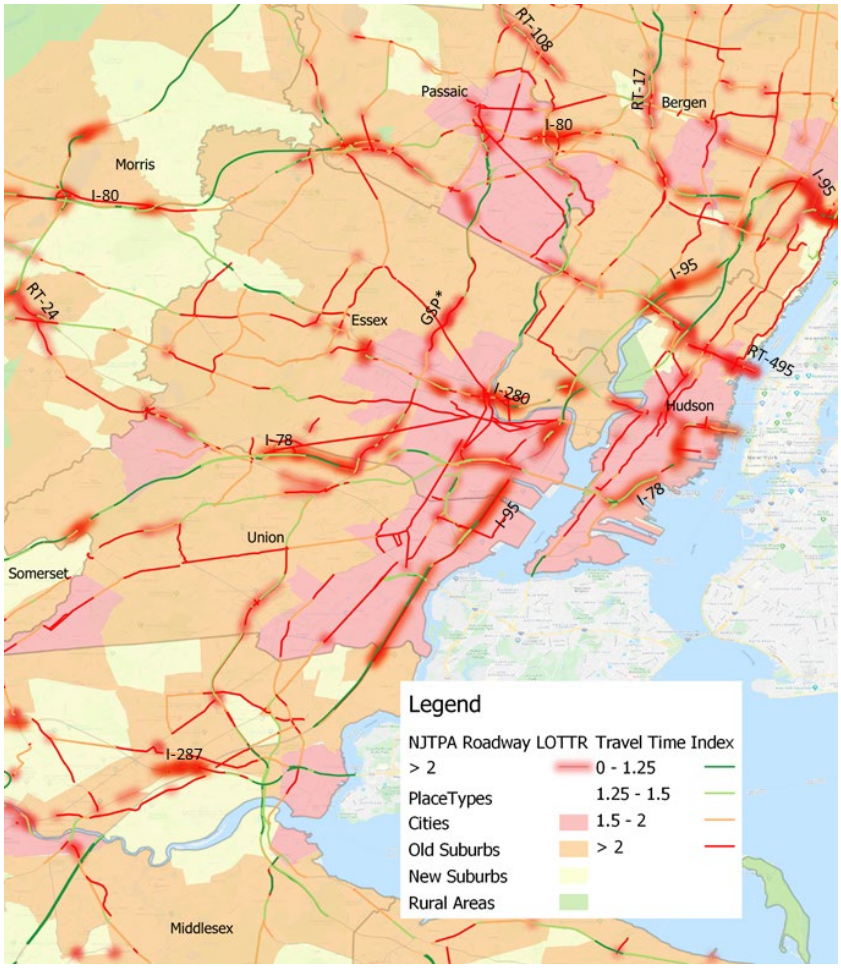
- The ***City of Newark*** has noted a need for increased bicycle infrastructure, speeding enforcement, and traffic calming techniques
- Bicycle and pedestrian safety concerns have been identified in the densely populated residential and supporting commercial areas of ***Hackensack along Prospect Street, Essex Street, Polifly Road and Summit Avenue***. Concerns relate to proximity to roadway access ramps leading to major regional highway corridors including I-80 and NJ Route 17 that attract commuter travel. Areas of identified concern include transit stations and stops, the high school, and particularly around the Hackensack Medical Center (identified as part of the draft list of needs for the 2019 CMP workshop).
- Pedestrian and bicycle safety concerns have been identified along the major travel corridors of ***Palisades Avenue and Anderson Avenue in Cliffside Park and Fort Lee***. Serving densely populated local residential and supporting commercial areas, these county roadways also serve as regional commuter arteries for access to the George Washington Bridge, Weehawken Ferry / Light Rail and the Lincoln Tunnel. Particular areas of concern include schools in the area along with bus stops on the heavily used transit routes serving these roadways (identified as part of the draft list of needs for the 2019 CMP workshop).

Congested and Unreliable Major Roadways

Roadway congestion and unreliability due to accidents, traffic signal timing, and other conditions contributes to both bus reliability issues and creates challenges for drivers in urban areas.

Figure 13 shows roadways in cities and nearby older suburbs that have poor levels of travel time reliability (level of travel time reliability over 2.0) overlaid on travel time index, which reflects congestion during peak periods (travel time index reflects that average peak period travel time in relation to free flow speeds, so a travel time index (TTI) of 2.0 means that it takes twice as long to travel during peak periods (e.g., 20 minutes rather than 10 minutes).

Figure 13. Congestion and Reliability, 2019 (Source: RITIS)



Examples of identified issues within urban areas from the analysis, and as part of the draft list of needs for the 2019 CMP workshop, include:

- ***City of Newark:***
  - ***Congested places along NJ-21 south of downtown Newark*:** Connecting NJ Routes 1&9, I-78, US 22 and I-95 into downtown Newark, NJ-21 serves commuters, students, regional travelers and freight to Newark Liberty International Airport, the nearby Ports of Newark and

Elizabeth, downtown offices and several colleges and universities in the City of Newark. The roadway also provides access to local streets serving many industrial, commercial and warehouse uses nearby, and supports transit access to Broad Street at its southern end. Because this heavily used signalized arterial roadway experiences both recurring and non-recurring congestion, the NJDOT has identified several Congested Places locations for further analysis.

- ***Queuing and delays on Broad Street:*** Extending from NJ-21 to north of I-280, Broad Street is the city's major commercial and bus transit thoroughfare through the downtown CBD. High travel volumes, frequent construction, events and incidents, and on-street parking and deliveries serving businesses are exacerbated by non-optimized signal progression, resulting in severe peak period queuing and delays extending south onto NJ-21 near the I-78/US-1&9/US 22 corridors.

- ***Jersey City***:
  - ***Unpredictable travel times along NJ-139:*** As a heavily traveled arterial roadway by both commercial and commuter travelers connecting NJ Routes 7, 440 and US 1&9 to the Holland Tunnel and lower Manhattan, NJ-139 experiences severe congestion in both directions during peak hours and contains multiple unpredictable segments.
  - ***Unpredictable travel times along Paterson Plank Road***: Paterson Plank Road is an important county arterial roadway connecting the Heights neighborhood of Jersey City south and east to waterfront areas of Hoboken and Jersey City, and providing local access to the Holland Tunnel. The roadway experiences frequent peak period congestion and certain segments have unpredictable travel times.
  - ***Unpredictable travel times and community mobility issues along NJ-440***: Highly congested, several segments of the road have unpredictable travel times. The road divides the community in the West Side of Jersey City from the Hackensack River waterfront, and produces undesirable outcomes with regard to noise and safety.

- ***Other Parts of Hudson County:***
  - ***Unpredictable travel times along NJ-495/NJ-3 in Secaucus, North Bergen, Union City and Weehawken:*** Due to high commuter and commercial vehicle volumes during weekday peak periods and weekend recreational travel to Meadowlands events, sections of these roadways exhibit unpredictable travel times and significant congestion. Also, major bus transit corridors (I-495 hosts XBL), both experience significant routine and incident delays. Opening of the regional American Dream shopping and recreational complex in nearby Bergen County was also identified as a cause of concern.
  - ***Unpredictable travel times along CR-675/Willow Avenue in Hoboken***: Providing direct access to the Lincoln Tunnel to the north and access through the City of Hoboken to the south, this county arterial roadway experiences frequent congestion and unpredictable travel times along several segments.

Bus Reliability and Crowding Issues

Bus services in urban areas face challenges in operations and performance due to heavy traffic congestion on roadways, which can lengthen travel times and lead to on-time performance issues. Many

local buses serving populations in cities have **poor on-time performance** due to roadway congestion. Examples of such corridors are shown in Table 5 and Figure 14.

Table 5. Local NJ Transit Buses with On-Time Performance Under 60%, September 2019 (Source: NJ TRANSIT)

Bus Route	On Time	Early	Late	On Time %
83: Hackensack - JC - Journal Sq	22,573	8,730	12,349	51.7%
96: 18th Street Crosstown	5,893	1,264	3,893	53.3%
378: Newark - Secaucus Express	118	11	88	54.4%
1: Newark	96,728	4,203	76,354	54.6%
86: Union City - JC - Newport Ctr Mall	8,802	1,204	5,082	58.3%
356: American Dream - Secaucus Ju	676	24	448	58.9%

Figure 14. Local NJ TRANSIT Bus Services with On-Time Performance Under 60%, September 2019 (Source: NJ TRANSIT)

In addition, **overcrowded local bus services and local traffic congestion** for buses accessing rail stations in some areas are also challenges. Examples (identified by stakeholders in the 2019 CMP workshop) include:

- ***Overcrowded bus transit accessing Journal Square Transportation Center***: A number of the bus routes serving the Journal Square Transportation Center experience significant overcrowding during the morning and evening peak periods. These capacity constraints are a hindrance to transit trips that originate north and south of the station.
- ***Poor bus travel time on major Newark corridors***: Congestion delays hamper transit operations on roads such as Broad Street, Market Street, and Raymond Boulevard.

Need for Supportive Transit Infrastructure, such as Bus Shelters and Benches

Based on stakeholder feedback, there are needs for bus infrastructure within the urban areas of the region. Examples of concerns include a need for bus shelters in South Kearny. NJ Transit's Bus Shelter program can help to support these needs.

Opportunities for Micro-mobility Options

While there are bikeshares available in the urban core areas, stakeholders have identified that there has not been a cohesive approach to integrating them, and bikeshare efforts are hampered by safety and liability concerns (identified by Hudson County and City of Newark stakeholders in CMP workshop). Jersey City and the City of Hoboken recently announced plans to merge their bikeshare programs. Given the density of the area, there may be other promising opportunities for enhancements to shared micro-mobility options, such as shared bicycles, e-bikes, scooters, and other low-cost mobility options.

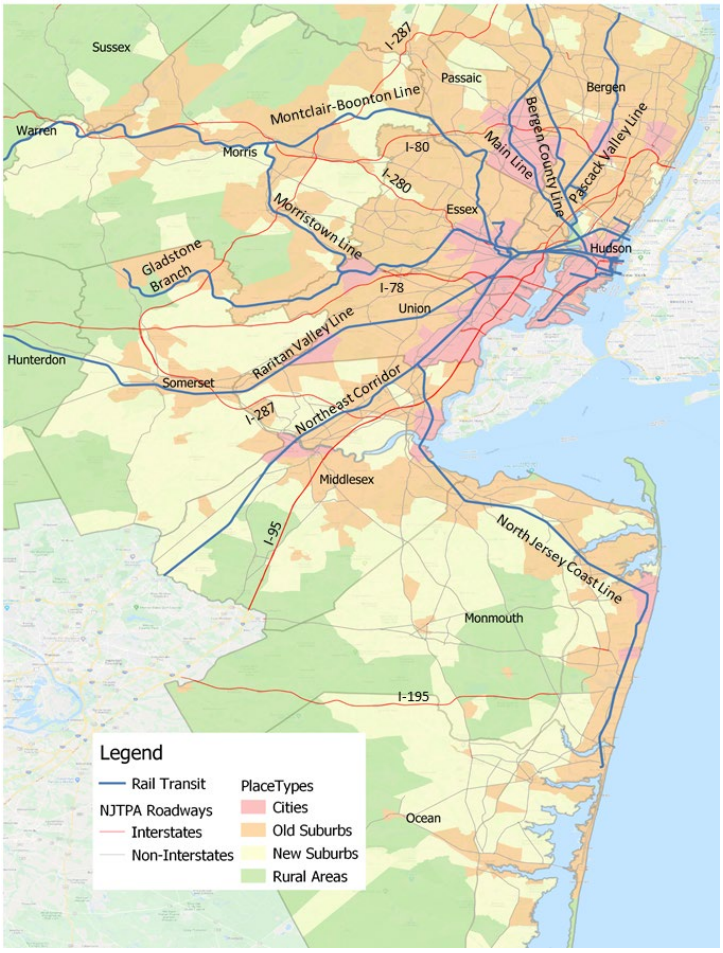
4| ACCESSIBILITY & MOBILITY BETWEEN/WITHIN SUBURBAN AREAS

Context

Northern New Jersey has a wide array of suburban communities, including both older suburban neighborhoods developed post-World War II and newer suburbs. Suburban areas are characterized by large office and industrial parks, retail suburban centers, and residential neighborhoods often disconnected from other land uses, making auto travel more prevalent.

Access to transit is a key factor and differentiator between suburban communities. Suburban communities tend to have lower frequency and coverage of transit services compared to cities and are not as pedestrian-friendly. In many suburban areas, access to and from rail stations and bus stops can be challenging via walking or bicycling. Moreover, many roadways experience significant congestion.

Figure 15. Roadway and Transit Network into the Suburban Areas of North Jersey



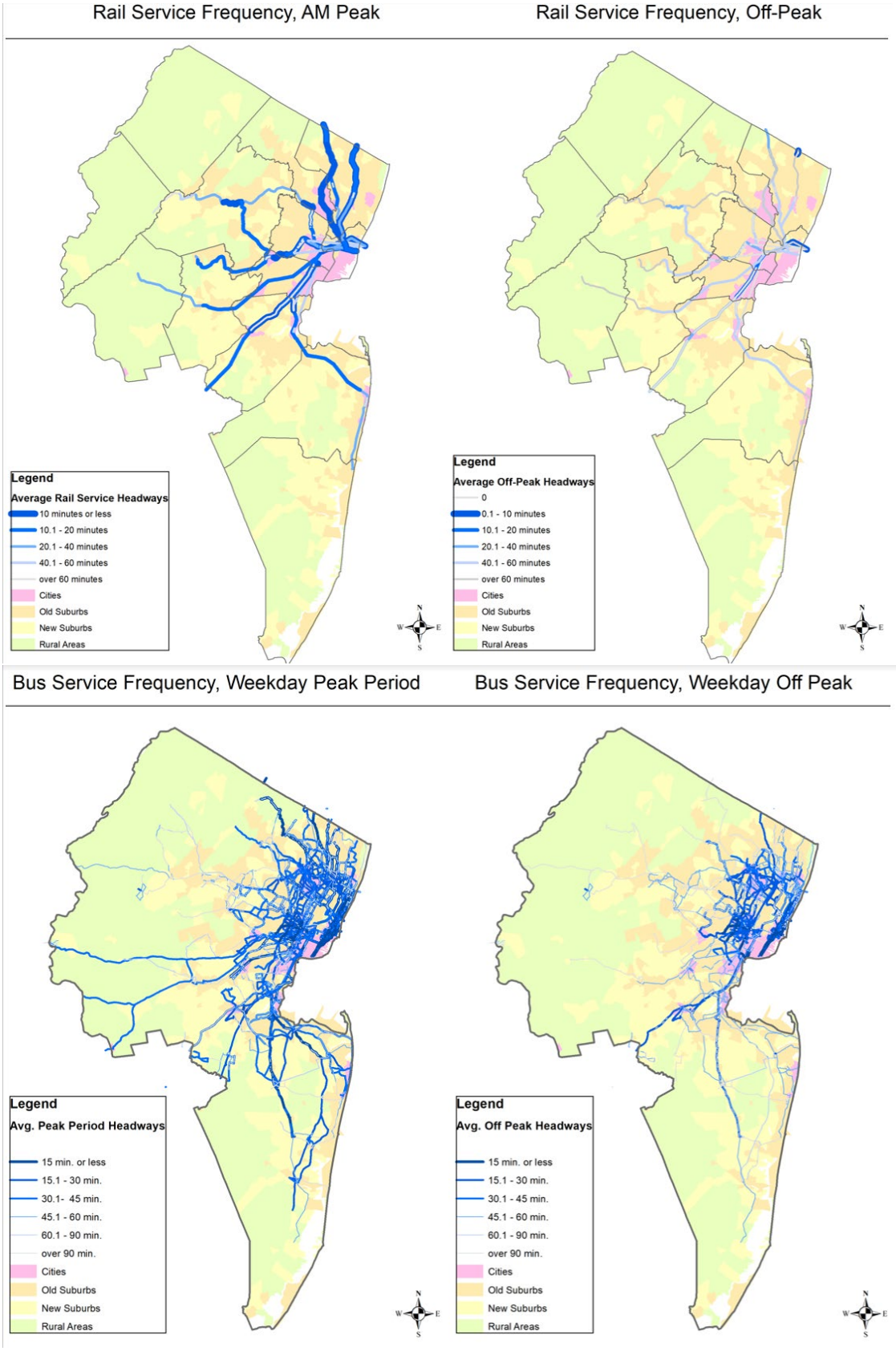
Needs Identified

This section identifies possible needs, defined in terms of performance gaps or challenges, as well as potential opportunities for improvements. It is important to note that additional study would be needed to consider potential solutions, as well as the feasibility or costs of addressing these problems.

Limited Alternatives to Driving, Particularly for Suburb-to-Suburb Travel and Off-Peak Travel

Both bus and rail mostly service cities and older suburbs and are geared toward movement into and out of the urban core, with limited transit services available for suburb-to-suburb trips and during off-peak periods, as shown in Figure 16. As a result, suburban travelers (and urban residents trying to reverse commute to suburban areas) can face challenges accessing suburban destinations without a personal vehicle.

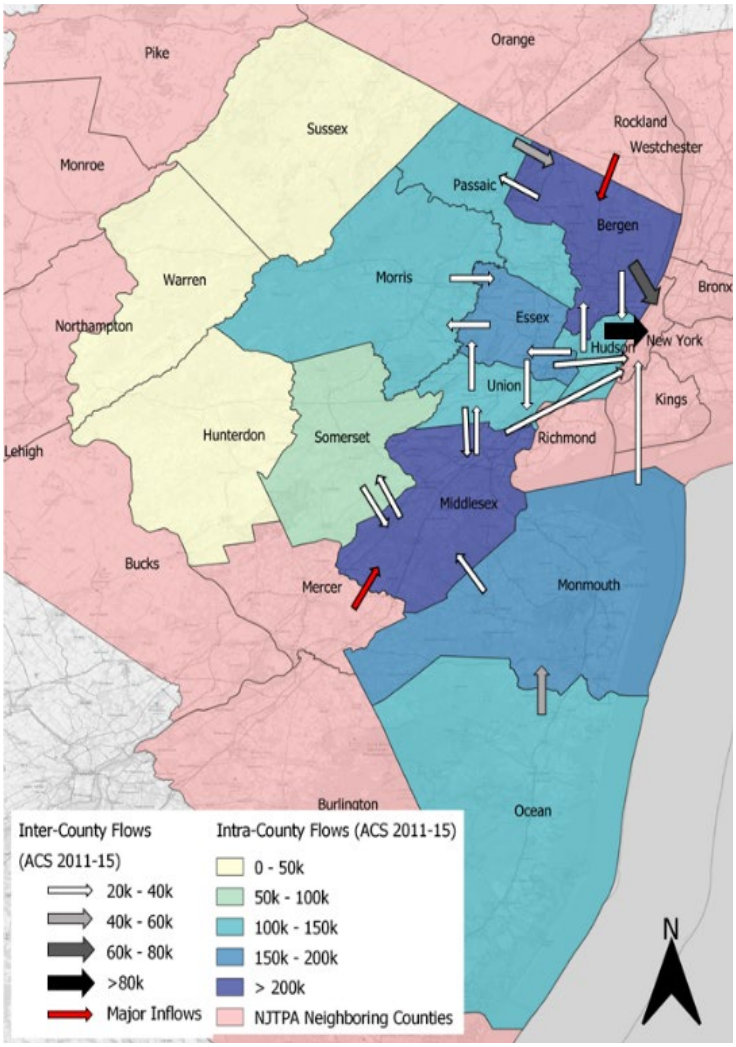
Figure 16. Bus and Rail Service Frequencies (Source: NJRTME Model)



Suburban development is often auto-oriented, has lower densities, and is not very friendly for pedestrians and transit, which are key challenges for providing effective suburb-to-suburb transit services. Based on these factors and overall demand levels, relatively few fixed route transit services are available connecting suburban areas. The **limited alternatives to driving create challenges for households without vehicles and for others to reach suburban destinations,** and also **contribute to traffic congestion**.

While a significant share of commuters travel to jobs in New York City and the large cities in the northeastern part of the region, that there are considerable county-to-county commute flows between some suburban counties and within suburban counties. For instance, Middlesex and Bergen Counties each have over 200,000 daily commuters living and working within their respective counties, as shown in Figure 17, as both these counties have major employment centers, educational institutions, and other trip attractors. Over 20,000 workers commute between Somerset and Middlesex counties each way, yet there are limited transit services that provide direct service connections. Demand-based analyses could help determine if there are additional viable bus routes to serve these suburb-to-suburb trips, recognizing the challenges of serving decentralized suburban areas, and land use analyses could reveal opportunities for more development density to help support such service.

Figure 17. Inter-County and Intra-County Commute Flows (Source: American Community Survey)



Analysis from the NJTPA's System Connectivity Study showing origin-destination pairs found that while transit times from suburban areas to New York City and major cities such as Newark are generally competitive with driving, **transit times from suburb to suburb are not competitive, or transit routes do not exist**. As noted earlier, it is important to recognize that transit would not be expected to be competitive with auto for all trip pairs, and sufficient demand is needed for fixed route transit to operate cost-effectively, which is often lacking in suburban areas. Demand-based analysis for individual corridors, outside the scope of this study, is needed to determine if new transit routes, connections, or alternative service arrangements are warranted in locations where transit travel times are significantly longer than driving.

Based on stakeholder input from the 2019 CMP Workshop, examples of issues include:

- ***Essex County:*** Improved frequency of services is desired. If the level of travel demand does not justify transit due to suburban growth patterns and land use issues, other shared services may be considered.
- ***Middlesex County:*** Although Middlesex County has effective rail access to regional centers including New Brunswick, New York and Newark and a robust county shuttle program, many major shopping, residential and employment destinations located along the US-1, US-9, and NJ-18 corridors lack frequent and direct transit access from areas outside of New Brunswick.
- ***Monmouth County:*** Monmouth County identified that with regional rail and bus transit commuter services heavily oriented to northern New Jersey and Manhattan destinations, only bus routes along the Bayshore on NJ-36, central Monmouth along US-9 and the North Jersey Coast Line rail provide limited and often lengthy reverse peak transit services in the county.
- ***Morris County:*** Transit services have low frequencies, with long headways that are endured by passengers without cars. There is a general lack of service after 6PM. Consequently, it is difficult to access shopping locations, though there is some use of shared Ubers. Additional demand-based analyses can help locate corridors that could justify improvement in evening transit frequencies.
- ***Ocean County:*** There is a need for alternative travel modes other than private automobiles.
- ***Somerset County:*** Somerset has limited local transit service for destination centers such as Bridgewater and the northern parts of Franklin. There is a desire for more shuttle services, including service from Bound Brook/Somerville to New Brunswick. Shuttles for medical access do not go much farther than the county line. There is insufficient density for transit in many locations.

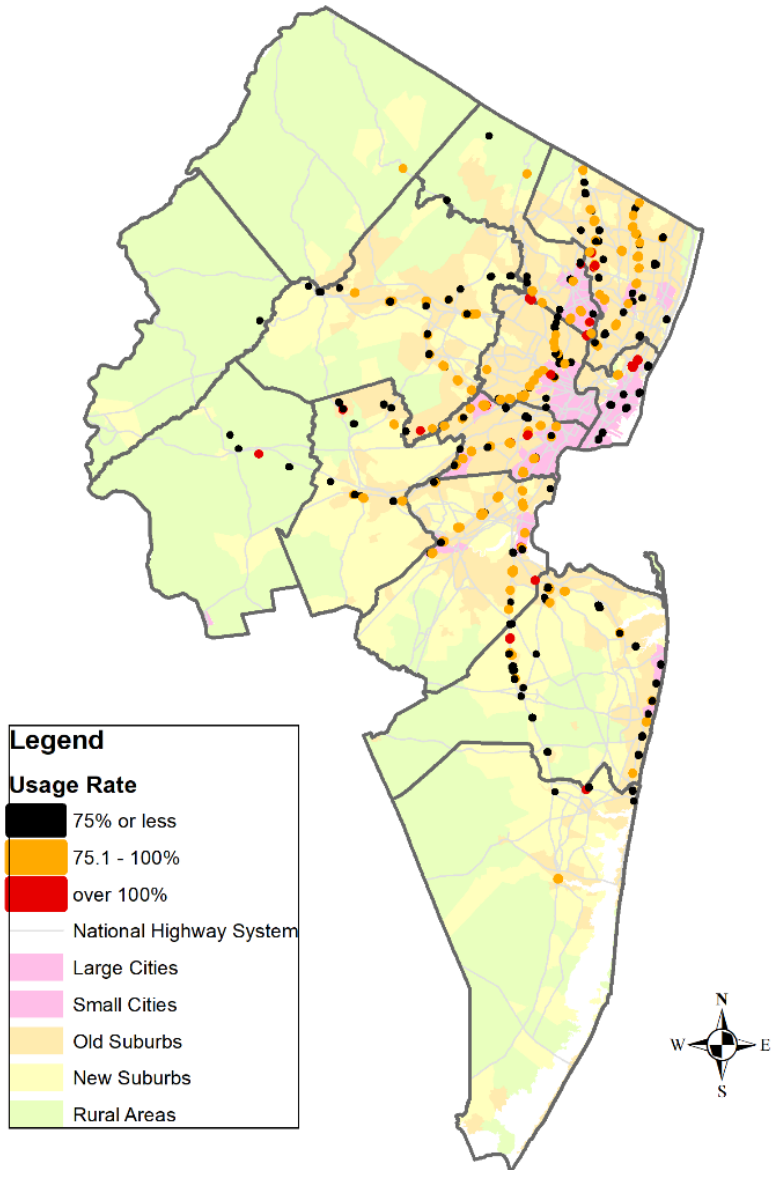
Park-and-Ride Capacity Constraints

In many suburban communities, many NJ TRANSIT Park and Rides facilities have very high demand and often get full, creating constraints on possible transit ridership. Park-and-Ride lots (outside of Hudson County) over capacity (use rate above 100% in 2017) are:

1. Union Hill (Route 9 N & Union Hill Road), Monmouth
2. Passaic (Lackawanna Pl & Barry Pl), Passaic
3. Willowbrook Mall (Rt. 46 & Willowbrook Blvd), Passaic
4. Brick Church (Halsted St), Essex
5. Summit (Broad St & Summit Ave), Union
6. Clifton Commons (Kingsland Ave), Passaic
7. Old Bridge (Matawan Rd & GSP Exit 120 S), Middlesex
8. Dorado (Lanes Mill Rd & Stephan Rd), Ocean
9. Passaic (Passaic Ave & Tom Saba Square), Passaic
10. Hawthorne (Washington Ave & Washington St), Passaic
11. Linden (Wood Ave & Linden), Union
12. South Orange (W 3rd St & New Waterlands Park), Essex
13. Lebanon (Railroad Ave & Central Ave), Hunterdon
14. Glen Rock Boro Hall (Glen Ave & West Plaza), Bergen

15. Peapack (Holland Ave), Somerset
16. Stirling (Central Ave & Elm St), Morris
17. South Amboy (Augusta St & Mason Ave), Monmouth
18. Cranford (South Ave & High St), Union
19. Radburn-Fairlawn (two facilities: Pollitt Dr & Fair Lawn Ave, Fairlawn Ave), Bergen
20. Roselle Park (West Lincoln Ave & Chestnut St), Bergen

Figure 18. Park and Ride Facility Utilization Rates, 2017
(Source: NJ TRANSIT)

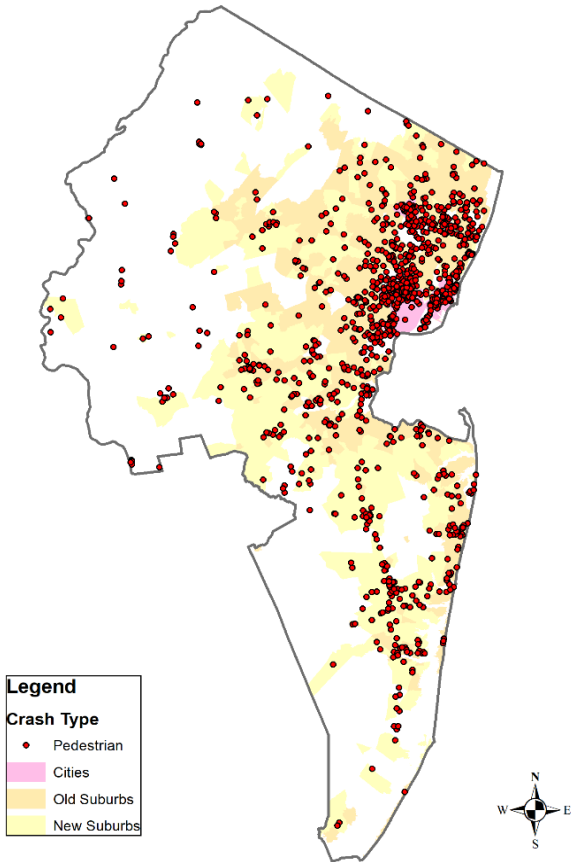


First-Mile/Last-Mile Challenges in Accessing Transit, Pedestrian & Bicycle Safety and Infrastructure

Beyond parking constraints, many transit stations are not walkable or easily bikeable. More generally, bicycle and pedestrian safety are issues in many suburban communities. Significant numbers of pedestrian crashes with fatalities or serious injuries have occurred in suburban areas. For example, a significant number of these crashes occurred along the US-9 corridor in Monmouth and Ocean Counties.

Examples of general bicycle/pedestrian issues are noted below.

Figure 19. Pedestrian Crashes with Fatalities and Serious Injuries, 2014-2018



- ***Middlesex County:***
  - ***Pedestrian / bicycle safety near Rutgers University New Brunswick/Piscataway Campuses***: There are high rates of pedestrian crashes along roadway corridors serving Rutgers University campuses, along with challenges including vehicle volumes, travel speeds, lack of roadway shoulders or bike lanes, on-street parking and driveways.
- ***Monmouth County:***
  - ***Freehold Area bicycle access*****:** Although the southern terminus point for the Bayshore Rail Trail ends at the northern end of Borough, there are no bicycle lanes in downtown Freehold nor connections to outlying areas and attractors at the Monmouth Battlefield State Park, Freehold Township or Manalapan.
- ***Morris County:***
  - ***Pedestrian crashes in downtown Morristown*****:** There is a cluster of pedestrian crashes in and near downtown Morristown, although there is highly walkable infrastructure. The immediate vicinity has multiple schools and transit stops which can contribute to the number of vulnerable pedestrians.
- ***Somerset County:***
  - ***Pedestrian/bicycle safety along NJ-27 and NJ-28:*** There are many pedestrian crashes along NJ-28 in Somerville and Bound Brook, as well as along SR-27, especially in the northern part of Franklin and the Kendall Park area.

Congested and Unreliable Major Roadways

Roadway congestion and unreliability due to accidents, traffic signal timing, and other conditions contributes to bus reliability issues and challenges for drivers in suburban areas. Figure 20 and Figure 21

show unreliable and congested road segments in suburban areas in the northern and southern parts of the region, respectively, while the following two figures show roadway unreliability in relation to bus routes.

Figure 20. Unreliable and Congested Road Segments, Northern Suburban Areas (Source: RITIS)

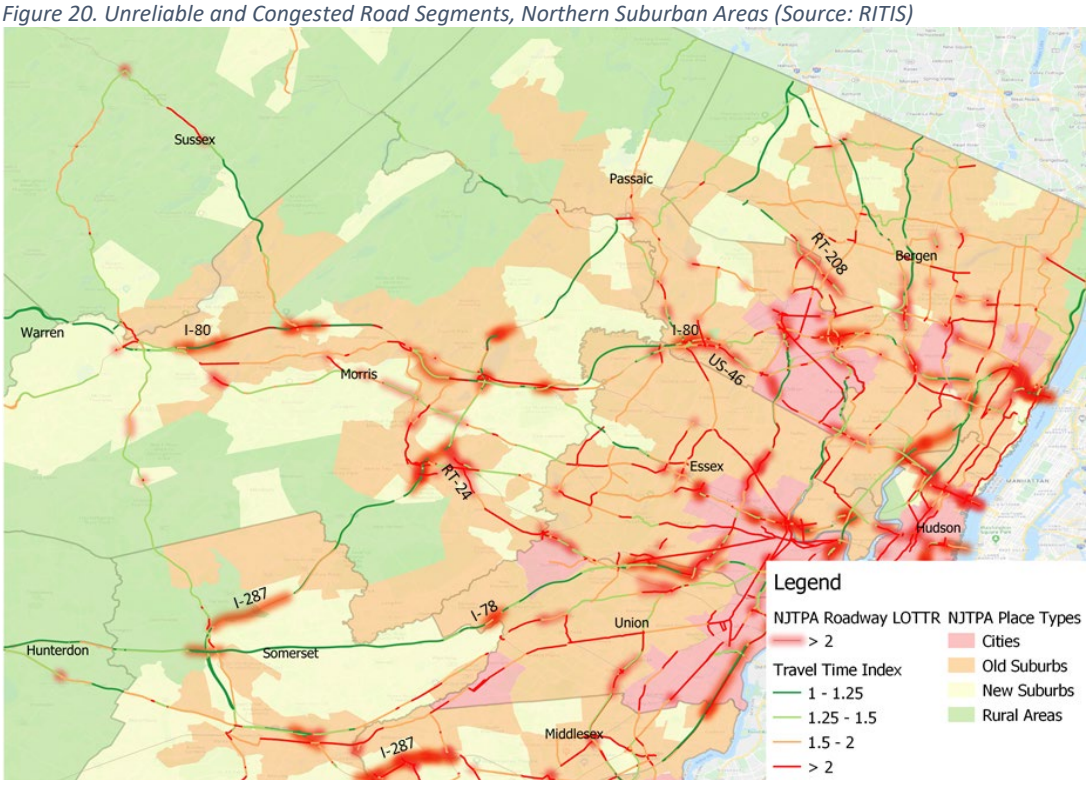


Figure 21. Unreliable and Congested Road Segments, Southern Suburban Areas (Source: RITIS)

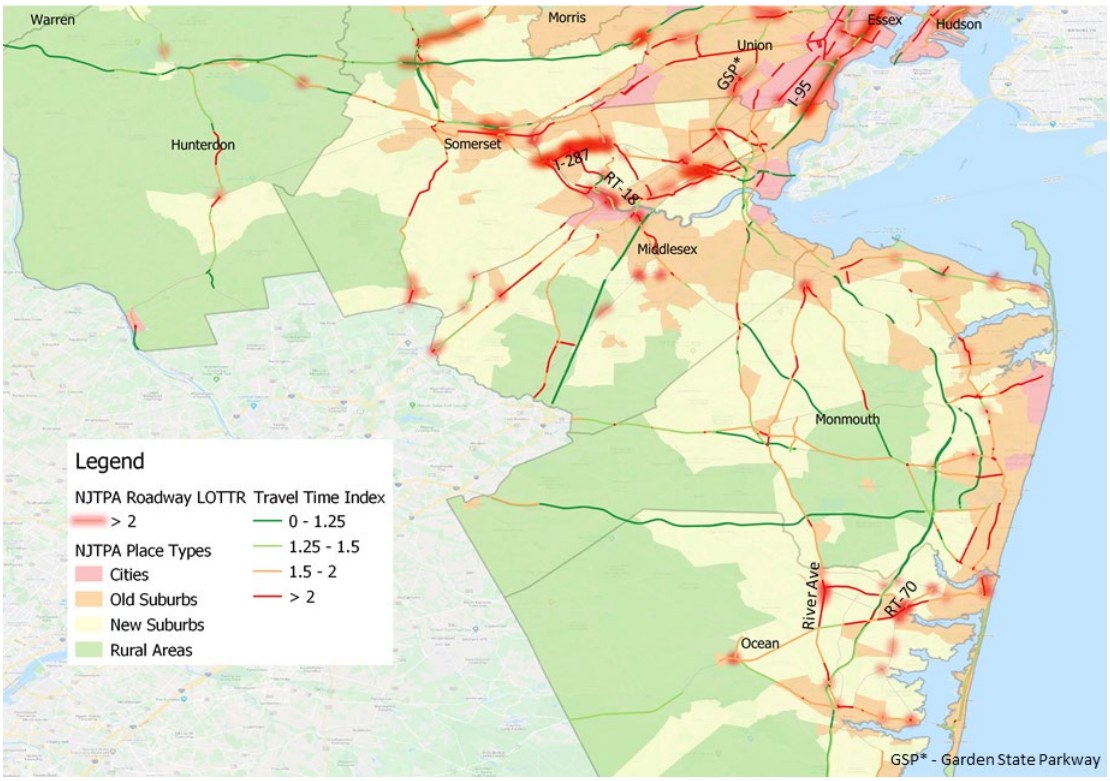


Figure 22. Unreliable Road Segments overlaid with the Bus Transit Network, Northern Suburban Areas (Source: RITIS, NJRTME Model)

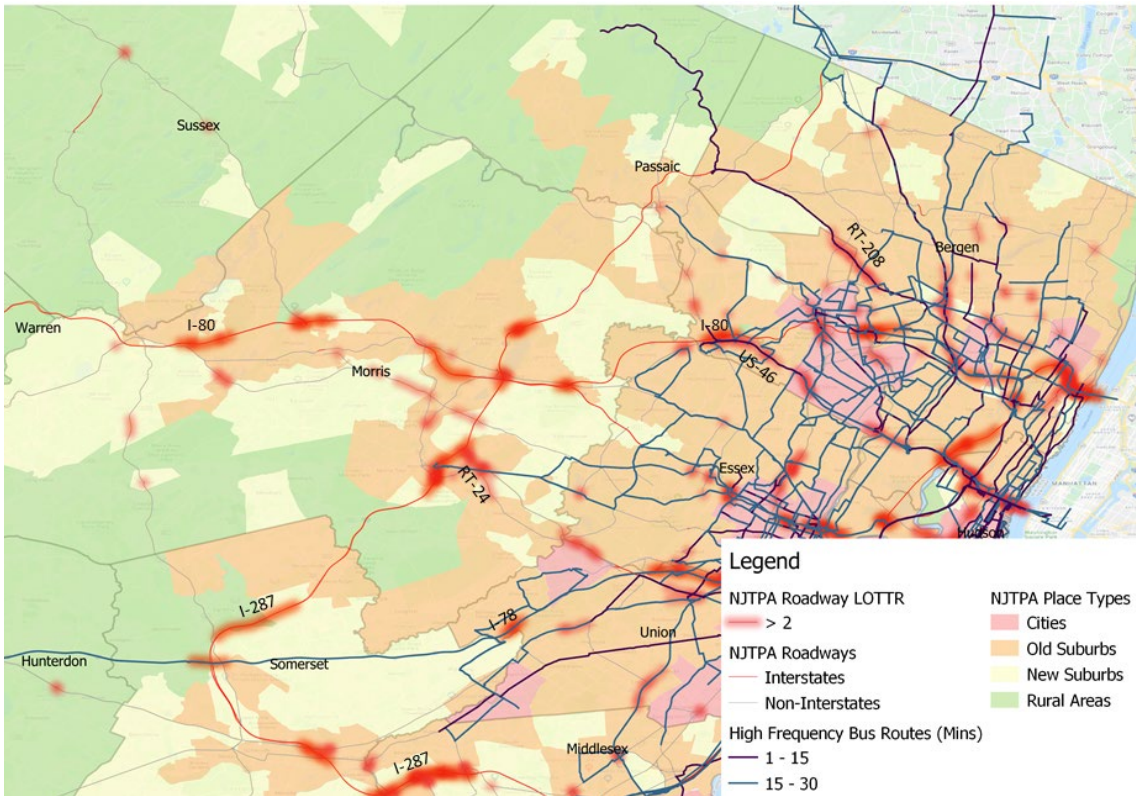
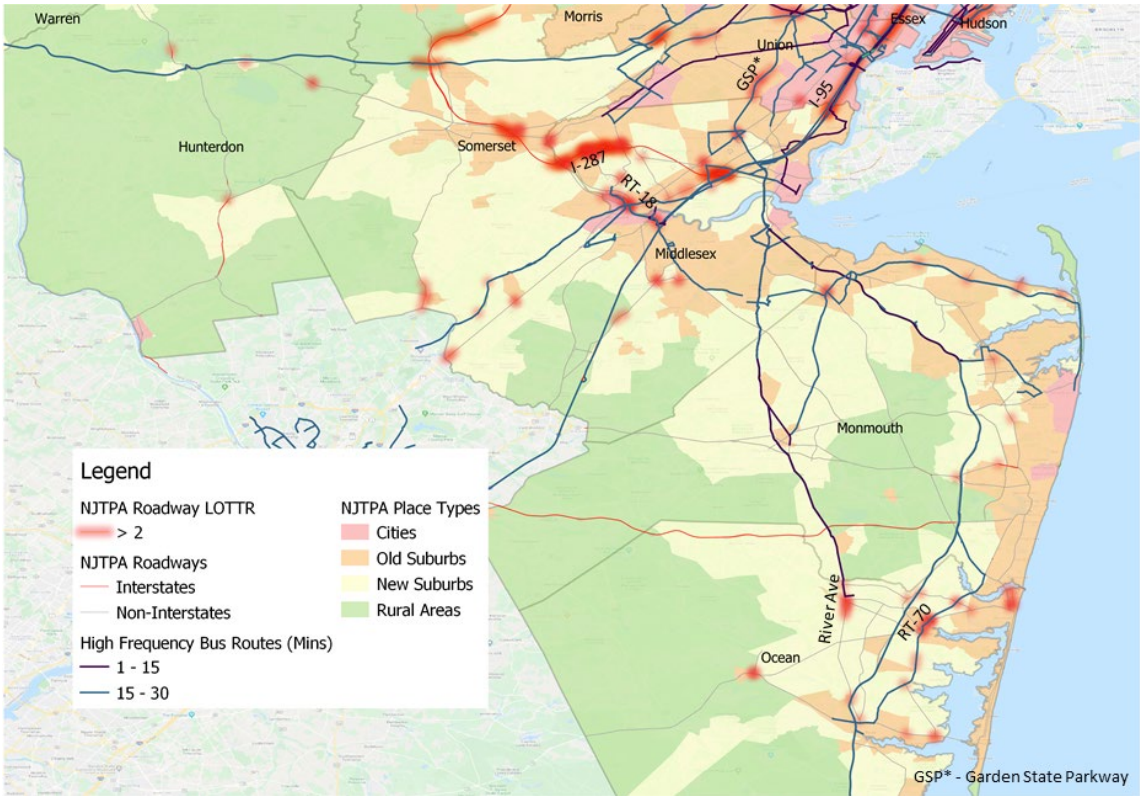


Figure 23. Unreliable Road Segments overlaid with the Bus Transit Network, Southern Suburbs (Source: RITIS, NJRTME Model)



Unreliable and congested roadways include (Based on 2019 RITIS NPMRDS LOTTR Metric and Travel Time Index) include:

- ***I-287***, at many points:
  - ***Near I-287's convergence with I-80, NJ 10 and NJ 24 in Morris County***: I-287 serves many of northern New Jersey's major employers located in the Morristown, Parsippany-Troy Hills and Hanover areas of Morris County, and is also a major regional truck corridor.
  - ***Near the interchanges in Bernards, Far Hills, Bedminster, Bridgewater, Franklin (interchange with Easton Ave and interchange with Weston Canal) and along I-78 interchange area in Somerset County*****,** with many warehouses within 10 minutes of the interstate and access to commercial, industrial, and office employers.
  - ***Between Piscataway and South Bound Brook, including interchanges in Piscataway, South Plainfield, and Edison in Middlesex County*****,** providing access to commercial, industrial and office employers located in the Piscataway, South Plainfield, Edison and Woodbridge areas and is a major commuter travel corridor accessing Staten Island via the Outerbridge Crossing.
- ***I-80 between Parsippany and Roxbury Township***: A major east-west interstate corridor serving commuter, freight, and recreational travel oriented to both trans-Hudson and Morris County employment, warehouse and commercial locations; high travel volumes, especially during peak hour periods, contribute to recurring and non-recurring bottlenecks and unpredictable travel times, further magnified by interchanges and convergence with other regional roadways.
- ***NJ-10 in Morris Plains/Hanover/Parsippany*****:** This multi-lane divided east-west state arterial roadway provides access to many retail, commercial locations and employment centers.
- ***NJ-208 from Midland Park to Fairlawn***
- ***Near Meadowlands/American Dream*****:** Located adjacent to the Meadowlands Sports Complex along peak weekend event congestion along NJ Routes 3, 120 and 17**.**
- ***NJ-18 in North Brunswick and East Brunswick***, which is a divided highway linking Middlesex and Monmouth Counties, and includes freight congestion on the section that links the NJ Turnpike to US-1.

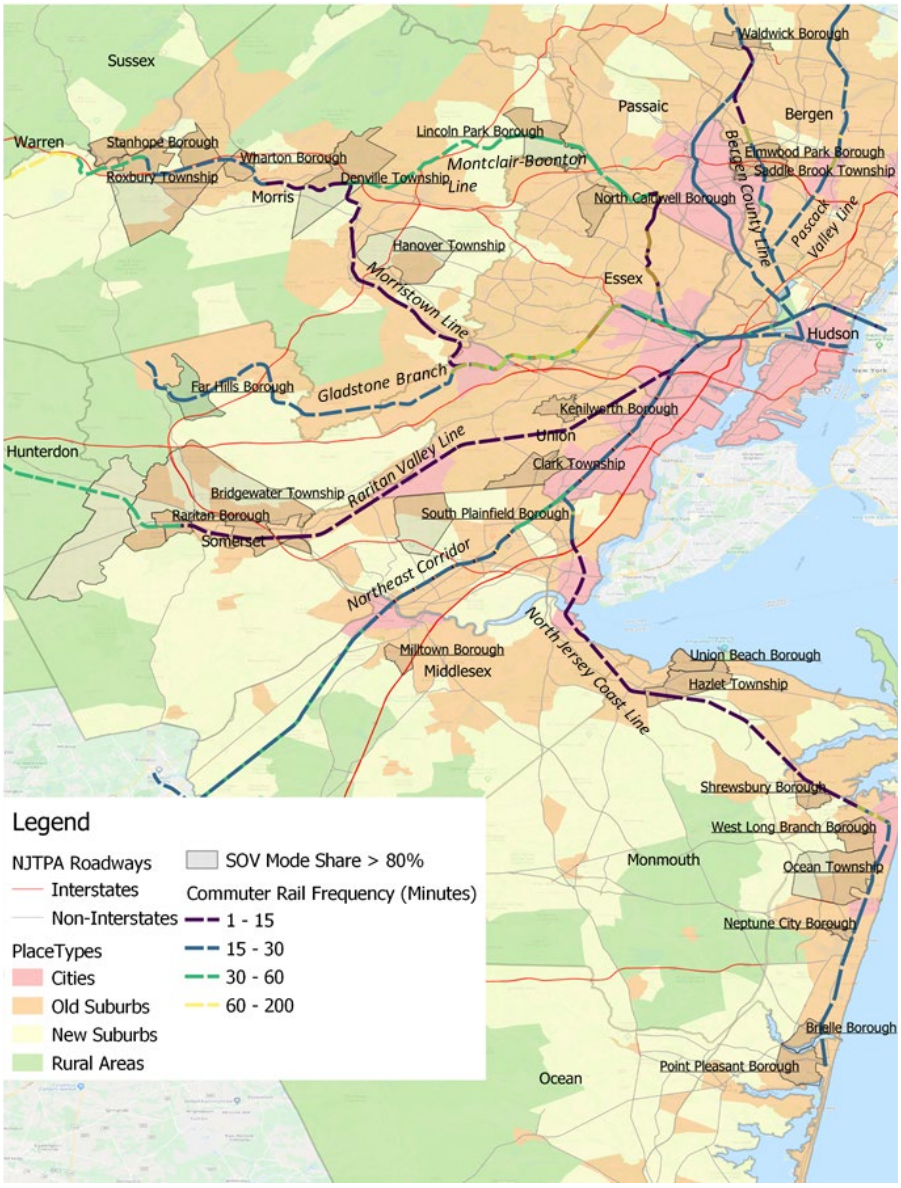
Opportunities to Reduce Single-Occupant Vehicle Travel through Transit-Oriented Development and Other Strategies

While some suburban areas are auto-oriented, there are many suburban communities located near rail lines that create opportunities to reduce reliance on single-occupant vehicles (SOVs). Some suburban areas along rail lines have a relatively high SOV mode share, suggesting that there may be untapped opportunities to bring more people onto transit, via transit-oriented development, more frequent transit service, better first-mile/last-mile connections to transit, or other options. These opportunities would need to consider transit crowding and how bringing more people onto transit would relate to needs for additional core transit capacity. Examples of these areas include:

- ***Roxbury Township, Wharton Borough, Denville Township, Hanover Township, Lincoln Park and North Caldwell Boroughs*** along the Morristown and Montclair-Boonton Lines;
- ***Raritan Borough, Bridgewater Township, and Kenilworth Borough*** along the Raritan Valley Line;
- ***Clark Township and South Plainfield Borough*** between the Raritan Valley Line and Northeast Corridor;

- ***Waldwick and Elmwood Park Boroughs and Saddle Brook Borough*** along the Bergen County Line; and
- ***Several areas along the North Jersey Coast Line***, including Hazlet Township, Union Beach Borough, Shrewsbury Borough, West Long Branch Borough, Ocean Township, Neptune City Borough, and Brielle and Point Pleasant Boroughs.

Figure 24. Suburban Areas with SOV Mode Share over 80% located along Rail Lines (Source: American Community Survey)



Need for Supportive Transit Infrastructure, such as Bus Shelters and Benches

Based on stakeholder feedback, there are needs for bus infrastructure within the suburban areas of the region.

5| ACCESSIBILITY & MOBILITY BETWEEN/WITHIN RURAL AREAS

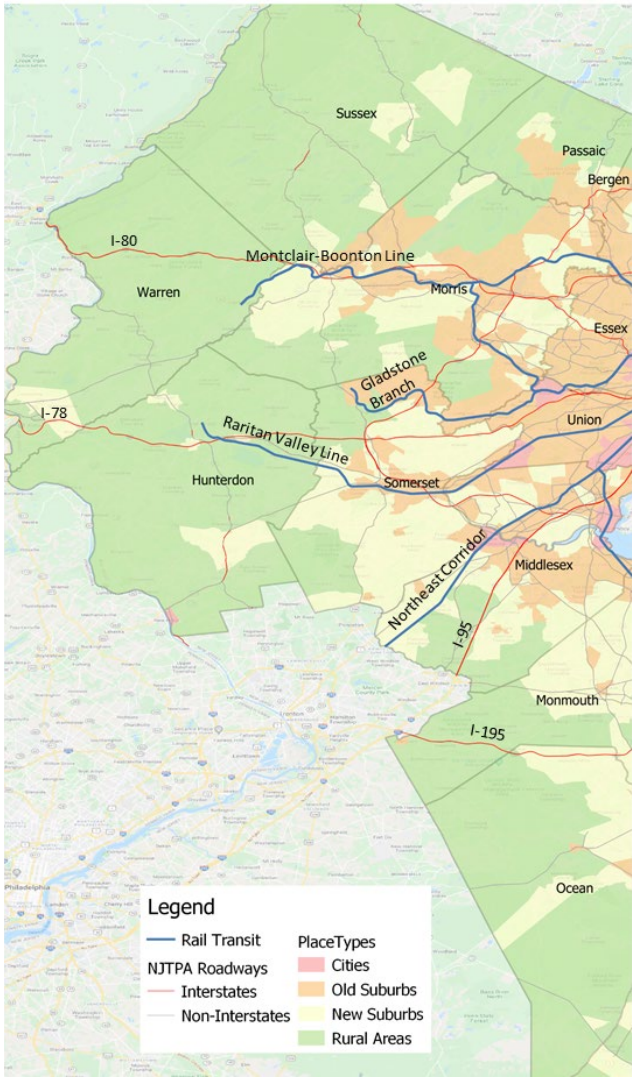
Context

Northern New Jersey has a substantial amount of area that is classified as rural. In some cases, these areas are somewhat like newer suburban areas, with office and business parks, retail centers, and residential neighborhoods, but the uses are even more dispersed and lower-density than in suburban areas.

Similar to suburban areas, multi-modal transportation options (public transit, walking, and bicycling) are limited, and automobile travel is even more predominant. Rural areas have very low coverage and frequency of transit service due to low population and employment densities, which also makes walking or bicycling impractical in most cases.

Transit services connecting rural and vacation areas are limited. These services tend to be regional or interregional rail or bus, commuter routes connecting densely populated and commercially developed points that pass through rural areas, local circulator routes that serve populations without autos, or niche services targeting specific markets.

Figure 25. Roadway and Transit Network in the Rural NJTPA Region



Needs Identified

This section identifies possible needs for rural areas, defined in terms of performance gaps or challenges, as well as potential opportunities for improvements. It is important to note that additional study is needed to consider potential solutions, as well as the feasibility or costs of addressing these problems.

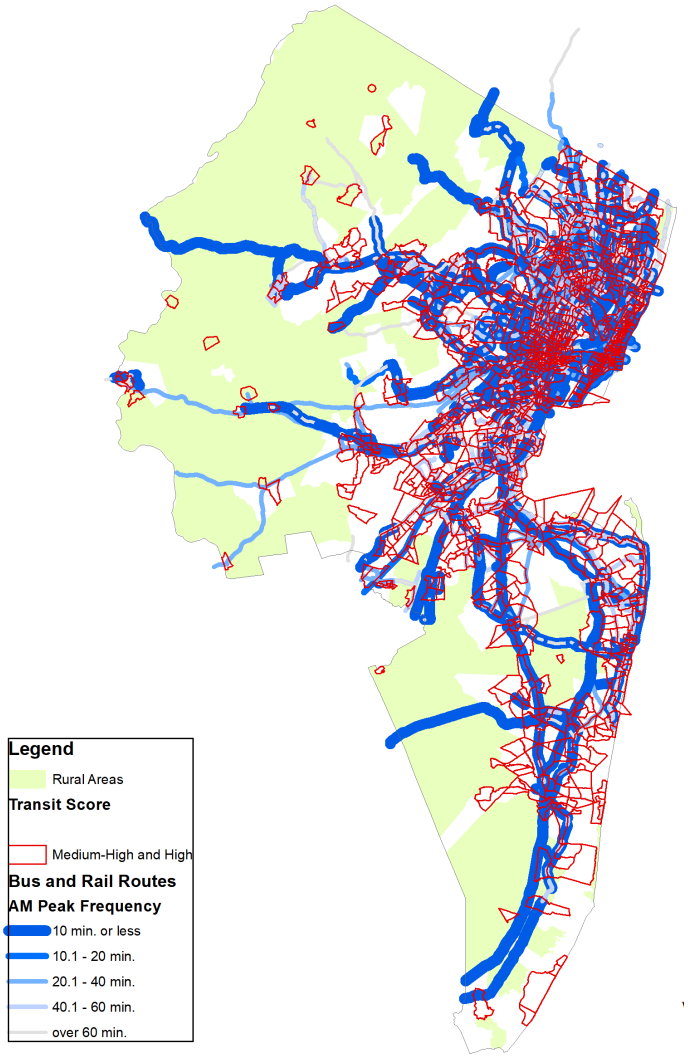
Targeted Transit Needs/Opportunities

As per the Transit Score Index, most rural areas do not have the propensity to support fixed-route public transit service, and correspondingly current transit service in rural areas is limited. However, a few towns in rural communities have a medium or higher Transit Score and do not have transit service. These areas include Branchville, Franklin, and Sussex in Sussex County, and Alpha, Belvidere, and Washington in Warren County. Also, as in other areas, there may be transit service needs for various trip types for low-income persons, elderly persons, and disabled persons, among others.

Based on the 2019 CMP Workshop, examples of these issues include:

- In Sussex County, ***Andover*** will be served in the future by a NJ TRANSIT rail extension. However, there is no current local Skylands Ride transit service to Andover, so this will be a need when the rail station opens.
- In Warren County, ***Hackettstown*** is served by NJ TRANSIT rail and regional bus but lacks last-mile connectivity for people residing in the area, such as a local bus service (identified as part of the draft list of needs for the 2019 CMP workshop).
- In Hunterdon County, ***Flemington*** area residents currently have only one regional bus option for travel to New York City, and there is no direct transit access to Newark or Newark Liberty International Airport (identified as part of the draft list of needs for the 2019 CMP workshop).

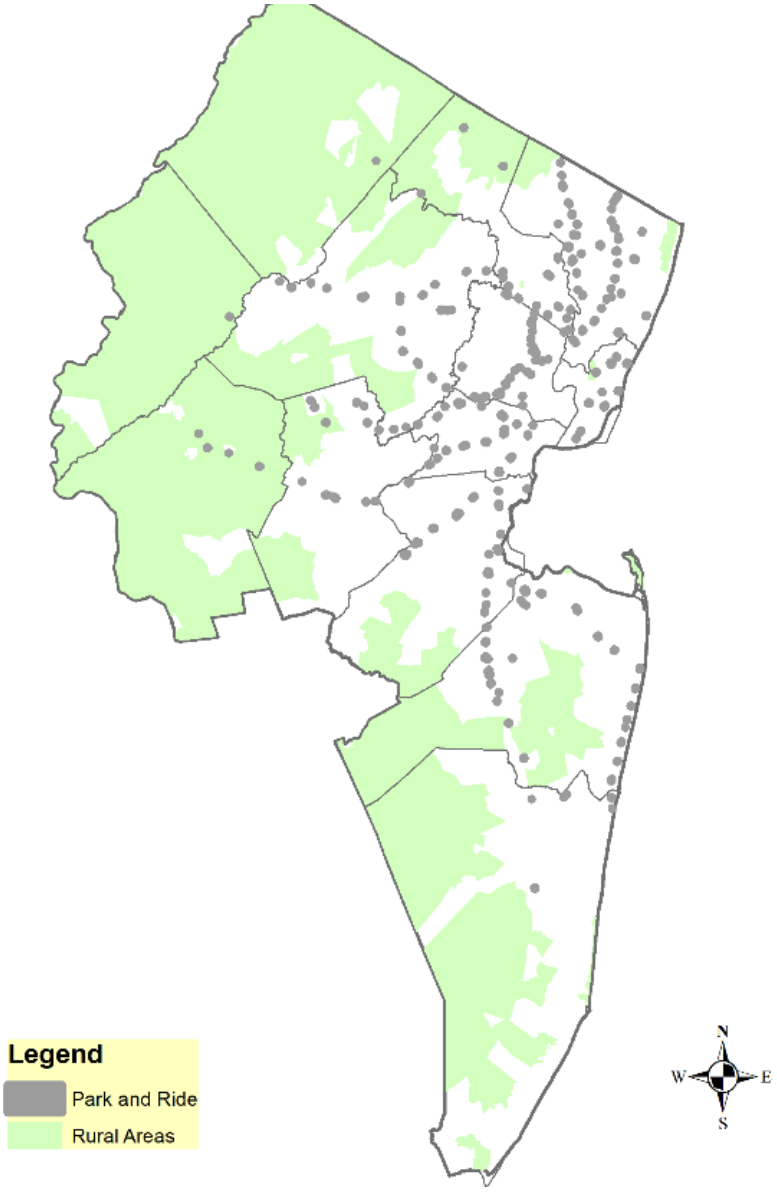
Figure 26. Transit Score and Transit Frequencies (Source: NJTPA, NJRTME)



Park and Ride Availability

Very few park-and-ride facilities are available in rural areas. While several park-and-ride lots are located along the NJ TRANSIT Raritan Valley Line in Hunterdon County, there are few others in rural communities and residents may need to drive further distances into facilities located in closer-in suburban communities. Increased park-and-ride capacity might be viable in some areas and allow for increased commuter bus lines and general ridesharing opportunities. Demand analysis would be needed to assess viability and the specific locations for potential facilities.

Figure 27. Park and Ride Facilities in Rural Areas (Source: NJ TRANSIT)



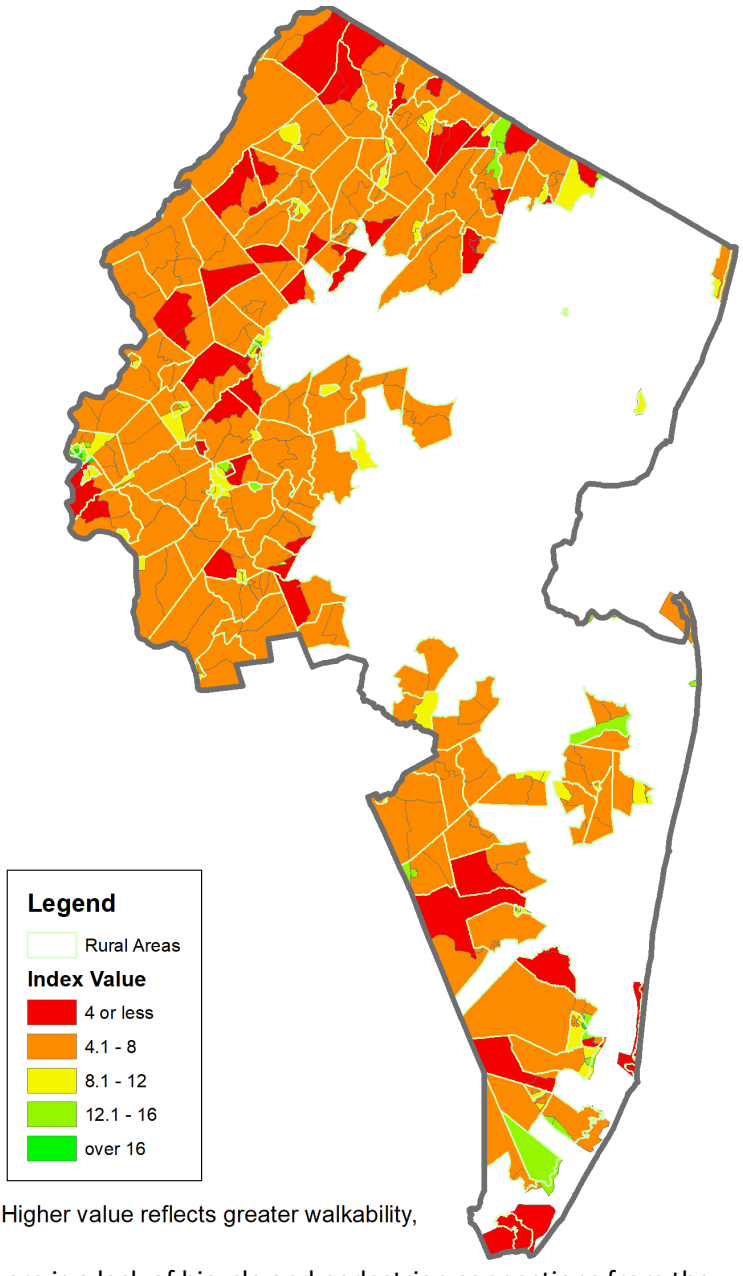
Pedestrian and Bicycle Safety and Infrastructure

Because of the relatively low development density, rural areas typically have low walkability. Even some downtown areas such as Flemington, Newton, and Sparta have limited pedestrian and bicycle facilities within the town and with neighboring communities. The lack of sidewalk networks has led to some concerns over pedestrian access and safety, especially to destinations such as schools.

Examples of specific needs identified by stakeholders include:

- In ***Sussex County***,
  - Although the town centers of Newton and Sparta have greater population and employment density than most areas of the county, pedestrian and bicycle facilities in the towns and connections to neighboring communities are limited.
  - Newton for instance, has pedestrian activity but missing links on US-206 by the Walmart.
  - In Sparta, Main Street has sidewalks, but there are missing links on CR-517.
- In ***Warren County***:
  - Walkability is limited due to the rural nature of much of the county in areas outside of Phillipsburg. There are no bicycle lanes in the Phillipsburg/Alpha area or along NJ-57.
- In ***Hunterdon County***:
  - Although Main Street in Flemington is a vibrant commercial area, a number of pedestrian crashes have occurred, and there is a lack of bicycle and pedestrian connections from the Flemington downtown area to the many destinations along the nearby NJ-31 corridor.

Figure 28. Walkability in Rural Areas (Source: National Walkability Index, U.S. Environmental Protection Agency)



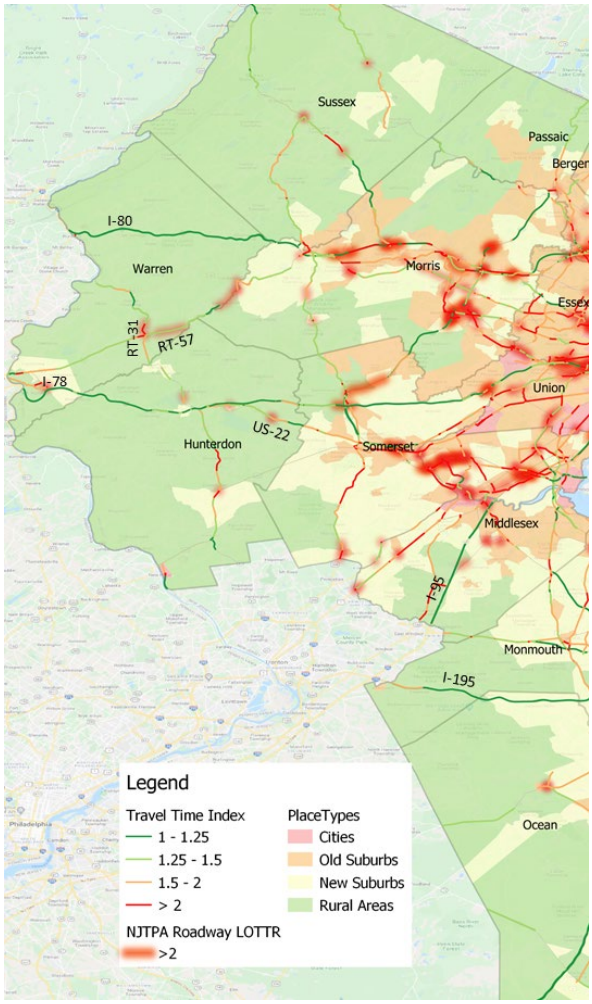
Higher value reflects greater walkability,

- Main Street (NJ-173) in Clinton has shown a high level of pedestrian crashes, and is a major road in the borough providing access to the elementary and middle schools and commercial areas.

Roadway Reliability and Safety Issues

Roadway congestion and unreliability due to accidents, traffic signal timing, and volumes is less an issue in rural areas than in other areas, but there are still some roadways with poor reliability in rural areas. Figure 29 shows unreliable roadway segments based on the Level of Travel Time Reliability (LOTTR) metric derived from RITIS NPMRDS. This map highlights concerns about unreliable travel on segments of NJ-31 and NJ-57 in Warren County in particular.

Figure 29. Reliability and Congestion in Rural Areas (Source: RITIS)



Specific examples of these needs identified by stakeholders include:

- In ***Sussex County***:
  - There are high levels of congestion at places along ***NJ-15 in Sparta and Lafayette Townships***, as this arterial roadway handles increasing commuter and recreational travel.
  - Other roads with congestion and unpredictable travel times include CR-521 in Hampton Township and along US-206 in Newton and Hampton Townships.
- In ***Warren County***:
  - ***NJ-57*** has multiple segments with unpredictable travel time reliability and some congested locations; this is a two-lane arterial connecting the US-46 corridor near Hackettstown to the US-22 corridor in Philipsburg.
  - Other identified problem areas include parts of ***US-22***, given the limited number of east-west roads through this growing area of Warren County, and along I-80 in Knowlton, where heavy weekend recreational travel to Delaware Water Gap and Pocono destinations (weekend values for LOTTR are not specifically shown on map) contribute to unpredictable travel times in Knowlton approach the Delaware Water Gap.
- In ***Hunterdon County***:
  - Non-recurring delays occur at ***NJ-31, NJ-173, and CR-626 intersection*** by middle school in Clinton Borough; travelers from NJ-173 going to the middle school need to make a left turn with poor visibility onto CR-626.
  - Non-recurring delays on ***NJ-31*** north of the Flemington Circle occur due to volume and lane geometrics.

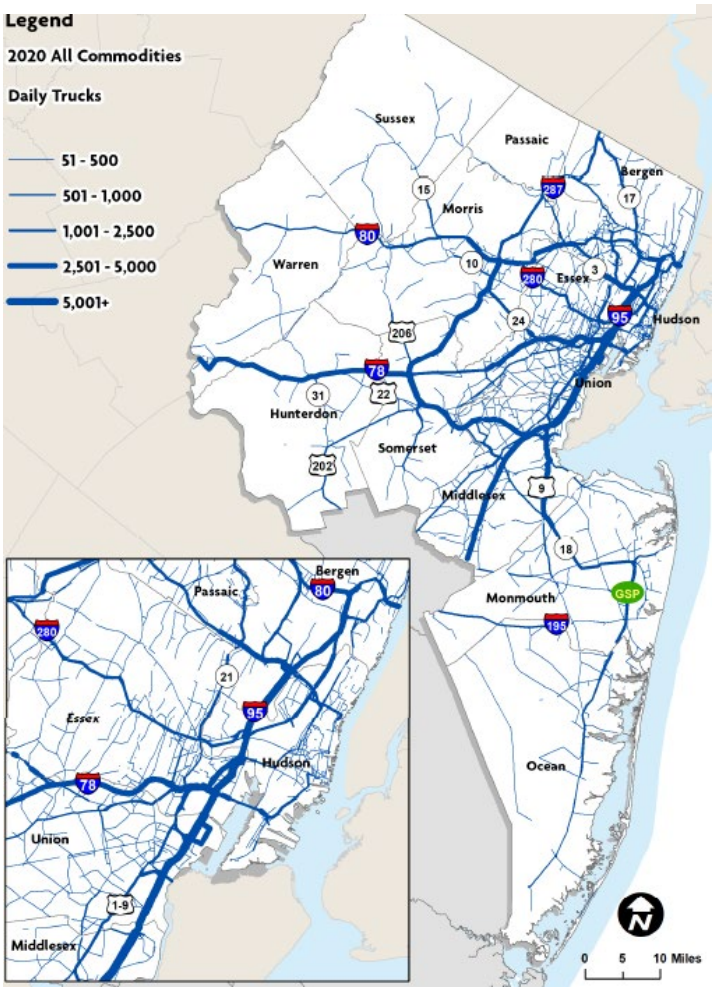
6| FREIGHT TRANSPORT

Context

Reflecting the unique needs associated with goods movement, this section describes freight-related mobility issues and needs. Given the importance of freight movement at different scales, this discussion reflects issues and needs related to both regional movements (across interstates and via rail/port), as well as local freight accessibility. Key components of the region's freight system include:

- The Port of New York and New Jersey, which is the home of the largest container port on the Atlantic seaboard.
- Rail, with the region served by two Class I railroads, CSX and Norfolk Southern.
- Air, via Newark Liberty International Airport, which was the 11th ranked air cargo airport in North America in 2018 (Source: Airports Council).
- Trucking, using the region's interstates and roadway network, with over 5,000 commodity trucks each day in each direction on segments of the New Jersey Turnpike and I-78 (see Figure 32).
- Industrial properties, with northern and central New Jersey having one of the leading concentrations in North America with over 833 million square feet of industrial properties in the first quarter of 2020 (Source

Figure 30. Overview of Truck Flows in the NJTPA Region (Source: NJTPA)



It is important to recognize that freight activity affects community mobility issues, including the environment for pedestrian and bicyclists, as well as drivers. Due to its location within the Northeast Corridor, the North Jersey region has a large amount of goods movement activity relating to ports, trucking, and rail freight, and there is a need to accommodate freight flows while balancing this need with potential community impacts.

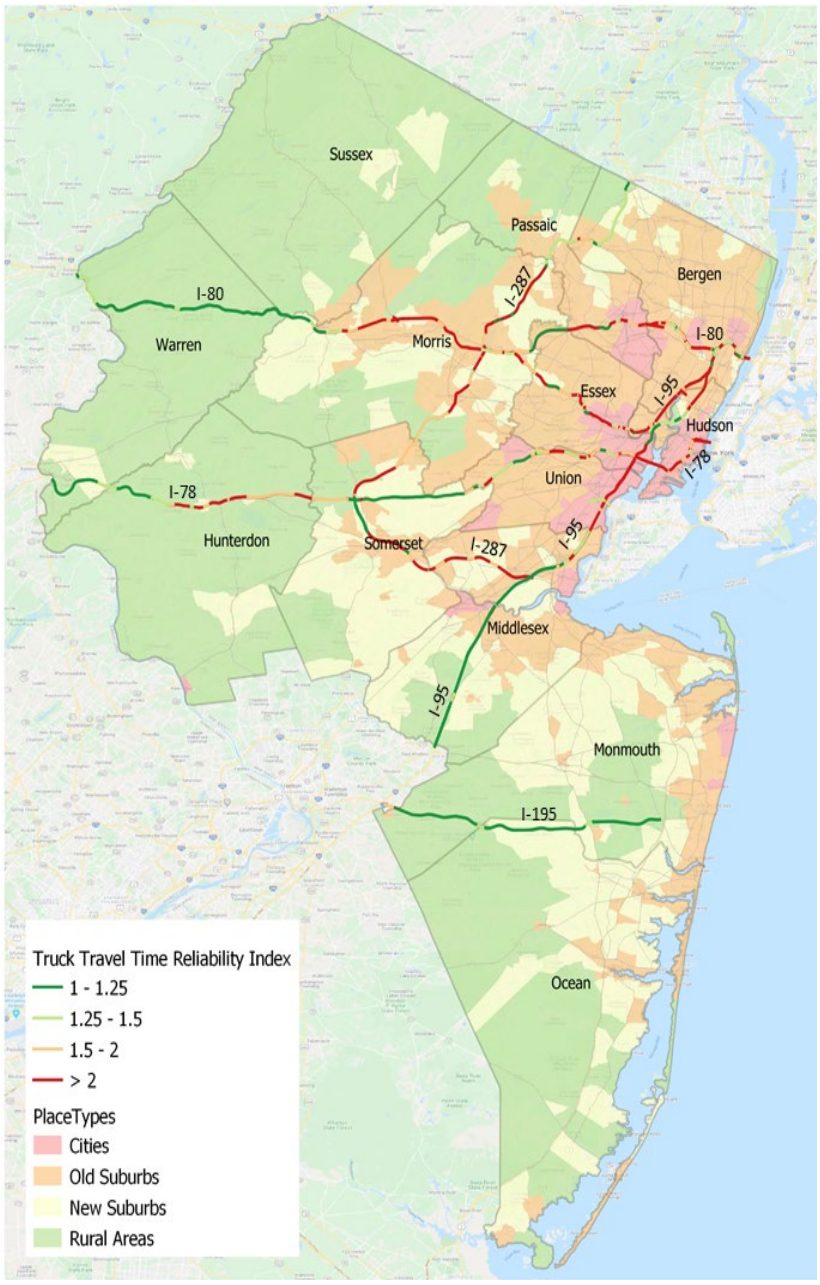
Needs Identified

This section identifies possible needs for freight transport, defined in terms of performance gaps or challenges, as well as potential opportunities for improvements. It is important to note that additional study would be needed to consider potential solutions, as well as the feasibility or costs of addressing these problems.

Interstate Truck Reliability Issues

Travel time reliability is particularly important for trucking to be able to make on-time deliveries. Interstate truck travel time reliability is poor on many segments of several key corridors throughout the urban and suburban parts of the region, and also are present in more rural areas, such as along I-78 in Hunterdon County.

Figure 31. Interstate Truck Travel Time Reliability (Data Source: RITIS)



Specific areas with poor truck travel time reliability include:

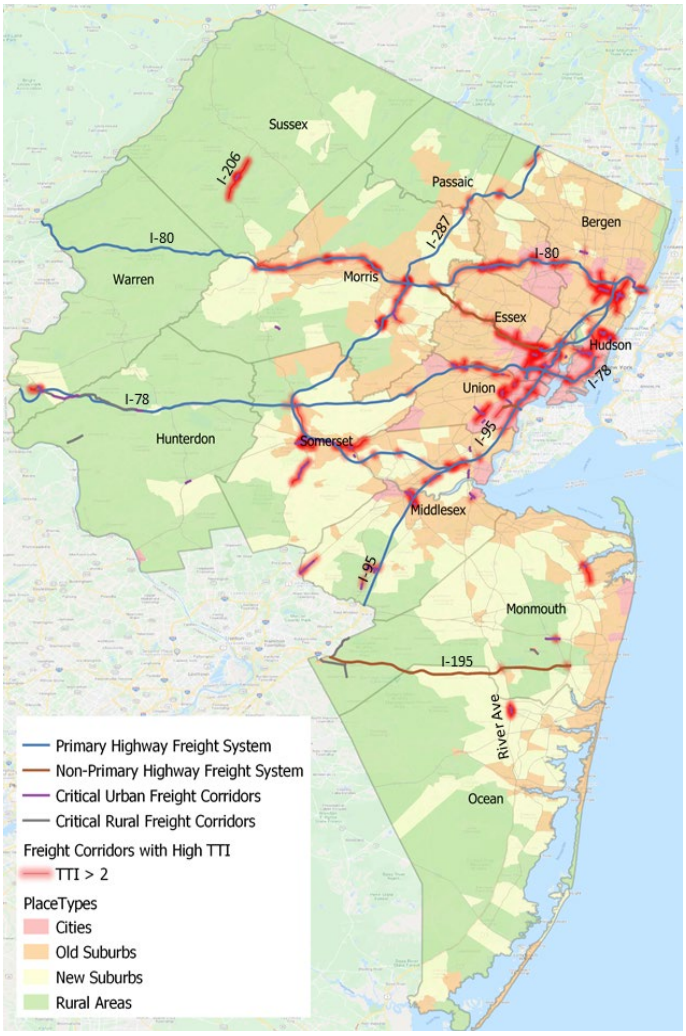
- ***The New Jersey Turnpike*** (I-***95) and I-78/New Jersey Turnpike Extension***, which provides primary access to the Ports of Elizabeth and Newark, Newark Liberty International Airport, the City of Newark, Port Jersey and many commercial and warehouse destinations
- ***I-287*** across broad parts of the region.
- ***I-80 in Morris, Passaic, and Bergen Counties***, which supports trans-Hudson employment, warehouse, and commercial locations
- ***I-78 in Hunterdon County*** up to I-287 in Somerset County, which experiences heavy freight volumes, on-shoulder truck parking, and other challenges as many New Jersey and Allentown/ Bethlehem, PA warehouses are located within 10 miles of the interstate.
- In addition, other places experience some issues with reliability and congestion on truck corridors. For instance, Warren County identified I-78 in Pohatcong, Alpha, and Greenwich as having challenges.

Congested Freight Corridors

The National Highway Freight Network (NHFN) includes the following sub-system of roadways:

- Primary Highway Freight System (PHFS): Most critical highway portions of the U.S. freight transportation system.
- Non-PHFS: Remaining portion of Interstate roads not included in the PHFS.
- Critical Urban Freight Corridors (CUFCs): Public roads in urbanized areas which provide access and connection to the PHFS and non-PHFS
- Critical Rural Freight Corridors (CRFCs): Public roads not in an urbanized area which provide access and connection to the PHFS and non-PHFS.

Figure 32. National Highway Freight Network overlaid on the Travel Time Index of the Roadway Network (Source: FHWA, RITIS)



The NJTPA region has all four NHFN sub-systems with PHFS as its majority, as shown in Figure 32. The PHFS is most affected by the congested corridors with a travel time index of above 2 on I-80, I-78, I-287 and I-95. The congested corridors are concentrated in the urban and suburban regions. While the extent of CRFC is limited, some of them are along congested roadway corridors. Examples of key freight corridors along congested roadways are as below:

Primary and Non-Primary Freight System: Urban and suburban sections of I-80 (Bergen, Passaic, Essex, Morris), I-287 in Morris and Somerset counties, I-95 in Hudson, Union and Middlesex counties, I-78 in Hudson and Essex counties. See discussion above on interstate reliability.

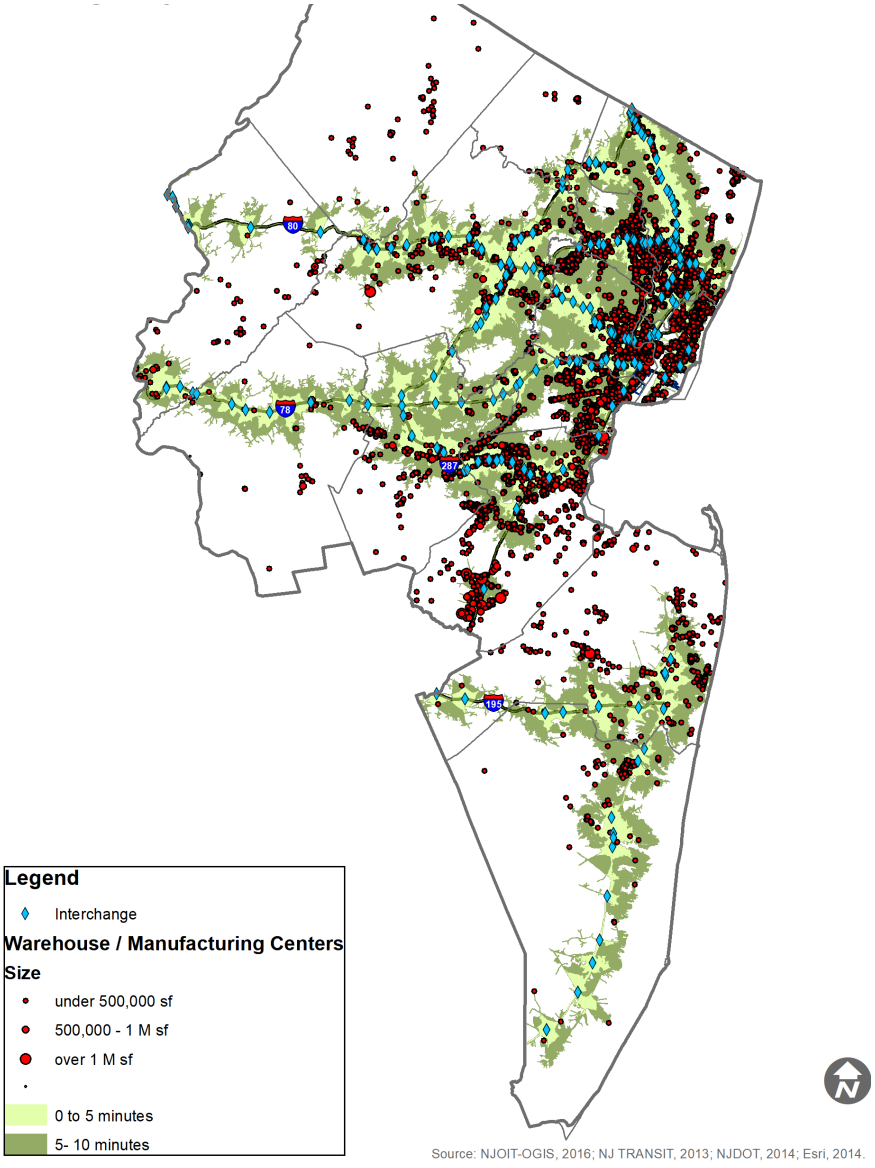
Critical Urban Freight Connectors: RT-495 in Hudson county, River Ave in Ocean county, NJ 35 in Monmouth county, US-130 and US-1 in Middlesex county, US-206 in Somerset county.

Critical Rural Freight Connectors: US-206 in Sussex county, RT-122 in Warren county.

Truck Access to Warehouses and Distribution Centers

Ideally, freight-related businesses such as warehouses and distribution centers should be located a short distance from main roads for convenient truck access. Figure 33 shows that most warehouses and manufacturing centers are located within 10 minutes of a main highway, but many are not. Examples of such clusters that are not accessible within 10 minutes of a main highway are as below:

Figure 33. Travel Time between Warehouse/Manufacturing Centers and Highway Access (Source: NJTPA)



- Close to I-95 in rural Middlesex county
- North of I-195 in Monmouth county
- Sussex county
- Between I-80 and I-78 in Warren county
- South of I78 in Hunterdon county

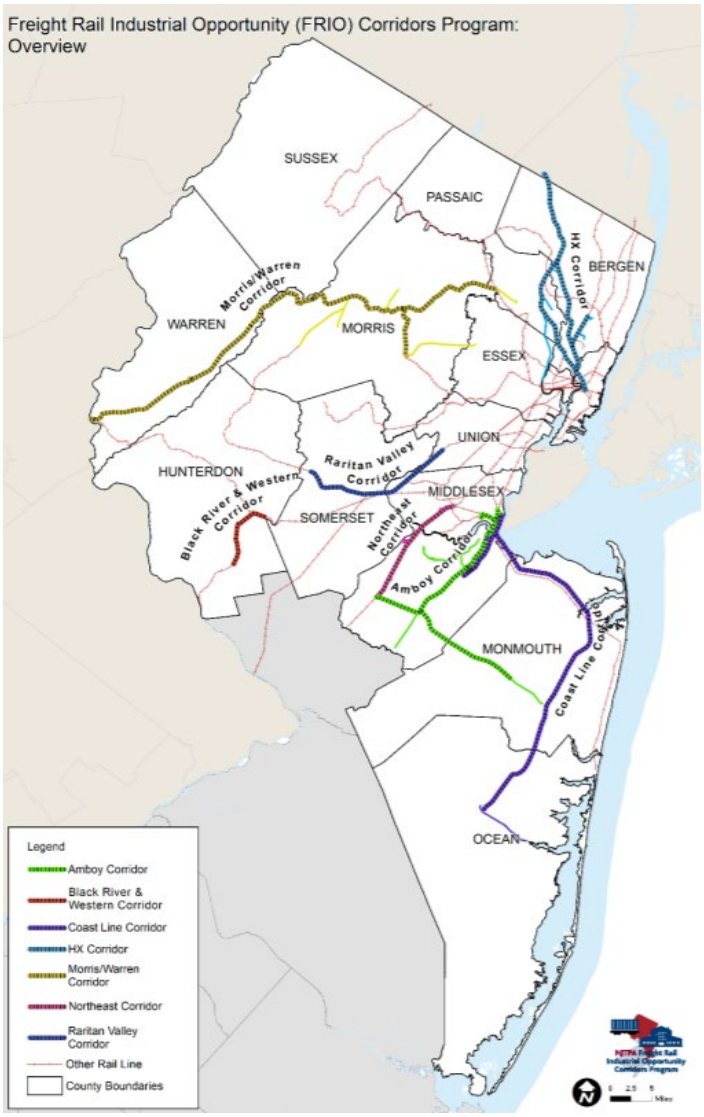
The needs arising from these warehouse / manufacturing centers are not entirely clear, as it is not the intent to add new highways to service these locations. However, there may be opportunities to improve travel times or consider needs in relation to roadways that serve warehouse or manufacturing centers that are not along major highways.

Moreover, the location of warehouses in areas outside of those accessible by transit also can create challenges for employees seeking to access jobs in these locations. This issue is explored in the Equity Assessment report.

Rail Capacity Needs

The State of New Jersey handled 50.9 million tons of rail freight in 2017, a rise of about 4.9 million tons since 2014 as reported in the New Jersey Statewide Freight Rail Strategic Plan. Northern New Jersey is served by two Class I railroads—CSX and Norfolk Southern, with additional infrastructure including the Conrail Shared Assets Area, extensive on- and near-dock rail operations that serve the Port, and several short line railroads. NJTPA has conducted multiple studies to identify and address the needs in rail freight transport. The Dover and Rockaway Rail ("D&R") Realignment Project Pilot study is aimed to develop and assess potential alternatives to relocate the existing junction between the D&R and the NJ TRANSIT Morristown Line to east of Dover. Moving the connection would allow for the elimination of un-gated at-grade crossings in downtown Dover and improve the efficiency and safety of freight rail transport on the D&R. The Hackettstown Bridge over Drain Weight Restriction Elimination Project Pilot Study tests the feasibility of improving the bridge to allow the movement of heavier rail cars and promote economic development and optimize freight movement development.

Figure 34. Overview of 7 corridors in the Freight Rail Industrial Opportunity Corridors Program (Source: NJTPA)



The Freight Rail Industrial Opportunity (FRIO) Corridors Program performed an assessment of the physical barriers to improved rail freight movement along 7 corridors in the NJTPA Region as illustrated in Figure 34 and as listed below:

- HX Corridor
- Raritan Valley Corridor
- Amboy Corridor
- Coast Line Corridor
- Morris/Warren Corridor
- Black River & Western Corridor
- Northeast Corridor

The study identifies two types of physical restrictions – weight and height. Weight restrictions that prevent the use of modern freight cars weighing 286,000 pounds fully loaded and height restrictions that prevent the use of freight cars measuring 17 feet above the top of the running rails.

7| CONCLUSION

The accessibility and mobility needs identified through this study encompass a broad range of issues that are important for addressing the region's Congestion Management Process (CMP) objectives, which include the following:

Overarching objectives:

- Improve accessibility to destinations
- Ensure equitable access for all
- Enhance the reliability of travel for all modes

Travel choices focused objectives:

- Ensure that alternatives to driving alone are supported
- Enhance the usability of public transit
- Increase the viability of walking, bicycling, and other micromobility options

Freight and facility focused objectives:

- Optimize freight movement, sensitive to local context
- Address bottlenecks and excessive delay, optimizing existing roadway capacity

Using data on system performance, as well as stakeholder input, the analysis identified needs that relate to all modes of transportation, including public transit, driving, and bicycle/pedestrian travel and micro-mobility options. These needs address both ***regional movements*** between major destination points within Northern New Jersey and externally, including New York City, and ***local access*** to the regional transit and highway network and for shorter trips within communities. While there are many common needs across the region, there also are unique needs and issues across different place types, from cities to suburbs to rural towns and communities, reflecting differences in land use, population, and trip-making characteristics across these contexts. Table 6 below summarizes the needs identified in relation to each of the region's objectives. Note that a separate technical report focuses on equitable access, based on an analysis of needs in relation to vulnerable population groups.

Table 6. Relation of Identified Needs to CMP Objectives

Need or Issue	Accessibility to Destinations	Equitable Access	Reliability	Alternatives to Driving Alone	Public Transit Usability	Walking & Bicycling	Freight Movement	Bottlenecks & Delay
Mobility to/from Urban Areas and New York City								
Trans-Hudson Transit Capacity	☑		☑		☑			☑
Transit Crowding					☑			
Bottlenecks and Unreliable Highways/Major Roadways			☑					☑
Transit Reliability Issues			☑		☑			
Long and Uncompetitive Transit Travel Times from Some Areas	☑	☑			☑			☑

Need or Issue	Accessibility to Destinations	Equitable Access	Reliability	Alternatives to Driving Alone	Public Transit Usability	Walking & Bicycling	Freight Movement	Bottlenecks & Delay
Reverse Commute Challenges	☑	☑			☑	☑		
Lack of Connectivity between Transportation Service Payment Systems		☑			☑			
Accessibility & Mobility within Urban Areas								
Pedestrian Safety / Infrastructure Needs	☑	☑				☑		
Bicycle Safety / Infrastructure Needs	☑					☑		
Congested and Unreliable Roadways			☑					☑
Bus Reliability and Crowding Issues			☑		☑			
Need for Supportive Transit Infrastructure, such as Bus Shelters and Benches		☑			☑			
Opportunities for Micro-mobility Options						☑		
Accessibility & Mobility between/within Suburban Areas								
Limited Alternatives to Driving, Particularly for Suburb-to-Suburb Travel and Off-Peak Travel	☑	☑			☑	☑		
Park-and-Ride Capacity Constraints				☑	☑	☑		
First-Mile/Last-Mile Challenges in Accessing Transit, Pedestrian & Bicycle Safety and Infrastructure	☑	☑			☑	☑		
Congested and Unreliable Roadways			☑					☑
Opportunities to Reduce Single-Occupant Vehicle Travel through Transit-oriented development and Other Strategies	☑			☑	☑	☑		
Need for Supportive Transit Infrastructure, such as Bus Shelters and Benches		☑			☑			
Accessibility & Mobility between/within Rural Areas								
Targeted Transit Needs/Opportunities	☑	☑			☑			

Need or Issue	Accessibility to Destinations	Equitable Access	Reliability	Alternatives to Driving Alone	Public Transit Usability	Walking & Bicycling	Freight Movement	Bottlenecks & Delay
Park-and-Ride Availability				☑	☑			
Pedestrian and Bicycle Safety and Infrastructure	☑	☑				☑		
Roadway Reliability and Safety Issues			☑					☑
Freight Transport								
Interstate Truck Reliability Issues			☑				☑	
Congested Freight Corridors							☑	☑
Truck Access to Warehouses and Distribution Centers							☑	
Rail Capacity Needs							☑	

The needs identified in this technical report, combined with needs identified to support equitable access for vulnerable populations, will be used to identify implementable strategies to support the region's accessibility and mobility objectives. The strategies will reflect potentially beneficial actions that the NJTPA may try to advance through the long range transportation plan, through follow-up studies, by funding projects or programs in the transportation improvement program, in other ongoing programs or activities, or by encouraging and coordinating with partner agency implementers.

NJTPA Accessibility & Mobility Strategy Synthesis Needs Assessment Appendix

This appendix provides information on performance measures that were used to characterize existing (and in some cases anticipated) accessibility and mobility conditions and to support identification of needs. Table A-1 below summarizes the performance measures and data sources, as well as how the measures were used to support needs assessment.

Table A-1. Performance Measures, Data Sources, and Application for Needs Assessment

Objective	Performance Measures	Data Sources	Use in Needs Assessment

Improve accessibility to destinations	• Average commute time
	  ○ All workers
	  ○ Transit commuters (where data available)
		American Community Survey (ACS)	Used to identify locations with longer than average commute

	• # of jobs accessible within 45-minute drive by TAZ, current and 2045 • # of jobs accessible within 45-minute transit trip by TAZ, current and 2045	NJRTM-E (regional travel demand model)	*Characterizes existing and anticipated accessibility conditions*
Ensure equitable access for all	Comparison of selected measures (e.g., average commute travel time, access to jobs within 45-minute commute, walkability) across different socio-economic groups (based on income, race, and disability status, etc.)	Census, ACS, etc.	***To be conducted in separate analysis***
Enhance the reliability of travel for all modes	• Transit on-time performance (OTP) by route (rail and bus)	NJ TRANSIT	Used to identify bus routes with poor on-time performance (under 60% on-time)
	• Level of travel time reliability (LOTTR) by road segment	RITIS NPMRDS	Used to identify road segments with poor reliability (over 2.0 LOTTR)
	• Flooding on Roadways	TRANSCOM	Supplemental information
Ensure that alternatives to driving alone are supported	• % of non-SOV commute mode share (by county and Census tract level)	ACS	Used to identify locations near rail transit with high SOV mode share, suggesting possible opportunities to increase transit, bicycling, and walking

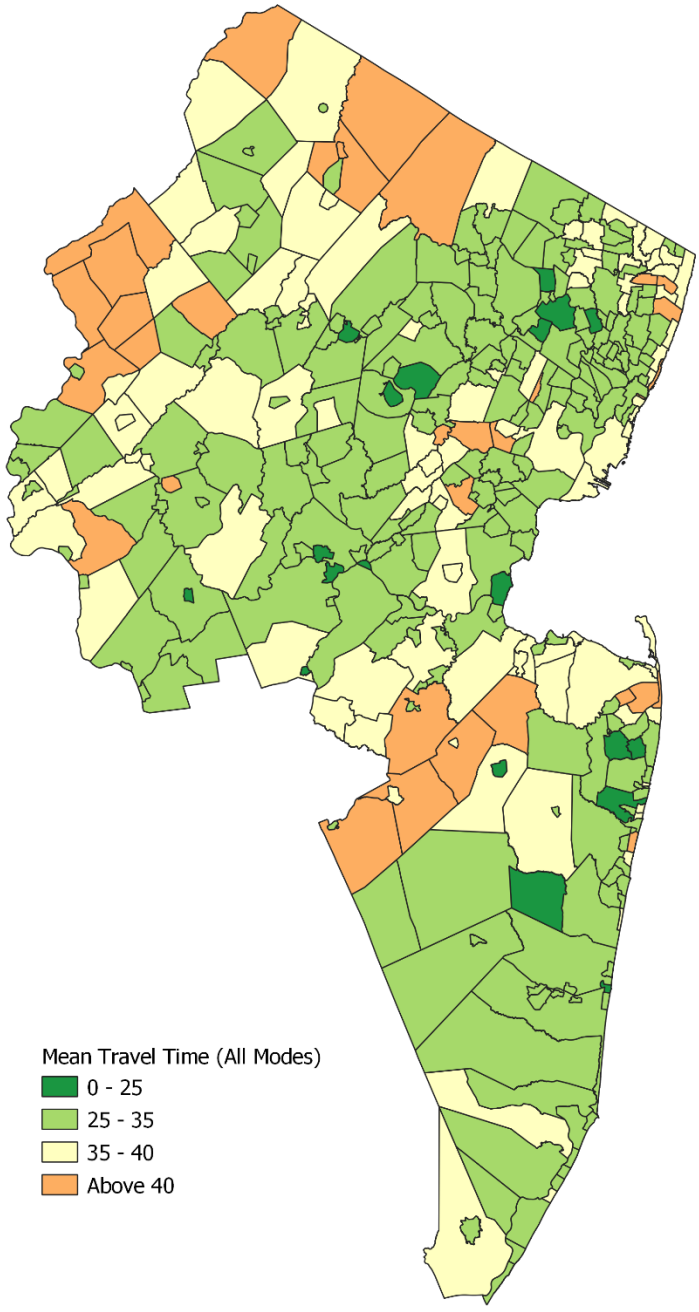
Objective	Performance Measures	Data Sources	Use in Needs Assessment
	• Park-and-ride lot utilization	NJ TRANSIT, NJTPA	Used to identify oversubscribed parking facilities
Enhance the usability of public transit	• Frequency of transit service, bus and rail	NJRTM-E	Used to identify locations with limited transit frequency (particularly with high Transit Score Index)
	• Number of households within a ½ mile of service, for regional transit nodes • Number of jobs within a ½ mile of service, for regional transit nodes	ACS and LEHD LODES data	*Characterizes transit-oriented development (Used in combination with other measures)*
	• Transit Score	NJ TRANSIT	*Characterizes propensity to use transit (Used in combination with other measures)*
Increase the viability of walking and bicycling options	• Walkability index	USEPA, Smart Location Database	*Characterizes walkability (Used in combination with other measures)*
	• Bicycle and pedestrian fatalities and serious injuries	NJDOT Crash Database	Used to identify locations with bicycle/pedestrian needs
	• Bicycle level of comfort index	NJTPA	*Characterizes availability of comfortable bicycling routes (Used in combination with other measures)*
Optimize the efficiency of freight movement	• Truck travel time reliability ratio by road segment	RITIS NPMRDS	Used to identify interstates with poor truck reliability
Address bottlenecks and excessive delay on roadways	• Person Hours of Excessive Delay (PHED)	RITIS NPMRDS	Used to identify roadways with the most excessive delay
	• Travel Time Index (TTI)	NJRTM-E	Used to identify roadways with significant congestion (TTI over 2.0), including freight corridors

Average Commute Trip Time

Accessibility to Destinations

Commute travel times depend on many factors, including housing and employment location decisions, the mode choices made by travelers (driving or using transit), and the availability and efficiency of transportation options connecting these locations. It is expected that people living in more outlying suburban or exurban areas would generally have longer travel times to access jobs than those living in more central locations, and people make choices and tradeoffs accounting for housing costs, quality of schools, perceived safety, and other factors when making housing location decisions.

Figure A-1. Mean Travel Time for All Modes, in Minutes (ACS 2014-2018)



Key Observations:

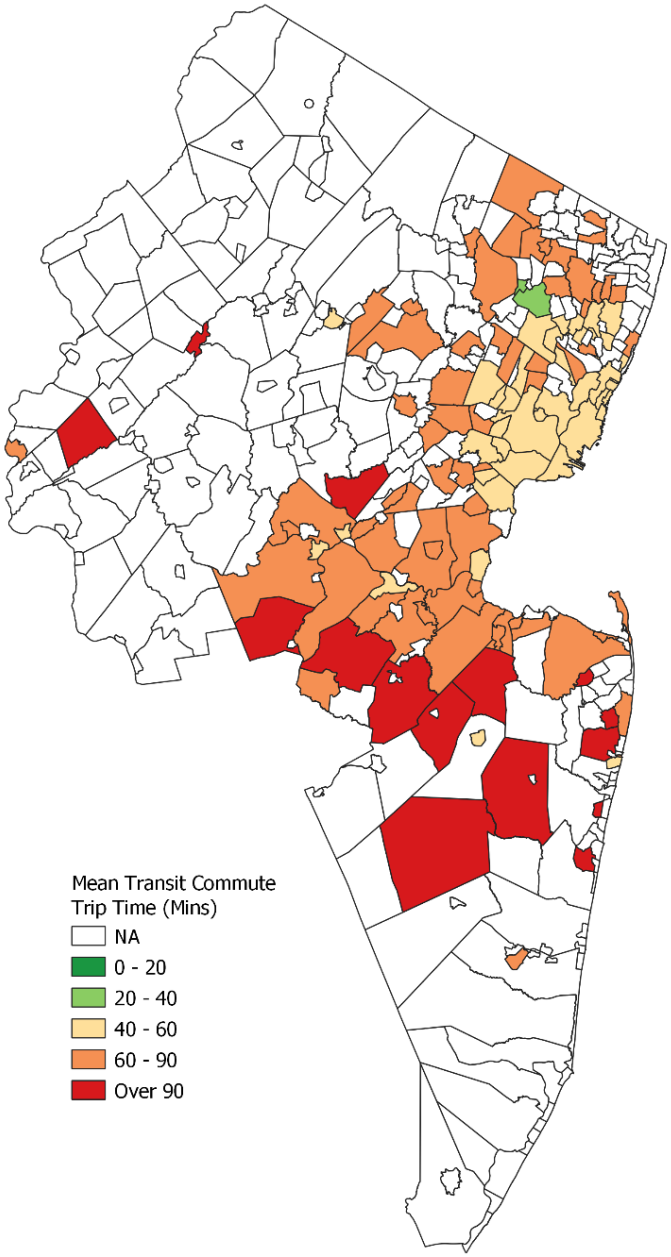
- The longest travel times to work are generally located in more suburban and exurban areas, such as Warren County, north Sussex County, and western Monmouth County, as might be expected due to distance to major job centers.
- Some more central locations, such as Milburn township, also experience generally long commute times. These may suggest needs for improvements to transportation to enhance connections and reduce travel times.
- Some inner suburbs and small towns (e.g., Dover, Somerville, Flemington) have relatively short commute times, but similar towns like Westfield and Summit have relatively high times, likely skewed by the high number of transit commuters.

Average Transit Commute Trip Times

Accessibility to Destinations

Of particular interest is long transit commute trip times, since transit should be a primary, viable choice for travelers for commuting. Figure A-2 shows average travel time for transit commuters, highlighting that in many parts of the region, transit commuters have average transit trips of over 1 hour (note: no data are available on average transit commute times for many parts of the region).

Figure A-2. Mean Travel Time for Transit Commuters (ACS 2014-2018)



Key Observations:

- Average commute times by public transit are considerably longer than average commute times by driving in most areas. These differences in part may reflect different locations of jobs being accessed.
- The urban core areas tend to have the shortest average transit commute times, but in large parts of the region, average transit commute times are over 60 minutes each way.
- Some area of the region have particularly long transit commutes, averaging more than 90 minutes each way. Long transit commutes are particularly the case in parts of Middlesex, Monmouth, and Ocean Counties, suggesting possible needs for more viable transit alternatives.

Access to Jobs

NJTPA's travel demand model, NJRTM-E, has generated data that show the estimated number of jobs accessible within different categories of travel time (i.e., within 45 minutes, 60 minutes) for resident workers in each travel analysis zone (TAZ). For this analysis, the modeled number of jobs accessible within 45 and 60 minutes by transit and by auto was analyzed for 2020.

Observations:

- The number of jobs accessible by auto is much greater than that for transit trips throughout the region. Based on the model analysis, in 2020, over 50% of the region's residents live in locations in the region that have accessibility to over 1 million jobs within a 45-minute auto trip, while less than 2% live in areas with accessibility to over 1 million jobs within a 45-minute transit trip.
- As may be expected due to locations of jobs, residents in urban areas have greater job accessibility than do suburban or rural residents. For transit, the locations with the greatest jobs accessibility by transit are located in cities. Even by auto, nearly all TAZs that have accessibility to over 1 million jobs via a 45-minute automobile trip are cities or older suburbs.

Figure A-3. Number of Jobs Accessible by Transit within 45 minutes and 60 minutes, 2020

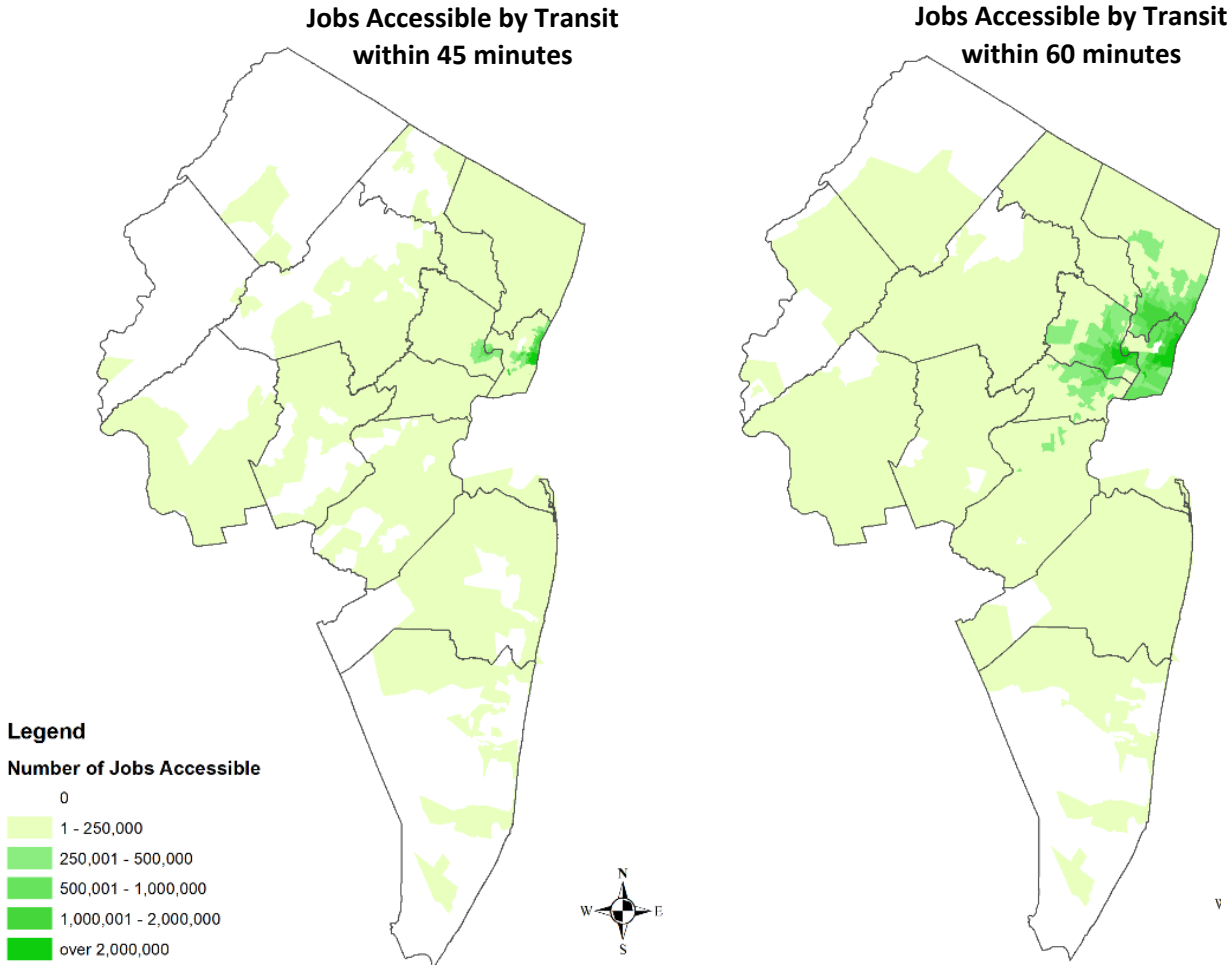
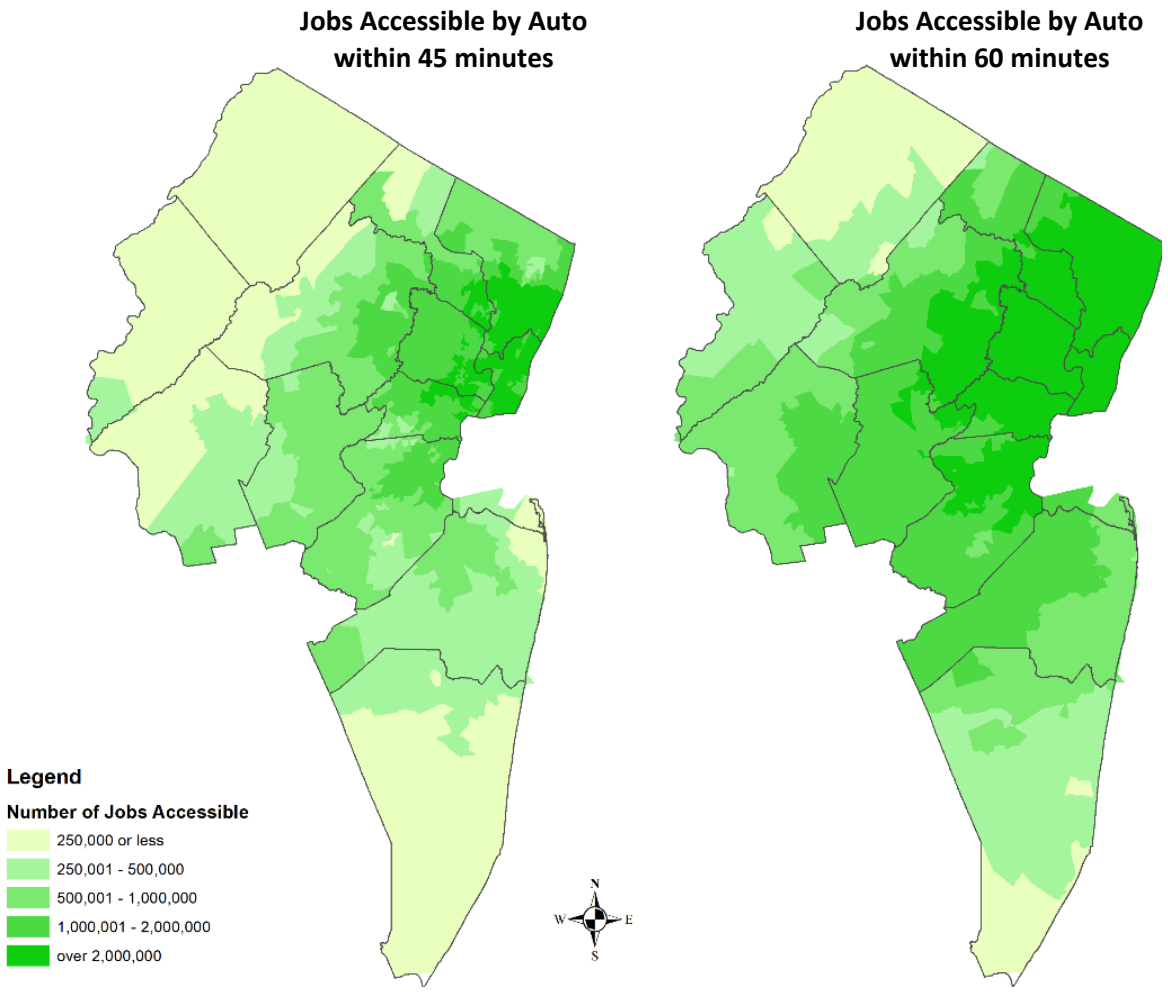


Figure A-4. Number of Jobs Accessible by Auto within 45 minutes and 60 minutes, 2020



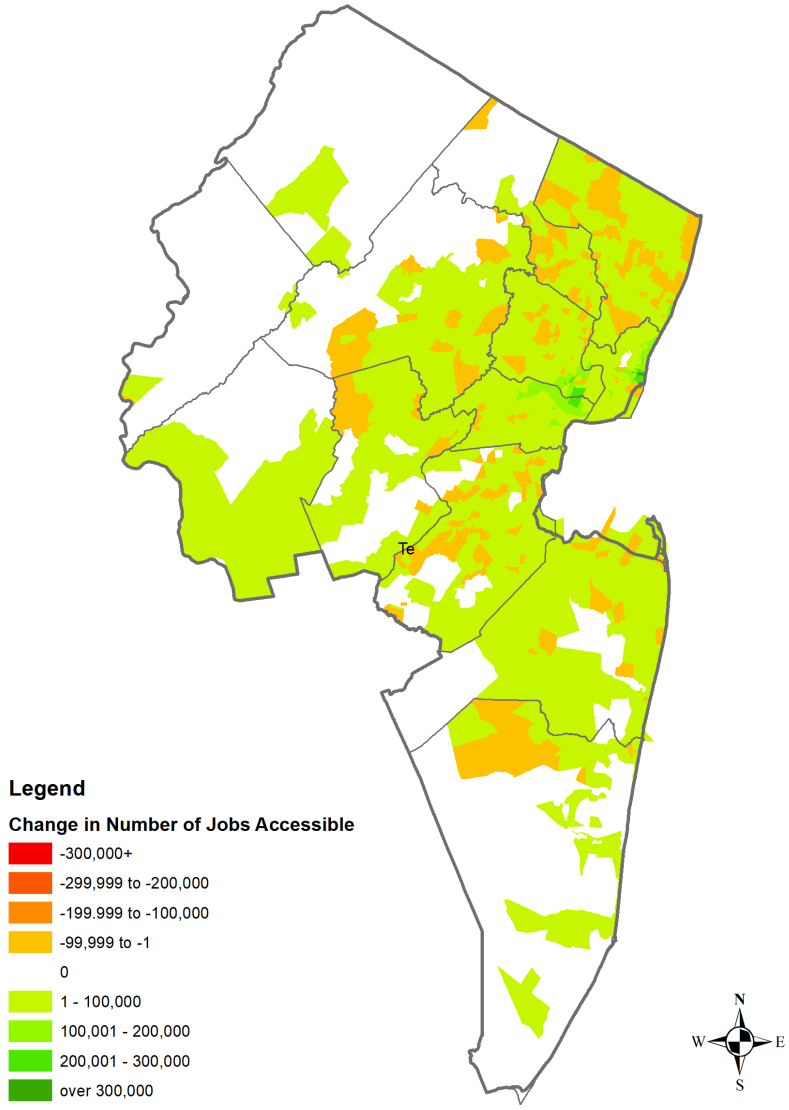
Anticipated Changes in Access to Jobs

Accessibility to Destinations

Looking forward to 2045, the NJTPA region is anticipated to see an increase in jobs. However, accessibility to jobs within a 45-minute commute timeframe is not anticipated to increase in all parts of the region by both transit and auto. Due to traffic congestion and shifts in locations of jobs, some areas of the region are anticipated to see a decline in the number of jobs accessible within a 45-minute commute by 2045. [Note that these future projections may not be accurate if there are longer-term changes in telework activity and corresponding peak period congestion. Moreover, some minor changes in accessibility may be associated with aspects of the modeling approach.]

Changes in Access to Jobs by Transit

Figure A-5. Difference in Number of Jobs Accessible by Transit within 45 minutes, 2020 to 2045

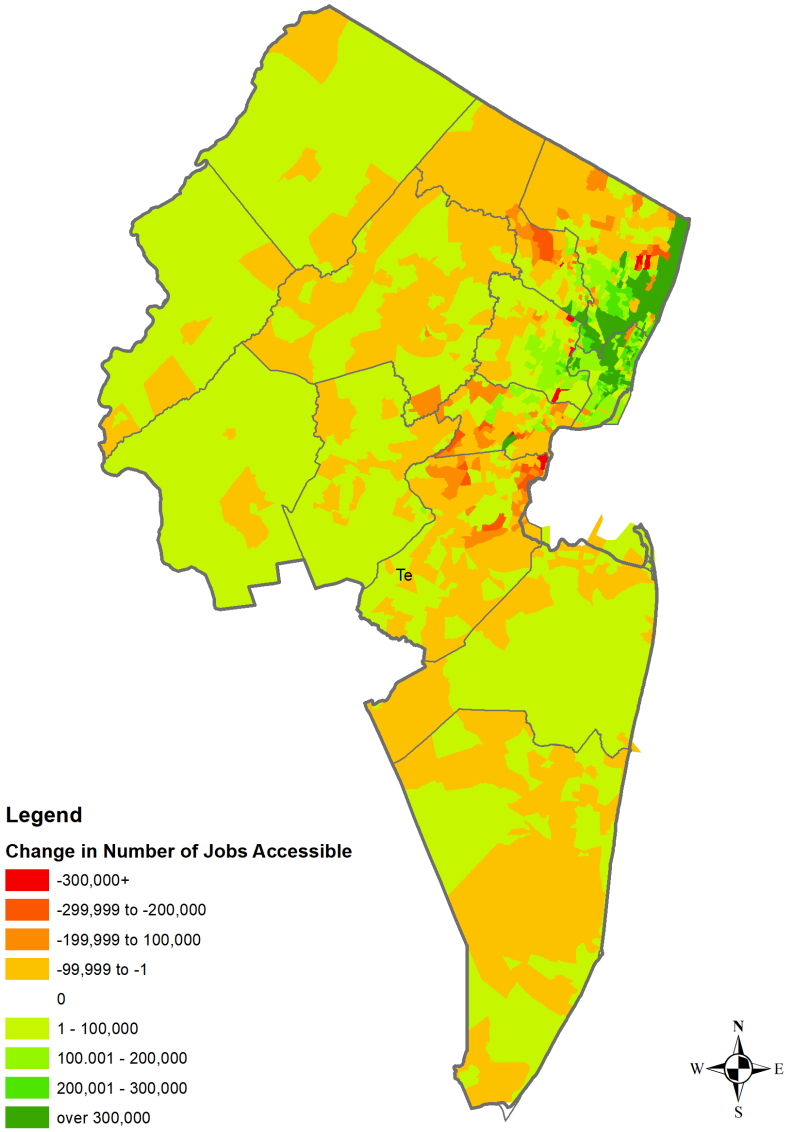


Key Observations:

- Most parts of the region are anticipated to see an increase in the number of jobs accessible by transit. The most significant increases are in the area around Jersey City, Newark, and Elizabeth (southern part of Essex County and northern part of Union County).
- Scattered areas throughout the region are anticipated to see relatively small declines in number of jobs accessible by transit, presumably due to increased traffic congestion affecting buses. Reductions in bus speeds will likely occur with increased traffic congestion, which may increase bus trip times in locations without transit priority treatments.

Changes in Access to Jobs by Auto

Figure A-6. Difference in Number of Jobs Accessible by Auto within 45 minutes, 2020 to 2045



Key Observations:

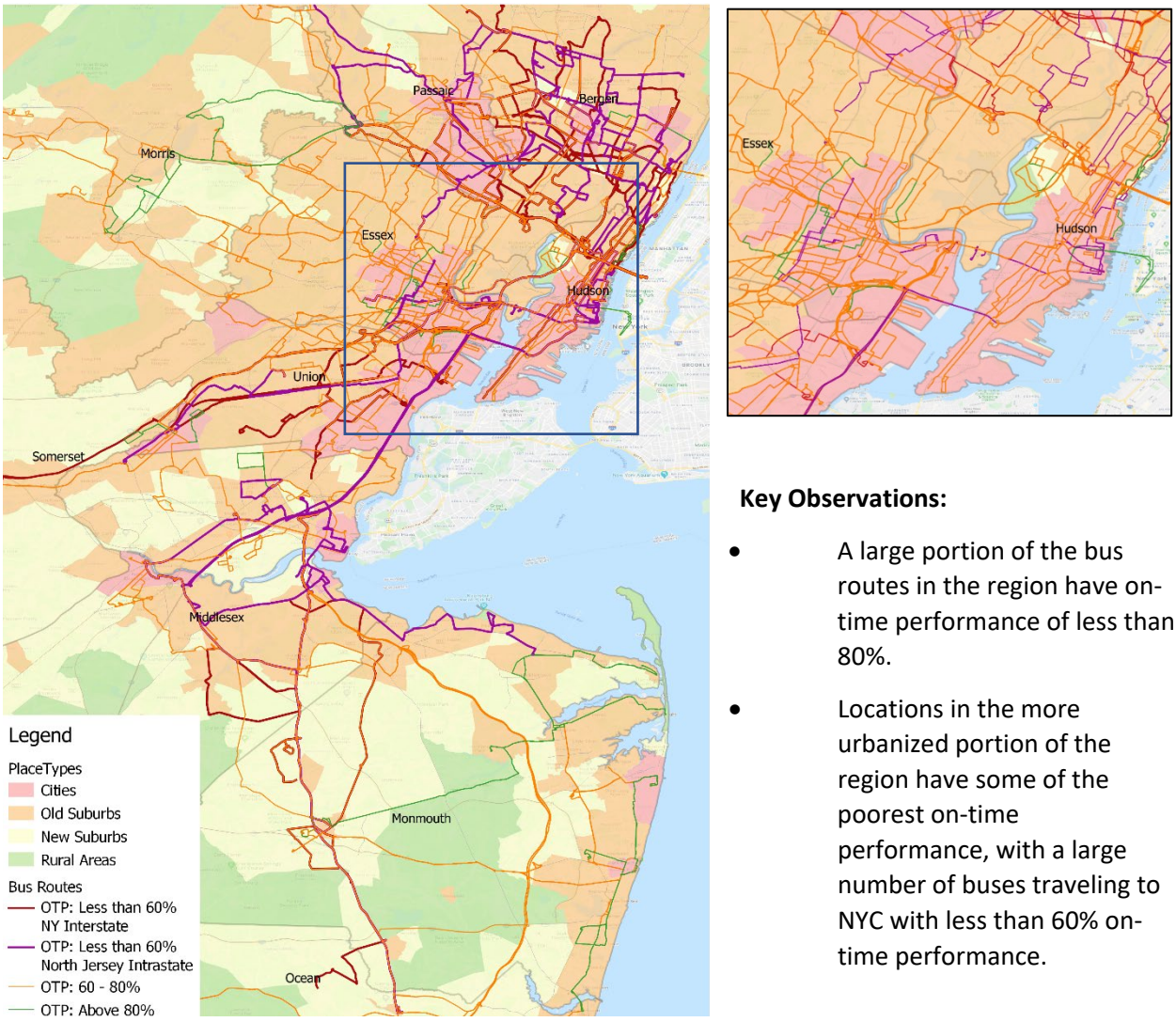
- Locations in the more urbanized portion of the region are anticipated to see a significant increase in the number of jobs accessible by auto, due to anticipated job growth.
- Parts of Passaic, Middlesex, and Union Counties, as well as northwestern portions of Bergen County, however, are anticipated to see declines in the number of jobs accessible within a 45-minute drive, due to increasing traffic congestion.

Transit On-Time Performance

Reliability

Transit on-time performance is affected by many factors, including traffic congestion, incidents, and the existence of priority transit treatments, such as bus rapid transit (BRT) facilities and transit signal priority.

Figure A-7. Bus On-Time Performance (Source: NJ TRANSIT)



Key Observations:

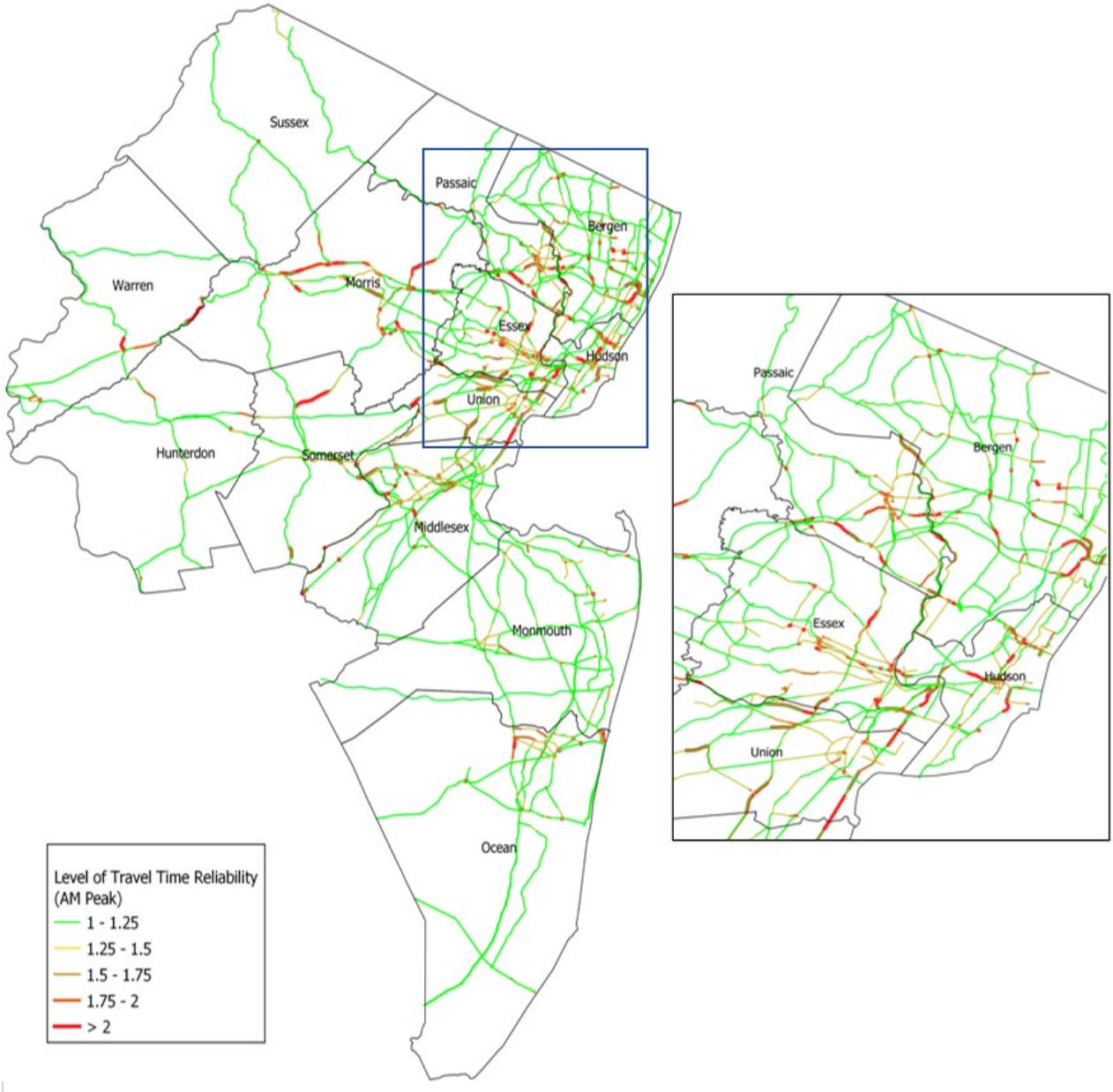
- A large portion of the bus routes in the region have on-time performance of less than 80%.
- Locations in the more urbanized portion of the region have some of the poorest on-time performance, with a large number of buses traveling to NYC with less than 60% on-time performance.

Roadway Travel Time Reliability

Reliability

Poor roadway travel time reliability means that it is difficult for travelers to predict how much time it will take to get from place to place. Roadway reliability is measured based on a metric called "Level of Travel Time Reliability" or LOTTR, which is calculated as the ratio of the 80th percentile travel time to the 50th percentile travel time value. It is calculated separately for the AM Peak, midday, PM peak and weekends. A higher LOTTR value represents worse reliability. The following three figures show the LOTTR values for the morning peak, midday off-peak and weekend periods in the NJTPA Region respectively. The data source for the LOTTR values is the RITIS NPMRDS platform.

Figure A-8. Level of Travel Time Reliability, AM Peak, 2019



Key Observations:

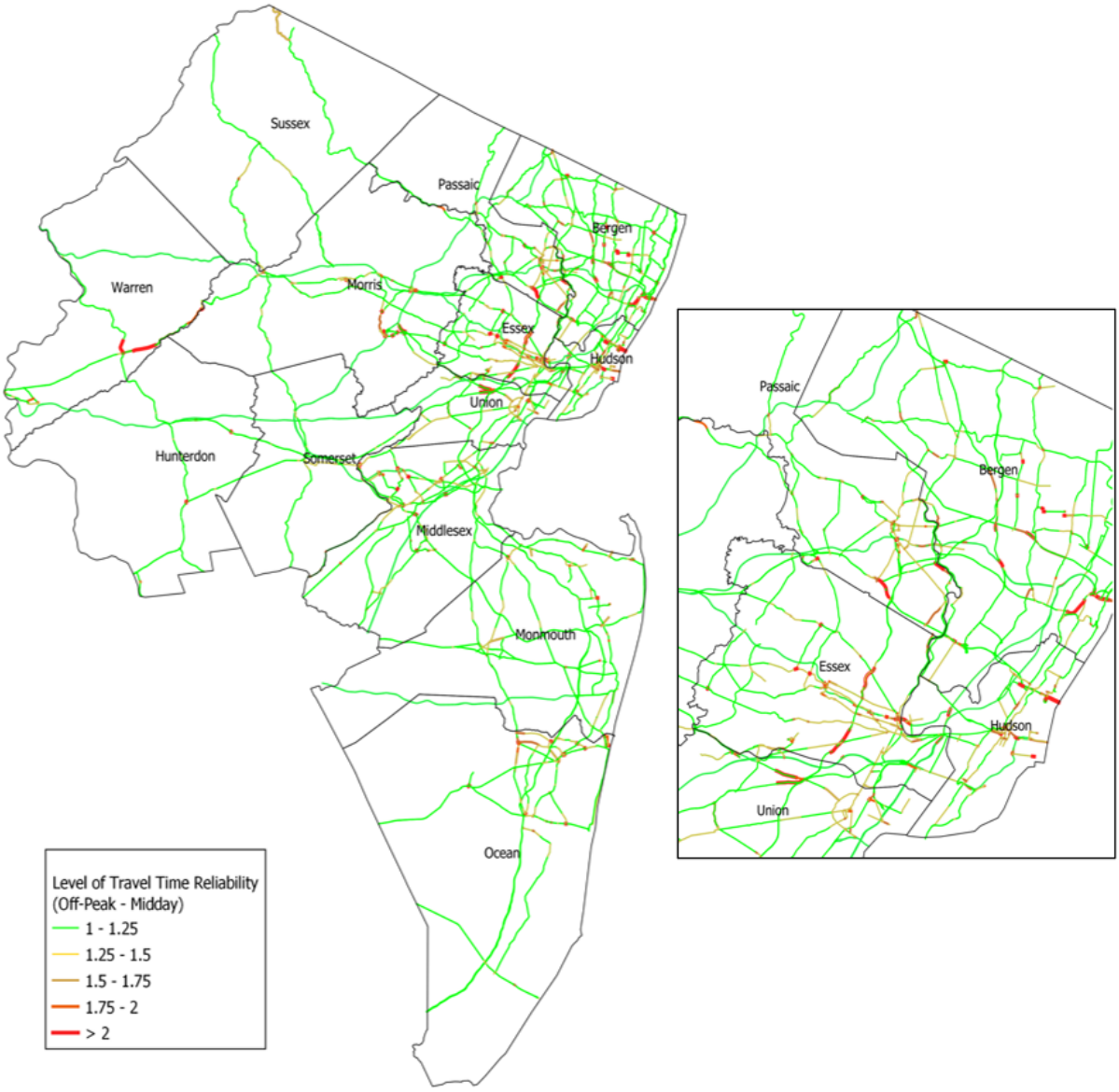
There are roadways with poor peak period reliability across many counties within the region, with roads with poor reliability located in nearly every county. Overall, the reliability is worse in the urban core as compared to the rural areas.

Some of the roadways with the poorest reliability are:

- Interstates
    - I-287 in Morris, Somerset and Middlesex counties
    - I-80 in Passaic, Morris county
    - I-78 in Hudson county
    - I-95 in Bergen, Essex and Union county
- Non-Interstates
    - Newark-Jersey City Turnpike in Hudson country
    - RT-495 in Hudson county
    - Tonnelle Ave in Hudson county
    - Garden State Parkway in Essex county
    - US-46 in Passaic county
    - RT-208 in Passaic county
    - RT-4 in Bergen county
    - RT-10 in Morris county
    - RT-57 in Warren county
    - RT-31 in Warren county
    - River Ave in Ocean county
    - Chicago Ave in Ocean county
    - RT-24 in Morris and Union county

Note that reliability is different than congestion and reflects the variability in travel times or ability for travelers to predict the time it will take to get from place to place. A consistently congested highway will show a lower LOTTR than a roadway that is only sometimes very congested.

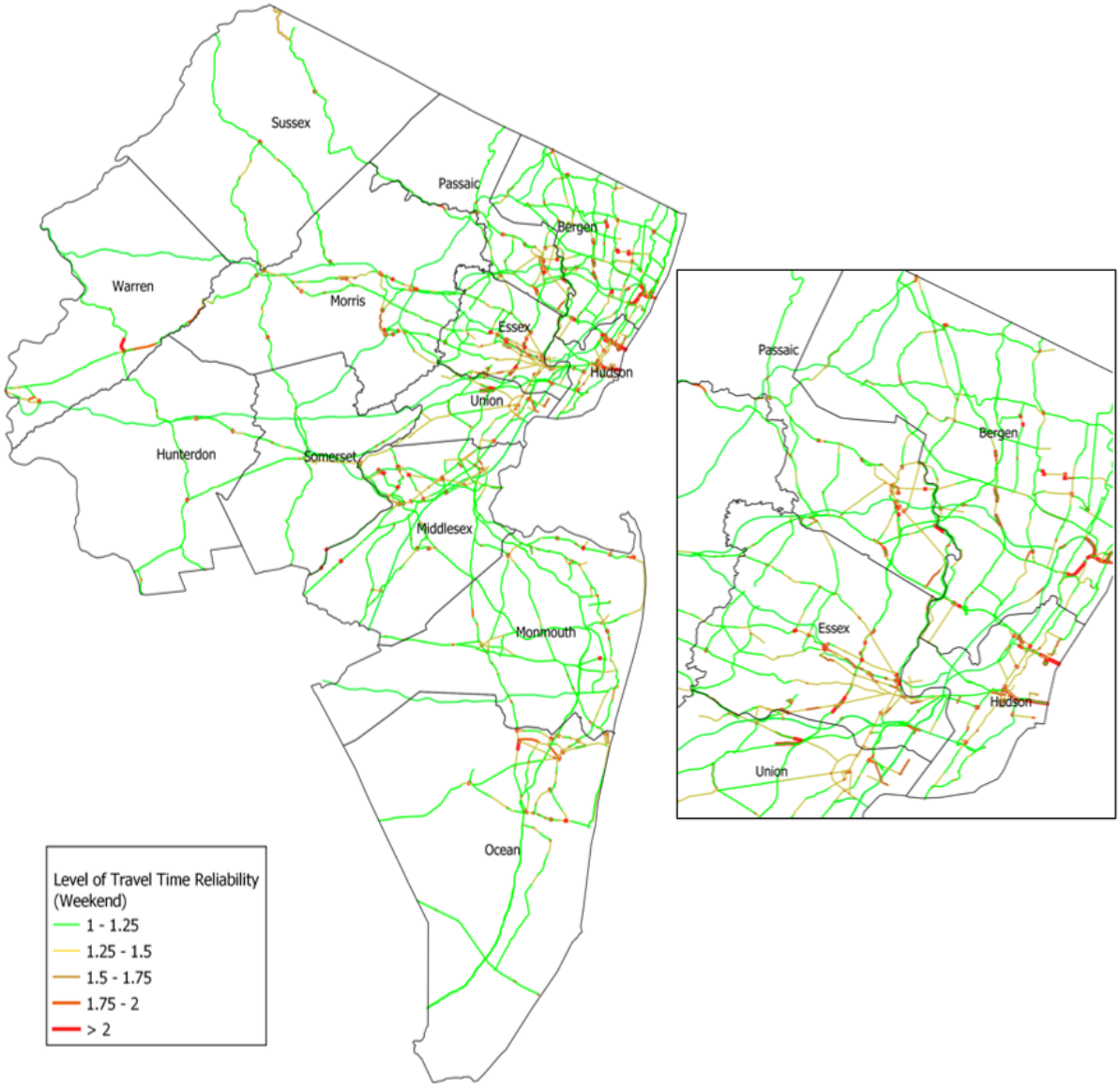
Figure A-9. Level of Travel Time Reliability, Midday Off-Peak, 2019



There are much fewer roadways that exhibit unreliable travel times in the midday than in the peaks. Some of the roadways with high unreliability where the off-peak reliability is worse than the peak reliability are as below:

- Interstates
    - I-95 in Essex, Hudson and Bergen counties
    - I-280 at the border of Hudson and Essex counties
- Non-Interstates
    - Garden State Parkway in Essex county
    - RT-495 in Hudson county
    - RT-3 in Passaic county
    - RT-21 in Passaic county
    - RT-18 in Middlesex county
    - RT-57 in Warren county

Figure A-10. Level of Travel Time Reliability, Weekend, 2019



Some of the roadways with high unreliability where the weekend reliability is worse than the weekday peak reliability are as below:

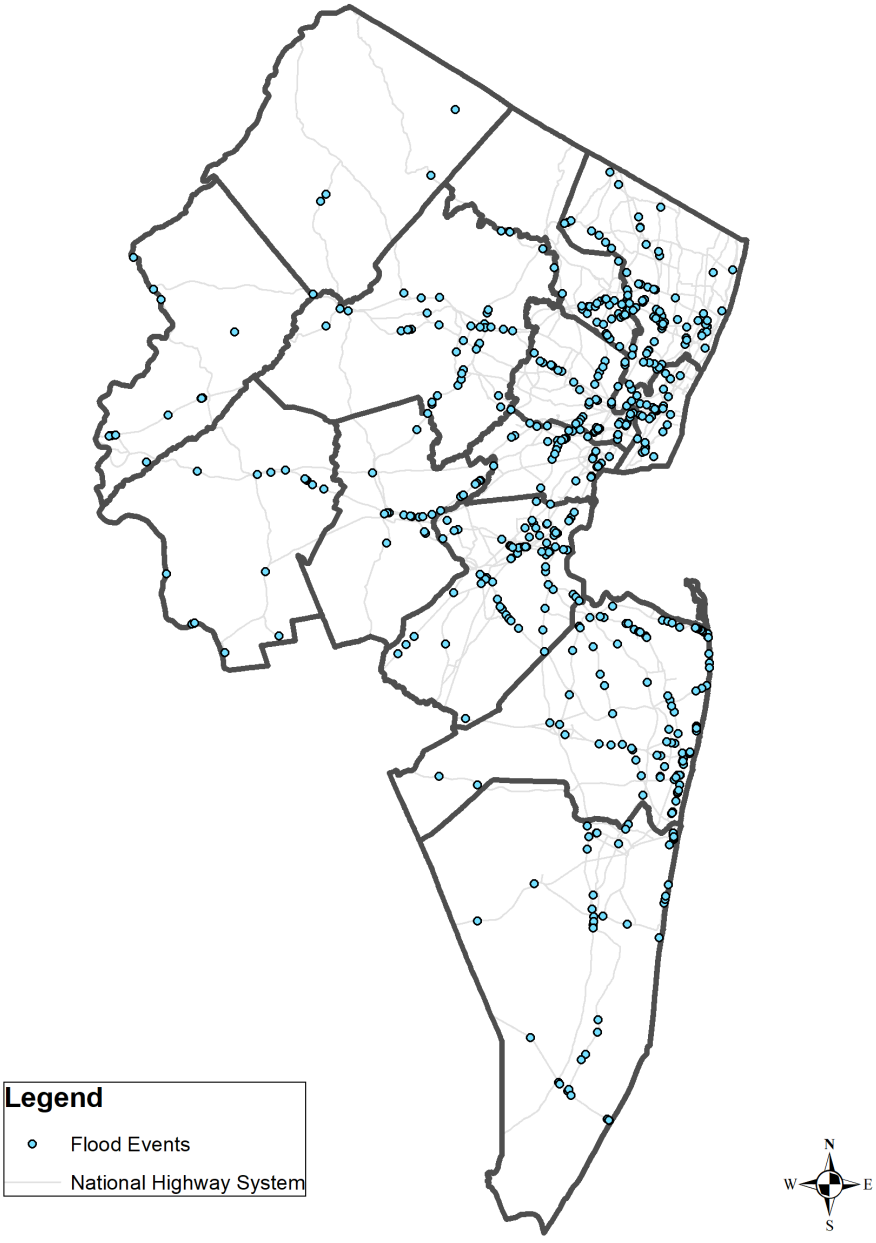
- Interstates
  - I-280 in Essex county
  - I-95 in Bergen county
- Non-Interstates
  - RT-31 in Warren county
  - RT-139 in Hudson county
  - RT-495 in Hudson county
  - RT-17 in Bergen county
  - US-46 in Bergen county
  - US-22 in Union county
  - Garden State Parkway in Essex county
  - RT-37 Merge points in Ocean county

Flooding on Roadways

Roadway flooding events can be a cause of road closures, detours, and needs for repairs. As a result, flooding events contribute to unreliability of roadways.

Reliability

Figure A-11. Roadway Flooding Events, January 2017-March 2020 (Source: TRANSCOM)



Key Observations:

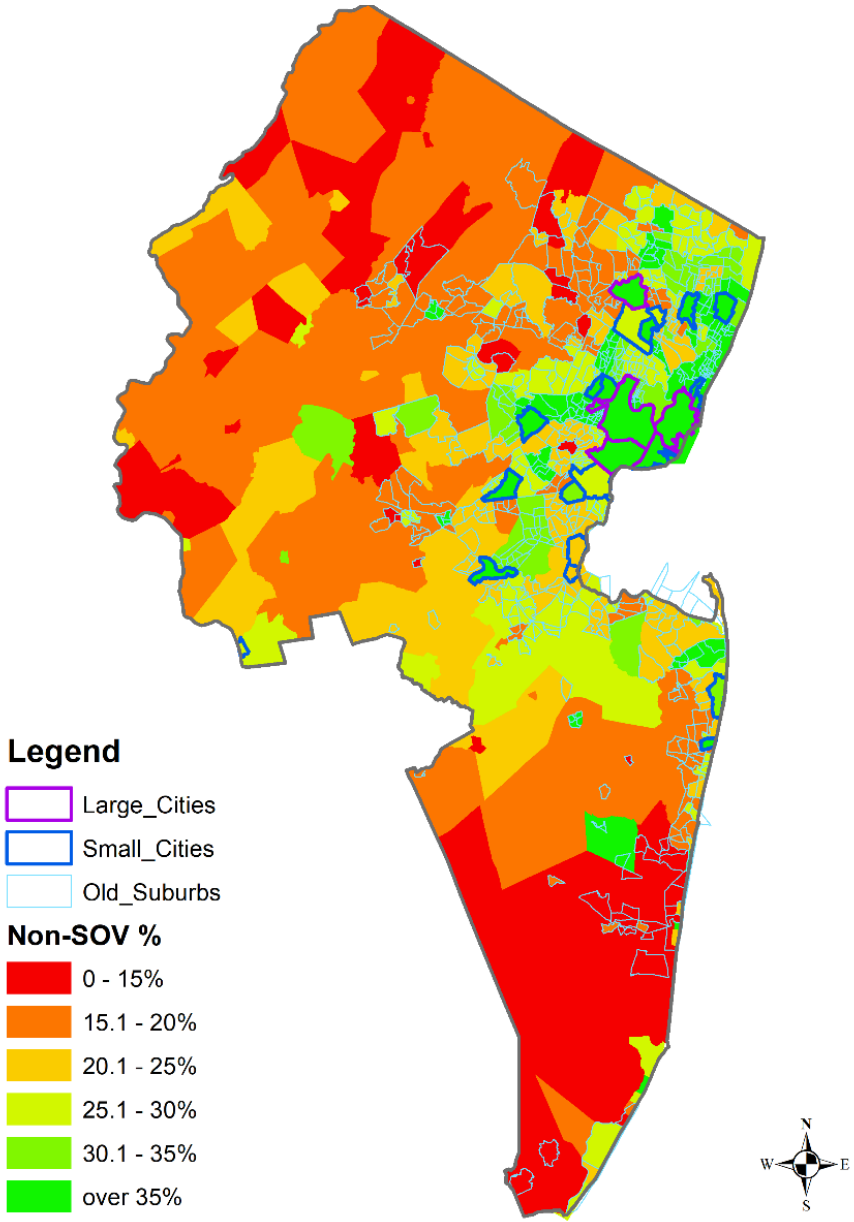
- In general, more flood events have occurred in urban and suburban areas than rural areas. Areas along the Atlantic Coast also have a considerable number of flooding events.
- The counties with the most events have been Monmouth, Middlesex, and Bergen Counties.
- The roads with the most events have been US 22, NJ 35, and the Garden State Parkway.

Non-SOV Mode Share

Alternatives to Driving Alone

Using transit, ridesharing, bicycling, walking, and teleworking helps to reduce traffic on roadways in the region and supports efficient movement, active living, and reduces pollution. Non-SOV mode share is an **outcome** of different factors, including access to transit and other travel options, the bicycle and pedestrian environment, and land use.

Figure A-12. Non-SOV mode share for work trips, 2017 (Source: American Community Survey)



Key Observations:

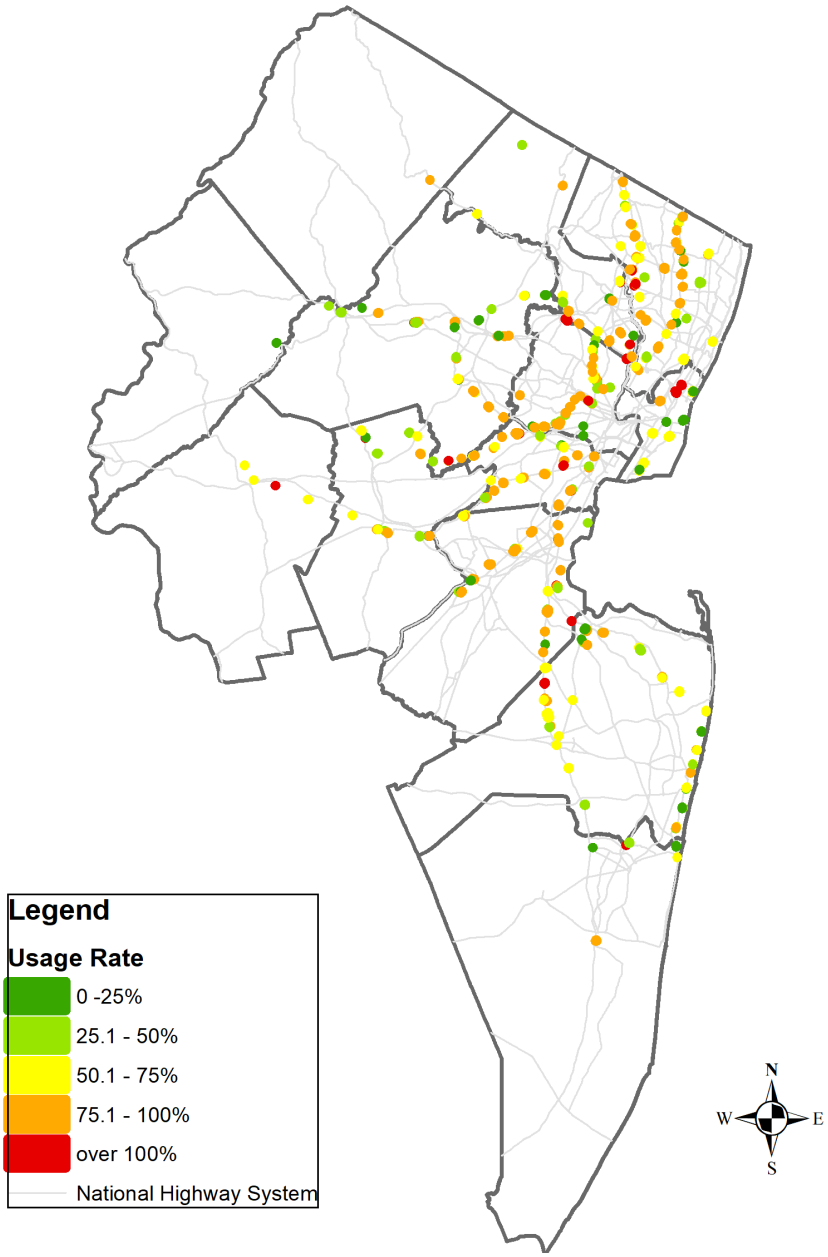
- Areas with the highest non-SOV mode share tend to be in large and small cities, particularly around Newark and Jersey City.
- Rural areas in Southern Ocean County, western Hunterdon County, and parts of Sussex County have the highest SOV mode shares for trips to work.
- However, there are some areas of Ocean, Monmouth, and other more suburban and rural counties with high shares of non-SOV commute trips primarily because of higher percentage of carpool or work from home mode share.

Park-and-Ride Availability and Utilization Rate

Alternatives to Driving Alone

Park-and-ride facilities provide access to transit stations and ridesharing opportunities primarily for commuters. Oversubscribed parking signifies that there is more demand for these stations than can be accommodated. Multiple strategies could be implemented to support these needs, including first-mile/last-mile connections (including community shuttles, improved bicycling and walking, or drop off access), shifting commuters to other facilities with available parking, or increasing the amount of parking.

Figure A-13. Park-and-Ride Locations and Usage Rates (Source: NJTPA, NJ TRANSIT)



Key Observations:

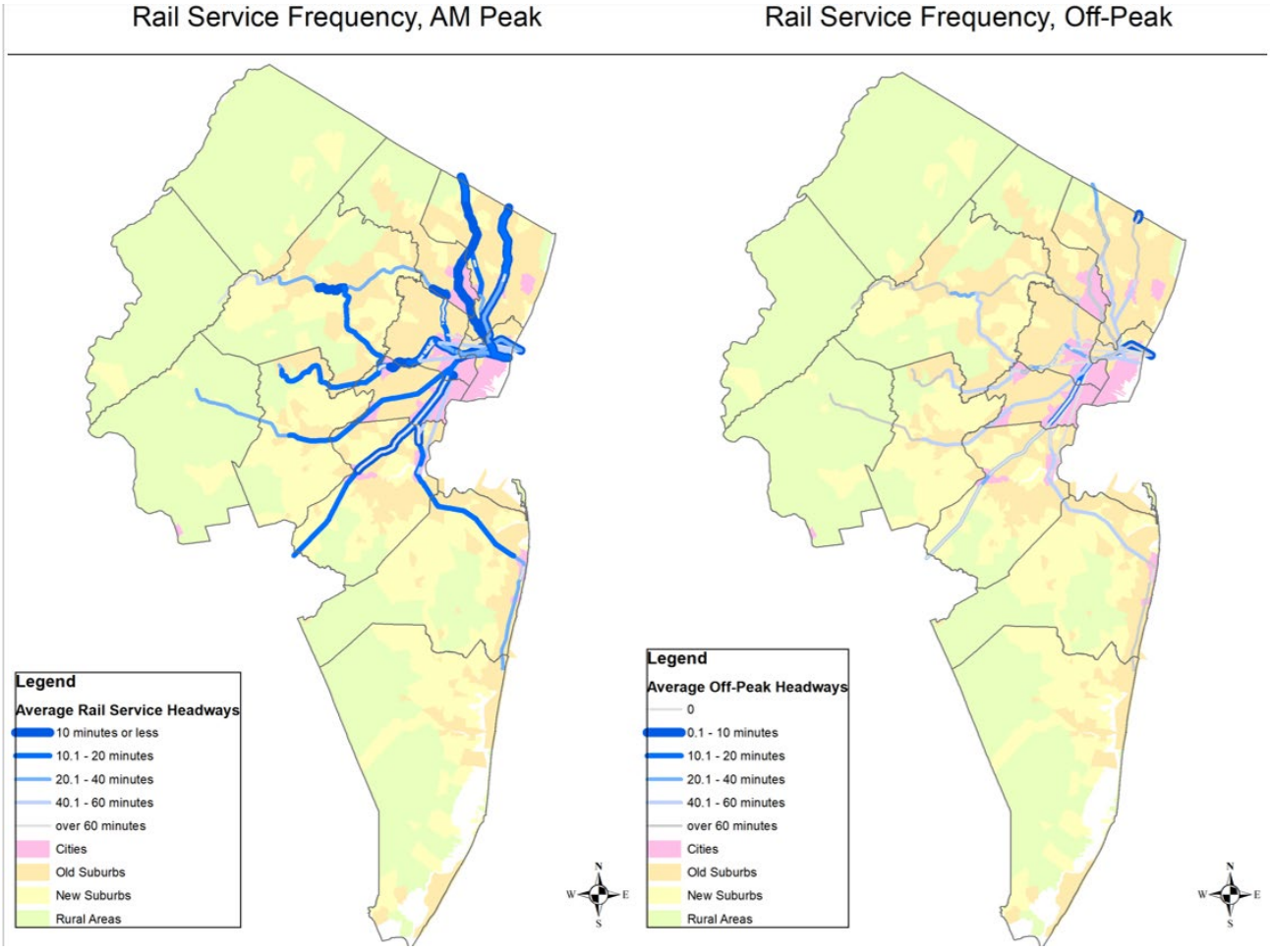
- There are oversubscribed parking facilities in several parts of the region, from the urban core to suburban and even some rural areas.
- Over one-half of facilities have a usage rate of 75% or greater.
- At the same time, there are some facilities with low utilization rates, particularly along the Montclair-Boonton line. Some parking facilities may also be restricted based on nearby residency conditions.

Transit Frequencies

The NJTPA region has a very robust transit network with extensive rail and bus services, particularly in urban areas. In some parts of the region, however, rail service does not exist and bus service is relatively infrequent, even during peak-hours, meaning that passengers do not have the same flexibility to use transit, may have long waits, and may have difficulty matching up bus schedules to meet their needs. At the same time, frequent transit service is not viable in all locations, depending on demands and factors such as land use and travel patterns.

Rail Service

Figure A-14. Rail Service Frequency (Left – Weekday, Peak, Right – Weekday, Off-Peak)

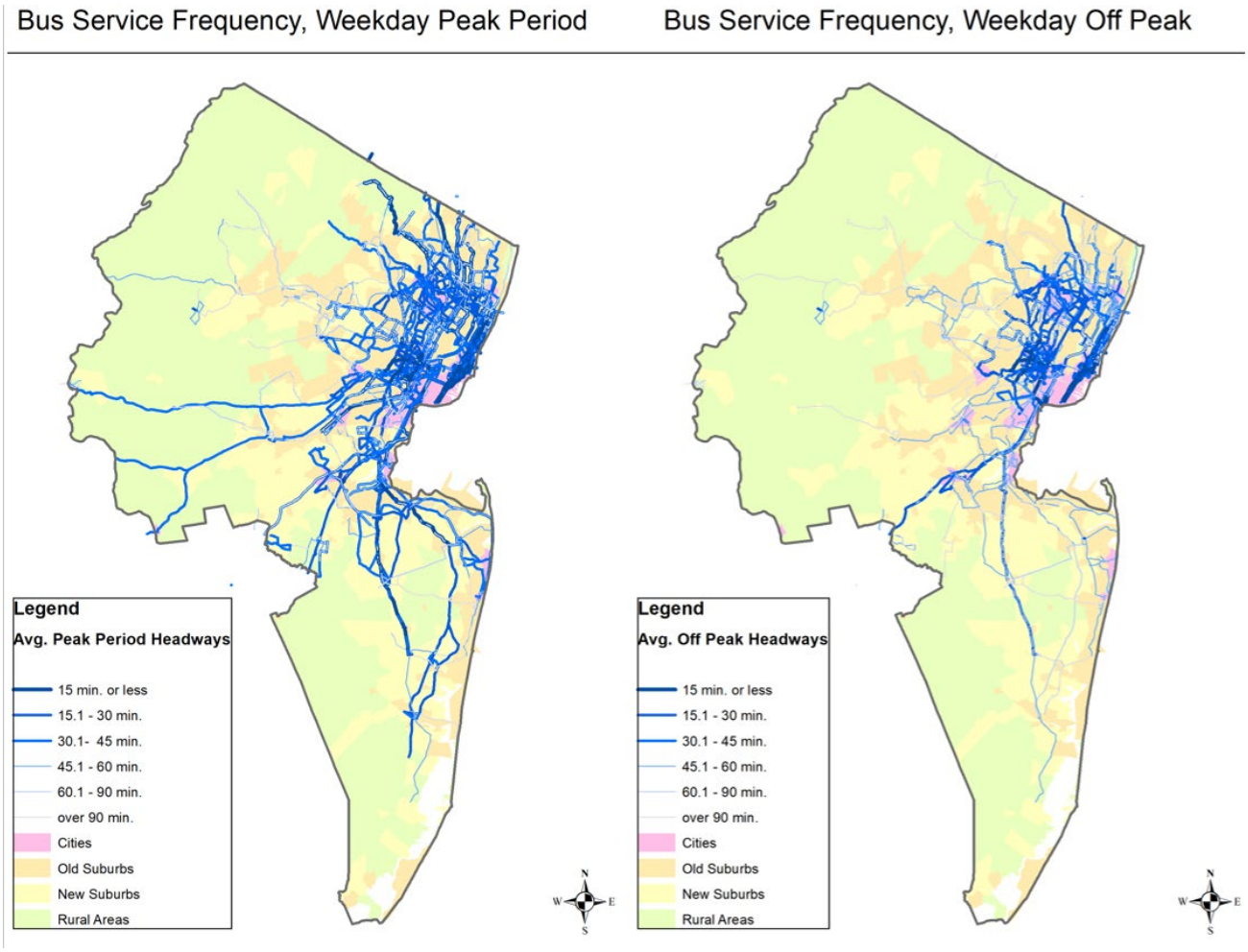


Key Observations:

- Rail service varies by line. During peak hours, most urban and suburban areas are served with high frequency transit. Off-peak frequency remains high between Rahway, Newark, and New York Penn Station, but generally is less than every 20 minutes for most rail corridors.
- Rail service is less frequent west of Dover in Morris County and west of Raritan in Somerset County.

Bus Service

Figure A-15. Bus Service Frequency (Left – Weekday, Peak, Right – Weekday, Off-Peak)



Key Observations:

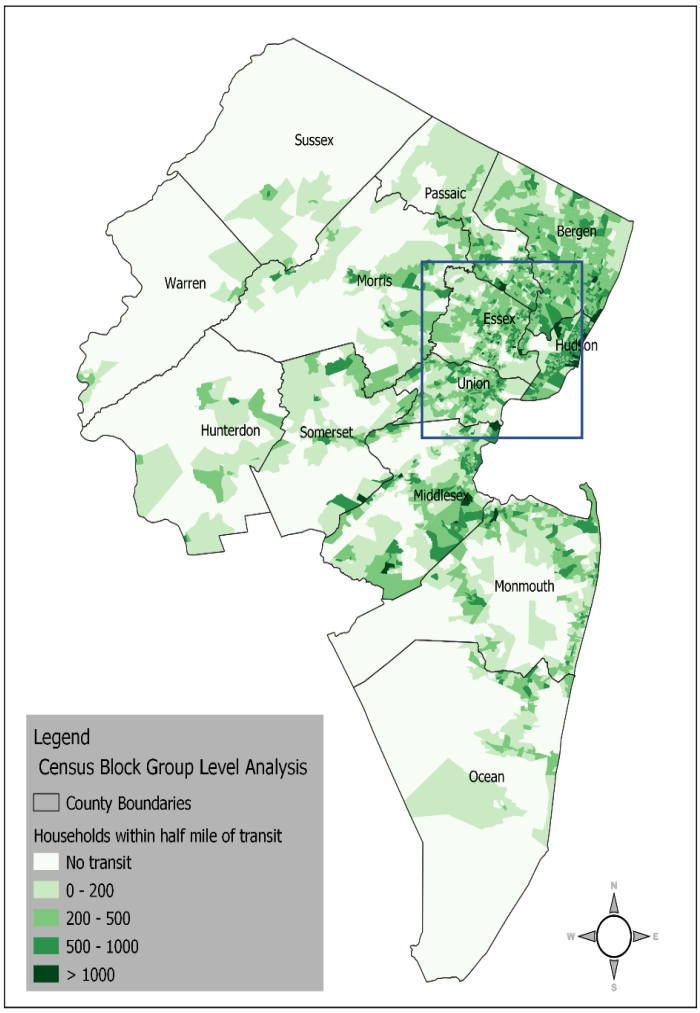
- Bus frequency is highest in the urban areas.
- Overall, buses provide extensive services within cities and older suburbs, with services mostly serving cities and older suburbs.
- While rail transit service is less frequent in off-peak hours, bus transit is both less frequent and has fewer routes operating during off-peak hours as compared to peak period.

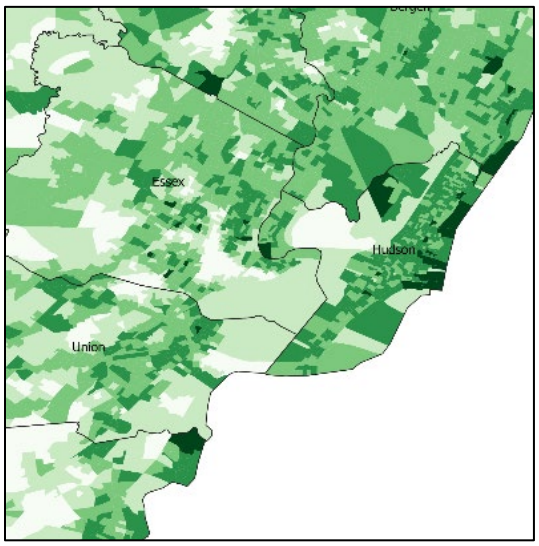
Households and Jobs within a Half Mile of Transit

Public Transit Usability

Figure A-16 and Figure A-17 illustrate the total number of households and jobs, respectively, within a half mile of transit stop for each Census Block Group (BG) in the NJTPA region. While the 2018 American Community Survey 5-year estimates are only available at the census block level, the household data was further distributed to the BG level by using the same proportions as in the 2010 decennial census data. The transit stop location data was adopted from the NJRTM-E model to create half mile buffers around each transit stop. The intersection area between the transit stop buffer layer and the BG layer was analyzed to create the maps. For each intersected BG – transit stop combination, the ratio of the intersected BG area to the total BG area was calculated. All intersected regions with a ratio of under 20% were ignored, to account for the fact that jobs are typically concentrated. For the remaining intersected regions, the proportional (by area) number of households were summed up and displayed as the final map. For the number of jobs, instead of using the 2018 ACS Household data, 2017 LEHD LODES dataset was used.

Figure A-16. Number of households within a half mile of transit (Source: NJTRME model, ACS 2018)

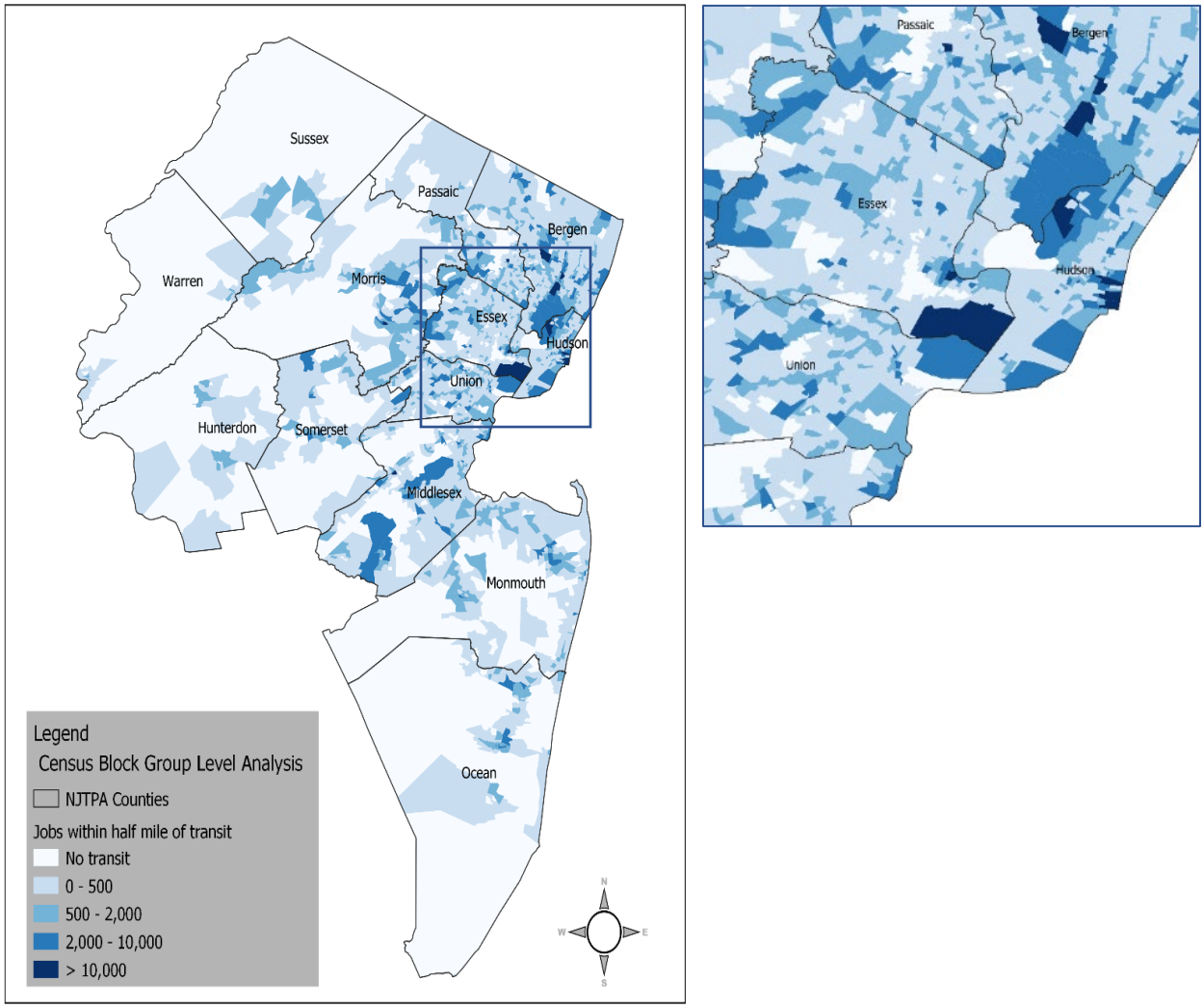




Key Observations:

- Transit access is the highest in the urban core of NJTPA and lowest in the rural areas.
- Hudson county and the urban centers in Essex, Union and Passaic county have amongst the highest number of transit accessible households in the region.
- Accessibility is also high along the North Jersey Coast rail line in Middlesex and Monmouth counties.
- A majority of Sussex, Warren, Hunterdon, and Ocean counties have no access to transit. In the smaller areas where transit is available, the number of transit accessible households per BG is under 200.

Figure A-17. Number of jobs within a half mile of transit (Source: NJTRME Model, LEHD LODES 2017)



Key Observations:

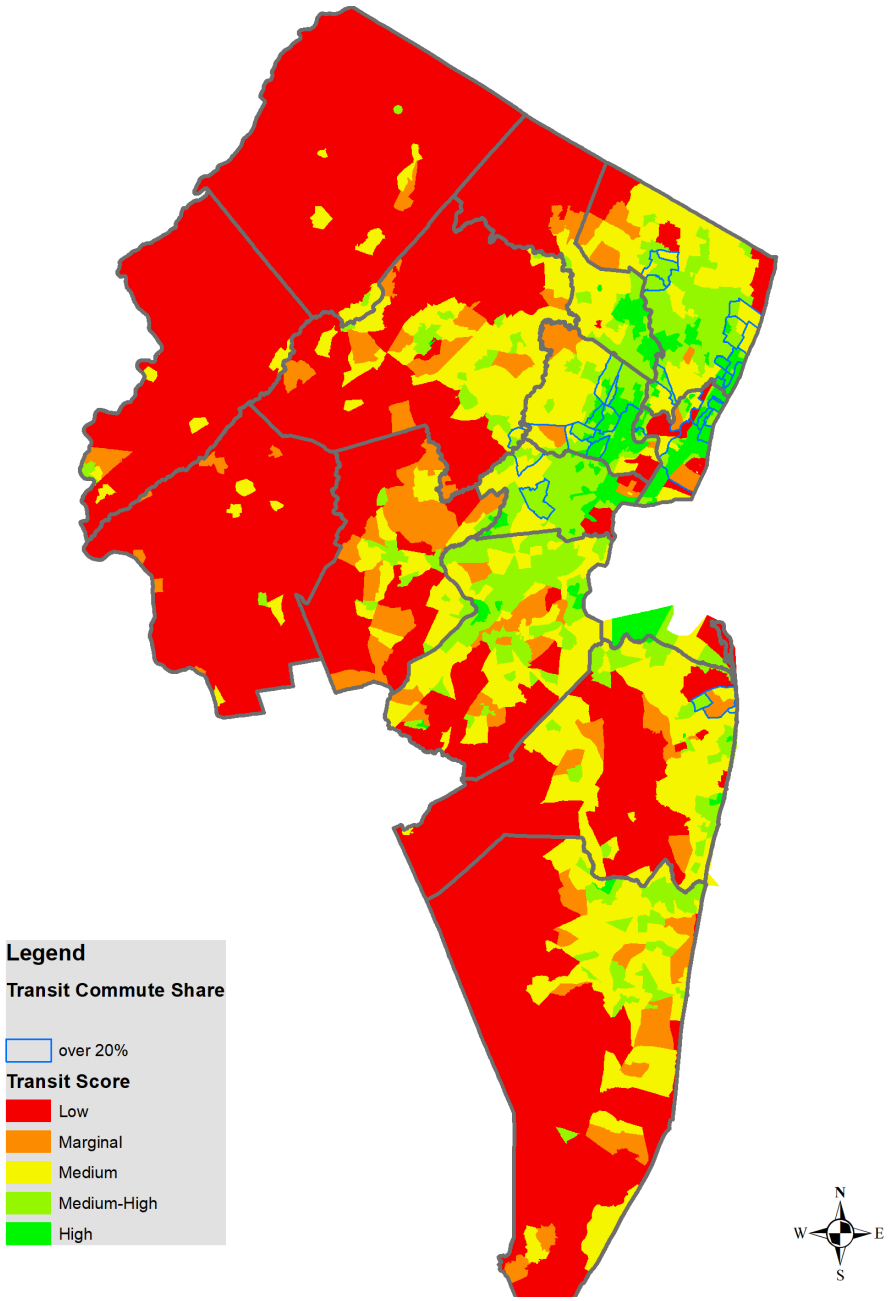
- The overall transit accessibility to jobs follows similar trends as the that to households. It is highest in the urban core of NJTPA and lowest in the rural areas. Hudson county and the urban centers in Essex, Union and Passaic county have amongst the highest number of jobs accessible to transit in the region. Middlesex County also has areas with a significant number of jobs within a half mile of transit.
- The large block group with a high number of jobs accessible to transit in the southeast corner of Essex county represents the Newark airport, with over 24,000 jobs. Other regions with the highest number of transit accessible jobs are in Jersey City, Hackensack, Paterson, New Brunswick, the Westfield Garden State Plaza Mall in Bergen county, Teterboro Airport and the Morristown Medical Center.

Transit Score

Public Transit Usability

Transit score is an index used to assess how "transit friendly" a community might be and is used to assess the potential usage or propensity to use transit services. Transit score is calculated as a function of population density, employment density, and zero vehicle household density (for more information, see: Transit Score: New Jersey's Unique Planning Tool). The measure is classified into five categories based on the numerical value of the transit score – Low (< 0.6), Marginal (0.6 – 0.9), Medium (1 – 2.4), Medium-High (2.5 – 7.5) and High (> 7.5). As such, it is higher in cities and older suburbs.

Figure A-18. Transit Score overlaid with Transit Mode Share



Key Observations:

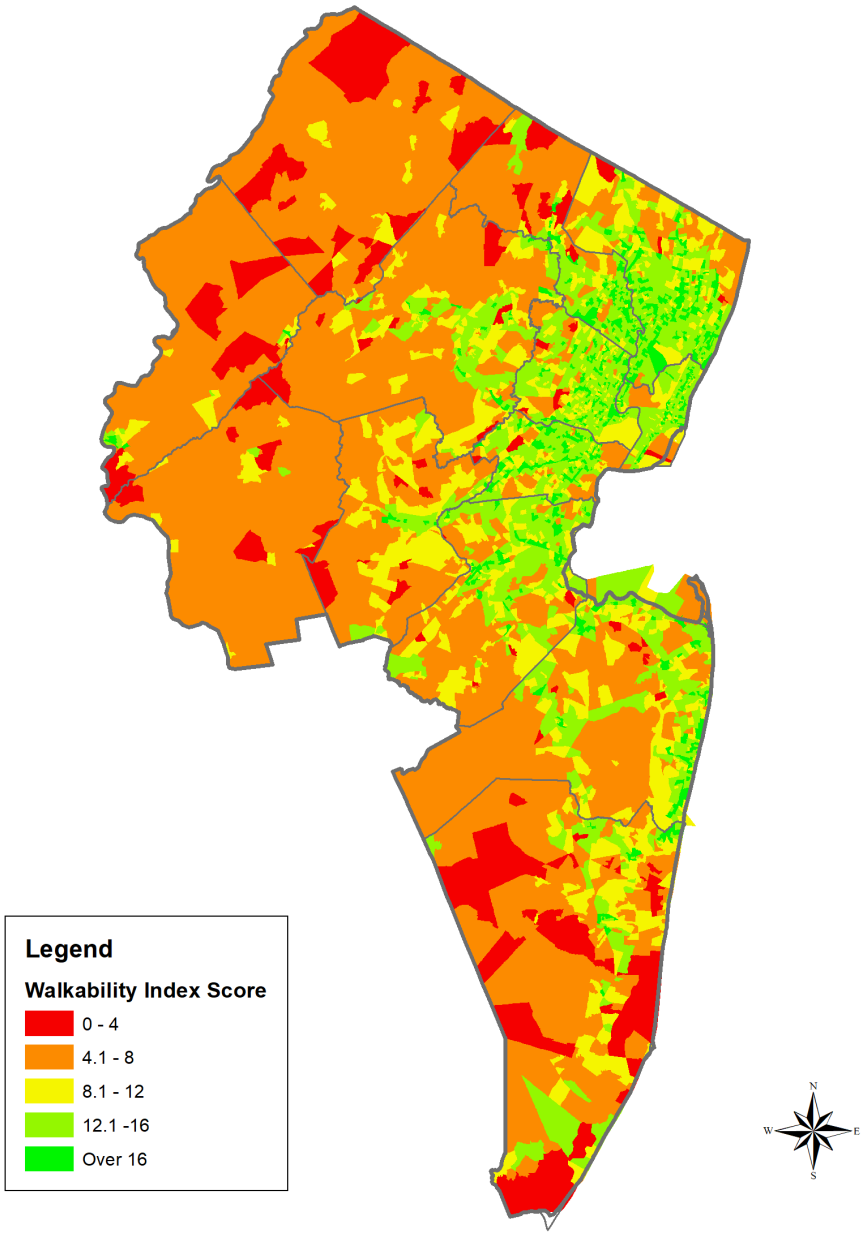
- Areas with the highest propensity for transit use are located in cities and older suburbs. However, there are areas with medium to high transit propensity in some townships and locations in more rural areas.
- When comparing with a map of transit routes, most areas with a Transit Score of Medium or higher are served by transit, but a few are not.
- Comparing this map to others showing non-SOV mode share reveal that some areas with low Transit Score have moderate non-SOV mode shares (15-25% non-SOV), and some areas with higher Transit Scores do not have the highest non-SOV mode shares.

Walkability Index

Walking & Bicycling

The USEPA developed a series of data products to assess the built environment and transit accessibility of neighborhoods in metropolitan regions across the United States. The **National Walkability Index** provides walkability scores based on a simple formula that utilizes factors that have been demonstrated to affect the propensity of walk trips. These factors generally relate to population density. This index does not reflect the existing of sidewalks or pedestrian connections but may be useful to help prioritize areas most conducive to walking with appropriate pedestrian infrastructure.

Figure A-19. National Walkability Index (Source: U.S. Environmental Protection Agency)



Key Observations:

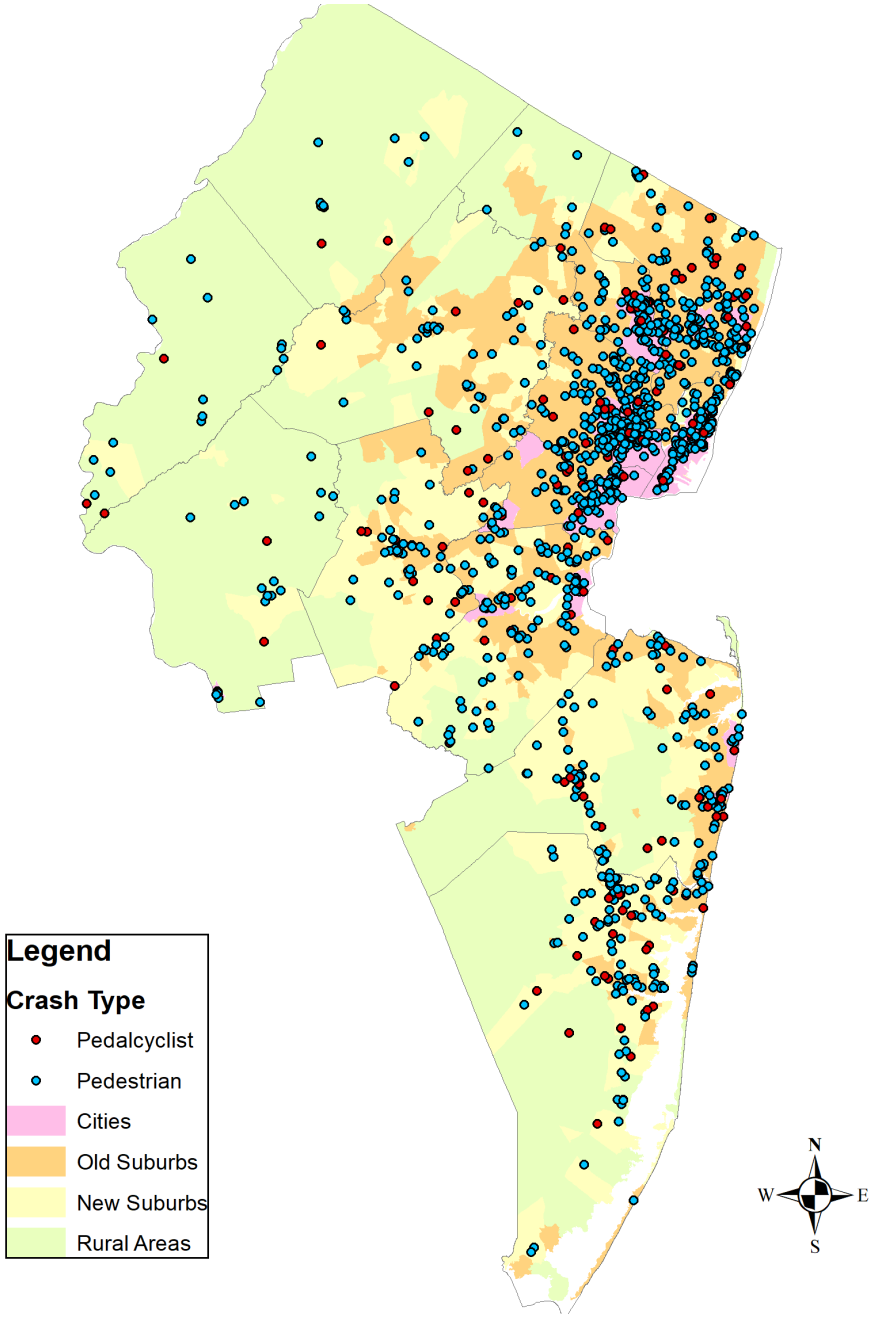
- Cities and older suburbs tend to have the highest walkability index score, while rural areas have the lowest scores.
- However, there are some locations in rural areas with moderate to high walkability.

Bicycle and Pedestrian Fatalities and Serious Injuries

Walking & Bicycling

Vehicle crashes involving bicycle and pedestrian fatalities or serious injuries are an indicator of an unsafe environment for bicycling and walking.

Figure A-20. Pedestrian Fatal and Severe Injury Crashes, 2014-2018



Key Observations:

- There are a large number of pedestrian and cyclist crashes with fatalities or serious injuries in urban areas and older suburbs, where there tends to be the largest amount of pedestrian and bicycle activity.
- However, there are also some clusters of these crashes in new suburbs and rural areas. For instance, there are a significant number of these crashes along the US-9 corridor in Monmouth and Ocean Counties.

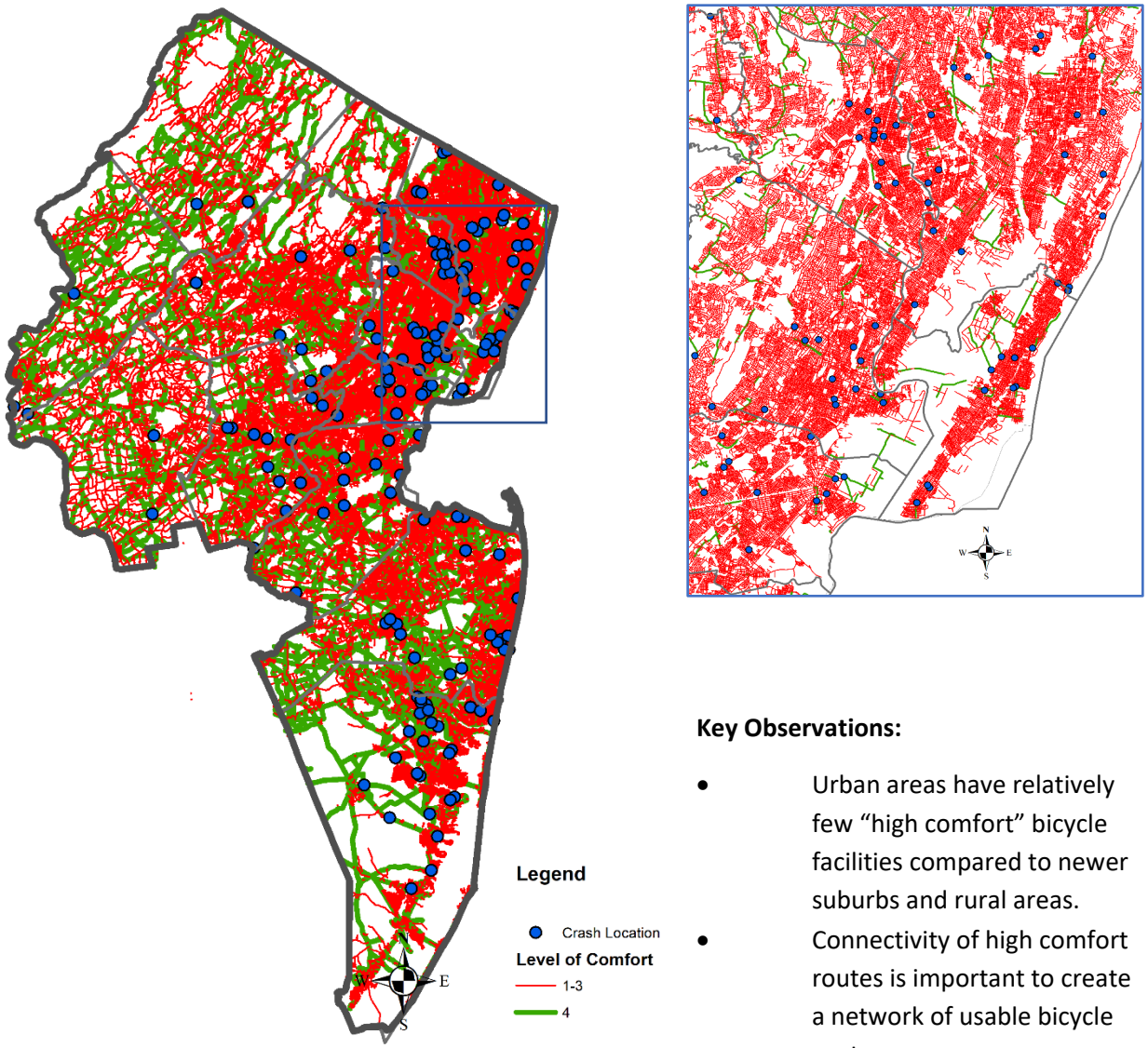
Bicycle Level of Comfort

Walking & Bicycling

Bicycle level of comfort is an index used to categorize roads by the suitability for bicycling. The level of comfort is on a scale of 1 to 4, and takes into account traffic speeds, number of lanes, and whether there are protected bike lanes along roadways. It also accounts for bike paths (highest level of comfort). More route options with high levels of comfort provide more options for people to use bicycles for trips.

The figure below shows bicycle level of comfort for those at the highest level of comfort (in green), which reflect bike paths and roads with protected bike lanes along roads at 30 mph or less; and other roadways (in red). It also maps the locations of bicycle crashes involving fatalities or serious injuries.

Figure A-21. Bicycle Level of Comfort and Bicycle Crashes involving Fatalities or Serious Injuries, 2014-2018



Note: Does not include interstates, other freeways, or other principal arterials.

Key Observations:

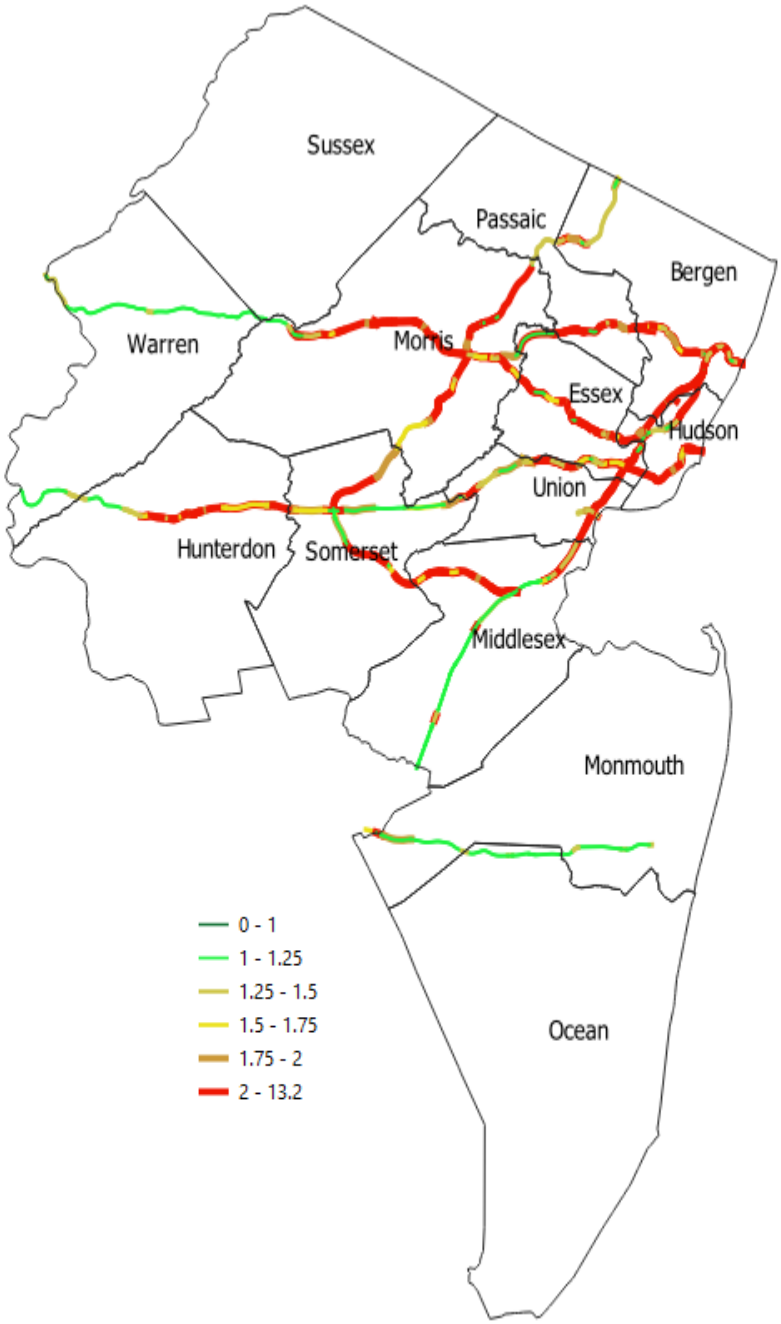
- Urban areas have relatively few "high comfort" bicycle facilities compared to newer suburbs and rural areas.
- Connectivity of high comfort routes is important to create a network of usable bicycle routes.

Truck Travel Time Reliability

Freight Movement

Truck Travel Time Reliability Index is the ratio of the 95th percentile travel time to the 50th percentile travel time on a road segment. The TTTR index is calculated for the interstate system for freight trucks. It gives a measure of the worst travel times experienced on a segment as compared to the 'normal' travel time.

Figure A-22. Interstate Truck Travel Time Reliability, 2019 (Source: RITIS NPMRDS)



Key Observations:

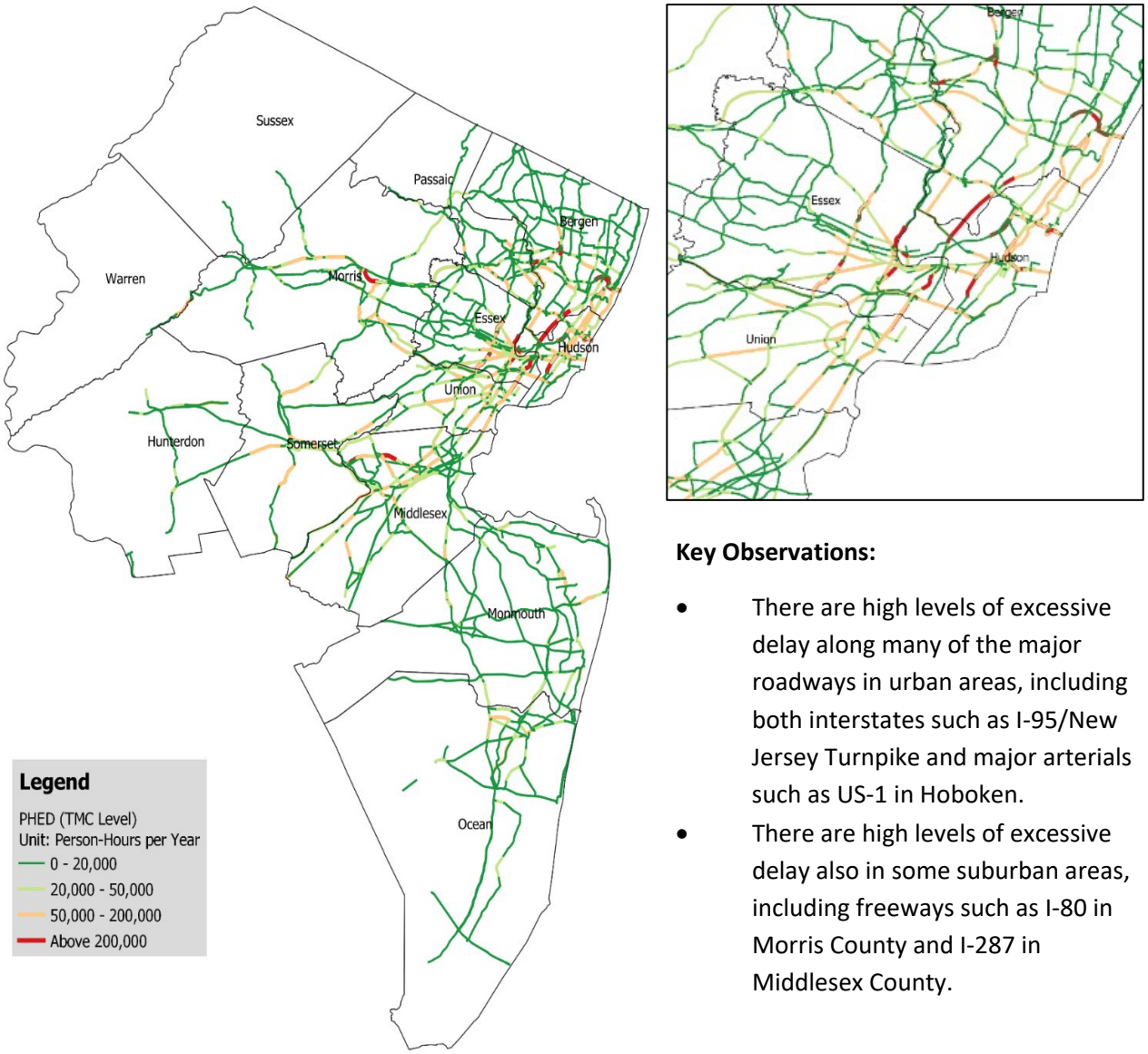
- Most of the region's interstates in urban and suburban areas exhibit poor truck travel time reliability.
- The TTTR Index is the worst in most urban regions and in parts of suburbs. The index value is under 1.25 for most of the rural areas.

Person Hours of Excessive Delay (PHED)

Bottlenecks & Delay

Person Hours of Excessive Delay (PHED) is a measure of traffic congestion that is being used for Federal performance reporting. The measure is valuable since it attempts to calculate "excessive delay", recognizing that some traffic delay is typically expected in urban areas during peak periods. The threshold for excessive delay is travel time at worse than 20 miles per hour or 60% of the posted speed limit travel time (e.g., 33 mph on a roadway with a 55 mph speed limit), whichever is greater. The delay is measured in 15-minute intervals during peak AM and PM travel hours during weekdays, and is weighted by vehicle volumes and occupancy to account for time spent in excessive delay by people (not just vehicles).

Figure A-23. Person Hours of Excessive Delay, 2019 (Source: RITIS NPMRDS)



Key Observations:

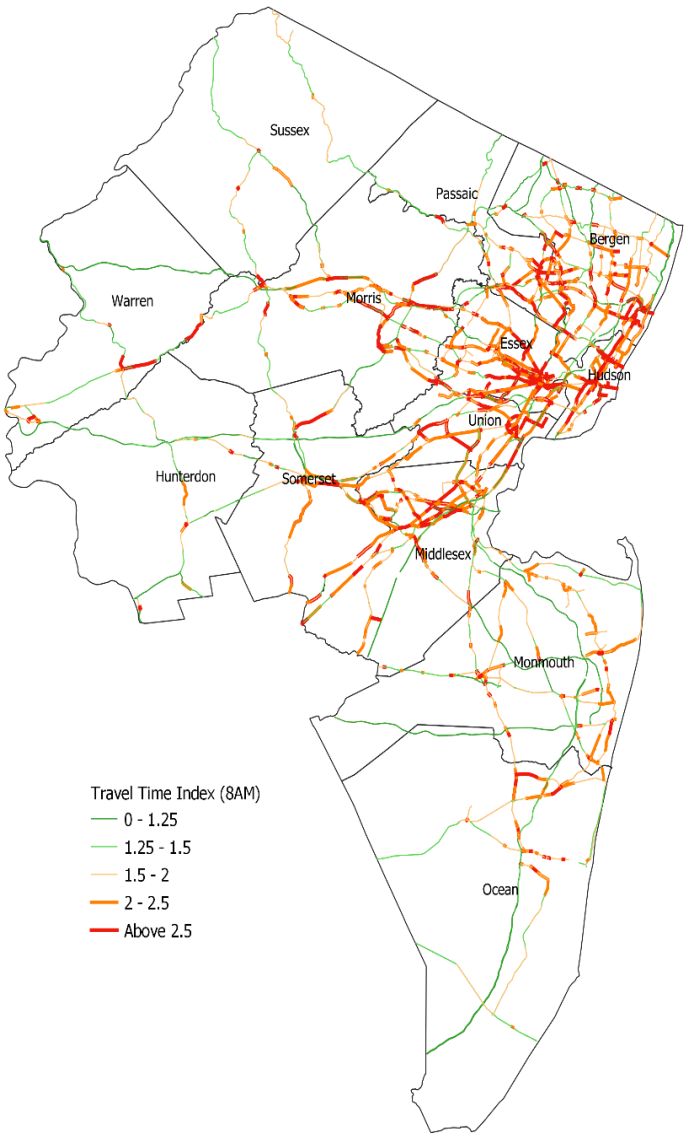
- There are high levels of excessive delay along many of the major roadways in urban areas, including both interstates such as I-95/New Jersey Turnpike and major arterials such as US-1 in Hoboken.
- There are high levels of excessive delay also in some suburban areas, including freeways such as I-80 in Morris County and I-287 in Middlesex County.

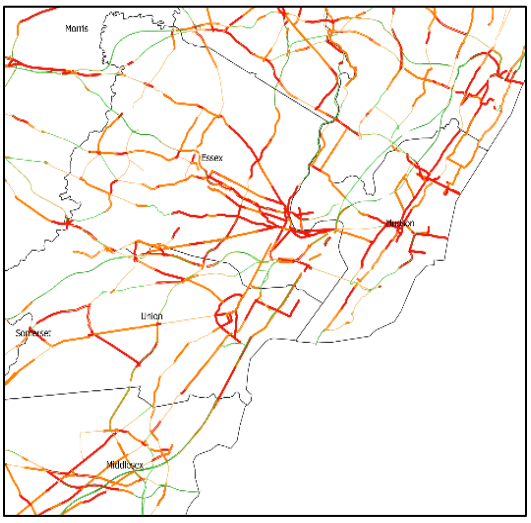
Travel Time Index (TTI)

Bottlenecks & Delay

The Travel Time Index is the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. A value of 2.0, for instance, indicates a 20-minute free-flow trip requires 40 minutes during the peak period. It should be recognized that traffic congestion is generally expected in busy urban areas with vibrant economic activity, and to the extent that the congestion is predictable (see earlier discussion of travel time reliability) can be built into the travelers' schedules. As a result, a high TTI may not necessarily signify a “problem” to be solved. However, compared to the “peak hours of excessive delay” measure, which accounts for the volume of vehicles and passengers to estimate total delay, TTI accounts for the perspective of individual drivers. As a result, some more rural and suburban areas with lower traffic volumes show up with high TTI even if the total volume on these roadways does not make them rise high on a measure of delay accounting for volumes.

Figure A-24: 2019 TTI for 8AM on a Weekday (Max of All Tuesday, Wednesday and Thursdays of 2019)





Key Observations:

- Many roadways throughout the region exhibit high levels of congestion when measured using TTI for the morning peak.
- Congested roadways are prevalent in urban and suburban areas.
- Congested roadways also occur in more rural areas, such as along NJ-57 in Warren County.