

Monmouth County Bus Rapid Transit Opportunities Study



Final Report

January 16, 2015

**PARSONS
BRINCKERHOFF**

URS

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I. Executive Summary

The *Monmouth County BRT Opportunities* study addresses the feasibility of implementing strategies and features consistent with Bus Rapid Transit (BRT) systems in order to improve bus service in Monmouth County. The study was developed by Monmouth County in partnership with Together North Jersey (TNJ) and the North Jersey Transportation Planning Authority (NJTPA). While further development of this concept may lead eventually to the development of a full-fledged BRT route (or multiple routes) within the county, the main intent is to develop approaches to improve existing service within the county. A Steering Advisory Committee met three times to develop goals and objectives, review intermediate analyses, and contribute to final recommendations. A public survey was also conducted to gather input from bus transit riders and stakeholders.

Data was collected from a variety of sources to describe the existing state of bus transit in Monmouth County. One of the key conclusions of the existing conditions analysis is that existing ridership on local bus service provided by NJ TRANSIT is generally lower than the express bus services operated by NJ TRANSIT and private operator Academy Bus. In many cases Trans-Hudson Express Bus service is nearing capacity during peak travel periods with limited opportunities to expand. These conclusions guided the study to emphasize improving local bus service and increasing ridership on trips within Monmouth County.

Existing local bus service has fairly good coverage within the portions of the County with the highest density of residential and commercial development. However, infrequent weekday service and limited weekend service contribute to a poor perception of reliability and service quality by transit riders. In many locations, passenger amenities at bus stops are inconsistent or limited. The highest ridership on existing local bus service is observed on the 832 bus that parallels NJ TRANSIT's North Jersey Coast Line (NJCL) rail service. However, there is also substantial demand for east-west service connecting Freehold to Eatontown, Asbury Park, and Red Bank. There are numerous existing connections between NJ TRANSIT bus and rail service other travel modes such as private bus service, ferries, and shuttles that are worth considering in the context of improving local bus service. The roadway network within Monmouth County features high-speed north-south links with lower speed east-west links directly connecting various communities. The network typically experiences congestion on the roadways during AM and PM peak travel periods.

Demographic and socio-economic conditions were also summarized as part of the analysis of existing conditions. According to U.S. Census and American Community Survey data, there are a number of concentrations of residential and commercial development within the County including Asbury Park, Red Bank, Freehold, and other communities along the NJCL. While not often recognized, there are several communities that feature a high percentage of zero-car households and other transit-dependent residents, such as Long Branch and Asbury Park. Dense residential developments, universities (Monmouth University and Brookdale Community College), hospitals (in Red Bank, Long Branch, Freehold, and Neptune), retail destinations (Freehold Raceway Mall and Monmouth Mall), and large employment centers represent the largest quantity of transit origins and destinations. Monmouth County recognizes a variety of locations which present opportunities for redevelopment, some of which could support transit-oriented development.

This study provides an overview of the applicable BRT features and strategies that could potentially be implemented as means of enhancing existing bus transit service. While a full-fledged BRT system may not be immediately realistic or feasible in Monmouth County, many of the features and strategies commonly associated with BRT systems could enhance the existing transit system. Additionally, the study examines existing and potential future transit nodes to

identify those suitable for further development. The process of developing these nodes in the future would include cost-benefit calculations and estimates of projected ridership increases. If potential features and strategies show positive economic and ridership value, then they could be implemented using a phased approach combining BRT features at transit node locations with BRT features and strategies on bus transit operations. Together, as improvements progress, the overall bus system could start to resemble a modern BRT system.

To identify the range of possible BRT features, the project team conducted an analysis of the existing Strengths and Weaknesses, future Opportunities, and Threats (SWOT) associated with bus service in Monmouth County. Factors were categorized as either impacting the transit service, physical characteristics, or socio-economic conditions. Strong ridership on commuter bus services, extensive coverage of the local bus network, and concentrated areas of residential and commercial development were cited as strengths. The overall lack of frequent service with high-quality passenger amenities and the long distance and travel times between some destinations within the County were noted as weaknesses. Future opportunities to improve bus transit include investing in new amenities, testing more frequent service, and developing new partnerships. Threats include funding and the public perception of bus transit service and facilities.

The SWOT analysis provides the basis for five recommendations that Monmouth County and other stakeholders can work towards implementing:

1. **Invest in Bus Transit** – A balance must be achieved between strategic investments and increased ridership. On local bus service, investments should be made that result in higher ridership and improve the cost-effectiveness of service.
2. **Enhance Local Bus Service** – Service should be expanded on a trial basis to include more frequency, longer span of service, and Sunday service. A process is presented by which new bus routes can be introduced into the existing network to complement existing service and enhance coverage and connectivity.
3. **Add BRT Features System-wide** – From the extensive list referenced by the study, features should be added on an on-going basis as needs dictate and funding becomes available. This may eventually allow certain routes with supportive demand and ridership to “graduate” to full-fledged BRT service, if this is determined to be desirable outcome in the future.
4. **Develop Future Bus Transit Nodes** – An analysis of 35 potential nodes is presented, from which five are recommended as the most attractive for further development as future bus transit nodes.
5. **Integrate Bus Transit into the Master Plan** – Monmouth County should emphasize bus transit and incorporate the goal of improving bus transit into its transportation, land use, and other elements of the Master Plan that is currently in development by County staff.

II. Study Overview

1. Project Background

Monmouth County, in partnership with Together North Jersey (TNJ) and the North Jersey Transportation Planning Authority (NJTPA), have studied the feasibility of implementing strategies and features consistent with Bus Rapid Transit (BRT) systems, in order to improve bus service in Monmouth County.

A Steering Advisory Committee (SAC) was assembled to provide input to the study process and findings. The Committee met three times to ensure stakeholder input was collected and applied to the study findings. Project Goals and Objectives were developed with help from the SAC. Coordination is also anticipated between this BRT study and the ongoing preparation of the *Monmouth County Master Plan*.

The study is divided into four sections and are presented as such (respectively - existing bus service, overview of features and strategies, SWOT analysis, and recommendations for improvements) in this final report. The first section focuses on a review of existing bus service within Monmouth County. Schedules, performance, ridership, and other data are summarized in order to provide an understanding of existing operations. Key trip generators such as high-density residential and employment centers were identified. Primary roadways within the study area include State Routes 18, 33, 34, 35, and 36, U.S. Route 9, and the Garden State Parkway. Traffic count data within the study area was assembled and summarized on major roadways.

This second section of the study provides an overview of features and strategies typically incorporated into bus transit systems. The third section involves a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis conducted by the project consulting team. The final section of this report provides recommendations for the County and other stakeholders to implement and consider moving forward.

2. Study Process

Project Team

The project administration team consisted of representatives from Monmouth County Division of Planning, the North Jersey Transportation Planning Authority, and Together North Jersey. A consultant team consisting of Parsons Brinckerhoff, with support from URS and InGroup, performed the analysis of existing transit data, SWOT analysis, and preparation of recommendations.

Steering Advisory Committee

A key driving force in the development of the BRT Opportunities study for Monmouth County was the locally and regionally represented Steering Advisory Committee (SAC). The following organizations and entities were represented on the SAC:

- City of Long Branch
- Howell Township Community Development
- Meadowlink TMA
- Monmouth County Economic Development
- Monmouth County Engineering
- Monmouth County Planning

- Monmouth County Transportation Council
- New Jersey Business Action Center, Office of Planning Advocacy
- New Jersey Department of Environmental Protection
- New Jersey Department of Transportation
- NJ TRANSIT
- North Jersey Transportation Planning Authority

The SAC provided invaluable input and guidance to the project team to ensure that the needs and goals of Monmouth County were properly channeled into the final document. Each of the first two meetings addressed a specific agenda, but also allowed for open discussions about on-going project efforts and provided ample opportunities for SAC members to voice their opinions about the study.

Public Opinion Survey

A key part of the public outreach strategy for the study was the development and deployment of a public opinion survey aimed at gauging public priorities for bus transit improvements and investments. The survey was developed by the consultant team in conjunction with Monmouth County and the North Jersey Transportation Planning Authority, and was deployed on the Monmouth County Planning website. The survey, which was available in both English and Spanish, featured 12 questions aimed at collecting user-level experiential data. Several questions were open ended allowing participants to provide maximum input. The survey was posted in July 2014 and closed in August 2014. The sixty survey responses are integrated into the SWOT analysis and incorporated into the final report (See Appendix A for the survey instrument and a summary of results).

3. Study Goals

The goals for this study were drafted by the project team, and reviewed at Steering Advisory the second of three Committee Meetings. The project team elected to closely examine the BRT Opportunities within Monmouth County and determine the applicability of BRT features and strategies both as individual improvements and as packages of improvements. Based on this approach, the team developed the following study goals:

- **Analyze existing transit services and identify the reasons for the success** of the most well-used transit services.
- **Identify** land uses and current travel origins and destinations—within the County and immediately outside the County—that are **suitable transit nodes**.
- **Focus primarily on trips within Monmouth County** with secondary emphasis on North Jersey destinations such as Newark, Secaucus, Jersey City, and Hoboken, along with more local destinations in Somerset and Mercer Counties.
- **Identify the ways** in which the set of BRT features and improvements can help to **improve public transit within Monmouth County**, either individually or in packages.
- **Identify the high-benefit and early implementation actions** that can lead to immediate transit improvements.
- **Develop long-term conceptual alternatives** for BRT that can be successfully implemented through a series of incremental improvements.

- **Support** the goals, objectives, and outcomes of **the transportation element of the County Master Plan.**

In addition to the stated study goals, the project team also strived to consider and represent members of traditionally under-represented communities. Efforts to represent these communities in this planning study included the following:

- In general, these communities tend to be over-represented amongst bus riders, including customers who are low-income, minority, disabled, elderly, and without access to cars. As a result, the study focused on improving bus service, which therefore takes into account the needs of many of these communities implicitly. Similarly, recommendations to improve existing and future service using the features and techniques associated with BRT will improve the travel experience, access to employment, and other factors for these communities.
- In the analysis of existing conditions, zero-car households, which are representative of many of these traditionally under-represented communities, were mapped and used to evaluate existing transit use.
- In the survey effort, the project team worked directly with the Community Affairs and Resource Center of Monmouth County (which works directly with multiple traditionally underrepresented communities) and the Vision Impaired Center to administer the survey to community members who may have been unable to complete the online version. This allowed the survey results to include additional input and results from these communities. Twenty-five percent of total survey responses were received through this format. In addition, the online version of the survey was made available in Spanish.
- In the analysis of future transit nodes, the presence of a high number of zero-car households was used as a factor when considering which future transit nodes are most appropriate for further future development.

4. Review of Past Studies

The 2020 Transit Report: Possibilities for the Future

The *2020 Transit Report: Possibilities for the Future*, prepared by NJ TRANSIT, conveyed the potential for different types of transit services and potential for new transit projects within New Jersey over the next twenty years. A transit score was developed to indicate the potential need for more service and more modes of transit. Candidate projects identified to be studied in Monmouth County included Bus Priority along the U.S. Route 9 Corridor and a Monmouth-Ocean-Middlesex (MOM) Rail Line.

US 9 and Garden State Parkway Studies

The *U.S. Route 9/Garden State Parkway Corridor Study* was conducted by the South Jersey Transportation Planning Organization in 2004, and proposes concepts and recommendations that include multi-modal alternatives. When the study was published, there were no proposed improvements to bus service within the U.S. Route 9 study area. The future build conditions concluded there are no bus improvement projects or studies in Monmouth County.

III. Existing Conditions Analysis

1. Existing Transit Service

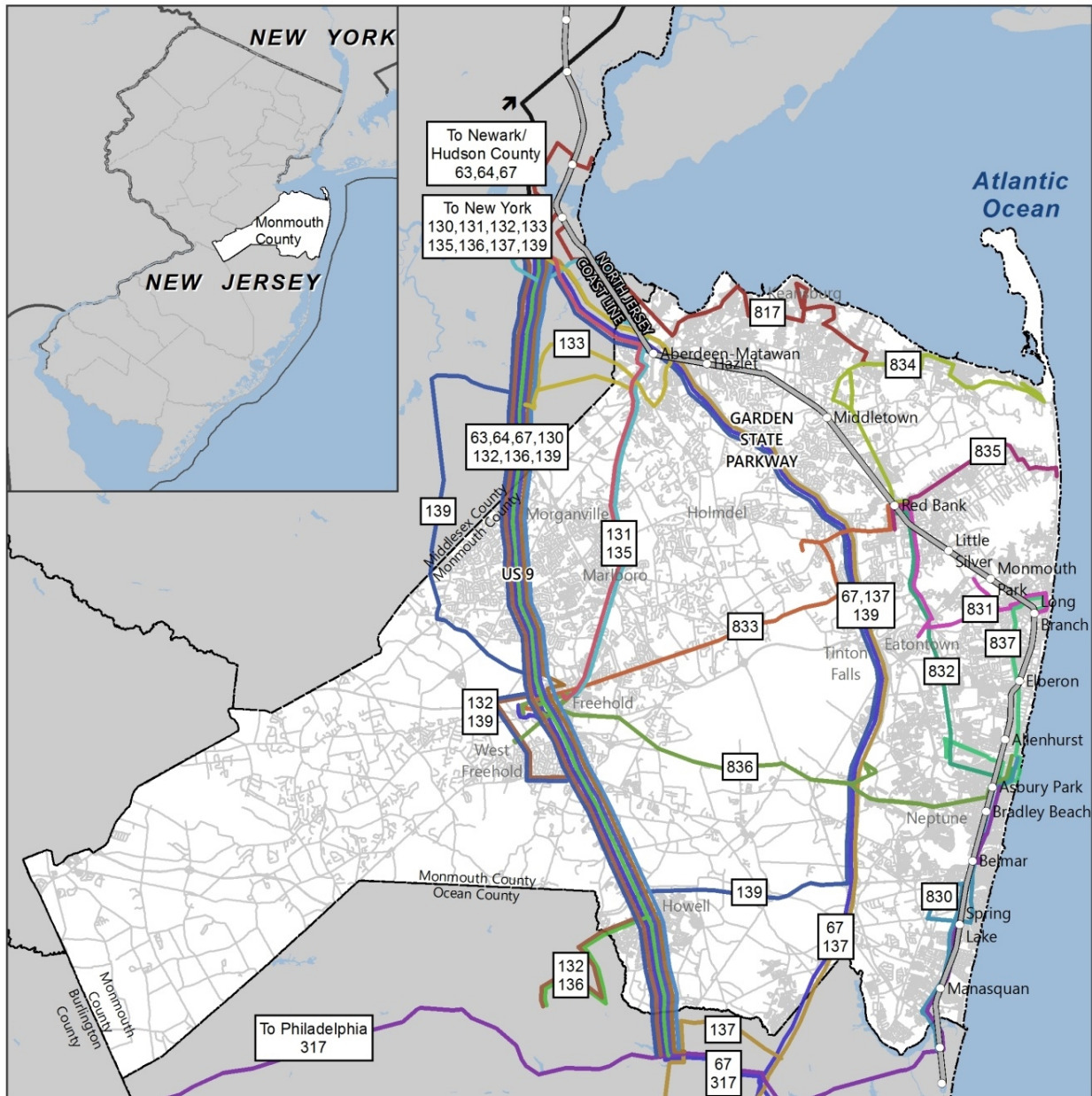
NJ TRANSIT is the public agency that operates bus service within Monmouth County. Private bus service is operated by Academy within the County as well as to Northern New Jersey and New York City. NJ TRANSIT also provides rail service between 14 stations within the County and major employment destinations such as Newark and Manhattan via the North Jersey Coast Line.

NJ TRANSIT Bus Routes

Currently, there are approximately 21 different NJ TRANSIT bus routes serving destinations in and around the County. Approximately 13 of these can be characterized as long distance routes that connect Monmouth County to regional destinations such as Newark, Manhattan, and Philadelphia. The majority of these long distance bus service routes use either the Garden State Parkway (GSP) or U.S. Route 9 (US 9) to traverse the County from south to north in AM peak periods and north to south in PM peak periods. Long distance bus routes are typically served using coach buses with high-back seats, reading lights, and other amenities.

Eight bus routes can be characterized as local service providing service between destinations within the County. The local bus routes typically serve municipalities that are further away from the GSP and US 9 and connect destinations within the County using east-west roadways. Existing NJ TRANSIT bus services are listed in **Table 1** (page 8). These 830 series routes are also shown graphically on **Figure 1** (page 7). Key transfer nodes providing connections between bus routes as well as to/from other transit services are shown on **Figure 6** (page 13).

Figure 1: NJ TRANSIT Bus and Rail Routes in Monmouth County



Bus Routes and Rail

- | | | | | | | | |
|----|-----|-----|-----|-----|-----|-----|-----------|
| 63 | 130 | 133 | 137 | 319 | 831 | 834 | 837 |
| 64 | 131 | 135 | 139 | 817 | 832 | 835 | NJCL Rail |
| 67 | 132 | 136 | 317 | 830 | 833 | 836 | |

Source: NJ TRANSIT, ESRI



Table 1: NJ TRANSIT Bus Routes in Monmouth County

Category	Route	Description
Routes to/from Hudson County and Newark	63	Lakewood - Jersey City – Weehawken
	64	
	67	Toms River - Lakewood – Newark
Routes to/from New York City	133	Old Bridge - Aberdeen - New York
	131	Sayreville - New York
	135	Freehold - Matawan - New York
	137	Toms River - Lakewood - New York
	130	Lakewood - Old Bridge - New York
	132	
	136	
	139	
Routes to/from Philadelphia	317	Asbury Park - Fort Dix – Philadelphia
Local Bus Service – Monmouth/Middlesex Inter-county	817	Perth Amboy - Campbell's Junction
Local Bus Service – Monmouth County	830	Asbury Park - Point Pleasant Beach
	831	Red Bank - Monmouth Mall - Long Branch
	832	Red Bank - Monmouth Mall - Asbury Park
	833	Red Bank - Freehold Raceway Mall
	834	Red Bank – Highlands
	835	Red Bank - Sea Bright
	836	Asbury Park - Freehold Raceway Mall - CentraState
	837	Long Branch - Asbury Park - Seaview Square

NJ TRANSIT Bus Schedule Information

NJ TRANSIT buses serving Monmouth County typically operate between early morning and late evening with very little overnight service. By far the most frequent service is the bus route 139, which runs every 2 minutes during weekday peak travel times, making 244 total trips per day along U.S. Route 9 through Monmouth County and terminating or originating at the Port Authority Bus Terminal in Manhattan. NJ TRANSIT operates between 15 and 35 trips per day on most other bus routes in the County. Long distance bus service is concentrated on the AM and PM weekday peaks, with very little service offered on Saturdays and Sundays. Local bus service on most routes operates with similar service frequency on weekdays and Saturdays, although very little service is available on Sundays. **Figure 2** (page 9) shows the number of buses operated each day on various routes serving Monmouth County.

Bus service headways for long distance bus service are typically 15 minutes or less on weekdays. However, due to the nature of long distance commuter buses, the services typically only run northbound in the AM peak and southbound in the PM peak, with limited capacity for reverse commuters. Local bus service tends to run in both directions from early morning to late evening, on fixed 60 minute headways. **Figure 3** (page 9) shows headways on bus routes operated in the County.

Figure 2: Monmouth County Daily Bus Trips by Route

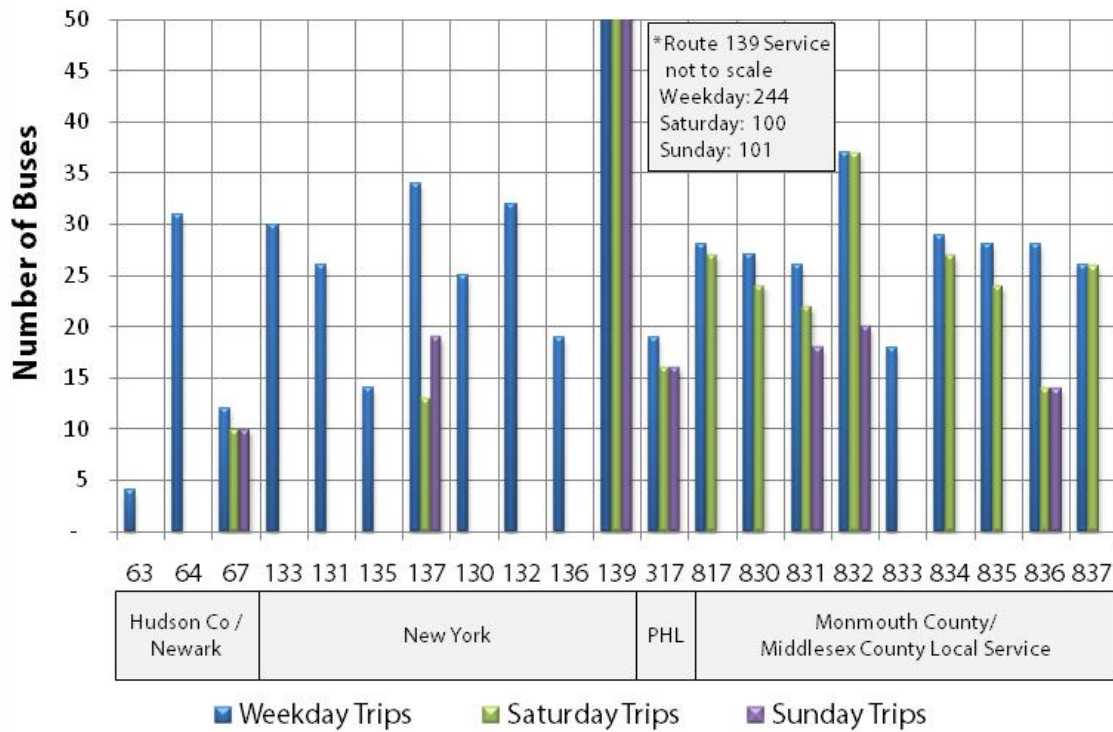
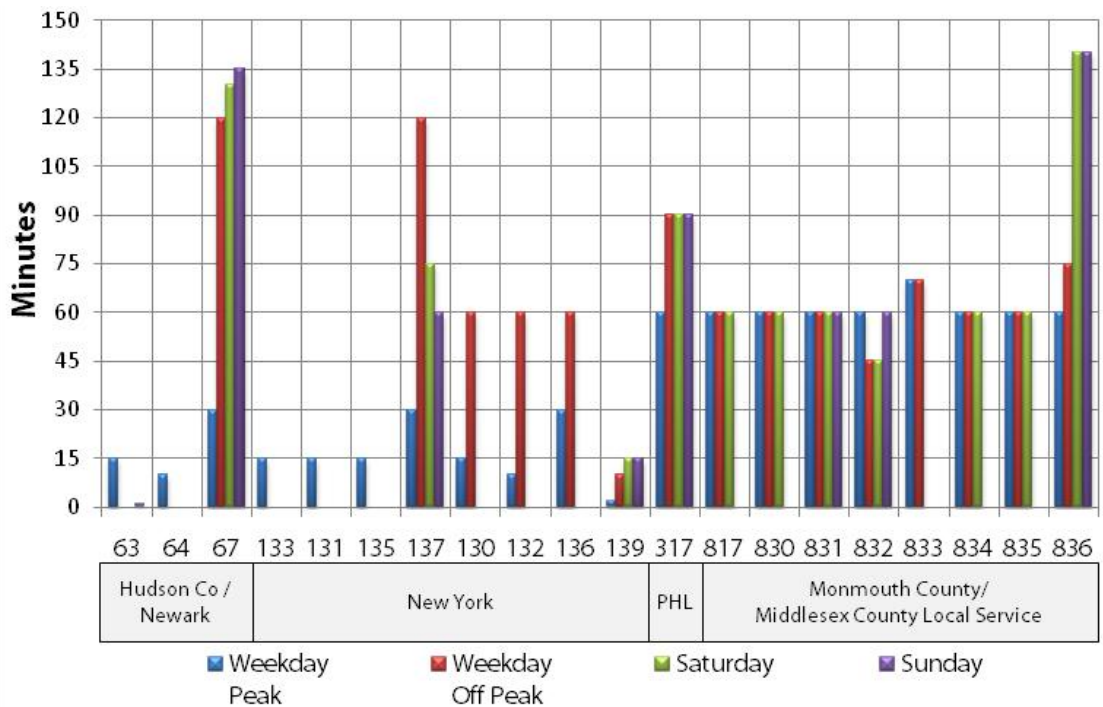


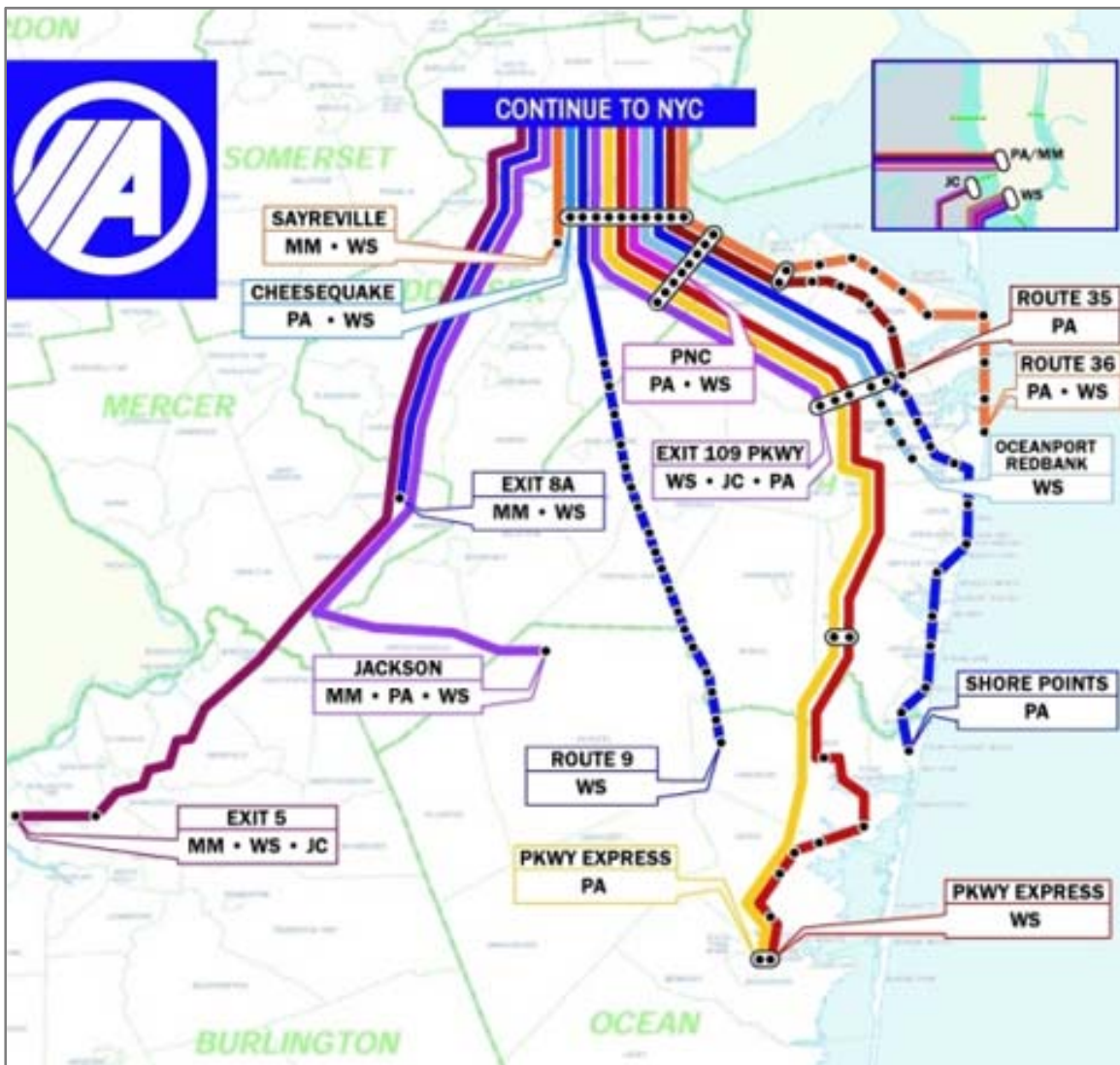
Figure 3: Monmouth County Bus Headways by Route



Private Bus Carriers

Additional private carrier commuter bus service is operated by Academy Bus throughout Monmouth County. This private operator operates long distance commuter buses between Monmouth County and New York City. The service is offered daily from numerous towns within Monmouth County including Asbury Park, Oceanport, and Atlantic Highlands. The bus service schedules, along with the land use of the County and demographic data, suggest that most patrons of private bus service are making long-distance trips to and from New York City. **Figure 4** below shows the Academy Bus service map.

Figure 4: Academy Bus Service Map



Source: Academybus.com

Monmouth County Shared Ride Bus

Another bus service available within Monmouth County is the demand-responsive Special Citizen Area Transportation (S.C.A.T.) shuttle. The service operates using seven-day advance reservations and is primarily focused on providing transportation for senior citizens, the permanently disabled, and others who do not have access to a vehicle. Trips to and from medical appointments, grocery shopping, and area stores are prioritized over leisure trips. A nominal fee is charged, providing some revenue to offset the cost of the service.

NJ TRANSIT Rail Service

NJ TRANSIT also operates the North Jersey Coast Line (NJCL) commuter rail service which serves 14 train stations within Monmouth County and provides continuing service to northern New Jersey and New York City, as well as a connection to the south in Ocean County at Bay Head Station. As shown in **Figure 1** (page 7), many train stations in Monmouth County serve as transfer nodes between rail service and local bus routes. Long Branch, Red Bank, and Asbury Park serve as multi-modal nodes with multiple bus routes connecting to train stations.

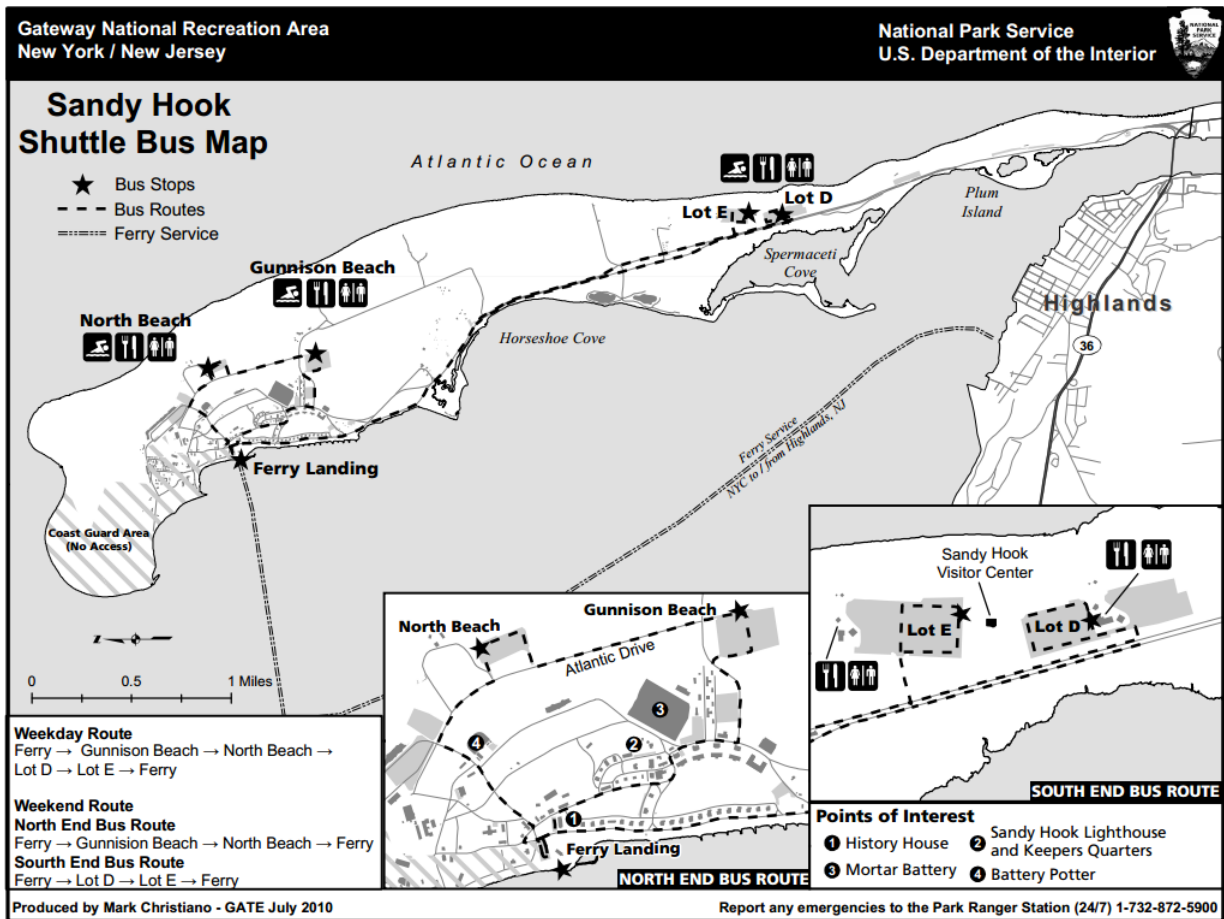
Ferry Service

Ferry Service to New York City is available from Belford Harbor, Atlantic Highlands, and Highlands, all of which are located along the north-facing bayshore, rather than the east facing ocean shore. Seastreak operates high speed catamaran service across Raritan Bay from Atlantic Highlands and Highlands to points in Manhattan, approximately 8 round trips per day. NY Waterway Ferry operates service from Belford to points in Manhattan, approximately 6 round trips per day.

Shuttle Service

Sandy Hook in the Gateway National Recreation Area in the northeast corner of Monmouth County serves as a unique tourism destination in the region. Parking is limited within the Recreation Area and is particularly constrained during the summer beach season. A shuttle bus operated by the National Park Service provides transportation within the park, as shown in **Figure 5** (page 12). It is worth noting that the only other public transit service that this shuttle connects to is the ferry at the landing within the park.

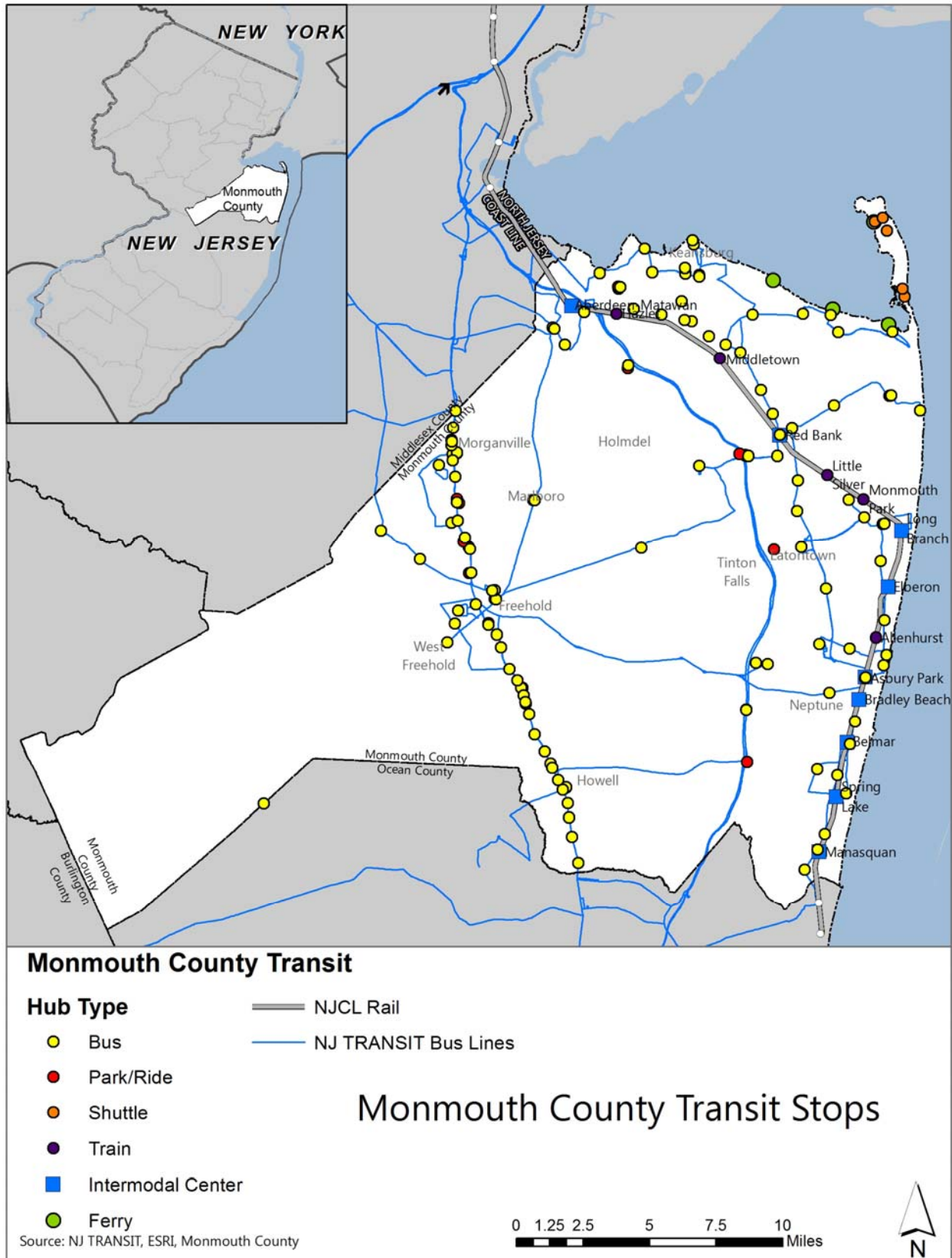
Figure 5: Sandy Hook Shuttle Bus



Source: Sandy Hook, Gateway National Recreation Area website

Monmouth County transit stops and centers, including bus stops, ferry, park-ride, shuttle, and train stations, are shown in **Figure 6** (page 13).

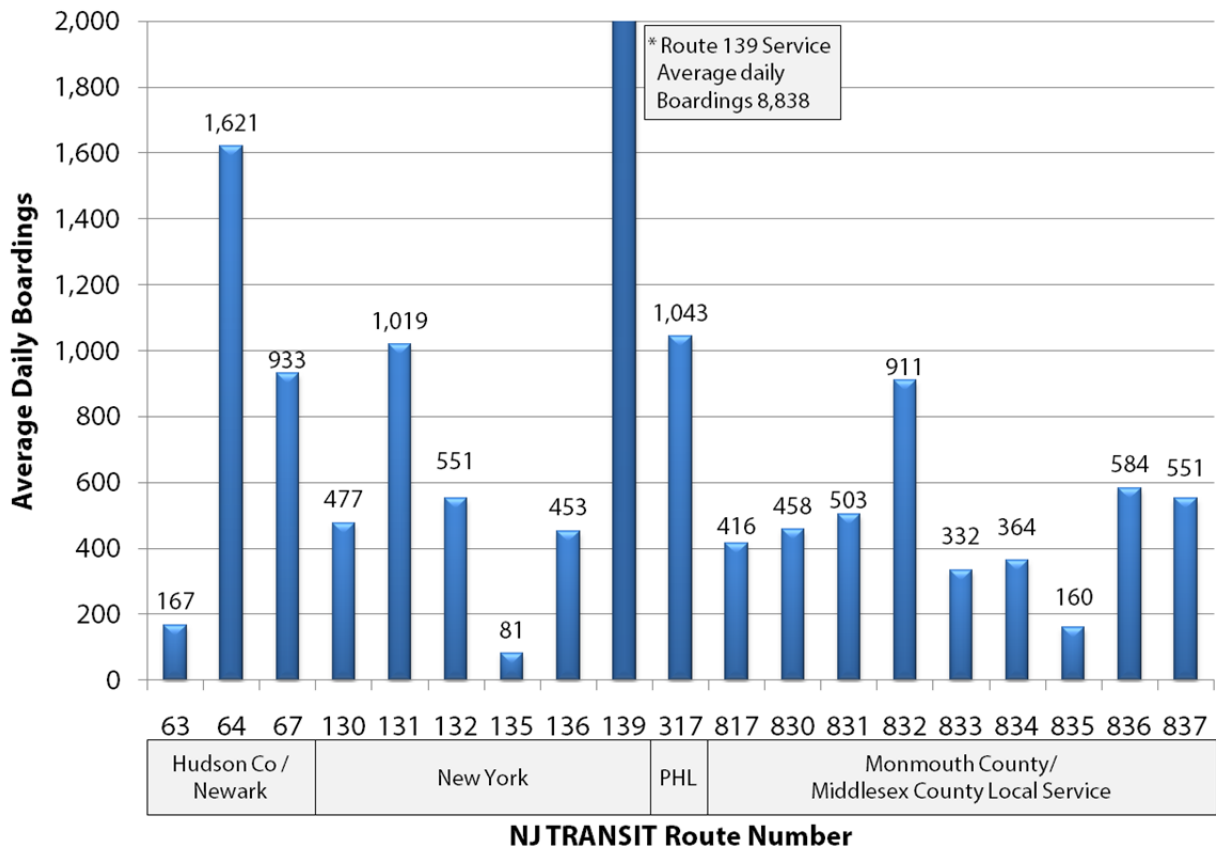
Figure 6: Map of Transit Stops within Monmouth County



2. Ridership Information

Bus ridership data was collected via the fare box collection system and 2014 schedule data from NJ TRANSIT. Average daily boardings, from April 2014 for NJ TRANSIT routes serving Monmouth County are shown in **Figure 7** below. As shown in the figure the Route 139 service to New York City carries almost 9,000 riders per day. Buses bound for Newark and Hudson County, including the 63, 64, and 67, each have fewer than 1,500 daily boardings. The Monmouth County local routes each have fewer than 1,000 daily boardings, with many of the routes averaging far fewer riders.

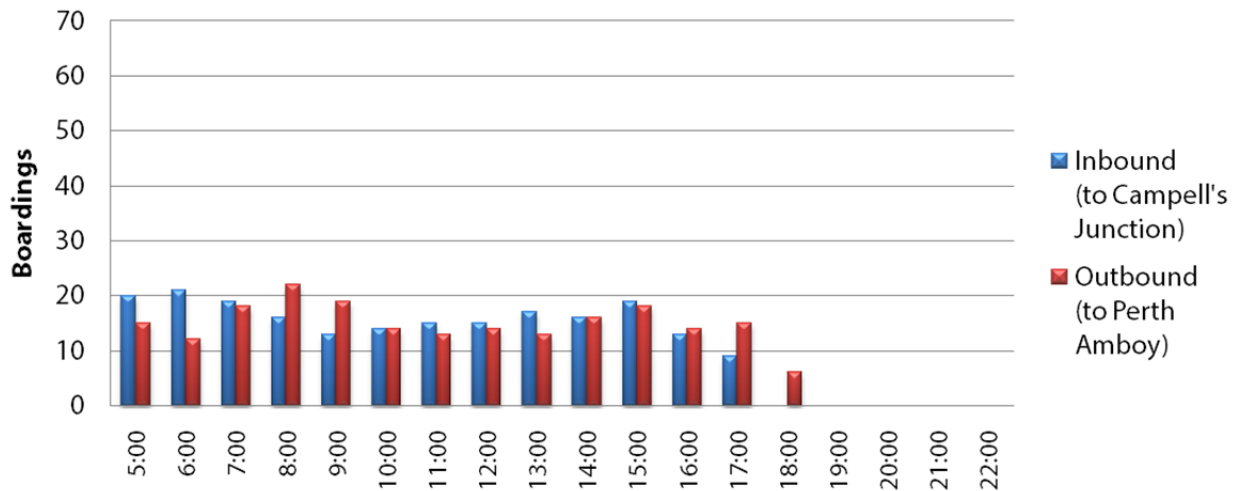
Figure 7: Average Daily Boardings for NJ TRANSIT Monmouth County Routes (April 2014)



This detailed ridership summary focuses on local bus service only, due to availability of data. Weekday ridership classified by route, direction, and trip time is shown in **Figure 8** through **Figure 16** (pages 15 through 19). The figures summarize April 2014 ridership information (the most recently available) by the hour to allow for an even comparison between routes. Most of the buses operated on the local service routes have a capacity of 42 riders.

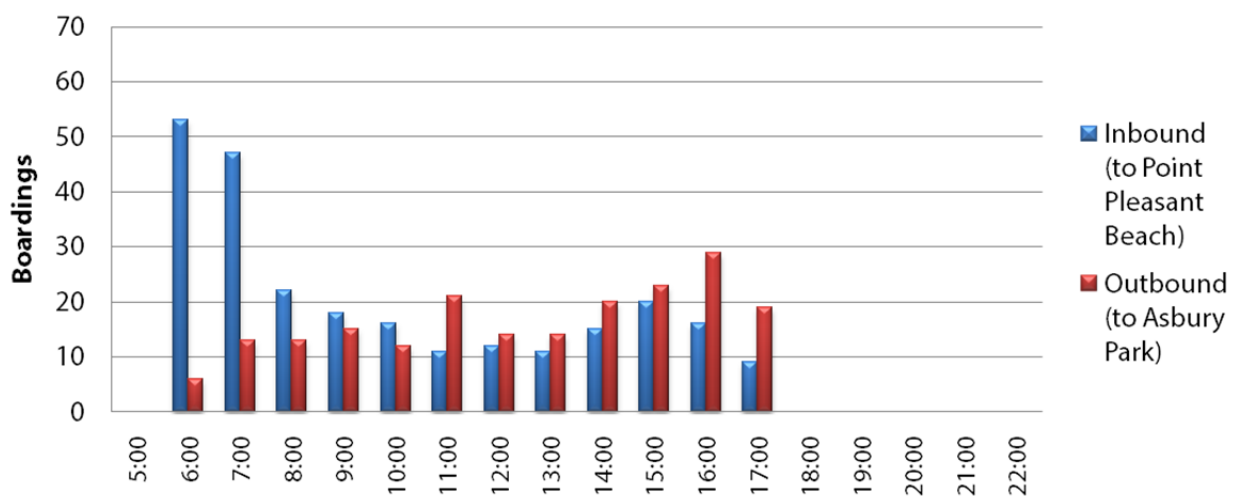
Weekday boardings for Route 817, which has service between Perth Amboy and Belford, are shown in **Figure 8** below. Weekday service runs at roughly 60 minute headways with 28 total trips per day. There are 23 trips on Saturday and no Sunday service. Overall, load factors on this route are among the lowest of the routes analyzed.

Figure 8: Route 817 Weekday Boardings (average 416 per day)



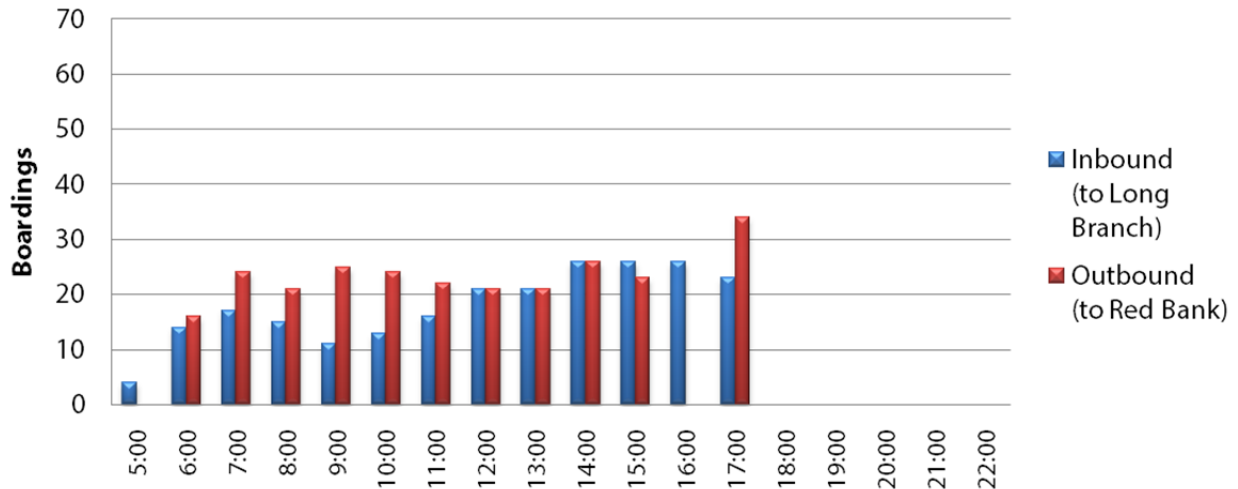
Weekday boardings for Route 830, which has service between Asbury Park and Point Pleasant Beach, are shown in **Figure 9** below. Weekday service runs at roughly 60 minute headways with 27 total trips per day. There are 23 trips on Saturday and no Sunday service. There is a pronounced peak in ridership during the early morning AM peak hours as customers travel towards Point Pleasant Beach, and a corresponding but less pronounced peak in ridership in the PM peak hours towards Asbury Park.

Figure 9: Route 830 Weekday Boardings (average 458 per day)



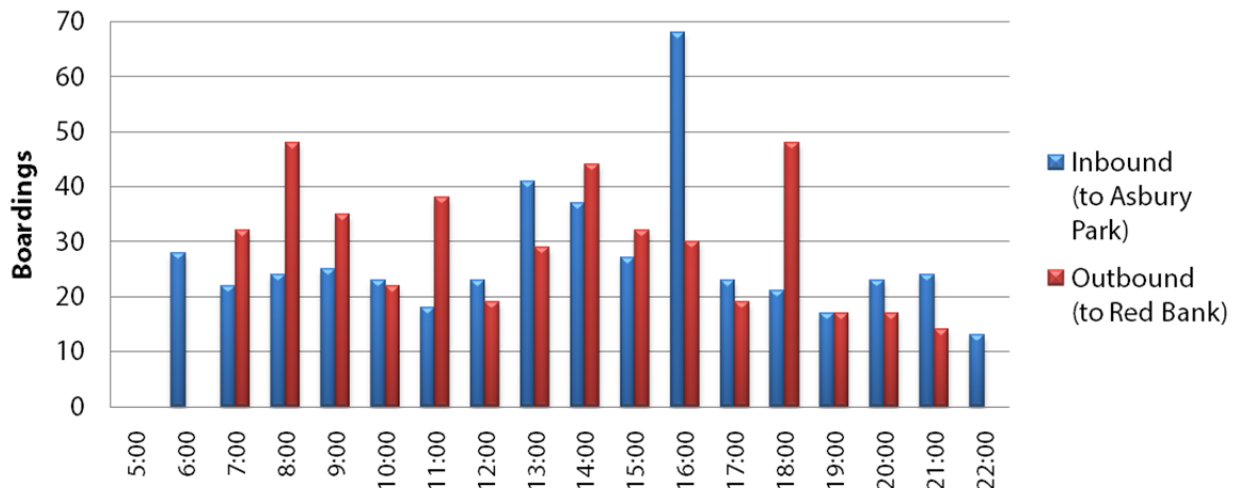
Weekday boardings for Route 831, which has service between Red Bank and Long Branch, are shown in **Figure 10** below. Weekday service runs at 60 minute headways with 26 total trips per day. There are 20 trips each on Saturday and Sunday. There is a noticeable ridership peak in the AM peak period between 7 AM and 11 AM for riders outbound to Red Bank. The last bus of the day attracts the highest load factor of the day, indicated a potential unmet demand for additional service later in the evening.

Figure 10: Route 831 Weekday Boardings (average 503 per day)



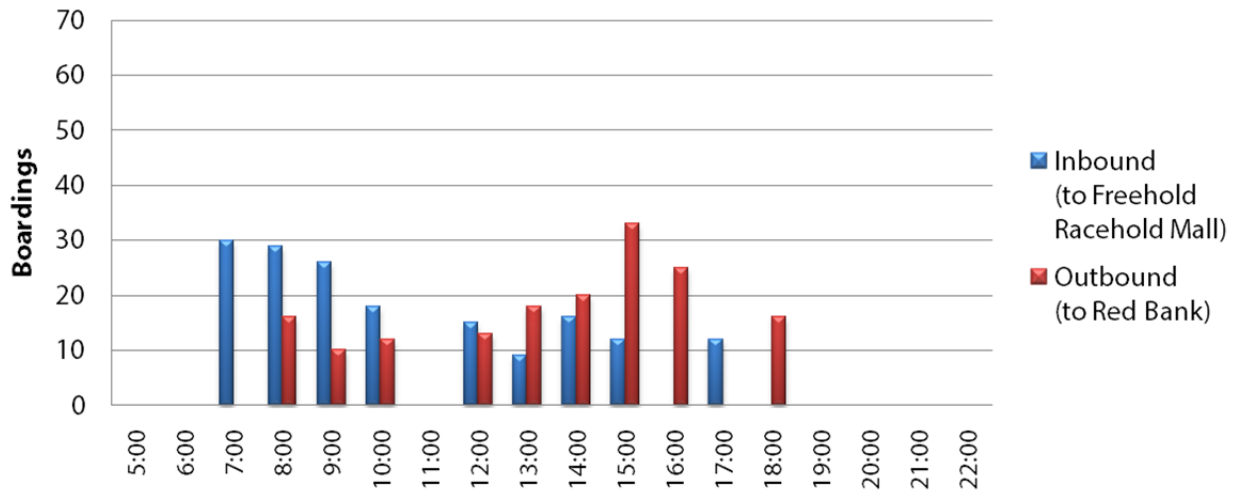
Weekday boardings for Route 832, which has service between Red Bank and Asbury Park, are shown in **Figure 11** below. Weekday service runs at roughly between 45-70 minute headways with 37 total trips per day. There are 35 Saturday trips and 16 Sunday trips. The highest demand for service is outbound towards Red Bank in the late morning and inbound towards Asbury Park in the late afternoon.

Figure 11: Route 832 Weekday Boardings (average 911 per day)



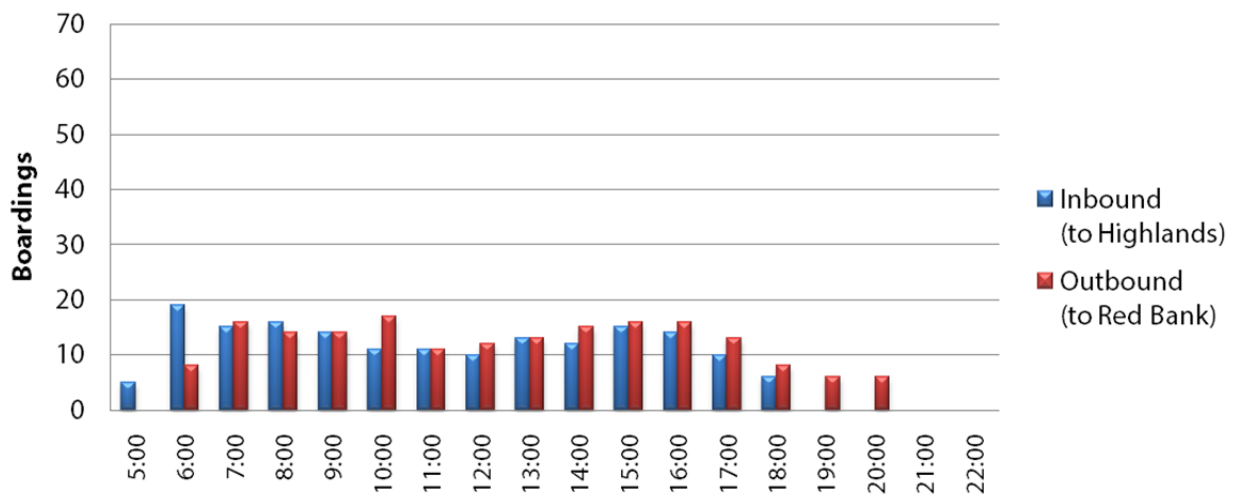
Weekday boardings for Route 833, which has service between Red Bank and Freehold Raceway Mall, are shown in **Figure 12** below. Weekday service runs at roughly 70 minute headways with 18 total trips per day. There is no Saturday or Sunday service.

Figure 12: Route 833 Weekday Boardings (average 332 per day)



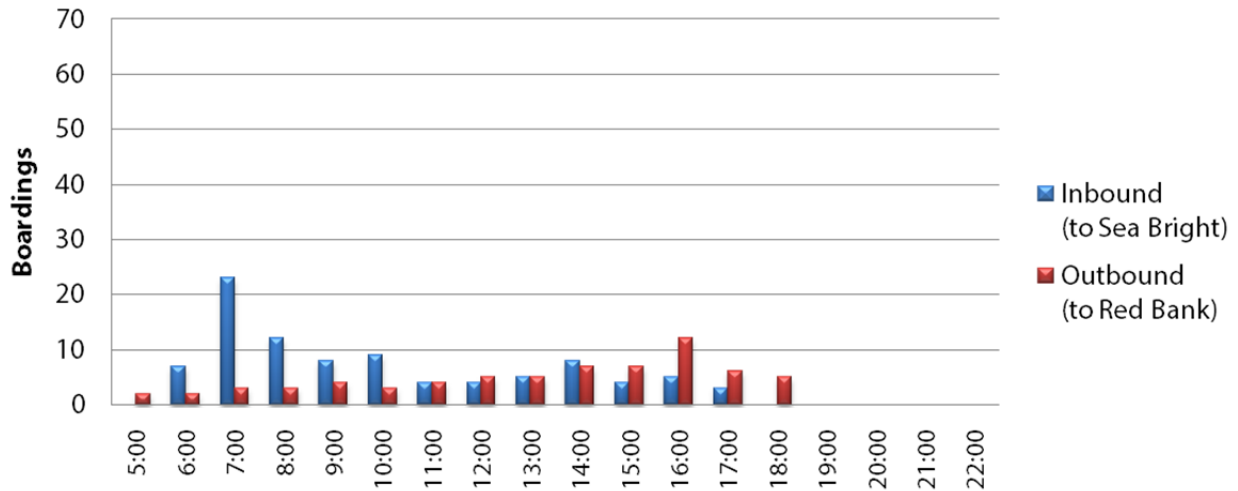
Weekday boardings for Route 834, which has service between Red Bank and Highlands, are shown in **Figure 13** below. Weekday and Saturday service runs at 60 minute headways with 29 total trips per day on weekdays and 27 on Saturdays. There is no Sunday service. Load factors on this service are very low, with most buses averaging fewer than 15 riders.

Figure 13: Route 834 Weekday Boardings (average 364 per day)



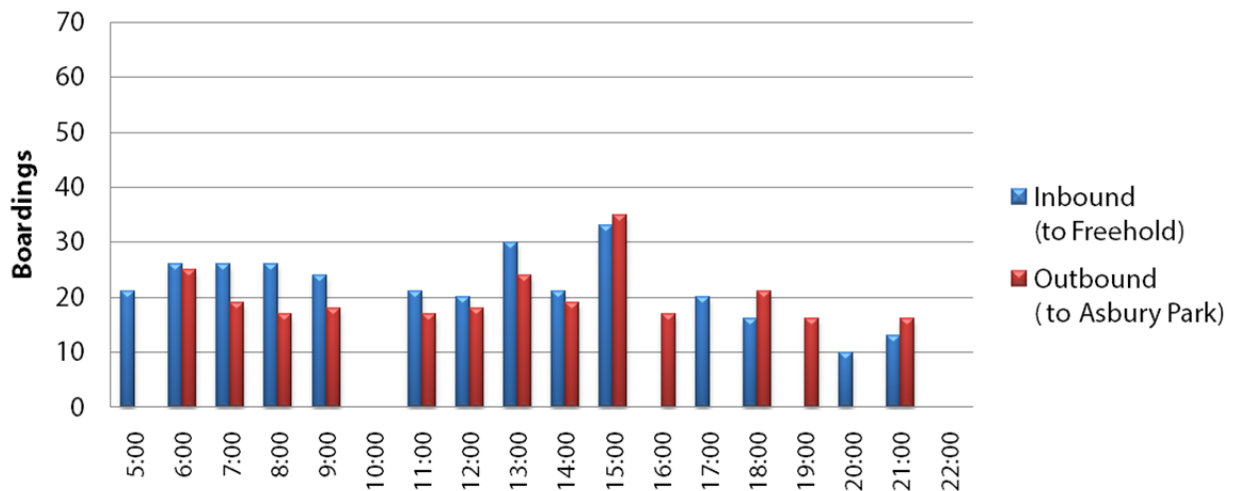
Weekday boardings for Route 835, which has service between Red Bank and Sea Bright, are shown in **Figure 14** below. Weekday and Saturday service runs at 60 minute headways with 26 total trips per day on weekdays and 23 on Saturdays. There is no Sunday service. Load factors on this route are extremely low with most buses averaging no more than 10 riders. The AM peak period attracts more riders inbound towards Sea Bright, while the PM peak period attracts more riders outbound towards Red Bank.

Figure 14: Route 835 Weekday Boardings (average 160 per day)



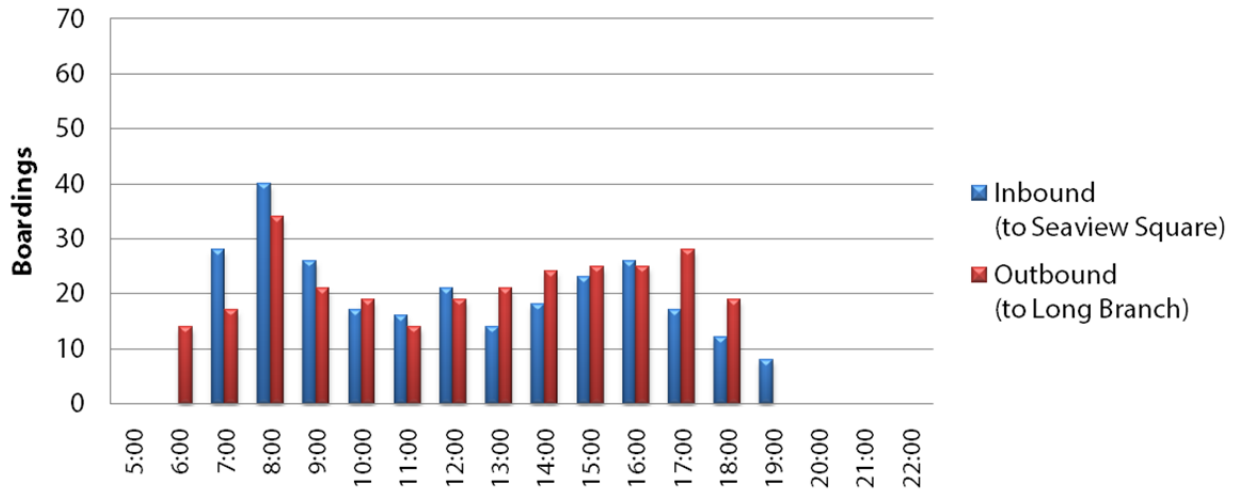
Weekday boardings for Route 836, which has service between Asbury Park and Freehold, are shown in **Figure 15** below. Weekday service runs at roughly 60 minute headways with 28 total trips per day. Saturday and Sunday service runs reduced with 12 and 14 trips respectively.

Figure 15: Route 836 Weekday Boardings (average 584 per day)



Weekday boardings for Route 837, which has service between Long Branch and Seaview Square, are shown in **Figure 16** below. Weekday and Saturday service both run at 60 minute headways, and there is no Sunday service. The highest periods of ridership are during the AM and PM peak hours, with more than 25 riders per hours in each direction.

Figure 16: Route 837 Weekday Boardings (average 546 per day)



IV. Trip Generators

Potential transit trips can be visualized by mapping density of employment centers and residences. According to the TCRP Transit Capacity and Quality of Service Manual, it is possible to gain some understanding of the demand for transit trips within a study area by identifying concentrations of employment and residential developments.

Job density, as reported in the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) data, and shown by primary employees per square mile, is shown in **Figure 17** (page 21). Additionally, the County Seat of Freehold represents a significant concentration of government and service-related employment. Employment is concentrated in areas of the County that are served by the NJCL rail network. The communities of Aberdeen, Red Bank, Eatontown, and Neptune have the highest concentration of employees within the County. Additionally, the County Seat of Freehold represents a significant concentration of government and service related employment.

Similar to job density, **Figure 18** (page 22) shows that population (household location) is centered in areas that are served by rail. Despite following similar patterns, the density for population varies slightly with employment density. For example, the area near Eatontown has higher employment density while the area near Long Branch has more population density.

Households that do not have a private vehicle available, or transit dependent households, exist primarily within the most densely populated areas of Monmouth County. **Figure 19** (page 23) shows the percentage of households with zero cars by census tract. The majority of areas with a high percentage of zero car households are located along the North Jersey Coast Line or NJ TRANSIT bus routes, but there are some census tracts with transit dependent populations which are not currently well-served by bus transit.

The location of employment for the workforce that lives in Monmouth County is shown in **Table 2** (page 25). Over 60% of Monmouth County's employed residents also work in Monmouth County, while the rest travel to jobs in other counties. The dynamics between household location and employment location for work generated trips are shown in **Table 3** (page 25), which indicated where workers travelling to Monmouth County live. Typically, the majority of work trips from home location to work location take place in the morning and the reverse takes place in the evening.

Figure 17: Monmouth County Job Density (US Census LEHD 2010)

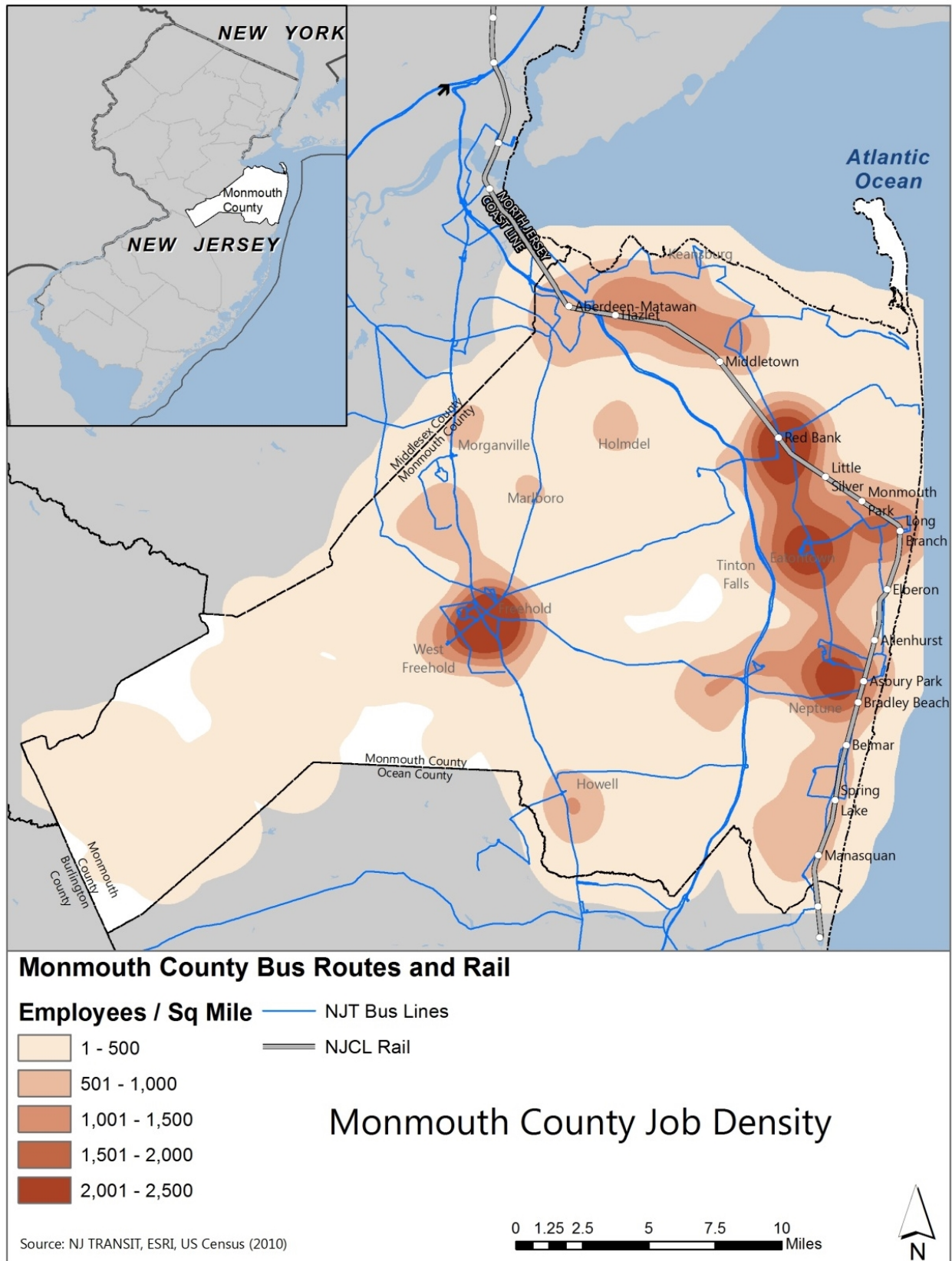


Figure 18: Monmouth County Population Density

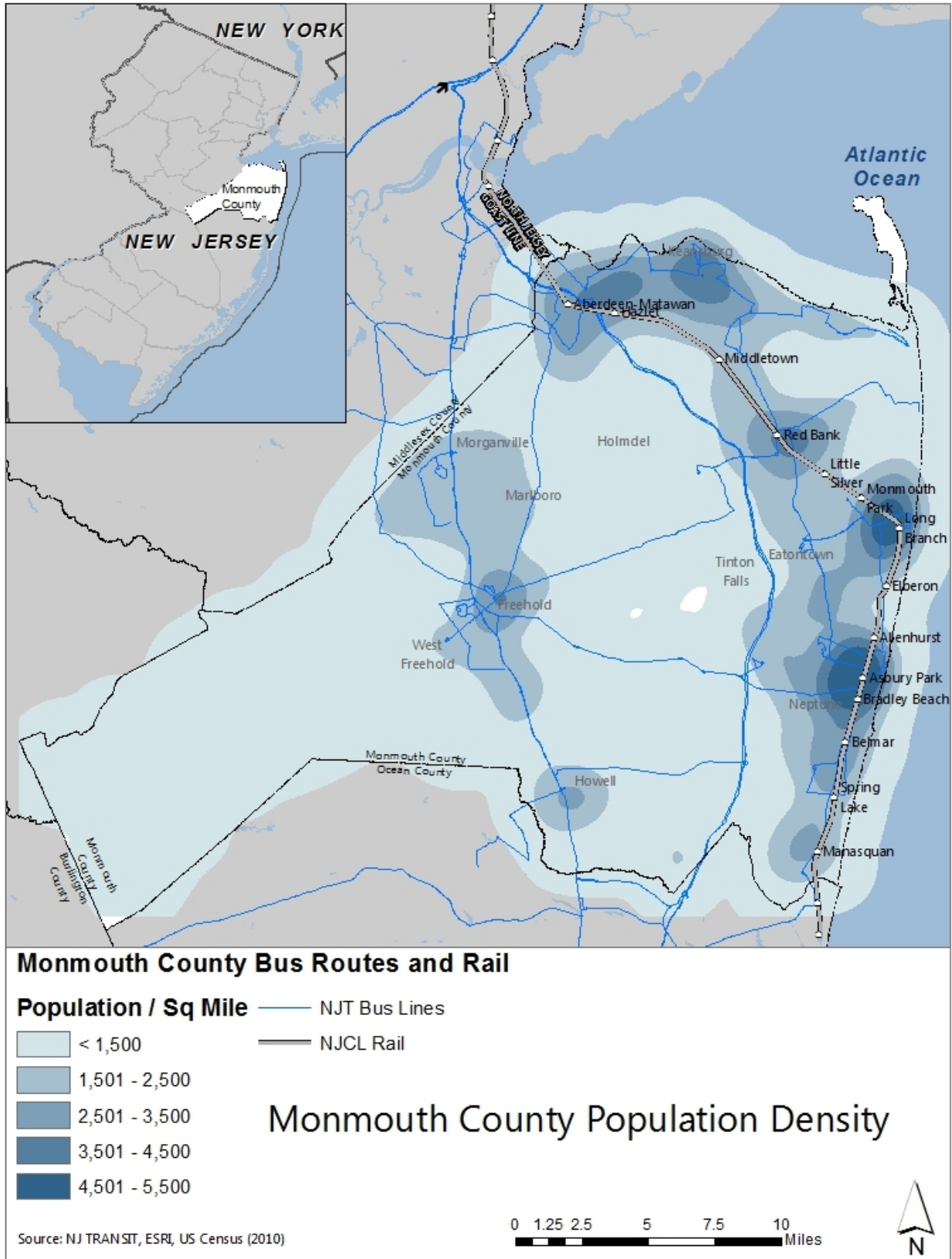


Figure 19: Monmouth County Zero Car Households

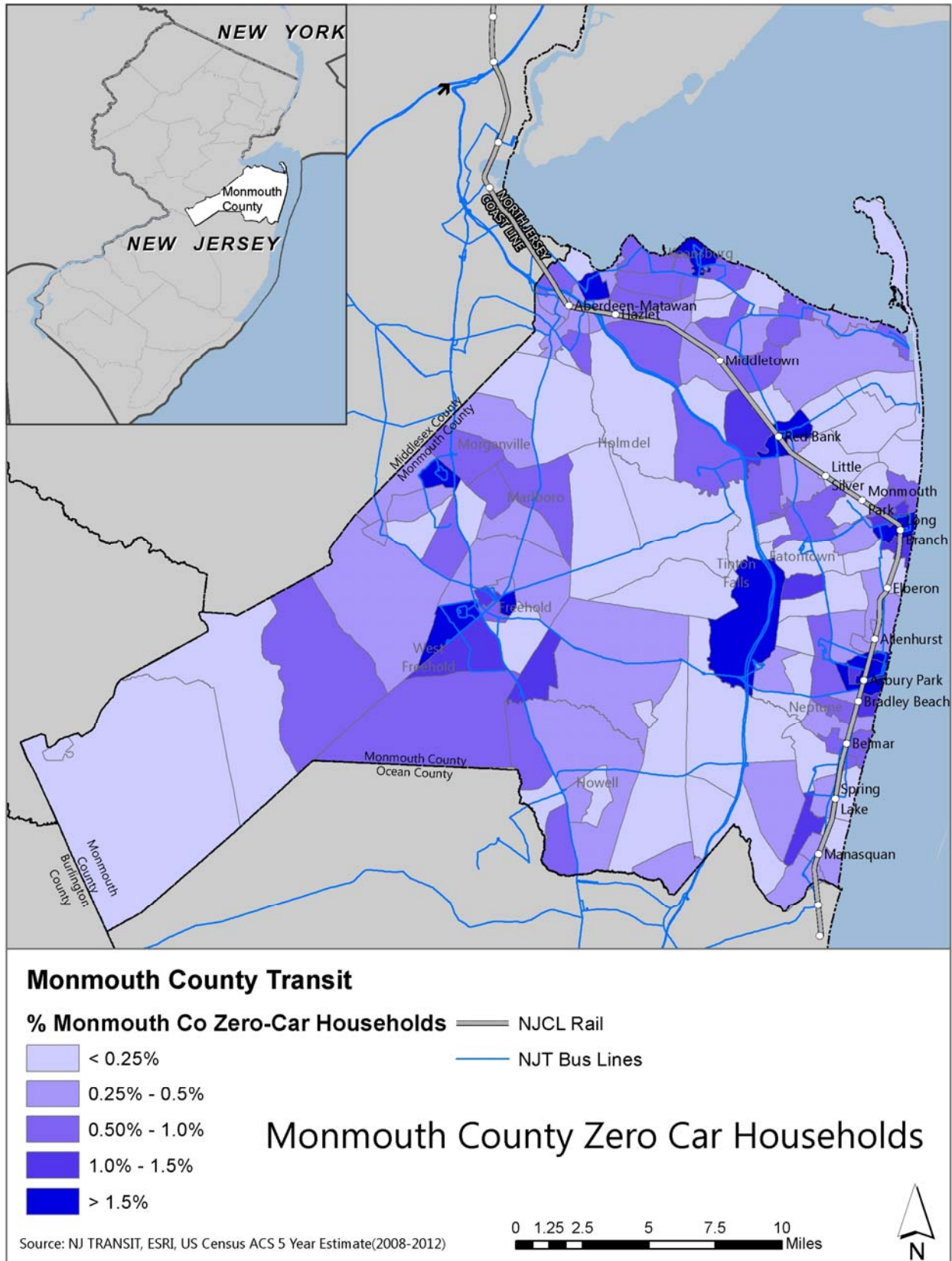


Figure 20: Monmouth County Redevelopment Areas

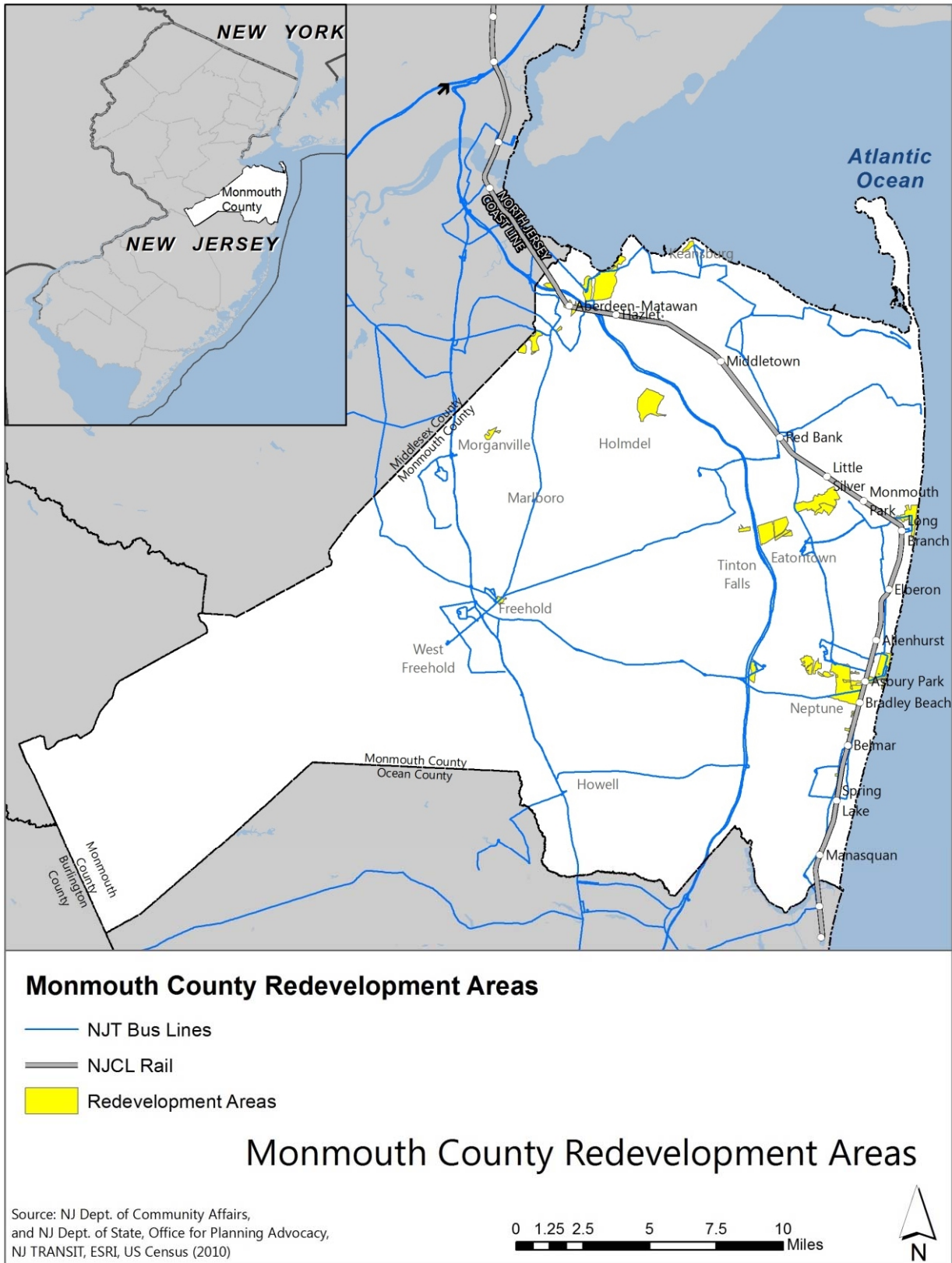


Table 2: Employment Location of Monmouth County Residents

Employment Location	Percent of Monmouth County Residents
Monmouth County	61.0%
Middlesex County	8.6%
New York County (Manhattan)	7.9%
Ocean County	3.8%
Mercer County	2.6%
Essex County	2.6%
Union County	2.4%
Hudson County	2.2%
Somerset County	1.4%
Richmond County (Staten Island)	1.2%
Kings County (Brooklyn)	1.2%
Bergen County	1.1%
Morris County	1.0%
Burlington County	0.5%
Passaic County	0.4%
Rest of the World	2.1%

Table 3: Residence Location of Monmouth County Employees

Residence Location	Percent of Monmouth County Employees
Monmouth County	69.7%
Ocean County	16.2%
Middlesex County	6.2%
Mercer County	1.1%
Union County	0.9%
Burlington County	0.7%
Essex County	0.6%
Somerset County	0.6%
Bergen County	0.4%
Richmond County (Staten Island)	0.3%
Hudson County	0.3%
Passaic County	0.3%
New York County (Manhattan)	0.2%
Hunterdon County	0.2%
Atlantic County	0.2%
Rest of the World	2.1%

1. Redevelopment

Redevelopment can change trip generation patterns. Duly adopted Redevelopment Areas are shown in **Figure 20** (page 24). Redevelopment could produce significant trip generators in the future depending on the type of redevelopment, should it occur.

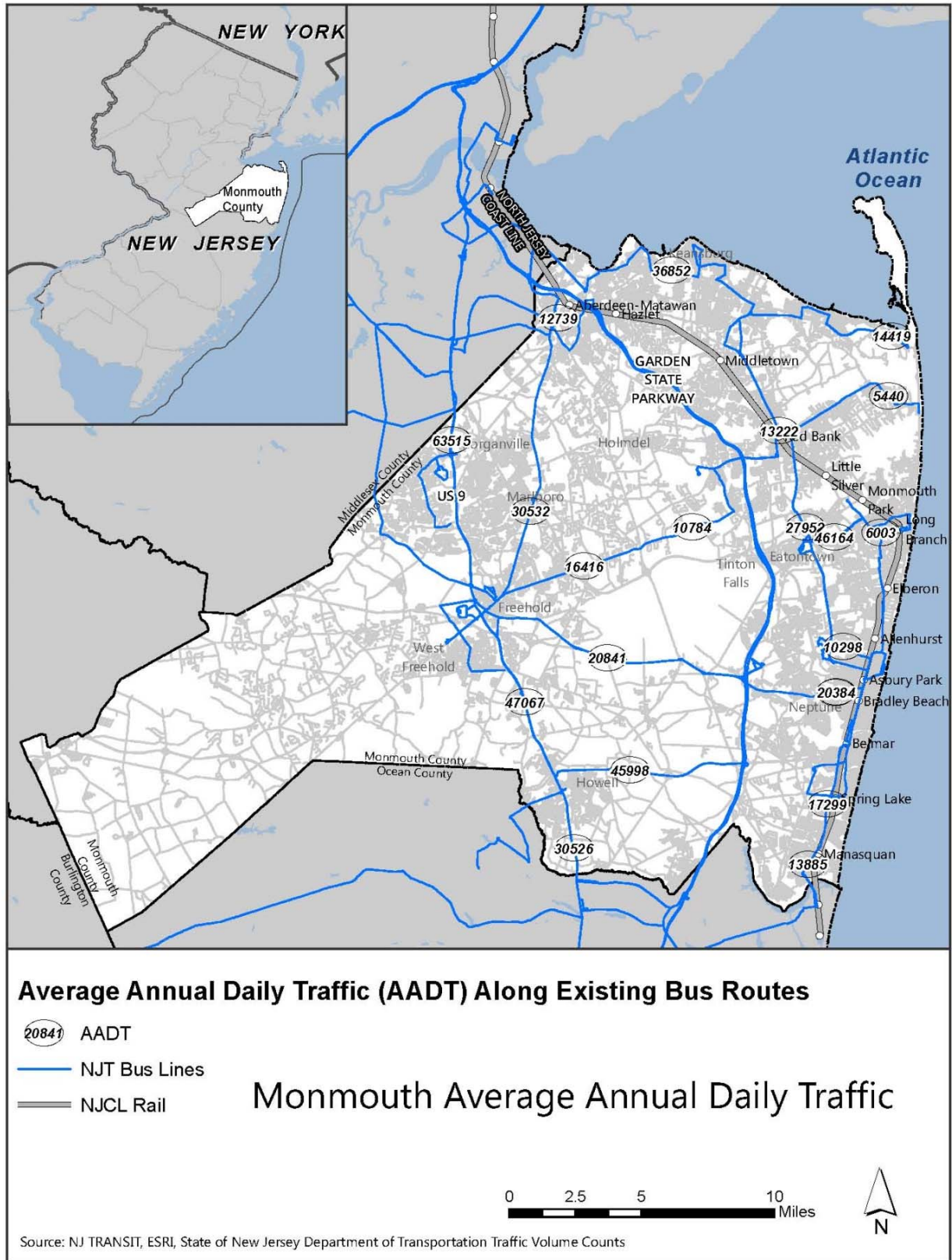
2. Traffic Counts

Average Annual Daily Traffic (AADT) for major routes in the study area is available from the NJDOT Interactive Traffic County Report database. **Figure 21** (page 27) shows select traffic counts along existing bus routes where traffic counts are available. Additional counts are available on other parallel and potential alternate route locations, and may be accessed as needed if alternative routing is considered.

NJ TRANSIT bus routes 63, 64, 67, 130, 132, 136, and 139 run along U.S. Route 9. Along this corridor, AADT was recorded at 63,515 in the north end of the county, with the volume dropping to 47,067 and then to 30,526 in the south end of the County. These numbers reflect significantly more traffic volume in the north end of Monmouth County and the concomitant delays for any buses that do not have a dedicated lane. Marlboro Road, the corridor of bus route 131, runs nearly parallel to US 9 in the north end of the county with an AADT of 30,532. Bus Route 139, which runs along I-195 (AADT of 45,998), is most likely less affected by the high traffic volume as an Interstate Highway can accommodate more vehicle throughput.

NJ Route 33 (which hosts cross-county Route 836), has an AADT of 20,612. The other cross-county connection, County Route 537, for bus route 833, has an AADT of 10,784 at the eastern end and 16,416 towards its western terminus. Cross-county locations have significantly lower traffic volumes; however, the capacity of these roadways may be limited in comparison to north-south routes. More detailed capacity/Level of Service analysis would be necessary in future studies to provide additional context for the traffic volume data and to fully understand operational impacts.

Figure 21: Monmouth County Average Annual Daily Traffic (AADT) from NJDOT (2011 to 2013)



3. Park-Ride

NJ TRANSIT Park-Ride lots are located at select bus and train stations. Lots located at train stations often provide fee-based parking for residents of the community, either on a monthly charge or daily use-fee basis. Prices range from \$1 to \$7 per day or from \$66 to \$360 per year. Park-Ride lots serving bus stops are less likely to charge for parking. Approximately 14% of parking facilities prohibit parking for non-residents of the community. Capacity and observed 2013 usage is shown in **Table 4** (below) and **Table 5** (page 29) and are also shown graphically in **Figure 22** (page 30).

Table 4: Bus Park-Ride Locations in Monmouth County

Location, Municipality	Capacity	Used Spaces	Utilization
Aldrich Road, <i>Howell Township</i>	670	285	43%
Craig Road, <i>Manalapan Township</i>	210	155	74%
Freehold Center, <i>Freehold Borough</i>	52	30	58%
Freehold Mall, <i>Freehold Township</i>	341	187	55%
Gordons Corner, <i>Manalapan Township</i>	791	649	82%
Howell, <i>Howell Township</i>	450	276	61%
Marlboro, <i>Marlboro Township</i>	96	59	61%
Schibanoff, <i>Freehold Township</i>	493	284	58%
Symmes Drive, <i>Manalapan Township</i>	293	245	84%
Texas Road, <i>Marlboro Township</i>	354	143	40%
Union Hill, <i>Marlboro Township</i>	581	443	76%

Source: NJ TRANSIT Park-Ride website and parking utilization data

Eight of the twelve Park-Ride lots located at bus stops typically operate with utilization between 33% and 84%. The parking lots with high utilization tend to be among the largest of the bus Park-Ride lots in Monmouth County. The concentration of these larger and highly utilized lots along U.S. Route 9 suggests that demand for bus transit is the greatest on this corridor, which is confirmed by the frequency of bus service along this corridor. Since many lots are intended to serve specific communities, there are challenges in balancing the number of local parking permits with the daily demand. Freehold is noted as one of the more challenging communities for parking near transit facilities.

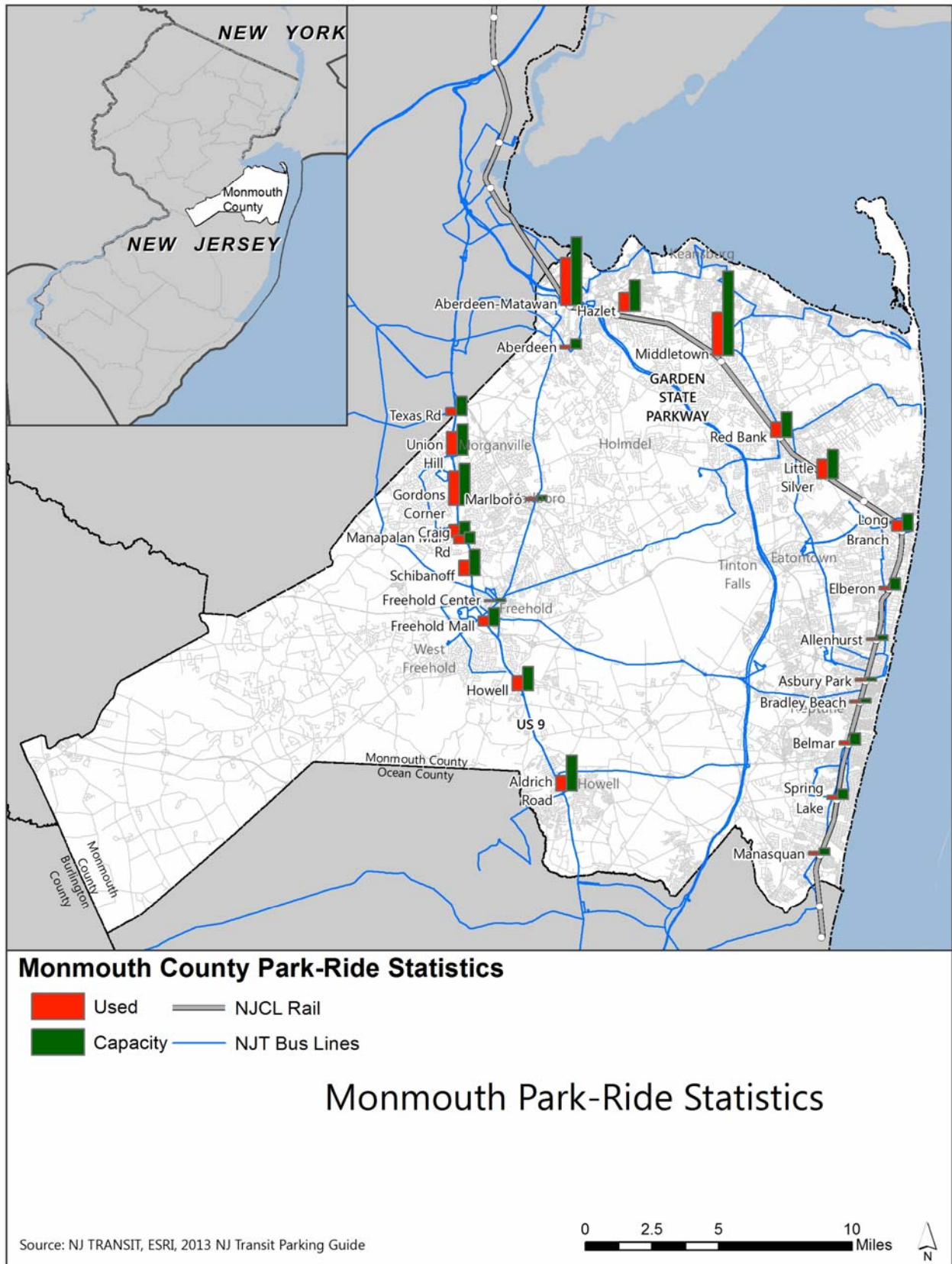
Table 5: Rail Park-Ride Locations

Location, Municipality	Capacity	Used Spaces	Utilization
Aberdeen-Matawan, <i>Matawan Boro.</i>	1,284	900	70%
Middletown, <i>Middletown Township</i>	1,588	811	51%
Red Bank, <i>Red Bank Borough</i>	473	285	60%
Little Silver, <i>Little Silver Borough</i>	548	365	67%
Long Branch, <i>City of Long Branch</i>	331	199	60%
Elberon, <i>City of Long Branch</i>	222	61	27%
Allenhurst, <i>Allenhurst Borough</i>	95	45	47%
Hazlet, <i>Hazlet Township</i>	589	349	59%
Asbury Park, <i>City of Asbury Park</i>	65	48	74%
Bradley Beach, <i>Bradley Beach Boro.</i>	73	48	66%
Belmar, <i>Belmar Borough</i>	217	67	31%
Spring Lake, <i>Spring Lake Borough</i>	188	72	38%
Manasquan, <i>Manasquan Borough</i>	127	61	48%

Source: NJ TRANSIT Park-Ride website, and NJ TRANSIT parking utilization data

Utilization in nearly every Park-Ride located at NJCL rail stations ranges between 27% and 67%. The most-used parking facility is the Asbury Park lot, which operates with at 74% utilization. Another indicator of ridership along the train line is the capacity. Middletown and Aberdeen-Matawan are nearly three times the size of the next largest locations. Bus transit service should consider available parking capacity at Park-Ride locations.

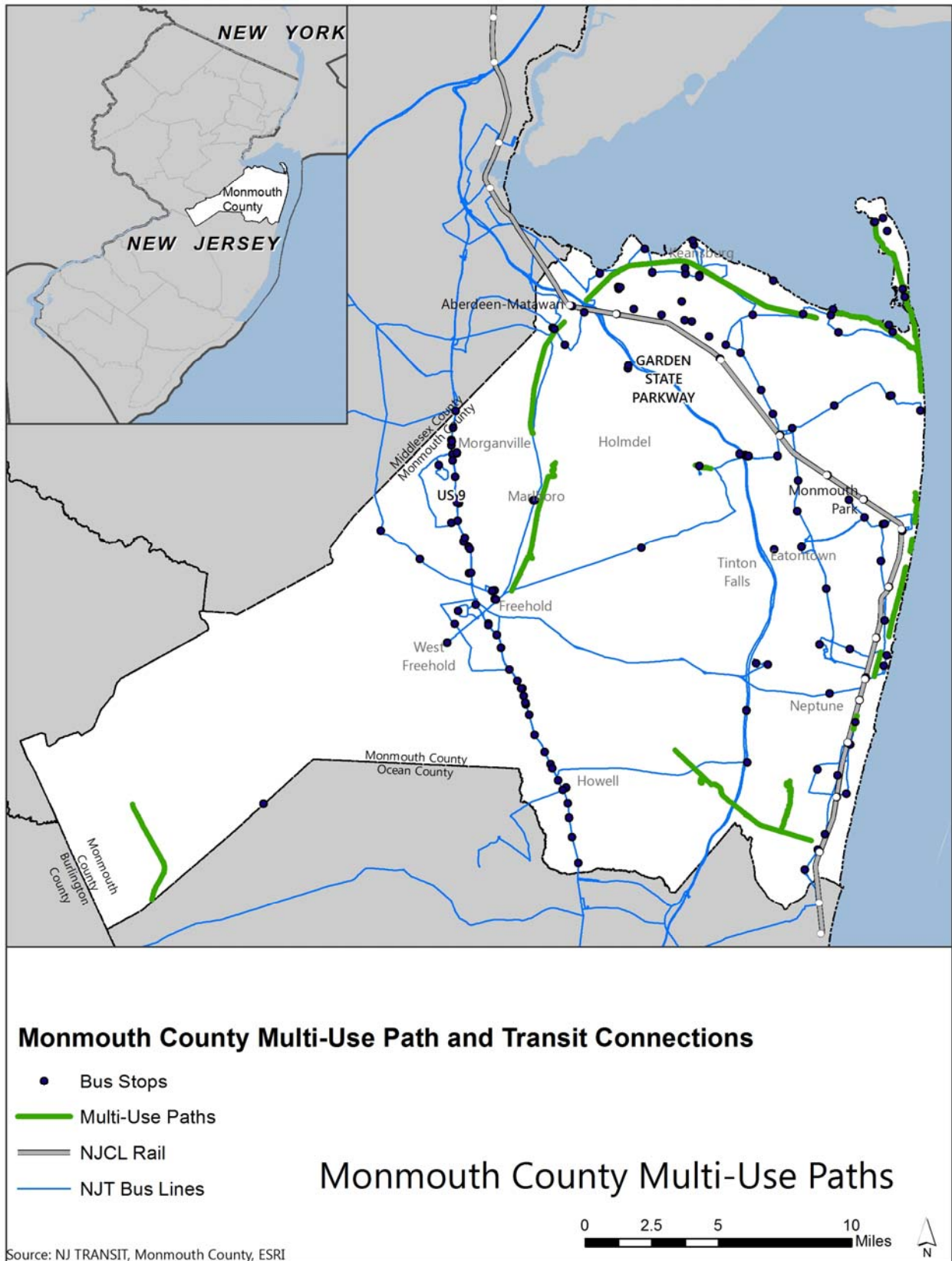
Figure 22: Monmouth Park-Ride Capacity and Utilization



4. Bicycle and Pedestrian Connections

Bicycle routes, designated by Monmouth County, are shown in **Figure 23** (page 32), and consist primarily of off-street bike path facilities with limited on-street bike lanes. Bicycle paths have some connectivity to bus stops at select locations. Connections to transit are critical to users who arrive via bicycle or by walking, since they expand the range of transit systems by helping to make “last-mile” connections. They also further enable travelers without access to an automobile a safe method of accessing the transit system.

Figure 23: Monmouth County Multi-Use Paths



V. Overview of Potential Features and Strategies

One of the project objectives is to identify the ways in which BRT features and strategies could be deployed in Monmouth County to improve public transit. While a full-fledged BRT system may not be immediately realistic or feasible in Monmouth County, many of the features and strategies commonly associated with BRT systems could serve to enhance the existing transit system. As features and strategies are added, local and commuter bus services would start to resemble a modern cohesive BRT system.

This section offers a summary of the applicable BRT features and strategies that could potentially be implemented as means of enhancing existing bus transit service in Monmouth County. The definitions and other information included in this overview are generally excerpted from Transit Cooperative Research Program (TCRP) Report 118—“Bus Rapid Transit Practitioner’s Guide”¹—and a 2009 Federal Transit Administration (FTA) report, entitled “Characteristics of Bus Rapid Transit for Decision-Making.”²

The BRT technologies are sorted into two different categories. Features would apply to physical infrastructure at individual bus transit nodes, along corridors, or to the bus rolling stock itself. Strategies would apply to County and other jurisdictional policies, and could be used to guide overall development of a bus rapid transit network. Taken together, the features and strategies described in this section have the potential to upgrade existing bus services within Monmouth County through the spectrum of existing bus service, to enhanced bus service, and ultimately to a BRT or BRT-like system.

1. BRT Features

Stations and Stops

BRT stations and stops are the link between passengers and vehicles, and they represent the identity of a BRT system through both visual features and physical amenities (**Figure 24** on page 34). There are several different types of BRT stations and stops worth considering:

Signpost Station – Some of the existing NJ TRANSIT bus stops within Monmouth County feature only a road sign indicating the location of the bus stop. These stops do little to promote ridership since they offer few or no passenger amenities, such as schedule information, weather protection, or enhanced safety. Signpost stations are generally not consistent with bus transit systems known as BRT.

Simple Shelter – A simple shelter is the simplest form of bus station types. In general, this type of station has the lowest capital cost and provides passengers with a weather-protected place to wait for approaching buses. However, these shelters often lack desired passenger amenities.

Enhanced Shelter – Enhanced shelters are often specially-designed for BRT to differentiate it from other transit stations and to provide additional features such as greater weather protection and lighting. Enhanced shelters often incorporate additional design treatments and passenger amenities such as benches, trash cans, or informational signage. They are often installed for on-street BRT applications to integrate with the sidewalk infrastructure.

¹ Transit Cooperative Research Program (TCRP) Report #118:
http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_118.pdf

² National BRT Institute – Characteristics of Bus Rapid Transit for Decision-Making:
<http://www.nbrti.org/docs/pdf/High%20Res%20CBRT%202009%20Update.pdf>

Figure 24: Station Stop Examples



Station Enclosure – Station enclosures are typically designed specifically for a stand-alone BRT system and are fabricated off site, allowing for identical and modular designs for multiple locations. The station enclosure may include level passenger boarding and alighting, a full range of passenger amenities including retail service, and a complete array of passenger information.

Intermodal Transit Center – Intermodal transit centers are the most complex and costly of the BRT station types. They often include enclosures for passengers waiting for multiple directions of travel, pedestrian passageways, ADA-accessibility features such as ramps and elevators, and grade-separated connections from one platform to another, as well as a full range of passenger amenities including retail service and a complete array of passenger information. They often will have level boarding and a host of amenities and will accommodate the transfers from BRT service to local bus and other public transit modes.

When selecting the most appropriate type of station and/or stop for a BRT system, the following considerations should be taken into account:

- Spacing of stations/stops
- Platform sizing
- Passenger amenities
- BRT operating schedule
- Curb extensions
- Station access
- Maintenance costs and responsibilities *

* In New Jersey, local municipalities are responsible for maintaining bus stop/station infrastructure installed by NJ TRANSIT.

Running Ways

The running way defines where BRT vehicles travel. It is analogous to tracks in a rail transit system. There are several different types of roadway worth considering for bus transit systems (**Figure 25** on page 36):

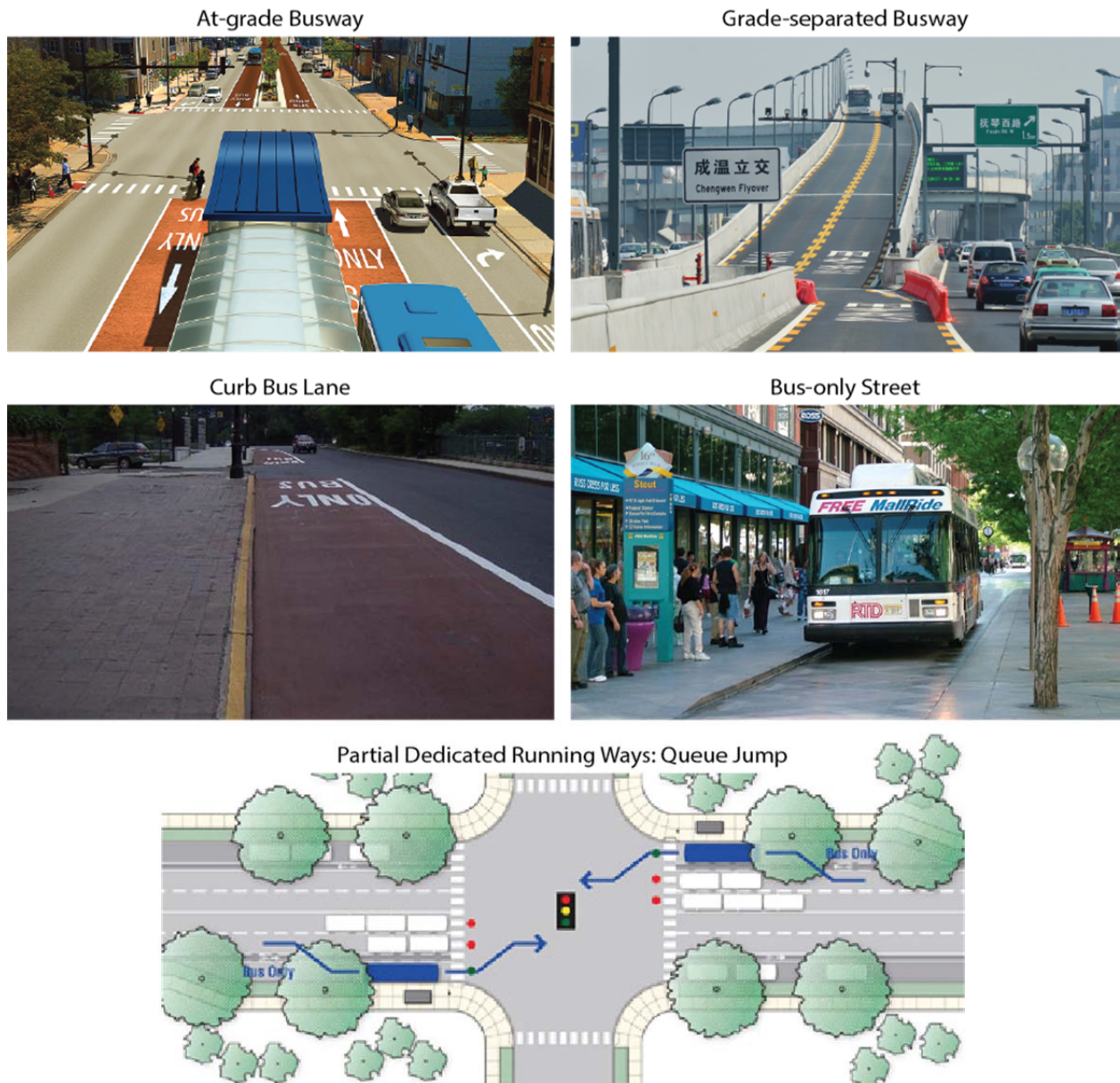
At-grade (including median) and Grade-separated Busways – Busways are separated roadway facilities for the exclusive use of buses, either within an overall roadway right-of-way (ROW) or in a separate ROW. At-grade busways can be created where there is available ROW, such as a railroad corridor that is no longer in use. One type of at-grade busway is a median busway that runs along the center of a roadway yet is physically separated from adjacent travel lanes. Grade-separated busways traverse cross streets with overpasses or underpasses, allowing transit vehicles to operate unimpeded at maximum safe speeds between stations. They are separated from congestion along local streets at intersections and adjacent highways.

Curb/Dual-curb and Interior Bus Lanes – Curb bus lanes are dedicated on-street bus lanes located adjacent to the curb. Dual-curb bus lanes feature two dedicated on-street bus lanes located adjacent to the curb. Interior bus lanes are dedicated on-street bus lanes located adjacent to parking lanes (one lane away from the curb). Curb/dual-curb and interior bus lanes may operate in the same direction (concurrent flow) or in the opposite direction (contraflow) of general traffic, and may operate at all times, for extended hours (e.g., from 7 a.m. to 7 p.m.), or just during peak hours.

Bus-only Streets – Bus-only streets are entire roadways that are restricted for use by buses only. The most substantial benefit to designating streets as bus-only is increased capacity to the bus transit network. However, the trade-off for increased bus transit network capacity is often reduced capacity on the greater roadway network. So bus-only streets should only be considered after traffic studies have been conducted and a full analysis done of the benefits and impacts of this treatment has been completed.

Partial Dedicated Running Ways: Queue Jumps – A queue jump is a lane on an approach to a traffic bottleneck location that is reserved for buses or serves a bus-only movement. Bottleneck locations are usually intersections but can be non-intersection locations such as in advance of a narrower section of roadway (e.g., a bridge). There are at least two widely-used categories of queue jumps—those with a physical lane only and those that are coordinated with implementation of traffic signal priority (TSP) for BRT vehicles.

Figure 25: Running Way Example



Vehicles

Vehicles are core components of any BRT system, and the internal and external vehicle aesthetics help to establish and reinforce the brand identity of the BRT system. Several different types of vehicles are applicable when discussed bus transit in Monmouth County (**Figure 26** on page 37):

Conventional Standard BRT and Bus Transit Vehicles – Conventional standard vehicles are 40-45-feet in length and have a conventional (“boxy”) body. The partial low-floor variety (now the norm among urban transit applications) contains internal floors that are significantly lower (14 inches above pavement) than high floor buses. They typically have at least two doors and a rapidly deployable ramp for wheelchair-bound and other mobility-impaired customers. A typical 40-ft vehicle has seating for 35-44 patrons, expanding to between 50 and 60 seated and

standing. A typical 45-foot vehicle (which are in limited use nationally) can carry 35-52 passengers seated and 60-70 seated and standing.

Figure 26: Vehicle Examples



Stylized Standard BRT Vehicles – Stylized standard vehicles have the features of a conventional low-floor vehicle—including a similar capacity—but they also incorporate slight body modifications or additions to make the body appear more modern, aerodynamic, and attractive.

Conventional Articulated BRT Vehicles – The longer, articulated vehicles have a higher passenger carrying capacity (~50% more) than standard vehicles. Articulated vehicle seating capacity depends heavily on the number and placement of doors, ranging from 31 (four wide doors) to 65 (two doors), with a total capacity of 80-90 passengers seated and standing.

Stylized Articulated (partial low-floor) BRT Vehicles – Stylized articulated vehicles have many of the same features of conventional articulated vehicles—including a similar capacity—but they also incorporate enhanced interior and exterior design features, as well as low floors and quick-deploy ramps, which facilitate boarding and alighting to shorten stop dwell times.

Specialized (full low-floor) BRT Vehicles – Specialized vehicles employ a modern, aerodynamic body that has a look similar to that of rail vehicles, with a capacity similar to other articulated BRT vehicles. Special axles and drivetrain configurations create a full low floor in the vehicle interior. They also employ advanced propulsion systems and often include integrated intelligent transportation system (ITS) components and guidance systems.

New Vehicle Propulsion Systems – New vehicle propulsion systems such as hybrid diesel-electric vehicles or even full electric vehicles can reduce vehicle noise and pollution compared to traditional internal combustion vehicles. Purchase of these new vehicles can be capital intensive, and for some propulsion technologies such as electric vehicles, natural gas, or hydrogen powered vehicles, there can be additional capital costs associated with installing or upgrading refueling infrastructure.

2. BRT Strategies

Fare Collection

Fare collection refers to the process, equipment / media, and structure of fare payment for BRT systems. Different types of fare collection processes include the following:

On-board Fare Collection – Fare payment and validation occur on-board and typically involve a fare box and/or a standalone processing unit for tickets or cards adjacent to the vehicle operator. The process is easy for customers, particularly first-time transit users, to understand. However, at locations where large numbers of passenger board, on-board fare collection can be time consuming.

Off-board, Barrier Fare Collection – Fare payment occurs at a turnstile or fare gate, or is made directly to a ticket agent, in an enclosed station area or platform. It may involve entry control only or entry-and-exit control. Off-board fare collection generally reduces boarding time, particularly when there are large numbers of passengers boarding at a single stop. However, there is an added level of complexity for passengers to purchase a ticket before boarding.

Off-board, Proof-of-payment Fare Collection – Fare payment occurs off-board at stations/stops. The passenger is required to carry a valid (by day, time, and fare zone, if applicable) ticket or pass when on the vehicle and is subject to random inspection by roving personnel.

Several different technologies are often employed for fare collection: cash / tokens / paper media, magnetic stripe fare cards, smartcards, commercial credit / debit cards, and mobile devices. Fares are most frequently charged using either a flat fare or fare differentiated by length of trip, time of day, and/or type of service.

Intelligent Transportation Systems (ITS)

ITS enhances transportation system performance through the use of advanced technologies. Different categories and types of ITS have different technology requirements. Most common is Transit Vehicle Prioritization (TVP) and Transit Signal Priority (TSP). TVP provides priority to buses to pass through intersections to reduce overall delay at traffic signals and achieve improved schedule adherence and consistency. TSP is a more complex system that relies on automatic vehicle locators affixed to each bus to communicate with traffic signals in the roadway network. The traffic signal controllers then alter their timing to maximize the likelihood that a bus

will arrive at a green signal. The travel time savings of effective TSP corridors can be dramatic, particularly if the BRT running way is separated from other traffic volumes.

When considering different levels of TVP, it is critical to examine operational characteristics of the roadway corridors. Existing and projected future traffic congestion along the corridor and on cross streets as well as complexity of signalized intersections can have a substantial impact on the complexity and cost of implementing Transit Vehicle Prioritization.

Intelligent Vehicle Systems (IVS)

IVS systems provide automated controls for BRT vehicles to reduce running times, station dwell times, and the frequency/severity of crashes. Types of intelligent vehicle system technologies commonly used on BRT vehicles include the following:

Collision Warning – Infrared or video sensors combined with driver notification devices alerting BRT vehicle drivers about the presence of obstacles or the impending impact with pedestrians or obstacles. More advanced collision avoidance systems are sometimes capable of taking control of the vehicle if a driver does not respond to warnings.

Precision Docking – Sensors on BRT vehicles integrated with vehicle steering systems assist BRT drivers in accurately placing a vehicle at a stop or station location.

Lane-keeping Assistance Systems / Vehicle Guidance Systems – Machine vision equipment such as cameras, image processing equipment, and pattern recognizing algorithms combine to guide BRT vehicles on running ways by either providing feedback to the driver or by controlling the vehicle automatically, which allows BRT vehicles to safely operate at higher speeds in dedicated or semi-dedicated lanes that may be narrower than standard traffic lanes.

GPS-based Technologies – GPS location data collected with GPS receiver hardware can be used to provide real-time information to BRT drivers such as roadway mapping, traffic conditions, and weather. Operations centers can use GPS data to track on-time performance, vehicle speeds, and numerous other characteristics.

Operations Management Systems

Operations management systems enhance BRT operations by improving operating efficiencies, increasing service reliability, and reducing travel times. Systems commonly associated with BRT vehicles include the following:

Automatic Vehicle Location (AVL) – GPS receivers provide the exact real-time location and speed of each vehicle that is equipped with the required hardware and software. AVL allows central dispatch to determine route and schedule adherence as well as to identify specific problems with individual vehicles.

Automated Scheduling and Dispatch System – Advanced dispatch systems combine AVL data with computer-aided dispatch technology to restructuring and plan routes, allowing transit agencies to produce the most efficient vehicle and operator/crew schedules.

Automated Passenger Counter (APC) – Sensors fixed to the doors of BRT vehicles count passengers automatically when they board and alight vehicles. This data can be used to reduce the costs of data collection and improve data accuracy. When integrated with AVL technology, passenger counts can be used to develop ridership summaries by station.

Vehicle Component Monitoring System – Computers on board BRT vehicles monitor various vehicle components and report on their performance. They can send warnings of impending/actual failures, enabling maintenance personnel to perform preventive maintenance before a minor problem becomes major.

Passenger Information Systems

The type, quantity, and speed of data provided to transit users can have a dramatic impact on perceived level of services. Accuracy of information is critical to enhancing the customer experience. Types of passenger information systems worth considering in Monmouth County include the following:

Pre-trip / En-route Passenger Information – General bus service information, itinerary planning, multimodal traveler information, and real-time information can all be provided via interactive voice response telephone systems, traveler information websites, and mobile applications. Note that in most cases, providing real-time bus information requires integration with GPS-based automated vehicle locators (AVL).

Passenger Information at Stations / Stops – Similar schedule, service, or real-time AVL data can be displayed at stations/stops through the use of dynamic message signs and/or kiosks with touch screens.

In-vehicle Passenger Information – BRT vehicles can display route, travel time, next stop, and arrival time information via automated annunciation system with dynamic message signs on vehicles.

In-vehicle Passenger Information – Safety and Security Systems, including on-board silent alarms and video monitoring are designed to keep bus transit passengers safe and promote a feeling of safety to users.

Mobile Passenger Information – Bus systems equipped with AVL can provide real-time bus location information and accurate next-bus arrival time to passengers through a mobile application or smart-phone integrated system. NJ TRANSIT has implemented MyBus for fixed schedule information and MyBusNow for real-time AVL information.

VI. SWOT Analysis

Based on the existing transit data collected and summarized in the Existing Conditions Analysis (Section III), the project team has developed an analysis of Strengths, Weaknesses, Opportunities, and Threats (referred to as a SWOT analysis) to bus rapid transit within Monmouth County. In general, strengths and weaknesses represent characteristics of the existing bus transit system, physical geometry of roadways or bus stops, or socio-economic factors which include demographics, political influences, and financial considerations. Opportunities and threats are divided into the same three categories, but tend to focus more on potential futures changes or impacts to the bus transit system in Monmouth County. All of the factors described in the SWOT analysis relate to either bus rapid transit (BRT) or to improved bus service within the County and are shown in **Table 6** (pages 41 to 43).

Table 6: SWOT Analysis

Strengths
Transit Network
Ridership on express bus transit service to New York City is high, indicating strong demand for bus transit services within Monmouth County.
There is already fairly good transit coverage and an existing network in place.
There are already some existing transit hubs (e.g., Red Bank, Asbury Park)
Existing bus operators already account for multiple customer bases.
Some existing buses used for local service are already equipped with bicycle racks.
Physical Characteristics
Many roadways are constructed in straight lines between population centers.
Some roadways operate with high-speeds and are attractive to bus transit operations.
There may be unused roadway capacity within the County, particularly east-west roadways.
The Red Bank Station serves as a multi-modal transit hub for buses and NJCL trains.
Precedent for dedicated bus lanes is set along U.S. Route 9 in adjacent Middlesex County.
Socio-economic Condition
There are several distinct high-density residential and employment concentrations.
Half of population who work in Monmouth County live in Monmouth County.
Some communities are supportive of improving transit services.
The County has jurisdictional control over many key roadways and intersections.
Historically there has been cooperation between public and private transit operators.

Table 6: SWOT Analysis (Cont.)

Weaknesses
Transit Network
Ridership on existing local bus service is generally low, and the daily duration of service may not last long enough for all users.
Buses serving the local transit market operate infrequently.
Some transit stops lack ADA-compliant pedestrian amenities, connections to adjacent sidewalks, weather-protected shelters, and adequate lighting.
There may be a generally perceived lack of transit customer amenities.
Bus service to New York City is near capacity, and the ability to increase capacity is limited.
There is limited fare integration between public and private operators.
Physical Characteristics
Congestion is prevalent on key North-South highways within the County.
The existing bicycle network is incomplete.
Some of the existing transit nodes are spaced far apart, both in distance and travel time.
There are numerous “low-speed” roadways in the County resulting in long bus travel times.
Infrastructure providing access to existing and potential stations is often under-developed.
In many locations there is limited space to make access and other BRT improvements.
Socio-economic Conditions
Large portions of the County are relatively sparsely developed or completely undeveloped.
The capacity at park-ride lots within the County is commonly managed by municipalities, and permitting constraints with local residents may exist.
Some communities within the County are not supportive of increased transit.
There is generally a lack of the type of partnerships that typically make transit successful.

Table 6: SWOT Analysis (Cont.)

Opportunities
Transit Network
There is a demand for east-west transit service as evidenced by existing ridership patterns.
There may be a demand for seasonal bus service to shore and other recreation destinations.
Several large employers, universities, and medical centers distributed throughout the County could be potential partners for new or enhanced transit service.
Physical Characteristics
There may be opportunities to create transit-oriented developments (TOD) in some areas.
NJDOT and other agencies have some roadway improvement projects underway, which bus transit could potentially add on to.
The U.S. Route 9 express bus lane facility could potentially be extended south into Monmouth County.
Socio-economic Conditions
There are nodes of substantial density within the County.
There are zero-car households who might use transit more.
New technologies such as AVL, real-time information, etc. could be used to enhance bus service, and some of these technologies are being deployed already.
There is potential for incremental or phased implementation of BRT features and strategies.

Threats
Transit Network
Adoption of new service is threatened by past setbacks.
Public perceptions of car use vs. bus use and transit work trips may exist.
Physical Characteristics
Population has increased County-wide by 2.5% in the last 10 years.
Increasing populations may lead to increased roadway congestion.
Socio-economic Conditions
There are multiple jurisdictions and fragmented political boundaries to negotiate.
Multiple operators could fragment the transit market.

1. Strengths

Transit Network

One of the most significant strengths is the existing bus transit network within Monmouth County. Existing bus operators already provide a number of different bus services for each of the key customer bases within the County. Trans-Hudson commuter bus service is provided by both NJ TRANSIT and Academy Bus, while local bus service is provided on nine local routes. Ridership on the commuter bus service is very high, with many of the more than 200 daily buses operating at capacity. The existing bus network and the associated ridership demonstrate the viability of bus transit within the County, and the level of existing transit use can justify potential future transit improvements.

There already exist several locations where bus transit riders can transfer from local bus service to express bus service or rail service to continue their journey. Most notably the transit centers in Red Bank (shown in **Figure 27** below) Asbury Park, Long Branch, and Freehold are well developed with parking, connecting bicycle and pedestrian infrastructure, and transit schedules which attempt to make transfers convenient for users. The presence of transit centers with connecting bus transit services in Monmouth County is a strength of the existing bus network.

Figure 27: NJ TRANSIT #833 Bus at Red Bank Station



Another strength is that the existing local bus transit network already extends to all of the major population and employment centers. Many of the buses used for local service are already equipped with bicycle racks, which give users a bicycle option to make the “last-mile” connection to and from their destinations. **Figure 28** (page 45) shows an Asbury Park-bound NJ TRANSIT bus carrying a bicycle.

Figure 28: NJ TRANSIT Bus with Bike Rack



Physical Characteristics

Monmouth County has a well-connected roadway network with several high-speed roadways, particularly connecting north-south destinations. Many roadways within the County are constructed in straight lines between population centers, such as County Road 537 between Freehold and Red Bank, and NJ Route 79 between Freehold and Aberdeen/Keyport. While traffic congestion issues persist on some north-south highways and at key intersections throughout the County, there appears to be considerable roadway capacity that is currently unused, particularly during off-peak travel times. These direct roadway links with available capacity for additional traffic could minimize the need for circuitous bus transit routes, and could form the physical infrastructure basis for an efficient and robust public transit network.

The existing commuter bus services that operate on U.S. Route 9 in adjacent Middlesex County make use of dedicated bus shoulder lanes on the highway. This feature, already in use, reduces travel times for bus trips along the Route 9 corridor, thereby increasing the attractiveness of the bus in comparison to private vehicles for long-distance trips. According to a study by NJ TRANSIT, reducing travel times on bus routes by at least five minutes result in a passenger-perceived time savings of closer to ten minutes. The presence of this infrastructure sets a precedent for similar dedicated bus right-of-way or travel lanes within Monmouth County. NJDOT and NJ TRANSIT have done some planning and development work to examine the possibility of extending the dedicated bus lanes farther south into the County. This project is currently being studied and will then proceed to environmental clearance and identification of funding.

Bus transit in a suburban area like Monmouth County is often enhanced by parking facilities, particularly at transit nodes. Some park-ride lots within the County are currently operating below capacity, which indicates that there is potential for additional transit riders to park their vehicle and finish their journey by bus. Many of the park-ride lots are permit-controlled at a municipal level. Anecdotally, some municipalities have reached the limit of the number of parking permits available for sale, even though it may appear that some lots are not fully utilized. However, through an evaluation of the current parking management system or an update to some procedures, it may be possible to increase the utilization of some park-ride facilities while maintaining high levels of customer service.

Socio-economic Conditions

Monmouth County has several distinct and well-defined concentrations of high-density development. The concentrations feature both residential and employment centers, which could provide a strong ridership base for bus transit use. Additionally, approximately half of the people who work in Monmouth County also live in the County. This means that many commuter trips are fairly short distances, possibly originating in one of the densely populated communities and ending in one of the densely populated employment centers that can be effectively served by transit.

Monmouth County owns a large proportion of the roadway network, and as such controls many signalized intersections. This allows the County to make specific improvements to physical infrastructure that would enhance the performance of transit services, without relying entirely on other agencies for funding and approvals.

Monmouth County contains numerous large businesses, universities, and medical institutions, some of which already partner with County and local governments to make transit more convenient for users. There has historically been cooperation between both public and private transit operators and the County. Several of the key communities, such as Asbury Park and Long Branch, have shown historical support for improving transit services. The political atmosphere in Monmouth County that appears supportive of improvements to transit services could prove to be useful in identifying and implementing future improvements.

2. Weaknesses

Transit Network

The existing local transit bus service features several characteristics that can be categorized as weaknesses for the Monmouth County transit system. Local bus service typically operates with relatively low frequency, often 60-minute headways. The daily span of bus service is from early morning to early evening; however there is very little late-night service provided. Bus service on Saturdays is less frequent than on weekdays, and service on Sundays is even more limited—on most routes, no Sunday service is provided. Ridership on the existing local bus service is quite low, with many buses lines operating well below capacity.

Some transit stops lack ADA-compliant pedestrian amenities, connections to adjacent sidewalks, weather-protected shelters, and adequate lighting. **Figure 29** (page 47) shows one such bus stop along NJ Route 35 with limited amenities for transit users. Maintenance responsibilities for NJ TRANSIT-installed transit infrastructure often reverts to local municipalities. Many of the buses in the existing fleet, particularly those operating on local service routes, use a high-floor configuration, which are generally less desirable than low-floor buses due to ease of passenger boarding considerations.

Figure 29: Bus Stop with Limited Amenities for Transit Users



Express bus service to New York City currently operates very close to capacity. Ridership is becoming constrained by the number of buses which can load and unload passengers at the Port Authority Bus Terminal in New York City. The market for bus transit service to New York City is also constrained by limited roadway capacity crossing the Hudson River. Within Monmouth County, there are few transfer points between local bus service and private express bus service, and a lack of fare integration does not encourage inter-operator transit use.

Figure 30: Congestion on U.S. Route 9 Southbound



Physical Characteristics

The roadway network within the County is under the control of numerous stakeholders including the NJDOT, the New Jersey Turnpike Authority (NJTA), various municipalities, and Monmouth County. Traffic congestion is prevalent on key North-South highways within the County during AM and PM peak weekday travel periods, most notably U.S. Route 9 and the Garden State Parkway. These congested corridors currently serve as primary routes for a large proportion of bus transit service within the County. The limited roadway capacity causes increased travel times for transit trips.

Existing transit stops and intermodal centers within the County such as Red Bank, Asbury Park, and others are located far apart from one another, which creates a challenge for local bus service to provide frequent connections. Many connecting roadways feature low speed limits, narrow or missing shoulders, and other characteristics challenging to higher speed bus transit. The resulting travel times between nodes of the bus transit network are long and unattractive to some transit services and users. Additionally, in many locations, existing roadway infrastructure is constrained by right-of-way or adjacent development which limits possible future expansion or inclusion of BRT features.

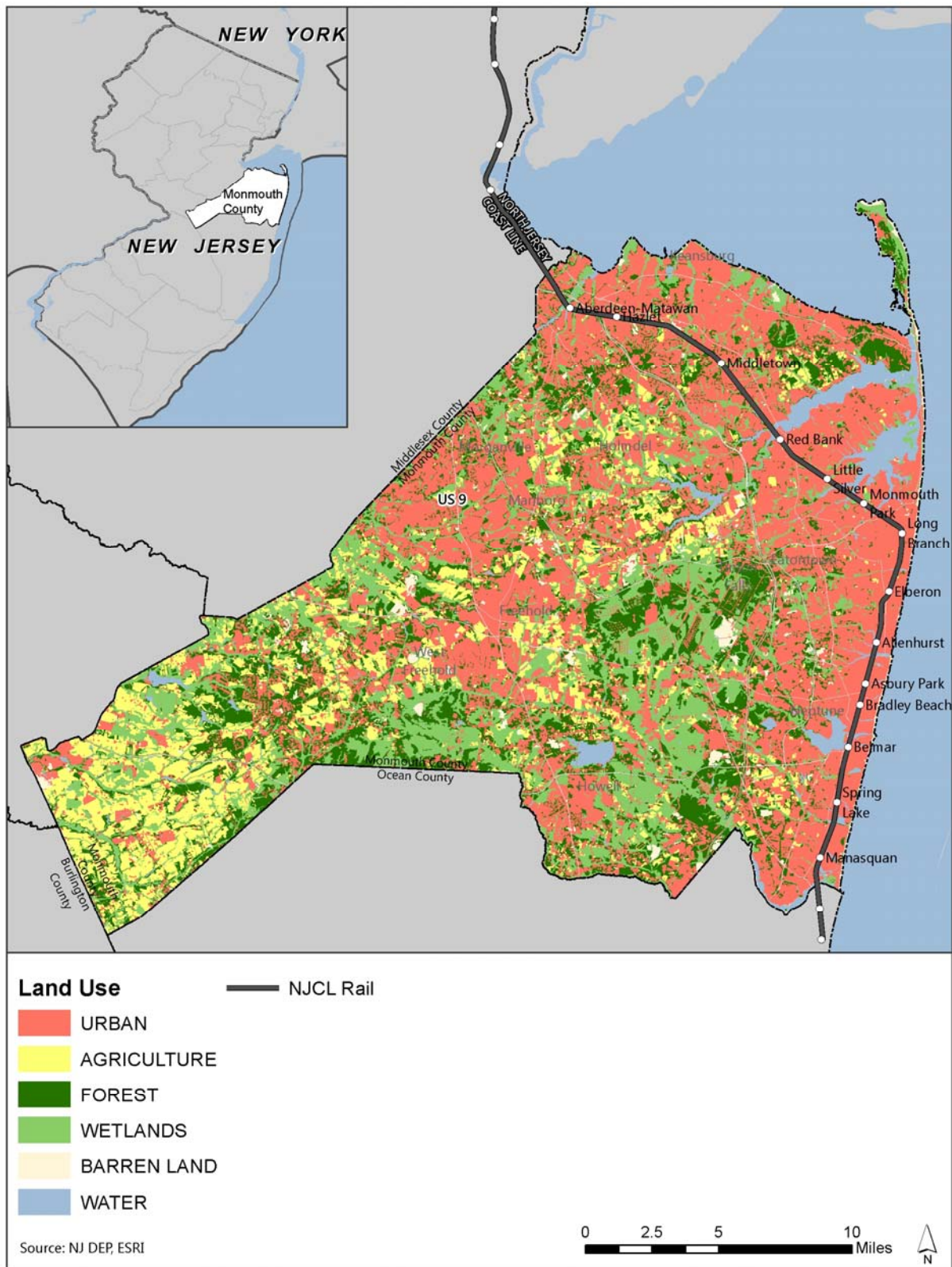
While access to some of the existing bus transit nodes is accommodated by well-developed sidewalk infrastructure, bicycle parking and access, and parking facilities for private vehicles, many of the local bus stops lack adjacent infrastructure. Bicycle infrastructure within the County is expanding, but a cohesive bicycle network is not yet fully in place. Bicycle and pedestrian access to large employment centers and dense concentrations of residential development in high-density areas is relatively well developed compared to transit stops in low-density areas, which generally lack key customer amenities such as sidewalks, ADA-compliant curb ramps, bike lanes, and bike lockers.

Socio-economic Conditions

Monmouth County is divided into numerous municipalities, some of which historically have not been supportive of increasing transit service. While a few strong partnerships exist, overall there are many more potential partnerships that would need to be leveraged between employers, medical institutions, municipalities, and other potential partners with transit operators in Monmouth County. The lack of more partnerships indicates historically weak support for bus transit systems between these entities with Monmouth County and transit operators. Park-Ride facilities owned and/or operated by municipalities are challenged by existing parking permit systems which constrain the number of transit customers who can park at a facility, but also anecdotally tend to unintentionally leave excess parking capacity available in the park-ride lots, either for late arrivals or mid-day business parking. NJ TRANSIT has undertaken a study to better understand demand and capacity constraints at park-ride lots in the County.

Overall, residential and commercial development within the County is quite sparse, with large portions of the County occupied by farms and other land uses not typically supportive of bus transit. **Figure 31** (page 49) shows land use in the County. Existing developments are primarily concentrated along the North Jersey Coast Line rail corridor and the outlying Borough of Freehold. Opportunities to create a robust, well-connected network between key transit origins and destinations may be limited by the geographic distribution and density of development.

Figure 31: Monmouth County Land Use



Source: NJ DEP, ESRI

Source: NJ DEP 2010 data

3. Opportunities

Transit Network

Based on analysis of the ridership statistics on the existing east-west local bus service, particularly bus routes 833 and 836 bus routes, there is considerable demand for local bus service. This presents an opportunity for increased bus service supported by increased transit ridership.

There are seasonal or event-based bus transit service markets in Monmouth County. Specifically, north-south bus service connecting shore towns have anecdotally been successful in serving summer beach traffic. Several shuttles, operated by Meadowlink TMA using CMAQ and local funds, provide service connecting North Jersey Coast Line stations with shore towns and boardwalks. For example, shuttle bus service was recently launched on a seasonal trial basis, connecting Seaside Heights to Point Pleasant Beach and express North Jersey Coast Line service. PNC Bank Center shuttle event-goers back and forth between the venue and nearby train stations; however there is limited regularly scheduled service. In locations where transit partnerships or cooperation with transit operators can be achieved, seasonal or event service is an opportunity for increased transit use in Monmouth County.

With several large medical centers and universities in the County, there may be opportunities for transit operators to partner with stakeholders to create a shared ridership program to provide free or subsidized transit rides for University students or medical patients. The large concentrations of students, patients, and employees represent an opportunity for new or enhanced nodes in the bus transit network.

In the past 10 to 15 years, there have been numerous advances in technology that present new opportunities for BRT in Monmouth County. Some of these are described in the Section for features of BRT. Technology for improved bus service in Monmouth County exists to provide automated-vehicle location, real-time information, online schedules, and other information useful to transit users via smart phone apps and the internet. These technological advances represent new opportunities for BRT systems in the County, and some are already being deployed by NJ TRANSIT.

Many BRT systems are not introduced in a single phase, and instead are planned for incremental implementation. Small changes or improvements often cost less, and carry less risk, than large one-time expenditures. As bus transit continues to develop in Monmouth County with the addition of new features and strategies, the potential phasing of implementation is an opportunity for agency, operator, stakeholder, transit user, and public buy-in and approval.

Physical Characteristics

There are numerous sites throughout Monmouth County that have been designated through various planning efforts as redevelopment sites, such as Fort Monmouth, as discussed in the existing conditions section of this report. Some of these sites could potentially support increased residential or commercial density. These redevelopment opportunities, in conjunction with potential roadway and other infrastructure improvements, could create an opportunity to explore Transit Oriented Development. The County, in cooperation with transit operators, private developers, and the municipalities who control the zoning for redevelopment, could potentially plan and construct new or enhanced bus transit nodes within the County at or near these redevelopment sites. Private development also represents an opportunity for new or increased funding for bus transit on a one-time or ongoing basis.

With the recent trend towards integrating elements of Complete Streets into roadway and development projects, there are often additional opportunities to include bus transit

infrastructure in projects. NJDOT's project development process includes a bicycle and pedestrian review phase before projects are incorporated into the Statewide Transportation Improvement Program (STIP). Through this process, there are often opportunities that can be identified to incorporate transit-friendly elements into preliminary and final design.

U.S. Route 9 represents the highest service and highest ridership bus transit corridor in Monmouth County. In adjacent Middlesex County, the corridor features dedicated bus lanes and transit signal priority, both of which make the express bus service from Monmouth County to New York City more efficient. Opportunities may exist to extend the dedicated bus infrastructure and/or transit signal priority systems further south into Monmouth County. As noted, the project is currently under study and will then proceed to environmental clearance and identification of funding sources.

Socio-economic Conditions

Existing land use patterns within the County indicate well-defined concentrations of population and employment. Additionally, several large employers, medical facilities, universities, and retail centers can serve as destinations for existing or potential future transit trips. Each of these locations represents an opportunity for enhancing an existing bus transit node, or creating a new one. An analysis of potential transit nodes County-wide is presented in the recommendations section of this report and shown in **Figure 35** (page 66).

Within Monmouth County, there are members of zero-car households that might increase their use of transit services if it were improved or enhanced. Zero-car household members and other transit dependent users are represented in the public outreach survey. Their input was valuable to developing study recommendations, and this group of users represents an opportunity for increased transit ridership within the County moving forward.

4. Threats

Transit Network

One of the largest threats to any new transit system, including BRT, is adoption. Often new bus routes are implemented on a temporary basis, and must prove themselves to be financially viable or at least supported with substantial ridership. Agencies, stakeholders, operators, and transit users are particularly wary of new bus transit services in areas where past temporary bus service has been unsuccessful and subsequently cancelled. Services such as the former Dock n' Roll shuttle bus service connecting Middletown Rail Station with the Bayshore Ferry Terminal, but subsequently cancelled due to low ridership, serve as a reminder of the threat to new bus transit routes in Monmouth County.

One common threat to new or enhanced bus transit service is public perception that it is not needed. New Jersey (and Monmouth County specifically) has historically had a reputation for being a car-based society. Another public perception within New Jersey is that people only ride transit for their work trip. This is not supportive of new or enhanced bus services for weekend or recreational transit trips. Additionally, the term BRT itself has varying definitions and is not always well-accepted by transit users. Terms such as enhanced bus, better bus, and others can further confuse transit users, operators, and stakeholders. Public perceptions that have long been in place within Monmouth County continue to represent a threat to bus transit.

Physical Characteristics

Roadway traffic congestion has increased in the last 10 years, and the population is projected to continue growing in the future, which will likely further contribute to increases in traffic congestion on the roadway network. Patterns of future growth could be either in urbanized areas or less developed portions of the County, and depend on a wide variety of factors,

resulting in uncertainty in future growth patterns. In the absence of improved public transit service, this could increase travel times on key roadway links and generally make it more difficult to get around the County. Increased travel times and roadway congestion represent a threat to bus service routes, as users expect reliable travel times.

Socio-economic Conditions

The availability of funding is almost always a threat for bus transit services. Most publicly operated services are subsidized through Federal, State, Local, or other funding. Funding is further complicated in Monmouth County by the presence of multiple operators and the multi-jurisdictional nature of the roadway network.

In any service area with multiple bus transit operators, there is a threat that the operators will compete with one another, which could dilute ridership on certain routes threatening their viability. Separate routes on the bus transit network often fragment the transit market. Limited opportunities for fare-integration and co-location of transit nodes further divide transit customers. Continued long-term operation of separate systems creates a threat to the transit network as the multiple operators compete for limited transit ridership, physical infrastructure, public support, and funding. Academy Bus and other private transit operators should be considered critical stakeholders for any further development of bus transit systems in Monmouth County.

VII. Bus Transit Improvement Recommendations

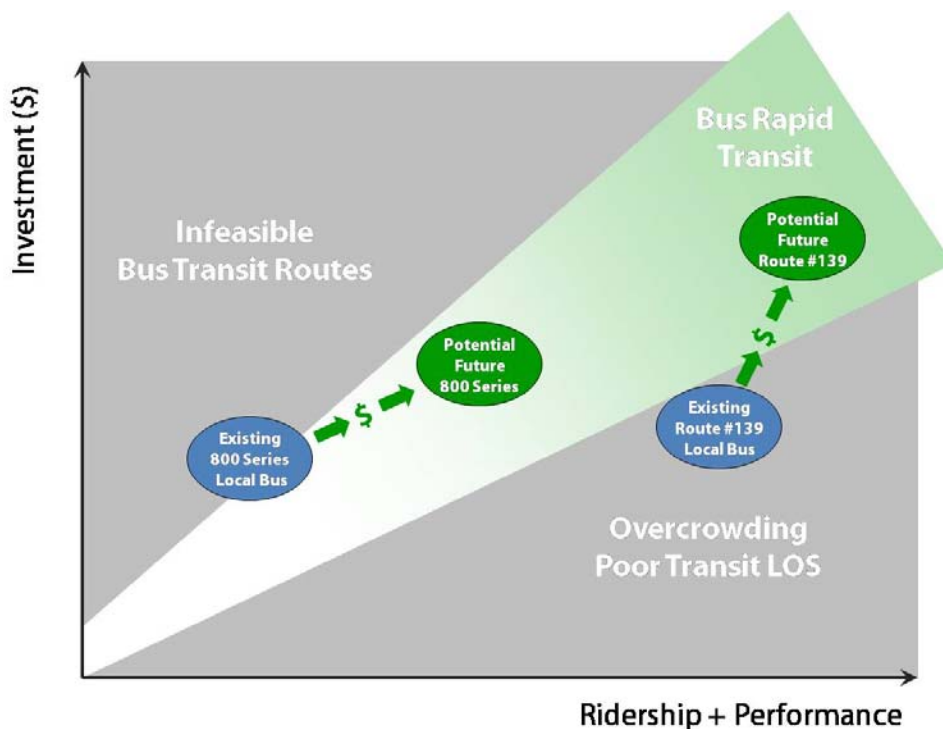
In this section of the report, recommendations are made for upgrades to existing local and commuter bus service as well as to system-wide infrastructure and operations. Bus transit services in Monmouth County will develop and evolve in different ways for each of the separate bus transit markets and customer types. The strengths, weaknesses, opportunities, and threats described in the previous section do not indicate one clear action plan, but rather create multiple directions and ways to implement certain features and strategies of BRT as a means of improving bus service. The set of strategies and features recommended for near-term implementation on local bus service are different from those which would benefit the longer distance NJ TRANSIT Route #139 or Academy bus services that travel to New York City. While some cities have successfully improved bus services through a large one-time investment in new infrastructure or service, it is much more common for existing bus services to be enhanced with incremental investments and corresponding increases in ridership.

In Monmouth County, it is recommended that transit service improvements follow a phased approach, similar to GoBus or Mega Bus, in order to minimize investment risk and provide adequate time for transit users to adjust to new features and strategies. This incremental approach provides benefits in the near term and has the potential to lead to BRT over time. A baseline of existing and a preliminary set of future transit nodes are identified for an improved bus transit network and guidance is provided that can be included in the Monmouth County Master Plan.

1. Investing in Bus Transit

Bus transit systems can be characterized along a spectrum ranging from bus services with very few features to those with many elaborate attributes found on complex, high performance systems. In Monmouth County, there are already some bus services that use many of the features typically found on high-end BRT systems, such as the #139 bus stops, while other bus services present opportunities for improvement through investment in new technologies. **Figure 32** (page 54) shows the two different categories of public bus service and how they currently relate to varying degrees of investment, capacity, customer satisfaction, and ridership. This illustrates how insufficient investment in transit leads to poor service, while overinvestment in poorly performing corridors is also not desirable or beneficial. Finding the “sweet spot” where additional investment to improve transit will produce improved service and increased ridership is the key to successfully improve public transit of all types, including BRT.

Figure 32: Relationship between Investment and Monmouth County Bus Ridership



2. Enhance Local Bus Service

For the purposes of this study, local bus service can be defined as the service operated by NJ TRANSIT’s 800 series routes. As described in the Existing Conditions section, local bus service experiences fairly low ridership. Developing and evaluating alternative investment strategies to improve local bus service should focus on features that would dramatically increase ridership in order to maintain long-term viability of the local bus service. This can be achieved through strategies such as: increasing service, developing new routes, and improving local bus stops to meet minimum design standards.

Increase Service on Local Bus Routes

One of the most significant barriers to increased ridership on the NJ TRANSIT 800 series local bus is the operating schedule. In general, users have an unfavorable view of the convenience and usability of bus transportation that only runs once an hour and makes only 10 trips per day. Therefore it is recommended that the County, local municipalities, business partners, Universities, and developers coordinate with NJ TRANSIT to:

- Explore longer spans of service on key routes with emphasis on early morning and evening service.
- Trial increased frequency (e.g., 20 or 30 minute headways) on key routes during peak periods.
- Introduce Sunday service on routes with highest ridership.
- Review seasonal bus services, and trial new or enhanced existing beach and event services.
- Assist NJ TRANSIT in marketing improved bus service.

Transit customer response to each of the trials should be carefully analyzed through a variety of metrics including changes in ridership and customer satisfaction surveys, as a basis for assessing the long-term viability of these types of improvements.

Explore Potential New Bus Routes

A new bus route requires extensive planning, trialing, marketing, and performance tracking. NJ TRANSIT maintains rigorous viability standards for new bus service, based primarily on achieving specific ridership or productivity targets within a given time after implementation. However, analysis of existing ridership indicated a potential demand for bus service providing east-west travel in the County to and from destinations such as Eatontown and Freehold. NJ TRANSIT typically conducts origin-destination surveys to further assess this potential.

The following section outlines a sample case study for the type of route planning analysis and activities which could be conducted, focused on an east-west route from Long Branch to Freehold. While this is not a recommendation to implement new bus service, the example illustrates the process by which new service could be considered, tested, measured, and adjusted. Costs, financing, operations, and other factors are mentioned but not described in detail in this example. Implementing new service would require careful consideration of financial costs including capital costs such as purchase of buses, operating costs such as fuel and driver salary, and maintenance costs such as stop upkeep.

Identify Demand – In this case study, demand is identified through analysis of existing ridership trends. Further analysis of U.S. Census Longitudinal Employer-Household Dynamics (LEHD) and Census Transportation Planning Products (CTPP), in addition to surveys of transit users typically conducted by NJ TRANSIT, would be required in order for route justification to proceed.

Identify Nodes – In evaluating improved bus transit services in more suburban locations such as Monmouth County, it has become increasingly clear that the development of routes should focus on the critical nodes that generate ridership, as opposed to corridors or specific routes. The nodes selected were chosen because they represent trip generators such as dense concentrations of residents and/or trip attractors such as retail and employment centers. All of the stops selected are already transit nodes, which results in reduced infrastructure costs, compared to constructing new bus stops. However, opportunities for improved amenities at each of the stations should be explored. The terminal station in Long Branch features the benefit of providing an intermodal connection with the North Jersey Coast Line. **Table 7** below shows the five nodes selected for further use in this sample case study. In general, this is not a one-time analysis, but should be updated over time as major changes occur, such as new residential or commercial development.

Table 7: Potential Nodes Selected for Long Branch-Freehold Bus Service

VIII. Node	Existing Bus Service			Shortest Driving Route		Potential BRT Time Savings
	Scheduled Time (min)	# of Stops	Existing Route	Distance	Time (min)	
A to B	25	22	831	4.8	13	12
B to C	72	46	831 & 836	13.7	18	54
C to D	11	5	836	1.8	5	6
D to E	8	1	836	2.8	8	0
Total	116	74		23.1	44	72

Identify Potential Roadway Links – One particularly attractive roadway link used for this exercise is NJ Route 18, which offers a high-speed connection between Eatontown and Freehold. The use of the roadway could potentially reduce bus travel times significantly compared to existing service. However, using the roadway could potentially limit the ability to serve destinations between the two municipalities.

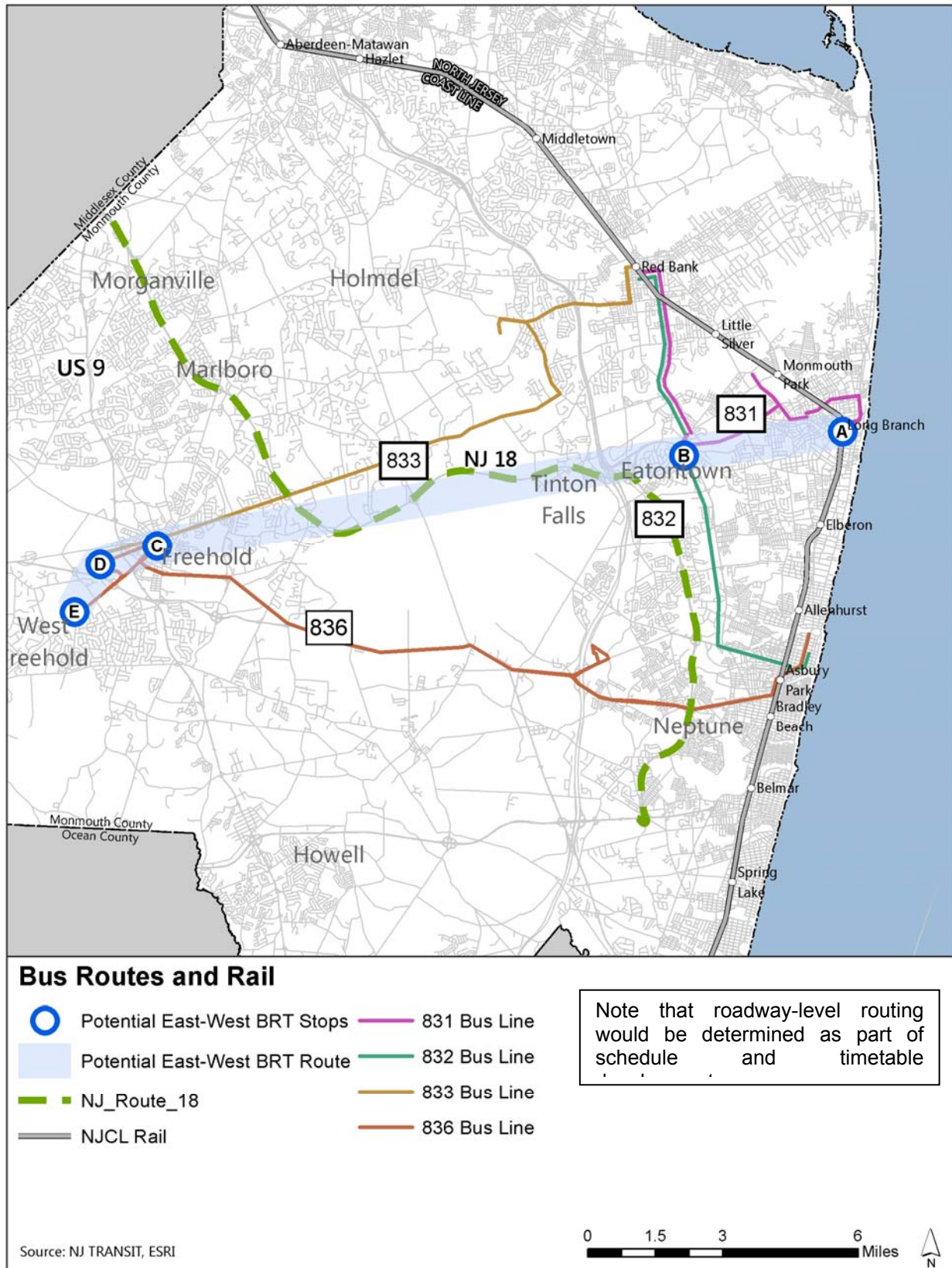
Make the Case – **Figure 33** (page 57) depicts the five nodes selected on a map, which shows the linear relationship to one another; this graphic does not show a specific routing as this concept is intended to be merely illustrative. At this point, robust route travel times can be developed, which would be used to forecast potential ridership. If the route looks attractive, U.S. Journey to Work data can be explored, routing and service timetables can be developed, and bus service can begin.

Track and Evaluate Results – Critically, new bus service should be measured and tracked to determine its viability and to improve ridership wherever possible. **Table 8** below shows potential travel time savings, compared to existing public transit. However, actual route performance may be substantially different than theoretical schedules. Ridership targets are often phased such that the new route can be considered successful if the daily number of riders reaches half or two thirds of the local average within three, six, or nine months. If the route passes initial viability, all stakeholders should reconvene and look for ways to further improve the new bus route, or whether more fundamental adjustments are needed.

Table 8: Potential Long Branch-Freehold BRT Route

Node Pair	Existing Bus Service			Shortest Driving Route (Google maps)		Potential BRT Time Savings (min)
	Scheduled Time (min)	# of Stops	Existing Route	Distance (mi)	Time (min)	
Long Branch to Monmouth Mall	25	22	831	4.8	13	12
Monmouth Mall to Freehold Center	72	46	831 & 833	13.7	18	54
Freehold Center to Freehold Raceway Mall	7	5	833 or 67	1.8	5	2
Freehold Raceway Mall to Centra State	8	1	836	2.8	8	0
Total	112	74		23.1	44	72

Figure 33: Potential Long Branch-Freehold BRT Route



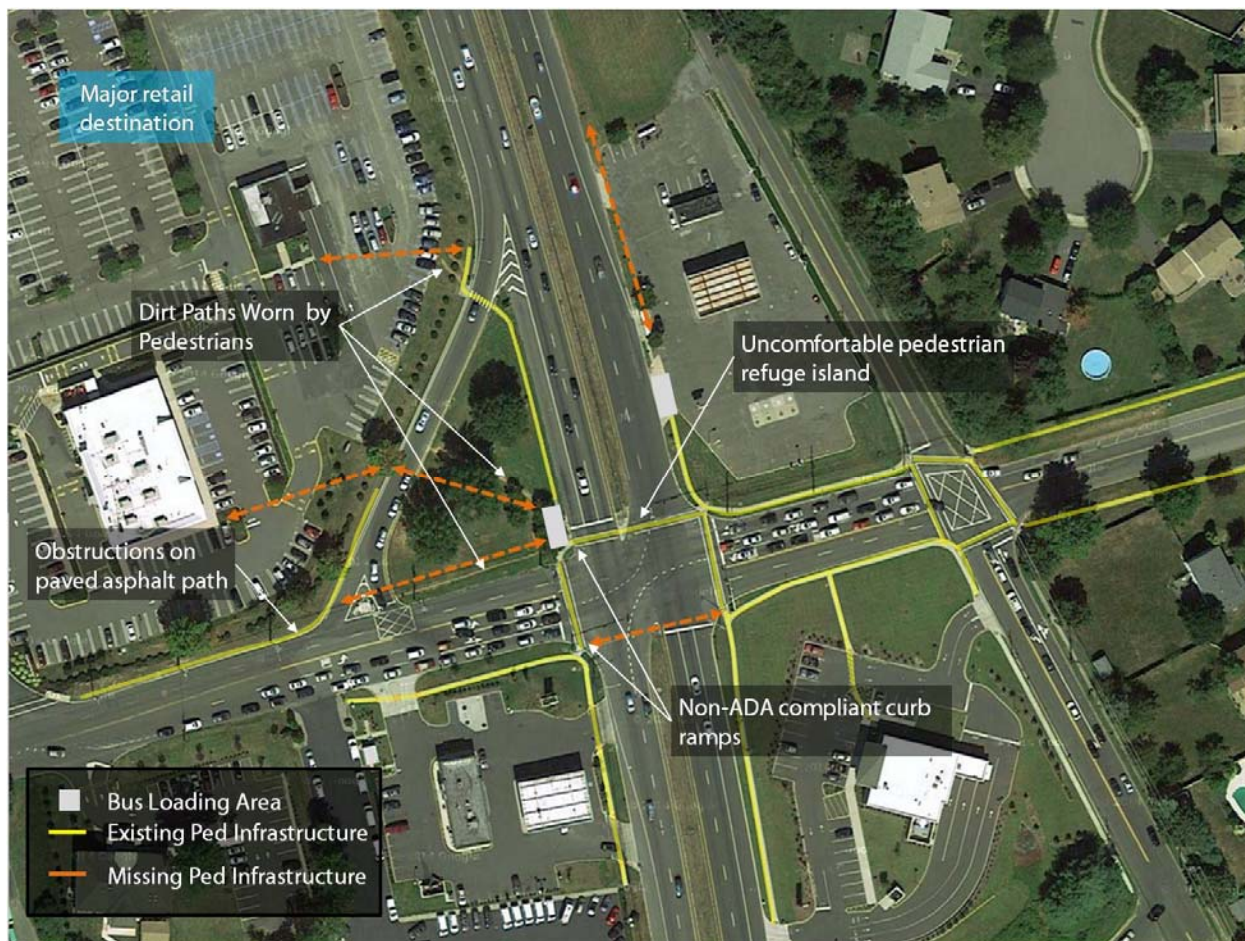
Physical Improvements / Design Standards

Establishing design guidelines that provide a standardized minimum set of amenities at each bus stop would improve public perception of bus facilities. Such guidelines often include direction on appropriate bus loading, passenger waiting, weather protection, and other areas associated with bus stop infrastructure. There are often instructions for incorporating adequate signage, lighting, and ADA-compliant elements into bus stop design. Once established, older bus stops should be upgraded to meet new design guidelines. Public perception can be changed through marketing campaigns and over time as adoption and acceptance for the new standards builds.

Bicycle and Pedestrian Access

Pedestrian access to bus stops is critical to the safety and comfort of transit customers. Within Monmouth County, many stops have adequate, ADA-compliant, and updated pedestrian infrastructure. However, other locations are missing key sidewalk or crosswalk connections and may be missing ADA-compliant curb ramps, pedestrian countdown timers at traffic signals, or other pedestrian infrastructure. **Figure 34** shows a NJ TRANSIT bus stop along U.S. Route 9 and highlights the existing and missing pedestrian infrastructure. This example is included not to recommend specific improvements at this location, rather to show typical deficiencies of pedestrian infrastructure around bus stops. Improving and updating pedestrian infrastructure often requires coordination and cooperation between NJ TRANSIT, NJDOT, the County, property owners, and other stakeholders.

Figure 34: Potential Deficiencies in Pedestrian Infrastructure near Bus Stops



3. Add BRT Features System-Wide

Analyses of existing transit conditions and development patterns in Monmouth County indicate that an extensive BRT network is not likely to be supported in the near-term planning horizon. However, through a series of iterative improvements and by investing in BRT features, the existing bus transit services can be transformed over time into a BRT or BRT-like system. **Figure 32** previously showed the qualitative relationship between investments in new features and corresponding increases in ridership or improved customer service, producing cost effective improvements. A local bus route may graduate to an enhanced bus route or “BRT” route when ridership reaches a certain level (e.g., 2,500 or 5,000 riders per day, depending on local context). The ridership will likely be accompanied by strong service metrics such as a 15+ hour service space, 15-minute headways or less, and the addition of specialized features or vehicles. This section describes some of the features which can be added to existing bus transit service along with some cost and implementation timeline information.

Typical BRT Feature Costs and Implementation Timeline

NJ TRANSIT has already begun investing in AVL GPS technology for its bus fleet. Using this GPS location data, applications can be developed which would provide accurate real-time travel time information to internet and smart phone users.

While a wide array of technologies is presented in the features and strategies section of this report, some features are more applicable to bus routes within Monmouth County than others. In the future, the County and bus transit stakeholders should use this report as a reference

guide to find solutions to problems or to identify the best technology for opportunities which arise.

Table 9: Cost and Implementation Matrix (\$2009)

BRT Feature	Cost Estimate
Bus Lanes	
Bus Lane - restripe existing shoulder	\$50,000 to \$100,000 per lane mile
Bus Lane - new construction	\$2.0 million to \$3.0 million per lane mile
Dedicated Bus Roadway	\$6.5 million to \$10.2 million per lane mile
Queue jump - restripe existing shoulder	\$500 to \$2,000 ea
Queue jump - new construction	\$100,000 to \$290,000 ea
Stops / Stations	
Simple Shelter	\$15,000 to \$20,000
Enhanced Shelter	\$25,000 to \$35,000
Station Enclosure	\$150,000 to \$300,000
Intermodal Transit Center	\$5 million and up
Vehicle Types	
Conventional / Standard	\$375,000 to \$400,000 ea
Articulated	\$700,000 to \$750,000 ea
Specialized	\$950,000 to \$1,600,000 ea
Other Technologies	
Ticket vending machine	\$25,000 to \$60,000 ea
Electronic fare validator	\$1,500 to \$3,000 per vehicle
Automated vehicle locators	\$1,500 to \$3,000 plus software, etc.
Automated passenger counters	\$2,500 to \$6,000 plus software, etc.

Source: FTA (2009); TRCP Report 118 (2007)

Costs are provided in 2009 dollars

Location-specific Features

At many locations throughout Monmouth County, there are opportunities to add BRT features such as exclusive lanes, transit signal priority, or queue jumps. Some characteristics of locations suitable for these types of treatments include roadways or intersections where:

- Congestion persists during peak travel times
- Transit vehicles are routinely delayed by a control device
- Removing the obstacle would represent material time savings
- A relatively high number of transit vehicles use the facility
- Frequency of bus transit service

One case study for the addition of location-specific BRT features is along U.S. Route 9. North of Monmouth County, there are shoulder lanes which are marked exclusively for use by buses. These lanes allow the NJ TRANSIT #139 bus to bypass substantial congestion northbound in the AM peak period and southbound in the PM peak period. Similar treatments are under consideration for portions of Route 9 within Monmouth County and could also be deployed on other major arterials or limited access highways that host bus service.

4. Develop Future Bus Transit Nodes

To facilitate the long-term improvement of the bus transit network, it is important for the County and other stakeholders to develop robust bus transit nodes that can serve as a backbone for future BRT services. This section presents a screening of some potential bus transit nodes within the county including some with existing bus or train service and others that do not currently serve as transit access points. Criteria to evaluate the attractiveness of each node were established and a summary of the bus transit nodes that appear most attractive for new investment is presented.

Screening

Potential nodes for development as bus transit stops and stations were identified using information from a variety of sources including:

- Existing bus and rail transit
- Ridership on existing bus services
- Results of the public survey
- Concentrations of residential or employment development
- Designated redevelopment areas

In order to determine the most attractive nodes for future development, characteristics of each potential bus transit nodes were collected as shown in **Table 10** (pages 62 to 65). Stops with existing transit service, located in dense residential areas or areas which serve zero-car households, with major trip generators, adjacent to redevelopment sites, and with good roadway, bicycle, pedestrian, and private vehicle facilities were given higher priority than other sites. **Table 10** shows all 35 redevelopment sites considered in the analysis in order of their attractiveness. Note that the existing transit centers in Asbury Park, Red Bank, and Long Branch, which emerge as most attractive for additional investment, already exhibit many of the characteristics desirable for use as a bus transit stop. **Figure 35** (page 66) depicts the existing and future nodes considered in the analysis.

Table 10: Potential New or Improved Transit Centers

Node	Ex. Public Transit Service	Pop. Density (per sq. mi.) w/in 1/4 mi	% Zero-car Household w/in 1/4 mi	Major Trip Generators	Primary Access Roadways	Pedestrian & Bicycle Facilities	Near Desig. Redevelop. Area	Parking Nearby
Asbury Park	Train/Bus	11,600	31.3%	NJ TRANSIT Asbury Park station; Asbury CBD	NJ 71	Good	Yes	Med
Red Bank	Train/Bus	6,600	22.3%	NJ TRANSIT Red Bank Station; retail/restaurants; Red Bank CBD (~.45 miles)	Monmouth St; near Rt 35	Good	No	Med
Freehold Center (Downtown)	Bus	6,600	22.8%	Freehold CBD; NJ TRANSIT bus hub	CR 537	Good	No	Low
Long Branch/Monmouth Med. Ctr.	Train/Bus	8,600	18.5%	NJ TRANSIT Long Branch Station; Monmouth Medical Center; Long Branch Middle/High school; beach/boardwalk (~.4 miles)	3rd Ave	Good	No	Med
Bradley Beach	Train/Bus	7,900	8.9%	NJ TRANSIT Bradley Beach Station; Retail/Restaurants; Main St.; beach/boardwalk	NJ 71; Brinley Ave (CR 2)	Good	No	Low
Belmar	Train/Bus	4,000	7.0%	NJ TRANSIT Belmar Station; Retail/Restaurants; Main St. Belmar; Belmar Marina; Belmar beach/boardwalk (~.7 miles)	10th Ave; NJ 71; Main St	Good	No	Med
Manasquan	Train/Bus	4,400	4.0%	NJ TRANSIT Manasquan Station; Retail/Restaurants	NJ 71	Good	No	Med
Jersey Shore Medical Center	Bus	3,700	3.4%	Jersey Shore Medical Center; One Stop Career Center	NJ 33	Fair	No	High

Table 10: Potential New or Improved Transit Centers (Cont.)

Node	Ex. Public Transit Service	Pop. Density (per sq. mi.) w/in 1/4 mi	% Zero-car Household w/in 1/4 mi	Major Trip Generators	Primary Access Roadways	Pedestrian & Bicycle Facilities	Near Desig. Redevelop. Area	Parking Nearby
Monmouth University	Bus	3,700	1.5%	Monmouth University	NJ 71	Fair	No	High
Freehold Raceway Mall	Bus	1,000	0.6%	Freehold Raceway Mall	Mall access roads; US 9, NJ 33, CR 537	Poor	No	High
Rt 9 at East Freehold Road	Bus	1,400	7.0%	Retail (strip commercial/big box)	US 9	Fair	No	Med
Fort Monmouth	Bus	2,500	1.6%	Fort Monmouth (designated for redevelopment)	NJ 35	Poor	Yes	High
Main St Keansburg	Bus	4,700	1.3%	Main Street; Keansburg Plaza	Main St (CR 7)	Good	No	Low
Rt 9 at Freehold Raceway Mall	Bus	2,200	13.5%	Freehold Raceway Mall; Freehold Raceway	US 9	Poor	No	High
Rt 9 at Aldrich Road	Bus	2,900	4.8%	Retail (strip commercial/big box)	US 9	Poor	No	High
Centra State Medical	Bus	3,100	1.8%	Centra State Medical Center	CR 537	Fair	No	High
Monmouth Mall	Bus	1,300	0.7%	Monmouth Mall; One Stop Career Center	NJ 35/NJ36/CR 547	Poor	No	High
Asbury Park Boardwalk	none	6,600	22.9%	Asbury Park boardwalk	Ocean Ave, Asbury Ave	Good	Yes	Med
Freehold Raceway	Bus	4,500	20.6%	Freehold Raceway	NJ 33	Poor	No	High
Brookdale Community College	Bus	400	0.0%	Brookdale Community College	Campus Dr; CR 54; CR 520	Fair	No	High

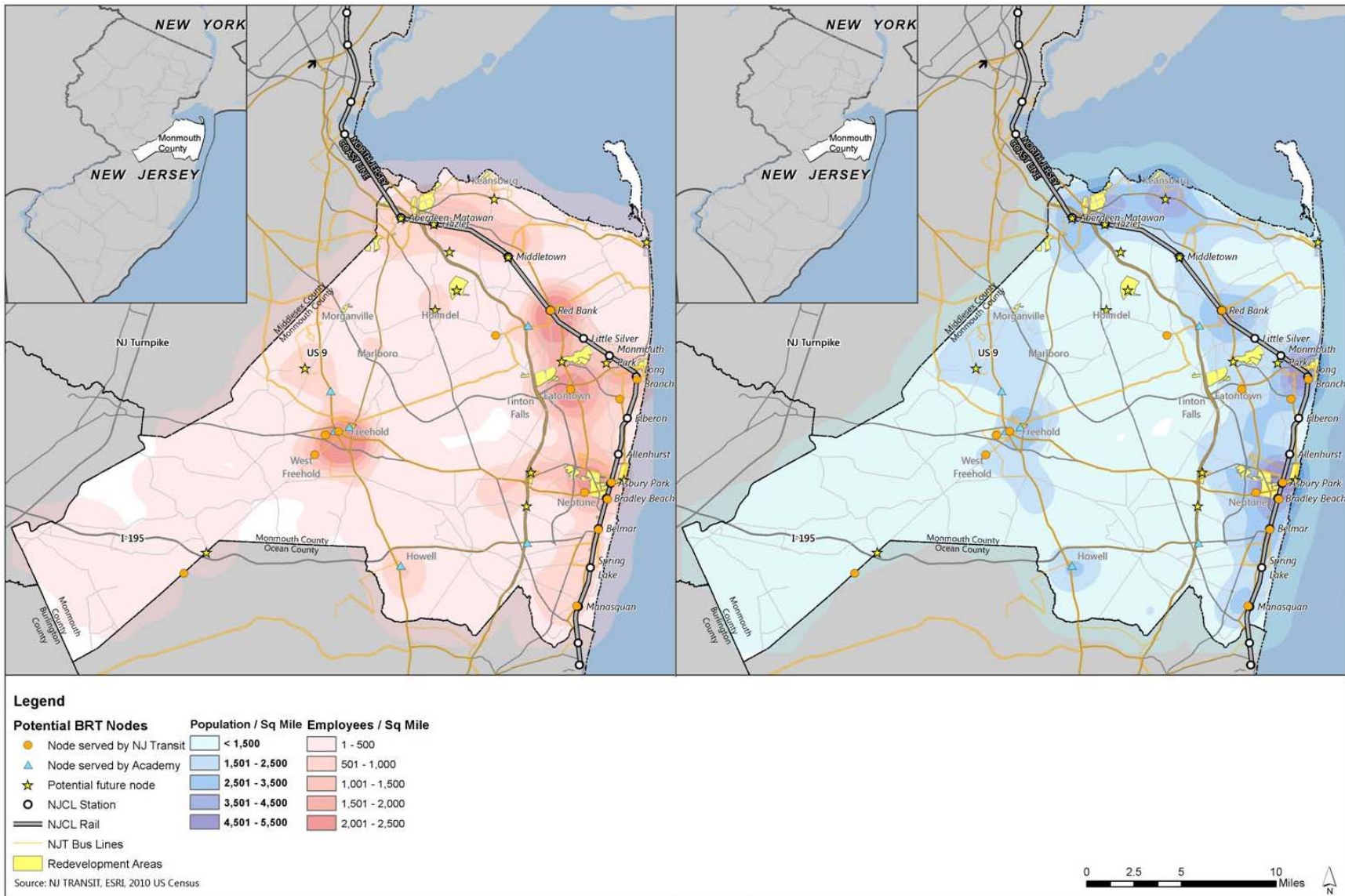
Table 10: Potential New or Improved Transit Centers (Cont.)

Node	Ex. Public Transit Service	Pop. Density (per sq. mi.) w/in 1/4 mi	% Zero-car Household w/in 1/4 mi	Major Trip Generators	Primary Access Roadways	Pedestrian & Bicycle Facilities	Near Desig. Redevelop. Area	Parking Nearby
GSP Exit 109 Park-Ride	Bus	1,200	0.7%	Park & Ride; large offices bldgs	CR 520	Fair	No	Med
Matawan	Train	3,400	2.7%	NJ TRANSIT Matawan Station	CR 516, Atlantic Ave	Fair	Yes	High
Parkway Express	Bus	600	0.0%	Park & Ride	GSP; NJ 138	Poor	No	Low
Six Flags Great Adventure	Bus	100	0.0%	Six Flags	CR 537	Poor	No	High
PNC Bank Arts Center	Bus	1,100	0.0%	PNC Bank Arts Center	GSP	Poor	No	High
Jersey Shore Premium Outlets	none	1,500	2.1%	Jersey Shore Premium Outlets	Essex Rd/Premium Outlet Blvd; NJ 66	Poor	Yes	High
Holmdel - Alcatel-Lucent	none	700	0.0%	Large office (Vonage Marketing)	NJ 34, CR 520, CR 4	Poor	Yes	High
Sandy Hook (Gateway Nat'l Rec)	Ferry	700	3.5%	Sandy Hook - Gateway National Recreation Area	NJ 36	Good	No	Med

Table 10: Potential New or Improved Transit Centers (Cont.)

Node	Ex. Public Transit Service	Pop. Density (per sq. mi.) w/in 1/4 mi	% Zero-car Household w/in 1/4 mi	Major Trip Generators	Primary Access Roadways	Pedestrian & Bicycle Facilities	Near Desig. Redevelop. Area	Parking Nearby
Yorketown	Bus	2,200	1.3%	strip commercial	Gordons Corner Road, Pease Rd	Poor	No	Med
Monmouth Service Area	none	500	0.0%	Service Area/Park & Ride	GSP	Fair	No	High
Middletown	Train	1,300	0.9%	NJ TRANSIT Middletown Station	Church St/Middletown Lincroft Rd	Poor	No	High
Monmouth Park	Train	1,100	0.7%	Monmouth Park	CR 11	Poor	No	High
Hazlet	Train	3,900	0.3%	NJ TRANSIT Hazlet Station	Holmdel Road (CR 4)	Poor	No	Med
Jackson Outlets	none	100	0.0%	Jackson Outlets	CR 537	Poor	No	High

Figure 35: Potential Future BRT Nodes in Monmouth County



Potential Bus Rapid Transit nodes in Monmouth County

Sample Station Improvements

At each of the potential future transit nodes, improvements should be explored that would:

- Improve access for transit vehicles (geometric changes, improved pavement, enhanced signage, signal operations improvements, etc.)
- Improve or provide safe pedestrian / bicycle routes to nearby destinations
- Improve or provide standardized amenities such as shelters, signage, loading areas, etc.

Figure 36 below shows sample improvements which could be made in the vicinity of a bus transit stop and a rail station.

Figure 36: Sample Station Area Improvements



5. Integrate Bus Transit improvements into County Master Plan

Results of this *BRT Opportunities Study* and the recommendations contained within this chapter should be incorporated into the Monmouth County Master Plan Update. The transportation element of the master plan could include findings directly related to transit, while other elements could consider economic development, land use, and other socio-economic opportunities and threats described by the SWOT analysis.

As designated redevelopment areas and other development projects progress towards future residential and commercial construction, the County and other stakeholders should be mindful that access via public transit can benefit both the development and the transit system. New opportunities for increased ridership can serve as justification for additional investment in the bus transit network. Such development projects also create openings for new or enhanced partnerships between the County, transit operators, property owners, and other stakeholders that can be mutually beneficial.

Bus transit is crucial to the vision of creating a robust multi-modal public transportation system in Monmouth County. The existing bus transit system offers a broad array of services that generally provide good transit coverage; however, gaps in service areas and service times limit its effectiveness. The system is oriented to higher density population centers with limited coverage in outlying suburbs. Service is also generally focused on commuter schedules with limited off-peak and weekend service, which reduces bus transit convenience for non-traditional commuters and other transit dependent populations. In the future, bus transit should be considered an integral part of the overall public transportation system.

Table 11 below provides a summary of the recommendations, along with information about the agencies that will need to be involved in implementing these recommendations, potential funding sources, and the Regional Plan for Sustainable Development (RPSD) topics that each recommendation addresses.

Table 11: Potential New or Improved Transit Nodes

Recommendation	Lead Agency	Partner Agencies	Potential Funding Sources	RPSD Topic(s)
Invest in Bus Transit	NJTPA	NJ TRANSIT, NJDOT, Monmouth County	FTA, FHWA	Transportation, Business Environment & Entrepreneurial Support
Enhance Local Bus Service	NJ TRANSIT	NJTPA, Monmouth County, Local Partners	FTA, FHWA	Transportation, Workforce Preparedness & Training
Add BRT Features System-Wide	NJ TRANSIT	NJTPA, Monmouth County, Local Partners	FTA, FHWA	Transportation, Health & Safety
Develop Future Bus Transit Nodes	Monmouth County	NJTPA, NJ TRANSIT, Local Partners, Private Developers	FTA, FHWA	Transportation, Land Use & Urban Design, Asset-Based Infrastructure Development
Integrate Bus Transit Improvements into County Master Plan	Monmouth County	Local Partners	N/A	Transportation, Land Use & Urban Design

IX. Regional Connections, Implementation, and Next Steps

This study was funded by Together North Jersey's Local Government Capacity Grant (LGCG) program, which was established to provide financial and technical assistance to County and municipal members to conduct planning activities in northern New Jersey. The program is intended to foster planning activities that are consistent with the goals of Together North Jersey's Regional Plan for Sustainable Development (RPSD) project. The funding source for the LGCG program is a combination of funds from the United States Department of Housing and Urban Development (US HUD) and from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) passed through the North Jersey Transportation Planning Authority (NJTPA). One of the conditions of the grant is that the following four elements be considered in the study:

1. Categorization of the types of recommendations made by the study.
2. Description of factors which affect implementation of the recommendations.
3. Inclusion and engagement of traditionally under-represented communities.
4. Consideration for how study recommendations fit into RPSD and regional context.

1. Types of Recommendations

This study proposes actions which can be categorized as follows:

- **Policy or Legislative Changes** – Numerous policy changes are suggested in the recommendations section of this report.
- **Additional Planning Studies Needed** – The most significant additional planning effort recommended by this study is to further refine and evaluate the list of potential future bus transit centers with emphasis on developing actionable improvement strategies for the most attractive nodes.
- **Implementation Strategies or Actions** – Implementation strategies and actions are suggested in the recommendations section of this report.

2. Factors Affecting Recommendations

Each of the five key recommendations of the study is shown previously in **Table 11** (page 68) of this report, along with answers to the following questions:

- What organization / entity is responsible?
- What types of funding would be needed and what organization could provide that funding?
- Opportunities for partnership and what partners are best matched for the effort?

3. Traditionally Under-Represented Communities

Inclusion and engagement of traditionally under-represented communities (e.g. low income, minority, elderly, disabled, etc.):

- **Public Outreach Efforts and Methods** – The public opinion survey was made available in both English and Spanish. It was further distributed by paper copy to individuals who may not have access to the online survey form, including the visually impaired. Twenty-five percent of total survey responses were received through this method.

- **Partnership with Organizations that Work with or Represent Traditionally Underrepresented Communities** – The Steering Advisory Committee for this effort included representatives from the Vision Impaired Center and the Community Affairs and Resource Center, both of which typically work with or represent traditionally underrepresented communities. These organizations assisted in distributing the public opinion survey.
- **Consideration and Inclusion of Data about Traditionally Underrepresented Communities** – Fair Housing Equity Assessment data provided by Rutgers VTC was used in the existing conditions analysis. Zero-car households were mapped during existing conditions, and used in the scoring of potential future transit centers.

4. RPSD and Regional Context

This section examines how the study and its recommendations support regional planning.

- **In which Place type(s) is the Recommendation Applicable?** – Recommendations in this study apply to urban, suburban, and rural settings since bus transit serves the entirety of Monmouth County.
- **Are There Any “Lessons Learned” from the Study Findings or Process that Can Feed into the RPSD effort and/or Be Incorporated into Future Programs, Policies, and Planning Efforts?** – This effort was successful in large part due to the Steering Advisory Committee. By welcoming a large group inclusive of all potential stakeholders, and by expanding the group throughout the study, the SAC was able to provide input and guidance through the study effort. This type of collaborative approach should be replicated whenever practical.
- **Transferability – Can this Effort be Duplicated across the Region?** – The framework established by this effort could easily be extended to other study areas at a County or local municipality level.
- **Under Which of the Following RPSD Topic(s) Does Each Recommendation Fall?** – **Table 11** (page 68) of this report shows that the five recommendations address RPSD topics under all three of the major headings: Livability and the Environment, Economic Competitiveness and Workforce Development, and Society and Community. However, given that this study focuses on bus transit services, Transportation is the most heavily emphasized RPSD topic throughout the report.

X. Appendix A – Public Opinion Survey Results Summary

A key part of the public outreach strategy for the study was the development and deployment of a public opinion survey aimed at gauging the community's priorities for bus transit improvements and investments. The survey was developed by the consultant team in conjunction with Monmouth County and the North Jersey Transportation Planning Authority, and was deployed on the Monmouth County Planning website (<http://co.monmouth.nj.us/page.aspx?ID=4373>).

In order to solicit the maximum number of responses, the survey was made available in both English and Spanish. Some questions were aimed at collected user-level experiential data while others were designed to provide quantitative results related to desired improvements. Several questions were open ended allowing participants to provide maximum input.

The survey was posted in July 2014 and closed in August 2014. Responses are integrated into the SWOT analysis and incorporated into the final report. The online survey collected 47 complete and valid responses, while the paper survey collected an additional 13 responses.



Monmouth County Bus Service Survey

Monmouth County and Together North Jersey are working to find ways to make public transportation in Monmouth County better. While we have done some research and analysis, we really need your input about how you travel around Monmouth County and how you think your travel could be improved. Please take a moment to share your thoughts and help us improve public transportation.

1 Do you own or have access to a car?

- Yes, I own a car
- No, but I have access to a car
- No, and I do not have reliable access to a car

**2 Which NJ TRANSIT bus line(s) do you currently use in Monmouth County?
(please check all that apply)**

- I don't ride the bus
- Local Monmouth County Service
 - 830
 - 831
 - 832
 - 833
 - 834
 - 835
 - 836
 - 837
- Newark / New York Service
 - 63
 - 64
 - 67
 - 130
 - 131
 - 132
 - 133
 - 135
 - 136
 - 137
 - 139
- Others
 - 317
 - 319
 - 817
 - I ride bus transit provided by Academy

3 What do you like about riding the bus (as a user or possible user)?

- Convenience
- Affordability
- Eco-Friendly
- Only way to get there
- Prefer not to drive
- Allows me to do other things
- Other

4 What problems have you had while riding or using the bus system in Monmouth County?

5 Where have you experienced those problems?

6 Where do you wish you could get to more easily, on the bus?

7 Which TWO bus system improvements would MOST encourage you to ride the bus more often?

- Easier boarding
- Better route & schedule information
- Faster travel times
- More frequent service
- Service to more destinations
- Improve feeling of safety
- Connections to preferred destinations
- Better walking conditions around stations
- Other

8 Which TWO passenger features would MOST encourage you to ride the bus more often?

- Easier to understand schedules and maps
- Accurate information of when the next bus is coming
- Ability to buy a ticket before boarding
- Clearer signs showing where to board
- Nicer stations (lighting, benches, etc.)
- Ability to board at front and back of bus
- More parking next to bus stops/stations
- Nicer and/or more comfortable buses
- Other

9 What else would you change about bus service in Monmouth County?

Monmouth County Bus Rapid Transit
Opportunities Study



10 Email (Optional) - so we can inform you about future development in this study

Thank you for helping to improve bus service in Monmouth County. Your input is critical to the planning process!

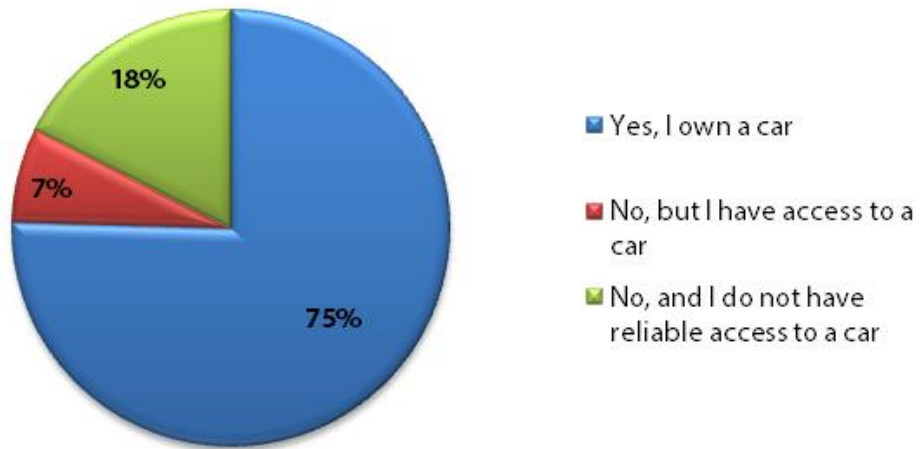
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c/o InGroup Inc.
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Midland Park, NJ 07432

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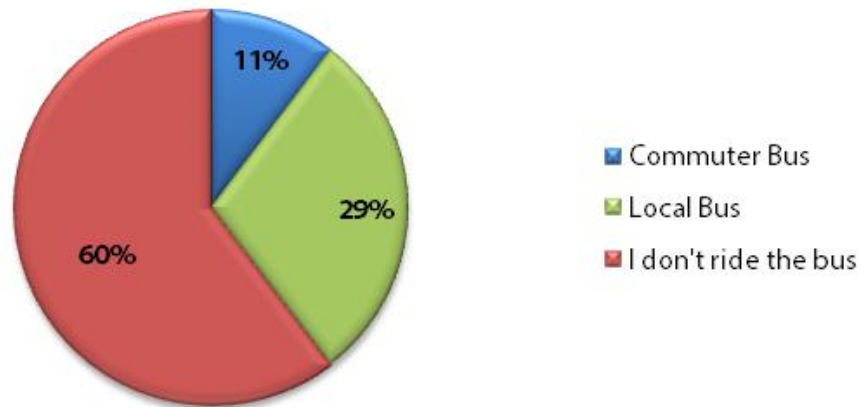


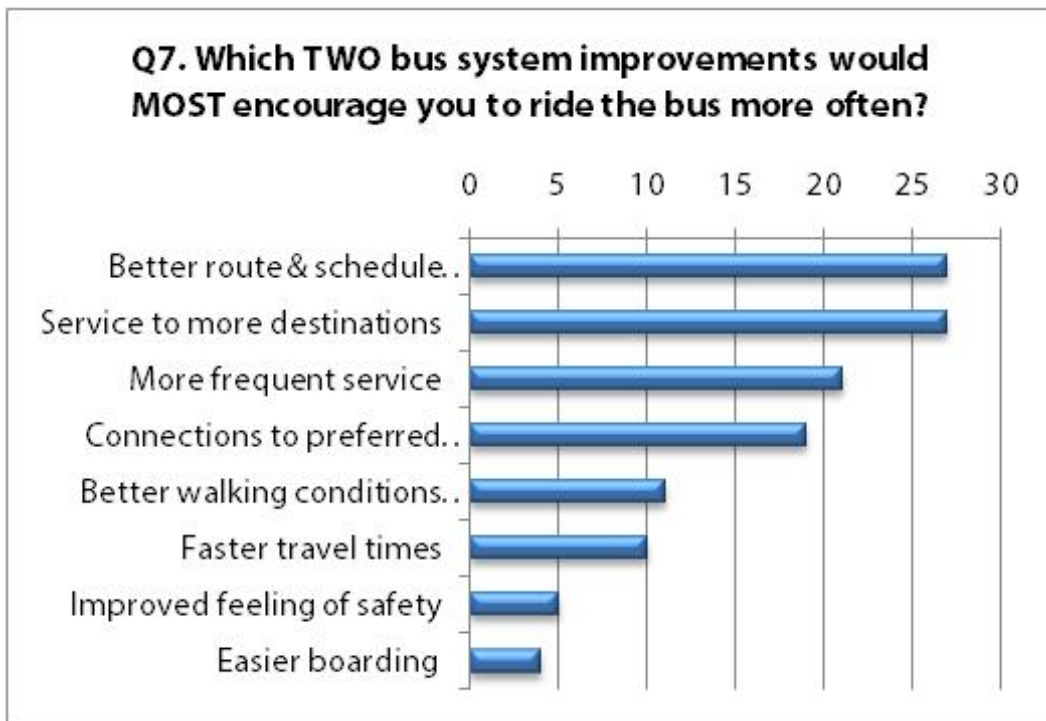
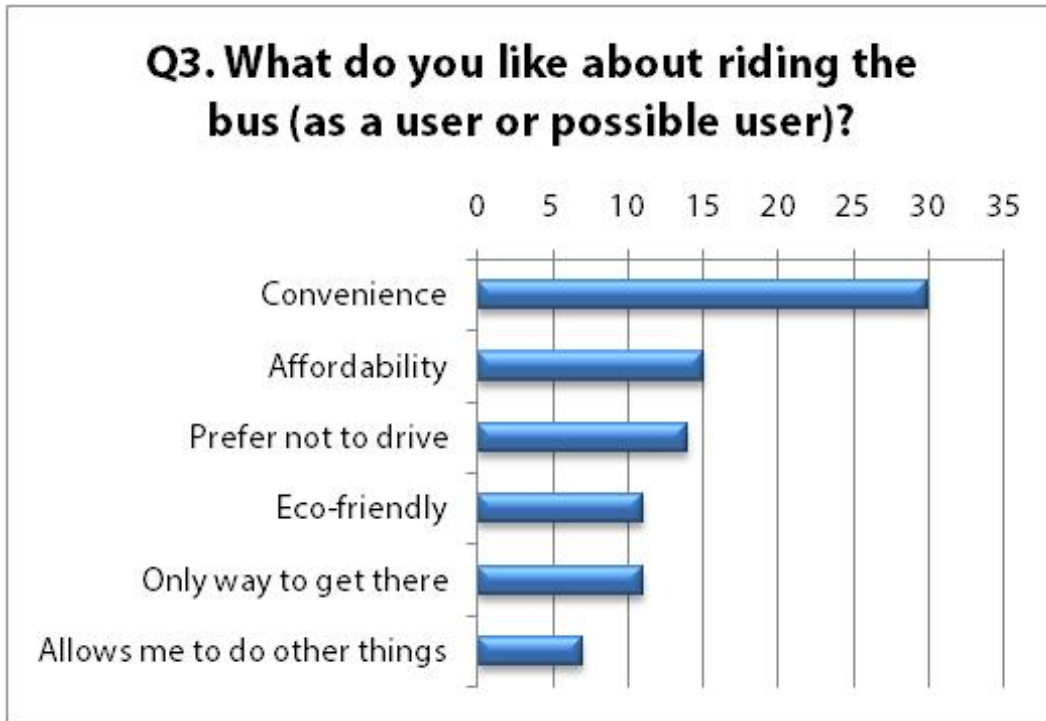
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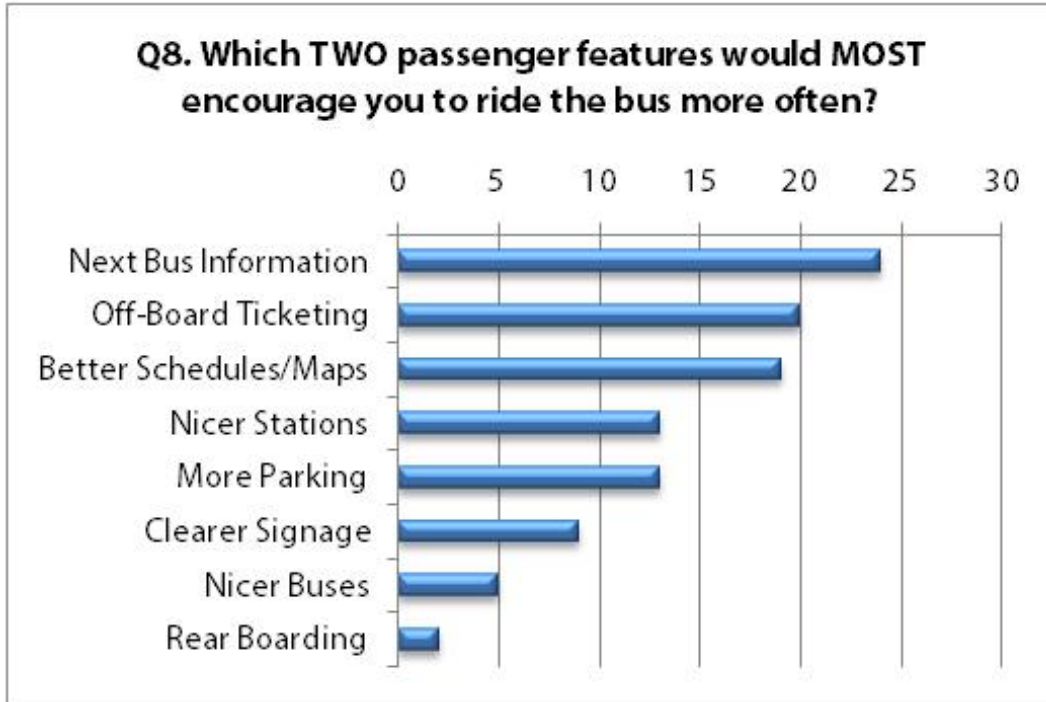
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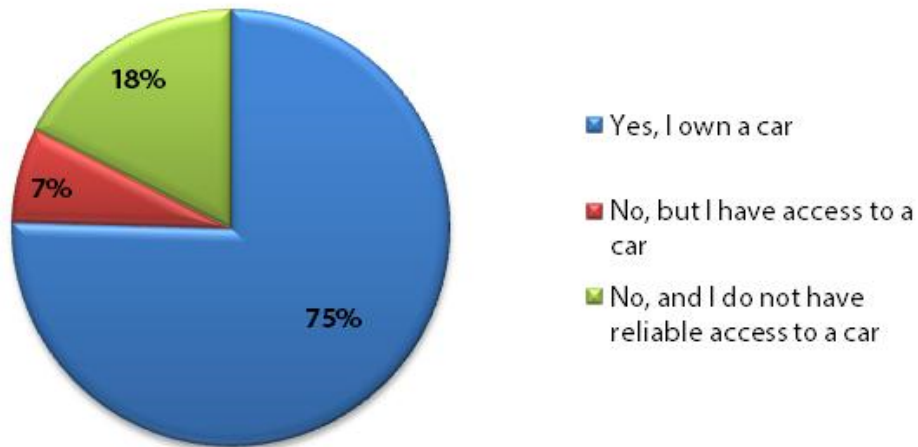
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