

Rhode Island Transit Master Plan

DRAFT

MARKET ANALYSIS 2018

TRANSIT 
FORWARD 2040

TRANSIT RI
FORWARD 2040



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Introduction



What is the Rhode Island Transit Master Plan?

The purpose of the Rhode Island Transit Master Plan (RI TMP) is to increase transit's role in Rhode Island's transportation system by making service more attractive and to expand its reach to new areas, both within and outside of the state. The TMP will approach these goals through four comprehensive elements:

- Develop a transit vision for Rhode Island over the next two decades
- Identify the specific improvements that should be implemented to achieve the vision
- Identify potential new sources of funding for the improvements
- Identify governance changes that could facilitate implementation and improve service delivery

About the Market Analysis

The foundation of understanding how to best serve an area with transit is to understand the underlying market and demand for different kinds and levels of service.

This market analysis examines:

1. The underlying demand for transit services throughout the state of Rhode Island and across its borders
2. Where people are traveling from and where they are going
3. How these demand patterns and travel flows shift through the year 2040





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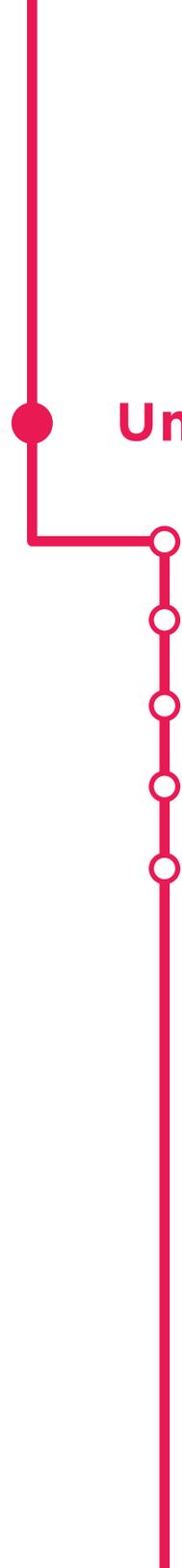
3 Warwick Ave
92 WEST RIC/Federal Hill

R2 FEDERAL HILL

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Rhode Island
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Ocean State



Underlying Local Transit Demand

- Overview of Transit Demand
- Population-Based Demand
- Employment-Based Demand
- Major Activity Centers
- Combined Population and Employment-Based Demand

Overview of Local Transit Demand

Underlying transit demand is strongly related to six factors:



Population and Population Density: Since transit relies on having more people in close proximity to service, higher population density makes it feasible to provide higher levels of service.



Socioeconomic Characteristics: Different people have a different likelihood to use transit, with differences related to socioeconomic characteristics. For example, households with many cars are much less likely to use transit than those with one or none.



Employment and Employment Density: The location and density of jobs is also a strong indicator of transit demand, as traveling to and from work often accounts for the most frequent type of transit trip.



Development Patterns: In all cities, there is a strong correlation between development patterns and transit ridership. In areas with denser development, mixed-use development, and a good pedestrian environment, transit can become very convenient, making it attractive and well used.

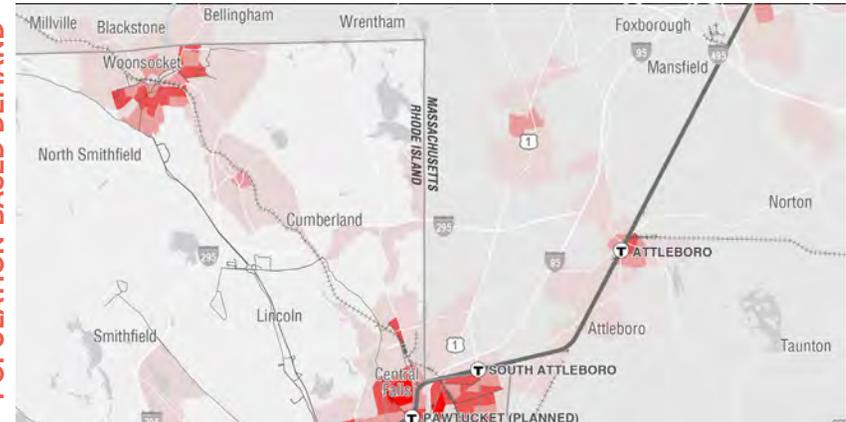


Major Activity Centers: Large employers, universities, tourism destinations, and other high-activity areas attract large volumes of people and can generate a large number of transit trips.

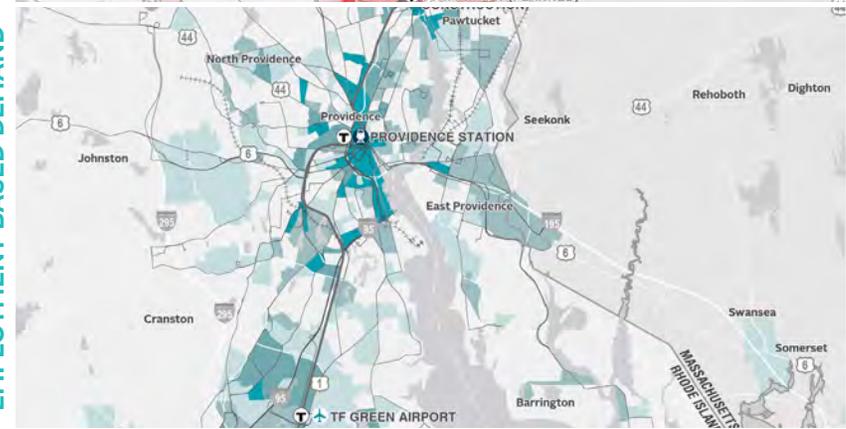


Travel Flows: People use transit to get from one place to another. Major transit lines such as commuter rail and high frequency bus corridors are designed to serve corridors with high volume travel flows.

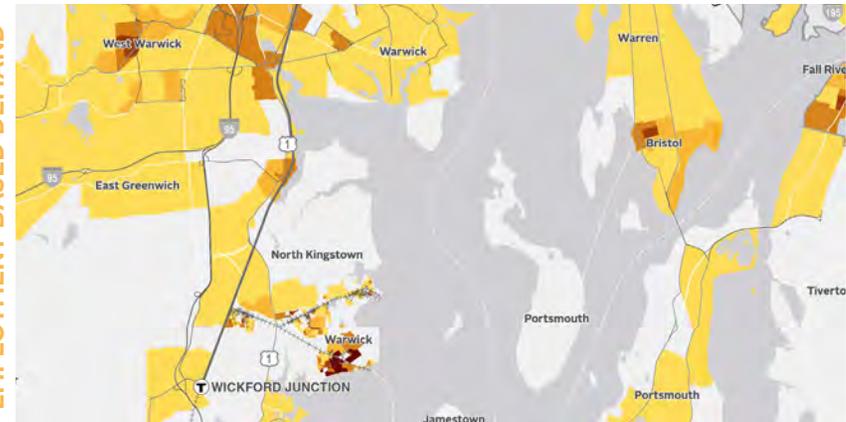
POPULATION-BASED DEMAND



EMPLOYMENT-BASED DEMAND



COMBINED POPULATION- AND EMPLOYMENT-BASED DEMAND



More than any other factor, **population and employment density** will determine the underlying demand for transit. This is because:

- The reach of transit is generally limited to within one-quarter mile of the bus stop or station. As a result, the size of the travel market is directly related to the density of development in that area.
- Transit service frequencies, in turn, are closely related to market size. Bigger markets support more frequent service, while smaller markets can support only less frequent service.
- To attract travelers who have other options, such as private automobiles, transit service must be relatively frequent and get riders to their destination in a time and at a cost competitive with a private vehicle.

Population and job densities also provide an indication of the underlying population-based demand for transit in terms of the type and frequency of service that would be most appropriate. For example, to support 30-minute service, there generally must be at least 15 households per acre or more than 15 jobs per acre, or a combination thereof. However, these densities broadly indicate demand across contiguous and nearby areas. Clusters of density throughout an area or along a corridor are strong indicators of demand, while a dense but small block group in an isolated area would not produce sufficient demand in and by itself. Demand can also accumulate along corridors to produce demand for more frequent service than the densities alone would indicate. For example, long corridors where most block groups have the density to support 15- to 30-minute service will often produce accumulated demand for 15-minute or better service.

Areas that do not have at least 10 residents or 5 jobs per acre or a combination thereof, generally more sprawling communities made up of single family neighborhoods, do not provide an environment where fixed-route transit

can succeed easily. New technologies are allowing for the use of microtransit in these areas, which tend to be demand-response services that can transport residents to fixed-routes or destinations in other low-density areas. Providing appropriate levels of service that match demand in different environments is more efficient and results in better service for residents. Instead of providing fixed route service every few hours in low-density areas, using demand-response services in these areas provides more freedom for residents there, and can free up larger vehicles to run service where densities are higher.

LAND USE			TRANSIT	
Land Use Type	Residents per Acre	Jobs per Acre	Appropriate Types of Transit	Frequency of Service
 Downtowns & High Density Corridors	>45	>25	   	 10 mins or better
 Urban Mixed-Use	30-45	15-25	  	 10-15 minutes
 Neighborhood & Suburban Mixed-Use	15-30	10-15		 15-30 minutes
 Mixed Neighborhoods	10-15	5-10	 	 30-60 minutes
 Low Density	2-10	2-5	  	 60 mins or less or On Demand
 Rural	<2	<2	 	 On Demand

Population-Based Demand



Population Density

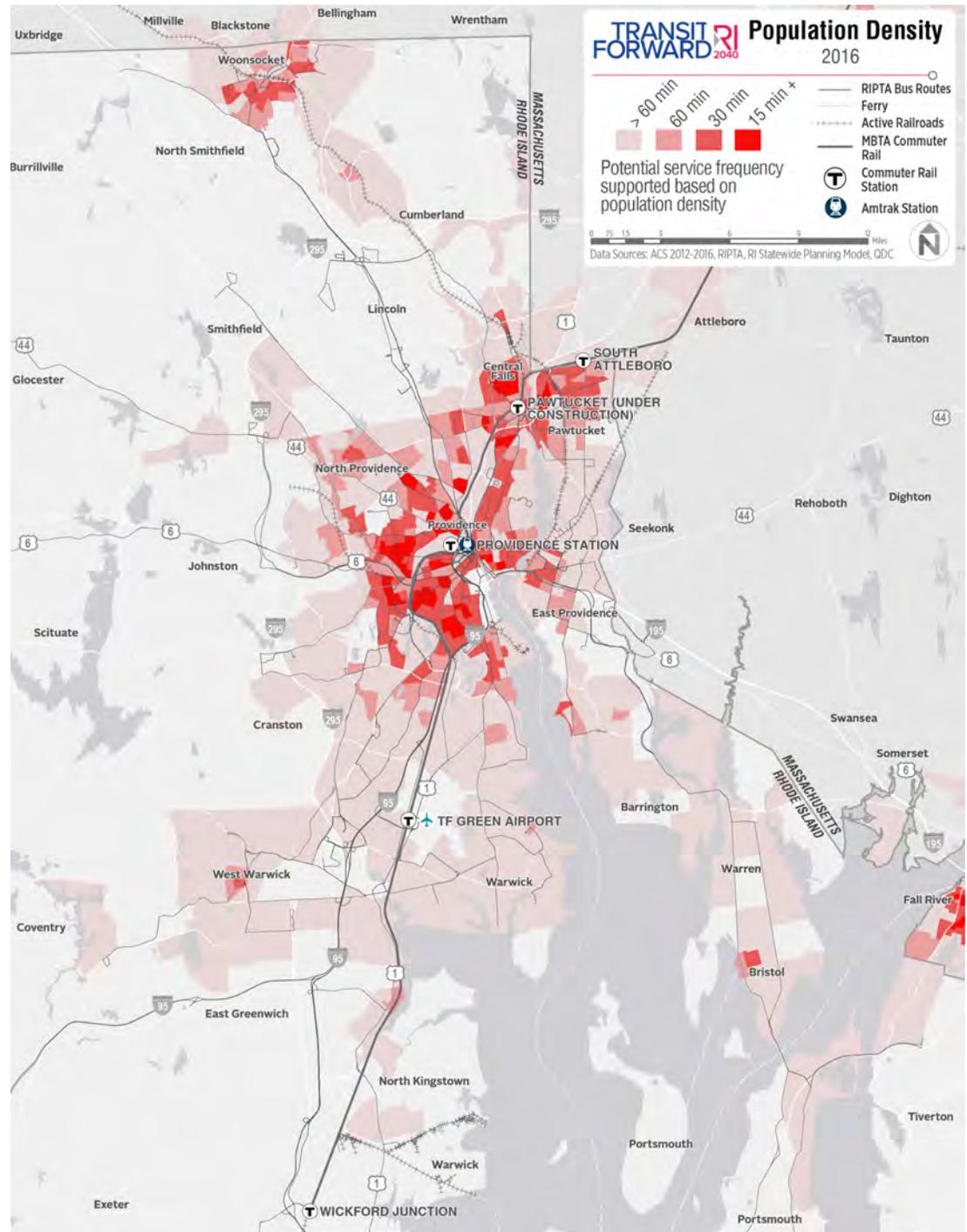
Population density is one of the most important factors in determining underlying demand for transit. Not only does density indicate where there are many people in close proximity, but also generally indicates land use types more suited for transit. Denser areas tend to be more walkable and less auto-oriented, with more limited access to parking and less reason and incentive to own a private automobile.

Rhode Island, as of 2016, was home to 1.05 million residents, with concentrations of the population varying greatly across the state. Different levels of density can translate into the level of transit service a given area could support. Areas shown in red can support some level of fixed-route transit.

Areas with the highest population concentrations are within the urban areas of:

- Providence
- Pawtucket
- Central Falls
- East Cranston
- Woonsocket
- Newport
- Fall River and South Attleboro, across the border in Massachusetts

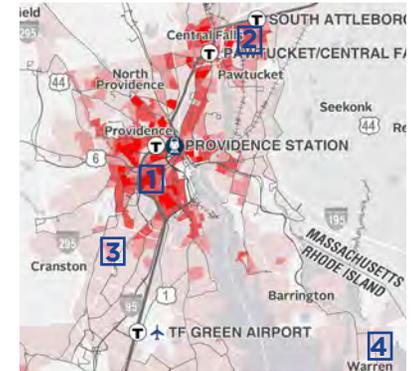
Currently, Providence and the bordering municipalities noted above have the most extensive transit service.



Visualizing Population Density

Visualizing density can be a helpful way to understand what different land uses look as they relate to potential transit demand. More people in an area often means taller buildings packed more closely together, like the multi-family apartment buildings in the West End as opposed to detached single family units in Pawtucket, Cranston, and Bristol.

Transit Frequency	Population Density
 <= 15 mins	> 30 residents/acre
 16 - 30 mins	15 - 30 residents/acre
 31 - 60 mins	10 - 15 residents/acre
 Microtransit	< 10 residents/acre



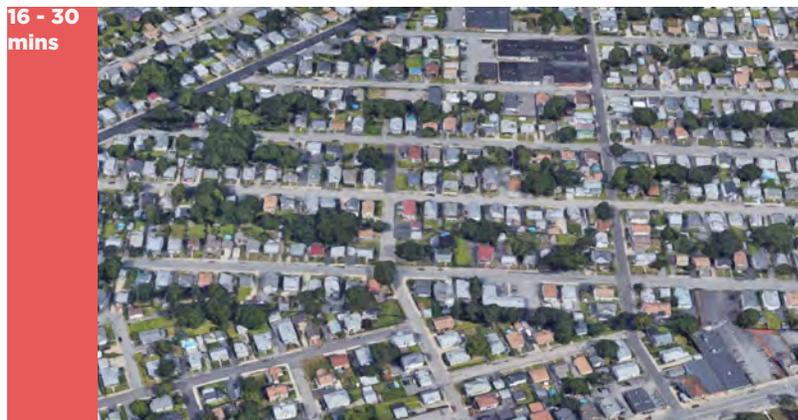
1 The West End, Providence - 33 Residents per Acre



3 Cranston - 12 Residents per Acre



2 Darlington/Pawtucket - 21 Residents per Acre



4 Bristol - 5 Residents per Acre



Socioeconomic Characteristics

In addition to population density, socioeconomic characteristics influence people's propensity to use transit. National research shows that many population groups have a higher propensity for transit use than the overall population. Socioeconomic characteristics that are related to transit propensity include:

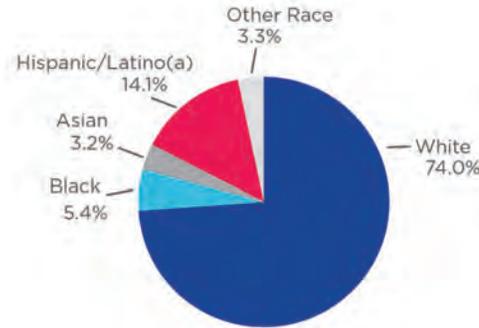
Race and Ethnicity: Minority residents generally have higher rates of transit use, and the provision of effective transit service to minority populations is also particularly important to the Federal Transit Administration and is a requirement under Title VI of the Civil Rights Act of 1964. Approximately 26% of Rhode Island's population is made up of minority residents--14% Hispanic or Latino(a), 5% Black, 3% Asian and 3% of another race or races.

Vehicle Ownership and Access: Households with limited or no access to a personal vehicle, either by choice or by necessity, are more likely to rely on transit. Some living in areas of the urban core in Rhode Island may choose to live car-free because they can access jobs and other amenities via transit or by walking. Other residents may use transit for other reasons, such as cost or inability to drive. Other households have fewer cars than workers, and one-vehicle households also have higher rates of transit use. In the state, 10% of households do not own a vehicle, 37% own one vehicle, and 53% own two or more vehicles.

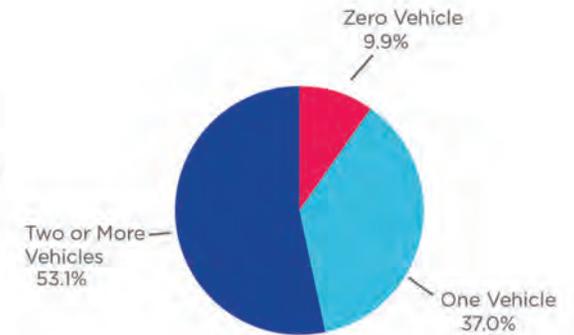
Immigrant Communities: For a wide array of reasons, those who are foreign-born are more likely to use public transit than the general population. In many other countries, transit use is more common among the general public. As a result, many foreign-born residents are more inclined to use transit when they arrive in the United States. Immigrant communities are also more likely to use transit because of the cost burden associated with arriving in a new country and obtaining a vehicle or a driver's license, or of navigating different traffic laws.

Income: Residents with lower incomes tend to use transit to a greater extent because it is less expensive than owning and operating a personal vehicle, and many rely on transit as their primary mode of transportation. Members of households earning less than \$35,000 a year use transit to a greater extent than the general population. Rhode Island households are made up of 23% with incomes less than \$25,000, 9% \$25,000 - \$35,000, and 68% over \$35,000.

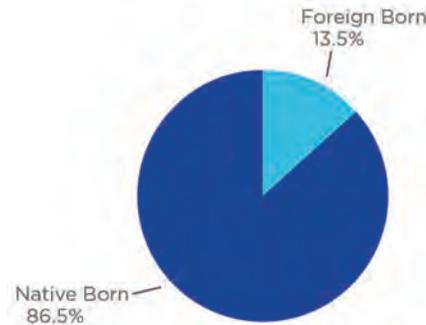
Race/Ethnicity



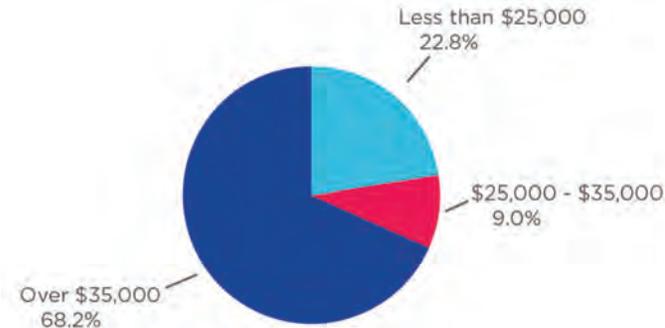
Household Vehicle Ownership



Country of Origin



Household Income



Demographics and Transit Propensity

When significant numbers of individuals and households from these high-transit propensity groups cluster together, they can influence the underlying demand for transit to an extent that is not captured when only considering total population. In a given location, groups of people from transit-supportive demographic groups may be too small individually to indicate significant demand for transit service, but their clustering may result in potentially high levels of transit use. Similarly, in a location where transit-supportive demographic groups have low representation, the level of potential transit demand may actually be lower than total population density alone would indicate.

To take this into account, a measure called the transit propensity adjustment factor was developed to measure relative demand for transit in different areas as compared to the region. This factor takes into account demographic characteristics for the population aged 16 and over who are employed. These factors measure the likelihood of certain demographic groups to use transit to commute to work relative to the study area's general population. Demographic groups with a transit propensity adjustment factor greater than 1 is more likely than the general population to use transit.

Differences in transit propensity are based on vehicle ownership, race and ethnicity, annual income, and immigration status.

Members of households with no vehicle households are, intuitively, the demographic group with the highest likelihood to take transit. Most people don't live within walking distance of their job, so transit becomes the option available to them. Members of one vehicle households are also more likely to take transit, but to a lesser extent. This is because many households comprise of more than one worker or working aged adult, meaning that often one member will not have as primary access

to the vehicle. Those who are black, Hispanic or Latino, or of another race show a strong propensity to use transit, as do those making less than \$25,000 a year and those born in other countries.

DEMOGRAPHIC GROUP	RELATIVE TRANSIT PROPENSITY
RACE AND ETHNICITY	
White Alone (Not Hispanic or Latino)	0.63
Black or African-American (Not Hispanic or Latino)	2.00
Asian (Not Hispanic or Latino)	1.24
Other Race (Not Hispanic or Latino)	2.01
Hispanic or Latino	1.75
HOUSEHOLD VEHICLE OWNERSHIP	
No Car	6.18
One Car	1.27
Two or More Cars	0.55
COUNTRY OF ORIGIN	
Native	0.86
Foreign	1.49
HOUSEHOLD INCOME	
Less than \$25,000	1.42
\$25,000 - \$35,000	0.97
More than \$35,000	0.69

Source: Calculations developed using 2012-2016 American Community Survey 5-Year Estimates

While persons with disabilities, young adults, and older adults are also documented to use transit at higher rates, transit propensity for these demographics is not captured accurately by using journey-to-work data as these groups are employed at lower rates than the total population.

These figures indicate the relative propensity of different groups to use transit. For example, transit propensity factor of 1.77 indicates that the group is 1.77 times more likely to use transit than the general population. This is based on the transit mode share of 21.5% for the Census Designated Places that makeup the service area, and the available demographic split on journey-to-work data.

Transit Propensity Adjustment Factor

When the proportion of the different socioeconomic characteristics described above are considered, residents of the urban core have a higher propensity to use transit (shades of green), and most residents of outer areas have a lower propensity to use transit (shades of red), as compared to the state average. Areas where the makeup of residents is more transit dependent tend to be adjacent to one another because of the geographic clustering of low-income, immigrant, and minority communities, as well as these communities tendency to live in denser areas.

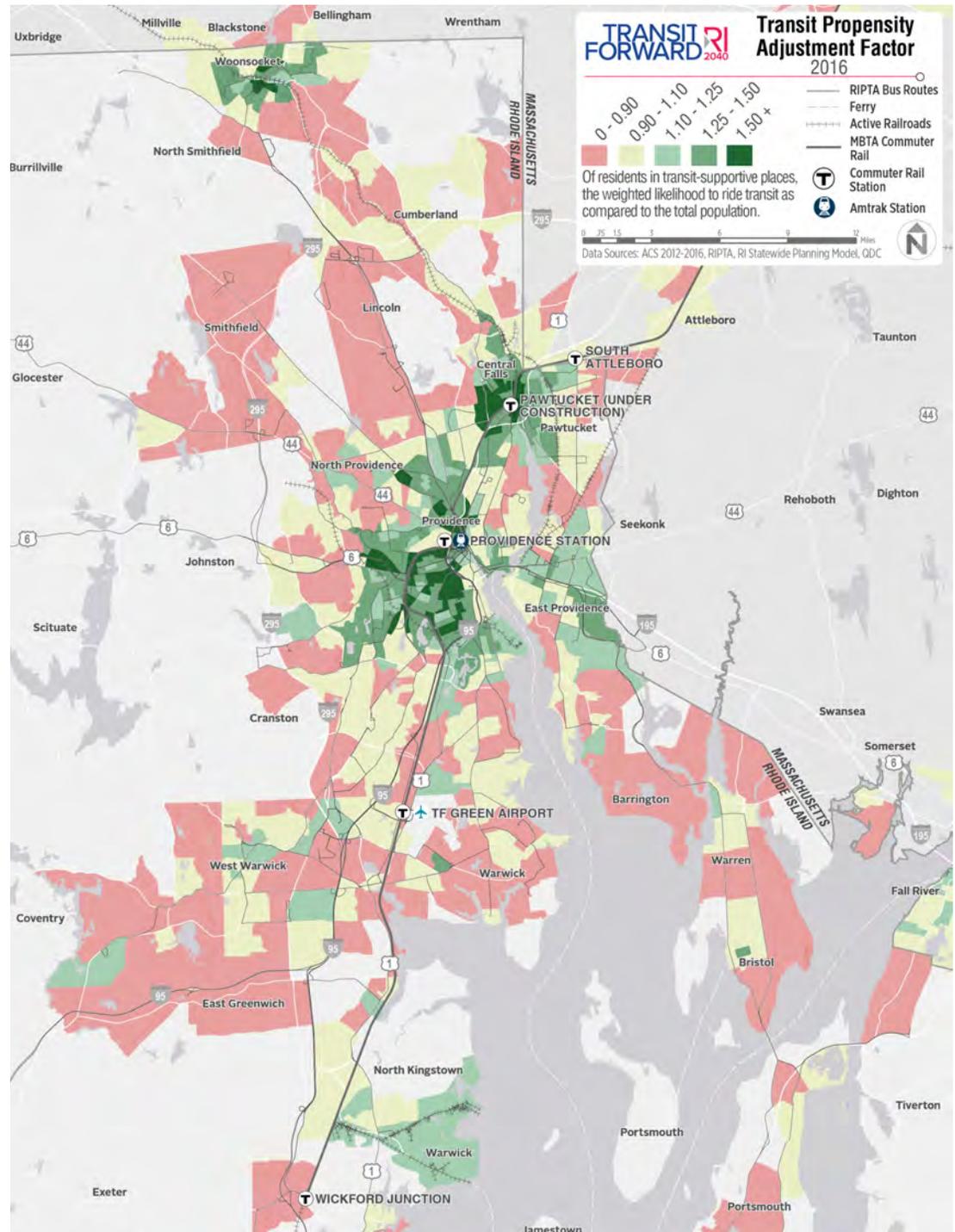
The areas where residents have the highest propensity to use transit include:

- Providence
- Central Falls
- Pawtucket
- East Cranston
- East Providence
- Woonsocket
- Fall River, Massachusetts
- Parts of Newport

Some suburban areas in Rhode Island are still dense enough to support transit, but the demographic characteristics of their residents indicate that they're less likely to use transit than those in the urban core. These areas include:

- East Greenwich
- Smithfield
- Barrington
- Lincoln
- Portsmouth

Note that only areas that can support some level of transit service are evaluated and displayed on the map to the right.

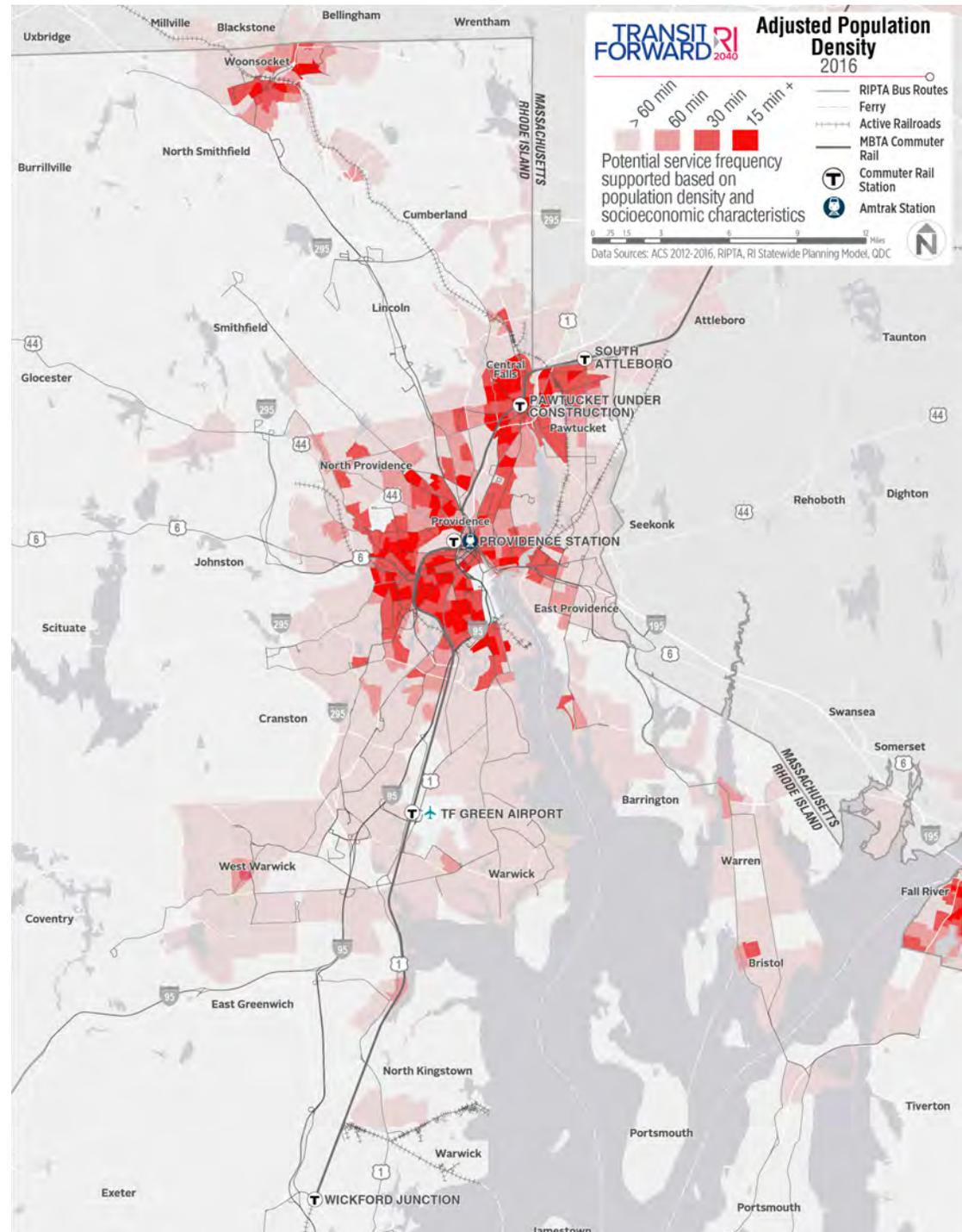


Adjusted Population-Based Demand

When demographic factors are considered in the context of population densities, the effective underlying demand is higher in some areas and lower in others. In general, when socioeconomic characteristics are considered with density, it tends to intensify the demand in urban areas and diminish the demand in more outlying, sprawling areas. Areas that have a very high underlying demand for transit by this measure are:

- Providence
- North Providence
- Pawtucket
- Central Falls
- Woonsocket
- Newport
- Fall River, Massachusetts

These are generally the same areas where absolute population densities are highest. Just as important as recognizing the Providence metro area and the few communities outside of it that show strong demand for transit, is to recognize that a vast majority of the state does not comprise of an environment in which traditional, fixed-route transit will run successfully. Demand falls off steeply outside of the urban core.



Employment-Based Demand

Employment Density

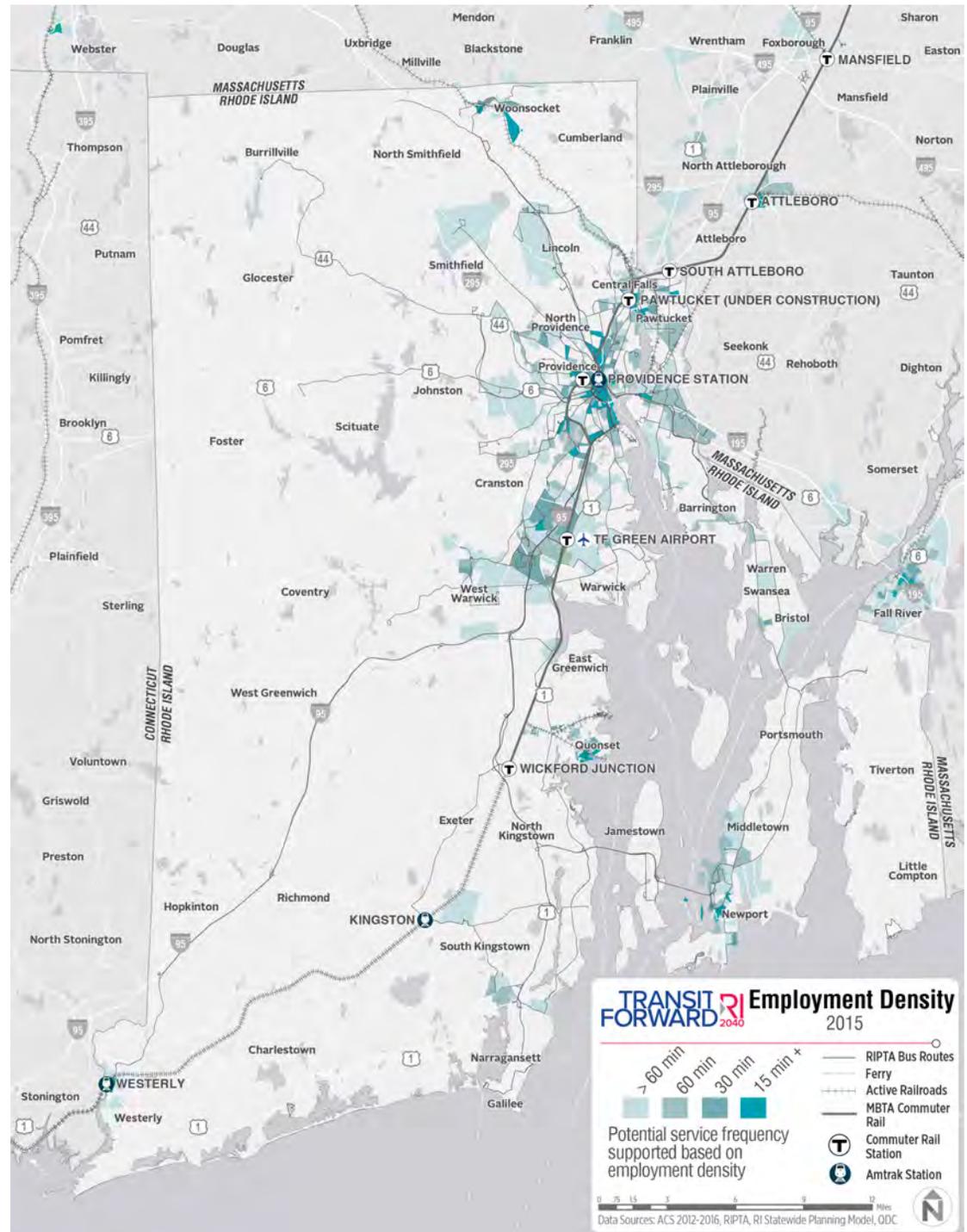
Commuters are the most frequent and regular reason riders take transit. As a result, employment density is another major source of transit demand. Job density is also an important indicator of demand because it is one of the easiest ways to represent other types of potential travel activity as well; where restaurant and retail employees need to travel are also where costumers are traveling, as with hospital employees and patients. As densities increase, the demand for transit grows, particularly for more frequent service.

The location of jobs, like population, clusters in certain areas. Those areas where job-based demand is highest include:

- Providence, especially downtown
- East Cranston
- Warwick, including near TF Green Airport
- Central Falls
- Pawtucket
- Woonsocket
- Newport
- Inland areas of Quonset Business Park
- Fall River, Massachusetts

Areas with lower levels of demand include:

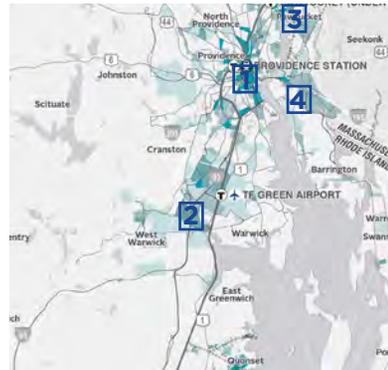
- Smithfield
- Lincoln
- West Warwick
- Kingston
- Westerly



Visualizing Employment Density

Just as with residents, density is the most important component when serving jobs with the appropriate level of fixed-route transit service. Jobs tend to be more concentrated than residents and sometimes one employer, like Kent Hospital in Example 2, can produce enough density in a small area to warrant more frequent levels of service. Areas with many office buildings, stores, restaurants, and other diverse forms of employment spaced closely together however are the best creators of demand for frequent transit service. While areas like Quonset Business Park in Example 4 house many jobs, and the travel needs of 11,000 employees should be considered, this should be compared to the 89,000 jobs in downtown Providence over roughly the same five square mile area. Downtown Providence is a much denser and more transit conducive environment.

Transit Frequency	Employment Density
≤ 15 mins	> 15 jobs/acre
16 - 30 mins	10 - 15 jobs/acre
31 - 60 mins	5 - 10 jobs/acre
Microtransit	< 5 jobs/acre



≤15 mins ≤mins		<p>1 Downtown Providence</p> <p>86 jobs/acre</p>
16 - 30 mins		<p>2 Kent Hospital Warwick</p> <p>10 jobs/acre</p>
31 - 60 mins		<p>3 East Pawtucket</p> <p>Post office and Elementary School</p> <p>6 jobs/acre</p>
Micro-transit and on demand		<p>4 Armington Corner East Providence</p> <p>3 jobs/acre</p>

Density is the most important component when serving jobs with the appropriate level of fixed route transit service.

Beyond Fixed Route Service

While density, more than raw numbers, matters most to traditional fixed route or frequent service, office parks and warehouses, which employ many people in one area, are often a priority for a region to serve with transit. Often employees of these areas are lower income or work second and third shift times and may have fewer resources to put toward transportation. Large employers often take an interest in how their employees get to work and are more likely to have the resources to invest in their employees' commutes. Areas such as Quonset, where there are currently 11,000 jobs and is projected to have 12,000 in the year 2040 is an example of a major employment zone that barely shows demand for fixed route service based on density. However, there are often a few key buildings in these areas employees need to get to that make them better candidates for other types of service.

Transportation Management Associations (TMA)

Lower density employment areas like Quonset are prime targets for Transportation Management Associations (TMAs), public-private partnerships between transit agencies and local employers who run shuttles or van services that coordinate with public transit services. Schedules and drop off points can be coordinated to get employees to the main sites throughout the park they need to get to from a strategic location, which could take up to several times the same amount of time to loop around with fixed route service. Coordinated partnerships can help get employees to their destinations faster, and help a transit agency run more productively.

Microtransit

Microtransit is a term often used to describe private companies or branches of transit agencies that use vans or small transit vehicles, often in conjunction with on demand service applications generally accessed through smartphones. When run by private companies, routes are often determined based on demographic information and crowdsourced data and may only operate during peak periods primarily as a commuter service. Much like TMAs, there is a potential to partner with microtransit companies to offer a suite of services with the recognition that one size doesn't fit all when it comes to transit. Microtransit run by transit agencies can be a demand

Example of a TMA Van in Waltham, MA



Source: 128 Business Council

response service that helps transport individuals to the nearest fixed route. This service may pick up individuals at the location they request, or have fixed "nodes" that serve as pickup or drop-off points. Microtransit is one way to address "first-mile/last-mile" connectivity issues.

Rideshare Services

Private rideshare companies, or Transportation Network Companies (TNCs) like Uber and Lyft compete directly with transit and evidence suggest they play a role in declining transit ridership across the country. However, public-private partnerships with these companies can also help serve as a way for individuals to reach fixed route service on demand and be integrated into a transit system rather than competing by serving trips that are not efficiently served by traditional transit.

Volunteer Driver Program

Volunteer Driver Programs are often used by humanitarian organizations to serve trips for older adults, those with disabilities, or other underserved markets in generally less dense areas. Volunteers are often reimbursed to drive transit dependent persons to medical appointments, grocery stores, or other necessary places that are usually not served by fixed-route transit services. These programs often serve life-line trips that otherwise would be served by paratransit or family members.

Major Activity Centers



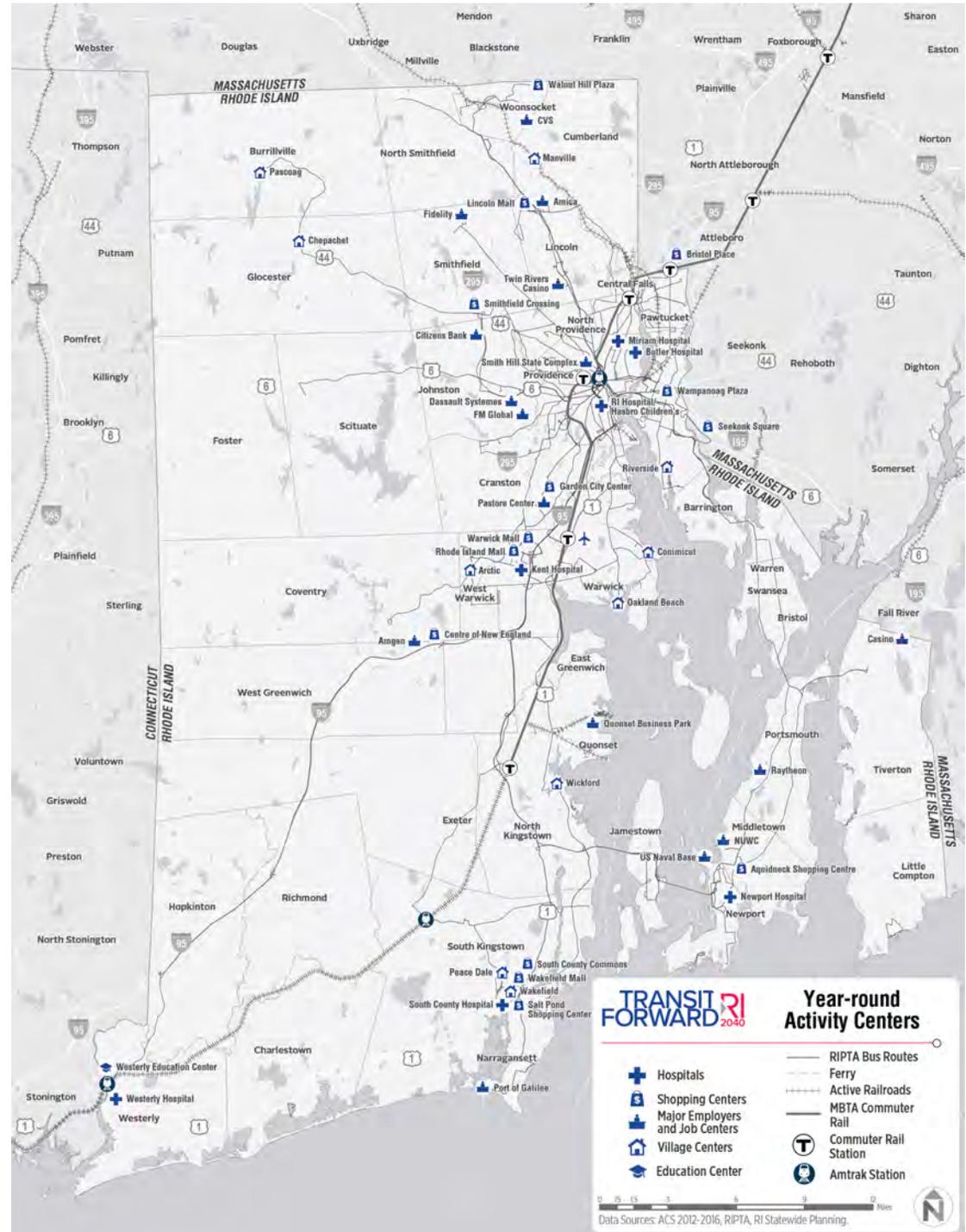
Some activity centers generate additional demand for transit. Most of these places – large employers, shopping malls and retail centers, hospitals, and town centers – generate relatively consistent demand for transit throughout the year. Other activity centers like state beaches and colleges and universities are significant transit demand generators only during certain seasons of the year.

Many major employment centers are defense-oriented businesses or military bases along the Rhode Island coast. Others are located in automobile-oriented suburban campuses in the Providence metro area:

Year-round Transit Demand Generators

Regionally-significant employers and shopping centers like Kent Hospital, Westerly Hospital, the US Naval Base in Newport, and shopping centers in Wakefield, Newport, Warwick, and Lincoln are important destinations to serve with transit year-round. Warwick in particular is home to a number of major activity centers (Warwick Mall, Rhode Island Mall, CCRI Warwick, and Kent Hospital) but is difficult to serve due to the large surface parking lots surrounding each destination.

Corporate campuses like Amica, Fidelity, Dassault Systemes, and Raytheon have large numbers of employees, but are generally segregated from street networks on their own automobile-oriented campuses. The village centers of Arctic, Riverside, Conimicut, Oakland Beach, Manville, Wickford, Chepachet, Wakefield, Peace Dale, and Pascoag are walkable mixed-use centers that today are mostly served by at least hourly service to Providence.



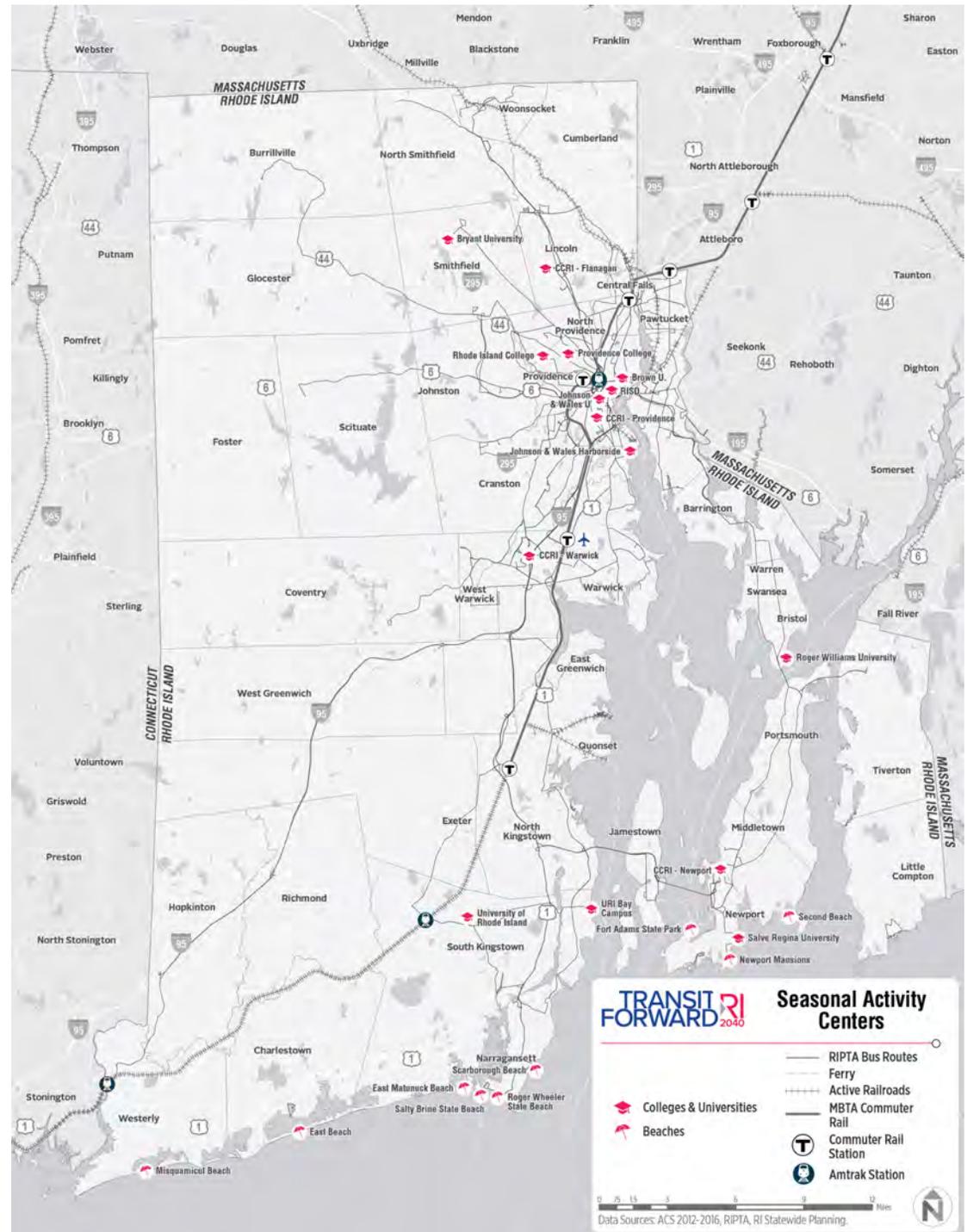
Seasonal Transit Demand Generators

Colleges and universities in Rhode Island generate additional demand for transit especially during the school year. A large number of schools are concentrated in the Providence metro area, including Brown, RISD, Providence College, Rhode Island College, Johnson & Wales, and CCRI - Providence. The main University of Rhode Island campus in Kingston, Salve Regina University and CCRI in Newport, Roger Williams University in Bristol, and the CCRI campuses in Warwick and Lincoln are other major activity centers.

State beaches like Misquamicut Beach, East Beach, East Matunuck Beach, Scarborough Beach, and Second Beach are in major demand during the summertime. Fort Adams State Park is the site of the Newport Folk Festival, an annual music festival in July that draws thousands.

There are a large number of places in Rhode Island that attract very high levels of travel. These destinations generally attract trips from their respective surrounding towns. However, since most of the bus routes in Rhode Island operate radially to and from Providence, the quality of transit service to these activity centers depends upon the direction in which people are travelling. Those who are traveling in directions that are on a line to downtown Providence are generally well served, while those who are travelling in other directions are generally less well served.

Ferry Service to Newport and Block Island are an important factor in tourism and seasonal markets in both these areas. Survey respondents indicated that without ferry service, many of them would have not visited Newport to begin with.



Mixed-Use Areas

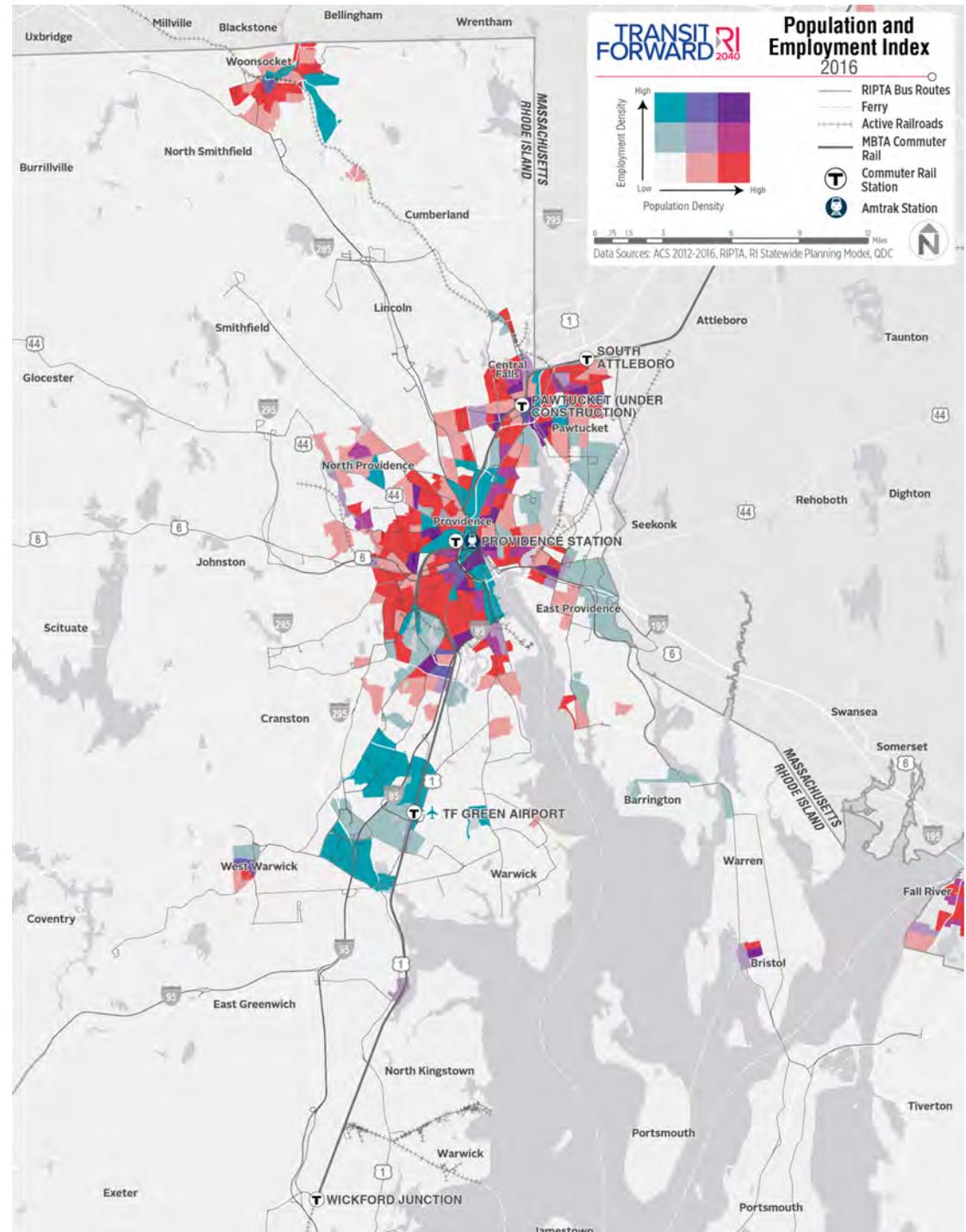


Mix of Population and Employment

While density of jobs or residents alone are good indicators of transit demand, a mix of land use in the same areas can produce even more demand than either alone. Areas where individuals are working and living indicate steady activity levels throughout the day and evening, whereas segregated employment and resident density leads to stricter windows of high demand for travel between areas. Places with high mixed-use density (shown in purple) include:

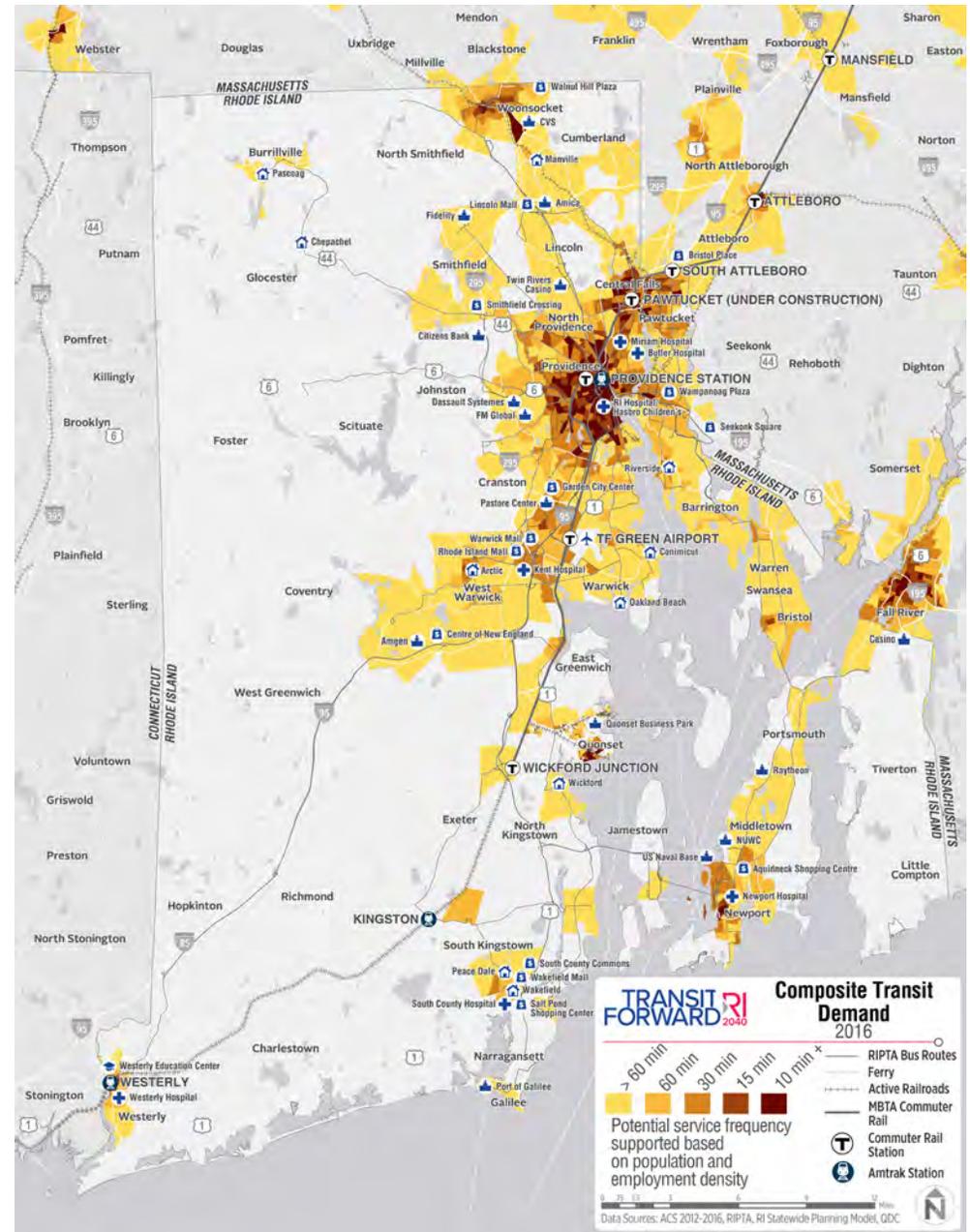
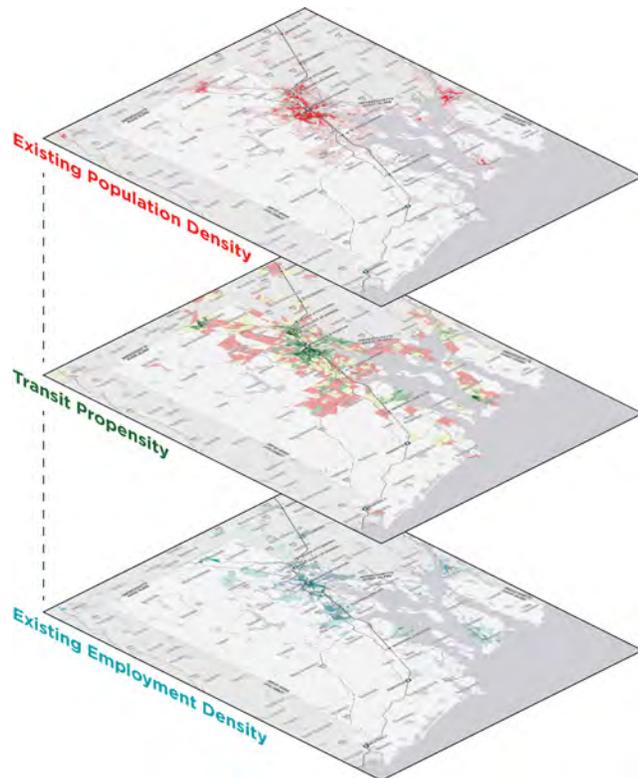
- Downtown Providence
- The area around Rhode Island Hospital
- Parts of Pawtucket
- Parts of Central Falls
- Downtown Fall River

While other parts of the urban core show significant demand from population and employment alone, dense residential or employment areas will produce trips between them that are more likely to follow general commute patterns as opposed to creating steady demand all throughout the day and evening. Making concerted efforts to develop in a mixed-use fashion and changing zoning to favor mixed-use development is an investment that can help support high-quality transit.



Combined Population, Demographic, & Employment-Based Demand

The previous sections have described how population density, socioeconomic characteristics, and employment density separately produce demand for transit. Looking at them combined however, is the best way to get a complete understanding of the underlying demand as none of these three aspects of demand exist in isolation from one another. When population, demographic, and employment-based demand are considered together, it is clear that the underlying demand for transit is very high in the Providence Metro Area and significant along the I-95 Corridor south of Providence. Woonsocket and Newport also make up areas with significant demand, as well as Fall River and Attleboro in Massachusetts. However, much of the state, and almost the entirety of those areas west of cities along the coast, show virtually no demand for fixed route service.



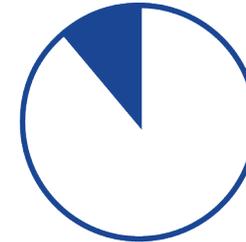
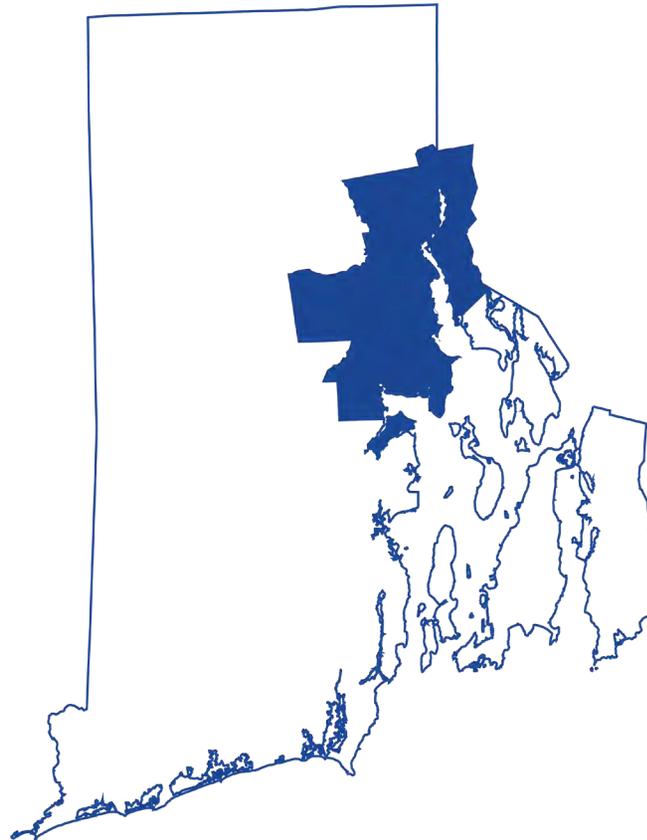
Focusing on the Core

Transit demand is much higher in the Metro Providence core than in outlying areas. Providence and the nearby cities of Pawtucket, Central Falls, East Providence, North Providence, Cranston, and Warwick form a contiguous area with high transit demand. While a large amount of travel will happen outside of these areas, the demand for frequent, all-day, high quality transit is largely within the urban core. With just 11% of the land area, these five communities contain 48% of total residents and 54% of total jobs in the state. Focusing on how to get residents and employees to, from, and within this area by means other than a private vehicle can greatly improve mobility to the highest traveled areas in the state and surrounding communities because of the large pull of such a significant

Providence, Pawtucket, Central Falls, East Providence, North Providence, Cranston, and Warwick form the state's urban core. With just 11% of the land area, these five communities contain 48% of total residents and 54% of total jobs in the state.

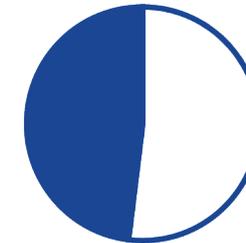
Rhode Island's Urban Core

7 Municipalities
113 Square Miles



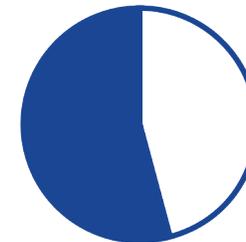
11%

Total Land Area



48%

Total Residents



54%

Total Jobs



Travel Patterns



State Travel Flows



Providence Metro Area Travel Flows



Rail & Ferry Markets



Travel Flows



Travel Flows within Rhode Island

For transit to be effective, it must take people from where they are to where they want to go. Travel flows, which show the places that people travel within the study area, are one resource to determine where direct or relatively easy connections should be made within an area. Travel flows within the study area were mapped based on all trips taken between travel flow analysis zones, which are defined by municipal and neighborhood boundaries. The flows with the largest number of average daily trips are highlighted, and include all types of trips made by all modes.

All Trips All Modes

Downtown Providence has traditionally been the primary business district and employment center in the state.

The largest trip volumes (25,000 daily trips or more) are trips made to and from Providence and the following locations:

- Johnston
- Smithfield
- North Providence
- Lincoln
- Pawtucket
- Attleboro
- East Providence
- Warwick
- Cranston



The second highest number of trips are made to and from Warwick and the following locations:

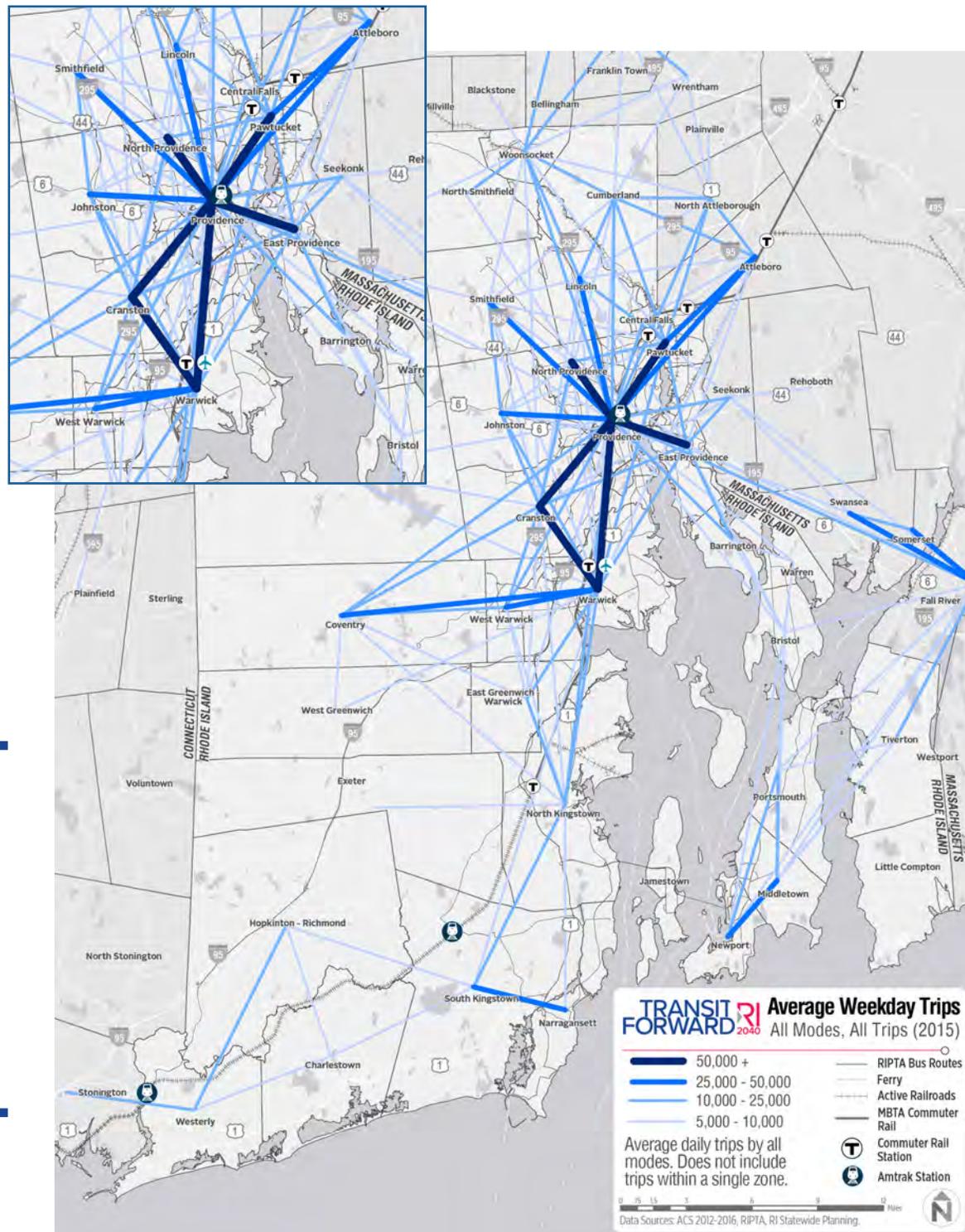
- Providence
- Cranston
- West Warwick
- Coventry

Other large trip volumes (25,000 daily trips or more) occur between the following areas:

- South Kingstown and Narragansett
- Pawtucket and Attleboro, MA
- Newport and Middletown

The urban core identified earlier as Providence, Pawtucket, Central Falls, Warwick, and Cranston are an origin or destination for 46% of the travel in the study area.

Providence, Cranston, and Warwick are the largest trip generators. In the rest of the state, South Kingstown and Newport are significant trip destinations and origins.



Transit Travel Flows

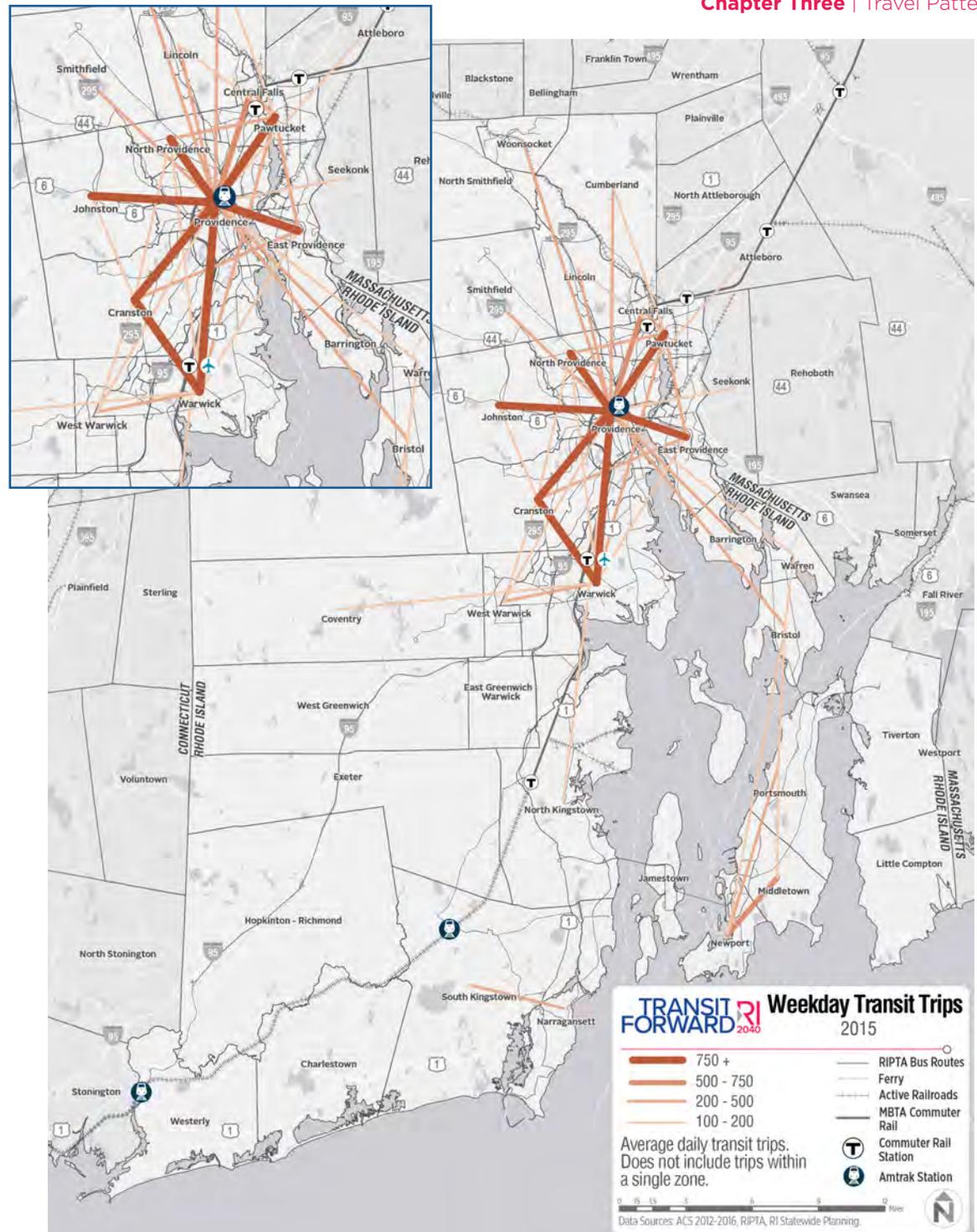
Reflecting the largely radial focus of the transit network to and from Providence, the largest transit trip volumes are generally oriented to and from Providence. Warwick is also a major regional origin and destination for transit trips. Transit trip pairs that have more than 500 weekday trips and are oriented toward Providence go to and from the following areas:

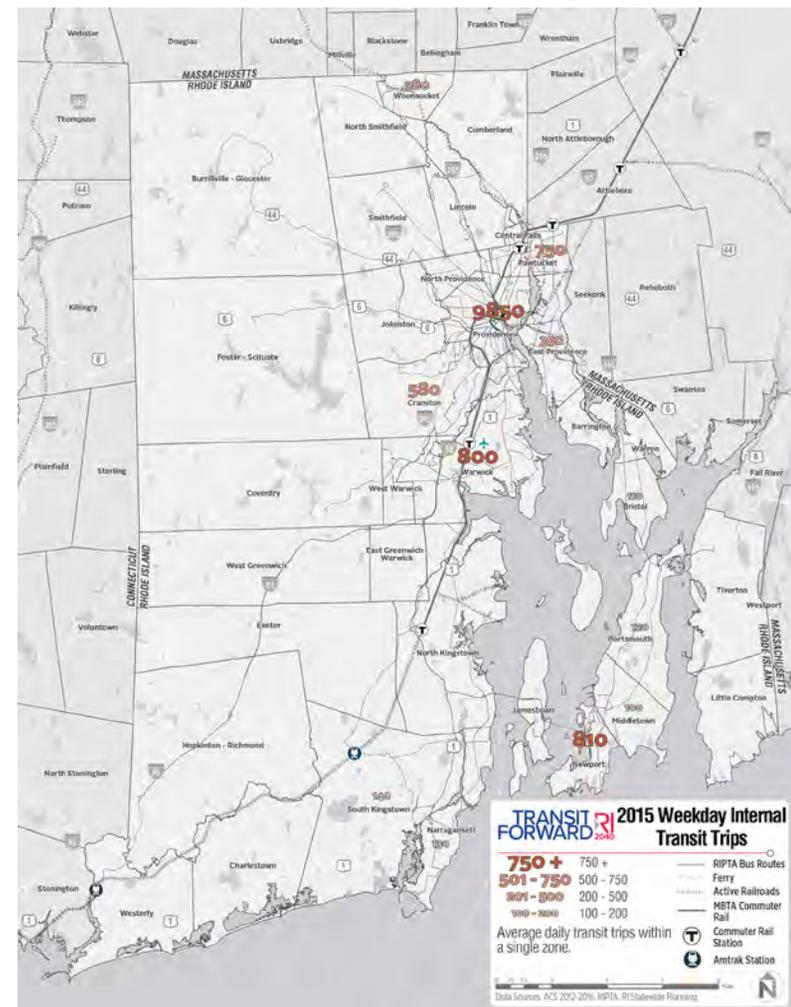
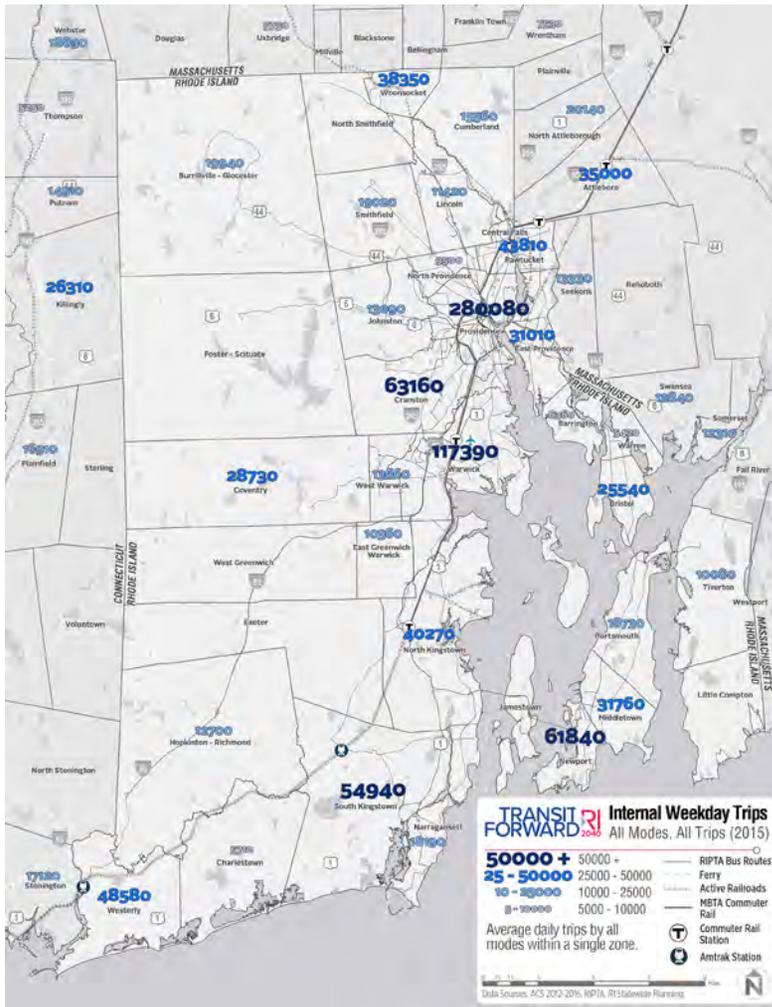
- Johnston
- North Providence
- Central Falls
- Pawtucket
- East Providence
- Warwick
- Cranston

In addition to Providence-oriented trips, there are several large travel flows (500 or more weekday transit trips) to and from the following areas:

- Warwick and Cranston
- Newport and Middletown

The urban core identified earlier as Providence, Pawtucket, Central Falls, Warwick, and Cranston are an origin or destination for 84% of the transit travel in the study area.





Internal Travel Flows All Modes & Transit

Travel within municipalities is also relevant to transit planning. Internal trips may be more likely to include shopping trips, bringing children to school, and recreational trips than commuting, which tends to be the longest regular trip made by travelers. Areas that are the biggest trip generators for inter-zone flows also have the most internal travel: Providence, Cranston, Warwick and Newport. Rural areas like South Kingstown and Westerly, notably generate more internal trips than flows to different areas.

Providence by far has the most internal transit trips, just as it is the main origin and destination for flow throughout the area. Using transit for internal trips in other communities appears to not be very heavily utilized. For example, between Johnston and Providence there are over 750 transit trips per day, but there are less than 100 transit trips within Johnston itself. This is probably due to the fact that RIPTA is a hub and spoke system; residents outside of Providence mainly use transit to commute into the urban core, rather than for other, more local trip types. A big factor limiting internal trips in denser communities is the lack of adequate cross-town connections.

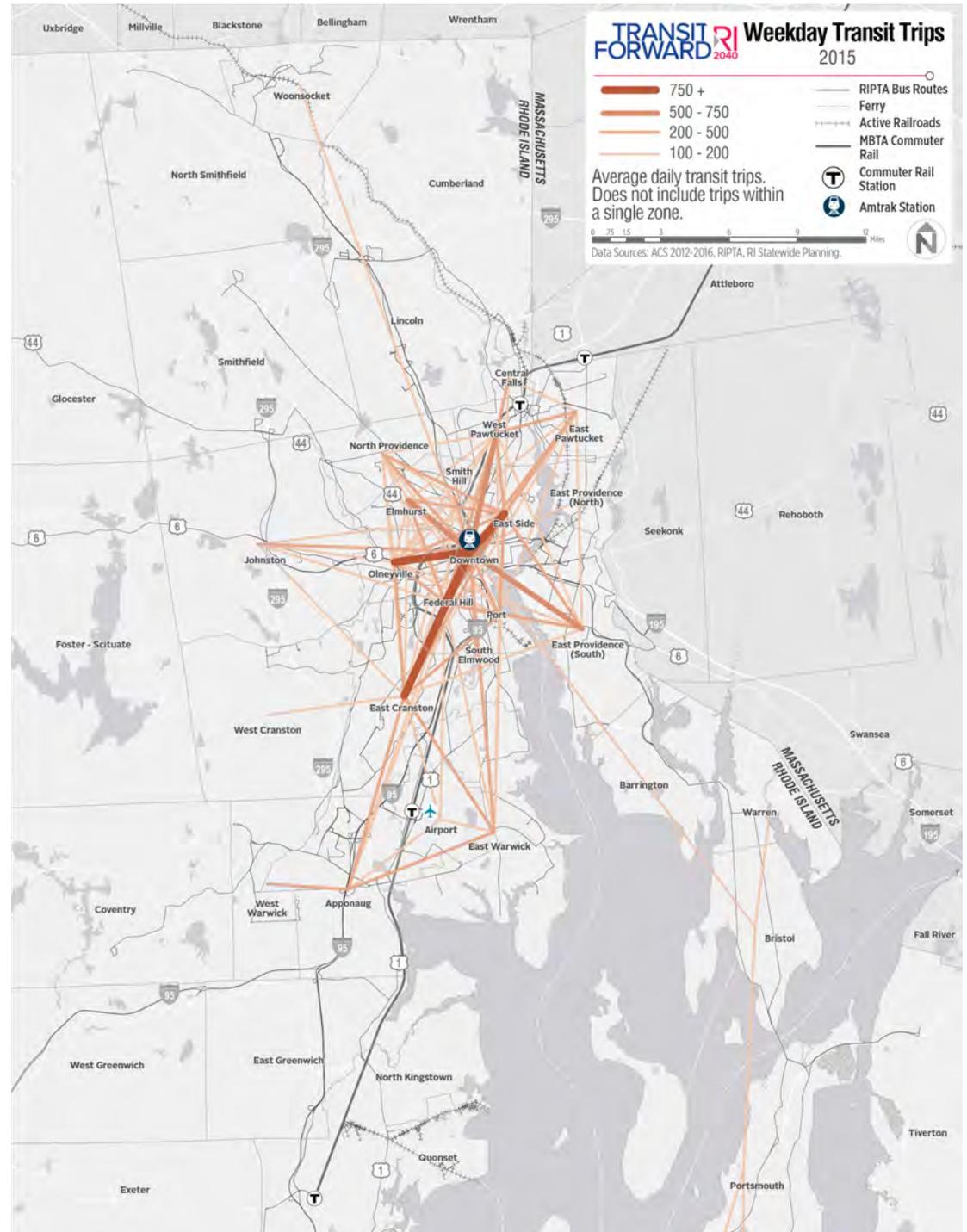
Transit Travel Flows

While East Cranston is a major trip generator for all modes, Downtown Providence is the major origin or destination for transit trips. More than 500 transit trips per weekday to and from Downtown Providence are to and from:

- East Cranston
- Olneyville
- Elmhurst
- West Pawtucket
- Providence East Side
- Southern section of East Providence

The most significant crosstown transit trip activity (more than 200 trips per weekday) occurs between the following pairs of areas:

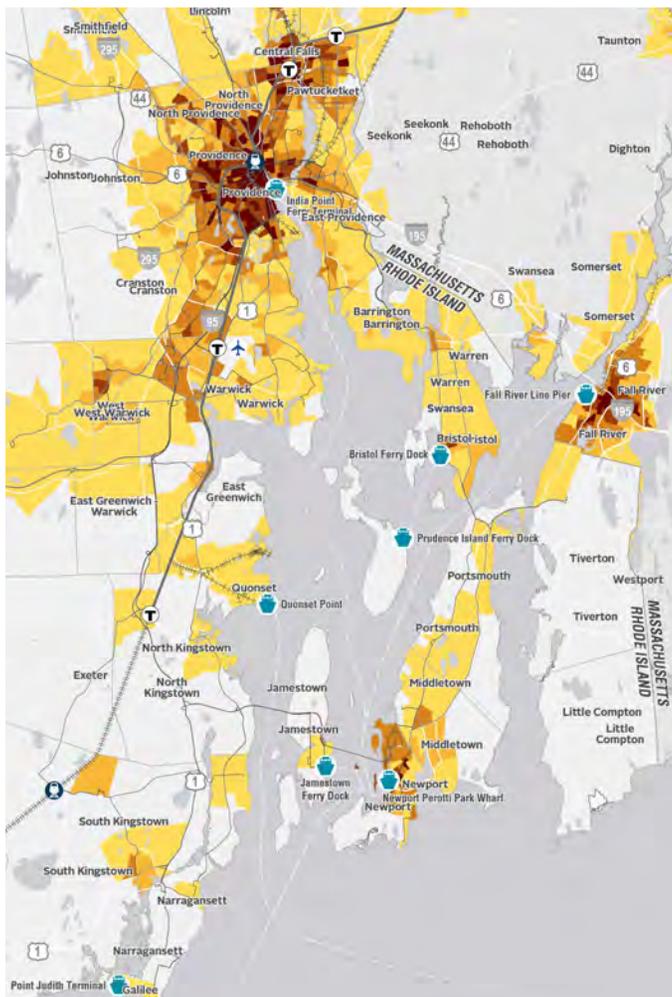
- Olneyville and East Cranston
- West Warwick and Apponaug
- Apponaug and East Warwick
- East Cranston and the Port of Providence
- North Providence and the East Side
- Elmhurst and the East Side
- The East Side and East Providence (South)
- West Pawtucket and East Pawtucket
- East Pawtucket and Federal Hill



Ferry Markets



Ferry service in Rhode Island mostly functions today as part of the tourism industry and used for recreational trips rather than commutes. While Rhode Island has extensive coast line, few high demand transit areas lie directly along the coast that ferries could most easily serve for regular, everyday trips. Furthermore, travel flows that would be most advantaged by ferry service across waterways are not major markets (for example, Bristol to Quonset or Providence to Block Island).



Block Island (not shown) lacks sufficient population and employment density to support year-round ferry service.

Challenges of Ferry Service

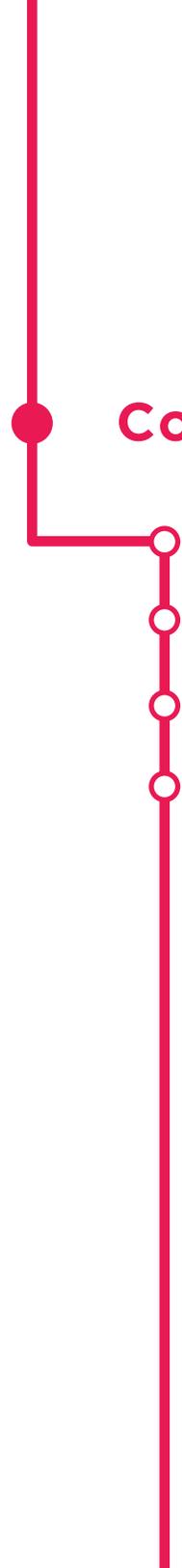
National research has shown that transit riders are very sensitive to transfers, and that multiple transfers makes transit unappealing. Because few final destinations are right along waterways, and because finding suitable places for docks can prove challenging, it is likely that those riding ferries would need to transfer to a shuttle or bus on either side of their trip. While a ferry ride and a bus ride between Providence and Newport are similar in time, a bus provides a one-seat ride.



Source: RI DOT

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Commuter Service Demand

Overview of Commuter Service Demand

Commuter Service Travel Flows

Time & Cost Competitiveness

Access to Employment

Overview of Commuter Service Demand

Underlying transit demand is strongly related to five factors:



Travel Flows from Residential Area to Employment Area

Area: The most important aspect of commuter services is the total number of people looking to travel between two longer distance areas, usually from a primarily residential area to a denser employment area and primarily during peak periods.



Population and Population Density in Station

Catchment Area: Residents are only willing to travel so far to commuter stations, so the amount of total people in a catchment area significantly affects the level of transit demand that can be expected.



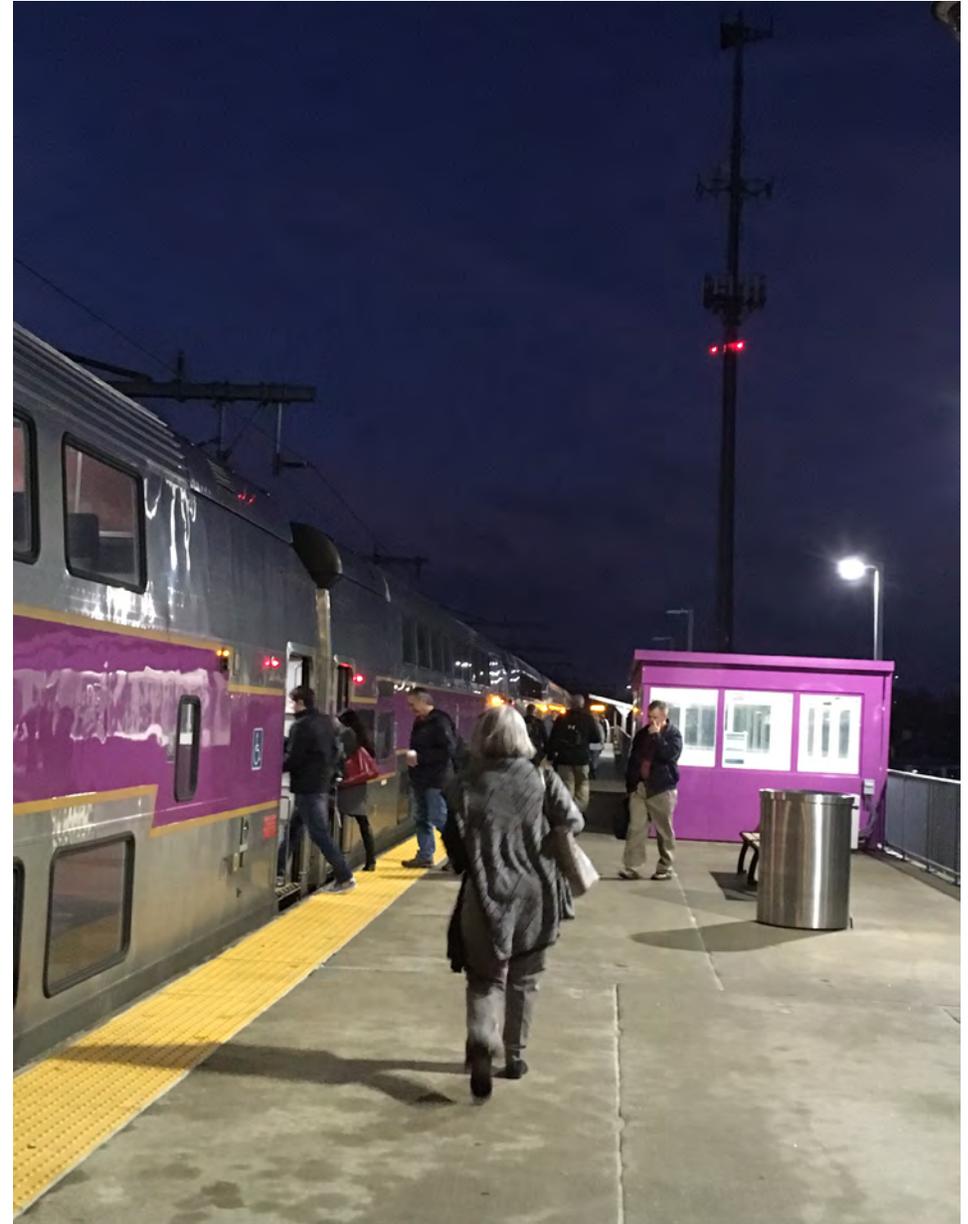
Time Competitiveness: Express services do well in areas with moderate to heavy levels of congestion. Successful commuter services often perform at speeds comparable to driving, or faster in cases of heavy auto congestion. Commuter services may also offer a more reliable time estimate and offer riders time to do work or read for pleasure, rather than driving.



Cost Competitiveness: Both fares and parking prices influence the decision to take commuter services. Higher parking prices near an employment area served by commuter rail can be a big deterrent to driving.



Access to Jobs in Employment Area: Most people reach employment areas by walking, biking, or transferring to other transit services after alighting a commuter service. The amount of jobs available and the multimodal infrastructure at an egress station play a large role in passengers decision to take commuter services.



Commuter services generally operate between two areas that are primarily made up of residences or jobs. Generally, the bulk of service runs during AM and PM peak periods, and trip lengths are significantly longer than local transit trip distances. Unlike local service, many riders may access commuter services by driving or being dropped off, and residential commuter service stops may have Park-and-Ride or Kiss-and-Ride infrastructure. Those who use commuter services tend to be higher income, own vehicles, and live in areas where high-quality fixed route service is not viable. Therefore, the attraction to a commuter service is generally based in a time or cost incentive over commuting in a private vehicle.

The most successful commuter services serve high density job areas characterized by heavy congestion and high parking prices. Employment areas served by commuter services tend to be walkable, bikable, and have connections to other frequent transit. High capacity services like commuter rail provide time and cost benefits to commuters, as exclusive rights of way provide fast and reliable travel times and monthly passes are generally less expensive than monthly parking passes. Freeway Bus Rapid Transit (BRT), generally operates in exclusive lanes along heavily traveled corridors with limited stops, offering time savings and increased reliability to passengers.

Express buses travel faster than local services as they often have more limited stops, but offer no time savings over private vehicles. Express bus services can be expected to have the lower ridership than Freeway BRT or Commuter Rail and operate in smaller markets.

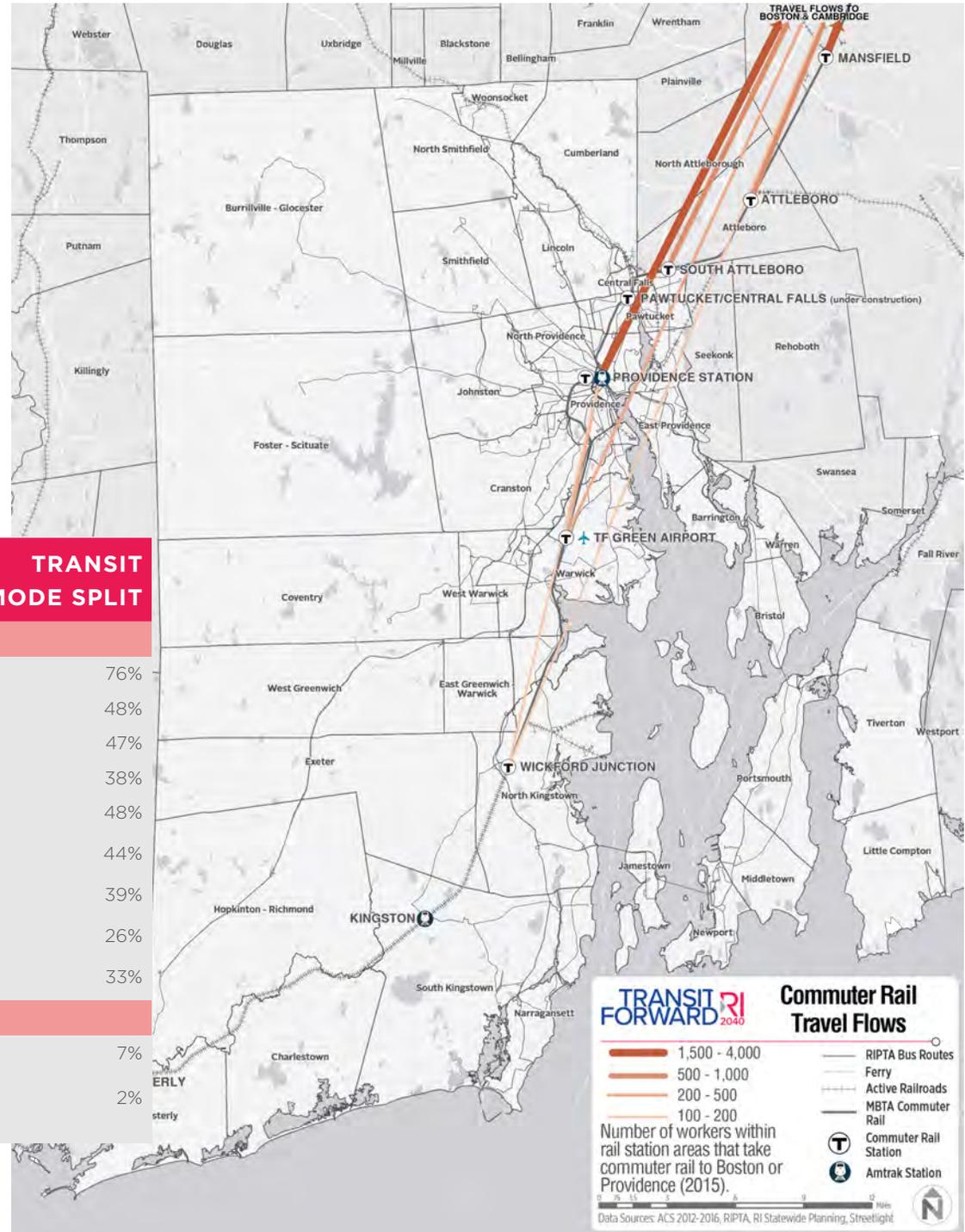
However, more than any other factor, **travel flows from the residential area to the employment area** will determine the underlying demand for commuter service,

and what type of service is best. Even if all other elements of demand for commuter services are present, the total number of those regularly traveling from the residential to the employment area is the largest indicator of how many riders can potentially be captured on commuter transit services. Building and operating commuter rail is an expensive investment for a region, and is appropriate for high total travel flows, as most commuter rail trains can carry several hundred passengers. Buses, however, carry several dozen passengers, and are appropriate for a much broader share of the commuter markets.

COMMUTER SERVICE TYPE	ELEMENTS OF DEMAND				
	Travel Flows	Population in Residential Area	Travel Time (compared to SOV)	Parking Cost in Employment Area	Jobs in Employment Area
 Commuter Rail	High	High	Faster or Comperable	High	High
 Freeway BRT	Medium to High	Medium to High	Faster or Comperable	Medium to High	High
 Express Bus	Low to Medium	Low to Medium	Slower	Medium to High	Medium to High

Providence Line Commuter Rail Travel Flows

The MBTA Providence Line runs between Wickford Junction and South Station in Boston. The catchment area for each station along the line was determined to be accessible within a 15-minute drive*. By far the strongest interstate flow occurs between Providence and Boston/Cambridge. Impressive transit capture occurs along the entire Providence Line into Boston/Cambridge, from a low of 26% at Canton Junction to a high of 76% at Wickford Junction. However, total flows matter greatly to appropriate transit service. Wickford Junction and TF Green only have several hundred total commuters traveling to Boston/Cambridge. Transit mode share into Providence is significantly lower along the Providence line, ranging from 0 - 7%. In order to shift these commuters to transit, time and cost competitiveness into Providence would need to also change.



ORIGIN STATION	TOTAL COMMUTERS	TRANSIT COMMUTERS	TRANSIT MODE SPLIT
FLOW TO BOSTON/CAMBRIDGE			
Wickford Junction	190	145	76%
TF Green	648	314	48%
Providence	3,524	1,650	47%
South Attleboro	2,029	772	38%
Attleboro	1,551	746	48%
Mansfield	9,014	4,005	44%
Sharon	4,410	1,733	39%
Canton Junction	14,483	3,835	26%
Rt. 128	34,981	11,549	33%
FLOW TO PROVIDENCE			
Wickford Junction	2,402	179	7%
TF Green	13,781	265	2%

Source: CTPP 2006-2010 Projected to reflect 2015 estimates

*According to the 2015-2017 MBTA Commuter Rail Passenger Survey, 83% of commuter rail riders traveled fifteen minutes or less to arrive at the first commuter rail station they boarded.

Potential Express Bus Markets

RIPTA currently runs Express Services between Providence and Park-and-Rides in lower-density areas of the state. Based on the maximum transit-capture of these Express Bus catchment areas, potential express bus markets to Providence were identified for flows 12 miles in length or longer. Assuming a 10% transit mode capture, the most promising Express Bus markets to Providence are from:

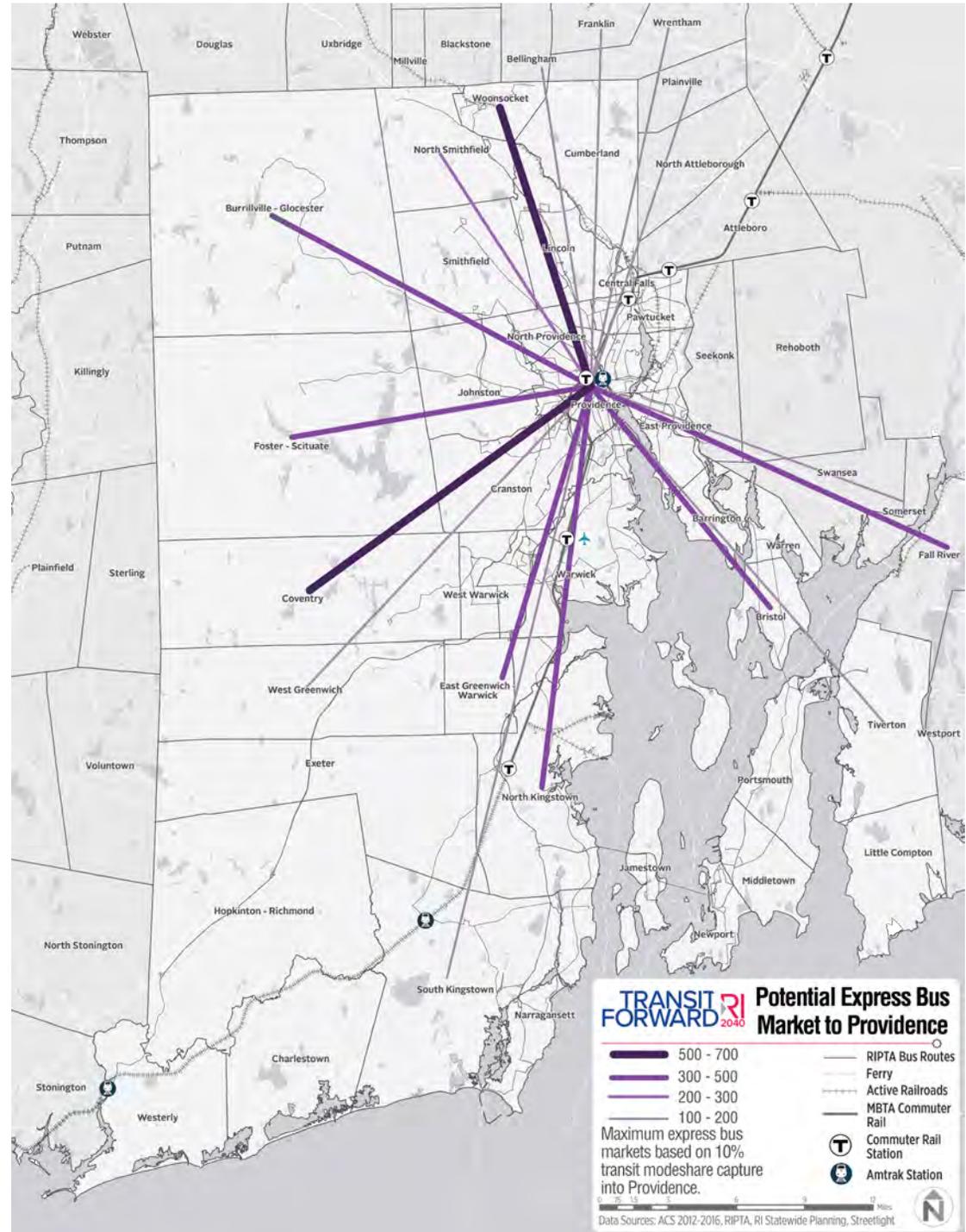
- Woonsocket
- Coventry
- Fall River
- North Kingstown
- Burrillville
- East Greenwich
- Bristol

Areas that show a less significant market for Express Bus are:

- Foster
- North Smithfield
- Franklin
- Tiverton
- Somerset
- South Kingstown
- Bellingham
- West Greenwich
- Wrentham
- Plainville

Flows between other areas had less than 100 potential commuters a day, which is the minimum market for an express service.

These flows are expressed as maximum market shares (10%), however, current express services are generally capturing between 2-5% of commutes into Providence. In order to reach these potential markets, transit priority treatments such as dedicated lanes and/or parking penalties in downtown Providence would need to be implemented.



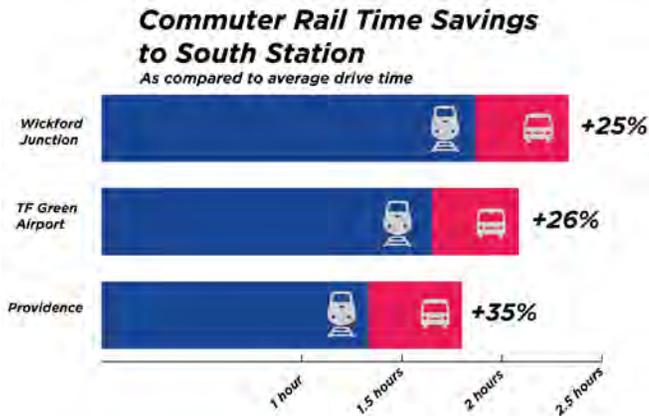
Time Competitiveness



In metropolitan areas with a high level of traffic, commuter rail and Freeway BRT can offer commute times that are similar to or often less than, commute times experienced by private vehicles. While those commuting in private vehicles often have almost no time associated with leaving home in their private vehicle and parking at their job, the amount of time at either end of the transit trip must also be taken into consideration when assessing time competitiveness for transit. For instance between Wickford Junction and Providence stations, the drive time to rail time is almost identical, but when adding in access and egress times, commuter rail time is over 35% longer, where as from Providence to South Station, commuter rail provides a 25% time saving.

for pleasure, and may feel like they “gain time” back in their day that they would otherwise spend driving. Driving in traffic has also been shown to cause high levels of stress, so while the time spent commuting may be the same, commuter services provide quality of life benefits.

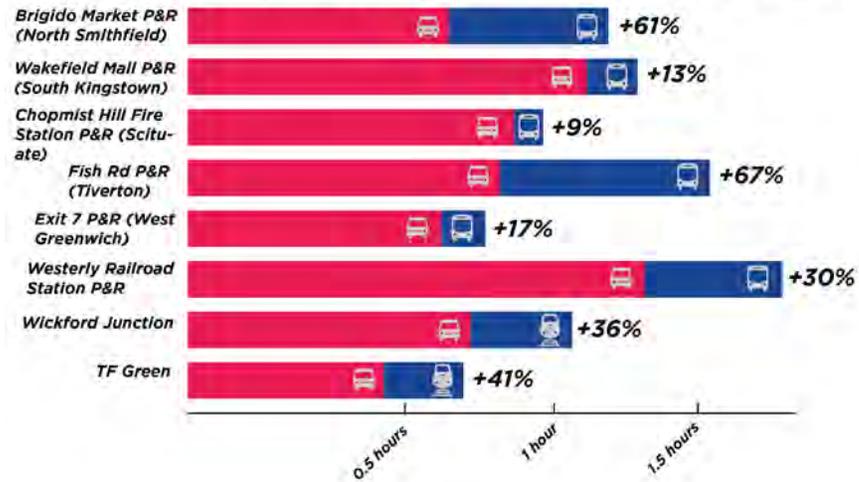
In areas of high congestion, commuter transit services can also offer more reliable commute times. Between Providence and Boston, the drive time variability is almost an hour during AM peak. Between Wickford Junction and Providence however, it is 20 minutes. Transit with exclusive right of way often offers much more reliable travel times in congested areas than private vehicles. RIPTA’s express commuter services into Providence vary broadly in their time competitiveness. Express bus services with fewer stops prove to be more time competitive. However, without exclusive lanes, transit signal priority, or other time-saving infrastructure, express buses operate in the same congestion and traffic variability as private vehicles.



Time competitiveness can also be thought of in terms of how time is spent. When riding a high quality commuter service instead of driving a private vehicle, passengers may have time to do work or other activities like reading

Drive Time Savings to Downtown Providence

As compared to average express bus and commuter rail travel times



Source: MBTA Commuter Rail Schedules, RIPTA Schedules, MBTA Dashboard, Google Maps Commute Time Estimates

*transit time estimates include average access and egress times

Cost Competitiveness



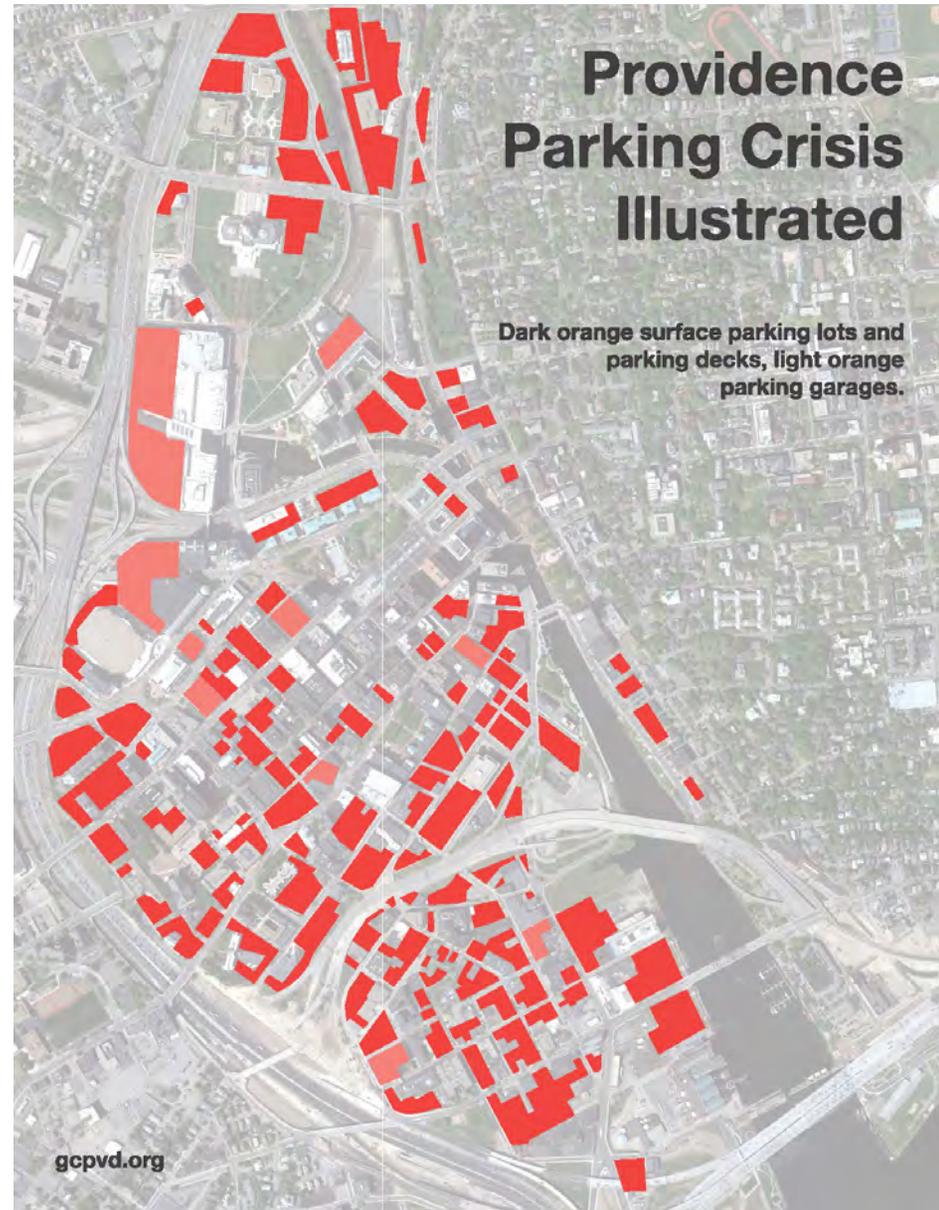
Commuter services are often most successful when they serve employment areas with limited parking and/or high parking prices. While a large percentage of those who ride commuter rail are often from higher income households who own vehicles, parking prices are often high enough to deter workers from commuting with private vehicles.

Parking in downtown Providence is significantly less expensive than in downtown Boston or Cambridge. The incentive to drive to downtown Providence is also exacerbated by the fact that parking is ample and largely free. Many downtown workers are offered free parking by their employers, including State employees, municipal employees, university employees, and other large private employers. So while downtown Providence is served by a one-seat ride on most RIPTA routes and the commuter rail from Wickford Junction and TF Green, for those who own a vehicle, there is not a significant price advantage to taking transit.

Other costs that influence public transit ridership are parking prices at the boarding station, fare prices and gasoline prices. Parking is free at all RIPTA Park-and-Ride lots and at Wickford Junction. Daily parking fees are charged at TF Green’s Interlink Garage and at private facilities around Providence Station. Because of the high cost of commuter rail fares to Boston from Rhode Island, most MBTA commuters into Boston are higher income. Reduced passes for low-income riders may increase commuter service ridership.

Employment Area	Average Daily Parking Garage Rates	Price Ranking
Downtown Providence	\$13 - \$20	\$ \$
Downtown Boston	\$30 - \$43	\$ \$ \$
Kendall (Cambridge)	\$25 - 42	\$ \$ \$

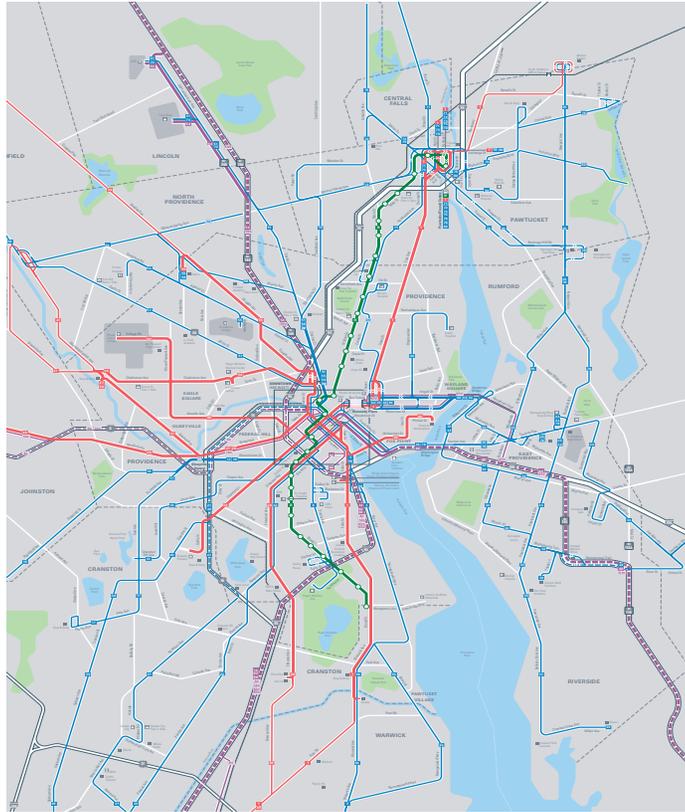
Source: parkme.com



Source: Greater City Providence (gcpvd.org)

Job Access in Employment Areas

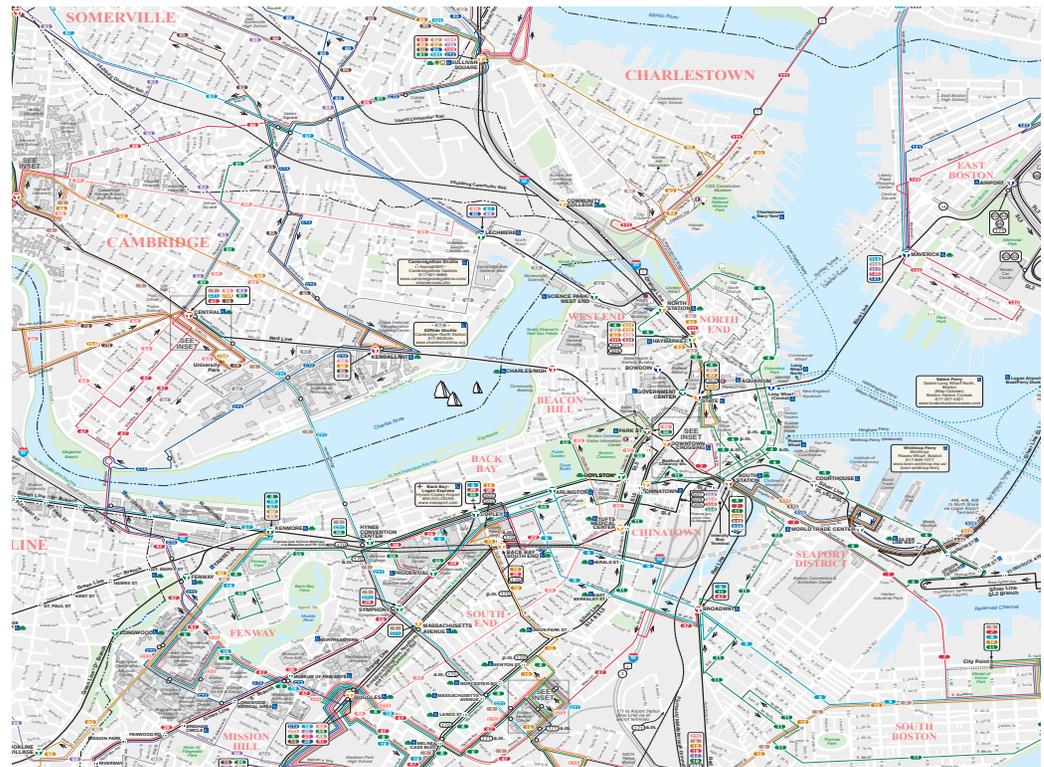
Currently, 91% of those who ride the Providence line are using it for home-based work*. Boston/Cambridge and Providence both serve as the largest employment areas in Massachusetts and Rhode Island, respectively. Once a commuter reaches either place via a commuter service,



Most RIPTA service runs through Providence, which has approximately 117,000 jobs.

the majority of jobs are reachable by walking, biking, or transferring to another frequent transit service.

The other stops on the Providence line that are not in Boston or Providence serve a limited number of jobs as well as multimodal connections and access. This is why travel between primarily residential areas along commuter rail lines are low.



The highest density jobs areas in Boston and Cambridge are served by rapid transit or frequent bus routes. Boston has 600,000 jobs and Cambridge has 113,000 jobs.

*MBTA 2015-2017 Systemwide Passenger Survey



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52 BRANCH

52 BRANCH AVE

318

35

Looking Forward to 2040



Planning for the Future

In order to prioritize transit improvements, it is as important to understand where future development and changes in population, employment, and land use will occur in Rhode Island. Looking ahead to 2040, the population of Rhode Island and the surrounding areas are predicted to increase by 4% and area employment is predicted to increase by 6%.

What goes into the Forecasts

These population and employment projections are subject to uncertainty. For the most part, current projections assume that recent trends will continue, for example post-industrial Pawtucket will continue to lose population and jobs as has been the case over the last several decades. However, there is renewed interest locally and nationally in revitalizing areas such as these and converting industrial space into lofts, restaurants, and office buildings. These efforts aim to break recent trends and increase growth.

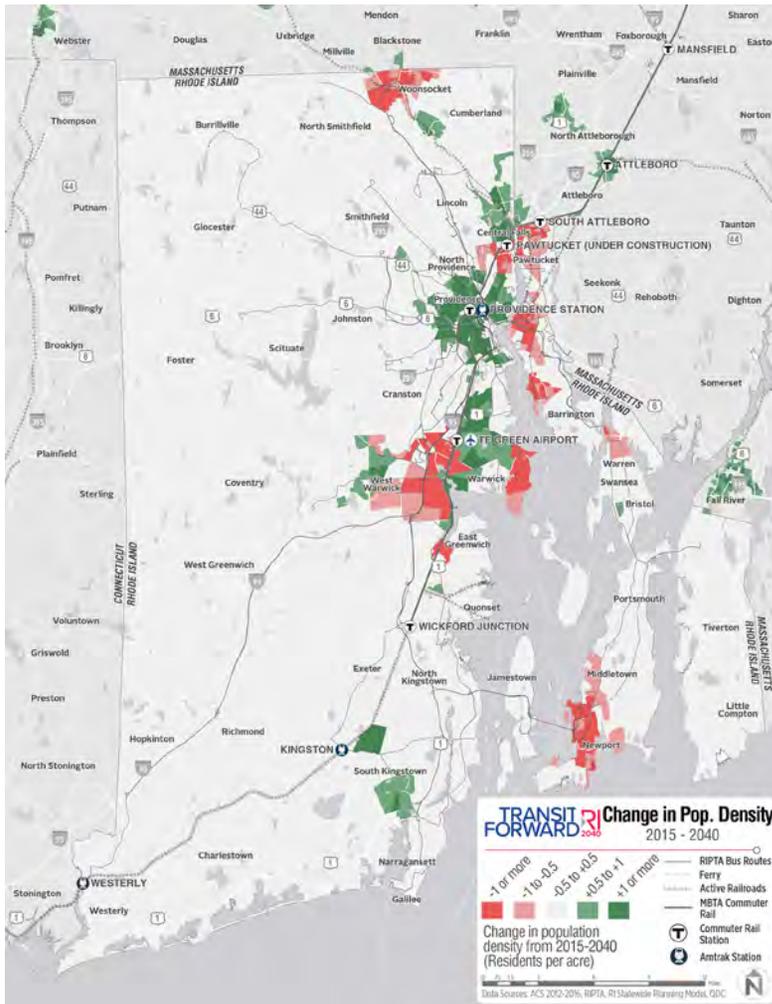
Population loss and shrinking household sizes is also a product of national trends toward smaller family sizes, especially in urban areas. However, some urban areas are expected to continue to densify further.

Population Growth 2015 - 2040

Over the past few decades, Rhode Island has grown slowly, from 1 million in 1990 to 1.05 million in 2016. Through 2040, total population is projected to grow by 2% to 1.07 million. It is projected that changes will be small in all areas of the state.

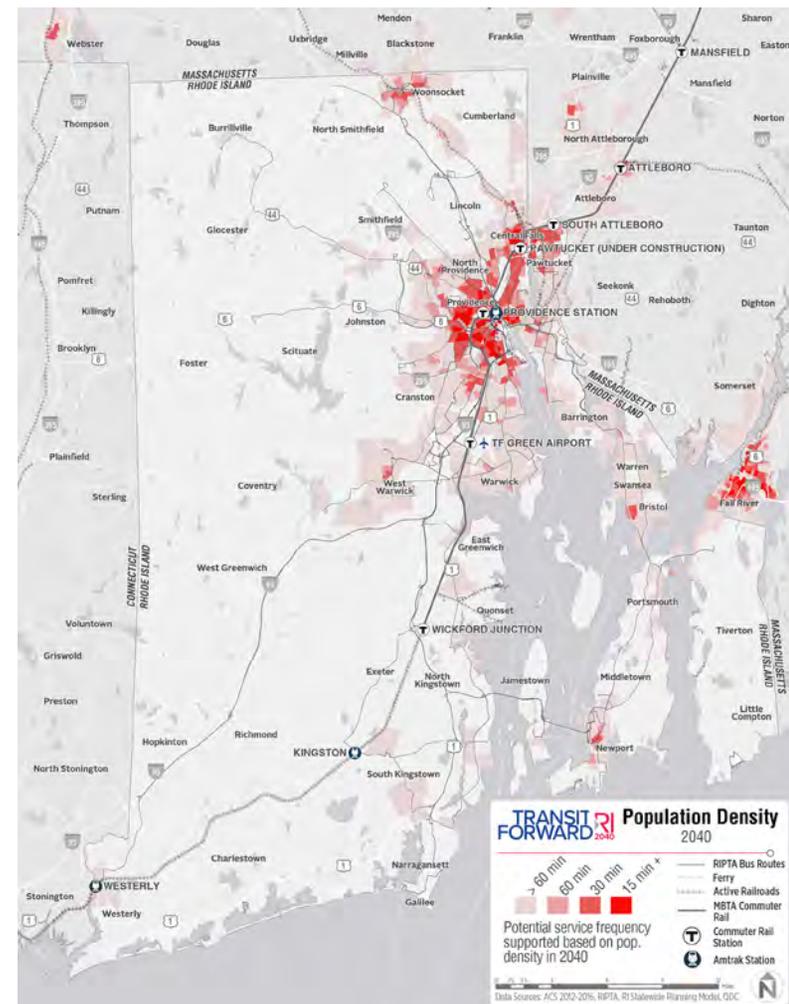
In terms of density, most of the city of Providence is expected to densify by at least one resident per acre by 2040. The areas of Warwick adjacent to and north of TF Green Airport





the Kingstown area, the area around URI, and the villages of Peace Dale and Wakefield are expected to densify by at least 0.5 residents per acre by 2040. Population density is also expected to increase in Central Falls just north of the planned Pawtucket MBTA Commuter Rail Station.

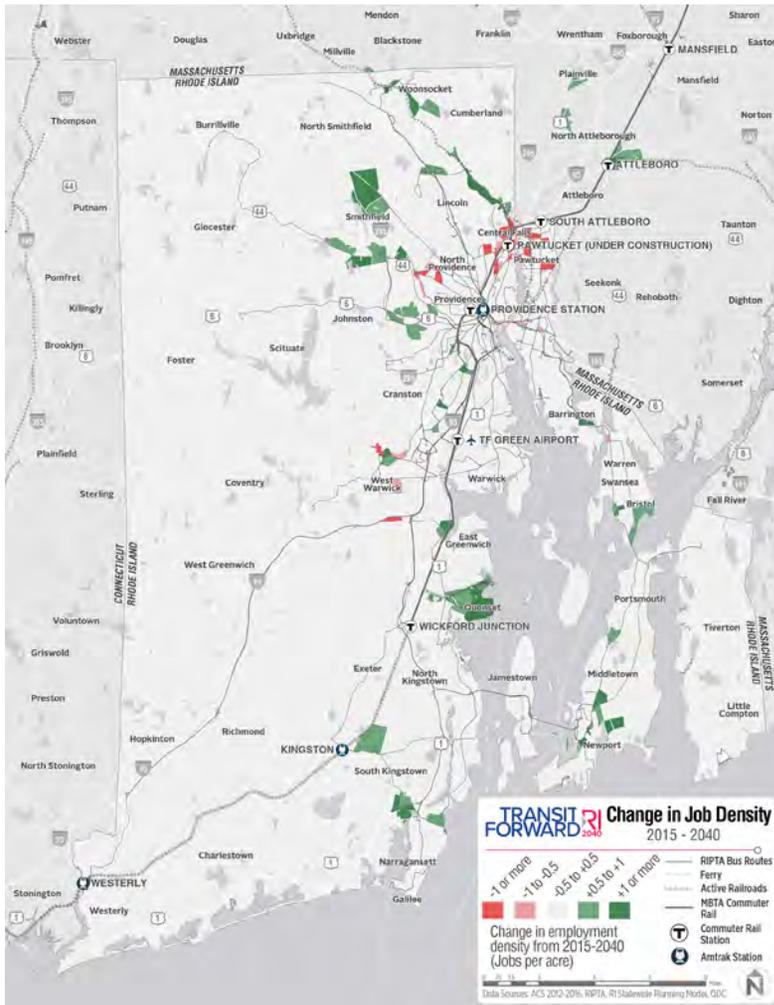
Most of West Warwick, Pawtucket, Woonsocket, East Providence, and Newport are expected to lose at least 0.5 residents per acre by 2040



Population Density 2040

Areas with the highest population concentrations in 2040 are projected to be the same as in 2016:

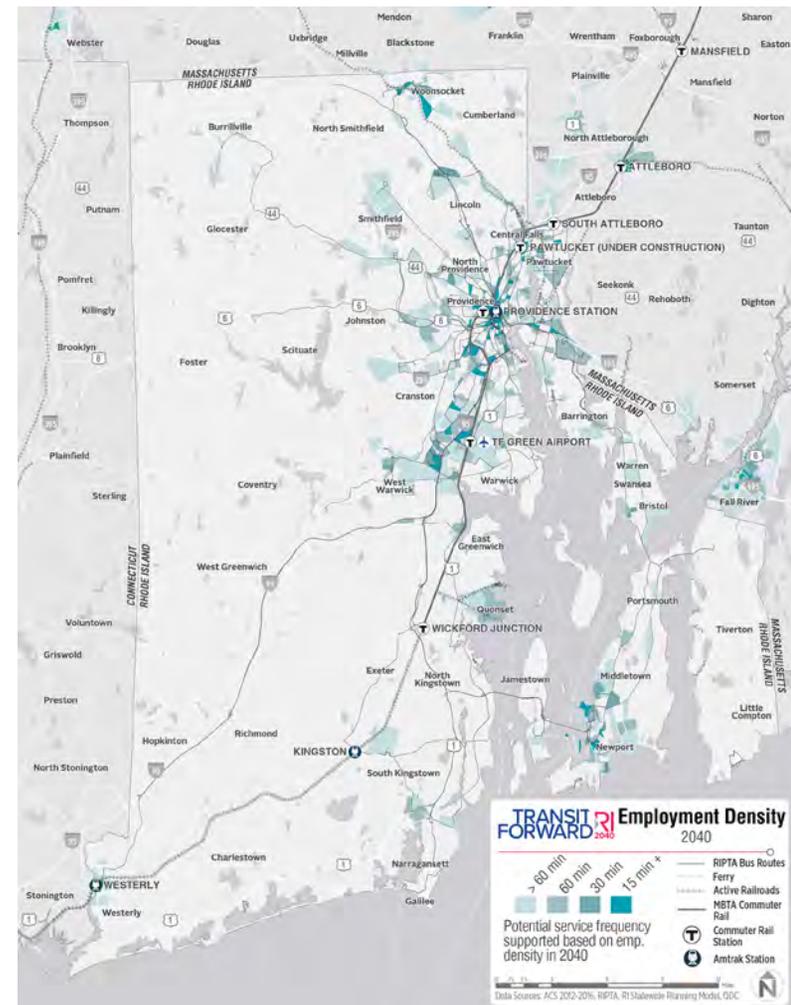
- Providence
- Pawtucket
- East Cranston
- Central Falls
- Woonsocket
- Newport
- Fall River and Attleboro, across the border in Massachusetts



Employment Growth 2015 - 2040 & Employment Density in 2040

Employment growth largely accompanies areas where population growth is also expected to occur. Western Providence, Kingston, Peace Dale, and Narragansett are expected to experience an increase of at least 0.5 jobs per acre by 2040. The largest geographical areas expected to experience job growth are:

- Smithfield, near I-295 and State Route 7
- North of Providence along the P&W mainline railroad
- Quonset
- Newport



Pawtucket and isolated areas of North Providence, Johnston, and West Warwick are expected to lose at least 0.5 jobs per acre during the next 25 years.

The densest employment areas in 2040 are projected to be:

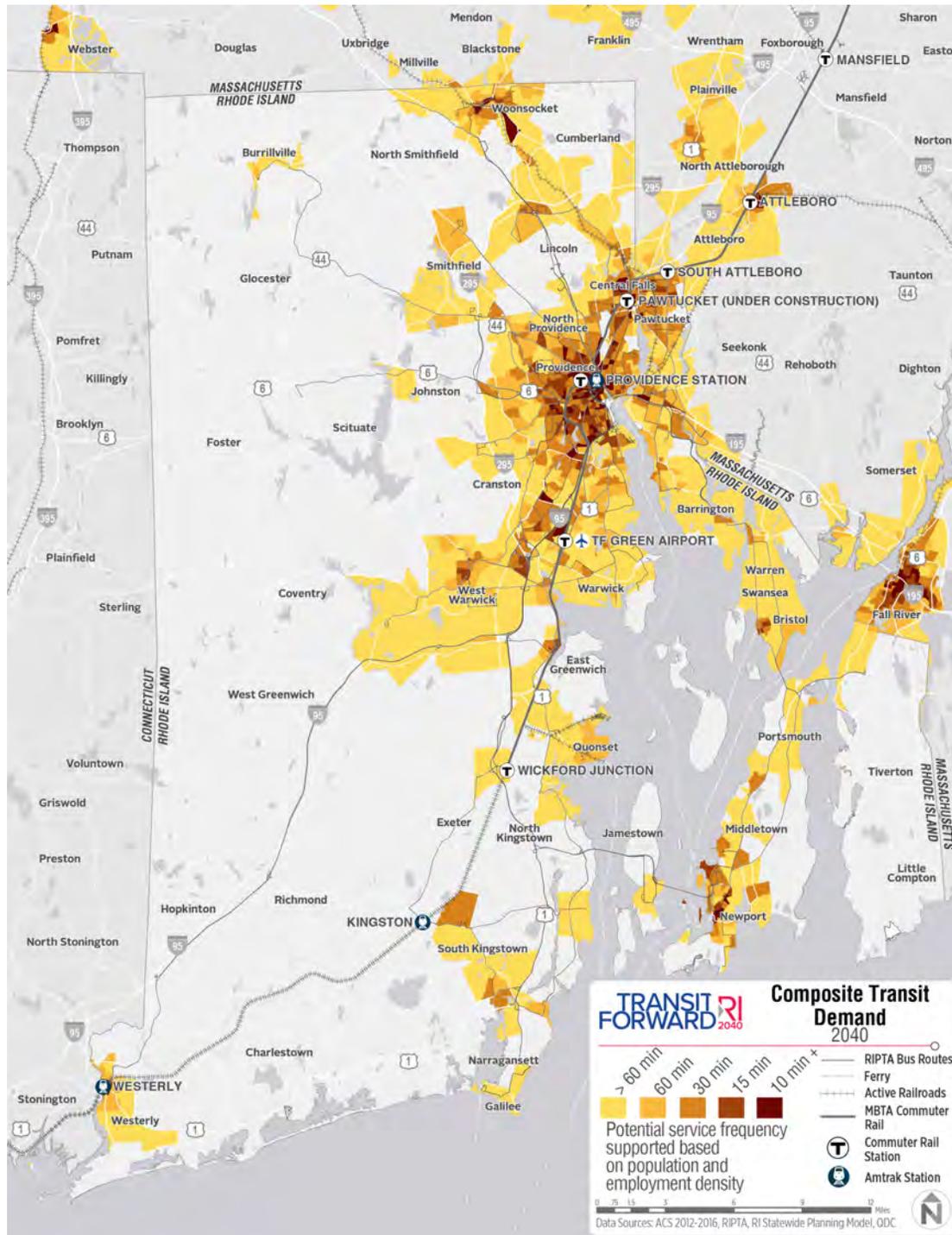
- Providence, especially downtown
- Warwick, especially the Area around TF Green Airport
- Central Falls
- Pawtucket
- Woonsocket
- Newport
- Fall River and Attleboro, across the border in Massachusetts

Composite Demand 2040

The areas with the greatest demand for transit are generally expected to be similar as at present. However, demand will increase in some areas:

- Lincoln near Lincoln Mall
- North of Providence along the P&W mainline railroad
- Smithfield near I-295 and State Route 7
- Quonset Business Park
- Warwick/Cranston near employment centers west of TF Green Airport

The transit propensity adjustment factors based on the socioeconomic characteristics of each area is applied in the same pattern as 2015, as no demographic predictions have been made for the state.



Travel Flows 2040



Travel Flows within Rhode Island

Daily trips are expected to increase by 7% within the state by 2040. Most travel patterns are very similar to those in 2015, and trips between the dense communities neighboring Providence and Providence remain the most significant.

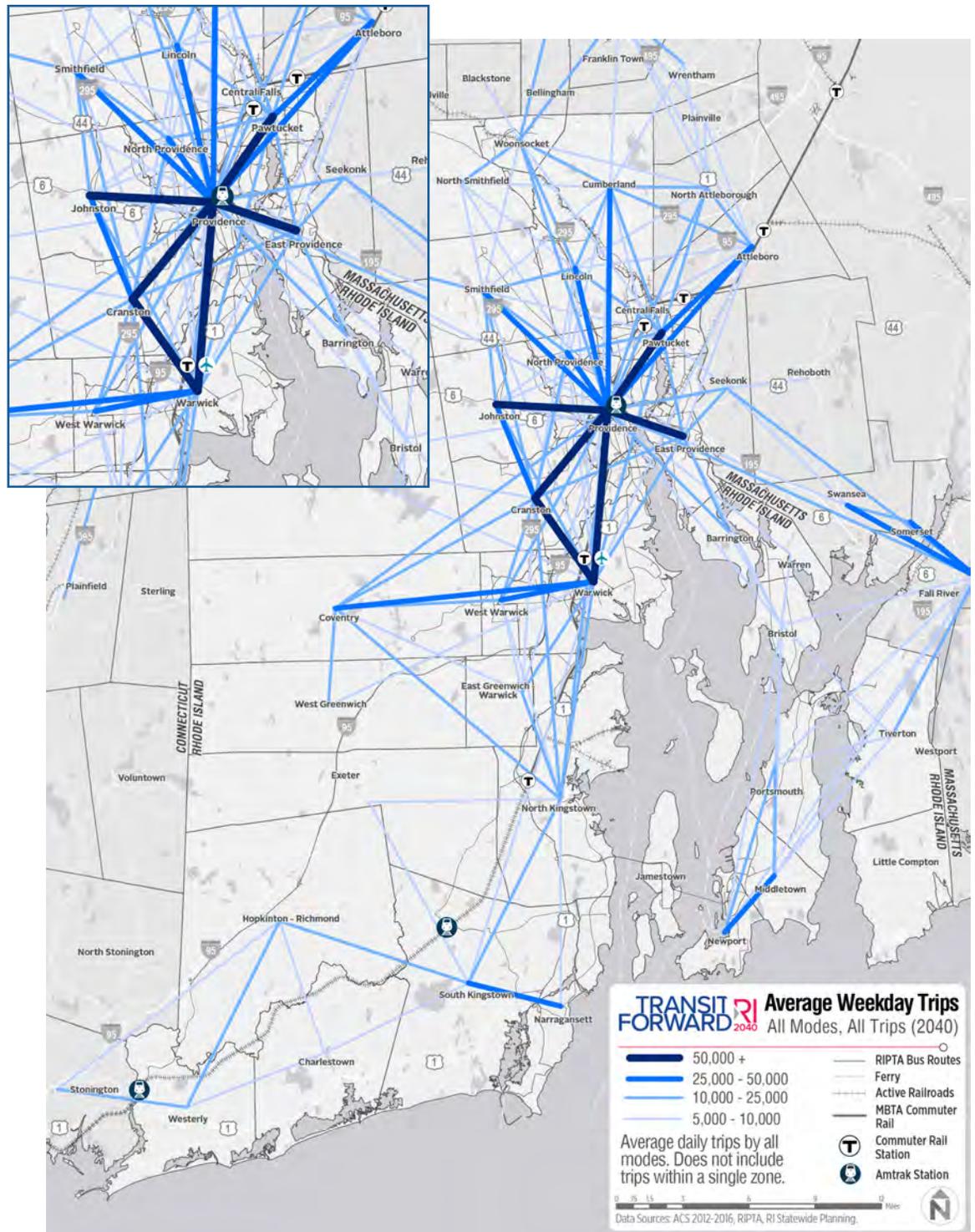
All Trips All Modes

The largest increase in travel are between the following areas:

- Areas directly west of Providence and Providence, including Smithfield, Johnston, and Cranston,
- South Kingstown and Narragansett in the southern part of the state

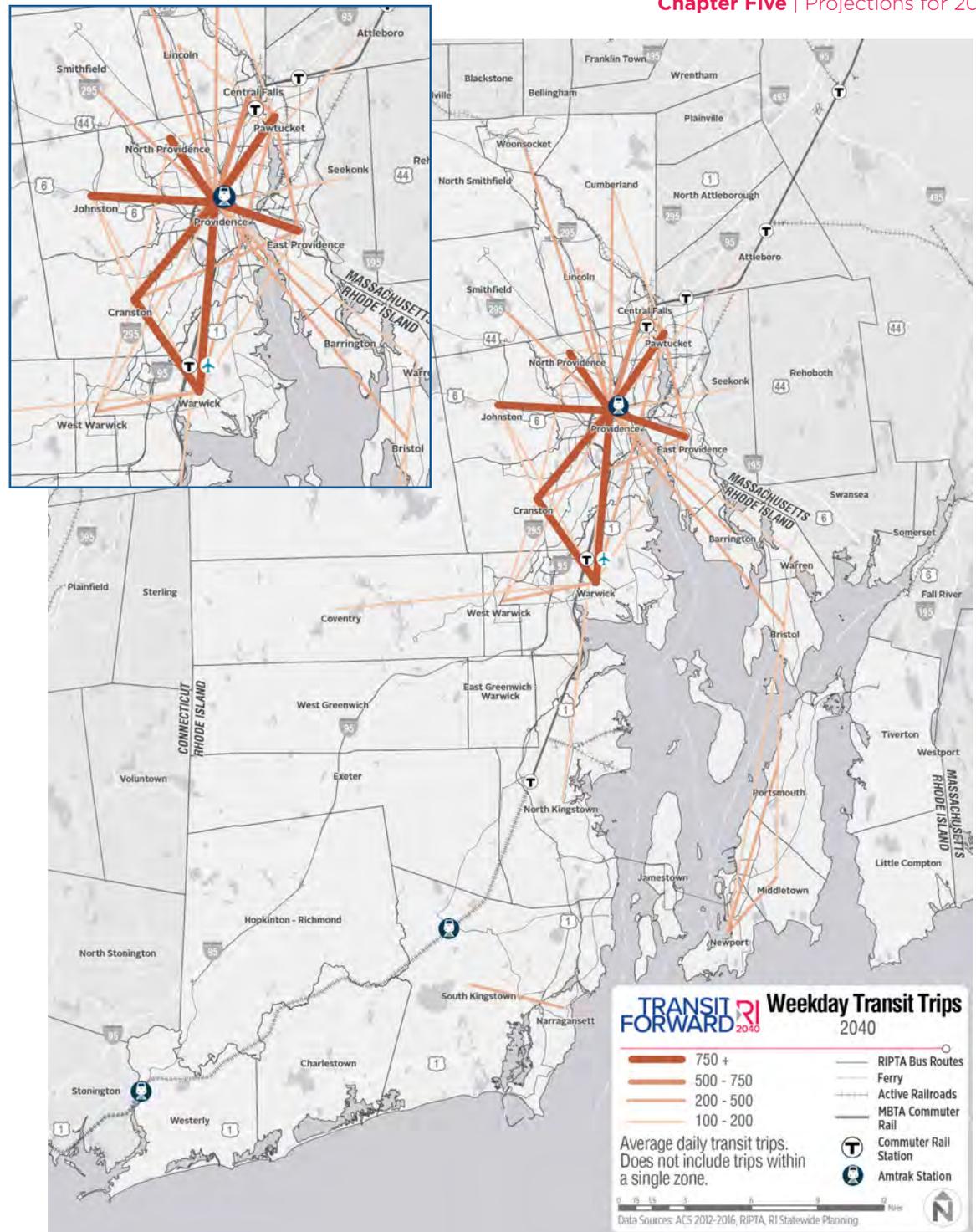
There are also increased in internal trips, most notably in:

- South Kingstown
- North Kingstown
- Smithfield
- Coventry
- Cranston
- Cumberland
- Providence
- Bristol



Transit Travel Flows

Transit trips are expected to grow by only 1% by 2040, a slower rate than trips of all modes and population and employment growth. As population and employment are expected to grow in Providence, where the majority of the state's transit travels to, from, and through, all the most notable transit travel patterns radiate from Providence. The most notable trip increases are internal trips within Providence and Cranston.







Summary

Summary



This document provides an overview of the current and future markets for transit in the state of Rhode Island and across its border into Massachusetts. The state varies in its potential to support different types of transit service, and no one solution will work for the Providence metro area, the state, or the region. The major overview of the transit markets include:

- Providence and the surrounding communities form an area of concentrated local transit demand based on population and employment density and socioeconomic factors. Woonsocket, Newport, and Fall River, MA, also show high demand for fixed route service
- Much of the state shows very low or no demand for fixed route service, and would better be served by alternative mobility options that integrate into the fixed route system.
- Most significant travel flows within the state are to, from, and within Providence. There is also significant travel within the southern part of the state.

- Commuter rail service predominantly serves trips between Providence and Boston.
- There are significant potential markets for express bus services into Providence, but currently these services are not time or cost competitive with driving.
- Rhode Island is expected to grow modestly in population and employment by the year 2040. Auto trips are expected to grow more quickly than transit trips, resulting in increased congestion and vehicle miles traveled (VMT)

Several guiding principles based on this analysis that could increase the quality and use of transit are:

- Match transit frequency to density.
- Focus fixed route service in the core of the state and focus priority transit treatments on the densest and most heavily used corridors
- Focus on alternatives to fixed route service in lower density areas to integrate them with the fixed route system. These alternatives can include TMAs, vanpools, or partnerships with TNCs
- Rethink the parking supply especially in downtown Providence. Free and ample parking for most employees does not provide a cost incentive to take transit.
- Consider total travel markets in future commuter rail operations.

Rhode Island has rich potential for many types of transit service. Matching service type, span, and frequency to different land use types and travel flows can allow those who live and work in Rhode Island to choose transit for all types of trips, comfortably and reliably.



