



Rhode Island Public Transit Authority
COMPREHENSIVE OPERATIONAL ANALYSIS

RHODE ISLAND TRANSIT MARKET REVIEW

DRAFT | VERSION 6

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1 INTRODUCTION

Like all areas, Rhode Island is constantly changing. In order to provide the best possible service, RIPTA must continually adjust and keep pace with those changes. **The purpose of this market analysis is to examine the underlying conditions in the greater Providence area and throughout Rhode Island as they relate to the demand for transit service and the types of services that best match the demand.**

A large number of factors impact the inherent demand for transit and actual use. These include:

1. Market demand
2. The physical environment
3. How well transit service is designed
4. Time and costs for alternative modes

This document focuses on market demand, and does so through the examination of a number of factors that are strong indicators of demand. These include:

- *Population and employment densities* are the strongest indicators of transit demand. Put simply, where larger numbers of people live and/or work in close proximity, transit demand is higher.
- *Socio-economic characteristics* such as income, auto availability, minority status, disability status, and age, that indicate where there is demand from populations that have a high propensity toward transit use.
- *The location of major activity centers*, which indicates where people desire to travel.
- *Existing and projected travel flows*, which provide information on the places that people travel between.

It should be stressed that each of these factors provide indications of transit demand, and that the other factors described above (the physical environment, transit service design, and time and cost for alternatives) also strongly impact transit demand. For example, nearly all transit riders are also pedestrians at at least one end of their trip, and thus walking environments strongly impact ridership. A common rule of thumb is that transit riders will walk one-quarter of a mile to access transit. However, in comfortable pedestrian environments, many transit riders will walk longer distances, while in uncomfortable environments, many will not walk that far. Service design also strongly influences ridership. Slow circuitous routes that take people closer to their destinations are often preferred by some riders, such as many elderly and persons with disabilities, but are seen as very inconvenient by most others. Thus, no matter the inherent demand for transit, service must be designed appropriately to appeal to local markets, and even so, external factors will impact demand.

Given the importance of these other factors, this market analysis serves as a starting point for the more detailed analysis that will be conducted in subsequent phases of the COA. That work will include:



- A detailed analysis of the effectiveness of existing services. That work will determine whether individual services, and combinations of services, achieve apparent market potential.
- The development of service improvement scenarios. That work will consist of changes to existing services to better serve market demands, as well as the development of new services to serve areas that this market analysis identifies as unserved or underserved.



2 POPULATION AND EMPLOYMENT

For transit to be successful, it must be frequent, fast, and easy to get to and from. More than any other factor, population and employment density will determine whether this will be possible:

- Transit needs to serve sufficiently high volumes of travelers to be cost-effective, and the density of development determines the overall size of the travel market. The reach of transit is generally limited to within 1/4 to 1/2 mile of the transit line or station, and thus 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 automobiles, transit must be relatively frequent—at least every 30 minutes, and preferably every 10 to 15 minutes. Below that, transit can be expected to serve only those who do not drive or cannot drive.

Population and employment densities can also be used to provide an indication of the type and frequency of service that would be most appropriate. As shown in Table 1, local bus services require eight or more residents per acre or four or more jobs per acre, Bus Rapid Transit (BRT) 26 to 52 persons per acre or more than 13 employees per acre and light rail 31 to 78 residents per acre or 15 or more jobs per acre.

TABLE 1 | POPULATION AND EMPLOYMENT DATA RELATED TO TRANSIT DEMAND

Transit Mode/ Service Frequencies	Population/ Acre	Jobs/ Acre
Flex Bus	0.5	
Community Circulator	2	
Local Bus		
60 minutes	8-16	4-8
30 minutes	16-31	8-16
15 minutes	31-47	16-24
10 minutes	47-92	24-48
<=5 minutes	>92	>48
Bus Rapid Transit	26-52	>13
Light Rail Transit	31-78	>15

Source: Nelson\Nygaard assembled from various sources.

In addition, population and employment densities also provide an indication of the types of riders that transit will serve. In general terms, there are two types of transit riders:

- **Discretionary riders** who have sufficient resources and the ability to operate private vehicles but choose to use transit because it provides a better choice. These riders are overwhelmingly located in areas with high population densities, as the high volumes of people who live close to transit lines can support the frequent service that makes transit convenient. Discretionary riders also chose to avoid congestion, the high cost of long commutes, and/or high parking charges.



- **Transit-dependent¹ riders** who use transit services because they don't have an automobile available for their trip or are unable to operate a private vehicle. Because they have one less choice for travel, they rely more on transit than discretionary riders. Transit-dependent riders are also more likely to use transit to get to appointments, shop, and visit friends/family.

Transit dependent riders are also often located in densely populated areas, and the combination of discretionary and transit-dependent riders produces demand for even more frequent service that increases the attractiveness of transit for discretionary riders. However, in less densely developed areas, because there are fewer people, the overall demand is lower, and consequently service levels are lower. As a result, transit dependent riders often comprise a large majority of riders in less developed areas.

¹ Transit dependent is a common transit industry term, but it should also be recognized that “transit dependent” riders also have choices. However, their choices are different than for those who could drive, and usually involved getting a rider from someone else. For these riders, transit provides independence that they otherwise would not have.



POPULATION DENSITY STATEWIDE

The distribution and density of population are among the most important factors influencing the viability of transit service. Higher density communities have more people within walking distance of a bus route and thus are likely to be more successful transit markets. In this respect:

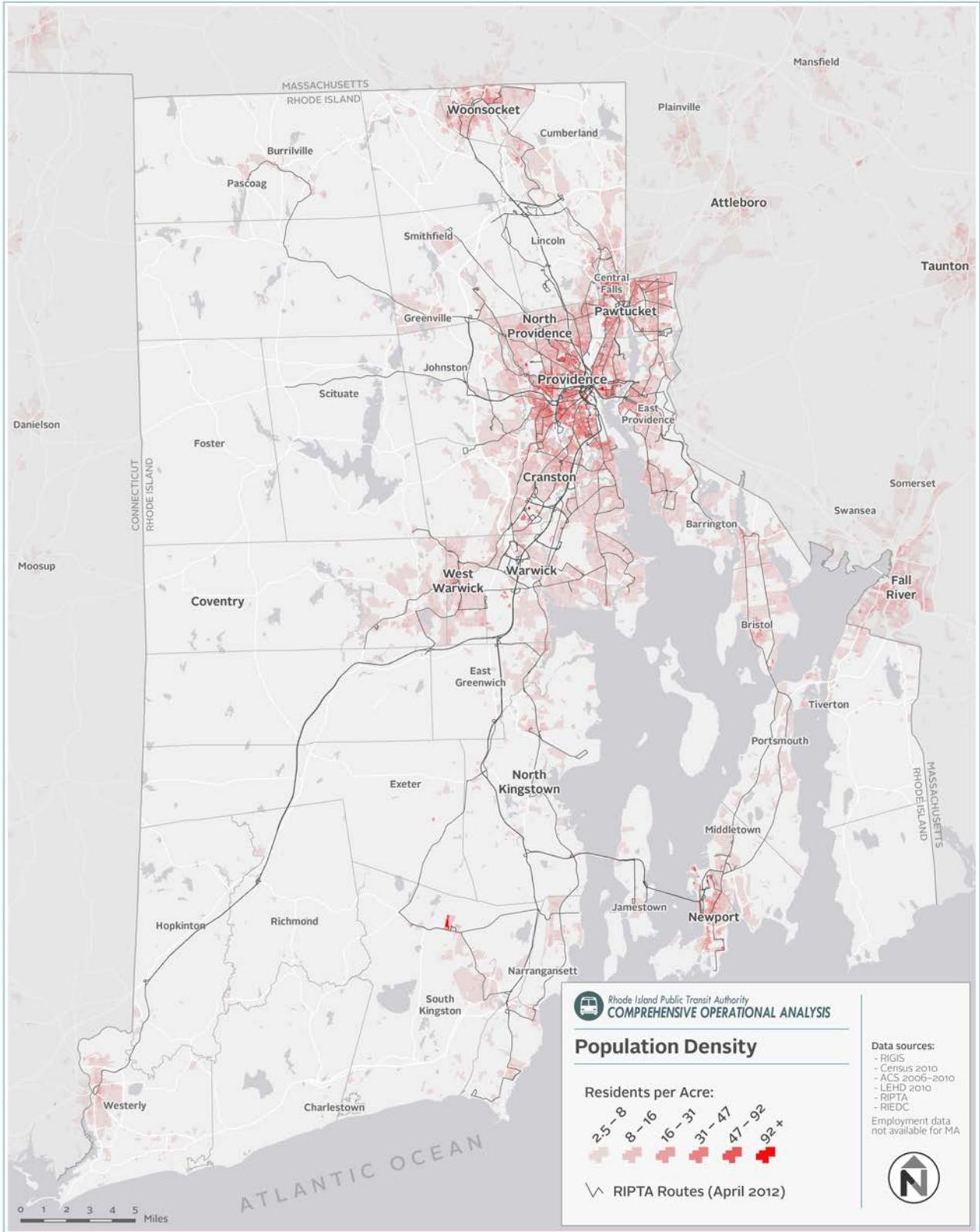
- Population is heavily concentrated on the eastern border of the state, especially in the Providence metro area.
- The highest population densities are in Providence, Central Falls, and Pawtucket. These communities can support high levels of transit service (based on population densities, service that operates every 10 minutes or less).
- Parts of North Providence, Woonsocket, and to a limited extent, Newport and Kingston (URI), also have high population densities and can support frequent bus service.
- Barrington, Bristol, Warwick, West Warwick, and Westerly have transit supportive densities, but to a significantly lesser degree than the communities listed above.
- Other areas of the state have population and population densities that, overall, are too low to be served by traditional transit.

In terms of how well existing transit serves areas with significant population densities:

- All communities with population densities high enough to support fixed-route transit service area are served to some extent. However, there are also some areas within most of these communities that have high population densities and that are not served. These areas will be examined in more detail as part of subsequent work.
- Many areas with transit supportive population densities are located relatively far from Providence (for example, Westerly, Woonsocket, and Newport), and services between these areas and Providence travel relatively long distances through areas with low population densities. This explains low ridership along many route segments (for example Route 14 West Bay between Kingston and Warwick), but is a necessary component of providing service to outlying communities.
- Overall, RIPTA serves an overwhelming majority of Rhode Islanders statewide. The 2010 Census indicates that 77% of Rhode Islanders live within ¼-mile of a RIPTA route or within a Flex zone.



FIGURE 1 | POPULATION DISTRIBUTION AND DENSITY – STATEWIDE



Source: Census 2010 by block.



POPULATION DENSITY PROVIDENCE METRO AREA

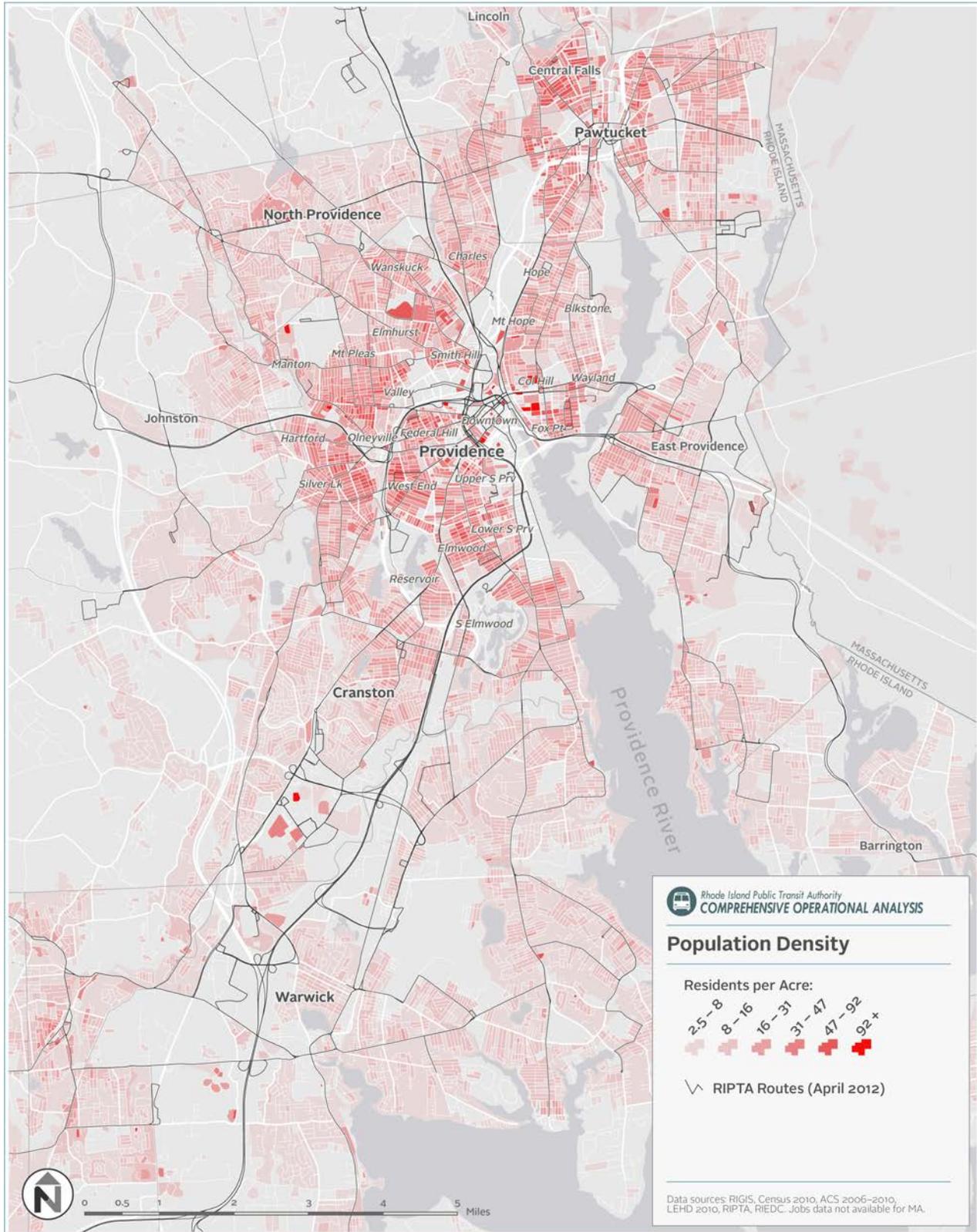
In the Providence metro area:

- The communities with the greatest population densities are central Providence, Pawtucket, and Central Falls. These communities tend to have over 50 residents per acre. Population density at this level will typically support transit service with a frequency of every 10 minutes or less.
- Providence neighborhoods with the greatest densities are Federal Hill, West End, Olneyville, Elmwood, and Fox Point. These neighborhoods can also support very frequent transit service.
- Bordering Providence, the communities of Cranston, and North Providence have moderate population densities.

In terms of how well existing transit serves areas with significant population densities:

- Areas with the highest population densities—Providence, Pawtucket, and Central Falls—have extensive service coverage.
- There are some areas in Cranston and North Providence where additional service coverage should be examined.
- Overall, RIPTA provides very good service coverage to the Providence Metro area. The 2010 Census indicates that 93% of Rhode Islanders living in the Metro area's seven cities/towns are within ¼-mile of a RIPTA route or within a Flex zone.

FIGURE 2 | POPULATION DISTRIBUTION AND DENSITY – PROVIDENCE METRO AREA



Source: Census 2010 by block.



EMPLOYMENT DENSITY STATEWIDE

Understanding the distribution and density of employment is also critical to transit service design. Bus routes that travel through areas of high employment density provide key connections to job opportunities. Employment is especially important because traveling to and from work accounts for the single most frequent type of transit trip.² Employment data for the Providence metro area, drawn from the U.S. Census Bureau's 2010 Longitudinal Employer-Household Dynamics (LEHD)³ product, is shown at right.

- Northeastern Rhode Island, and Providence in particular, has by far the largest number and highest concentration of jobs. Other communities along I-95 north and south of Providence also have high concentrations of jobs, particularly Pawtucket, Cranston, and Warwick.
- Other clusters of jobs are along Route 146 between Providence and Woonsocket, along I-295, at the Quonset Business Park in North Kingstown, and in Narragansett and Newport.⁴
- The only community in the western half of the state with any significant number of jobs is Westerly; the remainder has relatively few jobs, which tracks with the relatively low population.

In terms of how well existing transit serves areas with significant employment densities:

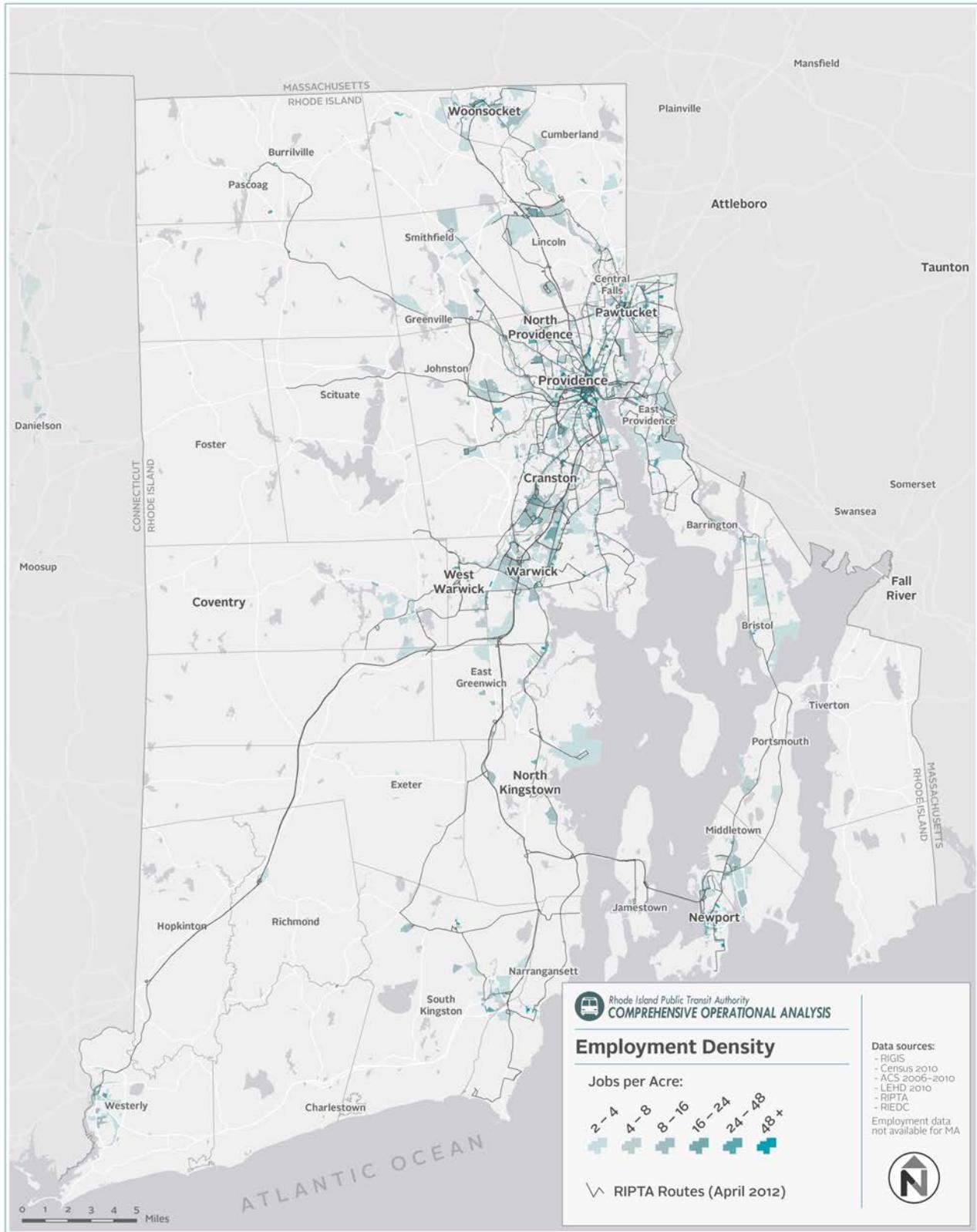
- All communities with employment densities high enough to support fixed-route transit service area served.
- However, there are some areas within some of these communities— in East Providence, West Warwick, Johnston, and Newport—that are not served and that warrant further examination in subsequent phases of the study.
- Outside of these communities, the Quonset Business Park in North Kingstown is an emerging business area that is not currently served.

² According to the 2009 National Household Travel Survey, 33% of all person trips are for the purpose of earning a living (compared to 31% of all trips for family/personal business, 19% for social/recreational purposes, and so on).

³ While the LEHD employment data is quite useful, the data comes with two notable drawbacks. First, job location data for companies with multiple locations occasionally suffers from “headquartering,” where all employees are assigned to a central location. Second, some special classes of employees are excluded from the data entirely (military personnel and Federal civilian employees). The data should be interpreted with these drawbacks in mind.

⁴ Note that there are approximately 5,800 employees at the Newport Naval Station that are not shown on the map because they are not included in the LEHD data.

FIGURE 3 | EMPLOYMENT DISTRIBUTION AND DENSITY – STATEWIDE



Source: Census LEHD 2010 by traffic analysis zone. No data available for Massachusetts because they do not participate in the LEHD program.



EMPLOYMENT DENSITY PROVIDENCE METRO AREA

Within the Providence metro area:

- Providence has by far the largest number and highest concentration of jobs, particularly in downtown. This makes downtown Providence a prime market for transit service, and explains RIPTA's strong focus there.
- South of Providence, Warwick and South Cranston have a high concentration and number of jobs, particularly along I-95 between Route 10 and I-295.
- Other communities with a high concentration and large number of jobs include Pawtucket and East Providence.

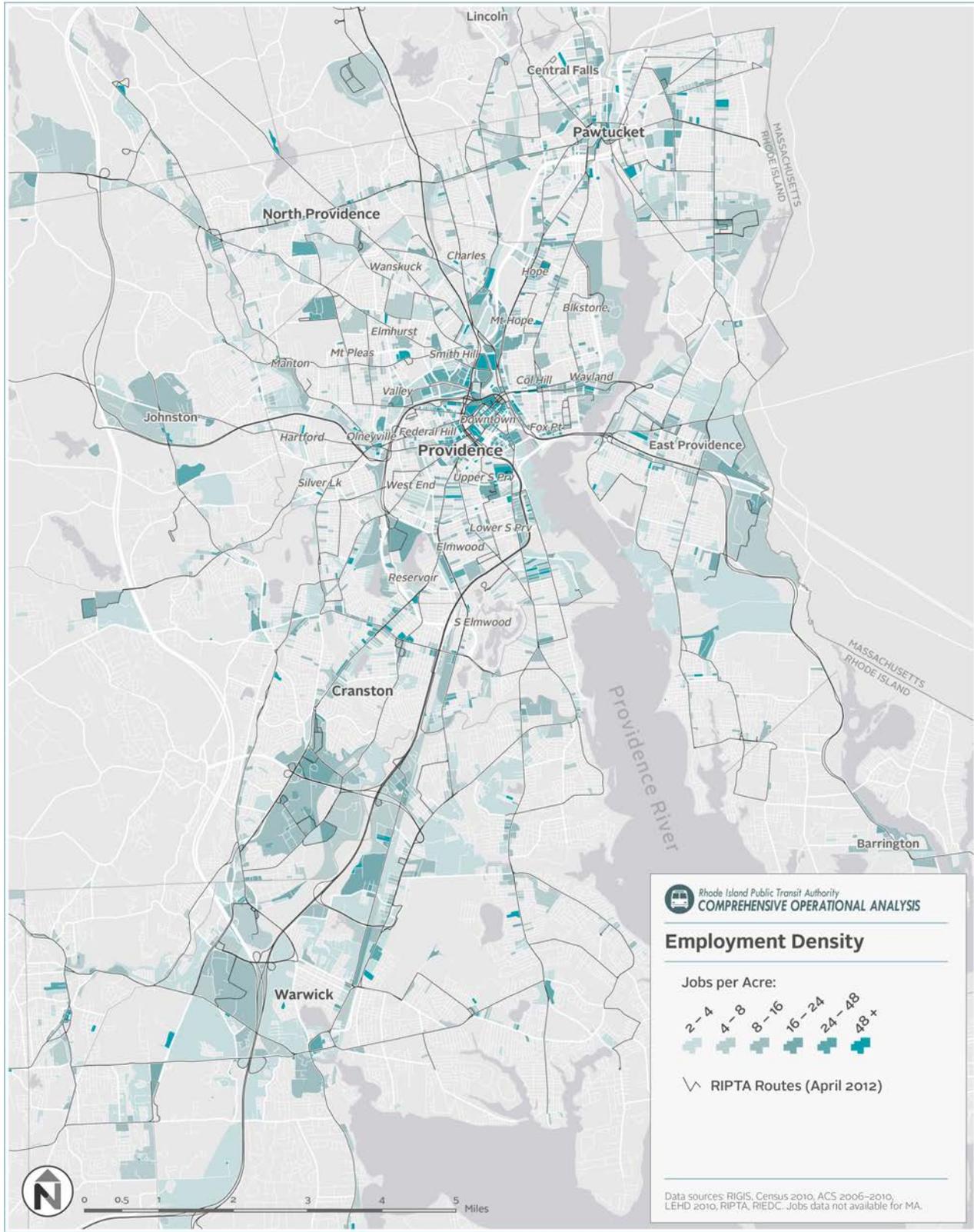
In terms of how well existing transit serves areas with significant population densities:

- All areas within the Providence Metro area are served with at least a peripheral level of service.
- An evaluation of areas that are served only peripherally will be conducted as part of the route-by-route analysis to determine whether job locations within zones with high employment densities are served sufficiently.⁵

⁵ This market analysis is based on data that is available only at the census block level, and does not provide information on the location of specific job sites.



FIGURE 4 | EMPLOYMENT DISTRIBUTION AND DENSITY – PROVIDENCE METRO AREA



Source: Census LEHD 2010 by traffic analysis zone. No data available for Massachusetts because they do not participate in the LEHD program.



LARGE EMPLOYERS STATEWIDE

To supplement the LEHD employment data, the study team also examined the location of large employers throughout the state using Rhode Island Economic Development Corporation data on employment sites with 100+ jobs.⁶ The large employment sites for the entire state are shown at right.

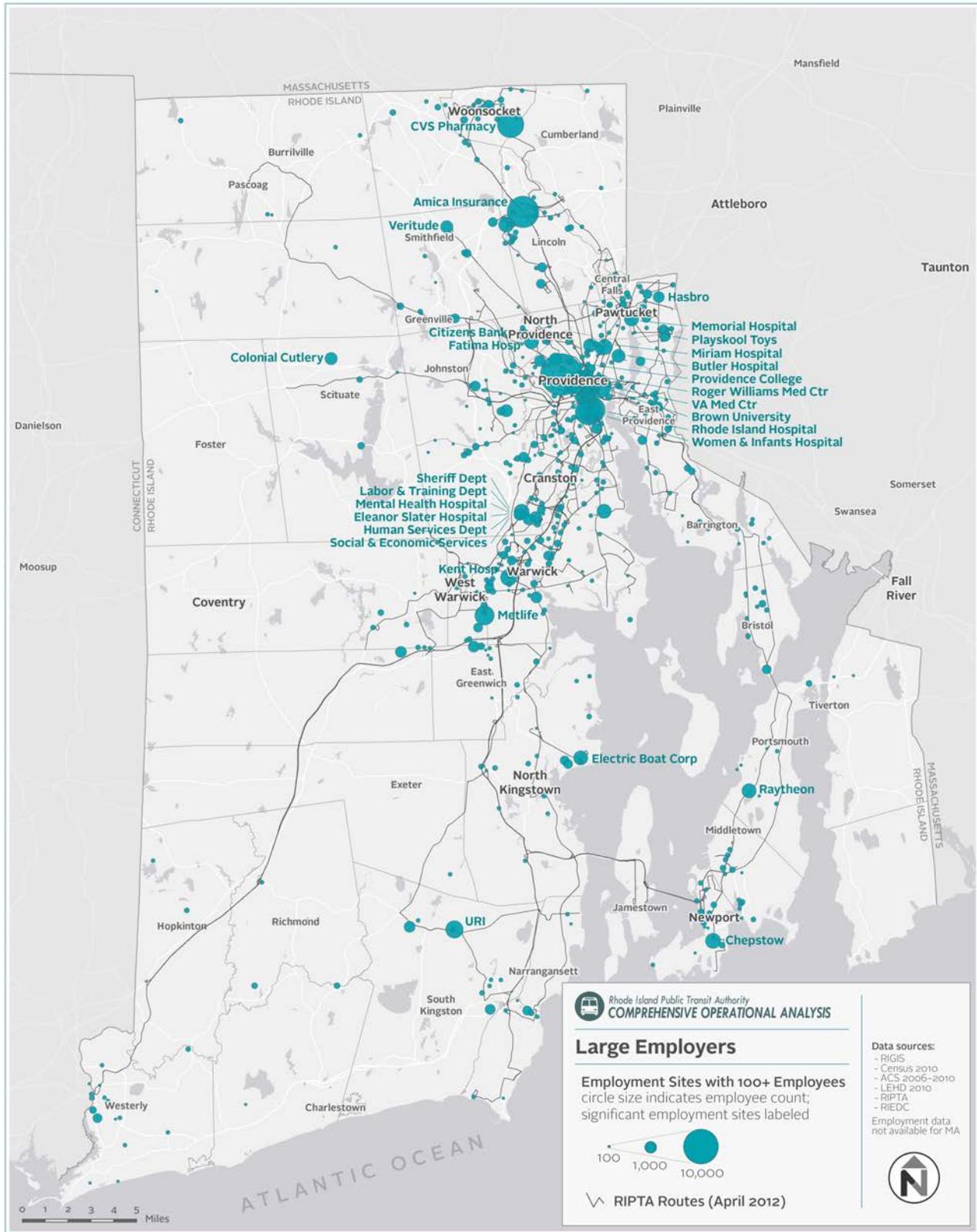
- This map reiterates the concentration of large employers in the Providence metro area.
- A small number of large employers are scattered throughout the state, including CVS in Woonsocket, Colonial Cutlery in North Scituate, Met-Life in Warwick, URI-Kingston, Raytheon in Portsmouth, and Electric Boat Corporation in North Kingstown.
- The western half of the state has very few large employers.

In terms of how well existing transit serves large employers:

- Virtually all major employment centers are served with at basic level of fixed-route bus service
- One exception is CVS' headquarters in Woonsocket, where previously provided fixed-route service performed poorly, and was replaced by Route 281 Woonsocket Flex service.

⁶ There are also many locations, such as shopping centers, where employment at individual businesses is less than 100, but where combined employment is greater than 100. There is no comprehensive source of data for those locations. However, the presence of these employers is reflected in the employment density data presented previously. In addition, service to individual activity centers such as shopping centers will be examined as part of the evaluation of the performance of individual routes.

FIGURE 5 | LARGE EMPLOYERS DISTRIBUTION AND DENSITY – STATEWIDE



"Large Employer" >100 employees per site. Source: Rhode Island Economic Development Corporation (May 2012).



LARGE EMPLOYERS PROVIDENCE METRO AREA

Within the Providence metro area:

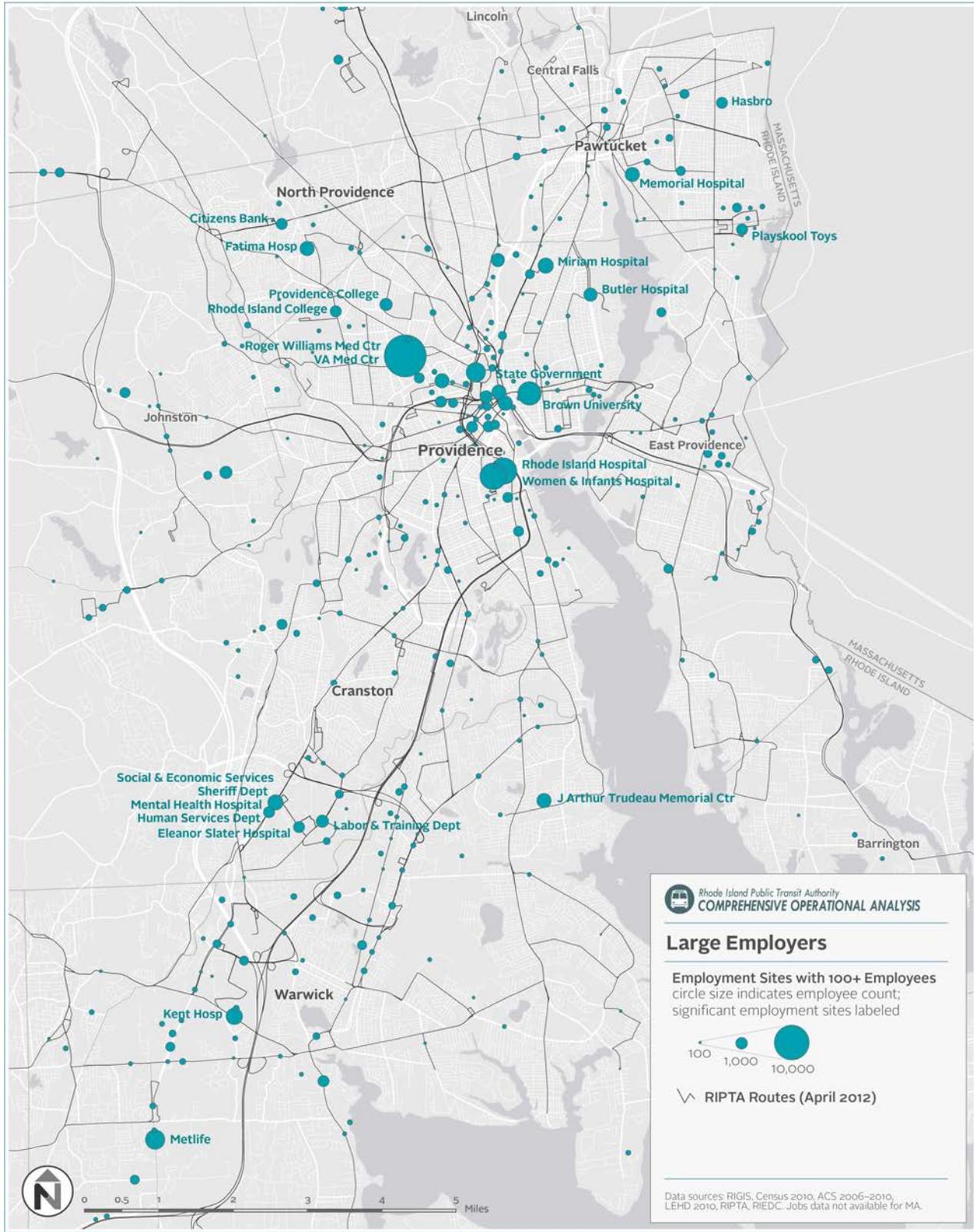
- Consistent with the LEHD data, Providence has the highest concentration of large employers; large employers include GTECH, Citizens Bank, Brown University, the Roger Williams Medical Center, Rhode Island Hospital, and Women’s & Infants Hospital.
- Other large employers are located in the bordering communities of North Providence, Pawtucket, Cranston, and Warwick.

In terms of how well existing transit serves large employers:

- All of the largest employers are directly served by transit.
- However, many of the “smaller” large employers are located in suburban areas outside of the urban core (for example, along I-295, and in Cranston and Warwick). These job sites, by themselves, are typically not large enough to support transit service, but in conjunction with other factors (for example, population and overall employment densities, or the presence of transit dependent populations) may be. The combination of factors may warrant transit service in some cases, and is described in Chapter 4.



FIGURE 6 | LARGE EMPLOYERS DISTRIBUTION AND DENSITY – PROVIDENCE METRO



"Large Employer" >100 employees per site. Source: Rhode Island Economic Development Corporation (May 2012) Socio-Economic Characteristic



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3 SOCIO-ECONOMIC CHARACTERISTICS

Many groups, such as older adults, the young, minorities, low-income residents, and households with no access to personal vehicles, use transit to a greater extent than other groups. In many cases, persons within these categories are often dependent upon family, friends, and public transportation to accomplish daily activities, as they lack access to a reliable vehicle or are unable to drive for other reasons. In these cases, the availability of transit service provides a critical lifeline and independence. The following pages describe transit demand among:

- Low income households, which have high rates of transit use because they are particularly sensitive to cost and the use of transit is less expensive than owning and operating a private automobile.
- Older adults, or individuals aged 65 or more, typically have high rates of transit usage, as people become less comfortable driving as they age or are no longer physically able to drive.
- Youths, who are old enough to travel independently but do not yet drive.
- Persons with disabilities, who often cannot drive or have difficulty driving.
- Households without automobiles, whose members rely on transit due to the simple fact that they do not have readily available access to an automobile, either by choice or for other reasons.
- Minority populations, whose who often have lower incomes and/or are new to the country and are just beginning to climb the economic ladder.

Note that there is a large amount of overlap between these groups. For example:

- Many elderly residents have low incomes and also have a disability.
- A large proportion of households without access to an automobile are also low income households.
- Minority populations typically use transit to a greater extent because of low incomes, and not specifically due to ethnic background.

Still, the presence of each population group is an important indicator of increased demand for public transit, and thus is presented individually. In addition, to present an indication of the how the combination of these populations will impact the demand for transit, the Transit Cooperative Research Program (TCRP) developed a methodology to combine individual factors.⁷

Finally, note that the large majority of populations with a high propensity to use transit are located in the Providence metro area and Woonsocket (the only exceptions are some small clusters in Newport). As a result, the maps in this chapter present this area rather than the state as a whole.

⁷ TCRP Report 28: “Transit Markets of the Future, The Challenge of Change”



INDIVIDUALS IN POVERTY

More than any other demographic, low-income status is the strongest indicator of higher than average transit demand. This is because, as income falls, the cost of owning and using a private vehicle becomes more burdensome, while transit is affordable.

According to the 2006–2010 American Community Survey, the number of Rhode Islanders living in poverty (a member of a household with income below poverty level as defined by the U.S. Census) is 12.2%. This is an increase from 11.9% in 2000 but still below the national average of 13.8%.

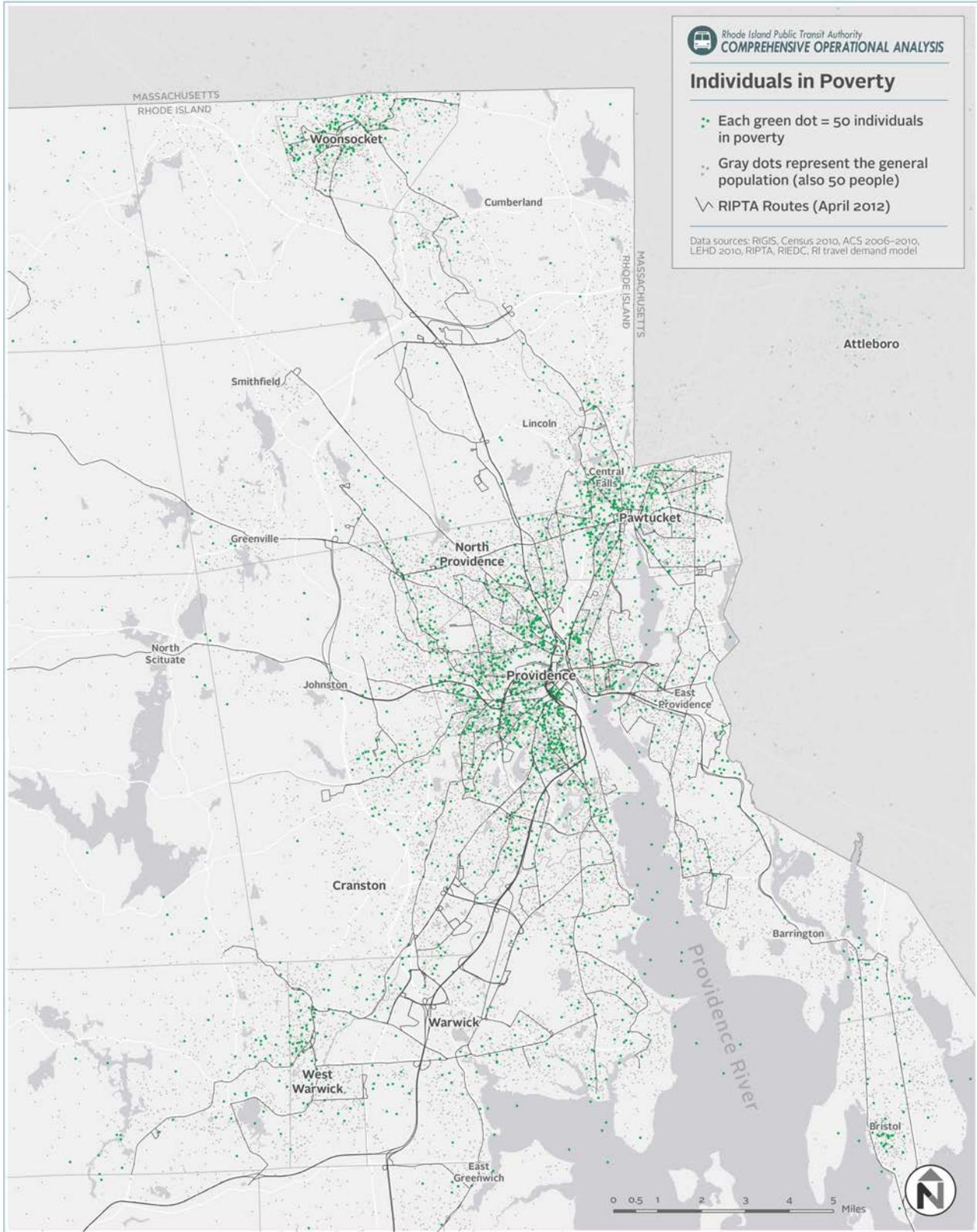
- Poverty is most concentrated in five cities: Providence, North Providence, Pawtucket, Central Falls, and Woonsocket.
- Other communities with lower, but still significant levels of poverty include East Providence, Cranston, Warwick, West Warwick, and Cumberland.

In terms of how well existing transit serves areas with high levels of poverty:

- Most areas with high levels of poverty receive among the highest levels of transit in the state. One partial exception is Woonsocket, where much of the city is served by Flex service, which is less convenient than fixed-route service for many.
- There are smaller populations of low income individuals in many areas who live between bus services. These populations, by themselves, are not large enough to warrant new service. However, as described in Chapter 4, in combination with other populations, the provision of additional service should be examined in parts of Cumberland, Smithfield, Greenville, Barrington, Bristol, Narragansett, and Westerly.



FIGURE 7 | HOUSEHOLDS IN POVERTY DISTRIBUTION AND DENSITY



Source: ACS 5-year estimates 2006-2010 by census block group.



OLDER ADULTS

Older adults (those 65 years and older) are more likely to ride transit than the general population because they have chosen to stop driving or can no longer drive. Throughout the country, this is a key market for transit, in part because it is increasing so dramatically. In 2000, 35 million Americans were age 65 and over, or 12.4% of the total population. By 2010, that number had grown to 40 million, or 13.0% of the total population.

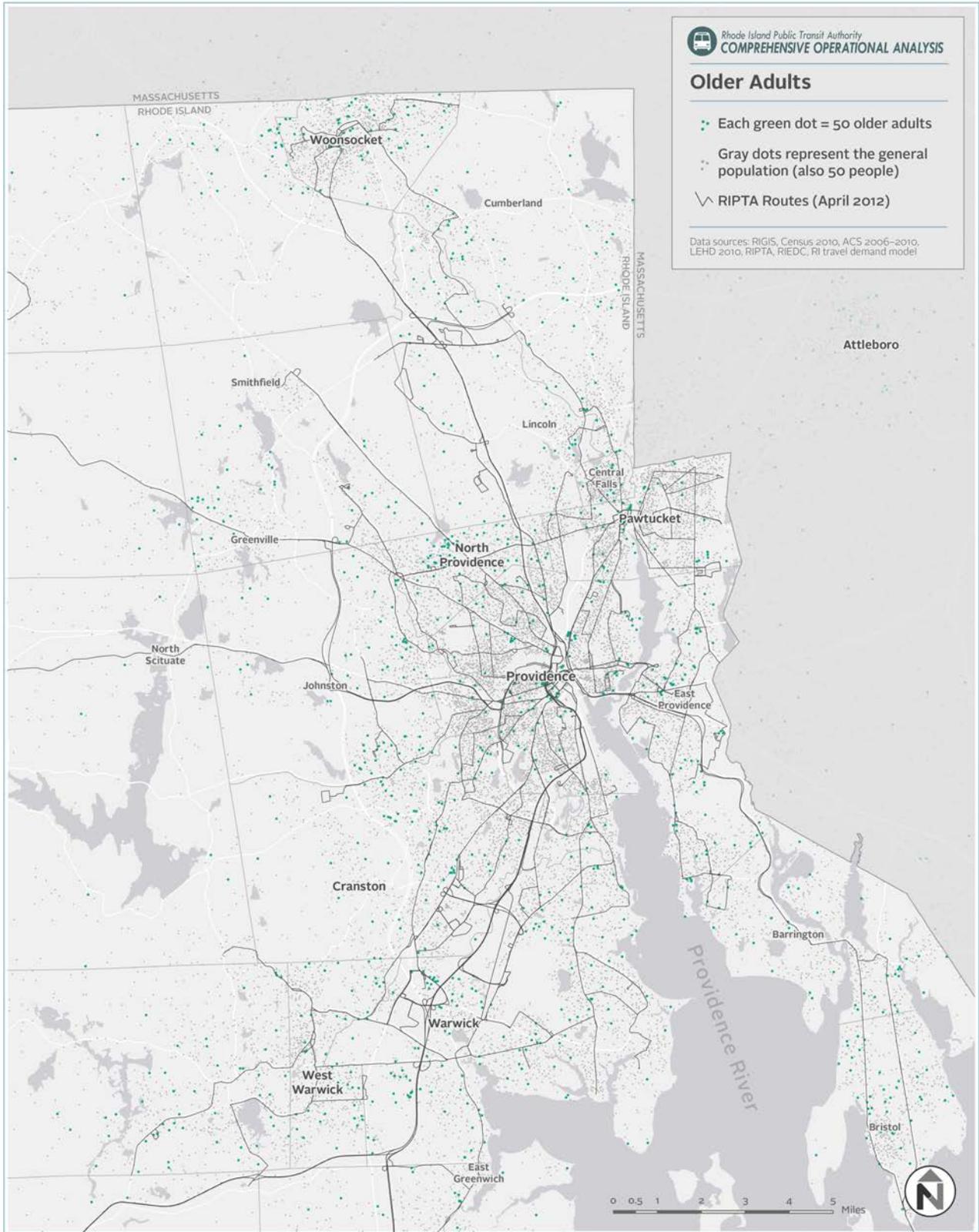
Over the past decade, Rhode Island has been the only state in the country not to have experienced an increase in older residents. Between 2000 and 2010, the number of residents aged 65 and older declined slightly, from 152,402 (14.5% of the total population) to 151,881 (14.4% of the total population). However, this trend is not likely to continue, as the number of residents aged 55 to 64 grew by nearly 50% in the same period. This suggests that there are a large number of individuals who will enter the “older adult” cohort in next decade.

At the current time:

- Older adults are very dispersed throughout the market. These individuals generally track well with the general population’s distribution and density and are not clustered in specific areas.
- Somewhat surprisingly, two exceptions are the central cities of Providence and Pawtucket, which have lower concentrations of older adults compared to the overall population.



FIGURE 8 | ELDERLY POPULATION DISTRIBUTION AND DENSITY



Source: Census 2010 by block.



YOUTHS

Youths are considered part of the transit-dependent population because many have a need or interest in traveling independently, but are not old enough to drive or do not have access to an automobile. The number of youth (ages 5 to 17) in the state fell slightly between 2000 and 2010, from 183,926 to 166,508. The proportion of youths within the overall population fell as well, from 17.5% in 2000 to 15.8% in 2010.

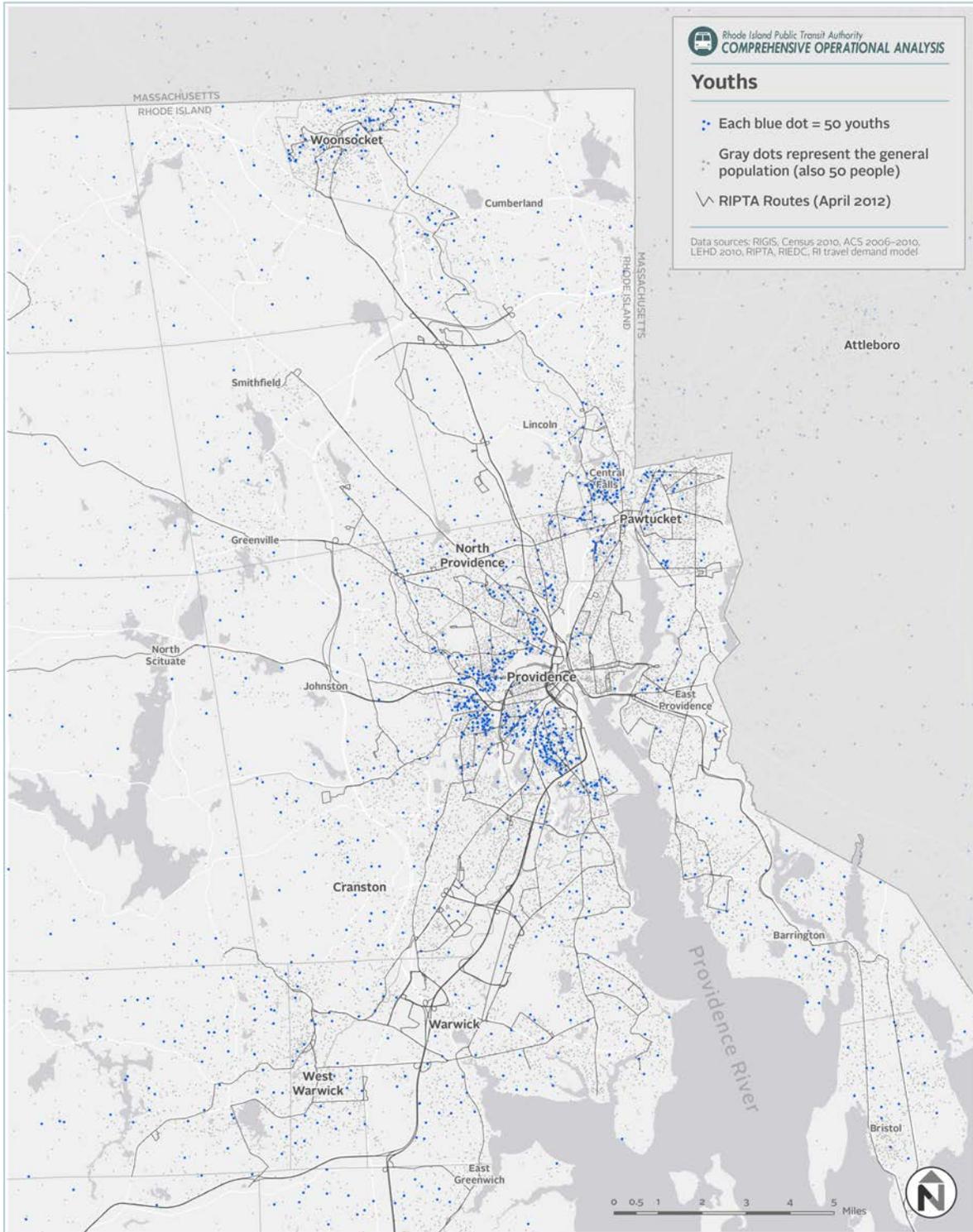
- Youths are clustered in the central cities of Providence, Pawtucket, and Central Falls, and in Woonsocket. These areas are also the areas with low populations of older adults, which indicates that the population in these areas is younger overall.
- Outside of these cities, populations of youths are very dispersed.
- Although not shown on the map, Newport has a particularly low proportion of youths.

In terms of how well existing transit serves areas with large numbers of youths:

- The areas with the largest numbers of youths are among the best served in the state.



FIGURE 9 | YOUTH POPULATION DISTRIBUTION AND DENSITY



Source: Census 2010 by block.



PERSONS WITH DISABILITIES

Persons with disabilities are more likely to utilize transit than the general population, often due to their inability to operate a vehicle. The U.S. Census indicates that 20% of the general population have a disability (the share is higher for older adults, of which 40% have a disability), which underscores the significance of this group on transit service.

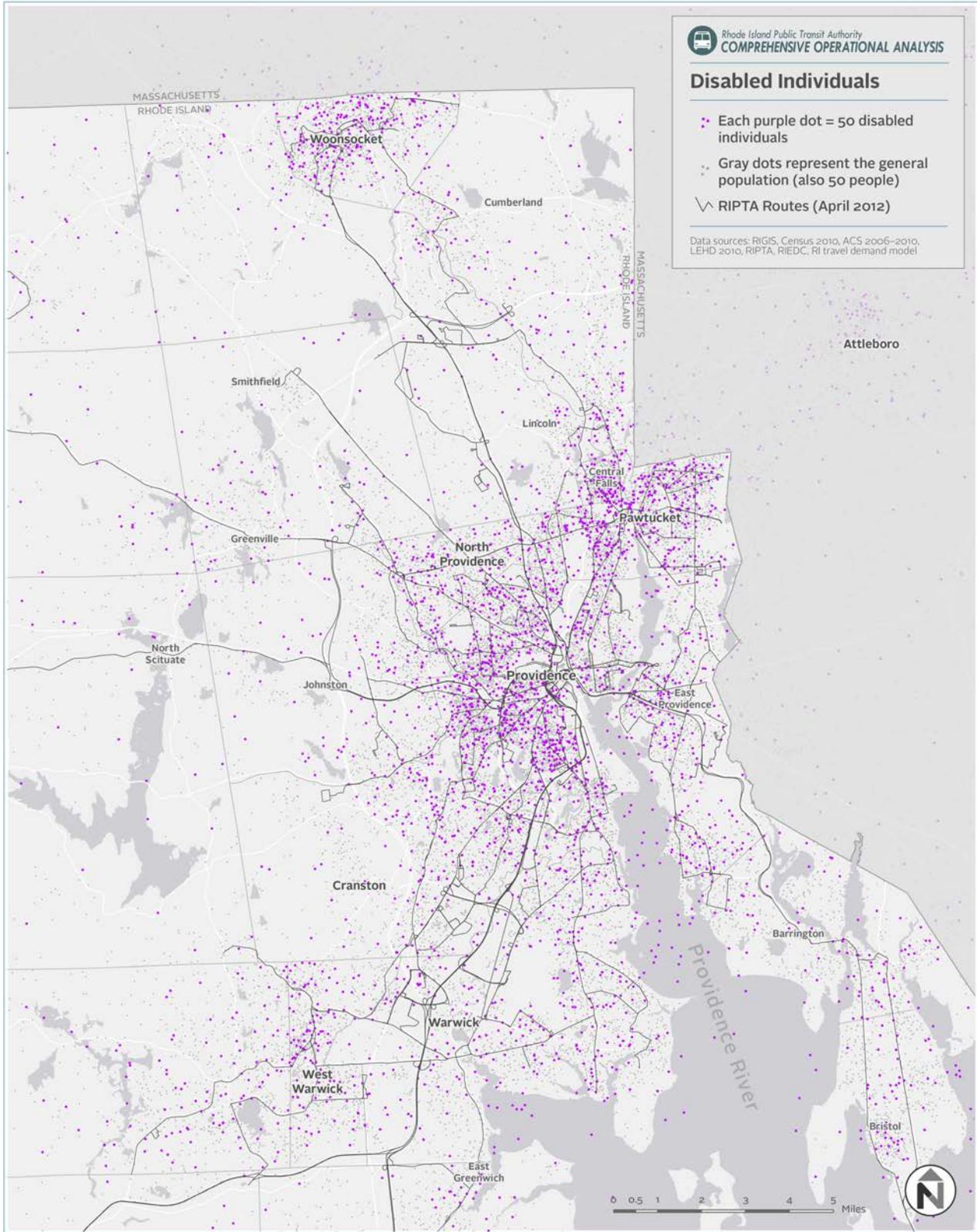
- Populations of disabled individuals generally track with overall population as areas with greater population also generally have higher numbers of disabled individuals. Disabled populations also track well with older adults, since they are more likely to have a disability.
- Coincident with overall population, important clusters for individuals with a disability include Providence, Pawtucket, Woonsocket, Central Falls, East Providence, and North Providence.

In terms of how well existing transit serves areas with large numbers of residents with disabilities:

- Most areas with large numbers of residents with disabilities receive among the highest levels of transit in the state.
- However, residents with disabilities live throughout the state, including in many areas where the provision of transit service is not practical.
- These populations, by themselves, are not large enough to warrant new service. However, as described in Chapter 4, in combination with other populations, the provision of additional service should be examined in parts of Cumberland, Smithfield, Greenville, Barrington, Bristol, Narragansett, and Westerly.



FIGURE 10 | DISABLED POPULATION DISTRIBUTION AND DENSITY



Source: Census 2000 by block group.



INDIVIDUALS WITHOUT ACCESS TO A VEHICLE

For self-evident reasons, individuals without access to an automobile represent a particularly strong market for transit. In many cases, individuals do not have access to an automobile, while in others, individuals do not own a car because they choose to use transit as their primary mode of transportation.

According to the American Community Survey, between 2000 and 2010, the number of zero-vehicle households in Rhode Island decreased from 44,717 to 39,471. The percentage of households without automobiles, however, is 9.7% and above the national average of 8.9%. Considering the number of individuals who are members of households without access to a vehicle:

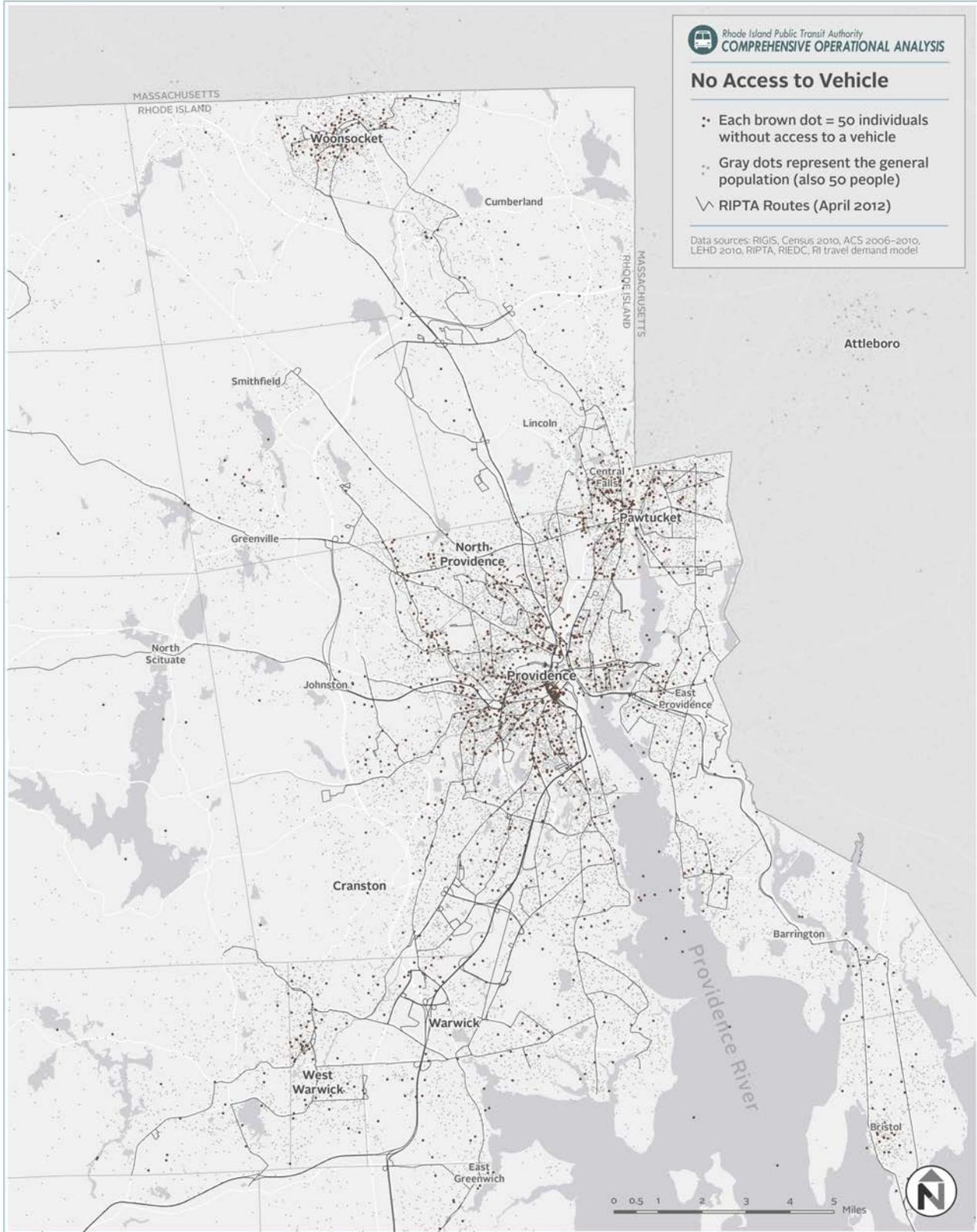
- Individuals without access to a vehicle are clustered in Providence, Pawtucket, and Central Falls, and to a lesser extent Woonsocket and Newport.
- Other communities that have significant numbers of individuals without access to a vehicle are East Providence, Warwick, West Warwick, North Kingstown, and Narragansett.
- In general, these are the same areas as those with large numbers of low income and minority residents.

In terms of how well existing transit serves areas with high levels of poverty:

- Most areas where there are many individuals without access to an automobile receive among the highest levels of transit in the state. One partial exception is Woonsocket, where some of the city is only served by Flex service, which is less convenient than fixed route service for many.
- There are smaller populations of low income individuals in many areas who live between bus routes. These populations, by themselves, are not large enough to warrant new service. However, as described in Chapter 4, in combination with other populations, the provision of additional service should be examined in parts of Cumberland, Smithfield, Greenville, Barrington, Bristol, Narragansett, and Westerly.



FIGURE 11 | ZERO VEHICLE HOUSEHOLDS DISTRIBUTION AND DENSITY





MINORITIES

National research shows that minority populations use transit to a much higher extent than non-minority populations.⁸ This is largely because minorities, on average, have lower incomes than non-minorities, and thus there is a particularly large amount of overlap between populations of minority populations and low income households. Still, the presence of high numbers of minority residents is a strong indicator of transit demand. The provision of effective transit service to minority populations is also particularly important to the Federal Transit Administration.

- Minority populations are heavily clustered in the central cities of Providence, North Providence, Central Falls, and Pawtucket.
- Woonsocket, Cranston, East Providence, and Newport have clusters of minority populations, though much smaller than in greater Providence.
- Warwick, West Warwick, Barrington, Bristol, Portsmouth, and North Kingston have a low proportion of minorities compared to their overall population.
- Western Rhode Island is home to very few minority individuals.

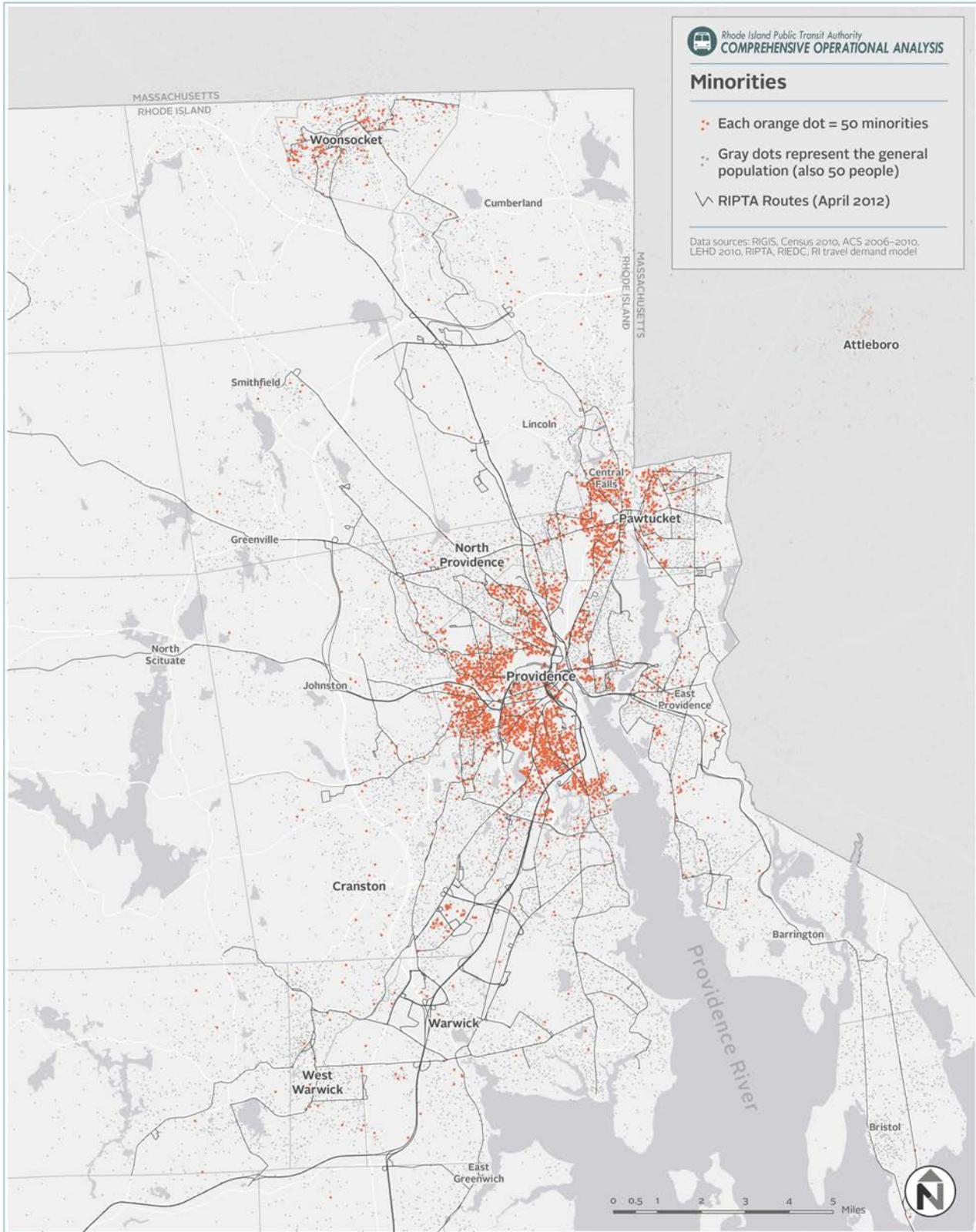
In terms of how well existing transit serves areas with large numbers of minority residents:

- Most areas with large numbers of minority residents receive among the highest levels of transit in the state.
- Still, there may be some opportunities to improve service coverage in some areas, particularly in Woonsocket (which will be addressed later in the study on a route-by-route basis).

⁸ TCRP Report 28, as previously cited.



FIGURE 12 | MINORITY POPULATION DISTRIBUTION AND DENSITY



Source: Census 2010 by block



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4 OVERALL TRANSIT DEMAND

The previous chapters provide indicators of transit demand in terms of a number of population and employment-related measures and socio-economic characteristics. To determine how all of these factors work together, this chapter presents overall transit demand by combining population and employment density with the distribution of the transit dependent groups.

Note that this data provides an indication of “latent” transit demand, and not a specific determination. As described at the beginning of this document, ridership on individual routes and the effectiveness of individual routes can vary significantly depending on a number of factors, including the physical environment, how well service is designed, and the time and costs for competing alternatives. For example:

- Even if the propensity of an area’s residents to use transit is very high, ridership will be high only if available service conveniently takes them where they want to go, but low if it doesn’t.
- If an area can theoretically support the operation of service every 10 minutes, if multiple routes operate in close proximity, the demand for each individual route will be proportionally lower.
- Slower, more circuitous routes will attract fewer discretionary riders than faster, more direct routes.
- Routes that serve areas with where it costs to park (i.e., downtown Providence) will carry higher ridership than routes that serve areas where parking is free.

Nonetheless, even in consideration of these other factors, this information still provides a very strong indication of the relative demand for transit throughout Rhode Island, and identifies areas where demand is highest and transit can be provided most effectively.



OVERALL TRANSIT DEMAND STATEWIDE

Based on combined population and employment densities, and the socio-economic characteristics of residents:

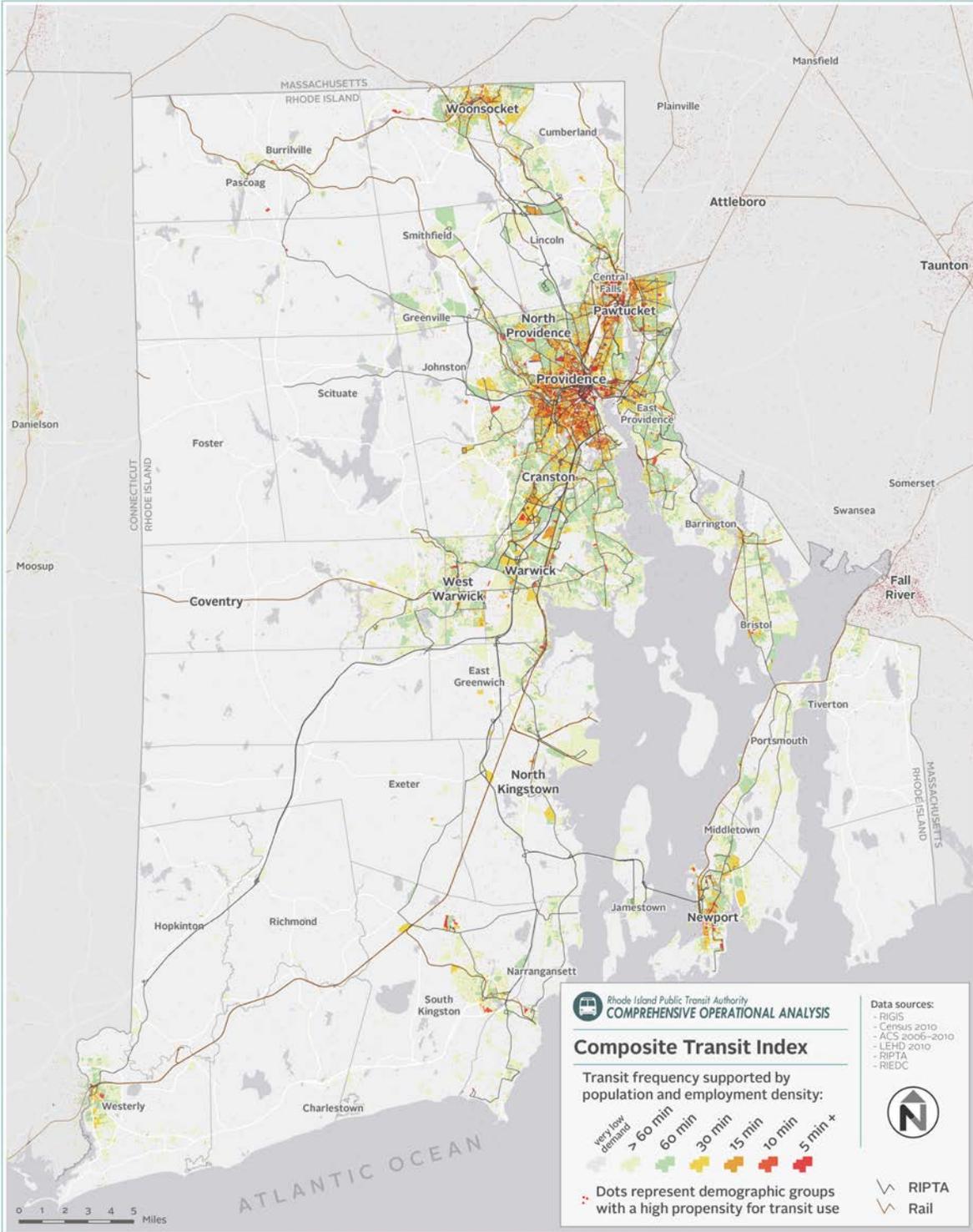
- The highest levels of transit demand are in the Providence metro area.
- Outside of the Providence metro area, there is very strong transit demand in Woonsocket and Newport.
- Beyond these areas, there are only limited pockets where there is very high demand for transit. From north to south, these include Cumberland, Smithfield, Greenville, Barrington, Bristol, Narragansett, and Westerly.

In terms of how well existing transit serves areas with large numbers of minority residents:

- RIPTA's highest levels of service are provided in the areas where demand is highest.
- An examination of service improvements in high demand areas of Cumberland, Smithfield, Greenville, Barrington, Bristol, Narragansett, and Westerly should be conducted in subsequent phases of the COA.



FIGURE 13 | OVERALL TRANSIT DEMAND – STATEWIDE





OVERALL TRANSIT DEMAND PROVIDENCE METRO AREA

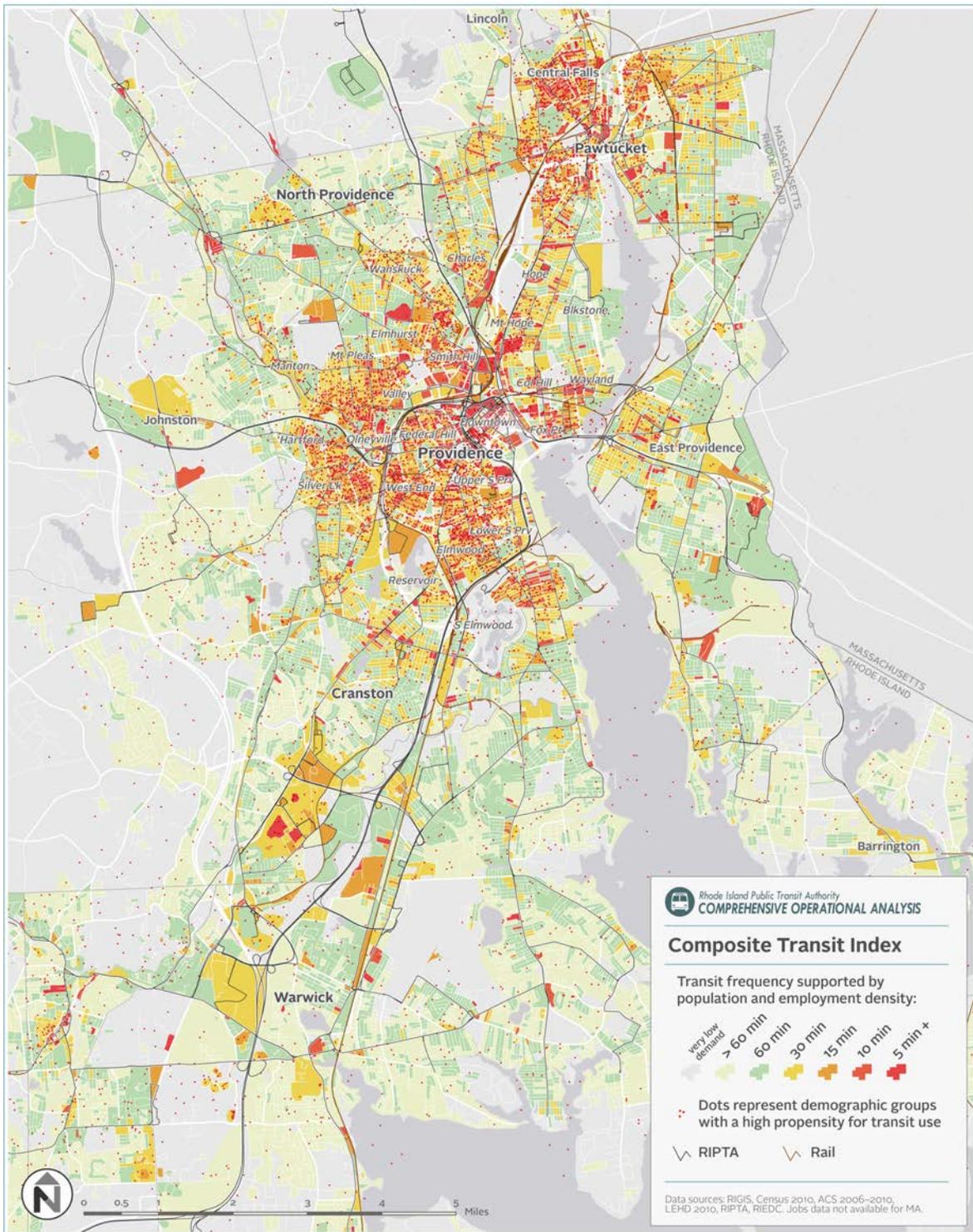
In more detail, in the Providence metro area:

- The most transit-supportive area is the Providence core. The prime neighborhoods include downtown, Fox Point, Mt Hope, Smith Hill, Federal Hill, Olneyville, West End, Upper South Providence, Lower South Providence, and Elmwood.
- Pawtucket and Central Falls also has very high overall transit demand.
- Warwick and Cranston employment centers also produce significant transit demand.

In terms of how well existing transit serves these areas:

- All areas with the highest transit propensities—generally Providence, Pawtucket, Central Falls, and parts of North Providence—have extensive service coverage.
- There are some areas in Cranston and North Providence (those indicated in yellow, orange and red) where additional service coverage should be examined.

FIGURE 14 | OVERALL TRANSIT DEMAND – METRO PROVIDENCE



A composite of population, employment, minorities, individuals in poverty, disabled individuals, youths, elderly, and individuals with no vehicle access.



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5 TRAVEL PATTERNS

For transit to be effective, it must take people from where they are to where they want to go. In Rhode Island, the largest volumes of trips have historically been to and from Providence, and this continues to be the case today. However, recent growth has been outward, and thus there is increasing demand for service to other places.

People also travel for many reasons including to and from work and school, and for shopping, medical, recreation, social, and other purposes. Transit serves all types of trips, but for all transit systems, work trips are particularly important. This for a number of reasons, including public policy and because many work trips are concentrated around times and to places that can be very effectively served by transit (for example, peak period trips to and from downtown Providence). Transit serves work trips throughout the day, but the highest numbers of trips are made during morning and late afternoon peak periods. Trips for other purposes typically comprise much lower volumes than work trips, between more dispersed locations, and are often more oriented toward the midday and evening.

This chapter presents and illustrates the highest volume travel patterns throughout Rhode Island for all trip types and work trips, and assesses how well existing transit service serves those flows. This information is presented in terms of total trips (all trip purposes) and work trips, using data produced by Statewide Planning's regional model.



TRAVEL FLOWS TO AND FROM PROVIDENCE; ALL TRIP TYPES

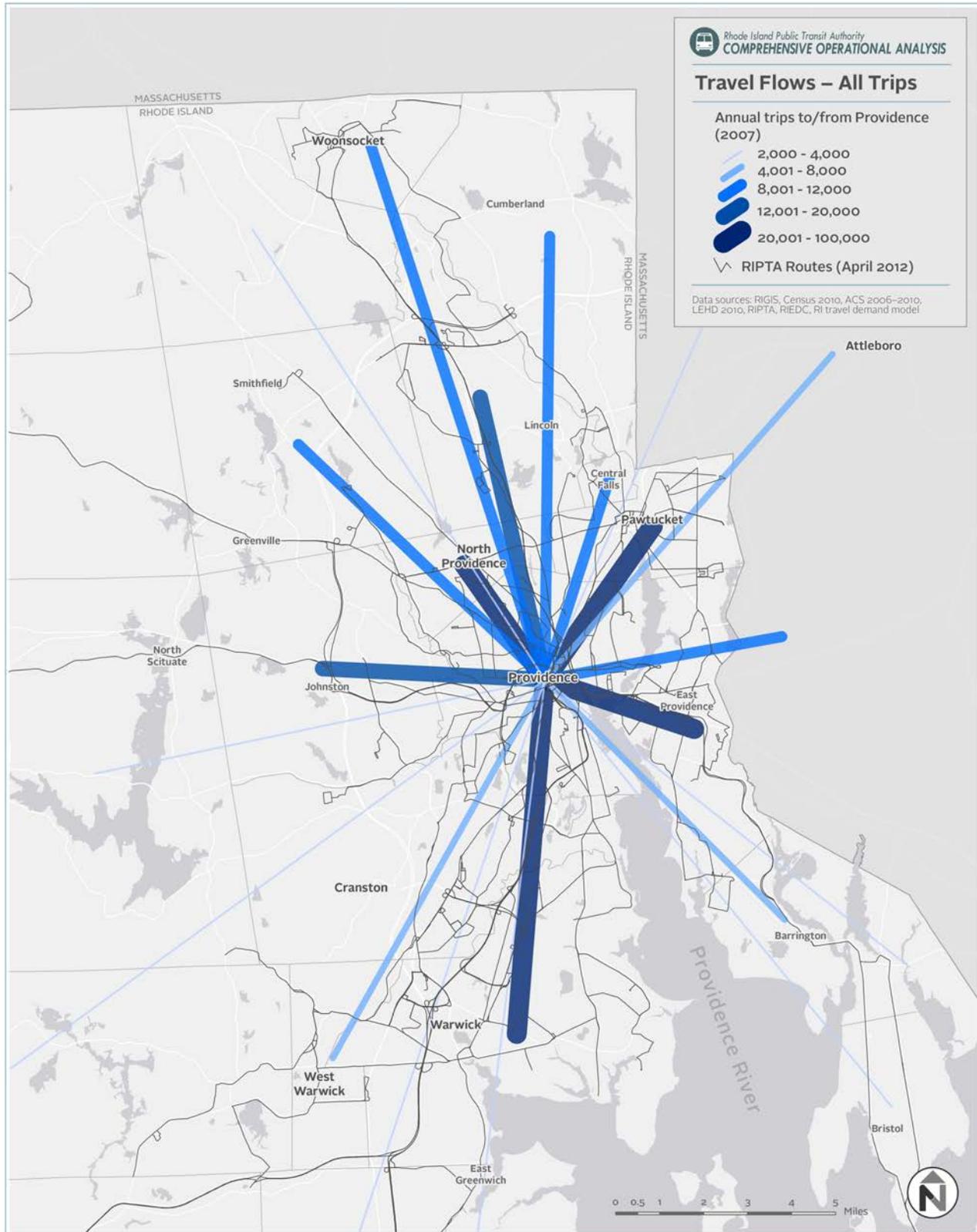
The Rhode Island travel demand model estimates daily trips between “Traffic Analysis Zones,” or “TAZs.” For this analysis, TAZs were combined on a community basis to present community-to-community travel patterns. Continuing its historical role, Providence remains the focal point of the highest volumes of trips:

- The highest volume travel flows (40,000 or more daily trips) are between Providence and Pawtucket, North Providence, East Providence, and Warwick.
- Communities with 20,000 to 40,000 daily trips to and from Providence are Johnston and Lincoln.
- Communities with 15,000 to 20,000 daily trips are Woonsocket, Cumberland, Smithfield, and Central Falls.
- Other Providence metro area communities have significantly less travel to and from Providence.

In terms of how well existing transit serves these areas, all high volume inter-community flows are served by either all day or commuter-oriented service:

- Pawtucket, Central Falls, North Providence, East Providence, and Warwick have high levels of transit service to and from Providence.
- Woonsocket, Cumberland, and Lincoln have strong transit ties to Providence via Route 54 Woonsocket–Lincoln–Providence.
- Smithfield is connected to Providence primarily by Routes 52 Branch Avenue, which provides all day service.
- MBTA Commuter Rail service provides connections between North Kingstown, Warwick/T.F. Green airport, Providence, and stations north to Boston.

FIGURE 15 | TO AND FROM PROVIDENCE; ALL TRIP TYPES





TRAVEL FLOWS TO AND FROM PROVIDENCE; WORK TRIPS

For work trips:

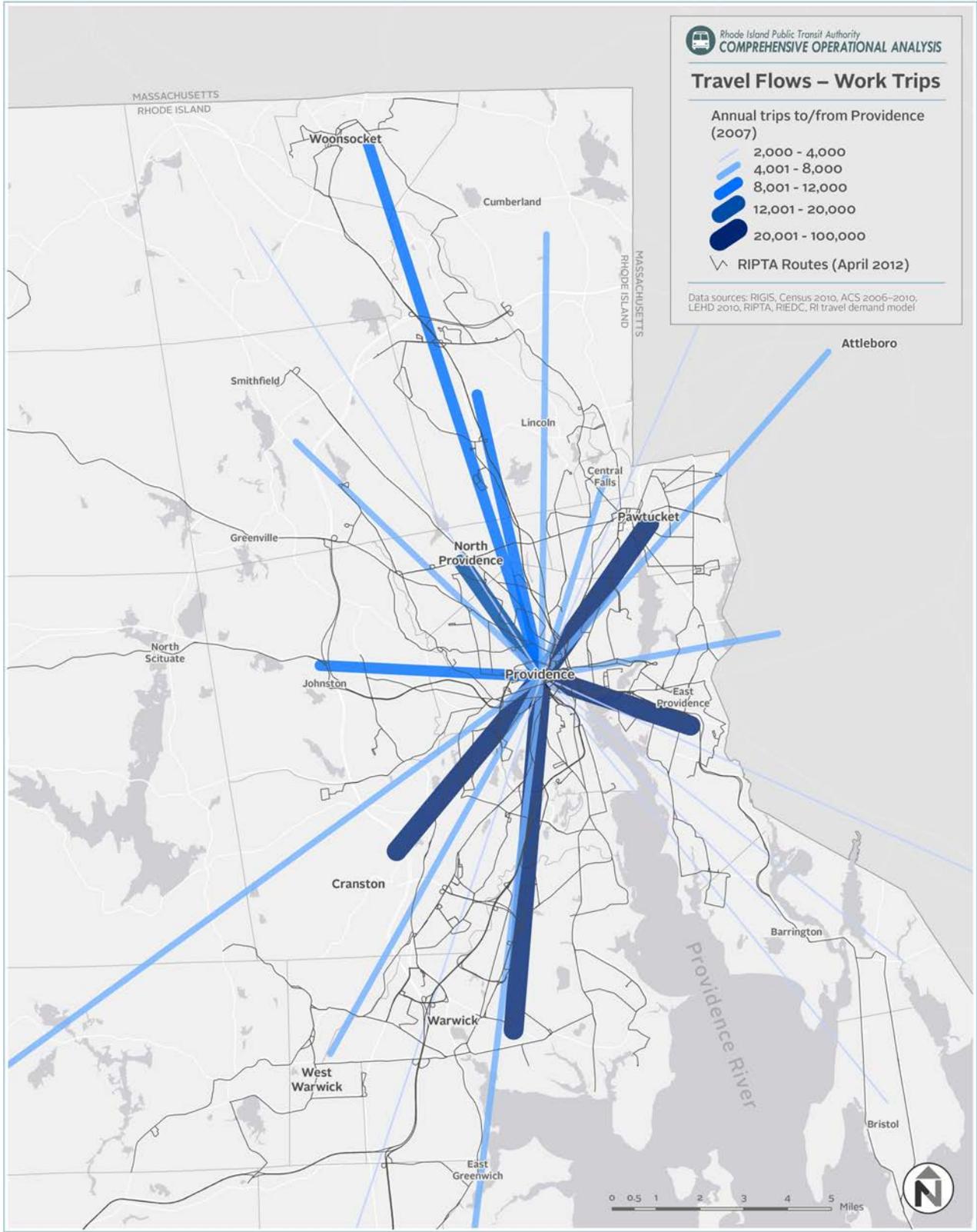
- The highest numbers of work trips to Providence are generally from the same Providence metro area communities that have the highest volumes of trips for all trip purposes.
- In addition, there are also significant numbers of trips from more distant communities, including West Warwick, Coventry, North Kingstown, and Westerly.

In terms of how well these areas are connected with Providence:

- Connections are available between Westerly and Providence via bus service and Amtrak.
- Connections are available between Kingston and Providence via Amtrak and RIPTA local bus.
- A variety of RIPTA services are available between West Warwick and Providence.
- Coventry is the one area with significant travel flows where no public transportation connections are currently available.



FIGURE 16 | TO AND FROM PROVIDENCE; WORK TRIPS





TRAVEL FLOWS

OTHER THAN PROVIDENCE; ALL TRIP TYPES

Travel volumes to locations other than Providence are lower but still significant:

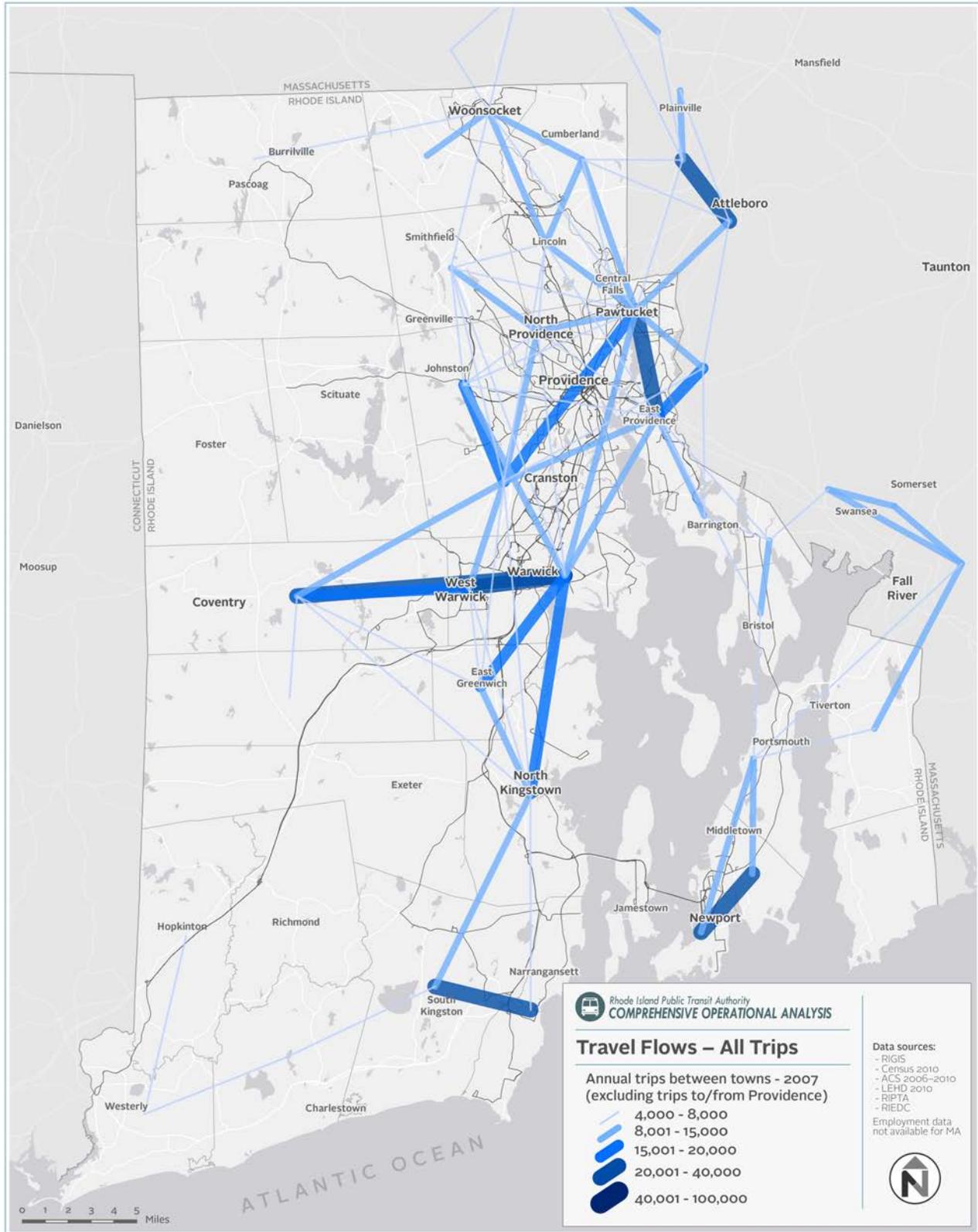
- Trip pairs with a high number of trips are between:
 - Narragansett and South Kingston
 - Newport and Middletown
 - Pawtucket and East Providence
 - Coventry and Warwick
 - West Warwick and Warwick
 - Johnston - Cranston

In terms of how well these areas are connected with Providence:

- Most of these trip flows are fairly well served by RIPTA.
- The largest exception is Johnston – Cranston and Coventry – Warwick.
- These flows should be examined in more detail in subsequent work.



FIGURE 17 | TRAVEL FLOWS BETWEEN LOCATIONS OTHER THAN PROVIDENCE; ALL TRIP TYPES





TRAVEL FLOWS

OTHER THAN PROVIDENCE; WORK TRIPS

For work trips to and from locations other than Providence:

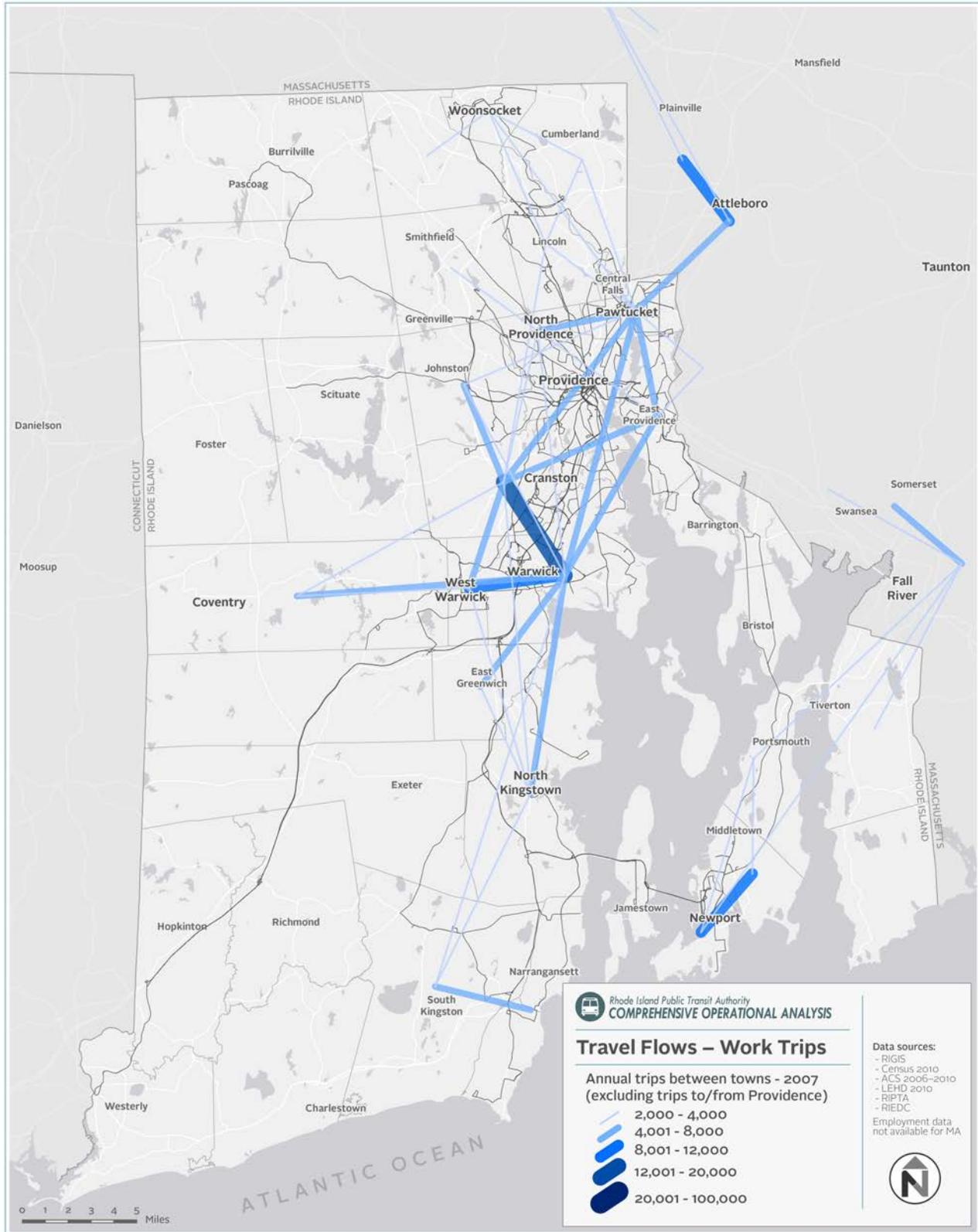
- Volumes of non-Providence commute trips are much smaller than to Providence (and which further emphasizes the continuing importance of Providence in the commute travel market).
- However, while much smaller than to Providence, there are significant travel volumes between:
 - Coventry and Warwick
 - Pawtucket and Cranston
 - East Providence and Pawtucket
 - North Kingston and Warwick
 - Narragansett and Kingston
 - Newport and Middletown

Most of the non-Providence work trip flows are well served. However, exceptions include:

- Cranston - Warwick
- West Warwick - Warwick



FIGURE 18 | TRAVEL FLOWS BETWEEN LOCATIONS OTHER THAN PROVIDENCE; WORK TRIPS





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6 CONCLUSIONS

SUMMARY OF FINDINGS

Overall, the findings of this market analysis indicate the following:

- Population, employment, and activity centers are overwhelmingly located on the eastern side of the state, primarily in the Providence metro area.
- The Providence and Pawtucket city centers have the highest demand for transit.
- Central Falls, though it is small in area, also has a very high demand for transit.
- North Providence, Warwick, West Warwick, Barrington, and Bristol have relatively large, but more dispersed, populations, making these communities less transit-supportive from a population perspective, but still significant.
- Similar to the distribution of population and overall activity, employment is also clustered on the eastern border of the state. Providence is the most significant job center, followed by the neighboring communities of Cranston, West Warwick, Warwick, and Pawtucket.
- The central location of Providence and its surrounding communities make them easy to serve with transit. Communities such as Westerly, Woonsocket, Narangansett, and Newport are more difficult to serve with regional service because they are geographically isolated.
- There are several residential areas where there are concentrations of individuals in poverty — Providence, Central Falls, and Woonsocket. These areas are close to clusters or along corridors of high employment. These factors make these communities very transit-supportive.
- Older adults are very dispersed throughout the state and do not exhibit clusters, while youths and minorities are very concentrated in Providence and Pawtucket.
- The overall transit demand analysis indicates that the highest demands for transit are in:
 - The Providence core
 - Pawtucket
 - Central Falls
 - Between Providence and West Warwick (generally along I-95), including Cranston

POTENTIAL IMPROVEMENTS

Overall, this market analysis finds that RIPTA's route network is generally very well matched with demand. More detailed subsequent phases of the study will examine how to improve those existing services. Beyond those improvements, there are also opportunities for service to some new areas, and better service between some communities. These include:

- A reconfiguration of service in the Warwick area. Warwick is an important work trip location from surrounding communities including Cranston and West Warwick, plus other nearby communities. There may be opportunities to develop a Warwick transit hub (similar to



Pawtucket) that could provide strong ties between Warwick and Providence as well as facilitate local travel. The InterLink station in Warwick (at the T.F. Green Airport) or the Warwick Mall may be potential hub candidates. The InterLink station would offer a convenient connection to commuter rail.

- Transit demand is high throughout most of North Providence, and there may be opportunities to improve service coverage.
- Transit demand is also high in much of Cranston, and there may be opportunities to improve service coverage.
- Demand is high throughout most of Woonsocket, and there are opportunities to improve fixed-route service coverage.
- There appears to be emerging demand for service in the southern half of the I-295 corridor, particularly the south half in Smithfield, Johnston, Cranston, and West Warwick.

These potential opportunities will be further examined in subsequent phases of the COA. Also, as stated in the introduction, this market analysis focused on an examination of service coverage with demand, and does not address whether the levels of service on individual routes are appropriate. The detailed route-by-route analyses that will be conducted will evaluate whether more (or less) service would be warranted to better match levels of service with demand.