

Quonset Transit Market Study and Service Plan

November 2016



With Support From:



FOURSQUARE
INTEGRATED
TRANSPORTATION
PLANNING

Acknowledgements

This plan could not be completed without the help of businesses across the Quonset Business Park. These organizations assisted the study by participating in phone interviews and a focus group, providing the team valuable data, and helping to distribute surveys to their workforces.

This study was developed through close cooperation between:

- The Rhode Island Public Transit Authority
- Quonset Development Corporation
- Rhode Island Department of Transportation

Technical assistance was provided by:

- Foursquare Integrated Transportation Planning

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1. Introduction and Plan Overview

1.1 PARK BACKGROUND

The Quonset Business Park is located on over 3,200 acres of land at the site of the former Quonset Point Naval Air Station and Davisville Construction Battalion Center, about 20 miles south of Providence, Rhode Island. Quonset Point Naval Air Station was a major naval base during World War II and the Cold War until its decommissioning in 1974, at which time jurisdiction over the site was transferred to various Rhode Island state agencies and the Town of North Kingstown. Davisville closed in 1994, followed by additional property transfers to the State and Town. In 2004, the Rhode Island state legislature created the Quonset Development Corporation (QDC), which assumed management of the area on January 1, 2005. Since then, QDC has been responsible for the development and management of the Quonset Business Park, which currently hosts approximately 200 companies employing over 11,000 people.

The most recent comprehensive transit study was conducted at Quonset in 2002, at which time about 93 percent of employees at Quonset Business Park arrived in single-occupancy vehicles (SOV). Of those not arriving in SOVs, the overwhelming majority used carpools or vanpools. The plan acknowledged that Quonset was a challenging location to serve by transit and recommended a mix of improvements like a circulator to connect to the nearby Route 14, and an enhanced vanpool and carpool program.

Today, the entrance to Quonset Business Park is still served by RIPTA Route 14, however there is no RIPTA service within QBP itself. Over the last decade the Quonset Business Park has seen its workforce nearly double in size. The employer base has grown as well, attracting a diverse range of firms from industries like food preparation and logistics, to professional services and insurance. The 2016 *Quonset Transit Market Study and Service Plan* re-examines the need for improved commuter options at the business park in light of Quonset's ongoing expansion.

1.2 PURPOSE OF PLAN

The purpose of the *Quonset Transit Market Study and Service Plan* is to create an effective and implementable proposal for improving commuter links to the Quonset Business Park. The study relies extensively on data collected from Quonset based businesses and employees to understand the existing commuter dynamics of the park. While previous studies have explored improving transit access to the Park, most notably in 2002, the Quonset Business Park has undergone major changes over the last decade. The expansion of major tenants like Electric Boat, along with the growth of a number of new businesses in the Park mean that travel demand in Quonset has both expanded and changed.

The study begins with a thorough existing conditions analysis of the Park and its transportation needs. This existing conditions analysis concludes by identifying major opportunities and challenges to improving commuter options into QBP. Following the existing conditions analysis, the study identifies a number of potential

alternatives for improving transit access, and focuses on refining in greater detail two options which are deemed as the most feasible and effective. The study also explores non-transit solutions such as Transportation Demand Management (TDM) and ridesharing as means to improve non-SOV access to the Park. The study concludes with an implementation plan that outlines the timeline, costs, and next steps associated with the study recommendations.

1.3 PLAN STAKEHOLDERS

The Quonset Transit Market Study and Service Plan is a collaborative effort between the Rhode Island Public Transportation Authority (RIPTA), the Quonset Development Corporation (QDC), and the Rhode Island Department of Transportation (RIDOT). Each organization provided its own support and expertise in developing this plan.

1.3.1 RIPTA

The Rhode Island Public Transit Authority (RIPTA) is a quasi-public, independent authority. Established in 1966, RIPTA is authorized to operate public transit services throughout the State of Rhode Island. In the fiscal year (FY) 2016, which ended in June 2016, RIPTA carried over 18 million passengers on its fixed-route bus, flex service, and Ride Senior/ADA/Disabled program.

1.3.2 QDC

Founded in 2004, the Quonset Development Corporation (QDC) is a quasi-state agency, established as a special purpose subsidiary of the Rhode Island Commerce Corporation (formerly the RI Economic Development Corporation). The organization is responsible for the development and management of the Quonset Business Park. QDC brings to the project and in-depth understanding of the Park and the needs of its tenants.

1.3.3 RIDOT

The Rhode Island Department of Transportation (RIDOT) designs, constructs, and maintains the state's surface transportation system. With a staff of more than 700 transportation professionals, RIDOT serves as the steward of a statewide multimodal transportation network, consisting of 3,300 lane miles of roadway, 1,162 bridges, five rail stations, and more than 60 miles of bike and pedestrian paths.

2. Existing Conditions

2.1 PURPOSE

An existing conditions analysis was conducted to understand the current transportation needs of the park. This analysis includes the following sections:

- Review of prior plans related to transportation access at Quonset;
- Analysis of existing transit services near the QBP;
- Interview with major QBP tenants to understand commuter needs;
- Focus group with QBP tenants;
- Commuter survey of QBP employees;
- Review of US Census data on employment and place of residence; and
- Transit propensity analysis to highlight transit demand.

Together, this information provides a more complete picture of commuter behavior and needs at the Quonset Business Park. This section concludes with key findings and outlines the commuter market that subsequent service improvements should seek to serve.

2.2 PREVIOUS STUDY EFFORTS

The Quonset Business Park was the subject of three prior transportation studies. While these studies provide a good basis of understanding, the rapid development and expansion of employment at Quonset means that commuting conditions have changed quite a bit over the last ten years.

[Quonset Point Davisville – Planning for the Proposed Port and Commerce Park, 1999](#)

In 1999, Grow Smart Rhode Island developed a report on the planned infrastructure, including transit, for the redeveloped Quonset Point site. The study noted that because bus service did not enter Quonset and was not coordinated with shift changes for the companies located there, that transit use was low. Yet the report also stated that with the proper improvements to the existing service, transit could reduce the number of SOVs accessing the site by as much as 10 percent, as jobs would become accessible to workers who do not own cars and it would provide an alternative to get to and from work for those who do own cars.

[Quonset Transit Study, 2002](#)

The 2002 Quonset Transit Study, commissioned by the Rhode Island Economic Development Corporation (RIEDC), is the most direct predecessor to this planning effort. A survey of all the companies located in Quonset Business Park in 2001 was undertaken in order to determine how many people came to the business park and how they arrived there. However, the survey was only conducted at the companies' administrative level; it was not a survey

of the employees themselves. Questions included how many employees worked at the company, their zip code of residence, what travel modes they used to arrive at work, and when employees typically reported to and left work.

Using this survey data, the study offered recommendations that could be enacted both in the short and long term in order to have five to 10 percent of all Quonset Business Park employees arrive by a mode other than SOV. Carpools and vanpools were suggested as the most effective tools for achieving this goal. The study recommended improvements to fixed route RIPTA bus service near Quonset Business Park, including the introduction of a circulator bus within the business park itself to feed into RIPTA's Route 14 at the park entrance. The plan acknowledged that the dispersion of employees' residences throughout the state and varying work schedules at the companies located at Quonset, made it difficult to implement new transit improvements at a reasonable cost.

The report also suggested that in the long term, ferry service or commuter rail service could create additional ways for commuters to reach Quonset without using their own cars. However, the projected numbers of employees at Quonset through 2021 did not indicate that either service would be viable or cost effective.

[Quonset Point Multi-Modal, Mixed-Use Ferry Terminal Study, 2006](#)

Finally, in 2006, the Quonset Point Multi-Modal, Mixed-Use Ferry Terminal Study was conducted to determine the feasibility of providing ferry services to and from Quonset. A variety of potential services were evaluated, including commuter services for those working at Quonset and services for those traveling to islands such as Martha's Vineyard and Block Island. The study recommended that planning decisions be made so as to allow for future integration between a ferry terminal and other development at Quonset. Today, there is currently a "fast ferry" from Quonset to Martha's Vineyard during the summer months, but no commuter ferries serve the business park.

2.3 EXISTING TRANSIT SERVICE

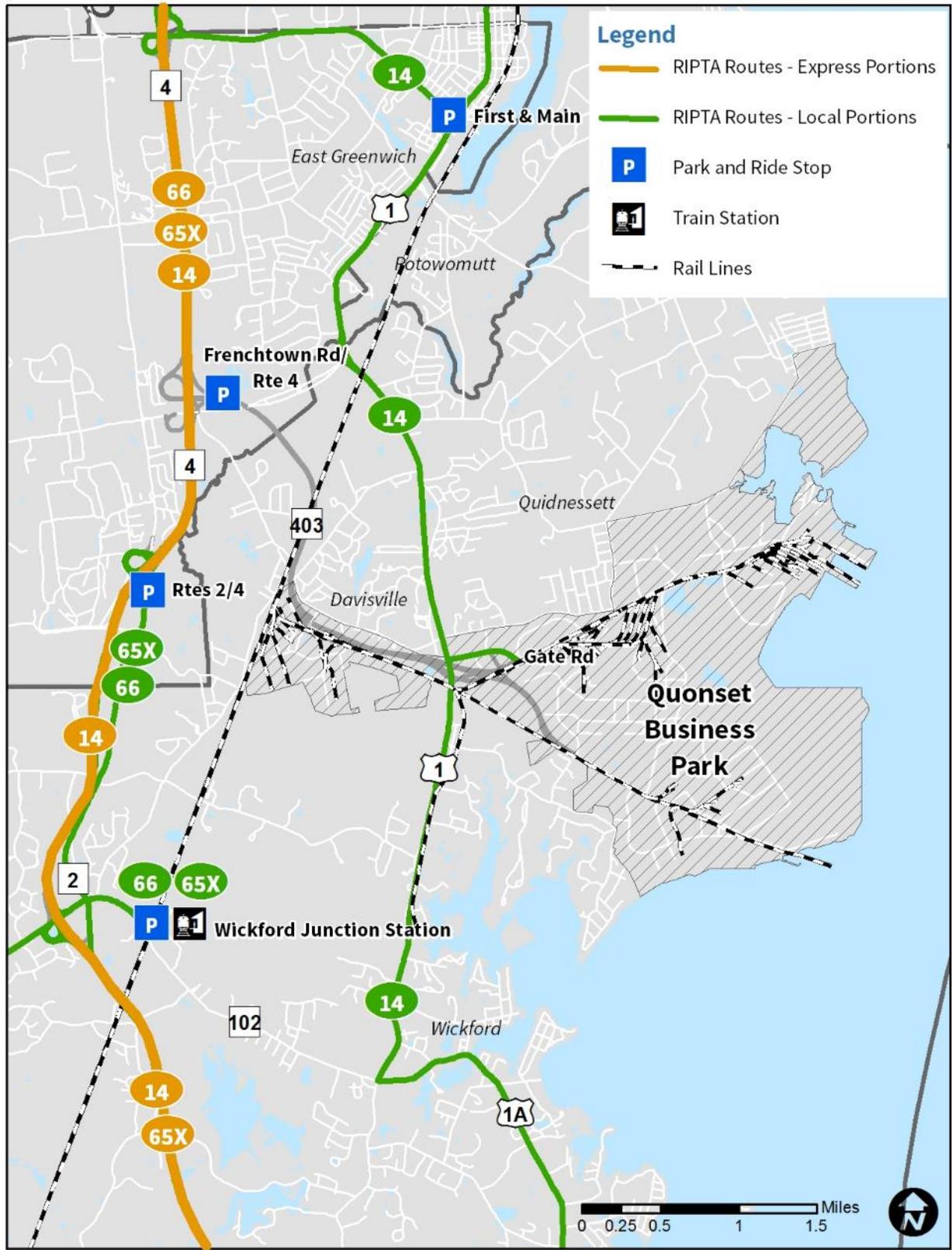
2.3.1 Overview

Quonset Business Park is served by limited transit service. RIPTA Route 14 is the only route that actually enters (but does not circulate within) QBP, with local bus service on Post Road (US Route 1) and Gate Road at QBP's perimeter. About 4.5 miles from the entrance to the Business Park along Route 4 are three RIPTA express bus services: Routes 65X, Route 66, and an express branch of Route 14. All operate in a north-south direction, connecting destinations in the West Bay to the Providence area. The MBTA provides Commuter Rail service to Wickford Junction station, about five miles from QBP by road.

RIPTA serves three park and ride facilities within five miles of QBP: at Wickford Junction Commuter Rail Station, at the junction of Route 2 and Route 4, and at First and Main Streets in East Greenwich. **Figure 2** provides an overview of existing transit services near QBP. In addition to these locations there is a Park and Ride on Frenchtown Road in East Greenwich which is used to serve carpools.

Note that when discussing the direction of service, inbound denotes service toward Providence (northbound), and outbound denotes service away from Providence (southbound).

Figure 1: Nearby Transit Services to Quonset Business Park



2.3.2 MBTA Commuter Rail

The MBTA Providence/Stoughton Commuter Rail line provides service between Wickford Junction Station via Providence Station to South Station in Boston. Wickford Junction Station is located approximately five miles from the Gate Road/Post Road intersection on Ten Rod Road (Route 102) in North Kingstown. The MBTA provides 10 weekday roundtrips to the station (**Table 1**). RIPTA Route 66 and 65X provide connections to Wickford Junction Station, however there is no bus service between the station and the Quonset Business Park.

Table 1: Weekday MBTA Commuter Rail Trips To/From Wickford Junction Station

| Period | Inbound (Departure Time) | Outbound (Arrival Time) |
|----------------------|---------------------------------|--------------------------------|
| AM Peak | 4:45am, 5:45 am, 6:35am, 7:45am | 5:30am, 6:21am, 7:27am, 9:01am |
| Midday | 9:20am, 1:25pm | 12:58pm, 4:59pm |
| PM Peak | 5:30pm, 6:55pm, 7:45pm | 6:09pm, 7:15pm, 8:33pm |
| Late | 8:53pm | 11:43pm |
| Total Weekday | 10 | 10 |

*MBTA defines time periods by trip arrival time in South Station, Boston.

Wickford Junction station currently has free parking for up to 1,100 vehicles and 20 bicycles.

2.3.3 RIPTA

RIPTA is the sole provider of bus public transportation in Rhode Island and is a quasi-public, independent authority that was established in 1966. RIPTA provides services to 35 of Rhode Island's 39 communities (cities and towns) and operates 53 fixed bus routes overall. It also operates statewide ADA Paratransit service and 9 flex route services. RIPTA operates three major transit hubs, Kennedy Plaza in Providence, the Pawtucket Transit Center, and the Gateway Center in Newport, and provides bus service to 38 park and ride lots around the state.

Commuter Resources

RIPTA provides a number of commuter resources that extend beyond operating transit service. The agency partners with NuRide, the largest carpool/vanpool matching program in the country. Commuters can use NuRide to find and join carpools. The program offers incentives and rewards to further make carpooling more appealing.

In addition to the services provided by NuRide, RIPTA offers a guaranteed ride home program for carpools. In cases of emergency, RIPTA will cover the cost of a taxi for carpool eligible commuters up to twice a year.

RIPTA Route 66

Route Overview

Route 66 (**Figure 3**) is RIPTA's URI/Galilee route, providing service between downtown Providence and Galilee in Narragansett and the University of Rhode Island in Kingston. Select trips also serve the Community College of Rhode Island's (CCRI) Warwick campus on weekdays. As of 2015, the stop at the park and ride at Route 102 and Route 2 in North Kingstown was relocated to Wickford Junction station in order to provide more options for commuters using this station. The closest stops to the Quonset Business Park on Route 66 are Wickford Junction station (4.5 miles) and the Route 2/Route 4 Park and Ride (6 miles).

Figure 2: Route 66 Alignment

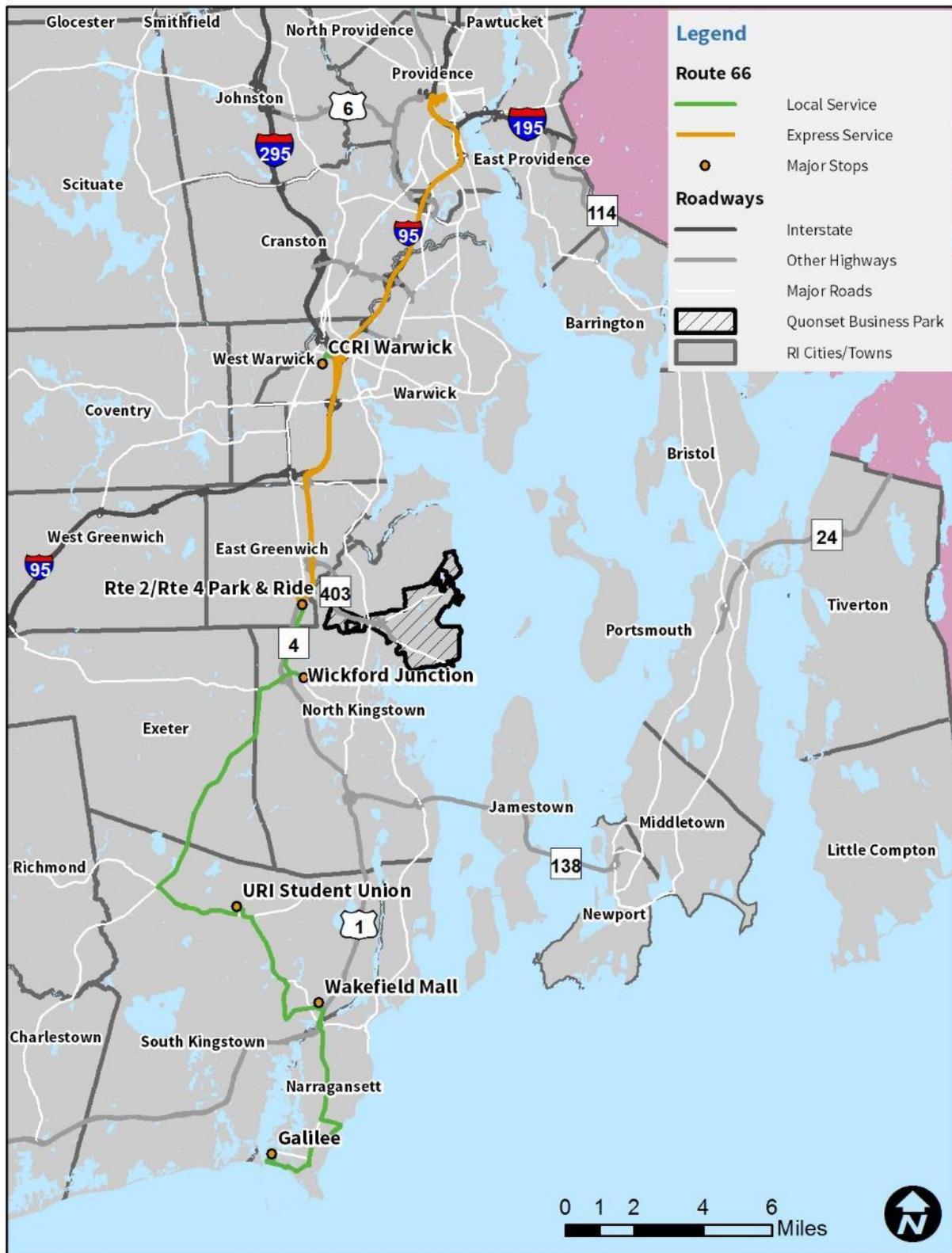


Table 2 summarizes the number of trips on each different Route 66 pattern by direction, including starting and ending points.

Table 2: Number of Daily Trips by Pattern on Route 66

| Begin/End | Inbound | | Outbound | |
|-----------------------|---------------------------------------|---|--|---|
| | Regular Pattern | Via CCRI Warwick | Regular Pattern | Via CCRI Warwick |
| Galilee | 1 AM Peak 19 Saturday 10 Sunday | 4 AM Peak 6 Midday 4 PM Peak 3 Evening | 15 Saturday 10 Sunday | 4 AM Peak 6 Midday 5 PM Peak 3 Evening |
| URI Kingston | 3 Midday 6 PM Peak 1 Evening | - | 4 AM Peak 1 Midday 2 PM Peak 5 Saturday 2 Sunday | - |
| Wakefield Mall | 2 Sunday | - | - | - |

Table 3 summarizes levels of service on Route 66, including span of service and headways by service day. Weekday headways on Route 66 are fairly inconsistent, ranging from 15 minutes to 60 minutes. On Saturdays, the route has a fairly consistent 45-minute headway. On Sundays, headways vary from 45 minutes to 80 minutes in the outbound direction, but are a fairly consistent 65 minutes in the inbound direction.

Table 3: Level of Service on Route 66

| | Weekday | | Saturdays | | Sunday | |
|-----------------------------------|----------------|---|----------------|---------|----------------|---------|
| | Span | Headway | Span | Headway | Span | Headway |
| Inbound (to Providence) | 5:15am-11:35pm | AM Peak: 50-60 Midday: 25-45 PM Peak: 20-25 | 7:30am-10:12pm | 45 | 7:45am-10:18pm | 65 |
| Outbound (from Providence) | 6:00am-11:40pm | AM Peak: 20-30 Midday: 30-50 PM Peak: 15-45 | 8:00am-11:12pm | 45 | 7:50am-11:12pm | 45-80 |

2012 Passenger Survey Results

As part of the 2012 Comprehensive Operational Analysis (COA), RIPTA completed a passenger survey¹ that received responses from over 25 percent of its passengers. Results were also tabulated by route and are summarized for Route 66 in **Table 4**.

¹http://www.ripta.com/stuff/contentmgr/files/0/907a37ba5c6d5fc7d6f489e8ff00f8fb/files/passenger_survey_results_final.pdf

Table 4: 2012 Passenger Survey Top Results for Route 66

| Route | 66 |
|---|--|
| Percent riders with vehicle access | 37% |
| Preferences | <ul style="list-style-type: none"> • More frequent service • More weekday service • More night service • Faster service • Fewer transfers • Improve existing service |
| Trip Purpose | School, Work |
| Mode of Access/Egress | Walk, (Drive ~ 25% of access) |
| Top RIPTA Transfers (% of Route Ridership) | <ul style="list-style-type: none"> • 99 (Replaced by R Line) (2.6%) • 26 (Replaced by 92) (1.9%) • 28 (1.9%) |

Previous Recommendations

The 2013 Comprehensive Operational Analysis² had several recommendations for Route 66. As of summer 2016, none of these recommendations have been implemented. The recommendations for Route 66 included a reconfiguration to make service more consistent and relieve overcrowding. The following details these recommendations:

- Operate all service along a consistent alignment, with all trips serving the Kingston Amtrak Station and the planned Warwick Mall transfer hub.
- Operate service with consistent schedules:
 - On weekdays, provide service between 5:30 AM and 10:30 PM with a mix of long and short trips to better balance service levels with demand, with short trips between URI and downtown Providence and long trips along the full length of the route. Operate both long and short trips every 60 minutes throughout the day, which would provide service between URI and Providence every 30 minutes, and service between Galilee and URI every 60 minutes.
 - On weekends, operate service between 8:00 AM and 10:30 PM, every 60 minutes for most of the day and every 120 minutes at the beginning and end of the day.

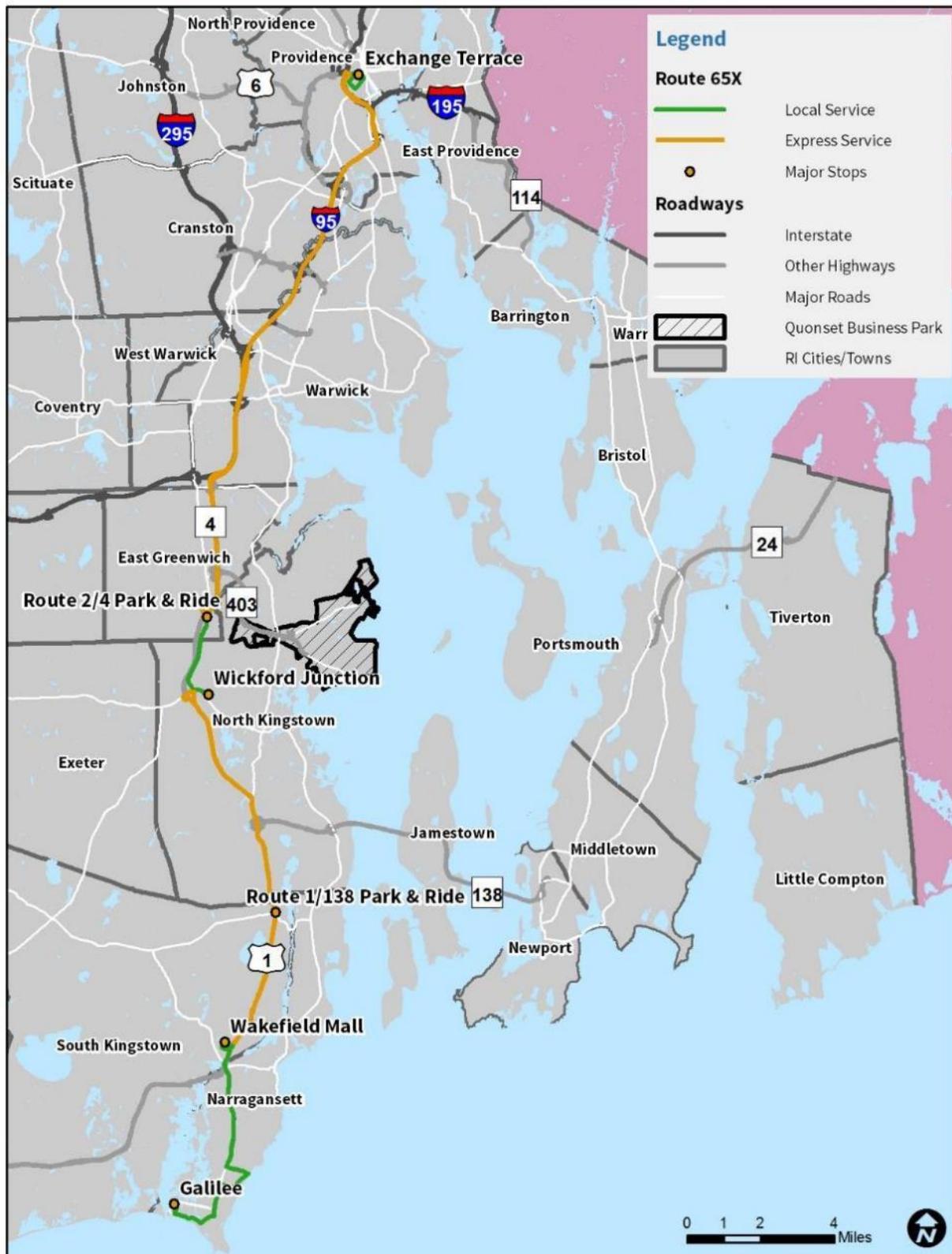
RIPTA Route 65X

Route 65X is RIPTA's Wakefield Park and Ride express route, providing service between downtown Providence and the Wakefield Mall. Stops are also made at the Route 2/Route 4 Park and Ride, Wickford Junction, the Route 1/Route 138 Park and Ride, and several locations in downtown Providence. The closest stops to Quonset on Route 65X are Wickford Junction station (4.5 miles) and the Route 2/Route 4 Park and Ride (6 miles).

² http://www.ripta.com/stuff/contentmgr/files/0/907a37ba5c6d5fc7d6f489e8ff00f8fb/files/66_galilee_130518.pdf

Route 65X has a single pattern in the inbound (toward Providence) direction (see **Figure 4**). In the outbound direction there are two patterns, one of which follows the same route as the inbound direction and another that follows this same pattern but also extends to Galilee; only one trip per day extends to Galilee (the 4:38pm trip from Providence).

Figure 3: Route 65X Alignment



The route operates in the peak direction during the peak period only, with six inbound trips during the AM peak period and five outbound trips during the PM peak period. **Table 5** summarizes levels of service on Route 65X, including span of service and headways by service day. Weekday headways on Route 65X are a consistent 15 minutes in the inbound direction, and 20 to 30 minutes in the outbound direction. There is no weekend service.

Table 5: Level of Service on Route 65X

| | Weekday | |
|-----------------------------------|-------------------|---------|
| | Span | Headway |
| Inbound (to Providence) | 6:30 AM - 8:39 AM | 15 |
| Outbound (from Providence) | 3:38 PM - 6:23 PM | 20-30 |

2012 Passenger Survey Results

Route 65 (the predecessor to Route 65X) was not included in the passenger survey conducted in 2012 as part of the Comprehensive Operational Analysis.

Previous Recommendations

The 2013 Comprehensive Operational Analysis had several recommendations for Route 65, the predecessor to Route 65X. The recommendations for Route 65 including consolidating the express trips on Route 66 and Route 14 (Narragansett) into Route 65X, and operating through Wickford Junction on all trips. The following details these recommendations:

- Consolidate existing Route 65 and 14 West Bay express trips into a single Route 65X Narragansett/Wakefield Express route that would operate between the Wakefield Mall and downtown Providence via Route 65's current alignment.
- Adjust service levels to balance AM and PM service levels.

As of summer 2016, Route 65X has been implemented, however express trips are still operated on Route 14.

RIPTA Route 14

Route 14 (**Figure 5**) is RIPTA's West Bay route, with the majority of trips operating from downtown Providence to either Narragansett or Newport. Narragansett trips begin and end at Salt Pond Plaza while Newport trips begin and end at the Gateway Center and operate via Jamestown. In addition to these two major termini, some trips operate express between downtown Providence and First and Main Streets in East Greenwich, while others operate express between downtown Providence and the Route 1A/138 Park and Ride in North Kingstown. The remainder of trips are only express between T.F. Green Airport and downtown Providence. Additionally, one Saturday trip begins at Gate Road in North Kingstown. With the exception of trips that are express to or from the Route 1A/Route 138 Park and Ride (one AM Peak Weekday inbound trip and one PM Peak Weekday outbound trip), all trips serve Gate Road in Quonset.

Figure 4: Route 14 Alignment

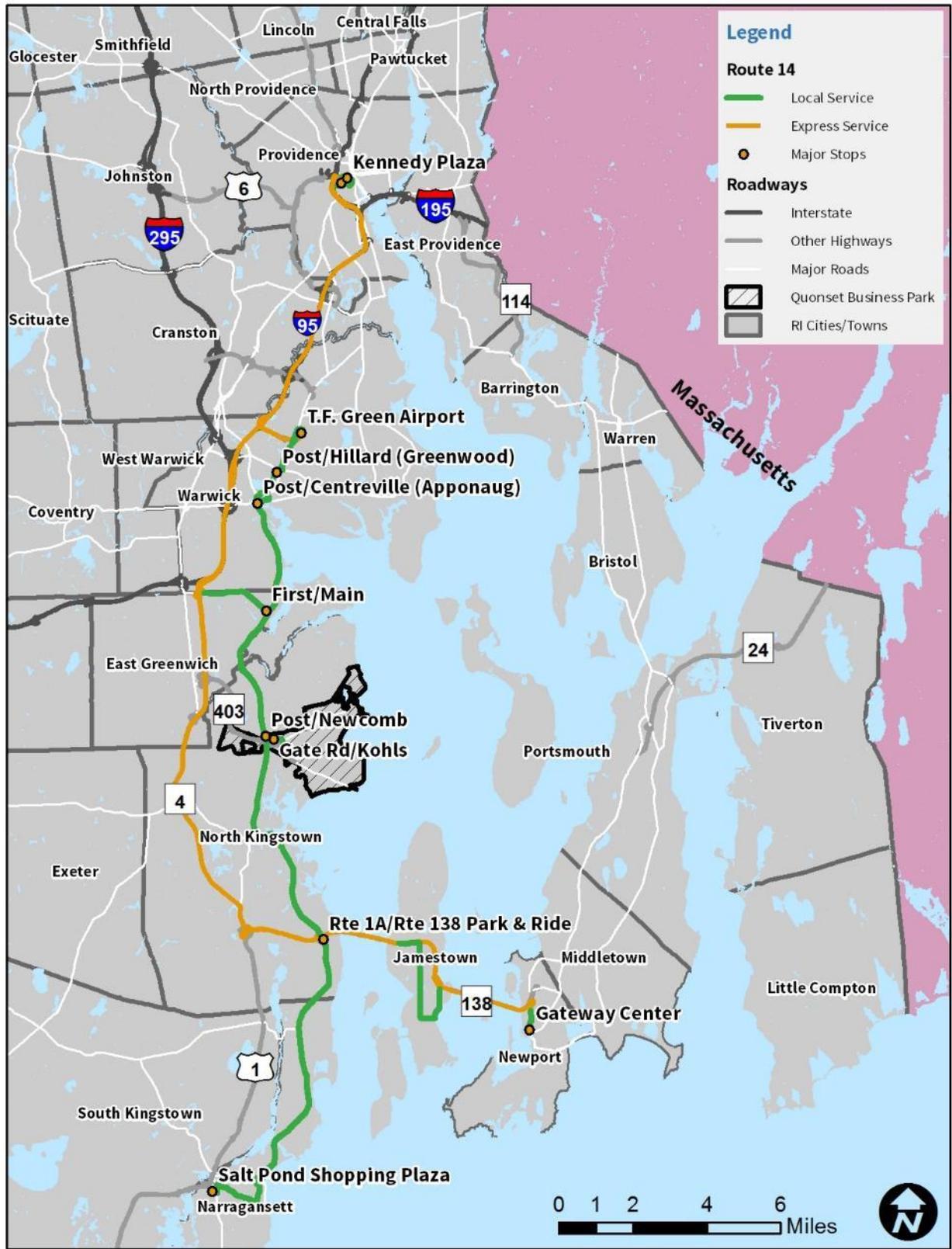


Table 6 summarizes the number of trips on each different Route 14 pattern by direction, including starting and ending points.

Table 6: Number of Daily Trips by Pattern on Route 14

| Begin/End | Inbound | | | Outbound | | |
|--|--|---------------------------|-------------------------|--|-------------------------|-----------------------|
| | Local Service on Route 1 | Express from First & Main | Express from Rte 1A/138 | Local Service on Route 1 | Express to First & Main | Express to Rte 1A/138 |
| Gateway Center | 3 AM Peak 4 Midday 2 PM Peak 4 Saturday | - | 1 AM Peak | 2 AM Peak 2 Midday 3 PM Peak 4 Saturday | - | 1 PM Peak |
| Salt Pond Plaza | 3 Midday 2 PM Peak 3 Saturday | 3 AM Peak | - | 2 AM Peak 3 Midday 2 PM Peak 3 Saturday | 2 PM Peak | - |
| Gate Road | 1 Saturday | - | - | - | - | - |
| Total Trips Serving Quonset (Gate Rd) | 14 Weekday 8 Saturday | 3 Weekday | None | 14 Weekday 7 Saturday | 2 Weekday | None |

Table 7 summarizes levels of service on Route 14, including span of service and headways by service day. Weekday headways on Route 14 are fairly inconsistent, ranging from 20 minutes during portions of the AM Peak period inbound to 75 minutes during portions of the AM Peak outbound. On Saturdays, the route has a fairly consistent 90-minute headway.

Table 7: Level of Service on Route 14 Overall

| | Weekday | | Saturdays | |
|-----------------------------------|---------------|--|---------------|---------|
| | Span | Headway | Span | Headway |
| Inbound (to Providence) | 4:50am-7:02pm | AM Peak: 25 Midday: 65 PM Peak: 50 | 8:22am-8:01pm | 90 |
| Outbound (from Providence) | 5:40am-8:28pm | AM Peak: 55 Midday: 65 PM Peak: 35 | 7:45am-6:27am | 90 |

Table 8 summarizes levels of service on Route 14 at the Gate Road/Kohl's stop in Quonset. Headways are the same as Route 14 overall with two exceptions. During the weekday AM Peak period inbound, one trip operates express between the Route 1A/Route 138 Park and Ride and therefore skips Gate Road/Kohl's, resulting in a 30-minute headway instead of a 25-minute headway. The same thing happens during the weekday PM Peak period outbound, resulting in a 40-minute headway instead of a 35-minute headway.

The first inbound trip toward Providence leaves Gate Road at 5:21am on weekdays and 8:22am on Saturdays. The first outbound trip from Providence arrives at Gate Road at 6:23am on weekdays and 8:30am on Saturdays. The last inbound trip leaves Gate Road at 6:18pm on weekdays and 7:16pm on Saturdays. The last outbound trip arrives at Gate Road at 7:58pm on weekdays and 5:51pm on Saturdays.

Table 8: Level of Service to Gate Road in Quonset on Route 14

| | Weekday | | Saturdays | |
|-----------------------------------|---------------|--|---------------|---------|
| | Span | Headway | Span | Headway |
| Inbound (to Providence) | 5:21am-6:18pm | AM Peak: 30 Midday: 65 PM Peak: 50 | 8:22am-7:16pm | 90 |
| Outbound (from Providence) | 6:23am-7:58pm | AM Peak: 55 Midday: 65 PM Peak: 40 | 8:30am-5:51pm | 90 |

2012 Passenger Survey Results

The results of the 2012 Passenger Survey are summarized for Route 14 in **Table 9**.

Table 9: 2012 Passenger Survey Top Results for Route 14

| Route | 14 |
|--|--|
| Percent riders with vehicle access | 29% |
| Preferences | <ul style="list-style-type: none"> • Longer span/more frequent service • More weekend service • More night service • Faster service • Fewer transfers • Improve existing service |
| Trip Purpose | Work, Other, School |
| Mode of Access/Egress | Walk |
| Top RIPTA Transfers (% of Total Ridership on Route) | <ul style="list-style-type: none"> • 29 (3.9%) • 66 (3.3%) • 54 (2.6%) • 11 (2.0%) • 60 (2.0%) |

Previous Recommendations

The 2013 Comprehensive Operational Analysis had several recommendations for Route 14. As of summer 2016, none of these recommendations have been implemented. The recommendations included consolidating it with

Route 8, implementing a short-turn, and shifting express service to a different route. The following details these recommendations:

- Follow the existing local alignment between Salt Pond Plaza in Narragansett and Centerville Road in Warwick, just south of T.F. Green Airport. Operate via Jefferson Boulevard (to replace Route 8 Jefferson service) and then via I-95 to downtown Providence. To offset most of the additional time via Jefferson Boulevard, service would not operate in and out of the airport, but connections would instead be available via the InterLink.³
- On weekdays, operate alternating long and short trips from Kennedy Plaza. Long trips would end at Narragansett, while short trips would end at Kohl's/Gate Road in North Kingstown. Short trips to North Kingstown would operate every 30 minutes during peak periods and every 60 minutes during off-peak periods. Long trips to and from Narragansett would operate every 60 minutes during peak periods and every 120 minutes during the off-peak.
- Service span would be extended to begin earlier and end later.
- All West Bay express service would be provided via Route 65X Wakefield Express, which operates between the Wakefield Mall and downtown Providence. Five AM inbound and five PM outbound trips would be provided.

Current Stops in the Quonset Area

As previously mentioned, Route 14 is the closest route to the Quonset Business Park and therefore will be analyzed in more detail. The route primarily operates on Post Road (US Route 1), however it also deviates into the QBP on Gate Road to Sams Circle. There are five total stops (two serve buses in only one direction) that serve the Quonset Business Park, as summarized in **Table 10**. Two out of the five total stops have shelters, while the remainder are only marked with RIPTA's standard bus stop sign.

³ The Interlink is the multimodal facility on Jefferson Boulevard that connects the T.F. Green Airport MBTA station with the T.F. Green Airport terminal via a pedestrian bridge.

Table 10: Route 14 Stops Serving the Quonset Business Park

| Direction | Stop Name | Order of Service | Amenities |
|-----------------|--------------------------|------------------|-------------------------|
| Inbound | Gate Road at Sams Circle | 1 | Sign |
| | Gate Road at Iafrate Way | 2 | Sign |
| | Gate Road at Kohl's | 3 | Shelter, Pull-In, Trash |
| | Post and Newcomb | 4 | Shelter |
| Outbound | Post and Devil's Foot | 1 | Sign |
| | Gate Road at Sams Circle | 2 | Sign |
| | Gate Road at Iafrate Way | 3 | Sign |
| | Gate Road at Kohl's | 4 | Shelter, Pull-In, Trash |

The Gate Road/Sams Circle stop is the deepest stop into the park yet only 0.4 miles from Post Road. The only businesses served directly by Route 14 are the Shops at Quonset Point shopping center (Kohl's, Dave's Marketplace, and HomeGoods), the Towne Place Suites on Gate Road, the Seabees Museum, the Sunshine Child Care Center, Gateway multi-tenant office buildings, and the former Lowes shopping center. The major businesses in the park, including Electric Boat, Ocean State Job Lot, and Toray Plastics are more than a 15-minute walk from the stop and there are no sidewalks or similar pedestrian amenities.

Route Ridership

Ridership data for Route 14 was obtained for the Fall 2015 pick (September through December) and the Winter 2016 pick (January through April) from RIPTA's Automatic Passenger Counter (APC) system. Due to issues with the APC system, data for certain weekday trips in the Winter 2016 pick and half of the Saturday trips in the Fall 2015 pick was unavailable. Using the ridership sets that were complete, the entire Route 14 (not just at Quonset) had a total of 754 total boardings on an average weekday during the September pick, and 276 total boardings on an average Saturday during the January pick.

Overall, weekday ridership on Route 14 was higher in September 2015 with the exception of a handful of trips. **Figure 6** through **Figure 9** illustrate average weekday boardings and maximum passenger loads on Route 14 by direction and trip for September 2015 and January 2016.

Figure 5: Average Weekday Boardings on Route 14 Inbound by Trip for September 2015 and January 2016 Picks

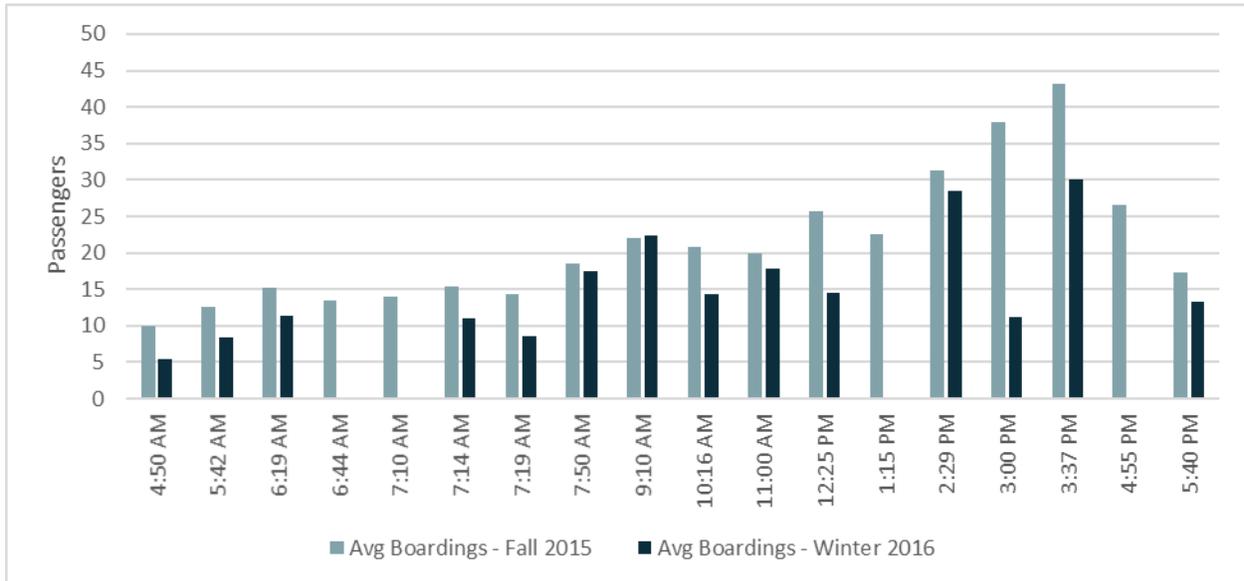


Figure 6: Average Weekday Boardings on Route 14 Outbound by Trip for September 2015 and January 2016 Picks

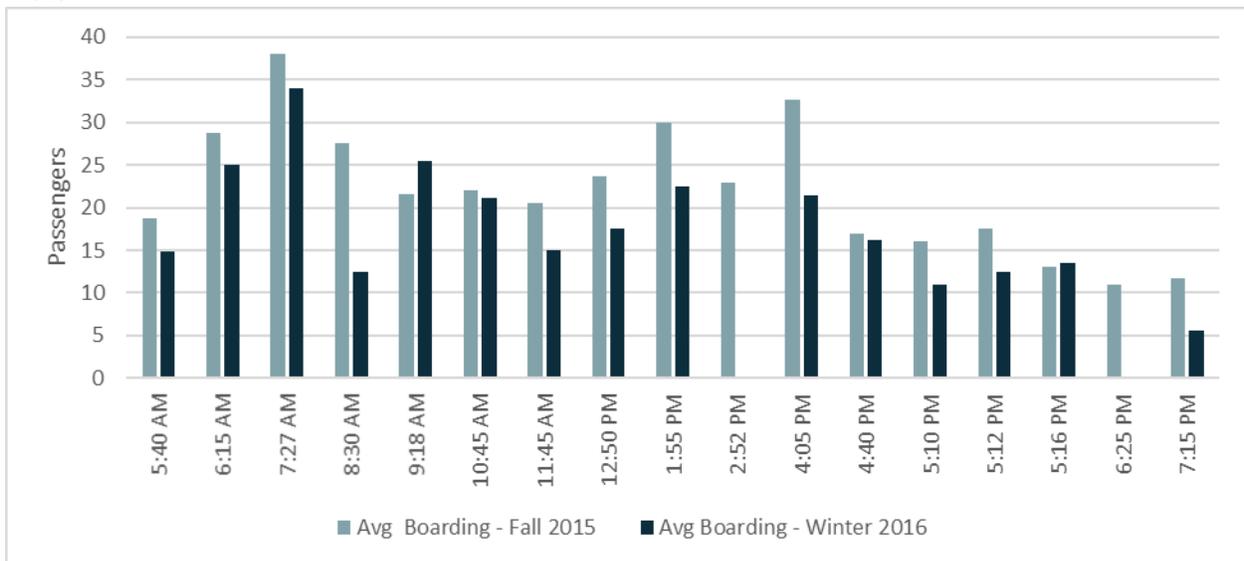


Figure 7: Maximum Passenger Loads on Route 14 Inbound by Trip for September 2015 and January 2016 Picks

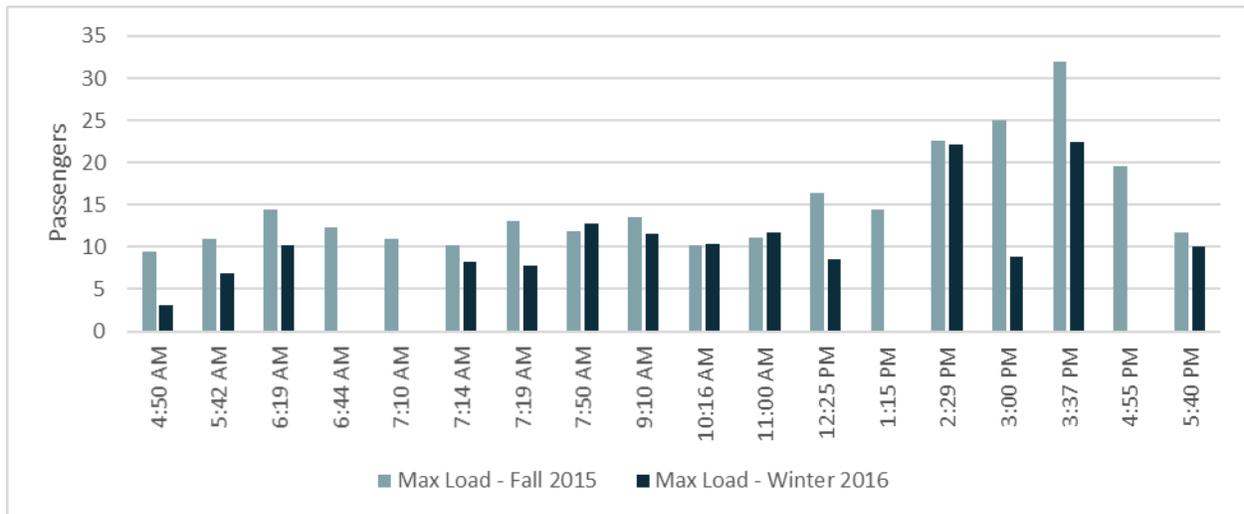
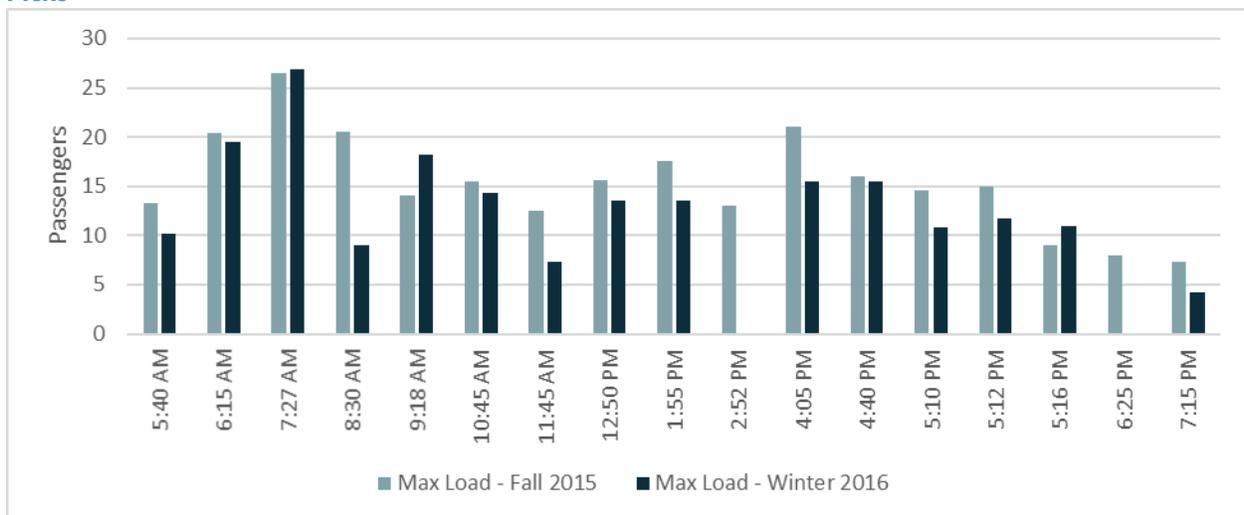


Figure 8: Maximum Passenger Loads on Route 14 Outbound by Trip for September 2015 and January 2016 Picks



Overall, the busiest weekday inbound trips occur in the afternoon, and the busiest weekday outbound trips in the morning, followed by a second spike in the afternoon. The maximum load in the inbound direction occurred between 2426 Post Road in Warwick and T.F. Green Airport. The inbound trip with the highest load occurred between 2222 Post Road and Post Road/Baywood Street in Warwick. This segment is located between T.F. Green Airport and the New England Institute of Technology Post Road campus – two major generators along the route. This area also includes several hotels that serve T.F. Green Airport.

Trip level ridership data indicates that work commutes to Providence are likely not the main factor driving ridership on Route 14, but rather work commutes to other destination along the route as well as non-work trips. This is supported by the 2012 passenger survey data, which indicated that work destinations only comprised approximately 40 percent of all destinations. The location of maximum passenger loads near T.F. Green Airport

and the New England School of Technology also support this observation, as these represent large non-peak trip generators

Overall Ridership Patterns

The majority of ridership activity on Route 14 takes place from the Quonset Business Park (Gate Road) north (**Table 11**). This is likely why the 2013 Comprehensive Operational Analysis (COA) recommended implementing a short-turn at Gate Road, with double the number of trips between Providence and Gate Road than between Providence and Narragansett.

Table 11: Average Weekday Ridership North and South of Quonset Business Park on Route 14

| Segment | On | Off | Total |
|--|-----|-----|-------|
| Inbound South of Quonset | 139 | 26 | 165 |
| Inbound North of/Including Quonset | 242 | 355 | 597 |
| Outbound South of Quonset | 23 | 135 | 158 |
| Outbound North of/Including Quonset | 350 | 248 | 598 |

The busiest stops on Route 14 in both directions include two of the three terminals: Kennedy Plaza in downtown Providence and the Gateway Center in Newport, as well as stops serving T.F. Green Airport, Apponaug Four Corners (Post Road at Centerville Road/Greenwich Avenue), and The Shops at Quonset Point in North Kingstown. The Shops at Quonset Point are located at the edge of the Quonset Business Park at the Post Road/Gate Road intersection **Table 12** summarizes the highest ridership stops on Route 14 on weekdays. **Figure 12** and **Figure 13** illustrate boardings and alightings on Route 14 on an average weekday in both directions.

Table 12: Busiest Stops on Route 14 on Average Weekday

| Direction | Stop Name | Location | Ons | Offs | Total |
|-----------------|--|---|-----|------|-------|
| Inbound | Kennedy Plaza, H | Kennedy Plaza, Providence | 0 | 226 | 226 |
| | Gateway Center, Berth 14 | Gateway Center, Newport | 46 | 0 | 46 |
| | T.F. Green Airport | T. F. Green Airport | 18 | 27 | 45 |
| | Post and Centerville (Apponaug Four Corners) | Apponaug | 20 | 13 | 33 |
| | Post Road and Newcomb Road | Shops at Quonset Point, North Kingstown | 27 | 5 | 32 |
| Outbound | Kennedy Plaza, H | Kennedy Plaza, Providence | 223 | 0 | 223 |
| | Post Road Opposite 2222 Post Road | T.F. Green Airport | 21 | 26 | 47 |
| | Post and Centerville (Apponaug Four Corners) | Apponaug | 20 | 20 | 40 |
| | Gateway Center, Berth 14 | Gateway Center, Newport | 0 | 29 | 29 |
| | Gate Road at Kohl's | Shops at Quonset Point, North Kingstown | 11 | 11 | 22 |

Figure 9: Average Weekday Boardings and Alightings by Stop on Route 14 Inbound

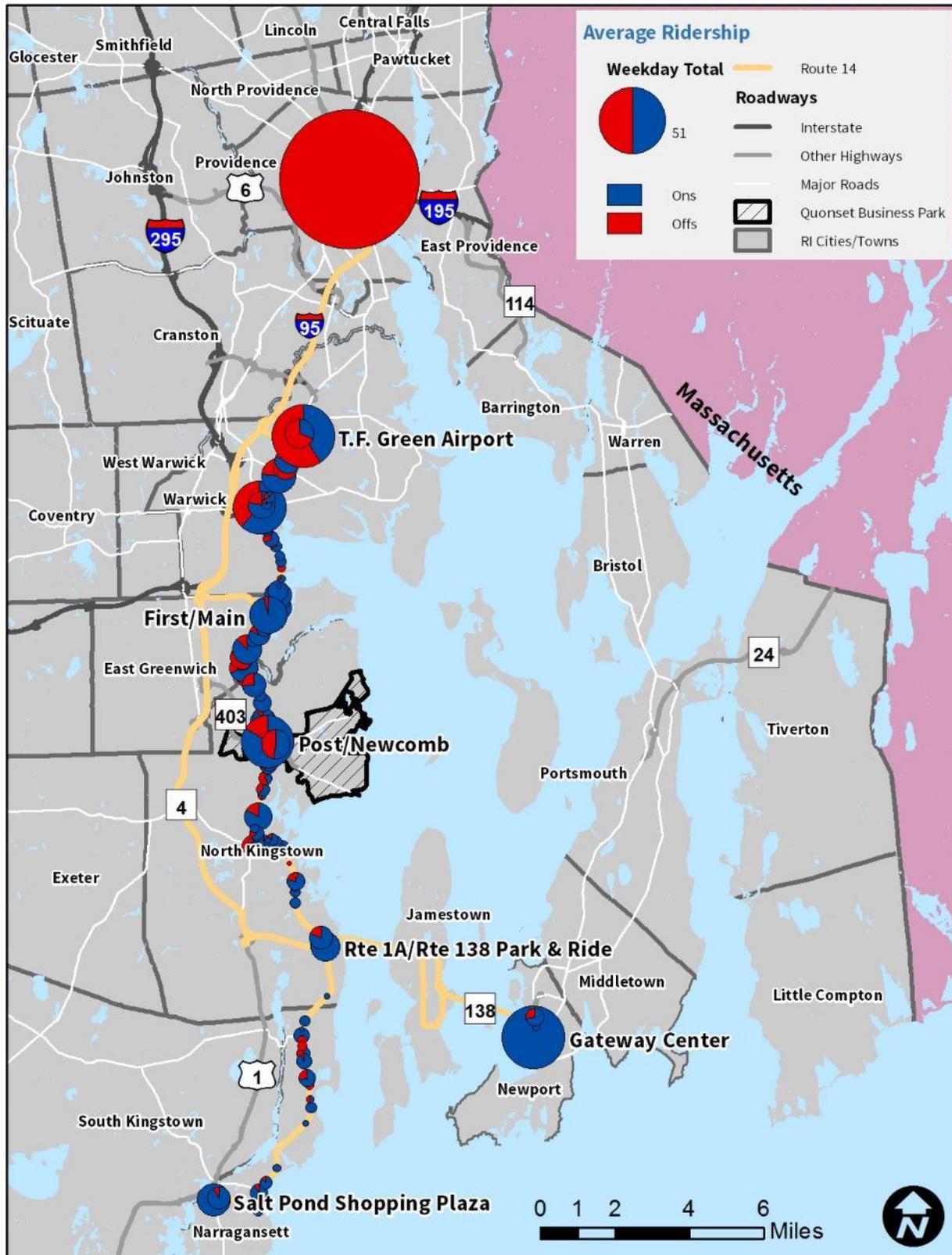
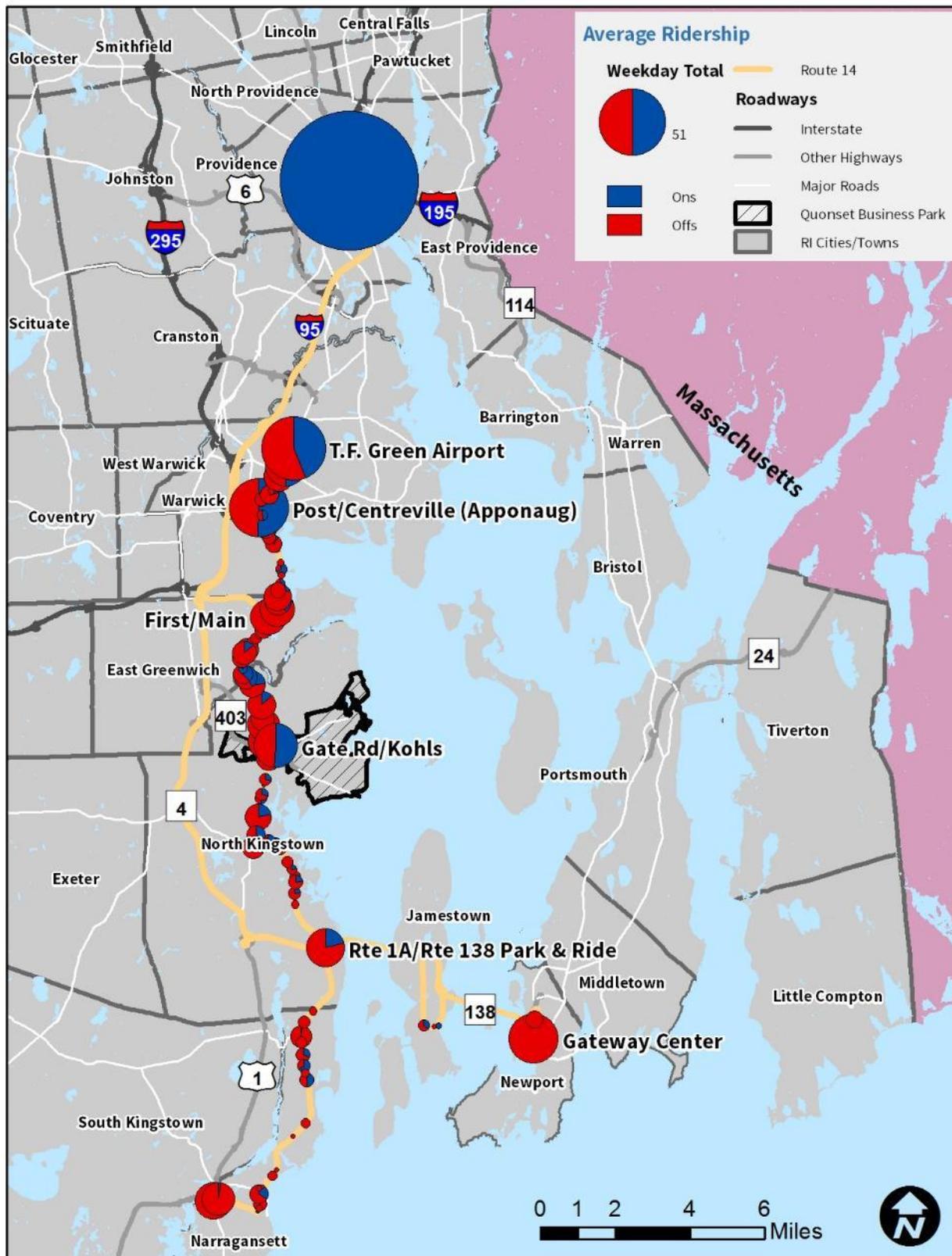


Figure 10: Average Weekday Boardings and Alightings by Stop on Route 14 Outbound



There are several turnover locations on Route 14 where there are a significant number of boardings and alightings in the same direction. These locations typically indicate major transfer points and/or trip generators along the route outside of the route termini. These locations include T.F. Green Airport, Apponaug Four Corners (Post Road at Centreville Road/Greenwich Avenue), and Gate Road at Kohl's (see **Table 13**). While T.F. Green Airport and Gate Road at Kohl's are both adjacent to significant generators, the turn over at Apponaug Four Corners is likely due to transfers with RIPTA Route 29, which provides crosstown service to Warwick, West Warwick, and Coventry. According to the 2012 passenger survey, the top transfer for Route 14 was to/from Route 29 (3.9%).

Table 13: Top Turnover Locations on Route 14

| Stop Name | Location | Inbound Average Weekday | | Outbound Average Weekday | |
|---|--|-------------------------|------------|--------------------------|------------|
| | | Boardings | Alightings | Boardings | Alightings |
| T.F. Green Airport | Airport Terminal | 18 | 27 | 21* | 26* |
| Post and Centerville (Apponaug Four Corners) | Apponaug, Transfer to 29 | 20 | 12 | 20 | 20 |
| Gate Road at Kohl's | Shops at Quonset Point Shopping Center | 5 | 5 | 11 | 11 |

*In outbound direction, data shows up at POST OPP 2222 POST due to APC error

Ridership in the Quonset Area

Current ridership on Route 14 in the Quonset Business Park area is low. As previously mentioned, trips on Route 14 in both directions enter the edge of the park and serve Gate Road between Post Road and Romano Vineyard Way (Sams Circle).

In the inbound direction, two stops show ridership: Gate Road at Kohls (The Shops at Quonset Point shopping center), with five average weekday boardings, and Post Road /Newcomb Road, with 27 average weekday boardings. Post Road / Newcomb Road is located on Post Road (US Route 1) on the western edge of the Shops at Quonset Point and likely pulls ridership both from the shopping center and nearby apartment complexes. Maximum passenger loads leaving these two stops average between 11 passengers and 16 passengers.

In the outbound direction, two stops show ridership: Gate Road at Kohls, with 11 average weekday boardings, and Post Road / Devils Foot Road, with two average weekday boardings. Post Road / Devils Foot Road is located opposite the Post Road/Newcomb Road stop and likely pulls ridership from the same locations. Maximum passenger loads leaving these two stops average between 10 and 11 passengers. Two additional stops on Gate Road, at Sams Circle and LaFrate Way, do not show any ridership activity. **Figure 12 and Figure 13** illustrate ridership at stops on Route 14 near Quonset.

Figure 11: Route 14 Inbound Average Weekday Ridership by Stop in Quonset Area

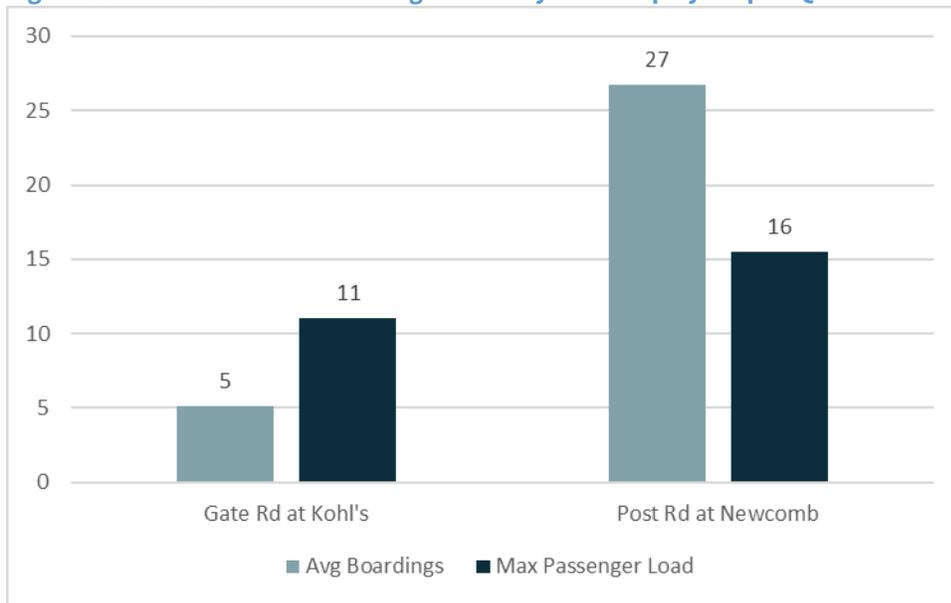
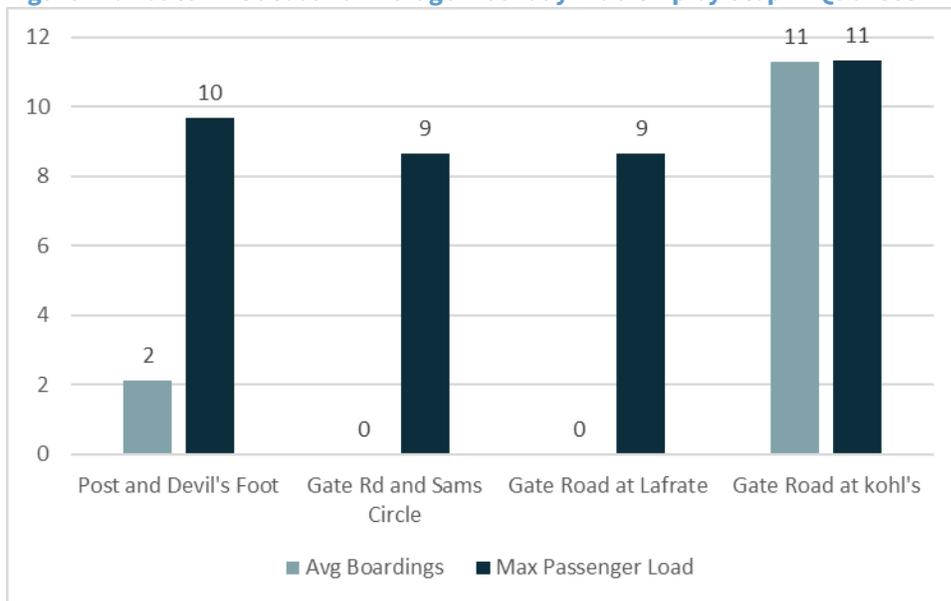


Figure 12: Route 14 Outbound Average Weekday Ridership by Stop in Quonset Area



2.4 EMPLOYER INTERVIEWS

As a starting point for this study, Business Park tenants were contacted directly to provide an understanding of commuting challenges from the employer's perspective. All 25 companies with at least 50 employees (see **Figure 14**) were contacted and asked if a representative of the company would be willing to participate in a phone interview. The following eleven companies participated:

- Air Force National Guard
- BB&S Treated Lumber of N.E.
- Dominion Diagnostics
- Electric Boat
- Greencore
- Hayward Industries Corp
- LJM Packaging
- NORAD
- Seafreeze
- Senesco Marine Inc.
- Toray Plastics

Questions asked during the phone interviews included the number of employees at the company, when shift changes occur, whether the company provides any commuter incentives, where employees currently live and how they get to work, and any issues that transit access poses in recruiting and retaining staff.

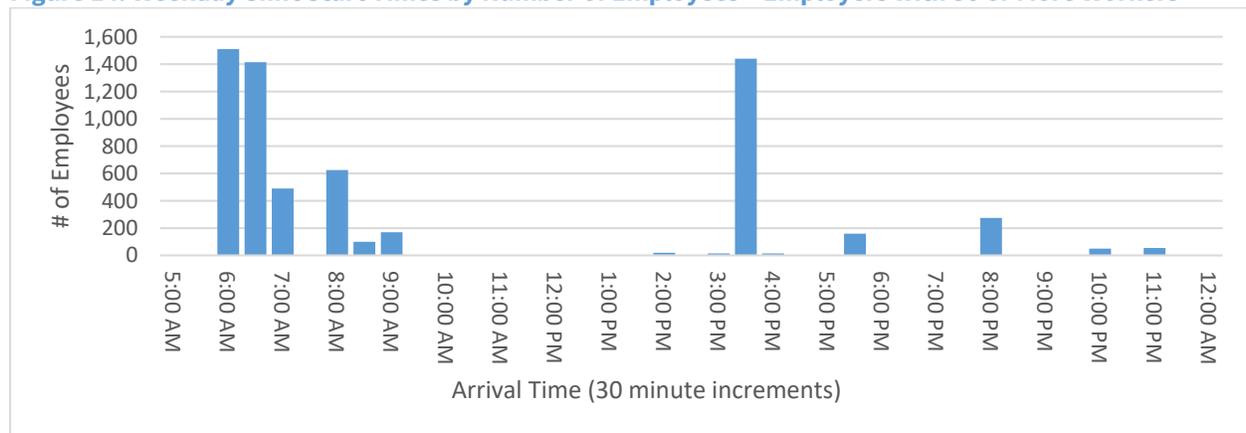
Shift Times

Quonset has over 200 companies and therefore the start, end, and duration of shift times at QBP vary widely. Companies have a mix of 8, 10, and 12 hour shifts. Some companies have staff on-site 24 hours a day, while others only have one or two shifts each day. In addition, the office staff at some companies may work different hours than shift-work employees, typically starting at 7 or 8 AM and working until about 4 PM. The park is most active during the weekday, with most employers interviewed having reduced or no operations on the weekend.

The larger companies at Quonset tend to start their day early, with the highest volume of first shift employees arriving between 6 AM and 8 AM. Employees arriving in the morning after 8 AM tend to work office jobs that do not have to accommodate multiple shifts. Second shifts have more broadly distributed start times, ranging from the late afternoon (after 3 PM) to the evening. At the companies with around the clock operations, the third shift usually starts at 11 PM. Shifts generally end at about the same time the next shift is about to come on duty. Regardless of the type of company, there appears to be little travel demand between 9 AM and the start of Electric Boat’s second shift at 3 PM. **Figure 15** and **Figure 16** show the start and end time of shifts by number of employees for the large employers participating in this study by number of workers.⁴ Because of its large size (3,600 employees or half of the workforce included in the shift time data), Electric Boat’s workforce dominates the chart.

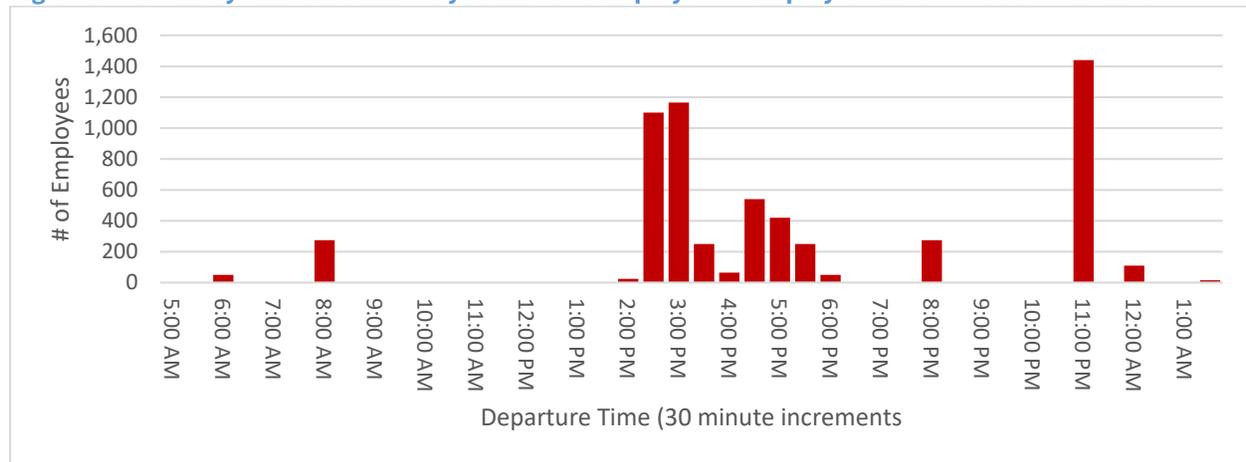
While it was somewhat more common for employees at the smaller companies surveyed to leave the workplace for lunch, larger manufacturing tenants as a policy or practice had employees take their lunch break on-site.

Figure 14: Weekday Shift Start Times by Number of Employees – Employers with 50 or More Workers



⁴ The values in the charts represent all firms that provided information on shift times, supplemented with employee survey data to fill gaps in telephone interview responses. For companies that were unable to quantify the number of workers between shifts, total workforce was divided equally among shifts.

Figure 15: Weekday Shift End Times by Number of Employees – Employers with 50 or More Workers



Transportation Incentives

Most of the companies that completed telephone interviews said that they do not offer any commuter incentives due to the lack of transit service at Quonset. While most employees drive their own cars, a handful do use a carpool or vanpool. Electric Boat was the only employer with a formalized vanpool program.

Employee Access Issues

Employers described the transportation challenges they face and how those challenges impact their business. Many companies reported difficulties in recruiting and retaining staff due to the lack of transit access, which has a negative impact on business. Specifically, when employees miss their shared ride or are unable to use their own vehicle, they call out for the day and do not report to work. These issues appear most prevalent among companies with a large entry-level or unskilled workforce, as their employees are less likely to have access to a car and live farther from the Business Park. Companies also reported difficulty in recruiting temporary workers and interns due to the lack of transit access. At least one company stated that temp companies have in the past had to provide van transportation for their employees to QBP. Temporary workers represent an important subset of employees at Quonset due to the seasonal nature of some major businesses.

Parking

Parking for most companies at Quonset is plentiful and free, and therefore not an issue for employees with vehicle access once they arrived at Quonset each day. Only Electric Boat voiced concerns about parking availability; as the company plans to significantly scale up its workforce over the next five years, it anticipates parking will begin to become a constraint.

Distribution of Shift Times by Employee Home Zip Code

Four employers, Electric Boat, Hayward Industries, Toray Plastics, and Greencore, provided data on their workforces' home zip codes. The home location for each particular company was distributed by shift time based on the proportion of employees in each shift. While only four companies provided zip code data, these companies represent approximately 40 percent of Quonset's workforce and also provide a snapshot of various different kinds

of workforces, from high-skill manufacturing and engineering jobs to entry level manufacturing and service industry jobs. Overall the analysis showed very little geographic distribution of employees based off of shift times; stated in other words, commuters in one part of the state were no less likely to start their shift at a particular time than commuters in another.

2.5 EMPLOYER FOCUS GROUPS

2.5.1 Summary of Effort

To complement the one-on-one employer interviews, a focus group with 16 representatives from 11 of the Business Park's companies was held on April 27, 2016. The 50+ employee companies that received the invitation to participate in the phone interview also received invitations to participate in the focus groups. In addition, an email was sent out via the Quonset Business Park listserv and companies that responded to this invitation, even if they had under 50 employees, were also invited to participate. Participation in the focus group remains confidential to protect the privacy of the companies involved, however the attendance included a mix of large companies, including ones that did not participate in the phone interviews, along with a few smaller tenants.

The focus group began with everyone introducing themselves and noting the issues that their company faces due to the limited transit access at Quonset Business Park. This was followed by a PowerPoint presentation about the study, which included several questions that focus group participants replied to anonymously via an electronic voting system. The results of these survey questions were displayed in real-time and discussed during the focus group.

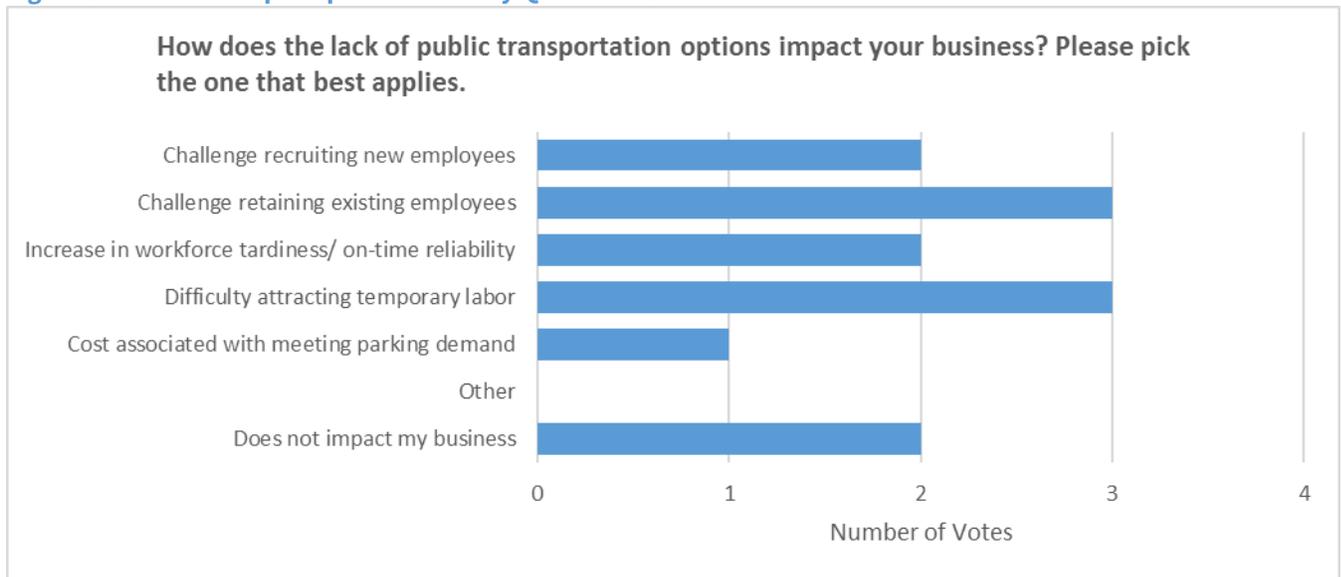
2.5.2 Summary of Findings

Commuter Challenges

During open-ended conversation a number of people talked about the difficulty in recruiting and retaining employees due to the minimal amount of transit access to the Business Park. They expressed hope that improvements to transportation in the area will decrease employee truancy and lost days of work and make Quonset a more competitive destination for young adults living in urban areas like Providence.

Participants were asked to vote on what were the greatest challenges they face due to the lack of suitable transportation alternatives to Quonset (**Figure 17**). Echoing the findings of the employer phone interviews, participants voted that recruiting new employees and obtaining the necessary temporary staff were the two largest challenges they face. Only two participants felt that the lack of commuter alternatives did not impact their business in some way. One business expressed a wish for extending commuter rail to the Park to provide a rapid link to the airport and Boston metro area.

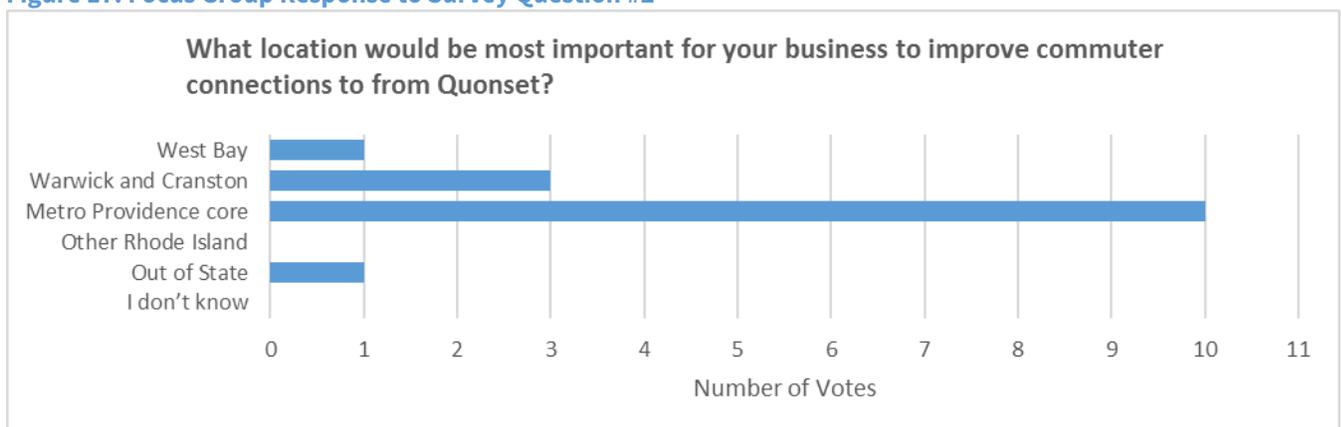
Figure 16: Focus Group Response to Survey Question #1



Geographic Priorities

Two-thirds of the focus group members identified that the urban core of Rhode Island, consisting of Providence, East Providence, Central Falls, and Pawtucket represent the most important geographic areas to address access from with any future transit or commuter improvements (**Figure 18**). The emphasis on Providence runs somewhat counter to the LEHD and employer zip code data that shows that areas closer to QBP like Warwick, West Warwick, Cranston, Coventry, and North Kingstown have the largest number of Quonset employees. The existing location of Quonset employees likely reflects existing constraints in recruiting the large workforce that lives in the more urban Northeastern part of Rhode Island. QBP in recent years has seen growth in entry-level and unskilled jobs in manufacturing, call-centers, and the service industry, and these companies rely more on recruiting workers beyond the towns that immediately border Quonset.

Figure 17: Focus Group Response to Survey Question #2



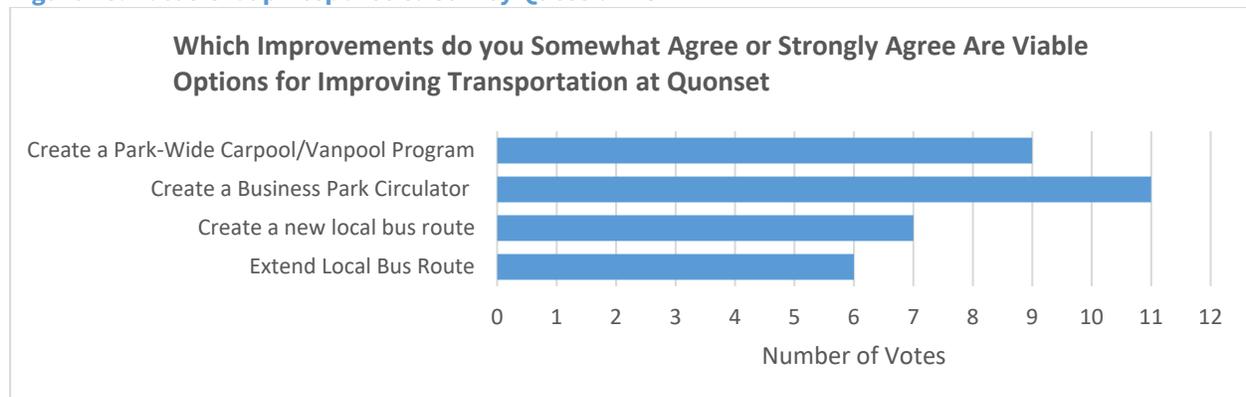
Preferences for Improvements

The focus group was presented with several options for transit improvements for Quonset (**Figure 19**). These included a new bus route to Quonset, extension of the existing RIPTA Route 14 into the Business Park itself, creating a circulator within the Business Park that would connect to RIPTA Route 14, and creating a vanpool and carpool program for all Quonset tenants. Participants were concerned that regular bus service, whether a new route or the extension of a current route through the Business Park, would not carry enough passengers to justify maintaining the service, and that such a service would be at risk of being discontinued. However, most of the participants said they were in favor of an internal circulator bus that would connect to the existing RIPTA service at the business park entrance.

Both extending Route 14 or establishing a park circulator fail to address the schedule limitations of the existing RIPTA bus service. The earliest outbound Route 14 does not arrive until 6:23 AM, missing the start of first shift for number of participating companies. Moreover, RIPTA service is unable to serve some second and third shift employees due to limited connections in the evening and the lack of late-night service.

Participants also raised a concern about the viability of a carpool and vanpool program. For many companies, carpools and vanpools pose a problem as turnover of one employee can jeopardize the transportation of many others. Creating a park-wide ride matching program would help alleviate some of that concern as employees would have a much larger pool to choose from, allowing for them to identify alternatives if their existing ride is no longer available.

Figure 18: Focus Group Response to Survey Question #3



Employer Incentives to Support Alternative Modes

The focus group discussed the role of employers in promoting non-SOV modes, including public transportation and carpools. During this discussion, the group was presented with various transportation demand management (TDM) strategies and asked whether or not particular strategies would be feasible within Quonset. Participants had the greatest support for expanding employee outreach and education on transportation alternatives, along with offering pre-tax transportation deductions to employees. The group was split in their support for providing priority carpool and vanpool parking to employees, although representatives from larger employers seemed

more interested in the concept. Finally, there was nearly no support for policies that would either restrict parking or begin charging for parking.

2.6 EMPLOYEE SURVEY

2.6.1 Survey Design and Goals

A survey for Quonset Business Park employees was administered to obtain information about where they currently live, how they get to and from their jobs, and their opinions on potential future access improvements at the business park. The survey had 13 questions and one open-ended section for additional feedback.

2.6.2 Survey Promotion

Several methods were undertaken to promote the survey before and during the survey period. An electronic message sign was placed at several locations near the entrance to Quonset Business Park to publicize the plan and online survey address. Announcements and information advertising the survey were posted to the QDC website (Quonset.com), Facebook page, and email listserv. Paper fliers promoting the survey were distributed at Dave's Market, Seasons Market, and Marylou's Coffee, three businesses located at the entrance to QBP that are popular with employees. Finally, the QDC and RIPTA wrote and issued a press release about the transit plan and survey.

2.6.3 Survey Distribution

Surveys were distributed through three methods: a postage-paid paper survey that could be sealed and returned by mail, an online survey hosted on the project page at Quonset.com, and a fillable PDF form that could be emailed out to Quonset employees without access to the previous two survey formats. The online and paper surveys were made available in English, Spanish, and standard Portuguese.

A total of 2,650 paper surveys were printed. The majority of these surveys were in English, however approximately 500 were printed in Spanish and Portuguese. Two thirds of surveys were handed directly to employers for distribution among their workforce. Every company with 50 or more employees was contacted to participate in the survey effort, and physical surveys were distributed to the following companies (approximate number of surveys in parentheses).

- Dominion Diagnostics (50)
- Electric Boat (1000)
- Fuji Film (25)
- Greencore (150)
- J. Goodison Company (50)
- LJM Packaging (25)
- NORAD (15)
- Ocean State Job Lots (150)
- Senesco Marine Inc. (50)
- Stanley Black & Decker (15)
- Toray Plastics (500)

In addition to survey distribution at these companies, postcards with information on where to take the survey online were distributed door-to-door, along with additional paper surveys to a number of companies upon request. Door-to-door canvassing was targeted at companies with fewer than 50 employees that had not been participating in the study effort to date. Finally, paper surveys were left at a drop-off point at the two Route 14 bus stops closest to the Business Park.

At the end of the survey period, a total of 334 were returned completed. Paper surveys had a fairly low response rate, 3.5 percent, with a total of 91 returned by mail at the end of the survey period. Sixteen of these surveys were completed in Spanish and three in Portuguese. A number of companies that were provided surveys failed to distribute them to employees. In other cases, logistical challenges like the security restrictions at Electric Boat, constrained the ability to distribute surveys effectively on-site.

197 English surveys and one Portuguese survey were completed online, making up over half of all surveys received. These surveys did tend to preference office/administrative employees who had access to a computer. Finally, 44 surveys were returned as PDFs. Thirty-five of these were fillable PDF forms that were emailed out to Electric Boat as a means to overcome physical distribution challenges at the secure site as well as firewall security that made the online survey inaccessible to employees. The remaining nine surveys were completed by employees as Edesia Inc., scanned and emailed.

2.6.4 Summary of Results

The survey results were primarily used to understand commuter behavior and preferences. The inclusion of questions on income, car access, and transit use allowed for cross tabulations across specific subsets of commuters. Survey responses corroborated focus group and telephone interview findings that existing transit service is ill-suited to meet many of the travel demands of QBP employees. As the survey was not conducted as a randomized sample, the survey results should not be interpreted as representing a statistically valid sample of the Park's population. With that note, the survey results are still an important qualitative data point for the study.

Commuter Profile

Figure 20 shows how survey respondents said they arrived at work each day. Nearly 90 percent said they drove to work, whereas far fewer people use public transit, a shared ride, or walk. About two-thirds of the respondents have commutes of under 30 minutes (**Figure 21**); Across each 15-minute commute time cohort driving alone is the most common mode used. (**Figure 22**).

Figure 19: Survey Respondents' Travel Mode

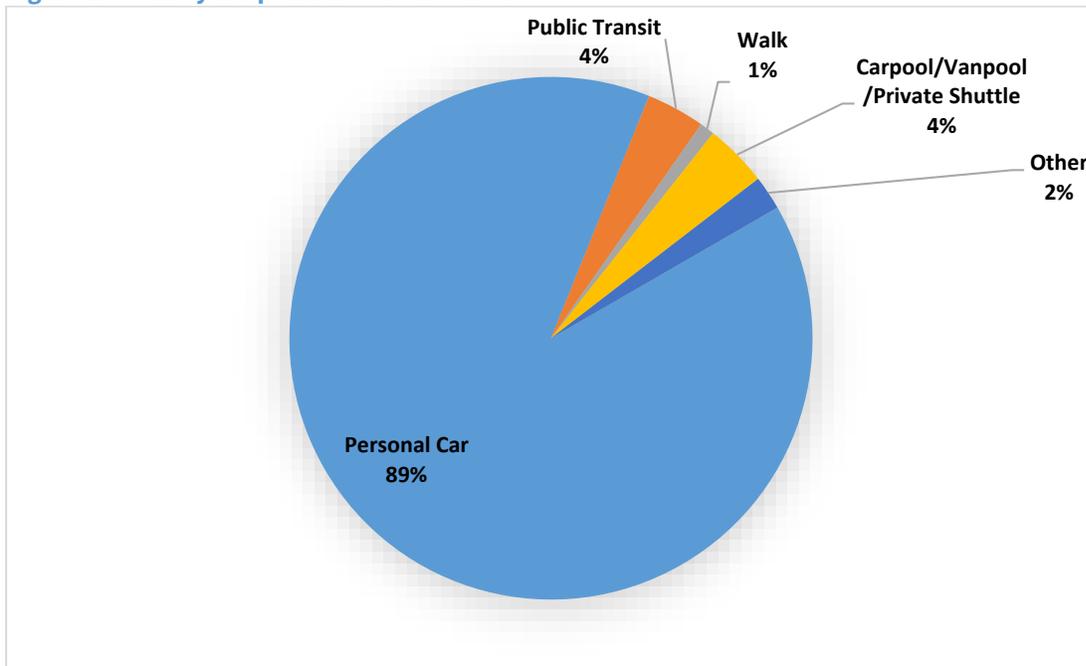


Figure 20: Survey Respondents' Travel Time

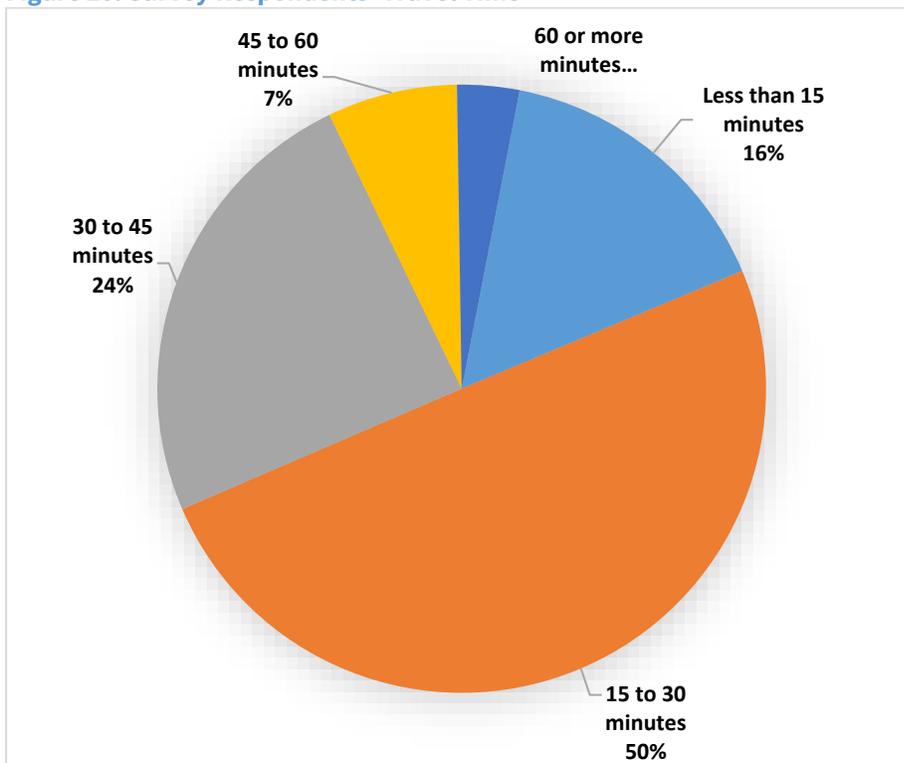
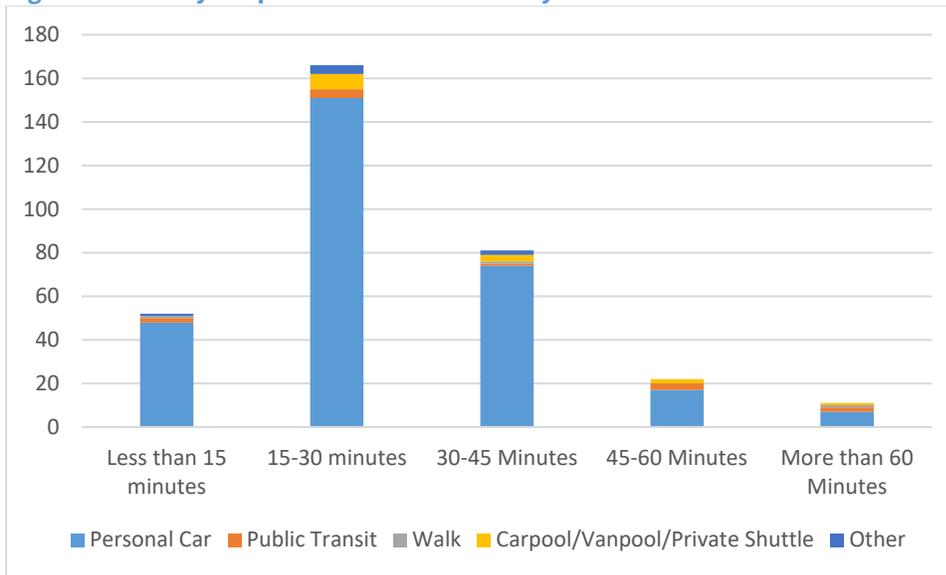
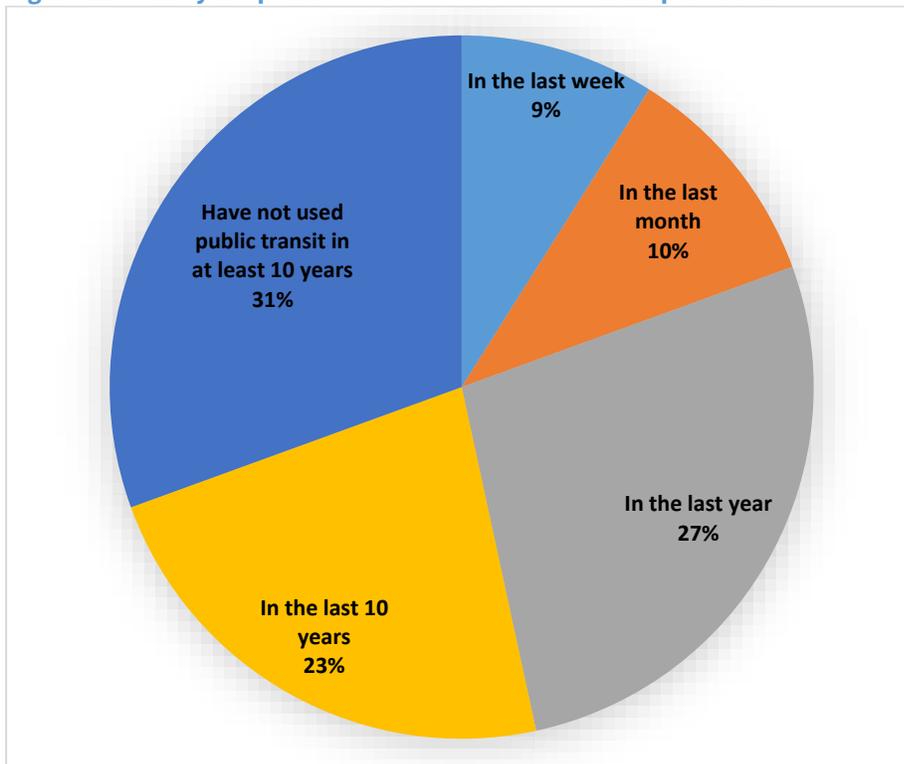


Figure 21: Survey Respondents' Travel Time by Mode



Twelve respondents said that they use public transit on a regular basis. About half of these respondents come from either Providence, North Kingstown, or West Warwick. Those who use public transit were asked to list which routes they use on their trip to or from Quonset. Most stated they use either Route 14 or Route 66 for part of their journey. Five respondents indicated that they transferred to additional bus routes, including: 12X, 17, 19, 20, 29, 30, 31, and 65. All but three of the survey respondents who use public transit reported a household income of less than \$40,000 per year and only one has regular access to a personal vehicle for commuting.

All survey respondents were asked when was the last time they used public transit for any purpose (**Figure 23**). While 19 percent used public transit in the past week or month and 46 percent used public transit in the past year, over half of respondents had not used transportation in the last year, and 31 percent had not used transit in the last 10 years. These results indicate that most of the employees of the Quonset Business Park are not accustomed to using public transportation, meaning that even with better transit service there would be a large education component needed to impact mode shift.

Figure 22: Survey Respondents' Last Use of Public Transportation

The survey asked respondents for their annual household income (**Figure 24**) and if they have regular access to a car for commuting (**Figure 25**). Based on the results of these two questions in conjunction with the number of people who said they drive to work regularly, it is likely that the survey responses come from a disproportionate number of Quonset's white collar employees.

Mapping the geographic distribution of responses (**Figure 26**) by household income shows a clear concentration of households making less than \$40,000 a year within the urban core of Rhode Island: Providence, Pawtucket, and Central Falls.

Figure 23: Annual Household Income of Survey Respondents

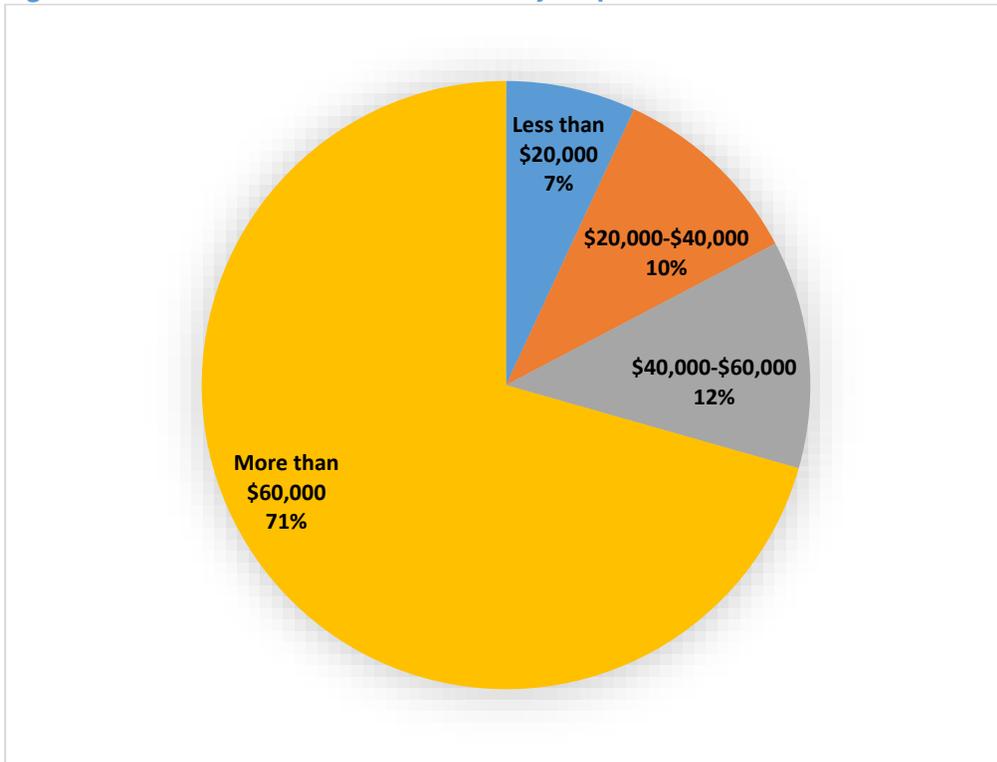


Figure 24: Survey Respondents' Vehicle Access

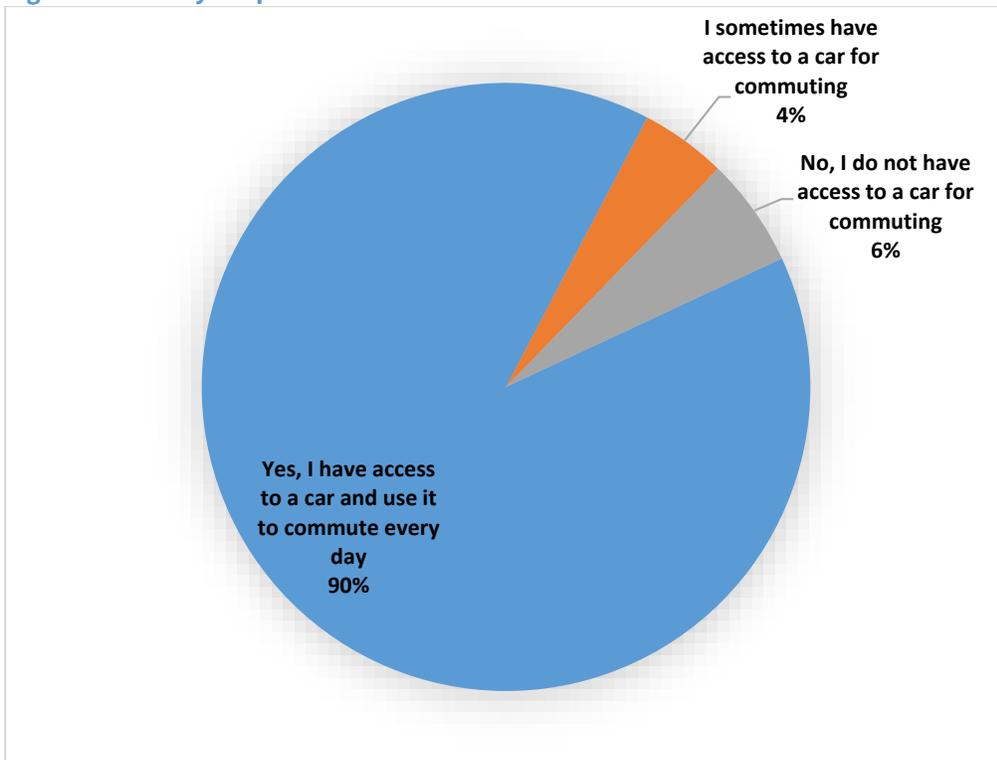
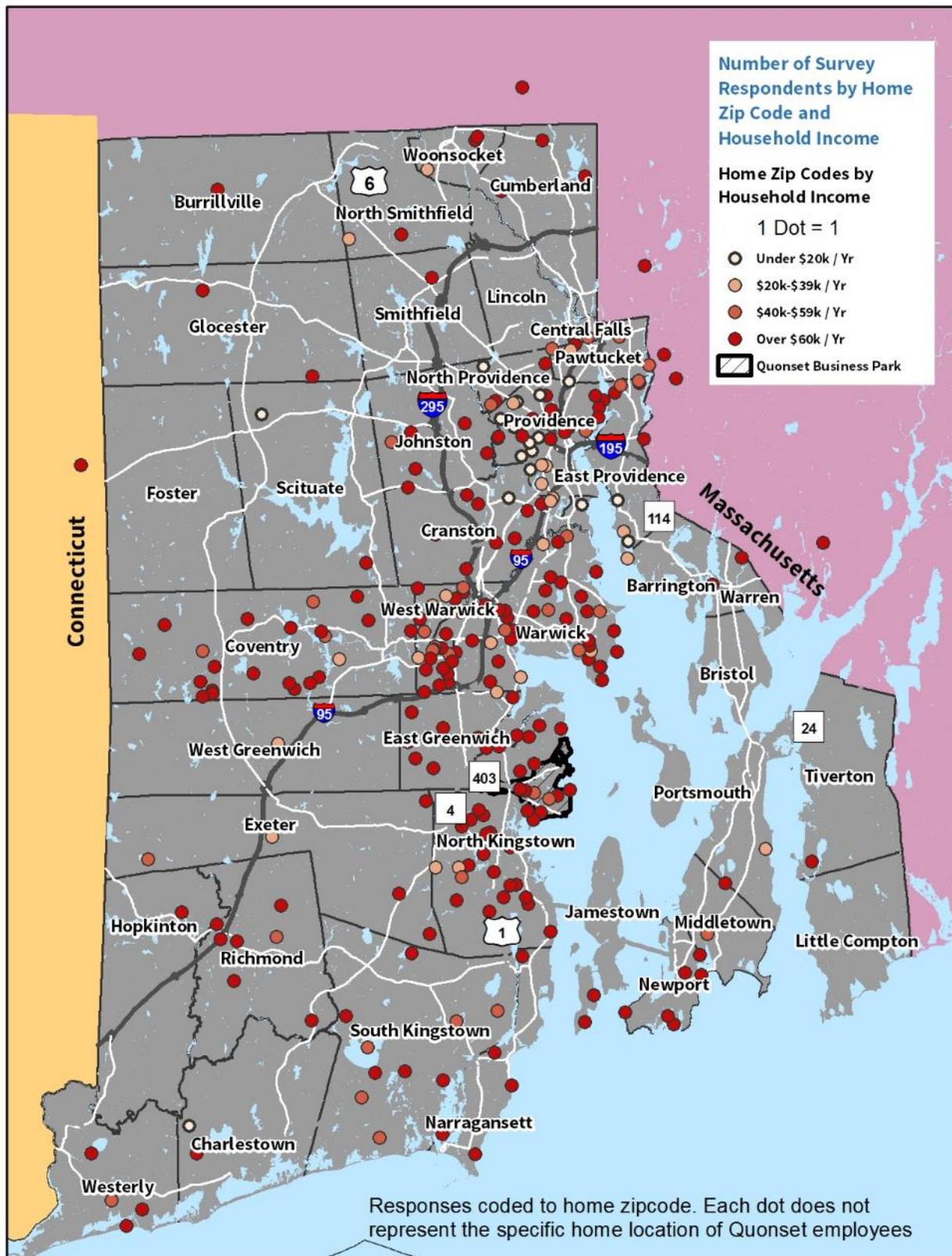


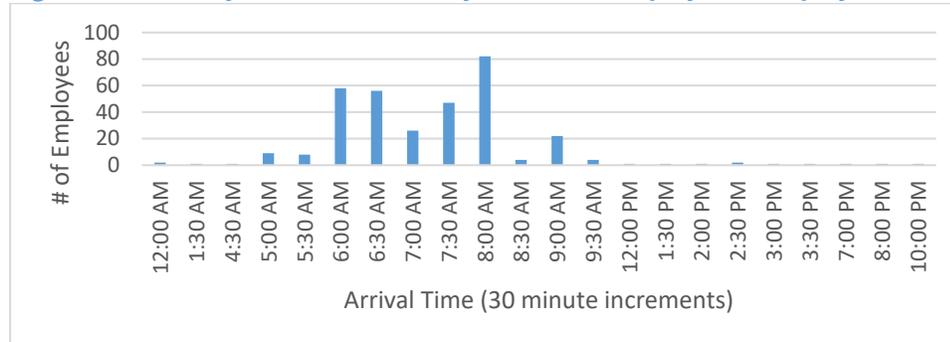
Figure 25: Survey Respondents' Home Zip Code and Annual Household Income



Shift Times

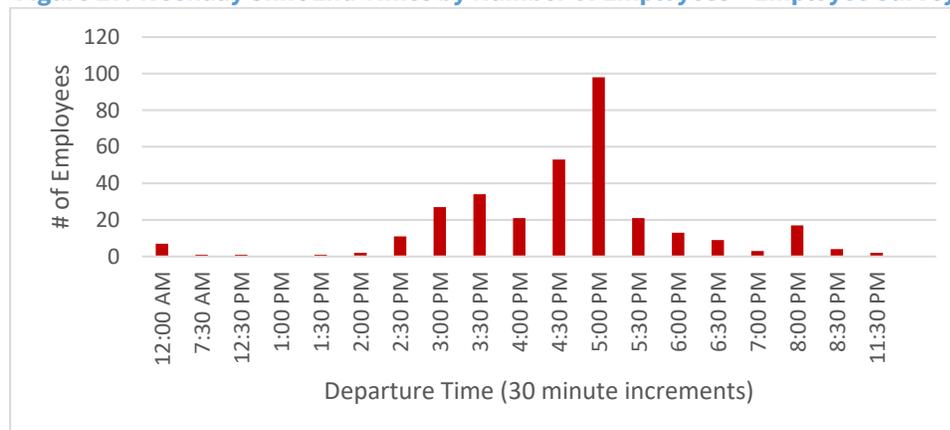
There is a high correlation between the employer provided shift time data and the data collected through the survey. Most employees said they arrived between 6 and 9 AM and left between 3 PM and 6:30 PM. However, there were spikes in arrival times in the afternoon as second shifts began and in departure times at around midnight as second shifts ended. As the employee survey included a high proportion of workers at smaller companies within the Business Park, shift times do differ slightly from those collected directly from companies with 50 or more employees.

Figure 26: Weekday Shift Start Times by Number of Employees – Employee Survey Results



*x-axis only displays time periods with at least one response

Figure 27: Weekday Shift End Times by Number of Employees – Employee Survey Results



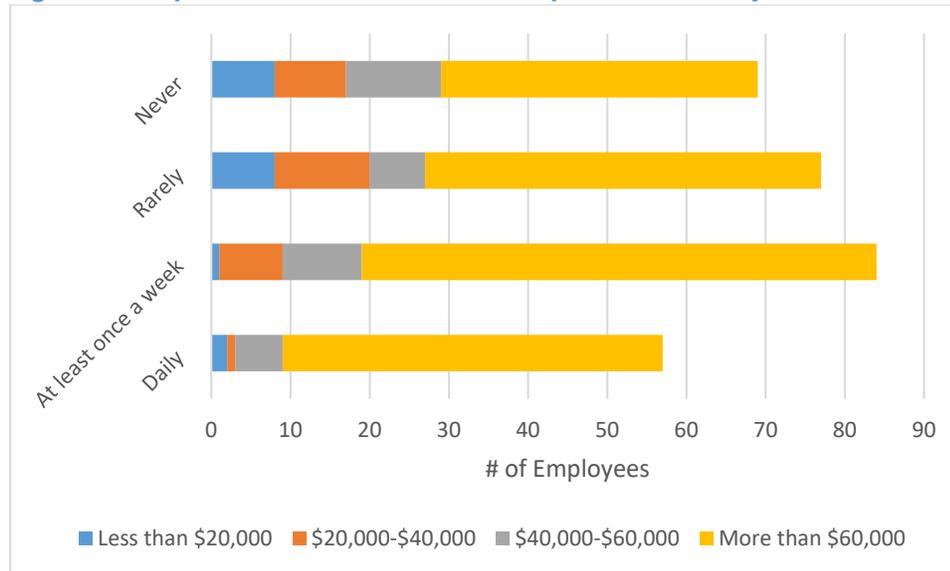
*x-axis only displays time periods with at least one response

Other Destinations

Nineteen percent of respondents indicated that they make a stop on their commute between their home and work. Out of those who provided additional details about where they make intermediate stops, nine percent said they dropped off or picked up children at childcare, three percent said they went to CCRI-Warwick, and eleven percent indicated they made stops to buy groceries or food. Some of these intermediate stops occur right at the entrance to Quonset Business Park at places such as Dave’s Market or Sunshine Daycare.

There are several commercial establishments at the entrance to the business park such as Dave’s Market, where employees go to during their lunch breaks. Forty-eight percent of respondents leave their workplace at least once a week for lunch (**Figure 29**). Of those who said that they leave their workplace for lunch, nearly 70 percent said they made more than \$60,000 and nearly all commuted by car, supporting the interview and focus group results that the often higher paid office workers have more flexibility in leaving their workplace for lunch.

Figure 28: Respondents Who Leave Their Workplace for Lunch by Income



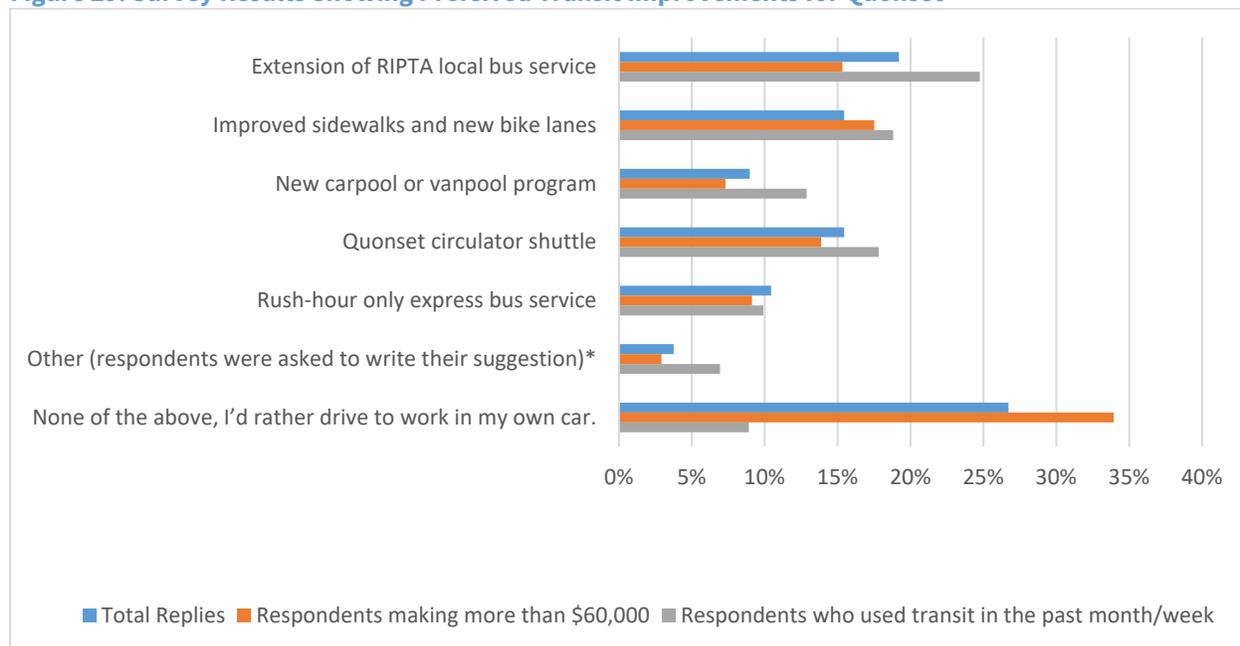
Transit Improvements

One of the survey questions asked respondents to select up to two options for improved access at Quonset Business Park from a list of seven, including choices for “none of the above” and “other” (**Figure 30**). The purpose of the transit improvement question was to gauge the preferences of Quonset commuters and understand what kinds of trade-offs matter to them. The seven options in the survey were:

- Extension of Local Bus Service to Quonset Business Park: This option would provide commuters a one-seat rider but feature infrequent service and slow travel times.
- Creation of a Quonset Circulator: This option would provide more frequent and convenient service to Park tenants but require a transfer to other transit services and possibly long end to end travel times.
- Creation of an Express Bus: This option would provide non-stop service to a transit hub or park and ride. It would offer the fastest commute times but offer only a few trips a day and require most users to drive or take another bus to reach home.
- Create a Park-Wide Carpool and Vanpool Program: While not traditional transit service, this option would improve the reliability and flexibility of a carpool program by including all commuters at QBP.
- Improve Bicycle and Pedestrian Facilities: This option would not improve transit service but make it easier for pedestrians and cyclists to access the Business park from nearby destinations and transit stops.
- The final two options were “Other” and “None of the Above”. The few respondents that stated “Other” specified improvements such as commuter train service to QBP and commuter ferry.

Those with incomes of less than \$60,000 and those who had used transit in the past year tended to select at least one of the proposed improvements. Meanwhile, most of those who selected “none of the above” have household incomes of more than \$60,000 a year.⁵

Figure 29: Survey Results Showing Preferred Transit Improvements for Quonset



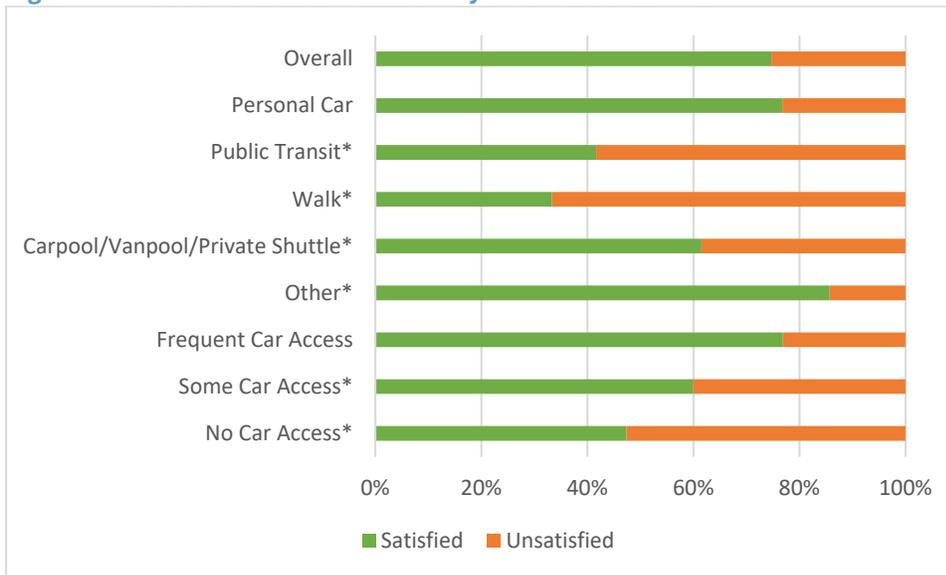
NOTE: The total number of responses does not equal the total number of completed surveys as each respondent was allowed to choose up to two responses to this question. Responses with fewer than 20 people are marked with an asterisk.

Seventy-five percent of the survey respondents indicated that they are satisfied with their existing commute to Quonset, while 25 percent indicated that they are unsatisfied (**Figure 31**). Of the satisfied commuters, 78 percent make more than \$60,000 each year and 91 percent said they have access to a car.

While some respondents who expressed dissatisfaction with their current commutes also expressed a willingness to consider or use transit if service were to be improved, others did not appear to be likely to shift modes if additional options were available. Instead, they used the survey as a chance to express dissatisfaction with traffic light timings leaving the business park, local speed limits, and pedestrian traffic walking in the roadways due to a lack of sidewalks.

⁵ The survey allowed up to two responses to this question, and there were respondents who chose both an improvement and “none of the above.”

Figure 30: Satisfaction with Commute by Mode and Vehicle Access



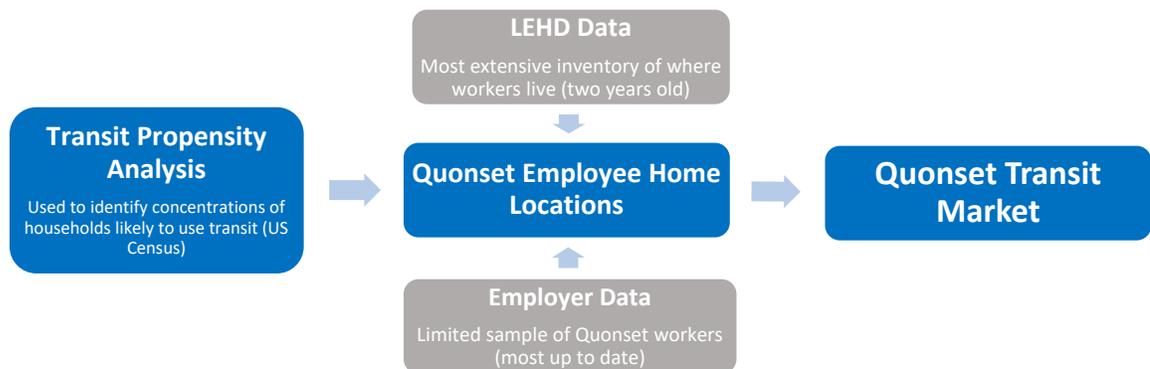
NOTE: Responses with fewer than 20 people are marked with an asterisk.

2.7 TRANSIT MARKET ANALYSIS

2.7.1 Introduction

The purpose of the Transit Market Analysis is to identify areas that have the greatest demand for transit connections to the Quonset Business Park. The analysis follows a multi-step process that relies on both publicly available data from the US Census Bureau - the American Community Survey (ACS) and the Longitudinal Employer-Household Dynamics (LEHD), as well as original data collected for this plan. The process starts by identifying the likelihood a commuter would use public transportation, or the Transit Propensity Index. Layered on top of this index is data on where specifically Quonset commuters live. The intersection between places with a high transit propensity and concentration of Quonset employees represent the primary market area for any future transit improvements to QBP. **Figure 32** illustrates the transit market analysis process.

Figure 31: Transit Market Analysis Process



To get a more complete picture of commuter dynamics, the study utilizes three key data sources: the Quonset Commuter Survey, employer provided data, and data from the US Census Bureau. **Table 14** highlights the caveats of each data source; despite these issues, these are the best sources available to conduct this analysis. US Census information provides the most robust and statistically significant sample of data. The market study primarily uses data from the American Community Survey (ACS) and the Longitudinal Employer-Household Dynamic Survey (LEHD). The downside of Census data is that it is at least two years old and fails to capture the most recent trends. To fill in some of that data gap, the market study also utilized employer provided data to understand where employees commute from. This data is more up to date and employer specific, however it covers only four large employers and approximately 40 percent of Quonset’s workforce. The market analysis uses the Quonset Commuter Survey as a secondary source but because it is not a random sample of employees, it is not used to determine where workers live.

Table 14: Caveats of Employee Survey Data and Transit Market Analysis Data in Determining Transit Market

| | Employer Data | US Census Bureau Data (ACS and LEHD) | Employee Survey |
|-------------|--|--|--|
| Pros | <ul style="list-style-type: none"> • Up-to-date data and highly accurate. • Sample consists of 40% of Quonset workforce • Employer specific. • Allows generalizations about shift times. | <ul style="list-style-type: none"> • Most robust sample. • Provides socio-demographic and commute information. • Allows study examine <i>potential</i> Quonset commuters. | <ul style="list-style-type: none"> • Most detailed source of data. • Allows the study of preferences across commuter sub-groups. |
| Cons | <ul style="list-style-type: none"> • Only covers four companies • No information on how employees get to work. | <ul style="list-style-type: none"> • Data set does not distinguish where within Quonset commuters are traveling. • Data is at least two years out of date. | <ul style="list-style-type: none"> • Smallest sample size. • Sample of little use to determine where commuters live. |

2.7.2 Transit Propensity Index

The transit propensity index consists of nine density-based categories: population, households, households below the poverty line, zero-car households, one-car households, disabled persons, labor force, transit commuters, and carpool commuters. These data-sets are indicative of where there are high-concentrations of individuals who are more likely to use transit. The weights for each category are based on the projected impact of each in defining transit-oriented populations. The end result, once individual measures are normalized and combined, is a score from 0 to 1 for each Census Block Group in the state of Rhode Island.

Table 15 summarizes the data sets that are inputs to the transit-oriented populations index and their respective weighting.

Table 15: Transit-Oriented Population Index Categories and Weighting

| Category | Weight |
|-----------------------------|--------|
| Population Density | 0.20 |
| Household Density | 0.15 |
| Poverty Household Density | 0.10 |
| Zero-Car Household Density | 0.15 |
| One-Car Household Density | 0.05 |
| Disabled Population Density | 0.05 |
| Labor Force Density | 0.15 |
| Transit Commuters Density | 0.10 |
| Carpool Commuters Density | 0.05 |

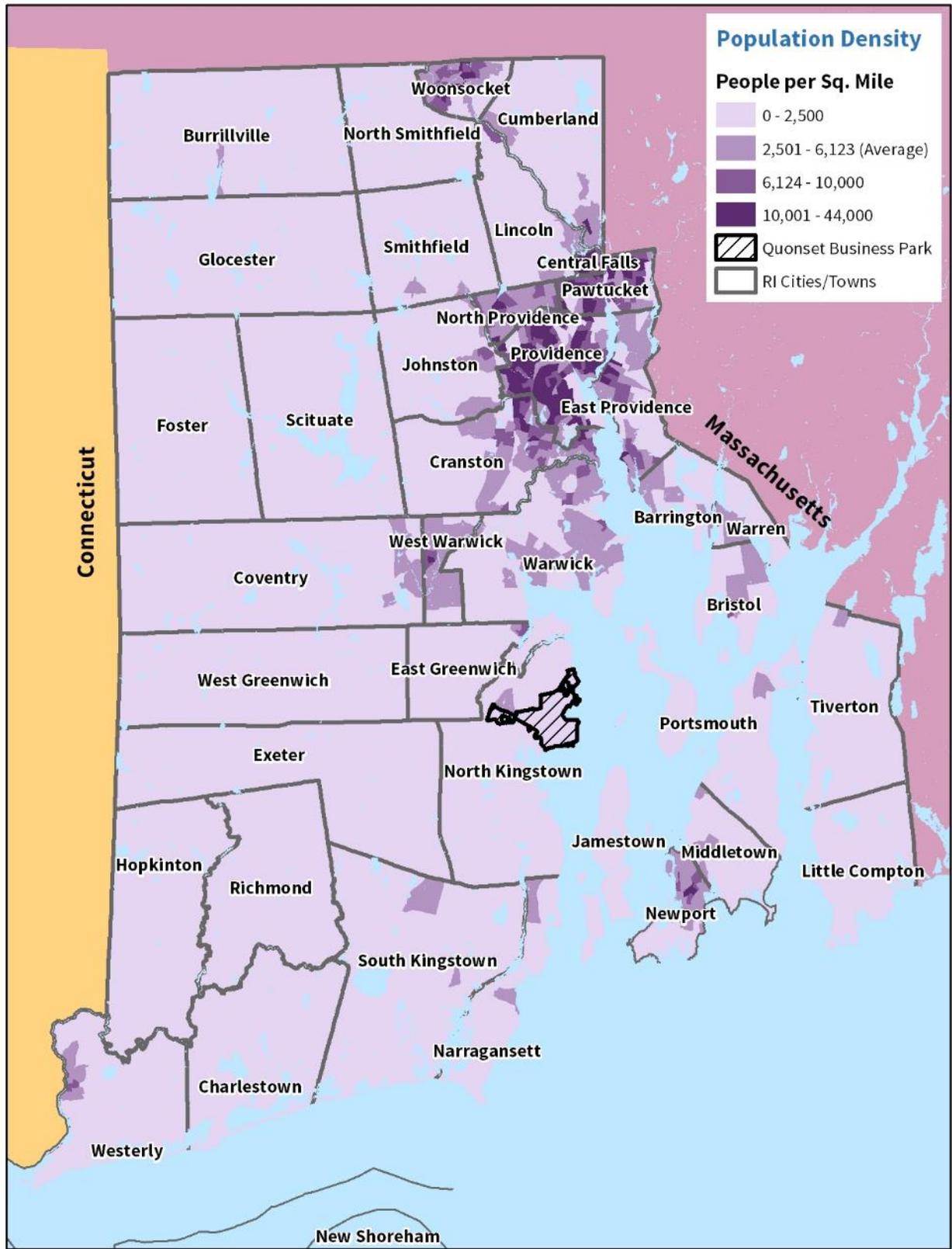
The four highest weighted categories are population density, household density, zero-car household density, and labor force density. Population density and household density have long been used by the industry to determine transit viability. Zero-car households (and one-car households) are more likely to use transit services simply because they lack access to private vehicles. Labor force is important in the context of Quonset, as QBP is primarily a workplace destination. The findings of these categories in the RIPTA service area (the State of Rhode Island) are described in detail below.

Population Density

The Federal Transit Administration (FTA) defines highly transit supportive areas as having 10,000 people per square mile or greater. In the RIPTA service area, much of Providence, Pawtucket, and Central Falls have densities greater than 10,000 people per square mile. Additionally, portions of Cranston (Laurel Hill, Edgewood), Woonsocket, East Providence (Riverside), North Providence, West Warwick (Arctic), and Newport (Broadway) also have neighborhoods with more than 10,000 people per square mile. Portions of Lincoln, Cumberland, East Greenwich, and Warwick have population densities greater than the state average.

Figure 33 illustrates population density by Census Block Group in the State of Rhode Island.

Figure 32: Population Density

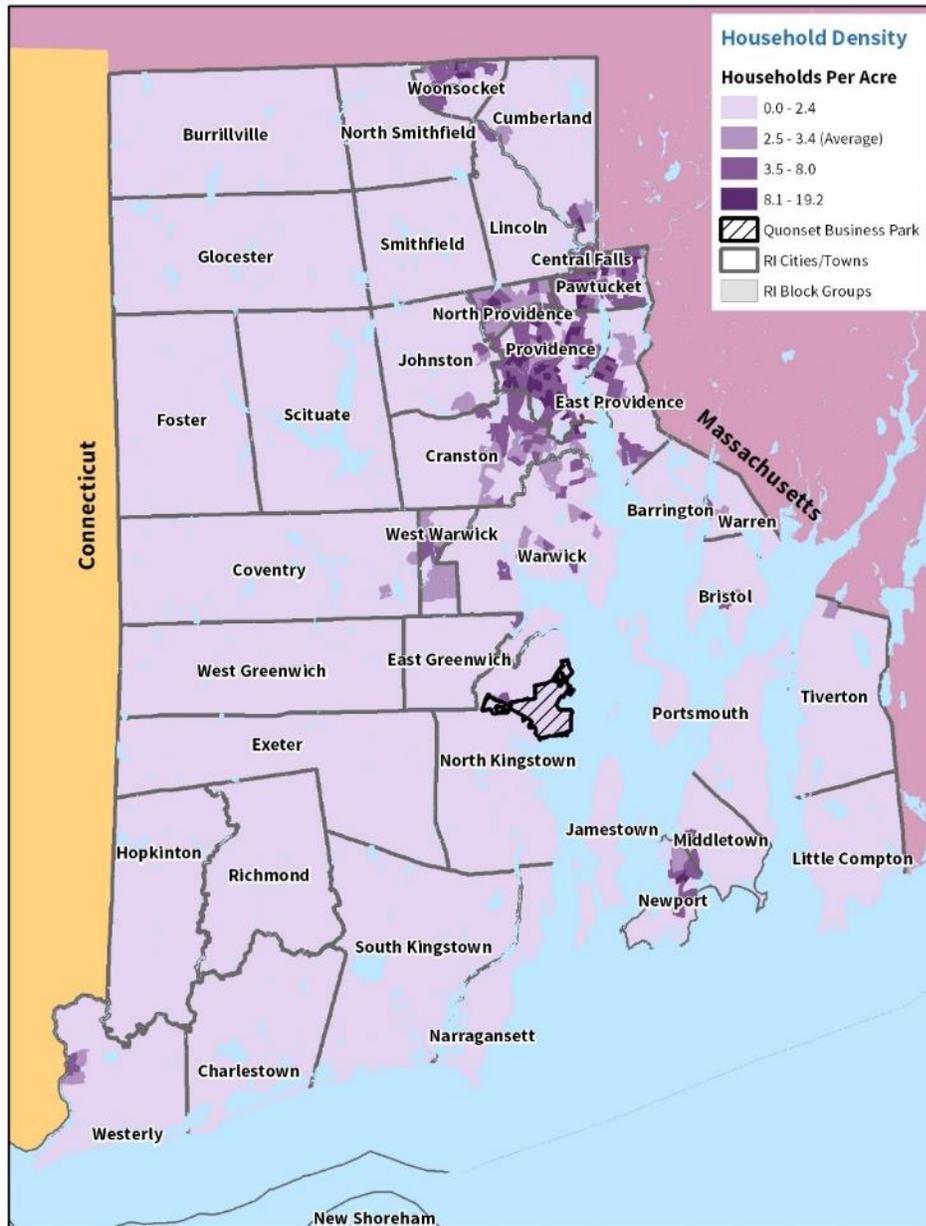


Household Density

The benchmark for supporting transit is generally around eight households per acre. In the RIPTA service area, densities over this benchmark exist throughout much of Providence, Pawtucket, and Central Falls. Additionally, a few Block Groups in East Providence, Cranston, and Newport have household densities above this benchmark. Block groups in West Warwick, Warwick, and North Kingstown (in the Davisville area) have above average household densities for the service area.

Figure 34 illustrates household density by Census Block Group in the State of Rhode Island.

Figure 33: Household Density

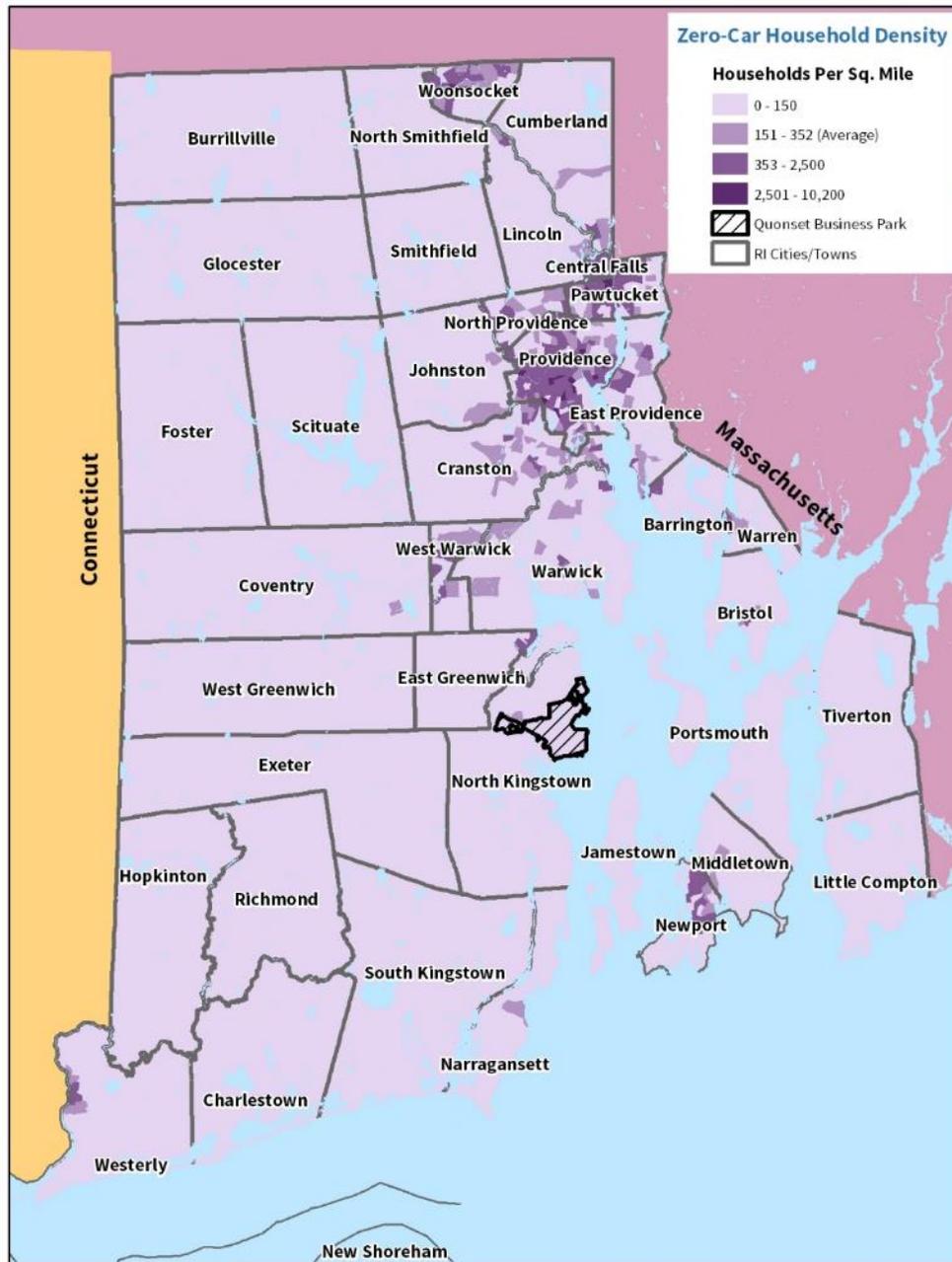


Zero-Car Household Density

Census Block Groups with the highest zero-car household density are primarily located in the urban core of Providence, Pawtucket, Central Falls, East Providence, North Providence, and Cranston. Additionally, Newport, Woonsocket, West Warwick, Warwick, Barrington, Warren, Lincoln, Cumberland, and East Greenwich all have Block Groups with zero-car densities that are above average for the state.

Figure 35 illustrates zero-car household density by Census Block Group in the state.

Figure 34: Zero-Car Household Density

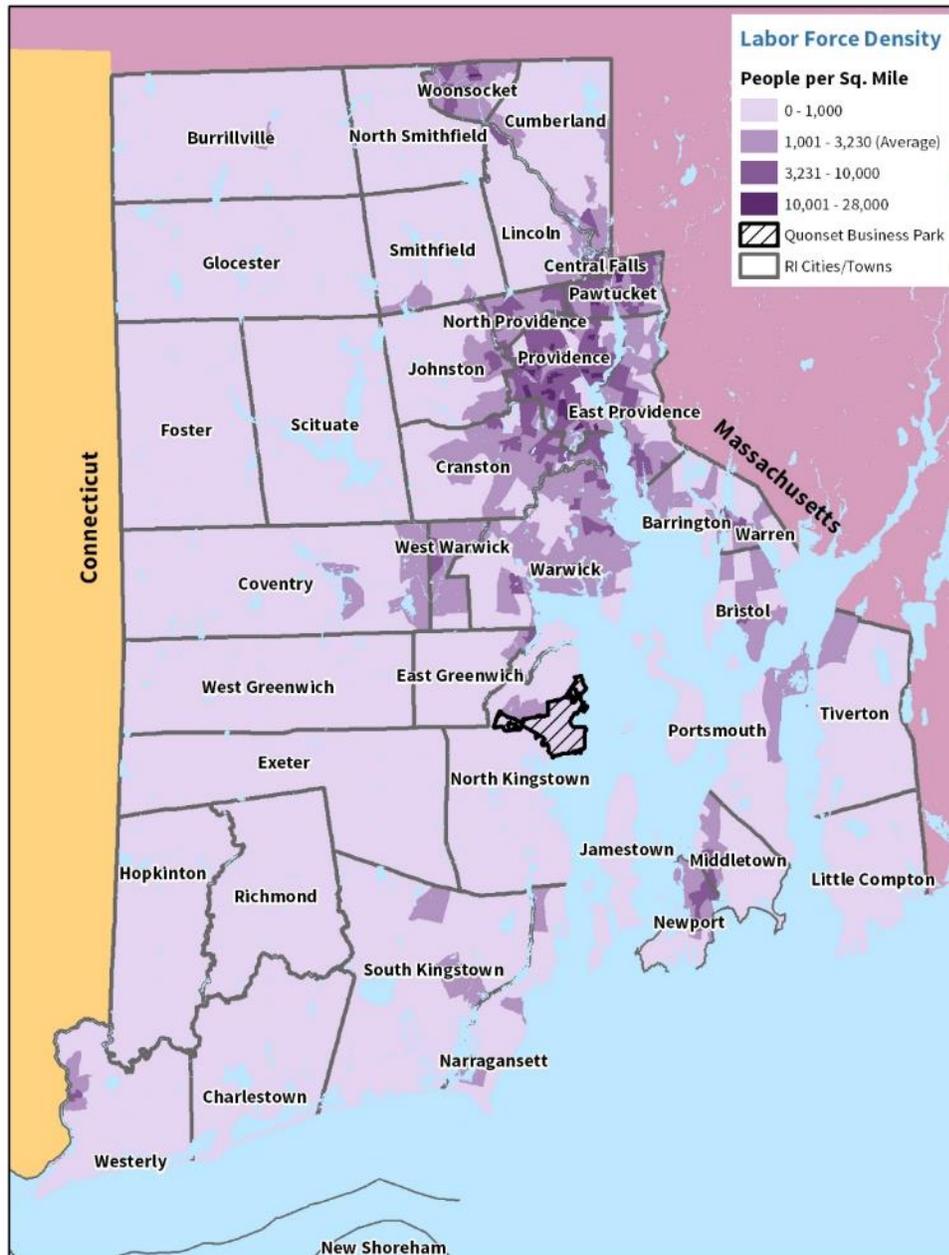


Labor Force Density

Labor force densities generally follow the same trend as population densities, with densities greater than 10,000 people per square mile existing in several Block Groups on the west side of Providence and in Pawtucket and Central Falls. Additionally, certain Block Groups in Newport, East Greenwich, Warwick, West Warwick, Cranston, Johnston, North Providence, East Providence, Warren, Cumberland, and Woonsocket have labor force densities above the state average.

Figure 36 illustrates labor force density by Census Block Group in the state.

Figure 35: Labor Force Density



Overall Transit Propensity

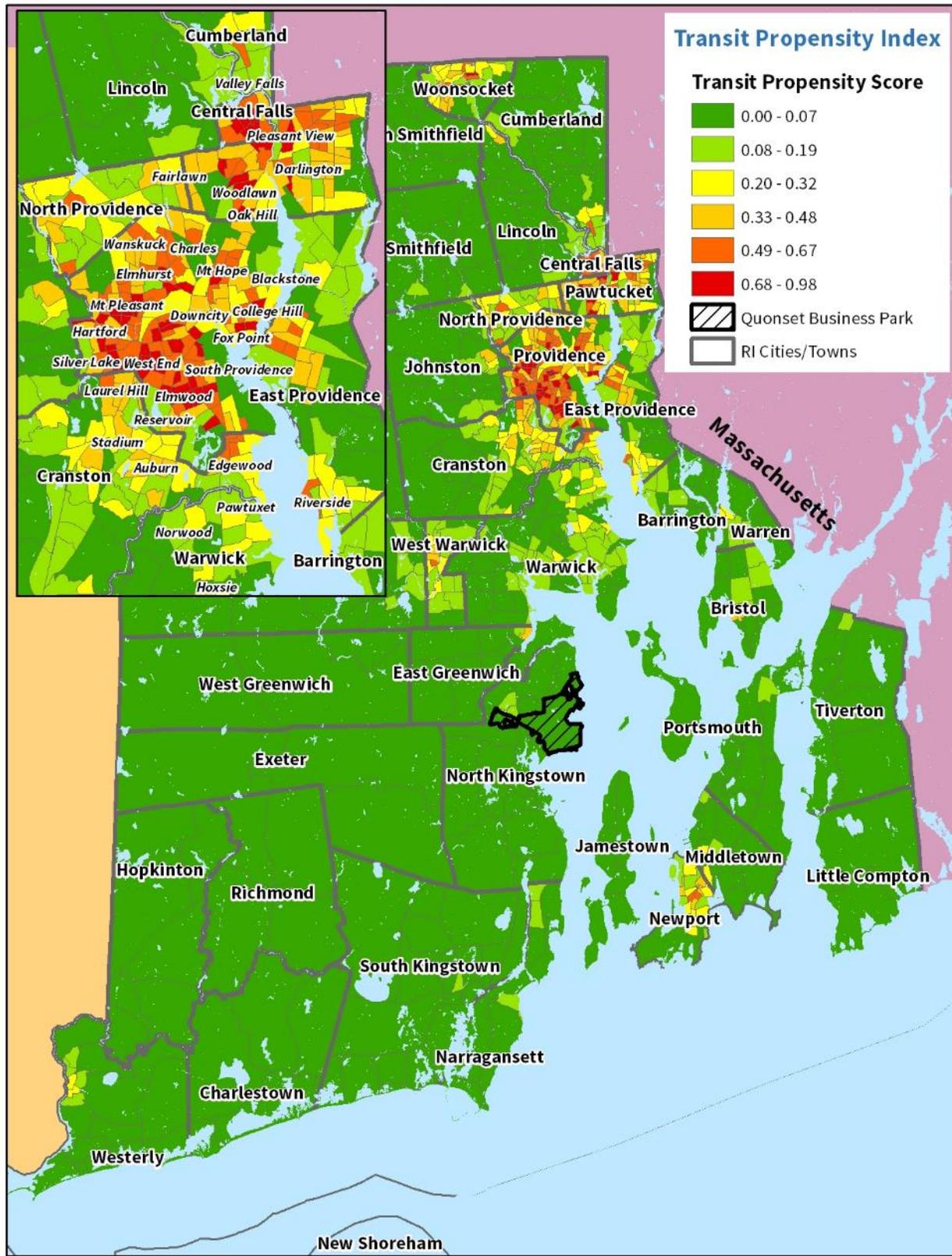
The transit propensity index overall is an indicator of potential transit demand independent of the supply of transit in a given area, meaning it is indicative of where high transit ridership is likely to materialize if high quality transit service was provided. While technically independent from the supply of transit, the existing transit mode split in a given area is a good point of reference for the transit propensity index score. **Table 16** summarizes the transit propensity index scores (in ranges based on natural breaks) and the corresponding average and maximum combined transit and carpool mode splits for the Block Groups that fall into each range. The two highest Transit Propensity score ranges have average transit/carpool mode splits of 20.5 percent and 27.3 percent, respectively. The maximum combined transit/carpool mode split represents the highest mode split of all the Block Groups that fall in that Transit Propensity Score range; the highest non-single occupancy vehicle mode split reported in the state was 69.5 percent in the Reservoir neighborhood of Providence.

Table 16: Transit Propensity Score Compared to Average and Maximum Transit/Carpool Mode Splits

| Transit Propensity Scores | Average Transit/Carpool Mode Split in these Block Groups | Max Transit/Carpool Mode Split in these Block Groups |
|---------------------------|--|--|
| 0.00-0.07 | 9.3% | 31.2% |
| 0.08-0.19 | 9.9% | 31.8% |
| 0.20-0.32 | 11.6% | 41.6% |
| 0.33-0.48 | 13.8% | 49.7% |
| 0.49-0.67 | 20.5% | 50.0% |
| 0.68-0.98 | 27.3% | 69.5% |

The areas of the state with the highest transit propensity index are mostly concentrated in Providence, Central Falls, Pawtucket, North Providence, East Providence, Woonsocket, West Warwick, and Newport (**Figure 37**). In Providence, these areas are most concentrated in the neighborhoods of Reservoir, Elmwood, West End, Silver Lake, Hartford, South Providence, Mount Pleasant, and Fox Point. In Pawtucket, these areas include portions of downtown as well as Woodlawn and Oak Hill. In Newport, these areas include the Broadway neighborhood just north of the historic downtown. Overall, all neighborhoods with the highest transit propensity index have RIPTA fixed-route service and connect with either Kennedy Plaza, the Pawtucket Transit Center, or the Gateway Center in Newport. There are no areas along Route 14 with a high transit propensity index, however connections to Route 14 can be made at Kennedy Plaza, Apponaug, and the Gateway Center, where other routes serving high transit propensity areas connect.

Figure 36: Transit Propensity Index Results



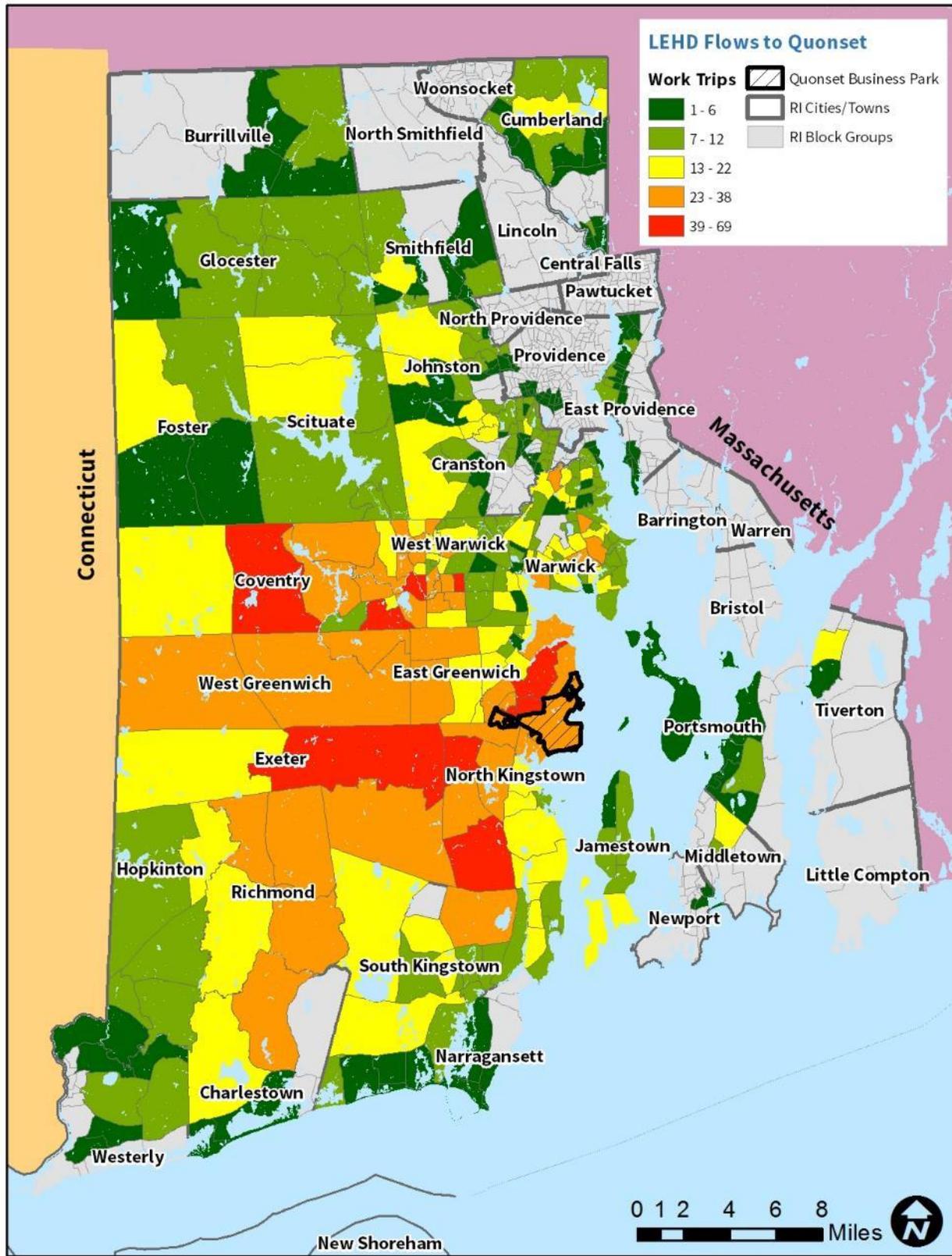
2.7.3 LEHD Travel Flow Analysis

LEHD data reports on the home Census Tract of individuals employed within Quonset. Of the top 100 flows to Quonset, only one was from outside Rhode Island (Seekonk, MA, which borders East Providence, RI). Since this is outside of the RIPTA service area, this Census Tract was excluded from the analysis. The transit propensity index uses Census Block Groups instead of Census Tracts (in order to analyze more specific geographies), and the LEHD data was disaggregated from Census Tracts to Census Block Groups using the proportion of total commuters reported by Census Block Group. The resulting analysis approximates where people who commute to the Census Block Group that contains Quonset live.

The top seven origin Census Block Groups for commutes to Quonset come from two communities: North Kingstown and Coventry. In North Kingstown, the majority of these Block Groups are in the northern half of the town with the exception of one in Saunderstown and one near Wickford Junction. In Coventry, both Census Block Groups are in the eastern side of the town near the East Greenwich and West Warwick borders. The remainder of the top 20 origin Census Block Groups for Quonset commuters are located in Coventry, West Warwick, Warwick, Exeter, West Greenwich, and Richmond. Other than those located along Post Road (US Route 1) in North Kingstown, none of these Census Block Groups are located along Route 14. It is important to note, while these areas have the highest absolute number of commuters, because of their large size they do not have the highest density of commuters.

Figure 38 illustrates the top Block Groups with existing work commutes to Quonset.

Figure 37: Top Block Groups with Existing Work Commutes to Quonset (LEHD)



2.7.4 Combined Market Analysis

The combination of the transit-oriented population index and the LEHD travel flow analysis creates a dataset that shows where people are commuting to Quonset from and if they are likely to use transit. To combine the datasets, the transit propensity index score (from 0 to 1.0) was multiplied by the total number of commutes to Quonset for each Census Block Group. The combined transit market analysis using LEHD is illustrated by Block Group in **Figure 39**.

The top 20 Census Block Groups with the highest scores are all located in West Warwick, Coventry, Warwick, Cranston, East Greenwich, North Kingstown, and Providence (see **Table 17** and **Figure 40**). The largest overall cluster can be found in central West Warwick and eastern Coventry, where 10 out of the 20 are located. Combined, these Census Block Groups total a score of 56. Two Census Block Groups in the top 20 are located along Route 14, including one in the Davisville section of North Kingstown, and one in downtown East Greenwich.

Table 17: Census Block Groups with Highest Transit Market Analysis Using LEHD Score

| Block Group ID | City/Town | Neighborhood | Score |
|----------------|-----------------|--------------------------|-------|
| 440090501033 | North Kingstown | Davisville | 9.1 |
| 440030203003 | West Warwick | Arctic | 8.3 |
| 440070140003 | Cranston | Stadium | 8.0 |
| 440030209011 | East Greenwich | Downtown (Hill & Harbor) | 6.8 |
| 440030201022 | West Warwick | Crompton | 6.2 |
| 440030201021 | West Warwick | Crompton | 6.1 |
| 440030206041 | Coventry | Anthony | 5.8 |
| 440030202001 | West Warwick | Arctic | 5.6 |
| 440070147001 | Cranston | Laurel Hill | 5.5 |
| 440030201023 | West Warwick | Crompton | 5.3 |
| 440030214021 | Warwick | Hoxsie | 5.3 |
| 440070016006 | Providence | Silver Lake | 5.0 |
| 440070014002 | Providence | West End | 4.9 |
| 440030201013 | West Warwick | Crompton | 4.8 |
| 440030206043 | Coventry | Anthony | 4.7 |
| 440030218001 | Warwick | Shawomet/Lockwood | 4.6 |
| 440030201011 | West Warwick | Crompton | 4.5 |
| 440030203002 | West Warwick | Arctic | 4.4 |
| 440070141001 | Cranston | Laurel Hill | 4.3 |
| 440070020004 | Providence | Mt Pleasant | 4.2 |

Figure 38: Combined Transit Market Analysis Using LEHD by Census Block Group

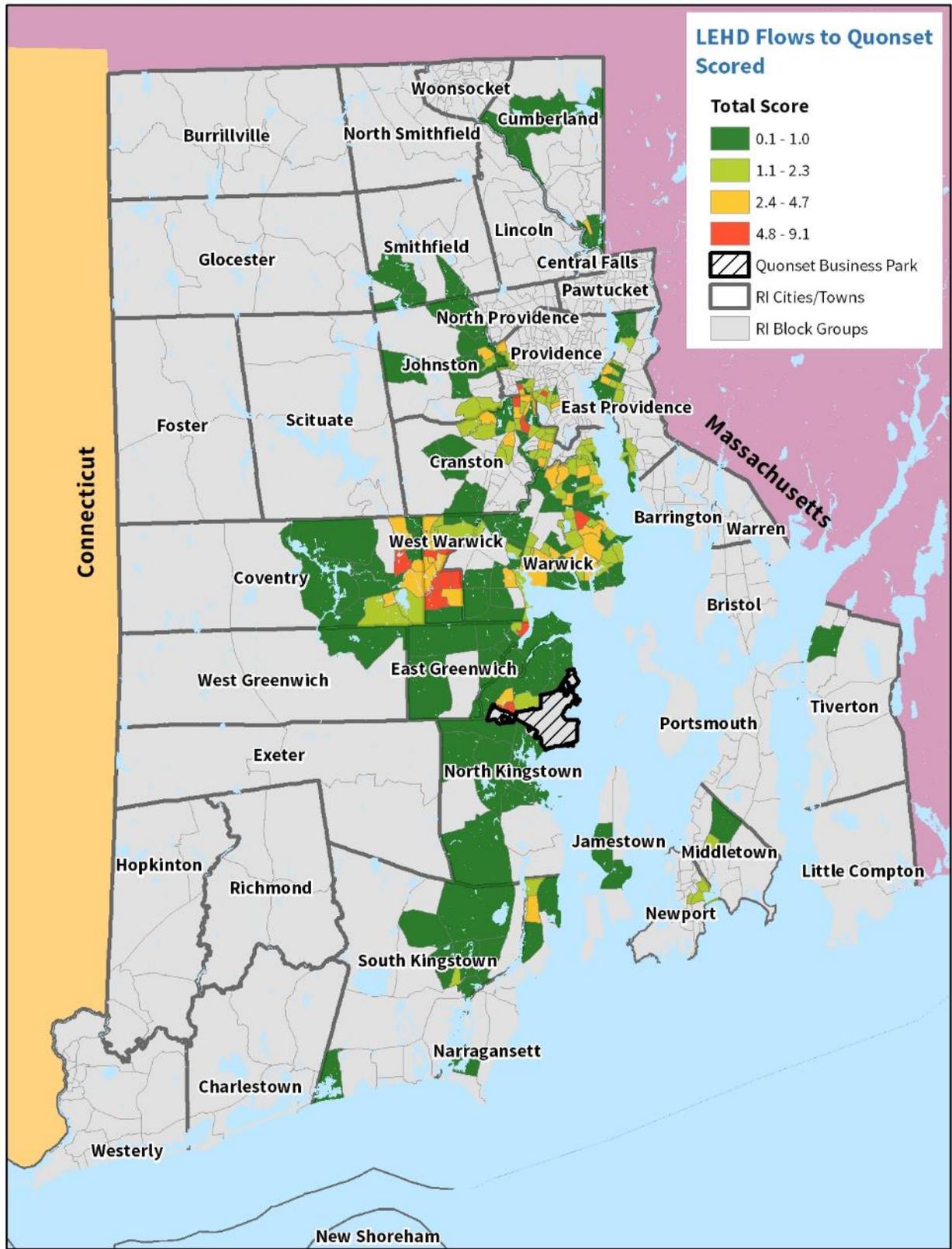
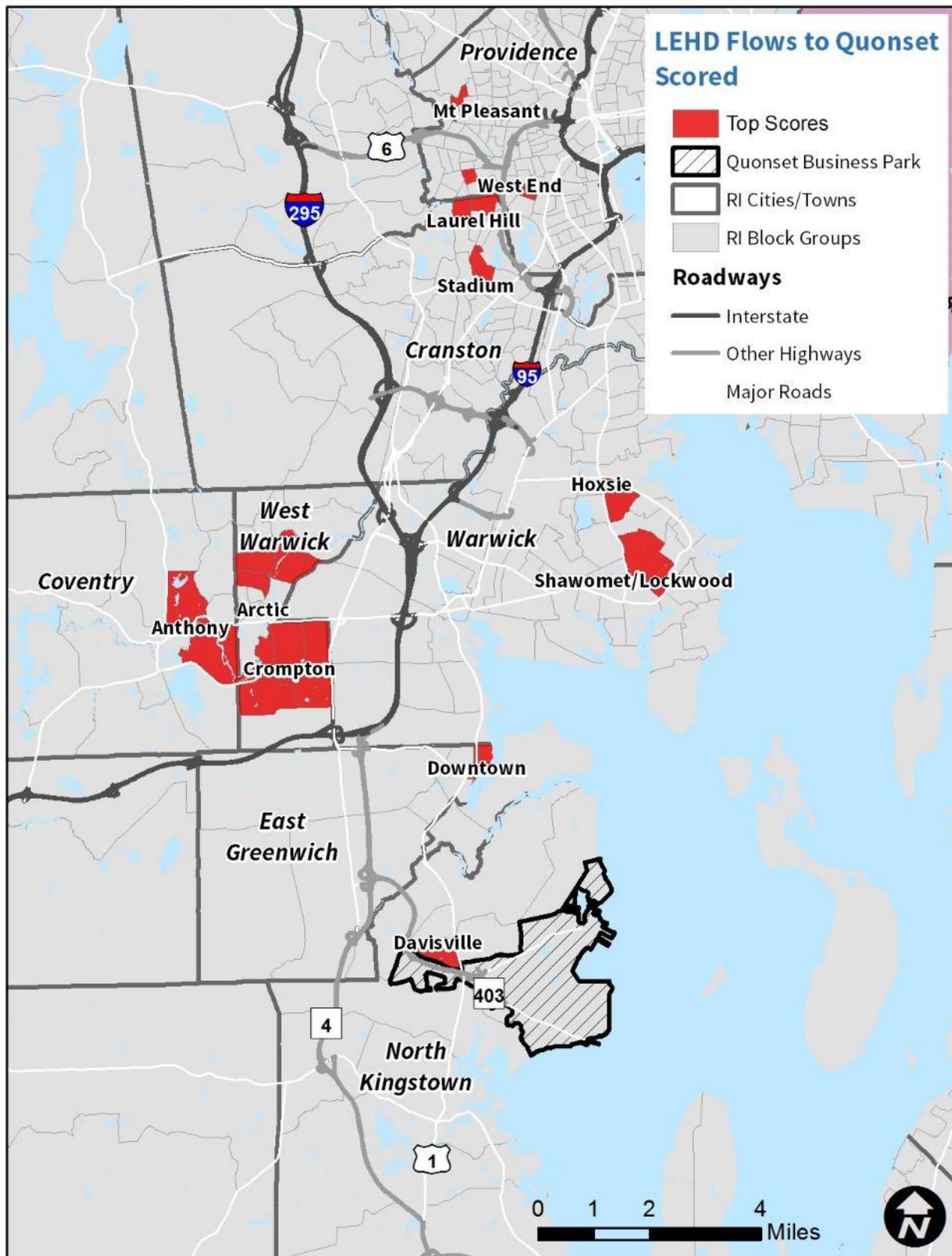


Figure 39: Census Block Groups with Highest Transit Market Analysis Using LEHD Score



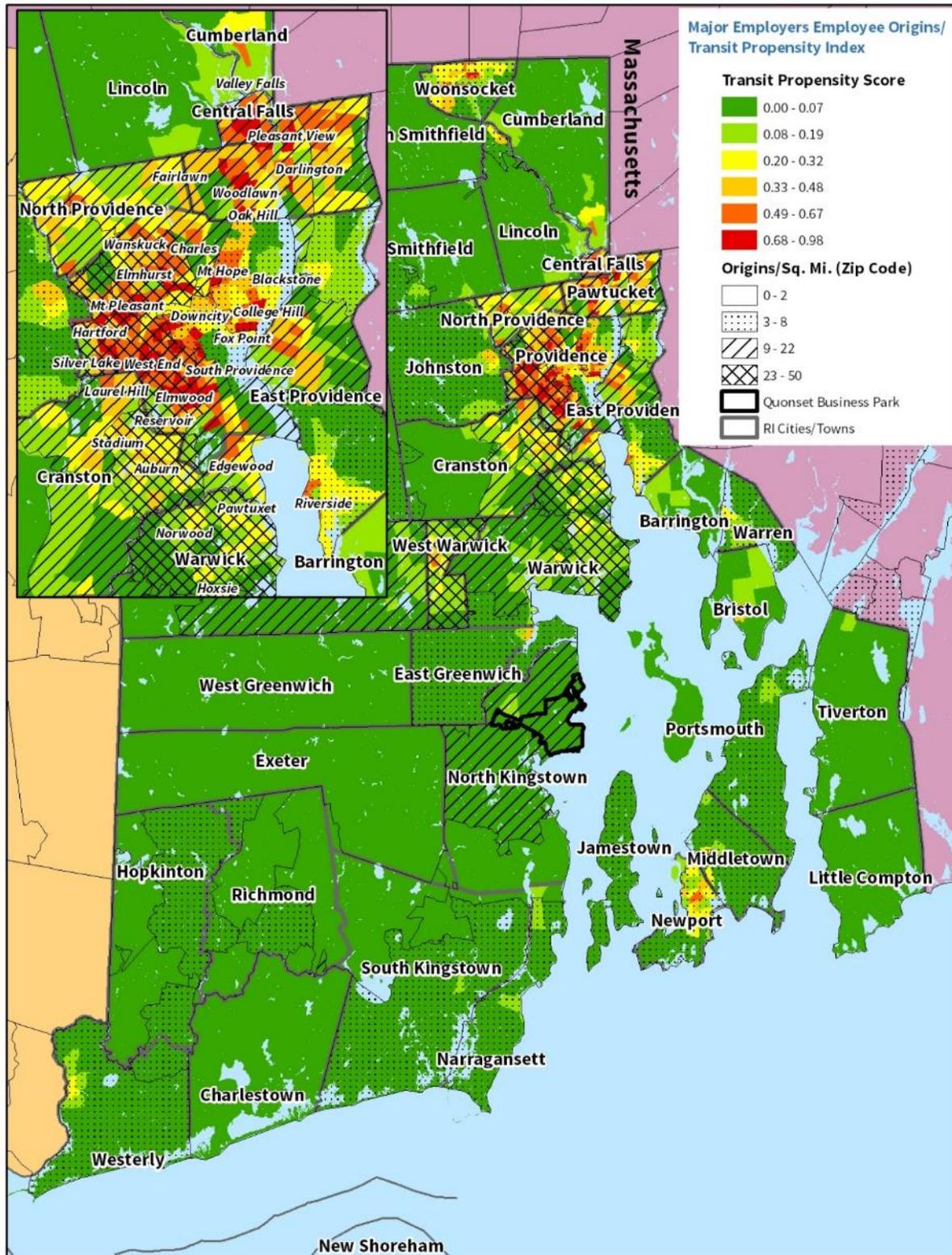
Overall, the areas noted in Table 18 represent areas with high market potential for transit and/or rideshare work trips to Quonset under this analysis, given that they presently contain a large number of existing Quonset commuters and commuters and have a high number of people who are likely to use transit.

2.7.5 Employee Origins at Major Employers

As discussed in a previous section, four major employers in Quonset provided home zip codes for employees, including Electric Boat, Greencore, Hayward Industries, and Toray Plastics. Combined, these businesses employ just over 4,400 people. In order to supplement the previous transit market analysis conducted using LEHD data, the same analysis was conducted utilizing this dataset, including combining it with the Transit Propensity Analysis to help determine the potential transit market.

Since zip codes are a much larger geography than Census Block Groups, the density of employees by zip code was first calculated to arrive at an employee per square mile figure for each zip code. These densities were broken up into four bins using natural breaks. The results were then overlaid on the transit propensity analysis to visually determine the overlap between the two, as the zip codes also do not match up well with Census Block Groups (see **Figure 41**).

Figure 40: Electric Boat, Greencore, Hayward Industries, and Toray Plastics Employees Per Square Mile by Zip Code (Origins) and Transit Propensity Index



A number of Block Groups were identified as having a high transit propensity index and a high corresponding employee origin density. To identify the highest potential for transit commutes to Quonset, the overlap between the two measures was calculated in two ways:

- Block Groups with a transit propensity index in the top bin (score ≥ 0.67) and a corresponding employee origin density in the top two bins (>9 employees per square mile), or;
- Block Groups with a transit propensity index in the two highest bins (score ≥ 0.49) and a corresponding employee origin density in the top bin (>23 employees per square mile).

Table 19 summarizes the neighborhoods which meet the overlap criteria above and the city or town in which they reside. Figure 42 illustrates these areas, including the individual Block Group boundaries.

Table 18: Neighborhoods with High Transit Propensity Index and a High Electric Boat, Greencore, Hayward Industries, Toray Plastics Employee Origin Density

| City/Town | Neighborhood |
|----------------------|--|
| Central Falls | All |
| Pawtucket | Pleasant View, Darlington, Fairlawn, Oak Hill, Woodlawn |
| Providence | Elmhurst, Elmwood, Federal Hill, Hartford, Mount Hope, Mount Pleasant, Silver Lake, Smith Hill, South Providence, West End |
| West Warwick | Arctic |

2.7.6 Transit Market Analysis/Major Employer Origin Combined Analysis

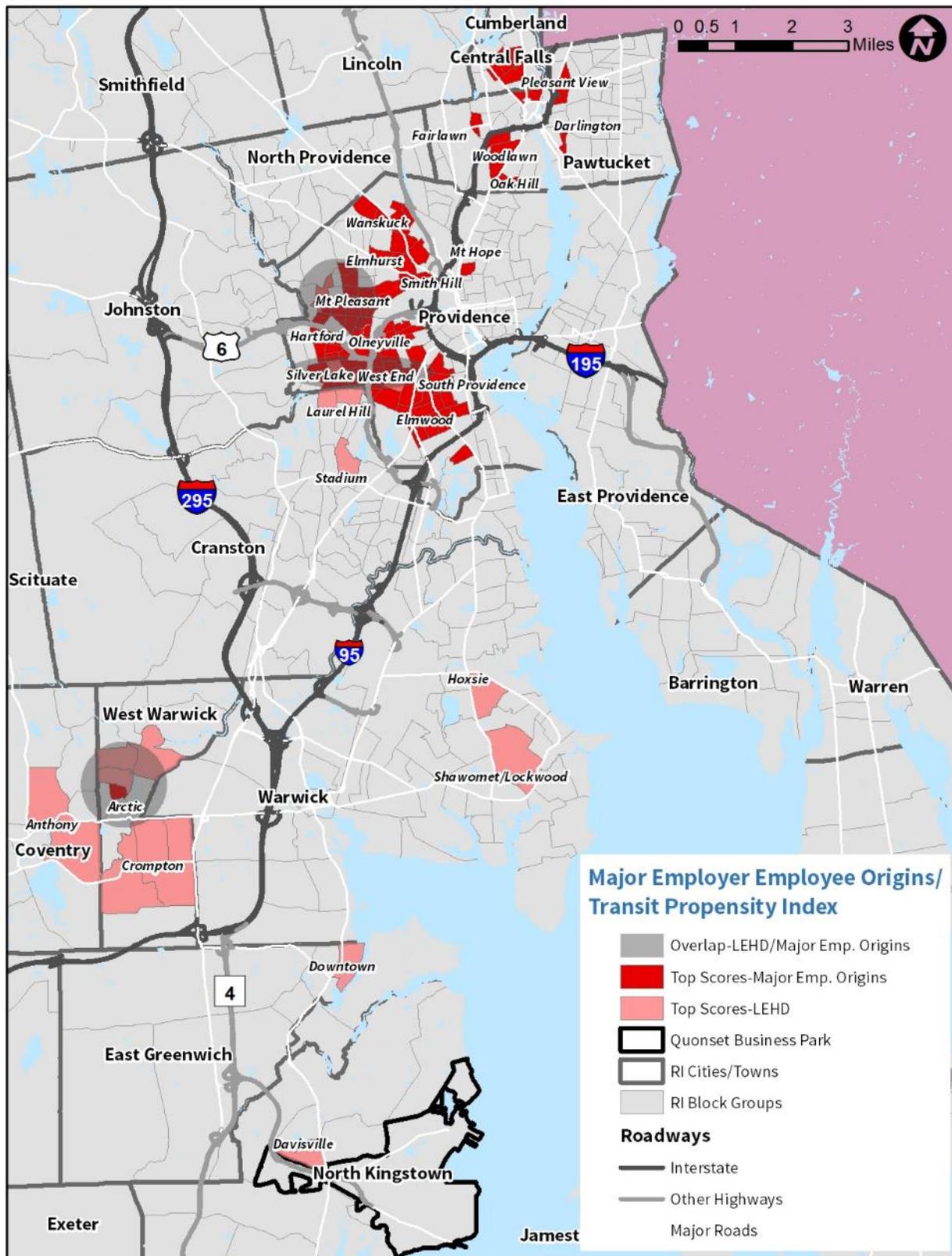
There is some overlap between the transit market analysis (using the transit propensity index and LEHD travel flows) and the analysis of employee origins at major employers. These areas include the Arctic neighborhood in West Warwick and the Mount Pleasant, Silver Lake, and West End neighborhoods in Providence. These neighborhoods represent the highest potential for transit commutes to Quonset. Overall, the Census Block Groups with the highest scores in each of these analyses represent the geographic market for transit trips to the Quonset Business Park.

Figure 43 illustrates the final geographic market for transit trips to the Quonset Business Park, including the top Census blocks from the transit market analysis using LEHD, the major employer employee origins analysis, and the overlap between the two. **Table 20** summarizes these areas.

Table 19: Final Geographic Market for Transit Trips to the Quonset Business Park

| City/Town | Neighborhood |
|---------------------------|---|
| Highest Potential | |
| Providence | Mt Pleasant, Silver Lake, West End |
| West Warwick | Arctic |
| Moderate Potential | |
| Central Falls | All |
| Coventry | Anthony |
| Cranston | Laurel Hill, Stadium |
| East Greenwich | Downtown |
| North Kingstown | Davisville |
| Pawtucket | Pleasant View, Darlington, Fairlawn, Oak Hill, Woodlawn |
| Providence | Elmhurst, Elmwood, Federal Hill, Hartford, Mount Hope, Smith Hill, South Providence |
| Warwick | Hoxsie, Shawomet/Lockwood |
| West Warwick | Crompton |

Figure 42: Final Transit Market for Quonset



2.8 KEY FINDINGS

The existing conditions analysis conducted for the Quonset Transit Study looks at the travel needs of employees of QBP from a number of perspectives, along with an analysis of existing service. The following section summarizes this analysis into a handful of key findings.

2.8.1 Where is Transit Demand the Greatest?

The Quonset Business Park faces an interesting commuter dynamic. While the towns surrounding QBP are home to the highest number of Quonset employees in absolute terms, these areas are not necessarily the best focus for transit and other commuter improvements. These areas have lower density land uses that are difficult to serve by public transportation, and residents in towns like North Kingstown or Exeter have high rates of car ownership and few barriers to accessing jobs in QBP. Instead, the greatest need for Quonset is to connect the QBP to the higher density communities in and around Providence. Places like Providence, East Providence, and Warwick have both concentrations of Quonset employees and the characteristics reflective of public transportation use.

Based on the employer focus group, these areas are also from where employers struggle to recruit new employees. Fewer Quonset employees commute from Providence's urban core to Quonset than from the QBP's nearby suburban communities, reflecting in part the effect of poor transit access to the QBP. Improving access from Rhode Island's urban core would allow job seekers currently unable to make a commute to Quonset to have access to jobs in the business park and allow growing employers to meet their needs by recruiting from a larger population.

2.8.2 Top Destinations within QBP

There are a handful of key destinations within QBP that provide the greatest demand for improved commuter options. Electric Boat and Toray Plastics, as the two largest employers, are natural destinations in QBP. From the propensity analysis and survey results, these two employers do not appear to have a high level of existing transit use but their sheer size still make them worthwhile to serve. Commerce Park Road, which is home to businesses like Ocean State Job Lots and Greencore, is another node of demand. These workplaces have a higher concentration of employees likely to take transit, i.e., lower wage and entry-level workers. The area around Commerce Park Road has seen a lot of growth over the last few years and improved transportation options could facilitate recruitment of new employees.

A secondary destination for enhanced commuter options is along Circuit Drive and Whitecap Drive. While this cluster of businesses is composed of mostly small and medium sized employers, including higher-wage office jobs, there are a number of key companies that would benefit from improved transit connections.

2.8.3 Commuter Satisfaction

Future transportation improvements should target employees with limited vehicle access. The Commuter Survey showed that commute satisfaction declined as household income declined (with the exception of employees whose household incomes are \$20,000 or less per year, a finding that is likely the consequence of an overall low sample from this group). Employees without reliable access to a personal vehicle for commuting had a much lower satisfaction with their commute than those who drove every day, which leads to truancy and employee turnover, a costly impact to the employers.

2.8.4 User Preference for Improvements

The commuter survey provided information on the commuting preferences of Quonset employees. The survey highlighted a number of options that encompass the tradeoff inherent between frequency, travel time, coverage, and cost. Riders who took transit for any purpose in the last month had differing preferences from the entire population of respondents, especially those with incomes over \$60,000 a year. Frequent transit users preferred the extension of local bus service by a large margin compared to the average respondent. Higher-income respondents chose “none of the above” at the highest prevalence.

The preference of extending existing service over creating a circulator or express bus route, both of which either required a transfer or drive to a Park and Ride, suggests, not surprisingly, that survey respondents have a preference for one-seat rides to QBP. The relative unpopularity of the peak-only express bus option compared to a circulator or local bus extension, suggests workers value some degree of all-day service and travel flexibility as well. Based on shift time data and lunch-time travel information, any future service would need to focus on periods of high travel turn-over, as there is little travel demand outside of shift change periods.

2.8.5 Issues with Existing Transit Service

The existing transit network, even if extended into QBP, is poorly suited to serve the travel demand within Quonset without some adjustment. A large number of commuters arrive to QBP by 6:30 AM; the first outbound trip of the Route 14 reaches Gate Road only at 6:23 AM and at a distance of over a mile to most Quonset businesses. Furthermore, at major transfer points there are limited connection opportunities so early in the morning, compounding schedule problems. While a smaller volume of trips occurs during the second and third shift, these periods are incompatible with existing RIPTA schedules as they end after service discontinues for the night. The limitations of the existing network suggest that for transit to be successful in Quonset, some degree of service re-organization will have to occur.

2.8.6 Employer Investment in Alternative Modes

The employer focus group illustrated that Quonset’s businesses are very interested in improved travel options to QBP. Companies stated that the lack of transit access makes it harder to recruit and retain the labor force that QBP depends on. The companies at the focus group recognized that they had a part in making alternative modes like transit and carpooling a success in QBP. They generally seemed to support measures to promote transit and other non-single occupancy vehicle use in the workplace through enabling pre-tax deductions for transit expenses and educating workers about their travel options. The focus group attendees were less favorable about enacting disincentives to single occupancy vehicle (SOV) trips such as limiting parking supply or charging for parking. As there is virtually no transportation demand management (TDM) program at Quonset, implementing TDM measures at QBP represent a low-cost means to boost transportation alternatives.

3. Transit Alternatives

3.1 INTRODUCTION

Determining the best solution to providing public transportation to Quonset began by developing a long list of potential improvements which were then screened for their feasibility and effectiveness. Four potential types of improvements were identified, with each type having a number of variations for a total of ten potential transit alternatives. These four options are:

- Reconfigure the existing Route 14 to serve Quonset directly.
- Create a new Fixed-Route bus line.
- Create a new Flex-Route service.
- Implement a high capacity service such as commuter rail or ferry.

In addition to these alternatives, transit demand management (TDM) and ridesharing strategies were explored and are discussed in **Section 6** of the study.

3.2 SCREENING OF ALTERNATIVES

A number of critical factors were used to determine which alternatives were the most feasible and warranted further study, including:

- Minimize the number of transfers necessary to reach the Park for Quonset commuters.
- Allow for effectively timed connections to the wider RIPTA network.
- Ensure that service improvements have a minimal negative impact on existing transit services.
- Provide a cost and travel time effective solution for commuters.
- Provide a low-cost solution that can be launched relatively quickly by RIPTA.

Table 21 summarizes the strengths and weaknesses of each alternative assessed, while a detailed discussion of each alternative follows.

Table 20: Strengths and Weaknesses of Initial Alternatives vis-à-vis Screening Criteria

| | Limits # of Transfers | Enables convenient transfers | Impacts existing transit services | Service travel time and fare | Cost effective for agency |
|------------------------------|-----------------------|------------------------------|-----------------------------------|------------------------------|---------------------------|
| Route 14 Improvements | | | | | |
| Route 14 Short-Turn | ✓ | ✗ | ✗ | ✗ | ✗ |
| Route 14 Express Bus | ✓ | ● | ✗ | ✗ | ✗ |
| Route 14 Deviated Service | ✓ | ✗ | ✗ | ✗ | ✗ |
| New Fixed-Route | | | | | |
| New Bus Route to Park | ✓ | ✓ | ✓ | ✓ | ✗ |
| Internal Park Circulator | ✗ | ✗ | ✓ | ✗ | ✗ |
| Flex Route Service | | | | | |
| Internal Park Circulator | ✗ | ✗ | ✓ | ✗ | ✓ |
| Flex to Wickford Junction | ● | ● | ✓ | ● | ✓ |
| Flex to Warwick Hub | ● | ✓ | ✓ | ✓ | ✓ |
| High-Capacity Service | | | | | |
| Commuter Rail into Park | ✓ | ✓ | ✗ | ✗ | ✗ |
| Ferry Route into Park | ✓ | ✓ | ✓ | ✗ | ✗ |

Key: ✓: Good; ●: Moderate; ✗: Poor

3.2.1 Route 14-Based Alternatives

As the RIPTA Route 14 operates at the edge of the Park along Gate Road and Post Road, it is possible to adjust the route to increase its utility for Quonset commuters. Ultimately, three options were identified (**Figure 44**), all of which were eliminated for further study due to major limitations.

Route 14 Short-Turn

The Route 14 is one of the longest routes in the entire RIPTA system. To improve the route’s operations, previous studies have recommended terminating certain trips at Gate Road as the outbound end of the route, a practice known as short turning. As the route has its highest passenger loads north of Gate Road, introducing a short-turn may improve route efficiency by reallocating resources to where there is the greatest demand. In this alternative, the short-turn trips on the route would circulate through the Park instead of simply terminating at Gate Road. Full trips to/from Newport and Narraganset would continue along the route’s current alignment.

There are a number of shortcomings to this alternative:

- Route 14 does not directly serve where most QBP commuters live, necessitating a transfer to/from another RIPTA route. To meet the peak demand during the first shift (6:00 AM – 6:30 AM), the route would have to depart Kennedy Plaza before most connecting routes arrive at the transfer hub.
- Route 14 operates locally along Post Road, leading to a 42-minute, delay prone trip between Kennedy Plaza in Providence and the entrance to the Park.
- Short-turning the route would have negative consequences on riders boarding or alighting south of Gate Road as it would cut frequencies on the line along that segment. The route currently has average headways of over one hour.
- Increasing service along the route to make up for the short-turn trips would result in a major operating cost increase for RIPTA.

Route 14 Express Bus to Park

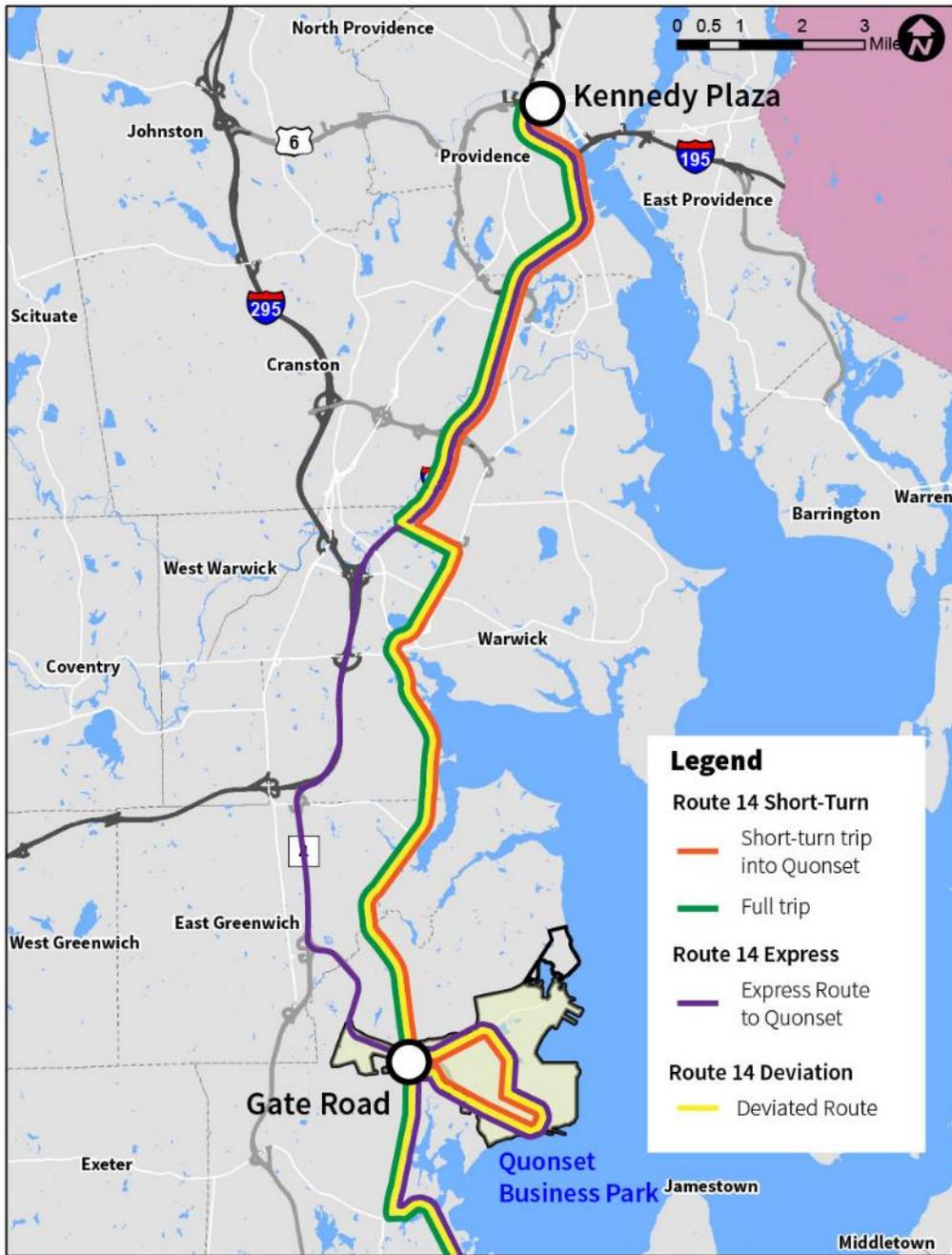
A second option for adjusting service along the Route 14 would be to create an express pattern of the route that serves Quonset. The route would utilize I-95, Route 4, and Route 403 between Kennedy Plaza and Quonset, significantly improving travel times between Kennedy Plaza and the Park compared to the existing alignment along Post Road. After circulating through Quonset the route would operate locally to Newport or Narraganset. Local service along Route 14 north of the Park would continue to operate but short turn at Gate Road. This alternative was eliminated for the following reasons:

- As the route would be split into a local service between the Airport and Gate Road and an express service from Providence to Quonset, Newport, and Narraganset, approximately 100 daily riders would have to transfer at Gate Road to take a journey that currently is a one seat ride.
- Running the route express from Providence would be costly and duplicate much of the existing Route 66 and 65x.
- The line would require existing Route 14 riders who board at Kennedy Plaza and travel south of the Park to take a lengthy loop through the Park.

Route 14 Deviated Service

The final adjustment explored for the Route 14 is to modify the route to be a deviated fixed-route service. The route would deviate into the Park from its normal alignment upon the request of riders. This alternative was eliminated due to the negative impact it would have on Route 14. Adding deviated service into the Park would greatly add to the travel time and reduce schedule reliability.

Figure 43: Service Alternatives – Adjustments to Route 14



3.2.2 New Fixed-Route Service

Creating a new fixed-route bus service unrelated to Route 14 (see **Figure 45**) is another option for serving the Park. Two alternatives for a new fixed route service were explored: creating an internal park circulator and an entirely new route that operate from a major bus transfer location into the Park.

Fixed-Route Bus Service

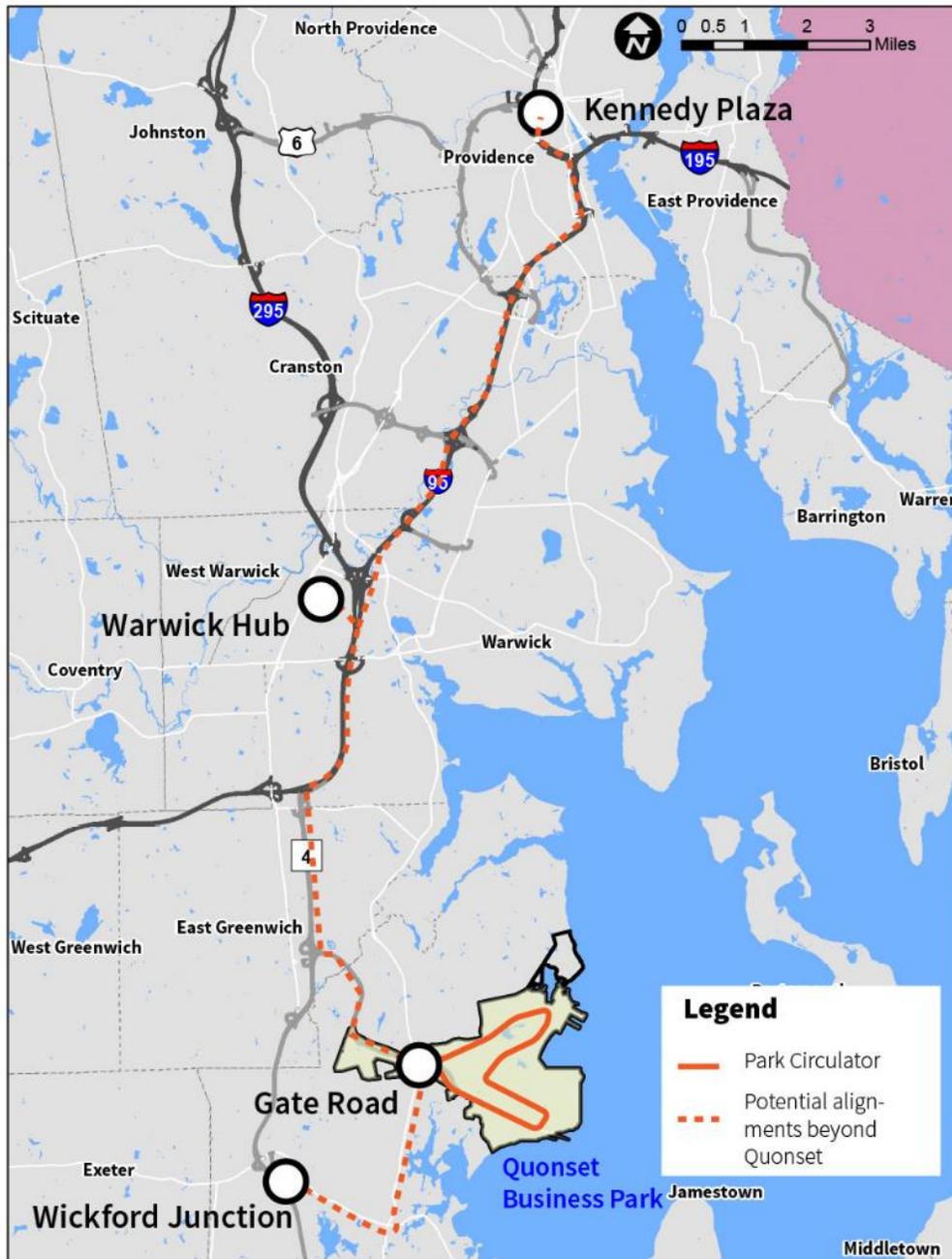
A new bus route could be established between Quonset and a major transfer node like Wickford Junction, a Warwick Hub at CCRI or the Warwick Mall, or Kennedy Plaza in Downtown Providence. Operating a route directly to a transfer hub will allow the route to serve all but the earliest shifts in the AM peak. While many riders would have to transfer twice to reach the Park, schedules can be coordinated to minimize wait times. For example, riders may first go to Kennedy Plaza, transfer to the Route 66 to the Warwick Hub, and finally transfer to the Circulator. Ultimately, a few shortcomings to this option were identified:

- As employment in the Park is highly spread out, the route would have to either make a long and inefficient loop through the Park or require riders reaching off-route workplaces to walk long distances.
- Providing fixed-route service is costly; the additional route may not generate the necessary demand to achieve a suitable cost recovery, especially at the frequency and schedule necessary to meet Quonset's needs.
- Fixed route service along I-95 would duplicate other RIPTA bus service.

Fixed-Route Bus Circulator

Another option for creating a new route is to establish a circulator that would operate only within the Park itself, allowing riders to transfer at Gate Road to the Route 14. As the circulator would be shorter than a bus route traveling for many miles outside of the Park, resources could be concentrated in improved service frequency. Unfortunately, as the Route 14 would be the only connecting line, riders would face all the same drawbacks associated with extending Route 14 into the Park, including the inability of the line to serve the majority of first shift workers due to the long travel time and lack of early-morning transfer opportunities at Kennedy Plaza.

Figure 44: Service Alternatives – New Fixed Route Service



3.2.3 Flexible Routes

Another option for serving the Park is to create a flex route service. Unlike traditional fixed-route bus lines, flex routes have a mix of scheduled stops and on-request deviations. Because the vehicles are smaller, they are more suitable for complex routings that include smaller streets or many turns. As Quonset has highly variable demand across the Park based on the time of day and employer, allowing deviations would provide employees better

transit access without making each run an extensive loop past all major businesses in QBP. Flex routes also are easier for RIPTA to implement in the short-term due to the lower unit cost of operating the service.

[Park-Only Circulator with Connection at Gate Road](#)

The first option for a flex route would be to create a circulator that would run within the Park, providing connections to the Route 14 at Gate Road. This option was ruled out for the same reason as the fixed-route circulator detailed above; relying on the Route 14 for all transfers would be limit the utility of the line and make it difficult to reach Quonset in time for the first shift of many employers.

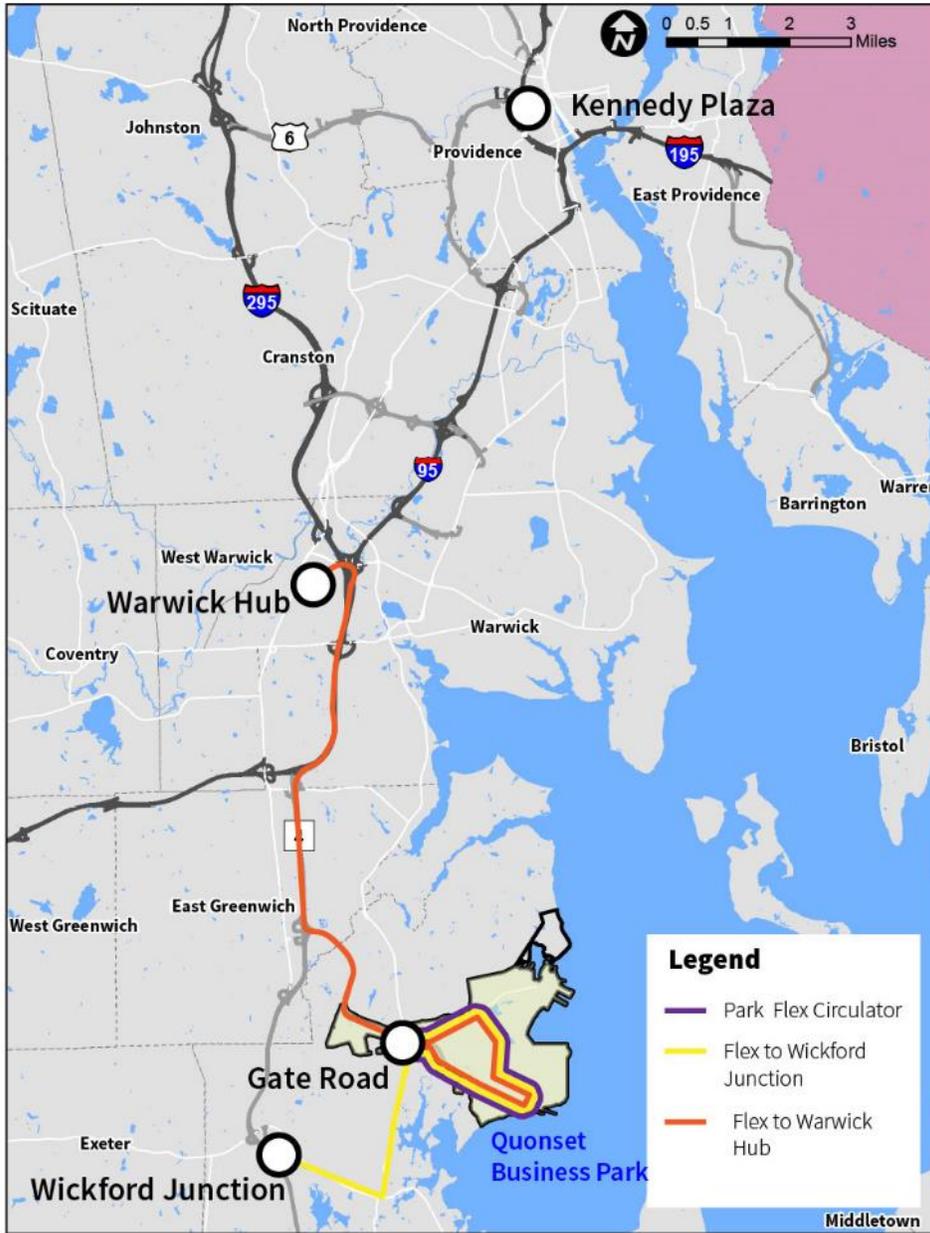
[Park Circulator with Connection to Wickford Junction and Potentially Wickford Village](#)

A second option for a flex route would be to operate a Park circulator that than continues on to Wickford Junction, providing connections to the 66, 65X, and Commuter Rail. This alternative has more utility than a Park-only circulator, as riders would then have an express bus option for reaching Providence. While there are still some scheduling issues that limit the ability for transferring passengers to reach the Park in time for the start of the first shift, adjustments to the schedules of connecting services like the 66 could enable a convenient transfer on a two or three seat ride for commuters. Additionally, a circulator travelling to Wickford Junction could also serve Wickford Village, a historic town and tourist attraction south of Quonset that currently lacks any transit connection to Wickford Junction. Due to the opportunities present in this alternative, the option was retained for further study.

[Park Circulator with Connection to Warwick Hub](#)

As an alternative to serving Wickford Junction, a flex route could instead run to RIPTA's proposed Warwick Hub at CCRI. Serving the Warwick Hub would allow the flex to connect to more frequent service to Providence than is available at Wickford Junction. Providing a direct connection to Warwick would also reduce travel times for commuters, allowing for early morning commuters to reach key pulses as Kennedy Plaza in time for a Warwick bound bus. Due to the opportunities present in this alternative, this option was also selected for further study.

Figure 45: Service Alternatives – Flex Routes



3.2.4 High-Capacity Transit

Extending commuter rail service into Quonset and the addition of commuter ferry service into the park were both explored. These options were deemed infeasible in the short-term due to the high cost and complexity of either alternative. If the transit market to Quonset becomes further developed, these high capacity options may warrant further study.

Commuter Rail

Expanding commuter rail into Quonset would require extensive planning and capital-intensive investments. Any rail service into the Park would operate along the Northeast Corridor rail line which is owned by Amtrak in RI. Constructing a train station within the park would not negate the need for a circulator service to connect commuters to their workplace. Finally, extending rail service into the Park would carry a very high operating cost compared to the expected ridership such a service would generate. Operating expenses for rail include access fees, liability insurance, and compensation to the MBTA.

Passenger Ferry

Launching a passenger ferry to Quonset faces a number of similar challenges to commuter rail. Ferry service would be costly to implement because of the need to procure or lease ferry vehicles, along with funding any infrastructure upgrades necessary at ferry landings. A major weakness of a ferry service is that few commuters would actually live within walking distance to a potential ferry landing, requiring supporting investments to connect riders from their home to the docks themselves. As with commuter rail, a circulator service would have to operate between the ferry docks and businesses in the Park as only a handful of sites (notably Electric Boat and Senesco Marine) are within walking distance of the existing docks.

4. Service Recommendations

At the conclusion of the initial alternative screening, two flex route options were selected as the most feasible alternatives for serving the Park. Both options would circulate through the Park, allowing for scheduled stops as well as deviations to workplaces off of the main alignment. The first flex alternative would, upon leaving the Park, travel to Wickford Junction, where riders can transfer to express bus and commuter rail service. The second flex route option would travel to the Warwick hub at CCRI, which provides connections to more frequent bus service than Wickford Junction. Within these alternatives, the study looks at various scheduling options for a total of five flex route alternatives, including:

- Wickford Junction Flex Route
 - Alternative 1: One Vehicle in Operation
 - Alternative 2: Two Vehicles in Operation
- Warwick Hub Flex Route
 - Alternative 1: One Vehicle in Operation
 - Alternative 2: Two Vehicles in Operation
 - Alternative 3: Two Vehicles in Operation and Early Morning Pattern to Providence

Finally, a high level analysis was conducted to determine the cost of upgrading Flex service to a fixed-route bus line.

4.1 WICKFORD JUNCTION FLEX ROUTE

4.1.1 Overview

The Flex route to Wickford Junction would provide flex service with scheduled stops at several locations in the Quonset Business Park. Connections at the Wickford Junction transit hub could be made to the MBTA Commuter Rail Providence/Stoughton Line in addition to RIPTA Routes 66 and 65X. Additionally, transfers to Route 14 would be possible at the Kohl's/Gate Road stop. Route 66 would serve as the primary connector to Kennedy Plaza in Providence, where riders can transfer to over 40 RIPTA routes.

The flex zone for this option would initially be the entire Quonset Business Park east of Route 1 and south of Romano Vineyard Way. This area of the park demonstrates the highest employment density and therefore the best option for a successful route. Future consideration should be given to an expansion of the flex zone to West Davisville and Wickford Village, however initially this is not recommended due to the increased travel time that would result (approximately 10 to 11 minutes per roundtrip).

4.1.2 Alignment and Cycle Time

The Flex route to Wickford Junction would stop at scheduled locations along its main alignment, shown in section **Figure 47**. The alignment would use Ten Rod Road and Post Road between Wickford Junction and the entrance

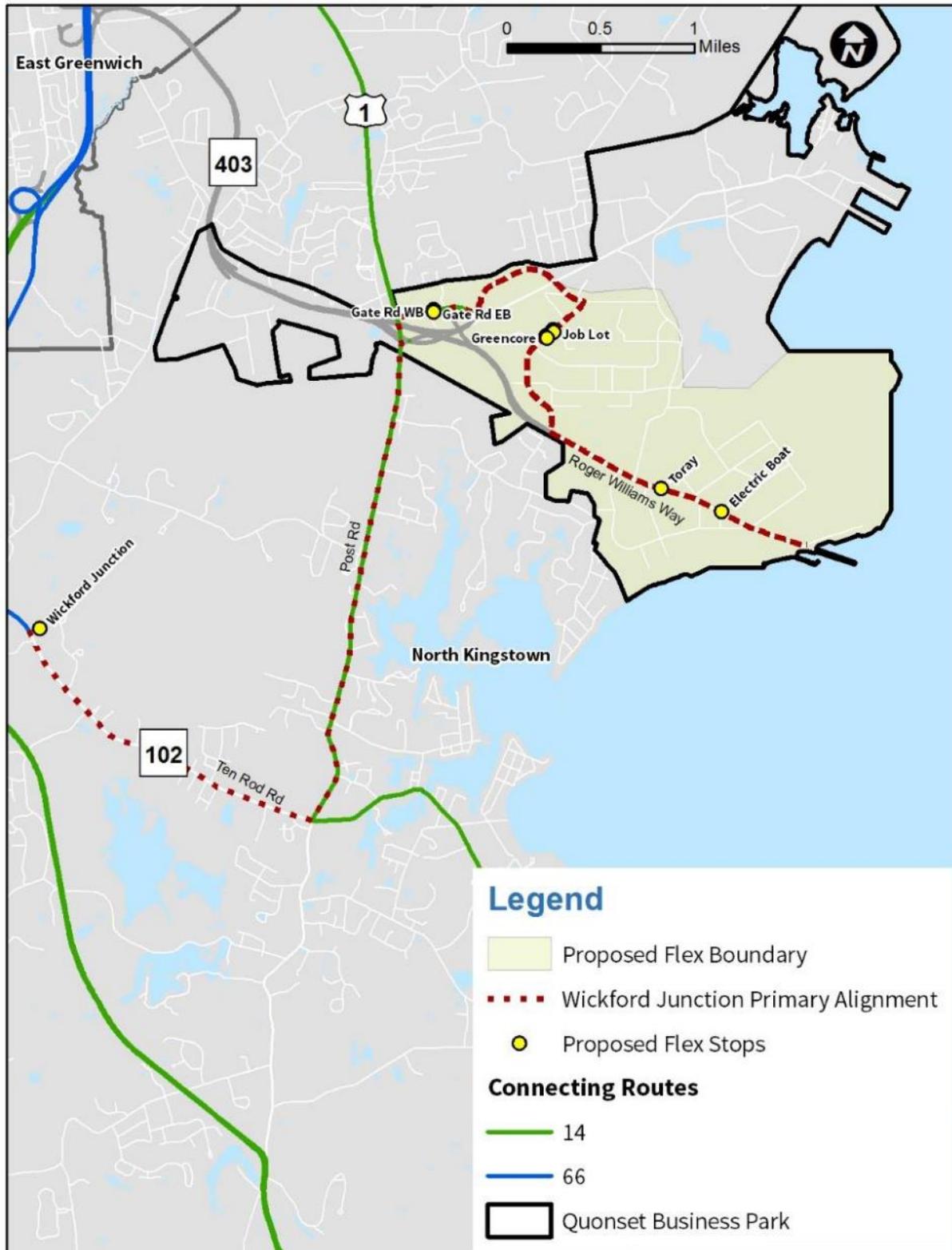
to the Park, and then would use Gate Road, Romano Vineyard Way, Commerce Park Road, and Rogers Williams Way within the Park. This would result in a single trip cycle time of approximately 48 minutes, including dwell time at each stop and a 10 percent recovery time in between trips (Table 22). Deviations from this primary alignment would lengthen each trip’s cycle time. Table 22 also displays the travel time of two example deviations: Edesia Inc. at Jones Road and Romano Vineyard Way, and Hexagon Metrology at Circuit and Whitecap Drive.

Table 21: Estimated Cycle Times for the Wickford Junction Flex Service

| Alignment | Cycle Time (Minutes) |
|---|----------------------|
| Primary Alignment | 48 |
| Deviation on Circuit Drive / Whitecap Drive | 7 |
| Deviation to Edesia | 3 |

With a base cycle time of 48 minutes, deviations to Hexagon and Edesia could be accommodated within a one-hour cycle. This would allow the service to serve shifts that are one-hour apart with a single vehicle. More details on different schedule alternatives for the Wickford Junction flex service can be found in **Section 5.1.4**

Figure 46: Wickford Junction Flex Primary Alignment



4.1.3 Recommended Stop Locations

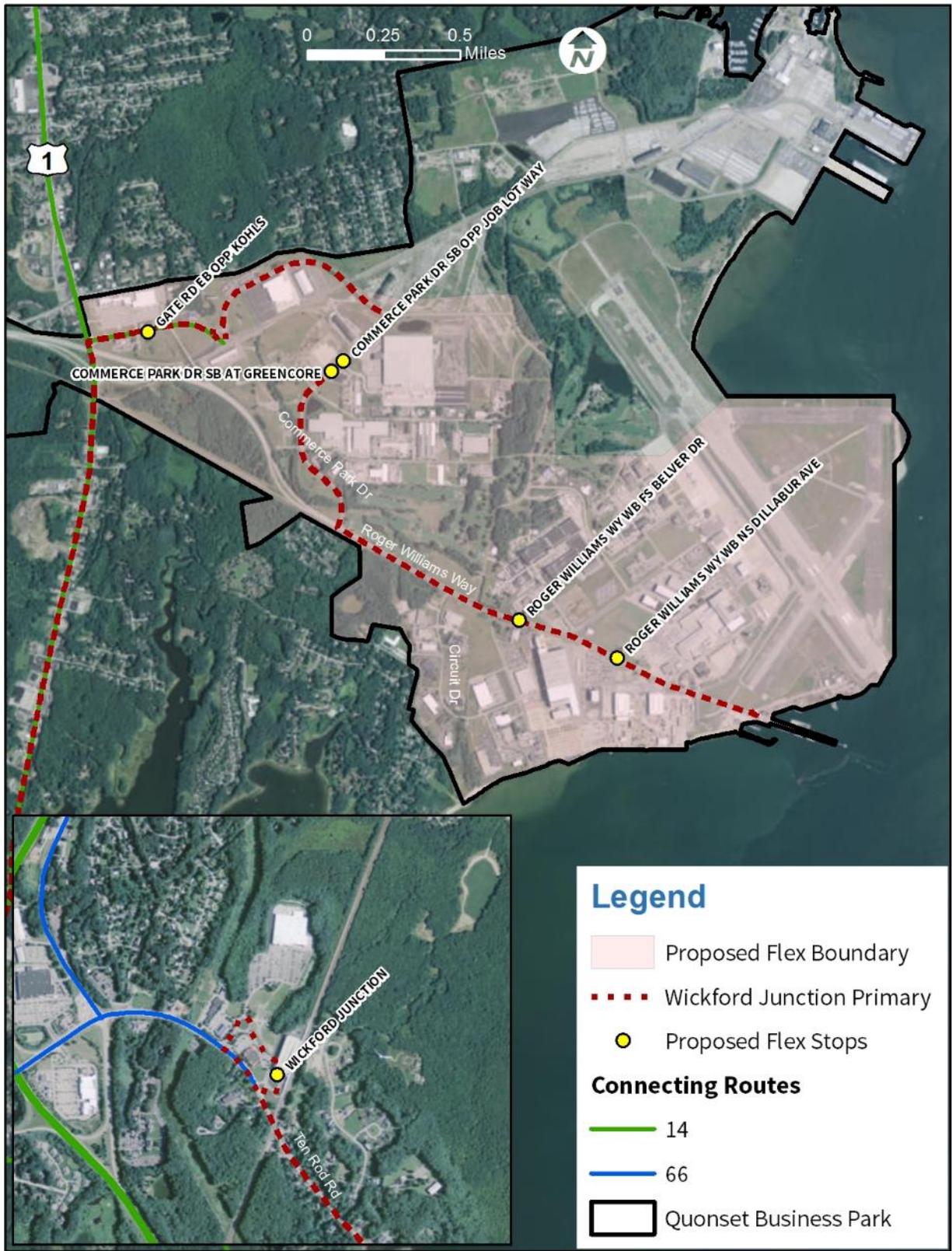
Flex Route 1 features six scheduled stops at major employment centers or transfer locations, including Ocean State Job Lot, Greencore, Electric Boat, Senesco Marine, and Toray Plastics. Each of these stops would be associated with a single timepoint in the route's schedule.

In the inbound direction (trips operating to Quonset), there would be six stops, including one existing RIPTA stop and five new stops. The first new stop would be on Gate Road in the eastbound direction opposite the existing stop outside Kohl's. This would allow for passengers to connect to Route 14 without the flex route bus having to turn around twice to continue into the Park. Two of the new stops would be located on Commerce Park Road in the southbound direction and the remaining two would be located on Roger Williams Way in the westbound direction. Despite the fact that the route would initially be traveling eastbound on Roger Williams Way, the westbound direction (north side) was selected for these stops since it has a sidewalk. The south side of Roger Williams Way lacks sidewalks and is also directly adjacent to an active freight rail line. The scheduled stops are summarized in **Table 23** in the proposed order of service and are illustrated in **Figure 48**.

Table 22: Wickford Junction Flex Service Inbound (To Quonset) Recommended Scheduled Stop Locations

| Stop ID | Location | Existing/ New | Generator |
|-------------|---|------------------|--|
| 1 IB | Wickford Junction Transit Center | Existing | Wickford Junction Station and Shopping Center, Routes 65X and 66 |
| 2 IB | Gate Road Eastbound Opposite Kohl's | New | Shops at Quonset, Route 14 |
| 3 IB | Commerce Park Road Southbound Opposite Job Lot Way | New | Job Lot |
| 4 IB | Commerce Park Road Southbound at Greencore Entrance | New | Greencore |
| 5 IB | Roger Williams Way Nearside Dillabur Ave | New | Electric Boat, Senesco |
| 6 IB | Roger Williams Way Farside Belver Ave | New | Toray |

Figure 47: Wickford Junction Flex Service Inbound (To Quonset) Recommended Scheduled Stop Locations

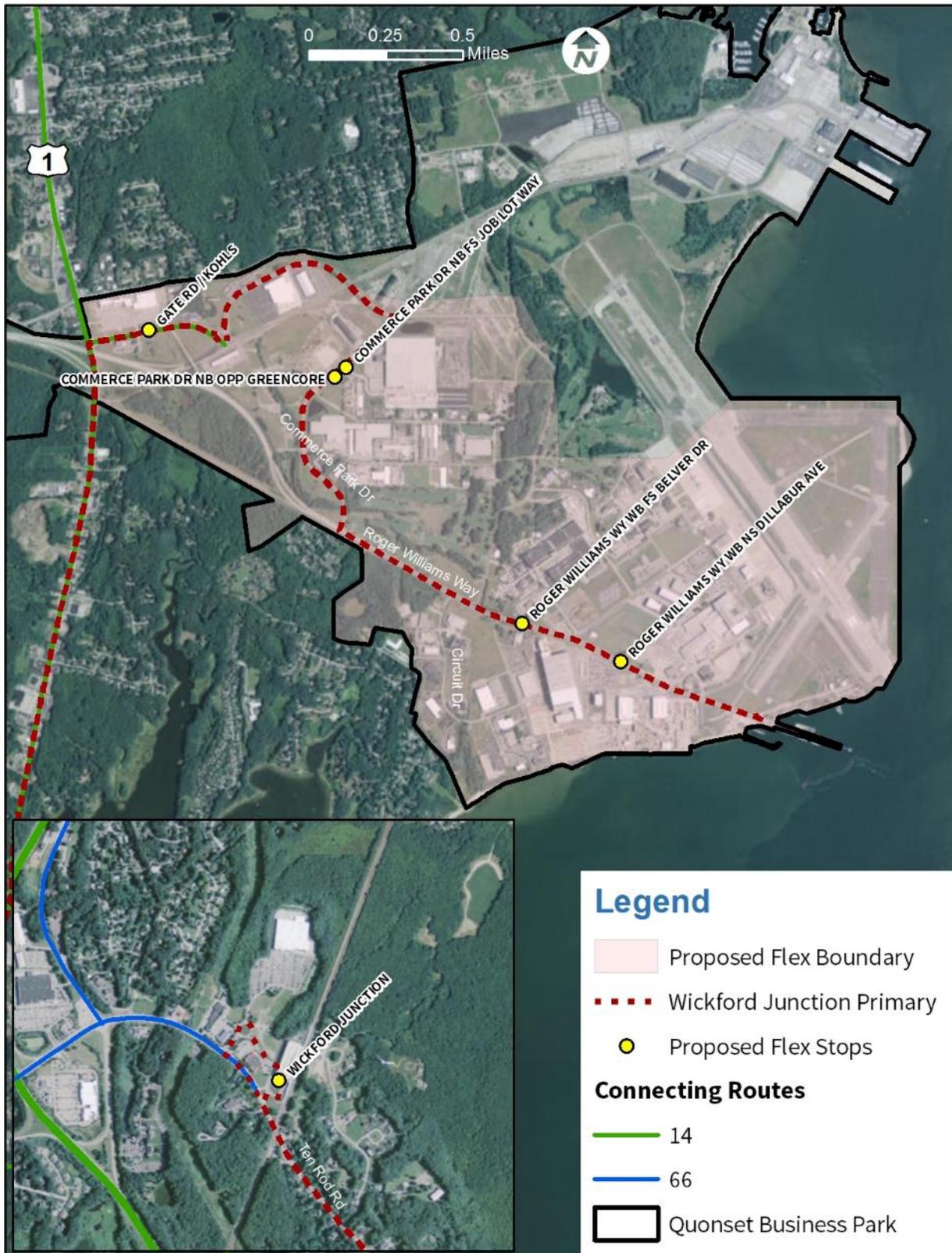


In the outbound direction (trips leaving Quonset), there would also be six stops, including two existing RIPTA stops and four new stops. In this direction, the existing stop on Gate Road westbound at Kohl’s would be used for connections to Route 14. Two of the new stops would be on Roger Williams Way in the westbound direction and would be shared with the inbound direction. The other two new stops would be located on Commerce Park Road in the northbound direction. The scheduled stops as summarized in **Table 24** in the proposed order of service and are illustrated in **Figure 49**.

Table 23: Wickford Junction Flex Service Outbound (From Quonset) Recommended Scheduled Stop Locations

| Stop ID | Location | Existing/ New | Generator/ Connections |
|-------------|---|------------------|--|
| 1 OB | Roger Williams Way Nearside Dillabur Ave | New | Electric Boat, Senesco |
| 2 OB | Roger Williams Way Farside Belver Ave | New | Toray |
| 3 OB | Commerce Park Road Northbound Opposite Greencore Entrance | New | Greencore |
| 4 OB | Commerce Park Road Northbound Farside Job Lot Way | New | Job Lot |
| 5 OB | Gate Road at Kohl’s | Existing | Shops at Quonset, Route 14 |
| 6 OB | Wickford Junction Transit Center | Existing | Wickford Junction Station and Shopping Center, Routes 65X and 66 |

Figure 48: Wickford Junction Flex Service Outbound (To Quonset) Recommended Scheduled Stop Locations



The two existing RIPTA stops located on Gate Road and at Wickford Junction are both ADA compliant and have several passenger amenities. The seven new stops would require improvements to make them ADA compliant, including the construction of a five-foot by eight-foot ADA passenger concrete waiting area. While Roger Williams Way and Gate Road have existing sidewalks, Commerce Park Road currently lacks sidewalks. The seven new stops would also need RIPTA bus stop signs.

Three proposed stops would likely have numerous passenger street crossings from adjacent businesses, including Roger Williams Way at Dillabur Avenue, Commerce Park Road Southbound at Job Lot Way, and Commerce Park Road Northbound at Grencore. Roger Williams Way at Dillabur Avenue has a crosswalk with a traffic signal. This stop would generate the most street crossings associated with it due to the fact that Electric Boat has a large facility on the south side of the roadway. There are no crosswalks on Commerce Park Road at Job Lot Way or at Grencore. Crosswalks should be considered at these locations in order to provide a safer pedestrian crossing to reach adjacent bus stops.

Additionally, there would likely be some pedestrian crossing activity to reach the proposed Gate Road westbound stop opposite Kohl’s. This location is un-signalized and should be investigated further to see if a traffic signal with a pedestrian signal is warranted here. The QDC performed a signal analysis at this location in the past at the request of adjacent businesses and found that a pedestrian signal was not warranted at the site. With the introduction of this new stop, this idea should be revisited. **Table 25** summarizes the existing infrastructure and needed infrastructure at the proposed scheduled stops under this alternative.

Table 24: Stop Access Infrastructure Needs for Scheduled Stops on the Wickford Junction Flex Service

| Stop ID(s) | Location | Direction | Existing Infrastructure | Infrastructure Improvements Needed |
|------------------|--|-----------|---------------------------|---|
| 1 IB/6 OB | Wickford Junction Transit Center | Both | Sidewalk | - |
| 5 OB | Gate Road Westbound at Kohl’s | Outbound | Shelter, Trash, Sidewalks | - |
| 2 IB | Gate Road Eastbound Opposite Kohl’s | Inbound | Sidewalk | 5’ by 8’ ADA pad, Sign, Investigate signal with crosswalk |
| 3 IB | Commerce Park Road Southbound Opposite Job Lot Way | Inbound | None | Sign, 5’ by 8’ ADA pad, Sidewalk, Crosswalk |
| 4 OB | Commerce Park Road Northbound, Farside Job Lot Way | Outbound | None | Sign, 5’ by 8’ ADA pad, Sidewalk |
| 4 IB | Commerce Park Road Southbound at Grencore Entrance | Inbound | None | Sign, 5’ by 8’ ADA pad, Sidewalk |
| 3 OB | Commerce Park Road Northbound Opposite Grencore Entrance | Outbound | None | Sign, 5’ by 8’ ADA pad, Sidewalk, Crosswalk |

| Stop ID(s) | Location | Direction | Existing Infrastructure | Infrastructure Improvements Needed |
|--------------|--|-----------|-------------------------------------|--|
| 5 IB/1 OB | Roger Williams Way, Nearside Dillabur Ave | Both | Sidewalk, Signal with crosswalks | Sign, 5' by 8' ADA pad, pedestrian signal |
| 6 IB/2 OB | Roger Williams Way, Farside Belver Ave | Both | Sidewalk | Sign, 5' by 8' ADA pad |

4.1.4 Wickford Junction Flex Service Options

There are several different schedule alternatives for operating a Wickford Junction flex service. The following section details the operating characteristics of these schedule alternatives with a 55-minute cycle time, which includes enough time for the primary alignment to operate plus the potential deviation on Circuit Drive / White Cap Drive. This is expected to be the most popular deviation given the employment density of the area.

Wickford Junction Alternative 1: One Vehicle

The first Wickford Junction alternative would operate with one vehicle and does not include additional changes to the schedules of connecting RIPTA bus routes.

Wickford Junction Alternative 1 would serve shifts that start at 7:00 AM and 8:00 AM and end at 3:30 PM, 4:30 PM, 5:30 PM, and 8:00 PM. Structuring the service to more closely align with the end shifts on the half hour instead of the hour would result in higher ridership potential, as the route would still be able to pick up employees whose shift times end on the hour.

Service Details

Table 26 summarizes the service span and number of trips proposed for Wickford Junction Alternative 1. The span of service has been optimized so that most employees will arrive 15 minutes before their shift begins and be picked up 15 minutes after their shift ends. In some cases, this window was shortened in order to not miss a connection with Route 66 at Wickford Junction.

Service is proposed during peak hours only with three roundtrips in the AM Peak and four roundtrips plus one additional outbound trip in the PM Peak. While travel demand is concentrated before 8 AM, a final trip after 8 AM will provide added schedule flexibility for commuters. Similarly, in the PM Peak an additional roundtrip will be provided between the 5:30 PM and 8:00 PM shifts for employees that may have left their workplace later than usual.

Table 25: Wickford Junction Flex Alternative 1 Service Details

| Period | Service Span | Number of Roundtrips |
|--------|-------------------|-----------------------------------|
| AM | 6:12 AM – 9:33 AM | 3 |
| PM | 3:45 PM – 8:36 PM | 4 plus 1 additional outbound trip |

Table 27 and **Table 28** summarize each shift time served, the connecting route between Kennedy Plaza and Wickford Junction, “home routes” that feed riders to Kennedy Plaza from their homes, the expected typical travel time for commuters, and the number of forecasted riders. Home routes were excluded if there would be any transfer times associated with the trip that exceeded 45 minutes.

Table 26: Inbound Wickford Junction Flex Alternative 1 Connection, Ridership, and Travel Time Details

| Trip | Serves Shifts Starting at | Connector Route | Connector Arrives at Wickford Junction | Home Routes | Average Travel Time (min) | Riders |
|------|---------------------------|-----------------|--|---|---------------------------|--------|
| 1 | 7:00 AM | 66 | 6:33 AM | 20, 21, 30, 50, 51, 55, 56, 57, R-Line | 89-91 | ~35 |
| 2 | 8:00 AM | 66 | 7:24 AM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 3 | After 8:00 AM | 66 | 8:06 AM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |

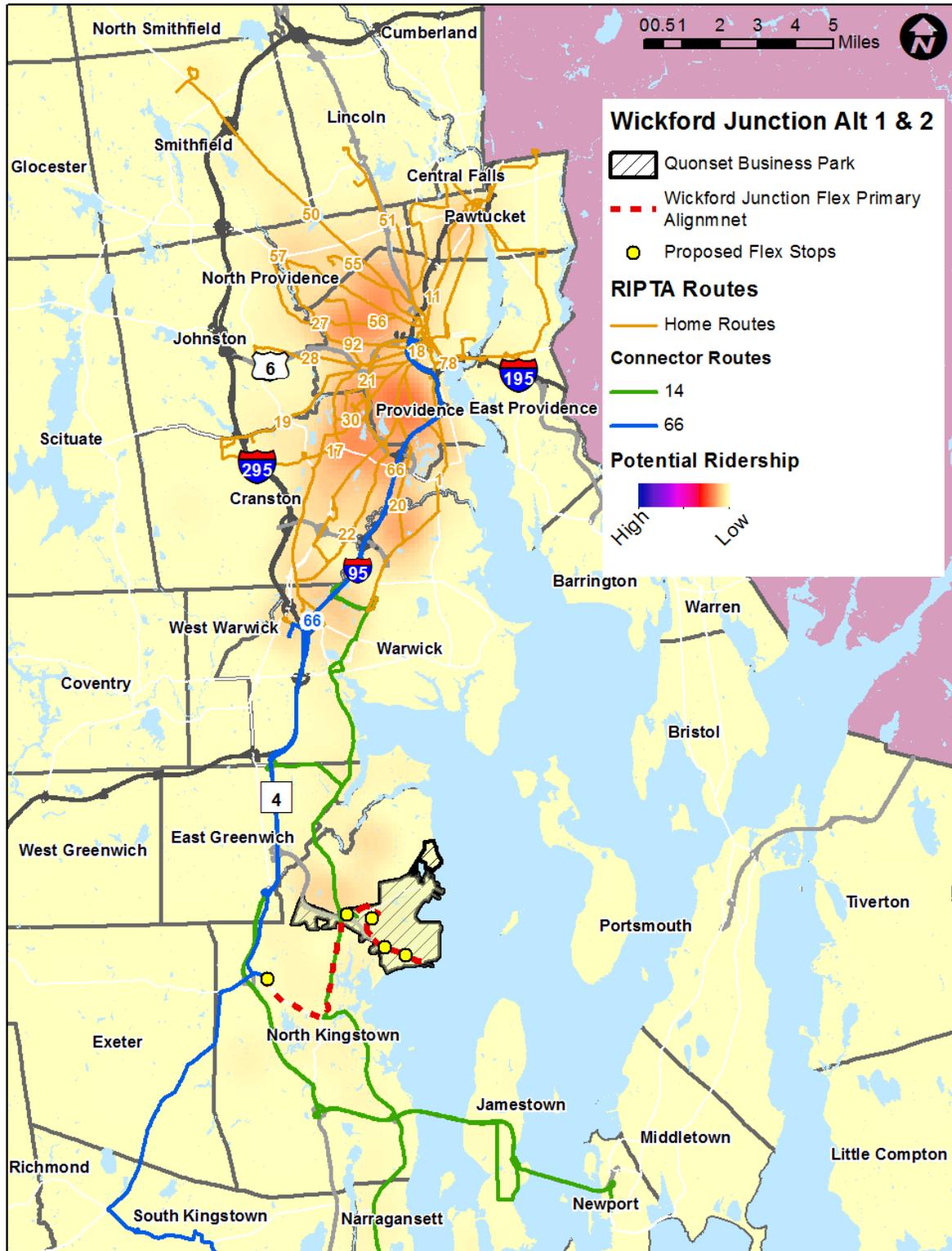
Table 27: Outbound Wickford Junction Flex Alternative 1 Connections

| Trip | Serves Shifts Ending at | Connector Route | Connector Departs Wickford Junction | Home Routes | Average Travel Time (min) | Riders |
|------|-------------------------|-----------------|-------------------------------------|---|---------------------------|--------|
| 1 | 3:30 PM | 66 | 4:23 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | 55-71 | ~35 |
| 2 | 4:30 PM | 66, Train | 5:35 PM, 5:30 PM | 1, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 3 | 5:30 PM | 66 | 6:28 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 4 | 5:30 PM – 8:00 PM | 66 | 7:24 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 5 | 8:00 PM | Train | 8:53 PM | R-Line, 50, 51, 55, 56, 57 | | |

Overall, 33 riders making roundtrips are projected to use this service daily (see Appendix for ridership projection methodology). The 7:00 AM shift would have a tight connection for most employees, as the first Route 66 trip does not arrive at Wickford Junction from Providence until 6:33 AM and therefore the flex route would not reach its final scheduled stop at Belder Avenue until 6:59 AM. A slight adjustment in the Route 66 schedule could help to maximize ridership for the 7:00 AM shift, however most employees with this shift start time would still be able to use the service. Employees using the service from the 8:00 PM end shift would likely opt for the MBTA train that leaves Wickford Junction at 8:53 PM instead of Route 66, which does not leave Wickford Junction until 9:24 PM.

With approximately 35 riders, the morning vehicles could reach seated capacity, as RIPTA flex vehicles have 16 seats. **Figure 50** illustrates from where riders are expected to be drawn.

Figure 49: Wickford Junction Flex Service Ridership Heat Map



Operating Statistics and Cost

This option would have 9.2 daily platform hours and, as was previously mentioned, would require a single flex vehicle (**Table 29**). This alternative would require two operators – one for the morning and one for the afternoon. Since each operator needs to be paid for an eight-hour shift, the total annual operating cost would be approximately \$206,000.

Table 28: Wickford Junction Flex Alternative 1 Operating Statistics

| Period | Total Daily Platform Hours | Total Daily Paid Hours | Annual Operating Cost |
|--------------|----------------------------|------------------------|-----------------------|
| AM | 3.5 | 8 | \$102,780 |
| PM | 5.7 | 8 | \$102,780 |
| Total | 9.2 | 16 | \$205,560 |

Wickford Junction Alternative 2: Two Vehicles

The second Wickford Junction alternative would operate with two vehicles and not include any additional changes to the schedules of connecting RIPTA bus routes.

This alternative would serve the 7:00 AM and 8:00 AM start shifts and the 3:00 PM, 3:30 PM, 4:30 PM, 5:00 PM, 5:30 PM, and 8:00 PM shift ends.

Service Details

Table 30 summarizes the service span and number of trips proposed for Wickford Junction Alternative 2. Service is proposed during peak hours only with four roundtrips plus one additional inbound trip in the AM Peak and six roundtrips plus two additional outbound trips in the PM Peak. Under this alternative, shifts will be served every half-hour instead of every hour. While the existing conditions found limited demand after 8:30 AM, an additional roundtrip is proposed for employees who may have missed their regular trip and also to provide connections for anyone with a later morning shift start time. Similarly, in the PM Peak an additional roundtrip will be provided after 5:30 PM, even if most workers are expected to depart before 5:30 PM. The PM schedule includes more trips in total than the AM schedule due to the shift times in the afternoon being more spread out.

Operating the route with two vehicles will allow the route to better recover in instances of delay or multiple deviations, as one-vehicle operations would enable any delay to cascade through the rest of the service period.

Table 29: Wickford Junction Flex Alternative 2 Service Details

| Period | Service Span | Number of Roundtrips |
|--------|-------------------|------------------------------------|
| AM | 6:12 AM – 9:33 AM | 4 plus 1 additional inbound trip |
| PM | 3:15 PM – 8:36 PM | 6 plus 2 additional outbound trips |

Table 31 and **Table 32** summarize each shift time served, the connecting route between Kennedy Plaza and Wickford Junction, home routes that feed riders to Kennedy Plaza, the expected typical travel time for

commuters, and the number of forecasted riders. Home routes were excluded if there would be any transfer times associated with the trip that exceeded 45 minutes.

Table 30: Inbound Wickford Junction Flex Alternative 2 Connection, Ridership, and Travel Time Details

| Trip | Serves Shifts Starting At: | Connector Route | Connector Arrives at Wickford Junction | Home Routes | Average Travel Time (min) | Riders |
|------|----------------------------|-----------------|--|---|---------------------------|--------|
| 1 | 7:00 AM | 66 | 6:33 AM | 20, 21, 30, 50, 51, 55, 56, 57, R-Line | 89-91 | ~35 |
| 2 | 7:30 AM | 66 | 6:33 AM | 20, 21, 30, 50, 51, 55, 56, 57, R-Line | | |
| 3 | 8:00 AM | 66 | 7:24 AM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 4 | 8:30 AM | 66, Train | 7:24 AM, 7:27 AM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 5 | After 8:30 AM | 66 | 8:06 AM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |

Table 31: Outbound Wickford Junction Flex Alternative 2 Connections

| Trip | Serves Shifts Ending At: | Connector Route | Connector Departs Wickford Junction | Home Routes | Average Travel Time (min) | Riders |
|------|--------------------------|-----------------|-------------------------------------|---|---------------------------|--------|
| 1 | 3:00 PM | 66 | 3:55 PM | 1, 14, 17, 19, 20, 33, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | 55-86 | ~35 |
| 2 | 3:30 PM | 66 | 4:23 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 3 | 4:00 PM | 66 | 4:40 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 4 | 4:30 PM | 66, Train | 5:35 PM, 5:30 PM | 1, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 5 | 5:00 PM | 66 | 5:45 PM | 1, 14, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 6 | 5:30 PM | 66 | 6:28 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 7 | 5:30 PM to 8:00 PM | 66 | 7:24 PM | 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line | | |
| 8 | 8:00 PM | Train | 8:53 PM | R-Line, 50, 51, 55, 56, 57 | | |

Overall, approximately 35 employees making roundtrips are projected to use this service daily (see Appendix for ridership projection methodology). With 35 employees and two vehicles serving the 7:00 AM and 8:00 AM shifts, no trips should reach seated capacity. Even though this alternative provides service at twice the frequency of Alternative 1, the model does not project an increase in ridership due to no difference in the service period; in real world conditions, RIPTA can expect some increase in ridership due to the higher frequency and greater convenience of the two vehicle alternative.

Like in the one vehicle alternative, the 7:00 AM shift would have a tight connection for most employees. A slight adjustment in the Route 66 schedule could help to maximize ridership for the 7:00 AM shift. Employees using the service from the 8:00 PM end shift would likely opt for the MBTA train that leaves Wickford Junction at 8:53 PM instead of Route 66, which does not leave Wickford Junction until 9:24 PM. The ridership for Alternative 2 would be the same as Alternative 1 (**Figure 50**).

The 4:00 PM shift will be a tight connection for most employees, as the flex route would likely not arrive at Wickford Junction until 4:39 PM and Route 66 departs Wickford Junction at 4:40 PM. In the future, the Route 66 schedule could be modified to provide a better connecting time. Employees with shifts ending at 4:30 PM would have the additional option of using the MBTA Commuter Rail to return to Providence.

Operating Statistics and Cost

Overall, this alternative would have 14.2 daily platform hours and as was previously mentioned, would require two flex vehicles (see **Table 33**). This alternative would require four operators – one for each vehicle in the morning and afternoon. Since each operator needs to be paid for an eight-hour shift, the total annual operating cost would be approximately \$411,000.

Table 32: Wickford Junction Flex Alternative 2 Operating Statistics

| | Total Daily Platform Hours | Total Daily Paid Hours | Annual Operating Cost |
|--------------|----------------------------|------------------------|-----------------------|
| AM | 5.6 | 16 | \$205,560 |
| PM | 8.6 | 16 | \$205,560 |
| Total | 14.2 | 32 | \$411,120 |

4.1.5 Future Considerations

If the Wickford Junction flex route is successful, there are several options for expanding the service geographically. The primary opportunities for flex zone expansion are West Davisville and Wickford Village. Requests for deviations for the initial flex service and requests for service should be monitored to gauge whether an expansion to either of these areas is warranted.

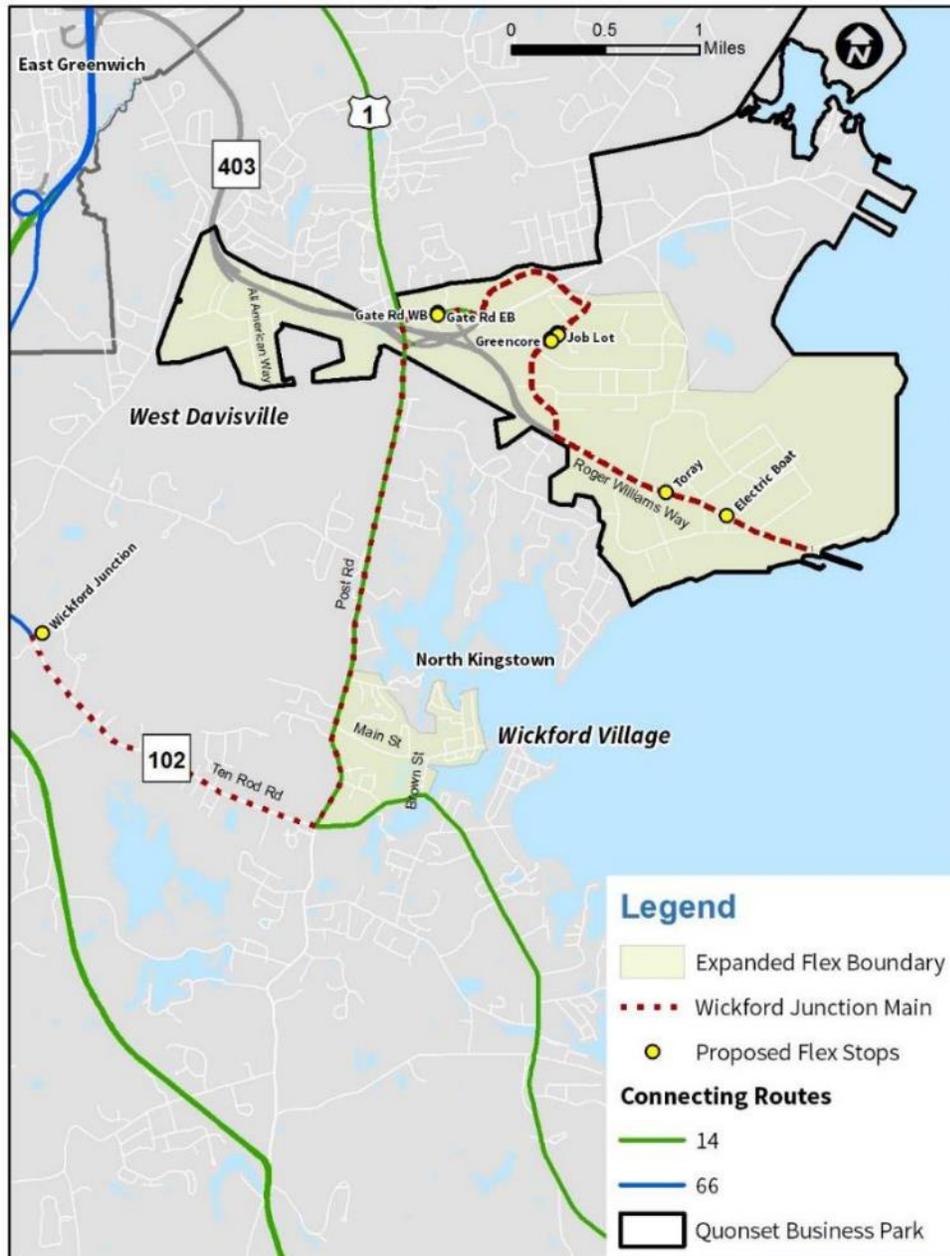
The most likely deviation into West Davisville would be to All American Foods on All American Way. This deviation would require an additional 11 minutes of cycle time. Deviating into Wickford Village to reach Brown Street would require an additional 10 minutes of cycle time (**Table 34**). The additional runtime required to serve both of these areas would likely require the introduction of a third flex vehicle in order to be able to continue to serve all the shifts served under Wickford Junction Flex Alternative 2. The two potential flex zone expansions are illustrated in

Figure 51.

Table 33: Wickford Junction Flex Zone Expansion Cycle Time

| Alignment | Cycle Time (Minutes) |
|---|----------------------|
| Primary Alignment + Circuit Drive Deviation | 55 |
| Deviation into West Davisville | 11 |
| Deviation into Wickford Village | 10 |

Figure 50: Potential Expansion of the Wickford Junction Flex Service into West Davisville and Wickford Village



4.2 WARWICK HUB FLEX ROUTE

4.2.1 Overview

The second option for Flex service would be to create a route that connects QBP to a Warwick Hub instead of to Wickford Junction. The ideal location for the Warwick Hub would be at CCRI, which has connections to Kennedy Plaza in Providence on Routes 21 and 66. At Kennedy Plaza, riders can connect to over 40 RIPTA routes. This location is also easily accessible to I-95, which would reduce the flex route's runtime.

As with the Wickford Junction alternative, the initial flex zone would be limited to the Quonset Business Park east of Route 1 and south of Romano Vineyard Way. This area of the Park demonstrates the highest employment density and therefore the best option for a successful route. Future consideration should be given to an expansion of the flex zone to West Davisville, however initially this is not recommended due to the increased travel time that would result (approximately 5 minutes on an outbound trip and 10 minutes on an inbound trip).

4.2.2 Alignment and Cycle Time

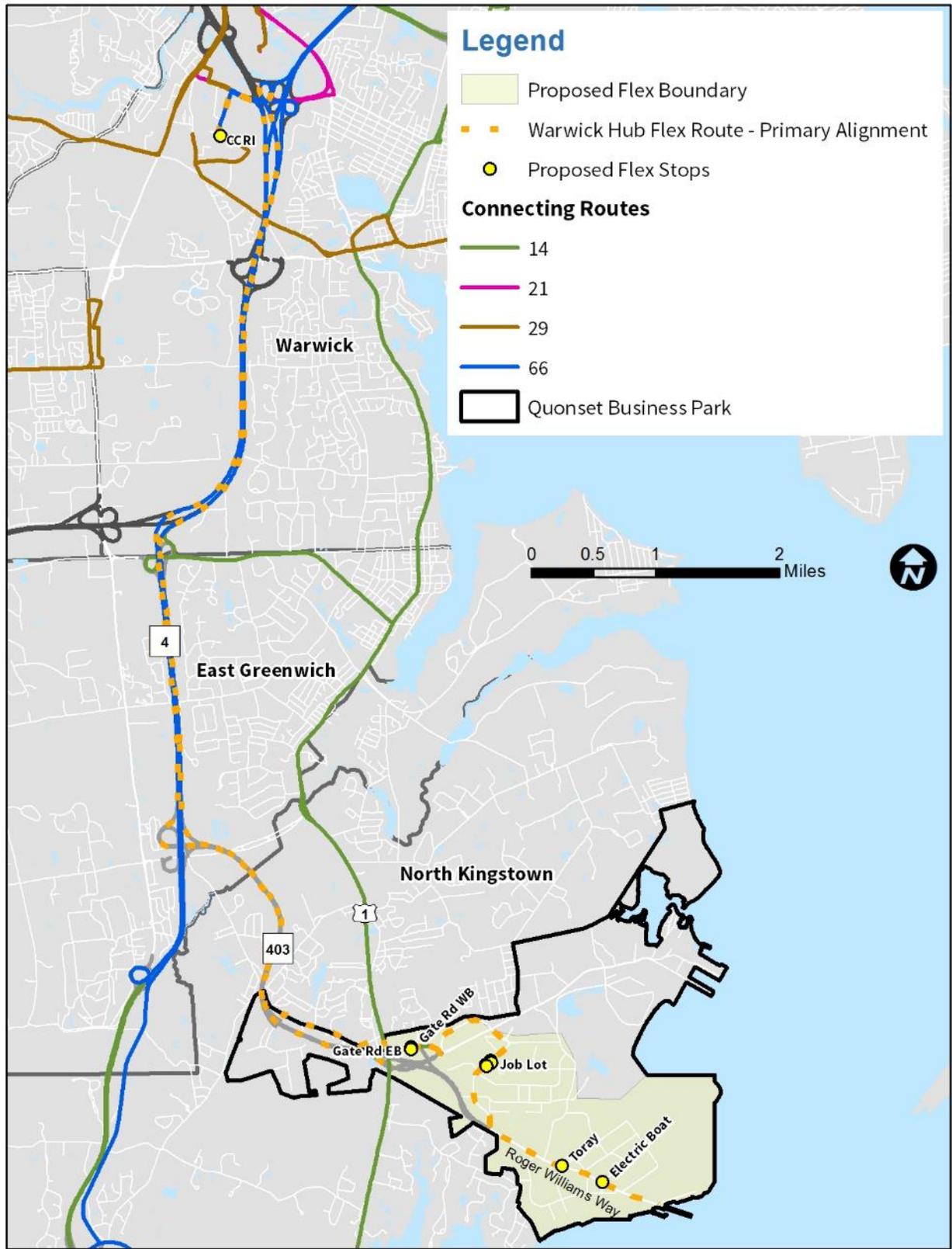
The primary alignment where it would serve scheduled stops only is illustrated in **Figure 52**. The alignment would use Route 113, I-95, Route 4, Route 403, and Route 1 between CCRI and the entrance to the Park, and then would use Gate Road, Romano Vineyard Way, Commerce Park Road, and Rogers Williams Way within the Park. This would result in a single trip cycle time of approximately 54 minutes, including dwell time at each stop and a 10 percent recovery time in between trips (**Table 35**). Deviations from this primary alignment would lengthen each trip's cycle time. **Table 35** also displays the travel time of two example deviations: Edesia Inc. at Jones Road and Romano Vineyard Way, and Hexagon Metrology at Circuit and Whitecap Drive.

Table 34: Estimated Cycle Times for the Warwick Hub Flex Service

| Alignment | Cycle Time (Minutes) |
|--|----------------------|
| Primary Alignment | 54 |
| Deviation on Circuit Drive / Whitecap Drive | 7 |
| Deviation to Edesia | 3 |

With a base cycle time of 54 minutes, deviations to Circuit Drive could be accommodated with a 61-minute cycle time. This would allow the service to serve shifts that are one-hour apart with a single vehicle. More details on different schedule alternatives for the Warwick Hub flex service can be found in the Schedule Alternatives section.

Figure 51: Warwick Hub Flex Primary Alignment



4.2.3 Recommended Stop Locations

The stop needs for this option would be the same as the Wickford Junction option (see page 76), with the existing RIPTA bus stop at CCRI Warwick used in place of Wickford Junction. Within the Quonset Business Park, the same stops as the Wickford Junction option would be used and the same infrastructure needs would be necessary at new stops. The scheduled stops are summarized in **Table 36** and **Table 37** in the proposed order of service and are illustrated in **Figure 53** and **Figure 54**. Details on stop infrastructure needs within Quonset can be found in **Table 25**.

Table 35: Warwick Hub Flex Service Inbound (To Quonset) Recommended Scheduled Stop Locations

| Stop ID | Location | Existing/ New | Generator |
|-------------|---|------------------|-------------------------------|
| 1 IB | CCRI Entrance | Existing | CCRI, Routes 21, 29, 66 |
| 2 IB | Gate Road Eastbound Opposite Kohl's | New | Shops at Quonset, Route 14 |
| 3 IB | Commerce Park Road Southbound Opposite Job Lot Way | New | Ocean State Job Lot |
| 4 IB | Commerce Park Road Southbound at Greencore Entrance | New | Greencore |
| 5 IB | Roger Williams Way, Nearside Dillabur Ave | New | Electric Boat, Senesco Marine |
| 6 IB | Roger Williams Way, Farside Belver Ave | New | Toray Plastics |

Figure 52: Warwick Hub Flex Service Inbound (To Quonset) Recommended Scheduled Stop Locations

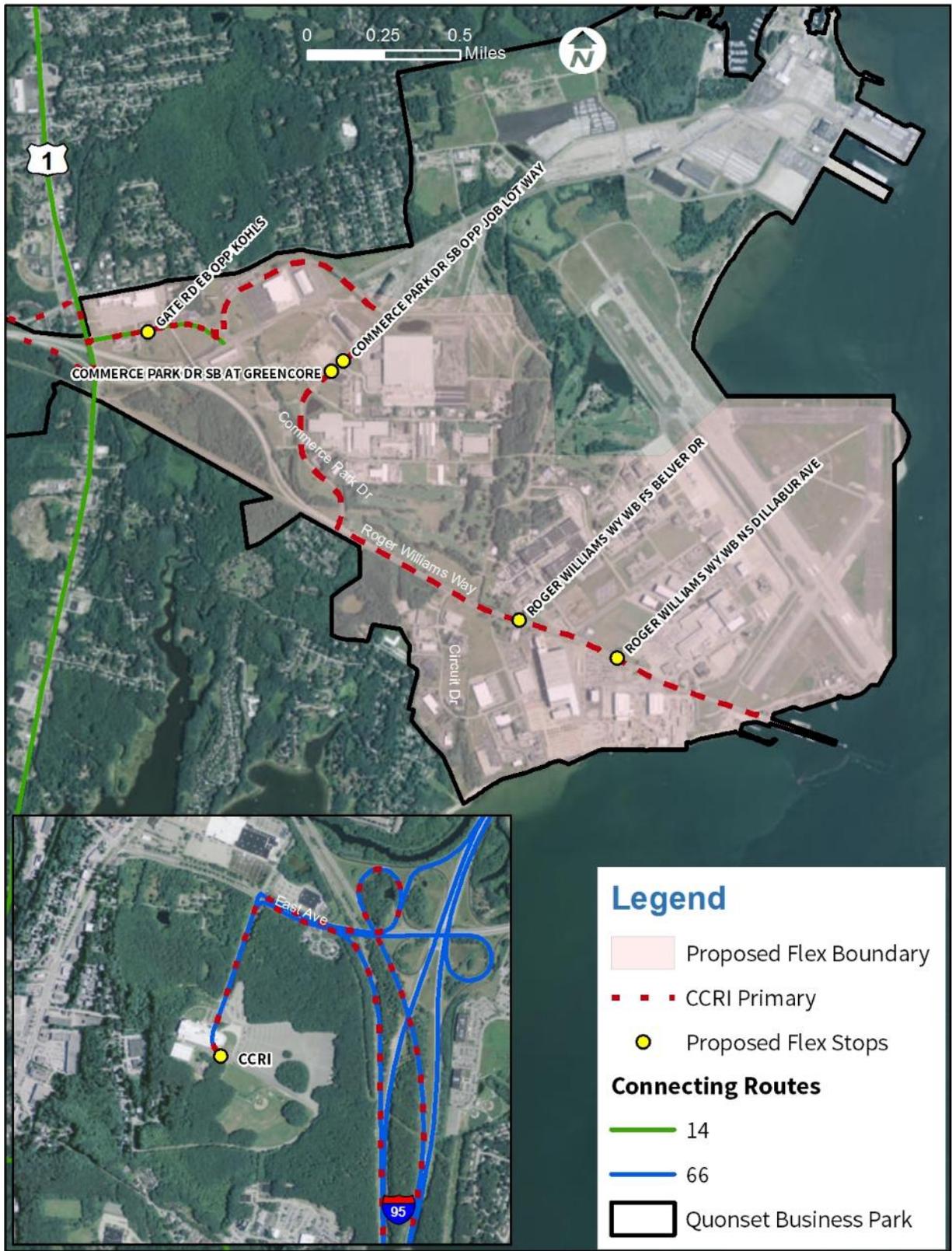
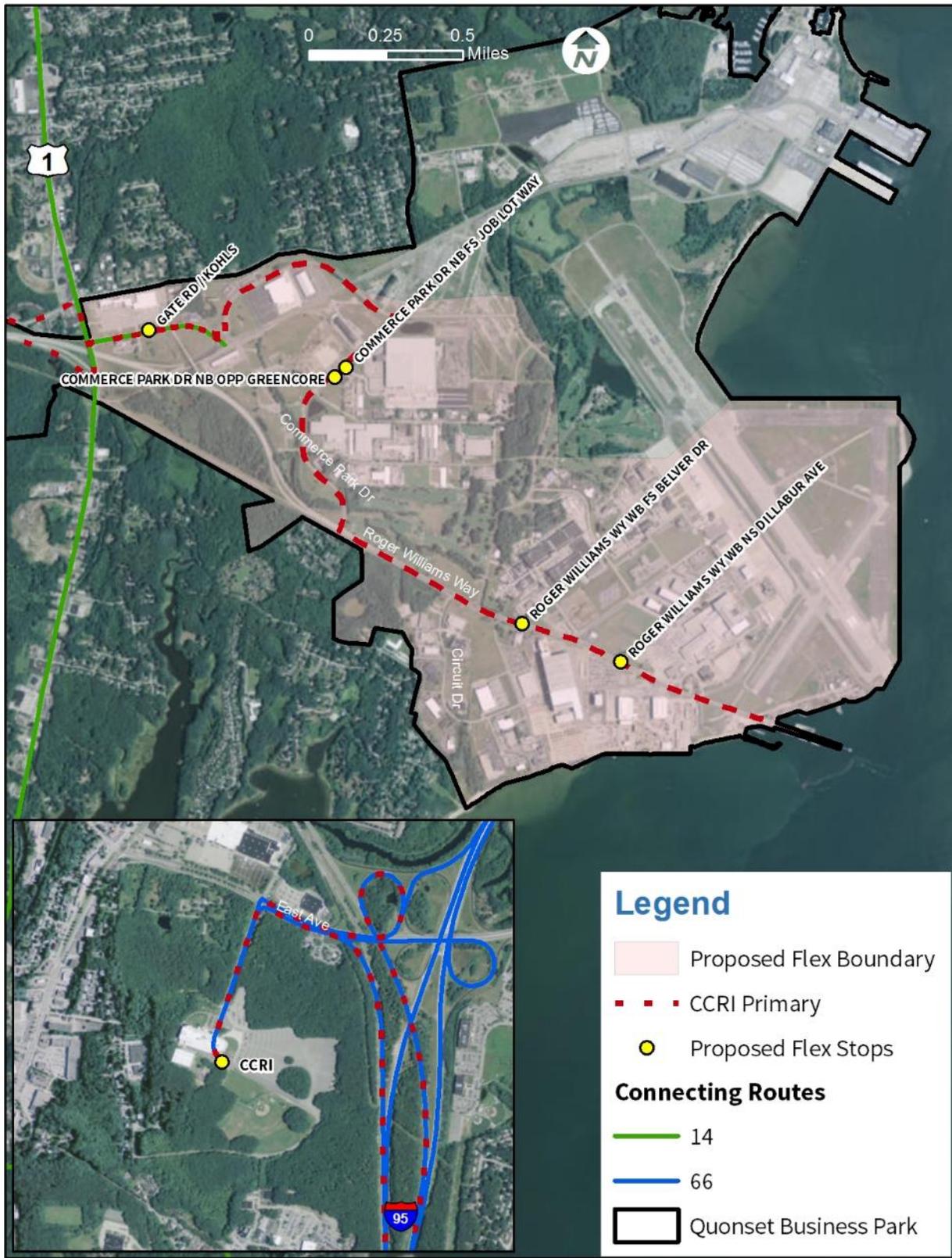


Table 36: Warwick Hub Flex Service Outbound (From Quonset) Recommended Scheduled Stop Locations

| Stop ID | Location | Existing/ New | Generator/ Connections |
|-------------|---|------------------|----------------------------|
| 1 OB | Roger Williams Way Nearside Dillabur Ave | New | Electric Boat, Senesco |
| 2 OB | Roger Williams Way Farside Belver Ave | New | Toray |
| 3 OB | Commerce Park Road Northbound Opposite Greencore Entrance | New | Greencore |
| 4 OB | Commerce Park Road Northbound, Farside Job Lot Way | New | Ocean State Job Lot |
| 5 OB | Gate Road at Kohl's | Existing | Shops at Quonset, Route 14 |
| 6 OB | CCRI Entrance | Existing | CCRI, Routes 21, 29, 66 |

Figure 53: Warwick Hub Flex Service Outbound (To Quonset) Recommended Scheduled Stop Locations



4.2.4 Warwick Hub Flex Schedule Alternatives

There are several different schedule alternatives for the Warwick Hub flex service. The following sections detail the operating characteristics of these schedule alternatives with a 61-minute cycle time, which includes enough time for the primary alignment to operate plus the potential deviation likely onto Circuit Drive.

Warwick Hub Alternative 1: No Schedule Changes, One Vehicle

This first alternative would operate with one vehicle to the Warwick Hub.

Warwick Hub Alternative 1 would serve shifts starting at 7:00 AM and 8:00 AM, along with shifts ending at 3:30 PM, 4:30 PM, 5:30 PM, and 8:00 PM. Structuring the service to more closely align with the end shifts on the half hour instead of the hour would result in higher ridership potential, as the route would still be able to pick up employees whose shift times end on the hour.

Service Details

Table 38 summarizes the service span and number of trips proposed for this alternative. Service is proposed during peak hours only with three roundtrips in the AM Peak and four roundtrips plus one additional outbound trips in the PM Peak. While the existing conditions analysis determined that the majority of commuters arrive at or before 8 AM and leave at or before 5:30 PM, an additional morning and afternoon trip are provided to offer greater schedule flexibility.

Table 37: Warwick Hub Flex Alternative 1 Service Details

| Period | Service Span | Number of Roundtrips |
|--------|-------------------|------------------------------|
| AM | 6:21 AM – 9:21 AM | 3 |
| PM | 3:45 PM – 8:37 PM | 4 plus 1 additional outbound |

Table 39 and **Table 40** summarize each shift time served, the connecting route between Kennedy Plaza and CCRI, home routes that feed riders to Kennedy Plaza, the expected typical travel time for commuters, and the number of forecasted riders. Home routes were excluded if there would be any transfer times associated with the trip that exceeded 45 minutes.

Table 38: Inbound Warwick Hub Flex Alternative 1 Connection, Ridership, and Travel Time Details

| Trip | Serves Shifts Starting by: | Connector Route | Connector Arrives at CCRI at: | Home Routes | Average Travel Time | Riders |
|------|----------------------------|-----------------|-------------------------------|--|---------------------|--------|
| 1 | 7:00 AM | 66 | 6:16 AM | R-Line, 1, 20, 21, 30, 50, 51, 55, 56, 57 | 74-81 | ~35 |
| 2 | 8:00 AM | 66 | 7:06 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |

| Trip | Serves Shifts Starting by: | Connector Route | Connector Arrives at CCRI at: | Home Routes | Average Travel Time | Riders |
|------|----------------------------|-----------------|-------------------------------|--|---------------------|--------|
| 3 | After 8:00 AM | 21 | 7:55 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |

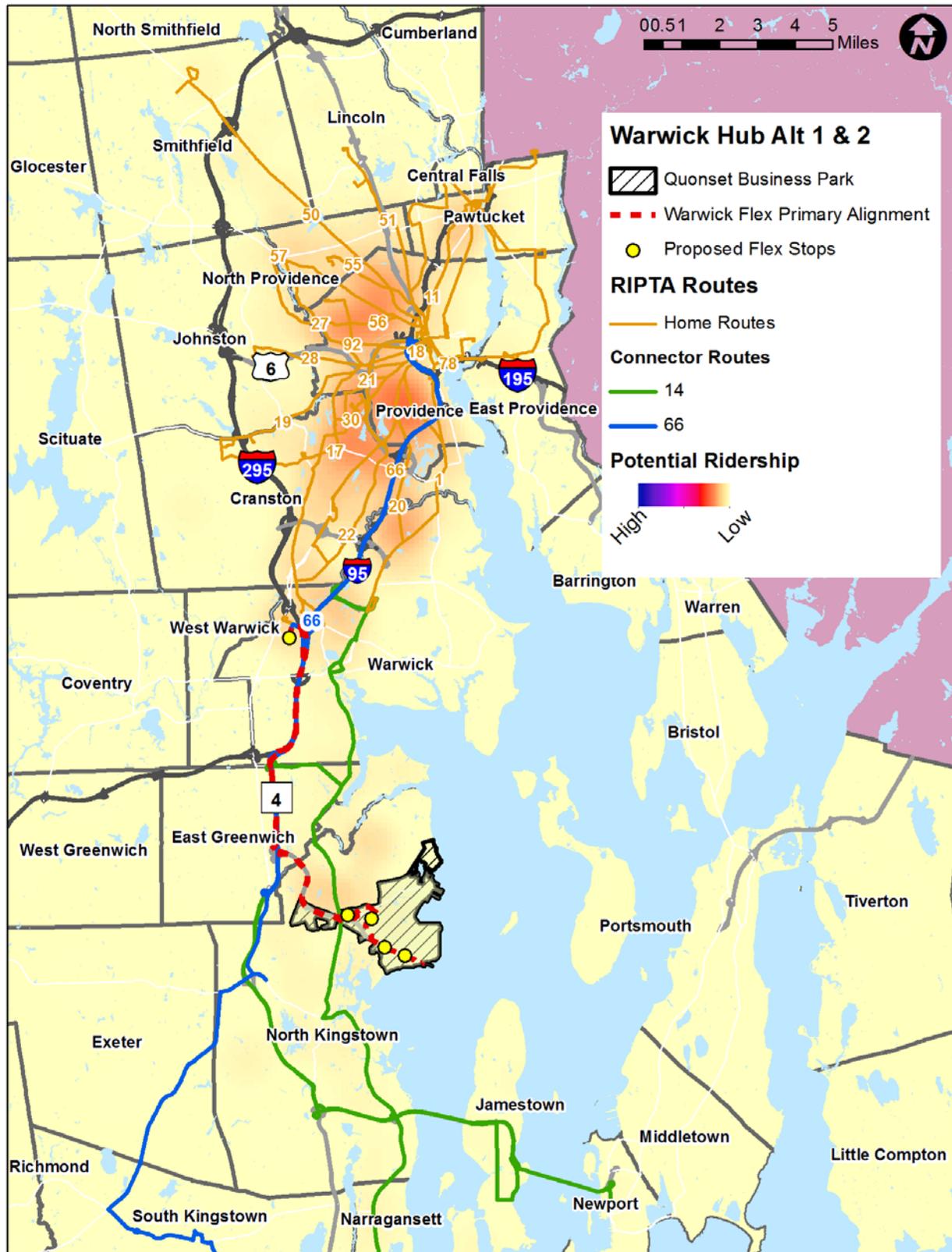
Table 39: Outbound Warwick Hub Flex Alternative 1 Connections

| Trip | Serves Shifts Ending by: | Connector Route | Connector Leaves CCRI at: | Home Routes | Average Travel Time | Riders |
|------|--------------------------|-----------------|---------------------------|---|---------------------|--------|
| 1 | 3:30 PM | 21, 66 | 4:20 PM, 4:42 PM | R, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | 50-75 | ~35 |
| 2 | 4:30 PM | 21, 66 | 5:20 PM, 5:54 PM | R, 1, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 3 | 5:30 PM | 21, 66 | 6:22 PM, 6:44 PM | R, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | | |
| 4 | 5:30 PM – 8:00 PM | 66 | 7:42 PM | R, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | | |
| 5 | 8:00 PM | 66 | 8:42 PM | R-Line, 1, 19, 20, 22, 27, 28, 31, 55, 57, 78, 92 | | |

Overall, approximately 35 employees making roundtrips are projected to use this service daily (see Appendix for ridership projection methodology). With 35 employees, the morning vehicles could reach seated capacity, as RIPTA flex vehicles have 16 seats. **Figure 55** illustrates the estimated ridership on Warwick Hub Alternative 1 by employees’ home census block group.

Routes 21 and 66 both connect to CCRI Warwick and therefore either could be taken to connect with Kennedy Plaza in downtown Providence. Route 21 has a significantly longer runtime than Route 66 (48 minutes versus 17 to 24 minutes during the PM Peak period), however it departs CCRI between 22 and 34 minutes prior to Route 66 for each afternoon shift end time. Therefore, it is not more likely that riders will choose one option over the other unless they live along Route 21. If the Route 66 schedule were updated in the future, then consideration should be given to providing a quicker transfer at CCRI.

Figure 54: Warwick Hub Flex Service Estimated Ridership Heat Map



Operating Statistics and Cost

This option would have 9.1 daily platform hours and as was previously mentioned, would require one flex vehicle (**Table 41**). This alternative would require two operators – one for the morning and one for the afternoon. Since each operator needs to be paid for an eight-hour shift, the total annual operating cost would be approximately \$206,000.

Table 40: Warwick Hub Flex Alternative 1 Operating Statistics

| Period | Total Daily Platform Hours | Total Daily Paid Hours | Annual Operating Cost |
|--------------|----------------------------|------------------------|-----------------------|
| AM | 3.5 | 8 | \$102,780 |
| PM | 5.6 | 8 | \$102,780 |
| Total | 9.1 | 16 | \$205,560 |

Warwick Hub Flex Alternative 2: Two Vehicles

This alternative would operate the same span as Alternative 1, but with two vehicles and a greater frequency of service.

Service Details

Table 42 summarizes the service span and number of trips proposed for this alternative. Service is proposed during peak hours only with four roundtrips plus one additional inbound trip in the AM Peak and six roundtrips plus two additional outbound trips in the PM Peak. Under this alternative, shifts will be served every half-hour instead of every hour. Operating the route with two vehicles would improve service recovery, as any delay on one vehicle has the potential of cascading through the schedule period.

Table 41: Warwick Hub Flex Alternative 2 Service Details

| Period | Service Span | Number of Roundtrips |
|--------|-------------------|------------------------------------|
| AM | 6:21 AM – 9:21 AM | 4 plus 1 additional inbound trip |
| PM | 3:15 PM – 8:37 PM | 6 plus 2 additional outbound trips |

Table 43 and **Table 44** summarize each shift time served, the connecting route between Kennedy Plaza and Wickford Junction, home routes that feed riders to Kennedy Plaza, the expected typical travel time for commuters, and the number of forecasted riders. Home routes were excluded if there would be any transfer times associated with the trip that exceeded 45 minutes.

Table 42: Inbound Warwick Hub Flex Alternative 2 Connection, Ridership, and Travel Time Details

| Trip | Serves Shifts Starting by | Connector Route | Connector Arrives at CCRI at | Home Routes | Average Travel Time (min) | Riders |
|------|---------------------------|-----------------|------------------------------|--|---------------------------|--------|
| 1 | 7:00 AM | 66 | 6:16 AM | R-Line, 1, 20, 21, 30, 50, 51, 55, 56, 57 | 74-81 | ~35 |
| 2 | 7:30 AM | 66, 21 | 6:16 AM, 6:51 AM | R-Line, 1, 20, 21, 30, 50, 51, 55, 56, 57 | | |
| 3 | 8:00 AM | 66 | 7:06 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 4 | 8:30 AM | 66, 21 | 7:06 AM, 7:55 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 5 | After 8:30 AM | 21 | 7:55 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |

Table 43: Outbound Warwick Hub Flex Alternative 2 Connection, Ridership, and Travel Time Details

| Trip | Serves Shift Ending by | Connector Route | Connector Departs CCRI | Home Routes | Average Travel Time | Riders |
|------|------------------------|-----------------|------------------------|--|---------------------|--------|
| 1 | 3:00 PM | 66 | 3:49 PM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | 50-80 | ~35 |
| 2 | 3:30 PM | 21, 66 | 4:20 PM, 4:42 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 3 | 4:00 PM | 21 | 4:50 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 4 | 4:30 PM | 21, 66 | 5:20 PM, 5:54 PM | R-Line, 1, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 5 | 5:00 PM | 66 | 5:54 PM | R-Line, 1, 14, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 6 | 5:30 PM | 21, 66 | 6:22 PM, 6:44 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | | |
| 7 | 5:30 PM – 8:00 PM | 66 | 7:42 PM | R-Line, 1, 19, 20, 22, 27, 28, 31, 55, 57, 78, 92 | | |
| 8 | 8:00 PM | 66 | 8:42 PM | R-Line, 1, 19, 20, 22, 27, 28, 31, 55, 57, 78, 92 | | |

Overall, approximately 35 employees are projected to use this service daily (see Appendix for ridership projection methodology). With 35 employees and two vehicles serving the 7:00 AM and 8:00 AM shifts, no trips should reach seated capacity. The ridership for Alternative 2 is expected to be similar to that of Alternative 1 (see **Table 46**).

Routes 21 and 66 both connect to CCRI Warwick and therefore either could be taken to connect with Kennedy Plaza in downtown Providence. Route 21 has a significantly longer runtime than Route 66 (48 minutes versus 17 to 24 minutes during the PM Peak period), however it departs CCRI between 22 and 34 minutes prior to Route 66 following the 3:30 PM, 4:30 PM, and 5:30 PM shift end times and is the only reasonable option available following the 4:00 PM shift end time. Therefore, it is not more likely that riders will choose one option over the other unless they live along Route 21 or end their shift at 4:00 PM. If the Route 66 schedule were updated in the future, then consideration should be given to providing a quicker transfer at CCRI.

Operating Statistics and Cost

This option would have 14.7 daily platform hours and, as was previously mentioned, would require two flex vehicles (see **Table 45**). This alternative would require four operators – one for each vehicle in the morning and afternoon. Since each operator needs to be paid for an eight-hour shift, the total annual operating cost would be approximately \$411,000.

Table 44: CCRI Flex Alternative 2 Operating Statistics

| Period | Total Daily Platform Hours | Total Daily Paid Hours | Annual Operating Cost |
|--------------|----------------------------|------------------------|-----------------------|
| AM | 5.9 | 16 | \$205,560 |
| PM | 8.8 | 16 | \$205,560 |
| Total | 14.7 | 32 | \$411,120 |

Warwick Hub Alternative 3: Early Pattern, Two Vehicles

This alternative would operate an additional AM Peak trip to enable the 6:30 AM shifts to be served. This additional trip would operate a one-seat ride directly between Kennedy Plaza, CCRI, and Quonset since there are no fixed-route connections to CCRI operating early enough from Kennedy Plaza. This alternative would also use two flex vehicles.

Service Details

Table 46 summarizes the service span and number of trips proposed for this alternative. Service is proposed during peak hours only with six roundtrips in the AM Peak and six roundtrips plus two additional outbound trips in the PM Peak. Under this alternative, shifts will be served on the half-hour.

Table 45: CCRI Flex Alternative 3 Service Details

| Period | Service Span | Number of Roundtrips |
|--------|-------------------|------------------------------|
| AM | 5:32 AM – 9:21 AM | 6 |
| PM | 3:15 PM – 8:37 PM | 6 plus 2 additional outbound |

In order to serve the 6:30 AM shift, the flex route will need to leave Kennedy Plaza by 5:32 AM. This would allow for connections from two major routes at Kennedy Plaza, the R-Line and Route 20.

Table 47 and **Table 48** summarize each shift time served, which connecting route would be used to connect from CCRI to Kennedy Plaza, which home routes provide reasonable connections to the market, and the average travel time for potential riders and the maximum estimated number of riders that would likely use the service in the inbound direction. Home routes were excluded if there would be any transfer times associated with the trip that exceeded 45 minutes.

Table 46: CCRI Flex Alternative 3 Connection, Ridership, and Travel Time Details

| Trip | Serves Shifts Starting by | Connector Route | Connector Arrives at | Home Routes | Average Travel Time (min) | Riders |
|------|---------------------------|-----------------|----------------------------|--|---------------------------|--------|
| 1 | 6:30 AM | - | 5:32 AM (at Kennedy Plaza) | R-Line, 20 | 71-81 | ~55 |
| 2 | 7:00 AM | 66 | 6:16 AM (CCRI) | 1, 20, 21, 30, 50, 51, 55, 56, 57, R-Line | | |
| 3 | 7:30 AM | 66, 21 | 6:16 AM, 6:51 AM (CCRI) | R-Line, 1, 20, 21, 30, 50, 51, 55, 56, 57 | | |
| 4 | 8:00 AM | 66 | 7:06 AM (CCRI) | 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, R-Line, 242 | | |
| 5 | 8:30 AM | 66, 21 | 7:06 AM, 7:55 AM (CCRI) | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 6 | After 8:30 AM | 21 | 7:55 AM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |

Table 47: CCRI Flex Alternative 3 Connections

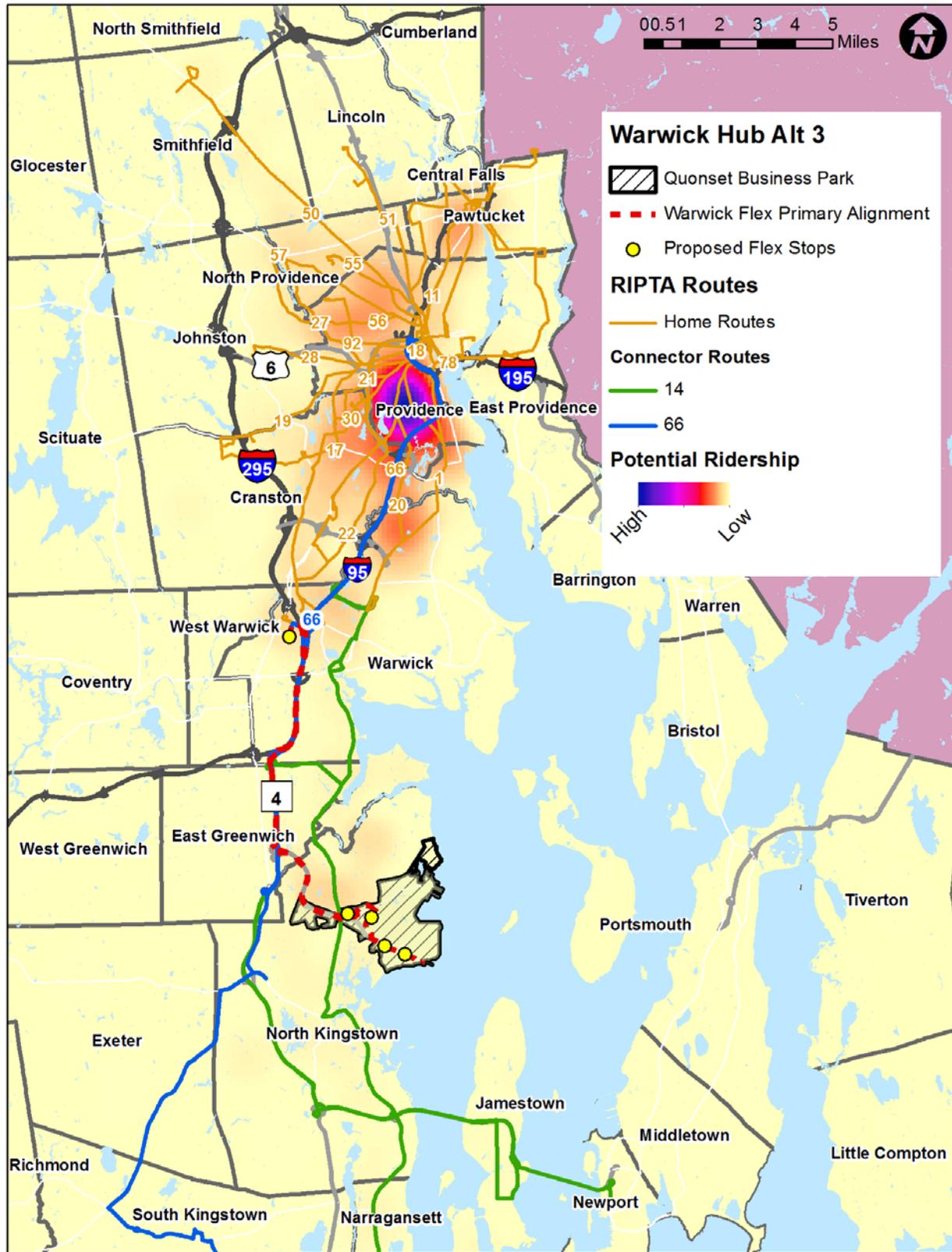
| Trip | Serves Shifts Ending by | Connector Route | Connector Leaves CCRI | Home Routes | Average Travel Time (min) | Riders |
|------|-------------------------|-----------------|-----------------------|--|---------------------------|--------|
| 1 | 3:00 PM | 66 | 3:49 PM | R-Line, 1, 14, 17, 18, 19, 20, 21, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | 50-80 | ~55 |
| 2 | 3:30 PM | 21, 66 | 4:20 PM, 4:42 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 3 | 4:00 PM | 21 | 4:50 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |

| Trip | Serves Shifts Ending by | Connector Route | Connector Leaves CCRI | Home Routes | Average Travel Time (min) | Riders |
|------|-------------------------|-----------------|-----------------------|--|---------------------------|--------|
| 4 | 4:30 PM | 21, 66 | 5:20 PM, 5:54 PM | R-Line, 1, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 5 | 5:00 PM | 66 | 5:54 PM | R-Line, 1, 14, 17, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92, 242 | | |
| 6 | 5:30 PM | 21, 66 | 6:22 PM, 6:44 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | | |
| 7 | 5:30 PM – 8:00 PM | 66 | 7:42 PM | R-Line, 1, 14, 17, 18, 19, 20, 22, 27, 28, 31, 50, 51, 55, 56, 57, 72, 78, 92 | | |
| 8 | 8:00 PM | 66 | 8:42 PM | R-Line, 1, 19, 20, 22, 27, 28, 31, 55, 57, 78, 92 | | |

Overall, approximately 55 employees are projected to use this service daily (see Appendix for ridership projection methodology). Some trips could exceed the seated capacity of the typical RIPTA flex vehicle, which has 16 seats. A large increase in ridership over Alternatives 1 and 2 is generated by better serving the Elmwood section of Providence, where riders have access to the R-Line and Route 20 to connect to the flex service to reach Quonset for the 6:30 AM shifts. **Figure 56** illustrates the estimated ridership on Warwick Hub Alternative 3 by employees’ home census block group.

Routes 21 and 66 both connect to CCRI Warwick and therefore either could be used to connect with Kennedy Plaza in downtown Providence. Route 21 has a significantly longer runtime than Route 66 (48 minutes versus 17 to 24 minutes during the PM Peak period), however it departs CCRI between 22 and 34 minutes prior to Route 66 following the 3:30 PM, 4:30 PM, and 5:30 PM shift end times and is the only reasonable option available following the 4:00 PM shift end time. Therefore, it is not more likely that riders will choose one option over the other unless they live along Route 21 or end their shift at 4:00 PM. If the Route 66 schedule were updated in the future, then consideration should be given to providing a quicker transfer at CCRI.

Figure 55: Warwick Hub Flex Service Alternative 3 Estimated Ridership Heat Map



Operating Statistics and Cost

This option would have 16.4 daily platform hours and as was previously mentioned, would require two flex vehicles (see **Table 49**). This alternative would require four operators – one for each vehicle in the morning and afternoon. Since each operator needs to be paid for an eight-hour shift, the total annual operating cost would be approximately \$411,000

Table 48: CCRI Flex Alternative 3 Operating Statistics

| Period | Total Daily Platform Hours | Total Daily Paid Hours | Annual Operating Cost |
|--------------|----------------------------|------------------------|-----------------------|
| AM | 7.6 | 16 | \$205,560 |
| PM | 8.8 | 16 | \$205,560 |
| Total | 16.4 | 32 | \$411,120 |

4.2.5 Future Considerations

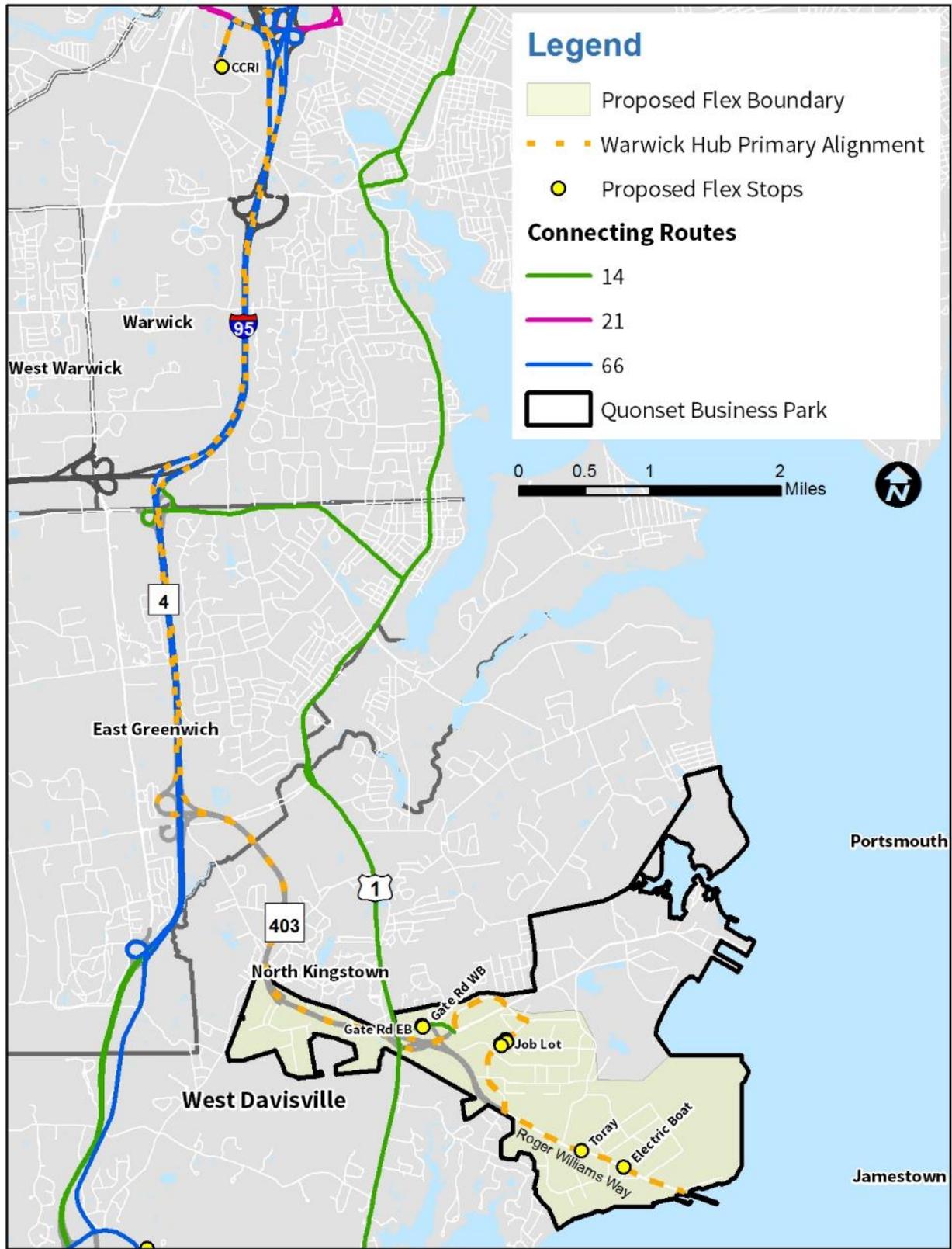
If the Warwick Hub flex route is successful, the flex zone could be expanded into West Davisville as under the Wickford Junction option. Reservations for the initial flex service and requests for service should be monitored to gauge whether an expansion to this area is warranted.

The most likely deviation into West Davisville would be to All American Foods on All American Way. This deviation would require an additional 5 to 10 minutes of cycle time (**Table 50**). The additional cycle time required to serve both of this area would likely require the introduction of a third flex vehicle in order to be able to continue to serve all the shifts served under Alternatives 2 and 3. **Figure 57** illustrates the potential expansion of the flex zone into West Davisville.

Table 49: Warwick Flex Zone Expansion Cycle Time

| Alignment | Cycle Time (Minutes) |
|--|----------------------|
| Primary Alignment + Circuit Drive Deviation | 62 |
| Deviation into West Davisville | 5-10 |

Figure 56: Potential Expansion of the Warwick Hub Flex Service into West Davisville

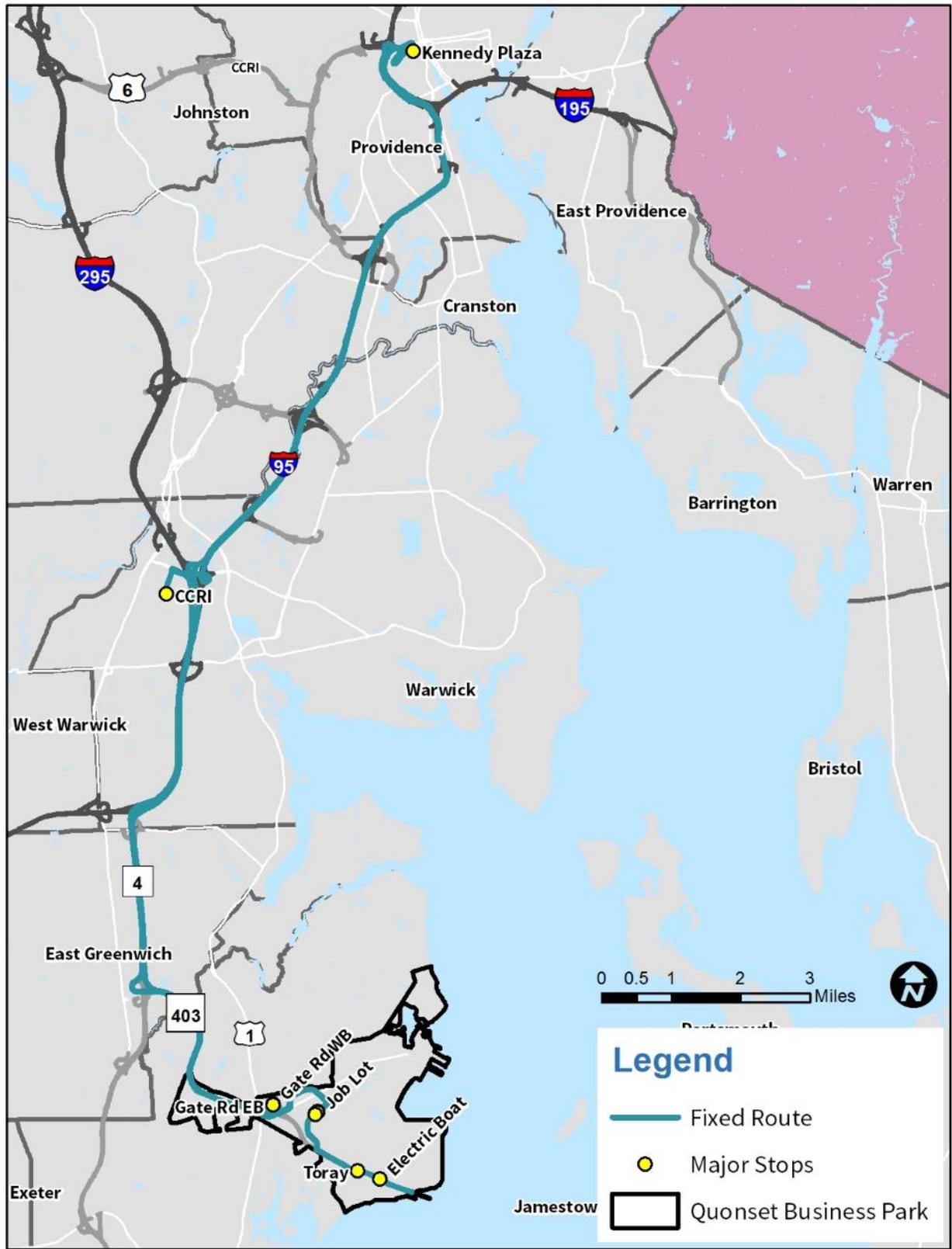


4.3 CONVERSION TO FIXED ROUTE

If either the Wickford Junction or the Warwick Hub flex routes are heavily utilized, the service can be converted into a fixed-route bus service. RIPTA's fixed-route buses can hold up to 60 passengers on a single trip (approximately 40 seated and 20 standees) versus only 16 on a flex vehicle.

The ideal alignment for a fixed route bus would be to operate directly between Kennedy Plaza, CCRI, and Quonset. This would provide connections to the majority of the market with only a single transfer required, however it would not allow for deviations in the park and would thus require employees who work along Circuit Drive, Whitecap Drive, and at Edesia to walk further to reach their workplaces. As a fixed route, the service would likely begin at Kennedy Plaza and operate via I-95 to CCRI, and then return to I-95 to Route 4, Route 403, and Route 1 to then follow the primary alignment of the flex route along Gate Road, Romano Vineyard Way, Commerce Park Road, and Roger Williams Way (**Figure 58**).

Figure 57: Fixed-Route Option Alignment



4.3.1 Operating Characteristics

The runtime from Kennedy Plaza to Zarbo Avenue in Quonset would be approximately 45 minutes during off-peak periods and 55 minutes during peak periods. Including a 10-20 percent layover/recovery time, a cycle time of 120 minutes would be ideal. Given this cycle time, a headway of 30 minutes could be provided with four vehicles. This headway would be sufficient to meet shift times that are 30 minutes apart without excess wait time. In the AM Peak, it would be desirable to serve the 6:30 AM, 7:00 AM, and 8:00 AM shift start times. In the PM Peak, it would be desirable to serve the 3:00 PM, 3:30 PM, 4:00 PM, 4:30 PM, 5:00 PM, and 5:30 PM end shifts. This would require a span of service in the AM Peak of 5:35 AM to 8:35 AM and in the PM Peak of 3:15 PM to 6:45 PM and would provide six AM Peak roundtrips and seven PM Peak roundtrips.

Overall, this option would result in 26.0 daily revenue hours and would cost approximately \$928,000 to operate annually, using RIPTA’s fixed route cost per revenue hour of \$142.79. **Table 51** summarizes the operating characteristics and estimated operating cost of the fixed-route option.

Table 50: Kennedy Plaza Fixed Route Option Operating Characteristics

| | AM Peak | PM Peak |
|------------------------------|-------------------|-------------------|
| Span of Service | 5:35 AM – 8:35 AM | 3:15 PM – 6:45 PM |
| Headway | 30 | 30 |
| Cycle Time | 120 | 120 |
| Vehicles | 4 | 4 |
| Daily Revenue Hours | 26.0 | |
| Annual Revenue Hours | 6,500 | |
| Annual Operating Cost | \$928,000 | |

4.3.2 Benefits

There are several major benefits to implementing a fixed-route service to Quonset. The primary benefit would be the increase in capacity, particularly if the flex service realized its ridership potential and became overcrowded. Overall, the major benefits include:

- A significant increase in overall passenger capacity and capacity per trip.
- A five-minute reduction in travel time from Kennedy Plaza due to the elimination of a transfer at the Warwick Hub.
- A reduction in the typical number of transfers from two to one for the majority of the market.
- A more consistent scheduled service that is more user-friendly.

While the operating cost of a fixed-route service would be significantly higher than a flex service, the benefits listed above would likely increase total ridership.

4.4 FINAL RECOMMENDATION

In summary, a flex route using Wickford Junction as a hub and a flex route using CCRI in Warwick as a hub were analyzed, along with a fixed-route option with service directly between Kennedy Plaza in Providence and

Quonset. Different schedule alternatives were also presented for each flex route option. Travel times on the Warwick Hub flex route would also be less than on the Wickford Junction flex route, as the Warwick Hub is more central to the transit market for Quonset. Thus, the Warwick Hub flex route is preferable to the Wickford Junction flex route.

Under the Warwick Hub flex route option, Alternative 3 would produce the most ridership and therefore is the recommended alternative. This alternative would be able to serve three major AM Peak shift start times whereas the other alternatives are unable to provide effective service for Quonset’s 6:30 AM shift, which serves the Park’s largest employer, Electric Boat.

While the fixed-route option would require the least number of transfers and therefore would likely have lower travel times which would increase ridership, it is the most expensive option and would require the use of standard buses instead of flex vehicles.

Table 51 compares the six alternatives analyzed. The scoring is based on ridership potential, cost, and travel time.

Table 51: Comparison of Alternatives

| Alternative | Daily Ridership Potential* | Annual Operating Cost | Average Travel Time (Minutes) | Average No. of Transfers | Score |
|--------------------------------|----------------------------|-----------------------|-------------------------------|--------------------------|-------|
| Wickford Junction Alt 1 | ~70 | \$206,000 | 55-91 | 2 | ✘ |
| Wickford Junction Alt 2 | ~70 | \$411,000 | 55-91 | 2 | ✘ |
| Warwick Hub Alt 1 | ~70 | \$206,000 | 50-81 | 2 | ● |
| Warwick Hub Alt 2 | ~70 | \$411,000 | 50-81 | 2 | ● |
| Warwick Hub Alt 3 | ~110 | \$411,000 | 50-81 | 2 | ✓ |
| Fixed Route | NA | \$928,000 | NA | 1 | ● |

*Total unlinked passenger trips

4.5 MODIFICATIONS TO OTHER ROUTES

There are several modifications to other RIPTA routes that could be made to help support Quonset transit service. These modifications include span adjustments on key routes connecting to Kennedy Plaza and CCRI, adjustments to the Route 66 schedule, and minor route realignments.

4.5.1 Span Adjustments

In order for a flex route to have proper feed from routes that serve commuters’ home locations, adjustments will have to be made to the spans of some of those home routes. These changes would result in higher potential ridership and may necessitate greater than hourly frequency on the flex route.

Table 53 summarizes the times by which home routes would need to reach Kennedy Plaza in order to provide enough time for transfers (a five-minute window) to the Warwick Hub flex service directly for the 6:30 AM shifts and to the 6:00 AM Route 66 trip from Kennedy Plaza for the 7:00 AM shifts.

Table 52: Arrival Times at Kennedy Plaza to Make Connections to the 6:30 AM and 7:30 AM Shifts

| Alternative | 6:30 AM | 7:00 AM |
|----------------------------------|---------|---------|
| Warwick Hub Alternative 3 | 5:27 AM | 5:55 AM |

With the Warwick Hub flex service as a base, several existing routes would yield ridership boosts if their spans are adjusted earlier to meet the pulse at Kennedy Plaza. The ability to increase ridership was based on which routes served the market areas defined in the Market Analysis section. For example, a change to the span of Route 29 would allow for earlier connections between the West Warwick and Warwick markets to CCRI and could increase ridership from those areas. Overall, the highest ability to increase ridership to the 6:30 AM shifts is on Routes 17, 18, 21, 22, 30, and 31. The highest ability to increase ridership to the 7:00 AM shifts is on Routes 17, 18, 22, and 31 (see **Table 54**).

Table 53: Ability to Increase Ridership to 6:30 AM and 7:00 AM Shifts by Route

| Home Route | Market Area Served | 6:30 AM | 7:00 AM |
|---------------|--|---------|---------|
| R-Line | Pawtucket, Mt Hope, South Providence | ● | ● |
| 1 | Pawtucket, Mt Hope, South Providence | ● | ● |
| 17 | Federal Hill, West End, Silver Lake, Laurel Hill | ✓ | ✓ |
| 18 | Federal Hill, West End | ✓ | ✓ |
| 19 | Federal Hill, West End, Silver Lake | ✗ | ✗ |
| 20 | Elmwood | ● | ● |
| 21 | Stadium | ✓ | ● |
| 22 | Elmwood, West End, Stadium | ✓ | ✓ |
| 27 | Federal Hill, Olneyville | ● | ● |
| 28 | Federal Hill, Olneyville, Hartford | ● | ● |
| 29 | Warwick, Arctic | ● | ● |
| 30 | Laurel Hill, Stadium | ✓ | ● |
| 31 | West End | ✓ | ✓ |
| 50 | Wanskuck, Smith Hill | ✗ | ● |
| 51 | Smith Hill | ✗ | ● |

| Home Route | Market Area Served | 6:30 AM | 7:00 AM |
|------------|---------------------------------------|---------|---------|
| 55 | Wanskuck, Smith Hill | ✘ | ● |
| 56 | Smith Hill, Mt Pleasant | ● | ● |
| 57 | Smith Hill, Elmhurst | ● | ● |
| 58 | Wanskuck | ● | ● |
| 78 | Eastern Pawtucket (Memorial Hospital) | ✘ | ✘ |
| 92 | Mt Pleasant, Federal Hill | ● | ● |
| 242 | Arctic, Crompton, Anthony | ● | ● |

● Currently Served ✓ High Ability ● Moderate Ability ✘ Low Ability

4.5.2 Adjustments to Route 66 Schedule

If the Route 66 schedule were modified in the future, some consideration should be given to minimizing transfer times to and from the Warwick Hub flex route, particularly in the afternoon when some transfer times exceed 30 minutes. This rescheduling would have to be balanced with other factors that dictate the Route 66 schedule, including class times at CCRI, and MBTA commuter rail service to and from Wickford Junction.

4.5.3 Route Realignments

The proposed Warwick Hub flex service operating out of CCRI would only allow for connections to the market in West Warwick and Coventry to be made using the current flex route 242. Additionally, the fact that the only connections to Kennedy Plaza are available on Routes 21 and 66 at CCRI limits the number of connections available to reach the majority of the market “home” routes at Kennedy Plaza.

There are three routes that currently terminate at Warwick Mall, located just north of CCRI: Routes 13, 22, and 30. Route 13 provides connections to the market in West Warwick and Coventry, Route 22 provides connections to the market in Cranston and Providence, and Route 30 provides connections to the market in Cranston. Additionally, Routes 22 and 30 provide another option to reach Kennedy Plaza. If these three routes were connected to CCRI, they would increase overall ridership on the Warwick Hub flex route alternative by increasing access and frequency to the market and providing a better effective headway between CCRI and Kennedy Plaza. Additionally, this would greatly decrease travel time for employees whose “home” route is the 22 or 30, as they would no longer have to ride Routes 21 or 66 to Kennedy Plaza and then transfer to head back south.

Figure 58 illustrates how Routes 13, 22, and 30 could be realigned to serve CCRI and therefore provide increase connectivity to the Warwick Hub flex service.

Figure 58: Routes 13, 22, and 30

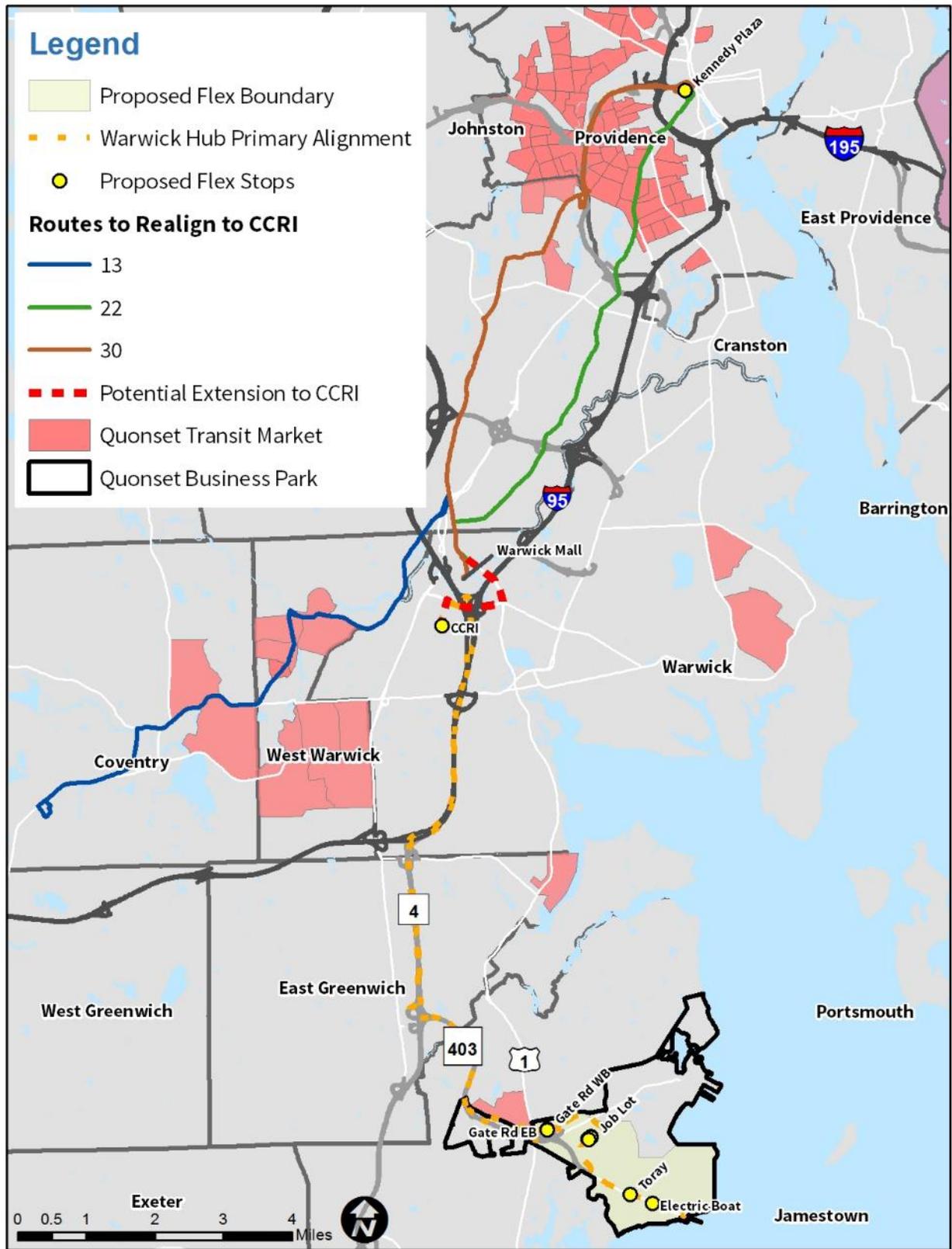


Table 55 summarizes the benefits of this realignment by route. **Table 56** summarizes the potential number of trips per hour and effective headway between CCRI and Kenney Plaza if this realignment was implemented.

Table 54: Route Realignment to CCRI - Options and Benefits

| Route | Route Name | Market Served | Realignment Benefit |
|-----------|------------------------------|--|--|
| 13 | Coventry/Arctic/Warwick Mall | Arctic, Anthony (West Warwick and Coventry) | Increase access to market |
| 22 | Pontiac Ave | Elmwood, West End, Stadium (Providence and Cranston) | Provide shorter travel time to market, increase number of trips to Kennedy Plaza |
| 30 | Arlington / Oaklawn | Laurel Hill, Stadium (Cranston) | Provide shorter travel time to market, increase number of trips to Kennedy Plaza |

Table 55: Potential Number of Trips Per Hour between CCRI and Kennedy Plaza with the Realignment of Routes 22 and 30

| Route | Potential No. of Trips/Hour |
|--------------------------|-----------------------------|
| 21 | 2 |
| 22 | 2 |
| 30 | 1.5 |
| 66 | 1 |
| Total | 6.5 |
| Effective Headway | 9 Minutes |

4.6 OTHER INFRASTRUCTURE NEEDS

In addition to stop infrastructure at new stop locations, there is additional infrastructure needed to support transit service in Quonset and ensure that it is operable in the most efficient and safest manner possible.

4.6.1 Bus Turn-Around in QBP

The primary piece of infrastructure needed to support transit service in Quonset is a proper bus turn-around on Roger Williams Way at the end of the route in the Park. Initially, transit vehicles can use the triangle intersection at Zarbo Avenue and Roger Williams Way to turn around. However, it would be beneficial and more cost-effective to have a turn-around closer to Electric Boat so that vehicles do not have to travel to Zarbo Avenue on every single trip.

One potential location for a turn-around is at the intersection of Roger Williams Way and Eccleston Avenue. There is deteriorated pavement at this intersection just east of Eccleston Avenue that nearly connects to Roger Williams Way – this area could be re-paved and connected to Roger Williams Way and used by buses to turn around. Having

the turn-around at this location would save 0.6 miles on most roundtrips and approximately two minutes of runtime. The turnaround could be formalized into a bus stop with passenger amenities and/or operator facilities (including restrooms) depending on future demand. **Figure 60** illustrates this location.

Figure 59: Proposed Bus Turn-Around at Rogers Williams Way and Eccleston Avenue



5. Transportation Alternatives

5.1 OVERVIEW

Public transit alone cannot meet the commute needs of the Park. Many shifts start too early or end too late to allow commuters to utilize RIPTA's bus service. The Business Park has a number of options for serving these shifts, even if providing direct transit service is not feasible. These options include providing dynamic mobility options, building up a user base of carpool and vanpool commuters, and implementing a strong Transportation Demand Management (TDM) program.

5.2 DYNAMIC MOBILITY OPTIONS

Over the last few years, companies like Uber, Lyft, and Bridj have offered consumers new on-demand travel options. These firms, broadly referred to as Transportation Network Companies (TNCs), may utilize different business models but share some common attributes: They allow consumers to request a ride with little or no advanced notice; consumers interact with the service largely through a smartphone app and software automates the ride matching, trip planning, and payment functions of the service, and in most instances the drivers are independent contractors who utilize their own vehicle. Programs like Uber and Lyft have emerged as an alternative to traditional taxis, providing customers competitively priced fares and a high level of convenience. Some other TNCs like Bridj operate shuttle buses that more directly compete with publically operated transportation services; these shuttles often charge a premium to public transit but offer greater comfort and speed.

TNCs have the potential to alter the public transportation network by complementing public transit offerings and more affordably filling a niche that currently transit is ill-suited to serve. While fixed-route transit is the most efficient way of moving a large number of people between two destinations, as travel demand decreases the cost of operating these services grow. TNCs therefore show great promise as a cost effective way to provide transit service to a place like Quonset, a low density area where travel demand often occurs at times when RIPTA operates reduced service (e.g., late nights, weekends, and off-peak). A few transit agencies have already partnered with TNCs to provide services to their customers, however these partnerships are still fairly limited. A number of issues will need to be addressed before TNCs are a viable alternative for Quonset.

5.2.1 Examples of TNC-Transit Partnerships

As many TNCs provide services that never existed before, they often operate in legal grey zones as regulation struggles to keep up with these new travel options. This has posed a challenge to TNCs partnering with public agencies and only very recently have these partnerships emerged; because partnerships between TNCs and transit agencies are still at their earliest stages, the nature of these partnerships may very well look different in only a few years. The following examples describe some models for how transit agencies have partnered with

TNCs to provide service to patrons in various operating environments. While the subsidy provided to the private operators is high in some cases, it is often still more cost effective than paying for fixed route or even flex service provided by the agency to serve areas or populations with less demand. The services can also be used for first mile and last-mile access, providing alternatives to fixed route service to connect to the primary transit routes.

MBTA and Uber/Lyft Partnership

In September 2016 the Massachusetts Bay Transportation Authority (MBTA) announced a pilot program to subsidize rides on Uber and Lyft for its paratransit customers⁶. The existing RIDE paratransit service is a costly component of the agency's budget. To help control costs and expand vehicle availability, the pilot will allow paratransit riders to use Uber or Lyft as an alternative to THE RIDE. Each trip will carry a \$2 base fare, with MBTA subsidizing up to \$13 of each trip's cost. The rider is required to pay for the remaining cost of the trips if it exceeds \$17. While the primary method of accessing the service is through the standard Lyft or Uber app, Lyft has also enabled customers to place reservations over the phone. Uber has announced they will provide customers a smartphone on a limited-time basis to enable them to use the service, although the details of this arrangement are not clear at this time.

PSTA and Uber/Taxi Partnership

In March 2016 Pinellas Suncoast Transit Authority (PSTA) in Florida launched a pilot with Uber and a local taxi company, United Taxi, to provide service in an area underserved by transit. The pilot was initiated after the agency was forced to eliminate a low performing route due to budget cuts. The service allows customers to use either Uber or United Taxi for trips within a predetermined service area; trips must begin or end at one of two existing PSTA bus stops in the neighborhood. The agency will subsidize half of the trip costs up to \$3, approximately PSTA's average subsidy per trip. The service is only available between 7AM and 7PM Monday through Saturday⁷.

The program got off to a slow start initially, attributed to inadequate rider promotion and outreach. Many riders who did use the service ended up taking trips that were ineligible for the PSTA subsidy. Over time PSTA has worked with Uber to improve in-app integration and expand promotional efforts.⁸

KCATA and Bridj

Also in March 2016, the Kansas City Area Transit Authority (KCATA) initiated a pilot program with the on-demand transit provider Bridj to serve two inner-city neighborhoods. While these neighborhoods already have KCATA service, the existing network requires multiple transfers between the neighborhoods. During peak hours (6 AM – 10 AM and 3 PM – 7 PM) riders can request trips between the two neighborhoods. The service works identically to Bridj in other cities: riders reserve a seat on a particular trip, and are assigned a bus stop within a 10 minute walk of their starting location. KCATA will help subsidize the operation so that fares match the existing systemwide fare of \$1.50. The program will use KCATA's existing unionized workforce to drive a fleet of 14-seat leased vans. Bridj's primary contribution is providing the technology to enable the service.

⁶ http://www.mbta.com/about_the_mbta/news_events/?id=6442456779&month=&year=

⁷ <http://www.psta.net/directconnect/index.php>

⁸ <http://transitcenter.org/wp-content/uploads/2016/09/TC-Private-Mobility-Public-Interest-20160909.pdf>



Source: KCATA.org

5.2.2 Other Options for On-Demand Transportation Services

Some transit agencies have decided to provide on-demand transit options in-house and bypass working with an existing TNC. Firms like Transloc are developing technology to allow transit agencies to develop their own dynamic flexible services. Santa Clara Valley Transportation Authority (VTA) in California recently launched a six-month pilot called FLEX that allows for point-to-point rides within a designated flex zone. The service differs from RIPTA's Flex service in two ways: there are no predetermined timepoints, and reservations can be made at the time of travel, instead of 24 hours in advance. All reservations are made through a smartphone app or website, with the customers notified of a match over the app or text message.

5.2.3 Designing a Dynamic Flex Service for Quonset

There are a few models for how RIPTA can structure a dynamic flex service regardless of whether the program is operated in-house or through a TNC. The above examples illustrate these possible models:

- **Zone-to-Stop Model:** In this option all trips must begin or end at a specific location or set of locations, typically a transfer node where riders can access other services. Riders can utilize the service from anywhere within a predetermined area as long as one end of their trip includes a stop location. This model is similar to how PSTA operates its partnership with Uber and United Taxi.
- **Zone-to-Zone Model:** In this option all trips must begin in one predetermined area and end in another predetermined area. The service can be bi-directional between the zones, or operate only in a "peak" direction. The service may operate as a door to door service between zones, or serve pick-up and drop-off points that aggregate together nearby trip requests. This model is how Bridj typically operates in the cities it serves.
- **Point-to-Point Model:** In this model, riders can take the flex service between any two points within a predetermined area. The service can operate as a door-to-door service or require passengers to walk to the nearest intersection or bus stop.

A Zone-to-Stop Model is likely the most appropriate option for serving the Quonset Business Park during off-peak hours and for complementing the proposed Flex route service. The existing home location of commuters is too spread out to efficiently operate through the other two models. The service would pick-up/drop-off anywhere within the Park and deliver riders to a major transit node, likely either the Warwick Hub or Kennedy Plaza in Providence. Having the service mimic the proposed flex route provides greater service consistency throughout the day and enables RIPTA to connect commuters to its already robust fixed-route services.

5.2.4 Important Considerations

Dynamic transportation services are still in their infancy. In creating a system that allows for on-demand transportation to and from the Park, a number of factors will need to be taken into consideration. Key items to consider include, but are not limited to:

- **Fare Equity:** Determine whether the program conforms with RIPTA's existing Title VI policy. A dynamic flex service may charge a different fare than fixed route bus service; does that pricing have a disproportionate impact on minority, and Limited-English proficiency riders?
- **Funding Eligibility:** What are the limitations on using existing operating funds to subsidize a service, especially if operated by a TNC like Uber or Lyft. Can RIPTA use local, state, or federal funds for such a program?
- **Legal Questions:** What are the regulatory implications of RIPTA utilizing a third party service that is not operated directly by RIPTA drivers? Do existing TNCs comply with existing state law? If not, what steps must be taken in order for them to comply?
- **Operating Hours:** What time of day will the service operate? Will it replace the proposed Warwick Hub Flex Circulator or merely complement it during off-peak hours?
- **Service Accessibility:** How can RIPTA ensure the service is accessible to all of Quonset's workforce? A number of firms have sizable non-English speaking workforces. Will Spanish or Portuguese speakers be able to easily use the service? Will the service require smartphone access or will there be an over the phone option?
- **Customer Information:** A common challenge with dynamic flex services is that existing riders may be unfamiliar with how the service operates and functions. Some of the existing models expose customers to hefty fare overages or only provide discounts if the ride ends in a particular location. Riders will have to fully understand the limits and costs of the service.
- **Vehicle Availability:** TNC services like Uber and Lyft depend on a certain level of local vehicle availability to ensure the service functions properly. How can RIPTA cooperate with TNCs to ensure ample vehicle supply during the end and start of shifts? Does the transit agency need to provide additional financial incentives like a minimum revenue guarantee to support this supply?

5.3 CARPOOL AND VANPOOL

5.3.1 Vanpool Program

Overview

Vanpools are generally used for longer commutes (10 miles or more each way),⁹ and are often well-suited for shift work schedules. Massachusetts-based Electric Boat employees at QBP can already choose from at least two separate vanpools to their work site from vRide, a vanpool vendor affiliated with the Massachusetts Department of Transportation's MassRIDES program.¹⁰ Electric Boat also offers a rideshare incentive through a corporate partnership with Easy Street, which provides both vehicles and a cash incentive for each rider a driver signs up. Easy Street vehicles include seven-passenger minivans as well as 12 and 15-passenger vans. Fares are charged by seat, and payable monthly.¹¹

RIPTA has issued an RFP (June 2016) to procure one or more vendors to provide vanpool services for trips that begin and/or end in Rhode Island. These vendors, working with RIPTA, will provide turn-key vanpool services to commuters, including insurance and vehicles, and coordinate with Commute Resource RI to promote the formation of new vanpools. These vans will seat a minimum of seven passengers and a maximum of 15 passengers; to participate, each vanpool participant must register with NuRide, a national commuter rewards program that serves as a rideshare matching vendor for Commute Resource RI. To promote the program, RIPTA will provide the following subsidies for each vanpool:

- \$300 for the first month of operations for any new vanpool
- \$100 per month for every month the vanpool is in operation after the first month¹²

Recommendation

Creating an independent vanpool program through the Quonset Development Corporation (QDC) would be costly and time-consuming, requiring fleet acquisition, dedicated staff, and extensive insurance and legal coordination. QDC and business park tenants should instead work together to ensure that new RIPTA-supported vanpool services are well-promoted to both current and potential business park employees, and encourage all QBP commuters interested in ridesharing to register with NuRide.

⁹ Ridesharing: Carpooling and Vanpooling. Victoria Transport Policy Institute, TDM Encyclopedia, Updated 21 December 2015. Accessed at <http://www.vtpi.org/tm/tm34.htm>

¹⁰ Massachusetts-based vanpools to Electric Boat Corporation at QBP listed on nuride.com begin in Fall River, MA, and Swansea, MA. Each vanpool operates Monday through Friday (September 2016).

¹¹ General Dynamics Electric Boat, Quonset Point Facility, Commuter Resources. Accessed at http://www.gdeb.com/qp/employee_resources/CR/

¹² Rhode Island Public Transit Authority, Request for Proposals Number 16-31. Accessed at <http://www.purchasing.ri.gov/RIVIP/ExternalBids/QuasiPublicAgencies/RIPublicTransitAuthBids/16-31.pdf>

5.3.2 Carpool Program

Overview

Twelve QBC employees are currently listed as carpoolers on Commute Resource RI's NuRide rideshare website; all employees list either "Electric Boat Corporation" or "General Dynamics" (Electric Boat Corporation's parent company) as their final destination within QBP. The employees registered on the site begin their commutes in Rhode Island, Massachusetts, or Connecticut.

In addition to NuRide rideshare matching, RIPTA provides "Guaranteed Ride Home" taxi trips to carpoolers in case of an emergency (up to two per calendar year). Carpoolers must be registered with NuRide to receive the benefit.¹³

Recommendation

QDC and QBP employers should work together to ensure that the NuRide carpool matching program is marketed to both current and potential business park employees, and encourage all Quonset commuters interested in ridesharing to register with NuRide.

5.4 COMMUTER INCENTIVES

5.4.1 Federal Transportation Tax Benefits

Overview

The federal tax code allows employers to exclude the value of certain transportation benefits from employee wages. Employers can offer several different transportation options to employees, including a tax-free employer-paid transportation subsidy or a pre-tax employee-paid payroll deduction. These programs benefit both employers, who save money on payroll taxes, and employees, who save money on income taxes. Exclusions of up to \$255 per employee/month are available for the following transportation benefits:

- Commuter highway vehicle: A commuter highway vehicle is any highway vehicle that seats at least six adults (not including the driver). In addition, you must reasonably expect that at least 80% of the vehicle mileage will be for transporting employees between their homes and work place with employees occupying at least one-half the vehicle's seats (not including the driver's).¹⁴
- Transit pass: A transit pass is any pass, token, farecard, voucher, or similar item entitling a person to ride, free of charge or at a reduced rate, on one of the following:
 - On mass transit.
 - In a vehicle that seats at least six adults (not including the driver) if a person in the business of transporting persons for pay or hire operates it.

¹³ Guaranteed Ride Home. Commute Resource RI. Accessed at <http://www.ripta.com/guaranteed-ride-home-1>

¹⁴ Department of the Treasury Internal Revenue Service, Publication 15-B, Employ's Tax Guide to Fringe Benefit for use in 2016. Accessed at <https://www.irs.gov/pub/irs-pdf/p15b.pdf>

- Qualified parking: Qualified parking is parking you provide to your employees on or near your business premises. It includes parking on or near the location from which your employees commute to work using mass transit, commuter highway vehicles, or carpools. It doesn't include parking at or near your employee's home.¹⁵

Exclusions of up to \$20 per employee/month are available for employer reimbursements of reasonable bicycle commuting expenses. Reasonable expenses include the purchase, improvement, repair and storage, of the bicycle, as long as the bicycle is regularly used for travel between the employee's residence and place of employment. The exclusion for qualified bicycle commuting reimbursement isn't available in any month the employee receives any of the other qualified transportation benefits.¹⁶

Recommendation

QDC should work with QBP employers to ensure that employers and employees have the information necessary to both offer and utilize federal transportation tax benefits, including the Rhode Island-specific benefits described in the next section.

5.4.2 Rhode Island Transportation Benefits

Overview

Rhode Island employers who offer transit benefits can participate in the Eco-Pass program, a smart card-style reloadable pass that provides unlimited bus, trolley, and flex route RIPTA transportation service. EcoPass rates are reduced when ten or more employees at a company are enrolled, but companies of any size can participate in the EcoPass program. Commute Resource RI offers on-site events and one-on-one trip planning for employers participating in the program.¹⁷

Recommendation

QDC should work with QBP employers to ensure that employers and employees have the information necessary to both offer and utilize EcoPass benefits.

5.5 PROGRAM ORGANIZATION

5.5.1 Overview

A centralized structure and program is required to oversee and plan for the many transportation alternatives that will be needed to complement the Flex route service. One option is a Transportation Management Association (TMA), a public-private initiative that operates a not-for-profit, membership organization comprised of local governments, employers, and other stakeholders that provide transportation services within a local area. TMAs can also provide an administrative framework for TDM benefits (including ridematching services), and are often

¹⁵ Ibid

¹⁶ Ibid

¹⁷ Commute Resource RI, accessed at <http://www.ripta.com/bus>

seen as organizational options for coordinating transit and TDM service in a large business district or business park. A TMA for the Quonset Business Park would likely be comprised of member employers, the QDC, and other key stakeholders who are invested in promoting transit and TDM services. Costs can vary, but a TMA typically charges employees an annual fee based on the number of covered employees.

However, RIPTA and Commute Resource RI already provide the building blocks of TMA service in Quonset, including contracting with rideshare matching programs. The major missing component is a dedicated staff member to oversee these functions for Quonset, including providing Quonset-specific marketing, outreach, and advocacy.

5.5.2 Recommendation

In lieu of creating a TMA, the Quonset Development Corporation should consider developing a Quonset Business Park Commute Committee with representatives from tenant organizations, RIPTA, and RIDOT. This committee could meet quarterly to discuss commute trends, services, and commute transportation issues facing the business park.

5.6 MARKETING

Although Commute Resource RI currently offers several commute benefits – and will soon offer a vanpool program – many Quonset employees and employers are unaware of alternative commute options. A strong TDM marketing program will increase Park tenants’ ability to attract employees from new markets. **Table 56** outlines a number of possible marketing strategies. Implementing TDM in Quonset will rely in part on support to ensure alternative commute resources are well-known and utilized throughout the business park, and to facilitate language translation and other activities aimed at specific demographic groups, employee types, or market areas. RIPTA already has an existing commuter resources team that can assist in TDM marketing efforts. Alternatively, Park tenants could collaborate to fund a part-time TDM coordinator dedicated to the Quonset Business Park.

Table 56: QDC Alternative Commute Marketing Strategies

| Recommendation | Description |
|--------------------------------------|---|
| QDC Transportation Marketing | Utilize existing TDM resources like RIPTA’s Commute Resources to create targeted marketing to Quonset employees and employers regarding commute alternatives. |
| Employer Coordination | Work with all employers with 25+ employees to identify an Employee Transportation Coordinator who can serve on the Quonset Commute Committee, and communicate alternative commute options back to management/employees. |
| | Develop a Quonset Commute Committee, with a member required from every employer with 25+ employees (membership would be optional for those with fewer than 25). |
| | Facilitate quarterly meetings of the Quonset Commute Committee |
| Tenant and Commuter Materials | Create a Quonset Tenant Commuter Benefit packet, explaining commute options and programs, including tax benefits, NuRide rideshare matching services (carpool and vanpool), and transit passes to Quonset tenants. |

| Recommendation | Description |
|-----------------------------------|--|
| | <p>Create a new employee packet explaining commute options and programs, including NuRide rideshare matching services (carpool and vanpool), tax benefits, Guaranteed Ride Home benefits for carpoolers, and transit passes. Distribute pamphlets to each tenant, working with Employee Transportation Coordinator for larger employers. Include easy-to-use, paper NuRide signup forms for employees who don't have regular access to a computer, and translate all forms into both Spanish and Portuguese.</p> |
| | <p>Add alternative commute benefits/information to Quonset Development Corporation website.</p> |
| | <p>Develop annual Alternative Commute Report, working with Commute Resource RI and Employee Transportation Coordinators to track VMT reduction, tax savings, and other positive benefits from alternative commutes to the Park.</p> |
| <p>Commute Information</p> | <p>Provide annual alternative commute trainings and information sessions for tenants (both employees and employers), promoting tax benefits, transit options, and rideshare matching. Provide Spanish and Portuguese translators, as needed.</p> |
| | <p>Facilitate an annual commuter benefit updates presentations to tenants from staff at Commute Resource RI.</p> |

6. Implementation and Next Steps

Improving commuter access to Quonset will require the implementation of a wide range of strategies. A new Flex route service to the Park will provide employees a direct transit link to the Park that primarily supports first shift workers. A stronger carpool and vanpool program will allow commuters ill-served by transit to match with other commuters to the Park, reducing overall traffic volume and commuting costs and improving employee reliability. Innovative solutions like partnerships with Transportation Network Companies (TNC) such as Uber, Bridj, or Lyft can fill in commuter needs during the periods it is not cost effective to provide dedicated transit service into the Park. Finally, a growing emphasis on promoting transportation alternatives will inform current and potential employees of the Park on their transportation alternatives. Fully realizing the recommendations in this study will require the coordination of a number of key stakeholders, an ongoing funding commitment, and sustained outreach.

6.1 PHASING

The recommendations outlined in this study are intended to be implementable in the near term with the existing resources available at RIPTA. A Flex route could be launched in less than 12 months, although RIPTA and QDC should ensure the proper promotional capacity is in place before the launch of service to guarantee any new transit service the greatest chance for success. While one vehicle operations are feasible, it is recommended immediately operating the service with two vehicles. Finally, over the long-term RIPTA and QDC can explore implementing a higher-capacity option like fixed route express bus service from Quonset.

6.1.1 Early Action Items (Year 1)

Before making investments in new transportation alternatives, the Quonset Business Park will need to focus on laying the groundwork for the successful promotion of transportation alternatives. As discussed in the **Section 5.6**, QDC can work with Park tenants to establish a Quonset Commute Committee that would provide businesses in Quonset an open forum to discuss commuting issues and come up with common solutions.

One of the key elements to promoting transportation alternatives is to ensure that businesses have in place incentives for commuters to use a mode other than driving alone to work. **Section 5.4** discusses low-cost strategies such as providing pre-tax transit benefits, commuting information, and guaranteed ride home services. Quonset should take full advantage of the start-up of a Rhode Island statewide vanpool program. This program, once launched, will greatly expand the utility of vanpools for QBP employees. The success of vanpools in the Park will rely in part on strong internal promotion of the service.

Identifying additional funding is essential to get any transit service off the group. RIPTA currently unable to operate the service within the constraints of its current budget and fleet.

Finally, As the flexible service will have to operate with varying patterns and a peak only schedule, outreach will be key in the time before launch to allow potential commuters to learn about the service and how they can use it. An education push should occur in the month prior to launch to build up support for the service.

6.1.2 Short-Term Phase (Years 1-3)

Though this report outlines a number of alternatives for providing flex service to Quonset, the Warwick Hub Flex Alternative 3 is the best option for short-term implementation. This service would operate through the Park to the Warwick Hub at CCRI, where commuters can transfer to express and local bus service. In order to overcome scheduling coordination issues during the first run of the day, that trip will begin at Kennedy Plaza. It is recommended that the service initially operate as a pilot with a two-year funding commitment.

The Flex route is designed to serve the first shift of major employers at the Park. The scheduling of the service is designed to provide the earliest feasible connections to the Park from Providence. While these services will provide a link for commuters arriving during most of AM shifts, it will be unable to serve second or third shift workers, along with commuters who must arrive at Quonset before 6:20 AM.

6.1.3 Mid-Term Phase (Years 3-5)

At the conclusion of the Two-Year pilot, if the Flex service is deemed a success, RIPTA, QDC, and local tenants should work together to identify permanent funding for the service. The continual operations of the Flex service will depend in large part on employers promoting the service to their workforce. RIPTA should pursue partnership opportunities with Park tenants, including the sale of transit passes to tenants of the Park.

During this phase, RIPTA will likely be underway or have completed the creation of a consolidated Warwick Hub at CCRI. This would be a good opportunity to implement schedule tweaks to other RIPTA services to maximize transfer opportunities to the Quonset flex circulator. RIPTA and QDC can also begin implementing more infrastructure to support the flex route, including a bus loop off of Roger Williams Way and improvements pedestrian infrastructure around stops.

The maturing of the transit, vanpool, and carpool market will also allow RIPTA to explore additional options to serve the Park. There is a growing movement to partner with Transportation Network Companies (TNCs) like Uber, Lyft, or Bridj. These services could provide enhanced travel options during the hours where operating RIPTA flex service into the Park is not feasible. The involvement of TNCs makes sense as a mid-term solution because Quonset is largely an untested market today for these kinds of services. Demonstrating travel demand in the first phase of the project will provide RIPTA leverage to attract TNC services into the Park.

6.1.4 Long-Term Solutions (Years 6-10)

If the Warwick Hub Flex Service Alternative 3 is successful and ridership exceeds the capacity of the service, it can be upgraded to the fixed-route option. This option would require four new 40-foot buses and would cost nearly \$1 million annually to operate (\$ 2016).

6.1.5 Other Long Term Investments (Years 10+)

In the long-term the Park may warrant a higher capacity mode like ferry service, however at this time demand does not warrant such a large investment.

6.2 COSTS AND FUNDING

6.2.1 Transit Services

Implementing the recommendations of the study will require funding from multiple sources. A flex route based on the Warwick Hub Alternative 3 option, is expected to cost approximately \$411,000 a year to operate. The service would require 2 additional vehicles at a capital cost of \$156,000 per vehicle. **Table 57** shows the cost of a flex route and fixed route option.

With the expiration of the Job Access and Reverse Commute (JARC) program, there are limited federal funding options for reverse commute services into Quonset. RIPTA could apply for Congestion Management and Air Quality (CMAQ) funding for pilot start-up and capital costs or use Federal Formula Funds for capital costs. CMAQ funding is currently allowed to fund up to three years of operations.¹⁸

Table 57: Service Implementation Plan

| Alternative | Trips | Annual Operating Cost | Vehicles Required |
|---------------------------------------|----------------------------|-----------------------|-------------------|
| Warwick Hub Flex Alternative 3 | 10 round trips, 3 one-way. | \$411,000 | 2 flex vehicles |
| Fixed-Route | 11 roundtrips | \$928,000 | 4 standard buses |

6.2.2 Infrastructure

The implementation of stop infrastructure at seven locations within Quonset would cost approximately \$1,250 per stop, including a concrete waiting area that meets ADA standards and signage, for a total cost of \$8,750 for bus stop infrastructure. These costs do not include any costs associated with building out additional sidewalk infrastructure or crosswalks. In some cases, sidewalks can be implemented through site plan requirements for new construction. As nearly all parcels in the Park feature the necessary right of way and easements for sidewalks, no land acquisition costs are expected.

6.2.3 TDM Services

Implementing a broader TDM program will require staff time and funding for marketing materials. The cost of TDM efforts depend on the scale of promotion. Existing RIPTA staff could absorb the work that goes into promoting transportation alternatives if they receive the strong and consistent cooperation of major park tenants to push out promotional materials and implement commuter incentives. As Rhode Island currently has a number of TDM resources, including a state-wide carpool database, Quonset could expand carpool and vanpool usage

¹⁸ Operating funds for the third year can be spent down over two more additional years. For example, \$90,000 in operating funds in year 3 can be spent as \$30,000 per year for years 3, 4, and 5.

without funding a new ride-match program. The State of Rhode Island is currently in the process developing a statewide vanpool program which will be eligible for federal funding. Once this program is in place, Quonset commuters would be an ideal group to target with the program.

6.2.4 Partnership with a Transportation Network Company

Transportation Network Companies (TNC) like Uber, Lyft, and Bridj are emerging partners for meeting transportation needs that traditional public transit struggles to serve. To date there has been limited private/public partnership with these organizations. A few transit agencies have partnered with TNC's in a financial relationship. Currently there are no known federal or state revenue sources that could subsidize a partnership program, however depending on the judgement of RIPTA's legal counsel, the agency may be able to directly use its own funding to support a limited TNC partnership serving Quonset during off-peak hours.

Based on the proportion of Quonset employees traveling during off-peak hours, it is estimated that a TNC service could attract approximately 90 users a day with a non-stop service to Kennedy Plaza. If RIPTA subsidized the service at \$3.06 per trip, the current average subsidy per unlinked bus trip on the network,¹⁹ the average user cost per trip would range from \$5 to \$8 dollars based on vehicle occupancy at the current rates offered by Uber and Lyft. At these sketch level estimates, a modest partnership with a TNC provider would cost around \$75,000 a year to subsidize.

Table 58: Estimated Unit Cost of TNC Car Service From Quonset to Kennedy Plaza, Providence

| Occupancy | Total Cost Per Passenger | Subsidy Per Vehicle Trip | Fare Per Passenger |
|--------------|--------------------------|--------------------------|--------------------|
| 3 Passengers | \$11 | \$9.18 | \$8.00 |
| 4 Passengers | \$8.35 | \$12.24 | \$5.20 |

6.3 RELATED CHANGES

6.3.1 Implementation of a Warwick Hub

While all the analysis in this report is based on the existing transit system, RIPTA is currently studying the feasibility of consolidating service in Warwick to operate at one unified hub, instead of splitting service between CCRI and the Warwick Mall. Creating a unified hub would greatly enhance the transfer opportunities available to riders using the Flex service to Quonset. Once the hub is implemented, Quonset commuters could transfer to the Flex from the 13, 22, and 30, in addition to the 66 and 21 which currently provide service.

6.3.2 Schedule and Span Adjustments

Transit access to Quonset will depend largely on riders transferring at Kennedy Plaza to either the Flex to Quonset or Route 66 to CCRI. Shifts starting before 7:30 AM are challenging to serve by transit as few early morning routes reach Kennedy Plaza in time for a transfer to Quonset-bound service. Adjusting the schedule and span of routes to arrive at Kennedy Plaza by 5:30 AM for the 6:30 AM shift, and 5:55 AM for the 7:00 AM shift, will provide ample

¹⁹ National Transit Database, 2014 System Profile (Most recent year available)

time for transfers and travel to the Park. The routes that show the greatest promise in enhancing Quonset ridership include: Routes 17, 18, 21, 22, 30, and 31.

7. Conclusion

Quonset Business Park faces the commuting challenges quintessential to large suburban employment centers. Located outside of the urban core, the Park draws commuters coming from all around Rhode Island, as well as neighboring states like Connecticut and Massachusetts. The defuse nature of these commutes, coupled with the varying shift times of the Park's workforce, makes Quonset a challenge to serve with traditional transit.

This market study has identified targeted opportunities to provide transportation alternatives for businesses in the Park. A proposed Flex route service will allow commuters to reach the Park from Warwick (and Providence with a transfer), offering a more convenient connection than can be currently offered by Route 14 at Gate Road. An expanded TDM program, including promotion of vanpool and carpool options, will improve travel options for those commuters who work shift times poorly served by transit or commute from locations without adequate transit service. Innovations like a partnership with a Transportation Network Company would allow Quonset to meet additional commuter needs.

Due to the land use within the Park and distribution of employee home locations, driving will continue to be the dominant mode of commuting to the Quonset Business Park. Nonetheless, providing adequate transportation alternatives is an important component to ensuring the vitality of the Quonset Business Park and its tenants for years to come. As the Park grows, the need for additional travel options becomes more apparent. From our discussions with local businesses, the lack of public transportation access reduces the ability of companies to recruit and retain employees. Investing in transportation alternatives will help secure Quonset's future as a major economic hub for the State of Rhode Island.

Appendix

RIDERSHIP CALCULATIONS

In order to determine the ideal service plan for the two Flex alternatives examined in greater detail, an analysis of potential transit trips between the Quonset transit market and the Quonset Business Park was conducted using the existing RIPTA and MBTA system in conjunction with the flex service improvements. This involved a three-step process:

1. Identify the market.
2. Identify the “path” from the market to the flex service.
3. Estimate potential ridership by shift start time from market areas to Quonset using the Transit Propensity Analysis and estimated travel time.

Each of these steps is described in detail in the following sections.

Identify the Market

The market for transit trips to Quonset is summarized in the Transit Market section. Overall the highest market potential for transit trips to Quonset can be found within the communities of Providence, Pawtucket, Central Falls, Cranston, Warwick, West Warwick, Coventry, East Greenwich, and North Kingstown.

Path Between the Market and Quonset

The “path” between the market and Quonset is defined as the transit routes that employees would use to get from their homes to their jobs in Quonset.

Flex Circulator to Wickford Junction

For the majority of trips in this option, passengers would use Route 66 to connect from Wickford Junction to Kennedy Plaza in Providence, where connections to numerous other RIPTA routes can be made to reach the market. To reach all market areas, the majority of passengers would have to make two transfers: from the route that connects to their neighborhood (“home route”) to Route 66 at Kennedy Plaza, and then from Route 66 to the flex service at Wickford Junction. In some cases, passengers from certain market areas could also use the MBTA Commuter Rail train to reach Wickford Junction, or transfer to Route 66 at the CCRI Warwick campus instead of Kennedy Plaza. Employees living in Davisville and Downtown East Greenwich would be able to transfer directly to the flex service from Route 14 at Gate Road.

Table 59 summarizes the universe of existing routes that currently connect market areas to Route 66 or to the MBTA Commuter Rail service at Providence Station and therefore could be used to make connections to the flex service via Wickford Junction. These routes are illustrated in **Figure 61**.

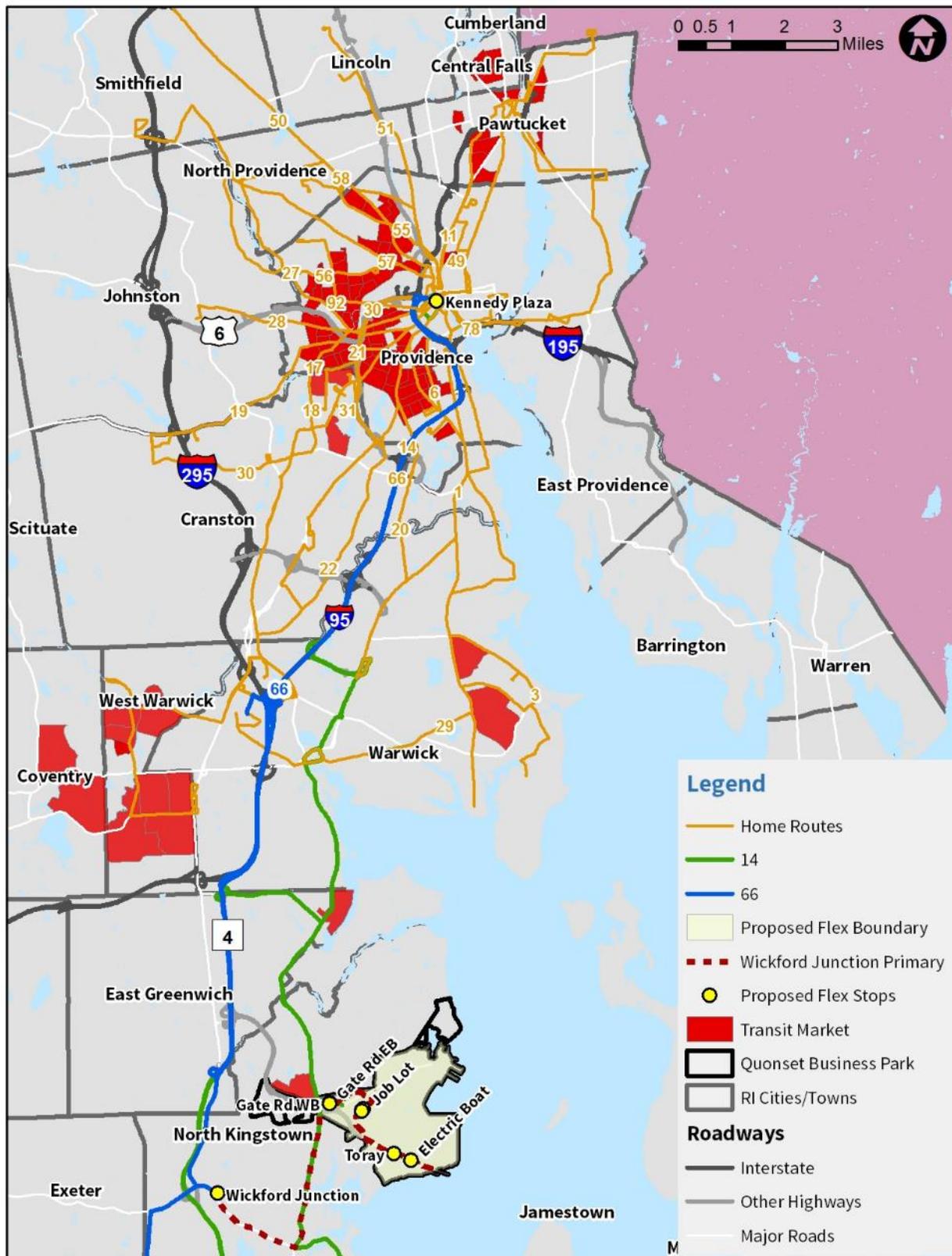
Table 59: Routes Connecting from the Transit Market to Route 66 and/or Providence Station

| Home Route | Name | Market Area Served | Connects To: |
|---------------|--------------------------------|--|------------------------------------|
| R-Line | Broad/North Main | Pawtucket, Mt Hope, South Providence | Route 66 at Kennedy Plaza & Train |
| 1 | Eddy/Hope/Benefit | Pawtucket, Mt Hope, South Providence | Route 66 at Kennedy Plaza |
| 3 | Warwick Ave | Shawomet/Lockwood, Hoxsie | Route 66 at Kennedy Plaza |
| 6 | Prairie/Zoo | South Providence | Route 66 at Kennedy Plaza |
| 14 | West Bay | Davisville, East Greenwich | Flex at Gate Road |
| 17 | Dyer/Pocasset | Federal Hill, West End, Silver Lake, Laurel Hill | Route 66 at Kennedy Plaza |
| 18 | Union Ave | Federal Hill, West End | Route 66 at Kennedy Plaza |
| 19 | Plainfield/Westminster | Federal Hill, West End, Silver Lake | Route 66 at Kennedy Plaza |
| 20 | Elmwood Ave | Elmwood | Route 66 at Kennedy Plaza |
| 21 | Reservoir / Garden City / CCRI | Stadium | Route 66 at Kennedy Plaza and CCRI |
| 22 | Pontiac Ave | Elmwood, West End, Stadium | Route 66 at Kennedy Plaza |
| 27 | Broadway/Manton | Federal Hill, Olneyville | Route 66 at Kennedy Plaza |
| 28 | Broadway/Hartford | Federal Hill, Olneyville, Hartford | Route 66 at Kennedy Plaza |
| 29 | Kent County | Arctic, Crompton, Shawomet/Lockwood | Route 66 at CCRI |
| 30 | Arlington / Oaklawn | Laurel Hill, Stadium | Route 66 at Kennedy Plaza |
| 31 | Cranston St | West End | Route 66 at Kennedy Plaza |
| 49 | Camp St/Miriam Hospital | Mt Hope | Route 66 at Kennedy Plaza |
| 50 | Douglas Ave/Bryant University | Wanskuck, Smith Hill | Route 66 at Kennedy Plaza |
| 51 | Charles St/Twin River/CCRI | Smith Hill | Route 66 at Kennedy Plaza |
| 55 | Admiral/Providence College | Wanskuck, Smith Hill | Route 66 at Kennedy Plaza |

| Home Route | Name | Market Area Served | Connects To: |
|------------|-----------------------------------|---------------------------------------|---------------------------|
| 56 | Chalkstone Ave | Smith Hill, Mt Pleasant | Route 66 at Kennedy Plaza |
| 57 | Smith St | Smith Hill, Elmhurst | Route 66 at Kennedy Plaza |
| 58 | Mineral Spring/North Providence | Wanskuck | Route 66 at Kennedy Plaza |
| 78 | Beverage Hill/Newport Ave | Eastern Pawtucket (Memorial Hospital) | Route 66 at Kennedy Plaza |
| 92 | RI College/Federal Hill/East Side | Mt Pleasant, Federal Hill | Route 66 at Kennedy Plaza |
| 242 | West Warwick / Coventry Flex | Arctic, Crompton, Anthony | Route 66 at CCRI |

A matrix of travel times between home census block groups, Kennedy Plaza, and Wickford Junction was created using the home routes identified for Quonset transit commuters. These trip times included both route runtimes and transfer times. Routes 6, 49, and 58 were eliminated as home routes in this process since their spans do not provide enough time to reach Quonset by the start of any of the morning shifts. It is anticipated that the majority of employees from the market areas of West Warwick and Coventry would use Route 242 to access CCRI, however it is difficult to forecast a travel time for this option since Route 242 is a flex service itself. Finally, it is anticipated that employees from the Warwick market would likely use Route 29 instead of Route 3, and thus Route 3 was also excluded. While Route 3 provides more frequent service, it is highly unlikely that any employees would use this considering they would have to ride all the way to Kennedy Plaza only to backtrack to Wickford Junction via Route 66.

Figure 60: "Home" Routes for Employees Using the Wickford Junction Flex Service



Flex Circulator to the Warwick Hub

The “path” between the market and Quonset is defined as the transit routes that employees would use to get from their homes to their jobs in Quonset. For the majority of trips in this option, passengers would use Routes 21 or 66 to connect from CCRI in Warwick to Kennedy Plaza in Providence, where connections to numerous other RIPTA routes can be made to reach the market. To reach all market areas, the majority of passengers would have to make two transfers: from the route that connects to their neighborhood (“home route”) to Routes 21 or 66 at Kennedy Plaza, and then from Routes 21 or 66 to the flex service at CCRI. In some cases, passengers from certain market areas could also transfer directly to the flex service at CCRI instead of Kennedy Plaza. Employees living in Davisville and Downtown East Greenwich would be able to transfer directly to the flex service from Route 14 at Gate Road.

Table 60 summarizes the universe of existing routes that currently connect market areas to Routes 21, 66, or directly to CCRI and therefore could be used to make connections to the flex service at CCRI. These routes are illustrated in Figure 61

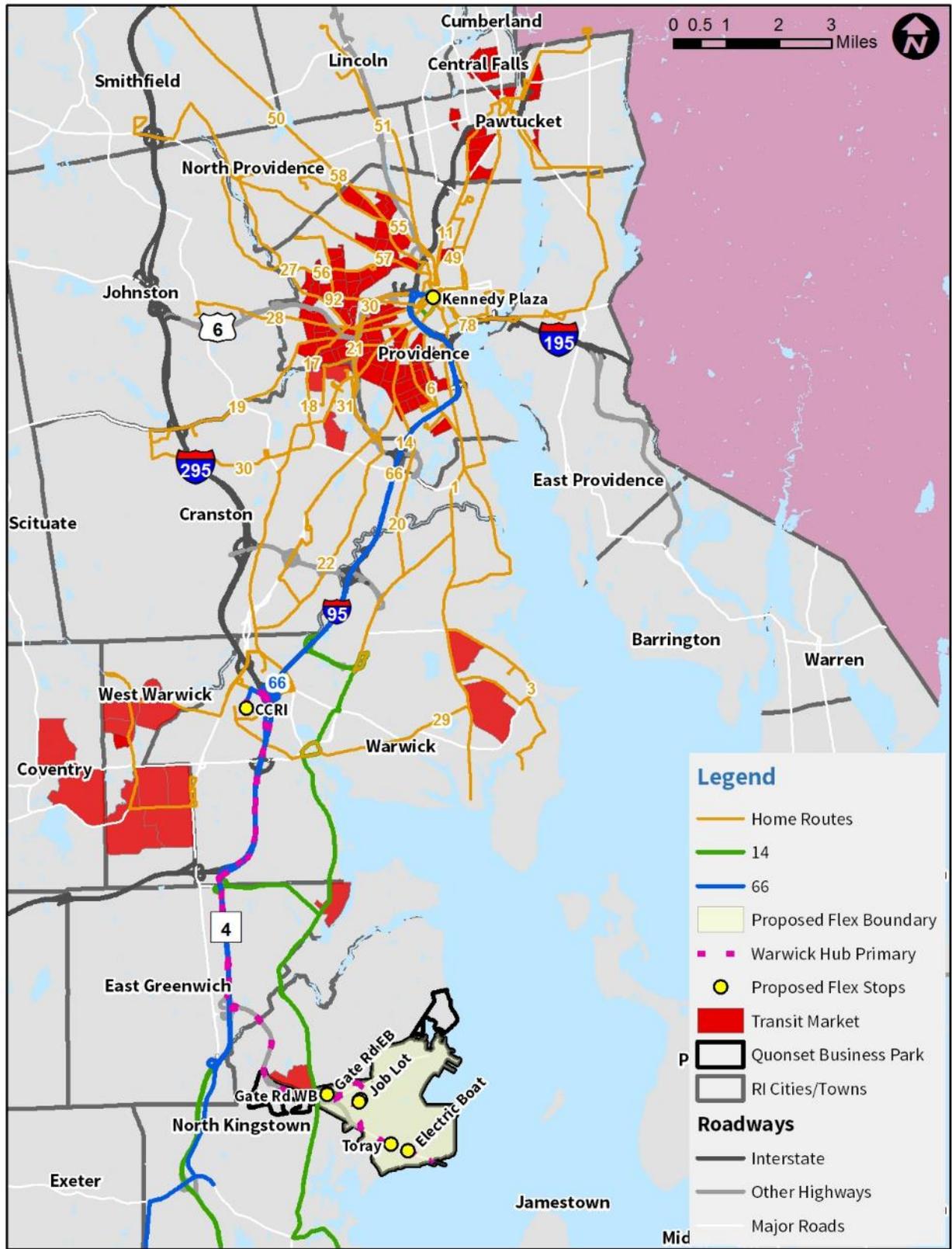
Table 60: Routes Connecting from the Transit Market to Routes 21, 66, or CCRI

| Home Route | Name | Market Area Served | Connects To: |
|---------------|--------------------------------|--|------------------------------------|
| R-Line | Broad/North Main | Pawtucket, Mt Hope, South Providence | Route 66 at Kennedy Plaza & Train |
| 1 | Eddy/Hope/Benefit | Pawtucket, Mt Hope, South Providence | Route 66 at Kennedy Plaza |
| 3 | Warwick Ave | Shawomet/Lockwood, Hoxsie | Route 66 at Kennedy Plaza |
| 6 | Prairie/Zoo | South Providence | Route 66 at Kennedy Plaza |
| 14 | West Bay | Davisville, East Greenwich | Flex at Gate Road |
| 17 | Dyer/Pocasset | Federal Hill, West End, Silver Lake, Laurel Hill | Route 66 at Kennedy Plaza |
| 18 | Union Ave | Federal Hill, West End | Route 66 at Kennedy Plaza |
| 19 | Plainfield/Westminster | Federal Hill, West End, Silver Lake | Route 66 at Kennedy Plaza |
| 20 | Elmwood Ave | Elmwood | Route 66 at Kennedy Plaza |
| 21 | Reservoir / Garden City / CCRI | Stadium | Route 66 at Kennedy Plaza and CCRI |
| 22 | Pontiac Ave | Elmwood, West End, Stadium | Route 66 at Kennedy Plaza |
| 27 | Broadway/Manton | Federal Hill, Olneyville | Route 66 at Kennedy Plaza |

| Home Route | Name | Market Area Served | Connects To: |
|------------|-----------------------------------|---------------------------------------|---------------------------|
| 28 | Broadway/Hartford | Federal Hill, Olneyville, Hartford | Route 66 at Kennedy Plaza |
| 29 | Kent County | Arctic, Crompton, Shawomet/Lockwood | Route 66 at CCRI |
| 30 | Arlington / Oaklawn | Laurel Hill, Stadium | Route 66 at Kennedy Plaza |
| 31 | Cranston St | West End | Route 66 at Kennedy Plaza |
| 49 | Camp St/Miriam Hospital | Mt Hope | Route 66 at Kennedy Plaza |
| 50 | Douglas Ave/Bryant University | Wanskuck, Smith Hill | Route 66 at Kennedy Plaza |
| 51 | Charles St/Twin River/CCRI | Smith Hill | Route 66 at Kennedy Plaza |
| 55 | Admiral/Providence College | Wanskuck, Smith Hill | Route 66 at Kennedy Plaza |
| 56 | Chalkstone Ave | Smith Hill, Mt Pleasant | Route 66 at Kennedy Plaza |
| 57 | Smith St | Smith Hill, Elmhurst | Route 66 at Kennedy Plaza |
| 58 | Mineral Spring/North Providence | Wanskuck | Route 66 at Kennedy Plaza |
| 78 | Beverage Hill/Newport Ave | Eastern Pawtucket (Memorial Hospital) | Route 66 at Kennedy Plaza |
| 92 | RI College/Federal Hill/East Side | Mt Pleasant, Federal Hill | Route 66 at Kennedy Plaza |
| 242 | West Warwick / Coventry Flex | Arctic, Crompton, Anthony | Route 66 at CCRI |

A matrix of travel times between home census block groups, Kennedy Plaza, and CCRI was created with the home routes identified for Quonset transit commuters. These trip times included both route runtimes and transfer times. Routes 6, 49, and 58 were eliminated as home routes in this process since their spans do not provide enough time to reach Quonset by the start of any of the morning shifts. Route 29 was also eliminated because its long headways create undesirable transfer times in excess of 45 minutes. It is anticipated that the majority of employees from the market areas of West Warwick and Coventry would use Route 242 to access CCRI, however it is difficult to forecast a travel time for this option since Route 242 is a flex service itself. Finally, it is anticipated that employees from the Warwick market would likely use Route 29 instead of Route 3, and thus Route 3 was also excluded.

Figure 61: "Home" Routes for Employees Using the Warwick Hub Flex Service



Ridership Estimate by Home Route and Shift Start Time

Ridership for the flex alternatives was estimated based on building a realistic schedule of transit travel routes to Quonset. The analysis started by estimating the base ridership of each census block group in the market as identified in this studies Transit Market Analysis. Each census block group was assigned a transit mode split based on its transit propensity score. The number of commuters to Quonset from each block group was then multiplied by its respective transit mode share. The final transit ridership from a block group to Quonset was decayed based on whether there was a feasible transit route for a commuter to use and the overall travel time. It was assumed that trips taking 48 minutes or less would have no reduction in ridership, with the mode split to transit decaying along a curve until 120 minutes, when we assume no transit commuters to Quonset.

Ridership was estimated only for inbound trips during the AM Peak, with the assumption that all transit commuters to Quonset in the morning will travel roundtrip by transit. Second and third shift commutes are not part of the ridership estimate as their shifts largely end too late to take advantage of the RIPTA bus network. Even for AM shift times, many otherwise potential transit commuters cannot reach the Park because they must leave home before the routes they would use begin operation.

Several areas of the RIPTA service area that were not initially identified as being a part of the Quonset transit market were predicted to produce transit ridership to Quonset through this process. This is due to the fact that they are served by “home” routes connecting to the initially-identified market areas and likely have market characteristics that fell just below the thresholds for inclusion in the original market.