BASELINE CONDITIONS & SYSTEM PERFORMANCE REPORT

Rhode Island Moving Forward

Long-Range Transportation Plan

MOVING FORWARD RI 2040

PREPARED FOR

Statewide Planning Program
Division of Planning
Rhode Island Department of Administration

March 2018

Table of Contents

List of Tables

This page intentionally left blank.

List of Figures

1

Introduction

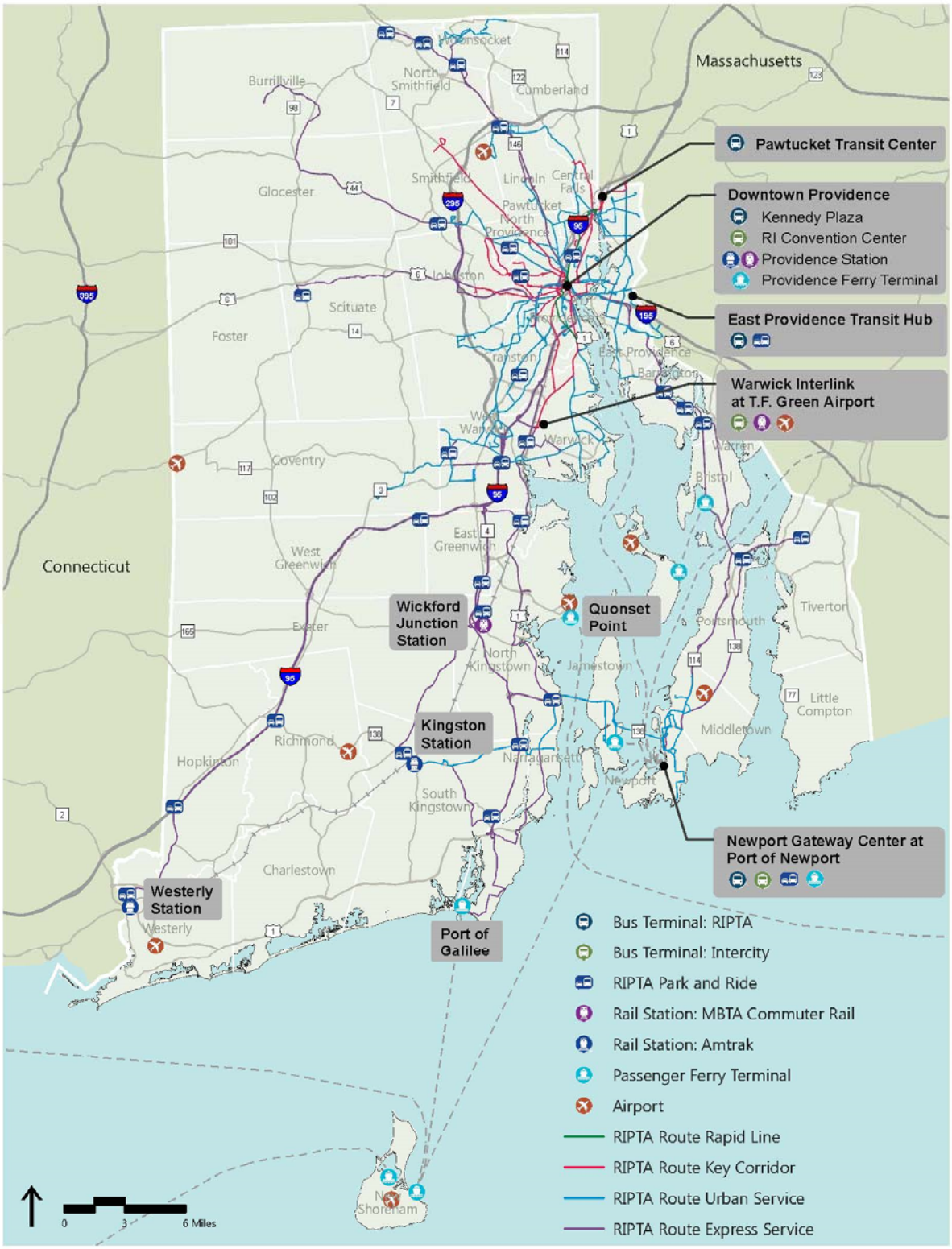
The purpose of this Baseline Conditions Report is to establish a clear understanding of the current state and operation of the intermodal transportation network in Rhode Island. The Report is intended ascertain current needs, and to assist decision making to plan policies, strategies and investments to the transportation system. The Report also forms a basis for comparison of existing conditions with future changes considered in subsequent deliverables. The measures introduced in this Report will be important markers to effectively gauge progress toward transportation goals established in the subsequent LRTP.

This Baseline Conditions & System Performance Report is one of several foundation documents for the RI Moving Forward 2040 Long-Range Transportation Plan (LRTP). Much of the information presented in this report comes from transportation departments and agencies around the state and Rhode Island's continual transportation planning and performance monitoring efforts. Those reports provide extensive information on each topic. A *Compendium of Plans Review* was completed

as a companion report to this study. The Review summarizes other planning efforts and documents that contribute to the RI Moving Forward 2040 LRTP effort.

Figure 1-1 illustrates the Rhode Island transportation network, including key intermodal hubs. Figure 1-2 is a summary factsheet of the elements of that statewide network. The chapters that follow explore the infrastructure and system performance of the individual transportation systems, including roadways and bridges, public transportation, the bicycle and pedestrian network, air transportation, and freight.

Figure 1-1 Rhode Island Statewide Transportation Network



Transportation by the numbers

On-Road

6,586 road miles
11.6 bike lane miles
0.8 transit lane miles
35 cities/towns served by RIPTA

Off-Road

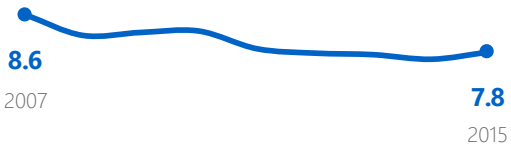
67 miles of shared-use paths
50 miles of passenger rail
129 miles of freight rail

Bridge

1,197 bridges
181 structurally deficient bridges (2016)
29% of all bridges in poor condition

On-Road Travel

7.8 billion annual vehicle miles traveled (2015)
▼ **9%** reduction since 2007



Safety

55 five-year average crashes (2012-2016)
▼ **20%** reduction since 2012

Intermodal Connections

3 MBTA commuter rail stations
3 Amtrak rail stations
55 bus routes
28 park n' ride facilities

1 international airport (TF Green)
9 marine passenger ports
5 marine commercial ports

Transportation by the numbers

Regional Travel

33 cities accessible via direct flights

8 cities directly accessible by intercity bus

4 cities accessible by ferry

2 rail services providing access to the northeast corridor

Travel Patterns

24.4 minute average commute to work (all modes)

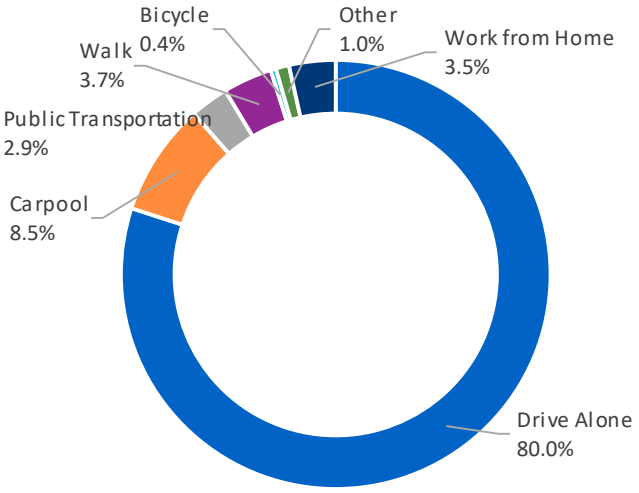
0.4 million annual MBTA commuter rail boardings

16.2 million annual RIPTA boardings

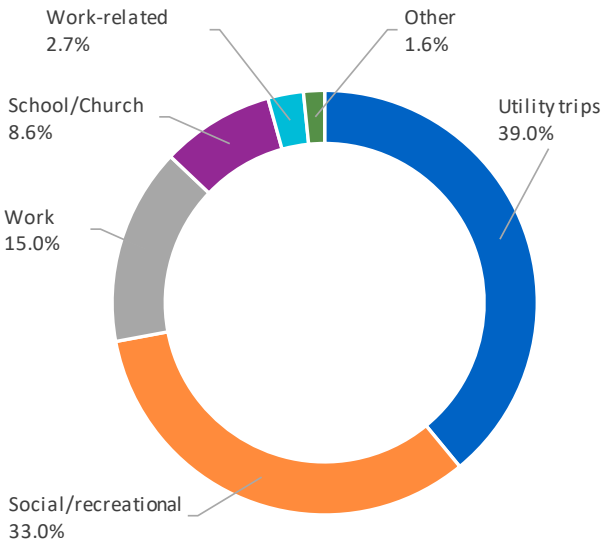
1.8 million annual airline boardings (TF Green, 2017)

9.6 million annual fixed-route vechicle miles (RIPTA)

How We Get Around



Why We Travel



How We Get Around—US Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

Why We Travel—US Department of Transportation 2009 National Household Travel Survey.

This page intentionally left blank.

2

Roadways and Bridges

Roadways and bridges remain the largest components of Rhode Island's surface transportation network — in terms of quantity of assets, cost to operate, maintain, and repair, and the number of users. There are more than 6,500 miles of roads and 1,197 roadway bridges in the state.

This section will describe the roadway and bridge elements of the surface transportation network, including asset inventory, relative facility conditions, how those conditions impact performance, and provide some background on how those systems are performing. Key performance indicators such as pavement and bridge condition, mode share, and congestion measures will be summarized.

2.1 Roadways

The state road network totals 6,586 miles. As shown in Table 2-1, about 10 percent of the roadway miles are among National Highway System roadways. As depicted on Figure 2-1, there are several different classifications related to roadway use and purpose. In addition to local streets and interstate highways, there are arterial and collector roads. Local streets account for the almost 70 percent of roadway miles.

The National Highway System (NHS) is a network of strategic highways across the U.S. The NHS includes Interstate Highways and other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transportation facilities.

Table 2-1 Roadways by Functional Classification

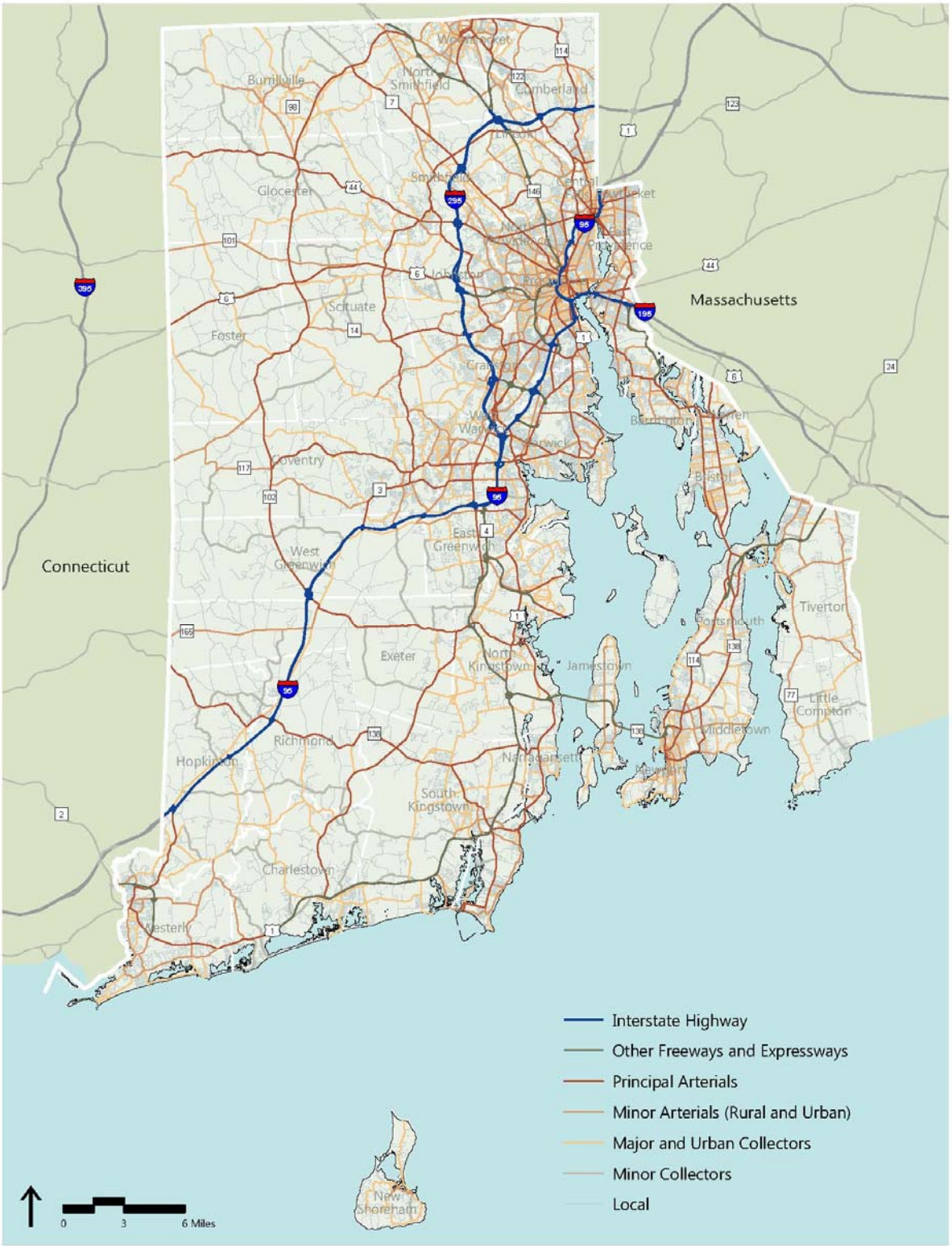
Interstate highways account for less than 2 percent of Rhode Island's roadway miles, but handle more than 70 percent of vehicle miles traveled.

Roadway Type	Roadway Miles	Percentage
National Highway System (NHS) Roadways		
Interstate Highways	90	1.4%
Other Freeways & Highways	125	1.9%
Other Principal Arterial Roads	436	6.6%
Total NHS		9.9%
Non-National Highway System Roadways		
Minor Arterial	426	6.5%
Major Collector	724	11.0%
Minor Collector	183	2.8%
Local Streets	4,602	69.9%
Total Non-NHS		**90.1%**
Total (NHS and Non-NHS)	**6,586**	**100.0%**

Source: Rhode Island Dept. of Administration. 2016. "RIDOT Roads (2016)." Rhode Island Geographic Information System, Division of Statewide Planning. URL: www.rigis.org/datasets/ridot-roads-2016. 23 Feb 2016.
Rhode Island Dept. of Administration. 2014. "Technical Paper 165, The State of Rhode Island Highway Functional Classification System." Division of Statewide Planning.

The primary NHS corridor is Interstate 95. It is a designated High Priority Corridor in the NHS and links Rhode Island to Massachusetts, Connecticut and the NHS throughout the country. I-95 connects with I-295, a western bypass highway around Providence, and with I-195, which provides access to southeastern Massachusetts and Cape Cod. Other important regional connections are via Route 146 with access to Worcester, Massachusetts, and Route 6, which is an alternative route around Providence.

Figure 2-1 Major Roadways



2.1.1.1 Roadway Conditions

Pavement condition is an important factor in the overall utility of a roadway. Poor condition pavements can result in reduced speeds, damage to vehicles, crashes and related impacts to the Rhode Island economy. Conversely, a well-maintained roadway system with high-quality pavement condition can be a benefit to the economy. The Rhode Island Department of Transportation (RIDOT) road network totals 1,315 miles. RIDOT measures the condition of the roads using a Pavement Structural Health Index (PSHI) that is calculated from pavement structure condition, rutting, and cracking field measurements. The PSHI categorizes roads into five conditions: failed, poor, fair, good, and excellent. A measurement calculated to be between zero and 60 receives a failed condition, 60 to 70 for poor, 70 to 80 for fair, 80 to 90 for good, and 90 to 100 for excellent. The grading of pavement condition allows for a more strategic use of maintenance funding geared toward improving key needs in the roadway network.

Table 2-2 shows roadway pavement condition for all RIDOT roads. Sixty percent of RIDOT's roads are categorized as having "good" or "excellent" pavement condition while six percent are categorized as "failed". Overall, 40 percent of roads fall within the "fair" to "failed" end of the spectrum.

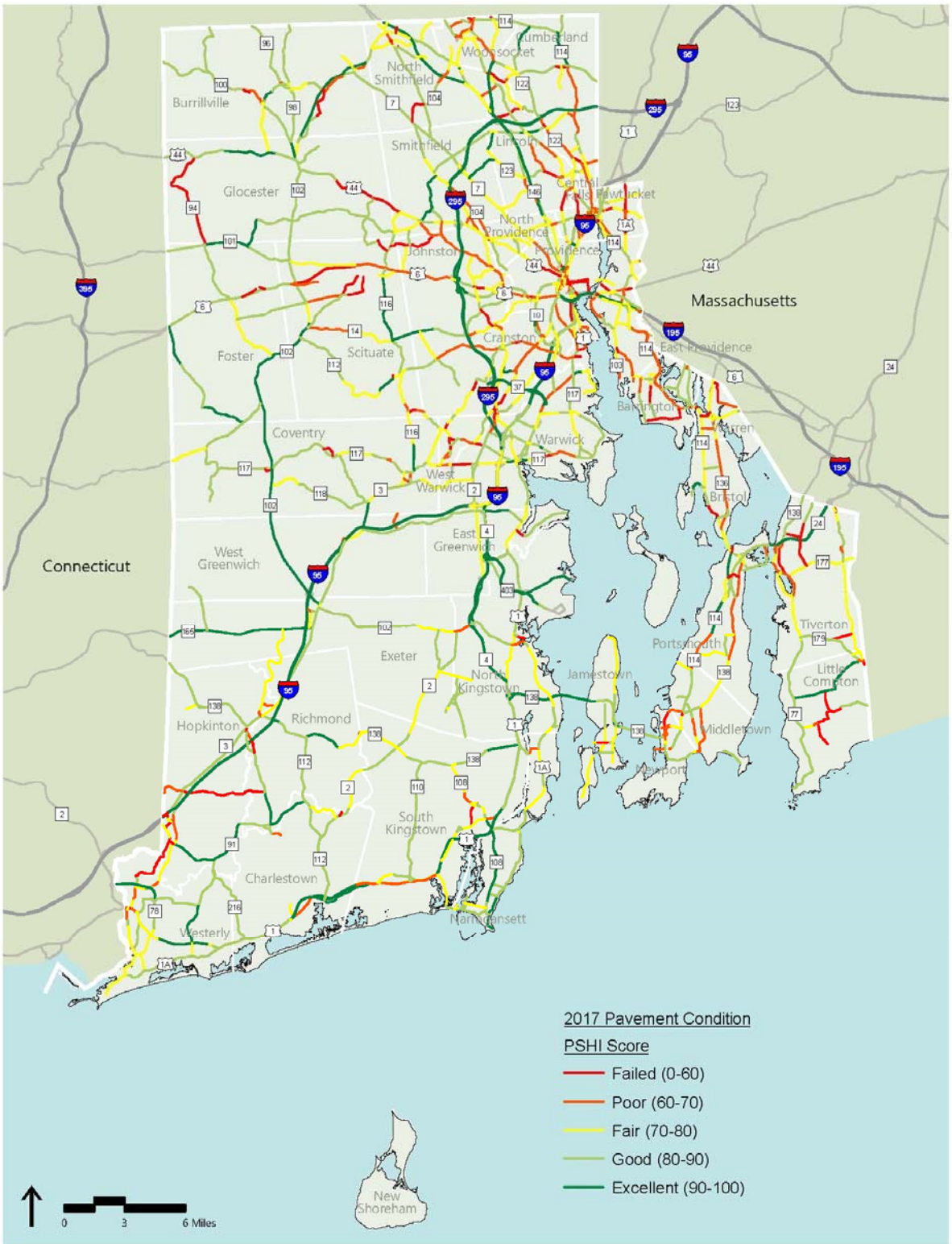
Table 2-2 RIDOT Pavement Condition (2017)

Condition	Pavement Structure Health Index	RIDOT Roadway Miles	Percent of Total
Failed	0-60	82	6%
Poor	60-70	141	11%
Fair	70-80	303	23%
Good	80-90	478	36%
Excellent	90-100	311	24%
Total	-	1,315	

Source: Rhode Island Department of Transportation, 2017. Rhode Island Pavement Condition Database. Data received 11 December 2017.

Figure 2-2 shows that Rhode Island's southern and western RIDOT roads are in better condition than RIDOT roads to the north and east. City areas like Providence are home to many "failed" condition roads due to the increased traffic volumes in the city. These northern and eastern portions of the state also tend to have older roadways and a greater proportion of the overall roadway network in Rhode Island. Figure 2-2 shows that the majority of I-95 and I-295 have a measured PSHI score between 90 and 100 indicating that the routes are in "excellent" condition. These pavement condition PSHI scores are only for RIDOT roadways and do not account for locally-owned roadways.

Figure 2-2 Rhode Island Pavement Condition Map, RIDOT Roadways (2017)



Source: Rhode Island Department of Transportation, 2017. Rhode Island Pavement Condition Database. Data received 11 December 2017.

2.2 Bridges

There are 1,197 bridges in Rhode Island, of which 776 have a bridge span of more than 20 feet, which is the threshold for being listed on the Federal Highway Administration National Bridge Inventory (NBI). Most Rhode Island bridges are owned by the state. Of the 776 bridges in the NBI, 614 are state-owned. Of the 421 smaller bridges (less than 20 feet), not in the NBI, 314 are state-owned.

Pell Bridge, Newport

Most state-owned bridges are owned by RIDOT. The Rhode Island Turnpike and Bridge Authority operates four of the state's largest bridges—the Mount Hope Bridge and Sakonnet River Bridge at the northern end of Aquidneck Island, Pell Bridge at the southern end of Aquidneck Island, and the Jamestown Verrazano bridge between Newport and Jamestown. Table 2-3 shows bridge ownership in Rhode Island.

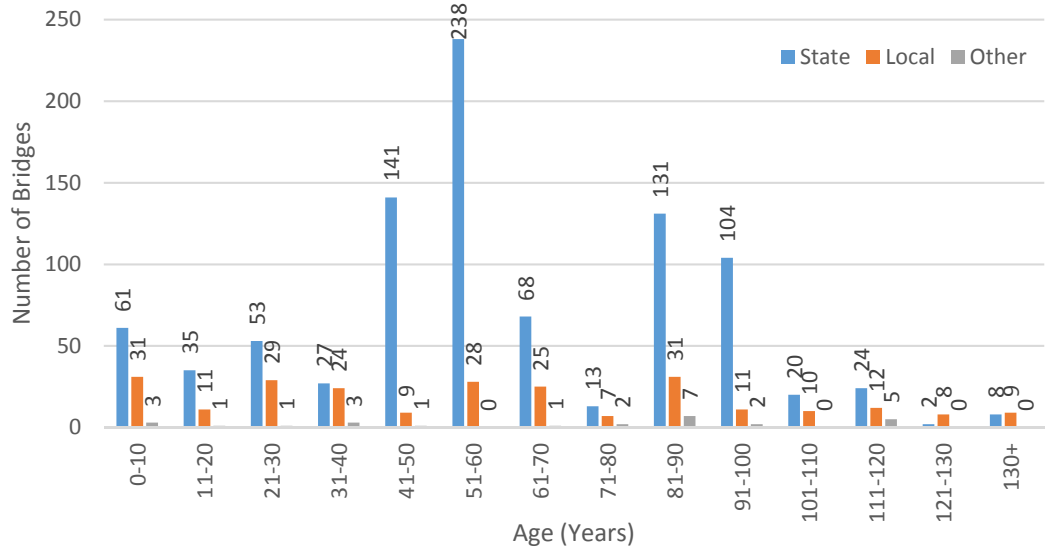
Table 2-3 Rhode Island Bridge Inventory and Ownership (2016)

Bridge Ownership	State-Owned	Town/Other-Owned	Total
NBI: Span > 20 feet	614	162	776
Non-NBI: Span < 20 feet	314	107	421
	928	269	1,197

Source: Rhode Island Department of Transportation, 2016. Rhode Island Bridge Database. Data current as of 31 December 2016.

The age of bridges in Rhode Island ranges from 1 year to 207 years old. Figure 2-3 illustrates the distribution of bridge age. The average bridge age is 73 years. The median age is 54 years.

Figure 2-3 Age of Bridges in Rhode Island by Ownership



Source: Rhode Island Department of Transportation, 2016. Rhode Island Bridge Database. Data current as of 31 December 2016.

2.2.1 Bridge Conditions

Bridges in the National Bridge Inventory are inspected at least once every two years. The inspection includes a rating of various bridge structural elements, comprised of the deck, superstructure, and substructure, based on Federal Highway Administration standards. A "good" condition bridge has zero to minor deterioration of structural elements. A "fair" bridge has sound structural elements but some slight deficiencies. A "poor" bridge has advanced deficiencies. Table 2-4 shows that there are 225 bridges in poor condition. These account for 29 percent of all Rhode Island bridges. This is the highest percentage among all 50 states.

Table 2-4 Bridge Condition (NBI Bridges)

Ownership	Good	Fair	Poor
State Owned	88 (14%)	348 (57%)	178 (29%)
Local/Other Owned	33 (20%)	82 (51%)	47 (29%)
Total	**121 (16%)**	**430 (55%)**	**225 (29%)**
National Bridge Inventory (overall)	**291,412 (47%)**	**274,306 (45%)**	**48,559 (8%)**

Source: Rhode Island Department of Transportation, 2016. Rhode Island Bridge Database. Data current as of 31 December 2016.
U.S. Dept. of Transportation. 2016. "Highway Bridge Condition by Highway System, 2016." Federal Highway Administration. URL: https://www.fhwa.dot.gov/bridge/nbi/no10/condition16.cfm. Accessed March 2018.

Until recently, the inspection reporting for the National Bridge Inventory categorized bridges as "structurally deficient" and "functionally obsolete". Structurally deficient bridges are generally those with "poor" scores among some of the bridge

component ratings. Functionally obsolete bridges are those that do not meet current geometric design standards, such as for vertical clearance, but otherwise are performing satisfactorily.

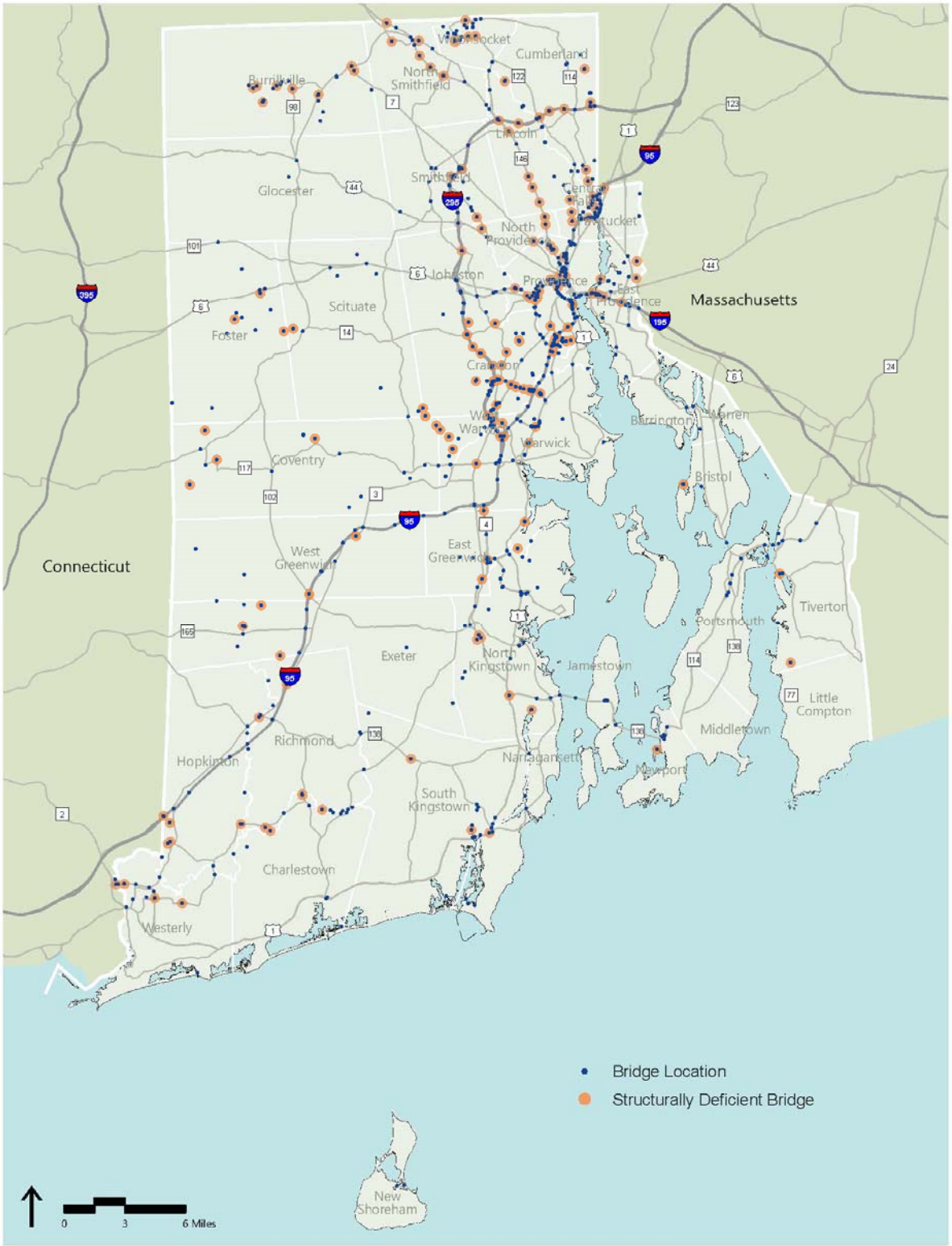
Table 2-5 presents the number of structurally deficient bridges and Figure 2-4 shows their location. Table 2-6 discusses the most traveled structurally deficient bridges in the state. Many of the busiest facilities are located on Interstate 95 in the vicinity of Providence.

Table 2-5 Bridge Rating (NBI Bridges)

Structurally Deficient	State-Owned	Town/Other-Owned	Total
Structurally Deficient	140	41	181
Functionally Obsolete	171	41	212

Source: Rhode Island Department of Transportation, 2016. Rhode Island Bridge Database. Data current as of 31 December 2016.

Figure 2-4 Structurally Deficient Bridges (National Bridge Inventory, 2016)



Source: Rhode Island Department of Transportation, 2016. Rhode Island Bridge Database. Data current as of 31 December 2016.

Table 2-6 Most Traveled Structurally Deficient Bridges in Rhode Island

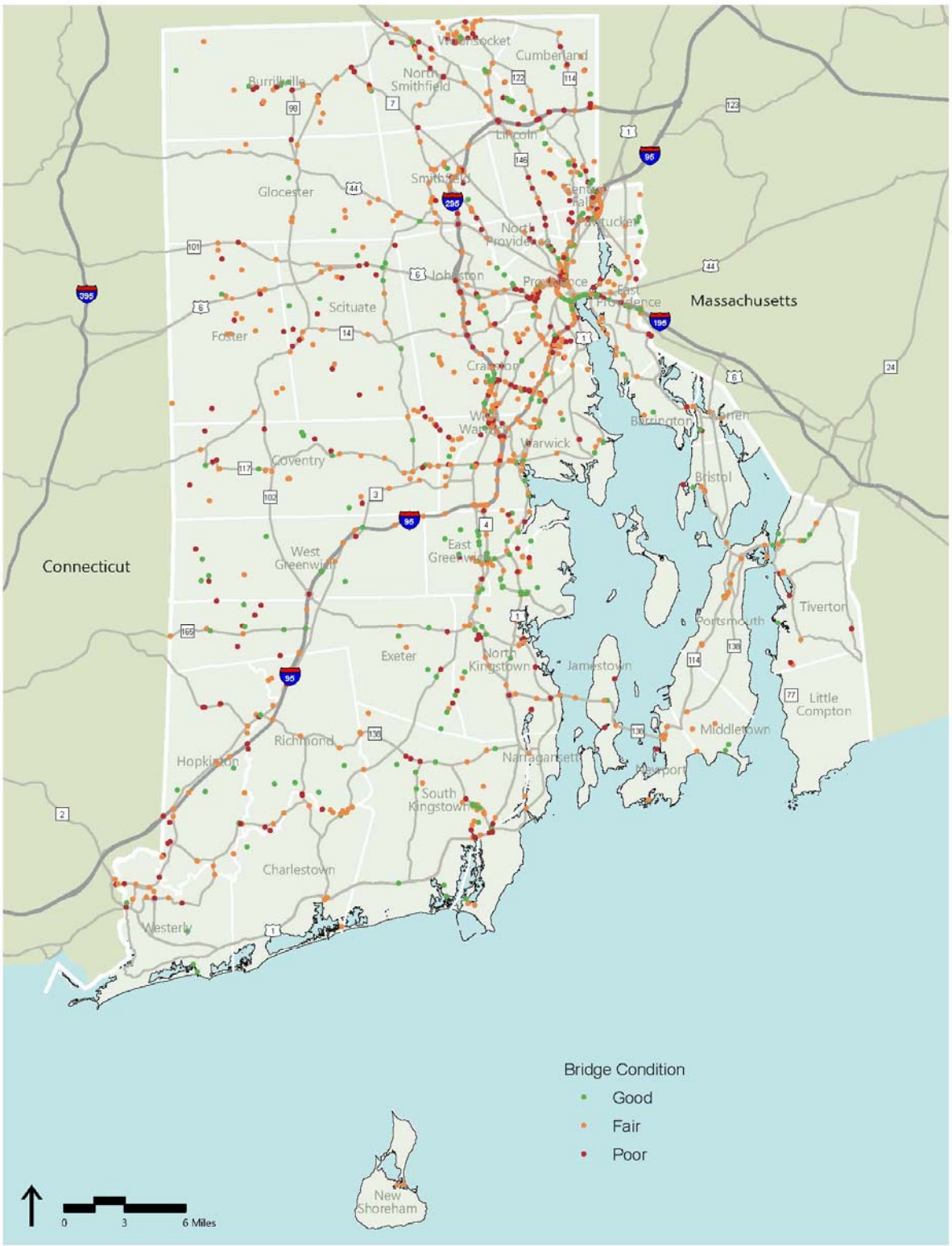
Location	County	Year Built	Daily Crossings
I-95 NB & SB over US 1 Elmwood Ave, 0.6 mi N of Junction RI 10	Providence	1965	186,500
I-95 NB & SB over Amtrak at 1.5 mi S of Junction US 1A	Providence	1964	159,200
I-95 NB & SB over Jefferson Blvd at 0.3 mi N of Junction I-95/295	Kent	1966	156,400
I-95 NB & SB over Wellington Ave at 0.2 mi N of Junction RI 10	Providence	1964	147,900
RI 51 Phenix Av over I-295 at 0.2 mi N of Junction RI 5	Providence	1968	124,000
I-195 WB over Seekonk River at 0.2 mi S of Junction RI 5	Providence	1969	76,700
RI 146 Eddie Dowling Highway over RI 246 at 0.5 mi N of Junction RI 15	Providence	1956	72,800
RI 146 Eddie Dowling Highway over RI 15 Mineral Spring Ave at 0.8 mi S of Junction Charles Street	Providence	1957	72,800
US 6 EB & WB over US 6A Hartford Ave at 1.0 mi W of Junction RI 10	Providence	1969	52,700

Source: Rhode Island Department of Administration, Sept. 2016. "Freight Forward: State of Rhode Island Freight and Goods Movement Plan." Available at http://www.planning.ri.gov/publications/trans-documents.php.

Note: N – North; S – South; E – East; W – West; mi – mile

FHWA has been in the process of migrating to a new set of bridge condition measures that focus on rating bridges as being in good, fair, or poor condition rather than using terminology such as structurally deficient. Figure 2-5 summarize all bridges in the state based on their condition. Bridge condition is presented by functional classification to give a relative sense of the traffic flow on a given facility.

Figure 2-5 Bridge Condition (2016), All Bridges



Source: Ibid.

2.3 System Performance

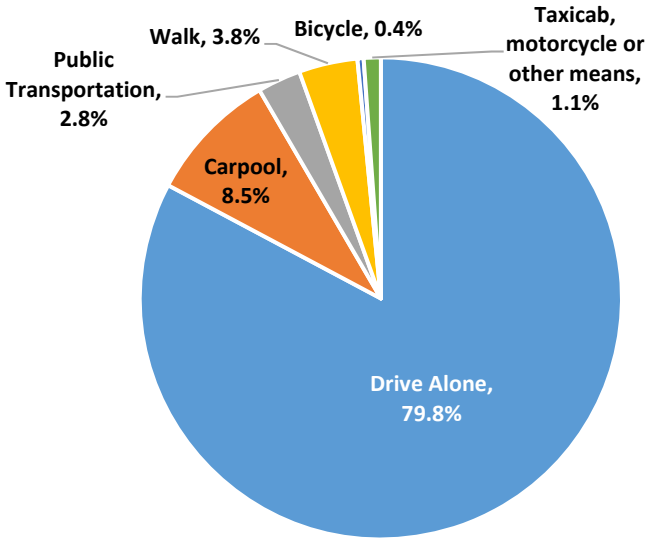
System performance provides a qualitative review of transportation operations on the surface transportation network described. Because the roadway network is primarily being used to serve automobile travel this section will focus on mode share, roadway congestion, network bottlenecks, and an overview of roadway safety for all users.

2.3.1 Mode Share

Prior to reviewing congestion factors and safety, a brief discussion of mode share is useful. Mode share is the percentage of travelers using a particular type of transportation. It is a useful way of understanding where the pressure and need on a transportation system are most present. For instance, if 99 percent of all travelers are driving alone, the roadway system may be under extreme pressure to accommodate those vehicles. Policy makers also use mode share numbers to set targets and gauge progress toward those targets over time – encouraging more people to bicycle, walk or take public transportation, for instance.

Figure 2-6 shows the mode share for the journey to work trip in Rhode Island as estimated in 2016. It shows that about 80 percent of Rhode Island workers drove alone to work. Another 8.5 percent carpooled in Rhode Island, putting the total drive-to-work mode share at 88.3 percent of work commuters. For comparison, the drive-to-work mode share for Massachusetts is 78.6 percent, 86.4 percent for Connecticut, and 85.7 percent for the U.S. as a whole. Rhode Island workers tend to drive for their work commute more than neighbors in the region and more than the nation.

Figure 2-6 Rhode Island Journey to Work Mode Share, 2016



Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

The Rhode Island mode share characteristics have been entirely stable over the course of U.S. Census estimates going back to 2010. Data indicate that Rhode Island workers commute in 2016 in almost the same manner as they did six years ago.

2.3.2 Roadway System Performance

Vehicle miles traveled in Rhode Island reached 7.8 billion in 2015.[1] Vehicle miles traveled have remained steady for about five years. This combined with the high percentage of Rhode Islanders using cars for commute trips (and presumably for many other types of trips, as well) reinforce that the ability of the roadway system to effectively accommodate travel is paramount. Roadway systems that become overtaxed have reduced speeds and increased delay to drivers. Vehicles moving at slow speeds emit more pollutants into the air. Roads that are congested are doing a poor job of providing mobility.

This section will frame where congestion is taking place in Rhode Island. This has implications for policy and fiscal considerations, such as maintenance decisions that may temporarily increase congestion, or the widening of certain roadways to decrease congestion. Congestion mitigation may take other routes than roadway improvement, however, such as investment in other modes (such as public transit) to decrease the number of drivers on the road. Currently, the average commute time in Rhode Island is 24.4 minutes[2].

2.3.2.1 Roadway Congestion and Bottlenecks

The National Performance Management Research Data Set, or NPMRDS, is a vast national data set of average travel times on the National Highway System. The NHS includes Interstate highways and other main roads serving major destinations. The NPMRDS does not include congestion measurement data for local roadways. It is used for performance measurement of traffic congestion on highways and arterials. The following are key metrics calculated from the NPMRDS data[3]:

- **Speed** – Measured average speed for every hour of every day of the year.
- **Travel Time Index** – Travel time represented as a percentage of the ideal travel time (Travel Time ÷ Free-flow Travel Time). The travel time index is a measure of average conditions that explains how much longer, on average, travel times are during congestion compared to during light traffic.

[1] "Highway Statistics Series." U.S. Department of Transportation/Federal Highway Administration, 8 Mar. 2017, www.fhwa.dot.gov/policyinformation/statistics/abstracts/2015/state.cfm?loc=ri.

[2] U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

[3] https://npmrds.ritis.org/analytics/help/#data-types.

- **Buffer Time Index** – The buffer time represents additional time travelers need to set aside to ensure an on-time arrival. The index is calculated as the different between the 95th percent travel time and the average travel time relative to the average travel time ((95th% Travel Time - Average Travel Time) ÷ Average Travel Time). Its value increases as reliability gets worse. For example, a buffer index of .4 (40 percent) means that, for a 20-minute average travel time, a traveler should budget an additional 8 minutes (20 minutes x 40 percent = 8 minutes) to ensure on-time arrival most of the time.
- **Planning Time Index** – The total travel time that should be planned when an adequate buffer time is included (95% Travel Time / Free-flow Travel Time). The planning time index differs from the buffer index because it includes typical delay as well as unexpected delay. Thus, the planning time index compares near-worst case travel time to a travel time in light or free-flow traffic. For example, a planning time index of 1.60 means that, for a 15-minute trip in light traffic, the total time that should be planned for the trip is 24 minutes (15 minutes x 1.60 = 24 minutes).

Note that data were available for 2017, but due to a change at FHWA in their data collection vendor and methodology, the information is not useful in looking at trends from previous years.

Table 2-7 shows NPMRDS metrics during the peak morning commute hour (8:00 - 9:00 am). The travel time index – a measure of average congestion – has been rising slightly since 2013, as have the buffer time index and planning time index. These three metrics indicate that as traffic congestion has been increasing journey time reliability has been decreasing in Rhode Island during this commute hour.

Table 2-7 Morning Peak NPMRDS Metrics (8:00 -9:00 am), 2013-2016

NPMRDS Metric	2013	2014	2015	2016
Speed (mph)	24.11	23.03	22.59	22.19
Travel Time Index	2.03	2.12	2.16	2.20
Buffer Time Index	2.05	2.18	2.29	2.53
Planning Time Index	4.65	4.83	5.00	5.37

Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

Table 2-8 shows the NPMRDS metrics during the peak evening commute hour (5:00 – 6:00 pm). Again, increased congestion from 2013-2016 is indicated by the three indices, though the overall buffer time and planning time indices are considerably higher than for the morning peak hour.

Table 2-8 Evening Peak NPMRDS Metrics (5:00 – 6:00 pm), 2013-2016

NPMRDS Metric	2013	2014	2015	2016
Speed (mph)	23.23	21.27	20.19	19.75
Travel Time Index	2.10	2.30	2.42	2.48
Buffer Time Index	2.50	2.79	3.18	3.60
Planning Time Index	5.44	5.87	6.47	7.13

Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

Table 2-9 shows the NPMRDS metrics during the peak weekend traffic hour (1:00 - 2:00 PM). The same trend of increasing congestion is evident for weekend peak traffic. The increasing congestion indicators are inversely related to average speeds.

Table 2-9 Weekend Peak NPMRDS Metrics (1:00 – 2:00 pm), 2013-2016

NPMRDS Metric	2013	2014	2015	2016
Speed (mph)	24.74	22.01	20.78	18.97
Travel Time Index	1.98	2.22	2.36	2.58
Buffer Time Index	2.47	3.05	3.38	4.74
Planning Time Index	5.26	6.10	6.61	8.65

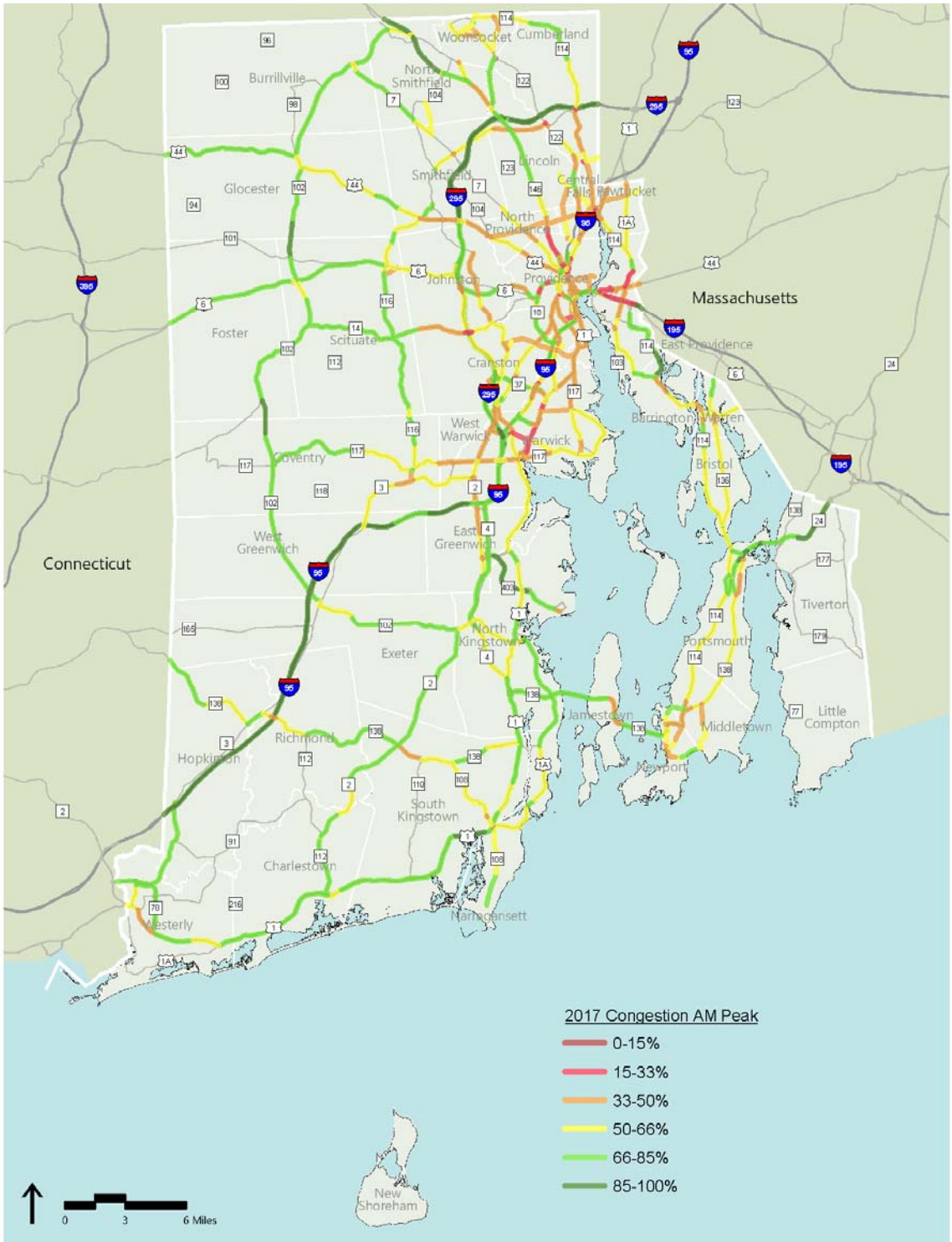
Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

Figure 2-7, 2-8 and 2-9 show congestion on Rhode Island NHS roadways. Congestion is calculated as the measured speed as a percentage of the free-flow speed. For instance, if the average speed on a roadway during a peak travel hour is 35 mph and the speed limit is 55 mph, congestion is calculated as 35/55, or 63 percent. Free-flow conditions are 100 percent. In the congestion figures below, areas with lower percentages and corresponding colors indicate more congestion during the peak hours studied.

Figure 2-7 shows morning peak congestion on Rhode Island NHS roadways. Congestion clusters around the Providence core and the corridor between Warwick and Cranston. For the evening peak (Figure 2-8), the same areas show widespread congestion, but there are additional and larger pockets in the Warwick/West Warwick area, Central Falls/Pawtucket and Newport near the Pell Bridge. There are isolated pockets of congestion near many intersections throughout the state.

Saturday-Sunday peak congestion (Figure 2-9) shows moderate congestion, again mainly concentrated and Providence and the near vicinity. There are additional localized congestion spots such as in downtown Newport, Warren and Woonsocket.

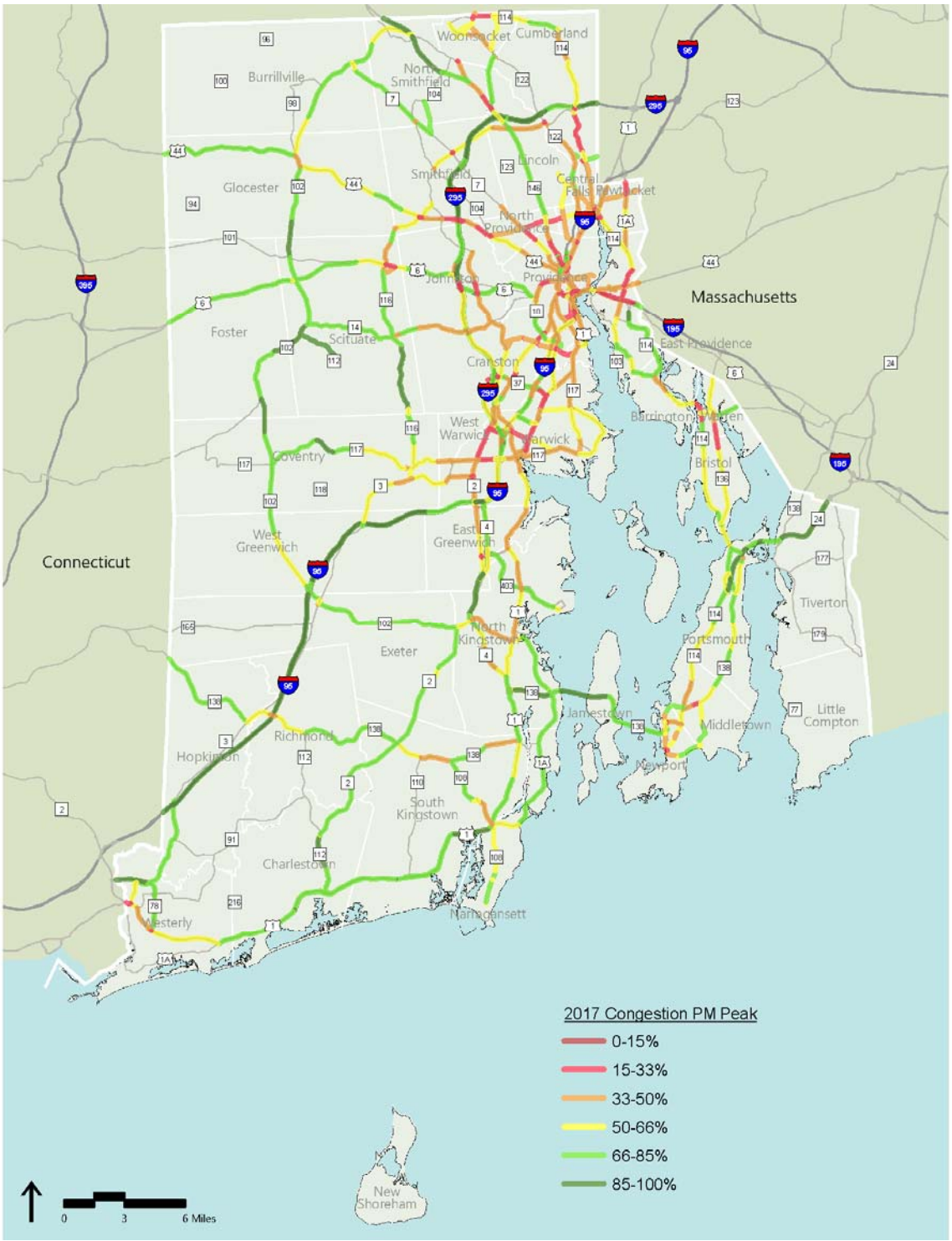
Figure 2-7 Morning Peak Hour Congestion (8:00 – 9:00 am) on RI NHS Roadways (2017)



Note: A measure of 100% indicates that traffic is traveling at the free flow (desired) speed, this is the ideal condition.

Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

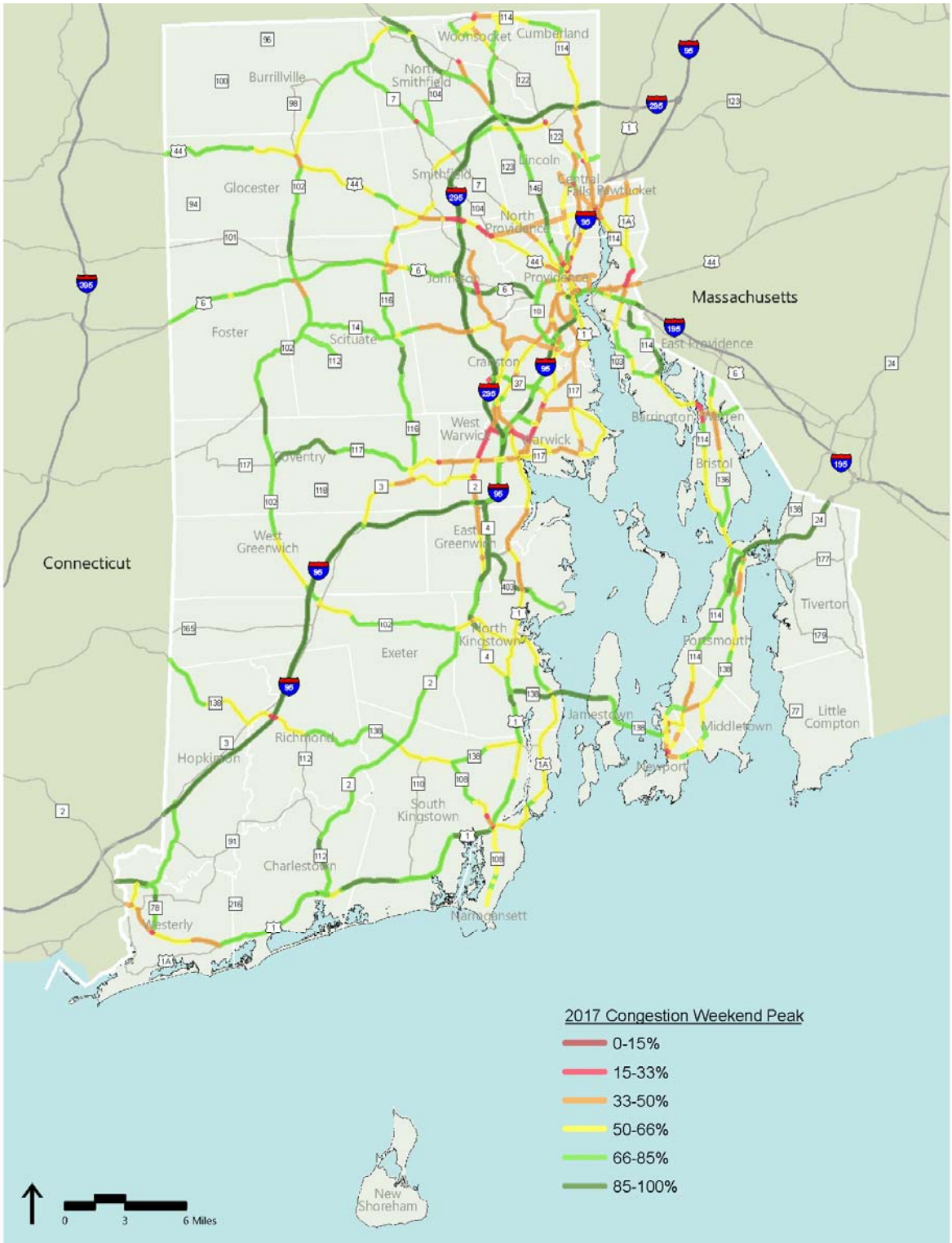
Figure 2-8 Evening Peak Hour Congestion (5:00 – 6:00 pm) on RI NHS Roadways (2017)



Note: A measure of 100% indicates that traffic is traveling at the free flow (desired) speed, this is the ideal condition.

Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

Figure 2-9 Weekend Peak Hour Congestion (1:00 – 2:00 pm) on RI NHS Roadways (2017)



Note: A measure of 100% indicates that traffic is traveling at the free flow (desired) speed, this is the ideal condition.

Source: U.S. Dept. of Transportation, 2018. *National Performance Management Research Data Set*. Federal Highway Administration. Accessed 26 January 2018.

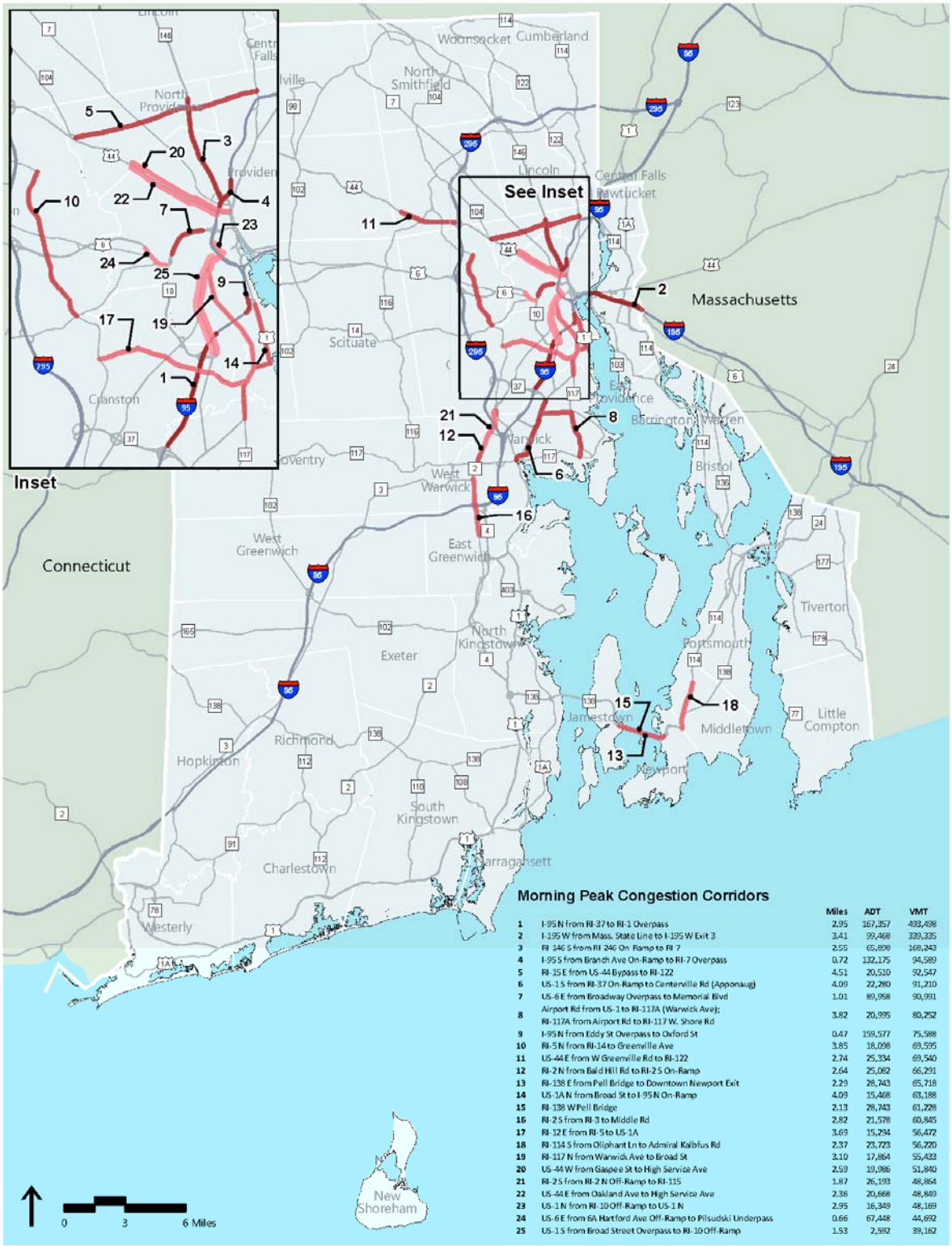
Figure 2-10 and Figure 2-11 show the most congested corridors in the Rhode Island network. By and large, these occur around Providence.

Figure 2-10 shows the top 25 corridors for morning peak congestion on the Rhode Island NHS network. Nearly all are in the greater Providence area. Several are located on Aquidneck Island and the Pell Bridge. Three of the top five most congested corridors are on the Interstate Highway System (I-95 and I-195). Other major congested corridors for this commute period include RI-146 and US-6.

Figure 2-11 depicts the top 25 most congested corridors during the evening peak commute hour. All but one section of road on this list is in Providence or the nearby vicinity. The most congested evening section of road is I-195 between the I-95 interchange and the Massachusetts state line. This road carries 121,000 vehicles daily. Congestion is caused by a series of interruptions to traffic flow from the lane drop at the Broadway interchange, weaving at the Taunton Avenue interchange, and through the series of interchanges up to the merge with Interstate-95 south. This bottleneck often causes queuing during the evening peak hour over 4 ½ miles long. I-95 is also significantly congested during this period along much of its length through the Providence area.

It should be noted that portions of Interstate 95 south from the Massachusetts state line to the City of Providence are missing from the federal data set. This discrepancy has been brought to FHWA's attention and is being addressed. When these data become available the identified top corridors will likely change slightly.

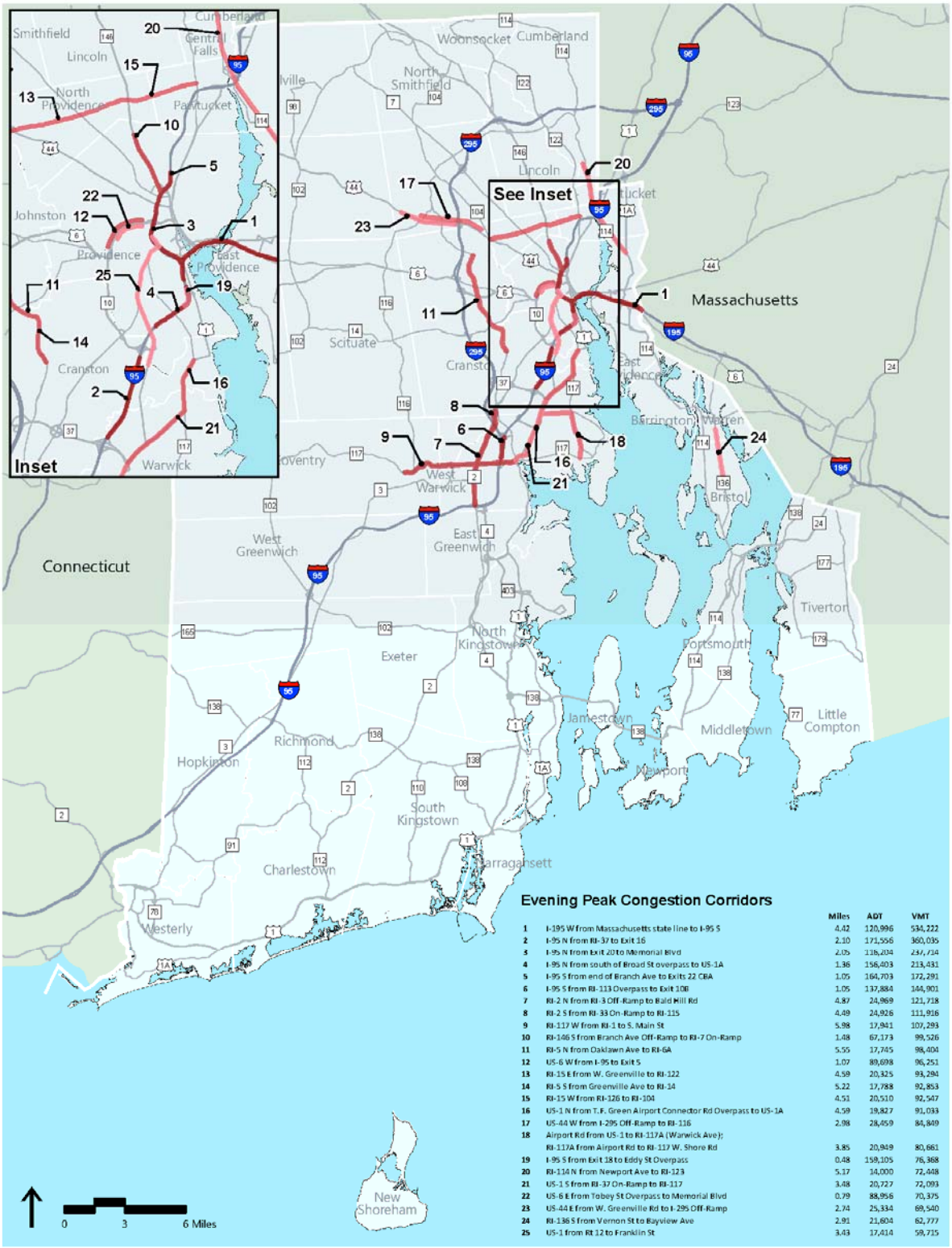
Figure 2-10 Top Congested Corridors, AM Peak Hour (2017)



		Miles	ADT	VMT
1	I-95 N from RI-37 to RI-1 Overpass	2.95	167,357	493,408
2	I-195 W from Mass. State Line to I-195 W Exit 3	3.41	99,468	339,335
3	RI 146 S from RI 246 On Ramp to RI 7	2.55	65,898	168,243
4	I-95 S from Branch Ave On-Ramp to RI-7 Overpass	0.72	132,175	94,589
5	RI-15 E from US-44 Bypass to RI-122	4.51	20,510	92,547
6	US-1 S from RI-37 On-Ramp to Centerville Rd (Apponaug)	4.09	22,280	91,210
7	US-6 E from Broadway Overpass to Memorial Blvd	1.01	89,958	90,991
8	Airport Rd from US-1 to RI-117A (Warwick Ave); RI-117A from Airport Rd to RI-117 W. Shore Rd	3.82	20,995	80,252
9	I-95 N from Eddy St Overpass to Oxford St	0.47	159,577	75,588
10	RI-5 N from RI-14 to Greenville Ave	3.85	18,098	69,595
11	US-44 E from W Greenville Rd to RI-122	2.74	25,334	69,540
12	RI-2 N from Bald Hill Rd to RI-2 S On-Ramp	2.64	25,082	66,291
13	RI-138 E from Pell Bridge to Downtown Newport Exit	2.29	28,743	65,718
14	US-1A N from Broad St to I-95 N On-Ramp	4.09	15,468	63,188
15	RI-138 W Pell Bridge	2.13	28,743	61,228
16	RI-2 S from RI-3 to Middle Rd	2.82	21,578	60,845
17	RI-12 E from RI-5 to US-1A	3.69	15,294	56,472
18	RI-114 S from Oliphant Ln to Admiral Kalbfus Rd	2.37	23,723	56,220
19	RI-117 N from Warwick Ave to Broad St	3.10	17,864	55,433
20	US-44 W from Gaspee St to High Service Ave	2.59	19,986	51,840
21	RI-2 S from RI-2 N Off-Ramp to RI-115	1.87	26,193	48,864
22	US-44 E from Oakland Ave to High Service Ave	2.36	20,668	48,849
23	US-1 N from RI-10 Off-Ramp to US-1 N	2.95	16,349	48,169
24	US-6 E from 6A Hartford Ave Off-Ramp to Pilsudski Underpass	0.66	67,448	44,692
25	US-1 S from Broad Street Overpass to RI-10 Off-Ramp	1.53	2,592	39,162

Source: Compiled on behalf of Rhode Island Department of Transportation using October 2017 NPMRDS dataset.

Figure 2-11 Top Congested Corridors, PM Peak Hour (2017)



		Miles	ADT	VMT
1	I-195 W from Massachusetts state line to I-95 S	4.42	120,996	534,222
2	I-95 N from RI-37 to Exit 16	2.10	171,556	360,035
3	I-95 N from Exit 20 to Memorial Blvd	2.05	116,204	237,734
4	I-95 N from south of Broad St overpass to US-1A	1.36	156,403	213,431
5	I-95 S from end of Branch Ave to Exits 22 CBA	1.05	164,703	172,291
6	I-95 S from RI-113 Overpass to Exit 10B	1.05	137,884	144,901
7	RI-2 N from RI-3 Off-Ramp to Bald Hill Rd	4.87	24,969	121,718
8	RI-2 S from RI-33 On-Ramp to RI-115	4.49	24,926	111,916
9	RI-117 W from RI-1 to S. Main St	5.98	17,941	107,293
10	RI-146 S from Branch Ave Off-Ramp to RI-7 On-Ramp	1.48	67,173	99,526
11	RI-5 N from Oaklawn Ave to RI-6A	5.55	17,745	98,404
12	US-6 W from I-95 to Exit 5	1.07	89,698	96,251
13	RI-15 E from W. Greenville to RI-122	4.59	20,325	93,294
14	RI-5 S from Greenville Ave to RI-14	5.22	17,788	92,853
15	RI-15 W from RI-126 to RI-104	4.51	20,510	92,547
16	US-1 N from T.F. Green Airport Connector Rd Overpass to US-1A	4.59	19,827	91,033
17	US-44 W from I-295 Off-Ramp to RI-116	2.98	28,459	84,849
18	Airport Rd from US-1 to RI-117A (Warwick Ave); RI-117A from Airport Rd to RI-117 W. Shore Rd	3.85	20,949	80,661
19	I-95 S from Exit 18 to Eddy St Overpass	0.48	158,105	76,368
20	RI-114 N from Newport Ave to RI-123	5.17	14,000	72,448
21	US-1 S from RI-37 On-Ramp to RI-117	3.48	20,727	72,093
22	US-6 E from Tobey St Overpass to Memorial Blvd	0.79	88,956	70,375
23	US-44 E from W. Greenville Rd to I-295 Off-Ramp	2.74	25,334	69,540
24	RI-136 S from Vernon St to Bayview Ave	2.91	21,604	62,777
25	US-1 from Rt 12 to Franklin St	3.43	17,414	59,715

Source: Compiled on behalf of Rhode Island Department of Transportation using October 2017 NPMRDS dataset.

2.3.2.2 Roadway Safety

The Rhode Island Strategic Highway Safety Plan (SHSP) is a five-year transportation safety plan developed by the Rhode Island Department of Transportation (RIDOT) in partnership with local, state, and federal organizations and other key stakeholders. In 2005, the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was passed, which requires each state to develop and implement a transportation safety plan. Additional requirements established in the Fixing America's Surface Transportation (FAST) Act include updating the SHSP every five years.

The SHSP is a data-driven analysis, encompassing all public roads including state and local roads, to identify a State's safety needs, set goals for reducing fatalities and serious injuries, and allocate investments in safety projects. The SHSP employs the 4E's of safety: Engineering, Education, Enforcement, and Emergency Medical Services with the goal of moving "Toward Zero Deaths" and halving serious injuries by 2027. The SHSP was recently revised in 2017 and will be used through 2022 with the latest update identifying ten emphasis areas for the State to target. Rhode Island has adopted the following emphasis areas:

- Impaired driving
- Occupant Protection
- Intersection and Run-off-the-Road
- Speeding
- Vulnerable Users (Bicyclists, Pedestrians, Motorcyclists)
- Aging Drivers
- Young Drivers
- Distracted Driving
- Traffic Incident Management
- Data

The Highway Safety Improvement Program (HSIP) and the Highway Safety Plan (HSP) outline a plan to implement strategies and action items that target the emphasis areas outlined in the SHSP develop by the RIDOT Office of Highway Safety. The HSIP, which is administered by Federal Highway Administration (FHWA) focuses in on implementing infrastructure projects at site-specific and systemic locations based on safety needs. The HSP, administered by the National Highway Traffic Safety Administration (NHTSA), focuses on public outreach and communication through media campaigns and events. All projects and programs are programmed in the state's Transportation Improvement Program (TIP).

As part of the Rhode Island SHSP, HSIP, and HSP, the goal for the state is to reduce fatal and serious injuries on all roadways with the guiding principle of "Toward Zero Deaths." Crash data is reviewed throughout the year by RIDOT to continually keep track of the fatal and serious injuries. Serious injuries are considered incapacitating

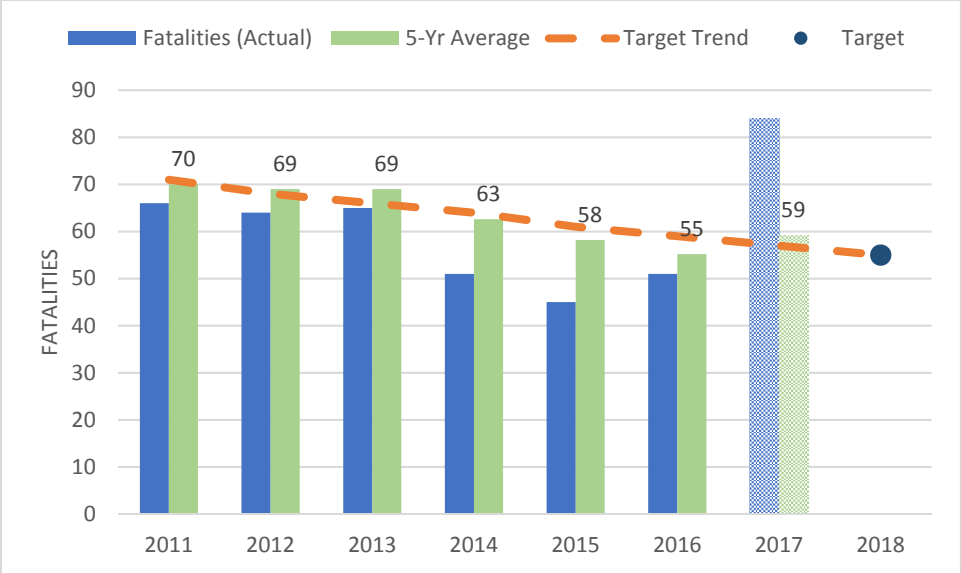
injuries. When reporting in the above-mentioned plans, a five-year rolling average is used to track the progress of the performance metrics set by the State. This method helps smooth out yearly fluctuations in traffic-related injuries due to the random nature of fatal and serious injuries. The SHSP sets objectives for five performance metrics as required by federal safety performance rulemaking:

- Fatalities
- Fatality Rate
- Serious Injuries
- Serious Injury Rate
- Non-motorized fatal & serious injuries

For each of these five metrics, Rhode Island sets a target on an annual basis. For fiscal year 2018, a target of three to four percent annual decline was set. The following presents and summarizes the most recent trends for the five-metrics set in the SHSP.

Fatalities in Rhode Island have steadily declined in recent years, however with low numbers to begin with in Rhode Island, it is increasingly difficult to reduce fatalities and injuries from the previous year.

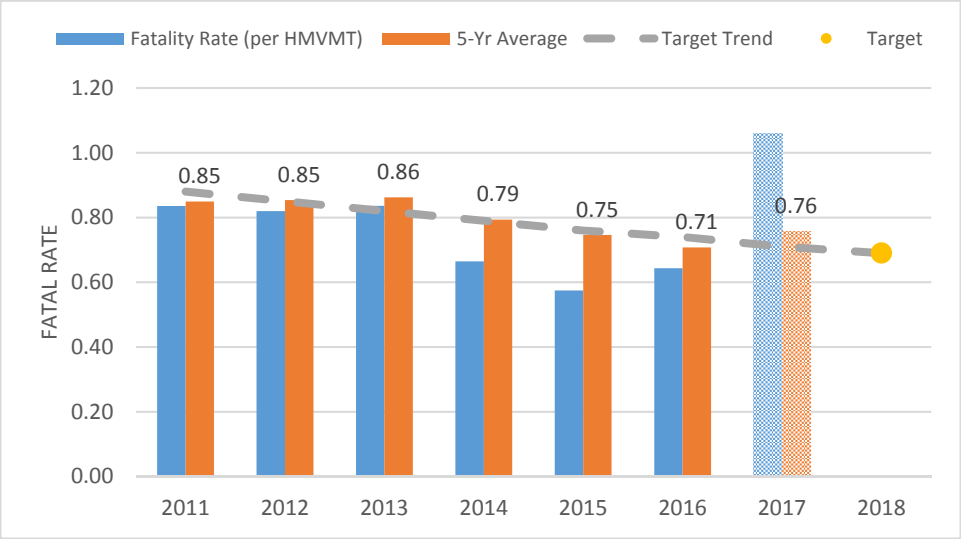
Figure 2-12 Historic Fatalities (2011-2017)



Note: 2017 data are considered preliminary.
Sources: 2012-2016 fatal data, FARS; 2012-2017 serious injury data & 2017 fatal data, RIDOT Office of Highway Safety

Figure 2-13 shows the fatality crash rate, which has steadily declined in recent years. Previously, there was a minor increase in 2013, however in the preliminary data of 2017, there was a significant increase to above a 1.0 crash rate.

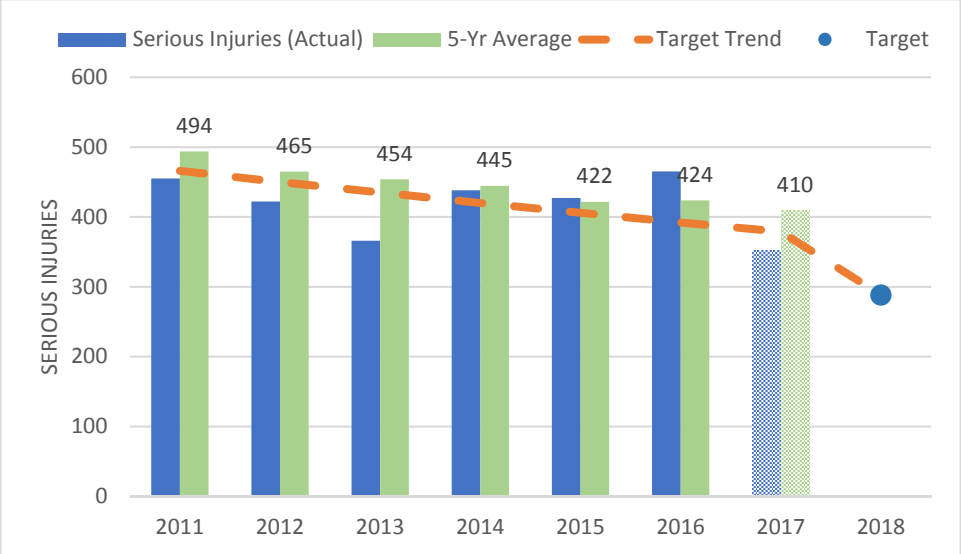
Figure 2-13 Historic Fatal Crash Rate (2011-2017)



Note: 2017 data are considered preliminary.
Sources: 2012-2016 fatal data, FARS; 2012-2017 serious injury data & 2017 fatal data, RIDOT Office of Highway Safety

Serious injuries in Rhode Island has also been steadily declining similar to fatalities. However, the annual number of serious injuries per year continues to fluctuate. In 2016, the serious injuries were the highest they have been in several years.

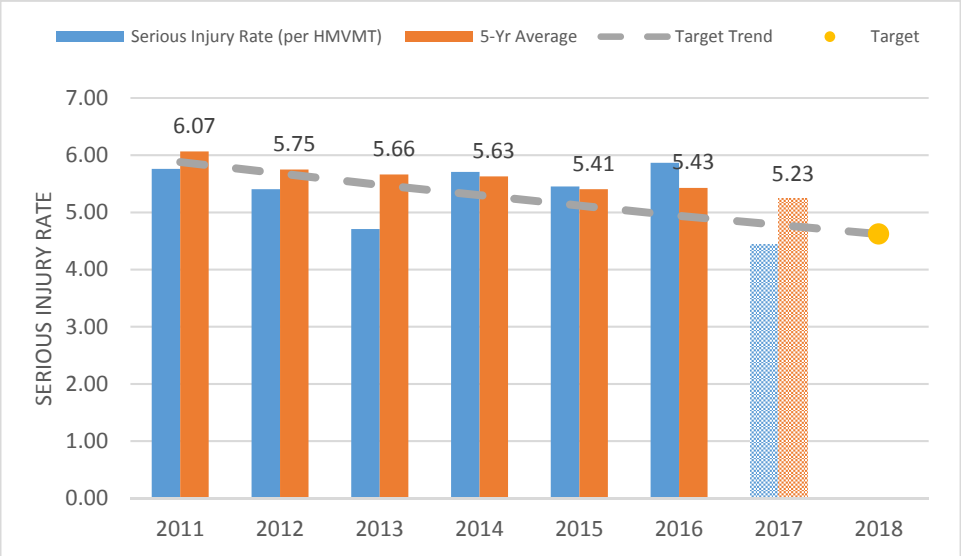
Figure 2-14 Historic Serious Injuries (2011-2017)



Note: 2017 data are considered preliminary.
Sources: 2012-2016 fatal data, FARS; 2012-2017 serious injury data & 2017 fatal data, RIDOT Office of Highway Safety

The serious injury rates throughout Rhode Island are found to fluctuate in previous years. In 2016, there was an increase in serious injuries. Although, fatalities were shown to increase in 2017, serious injuries decreased.

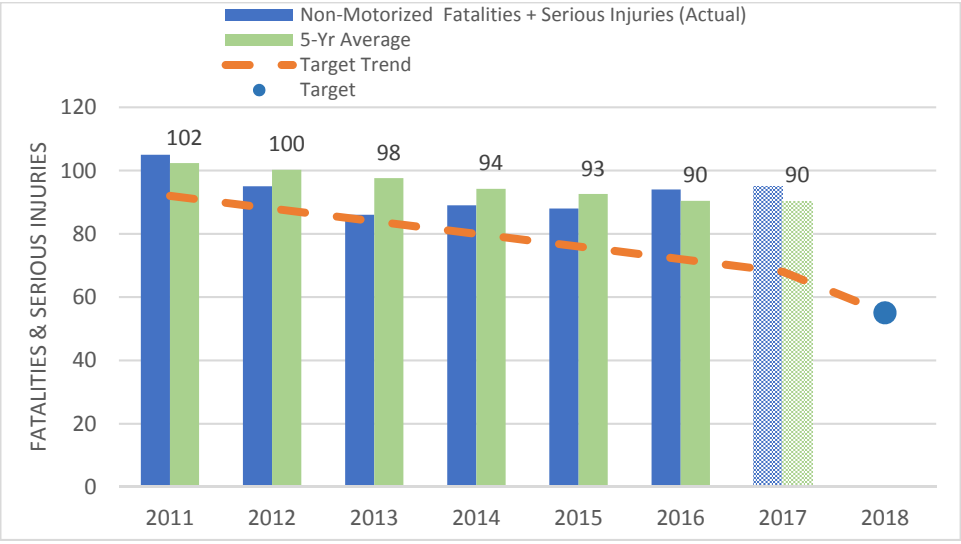
Figure 2-15 Historic Serious Injury Rate (2011-2017)



Note: 2017 data are considered preliminary.
Sources: 2012-2016 fatal data, FARS; 2012-2017 serious injury data & 2017 fatal data, RIDOT Office of Highway Safety

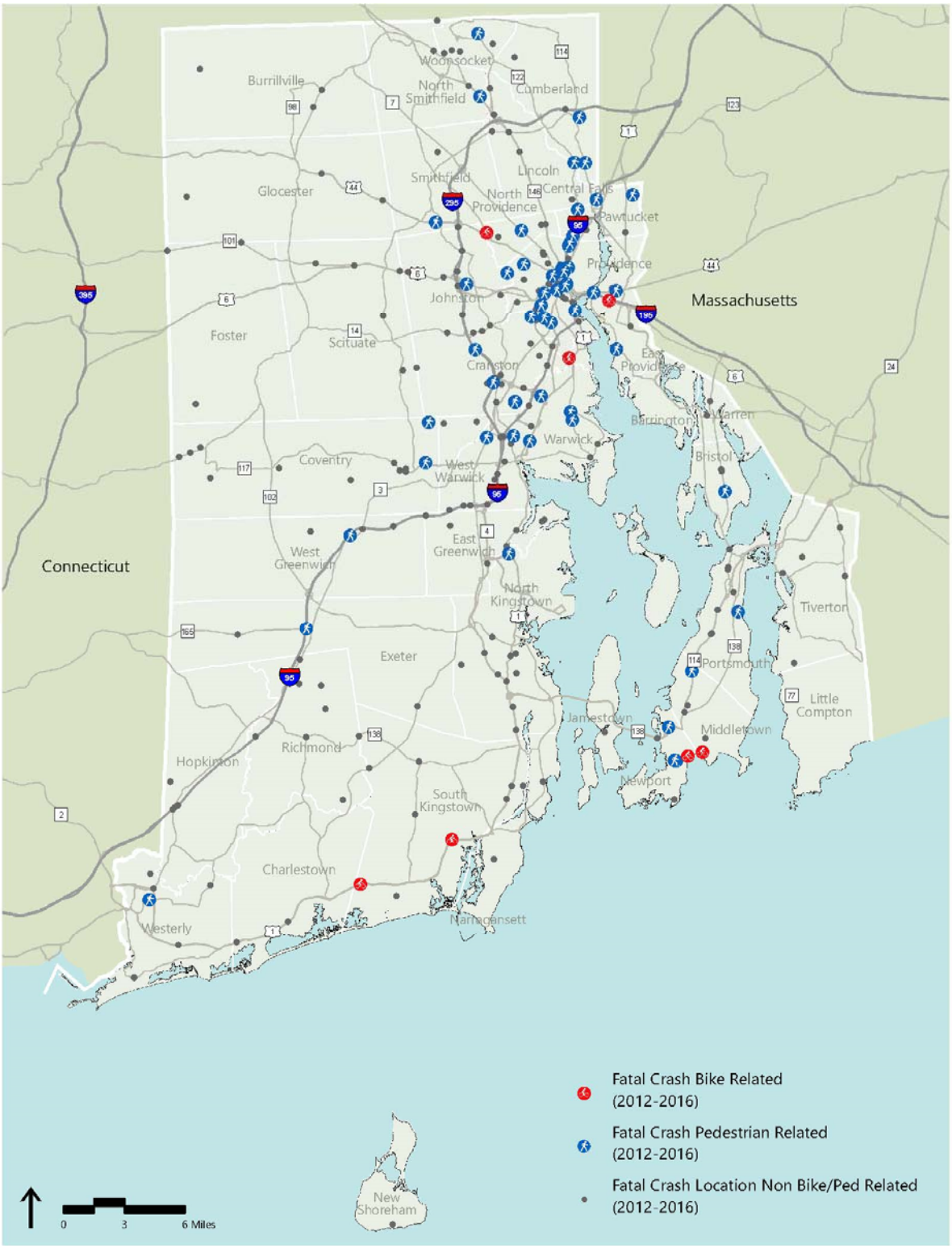
Pedestrian and bicycle fatalities and serious injuries in Rhode Island have generally trended downward. However, in 2016 the fatal and serious injuries were the highest they have been in several years.

Figure 2-16 Historic Non-Motorized Fatalities and Serious Injuries (2011-2017)



Note: 2017 data are considered preliminary.
Sources: 2012-2016 fatal data, FARS; 2012-2017 serious injury data & 2017 fatal data, RIDOT Office of Highway Safety

Figure 2-17 Rhode Island Fatal Roadway Crashes (2012-2016)



Source: Rhode Island Department of Transportation, 2012-2016. Fatal Crashes. Online System Crash Analysis & Reporting. Data current as of February 2018.

2.4 Key Findings

- The majority of RIDOT roads (60%) are in good or excellent condition. Only six percent are in failed condition. Often, the roadways in the worst condition are those serving Providence.
- While 29 percent of Rhode Island bridges are in poor condition only eight percent of bridges nationally are in poor condition.
- Eighty percent of Rhode Island workers commute by driving alone. Additionally, 8.5 percent carpool. The total drive-to-work mode share is 88.5%. This is higher than the national average of 85.7%.
- Over the period from 2013-2016 travel measures are showing a steady rise in travel delay and congestion.
- Five year rolling average fatalities and serious injuries have been trending downward over the last five year period. The 2017-2022 Strategic Highway Safety Plan provides emphasis areas for targeted safety needs over next five years to continue the trend.

This page intentionally left blank.

3

Passenger Transportation

Rhode Island residents have a variety of public and private passenger transportation services allowing them to make local and out-of-state trips without using a single-occupancy automobile. This section will describe these options.

Public options include RIPTA bus and paratransit services, MBTA commuter rail, Amtrak intercity rail service, subsidized vanpools, and RIDOT's seasonal passenger ferry. There are also numerous privately-operated alternative transportation modes in the state, including taxi/livery/ride-hailing services, private passenger ferries, intercity buses and general and commercial aviation.

Gateway Center RIPTA Station, Newport

3.1 RIPTA Transit Service

The Rhode Island Public Transit Authority (RITPA) is a quasi-public, independent authority authorized to operate public transit services throughout Rhode Island. RIPTA provides fixed-route bus and paratransit service among 35 of Rhode Island's 39 municipalities.

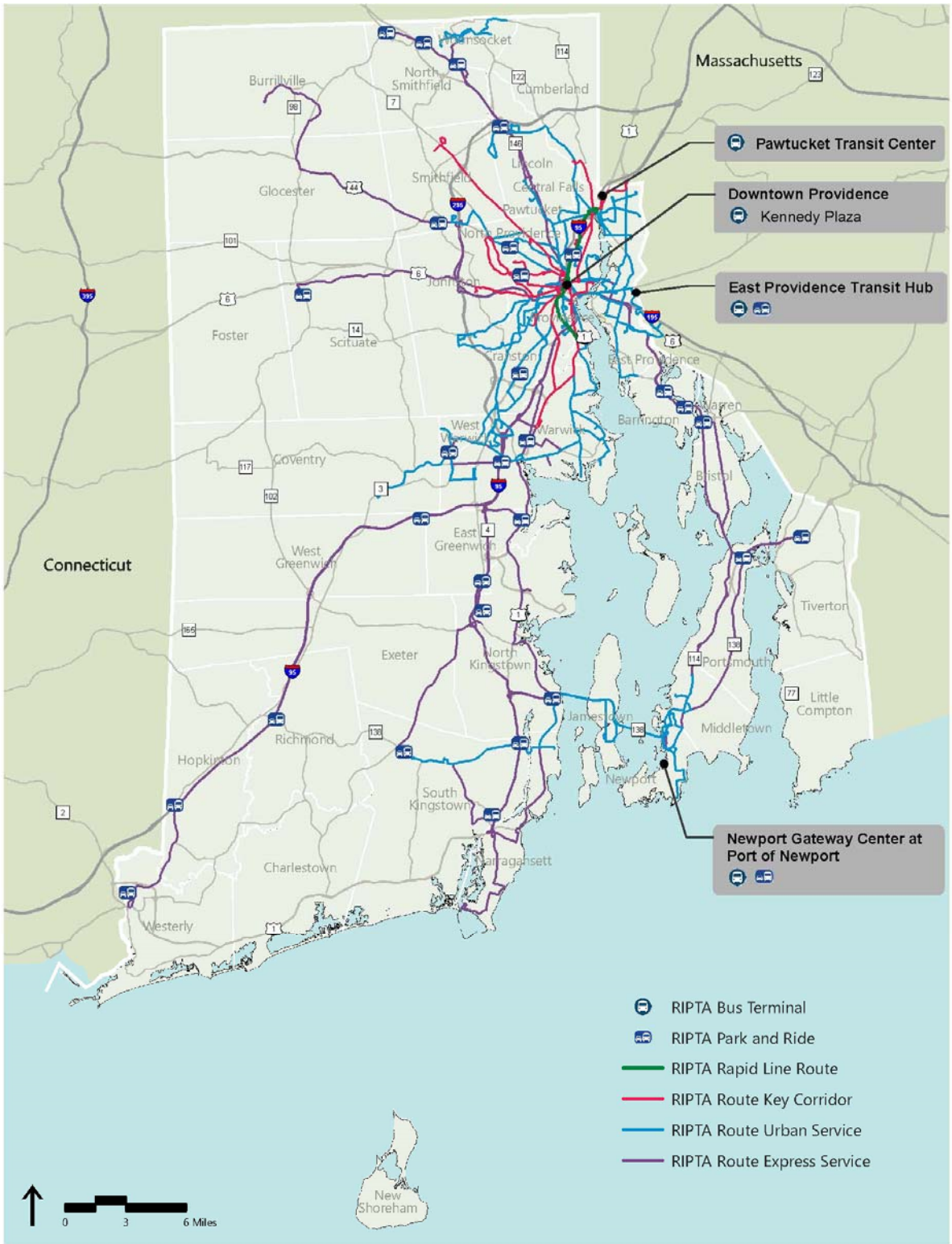
3.1.1 RIPTA Service and Operations

RIPTA operates a total of 55 fixed-routes as shown on Figure 3-1. The RIPTA bus services include:

- **Rapid Bus** service, known as "the R-Line," operating from the Providence/Cranston line through downtown Providence to Pawtucket, via Broad and North Main Streets. Rapid Bus service is designed to provide frequent (every 10 minutes on weekdays), limited-stop service utilizing intelligent technology systems such as signal priority to reduce travel time.
- **Key Corridor** routes offering direct service along primary arterials every 20 minutes or better. Key corridor routes serve densely populated corridors or those with major activity centers and are RIPTA's highest ridership and most productive routes. There are currently nine key corridor routes.
- **Regional and Express Routes** operating over long distances from park and ride facilities or outlying areas into downtown Providence, generally using highways for a portion of the route. Express routes, designated by an 'X,' make limited stops and make most trips during peak commuting periods.

- **Local Routes** consisting of radial routes operating in and out of downtown Providence or other local RIPTA hubs. These routes operate at varying frequency, generally every 30-60 minutes or less. Most of RIPTA's service (about 30 routes) fall into this category.
- **Flex Service and Rural Ride** operating in lower density areas. There are eight geographically-limited Flex zones and one Rural Ride zone. Each provides pick-ups and drop-offs anywhere within that zone. Rural Ride operates only one day per week. These services are intended to provide transportation options in areas that have little or no fixed-route service.
- **Ride Paratransit** provides mobility services for persons with disabilities that are unable to use fixed-route buses. Paratransit is a service required by the Americans with Disabilities Act (ADA). The service is shared with other riders, is door-to-door and requires advanced reservations.

Figure 3-1 RIPTA Fixed-Route Service



Source: Rhode Island Geographic Information System. 2016. "RIPTA Bus Routes. (September 7, 2016)." Rhode Island Public Transit Authority. Available at http://data.rigis.org/trans/RIPTAroutes0916.zip. Accessed August 2017.

RIPTA has 4 key stations around the state:

Kennedy Plaza, Providence

Pawtucket Transit Center

Newport Visitor Center

East Providence Transit Hub

There are three primary transit hubs served by RIPTA: Kennedy Plaza in downtown Providence, the Pawtucket Transit Center, and Newport's Gateway Center and a smaller hub located in East Providence at Wampanoag Plaza. RIPTA is planning to locate a Warwick hub at the Community College of RI (CCRI) campus, and is also working with RIDOT on a new intermodal bus terminal near Providence Rail Station.

Kennedy Plaza is the largest hub, served by 41 of RIPTA's statewide bus routes with more than 30,000 passengers passing through each day. Ten routes serve the Pawtucket hub, five routes plus a Flex van serve Newport's Gateway Center, three serve East Providence. Providence Station, T.F. Green Airport, downtown Woonsocket and the University of RI are also points where multiple RIPTA routes converge.

Multimodal connections can be made between RIPTA and MBTA commuter rail at Providence Station, T.F. Green/Warwick Station, Wickford Junction and in South Attleboro, Massachusetts. Amtrak connections can be made at all three stations in Providence, Kingston and Westerly. Intercity bus connections can be made in Providence, at T.F. Green Airport or at Gateway Center in Newport. Passenger ferry connections can be made in Providence, Newport and Point Judith in Narragansett. RIPTA's express routes service 28 park and ride lots throughout the state.

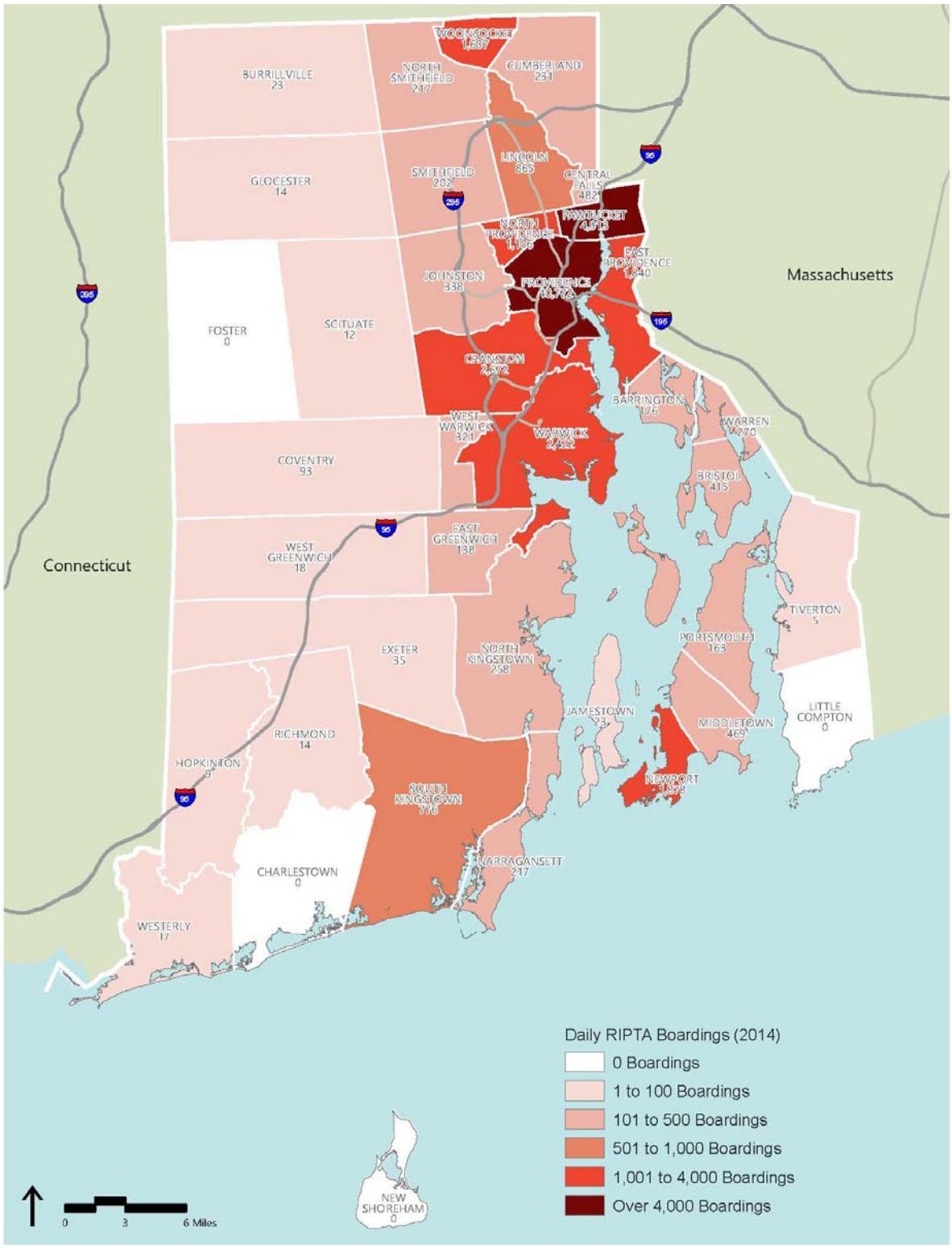
3.1.2 RIPTA Infrastructure and Fleet

As of 2017, RIPTA has a fleet of 221 fixed-route buses, 95 paratransit vans and 17 Flex vans. RIPTA operates maintenance facilities in Providence and Newport to house and maintain these vehicles. While RIPTA does not own any roadways, they do operate 0.8 miles of dedicated right-of-way in the East Side Tunnel in Providence.

RIPTA owns Gateway Center in Newport (serving 6 routes, private intercity coaches and located one block from the Newport Ferry Terminal), as well as the passenger building, shelters and other amenities in Kennedy Plaza, Providence. Kennedy Plaza is owned by the City of Providence and leased to RIPTA on a long-term basis. While RIPTA owns some other passenger shelters throughout the state, most are privately-owned and installed through a private advertising contract.

RIPTA is currently planning to relocate the Pawtucket Transit Center (serving 9 routes) out of a leased facility and closer to the planned Pawtucket/Central Falls commuter rail station. The new hub will be part of a larger public intermodal facility partially owned and operated by RIPTA.

Figure 3-2 RIPTA Boardings by Town (2014)



Source: Rhode Island Public Transit Authority. 2014. Boardings and Alightings records.

3.1.3 RIPTA System Performance

RIPTA provided 16.2 million rides in 2017. Average weekday boardings are more than 60,000, two-thirds of which occur in Providence. Figure 3-2 shows the distribution of ridership statewide for 2014. The bulk of daily ridership occurs in Providence and cities in the immediate vicinity. Cities and towns with more than 1,000 daily boardings include Cranston, East Providence, North Providence, Newport, Providence, Pawtucket, Warwick, and Woonsocket.

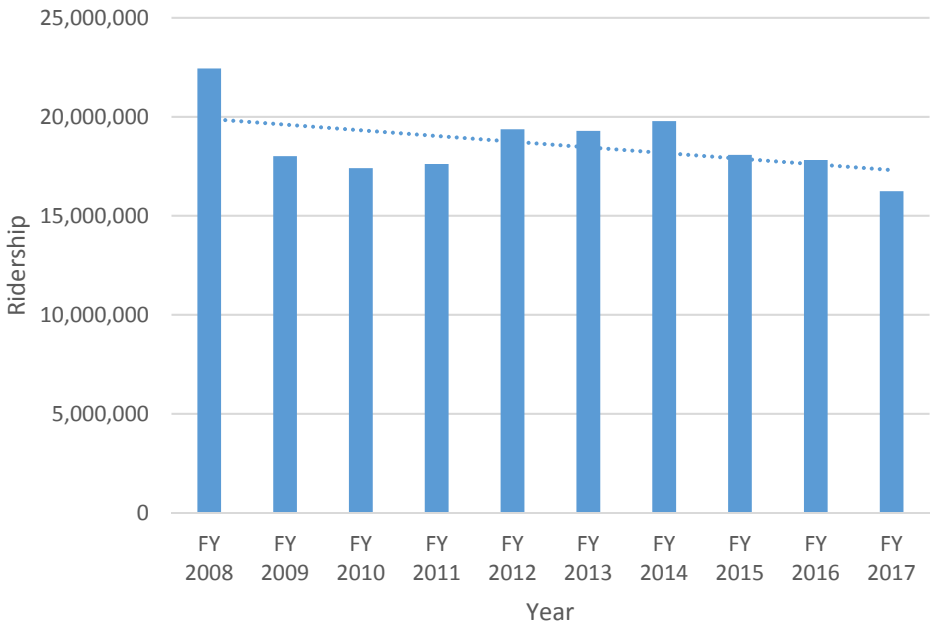
3.1.3.1 RIPTA Bus Service Performance

Figure 3-3 depicts annual ridership on RIPTA's fixed-route and Flex bus service. FY 2017 ridership was 16.2 million, down from 22.4 million in FY 2008. Fixed routes account for approximately 95 percent of ridership, while Flex routes comprise five percent. RIPTA offers the UPass program to local universities and colleges and the Ecopass program to help employers make transit more accessible to their employees. Among the annual ridership are 1.2 million rides associated with the UPass program and almost 130,000 with the Ecopass Program. RIPTA is reimbursed for fares paid using college ID cards. Through the Ecopass program employers can sign up to purchase passes for their employees in advance.

Buses and Bikes

All RIPTA buses are equipped with bike racks capable of carrying two bicycles at a time. In FY 2016, almost 117,000 bus riders traveled with their bicycles.

Figure 3-3 RIPTA Bus Service Ridership (FY 2008 – FY 2017)



Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

Ridership is highly dependent on economic activity and gasoline prices, as well as the amount of service hours provided. Ridership over the last ten years peaked in 2008, during the early years of the most recent recession. Some recovery was observed as Rhode Island began to emerge from this downturn in 2012, but more recent trends have again shown declining ridership. This trend has been observed at transit systems across the U.S. and is thought to be due to lower gas prices and competition from private ride-hailing services. In RIPTA's case, during the last half of FY 2017, a fare was imposed on low-income seniors and persons with disabilities, which also may have contributed to an overall loss in ridership in this year.

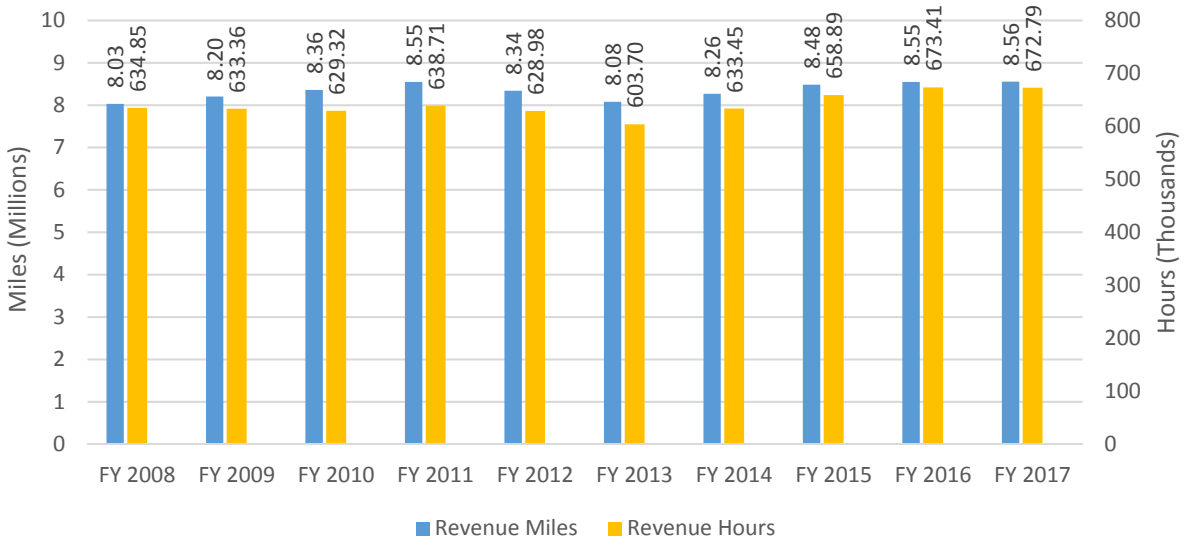
Additional factors are also thought to contribute to ridership decline. Roadways have become more congested with the post-recession economic recovery and more easily attainable car ownership, resulting in reduced bus speeds and the need for additional service hours to maintain existing headways. Changes in working lifestyles have resulted in reductions in sales of monthly transit passes, as riders opt for pay-as-you-go fares to accommodate their flexible working schedules. Private ride-hailing companies have introduced ride-splitting services, which allow riders to share rides with other patrons, bringing the relative trip cost down and reducing the cost-competitiveness of transit services.[4] All of these are thought to contribute to declining use of public transportation.

Revenue vehicle hours (RVH) and miles (RVM) are the total number of hours or miles a bus is in service, not counting travel to and from the garage. These metrics are used to measure the overall volume of service provided by a transit agency. As shown in Figure 3-4, the annual revenue vehicle miles operated by RIPTA has stayed fairly consistent at just over 8 million miles, climbing closer to 8.5 million miles over the last four years as new services and higher frequencies were added following RIPTA's 2012 Comprehensive Operational Analysis (COA).

Standard performance metrics for transit translate the above statistics into the number of passengers per RVM or RVH to measure the overall productivity of individual routes. RIPTA Service Guidelines establish minimum productivity guidelines for each of their route types (e.g. Rapid Bus, Express) based on passenger per RVH as shown in Table 3-1.

[4] Grisby, Darnell, Matthew Dickens, MacPherson Hughes-Cromwick, (2017, November). "Understanding Recent Ridership Changes: Trends and Adaptations." American Public Transportation Association. URL: http://www.apta.com/resources/reportsandpublications/Pages/Ridership-Changes-2017.aspx. Accessed 26 February, 2018.

Figure 3-4 RIPTA Bus Service Annual Revenue Miles and Hours (FY 2008 – FY 2017)



Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

Table 3-1 RIPTA Minimum Productivity Levels (Passengers Per Revenue Vehicle Hour)

	Passengers Per Revenue Service Hour					Passengers Per Trip	
	Rapid Bus	**Key Corridor**	**Urban Radial**	**Non-Urban/ Suburban/ Crosstown**	**Flex**	**Regional**	**Express/ Commuter**
Weekdays							
Early Morning	20	15	10	10	5	15	15
Late Night	20	15	10	10	5	15	15
All Day	50	35	20	15	5	20	25
Saturdays							
Early Morning	20	10	10	10	5	15	-
Late Night	20	10	10	10	5	15	-
All Day	30	20	15	10	5	15	-
Sundays							
Early Morning	20	10	10	10	5	15	-
Late Night	20	10	10	10	5	15	-
All Day	30	20	15	10	5	15	-

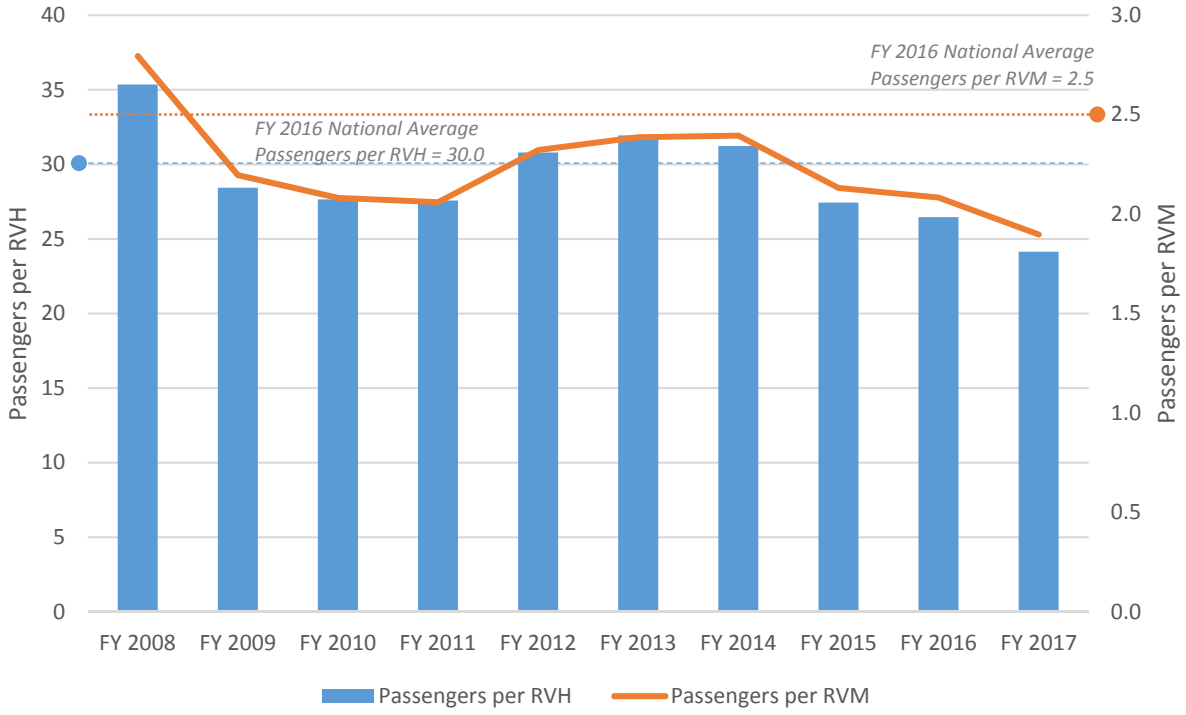
Note: "Early Morning" and "Late Night" refers to service before and after the minimum span of service. All day refers to the complete span of service, including early morning and late night service. "-" indicates that the standard does not apply. *Express productivity is measured as a minimum number of passengers per trip

Source: Rhode Island Public Transit Authority. "Service Guidelines" April 2015. https://www.ripta.com/stuff/contentmgr/files/0/9dcc62316daeb256a7e9e7dc561a62b0/files/ripta_service_guidelines_april_2015.pdf

As shown in Figure 3-5, overall RIPTA route productivity follows a trend line very similar to ridership, peaking in 2008, decreasing for three years before improving again over FY 2012 to FY 2014, then decreasing again over the last three years. This decline in productivity can largely be attributed to recent declines in ridership. It should also be noted that this chart shows average productivity over the entire system; certain urban routes remain highly productive, but are offset overall by other services in less densely populated areas.

Nationally, during FY 2016 the bus mode served an average of 30 passengers per revenue vehicle hour and 2.5 passengers per revenue vehicle mile. These national averages include 1,230 bus systems serving an average of 3.9 million passengers annually. Systems vary widely with systems on the small end serving fewer than 500 passengers annually and the largest system (MTA New York City) serving over 700 million passengers annually.

Figure 3-5 RIPTA Bus Service Annual Revenue Miles and Hours (FY 2008 – FY 2017)



Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

Note: National Averages for the Bus mode comprised of rubber-tired passenger vehicles operating on fixed routes and schedules over roadways. Vehicles are powered by Diesel, Gasoline, or Battery.

Table 3-2 shows a snapshot of these productivity measures for FY 2016. RIPTA's fixed-route buses carried an average of 27.2 passengers per revenue vehicle hour and Flex service carried 10.3 passengers per revenue hour. These compare favorably with RIPTA service standards.

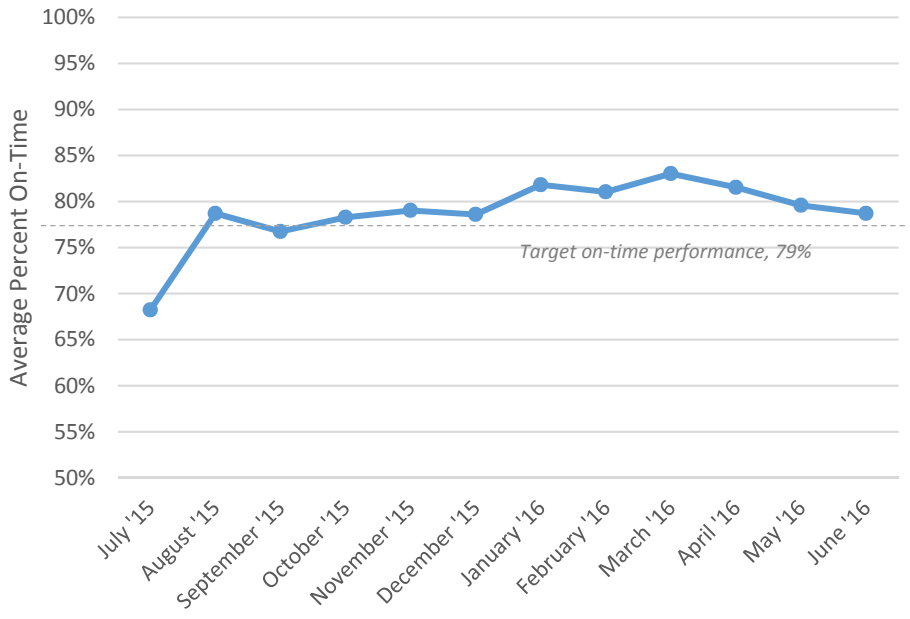
Table 3-2 RIPTA Bus Service Metrics (FY 2016)

	Passenger Trips	Revenue Hours	Revenue Miles	Passengers per Hour	Passengers per Mile
Flex	326,043	31,681	324,811	10.3	1.0
Fixed-route	17,487,062	641,728	8,222,095	27.2	2.1
Total	17,813,105	722,345	8,546,906	26.5	2.1

Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

RIPTA tracks on-time performance for all its bus routes. A bus is considered on-time if it passes a timepoint between one minute early and five minutes late. The minimum on-time performance standard is to exceed the average on-time performance of peer transit agencies, although RIPTA strives for the best on-time performance possible. The current minimum on-time performance standard is 79 percent. As shown in Figure 3-6, monthly on-time performance in FY 2016 ranged from 68 percent to 83 percent, with the overall annual average meeting the 79 percent target.

Figure 3-6 RIPTA Monthly On-Time Performance (FY 2016)



Source: Rhode Island Public Transit Authority. 2016. On-time Performance records.

3.1.3.2 RIPTA Paratransit Service Performance

Figure 3-7 depicts annual ridership on RIPTA's paratransit service, including ridership on the Ride paratransit brokerage program managed by RIPTA prior to FY 2015. Ridership fell significantly in FY 2015 when the provision of Non-Emergency Medical Transportation (NEMT) under Medicaid was transitioned from RIPTA's Ride Program to a private contractor. Ridership fell from a peak of 706,310 in FY 2012 to 363,857 in FY 2017.

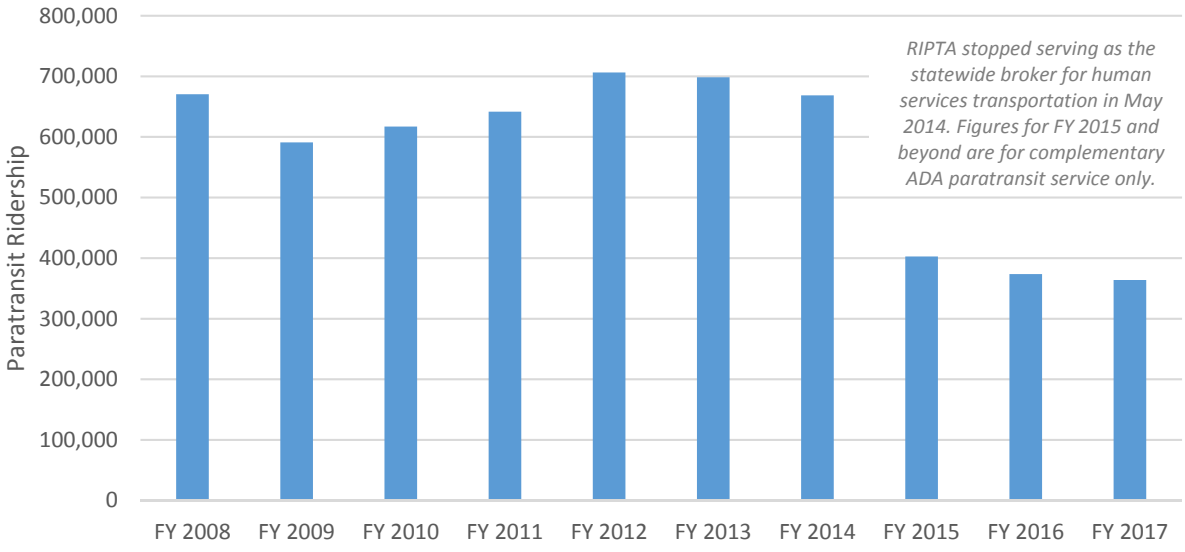
Table 3-3 shows paratransit service data for FY 2016. As is typical of all paratransit services, ridership per hour or mile is substantially lower than for general bus service. Many of the same external factors that impact general bus ridership can also impact paratransit ridership.

Table 3-3 RIPTA Paratransit Service Metrics (FY 2016)

Passenger Trips	Revenue Hours	Revenue Miles	Passengers per Hour	Passengers per Mile
373,629	179,245	2,975,367	2.1	0.1

Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

Figure 3-7 RIPTA RIDE Program and ADA Paratransit Service Ridership (FY 2008 – FY 2017)



Source: U.S. Dept. of Transportation, 2017. "National Transit Database." Federal Transit Administration. Available at www.transit.dot.gov/ntd. Accessed December 2017.

3.2 Passenger Rail Services

Rhode Island is served by two passenger rail services – the Massachusetts Bay Transportation Authority (MBTA) and Amtrak operating on 50 miles of passenger rail in the state. MBTA provides commuter rail service from several Rhode Island stations into Boston, while Amtrak provides service on its Northeast Corridor alignment north to Boston and south to Connecticut, New York and points further south. Figure 3-8 shows the alignment of the Northeast Corridor and existing passenger rail stations in Rhode Island.

3.2.1 MBTA Commuter Rail

The MBTA's Providence/Stoughton Line operates along Amtrak's Northeast Corridor in Rhode Island, serving stations in Providence, at T.F. Green Airport in Warwick, and at Wickford Junction in North Kingstown. The MBTA has been serving Providence Station since 1988, with both T.F. Green and Wickford Junction stations opening in 2010.

RIDOT is currently working to design and construct a fourth commuter rail station to be served by the MBTA's Providence Line. This station will be built on the Pawtucket/Central Falls border and is anticipated to open in 2020.

3.2.2 Commuter Rail Service

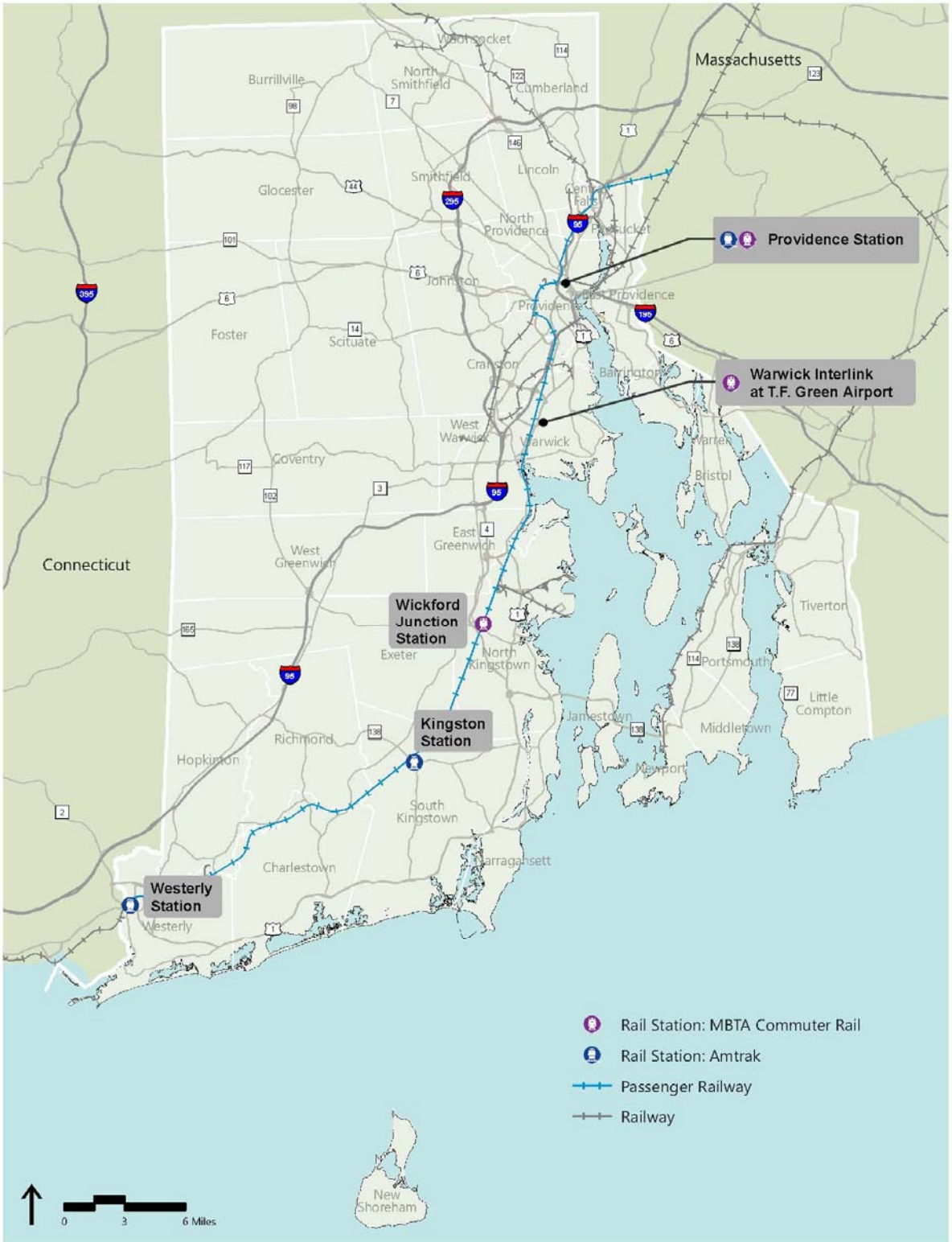
Providence Station is the third busiest commuter rail station in the MBTA network following Boston South Station and North Station[5]. Twenty-three outbound and 20 inbound MBTA commuter rail trains serve Providence Station each weekday, serving nine stations to the north including Attleboro, Route 128 and Boston's Ruggles, Back Bay and South Stations.

The T.F. Green Airport and Wickford Junction stations are served by 10 trips each weekday. Only Providence has service on weekends, with nine roundtrips on Saturdays and seven on Sundays.

MBTA rail services in Rhode Island are funded through an interstate agreement known as the Pilgrim Partnership. Rhode Island provides federal capital dollars to the MBTA in return for service, with some additional contributions depending on fare collections in Rhode Island.

[5] Massachusetts Bay Transit Authority. "Ridership and Service Statistics, 14th Edition". 2014. https://cdn.mbtace.com/uploadedfiles/documents/2014%20BLUEBOOK%2014th%20Edition(1).pdf

Figure 3-8 Passenger Rail Service



3.2.3 Commuter Rail Infrastructure

The Northeast Corridor rail line in Rhode Island is owned by Amtrak.

Providence Station is owned by Amtrak and serves both Amtrak and MBTA commuter rail trains. It is served by eight RIPTA routes. The station is open every day, from 5:00 am to 11:30 pm. There are 330 parking spaces available directly adjacent to the station in an underground garage, and several other parking facilities nearby. The state is planning to construct a RIPTA bus terminal in the vicinity of the station, to host both RIPTA and intercity bus services, transforming it into a true intermodal hub.

T.F. Green Airport Station is owned by the state and managed by the RI Airport Corporation. It is connected to T.F. Green Airport by the Interlink, a skywalk with moving sidewalks, and serves as a multimodal center for airport-related transportation services including RIPTA and car rental agencies. The station includes a 650-space garage and daily and monthly parking is available for commuter rail users. Looking toward the future, providing Amtrak service at this location would be an opportunity to enhance intermodal connections at T.F. Green Airport.

Wickford Junction Station was built as part of a public-private partnership with developers of the adjacent Wickford Junction Plaza. The station has an indoor waiting area and covered platform. A 1,100-space garage is attached to the station and parking is currently free. The station is served by RIPTA bus service.

In 2006, Rhode Island constructed the Pawtucket Layover Facility which is used for light maintenance and layover of MBTA trains.

A new commuter rail station is currently being planned near the Pawtucket/Central Falls border on the Northeast Corridor. The Pawtucket Transit Center, served by nine RIPTA bus lines, will be relocated at or near the new station to create an intermodal facility.

3.2.4 MBTA Providence Line Performance

Annual boardings among the three Rhode Island stations are approximately 400,000 and average weekday boardings exceed 1,800. More than 80 percent of these boardings occur at Providence Station.

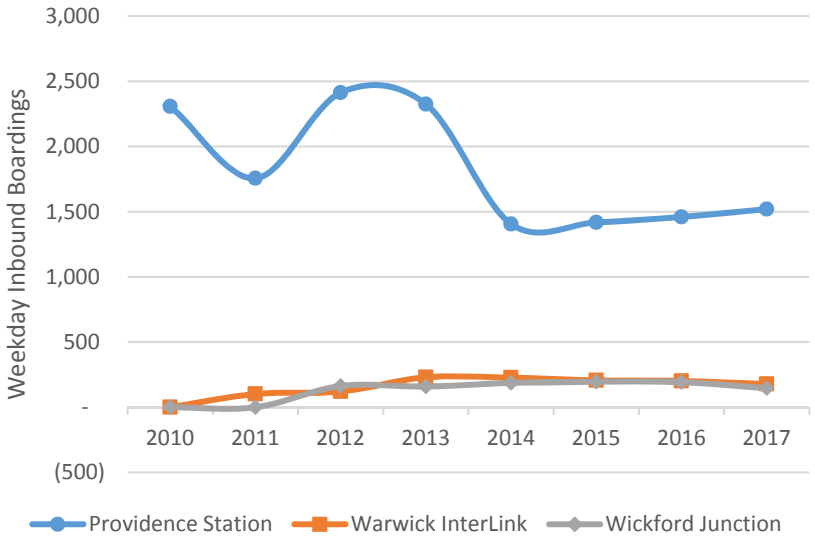
In 2015, RIDOT transitioned to a new methodology for estimating commuter rail boardings in Rhode Island. RIDOT now conducts quarterly counts at each of the three stations. RIDOT believes the ridership estimates displayed over the last three years, albeit lower than 2013 and 2014, provide more reliable metrics.

The MBTA has a Service Delivery Policy that establishes service standards for all of its public transit services. Among those for commuter rail are accessibility and reliability.

Accessibility is a two-part standard regarding span of service and frequency of service. The service span requirements call for service between 7:00 am and 10:00 pm on weekdays and 8:00 am and 6:30 pm on Saturdays. The minimum frequency standards for commuter rail require (1) at least three trains provide service in the peak direction during the morning and evening peak periods and (2) trains run at least every three hours on Saturdays and during off peak times on weekdays. All these standards are met for Providence Station. The standards are met for the other stations except that there is no Saturday service.

Figure 3-9 shows weekday inbound (toward Boston) boardings for MBTA trains at the three Rhode Island's stations with MBTA service. Providence Station is by far the most heavily used of these three and shows more responsiveness to market conditions. As with bus services, MBTA ridership rose with the higher fuel prices and improving labor market conditions of 2012 and 2013 and declined as fuel prices dropped and other market factors such as low-cost auto loan credit proliferated. Recent years show a slightly upward trend from 2014.

Figure 3-9 Commuter Rail Weekday Inbound Boardings (FY 2010 – FY 2017)



Source: Rhode Island Dept. of Transportation. 2017. RIDOT Commuter Rail Planning Assistance: Ridership Observations and Survey. August 4, 2017.

The reliability standard for commuter rail service is that 95 percent of all trips arrive and depart within five minutes of scheduled arrival and departure times. The entire MBTA commuter rail system, including the Providence Line, has been somewhat below the target performance level over the past two years, as shown in Table 3-4.

Table 3-4 Providence Commuter Rail On-Time Performance

Commuter Rail Line	On-Time Performance 2016	On-Time Performance 2017*
Providence Line	86.7%	87.8%
All Commuter Rail Lines	89.2%	88.6%
MBTA Standard	95.0%	95.0%

Source: Massachusetts Bay Transportation Authority. 2017. MBTA Performance Dashboard. URL: http://www.mbtabackontrack.com/performance/index.html#/home.
2017 data reflects performance through 12/7/2017.

3.2.5 Intercity Passenger Rail (Amtrak)

Amtrak's Northeast Corridor service provides intercity rail service between Boston, Massachusetts and Washington, DC, serving three Rhode Island stations in Providence, Kingston, and Westerly. Providence is served by Amtrak's high-speed Acela service, as well as its local Northeast Regional trains. Kingston and Westerly are served only by the regional trains.

There are 12 weekday round trips via Amtrak's Acela Express service from Providence, along with two trips on Saturdays and five on Sundays. Amtrak's Northeast Regional service stops at all three Rhode Island stations with nine daily round trips.

Boston-bound trains stop at Route 128 Station. New York City-bound trains make several intermediary stops in Connecticut and continue to Philadelphia, Baltimore and Washington, D.C. From New Haven, Connecticut, connections can be made to other Amtrak trains serving western Massachusetts, Vermont and Montreal, Canada. From Boston, Amtrak connections are also available to central and western Massachusetts, New Hampshire and Maine.

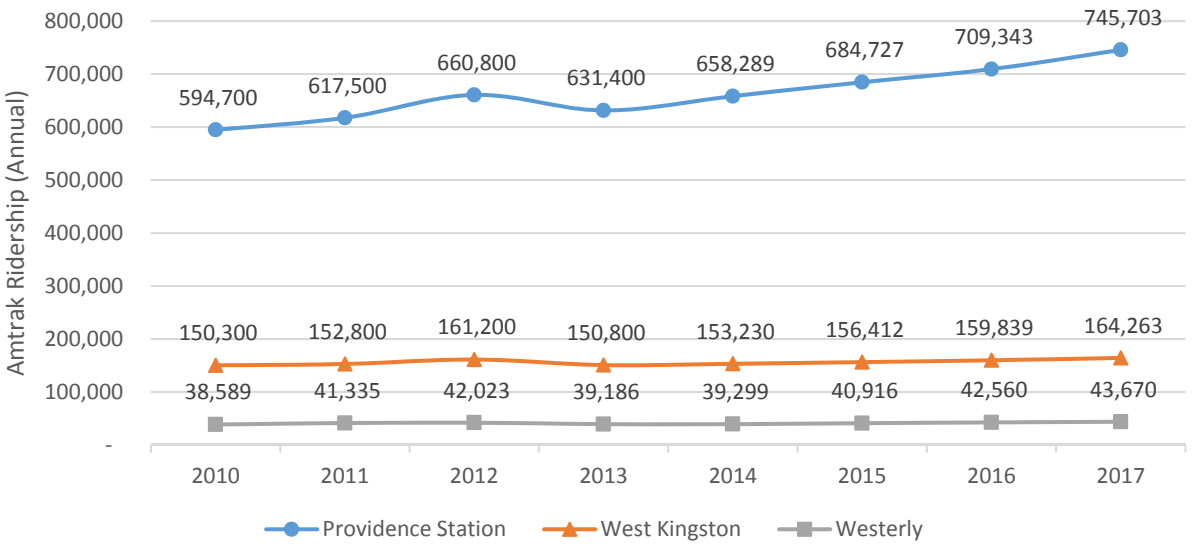
Amtrak owns and maintains the Northeast Corridor rail right-of-way for its entire length through Rhode Island.

Providence Station is owned by Amtrak and is also used by MBTA commuter rail. The Kingston and Westerly stations are owned by RIDOT. Providence and Kingston are staffed daily; Westerly is staffed on weekdays. All Amtrak stations are served by RIPTA fixed-route or Flex services. Providence and Kingston have long-term parking available.

Annual ridership among the three Rhode Island stops exceeds 900,000 passengers annually as of 2016 (Figure 3-10). About 78 percent of these trips begin/end at Providence Station. Ridership for Westerly and West Kingston is flat, while Providence ridership shows a 25 percent increase since 2010. In 2015 Providence Station was the 11th busiest station in the national Amtrak system.[6]

[6] "Amtrak National Facts" Amtrak, 2018, www.amtrak.com/about-amtrak/amtrak-facts/amtrak-national-facts.html.

Figure 3-10 Amtrak Annual Passenger Arrivals and Departures at Rhode Island Stations, 2010-2017



Source: Amtrak. Amtrak Fact Sheet, Fiscal Year 2017: State of Rhode Island. https://www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/statefactsheets/RHODEISLAND17.pdf

National Association of Railroad Passengers. Amtrak Ridership Statistics. https://www.railpassengers.org/site/assets/files/1038/cities-2.pdf

3.3 Vanpools

Vanpools provide Rhode Island commuters with a lower cost transportation option for getting to and from work, particularly on routes where other public transit is not available. RIPTA has partnered with Enterprise Rideshare to provide and maintain vans and offers monthly subsidies as an incentive for commuters to switch from single-occupancy vehicle commutes. RIPTA's Commuter Resources department manages the program and uses NuRide (a carpool matching program) to help commuters find others with similar commutes. The program started in July 2017 and has limited performance data to date.

Certain Rhode Island employers also partner with vRide, the Massachusetts Department of Transportation's vanpool program, or other private vanpool contractors.

3.4 Taxi, Livery, and Ride Hailing

Taxis, limousine/sedan companies, and ride hailing networks such as Uber and Lyft provide on-demand and pre-arranged ride service throughout Rhode Island.

Taxi and Public Motor Vehicle Companies (limousine/sedan service) carriers are registered with the Public Utilities Commission Division of Public Utilities and Carriers. As of 2016, there were 49 taxi companies and 171 Public Motor Vehicle

Companies. Taxi territories cover all Rhode Island communities except Exeter, Foster, Glocester, Hopkinton, Richmond, and Scituate.

Several taxi companies also offer accessible taxi service using vehicles equipped with wheelchair ramps purchased through RIPTA using federal grant monies. These accessible taxis are available in 17 communities and at T.F. Green Airport.

Uber and Lyft are Transportation Network Companies (TNCs) providing ride-hailing service by individuals using their personal vehicles. Both TNCs primarily cover the more urbanized parts of Rhode Island and are not available in more rural parts of the state.

3.5 Human Services Transportation

Rhode Island's state agencies and municipalities provide some public transportation services specifically designed for elderly persons and individuals with disabilities.

3.5.1 RIPTA Programs

- **ADA Complementary Paratransit Service** serves individuals with disabilities and is available within three-quarters of a mile of all RIPTA fixed-route bus service. It operates during the same hours and days as does the fixed-route service. All trips start and end in the corridors of the fixed bus service.

  To be eligible, persons must have a health professional certify that their disability prevents them from using a regular fixed route. One-way fare is $4.00 and if a person uses a personal care assistant no fare is charged for the assistant.
- **The Senior & Disabled Pass Program** allows seniors and persons with disabilities to pay half-fare ($1.00) on fixed and Flex routes during non-peak hours. Low-income seniors and persons with disabilities can purchase a pass allowing them to ride fixed routes and flex routes at no fare.

3.5.2 State Programs

Since May 2014 the following programs have been managed by LogistiCare, a private transportation broker under statewide contract with the Department of Health and Human Services. LogistiCare uses a variety of providers including taxis, the RIPTA paratransit vans and ambulance companies.

- **The Elderly Transportation Program** funds Ride transportation for seniors (age 60+) and all adults with disabilities whose income qualifies them for DHS medical assistance. Transportation is provided on weekdays to medical appointments, nutrition centers, and adult day centers. The fee is $2.00 per trip.
- **Service for Persons with Developmental Disabilities** is funded by the RI Division of Behavioral Health, Developmental Disabilities, and Hospitals. The weekday service proved transportation to group settings or supported employment for individuals with developmental disabilities.

- **Non-Emergency Medical Transportation (NEMT)** is funded by Medicaid and is provided through the Department of Human Services. It provides transportation to medical services for Medicaid enrollees who cannot utilize regular RIPTA bus services. Rides must be booked 48 hours in advance and a 15-minute window before and after scheduled pick-up time.

3.5.3 Non-Profit and Community Transportation Services

Seventeen Rhode Island communities provide transportation for local seniors to senior centers, meal sites, shopping, and local errands. The service typically operates weekdays, using a single van, on a reservation basis. Some communities offer the service to residents with disabilities.

Among other transportation services provided are those by a number of non-profit human service agencies to provide non-emergency medical transportation outside of the Ride Program, as well as some local volunteer programs that provide local transportation for seniors.

3.6 Passenger Ferries

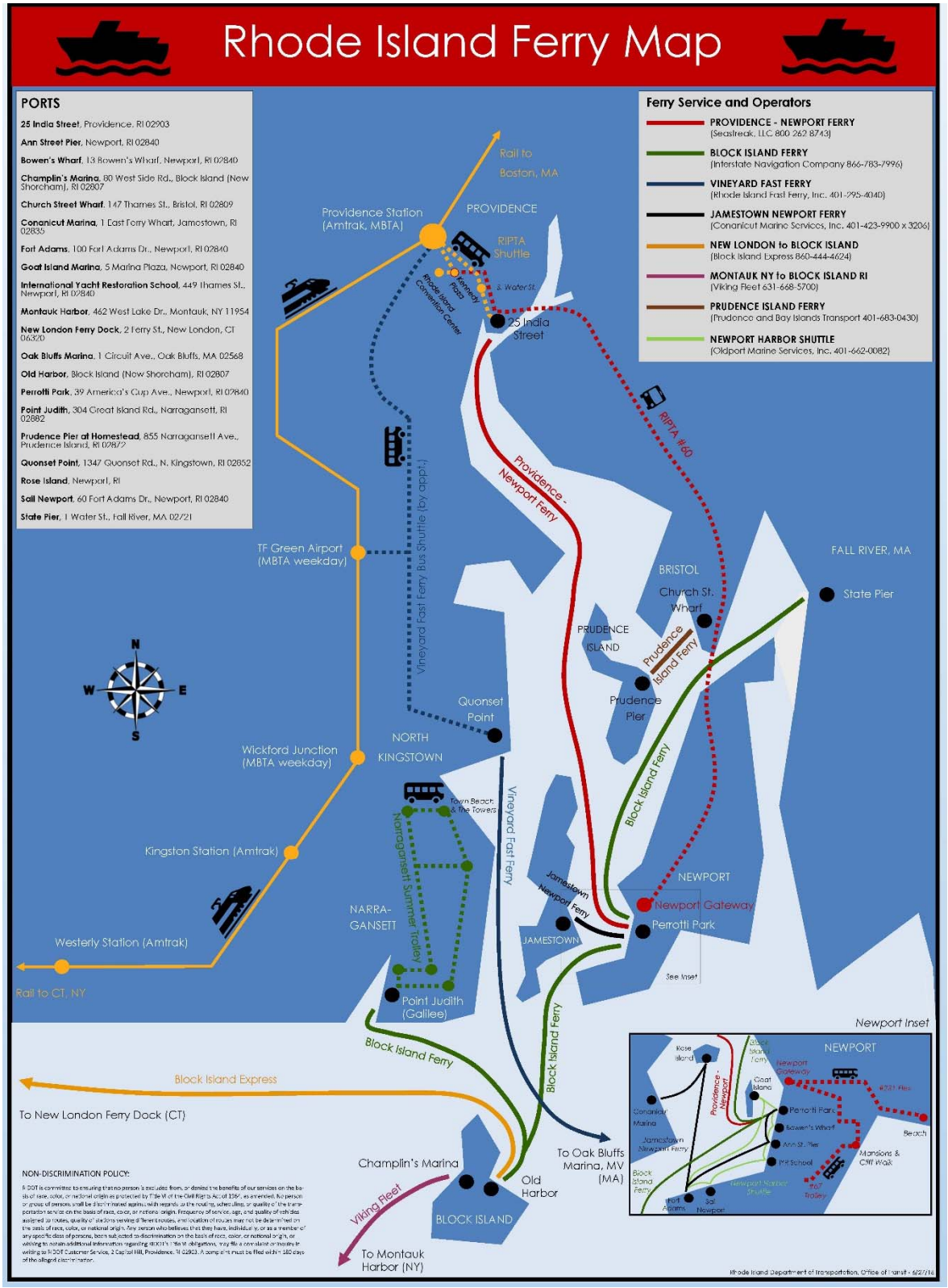
There are currently six intrastate and four interstate passenger ferry services operating in Rhode Island. Only one of these services – the seasonal Providence to Newport ferry – is operated by the state. The other services are privately owned and managed.

3.6.1 Services

As shown in Table 3-5 and in Figure 3-11, year-round service is provided only to Prudence Island in Portsmouth and to Block Island (otherwise known as New Shoreham), two islands with year-round populations. Seasonal connections can be made to a number of in-state and out-of-state coastal locations.

The Block Island Ferry is operated by the Interstate Navigation Company, offering both traditional and high-speed service out of the Port of Galilee in Narragansett to Old Harbor in New Shoreham. The Prudence Island Ferry operates year-round from the Church Street Wharf in Bristol to Prudence Wharf; the operator is Prudence and Bay Island Transport Company.

Figure 3-11 Rhode Island Ferry Map



Source: Rhode Island Dept. of Transportation. Intermodal Planning.

Table 3-5 Rhode Island Passenger Ferry Service

Service	Schedule
Intrastate Route	
Narragansett (Port Judith) and Block Island	Year Round
Prudence Island and Bristol	Year Round
Newport and Block Island	Seasonal
Jamestown and Newport	Seasonal
Newport Harbor Shuttle	Seasonal
Providence and Newport	Seasonal
Interstate Route	
New London, CT and Block Island	Seasonal
Montauk, NY and Block Island	Seasonal
Fall River, MA and Newport	Seasonal
Quonset Point and Martha's Vineyard, MA	Seasonal

There are five seasonal passenger ferry services serving Newport. The Interstate Navigation Company operates between Fall River and Block Island with an intermediary stop in Newport. Private operators also run the Jamestown-Newport Ferry, which serves three stops along the Newport waterfront, Goat Island, and the Conanicut Marina in Jamestown. The Newport Harbor Shuttle serves six destinations within the harbor.

The Providence–Newport ferry is the newest service and the only service managed by the state. It was started in 2016 and operates from the Seastreak Ferry Terminal in Providence. A free RIPTA shuttle makes connections between the terminal and Providence Station, the RI Convention Center, and downtown Providence. First year ridership of 33,221 increased to 43,068 in 2017. This increase is partially due to a longer 2017 season, (mid-June to October 1st, versus July 1st to Labor Day in 2016). Some 30% of passengers are from out of state.[7]

There is also seasonal service from Block Island to Connecticut and Long Island, and from Quonset Point to Martha's Vineyard, Massachusetts.

In 2016, the Rhode Island Division of Public Utilities granted a license to RI Fast Ferry to operate new fast ferry service from Quonset Point to Block Island. A new dock is planned on Block Island to accommodate this new service, which has yet to begin operations.

[7] Rhode Island Department of Transportation. "Quarterly Report July – September 2016". October 30, 2016. http://www.admin.ri.gov/documents/Reports/OMB//2016-10-30_%20Transportation%20-%20RhodeWorks%20Quarterly%20Report.pdf
RI.gov. "RIGOV." RI.gov: Rhode Island Government, 5 Oct. 2017, www.ri.gov/press/view/32050.

3.6.2 Infrastructure

The RI Department of Environmental Management owns the passenger ferry piers at the Port of Galilee and in Newport. The Quonset Development Corporation, a quasi-public state entity formed under the RI Commerce Corporation, owns the Quonset pier.

South Pier on Block Island is owned by the Town of New Shoreham.

All passenger ferries are privately owned, with the Providence to Newport ferry contracted by RIDOT for seasonal operations.

3.7 Intercity Bus

Providence, T.F. Green Airport, and Newport are served by regional or national private motor coach companies (see Figure 3-12).

Greyhound and Peter Pan Bus Lines both provide regional service throughout New England, and national connections via New York City. These carriers provide more than 10 trips each day to Boston/Logan Airport, New York, and Springfield. Service is also available to Cape Cod, Hartford, Connecticut, Albany, New York and other southeastern New England destinations.

Megabus and Go Bus are low cost carriers providing direct connections from Providence to New York and Boston, as well as to Fall River and New Bedford, Massachusetts, and New Haven and Hartford, Connecticut.

Providence is served by all four motor coach carriers. Greyhound and Peter Pan operate out of the RI Convention Center on Sabin Street. Megabus and Go Bus stop on Canal Street in Providence and do not maintain physical ticket windows (passenger pre-purchase tickets electronically).

Service from Newport's Gateway Center is provided by Peter Pan Bus Lines, with four round trips daily to Boston via Fall River. The route also serves Middletown and Portsmouth. At Fall River there are connections to New Bedford and Hyannis, and to Providence.

The service at T.F. Green Airport in Warwick is part of a comprehensive set of local and regional transit options to/from the airport. Peter Pan Bus Lines operates five daily roundtrips from T.F. Green Airport to Logan Airport in Boston. Stops are made in Providence and downtown Boston.

Figure 3-12 Intercity Bus Regional Connections

The *Northeast Corridor Intercity Travel Study* (September 2015) looked at origin-destination travel in the northeast corridor for all modes of travel. Among the findings of the study are:

- Travel between the northeast corridor submarkets of Greater Boston/Providence and New York City was among the most heavily travelled submarket pairs. Intercity bus travel accounted for 13 percent of the trips between Boston/Providence and New York City. Rail travel accounted for 15 percent of the trips.
- Half of automobile trips between Boston/Providence were by persons driving alone, whereas three-quarters of trips using intercity bus were by persons traveling alone.
- 86 percent of intercity bus trips in the Northeast Corridor were for personal travel rather than business purposes. This is comparable to automobile travel.
- 34 percent of those using intercity buses in the Northeast Corridor do not have access to a car.
- Of those using intercity buses in the Northeast Corridor, seven percent would not have made the trip if bus travel were not an option. If bus travel were not an option, slightly over half would have traveled by rail. Of those driving, 40 percent would not have made the trip if they could not drive. One-third of drivers would use rail for their trip if they could not drive.

3.8 Key Findings

- RIPTA provided 16.2 million rides in 2017. Average weekday boardings are more than 60,000, two-thirds of which occur in Providence.
- In 2017 RIPTA served 1.9 passengers per revenue mile and 24.1 passengers per revenue hour.
- Providence Station is the third busiest commuter rail station in the MBTA commuter rail network following Boston South Station and North Station.
- Providence Station is the 11th busiest Amtrak Station in the national network.
- Along the Northeast Corridor travel between Greater Boston/Providence and New York City is one of the most heavily traveled independent of mode.

This page intentionally left blank.

4

Bicycling & Walking

Non-motorized transportation is a critical element of the overall transportation network in Rhode Island. These modes provide walking or biking mobility for whole trips, but can also complement and support trips via all modes. Transportation planners often talk about the first and last mile of a trip – where non-motorized modes are key in connecting to passenger transportation and parking. Active transportation modes like bicycling and walking have been identified as important means to improved public health outcomes.

This chapter describes the various facilities that make up the existing non-motorized transportation network.

4.1 Bicycle Facility Types

Figure 4-1 shows the shared use paths, bike lanes, and signed bike routes in Rhode Island. Table 4-1 summarizes what is shown in these features.

Table 4-1 Bicycle Facilities

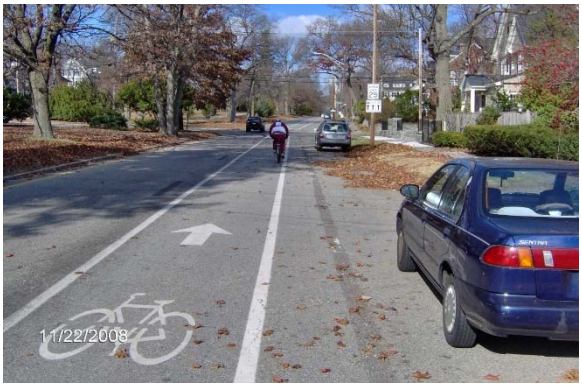
Facility Type	Quantity (Miles)
Shared Use Path (existing)	67.4 miles
Bike Lane (existing)	11.6 miles
4' minimum shoulder & signage (existing)	118.8 miles
Shared Use Path (funded)	11.5 miles
Bike Lane (funded)	9.6 miles

Source: Rhode Island Dept. of Administration. 2018. "Rhode Island Statewide Bicycle Mobility Plan [Draft]." Division of Statewide Planning.

4.1.1 Shared Use Path

A shared use path is a trail-like facility dedicated for non-motorized users, only. These are frequently shared use, but in some instances separate pathways may be provided for bicycles and pedestrians (either with separate paved surfaces or paint delineation). These paths may be paved or unpaved, marked or unmarked with a center line, and may be enhanced by complementary amenities or infrastructure such as informational kiosks, wayfinding signage and lighting. Most pedestrians and bicyclists feel very comfortable on this type of infrastructure, as they do not have to share space with motor vehicles.

4.1.2 Bike Lane



A bike lane is a portion of the roadway that has been designated for the preferential or exclusive use of bicyclists through striping, signage and pavement markings. Bike lanes are typically located adjacent to a righthand curb or parking lane, four to six feet wide and separated from motor vehicle traffic by a solid white line. Bike lanes may be supplemented with a black and white bike lane sign. Variations include buffered bike lanes (where additional space is provided between bicyclists and moving traffic or bicyclists and curbs through a marked buffer zone), contra-flow

bike lanes (where a designated bike lane travels against the general traffic flow of a street) and left-side bike lanes. Bike lanes provide a measure of comfort to bicyclists as they provide exclusive space, which is enhanced with buffer space. However, bicyclists still share the same travelled way as cars and are subject to hazards such as parked vehicles, turning vehicles and cars entering/exiting the road at driveways.

Parking-protected bike lanes are the traditional relationship of bike lane and parked cars are reversed – the bike lane is sandwiched between the curb and parked cars with a marked buffer zone. These facilities are considered a step in establishing a safer and more comfortable space for bicycling.

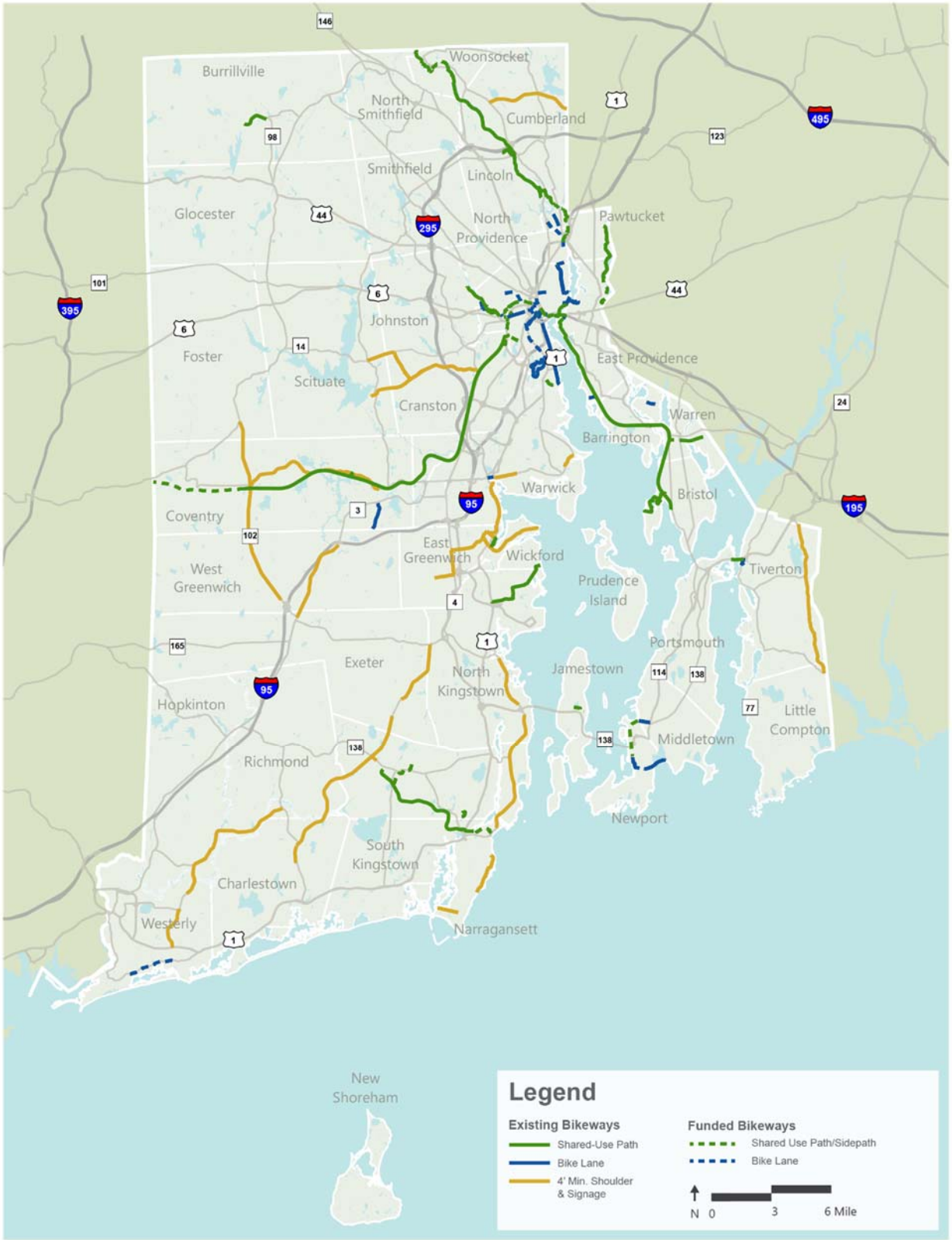
4.1.3 Shared Lane Bicycle Markings (aka Sharrows)

Shared Lane Markings, or sharrows, are a means of road marking meant to indicate a shared lane environment for bicycles and automobiles. No exclusive space is provided to bicyclists. Sharrows provide a suggested position on the roadway for bicyclists, alert motor vehicles about the potential presence and position of bicyclists on the road and have some safety benefits in the form of bicyclists riding farther away from the door zone of parked cars and cars giving more space to bicyclists when passing. Some cities have used sharrows as wayfinding devices where bikeways change direction, or as a means of navigating bicyclists through intersections. As no dedicated space is provided, level of comfort for bicyclists depends highly on the volume and relative speed of cars. For those bicyclists less amenable to sharing a street with general vehicular traffic, sharrows provide little comfort.

4.1.4 Signed Bicycle Route

Signed bicycle routes are designated with the traditional, green bicycle route sign, but does not involve any roadway marking or dedicated space for bicyclists. Some of these roads have a rideable shoulder that functions almost like a bike lane, but many do not. Bike route signage helps to alert motorists about the potential presence on roads. As no dedicated space is provided, bicyclist level of comfort depends highly on the volume and relative speed of cars.

Figure 4-1 Statewide Bicycle and Pedestrian Facilities



4.2 Bicycle Facilities in Rhode Island

Bicycle infrastructure in Rhode Island reaches several corners of the state. Major shared use paths provide 67.4 miles of paths include the following:

- Blackstone River Bikeway in northern Rhode Island connecting Woonsocket to the Central Falls line via Cumberland and Lincoln;
- Woonasquatucket River Greenway connecting Johnston to Providence and providing an isolated link along the river in Burrillville;
- Ten-Mile River Greenway connecting Pawtucket to East Providence along the state line;
- East Bay Bike Path connecting Bristol and Warren to Providence via Barrington and East Providence with an isolated link further north connecting Providence to Pawtucket;
- Washington Secondary Bike Path providing east-west connections from Coventry to the Providence line via West Warwick and Cranston; and
- William C. O'Neill (South County) Bike Path providing east-west connections across South Kingstown and Narragansett.

Bicycle facilities that provide connections to desirable destinations and to other bicycle facilities encourage ridership and facilitate bicycling as a transportation choice. Poor or non-existent connections discourage bicyclists and can decrease ridership for a given bicycle facility. Some bicycle facility types, such as high-quality shared use trails, are both a means of accessing destinations and recreational destinations in and of themselves.

Many of the shared use paths around the state provide connections to the Providence area (with the primary exception being the South County Bike Path). Despite these pathways providing some access, numerous gaps exist within and between shared use paths in and around Providence. Bridging gaps and building connections between shared use paths in the Providence area would help to create a network of bicycle options.

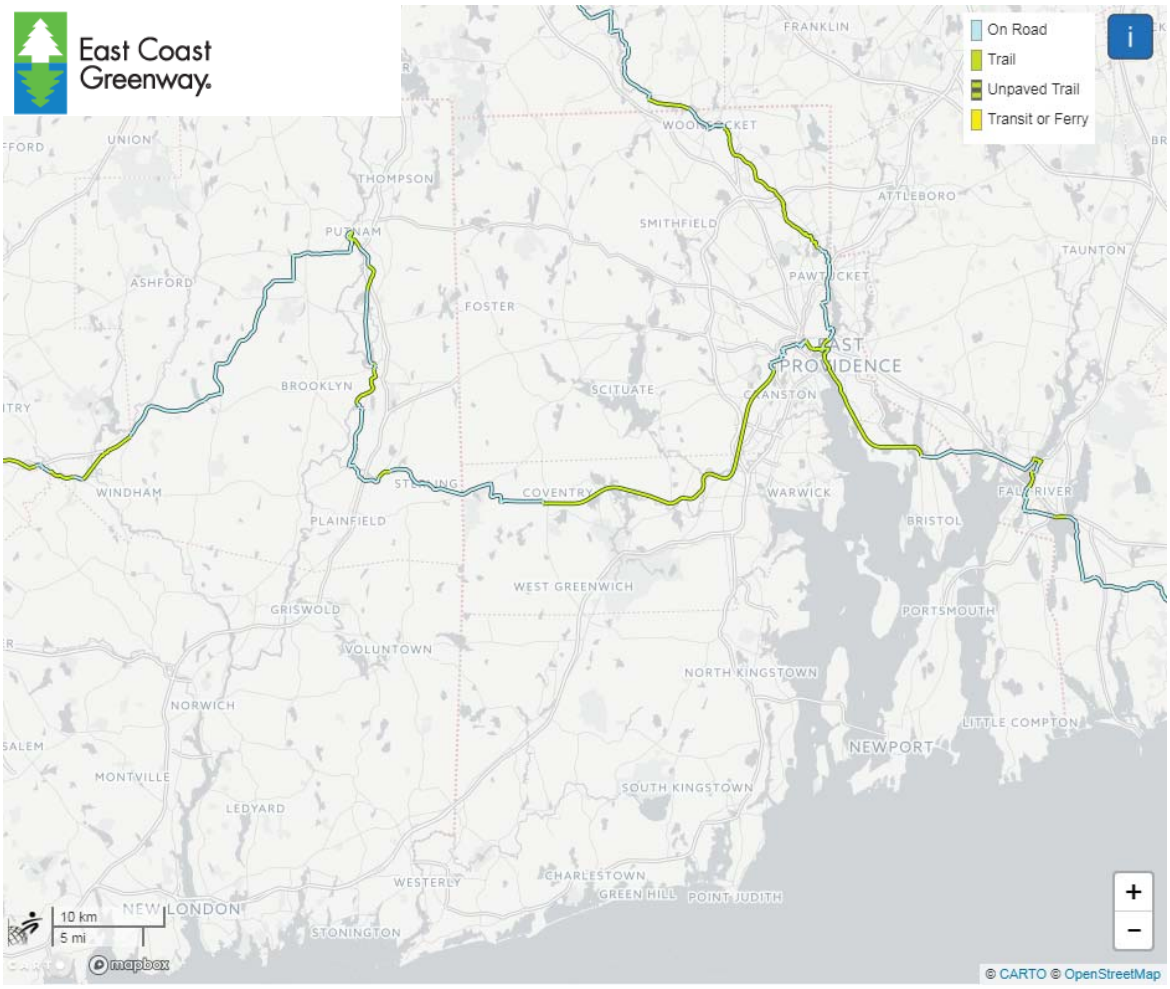
Bike lanes and sharrows around the state are less common than shared use paths, totaling about 24 miles statewide. Bike lanes are in use in Providence and Newport while bike sharrows are found in Providence, Pawtucket and Central Falls.

New types of bicycle facilities have been implemented in Rhode Island in recent years. In Central Falls there is a contra-flow bike lane on Washington Street. The wide pavement width on this one-way street is used to provide bicycle connectivity in the opposite direction of vehicle travel. In Providence, Fountain Street was recently restriped as a buffered bike lane, taking advantage of a reduction in the number of travel lanes. The Fountain street lane is separated from adjacent traffic by on-street parking, a striped buffer and vertical delineators. A similar project was recently completed on Providence's Olney Street.

4.2.1 Regional Connectivity

The primary regional connections for the bicycle network are along the East Coast Greenway (see Figure 4-2). This network provides a route for cycling north and south along the east coast, ranging from Maine to Florida. The Blackstone River Bikeway, East Bay Bike Path, and Washington Secondary Bike Path are part of the East Coast Greenway system. While these are part of the East Coast Greenway, none of them reach the state border. Each connects to facilities in neighboring Massachusetts or Connecticut through on-street connections. The gap between the Blackstone River Bikeway in Rhode Island and its Massachusetts complement is comparatively small (under 3 miles), and there are plans to close this gap.

Figure 4-2 East Coast Greenway



Source: East Coast Greenway. URL: https://map.greenway.org/ Accessed: November 2017.

4.3 Bicycle Network System Performance

4.3.1 Operations

Bicycle traffic counts are being undertaken as part of the Rhode Island Statewide Bicycle Mobility Plan. These are the first comprehensive counts of their kind, and may establish a baseline for further counting in the future. No data are yet available from this counting effort, and other existing sources of comprehensive bicycle count data are not available in Rhode Island. Several sources of existing data have been compiled to better understand existing cycling patterns in Rhode Island.

- The Blackstone River Bikeway and the East Bay Bike Path are the facilities with the highest annual average daily bicyclist volumes at about 1,700 bicyclists per day.[8]
- The Ten Mile River Greenway, Washington Secondary Path, South County Bike Path, and Quonset Bike Path each serve between 200-500 bicyclists per day.[9]
- Peak hourly volumes on highly-utilized shared use paths and dedicated on-street bicycle facilities can vary typically from 20 to 50 bicyclists per hour during peak cycling season.
- Observationally, on-street cycling is most common in Providence and Newport. These are also cities actively investing in on-street bicycle infrastructure.
- U.S. Census data indicates that less than one percent of Rhode Island workers bicycle to work, while approximately 3.8 percent walk.[10]
- Key operational deficiencies for the pedestrian and bicyclist network include:
  - High volumes of vehicle traffic;
  - Facility maintenance (general poor surfaces and snow/ice removal problems); and
  - Limited connectivity between existing bicycle facilities, to key destinations, and with other modes, specifically public transit.

4.3.2 Safety

Bicycle and pedestrian traffic fatality and serious injury trends have remained consistent in recent years. The five-year moving average crash trends for both modes are shown in Figure 4.3 and Figure 4-4. A five-year moving average for a given year is calculated using recorded data for four years preceding the year for

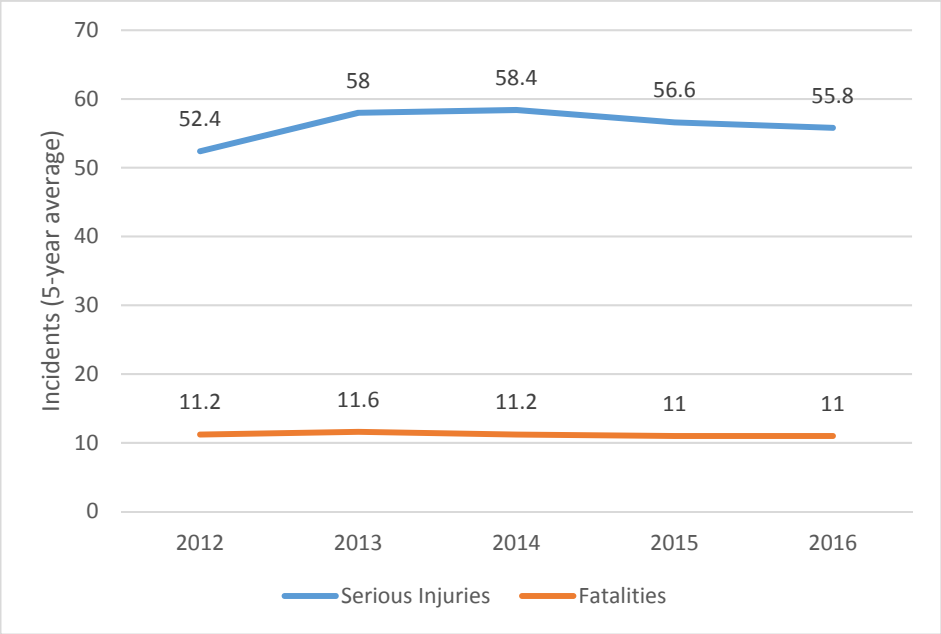
[8] Rhode Island Bicycle Coalition. "Leonard 2014 Bike Path Study". 2014. https://ribike.org/wp-content/uploads/Leonard-2014-Summary.pdf

[9] Ibid.

[10] U.S. Census Bureau. 2017. "2012-2016 American Community Survey 5-Year-Estimates." URL: https://factfinder.census.gov/.

which the moving average is stated. For example, a five-year moving average for 2012 would be an average of the number of incidents from 2008-2012. Moving averages are very useful in forecasting long-term trends.

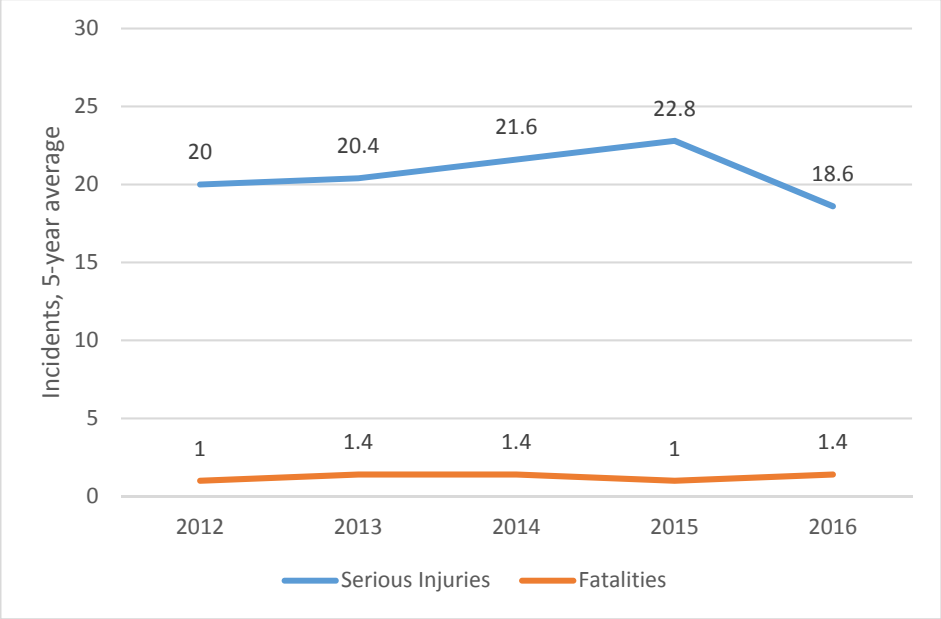
Figure 4-3 Rhode Island Pedestrian Fatalities and Serious Injuries



Source: Rhode Island Dept. of Transportation. 2017. "FFY 2018 Highway Safety Plan." Office of Highway Safety.

Pedestrian five-year average fatalities made up 20 percent of all traffic fatalities in Rhode Island in 2016 while bicyclist fatalities made up three percent. Similarly, serious injury crashes have remained consistent over recent years. Serious injury crashes involving pedestrians made up approximately 11 percent of serious injury crashes in 2016 and those crashes involving bicyclists made up approximately four percent of crashes. These data track with the national trend showing bicyclists and pedestrians are over-represented in serious and fatal crashes when compared to their modal share. For this reason, bicyclists and pedestrians (along with motorcyclists) are often referred to as *vulnerable users* of the transportation network.

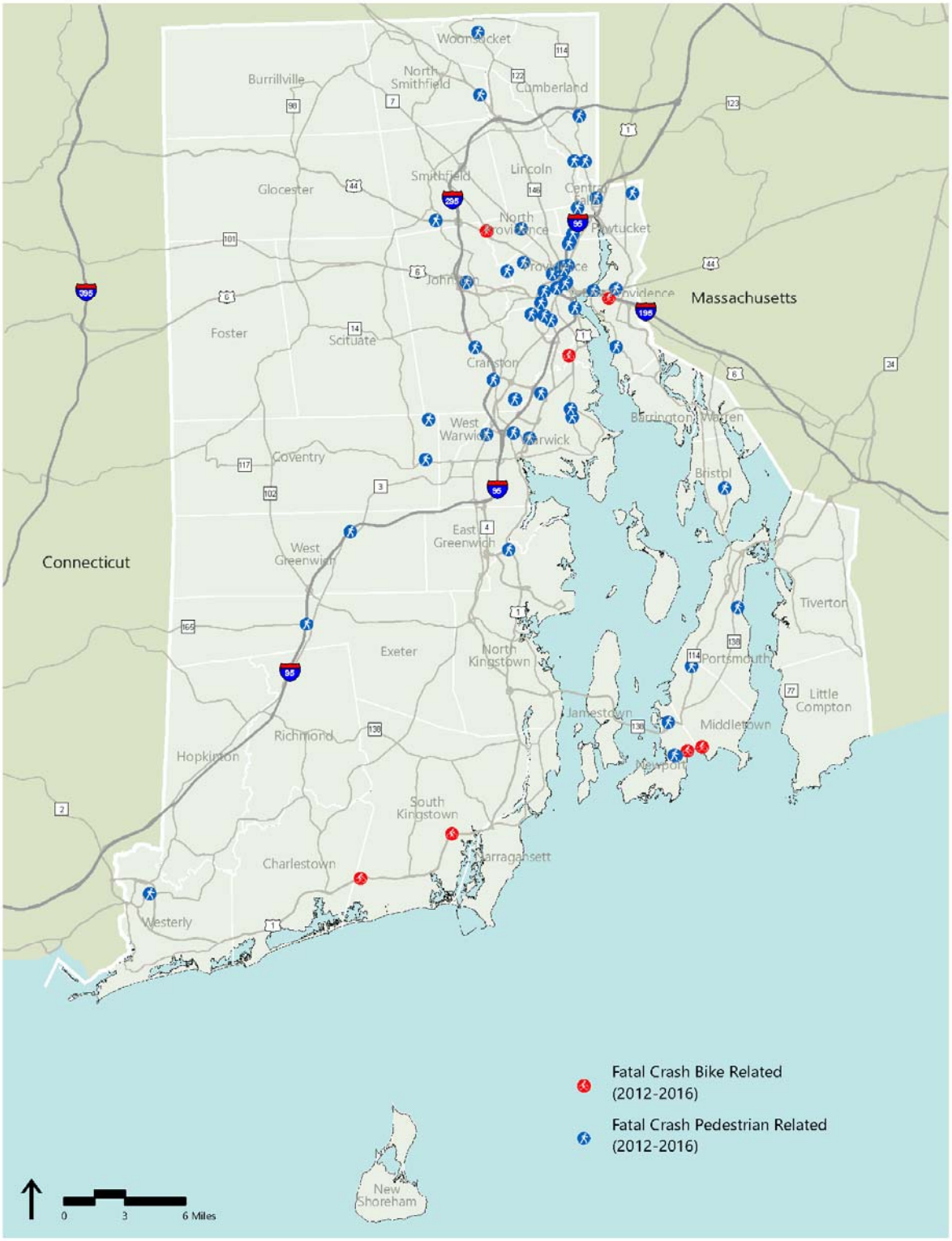
Figure 4-4 Rhode Island Bicyclist Fatalities and Serious Injuries



Source: Ibid.

Figure 4-5 shows the location of the bicycle and pedestrian fatalities in Rhode Island recorded during the 2012-2016 period. As would be expected for areas with higher volumes of walking, pedestrian fatalities occur predominantly in the Providence core and vicinity. Three bicycle crashes have occurred in the Providence vicinity, though there were also several fatal crashes during this period along Memorial Drive between Newport and Middletown and along US-1 in South Kingstown. More review of crash data would be required to determine the nature of fatal bicycle and pedestrian crashes, such as why they occur and what factors are present.

Figure 4-5 Rhode Island Bicycle and Pedestrian Serious and Fatal Crashes (2012-2016)



Source: Rhode Island Department of Transportation, 2012-2016. Fatal Crashes. Online System Crash Analysis & Reporting. Data current as of February 2018.

RIDOT has a goal of reducing the pedestrian five-year fatality average by nine percent by the end of 2018 – from 11 to 10 crashes. The goal for bicyclists is to maintain or reduce the five-year average number of fatalities at one incident in 2018 (RIDOT Office of Highway Safety, 2017. *FFY 2018 Highway Safety Plan*).

Safety of vulnerable users is an emphasis area of the RIDOT's Office of Highway Safety. Current strategies to improve bicycle and pedestrian safety include:

- Providing education to inform law enforcement and the public on vulnerable road user safety;
- Identify regulations or policies that could augment vulnerable road user safety;
- Enhance road design policies to account for vulnerable road users; and
- Work toward closing data gaps that limit data-driven solutions; in particular count data to better understand where bicycling and walking is taking place and how this information relates to crash locations.

Positive safety outcomes can also result simply from getting more people to walk and bicycle. This safety-in-numbers phenomenon has been noted in several cities – as prevalence of walking and biking rise, crash rates for those travel modes fall. It is believed that this is the result of general increased awareness of walkers and bicyclists among the driving public, and an outcome of more drivers also participating in these activities.

4.4 Key Findings

- Bicycling and walking make up about four percent of commuter mode share.
- Rhode Island has six shared use paths making up a 67.4 miles of off-road network. These facilities, however, are not connected resulting in significant gaps in the network.
- Pedestrian fatalities make up 20 percent of traffic fatalities annually statewide. Given the low bicycle/pedestrian mode share this is a disproportionate share of fatalities.
- Bicyclists make up about three percent of annual fatalities.
- The recently adopted 2017-2022 Strategic Highway Safety Plan includes a vulnerable user emphasis area.

This page intentionally left blank.

5

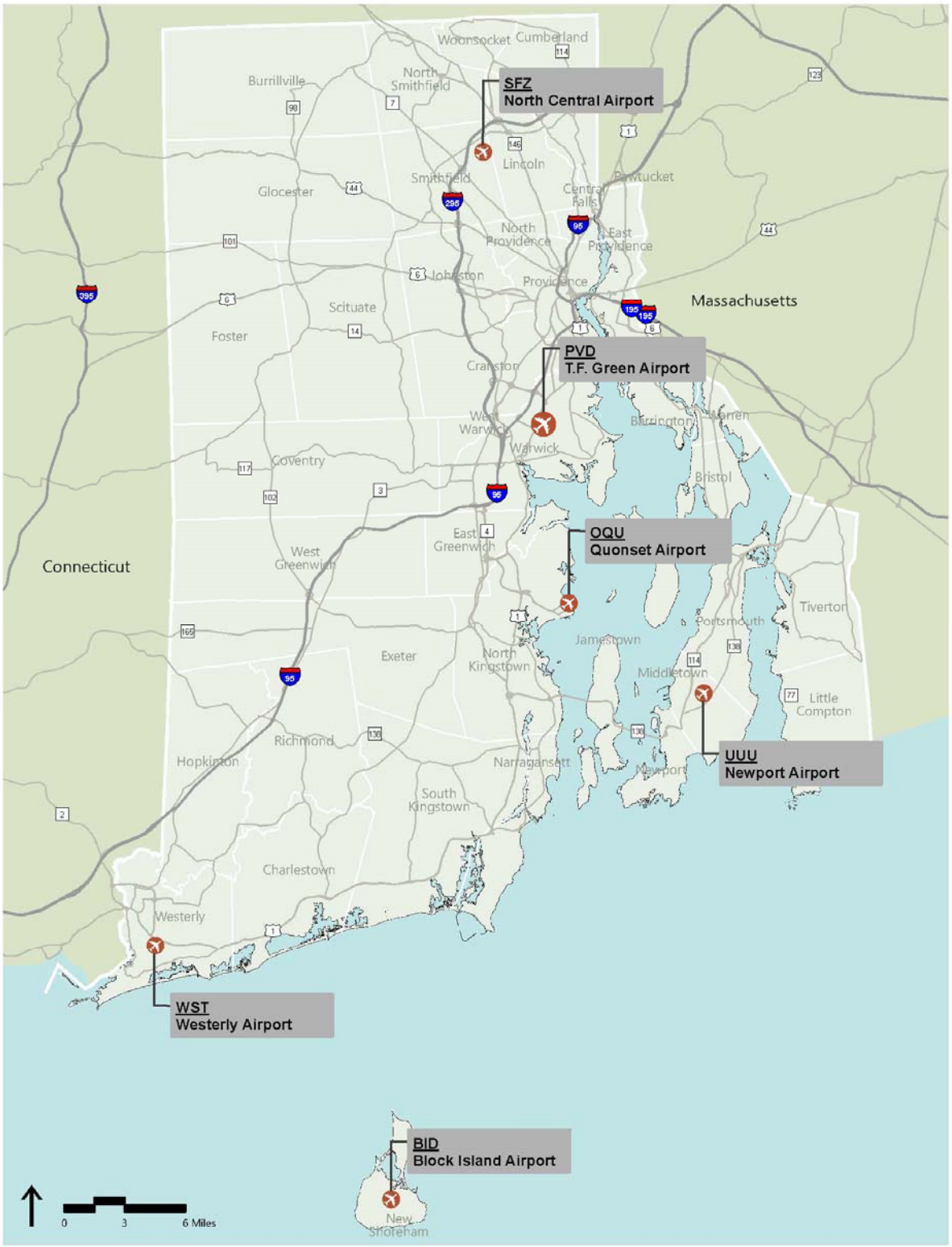
Air Transportation

The commercial aviation system contributes to the overall transportation network by facilitating interstate and international passenger travel and freight movement. It contributes significantly to the commerce, tourism, and economic development of Rhode Island.

The Rhode Island Airport Corporation (RIAC) manages T.F. Green and the five state-owned general aviation airports that are in the state aviation system. Rhode Island's state-owned airports are shown on Figure 5-1**.**

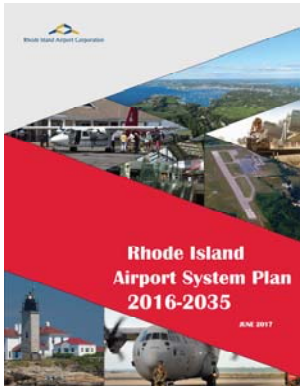
.

Figure 5-1 Rhode Island's State Airports



5.1 Rhode Island State Airport Summaries

Under the National Plan of Integrated Airport Systems (NPIAS), airports are categorized by types of activities, including commercial service, primary, cargo service, reliever, and general aviation airport. As shown in Table 5-1, Rhode Island airports include all those categories



The primary source of information for this chapter is the Rhode Island Airport System Plan 2016-2035, June 2017.1.

T.F. Green is a primary commercial service airport and serves more than three million passengers annually. It is considered a "Medium Hub" airport in the National Plan of Integrated Airport Systems (NPIAS). North Central, Quonset, and Newport serve only general aviation activity. However, North Central and Quonset are designated as Reliever airports in the NPIAS because they also serve to relieve T.F. Green of some of the general aviation activity.

Table 5-1 State-owned Airports

Airport	Location	Associated City	NPIAS Service Levels
Block Island	New Shoreham	Block Island	PS (Non-Hub)
Newport	Middletown	Newport	GA
North Central	Smithfield/Lincoln	Pawtucket	GA / Reliever
Quonset	North Kingstown	North Kingstown	GA / Reliever
T.F. Green	Warwick	Providence	PS (Medium Hub) / Cargo
Westerly	Westerly	Westerly	PS (Non-Hub)

NPIAS = National Plan of Integrated Airport Systems
PS = Primary (Commercial) Service
GA = General Aviation
Source: U.S. Dept. of Transportation. 2017. "Airport Programs & Guidance." Federal Aviation Administration. URL: www.faa.gov/airports. Accessed December 2017.

Highlights of each airport are listed in Table 5-2. This includes core inventory data regarding acreage, runways, and taxiways, as well as service information such as the number of aircraft based at the airport, annual operations (aircraft landings), and enplanements (passenger boardings).

Table 5-2 Airport Highlights

Block Island State Airport (BID)	
Acres	136
Runways	10-28: 100' wide by 2,501' long
Taxiways	Partial Parallel
FBOs and Tenants (2011)	5
Based Aircraft (2017)	4
Operations (2017)	15,170
Enplanements (2016)	17,225
Economic Impact (2014)	$24.2 million
Newport State Airport (UUU)	
Acres	221
Runways	4-22: 75' wide by 2,999' long 16-34: 75' wide by 2,623 long
Taxiways	Full Parallel (4-22)
Based Aircraft (2017)	25
Operations (2017)	18,708
Enplanements (2009)	Not applicable
Economic Impact (2014)	$12.3 million
North Central State Airport (SFZ)	
Acres	475
Runways	5-23: 100' wide by 5,000' long 15-33: 75' wide by 3,210' long
Taxiways	Full Parallel (5-23), Partial Parallel (15-33)
Based Aircraft (2017)	70
Operations (2017)	14,844
Enplanements (2016)	Not applicable
Economic Impact (2014)	$9.5 million

Providence Jet Centers

Executive Class Aviation Facilities including concierge services, heated hangar space, a complete range of aircraft services, conference rooms, and pilot' lounges

Locations

Quonset
North Central

Table 5-2 Airport Highlights (continued)

Quonset State Airport (OQU)	
Acres	754
Runways	5-23: 75′ wide by 4,003′ long 16-34: 150′ wide by 7,500′ long
Taxiways	Full Parallel (16-34), Partial Parallel (5-23)
FBOs and Tenants (2011)	4
Based Aircraft (2017)	25
Operations (2017)	20,058
Enplanements (2016)	Not applicable
Economic Impact (2014)	$151.2 million
T.F. Green Airport (PVD)	
Acres	1,111
Runways	5-23: 150′ wide by 7,166′ long 16-34: 150′ wide by 6,081′ long
Taxiways	Full Parallel (5-23), Partial Parallel (16-34)
Based Aircraft	38
Operations (2017)	71,902
Enplanements (2016)	1.8 million
Economic Impact (2014)	$1.2 billion
Westerly State Airport (WST)	
Acres	321
Runways	7-25: 100′ wide by 4,010′ long 14-32: 75′ wide by 3,980′ long
Taxiways	Full Parallel to both runways
Based Aircraft (2017)	43
Operations (2017)	18,853
Enplanements (2017)	17,218
Economic Impact (2014)	$16.0 million

Sources: Rhode Island Dept. of Administration. 2011. "State of Rhode Island Airport System Plan: Stage Guide Plan Element 640, Report Number 114." Statewide Planning Division. 15 September 2011.
U.S. Dept. of Transportation. 2017. "Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports." Federal Aviation Administration. URL: https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/. Accessed December 2017.
All other data from FAA Airport Master Records (December 2017).

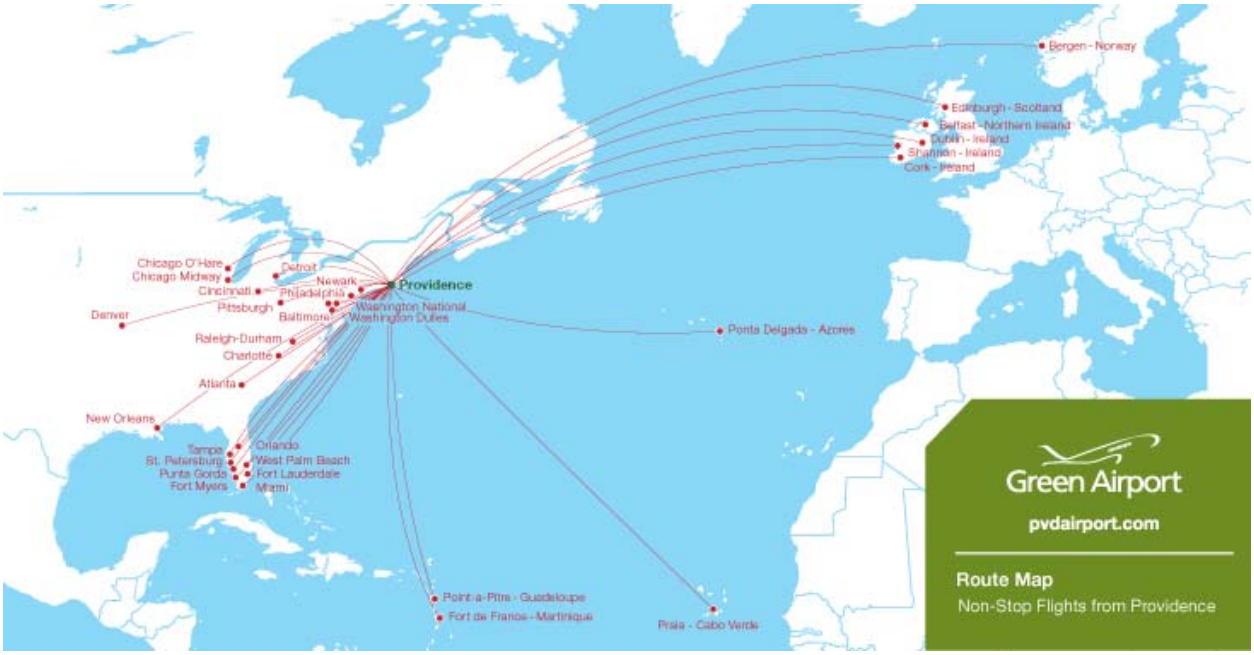
T.F. Green Airport is home to the InterLINK Transit hub providing connections between air, MBTA rail, and Intercity bus.

5.1.1 T.F. Green Airport

T.F. Green Airport is the largest airport in Rhode Island and is classified as a medium hub primary commercial service airport. The airport is in Warwick, north of the Interstate-95/Interstate-295 interchange. T.F. Green completed a major runway extension and other improvements in October 2017, which have enabled larger aircraft to land at the airport.

The T.F. Green Airport air service area extends to southwestern Connecticut, southeastern Massachusetts, and Cape Cod. Eight airlines provide scheduled direct service to 23 domestic and 10 international airports. Those direct service connections are shown on Figure 5-2.

Figure 5-2 T.F. Green Airport Route Map



Source: T.F. Green Airport. 2017. URL: http://www.pvdairport.com/documents/pvd%20world%20route%20map-final.pdf. Accessed December 2017.

5.1.2 General Aviation Airports

The five general aviation airports owned by the State of Rhode Island are: Quonset State Airport (OQU), North Central State Airport (SFZ), Newport State Airport (UUU), Westerly State Airport (WST), and Block Island State Airport (BID).

5.1.2.1 Quonset State Airport (OQU)

Quonset State Airport is a key component of a transportation hub / industrial park complex created from two former military bases — Quonset Naval Air Station and Davisville. The complex is home to many companies that have created substantial employment opportunities for Rhode Island's job market. It is also home to the Air National Guard and Army National Guard who use the airport as a base for their respective military missions. The airport is capable of servicing most of the business-jet fleet operating today.

5.1.2.2 North Central State Airport (SFZ)

North Central State Airport is located in Smithfield, close to several business/industrial parks. It serves corporate and recreational users within the Providence metropolitan area, while relieving general aviation activity from T. F. Green Airport.

5.1.2.3 Newport State Airport (UUU)

First and foremost, Newport State Airport serves the visitors to the year-round tourist attractions at Newport. The airport also provides quick access for boat owners who harbor vessels in the nearby marinas. Local aviation enthusiasts, the corporate community, and the Army National Guard also use Newport State Airport. The runway length limits airport uses to single-engine and small twin-engine aircraft.

5.1.2.4 Westerly State Airport (WST)

Westerly State Airport fulfills several roles for the South County area, including corporate aviation service, and extensive aircraft maintenance and repair. Most important, the airport provides essential service to Block Island, transporting well over 10,000 passengers annually and essential cargo from the mainland to the island year-round. It also fulfills several roles for the South County area, including general aviation services and a base for aircraft maintenance and repair of the New England Airlines fleet.

5.1.2.5 Block Island State Airport (BID)

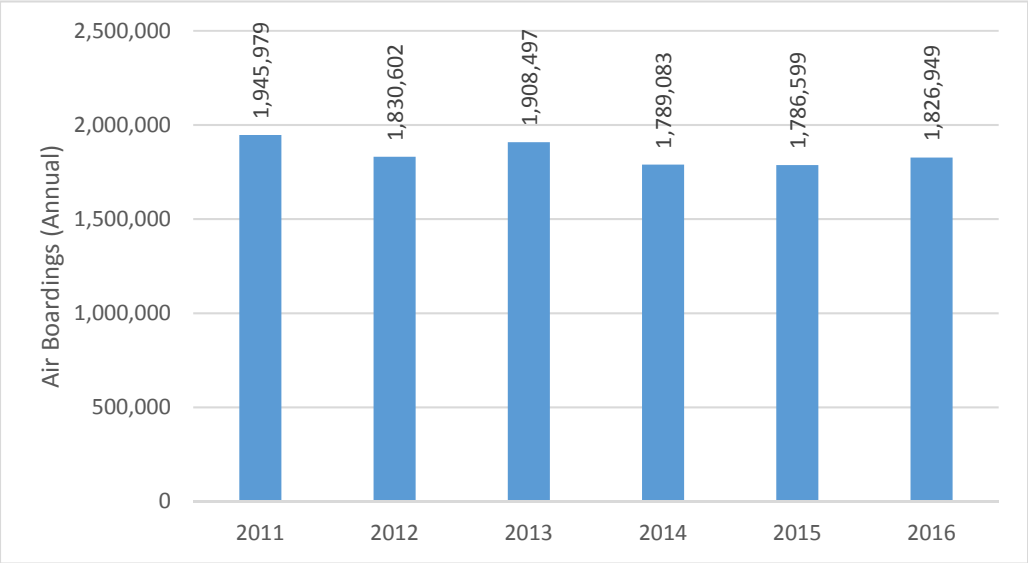
New England Airlines provides scheduled commercial passenger service to BID from Westerly State Airport. In addition, during the height of the summer tourist season, private aircraft owners from around the country visit the airport. The airport also serves Block Island's needs by providing access for time-sensitive cargo and urgent medical transport.

5.2 Air Passenger System Performance

5.2.1 Commercial Passenger Service

Air passenger boardings at T.F. Green Airport totaled 1.83 million in 2016. As shown in Figure 5-3, boardings have been relatively constant in recent years, although they are currently about six percent below 2011 numbers, when there were 1.95 million boardings. New air carriers (which initiated service at the airport in 2017) and the improved economy are encouraging indicators that growth in boardings may be achievable over the next several years. T.F. Green also completed a runway expansion in October 2017 to accommodate larger aircraft.

Figure 5-3 Annual Air Boardings – T.F. Green Airport



Source: Rhode Island Airport Commission. July 2017. "Monthly Airport Passenger Activity Summary."

The only other commercial passenger service in Rhode Island occurs between the Block Island and Westerly airports. There is hourly service during the peak summer season and flights every two hours during the off season. Enplanements at each airport exceeded 17,000 in 2017 and are annual records for the airports. Annual enplanements were sometimes less than 10,000 about 10 years ago. It is beneficial that enplanements stay above 10,000 as this is the eligibility threshold for the FAA Airport Improvement Program's minimum $1 million funding entitlement.

5.2.2 General Aviation

The Rhode Island Airport System Plan notes that general aviation (GA) activity in Rhode Island is consistent with national trends. There had been slight but steady growth in the number of GA aircraft based in Rhode Island until there was a sharp drop after 2008. The number of GA aircraft based in Rhode Island has increased from 341 in 2004 to 351 in 2008, but dropped to 273 by the end of 2009. After decreasing further to 260 in 2013, the number began increasing once again, to 281 in 2014.

Forecasts of the GA activity are presented in the 2014-2040 FAA Terminal Area Forecast (TAF). The TAF is the official FAA forecast of aviation activity for U.S. airports. The TAF assumes different annual average growth rates for airports with and without an air traffic control tower (ACTC). The rates are 0.9% for ATCT airports (T.F. Green and Quonset) and 0.5% for non-ATCT airports (Westerly, Block Island, North Central, Newport) As shown in Table 5-3, GA operations activity (measured in airplane touchdowns) over the next 20 years is expected to show very modest growth (96,000 vs 109,000 operations annually).

Table 5-3 FAA Terminal Area Forecast – General Aviation Operations

Airport Name	2014	2020	2025	2035
T.F. Green	28,813	30,404	31,797	34,778
Westerly State	11,518	11,797	12,035	12,525
Block Island	8,803	9,016	9,918	9,573
North Central	17,059	17,473	17,825	18,551
Quonset	9,294	9,807	10,257	11,218
Newport	20,514	21,011	21,435	22,308
Total	96,001	99,508	102,547	108,953

Source: Rhode Island Airport Corporation. "Rhode Island Airport System Plan 2016-2035". June 2017

5.3 Key Findings

- The 2016-2035 Rhode Island Airport System Plan indicates that forecasted growth of aviation activity over the next 20 years is stagnant.
- New air carriers (which initiated service at the airport in 2017) and the improved economy are encouraging indicators that growth in boardings (general aviation) at T.F. Green may be achievable over the next several years.
- General aviation activity in Rhode Island is consistent with national trends.

6

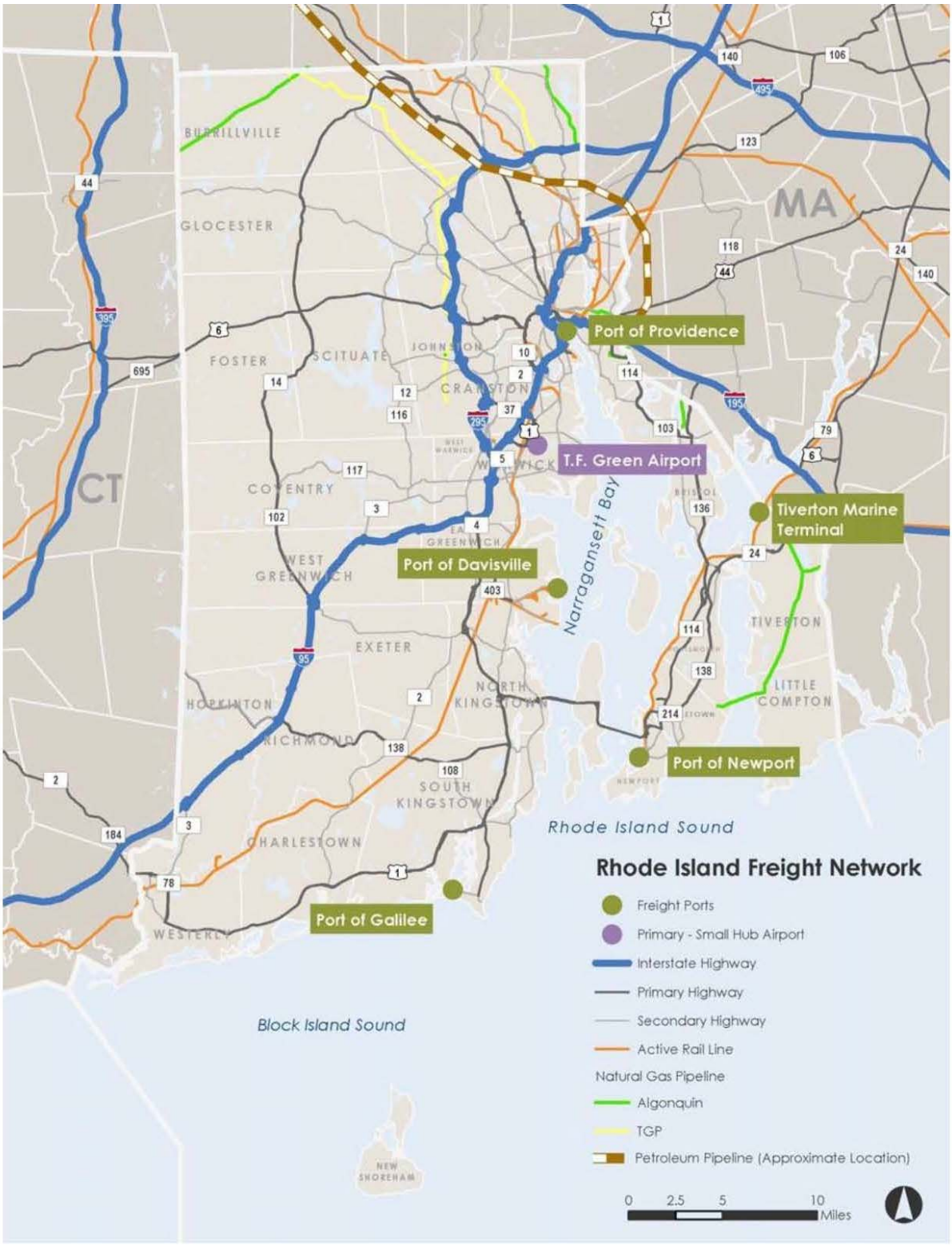
Freight

Freight moves by road, rail, air, and sea. This intermodal freight network supports the delivery of the necessities of life to Rhode Island residents every day, provides employment for thousands of people, links to regional economies, and connects the state to a larger global network.

The movement of freight goods is critical to the economy and daily operation of Rhode Island. Freight carriers move consumer goods, groceries, raw materials, energy resources, medical materials and a host of other items. These carriers also transport manufactured goods for export outside of the state boundaries. Freight provides the goods and materials Rhode Island businesses and residents need to live, work, prosper and get goods to market.

Figure 6-1 shows the Rhode Island freight network.

Figure 6-1 Rhode Island's Primary Freight Network



Source: Rhode Island Dept. of Administration. 2016. "State of Rhode Island Freight and Goods Movement Plan." Statewide Planning Division. September 2016.

6.1 Trucking Transport on Highways and Roads

The movement of goods within and through Rhode Island is highly dependent on highways and roads. All freight moving within Rhode Island, and most freight entering or leaving the state, moves by truck. Truck transport also provides intermodal connectivity with rail, marine, and air freight terminals.

6.1.1 Truck Transport Infrastructure

The road and bridge network is described in Chapter 2. Road and bridge conditions, and travel time and congestion, are as important for truck transport as for passenger vehicle travel. Truck transport also faces more roadway travel constraints than do personal vehicles — there are about 100 bridges closed to heavy vehicles and another 15 bridges have vertical clearances less than the 13'6" height of most larger trucks.

The roadway system includes several facilities that directly support truck transport. There are two highway rest areas (one currently closed), two weigh stations (both closed), and eight truck pull-off parking areas located alongside the interstates and other primary roadways. The largest is a private truck stop located in West Greenwich at I-95 exit 5 at Route 102. The facility provides fuel, repairs, a motel, a restaurant, a store, showers and laundry services, along with 180 truck parking spaces.

6.1.2 Truck Transport Operations

Table 6-1 shows truck freight flows in Rhode Island. Roughly 10 percent of truck transport is local, that is, goods dispatched and delivered in Rhode Island. Over 30 percent of truck transport tonnage is through traffic, primarily along the I-95 corridor between Connecticut and Massachusetts. Inbound and outbound tonnage is relatively balanced at about 29 percent of tonnage. Most inbound truck volume comes from Massachusetts. Outbound traffic is primarily destined for states in the Northeast region.

Table 6-1 Rhode Island Truck Flows (2013)

	Tonnage (1000s of Tons)	Percentage of Tonnage	Value ($ Millions)	Percentage of Value
Through	13,696	31.0%	24,099	36.5%
Outbound	12,873	29.1%	18,723	28.3%
Inbound	12,578	28.5%	17,481	26.5%
Local	5,061	11.4%	5,744	8.7%
Total	44,208		66,047	

Source: Rhode Island Dept. of Administration. 2016. "State of Rhode Island Freight and Goods Movement Plan." Statewide Planning Division. September 2016.

6.2 Freight Railways

Rhode Island has 129 miles of active railways used for freight transport (see Table 6-2). The Providence and Worcester Railroad Company (P&W), owned by parent company Genesee & Wyoming, provides almost all the rail freight service in the state. The P&W owns 29 miles of rail in the state, operates 9 miles of track owned by the State of Rhode Island, and has trackage rights on Amtrak's Northeast Corridor. The only other freight rail company is Seaview Transportation Railroad, which provides switching service at the Quonset Business Park. Rhode Island's railroads are shown in Figure 6-2).

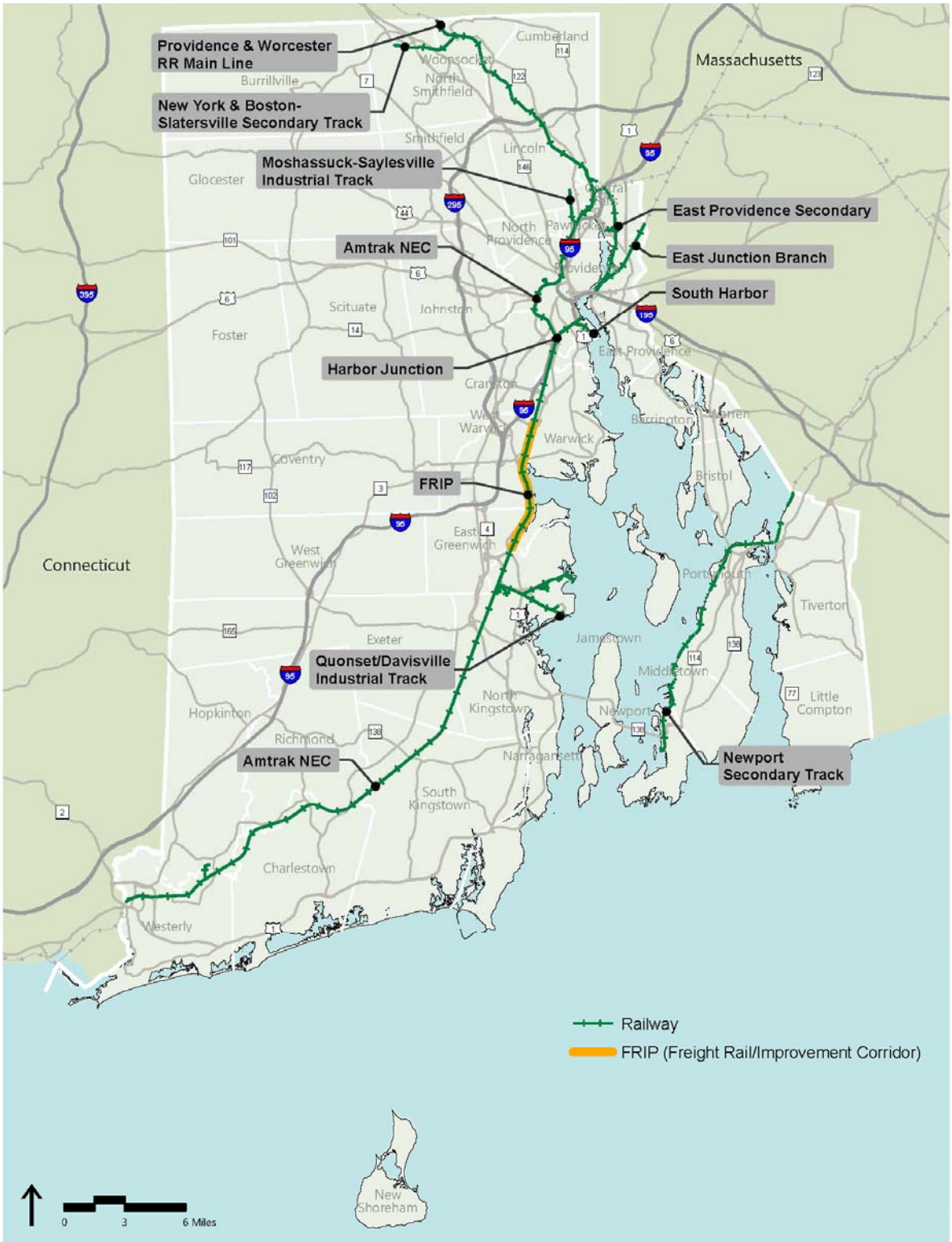
Table 6-2 Rhode Island Active Freight Rail Lines

Rail Line	Owner	Freight Operator	Length (miles)	Locations
Amtrak Northeast Corridor	Amtrak	P&W	49.7	Westerly, Charlestown, Hopkinton, Richmond, South Kingstown, North Kingstown, East Greenwich, Warwick, Cranston, Providence, Pawtucket, Central Falls
East Junction Secondary	P&W, RIDOT	P&W	3.55	Pawtucket, East Providence, Cumberland
East Providence Branch	P&W, RIDOT	P&W	9.33	Cumberland, Pawtucket, East Providence
FRIP Track North	Amtrak/RIDOT	P&W	14.06	Central Falls, Pawtucket
FRIP Track South	Amtrak/RIDOT	P&W	2.01	Providence, Cranston, Warwick
Harbor Junction Industrial Track	City of Providence	P&W	2.04	Providence
Massassuck-Saylesville Industrial Track	P&W, City of Pawtucket	P&W	2.36	Pawtucket, Lincoln
New York and Boston Slatersville Secondary Track	P&W	P&W	4.62	Woonsocket, North Smithfield
P&W Railroad Main Line	P&W	P&W	16.94	Woonsocket, North Smithfield, Cumberland, Lincoln, Central Falls
South Harbor	City of Providence	P&W	3.76	Providence
Quonset Point/ Davisville	Quonset Development Corp.	Seaview	20.36	North Kingstown

Source: Freight Forward, State of Rhode Island Freight and Goods Movement Plan (Sept. 2016)

In 2013 the state's rail system carried 784,000 tons of freight, some 1.6 percent of the state's freight tonnage. The value of rail freight was more than $1.1 billion. Over 90 percent of the rail freight was inbound as Rhode Island does not manufacture the type of commodities generally shipped by rail.

Figure 6-2 Rhode Island Freight Rail System



6.2.1 Rail Transport Operations

Table 6-3 shows rail freight flows in Rhode Island. Roughly 94 percent of rail transport is inbound, goods entering Rhode Island. This is reflective of the limited levels of manufacturing taking place in Rhode Island. Outbound goods are primarily minerals being shipped out of state.

Table 6-3 Rhode Island Rail Flows (2013)

	Tonnage (1000s of Tons)	Percentage of Tonnage	Value ($ Millions)	Percentage of Value
Through	6	1%	8	0.7%
Outbound	42	5%	13	1.1%
Inbound	736	94%	1,115	98.2%
Total	784		1,136	

Source: Rhode Island Dept. of Administration. 2016. "State of Rhode Island Freight and Goods Movement Plan." Statewide Planning Division. September 2016.

6.3 Air Freight

T.F. Green Airport handles virtually all air freight activity in Rhode Island. Among the other five public airports, Westerly Airport occasionally provides time-sensitive small freight service to Block Island, but none of the five airports have any consistent freight operations.

There are two cargo facilities at T.F. Green Airport, both located in the general aviation area on the north side of the airport. FedEx and UPS account for over 90 percent of air freight shipments in Rhode Island. FedEx has a small-scale sorting operation at the airport. UPS trucks cargo to the airport from an off-site sorting facility. Cargo carried on passenger airlines is processed at a facility on the west side of the airport near the terminal.

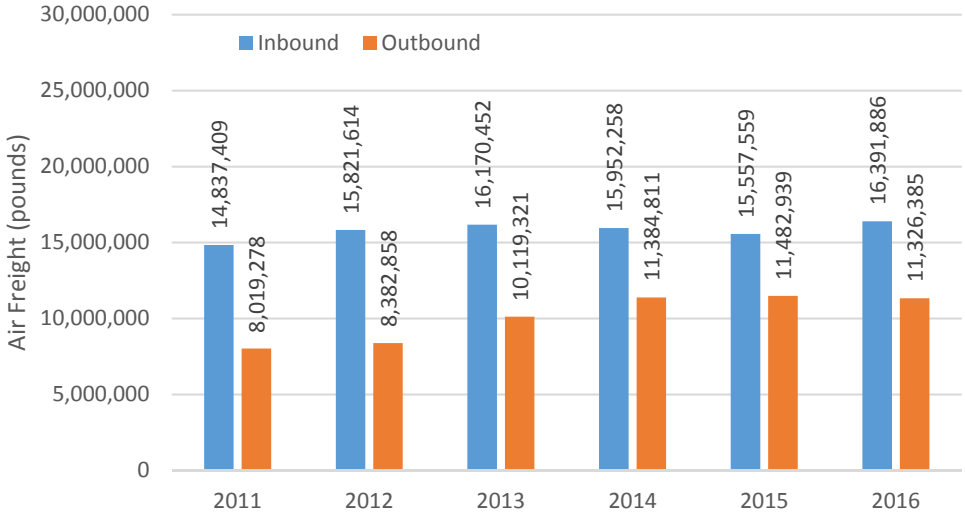
Small package and mail comprise almost half of the approximately 12,000 tons of air freight flow in Rhode Island. As shown in Table 6-4, the majority of air freight is inbound. The amount of inbound freight has held constant in recent years, while outbound freight tonnage has seen a slight upward trend.

Table 6-4 Rhode Island Air Freight Flows (2013)

	Tons	Percentage of Tonnage	Value ($Millions)	Percentage of Value
Outbound	4,545	38%	734	46%
Inbound	7,396	62%	861	54%
Total	11,941		1,596	

Source: Freight Forward, State of Rhode Island Freight and Goods Movement Plan (Sept. 2016)

Figure 6-3 Rhode Island Air Freight Flows (2011 - 2016)



Note: Cargo tracking by airports typically will not align with Federal Aviation Administration values, and may be adjusted in the future.
Source: Rhode Island Airport Corporation Monthly Airport Passenger Activity Summary reports

6.4 Waterborne Freight

Rhode Island has five commercial ports. Four are located in Narragansett Bay, including the Port of Providence, the Port of Davisville at the Quonset Business Park, the Tiverton Terminal Pier, and the Port of Newport. The other — Port of Galilee in Point Judith in Narragansett — is located on Block Island Sound.

- The Port of Providence has several terminals covering 225 acres, the largest of which is ProvPort at 105 acres. ProvPort has 3,500 lineal feet of space among six berths. ProvPort includes 300,000 square feet of warehouse space, a petroleum tank farm, and fueling facilities. There is rail line access to ProvPort.
- The Port of Davisville is one of the top 10 ports nationally for auto imports. The port is 289 acres in size and the port terminal has 4,500 feet of berthing space. Seaview Railroad provides on-dock rail service within the port and connect to P&W service on Amtrak's Northeast Corridor.
- Tiverton Marine Terminal is a 12-acre facility that is used for distribution of petroleum products. The products arrive via barge and are distributed via trucks.
- The Port of Galilee is managed by the Rhode Island Department of Environmental Management. It includes two

Port of Davisville
Source: Quonset Development Corporation

port terminals and covers 32 acres. The port is home to more than 200 fishing vessels, is the largest commercial fishing port in the state and one of the largest on the East Coast. The Port of Galilee is the primary freight supplier to Block Island. This includes all diesel fuel used to generate electricity on the island. Block Island-bound freight is trucked to the port and carried to the island by ferry services.

- The Port of Newport is primarily used for dockage of recreational vessels, and for restaurant and commercial uses. The area of the port used for traditional maritime commercial uses is approximately 12 acres. It is home to more than 50 fishing vessels, and several ferry services stop here.

6.5 Key Findings

- About 100 bridges statewide are closed to heavy vehicles and another 15 bridges have vertical clearances less than the 13'6" which limits truck travel.
- Rhode Island has about 129 miles of active freight railways.
- The Port of Davisville is one of the top 10 ports nationally for auto imports.

7

Transportation Funding and Finance

Transportation funding and finance is necessary to understand the fiscal constraints on the network that govern capital investment and system maintenance. This section provides a summary of historic transportation funding and investment strategy.

Transportation funding for the surface transportation network totals approximately $687 million annually. To characterize transportation funding in Rhode Island, this section provides a review of key funding sources, classification of expenditures, and a review of the current investment strategy.

7.1 Funding Sources

A review of FHWA Highway Finance Reporting (Form-531, Form-532) from 2007 to 2016 was completed to establish baseline transportation funding. While funding opportunities may fluctuate slightly from year to year the general trends remain the same.

The primary sources of transportation funding in Rhode Island are as follows:[11]

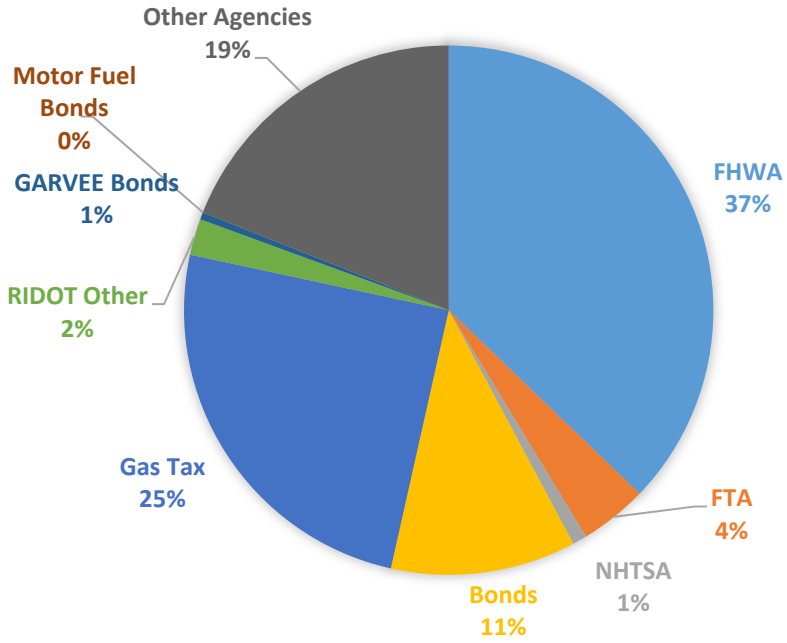
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- National Highway Traffic Safety Administration (NHTSA)
- Bonds
- Gas Tax
- RIDOT funds not initially earmarked for transportation
- Grant Anticipation Revenue Vehicle (GARVEE) bonds
- Motor Fuel Bonds

Federal Highway Administration funds consistently provides the majority of funding making up about 42 percent of funding over the last 10 years and 37 percent in 2016. Figure 7-1 shows funding by source and Figure 7-2 shows this data for the most recent 10 years from 2007 to 2016 including the following trends.

- In 2016, gas tax provided about 25 percent of transportation funding. Prior to 2016 the gas tax typically made up 10 percent to 17 percent of total funding.
- Over the last 10 years transportation bonds including Grant Anticipation Revenue Vehicle (GARVEE) bonds and Motor Fuel Tax bonds have made up 22 percent of transportation funding. In 2016 transportation bonds made up 11 percent of state highway funding.
- In 2011 Federal Transit Administration funding began contributing a larger portion to overall funding. This coincides with the authorization of the Moving Ahead for Progress in the 21st century (MAP-21) transportation funding bill.

[11] Please note that in 2007 data indicate that additional funding was received from RIPTA and RIDOT Restricted Receipts. For the purpose of consistency through the ten-year period, these categories were not included in this analysis.

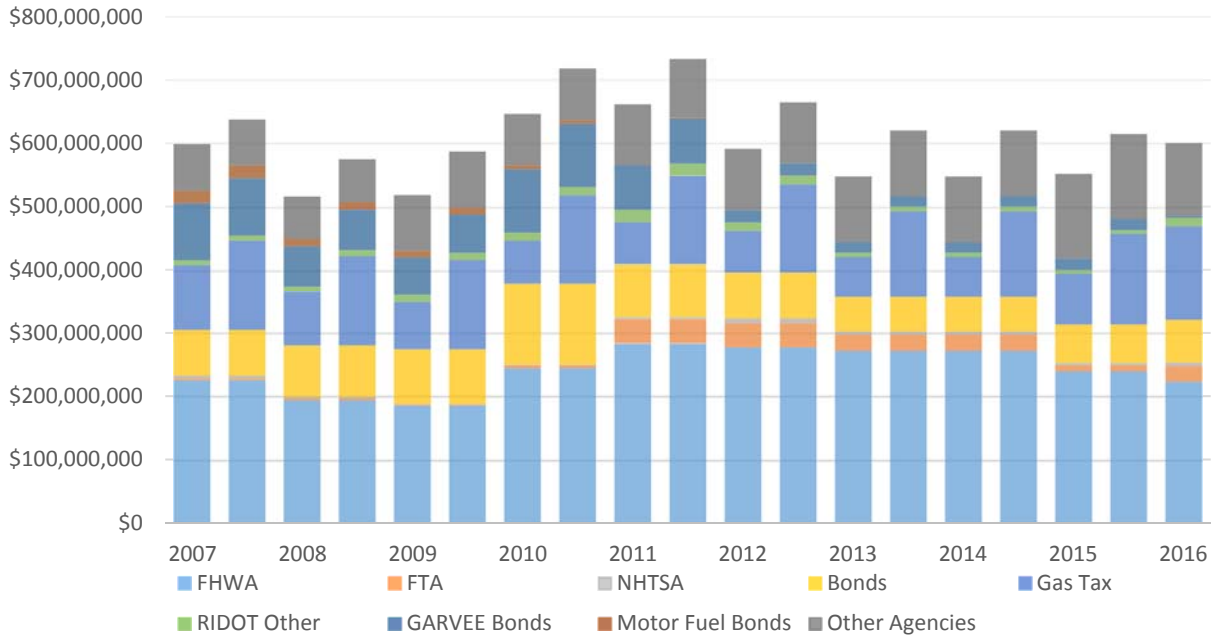
Figure 7-1 Transportation Funding by Source (2016)



Note: RIDOT Other includes RI Highway Maintenance Account and RI Capital Plan funds as well as the balance of funds remaining from the prior fiscal year.

Source: RI Department of Transportation. FHWA Forms 531 and 531, Receipts and Expenditures of State Highway Agencies.

Figure 7-2 Transportation Funding Source (2007-2016)



Source: RI Department of Transportation. FHWA Forms 531 and 531, Receipts and Expenditures of State Highway Agencies.

7.2 Network Investments

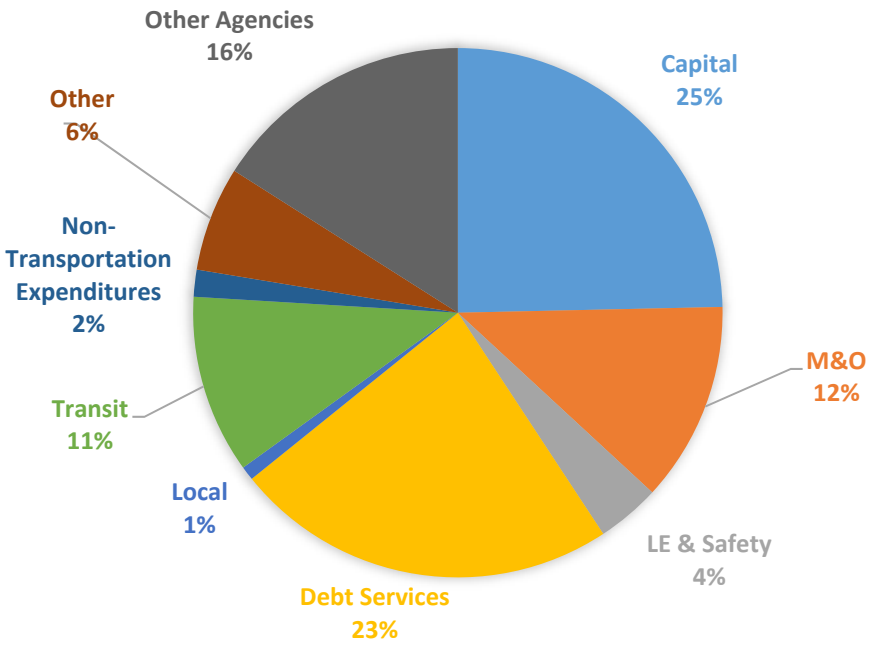
Figure 7-3 and Figure 7-4 below shows how the state highway income described was invested in the transportation network over the same 10-year period. Spending is tracked in the following general categories:

- **Capital** expenses include cost of right-of-way, design and engineering, and construction. This expense also includes pavement resurfacing.
- **Maintenance and Operations (M&O)** includes efforts to keep facilities in the same condition as originally designed and constructed and extend facility life. Additionally, this item includes highway and traffic services including traffic control operations, snow removal, and sanding.
- **Law Enforcement (LE) and Safety** includes enforcement of state highway laws, driver and traffic safety programs, and vehicle inspection programs.
- **Debt Services** includes payments on obligations for highway bonds including interest paid and retirement.
- **Expenditures** for local roads and to local governments (Local) are state highway funds used to funding efforts on locally owned roadways.
- **Passenger Transportation** funds are state highway funds used to funding efforts to support passenger transportation (or mass transit) systems.
- **Non-Transportation Expenses** includes other surface transportation expenses unrelated to moving individuals (primarily freight facilities).
- **Other** includes research, general administration expenses, building expenses, and other related overhead costs.

The following figures illustrate the trends by category from 2007-2016. The following trends have been observed over the last 10 years.

- From 2007-2016, over $1.8 billion (33%) was spent on capital investments in infrastructure.
- Over the most recent 10 years debt services have been the second largest expenditure at just over $1 billion or one-fifth of funding.
- From 2007-2016, maintenance and operations totaled nearly $900 million (16%).

Figure 7-3 Transportation Expenditures by Category (2016)



Source: RI Department of Transportation. FHWA Forms 531 and 531, Receipts and Expenditures of State Highway Agencies.

Figure 7-4 Transportation Expenditures (2007 – 2016)

Source: RI Department of Transportation. FHWA Forms 531 and 531, Receipts and Expenditures of State Highway Agencies.

7.3 Future Investments- Rhode Island State Transportation Improvement Program

As a condition for receiving the funds from various sources (listed above), the State must always have an active list of prioritized projects compiled into a Transportation Improvement Program (TIP). In December 2017, the State of Rhode Island adopted a State TIP for federal fiscal year 2018 to 2027. This program is not an arbitrary list but rather identifies projects with anticipated, if not guaranteed funding commitments during the projected period.

All state TIPs include the following:

- Capital and non-capital surface transportation projects,
- Bicycle and pedestrian facilities and other transportation enhancements,
- Federal Lands Highway projects, and
- Safety projects included in the State's Strategic Highway Safety Plan (SHSP).

Also included are regionally significant projects which receive FHWA or FTA funds, or for which FHWA or FTA approval is required, in addition to non-federally funded projects that are consistent with the Metropolitan Transportation Plan. In this case, the State Planning Council is the Metropolitan Planning Organization which oversees the Rhode Island State plan.

The Rhode Island TIP anticipates federal funding to be invested in the following categories:

- **Bridge:** Investing in bridge restoration and replacement
- **Operations and Maintenance:** Maintenance for bridges; pavement; traffic safety; drainage; and staff to reduce future costs
- **Route 6 and 10:** Replacement of Route 6 /10 interchange bridges, road re-alignment, and pavement improvements to achieve a state of good repair.
- **Pavement:** Maintain pavement to prevent road failure and extend the life of the road surface
- **Transit:** Projects include the Downtown Transit Connector between the Providence Train Station and the Hospital District, and a new transit center at the Pawtucket/Central Falls city line.
- **Transportation Alternatives Program:** Key connections in the state bicycle network; recreational trails; and upgrades to pedestrian facilities in some of the densely populated areas near schools.
- **Drainage:** Statewide inspection and inventory of state-owned highway drainage systems and subsequent investment plan.
- **Traffic & Safety:** Replacing traffic lights, street lights and signals; improvements to projects at high-hazard intersections, signage, and those specified by the State Traffic Commission; and investments in the RI*STAR program which identifies hazardous intersections where safety and mobility can be improved.

The current administration has made significant efforts to follow an asset management based system for transportation planning that uses funding to invest wisely in roads and bridges to bring them up to a state of good repair. Smaller investments of maintenance and repair can reduce the number of major projects investing in infrastructure replacement.

The diagram below based on Rhode Island's 2018-2027 TIP displays how much of the anticipated federal funds will be spent on various categories over the next ten years. A ten-year perspective was taken to gain a complete understanding of the current investment strategy. Transportation projects are often very expensive and paid for over the course of several years. A single large project in one year may take away from investments in other modes for a short time but investments in other modes may "catch up" in other years. Looking at investments over 10 years is one way to balance out those larger projects.

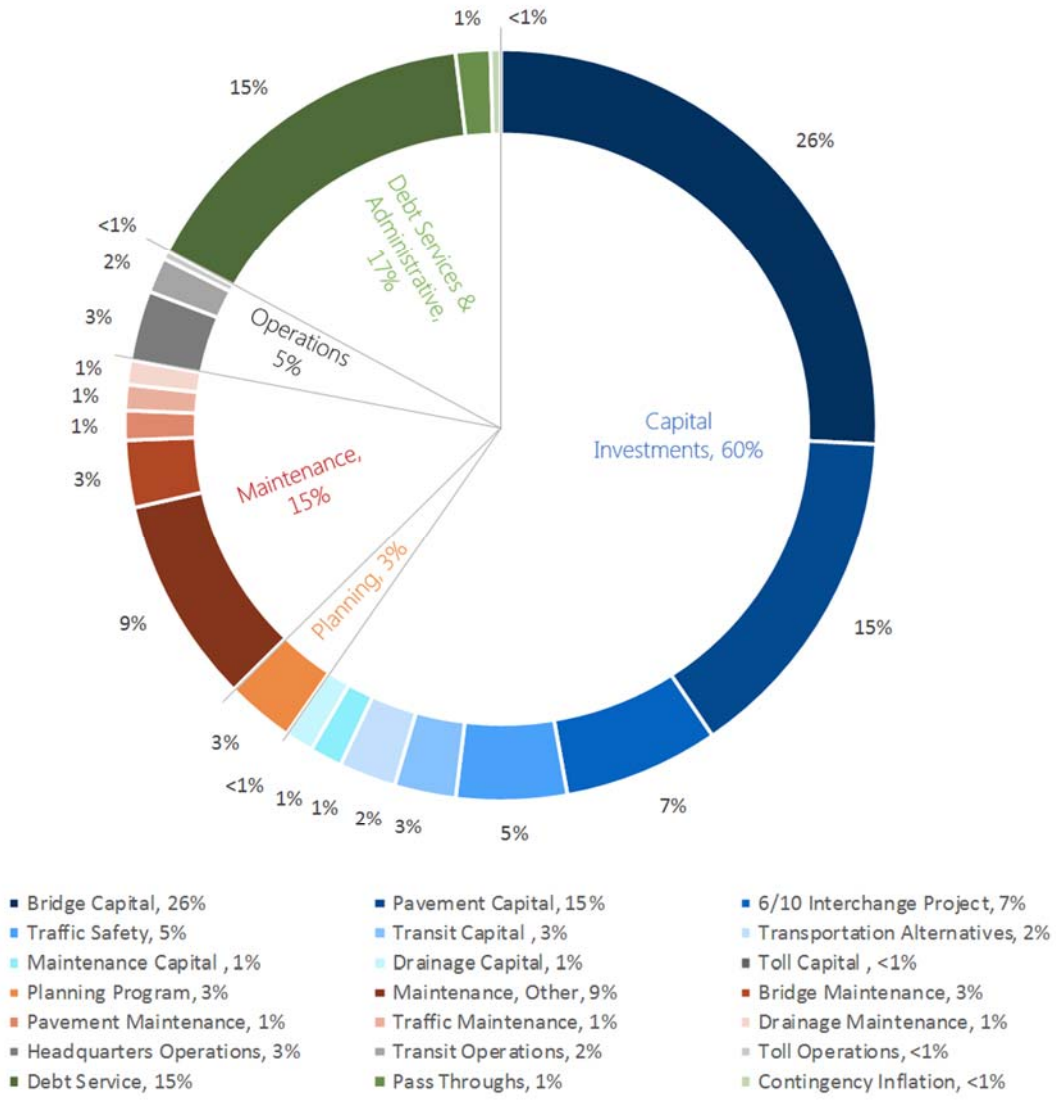
Figure 7-5 illustrates the current funding strategy over the next decade.

- Capital investments make up the largest segment of funding at 60 percent.
- Bridge capital investment makes up the single largest segment of investment at 26 percent of total funding.
- The Route 6/10 Interchange project is a major transportation project that will change how traffic moves in the greater Providence area and address seven structurally deficient bridges. This project accounts for seven percent of total funding.
- Funds allocated toward debt services make up the same portion of funding as is invested in maintenance across modes.

Most of the TIP funds are allocated to roads and bridges but it is helpful to see what percentage of funds are allocated to other modes. Figure 7-6 depicts investments over the next ten years by mode.

It is important to note that Transportation Alternative Program (TAP) is intended for bicycle and pedestrian investments. The Transportation Alternatives Program allocation of three percent represents a minimum allocation to bicycles and pedestrians. While some transportation facilities are specific to non-motorized users, some bicycle and pedestrian improvements could also come through roadway investments where non-motorized facilities are enhanced. For example, when a roadway is restriped the lane utilization could be changed to incorporate bike lanes. More significant bicycle or pedestrian investments that may be incorporated in roadway funding are those that require right-of-way acquisition, increased pavement widths, or installation of sidewalks.

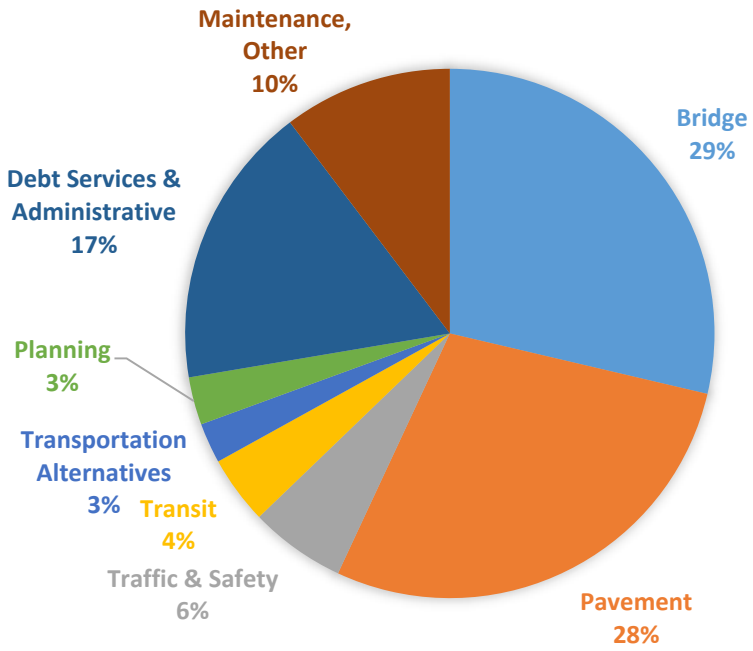
Figure 7-5 Rhode Island Transportation Improvement Program Funding by Program FY 2018-2027



Source: RI Transportation Improvement Program FY 2018-2027. December 14, 2017.

Figure 7-6 shows that of all the expenditures that can be broken out by mode, most (29%) are allocated to bridges. Only five percent is spent on traffic/safety, and four percent is spent on transit-related projects.

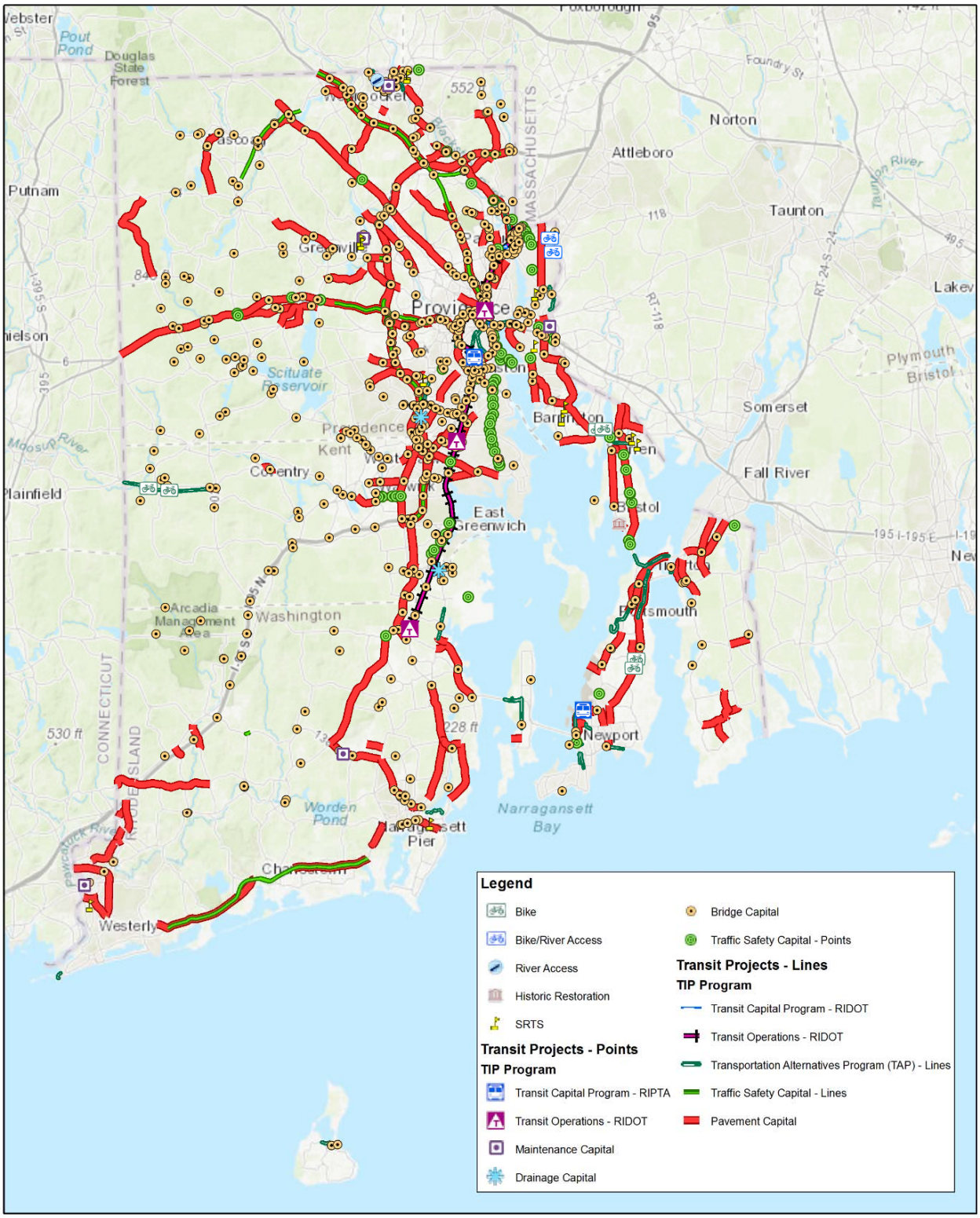
Figure 7-6 Transportation Expenditures by Mode/Category (2016)



Source: RI Department of Transportation. FHWA Forms 531 and 531, Receipts and Expenditures of State Highway Agencies.

There is very little difference in the distribution and anticipated expenditures between the 2017-2025 TIP and the 2018-2027 TIP. A map of the adopted 2017-2025 TIP projects is shown in Figure 7-7 to illustrate the geographic distribution of projects.

Figure 7-7 Geographic Distribution of Transportation Improvement Program FFY 2017-2025



Source: Division of Planning, State of Rhode Island. RI State Transportation Improvement Program FFY 2017-2025. http://www.arcgis.com/home/item.html?id=303a595023804d52832717e1f3934442 Last modified: September 6, 2017.

7.4 TIP-Funded Regionally Significant Projects

According to 23 CFR 450.104, projects of regional significance are classified as those which "serve regional transportation needs (such as access to and from the area outside the region; major activity centers in the region; major planned developments such as new retail malls, sports complexes, or employment centers; or transportation terminals) and would normally be included in the modeling of the metropolitan area's transportation network. At a minimum, this includes all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel."

The following regionally significant projects are listed in the TIP for 2018-2027:

- Route 6/10 Redesign/Reconstruction
- Interstate 95 Viaduct- Northbound (partially funded)
- Pawtucket/Central Falls Train Station

7.4.1 Unfunded Regionally Significant Projects

The following regionally significant projects do not currently have designated funding but are listed in the Rhode Island TIP should funds become available.

- Route 4 and Interstate 95 Interchange
- Interstate 195 Interchange: Taunton and Warren Avenue
- Route 146 at Sayles Hill Road Interchange
- Route 403 Deferred Ramps at the Quonset Business Park and West Davisville Industrial area
- Route 4 traffic light elimination

7.5 Fiscal Constraints

Except for the unfunded regionally significant projects, the Rhode Island TIP must only include projects which have an identified funding source. This prevents the TIP from becoming a wish list and anchors it with projects ready for implementation.

A mix of federal and state resources are expected to be available within the next four years (2018 to 2021). The following conditions may limit the available funding.

- Congressionally mandated limitations or reductions in Federal Highway Administration (FHWA) available to Rhode Island
- Federal Transit Administration funding not consistent with historical averages
- RhodeWorks toll revenue/reimbursements not aligned with projections. RhodeWorks is an asset management plan that is funded through bonds granted based on projected truck tolling revenue. Lower than projected revenue could result in reductions in RhodeWorks funding.
- Decline in RIPTA ridership due to low gas prices

7.6 Key Findings

- Federal funding (FHWA, FTA, NHTSA) make up about 42 percent of transportation funding.
- Over the most recent 10 years over $1.8 billion (33%) was spent on capital investments in infrastructure and 23 percent (just over $1 billion) was spent on debt services. Over that period nearly $900 million (16%) was invested in maintenance.
- Bridge and pavement programs received the highest level of funding in 2016 with 29 percent and 28 percent of funding, respectively.
- Are review of future projected spending showed that approximately 60 percent of funds is programed for capital investments, 17 percent on debt services, and 15 percent on maintenance.

8

Economic Development

An efficient, safe, and reliable movement of people and goods using Rhode Island's transportation system is important for both the economy and quality of life. Important decisions regarding housing, employment, and mode of transportation are directly influenced by how well a transportation system performs and its ability to facilitate movement to desired destinations. A functioning and connected transportation system directly affects people's lives as it provides needed access to jobs, training, education, health services, recreation, and cultural opportunities.

Looking past the direct impacts to transportation, it also can affect public health based on emissions levels which may be concentrated within disadvantaged

communities. Preference for walkable/bicycle friendly communities are on the rise[12] and recent research has shown investments in sustainable streets also support increased economic activity[13]. Rhode Island's transportation system also supports the inflow of tourism dollars as visitors come to the state to visit historic, cultural, and leisure attractions and spend money on accommodations, food and beverages, retail, and entertainment—a stimulus estimated at $5.2 billion dollars and 41,000 jobs.[14]

In 2016, there were over 7.9 billion vehicle miles driven in Rhode Island with 89% of these miles driven within urban areas.[15] Despite a high level of car ownership across the state (96.7%[16]), there exists economically depressed cities and areas with lower rates of ownership that may also lack reliable transit access. This lack of mobility acts as a barrier to economic opportunities and can negatively affect those who do not drive due to age, ability, or economic status. Forecasted growth in population and employment for the state emphasizes the need to evaluate alternatives to roadway expansion to address growing congestion and declining reliability that influences travel behavior and route selection. Ensuring proper maintenance and the condition of existing transportation assets not only extends the useful life, the best use, and performance of these useful assets, but also influences economic development outcomes. Of the 192 structurally deficient bridges in Rhode Island, 137 of them (71%) are between 45 and 70 years old.[17] In addition, 69% of all urban major and minor collectors in Rhode Island have an International Roughness Index (IRI) rating between 171 and >220 which constitute "Poor Pavement" conditions.[18] Poor pavement conditions; diversions due to bridge closures or weight limitations; and other structural deficiencies can increase travel costs, reduce cost competitiveness, and ultimately deter economic growth.

8.1 Economic Context of Transportation for Rhode Island

A functioning transportation system directly supports manufacturing and service-oriented jobs by enabling the flow of material inputs and finished goods between buyers and suppliers as well as maintaining the boundaries of a vibrant labor market. This system serves all residents, employees, businesses, and public agencies in the state for personal, commuting, and business oriented purposes.

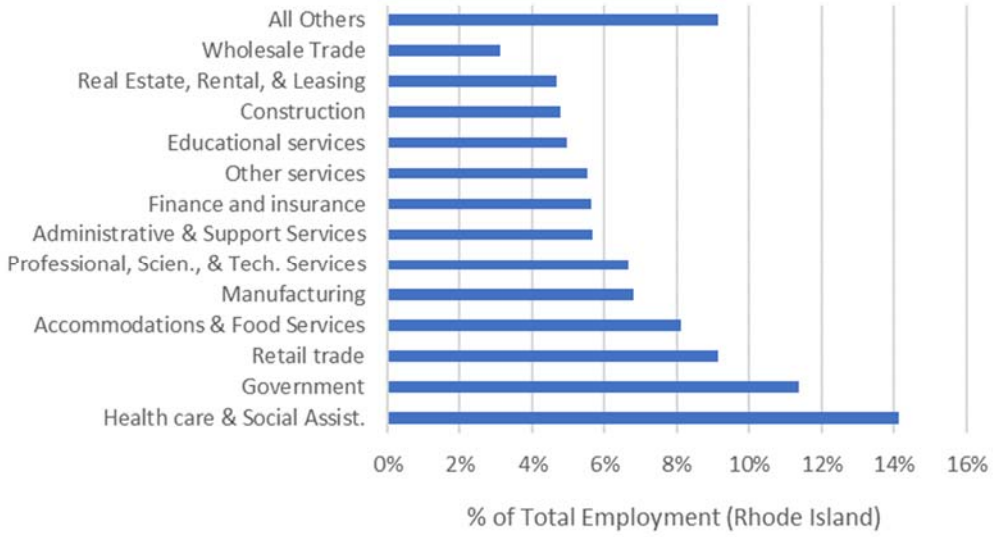
12 Urban Land Institute's *America in 2015* report.
13 "The Economic Benefits of Sustainable Streets." NYCDOT, 2013.
14 http://www.edc.ri.gov/growth/tourism/
15 2016 Federal Highway Statistics. Table VM-2
16 2015 American Community Survey (U.S. Census)
17 Federal Highway Statistics: Structurally Deficient Bridges by Year Built. https://www.fhwa.dot.gov/bridge/nbi/no10/yrblt16.cfm#b
18 Federal Highway Statistics: Miles by Measured Pavement Roughness. Table HM-63.

8.2 Industry Reliance on Transportation

Although an industry on the decline in Rhode Island, manufacturing sectors are still directly affected by the condition and performance of the transportation system. Senior managers at existing businesses and prospective businesses carefully considers the ability to access required inputs (e.g., raw materials and intermediate goods) and transport finished goods to customers (within and outside the state) within a competitive cost structure.

Many service-oriented businesses also purchase needed materials to provide services to customers, and therefore are also reliant on the transportation system. Of the 632,000 non-farm jobs in Rhode Island in 2016, only 7% were in manufacturing while major service-oriented businesses in health care, government, retail, professional services, administrative services, finance and insurance, education, and other services combined to support 66% of statewide employment (Figure 8-1).

Figure 8-1 Profile of Employment by Industry for Rhode Island



Source: Bureau of Economic Analysis, 2016 (report SA25N)

Service-oriented industries serve both local and out of state customers and require efficient inbound freight movements to procure needed supplies and materials. This applies to health care and social assistance (14% of statewide employment), retail trade (9%), accommodations and food services (8%), and construction (5%). Health care and social assistance services rely on the use of medicine, industrial chemicals, and other inputs to function. Retail products often come in mixed containers with a variety of commodity types. Accommodations require a variety of cleaning products and textiles while food services purchase food and agricultural products including meat, poultry, and dairy, as well as plastics and other miscellaneous types of goods. Construction of commercial and residential properties involves purchases of fabricated metals, refined petroleum products, plastics, and other materials.

Although business adaptation and response may vary with changes in the performance of a transportation system, understanding the ways manufacturing and service-oriented businesses are "supported by" or "reliant" on the transportation system frames the important relationship between transportation and the state economy.

8.3 Supporting International Trade

The transportation system in Rhode Island also supports international trade with nearly $2.3 billion in exports (Table 8-1) and over $8.7 billion in imports (Table 8-2) in 2016. Although these shipments primarily use various ports of entry or exit (marine and airport) within and outside of Rhode Island, these intermodal facilities are linked to the highway and rail system to reach origin and destination points of delivery.

Table 8-1 Rhode Island Exports – 2016

Exports	$ (millions)	% Total
Waste and Scrap	$454	20%
Chemicals	$334	15%
Miscellaneous Commodities	$295	13%
Primary Metals	$258	11%
Computer and Electronic	$163	7%
Machinery	$143	6%
Electrical Equip./Appliances	$133	6%
All Others	$498	22%
Total	$2,278	100%

Source: U.S. Census of Foreign Trade (via WiserTrade), 2016

Table 8-2 Rhode Island Imports – 2016

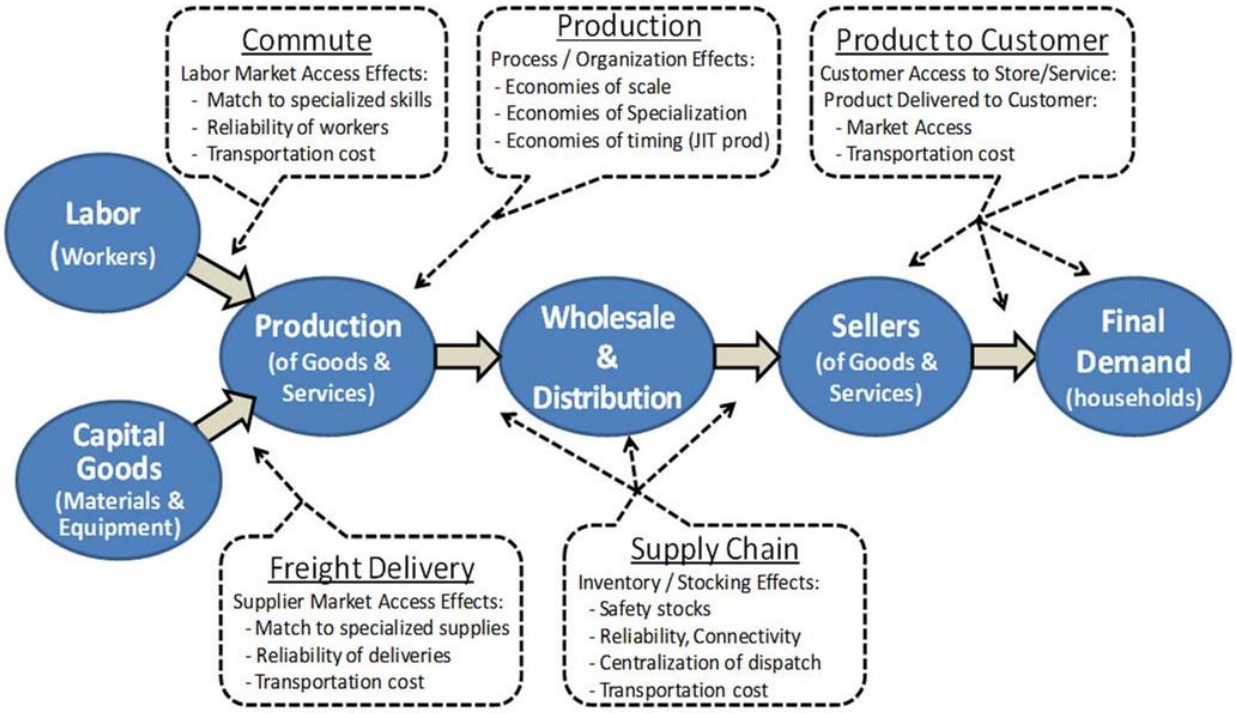
Imports	$ (millions)	% Total
Transportation Equipment	$4,890	56%
Miscellaneous Commodities	$1,231	14%
Petroleum and Coal	$724	8%
Machinery	$313	4%
Chemicals	$177	2%
Fabricated Metals	$153	2%
Electrical Equip./Appliances	$148	2%
All Others	$1,113	13%
Total	$8,748	100%

Source: U.S. Census of Foreign Trade (via WiserTrade), 2016

8.4 Market Accessibility

In addition to supporting freight movements, access to labor, customers, supplies, and intermodal terminals, the transportation system can enhance or constrain economic growth. Accessibility is a critical performance measure for any transportation system and affects various segments of the supply chain as shown in Figure 8-2. Economic agglomeration (e.g., business concentration and clustering) is enabled by efficient connections between businesses and workers, suppliers, customers, and intermodal centers that enable economies of scale associated with declining costs and increased productivity which ultimately drives economic growth.

Figure 8-2 Supply Chain Overview by Segment



For example, service-oriented industries such as health care or business support services are affected by accessibility to a local labor market that may cross state boundaries. A large labor market enables businesses to find employees with desired skill sets needed for their operations. Congestion directly affects the reliability of supply chain processes and can lower safety stock requirements, decrease overtime labor costs, and reduce the opportunity cost of capital. Connections to a wide variety of suppliers enables a more competitive selection of materials, and intermediate goods and improved access to intermodal terminals (e.g., rail and sea ports) can broaden domestic and international customer markets. Improvements in any one of these accessibility measures drives business productivity and economic growth.

Each industry has a different level of sensitivity to each measure of accessibility as shown in Figure 8-33. These measures of accessibility affect supply chain performance and can either enhance or constrain economic growth depending on the condition and performance of the transportation system.

As show in Figure 8-3, different accessibility measure will affect different types of industries. For example:

- Resource industries are sensitive to rail access;
- Manufactured goods require one-day truck delivery markets;
- And technical/service industries tend to rely more on labor market and airport access

Figure 8-3 Industry Sensitivity to Transportation Accessibility Measures

			Sensitivity to Access Measure (1-10 scale)			
	NAICS	Sector	40-min Market	3-hr Delivery Market	Commercial Airport	Rail Intermodal
Resource	212-213	Mining	3	0	4	5
	311	Food	3	0	0	0
Resource Based-Mfg	312	Beverage	10	0	0	3
	313	Textile Mills	5	5	2	3
	314	Textile	5	10	0	0
	315	Apparel	5	5	0	0
	316	Leather	5	3	2	5
	321	Wood	0	5	0	5
	322	Paper	0	5	0	5
Durables Mfg	323	Printing	10	0	7	0
	324	Petroleum	6	0	0	0
	325	Chemical	5	3	4	3
	326	Plastics	8	10	0	3
	327	Nonmetal Mineral	5	5	2	0
	331	Primary Metal	3	5	4	0
	332	Fabricated Metal	10	5	2	0
	333	Machinery Mfg	0	5	2	0
	334	Computer	3	5	2	3
	335	Elec Appliances	0	10	3	0
	336	Transport Equip	5	5	3	3
	337	Furniture	5	10	3	0
	339	Miscellaneous Mfg	5	5	5	0
Trade & Distrib	420	Wholesale Trade	10	0	3	0
	441-454	Retail Trade	8	3	3	5
	481-487	Transportation	5	0	3	0
	491-493	Del & Warehousing	10	0	2	3
Tech/ Services	511	Publishing	10	0	10	0
	512	Movie & Sound	10	3	9	0
	513	Broadcasting	10	0	5	0
	514	Internet & DP	8	3	5	0
	521-531	Finance,Insurance	10	0	3	0
	541-551	Prof. Scien Tech	10	3	10	0

Source: Economic Development Research Group

Accessibility within a transportation system has a direct influence on business operations and their ability to attract the right employees, service a sustainable customer base, access competitively priced inputs, and serve domestic and international markets. Maintaining or improving these measures of access will support business retention or expansion and attract new businesses to Rhode Island to support additional economic growth and development.

9

Next Steps

This Baseline Conditions and System Performance report is one study of several that will be used to develop the Long-Range Transportation Plan: Rhode Island Moving Forward.

In addition to this Baseline Conditions & System Performance report the following technical reports are under development to inform the Long-Range Transportation Plan:

- Compendium of Plans Review
- Trends Report
- Stakeholder Outreach Report
- Systems Needs Assessment
- Implementation Program

Simultaneously, public outreach efforts including presentations to stakeholders and transportation professionals and public workshops have been taking place and will continue through the duration of the project. These events solicit valuable feedback and providing an ongoing sounding board for the project.