CHAPTER 2

System Performance and Operations Analysis

(Page Intentionally Left Blank)

Contents

Tables

Figures

(Page Intentionally Left Blank)

2. System Performance and Operations Analysis

2.1 System and Service Data

Covering the cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach, HRT has a service area of approximately 432 square miles and a population of approximately 1.14 million people, with an overall population density of approximately 2,667 people per square mile.[1] A detailed analysis of current and future regional population density is included in **Section 2.2.1**.

HRT's fixed-route bus service includes 53 local routes, nine Metro Area Express (MAX) regional express routes, five Peninsula Commuter Service (PCS) routes, and three seasonal routes in Virginia Beach (VB Wave and Bayfront Shuttle). HRT also operates a light rail, The Tide, in Norfolk and a ferry across the Elizabeth River to connect Downtown Portsmouth and Downtown Norfolk. HRT's demand response program is a shared ride paratransit service serving the cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach to and from locations within three-quarter miles of existing fixed-route bus, light rail, and ferry service during HRT's regular operating hours.

HRT has a total of 393 revenue vehicles. The total number of vehicles as of May 2019 by mode is shown in **Table 2-1**.

Table 2-1: HRT Revenue Fleet and Peak Vehicle Need, May 2019

Mode	Fleet Size	Peak Vehicle Need
Bus	272	235
Light Rail	9	6
Ferry	3	2
Paratransit	109	103
Total	**393**	**346**

2.1.1 Fixed-Route Bus Service

The following section summarizes information on fixed-route services, including level of service, operating costs, number of vehicles in peak service, ridership, revenue hours, total hours, revenue miles, and directional route mileage from FY 2019.

HRT operates fixed-route service seven days a week. Weekday service runs between 3:40 a.m. and 2:00 a.m. The time that service operates varies between the six member jurisdictions, as each city determines how early/late the service runs. Local routes operate on 15- to 60-minute headways during morning and afternoon peak periods. Southside routes include those that operate in Chesapeake, Norfolk, Portsmouth, and Virginia Beach; Peninsula routes operate in Hampton and Newport News.

Table 2-2 and **Table 2-3** summarize span of service and headways by service day and time periods for individual HRT fixed route bus routes. HRT time periods are defined as:

- **Early:** before 6:00 a.m.
- **AM Peak:** 6:00 a.m.–9:00 a.m.
- **Base:** 9:00 a.m.–3:00 p.m.
- **PM Peak:** 3:00 p.m.–6:00 p.m.
- **Evening:** 6:00 p.m.–11:00 p.m.
- **Late Night:** after 11:00 p.m.

[1] NTD, 2017. HRT Agency Profile. Accessed at https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2017/30083.pdf.

Table 2-2: Weekday Level of Service, July 2019

Route	Span (* denotes Friday service ends later)	Headway (minutes)						Number of One-Way Daily Trips
		Early	AM Peak	Base	PM Peak	Evening	Late Night	
Southside Services								
1	4:44 a.m.–1:30 a.m.	30	15	30	15	40	60	93
2	4:51 a.m.–11:42 p.m.*	30	30	30	30	49	60	63
3	4:51 a.m.–1:27 a.m.	30	15	30	15	49	60	88
4	6:00 a.m.–10:51 p.m.	—	60	60	60	60	—	34
5	6:12 a.m.–6:14 p.m.	—	60	60	60	60	—	24
6	5:30 a.m.–12:50 a.m.	30	30	60	30	60	60	52
8	5:18 a.m.–12:15 a.m.*	30	30	30	30	42	60	65
9	5:48 a.m.–12:11 a.m.	30	30	30	30	43	60	62
11	6:07 a.m.–6:30 p.m.	—	60	60	60	60	—	25
12	5:48 a.m.–9:35 p.m.	60	60	60	60	60	—	31
13	4:48 a.m.–12:43 a.m.	60	30	60	30	60	60	54
14	6:17 a.m.–7:13 p.m.	—	60	60	60	60	—	26
15	4:48 a.m.–1:16 a.m.	30	15	30	15	30	60	96
18	5:42 a.m.–10:38 p.m.	60	60	60	60	60	—	34
20	4:52 a.m.–1:15 a.m.	30	15	30	15	60	60	91
21	5:11 a.m.–1:17 a.m.	30	30	30	30	60	60	69
22	6:03 a.m.–6:56 p.m.	—	60	60	60	60	—	26
23	5:06 a.m.–12:56 a.m.*	30	30	30	30	48	60	66
25	6:02 a.m.–11:45 p.m.*	—	60	60	60	60	60	37
26	6:29 a.m.–6:45 p.m.	—	30	30	30	30	—	48
27	5:48 a.m.–11:54 p.m.*	30	30	60	30	60	60	47
29	6:48 a.m.–10:16 p.m.	—	60	60	60	60	—	31
33	6:16 a.m.–10:58 p.m.	—	60	60	60	60	—	33
36	5:48 a.m.–10:41 p.m.	30	30	60	30	60	—	45
41	5:56 a.m.–6:53 p.m.	60	60	60	60	60	—	26
43	6:36 a.m.–6:23 p.m.	—	60	60	60	60	—	24
44	6:05 a.m.–10:02 p.m.	—	60	60	60	60	—	31
45	4:39 a.m.–11:54 p.m.	30	15	30	15	30	60	90
47	5:49 a.m.–10:30 p.m.	30	15	30	15	30	—	77
50	6:03 a.m.–6:55 p.m.	—	60	60	60	60	—	26
55	6:30 a.m.–7:56 p.m.	—	60	60	60	60	—	27
57	6:19 a.m.–7:20 p.m.	—	60	60	60	60	—	25
58	5:48 a.m.–7:10 p.m.	60	60	60	60	60	—	27

Route	Span (* denotes Friday service ends later)	Headway (minutes)						Number of One-Way Daily Trips
		Early	AM Peak	Base	PM Peak	Evening	Late Night	
Peninsula Services								
64	4:40 a.m.–7:52 a.m.; 2:10 p.m.–5:27 p.m.	1 Trip	1 Trip	1 Trip	1 Trip	—	—	7
101	5:15 a.m.–12:10 a.m.	30	35	35	35	60	60	60
102	6:19 a.m.–8:10 p.m.	—	60	60	60	60	—	28
103	5:15 a.m.–11:52 p.m.	30	30	30	30	30	45	67
104	5:45 a.m. – 10:41 p.m.	30	30	30	30	30	—	62
105	6:12 a.m.–12:13 a.m.	—	60	60	60	60	60	36
106	5:09 a.m.–12:42 a.m.	20	60	60	60	60	60	40
107	5:59 a.m.–12:07 a.m.	60	60	60	60	60	60	34
108	5:55 a.m.–11:31 p.m.	60	60	60	60	60	60	35
109	6:51 a.m.–10:05 p.m.	—	60	60	60	60	—	30
110	6:00 a.m.–10:50 p.m.	—	60	60	60	60	60	33
111	6:54 a.m.–10:48 p.m.	—	60	60	60	60	—	32
112	5:15 a.m.–12:35 a.m.	30	30	30	30	30	60	68
114	6:20 a.m.–11:38 p.m.	—	30	30	30	60	60	60
115	5:45 a.m.–12:11 a.m.	60	60	60	60	60	60	37
116	5:45 a.m.–12:08 a.m.	60	60	60	60	60	60	38
117	6:15 a.m.–7:38 p.m.	—	60	60	60	60	—	28
118	6:15 a.m.–10:13 p.m.	—	60	60	60	60	—	32
120	7:10 a.m.–8:48 p.m.	—	60	60	60	60		28
121	5:30 a.m.–7:00 a.m.; 3:40 p.m.–5:50 p.m.	2 Trips	—	—	2 Trips	—	—	4
VB Wave and Bayfront Shuttle Services								
30	8:00 a.m.–2:00 a.m.	—	15	15	15	15	15	218
31	9:30 a.m.–11:10 p.m.	—	20	20	20	20	20	82
35	8:00 a.m.–12:50 a.m.	—	30	30	30	30	30	44
Peninsula Commuter Services								
403	5:28 a.m.–6:18 a.m.	1 Trip	—	—	—	—	—	1
405	5:50 a.m.–6:31 a.m.; 3:40 a.m.–4:38 p.m.	1 Trip	—	—	1 Trip	—	—	2
414	5:20 a.m.–7:49 a.m.; 4:04 p.m.–6:33 p.m.	2 Trips	—	—	3 Trips	—	—	5
415	3:45 p.m.–4:27 p.m.	—	—	—	1 Trip	—	—	1
430	5:35 a.m.–6:30 a.m.; 3:45 p.m.–4:29 p.m.	2 Trips	—	—	1 Trip	—	—	3

Route	Span (* denotes Friday service ends later)	Headway (minutes)						Number of One-Way Daily Trips
		Early	AM Peak	Base	PM Peak	Evening	Late Night	
Metro Area Express (MAX) Services								
919	5:10 a.m.–7:26 a.m.; 2:54 p.m.–5:03 p.m.	3 Trips	—	—	4 Trips	—	—	7
922	5:00 a.m.–7:13 a.m.; 2:55 p.m.–4:40 p.m.	4 Trips	—	—	3 Trips	—	—	7
960	5:35 a.m.–8:27 p.m.	60	60	60	60	60	—	30
961	4:55 a.m.–11:12 p.m.	30	30	52	30	60	60	42
966	5:20 a.m.–6:31 a.m.; 3:40 p.m.–5:03 p.m.	2 Trips	—	—	2 Trips	—	—	2
967	4:25 a.m.–7:14 a.m.; 3:00 p.m.–6:24 p.m.	6 Trips	—	—	6 Trips	—	—	12
972	5:15 a.m.–6:17 a.m.; 3:40 p.m.–4:58 p.m.	1 Trip	—	—	1 Trip	—	—	1
973	5:00 a.m.–6:50 a.m.; 3:30 p.m.–5:23 p.m.	2 Trips	—	—	2 Trips	—	—	4
974	5:00 a.m.–6:59 a.m.; 3:40 p.m.–5:39 p.m.	2 Trips	—	—	2 Trips	—	—	4

Table 2-3: Weekend Level of Service, July 2019

Route	Saturday			Sunday		
	Span	Headway	Number of One-Way Daily Trips	Span	Headway	Number of One-Way Daily Trips
Southside Services						
1	4:40 a.m.–1:31 a.m.	30	68	5:37 a.m.– 1:30 a.m.	60	38
2	5:11 a.m.–1:04 a.m.	60	40	5:28 a.m.– 12:10 a.m.	60	37
3	5:21 a.m.–1:27 a.m.	30	64	5:59 a.m.– 12:31 a.m.	60	36
4	7:00 a.m.–10:51 p.m.	60	28	8:00 a.m.– 10:49 p.m.	67	26
5	7:17 a.m.–6:12 p.m.	60	22	—	—	—
6	5:42 a.m.–12:42 a.m.	60	39	5:54 a.m.– 6:38 p.m.	60	26
8	5:43 a.m.–12:45 a.m.	30	65	6:40 a.m.– 8:58 p.m.	60	28
9	5:32 a.m.–12:12 a.m.	60	37	—	—	—
11	6:07 a.m.–6:27 p.m.	60	25	8:42 a.m.– 5:38 p.m.	60	18
12	5:48 a.m.–9:35 p.m.	60	31	—	—	—
13	5:26 a.m.–12:43 a.m.	60	38	5:52 a.m.– 10:36 p.m.	60	34
14	6:17 a.m.–7:12 p.m.	60	26	—	—	—
15	5:18 a.m.–12:45 a.m.	30	66	6:46 a.m.– 12:45 a.m.	60	36
18	6:16 a.m.–10:18 p.m.	60	32	—	—	—
20	5:22 a.m.–1:14 a.m.	30	65	6:23 a.m.– 1:13 a.m.	60	36

Route	Saturday			Sunday		
	Span	Headway	Number of One-Way Daily Trips	Span	Headway	Number of One-Way Daily Trips
21	5:12 a.m.–1:22 a.m.	30	68	6:43 a.m.– 1:21 a.m.	60	36
22	6:03 a.m.–6:50 p.m.	60	25	—	—	—
23	5:02 a.m.–1:22 a.m.	30	67	6:23 a.m.–9:25 p.m.	60	30
25	6:03 a.m.–12:45 a.m.	60	37	—	—	—
26	7:32 a.m.–6:46 p.m.	30	45	—	—	—
27	5:48 a.m.–1:03 a.m.	60	38	—	—	—
29	6:48 a.m.–10:22 p.m.	60	31	—	—	—
33	6:26 a.m.–10:53 p.m.	60	33	6:02 a.m.–6:58 p.m.	45	35
36	6:10 a.m.–10:43 p.m.	60	32	—	—	—
41	6:03 a.m.–6:55 p.m.	60	26	—	—	—
43	6:50 a.m.–6:01 p.m.	60	23	—	—	—
44	6:05 a.m.–10:01 p.m.	60	31	—	—	—
45	5:10 a.m.–12:51 a.m.	30	68	6:06 a.m.–10:51 p.m.	60	32
47	6:03 a.m.–10:30 p.m.	30	58	6:33 a.m.–7:30 p.m.	60	26
50	7:03 a.m.–6:29 p.m.	60	23	7:00 a.m.–6:20 p.m.	60	23
55	7:48 a.m.–8:12 p.m.	60	25	—	—	—
57	6:18 a.m.–7:20 p.m.	60	25	—	—	—
58	5:48 a.m.–7:10 p.m.	60	27	—	—	—
Peninsula Services						
101	5:15 a.m.–12:10 a.m.	35	57	5:45 a.m.–7:38 p.m.	60	29
102	7:19 a.m.–7:10 p.m.	60	24	8:20 a.m.–7:08 p.m.	60	22
103	5:15 a.m.–11:52 p.m.	30	67	7:30 a.m.–8:07 p.m.	45	26
104	5:45 a.m.–10:41 p.m.	30	61	5:45 a.m.–7:43 p.m.	60	28
105	6:15 a.m.–12:13 a.m.	60	35	8:15 a.m.–8:13 p.m.	60	22
106	5:09 a.m.–12:42 a.m.	60	39	5:59 a.m.–8:19 p.m.	60	26
107	5:59 a.m.–12:07 a.m.	60	34	7:15 a.m.–8:27 p.m.	60	25
108	5:55 a.m.–11:31 p.m.	60	35	6:35 a.m.–7:02 p.m.	60	24
109	7:45 a.m.–9:10 p.m.	60	27	6:45 a.m.–7:10 p.m.	60	25
110	7:00 a.m.–10:50 p.m.	60	31	8:00 a.m.–7:48 p.m.	60	22
111	7:00 a.m.–10:39 p.m.	60	30	7:50 a.m.–7:31 p.m.	60	22
112	5:15 a.m.–12:35 a.m.	30	66	6:15 a.m.–8:01 p.m.	60	27
114	6:45 a.m.–11:32 p.m.	30	57	6:45 a.m.–7:30 p.m.	60	26
115	6:15 a.m.–10:08 p.m.	60	32	8:15 a.m.–7:41 p.m.	60	23
116	7:00 a.m.–11:47 p.m.	60	32	7:33 a.m.–7:09 p.m.	60	24
117	8:15 a.m.–7:38 p.m.	60	24	8:15 a.m.–6:38 p.m.	60	22
118	6:15 a.m.–10:13 p.m.	60	32	8:15 a.m.–7:13 p.m.	60	21
120	8:10 a.m.–8:48 p.m.	60	26	8:10 a.m.–6:48 p.m.	60	22

Route	Saturday			Sunday		
	Span	Headway	Number of One-Way Daily Trips	Span	Headway	Number of One-Way Daily Trips
VB Wave and Bayfront Shuttle Services						
30	8:00 a.m.–2:00 a.m.	15	218	8:00 a.m.–2:00 a.m.	15	218
31	9:30 a.m.–11:10 p.m.	20	82	9:30 a.m.–11:10 p.m.	20	82
35	8:00 a.m.–12:50 a.m.	30	44	8:00 a.m.–12:50 a.m.	30	44
Metro Area Express (MAX) Services						
960	6:30 a.m.–8:19 p.m.	60	28	7:50 a.m.–8:53 p.m.	60	27
961	4:58 a.m.–10:57 p.m.	30	48	7:00 a.m.–8:58 p.m.	60	28

Operating Statistics

HRT's fixed-route services operate out of three garages; the two year-round operating facilities are in Norfolk and in Hampton, with another small seasonal (summer) facility in Virginia Beach. The agency has a 235 fixed-route peak vehicle need during the summer season and a 222 fixed-route peak vehicle need all other times. Annually, the HRT fixed-route services operate over 10.5 million revenue miles and approximately 830,000 revenue hours. The majority of this service is operated in the Southside. **Table 2-4** summarizes key operational statistics for HRT's fixed route buses for FY 2019.

Table 2-4: Operating Statistics by Service

Service	Peak Vehicle Need[2]	Annual Revenue Miles[3]	Annual Revenue Hours[4]
Southside Services	139	5,367,270	462,788
Peninsula Services	52	2,692,806	213,797
VB Wave and Bayfront Shuttle Services (seasonal)	13	193,694	23,786
Peninsula Commuter Services	1	49,939	2,558
Metro Area Express (MAX) Services	30	902,532	40,481
Total	**235**	**9,206,241**	**743,410**

Overall, Route 20 has the highest daily weekday peak vehicle need at 19 vehicles and operates the most revenue miles and hours compared to any other route in the system. In general, PCS and MAX Services operate longer one-way trips compared to the local fixed-route services. **Table 2-5** shows route-level peak vehicle need, average one-way trip route mileage, and annual revenue hours and miles for HRT's fixed-route bus services.

Table 2-5: Operating Statistics by Route

Route	Peak Vehicle Need[5]	Route Length: Average One-Way Trip (miles)	Annual Revenue Miles[6]	Annual Revenue Hours[7]
Southside Services				
1	10	23.6	419,828	35,700
2	4	10.2	207,102	19,445
3	7	17.2	389,491	27,628

[2] As of May 2019.
[3] FY 2019 data, except VB Wave and Bayfront Shuttle Services, which represent estimated FY 2018 data.
[4] FY 2019 data.
[5] As of May 2019.
[6] FY 2019 data, except VB Wave and Bayfront Shuttle Services, which represent estimated FY 2018 data.
[7] FY 2019 data.

Route	Peak Vehicle Need[5]	Route Length: Average One-Way Trip (miles)	Annual Revenue Miles[6]	Annual Revenue Hours[7]
4	1	4.9	57,783	5,964
5	1	6.8	48,919	3,625
6	3	10.0	122,403	11,941
8	4	8.2	171,450	16,530
9	6	9.5	164,840	16,745
11	1	3.7	32,158	4,289
12	2	14.4	135,044	9,291
13	3	9.8	118,650	12,322
14	3	15.6	119,062	7,714
15	9	15.4	375,656	31,729
18	3	5.7	57,220	5,301
20	19	23.6	598,880	54,594
21	5	13.0	247,413	26,389
22	2	12.8	95,298	7,727
23	5	11.9	285,187	27,133
25	2	12.4	127,286	11,177
26	2	5.3	64,800	5,669
27	2	7.7	101,759	6,663
29	3	14.2	135,604	8,563
33	5	18.2	188,268	14,427
36	4	8.1	100,071	8,478
41	2	11.9	93,511	7,802
43	1	3.9	28,068	3,610
44	3	15.0	128,671	9,678
45	8	11.2	284,839	26,852
47	11	9.0	174,136	15,626
50	1	6.0	48,472	4,281
55	1	6.7	53,364	4,034
57	5	15.9	120,406	7,633
58	1	8.6	71,631	4,228
Peninsula Services				
64	4	34.8	35,997	1,616
101	3	9.1	152,035	11,077
102	1	7.5	59,459	4,735
103	3	10.1	189,764	16,820
104	3	8.1	161,640	14,426
105	2	12.7	147,750	11,774
106	3	20.1	273,040	19,828
107	4	18.6	220,148	17,250
108	4	8.8	105,214	11,056
109	1	4.4	45,852	4,207
110	4	12.9	140,642	10,998
111	4	13.6	145,344	10,694

Route	Peak Vehicle Need[5]	Route Length: Average One-Way Trip (miles)	Annual Revenue Miles[6]	Annual Revenue Hours[7]
112	4	14.0	294,090	21,821
114	4	10.1	194,289	19,190
115	1	8.0	98,333	6,115
116	3	16.7	183,455	14,735
117	0	3.1	24,786	2,382
118	2	12.6	137,960	10,770
120	1	4.9	47,309	3,359
121	1	37.0	35,699	945
VB Wave and Bayfront Shuttle Services				
30	7	3.0	78,535	12,883
31	2	4.9	32,691	3,007
35	4	16.2	82,468	7,896
Peninsula Commuter Services				
403	0	15.7	3,944	211
405	0	16.1	7,705	480
414	1	20.2	25,336	1,192
415	0	12.7	3,159	188
430	0	14.2	9,795	487
Metro Area Express (MAX) Services				
919	4	20.9	38,228	1,494
922	3	23.8	43,831	1,733
960	2	20.8	218,399	10,312
961	8	29.7	48,421	20,400
966	2	33.2	32,073	1,068
967	6	39.4	110,889	3,663
972	1	39.2	18,662	512
973	2	18.7	18,491	598
974	2	24.8	24,518	701
Total	**235**	-	**10,466,184**	**743,410**

Operating Costs

An analysis of operating expenses and revenues can elicit an understanding of how cost-efficient HRT services are operating. In FY 2019, fixed-route service operating expenses totaled over $68 million, with farebox revenue generating just over $12 million, covering approximately 18 percent of the operational costs. **Figure 2-1** through **Figure 2-4** show operating expenses and revenues by route for FY 2019 for fixed-route bus services.[8]

[8] Missing revenue and expenses for PCS routes.

Figure 2-1: Operating Expenses and Revenues by Route for Southside Routes, FY 2019

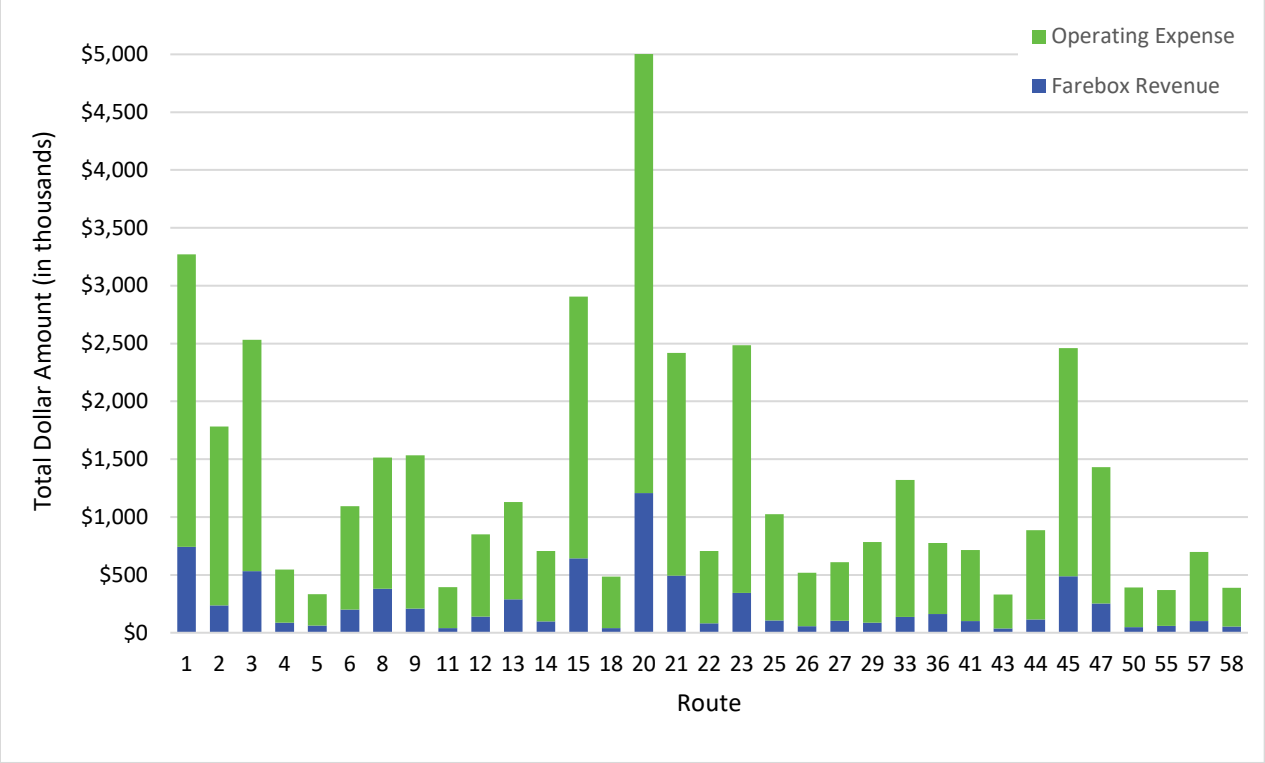


Figure 2-2: Operating Expenses and Revenues by Route for Peninsula Routes, FY 2019

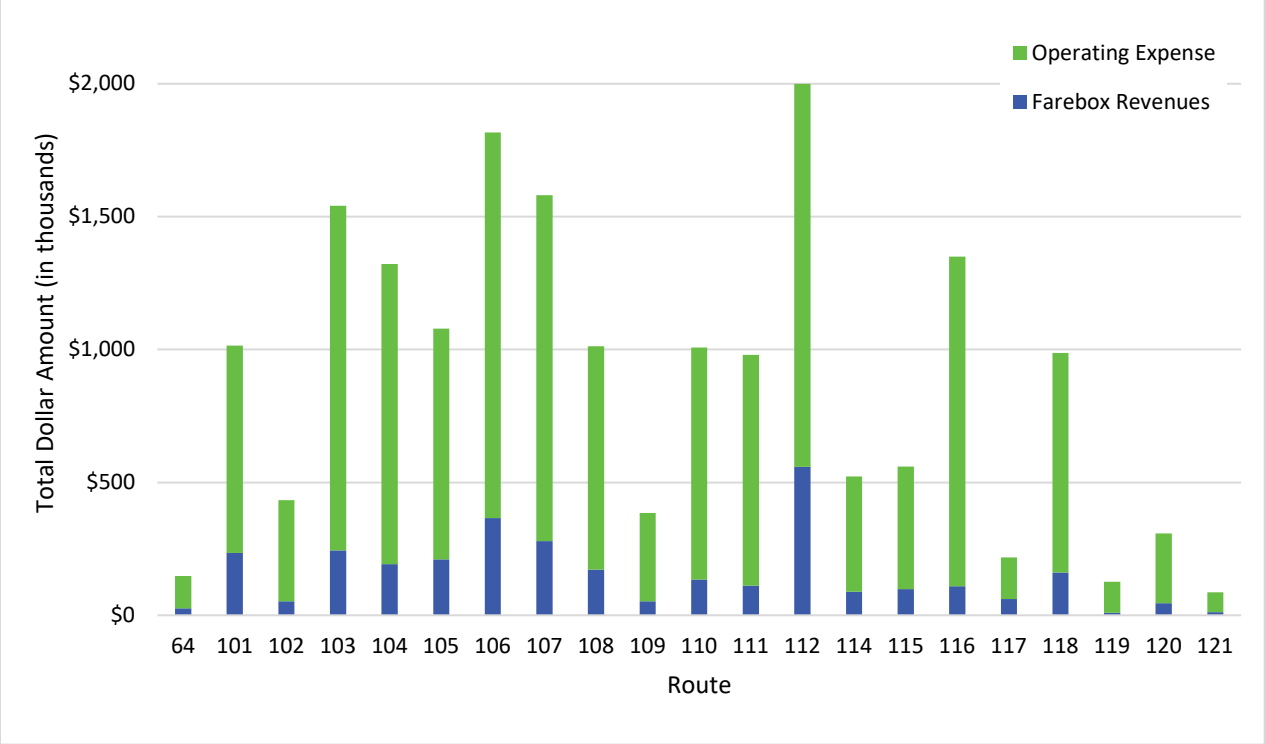


Figure 2-3: Operating Expenses and Revenues for VB Wave and Bayfront Shuttle Service, FY 2019

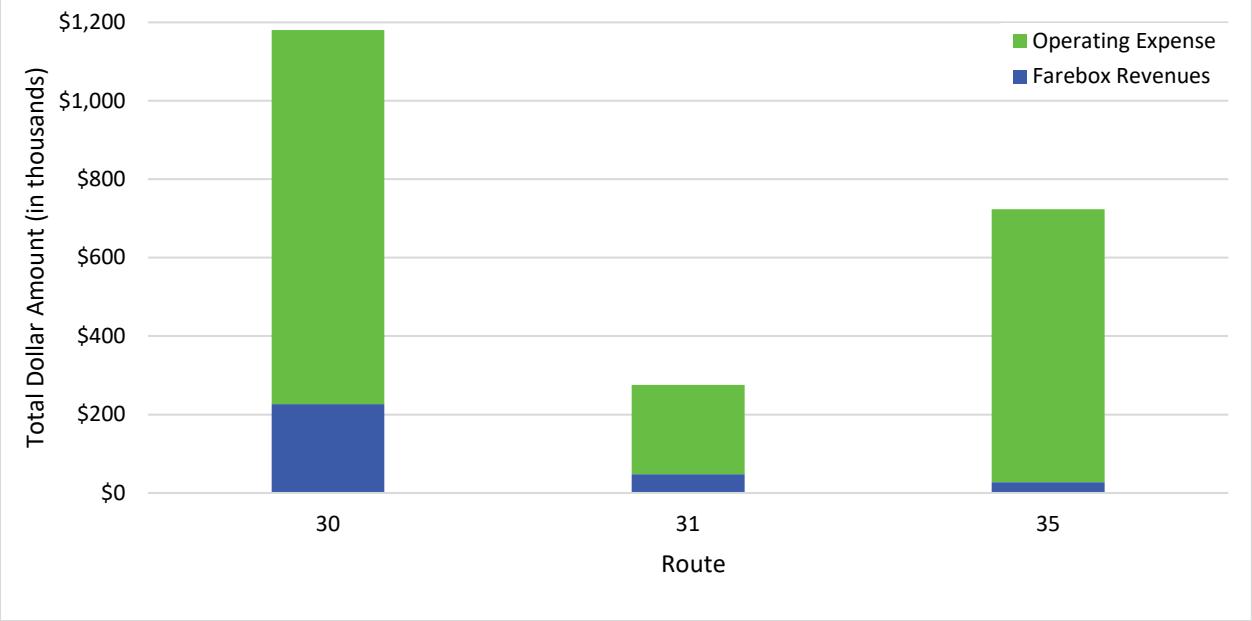
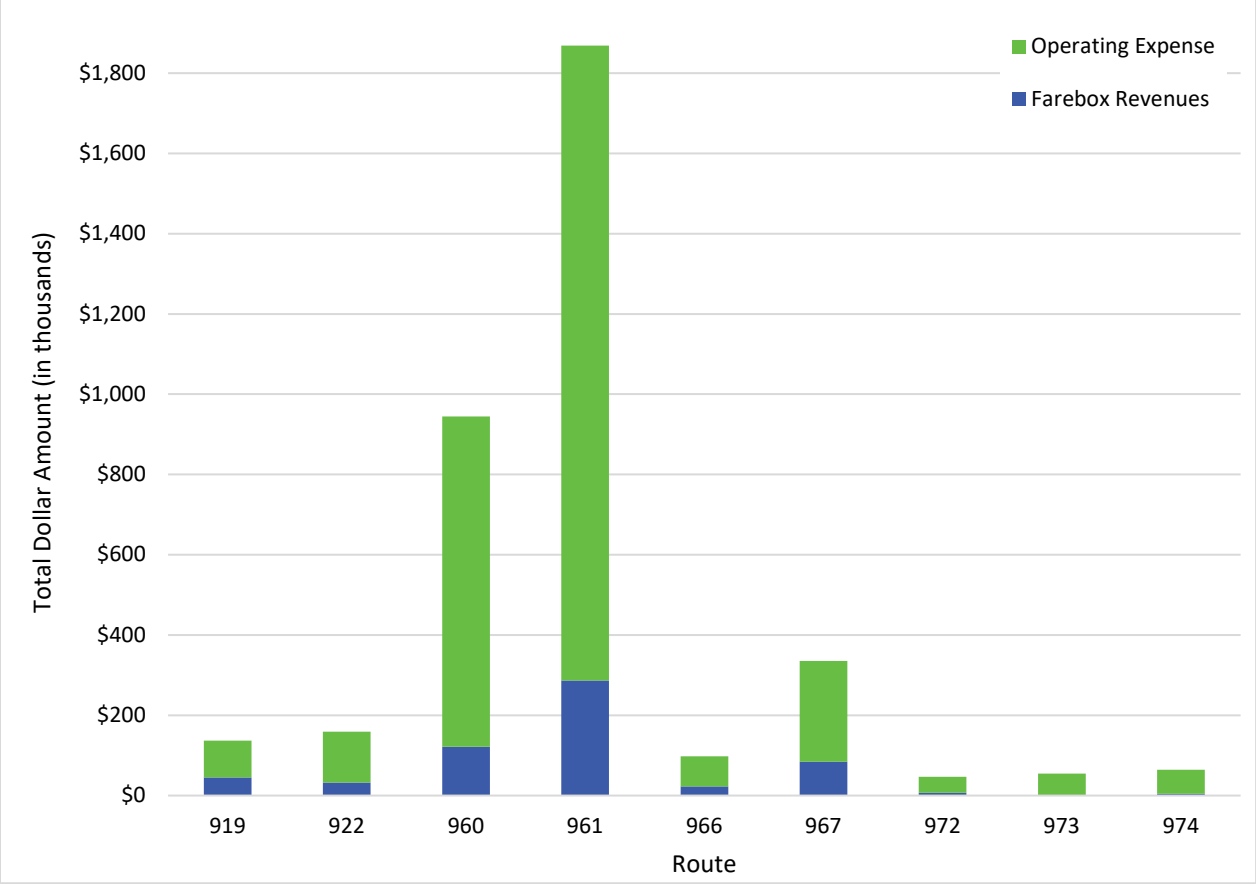


Figure 2-4: Operating Expense and Revenue for MAX Routes, FY 2019



Annual Ridership

In FY 2019, HRT's Southside, Peninsula, PCS, MAX, and VB Wave routes served a combined total of over 11 million riders. By service, the FY 2019 ridership was:

- **Southside:** 7,100,293
- **Peninsula:** 3,224,922
- **PCS:** 85,054
- **MAX:** 389,558
- **VB Wave:** 277,070

Route 20 (Downtown Norfolk/Virginia Beach Oceanfront) had the highest overall ridership in FY 2019, with more than 1 million riders, representing 9.3 percent of all HRT fixed-route bus ridership. Route 20 is followed by Route 1 (Downtown Norfolk/Pembroke East) in ridership and Route 15 (Evelyn Butts to Robert Hall/Greenbrier Mall), which – combined – account for over 20 percent of all HRT fixed-route bus ridership. Ridership and rank for each route is shown in **Table 2-6**.

Table 2-6: Annual Ridership by Route, FY 2019

Route	Annual Ridership	System Rank
Southside Services		
1	697,288	2
2	214,975	17
3	500,937	4
4	85,562	39
5	62,204	44
6	188,974	21
8	367,093	8
9	193,928	20
11	41,898	54
12	118,540	28
13	265,055	12
14	88,026	38
15	588,446	3
18	37,520	56
20	1,029,178	1
21	470,520	6
22	73,399	42
23	324,459	10
25	97,330	33
26	48,913	50
27	93,781	35
29	75,153	40
33	107,895	30
36	137,069	26
41	94,363	34
43	39,065	55
44	105,727	31
45	454,224	7
47	235,240	15
50	47,046	53
55	50,556	49
57	91,603	36
58	51,985	48
64	22,341	60
Peninsula Services		
101	233,440	16
102	55,134	47
103	243,204	14
104	181,691	22
105	199,351	19
106	314,878	11
107	254,451	13
108	139,414	25
109	56,172	46
110	134,706	27
111	108,883	29
112	497,207	5
114	336,096	9
115	98,516	32
116	90,448	37
117	61,122	45
118	152,853	24
119	8,944	67
120	47,308	52
121	11,104	65

Route	Annual Ridership	System Rank
VB Wave and Bayfront Shuttle Services		
30	205,588	18
31	47,846	51
35	23,636	58
Peninsula Commuter Services		
403	10,950	66
405	14,957	63
414	22,574	59
415	8,124	68
430	28,449	57

Route	Annual Ridership	System Rank
MAX Services		
919	20,275	62
922	14,551	64
960	69,252	43
961	180,153	23
966	22,206	61
967	73,692	41
972	6,566	69
973	814	71
974	2,049	70

2.1.2 Paratransit Service

HRT's paratransit service operates during the same hours and days as the regularly scheduled fixed-route service. HRT paratransit serves areas within three-quarters of a mile of any fixed route. HRT contracts out both the call center, which takes all the trip requests and creates the daily scheduling, and the daily operations. The service transports passengers using accessible lift vans and sedans that are a combination of owned and leased vehicles.

Operating Statistics

Paratransit services provide approximately 25 percent of the revenue hours and miles across all of HRT's modes. **Table 2-7** details the peak vehicle need and revenue miles for HRT's paratransit services.

Table 2-7: Operational Statistics for Paratransit Services, FY 2019

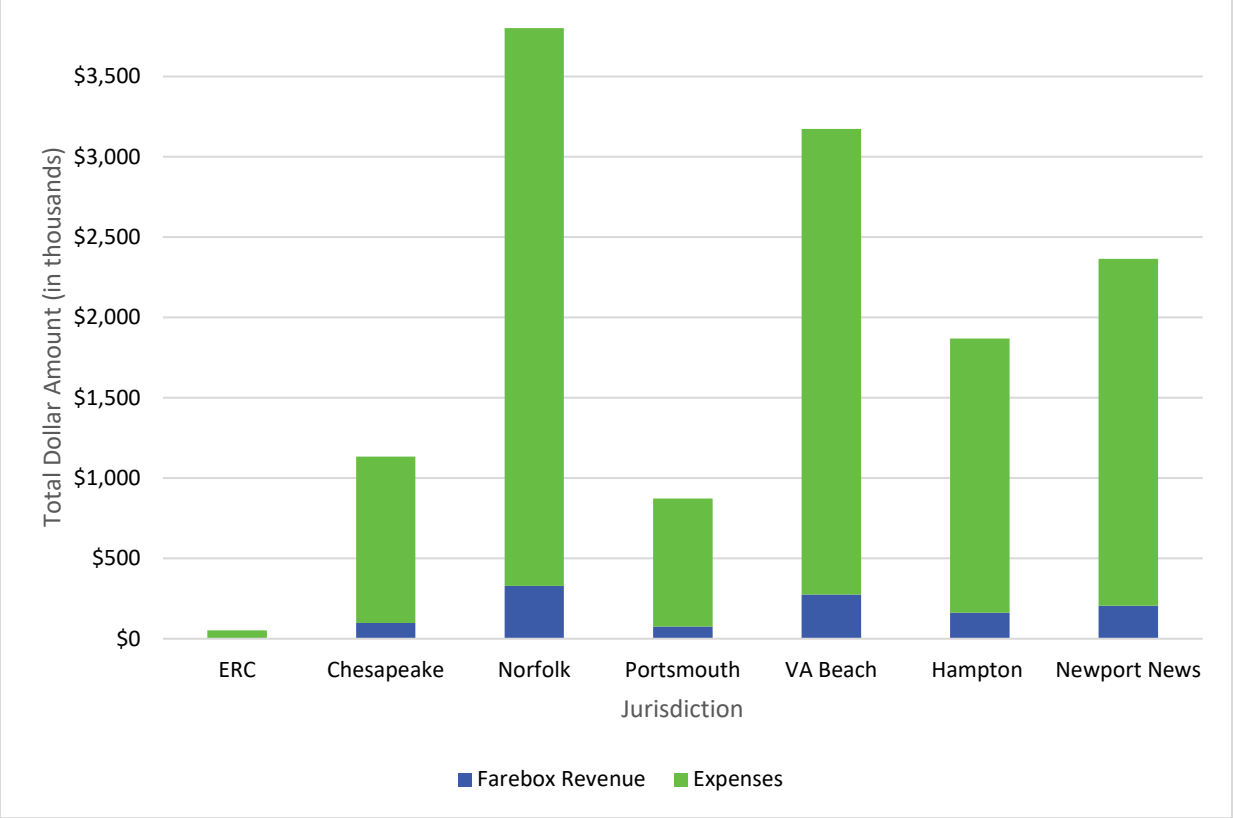
Peak Vehicle Need[9]	Revenue Miles	Total Hours
103	3,719,272	266,860

Operating Costs

In FY 2019, demand response operating expenses totaled $13,281,517. Operating expenses and revenues for demand response service for each jurisdiction are shown in **Figure 2-5**.

[9] As of May 2019

Figure 2-5: Operating Expense and Revenue for Demand Response Service, FY 2019[10]



Annual ridership

In FY 2019, HRT carried 373,376 passengers on its paratransit service. Of the jurisdictions, Norfolk had the highest paratransit ridership, followed by Virginia Beach and Newport News. Annual ridership for paratransit service broken down by jurisdiction is shown in **Table 2-8**.

Table 2-8: Annual Demand Response Ridership, FY 2019

Jurisdiction	Ridership	System Rank
Chesapeake	32,109	5
Hampton	52,504	4
Newport News	66,479	3
Norfolk	107,711	1
Portsmouth	24,652	6
Virginia Beach	89,358	2

2.1.3 Ferry Service

HRT contracts with Norfolk-by-Boat to provide service on three 100-passenger ferries on the Elizabeth River between Norfolk and Portsmouth. Ferries operate seven days a week year-round, but offer higher frequency during the summer months, as shown in **Table 2-9** and **Table 2-10**. HRT also runs ferry service to Harbor Park when the Norfolk Tides play a home game; ferries run every 30 minutes for one hour before the game begins and run until the game ends.

[10] ERC farebox revenue totaled $4,446 and expenses totaled $51,386 in FY 2019

Table 2-9: Elizabeth River Ferry Summer (Memorial Day–Labor Day) Schedule

Day	Span	Headway (minutes)	Number of Daily Trips
Monday - Thursday	5:30 a.m.–11:45 p.m.	30	37
Friday	5:30 a.m.–4:00 p.m.; 10:00 p.m.–11:45 p.m.	30	48
	4:00 p.m.–10:00 p.m.	15	
Saturday	10:00 a.m.–2:00 p.m.; 8:00 p.m.–11:45 p.m.	30	38
	2:00 p.m.–8:00 p.m.	15	
Sunday	10:00 a.m.–12:00 p.m.; 6:00 p.m.–11:45 p.m.	30	38
	12:00 p.m.–6:00 p.m.	15	

Table 2-10: Elizabeth River Ferry Winter (Labor Day–Memorial Day) Schedule

Day	Span	Headway (minutes)	Number of Daily Trips
Monday - Thursday	5:30 a.m.–9:45 p.m.	30	33
Friday	5:30 a.m.–11:45 p.m.	30	37
Saturday	10:00 a.m.–11:45 p.m.	30	28
Sunday	10:00 a.m.–9:45 p.m.	30	24

Operating Statistics

Ferry services account for less than one percent of the revenue hours and miles across all of HRT's modes. The Elizabeth River Ferry has three stops, High Street, North Landing, and Waterside, that result in a route 1.5 miles long. Ferry service is also provided to the Harbor Park baseball stadium between April and September when the Norfolk Tides play home games. **Table 2-11** shows key operational statistics for HRT's ferry services for FY 2019.

Table 2-11: Operating Statistics for Ferry Service, FY 2019

Peak Vehicle Need[11]	Route Length (miles)	Revenue Miles	Total Hours
2	1.5	18,734	6,516

Operating Costs

In FY 2019, total ferry budgeted expenses equaled $1,287,731.[12]

Annual Ridership

In FY 2019 ridership on the Elizabeth River Ferry totaled 301,321. On average, the ferry service carried approximately 730 passengers on weekdays, 1,330 on Saturdays, and 770 on Sundays.

[11] As of May 2019
[12] Hampton Roads, VA Fiscal Year 2019 Budget: https://gohrt.com/wp-content/uploads/2019/05/FY2019-Budget-Book.pdf

2.1.4 Light Rail Service

HRT operates a 7.4-mile light rail transit system called The Tide from the Eastern Virginia Medical Center complex to the Norfolk/Virginia Beach Border at Newtown Road. The Tide is the first light rail transit system in Virginia and operates seven days a week. **Table 2-12** shows The Tide's schedule.

Table 2-12: The Tide Light Rail Schedule

Span	Headway (minutes)	Number of Daily Trips
Weekday		
6:00 a.m.–6:30 a.m.	15	5
6:30 a.m.–9:00 a.m.	10	15
9:00 a.m.–3:30 p.m.	15	27
3:30 p.m.–7:00 p.m.	10	22
7:00 p.m.–10:00 p.m.	15	14
10:00 p.m.–11:00 p.m.	30	4
10:00 p.m.–12:00 a.m.[13]	30	6
Saturday Schedule		
6:00 a.m.–9:00 a.m.	30	8
9:00 a.m.–9:30 p.m.	15	3
9:30 p.m.–12:00 a.m.	30	57
Sunday Schedule		
10:55 a.m.–9:00 p.m.	15	46

Operating Statistics

Light rail services account for approximately three percent of the revenue hours and miles across all of HRT's modes. **Table 2-13** details the peak vehicle needs, and revenue hours and miles for HRT's light rail services.

Table 2-13: Light Rail Operating Statistics, FY 2019

Peak Vehicle Need[14]	Route Length: Average One-Way Trip (miles)	Revenue Miles	Total Hours
6	7.4	385,467	29, 475

Operating Costs

In FY 2019, total light rail budgeted expenses equaled $10,821,629.[15]

Annual Ridership

Annual ridership on light rail totaled 1,397,192 trips in FY 2019.

2.1.5 Route Design and Schedule Standards

Service design standards are critical planning tools to ensure an objective approach to service provision and modification. HRT's service design standards are fully detailed in **Section 1.2.3: Service Design Standards** and include standards related to route design as well as schedule and performance standards.

[13] Service until 12:00 a.m. is only on Fridays.
[14] As of May 2019
[15] Transportation District Commission of Hampton Roads, Hampton Roads, Virginia, Fiscal Year 2019 Budget. https://gohrt.com/wp-content/uploads/2019/05/FY2019-Budget-Book.pdf

Route Design

The alignment of each route is a key factor in its ability to successfully serve customers' mobility needs. "Route design" refers to route directness, connections to key origins and destinations, and how routes interface with other services that comprise the overall network. Key route design principles include:

- HRT routes should be designed to serve origins and destinations via direct pathways, minimizing out-of-direction movements. This provides a faster trip to attract more customers and fare revenue while minimizing the cost to provide service.
- Bus routes should serve major mixed-use corridors throughout the service area, avoiding smaller neighborhood streets.
- High-frequency HRT routes should be designed to serve major corridors, offer more direct service, and provide transfer connections either on-street or at major transfer hubs in the urban core.
- Deviations off the basic alignment of a fixed route should be minimized whenever possible; however, under HRT's standards, routes may deviate off their primary alignment to serve major activity centers or provide coverage to areas with limited access. The time necessary for the deviation should not exceed five minutes, or ten percent of the one-way travel time of the existing route without deviation, and deviations must result in an increase in overall route productivity.

Schedule Standards

HRT's weekday service generally runs between 5:00 a.m. and 1:00 a.m., but some routes end as late as 2:00 a.m. and start as early at 4:44 a.m. Each time period and route type have different service span standards. Weekend service generally runs between 6:00 a.m. and 12:00 a.m. **Table 2-14** shows the standards for headways by service classification and time period.[16]

Table 2-14: Service Headway by Route Classification

Time Period		Regional Backbone	Local	Coverage	Limited / Express	On-Demand
Weekday peak	6:00 a.m.–9:00 a.m. 3:00 p.m.–6:00 p.m.	15 min	30 min	60 min	Demand base	n/a
Weekday midday	9:00 a.m.–3:00 p.m.	30 min	30 min	60 min	Demand base	n/a
Weekday evening	6:00 p.m.–9:00 p.m.	30 min	60 min	60 min	Demand base	n/a
Weekend peak	8:00 a.m.–6:00 p.m.	30 min	30 min	60 min	Demand base	n/a
Weekend off-peak	6:00 a.m.–8:00 a.m. 6:00 p.m.–9:00 p.m.	30 min	60 min	60 min	Demand base	n/a

2.1.6 Survey Results

HRT conducted an on-board passenger survey across all modes between August 2016 and February 2017, with the next on-board passenger survey slated for FY 2021. In addition to the origin and destinations of their trip, survey respondents provided demographic information, the type of fare used, and their means of access to the HRT system. The results of the survey are summarized in the following subsections.

Demographics

HRT customers reported the following demographic characteristics:

- Nearly 75 percent identify as a minority, including Black/African American, Hispanic/Latino, Asian, American Indian/Alaskan Native, and Native Hawaiian/Pacific Islander. The remainder identify as White/Non-Hispanic.
- Forty-seven percent live in a household with a total income less than $25,000 per year, and 80 percent live in a household with an income below $50,000 per year.

[16] Weekday early morning (before 6:00 a.m.) and late-night services (after 9:00 p.m.) do not have defined service standards.

- Fifty-eight percent identify as female.
- Approximately 75 percent are employed either full-time or part-time.
- Five percent reported having a disability.
- Seventy-six percent live in zero- or one-car households.
- Fifty-eight percent are 34 years old or younger, three percent were under the age of 18, and three percent were 65 or older.

Fare Type

According to the on-board survey, a majority of riders use a 1-Day GoPass for their trip (53 percent), followed by a one-trip fare paid with cash (15 percent). **Table 2-15** shows the full fare breakdown of survey respondents.

Table 2-15: Percent Responses by Fare Type

Fare Type	Percentage of People
1-Day GoPass	53%
One-trip fare (cash)	15%
30-Day GoPass	9%
7-Day GoPass	8%
GoPass 365	6%
Other[17]	9%

Few respondents reported that they received a discount on their fare: three percent received a senior discount, two percent received a discount for persons with disabilities, and one percent received a youth discount.

Access Mode

Riders overwhelmingly access transit by walking, as shown in **Table 2-16**. Fewer than eight percent reported being dropped off, biking, driving to transit, or using other means of access.

Table 2-16: Percent Responses by Access Mode

Access Mode	Percentage of People
Walk	92%
Was dropped off by someone	3%
Bike	2%
Drove alone and parked	1%
Drove or rode with others and parked	1%
Other[18]	<1%

Most passengers (63 percent) reported making no transfers to complete their trip. Twenty-nine percent reported making one transfer and eight percent reported making two or more transfers.

Trip Origins and Destinations

Travel to home or work accounts for the majority of trips on HRT services. Other major destination types include shopping and school. Similar patterns can be seen among trip origin types. A full breakdown of trip destinations is shown in **Table 2-17**.

[17] "Other" includes: VB Wave 1 Day, GoSemester, Student Freedom Pass, VB Wave 3 Day, 1-Day MAX Pass, Try Transit 1-Day, 30-Day MAX Pass, e-Tide Ticket, 2-Ride GoPass, Try Transit 30 day.
[18] "Other" modes include: Wheelchair or scooter, Skateboard, Transportation Network Company (Uber, Lyft, etc.), Taxi, and school/shuttle bus. Fewer than 0.3 percent of survey respondents used any of these modes.

Table 2-17: Percent Responses by Destination Type

Destination Type	Percentage of People
Home	32%
Work	29%
Shopping	9%
School[19]	5%
Recreation[20]	5%
Eating or Dining Out	4%
Medical Appointment or Doctor's Visit	2%
Other[21]	15%

2.1.7 Support for Transit

As discussed in detail in **Section A.4.3: Transit Design Agreements with Localities**, the cities of Newport News, Norfolk, and Virginia Beach have included transit-supportive land use policies or strategies in their most recent comprehensive plans. While these policies do not represent current transit design agreements with HRT, they do reflect a regional desire to link land use and transportation, including transit access. HRT and the other service providers in the region, Suffolk Transit and Williamsburg Area Transit Authority (WATA), have begun identifying strategies for interagency coordination and collaboration, as described in **Section 2.5: Analysis of Opportunities to Collaborate with Other Transit Providers**. This move toward collaboration and coordination across agencies demonstrates the municipal level support for well-connected transit service in the region.

In addition to municipal level support for transit in the region, HRT has established practices for gauging and tracking public support for transit. As described in **Section A.11: Public Outreach/Engagement/Involvement,** HRT's "Public Hearings and Meetings" policy details the formal process of scheduling public hearings and meetings relative to major service and fare changes. All other changes in HRT service are subject to "meaningful public engagement methods as appropriate to the nature of the proposed change," as is documented in the agency's Title VI Program Public Participation Plan.

From November 2018 – February 2019 HRT conducted a survey to gather community feedback on how to best prioritize improvements to the HRT bus system as part of the Transit Transformation Project. This survey highlighted, from the user perspective, the system's most pressing needs. Nearly 2,500 people participated in the survey, with about 40% of participants self-identifying as HRT bus users. Of potential improvements to the system, surveyed users weighed more reliable and frequent service as well as real-time bus arrival information most heavily.

[19] "School" includes: K-12 and college or university destinations (for students only).
[20] "Recreation" includes: recreation/sightseeing and sporting events.
[21] "Other" destinations include: social visits (friends/relatives), personal business (bank, post office), other business related, pick-up/drop-off someone (daycare, school).

2.2 Evaluation of Transit Market Demand and Underserved Areas

2.2.1 Transit Demand and Underserved Area Evaluation

The following market analysis maps the current density and population of Hampton Roads to determine the demand for different types of transit services throughout HRT's service area. The market analysis is broken into multiple sub-analyses:

- Transit-Oriented Populations Origin Index
- Commuter Origin Index
- Employment Destination Index
- Activity Destination Index
- Population / Employment Trends
- Regional Travel Flows

Transit Propensity Indices

To determine whether a location is suitable for transit service, this transit strategic plan uses a series of indices that reveal locations with significant clusters of potential transit-oriented users, commuters, jobs, or other non-work activity destinations that could be well-served by transit. Each index is based on a set of demographic, employment, and geographic characteristics which are weighted to reflect the effect of these characteristics on transit demand. Together with other data on the origins and destinations of trips throughout the region, and input from stakeholders, these indices provide a foundation for planning transit service throughout the HRT service area. The transit propensity indices for the Hampton Roads Transit TSP are summarized in **Table 2-18**.

The transit propensity indices that follow are constructed from demographic and employment statistics that are positively correlated with transit ridership. For instance, a location with a high number of zero-car households will be more likely to have potential transit users than a location with more multi-car households, with all other characteristics being equal. For each index, these demographic and employment statistics are weighted based on their relative effect on transit ridership within the Hampton Roads region derived from Hampton Roads Transit's 2016 *Regional Origin and Destination Study*.

The transit-oriented population and commuter indices draw from the US Census' 2017 American Community Survey (ACS) five-year estimates, which provide the most recent and reliable source of demographic data for small geographic areas (Census block groups). Employment and non-work travel indices are based on the US Census' 2015 Longitudinal Employer-Household Dynamics (LEHD) survey, which provides the most recent estimates of the number and type of jobs in an area (Census block groups).

Table 2-18: Summary of Transit Propensity Indices

	Transit Propensity Index	Demographic and Employment Statistics Used	Locations with Highest Propensity
Trip Producers	**Transit-Oriented Population**	Population, race/ethnicity, households, age, income, car ownership, disability status	Downtown Norfolk, Downtown Hampton, areas south and east of I-664 in Newport News, and areas immediately north of I-64 in Norfolk.
	Commuter	Labor force, employed persons, commuters	Downtown Norfolk, the Virginia Beach Oceanfront, and residential neighborhoods throughout Virginia Beach.
Trip Attractors	**Workplace**	Employees	Military facilities, Chesapeake Municipal Center, Lynnhaven Mall, and the downtowns of Norfolk, Newport News, and Hampton.
	Non-Work	Jobs in restaurant and retail, recreation, healthcare and social assistance, education, and government	Downtowns of Hampton, Norfolk, Portsmouth, the Chesapeake Municipal Center, and areas adjacent to the intersection of I-64 and I-264.

Transit-Oriented Population Index

The Transit-Oriented Population Index identifies areas with higher numbers and concentrations of potential transit-oriented customers, to highlight areas throughout the service area that need or demand transit. The index is constructed from various demographic statistics in five categories: population (including race and ethnicity), age, income, vehicle ownership, and disability status. After each block group is scored in these categories, these scores are weighted and combined to create an overall transit-oriented population index, **Table 2-19** details the weights used for each category.

Table 2-19: Transit-Oriented Population Index

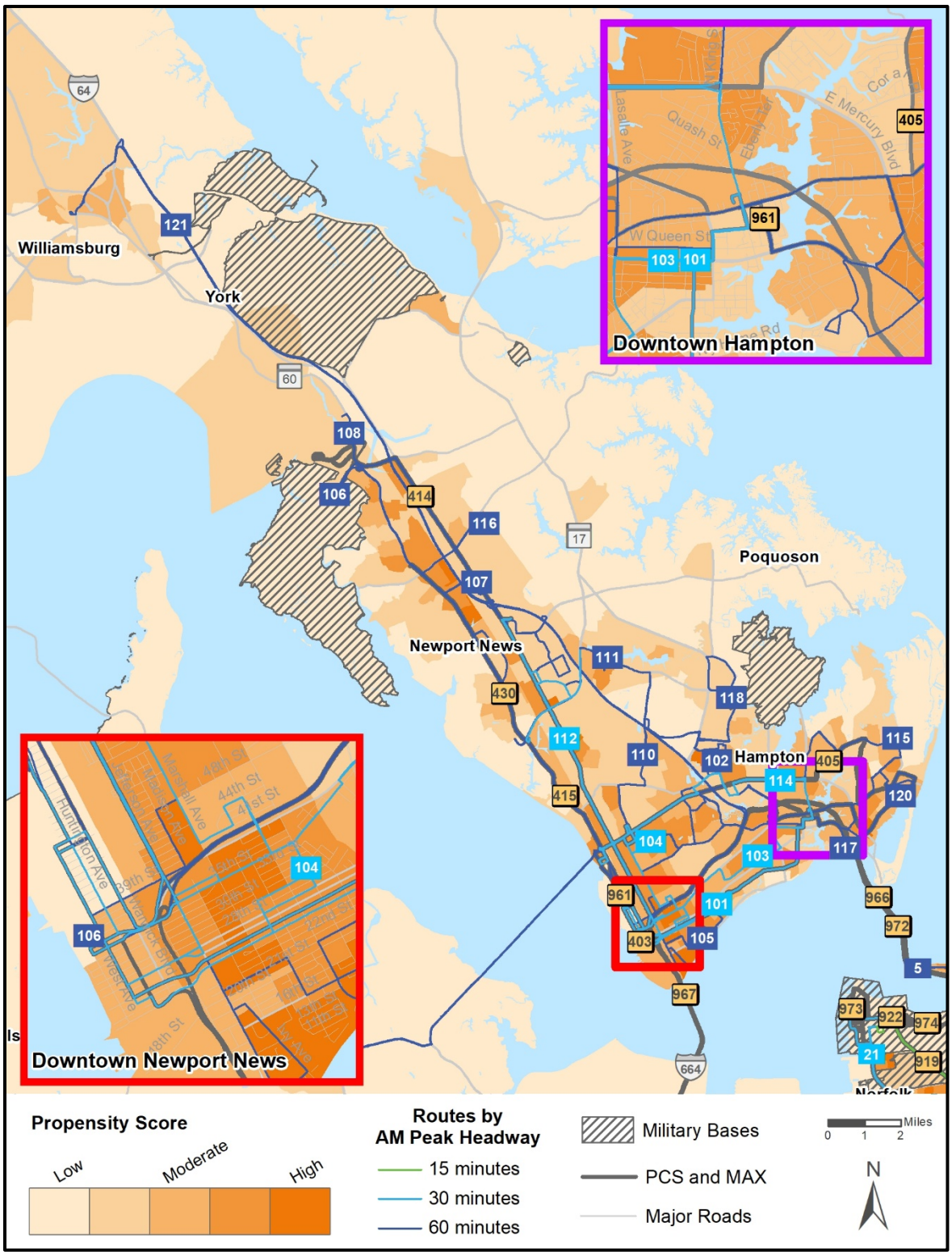
Category	Weight
Population (General / Minority)	30
Age (Youth / Senior)	10
Income (Low)	20
Vehicle Ownership (Zero / One Car)	30
Disability Status (Yes)	10

Across the entire Hampton Roads region, the areas with the most highly transit-oriented populations include neighborhoods in and adjacent to Downtown Norfolk such as Brambleton and Ghent, portions of Downtown and Midtown Portsmouth, Downtown Newport News, Downtown Hampton, and areas south and east of I-664 in Newport News. Other areas of significant transit-oriented populations are scattered throughout the metropolitan area, typically where relatively dense apartment complexes can be found. **Figure 2-6** and **Figure 2-7** show the Transit-Oriented Population Index for the Peninsula and Southside, respectively. Areas with moderate-to-high concentrations typically show significant concentrations of population, zero- and one-car households, low-income individuals, or some combination thereof.

On the Peninsula, moderate-to-high levels of transit-oriented populations can also be found in neighborhoods in and around Downtown Hampton, along the I-64 corridor in Newport News, and along Mercury Boulevard in both Newport News and Hampton. Many of these areas are either in close proximity to a major activity center, transportation corridor, or are relatively dense.

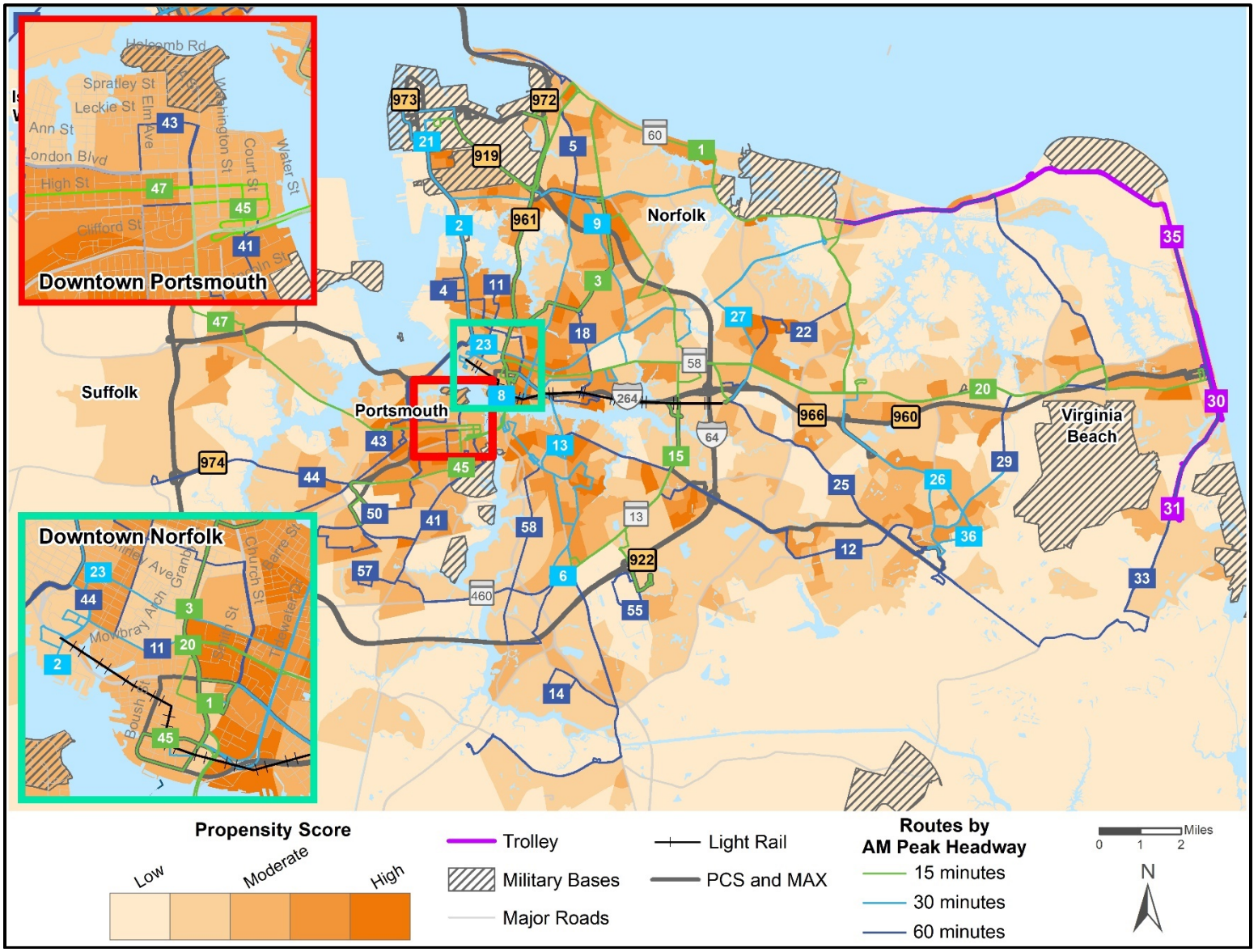
In the southern portion of HRT's service area, moderate-to-high concentrations of transit-oriented populations can also be found near historic downtowns and near major activity centers, such as higher education institutions like Virginia Wesleyan University and the Virginia Beach Convention Center. These locations include Downtown Portsmouth, Downtown Norfolk, along the Chesapeake-Norfolk border north of I-64 to the Elizabeth River, neighborhoods adjacent to Virginia Beach Boulevard such as Newtown and North Virginia Beach, and neighborhoods around Lynnhaven Parkway north of Princess Anne Boulevard.

Figure 2-6: Peninsula – Transit-Oriented Population Index



Source: HRT Routes Fall 2018

Figure 2-7: Southside – Transit-Oriented Population Index



Source: HRT Routes Fall 2018

Commuter Index

The Commuter Index identifies areas with high numbers and concentrations of traditional peak-hour commuters in order to determine how well existing transit service meets commuter demand and to identify potential new markets. The index is constructed from demographic statistics in two categories: labor force and commute mode. Statistics in these categories are designed to correlate with peak-hour trip flows. After each block group is scored in these categories, these scores are weighted and combined to assess an area's overall Commuter Index score. **Table 2-20** details the weights by category.

Table 2-20: Commuter Index

Category	Weight
Labor Force	90
Commute Mode (Transit)	10

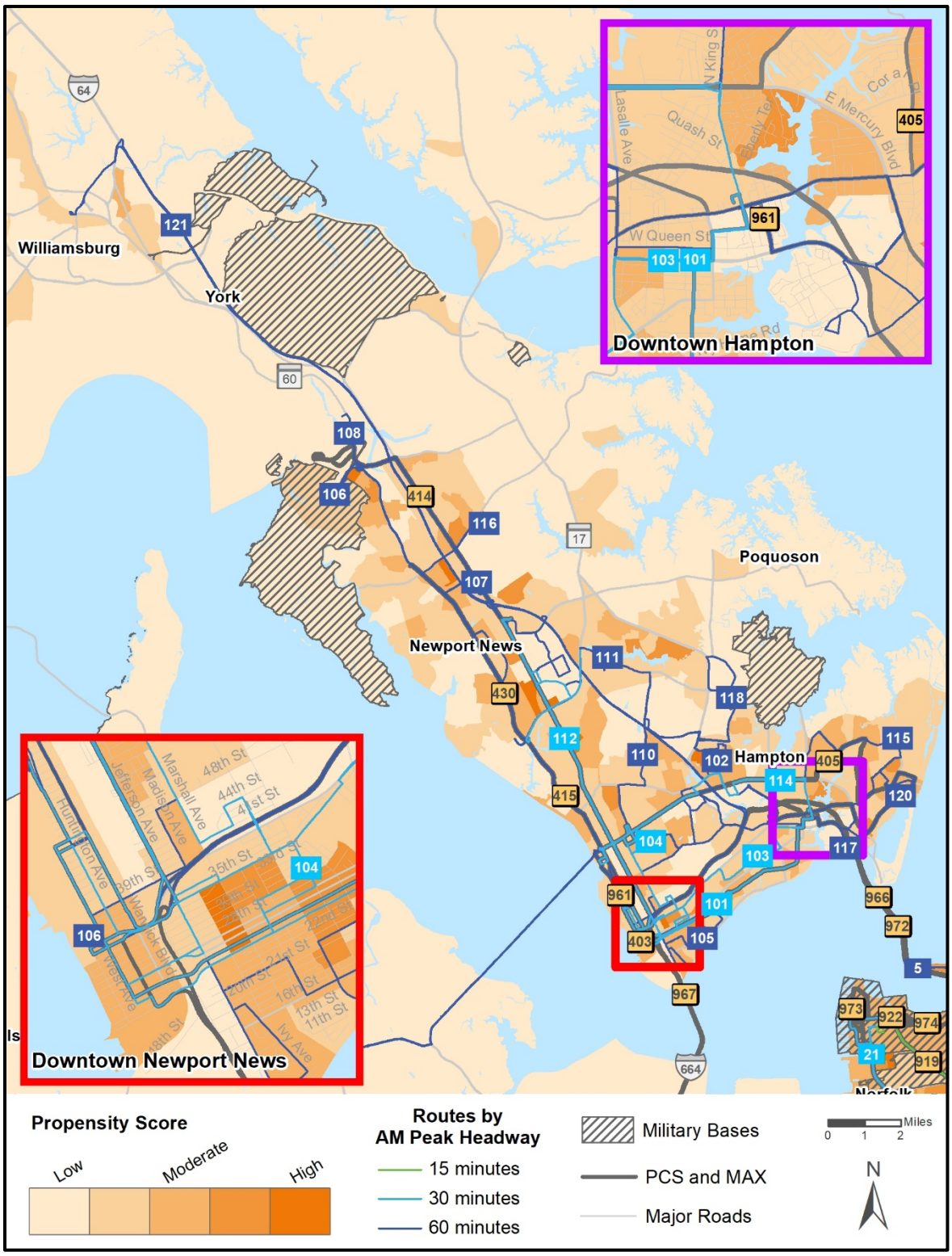
Figure 2-8 and **Figure 2-9** show the Commuter Index for the Peninsula and Southside, respectively. By design, areas with moderate to high Commuter Index scores are those areas with high numbers and densities of persons employed or in the labor force.

Across the entire HRT service area, the areas with the highest Commuter index scores include dense residential neighborhoods adjacent to Downtown Norfolk, the Virginia Beach Oceanfront, and several neighborhoods throughout Virginia Beach.

On the Peninsula, moderate levels of commuters are found along I-64 north of Mercury Boulevard and Warwick Boulevard (US-60) in Newport News. By comparison, the southernmost portions of Newport News and Downtown Hampton show relatively low commuter index values.

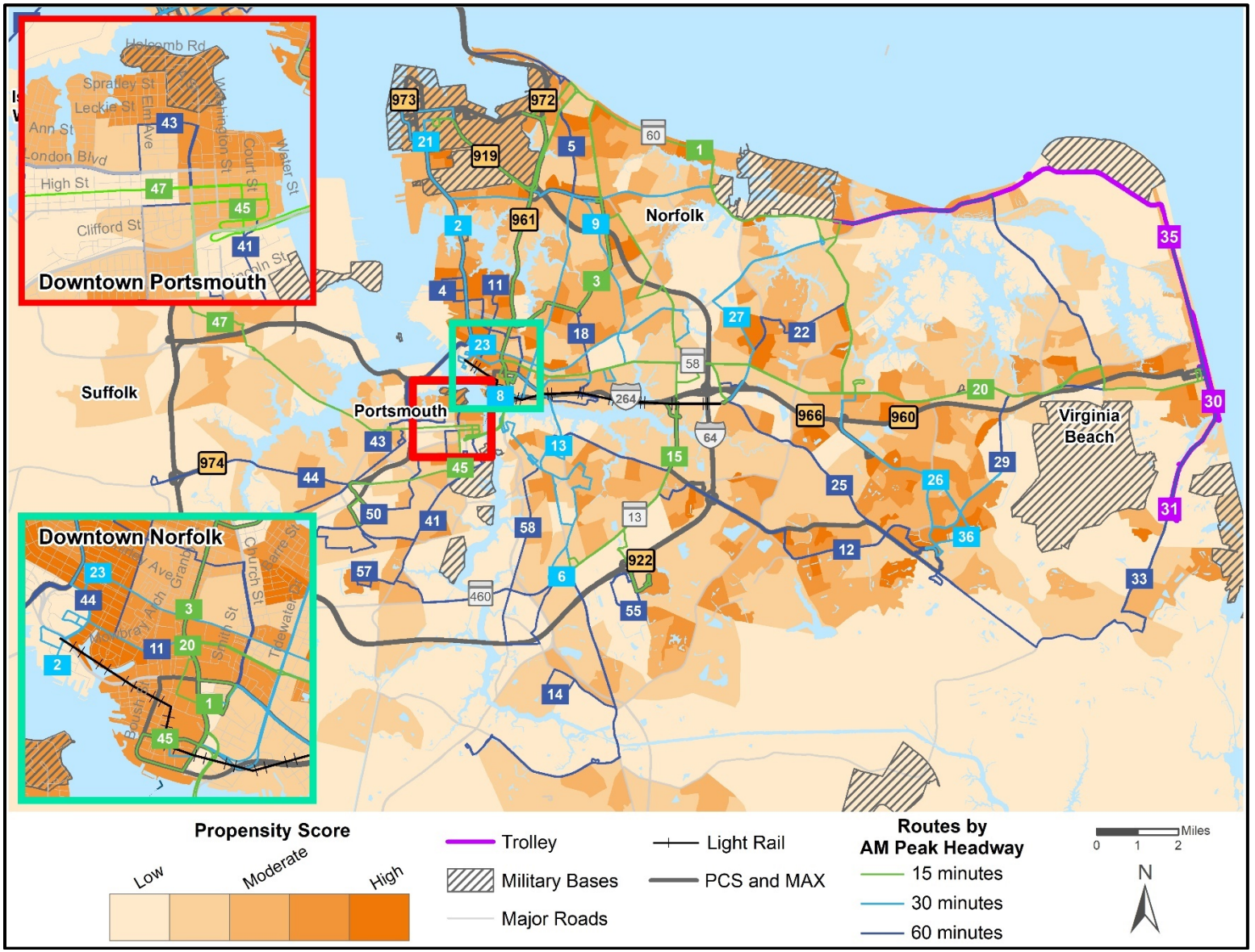
In the southern portion of HRT's service area, moderate-to-high concentrations of commuters are prevalent in places proximate to freeways and major arterials, primarily outside the region's urban core. In Chesapeake, medium concentrations are seen north of Military Highway, as well as around Greenbrier Mall and nearby neighborhoods. In Virginia Beach, these concentrations are highest along I-264 at the Virginia Beach Oceanfront, south of I-264 along Lynnhaven Parkway, and north of Virginia Beach Boulevard along Newtown Road.

Figure 2-8: Peninsula – Commuter Index



Source: HRT Routes Fall 2018

Figure 2-9: Southside – Commuter Index



Source: HRT Routes Fall 2018

Workplace Index

The Workplace Index is constructed from the total number of jobs and employment density in an area (**Table 2-21**). Areas with high numbers and densities of jobs are also likely to be locations where traditional peak-hour commuters would travel to for work and are considered major trip attractors. This index relies on Longitudinal Employer-Household Dynamic (LEHD) data on the location of both public and private sector jobs where the job is the primary job held by an individual. However, for block groups with military bases, LEHD figures significantly underestimate the jobs present at the facility. As a result, employment figures from Department of Defense websites and economic development reports are used in lieu of LEHD data for select military base block groups.

Table 2-21: Workplace Index

Category	Weight
Employment (All Jobs)	100

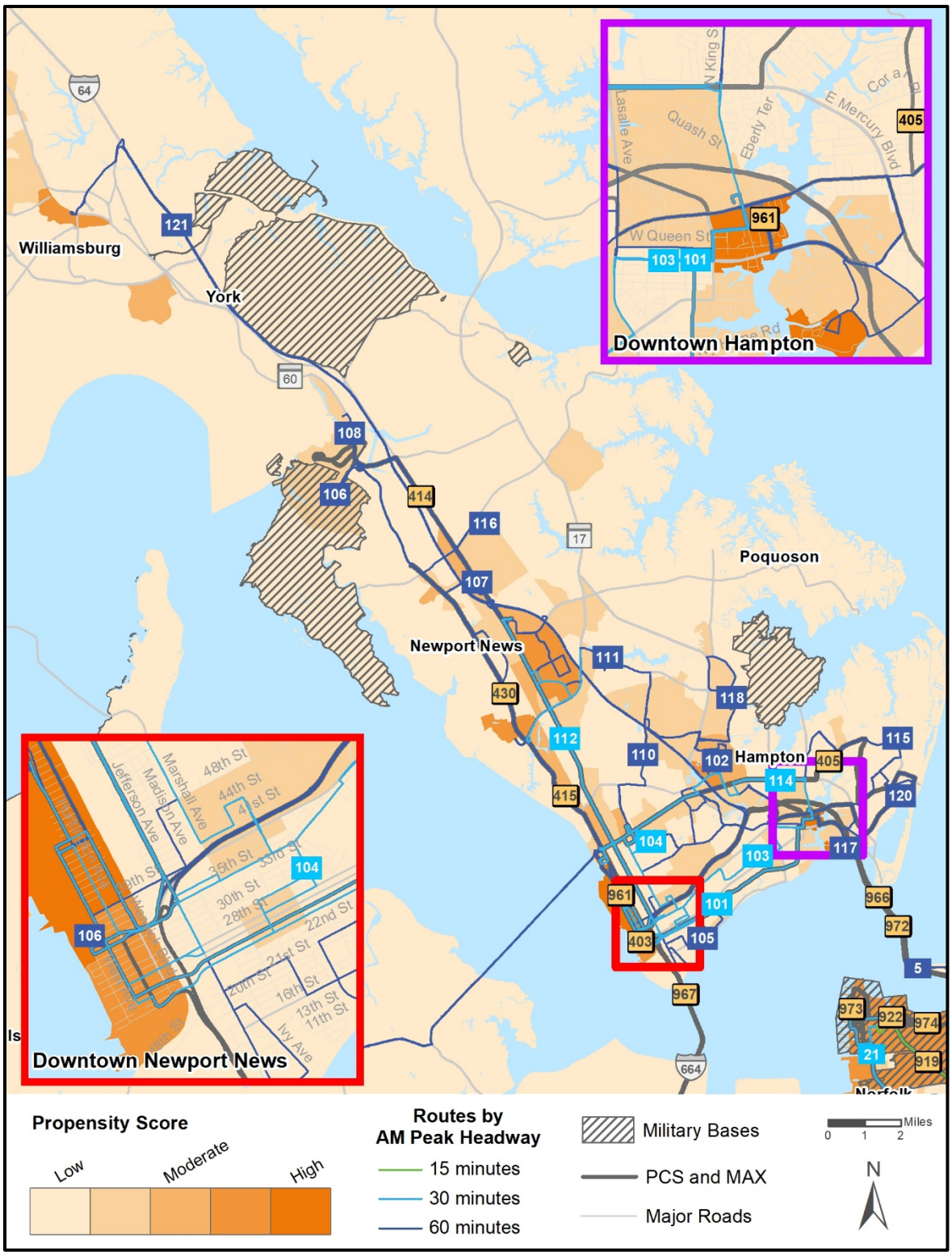
Figure 2-10 and **Figure 2-11** show the Workplace Index for the Peninsula and Southside, respectively. Because employment centers are more strongly concentrated than residential areas, fewer areas in the region receive moderate to high Workplace Index scores. By design, those areas with high levels and densities of jobs receive the highest score.

Across the entire HRT service area, the areas with the highest Workplace index scores include military facilities like Naval Station Norfolk, Naval Support Activity Norfolk, Naval Amphibious Base Little Creek, Norfolk Naval Shipyard, Naval Air Station Oceana, and Newport News Shipbuilding. Non-military locations with high Workplace Index scores include the Chesapeake Municipal Center, Lynnhaven Mall, and the downtowns of Norfolk, Portsmouth, Hampton, and Newport News.

On the Peninsula, moderate-to-high levels of employment are also found near I-64 at Oyster Point Road, in the area where the City Center at Oyster Point, the Marketplace at Tech Center, and Cannon, Inc. are located. Christopher Newport University and Riverside Regional Medical Center form another concentration of employment in that area. In Hampton, the downtown area is another substantial concentration of jobs, as are the VA Medical Center and the Peninsula Town Center.

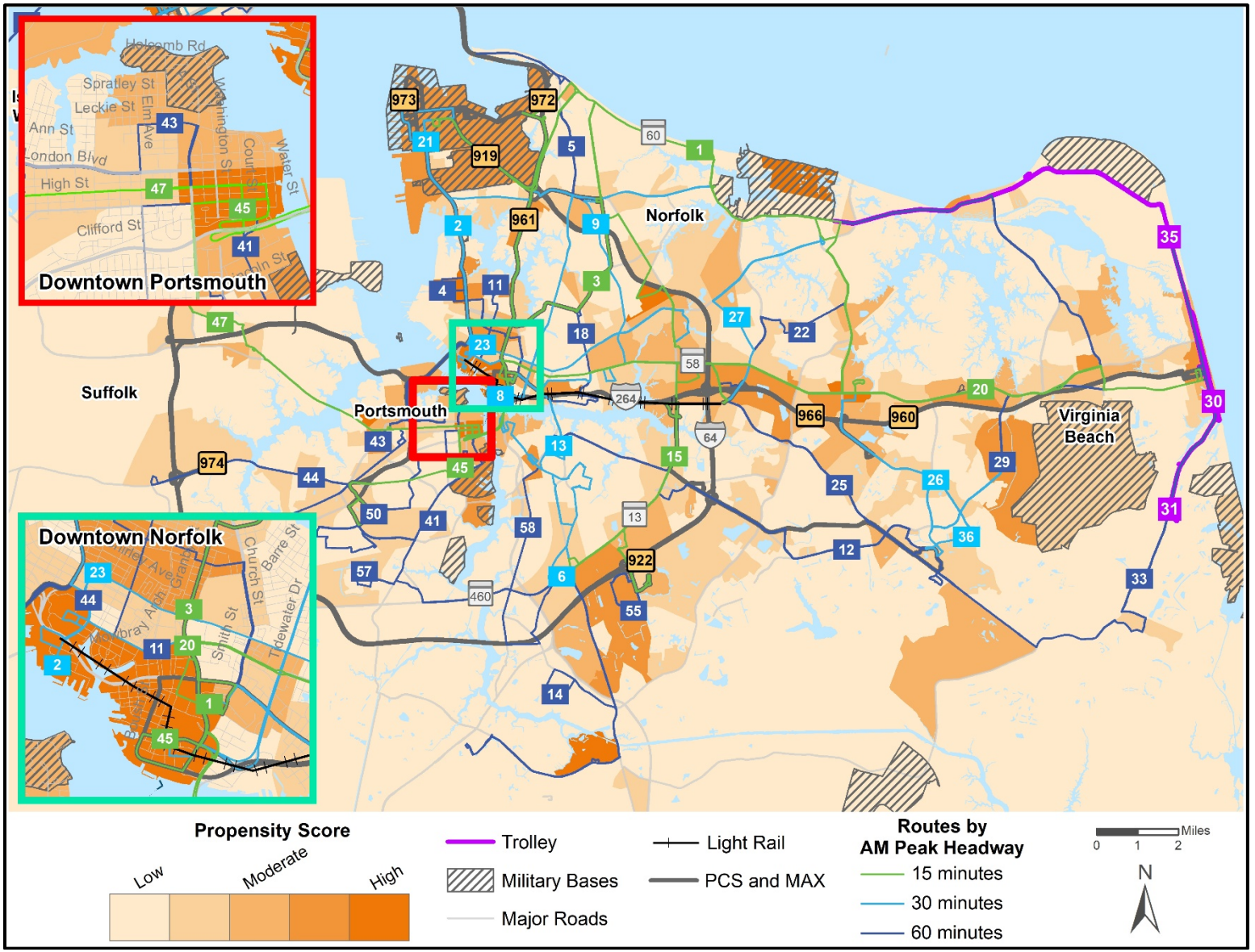
In the southern portion of HRT's service area, additional concentrations of employment are found clustered around other major activity centers. In Chesapeake, the Greenbrier area forms a significant concentration. In Virginia Beach, the area along I-264 from Military Circle Mall to Virginia Beach Town Center and the Lynnhaven Mall area are other strong concentrations. The Princess Anne area also received a high score due to a number of athletic complexes and recreational facilities. Though the Virginia Beach Oceanfront is less significant as an employment center, this is likely a consequence of available employment data not reflecting seasonal peaks of employment in the area. In Norfolk, additional concentrations of employment are seen at Old Dominion University and in industrial areas near Princess Anne Road towards the city's eastern edge. Portsmouth's concentrations of employment fall near High Street where the Maryview Medical Center and a Walmart Super Center can be found.

Figure 2-10: Peninsula – Workplace Index



Source: HRT Routes Fall 2018

Figure 2-11: Southside – Workplace Index



Source: HRT Routes Fall 2018

Non-Work Index

The Non-Work Index shows potential destinations for non-work travel based on the concentration of certain job types in an area. For instance, areas with high numbers and densities of retail and restaurant jobs likely indicate places where transit customers might travel for shopping or dining related trips. Scores across Retail & Restaurant, Recreation, Health Care & Social Assistance, Education, and Government are combined to create an overall Non-Work Index (**Table 2-22**). This index relies on LEHD data on the location of both public and private sector jobs where the job is the primary job held by an individual.

Table 2-22: Non-Work Index

Category	Weight
Retail / Restaurant	20
Recreation	10
Healthcare / Social Assistance	35
Education	25
Government	10

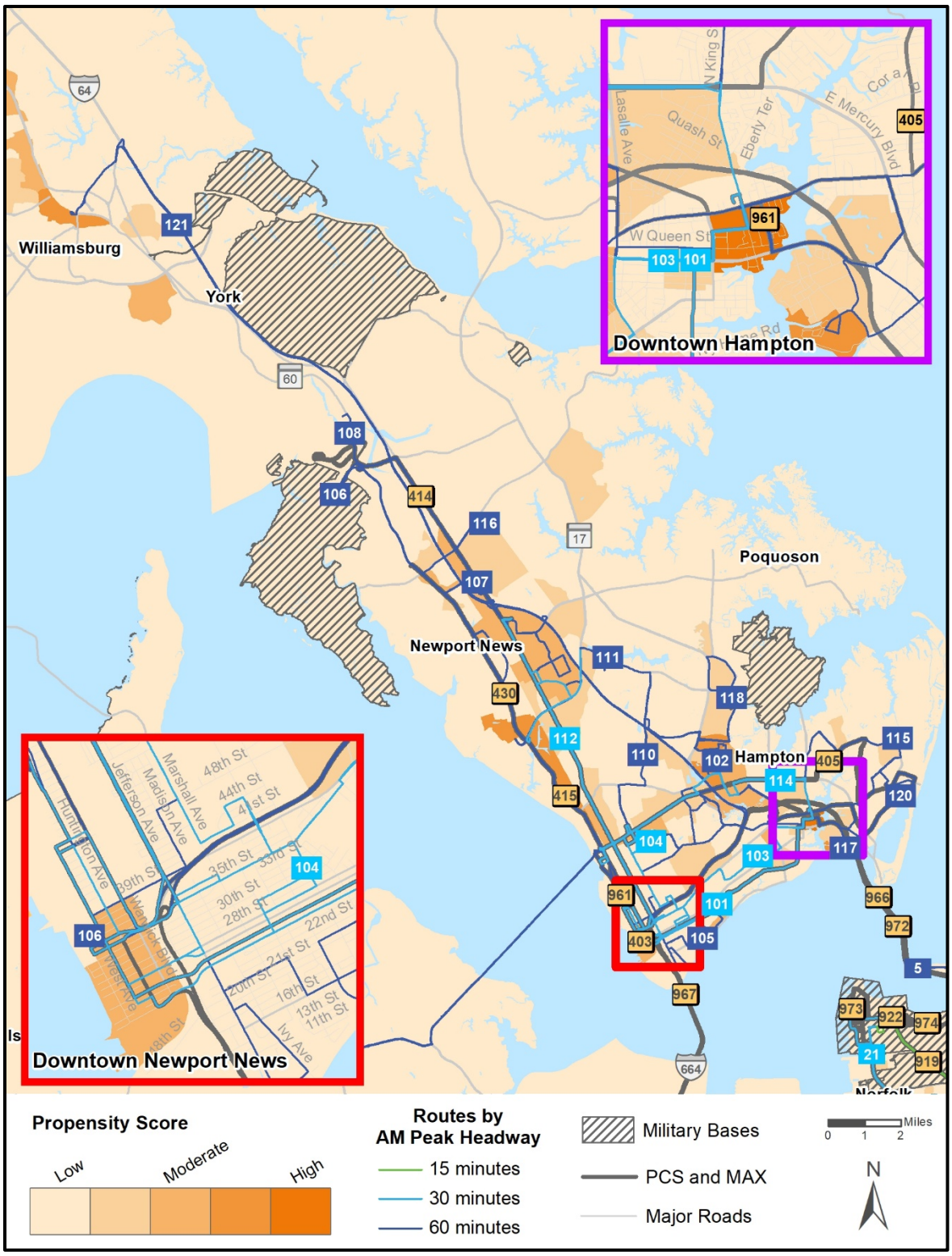
Areas with the highest scores in this index have not only significant numbers of jobs in the employment categories used to construct this index, but also high levels of employment overall. In part, this reflects the significant role that education, military and other government institutions play in the region's economy, all of which are more heavily weighted in the Non-Work Index. Because employment centers are more concentrated than residential areas, far fewer areas show medium to high scores in this index than in the Transit-Oriented Population or Commuter Indices. Because the Non-Work Index is based on employment data, the distribution of scores across block groups is similar to the Workplace Index.

Across the entire HRT service area, the areas with the highest Non-Work Index scores are the downtowns of Hampton, Norfolk, Portsmouth, the Chesapeake Municipal Center, and the areas adjacent to the intersection of I-64 and I-264. In each of these areas, a dense and diverse mix of education, government, health care, retail and recreation jobs indicate strong attractors for trips of various non-work purposes. **Figure 2-12** and **Figure 2-13** show the Non-Work Index for the Peninsula and Southside, respectively.

On the Peninsula, moderate concentrations of non-work destinations are also found near educational institutions, such as Thomas Nelson Community College and Hampton University in Hampton, Christopher Newport University in Newport News, and the College of William & Mary in Williamsburg. Retail destinations in the area, such as those along Mercury Road in Hampton and Jefferson Avenue in Newport News, are other attractors of non-work trips.

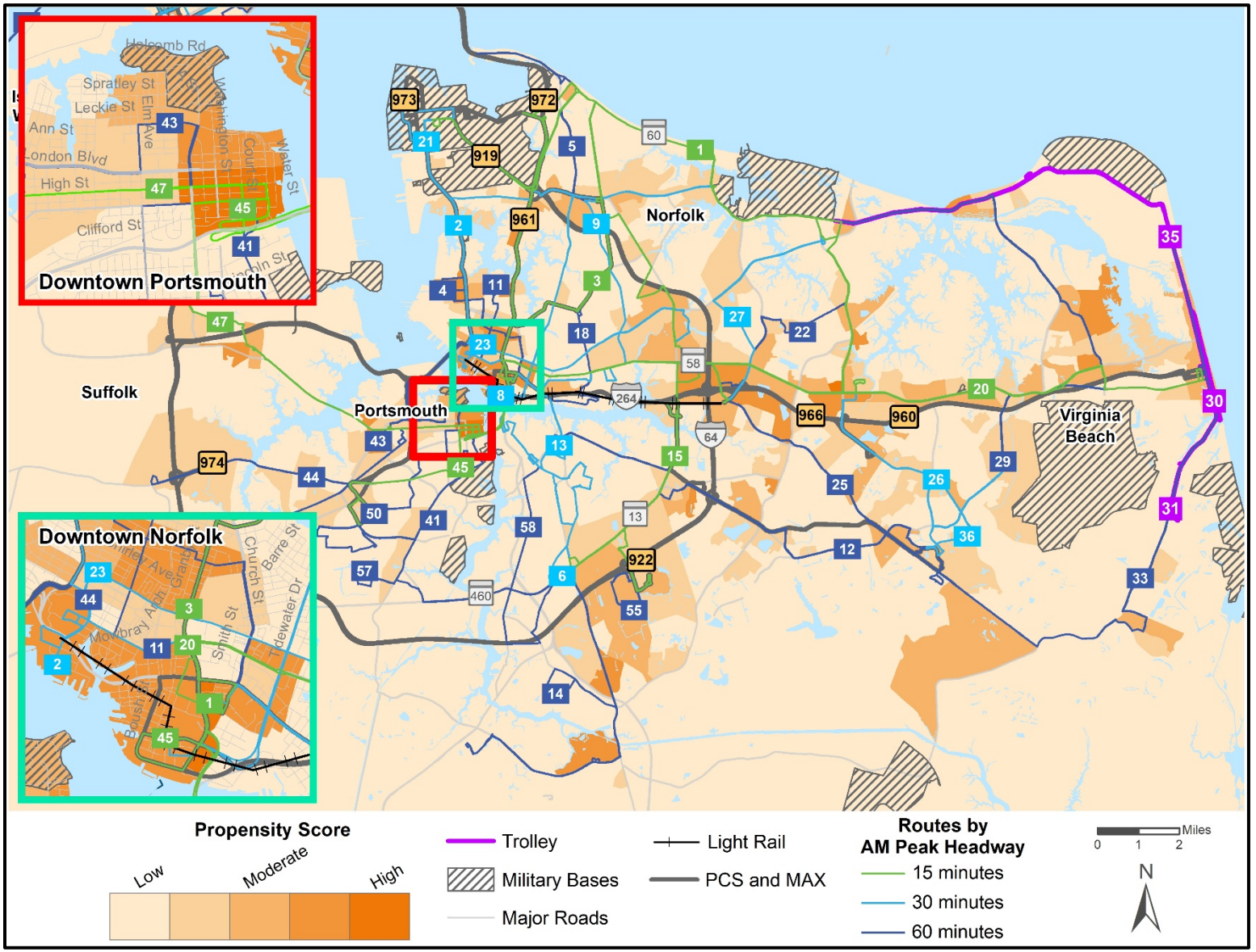
In the southern portion of HRT's service area, the highest Non-Work Index scores are similarly found in areas with strong concentrations in one or more categories. In Norfolk, high index scores are seen for educational institutions like Norfolk State University and Old Dominion University, and medical facilities such as Norfolk General Hospital and Bon Secours DePaul Medical Center. In Portsmouth, commercial and medical facilities along High Street and Airline Boulevard are other notable concentrations of non-work trip destinations. In Chesapeake, the Greenbrier area is notable for non-work trip attractors, as it was in the Workplace Index. In Virginia Beach, the I-264 corridor from Norfolk to the Oceanfront shows consistent levels of non-work trip attraction. Like the Workplace Index, the Princess Anne area of Virginia Beach is notable here for its mix of government, recreation and retail institutions.

Figure 2-12: Peninsula – Non-Work Index



Source: HRT Routes Fall 2018

Figure 2-13: Southside – Non-Work Index



Source: HRT Routes Fall 2018

Population / Employment Trends

As an area's population density or employment density grows, it typically becomes more supportive of transit. For this analysis, population and employment density were calculated based on data from the Hampton Roads Transportation Planning Organization (HRTPO). To calculate percentage changes, HRTPO's 2045 forecasts were compared to 2015 data, the most current year for which data is available.

Population Density

Several areas showed expected 2045 population densities above 15,000 persons per square mile, a density suitable for high-quality transit service. These areas included neighborhoods around Downtown Norfolk, Downtown Portsmouth, and Virginia Beach Town Center. Areas with the lowest population densities include industrial areas along waterfronts, military facilities, and the southernmost rural areas of the City of Virginia Beach, the City of Chesapeake, and portions of York County (currently outside of HRT's service area).

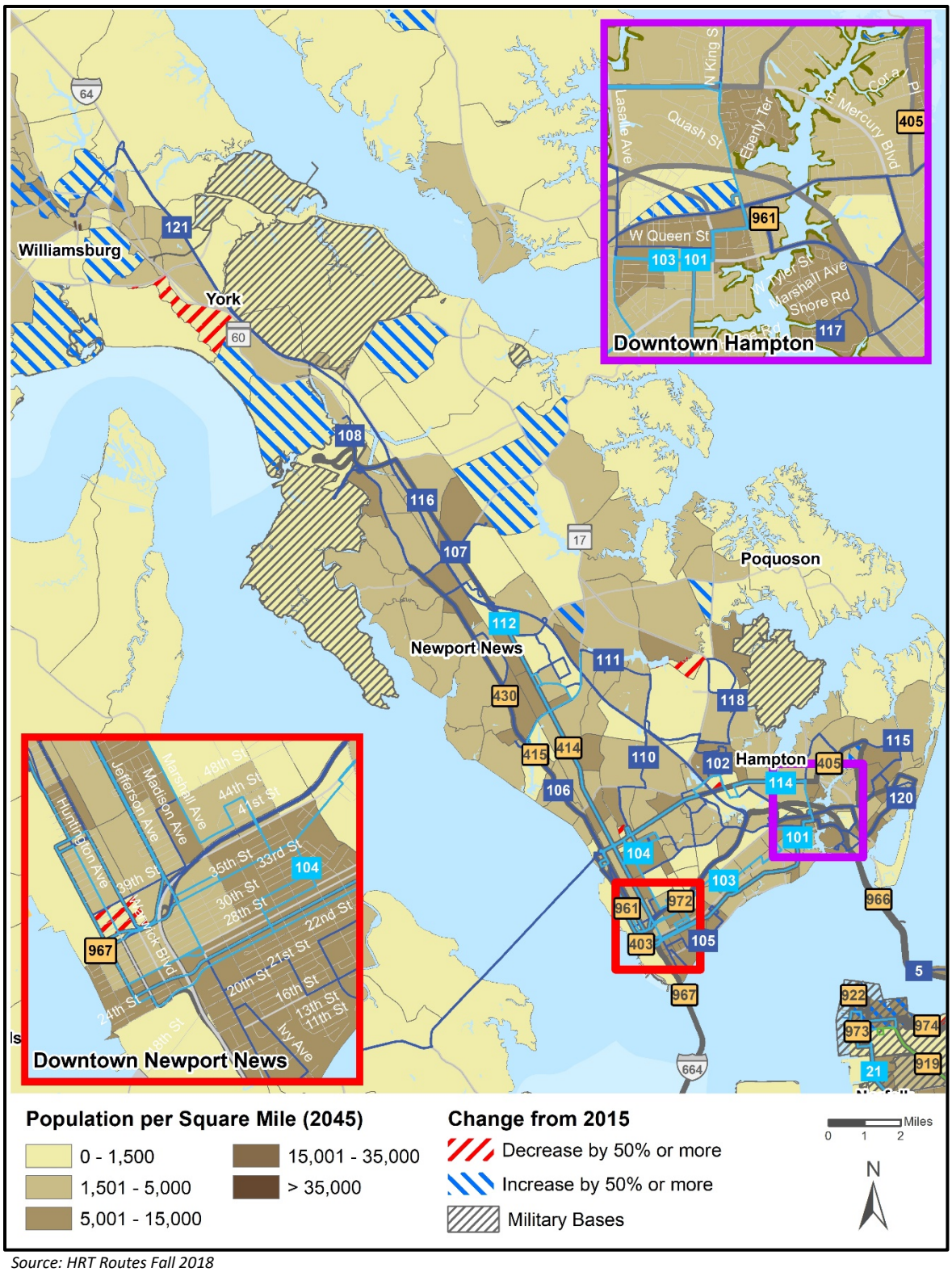
By 2045, the fringes of Portsmouth, and the cities of Chesapeake and Virginia Beach, are expected to grow in population most quickly, albeit from low existing population. Areas in the northern part of the Peninsula, and areas around Downtown Norfolk, Downtown Portsmouth, and the Virginia Beach Town Center are expected to densify much further as well. **Figure 2-14** and **Figure 2-15** show population densities throughout the Hampton Roads region, along with notable changes in densities from 2015 estimates.

Employment Density

Areas with higher employment attract more trips to work by commuters, and higher densities improve the ability of transit to serve those areas. Locations with expected high population densities in 2045 include Downtown Norfolk, Downtown Newport News, and areas along the I-264 corridor from Norfolk to the Virginia Beach Oceanfront. Notably, while military employment is significant in the region, HRTPO excludes many military bases from its 2015 estimates of employment.

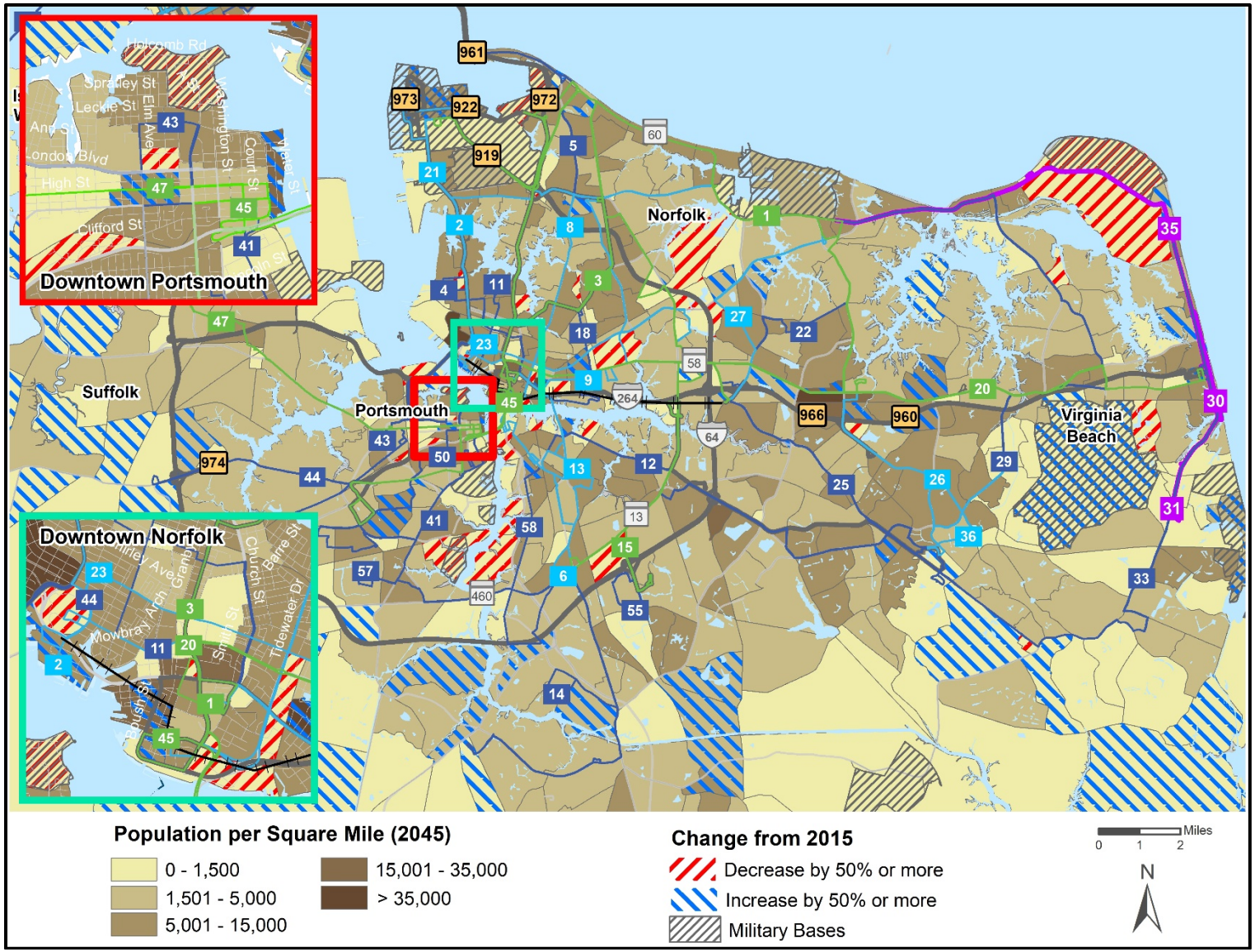
Employment growth through 2045 will be scattered but strongest on the southside of the region, particularly in portions of Norfolk, Portsmouth, and in Chesapeake in the Greenbrier area. Areas along the I-264 corridor from Norfolk to the Virginia Beach Oceanfront are also expected to grow in employment. On the Peninsula, employment in Downtown Hampton is projected to grow as well. Conversely, portions of Virginia Beach along the VA-165 corridor are expected to lose jobs. **Figure 2-16** and **Figure 2-17** show 2045 employment densities throughout the Hampton Roads Transit Service area, along with notable changes in densities from 2015 estimates.

Figure 2-14: Peninsula – Population Density (2045)



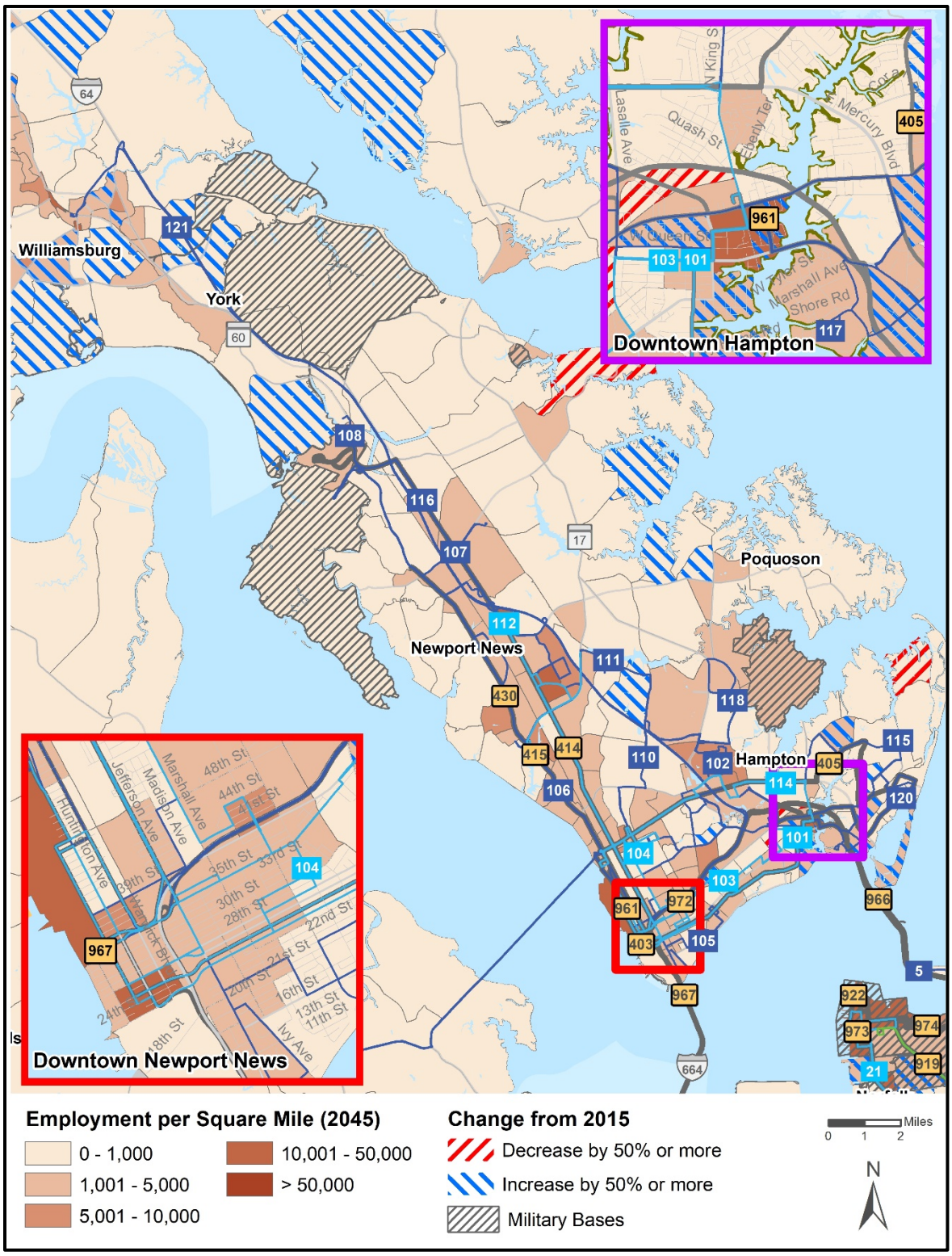
Source: HRT Routes Fall 2018

Figure 2-15: Southside – Population Density (2045)



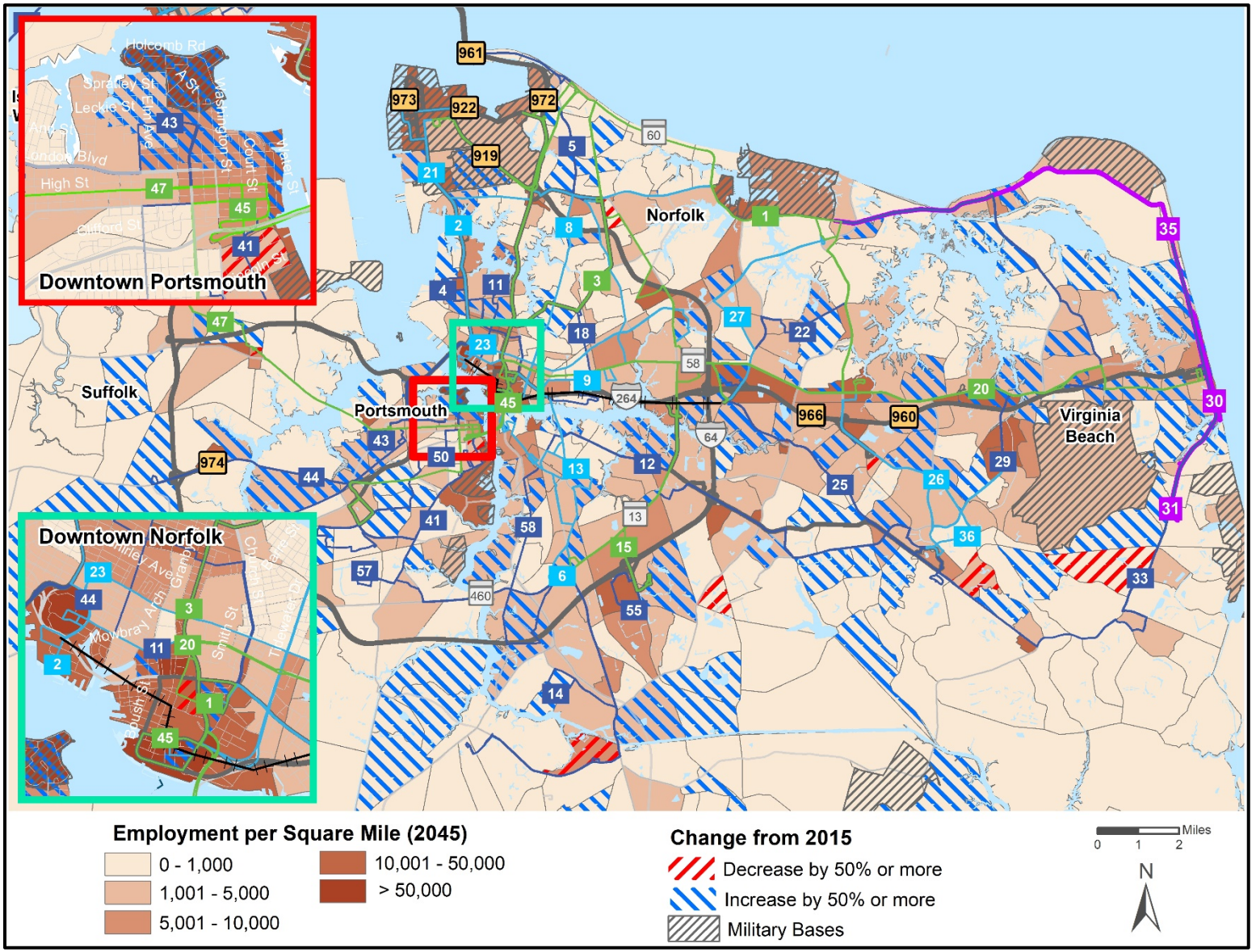
Source: HRT Routes Fall 2018

Figure 2-16: Peninsula – Employment Density (2045)



Source: HRT Routes Fall 2018

Figure 2-17: Southside – Employment Density (2045)



Source: HRT Routes Fall 2018

Travel Flow Analysis

Travel patterns within the HRT service area were determined using the Hampton Roads Transportation Planning Organization (HRTPO) Regional Travel Demand Forecasting Model. The model provides an estimate of unlinked passenger trips between traffic analysis zones (TAZs) for 2009 and 2040. For this analysis, the trips are then aggregated to larger travel districts to better understand general regional travel trends. The model forecasts travel across the cities of Chesapeake, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg and the counties of Gloucester, Isle of Wight, James City, and York. While the focus of the analysis is solely on the HRT service area, the full extent of the model was analyzed to understand the regionwide travel patterns and best create transit options.

For the purpose of this study, three types of trips were analyzed: home based work, home based other, and non-home based during two different time periods: peak and off-peak. **Table 2-23** provides a detailed description of each type of trip and time period.

Table 2-23: Travel Demand Model Classifications

Classification	Description
Home Based Work (HBW)	A direct trip between a person's home and workplace in either direction.
Home Based Other (HBO)	A direct trip between a person's home and any non-work location in either direction.
Non-Home Based (NHB)	A trip that does not begin or end at the home. Typically representing the middle part of trip chains; for example: going out to lunch at work or traveling to a second store location while shopping.
Peak	A trip during the morning or afternoon peak periods (6:00 a.m.–9:00 a.m. and 3:00 p.m.–6:00 p.m.)
Off-peak	A trip during the early morning, midday, evening, or late-night periods (9:00 a.m.–3:00 p.m. and 6:00 p.m.–6:00 a.m.)

The following analysis investigated two different types of travel patterns:

- **All-Day Travel:** combines trips from all time periods and purpose to give a full picture of travel throughout the region.
- **Peak Period Travel:** exclusively examines the peak hour home based work trips to understand commuting patterns.

All-Day Travel

Regionwide, the highest density of all-day travel trips originates within Downtown Norfolk and along the I-264 corridor between Norfolk and Virginia Beach. The model shows the highest concentration of trip origins in Downtown Norfolk (96 trips per acre), an area that is made up of high and medium-density housing, retail, and office buildings. The surrounding areas, including northern Norfolk and western Virginia Beach, also showed a high concentration of trips originating from within.

On the Peninsula, trips tend to originate from the low to medium density communities located off I-64 and Jefferson Avenue. Additionally, Downtown Newport News and the community directly west have high densities of trip origins. **Table 2-24** identifies the districts with the highest concentrations of all-day trip origins and **Figure 2-18** shows the density of trip origins throughout the region.

Relative to the trip origins, the trip destinations are more heavily concentrated in Downtown Norfolk, which has a trip density of 521 per acre; the next highest area—Ghent, which is adjacent to Downtown Norfolk—had less than a quarter of that density of trip destinations. Downtown Norfolk is a medium- to high-density mixed-use area that attracts a lot of visitors due to the various attractions including the MacArthur Center, Scope Arena, and Harbor Park Stadium, and government services such as the Norfolk City Hall, Department of Motor Vehicles, and Norfolk Circuit Court. Ghent is a mix of medium density residential and commercial development. The downtown areas of Portsmouth and Virginia Beach have a similar combination of attractions and services as Downtown Norfolk that

form smaller destination hubs, receiving between 40 and 50 trips per acre. On the Peninsula, the Deer Park / Palmer area, which includes the Patrick Henry Mall and Oyster Point in Newport News, had the highest number of trip destinations at 62 trips per acre. This area includes multiple shopping centers and retail destinations which drive all-day travel. The other high-density areas on the Peninsula include the Newport News / Williamsburg International Airport, Downtown Newport News, and the shopping centers in Mercury Central. **Table 2-25** identifies the districts with the highest concentrations of all-day trip destinations and **Figure 2-19** illustrates the density of trip destinations throughout the region.

Table 2-24: Travel Districts with a High Density of All-Day Trip Origins

Area	District Name	Number of Trip Origins	Density (Trips/Acre)
Southside	Downtown Norfolk	30,483	96
	Ghent	84,326	62
	Ocean View Ave	98,224	52
	Lafayette-Winona	47,772	48
	Kensington, Highland Park, Colonial Place	82,394	44
Peninsula	Windsor Great Park, Richneck	105,493	38
	Downtown Newport News	85,785	37
	Denbigh	142,349	32
	Northampton	123,854	31
	Deerfield, Kiln Creek, Bayberry	52,747	31

Table 2-25: Travel Districts with a High Density of All-Day Trip Destinations

	District Name	Activity Centers	Number of Trip Destinations	Density (Trips /Acre)
Southside	Downtown Norfolk	Downtown Norfolk, MacArthur Center, Norfolk Circuit Court, Norfolk City Hall, Tidewater Community College - Norfolk	165,634	521
	Ghent	Downtown Norfolk, Norfolk General Hospital, Children's Health System (CHKD), Eastern Virginia Medical School, US Army Corps of Engineers - Norfolk	167,974	124
	Tanners Creek, Partra	Southern Shopping Center, Norview Community Center, Naval Station Norfolk	89,824	53
	Kings Grant	Virginia Beach Town Center, Loehmann's Plaza	289,735	52
	Brambleton	Norfolk State University, Harbor Park Stadium, Hampton Roads Transit (HRT) - Southside Facility, Amtrak Station	81,483	50
Peninsula	Deer Park / Palmer	City Center at Oyster Point, Patrick Henry Mall, Oyster Point Square, Canon, Inc., Tech Center	188,668	62
	Mercury Central	Coliseum Square Center, Coliseum Crossing Shopping Center, Sentara CarePlex Hospital, Peninsula Town Center, Langley Air Force Base	133,207	53
	Newport News Shipbuilding	Huntington Ingalls Industries, Inc. (Newport News Shipbuilding)	38,594	39
	Downtown Newport News	Downtown Newport News	89,017	38
	Newport News / Williamsburg International Airport	Mary Immaculate Hospital, Jefferson Commons	58,269	33

Figure 2-18: Density of All-Day Trip Origins

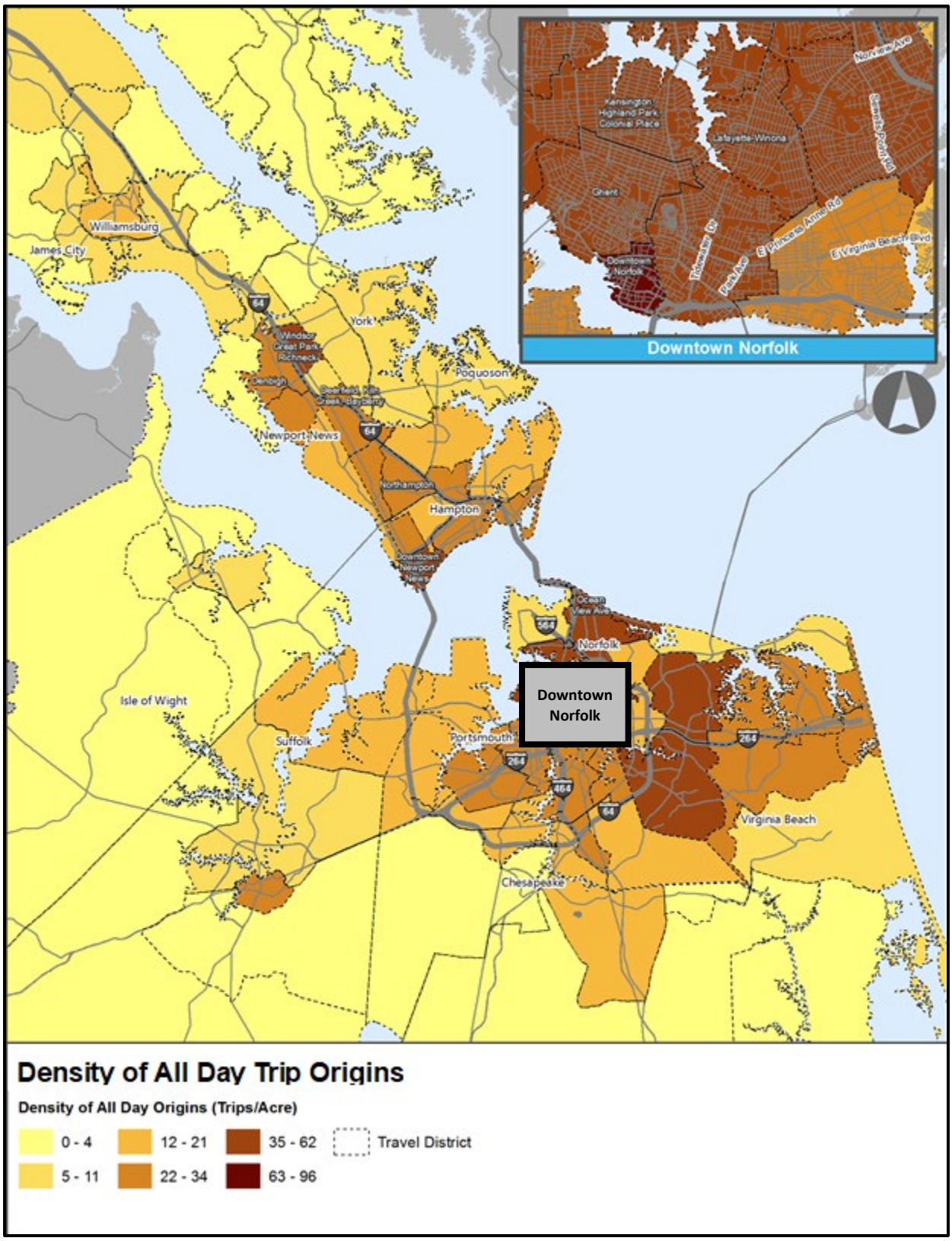
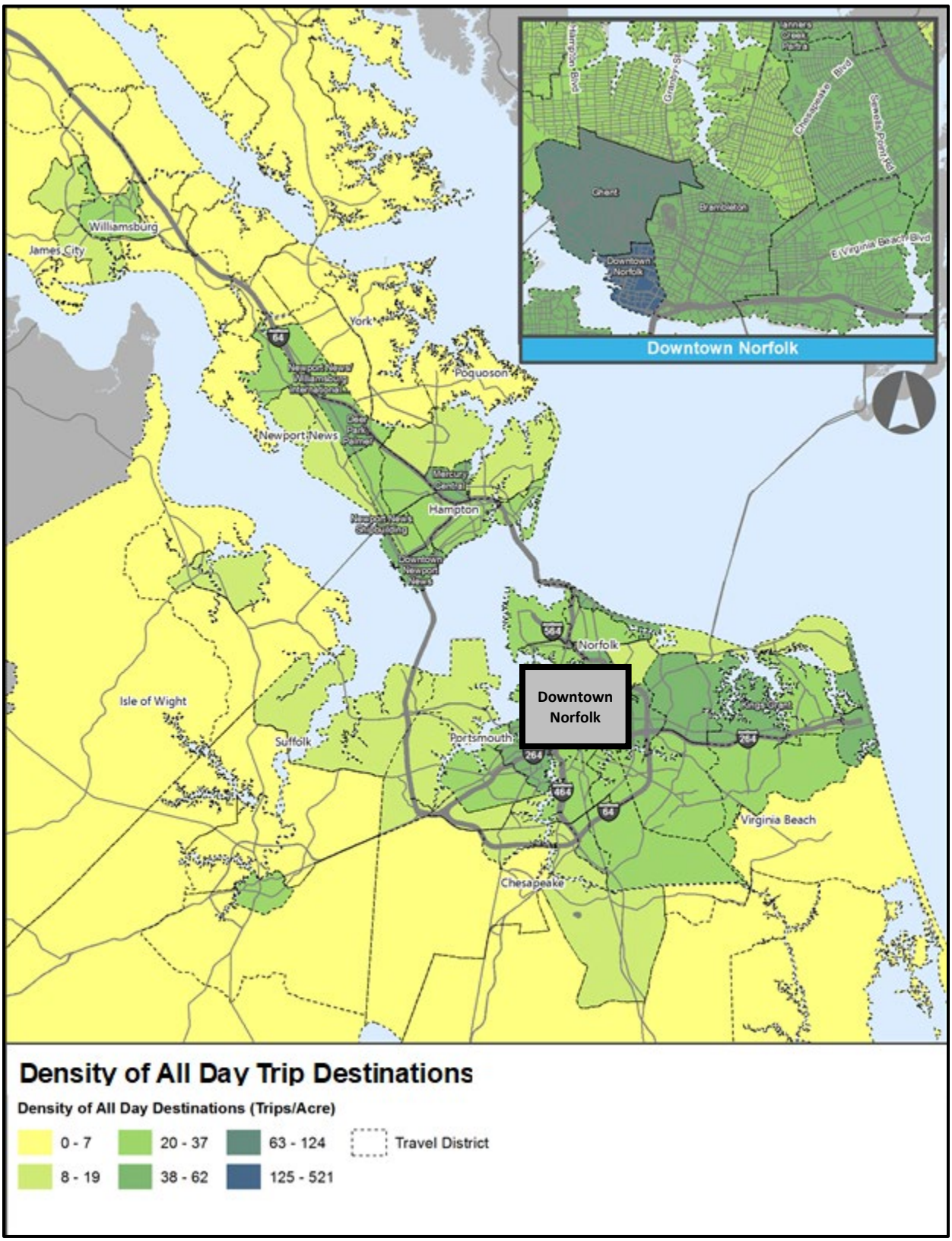


Figure 2-19: Density of All-Day Trip Destinations



Within the HRT service area, the majority of all-day trips are short distance, either traveling internally within the district or connecting to an adjacent district. The districts with the highest internal and external travel flows can be found in **Table 2-26** and **Table 2-27**, respectively. The high concentrations of internal all-day travel flows tend to be in large suburban districts that contain a town center or large shopping center, such as Virginia Beach Town Center, the City Center at Oyster Point, and the Lynnhaven / Naval Base area.

Across the HRT service area and member jurisdictions, people primarily circulate within small groups of districts according to the all-day travel flows. These travel patterns create communities where there are large volumes of flows between adjacent districts and little to no travel to districts outside the group. This is mostly caused by the bodies of water that divide the area but can also occur due to poor roadway connectivity or based on placement of trip generators. People appear to be willing to travel the farthest to reach Downtown Norfolk, with travel flows from as far as southern Virginia Beach. **Figure 2-20** illustrates the pattern of trips between districts. The all-day travel flows can be grouped into the following areas:

- **Hampton and Newport News** – This area is comprised of a continuous web of connected districts that cover the Peninsula. This pattern breaks between Newport News and James City where the Yorktown Naval Weapons Station is located. The Peninsula has lower volumes of travel when compared to the districts on the Southside due to its lower population and employment.
- **Portsmouth, Northern Chesapeake, and Northern Suffolk** – This area is defined by the Nansemond, James, and Elizabeth Rivers. Within the area there are a number of large retail locations including Chesapeake Square Mall, Victory Crossing Shopping Center, and Downtown Portsmouth, which draw people between the different districts.
- **Southern Norfolk and Virginia Beach** – This area consists of a continuous web of highly trafficked districts that cover Virginia Beach and Norfolk south of the Lafayette River. This group is the largest and most active area within the study area. The most active parts of this area tend to be outside I-64 along I-264.
- **Northern Norfolk** – This area makes up the northwest corner of Norfolk and consists of districts that border Little Creek Road. These districts have relatively low trip volume overall when compared to neighboring districts on the Southside. Although districts in this group do have some travel to districts outside this group, people predominantly travel to areas along Little Creek Road.
- **Southern Chesapeake** – This area is located outside of I-64 in southern Chesapeake. These districts are mostly made up of low-density suburban housing with some rural housing in the southern parts of the area. Travel in this community is centered on Greenbrier Mall and the adjacent shopping centers. The area functions as a hub for the area and contains many retail establishment and services.

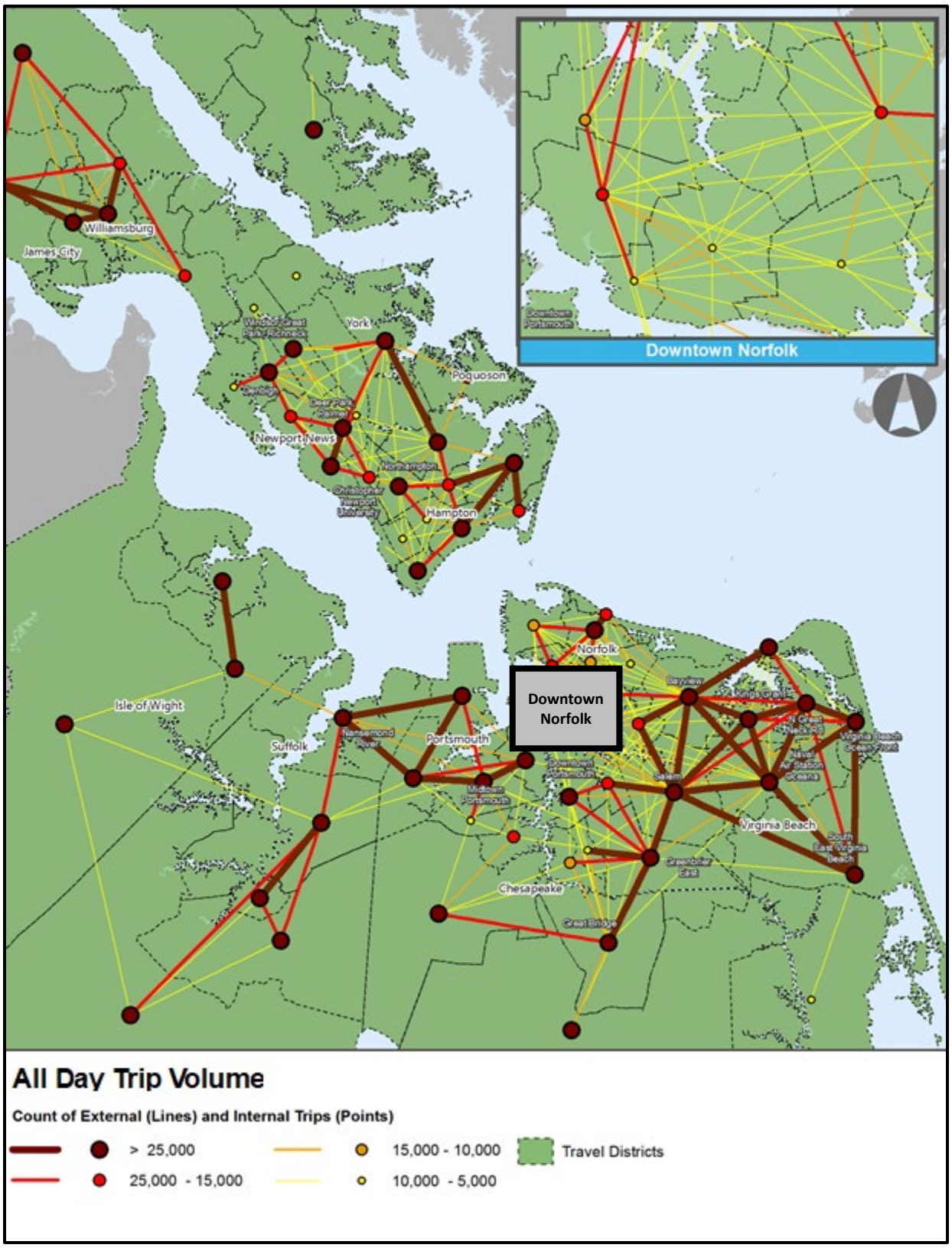
Table 2-26: Highest Internal All-Day Travel Flows within a District

Travel District	Internal Trip Count
Peninsula	
Denbigh	49,546
Christopher Newport University	36,791
Northampton	35,744
Deer Park / Palmer	33,684
Windsor Great Park / Richneck	33,347
Southside	
Salem	206,766
Lynnhaven / Naval Air Station Oceana	183,772
Bayview	180,497
Great Bridge	147,801
Nansemond River	144,980

Table 2-27: Highest External All-Day Travel Flows Between Districts

Origin	Destination	Total Trips
Salem	Lynnhaven/ Naval Air Station Oceana	129,582
Bayview	Kings Grant	79,666
Salem	Bayview	76,698
South East Virginia Beach	Lynnhaven/ Naval Air Station Oceana	74,741
Lynnhaven / Naval Air Station Oceana	Kings Grant	71,334
Midtown Portsmouth	Downtown Portsmouth	70,594
Salem	Greenbrier East	62,051
N Great Neck Rd	Virginia Beach Ocean Front	51,693
Lynnhaven / Naval Air Station Oceana	Bayview	49,732
Great Bridge	Greenbrier East	44,682

Figure 2-20: All-Day Travel Flow Volume Between Districts



Peak Period Travel

Peak period travel examines home based work trips during the peak commuting hours (6:00 a.m.–9:00 a.m. and 3:00 p.m.–6:00 p.m.) to understand commuting patterns.

On the Southside, the density of peak trip origins is centered around Downtown Norfolk, with the highest density area occurring in Downtown Norfolk south of Brambleton Ave. In that area of Downtown Norfolk, there were found to be eight trips per acre during the peak periods. Outside of Downtown Norfolk, the highest volumes of peak period trips occur in large suburban districts outside I-64 in western Virginia Beach. Of these districts the highest trip origin volume is from Salem which had 49,976 trips in the peak period (three trips per acre). The highest density of peak period trip destinations can be found in Downtown Norfolk–an area that also holds the highest density of employment in the region. Districts with large employment centers, including Downtown Portsmouth and Naval Station Norfolk, also saw high density and volume of trips in the peak period.

On the Peninsula, the highest density and volume of trips comes from a collection of districts toward the middle of the Peninsula, including Denbigh, Northampton, and Windsor Great Park/Richneck. The highest density of trip destinations was to the Newport News Shipbuilding district.

Table 2-28 details the districts with the highest density of peak period trip origins and **Figure 2-21** illustrates the density of peak period trip origins throughout the region. The highest density areas of trip destinations on the Peninsula and on the Southside are detailed in **Table 2-29** and **Figure 2-22** illustrates the density of peak trip destinations throughout the region.

Table 2-28: Travel Districts with the Highest Density of Peak Period Trip Origins

Area	District Name	Number of Trip Origins	Density (Trips/Acre)
Southside	Downtown Norfolk	2,408	8
	Ghent	6,078	5
	Ocean View Ave	6,956	4
	Salem	49,976	3
	Lafayette-Winona	3,245	3
Peninsula	Windsor Great Park, Richneck	7,354	3
	Northampton	9,106	2
	Downtown Newport News	5,316	2
	Denbigh	10,084	2
	Deerfield, Kiln Creek, Bayberry	3,805	2

Table 2-29: Travel Districts with a High Density of Peak Period Trip Destinations

Area	District Name	Activity Centers	Number of Trip Destinations	Density (Trips / Acre)
Southside	Downtown Norfolk	Downtown Norfolk, MacArthur Center, Norfolk Circuit Court, Norfolk City Hall, Bank of America, Tidewater Community College - Norfolk	31,460	99
	Ghent	Norfolk General Hospital, Children's Health System (CHKD), Eastern Virginia Medical School, US Army Corps of Engineers	22,658	17
	Downtown Portsmouth	Downtown Portsmouth, Portsmouth Naval Medical Center, Bon Secours Maryview Medical Center, Naval Medical Center Portsmouth, Norfolk Naval Shipyard	33,309	8
	Naval Station Norfolk	Naval Station Norfolk, Naval Support Activity Norfolk	37,109	7
	Military Circle	Lake Taylor Hospital, Sentara Leigh Hospital, Military Circle Mall, Janaf Shopping Center, PRA Group, Inc., Virginia Wesleyan College	20,108	5
Peninsula	Newport News Shipbuilding	Huntington Ingalls Industries, Inc. (Newport News Shipbuilding), Downtown Newport News	10,241	10
	Deer Park / Palmer	City Center at Oyster Point, Patrick Henry Mall, Oyster Point Square, Canon, Inc., Marketplace at Tech Center	18,454	6
	Mercury Central	Coliseum Square Center, Coliseum Crossing Shopping Center, Sentara CarePlex Hospital, Peninsula Town Center, Langley Air Force Base	10,140	4
	Newport News / Williamsburg International Airport	Mary Immaculate Hospital, Jefferson Commons	4,902	3
	Downtown Newport News	Downtown Newport News	5,783	3

Figure 2-21: Density of Peak Period Trip Origins

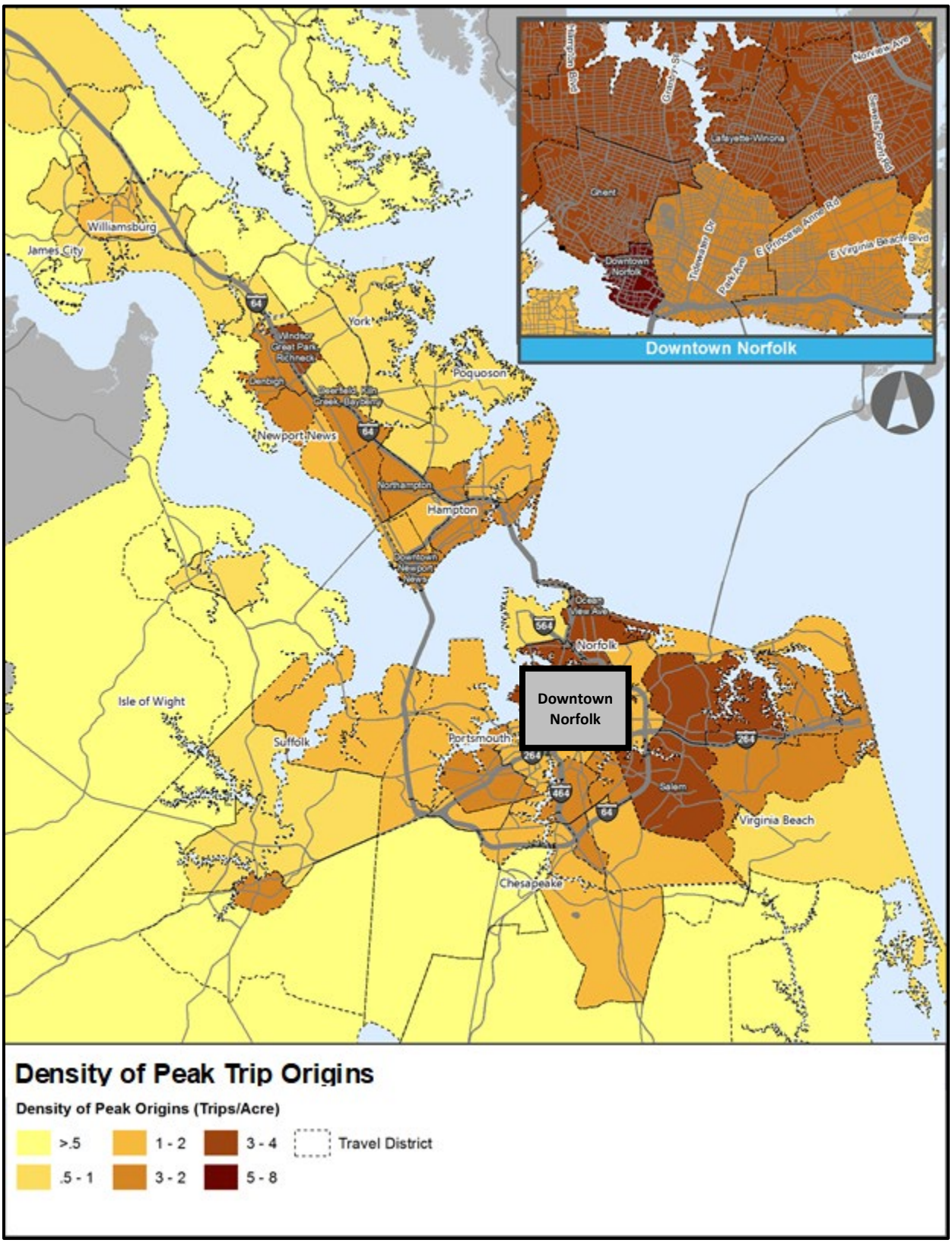
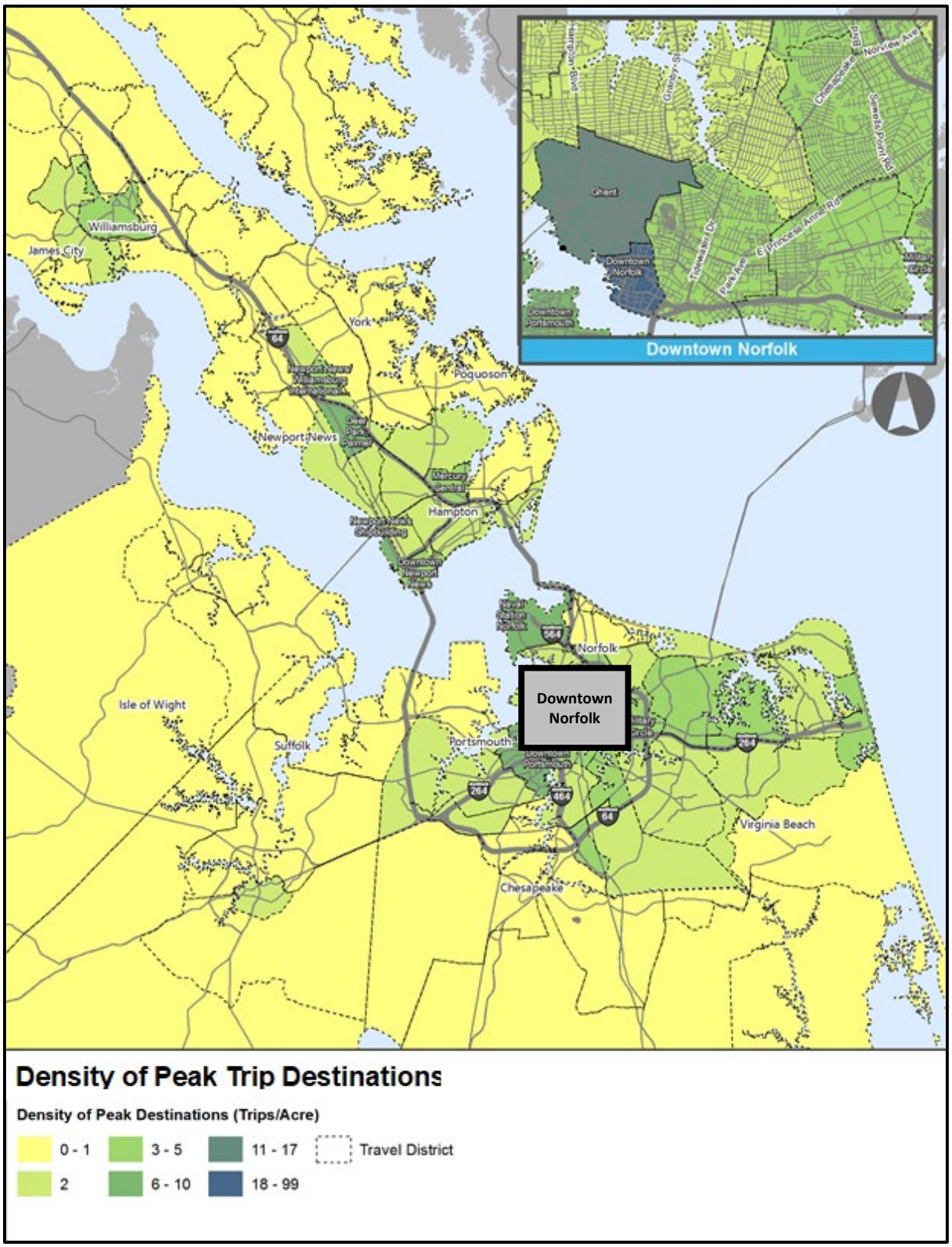


Figure 2-22: Density of Peak Period Trip Destinations



The analysis of peak travel patterns shows that people travel greater distances for work trips during the peak than for non-work trips. Internal district trips make up a much smaller portion of the overall travel during the peaks than all-day; **Table 2-30** and **Table 2-31** show the highest internal and external district travel flows during the peak periods. The highest internal travel flow is 7,580 peak hour trips in the Lynnhaven Mall / Naval Air Station Oceana district. This district contains a large military employer and a large residential area where many of those employees likely live. The highest external flow between districts is 7,255 peak hour trips primarily from the residential area in Salem to Lynnhaven Mall / Naval Air Station Oceana.

Figure 2-23 shows peak period travel patterns within the region. Employment centers are central destinations that draw workers from the surrounding areas. The largest employment centers have notable travel patterns associated with them:

- **Naval Station Norfolk -** This district is located in the northwestern section of Norfolk and attracts employees from every county within the study area. It houses the largest employer in the region, Naval Station Norfolk. The majority of the workforce is spread around along the I-64/264 corridor and the southern portion of I-64.
- **Lynnhaven / Naval Air Station Oceana -** This district is located in central Virginia Beach. Most of the employment within this area comes from the Naval Air Station Oceana, but the district also contains other employment centers such as Lynnhaven Mall and Tidewater Community College. The majority of employees within this district appear to travel from the adjacent districts along the I-264 corridor.
- **Downtown Norfolk -** The downtown houses various public and private employers. People who work in this district primarily commute from Norfolk or northwest Virginia Beach. The remainder commute across the river from Portsmouth and northern Chesapeake.
- **Deer Park / Palmer -** This district contains a collection of employers in the technology sector as well as the Canon Factory Service Center. Employees of this district live in the neighboring areas but a large number appear to commute from southern York.

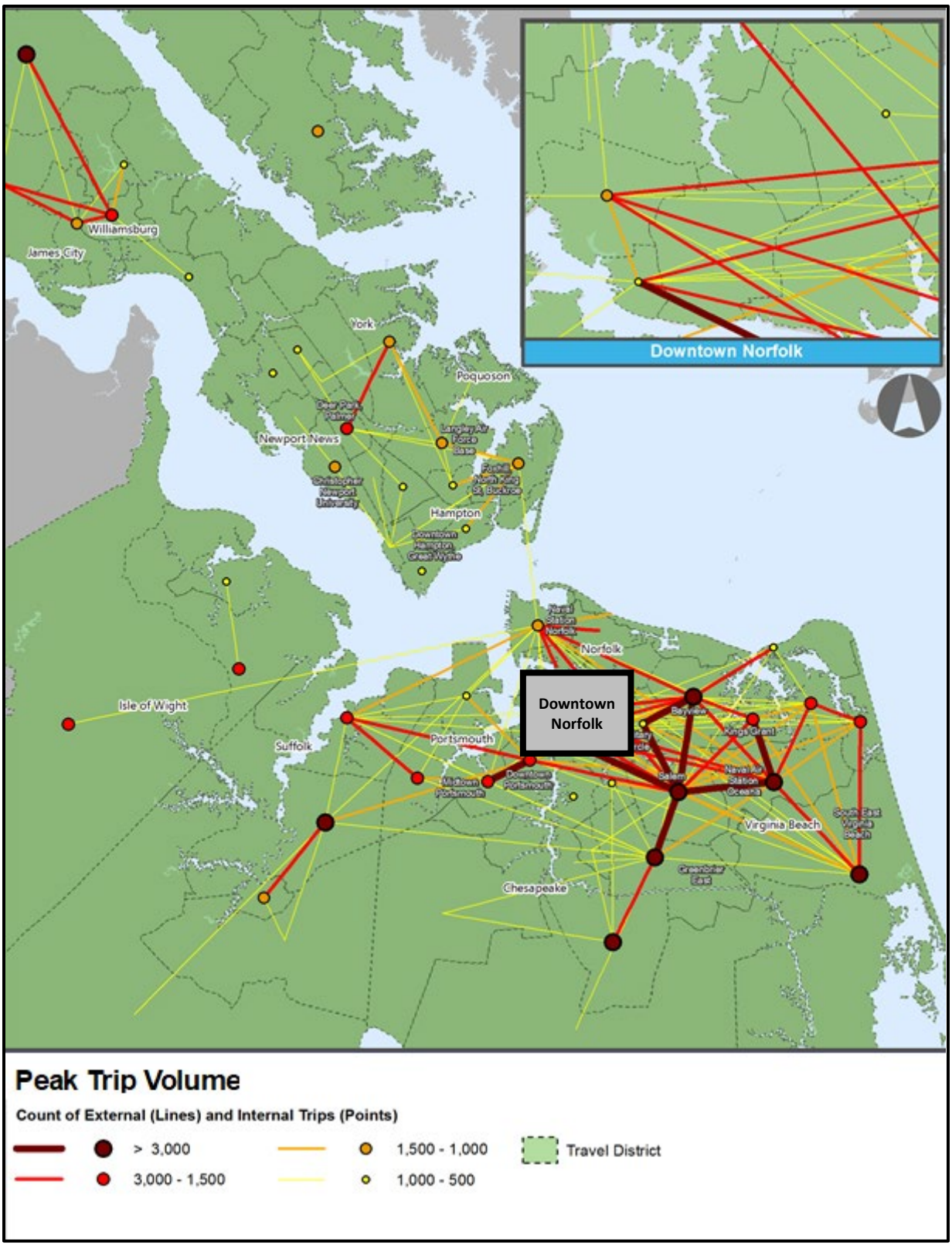
Table 2-30: Highest Internal Peak Period Travel Flows within a District

Travel District	Internal Trip Count
Peninsula	
Deer Park / Palmer	1,692
Foxhill / North King St / Buckroe	1,236
Langley Air Force Base	1,108
Christopher Newport University	1,067
South West Hampton	841
Southside	
Lynnhaven / Naval Air Station Oceana	7,580
Bayview	6,871
Salem	5,663
Greenbrier East	4,839
South East Virginia Beach	4,021

Table 2-31: Highest External Peak Period Travel Flows within a District

Origin	Destination	Total Trips
Salem	Naval Air Station Oceana	7,255
Salem	Bayview	5,848
South East Virginia Beach	Naval Air Station Oceana	5,779
Bayview	Kings Grant	5,234
Naval Air Station Oceana	Kings Grant	5,197
Midtown Portsmouth	Downtown Portsmouth	5,059
Salem	Greenbrier East	4,720
Naval Air Station Oceana	Bayview	4,411
Salem	Downtown Norfolk	4,340
Bayview	Military Circle	3,880

Figure 2-23: Volume of Peak Period Travel Between Districts



2.2.2 Transit Demand and Underserved Area Opportunities for Improvement

After determining the market for different types of transit services—in terms of transit propensity for different trip types and general travel flows—a gap analysis was conducted to compare the existing transit service to transit demand to find areas that could benefit from new or increased service.

Two types of service gaps were identified:

- **Level of Service:** where more service could be implemented.
- **Coverage:** where services could be expanded.

This gap analysis sheds light both on how well existing transit services meet current demand, as well as how planned transit services could reach new markets.

Level of Service Analysis

Based on the five transit propensity indices—Transit-Oriented Population, Commuter, Workplace, and Non-Work—and their underlying data, several additional transit propensity indices were developed to aid in identifying the types of transit service potentially suitable for locations within the HRT service area.

All-Day Service Index

The All-Day Service Index identifies locations suitable for all-day transit service by combining the results of the Transit-Oriented Population and Non-Work Indices. At both peak and off-peak hours, locations with significant transit-oriented populations are presumed to require connections to and from jobs or non-work-related trip destinations. This results in a propensity index that identifies major origins or destinations for transit trips that would occur throughout the day.

Areas with high All-Day Service Index scores largely reflect those with high Transit-Oriented Populations, or downtowns, government centers, and medical and educational campuses. On the Peninsula, areas with a higher need for all-day service include neighborhoods along Warwick Boulevard, such as Denbigh and Jenkins, and along Mercury Boulevard, in particular within the Newmarket neighborhood and around the Peninsula Town Center. Downtown Newport News and Downtown Hampton also have higher all-day service needs. On the Southside, the need for all-day service is most prevalent in Downtown Norfolk and Portsmouth, but also along major corridors such as Granby Street and Chesapeake Boulevard in Norfolk, Virginia Beach Boulevard between Norfolk and Virginia Beach, Indian River Road in Virginia Beach, and Portsmouth Boulevard in Portsmouth.

These higher propensity areas for all-day service are opportunities for expanding service during off-peak hours such as midday or later into the evening. **Figure 2-24** and **Figure 2-25** show the All-Day Service Index for the Peninsula and Southside, respectively.

Peak Service Index

The Peak Service Index identifies locations suitable for peak-period service by combining results from the Commuter and Workplace Indices. Locations with significant numbers and densities of commuters are presumed to require connections to and from locations with significant numbers and densities of jobs, especially at peak hours. This results in a propensity index that identifies major origins and destinations for transit trips that would occur during peak hours.

On the Peninsula, areas with a higher propensity or need for peak hour services include along Denbigh Boulevard and J Clyde Morris Boulevard, within the Peninsula Town Center, at the Newport News Shipbuilding, and in Downtown Hampton. On the Southside, major employment centers such as Naval Station Norfolk, the Joint Expeditionary Base – Fort Story, Chesapeake Municipal Center, and the Naval Medical Center Portsmouth have larger needs for peak service, as well as in areas with high volumes of job opportunities such as Downtown Norfolk and along the I-264 corridor to Virginia Beach, and areas with significant concentrations of commuters, such as more suburban portions of Chesapeake, Newport News, and Virginia Beach.

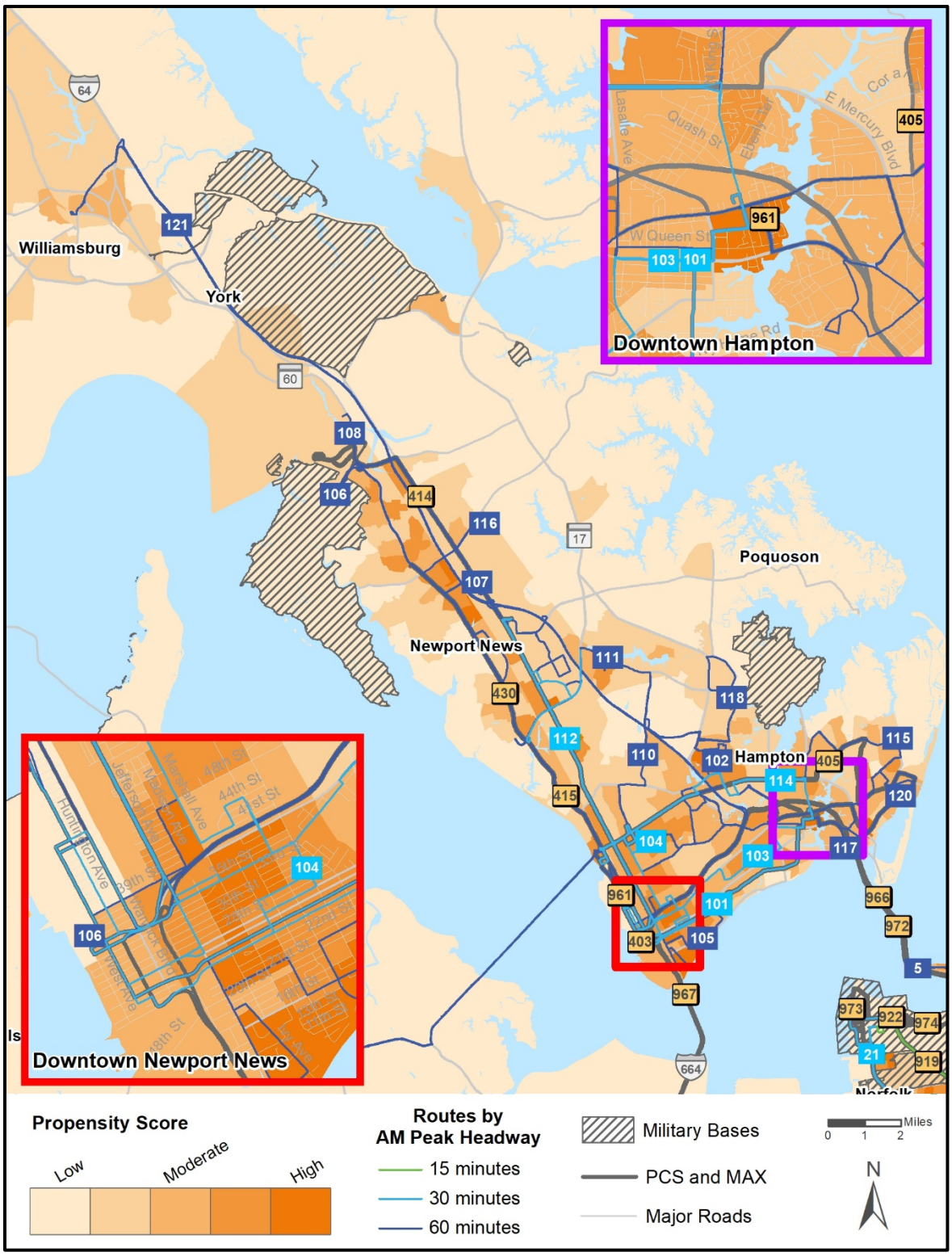
These areas identified as having a high propensity for peak service would benefit from an increased frequency during peak hours to service both higher commuter populations and connecting with larger concentrations of job opportunities. **Figure 2-26** and **Figure 2-27** show the Peak Service Index for the Peninsula and Southside, respectively.

Multimodal Service Index

The Multimodal Service Index identifies origins and destinations that could support high-quality, all-day transit service by combining results from the Transit-Oriented Population, Commuter, Workplace, and Non-Work propensity indices. Locations with significant populations and densities of both transit-oriented populations and commuters are presumed to require connections to and from locations with jobs and non-work destinations. This results in a propensity index that identifies major origins or destinations for high-quality, all-day transit service.

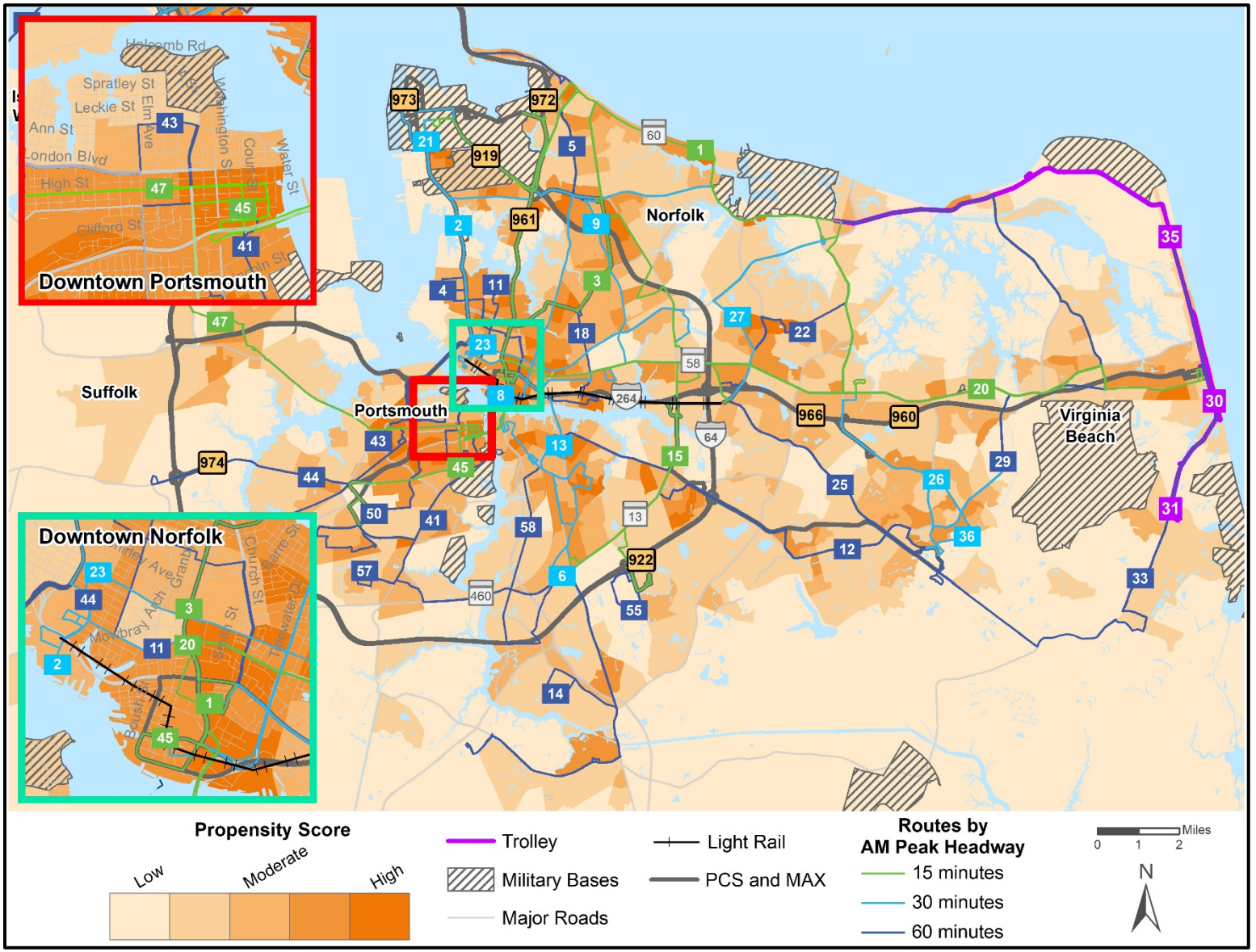
Clusters of areas with moderate-to-high Multimodal Service Index Scores can be seen along the I-264 corridor in Virginia Beach, in the downtown cores of Newport News, Hampton, Norfolk, and Portsmouth, and in clusters along the I-64 corridor between Chesapeake and Naval Station Norfolk. **Figure 2-28** and **Figure 2-29** show the Multimodal Service Index for the Peninsula and Southside, respectively.

Figure 2-24: Peninsula – All-Day Service Index



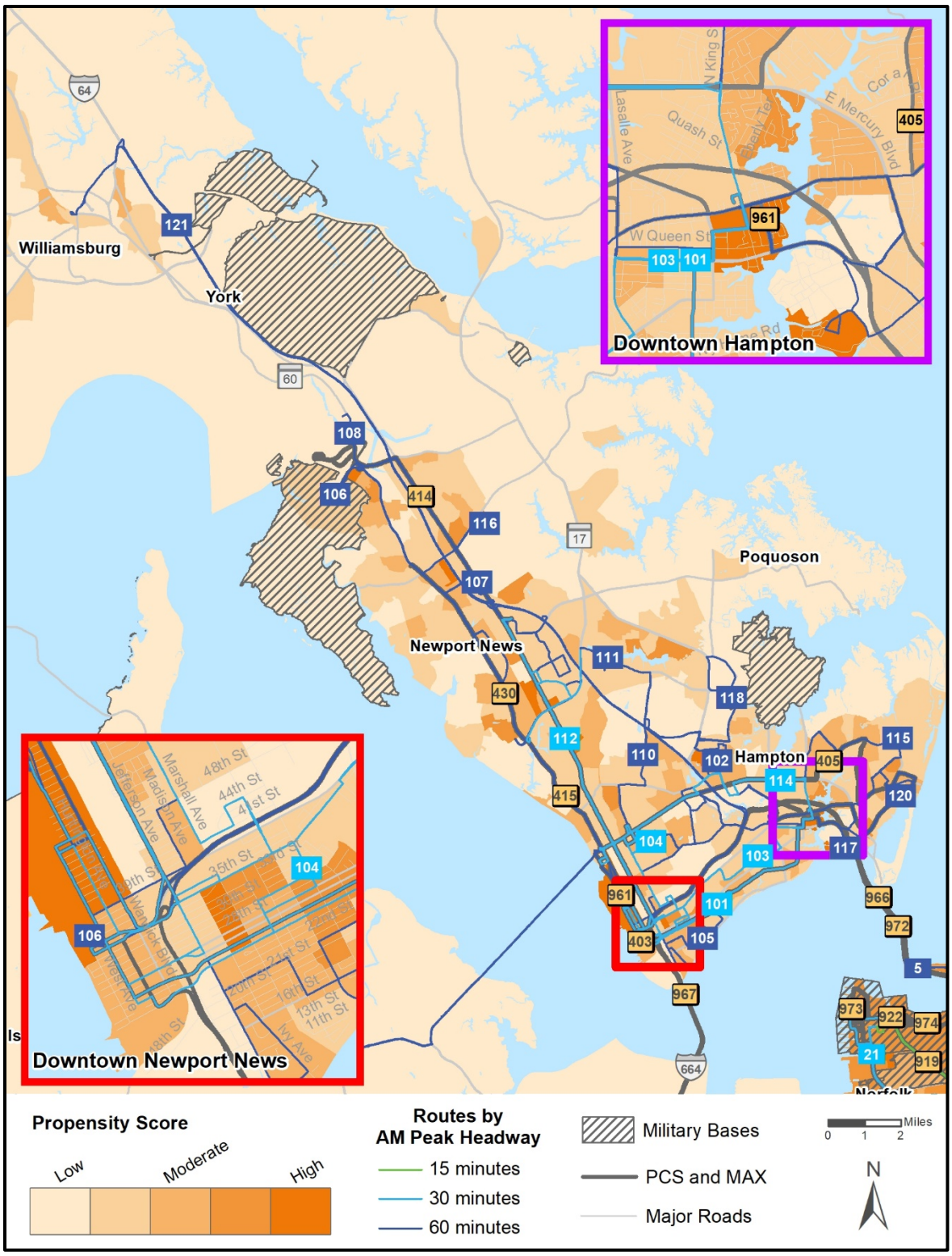
Source: HRT Routes Fall 2018

Figure 2-25: Southside – All-Day Service Index



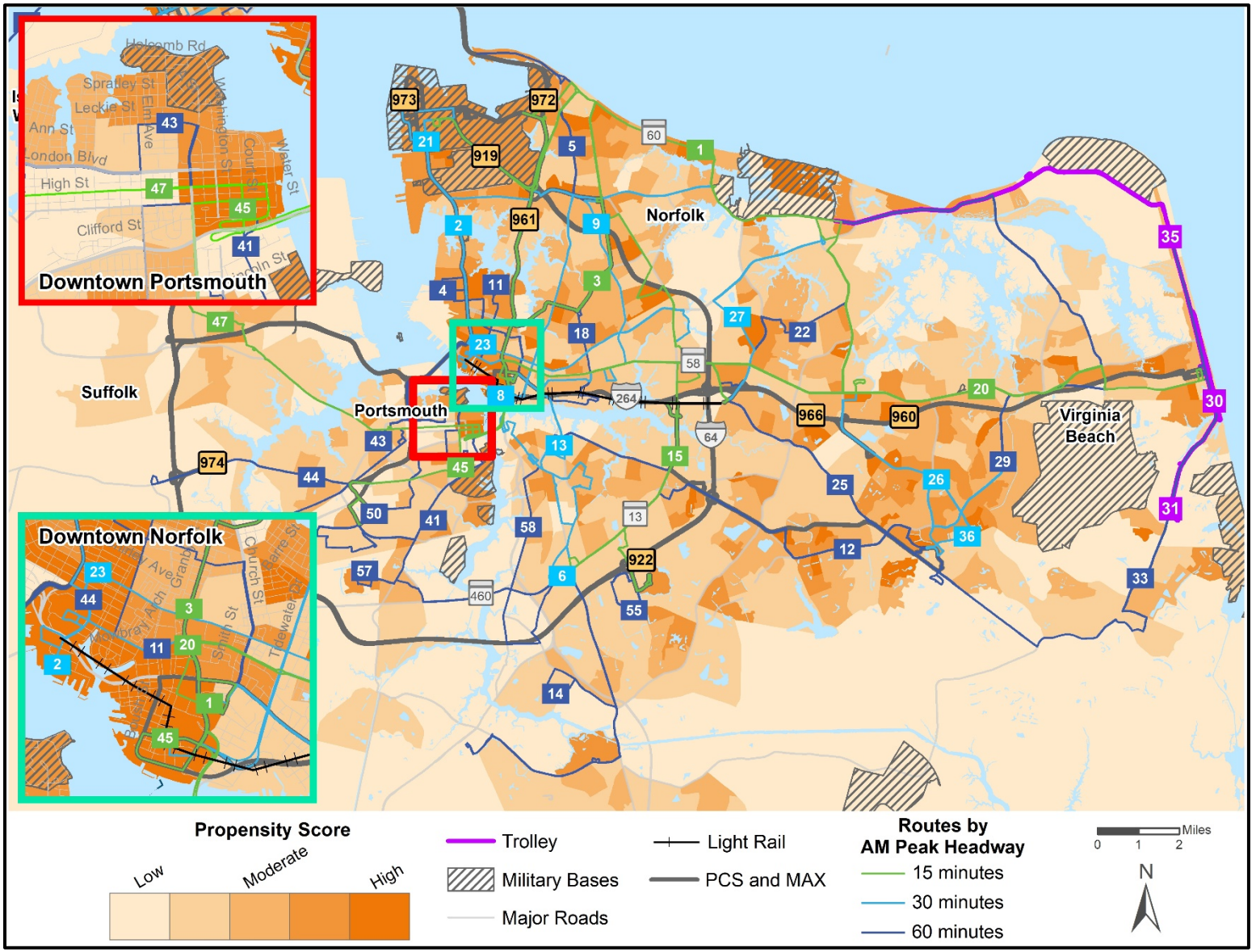
Source: HRT Routes Fall 2018

Figure 2-26: Peninsula – Peak Service Index



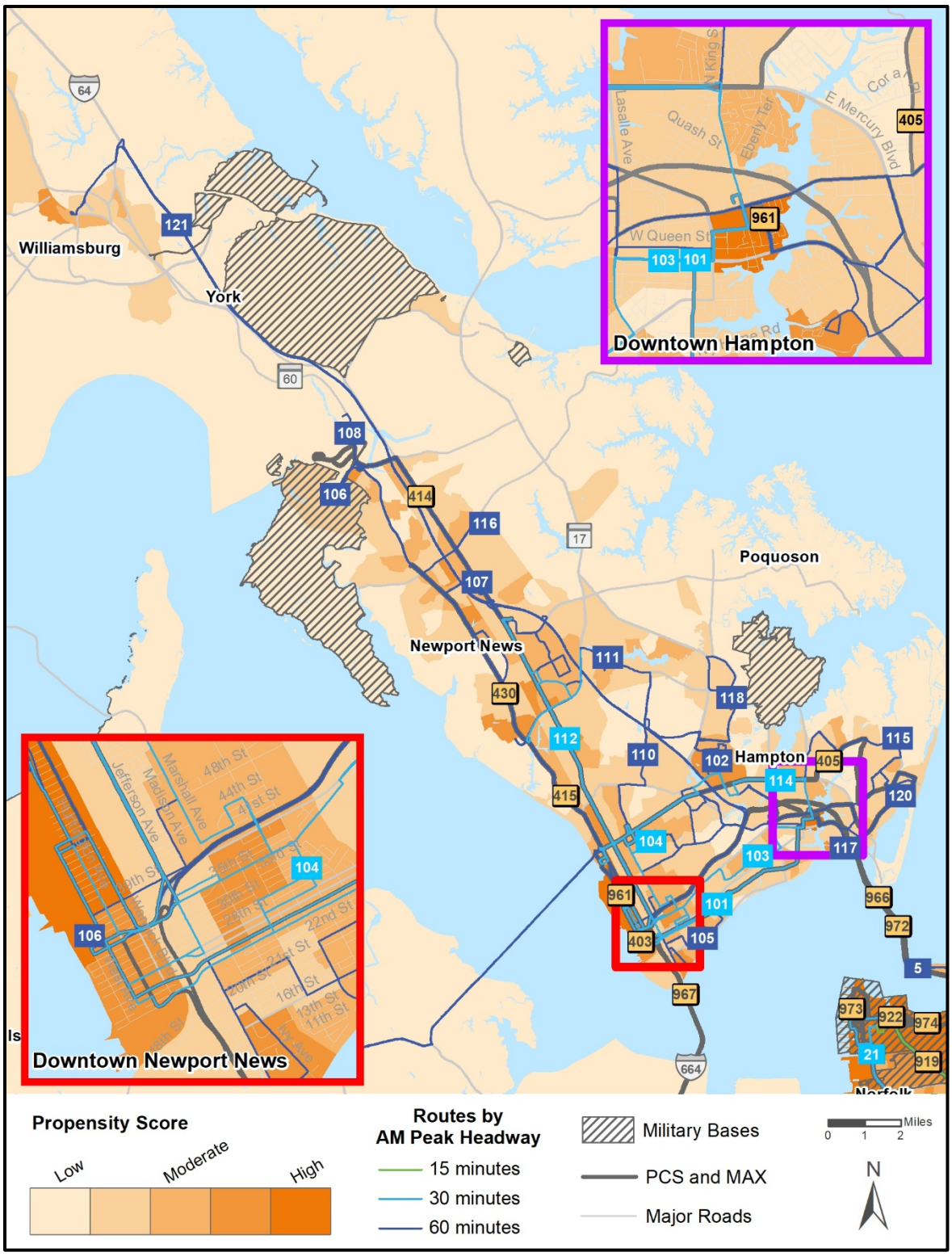
Source: HRT Routes Fall 2018

Figure 2-27: Southside – Peak Service Index



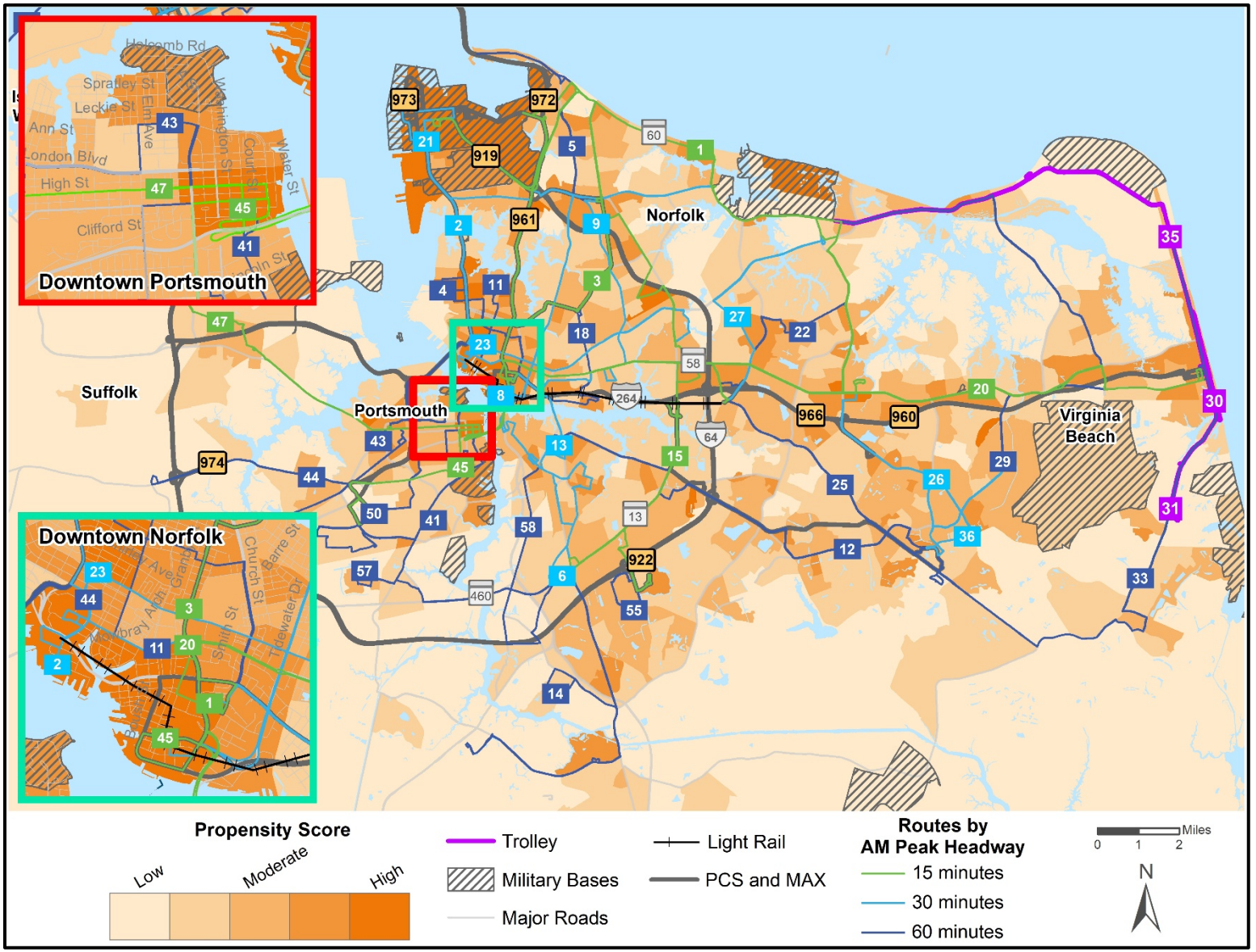
Source: HRT Routes Fall 2018

Figure 2-28: Peninsula – Multimodal Service Index



Source: HRT Routes Fall 2018

Figure 2-29: Southside – Multimodal Service Index



Source: HRT Routes Fall 2018

Coverage / Connection Gap Analysis

HRT provides coverage over much of the areas within the six member jurisdictions identified as needing transit service with local, express, and commuter bus service, along with The Tide light rail, despite a challenging geographic area that is both very large and heavily segmented by the many rivers and limited by the bridges and tunnels that connect the areas.

Looking ahead, as the population and employment of the region changes and the region strives to retain and attract talent for a thriving economy, it becomes necessary to evaluate the existing transit network to ensure there are no gaps in service where current and future demands will not be met. This analysis compares the current transit supply per period to the future travel demands as forecasted through the HRTPO Regional Travel Demand Forecasting Model.

The following analysis uses the travel flows analyzed as the measure of future travel demands. The travel flows were compared against the propensity indices to approximate the demand for transit between districts. All-day trip volumes were adjusted based on the Transit-Oriented Population and Non-Work propensity of their origin and destination districts, while peak trip volumes were adjusted using Commuter and Workplace propensity.

The transit supply, in terms of the number of weekday trips per period, was calculated from HRT's GTFS feed from fall 2016[22] which contains the schedule, route, and bus stop information for all HRT services. The level of service measure was applied to any areas within a quarter mile of a bus stop.

These measures of transit supply and travel demand were used to identify three types of gaps in transit service.

- **Low Level of Service:** Evaluates if an existing direct connection provides a sufficient number of trips for the travel flow between districts by comparing the number of trips that directly connect travel districts to volume of trips between them.
- **Lacks Direct Connection:** Evaluates person trips within the existing service area that require difficult transfers. In this case, the number of transfer opportunities between routes is used as a measure of difficulty.
- **New Service Area:** Evaluates the total volume of person trips between districts for connections where one or more of the districts does not have access to transit.

All-Day Coverage Gaps

All-day service gaps, or lack of service between popular origin-destination pairs, exist in several locations throughout the service area.

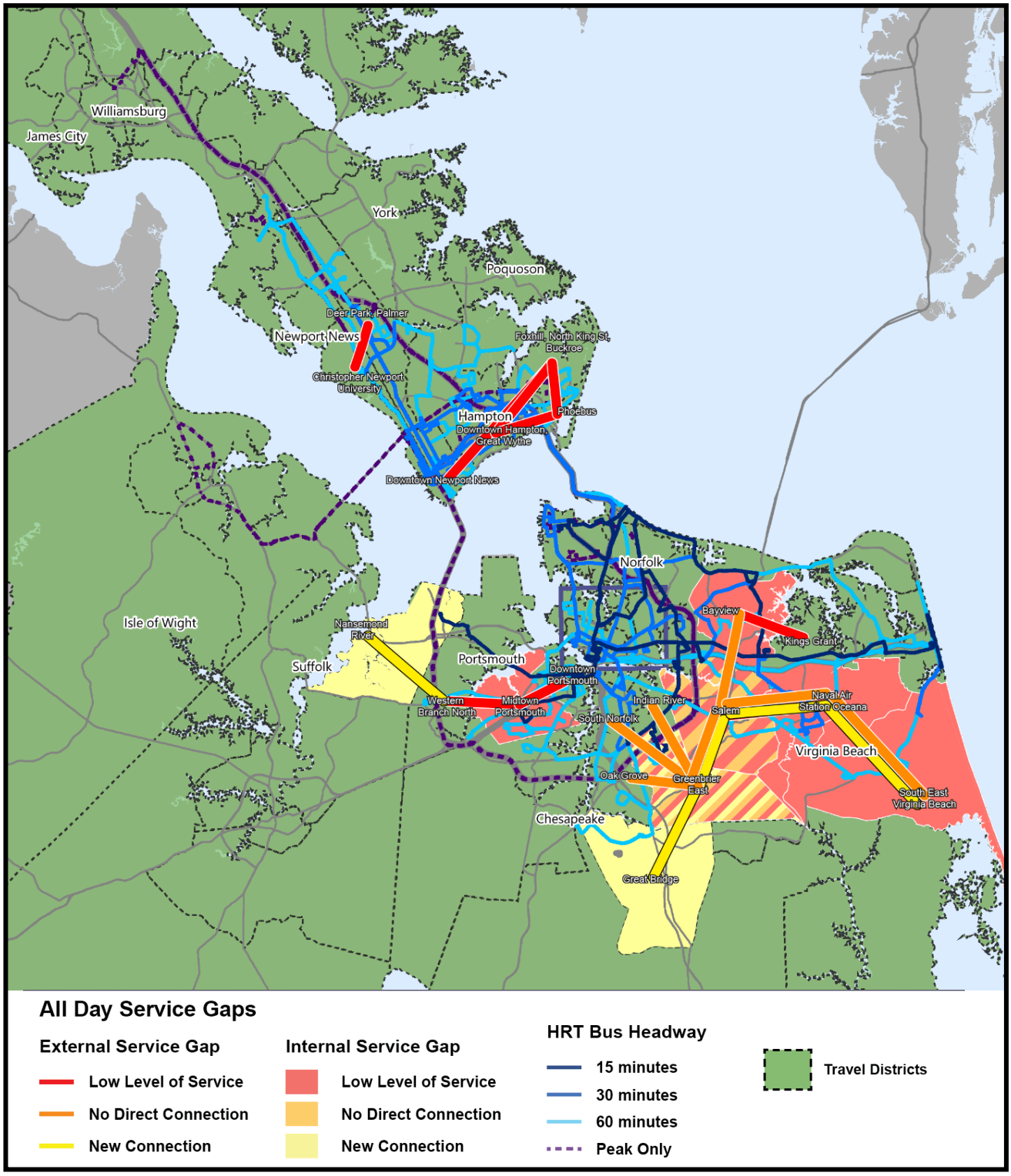
Low levels of all-day service were identified in three general areas: Hampton, Portsmouth, and throughout Virginia Beach. In Hampton, gaps were identified between all three districts on the eastern portion of the city (Downtown Hampton / Greater Wythe, Phoebus, and Foxhill / North King St / Buckroe), suggesting there is a greater need for transit trips that circulate throughout the area. Virginia Beach showed a chain of districts along I-264 that need increased levels of service to Salem. Additionally, there was an isolated gap in Newport News between Christopher Newport University and the Deer Park area.

Gaps in direct connections and new service areas were both identified in one general area, between northeast Chesapeake and central Virginia Beach. Routes extend to this area radially from Downtown Norfolk which currently necessitates multiple transfers in order to cross the region. Additionally, this area has limited coverage within its neighborhoods and presents the largest new market available within the HRT service area and member cities jurisdictions.

The all-day coverage and connection gaps identified through this analysis could be addressed with increased levels of service on routes connecting the various regions, or new services that could include fixed-route or alternative types of services. **Figure 2-30** illustrates the service gaps that were identified though this analysis.

[22] Analysis from the HRT FY 2018 – FY 2027 Transit Development Plan

Figure 2-30: All-Day Service Gaps

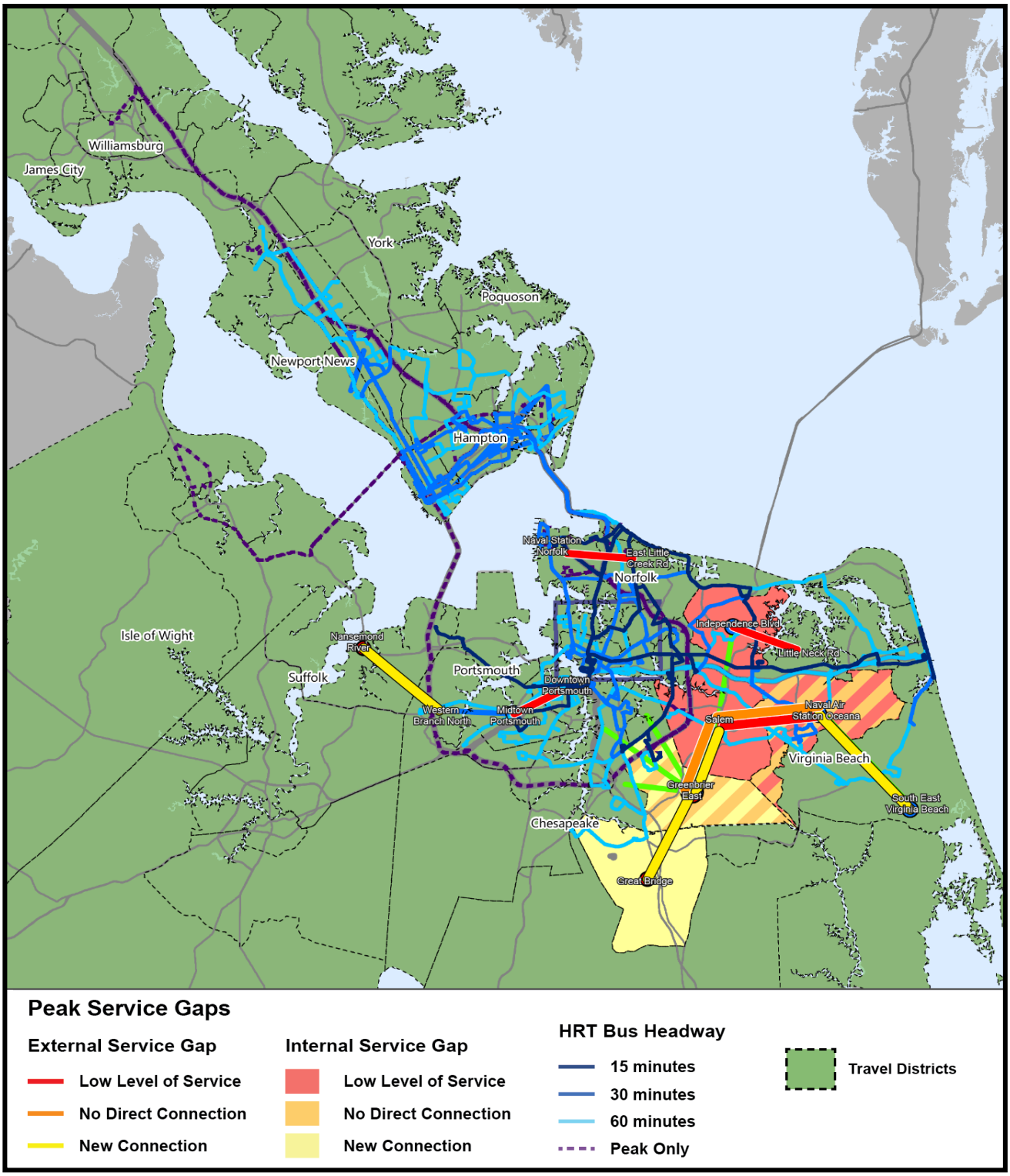


Peak Coverage Gaps

Most of the peak period service gaps that were identified were also identified as all-day service gaps, including those in Virginia Beach and Portsmouth. In addition, there is a gap in peak period level of service in Norfolk on East Little Creek Road between JEB Little Creek and Naval Station Norfolk. Service between these districts is currently provided by Route 21.

The coverage and connection peak gaps identified through this analysis could be addressed with increased peak levels of service on routes connecting the various regions, or new services that could include fixed-route or alternative types of services. **Figure 2-31** illustrates the service gaps that were identified though this analysis.

Figure 2-31: Peak Service Gaps



2.3 Performance Evaluation

2.3.1 Performance Evaluation

Fixed-Route Service Effectiveness

Service effectiveness, which is expressed by showing the number of passengers per revenue hour and passengers per revenue mile, reflects the return that HRT receives on its investment. Each HRT route requires an investment of resources which is quantified by revenue hours and revenue miles. The relative success of each investment is measured by the ridership that each route generates.

Ridership

Passengers per Revenue Hour

Passengers per revenue hour is a comparison of the total passengers carried on a route to the total number of revenue (or service) hours operated by the route. It is used to determine the productivity of a route's average revenue hour. Passengers per revenue hour by route is illustrated in **Figure 2-32.**

Route 120 (Downtown Hampton/Mallory/Buckroe) was the most productive route in FY 2019, with 34 passengers per revenue hour; Route 430 (Denbigh Fringe) and Route 117 (Hampton University/V.A. Hospital are also productive, with 25 or more passengers per revenue hour.

The average number of passengers per revenue hour across the entire system is 14.8. The average number of passengers per revenue hour for Southside routes is 15.3; for Peninsula routes, 15.1; for PCS/MAX routes, 10.4; and for VB Wave and Bayfront Shuttle routes, 11.6 passengers per revenue hour.

Passengers per Revenue Mile

Passengers per revenue mile is a comparison of the total passengers carried on a route to the total number of revenue (or service) miles operated by the route. It is used to determine the productivity of a route's average revenue mile. Route level passengers per revenue mile for FY 2019 is shown in **Figure 2-33**.

When measured by passengers per revenue mile, Route 430 (Denbigh Fringe) is the most productive, carrying six passengers per revenue mile, followed by Route 30 (Oceanfront Shuttle), which carries three passengers per revenue mile, and Route 405 (NNTC/Buckroe) which carries 2.5 passengers per revenue mile.

The system wide average number of passengers per revenue mile is 1.0. The Southside and Peninsula routes' average number of passengers per revenue mile are slightly higher than the system wide average, at 1.2 and 1.1 passengers per revenue mile, respectively. The PCS and MAX routes perform lower on average, at 0.4 passengers per revenue mile, while VB Wave and Bayfront Shuttle routes are above average at 1.4 passengers per mile.

Passengers per One-Way Trip

Passengers per trip is a comparison of the total passengers carried on a route to the total number of trips on the route. This is used to determine the productivity of a route on a per trip basis. **Figure 2-34** shows passengers per one-way trip by route for FY 2019.[23]

For FY 2019, Route 20 (Downtown Norfolk / Virginia Beach Oceanfront) averaged 56 passengers per one-way trip, the highest in the HRT fixed-route bus system. Other high performers are Route 966 (Silverleaf Park and Ride / Newport News Transit Center), Route 403 (Buckroe Shopping Center), and Route 430 (Denbigh Fringe), which all average more than 36 passengers per trip. The least productive routes were Route 973 (Portsmouth / Naval Station Norfolk), Route 974 (Chesapeake / Naval Station Norfolk), and Route 26 (TCC Virginia Beach / Lynnhaven Mall) with one, two, and three passengers per trip, respectively.

Overall, HRT routes carry 13.5 passengers per one-way trip. The average number of passengers per trip for Southside Routes is 14.5; for VB Wave routes, 6.1; for Peninsula routes, 12.5; and for PCS/MAX routes, 16.1 passengers per trip.

[23] VB Wave routes (Route 30, Route 31, and Route 35) are excluded from this analysis.

Figure 2-32: Passengers per Revenue Hour, FY 2019

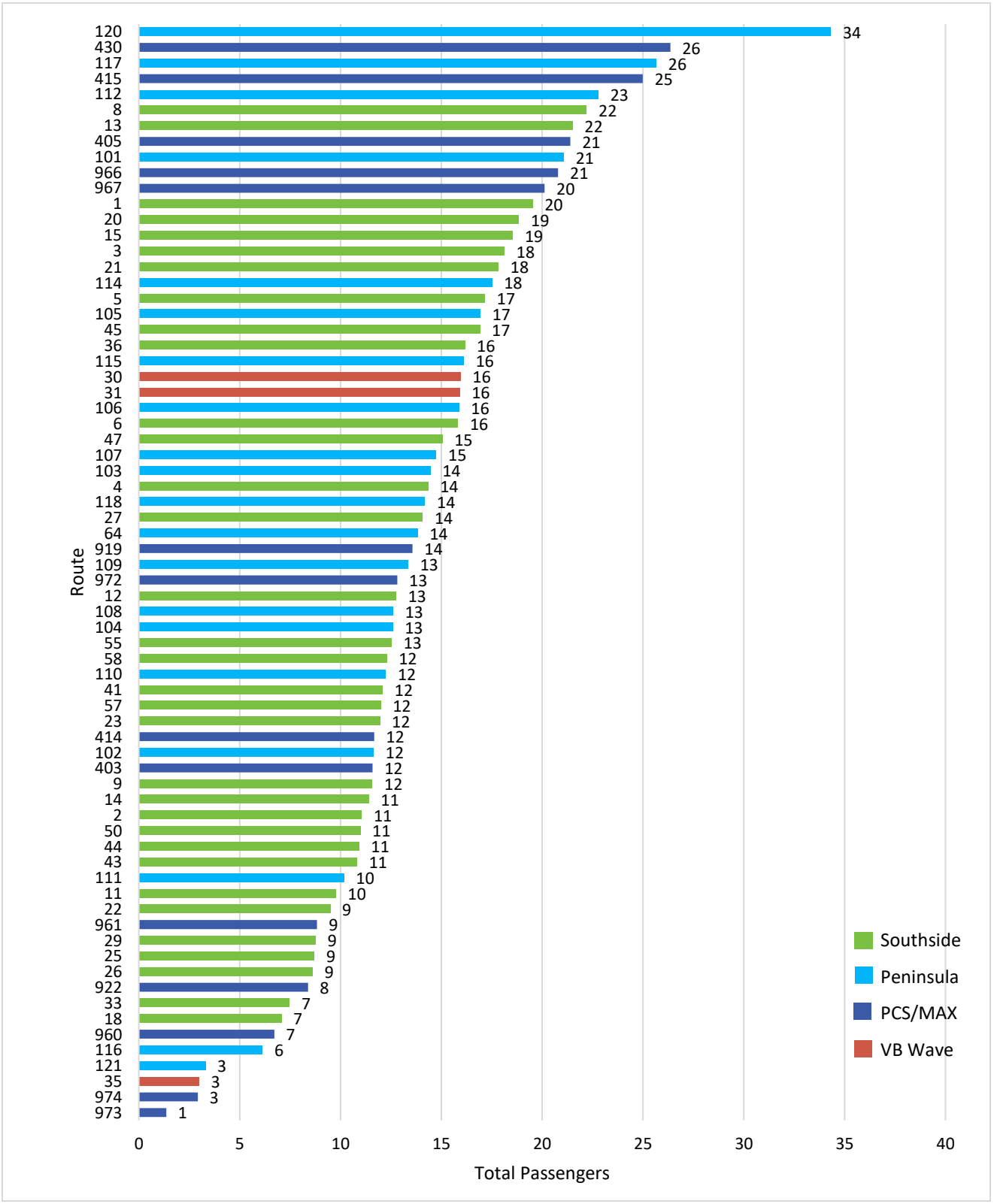


Figure 2-33: Passengers per Revenue Mile, FY 2019

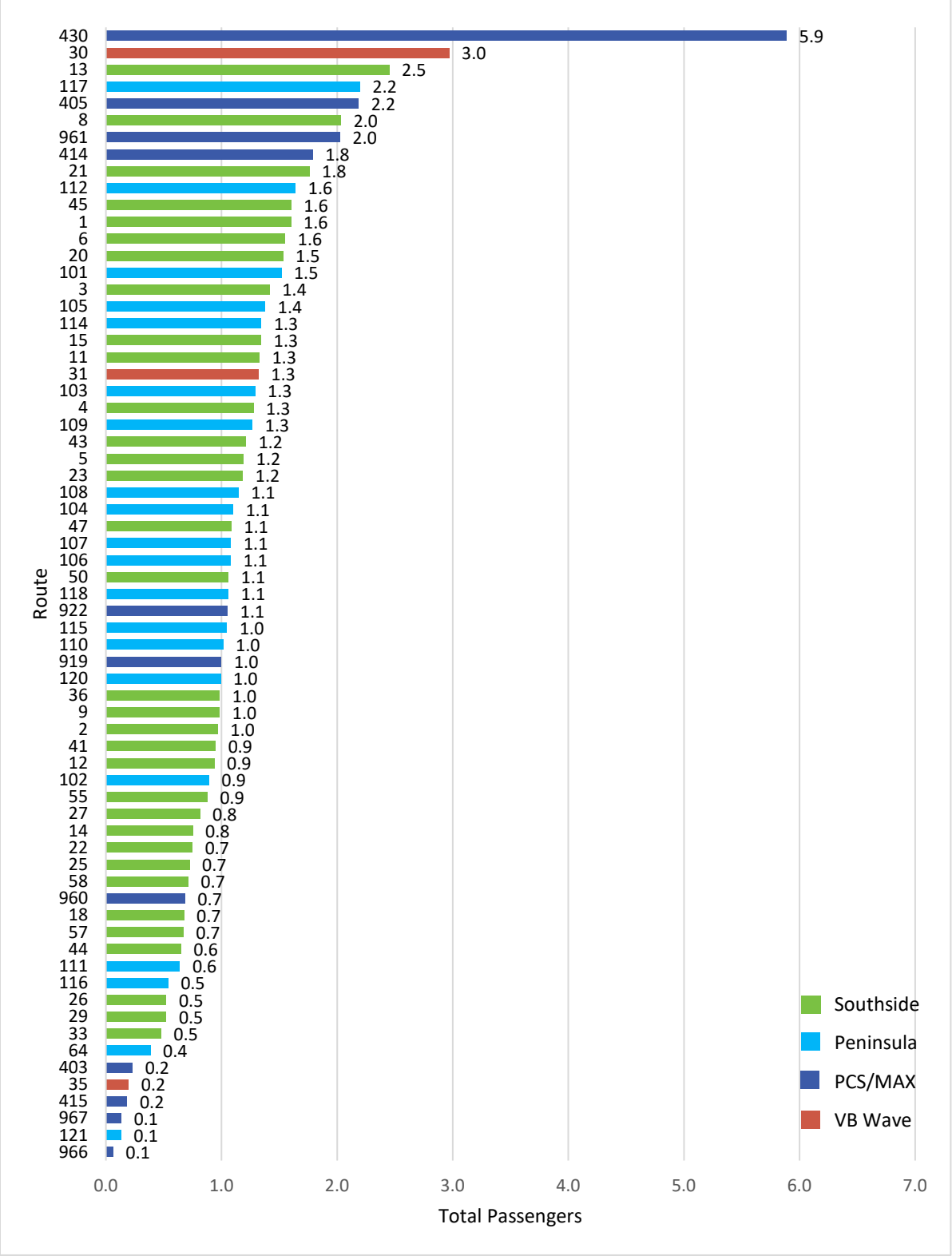
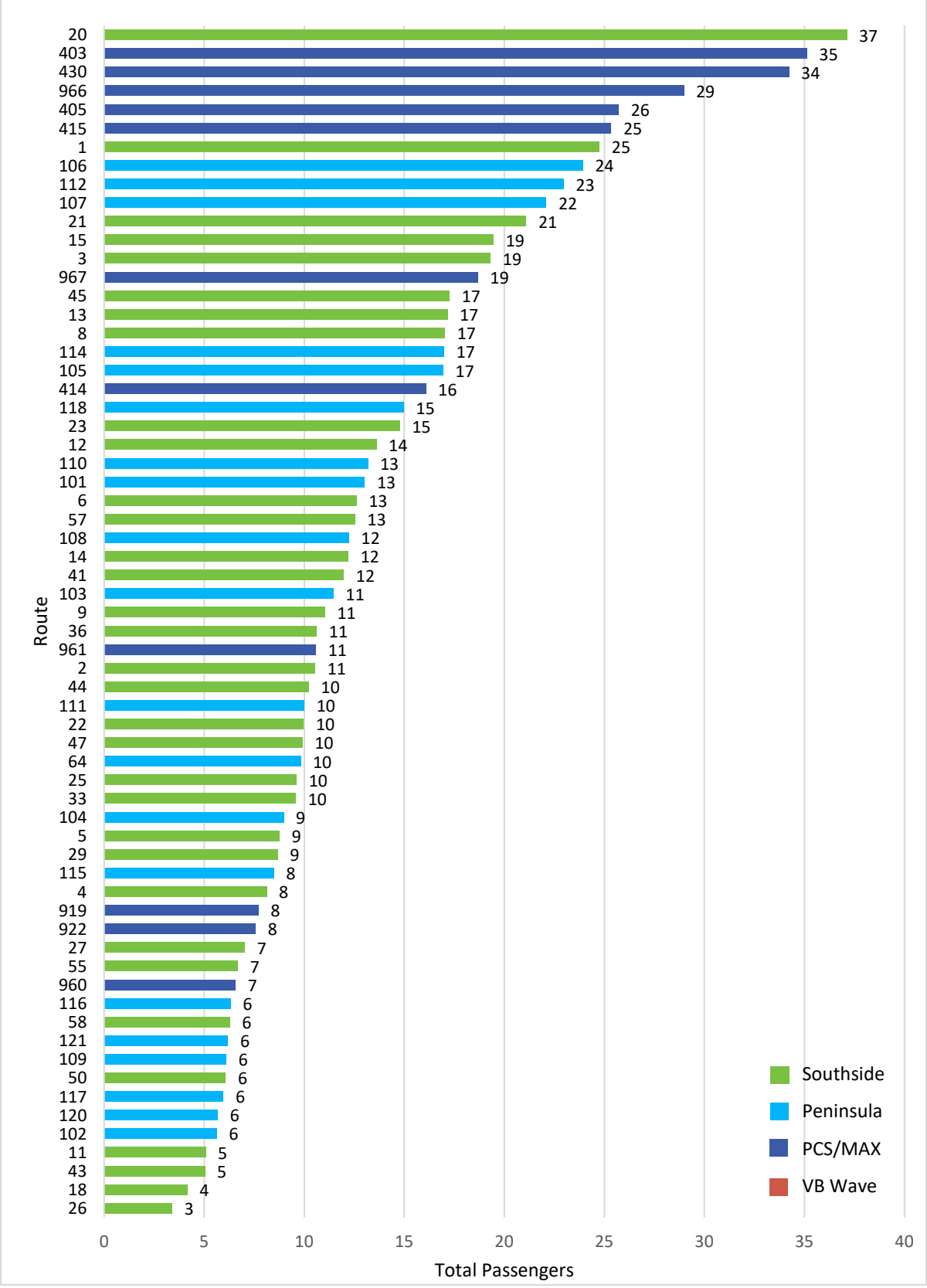


Figure 2-34: Passengers per One-Way Trip, FY 2019



Cost Efficiency

Farebox Recovery

Farebox recovery measures the percentage of operating costs covered through rider fares; the farebox recovery ratio is a comparison of the total cost to operate a route to the total fare collected by the route. **Figure 2-35** shows the farebox recovery ratio by route for FY 2019.

For FY 2019, Route 430 (Denbigh Fringe) had a farebox recovery ratio of 69.5 percent, the highest in the HRT fixed-route bus system. Other high performers were Route 403 (Buckroe Shopping Center) and Route 415 (NNTC / Denbigh), which both had a farebox recovery ratios above 50 percent. The routes with the lowest farebox recovery ratios were Route 973 (Portsmouth / Naval Station Norfolk), Route 35 (Bayfront Shuttle), and Route 974 (Chesapeake / Naval Station Norfolk), which had farebox recovery ratios of 3.1 percent, 3.8 percent, and 7.4 percent respectively.

Overall, HRT routes have a farebox recovery ratio of 17.9 percent. The farebox recovery ratio for Southside routes is slightly above average at 18.3 percent and the farebox recovery ratio for Peninsula routes is slightly below average at 17.7 percent. For VB Wave trolley and Bayfront Shuttle routes, the farebox recovery ratio is below average at 13.9 percent, and for PCS and MAX routes, it is slightly below average at 17.7 percent.

Net Cost per Passenger

The net cost per passenger is measured as the subsidy per passenger boarding. Subsidy per passenger boarding is a comparison of the total operating subsidy, or cost not covered by fare revenue, of a particular route to the total number of passenger trips operated by the route. In general, it represents the cost of a passenger trip supplemented by additional funding sources. **Figure 2-36** shows subsidy per passenger for each route for FY 2019.

For FY 2019, Route 430 (Denbigh Fringe) had a subsidy per passenger of $0.45, the lowest in the system. Other routes with low subsidies included Route 403 (Buckroe Shopping Center), Route 415 (NNTC / Denbigh), Route 405 (NNTC / Buckroe), Route 117 (Hampton University / V.A. Hospital), and Route 112 (Downtown Newport News / Patrick Henry Mall), all of which had subsides per passenger below $3.00. Route 973 (Portsmouth / Naval Station Norfolk) had the highest subsidy per passenger at $65.23, followed by Route 35 (Bayfront Shuttle) at $29.44, and Route 974 (Chesapeake / Naval Station Norfolk) at $29.00.

Overall, HRT routes have a subsidy per passenger of $5.05. The subsidy per passenger for Southside and Peninsula routes have an average subsidy per passenger below the systemwide average at $4.90 and $4.98 respectively. VB Wave and Bayfront Shuttle and PCS/MAX routes have an average subsidy per passenger above the systemwide average at $6.78 and $6.88 respectively. HRT's systemwide average operating cost per passenger is $6.27.

Figure 2-35: Farebox Recovery Ratio, FY 2019

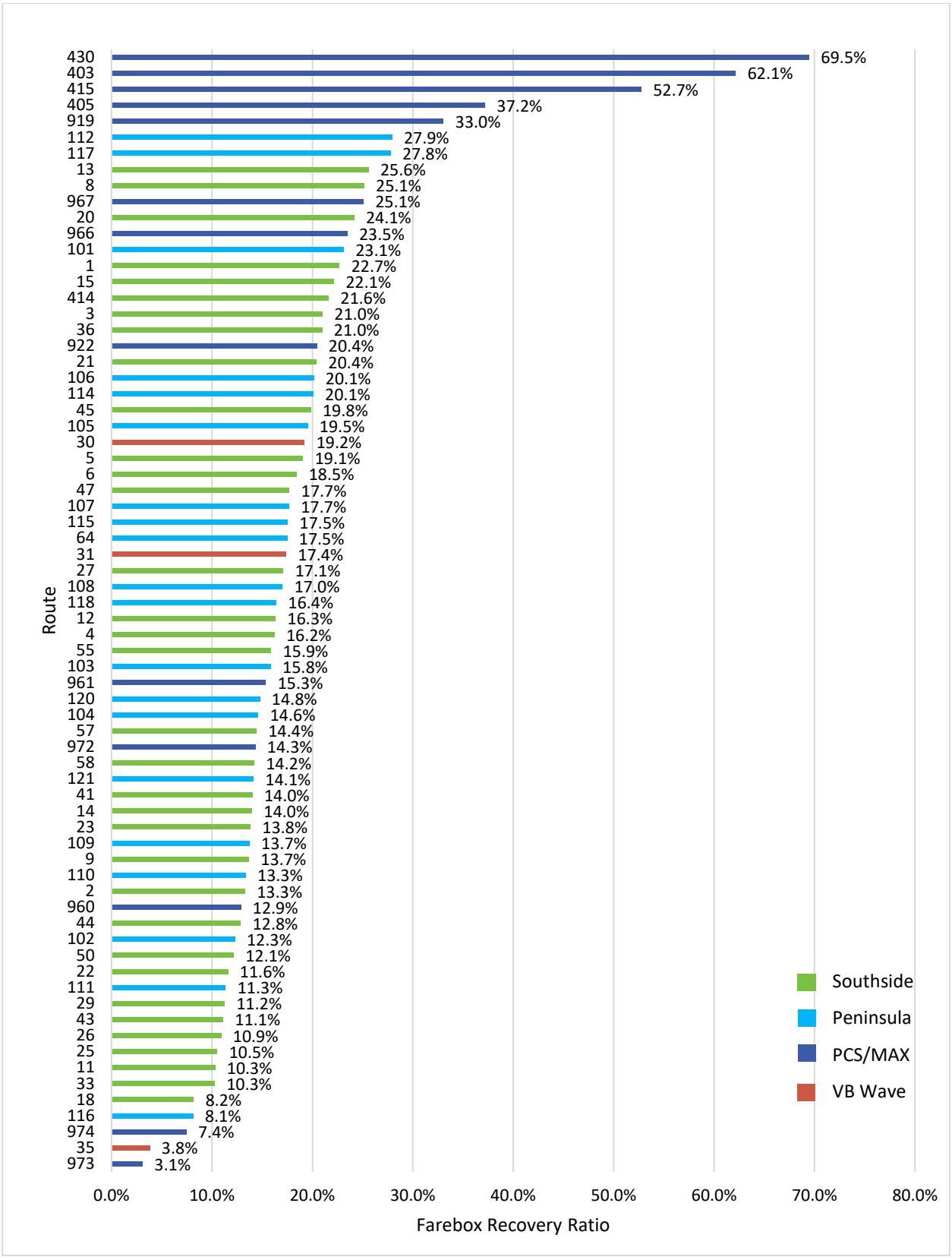
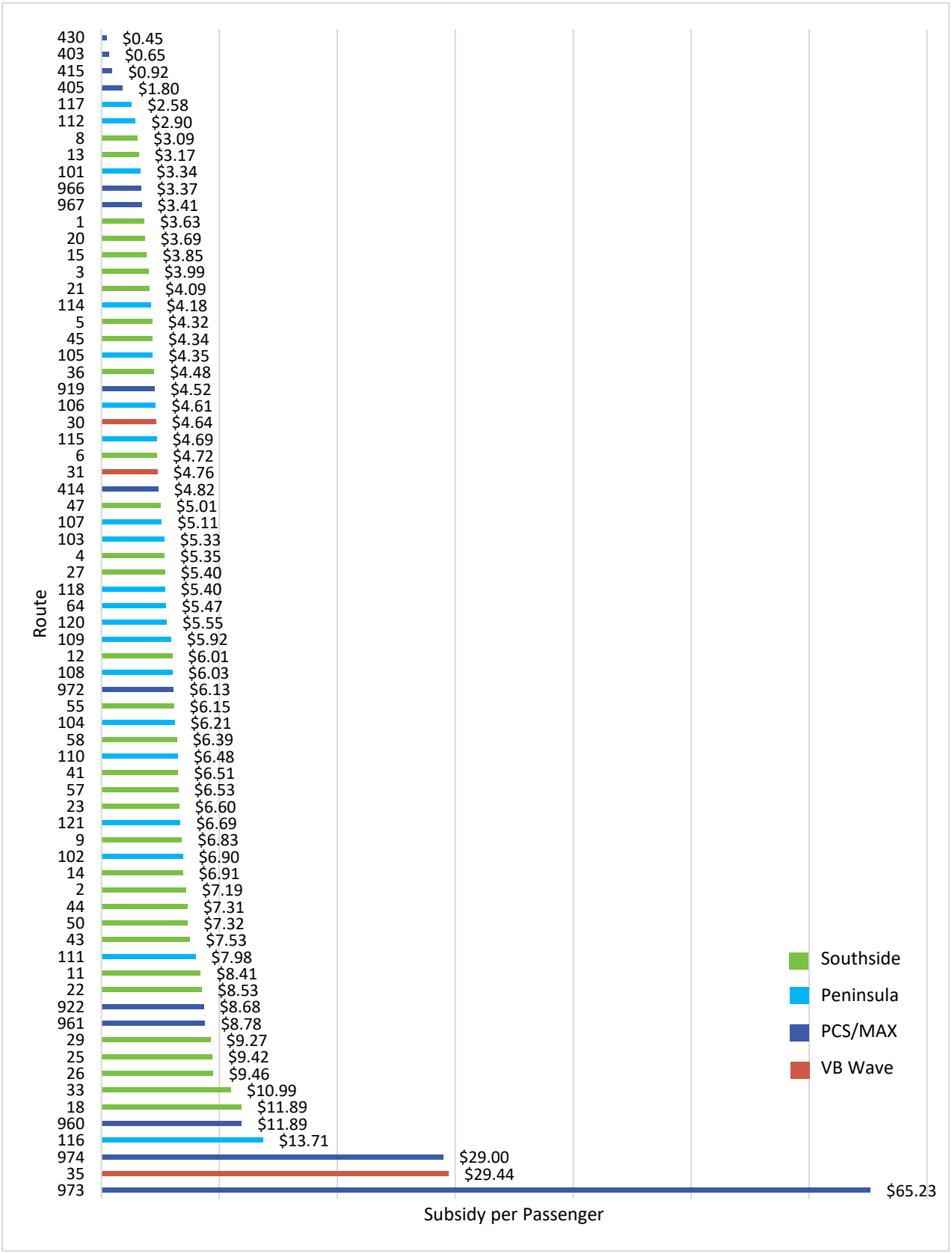


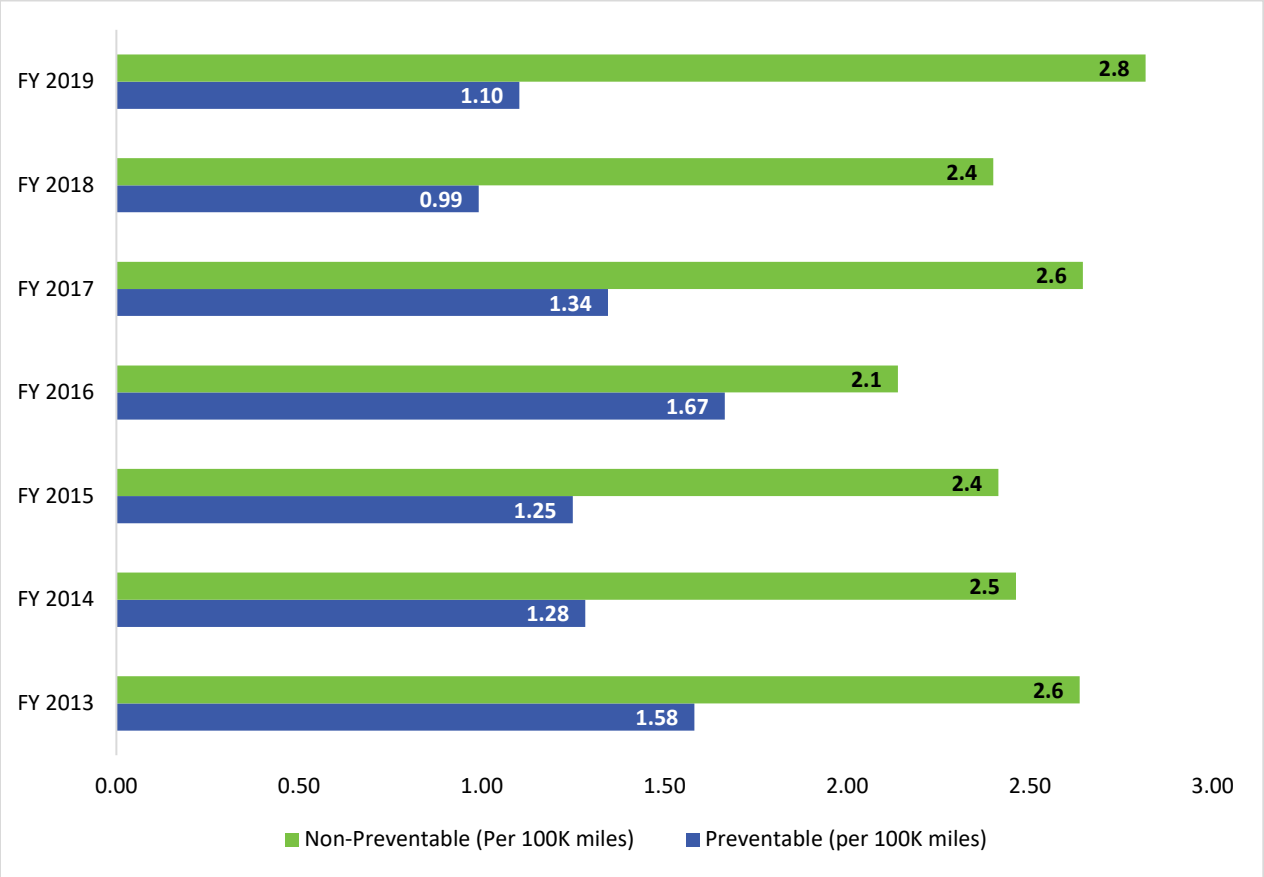
Figure 2-36: Subsidy per Passenger, FY 2019



Safety

Safety is measured as the number of preventable and non-preventable bus accidents by fiscal year. In FY 2019 there were a total of 119 total preventable accidents and 304 non-preventable accidents, a small increase compared to FY 2018, but an overall drop in preventable accidents compared to the seven-year period between FY 2013 and FY 2019. Normalizing by vehicle mileage, there were 1.10 preventable and 2.8 non-preventable accidents per 100,000 miles in FY 2019, as shown in **Figure 2-37**. When normalized by mileage, the number of preventable and non-preventable accidents has remained relatively steady across the time period.

Figure 2-37: Preventable and Non-Preventable Accidents, FY 2013-FY 2019



System Accessibility

System accessibility measures how accessible a transit system is to residents and jobs. Area within walking distance was measured as the area within half of a mile of routes with 15-minute frequencies and a quarter of a mile within all other routes. Population and jobs within the region were estimated based on the American Community Survey 2015 five-year estimates and Longitudinal Employer-Household Dynamics, 2015. HRT's existing system is accessible to about 64 percent of residents and to 58 percent of jobs in the region, as shown in **Table 2-32**.

Table 2-32: System Accessibility to Population and Jobs

Measure	Area within Walking Distance	Hampton Roads Total	Percentage Covered
Resident Access	734,665	1,140,000	64%
Access to Jobs	417,590	710,769	58%

Trend Analysis

This trend analysis reports on and assesses HRT's bus and demand response transit services during the period spanning FY 2012 through FY 2017. Such an evaluation allows for an assessment of transit services over time, and sheds light on how development and changing demographics have impacted transit performance and system growth. The following section reports on the following characteristics for each of these services:

- **Service area characteristics:**
  - Square miles
  - Population
  - Population density
- **Operational metrics:**
  - Vehicles operated in maximum service
  - Vehicle revenue miles
  - Vehicle revenue hours
- **Ridership metrics:**
  - Total ridership
  - Passengers per revenue mile
  - Passengers per revenue hour
- **Revenue and cost metrics:**
  - Total operating expenses
  - Operating expenses per passenger trip
- **Service efficiency:**
  - Fare revenue
  - Farebox recovery ratio
  - Subsidy per passenger

Service Area Characteristics

A review of service area characteristics allows an agency to assess how the scale of its operations and constituency size have evolved along with the service provided.

The square mileage of HRT's service area decreased by approximately 17 percent from FY 2012 to FY 2017. In January 2012, the City of Suffolk, Virginia withdrew from the Transportation District Commission of Hampton Roads, thereby reducing HRT's service area size. Although some HRT routes currently operate in the City of Suffolk, most bus service in this city is now provided by Suffolk Transit.

In addition, HRT's service area population decreased by 21 percent over this period. According to the U.S. Census Five-Year American Community Survey, from 2012 through 2015, the populations of the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area and Virginia Beach Urban Area each increased over this timeframe. Therefore, HRT's reduction in service area population can likely also be at least in part attributed to the loss of service in the City of Suffolk.

Lastly, the population density of HRT's service area dropped by five percent over the five-year period, from 2,795 persons per square mile to 2,667 persons per square mile. **Table 2-33** summarizes how the characteristics of HRT's service area have changed over the last five fiscal years.

Table 2-33: Service Area Characteristics

Fiscal Year	Square Miles	Population	Population Density
2012	515	1,439,666	2,795
2013	515	1,439,666	2,795
2014	421	1,134,343	2,694
2015	431	1,143,932	2,654
2016	431	1,143,932	2,654
2017	428	1,141,651	2,667
% Change	**-17%**	**-21%**	**-5%**

Operational Statistics

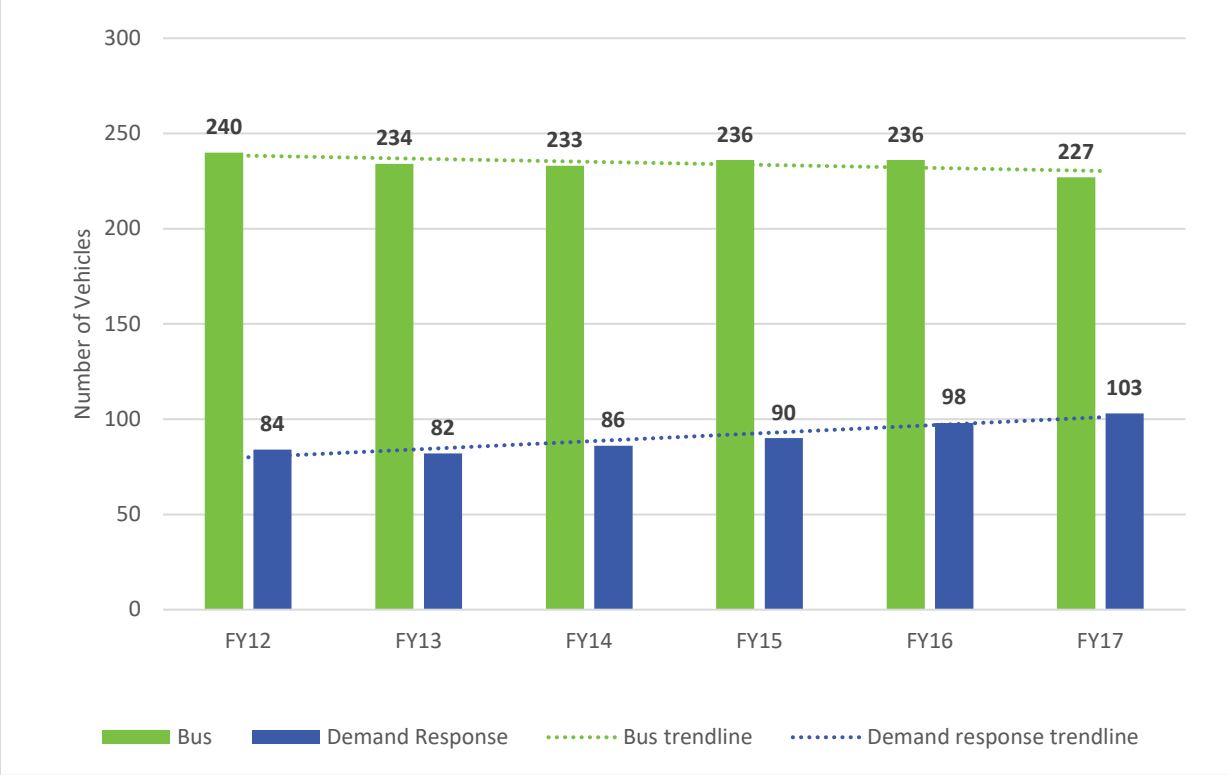
A review of operational statistics describes the level of service HRT has provided over the six years from FY 2012 to FY 2017. The following section analyzes the vehicles operated in maximum service, revenue hour and revenue mile trends within the HRT system.

Vehicles Operated in Maximum Service

Between FY 2012 and FY 2017, the number of fixed-route vehicles in maximum service remained relatively constant, dropping overall by just five percent (from 240 to 227).

In contrast, HRT increased its paratransit fleet operating in maximum service from 84 to 103 vehicles, a 23 percent increase, greatly improving its ability to serve the region's elderly and disabled populations during peak periods. During FY 2013 and FY 2014, as the demand for paratransit grew, the costs of operating paratransit grew slower than inflation. In FY 2014, HRT capitalized on this trend by replacing its entire paratransit fleet. **Figure 2-38** details the number of vehicles operated in maximum service over the period from FY 2012 through FY 2017.

Figure 2-38: Vehicles Operated in Maximum Service



Vehicle Revenue Miles

Fixed-Route

A vehicle is considered in revenue service when operating on a route and serving passengers, and in non-revenue service when traveling to or from a garage without passengers. Fixed-route revenue miles dropped from FY 2012 to FY 2013, but rose steadily thereafter, resulting in a two percent overall increase from FY 2012 to FY 2017.

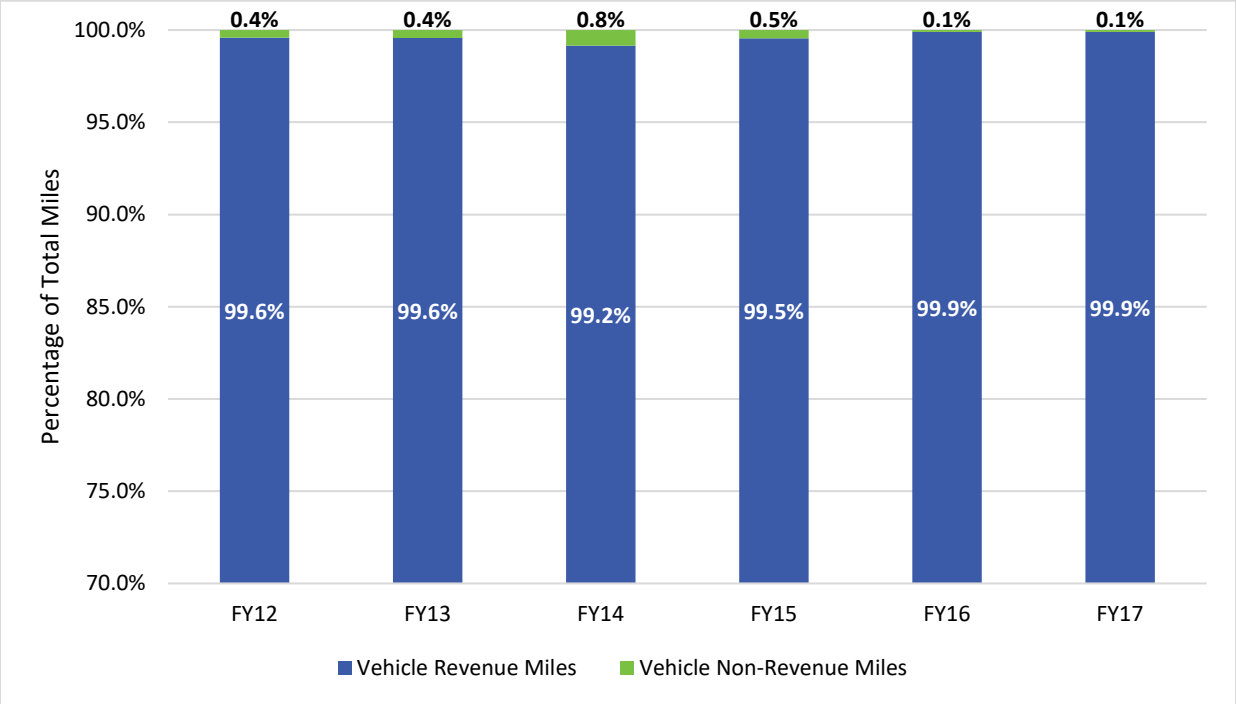
Table 2-34 summarizes the total revenue versus non-revenue miles on HRT fixed-routes during the six-year period.

Table 2-34: Fixed Route: Revenue / Non-Revenue Miles[24]

Fiscal Year	Revenue Miles	Non-Revenue Miles
2012	10,466,059	43,858
2013	9,932,136	43,593
2014	9,794,751	83,543
2015	10,218,494	46,630
2016	10,657,297	11,089
2017	10,624,169	11,051
% Change	**2%**	**-75%**

The percentage of fixed-route vehicle revenue versus that of non-revenue miles, shown in **Figure 2-39**, reveals that although non-revenue miles fluctuated during the five-year period, HRT's percentage of vehicle revenue miles never fell below 99 percent and barely deviated from 99.6 percent, the value reported in FY 2016.

Figure 2-39: Fixed-Route: Percentage of Vehicle Revenue and Non-Revenue Miles



[24] Non-revenue miles increased by 92 percent in FY 2014, a direct result of a new scheduling process within Trapeze.

Demand Response

Along with the overall size of its fleet and the demand for paratransit, HRT drastically increased demand response service from FY 2012 to FY 2017; revenue miles surged by a total of 69 percent. As revenue service grew, so did non-revenue miles, by a total of 12 percent.

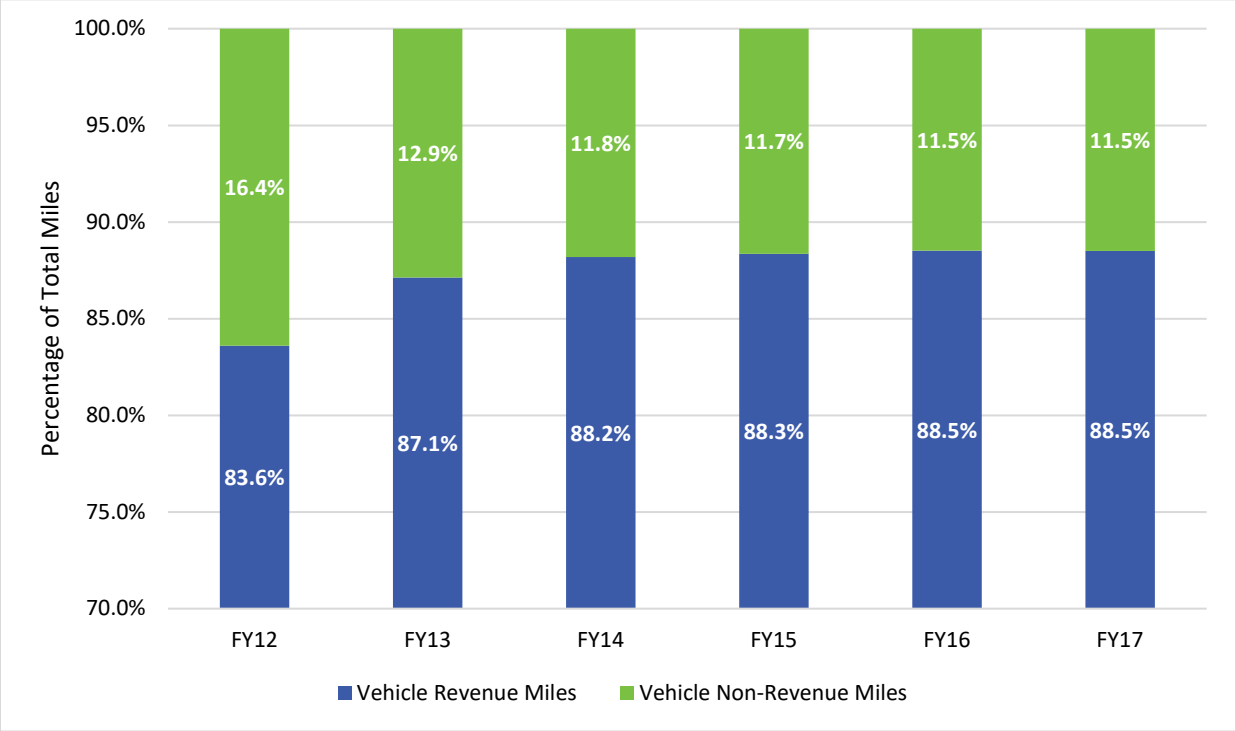
Table 2-35 summarizes the total revenue versus non-revenue miles in HRT demand response vehicles over the five-year period.

Table 2-35: Demand Response: Revenue / Non-Revenue Miles

Fiscal Year	Revenue Miles	Non-Revenue Miles
2012	2,251,183	441,368
2013	3,054,073	451,408
2014	3,259,377	436,238
2015	3,370,172	444,553
2016	3,788,225	491,308
2017	3,804,596	494,151
% Change	**69%**	**12%**

Figure 2-40 shows the percentage of demand response revenue versus non-revenue miles over the six-year period. While paratransit vehicles spent just 83.6 percent of their mileage in revenue service in FY 2012, by FY 2017, this figure had reached 88.5 percent.

Figure 2-40: Demand Response: Percentage of Vehicle Revenue and Non-Revenue Miles



Vehicle Revenue Hours

Fixed-Route

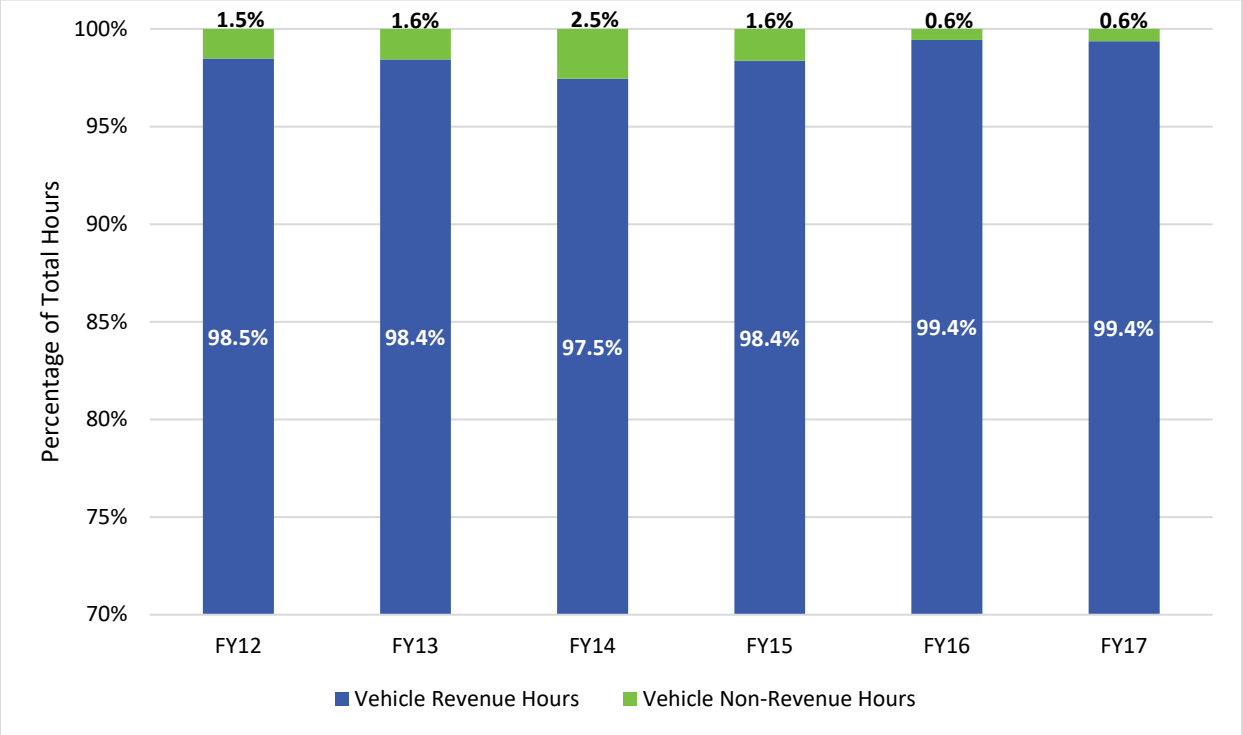
A complement to vehicle revenue miles, an analysis of revenue hours reveals–in terms of total time rather than distance–how efficient an agency is with its vehicles as it aims to spend as much time in service as possible. Over the six-year period, while HRT increased its revenue hours by five percent, non-revenue hours dropped by 57 percent. **Table 2-36** shows revenue versus non-revenue hours on HRT fixed-route services from FY 2012 to FY 2017.

Table 2-36: Fixed Route: Revenue / Non-Revenue Hours

Fiscal Year	Revenue Hours	Non-Revenue Hours
2012	788,917	12,092
2013	781,983	12,386
2014	778,904	20,316
2015	786,442	13,087
2016	823,606	4,710
2017	827,021	5,260
% Change	**5%**	**-57%**

Figure 2-41 shows the percentage of vehicle revenue versus non-revenue hours on buses. Although the percentage of revenue hours dropped slightly from FY 2012 to FY 2014, this percentage would rise once more until reaching a peak in FY 2017. Over the six-year period, HRT has used its vehicles more efficiently.

Figure 2-41: Fixed Route Percentage of Vehicle Revenue and Non-Revenue Hours



Demand Response

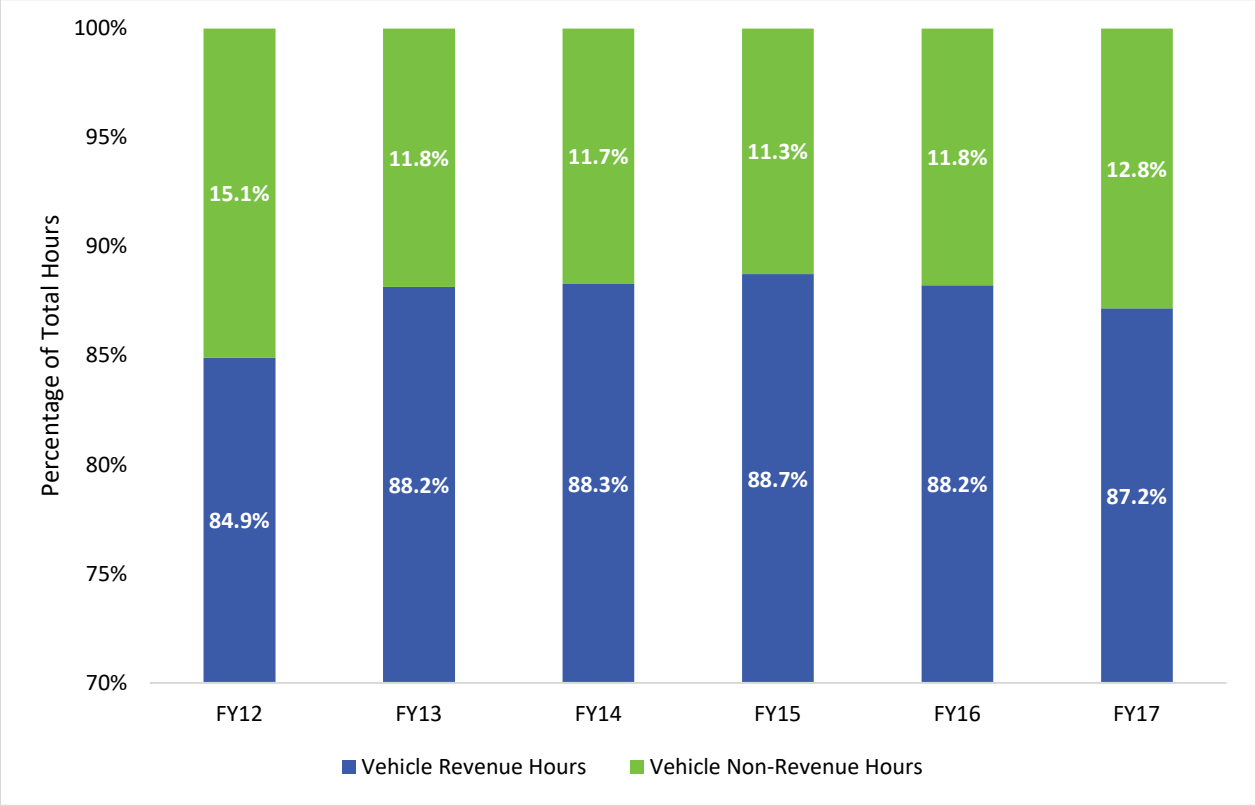
As the demand response service has grown, both revenue and non-revenue demand response hours have increased, respectively by 60 and 32 percent. **Table 2-37** summarizes revenue and non-revenue hours for paratransit service over the six-year period.

Table 2-37: Demand Response: Revenue / Non-Revenue Hours

Fiscal Year	Revenue Hours	Non-Revenue Hours
2012	150,171	26,672
2013	195,576	26,286
2014	201,726	26,761
2015	213,638	27,095
2016	237,016	31,593
2017	239,679	35,282
% Change	**60%**	**32%**

Despite dipping slightly from FY 2013 to FY 2014 and from FY 2015 to FY 2016, the percentage of demand response revenue hours has risen overall. Thus, as service has grown, HRT has increased the efficiency of its paratransit vehicle operation. **Figure 2-42** shows the percentage of revenue versus non-revenue hours on demand response vehicles. Notably, compared to the previous years, where the proportion of revenue to non-revenue hours remained relatively constant, 2017 saw an increase in the percentage of non-revenue hours as compared to total hours. This indicates that in 2017, demand response service was less efficient than in years past.

Figure 2-42: Demand Response Percentage of Vehicle Revenue and Non-Revenue Hours



Ridership

Total Ridership

An assessment of ridership reveals how the usage of HRT services has changed over the six-year analysis period. This section reviews unlinked passenger trips, or the total number of boardings on vehicles, regardless of how many transfers were made during any single trip.

While bus ridership rose slightly from FY 2012 to FY 2013, the number of unlinked trips dropped each year thereafter, ultimately resulting in an overall 21 percent decrease over the six-year period.

Table 2-38 shows annual total ridership on the bus and demand response services from FY 2012 through FY 2017. Therefore, despite a slight increase in revenue miles and hours, HRT has served fewer bus passengers now than it did six years ago. There are several potential reasons for this drop:

- As mentioned, HRT's service area square mileage dropped sharply from FY 2013 to FY 2014. Although the population within the service area fluctuated in the ensuing years, it is possible that the loss of the Suffolk service area signified a loss of areas using transit, which in turn led to a gradual drop in ridership.
- In FY 2013, HRT updated the terms of its GoPass365 program, which offers businesses and educational institutions the opportunity to buy transit passes and supplement employees' and students' fares. Previously, the program consisted of one flat fee for institutions, which were subsequently passed on to riders in the form of unlimited access. This structure underpriced passes and resulted in lost revenue. Through the current program, institutions may select one of two options: a per pass flat rate based on tier pricing or a per swipe monthly based on accumulative swipes. Institutions now buy passes based on the level of interest; passes are priced higher, and institutions must support a minimum participation threshold to qualify. In addition to fare increases and the fact that several participating educational institutions now pass half of the transit costs on to students, these program restructuring factors contributed to a decline in overall ridership.
- A lengthy federal government shutdown in FY 2013 and a federal sequestration process in FY 2014 temporarily prevented many riders from reporting to work.
- Weather-related events in FY 2014 and FY 2015 temporarily closed the entire HRT system.
- HRT instituted a fare increase in FY 2015, which was complemented with lower gas prices.
- Service changes to routes over the five-year period have eliminated ridership from previously served areas.
- Gas prices decreased by approximately 38 percent between FY 2012 and FY 2016.

In contrast, demand response ridership has increased steadily each year, and by 25 percent overall. During the six-year period, as the costs for paratransit grew slower than those of inflation, HRT completed much work to improve its demand response service. In FY 2014, in addition to replacing its entire paratransit fleet, HRT participated in a symposium to inform a reengineering of the program, completed a peer review of demand response contract specifications, and developed a new Request for Proposals for the program. In addition, the demand for paratransit was perhaps also fueled by a growing senior population. According to the Five-Year American Community Survey, the percentage of residents aged 65 and older in HRT member cities increased from 10.8 percent in 2012 to 11.6 percent in 2015.

Table 2-38: Annual Total Ridership

Fiscal Year	Fixed-Route Bus	Demand Response	Total
2012	16,166,475	293,012	16,459,487
2013	16,217,920	304,004	16,521,924
2014	15,026,924	311,789	15,338,713
2015	14,218,168	324,510	14,542,678
2016	13,241,512	351,654	13,593,166
2017	12,586,719	365,310	12,952,029
% Change	**-22%**	**25%**	**-21%**

Passengers per Revenue Mile

Often but not always linked with trends in total ridership, this metric measures the productivity of HRT in transporting its passengers.

While HRT's passengers per revenue mile on bus service increased initially, as was the case with total ridership, this value decreased steadily through FY 2017, ultimately by 20 percent overall. This drop was likely related to the aforementioned reasons for decreased annual ridership, and perhaps also to the combined effects of minor route re-routings and schedule changes over the six-year period.

The number of demand response passengers per revenue mile remained steady at 0.1 throughout the analysis period, a figure well below this value for bus service in any analysis year. Although this reported value may appear low, paratransit vehicles are typically significantly smaller than most local or express buses and as a result often transport fewer passengers per mile covered. **Table 2-39** shows passengers per revenue mile for both services over the analysis period.

Table 2-39: Passengers per Revenue Mile

Fiscal Year	Fixed-Route	Demand Response
2012	1.5	0.1
2013	1.6	0.1
2014	1.5	0.1
2015	1.4	0.1
2016	1.2	0.1
2017	1.2	0.1
% Change	**-20%**	**0%**

Passengers per Revenue Hour

Passengers per revenue hour is another metric used to evaluate how productively HRT vehicles spend their time (rather than distance) in service.

As was the case with other ridership metrics covered in this section, passengers per bus revenue hour increased slightly from FY 2012 to FY 2013 (from 20.5 to 20.7) and decreased thereafter (by 26 percent overall). Demand response passengers per revenue hour also decreased over the six-year period, ultimately by 25 percent overall (from 2.0 to 1.5). **Table 2-40** summarizes passengers per revenue hour by service.

Table 2-40: Passengers per Revenue Hour

Fiscal Year	Fixed-Route	Demand Response
2012	20.5	2.0
2013	20.7	1.6
2014	19.3	1.6
2015	18.1	1.5
2016	16.1	1.5
2017	15.2	1.5
% Change	**-26%**	**-25%**

Revenue and Cost

Operating Expenses

An analysis of operating expenses over time can elicit an understanding of how much money HRT expends to operate its services each fiscal year. **Table 2-41** relays this information for both bus and demand response services.

While total bus operating expenses decreased from FY 2012 to FY 2013, expenses increased each year thereafter, and overall by 18 percent. However, the percentage by which operating expenses increased also decreased over time, with a slight increase from FY 2016 to FY 2017. From FY 2013 to FY 2014, expenses increased by 12 percent (from $62.8 million to $70.3 million); from FY 2014 to FY 2015, expenses increased by eight percent (from $70.3 million to $75.8 million); from FY 2015 to FY 2016, expenses only increased by 0.02 percent (from $75.84 million to $75.85 million), and from FY 2016 to FY 2017 expenses increased by two percent ($75.85 million to $76.05 million). In FY 2015, HRT completed a great deal of work to reduce operating expenses, limiting bus operator unscheduled overtime and absenteeism, reducing paid sick leave for employees, and renegotiating agency insurance premiums.

Demand response total operating expenses fluctuated markedly over the six-year period, initially increasing by 23 percent from FY 2012 to FY 2013 (from $8.8 million to $10.8 million), only to fall slightly over the period spanning FY 2013 to FY 2015 (from $10.8 million to $9.9 million). Operating expenses rose once again in FY 2016, but only by 0.47 percent (from $9.9 million to $10 million). In FY 2017, operating expenses fell compared to FY 2016 by one percent.

Table 2-41: Total Operating Expenses

Fiscal Year	Fixed-Route	Demand Response
2012	$64,594,584	$8,812,419
2013	$62,865,214	$10,819,386
2014	$70,334,896	$10,225,660
2015	$75,843,693	$9,986,092
2016	$75,859,835	$10,032,847
2017	$76,045,680	$9,932,249
% Change	**18%**	**13%**

Operating Expenses per Passenger Trip

Operating expenses per passenger trip can provide insight into how efficiently an agency is utilizing its operating resources. This analysis can also shed light on whether an agency's cost increases or decreases are correlated with ridership trends.

As total bus operating expenses decreased, operating expenses per trip too dropped from $4.00 per trip in FY 2012 to $3.88 per trip in FY 2013. Expenses per trip then steadily rose through FY 2017, increasing overall by 51 percent during the analysis period, this is a direct result of the decreasing ridership.

Demand response operating expenses per trip increased from $30.08 per trip in FY 2012 to $35.59 per trip in FY 2013, following the upward trend of overall operating expenses. However, between FY 2013 and FY 2017, expenses per passenger trip decreased. In all, operating expenses per passenger trip decreased to $27.19 in FY 2017, indicating a 10 percent overall decrease. Thus, as expenses for paratransit climbed during the analysis period, the service was carrying significantly more passengers. This was not the case for bus service.

Figure 2-43 shows operating expenses per passenger trip for bus and demand response from FY 2012 through FY 2017.

Figure 2-43: Operating Expenses per Passenger Trip

Service Efficiency

Cost Recovery Ratio

While all transit agencies seek to earn as much fare revenue as possible, the cost recovery ratio statistic, measures the percentage of operating expenses recovered by fare revenue, determining a service's cost effectiveness.

Fixed-route fare revenue dropped by ten percent from FY 2012 to FY 2013 (from $14.7 million to $13.2 million), then rose by five percent from FY 2013 to FY 2014 (from $13.2 million to $13.9 million), only to rise again the following year and remain relatively level between FY 2015 and FY 2016. Between FY 2016 and FY 2017 fare revenue dropped eight percent (from $14 million to $12.9 million).

During the six-year period, fixed-route cost recovery dropped steadily six percentage points overall (23 percent in FY 2012 to 17 percent in FY 2017). The rate of the cost recovery ratio decrease was largely correlated with the rate of increase in total operating expenses and decrease in ridership, appearing to level out from FY 2015 to FY 2016, a period during which operating expenses decreased relatively little. **Figure 2-44** shows fare revenue and the cost recovery ratio for fixed-route service from FY 2012 through FY 2016.

Demand response fare revenue increased steadily–by 85 percent overall–from FY 2012 to FY 2017. Moreover, although total operating expenses peaked and valleyed during this timeframe, the farebox recovery ratio increased by a small amount each year, reaching 11 percent in FY 2017. **Figure 2-45** details fare revenue and the cost recovery ratio for demand response service from FY 2012 through FY 2017.

Figure 2-44: Fixed-Route Fare Revenue / Cost-Recovery Ratio

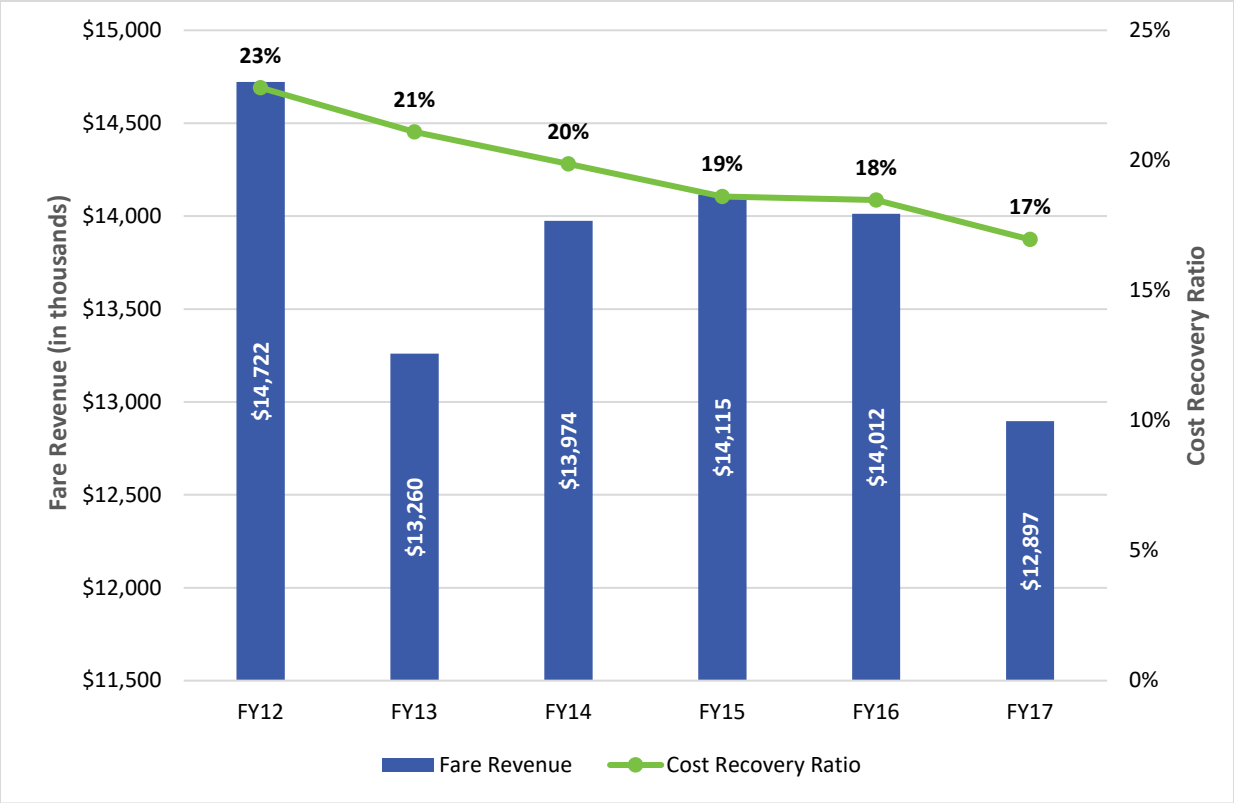
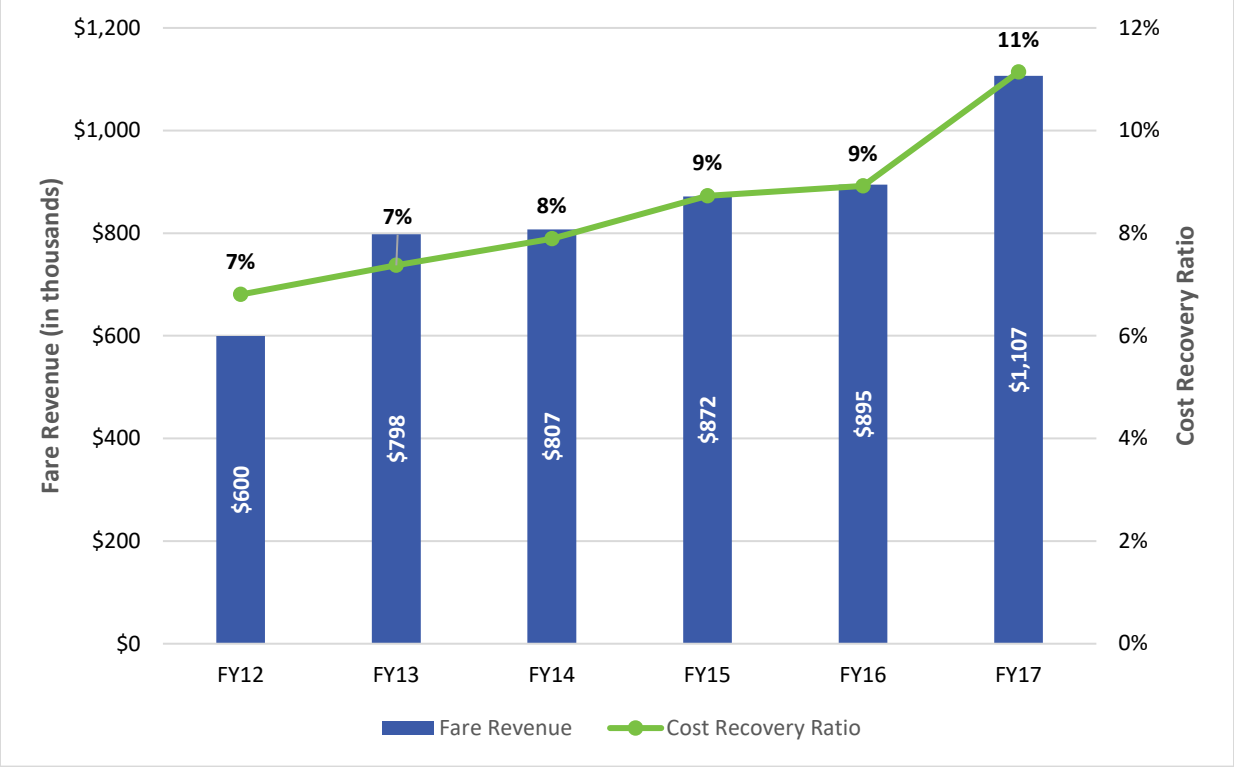


Figure 2-45: Demand Response Fare Revenue / Cost Recovery Ratio



Subsidy per Passenger

A subsidy is the cost incurred by the agency once fare revenue is deducted from the operating expenses. Assessing the average subsidy per passenger is an indication of the cost effectiveness of the service in relation to the local, state, federal or dedicated funding resources being devoted per passenger.

The subsidy per passenger for fixed-route service followed the trend of total operating expenses during this time period, decreasing from FY 2012 to FY 2013 and increasing each year thereafter. Overall, the fixed-route subsidy per passenger increased by 63 percent.

The demand response subsidy per passenger followed a reverse trend, increasing slightly from the first fiscal year to the next and decreasing each year thereafter (by 14 percent overall). In this case, the dollar amount required to subsidize each passenger decreased alongside increases in both fare revenue and the cost recovery ratio. **Table 2-42** shows the subsidy per passenger for bus and demand response services from FY 2012 through FY 2017.

Table 2-42: Subsidy per Passenger

Fiscal Year	Fixed-Route	Demand Response
2012	$3.08	$28.03
2013	$3.06	$32.97
2014	$3.75	$30.21
2015	$4.34	$28.09
2016	$4.67	$25.99
2017	$5.02	$24.16
% Change	**63%**	**-14%**

Summary and Key Findings

Between FY 2012 and FY 2017, HRT's service area decreased in terms of both square miles and population and has become slightly less dense. From an operational standpoint, HRT operates five percent fewer bus vehicles in maximum service, and 26 percent more demand response vehicles. Although the percentage of hours devoted to paratransit revenue service has increased slightly, the percentages of revenue miles and revenue hours of only demand response has changed significantly.

HRT's total fixed-route ridership has decreased, as have the values for measures regarding how efficiently the agency transports its passengers. While total demand response ridership rose by 25 percent over the six-year period, passengers per revenue hour decreased. Decreases in ridership are likely attributable to several factors, including a shrinking service area, service changes, changes to the GoPass365 program, federal government shutdowns, lower gas prices, extreme weather, and fare increases.

HRT's total operating expenses increased for both modes by similar percentages. However, while expenses per passenger trip rose by 51 percent for fixed-route service, this figure dropped by 10 percent for demand response service, indicating that the latter service is more efficient to operate. Due to several measures, the rate of increase of HRT operating expenses began to plateau toward the end of the six-year period.

Finally, regarding service efficiency, while fixed-route fare revenue dropped slightly, demand response fare revenue increased, in conjunction with increased ridership, by 85 percent. The cost recovery ratios for fixed-route and demand response service respectively dropped and rose slightly. While the operating subsidy for bus service went up by 63 percent, the subsidy for demand response went down by 14 percent. **Table 2-43** summarizes the results of the trend analysis by category, listing the percent change.

Table 2-43: FY 2012 to FY 2017 Trend Analysis Summary

Metric	Percent Change	
	Fixed-Route	Demand Response
Service Area		
Square Miles	-17%	
Population	-21%	
Population Density	-5%	
Operational		
Vehicles Operated in Maximum Service	-5%	23%
Revenue Miles	2%	69%
Revenue Hours	5%	60%
Ridership		
Total Ridership	-22%	25%
Passengers per Revenue Mile	-20%	0%
Passengers per Revenue Hour	-26%	-25%
Revenue and Cost		
Total Operating Expenses	18%	13%
Operating Expenses per Passenger Trip	51%	-10%
Service Efficiency		
Fare Revenue	-12%	85%
Cost Recovery Ratio	-6%	4%
Subsidy per Passenger	63%	-14%

2.3.2 Performance-Based Opportunities for Improvement

While previous sections provide analysis of a range of route-level and system-level metrics, the following section assesses each HRT fixed-route service against the passengers per revenue hour, passengers per one-way trip, farebox recovery and subsidy per passenger boarding key performance indicators (KPI) detailed in **Section 1.2.4: Performance Standards**.[25] These KPIs assess the performance of routes against the routes within their service classification in order to determine which are underperforming.

Key Performance Indicator: Passengers per Revenue Hour

The passengers per revenue hour metric is key to assessing the productivity of a route. Only local services (Southside, Peninsula, and VB Wave and Bayfront Shuttle Services) were evaluated using this KPI, as passengers per revenue hour is not appropriate for Limited/Express routes (Peninsula Commuters Services, Metro Area Express). For this KPI, any Southside or Peninsula route that fell short of 7.6 passengers per revenue hour and any VB Wave and Bayfront Shuttle Services route that fell short of 5.8 passengers per revenue hour did not meet the benchmark.[26] Routes that were deficient in this category are:

- **Southside Services:** Routes 18 and 33
- **Peninsula Services:** Routes 116 and 121
- **Bayfront Shuttle:** Route 35

[25] The service types identified in Chapter 1 – Regional Backbone, Local, and Coverage – are used for defining route recommendations as shown in Chapter 3. For existing HRT routes, all routes that are not Limited/Express are grouped together as a combination of these three service types. When the recommendations are implemented, each new non-Express/Limited route will be assigned one of these three classifications.
[26] The benchmark is determined by 50% of the service classification average on weekdays and weekends.

Key Performance Indicator: Passengers per One-way Trip

The passengers per one-way trip metric is key to assessing the productivity of an express or limited service route. Only the PCS and MAX routes were evaluated using this KPI, as passengers per one-way trip is not an appropriate measure for local services. For this KPI, any route that fell short of 20 passengers per one-way trip did not meet the benchmark.[27] Routes that were deficient in this category are:

- **PCS:** Route 414
- **MAX:** Routes 919, 922, 960, 961, 967, 973, and 974

Key Performance Indicator: Farebox Recovery

The farebox recovery ratio is used to assess if a route is operating cost effectively. For all service classifications, the benchmark is 50 percent of the service classification average on weekdays and weekends. For this KPI, any Southside route that fell short of a 9.1 percent farebox recovery ratio, any Peninsula route that fell short of an 8.9 percent farebox recovery ratio, and any VB Wave and Bayfront Shuttle Services route that fell short of a 6.9 percent farebox recovery ratio did not meet the benchmark. Routes that were deficient in this category are:

- **Southside:** Route 18
- **Peninsula Services:** Routes 116
- **Bayfront Shuttle:** Route 35

For PCS and MAX routes, any route that fell short of an 8.8 percent farebox recovery ratio did not meet the benchmark. Routes that were deficient in this category are:

- **MAX:** Routes 973 and 974

Key Performance Indicator: Subsidy per Passenger Boarding

The subsidy per passenger measures how much additional funding outside of the fare revenue an agency has to pay to cover the cost of an individual trip. For all service classifications, the benchmark is twice the service classification average on weekdays and weekends. For this KPI, any Southside route that exceeded a subsidy of $9.79 per passenger, any Peninsula route that exceeded a subsidy of $9.95 per passenger, and any VB Wave and Bayfront Shuttle Services route that exceeded a subsidy of $13.55 per passenger did not meet the benchmark. Routes that were deficient in this category are:

- **Southside:** Routes 18 and 33
- **Peninsula Services:** Routes 116
- **Bayfront Shuttle:** Route 35

For PCS and MAX routes, any route that exceeded $13.76 subsidy per passenger boarding did not meet the benchmark. These are:

- **MAX**: Routes 973 and 974

[27] Minimum passengers boardings per one-way trip is 20 on weekdays and 15 on weekends.

2.4 Operating and Network Efficiency Evaluation

2.4.1 Efficiency Evaluation

On-Time Performance

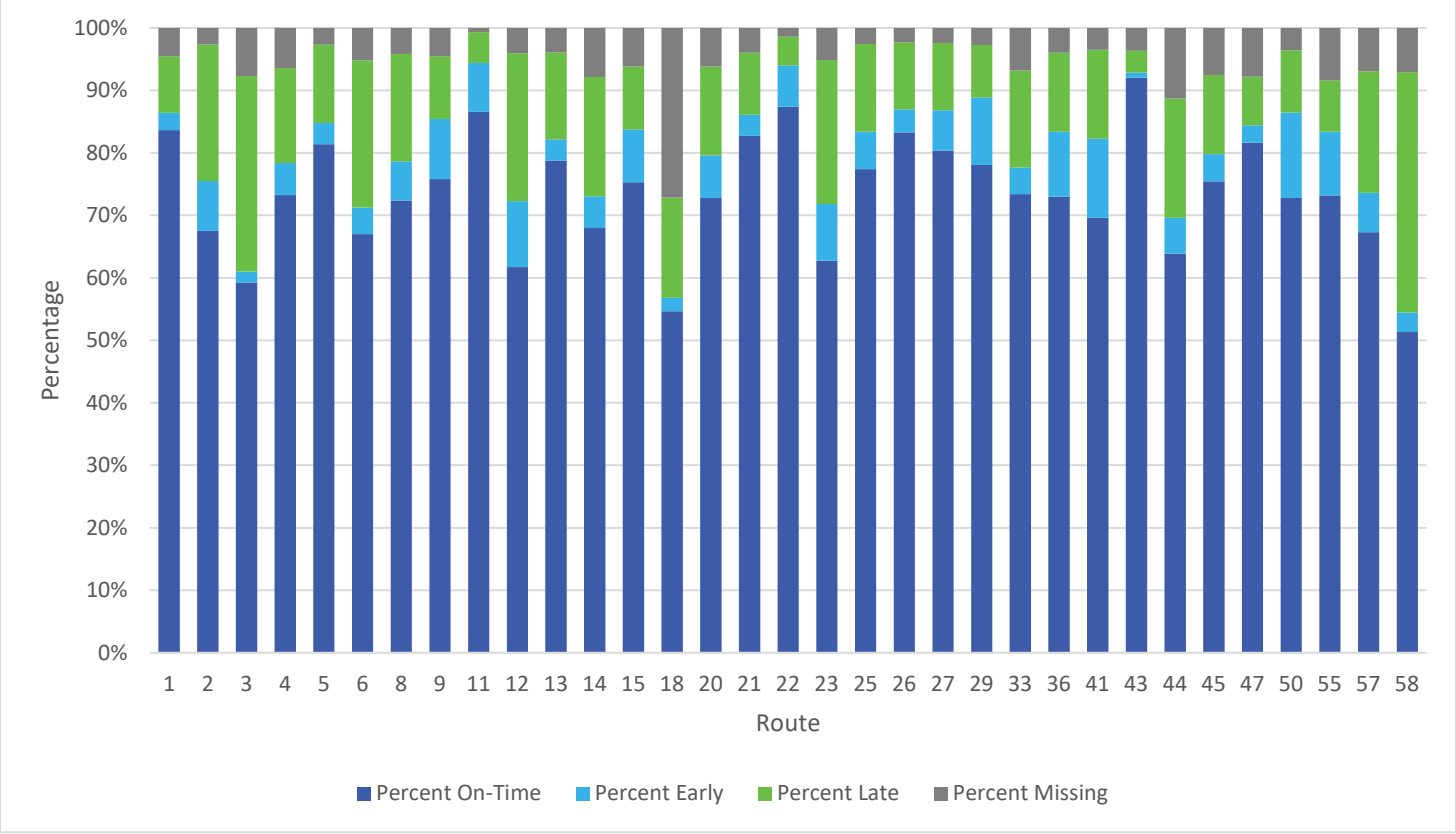
HRT's on-time performance standard defines "on time" as zero minutes early to five minutes late at each time point. HRT also has a minimum goal of 85 percent on-time performance system-wide, at all time-points. On-time performance is a reflection of the reliability of a bus to be there when a passenger is expecting to make a trip.

On-time performance data for FY 2019 was used to analyze HRT's on-time performance at the system level and service type level. In FY 2019, HRT's system wide average on-time performance across all modes was 88 percent, which is above the agency's target of 85 percent. HRT's fixed-route on-time performance was below average in FY 2019 at 79 percent, while paratransit's on-time performance was above average at 88 percent, and light rail's on-time performance was above average at 98 percent.

Based on the August 2019 route level data for fixed-route bus service, Route 919 (Silverleaf Park & Ride / Naval Station Norfolk Gate 4), Route 922 (Greenbrier Mall Park & Ride / Naval Station Norfolk Gate 4), Route 973 (Portsmouth / Naval Station Norfolk), and Route 974 (Chesapeake / Naval Station Norfolk) have the highest on-time performance of all routes, at 95 percent; Route 403 (Buckroe Shopping Center) had the lowest on-time performances of all routes, at 42 percent.

The overall on-time percentage for Southside routes is 74 percent; for Peninsula Routes, 71 percent; for PCS routes, 57 percent; and for MAX routes, 74 percent. **Figure 2-46** through **Figure 2-50** provide a route level overview of on-time performance.[28]

Figure 2-46: On-Time Performance by Southside Route, August 2019



[28] Route level on-time performance reflects August 2019 data.

Figure 2-47: On-Time Performance by Peninsula Route, August 2019

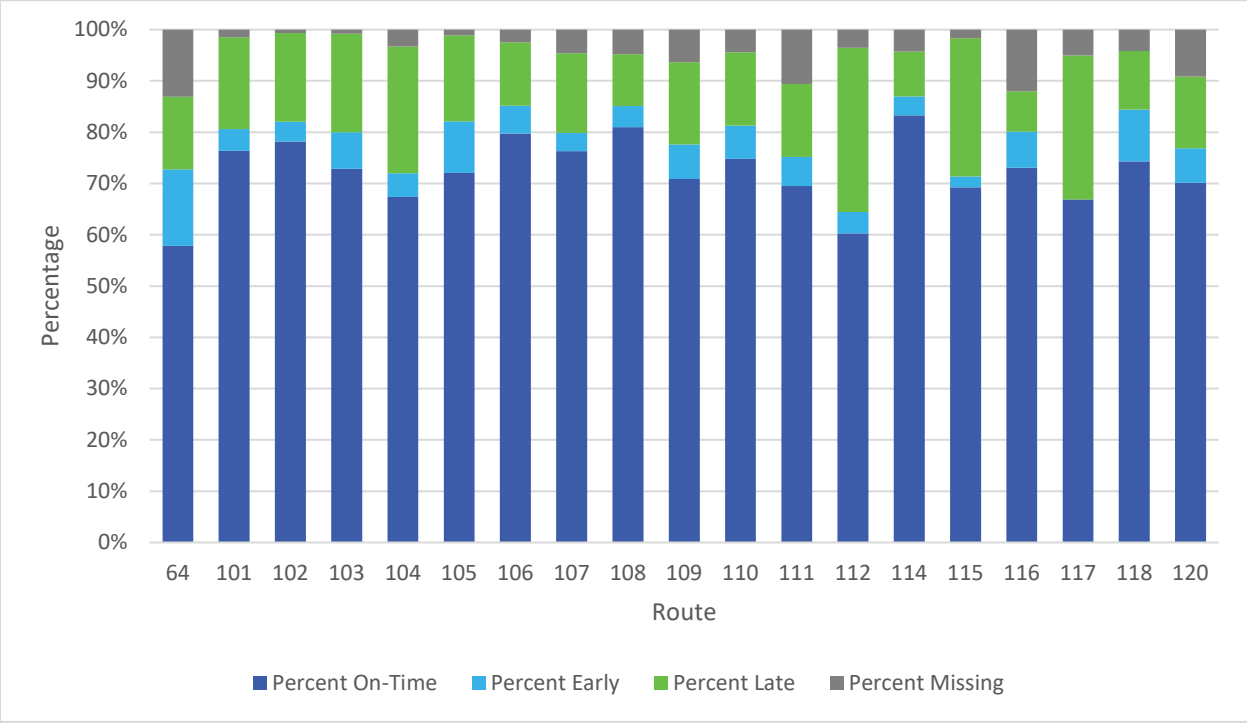


Figure 2-48: On-Time Performance by PCS Route, August 2019

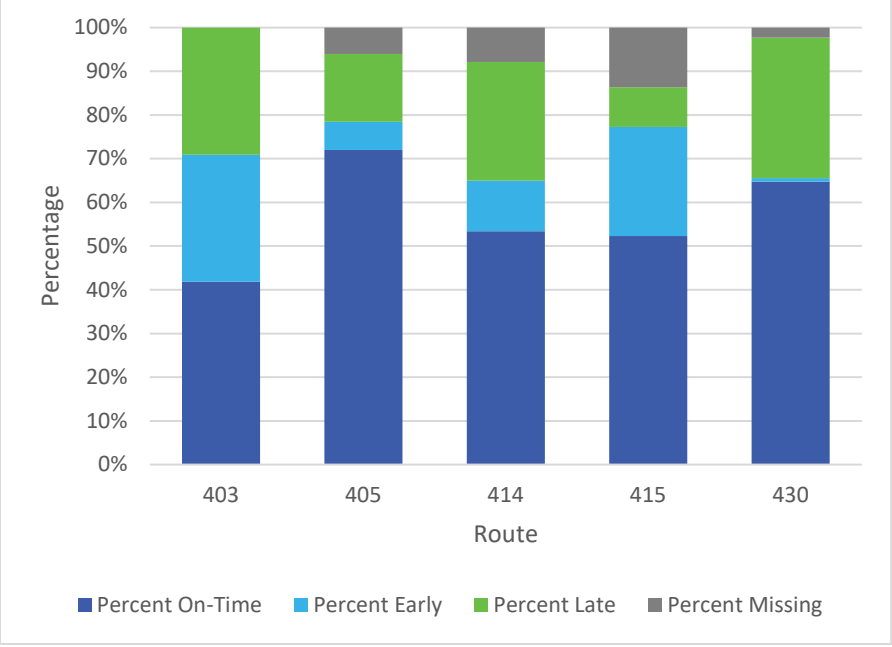


Figure 2-49: On-Time Performance by MAX Route, August 2019

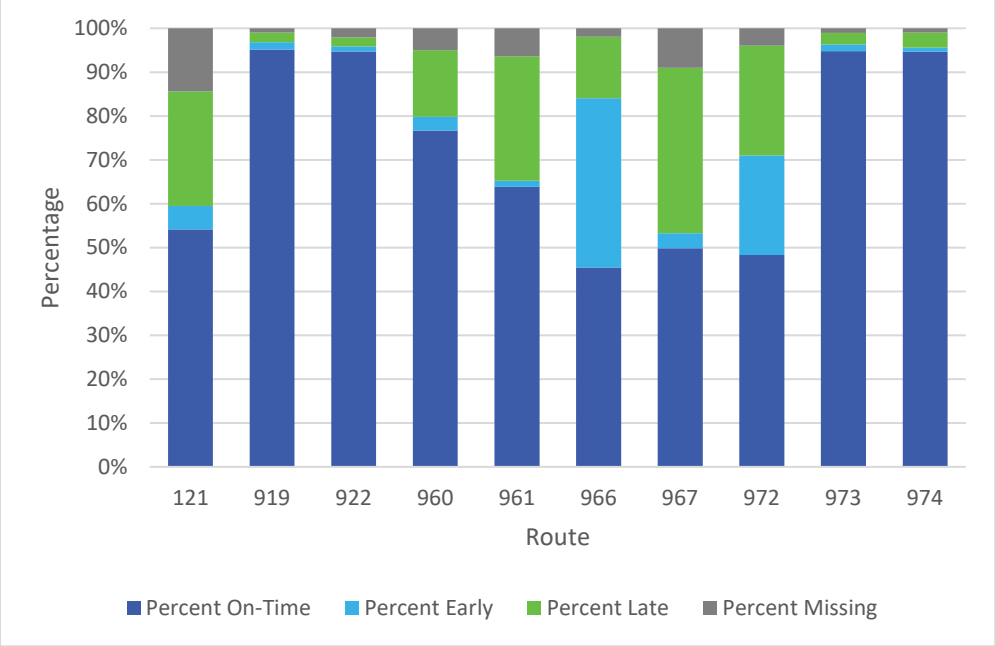
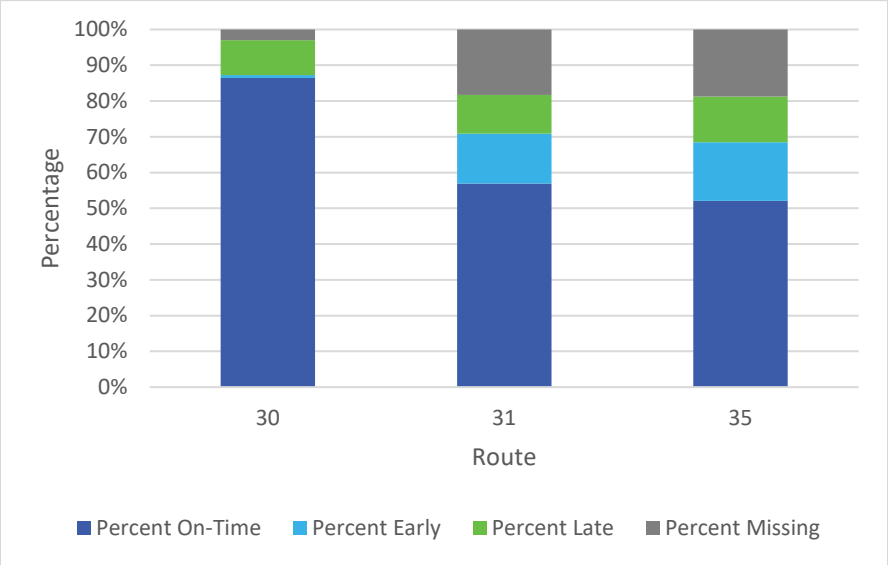


Figure 2-50: On-Time Performance by Trolley Route, August 2019



Passenger Loads

The passenger load assessment measures the comfort and safety of passengers while onboard a vehicle. It identifies how many people are on the bus at any given moment compared to its capacity. High passenger loads result in overcrowded conditions, which may require additional service to address the issue. For local services (Southside routes, Peninsula routes, and VB Wave and Bayfront Shuttle Services) the load standard is 125 percent of seated capacity for two or more miles. For Limited/Express services (PCS and MAX routes), the load standard is 100 percent of seated capacity and 125 percent if operated along an arterial road.

To identify routes with potential overcrowding, the weekday average maximum passenger loads on each route[29] were compared to the seated capacity of the vehicles assigned to each route.[30] The local load standards were applied to the Southside and Peninsula services, while Limited/Express load standards were applied to PCS and MAX services.

HRT's weekday passenger loads range from a low of six passengers on Route 43 (Downtown Portsmouth / Bart Street) to a high of 35 passengers on Route 967 (Virginia Beach - Chesapeake to Newport News). No routes had maximum loads that exceeded the load standard.

The average maximum weekday passenger loads for Southside and Peninsula routes are 18 and 17, respectively; PCS routes have an average maximum weekday passenger load of 20, and MAX routes have an average maximum weekday passenger load of 21.

Table 2-44 through **Table 2-47** detail the average maximum load experienced on a route and a load standard, or capacity, that should not be exceeded in order to ensure a safe, comfortable service.

[29] HRT Ridership Database reports on *Bus Stop Ridership by Route Trip* were used to identify weekday average maximum passenger loads. Southside and Peninsula route data is from March 1 to May 31, 2016; PCS and MAX route data is from February 1 to April 30, 2016, due to better sampling for those routes during this time. Route 922 is not included in the data; in both time periods, the sampling rate for the route was below 30 percent. VB Wave data was not available for either of these time periods.

[30] Capacity by route was determined by identifying HRT's assigned vehicle size by route, then finding the average capacity by vehicle size.

Table 2-44: Southside Max Load, March–May 2016

Route	Trip	Maximum Load	Load Standard
1	5:01 a.m.	*29*	*44*
2	7:13 a.m.	*18*	*40*
3	5:31 a.m.	*26*	*44*
4	6:29 a.m.; 2:04 p.m.; 3:42 p.m.; 4:22 p.m.	*12*	*38*
5	7:12 a.m.	*12*	*38*
6	6:26 a.m.; 4:21 a.m.	*20*	*40*
8	6:48 a.m.	*22*	*40*
9	12:58 p.m.; 4:25 p.m.	*18*	*38*
11	8:40 a.m.; 1:40 p.m.; 3:05 p.m.; 3:39 p.m.	*11*	*38*
12	6:48 p.m.	*19*	*40*
13	6:21 a.m.	*34*	*40*
14	8:22 a.m.	*32*	*40*
15	9:18 a.m.	*28*	*44*
18	5:44 p.m.	*7*	*38*
20	6:22 a.m.	*31*	*44*
21	3:01 p.m.	*20*	*44*
22	6:07 p.m.	12	38
23	2:06 p.m.	*17*	*44*
25	8:02 a.m.	*22*	*38*
26	4:25 p.m.	*11*	*38*
27	5:48 a.m.; 7:48 a.m.; 8:48 a.m.	*13*	*38*
29	6:48 a.m.	*17*	*38*
33	7:48 a.m.	*24*	*40*
36	1:48 p.m.	*19*	*38*
41	5:56 a.m.; 4:03 p.m.	*18*	*38*
43	6:36 a.m.; 7:03 a.m.; 10:38 a.m.; 4:03 p.m.; 5:03 p.m.	*6*	*40*
44	12:00 p.m.	*14*	*44*
45	6:07 a.m.	*28*	*40*
47	5:49 a.m.	*18*	*38*
50	6:03 a.m.; 3:33 p.m.	*11*	*38*
57	6:19 a.m.; 6:24 p.m.	*11*	*40*
58	7:48 a.m.; 4:18 p.m.	*9*	*38*

Table 2-45: Peninsula: Max Load, March–May 2016

Route	Trip	Maximum Load	Load Standard
64	5:35 a.m.	*18*	*40*
101	7:00 a.m.; 3:45 a.m.	*18*	*40*
102	8:19 a.m.; 9:19 a.m.	*13*	*33*
103	6:33 a.m.; 4:15 p.m.	*20*	*40*
104	6:45 a.m.; 7:15 a.m.; 9:45 a.m.; 3:45 p.m.	*14*	*40*
105	8:15 a.m.; 3:15 p.m.	*18*	*40*
106	6:02 a.m.	*30*	*49*
107	5:59 a.m.; 1:40 p.m.	*20*	*49*
108	9:25 a.m.; 2:43 p.m.	*15*	*33*
109	6:51 a.m.; 1:45 p.m.	*12*	*40*
110	7:00 a.m.	*17*	*40*
111	1:50 p.m.; 2:50 p.m.; 3:50 p.m.	*12*	*40*
112	10:45 a.m.	*24*	*49*
114	1:20 p.m.; 3:45 p.m.; 3:50 p.m.	*17*	*40*
115	5:45 a.m.	*19*	*33*
116	7:45 a.m.	*12*	*33*
117	6:15 a.m.	*19*	*40*
118	9:15 a.m.	*21*	*40*
120	1:31 p.m.	*7*	*33*
121	5:05 p.m.	*11*	*33*

Table 2-46: PCS: Max Load, February–April 2016

Route	Trip	Maximum Load	Load Standard
403	5:20 a.m.	*21*	*32*
405	3:40 p.m.	*23*	*32*
414	5:20 a.m.; 6:55 a.m.	*18*	*32*
415	3:45 p.m.	*23*	*39*
430	5:55 a.m.	*29*	*39*

Table 2-47: MAX: Max Load, February–April 2016

Route	Trip	Maximum Load	Load Standard
918	3:30 p.m.	12	35
919	2:54 p.m.	18	38
922	5:00 a.m.	14	
960	7:45 a.m.	29	38
961	3:40 p.m.	30	38
967	3:30 p.m.	35	38

2.4.2 Efficiency Based Opportunities for Improvement

Key Performance Indicator: On-time Performance

On-time performance is important to ensuring a reliable mode of travel for passengers, when routes are unreliable it discourages use of the system by existing passengers and even future passengers. For all service classifications, the benchmark is 85 percent on-time performance at all timepoints. HRT defines "on-time" as zero minutes early to five minutes late. Routes that fell short of 85 percent on-time performance did not meet the benchmark. Routes that were deficient in this category are:

- **Southside Services:** Routes 1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 14, 15, 18, 20, 21, 23, 25, 26, 27, 29, 33, 36, 41, 44, 45, 47, 50, 55, 57, and 58
- **Peninsula Services:** Routes 64, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 114, 115, 116, 117, 118, 120, and 121
- **VB Wave and Bayfront Shuttle Services:** Routes 31 and 35
- **PCS:** Routes 403, 405, 414, 415, and 430
- **MAX:** Routes 960, 961, 966, 967, and 972

Key Performance Indicator: Maximum Load

The Maximum Load KPI is important in an important measure for comfort and safety. For local services (Southside, Peninsula, and VB Wave and Bayfront Shuttle Services), the benchmark is 125 percent of seated capacity for two or more miles. No Southside or Peninsula routes exceeded these maximum load capacities, as measured in February-April 2016. No load data is available for Southside Services Route 55 or VB Wave and Bayfront Shuttle Services Routes 30, 31, or 35.

For PCS and MAX routes, the benchmark is 100 percent of seated capacity for two or more miles (125 percent if operated along arterial rather than limited-access roadways). No PCS or MAX routes exceeded these maximum load capacities, as measured in February-April 2016. No load data is available for Metro Area Express Routes 922, 972, 973, or 974.

2.5 Analysis of Opportunities to Collaborate with Other Transit Providers

2.5.1 Collaboration Analysis

Two other transit providers, Suffolk Transit and the Williamsburg Area Transit Authority (WATA), operate adjacent to the HRT service area. HRT routes currently connect with two Suffolk Transit routes and six WATA routes. HRT works with Suffolk Transit and WATA as needed to coordinate the details of connecting services, such as stop location and schedule.

The City of Suffolk, located west of HRT's Southside communities, operates Suffolk Transit, which provides fixed-route and paratransit service in and around Suffolk's downtown core. Suffolk Transit began service in January 2012 following the city's withdrawal from the Transportation District Commission of Hampton Roads (TDCHR) in 2011, contracting with Virginia Regional Transit to operate six fixed routes (Green, Orange, Yellow, Red, Purple, and Pink).[31] The Purple route currently connects with HRT Route 47 at the Walmart in Suffolk, and the Pink Route connects with Routes 44, 967 and 974 at the Chesapeake Square Transfer Point.

WATA's 12-route system operates north and west of the HRT service area, serving the City of Williamsburg as well as parts of James City County, Surry County, and York County. Six WATA routes (Route 1: Lee Hall [Gray]; Route 2: Richmond Road [Blue]; Route 3: Merrimac Trail [Orange]; Route 5: Monticello [Red]; Route 6: Jamestown; and Route 7: Mooretown Road [Tan] serve the Williamsburg Transportation Center, which is also served by HRT Route 121. Additionally, WATA's Route 1: Lee Hall (Gray) and Route 11: Lackey connect with HRT Routes 108 and 116 at Lee Hall in Newport News.[32]

The Hampton Roads Transportation Planning Organization (HRTPO), the region's metropolitan planning organization (MPO), provides opportunities for HRT to coordinate with other jurisdictions and agencies throughout the region. The HRTPO Board has members from all six HRT member jurisdictions as well as the Cities of Franklin, Poquoson, Suffolk, and Williamsburg, and the Counties of Gloucester, Isle of Wight, James City, Southampton, and York. Representatives from HRT and WATA also serve on the board.[33] HRTPO manages its Rail and Public Transportation Task Force and the Transportation Technical Advisory Committee (TTAC). The TTAC has a subcommittee, Hampton Roads Transportation Operations (HRTO), which focuses on improving transportation operations in the region. HRT, its six member jurisdictions, the City of Suffolk, and WATA all serve on the Task Force, TTAC, and HRTO.[34]

Further collaboration among transit providers and other agencies in the region will benefit both transit users and transit providers. Users could benefit from more connected and streamlined services. By connecting and collaborating, transit providers could gain a wider base of potential riders and gain access to new technology and funding opportunities, leading to costs savings for both providers and users. Specific opportunities for collaboration fall into two broad categories: communication and service coordination. These opportunities are described in the following section.

2.5.2 Collaboration Based Opportunities for Improvement

The following provides an overview of opportunities for collaboration which could benefit HRT and other transit providers. These opportunities were discussed at inter-agency meeting between HRT, HRTPO, Suffolk Transit, and WATA on May 29 and August 15, 2019. During these meetings, strategies were identified that have low barriers to implementation and would most benefit from interagency collaboration.

Communication, Funding, and Procurement

There is an opportunity to improve communication between transit providers and between the providers and the public. The improved communication, especially among HRT, Suffolk Transit, and WATA, would help facilitate

[31] Suffolk Transit, Accessed at http://www.suffolkva.us/429/Suffolk-Transit
[32] Williamsburg Area Transit Authority, Accessed at https://gowata.org/
[33] HRTPO Board, Accessed at https://www.hrtpo.org/page/hrtpo-board/
[34] Hampton Roads Transportation Operations, Accessed at https://www.hrtpo.org/page/hampton-roads-transportation-operations-(hrto)/

improved coordination of service as well as other opportunities for collaboration, such as joint purchasing. These communication opportunities are listed in **Table 2-48.**

Table 2-48: Communication Collaboration Opportunities

Opportunity	Description
Establish regional transit technical committee that meets regularly and is facilitated by the HRTPO	Discussion of regional priorities for transit and potential joint funding and purchasing opportunities
	Discussion of opportunities for inter-agency collaboration, including coordination of relevant portions of Transit Strategic Plans
	Coordination of capital planning and programming
Joint marketing and rider information tool	Development of a regional transit map, schedules, and brochures
	Establishment of a regional trip planning website

Service Coordination

Another avenue for expanding collaboration among the service providers in the area is through service coordination. Service coordination allows for riders to more seamlessly transfer between systems and helps ensure that HRT, Suffolk Transit, and WATA are running complementary service. Specific service coordination opportunities are listed in **Table 2-49.**

Table 2-49: Service Coordination Collaboration Opportunities

Opportunity	Description
Coordinated scheduling and service	Establishment of regional transit priority corridors across systems
	Alignment of schedules and operations, especially at transfer locations
On-demand microtransit service	Exploration of new on-demand transit service to serve lower-density areas and exploration of jointly developing these services
Fare system integration	Development of common fares among service providers and shared transfer policies
	Establishment of a single fare payment mechanism (requires technology upgrades)
Shared technology	Exploration of trip planning apps that integrates all the service providers
Regional paratransit service	Designation of a regional paratransit service operator across jurisdictions

The initial collaboration actions for HRT and its regional partners are recommended to include: participating in the formal establishment of the HRTPO joint technical committee; meeting regularly and collaborating on a variety of initiatives; and developing and proceeding with action plans to further the opportunities identified above, along with any new opportunities that might be discovered.