HAMPTON ROADS TRANSIT

Transit Development Plan

FY2018-FY2027

HAMPTON ROADS TRANSIT

JANUARY 2018

(Page Intentionally Left Blank)

Prepared By:

(Page Intentionally Left Blank)

Contents

Figures

Tables

Executive Summary

TDP OVERVIEW

The Hampton Roads Transit (HRT) Transit Development Plan (TDP) is an effort to evaluate and assess the performance, connectivity, efficiency and effectiveness of the HRT routes that operate within the six-member jurisdictions. The study, which began in the Summer of 2016, provides a comprehensive vision for transit operations and capital improvements for the ten-year period of FY2018 through FY2027.

The TDP presents an in-depth and comprehensive evaluation of HRT services and operations costs. This document includes the results of the demographic and socioeconomic market analysis, the operational analysis, and public outreach, all of which were important steps in the creation of this TDP. Key elements that have been addressed include:

- An overview of HRT's history, governance, and organizational structure;
- An overview of the existing services, fleet, facilities, policies, and public outreach processes;
- A historical analysis of service and financial characteristics;
- The development of goals, objectives and performance standards to guide future operational and capital planning initiatives;
- A detailed evaluation of the existing HRT service characteristics and an in-depth analysis of the socioeconomic and demographic transit market;
- Recommended operational improvements, including a new high frequency network, and a capital improvement plan; and
- Funding requirements and potential funding sources for recommended service improvements and vehicle purchases.

The TDP summarizes HRT's challenges and opportunities, and establishes clear and measurable performance standards. It provides a framework that will help guide day-to-day decisions as the recommended service improvements get implemented.

The most expansive recommendation brought forth through the TDP effort is an identified need for a dependable high frequency transit network that operate consistently throughout the six-member jurisdictions. The high frequency routes will provide an inter-connected network of reliable and easy to use transit service between the region's most important activity centers. These new services, along with HRT's Tide Light rail service will function as the transit system's backbone, along with HRT's Tide light rail service.

HRT's existing local bus services are recommended to be adjusted to facilitate easy transfers to the high frequency network, and will provide better, more direct connections throughout the service area. An emphasis is placed on

improving the system-wide on-time performance via the implementation of new, data-driven run times, and improving service cost efficiency by eliminating duplicative services and increasing route directness. Finally, the recommendations also provide new or revised routes to underserved communities and unserved locations to fill in the existing geographic transit gaps.

PLAN GOALS

HRT has modified the agency's vision, mission, goals, and objectives through a recent strategic planning process in advance of the FY2018 – FY2027 TDP. The process involved reviewing the goals and objectives from HRT's FY2012 – FY2017 TDP, as well as the updates to those goals in HRT's annual TDP letters. HRT's agency-wide and TDP goals are to:

- Provide a **quality service** that is easy to use and enhances people's lives.
- Foster regional quality of life and economic vitality.
- Ensure **financial stewardship** and **cost-effective operations** that further financial partnerships and community trust.
- Build an **innovative workplace culture** to ensure that HRT remains relevant to the dynamic needs of our region.

ANALYSES AND ASSESSMENTS

To develop strategies and recommendations that will allow HRT to meet the TDP goals and objectives, a three-pronged technical analysis was performed, which allowed for a thorough understanding of the services operated by HRT, the situations in which they operate, and how effectively HRT meets the demand for bus service.

System Assessment

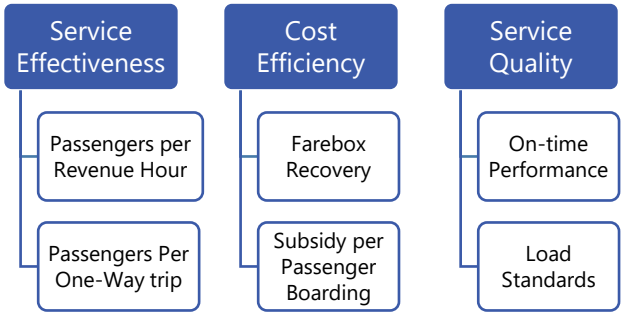
HRT offers a selection of different service types, each which meet the differing needs of the region's transit reliant and commuter populations. The fixed-route bus network consists of 70 fixed service routes that primarily operate throughout six independent cities in Virginia – Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach. The system consists of local services (54 routes), express services (8 routes), commuter services (5 routes), and seasonal services (3 routes):

- **Southside Service:** Local services in Norfolk, Virginia Beach, Chesapeake, and Portsmouth.
- **Peninsula Service:** Local services in Newport News, Hampton, with select service to Williamsburg and Smithfield.
- **Metro Area Express (MAX) Express Bus Service:** A regional express service focused on commuters, offering limited stop express service between major destinations in the region.
- **Peninsula Commuter Services:** Commuter bus service to major employers on the Peninsula.

- **VB Wave:** Seasonal (May to September) shuttles providing access to the Virginia Beach waterfront, serving major tourist corridors, campgrounds, and retail.

The analysis of the existing services included the assessment of several key performance indicators that relate to transit success. These performance indicators were evaluated to:

- Assess the service effectiveness at the route, trip, and stop levels;
- Evaluate the cost efficiency of each route and the system overall; and
- Measure HRT's ability to provide quality, dependable, and comfortable service.



Key Bus Service Performance Indicators

In FY2016, HRT carried over 13.2 million passengers across all the agencies fixed-route transit options. Since FY2012, bus ridership has decreased by approximately 18 percent. This ridership loss can be attributed to several justifiable reasons, which include: the decrease of the agency's service area due to the loss of one of the supporting jurisdictions in FY2013; a long federal shut down and federal sequestration process in FY2013 and FY2014, respectively; weather related events in FY2015, and a 38 percent decrease in the price of gas over the same time period. Likewise, transit ridership nationwide has declined in this same time period. In contrast, utilization of HRT's demand responsive service has increased over 20 percent since FY2012.

HRT Trend Analysis Summary (FY2012 - FY2016)

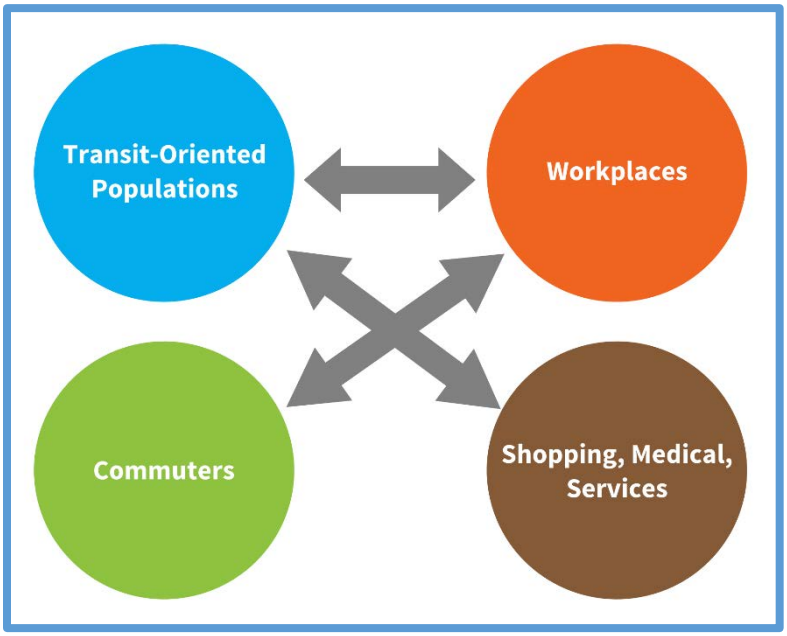
Metric	Percent Change	
	Fixed-Route	Demand Response
Service Area		
Square Miles	-16%	
Population	-21%	
Population Density	-5%	
Service Provided		
Vehicles Operated in Maximum Service	-2%	17%
Revenue Miles	0%	1.9%
Revenue Hours	0.9%	3.3%
Ridership		
Total Ridership	-18%	20%
Passengers per Revenue Mile	-20%	0%
Passengers per Revenue Hour	-22%	-24%
Revenue and Cost		
Total Operating Expenses	17%	14%
Operating Expenses per Passenger Trip	43%	-5%
Service Efficiency		
Fare Revenue	-5%	49%
Cost Recovery Ratio	-5%	2%
Subsidy per Passenger	51%	-7%

Of the HRT services, Route 20 (Downtown Norfolk/Virginia Beach Oceanfront) had the highest overall annual ridership with more than 1.2 million passengers in FY2016, while Routes 1 (Downtown Norfolk to Pembroke East), 15 (Evelyn Butts to Robert Hall/Greenbrier Mall), and 3 (Naval Station Norfolk/Chesapeake Boulevard) each carried more than 600,000 riders. The Peninsula route with the highest ridership was Route 112 (Downtown Newport News/Riverside Hospital), while Route 414 (Newport News Transit Center/Jefferson/Oakland) was the top performing Peninsula Commuter Service. Route 961 (Newport News-Hampton to Downtown Norfolk Transit Center/Norfolk) was the highest utilized MAX service and seasonal Route 30 (Oceanfront Shuttle) carried the most passengers on the VB Wave service. Ridership was also assessed at the stop level, which helped to clarify high utilization stops and to gain an understanding of transfer patterns.

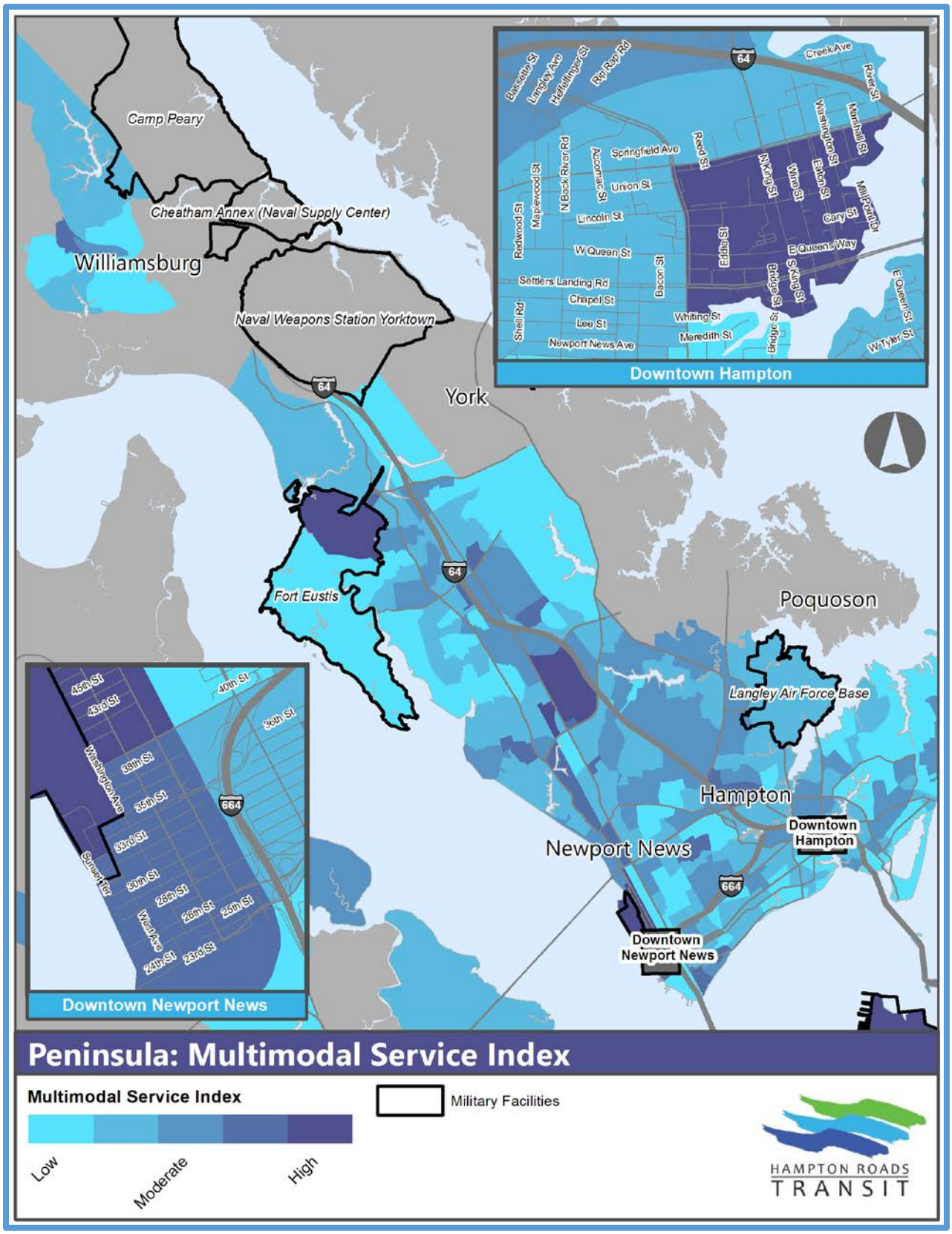
On-time performance reflects the reliability of route to be there when a passenger is expecting to make a trip or arrive at a destination. HRT's on-time performance standard defines "on time" as zero minutes early up to five minutes late at each time point. HRT also has a minimum goal of 85 percent on-time performance system-wide, at all time-points. On-time performance data for calendar year 2016 was used to analyze HRT's on-time performance, both at a route and system level. During this time period, HRT's system wide average on-time performance was 82 percent, slightly below the agency's target.

Understanding the Service Area

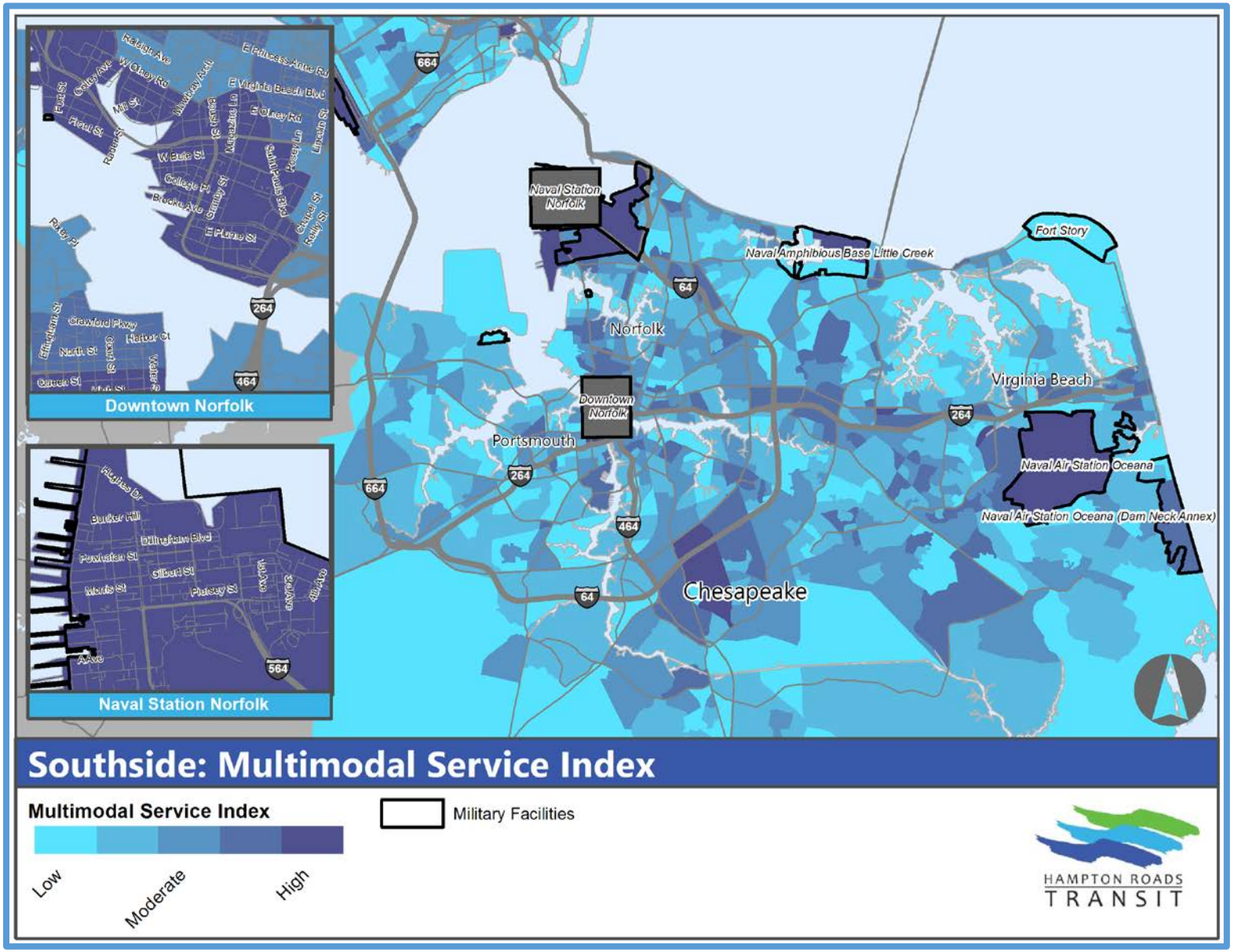
The TDP's market analysis reviews the demand for transit services within HRT's service area through a review of current and future residential and employment density trends. Population and employment densities are assessed at the census block group level throughout the region, and demographic and employment data from the U.S. Census and Longitudinal Employer-Household Dynamics (LEHD) are compiled into transit propensity indices. These indices illustrate areas with high concentrations of potential transit users, commuters, jobs, and non-work destinations, and, along with a travel flow analysis, help to identify opportunities to improve existing transit services and expand services into new areas. For example, the two on the following pages illustrates the overall multimodal transit propensity (blue) of the Peninsula and Southside, respectively, with the darker colors exhibiting the likely areas of greater transit utilization.



Transit Propensity Analysis



Peninsula Transit Propensity Index: Multimodal Service Need



Southside Transit Propensity Index: Multimodal Service Need

Service Evaluation

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 area, HRT provides coverage over much of the areas identified as needing transit service. 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.

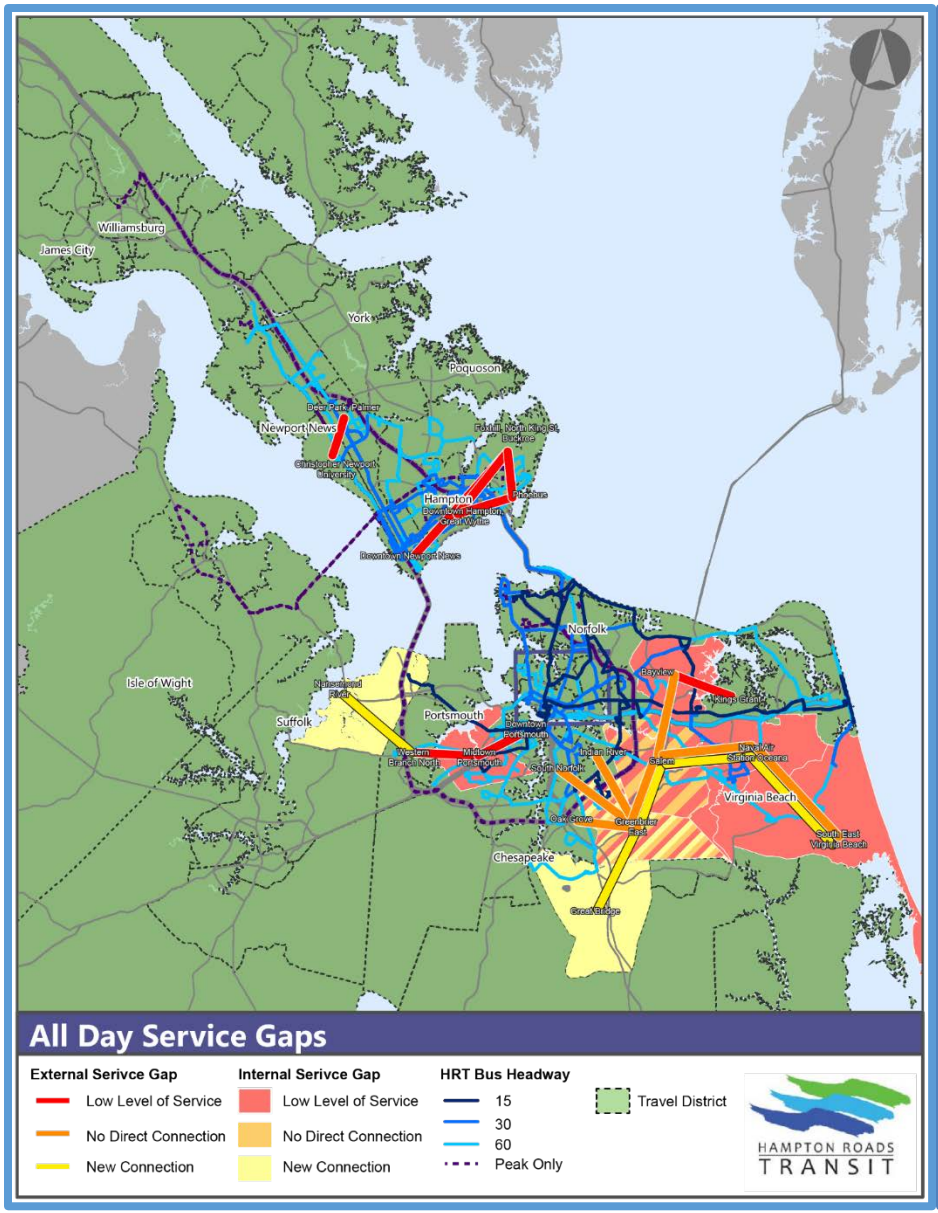
An analysis was performed that compares the travel flows against the transit propensity indices to approximate the demand for transit between districts. All day trip volumes were adjusted based on the transit-oriented population and non-work propensity of their origin and destination districts, while 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 which contains the schedule, route, and bus stop information for all HRT services. The level of service measure was applied to any areas within 1/4 of a mile of a bus stop.

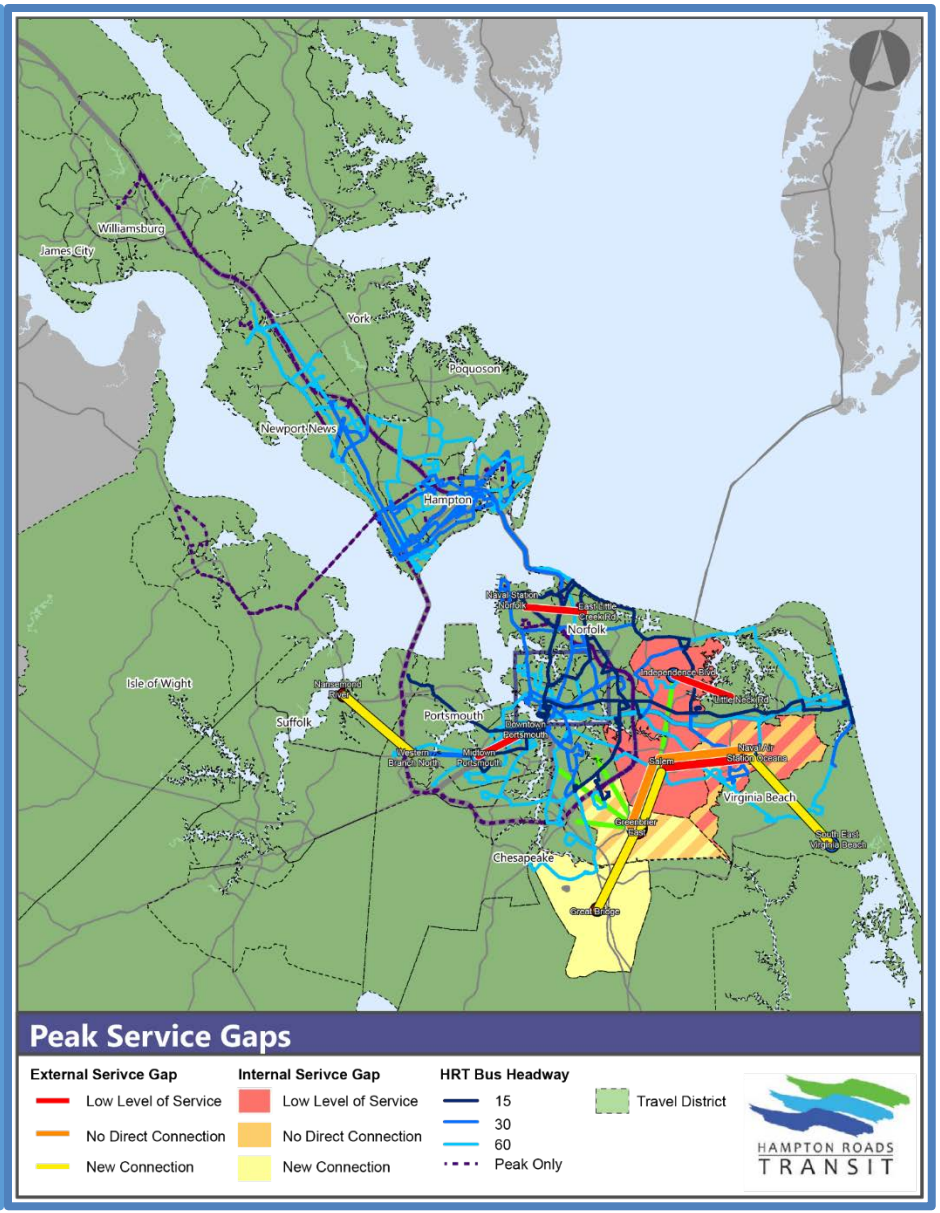
These measures of transit supply and travel demand were used to identify three types of gaps in transit service:

- **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 the 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.

The following graphics illustrate the services gaps identified within the existing HRT bus network for "All Day," and "Peak" periods.



Areas with gaps in "All Day" Services



Areas with gaps in "Peak" Services

TDP RECOMMENDATIONS

The TDP recommendations aim to improve the network of routes that provide service throughout the HRT service area based on the analyses and assessments performed during the exploratory portion of the TDP process. Various issues and challenges were identified, including the need for more dependable, on-time services that arrives more often, and several gaps in service, in terms of both service coverage and level of service. Solutions have been proposed that will eliminate duplicative services, straighten route alignments that currently have too many turns, prepare new realistic run-times for all routes based on the existing service travel times, and the development of service levels that better meet the needs of the residents and employees who live and work in the HRT service area. Additionally, a new High Frequency Transit Network (HFTN) will be created that will serve as the backbone of the redeveloped bus network.

In order to make some of these recommendations a reality, tough decisions had to be made during the planning process. The new high frequency network and the attempt to fill in the existing service gaps will require additional resources in terms of operators and vehicles that are currently allocated elsewhere. Without the support of additional funding, resources must be reallocated based on the assessment of transit need and the availability of transit resources.

High Frequency Transit Network

HFTNs play an important role in connecting people and businesses to resources, and providing safe, affordable access to employment, education, and other daily needs. The ability to move quickly, without the need to memorize a schedule, from one destination to another is also valuable to attracting choice riders.

To enhance HRT's fixed-route service and to create a competitive mode that will effectively serve the Hampton Roads region, a HFTN overlay on the HRT Transit Development Plan recommendations is recommended to connect major activity centers throughout the six member jurisdictions.

With the implementation of the high frequency route recommendations, the number of people with access to high frequency services within one-quarter mile will increase by 279 percent and the number of employment opportunities will increase by 162 percent. Ridership, based on forecasts, is expected to increase by 35 percent.

Overall, the total cost, including operating and administrative costs, for all routes within the HFTN is estimated to be $71.5 million, an increase of $28.5 million when compared to the total costs of the existing services on these routes. It would also require approximately 181 peak vehicles, which would be an additional 88 vehicles, 73 revenue vehicles and 15 spares, on top of the existing 108 vehicles that operate on these corridors during peak hours. These additional 88 vehicles incur a total capital cost of approximately $43.1 million. None of this can be accomplished without a new source of funding; the HFTN financial needs are beyond anything the six cities can fund on their own.

High Frequency Transit Network Impacts

	Existing	Proposed	Percent Increase
Service Area (sq mi)	22.6	87.5	**287%**
Population	91,279	346,374	**279%**
Employment Opportunities	85,043	222,575	**162%**
Ridership	8,432,980	11,353,730	**35%**

Service Parameters

The HFTN is created by 22 routes that offer service Monday through Sunday. HFTN corridors will have a minimum effective[1] frequency of every 15-minutes during peak periods. The minimum frequencies by time period and span of service are defined below:

Frequency by Time Period

- Morning/Afternoon Peak: 15-minutes
- Midday/Evening: 30-minutes
- Early Morning/Late Night: 60-minutes
- Saturday: 30-minutes
- Sunday: 60-minutes

Span of Service by Day Type

- Weekdays: 6:00 AM - 11:00 PM
- Saturday: 6:00 AM - 11:00 PM
- Sunday: 7:00 AM - 8:00 PM

Recommended Route Structure

Twenty-two recommended routes for the HFTN would operate on twenty different corridors to provide high frequency service throughout the Hampton Roads Region. These recommendations were developed based on the following factors:

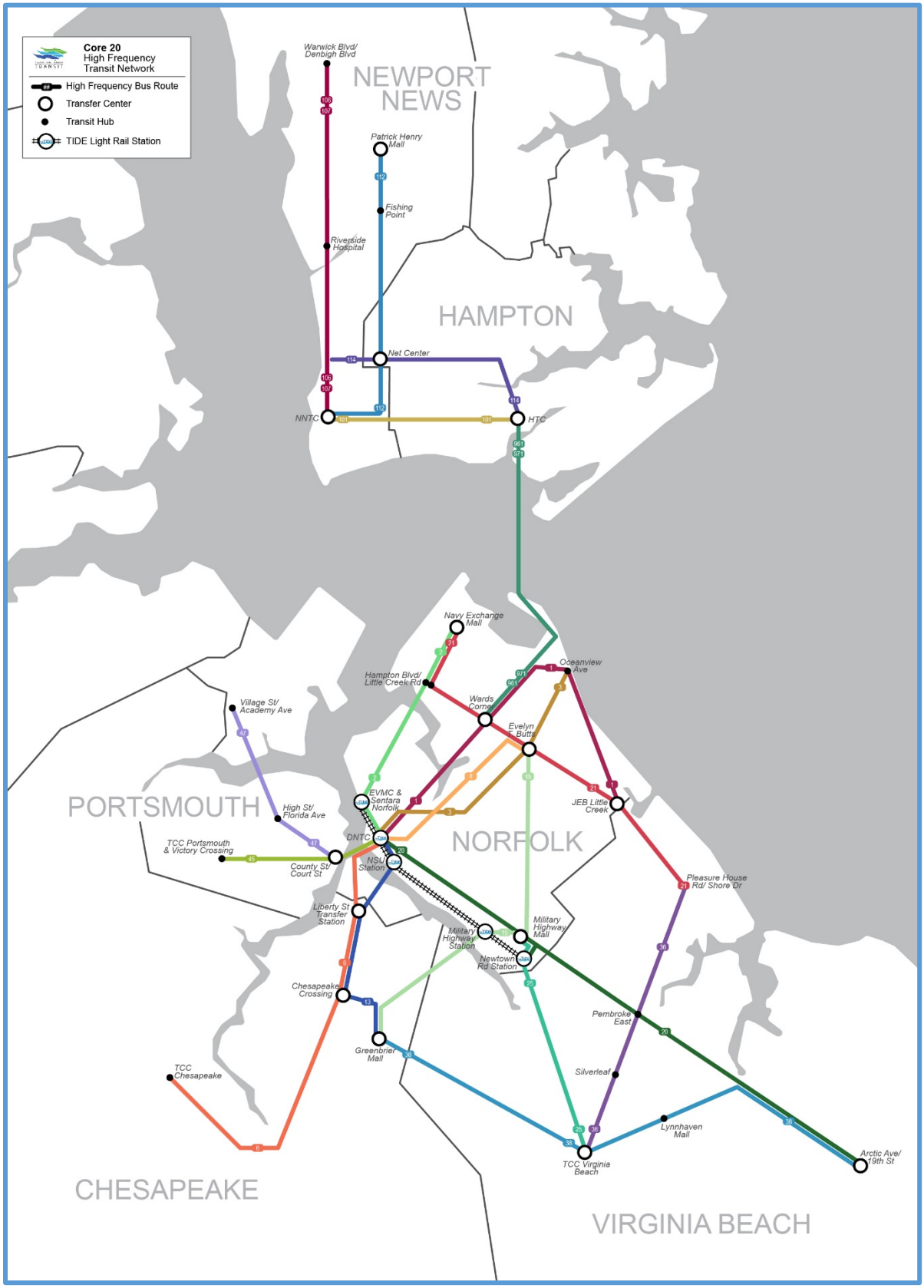
- Existing levels of service;
- Existing ridership levels;
- Multi-modal propensity;
- Regional travel flows; and
- Geographic diversity and range of connections across the region.

On the Peninsula, the High Frequency Transit Network is composed of seven routes. Five of these recommendations provide connections between activity centers on the Peninsula, including: Downtown Newport News, Downtown Hampton, Newmarket, Net Center, Oyster Point, and the Patrick Henry Mall. The other two Peninsula routes together provide a high frequency connection across the Bridge Tunnel to the Southside, connecting to Wards Corner.

There are 15 recommendations serving the Southside which provide connections between activity centers on the Southside, and are designed to connect across the four member jurisdictions encouraging cross-city connections.

The map illustrating the High Frequency Transit Network alignments is shown on the following page.

[1]Effective frequencies refer to situations where multiple routes, whose schedules are coordinated, work together to maintain higher frequencies along a corridor.



High Frequency Transit Routes / Corridors

Bus Network

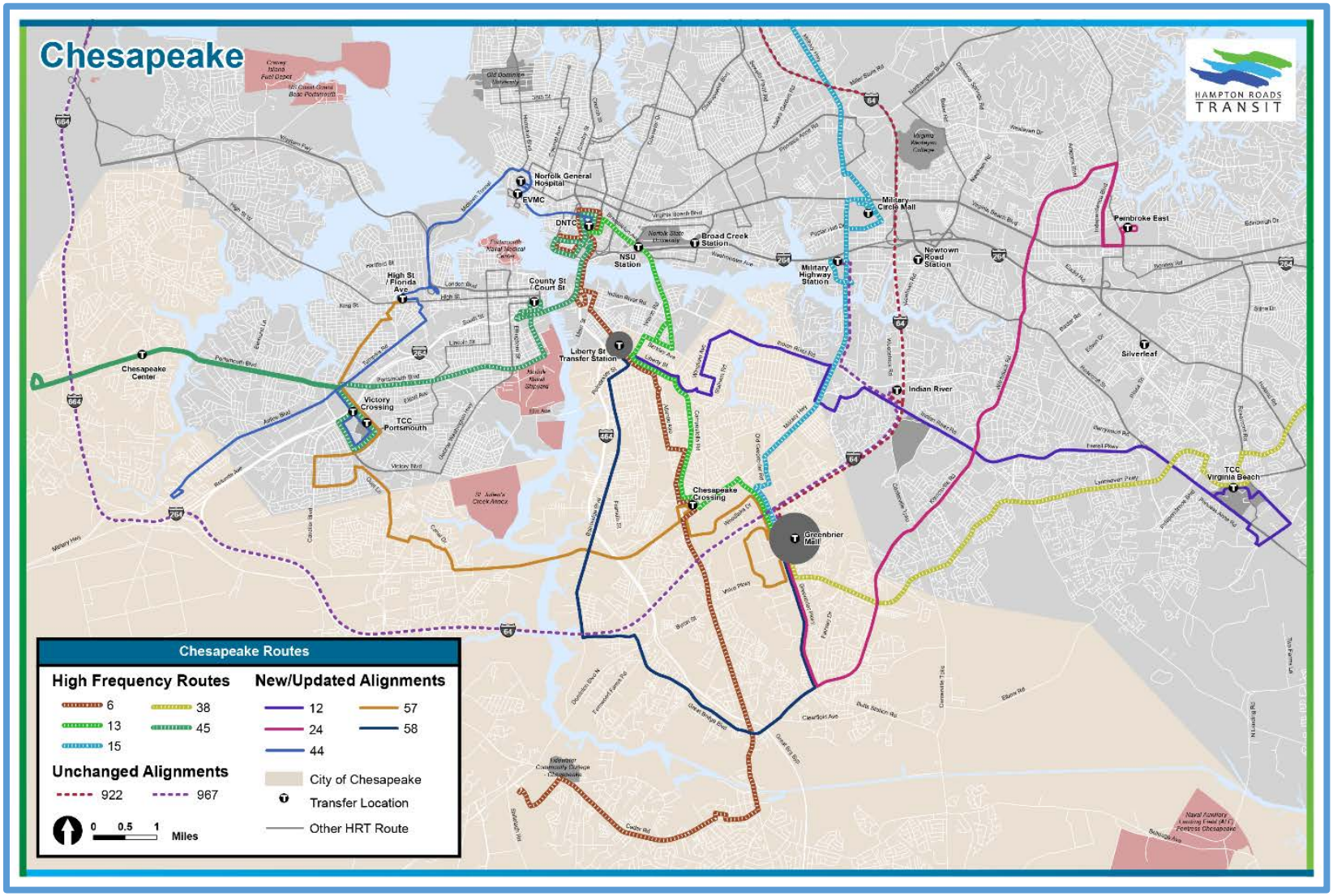
The following sections describe each of the recommendations for improvements to the core bus network, including local, express and commuter service; local service has been designed to feed the HFTN. The recommendations by city show the types of changes being recommended (e.g., alignment changes, being converted to a HFTN route, a new route, service level changes, or no change at all). Recommendations identified for FY 2018 through FY 2021 were financially constrained while recommendations in FY 2022 through FY 2027 were identified as unfunded needs.

Chesapeake

There are 24 recommendations for the City of Chesapeake transit service, for the most part focusing on increasing frequency and span of service. Of the 10 local routes that operate in the City of Chesapeake, there are five constrained recommendations and 19 recommendations identified that are unfunded. Five of the unfunded recommendation will finalize the entire HFTN in Chesapeake.

The proposed recommendations for the City of Chesapeake will result in an additional annual need of $7,116,000 in operating funds. Ridership is expected to increase by 43 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
44	Improve Level of Service	2019
24	New Route	2020
44	Alignment Change	2020
55	Discontinue Route	2021
57	Alignment Change	2021
Identified Unfunded Need		
12	Alignment Change/Discontinue Segment	2022
13	Discontinue Segment	2022
38	New Route	2022
44	Alignment Change	2022
45	Alignment Change/Discontinue Segment/Reduce Level of Service	2022
57	Alignment Change/Discontinue Segment	2022
6	Alignment Change	2023
13	Alignment Change	2023
14	Discontinue Route	2023
15	Alignment Change/Discontinue Segment	2023
58	Alignment Change/Discontinue Segment	2023
13	Improve Level of Service	2024
12	Improve Level of Service	2025
6	Improve Level of Service	2027
13	Improve Level of Service	2027
15	Improve Level of Service	2027
38	Improve Level of Service	2027
45	Improve Level of Service	2027



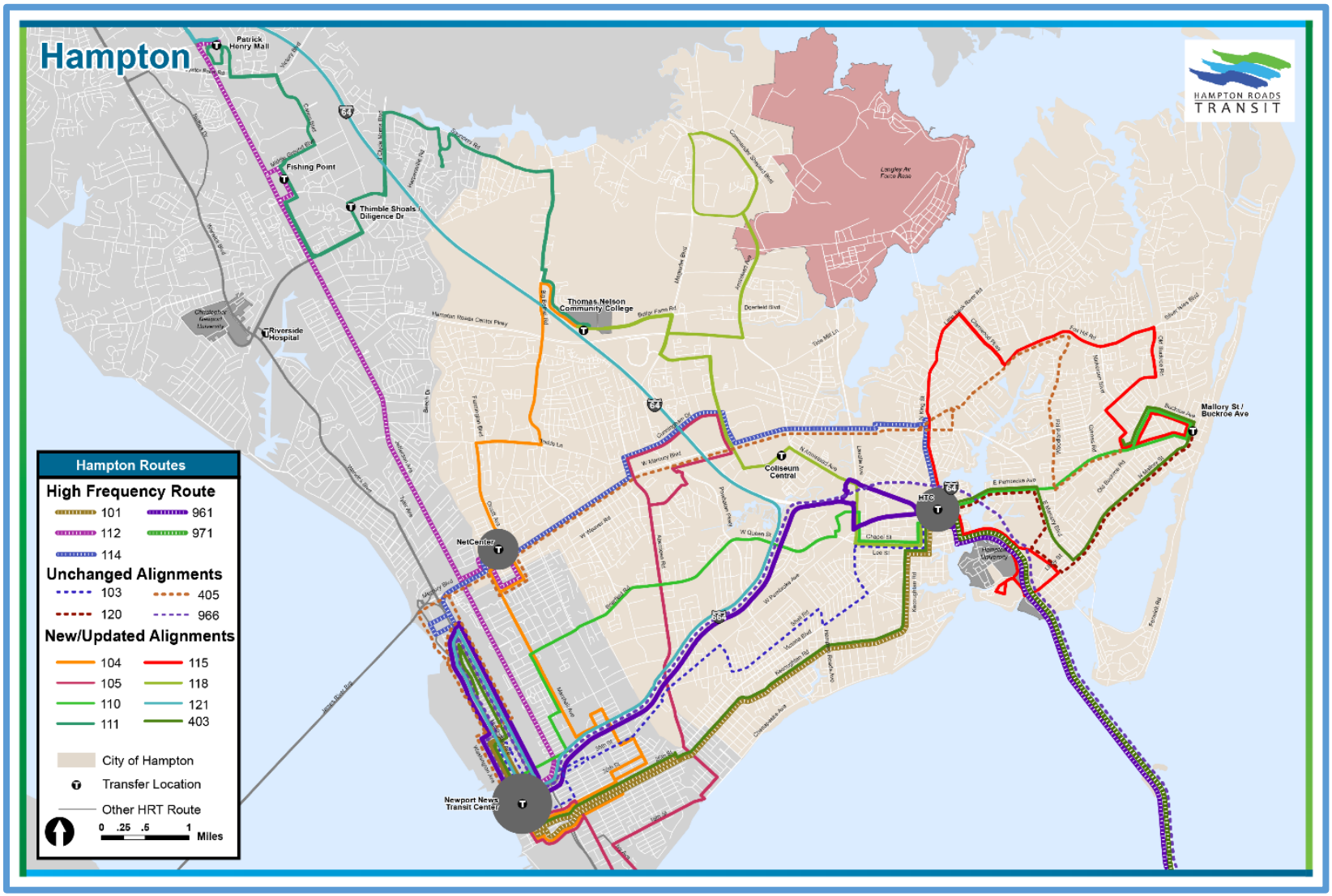
Chesapeake Fully Implemented System

Hampton

The City of Hampton recommendations focus on creating efficient and frequent connections throughout Hampton and with Newport News. Of the 11 local routes and three commuter routes that operate in the City of Hampton, there are 11 constrained recommendations and 3 unfunded recommendations. Two of the unfunded recommendations are part of the HFTN. Routes 103, 120, 403, and 405 have no proposed changes.

The proposed recommendations for the City of Hampton will result in an additional annual need of $329,000 in operating funds. Ridership is expected to increase by 20 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
111	Alignment Change/Discontinue Segment	2019
114	Alignment Change/Discontinue Segment	2019
118	Alignment Change/Discontinue Segment	2019
102	Discontinue Route	2020
104	Alignment Change	2020
105	Alignment Change/Discontinue Segment	2020
109	Discontinue Route	2020
110	Alignment Change/Discontinue Segment	2020
115	Alignment Change	2020
115	Improve Level of Service	2020
117	Discontinue Route	2020
Identified Unfunded Need		
116	Improve Level of Service	2023
101	Improve Level of Service	2026
114	Improve Level of Service	2026



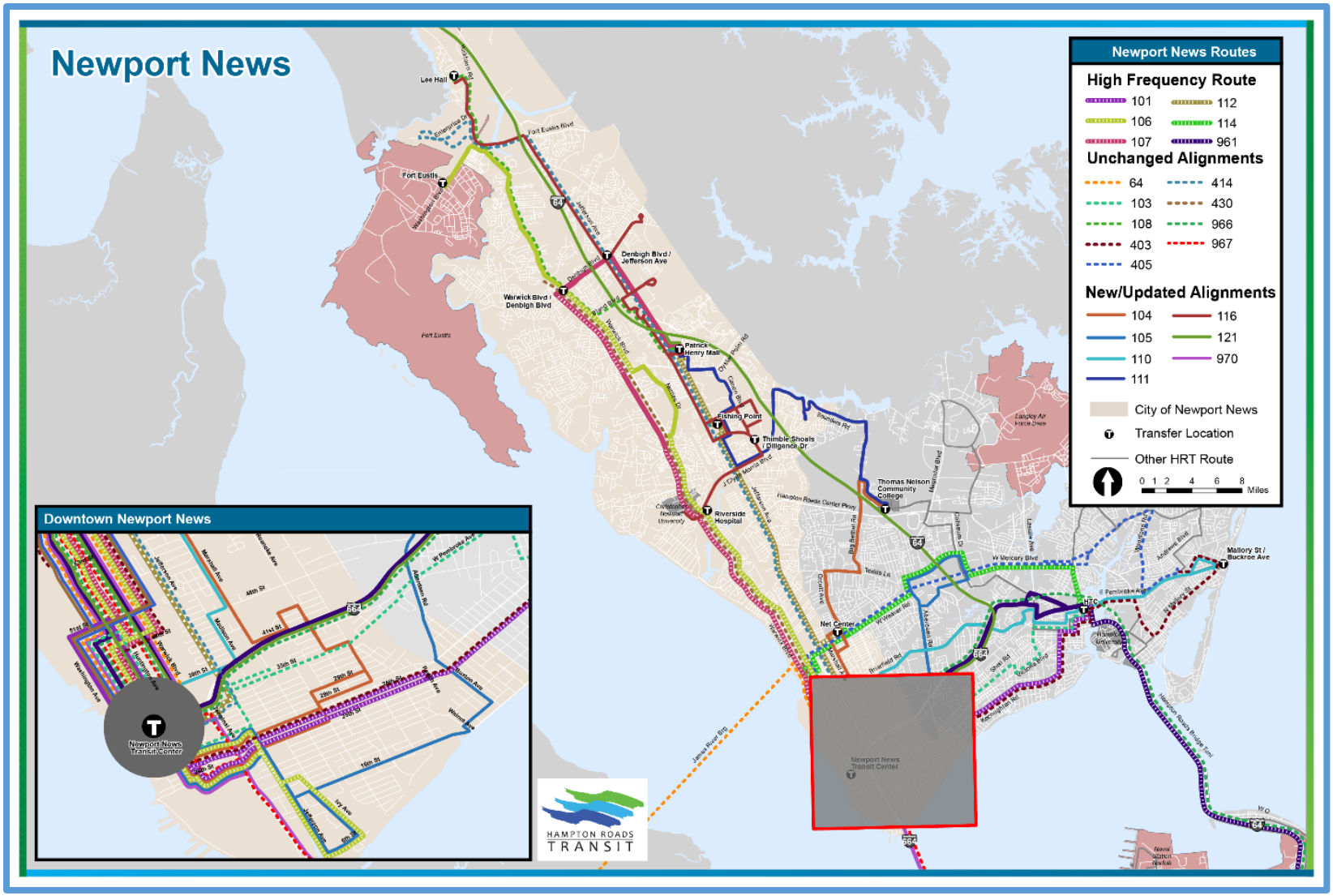
Hampton Fully Implemented System

Newport News

Of the 12 local routes and six commuter routes that operate in the City of Newport News, there are 10 constrained recommendations and 6 recommendations classified as an unfunded need. Five of the unfunded recommendations are part of the HFTN. Routes 103, 108, 403, 405, 414, and 430 have no proposed changes.

The proposed recommendations for City of Newport News will result in an additional annual need of $2,132,000 in operating funds. Ridership is expected to increase by 21 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
107	Alignment Change/Discontinue Segment	2019
111	Alignment Change/Discontinue Segment	2019
114	Alignment Change/Discontinue Segment	2019
116	Alignment Change	2019
119	Discontinue Route	2019
121	Adjust Schedule	2019
64	Adjust Schedule	2020
105	Alignment Change/Discontinue Segment	2020
110	Alignment Change/Discontinue Segment	2020
415	Discontinue Route	2020
Identified Unfunded Need		
116	Improve Level of Service	2023
101	Improve Level of Service	2026
106	Improve Level of Service	2026
107	Improve Level of Service	2026
112	Improve Level of Service	2026
114	Improve Level of Service	2026



Newport News Fully Implemented System

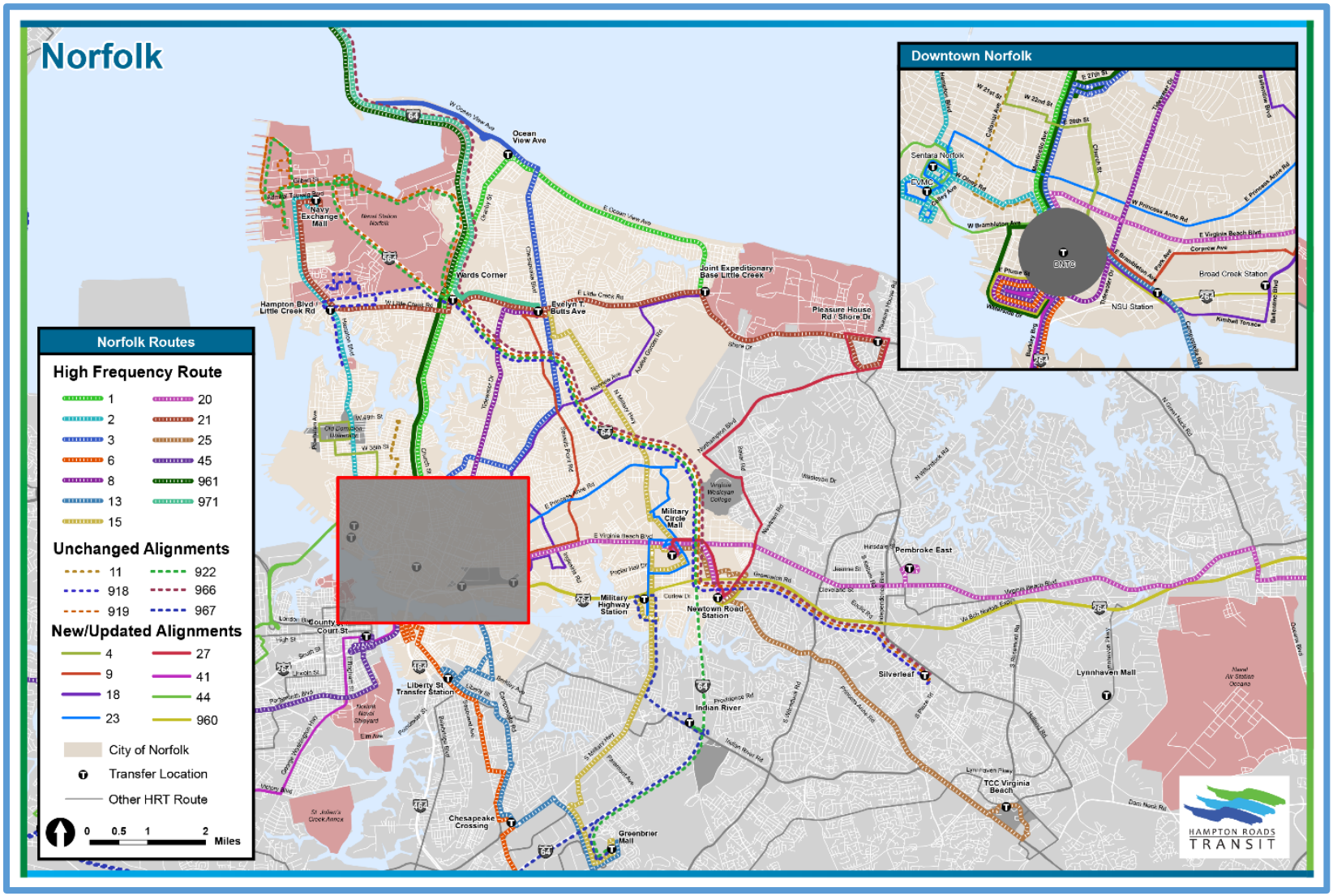
Norfolk

For the 19 local routes that operate in the City of Norfolk approximately 36 different recommendations were made to improve and enhance the Norfolk service. For ten of the recommendations funding was identified, while 26 recommendations remain unfunded needs. Twelve of the Norfolk unconstrained recommendations make up part of the HFTN.

Within the City of Norfolk, the proposed recommendations will result in an additional annual need of $9,617,000 in operating funds. Ridership is expected to increase by 18 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
4	Discontinue Segment/Reduce Level of Service	2019
9	Discontinue Segment/Reduce Level of Service	2019
11	Reduce Level of Service	2019
44	Improve Level of Service	2019
23	Alignment Change	2020
44	Alignment Change	2020
1	Alignment Change/Discontinue Segment	2021
3	Alignment Change/Discontinue Segment/Reduce Level of Service	2021
5	Discontinue Bus Route	2021
21	Alignment Change	2021

Route	Description	Implementation Year
Identified Unfunded Need		
12	Alignment Change/Discontinue Segment	2022
13	Discontinue Segment	2022
41	Alignment Change/Discontinue Segment/Improve Level of Service	2022
44	Alignment Change	2022
45	Alignment Change/Discontinue Segment/Reduce Level of Service	2022
6	Alignment Change	2023
13	Alignment Change	2023
15	Alignment Change/Discontinue Segment	2023
18	Alignment Change/Discontinue Segment/Reduce Level of Service	2023
13	Improve Level of Service	2024
21	Improve Level of Service	2024
25	Improve Level of Service	2024
12	Improve Level of Service	2025
27	Alignment Change/Reduce Level of Service	2025
1	Improve Level of Service	2027
2	Improve Level of Service	2027
3	Improve Level of Service	2027
6	Improve Level of Service	2027
6	Improve Level of Service	2027
8	Improve Level of Service	2027
13	Improve Level of Service	2027
15	Improve Level of Service	2027
20	Improve Level of Service	2027
21	Improve Level of Service	2027
25	Improve Level of Service	2027
45	Improve Level of Service	2027



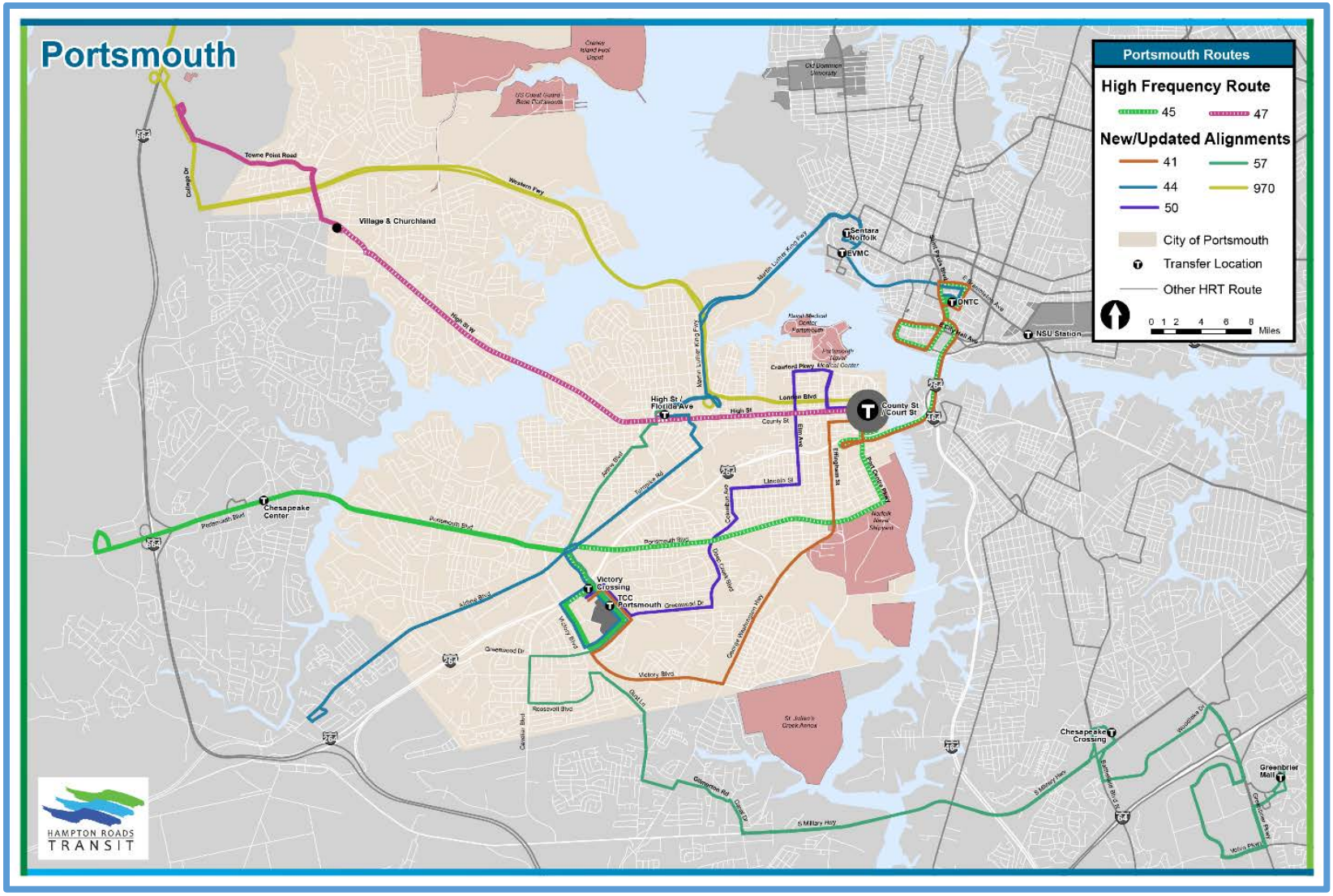
Norfolk Fully Implemented System

Portsmouth

The route recommendations for the City of Portsmouth local bus focus on adding Sunday service on many routes as well as creating a more efficient network throughout Portsmouth. Of the six local routes that operate in the City of Portsmouth, there are six constrained recommendations and six unfunded recommendations. One recommendation is part of the HFTN.

The proposed recommendations for the City of Portsmouth will result in an additional annual need of $3,010,000 in operating funds. Ridership is expected to increase by 10 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
44	Improve Level of Service	2019
50	Improve Level of Service	2019
44	Alignment Change	2020
43	Discontinue Bus Route	2021
50	Alignment Change/Discontinue Segment	2021
57	Alignment Change	2021
Identified Unfunded Need		
41	Alignment Change/Discontinue Segment/Improve Level of Service	2022
44	Alignment Change	2022
45	Alignment Change/Discontinue Segment/Reduce Level of Service	2022
57	Alignment Change/Discontinue Segment	2022
47	Improve Level of Service	2024
45	Improve Level of Service	2027



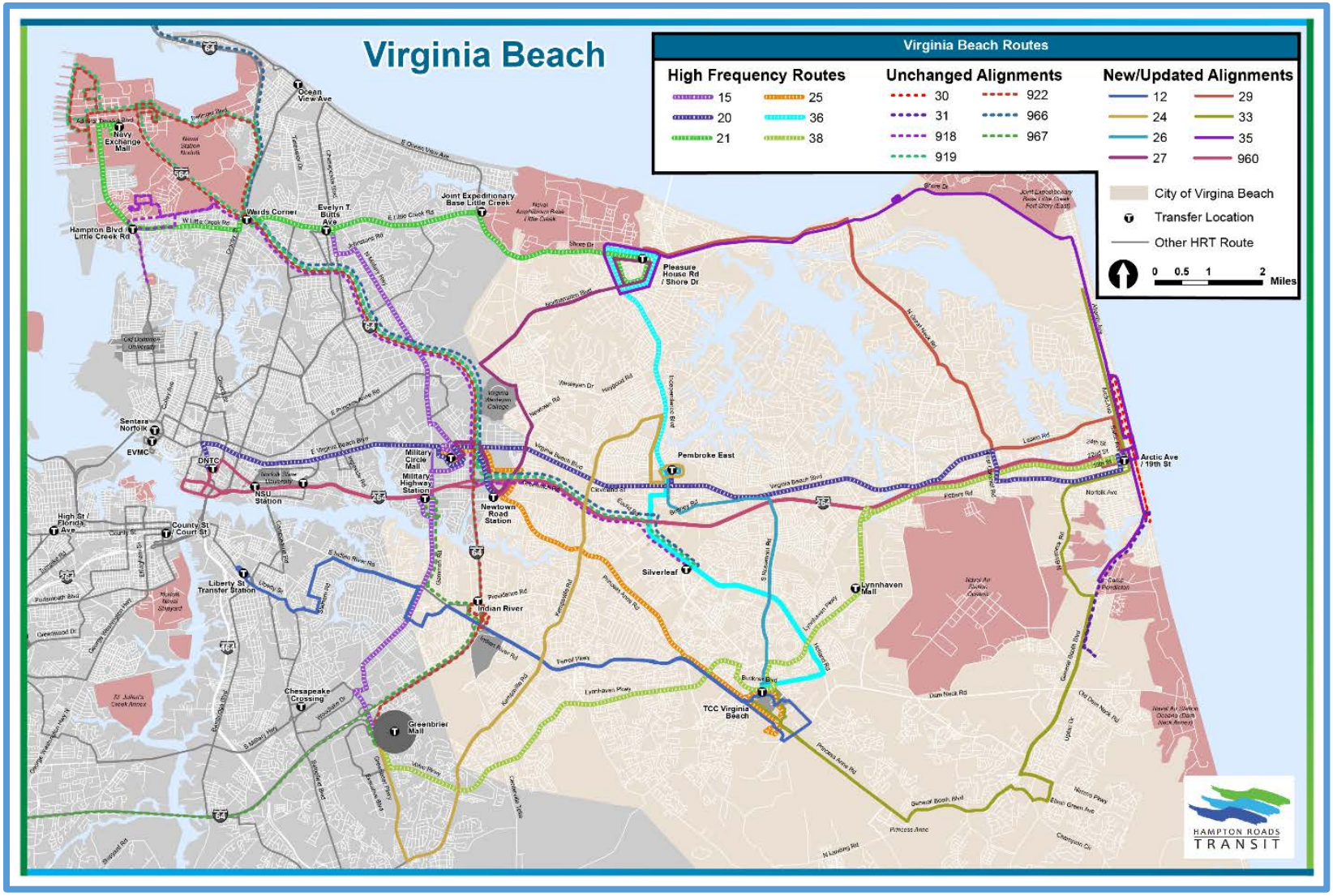
Portsmouth Fully Implemented System

Virginia Beach

There were 26 recommendations to improve local service within the City of Virginia Beach, including two new routes that will provide new connections throughout Virginia Beach. Seven routes are financially constrained and 19 recommendations remain unfunded. Seven of the recommendations make up part of the HFTN. Routes 30 and 31 had no proposed changes.

Within Virginia Beach, the proposed recommendations will result in an additional annual need of $11,486,000 in operating funds. Ridership is expected to increase by 31 percent on the routes with proposed changes.

Route	Description	Implementation Year
Constrained Recommendations		
25	Alignment Change	2018
24	New Route	2020
35	Alignment Change/	2020
1	Alignment Change/Discontinue Segment	2021
21	Alignment Change	2021
22	Discontinue Route	2021
36	Alignment Change	2021
Identified Unfunded Need		
12	Alignment Change/Discontinue Segment	2022
26	Alignment Change/Reduce Level of Service	2022
29	Alignment Change/Discontinue Segment	2022
38	New Route	2022
15	Alignment Change/Discontinue Segment	2023
33	Alignment Change/Discontinue Segment	2023
35	Alignment Change/Improve Level of Service	2023
21	Improve Level of Service	2024
25	Improve Level of Service	2024
12	Improve Level of Service	2025
27	Alignment Change/Reduce Level of Service	2025
33	Improve Level of Service	2025
1	Improve Level of Service	2027
15	Improve Level of Service	2027
20	Improve Level of Service	2027
21	Improve Level of Service	2027
25	Improve Level of Service	2027
36	Improve Level of Service	2027
38	Improve Level of Service	2027



Virginia Beach Fully Implemented System

Metro Area Express

Four recommendations were identified for Max commuter service. Two recommendations are financially constrained and make the service more efficient with the elimination of a route and the elimination of service to Silverleaf Park and Ride. The unfunded recommendations introduce new service that will make the service more effective and regional.

Route	Description	Implementation Year
Constrained Recommendations		
960	Discontinue Segment	2018
965	Discontinue Route	2018
Identified Unfunded Need		
970	New Max Route	2022
971	New Max Route	2027

Paratransit

The paratransit service area, defined as a 3/4-mile radius of any fixed route, will be adjusted to accommodate any new routes, extensions into new service areas by the existing fixed route service, or the expansion of the span of service in any area. Upon full implementation of the proposed service plan it is estimated that paratransit revenue hours will increase by 0.7 percent as a result of a small increase to the service area.

CONSTRAINED FINANCIAL PLAN

Operations

HRT faces a number of funding challenges that limit the agency's ability to realize all the recommendations in this TDP without additional sources of revenue. Due to constraints at the state and federal level, the agency expects operating revenue to grow slower than operating costs. This operating revenue trend poses a challenge for the agency to simply maintain existing service levels, let alone implement any expansion of services. HRT is working internally to contain operating costs and intends to present a balanced budget next fiscal year, but over the long-term the agency will require additional operating support to fill the gap caused by revenue not keeping pace with inflation.

10-Year Projection of Baseline Operating Costs ($1,000s)

Operating Expenses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Bus	75,086	77,086	79,081	81,142	83,270	85,471	88,035	90,676	93,396
LRT	11,685	11,998	12,322	12,657	13,004	13,363	13,764	14,177	14,602
Paratransit	16,586	17,368	18,190	19,308	20,516	21,798	22,451	23,125	23,819
Ferry	1,571	1,600	1,630	1,661	1,692	1,724	1,776	1,829	1,884
Expenses Total	**104,928**	**108,053**	**111,224**	**114,768**	**118,483**	**122,355**	**126,026**	**129,807**	**133,701**

10-Year Projection of Baseline Revenue ($1,000s)

Operating Revenue	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Farebox	16,071	16,245	16,759	16,951	17,145	17,342	17,862	18,398	18,950
Federal Funds	15,715	16,132	17,416	17,860	18,318	18,791	19,355	19,935	20,533
State Funds	19,222	19,226	19,485	18,425	18,689	18,884	19,450	20,034	20,635
Non-Operating Revenues	5,037	5,078	5,120	5,162	5,193	5,187	5,343	5,503	5,668
Local Funds	45,363	46,498	47,660	48,851	50,073	51,325	52,864	54,450	56,084
Identified Revenue Total	**101,409**	**103,178**	**106,440**	**107,250**	**109,418**	**111,528**	**114,874**	**118,321**	**121,870**
Unidentified Funding	**3,519**	**4,875**	**4,784**	**7,518**	**9,065**	**10,827**	**11,151**	**11,486**	**11,831**

The financial plan presents a constrained operating budget that outline what recommendations the agency can expect to achieve based on its forecasts of operating revenue and costs. The constrained operating budget can only support TDP recommendations to be implemented in FY2021 or earlier. These recommendations are largely cost neutral or tied to specific sources of local operating support.

10-Year Operating Costs Associated with Fiscally Constrained Service Recommendations ($1,000s)

Recommendations – Operating Expenses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Bus	-364	2,418	2,958	3,035	3,114	3,195	3,368	3,573	3,680
LRT	0	0	0	0	0	0	0	0	0
Paratransit	11	141	0	0	0	0	0	0	0
Ferry	0	0	0	0	0	0	0	0	0
Total	**-353**	**2,559**	**2,958**	**3,035**	**3,114**	**3,195**	**3,368**	**3,573**	**3,680**

10-Year Operating Revenue Associated with Fiscally Constrained Service Recommendations ($1,000s)

Recommendations - Revenues	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Farebox	-54	385	446	448	451	453	477	506	522
State Operating Assistance	-65	469	542	556	570	585	617	655	674
Federal Operating Assistance	0	0	0	0	0	0	0	0	0
Local Contributions	0	1,866	1,970	2,031	2,093	2,157	2,274	2,412	2,485
Total	**-119**	**2,720**	**2,958**	**3,035**	**3,114**	**3,195**	**3,368**	**3,573**	**3,680**

Capital

The TDP has identified $354 million in capital funding needs over the next ten years. These needs include both the $265 million in capital needs identified in the agency's six-year Capital Improvement Plan, plus additional capital needs to expand and support the agency's fleet. HRT's six-year capital budget projection identified $134 million in capital revenue from FY19 to FY2024. This funding would be used to address HRT's most critical needs, most notably maintaining the bus fleet in a state of good repair, but would be unable to implement any major expansion of the bus fleet or operating facilities.

Capital Revenues by Source and Year ($1,000s)

New Capital Revenue	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Federal Formula Funds	6,755	6,854	6,173	7,161	6,295	6,475
Local Funding (ACC)	4,100	2,412	2,427	2,573	2,500	2,500
RSTP/CMAQ	6,646	8,622	10,871	5,781	1,922	9,773
State Funding	12,803	7,794	2,707	4,172	3,893	1,382
Other	750	0	0	0	446	0
Total	**31,054**	**25,681**	**22,177**	**19,688**	**15,057**	**20,130**

Fiscally Constrained Capital Expenditure by Type ($1,000s)

New Capital Uses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Vehicles	23,502	19,214	16,734	14,296	10,314	14,893
Facilities	0	2,742	0	612	1,542	2,881
Technology	4,208	1,782	3,861	2,439	3,201	2,356
Safety Security	1,782	1,399	1,425	1,674	0	0
Other	1,563	544	157	667	0	0
Total	**31,054**	**25,681**	**22,177**	**19,688**	**15,057**	**20,130**

UNCONSTRAINED RECOMMENDATION COSTS

Implementing all the service recommendations in the TDP will require major increases in operating funding, along with capital investments in new buses and facilities.

Operating Costs

By FY2027, the operating cost of all service recommendations will total $44.2 million and account for just under a third of agency's operating budget in that year. Of this $44.2 million, $40.5 million is for the recommendations outlined as *"Identified Unfunded Needs"* in the sections above.

Capital Improvements

Rolling Stock

Upon full implementation of the TDP's service recommendations HRT's bus fleet would increase by 106 vehicles (including spares), of which 100 are part of the *"Identified Unfunded Needs."* The cost to purchase and maintain these additional 100 vehicles in a state of good repair is $54 million over the 10-year plan.

Transit Facilities

In order to support the 106 additional buses required for the TDP service recommendations, an investment in a replacement bus maintenance facility for the Parks Avenue garage must be made. This investment would cost, at a minimum, $25 million to accommodate the additional vehicles. The facility at full build-out is estimated to cost $65 million in FY2024.

(Page Intentionally Left Blank)

1 Overview of Hampton Roads Transit

1.1 HISTORY

Hampton Roads Transit (HRT) serves a 431-square mile area within the Hampton Roads Region. HRT consists of six-member jurisdictions: Newport News, Hampton, Norfolk, Virginia Beach, Portsmouth, and Chesapeake. The population of the six jurisdictions combined is approximately 1.34 million[2]; the 2040 projected population for the six jurisdictions is 1.49 million, an 11 percent increase over a 25-year period. Out of the six-member jurisdictions, Chesapeake is projected to see the largest population increase, 36 percent.[3] The average population density of the six cities is approximately 3,100 persons per square mile; however, there is a wide range of population densities in the service area, from over 22,000 persons per square mile in part of Downtown Norfolk to less than 20 persons per square in Chesapeake, near the Great Dismal Swamp National Wildlife Refuge.

The service area is largely split in two, by the James River. The *Southside* of the James River consists of Chesapeake, Portsmouth, Norfolk, and Virginia Beach and the *Peninsula* between the James River, York River and Chesapeake Bay, is made up of Hampton and Newport News.

All six jurisdictions in the service area are home to United States military installations, including: Naval Station Norfolk, Joint Expeditionary Base Little Creek – Fort Story, Naval Air Station Oceana, Fort Eustis, and the Langley Airforce Base; there are approximately 150,000 active duty and civilian personnel in the region, and Norfolk is home to the world's largest naval base. Department of Defense (DOD) spending accounts for almost half of all regional economic activity.[4]

Originally, two transit systems developed separately on the Southside and Peninsula, Tidewater Regional Transit and Pentran, respectively. Electric trolleys operated in both areas before the turn of the 20th century, and were gradually replaced by buses between the 1920s and 1940s. Paratransit service began in both regions between 1979-1980, and ferry service between Norfolk and Portsmouth – operated by Tidewater Regional Transit - was established in 1983. Late night bus service began on the Peninsula in 1991.

Tidewater Regional Transit and Pentran merged in 1999 to create the Transportation District Commission of Hampton Roads (TDCHR), which operates HRT. In 2008, HRT began an eight-route express bus service linking all six (then) current jurisdictions; in 2011, HRT completed and opened Virginia's first light rail line, the Tide, which provides service through Downtown Norfolk to the border of Virginia Beach. HRT currently operates 70 fixed-bus routes, including three seasonal routes serving tourists in Virginia Beach.

The City of Suffolk, located on the Southside, was initially part of the TDCHR. HRT began service in the City of Suffolk in 2009. The City of Suffolk withdrew from the TDCHR in December 2011, and the change was effective in January 2012. The City of Suffolk now contracts with Virginia Regional Transit to operate Suffolk Transit.[5]

---

[2] ACS 2011-2015 5-year estimates

[3] HRTPO, "Hampton Roads 2040 Socioeconomic Forecast" Accessed at http://hrtpo.org/uploads/docs/HR_2040_SocioeconomicForecast_TAZAllocation_FinalReport.pdf

[4] Hampton Roads Chamber of Commerce, "Our Military." Accessed at http://www.hamptonroadschamber.com/page/our-military/

[5] Suffolk Transit, Access at http://www.suffolkva.us/pub_wks/transit/

1.2 GOVERNANCE STRUCTURE

The Transportation District Commission of Hampton Roads (TDCHR), which operates Hampton Roads Transit (HRT) was established in accordance with Chapter 45 of Title 15.2 of the Code of Virginia ("The Transportation District Act of 1964"), as well as ordinances adopted by the city governments in its service area. The Commission meets every month, alternating locations between Norfolk (Southside) and Hampton (Peninsula).[6]

1.2.1 Funding

TDHCR is divided into two divisions for the allocation of operating revenue and costs: the Southside Division (Chesapeake, Norfolk, Portsmouth, and Virginia Beach) and the Peninsula Division (Hampton and Newport News).

HRT has no dedicated revenue source; funding for service is provided by federal, state, and local subsidies, as well as passenger revenues. Local funding is provided based on a Cost Allocation Agreement, where service allocation in each independent city is based on the subsidy it provides after all federal, state, and farebox revenues are applied.[7]

TDCHR Members

The TDCHR has 13 members; each of the six HRT member jurisdictions appoints a member of their governing body (or the City Manager), who serves at the pleasure of the city government. The Governor of Virginia appoints one citizen Commissioner from each jurisdiction. The Chairperson of Virginia's Commonwealth Transportation Board, or a designee, is also an ex-officio member with voting privileges, **Table 1-1** details the existing TDCHR officers. Each TDCHR officer is elected at the annual meeting of the Commission to a four year term.

Table 1-1 | TDCHR Officers[8]

Location	Officer	Term Expires
Virginia Beach	Hon. James L. Wood ***(Chair)***	City Council Appointed
	Comm. Amelia Ross-Hammond	June 30, 2020
Newport News	Hon. Patricia P. Woodbury ***(V. Chair)***	City Council Appointed
	Comm. Robert "Rob" Coleman	June 30, 2020
Hampton	Hon. Will J. Moffett	City Council Appointed
	Comm. Gaylene Kanoyton	June 30, 2020
Portsmouth	Hon. John L. Rowe	City Council Appointed
	Comm. Charles B. Hunter	June 30, 2018
Chesapeake	Hon. Richard W. "Rick" West	City Council Appointed
	Comm. Douglas W. Fuller	June 30, 2018
Norfolk	Hon. Paul R. Riddick	City Council Appointed
	Comm. Keith Parnell	June 30, 2020
CTB	Jennifer Mitchell	Appointed

TDCHR Staff

Commission staff provide administrative and clerical support to the Commission, and help HRT leadership achieve the goals and objectives of the Commission. Commission staff includes the President and Chief Executive Officer, the Commission Secretary, Internal Auditor and the Chief Financial Officer/Commission Treasurer.

1.2.2 Advisory Committees

Transit Riders Advisory Subcommittee

The Transit Riders Advisory Subcommittee (TRAC) is a subcommittee to the TDCHR Executive Committee. The

[6] http://gohrt.com/about/governing-board/
[7] TDCHR Cost Allocation Agreement
[8] Transportation District Commission of Hampton Roads, Accessed at http://gohrt.com/about/governing-board/transportation-district-commission-of-hampton-roads/

TRAC may have up to 14 members, including residents from each city in the service area; these residents aree HRT customers. TRAC's function is to:

- Provide HRT administration with input and information on issues affecting HRT customers.
- Suggest ideas for improving operations and services.
- Provide input into HRT's customer outreach activities.
- Share information with HRT customers and the community at large about HRT services and avenues for providing input concerning service improvements.

Paratransit Advisory Subcommittee

The Paratransit Advisory Subcommittee (PAC) is a subcommittee to the TDCHR Executive Committee. The PAC may have up to 21 members; of those, up to 14 may be "user members", and up to seven may be service provider agency representatives. The PAC's function is to:

- Advise the Commission on implementation of HRT's Unified Service Plan & Policy for Complementary Paratransit Services Under the Americans with Disabilities Act.
- Advise the Commission on compliance issues relative to the Plan.
- Share information with HRT customers and community-at-large about HRT's paratransit services.
- Share information with HRT staff and the Commission regarding paratransit customer needs.
- Provide input to the staff and the Commission on quality of service issues relative to paratransit services provided.[9]

1.3 ORGANIZATIONAL STRUCTURE

1.3.1 Organization

The President and CEO of HRT, Internal Auditor, and General Counsel report to the TDCHR. The following HRT officers report to the President, Internal Auditor, and General Council:

- Assistant to the President for Organizational Development
- Chief Transit Operations Officer
- Director of Marketing & Communications
- Chief Financial Officer
- Chief Planning and Development Officer
- Chief Technology Officer
- Chief Safety & Security Officer
- Chief Engineering & Facilities Officer
- Chief Human Resources Officer
- Corporate Council

[9] Bylaws of the Transportation District Commission of Hampton Roads, Accessed at http://gohrt.com/wp-content/uploads/2016/01/revised-bylaws.pdf

Table 1-2 provides an overview of these officers, and associated departmental responsibilities and **Figure 1-** illustrates the organizational structure.

Table 1-2 | HRT Executive Team and Departments

Department	Title	Staff	Department Responsibility
Executive Department	President and CEO	William Harrell	Responsible for oversight of all functional areas within Hampton Roads Transit. This includes leadership and unity of effort to achieve the vision and mission of the agency, as well as: • **Internal Audit:** Provides assurances on HRT's governance, risk management and control processes to help the organization achieve its strategic operational and financial and compliance objectives. • **Government Relations:** Facilitates the development and implementation of the legislative and policy agenda of the Commission. • **Records Management:** Maintenance of all policies, agreements, transactions, and official correspondence of Hampton Roads Transit.
	Internal Auditor	Margaret Denencourt	
	Asst. for Org. Advancement	Brian Smith	
	TDCHR Secretary	Luis Ramos	
Technology	Chief Technology Officer	Alesia Cain	• **Support Services:** Management and administration of the entire Technology Division and for all Technology Project Management, Policy and Contract Management, Training and Support Services. • **Technology Services:** Infrastructure Services, Helpdesk and Desktop Support Services, Telecommunications and Video Surveillance Services • **Enterprise Application Services:** Management of Technology services and Enterprise applications, including systems for dispatching, scheduling, AVL, APC, and associated data feeds. • **Web Development & Database Support Services:** Responsible for all of the Agency's websites (internal and external) and databases, ensuring that they are properly created, maintained and administered. • **PeopleSoft Technical Services:** Provide technical support for users of PeopleSoft Human Resources and Financials applications. • **IT Security Services:** Enhance the security, resilience, and reliability of HRT's cyber and communications infrastructure.
Marketing & Communications	Director of Marketing & Comm.	Gene Cavasos	Works across a range of disciplines to share information about the agency's policies and practices using traditional and web-based platforms. Works to refine and improve the agency's brand while supporting HRT departments with initiatives and programming through public outreach, planning and communication development.
Engineering & Facilities	Chief Engineering and Facilities Officer	Sibyl Pappas	• **Facilities Maintenance & Asset Management:** Provides day to day operational support to all HRT departments, major systems and routine equipment maintenance, surplus property management, and the general upkeep of HRT properties. Also manages all contracts supporting HRT facilities. • **Office of Project Management (OPM):** Oversight of all HRT projects. OPM is also responsible for the selection and management of project designers and contractors, as well as outside consultants. OPM projects include construction of a new Southside Operations Complex, design and construction of both the Hampton Facility Renovation and the Downtown Norfolk Transit Center. • **Environmental Compliance and Sustainability (EMS):** Works with all HRT employees and departments to coordinate EMS procedures and sustainability initiatives to minimize HRT's environmental impacts, energy use, and resource use. Responsible for facilitating HRT's Environmental

Department	Title	Staff	Department Responsibility
			Policy and ensuring HRT's compliance with all federal, state, and local environmental laws and regulations.
Finance Department	Chief Finance Officer	Brandon Singleton	Responsible for developing strategic goals and objectives, assessing and monitoring financial and administrative performance, safeguarding the agency's assets, and ensuring the effective use of financial resources. • **Accounting:** Provide accurate and timely financial accounting and reporting services. Responsible for the post-award financial management and fiscal reporting functions for all Hampton Roads Transit grant awards. Analyze and prepare monthly financial reports and Comprehensive Annual Financial Report. • **Budget & Financial Analysis:** Prepare and submit annual operating budget that supports the agency's goals and objectives. Establish budgetary guidelines, communicates policies, procedures and best business practices and monitors compliance with HRT, federal and state policies. Reports statistical data to FTA, DRPT, and the American Bus Benchmarking Group (ABBG). • **Procurement:** Acquire supplies and professional and construction services in accordance with Virginia law and FTA regulations. Provide support to DBE efforts, helps identify opportunities for cost-savings. • **Revenue Services:** Collects, deposits, and accounts for all farebox revenue, is responsible for fare media purchases, and maintains control over fare media inventory.
Planning and Development Department	Chief Planning and Development Officer	Raymond Amoruso	Direct and support the development and implementation of short and long-range service and system plans and programs for public transportation services and facilities, including HRT's Six Year Capital Improvement Program and Transit Development Plan, as well as the development of the information for High Capacity transit corridors, bus routes, schedules, and the annual Transportation Service Plans for member cities in accordance with the Cost Allocation Agreement. • **Service Planning and Scheduling:** Provides service planning and scheduling for all bus and trolley services and stops/shelters, as well as strategic planning and quality assurance. Develops new routes and schedules, modifies and redesigns routes and schedules to improve the efficiency and effectiveness of HRT's service structure. Maintains the agency database for bus stops and passenger shelters. • **Business Development** • **Fare Media and Advertising Sales:** Works to increase the sale of fare media through partnerships with area businesses. Responsible for all internal and external bus and rail advertising, direct oversight over sales advertising, the GoPass 365 program and fare media sales. • **Traffic Demand Management Program (TDM or TRAFFIX):** TDCHR administers TRAFFIX, the regional TDM program; TRAFFIX program grants are directed through HRT, which oversees the administration of the program.[10] TRAFFIX provides vans, carpools, and telework options for

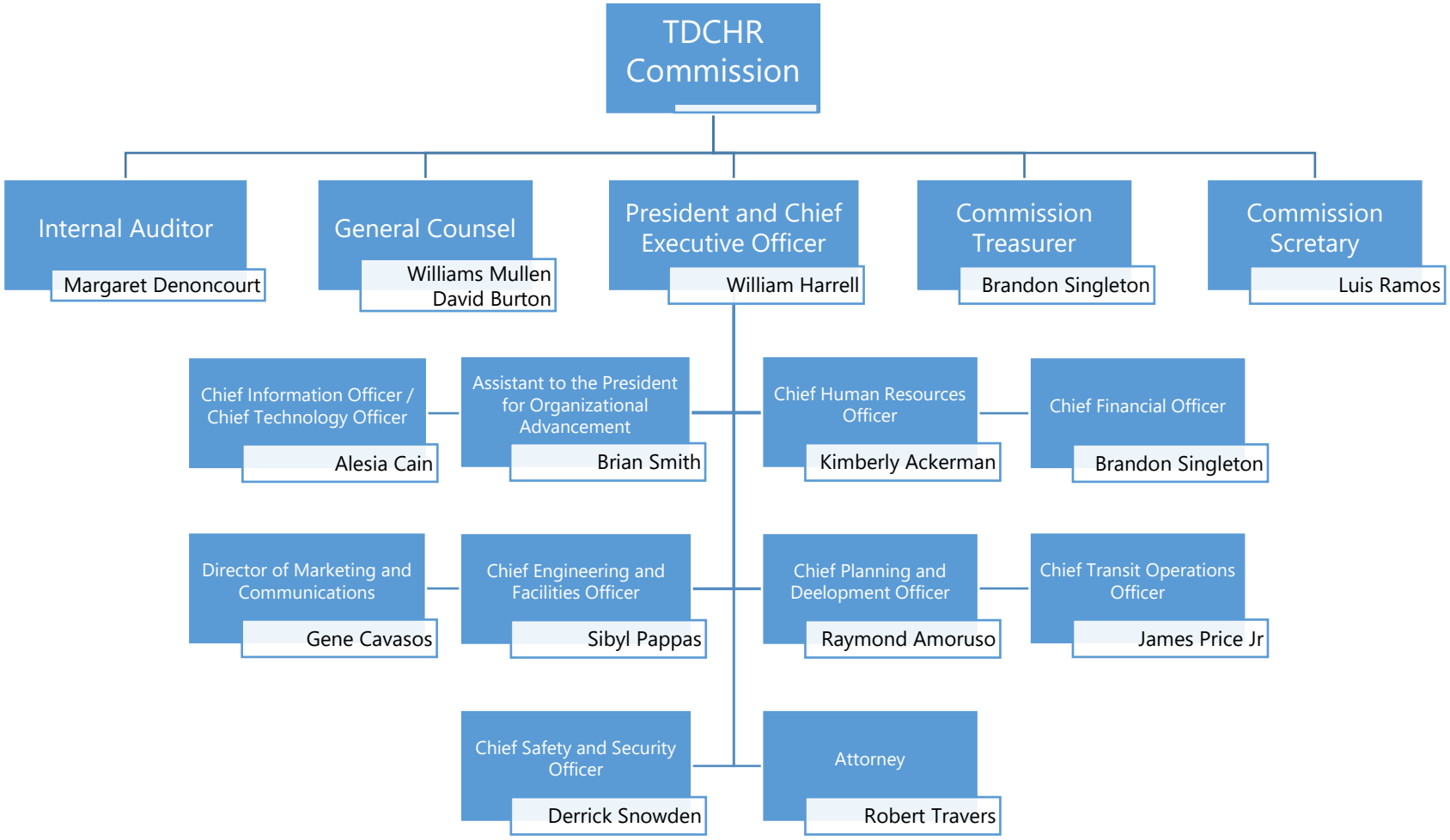
[10] TRAFFIX Long-Range Transportation Demand Management (TDM) Plan, 2010. Accessed at http://www.drpt.virginia.gov/media/1256/traffix-tdm-plan_feb-2010.pdf

Department	Title	Staff	Department Responsibility
			commuters, as well as parking options for those waiting for transit. TRAFFIX staff work closely with DRPT, VDOT, the military, and various local governments to administer programs associated with the development of public transportation alternatives. Develops Park and Rides, negotiates with businesses regarding bus routes that may affect traffic in and around businesses. • **Customer Relations:** Provides customer service via the contact center and the transit centers. The contact center is the central point in which all customer contacts are managed via the telephone, email and web. Information is entered into a formal database called the Customer Assistance System (CAS). The database is used to measure customer perceptions related to Key Performance Indicators. • **Grants Administration and DBE Compliance:** Pre- and post-award grant administration, including the submission of grant applications, amendments, revision, and closeouts. Has a shared responsibility for the development of the capital budget. Responsible for the preparation of requests for federal, state, and local funding, as well as managing the Disadvantaged Businesses Enterprise (DBE) Program. • **Long Range Planning & Transit Development:** Facilitates the planning and management of fixed guideway and High Capacity studies, major capital investment planning as well as transit-oriented development projects. Supports the preparation of requests for federal, state and local funding and manages the planning and environmental assessment for new rail, bus, ferry, and intermodal transportation. Responsible for the development of the six-year Capital Improvement Plan. Develops and implements the HRT Title VI program, including: Title VI service and fare equity analyses, Title VI complaints and agency compliance.
Safety & Security	Interim Chief Safety & Security Officer	Derrick Snowden	• **Safety:** Achieve the highest practical level of safety for all HRT modes of transit, in an effort to protect passengers, employees, revenues, and property. HRT has implemented a proactive, Agency-wide safety program plan supported by the Federal Transit Administration (FTA). • **Security:** Manages security services for HRT facilities, to include all transfer centers, modes, as well as vehicles. Security card access, surveillance camera systems, and key and lock systems for all agency facilities are also overseen by the Security department. Staff works with police departments throughout the Hampton Roads area.
Operations	Chief Transit Operations Officer	James Price	**Bus Maintenance Departments** • **Fleet Maintenance:** Vehicle maintenance services, as well as management of all corporate inventory functions. There are three maintenance facilities; one in Norfolk, one in Hampton and one seasonally operated facility in Virginia Beach. • **Inventory Services:** Responsible for management and operation of two storage and distribution centers, as well as management of all purchase requisitions, delivery schedules, and storage levels of petroleum products, oils, and lubricants. • **Fleet Support Services:** Provides maintenance and support for mobile and portable radios, Advanced Communication System, fare collection, Wi-Fi on buses and digital security camera systems, fare collection units, isolation boxes, Ticket Vending Machines, receivers, bus Wi-Fi systems,

Department	Title	Staff	Department Responsibility
			mobile radios, portable radios, base stations, dispatcher consoles, towers, emergency call boxes and mobile camera systems. Support Services team members are on-call 24 hours a day to respond to service needs.
			Bus Transportation Service Departments • **Transportation Services:** More than 500 bus operators, about 46 supervisors and dispatchers (during seasonal service). • **Bus Training:** Responsible for training all Bus Operators and Bus Supervisors on the operation of bus vehicles and operating rules and procedures. **Rail Maintenance Service Departments** • **Light Rail Vehicle Maintenance:** Preventive and corrective maintenance, which is accomplished by a preventive maintenance program, nightly cleaning and servicing, and from direct feedback received from the operators on corrective maintenance needs. • **Light Rail Inventory:** Ensure material needs for the department are met, including consumable supplies and spare parts for both LRV maintenance and System's maintenance divisions. • **Light Rail Systems:** Responsible for all maintenance along the Light Rail Right of Way and all HRT Operations Facilities equipment. Staffed 24 hours a day, 7 days a week. **Rail Transportation Service Departments** • **Light Rail Transportation Services:** The department consists of 25 light rail operators, 12 controllers/dispatchers, 1 Manager of Rail, and 1 Manager of Training, who is responsible for the development and implementation of all aspects of light rail operations. • **Rail Training:** The Rail Training department is responsible for training all Rail Operators and Rail Controllers on the operation of the rail vehicles and associated operating rules and procedures. **Ferry Services:** HRT contracts with Norfolk-by-Boat to provide ferryboat service on the Elizabeth River between Downtown Norfolk and Olde Town Portsmouth. Ferry service is also provided for special events at Harbor Park Stadium, home to Norfolk's Minor League Baseball team. The fleet consists of three, HRT-owned T-class, 150-passenger ferries that operate with dual control twin diesel engines. **Paratransit Services:** Works side-by-side with HRT fixed route services in a "demand-response" capacity; eligible customers call in advance for the service. A fare is required for each ride. These services are federally mandated by the American with Disabilities Act (ADA) of 1990. Paratransit services operate the same days and hours as the regular service and are limited to the same areas as HRT's fixed route bus service. HRT provides an origin to destination service within ¾ miles of the nearest fixed route service. The fleet dedicated to HRT's Paratransit service is comprised of 76 Agency-owned lift-equipped cutaway passenger vans and 3 Agency owned 15-passenger vans complemented by 29 sedans which are provided by the service contractor. **Support Vehicle Services:** Staff maintains a fleet of 134 non-revenue (or support) vehicles used by HRT employees for company business. The

Department	Title	Staff	Department Responsibility
			department performs all scheduled maintenance and repairs for the support vehicles and is responsible for tracking mileage and drivers and ensuring proper usage of fleet vehicles.
Human Resources	Chief Human Resources Officer	Kimberly Ackerman	HRT has over 1,000 employees who maintain the fleet, operate buses and light rail vehicles, and maintain support services to the organization. Human Resources staff plays an integral role in providing quality customer service to our employees and to our management team while promoting a positive, safe working environment that supports a work/life balance. Human Resources departments include Compensation & Benefits, Recruitment, Risk Management, and Compliance.
Legal	General Counsel	David Burton, Williams Mullen	The Legal Department is comprised of a Corporate Counsel who serves as a member of the Senior Executive Team and is responsible for providing legal advice and services to the President & CEO, other members of the Senior Executive Team, all departments, as well as the Board of Commissioners upon request.
	Corporate Counsel	Robert Travers	

Figure 1-1 | HRT Transportation District Commission of Hampton Roads – Organizational Chart



1.3.2 Contracted Transportation Services

HRT owns its ferry boats, but contracts with Norfolk-by-Boat to provide ferryboat service on the Elizabeth River between Downtown Norfolk and Olde Town Portsmouth, as well as special event services from April-September to Harbor Park Stadium, home to Norfolk's Minor League Baseball team. HRT also contracts with First Transit to provide paratransit call center services, and with MV Transportation to provide paratransit daily operations (**Table 1-3**).

Table 1-3 | HRT Contracted Transportation Services

Service	Contractor	Contract Expiration
Elizabeth River Ferry	Norfolk-by-Boat	June 20, 2018
Paratransit Call Center	First Transit	Jan. 31, 2020
Paratransit Daily Operation	MV Transportation	Jan. 31, 2020

1.3.3 Labor Unions and Contracts

HRT's contract with Amalgamated Transit Union Local 1177 is approved through June 2017 (**Table 1-4**). ATU Local 1177 represents full and part-time operators and permanent full-time hourly maintenance department employees at HRT, excluding clerical employees, guards, professional employees, or supervisors. [11]

Table 1-4 | HRT Labor Unions and Contracts

Union	Contract	Contract Length
Amalgamated Transit Union Local 1177	Agreement between ATU Local 1177 and HRT	July 2014-June 2017

[11] Agreement between ATU Local 1177 and HRT, Contract Term July 1, 2014-June 30, 2017. Accessed at https://gohrt.com/public-records/Commission-Documents/Governance/Collective-Bargaining-Agreement.pdf

1.4 TRANSIT SERVICES PROVIDED AND AREAS SERVED

1.4.1 Hampton Roads Transit

HRT provides the following service:

- Local, limited stop, regional express and seasonal bus
- Demand response paratransit
- Passenger ferry
- Light rail
- Transportation demand management vanpools

Table 1-5 details the total vehicles operated in maximum service for each mode in FY 2016. (See *Chapter 3 – Services and System Evaluation* – for more details on service).

Table 1-5 | Vehicles Operated in Maximum Service, FY 2016

Mode	Number of Vehicles
Bus	236
Demand Response	98
Ferry Boat	3
Light Rail	6
Vanpool	26

Local Bus Service

HRT operates 54 local bus fixed-routes, 33 routes on the Southside and 21 routes on the Peninsula. Fixed-route buses are equipped with bicycle racks and have low floors, ramps, or wheelchair lifts to assist the elderly and passengers with disabilities. Weekday service runs between 4:39 AM and 1:42 AM.

Peninsula Commuter Service

HRT's Peninsula Commuter Service (PCS) is a five route, limited stop bus service that provides service to major

employers on the Peninsula, including the Huntington Ingalls shipyard in Newport News. PCS routes offer commuter service with only one or two trips per day, designed to coincide with shift change times of major employers.

Metro Area Express Service

HRT's Metro Area Express (MAX) is an eight route regional express bus service traveling between Hampton/Newport News and Norfolk/Virginia Beach, mostly along interstates. The routes are designed for commuters; MAX service is limited stop, and operates on coach buses with free Wi-Fi. Some MAX routes operate throughout the day; others are designed for commuter service, only operating during peak periods.

Virginia Beach (VB) Wave

The VB Wave is a three-route seasonal service for residents and tourists in the Virginia Beach resort area. VB Wave operates from April to October, from 8:00 AM to 2:00 AM on a combination of 29-ft diesel buses and trolley-style diesel buses.

The Tide Light Rail

HRT opened its first fixed guideway light rail system in August 2011, called "The Tide." The Tide is Virginia's first modern light rail system; it operates on 7.4 miles of track in the City of Norfolk, stopping at eleven stations and connecting downtown Norfolk with the western edge of Virginia Beach. The Tide operates nine light rail vehicles, powered by an overhead electrical system. Each vehicle can carry up to 160 passengers. Nineteen HRT bus routes offer direct connections to six Tide stations, and four Tide stations have a combination of almost 800 free parking spaces. In November 2016, a Virginia Beach referendum asked voters if they supported extending the Tide to the Virginia Beach Town Center; 57 percent of voters voted "no," ending staff work on the project.[12]

Passenger Ferry

HRT contracts with Norfolk-by-Boat to provide daily service on the Elizabeth River between Downtown Norfolk and Downtown Portsmouth, using three 150-passenger ferries. Ferry service is also provided to the Harbor Park baseball stadium between April and September.

Demand Response Paratransit

HRT contracts with First Transit and MV Transportation to provide Demand Response paratransit service for persons with disabilities. Paratransit service is offered within ¾ of a mile of any fixed-route bus service during HRT's hours of operation.

1.4.2 Area Served

HRT serves a 431 square mile area within the Hampton Roads Region. HRT consists of six member jurisdictions: Newport News, Hampton, Norfolk, Virginia Beach, Portsmouth, and Chesapeake. The population of the six jurisdictions combined is approximately 1.34 million.

1.4.3 Bicycle

All HRT buses and light rail vehicles are equipped with bike racks. Bicycle amenities at HRT transit stops include bicycle parking, bicycle lockers, on-bus racks, bike share programs, or other infrastructure. The distribution of these amenities may be based on a number of factors, including bicycle ridership, local infrastructure requirements, and connectivity. However, bicycle amenities are not currently required at transit stops – for each type of transit stop, HRT's amenity guidelines note that the bicycle amenities will vary.

Bikeshare

[12] City of Virginia Beach, Light Rail, Referendum Outcome. Accessed at https://www.vbgov.com/residents/transportation/Pages/LightRail.aspx

As of June 2016, the cities of Norfolk and Portsmouth were working on developing a joint bikeshare project, with the goal of having more than 150 bikes across downtowns Norfolk and Portsmouth. At the time, the city of Norfolk said their vision is to have the bikeshare program "be an extension of public transportation, to take people that last mile or few blocks from the bus or ferry and get them to their final destination."[13]

1.4.4 Pedestrian

HRT's guidelines for pedestrian amenities, as found in its Passenger Amenity Policy, are classified by level of transit stop. However, all HRT bus transit stops are required to have an ADA-accessible alighting pad, cover ADA accessibility, a minimum sidewalk width of five feet, and basic signage.[14]

1.4.5 ADA Requirements

HRT provides Demand Response paratransit service for persons with disabilities. Paratransit service is offered to origins and destinations within ¾ of a mile of any route during HRT's hours of operation. All paratransit riders must be certified through an eligibility application process.[15]

All HRT transit services are wheelchair accessible. HRT's Bus Stop Location Policy[16] also includes ADA design requirements for passenger boarding areas and bus stop sites.

The HRT Paratransit Advisory Committee (PAC) is a subcommittee under the Transportation District Commission of Hampton Roads (TDCHR) Executive Committee. The PAC provides a communication link between the TDCHR, persons with disabilities who use or may use HRT services, and service providers to the disabled community on matters related to paratransit service within HRT's service area.

1.4.6 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 plan updates. 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. Summaries of these policies can be found in *Chapter 3.6.1 – Member Cities Land Use Plans*.

1.4.7 Bus Stop and Shelter Placement Guidelines

Bus Stop Location Guidelines

When establishing new bus stops or relocating existing bus stops, HRT coordinates with local jurisdictions to locate and identify mutually acceptable locations. Local jurisdictions make the final decisions about bus stop placement or relocation.

HRT considers many elements when locating a bus stop:

- Stops should be placed based on population density and/or major passenger generators i.e. major employment centers, regional shopping centers, hospitals, etc.);
- Distance between bus stops should be a minimum of 1,056 feet (1/5 of a mile) and a maximum of 1,320 feet (1/4 mile) apart or 3-4 blocks apart;
- Presence of sidewalks, marked crosswalks, and curb ramps;

[13] WTKR, "Norfolk and Portsmouth hoping to ride toward bike-sharing program together." Accessed at http://wtkr.com/2016/06/15/norfolk-and-portsmouth-hoping-to-ride-toward-bike-sharing-program-together/

[14] HRT Passenger Amenity Policy (7-8-16)

[15] HRT Paratransit, Accessed at http://gohrt.com/services/paratransit/

[16] HRT Bus Stop Location Policy (5-10-16)

- Protected crossings at signalized intersections;
- Connection to nearby pedestrian circulation system;
- Access for elderly and people with disabilities;
- Convenient passenger transfers to other routes; and
- Effect on adjacent property owners.

Further bus stop guidelines – including bus operations, traffic and rider safety, placement at intersections, passenger boarding area, bus stop access, and ADA requirements – can be found in HRT's Bus Stop Location Policy (5/10/2016).

Shelters

HRT's Passenger Amenity Guidelines classify different types of transit stops by level of use, and identify the appropriate amenities for each stop type, including bus stop shelters (**Table 1-6**). Bus shelters are typically placed at stops with at 25 or more average daily boardings. Due to funding constraints, priority may be given to stops with 40 or more average daily boardings. Shelters are required to be ADA accessible, and include an interior bench and nearby trash can.

Table 1-6 | HRT Shelter Placement Guidelines[17]

Stop Type	Average Daily Boardings	Bench, Trash Can	Shelter
Basic	0-24	N	N
Enhanced	25-39	Y	N
Sheltered	25+ Priority 40+	Y	Y
Transfer Center	5-9 routes	Y	Y
Transit Center	10+ routes	Y	Y
Fixed Guideway	TIDE, Ferry	Y	Y

1.4.8 TDM Program (TRAFFIX)

Overview

TRAFFIX was established in 1995 as Hampton Roads' regional Transportation Demand Management (TDM) agency. TDM, also called demand management, has traditionally focused on commuter ridesharing, air quality mitigation, reduced trip generation or parking needs, and increasing multi-modal options in transportation plans. However, the U.S. Department of Transportation has updated the definition of TDM to focus on traveler choices:

> *"Managing demand is about providing travelers, regardless of whether they drive alone, with travel choices, such as work location, route, time of travel and mode. In the broadest sense, demand management is defined as providing travelers with effective choices to improve travel reliability."*[18]

TRAFFIX receives funding from Virginia's Department of Rail and Public Transportation (DRPT). The TDCHR administers TRAFFIX, but program grants are directed through HRT, which oversees the administration of the program.[19] TRAFFIX provides and facilitates access to vanpools, carpools, and telework options for commuters, as well as parking options for those waiting for transit. TRAFFIX staff also work to develop Park and Rides and negotiate with businesses regarding bus routes that may affect traffic in and around businesses.

[17] HRT Passenger Amenity Policy (7/8/2016)
[18] U.S. Department of Transportation Federal Highway Administration, "Transportation Demand Management." Accessed at http://www.ops.fhwa.dot.gov/plan4ops/trans_demand.htm
[19] TRAFFIX Long-Range Transportation Demand Management (TDM) Plan, 2010. Accessed at http://www.drpt.virginia.gov/media/1256/traffix-tdm-plan_feb-2010.pdf

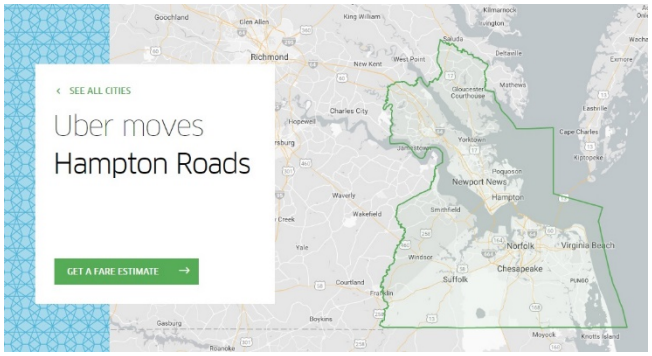
TRAFFIX Program

- **Vanpools/Carpools:** TRAFFIX provides and facilitates access to vanpools, carpools, and telework options for commuters; in FY 2015, 278 commuters participated in Enterprise Rideshare or v-Ride vanpools via the TRAFFIX program.[20]
- **Employer Services and Telework:** TRAFFIX TDM Programs include NuRide, an employer-based online incentive program that offers financial rewards to promote non-SOV travel options). In FY 2015, 403,740 non-SOV trips were recorded in NuRide, including carpooling, vanpooling, biking, walking, telecommuting, and taking public transportation.
- **Telework:** Telework!Va is a program administered through the Virginia's DRPT. Telework!Va provides resources for employers to start or expand a formal telework program.[21] In FY 2015, four companies in the region participated in this program.
- **Guaranteed Ride Home:** Provides transit or active transportation commuters with a reliable ride home if an unexpected emergency occurs after they arrive at work. Commuters can use this program up to two times or month, or six times a year. In FY 2015, 259 rides were given under this program.[22]
- **GoPass365 Program:** GoPass365 is a discounted bus pass that allows users unlimited usage of HRT's services (light rail, bus, ferry, VB Wave and MAX) by showing a GoPass365 and photo ID. The passes are purchased by colleges, employers and other businesses to provide a transit incentive or benefit to students or employees. In FY 2014, the top three GoPass365 clients were Tidewater Community College (1,675 passes), Portfolio Recovery Associates (1,300 passes), and Newport News Shipbuilding (1,250 passes).[23]
- **Military Benefits:** To reduce the number of commuters driving alone to military installations, the U.S. Navy, Marines and Air Force offer a Transportation Incentive Program (TIP) to their members, and the U.S. Army offers a Mass Transportation Benefit Program (MTBP). These transportation benefits are issued as debit cards, which can be used at HRT ticket vending machines or customer service centers.

1.4.9 Transportation Network Companies (TNCs)

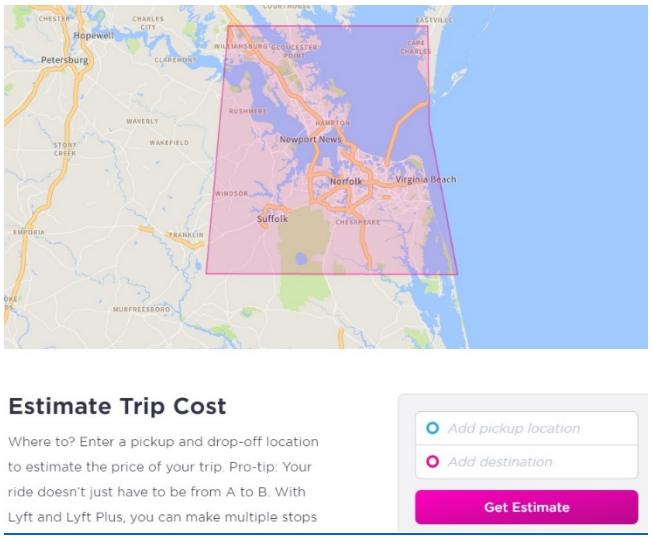
Ride hailing services Uber and Lyft are available across the entire HRT service area, **Figure 1-2** and **Figure 1-3**, respectively. Both services offer on-demand services in mid-size or larger vehicles; ride-pooling services (such as uberPOOL or Lyft Line) are not available in the region.

Figure 1-2 | Uber Service in HRT Service Area



[20] 2015 TRAFFIX Annual Report, Accessed at http://hrtpo.org/uploads/docs/P14-TRAFFIX_FY_2015_Annual_Report.pdf
[21] Telework!Va, Accessed at http://www.teleworkva.org/
[22] Ibid.
[23] 2015 TRAFFIX Annual Report, Accessed at http://hrtpo.org/uploads/docs/P14-TRAFFIX_FY_2015_Annual_Report.pdf

Figure 1-3 | Lyft Service in HRT Service Area



1.4.10 Taxi

Hampton Roads does not have a taxicab commission. For hire vehicles, including taxis, are governed by each city's local ordinances. Some cities (e.g., Norfolk) allow its City Manager or a Board to create additional regulations for taxis.

Hampton Roads Transportation, Inc., provides a regional taxi dispatch service in the HRT service area. Taxis in the service (**Table 1-7**) can be booked through phone, desktop website, or the smartphone app App-a-Cab.[24] A full list of taxicabs authorized to operate in the Hampton Roads service area can be found on the Virginia Department of Motor Vehicles website.[25]

Table 1-7 | HRT Regional Taxi Services

Service	Location
Black and White Cabs	Norfolk
Black and White Cabs	Virginia Beach
Norfolk Checker Taxi	Norfolk
Yellow Cab of Norfolk	Norfolk
Yellow Cab of Hampton	Hampton
Yellow Cab of Newport News	Newport News
Hampton Roads Transportation, Inc.	Regional Taxi Dispatch/Aggregation

1.4.11 Transportation for Seniors

Seniors over the age of 65 qualify to ride HRT fixed-route service for half fare. Paratransit customers using fixed route services can present valid forms of identification to receive free service on HRT's bus, light rail and ferry service. Several other organizations in the HRT service area offer senior transportation, including those listed in **Table 1-8**.

Table 1-8 | Senior Transportation HRT Service Area

Organization	HRT Service Area	Service Name
Senior Services of Southeastern Virginia	Chesapeake, Norfolk, Portsmouth, Virginia Beach	I-Ride Transit
Peninsula Agency on Aging, Inc.	Hampton, Newport News	PAA Transportation Services

1.4.12 Other Transportation Services

Amtrak

Amtrak service is available at the Newport News station on the Peninsula and the Harbor Park station in Norfolk. Amtrak service is also available in Williamsburg. Both the Norfolk and Newport News stations provide connections to Amtrak's Northeast Regional service, which operates on the Northeast Corridor between

[24] Hampton Roads Transportation, Inc., Accessed at http://www.hrtitaxi.com/about-us/

[25] Virginia DMV, Search/Filter Licensed Transportation Services. Accessed at https://www.dmv.virginia.gov/apps/mcs/default.aspx

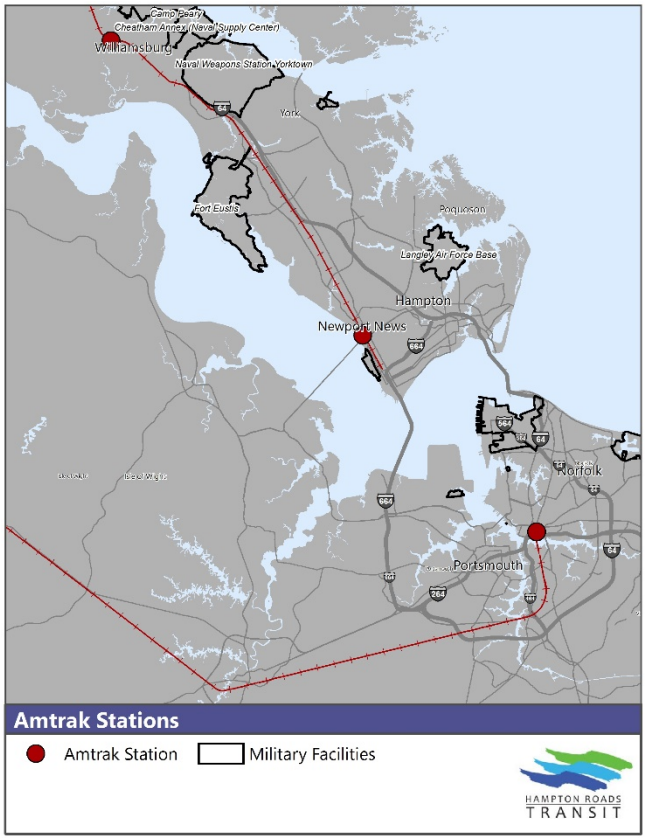
Boston and Washington, D.C., with several additional Virginia destinations (**Table 1-9**).[26]

On the Peninsula, the city of Newport News plans to begin construction in 2017 on a new multi-modal station near Bland Boulevard in Newport News, which would replace the current Amtrak station near Mercury Boulevard. The new facility is planned to accommodate HRT buses, as well as taxis and airport shuttles.[27]

Table 1-9 | Amtrak Service in Hampton Roads

Station	Trains per day	Amtrak Bus Service	HRT Routes
Newport News	***Monday-Thursday:*** two arrivals, two departures ***Friday:*** three arrivals, two departures ***Saturday-Sunday:*** two arrivals, one departure	Norfolk, Virginia Beach	106, 107
Norfolk	One arrival, one departure daily	Virginia Beach	The Tide
Williamsburg	***Monday-Thursday***: two arrivals, two departures ***Friday:*** three arrivals, three departures ***Saturday-Sunday:*** two arrivals, two departures		121

Figure 1-4 | Hampton Roads Amtrak Train Station Locations[28]



Regional Bus

Greyhound, an intercity bus service with over 2,700 destinations in the United States, stops at four locations in the HRT service area – Hampton, Norfolk, Virginia Beach, and Williamsburg.[29] Megabus, which provides intercity regional bus service in many parts of the United States, stops at the Hampton Bus Station in Hampton, Virginia and Downtown Norfolk (**Table 1-10**).[30]

[26] Amtrak Virginia Service Timetable, Updated November 2016. Accessed at https://www.amtrak.com/ccurl/1018/288/Northeast-Corridor-Schedule-W06-111416.pdf

[27] The Daily Press, "Newport News transportation center construction planned for early next year." Nov. 26, 206. Accessed at http://www.dailypress.com/news/newport-news/dp-nws-nn-transportation-center-update-20161123-story.html

[28] Amtrak Across Virginia and the Northeast, Accessed at https://www.amtrak.com/virginia/traveling-with-amtrak-in-virginia

[29] Greyhound Bus Station Locator, Accessed at http://locations.greyhound.com/

[30] Megabus Route Map, Accessed at https://us.megabus.com/routemap.aspx

Table 1-10 | Intercity Bus Service in HRT Service Area

Station	Address	Bus Services
Hampton Bus Station	2 W Pembroke Avenue, Hampton, VA	Greyhound, Megabus, HRT Routes 101, 102, 103, 109, 110, 114, 115, 117, 118, 120, 403, 961
Norfolk Bus Station	701 Monticello Avenue, Norfolk	Greyhound, HRT Routes 1, 3
Circle D Food Market	971 Virginia Beach Boulevard, Virginia Beach, VA	Greyhound, HRT Route 20
Williamsburg Bus Stop	468 N Boundary Street, Williamsburg, VA	Greyhound, HRT Route 121, WATA Routes Blue, Gray, Jamestown, Orange, Red, Tan

Public Transit

The City of Suffolk, Virginia, located just west of HRT's Southside communities, operates Suffolk Transit, which provides fixed route and paratransit service to Downtown Suffolk. Suffolk Transit was formed in January 2012, utilizing Virginia Regional Transit (VRT) as the City's service provider. Suffolk Transit operates six fixed routes, one of which (Gold Route) connects with HRT services (Routes 47 and 967) in Chesapeake at Portsmouth Boulevard and Capri Circle.

The Williamsburg Area Transit Authority (WATA) operates eight fixed routes and three specialty routes just north of HRT's Peninsula service area in James City County, the City of Williamsburg, and the Bruton District of York County. Five WATA routes (Route 3: Orange Line, Route 1: Gray Line, Route 7: Tan Line, Route 5: Red Line, Route 2: Blue Line) serve the Williamsburg Transportation Center, which connects to HRT Route 121. HRT Routes 108 and 116 also connects with the WATA Route 1: Gray Route at Lee Hall in Newport News.

Carshare

Zipcar, a short-term car-rental service, has cars at Christopher Newport University in Newport News, Old Dominion University in Norfolk, and the College of William and Mary in Williamsburg.[31]

1.5 FARE STRUCTURE

1.5.1 HRT Fare Structure and Types

Fare Structure

Passenger boardings on HRT buses are subject to the fares shown in **Table 1-11**. In 2014, after nine public hearings, HRT raised fares for the first time in 15 years, from $1.50 to $1.75, the fares are scheduled to increase again in October 2017 from $1.75 to $2.00.

Under HRT's fare policy (revised in 2016) HRT staff report annually to the TDCHR with a "review of farebox revenues, farebox recovery ratio and ridership for the entire system and by mode." In addition to this review, HRT staff will recommend possible solutions for meeting the minimum farebox recovery, which may include fare adjustments.[32]

[31] Zipcar, Where the Care Are. Accessed at http://www.zipcar.com/cities

[32] Hampton Roads Transit Fare Policy (7-1-2016), Accessed at http://gohrt.com/wp-content/uploads/2009/11/Fare-Policy-7_2016.pdf

Table 1-11 | HRT Fares

Ticket/Pass Type	Adult	Half Fare	Paratransit
Local Bus, Light Rail, & Ferry			
Cash	$1.75	$0.75	n/a
1 Day	$4.00	$2.00	n/a
1 Day *(Bundle of 5)*	$19.00	$9.50	n/a
7 Day	$20.00	n/a	n/a
30 Day	$60.00	$35.00	n/a
Shuttle			
Cash	$2.00	$1.00	n/a
1 Day	$4.00	$2.00	n/a
3 Day	$8.00	$4.00	n/a
MAX			
Cash	$3.50	$1.75	n/a
1 Day	$6.50	$6.50	n/a
1 Day *(Bundle of 5)*	$30.00	$30.00	n/a
30 Day	$110.00	$110.00	n/a
Paratransit			
Clients - Cash			$3.50
PCA - Cash			$0.00
Guests - Cash			$3.50

Bus/Light Rail Fare Types

The following fare types are available for HRT bus and light rail services.

- **One Day GoPass:** Unlimited access to all HRT services, except MAX, which requires an additional fee. The One Day GoPass is good for bus, light rail and ferry services.
- **Children/Youth:** Those 17 years old and younger can ride on any HRT vehicle for free if they are:
  - Accompanied by an adult fare-paying passenger; or
  - Provide a valid proof of age, including a school ID with photo, DMV identification card, or HRT Youth ID.
- **Senior citizens:** Those 65 years old and over can pay half-fare with a DMV ID, Medicare ID (with photo ID), HRT's Half-Fare ID, or any other proof of age that includes a photograph.
- **Persons with Disabilities:** Persons with disabilities can pay half-fare with a HRT Half-Fare ID, or an ADA Paratransit ID (with photo). Identification is also required at time of farecard purchase.
- **Medicare Cardholders:** Medicare cardholders can pay half fare with a Medicare card ID or HRT Half-Fare ID.
- **Cash fare:** HRT accepts exact fare only; bus/light rail/ferry operators cannot make change.
- **MAX:** Passengers can board the MAX using any valid fare pass, but an additional fee may be required for some passes, including the One Day GoPass.
- **Paratransit:** In October 2016, Demand Response (Paratransit) fees increased $.50 per ride, from $3.00 per ride to $3.50.

HRT's complete Half-Fare guidelines and a list of accepted forms of ID are available at http://gohrt.com/fares/half-fare-id/ or on an HRT route schedule.

HRT does not give refunds on any purchases.

1.5.2 HRT Fare Payment

On-Board Payment Methods

All HRT buses, trolleys and ferries are equipped with electronic fareboxes, which accept cash, coins and HRT magnetic-stripe farecards.

Ticket Vending Machines

Ticket vending machines (TVMs) are located at transfer centers, Tide Light Rail stations, the Naval Station at Norfolk, the Elizabeth River Ferry, and several VB Wave stops (**Table 1-12**). TVMs sell fare cards for local bus routes, MAX services, shuttles, and ferries, as well as reduced fare passes for seniors and persons with disabilities. TVM screens prompt customers to select

and purchase a fare card, which is then dispensed from the machine. TVMs accept cash, credit and debit transactions. Passes are not active until inserted into a farebox.

Table 1-12 | Ticket Vending Machine Locations

Locations	Address
Downtown Norfolk Transfer Center	434 St Pauls Boulevard, Norfolk, VA
Newport News Transfer Center	150 35th Street, Newport News, VA
Hampton Transfer Center	2 W Pembroke Avenue, Hampton, VA
Naval Station Norfolk	Building C-9, corner of Bacon and Gilbert, in the food court/mini-mart area
Elizabeth River Ferry	1 High Street, Portsmouth, VA
The TIDE Light Rail Stations	• EVMC/Fort Norfolk • York Street/Freemason • Monticello • MacArthur Square • Civic Plaza • Harbor Park • NSU • Ballentine/Broad Creek • Ingleside Road • Military Highway • Newtown Road

Retail Outlets

HRT's website, has a list of retail outlets that sell HRT fare cards in Chesapeake, Hampton, Newport News, Norfolk, Portsmouth and Virginia Beach.

Bulk Purchases

There is a $300 minimum purchased for mail orders, which can be placed online at HRT's website.

Transfer Agreements

HRT does not have any transfer agreements between HRT transit services and other regional transit services (free or reduced price transfers, etc.).

1.6 VEHICLE FLEET

The following sections summarizes the revenue fleet by mode and the non-revenue fleet by type. The FY2017 Capital Improvement Plan provides in in-depth fleet asset management plan, with a detailed schedule for replacement, expansion, overhaul and rebuild for each vehicles within the fleet.

1.6.1 Revenue Fleet

The HRT fixed-route bus fleet consisted of 299 vehicles, including 294 diesel buses and 37 hybrid buses, as of June 2017. Ninety percent of the fleet, or 268 total buses, were manufactured by Gillig. The HRT fleet also includes 10 Optima buses, 7 Nova buses, and 14 Hometown Trolley buses. Hometown Trolley buses are only operated on VB Wave routes, which operate during summer months. Aside from the trolley-style buses, the remainder of HRT's fleet is standard buses that range in length from 29-ft to 40-ft. HRT has no articulated buses or over-the-road coaches.

In addition to the buses listed above, HRT has 3 ferries, 9 light rail transit vehicles, and 108 paratransit vehicles. Of its paratransit vehicles, HRT owns a total of 79 paratransit vans, including 76 cutaway vans and 3 vans, and leases an additional 29 sedans through MV Transportation. Regardless of ownership, all paratransit vehicles are operated by MV Transportation.

HRT does not own the vehicles used in its vanpool program. Instead, vanpool drivers use a van leased from a third-party or one that they themselves own. The vanpool drivers are also responsible for vehicle maintenance.

Table 1-13 summarizes the number of revenue vehicles in HRT's fleet by mode, across both fixed route and demand responsive vehicles. Because HRT rotates vehicles between its active duty and reserve fleets to ensure mileage is distributed appropriately among its vehicles, individual vehicles are not separated into an active or reserve fleet. HRT's spare ratio for its bus fleet

is 24 percent, slightly over the FTA's recommended spare ratio of 20 percent for agencies of HRT's size. However, the agency will reduce the fleet size to 272 vehicles by FY2019 to reach the recommended spare ratio of 20 percent by vehicle type.

Table 1-13 | Revenue Fleet by Mode

Mode	Fleet Size	Vehicles Operated in Maximum Service	Spare Ratio
Bus	299	227	24%
Light Rail	9	7	29%
Ferry	3	2	50%
Paratransit	108	100	9%

1.6.2 Non-Revenue Fleet

HRT's non-revenue fleet consists of sedans, vans, SUVs, pick-up trucks, special purpose vehicles, and non-revenue buses that are used as system support vehicles by HRT's administrative and maintenance staffs. In total, there are 134 non-revenue vehicles employed by HRT for purposes that range from revenue vehicle maintenance to facility upkeep to sedans driven by upper management (see **Table 1-14** and **Table 1-15** for details).

Table 1-14 | Non-Revenue Fleet by Type

Type	Count of Vehicles
Van	56
SUV	10
Pickup Truck	28
Other Utility Vehicle	8
Sedan	32
Grand Total	**134**

Table 1-15 | Non-Revenue Fleet by Use

Use	Count of Vehicles
Admin/Other	43
Bus Maintenance	12
Facilities	10
Light Rail	30
Operations	18
Radio-Revenue	10
Safety	11
Grand Total	**134**

1.7 EXISTING FACILITIES

HRT maintains an extensive portfolio of administrative, transit, and customer-oriented facilities (such as parking), as detailed in **Table 1-16**, **Table 1-17**, **Table 1-18**, and **Table 1-19**.

1.7.1 Administrative

HRT administrative office are split between two facilities, located on the Peninsula and in the Southside service areas. **Table 1-16** provides specific details on each facility.

Table 1-16 | HRT Administrative Facilities

Type	Location
Headquarters	3400 Victoria Boulevard, Hampton, VA
HRT Southside Bus Operations, Maintenance and Administration	509 E 18th Street, Norfolk, VA

1.7.2 Maintenance, Fueling and Storage

Table 1-17 | Maintenance, Fueling and Storage Facilities[33]

Type	Location	Description
HRT Northside Bus Operations, Maintenance and Administration	3400 Victoria Boulevard, Hampton, VA	Repair bays (10), Body Bays (4), Paint Booth (1) Brake Bay (1) Steam Wash Bay (1)

[33] HRT Facilities, Accessed at http://gohrt.com/about/facilities/

Type	Location	Description
		Fueling Stations (1, with 2 pumps), Training Rooms (1)
HRT Southside Bus Operations, Maintenance and Administration	509 E. 18th Street, Norfolk, VA	Repair Bays (15), Body Bays (5), Brake Bay (1), Undercarriage Wash Bay (1), Wash Bays (3), Fuel Stations (3), Training Rooms (2), Storage and Inventory (7,000 SF)
HRT Virginia Beach Operations	1400 Parks Avenue, Virginia Beach, VA	Repair Bays (4) Fueling Stations (2) Bus Wash (1)
HRT Norfolk Tide Facility	850 Brambleton Avenue, Norfolk, VA	Serves LRT vehicles Repair Bays (4), Train Wash Bay (1)
HRT Rail Operations - Warehouse	3404 Mangrove Avenue, Norfolk, VA	Used for storage and administrative offices

1.7.3 Parking

Park and Ride Lots

HRT owns and operates park and ride lots at five Tide light rail stations. VDOT and jurisdictions in the HRT service area operate other Park and Rides that integrate HRT bus service, and a private owner provides 50 park and ride spaces at the Greenbrier Mall in Chesapeake. Parking at HRT-owned park and ride facilities is free (**Table 1-18**).

Table 1-18 | Park and Ride Lots with HRT Bus Service [34]

Type	Location	Description
Silverleaf Commuter Lot *(owned by VDOT)*	Silverleaf Drive and Route 225, Virginia Beach, VA	Parking Spaces: 260
		Connecting Bus Transit: Routes 918, 919, 960, 966
Indian River *(owned by VDOT)*	Indian River Road and Reon Drive, Virginia Beach, VA	Connecting Bus Transit: Routes 12, 922, 967
Greenbrier Mall *(privately owned)*	1401 Greenbrier Parkway, Chesapeake, VA	Parking Spaces: 50
		Connecting Bus Transit: Routes 15, 55, 922, 967
Harbor Park Tide station *(owned by City of Norfolk)*	280 Park Avenue, Norfolk, VA	Parking spaces: 176
Ballentine /Broad Creek Tide station *(owned by HRT)*	778 Ballentine Boulevard, Norfolk, VA	Parking Spaces: 105
		Connecting Bus Transit: Route 18
Military Highway Tide station *(owned by HRT)*	5525 Curlew Drive, Norfolk, VA	Parking Spaces: 232
		Connecting Bus Transit: Routes 15, 23, 967
Newtown Road Tide station *(owned by HRT)*	6212 Curlew Drive, Norfolk, VA	Parking Spaces: 266
		Connecting Bus Transit: Routes 20, 22, 25, 27
Denbigh Fringe Commuter Lot *(owned by locality)*	U.S. 60 & Old Courthouse Way, Newport News, VA	Parking Spaces: 265
		Connecting Bus Transit: Routes 415, 430
Park & Sail Commuter Lot *(owned by VDOT)*	Court Street and Crawford Street, Portsmouth, VA	Parking Spaces: 119
Hampton Transportation Center *(owned by HRT)*	2 West Pembroke Avenue, Hampton, VA	Parking Spaces: 138
		Connecting Bus Transit: Routes 101, 102, 103, 109, 110, 114, 115, 117, 118, 120, 961, 403
		Parking Spaces: 50

[34] VDOT, Park and Ride in Virginia. Accessed at http://www.virginiadot.org/travel/parkride/home.asp

Type	Location	Description
Huntington Park and Ride *(owned by locality)*	Route 17 near James River Bridge, Newport News, VA	Connecting Bus Transit: Route 64

1.7.4 Stations, Transit Centers, and Bus Stops

HRT has over 2,800 bus stops, 169 of which have shelters. **Table 1-19** details major transit / transfer centers in the HRT service area.

Table 1-19 | Major Transit / Transfer Centers

Name	Location	Connecting Routes
Hampton Transit Center	2 W Pembroke Avenue, Hampton, VA	Routes 101, 102, 103, 109, 110, 114, 115, 117, 118, 120, 961, 403
NetCenter	100 Newmarket Drive North, Hampton, VA	Routes 104, 110, 112, 114, 405
Downtown Norfolk Transit Center	434 St Pauls Boulevard, Norfolk, VA	Routes 1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 45, 960, 961
Wards Corner Transfer Center	7725 Granby Street, Norfolk, VA	Routes 1, 21, 961
Newport News Transit Center	150 35th Street, Newport News, VA	Routes 64, 101, 103, 104, 105, 106, 107, 112, 121, 961, 966, 967, 405, 414, 415, 430
Silverleaf Transit Center	4300 Commuter Drive, Virginia Beach, VA	Routes 918, 919, 960, 966

1.7.5 Rights of Way

HRT has not entered into any right-of-way agreements for current or future transit service.

1.7.6 Tracks or Guideways

The Tide operates on 7.4 miles of double track in the City of Norfolk, stopping at eleven stations and connecting Downtown Norfolk with the western edge of Virginia Beach. The Tide operates nine light rail vehicles, powered by an overhead electrical system.

1.7.7 Bicycle Facilities

Transit

HRT transit stop bicycle amenities include bicycle parking, bicycle lockers, on-bus racks, bike share programs, or other infrastructure. The distribution of these amenities may be based on a number of factors, including bicycle ridership, local infrastructure requirements, and connectivity. Bicycle amenities, while listed in the HRT Amenity guidelines, are not currently required at transit stops – for each type of transit stop, the amenity guidelines note that the bicycle amenities will vary.[35]

Paths and Trails

There are over 1,300 miles of shared use paths, bike lanes, paved shoulders, wide sidewalks, signed shared roadways, shared roadways and trails in the Hampton Roads metropolitan planning organization area.[36] Major trails (two miles or longer) in the HRT service area include: *(descriptions of existing trails adapted from the Rails to Trails Conservancy[37])*

- **South Hampton Roads Trail:** A planned 41-mile trail connecting Suffolk and the Virginia Beach Waterfront. A 2.3-mile section of the trail near the Suffolk Seaboard Coastline opened in 2015. [38]
- **Elizabeth River Trail Atlantic City Spur (9.5 miles):** The Elizabeth River Trail–Atlantic City

[35] HRT Passenger Amenity Policy (7-8-16)
[36] Hampton Roads TPO, "The State of Transportation in Hampton Roads – 2016."
[37] Rails-to-Trails Conservancy, Accessed at www.traillink.com
[38] Hampton Roads TPO, "The State of Transportation in Hampton Roads – 2016."

Spur runs between Harbor Park Stadium and the Norfolk International Terminals.

- **Wesley Drive/Haygood Road Trail (2.7 miles):** The trail runs parallel to its namesake roads between Independence Boulevard and Baker Road (Virginia Beach)
- **Little Neck Road Trail (3.3 miles):** The trail runs parallel to its namesake road between W. Little Neck Road and Virginia Beach Boulevard (US 58) (Virginia Beach).
- **Cape Henry Trail (7.5 miles):** The Cape Henry Trail crosses the heavily wooded First Landing State Park, located on Cape Henry north of Virginia Beach. The trail provides access to the Narrows Recreation area, located in the park, as well as to neighborhoods and shops just west of the park boundary (Virginia Beach).
- **General Booth Boulevard Trail (6.1 miles):** The trail runs parallel to its namesake road between Princess Anne Road and Norfolk Avenue (Virginia Beach).
- **Virginia Beach Boardwalk (2.6 miles):** The trail runs between 40th Street on the north and Rudee Inlet on the south with access to the Atlantic Ocean the whole way (Virginia Beach).
- **Birdneck Road Trail (2.1 miles):** The trail runs parallel to its namesake road between Norfolk Avenue and General Booth Boulevard (Virginia Beach).
- **Great Neck Road/London Bridge Road Trail (11.5 miles):** This 11.5-mile paved trail begins in the busy commercial area just south of Shore Drive/US 60 in Virginia Beach, and ends at the Virginia Beach Boardwalk (Virginia Beach).
- **Rosemont Road Trail (3.5 miles):** The trail runs parallel to its namesake road between Holland Road and Whiteberry Lane (Virginia Beach).
- **Dam Neck Road Trail (7.9 miles):** The trail runs parallel to its namesake road between Salem Road and Terrier Avenue, along the southern border of the Dam Neck Naval Air Station (Virginia Beach)
- **Lynnhaven Parkway Trail (6.4 miles):** The trail runs parallel to its namesake road between Lishell Place and Stewart Drive (Virginia Beach).
- **Independence Boulevard Trail (3.8 miles):** The trail runs parallel to S. Independence Boulevard in two disconnected segments (Virginia Beach).
- **Kempsville Road Trail (7.3 miles):** The trail runs parallel to its namesake road between Providence Road (SR 40) and Battlefield Boulevard (Virginia Beach/Chesapeake).
- **Trillium Trail - Sandy Bottom Nature Park (3.3 miles):** Sandy Bottom Nature Park is a 456-acre recreational oasis in Hampton, bordered on the northeast side by Interstate 64 and surrounded by busy residential, shopping and entertainment areas (Hampton).[39]

1.7.8 ADA Accommodations

Transit

HRT fixed route buses offer low floor "kneeling" buses, which allow the operator to bring the entire bus down to curb level, eliminating steps for boarding passengers, as well as wide doors and front aisles, interior visual and audio destination and stop announcements, and priority seating for those in need. In addition, the buses are equipped to accommodate two wheelchairs at one time

HRT Tide Light Rail Stations offer tactile strips on every platform, audio and Braille Ticket Vending Machines, directional Braille tablets at platform entrances, height accessible 911 emergency call buttons on platforms,

[39] Rails-to-Trails Conservancy, Accessed at www.traillink.com

platform level train vehicles for easy boarding, and priority seating for those in need. Visual and audio departure, arrival, and destination signage and announcements are used on all trains/stations, as well as visual and audio indicators for door opening and closing operations. Each train vehicle is equipped to accommodate four wheelchairs[40]

All HRT ferries are accessible; ramps and boarding docks allow for level boarding.

Paratransit

HRT provides Demand Response paratransit service for persons with disabilities. Paratransit service is offered within ¾ of a mile of any fixed route service during HRT's hours of operation. All paratransit riders must be certified through an eligibility application process.[41]

1.8 TRANSIT SECURITY PROGRAM

HRT has a commitment to creating a quality safety and security program.

- In 2000, HRT developed the Security Manager position.
- In 2004, the HRT commission approved the support to pursue a Special Police appointment
- In 2011, HRT hired a Chief of Safety and Security Officer and a Safety Security officer
- Currently, HRT now additionally has an Extra Duty Officer (EDO) Supervisor, 70 law enforcement officers, and additional contracted security

Overall, the FY 2017 budget for HRT's safety and security programs is approximately $1.5 million.

1.8.1 Security and Emergency Preparedness Plans

HRT has completed a Security and Emergency Preparedness Plan (SSEPP). It was audited in July 2016 during the HRT's Triennial Review by the Federal Transit Administration (FTA). It is currently being revised with the first draft addressing noted issues being submitted in January 2017 and the final draft being submitted in August 2017.

The SSEPP establishes methodologies for threat and vulnerability assessments for the LRT. HRT also has a security plan for buses and ferry. The plan delineates security practices for HRT's security contractors, off-duty police officers working for HRT, and all pertinent safety and security employees.

1.8.2 Fare Inspection

HRT conducts fare inspection on its light rail system. This happens Monday – Thursday, 5:00 AM – 10:00 PM, Friday – Saturday, 5:00 AM – 11:00 PM, and Sunday, 10:00 AM – 10:00 PM. In 2016, HRT inspected approximately 21 percent of fares on the light rail system.

On July 1, 2017, Virginia has adopted codes that go into effect allowing fare enforcement on all modes of transportation at HRT.

1.8.3 Security Features on Vehicles

HRT maintains video cameras on both its buses and light rail vehicles that can be used to investigate incidents onboard HRT vehicles, as well as to validate customer complaints about operators, justify employee discipline and/or termination, and verify workers' compensation claims and auto claims from drivers involved in crashes with HRT buses.

HRT also has in place an audio monitoring system that records calls between bus operators and dispatchers,

[40] HRT Service Accessibility, Accessed at http://gohrt.com/services/hrt-accessibility/

[41] HRT Paratransit, Accessed at http://gohrt.com/services/paratransit/

which can aid in investigations of security incidents onboard HRT vehicles. Each vehicle has security features to enable the driver or operator to contact dispatch for emergency situations, as well as contact local police enforcement, and GPS systems.

1.8.4 Security Features at Transit Stations and Facilities

At TIDE Light Rail stations, emergency call boxes can be used to contact the City of Norfolk's 911 system. The 2017 HRT Capital Improvement Plan also proposes passenger information display systems for both TIDE stations and key transfer locations, which could provide both audio and visual security alerts to passengers.

HRT facilities are secured through security card, key and lock systems, and surveillance cameras. Recent upgrades to transit facilities, such as the Military Circle Transit Center, include the addition of security cameras to other HRT facilities. These cameras benefit riders, employees, and the generally public alike by both deterring crime and helping to investigate incidents on HRT property. Gates and guards also secure entrances to HRT's 18th Street (Southside) and 3400 Victoria Boulevard (Peninsula) facilities. All HRT properties are fenced and are design using Crime Prevention Through Environmental Design (CPTED) concepts.

At HRT's 18th Street (Southside) and Virginia Beach bus operating facilities, mobile vaults are used to create a secure system for transferring cash from vehicle fareboxes to secure vaults. HRT's 3400 Victoria Boulevard facility uses an in-wall vault system that the agency plans to replace.

HRT also plans to improve its IT network security measures per a 2011 FTA Financial Management Oversight (FMO) IT Security review. These measures help secure HRT employees and the agency's assets against crime.

1.8.5 Security Training Programs

Currently, there is safety and security training for new employees; all the operator and driver curriculums include safety/security training. EDOs and contracted security are currently receiving security awareness, and Light Rail familiarization for First Responders training. Approximately, 30 administration and management staff have undergone NIMS training, which will include an annual refresher course.

Two safety/security drills (locational and a table top) are required annually by FTA and VDRPT on the light rail system; five were conducted prior to the start of light rail revenue operations. Also, TSA VIPR readiness drills are performed annually.

1.8.6 Public Awareness Programs

HRT is committed to promoting safety through education and has designed several public education campaigns and strategies to disseminate our safety message. Messages are distributed through HRT social media accounts and website inform and are designed to educate the community on how to interact safely with The Tide's tracks, station areas, and vehicles.

For the Light Rail system, HRT has launched several awareness campaigns, including:

- A Business Outreach Campaign
- A "Hey is that your bag" Campaign
- Recorded security messages on trains and platforms
- TSA "if you see something say something" Campaign

1.9 INTELLIGENT TRANSPORTATION SYSTEMS PROGRAM

HRT is currently in the process of documenting its Intelligent Transportation Systems (ITS) plan in conjunction with its Technology Project Management

Plan. The following sections summarize the agency's current ITS programs and projects.

1.9.1 Computer Aided Dispatch / Automatic Vehicle Locator Systems

HRT buses use a TransitMaster system for its Computer Aided Dispatch (CAD), Automatic Vehicle Locator (AVL), and Automatic Passenger Counter (APC) systems. The system includes AVL and APC hardware, onboard software and firmware, and external systems, including radio tower sites. AVL hardware is installed and in use on all buses in HRT's fleet. AVL hardware is also installed on ferry vessels.

1.9.2 Automatic Passenger Counters

HRT's TransitMaster system includes APCs, which track the number of boardings at each stop by route. APC units are installed on approximately 45 percent of HRT's bus fleet, with buses rotated between routes to obtain samples of ridership across all routes.

1.9.3 Traffic Signal Priority

Traffic Signal Priority and traffic signal pre-emption is used to improve travel times and reliability on The Tide Light Rail System. HRT is studying the introduction of signal priority at select intersections for its bus services.

1.9.4 Trip Planners

HRT provides a Google Maps-based trip planning tool to its customers via the gohrt.com website. Customers can also access trip planning assistance from HRT by calling the Customer Service Center.

HRT also makes schedules available to the public via the General Transit Feed Specification (GTFS), which is used by websites and apps such as Google Maps to help plan trips using HRT services.

1.9.5 Scheduling Software

HRT uses HASTUS software for light rail and bus route planning and scheduling. HRT's Service Planning and Operations departments uses the software to create bus schedules, construct bus runs, and schedule operators. HASTUS is also used to geographically locate and analyze routes and bus stops, and monitor the performance of the system.

For paratransit scheduling, Trapeze software is used. The software compiles customer profiles, fixed route service geography, and operating hours, along with fleet and driver information, to schedule paratransit trips.

1.9.6 Maintenance, Operations and Yard Management Systems

The Operations Department uses Spear Technologies fleet maintenance software to store information and schedule activities relevant to fleet maintenance. HASTUS is used to manage bus lots and parking locations. The FY2017 Capital Improvement Plan proposes upgrading this software to a newer transit asset management system that would allow the agency to more effectively track its fleet, vehicle ages, and their repair and replacement schedules in one system.

In addition, efforts are already underway to inventory HRT's facility assets and to procure a facility asset management system that will track facility assets and repair and replacement schedules.

1.9.7 Information Displays

HRT currently does not provide passenger information displays at its transit facilities. In its FY2017 Capital Improvement Plan, HRT has included projects to install screens with real-time arrival information at light rail and transit centers.

1.9.8 Real Time Arrival

Real-time arrival information is not available for HRT transit services. However, HRT makes available location data to third-party applications on a trial basis, providing limited real-time arrival functionality. A set of upgrades to HRT's AVL/APC systems and related systems proposed in the agency's Capital Improvement Plan would provide real-time arrival information to

customers, including potentially through passenger information displays, mobile applications, or Interactive Voice Response (IVR) phone systems).

1.9.9 Information to Mobile Devices or Applications

HRT distributes information about its services and collects feedback from customers through a variety of mobile devices and applications. Customers can engage with HRT through Facebook, Twitter, and YouTube mobile apps, where HRT also distributes important service alerts and information.

HRT makes its schedules available to app developers in the General Transit Feed Specification (GTFS) format, which enables trip planning for HRT services on mobile apps like Google Maps. Additionally, AVL data is available on a trial basis to third-party application developers, who have created a real-time arrival application for HRT.

1.10 DATA COLLECTION AND RIDERSHIP AND REVENUE REPORTING METHODOLOGY

HRT's methods for collecting, processing, verifying, storing, and reporting ridership and revenue service data vary based on the data source and report format required.

1.10.1 Electronic Registering Fareboxes

HRT uses Electronic Registering Fareboxes manufactured by Odyssey and Fast Fare to collect ridership and fare revenue data. Fareboxes are the source of the vast majority of ridership counts for HRT's bus services, with remaining counts obtained manually (see **Section 1.10.3**). Data from fareboxes is stored in a GFI database before being imported into HRT's CRIS database, the system of record for National Transit Database (NTD) reporting (see **Section 1.10.13**). For ferry services, farebox ridership reports are further adjusted in the CRIS database based on manual counts.

1.10.2 Automatic Passenger Counters

Iris IRMA and Trapeze TransitMaster APCs are installed on approximately 30 percent of HRT's fixed route buses and all of HRT's 9 light rail vehicles. APCs track the number of boardings and alightings by stop for each vehicle. While APC counts are the source of light rail ridership reports to the HRT board, manual sampling of light rail trips based on NTD sampling guidelines are used to generate NTD ridership counts. This is because HRT APCs have not yet been approved as a replacement for NTD reporting.

Raw APC data is transmitted from each vehicle in real-time or in a batch upload when the vehicle returns to a garage. Each service day, this data is processed and stored in a data mart.

1.10.3 Manual Ridership Counts

For NTD reporting, HRT conducts manual counts of ridership on its fixed route bus and light rail services based on a random sample of trips. To supplement ridership data sourced from fareboxes, the agency also conducts additional manual counts during special events.

For ferry services, manual counts are the primary source of ridership data. Not only are manual counts of passengers boarding and alighting at each stop required by the US Coast Guard, the fareboxes used for ferries have been found to produce inconsistent counts of ridership. After ferry farebox data is extracted to a GFI database and transferred to HRT's CRIS database for NTD reporting, an adjustment figure is added to match farebox counts to counts of total ridership obtained manually.

Vanpool services operated by Enterprise and V-Ride also provide ridership counts to HRT through manual counts. Daily ridership logs are imported into the CRIS database for further reporting.

1.10.4 Scheduling Software

HASTUS data is stored in an Oracle database for at least five years before it is expunged. Exports from this database are used to support both NTD reporting and other internal reports.

1.10.5 Accounting / Payroll Systems

HRT uses Oracle PeopleSoft Financials and Human Capital Management (HCM) software for its accounting, financial management, human resources, and payroll processes. These systems manage the collection, processing, verification, storage and reporting of such data. Data from accounting and payroll systems are reported in the agency's annual budget and Comprehensive Annual Financial Reports, as well as reports for various internal, local, state, and federal stakeholders.

The agency is currently soliciting an upgrade or replacement of its PeopleSoft Financials system, which completed implementation in 2003. In late calendar year 2017, the agency plans to upgrade further its PeopleSoft Human Capital Management system.

1.10.6 Mobile Data Terminals

HRT's paratransit provider MV uses tablet devices as mobile data terminals (MDTs). These tablets download schedules from Trapeze and provide drivers with turn-by-turn directions. While the vehicle is in operation, the tablets also transmit information to the Trapeze system, including vehicle location, arrivals, and departures. In the event of a Trapeze system outage, the devices store up to two hours of schedules in memory.

Using information generated from these MDTs, Trapeze generates a monthly route productivity report. This report is imported into HRT's CRIS database for further reporting.

1.10.7 Automatic Vehicle Locator

Trapeze TransitMaster AVLs are installed on all of HRT's revenue vehicles. These devices track and report vehicle location for use by dispatchers, ridership reporting, and planning activities.

As with APC data, AVL data on schedule adherence and location is transmitted from each vehicle in real-time or in a batch upload when the vehicle returns to a garage. This data is ultimately processed and stored in a data mart.

1.10.8 Odometer Readings for Mileage

Bus mileage is automatically collected by Fleet Watch, a system used to monitor fuel and fluid usage in the fleet. This data is uploaded to the Spear fleet management system on a daily basis.

Fleet Watch generates reports on the fuel efficiency of the fleet and a variety of other canned reports for use by bus maintenance staff. Odometer readings are also reported in the agency's annual Capital Improvement Plan.

1.10.9 Operating Expense and Revenue Data

The system of record for operating expense and revenue data is HRT's PeopleSoft systems, which include revenues from fares, leases, advertising, contract service and other sources. These systems comprehensively manage the collection, processing, verification, storage and reporting of such data.

1.10.10 Agency Accountability Policy

HRT's Comprehensive Annual Financial Reports are audited by an independent public accounting firm. Submissions to NTD are certified by the HRT CEO or his designee.

1.10.11 On-Line Grant Administration Performance Data Submission

HRT complies with DRPT On-Line Grant Administration (OLGA) submission requirements by submitting required data into OLGA by the 20th day of each month. The same data reported to NTD is also reported here,

including measures such as revenue hours, revenue miles, and ridership for each mode.

In 2016, HRT entered into a contract with CelWell Services to provide Vehicle Miles Reduced tracker application software and support services. The system will collect information on TRAFFIX programs, and data on employers and their commuter programs. The system will support monthly Online Grant Administration (OLGA) reporting requirements (daily, weekly, monthly, and annually) for the TRAFFIX program.[42]

1.10.12 Executive Director or Board Certification of Adherence to Standards and Accuracy of Data Submitted to OLGA

HRT does not currently have a certification process for OLGA submissions.

1.10.13 National Transit Database Data Submission Practices

To produce HRT's submissions to the National Transit Database (NTD), the agency's Manager of Data Analytics compiles data from various HRT departments into the HRT CRIS database. This database is the ultimate repository of data for various NTD measures, and includes a number of built-in reports used to identify significant variances and possible errors.

Both the Finance Department and the Safety and Security Department enter data for NTD submission separately, but these submissions are reviewed by the Manager of Data Analytics. All submissions are ultimately certified by the CEO of HRT. Submissions to NTD take place on a monthly or annual basis, depending on the type of data.

1.10.14 Financial Audit Review of Verification Method

HRT publishes a Comprehensive Annual Financial Report, which includes an independent audit of the agency's financial statements by an outside accounting firm.

1.11 COORDINATION WITH OTHER TRANSPORTATION SERVICE PROVIDERS

1.11.1 Bikeshare

As of June 2016, the cities of Norfolk and Portsmouth were working on a developing a joint bikeshare project, with the goal of having more than 150 bikes across downtown Norfolk and Portsmouth. [43]

1.11.2 Public Transit

The City of Suffolk, Virginia, located just west of HRT's Southside communities, operates Suffolk Transit, which provides fixed route and paratransit service to Downtown Suffolk. Suffolk Transit operates six fixed routes, one of which (Gold Route) connects with HRT services (Routes 47 and 967) in Chesapeake at Portsmouth Boulevard and Capri Circle.

The Williamsburg Area Transit Authority (WATA) operates eight fixed routes and three specialty routes just north of HRT's Peninsula service area in James City County, the City of Williamsburg, and the Bruton District of York County. Five WATA routes (Route 3: Orange Line, Route 1: Gray Line, Route 7: Tan Line, Route 5: Red Line, Route 2: Blue Line) serve the Williamsburg Transportation Center, which connects to HRT Route 121. HRT Routes 108 and 116 also connects

[42] TDCHR Commission Meeting Packet, April 28, 2015. Hampton Roads FY 2016 Financial Report, Accessed at https://gohrt.com/wp-content/uploads/2015/12/April-TDCHR-Meeting-Package.pdf

with the WATA Route 1: Gray Route at Lee Hall in Newport News.

1.12 PUBLIC OUTREACH PROGRAM

1.12.1 Public Outreach - Major Service Changes

HRT's Marketing and Communications Public Outreach staff is notified by the Chief of Planning and Development when the agency is proposing a major service change(s), elimination of a route, or fare increase. HRT's "Public Hearings and Meetings" policy details the formal process of scheduling public hearings and meetings relative to these service/fare changes, including internal procedures, external communications, and follow-up.

1.12.2 Public Participation Plan Overview

Besides actions defined as a fare change or a major reduction in service, any change in HRT service will be the subject to "meaningful public engagement methods as appropriate to the nature of the proposed change."[44]

HRT uses a broad range of outreach tools, documented in its Title VI Program Public Participation Plan and the HRT Policy and Procedures Manual for Public Hearings and Meetings, to conduct meaningful public engagement, which can include:

- Public Hearings
- Public Meetings
- Distribution of written materials at major transfer points
- Posting of informational flyers, and the posting of information on the HRT website.
    - Notices (signs and brochures) describing proposed action(s), date(s) and location(s) of any hearings or meetings posted on buses and at transfer centers.
    - Notices may also be published in major local and/or relevant neighborhood newspapers and on the HRT website.
- Facebook status updates, Twitter feeds, and website comment forms may be used to provide access through the internet.
- Open public meetings and formal public hearings are frequently used in an effort to gain public review and comment.
- Community organizations, public agencies and elected officials may be notified by mail of significant service changes.
- Hampton Roads Transit is in communication with many community-based organizations throughout the region, including cultural organizations, senior organizations, city partners, and business associations. HRT staff often attends meeting and events sponsored by these groups.

All public comments submitted to HRT through any of these outreach tools become part of the official record.

If special accommodation is needed at a HRT public meeting, meeting attendees can call HRT Customer Service 48 working hours before the meeting to arrange proper accommodations, which include language translation services. HRT selects meeting and hearing locations to provide reasonable accommodations in accordance with the Americans with Disabilities Act of 1990.

1.12.3 HRT's Public Participation Process

HRT adheres to a proactive public participation process. All public involvement activities must be functional for

[44] HRT 2014-2017 Title VI Program Public Participation Plan

HRT decisions and must be meaningful to the public. HRT benefits from public involvement by engaging the public at the earliest project stages from the development of the purpose and need through project implementation. HRT's public involvement activities increase public awareness and give the public an active voice in planning decisions. HRT's public participation process includes the following steps:

- **Step 1:** Outline a public participation plan at the beginning of key HRT planning projects.
- **Step 2:** Previously established mailing and email lists are identified.
- **Step 3:** Update existing mailing and email lists; new lists are identified.
- **Step 4:** All project documentation is archived with HRT's records management department throughout the life of the project.
- **Step 5:** Based on a project's milestones and requirements, a public involvement timeline is created. The public involvement timeline outlines each activity of the project's outreach efforts.
- **Step 6:** The effectiveness of the public participation plan is periodically assessed throughout the life of the project, to determine if the public involvement objectives were achieved.
    - The public participation strategy is assessed at different stages of a project to determine if the practices were effective in reaching each of the expected population and whether the events created opportunities for meaningful involvement.
    - HRT will change the public participation strategy to improve future performance in response to the assessment.

1.13 MARKETING AND PROMOTION

1.13.1 Marketing and Communication Department

HRT's Marketing and Communications Department is responsible for promoting HRT within the organization and to the general public. The Marketing and Communications department supports HRT departments with initiatives and programming through public outreach, planning and communication development. Its duties and responsibilities include:

- Marketing and advertising campaigns to teach the public about transit and introduce customers to new or evolving services.
- Media campaigns promoting alternative transportation options through congested regional transportation corridors.
- Internal information sharing among departments and coordination of public and private events, including formal public hearings, public outreach
- Providing content for the agency's two websites, Gohrt.com and Insite, the agency's intranet, and the agency's electronic bulletin board.
- Maintaining public outreach campaigns that will engage the public, our customers, and promote the agency as a whole.

1.13.2 Transportation Demand Management

TRAFFIX was established in 1995 as Hampton Roads' regional Transportation Demand Management (TDM) agency. For a detailed description of TRAFFIX services, see **Section 1.4.8**. TRAFFIX program staff are employees of HRT within the Planning and Development Department, but staff may include program-specific consultants.

1.14 CONNECT HAMPTON ROADS

In 2014, Hampton Roads Transit (HRT) began a new multimodal regional effort, *Connect Hampton Roads*, creates a long term visionary plan for better multi-modal transportation in the Hampton Roads region. Over 126 business, military, and community leaders from throughout the region participated in Connect Hampton Roads roundtable discussions in 2014 to discuss regional mobility and its impact on the region's economic vitality and quality of life, as well as multimodal transportation plans and options in peer cities. The TDCHR issued a resolution formally beginning the *Connect Hampton Roads* process in June 2014.

After the formal kick-off, a regional survey was conducted and outreach occurred at more than 60 events in every city in the region. Over 13,800 respondents participated in the Connect Hampton Roads regional survey, including current transit customers and citizens who seldom or never commute using public transportation. The survey results indicated that, in a typical week 20 percent of respondents use a bus, 18 percent use light rail, 7 percent use ferry, and 79 percent use a personal motor vehicle (respondents could pick more than one option) (

Figure 1-5). When asked what prevented them from using public transit, respondents indicated that transit failed to make their commute more convenient, had long travel times, and didn't offer the control that comes with a private vehicle (**Figure 1-6**).

During 2015-2016, an initial set of potential transportation improvements were grouped under six pillars. Preliminary cost information for the improvements is being developed; next steps will require refining the plan and determining prioritization, phasing, and funding scenarios.

1.14.1 Connect Hampton Roads Six Pillars

- **Enhanced Bus Networks and Transit Hubs:** Enhanced fixed route bus network that provides comprehensive geographic coverage with frequent service, and a consistent service day and service week; Community-based service plans to meet local needs that are currently not being met; and a fully "open" system completely accessible to persons with disabilities.
- **High-Capacity Transit Network** (Fixed Guideway Options): New corridors connecting the entire region with modes such as light rail, bus rapid transit, ferry routes and bus/HOV lanes.
- **Park and Rides:** A comprehensive network of park-and-rides that provide parking for transit users while integrating with city land use plans and growth strategies; Facilities that offer customers access to retail and service establishments.
- **Transit/Passenger Facilities and Amenities:** Passenger amenities that provide clean, safe and comfortable waiting areas at transit stops with reliable "real-time" passenger information that enhance customer experiences. Shelters, benches, and bus stop lighting and other components are key to this pillar.
- **Active Transportation – Complementary Transportation Investments Integrating Modes of Travel**: Linkages that address the "First-mile, Last-mile" at bus stops, transit hubs and park-and-rides. Connectivity to bike lanes, bike and pedestrian pathways, and accessible sidewalks are key investments in this element.
- **Transit Support Services** (Facilities, Rolling Stock, Security, Information Technology):

Infrastructure and facilities to support the transit vehicle fleet and operations to implement the plan and maintain a State of Good Repair

Figure 1-5 | Connect Hampton Roads Survey - Mode

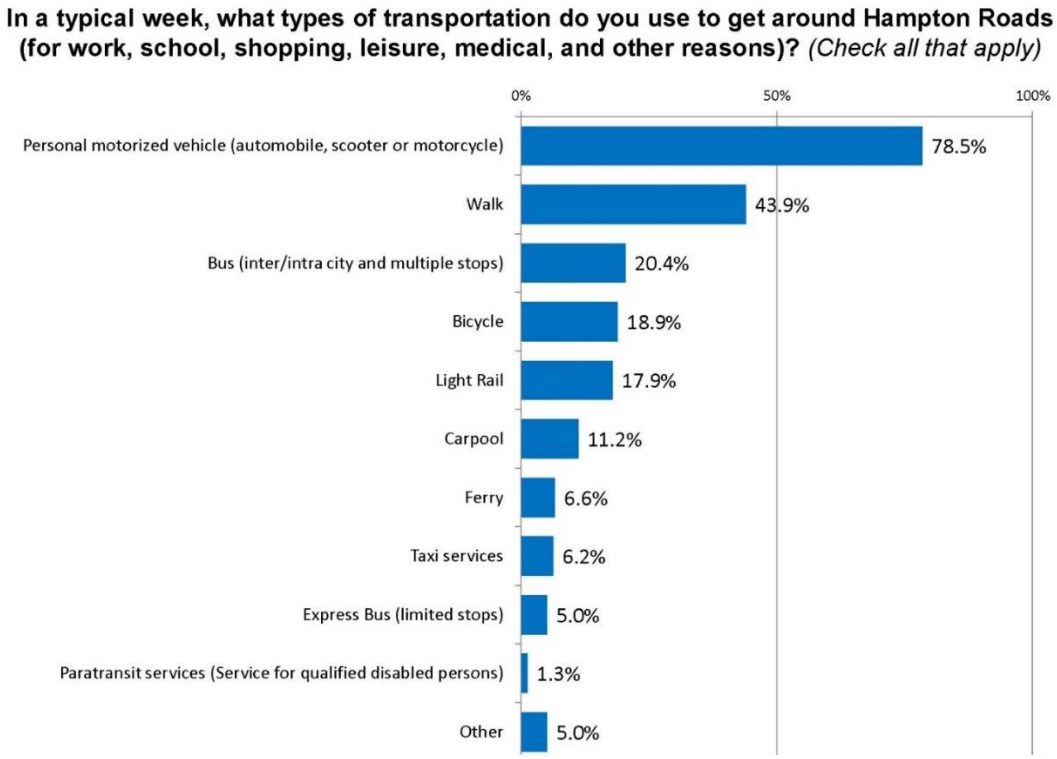
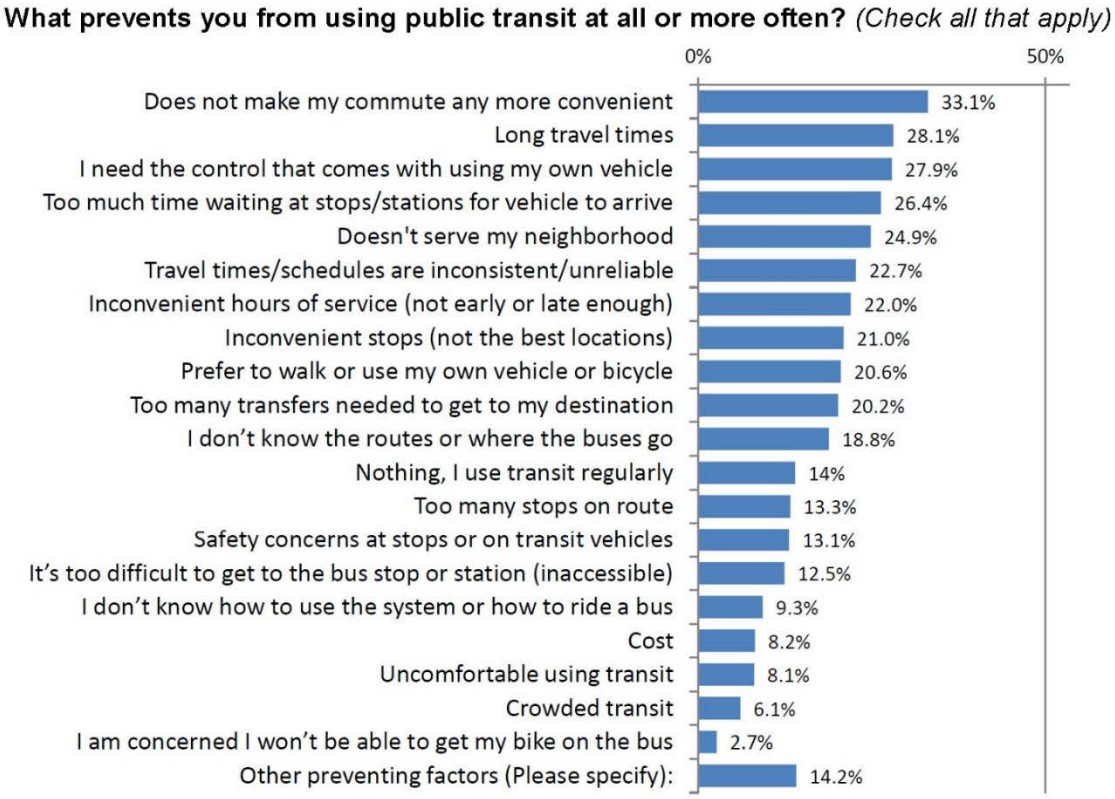


Figure 1-6 | Connect Hampton Roads Survey - Public Transit Barriers



(Page Intentionally Left Blank)

2 Goals, Objectives, and Standards

The Transit Development Plan's (TDP) goals, objectives, and performance measures reflect HRT's core values, the Connect Hampton Roads Strategic Initiative, and build on previous TDP goals. The FY 2018 TDP aims to support concepts put forth by the recently approved HRT 2017 Strategic Plan. As such, Chapter 2 of the TDP summarizes current goals and highlights the new goals, objectives, and performance measurements developed for the 2017 Strategic Plan.

2.1 VISION, MISSION, GOALS & OBJECTIVES

2.1.1 Current

Vision: Our vision is to be the most efficient and customer driven public transit agency in Virginia.

Mission: Our mission is to serve the community through high quality, safe, efficient and sustainable regional transportation services.

Goals:

- Provide quality customer experiences in all cities. Connect Hampton Roads with quality transit services that effectively support the regional economy and quality of life.
- Implement smart and innovative business practices that increase cost-savings and efficient, sustainable operations.
- Build partnerships with employers, military, colleges and universities, and other private and public stakeholders.

2.1.2 Proposed

Following the review of past agency goals and 2011 HRT TDP objectives, HRT's Senior Executive Team (SET) held two all-day workshops to review and evaluate the current vision, mission, goals, and objectives, and a half-day workshop to review strategies and performance measures to achieve and assess those objectives. The workshops provided HRT's SET members with a chance to come together and analyze the agency's strengths, weakness, opportunities, and threats. This framework was used to generate new goals and objects based on SMART (Specific, Measurable, Agreed, Realistic, Time-bound) principals and was informed by the agency's current operating climate.

The Transportation District Commission of Hampton Roads was involved in the review and approval of the updated vision, mission, goals, and objectives. These updated statements were also presented to the public through the public outreach process of the FY2018-FY2027 TDP.

Vision: A valued regional partner that drives prosperity and makes life better for our community.

Mission: To connect Hampton Roads through high quality, safe, efficient, and sustainable transportation services.

Goals:

- Provide a **quality service** that is easy to use and enhances people's lives.
- Foster **regional quality of life** and economic vitality.
- Ensure **financial stewardship** and cost-effective operations that further financial partnerships and community trust.
- Build an innovative workplace **culture** to ensure that HRT remains relevant to the dynamic needs of our region.

Each goal was tied to SMART objectives, detailed in **Table 2-.**

Table 2-1 | Updated Goals and Objectives

Goal	Objective
Provide a quality service that is easy to use and enhances people's lives.	Provide reliable and desirable service and amenities that serve people where and when they need to travel with a quality passenger experience.
	Achieve and maintain a high rate of customer satisfaction.
	Offer a safe and secure transportation service.
Foster regional quality of life and economic vitality.	Maximize access for residents, employees, and visitors to and between regional activity centers, job centers, and workforce development opportunities.
	Contribute to congestion mitigation and improved mobility.
	Contribute to regional air quality, and pollution reduction goals.
	Build community trust as a valuable partner in a thriving region.
Ensure financial stewardship and cost-effective operations that further financial partnerships and community trust.	Preserve and maintain existing assets and construct financially sustainable assets.
	Provide cost-efficient transit service that offers good value for the investment.
	Demonstrate sustainable business practices to ensure our long-term viability.
Build an innovative workplace culture to ensure that HRT remains relevant to the dynamic needs of our region.	Support an empowered workforce that generates efficiencies and innovation within HRT.
	Be an employer of choice in the region and in the industry.
	Inspire and invest in our workforce and develop future leaders.

The updated goals and objectives were then tied to a robust set of performance measures. These measures, where applicable, are held to the same design standards and performance targets as identified in the 2016 Service Standards and Performance policy document. New performance measures will be tracked to establish a baseline and then an annual target will be created. The Performance Measures that were developed through the 2017 Strategic Planning process can be found in **Table 2-2**.

Table 2-2 | Performance Measures

Objective	Performance Measure
Provide reliable and desirable service and amenities that serve people where and when they need to travel with a quality passenger experience.	On-time Performance
	Missed trips
	Mean distance between failures
	Ridership by mode and route, trip and jurisdictions
	Average travel time between key destinations and comparison to auto travel
	Comparison of paratransit travel times with fixed route bus
	Number of trips by ADA eligible riders on fixed route transit
	Percentage of routes that are high, medium, low frequency
	Percentage of routes that run past 6pm/8pm (time TBD)
	Percentage of routes that run peak only, 7 days a week, and weekend only
	Percentage of bus stops that meet defined amenity standards – shelters, benches, trash cans
	Once real-time tracking is in place, track how much it is utilized and its accuracy
	Once mobile ticketing and validators are in place, track usage of purchased tickets
Achieve and maintain a high rate of customer satisfaction.	Number of valid complaints per 100k miles system-wide; and by route; by type of complaint, including operator behavior, late bus, etc. (complaint categories from customer service center)
	Number of customer service calls for trip planning purposes
Offer a safe and secure transportation service.	Number of security incidents – personal and property damage - at HRT customer facilities and on board buses
	Number of accidents per 100,000 miles operated
	Number of significant injury/fatalities
Maximize access for residents, employees, and visitors to and between regional activity centers, job centers, and workforce development opportunities.	Number of trips that connect jurisdictions
	Number of trips that connect activity centers or attractions
	Percent of population within a 1/4 mile of a stop served by high frequency service, medium, and any service at all
	Percent of jobs served by high frequency service, medium service, and any service at all

Objective	Performance Measure
	Percent of activity centers served by high frequency service, medium service, and any service at all
	Passengers per revenue hour
	Percent of hotel rooms, mi within 1/4 mile of bus stop, light rail station, ferry dock by jurisdiction military jobs, educational institutions, and medical facilities
	Percent of underserved populations within 1/4 mile of bus route, light rail station, ferry dock
	Utilization of park and ride lots
Contribute to congestion mitigation and improved mobility.	VMT reduced (TPO model)
	Roadway LOS (TPO model) as compared with population and jobs levels in the region
Contribute to regional air quality, and pollution reduction goals.	VOC and NOX, CO, PM10, PM2.5 reduced as a result of HRT services
Build community trust as a valuable partner in a thriving region.	Percent of positive, negative, neutral press coverage/social media interactions
	Number of Public Private Partnerships (PPP)
	Number of formal partnerships with community organizations
Preserve and maintain existing assets and construct financially sustainable assets.	Difference between projected revenue and projected costs
	Differences between approved and actual budgets by department
	Mean distance between failures
	Average maintenance cost per vehicle
	Average cost of maintaining facilities and transit centers (per square foot basis)
	Attainment of HRT SGR metrics
Provide cost-efficient transit service that offers good value for the investment.	Planned maintenance hours and service hours vs. FTE requirement
	Overhead burden as percent of operating costs
	Average fare per rider / Average fare per GoPass rider
	Average cost per rider
	Call-ins for unpaid boardings
	Local investment per rider
Demonstrate sustainable business practices to ensure our long-term viability.	Percent of capital and operating budgets funded by different sources
	Percent of annual operating budget maintained in a reserve account
	Farebox recovery ratio
Support an empowered workforce that generates efficiencies and innovation within HRT.	Number of ideas submitted by staff
	Number of ideas that become projects and the cost savings realized
Be an employer of choice in the region and in the industry.	Turnover rate by department (voluntary)
	Number of internal promotions

Objective	Performance Measure
	Average tenure by employee type (operator, mechanic, ops supervision, administrative)
	Number of employees attending leadership training opportunities
Inspire and invest in our workforce and develop future leaders.	Number of workplace injuries
	Number of hires from other transit systems
	Average length of position vacancies by type
	Employee Satisfaction Rate (from Pulse survey)

2.2 SERVICE STANDARDS

In May 2016[45], HRT developed a set of service design standards, detailed in the HRT Policy and Procedures Manual: Service Standards and Performance. The design standards detail by service type the minimum requirements for:

- Route design
- Service Area Coverage
- Service Frequency
- Span of Service
- Vehicle Assignment
- New Service Warrants

The HRT's Service Standards and Performance policy also defines evaluation metrics. These metrics serve as a management tool to assess the efficiency, effectiveness, and quality of service delivered. The service standards benchmarks are used to inform decision-making on recommendations for existing and future services.

The metrics consist of six Key Performance Indicators (KPIs) with service targets within three major themes:

- **Service Effectiveness**
  - Passenger Boardings per Revenue Hour
  - Passenger per One-way Trip
- **Cost Efficiency**
  - Farebox Recovery
  - Subsidy per Passenger Boarding
- **Service Quality**
  - On-Time Performance
  - Load Standards

HRT defines the targets for five of the six KPIs based on the type of bus service that is being provided on. HRT has identified six bus service classifications detailed in **Table 2-3** below.

[45] The standards and measures were reviewed in July 2016

Table 2-3 | HRT Route Classification Types

Service Classification	Description
BRT	High frequency, high capacity, and high quality service that uses transit priority measures to speed travel times. Stop spacing is typically greater than local bus with enhanced service characteristics intended to emulate the passenger experience of arterial rail transit.
Core Local Route	High capacity bus service, operating along a major arterial/corridor with frequent service
Local Route	Fixed route transit using various size vehicles operating along an arterial serving a specific community area with connections to the regional network.
Local Lifeline	Fixed route transit using small vehicles serving a community that does not produce significant ridership but service is needed because it provides a lifeline connection to the regional network.
Circulator/Feeder	Fixed route or flexible route typically using a smaller vehicle serving an area confined to a specific locale, such as a downtown area or suburban neighborhood with connections to major traffic corridors.
Limited	Bus service with limited stops connecting surrounding communities with downtown and other major regional destinations.
Express (MAX) Weekday Only	Peak hour express bus service with limited stops connecting surrounding communities with downtown and other major regional destinations via expressways. Typically accessed via park-and-ride lots at the residential end.

The KPI that doesn't have a target tied to a service classification is on-time performance. The on-time performance standard defines a minimum threshold of HRT daily trips that operate on-time. HRT currently defines "on time" as one minute early to 5 minutes late at each time-point. The minimum goal of is 85% on-time performance system-wide at all time-points.

The remaining five KPIs have targets set based on service classifications, weekday and weekend targets are the same where service is provided seven days a week. **Table 2-4** below identifies the targets set for:

- Passenger Boardings per Revenue Hour
- Passenger per One-way Trip
- Farebox Recovery
- Subsidy per Passenger Boarding
- Load Standards

Table 2-4 | KPI Targets by Bus Service Classification

Service Classification	Minimum Passenger Boardings per Revenue Hour	Minimum Passengers per One-Way Trip	Minimum Farebox Recovery	Maximum Subsidy Per Passenger	Maximum Load Standard
BRT/Rapid	50% of the service classification average	NA	50% of the service classification average	Twice the service classification average	125% of seated capacity for two or more miles
Core Local	50% of the service classification average	NA	50% of the service classification average	Twice the service classification average	125% of seated capacity for two or more miles
Local	50% of the service classification average	MA	50% of the service classification average	Twice the service classification average	125% of seated capacity for two or more miles
Local Lifeline	NA	NA	NA	NA	125% of seated capacity
Circulator/Feeder	NA	NA	50% of the service classification average	Twice the service classification average	125% of seated capacity for two or more miles
Limited	50% of the service classification average	NA	50% of the service classification average	Twice the service classification average	100% of seated capacity (125% if operated along arterial)
Express (MAX) – Weekday Only	NA	20	50% of the service classification average	Twice the service classification average	100% of seated capacity

(Page Intentionally Left Blank)

3 Services and System Evaluation

3.1 EXISTING CONDITIONS

The following sections summarize Hampton Roads Transit (HRT) fixed route and paratransit general system attributes and ridership, on-time performance, revenue/cost, and capacity data, creating key performance indicators that measure service effectiveness, service quality and cost efficiency. This information is presented by route, and helps in understanding the route-level service performance.

3.1.1 Fixed-Route Service

In FY 2016 HRT carried 15.2 million passengers, 87 percent of whom rode on HRT's fixed route bus services. The HRT fixed-route bus transit system consists of 70 fixed service routes that primarily operate throughout six independent cities in Virginia – Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach. The system consists of a local service (53 routes), Express Service (ten routes), Peninsula Commuter Service (five routes), and seasonal service in Virginia Beach (three routes).

- **Southside Service:** Serves Norfolk, Virginia Beach, Chesapeake, and Portsmouth (33 local routes) (**Figure 3-**).
- **Peninsula Service:** Serves Newport News, Hampton, Williamsburg and Smithfield (21 local routes, two express/limited stop routes). (**Figure 3-2**).
- **MAX Express Bus Service**: Metro Area Express (MAX) is a regional express service focused on commuters, offers limited stop express service between major destinations in Hampton Roads, including Park and Ride facilities and major employers, including military facilities throughout the region. All MAX routes offer weekday service; two routes offer weekend service, as well (eight express/limited stop routes) (**Figure 3-** and **Figure 3-2**).
- **Peninsula Commuter Services:** The Peninsula Commuter Service is a Monday-Friday express bus service to major employers on the Peninsula, including the Newport News Shipyard (six commuter routes) (**Figure 3-2**).
- **VB Wave:** VB Wave routes are seasonal shuttles providing access to the Virginia Beach waterfront, serving major tourist corridors, campgrounds, and retail (three seasonal routes, operating from May to September) (**Figure 3-**).

Overall, weekday service runs between 3:40 AM and 2:00 AM, each city determines how early/late the service runs and it varies by route between the six member jurisdictions. All late night service (after 10:00 pm) is provided on local routes (Peninsula, Southside, or VB Wave services).

Local routes operate on 15 to 60-minute headway during morning and afternoon peak periods. The following routes operate on 15-minute headways during peak period service:

- Route 1: Downtown Norfolk Pembroke East
- Route 3: Downtown Norfolk/ Naval Station
- Route 15: Evelyn Butts to Robert Hall / Greenbrier Mall
- Route 20: Downtown Norfolk/ Virginia Beach Oceanfront
- Route 45: Downtown Norfolk/ Portsmouth
- Route 47: Downtown Portsmouth/ Churchland
- Route 30: Oceanfront Shuttle (seasonal)

Table 3-1 and **Table 3-2** summarize span of service and headways by service day and time periods for

individual HRT fixed bus routes. HRT time periods are defined as:

- Early: Before 6:00 AM
- AM Peak: 6:00 AM -9:00 AM
- Base: 9:00 AM – 2:30 PM
- PM Peak: 2:30 PM - 5:30 PM
- Evening: 5:30 PM – 10:00 PM
- Late Night: After 10:00 PM

Table 3-1 | Weekday Service Level

Route	Span	Headway (minutes)					
		Early	AM Peak	Base	PM Peak	Evening	Late Night
Southside Services							
1	4:44 AM - 1:30 AM	30	15	30	15	40	60
2	4:51 AM - 11:42 PM	30	30	30	30	49	60
3	5:01 AM - 12:50 AM	30	15	30	15	34	60
4	5:55 AM - 11:15 PM	---	60	60	60	60	---
5	6:12 AM - 6:14 PM	---	60	60	60	---	---
6	5:32 AM - 11:45 PM	30	30	60	30	53	60
8	5:18 AM - 12:15 AM	30	30	30	30	42	60
9	5:48 AM - 11:13 PM	30	30	30	30	42	---
11	6:07 AM - 6:30 PM	---	60	60	60	60	---
12	5:48 AM - 9:38 PM	60	60	60	60	60	---
13	4:48 AM - 11:45 PM	60	25	60	25	42	60
14	6:17 AM - 7:12 PM	---	60	60	60	60	-
15	4:48 AM - 1:17 AM	30	15	30	15	30	60
18	5:42 AM - 10:38 PM	60	60	60	60	60	60
20	4:52 AM - 1:15 AM	30	15	30	15	46	60
21	5:11 AM - 1:17 AM	30	30	30	30	43	60
22	6:03 AM - 6:56 PM	---	60	60	60	60	---
23	5:06 AM - 12:56 AM	30	30	30	30	48	60
25	6:02 AM - 11:45 PM	---	60	60	60	60	60
26	6:29 AM - 6:45 PM	---	30	30	30	30	---
27	5:48 AM - 11:54 PM	30	30	60	30	60	---
29	6:48 AM - 10:19 PM	---	60	60	60	60	---
33	6:35 AM - 10:46 PM	---	60	60	60	60	---
36	5:48 AM - 10:41 PM	30	30	60	30	60	60
41	5:56 AM - 6:53 PM	60	60	60	60	60	---
43	6:36 AM - 6:23 PM	---	60	60	60	60	---
44	6:05 AM - 10:02 PM	---	60	60	60	60	---
45	4:39 AM - 11:54 PM	30	15	30	20	30	60
47	5:49 AM - 10:30 PM	30	15	30	20	30	---
50	6:03 AM - 6:55 PM	---	60	60	60	60	---

Route	Span	Headway (minutes)					
		Early	AM Peak	Base	PM Peak	Evening	Late Night
55	6:30 AM - 7:36 PM	---	60	60	60	60	---
57	6:19 AM - 7:20 PM	---	60	60	60	60	---
58	5:48 AM - 7:15 PM	60	60	60	60	60	---
Peninsula Services							
64	4:40 AM - 7:52 AM; 2:10 PM - 5:27 PM	1 Trip	1 Trip	1 Trip	1 Trip	---	---
101	5:15 AM - 12:10 AM	30	35	35	35	43	60
102	6:19 AM - 8:10 PM	---	60	60	60	60	---
103	5:15 AM - 11:52 PM	30	30	30	30	30	45
104	5:45 AM - 12:43 AM	30	30	30	30	30	40
105	6:12 AM - 12:13 AM	---	60	60	60	60	60
106	5:09 AM - 12:42 AM	20	60	60	60	60	60
107	5:59 AM - 12:21 AM	---	60	60	60	60	60
108	5:55 AM - 11:11 PM	---	60	60	60	60	60
109	6:51 AM - 10:05 PM	---	60	60	60	60	---
110	6:00 AM - 10:50 PM	---	60	60	60	60	60
111	6:25 AM - 10:41 PM	---	48	60	60	60	---
112	5:15 AM - 12:09 AM	30	30	30	30	30	30
114	6:20 AM - 11:41 PM	---	30	30	30	40	60
115	5:45 AM - 12:11 AM	60	60	60	60	60	60
116	6:30 AM - 11:21 PM	---	60	60	60	60	60
117	6:15 AM - 7:38 PM	---	60	60	60	60	---
118	6:15 AM - 10:13 PM	---	60	60	60	60	---
119	5:52 AM - 11:51 PM	---	60	60	60	60	60
120	7:10 AM - 8:48 PM	---	60	60	60	60	
121	6:15 AM - 8:00 AM; 4:05 PM - 5:50 PM	---	1 Trip	---	1 Trip	---	---
VB Wave Services							
30	8:00 AM - 2:00 AM	---	15	15	15	15	15
31	9:30 AM - 11:10 PM	---	20	20	20	20	20
32	10:00 AM - 10:00 PM	---	---	60	60	60	---
Peninsula Commuter Services							
403	5:20 AM - 6:06 AM	1 Trip	---	---	---	---	---
405	5:50 AM - 6:37 AM; 3:40 AM - 4:31 PM	1 Trip	---	---	1 Trip	---	---
414	5:20 AM - 7:49 AM; 4:12 PM - 6:24 PM	1 Trip	1 Trip	---	3 Trip	---	---
415	3:45 PM - 4:25 PM	---	---	---	1 Trip	---	---

Route	Span	Headway (minutes)					
		Early	AM Peak	Base	PM Peak	Evening	Late Night
427	12:15 AM - 12:58 AM	---	---	---	-	---	1 Trip
430	5:35 AM - 6:30 AM; 3:45 PM - 4:26 PM	2 Trip	---	---	1 Trip	---	---
Max Services							
918	5:40 AM - 6:46 AM; 4:03 PM - 4:56 PM	---	1 Trip	---	1 Trip	---	---
919	5:00 AM - 7:46 AM; 2:54 PM - 5:03 PM	23	23	---	20	---	---
922	5:00 AM - 7:49 AM; 2:55 PM - 5:18 PM	17	35	---	28	---	---
960	5:35 AM - 8:27 PM	60	60	60	60	60	-
961	4:55 AM - 11:12 PM	30	30	52	30	53	53
965	5:15 AM - 7:38 AM; 2:45 AM - 5:15 PM	1 Trip	1 Trip	---	2 Trips	---	---
966	5:45 AM - 6:31 AM; 3:40 PM - 4:53 PM	1 Trip	---	---	1 Trip	---	---
967	4:35 AM - 7:14 AM; 3:00 PM - 6:39 PM	17	---	---	24	---	---

Table 3-2 | Weekend Level of Service

	Saturday			Sunday		
Route	Span	Headway (minutes)		Span	Headway (minutes)	
		Base	Late Night		Base	Late Night
Southside Services						
1	4:40 AM - 1:31 AM	30	60	5:37 AM - 1:30 AM	60	60
2	5:11 AM - 1:04 AM	60	60	5:28 AM - 12:10 AM	60	60
3	5:34 AM - 1:35 AM	30	60	6:00 AM - 12:35 AM	60	60
4	7:00 AM - 11:02 PM	60	---	8:00 AM - 10:54 PM	60	---
5	7:17 AM - 6:12 PM	60	---	---	---	---
6	5:32 AM - 12:45 AM	60	60	5:54 AM - 6:44 PM	60	---
8	5:43 AM - 12:45 AM	30	60	6:40 AM - 8:58 PM	60	---
9	5:32 AM - 12:15 AM	60	60	---	---	---
11	6:07 AM - 6:27 PM	60	---	8:42 AM - 5:38 PM	60	---
12	5:48 AM - 9:33 PM	60	---	---	---	---
13	5:26 AM - 12:45 AM	60	60	5:52 AM - 10:35 PM	60	---
14	6:17 AM - 7:12 PM	60	---	---	---	---
15	5:18 AM - 12:45 AM	30	60	6:46 AM - 12:45 AM	60	60

Route	Saturday			Sunday		
	Span	Headway (minutes)		Span	Headway (minutes)	
		Base	Late Night		Base	Late Night
18	6:16 AM - 10:18 PM	60	----	---	---	-
20	5:22 AM - 1:14 AM	30	60	6:23 AM - 1:13 AM	60	60
21	5:12 AM - 1:38 AM	30	60	6:43 AM - 1:38 AM	60	60
22	6:03 AM - 6:50 PM	60	---	---	---	---
23	5:02 AM - 1:22 AM	30	60	6:23 AM - 9:25 PM	60	---
25	6:03 AM - 12:45 AM	60	60	---	---	---
26	7:32 AM - 6:46 PM	30	---	---	---	---
27	5:48 AM - 1:03 AM	60	65	---	---	---
29	6:48 AM - 10:25 PM	60	---	---	---	---
33	6:30 AM - 10:47 PM	60	---	6:00 AM - 6:56 PM	45	---
36	6:10 AM - 10:43 PM	60	---	---	---	---
41	6:03 AM - 6:55 PM	60	---	---	---	---
43	6:50 AM - 6:01 PM	60	---	---	---	---
44	6:05 AM - 10:01 PM	60	---	---	---	---
45	5:10 AM - 12:51 AM	30	60	6:06 AM - 10:51 PM	60	---
47	6:03 AM - 10:30 PM	30	---	6:33 AM - 7:30 PM	60	---
50	7:03 AM - 6:29 PM	60	---	---	---	---
55	7:48 AM - 8:12 PM	60	---	---	---	---
57	6:18 AM - 7:20 PM	60	---	---	---	---
58	5:48 AM - 7:15 PM	60	---	---	---	---
Peninsula Services						
101	5:15 AM - 12:10 AM	35	60	5:45 AM - 7:38 PM	60	---
102	7:19 AM - 7:10 PM	60	---	8:20 AM - 7:08 PM	60	---
103	5:15 AM - 11:52 PM	30	45	7:30 AM - 8:07 PM	45	---
104	5:45 AM - 12:43 AM	30	40	5:45 AM - 7:43 PM	30	---
105	6:15 AM - 12:13 AM	60	60	8:15 AM - 8:13 PM	60	---
106	5:09 AM - 12:42 AM	60	60	5:59 AM - 8:19 PM	60	---
107	5:59 AM - 12:21 AM	60	---	7:07 AM - 8:27 PM	60	---
108	5:55 AM - 11:11 PM	60	---	6:33 AM - 6:43 PM	60	---
109	7:45 AM - 9:10 PM	60	---	6:45 AM - 7:10 PM	60	---
110	7:00 AM - 10:50 PM	60	---	8:00 AM - 7:48 PM	60	---
111	6:50 AM - 10:41 PM	60	---	7:50 AM - 7:41 PM	60	---
112	5:15 AM - 12:09 AM	30	30	6:15 AM - 8:07 PM	60	---
114	6:45 AM - 11:41 PM	30	---	6:45 AM - 7:41 PM	60	---
115	6:15 AM - 10:08 PM	60	---	8:15 AM - 7:41 PM	60	---
116	6:30 AM - 11:21 PM	60	---	7:05 AM - 7:13 PM	60	---
117	8:15 AM - 7:38 PM	60	---	8:15 AM - 6:38 PM	60	---

Route	Saturday			Sunday		
	Span	Headway (minutes)		Span	Headway (minutes)	
		Base	Late Night		Base	Late Night
118	6:15 AM - 10:13 PM	60	---	8:15 AM - 7:13 PM	60	---
119	5:52 AM - 11:51 PM	60	60	6:33 AM - 7:51 PM	60	---
120	8:10 AM - 8:48 PM	60	---	8:10 AM - 6:48 PM	60	---
VB Wave Services						
30	8:00 AM - 2:00 AM	15	15	8:00 AM - 2:00 AM	15	15
31	9:30 AM - 11:10 PM	20	20	9:30 AM - 11:10 PM	20	20
32	10:00 AM - 10:00 PM	60	60	10:00 AM - 10:00 PM	60	---
MAX Services						
960	6:30 AM - 8:28 PM	60	---	7:50 AM - 8:53 PM	60	---
961	4:58 AM - 10:57 PM	30	---	7:00 AM - 8:58 PM	60	---

Figure 3-1 | HRT System Map - Southside

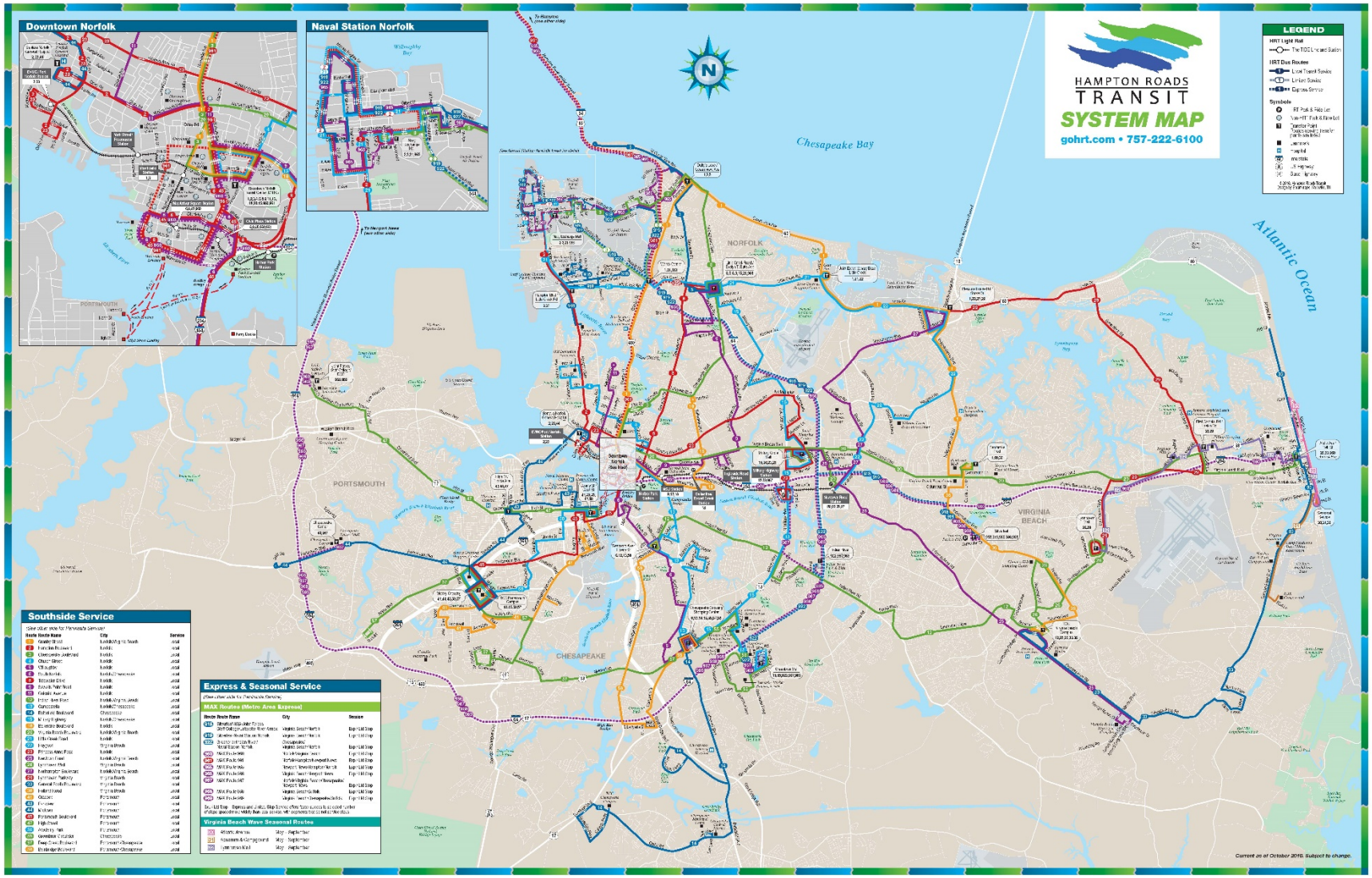
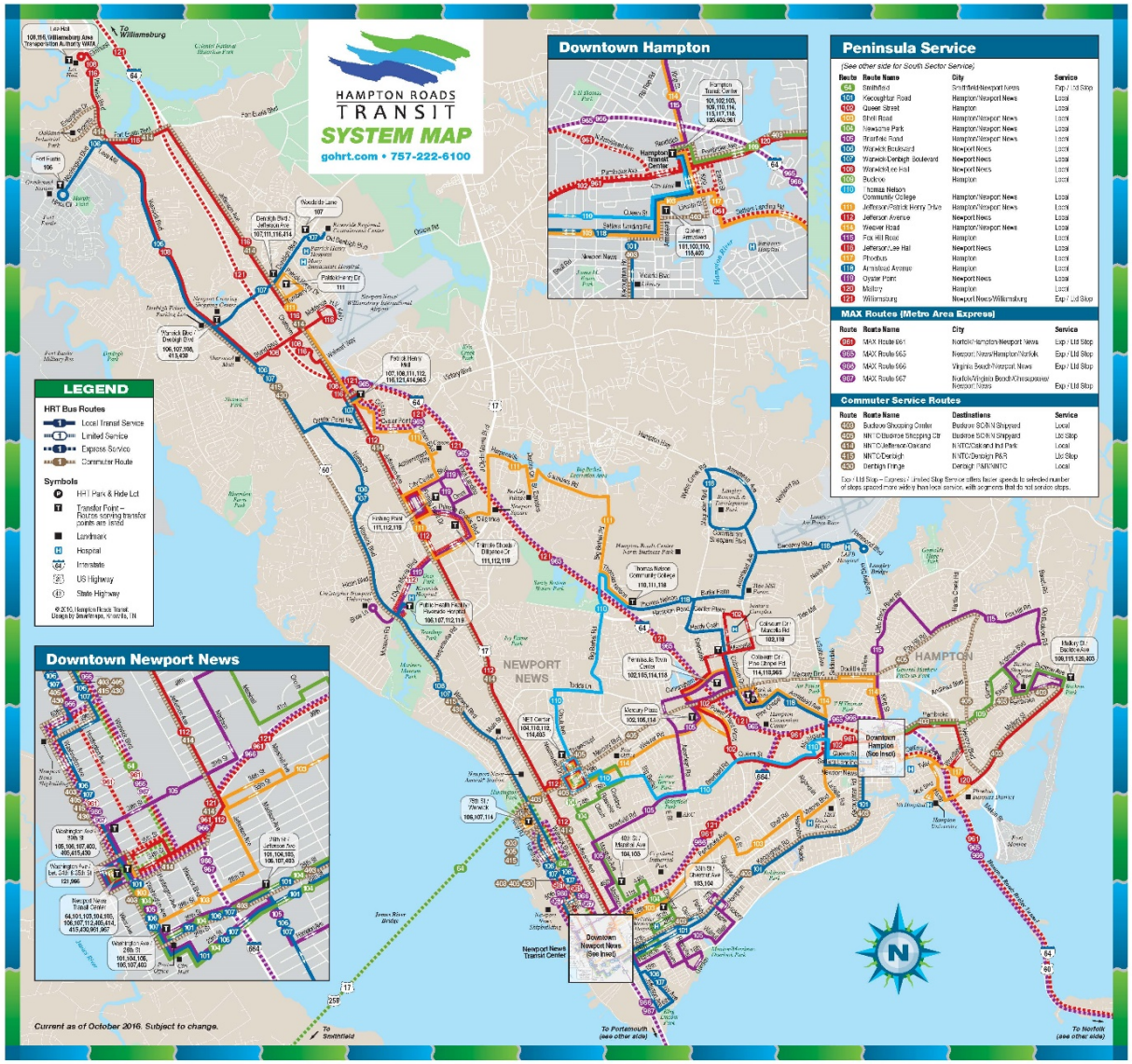


Figure 3-2 | HRT System Map - Peninsula



3.1.2 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 a 3/4-mile radius 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.

3.1.3 Other Transit Services

In addition to local, express and seasonal fixed-route bus services, additional public transit services are operated by HRT and other local providers throughout the Hampton Roads region. The following sections provide a brief overview of each of these services.

Elizabeth River Ferry

HRT contracts with Elizabeth River Crossings Opco, LLC, to provide service on three 150-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.

The Tide

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. The Tide is the first light rail transit (LRT) system in Virginia. The Tide operates seven days a week.

Other Regional Transit

Suffolk Transit

The City of Suffolk, Virginia, located just west of HRT's Southside communities, operates Suffolk Transit, which provides fixed route and paratransit service to downtown Suffolk. Suffolk Transit was formed in January 2012, utilizing Virginia Regional Transit (VRT) as the City's service provider.[46] Suffolk Transit operates six fixed routes, two of which connect with HRT. The connections occur at the Chesapeake Center in Chesapeake (Gold Route) and at College Drive and Lakeview Parkway (Blue Route) in Suffolk.[47]

Williamsburg Area Transit Authority (WATA)

The Williamsburg Area Transit Authority (WATA) operates nine fixed routes and three specialty routes just north of HRT's Peninsula service area in James City County, the City of Williamsburg, and the Bruton District of York County.[48] Five WATA routes (Orange Line, Gray Line, Tan Line, Red Line, Blue Line) serve the Williamsburg Transportation Center, which connects to HRT Route 121. WATA service also connects with HRT service at Lee Hall (Elmhurst Lane) in Newport News, Routes 108 and 116.

3.1.4 Activity Centers

There are a number of major activity centers in the HRT service area that are located within approximately ¼ mile from HRT fixed route bus service.

HRT is developing criteria to identify activity centers within its service area, including:

- Employment centers with 1,000+ employees;
- Retail centers with 400,000+ square feet of leasable space;
- Education centers with 2,500+ students;
- Major medical facilities with out-patient care; and
- Central Business Districts or Major Commercial District

HRT is also interested in identify medium to high density areas and neighborhoods. For the TDP, census

[46] Suffolk Transit, Accessed at http://www.suffolkva.us/pub_wks/transit/

[47] Suffolk Transit Blue Route and Gold Route, Accessed at http://www.suffolkva.us/files/8614/3835/8137/Suffolk_BlueGold_-_update.pdf

[48] WATA History, Accessed at http://gowata.org/171/History

block groups with 10,000 or greater persons per square mile will be used to help evaluate current and potential future service changes.

Table 3-3 provides an overview of the major generators that each route serves by municipality, and transit connections possible at each generator.

Table 3-3 | Activity Center Transit Connections

Type	Name	Routes
Chesapeake		
Business District	Greenbrier Business District	15, 55
Education	Tidewater Community College - Chesapeake	14
Government	Chesapeake City Hall and Municipal Complex	14
Hospital	Chesapeake Regional Medical Center	14
Major Employer	Capital One (HSBC)	55
	LTD Management Company, LLC	55
	Dollar Tree	55
Shopping	Chesapeake Crossing – Robert Hall	6, 13, 14, 15, 55, 57, 58
	Chesapeake Square Mall	44
	Great Bridge Shopping Center	14
	Greenbrier Mall	15, 55, 922, 967, 969
	Greenbrier Market center	55
	Parkview Shopping Center	15, 55
	Woodford Square	14
Hampton		
Transit Center	Hampton Transit Center	101, 102, 103, 109, 110, 114, 115, 117, 118, 961, 403
	Net Center	104, 110, 112, 114, 405
Business District	Coliseum Central	102, 105, 114, 118, 405, 965
Cultural & Arts	The American Theater	117, 120
	Casemate Museum, Fort Monroe	No service
	Charles H. Taylor Arts Center	101
	Hampton History Museum	101, 103, 110, 118, 403
	Virginia Air/Space Museum	No Service
Education	Thomas Nelson Community College	110, 11, 118
	Hampton University	117
Government	Hampton City Hall	101, 103, 110, 117, 118
Hospital	Sentara CarePlex Hospital	102, 118,
	Veterans Affairs Medical Center	117
Major Employer	Hampton Roads Transit (HRT) – Northside Facility	103
	NASA Langley Research Center	118
	TE Connectivity, Ltd.	118
Military	Fort Eustis	106, 108, 116, 414

Type	Name	Routes
	Langley Air Force Base	118
Shopping	Buckroe	109, 115, 403, 405
	Coliseum Crossing	102, 105, 114, 118
	Coliseum Square Center	102, 105, 114, 118, 405, 965
	Hampton Woods Plaza	110
	Langley Square	114, 405
	Newmarket South	104, 110, 112, 113, 114, 405, 414
	Peninsula Town Center	102, 105, 114, 118, 965
	Todd Center	102, 105, 114, 121, 405
	Willow Oaks Village Square	115, 405
Recreation	Hampton Coliseum	118
	Hampton Convention Center	118
Norfolk		
Transit Center	Downtown Norfolk Transit Center (DNTC)	1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 45, 960, 961
	Wards Corner Transfer Center	1, 21, 961
Business District	Downtown Norfolk CBD	6, 8, 45, 960, 961, TIDE
Cultural & Arts	Chrysler Hall	1, 3, 961
	Chrysler Museum of Art	2, 11
	Governors School for the Arts	961, TIDE
	Harrison Opera House	2, 11
Education	Tidewater Community College - Norfolk	6, 8, 45, 960, 961, TIDE
	Virginia Wesleyan College	27
	Eastern Virginia Medical School	2, 23, 44, TIDE
	Norfolk State University	9, 13, 18, TIDE
	Old Dominion University	2, 4
Government	Norfolk Circuit Court	6, 8, 45, 960, 961, TIDE
	Norfolk City Hall	6, 8, 45, 960, 961, TIDE
Hospital	Lake Taylor Hospital	15, 23
	Norfolk General Hospital	2, 23, 44, TIDE
	Sentara Leigh Hospital	20, 25
	Bon Secours DePaul Medical Center	1, 961
Major Employer	Automatic Data Processing (ADP)	6, 8, 45, 960, 961, TIDE
	BAE Systems Norfolk Ship Repair	6
	Bank of America	6, 8, 45, 960, TIDE
	Children's Hospital (CHKD)	2, 23, 44, TIDE
	Dominion Enterprises	6, 8, 45, 960, TIDE
	Hampton Roads Transit (HRT) – Southside Facility	1, 3, 961

Type	Name	Routes
	PRA Group, Inc.	15, 23, 967, TIDE
Military	Naval Station Norfolk	2, 3, 21, 919, 922, 965
	Naval Support Activity	2, 918
	US Army Corps of Engineers - Norfolk District	2, 23, TIDE
Recreation	Harbor Park Stadium	TIDE
	Kroc Center	18, 23
	Norview Community Center	3, 9
	Scope Arena	1, 3, 961
Shopping	Janaf	15, 20, 23, 25
	MacArthur Center	6, 8, 45, 960, 961, TIDE
	Military Circle	15, 20, 23, 25
	Ocean View	1, 3, 5, 965
	Southern Shopping Center	5, 8, 9, 21
Newport News		
Transit Center	Newport News Transit Center	64, 101, 103, 104, 105, 106, 107, 112, 121, 961, 966, 967, 405, 414, 415, 430
Business District	City Center	111, 112, 119
Cultural & Arts	Endview Plantation	No Service
	Ferguson Center for the Arts	106, 107
	Lee Hall Mansion	No Service
	Mariners Museum	No Service
	Peninsula Fine Arts Center	No Service
	Virginia War Museum	106, 107
Education	Christopher Newport University	106, 107, 119
Hospital	Mary Immaculate Hospital	107, 111
	Riverside Regional Medical Center	106, 107, 112, 119, 415, 430
Major Employer	AAFES Dan Daniel Distribution Center	414
	Canon Virginia, Inc.	111
	Newport News Shipbuilding	64, 101, 103, 105, 106, 107, 112, 403, 405, 415, 430, 961, 966, 967
	Tech Center/Jefferson Lab	111, 112, 414
Military	Naval Support Activity (Lafayette River Complex)	2, 918
Multimodal Connection	Amtrak Station	106, 107
Recreation	Denbigh Community Center	106, 108
Shopping	Jefferson Commons	111, 116, 414

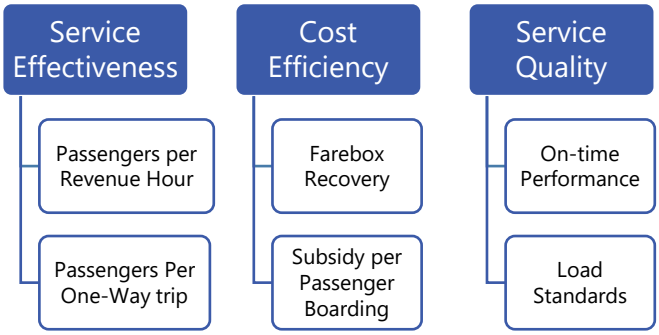
Type	Name	Routes
	Marketplace at Tech Center	112, 414
	Oyster Point Square	111, 112, 414
	Patrick Henry Mall	107, 108, 111, 112, 116, 121, 414, 965
	Warwick Center	106, 107
Portsmouth		
Transit Center	County & Court	41, 43, 45, 57, 50
Business District	Downtown Portsmouth	41, 43, 45, 47, 50
Cultural & Arts	Children's Museum of Virginia	43, 47
	Portsmouth Arts and Cultural Center	43, 47
	Portsmouth Naval Shipyard Museum	43, 47
Education	Tidewater Community College - Portsmouth	44, 45, 50, 57
Hospital	Bon Secours Maryview Medical Center	47
	Naval Medical Center Portsmouth	43
	Portsmouth Naval Medical Center	43
	US Coast Guard - Base Portsmouth	No service
Major Employer	Norfolk Naval Shipyard	41, 45
Shopping	Churchland	47
	Victory Crossing	41, 44, 45, 50, 57
Virginia Beach		
Business District	Town Center	1, 20, 36
Cultural & Arts	Francis Land House	20
	Lynnhaven House	No service
	Museum of Contemporary Art	960
	Sandler Center for the Performing Arts	36
Education	Bryant and Stratton College	36
	Old Dominion University	25, 33
	Regent University	12
	TCC - Virginia Beach	12, 25, 26, 33, 36
Government	Virginia Beach Municipal Center	25, 33
Hospital	Princess Anne Hospital	25, 33
	Sentara Independence	1
	Virginia Beach General Hospital	29
Major Employer	Christian Broadcasting Network, Inc./Regent University	12
	GEICO Direct	No service
	Gold Key / PHR Hotels & Resorts	33
	Hall Automotive Group	29

Type	Name	Routes
	HSBC, Inc.	55
	LifeNet Health	25, 33
	STIHL, Inc.	29
	Wellpoint, Inc. (Amerigroup Corporation)	No service
Military	Joint Expeditionary Base Little Creek - Fort Story (West)	1, 21, 22
	Joint Expeditionary Base Little Creek - Fort Story (East)	No service
	Naval Air Station Oceana	No service
	Naval Air Station Oceana (Dam Neck Annex)	No service
	Naval Amphibious Base Little Creek	1, 21, 22, 27, 29
	Navy Exchange Service Command (NEXCOM)	20
Recreation	Farm Bureau Live	25, 33
	Virginia Aquarium	33
	Virginia Beach Convention Center	960
	Virginia Beach Oceanfront	30, 31, 32, 33, 20, 28, 960
	Williams Farms Recreation Center	22
Shopping	Chimney Hill	26, 36
	College Park Square	12, 15
	Cypress Point	22
	Great Neck Village	29
	Green Run Square	26, 36
	Haygood	1, 22
	Hilltop	20, 29, 32
	Holland Plaza	36
	KempsRiver Crossing	12
	La Promenade	20, 29, 32
	Loehmann's Plaza	20
	London Bridge Shoppes	20, 29
	Lynnhaven Crossing	26, 29, 32
	Newpointe	22, 27
	Pembroke	1, 20, 36
	Pleasant Valley Marketplace	12
	Red Mill Commons Shopping Center	33
	Regency Hilltop	20, 29, 32
	Strawbridge Marketplace	33
	Timberlake	36

3.1.5 Performance Indicators

HRT's performance indicators[49] were used to assess how the service is performing at route and system levels, using key measure categories such as service effectiveness, cost efficiency, and service quality (**Figure 3-3**).

Figure 3-3 | HRT Key Performance Indicators



DRPT also requires transit systems to incorporate performance measures as defined in the June 2014 SB1140 Performance-Based Funding Allocation Study report,[50] adopted regional transit or mobility vision plans and/or CLRPs to the extent possible. These performance measures are net cost per passenger (addressed in Cost Efficiency), passengers per revenue hour and passengers per revenue mile (both addressed in Service Effectiveness).

Annual Ridership

In FY 2016, HRT's Southside, Peninsula, PCS, MAX and VB Wave routes served a combined total of over 13.2 million riders. HRT routes served an average of 188,876 riders per year in FY 2016. By service, the FY 2016 average ridership per route was:

- Southside: 264,289 passengers
- Peninsula: 189,774 passengers
- PCS: 13,190 passengers
- MAX: 51,926 passengers
- VB Wave: 94,753 passengers

Route 20 (Downtown Norfolk/Virginia Beach Oceanfront) had the highest overall ridership in FY 2016, with more than 1.2 million riders, representing 9.1 percent of all HRT fixed route bus ridership. Route 20 is followed in ridership by Route 1 (Downtown Norfolk Pembroke East) and Route 15 (Evelyn Butts to Robert Hall/Greenbrier Mall), which – combined – account for over 12 percent of all HRT fixed route bus ridership.

The top five annual ridership routes were all local Southside service; the top two routes (Route 20 and Route 1) connect Norfolk with Virginia Beach, and the remainder connect Norfolk with surrounding communities and military installations (**Table 3-4)**.

As detailed in **Table 3-5**, the highest ridership Peninsula route is Route 112 (Downtown Newport News/Patrick Henry Mall); the highest ridership PCS route is Route 414 (NNTC/Jefferson/Oakland); the highest ridership MAX route is Route 961 (Newport News – Hampton to Norfolk); and the highest ridership VB Wave route is Route 30 (Oceanfront Shuttle).

Route 64 (To Smithfield/Gwaltney and Northrop Grumman) and Route 121 (Patrick Henry Mall, Williamsburg Transportation Center) have low ridership, but each route provides Express/Limited Stop service with only four trips per day, two in the morning and two in the afternoon peak periods, operating Monday-Friday.

VB Wave Routes 31 (Aquarium and Campground Shuttle) and 32 (Shoppers Shuttle) each have less than quarter of the ridership than VB Wave Route 30 (Oceanfront Shuttle), but those routes also operate at lower frequencies and more limited spans than Route

[49] Hampton Roads Transit Policies and Procedures PD-112 – Service Standards and Performance, July 2016.
[50] Virginia Department of Rail and Public Transportation, SB1140 Performance-Based Funding Allocation Study. June 2014. Accessed at http://www.drpt.virginia.gov/media/1345/final-performance-based-funding.pdf

30. **Figure 3-4** through **Figure 3-8** provide route level detail on total and average annual ridership by service.

Table 3-4 | Top Ten Routes by Annual Ridership, FY16

Route	Service	Route Name	Annual Ridership	Percent of Total Ridership
20	Southside	Downtown Norfolk/Virginia Beach Oceanfront	1,204,112	9.1%
1	Southside	Downtown Norfolk Pembroke East	868,159	6.6%
15	Southside	Evelyn Butts to Robert Hall/Greenbrier Mall	731,736	5.5%
3	Southside	Naval Station Norfolk/Hampton Boulevard	620,954	4.7%
21	Southside	Little Creek Road	580,076	4.4%
45	Southside	Downtown Norfolk/ Portsmouth	546,052	4.1%
112	Peninsula	(Jefferson) Downtown Newport News/ Riverside Hospital	523,512	4.0%
106	Peninsula	Newport News / Warwick Boulevard / Denbigh / Fort Eustis	402,249	3.0%
114	Peninsula	(Weaver Rd.) Newmarket/ Downtown Hampton	394,028	3.0%
8	Southside	Downtown Norfolk/ Little Creek Amphib. Base	384,575	2.9%

Table 3-5 | Top Route by Annual Ridership for each Service, FY16

Route	Service	Route Name	Annual Ridership	Percent of Total Ridership
20	Southside	Downtown Norfolk/Virginia Beach Oceanfront	1,204,112	9.1%
112	Peninsula	Downtown Newport News/Riverside Hospital	523,512	4.0%
414	PCS	NNTC/Jefferson/Oakland	26,627	0.2%
961	MAX	Newport News – Hampton to Norfolk	199,237	1.5%
30	VB Wave	Oceanfront Shuttle	229,176	1.7%

Figure 3-4 | Southside: Annual Ridership by Route, FY16

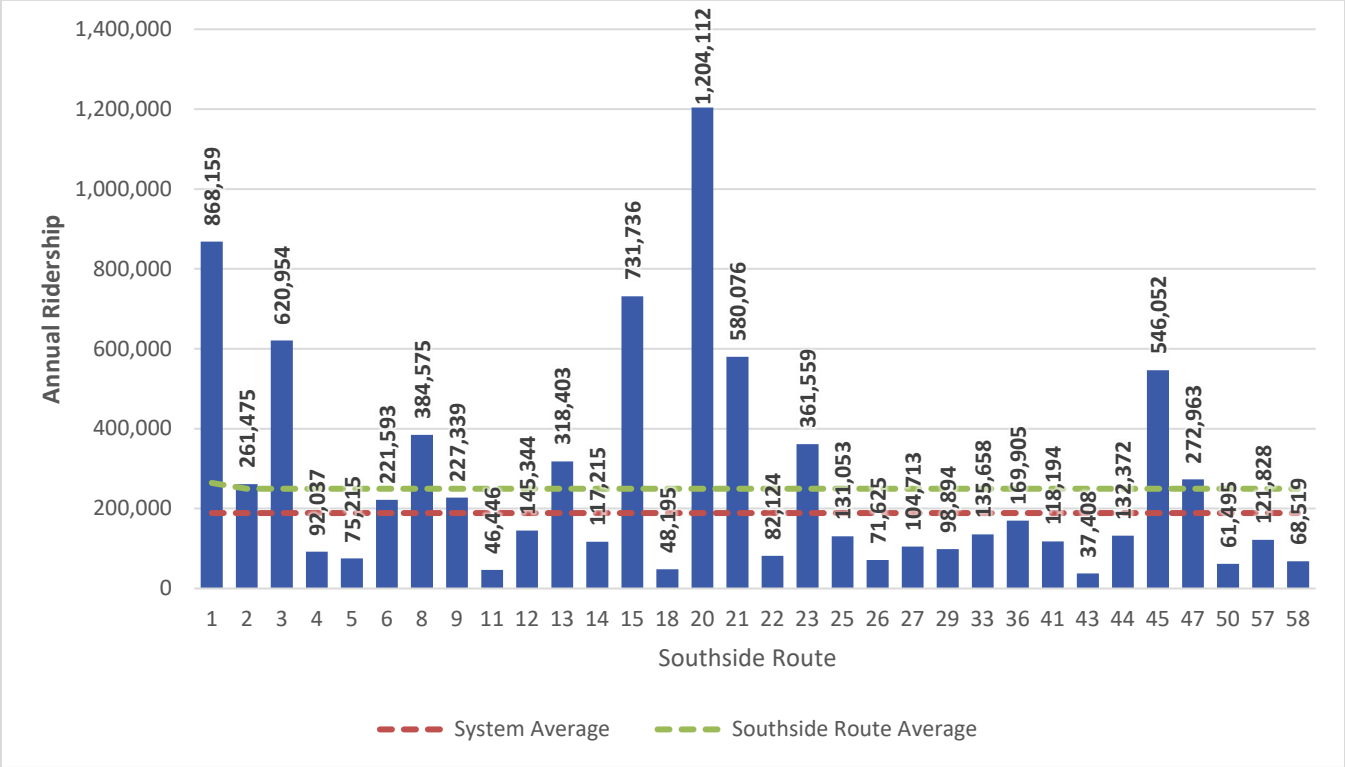


Figure 3-5 | Peninsula: Annual Ridership by Route, FY16

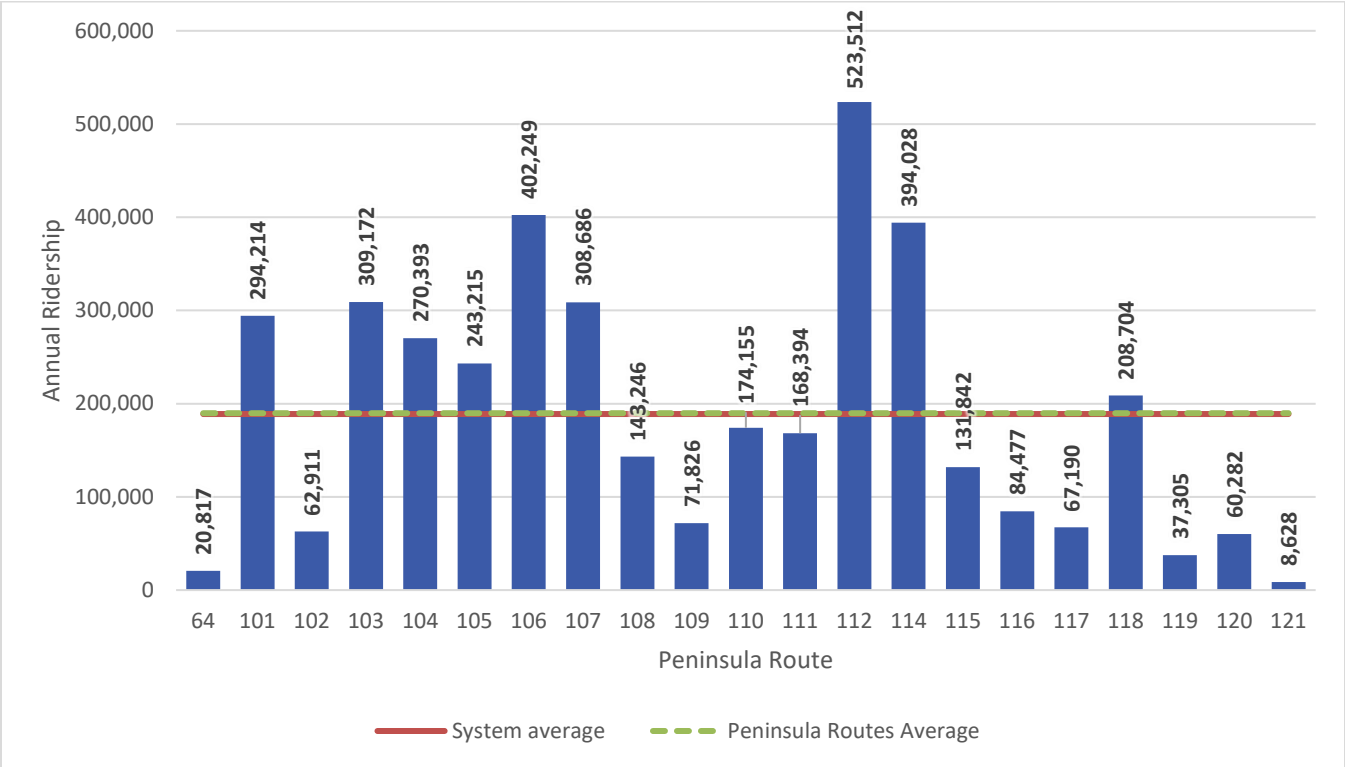


Figure 3-6 | PCS: Annual Ridership by Route, FY16

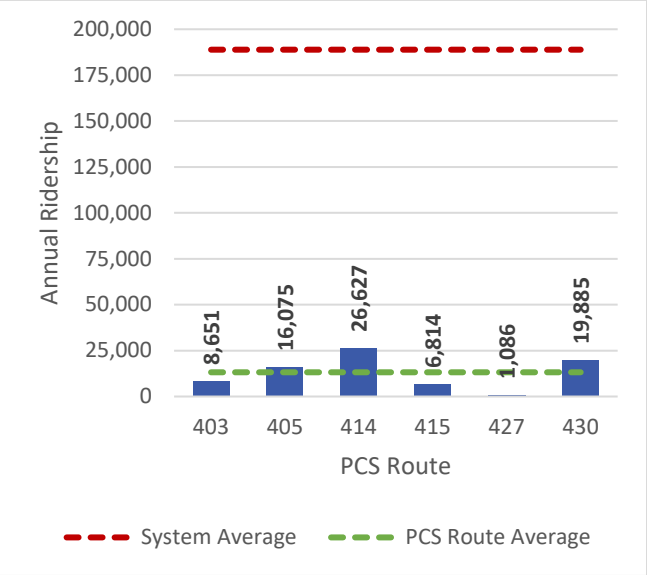


Figure 3-7 | MAX: Annual Ridership by Route, FY16

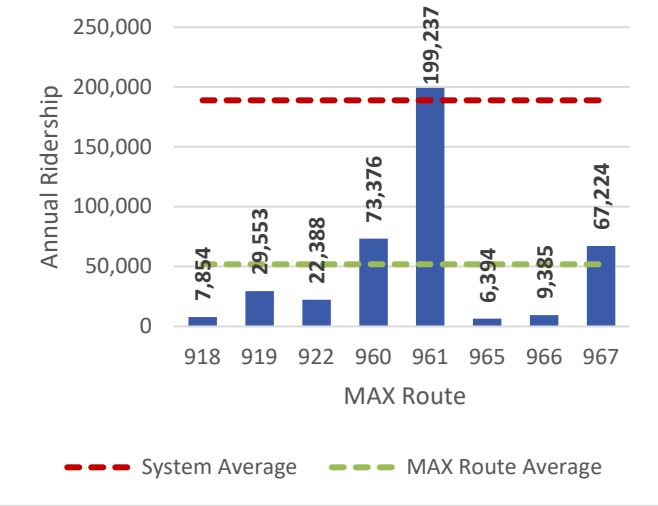
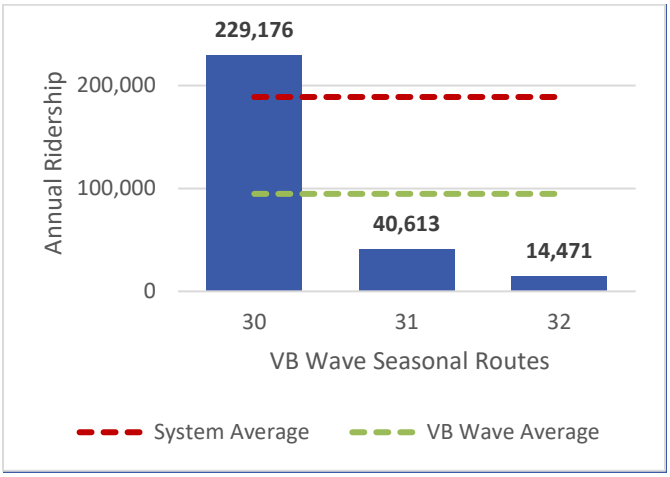


Figure 3-8 | VB Wave: Annual Ridership by Route, FY16



Service Effectiveness

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.

Route 117 (Hampton University/V.A. Hospital), was the most productive route in FY 2016, with 28 passengers per revenue hour; Route 403 (Buckroe Shopping Center) and Route 101 (Downtown Newport News/Downtown Hampton) are also productive, with 25 or more passengers per revenue hour. The least productive route was Route 965 (Patrick Henry Mall/Peninsula Town Center/Naval Station Norfolk), which has two passengers per revenue hour, followed by Routes 918 (Virginia Beach to Joint Forces Staff College Norfolk/ Naval Station Norfolk) and 427 (Denbigh Midnight), which each have four passengers per revenue hour. **Table 3-6** and **Table 3-7** detail the top five routes in the entire system and by service for FY 2016.

The average number of passengers per revenue hour – across the entire system – is 16. The average number of passengers per revenue hour for Southside routes is 14; for Peninsula routes, 17; for PCS/MAX routes, 11; and for VB Wave routes, 11 passengers per revenue hour. **Figure 3-9** through **Figure 3-13** illustrate the passengers per revenue hour by route for each service.

Table 3-6 | Top Five Routes by Passengers per Revenue Hour, FY16

Route	Service	Route Name	Passengers per Revenue Hour
117	Peninsula	Hampton University/V.A. Hospital	28
403	PCS	Buckroe Shopping Center	27
101	Peninsula	Downtown Newport News/Downtown Hampton	25
13	Southside	Downtown Norfolk/ Robert Hall Boulevard/ TCC – Chesapeake	24
405	PCS	NNTC/ Buckroe	23

Table 3-7 | Top Route by Passengers per Revenue Hour for each Service Type, FY16

Route	Service	Route Name	Passengers per Revenue Hour
13	Southside	Downtown Norfolk/ Robert Hall Boulevard/ TCC – Chesapeake	24
117	Peninsula	Hampton University/V.A. Hospital	28
403	PCS	Buckroe Shopping Center	27
961	MAX	Newport News – Hampton to Norfolk	9
30	VB Wave	Oceanfront Shuttle	15

Figure 3-9 | Southside: Passengers per Revenue Hour, FY16

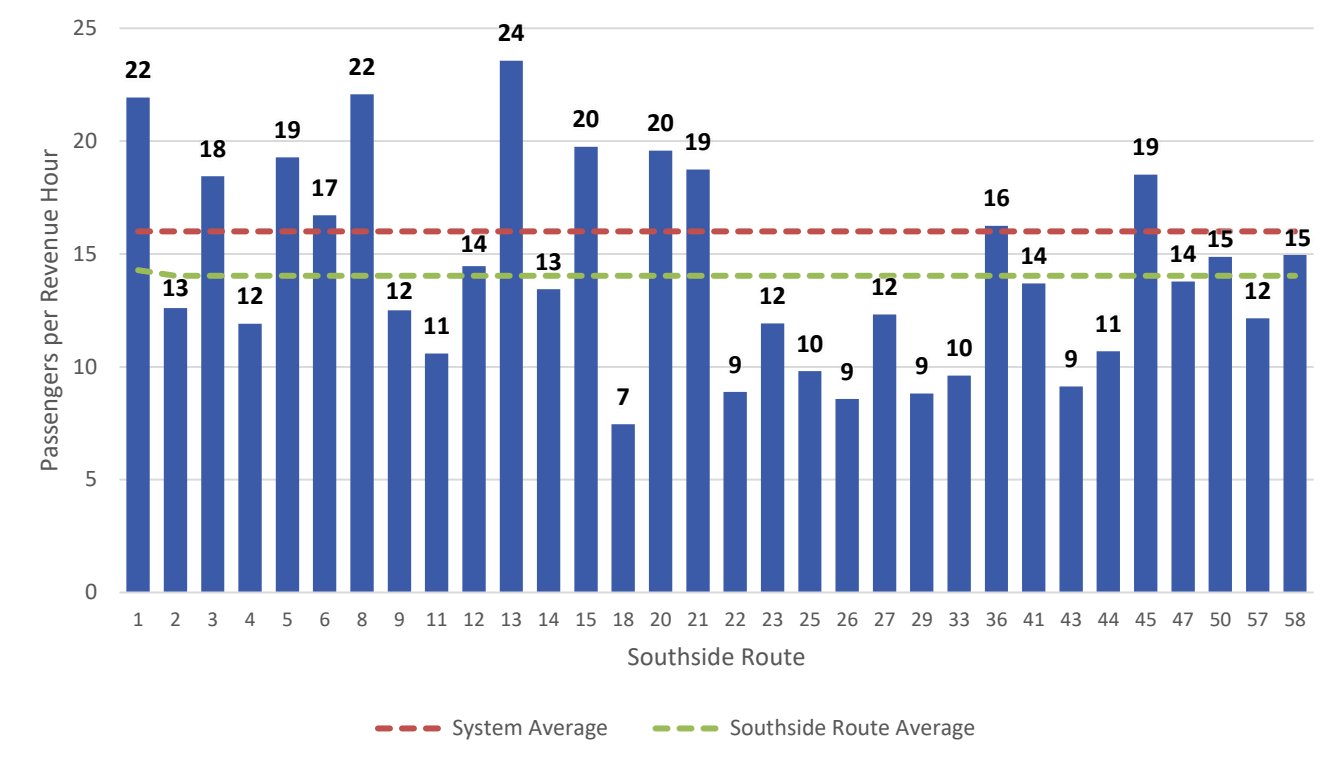


Figure 3-10 | Peninsula: Passengers per Revenue Hour, FY16

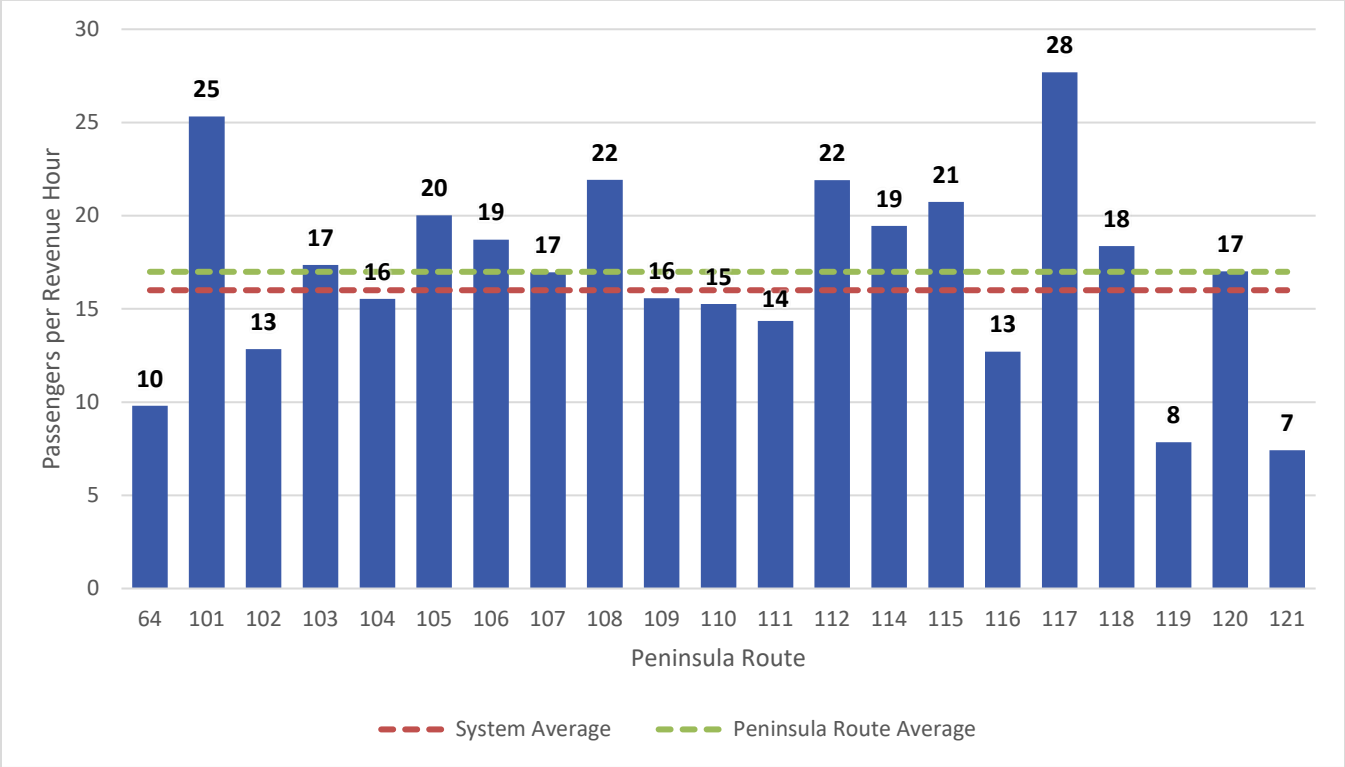


Figure 3-11 | PCS: Passengers per Revenue Hour, FY16

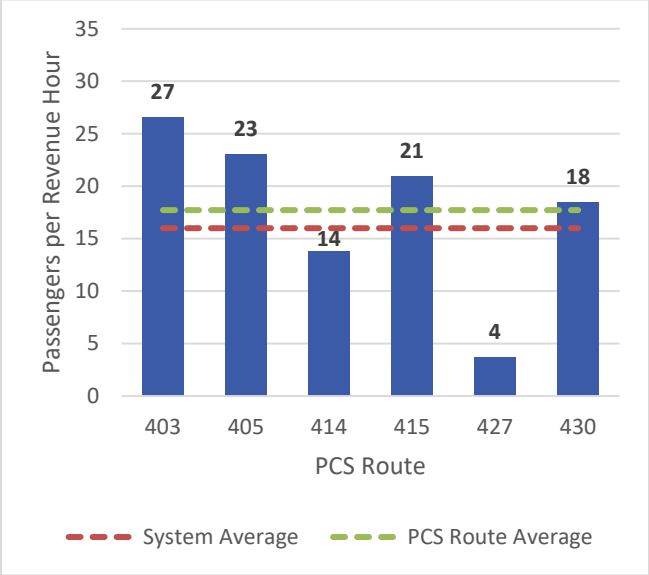


Figure 3-12 | MAX: Passengers per Revenue Hour, FY16

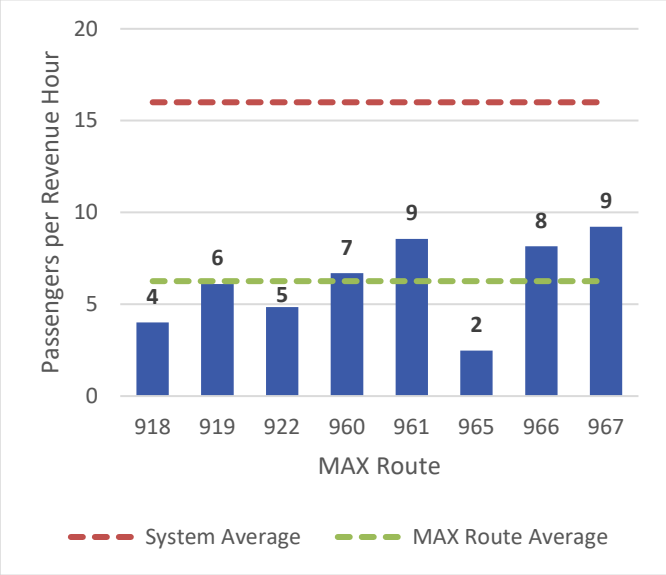
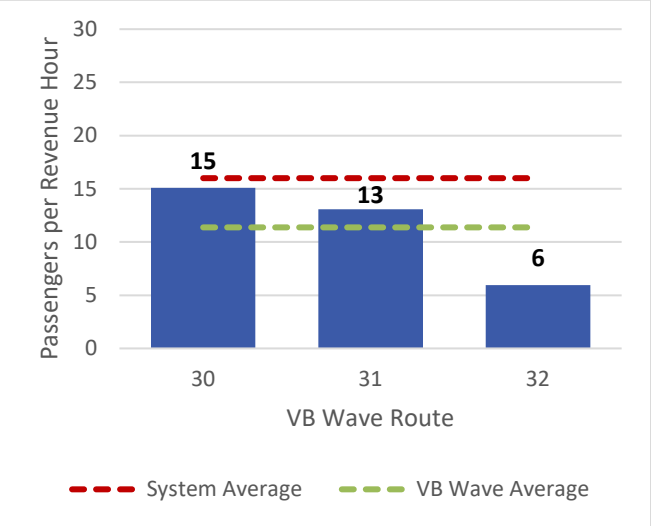


Figure 3-13 | VB Wave: Passengers per Revenue Hour, FY16



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.

For FY 2016, Route 20 (Downtown Norfolk/ Virginia Beach Oceanfront) averaged 42 passengers per one-way trip, the highest in the HRT fixed-route bus system. Other high performers are the Route 403 (Buckroe Shopping Center) and Route 405 (NNTC Buckroe), which both average more than 30 passengers per trip. The least productive routes were Route 119 (Oyster Point) Patrick Henry Mall/ Thimble Shoals Blvd), Route 427 (Denbigh Midnight) and Route 32 (Shoppers Shuttle) with three, four and four passengers per trip, respectively. **Table 3-8** and **Table 3-9** detail the top five routes in the entire system and by service for FY 2016.

Overall, HRT routes carry 14 passengers per one-way trip. The average number of passengers per trip for Southside Routes is 14; for Peninsula routes, 14; for PCS/MAX routes, 17 passengers per trip; and for VB Wave 5 passengers per trip. **Figure 3-14** through **Figure 3-18** illustrate the passengers per revenue hour by route for each service.

Table 3-8 | Top five Routes by Passengers per One-Way Trip, FY16

Route	Service	Route Name	Passenger per One-Way Trip
20	Southside	Downtown Norfolk/ Virginia Beach	42
403	PCS	Buckroe Shopping Center	34
405	PCS	NNTC Buckroe	32
1	Southside	Downtown Norfolk Pembroke East	29
108	Peninsula	Denbigh Fringe	27

Table 3-9 | Top Route by Passengers per One-Way Trip for each Service Type, FY16

Route	Service	Route Name	Passenger per One-Way Trip
20	Southside	Downtown Norfolk/ Virginia Beach	42
108	Peninsula	Denbigh Fringe	27
403	PCS	Buckroe Shopping Center	34
967	MAX	Virginia Beach - Chesapeake to Newport News	20
31	VB Wave	Aquarium and Campground Shuttle	7

Figure 3-14 | Southside: Passengers per One-Way Trip, FY16

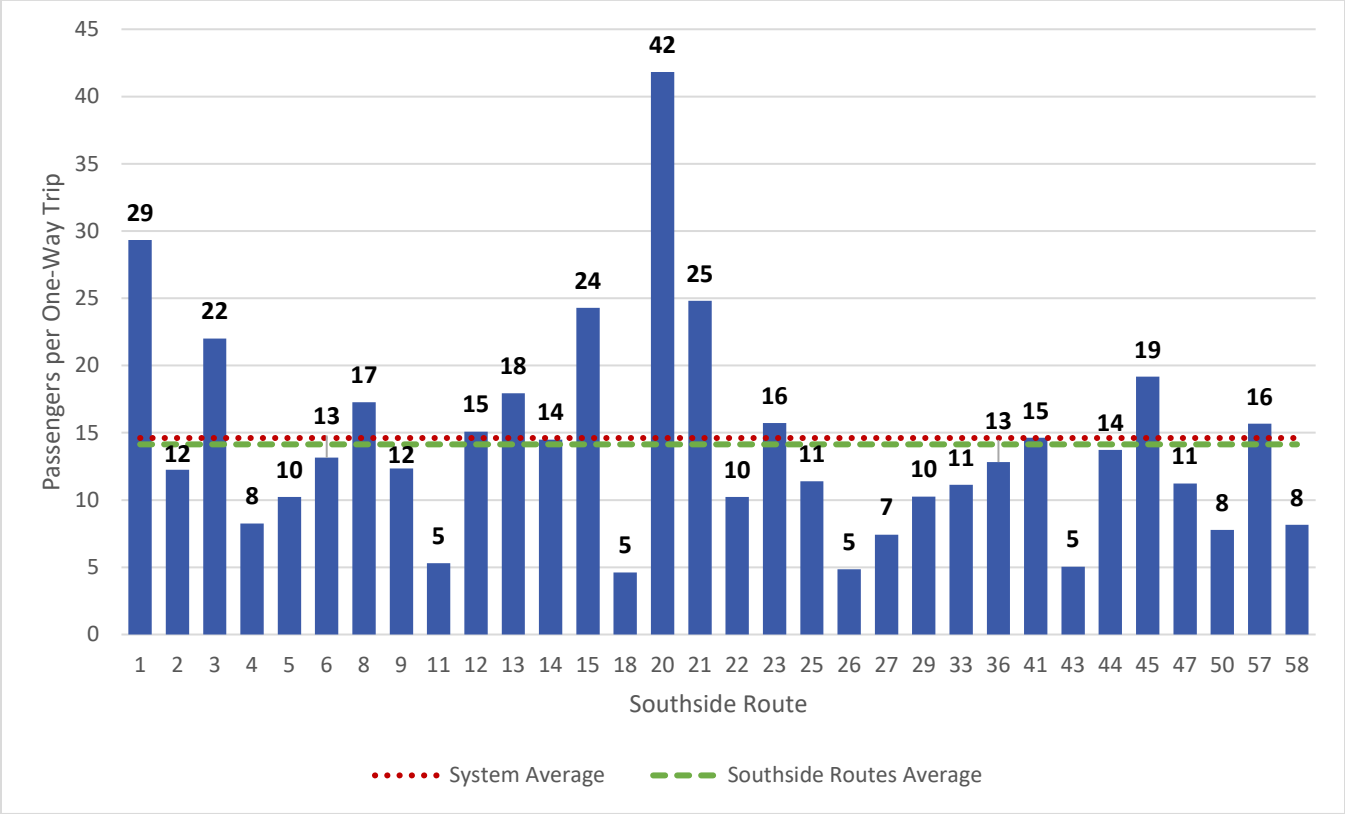


Figure 3-15 | Peninsula: Passengers per One-Way Trip, FY16

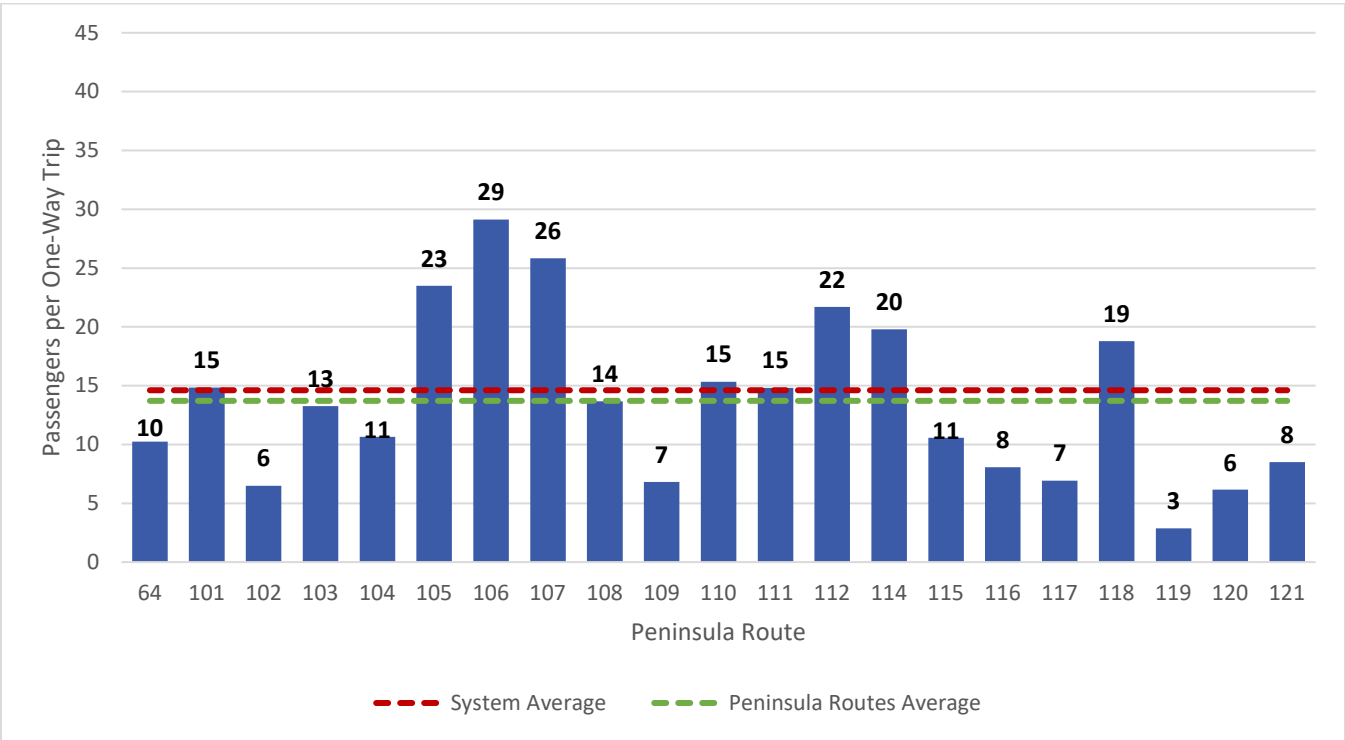


Figure 3-16 | PCS: Passengers per One-Way Trip, FY16

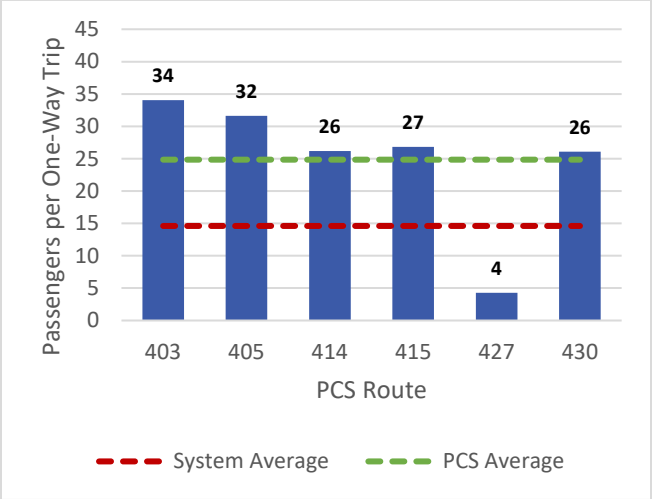


Figure 3-17 | MAX: Passengers per One-Way Trip, FY16

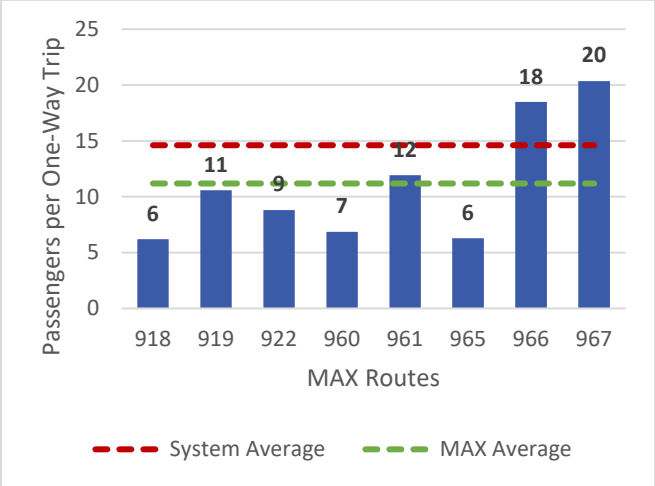
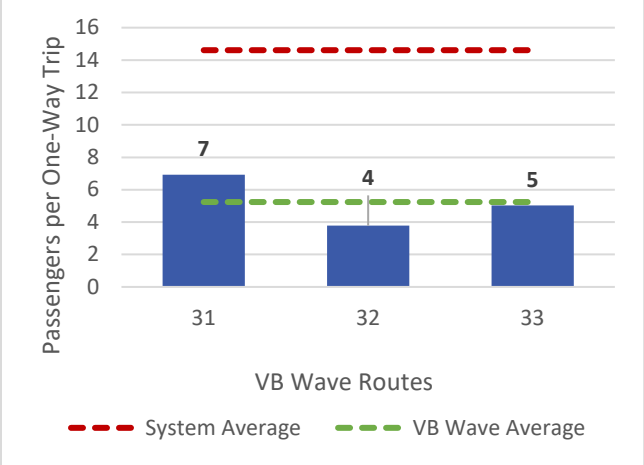


Figure 3-18 | VB Wave: Passengers per One-Way Trip, FY16



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.

When measured by passengers per revenue mile, Route 30 (Oceanfront Shuttle), Route 13 (Downtown Norfolk/ Robert Hall Boulevard/ TCC – Chesapeake), and Route 117 (Hampton University/ V.A. Hospital) are the most productive routes, each carrying more than 2.6 passengers per revenue mile. Routes 121 (Patrick Henry Mall, Williamsburg Transportation Center) and 965 (Patrick Henry Mall/ Peninsula Town Center/ Naval Station Norfolk) are the least productive carrying less than 0.25 passengers per revenue mile. **Table 3-10** and **Table 3-11** detail the top five routes in the entire system and by service for FY 2016.

The system wide average number of passengers per revenue mile is 1.3. The Southside route's average number of passengers per revenue mile is slightly higher than average at 1.4 passengers per revenue mile. The Peninsula Routes are at 1.3, and the PCS / MAX routes are lower at 0.9 passenger per revenue mile, while the VB wave routes are above average at 1.6 passengers per mile. **Figure 3-19** through **Figure 3-23** illustrate the average passenger per mile by route.

Table 3-10 | Top Five Routes by Passengers per Revenue Mile, FY16

Route	Service	Route Name	Passengers per Revenue Mile
30	VB Wave	Oceanfront Shuttle	2.9
13	Southside	Downtown Norfolk/Robert Hall Boulevard/TCC-Chesapeake	2.8
117	Peninsula	Hampton University/VA Hospital	2.7
21	Southside	Little Creek Road	2.2
415	PCS	NNTC/Denbigh	2.2

Table 3-11 | Top Route by Passengers per Revenue Mile for each by Service Type, FY16

Route	Service	Route Name	Passengers per Revenue Mile
13	Southside	Downtown Norfolk/Robert Hall Boulevard/TCC-Chesapeake	2.8
117	Peninsula	Hampton University/VA Hospital	2.7
415	PCS	NNTC/Denbigh	2.2
966	MAX	Silverleaf Park & Ride/Newport News Transit Center	0.5
30	VB Wave	Oceanfront Shuttle	2.9

Figure 3-19 | Southside: Passengers per Revenue Mile, FY16

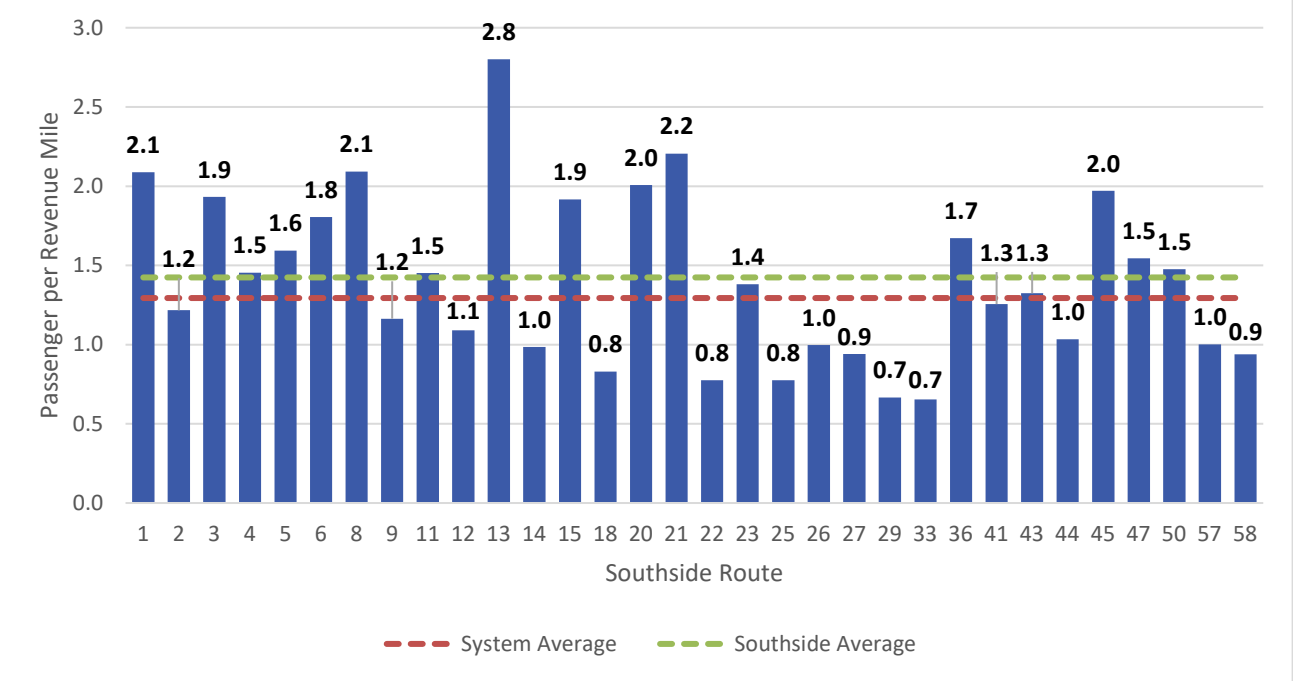


Figure 3-20 | Peninsula: Passengers per Revenue Mile, FY16

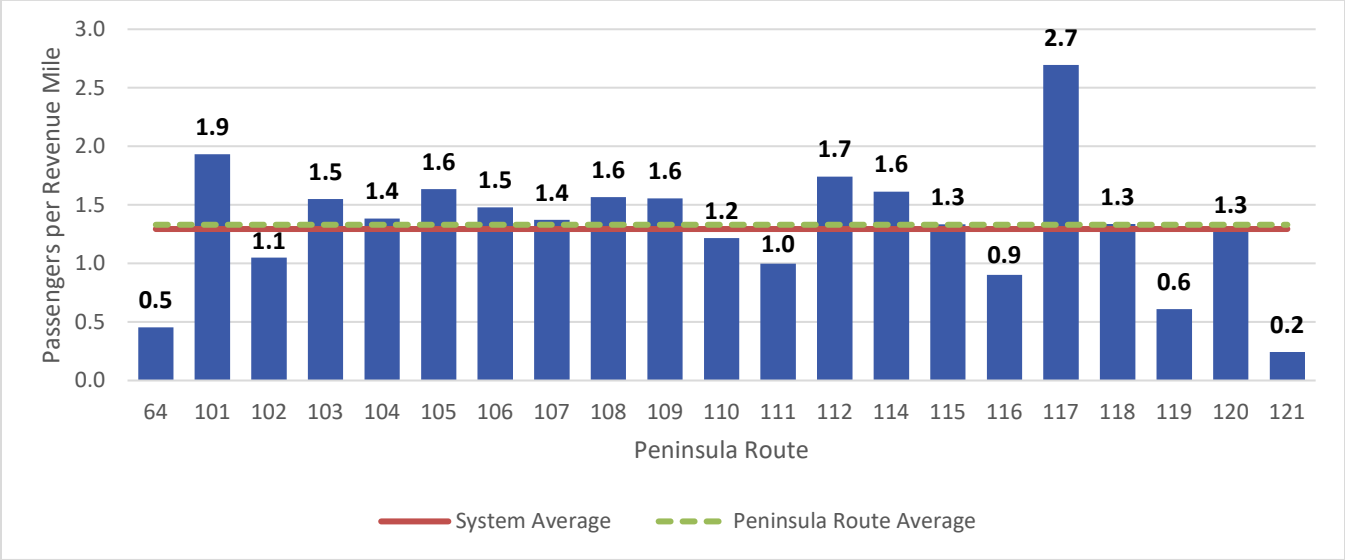


Figure 3-21 | PCS: Passengers per Revenue Mile, FY16

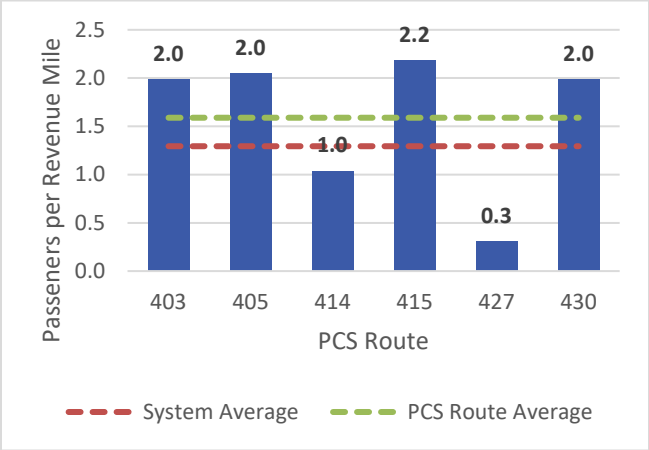


Figure 3-22 | MAX: Passengers per Revenue Mile, FY16

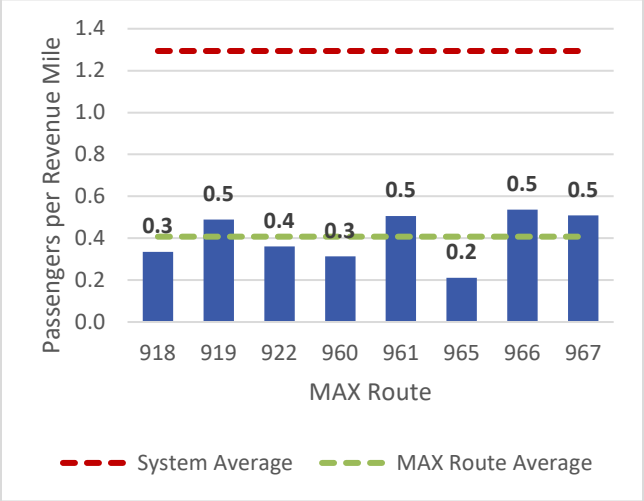
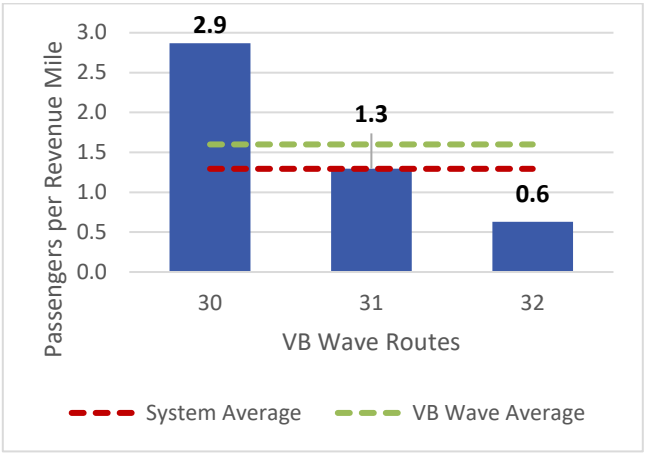


Figure 3-23 | VB Wave: Passengers per Revenue Mile, FY16



Cost Efficiency

Farebox Recovery

Farebox recovery measures the percentage of operating costs recovered through rider fares; the farebox recovery ratio is a comparison of the total cost to operate a route to the total fare revenue collected by the route.

The route with the highest FY 2016 cost recovery is Route 403 (Buckroe Shopping Center), which recoups 43 percent of its operating costs through passenger fares. Route 403 is followed by Routes 415 (NNTC/

Denbigh), 405 (NNTC/ Buckroe), 430 (Denbigh Fringe), 47 (Downtown Portsmouth/ Churchland), 45 (Downtown Norfolk/ Portsmouth), and 13 (Downtown Norfolk/ Robert Hall Boulevard/ TCC – Chesapeake), all of which receive more than 30 percent of operating costs through passenger fares. The routes with the lowest FY 2016 cost recoveries were Route 965 (Patrick Henry Mall/ Peninsula Town Center/ Naval Station Norfolk), Route 32 (Shoppers Shuttle), and Route 427 (Denbigh Midnight), which each had a recovery ratio under six percent. **Table 3-12** and **Table 3-13** identify the top five routes in the entire system and by service for FY 2016.

For adults, Southside, Peninsula and PCS routes charge $1.75 per trip; VB Wave routes charges $2.00 per trip; and MAX routes charge $3.50 per trip. Overall, the system average farebox recovery ratio is 21 percent. The average recovery ratio for the Southside routes is 19 percent, Peninsula Routes is 19 percent, PCS/MAX routes is 20 percent, and VB Wave routes is 9 percent. **Figure 3-24** through **Figure 3-28** detail the individual farebox recovery ratio for each route.

Table 3-12 | Top Five Routes by Farebox Recovery Ratio, FY16

Route	Service	Route Name	Farebox Recovery Ratio
403	PCS	Buckroe Shopping Center	43%
415	PCS	NNTC/ Denbigh	39%
405	PCS	NNTC/ Buckroe	38%
430	PCS	Denbigh Fringe	34%
47	Southside	Downtown Portsmouth/ Churchland	33%

Table 3-13 | Top Route by Farebox Recovery Ratio for each by Service Type, FY16

Route	Service	Route Name	Farebox Recovery Ratio
47	Southside	Downtown Portsmouth/ Churchland	33%
108	Peninsula	Denbigh Fringe	29%
403	PCS	Buckroe Shopping Center	43%
961	MAX	Newport News – Hampton to Norfolk	19%
30	VB Wave	Oceanfront Shuttle	13%

Figure 3-24 | Southside: Farebox Recovery Ratio, FY16

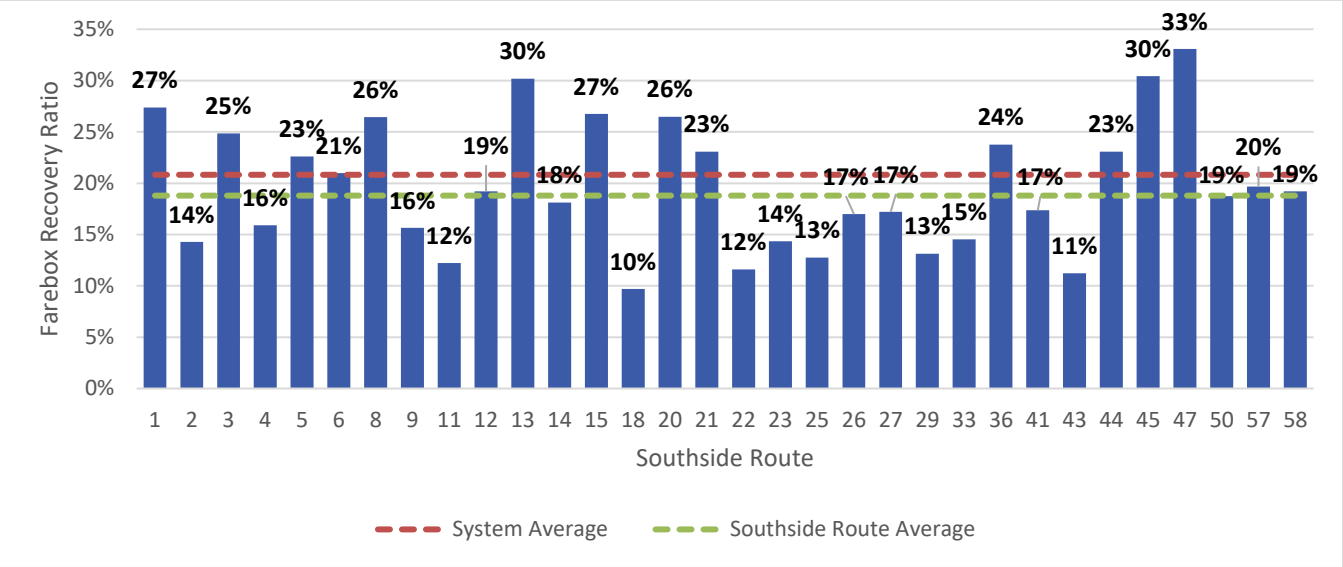


Figure 3-25 | Peninsula: Farebox Recovery Ratio, FY16

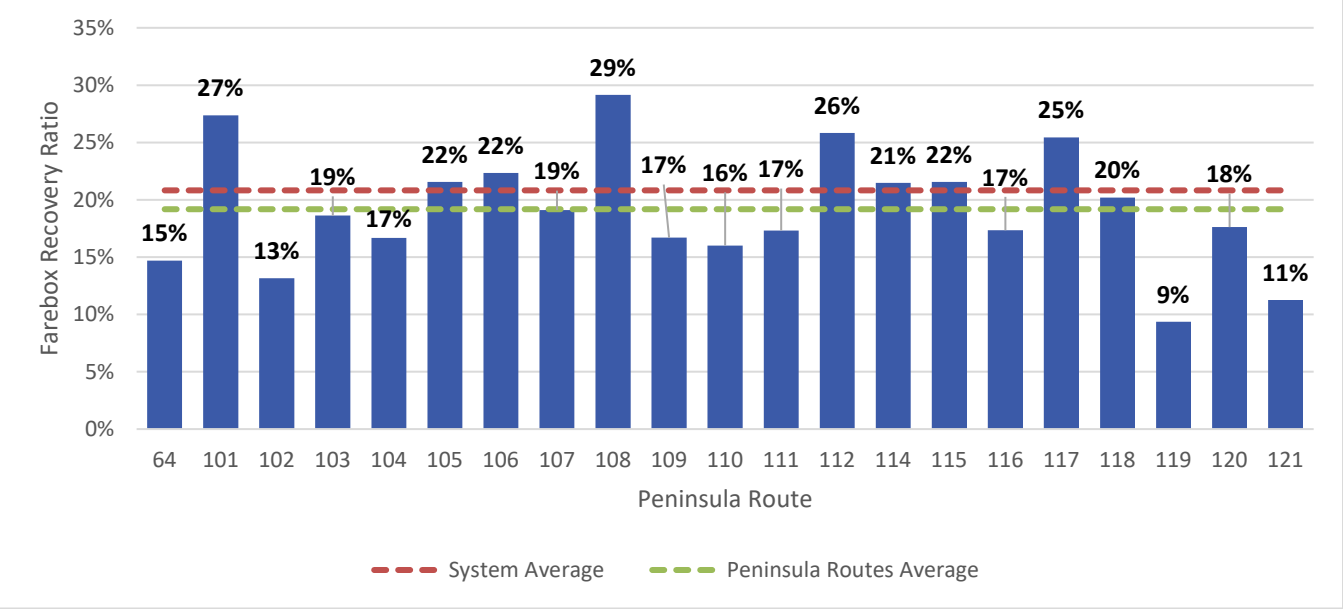


Figure 3-26 | PCS: Farebox Recovery Ratio, FY16

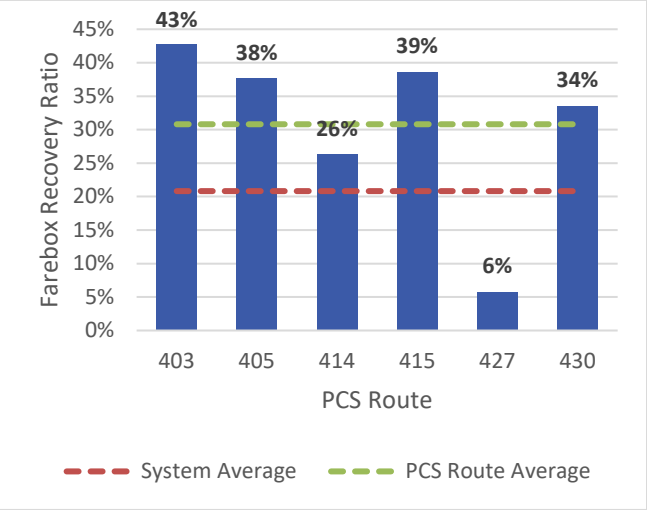


Figure 3-27 | MAX: Farebox Recovery Ratio, FY16

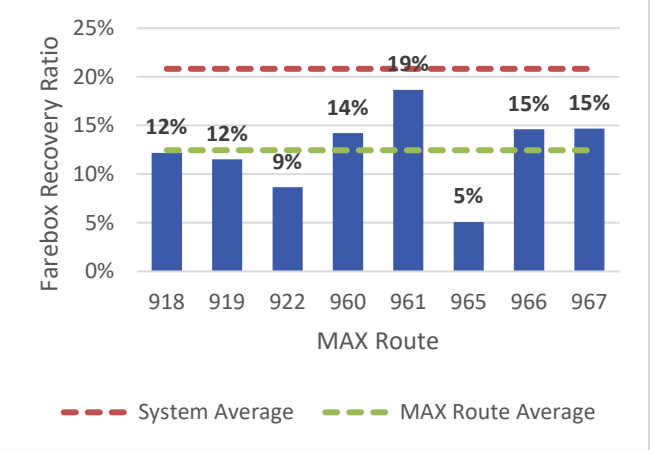
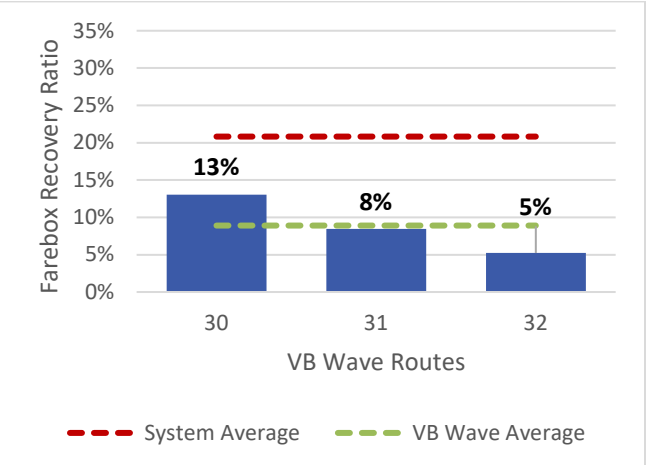


Figure 3-28 | VB Wave: Farebox Recovery Ratio, FY16



Subsidy per Passenger Boarding

Subsidy per passenger 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.

The HRT bus route with the lowest subsidy per passenger trip was Route 403 (Buckroe Shopping Center), at $1.19 per passenger, while the routes with the highest subsidy per passenger trip were Route 965 (Patrick Henry Mall/ Peninsula Town Center/ Naval Station Norfolk) and Route 427 (Denbigh Midnight), at $20.36 and $15.27 per passenger trip, respectively. **Table 3-14** and **Table 3-15** identify the top five routes in the entire system and by service for FY 2016.

The system wide average subsidy per passenger trip was approximately $4.03 per passenger. The average subsidy for the Southside routes is $5.29; for Peninsula Routes, $4.68; for PCS/MAX routes, $7.19; and for VB Wave routes, $8.54 per passenger trip. **Figure 3-29** through **Figure 3-33** highlight the subsidy per passenger by route.

Table 3-14 | Top Five Routes by Subsidy per Passenger, FY16

Route	Service	Route Name	Subsidy per Passenger
403	PCS	Buckroe Shopping Center	$1.19
415	PCS	NNTC/Denbigh	$1.47
405	PCS	NNTC/Buckroe	$1.53
430	PCS	Denbigh Fringe	$1.81
47	Southside	Downtown Portsmouth/Churchland	$2.25

Table 3-15 | Top Route by Lowest Subsidy per Passenger for each by Service Type, FY16

Route	Service	Route Name	Subsidy per Passenger
47	Southside	Downtown Portsmouth/Churchland	$2.25
117	Peninsula	Hampton University/VA Hospital	$2.41
403	PCS	Buckroe Shopping Center	$1.19
967	MAX	Virginia Beach - Chesapeake to Newport News	$5.07
30	VB Wave	Oceanfront Shuttle	$5.12

Figure 3-29 | Southside: Subsidy per Passenger, FY16

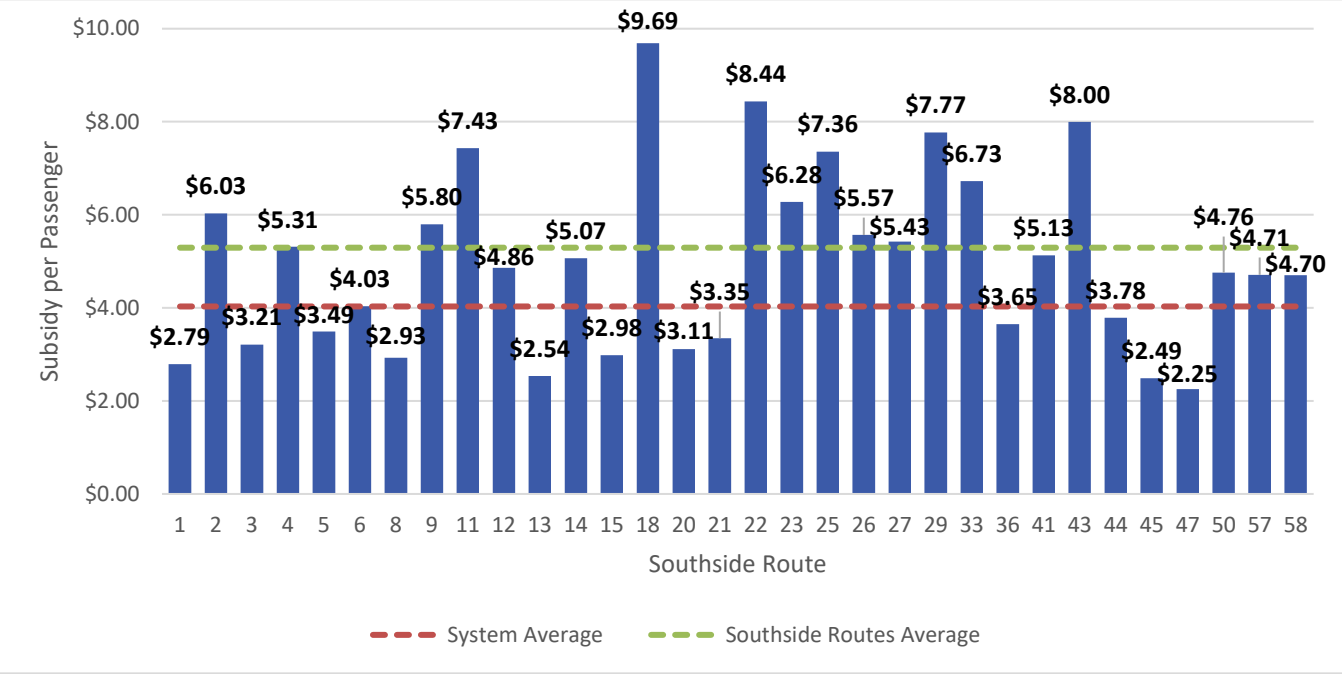


Figure 3-30 | Peninsula: Subsidy per Passenger, FY16

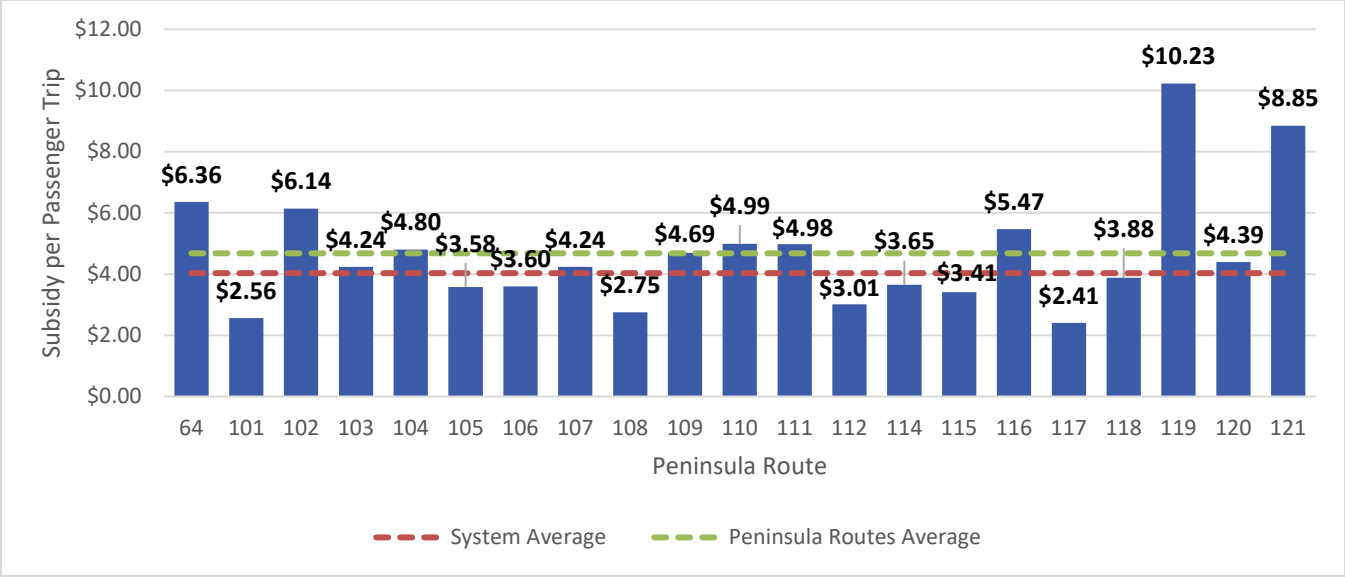


Figure 3-31 | PCS: Subsidy per Passenger, FY16

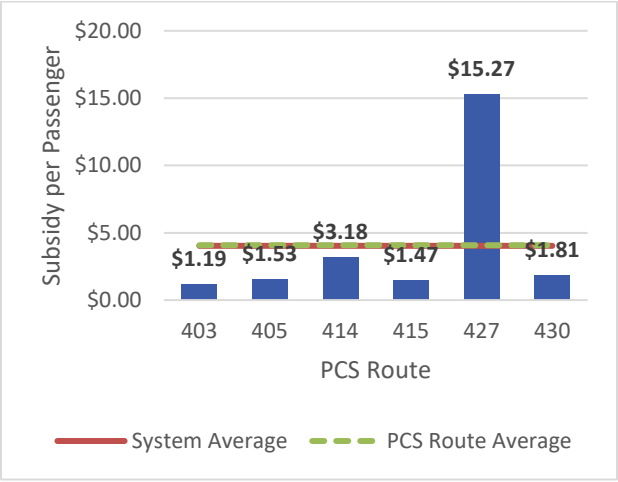


Figure 3-32 | MAX: Subsidy per Passenger, FY16

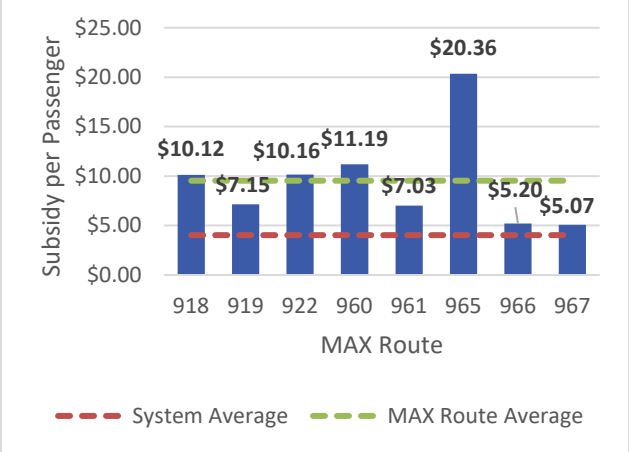
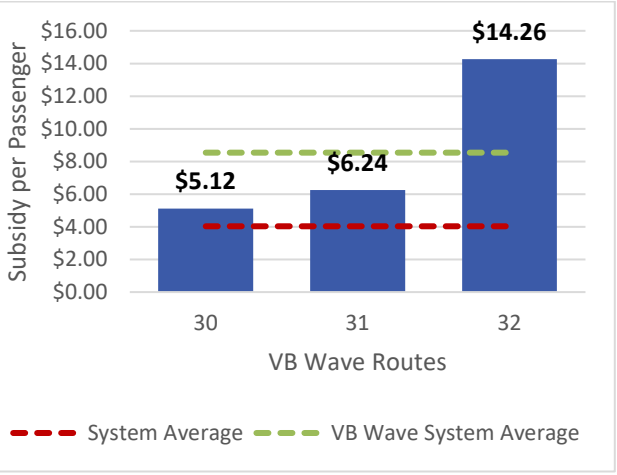


Figure 3-33 | VB Wave: Subsidy per Passenger, FY16



Service Quality

On-Time Performance

HRT's on-time performance standard[51] defines "on time" as 1 minute early to 5 minutes late at each time point. HRT also has a minimum goal of 85% on-time performance system-wide, at all time-points. [52] On-time performance is a reflection of the reliability of route to be there when a passenger is expecting to make a trip.

On-time performance data for calendar year 2016 from was used to analyze HRT's on-time performance, both at a route and system level. During this time period, HRT's system wide average on-time performance was 82 percent, which is below the agency's target of 85 percent. Route 43 (County St./Bart St.) has the highest on-time performance of all routes, at 94 percent; Route 32 (Shoppers Shuttle) had the lowest on-time performances of all routes, at 42 percent. **Table 3-16** and **Table 3-17** detail the top five route overall and based on service.

The overall on-time percentage for Southside routes is 84 percent; for Peninsula Routes, 80 percent; for PCS routes, 52 percent; for MAX routes, 80 percent; and for VB Wave routes, 53 percent. **Figure 3-34** though **Figure 3-38** provide a route level overview of on-time performance.

Table 3-16 | Top Five Routes by On-Time Performance, CY16

Route	Service	Route Name	On-time Performance
43	Southside	County St./ Bart St.	94%
11	Southside	Downtown Norfolk/ Colonial Place	93%
47	Southside	Downtown Portsmouth/ Churchland	91%
13	Southside	Downtown Norfolk/ Robert Hall Boulevard/ TCC – Chesapeake	91%
50	Southside	Academy Park/ Victory Crossing	90%

Table 3-17 | Top Route by On-Time Performance for each by Service Type, CY16

Route	Service	Route Name	On-time Performance
43	Southside	County St./ Bart St.	94%
119	Peninsula	(Oyster Point) Patrick Henry Mall/ Thimble Shoals Blvd	89%
430	PCS	Denbigh Fringe	72%
960	MAX	Virginia Beach to Norfolk	88%
31	VB Wave	Aquarium and Campground Shuttle	59%

[51] This standard was updated in January 2017 to reflect 0 minutes early to 5 minutes late

[52] Hampton Roads Transit Policies and Procedures PD-112 – Service Standards and Performance, July 2016.

Figure 3-34 | Southside: On-Time Performance, CY16

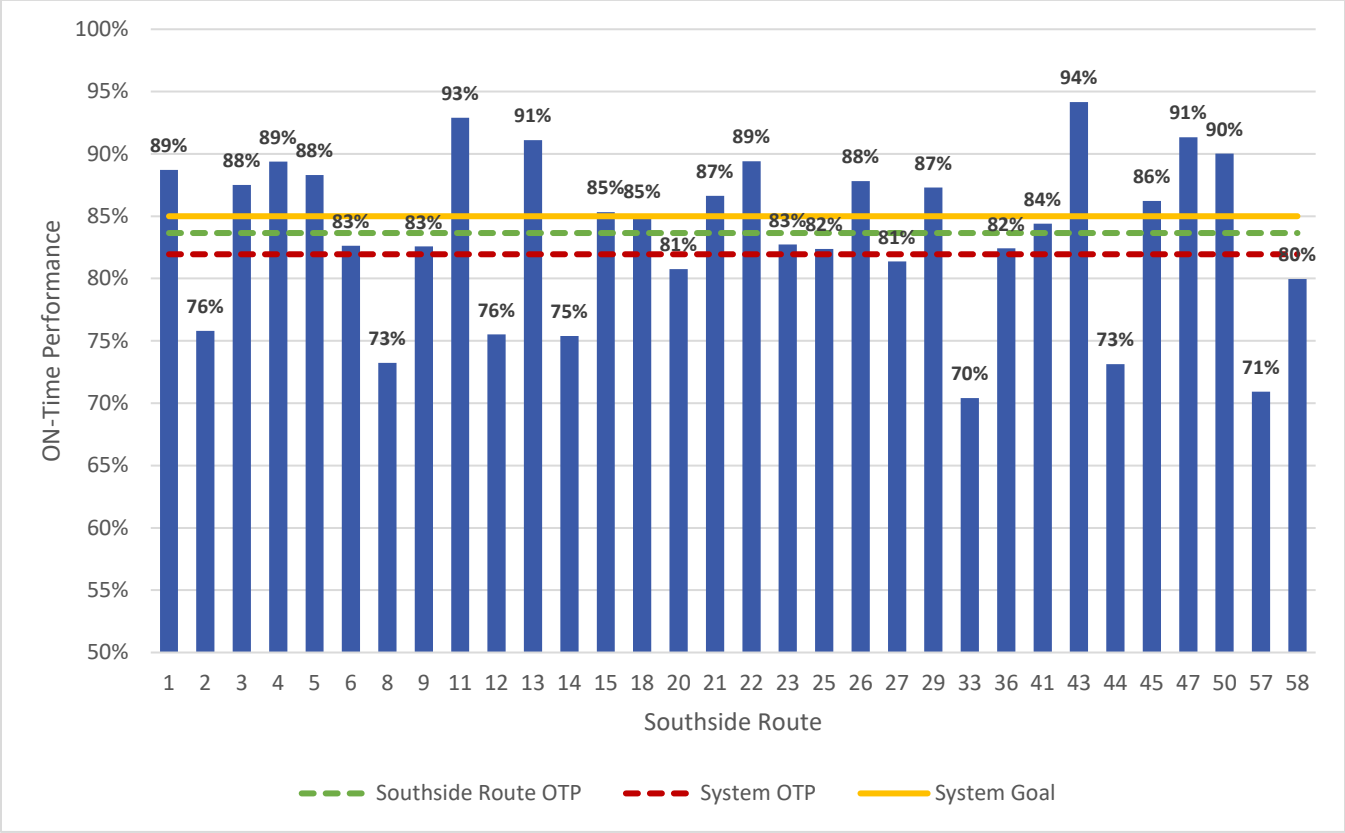
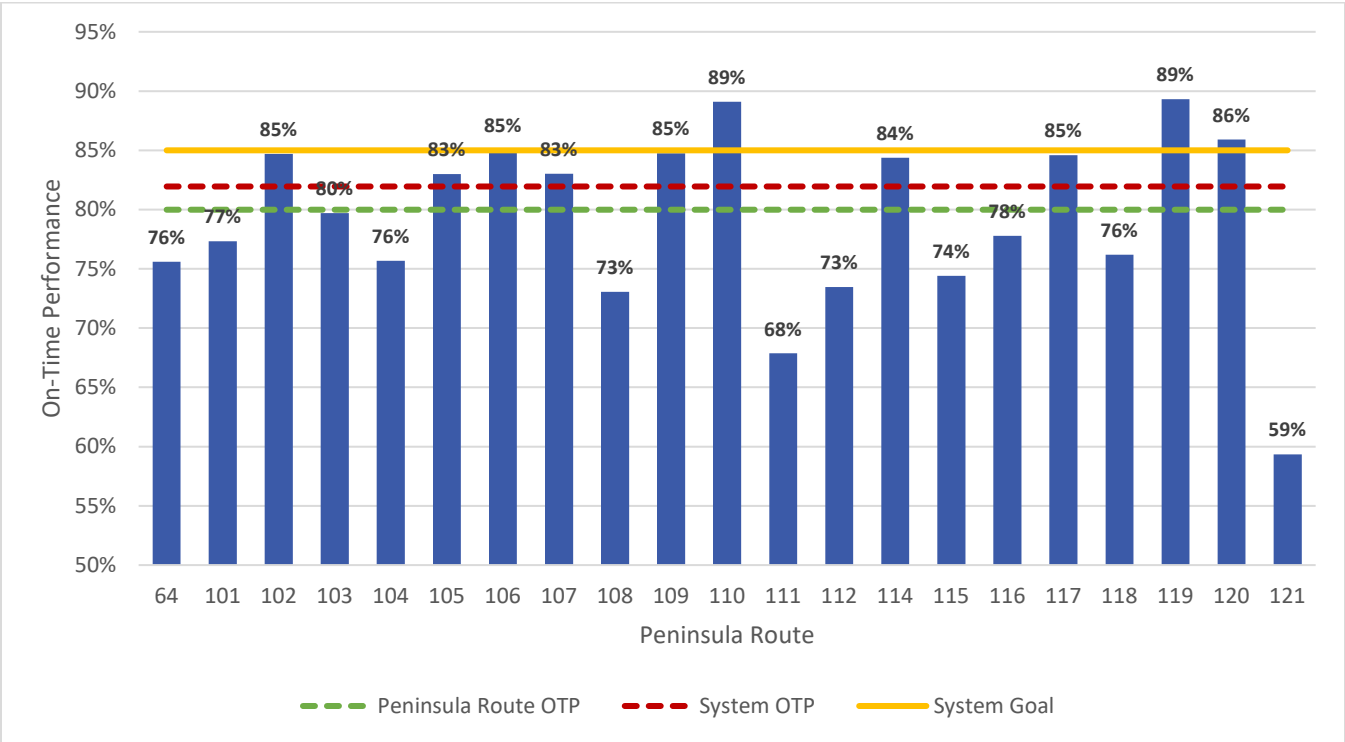


Figure 3-35 | Peninsula: On-Time Performance, CY16



HAMPTON ROADS TRANSIT

Figure 3-36 | PCS: On-Time Performance, CY16

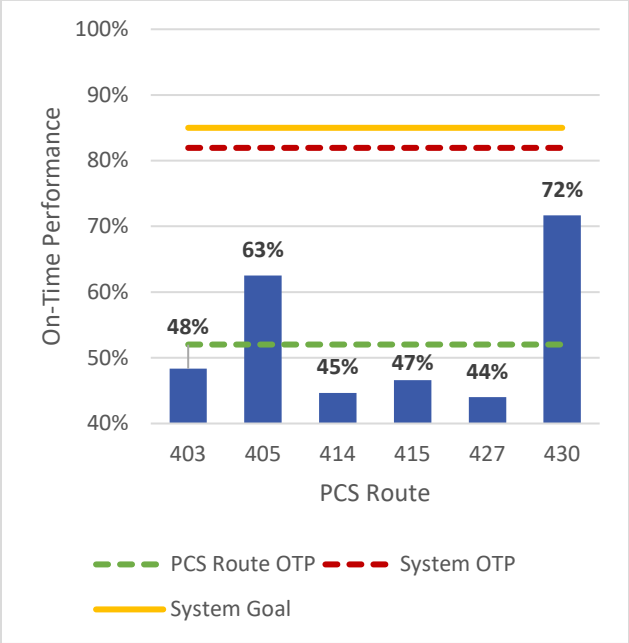


Figure 3-37 | MAX: On-Time Performance, CY16

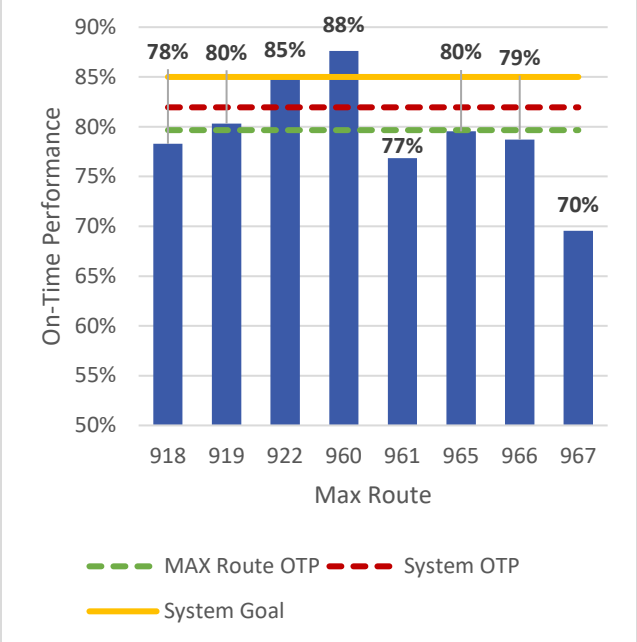
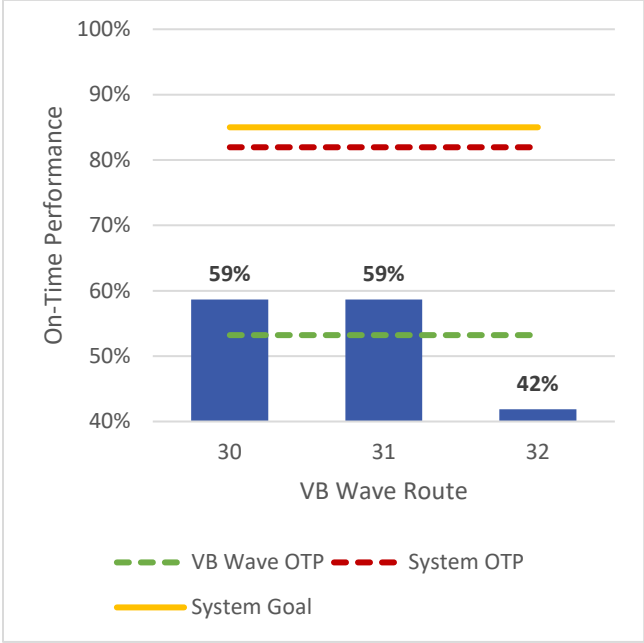


Figure 3-38 | VB Wave: On-Time Performance, CY16



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.[53] **Table 3-18** describes HRT's load standards by service type for each service being evaluated in this study, the load standard is the maximum number of persons that should be on a bus at a given time.

Table 3-18 | Load Standards

Category	Load Standard
Local	125% of seated capacity for two or more miles
Limited	100% of seated capacity (125% if operated along arterial)
Express	100% of seated capacity

To identify routes with potential overcrowding, the weekday average maximum passenger loads on each

[53] Hampton Roads Transit Policies and Procedures PD-112 – Service Standards and Performance, July 2016.

route[54] were compared to the seated capacity of the vehicles assigned to each route.[55] The local load standards were applied to the Southside and Peninsula services, while limited load standards were applied to PCS and express load standards were applied to MAX services.

HRT's weekday passenger loads range from a low of five passengers on Route 427 (Denbigh Midnight) 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 3-19** through **Table 3-22** detail the average max load experienced on a route and a load standard, or capacity, that should not be exceeded in order to ensure a safe, comfortable service.

Table 3-19 | Southside: Max Load, Mar - May 2016

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

Table 3-20 | Peninsula: Max Load, Mar – May 2016

Route	Trip	Maximum Load	Load Standard
64	5:35 AM	*18*	*40*
101	7:00 AM; 3:45 AM	*18*	*40*
102	8:19 AM; 9:19 AM	*13*	*33*

[54] 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 1st to April 30th, 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.

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

Route	Trip	Maximum Load	Load Standard
103	6:33 AM; 4:15 PM	*20*	*40*
104	6:45 AM; 7:15 AM; 9:45 AM; 3:45 PM	*14*	*40*
105	8:15 AM; 3:15 PM	*18*	*40*
106	6:02 AM	*30*	*49*
107	5:59 AM; 1:40 PM	*20*	*49*
108	9:25 AM; 2:43 PM	*15*	*33*
109	6:51 AM; 1:45 PM	*12*	*40*
110	7:00 AM	*17*	*40*
111	1:50 PM; 2:50 PM; 3:50 PM	*12*	*40*
112	10:45 AM	*24*	*49*
114	1:20 PM; 3:45 PM; 3:50 PM	*17*	*40*
115	5:45 AM	*19*	*33*
116	7:45 AM	*12*	*33*
117	6:15 AM	*19*	*40*
118	9:15 AM	*21*	*40*
119	5:08 PM	*11*	*33*
120	1:31 PM	*7*	*33*
121	5:05 PM	*11*	*33*

Table 3-21 | PCS: Max Load, Feb – Apr 2016

Route	Trip	Maximum Load	Load Standard
403	5:20 AM	*21*	*32*
405	3:40 PM	*23*	*32*
414	5:20 AM; 6:55 AM	*18*	*32*
415	3:45 PM	*23*	*39*
427	12:15 AM	*5*	*39*
430	5:55 AM	*29*	*39*

Table 3-22 | MAX: Max Load, Feb – Apr 2016

Route	Trip	Maximum Load	Load Standard
918	3:30 PM	*12*	*35*
919	2:54 PM	*18*	*38*
922	5:00 AM	*14*	
960	7:45 AM	*29*	*38*
961	3:40 PM	*30*	*38*
965	5:15 AM	*11*	*38*
966	5:45 AM	*22*	*38*
967	3:30 PM	*35*	*38*

3.2 SERVICE ANALYSIS

3.2.1 Market Analysis

This market analysis sheds light both on how well existing transit services meet current demand, as well as how planned transit services could reach new markets. To identify areas that could support transit in the future, the analysis uses regional population and employment forecasts and growth estimates for the year 2040.

To understand how well the existing transit services meet current demand, demographic and employment data from the U.S. Census are compiled into transit propensity indices, which illustrate areas with high concentrations of potential transit users, commuters, jobs, and non-work destinations. These transit indices, along with data on regional trip patterns, identify opportunities to both improve existing transit services and grow service into new areas.

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 2040 forecasts were compared to 2009 data, the most current year for which data is available.

Population Density

Several areas showed expected 2040 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 populations densities include industrial areas along waterfronts, military facilities, and the southernmost areas of the City of Virginia Beach and the City of Chesapeake.

By 2040, areas in Isle of Wight County and the fringes of the cities of Chesapeake and Virginia Beach are expected to grow in population most quickly, albeit from low existing population. Areas around Downtown Norfolk, Downtown Newport News, and the Virginia Beach Town Center are expected to densify much further as well. **Figure 3-39** and **Figure 3-40** show population densities throughout the Hampton Roads Transit service area, along with notable changes in densities from 2009 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 2040 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 2009 estimates of employment. However, military employment will be discussed further in the following section using alternative data sources.

Similar to expected population growth in the region, by 2040, employment growth will be strongest in the southern portions of the cities of Chesapeake and Virginia Beach, along with Isle of Wight County. Areas in Downtown Newport News, Downtown Norfolk, and the I-264 corridor from Norfolk to the Virginia Beach Oceanfront are also expected to grow in employment.

Figure 3-41 and **Figure 3-42** show 2040 employment densities throughout the Hampton Roads Transit service area, along with notable changes in densities from 2009 estimates.

Figure 3-39 | Population Density (2040) - Peninsula

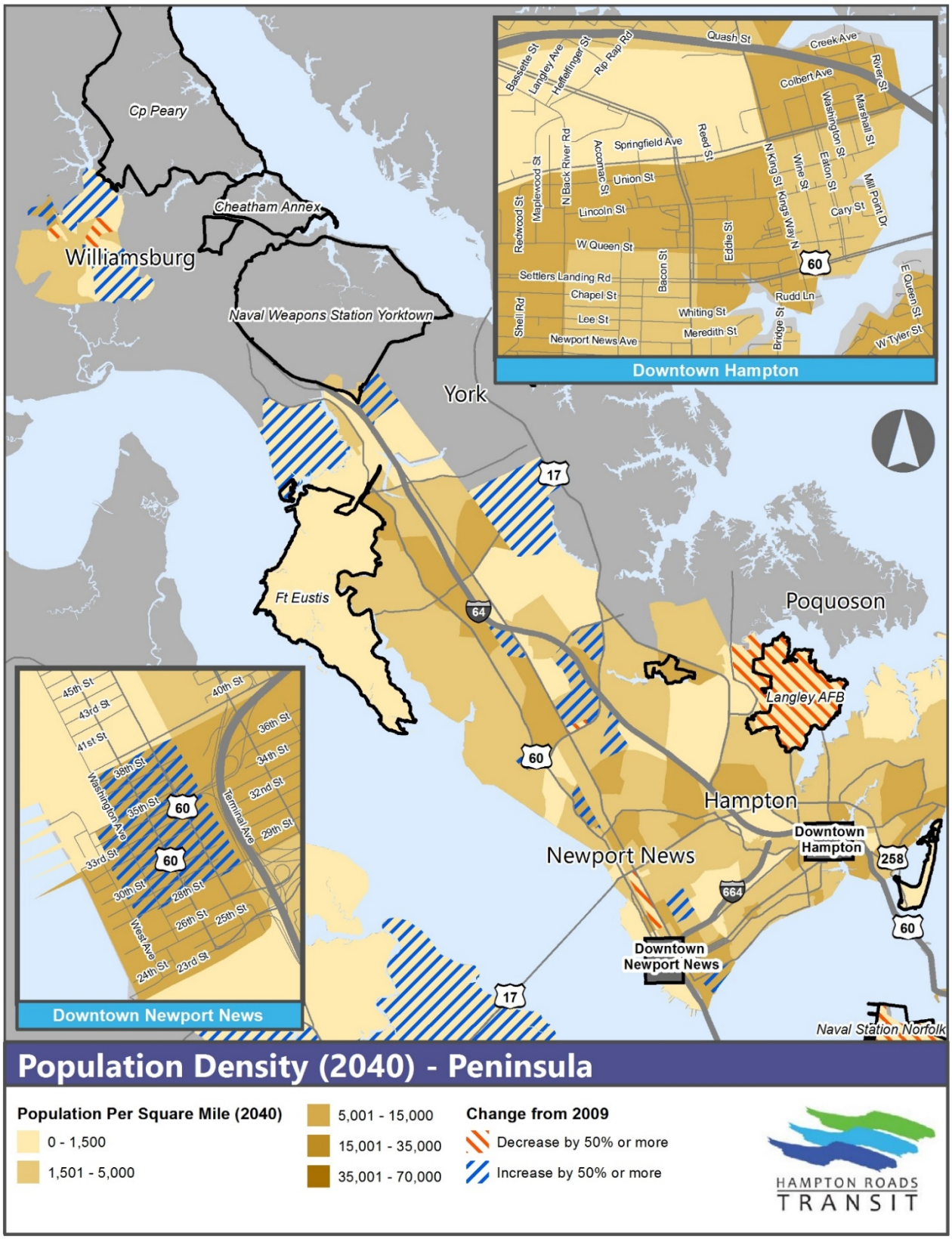


Figure 3-40 | Population Density (2040) - Southside

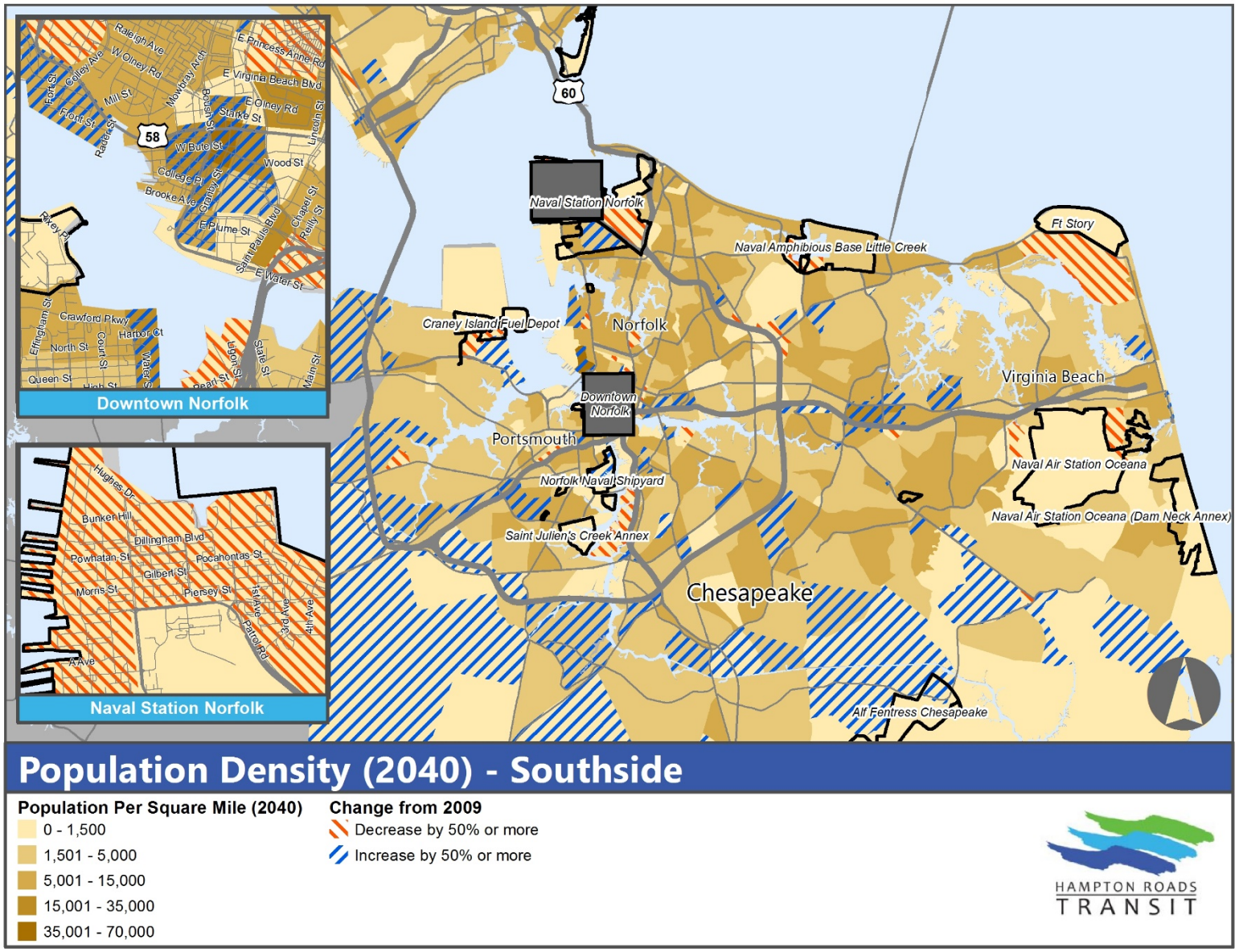


Figure 3-41 | Employment Density (2040) - Peninsula

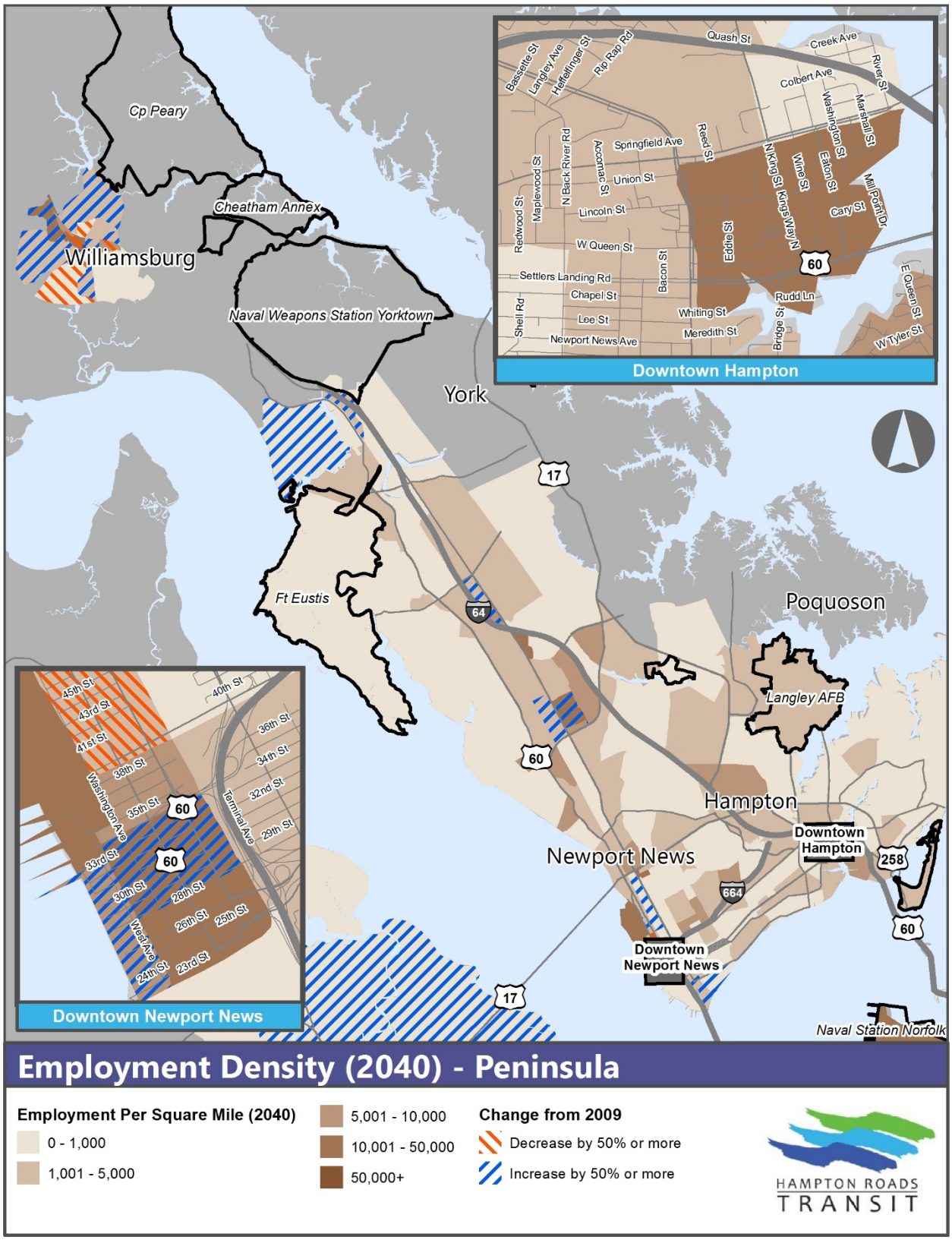
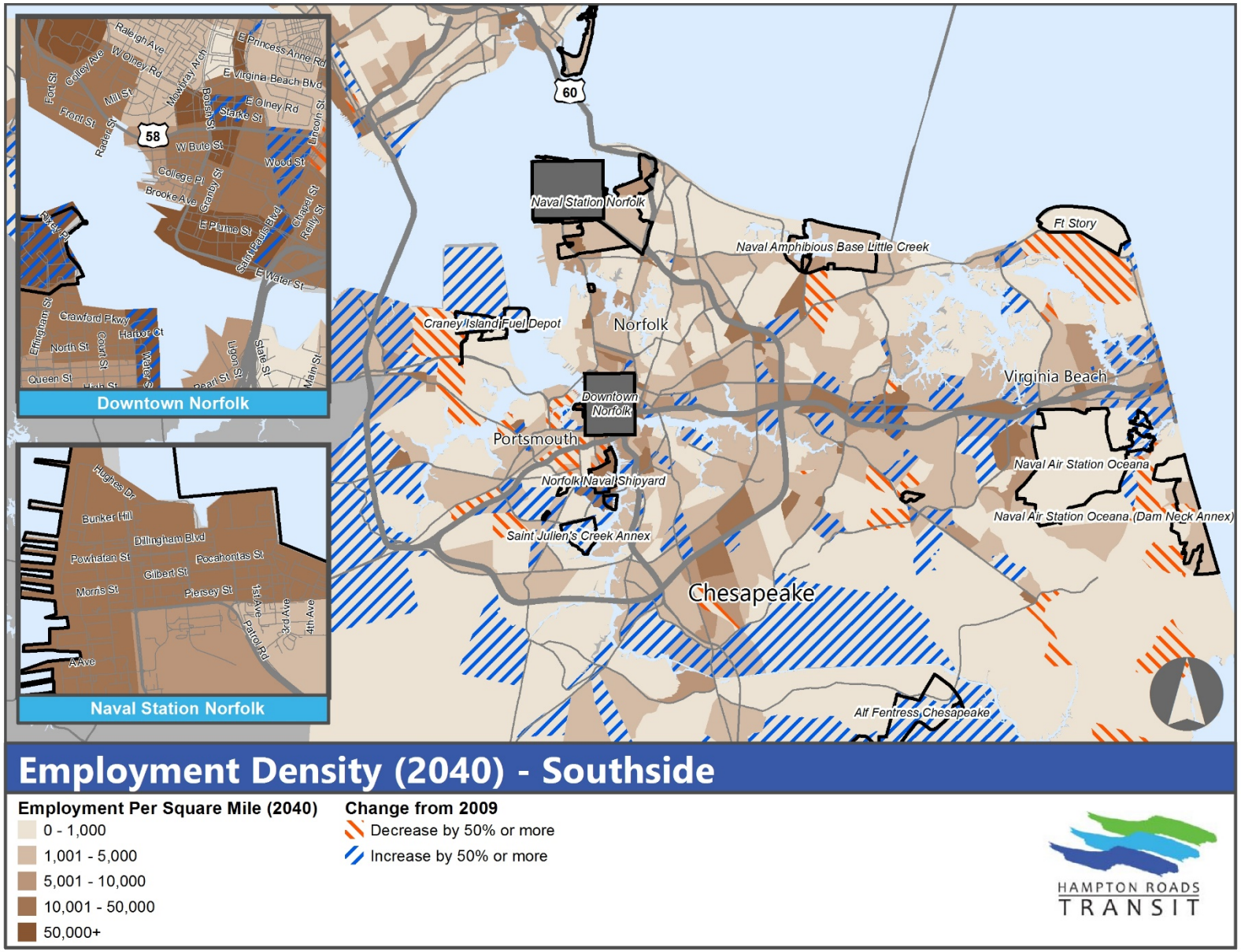


Figure 3-42 | Employment Density (2040) - Southside



Transit Propensity Indices

To determine whether a location is suitable for transit service, this transit development plan uses a series of indices that reveal locations with significant clusters of potential transit oriented users, commuters, jobs, or other non-work 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 TDP are summarized in **Table 3-23**.

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, all else 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 the 2013 Hampton Road Origin-Destination Study.

The transit-oriented population and commuter indices draw from the US Census' 2015 American Community Survey (ACS) five-year estimates, which provide the most recent and reliable source of demographic data for small geographic areas. Employment and non-work travel indices are based on the US Census' 2014 Longitudinal Employer-Household Dynamics (LEHD) survey, which provides the most recent estimates of the number and type of jobs in an area. Because LEHD data does not include the jobs of active duty service members, counts of jobs at military bases in the Hampton Roads region are derived instead from recent economic development reports and publicly reported Department of Defense figures.[56]

Table 3-23 | 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, 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 military facilities.
	Military	Armed Forces (AF) population, AF disability status, and AF income level	Military facilities, including Naval Station Norfolk, Fort Eustis, Naval Amphibious Base Little Creek, Naval Air Station Oceana, and Langley Air Force Base.

[56] See NRMA Integrated Shore Requirements Office, *Navy Region Mid-Atlantic Hampton Roads Area FY 2015 Economic Impact Report"*, September, 2016 and Department of Defense, *Military Installations,* www.militaryinstallations.dod.mil, Accessed December 14, 2016.

	Transit Propensity Index	Demographic and Employment Statistics Used	Locations with Highest Propensity
Trip Attractors	**Workplace**	Employees	Military facilities, Chesapeake Municipal Center, and the downtowns of Norfolk, Portsmouth and Hampton.
	Non-Work	Jobs in restaurant and retail, recreation, healthcare and social assistance, education, and government	Downtowns of Hampton, Norfolk, Portsmouth, and the Chesapeake Municipal Center.

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 six categories: population (including race and ethnicity), age, households, 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 3-24** details the weights used for each category.

Table 3-24 | Transit-Oriented Population Index

Category	Weight
Population (General / Minority)	30
Age (Youth / Senior)	5
Households	10
Income (Low)	20
Vehicle Ownership (Zero / One Car)	30
Disability Status (Yes)	5

Figure 3-43 and **Figure 3-44** 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, or low-income individuals, if not several of these characteristics.

Across the entire HRT service area, the areas with the most highly transit-oriented populations include neighborhoods in and adjacent to Downtown Norfolk, areas south and east of I-664 in Newport News, and areas immediately north of I-64 in Norfolk. Other areas of significant transit-oriented populations are scattered throughout the metropolitan area, typically where relatively dense apartment complexes can be found.

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 and the Virginia Beach Oceanfront. These locations include Downtown Portsmouth, along the Chesapeake-Norfolk border north of I-64 to the Elizabeth River, and several Virginia Beach locations, such as the neighborhoods adjacent to Virginia Beach boulevard east of I-64, neighborhoods south of I-264 between Princess Anne Boulevard and Lynnhaven Parkway, and neighborhoods adjacent to I-264 near the Virginia Beach Oceanfront.

Figure 3-43 | Peninsula: Transit Oriented Population Index

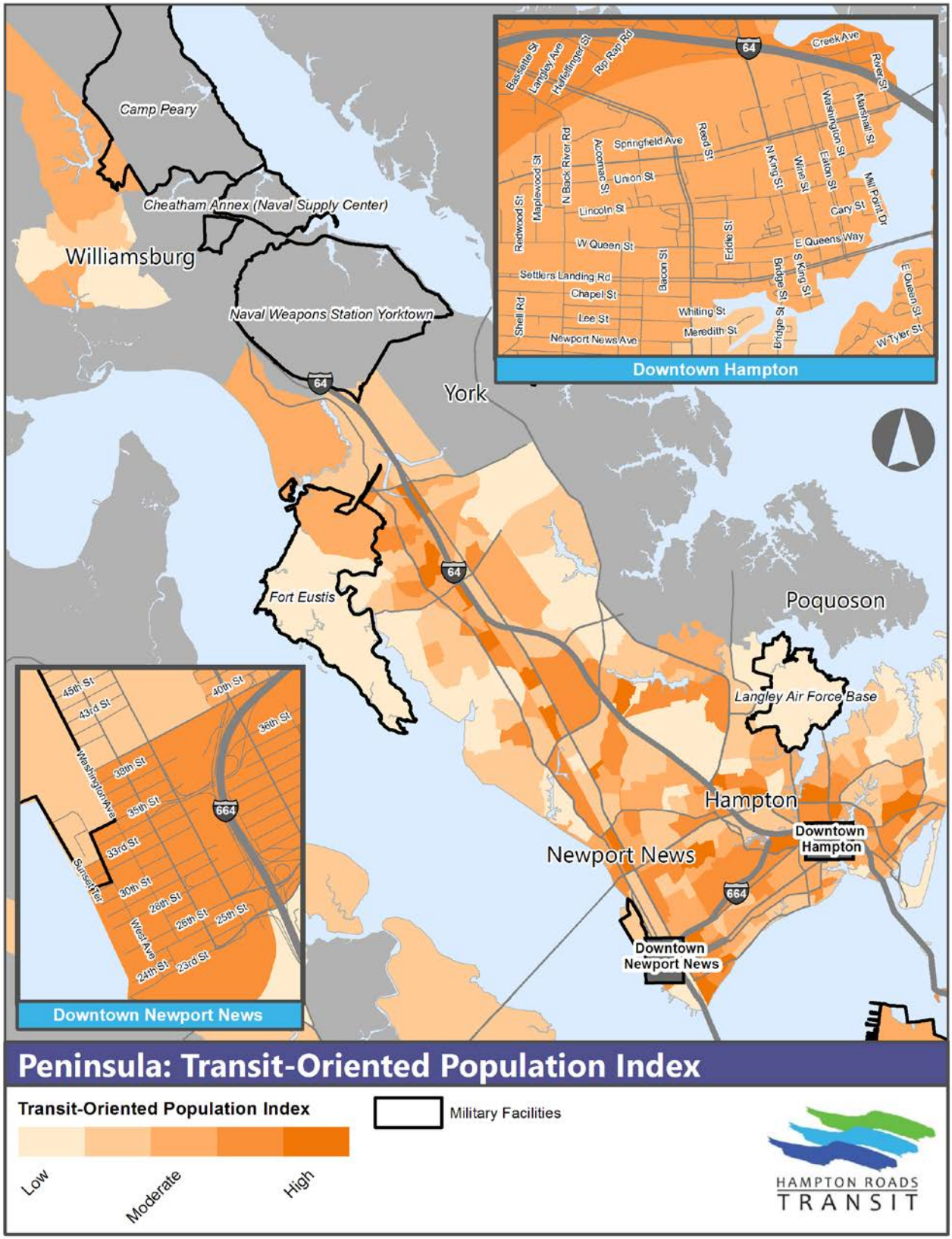
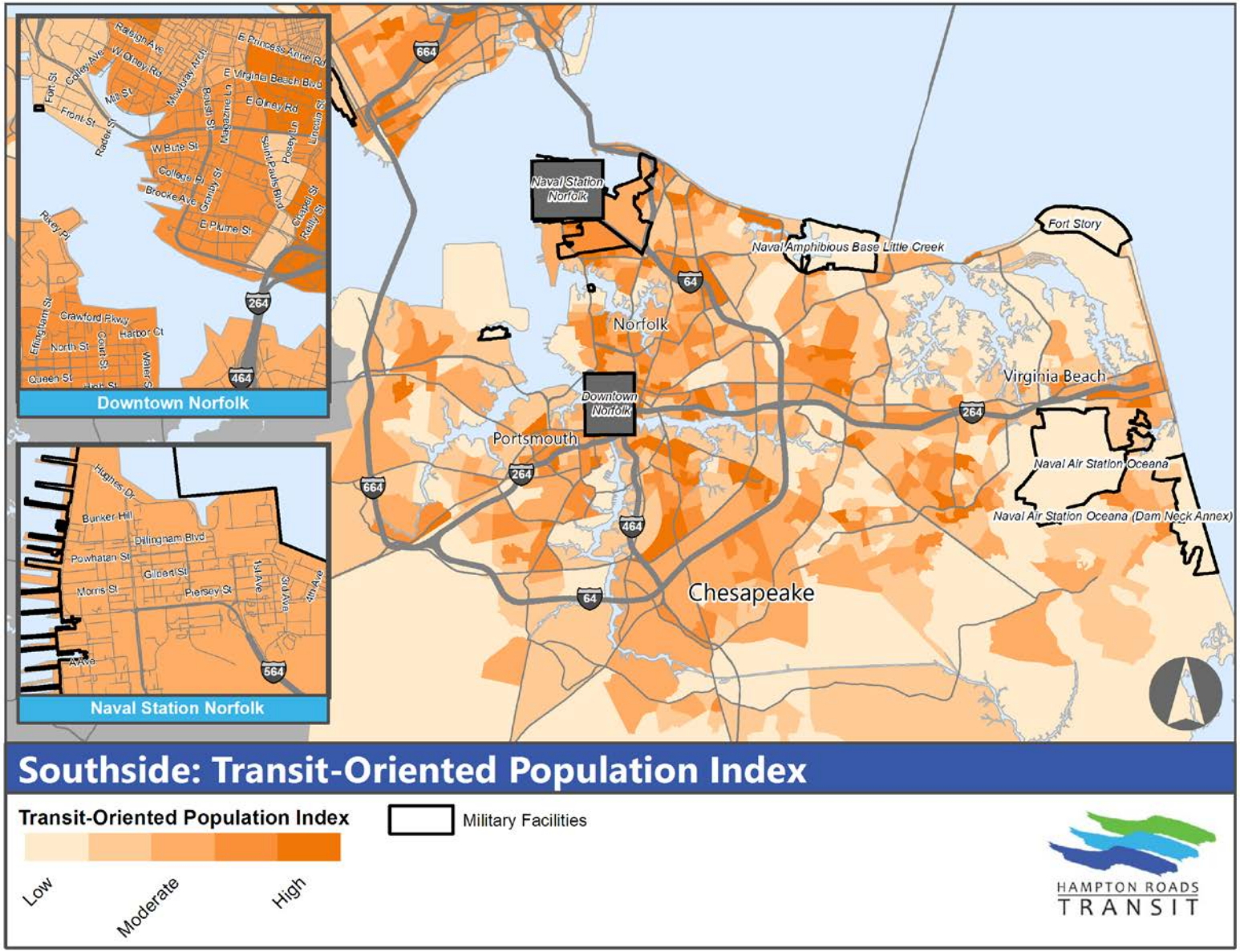


Figure 3-44 | Southside: Transit Oriented Population Index



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 3-25** details the weights by category.

Table 3-25 | Commuter Index

Category	Weight
Labor Force	90
Commute Mode (Transit)	10

Figure 3-45 and **Figure 3-46** 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 military facilities, such as Naval Station Norfolk, Fort Eustis in Newport News, and Naval Amphibious Base Little Creek in Norfolk.

On the Peninsula, moderate-to-high levels of commuters are also 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 also prevalent in places proximate to freeways, major arterials, and military installations. In Chesapeake, high concentrations are seen in Chesapeake along I-64 and I-664, as well as along Cedar Road and Mount Pleasant Road. 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 3-45 | Peninsula: Commuter Index

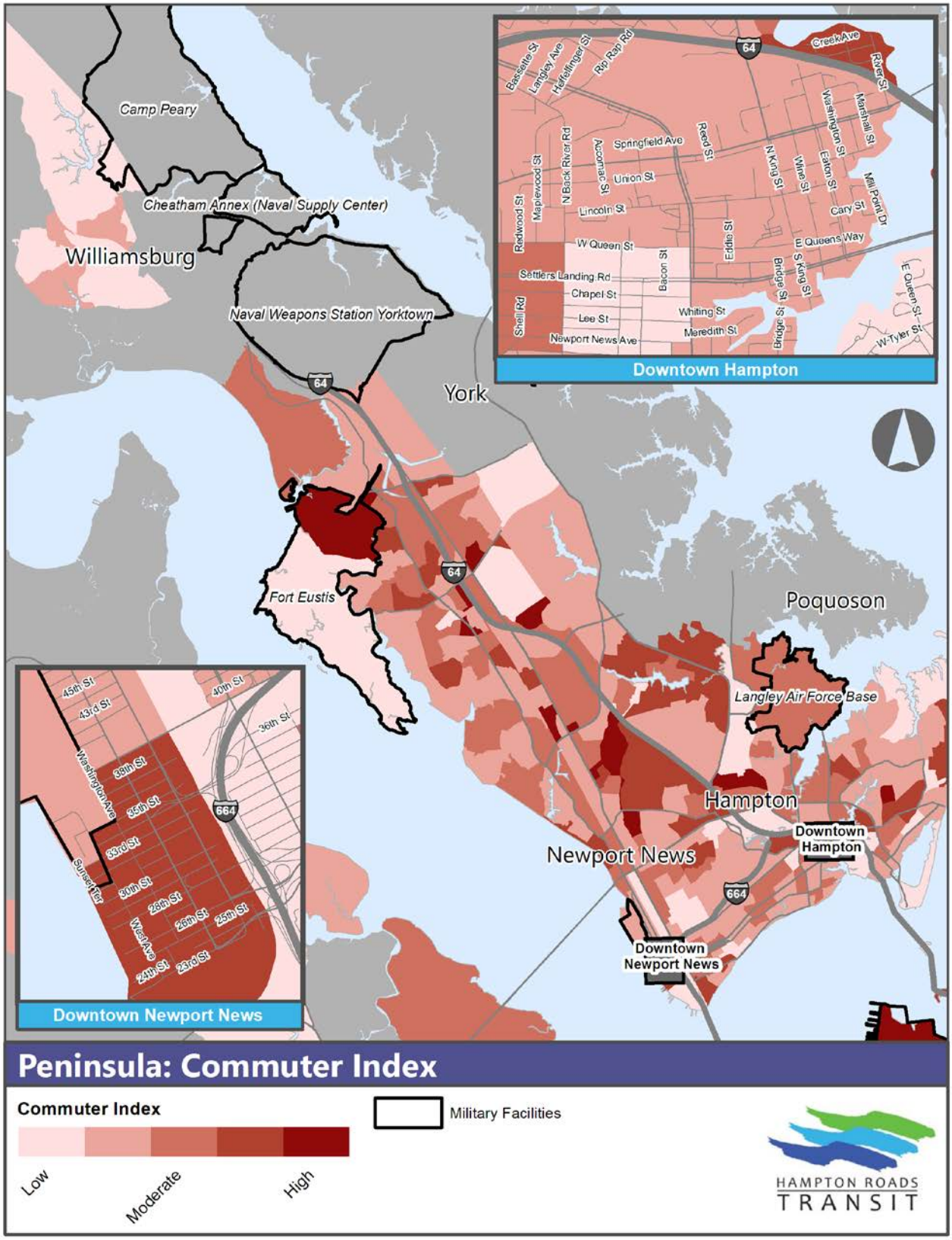
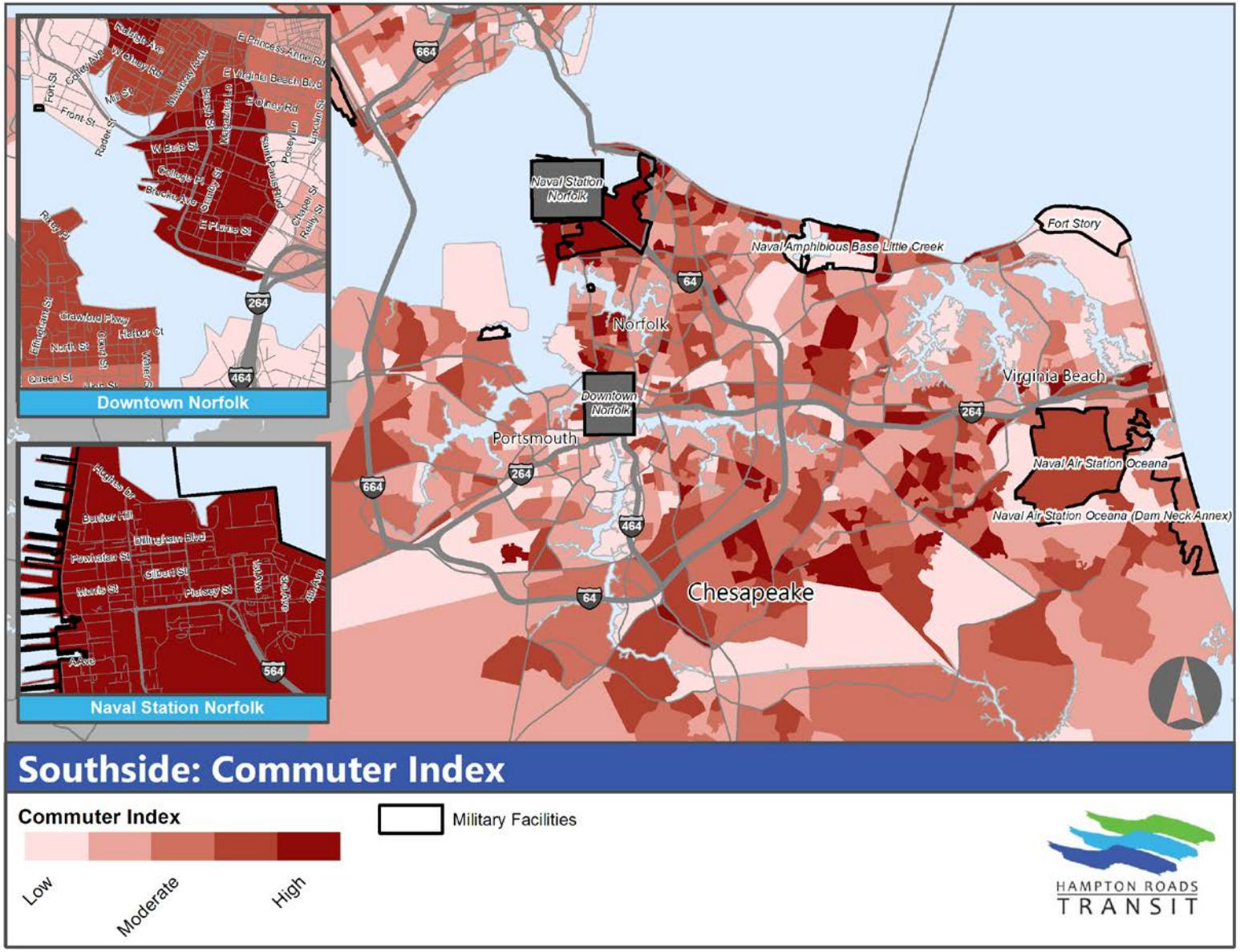


Figure 3-46 | Southside: Commuter Index



Military Index

The Military Index identifies locations that are home to high concentrations of members of the armed forces who may use transit services. Areas with high numbers and densities of active duty members of the military, and especially those individuals who have lower incomes or a disability, are presumed to be more likely to travel to a military base by transit, if service were available. Similar to the Transit-Oriented Population Index, the statistics used for the Military Index include population, income, and disability status (**Table 3-26**). The relative weights of categories for this index are identical to the Transit-Oriented Population Index, with the Population category weighted three times as much as the disability status or income category.

Table 3-26 | Military Index

Category	Weight
Population (Armed Forces)	75
Disability Status (Yes, Armed Forces)	5
Income (Low, Armed Forces)	20

Figure 3-47 and **Figure 3-48** show the Military Index for the Peninsula and Southside, respectively. Across the entire HRT service area, the areas with the highest military index scores are military bases with significant residential populations, including Naval Station Norfolk, Fort Eustis, Naval Amphibious Base Little Creek, Naval Air Station Oceana (including the Dam Neck annex), and Langley Air Force Base. A residential area adjacent to Langley Air Force Base with a high concentration of active duty military individuals, including those with a disability and those in poverty, is the only off-base area with a high score in the military index.

On the Peninsula, moderate-to-high levels of military personnel are also found near I-64 and Mercury Boulevard in Hampton and in scattered areas along I-64 in Newport News.

In the southern portion of HRT's service area, moderate-to-high concentrations of military personnel are also prevalent in neighborhoods adjacent to Naval Amphibious Base Little Creek and near Naval Air Station Oceana. Areas in and near Downtown Norfolk and Downtown Portsmouth likewise see moderate Military Index scores. In some cases, particular block groups do not have especially high military personnel populations, but are nonetheless home to relatively high concentrations of those members of the military who have a disability or live in a low-income household.

Figure 3-47 | Peninsula: Military Index

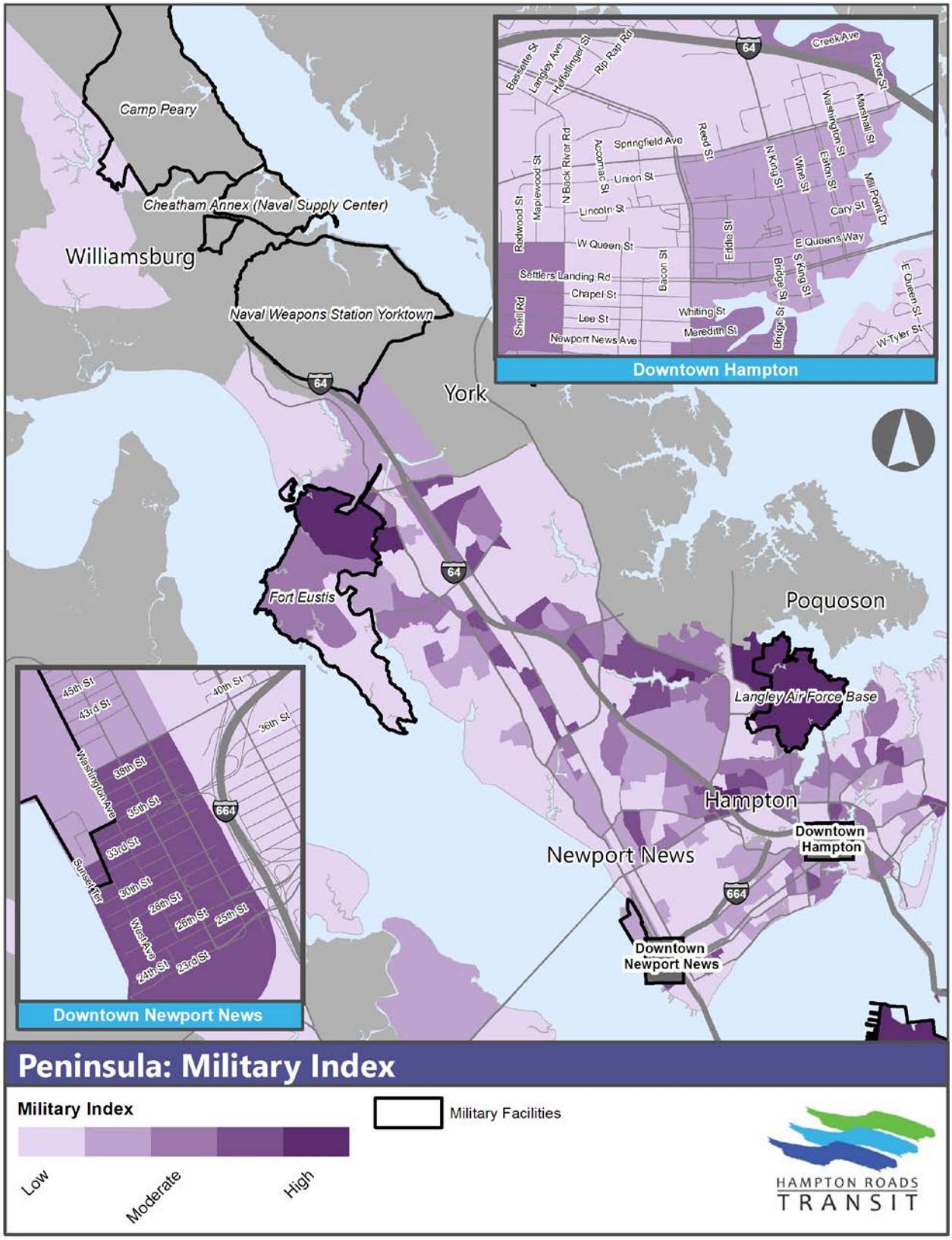
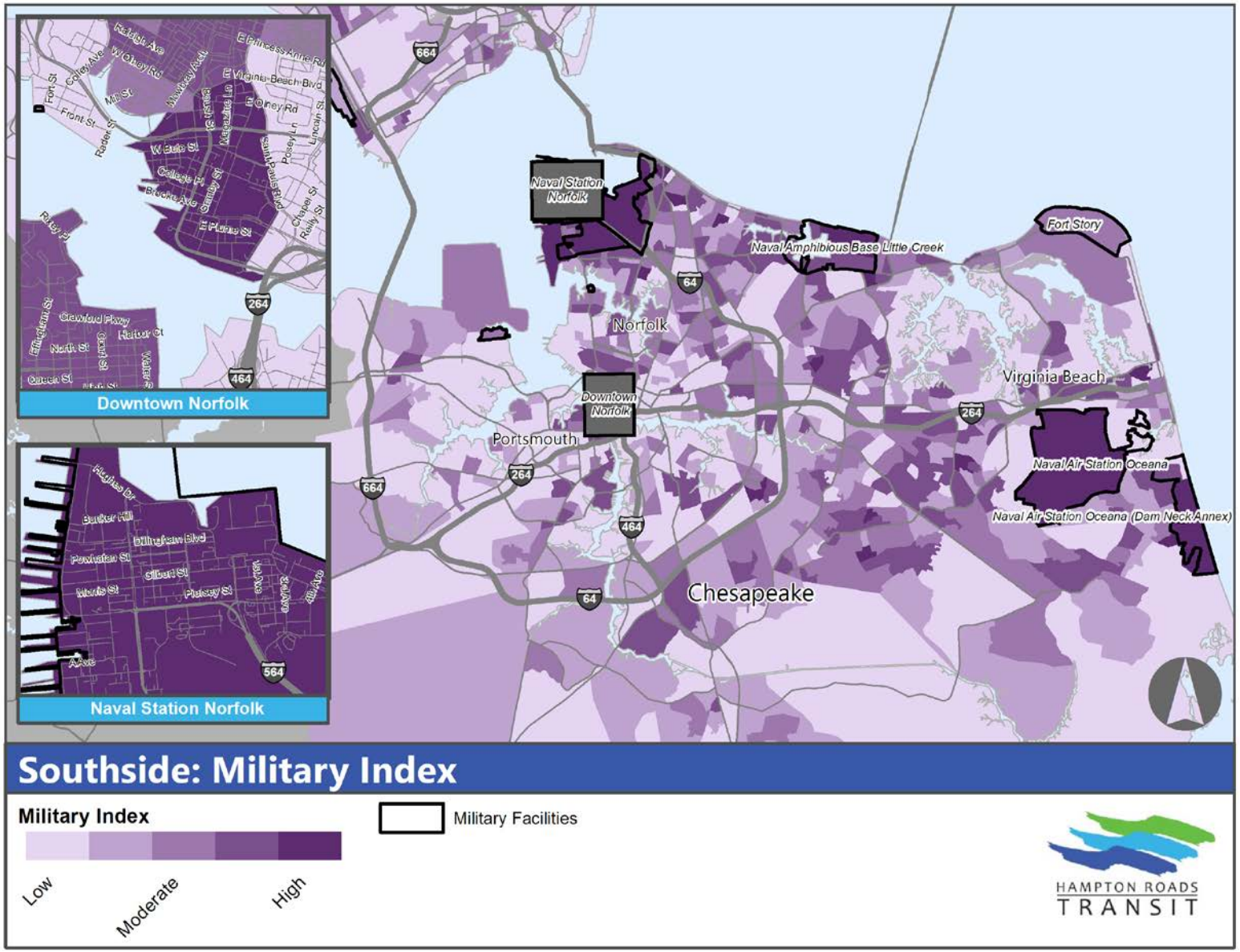


Figure 3-48 | Southside: Military Index



Workplace Index

The Workplace Index is constructed from the total number of jobs and employment density in an area (**Table 3-27**). 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 3-27 | Workplace Index

Category	Weight
Employment (All Jobs)	100

Figure 3-49 and **Figure 3-50** 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 and the downtowns of Norfolk, Portsmouth and Hampton.

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 Canon, Inc. are located. Christopher Newport University and Riverside Regional Medical Center form another concentration of employment in that area. In Hampton, the VA Medical Center is another substantial concentration of jobs, followed by Thomas Nelson Community College 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 industrial center east of Norfolk International Airport are other strong concentrations. 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. Outside of military facilities along the Elizabeth River and its downtown, Portsmouth's other concentrations of employment fall near High Street where the Maryview Medical Center and a Wal-Mart Super Center can be found.

Figure 3-49 | Peninsula: Workplace Index

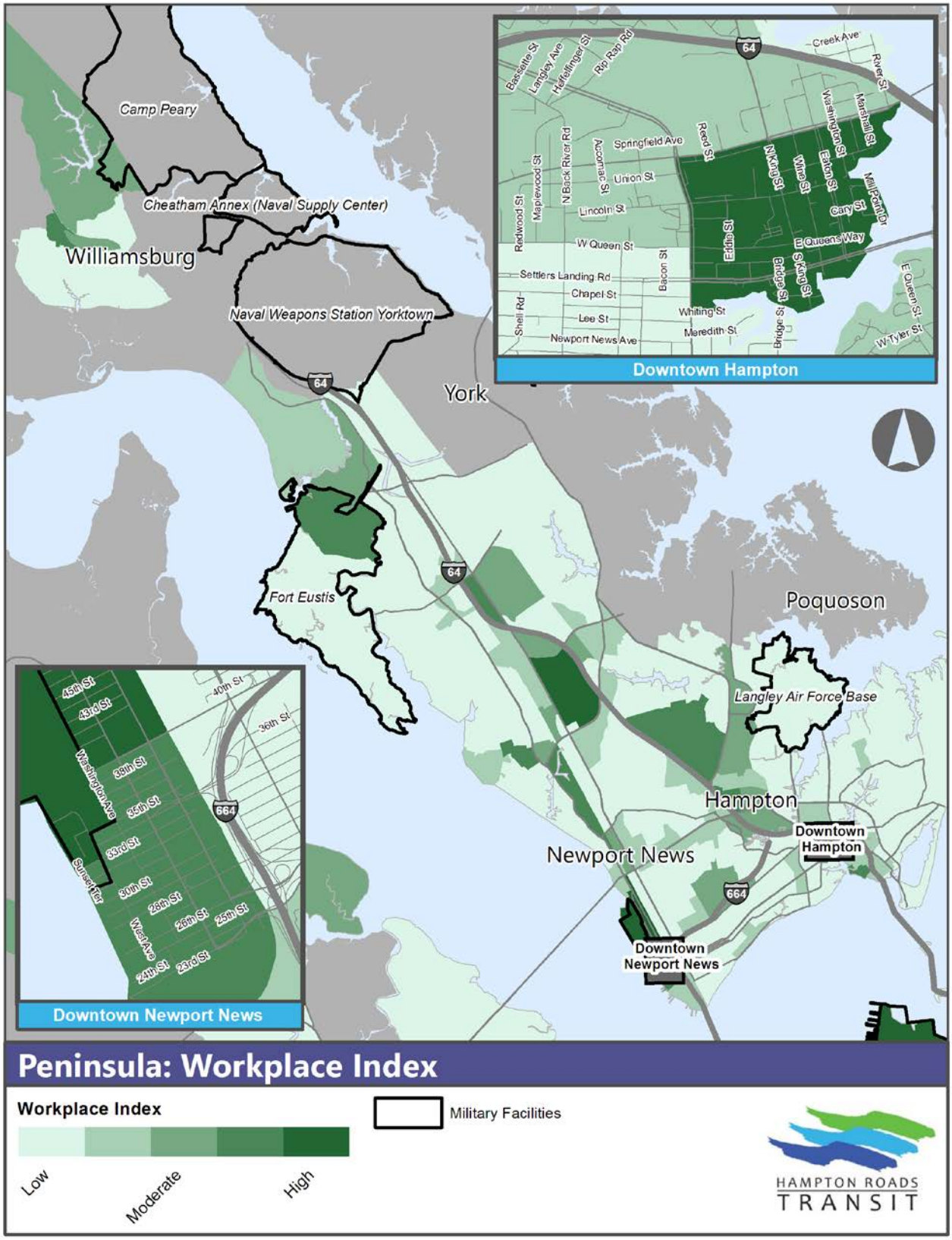
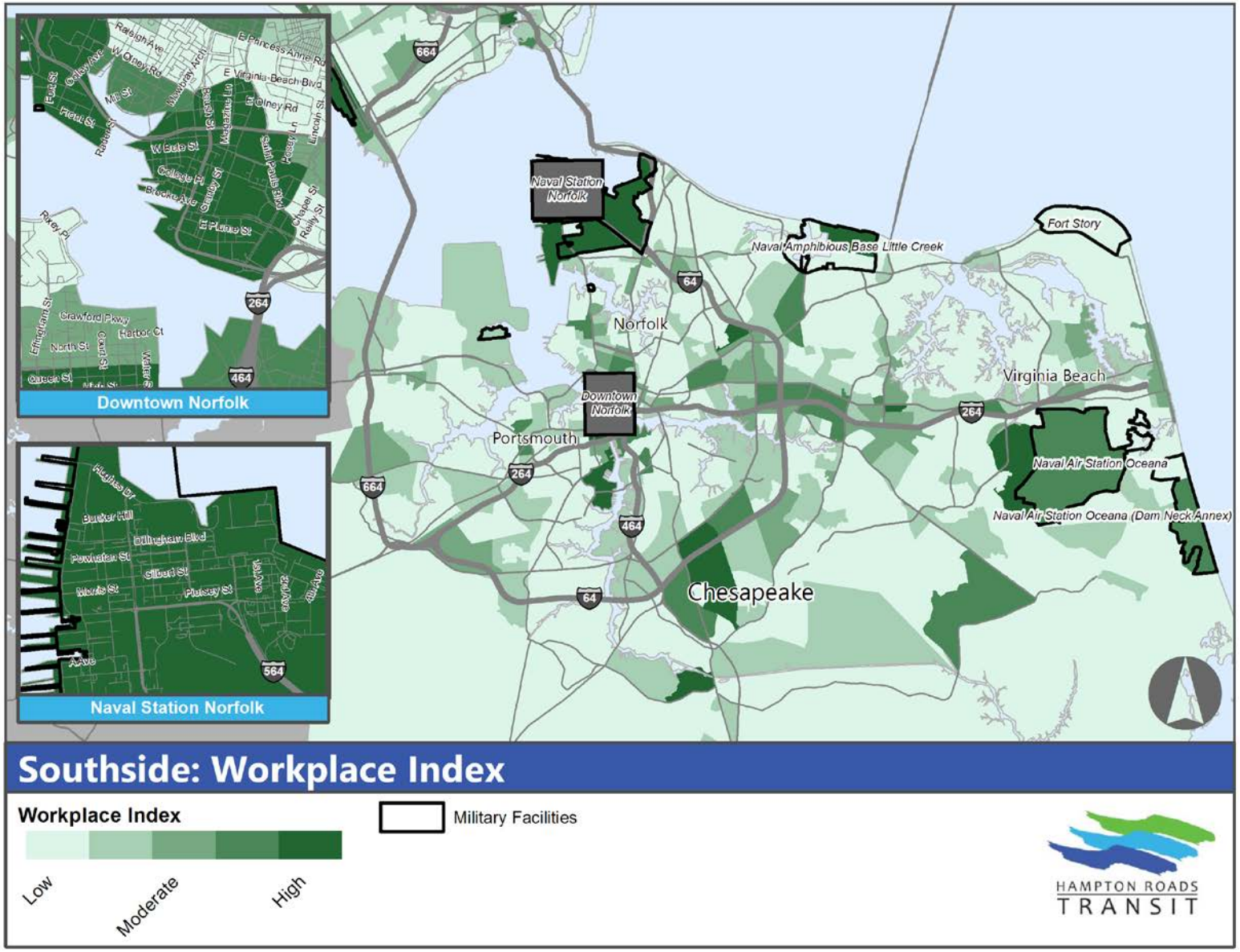


Figure 3-50 | Southside: Workplace Index



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 to for shopping or dining, or make general transit trips. Scores across Retail & Restaurant, Recreation, Health Care & Social Assistance, Education, and Government are combined to create an overall Non-Work Index (**Table 3-28**). 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.

Table 3-28 | Non-Work Index

Category	Weight
Retail / Restaurant	5
Recreation	10
Healthcare / Social Assistance	35
Education	25
Government	10

Figure 3-51 and **Figure 3-52** show the Non-Work Index for the Peninsula and Southside, respectively. 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 Trip Producer 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, and the Chesapeake Municipal Center. 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.

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. Downtown Newport News and the area adjacent to Langley Air Force Base show strong propensity for non-work trips due to concentrations of shopping, government, and medical institutions.

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, shopping destinations along I-64, and medical facilities near Norfolk General Hospital. 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. Unlike other propensity indices, the Princess Anne area of Virginia Beach is notable here for its mix of government, recreation and retail institutions.

Figure 3-51 | Peninsula: Non-Work Index

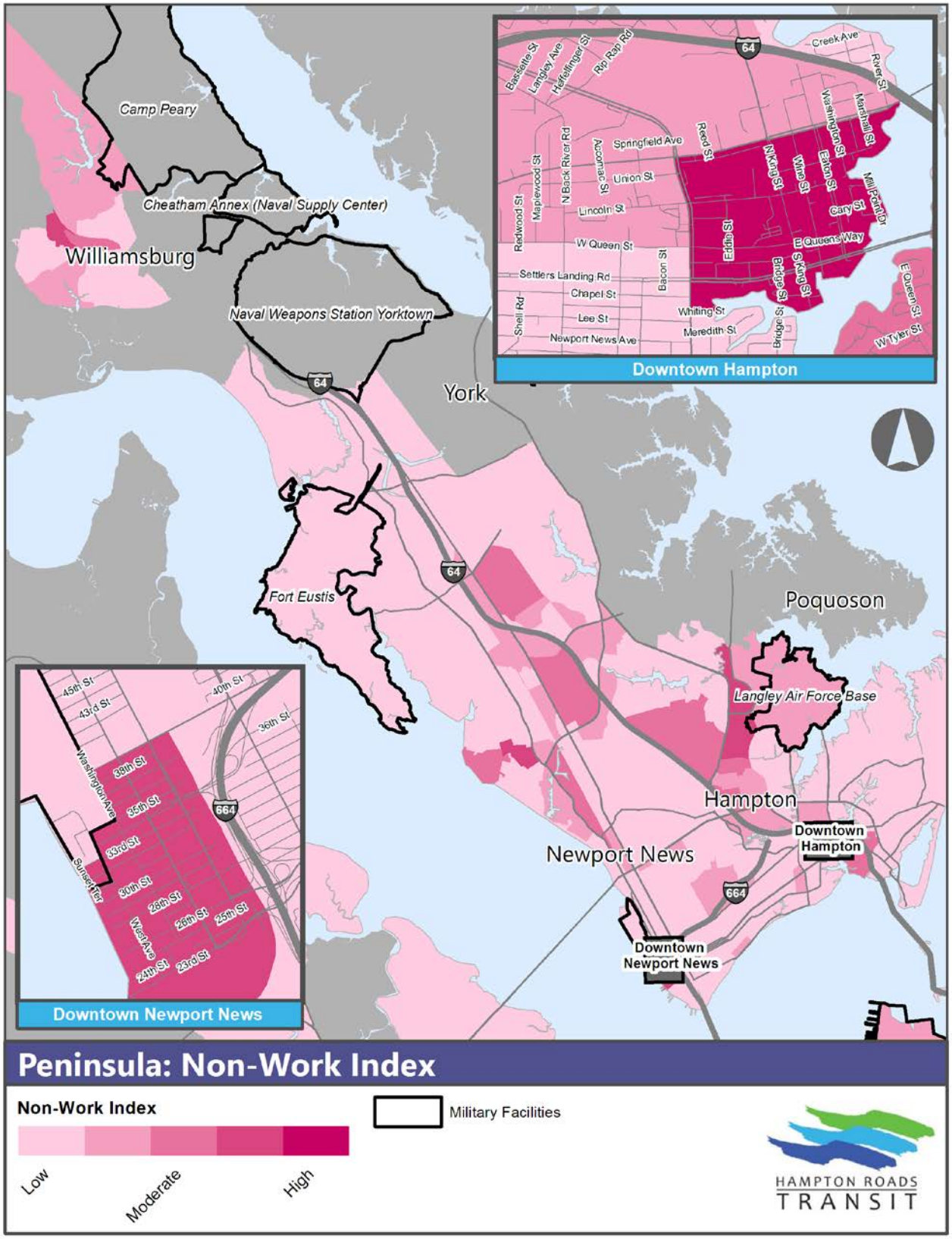
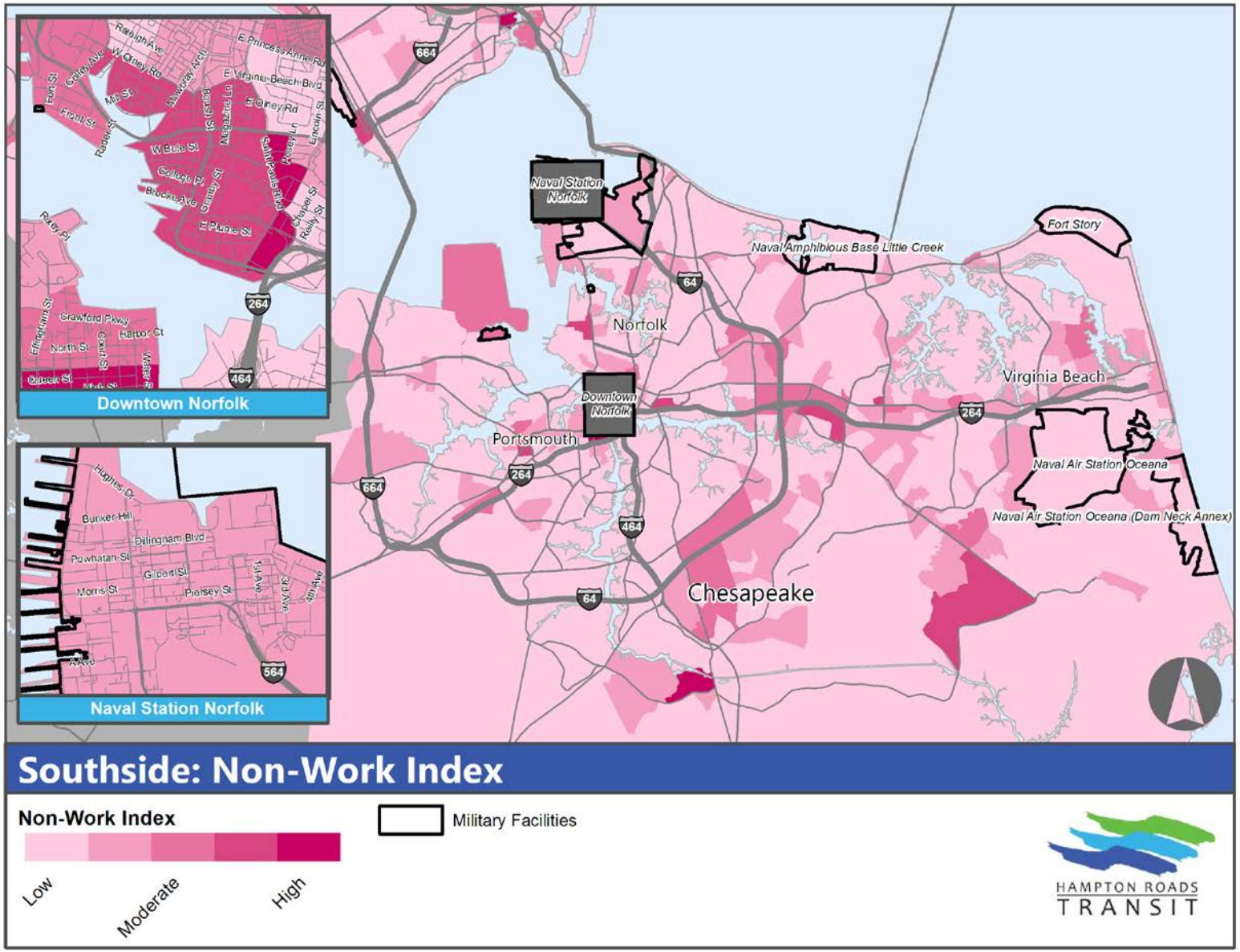


Figure 3-52 | Southside: Non-Work Index



3.2.2 Transit Propensity Analysis

Based on the five transit propensity indices and their underlying data, several additional transit propensity indices were developed. These three propensity analyses 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.

Figure 3-53 and **Figure 3-54** show the All-Day Service Index for the Peninsula and Southside, respectively. Areas with high All-Day Service Index scores largely reflect those with high Transit-Oriented Populations, with the exception of downtowns, government centers and medical and educational campuses that attract many non-work trips.

Peak Service Index

The Peak Index identifies locations suitable for peak-hour 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 or destinations for transit trips that would occur during peak hours. **Figure 3-55** and **Figure 3-56** show the Peak Service Index for the Peninsula and Southside, respectively. Areas with high Peak Service Index Scores reflect areas with significant concentrations of commuters, such as more suburban portions of Chesapeake, Newport News, and Virginia Beach, as well as major employment centers like military facilities and downtown areas.

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. **Figure 3-57** and **Figure 3-58** show the Multimodal Service Index for the Peninsula and Southside, respectively. 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, Norfolk and Portsmouth, and in the Greenbrier area of Chesapeake.

Figure 3-53 | Peninsula: All-Day Service Index

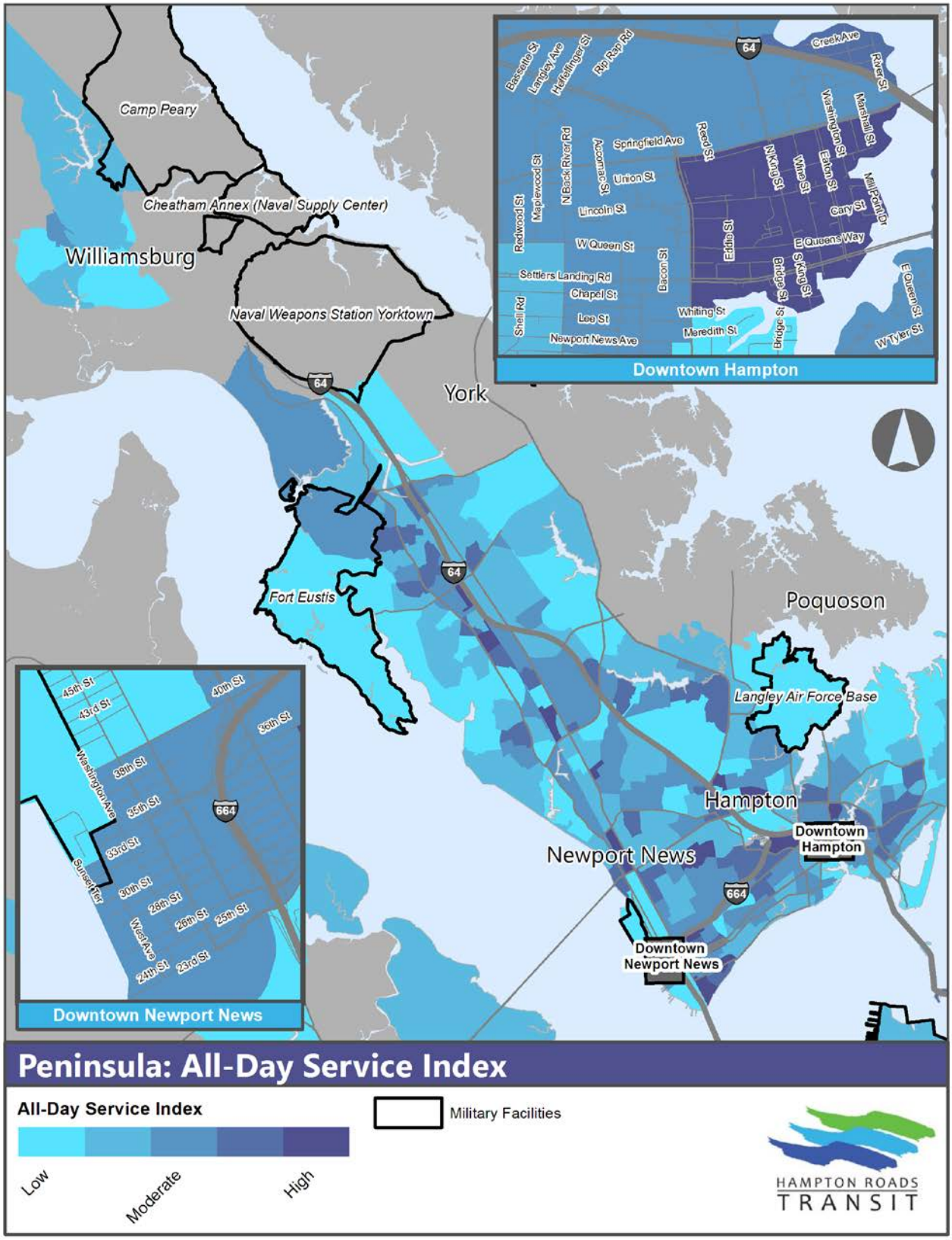


Figure 3-54 | Southside: All-Day Service Index

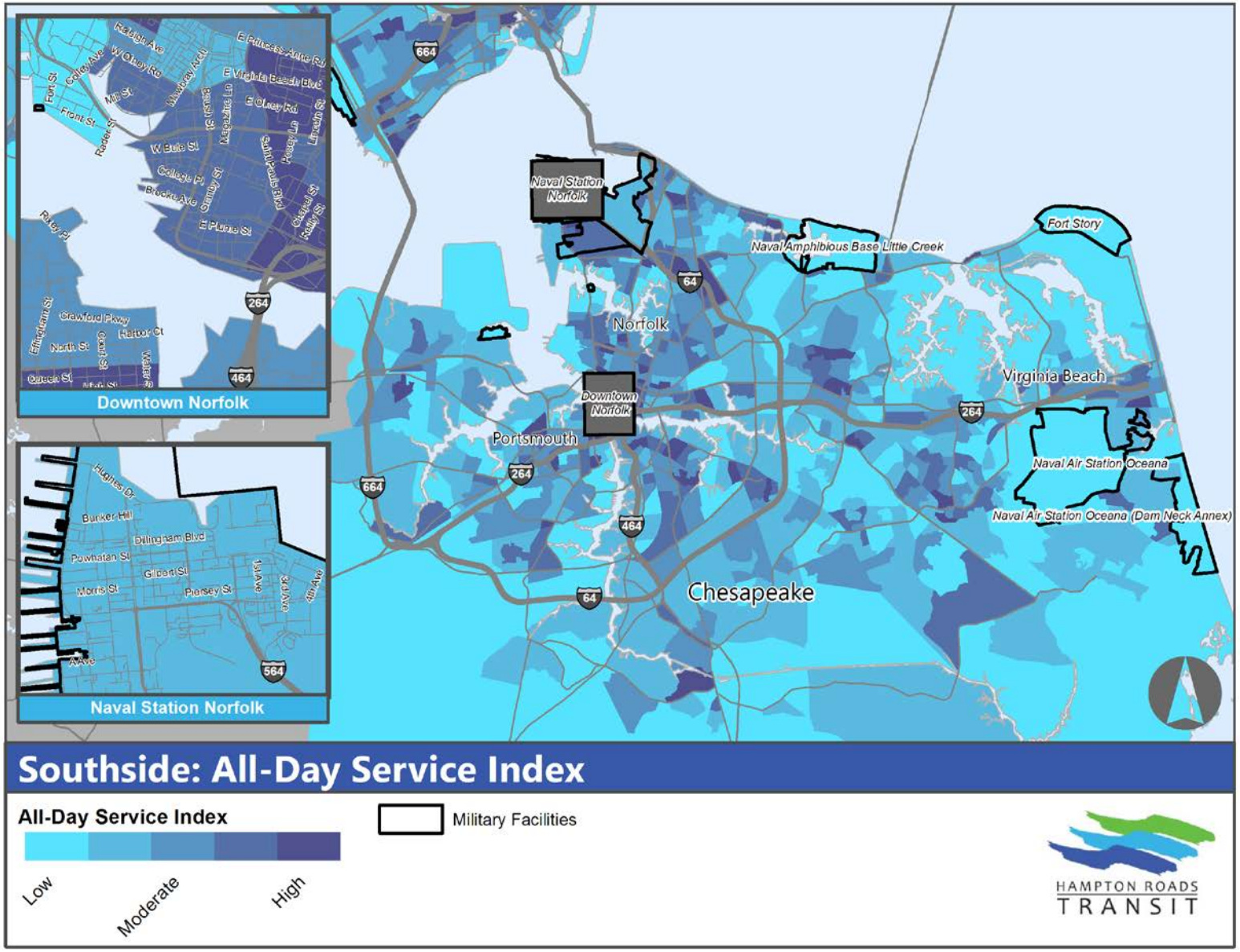


Figure 3-55 | Peninsula: Peak Service Index

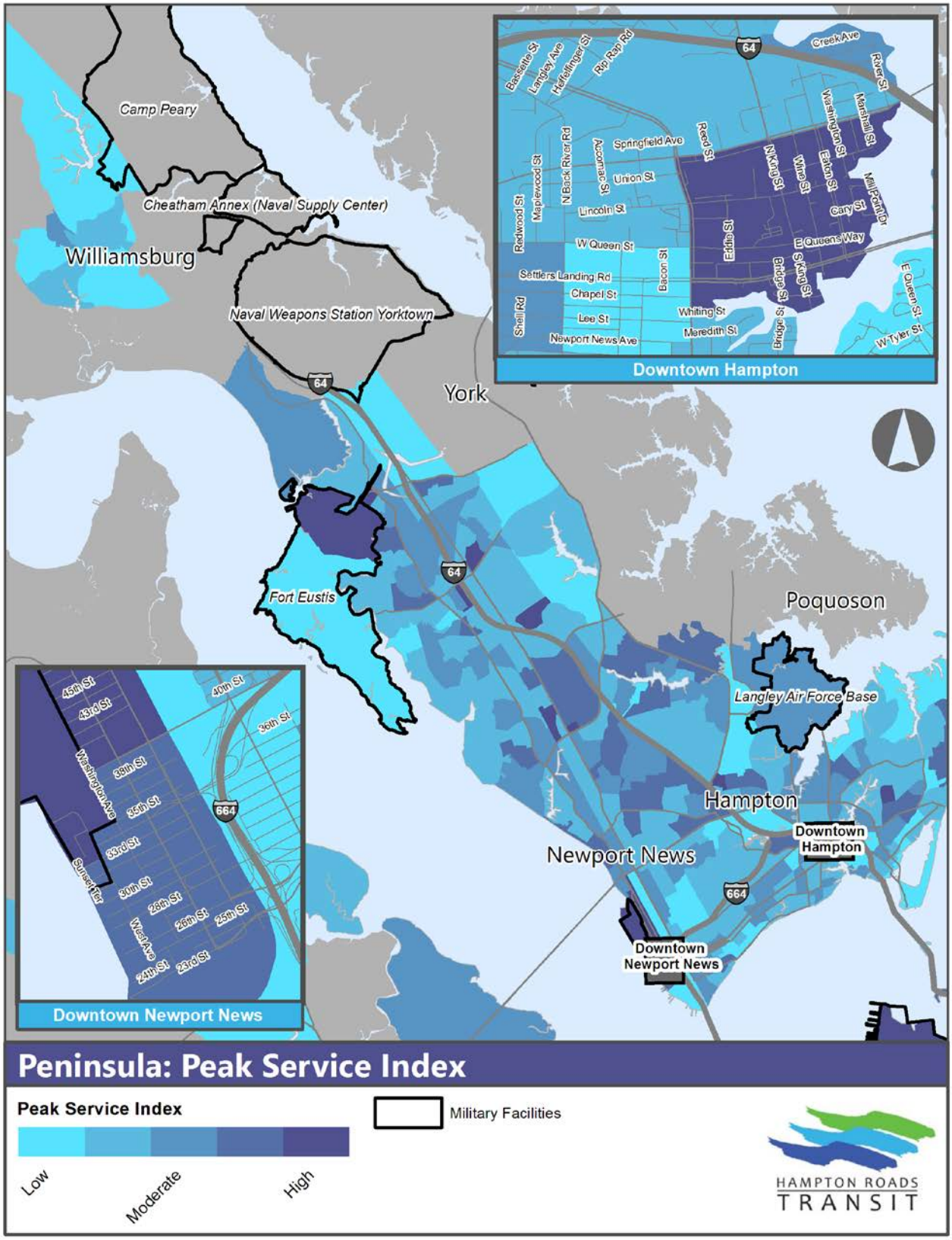


Figure 3-56 | Southside: Peak Service Index

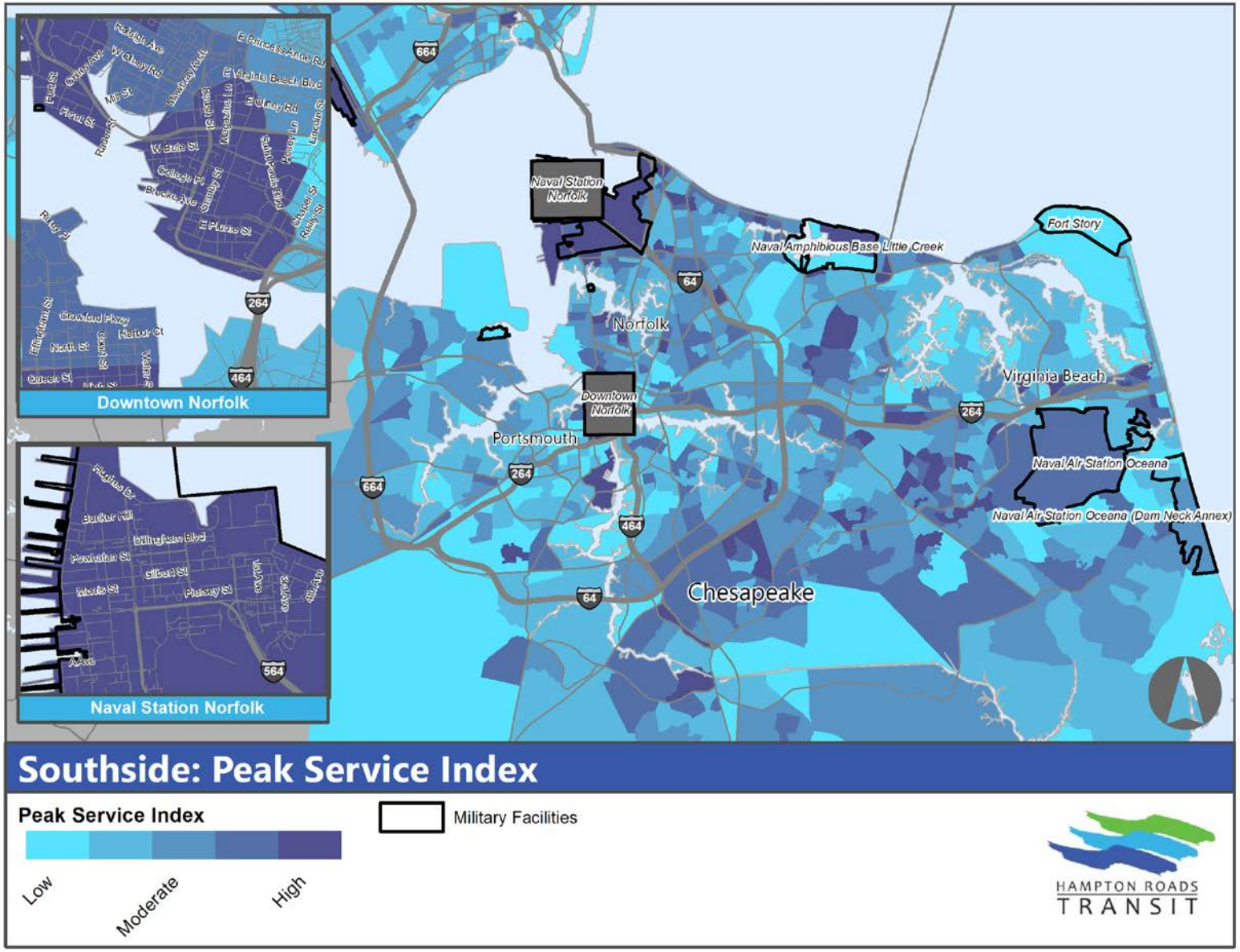


Figure 3-57 | Peninsula: Multimodal Service Index

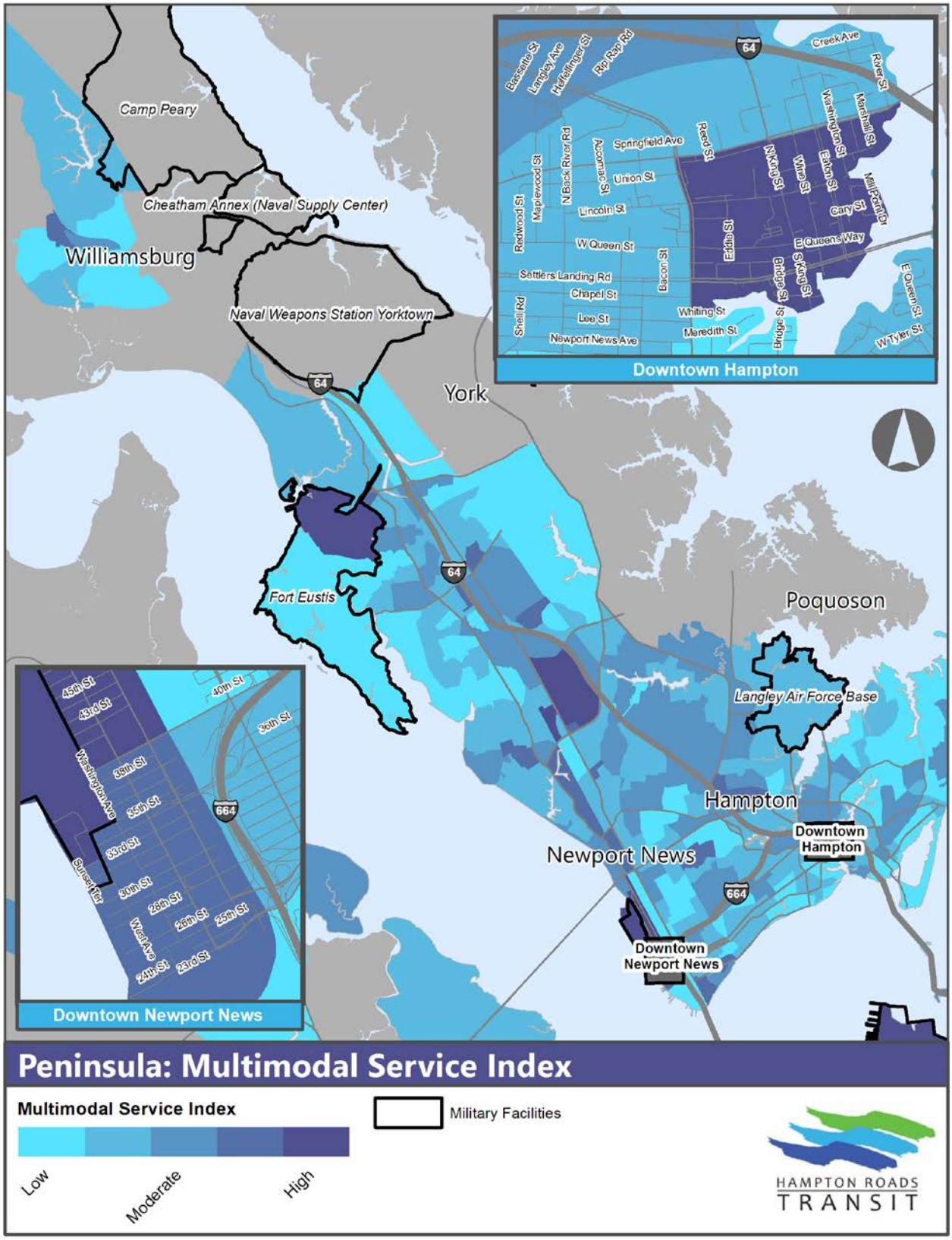
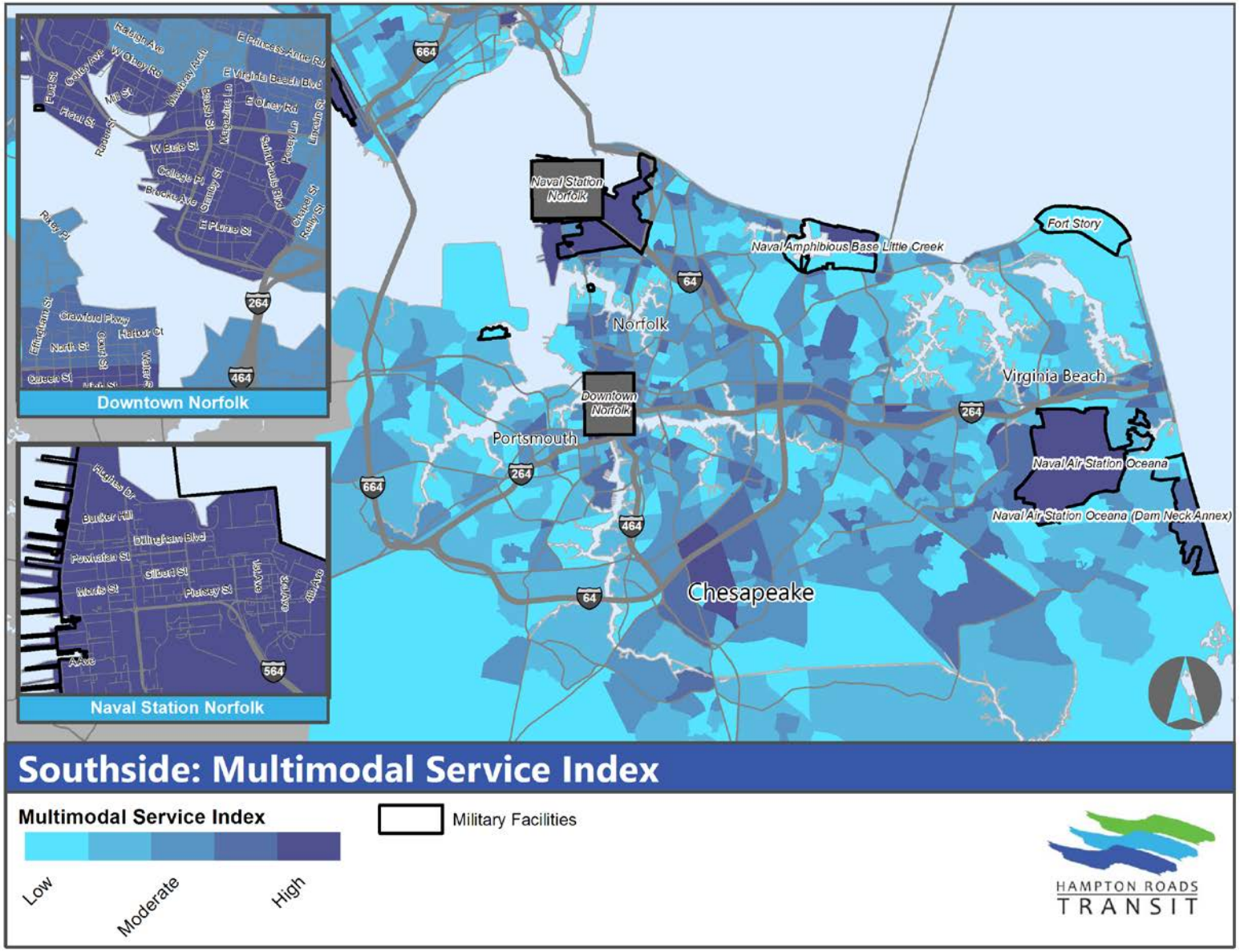


Figure 3-58 | Southside: Multimodal Service Index



3.2.3 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[57] between traffic analysis zones (TAZ), for 2009 and 2040[58]. For this analysis, the trips are then aggregated to larger travel districts[59] to better understand general regional travel trends.[60] The model forecasts travel across the cities of Norfolk, Portsmouth, Hampton, Poquoson, Newport News, Suffolk, Chesapeake, Virginia Beach, and Williamsburg and the counties of Gloucester, James City, Isle of Wight, York, and James City. While the focus of the analysis is solely on the HRT service area, the full extent of the model was analyzed to understand the region-wide travel patterns and best create transit options.

For the purpose of this study, three types of trips were analyzed: home base work, home based other, and non-home based during two different time periods: peak and off-peak**. Table 3-29** provides a detailed description of each type of trip and time period.

Table 3-29 | Travel Demand Model Classifications

Trip Purpose	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.
Time Period	**Description**
Peak	A trip during the morning or afternoon peak periods (6:00 am – 9:00 am and 3:00 pm – 6:00 pm).
Off-peak	A trip during the early morning, midday, evening, or late night periods (9:00 am – 3:00 pm and 6:00 pm – 6:00 am).

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

Region wide, 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 trip originating from within.

[57] The number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination.
[58] The Hampton Roads Transportation Planning Organization (HRTPO) Regional Travel Demand Forecasting Model only provides the 2009 and 2040 scenario.
[59] Travel districts are modified versions of districts defined by the Hampton Roads Transportation Planning Organization. Where possible, modifications were made to break out large military installation into their own districts.
[60] Districts are generally referred to by the name of the neighborhood, but are sometimes referred to by major corridors, military bases, or activity centers.

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 3-30** identifies the districts with the highest concentrations of all day trip origins and **Figure 3-59** 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, had less than a quarter of that density of trip destinations. Downtown Norfolk is a medium-high density mixed use area that attracts a lot of visitors due to the various attractions like, the MacArthur Center, Scopes Arena, and Harbor Stadium, and government services such as the Norfolk City Hall, Department of Motor Vehicles, and Norfolk Circuit Court. Ghent, adjacent to Downtown Norfolk, is a mix of medium density residential and commercial development. The downtown areas of Portsmouth, Newport News, 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 had the highest number of trip destinations at 62 trips per acre. This area includes multiple shopping centers and retail destinations which drives 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 3-31** identifies the districts with the highest concentrations of all day trip destinations and **Figure 3-60** illustrates the density of trip destinations throughout the region.

Table 3-30 | Travel Districts with a High Density of All Day Trip Origins

	District Name	Number of Trip Origins	Density (Trips/Acre)	Connecting Routes
Southside	**Downtown Norfolk**	30,483	96	64, 101, 103, 104, 105, 106, 107, 112, 121, 403, 405, 414, 415, 430, 961, 966, 967
	Ghent	84,326	62	1, 2, 3, 4, 6, 8, 11, 20, 23, 44, 45, 800, 960, 961
	Ocean View Ave	98,224	52	1, 3, 5, 21, 22, 961, 965, 966
	Lafayette-Winona	47,772	48	3, 8, 18, 23, 961
	Kensington, Highland Park, Colonial Place	82,394	44	1, 2, 3, 4, 11, 961
Peninsula	**Windsor Great Park, Richneck**	105,493	38	107, 111, 116, 121, 414
	Downtown Newport News	85,785	37	64, 101, 103, 104, 105, 106, 107, 112, 121, 403, 405, 414, 415, 430, 961, 966, 967
	Denbigh	142,349	32	106, 107, 108, 116, 121, 414, 415, 430
	Northampton	123,854	31	102, 104, 105, 110, 111, 112, 114, 118, 121, 405, 414, 965
	Deerfield, Kiln Creek, Bayberry	52,747	31	108, 111, 112, 116, 119, 121, 414, 965

Table 3-31 | Travel Districts with a High Density of All Day Trip Destinations

	District Name	Activity Centers	Number of Trip Destinations	Density (Trips /Acre)	Connecting Routes
Southside	**Downtown Norfolk**	Downtown Norfolk, MacArthur Center, Norfolk Circuit Court, Norfolk City Hall, Tidewater Community College - Norfolk	165,634	521	1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 45, 90, 800, 960, 961
	Ghent	Downtown Norfolk, Norfolk General Hospital, Children's Health System (CHKD), Eastern Virginia Medical School, US Army Corps of Engineers - Norfolk	167,974	124	1, 2, 3, 4, 6, 8, 11, 20, 23, 44, 45, 800, 960, 961
	Tanners Creek, Partra	Southern Shopping Center, Norview Community Center, Naval Station Norfolk	89,824	53	1, 3, 5, 8, 9, 15, 21, 918, 919, 922, 961, 966
	Kings Grant	Virginia Beach Town Center, Loehmann's Plaza	289,735	52	1, 20, 29, 32, 36, 918, 919, 960, 966, 968
	Brambleton	Norfolk State University, Harbor Park Stadium, Hampton Roads Transit (HRT) - Southside Facility, Amtrak Station	81,483	50	1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 23, 45, 90, 800, 960, 961
Peninsula	**Deer Park / Palmer**	City Center at Oyster Point, Patrick Henry Mall, Oyster Point Square, Canon, Inc., Tech Center	188,668	62	106, 107, 108, 111, 112, 116, 119, 121, 414, 965
	Mercury Central	Coliseum Square Center, Coliseum Crossing Shopping Center, Sentara CarePlex Hospital, Peninsula Town Center, Langley Air Force Base	133,207	53	102, 105, 110, 114, 118, 121, 405, 961, 965, 966
	Newport News Shipbuilding	Huntington Ingalls Industries, Inc. (Newport News Shipbuilding)	38,594	39	64, 101, 103, 104, 105, 106, 107, 112, 114, 121, 403, 405, 414, 415, 430, 961, 966, 967
	Downtown Newport News	Downtown Newport News	89,017	38	64, 101, 103, 104, 105, 106, 107, 112, 121,

	District Name	Activity Centers	Number of Trip Destinations	Density (Trips /Acre)	Connecting Routes
					403, 405, 414, 415, 430, 961, 966, 967
	Newport News/ Williamsburg International Airport	Mary Immaculate Hospital, Jefferson Commons	58,269	33	107, 108, 111, 116, 121, 414

Figure 3-59 | Density of All Day Trip Origins

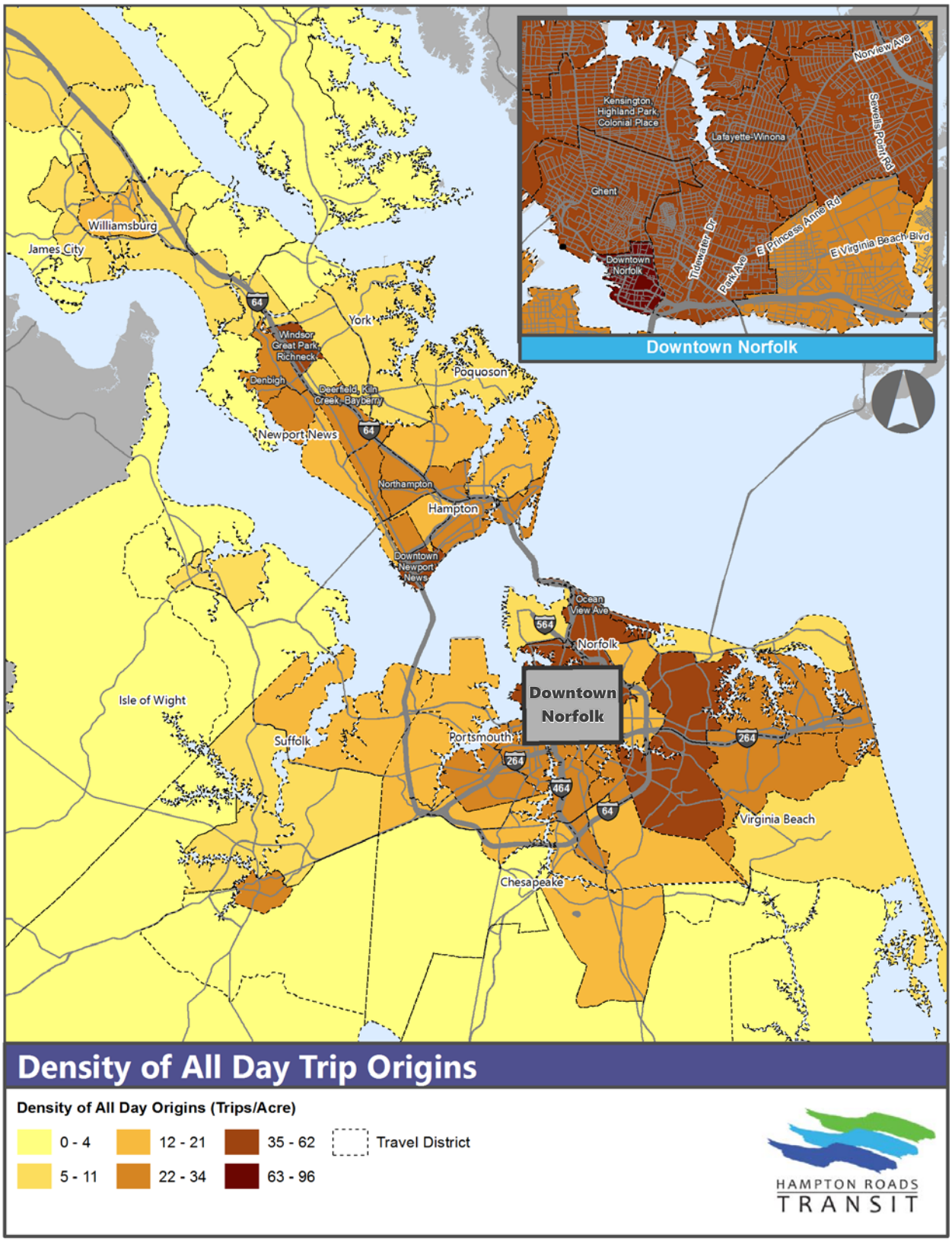
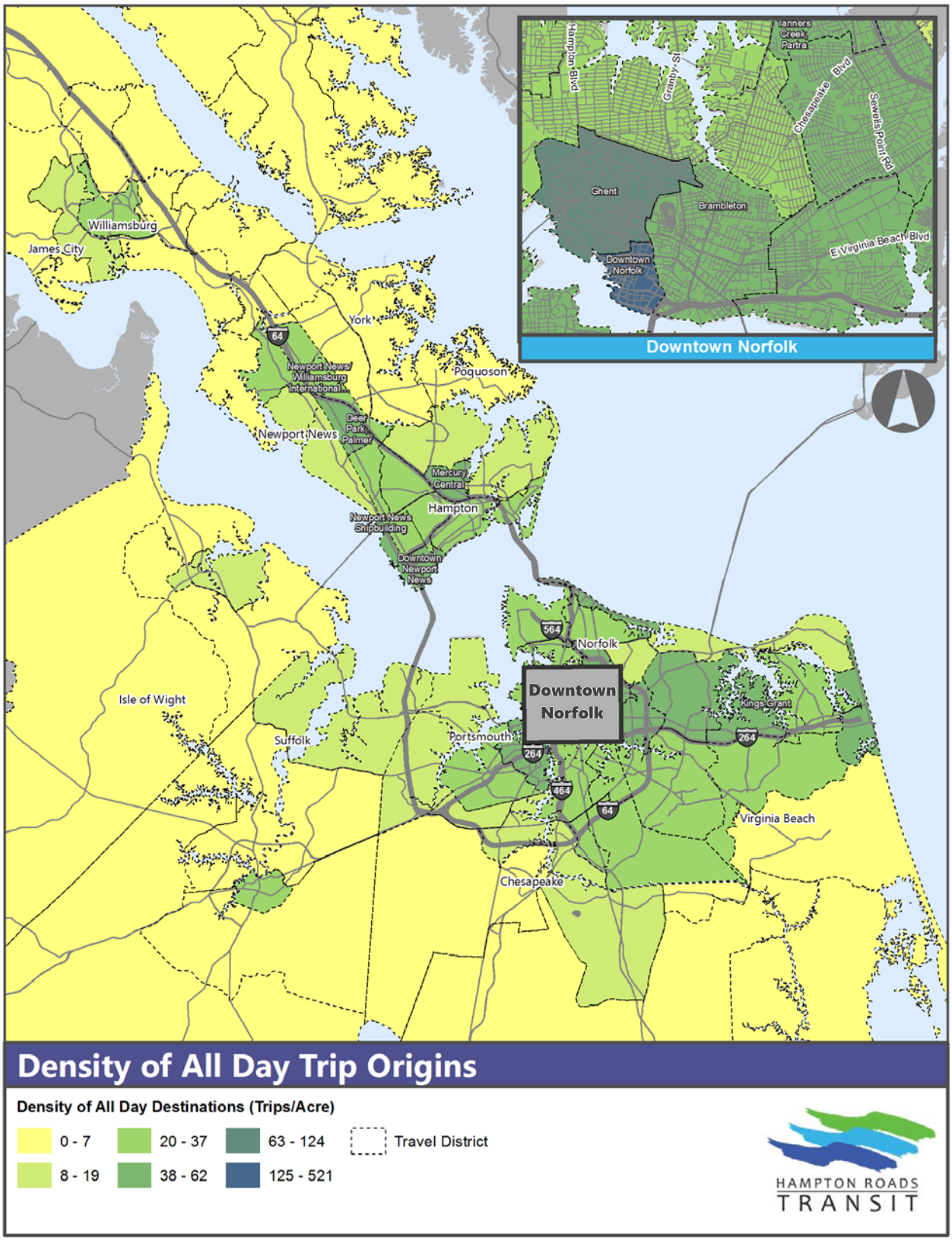


Figure 3-60 | Density of All Day Trip Destinations



Within the HRT service area and member jurisdictions 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 3-32** and **Table 3-33**, respectively.

These 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 Lynnhaven / Naval Base area.

Across the HRT service area and member jurisdictions people primarily circulate within small groups of districts when looking at 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 3-61** 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 that 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 the beltway 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 the beltway 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.

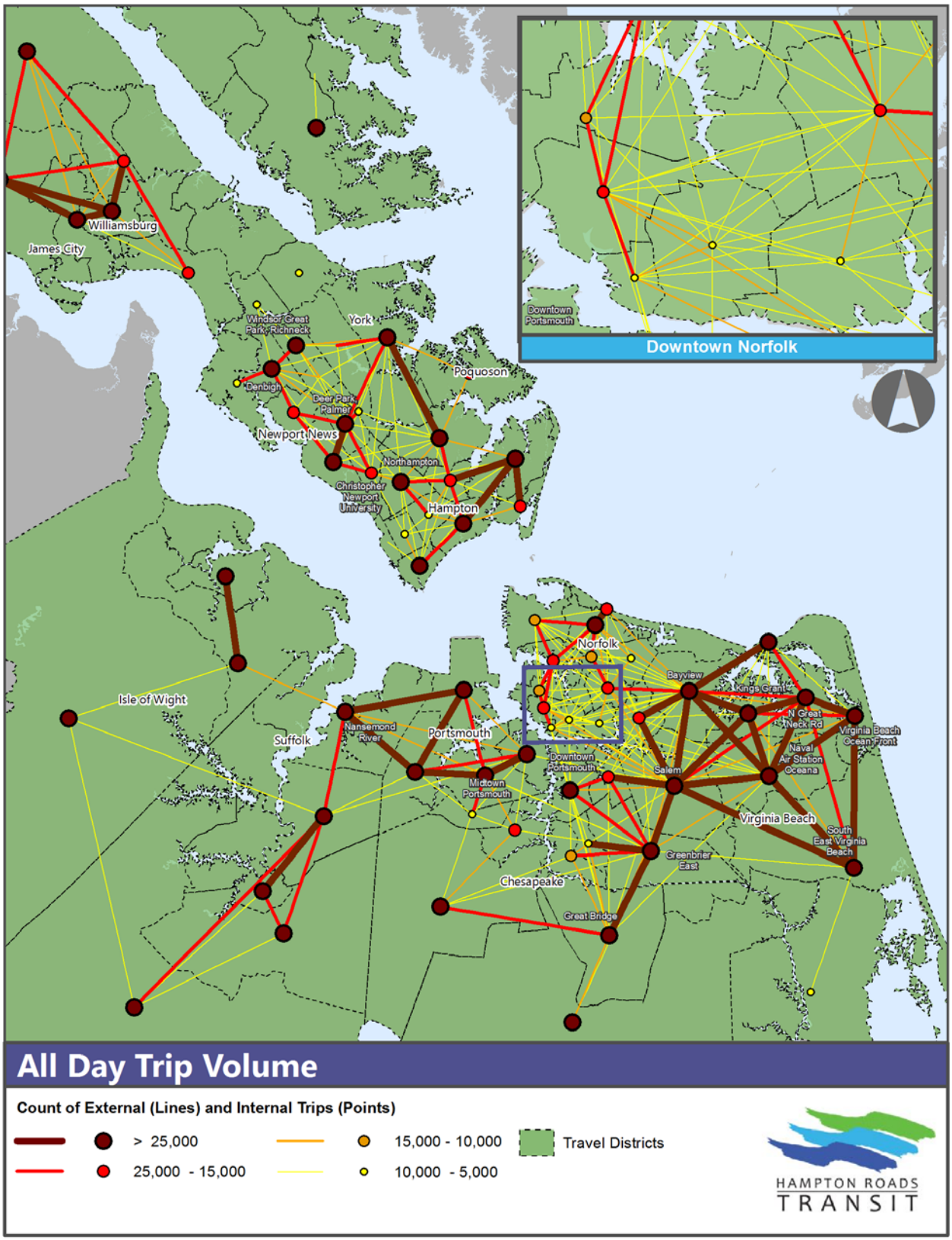
Table 3-32 | Highest Internal All-Day Travel Flows within a District

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 3-33 | 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 3-61 | 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 am – 9:00 am and 3:00 pm – 6:00 pm) 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 the beltway in western Virginia Beach. Of these districts the highest trip origin volume is from Salem which had 49,976 trips in the peak period (3 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 3-34 details the districts with the highest density of peak period trip origins and **Figure 3-62** 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 3-35. Figure 3-63** demonstrates the density of peak trip destinations throughout the region.

Table 3-34 |Travel Districts with the Highest Density of Peak Period Trip Origins

	District Name	Number of Trip Origins	Density (Trips/Acre)	Connecting Routes
Southside	**Downtown Norfolk**	2,408	8	1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 45, 90, 800, 960, 961
	Ghent	6,078	5	1, 2, 3, 4, 11, 23, 44, 800, 961
	Ocean View Ave	6,956	4	1, 3, 5, 965
	Salem	49,976	3	12, 15, 20, 22, 25, 27, 36, 800, 918, 919, 922, 960, 966, 967, 968, 969
	Lafayette-Winona	3,245	3	3, 8
Peninsula	**Windsor Great Park, Richneck**	7,354	3	107, 111, 116, 121, 414
	Northampton	9,106	2	102, 104, 105, 110, 111, 112, 114, 118, 121, 405, 414, 965

	District Name	Number of Trip Origins	Density (Trips/Acre)	Connecting Routes
	Downtown Newport News	5,316	2	64, 101, 103, 104, 105, 106, 107, 112, 121, 403, 405, 414, 415, 430, 961, 966, 967
	Denbigh	10,084	2	106, 107, 108, 116, 415, 430
	Deerfield, Kiln Creek, Bayberry	3,805	2	108, 111, 112, 116, 119, 121, 414, 965

Table 3-35 | Travel Districts with a High Density of Peak Period Trip Destinations

	District Name	Activity Centers	Number of Trip Destinations	Density (Trips / Acre)	Connecting Routes
Southside	**Downtown Norfolk**	Downtown Norfolk, MacArthur Center, Norfolk Circuit Court, Norfolk City Hall, Bank of America, Tidewater Community College - Norfolk	31,460	99	1, 2, 3, 4, 6, 8, 9, 11, 13, 18, 20, 45, 90, 800, 960, 961
	Ghent	Norfolk General Hospital, Children's Health System (CHKD), Eastern Virginia Medical School, US Army Corps of Engineers	22,658	17	1, 2, 3, 4, 6, 8, 11, 20, 23, 44, 45, 800, 960, 961
	Downtown Portsmouth	Downtown Portsmouth, Portsmouth Naval Medical Center, Bon Secours Maryview Medical Center, Naval Medical Center Portsmouth, Norfolk Naval Shipyard	33,309	8	41, 43, 44, 45, 47, 50, 90
	Naval Station Norfolk	Naval Station Norfolk, Naval Support Activity Norfolk	37,109	7	1, 2, 3, 5, 21, 918, 919, 922, 961, 965, 966
	Military Circle	Lake Taylor Hospital, Sentara Leigh Hospital, Military Circle Mall, Janaf Shopping Center, PRA Group, Inc., Virginia Wesleyan College	20,108	5	15, 20, 22, 23, 25, 27, 800, 918, 919, 922, 960, 966, 967, 968
Peninsula	**Newport News Shipbuilding**	Huntington Ingalls Industries, Inc. (Newport News Shipbuilding), Downtown Newport News	10,241	10	64, 101, 103, 104, 105, 106, 107, 112, 114, 121, 403, 405, 414, 415, 430, 961, 966, 967
	Deer Park/ Palmer	City Center at Oyster Point, Patrick Henry Mall, Oyster	18,454	6	106, 107, 108, 111, 112, 116,

	District Name	Activity Centers	Number of Trip Destinations	Density (Trips / Acre)	Connecting Routes
		Point Square, Canon, Inc., Marketplace at Tech Center			119, 121, 414, 965
	Mercury Central	Coliseum Square Center, Coliseum Crossing Shopping Center, Sentara CarePlex Hospital, Peninsula Town Center, Langley Air Force Base	10,140	4	102, 105, 110, 114, 118, 121, 405, 961, 965, 966
	Newport News/ Williamsburg International Airport	Mary Immaculate Hospital, Jefferson Commons	4,902	3	107, 108, 111, 116, 121, 414
	Downtown Newport News	Downtown Newport News	5,783	3	64, 101, 103, 104, 105, 106, 107, 112, 121, 403, 405, 414, 415, 430, 961, 966, 967

Figure 3-62 | Density of Peak Period Trip Origins

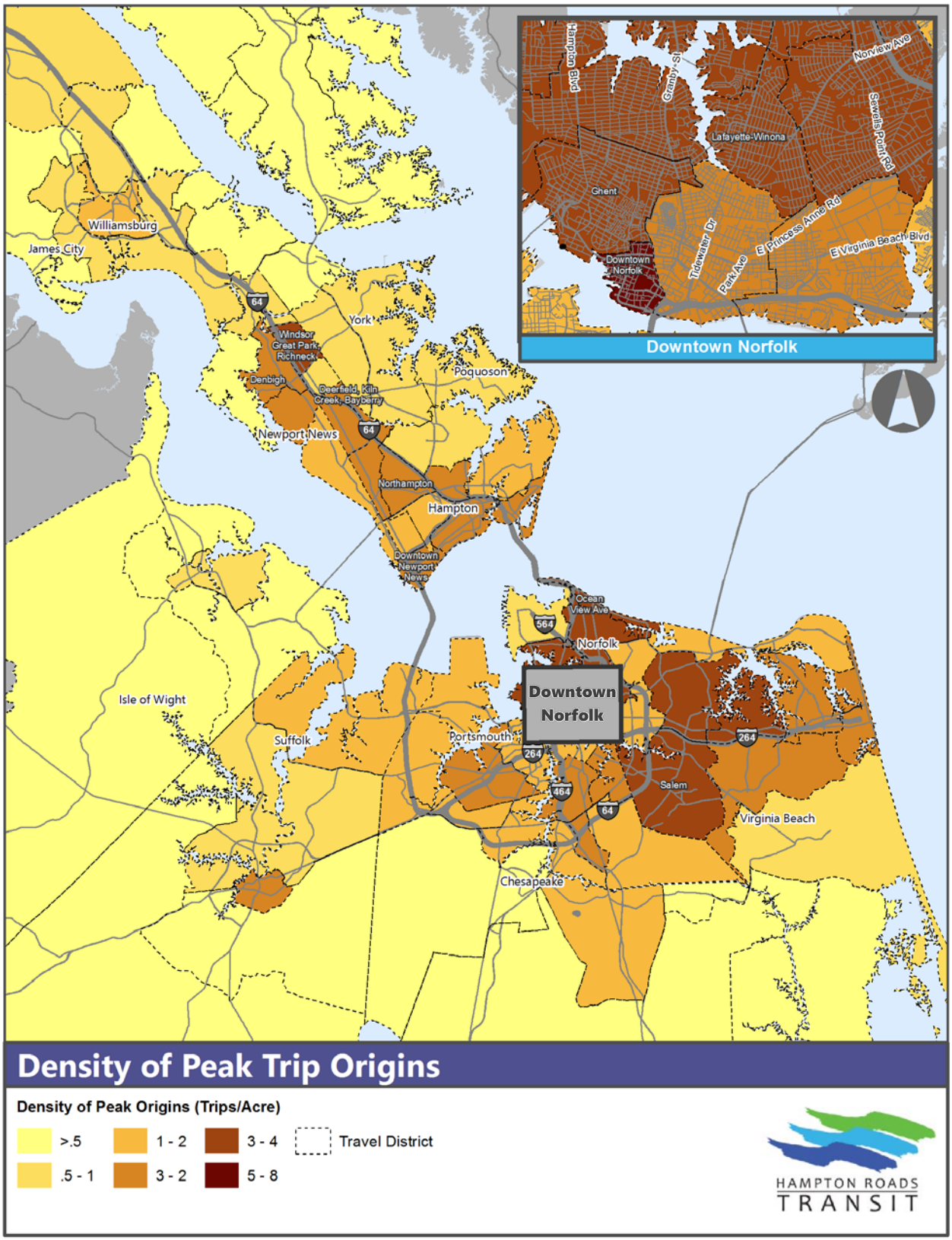
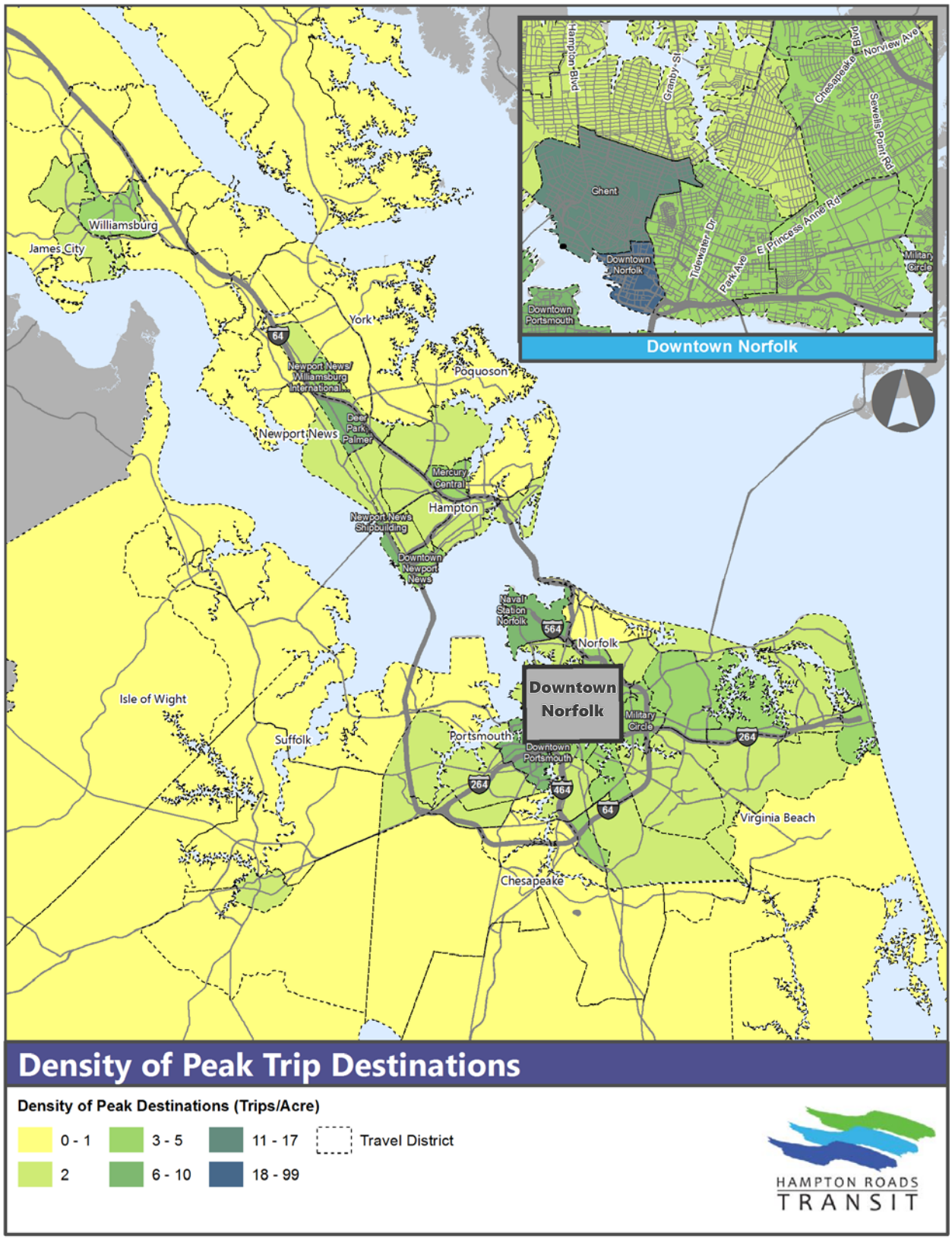


Figure 3-63 | Density of Peak Period Trip Destinations



The analysis of peak travel patterns shows that people travel greater distances for work trips during the peak than for a typical daily trip. Internal district trips make up a much smaller portion of the overall travel during the peaks than all day; **Table 3-36** and **Table 3-37** 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 Oceania 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 Oceania.

Figure 3-64 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 the along the I-64/264 corridor and the southern portion of the beltway.
- **Lynnhaven / Naval Air Station Oceania -** This district is located in central Virginia Beach. Most of the employment within this area comes from the Naval Air Station Oceania, 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.

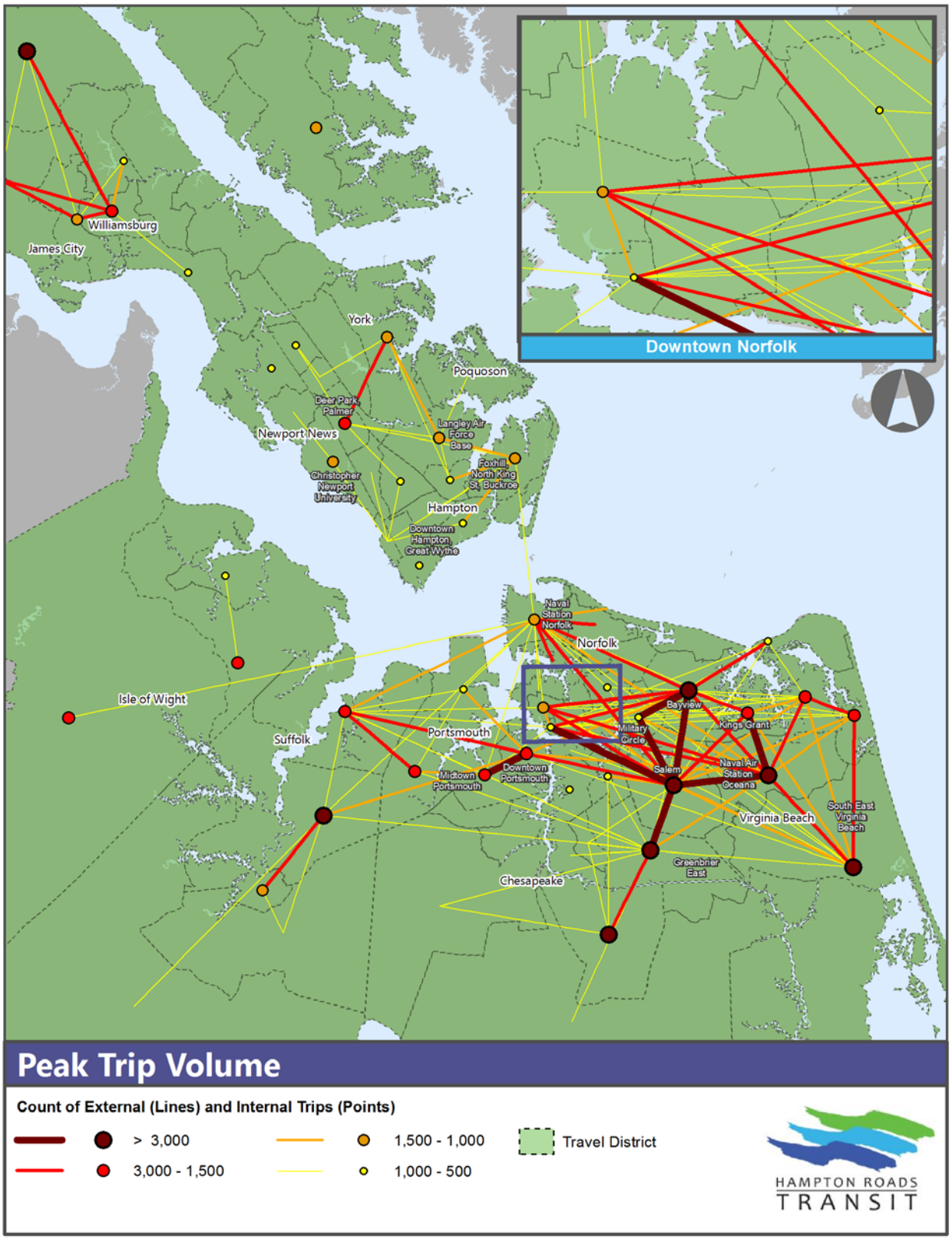
Table 3-36 | Highest Internal Peak Period Travel Flows within a District

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 3-37 | 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 3-64 | Volume of Peak Period Travel Between Districts



3.2.4 Service Gap Analysis

HRT provides coverage over much of the areas within the six-member jurisdiction 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.

The following analysis uses the travel flows analyzed in **Section 3.2.3** as the measure of future travel demands. The travel flows were compared against the propensity indices from **Section 3.2.1** 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 which contains the schedule, route, and bus stop information for all HRT services. The level of service measure was applied to any areas within 1/4 of a 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 Service Gaps

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

Low levels of service were identified in three general areas: the City of Hampton, I-264 corridor in Portsmouth, and northern Virginia Beach. In Hampton, gaps were identified between all three districts on the eastern portion of the city (Downtown Hampton/ Great Wythe, Phoebus, and Foxhill/ North King St/ Buckroe), suggesting there is a greater need for transit trips that circulate throughout the area. Portsmouth showed a chain of districts along I-264 that need increased levels of service to Downtown Portsmouth. On the periphery of the service area in Virginia Beach, there are gaps in the level of service within many of the districts and along Virginia Beach Boulevard.[61] 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 the same general area, between northeast Chesapeake and central Virginia Beach. Routes in this area extend radially from Downtown

[61] This gap has been identified for increased service through the Naval Station Norfolk Transit Extension Study.

Norfolk and would necessitate transfers to cross the region. Additionally, this area has limited coverage within its neighborhoods and presents the largest new market within the HRT service area and member cities jurisdictions. A full summary of the all-day service gaps can be found in **Table 3-38** and **Table 3-39. Figure 3-65** illustrates the service gaps that were identified though this analysis.

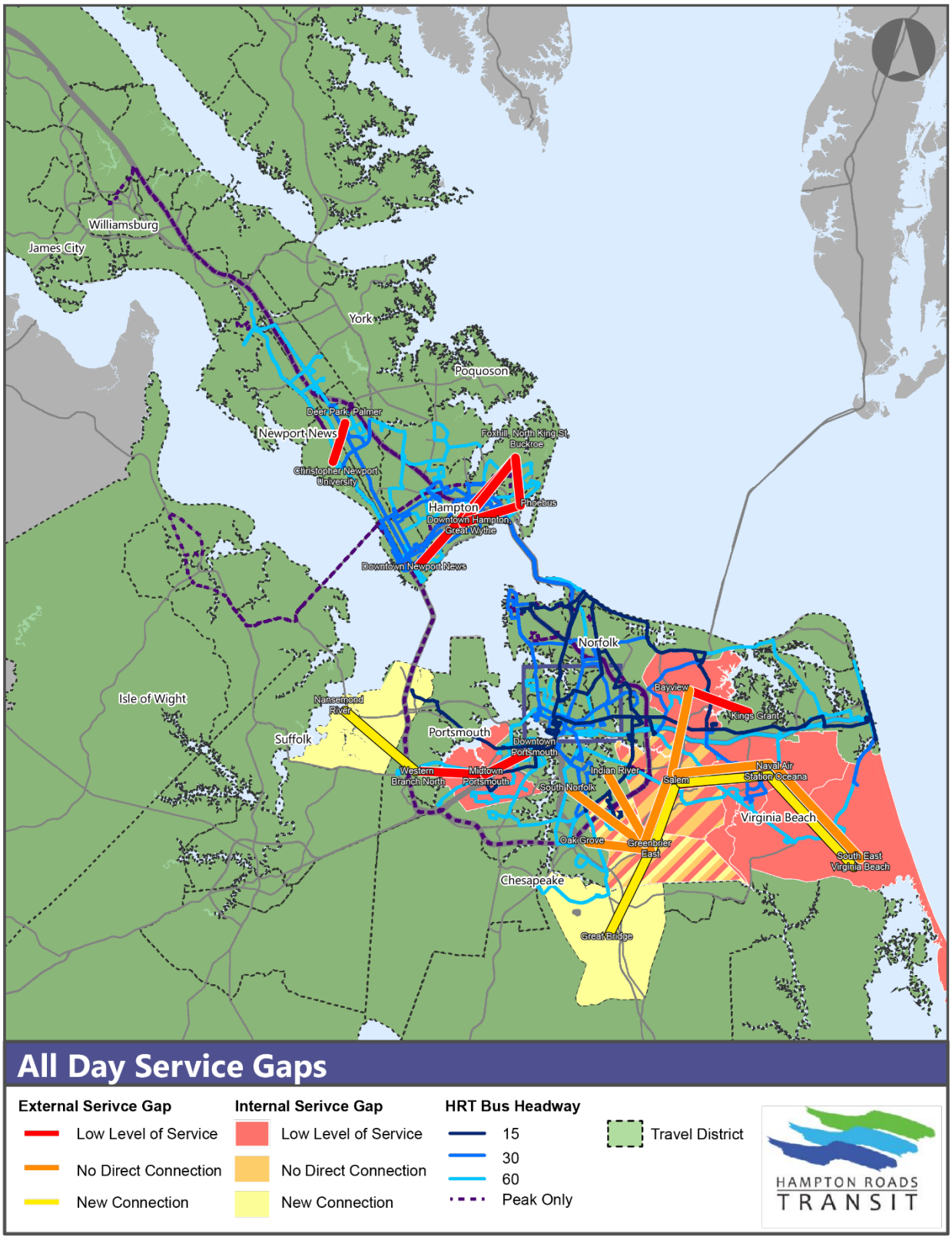
Table 3-38 | Internal All-Day Service Gaps

District
Low Level of Service
Midtown Portsmouth
Bayview
Southeast Virginia Beach
Naval Air Station Oceana
Salem
Lacks Direct Connection
Salem
Greenbrier East
News Service Area
Greenbrier East
Great Bridge
Nansemond River
Salem

Table 3-39 | All-Day Service Gaps Between Districts

District One	District Two
Low Level of Service	
Western Branch North	Midtown Portsmouth
Downtown Portsmouth	Midtown Portsmouth
Bayview	Kings Grant
Naval Air Station Oceana	Salem
Downtown Newport News	Foxhill, North King St, Buckroe
Christopher Newport University	Deer Park/ Palmer
Downtown Hampton, Great Wythe	Foxhill/ North King St/ Buckroe
Downtown Hampton, Great Wythe	Phoebus
Foxhill, North King St, Buckroe	Phoebus
Lacks Direct Connection	
South Norfolk	Greenbrier East
Indian River	Greenbrier East
Greenbrier East	Oak Grove
Greenbrier East	Salem
Bayview	Salem
South East Virginia Beach	Naval Air Station Oceana
Naval Air Station Oceana	Salem
New Service Area	
Greenbrier East	Great Bridge
Greenbrier East	Salem
Western Branch North	Nansemond River
South East Virginia Beach	Naval Air Station Oceana
Naval Air Station Oceana	Salem

Figure 3-65 | All-Day Service Gaps



Peak Service Gaps

Few peak period service gaps, or popular peak period travel connections, were identified on the Southside. Of the few gaps that were identified, many of them were also identified as all-day service gaps, including those in northern Virginia Beach and Portsmouth. A full summary of the peak period service gaps can be found in **Table 3-40** and **Table 3-41**.

A new gap in the level of service was identified between the East Little Creek Road district and Naval Station Norfolk. Service between these districts is currently provided by Route 21 which connects Naval Station Norfolk to Joint Expeditionary Base Little Creek.

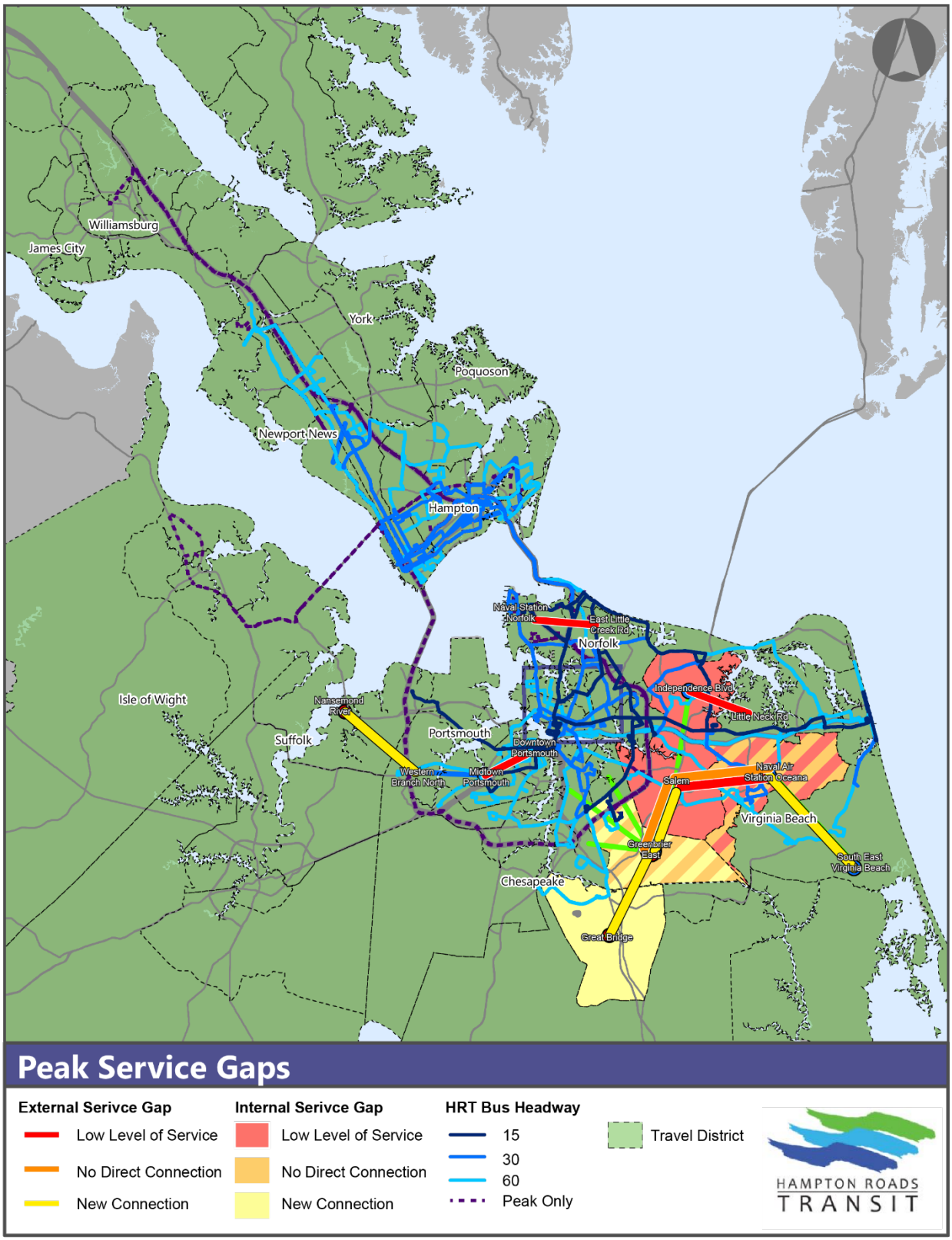
Table 3-40 | Internal Peak Period Service Gaps

District
Low Level of Service
Bayview
Naval Air Station Oceana
Salem
Lacks Direct Connection
Greenbrier East
Naval Air Station Oceana
New Service Area
Greenbrier East
Great Bridge
Nansemond River
Salem

Table 3-41 | Peak Period Service Gaps Between Districts

District One	District Two
Low Level of Service	
Naval Station Norfolk	East Little Creek Rd
Downtown Portsmouth	Midtown Portsmouth
Bayview	Kings Grant
Naval Air Station Oceana	Salem
Lacks Direct Connection	
Greenbrier East	Salem
Naval Air Station Oceana	Salem
New Service Area	
Greenbrier East	Great Bridge
Greenbrier East	Salem
Western Branch North	Nansemond River
Downtown Portsmouth	Nansemond River
South East Virginia Beach	Naval Air Station Oceana

Figure 3-66 | Peak Service Gaps



3.3 PEER ANALYSIS

The following peer review analyzes HRT's operating characteristics against those of five peer transit agencies:

- Pinellas Suncoast Transit Authority (PSTA), Pinellas County, Florida;
- Jacksonville Transportation Authority (JTA), Jacksonville, Florida;
- Central Ohio Transit Authority (COTA), Columbus, Ohio;
- Sacramento Regional Transit District (RT) Sacramento, California; and
- OmniTrans, San Bernardino, California.

A brief summary of the key findings of this analysis can be found in the following section. The complete Peer Analysis is documented in **Appendix A**.

3.3.1 Summary and Key Findings

On average, HRT operates a greater number of revenue hours, revenue miles and peak vehicles than its peers. HRT vehicles also travel more miles per vehicle and per hour as compared to peer agencies. Although the number of unlinked local passenger trips fell slightly below the peer average, HRT passengers traveled slightly more overall miles than the average peer agency's passengers. HRT's operating expenditures on local bus in FY 2015 was on par with that of the average peer.

HRT fell marginally short of the average peer in all service efficiency categories, bringing in less fare revenue, recovering less of its operating costs through fare revenue, and having a relatively higher subsidy per passenger amount.

Table 3-42 summarizes average peer values in operational metrics, service efficiency, and sources of operating and capital revenue expended, as well as how HRT compares to the five peer agencies presented in this analysis.

Table 3-42 | Summary of Average Peer Metrics as Compared to HRT Metrics

Characteristic	Peer Group Average Value	HRT Value	Percent Difference[62]
Operational Metrics			
Vehicles Available in Maximum Service	235	267	13.6%
Vehicles Operational in Maximum Service	185	236	27.6%
Vehicle Revenue Miles	8,709,830	10,218,494	17.3%
Vehicle Revenue Hours	680,639	786,442	15.5%
Vehicle Revenue Miles per Available Peak Vehicle	37,988	38,272	0.75%
Vehicle Revenue Miles per Vehicle Revenue Hour	12.8	13.0	1.56%
Percentage of Revenue Hours	93%	98%	5.4%
Unlinked Passenger Trips	14,699,217	14,218,168	-3.3%
Total Passenger Miles	65,250,593	65,849,308	0.9%
Passengers per Revenue Mile	1.7	1.4	-19.2%

[62] Calculated by determining the percent difference between the HRT Values and Peer Group Average Value – ([Peer Group Average Value]-[HRT Value])/[Peer Group Average Value]

Characteristic	Peer Group Average Value	HRT Value	Percent Difference[62]
Passengers per Revenue Hour	21.8	18.1	-17.2%
Operating Expenses	$72,375,159	$75,843,693	4.8%
Operating Expenses per Revenue Hour	$107.29	$96.44	-10.11%
Service Efficiency			
Fare Revenue	$14,179,449	$14,115,226	-0.5%
Farebox Recovery Ratio	20%	19%	-3.7%
Subsidy per Passenger	$3.99	$4.34	8.8%
Source of Operating Revenue Expended			
Federal	10.9%	23.4%	12.5%
State	6.1%	17.9%	11.8%
Local	36.0%	40.1%	4.1%
Directly Generated	47.0%	18.6%	-28.4%
Source of Capital Revenue Expended[63]			
Federal	81.2%	22.3%	-58.9%
State	8.8%	29.9%	21.1%
Local	2.3%	47.9%	45.6%
Directly Generated	7.7%	0.0%	-7.7%

3.4 TREND ANALYSIS

This trend analysis reports on and assesses HRT's bus and demand response transit services during the period spanning FY2012 through FY2016. 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.

HRT's bus service includes 54 local routes, 9 Metro Area Express (MAX) regional express routes, 5 Peninsula Commuter Service routes, and 3 seasonal VB Wave shuttle system routes around Virginia Beach. 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 0.75 miles of all existing fixed-route service, including bus and light rail. This 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

[63] HRT's capital expenditures in FY 2015 are not reflective of a typical year.

- Revenue and cost metrics:
  - Total operating expenses
  - Operating expenses per passenger trip
- Service efficiency
  - Fare revenue
  - Farebox recovery ratio
  - Subsidy per passenger

3.4.1 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 16 percent from FY 2012 to FY 2016. 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 Suffolk, the majority of 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 drop in service area population can likely also be at least in part attributed to the loss of service in 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 2,654 persons per square mile.

Table 3-43 summarizes how the characteristics of HRT's service area have changed over the last five fiscal years.

Table 3-43 | 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
% Change	**-16%**	**-21%**	**-5%**

3.4.2 Operational Statistics

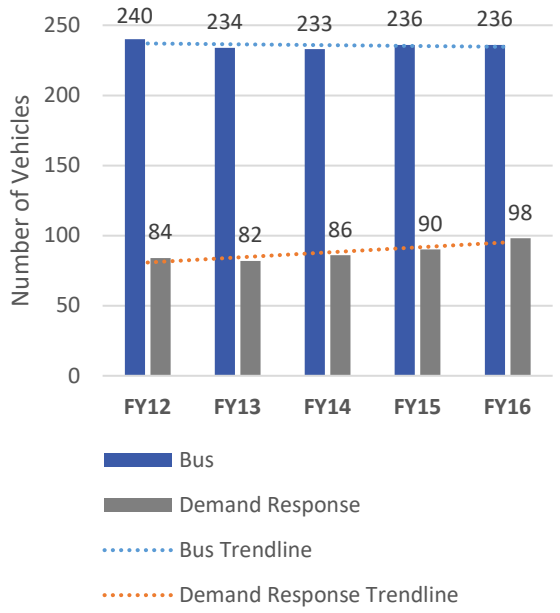
A review of operational statistics describes the level of service HRT has provided over the last five years. The following section analyzes the vehicles operated in maximum service, revenue hour and revenue mile trends within the HRT system.

Vehicles Operated in Maximum Service

Between FY 2012 and FY 2016, the number of fixed-route vehicles in maximum service remained relatively constant, dropping overall by just two percent (from 240 to 236).

In contrast, HRT increased its paratransit fleet operating in maximum service from 84 to 98 vehicles (by 17 percent), 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 3-67** details the number of vehicles operated in maximum service over the period from FY 2012 through FY 2016.

Figure 3-67 | Vehicles Operated in Maximum Service



Vehicle Revenue Miles

Fixed-route

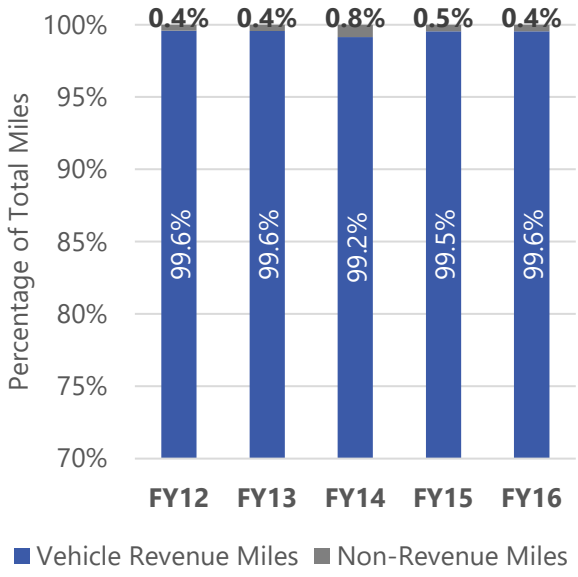
A vehicle is considered in revenue service when operating on a route and serving passengers, and in non-revenue service when traveling to or from a garage without passengers. Fixed-route revenue miles dropped from FY 2012 to FY 2013, but rose steadily thereafter, resulting in a two percent overall increase from FY 2012 to FY 2016. **Table 3-44** summarizes the total revenue versus non-revenue miles on HRT fixed-routes during the five-year period.

Table 3-44 | Fixed-Route: Revenue / Non-Revenue Miles[64]

Fiscal Year	Revenue	Non-Revenue
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	47,797
% Change	**2%**	**9%**

The percentage of fixed-route vehicle revenue versus that of non-revenue miles, shown in **Figure 3-68**, 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 3-68 | Fixed-Route: Percentage of Vehicle Revenue and Non-Revenue Miles



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 2016; revenue miles surged by a total of 68 percent. As revenue service grew, so did non-revenue miles, by a total of 11 percent. **Table 3-45** summarizes the total revenue versus non-revenue miles in HRT demand response vehicles over the five-year period.

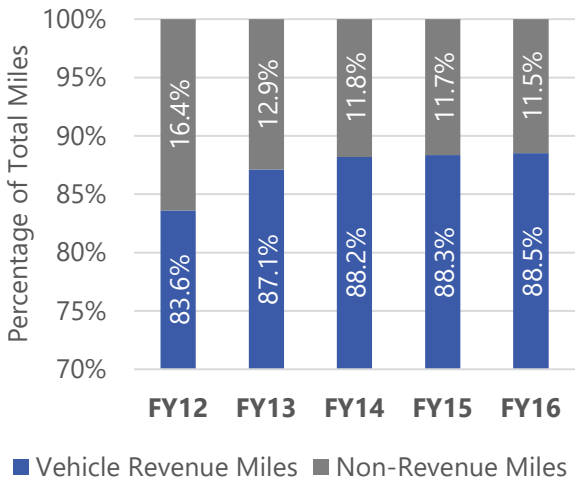
[64] Non-revenue miles increased by 92 percent in FY 2014, this was a direct result of a new scheduling process within Trapeze.

Table 3-45 | Demand Response: Revenue / Non-Revenue Miles

Fiscal Year	Revenue	Non-Revenue
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
% Change	**68%**	**11%**

Figure 3-69 shows the percentage of demand response revenue versus non-revenue miles over the five-year period. While paratransit vehicles spent just 83.6 percent of their mileage in revenue service in FY 2012, by FY 2016, this figure had reached 88.5 percent.

Figure 3-69 | Demand Response: Percentage of Vehicle Revenue and Non-Revenue Miles



Vehicle Revenue Hours

Fixed-Route

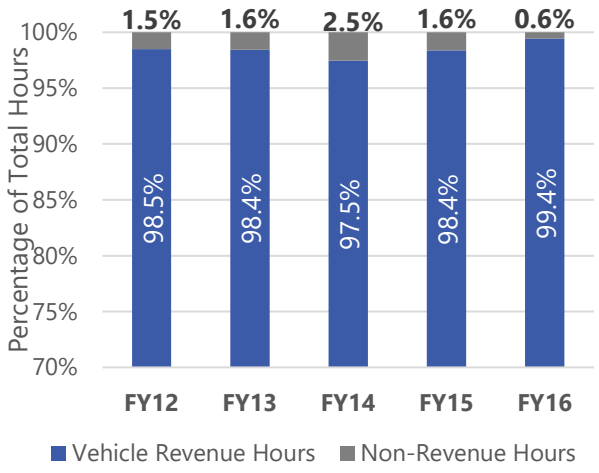
A complement to vehicle revenue miles, an analysis of revenue hours reveals – in terms of total time rather than distance – how efficient an agency is with its vehicles as it aims to spend as much time in service as possible. Over the five-year period, while HRT increased its revenue hours by four percent, non-revenue hours dropped by over 60 percent. **Table 3-46** shows revenue versus non-revenue hours on HRT fixed-route services from FY 2012 to FY 2016.

Table 3-46 | Fixed-Route: Revenue / Non-Revenue Hours

Fiscal Year	Revenue	Non-Revenue
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
% Change	**4%**	**-61%**

Figure 3-70 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 2016. Over the five-year period, HRT has used its vehicles more efficiently.

Figure 3-70 | Fixed-Route: Percentage of Vehicle Revenue and Non-Revenue Hours



Demand Response

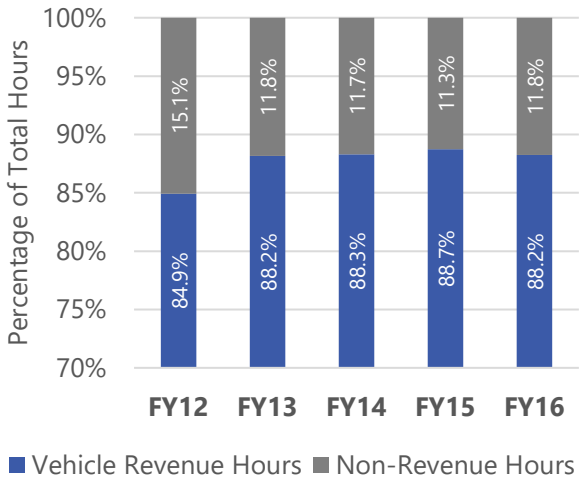
As the demand response service has grown, both revenue and non-revenue demand response hours have increased, respectively by 58 and 18 percent. **Table 3-47** summarizes revenue and non-revenue hours for paratransit service over the five-year period.

Table 3-47 | Demand Response: Revenue / Non-Revenue Hours

Fiscal Year	Revenue	Non-Revenue
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
% Change	**58%**	**18%**

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 3-71** shows the percentage of revenue versus non-revenue hours on demand response vehicles.

Figure 3-71 | Demand Response: Percentage of Vehicle Revenue and Non-Revenue Hours



3.4.3 Ridership

Total Ridership

An assessment of ridership reveals how the usage of HRT services has changed over the five-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 18 percent decrease over the five-year period. **Table 3-48** describes annual total ridership on the bus and demand response services from FY 2012 through FY016. Therefore, despite a slight increase in revenue miles and hours, HRT has served fewer bus passengers now than it did five 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. Prior to its overhaul, the program consisted of one flat fee option for institutions, which were subsequently passed on to riders in the form of unlimited access. This structure underpriced passes, and ultimately 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). Instead of purchasing passes for all employees or students, 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; and
- Various service changes to routes over the five-year period may 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 20 percent overall. During the five-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 3-48 | Annual Total Ridership

Fiscal Year	Fixed-Route	Demand Response
2012	16,166,475	293,012
2013	16,217,920	304,004
2014	15,026,924	311,789
2015	14,218,168	324,510
2016	13,241,512	351,654
% Change	**-18%**	**20%**

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 2016, 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 five-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 3-49** shows passengers per revenue mile for both services over the analysis period.

Table 3-49 | 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
% 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, passenger per bus revenue hour increased slightly from FY 2012 to FY 2013 (from 20.5 to 20.7) and decreased thereafter (by 22 percent overall). Demand response passengers per revenue hour also decreased

over the five-year period, ultimately by 24 percent overall (from 2.0 to 1.5). **Table 3-50** summarizes passengers per revenue hour by service.

Table 3-50 | 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
% Change	**-22%**	**-24%**

3.4.4 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 3-51** 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 17 percent. However, the percentage by which operating expenses increased also decreased over time. 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); and from FY 2015 to FY 2016, expenses only increased by 0.02 percent (from $75.84 million to $75.85 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 five-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).

Table 3-51 | 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
% Change	**17%**	**14%**

Operating Expenses per Passenger Trip

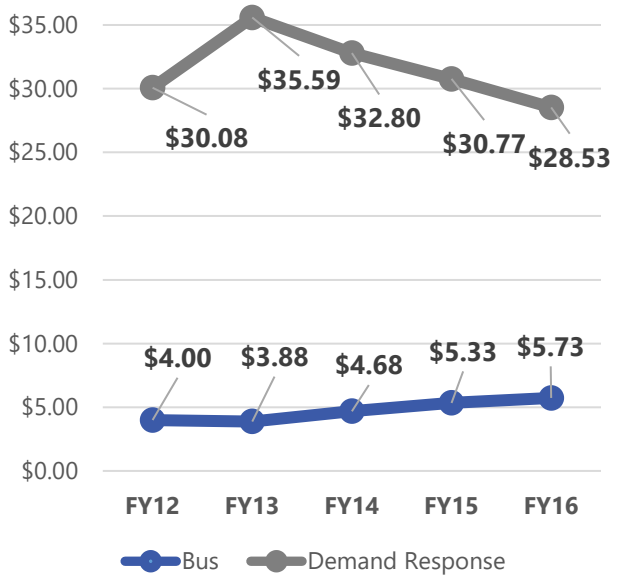
Operating expenses per passenger trip can provide insight into how efficiently an agency is utilizing its operating resources. This analysis can also shed light on whether an agency's cost increases or decreases are correlated with ridership trends.

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 2016, increasing overall by 43 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 2016, expenses per passenger trip decreased. In all, operating expenses per passenger trip decreased to $28.53 in FY 2016, indicating a five 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 3-72 shows operating expenses per passenger trip for bus and demand response from FY 2012 through FY 2016.

Figure 3-72 | Operating Expenses per Passenger Trip



3.4.5 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 for the rest of the analysis period. During the five-year period, fixed-route cost recovery dropped steadily and by five percent overall (23 percent in FY 2012 to 18 percent in FY 2016). 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 by relatively little. **Figure 3-73** 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 49 percent overall –from FY 2012 to FY 2016. Moreover, although total operating expenses peaked and valleyed during this timeframe, the farebox recovery ratio increased by a small amount each year, reaching nine percent in FY 2016. **Figure 3-74** details fare revenue and the cost recovery ratio for demand response service from FY 2012 through FY 2016.

Figure 3-73 | Fixed-route: Fare Revenue / Cost Recovery Ratio

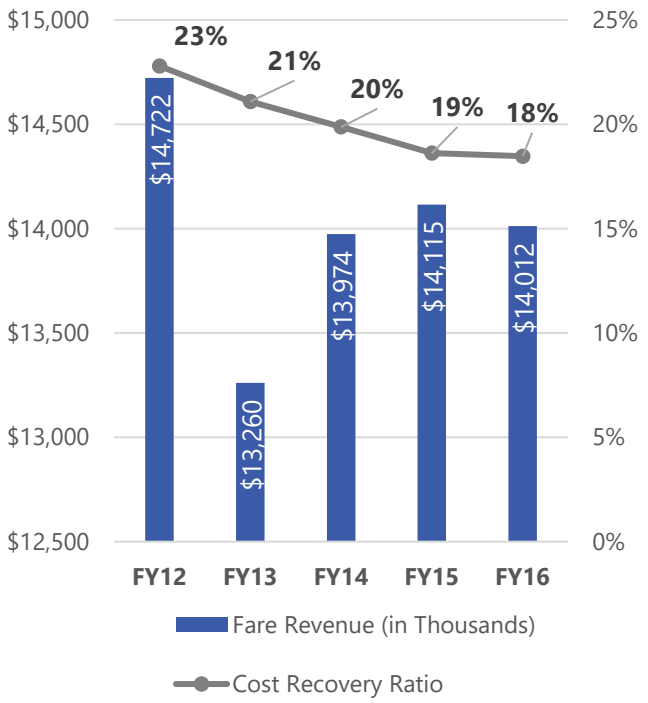
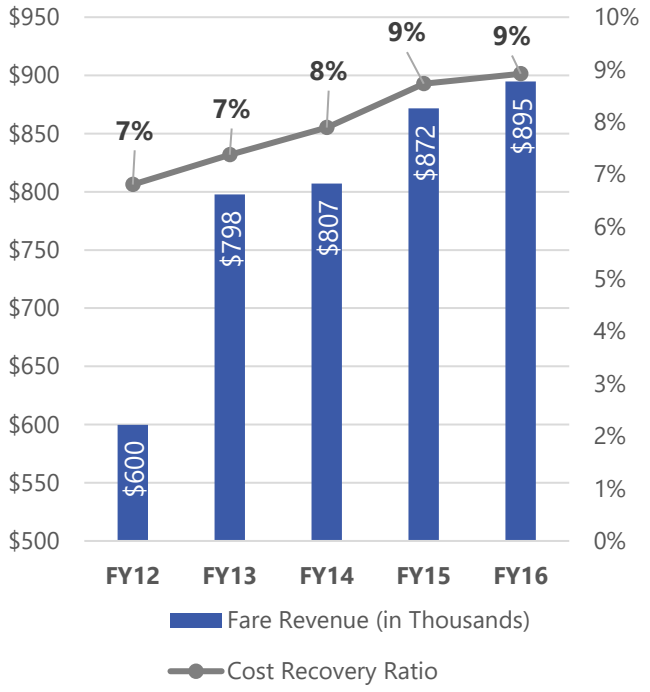


Figure 3-74 | Demand Response: Fare Revenue / Cost Recovery Ratio



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 passengers 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 51 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 seven 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 3-52** shows the subsidy per passenger for bus and demand response services from FY 2012 through FY 2016.

Table 3-52 | 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
% Change	**51%**	**-7%**

3.4.6 Summary and Key Findings

Between FY 2012 and FY 2016, HRT's service area has decreased in terms of both square miles and population, and has become slightly less dense. From an operational standpoint, HRT operates marginally fewer bus vehicles in maximum service, and 17 percent more demand response vehicles. Although the percentage of hours devoted to paratransit revenue service has increased slightly, neither the percentages of revenue miles nor revenue hours of either mode 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 20 percent over the five-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 43 percent for fixed-route service, this figure dropped by just five 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 five-year period.

Finally, regarding service efficiency, while fixed-route fare revenue dropped slightly, demand response fare revenue increased, in conjunction with increased ridership, by nearly 50 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 51 percent, the subsidy for demand response went down by a small margin (seven percent). **Table 3-53** summarizes the results of the trend analysis by category, listing the percent change.

Table 3-53 | FY 2012 to FY 2016 Trend Analysis Summary

Metric	Percent Change	
	Fixed-Route	Demand Response
Service Area		
Square Miles	-16%	
Population	-21%	
Population Density	-5%	
Operational		
Vehicles Operated in Maximum Service	-2%	17%
Revenue Miles	0%	1.9%
Revenue Hours	0.9%	3.3%
Ridership		
Total Ridership	-18%	20%
Passengers per Revenue Mile	-20%	0%
Passengers per Revenue Hour	-22%	-24%
Revenue and Cost		
Total Operating Expenses	17%	14%
Operating Expenses per Passenger Trip	43%	-5%
Service Efficiency		
Fare Revenue	-5%	49%
Cost Recovery Ratio	-5%	2%
Subsidy per Passenger	51%	-7%

3.5 ON BOARD SURVEY DATA ANALYSIS[65]

HRT conducted an on-board passenger survey between August 2016 and February 2017. 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. Responses were weighted by ridership along the segments where surveys were collected in order to provide a profile of overall ridership on the HRT system. The results of the survey are summarized in the subsections below. A complete report of the survey results is provided in **Appendix B**.

3.5.1 Demographics

HRT customers report the following demographic characteristics:

- Nearly three-quarters identify as Black or African American. The remainder identified 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;
- The majority are female (58 percent);
- Three-quarters are employed either full-time (57 percent) or part-time (19 percent);
- Five percent reported having a disability;
- Seventy-six percent live in zero- or one-car households; and

[65] HRT Origin-Destination Survey, 2016-2017

- Fifty-eight percent are 34 years old or younger. There are few riders under the age of 18 (three percent) or 65 and older (three percent).

3.5.2 Fare Type

According to the HRT on-board survey, a majority of riders use a 1-Day Go Pass for their trip (53 percent), followed by a one-trip fare paid with cash (15 percent), as seen in **Table 3-54**.

Table 3-54 | Percent of Responses by Fare Type[66]

Fare	
1-Day Go Pass	53%
One trip fare (cash)	15%
30-Day Go Pass	9%
7-Day Go Pass	8%
GoPass 365	6%
Other	9%

Several other fare types are used by fewer than 5 percent of passengers in any mode. These are:

- e-Tide Ticket
- 2-Ride Go Pass
- Try Transit 30 Day pass
- Student Freedom Pass
- GoSemester pass
- "Other" fare types

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.

3.5.3 Access Mode

Riders overwhelmingly access transit by walking, as seen in **Table 3-55**. Fewer than five percent reported being dropped off, biking, driving to transit, or using other means of access.

Table 3-55 | Percent of Responses by Access Mode

Access Mode[67]	
Walk	92%
Was dropped off by someone	3%
Bike	2%
Drove alone and parked	1%
Drove or rode with others and parked	1%
Other	<1%

Most passengers (63 percent) reported making no transfers to complete their trip, as shown in **Table 3-56**.

Table 3-56 | Percent of Responses by Number of Transfers

Number of Transfers	
0	63%
1	29%
2+	8%

3.5.4 Trip Origins and Destinations

Travel to home or work accounts for a majority of trips on HRT services, as seen in **Table 3-57**. Other major destination types include shopping and school. Similar patterns can be seen among trip origin types.

Table 3-57 | Percent of Responses by Destination Type

Destination Type[68]	
Home	32%

[66] "Other" includes: Shuttle (Wave) 1 Day, GoSemester, Student Freedom Pass, Other, Shuttle (Wave) 3 day, 1-Day MAX Pass, Try Transit 1 day, 30-Day MAX Pass, e-Tide Ticket, 2-Ride Go Pass, Try Transit 30 day.

[67] "Other" modes include: Wheelchair or scooter, Skateboard, Transportation Network Company service (Uber, Lyft, etc.), Taxi, and School / Shuttle Bus. Fewer than 0.3 percent of survey respondents used any of these modes.

[68] "Other" destinations include: Social visits (friends / relatives), Personal business (bank, post office), Other business related, Your hotel, Pick up/drop off someone (daycare, school). "School" includes: K-12 and College or University destinations (for students only). "Recreation" includes: Recreation / Sightseeing and Sporting event.

Destination Type[68]	
Work	29%
Shopping	9%
School	5%
Recreation	5%
Eating or Dining Out	4%
Medical Appointment or Doctor's Visit	2%
Other	15%

3.6 LAND USE REVIEW

This section addresses the current land use planning context within HRT's six member jurisdictions: the cities of Chesapeake, Hampton, Newport news, Norfolk, Portsmouth, and Virginia Beach. It summarizes the existing and proposed land use elements of jurisdictions' comprehensive plans as it relates to the provision of transit services.

3.6.1 Member Cities' Land Use Plans

Table 3-58 summarizes the most current comprehensive plan effort for each member city. Those cities marked with an asterisk (*) are currently in the process of completing a comprehensive plan update. In addition to the plans listed below, several jurisdictions produce small area or neighborhood plans on a periodic basis.

Table 3-58 | Comprehensive Plans by Jurisdiction

City	Plan Title	Adoption Year
Chesapeake	*Moving Forward – Chesapeake 2035*	2014
Hampton	*Hampton Community Plan Update*	2011
Newport News*	*Framework for the Future 2030*	2008
Norfolk	*plaNorfolk 2030*	2013[69]
Portsmouth*	*Destination 2025*	2005
Virginia Beach	*It's Our Future: A Choice City*	2016

Chesapeake

Adopted in 2014, *Moving Forward – Chesapeake 2035* is the City of Chesapeake current comprehensive plan. The plan key components include the 2035 Land Use Plan and the 2050 Master Transportation Plan, comprised of two maps depicting the City's transportation and land use future.

The Land Use Plan calls for future commuter or light rail transit from the northeast to the southeast portions of the City, including along the Chesapeake Expressway. This proposed line would span designated urban, suburban, and rural overlay zones. The City's Master Transportation Plan envisions a series of new two-, four-, and six-lane arterial roads, including the following:

- A two-lane arterial stretching from Edinburgh Parkway to Route 168;
- A four-lane arterial extending Joliff Road in the northwest corner of the city;
- A four-lane freeway along Southeastern Parkway from Chesapeake Expressway to Elbow Road; and
- A six-lane arterial along Pleasant Grove Parkway from Military Highway to Route 168.

As HRT service is limited in Chesapeake, none of these roadway projects is expected to impact current local or express bus service.

Hampton

The City of Hampton's *Community Plan* was updated in 2011 with a focus on strategic issues. Organized around a series of important themes for the jurisdiction's future, the plan assesses existing conditions and puts forth goals and strategies.

One of these strategic issues touches on Hampton's economic base, regionalism, transportation, and infrastructure. The fourth goal in this section reads:

[69] Revised August 2016

> *Hampton creates and enhances local and regional transportation options for residents and visitors by supporting urban development patterns and implementing master plans for strategic investment areas.*

Although the City does not cite any specific land use or transportation plans with regards to this goal, general measures to accomplish it include supporting the development of new transportation options that address regional needs and reducing citywide commute times.

Newport News

The City of Newport News' current comprehensive plan is entitled *Framework for the Future 2030*. In the near future, the City will adopt its new plan, *One City, One Future Comprehensive Plan,* which includes an outlook to 2040.

Framework for the Future contains both a land use and a transportation plan. Each section consists of a series of goals, policies, and strategies to guide future development. The City's land use strategies related to transportation include:

- Mixed use, high density, transit-oriented developments (TODs) are planned for sites within walking distance of rapid transit stations. The City hopes that TOD, which could involve acquisition of sites through partnerships, could spur higher transit ridership;
- High density, residential uses should be developed in close proximity to major roads where strong access to public transit exists;
- Construction of a multi-modal terminal in Newport News to provide a transfer point for bus, rail, and other transit passengers. This terminal would be situated downtown and near the airport;
- To complement the development of high speed passenger and/or vehicle ferry service between Newport News, Hampton, and Southside Hampton Roads, the City would build appropriate support facilities; and
- The modification of the City subdivision and site plan ordinance to include improved access for public transit, including light rail right of way.

The City's street transportation plan map also proposes the following major interstate and arterial road widenings (with current HRT routes servicing these areas listed in parentheses):

- Warwick Boulevard from Fort Eustis Boulevard to J Clyde Morris Boulevard (106, 107, 108, 415, 430);
- Interstate 64 from the Williamsburg border to City Center Boulevard (121, 965); and
- Jefferson Avenue from Fort Eustis Boulevard to Denbigh Boulevard (116, 414).

The plan also proposes several new arterials, the most major of which would cross the northern portion of Newport News, stretching from Fort Eustis Boulevard to Warwick Boulevard.

Norfolk

plaNorfolk 2030, the City of Norfolk's current comprehensive plan, was adopted in 2013 and most recently revised in August 2016. With a promise to encourage land use patterns designed to support transit, the plan's future land use map identifies several "transit supportive areas," urban regions surrounding rail stations located along Norfolk's southern edge. From a land use perspective, these areas are intended to create opportunities for a mix of employment and residential activity that, as the plan states, "promotes transit, bicycle, and pedestrian activity while discouraging low intensity auto-oriented uses."

The plan also delves into a series of transportation-land use connection opportunities for specific regions. These include:

- Seeking to identify good sites for improved signage and bus shelters, the City plans to study

transit travel patterns and demand in the Central Hampton Boulevard area;
- In the East Little Creek Road corridor, Norfolk plans to encourage stronger transit linkages through commercial districts and along Chesapeake Boulevard between East Little Creek Road and Fisherman's Road; and
- In the Fort Norfolk-Eastern Virginia Medical School area, the City will encourage stronger transit, pedestrian, and bicycle connections to and from destinations in Fort Norfolk and Ghent, as well as from Ghent to downtown Norfolk and Fort Norfolk.

plaNorfolk's transportation plan also calls for a series of roadway construction, improvements, and widenings that could ultimately affect bus operations across the City and region. Additionally, the City vows to continue planning for a multimodal transportation center at Harbor Park to passenger rail, light rail, regional bus, and ferry services.

Portsmouth

Destination 2025 is Portsmouth's most recently-published comprehensive plan. The plan makes coordination of land use strategies with existing and future transportation initiatives a City policy. As stated, the need to ensure that industrial and employment centers – which can be major traffic generators – have strong access to the existing roadway will be crucial. In these areas and elsewhere throughout the region, Portsmouth recognizes the necessity of providing convenient, transit access to and from land uses that generate high traffic.

Aside from these general policies, in *Destination,* the City promotes road improvements on (with current HRT routes servicing these areas listed in parentheses):

- Turnpike Roadway from County Road to Alexander's Corner (44);
- Along the Pinner's Point connector from the MLK Freeway and Midtown Tunnel (44); and
- On Victory Boulevard between I-264 and Greenwood Drive (44, 45, 50, 57).

Virginia Beach

In *It's Our Future: A Choice City,* the City of Virginia Beach identifies eight Strategic Growth Areas (SGAs) in which to direct urban development. The plan lists TOD within a half-mile of mass transit stations as a priority for all SGAs. Although the plan suggests planning around future, proposed light rail stations, a local referendum in 2016 defeated recent plans for an extension of HRT's The Tide light rail service into the City. Despite this change, the City welcomes the prospect of TOD around areas heavily served by transit.

Specific land use plans in SGAs include:

- In the Burton Station SGA, the City plans to improve the design and function of Northampton Boulevard to improve transit access;
- In the Centreville, Newtown, Rosemont, and Resort SGAs, Virginia Beach plans to improve local pedestrian and trail facilities to connect neighborhoods to future transit and neighborhood centers;
- In the Rosemont area, the City plans to design a transit-ready framework that permits adequate scale and density along with phasing of public investment;
- Also in Rosemont, the City plans to build Virginia Beach Boulevard more at a human scale, while supporting commercial uses along the corridor and improved transit options; and
- In the Hilltop SGA, the City supports a new transit station and transit park.

The City's Master Transportation Plan, which is also included as part of *It's Our Future,* stresses walkable, transit-supportive, mixed-use neighborhoods, especially in SGAs. This portion of the plan also proposes several new interchanges as well as a cross-

city parkway and greenbelt, which holds the potential affect surrounding land uses and bus operations.

3.6.2 HRTPO Planning

In addition to the six HRT member cities, the Hampton Roads Transportation Planning Organization (HRTPO), the Metropolitan Planning Organization (MPO) for Hampton Roads, is a crucial actor in the region's transportation future. With voting members from each of HRT's member jurisdictions, the HRTPO Board also includes representation from the Cities of Franklin, Poquoson, Suffolk, and Williamsburg, and the Counties of Gloucester, Isle of Wight, James City, Southampton, and York.

The HRPTPO compiles two main reports vital to transportation planning in the region:

- The **Transportation Improvement Program (TIP)** includes a detailed, financially-constrained listing of all federally-funded and/or regionally significant projects that require action by the Federal Highway Administration or Federal Transit Administration. With an outlook from FY 2015 through FY 2018, the most recent TIP was released in 2014 and currently a draft CIP has been published and is out for public comment; and
- The **Long Range Transportation Plan (LRTP)** includes also includes a fiscally-constrained list of projects with identified funding sources, but over a 20-year planning horizon. The LRTP is updated every four years and was most recently released in 2016.

While each of these reports describes transportation rather than land use projects, significant roadway modifications hold the potential to impact bus operations as well as surrounding land uses. Major projects with overlapping mentions between the two reports include (with current HRT routes servicing these areas listed in parentheses):

- A new multimodal station located on Bland Boulevard between Warwick Boulevard and Interstate 64, in close proximity to Newport News/Williamsburg International Airport (all routes servicing the vicinity of the airport, including 108 and 116);
- The widening of Interstate 64 on three segments of the Peninsula side of Hampton Roads (121, 965); and
- The widening of Interstate 64 on the Southside portion of Hampton Roads (966, 967, 968, 969).

The region also plans to continue to study a third crossing of Hampton Roads, which, if ultimately implemented, could greatly impact bus operations in the region. The multimodal third crossing will include the following improvements:

- Patriots Crossing (I-664 to Hampton Blvd);
- Craney Island Intermodal Connector (Patriots Crossing to VA 164); and
- I-664, additional lanes and tunnel (I-64 at Hampton Coliseum to I-264/I-64 Bowers Hill); project includes Bowers Hill interchange.

4 Service and Capital Improvement Plan

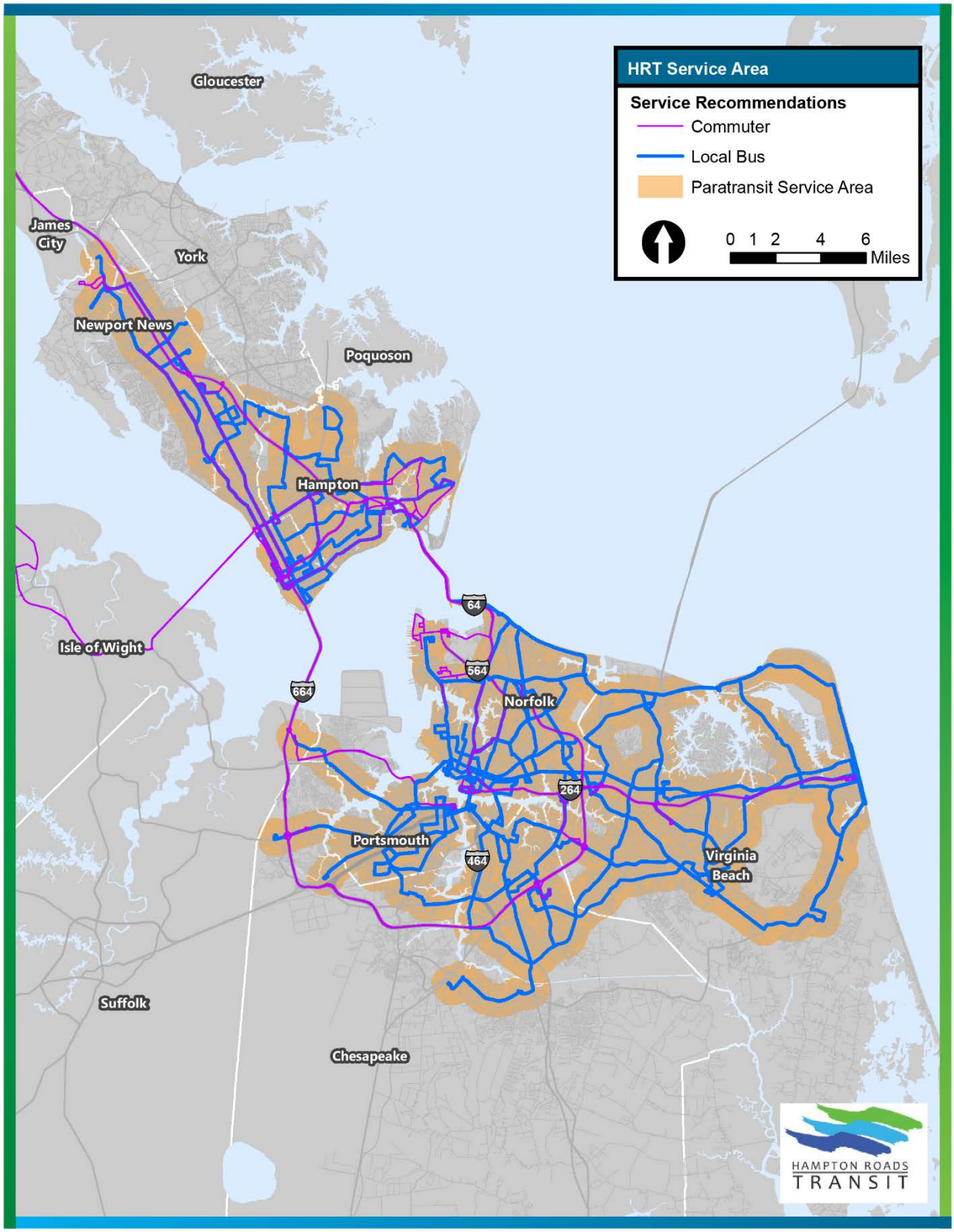
The following chapter identifies and prioritizes service improvements for HRT's local, commuter and paratransit services. Service recommendations are based on information obtained from the evaluation of the market needs of the region, existing HRT transit services, service coverage and level of service analyses, and meetings held with stakeholder, the public and HRT staff.

During Phase 1 of this TDP's Public Outreach, common areas for improvement were identified and considered within the development of service recommendations:

- **Service Planning**: Riders suggested more frequent service, adding routes and stops in key locations, and enhancing opportunities for transfers. In addition, riders requested a better customer experience with comments regarding additional bus shelters.
- **Hours of Operation:** Riders asked for consistent service hours between cities and expanded evening and weekend hours.
- **On-Time Performance:** Riders commented that buses are not on time often enough, limiting riders' abilities to plan their trips in advance.
- **Customer Services:** Riders frequently requested customer support tools, including better digital tools on the agency website and trip planning support.
- **Maintenance**: Riders requested that buses be cleaned more often.

This ten-year TDP consists of over 80 different route recommendations; **Figure 4-** illustrates the HRT system upon full implementation of all TDP recommendations. The sections below provide additional detail by member jurisdiction on each individual route, all costs shown are in Fiscal Year 2018 dollars. Additional information regarding population and employment trends can be found in **Section 3.2: Service Analysis**.

Figure 4-1 | Proposed System Map



4.1 PRIORITIZATION AND RIDERSHIP FORECASTING

For this TDP, a prioritization method was developed to determine the implementation year for each individual route recommendation. The method consisted of forecasting ridership and developing a prioritization score using three factors: passenger per hour, operating cost per capita, and employment opportunities.

To create a baseline ridership forecast, various types of ridership estimating approaches were applied to each individual route depending on the type of route recommendation, as described in **Table 4-**.

Table 4-1 | Ridership Forecasting Methodology by Improvement Type

Proposed Service Change	Ridership Estimation Methodology
No Change	Current Ridership
Extension of Route/ New Service Period	(Current Passengers/Revenue Mile) x (Proposed Revenue Mile)
Segment Transfer Between Routes	Current Boardings by Stop on Transferred Segment with Headway/Span Change Methodology
Change in Headway	-0.46 Elasticity
Change in Span	0.83 Elasticity

Prioritization was weighted equally based upon the following three factors:

- Passenger Per Hour
- Operating Cost per Capita
- Employment Opportunities

Within each recommendation, once the score for each factor was determined they were added together to produce a total score out of 100. Using these scores as a guide, implementation years were assigned to each recommendation.

4.2 SERVICE IMPROVEMENTS AND NEEDS IDENTIFICATION

Service recommendations for Local, MAX and PCS bus routes were classified as either Short-term Mid-term, or Long-term.

Short-term recommendations focus on improving the efficiency of the transit network. Examples of this type of recommendation include: removing deviations to increase travel time and reliability, transferring segments of routes to create more efficient connections, and reducing the level of service on low performing routes.

Mid-term recommendations are focused on improving the accessibility throughout the region. Examples of this type of recommendation include: level of service improvements (frequency and span), route extensions to provide better connections to new and existing activity centers, and creating new routes to connect to new areas throughout the region.

Long-term recommendations integrate a high frequency transit network within the system by increasing the level of service to minimum of 15-minute peak frequency on key routes.

The recommendations for each jurisdiction are listed in **Section 4.2.1 thru 4.2.6** and are ranked based on the prioritization described in **Section 4.1.** Recommendations that relate to multiple jurisdictions are repeated in each section and ranked in relation to each jurisdiction's recommendations. Details of each

recommendation can be found in **Appendix C: Route Sheets**.

4.2.1 Norfolk

The prioritization of service recommendations for the City of Norfolk can be found in **Table 4-2**, along with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of all the proposed routes within Norfolk can be seen in **Figure 4-2.**

For the 19 local routes that operate in the City of Norfolk approximately 36 different recommendations were made to improve and enhance the Norfolk service. Eighteen of the recommendations are classified as short-term (including the elimination of one route), six routes are categorized in the mid-term, and 12 are long-term recommendations.

Within the City of Norfolk, the proposed recommendations will result in a need of an additional $9,617,000 in operating costs.

Ridership is expected to increase by 18 percent on the routes with proposed changes.

Figure 4-2 | Norfolk Jurisdictional Map

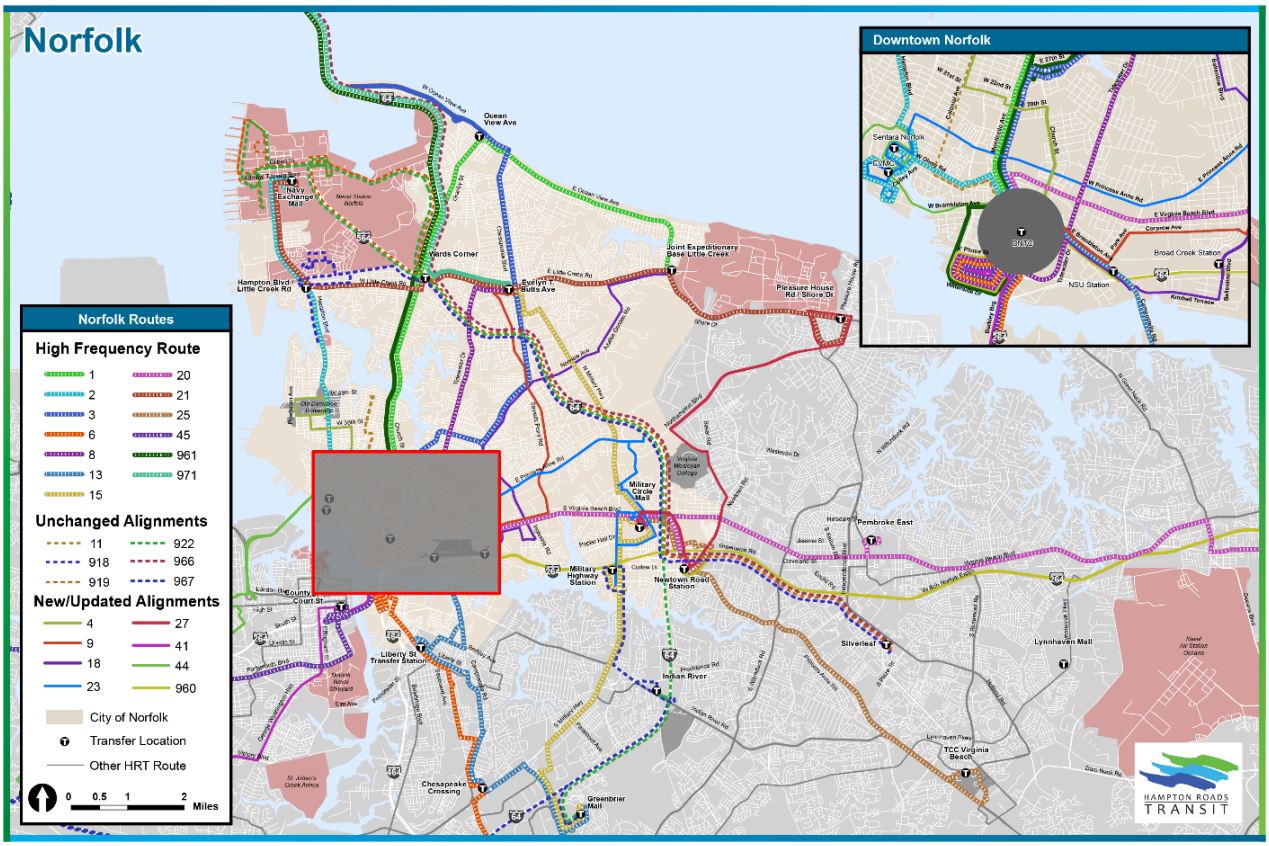


Table 4-2 | Norfolk Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	13	Eliminate deviation onto Bethel Road, Harling Drive, Border Road, Fireside Road, and Parkside Drive.	295,160	-7%	$0
2	6	Extend service to TCC-Chesapeake every 60-minutes.	338,190	53%	$727,000
3	1	Truncate the route at JEB Little Creek.	792,550	-9%	-$552,000
4	11	Eliminate weekend service.	38,600	-17%	-$118,000
5	13	Extend the route to the Greenbrier Mall every 60-minutes, weekdays, Saturdays and Sundays.	373,670	17%	$618,000
6	3	Realign the northern terminus of the route to serve the Willoughby Spit rather than Naval Station Norfolk (every 30-minutes during peak and midday periods and 60-minutes off-peak). End service to the Willoughby Spit at 7:00 PM.	712,700	15%	$148,000
7	4	Eliminate the deviation onto Goff Street, Tidewater Drive, Princess Anne Road, Chapel Street, and Virginia Beach Boulevard, and end service at 9:00 PM.	82,560	-10%	$0
8	9	Eliminate two deviations: on Widgeon Road, Tidewater Drive and Philpotts Road, and Ingleside Road, Gatling Avenue and Scott Street. Reduce evening frequency to every 60-minutes.	205,310	-10%	-$354,000
9	44	Extend the route to the Downtown Norfolk Transit Center.	164,190	24%	$164,000
10	45	Realign onto Port Centre Parkway, reduce frequency to every 30-minutes to coordinate trips across the Downtown Tunnel with Route 41. Realign to Starmount & Jolliff every 60-minutes.	526,240	-4%	$473,000
11	12	Discontinue service on Wilson Road and Indian River Road, between Campostella Road and Wingfield Avenue, as well as on Indian Lakes Boulevard and Lynnhaven Parkway.	161,020	11%	$75,000
12	15	Eliminate the deviation onto Azalea Garden Road and Robin Hood Road. Discontinue service to Robert Hall (terminating the route at the Greenbrier Mall).	723,390	-1%	$0
13	44	Realign the route to Sunkist & Airline.	159,840	21%	$90,000
14	23	Realign the route up Northampton Boulevard to the IKEA. Increase evening frequency to every 30-minutes.	393,600	9%	$166,000
15	21	Extend the route to Pleasure House Road & Shore Drive every 60-minutes.	651,380	12%	$987,000
16	18	Eliminate the deviation to Grandy Village via Kimball Terrace. Realign route onto Scott Street, Gatling Avenue, Ingleside Road, and Tait Terrace, and extend the route to JEB Little Creek. End weekday service at 8:00 PM.	60,440	26%	$727,000
17	27	Extend the route to Military Circle Mall. Reduce peak frequency to every 60-minutes.	95,540	4%	$362,000
18	5	Eliminate route.	-	-100%	-$365,000

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Mid-Term					
1	44	Add Sunday service every 60-minutes.	143,840	8%	$234,000
2	13	Increase peak, midday, evening, and Saturday frequency to Greenbrier Mall to every 30-minutes.	449,600	41%	$941,000
3	12	Increase peak frequency to every 30-minutes.	166,380	14%	$360,000
4	41	Increase peak frequency to every 30-minutes. Extend route to the Downtown Norfolk Transit Center. Realign the route onto Effingham Street and discontinue the deviations onto Afton Parkway and Gust Lane, Avondale Road, Roosevelt Boulevard, and Greenwood Drive.	125,870	7%	$1,029,000
5	21	Increase frequency to Pleasure House Road & Shore Drive to every 30-minutes.	656,890	13%	$584,000
6	25	Increase peak, midday and Saturday frequency to every 30-minutes. End weekday service at 10:45 PM.	177,290	35%	$539,000
Long-Term					
1	8	Increase peak frequency to every 15-minutes.	432,790	12%	$780,000
2	1	Increase peak and midday frequency to every 15-minutes.	955,400	10%	$1,454,000
3	20	Increase peak and midday frequency to Virginia Beach Oceanfront to every 15-minutes, and off-peak frequency to every 30-minutes.	1,342,380	11%	$2,235,000
4	15	Increase peak and midday frequency to Greenbrier Mall to every 15-minutes.	947,320	29%	$960,000
5	45	Increase peak frequency to every 15-minutes between Downtown Norfolk and Victory Crossing.	586,660	7%	$729,000
6	3	Increase peak and midday frequency to every 15-minutes to Ocean View.	826,230	33%	$1,614,000
7	2	Increase peak frequency to every 15-minutes and Saturday frequency to every 30-minutes.	301,420	15%	$873,000
8	6	Increase peak frequency to Robert Hall to every 15-minutes. and to TCC-Chesapeake to every 30-minutes.	493,510	123%	$2,207,000
9	13	Increase peak frequency to every 15-minutes.	499,170	57%	$729,000
10	6	Increase peak frequency to TCC-Chesapeake to every 15-minutes and increase off-peak and Saturday frequency to every 30-minutes.	522,810	136%	$959,000
11	21	Increase peak frequency to every 15-minutes to Pleasure House Road & Shore Drive and increase midday frequency to every 15-minutes to JEB Little Creek.	837,470	44%	$1,679,000
12	25	Increase peak frequency to every 15-minutes.	199,160	52%	$435,000

4.2.2 Virginia Beach

The prioritization of service recommendations for the City of Virginia Beach can be found in **Table 4-3** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of routes within Virginia Beach can be seen on

Figure 4-3.

There were 26 recommendations to improve local service within the City of Virginia Beach, including two new routes that will provide new connections throughout Virginia Beach. Twelve routes have short-term recommendations (including the elimination of one route), there are seven mid-term recommendations, including the two new routes being proposed, and seven routes have long-term recommendations. Routes 30 and 31 had no proposed changes.

Within Virginia Beach, the proposed recommendations will result in a need of an additional $11,486,000 in operating costs.

Ridership is expected to increase by 31 percent on the routes with proposed changes.

Figure 4-3 | Virginia Beach Jurisdictional Map

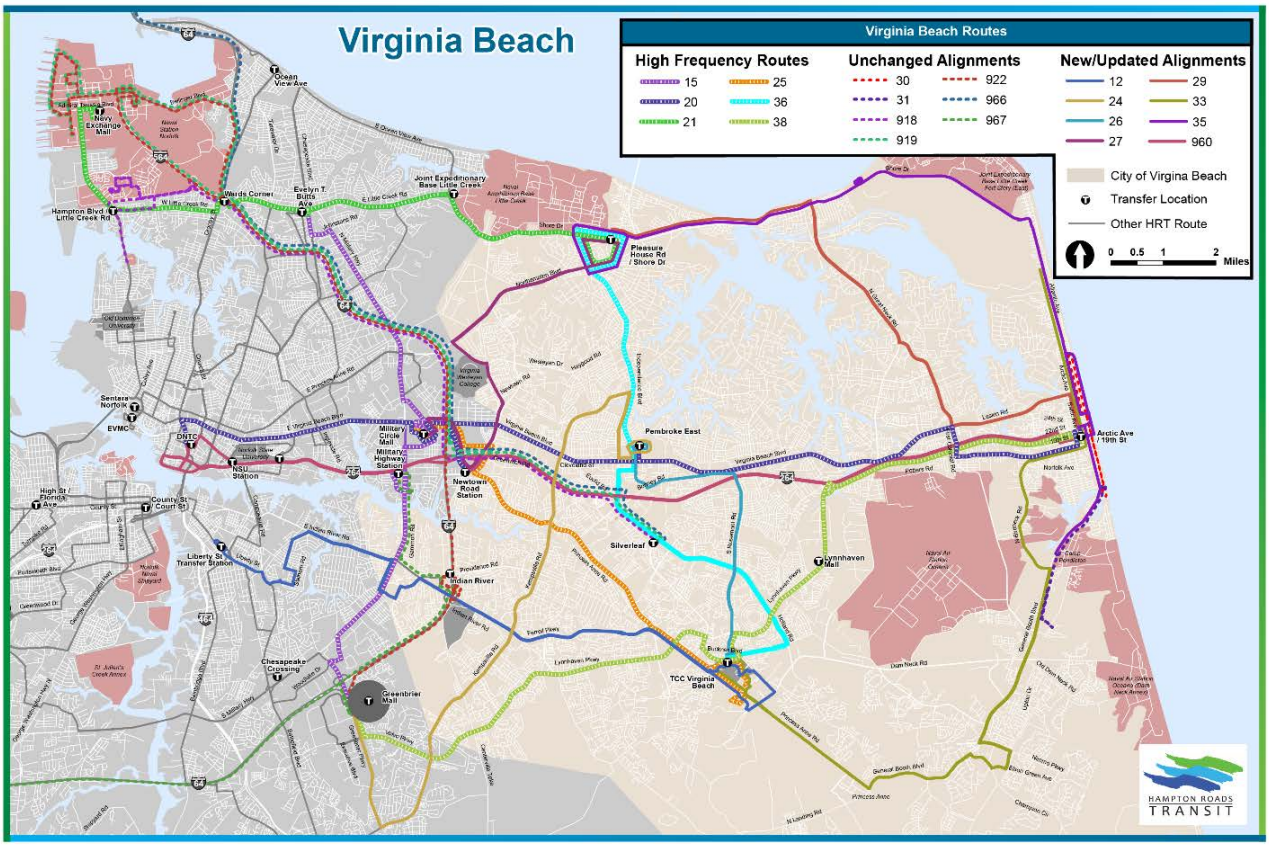


Table 4-3 | Virginia Beach Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	1	Truncate the route at JEB Little Creek.	792,550	-9%	-$552,000
2	12	Discontinue service on Wilson Road and Indian River Road, between Campostella Road and Wingfield Avenue, as well as on Indian Lakes Boulevard and Lynnhaven Parkway.	161,020	11%	$75,000
3	15	Eliminate the deviation onto Azalea Garden Road and Robin Hood Road. Discontinue service to Robert Hall (terminating the route at the Greenbrier Mall).	723,390	-1%	$0
4	33	Realign route onto Birdneck Road and Virginia Beach Boulevard.	177,200	31%	$0
5	21	Extend the route to Pleasure House Road & Shore Drive every 60-minutes.	651,380	12%	$987,000
6	36	Realign to Pleasure House & Shore Drive every 60-minutes.	255,420	50%	$1,163,000
7	26	Extend the route to Pembroke East via Rosemont Road, and discontinue service to Lynnhaven Mall. Reduce weekday frequency to every 60-minutes.	70,150	-2%	-$140,000
8	25	Terminate route at Sentara Princess Anne Hospital.	135,450	3%	$0
9	35	Extend the northern terminus of the route to Pleasure House & Shore Drive, and the southern terminus to Atlantic Avenue & 3rd Street.	64,770	42%	$360,000
10	29	Realign the route to Artic Avenue & 19th Street (Virginia Beach Oceanfront) and discontinue service to Lynnhaven Mall.	75,560	-24%	$0
11	27	Extend the route to Military Circle Mall. Reduce peak frequency to every 60-minutes.	95,540	4%	$362,000
12	22	Eliminate route.	-	-100%	-$864,000
Mid-Term					
1	38	New route operating between Greenbrier Mall and Artic Avenue & 19th Street (Virginia Beach Oceanfront) via Lynnhaven Parkway. Operates every 30-minutes weekdays and Saturdays, and 60-minutes on Sundays.	346,750	-	$2,705,000
2	24	New route operating between Greenbrier Mall and Pembroke East via Kempsville Road.	246,960	-	$2,177,000

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
		Operates every 30-minutes during peak periods, 60-minutes off-peak, Saturday and Sunday.			
3	12	Increase peak frequency to every 30-minutes.	166,380	14%	$360,000
4	35	Extend the route to the Virginia Aquarium & Marine Science Center. Provide service all year long, increase weekday and Saturday frequency to every 30-minutes.	301,440	94%	$1,045,000
5	21	Increase frequency to Pleasure House Road & Shore Drive to every 30-minutes.	656,890	13%	$584,000
6	25	Increase peak, midday and Saturday frequency to every 30-minutes. End weekday service at 10:45 PM.	177,290	35%	$539,000
7	33	Increase peak frequency to every 30-minutes. Provide Sunday service on the full length of the route.	198,570	46%	$699,000
Long-Term					
1	1	Increase peak and midday frequency to every 15-minutes.	955,400	10%	$1,454,000
2	20	Increase peak and midday frequency to Virginia Beach Oceanfront to every 15-minutes, and off-peak frequency to every 30-minutes.	1,342,380	11%	$2,235,000
3	15	Increase peak and midday frequency to Greenbrier Mall to every 15-minutes.	947,320	29%	$960,000
4	38	Increase peak frequency to every 15-minutes.	574,930	-	$1,257,000
5	36	Increase frequency to Pleasure House & Shore Drive to every 15-minutes during peak periods, 30-minutes during the midday. Add Sunday service every 60-minutes.	341,960	101%	$739,000
6	21	Increase peak frequency to every 15-minutes to Pleasure House Road & Shore Drive and increase midday frequency to every 15-minutes to JEB Little Creek.	837,470	44%	$1,679,000
7	25	Increase peak frequency to every 15-minutes.	199,160	52%	$435,000

4.2.3 Chesapeake

The prioritization of service recommendations for the City of Chesapeake can be found in **Table 4-4** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of routes within Chesapeake can be seen on **Figure 4-4.**

There is a total of 24 recommendations for the City of Chesapeake transit service, for the most part focusing on increasing frequency and span of service. Of the 10 local routes that operate in the City of Chesapeake, there are 12 short-term recommendations, including two route eliminations, six routes have mid-term recommendations (two new routes are proposed), and six routes have long-term recommendations.

The City of Chesapeake proposed recommendations will result in a need of an additional $7,116,000 in operating costs.

Ridership is expected to increase by 43 percent on the routes with proposed changes.

Figure 4-4 | Chesapeake Jurisdictional Map

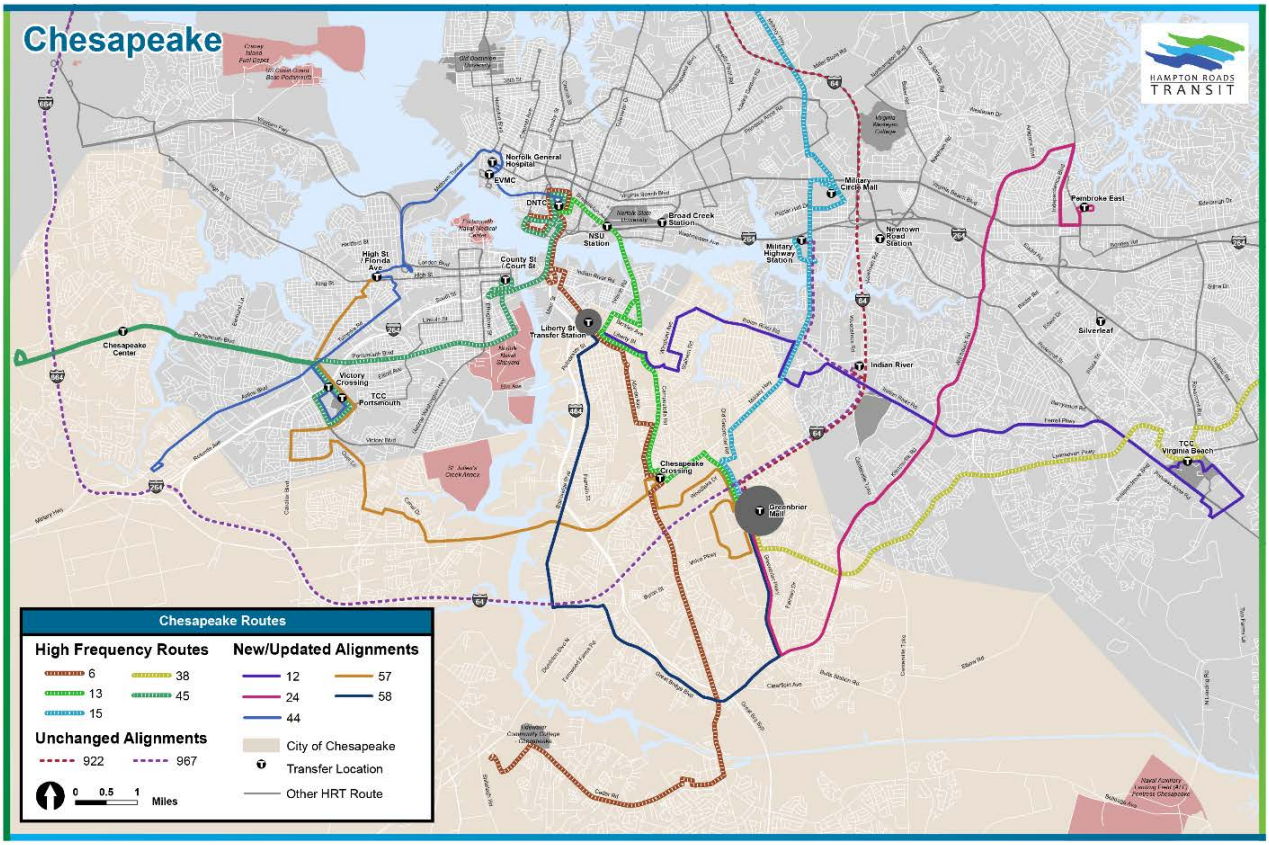


Table 4-4 | Chesapeake Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	13	Eliminate deviation onto Bethel Road, Harling Drive, Border Road, Fireside Road, and Parkside Drive.	295,160	-7%	$0
2	6	Extend service to TCC-Chesapeake every 60-minutes.	338,190	53%	$727,000
3	13	Extend the route to the Greenbrier Mall every 60-minutes, weekdays, Saturdays and Sundays.	373,670	17%	$618,000
4	45	Realign onto Port Centre Parkway, reduce frequency to every 30-minutes to coordinate trips across the Downtown Tunnel with Route 41. Realign to Starmount & Jolliff every 60-minutes.	526,240	-4%	$473,000
5	44	Extend the route to the Downtown Norfolk Transit Center.	164,190	24%	$164,000
6	12	Discontinue service on Wilson Road and Indian River Road, between Campostella Road and Wingfield Avenue, as well as on Indian Lakes Boulevard and Lynnhaven Parkway.	161,020	11%	$75,000
7	15	Eliminate the deviation onto Azalea Garden Road and Robin Hood Road. Discontinue service to Robert Hall (terminating the route at the Greenbrier Mall).	723,390	-1%	$0
8	44	Realign the route to Sunkist & Airline.	159,840	21%	$90,000
9	57	Extend the route to High Street & Florida Avenue. Discontinue service to the Camelot neighborhood. Realign the route onto Deep Creek Boulevard, Gust Lane, Bunche Boulevard, Roosevelt Boulevard, Cavalier Boulevard and Greenwood Drive.	122,810	1%	$0
10	58	Extend the route to the Greenbrier Mall, discontinue service to Robert Hall.	87,700	28%	$338,000
11	14	Eliminate route.	-	-100%	-$815,000
12	55	Eliminate route.	-	-100%	-$393,000
Mid-Term					
1	57	Extend the route to Greenbrier Mall, following the current Route 55 alignment.	192,470	58%	$359,000
2	44	Add Sunday service every 60-minutes.	143,840	8%	$234,000
3	38	New route operating between Greenbrier Mall and Artic Avenue & 19th Street (Virginia Beach Oceanfront) via Lynnhaven Parkway. Operates every 30-minutes weekdays and Saturdays, and 60-minutes on Sundays.	346,750	-	$2,705,000
4	13	Increase peak, midday, evening, and Saturday frequency to Greenbrier Mall to every 30-minutes.	449,600	41%	$941,000
5	24	New route operating between Greenbrier Mall and Pembroke East via Kempsville Road. Operates every 30-minutes during peak periods, 60-minutes off-peak, Saturday and Sunday.	246,960	-	$2,177,000
6	12	Increase peak frequency to every 30-minutes.	166,380	14%	$360,000

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Long-Term					
1	15	Increase peak and midday frequency to Greenbrier Mall to every 15-minutes.	947,320	29%	$960,000
2	38	Increase peak frequency to every 15-minutes.	574,930	-	$1,257,000
3	45	Increase peak frequency to every 15-minutes between Downtown Norfolk and Victory Crossing.	586,660	7%	$729,000
4	6	Increase peak frequency to Robert Hall to every 15-minutes. and to TCC-Chesapeake to every 30-minutes.	493,510	123%	$2,207,000
5	13	Increase peak frequency to every 15-minutes.	499,170	57%	$729,000
6	6	Increase peak frequency to TCC-Chesapeake to every 15-minutes and increase off-peak and Saturday frequency to every 30-minutes.	522,810	136%	$959,000

4.2.4 Portsmouth

The prioritization of service recommendations for the City of Portsmouth can be found in **Table 4-5** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of routes within Portsmouth can be seen on **Figure 4-5.**

The route recommendations for the City of Portsmouth local bus focus on adding Sunday service on many route, as well as creating a more efficient network throughout Portsmouth. Of the six local routes that operate in the City of Portsmouth, there are six short-term recommendations (including the elimination of one route), five routes have mid-term recommendations, and one route has a long-term recommendation.

The City of Portsmouth proposed recommendations will result in a need of an additional $3,010,000 in operating costs.

Ridership is expected to increase by 10 percent on the routes with proposed changes.

Figure 4-5 | Portsmouth Jurisdictional Map

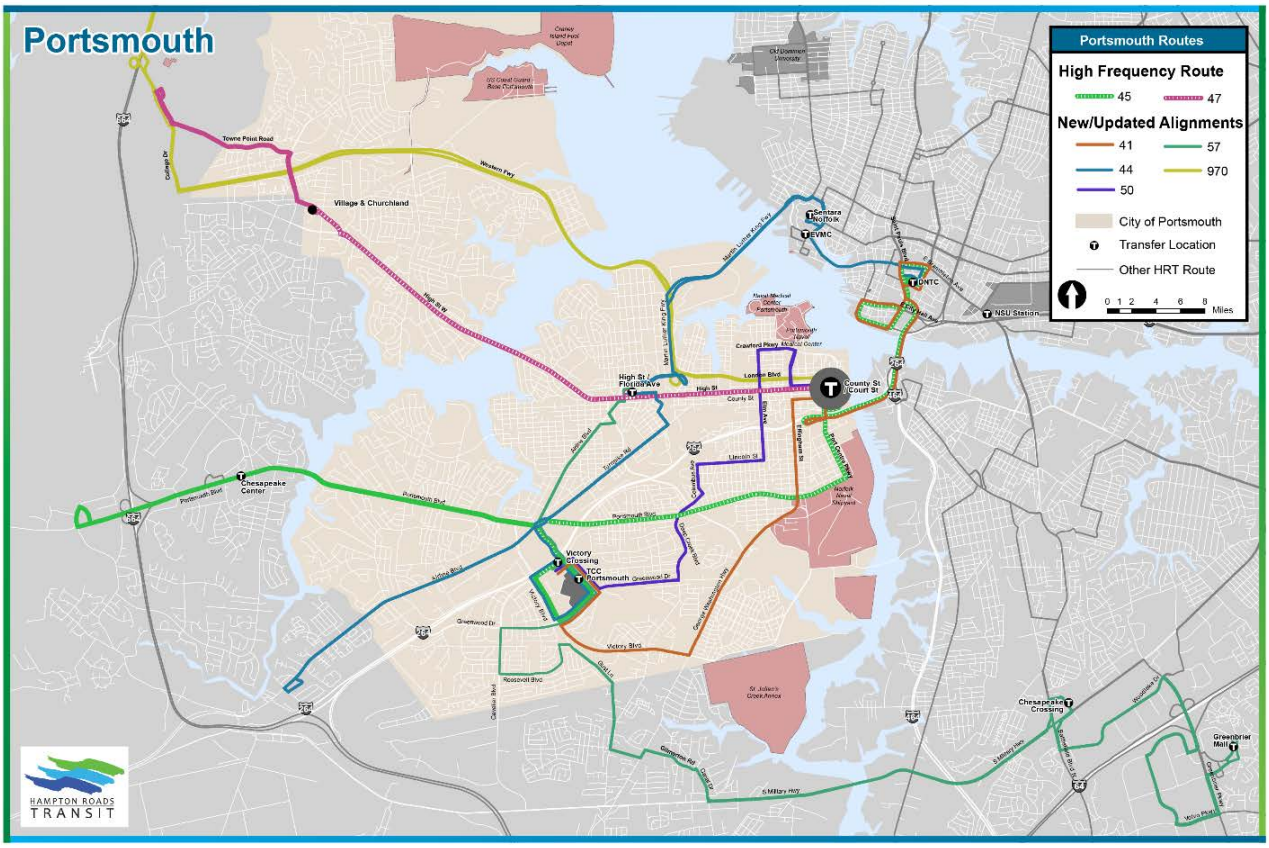


Table 4-5 | Portsmouth Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	44	Extend the route to the Downtown Norfolk Transit Center.	164,190	24%	$164,000
2	45	Realign onto Port Centre Parkway, reduce frequency to every 30-minutes to coordinate trips across the Downtown Tunnel with Route 41. Realign to Starmount & Jolliff every 60-minutes.	526,240	-4%	$473,000
3	44	Realign the route to Sunkist & Airline.	159,840	21%	$90,000
4	57	Extend the route to High Street & Florida Avenue. Discontinue service to the Camelot neighborhood. Realign the route onto Deep Creek Boulevard, Gust Lane, Bunche Boulevard, Roosevelt Boulevard, Cavalier Boulevard and Greenwood Drive.	122,810	1%	$0
5	50	Realign onto Crawford Parkway.	85,000	38%	$341,000
6	43	Eliminate route.	-	-100%	-$383,000
Mid-Term					
1	57	Extend the route to Greenbrier Mall, following the current Route 55 alignment.	192,470	58%	$359,000
2	44	Add Sunday service every 60-minutes.	143,840	8%	$234,000
3	50	Add Sunday service every 60-minutes.	80,660	31%	$172,000
4	41	Increase peak frequency to every 30-minutes. Extend route to the Downtown Norfolk Transit Center. Realign the route onto Effingham Street and discontinue the deviations onto Afton Parkway and Gust Lane, Avondale Road, Roosevelt Boulevard, and Greenwood Drive.	125,870	7%	$1,029,000
5	47	Increase weekday frequency to Lakeview Industrial Park to every 30-minutes. Add Saturday and Sunday service to Lakeview Industrial Park every 60-minutes.	317,200	16%	$366,000
Long-Term					
1	45	Increase peak frequency to every 15-minutes between Downtown Norfolk and Victory Crossing.	586,660	7%	$729,000

4.2.5 Hampton

The prioritization of service recommendations for the City of Hampton can be found in **Table 4-6** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of routes within Hampton can be seen on **Figure 4-6.**

The City of Hampton recommendations focus on creating efficient and frequent connections throughout Hampton and with Newport News. Of the 11 local routes and 3 commuter routes that operate in the City of Hampton, ten routes have short-term recommendations (including the elimination of three routes), there are also two mid-term and long-term recommendations. Routes 103, 120, 403, and 405 have no proposed changes.

The City of Hampton proposed recommendations will result in a need of an additional $329,000 in operating costs.

Ridership is expected to increase by 20 percent on the routes with proposed changes.

Figure 4-6 | Hampton Jurisdictional Map

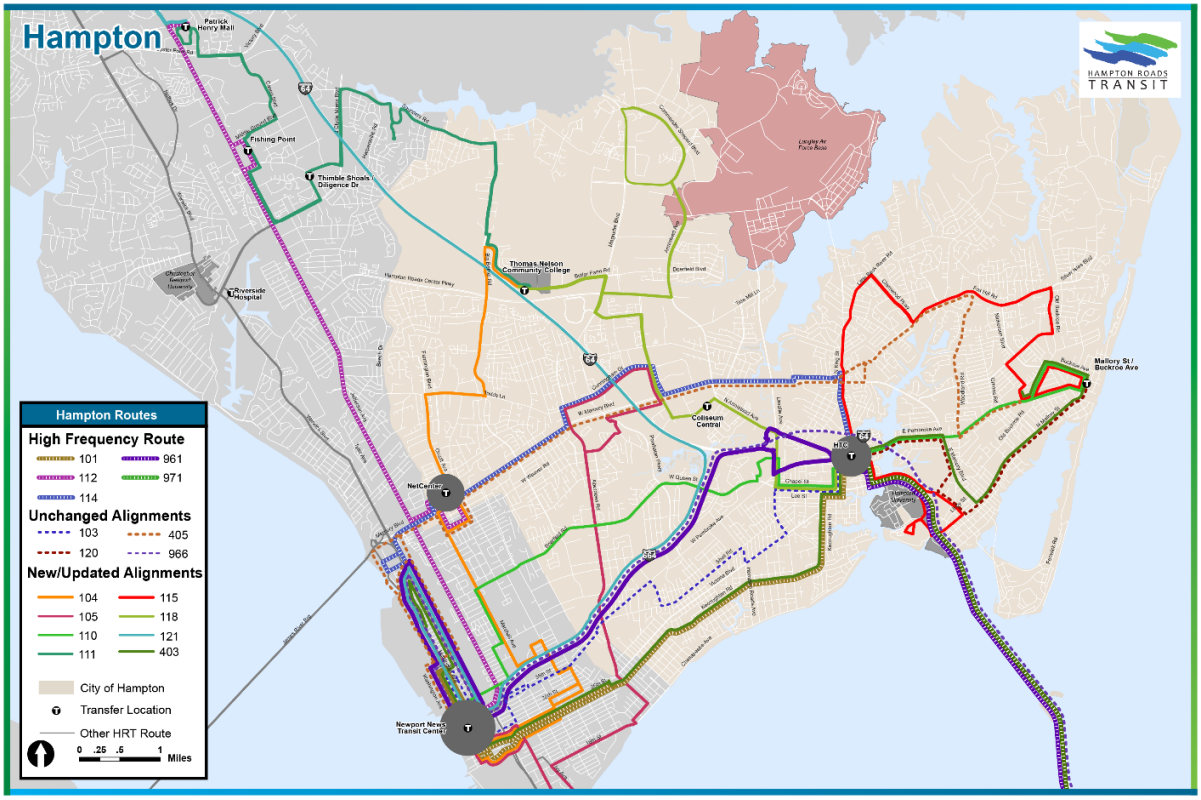


Table 4-6 | Hampton Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	115	Extend the route to Hampton Veteran Administration Hospital, maintaining the existing Route 117 level of service in this area.	216,910	64%	$0
2	110	Extend the route to the Newport News Transit Center and Buckroe Beach, discontinue service to Thomas Nelson Community College.	192,540	10%	$0
3	118	Realign route to serve the Boo Williams Sportsplex. Discontinue service to the Langley Air Force Base.	241,280	15%	$3,000
4	111	Truncate the route at the Patrick Henry Mall.	149,600	-11%	-$175,000
5	105	Realign the route onto Aberdeen Road, Buxton Avenue, Blair Avenue, Walnut Avenue,16th Street, Jefferson Avenue,6th Street, Ivy Avenue, 16th Street, Jefferson Avenue, 28th Street, and Washington Avenue.	269,780	11%	$27,000
6	114	Realign the route onto Mercury Boulevard.	545,510	38%	$0
7	104	Extend the route to Thomas Nelson Community College.	306,910	13%	$324,000
8	109	Eliminate route.	-	-100%	-$431,000
9	117	Eliminate route.	-	-100%	-$227,000
10	102	Eliminate route.	-	-100%	-$458,000
Mid-Term					
1	115	Increase level of service between the Hampton Transit Center and Hampton Veteran Administration Hospital to be consistent across the route.	236,720	79%	$351,000
Long-Term					
1	101	Increase peak frequency to every 15-minutes.	351,750	19%	$796,000
2	114	Increase peak frequency to every 15-minutes. Add additional early morning trip.	570,470	45%	$263,000

4.2.6 Newport News

The prioritization of service recommendations for the City of Newport News can be found in **Table 4-7** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services. The final alignment of routes within Newport News can be seen on

Figure 4-7.

Of the 12 local routes and 6 commuter routes that operate in the City of Newport News, 10 routes had short-term recommendations (including the elimination of two routes), one route was improved in the mid-term, and five routes had a long-term recommendation. Routes 103, 108, 403, 405, 414, and 430 have no proposed changes.

The City of Newport News proposed recommendations will result in a need of an additional $2,132,000 in operating costs.

Ridership is expected to increase by 21 percent on the routes with proposed changes.

Figure 4-7 | Newport News Jurisdictional Map

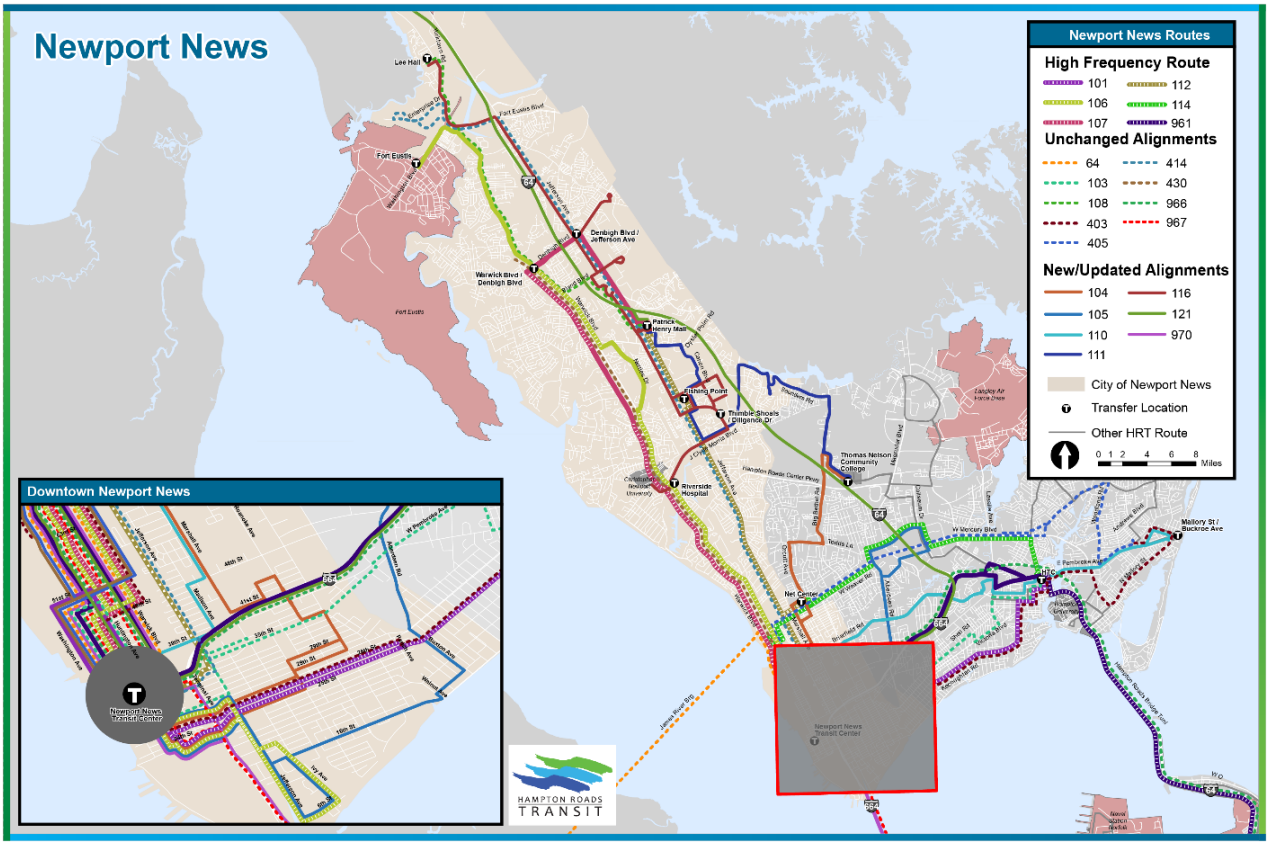


Table 4-7 | Newport News Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	116	During the weekdays, extend the route to the Riverside Hospital and Woodside Lane.	140,090	66%	$444,000
2	110	Extend the route to the Newport News Transit Center and Buckroe Beach, discontinue service to Thomas Nelson Community College.	192,540	10%	$0
3	111	Truncate the route at the Patrick Henry Mall.	149,600	-11%	-$175,000
4	107	Realign the route onto Denbigh Boulevard and Jefferson Avenue. Discontinue service south of the Newport News Transit Center and on Woodside Lane.	322,990	4%	$125,000
5	105	Realign the route onto Aberdeen Road, Buxton Avenue, Blair Avenue, Walnut Avenue,16th Street, Jefferson Avenue,6th Street, Ivy Avenue, 16th Street, Jefferson Avenue, 28th Street, and Washington Avenue.	269,780	11%	$27,000
6	114	Realign the route onto Mercury Boulevard.	545,510	38%	$0
7	121	Adjust schedule	8,600	0%	$0
8	415	Eliminate route.	-	-100%	-$30,000
9	119	Eliminate route.	-	-100%	-$444,000
10	64	Adjust schedule	20,760	0%	$0
Mid-Term					
1	116	Provide weekend service to the Riverside Hospital.	162,680	92%	$40,000
Long-Term					
1	106	Increase peak frequency to every 30-minutes. Add an additional early morning trip.	525,090	30%	$601,000
2	107	Increase peak frequency to every 30-minutes.	349,710	13%	$437,000
3	101	Increase peak frequency to every 15-minutes.	351,750	19%	$796,000
4	114	Increase peak frequency to every 15-minutes. Add additional early morning trip.	570,470	45%	$263,000
5	112	Increase peak frequency to every 15-minutes.	582,900	11%	$721,000

4.2.7 Metro Area Express

The prioritization of service recommendations for the Metro Area Express services can be found in **Table 4-8** with the forecasted ridership, the percentage change in ridership, and the incremental change in cost over existing services.

Four recommendations were identified for Max Service. Two recommendations in the short-term that make the service more efficient with an elimination of a route, and the elimination of service to Silverleaf Park and Ride. While the mid-term and long-term recommendations introduce new service that will make the service more effective and regional.

Table 4-8 | Metro Area Express Recommendation Prioritization

Rank	Route	Recommendation	Forecasted Ridership	Forecasted Change in Ridership	Incremental Change in Cost
Short-Term					
1	960	Eliminate the deviation to the Silverleaf Park and Ride.	59,800	-19%	$0
2	965	Eliminate route.	-	-100%	-$240,000
Mid-Term					
1	970	New Max route between Portsmouth and Newport News.	18,620	-	$148,000
Long-Term					
1	971	New Max route between North Norfolk and Hampton.	157,720	-	$906,000

4.2.8 Paratransit

Paratransit service works side-by-side with the fixed-route service in a demand response capacity, meaning eligible customers call in advance for the service to be delivered.

In the following analysis changes to the fixed-route service were assessed for the impact they would have on paratransit service hours and service area.

The paratransit service area, defined as a 3/4-mile radius of any fixed route, will be adjusted to accommodate any new routes, extensions into new service areas by the existing fixed route service, or the expansion of the span of service in any area.

The following methodology was applied to all changes that impacted the paratransit service:

- The ratio of paratransit service hours based on expansion of the span of service in any area was maintained.
- Percentage of revenue per square mile was applied to any expansions in the service area.

Upon full implementation of the proposed service plan it is estimated that paratransit revenue hour will increase by 0.7 percent.

4.3 SERVICE DEVELOPMENT AND NEEDS PRIORITIZATION

A variety of service expansion recommendations have been prepared through this project, including the vision of a high frequency transit network. These recommendations will be implemented over the course of the next ten years, in accordance to the priority determined based on the overall impact of the service and the funding available to meet the capital and operating needs for each recommendation. By 2027, this plan is expected to increase the fixed-route revenue hours by 43 percent, an additional 88 vehicles will be needed (106 vehicles with spares) and ridership is expected to increase by 24 percent.

The following section assigns each recommendation to an implementation year based on funding availability, as well as the priority score assigned in the previous section.

Each year's recommendations are broken out by financially constrained and identified unmet funding needs.

4.3.1 Service Plan

Fiscal Year 2018

In the first year of the TDP, the proposed service recommendations will focus on creating a more reliable service network by truncating Route 25 at the Sentara Princess Anne Hospital, which will reduce the overall runtime for this route and increase reliability, and discontinuing service to the Silverleaf Park and Ride on Route 960. It is also proposed to eliminate Route 965, service between Patrick Henry Mall, the Peninsula Town Center and Naval Station Norfolk. Overall, the following service reductions are being considered for FY 2018:

- **Route 25:** Discontinue service between Sentara Princess Anne Hospital and the Virginia Beach Municipal Center, which will reduce the frequency along this segment, but service will continue to be provided by the Route 33. Nineteen passengers boarding at one stop along George Mason Drive – located just over a quarter mile from Route 33 – will lose direct transit service.
- **Route 960:** Discontinue express service to Silverleaf Park and Ride. Forty-five passengers boarding at the Silverleaf Park and Ride will have to drive 4 miles to the new Newtown Road Station stop.
- **Route 965:** Discontinue express service between Patrick Henry Mall, the Peninsula Town Center and Naval Station Norfolk.

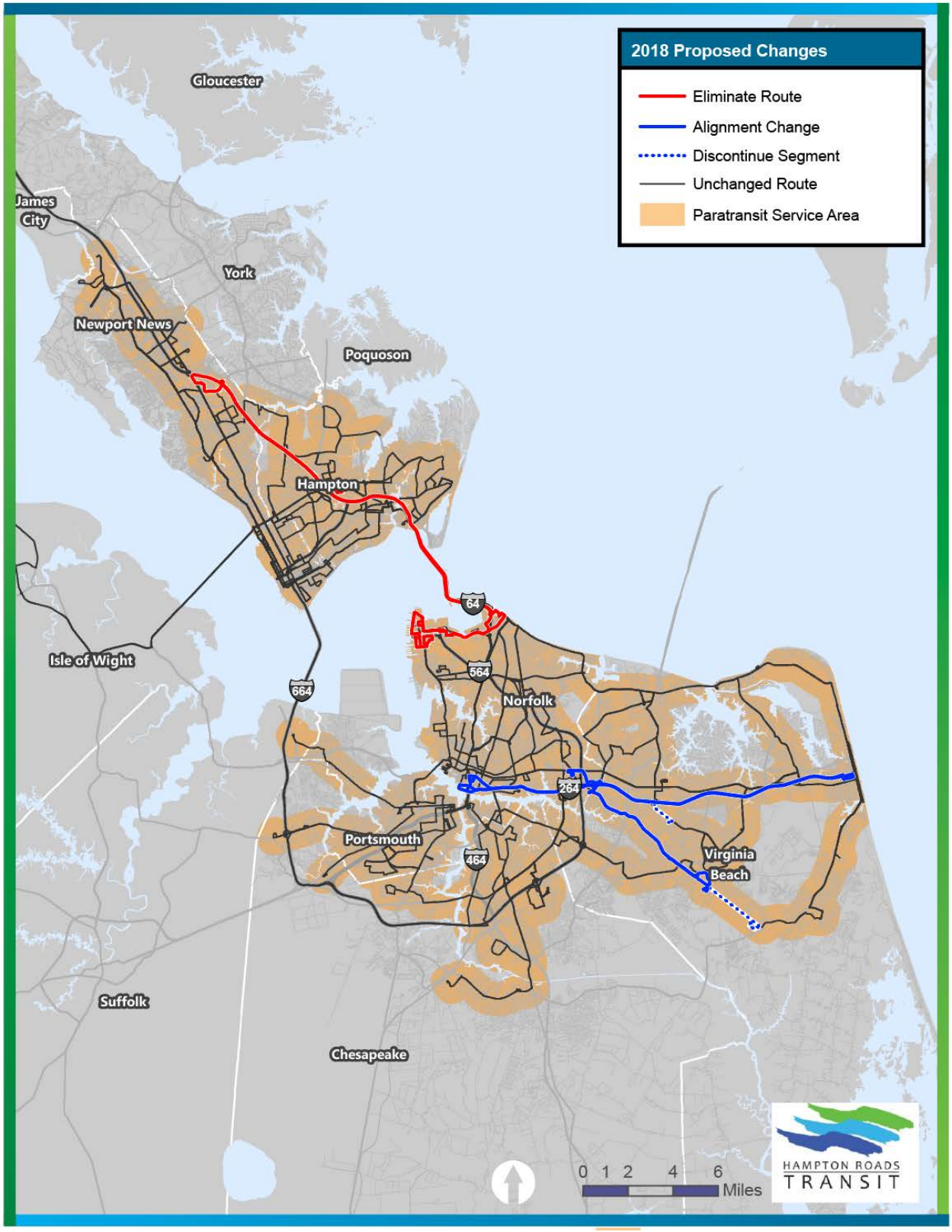
There are no proposed changes to the HRT paratransit service area or hours of service.

Table 4-9 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2018 service plan. **Figure 4-8** illustrates the changes on the route network.

Table 4-9 | Service Plan FY 2018

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2017 System Total				**833,320**	**10,779,210**	**220**
Constrained Recommendations						
AU	960	Alignment Change	Express	0	-18,640	0
V	25	Alignment Change	Local	0	-40,570	0
AV	965	Eliminate Route	Express	-2,570	-36,200	-2
FY 2018 Total Change				**-2,570**	**-95,410**	**-2**
FY 2018 System Total				**830,750**	**10,683,800**	**218**

Figure 4-8 | FY 2018 Service Plan – Proposed Changes



Fiscal Year 2019

FY 2019 TDP recommendations focus on creating more efficient route alignments by eliminating time-consuming and unproductive deviations on Routes 9, 4, 114, and 118, and re-aligning routes 107, 111, and 116. As well as making the system more accessible by adding Sunday service in Portsmouth on Routes 44 and 50. The following service reductions are being considered for FY 2019:

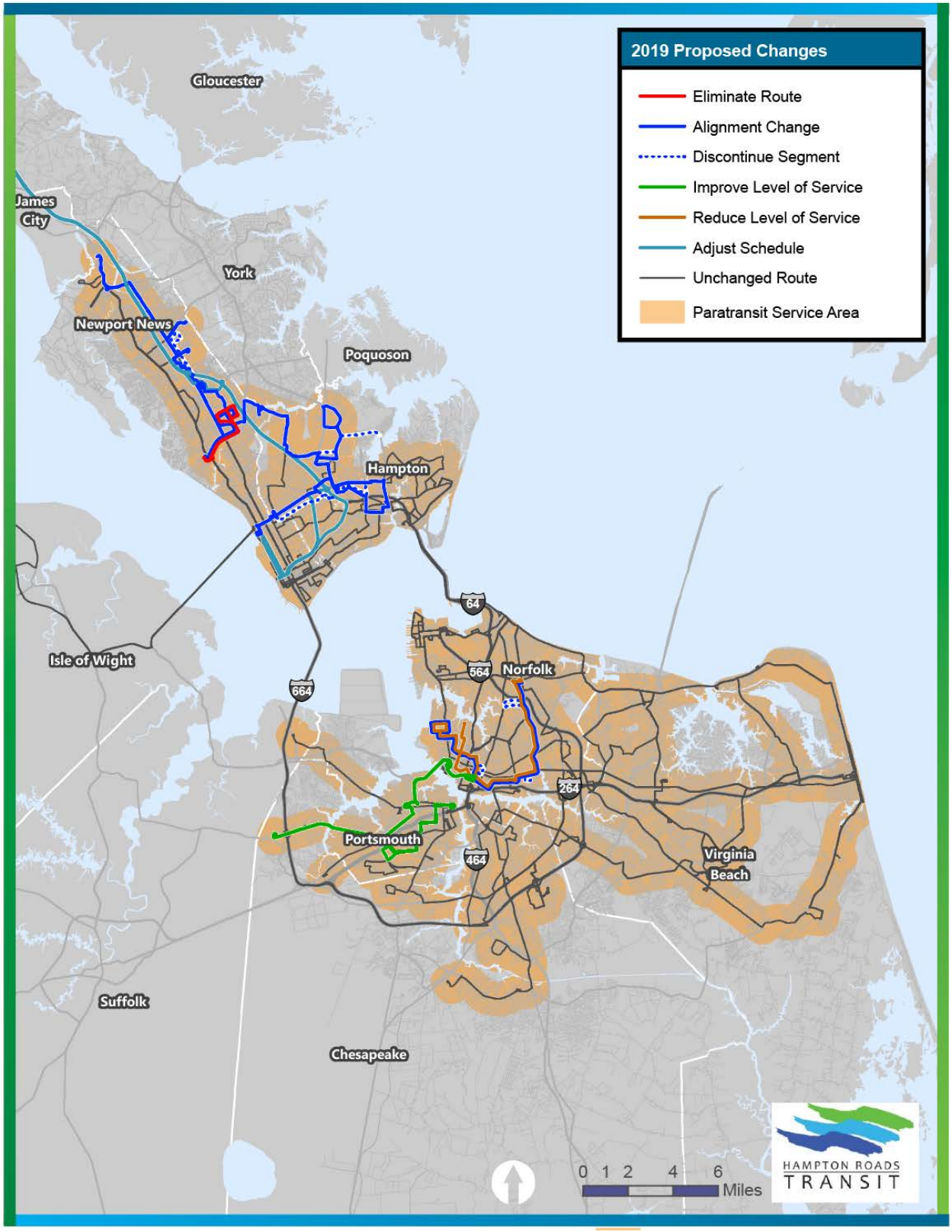
- **Route 107:** Service along Oyster Point between Nettles Drive and Jefferson Avenue will be eliminated, this will impact on average 65 passengers; however, most of these stops are within walking distance of proposed service.
- **Route 114:** Service on Weaver Road, Todds Lane, and Cunningham Drive will be eliminated, removing direct bus service for 294 riders. The majority of the passengers on Weaver Road will have access to the re-aligned service just over a quarter mile away on Mercury Boulevard.
- **Route 118:** Direct service to Langley Air Force Base will be removed, which fulfills a request to remove HRT services from limited access military facilities. This change will remove bus stops serving 20 passengers on average daily.
- **Route 4:** The deviation onto Goff Street, Tidewater Drive, Princess Anne Road, Chapel Street, and Virginia Beach Boulevard will be eliminated. Except for the stop on Goff Street just off Tidewater Drive (which serves one daily passenger), all bus stops proposed for discontinued service are located within a quarter mile of the proposed Route 4 alignment.
- **Route 9:** Eliminate the deviation onto Widgeon Road, Tidewater Drive and Philpotts Road this would affect approximately 41 current passengers (four percent of the route's current ridership).
- **Route 11:** Remove weekend service. Saturday and Sunday service on this route averages less than 150 passengers during weekend operation, which equates to approximately seven passengers per hour.

There are no proposed changes to the HRT paratransit service area, but the hours of service will increase slightly due to new Sunday service on Routes 44 and 50 on Sunday. **Table 4-10** provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2019 service plan. **Figure 4-9** illustrates the changes on the route network.

Table 4-10 | Service Plan FY 2019

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2018 System Total				**830,750**	**10,683,800**	**218**
Constrained Recommendations						
AM	107, 111, 116, 119	Alignment Change / Discontinue Segment / Eliminate Route	Local	-540	-36,690	0
L	11	Reduce Level of Service	Local	-1,270	-8,310	0
K	9	Discontinue Segment / Reduce Level of Service	Local	-3,790	-52,190	0
AR	118	Alignment Change / Discontinue Segment	Local	30	-13,110	0
F	4	Discontinue Segment / Reduce Level of Service	Local	0	0	0
AS	121	Adjust Schedule	Local	0	0	0
BB	44	Improve Level of Service	Local	2,500	17,900	0
BD	50	Improve Level of Service	Local	1,840	6,430	0
AP	114	Alignment Change / Discontinue Segment	Local	0	-58,540	0
FY 2019 Change				**-1,230**	**-144,510**	**0**
FY 2019 System Total				**829,520**	**10,539,290**	**218**

Figure 4-9 | FY 2019 Service Plan – Proposed Changes



Fiscal Year 2020

The FY 2020 service plan enhances route connectivity and synergy. On the Peninsula, seven routes were adjusted to create route connections that eliminate the need for excessive transferring while at the same reducing duplication between routes, this resulted in the elimination of two routes (102 and 107).

In Norfolk and Virginia, recommendations focused on creating connections to new areas on three routes, including the implementation of a the Route 24 which will enhance north-south connections within Virginia Beach via Kempsville Road.

Service reductions will be seen in the following areas:

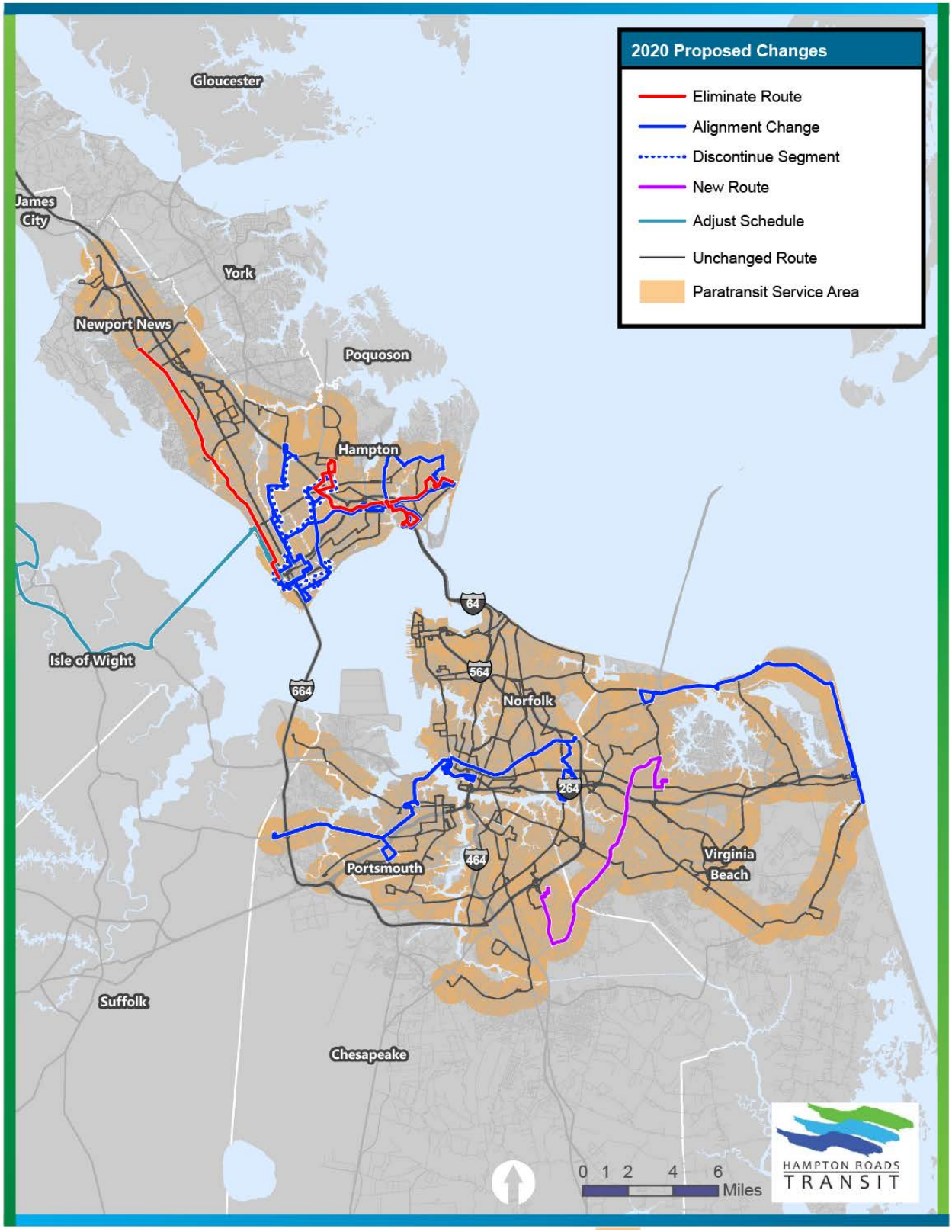
- **Route 102:** Transit service will no longer be provided on Medical Drive, Marcella Road, Executive Drive and portions of Power Plant Parkway. This will leave on average 70 passengers without direct transit service. All other portions of the route will be covered by other proposed routes.
- **Route 104:** Deviation via 76th and 79th Streets will be removed, impacting 83 passengers, 65 of those passengers are farther than a quarter mile from the proposed alignment.
- **Route 105:** Remove service on Hampton Avenue, Garden Drive and Maple Avenue. While this realignment would remove direct service from bus stops with approximately 164 passengers per day, many of the removed stops are close to the 16th Street / Buxton Avenue area and within 0.3 miles or less of the proposed new alignment.
- **Route 109:** Service will be removed on Grimes Road and Andrews Boulevard. Approximately, 11 passengers will lose service.
- **Route 110:** Service will be discontinued on Lassiter Drive, 79th Street and portions of Big Bethel Road. Approximately, 33 passengers will lose service.

There are no proposed changes to the HRT paratransit hours of service, but the service area will increase by approximately one percent due to the proposed Route 24. **Table 4-11** provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2020 service plan. **Figure 4-10** illustrates the changes on the route network.

Table 4-11 | Service Plan FY 2020

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2019 System Total				**829,520**	**10,539,290**	**218**
Constrained Recommendations						
AK	102, 104, 105, 109, 110	Alignment Change / Discontinue Segment / Eliminate Route	Local	-5,750	-110,570	-1
AQ	115, 117	Alignment Change / Discontinue Route	Local	0	0	0
BL	115	Improve Level of Service	Local	3,760	14,990	0
BJ	44	Alignment Change	Local	1,760	18,990	2
U	24	New Route	Local	23,300	238,970	6
T	23	Alignment Change / Improve Level of Service	Local	1,780	31,970	0
BI	35	Alignment Change	Local	3,850	44,070	3
AG	64	Adjust Schedule	Local	0	0	0
AT	415	Eliminate Route	Commuter	-330	-5,290	0
FY 2020 Change				**28,370**	**233,130**	**10**
FY 2020 System Total				**857,890**	**10,772,420**	**228**

Figure 4-10 | FY 2020 Service Plan – Proposed Changes



Fiscal Year 2021

The service plan in FY 2021, focuses on simplifying the route network to enhance service reliability and creating more efficient services.

Overall, despite the elimination of four routes, service will only be reduced on the following corridors:

- **Route 3:** Discontinue service to Naval Station Norfolk, which fulfills a request to remove HRT services from limited access military facilities. This will impact the travel patterns of approximately 124 current riders.
- **Route 5:** Service on Tidewater Drive between Little Creek Road and Ocean View Avenue will be discontinued. Eliminating service on Tidewater Drive would affect 39 daily weekday passengers.
- **Route 22:** Between Newtown Road at Baker Road to Haygood Road at Independence, 91 riders would no longer receive direct service, 67 of whom are not located within walking distance.
- **Route 43:** London Boulevard service will be discontinued. Although the proposed alignment would seemingly eliminate direct local service for 48 passengers, the majority of these boardings occur at Mid-City Shopping Center, which will be served by Route 57.
- **Route 55:** A short section on Military Highway between Old Greenbrier Road and Greenbrier Parkway will no longer have service, but has no bus stops.

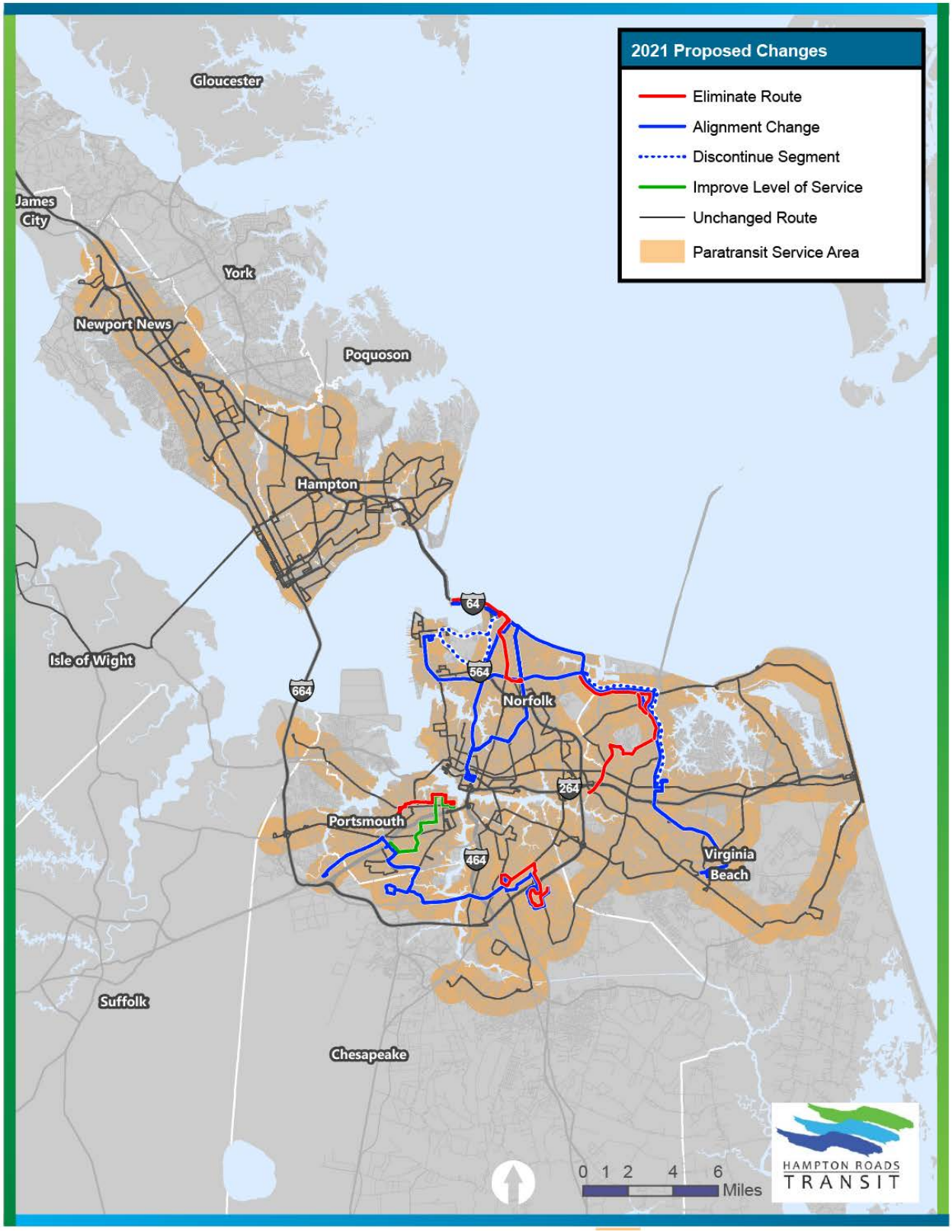
There are no proposed changes to the HRT paratransit hours of service, but the service area will decrease by approximately two percent due to the elimination of Routes 22 and 43.

Table 4-12 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2021 service plan. **Figure 4-11** illustrates the changes on the route network.

Table 4-12 | Service Plan FY 2021

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2020 System Total				**857,890**	**10,772,420**	**228**
Constrained Recommendations						
A	1, 21, 22, 36	Alignment Change / Discontinue Segment / Eliminate Route	Local	7,850	-115,720	-3
AF	55, 57	Alignment Change / Discontinue Route	Local	-360	440	0
D	3, 5	Alignment Change / Eliminate Route	Local	-2,310	-43,470	-2
AE	43, 50	Alignment Change / Improve Level of Service / Eliminate Route	Local	-450	-21,520	1
FY 2021 Change				**4,730**	**-180,270**	**-4**
FY 2021 System Total				**862,620**	**10,592,150**	**224**

Figure 4-11 | FY 2021 Service Plan – Proposed Changes



Fiscal Year 2022

The service plan in FY 2022, continues the development of simplifying the route network to enhance service reliability and increase travel time.

Overall, service will only be reduced on the following corridors:

- **Route 41:** Service to Port Centre Parkway, 7th Street, Lincoln Street, 8th Street and Portsmouth Boulevard, east of Effingham Street, and on Afton Parkway will be discontinued. This proposal will remove service from bus stops serving 137 passengers, approximately a third of those stops are within a quarter mile of other proposed local bus services.
- **Route 57:** Service will be discontinued on Camelot Boulevard, west of Deep Creek Boulevard, as well as on King Arthur Drive, Aaron Drive, Sir Galahad Drive, and Guinevere Drive. Approximately 39 current passengers will lose direct access to local bus service.

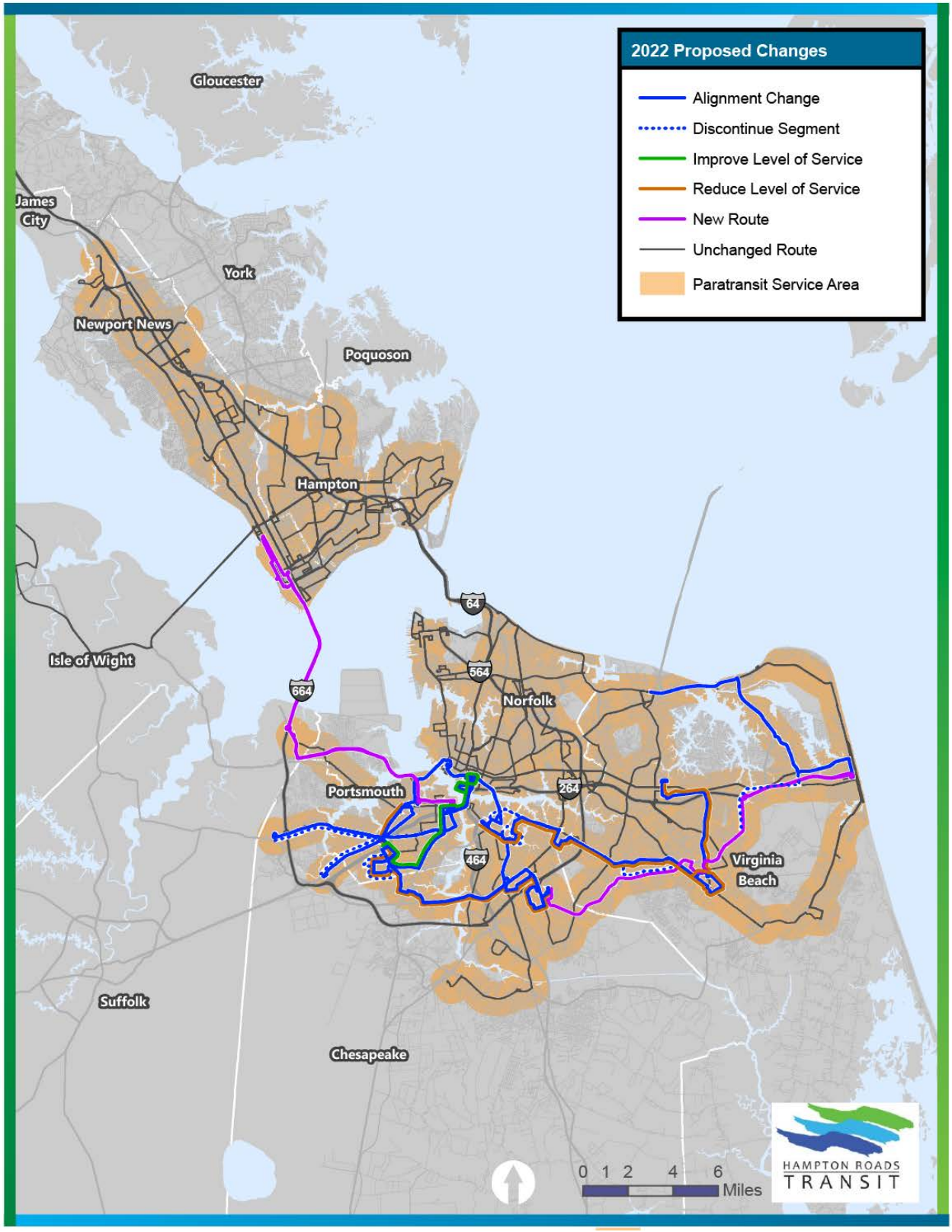
There are no proposed changes to the HRT paratransit hours of service, but the service area will increase by approximately one percent due to the implementation of Route 38.

Table 4-13 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2022 service plan. **Figure 4-12** illustrates the changes on the route network.

Table 4-13 | Service Plan FY 2022

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2021 System Total				**862,620**	**10,592,150**	**224**
Unfunded Need						
AZ	12, 13, 26, 29, 38	Alignment Change / Discontinue Segment / Reduce Level of Service / New Route	Local	28,250	349,990	5
AX	970	New Max Route	Express	1,580	43,130	3
AD	41, 44, 45, 57	Alignment Change / Discontinue Segment / Improve Level of Service	Local	17,030	109,890	2
FY 2022 Change				**46,860**	**503,010**	**10**
FY 2022 System Total				**909,480**	**11,095,160**	**234**

Figure 4-12 | FY 2022 Service Plan – Proposed Changes



Fiscal Year 2023

The service plan in FY 2023, implements further route restructuring to increase travel times and decrease forced transfers along higher frequency corridors. It also includes level of service improvements across the service area. Service will be reduced on the following routes:

- **Route 6:** Discontinue service on Campostella Road, west of Battlefield Boulevard. This will directly affect 30 daily weekday boardings.
- **Route 14:** Eliminate service on River Walk Parkway. The bus stop along this segment currently has approximately eight weekday passengers.
- **Route 18:** The re-alignment would affect approximately 53 current riders, most of whom are located along Ballentine Boulevard between Tait Terrace and Virginia Beach Boulevard and in Grandy Village.
- **Route 58:** Approximately 20 passengers would no longer receive direct transit service on Campostella Road between Military Highway and Libertyville Road.

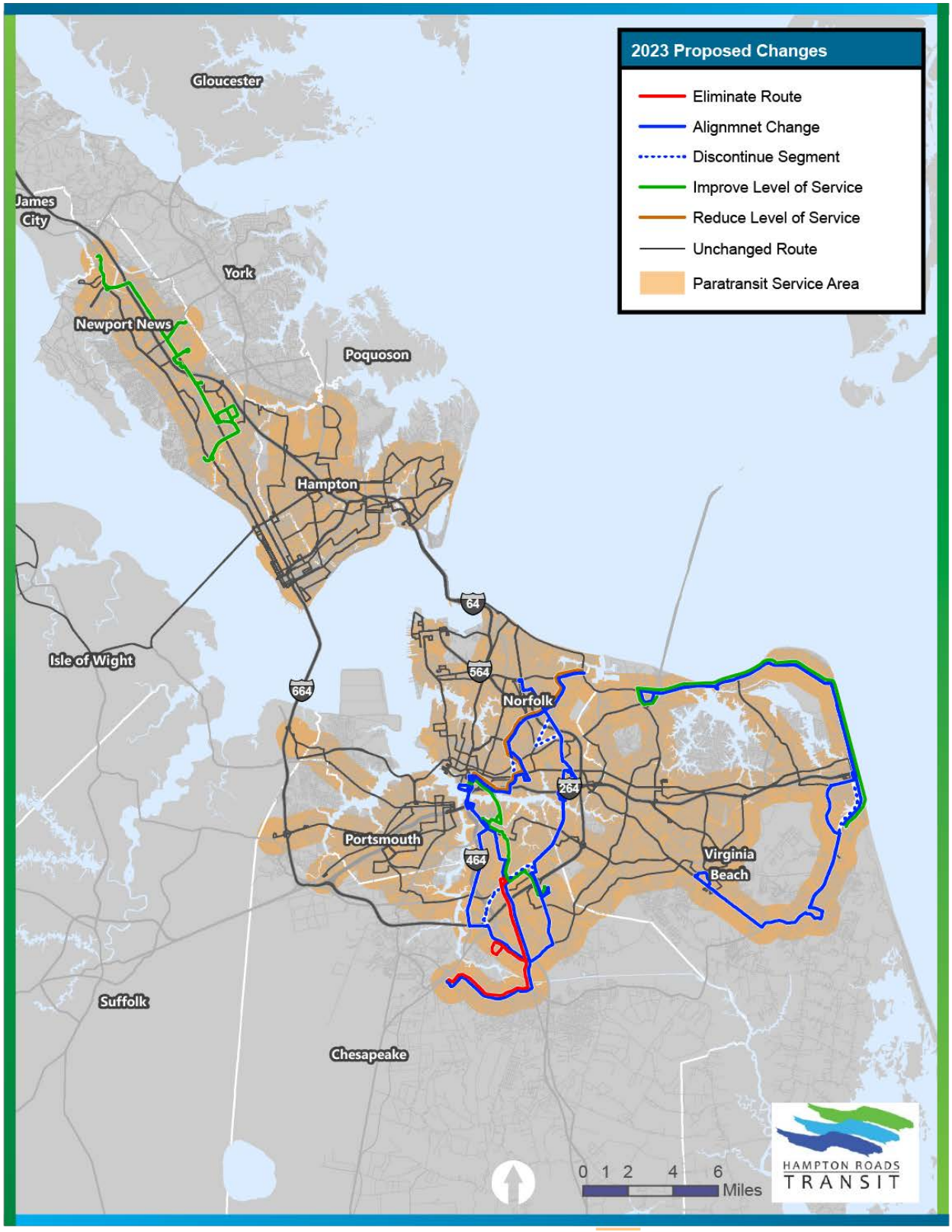
There are no proposed changes to the HRT paratransit hours of service or service area.

Table 4-14 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2023 service plan. **Figure 4-13** illustrates the changes on the route network.

Table 4-14 | Service Plan FY 2023

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2022 System Total				**909,480**	**11,095,160**	**234**
Unfunded Need						
H	6, 14, 58	Alignment Change / Discontinue Segment /	Local	2,670	-47,660	0
BK	116	Improve Level of Service	Local	430	29,560	0
O	13, 15	Alignment Change / Improve Level of Service / Discontinue Segment	Local	6,610	32,110	1
Z	33, 35	Alignment Change / Improve Level of Service / Discontinue Segment	Local	11,180	291,260	-1
Q	18	Alignment Change / Reduce Level of Service / Discontinue Segment	Local	7,780	45,020	2
FY 2023 Change				**28,670**	**350,290**	**2**
FY 2023 System Total				**938,150**	**11,445,450**	**236**

Figure 4-13 | FY 2023 Service Plan – Proposed Changes



Fiscal Year 2024

The service plan in FY 2024, includes level of service improvements on the southside. These frequency enhancements will support the creation of the future high frequent transit network. There is no proposed reduction in service in this fiscal year.

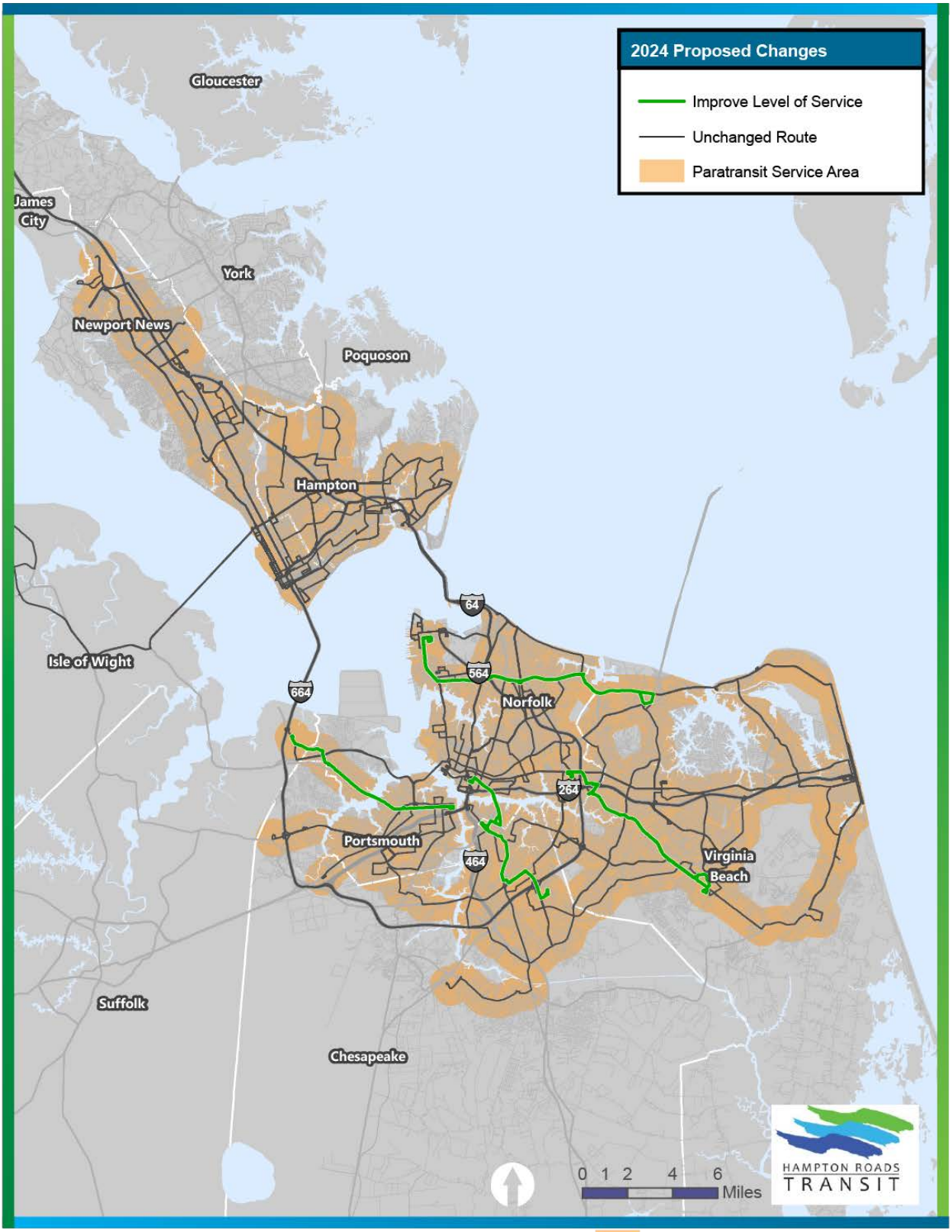
There are also no proposed changes to the HRT paratransit hours of service or service area.

Table 4-15 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2024 service plan. **Figure 4-14** illustrates the changes on the route network.

Table 4-15 | Service Plan FY 2024

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2023 System Total				**938,150**	**11,445,450**	**236**
Unfunded Need						
BA	13	Improve Level of Service	Local	10,070	105,220	1
BF	21	Improve Level of Service	Local	6,250	94,980	0
W	25	Improve Level of Service	Local	5,760	98,370	1
BC	47	Improve Level of Service	Local	3,910	520	0
FY 2024 Change				**25,990**	**299,090**	**2**
FY 2024 System Total				**964,140**	**11,744,540**	**238**

Figure 4-14 | FY 2024 Service Plan – Proposed Changes



Fiscal Year 2025

The service plan in FY 2025, includes additional level of service improvements on the southside. These frequency enhancements will support the creation of the future high frequent transit network.

Service will be reduced on the following route:

- **Route 27**: Service frequency will be decreased to hourly during the early morning and peak based on existing demand along the current service.

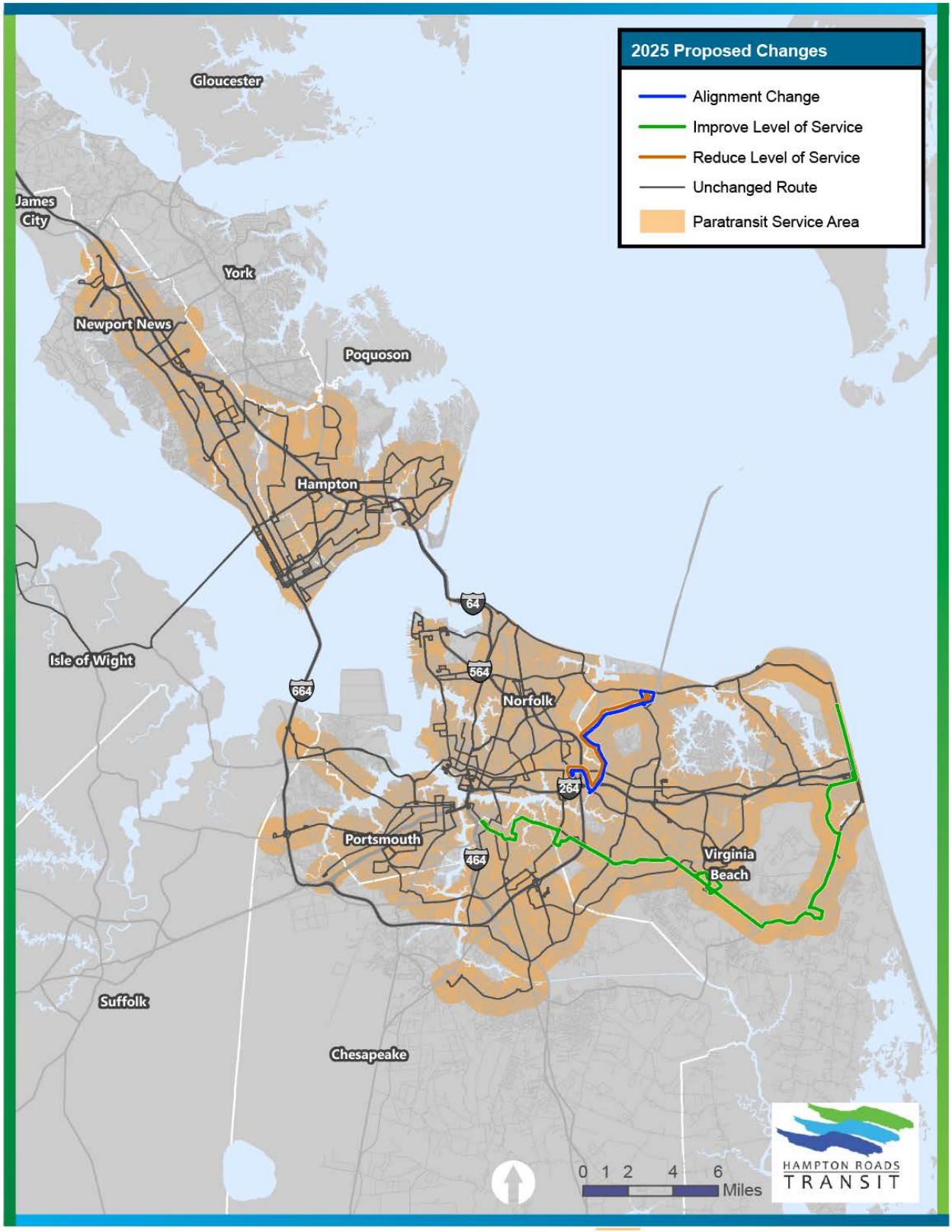
There are also no proposed changes to the HRT paratransit hours of service or service area.

Table 4-16 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2025 service plan. **Figure 4-15** illustrates the changes on the route network.

Table 4-16 | Service Plan FY 2025

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2024 System Total				**964,140**	**11,744,540**	**238**
Unfunded Need						
N	12	Improve Level of Service	Local	3,850	56,260	2
Y	27	Alignment Change / Reduce Level of Service	Local	3,880	1,260	-1
AA	33	Improve Level of Service	Local	7,480	87,690	2
FY 2025 Change				**15,210**	**145,210**	**3**
FY 2025 System Total				**979,350**	**11,889,750**	**241**

Figure 4-15 | FY 2025 Service Plan – Proposed Changes



Fiscal Year 2026

In FY 2026, a high frequency transit network will be implemented on the Peninsula. Overall, five Peninsula routes will receive an improved level of service in order to create high frequency corridors.

The high frequency network corridors will have the following minimum hours of operation:

- **Weekdays:** 6:00 am - 11:00 pm;
- **Saturday:** 6:00 am - 11:00 pm; and
- **Sunday**: 7:00 am - 8:00 pm.

And minimum frequency by time period:

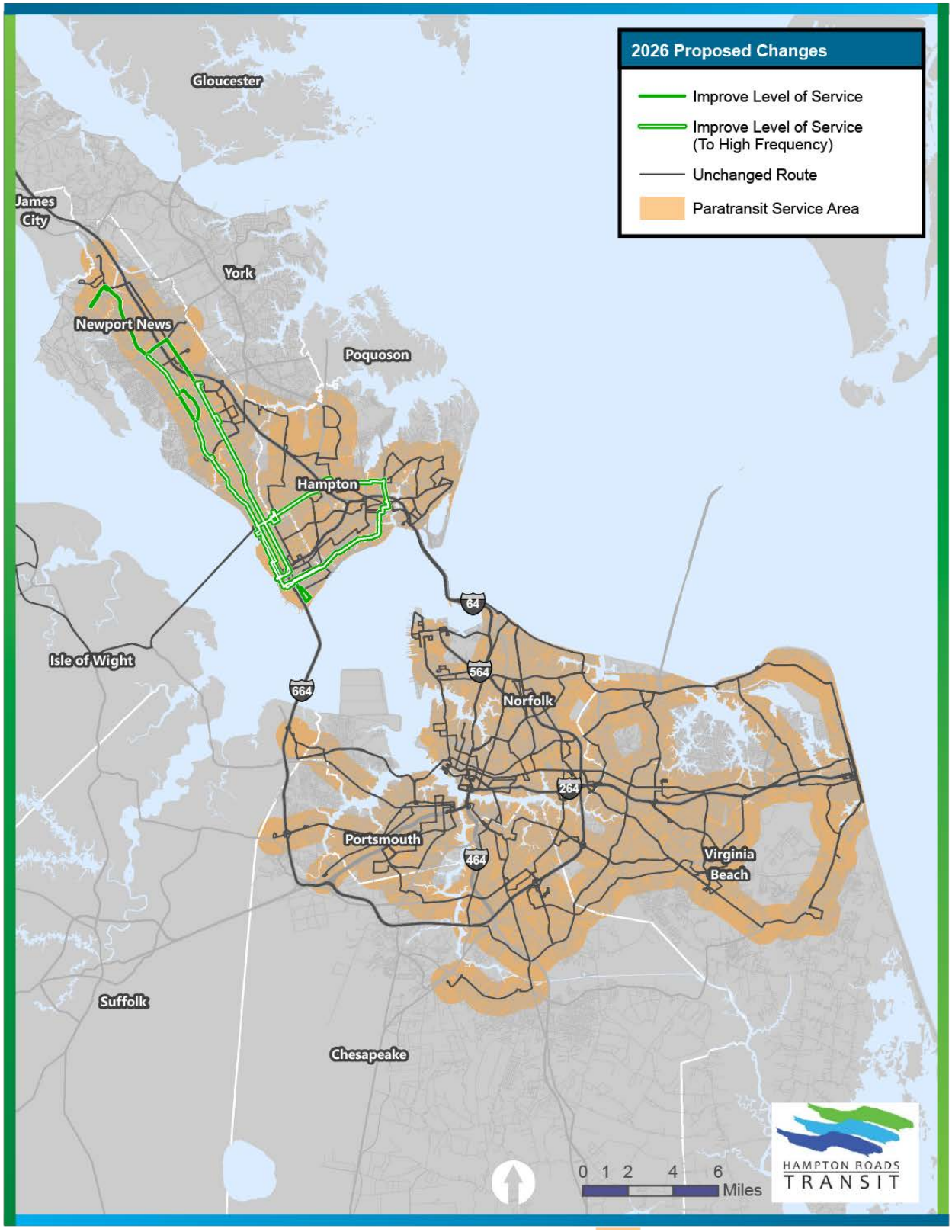
- **Early Morning:** 60-minutes
- **Morning Peak:** 15-minutes
- **Midday:** 30-minutes
- **Afternoon Peak:** 15-minutes
- **Evening:** 30-minutes
- **Late Night:** 60-minutes
- **Saturday**: 30-minutes
- **Sunday:** 60-minutes

Appendix E: High Capacity Transit Network Memo provides additional details on the service levels and impacts a high frequency network will have on the Hampton Roads region. There is no proposed reduction in service in this fiscal year. There are also no proposed changes to the HRT paratransit hours of service or service area. **Table 4-17** provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2026 service plan. **Figure 4-16** illustrates the changes on the route network.

Table 4-17 | Service Plan FY 2026

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2025 System Total				**979,350**	**11,889,750**	**241**
Unfunded Need						
AL	106, 107	Improve Level of Service	Local	11,110	120,910	7
AN	112	Improve Level of Service	Local	7,720	100,550	4
AH	101	Improve Level of Service	Local	8,510	65,730	2
BH	114	Improve Level of Service	Local	2,820	80,350	3
FY 2026 Change				**30,160**	**367,540**	**16**
FY 2026 System Total				**1,009,510**	**12,257,290**	**257**

Figure 4-16 | FY 2026 Service Plan – Proposed Changes



Fiscal Year 2027

In FY 2026, a high frequency transit network will be implemented on the Southside. This will include improved level of service on 14 routes and the addition of one max route (between North Norfolk and Hampton. There is no proposed reduction in service in this fiscal year.

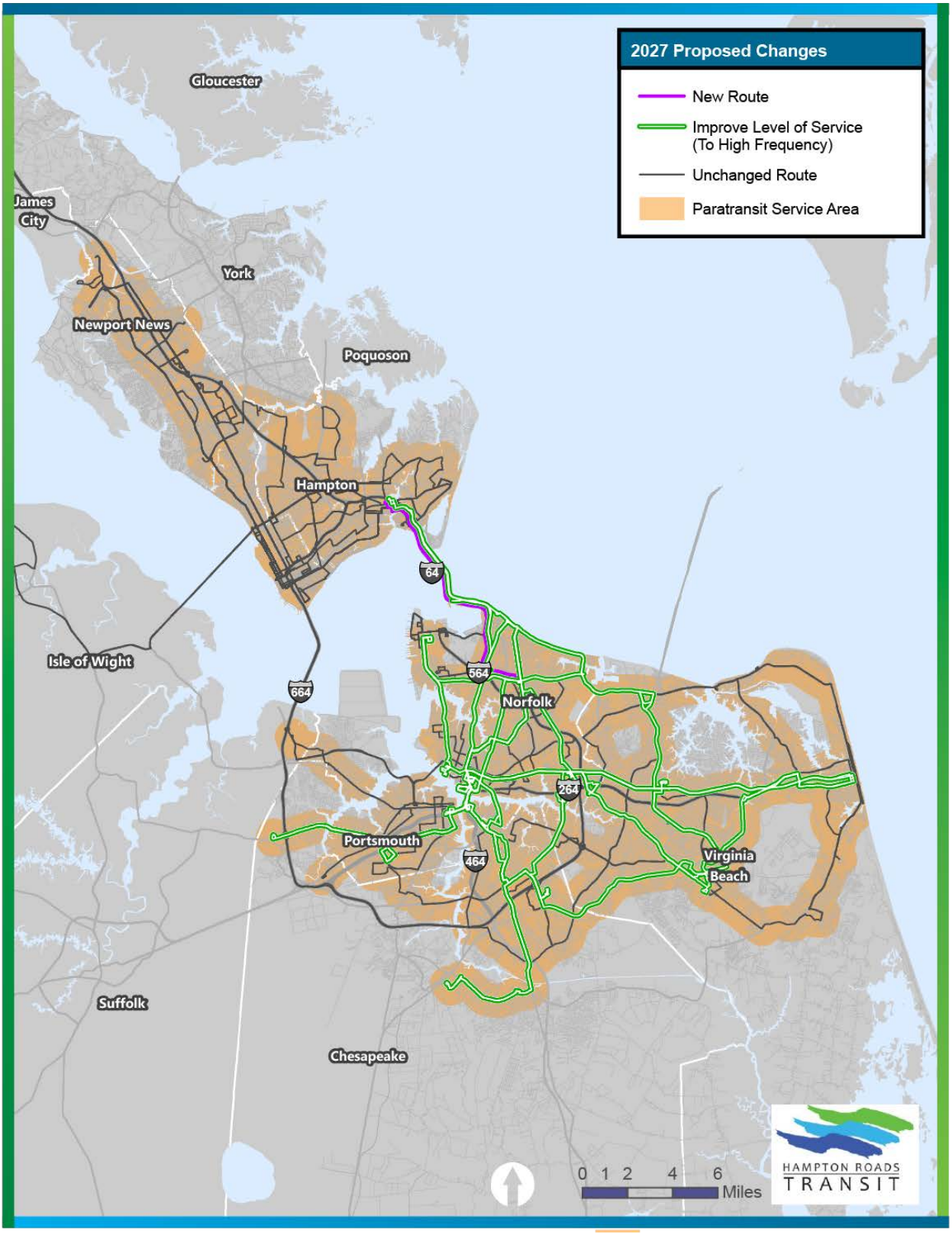
There are also no proposed changes to the HRT paratransit hours of service or service area.

Table 4-18 provides an overview of the change in revenue hours, revenue miles, and peak vehicle need upon implementation of the FY 2024 service plan. **Figure 4-17** illustrates the changes on the route network.

Table 4-18 | Service Plan FY 2027

Package	Route	Type of Recommendation	Service Type	Annualized Net Change in Revenue Hours	Annualized Net Change in Revenue Miles	Change in Peak Vehicles
FY 2026 System Total				**1,009,510**	**12,257,290**	**257**
Unfunded Need						
J	8	Improve Level of Service	Local	8,350	66,940	4
AW	971	New Max Route	Express	9,690	125,370	3
R	20	Improve Level of Service	Local	23,920	363,170	0
B	1	Improve Level of Service	Local	15,560	229,480	5
AY	15	Improve Level of Service	Local	10,270	185,770	1
BG	38	Improve Level of Service	Local	13,450	189,390	5
E	3	Improve Level of Service	Local	17,270	180,150	1
BE	45	Improve Level of Service	Local	7,800	75,850	4
C	2	Improve Level of Service	Local	9,340	92,760	3
G	6	Improve Level of Service	Local	23,610	238,440	5
AC	36	Improve Level of Service	Local	7,910	76,250	3
P	13	Improve Level of Service	Local	7,800	67,390	5
I	6	Improve Level of Service	Local	10,270	127,630	3
S	21	Improve Level of Service	Local	17,970	137,770	6
X	25	Improve Level of Service	Local	4,650	64,250	3
FY 2027 Change				**187,860**	**2,220,610**	**51**
FY 2027 System Total				**1,197,370**	**14,477,900**	**308**

Figure 4-17 | FY 2027 Service Plan – Proposed Changes



4.3.2 Capital Improvement Plan

The following section describes the investments necessary to support the capital needs throughout the HRT system. The agency has a six-year capital program that is updated annually based on the latest capital needs and available funding. As such, the agency has a higher level of detail for capital needs between FY2018 and FY2024. This TDP presents capital needs after FY2024 based on fleet requirements, and technology investments that must occur on fixed intervals.

Rolling Stock

Upon full implementation of the TDP's service recommendations HRT's bus fleet would increase by 106 vehicles (including spares) and the paratransit fleet is expected to grow by over 102 vehicles based on the six percent annual growth in ridership.

Over the ten-year plan, the rolling stock capital improvement plan, which includes maintaining a state of good repair of existing the existing fleets, as well as future expansion vehicles would cost approximately $178,636,000. **Table 4-19** provides an overview of capital costs by project.

Table 4-19 | Rolling Stock ($1000s)

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
Bus Fleet Replacement	0	11,870	13,145	13,860	10,930	4,808	9,773	18,213	1,114	0	**83,712**
Bus Fleet Mid-Life Overhaul	0	3,289	389	0	564	2,788	0	0	0	88	**7,118**
Bus Fleet Rebuild	0	3,000	4,836	0	0	0	0	0	0	0	**7,836**
Bus Fleet Expansion Procurement	0	0	0	4,136	1,052	1,071	2,181	10,548	34,475	0	**53,465**
Bus Fleet Expansion Overhaul	0	0	0	0	0	0	0	544	0	0	**544**
Paratransit Fleet Replacement	0	4,642	187	0	0	0	5,075	816	830	986	**12,536**
Paratransit Fleet Expansion	0	4,459	560	633	709	722	801	0	0	0	**7,883**
Light Rail Fleet Overhaul	0	701	658	333	182	51	0	0	0	0	**1,926**
Non-Revenue Fleet Replacement	0	1,681	183	159	62	134	33	361	205	278	**3,096**
Non-Revenue Fleet Expansion	0	520	0	0	0	0	0	0	0	0	**520**
Total	**0**	**30,162**	**19,957**	**19,121**	**13,499**	**9,574**	**17,864**	**30,482**	**36,625**	**1,352**	**178,636**

Transit Facilities

Forty-two transfer facilities were evaluated for potential capacity issues after the implementation of improved transit services across the region. The methodology focused on the estimated trips per available space, routes per available space and a general analysis of estimated layover and dwell time expected in total at each facility. **Table 4-20** presents the results of the analysis.

Overall, no facilities were identified for expansion based on the proposed route network. Though six facilities were identified for enhancements based on the expected increase in usage based on the TDP improved services. These facilities were:

- **Newport News Transit Center:** will serve an additional route, and is expected to have an 88 percent increase in peak trips per hour.
- **Hampton Transit Center:** will serve three less routes, but is expected to have an 88 percent increase in peak trips per hour.
- **Wards Corner Transfer Center:** will serve four additional routes, and is expected to have a 250 percent increase in peak trips per hour.
- **Evelyn T. Butts Transit Center:** is expected to have a 111 percent increase in peak trips per hour.
- **Victory Crossing:** will serve one less route, but is expected to have a 60 percent increase in peak trips per hour.
- **Greenbrier Mall Park and Ride:** will serve three additional routes, and is expected to have a 1450 percent increase in peak trips per hour.

Additional facilities and passenger amenity improvements have been identified to maintain a state of good repair across the HRT service area. Overall, these improvements would cost approximately $118,210,000 over the ten-year plan. They include the above-mentioned upgrades and are detailed further in **Table 4-21.**

.

Table 4-20 | HRT Transfer Facility / Transfer Center Analysis

Existing Facility		Proposed Network			Capacity (spaces) Needed
Location	Capacity (spaces)	Peak Trips / Hour	Number of Routes	Estimated Layover / Dwell Time (min)	
Arctic Ave / 19th St	2	22	6	46	2
Broad Creek Station	1	2	1	3	1
Chesapeake Center	1	2	1	3	1
Chesapeake Crossing (Robert Hall)	1	16	2	6	1
County St / Court St	2	18	5	29	1
Denbigh Blvd / Jefferson Ave	3	6	3	9	1
Downtown Norfolk Transit Center	1	81	16	160	4
Evelyn T. Butts Ave	1	40	7	49	2
EVMC Station	1	11	3	16	1
Fishing Point	1	12	3	9	1
Fort Eustis	1	3	1	10	1
Greenbrier Mall	4	31	7	63	2
Hampton Blvd / Little Creek Rd	2	17	3	9	1
High St / Florida Ave	1	8	2	6	1

Existing Facility		Proposed Network			Capacity (spaces) Needed
Location	Capacity (spaces)	Peak Trips / Hour	Number of Routes	Estimated Layover / Dwell Time (min)	
Hampton Transit Center	2	30	9	62	2
Indian River	1	1	2	6	1
Joint Expeditionary Base Little Creek	3	18	3	23	1
Lee Hall	1	3	2	20	1
Lynnhaven Mall	1	8	1	3	1
Mallory St / Buckroe Ave	3	4	3	16	1
Military Circle Mall	1	33	5	29	1
Military Highway Station	1	11	3	23	1
Navy Exchange Mall	1	16	2	20	1
Net Center	1	20	4	19	1
Newport News Transit Center	2	32	18	131	4
Newtown Road Station	1	22	4	12	1
NSU Station	1	11	3	9	1
Ocean View Ave	1	12	2	13	1
Patrick Henry Mall	2	17	7	49	2
Pembroke East	1	24	4	33	1
Pleasure House Rd / Shore Dr	1	17	5	50	2
Riverside Hospital	1	9	3	16	1
Liberty Street	1	20	3	9	1
Sentara Norfolk	2	14	3	9	1
Silverleaf Park and Ride	1	1	3	23	1
Tidewater CC - Portsmouth	4	6	4	12	1
Tidewater CC - Virginia Beach	2	15	5	29	1
Thimble Shoals / Diligence Dr	2	4	2	6	1
Thomas Nelson CC	1	6	3	23	1
Victory Crossing	1	16	4	33	1
Wards Corner	1	14	6	18	1
Warwick Blvd / Denbigh Blvd	2	9	4	12	1

Table 4-21 | Facilities and Passenger Amenities ($1000s)

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
3400 Victoria Boulevard Renovation: Phase 2	0	0	3,467	0	0	0	0	0	0	0	**3,467**
ADA Bus Stop Access Upgrades	0	350	350	350	350	350	350	0	0	0	**2,100**
Bus Stop Amenity Program	0	400	400	400	400	400	400	0	0	0	**2,400**
Centralized Command and Control Center	0	0	0	0	0	0	11,597	0	0	0	**11,597**
Evelyn T Butts Transfer Center Upgrades	0	0	0	538	2,208	0	0	0	0	0	**2,746**
Greenbrier Park and Ride	0	359	0	0	0	0	0	0	0	0	**359**
Hampton Transit Center Upgrades	0	0	0	0	0	0	0	0	0	0	**-**
HRT Paving Program	0	6,772	1,077	1,097	1,116	1,136	1,157	0	0	0	**12,355**
Light Rail Vehicle Paint and Body Shop	0	0	0	0	5,370	0	0	0	0	0	**5,370**
Newport News Transit Center Upgrades	0	0	0	0	0	0	0	0	0	0	**-**
Paratransit Operations Center	0	0	0	0	0	0	5,120	204	0	0	**5,324**
Parks Avenue Garage Relocation and Replacement	0	0	0	0	0	6,223	57,405	0	0	0	**63,628**
Reon Drive Transfer Center Upgrades	0	0	0	0	0	0	1,740	0	0	0	**1,740**
Silverleaf Transfer Center Upgrades	0	0	0	1,077	0	0	0	0	0	0	**1,077**
Ticket Vending Machines for Light Rail	0	0	0	0	2,109	0	0	0	0	0	**2,109**
Ticket Vending Machines for Bus Facilities	0	0	0	0	92	373	75	0	0	0	**540**
Ticket Vending Machines for Ferry Docks	0	0	0	0	0	0	0	0	0	0	**-**
Victory Crossing Park and Ride Phase 2	0	0	0	0	1,656	0	0	0	0	0	**1,656**
Victory Crossing Safety Upgrades	0	359	0	0	0	0	0	0	0	0	**359**
Wards Corner Transfer Center Upgrades	0	359	0	0	0	0	0	0	0	0	**359**
Warwick and Elmhurst Transfer Center	0	1,025	0	0	0	0	0	0	0	0	**1,025**
Total	**0**	**9,623**	**5,294**	**3,462**	**13,301**	**8,483**	**77,843**	**204**	**0**	**0**	**118,210**

Technology, Safety and Security and Other Capital

Besides fleet and facility needs, HRT has identified additional capital improvement investments that are necessary in order to provide safe and comfortable trips for passengers on the HRT system. These include investments in information technology software that for example will improve scheduling and reliability of routes, as well hardware that will provide real-time information to passengers on the location of vehicles. There are also investments in safety and security upgrades that can provide safer crossings at light rail tracks for pedestrians and tools to provide drivers additional training on operating a vehicle safely. **Table 4-22** provides a comprehensive list of the general capital improvements identified for HRT.

Table 4-22 | Information Technology, Safety and Security and General Needs ($1000s)

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
HASTUS	0	1,100	0	0	0	0	0	0	0	0	**1,100**
HASTUS (Upgrade)	0	0	0	0	1,101	0	0	0	0	1,101	**2,202**
Bus CAD AVL System Upgrades	0	1,459	0	0	0	0	0	0	0	0	**1,459**
Large Technology Infrastructure	0	611	0	0	0	1,539	0	0	0	0	**2,150**
Technology Hardware, Mobile and Network Equipment	0	1,161	21	105	21	22	0	0	0	0	**1,330**
Bus Technology Fare Payment Upgrade	0	0	0	3,165	0	0	0	0	0	0	**3,165**
IT Network Security	0	1,087	0	0	0	0	0	0	0	0	**1,087**
Passenger Information Displays - Bus Facilities	0	0	614	0	0	0	0	0	0	0	**614**
Passenger Information Displays - Light Rail	0	0	1,704	0	0	0	0	0	0	0	**1,704**
Onboard Wi-Fi	0	0	0	844	0	0	0	0	0	0	**844**
Audio Monitoring System (Phone + Control Room)	0	356	0	0	0	0	0	0	0	0	**356**
Mobile Vault System	0	662	0	0	0	0	0	0	0	0	**662**
Financial Information Software	0	750	0	0	0	0	0	0	0	0	**750**
Financial Information Software (Upgrade)	0	0	0	0	1,235	0	0	0	0	1,235	**2,470**
PeopleSoft HCM (Upgrade)	0	1,222	0	0	0	0	0	1,222	0	0	**2,443**
Real-Time System	0	0	0	0	0	0	0	0	0	0	**-**
Real-Time System (Upgrade)	0	0	0	0	0	1,640	0	0	0	0	**1,640**
IVR Phone System Upgrade	0	407	0	0	0	0	0	0	0	0	**407**
Transit Asset Management System	0	0	0	0	0	0	0	0	0	0	**-**
Transit Asset Management System (Upgrade)	0	0	0	0	2,274	0	0	0	0	2,274	**4,547**

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
Transportation Statistics Database	0	412	0	0	0	0	0	0	0	0	**412**
Light Rail Systems SGR	0	897	494	568	168	703	0	0	0	0	**2,829**
Light Rail Radio System Upgrade	0	0	0	220	0	0	0	0	0	0	**220**
Light Rail Cab Signaling	0	0	0	0	0	8,486	0	0	0	0	**8,486**
Norfolk Tide Facility Track Embedding	0	0	207	0	0	0	0	0	0	0	**207**
Bus Operator Driving Simulator	0	0	359	0	0	0	0	0	0	0	**359**
Bus Maintenance Training System	0	351	0	0	0	0	0	0	0	0	**351**
Portable Oil Analysis Lab	0	167	0	0	0	0	0	0	0	0	**167**
Peninsula Corridor Study	0	0	0	0	0	0	0	0	0	0	**-**
Naval Station Norfolk Transit Extension Studies - DEIS and AA	0	0	0	0	0	0	0	0	0	0	**-**
Chesapeake Corridor Study	0	0	0	0	0	0	0	0	0	0	**-**
Peninsula Corridor Study Phase 2 - Environmental Study	0	0	0	0	0	0	0	0	0	0	**-**
Upgrade the Video Recording Equipment for Buses	0	0	6,012	0	0	0	0	0	0	0	**6,012**
Upgrade the Video Recording Equipment for Light Rail	0	0	0	0	111	0	0	0	0	0	**111**
Mobile Camera Units for Transfer Centers	0	102	0	111	0	0	0	0	0	0	**213**
Wayside Advance Warning Device Upgrade	0	0	0	0	112	0	0	0	0	0	**112**
Replacement of Fixed-Camera Equipment	0	0	713	343	0	0	0	0	0	0	**1,056**
OCC Uninterupted Powersource Upgrade	0	0	0	0	0	0	0	0	0	0	**-**
Store Room Fork Lifts	0	0	93	53	54	55	56	0	0	0	**310**
Expansion Fixed-Cameras	0	51	52	0	0	0	0	0	0	0	**103**
Replacement of Key Card Readeres	0	0	714	0	0	0	0	0	0	0	**714**
North Side Server Room	0	814	0	0	0	0	0	0	0	0	**814**
Mobile Ticketing Phase II	0	0	0	0	0	0	0	2,377	2,472	0	**4,849**
Cellular Modem and Access Points	0	0	0	0	0	0	0	374	389	0	**762**
Total	**0**	**11,609**	**10,982**	**5,408**	**5,075**	**12,444**	**56**	**3,972**	**2,861**	**4,610**	**57,017**

(Page Intentionally Left Blank)

5 Implementation Plan

The purpose of the implementation plan is to highlight the key investments necessary for HRT to realize the service enhancements in the TDP. In addition to operating funding, new services require rolling stock such as buses, and back-end investments in facilities and technology. The following section outlines key investments, and describes which investments HRT can fund under its current revenue structure. As HRT's annual Capital Improvement Program spans a six-year period, funding has not been identified for capital needs after FY2024.

5.1 ROLLING STOCK UTILIZATION

5.1.1 Bus

Overview of Existing Fleet

HRT operates its fixed route bus services with 291 vehicles, utilizing a variety of bus makes and models. This includes vehicles both in-service vehicles and those being used as spares.

The most prevalent vehicle make within the overall HRT fleet is Gillig, which accounts for 262, or 90 percent, of the 291 vehicles. The remaining vehicles consist of Optima (8 vehicles), Nova (7 vehicles), and Hometown Trolley (14 vehicles). There are 37 hybrid vehicles among the fleet, while the remaining 254 vehicles have diesel engines. The 14 Hometown Trolley vehicles are for specific use on the VB Wave seasonal bus service in Virginia Beach.

HRT has four different sized buses: 29 foot vehicles, 34 foot vehicles, 35 foot vehicles, and 40 foot vehicles. The 40 foot vehicles are the most prevalent in the fleet accounting for 48 percent of the total vehicle stock.

It is important to note that the average age of the HRT bus fleet is 9.7 years, which is nearly 4 years beyond the recommended average age of a fleet for a fixed route system (i.e., FTA recommends that the average age of a fleet should be half of the age of the economic life of a transit vehicle, or six years for a heavy-duty transit vehicle).

Table 5- details the HRT fleet. Currently, 86 HRT buses are six years of age or younger, representing only 30 percent of the overall fleet.

Table 5-1 | Bus Fleet Characteristics

Year	Make	Length	Mode of Power	Seat / Stand Capacity	FTA Life Expectancy	Number of Vehicles
1999	Gillig	35-ft	Diesel	32 / 55	12	26
2000	Gillig	29-ft	Diesel	26 / 27	10	1
2001	Gillig	35-ft	Diesel	34 / 47	12	6
2002	Gillig	29-ft	Diesel	26 / 27	10	15
2002	Gillig	35-ft	Diesel	32 / 62	12	15
2002	Optima	29-ft	Diesel	23 / 31	10	8
2003	Gillig	35-ft	Diesel	36 / 43	12	10
2004	Gillig	40-ft	Diesel	40 / 44	12	6
2004	Gillig	40-ft	Diesel	41 / 24	12	9
2006	Gillig	40-ft	Diesel	38 / 41	12	22
2007	Gillig	29-ft	Diesel	26 / 8	10	10
2007	Gillig	40-ft	Diesel	38 / 41	12	18
2007	Gillig	40-ft	Diesel	38 / 41	12	29
2008	Gillig	29-ft	Hybrid	26 / 8	10	14
2008	Gillig	40-ft	Diesel	38 / 41	12	7
2008	Gillig	40-ft	Diesel	38 / 41	12	7
2009	Gillig	29-ft	Diesel	26 / 8	10	2
2011	Gillig	29-ft	Diesel	26 / 8	10	11
2011	Gillig	40-ft	Diesel	38 / 41	12	6
2012	Gillig	35-ft	Diesel	32 / 54	12	3
2012	Gillig	35-ft	Diesel	32 / 54	12	6
2013	Gillig	35-ft	Diesel	32 / 54	12	5
2013	Nova	40-ft	Diesel	36 / 42	12	7
2015	Gillig	35-ft	Diesel	31 / 55	12	2
2015	Gillig	40-ft	Diesel	38 / 41	12	6
2015	Hometown Trolley	34-ft	Diesel	27 / 18	10	14
2016	Gillig	35-ft	Diesel	32 / 54	12	3
2016	Gillig	40-ft	Diesel	38 / 41	12	23

Proposed State of Good Repair Investments

In order to maintain a state of good repair, HRT is performing three different methods of overhauling its aging vehicles.

- In cases where vehicles have reached the end of their useful life but are still in suitable condition, HRT can **rebuild** the vehicle to add a minimum of four years to the vehicle's life. HRT has utilized rebuilds as a stop-gap strategy to reduce bus replacement needs but does not plan to rely on rebuilds over the long-term as rebuilding buses is not a cost-effective strategy for the agency.
- Vehicles that have reached or are approaching the halfway point of their effective lives are being **overhauled** in an effort to improve effectiveness and decrease the mean distance between failures of these vehicles. However, the overhauling process does not extend the effective life of the vehicle.
- When a vehicle has reached the end of their effective lives they could qualify to be **replaced** by a brand-new vehicle.

The cost to rebuild, overhaul, or replace a vehicle is based on the size of the vehicle, whether the vehicle is a hybrid or not, and what extras also need to be installed, as detailed in **Table 5-2**. The base cost includes all costs associated with rebuilding the engine, as well as those for installing/replacing electric cooling fans, installing automated passenger counting (APC) systems, and installing/replacing LED headlights, as well as on-site inspections of the work performed on the vehicles. Depending on what technology is already installed on any individual vehicle, the rebuild might also require the installation of the Road Recorder 7000 (an audio/visual safety/security system). It takes approximately 66 days to completely rebuild each transit vehicle and 5-6 days to complete an overhaul.

Over the life of the TDP, in order to reach a state of good repair, HRT will replace 221 vehicles (76 percent of the fleet), overhaul 106 vehicles (36 percent of the fleet), and rebuild 32 vehicles (11 percent of the fleet). In most cases, HRT intends to replace retired vehicles with vehicles of a similar size. **Table 5-3** and **Table 5-4** detail the total units and necessary costs by year that will be replaced, overhauled, and rebuilt.

Table 5-2 | Vehicle Average Rebuild, Overhaul and Replacement Costs

Make	Vehicle Size	Replace Cost	Rebuild Cost	Repower Cost
Optima	29-ft	$480,527	$241,600	$70,000
Gillig (Hybrid)	29-ft	$480,527	$280,634	$161,000
Hometown Trolley	34-ft	$480,527	$241,600	$75,000
Gillig	35-ft	$485,063	$243,900	$81,667
Gillig	40-ft	$489,599	$245,600	$80,000
Nova	40-ft	$489,599	$245,600	$75,000

Table 5-3 | Bus Fleet - Capital Actions (Repowers, Rebuilds, and Replaces) per Year

Action	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Replace	53	26	26	27	21	9	18	33	2	6
Overhaul	45	15	5	0	7	34	0	0	0	0
Rebuild	0	13	19	0	0	0	0	0	0	0
Total Fleet	**98**	**54**	**50**	**27**	**28**	**43**	**18**	**33**	**2**	**6**

Table 5-4 | Bus Fleet - Capital Costs for Overhauls, Rebuilds, and Replaces per Year ($1000s)

Action	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Replace	25,599	12,638	12,684	13,138	10,177	4,397	8,781	16,075	966	2,938
Overhaul	3,505	3,231	375	-	525	2,550	-	-	-	-
Rebuild	-	3,193	4,666	-	-	-	-	-	-	-
Total Cost	**29,104**	**19,062**	**17,725**	**13,138**	**10,702**	**6,947**	**8,781**	**16,075**	**966**	**2,938**

Table 5-5 through **Table 5-7** details the FY2019 – FY 2024 outlines HRT's plans for funding future rebuild, repower, and replacement needs. It should be noted that all of the agency's FY2018 and some FY2019 investments are funding through already awarded grants, including state, federal formula, CMAQ, and RSTP funding.

Appendix F: Fleet Master Strategy provides additional tables describing the exact vehicles, and additional information on the vehicles, being replaced, overhauled and rebuilt.

Table 5-5 | Bus Fleet – Overhaul Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2019 Funding Needs		**3,289**
Federal 5307	2018	921
State	2019	2,237
ACC	2019	132
FY 2020 Funding Needs		**389**
Federal 5307	2019	109
State	2020	264
ACC	2020	16
FY 2022 Funding Needs		**564**
Federal 5339	2020	265
State	2022	276
ACC	2022	23
FY 2023 Funding Needs		**2,788**
Federal 5307	2022	461
State	2023	1,148
ACC	2023	94
ERC	2023	446
Federal 5339	2020	132
Federal 5339	2022	508

Table 5-6 | Bus Fleet – Rebuild Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2019 Funding Needs		**3,000**
State	2019	2,040
ACC	2019	120
Federal 5339	2018	280
Federal 5307	2018	560
FY 2020 Funding Needs		**4,836**
State	2020	3,288
ACC	2020	193
Federal 5339	2019	505
Federal 5307	2019	849

Table 5-7 | Bus Fleet – Replacement Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2019 Funding Needs		**11,870**
CMAQ	2019	4,097
RSTP	2019	2,549
State	2019	3,552
ACC	2019	209
Federal 5339	2018	1,462
FY 2020 Funding Needs		**13,145**
CMAQ	2020	8,380
RSTP	2020	242
State	2020	3,076
ACC	2020	181
Federal 5339	2019	1,266
FY 2021 Funding Needs		**13,860**
CMAQ	2021	1,712
RSTP	2021	9,159
State	2021	1,465
ACC	2021	120
Federal 5339	2020	1,405
FY 2022 Funding Needs		**10,930**
CMAQ	2022	3,349
RSTP	2022	2,432
State	2022	2,523
ACC	2022	206
Federal 5339	2021	1,832
Federal 5307	2021	587
FY 2023 Funding Needs		**4,808**
CMAQ	2023	1,922
State	2023	1,414
ACC	2023	115
Federal 5339	2022	1,356
FY 2024 Funding Needs		**9,773**
CMAQ	2023	3,818
CMAQ	2024	2,978
RSTP	2024	2,978

Fleet Expansion

Fully implementing the TDP recommendations would require HRT to grow its bus fleet by 106 vehicles (including spares). Under the fiscally constrained capital improvement program, HRT only has funding to add six additional vehicles to the fleet. Expansion vehicles will have the following characteristics:

- **Type**: Standard Bus
- **Length**: 40-ft
- **Wheel Chair Capacity**: 2
- **Seating / Standing Capacity:** 38 / 41
- **Mode of Power:** Diesel
- **FTA Useful Life:** 12 years

Table 5-8 provides an overview of the expansion fleet need, including spare vehicles, by year

The expansion needs identified in FY 2020 could be funded through $4.5 million in funded being returned to HRT due to the cancelation of the Virginia Beach Light Rail extension. As this is already awarded funding, HRT would not need to include these six buses in future capital requests.

Table 5-8 | Bus Fleet - Capital Actions (Expansions) per Year and Costs

	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Estimated Fleet Size	**271**	**271**	**277**	**277**	**285**	**287**	**289**	**293**	**312**	**373**
Estimated Peak Vehicle Need	**218**	**218**	**228**	**224**	**234**	**236**	**238**	**241**	**257**	**308**
Expansion Vehicles	**0**	**0**	**6**	**0**	**8**	**2**	**2**	**4**	**19**	**61**
Peak Vehicle Need	*0*	*0*	*6*	*0*	*6*	*2*	*2*	*3*	*16*	*51*
Spare Need	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*1*	*3*	*10*
Spare Ratio	**24%**	**24%**	**21%**	**24%**	**22%**	**22%**	**21%**	**22%**	**21%**	**21%**
Total Expansion Cost ($1000s)	**-**	**-**	**4,500**	**-**	**4,210**	**1,071**	**1,091**	**2,221**	**10,738**	**35,096**
Expansion Repowers	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**
Total Expansion Repower Cost ($1000s)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**554**	**-**	**-**

5.1.2 Paratransit

Overview of Existing Fleet

There are 109 paratransit vehicles in the fleet, which consists of 30 sedans, 76 cutaway vans, and three 15-passenger vans **(Table 5-9)**. All of the sedans are leased vehicles through MV Transportation and the cutaway vans and vans are owned by HRT.

Table 5-9 | Paratransit Fleet Characteristics

Year	Make	Type	Capacity	FTA Life Expectancy	Number of Vehicles
2012	Ford	15-passenger	15	4	3
2014	Ford	Sedan	5	4	1
2015	Ford	Sedan	5	4	29
2015	Starcraft	Cutaway	10 / 2 wheelchairs	4	76

Proposed State of Good Repair Investments

With the procurement of the 76 cutaway vehicles in FY2015 to replace the majority of the aging sedans, HRT greatly improved the average age of their paratransit fleet. The average age of the paratransit fleet is 3.1.

The effective life of a cutaway vehicle is four years or 100,000 miles (whichever comes first), and a 15-person, body–on-chassis vehicle that is wheelchair accessible via a lift gate costs approximately $60,000 per unit.

Appendix F: Fleet Master Strategy provides additional tables describing the exact vehicles, and additional information on the vehicles being replaced.

Table 5-10 | Paratransit Fleet - Capital Actions (Replacements) per Year and Costs ($1000s)

Action	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Replace (Cutaway)	0	76	0	0	0	0	76	0	0	0
Replace (15-passenger)	0	0	3	0	0	0	0	3	0	0
Total Vehicles	**0**	**76**	**3**	**0**	**0**	**0**	**76**	**3**	**0**	**0**
Total Costs ($1000s)		**4,560**	**180**	**-**	**-**	**-**	**5,280**	**180**	**-**	**-**

Table 5-11 details the FY2019–FY2024 future unprogrammed funding for paratransit fleet replacement

Table 5-11 | Paratransit Fleet – Replacement Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2019 Funding Needs		**4,642**
Federal 5307	2018	1,300
State	2019	3,157
ACC	2019	186
FY 2020 Funding Needs		**187**
Federal 5307	2019	52
State	2020	127
ACC	2020	7
FY 2024 Funding Needs		**5,120**
Federal 5307	2023	1,637
State	2024	1,382
ACC	2024	205
Federal 5339	2023	1,895

Fleet Expansion

The current projected peak requirement is 150 vehicles. In order to meet the requirement, HRT would need to purchase 69 additional cutaways and four more 15-passenger vans just to meet demand today.

Paratransit trips have increased by six percent annually between FY2013 and FY2016. If this trend continues, this would necessitate an increase of seven to nine paratransit vehicles each year. This would result in a growth of 38 vehicles between FY 2019 and FY 2024.

Table 5-12 details the proposed paratransit expansion plan.

Table 5-12 | Paratransit Fleet - Capital Actions (Expansions) per Year and Costs ($1000s)

	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27
Estimated Fleet Size	**109**	**182**	**191**	**201**	**212**	**223**	**235**	**248**	**260**	**275**
Estimated Peak Vehicle Need	**150**	**150**	**159**	**169**	**180**	**191**	**203**	**216**	**229**	**243**
Expansion Vehicles	**0**	**73**	**9**	**10**	**11**	**11**	**12**	**13**	**12**	**15**
Expansion (Cutaway)	*0*	*69*	*9*	*9*	*11*	*10*	*12*	*12*	*12*	*14*
Expansion (15-passenger)	*0*	*4*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*
Spare Ratio	**-27%**	**21%**	**20%**	**19%**	**18%**	**17%**	**16%**	**15%**	**14%**	**13%**
Total Expansion Cost ($1000s)	**-**	**8,940**	**720**	**600**	**660**	**660**	**720**	**780**	**720**	**840**

Table 5-13 details the funding identified for paratransit fleet expansion from FY2019 to FY2024. This funding will not meet all the agency's expansion needs but still accommodate major growth in fleet size.

Table 5-13 | Paratransit Fleet – Expansion Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2021 Funding Needs		**2,201**
State	2021	1,079
ACC	2021	1,123
FY 2022 Funding Needs		**2,620**
State	2022	1,284
ACC	2022	679
Federal 5307	2021	657
FY 2023 Funding Needs		**2,667**
State	2023	1,307
ACC	2023	107
Federal 5307	2022	1,254

5.1.3 Light Rail

Overview of Existing Fleet

HRT's Tide light rail fleet is described in **Table 5-14**. Since the vehicles have been placed into service there have been no major failures or other issues experienced by the fleet. The light rail vehicles are in good condition, and should remain so with proper preventive maintenance.

Table 5-14 | Light Rail Fleet Characteristics

Year	Make	Model	Length	Seat / Stand Capacity	Acceptance Date	FTA Life Expectancy	Expected Retirement
2009	Siemens	S70	93.6-ft	68 / 112	2012	25	2037
2009	Siemens	S70	93.6-ft	68 / 112	2011	25	2036

Proposed State of Good Repair Investments

Between FY2019 and FY2022, HRT has many vehicle overhaul initiatives intended to maintain the light rail fleet in a state of good repair. These investments include a range of items such as overhaul of the bogies and suspension systems. Through the Transit Asset Management plan, HRT expects to identify additional rolling stock needs after FY2023.

Table 5-15 | Light Rail Fleet – Overhaul Funding Schedule

Grant	Grant Year	Expected Funding ($1000s)
FY 2019 Funding Needs		**701**
Federal 5337 - FG	2018	196
State	2019	477
ACC	2019	28
FY 2020 Funding Needs		**658**
Federal 5337 - FG	2019	184
State	2020	447
ACC	2020	26
FY 2021 Funding Needs		**333**
Federal 5337 - FG	2020	157
State	2021	163
ACC	2021	13
FY 2022 Funding Needs		**182**
Federal 5337 - FG	2021	86
State	2022	89
ACC	2022	7
FY 2023 Funding Needs		**51**
Federal 5337 - FG	2022	24
State	2023	25
ACC	2023	2

Fleet Expansion

There is no planned expansion of the light rail fleet during the ten-year TDP period.

5.1.4 Ferry

Overview of Existing Fleet

The Elizabeth River Ferry operates its daily service with three vehicles, as listed in **Table 5-16.** While all three boats are past their FTA expected life, they have received overhauls and are in a state of good repair. HRT procured two replacement ferry boats, which should arrive in the next six months. Once these boats are received, the agency will dispose of two boats.

Table 5-16 | Ferry Fleet Characteristics

Year	Unit	Length	Breadth	Depth	Displacement	Capacity	Fuel	Acceptance Date	FTA Life Expectancy
1982	James C. Echols	60.0-ft	20.0-ft	6.2-ft	50-tons	138	Diesel	1986	25
1986	Elizabeth River Ferry II	59.2-ft	20.0-ft	5.9-ft	55-tons	150	Diesel	1986	25
1990	Elizabeth River Ferry III	65.0-ft	22.0-ft	6.0-ft	57-tons	150	Diesel	1990	25
2018	Elizabeth River Ferry IV	65.0-ft	22.0-ft	6.0-ft	57-tons	152	Diesel	2018	25
208	Elizabeth River Ferry V	65.0-ft	22.0-ft	6.0-ft	57-tons	152	Diesel	2018	25

5.2 MAJOR SYSTEM MAINTENANCE AND OPERATING FACILITIES

Behind the scenes, operating facilities are integral to the daily functioning of HRT. The agency's maintenance facilities help ensure the fleet is in working order, bus storage facilities store vehicles where they are needed, and administrative offices accommodate crucial staff and IT systems. HRT's constrained capital budget is currently focused on maintaining existing facilities.

5.2.1 Current Facilities

Hampton Roads Transit has five facilities that support operations (**Table 5-17**), which range from nearly new to aging and outdated. The two most important facilities in the system are the Northside Facility in Hampton at 3400 Victoria Boulevard and the Southside Bus Operations, Maintenance, and Administration Facility in Norfolk. These two facilities are the base for bus service and house storage, maintenance, and dispatch functions. In addition, the Northside and Southside facilities house HRT's administration and a large share of the agency's critical IT systems. Two HRT facilities support light rail operations: The Norfolk Tide Facility (NTF), which accommodates vehicles storage and maintenance, and the Rail Operations facility, which houses rail maintenance operations and a warehouse. Finally, HRT owns a small facility in Virginia Beach to support bus operations, including the VB Wave.

The following section provides more detail about these facilities.

Table 5-17 | HRT Operating Facilities

Name	Address	Size (sq. ft.)	Function
Southside Bus Operations, Maintenance and Administration Facility	509 E. 18th Street, Norfolk	133,500 sq. ft.	Bus storage, dispatch, bus maintenance, administrative space
Northside Facility	3400 Victoria Boulevard, Hampton	64,000 sq. ft.	Bus storage, dispatch, bus maintenance, administrative space
Norfolk Tide Facility (NTF)	1850 E. Brambleton Road, Norfolk	27,000 sq. ft.	Light rail vehicle storage and maintenance
Rail Operations	3404 Mangrove Ave, Norfolk	3,000 sq. ft.	Light rail operations
Virginia Beach Maintenance Facility	1400 Parks Avenue, Virginia Beach	6,000 sq. ft.	Bus storage and basic maintenance

Southside Facility

The facility at 509 E. 18th Street is HRT's largest and the hub for bus operations on the south side of the Hampton Roads region. The complex includes office space that houses HRT administrative staff, a bus maintenance facility, bus storage, and a bus dispatch center. The LEED-Gold certified complex opened in 2012 on-time and on-budget, replacing a dated and space constrained building nearby on Monticello Avenue. Overall, the facility is in excellent condition and provides space that functions well for HRT's needs.

Northside Facility

The facility at 3400 Victoria Boulevard in Hampton is HRT's base for operations on the north side of the region. The facility, originally constructed in 1989 is currently undergoing major renovations to the garage and administrative spaces. The renovation work is being conducted piecemeal as funding becomes available. The current phase of work is addressing the most important maintenance needs at the site. HRT does have a future unfunded phase of $3.5 million focused on enhancements to the building that will improve operations at the site and address cosmetic needs at publicly facing locations such as the building lobby and board room.

Norfolk Tide Facility

HRT stores and maintains its fleet of Light Rail Vehicles at the Norfolk Tide Facility (NTF), though the facility is missing certain necessary features. The facility was completed in 2011 when the Tide Light Rail opened and remains in good condition overall. The site does not currently have a vehicle paint/body shop facility. As the vehicle fleet expands and ages, a paint facility will allow HRT to perform body work on vehicles on-site without taking trains out of service for extended periods of time while being repaired off-site.

Rail Operating Facility

Light rail operations are based at a facility on Mangrove Avenue. The site is home to HRT's light rail track and system maintenance operations. The facility also functions as a warehouse space for light rail.

Virginia Beach Maintenance Facility

On a seasonal basis HRT operates a bus storage and maintenance facility on Parks Avenue in Virginia Beach to accommodate increased summer service. The site is extremely space constrained:

because of low ceiling heights, maintenance staff cannot conduct the same range of maintenance work performed at other maintenance shops. The agency would like to move into a larger space that would provide more flexibility for bus storage and maintenance as service in the area grows. Without an expanded site, at the start of each day HRT is forced to run some empty buses from storage in Norfolk to Virginia Beach, increasing the system's operating costs. If funding was available, HRT would co-locate the facility at a site currently being developed by the City of Virginia Beach. Replacement of the Park Avenue garage is necessary for HRT to implement all the service recommendations in this TDP.

5.2.2 Facility Capital Needs

HRT's capital needs for operating facilities can fall into three broad categories:

- Investments necessary to realize the unconstrained service plan presented in the TDP
- Facilities that would enhance HRT's operating capacity and capabilities but are not directly related to TDP recommendations.
- Smaller state-of-good repair investments needed to maintain existing facilities.

HRT's Capital Improvement Plan captures major needs, including investments to existing facilities as well as new facilities that enhance operating capacity. With the agency's Transit Asset Management plan, HRT hopes to integrate the smaller state-of-good repair investments into the CIP; these investments are largely funded out of the operating budget today and are not captured in the agency's capital planning document.

Overview of Facility Projects

The agency has identified $90,258 worth of capital needs associated with operating facilities. Of these projects, only the Park Avenue Garage Relocation is considered essential to implement the recommendations in the TDP. The other investments would expand HRT's operating capabilities but are not critical to expand service.

Table 5-18 | Facility Capital Needs[70] ($1000s)

Project Name	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
3400 Victoria Boulevard Renovation: Phase 2	0	3,467	0	0	0	0	0	0	0	**3,467**
Parks Avenue Garage Relocation and Replacement	0	0	0	0	6,223	57,405	0	0	0	**63,628**
Mobile Vault System	662	0	0	0	0	0	0	0	0	**662**
Light Rail Vehicle Paint and Body Shop	0	0	0	5,370	0	0	0	0	0	**5,370**
Norfolk Tide Facility Track Embedding	0	207	0	0	0	0	0	0	0	**207**
Centralized Command and Control Center	0	0	0	0	0	11,597	0	0	0	**11,597**
Paratransit Operations Center	0	0	0	0	0	5,120		0	0	**5,327**
Capital Need Total	**662**	**3,674**	**0**	**5,370**	**6,223**	**74,121**	**0**	**0**	**0**	**90,258**
State of Good Repair (TERM-lite)	**123**	**1,258**	**0**	**0**	**0**	**314**	**1,503**	**9,062**	**$0**	**12,260**

[70] HRT completed its development of its first-ever TERM-lite database of agency facilities. The database projects investments need based on the age of assets and not the assets condition. As such, it's not considered an accurate predictor of capital needs at this time; the agency plans to update the database regularly as assets are replaced or maintained, which will improve data quality over time. The totals highlighted in gray are included here for reference but have not been incorporated into the agency's capital plan at this time.

3400 Victoria Boulevard Renovation: Phase II

This project would fund the last phase of work on 3400 Victoria Boulevard by funding all work to the main building that was not accommodated in the phase currently underway. These investments would include renovations to the lobby and office spaces. While the project is important to the agency as it insures the 3400 Victoria meets HRT's operating needs, these investments should not directly impact the implementation of expanded service on the northside.

Park Avenue Garage Relocation

This project is critical to implement the service expansion proposed in the TDP. The existing Park Avenue garage is sub-standard. The facility is extremely space constrained and it's not suitable for year-round operations. A new relocated garage would accommodate HRT's Virginia Beach operations and allow the agency to better serve the city by removing the need to deadhead buses all the way to Norfolk. The total cost of the project is estimated at $55 million in current year dollars or $63.6 million in year of expenditure dollars. HRT estimates that a small modular facility could be constructed for $25 to $30 million that would meet the service needs identified in this TDP.

Mobile Vault System

HRT would like to implement a closed cash handling system at the Hampton garage. Mobile vaults would allow money to be transferred seamlessly from the on-board fare boxes to the vaults at garages. The project would require the procurement of the vaults, along with renovations to accommodate the equipment.

Centralized Command and Control Center

HRT's operating and security functions are handled at numerous facilities, rather than a single location. This project would create a centralized operating facility that would oversee HRT service across all modes. This facility would also allow seamless coordination between HRT security staff and operations staff during the event of an emergency.

Paratransit Operations Center

The facility would host paratransit operations, which are currently outsourced to a private contractor. HRT would like to open its own paratransit operating facility in order to reduce its reliance on external vendors and increase the agency's flexibility in operating paratransit. The paratransit facility would include both internal functions like operations oversight and scheduling, with customer facing functions like paratransit eligibility and customer service. Could be combined with Centralized Command and Control Center.

Light Rail Paint Booth and Body Shop

This project would construct a paint booth and body shop facility at the Norfolk Tide Facility, allowing HRT to conduct body work on LRT vehicles in-house. Currently, if a light rail vehicle requires repainting it must be shipped to an off-site location, taking a vehicle out of service for several months. Shipping out LRT trains will reduce HRT's spare ratio of trains and could impact service quality if for some reason an additional train must be put out of service. As the system ages, vehicles will need repainting and body work to keep the fleet attractive looking and in good condition. Having an in-house body shop will also allow HRT to conduct a wider array of body work than is currently possible.

Norfolk Tide Facility Track Embedding

This project would embed the tracks at the Norfolk Tide facility into a new roadway, allowing trucks to directly access the facility. This project would enable the agency to more easily access vehicles and move heavy equipment in and out of the facility.

Other State of Good Repair Investments

In 2017 HRT completed the development of its TERM-lite database of agency controlled facility assets. This database will over time give the agency a more accurate understanding of its maintenance capital needs. The database uses assets age to estimate replacement needs. As a new database, HRT still has incomplete information on when assets were replaced or most recently maintained. Moving forward, all investments in facility assets will be incorporated into the database, resulting in the quality of the data to improve over time. Based simply on the age of existing assets, the agency forecasts $12.6 million of state of good repair needs at maintenance facilities. These needs range from replacement of windows and roofs, to maintenance of the equipment housed in the facility. At this time HRT has not integrated the TERM-lite database findings into its Capital Improvement Program but plans to do so over the next year as part of its Transit Asset Management planning efforts. The agency has included these costs in **Table 5-19** to provide the DRPT an understanding of facility maintenance needs over the next 10 years. Facility Capital Funding

Beyond regular preventative maintenance, HRT has no funding in its constrained capital program to implement any of the capital projects listed in the previous section. The agency is currently completing work on the first phase of renovations at 3400 Victoria Boulevard. This $6.4 million project has already been awarded all necessary state and federal funding and will be completed in the next twelve months.

5.3 PASSENGER AMENITIES

5.3.1 Passenger Facility Needs

Every journey that HRT's customers take on bus, ferry, or light rail begins at a passenger facility – a bus stop, transit center, ferry dock, or light rail station. HRT and its member jurisdictions have made notable investments in these assets but more work must be done to bring all passenger facilities to a state of good repair. The projects that follow would address shortcomings in current conditions at passenger facilities and would support the recommendations outlined in this study.

Table 5-19 | Passenger Facility Capital Needs71 ($1000s)

Project Name	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
ADA Bus Stop Access Upgrades	350	350	350	350	350	350	0	0	0	**2,100**
Bus Stop Amenity Program	400	400	400	400	400	400	0	0	0	**2,400**
Newport News Transit Center Upgrades	0	0	0	0	0	0	0	0	0	**0**
Hampton Transit Center Upgrades	0	0	0	0	0	0	0	0	0	**0**
Wards Corner Transfer Center Upgrades	359	0	0	0	0	0	0	0	0	**359**
Evelyn T Butts Transfer Center Upgrades	0	0	538	2,208	0	0	0	0	0	**2,746**
Silverleaf Transfer Center Upgrades	0	0	1,077	0	0	0	0	0	0	**1,077**
Victory Crossing Park and Ride	0	0	0	1,656	0	0	0	0	0	**1,656**
Victory Crossing Safety Upgrades	359	0	0	0	0	0	0	0	0	**359**
Greenbrier Upgrades	359	0	0	0	0	0	0	0	0	**359**
Reon Drive Transfer Center Upgrades	0	0	0	0	0	1,740	0	0	0	**1,740**
Warwick and Elmhurst Transfer Center	1,025	0	0	0	0	0	0	0	0	**1,025**
Passenger Information Displays - Bus Facilities	0	614	0	0	0	0	0	0	0	**614**
Passenger Information Displays - Light Rail	0	1,704	0	0	0	0	0	0	0	**1,704**
Ticket Vending Machines for Bus Facilities	0	0	0	92	373	75	0	0	0	**540**
Ticket Vending Machines for Light Rail	0	0	0	2,109	0	0	0	0	0	**2,109**
Capital Need Total	**2,851**	**3,067**	**2,365**	**6,815**	**1,123**	**2,565**	**0**	**0**	**0**	**8,090**
State of Good Repair (TERM-Lite)	**103**	**104**	**0**	**0**	**59**	**1,188**	**1,306**	**674**	**1,344**	**4,799**

Passenger Amenities

HRT has included in its Capital Program the following projects related to passenger amenities:

ADA Bus Stop Access

Implements ADA improvements at bus stops. Due to the poor state of accessibility region-wide, this project will not be able to fund all of HRT's desired ADA improvements. HRT hopes to partner with its member jurisdictions to continue to support accessibility improvements to bus stops.

Bus Stop Amenity Program

Supports an agency-wide bus shelter amenity program, including funding for new shelters, benches, trash cans, and lighting. The agency currently relies on grants to fund these upgrades, and a dedicated funding source would allow HRT to better address bus stop needs across its large service area.

HRT Paving Program (EF3600 and EF3610)

HRT has ongoing paving needs at its facilities, including transit centers, maintenance garages, and park and rides. The lifespan of concrete averages twenty-five years, while asphalt must be repaved

[71] HRT completed its development of its first-ever TERM-lite database of agency facilities. The database projects investments need based on the age of assets and not the assets condition. As such, it's not considered an accurate predictor of capital needs at this time; the agency plans to update the database regularly as assets are replaced or maintained, which will improve data quality. The totals highlighted in gray are included here for reference but have not been incorporated into the agency's capital plan.

every ten years. In order to meet this maintenance schedule, HRT must set aside more than $1 million each year for resurfacing. These ongoing capital improvements are funded under the project HRT Paving Program.

Due to deferred maintenance, HRT currently has a critical resurfacing backlog. At some of facilities, paved surfaces have deteriorated to the point that they pose a threat to operations and passenger safety. For example, potholes at Wards Corner are large enough to damage vehicles.

Passenger Information Displays

HRT would like to deploy passenger information displays at major transit centers, such as Downtown Norfolk, Newport News, and Hampton, as well as 22 displays along the Tide Light Rail (two at each station). These signs would serve both a customer information and safety purpose. Signs can provide riders with real-time arrival information and would also be capable of providing riders up-to-date messages, including emergency alerts. The system will include a public announcement system as well as signs. Ambient microphones will be integrated with the system to provide HRT live notification of any security related events.

Passenger Facilities

HRT has historically little capital funding available to upgrade its passenger facilities. Over the long-run, the agency would like to expand its passenger transit centers provide riders with a more comfortable place to wait for their bus, train, or ferry. The following lists the passenger facilities included in this year's CIP.

Newport News Transit Center

Upgrades the existing facility by resurfacing/repaving the bus loop, augmenting and improving the efficiency of lighting. This project is expected to move forward next year with Smartscale funding.

Hampton Transit Center

Upgrades the existing facility by resurfacing/repaving the bus loop, augmenting and improving the efficiency of lighting. This project is expected to move forward next year with Smartscale funding.

Wards Corner Transfer Center Upgrades

Upgrades the Wards Corner Transfer Center with improved landscaping, better lighting, a new camera surveillance system, and restrooms.

Evelyn T. Butts Transit Center

Replaces the existing Evelyn T. Butts transit center with a new facility on the scale of Wards Corner transfer center. The goal of the project is to provide HRT customers a more conveniently located transit center with upgraded amenities. This project includes the procurement of land and build-out of the facility.

Silverleaf Park and Ride Upgrades

Upgrades the existing facility by replacing bus lanes and bays with concrete pads, improving the energy efficiency of lighting, and enhancing the aesthetic appearance of the site.

Victory Crossing Phase II

Constructs a Park and Ride at Victory Crossing transit center. As part of the upgrade, the facility will receive improved landscaping and public restrooms.

Victory Crossing Safety Upgrades

Improves safety and security at the Victoria Crossing transit center by improving lighting.

Greenbrier Mall Park and Ride Upgrades

Upgrades a portion of the parking lot at the Greenbrier Mall into a Park and Ride. The site will see the installation of new bus pads and a passenger waiting area with shelters, lighting, and seating.

Indian River and Reon Drive Transit Center Upgrades

Creates a transit center with two bus bays to provide customers with parking and a sheltered waiting area, along with layover space and operator restrooms. The project will create an aesthetically appealing area for customers and be similar to, but smaller than, the Wards Corner transfer center.

Warwick and Elmhurst Transfer Center

Upgrades site into a dedicated bus transfer facility. The location serves as the only link between HRT and WATA. The project would include a new bus loop, three bus shelters, amenities like lighting seating and trash cans, and restrooms. Project will include land acquisition.

Other State of Good Repair Investments

As described above under Operating Facilities, HRT is in the process of building out its TERM-lite database of transit assets as part of the development of an agency-wide transit asset management program. The database forecasts state of good repair needs based on the age of assets. The agency is continuing to refine the database and at this time does not rely on the database's outputs to develop its capital program. Based on the TERM-lite database, the need related to passenger facilities is $4.8 million over the next ten years. This information is provided at the bottom of **Table 19** to give DRPT an understanding of HRT's passenger facility maintenance needs but will be refined farther in future TDP updates and iterations of the annual CIP.

5.3.2 Passenger Facility Funding

Historically HRT has limited capital funding to support the expansion or renovations of passenger facilities. To maximize the benefit produced by its capital funds, the agency has tried to prioritize system-wide investments. In the constrained capital program, the agency has identified funding for only two projects, paving of passenger facilities and the replacement of Evelyn T. Butts (see **Table 5-20** and **Table 5-21**). In addition to these two projects, HRT have a number active projects funded through existing grant awards. These active projects include:

- Park and Ride upgrades to the Newport News and Hampton transit centers Funded through Smart Scale.
- Ongoing investments to expand the number of bus shelters through remaining 2015 Transportation Alternatives funding.
- Funding to renovate ferry docks and install TVMs at or near the docks through a $3.8 million federal discretionary grant.
- Funding to replace signage through the remaining balance on a 2014 federal formula grant.

Table 5-20 | Funding Sources for Evelyn T. Butts Transit Center Replacement

Grant	Grant Year	Expected Funding ($1000s)
FY 2023 Funding Needs		**577**
ACC (Local Funding)	2023	577
FY 2024 Funding Needs		**2,374**
Federal 5307	2023	706
ACC	2024	1,668

Table 5-21 | Funding Sources for Paving Program

Grant	Grant Year	Expected Funding ($1000s)
FY2020 Funding Need		**2,374**
Federal 5307	2019	918
ACC (Local)	2020	1,330
State	2020	494
FY 2022 Funding Needs		**612**
ACC (Local)	2022	539
ACC (Local)	2021	73

Grant	Grant Year	Expected Funding ($1000s)
FY23 Funding Need		**965**
ACC (Local	2024	965
FY24 Funding Need		**507**
ACC	2024	156
Federal 5307	2021	81
Federal 5307	2022	116
Federal 5307	2023	155

5.4 TECHNOLOGY SYSTEMS

Information technology investments provide direct and indirect benefits to every HRT employee and customer, and indeed the entire system. However, HRT faces a critical backlog of technology projects that threatens to impact agency operations severely. These projects range from software that allows HRT's Financial Department to efficiently collect and record revenue, to infrastructure at HRT facilities that allows live feeds from camera systems to be transmitted to the HRT control center and local law enforcement to keep HRT passengers safe.

5.4.1 Technology Capital Needs

HRT has a wide range of technology needs that have historically been challenging to fund due to the limited amount of eligible funding sources. Technology projects fall into the state's lowest capital matching tier. Moreover, federal funding for technology projects is largely limited to 5307 Formula Funds. Below is a list of capital projects related to technology. Most of these initiatives are not directly tied to supporting the service expansion recommended in the TDP but critical none-the-less for HRT service. Over the next ten years the agency has identified $41.1 million in technology capital needs (**Table 5-22**).

Table 5-22 | Technology Capital Needs ($1,000s)

Project Name	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
HASTUS	1,100	0	0	0	0	0	0	0	0	**1,100**
HASTUS (Upgrade)	0	0	0	1,101	0	0	0	0	1,101	**2,202**
Bus CAD AVL System Upgrades	1,459	0	0	0	0	0	0	0	0	**1,459**
Large Technology Infrastructure	611	0	0	0	1,539	0	0	0	0	**2,150**
Technology Hardware, Mobile and Network Equipment	1,161	21	105	21	22	0	0	0	0	**1,330**
Bus Technology Fare Payment Upgrade	0	0	3,165	0	0	0	0	0	0	**3,165**
IT Network Security	1,087	0	0	0	0	0	0	0	0	**1,087**
Passenger Information Displays - Bus Facilities	0	614	0	0	0	0	0	0	0	**614**
Passenger Information Displays - Light Rail	0	1,704	0	0	0	0	0	0	0	**1,704**
Onboard Wi-Fi	0	0	844	0	0	0	0	0	0	**844**
Audio Monitoring System (Phone + Control Room)	356	0	0	0	0	0	0	0	0	**356**
Mobile Vault System	662	0	0	0	0	0	0	0	0	**662**
Financial Information Software	750	0	0	0	0	0	0	0	0	**750**
Financial Information Software (Upgrade)	0	0	0	1,235	0	0	0	0	1,235	**2,470**
PeopleSoft HCM (Upgrade)	1,222	0	0	0	0	0	1,222	0	0	**2,443**
Real-Time System	0	0	0	0	0	0	0	0	0	**0**
Real-Time System (Upgrade)	0	0	0	0	1,640	0	0	0	0	**1,640**
IVR Phone System Upgrade	407	0	0	0	0	0	0	0	0	**407**
Transit Asset Management System (Upgrade)	0	0	0	2,274	0	0	0	0	2,274	**4,547**
Transportation Statistics Database	412	0	0	0	0	0	0	0	0	**412**
Upgrade the Video Recording Equipment for Buses	0	6,012	0	0	0	0	0	0	0	**6,012**
Upgrade the Video Recording Equipment for Light Rail	0	0	0	111	0	0	0	0	0	**111**
Mobile Ticketing Phase II	0	0	0	0	0	0	2,377	2,472	0	**4,849**
Cellular Modem and Access Points	0	0	0	0	0	0	374	389	0	**762**
Total	**9,226**	**8,350**	**4,114**	**4,742**	**3,201**	**0**	**3,972**	**2,861**	**4,610**	**41,076**

HASTUS Upgrades

HASTUS is software that HRT's Service Planning and Operations departments uses to create bus schedules, construct bus runs, and schedule operators. It also is used to geographically locate and analyze routes and bus stops, and monitor the performance of the system. It allows staff to make better decisions in scheduling and daily operations/dispatch. The agency needs to upgrade the system on a four-year interval.

Transit Master CAD AVL

Automatic Vehicle Locators (AVL) and Automatic Passenger Counters (APC) are used by HRT's Operations, Planning, and Safety and Security

departments to monitor and enhance the HRT system. The existing equipment for the TransitMaster CAD-AVL system was installed on vehicles and at radio tower sites in 2007, and is reaching the end of its useful life. Other real-time arrival information projects depend on this investment in order to be implemented.

While new buses will be procured with up-to-date CAD-AVL systems, the agency needs to fund the replacement of CAD-AVL systems on buses not slated for replacement in the next four years. Without these systems in place, HRT will not be able to accurately provide customers real-time information.

Large Technology Infrastructure

This project upgrades or remodels larger IT systems and facilities in order to handle current and future technology needs at HRT facilities. It includes a variety of investments such as the build out of a private WAN build-out, new network switches and routing, and fiber optic cabling.

Mobile Hardware and Network Equipment.

Technology hardware, mobile computing and network infrastructure equipment are integral to the efficiency of HRT's transit system and employees. Multiple HRT departments have expressed the need for tablets and replacement hardware to aid in their operations. For example, bus supervisors need equipment to help them monitor the system and ridership data collection staff need devices to collect data in the field. This initiative includes upgrades to the agency's WiFi system, firewall upgrades, phone system upgrades, and virtualization of key software systems.

Bus Technology and Fare Payment Upgrade

This project will upgrade backend systems and fareboxes to transition the agency to a next-generation "fast fare" system that incorporates mobile payment options. These investments will allow customers to pay fares with their phone instead of relying on cash and paper tickets.

IT Network Security

This project covers capital investments intended to address IT security vulnerabilities at the agency and is crucial to reduce risk exposure and business continuity. The project has a series of software and hardware investments intended to identify, detect, monitor, and prevent IT threats.

Real-Time Systems

These projects, along with the Automatic Vehicle Locators/Automatic Passenger Counters (AVL/APC) devices in project, will also allow HRT to provide a real-time data feed to its website, to mobile applications, and to automatic displays at transit facilities.

Onboard Wi-Fi

Wi-Fi on HRT vehicles would enable customers to connect to the internet while travelling. Additional comforts like these would encourage customers to choose HRT services over other modes of transportation.

Audio Monitoring System

This Audio Monitoring System would help HRT to investigate customer service complaints and assist the police in investigating incidents, potentially reducing HRT's liability for those events.

Financial Information Software Upgrade

A financial information software package will allow HRT to efficiently and effectively manage its current and future financial needs, including financial accounting, purchasing, cash and revenue management, and other core functions. Project IT1610 completes an ongoing implementation of this software package, while project IT1699 would upgrade the suite again in approximately five years.

Human Capital Management (HCM) Software

This investment would upgrade HRT's human resources software system on the recommended four-year interval. This system is critical for the agency and is used by nearly every part of the agency for basic business functions.

Interactive Voice Response (IVR) Phone System Upgrade (IT2099)

This project will replace the existing IVR system as the current system will soon no longer be supported. IVR phone systems automate HRT's telephone network and reduce the number of operators needed while making the system accessible for those with auditory disabilities.

Transit Asset Management System Upgrade

This project would upgrade HRT's transit asset management system within the recommended four-year interval to ensure the agency has an up-to-date system.

North Side Data Center

Northside Datacenter is the oldest datacenter at HRT. Existing emergency power delivery and distribution system is shared with other generator-backed systems and thus is capacity constrained. Uninterruptible power supply system deployed is undersized for the load. This data center is equipped with out-of-date fire suppression with system that can no longer be integrated into modern building fire monitoring systems. The cooling system is poorly arranged without a proper use of "cold" and "hot" isles leading. All existing equipment racks are occupied, there is little to no physical growth capacity.

5.4.2 Technology Capital Funding

Due to a lack of funding, HRT has historically been unable to fully fund its IT needs. To address the backlog, technology investments are a cornerstone of the agency's six-year fiscally constrained capital plan. A number of critical state-of-good repair investments in technology hardware and software is expected to move forward, including replacement of Bus CAD AVL Systems, completion of Financial Services software, upgrade of HASTUS scheduling software and PeopleSoft HCM, replacement of video recording equipment on buses, and investments in both mobile hardware and large technology infrastructure. Along with these investments, HRT plans to implement mobile payment and real-time information.

Table 5-23 | Bus CAD AVL Systems Funding

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**506**
State	2019	86
ACC (Local)	2019	420
FY2020 Funding Need		**580**
Federal 5307	2019	464
ACC (Local)	2020	116
FY2021 Funding Need		**591**
Federal 5307	2020	472
ACC (Local)	2021	118

Table 5-24 | Bus Video Recording Equipment Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**1,782**
State	2019	303
ACC (Local)	2019	1,479
FY2020 Funding Need		**1,399**
Federal 5307	2019	1,120
ACC (Local)	2020	280
FY2021 Funding Need		**1,425**
Federal 5307	2020	1,140
ACC (Local)	2021	285
FY2022 Funding Need		**1,450**
Federal 5307	2021	1,160
ACC (Local)	2022	290

Table 5-25 | Light Rail Video Recording Equipment

Grant	Grant Year	Expected Funding ($1000s)
FY2022 Funding Need		**111**
Federal 5337	2021	88
ACC (Local)	2022	23

Table 5-26 | Large Technology Infrastructure

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**611**
State	2019	208
ACC (Local)	2019	24
Federal 5307	2018	379
FY 2023 Funding Needs		**1,539**
ACC (Local)	2023	308
Federal 5307	2022	1,231

Table 5-27 | Financial Information Software

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**750**
Sale of Assets	2019	750

Table 5-28 | Financial Information Software Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2022 Funding Need		**1,235**
Federal 5307	2021	988
ACC (Local)	2022	247

Table 5-29 | PeopleSoft HCM Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**1,222**
State	2019	208
ACC (Local)	2019	49
Federal 5307	2018	965

Table 5-30 | HASTUS Scheduling Software Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**1,120**
State	2019	190
ACC (Local)	2019	929
FY2022 Funding Need		**1,182**
Federal 5307	2021	946
ACC (Local)	2022	236

Table 5-31 | Technology Mobile Hardware, and Network Equipment

Grant	Grant Year	Expected Funding ($1000s)
FY2020 Funding Need		**1,202**
State	2019	962
ACC (Local)	2020	240
FY2021 Funding Need		**105**
Federal 5307	2020	84
ACC (Local)	2021	21
FY2022 Funding Need		**21**
Federal 5307	2021	17
ACC (Local)	2022	4
FY2023 Funding Need		**22**
Federal 5307	2022	17
ACC (Local)	2023	4

Table 5-32 | Bus Fare Payment Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2021 Funding Need		**3,165**
Federal 5307	2020	2,532
ACC (Local)	2021	633

Table 5-33 | IT Network Security

Grant	Grant Year	Expected Funding ($1000s)
FY2019 Funding Need		**1,087**
Federal 5307	2018	397
ACC (Local)	2019	505
State	2019	185

Table 5-34 | Real-Time Systems Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2023 Funding Need		**1,640**
Federal 5307	2022	1,312
ACC (Local)	2023	328

Table 5-35 | Transit Asset Management System Upgrade

Grant	Grant Year	Expected Funding ($1000s)
FY2024 Funding Need		**2,356**
Federal 5307	2022	14
Federal 5307	2023	1,871
ACC (Local)	2024	471

(Page Intentionally Left Blank)

6 Financial Plan

This Financial Plan outlines the anticipated operating and capital costs associated with Hampton Road Transit's Transit Development Plan (TDP). The purpose of developing a financial plan is twofold: it allows the agency to determine how much service and how many of the TDP recommendations can be funded in the constrained operating plan, and it provides the agency and State with a forecast of the operating and capital funding needs necessary to support those transit services. On an annual basis, HRT develops a forecast of operating revenue and costs as part of its Capital Improvement Program. These six-year outlooks are the basis for the financial plan for the years FY2018 to FY2024. After these years, a simplified projection forecasts the agency's operating needs. While no capital revenue forecast has been developed for these later years, HRT does provide a high-level assessment of capital needs based on reoccurring fleet and technology needs.

6.1 ASSUMPTIONS

HRT conducted an analysis of capital and operating funding trends to prepare their budgeting forecasts for FY2019 to FY2024. These forecasts serve as the basis of the first six years of this TDP's financial plan. The financial plan projects operating costs and revenue by three percent per year after FY2024. HRT plans to update its six-year funding outlook annually, which will result in further refinement of the out years of the financial plan.

The following summarizes, in greater detail, the assumptions made by HRT to develop financial forecasts.

6.1.1 Operating Revenue

Federal Funding

The only federal funding sources at HRT's disposal for operations are Section 5307 and Section 5337 formula funds. These funds are intended for capital, but are permitted for use on certain operating expenditures, including the capital cost of contracting, Americans with Disabilities Act of 1990 (ADA) costs, and the cost of preventative maintenance. The financial analysis looks at the total amount of eligible preventative maintenance expenditures to determine the share of formula funds that will be used for capital. As a policy, HRT will not flex more than 87.5 percent of 5307 and 90 percent of 5339 funds to operating; in none of the years are HRT's formula-fund eligible operating expenditures expected to be lower than this maximum.

The total amount of available formula funds is based on HRT's current apportionment of formula funds. The agency forecasts federal formula revenue to grow by 1.9%. This escalation reflects HRT's expected share of future federal formula fund revenue based on FAST Act, as well as the growth rate for the Virginia Beach Metropolitan Statistical Area (MSA) between the 2000 and 2010 census.

In FY2021, HRT expects to see a $1 million increase in 5337 State of Good Repair revenue as the Tide Light Rail will become eligible for additional formula funds.

State Funding

HRT has forecasted state operating revenue based on forecasts provided by DRPT of its future budget for operating assistance.[72] The model assumes HRT will continue to maintain a consistent share of statewide transit revenue hours; the only exception to this

[72] Virginia *Department of Rail and Public Transportation. Six-Year Projection of Rail and Public Transportation Improvement Program.* http://www.drpt.virginia.gov/media/2146/fy18-final-syip-june-with-page.pdf

assumption is the opening of Silver Line Phase II, which will reduce HRT's share of state funds by five percent.

For future service improvements, the model assumes state funding will grow relative to the baseline in proportion to the change in revenue hours.

Fare Revenue

Based on historic ridership trends, HRT expects fare revenue to grow by 1.1 percent a year, except for FY2021 when HRT plans to implement a $0.25 cent fare increase which is expected to yield a 3.1 percent increase in total fare revenue.

Fare revenue for new service recommendations are assumed to follow the farebox recovery rate of the baseline model.

Non-Operating Revenue

Non-operating revenue includes all non-fare directly-generated sources of funding. Non-operating revenue includes Transportation Demand Management (TDM) funding, Unified Planning Work Program (UPWP) funds, advertising revenue, revenue from the Elizabeth River Crossing initiative, sale of assets, and non-reoccurring revenue. These funds are expected to grow by an average of 0.6 percent a year.

Local Funds

Based on HRT's cost-allocation agreement, local jurisdictions are a payer-of-last resort and fund the gap between operating costs and all other revenue sources. Each jurisdiction's share of funding is based on the proportion of service operated within its boundaries. In the case of light rail, Norfolk is responsible to fund the local share of operations in its entirety.

The model assumes that local funding will grow by 2.5 percent a year.

Other/Unidentified

The operating budget has a final line item called "Funding Source Unidentified". This amount may be covered by increases in state funding or local contributions. A share of this category consists of Norfolk's contribution to light rail. While that contribution will grow as the preventative maintenance needs of the system increases over time, no final agreement has been made between HRT and the City of Norfolk to determine the final amounts.

Likewise, a large portion of this category may be funding through state revenue. The Virginia Department of Rail and Public Transportation's (DRPT) guidance calls for agencies to assume a three percent increase in state revenue per year. HRT has utilized a much more conservative estimate to more accurately forecast operating revenue.

6.1.2 Operating Expenses

Baseline Forecasts

Operates costs, including administrative expenses, are fully allocated to the four modes operated by HRT: Bus, Ferry, Light Rail, and Paratransit. The baseline budget is built upon FY2017 operating costs. Operating costs are escalated based on a number of factors, including increase in general expenditures (1.9 percent), labor and fringe benefits (2.5 percent), healthcare (6.8 percent), and certain modal specific items (2.5 percent). For modes operated by a third party (e.g., paratransit), the cost escalations in the contract are also used to determine the change in operating costs over time. The growth rates for these areas are derived from an internal budget analysis conducted by HRT.

Except for paratransit, the amount of revenue hours operated by mode will stay flat in the baseline projection. Paratransit revenue hours have grown, and are assumed to continue to grow, by three percent per year. This growth is a result of the ongoing trend of an ever-increasing demand for paratransit service throughout the HRT service area. Moreover, due to an expansion in the paratransit fleet size to accommodate for the growth in ridership, insurance and liability costs are expected to increase in FY2021 and FY2022, contributing to an additional growth in paratransit operating costs.

Cost of Constrained Recommendations

The cost of service improvements was calculated based on an hourly cost for bus service of $93.45 (there were no recommendations impacting the other modes of service). The hourly cost was then applied to the net change in revenue hours to calculate the cost of each TDP recommendation.

Operating costs for TDP recommended service changes are escalated based on the same rates as those used in the baseline budget.

6.1.3 Capital Revenue

Federal Funds

HRT's capital budget includes federal funding through the formula grant program, as well as Congestion Management and Air Quality (CMAQ) and Regional Surface Transportation Program (RSTP) grants. Formula funding forecasts are based on current levels and are escalated by 1.8 percent per year. The amount of formula funds available for capital investments and improvements are calculated as the remainder of funds after all eligible operating expenditures are deducted from the formula fund total value. Federal formula funds are programmed to capital projects based on each funding source's eligibility requirements.

CMAQ and RSTP funds are allocated to HRT through the Hampton Roads Transportation Planning Organization (HRTPO). These funds are projected out to FY2024 and already assigned to specific capital needs.

State Funding

HRT receives state funds in the form of matching grants. The percentage of a project that Virginia will fund varies based on the type of project and year of funding through FY2024 (**Table 6-**). HRT's TDP and Capital Improvement Plan (CIP) follow DRPT's latest guidance on future capital grant matching rates. Rates after FY2019 are subject to change due to a host of funding unknowns, including what revenue sources will replace state bond revenue set to expire in FY2019.

Table 6-1 | Projected State Capital Matching Rates by Tier and Fiscal Year

Tier	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
1: Rolling Stock	68.0%	68.0%	68.0%	49.0%	49.0%	49.0%	27.0%
2: Facilities/ Right-of-Way	34.0%	34.0%	18.0%	-	-	-	-
3: Other	17.0%	17.0%	-	-	-	-	-

Local Funding

The local jurisdictions served by HRT provide an Advanced Capital Contribution (ACC) to support ongoing capital needs. This funding is largely used to match state and federal grants with the required local dollars. The ACC funding is presently set at two million dollars in new funding per year; in FY21, HRT will increase its ask from the local jurisdictions to a total of two and a half million dollars per year. Outside of ACC, the Norfolk Tide Light Rail is funded in part from contributions from the City of Norfolk. The capital budget forecasts show ACC funding in the year those dollars are expected to be obligated toward grants, not in the year they become available. This results in totals that do not necessarily match the annual contribution due to the timing between when funds become available and when they are spent.

Other Funding

HRT has two additional sources of capital funding that fall outside the above categories. In FY2019 the agency plans to complete the sale of its retired ferry boats, netting HRT $750,000 in capital revenue for new capital investments. After FY2022, HRT will begin receiving

capital funding as part of the Elizabeth River Crossing (ERC) initiative; these funds are intended for the repair and replacement of ERC buses.

6.1.4 Capital Expenses

Identifying Capital Needs

HRT's constrained capital needs were collected through the agency's CIP, a process that includes having HRT's internal departments access their capital needs and submit requests annually. The cost of each need was determined based on feedback from project managers. Once the capital inventory was complete, the needs were prioritized based on a scoring system that captures each project's impact on:

- Service delivery and the customer experience;
- Efficiency and effectiveness of agency operations;
- State of good repair; and
- Exposure to risk.

The final prioritization is used to decide which capital projects receive the limited capital funding available. The final capital budget is contained within the projected available capital revenue. *HRT's FY2019-FY2024 Capital Improvement Program* contains additional details on the methodology used to capture capital needs.

HRT has estimated its capital needs after FY2024 at a much higher-level; due to the lack of a detailed inventory for the out years of the TDP, the capital budget only captures predictable expenditures like vehicle procurement and technology maintenance needs. These out years also include any investments needed to support the unconstrained service plan. None of the capital needs identified after FY2024 are included in the constrained capital plan as no revenue projects were developed for this period.

Capital Cost Escalation

Capital project costs are escalated to reflect year-of-expenditure-dollars. Non-construction project costs are inflation rates are pegged to the average change in the Bureau of Labor Statistics Consumer Price Index (CPI) between 2007 and 2017[73]. Construction costs are escalated by the average growth rate (2.9 percent) in construction costs in the Virginia Beach MSA between 2006 and 2016[74].

6.2 OPERATING FORECAST

6.2.1 Baseline Budget

The baseline budget represents the anticipated funds associated with the existing system if no changes are made to service levels. As detailed in the assumptions, these forecasts are based on existing cost and revenue trends and do not capture the nuances of the annual budgeting process. The major trend in the baseline budget is that HRT's operating costs (**Table 6-2**) are continuing to grow faster than operating revenues (**Table 6-3**). Over the next six-years, operating costs are projected to grow by three percent on average, while operating revenues are to grow only by two percent.

[73] Bureau of Labor Statistics, *Consumer Price Index - South Urban*, 2007-2017

[74] RSMeans *Construction Cost Index*. Norfolk Metropolitan Area and Hampton Metropolitan Area combined average. 2006-2016.

Table 6-2 | 10-Year Projection of Baseline Operating Costs ($1,000s)

Operating Expenses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Bus	75,086	77,086	79,081	81,142	83,270	85,471	88,035	90,676	93,396
LRT	11,685	11,998	12,322	12,657	13,004	13,363	13,764	14,177	14,602
Paratransit	16,586	17,368	18,190	19,308	20,516	21,798	22,451	23,125	23,819
Ferry	1,571	1,600	1,630	1,661	1,692	1,724	1,776	1,829	1,884
Expenses Total	**104,928**	**108,053**	**111,224**	**114,768**	**118,483**	**122,355**	**126,026**	**129,807**	**133,701**

FY2025-FY2027 based on a straight-line forecast

Table 6-3 | 10-Year Projection of Baseline Revenue ($1,000s)

Operating Revenue	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Farebox	16,071	16,245	16,759	16,951	17,145	17,342	17,862	18,398	18,950
Federal Funds	15,715	16,132	17,416	17,860	18,318	18,791	19,355	19,935	20,533
State Funds	19,222	19,226	19,485	18,425	18,689	18,884	19,450	20,034	20,635
Non-Operating Revenues	5,037	5,078	5,120	5,162	5,193	5,187	5,343	5,503	5,668
Local Funds	45,363	46,498	47,660	48,851	50,073	51,325	52,864	54,450	56,084
Identified Revenue Total	**101,409**	**103,178**	**106,440**	**107,250**	**109,418**	**111,528**	**114,874**	**118,321**	**121,870**
Unidentified Funding	3,519	4,875	4,784	7,518	9,065	10,827	11,151	11,486	11,831

FY2025-FY2027 based on a straight-line forecast

HRT's operating cost growth is in line with DRPT guidance and driven by many factors such as healthcare and fringe-benefit liabilities that are largely fixed. Paratransit is the only mode anticipated to experience operating cost growth of greater than three percent; this is due to the long-term trend of greater paratransit demand.

While operating costs are expected to grow at a consistent rate, revenues are forecasted to vary considerably by source and year. Several trends impact the growth of HRT's known future revenue:

- Fare revenue is expected to grow at only 1.1 percent per year, the rate of long-term ridership growth, except for FY2020 when a $0.25 fare increase goes into effect. The agency needs to strike a balance between increasing fares to generate revenue and providing users a cost-effective transportation service. The agency cannot enact large fare increases without reducing ridership, which in turn would reduce any revenue benefits from higher fares.
- Federal revenue is expected to grow by only 1.8 percent. This rate is determined by federal transportation funding, as well as demographic trends in the Virginia Beach MSA, which are outside of HRT's control.
- Based on the latest guidance by DRPT, the total value of state transit operating assistance statewide will grow by less than one percent per year over the next six years. HRT's share of this revenue will decline as other transit initiatives in Virginia, such as the completion of Dulles Metrorail Extension Phase II, will reduce HRT's total share of transit service in the Commonwealth.
- Local jurisdictions face their own budgetary challenges and have limited capacities to grow their operating assistance for HRT. In recent years

the agency has worked to constrain the local contributions growth to 2.5 percent.

The result of costs growing faster than revenue is that HRT has a projected funding gap that the agency will have to address through an as of yet to be determined cost savings and/or additional revenues. There are several measures that could also help address this budget gap in both the short and long term:

- **A full accounting of local share obligations:** One major source of operating revenue not being fully accounted for in the baseline projections is the City of Norfolk's obligation to fund the local share of the Tide Light Rail's preventative maintenance costs. HRT's cost-allocation agreement assumes that the Tide will not use federal resources beyond those generated by the service's own revenue hours. The Tide does not generate enough 5337 or 5307 federal formula funds to fully cover its forecasted preventative maintenance needs. While the City of Norfolk will be responsible for covering those costs, no funding agreement has been reached between the City and HRT at this time, so those additional revenues are not reflected in the baseline budget.
- **Increase in State Operating Assistance:** While DRPT guidance calls for three percent increases in operating assistance per year, the reality is that flat state revenues combined with greater needs in Northern Virginia have resulted in HRT receiving a declining share of operating assistance from the state. Even a modest increase in state assistance will reduce pressures on HRT's operating budget.
- **Reduction in Operating Costs:** On the cost side, these forecasts are based on historic trends and do not fully reflect the work being done at HRT to contain operating costs. While the FY2019 proposed budget is still under development, the agency expects to be able to deliver a balance budget without resulting to cuts in service. HRT is working to address its labor costs and find additional savings where possible. The large number of bus replacements planned for FY2018, FY2019, and FY2020 should reduce agency maintenance expenditures. Other capital projects like investments in IT systems and the renovation of the Northside headquarters should lead to additional efficiency gains.
- **Achieving a Dedicated Funding Source:** While the agency is working to deliver a balance budget, in the long-run HRT recognizes the unsustainability of having operating revenues that grow slower than costs (and inflation). The agency sees obtaining a dedicated funding source as critical to achieving a sustainable and predictable operating budget.

6.2.2 Constrained Service Recommendations

Due to funding limitations, the majority of TDP recommendations included in the constrained operating plan (**Table 6-4**) are either cost neutral, result in a cost savings, or are tied to future sources of operating revenue (**Table 6-5**). In FY2019, the recommendations will result in a modest cost savings for the agency. These improvements are focused on making existing routes more efficient and should not have a measurable impact on service levels for riders. In FY2020, HRT will implement a service expansion in Virginia Beach. While no formal funding commitment has been obtained, the service improvements in FY2020 assumes local contributions will support the full cost of operating the proposed Route 24.

In FY2021, some additional modest service expansion would occur which will be largely offset by service efficiency improvements conducted in FY2019.

The fiscally constrained operating plan does not include any service enhancements after FY2021. The lack of additional revenue for service improvements, coupled with funding uncertainty, limits the agency's ability to implement any large-scale service improvements. Moreover, the capital budget does not have the

resources to support an increase in the agency's fleet size.

The recommendations will lead to a modest increase in paratransit operating costs in FY2019 and FY2020 due to an increase in service area and service span that will increase the number of paratransit eligible customers. Service changes in FY2021 should counteract the increase in paratransit service area generated in the previous two fiscal years.

Table 6-4 | 10-Year Operating Costs Associated with Fiscally Constrained Service Recommendations ($1,000s)

Recommendations – Operating Expenses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Bus	-364	2,418	2,958	3,035	3,114	3,195	3,368	3,573	3,680
LRT	0	0	0	0	0	0	0	0	0
Paratransit	11	141	0	0	0	0	0	0	0
Ferry	0	0	0	0	0	0	0	0	0
Total	**-353**	**2,559**	**2,958**	**3,035**	**3,114**	**3,195**	**3,368**	**3,573**	**3,680**

FY2025-FY2027 based on a straight-line forecast

Table 6-5 | 10-Year Operating Revenue Associated with Fiscally Constrained Service Recommendations ($1,000s)

Recommendations - Revenues	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Farebox	-54	385	446	448	451	453	477	506	522
State Operating Assistance	-65	469	542	556	570	585	617	655	674
Federal Operating Assistance	0	0	0	0	0	0	0	0	0
Local Contributions		1,866	1,970	2,031	2,093	2,157	2,274	2,412	2,485
Total	**-119**	**2,720**	**2,958**	**3,035**	**3,114**	**3,195**	**3,368**	**3,573**	**3,680**

Unfunded Service Improvements

Due to the lack of funding, none of the TDP service recommendations proposed after FY2021 are infeasible without additional operating revenue and capital support for fleet expansion. The unfunded needs (**Table 6-6**) largely consist of proposed expansion of bus service, including the phase-in of the high-frequency bus network. This major service expansion would yield a very small increase in paratransit service as the enhancements will have little impact on service area size. HRT is committed to working with its partners to identify strategies for funding further service improvements; moreover, the agency has a long-term goal of obtaining a dedicated funding source which would enable such service improvements.

Table 6-6 | Unfunded Operating Costs Associated with TDP Recommendations ($1,000s)

Operating Expenses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Bus	0	0	0	4,852	8,024	11,066	13,055	17,293	40,435
LRT	0	0	0	0	0	0	0	0	0
Paratransit	0	0	0	42	70	71	72	73	74
Ferry	0	0	0	0	0	0	0	0	0
Unfunded Total	**0**	**0**	**0**	**4,894**	**8,094**	**11,137**	**13,126**	**17,366**	**40,509**

6.3 CAPITAL FORECAST

Through HRT's annual CIP process, the agency has developed a six-year capital revenue forecast (**Table 6-7**), along with a fiscally constrained capital program (**Table 6-8**). The constrained capital budget presented below only covers the first six years of the TDP (FY2019 to FY2024). Because of the high amount of funding uncertainty, the agency is unable to create a constrained capital budget with a high degree of confidence after this time frame.

An unconstrained capital budget (**Table 6-9**) is also presented that included all capital needs associated between FY2019 and FY2027. The capital needs after FY2024 are based on a lower level of detail and only include either investments that are necessary to support the unconstrained operating plan or investments like fleet or software replacements that occur on a set interval. The unconstrained plan does not capture all the necessary state of good repair investments the agency expects to face over the next ten-years. HRT is in the process of completing a Transit Asset Management (TAM) plan which should provide the agency additional detail on state of good repair investments.

Over the next ten-year period, HRT has identified $354 million in capital investment needs. The first six-years of the plan are derived directly from the agency's capital improvement plan and focuses primarily on state of good repair investments. Based on forecasts of future capital revenue, the agency expects to receive $134 million in capital funds over the next six years. These funds are to be allocated to the agency's most critical needs as identified in the CIP.

The largest share of the capital program are vehicle related expenditures, with 74 percent of future capital revenues allocated to fleet needs in the fiscally constrained capital plan. HRT expects to have enough revenue to meet the replacement and repower needs of its current bus and paratransit fleet. In addition, starting in FY2021, HRT plans to begin expanding the paratransit fleet by up to 50 percent to accommodate the ongoing growth of paratransit ridership.

The remaining funds will be split between technology, facilities, safety security investments, and other investments (e.g., Tide guideway state of good repair projects, operating equipment). Notably, the capital program does not include much funding for any initiatives that expand service capacity or provide the agency with new operating capabilities. Instead these investments are targeting the core needs that the agency depends for day-to-day operations (e.g., maintenance of technology infrastructure and investments in core maintenance of HRT owned facilities).

One important thing to note is HRT's capital budget faces a high degree of uncertainty and instability. The two largest sources of capital funding, state and federal revenue, are largely outside the control of the agency and subject to large changes in amounts based on factors like state bond market and federal legislation.

Table 6-7 | Capital Revenues by Source and Year ($1,000s)

New Capital Revenue	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Federal Formula Funds	6,755	6,854	6,173	7,161	6,295	6,475
Local Funding (ACC)	4,100	2,412	2,427	2,573	2,500	2,500
RSTP/CMAQ	6,646	8,622	10,871	5,781	1,922	9,773
State Funding	12,803	7,794	2,707	4,172	3,893	1,382
Other	750	0	0	0	446	0
Total	**31,054**	**25,681**	**22,177**	**19,688**	**15,057**	**20,130**

Table 6-8 | Constrained Capital Expenditure by Type ($1,000s)

New Capital Uses	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Vehicles	23,502	19,214	16,734	14,296	10,314	14,893
Facilities	0	2,742	0	612	1,542	2,881
Technology	4,208	1,782	3,861	2,439	3,201	2,356
Safety Security	1,782	1,399	1,425	1,674	0	0
Other	1,563	544	157	667	0	0
Total	**31,054**	**25,681**	**22,177**	**19,688**	**15,057**	**20,130**

Table 6-9 | Sum of Capital Needs by Project Type ($1,000s)

Unconstrained Capital Needs	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Safety Security	662	0	0	0	0	0	0	0	0
Amenities	750	750	750	2,951	1,123	825	0	0	0
Facilities	8,873	4,544	2,712	10,350	7,359	77,018	204	0	0
Other	1,415	1,154	840	221	9,243	56	0	0	0
Safety Security	153	7,491	454	223	0	0	0	0	0
Technology	9,379	2,338	4,114	4,631	3,201	0	3,972	2,861	4,610
Vehicles	30,162	19,957	19,121	13,499	9,574	17,864	30,482	36,625	1,352
Grand Total	**51,394**	**36,233**	**27,991**	**31,875**	**30,501**	**95,762**	**34,658**	**39,485**	**5,962**
Unmet Need	*20,340*	*10,552*	*5,814*	*12,187*	*15,444*	*75,632*	*34,658*	*39,485*	*5,962*

**As HRT's detailed Capital Need Inventory extends only to FY2024, FY2025 to FY2027 captures only fleet needs and long-range IT initiatives.*

(Page Intentionally Left Blank)

Appendix A: Peer Review

The Hampton Roads Transit (HRT) Transit Development Plan (TDP) peer review analyzes operating characteristics against those of peer transit agencies with comparable service areas, operating characteristics, and several other factors. This analysis will be utilized to gauge the performance of HRT as compared to that of selected peers as a gauge of how the agency compares to similar agencies.

This assessment compares HRT with five transit agencies located in Florida, California, and Ohio. Contrasted metrics are:

- Urbanized and service area square mileage, population, and density;
- Transit service provided;
- Transit vehicles available;
- Vehicle revenue miles and hours;
- Total ridership and ridership per revenue mile and hour;
- Farebox recovery;
- Subsidy per passenger; and
- Funding sources of operating and capital expenses.

All statistics presented in this analysis are derived from the National Transit Database's (NTD) dataset for Fiscal Year (FY) 2015, the most recent year for which annual data was available at the time of publication. While each agency, including HRT, has several available transit modes, this analysis focuses solely on local bus transit service.

A.1 PEER SELECTION PROCESS

Peers were selected based on a comparison of the service area – population, square mileage, and population density; operating expenses; annual unlinked trips; vehicles in peak service; and vehicle revenue miles and hours.

Agencies were given a composite score calculated by totaling the number of numerical metrics falling within 25 percent (above or below) of HRT's statistics. This comparison, along with input from HRT staff, found the highest scoring peers to be:

- Pinellas Suncoast Transit Authority (PSTA), Pinellas County, Florida;
- Jacksonville Transportation Authority (JTA), Jacksonville, Florida;
- Central Ohio Transit Authority (COTA), Columbus, Ohio;
- Sacramento Regional Transit District (RT) Sacramento, California; and
- OmniTrans, San Bernardino, California.

The peer review utilizes these selected peer agencies to compare and contrast their various operating characteristics with those realized by HRT in FY 2015.

A.2 PEER ANALYSIS

A.2.1 Urbanized Area and Service Area Characteristics

The peer review first contrasts the urbanized areas (UZA) and service areas for each agency to review of the scale of operations for which each agency is responsible. **Table A-1** details the urbanized area and service area characteristics for HRT and each of the five peer agencies.

The Virginia Beach, Virginia UZA, which encompasses HRT's service area, has a population approximately of 1,439,666, 16 percent below the peer average. In addition, its square mileage is nearly 15 percent below the peer average. Of the peers, JTA, which operates in Jacksonville, Florida has the lowest UZA population (1,065,219), while the Tampa-St. Petersburg (Pinellas County), Florida UZA, served by PSTA, has the highest (2,441,770).

The Jacksonville, Florida UZA also reports the lowest population density (2,009 residents per square mile), while the Sacramento, California UZA is the densest of all peer UZAs (3,660 residents per square mile). In comparison, the Virginia Beach, Virginia UZA is approximately three percent less dense than the peer average.

Shifting to service area population, located in San Bernardino, California, OmniTrans serves 1,455,086 residents, the largest total of all peers in this category. PSTA serves the smallest constituency (944,553). The size of HRT's service area population (1,143,932) is nearly four percent higher than the peer average.

Finally, JTA serves the largest service area in terms of square miles, and also reports a service area square mileage larger than that of its corresponding UZA (798 square miles versus 530 square miles, respectively). On the other hand, RT serves the smallest service area, at 231 square miles. HRT's service area size (431 square miles) is approximate to the peer average (435 square miles).

Table A-1 | Peer Service Area Characteristics

Agency	Urbanized Area				Service Area	
	Name	*Population*	*Square Miles*	*Population Density*	*Population*	*Square Miles*
HRT	**Virginia Beach, VA**	**1,439,666**	**515**	**2,793**	**1,143,932**	**431**
RT	Sacramento, CA	1,723,634	471	3,660	1,035,779	231
PSTA	Tampa-St. Petersburg, FL	2,441,770	957	2,552	944,553	348
JTA	Jacksonville, FL	1,065,219	530	2,009	1,001,311	798
COTA	Columbus, OH	1,368,035	510	2,680	1,081,405	337
OmniTrans	Riverside-San Bernardino, CA	1,932,666	545	3,546	1,455,086	463
Peer Group Analysis						
Low	**N/A**	**1,065,219**	**471**	**2,009**	**944,553**	**231**
High		**2,441,770**	**957**	**3,660**	**1,455,086**	**798**
Average		**1,706,265**	**603**	**2,889**	**1,103,627**	**435**

A.2.2 Transit Modes Provided

Another way to compare peer agencies is to review the transit modes that each operates in daily service. As each agency provides local bus service, **Table A-2** summarizes the transit modes provided by each agency other than local bus.

HRT provides four services in addition to local bus (light rail, ferry, demand response, and vanpool), thereby surpassing the total modes of any of the peer agencies. All of the peer agencies provide demand responsive service. Two agencies, in addition to HRT, provide Light Rail / Monorail services (RT and JTA). Similar to HRT, JTA offers ferry service, the only other peer agency to provide this transit mode. PSTA offers two modes of service that no other agency in this peer review provides, commuter bus and taxi services.

Table A-2 | Peer Transit Modes Provided

Agency	Commuter Bus	Light Rail/ Monorail	Ferry	Demand Response	Vanpool	Taxi
HRT		X	X	X	X	
RT		X		X		
PSTA	X			X		X
JTA		X	X	X		
COTA				X		
OmniTrans				X		

A.2.3 Operational Statistics Analysis

The operational statistics of each agency were compared in terms of peak vehicles, vehicle revenue miles, vehicle revenue hours, vehicle revenue miles per peak vehicle available, and vehicle revenue miles per vehicle revenue hour. With agencies' funding resources allocation in mind, these statistics outline the level of service that each agency is capable of providing. **Table A-3** illustrates the operational statistics for HRT and each of its selected peer agencies.

HRT maintained both a higher number of vehicles available (267) and operational (236) during peak service than the peer averages for either metric. Of all peer agencies, JTA had the fewest number of vehicles in each of these categories; COTA maintained the most in each category. HRT also reported 17 percent more vehicle revenue miles and nearly 16 percent more vehicle revenue hours than the peer agency averages in FY 2015. COTA had the highest number of vehicle revenue miles and revenue hours operated, while RT had the lowest for both metrics.

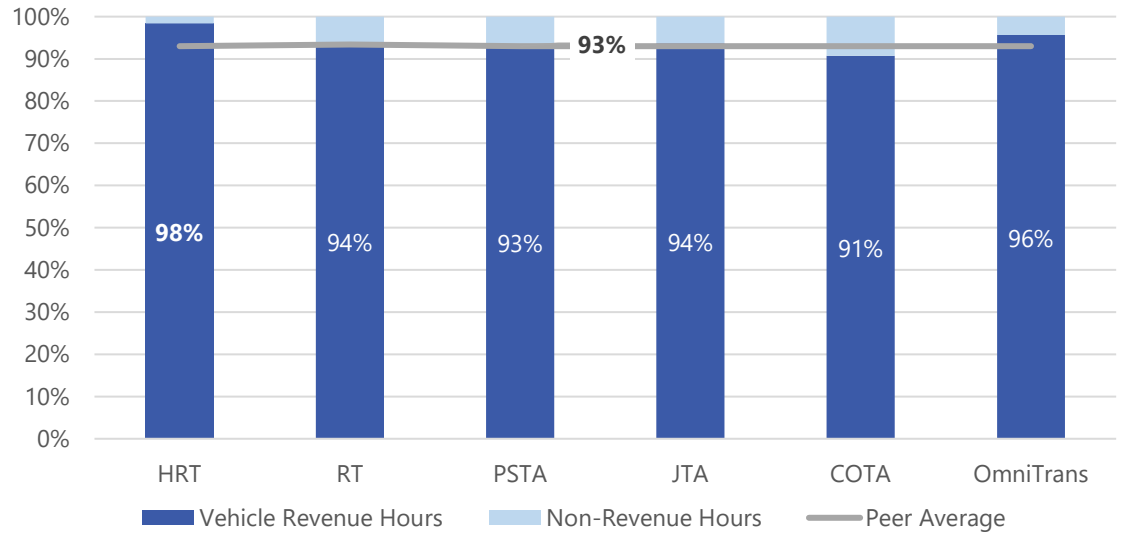
Finally, calculating vehicle revenue miles per available vehicles and vehicle revenue miles per revenue hour allows for a comparison of how effectively agencies utilize operating resources, especially where differences in fleet sizes or total service hours exist. HRT reported 38,272 miles per peak vehicle in 2015, just under one percent above the peer average for this metric. Among peers, JTA reported the highest number of miles per vehicle (48,901). In addition, HRT's 13 miles per revenue hour were 1.5 percent above the peer average (12.8). Of the peer agencies, PTSA reported the highest figure in this category (14.2).

Table A-3 | Peer Operational Metrics

Agency	Peak Vehicles		Vehicle Revenue Miles	Vehicle Revenue Hours	Vehicle Revenue Miles per Available Peak Vehicle	Vehicle Revenue Miles per Vehicle Revenue Hour
	Available	*Operational*				
HRT	**267**	**236**	**10,218,494**	**786,442**	**38,272**	**13.0**
RT	219	159	6,022,874	549,784	27,502	11.0
PSTA	234	178	9,117,053	640,774	38,962	14.2
JTA	175	150	8,557,699	618,327	48,901	13.8
COTA	341	284	11,443,670	948,298	33,559	12.1
OmniTrans	205	152	8,407,852	646,010	41,014	13.0
Peer Group Analysis						
Low	**175**	**150**	**6,022,874**	**549,784**	**27,502**	**11.0**
High	**341**	**284**	**11,443,670**	**948,298**	**48,901**	**14.2**
Average	**235**	**185**	**8,709,830**	**680,639**	**37,988**	**12.8**

The operational statistics analysis also includes vehicle revenue hours versus non-revenue hours, as detailed in **Figure A-1**. HRT reported a higher percentage of vehicle revenue hours compared to non-revenue hours than any peer (98 percent), indicating low layover and deadhead time. Of the peer agencies, COTA reported the lowest percentage of revenue hours (91 percent), while OmniTrans reported the highest (96 percent). The peer agency average for percentage of revenue hours versus non-revenue hours was 93 percent. For agencies with particularly large service areas such as HRT, longer time periods spent in non-revenue service are often correlated with longer distances to travel to and from dispatching garages.

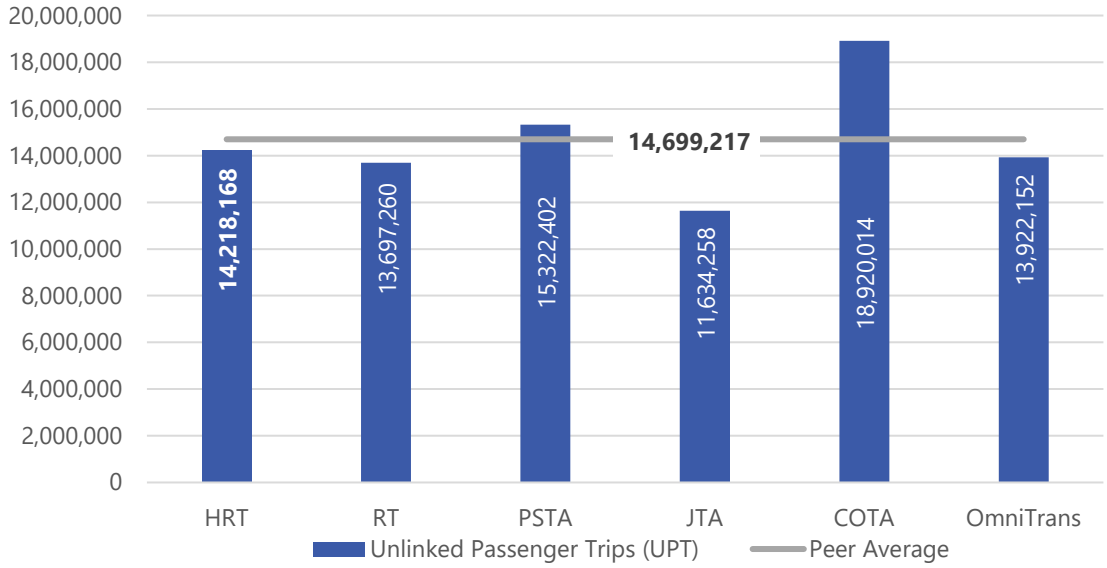
Figure A-1 | Peer Percentage of Revenue vs. Non-Revenue Hours



A.2.4 Ridership Metrics Assessment

The assessment of ridership metrics allows for an understanding of the number of passengers using the service during the analysis period. The assessment reviews unlinked passenger trips (**Figure A-2**) and passenger metrics in terms of total passenger miles, passengers per revenue mile, and passengers per revenue hour (**Table A-4**). The number of HRT unlinked bus passenger trips in FY 2015 (14,218,168) was approximately three percent lower than the peer average (14,699,217) for this metric. Of all peers, JTA reported the lowest number of bus boardings (11,634,258), while COTA, an agency which surpassed all peers and HRT in vehicle revenue miles and hours in FY 2015, reported the highest number of total bus boardings (18,920,014).

Figure A-2 | Peer Total Unlinked Passenger Trips



In FY 2015, HRT bus passengers traveled more total miles (65,849,308) than the average of the peer agencies. RT passengers traveled the fewest number of miles (51,450,964), while COTA passengers traveled the greatest number of miles (71,677,603).

Despite transporting all passengers an overall shorter distance, RT was most efficient of any peer in the categories of passengers per revenue mile and passengers per revenue hour, achieving 2.3 passengers per revenue mile and 24.9 passengers per revenue hour. JTA transported the fewest passengers per revenue mile (1.4), while HRT had the fewest passengers per revenue hour (18.1), below the lowest value achieved by the peer group (JTA –18.9). Passengers transported per revenue hour if often a function of the average headway of an agency's transit services. As much of HRT's bus service runs on 30- or 60-minute frequencies, the ability to carry a large number of passengers during each revenue hour can be limited. In contrast, agencies running average headways between 15 and 30 minutes are more likely to post a higher value for this metric, due to a collective tendency of transit riders to board more frequent services.

Table A-4 | Peer Passenger Metrics

Agency Name	Total Passenger Miles	Passengers per Revenue Mile	Passengers per Revenue Hour
HRT	**65,849,308**	**1.4**	**18.1**
RT	51,450,964	2.3	24.9
PSTA	66,809,350	1.7	23.9
JTA	70,409,205	1.4	18.8
COTA	71,677,603	1.7	20.0
OmniTrans	65,905,844	1.7	21.6
Peer Group Analysis			
Low	**51,450,964**	**1.4**	**18.8**
High	**71,677,603**	**2.3**	**24.9**
Average	**65,250,593**	**1.7**	**21.8**

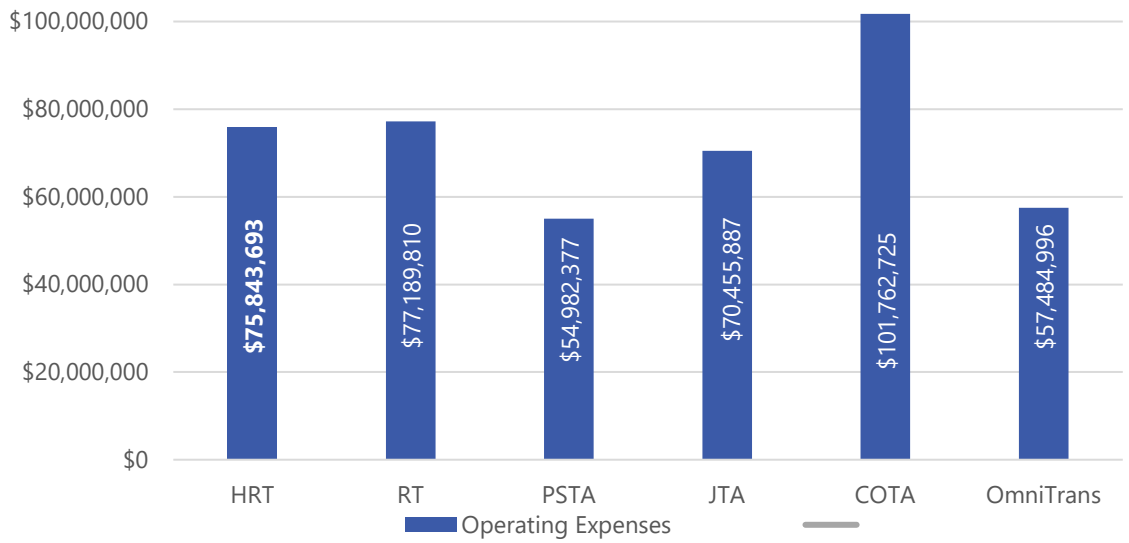
A.2.5 Bus Operating Cost and Funding

An operating cost and funding analysis was performed in terms of system operating expenses, service efficiency, and system funding.

Total Operating Expenses

Figure A-3 shows the operating expenses each agency incurred for local bus during FY 2015. HRT's operating expenses were on par with the average of the agencies, with PSTA spending the least on operating local bus service during FY 2015 and COTA the most.

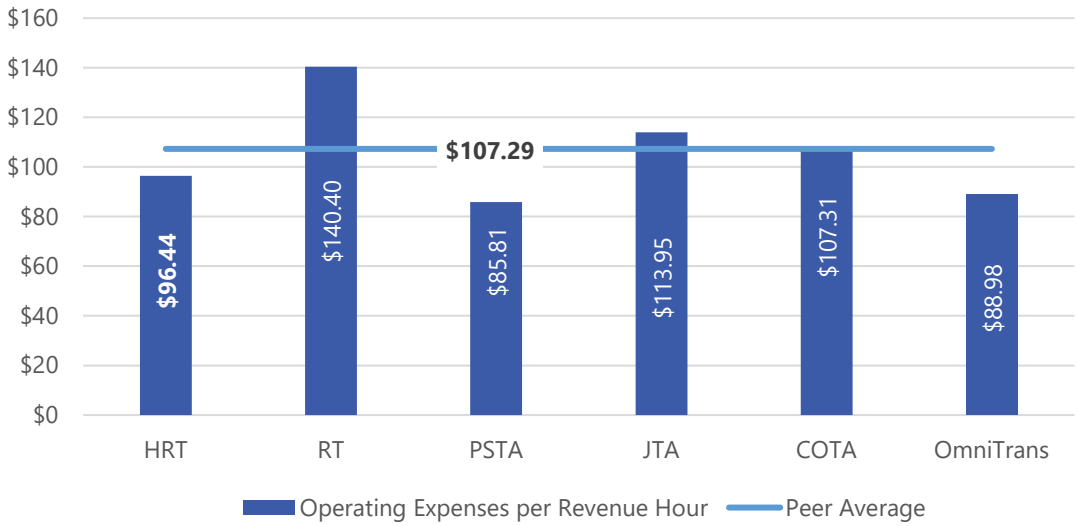
Figure A-3 | Peer Operating Expenses



Operating Expenses per Revenue Hour

Figure A-4 shows operating expenses per revenue hour for each peer and HRT. This metric allows for an effective comparison of the efficiency of operating fund expenditure across agencies of varying sizes and operating budgets. HRT's operating costs per revenue hour were approximately 10 percent below the peer agency average. Of peer agencies, RT was the most expensive service to operate per revenue hour, while PSTA was the least expensive. As stated above, PSTA also incurred the lowest total operating costs of all peers in 2015.

Figure A-4 | Operating Expenses per Revenue Hour



Service Efficiency

Table A-5 depicts service efficiency metrics for each peer agency in terms of total fare revenue, farebox recovery, and subsidy per passenger.

JTA, an agency serving a relatively smaller population, generated the lowest fare revenue of all of the peer agencies ($10,844,655), and also had the lowest farebox recovery ratio (15 percent), which measures the percentage of operating expenses recovered through fare revenue. Of all peers, although COTA generated the greatest amount of total fare revenue ($19,165,487), OmniTrans reported the highest farebox recovery ratio (23 percent) in FY 2015. As shown below, HRT reported totals marginally lower than the peer average in each of these categories.

Subsidy per passenger measures the dollar amount from operating expenses each agency must devote to its ridership after a portion of expenses have been recovered through fare revenue. Although a lower subsidy per passenger can indicate a more favorable farebox recovery ratio, this metric is also governed by the cost of operations during each service hour. PSTA reported the lowest figure in this category ($2.78), while JTA, which had the lowest farebox recovery ratio, reported the highest figure ($5.12). HRT's subsidy per passenger ($4.34) was nearly nine percent higher than the peer average.

Table A-5 | Peer Service Efficiency

Agency Name	Total Fare Revenue	Farebox Recovery Ratio	Subsidy per Passenger
HRT	**$14,115,226**	**19%**	**$4.34**
RT	$15,093,979	20%	$4.53
PSTA	$12,381,334	23%	$2.78
JTA	$10,844,655	15%	$5.12
COTA	$19,165,487	19%	$4.37
OmniTrans	$13,411,792	23%	$3.17
Peer Group Analysis			
Low	**$10,844,655**	**15%**	**$2.78**
High	**$19,165,487**	**23%**	**$5.12**
Average	**$14,179,449**	**20%**	**$3.99**

Funding Sources[75]

Funding sources were reviewed in terms of funding for operating expenses and funding for capital investments.

Funding Sources of Operating Revenue Expended

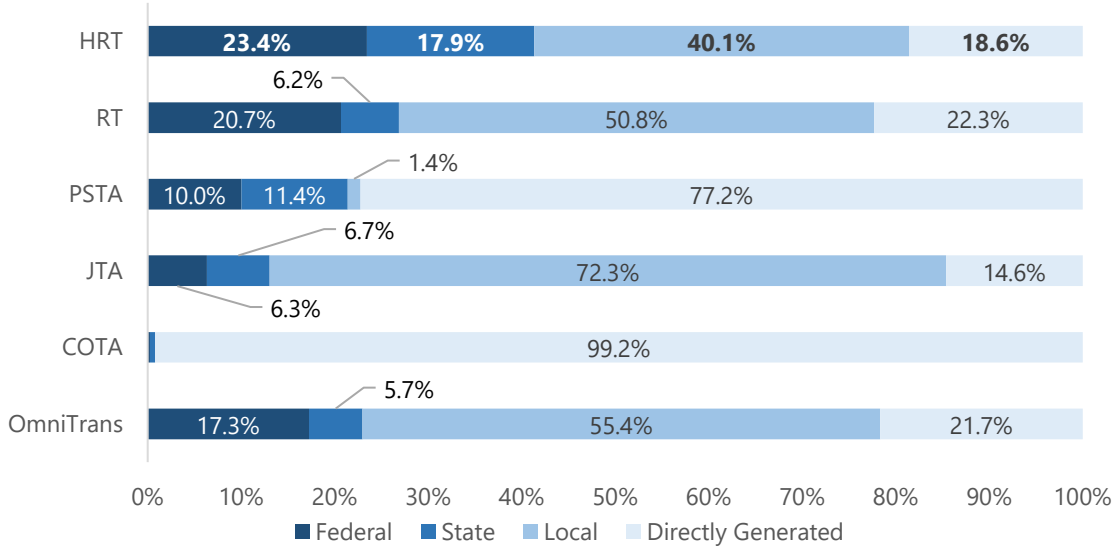
Figure A-5 illustrates the funding sources break down for each peer agency in terms of funding received from federal, state, local sources, and those directly generated. Not surprisingly, the funding sources for each agency were drastically different, as each agency operates in a unique

[75] Represents all modes

setting with differing political climates, available funding sources and funding agreements, and policies that dictate how funding can be attributed toward operating expenses. Additionally, state funding is dependent upon respective state's transit funding structure, as many states play a smaller role in transit agency operations funding than the Commonwealth of Virginia.

Two agencies – PSTA and COTA – received a relatively large portion of their 2015 operating revenue from directly generated sources. The majority of PSTA's directly generated revenue came from a property tax as well as fare sales, while the majority of COTA's was derived from a County-wide sales tax.

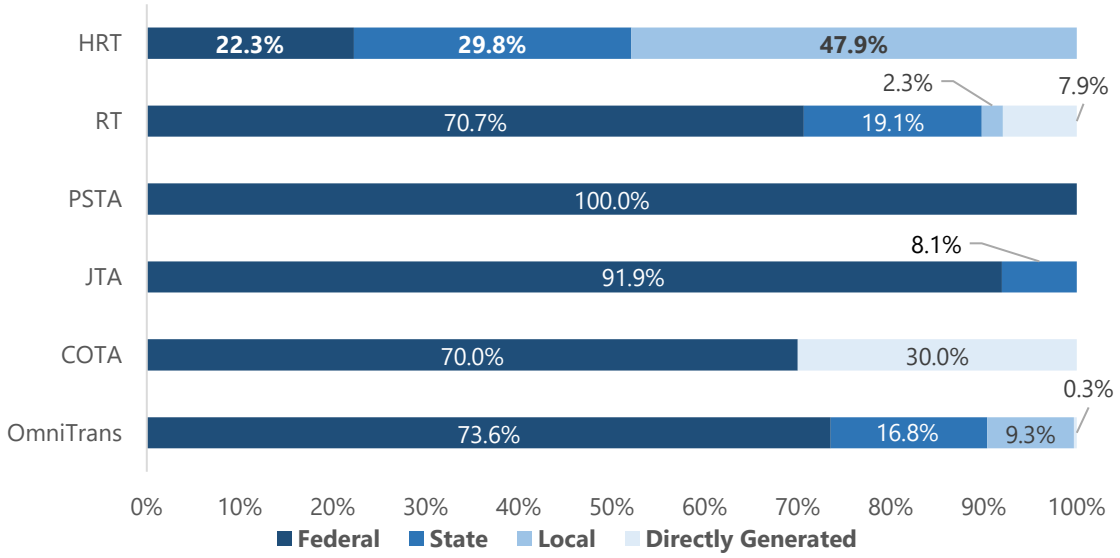
Figure A-5 | Peer Funding Sources of Operating Expenses



Funding Sources of Capital Revenue Expended

Figure A-6 details the funding sources of capital expenses for HRT and the peer agencies during FY 2015. All peer agencies funded the majority of their capital expenses using federal dollars; on average 81.2 percent of funding was federal across the peer agencies. RT and OmniTrans used state funding for 16.8 percent and 19.1 percent of capital expenses, respectively, and COTA used directly generated funding (from a sales tax) for 30 percent of capital expenses. In FY 2015 HRT received over 22 percent of the capital funding expended from federal sources; however, the majority of its capital funding came from state and local funding sources, 29.8 and 47.9 percent, respectively. In the FY2015 NTD data, HRT reported total capital expenditures of $10 million, much lower than in a typical year, which results in a percentage funded by local sources that is much higher than normal.

Figure A-6 | Peer Funding Sources of Capital Expenses



A.3 SUMMARY AND KEY FINDINGS

On average, HRT operates more revenue hours and revenue miles with more peak vehicles than its peers, as well as operating a greater overall percentage of revenue versus non-revenue hours. HRT buses also travel more miles per vehicle and per hour as compared to peer agencies. Although the number of unlinked local passenger trips fell slightly below the peer average (reflective of a time period during which HRT instituted a fare increase), HRT bus passengers traveled slightly more overall miles than the average peer agency's passengers. HRT's operating expenditures on local bus in FY 2015 was on par with that of the average peer. **Table A-6** summarizes average peer values in operational metrics, service efficiency, and sources of operating and capital revenue expended, as well as how HRT compares to the five peer agencies presented in this analysis.

HRT fell marginally short of the average peer in all service efficiency categories, bringing in less fare revenue, recovering less of its operating costs through fare revenue, and suffering from a relatively higher subsidy per passenger amount.

To conclude, HRT can work to improve its service efficiency metrics, seeking to recover more operating costs through fare revenue and continue to evaluate whether the values it reports for passengers per mile and revenue hour are in line with the agency's average headways. If need be, HRT can also seek to obtain more revenue through directly generated sources.

Table A-6 | Summary of Average Peer Metrics as Compared to HRT Metrics

Characteristic	Peer Group Average Value	HRT Value	Percent Difference
Operational Metrics			
Vehicles Available in Max. Service	235	267	13.6%
Vehicles Operational in Max. Service	185	236	27.6%
Vehicle Revenue Miles	8,709,830	10,218,494	17.3%
Vehicle Revenue Hours	680,639	786,442	15.5%
Vehicle Revenue Miles per Available Peak Vehicle	37,988	38,272	0.75%
Vehicle Revenue Miles per Vehicle Revenue Hour	12.8	13.0	1.56%
Percentage of Revenue Hours	93%	98%	5.4%
Unlinked Passenger Trips	14,699,217	14,218,168	-3.3%
Total Passenger Miles	65,250,593	65,849,308	0.9%
Passengers per Revenue Mile	1.7	1.4	-19.2%
Passengers per Revenue Hour	21.8	18.1	-17.2%
Operating Expenses	$72,375,159	$75,843,693	4.8%
Operating Expenses per Revenue Hour	$107.29	$96.44	-10.11%
Service Efficiency			
Fare Revenue	$14,179,449	$14,115,226	-0.5%
Farebox Recovery Ratio	20%	19%	-3.7%
Subsidy per Passenger	$3.99	$4.34	8.8%
Source of Operating Revenue Expended			
Federal	10.9%	23.4%	12.5%
State	6.1%	17.9%	11.8%
Local	36.0%	40.1%	4.1%
Directly Generated	47.0%	18.6%	-28.4%
Source of Capital Revenue Expended[76]			
Federal	81.2%	22.3%	-58.9%
State	8.8%	29.9%	21.1%
Local	2.3%	47.9%	45.6%
Directly Generated	7.7%	0.0%	-7.7%

[76] HRT's capital expenditures in FY15 are not reflective of a typical year.

(Page Intentionally Left Blank)

Appendix B: On Board Survey Summary

HAMPTON ROADS TRANSIT

Regional Origin and Destination Study 2016

PREPARED BY ETC INSTITUTE & HAMPTON ROADS TRANSIT
APRIL 2017

gohrt.com

Contents

EXECUTIVE SUMMARY

INTRODUCTION

Hampton Roads Transit provides regional transit service to six cities in the Hampton Roads region of Virginia – Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Virginia Beach. In FY2016, HRT carried 15.2 million passengers; inclusive of bus, rail, and ferry transit riders. The HRT fixed-route bus system consists of approximately 70 fixed-routes, with local service (53 routes), Express Service (ten routes), Peninsula Commuter Service (five routes), and seasonal service in Virginia Beach (three routes). HRT also operates The Tide light rail service and the Elizabeth River Ferry. The 2016 Regional Origin & Destination Study provides data, information, maps, and graphical representations of the regional transit system. The system is comprised of six independent cities whose travel patterns, based on the results of this survey, are truly regional in nature. The details of the Study and the updated origin and destination data provides HRT staff, leadership, the TDCHR (HRT's governing board), the six-member cities, stakeholders and the public, information highlighting who are riders are, where they are going, and how they get there. This information is critical in HRT's decision-making processes, short and long-term regional strategies related to transit, growth in the region, and the regional economy that transit supports. The data shows that our riders do not recognize city boundaries or lines in their travel patterns. Therefore, we must continue to create, expand, and foster a transit system that supports the regional travel behaviors and patterns that are exhibited in the findings of this Study.

Survey Summary and Key Findings

The full report, as provided in Chapters 1 - 5, will offer details of the findings of the 2016 Origin and Destination Study. As a preview to these chapters, and based on the expanded weekday survey data (unlinked weighted passenger trips), there are several key findings to be highlighted. The first is that the majority of HRT's riders ride the system regularly and frequently; 71% of all HRT riders use the HRT transit system 4-7 days per week. Riders are utilizing the system primarily to travel to and from home and work. Seventy-six (76%) percent of riders identified that they are employed full or part-time, making HRT's transit service critical for employment and access to opportunity. To get to one of HRT's approximately 2,800 transit stops, 92% of customers' access and egress mode to the stop is by walking. This figure underscores the need for complete streets within the service area allowing for safe and accessible service to those who walk, bike, and use other modes to access HRT transit service. The Study also finds that HRT's riders are highly transit dependent, with 89% of riders not having a car available to use for their trip. Therefore, regular, frequent, and on-time service is critical to allow our customers to get home, to work, go shopping, and "do-life" with Hampton Roads Transit providing the means for them to travel from their origin and to their destination.

Other key findings include:

- Approximately ¾ of trips consist of riders traveling home, to work, or shopping
- Transportation Network Companies (TNC's), like Uber and Lyft, accounted for only 0.10% of the mode by which HRT riders accessed transit.
- Most customers pay their fare with cash (91%)
- The HRT rider demographics are skewing younger. In 2016, 56% of riders identified as being between the ages of 18 – 34, as compared to 53% in 2014
- Twenty-one percent (21%) of riders were over the age of 45
- System-wide and across all modes, the majority of HRT riders are women (55%)
- Nearly ninety percent (88.9%) of all HRT riders have a smartphone
- Fifteen percent (15%) of riders identified themselves as students; including, approximately 12% as full/part-time college/university students and 3% are students in grades K-12
- Approximately 50% of riders live in households with incomes of less than $25,000 per year
- Ninety-nine percent (98.76%) of riders use two or fewer routes to complete their one-way trip

REPORT OVERVIEW

This report provides an overview and detailed description of the 2016-2017 HRT on-board study process. The report covers the Study's Purpose/Background, the Survey Design, Sampling, and Administration Methodology. The report will also cover the Quality Control process before, during, and after the study.

The 2016 Hampton Roads Transit (HRT) regional on-board origin and destination survey was conducted by ETC Institute, with collection occurring between August 2016 and early December 2016. Minimal data collection occurred during January and February 2017 to improve the overall distribution by targeting specific route, direction, and time of day data to improve the overall distribution and segments. The magnitude of the survey will allow regional planners to better understand the needs and travel patterns of many specialized populations. The on-board survey was completed for bus, rail, and ferry riders in HRT's six-city service area; including, Chesapeake, Hampton, Newport News, Norfolk, Portsmouth and Virginia Beach.

HRT staff has utilized the data and information provided through ETC's data collection efforts to develop the 2016 Origin & Destination Study report. The data has been thoroughly analyzed to provide graphics, tables, and summary information to help users of this report understand the travel patterns and related information of HRT riders throughout the system. This report includes how the region utilizes the transit system (Chapter 2), demographic information of HRT riders (Chapter 3), a new section featuring maps of the tripmaking behaviors of HRT customers across modes and routes (Chapter 4), and concludes with the survey methodology (Chapter 5).

Acronyms and Abbreviations

ACRONYM	DEFINITION
BA	Boarding & Alighting/Boarding & Alighting Counts
ETC	ETC Institute (or identified as the Survey Administrator)
FTA	Federal Transit Administration
GIS	Geographic Information System
GPS	Global Positioning System
HRT	Hampton Roads Transit
IPF	Iterative Proportional Fitting
MAX	Metro Area Express
O&D	Origin and Destination/Origin and Destination Survey
O2O	On-to-Off/ On-to-Off Survey
PnR	Park and Ride
Project	Hampton Roads Transit (HRT) regional on-board origin and destination survey
QA/QC	Quality Assurance/Quality Control
RFP	Request for Proposal
Study	Hampton Roads Transit (HRT) regional on-board origin and destination survey
Title VI	Title VI of the Civil Rights Act of 1964
VDOT	Virginia Department of Transportation

Chapter 1

Study Overview, Survey, Design & Administration

HAMPTON ROADS TRANSIT

CHAPTER 1: STUDY OVERVIEW, SURVEY DESIGN, & ADMINISTRATION

OVERVIEW

Purpose of the Survey

The purpose of this project was to gather updated travel information and behavior data from Hampton Roads Transit (HRT) riders. The information gathered will serve several objectives, including:

- Improving transit forecasts by updating the Virginia Department of Transportation's (VDOT) regional travel demand model,
- Gathering updated travel behavior data from transit users in the regional service area to gain a better understanding of today's transit riders,
- Supporting transit planning and operations activities based on observed ridership patterns and preferences,
- Allow for updated Environmental Justice and Title VI analysis and reporting.

The data and information collected, and as presented in this report, demonstrate that HRT is truly a regional transit system with a customer base who live, work, and engage in activities not only within their city of origin, but throughout the region. The 2016 Origin & Destination Study also shows the diverse ways in which our customers travel and interact within HRT's regional transit system network through their travel patterns and mode choices.

Date/Time Period of the 2016 O&D Study

The majority of the 2016 Hampton Roads Transit (HRT) regional on-board origin and destination survey collection was administered from August 2016 through early December 2016 and avoided all school breaks and holidays. Minimal data collection also occurred during January and February 2017 to improve the overall distribution by targeting specific routes, direction and time of day data.

Survey Administrator and Survey Elements

ETC Institute, the firm who administered the survey, is a nationwide leader in performing O&D surveys for the Federal Transit Administration (FTA). ETC has worked directly with the FTA modeling and planning staff to help establish guidelines for O&D methodologies. The methodology used for this survey was similar to those employed in more than 30 intercept interview based collections conducted by ETC Institute since 2009; including, the HRT 2013-2014 O&D Survey. The procedures used for this and the previous survey, continue to be developed with extensive input from the FTA and following national reviews of best practices in on-board survey research methods.

The survey consisted of four major elements as listed below:

- The On-to-Off (O2O) Counts are intended to identify boarding to alighting paths on a given route trip.
- The Boarding and Alighting (BA) Counts are intended to capture the volume of activity for the boardings and alightings on a given route trip.
- The Park and Ride (PnR) Counts are intended to assess the number of vehicles and passengers utilizing these facilities. These counts, along with the O2O and BA counts, are utilized to create the expansion template for the interview.
- The Origin & Destination (O&D) Survey is the core of the effort. The Survey consists of a detailed interview of riders conducted on-board rail, bus, and ferry routes. This data is expanded to the template created using the first three elements of the survey.

SURVEY DESIGN AND ADMINISTRATION

Pilot Survey Summary

A pilot test was conducted from August 16 - 17, 2016. The purpose of the pilot test was to assess all aspects of the survey including survey design, sampling methodology, implementation, and data processing tasks. The overall goal was to complete 100 Origin & Destination (O&D) Intercept Surveys. The actual number of O&D Intercept Surveys that were completed in the field was 201, of these 164 were classified as useable (82% recovery rate). Based on the results of the pilot test, the Survey Administrator recommended that the O&D survey proceed as scheduled with limited superficial changes.

Sampling Plan Summary

To ensure that the distribution of completed surveys mirrored the actual distribution of riders, the survey administrator developed a sampling plan that ensured: the completion of Boarding-Alighting counts on over 700 system trips, On-to-Off counts with at least 8,500 of the system's riders, park and ride counts for designated locations, and a full Origin & Destination Survey with at least 5,300 of the system's riders during the weekdays - representing 10% of HRT's average daily ridership (Tuesday – Thursday). Monday and Friday have more variations in trips than Tuesday through Thursday; therefore, were not included as part of the weekday. A sampling plan was developed that ensured the completion of 800 of the system's riders on the weekend (Saturday). The table below shows the overall sampling plan rates, goals, records completed, and percentage obtained of the goal.

PROJECT TASK	SAMPLING RATE	GOAL	COMPLETED	% COLLECTED
Boarding & Alighting Counts	50% Daily Trip (Ridership Above 500)	716	787	110%
On-To-Off Survey	20% of Daily Ridership (Ridership Above 500)	7,575	14,123	186%
Park and Ride Counts	Assigned Park and Ride Lots	13	13	100%
Weekday O&D Survey	10% of Daily Ridership/10% Rail Station	5,312	6,959	131%
Weekend O&D Survey	800 Weekend Rider Records	800	803	100%

Survey Weighting and Expansion Summary

Expanding and weighting is used to make the sample collected representative of system-wide and route specific HRT ridership. Survey records are "expanded" to represent the total average weekday ridership of each route by time-period and direction (see Chapter 5: Survey Expansion Overview for detailed information on survey data expansion). O&D surveys for Rail were expanded by direction/time of day and by the boarding and corresponding alighting rail station of the rider. For the HRT Bus and Ferry services, the surveys were expanded by route, direction, time of day, and the boarding and corresponding alighting segment of the rider. Overall, there are over 1,300 different weight factors in the final database. The average weight factor is 9.168 which means, on average, each survey record represents approximately nine (9) HRT riders. The average weight factor reflects and is representative of the appropriate ridership for a route, time-period and direction.

Data Quality Assurance and Processing Summary

The quality assurance/quality control (QA/QC) process was implemented throughout the survey's administration and after its completion, with proven post-processing quality check techniques. The establishment of specific sampling goals and procedures for managing the goals ensured that a representative sample was obtained from each route. Training of surveyors/interviewers, with high levels of oversight by team leaders, ensured that the survey was administered properly. Also, the use of the latest geocoding/survey review tools used by the survey administrator's Transit Review Team contributed to the high-quality results that were achieved.

Chapter 2

How the Hampton Roads Region Utilizes the HRT System

HAMPTON ROADS TRANSIT

CHAPTER 2: HOW THE HAMPTON ROADS REGION UTILIZES THE HRT SYSTEM

Hampton Roads Transit – Rider Travel Characteristics

Hampton Roads Transit (HRT) is the regional transit system for Hampton Roads. The integration of the transit system, through the connection of bus routes across cities, ferry connection between cities, and riders accessing light rail in all six jurisdictions makes it truly a regional transit system.

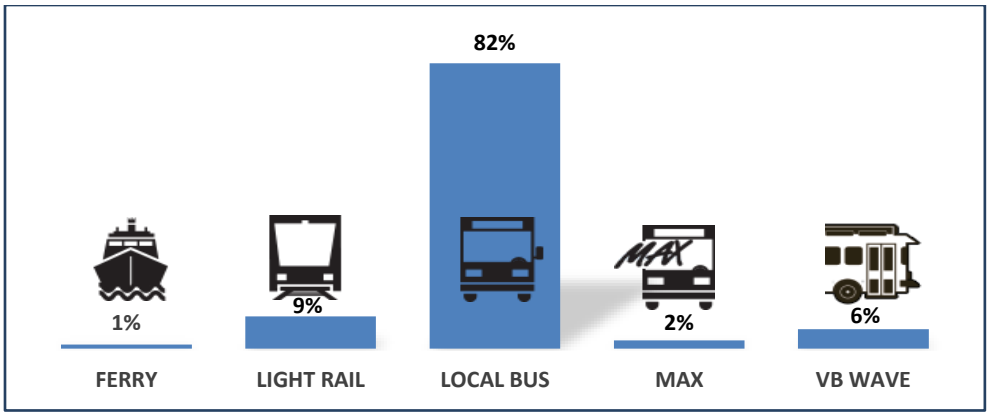
Chapter Two (2) focuses on how the Hampton Roads Region utilizes the transit system. This Chapter highlights and identifies key characteristics and aspects of customer travel within the regional system. The highlights of the chapter include selected demographic and trip-related findings from the survey based on the type of service; bus, rail, MAX routes, and the ferry. The survey provides insight to how HRT customers access transit, how often, the origin of their trip, and how they pay their fare among other data elements. The results of this information identify how the system is utilized, and may be used in the future to enhance the transit system and understand patterns that can positively impact the agency, cities, and region's approach to high quality transit service.

Note: All information provided throughout this report is based on expanded weekday ridership data unless otherwise stated.

Mode

The majority of HRT's transit riders utilize fixed-route bus service to get to and from their origin and destination. This mode of transit accounts for 82% of weekday trips. Other modes of service include; The Tide, HRT's light rail service providing 9% of passenger trips, followed by the VB Wave (seasonal service) at 6%, MAX service at 2%, and the Elizabeth River Ferry providing 1% of trips.

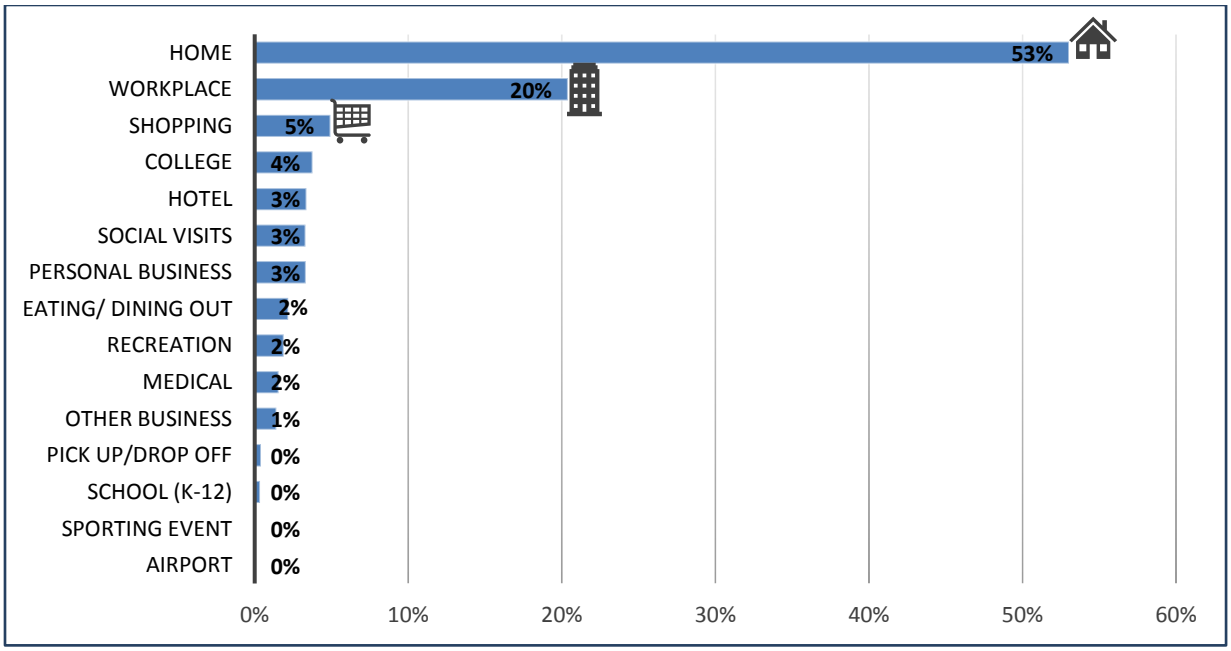
Figure 2-1: Ridership by Mode - Weekday



Most Common Trip Origins

Over half of riders named their home as the most common trip origin at fifty-three (53%) percent, followed by travel originating from their workplace (20%). Transit riders are demonstrating the highest trip patterns that allow them to travel from home and from work. There are several other destinations that make up the genesis of the passenger trip; these trips account for approximately 27% of the travel origins. Other key origins include shopping, social visits, college, personal business, hotel, and recreation.

Figure 2-2: Most Common Trip Origins



Most Common Trip Origins by Service Type

Table 2-1: Most Common Trip Origins by Service Type

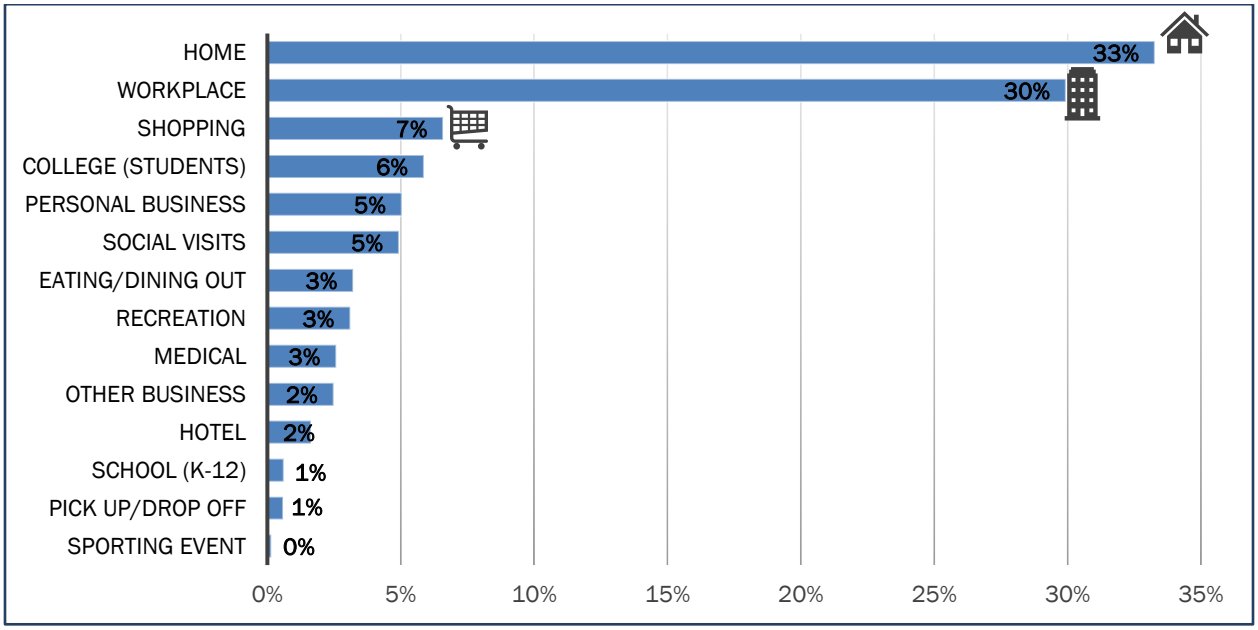
	AIRPORT	COLLEGE	EATING/ DINING OUT	HOME	HOTEL	MEDICAL	OTHER BUSINESS	PERSONAL BUSINESS
System Total	**0%**	**4%**	**2%**	**53%**	**3 %**	**2%**	**1%**	**3%**
Ferry	0%	0%	0%	1%	0%	0%	0%	0%
Light Rail	0%	1%	0%	4%	0%	0%	0%	0%
Local Bus	0%	3%	1%	47%	1%	1%	1%	3%
MAX	0%	0%	0%	2%	0%	0%	0%	0%
VB Wave	0%	0%	1%	0%	3%	0%	0%	0%

	PICK UP/ DROP OFF	RECREATION	SCHOOL (K-12)	SHOPPING	SOCIAL VISITS	SPORTING EVENT	WORKPLACE
System Total	**0.4%**	**2%**	**0.3%**	**5%**	**3%**	**0.0%**	**20%**
Ferry	0%	0%	0%	0%	0%	0%	1%
Light Rail	0%	0%	0%	0%	0%	0%	1%
Local Bus	0%	1%	0%	4%	3%	0%	18%
MAX	0%	0%	0%	0%	0%	0%	1%
VB Wave	0%	1%	0%	0%	0%	0%	0%

Most Common Trip Destinations

The most common trip destination for riders is their home (33%), followed by travel to their workplace (30%). Transit riders are demonstrating the highest trip patterns that allow them to travel to home and to work. There are several other destinations that make up the terminus of the passenger trip; these trips account for approximately 38% of the travel destinations. Other key destinations included shopping, social visits, recreation, and college.

Figure 2-3: Most Common Trip Origins by Service Type



Most Common Trip Destinations By Service Type

Table 2-2: Most Common Trip Origins by Service Type

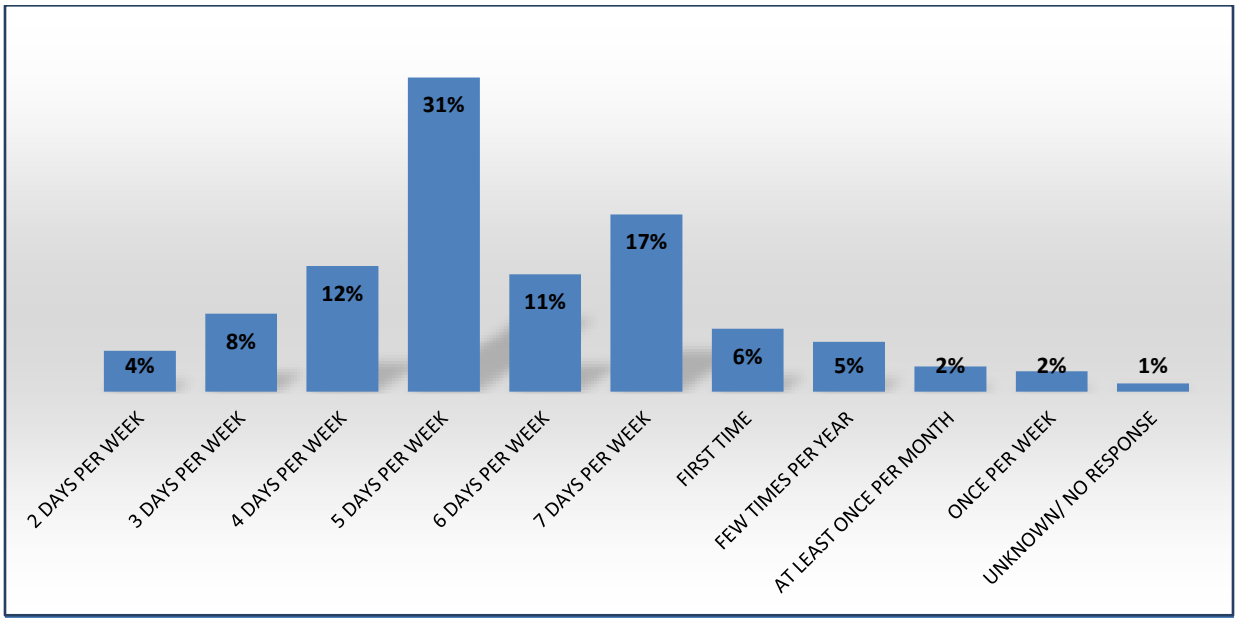
	COLLEGE (STUDENTS)	EATING/ DINING OUT	HOME	HOTEL	MEDICAL	OTHER BUSINESS	PERSONAL BUSINESS
System Total	**6%**	**3%**	**33%**	**2%**	**3%**	**2%**	**5%**
Ferry	0%	0%	1%	0%	0%	0%	0%
Light Rail	1%	0%	2%	0%	0%	0%	0%
Local Bus	5%	2%	29%	0%	2%	2%	4%
MAX	0%	0%	1%	0%	0%	0%	0%
VB Wave	0%	2%	0%	1%	0%	0%	0%

	PICK UP/DROP OFF	RECREATION	SCHOOL (K-12)	SHOPPING	SOCIAL VISITS	SPORTING EVENT	WORKPLACE
System Total	**1%**	**3%**	**1%**	**7%**	**5%**	**0%**	**30%**
Ferry	0%	0%	0%	0%	0%	0%	1%
Light Rail	0%	0%	0%	0%	0%	0%	2%
Local Bus	0%	1%	1%	6%	5%	0%	26%
MAX	0%	0%	0%	0%	0%	0%	1%
VB Wave	0%	2%	0%	0%	0%	0%	0%

Transit System Utilization – Frequency

Most transit riders utilize the system five or more days a week. The purpose of those trips are described the previous section. Thirty-one percent (31%) of riders ride the system five (5) days per week. Approximately sixty percent (59%) utilize the system five (5) to seven (7) days a week.

Figure 2-4: Frequency of Transit System Utilization



Note: Data includes weekday and weekend expanded data

Transit System Utilization – Frequency by Service Type

Customer utilization, or the frequency of how often HRT customers utilize a particular mode of transit, is an important factor that assists in the understanding of the trip purpose. The data below examines the five modes; bus, MAX, light rail, the VB Wave, and ferry and shows how many days of the week riders utilize each mode.

Table 2-3: Transit System Utilization – Frequency by Service Type

MODE	2 DAYS PER WEEK	3 DAYS PER WEEK	4 DAYS PER WEEK	5 DAYS PER WEEK	6 DAYS PER WEEK	7 DAYS PER WEEK	FIRST TIME	FEW TIMES PER YEAR	AT LEAST ONCE PER MONTH	ONCE PER WEEK	UNKNOWN/ NO RESPONSE
System Total	**4%**	**8%**	**12%**	**31%**	**11%**	**17%**	**6%**	**5%**	**2%**	**2%**	**1%**
Ferry	4%	6%	2%	49%	5%	11%	9%	4%	7%	3%	0%
Light Rail	3%	7%	9%	44%	11%	15%	2%	5%	2%	0%	1%
Local Bus	4%	8%	14%	31%	12%	18%	3%	4%	2%	2%	1%
MAX	4%	2%	5%	40%	8%	30%	1%	5%	4%	1%	0%
VB Wave	4%	1%	1%	2%	2%	3%	62%	19%	2%	0%	2%

Passenger Transfers

Customers utilizing transit in the HRT system are primarily able to reach their destination without making a transfer, thereby having a one-seat ride. Sixty-one (61%) percent of customers did not make a transfer to another route to get their destination. Over 91% are able to travel to their destination by having to make only one transfer to another route. The method by which transfer data is calculated has been modified from the 2014 Study, and is explained in Chapter Five.

Table 2-4: Passenger Transfers

	0 TRANSFERS	1 TRANSFER	2 TRANSFERS	3 TRANSFERS	4 TRANSFERS
System Total	**61%**	**30%**	**8%**	**1%**	**0.1%**
Ferry	64%	29%	7%	1%	0%
Light Rail	59%	29%	10%	2%	0%
Local Bus	60%	31%	8%	1%	0.1%
MAX	48%	29%	20%	3%	0.4%
VB Wave	73%	24%	1%	1%	0.2%

Reverse Trip Pattern

The survey instrument asked passengers if they took the exact trip to arrive to their destination on the way back to their point of origin (ex. exact return trip by route). Most riders (60%) took the exact same trip back to their destination; however, a notable portion of riders (40%) did not return to their point of origin with the same trip pattern. Therefore; those passengers may have traveled by a different route, mode, or means of access to get back to their point of origin and/or new destination.

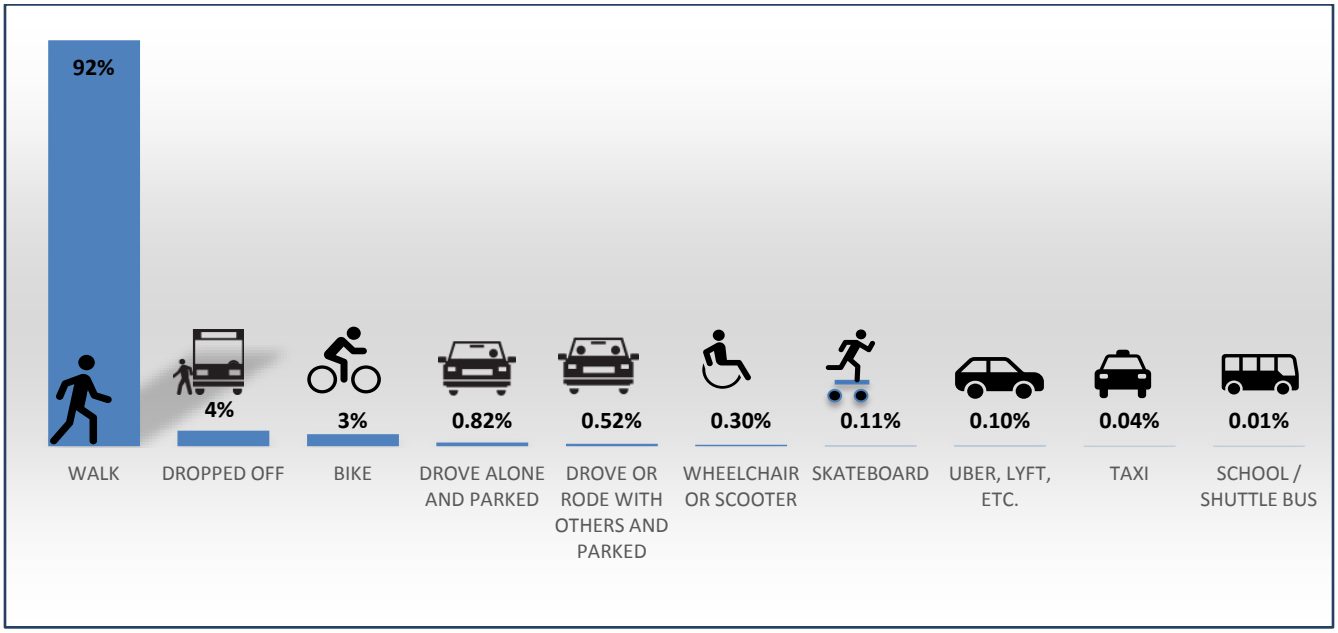
Table 2-5: Reverse Trip Pattern

	NO – ROUND TRIP (SAME TRIP NOT TAKEN IN REVERSE)	YES – ROUND TRIP (SAME TRIP TAKEN IN REVERSE)
System Total	**40%**	**60%**
Ferry	64%	29%
Light Rail	59%	29%
Local Bus	60%	31%
MAX	48%	29%
VB Wave	73%	24%

Transit Access

Ninety-two percent (92%) of riders access the HRT system by walking to their stop location. The lowest utilized methods of access to transit include Transportation Network Companies (TNCs) like Uber and Lyft at 0.10% and Taxis at 0.04%. Access modes to transit included walking, biking, carpooling, being dropped off, driving alone, TNCs, and taxis. The total percentage of all other modes in comparison to walking is significantly lower as shown in Figure 2-5.

Figure 2-5: Transit System Access



Access Mode by Service Type

Table 2-6 provides details on transit service type and how customers access (ex. walking, biking) the service type.

Table 2-6: Access Mode by Service Type.

	WALK	DROPPED OFF	BIKE	DROVE ALONG & PARKED	DROVE OR RODE W/ OTHERS & PARKED	WHEELCHAIR OR SCOOTER	SKATEBOARD	TNCs - UBER, LYFT,	TAXI	SCHOOL/ SHUTTLE BUS
System Total	**92%**	**4%**	**3%**	**0.82%**	**0.52%**	**0.30%**	**0.11%**	**0.10%**	**0.04%**	**0.01%**
Ferry	68%	2%	9%	3%	17%	0%	2%	0.0%	0%	0%
Light Rail	81%	5%	5%	7%	1%	0%	0%	0.5%	0%	0%
Local Bus	93%	3%	3%	0.2%	0.1%	0.4%	0.1%	0.1%	0.1%	0%
MAX	80%	11%	3%	5%	0.9%	0%	0%	0%	0%	0%
VB Wave	99%	0.6%	0%	0.4%	0.2%	0.1%	0%	0%	0%	0%

Fare Payment

HRT riders overwhelmingly utilize cash to pay their fare. Cash was identified as the payment method for 92% of transactions, on and off-board the vehicle. A smaller percentage of customers pay their fare by credit or debit card - six-percent (6%), and two-percent (2%) of customers utilize other means of fare payment. This includes employees who ride via their employee ID and the Student Freedom Pass. As a note, at the time of the study HRT had a limited number (approximately 36) of Ticket Vending Machines (TVMs) throughout its service area. TVMs and the locations where tickets are distributed (ex. transit centers and resellers) throughout the service area may have an impact on the data and the availability of fare payment options for customers.

Figure 2-6: Fare Payment

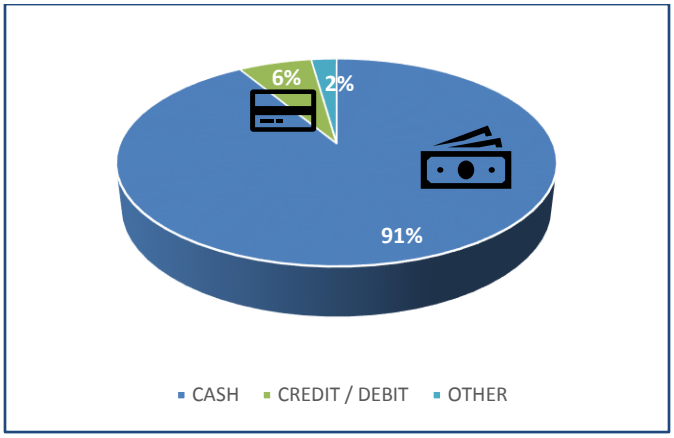


Figure 2-7: Fare Payment

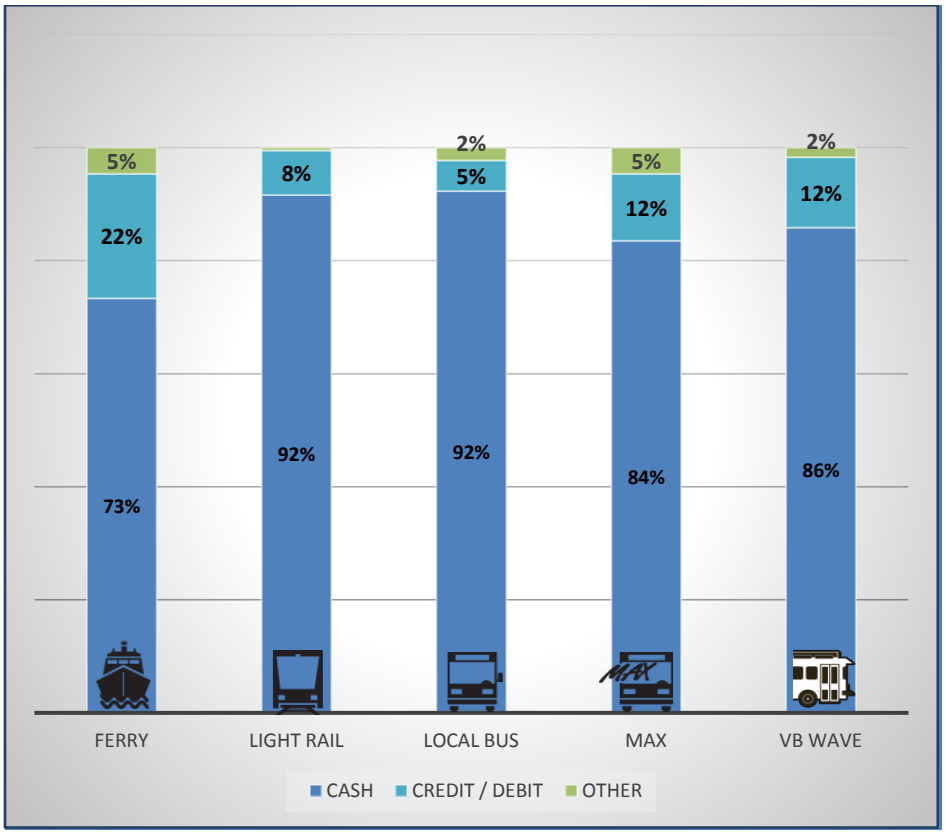
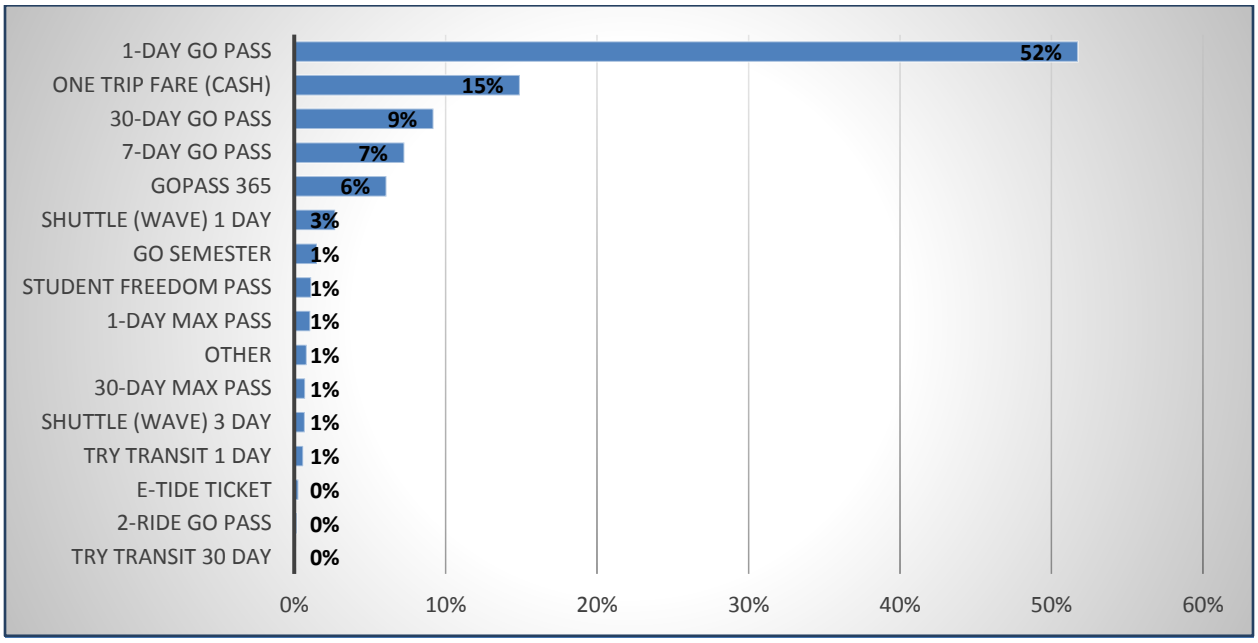


Table 2-7: Fare Payment

	CASH	CREDIT/DEBIT	OTHER
System Total	**91%**	**6%**	**2%**
Ferry	73%	22%	5%
Light Rail	92%	8%	0%
Local Bus	92%	5%	2%
MAX	84%	12%	5%
VB Wave	86%	12%	2%

Figure 2-8: Fare Payment by Pass Type



Fare Payment by Service Type

Table 2-8: Fare Payment by Service Type

	1-DAY GOPASS	GOPASS 365	ONE TRIP FARE (CASH)	7-DAY GOPASS	30-DAY GOPASS	30-DAY MAX PASS	TRY TRANSIT 1-DAY	OTHER	STUDENT FREEDOM PASS
Ferry	33%	39%	14%	4%	2%	3%	4%	2%	1%
Light Rail	49%	12%	10%	10%	9%	-	-	1%	1%
Local Bus	55%	6%	16%	8%	10%	-	1%	1%	1%
MAX	35%	-	-	2%	3%	20%	-	1%	1%
VB Wave	20%	-	13%	1%	3%	-	-	-	1%

	E-RIDE TICKET	GO SEMESTER	1-DAY MAX PASS	SHUTTLE (WAVE) 3-DAY	SHUTTLE (WAVE) 1-DAY
Ferry	-	-	-	-	-
Light Rail	4%	6%	-	-	-
Local Bus	-	1%	-	-	-
MAX	-	-	26%	-	-
VB Wave	-	-	-	12%	49%

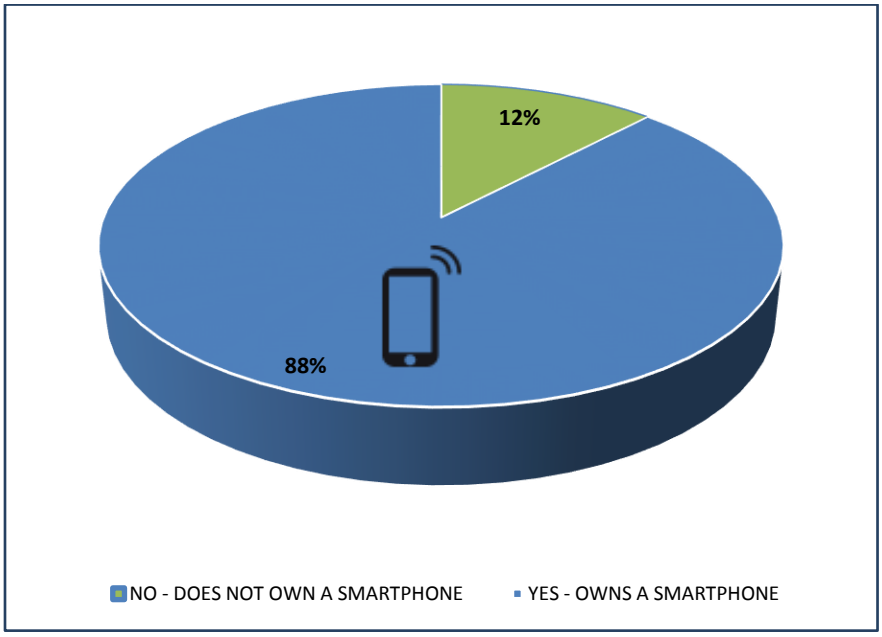
Discounted Fares

Table 2-9: Discounted Fares

MODE	REGULAR	SENIOR	DISABLED	YOUTH	HRT EMPLOYEES/ SPOUSE/ RETIREES	UNKNOWN/NO RESPONSE
System Total	**93%**	**3%**	**2%**	**1%**	**0%**	**1%**
Ferry	97%	3%	0%	0%	0%	0%
Light Rail	95%	1%	2%	0%	1%	1%
Local Bus	93%	3%	2%	1%	0%	1%
MAX	91%	1%	6%	0%	0%	1%
VB Wave	91%	8%	0%	1%	0%	1%

Technology – Smartphone

Figure 2-9: Smartphone Utilization



Technology – Smartphone by Mode

Figure 2-10: Smartphone Utilization by Mode

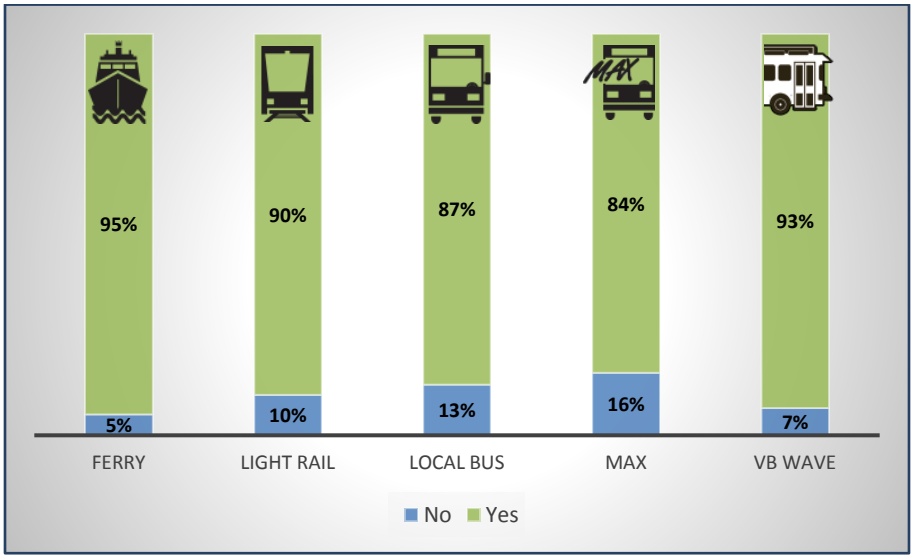


Table 2-10: Smartphone Ownership

	YES – OWNS A SMARTPHONE	NO – DOES NOT OWN A SMARTPHONE
System Total	**88%**	**12%**
Ferry	95%	5%
Light Rail	90%	10%
Local Bus	87%	13%
MAX	84%	16%
VB Wave	93%	7%

Chapter 3

System Demographics

HAMPTON ROADS TRANSIT

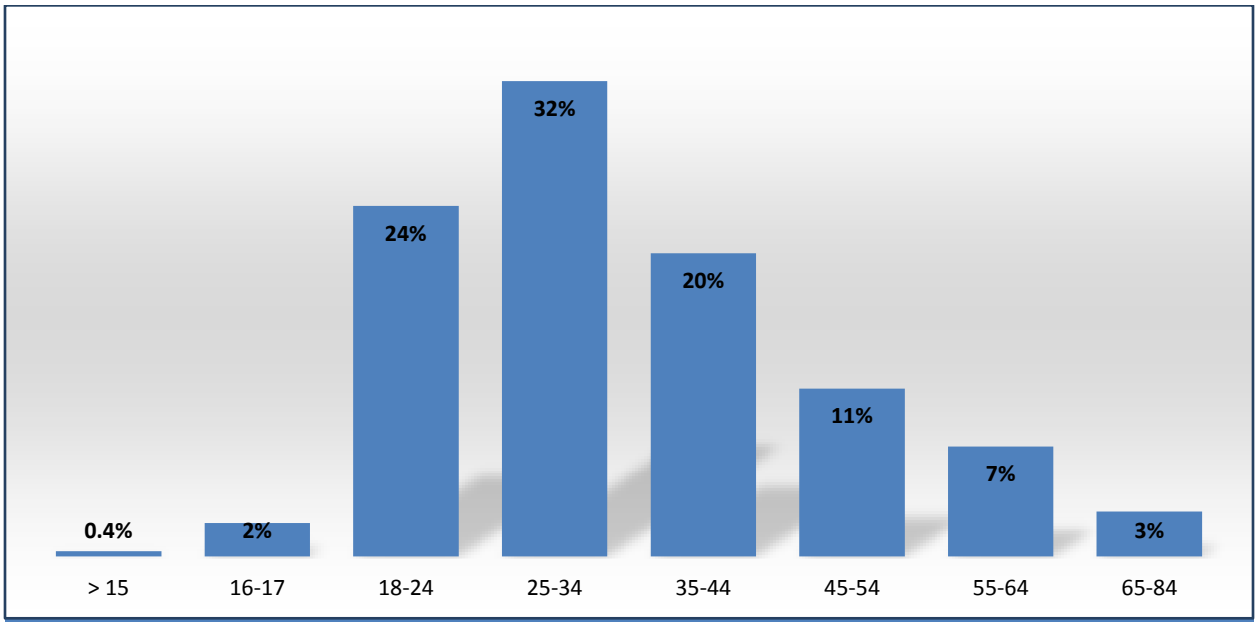
CHAPTER 3: SYSTEM DEMOGRAPHICS

HRT System Demographics

Age

The disbursement of transit riders by age is primarily concentrated in the generations typically identified as "Millennials" and "Generation X." The most concentrated percentage of riders included those in the age ranges of 18-24 (23.5%), 25-34 (31.9%), and 35-44 (20.3%). These three categories, ranging from 18-44, made up approximately 76% of HRT's riders.

Figure 3-1: Demographics - Age



Age by Service Type

Figure 3-2: Demographics by Service Type - Age

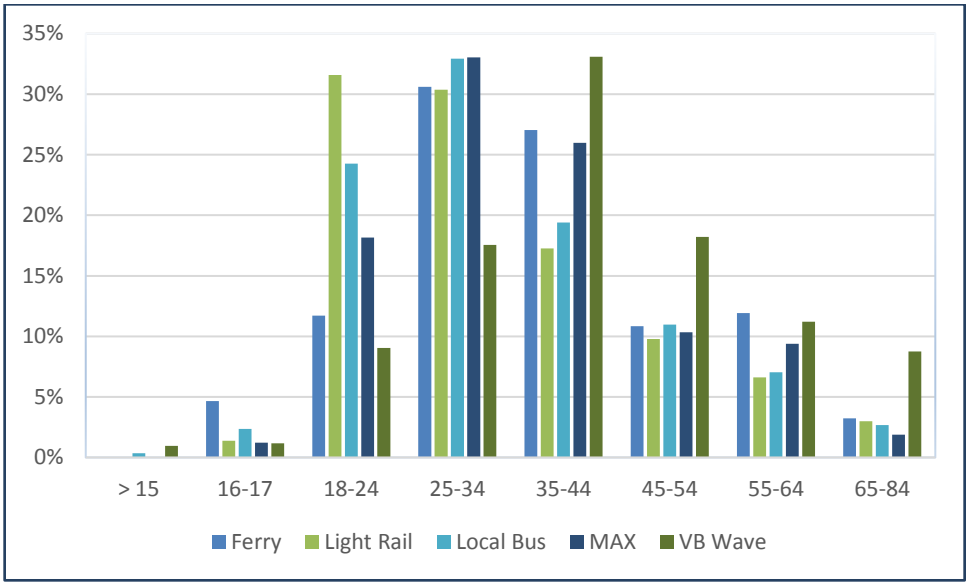


Table 3-1: Demographics by Service Type - Age

	> 15	16-17	18-24	25-34	35-44	45-54	55-64	65-84
System Total	**0.4%**	**2%**	**24%**	**32%**	**20%**	**11%**	**7%**	**3%**
Ferry	0%	5%	12%	31%	27%	11%	12%	3%
Light Rail	0%	1%	32%	30%	17%	10%	7%	3%
Local Bus	0%	2%	24%	33%	19%	11%	7%	3%
MAX	0%	1%	18%	33%	26%	10%	9%	2%
VB Wave	1%	1%	9%	18%	33%	18%	11%	9%

Gender by Service Type

Across all transit modes, the system-wide average shows that women are a higher percentage of riders than men by approximately 10%. Women make up 55% of HRT's overall ridership and men make up 45%. Further evaluation of the data show that the highest ridership by mode for year-round service by gender is light rail for women (57%) and Ferry service for men (55%).

Figure 3-3: Gender by Service Type

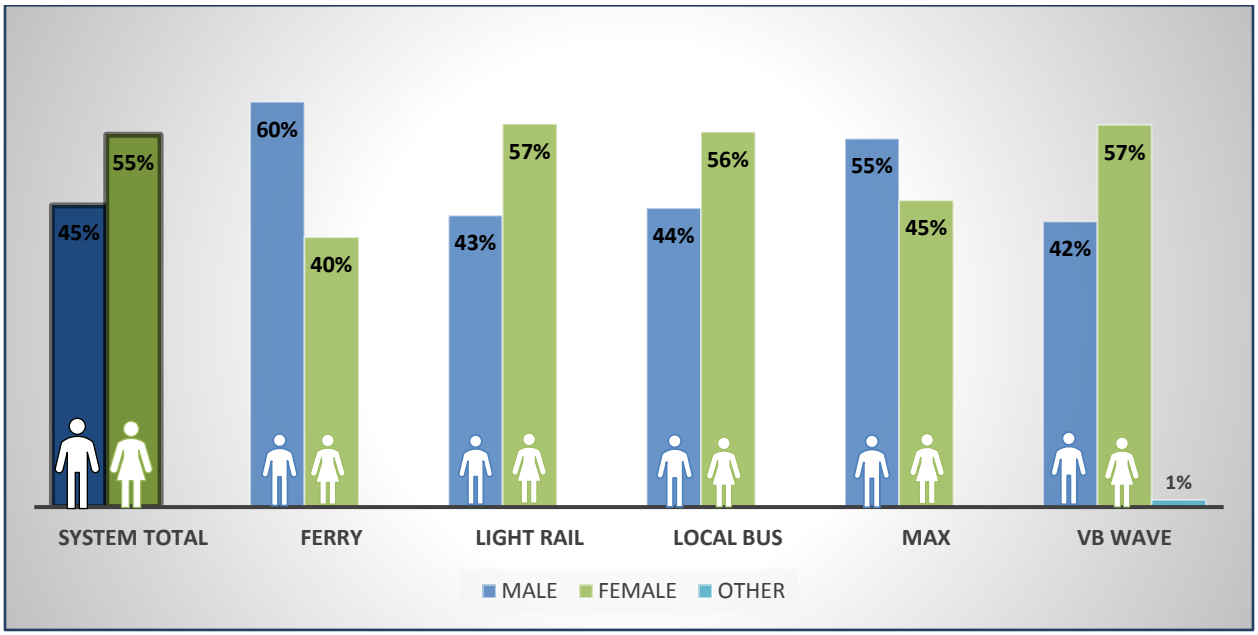


Table 3-2: Gender by Service Type

	MALE	FEMALE	OTHER
System Total	**45%**	**55%**	**0%**
Ferry	60%	40%	0%
Light Rail	43%	57%	0%
Local Bus	44%	56%	0%
MAX	55%	45%	0%
VB Wave	42%	57%	1%

Race/Ethnicity by Service Type

Figure 3-4: Minority Status by Service Type

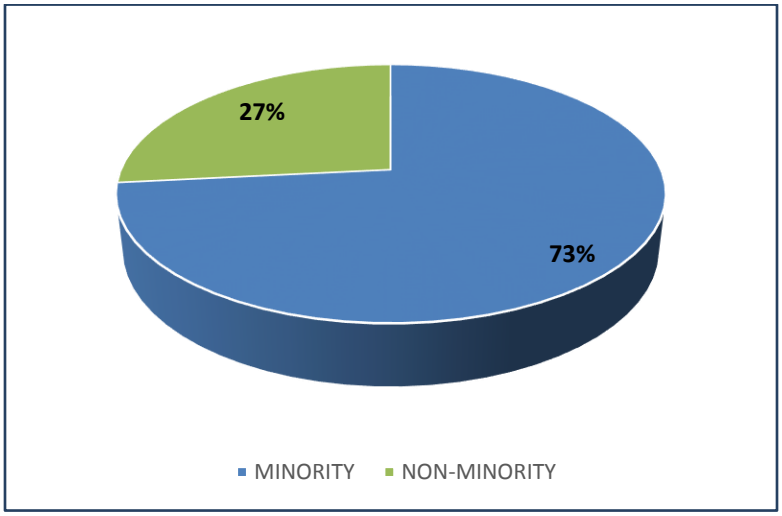


Table 3-3: Minority Status by Mode

	MINORITY	NON-MINORITY
System Total	**73%**	**27%**
Ferry	34%	66%
Light Rail	64%	36%
Local Bus	78%	22%
MAX	70%	30%
VB Wave	33%	67%

Table 3-4: Race/Ethnicity by Service Type

	SYSTEM TOTAL	FERRY	LIGHT RAIL	LOCAL BUS	MAX	VB WAVE
American Indian/Alaskan Native	1%	5%	0%	2%	0%	2%
Asian	2%	2%	2%	2%	4%	3%
Black/African American	74%	29%	67%	79%	70%	22%
Hispanic/Latino	5%	4%	5%	5%	5%	13%
Native Hawaiian/Pacific Islander	1%	0%	0%	0%	0%	2%
White/Caucasian	27%	66%	36%	22%	30%	67%

Language

The primary language spoken at home by over 95% of HRT riders is English. The percentage of riders who stated that their primary language spoken at home was not English, was with 4.62 %. Table 3-6 below provides a detailed breakdown of the languages identified in the study that are spoken.

Figure 3-5: Primary Language Spoken at Home

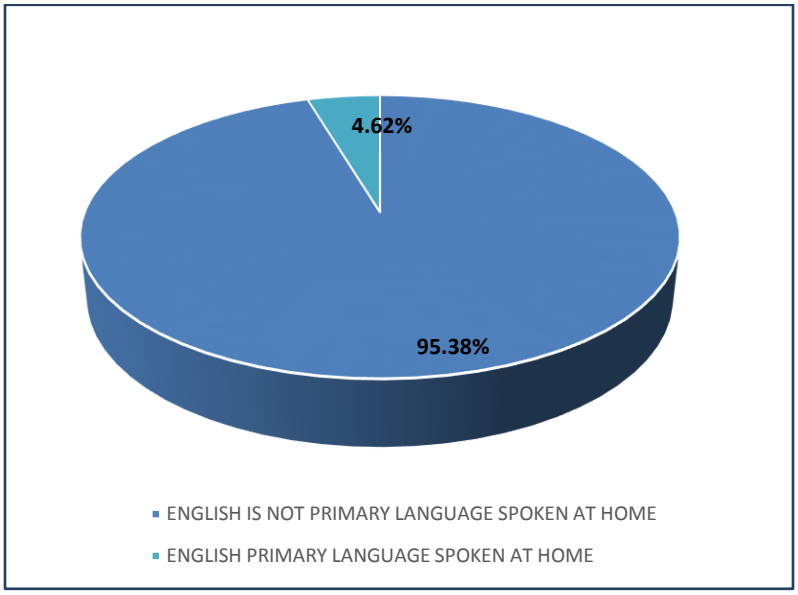


Table 3-5: Primary Language Spoken at Home

	ENGLISH IS NOT PRIMARY LANGUAGE SPOKEN AT HOME	ENGLISH PRIMARY LANGUAGE SPOKEN AT HOME
System Total	**95.38%**	**4.62%**
Ferry	100.00%	0.00%
Light Rail	95.25%	4.75%
Local Bus	96.06%	3.94%
MAX	95.62%	4.38%
VB Wave	83.73%	16.27%

Respondent Language other than English at Home

Table 3-6: Primary Language Spoken at Home – All languages, Detailed

	System Total
Afrikaans	0.03%
American Sign Language (ASL)	0.12%
Arabic, Standard	0.04%
Armenian	0.05%
Chamorro	0.01%
Chinese	0.08%
Chinese, Mandarin	0.03%
Farsi, Eastern	0.02%
Filipino	0.06%
French	0.39%
German	0.13%
Greek	0.00%
Haitian Creole French	0.07%
Hindi	0.03%
Indo-Portuguese	0.01%
Irish Gaelic	0.01%
Italian	0.02%
Japanese	0.06%
Korean	0.02%
Middle English	0.01%
Nepali	0.01%
Old English	0.02%
Old Spanish	0.02%
Other	0.02%
Pennsylvania German	0.02%
Pidgin, Nigerian	0.01%
Portuguese	0.03%
Potawatomi	0.00%
Russian	0.05%
Sinhala	0.04%
Somali	0.08%
Spanish	2.88%
Swahili	0.02%
Tagalog	0.10%
Thai	0.03%
Turkish	0.01%
Ukrainian	0.01%
Uzbek	0.01%
Vietnamese	0.04%

Employment Status

Figure 3-6: Employment Status

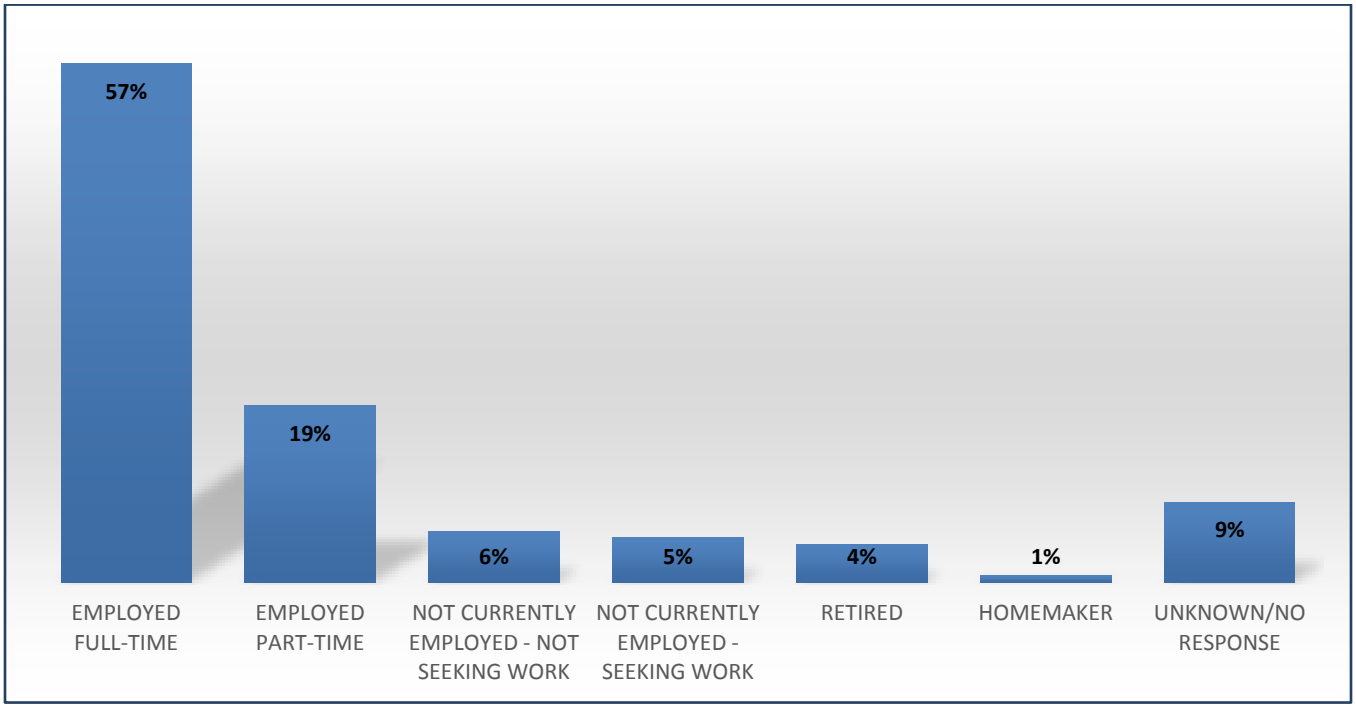


Table 3-7: Employment Status

	EMPLOYED FULL-TIME	EMPLOYED PART-TIME	HOMEMAKER	NOT CURRENTLY EMPLOYED - NOT SEEKING WORK	NOT CURRENTLY EMPLOYED - SEEKING WORK	RETIRED	NO RESPONSE
System Total	**57%**	**19%**	**1%**	**6%**	**5%**	**4%**	**9%**
Ferry	53%	7%	0%	1%	0%	5%	33%
Light Rail	65%	16%	1%	7%	4%	2%	5%
Local Bus	59%	22%	1%	6%	5%	5%	3%
MAX	73%	8%	0%	4%	4%	4%	8%
VB Wave	6%	1%	0%	1%	1%	0%	91%

Driver's License

Figure 3-7: Driver's License

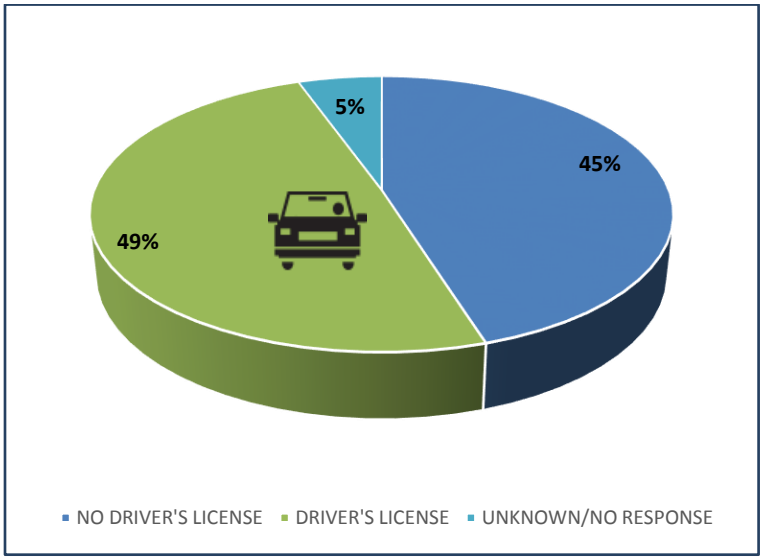


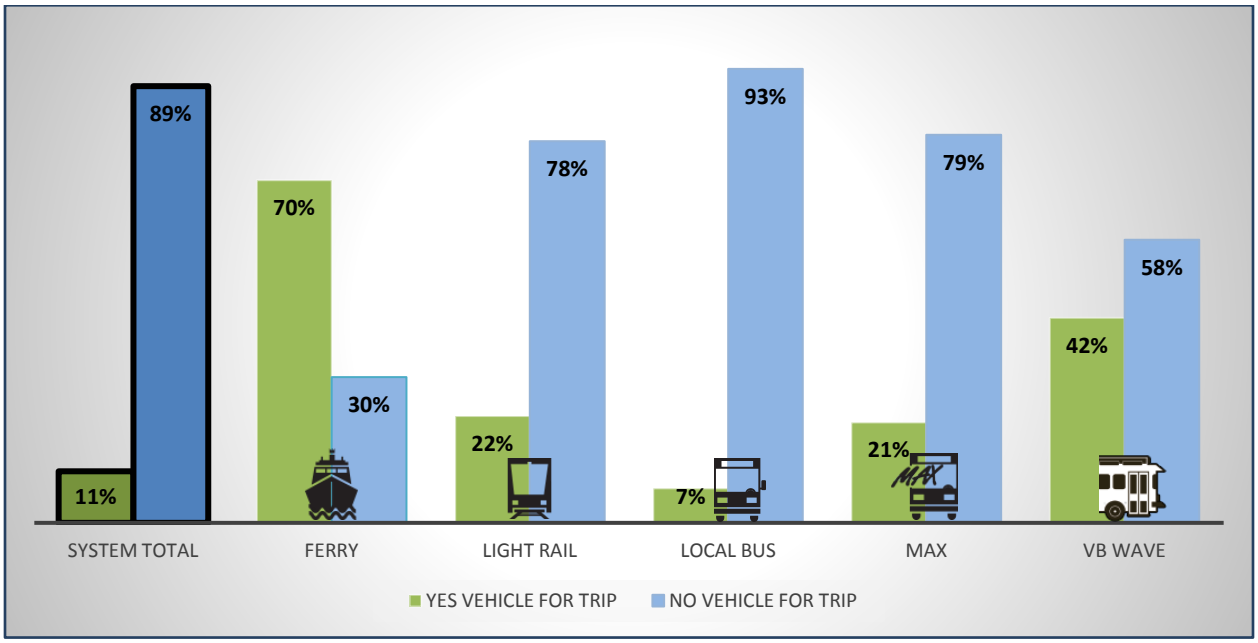
Table 3-8: Driver's License

	NO DRIVER'S LICENSE	DRIVER'S LICENSE	UNKNOWN/NO RESPONSE
System Total	**45%**	**49%**	**5%**
Ferry	17%	66%	17%
Light Rail	34%	66%	0%
Local Bus	50%	50%	0%
MAX	37%	61%	2%
VB Wave	5%	5%	91%

Car Availability by Service Type

Based on the results of the data HRT has a highly transit dependent population. Eighty-percent of riders could not access a car to complete their trip. For that rider, there was no car option available. Those who had access represented approximately 20% of those surveyed.

Figure 3-8: Car Availability by Service Type



*Based on those who responded to the survey. Does not include "no response"

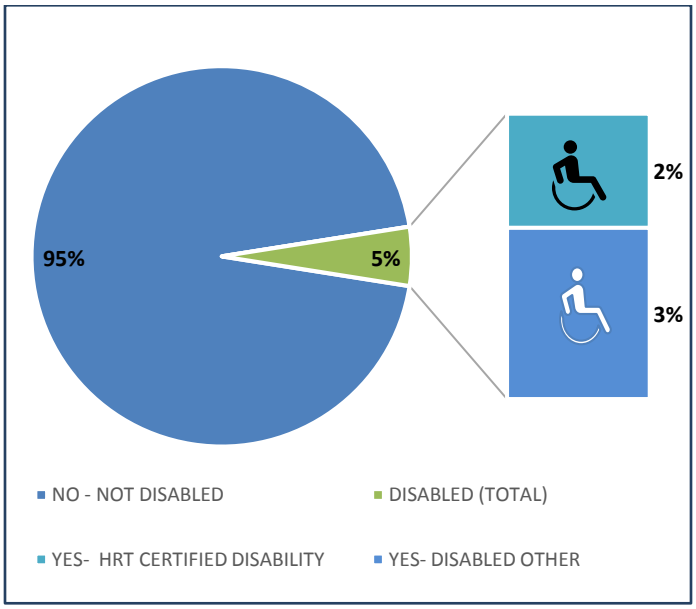
Table 3-9: Car Availability by Service Type

MODE	YES - VEHICLE FOR TRIP	NO - VEHICLE FOR TRIP
System Total	**11%**	**89%**
Ferry	70%	30%
Light Rail	22%	78%
Local Bus	7%	93%
MAX	21%	79%
VB Wave	42%	58%

Disability Status

Respondents were asked if they had a disability that limits their mobility that has been verified by HRT or another organization. Respondents were given the option to state that; Yes, they had a disability that has been verified through HRT; Yes, they had a disability that was verified by another organization; or No, they did not have a disability.

Figure 3-9: Disability Status



Student Status

Respondents' were asked their student status, this question allowed them to answer whether they were a full-time or part-time college/university student, a student in grades K-12, or that they did not identify as a student.

Figure 3-10: Student Status

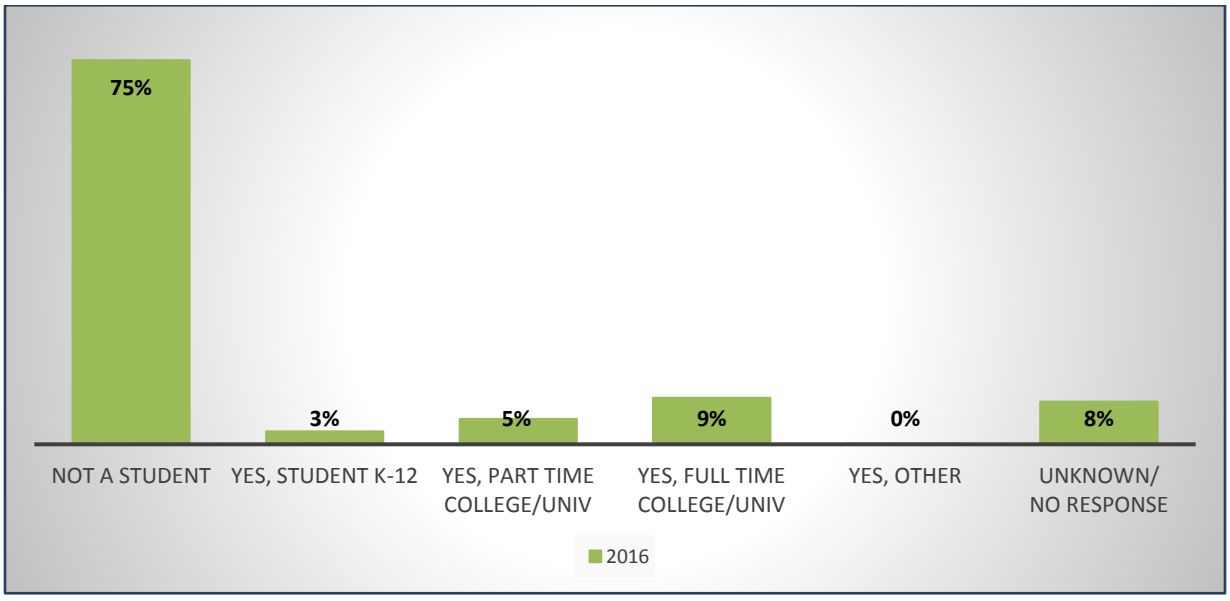


Table 3-10: Student Status

	NOT A STUDENT OR INTERN	OTHER	YES, FULL TIME COLLEGE/ UNIVERSITY	YES, GRADE K - 12	YES, PART TIME COLLEGE/ UNIVERSITY	UNKNOWN/ NO RESPONSE
System Total	**75%**	**0%**	**9%**	**3%**	**5%**	**8%**
Ferry	69%	0%	1%	2%	9%	18%
Light Rail	67%	0%	24%	1%	4%	3%
Local Bus	80%	0%	9%	3%	5%	3%
MAX	81%	0%	8%	1%	1%	8%
VB Wave	7%	0%	1%	0%	1%	91%

City of Trip Origin

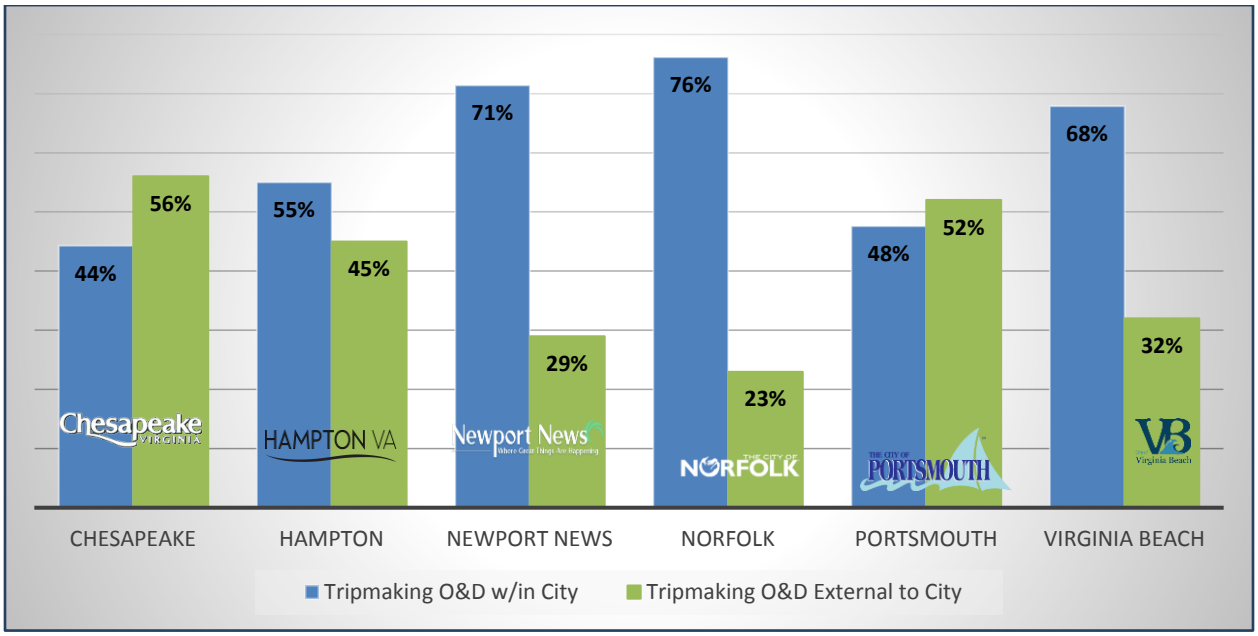
Table 3-11: City of Trip Origin

	SYSTEM TOTAL	FERRY	LIGHT RAIL	LOCAL BUS	MAX	VB WAVE
Carrollton	**0.03%**	0.00%	0.00%	0.04%	0.00%	0.00%
Chesapeake	**6.52%**	6.78%	5.89%	6.74%	11.54%	1.31%
Chester	**0.02%**	0.00%	0.00%	0.00%	0.00%	0.40%
Gloucester Courthouse	**0.01%**	0.00%	0.00%	0.01%	0.00%	0.00%
Hampton	**10.03%**	0.00%	0.72%	11.40%	17.01%	0.00%
Newport News	**16.60%**	0.00%	0.00%	19.32%	17.88%	0.00%
Norfolk	**40.77%**	32.34%	65.05%	42.09%	24.06%	2.71%
Out of State	**0.06%**	1.93%	0.40%	0.00%	0.00%	0.00%
Portsmouth	**7.72%**	41.76%	3.45%	8.00%	3.74%	0.00%
Smithfield	**0.07%**	0.00%	0.00%	0.08%	0.00%	0.00%
Suffolk	**0.30%**	11.36%	0.00%	0.09%	0.00%	0.53%
Virginia Beach	**17.65%**	4.76%	24.48%	11.98%	25.77%	95.04%
Williamsburg	**0.16%**	0.00%	0.00%	0.19%	0.00%	0.00%
Yorktown	**0.07%**	1.07%	0.00%	0.06%	0.00%	0.00%

Top Cities of Origin to Top Cities of Destination

The figure below highlights the regional nature of HRT's transit system. Across all cities approximately ¼ or more of trips either or more of trips either originate in one city and end in a different city within the region. This highlights the point that customers do not recognize city lines when they make their trips and that they see HRT as one single regional transit system.

Figure 3-11: City of Trip Origin



Park and Ride

Figure 3-12: Park and Ride

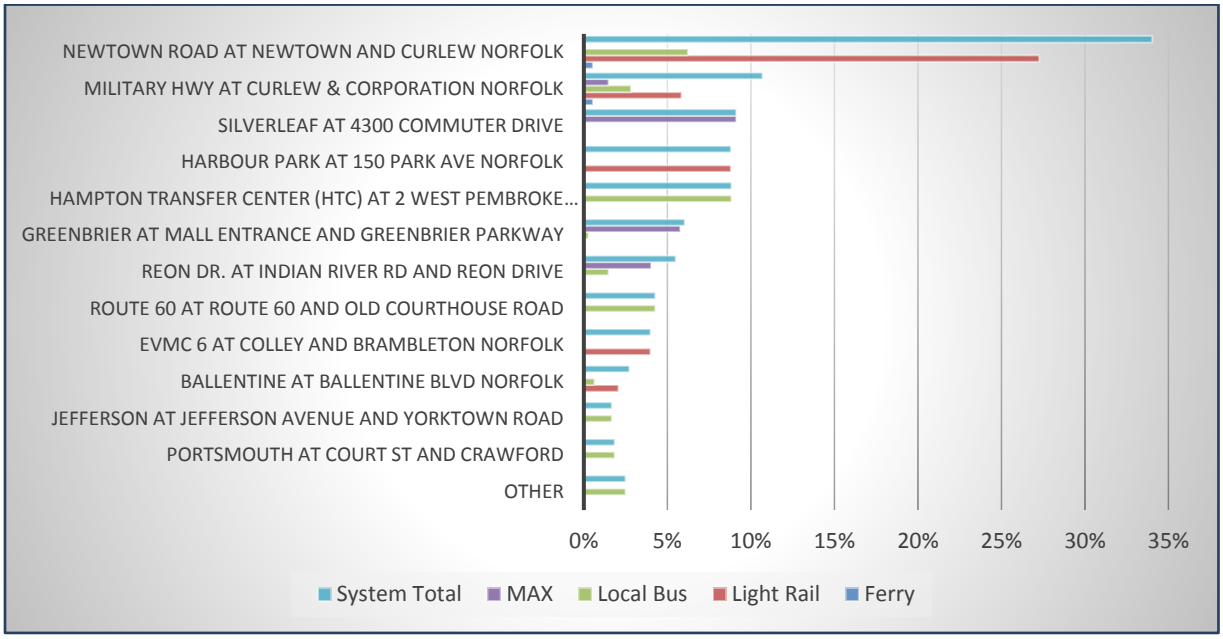


Table 3-12: Park and Ride Utilization

PARK AND RIDE LOCATION	SYSTEM TOTAL	FERRY	LIGHT RAIL	LOCAL BUS	MAX
Ballentine at Ballentine Blvd Norfolk	**3%**	0%	2%	1%	0%
EVMC 6 at Colley and Brambleton Norfolk	**4%**	0%	4%	0%	0%
Greenbrier at Mall Entrance and Greenbrier Parkway	**6%**	0%	0%	0%	6%
Hampton Transfer Center (HTC) at 2 West Pembroke Avenue Hampton	**9%**	0%	0%	9%	0%
Harbor Park at 150 Park Ave Norfolk	**9%**	0%	9%	0%	0%
Jefferson at Jefferson Avenue and Yorktown Road	**2%**	0%	0%	2%	0%
Military Hwy at Curlew and Corporation Norfolk	**11%**	1%	6%	3%	1%
Newtown Road at Newtown and Curlew Norfolk	**34%**	1%	27%	6%	0%
Other	**2%**	0%	0%	2%	0%
Court St and Crawford - Portsmouth	**2%**	0%	0%	2%	0%
Reon Dr. at Indian River Rd and Reon Drive - Chesapeake	**6%**	0%	0%	1%	4%
Route 60 at Route 60 and Old Courthouse Road	**4%**	0%	0%	4%	0%
Silverleaf at 4300 Commuter Drive – Virginia Beach	**9%**	0%	0%	0%	9%
System Total	**100%**	**1%**	**48%**	**31%**	**20%**

Chapter 4

Regional System Maps

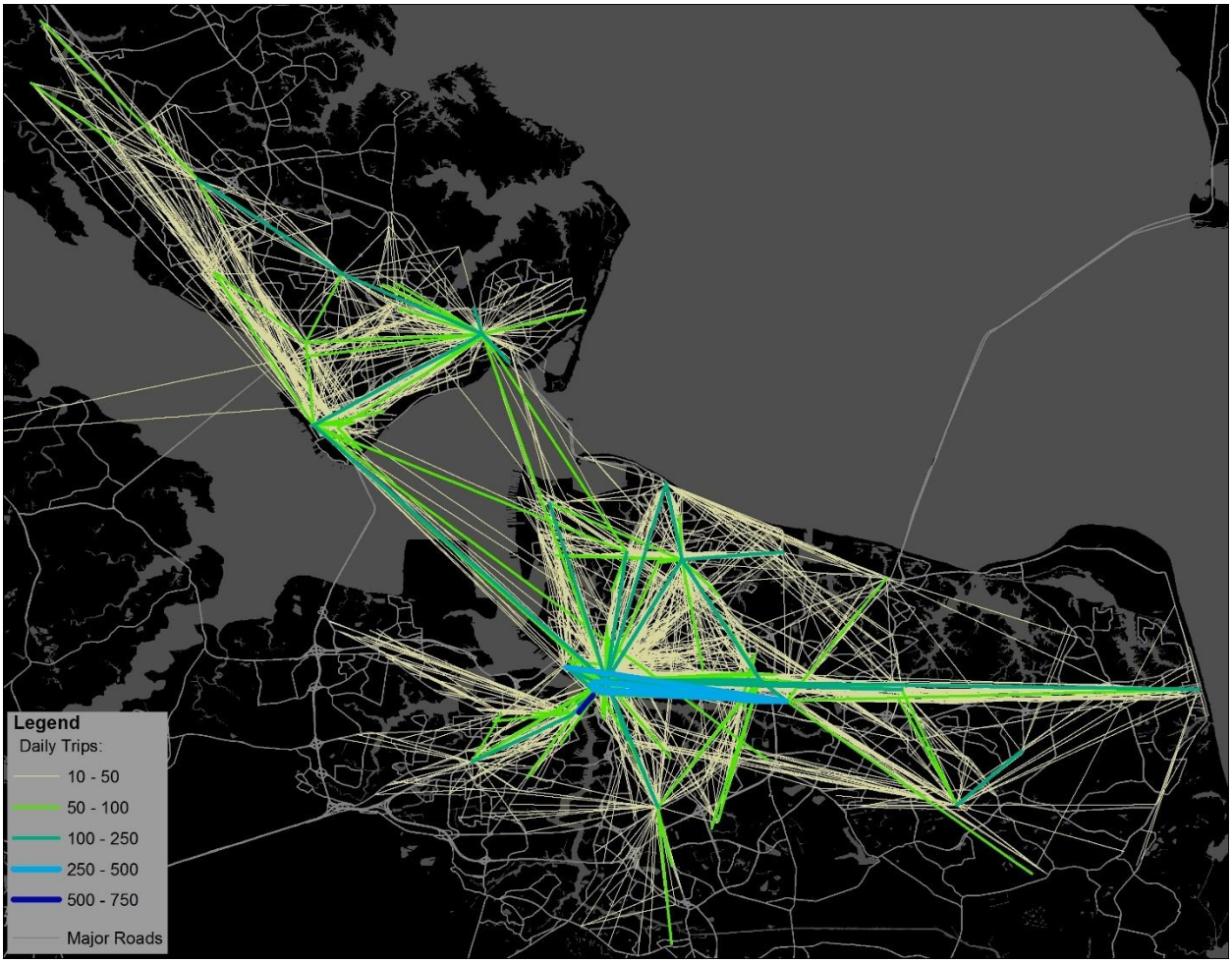
HAMPTON ROADS TRANSIT

CHAPTER 4: REGIONAL SYSTEM MAPS

Hampton Roads Transit's service extends beyond the boundary of each individual city that it serves. The maps below provide insight into the truly regional nature of the transit system. In many cases, the trip-making patterns of our customers extend beyond the individual city borders and occur throughout the transit system. The maps that follow will look at information; including origins and destinations by daily and weekly trips and route specific origin and destination data. The maps provide a pictorial representation of origin and destination travel behavior.

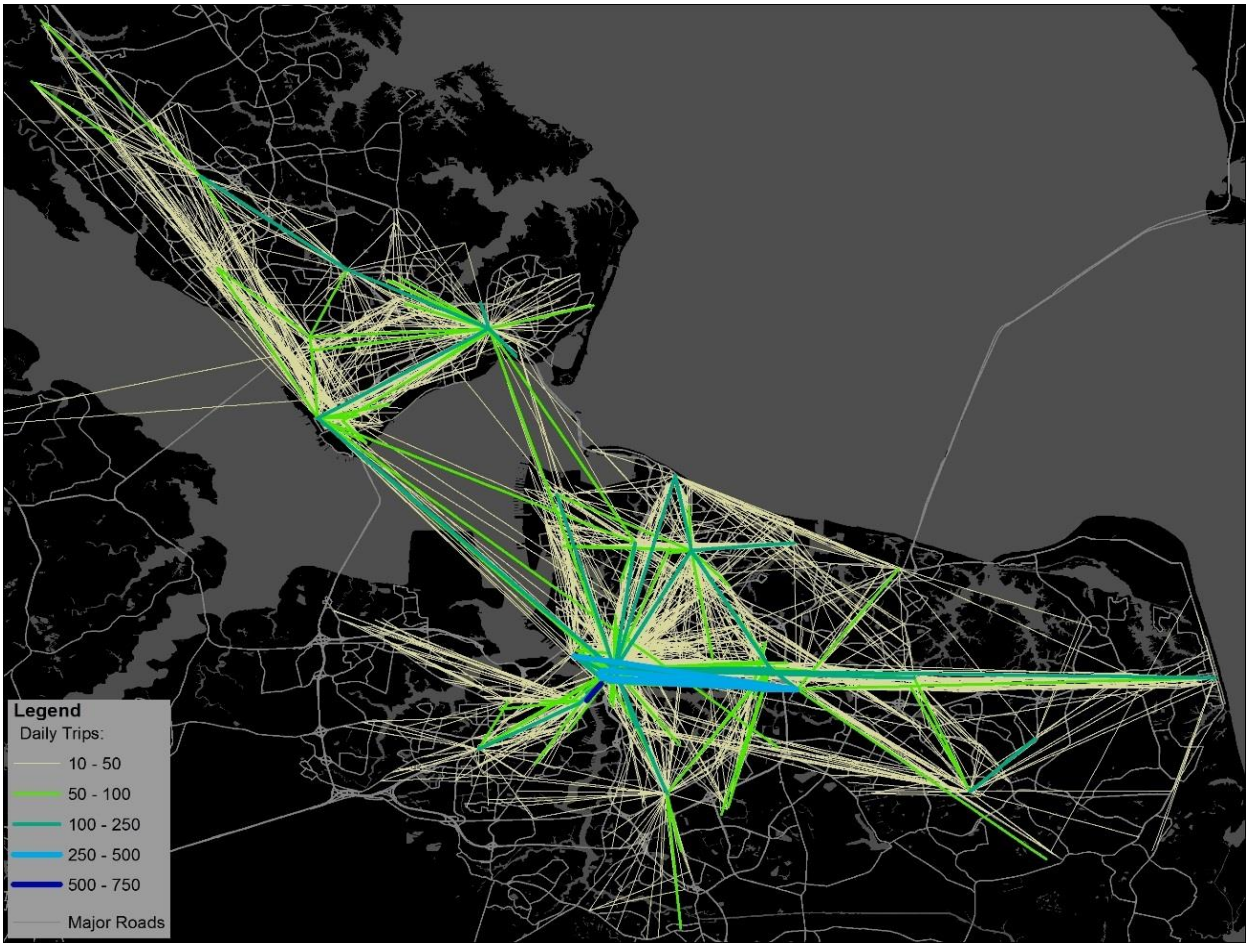
Origins and Destinations by Daily Trips

Figure 4-1: Origins and Destinations by Daily Trips



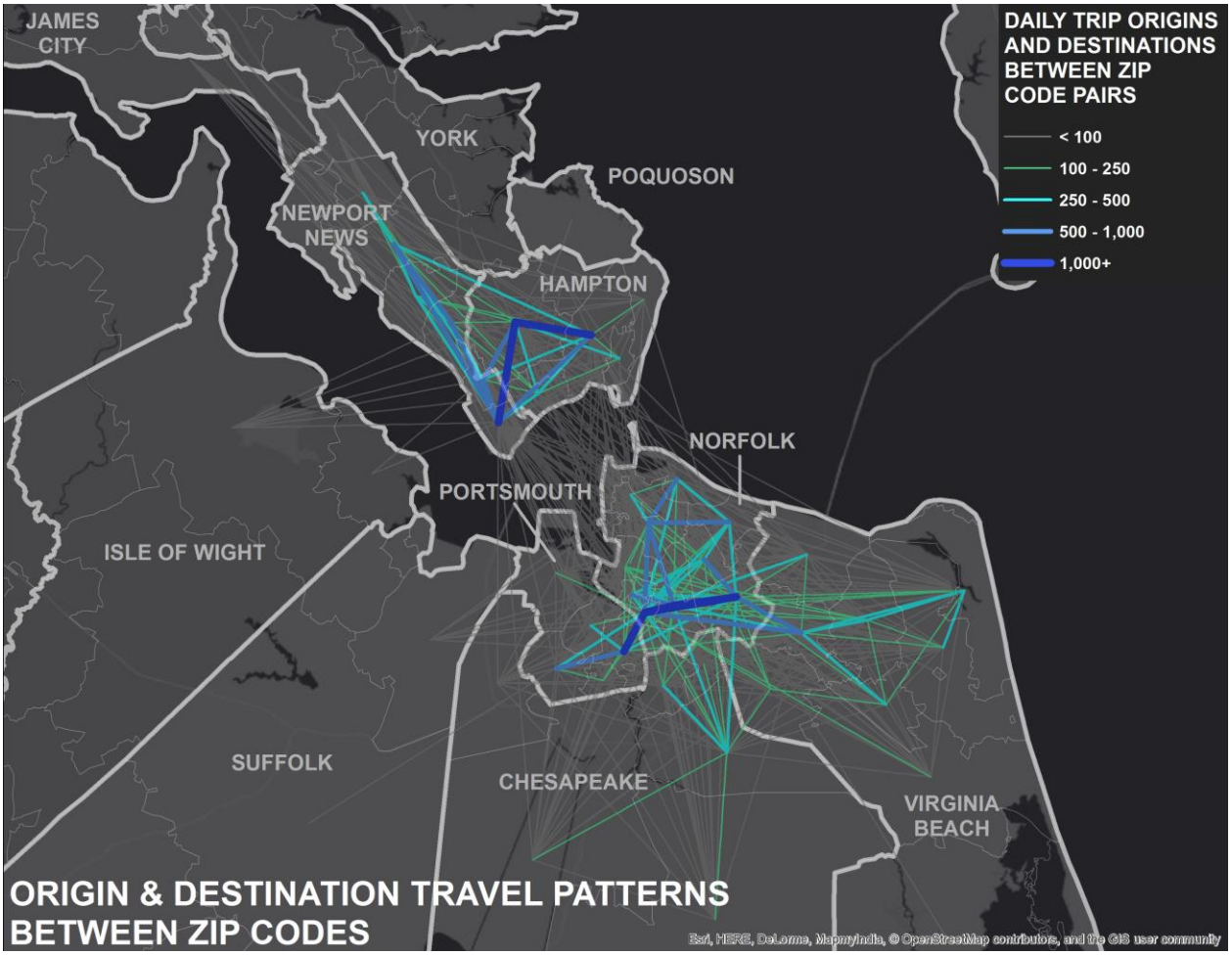
Travel Between All Routes – Aggregate

Figure 4-2: Travel Between All Routes - Aggregate



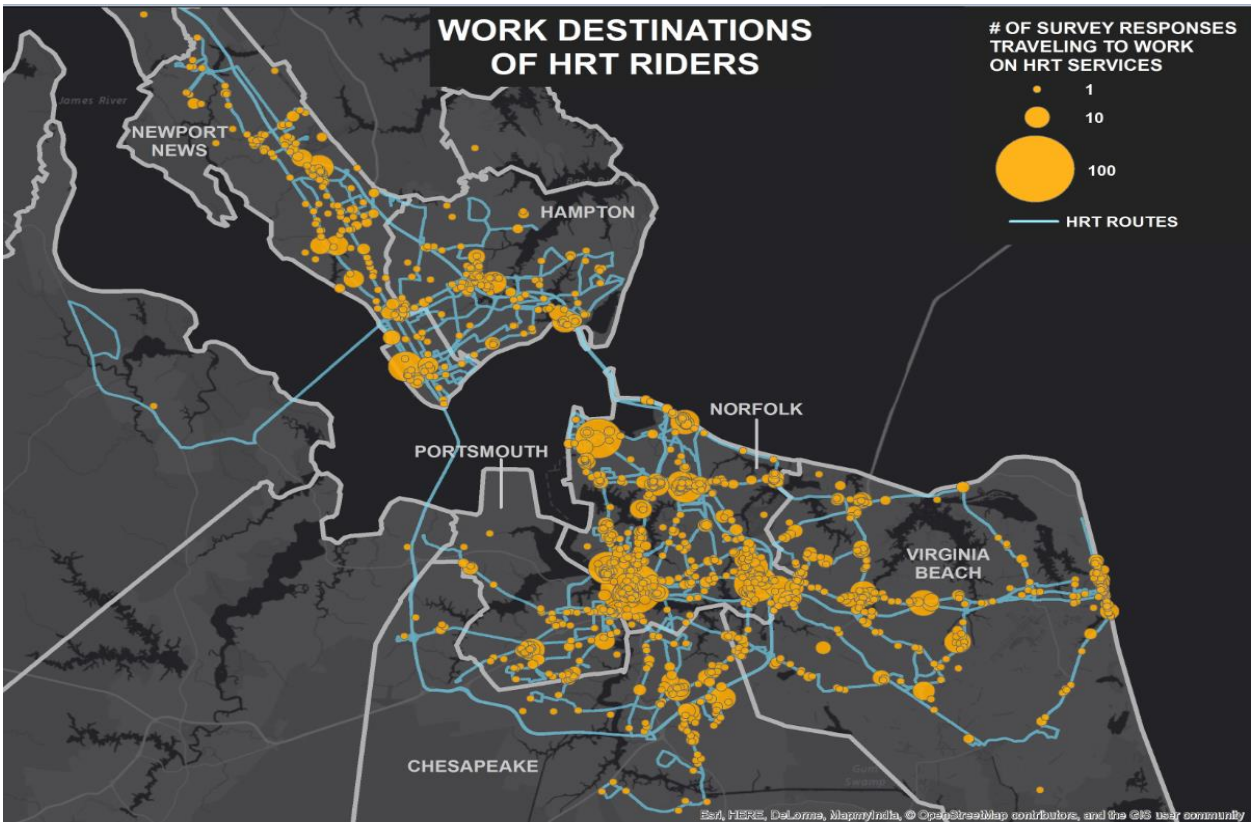
Travel Between Zip Codes

Figure 4-3: Travel Between Zip Codes



Employment Destinations

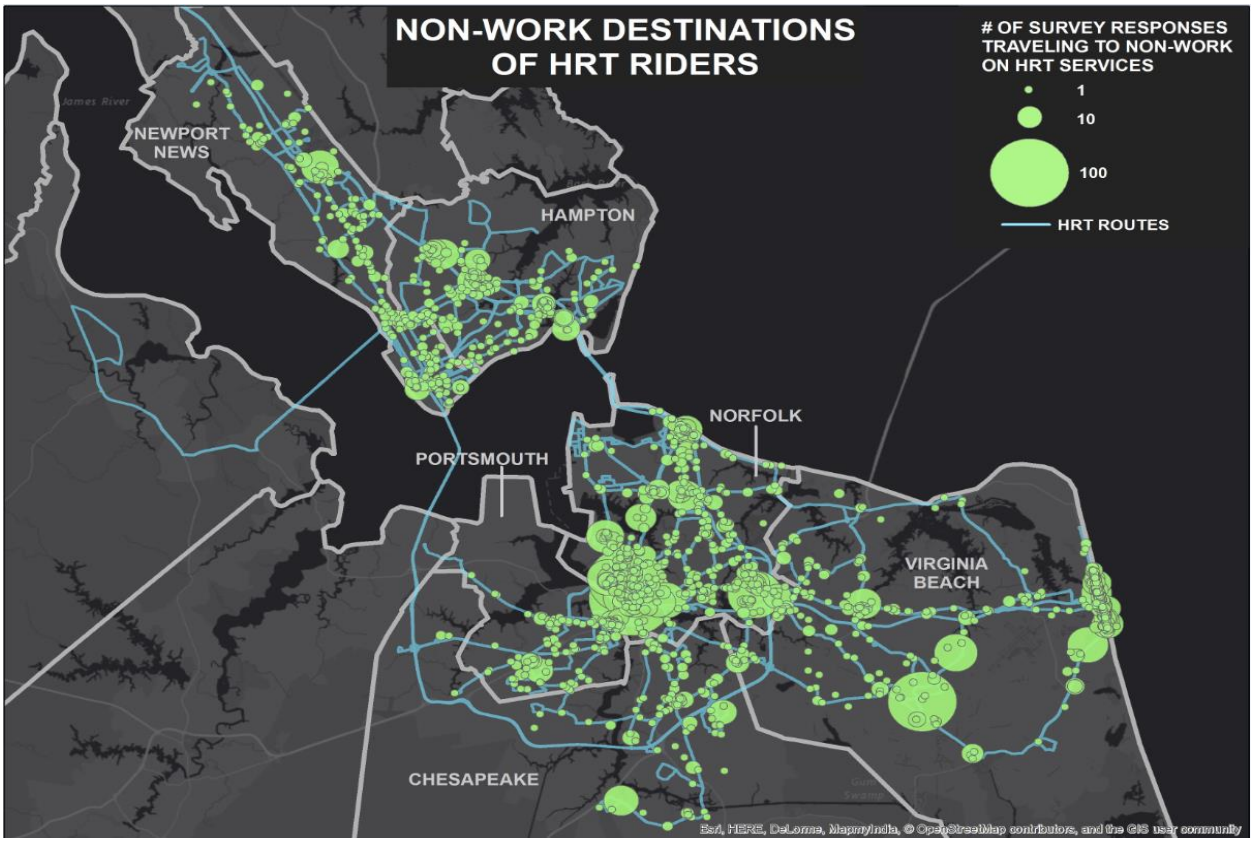
Figure 4-4: Employment Destinations



The map above utilizes data and information collected during the survey to depict survey respondents' identification of work location destinations. Key areas include: Coliseum Central, Downtown Norfolk, Greenbrier, Military Highway, Naval Station Norfolk, Newport News Shipyard, the Oceanfront, and Victory Crossing.

Destinations – Non-Work

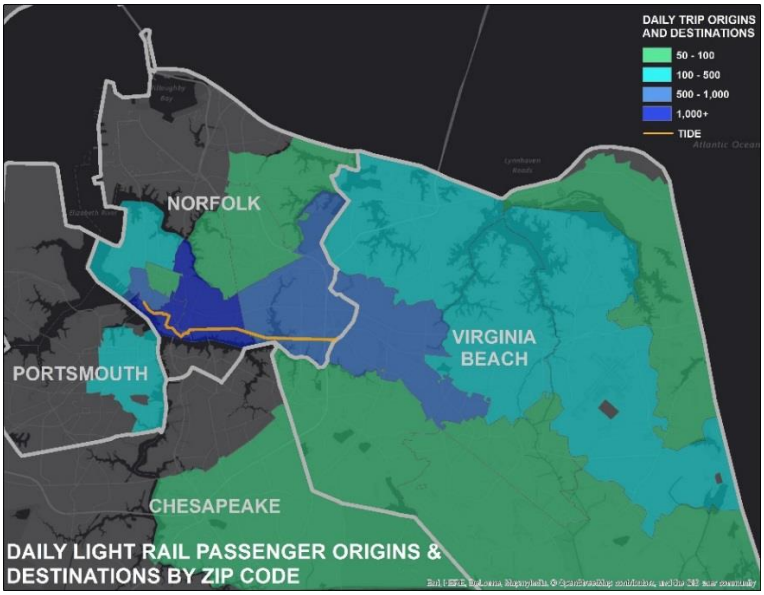
Figure 4-5: Destinations Non-Work



The map above utilizes data and information collected during the survey to depict survey respondents' identification of non-work location destinations. Key areas include: Downtown Norfolk, Government Centers, Military Circle, the Oceanfront, Patrick Henry Mall, Peninsula Town Center, Tidewater Community College (TCC), and Thomas Nelson Community College (TNCC), and Victory Crossing.

Light Rail – Origins and Destinations

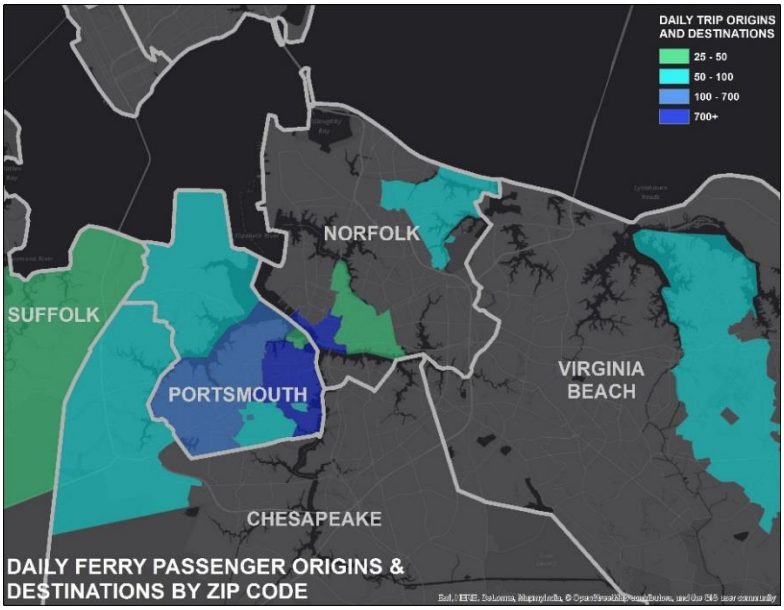
Figure 4-6: Light Rail - Origins and Destinations



The Tide light rail system's boundaries lie within the City of Norfolk. However, the map included shows how many of the trip origins and destinations occur outside of Norfolk's city boundaries. These include a significant number of trips that originate and/or terminate in the cities of Chesapeake, Portsmouth, and Virginia Beach, with additional trips (under 50 boardings - origins and destinations) occurring both within and outside of the region not shown on the map.

Ferry – Origins and Destinations

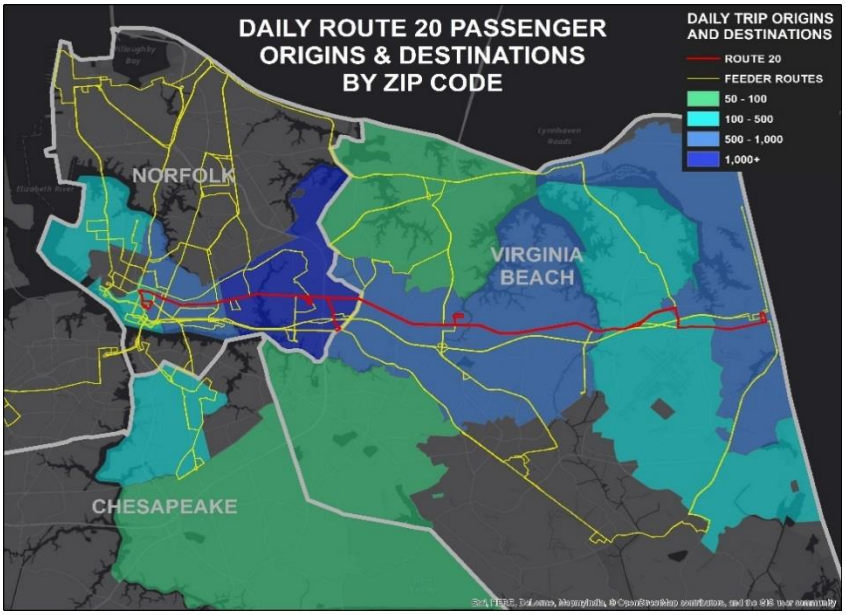
Figure 4-7: Ferry - Origins and Destinations



The Elizabeth River Ferry provides service between the cities of Norfolk and Portsmouth. These include trips that originate and/or terminate in the cities of Chesapeake, Suffolk, and Virginia Beach, with additional trips (under 50 boardings - origins and destinations) occurring both within and outside of the region not shown on the map.

Route 20: Origins and Destinations – Zip Code

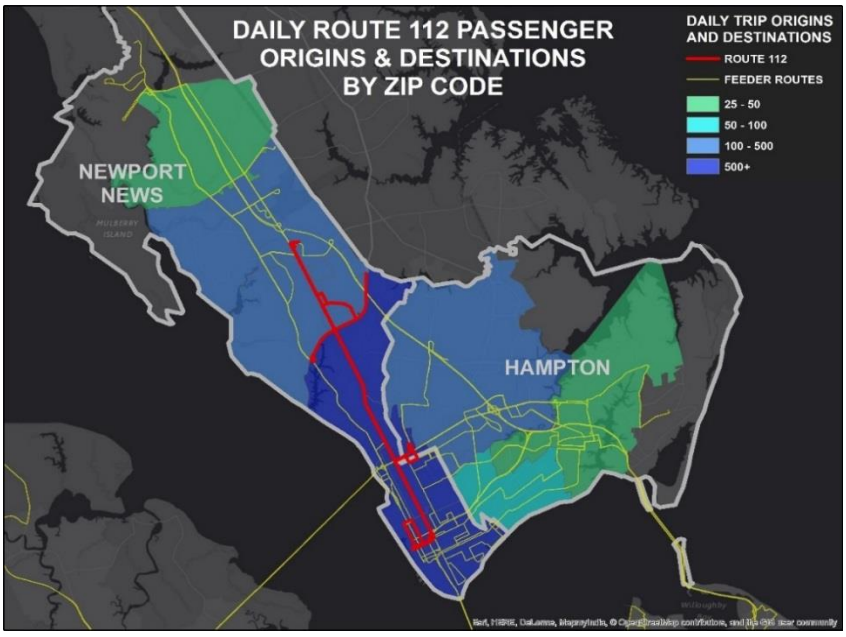
Figure 4-8: Route 20 - Origins and Destinations



The Route 20 provides service on the Southside of HRT's service area and is the highest performing local bus route system-wide, with 1,204,112 passenger trips generated in FY16. The map included shows how many of the trip origins and destinations occur in the cities of Chesapeake, Norfolk, and Virginia Beach. The map shows how feeder routes connect to the Route 20 highlighting its impact in the region and the impact the service has on areas and routes that are and are not physically connected along the route's path.

Route 112 – Origins and Destinations

Figure 4-9: Route 112 - Origins and Destinations



The Route 112 provides service on the Northside of HRT's service area and is the highest performing local bus route on the north side, with 523,512 passenger trips generated in FY16. The map included shows how many of the trip origins and destinations occur in the cities of Hampton and Newport News. The map shows how feeder routes connect to the Route 112 highlighting it as a route that serves as a "spine" of the Northside and the feeder route that supports its structure and generates ridership based on its connectedness.

Chapter 5

Survey Methodology

HAMPTON ROADS TRANSIT

CHAPTER 5: SURVEY METHODOLOGY

SAMPLING PLAN

To ensure that the distribution of completed surveys mirrored the actual distribution of riders, ETC Institute developed a sampling plan that ensured the completion of Boarding-Alighting Counts on over 700 system trips, On-to-Off counts with at least 8,500 of the system's riders, Park and Ride counts, and an Origin and Destination survey with at least 5,300 of the system's riders during the weekdays based on Tuesday – Thursday average weekday ridership. ETC Institute also developed a sampling plan that ensured the survey completion of 800 of the system's riders on the weekend. The time periods for the weekday collection of this survey were as follows:

TIME PERIOD	TIME RANGE
AM PEAK	Before 8am
MIDDAY	8am-2pm
PM PEAK	2pm-6pm
EVENING	After 6pm

Sources of Ridership Data

The source of the original ridership used to plan for and expand the survey came from HRT and was based on the August and September 2015 average daily ridership, this data source was summarized by ETC. ETC created stop-level ridership data by normalizing the Boarding and Alighting Survey results by the daily ridership totals. The new Stop-Level ridership created by ETC used to fine tune the collection and conduct the expansion, was from average daily ridership from September and October 2016. In both instances, the Virginia Beach (VB) Wave bus routes and Ferry utilized August data and the remaining routes used September data. Per HRT direction, the Virginia Beach (VB) Wave bus and Ferry routes utilized August 2016 data because of seasonal usage.

Sampling Plan for Boarding Alighting Counts

The sampling plan for the Boarding and Alighting Counts was designed to obtain ridership counts from a minimum of 50% of the daily trips on each bus route operated by HRT that has a minimum daily ridership of 500. The cutoff of 500 was selected based on the same cutoff being used for On-to-Off counts. The VB Wave route, with at least a count of 500 in ridership, was not counted due to the contract extension not occurring until after this route was discontinued for the summer season. **Error! No bookmark name given.** shows the g oals and the actual number of completed Boarding-Alighting counts that were obtained for a bus trip by Route, Time Period, and Direction.

Table 5-1 shows the goals and actual number of BA counts that were obtained for a bus trip by Route, Time Period, and Direction. ETC collected 72 more trips than the sampling goal. Overall, 27 of 27 (100.0%) weekday total route goals were fully achieved.

TABLE 5-1: HRT SAMPLING GOALS AND BA COUNTS COMPLETED BY TIME OF DAY AND DIRECTION (BUS)

Route #	Population of Trips						Sampling Goals						COMPLETED						GOAL (10%)
	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Trips	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	
1 Downtown Norfolk Pembroke East INBOUND [HRT]	11	13	13	5	42	81	6	7	7	3	21	41	2	11	8	3	24	47	YES
1 Downtown Norfolk Pembroke East OUTBOUND [HRT]	10	12	13	4	39		5	6	7	2	20		5	9	8	1	23		
2 Naval Station Norfolk/Hampton Blvd INBOUND [HRT]	5	12	6	4	27	56	3	6	3	2	14	28	3	5	3	3	14	28	YES
2 Naval Station Norfolk/Hampton Blvd OUTBOUND [HRT]	7	12	6	4	29		4	6	3	2	15		3	6	2	3	14		
3 Downtown Norfolk/Naval Station INBOUND [HRT]	9	14	13	6	42	80	5	7	7	3	21	40	5	8	6	3	22	40	YES
3 Downtown Norfolk/Naval Station OUTBOUND [HRT]	9	12	13	4	38		5	6	7	2	19		4	6	7	1	18		
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd INBOUND [HRT]	4	5	5	5	19	40	2	3	3	3	10	20	3	3	2	3	11	23	YES
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd OUTBOUND [HRT]	6	5	4	6	21		3	3	2	3	11		5	3	2	2	12		
8 Downtown Norfolk / Evelyn T. Butts Ave INBOUND [HRT]	6	12	5	2	25	48	3	6	3	1	13	24	2	12	5	2	21	40	YES
8 Downtown Norfolk / Evelyn T. Butts Ave OUTBOUND [HRT]	5	12	4	2	23		3	6	2	1	12		2	11	4	2	19		
9 Downtown Norfolk/Sewells Point Road INBOUND [HRT]	4	12	8	5	29	58	2	6	4	3	15	29	1	7	7	4	19	38	YES
9 Downtown Norfolk/Sewells Point Road OUTBOUND [HRT]	4	12	7	6	29		2	6	4	3	15		1	7	6	5	19		
12 South Norfolk/TCC – Virginia Beach INBOUND [HRT]	2	6	4	3	15	31	1	3	2	2	8	16	1	3	2	2	8	16	YES
12 South Norfolk/TCC – Virginia Beach OUTBOUND [HRT]	3	6	4	3	16		2	3	2	2	8		2	3	2	1	8		
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake INBOUND [HRT]	6	7	4	1	18	35	3	4	2	1	9	18	2	6	4	1	13	25	YES
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake OUTBOUND [HRT]	5	6	4	2	17		3	3	2	1	9		2	5	4	1	12		
15 Evelyn Butts to Robert Hall/Greenbrier Mall INBOUND [HRT]	9	14	14	8	45	93	5	7	7	4	23	47	5	8	7	4	24	49	YES
15 Evelyn Butts to Robert Hall/Greenbrier Mall OUTBOUND [HRT]	12	14	15	7	48		6	7	8	4	24		5	9	8	3	25		
20 Downtown Norfolk/Virginia Beach Oceanfront INBOUND [HRT]	10	11	16	5	42	78	5	6	8	3	21	39	5	11	10	1	27	52	YES
20 Downtown Norfolk/Virginia Beach Oceanfront OUTBOUND [HRT]	10	11	11	4	36		5	6	6	2	18		7	11	5	2	25		
21 Little Creek Rd. INBOUND [HRT]	6	12	8	7	33	66	3	6	4	4	17	33	3	6	5	3	17	35	YES
21 Little Creek Rd. OUTBOUND [HRT]	7	12	8	6	33		4	6	4	3	17		4	6	4	4	18		
23 Medical Tower/Military Circle/JANAF INBOUND [HRT]	6	12	8	6	32	66	3	6	4	3	16	33	3	7	4	3	17	33	YES
23 Medical Tower/Military Circle/JANAF OUTBOUND [HRT]	7	12	8	7	34		4	6	4	4	17		3	6	4	3	16		
36 (Holland) Pembroke East INBOUND [HRT]	3	3	5	4	15	31	2	2	3	2	8	16	1	1	2	3	7	16	YES
36 (Holland) Pembroke East OUTBOUND [HRT]	4	3	5	4	16		2	2	3	2	8		2	2	2	3	9		
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	11	14	10	8	43	86	6	7	5	4	22	43	3	8	7	4	22	46	YES
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	10	14	10	9	43		5	7	5	5	22		4	10	6	4	24		
47 Downtown Portsmouth/Churchland INBOUND [HRT]	9	12	10	1	32	64	5	6	5	1	16	32	1	9	6	0	16	33	YES
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	8	12	8	4	32		4	6	4	2	16		2	9	6	0	17		
101 (Kecoughtan) Downtown Newport News/Downtown Hampton INBOUND [HRT]	4	10	8	7	29	57	2	5	4	4	15	29	2	5	4	4	15	30	YES
101 (Kecoughtan) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	3	10	7	8	28		2	5	4	4	14		2	5	3	5	15		
103 (Shell Rd.) Downtown Newport News/Downtown Hampton INBOUND [HRT]	5	12	8	8	33	66	3	6	4	4	17	33	3	6	5	3	17	34	YES
103 (Shell Rd.) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	6	12	8	7	33		3	6	4	4	17		3	6	4	4	17		
104 (Marshall) Downtown Newport News/Newmarket INBOUND [HRT]	4	12	8	8	32	65	2	6	4	4	16	33	2	6	5	4	17	34	YES
104 (Marshall) Downtown Newport News/Newmarket OUTBOUND [HRT]	5	12	8	8	33		3	6	4	4	17		3	6	4	4	17		
105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center INBOUND [HRT]	2	6	4	6	18	35	1	3	2	3	9	18	1	3	2	3	9	18	YES
105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center OUTBOUND [HR	2	6	4	5	17		1	3	2	3	9		1	3	2	3	9		
106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis INBOUND [HRT]	2	4	2	4	12	25	1	2	1	2	6	13	1	2	1	2	6	13	YES
106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis OUTBOUND [HRT]	2	4	3	4	13		1	2	2	2	7		1	2	2	2	7		
107 Newport News / Warwick Boulevard / Denbigh INBOUND [HRT]	1	4	3	3	11	23	1	2	2	2	6	12	1	2	1	2	6	12	YES
107 Newport News / Warwick Boulevard / Denbigh OUTBOUND [HRT]	2	4	3	3	12		1	2	2	2	6		1	2	1	2	6		
110 (Thomas Nelson) Downtown Hampton/Thomas Nelson INBOUND [HRT]	2	3	3	2	10	21	1	2	2	1	5	11	1	2	2	0	5	11	YES
110 (Thomas Nelson) Downtown Hampton/Thomas Nelson OUTBOUND [HRT]	2	4	2	3	11		1	2	1	2	6		1	2	2	1	6		
111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh INBOUND [HRT]	1	1	1	2	5	11	1	1	1	1	3	6	0	1	0	2	3	6	YES
111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh OUTBOUND [HRT]	2		2	2	6		1	0	1	1	3		1	0	1	1	3		
112 Downtown Newport News / Patrick Henry Mall INBOUND [HRT]	5	12	8	11	36	73	3	6	4	6	18	37	2	6	4	6	18	37	YES
112 Downtown Newport News / Patrick Henry Mall OUTBOUND [HRT]	6	12	8	11	37		3	6	4	6	19		3	7	4	5	19		
114 (Weaver Rd.) Newmarket/Downtown Hampton INBOUND [HRT]	3	12	8	7	30	60	2	6	4	4	15	30	2	6	4	3	15	30	YES
114 (Weaver Rd.) Newmarket/Downtown Hampton OUTBOUND [HRT]	4	12	8	6	30		2	6	4	3	15		2	6	4	3	15		
118 (Magruder) Langley/Semple Farm Road INBOUND [HRT]	2	6	4	4	16	32	1	3	2	2	8	16	1	3	2	2	8	16	YES
118 (Magruder) Langley/Semple Farm Road OUTBOUND [HRT]	2	6	4	4	16		1	3	2	2	8		1	3	2	2	8		
961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	6	6	7	5	24	50	3	3	4	3	12	25	3	4	3	2	12	25	YES
961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	5	8	8	5	26		3	4	4	3	13		2	5	3	3	13		
TOTAL	286	492	378	275	1431	1431	143	246	189	138	716	716	131	301	213	142	787	787	YES

Sampling Plan for On-to-Off Counts

The sampling plan for the On-to-Off counts was designed to obtain completed surveys from a minimum of 20% of the daily ridership on each route operated by HRT that has a minimum daily ridership of 500. This is consistent with the previous HRT survey effort in 2013. Collecting at least 100 on-to-off surveys typically yield positive data results for the route/direction/time of day/segment breakdown during the expansion process. Surveying routes below 500 would have provided a sample size smaller than the preferred 100 surveys which is needed in order to provide valuable data for an expansion type that utilizes on-to-off survey's distribution.

Table 5-2 shows the goals and the actual number of actual completed On-to-Off surveys that were obtained for each bus by Route, Time Period, and direction. Table 5-2 through Table 5-4 show that ETC collected 8,067 more responses than the sampling goal. Overall, 40 of 40 (100%) weekday total route goals were fully achieved.

TABLE 5-2: HRT SAMPLING GOALS AND ON-TO-OFF SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (BUS)

Route #	Sampling Goals						COMPLETED						GOAL (10%)
	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	
1 Downtown Norfolk Pembroke East INBOUND [HRT]	48	100	100	26	**274**	**597**	84	280	115	40	**519**	**1007**	YES
1 Downtown Norfolk Pembroke East OUTBOUND [HRT]	57	114	112	41	**323**		96	144	136	112	**488**		
2 Naval Station Norfolk/Hampton Blvd INBOUND [HRT]	14	35	33	8	**90**	**203**	59	72	56	29	**216**	**446**	YES
2 Naval Station Norfolk/Hampton Blvd OUTBOUND [HRT]	21	45	36	11	**113**		61	92	55	22	**230**		
3 Downtown Norfolk/Naval Station INBOUND [HRT]	49	80	69	20	**218**	**407**	55	139	71	31	**296**	**602**	YES
3 Downtown Norfolk/Naval Station OUTBOUND [HRT]	25	60	78	26	**189**		39	125	83	59	**306**		
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd INBOUND [HRT]	16	30	29	6	**81**	**166**	51	71	34	67	**223**	**435**	YES
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd OUTBOUND [HRT]	20	28	29	7	**85**		91	64	35	22	**212**		
8 Downtown Norfolk / Evelyn T. Butts Ave INBOUND [HRT]	19	49	34	11	**113**	**259**	100	201	67	59	**427**	**849**	YES
8 Downtown Norfolk / Evelyn T. Butts Ave OUTBOUND [HRT]	15	56	54	21	**146**		100	96	158	68	**422**		
9 Downtown Norfolk/Sewells Point Road INBOUND [HRT]	16	32	27	7	**81**	**172**	28	54	43	31	**156**	**307**	YES
9 Downtown Norfolk/Sewells Point Road OUTBOUND [HRT]	12	35	30	14	**91**		32	38	52	29	**151**		
12 South Norfolk/TCC – Virginia Beach INBOUND [HRT]	3	15	20	4	**43**	**106**	5	67	96	61	**229**	**454**	YES
12 South Norfolk/TCC – Virginia Beach OUTBOUND [HRT]	14	28	18	4	**63**		25	135	49	16	**225**		
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake INBOUND [HRT]	24	44	37	14	**119**	**221**	54	151	81	55	**341**	**697**	YES
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake OUTBOUND [HRT]	17	33	41	11	**101**		91	98	159	8	**356**		
15 Evelyn Butts to Robert Hall/Greenbrier Mall INBOUND [HRT]	46	93	82	22	**242**	**519**	67	182	119	9	**377**	**793**	YES
15 Evelyn Butts to Robert Hall/Greenbrier Mall OUTBOUND [HRT]	42	93	106	36	**277**		22	196	124	74	**416**		
20 Downtown Norfolk/Virginia Beach Oceanfront INBOUND [HRT]	50	120	132	50	**351**	**802**	50	237	142	76	**505**	**1417**	YES
20 Downtown Norfolk/Virginia Beach Oceanfront OUTBOUND [HRT]	85	158	148	59	**451**		222	294	341	55	**912**		
21 Little Creek Rd. INBOUND [HRT]	37	78	64	15	**193**	**402**	42	148	67	22	**279**	**549**	YES
21 Little Creek Rd. OUTBOUND [HRT]	30	77	78	24	**209**		60	87	83	40	**270**		
23 Medical Tower/Military Circle/JANAF INBOUND [HRT]	17	44	38	12	**112**	**241**	46	53	42	16	**157**	**345**	YES
23 Medical Tower/Military Circle/JANAF OUTBOUND [HRT]	21	49	48	12	**130**		23	97	44	24	**188**		
30 Wave: Atlantic Avenue Shuttle INBOUND [HRT]	0	22	42	78	**143**	**400**	0	98	149	174	**421**	**834**	YES
30 Wave: Atlantic Avenue Shuttle OUTBOUND [HRT]	0	60	73	123	**257**		0	114	109	190	**413**		
36 (Holland) Pembroke East INBOUND [HRT]	11	25	26	7	**69**	**132**	13	41	34	13	**101**	**221**	YES
36 (Holland) Pembroke East OUTBOUND [HRT]	10	24	23	7	**63**		31	28	53	8	**120**		
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	43	70	63	23	**199**	**384**	73	176	98	64	**411**	**785**	YES
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	29	66	69	21	**185**		86	126	88	74	**374**		
47 Downtown Portsmouth/Churchland INBOUND [HRT]	24	60	49	9	**142**	**197**	27	56	64	9	**156**	**298**	YES
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	8	26	18	3	**55**		10	77	53	2	**142**		
101 (Kecoughtan) Downtown Newport News/Downtown Hampton INBOUND [HRT]	13	38	38	10	**99**	**194**	48	50	71	22	**191**	**350**	YES
101 (Kecoughtan) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	15	33	35	13	**95**		24	54	65	16	**159**		
103 (Shell Rd.) Downtown Newport News/Downtown Hampton INBOUND [HRT]	14	39	36	15	**104**	**206**	28	50	64	29	**171**	**347**	YES
103 (Shell Rd.) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	13	41	34	14	**102**		33	48	76	19	**176**		
104 (Marshall) Downtown Newport News/Newmarket INBOUND [HRT]	9	31	34	12	**87**	**188**	19	73	61	18	**171**	**350**	YES
104 (Marshall) Downtown Newport News/Newmarket OUTBOUND [HRT]	13	41	32	14	**101**		15	84	60	20	**179**		
105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center INBOUND [HRT]	6	21	25	14	**66**	**155**	5	28	38	28	**99**	**247**	YES
105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center OUTBOUND [HRT]	13	36	27	12	**88**		29	54	44	21	**148**		
106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis INBOUND [HRT]	28	47	43	20	**139**	**267**	40	50	55	42	**187**	**353**	YES
106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis OUTBOUND [HRT]	28	46	38	17	**128**		28	83	35	20	**166**		
107 Newport News / Warwick Boulevard / Denbigh INBOUND [HRT]	3	28	37	20	**88**	**205**	2	53	37	18	**110**	**285**	YES
107 Newport News / Warwick Boulevard / Denbigh OUTBOUND [HRT]	18	49	37	14	**117**		46	58	40	31	**175**		
110 (Thomas Nelson) Downtown Hampton/Thomas Nelson INBOUND [HRT]	3	24	21	9	**57**	**122**	12	34	48	14	**108**	**251**	YES
110 (Thomas Nelson) Downtown Hampton/Thomas Nelson OUTBOUND [HRT]	9	29	19	8	**65**		19	65	50	9	**143**		
111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh INBOUND [HRT]	6	24	19	6	**55**	**125**	14	43	30	10	**97**	**208**	YES
111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh OUTBOUND [HRT]	8	29	25	8	**70**		14	46	44	7	**111**		
112 Downtown Newport News / Patrick Henry Mall INBOUND [HRT]	23	63	53	19	**158**	**345**	33	71	84	53	**241**	**581**	YES
112 Downtown Newport News / Patrick Henry Mall OUTBOUND [HRT]	24	74	68	22	**188**		69	130	115	26	**340**		
114 (Weaver Rd.) Newmarket/Downtown Hampton INBOUND [HRT]	10	52	45	16	**122**	**265**	29	101	90	30	**250**	**472**	YES
114 (Weaver Rd.) Newmarket/Downtown Hampton OUTBOUND [HRT]	12	61	54	16	**143**		26	105	72	19	**222**		
118 (Magruder) Langley/Semple Farm Road INBOUND [HRT]	5	27	19	5	**56**	**151**	14	69	28	21	**132**	**296**	YES
118 (Magruder) Langley/Semple Farm Road OUTBOUND [HRT]	13	44	29	10	**95**		38	74	36	16	**164**		
961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	19	16	20	11	**67**	**142**	32	72	42	13	**159**	**344**	YES
961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	16	23	31	6	**76**		21	93	31	40	**185**		
TOTAL	1,142	2,765	2,625	1,042	**7575**	7,575	2,381	5,425	4,216	2,101	**14,123**	14,123	YES

TABLE 5-3: HRT SAMPLING GOALS AND ON-TO-OFF SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (RAIL)

		Sampling Goals						COMPLETED						GOAL (10%)
Station	Dir	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	
EVMC/Fort Norfolk Station	The Tide (Light Rail) Outbound	10	38	28	8	**85**	**85**	28	136	100	22	**286**	**286**	YES
York Street/Freemason	The Tide (Light Rail) Outbound	3	9	6	3	**21**	**33**	8	29	37	11	**85**	**126**	YES
York Street/Freemason	The Tide (Light Rail) Inbound	9	2	1	0	**12**		12	20	9	0	**41**		
Monticello	The Tide (Light Rail) Outbound	7	26	18	13	**65**	**111**	15	48	80	31	**174**	**271**	YES
Monticello	The Tide (Light Rail) Inbound	26	10	6	3	**46**		41	27	24	5	**97**		
MacArthur Square	The Tide (Light Rail) Outbound	3	37	46	17	**103**	**163**	5	44	107	33	**189**	**267**	YES
MacArthur Square	The Tide (Light Rail) Inbound	37	11	8	4	**61**		42	20	9	7	**78**		
Civic Plaza	The Tide (Light Rail) Outbound	15	27	22	6	**72**	**117**	29	72	66	36	**203**	**291**	YES
Civic Plaza	The Tide (Light Rail) Inbound	27	14	4	1	**46**		30	41	8	9	**88**		
Harbor Park	The Tide (Light Rail) Outbound	1	5	2	12	**21**	**41**	2	6	11	24	**43**	**95**	YES
Harbor Park	The Tide (Light Rail) Inbound	5	8	2	5	**20**		5	22	2	23	**52**		
NSU Station	The Tide (Light Rail) Outbound	4	10	7	8	**28**	**65**	9	16	19	23	**67**	**155**	YES
NSU Station	The Tide (Light Rail) Inbound	10	13	8	5	**36**		23	22	24	19	**88**		
Ballentine/Broad Creek Station	The Tide (Light Rail) Outbound	4	8	5	5	**22**	**56**	7	13	18	18	**56**	**148**	YES
Ballentine/Broad Creek Station	The Tide (Light Rail) Inbound	8	15	7	4	**34**		12	38	22	20	**92**		
Ingleside Road Station	The Tide (Light Rail) Outbound	1	2	1	1	**5**	**15**	2	6	5	6	**19**	**45**	YES
Ingleside Road Station	The Tide (Light Rail) Inbound	2	5	2	1	**10**		2	15	3	6	**26**		
Military Highway Station	The Tide (Light Rail) Outbound	4	7	6	3	**19**	**74**	11	13	14	15	**53**	**168**	YES
Military Highway Station	The Tide (Light Rail) Inbound	7	22	19	7	**55**		13	45	34	23	**115**		
Newtown Road Station	The Tide (Light Rail) Inbound	38	70	54	24	**185**	**185**	115	196	234	68	**613**	**613**	YES
TOTAL		223	339	254	130	946	946	411	829	826	399	2,465	2,465	YES

TABLE 5-4: HRT SAMPLING GOALS AND ON-TO-OFF SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (FERRY)

	Sampling Goals						COMPLETED						GOAL (10%)
Dir	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	
HRT FERRY	34	53	33	53	**174**	**174**	68	76	139	71	**354**	**354**	YES
Totals	34	53	33	53	**174**	**174**	68	76	139	71	**354**	**354**	YES

Sampling Goals for O&D Survey

ETC Institute developed a sampling plan that would ensure the completion of the O&D Survey with approximately 5,300, or 10%, of the system's weekday riders as well as 800 weekend riders.

Weekday

Table 5-5 shows the goals and the actual number of completed surveys that were obtained by Route, Time Period, and Direction. The sampling plan for the O&D Survey was designed to obtain completed surveys from a minimum of 10% of the ridership on each of the bus routes operated by HRT. ETC Institute collected surveys to represent the overall distribution by time of day. The 10% sample was requested by HRT in the RFP. Overall, 74 of 83 (89.2%) weekday total route goals were fully achieved. For each route's goal that wasn't achieved, an interview team spent at least three days attempting to target that specific route/set of cells.

TABLE 5-5A: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (BUS)

Route #	Route Name	Direction	Ridership Data (Sept-Oct 2016 Average)	Original Sampling Goals						COMPLETED						GOAL (10%)
			Total Ridership	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	
1	Downtown Norfolk Pembroke East	INBOUND	2758	21	45	45	12	123	299	22	126	53	14	215	401	YES
		OUTBOUND		26	51	50	18	145		28	92	50	16	186		
2	Naval Station Norfolk/Hampton Blvd	INBOUND	909	6	16	15	3	40	102	7	22	16	1	46	102	YES
		OUTBOUND		9	20	16	5	51		11	19	20	6	56		
3	Downtown Norfolk/Naval Station	INBOUND	2056	22	36	31	9	98	204	23	37	31	12	103	203	NO
		OUTBOUND		11	27	35	12	85		12	38	38	12	100		
4	Downtown Norfolk/ODU	INBOUND	322	3	7	5	4	18	34	6	19	6	4	35	65	YES
		OUTBOUND		2	5	5	2	13		2	18	6	4	30		
5	Willoughby – Evelyn Butts	INBOUND	252	3	5	3	0	11	27	2	72	59	0	133	246	YES
		OUTBOUND		1	5	6	0	13		4	63	46	0	113		
6	Downtown Norfolk/South Norfolk/Robert Hall Blvd	INBOUND	780	7	13	13	3	37	83	15	25	36	3	79	143	YES
		OUTBOUND		9	13	13	3	38		21	18	23	2	64		
8	Downtown Norfolk / Evelyn T. Butts Ave	INBOUND	1187	8	22	15	5	51	129	10	41	15	9	75	159	YES
		OUTBOUND		7	25	24	9	66		24	23	31	6	84		
9	Downtown Norfolk/Sewells Point Road	INBOUND	785	7	14	12	3	37	86	8	19	13	7	47	89	YES
		OUTBOUND		5	16	14	6	41		6	17	13	6	42		
11	Downtown Norfolk/Colonial Place	INBOUND	181	2	3	3	0	8	16	4	7	10	0	21	43	YES
		OUTBOUND		0	3	3	0	6		4	8	10	0	22		
12	South Norfolk/TCC – Virginia Beach	INBOUND	497	1	7	9	2	19	53	1	27	22	10	60	123	YES
		OUTBOUND		6	12	8	2	29		12	39	9	3	63		
13	Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake	INBOUND	1106	11	20	17	6	54	110	8	36	23	12	79	146	YES
		OUTBOUND		8	15	18	5	46		12	27	26	2	67		
14	Robert Hall Blvd / TCC Chesapeake	INBOUND	417	1	7	8	0	17	47	1	27	22	10	60	107	YES
		OUTBOUND		5	14	7	0	26		3	24	18	2	47		
15	Evelyn Butts to Robert Hall/Greenbrier Mall	INBOUND	2281	21	42	37	10	109	260	35	54	41	20	150	265	YES
		OUTBOUND		19	42	48	16	125		3	70	36	6	115		
18	Downtown Norfolk/Ballentine Boulevard	INBOUND	254	2	3	2	1	7	18	4	3	3	0	10	27	YES
		OUTBOUND		1	3	4	1	9		6	5	5	1	17		
20	Downtown Norfolk/Virginia Beach Oceanfront	INBOUND	3827	23	54	59	22	158	401	25	77	56	53	211	443	YES
		OUTBOUND		38	71	67	27	203		36	70	103	23	232		
21	Little Creek Rd.	INBOUND	1755	16	35	29	7	87	201	14	46	30	8	98	206	YES
		OUTBOUND		13	35	35	11	94		17	38	43	10	108		
22	Newtown Road Station/Joint Expeditionary Base Little Creek	INBOUND	298	3	5	4	0	13	30	3	46	34	0	83	156	YES
		OUTBOUND		2	6	7	0	15		4	29	40	0	73		
23	Medical Tower/Military Circle/JANAF	INBOUND	1164	8	20	17	5	50	121	15	20	31	4	70	133	YES
		OUTBOUND		9	22	22	5	58		12	25	19	7	63		
25	(Newtown) Military Circle/Princess Anne	INBOUND	471	2	8	5	2	17	48	4	27	21	2	54	90	YES
		OUTBOUND		4	12	7	4	26		3	17	12	4	36		
26	Lynnhaven Mall / TCC Virginia Beach	INBOUND	248	1	4	8	0	13	29	0	10	10	2	22	54	YES
		OUTBOUND		1	7	4	0	12		1	13	16	2	32		
27	Pleasure House Rd./Newtown Road Light Rail Station	INBOUND	352	5	6	5	2	17	37	6	6	10	2	24	49	YES
		OUTBOUND		2	4	6	3	16		3	10	7	5	25		
29	(Lynnhaven) Pleasure House Road	INBOUND	327	3	8	5	1	18	37	2	10	10	1	23	46	YES
		OUTBOUND		1	6	7	2	15		2	12	7	2	23		

TABLE 5-5B: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (BUS)

Route #	Route Name	Direction	Ridership Data (Sept-Oct 2016 Average) Total Ridership	Original Sampling Goals AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	COMPLETED AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	GOAL (10%)
30	Wave: Atlantic Avenue Shuttle	INBOUND		0	10	19	35	64	200	0	48	67	38	153	309	YES
		OUTBOUND		0	27	33	55	116		0	32	64	60	156		
31	Wave: Aquarium and Campground Shuttle	INBOUND		0	6	3	1	10	34	0	8	8	4	20	41	YES
		OUTBOUND		0	7	8	6	20		0	11	6	4	21		
32	Wave: Shoppers Shuttle	INBOUND		0	1	3	2	6	16	0	3	4	3	10	30	YES
		OUTBOUND		0	4	3	1	8		0	11	4	5	20		
33	(General Booth) North Seashore/Municipal Center	INBOUND	451	2	8	7	1	18	47	2	24	7	5	38	71	YES
		OUTBOUND		4	9	8	3	23		4	12	11	6	33		
36	(Holland) Pembroke East	INBOUND	621	5	11	11	3	31	66	4	12	13	5	34	68	YES
		OUTBOUND		4	11	10	3	28		6	10	15	3	34		
41	Downtown Portsmouth/Cradock	INBOUND	370	3	11	8	0	23	40	4	25	14	3	46	93	YES
		OUTBOUND		2	6	4	0	13		1	25	18	3	47		
43	County Street / Bart Street	INBOUND	129	1	5	3	0	9	13	0	8	2	0	10	19	YES
		OUTBOUND		0	1	1	0	3		0	4	5	0	9		
44	Norfolk General Hospital/Midtown Portsmouth	INBOUND	429	3	8	5	1	18	48	2	11	8	4	25	56	YES
		OUTBOUND		2	12	10	2	25		6	14	10	1	31		
45	Downtown Norfolk/Portsmouth	INBOUND	1794	19	31	28	10	90	192	20	25	29	19	93	192	YES
		OUTBOUND		13	30	31	9	83		16	33	37	13	99		
47	Downtown Portsmouth/Churchland	INBOUND	873	11	27	22	4	64	99	10	28	20	7	65	110	YES
		OUTBOUND		4	12	8	1	25		6	20	17	2	45		
50	Academy Park/Victory Crossing	INBOUND	192	3	9	7	0	19	24	2	16	11	1	30	45	YES
		OUTBOUND		0	1	1	0	2		2	10	3	0	15		
55	Greenbrier Circulator	INBOUND	192	0	2	4	1	6	17	0	3	3	3	9	26	YES
		OUTBOUND		2	5	2	0	9		1	9	5	2	17		
57	Robert Hall Boulevard/Airline Boulevard	INBOUND	382	4	9	8	0	22	45	3	25	9	0	37	70	YES
		OUTBOUND		3	8	8	0	19		4	21	8	0	33		
58	South Norfolk/Bainbridge Boulevard	INBOUND	205	1	4	4	0	9	24	2	11	7	0	20	49	YES
		OUTBOUND		2	6	4	0	12		2	21	6	0	29		
64	To Smithfield/Gwaltney and Newport News Shipyard	INBOUND	83	2	0	1	0	3	9	2	0	2	0	4	7	NO
		OUTBOUND		1	0	2	1	5		1	0	2	0	3		
101	(Kecoughtan) Downtown Newport News/Downtown Hampton	INBOUND	922	6	17	17	5	45	97	7	21	18	5	51	101	YES
		OUTBOUND		7	15	16	6	43		6	21	16	7	50		
102	(Coliseum) Peninsula Town Center/Downtown Hampton	INBOUND	205	1	2	1	0	4	24	3	8	3	1	15	28	YES
		OUTBOUND		2	9	7	0	18		2	5	6	0	13		
103	(Shell Rd.) Downtown Newport News/Downtown Hampton	INBOUND	934	6	18	16	7	47	103	8	19	20	7	54	99	NO
		OUTBOUND		6	18	15	6	46		6	21	13	5	45		
104	(Marshall) Downtown Newport News/Newmarket	INBOUND	775	4	14	15	5	39	94	7	15	17	9	48	108	YES
		OUTBOUND		6	19	14	6	46		10	25	16	9	60		
105	(Briarfield) Maple Avenue & 27th Street/Peninsula Town Center	INBOUND	733	3	10	11	6	30	77	3	16	9	7	35	82	YES
		OUTBOUND		6	16	12	6	40		9	17	15	6	47		
106	Newport News / Warwick Boulevard / Denbigh / Fort Eustis	INBOUND	1231	13	21	20	9	63	133	13	20	22	9	64	130	NO
		OUTBOUND		12	21	17	7	57		12	26	20	8	66		
107	Newport News / Warwick Boulevard / Denbigh	INBOUND	965	1	13	17	9	40	103	5	17	16	9	47	112	YES
		OUTBOUND		8	22	17	6	53		11	29	19	6	65		
108	Patrick Henry Mall / Lee Hall	INBOUND	435	4	10	7	2	22	44	4	15	8	3	30	48	YES
		OUTBOUND		2	6	6	3	17		4	5	6	3	18		
109	(Pembroke) Downtown Hampton/Buckroe	INBOUND	201	1	5	3	1	10	22	3	11	3	1	18	34	YES
		OUTBOUND		1	3	4	2	10		2	6	6	2	16		
110	(Thomas Nelson) Downtown Hampton/Thomas Nelson	INBOUND	593	1	11	9	4	26	61	2	19	11	5	37	79	YES
		OUTBOUND		4	13	9	4	29		3	16	20	3	42		
111	(Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh	INBOUND	401	3	11	8	3	25	63	10	12	7	2	31	65	YES
		OUTBOUND		4	13	11	4	32		2	15	12	5	34		
112	Downtown Newport News / Patrick Henry Mall	INBOUND	1856	10	29	24	8	71	173	11	33	27	14	85	174	YES
		OUTBOUND		11	33	30	10	84		16	31	26	16	89		
114	(Weaver Rd.) Newmarket/Downtown Hampton	INBOUND	1203	4	23	20	7	55	132	7	25	24	9	65	136	YES
		OUTBOUND		5	28	24	7	64		5	28	27	11	71		
115	Buckroe/Willow Oaks/Downtown Hampton	INBOUND	434	7	12	5	2	25	47	9	20	8	2	39	59	YES
		OUTBOUND		0	4	8	4	17		1	6	9	4	20		
116	(Mall Hall) Lee Hall/Patrick Henry Mall Loop	INBOUND	257	1	3	3	1	9	24	3	2	7	2	14	30	YES
		OUTBOUND		1	5	5	2	13		2	7	3	4	16		
117	(Phoebus) Hampton University/V.A. Hospital	INBOUND	217	0	3	4	0	8	25	1	2	2	1	6	24	NO
		OUTBOUND		4	8	3	1	15		5	8	4	1	18		
118	(Magruder) Langley/Semple Farm Road	INBOUND	658	2	12	9	2	25	76	5	19	10	5	39	78	YES
		OUTBOUND		6	20	13	4	43		6	16	12	5	39		
119	Fishing Point Dr/Riverside Regional Medical Center	INBOUND	173	1	2	2	0	4	11	1	1	2	0	4	13	YES
		OUTBOUND		1	3	2	0	6		1	5	3	0	9		
120	(Mallory) Downtown Hampton/Mallory/Buckroe	INBOUND	211	1	5	3	1	9	20	1	9	3	2	15	25	YES
		OUTBOUND		1	4	4	1	9		1	3	5	1	10		
121	Newport News Transportation Center / Williamsburg	INBOUND	32	1	0	0	0	1	5	1	0	3	0	4	7	YES
		OUTBOUND		1	0	2	0	3		1	0	2	0	3		
403	Buckroe Shopping Center	INBOUND	26	0	0	0	0	0	4	0	0	0	0	0	1	NO
		OUTBOUND		3	1	0	0	3		1	0	0	0	1		
405	NNTC/Buckroe	INBOUND	47	3	0	0	0	3	6	6	0	0	0	6	8	YES
		OUTBOUND		0	0	2	0	2		0	0	2	0	2		
414	NNTC/Jefferson/Oakland	INBOUND	97	0	0	4	0	4	11	0	0	6	0	6	11	YES
		OUTBOUND		5	0	1	0	6		4	0	1	0	5		
415	NNTC/Denbigh	INBOUND	21	0	0	0	0	0	3	0	0	0	0	0	8	YES
		OUTBOUND		0	0	3	0	3		0	0	8	0	8		
427	Denbigh Midnight	INBOUND	4	0	0	0	0	0	0	0	0	0	0	0	0	YES
		OUTBOUND		0	0	0	0	0		0	0	0	0	0		
430	Denbigh Fringe	INBOUND	95	4	0	0	0	5	7	3	0	0	0	3	7	YES
		OUTBOUND		0	0	1	0	1		0	0	4	0	4		
918	MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station N	INBOUND	19	2	0	0	0	2	4	2	0	0	0	2	3	NO
		OUTBOUND		0	0	1	0	1		0	0	1	0	1		
919	MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station N	INBOUND	94	5	0	0	1	6	13	5	0	0	0	5	9	NO
		OUTBOUND		0	0	6	0	6		0	0	4	0	4		
922	MAX Chesapeake-Virginia Beach to Naval Station Norfolk	INBOUND	81	3	0	0	0	4	10	5	0	0	0	5	12	YES
		OUTBOUND		1	0	4	0	5		0	0	7	0	7		
960	MAX Virginia Beach to Norfolk	INBOUND	235	2	2	5	0	9	24	2	2	5	0	9	24	YES
		OUTBOUND		4	4	4	0	13		3	4	8	0	15		
961	MAX Newport News-Hampton to Norfolk	INBOUND	674	8	7	9	5	30	71	10	12	8	6	36	73	YES
		OUTBOUND		7	10	14	3	34		6	13	14	4	37		
965	MAX Patrick Henry Mall to Naval Station Norfolk	INBOUND	21	0	0	1	0	1	2	0	0	1	0	1	2	YES
		OUTBOUND		1	0	0	0	1		1	0	0	0	1		
966	MAX Silverleaf Park & Ride/Newport News Transit Center	INBOUND	43	1	0	0	0	2	4	2	0	0	0	2	4	YES
		OUTBOUND		0	0	2	0	2		0	0	2	0	2		
967	MAX Virginia Beach-Chesapeake to Newport News (MHS)	INBOUND	225	9	0	0	3	12	29	9	0	0	0	9	31	YES
		OUTBOUND		0	0	13	0	14		0	0	22	0	22		
		TOTALS	42,066	668	1,578	1,507	536	4288	4,764	809	2,517	2,098	683	6,107	6,107	YES

TABLE 5-6: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (RAIL)

Station	Dir	Ridership Data (Aug-Oct 2016 Average) Total Ridership	Original Sampling Goals AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	COMPLETED AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	GOAL (10%)
EVMC/Fort Norfolk Station	Outbound	441	5	19	14	4	42	42	9	28	22	13	72	72	YES
York Street/Freemason	Inbound	113	4	1	0	0	6	16	7	2	1	0	10	47	YES
	Outbound		2	4	3	1	10		6	11	12	8	37		
Monticello	Inbound	459	13	5	3	2	23	54	14	4	4	2	24	71	YES
	Outbound		3	13	9	7	31		5	13	13	16	47		
MacArthur Square	Inbound	555	18	5	4	2	30	80	17	12	5	2	36	102	YES
	Outbound		2	18	22	8	50		4	20	29	13	66		
Civic Plaza	Inbound	473	13	7	2	0	22	57	12	11	5	2	30	82	YES
	Outbound		8	13	11	3	35		13	18	15	6	52		
Harbor Park	Inbound	170	3	4	1	2	10	20	10	17	2	7	36	70	YES
	Outbound		1	3	1	6	10		4	8	5	17	34		
NSU Station	Inbound	349	5	6	4	3	18	32	6	7	10	5	28	61	YES
	Outbound		2	5	3	4	14		4	14	8	7	33		
Ballentine/Broad Creek Station	Inbound	304	4	7	4	2	17	27	7	11	9	5	32	50	YES
	Outbound		2	4	2	2	11		3	6	5	4	18		
Ingleside Road Station	Inbound	85	1	2	1	0	5	7	3	10	6	4	23	33	YES
	Outbound		1	1	0	0	3		2	3	3	2	10		
Military Highway Station	Inbound	427	3	11	9	3	27	36	12	15	15	10	52	62	YES
	Outbound		2	3	3	1	9		2	3	3	2	10		
Newtown Road Station	Inbound	896	19	34	26	12	90	90	24	49	35	17	125	125	YES
TOTAL		4,270	109	165	124	63	461	461	164	262	207	142	775	775	YES

TABLE 5-7: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (FERRY)

Route #	Ridership Data (Sept-Oct 2016 Average) AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total Ridership	Sampling Goals AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	COMPLETED AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	GOAL (10%)
HRT FERRY	63	223	275	277	838	15	24	15	24	78	87	15	25	17	20	77	77	No

Weekend

Table 5-8 shows the goals and the actual number of completed surveys that were obtained by Route, Time Period, and Direction. The sampling plan for the origin and destination survey was designed to obtain completed surveys from 800 weekend riders. The 800 records were collected so that the data could be segmented into two groups of 400 and still have a confidence interval (CI) of 95% with a margin of error (ME) of ±5%. The full 800 records provide a 95% CI with a ME of ±3.4%. The original weekend ridership average was provided by HRT. ETC Institute then used average weekend ridership from September and October 2016 to conduct the expansion. Overall, the weekend total routes goal of 800 was fully achieved.

TABLE 5-8A: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (WEEKEND)

Route #	Route Name	Ridership Data (Sept-Oct 2016 Average)	% of Ridership (BUS)	Total Surveys Collected
TIDE	TIDE	3630	-	148
FERRY	FERRY	1573	-	29
1	Downtown Norfolk Pembroke East	1356	6.0%	75
2	Naval Station Norfolk/Hampton Blvd	275	1.2%	7
3	Downtown Norfolk/Naval Station	1074	4.7%	69
4	Downtown Norfolk/ODU	161	0.7%	0
5	Willoughby – Evelyn Butts	120	0.5%	0
6	Downtown Norfolk/South Norfolk/Robert Hall Blvd	256	1.1%	0
8	Downtown Norfolk / Evelyn T. Butts Ave	681	3.0%	26
9	Downtown Norfolk/Sewells Point Road	180	0.8%	0
11	Downtown Norfolk/Colonial Place	76	0.3%	0
12	South Norfolk/TCC – Virginia Beach	163	0.7%	0
13	Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake	472	2.1%	8
14	Robert Hall Blvd / TCC Chesapeake	127	0.6%	0
15	Evelyn Butts to Robert Hall/Greenbrier Mall	1008	4.4%	54
18	Downtown Norfolk/Ballentine Boulevard	41	0.2%	0
20	Downtown Norfolk/Virginia Beach Oceanfront	1952	8.6%	57
21	Little Creek Rd.	872	3.8%	37
22	Newtown Road Station/Joint Expeditionary Base Little Creek	80	0.4%	0
23	Medical Tower/Military Circle/JANAF	578	2.6%	35
25	(Newtown) Military Circle/Princess Anne	128	0.6%	0
26	Lynnhaven Mall / TCC Virginia Beach	62	0.3%	0
27	Pleasure House Rd./Newtown Road Light Rail Station	122	0.5%	0
29	(Lynnhaven) Pleasure House Road	98	0.4%	0
30	Wave: Atlantic Avenue Shuttle	2948	13.0%	16
31	Wave: Aquarium and Campground Shuttle	479	2.1%	8
32	Wave: Shoppers Shuttle	147	0.6%	5
33	(General Booth) North Seashore/Municipal Center	189	0.8%	0
36	(Holland) Pembroke East	163	0.7%	0
41	Downtown Portsmouth/Cradock	121	0.5%	0
43	County Street / Bart Street	38	0.2%	0
44	Norfolk General Hospital/Midtown Portsmouth	140	0.6%	0

TABLE 5-8B: HRT SAMPLING GOALS AND O&D SURVEYS COMPLETED BY TIME OF DAY AND DIRECTION (WEEKEND)

Route #	Route Name	Ridership Data (Sept-Oct 2016 Average)	% of Ridership (BUS)	Total Surveys Collected
45	Downtown Norfolk/Portsmouth	844	3.7%	68
47	Downtown Portsmouth/Churchland	364	1.6%	0
50	Academy Park/Victory Crossing	73	0.3%	0
57	Robert Hall Boulevard/Airline Boulevard	132	0.6%	0
58	South Norfolk/Bainbridge Boulevard	100	0.4%	0
101	(Kecoughtan) Downtown Newport News/Downtown Hampton	462	2.0%	7
102	(Coliseum) Peninsula Town Center/Downtown Hampton	78	0.3%	9
103	(Shell Rd.) Downtown Newport News/Downtown Hampton	520	2.3%	10
104	(Marshall) Downtown Newport News/Newmarket	361	1.6%	3
105	(Briarfield) Maple Avenue & 27th Street/Peninsula Town Center	438	1.9%	12
106	Newport News / Warwick Boulevard / Denbigh / Fort Eustis	638	2.8%	14
107	Newport News / Warwick Boulevard / Denbigh	540	2.4%	14
108	Patrick Henry Mall / Lee Hall	327	1.4%	15
109	(Pembroke) Downtown Hampton/Buckroe	167	0.7%	2
110	(Thomas Nelson) Downtown Hampton/Thomas Nelson	256	1.1%	3
111	(Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh	215	0.9%	1
112	Downtown Newport News / Patrick Henry Mall	1084	4.8%	42
114	(Weaver Rd.) Newmarket/Downtown Hampton	713	3.1%	17
115	Buckroe/Willow Oaks/Downtown Hampton	179	0.8%	2
116	(Mall Hall) Lee Hall/Patrick Henry Mall Loop	195	0.9%	0
117	(Phoebus) Hampton University/V.A. Hospital	47	0.2%	0
118	(Magruder) Langley/Semple Farm Road	282	1.2%	8
120	(Mallory) Downtown Hampton/Mallory/Buckroe	86	0.4%	2
960	MAX Virginia Beach to Norfolk	183	0.8%	0
961	MAX Newport News-Hampton to Norfolk	274	1.2%	0
TOTAL		27870	-	803

PILOT TEST

ETC Institute conducted a pilot test for the Hampton Roads Origin and Destination Study from August 16 - 17, 2016. The purpose of the pilot test was to assess all aspects of the survey including survey design, sampling methodology, implementation, and data processing tasks. The overall goal was to complete 100 Origin & Destination (O&D) Intercept Surveys. The actual number of O&D Intercept Surveys that were completed in the field was 201, of these 164 surveys were classified as useable (82% recovery rate). Useable records were defined as a trip that made logistical sense and all other variables answered. For a Rolling Pilot test, a 75% recovery rate is acceptable, understanding that as the interviewers become more experienced this figure of useable records will increase. Useable records were defined as a trip that made logistical sense and all other variables answered. Based on the results of the pilot test, the survey administrator recommended that the Origin & Destination survey proceed as scheduled with limited superficial changes. This included slight changes to the mapping features of the tablet PC base.

Routes Involved

With the Virginia Beach Wave (seasonal service) schedule, it was necessary to conduct the pilot test on the three (3) Wave routes prior to the end of August 2016 and begin surveying on these three routes for the full collection. The pilot test was administered to transit riders on all three Wave routes on weekdays between the hours of 6:00 am and 9:00 pm. The routes that were included in the pilot test are listed below:

- Route 30 – Atlantic Ave. Shuttle
- Route 31 – VA Aquarium and Campground
- Route 32 – Shopper Shuttle

Pilot Test Results

Assessment of Survey Length

The time it took survey participants to complete the survey on a tablet PC ranged from a minimum of 5.25 minutes to a maximum of 28 minutes. The average time was 8.75 minutes.

The issues with the individual stops loading, for the boarding and alighting questions, added approximately one and a half to two minutes to each bus survey. The cause was related to the number of individual patterns in each route and a multitude of stops associated to each pattern. ETC refined the mapping features in the route/stop files after the pilot test concluded and reduced the lag time. After the pilot test was concluded and the stop list mapping features were reprogramed with new algorithms, the boarding and alighting questions took less than five seconds to load all individual bus stops associated with each route.

Assessment of Survey Design

Overall, the survey design worked well and was understood by both the interviewers and passengers. No changes were needed to the survey design after the pilot test concluded.

Assessment of Survey Participation and Usability of Surveys

The goal was to complete 100 O&D Intercept Interviews. Overall, 201 interviews were conducted with 164 records passing secondary post processing. Test results by route are provided in the graph on the following page:

HRT Pilot Test Results

Route	Surveys Collected	Usable Surveys	Recovery %
30	164	147	90%
31	19	4	21%
32	18	13	72%
Total	**201**	**164**	**82%**

Route 31 had more records fall out of both field review and post processing due to survey staff not performing well.

Respondent Participation

A total of 235 passengers were asked to participate in the pilot test. Of these, 211 agreed to participate (201 participated on the vehicle) with the in-person interview, while 10 respondents provided call back information. When averaged, 86% of those who were asked to participate with the in-person interview agreed to participate either on the vehicle or by phone.

Note: For the pre-test, callbacks to complete the survey via phone were not conducted due to adding the callback feature once the survey was finalized. The callbacks were not considered in the recovery rate because they were not traditionally attempted on rolling pilot test surveys.

Assessment of Refusals

Twenty-three riders refused to complete the survey. Of these:

Reasons for Refusals:

- 56 percent indicated “Not interested/busy doing other things at the moment”
- 20 percent indicated “Rider did not give one of the above reasons”
- 24 percent indicated either “Disability impacting ability to complete interview” or “Already did the interview”

Conclusions

Based on the results of the pilot test, ETC Institute recommended that the Origin and Destination Survey proceed as scheduled. ETC Institute made changes to the mapping features of the tablet PC base on pilot test findings.

Considerations for future on-board survey

While the project was successful in its implementation, during the actual study there are always improvements that can be made for future projects. For future efforts, a more thorough review of the scope and the data to be collected should be conducted prior to official contracting to determine if any additional items are needed or adjusted based on the overall goal of the project. This includes any modifications to the contracting firm's approach to data collection and analysis.

One notable change from the 2014 Study to the current 2016 Study was the selection of Race/Ethnicity. The 2016 Survey allowed multiple responses for the Race/Ethnicity question. This is the current practice for O&D Surveys, rather than collecting the variable as a single response selection as was the case in the 2014 Study. HRT's percentage of mixed/other ethnicities may have increased from 41% (2014) to 61% (2016), based on these new standards from the previous study.

The number of customers that did not transfer has increased significantly from 2014 to 2016, from 41% (2014) to 61% (2016) This is due in part to a change in methodology. In the 2014 study, the raw number of transfers was expanded using a multiplier for each route. However, in 2016, the raw number was expanded in a way to be consistent with the ridership of both linked and unlinked trips in all routes. This new method generates a more accurate representation of the transfers occurring in the HRT system.

An additional area of improvement for future efforts is a review of the ridership data and sample plan at regular intervals during the study. Because the sample plan is built on historic data, new routes introduced in the current service schedule are not easily identified leading into the data collection. By conducting this review collectively between HRT and the contractor new routes can by more easily referenced, accounted for in the sample plan, and in the data collected during the core data collection.

SURVEY INSTRUMENT

The tablet PCs were the preferred survey method as the tablet PC's have an on-screen mapping features that allows for real-time geocoding of addresses and places based off either address, intersection or place searches based on feedback from respondents. The respondents can then confirm the geocoded location based on the on-screen map that shows the searched address/location via a Google Map indicator icon. In addition to using the mapping feature to collect the GPS coordinates of major survey locations (home address, origin address, destination address, boarding location, and alighting location), the tablet PC also allows the surveyor to walk through each question with the respondent. This allows the surveyor to answer any questions as well as to ensure the quality of the data collected. The respondent can also press the answers to the questions directly

on the tablet PC during the demographic section to allow for more privacy. Respondents who did not have time to complete the survey during their bus trip were also given the option of providing their phone numbers. Those who provided their phone numbers were then contacted by ETC Institute's call center to complete the survey. Examples from the tablet PC survey are below and in Figures 5-1, 5-2, 5-3, and 5-4.

FIGURE 5-1: TABLET PC SCREENSHOT FOR QUESTION: "WHAT TYPE OF PLACE ARE YOU COMING FROM NOW?"

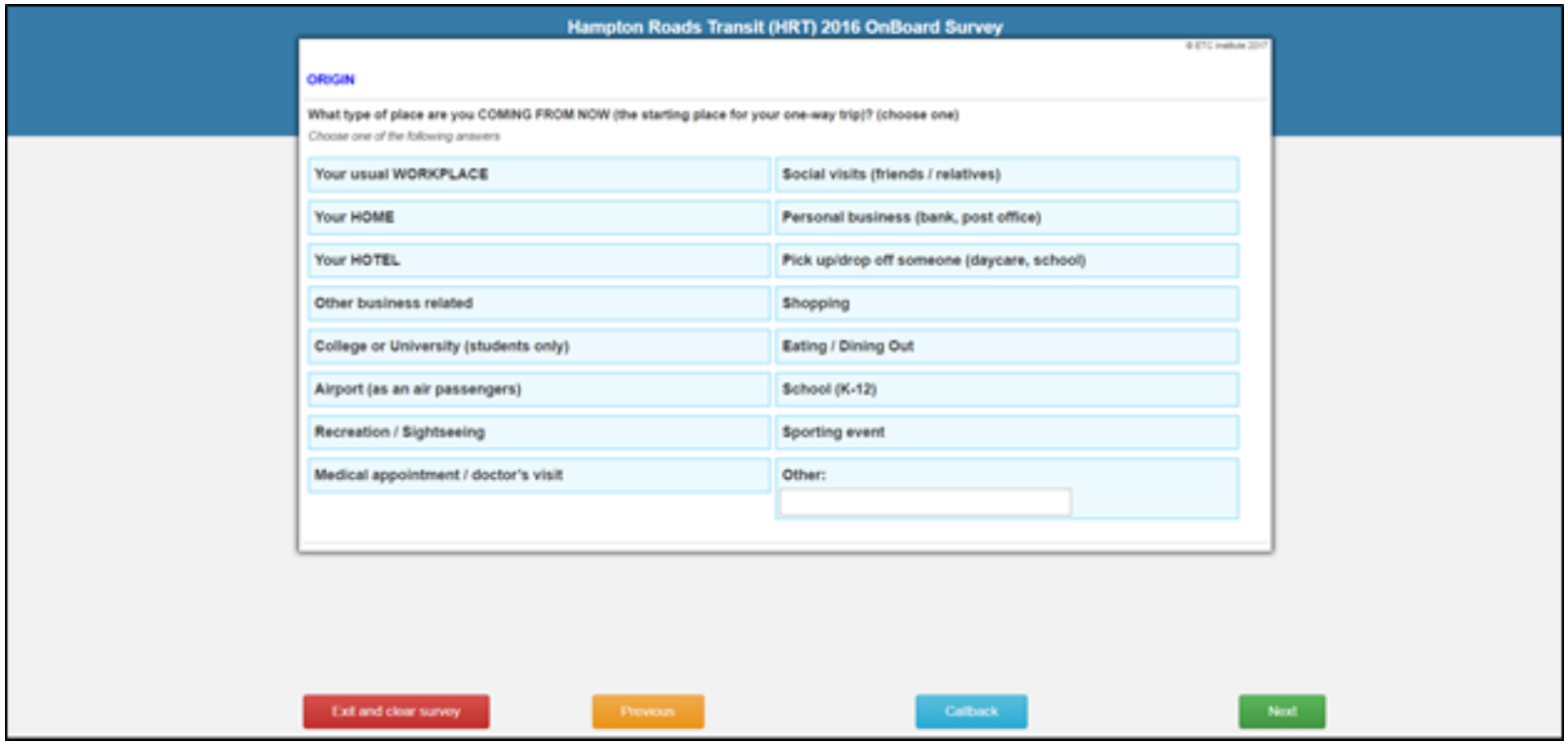


FIGURE 5-2: TABLET PC SCREENSHOT FOR QUESTION: "WHAT IS THE EXACT STREET ADDRESS OF THIS PLACE?"

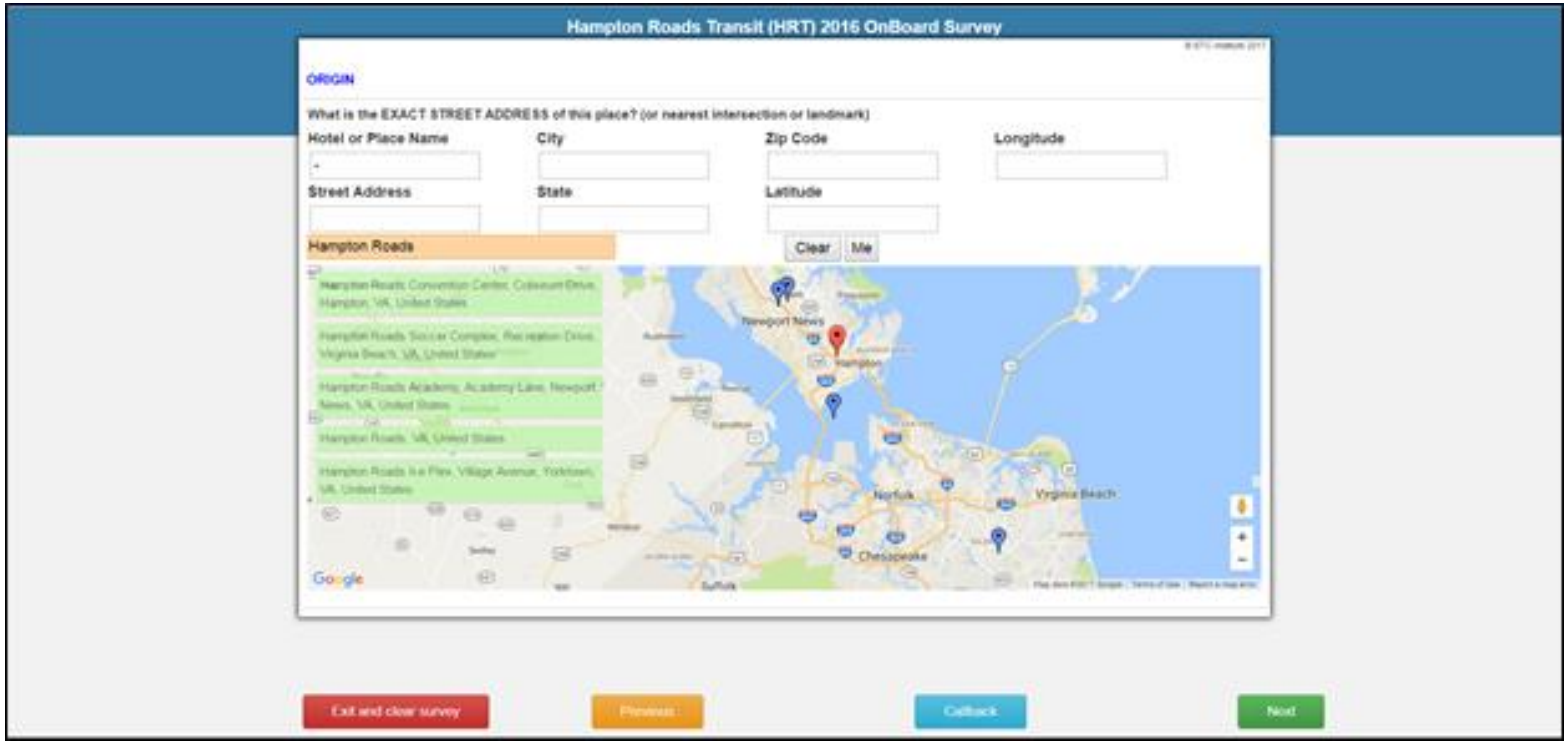


FIGURE 5-3: TABLET PC SCREENSHOT FOR QUESTION: "WHERE DID YOU GET ON THIS BUS?"

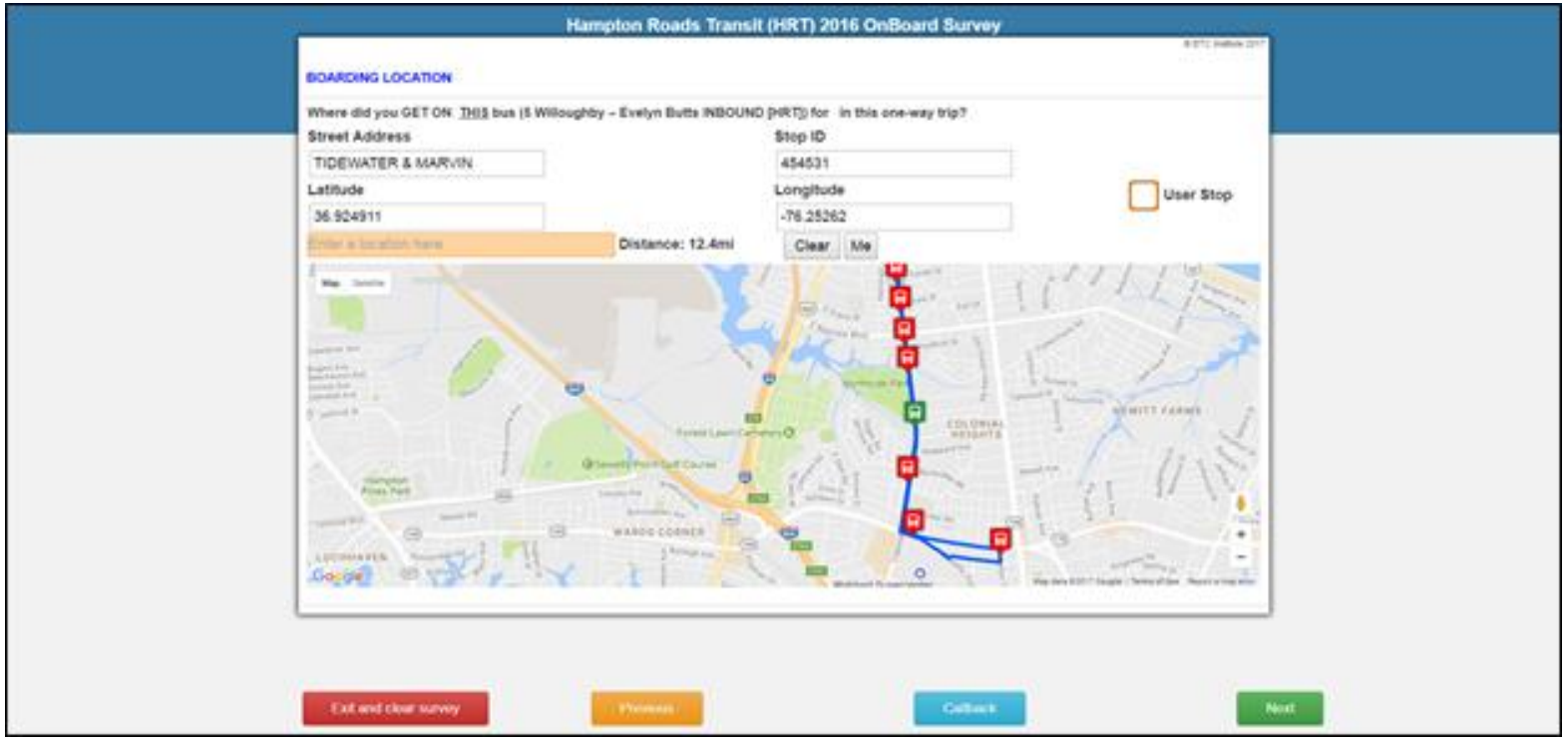
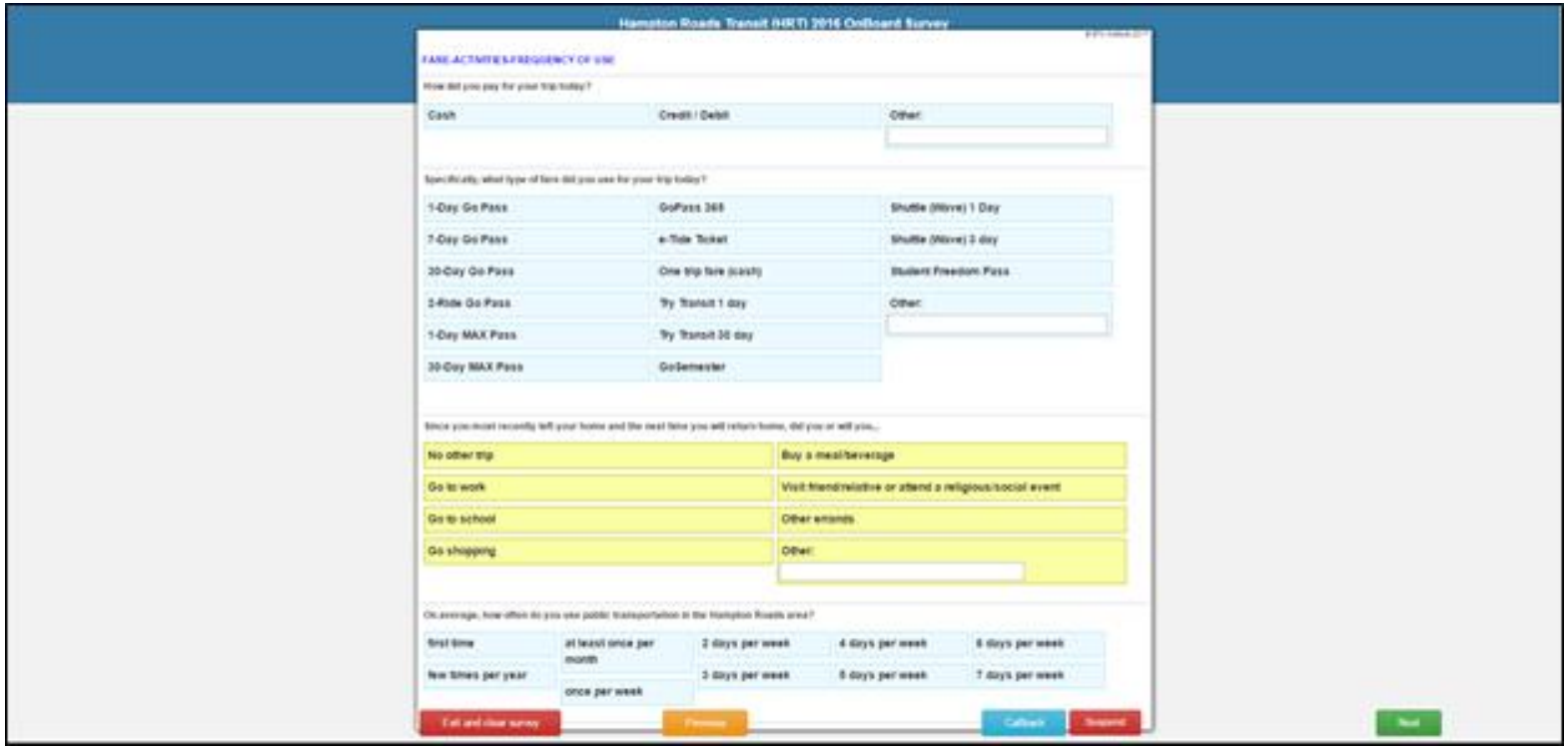


FIGURE 5-4: TABLET PC SCREENSHOT FOR QUESTIONS ABOUT FARE/SERVICE



For higher volume MAX/Express services, the respondent generally has a longer ride time, and the ease of distributing the paper surveys to a higher number of passengers often leads to a much higher percentage of surveys being captured than would have been possible by just using a tablet PC. Each paper questionnaire that was used by ETC Institute tracked the route and trip time (the paper questionnaire is provided in Appendix A). The paper surveys that were collected on these routes were then entered into the online database with the tablet PC survey collection.

SURVEY ADMINISTRATION

Labor Recruitment and Training

ETC Institute conducted two major training sessions throughout the data collection phases. The first major training was for the O2O counts and the second major training session was for the O&D survey collection. There were additional training sessions conducted throughout the data collection process on an as needed basis but with smaller groups. Additionally, ETC Institute trained select surveyors who participated in the O2O counts training and/or O&D training to conduct park-n-ride counts and Boarding Alighting (BA) count tasks.

Training sessions focused on the study purpose and objectives, the survey instruments, scripts on how to respond to passengers' questions, how to use data collection tools, instructions on how to conduct themselves when working with the public, and safety training. The survey staff were instructed to understand that while they are not HRT employees, they were representing HRT while on HRT vehicles or property and they needed to act in a manner that reflected positively.

Maximizing participation and legitimizing the survey among passengers depended on the public response to the survey staff. To support a good public image, ETC Institute imposed strict dress code standards that required survey staff to wear clean appropriate clothing to present a casual, yet neat, appearance that ensured professionalism and comfort. Survey staff were provided with surveyor badges and vests, identifying surveyors to the HRT staff and passengers to further legitimize their appearance. The badge and dress code standards promoted a professional appearance and reinforced survey legitimacy, which increased passengers' trust in the interviewers and the process.

As survey staff are the key ingredient to the success of a project, ETC provided an in-depth project specific training to ensure a successful data collection. The surveyor training reviewed project specifics and field procedures and provided training on how to actively engage customers (passengers). Key highlights in ETC's training focused on courtesy, professionalism, and person-to-person interactions.

Recruiting and Training Surveyors

The O2O counter training involved two (2) hours of classroom training and four (4) hours of field training for a total of six (6) hours per surveyor. The ETC Institute Project Manager and field supervisor created the necessary training materials and conducted the O2O training. The primary tool that was used for the training session was a PowerPoint presentation. The training went over the following details:

- Equipment use and setup
- Methodologies for collecting bus boarding and alighting pairs
- How to approach passengers
- Distribution and collection of bus on-to-off cards
- How to handle refusals

- How to react in various situations that may be encountered
- Safety training

Once surveyors had demonstrated that they can perform the O2O counts, the surveyors were invited to field training. The field training provided hands on training that involved the actual conducting of the O2O counts with bus and train passengers. During the field training, surveyors were tested on their proficiency and were provided with additional coaching if needed. If the surveyor was deemed unable to perform the on-to-off count, they were replaced.

Recruiting and Training Interviewers

The O&D training involved four (4) hours of classroom training and eight (8) hours of field training, with an additional two (2) hours of follow up training for a total of 14 hours per interviewer. The ETC Institute Data Collection Manager created the necessary training materials and conducted the O&D training. The classroom training session included a PowerPoint presentation to explain the purpose and objectives of the survey, questionnaire content, interviewer procedures and requirements, survey logistics, how to maximize response rates (including hard-to-survey passengers), and the data collection process in a step-by-step format. Other goals of the training included building interview staff confidence, helping interview staff feel that they are an important part of the survey's success, and helping them understand the importance of the survey and the long-term benefits to their community.

ETC Institute ensured that the training addressed the following details:

- Tips on intercepting/interacting with passengers with disabilities
- Tips on intercepting/interacting with limited English proficient passengers
- Cultural sensitivity
- Importance of understanding the intent of the questions
- Importance of random selection and properly recording all refusals
- Importance of data confidentiality
- Overview of the HRT system covering all topics covered in the tablet questionnaire
- How to handle passenger comments and complaints
- Instructions on conveying the purpose of the survey to passengers
- Safety training

Towards the end of training, interviewers conducted mock interviews using the survey tablets. This allowed ETC Institute staff to gauge each interviewer's comprehension of the survey and instrument and provide feedback as needed. After the training, interviewers were tested on items discussed in training.

Following classroom training, applicants got a chance to conduct interviews under the supervision of an experienced ETC Institute supervisor. Supervisors oversaw interviewers and provided feedback on performance throughout the day.

Interviewers who were conducting the survey properly could go to the next phase of field training. Interviewers who needed more help, but showed promise, were asked to spend a second day in the field under direct supervision. Once an interviewer had demonstrated proficiency under direct supervision, he/she was given a field test during which the prospective interviewer conducted surveys on his/her own. During this period, the interviewer's productivity and data quality were remotely assessed by ETC's staff.

Organization of Survey Team

On-to-off (O2O) Count Administrators Roles

The O2O count administrators (surveyors) were responsible for the distribution and collection of the on-to-off count cards. Typically, there were two surveyors assigned to each bus with one surveyor covering the front of the bus and a second surveyor positioned at the back of the bus. The surveyor at the front of the bus scanned and distributed barcoded cards to boarding passengers, while the surveyor at the back of the bus collected and scanned the cards as passengers alighted. The surveyors were equipped with handheld scanning devices to capture the boarding and alighting locations.

For light rail, counters asked the riders at which stop they entered (if not observed) and then what stop they exited the train. The rationale is two-fold. First, with relatively few stops with names overwhelmingly known by riders the ability to collect accurate on and off stops verbally is significantly more efficient than on buses. Second, the logistics of having staff at each door handling both the boarding and alighting activity is overwhelming for the counters. ETC Institute utilized a staff of at least 20 - 25 surveyors for the on-to-off count.

Origin Destination (O&D) Passenger Survey Administrators Roles

For the O&D survey, interviewers boarded their assigned bus/train/ferry and selected riders at random to participate in the survey. While conducting the interview, interviewers asked the respondent each question from the survey tablet and recorded each response provided to them by the passenger. Interviewers needed to be capable of establishing conversation in regard to the survey with bus passengers and inputting passenger responses. For the passenger survey, ETC utilized a staff of at least 15-20 surveyors for the Origin-Destination Survey.

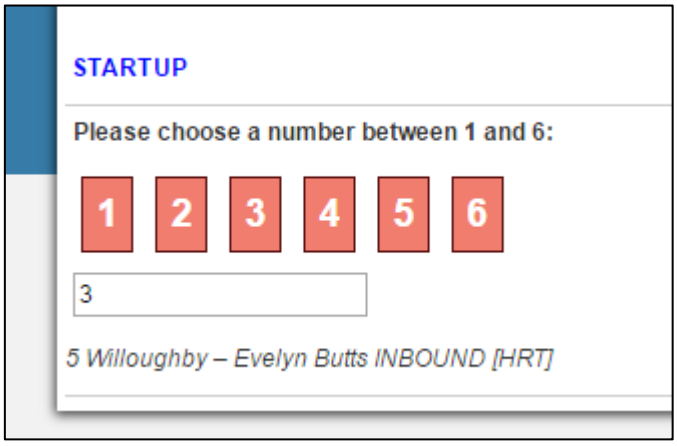
Survey Administration

Selection of participants

Each rider was provided the opportunity to participate in the on-to-off collection. For every sampled trip or individual bus/rail trip that was surveyed for the on-to-off counts, every passenger that boarded the vehicle was offered a barcoded card that was scanned when the passenger boarded and scanned again when the passenger alighted the vehicle. For express and regional routes, a hardcopy questionnaire was attempted to be administered to all boarding passengers.

For the O&D tablet surveys, a random number generator was used to determine which passengers were asked to participate in the survey after boarding the surveying bus shown in Figure 5-5. If four (4) people boarded a bus, the tablet PC randomly generated a number from 1 to 6. If the number generated was 2, the second person who boarded the bus was asked to participate in the survey. If the number generated was 1, the first person was asked to participate in the survey, and so forth. The selection was limited to the first six (6) people who boarded a bus or train at any given stop to ensure the interviewer could keep track of the passengers as they boarded. For example, if 20 people boarded a bus or train, the tablet PC program would randomly pick one of the first six people for the survey. If the interview is refused by the randomly selected rider, then the rider who boarded before the rider selected would be attempted.

FIGURE 5-5: ORIGIN-DESTINATION SURVEY RANDOM NUMBER GENERATOR



No-Time or Spanish/Other Language Speaking Rider Procedure

Respondents who did not have time to complete the survey during their bus trip or spoke a language other than the interviewers' were given the option of providing their phone numbers to conduct the survey at another time. Those who provided their phone numbers were then contacted by ETC Institute's call center to complete the survey. The vast majority of records were able to be completed on-board, less than 0.2% of records were completed by phone. Those interviewers that did speak the foreign language of the rider translated the English Tablet PC version.

Survey Incentives

Respondents who participated in the O&D Survey did receive an option to be entered in a random drawing for one of five $100 Visa gift cards. Drawings were completed after the conclusion of the collection.

On-to-off program procedure

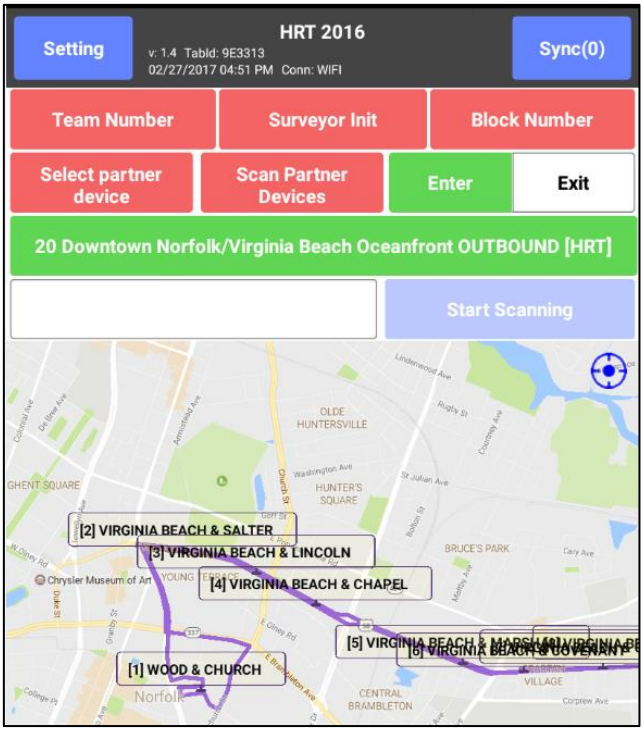
The O2O counts were collected using ETC's proprietary software running on GPS-capable tablets equipped with barcode scanners. Tablets onboard the same bus were paired up before a data collection session began. The riders' route, direction, boarding and alighting information (time, latitude and longitude) were captured with high degree of accuracy via the following process:

- Transit riders were asked to participate as they entered the transit vehicle.

- Each rider entering the bus was handed a barcoded card a moment after the card is scanned by the onboard team member.
- Riders were asked to keep the barcoded card for the duration of their trip on that transit vehicle.
- Riders were asked to hand their cards back as they exited the vehicle. The cards were scanned as the riders exited the bus.

The O2O software sent the scanned data to the O2O server where a server-side processing system evaluated the data and paired up the boarding and the alighting locations of each rider based on the unique barcode, time stamps, and other variables.

FIGURE 5-6: ON-TO-OFF SOFTWARE INTERFACE SCREENSHOT



Before any collection took place, counter staff were trained on every aspect of the onboard process. Supervisory staff administered a variety of quality control checks during tablet set-up; including, review of Route #, Team #, Block #, Run #, Bus #, and Partner Tablet ID#.

The O2O software was centered on a live map of the current transit route and associated stops. Our onboard data collection staff could follow the map of the route and accurately select the riders' boarding and alighting locations. Route termini were clearly marked on the map and the user was alerted when approaching a route terminus, where the session was closed and a new session began when the bus/train began a new run.

An example screen shot of the O2O software is shown Figure 5-6.

O&D Survey Procedure

Local Bus/Ferry/Light Rail (Fixed-route Procedure)

All routes were classified as *fixed-route*s and were surveyed using the tablet PCs. Fixed-routes are routes that provide regular/continuous service throughout the day. Interviewers selected people for the survey in accordance with the sampling procedures described earlier in this sub-section. Once an interviewer had selected a person for the survey, the interviewer:

- Approached the person who was selected and asked him or her to participate in the survey.
- If the person refused, the interviewer ended the survey.

- If the person agreed to participate, the interviewer asked the respondent if he/she had at least 5 minutes to complete the survey.
- If the person did not have at least 5 minutes on the bus, the interviewer asked the person to provide his/her boarding location, alighting location, name, and phone number. A phone interviewer from ETC Institute's call center contacted the respondent and asked him/her to provide the information by phone. This methodology ensured that people who completed "short-trips" on public transit were well represented. The vast majority of records were able to be completed on-board, only a nominal number of records were completed by phone.
- If the person had at least 5 minutes on the bus, the interviewer began administering the survey to the respondent as a face-to-face interview using a tablet PC.

Short Trip Route Procedure

"Short trips" were defined as trips when the distance between the boarding and alighting locations were less than one mile. If a route was identified as a possible short trip route and/or segment, additional interviewers were staffed on the route and interviewers were told to conduct the full interview even if the rider said that he/she did not have enough time to complete the survey. The interviewer would then get off the bus with the rider and complete the survey after getting off the bus.

MAX/Express Service (Express Procedure)

Described earlier in this report, for higher volume MAX/Express Services, the respondent generally has a longer ride time. The combination of longer ride time, and the ease of distributing the paper surveys to a higher number of passengers often leads to a much higher percentage of surveys being captured than would have been possible by using tablet PCs alone, while still maintaining a high level of accuracy. Each paper survey contained a serial number that was used by ETC Institute to track the route and sequence in which surveys were completed. Surveys were then inserted into the database by an ETC data entry team member (the paper version of the survey is provided in APPENDIX A: SURVEY INSTRUMENT).

Reducing Non-Response Bias

The various forms of known bias were combated in a number of different ways using the tablet-based in-person interview, including:

- Sample size distribution bias — Travel flows are typically not normally distributed, which leads to severe under-sampling and results in poor representation of travel flows. If farebox data is not available, the best alternative is to collect On-to-Off counts, expanding it to Stop-Level Ridership data, and utilizing the results for O&D Survey expansion. Besides producing much more accurate flows, this solution eliminates the burden on the O&D survey, and provides for lower O&D sampling rates;
- Access Bias — The tablet-based methodology increases the participation of the walking respondents. This is due to the random nature of the selection and higher response rates. Paper methods

traditionally over represents driver access due to their affluence and appreciation of the service provided;

- Language bias — The tablet-based methodology, with multilingual staff, and a call back option, improves the responses from non-English speaking respondents as described in the data collection task;
- Age Bias — The tablet based methodology allows interviewers to hand hold the younger respondent through the survey instrument. All riders age 15 and over will be eligible to participate. For those who are under 15 and are with a caretaker, then the caretaker can complete the interview on behalf of the younger rider. ETC worked with HRT to develop these protocols and cut off ages to maximize the representative population goals;
- Afternoon and Evening Fatigue — The goals were reached for the afternoon and evening times of day. However, the more important issue involves lower response rates that may occur during these time periods impacting the trip type distribution. ETC did not see any issues of afternoon fatigue based on the data collection results;
- Heavy Load Conditions — The tablet based methodology allows for the collection of information better than the paper based surveyed when heavy load conditions occur. Using paper, it is extremely difficult to distribute questionnaires to the entire bus (the sampling unit). Using the interview method, the sampling unit becomes the individual being surveyed;
- Short Trips — Overall, the tablet interview can be completed faster than a paper based instrument (with an experienced interviewer walking the respondent through the process rather than having to read and complete it themselves). For those riders who are only on the bus for a few stops, their name and phone number can be collected and a call back can be made as described in the data collection task. Paper based instruments traditionally have a very low mail back rate for short trips;
- Literacy bias — because the survey is administered by a surveyor, literacy is not an issue.

Timing of the Survey Administration

On-to-Off (O2O) Timing

The on-to-off survey was administered during weekdays with the exceptions of holidays and breaks for colleges/schools. Administration of the on-to-off survey began as early as 5am and continued as late as 10pm. This was to ensure that the on-to-off data would provide the O&D survey with an accurate sampling plan for administration and for the data expansion. See the service breakout below:

SERVICE TYPE	TIME RANGE
Local Bus	5am – 9pm
MAX/Express Service	6am – 8pm
Ferry	5am – 7pm
Light Rail	6am – 10pm

The bulk of the on-to-off survey was administered August 2016 through October 2016. Targeting for the rail line occurred during January 2017. See the breakout below:

SERVICE TYPE	DATE RANGE
Local Bus	August 2016 – October 2016
MAX/Express Service	August 2016 – October 2016
Ferry	August 2016
Light Rail	September 2016 – October 2016, January 2017

Boarding-Alighting Counts (BA) Timing

The Boarding-Alighting Counts was administered during weekdays with the exceptions of holidays and breaks for colleges/schools. Administration of the Boarding-Alighting Counts began as early as 4am and continued as late as 12am. This was to ensure that the Boarding-Alighting data would provide the O&D survey with an accurate sampling plan for administration and for the data expansion. See Service breakout below:

SERVICE TYPE	TIME RANGE
Local Bus	4am – 12am
MAX/Express Service	5am – 11pm

The bulk of the Boarding-Alighting Counts was administered November 2016 through early December 2016. Targeting trips occurred during January 2017. See the breakout below:

SERVICE TYPE	DATE RANGE
Local Bus	November 2016 – December 2016, January 2017
MAX/Express Service	November 2016 – December 2016, January 2017

Origin & Destination (O&D) Weekday Passenger Survey Timing

The O&D survey was conducted during weekdays (Tuesday through Thursday) from 5am to 11pm and avoided all school and college breaks.

SERVICE TYPE	TIME RANGE
Local Bus	5am – 11pm
MAX/Express Service	6am – 8pm
Ferry	5am – 7pm
Light Rail	5am – 9pm

The bulk of O&D Survey data collection was administered August 2016 through early December 2016. Minimal data collection occurred during the month of January and February 2017 to improve the overall distribution, by targeting specific route, direction, and time of day, and the additional collection of Route 55.

SERVICE TYPE	DATE RANGE
Local Bus	August 2016 – December 2016, January2017 - February 2017
MAX/Express Service	August 2016 – December 2016, January2017 - February 2017
Ferry	August 2016 – October 2016
Light Rail	September 2016 – November 2016

Origin & Destination (O&D) Weekend Passenger Survey Timing

The O&D survey was conducted on Saturdays from 6am to 10pm.

SERVICE TYPE	TIME RANGE
Local Bus	5am – 10pm
Ferry	1pm – 3pm
Light Rail	6am – 9pm

The Weekend O&D Survey data collection was administered August 2016 through November 2016.

SERVICE TYPE	DATE RANGE
Local Bus	August 2016 – November 2016
Ferry	August 2016
Light Rail	October 2016 – November 2016

Surveyor/Interviewer Assignments

Surveyors/interviewers were provided their collection assignments based on that day's sampling goal. Figure 5-7 is an example of a survey assignment card. Cards were handed out each morning or the night before. The surveyor was to stay on the given route/block to maintain sampling distribution. Breaks were assigned by the supervisor to maintain their sampling goal distribution as well.

FIGURE 5-7: SURVEYOR ASSIGNMENT CARD

Asn	ROUTE	BLOCK	OP DAY	DIR	START LOC	START TIME	END LOC	END TIME
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	6:15:00 AM	PENINSULA TOWN CENTER	7:10:00 AM
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	7:15:00 AM	27TH & MAPLE	8:13:00 AM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	8:15:00 AM	PENINSULA TOWN CENTER	9:10:00 AM
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	9:15:00 AM	27TH & MAPLE	10:13:00 AM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	10:15:00 AM	PENINSULA TOWN CENTER	11:10:00 AM
Break								
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	1:15:00 PM	27TH & MAPLE	2:13:00 PM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	2:15:00 PM	PENINSULA TOWN CENTER	3:10:00 PM
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	3:15:00 PM	27TH & MAPLE	4:13:00 PM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	4:15:00 PM	PENINSULA TOWN CENTER	5:10:00 PM
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	5:15:00 PM	27TH & MAPLE	6:13:00 PM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	6:15:00 PM	PENINSULA TOWN CENTER	7:10:00 PM
105-2	105	105 - 2	muwtf	Inbound	PENINSULA TOWN CENTER	7:15:00 PM	27TH & MAPLE	8:13:00 PM
105-2	105	105 - 2	muwtf	Outbound	27TH & MAPLE	8:15:00 PM	PENINSULA TOWN CENTER	9:10:00 PM

In-Field Quality Assurance/Quality Control

Daily, ETC's field supervisor reviewed each employee's data regarding the following issues to assess whether the employee was conducting the survey properly:

- Distribution of surveys by demographics
- Distribution of surveys by trip characteristics
- Length of each survey in minutes
- Percentage of refusals
- Percentage of short trips

ETC's field supervisor also conducted checks on the locations of where the interviews took place. These checks ensured data integrity and identified if an interviewer was being negligent. The ETC field supervisor could verify if an interviewer was on their assigned route by viewing the displayed geographic locations of where the interviews were taking place.

If any item listed above was missing or incomplete, the supervisor flagged the record for reviewing. ETC Instiute then forwarded all incomplete survey records and the corresponding name and phone number to ETC Institute's call center. Interviewers working in ETC Institute's call center then called respondents who had

provided their names and phone numbers to retrieve the missing information by phone. For this project, these actions ultimately resulted in changes to a nominal amount of records.

Status Reporting

ETC Institute provided HRT with weekly updates throughout the data collection effort via a sample completion report. This included data collection for the On-to-Off counts, Origin and Destination interviews, and Boarding and Alighting counts. The sample collected for each was monitored at both the overall route level as well direction and time of day. An example of a completion report is shown in Figure 5-8.

FIGURE 5-8: EXAMPLE OF A COMPLETION REPORT

			Ridership Data						Original Sampling Goals						COMPLETED					
Route #	Route Name	Direction	AM PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Ridership	PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys	PEAK (Before 8am)	Midday (8:00am-1:59pm)	PM Peak (2:00-5:59pm)	Night (After 6:00pm)	Total	Total Surveys
1	Downtown Norfolk Pembroke East	INBOUND	239	501	501	129	1,370	2986	21	45	45	12	123	299	22	126	53	14	215	401
		OUTBOUND	287	568	558	203	1,616		26	51	50	18	145		28	92	50	16	186	
2	Naval Station Norfolk/Hampton Blvd	INBOUND	72	174	164	38	448	1016	6	16	15	3	40	102	7	22	16	1	46	102
		OUTBOUND	104	226	180	57	567		9	20	16	5	51		11	19	20	6	56	
3	Downtown Norfolk/Naval Station	INBOUND	245	401	347	39	1,032	2037	22	36	31	9	98	204	23	37	31	12	103	203
		OUTBOUND	123	302	330	131	945		11	27	35	12	85		12	38	38	12	100	
4	Downtown Norfolk/ODU	INBOUND	30	74	57	39	199	339	3	7	5	4	18	34	6	19	6	4	35	65
		OUTBOUND	18	54	51	17	140		2	5	5	2	13		2	18	6	4	30	
5	Willoughby - Evelyn Butts	INBOUND	34	61	29	0	125	266	3	5	3	0	11	27	2	72	59	0	133	246
		OUTBOUND																		

Data Quality Assurance and Processing

Many of the processes described in previous sections of this report were essential elements of the overall quality assurance/quality control (QA/QC) process that was implemented throughout the survey administration process. The establishment of specific sampling goals and procedures for managing the goals ensured that a representative sample was obtained from each bus route. Training of interviewers and the high levels of oversight provided by team leaders and the Project Manager ensured that the survey was administered properly. Also, the use of the latest geocoding tools such as ETC Institute's Tablet PC survey with integrated real-time geocoding; ETC Institute Elvis editing program; and Caliper® Maptitude GIS Software all contributed to the high quality of geocoding accuracy that was achieved during this study.

The sub-sections below describe the QA/QC processes that were implemented after the data was collected.

Process for Identifying Complete Records

To classify a survey as being completed, the record must have contained all elements of the one-way trip. ETC has classified required trip data as containing the complete answers to the following:

- Route/Direction
- Time of trip
- Transfers made
- Home address
- Origin address
- Destination address
- Origin type place
- Destination type place
- Access mode
- Egress mode
- Boarding location
- Alighting location

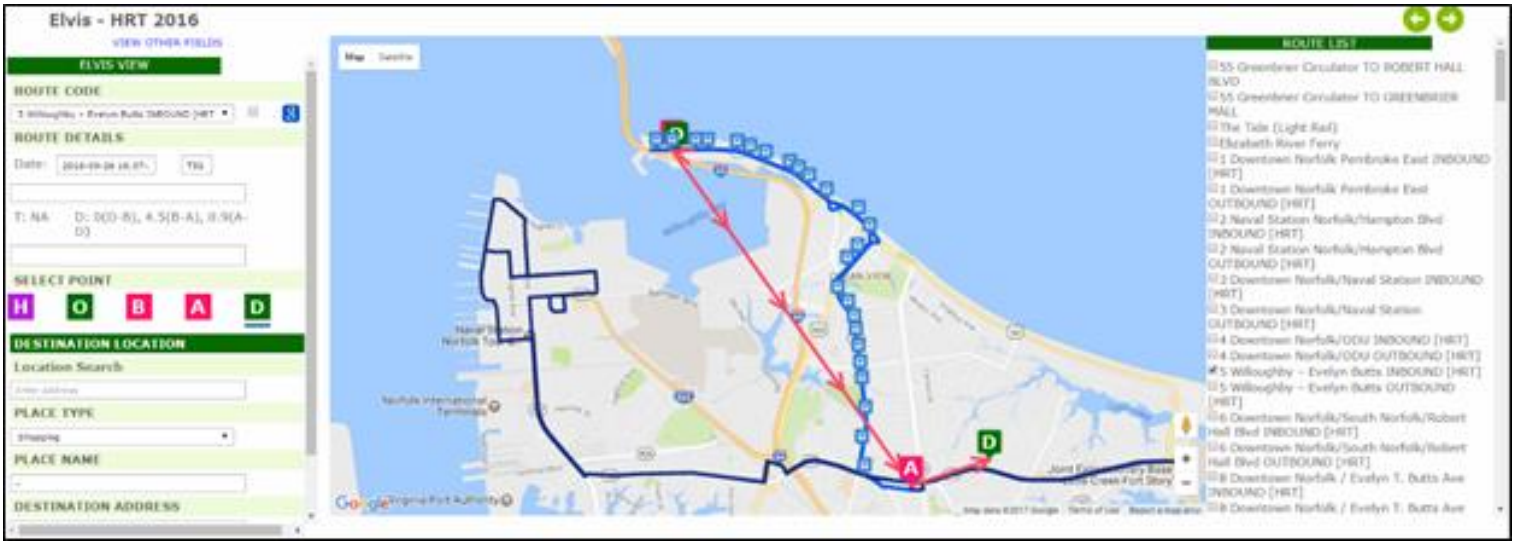
In addition to the required trip data questions, a survey must be marked as complete by the online survey program which occurs only if the interviewer has navigated through every required question on the online survey instrument including demographic questions.

Online Visual Review Tool

ETC has created an online visual review tool that allows for the review of all completed records within the database. This tool shows all components of each individual trip as well as a series of preprogrammed distance and ratio checks as described on subsequent pages. After directions were finalized, the next step was to run each record through the Speed/Distance/Time checks.

Figure 5-9 shows an example of the online visual review tool.

FIGURE 5-9: ONLINE VISUAL REVIEW TOOL (EDITABLE VERSION)



Pre-Processing Distance Checks

A series of distance and ratio checks are preprogrammed into the online visual review tool. This allowed for ETC Institute's Transit Review Team to take a more systematic approach in reviewing complete records. The Transit Review Team process for editing surveys is described later in this section.

Note: The distance and ratio checks described were meant to alert the reviewer that closer evaluation was needed. It did not necessarily indicate that the record was inaccurate or unusable.

The distances used for the checks were created using the great-circle distance formula, which is based on a straight line from point A to point B that considers the curvature of the earth.

Access/Egress Mode Distance Check

Table 5-9 shows the distance checks for access (Origin to Boarding) and egress modes (Alighting to Destination).

TABLE 5-9: ORIGIN TO BOARDING AND ALIGHTING TO DESTINATION DISTANCE CHECKS

Distance Check Name	Check	Condition 1	Condition 2	Flag?
Origin to Boarding	Origin to Boarding distance is greater than 1.75 linear miles	Access Mode - ANY USE OF A VEHICLE (i.e., dropped off, rode with others, drove, taxi...)		No
		Access Mode - Walk/Wheelchair/Skateboard	There is at least one transfer from origin to boarding	No
		Access Mode - Walk/Wheelchair/Skateboard	There are no transfers from origin to boarding	Yes
	Origin to Boarding distance is less than .25 linear miles	Access Mode - ANY USE OF A VEHICLE (i.e., dropped off, rode with others, drove, taxi...)		Yes
		Access Mode - Every mode	There is at least one transfer from origin to boarding	Yes
		Access Mode - Walk/Wheelchair/Skateboard	There are no transfers from origin to boarding	No
Alighting to Destination	Alighting to Destination distance is greater than 1.75 linear miles	Egress Mode - ANY USE OF A VEHICLE (i.e., will get picked up, ride with others, drive, taxi...)		No
		Egress Mode - Walk/Wheelchair/Skateboard	There is at least one transfer from alighting to destination	No
		Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	Yes
	Alighting to Destination distance is less than .25 linear miles	Egress Mode - ANY USE OF A VEHICLE (i.e., will get picked up, ride with others, drive, taxi...)		Yes
		Egress Mode - Every mode	There is at least one transfer from alighting to destination	Yes
		Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	No

Origin to Destination Distance Check

Table 5-10 shows the distance checks based on the origin and destination locations.

TABLE 5-10: ORIGIN TO DESTINATION DISTANCE CHECKS

Distance Check Name	Check	Flag?
Origin to Destination	Origin equals the Destination	Yes
	Origin to Destination is greater than 50 miles	Yes
	Origin to Destination is less than .25 miles	Yes

Boarding and Alighting Distance Check

Table 5-11 shows the distance checks based on the boarding and alighting locations.

TABLE 5-11: BOARDING TO ALIGHTING DISTANCE CHECKS

Distance Check Name	Check	Flag?
Boarding to Alighting	Boarding equals the Alighting	Yes
	Boarding to Alighting is less than .25 miles	Yes

Pre-Processing Ratio Checks

After all transfer checks were completed, the next step in this process involved the application of a series of QA/QC Ratio Checks (see: Table 5-14: Transfer Issues).

Three ratio checks were conducted for each record. First, the distance between boarding and alighting was divided by the distance between origin and destination. If the rider had a high ratio, then the rider was on the bus for an extensive time compared to the origin to destination distance. If the check created an extremely low ratio, the use of transit seemed unnecessary.

Second, the distance between origin and boarding was divided by the distance between origin and destination. If the rider had a high ratio, the origin to boarding distance was excessive compared to the origin to destination.

Third, the distance between alighting and destination was divided by the distance between origin and destination. If the rider had a high ratio, the alighting to destination distance was excessive compared to the origin to destination.

Table 5-12 a and b describe in more detail the ratio checks used, and the conditions in which a record would be flagged.

TABLE 5-12A: RATIO CHECKS

Ratio Checks	Check	Result of Formula	Condition 1	Condition 2	Flag?
Boarding to Alighting distance divided by Origin to Destination distance	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is 1.5 or greater			Yes
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	Access and Egress modes are both Walk/Wheelchair/Skateboard	There are NO transfers involved in the trip	Yes
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	Access or Egress mode - ANY USE OF A VEHICLE		No
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	There is at least one transfer involved in the trip		No

TABLE 5-12B: RATIO CHECKS

Ratio Checks	Check	Result of Formula	Condition 1	Condition 2	Flag?
Origin to Boarding distance divided by Origin to Destination distance	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	there is at least one transfer from origin to boarding		No
	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Access Mode - ANY USE OF A VEHICLE (i.e., dropped off, rode with others, drove, taxi...)		No
	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Access Mode - Walk/Wheelchair/Skateboard	there are no transfers from origin to boarding	Yes
Alighting to Destination divided by Origin to Destination	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	there is at least one transfer from alighting to destination		No
	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Egress Mode - ANY USE OF A VEHICLE (i.e., will get picked up, ride with others, drive, taxi...)		No
	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	Yes

Transit Review Team

ETC Institute has a dedicated team whose priority is reviewing and editing completed records using an online visual review tool. The Transit Review Team reviewed all completed records collected for the survey, paying special attention to records that were automatically flagged for automated distance checks. Typically, around 10% of all records receive an automatic flag. Prior to making edits to any survey, they first attempted to contact the respondent to clarify any questionable answer choices regarding the trip. If no contact was made, or if contact was not possible which occurs in the vast majority of cases, the actions as described in Table 5-13 were taken. The following actions generally result in changes that allow about 30% of those records that are automatically flagged to be retained, or approximately 3% of all completed surveys.

Pre-Processing General Issues and Actions

Table 5-13 describes the general issues that could occur within a trip where changes may have been appropriate.

TABLE 5-13: GENERAL ISSUES

Issue	Description of Issue	Action
Origin/Destination Condition 1	Origin/Destination appears incorrect because the wrong location of a multiple-location organization was selected	If for example, an Origin/Destination appears illogical based on the college campus that was selected, but an appropriate campus of the same college does appear logical given the other points and answer choices of the trip, then the appropriate campus will be selected.
Origin/Destination Condition 2	Origin/Destination appears to have been geocoded to the incorrect city/state	If for example, an Origin/Destination appears illogical based on the city/state that was geocoded, but the address/intersection is logical within the trip if the city/state are changed. This occurs occasionally because the surveyor selects the wrong choice from the list of possible address choices that appear in the online survey instrument, then the appropriate address information will be inserted.
Access/Egress Mode	Access/Egress Mode seems illogical based on trip	If the access/egress mode involves the use of a vehicle and the distance from either origin to boarding or alighting to destination is less than .2 miles, then the access/egress mode is recoded to walk/walked and that change will be reflected in the database.
Directionality of Record	Boarding and alighting locations indicate that the trip is going in the opposite direction of what was selected by the surveyor.	Change Direction of Route Selected and if necessary update boarding and alighting locations based on appropriate direction.

Transfer Issues and Actions

Table 5-14 describes the transfer issues that could occur within a trip where changes may have been appropriate.

TABLE 5-14: TRANSFER ISSUES

Issue #	Description of Issue	Action
Transfer Issue - 1	The transfer(s) seems illogical based on either the origin to boarding or alighting to destination	If the transfer appears to have been selected incorrectly based on surveyor mis-selection error (IE Route 24 selected which is illogical but Route 23 is logical) or passenger error (passenger gives inaccurate transfer), then an appropriate transfer(s) will be inserted based on the geocoded points of the trip (origin and destination), the time of day of the trip and the direction of travel. If no appropriate transfers can be found, then the record will be removed from the database.
Transfer Issue - 2	The transfer(s) seems unnecessary based on either the origin to boarding or alighting to destination	If the transfer(s) appears to be unnecessary because the distance from the origin to boarding or alighting to destination is less than 0.2 miles, then the trip will be reviewed in further detail to determine if the transfer(s) are inappropriate. Aspects that will determine appropriateness are: the landscape (0.1 miles for example is a very short distance but a river in-between the origin and boarding location could require an individual to use a transfer as opposed to being able to walk), disability, age, and alternate access/egress modes (IE if someone indicates walking 1 mile from origin to boarding but then indicates taking 2 transfers from alighting to destination to travel a total of 0.1 miles they have likely indicated transfers for a future trip later in the day). *NOTE: The 0.2 distance is only used as guideline to create a flag for closer review. Typically, only extreme distances have transfers removed*
Transfer Issue - 3	The passenger indicated that they did not use a transfer but based on their access/egress mode and the distance between either the origin to boarding or alighting to destination suggests that a transfer should have been used.	If the access/egress mode is "walked/walk" and no transfer is indicated, and the distance between either origin to boarding or alighting to destination is greater than 2 miles, then an appropriate transfer(s) will be inserted based on the geocoded points of the trip (origin and destination), the time of day of the trip and the direction of travel. If no appropriate transfers can be found, then the record will be removed from the database.
Transfer Issue - 4	Duplicate Transfers in the Route Path	If duplicate transfers exist in the route path, the trip path is reviewed visually to determine which route(s) were incorrectly entered. If a review of the record suggests that the transfer route(s) is/are unnecessary then they will be removed. If the transfers suggest that trip is a round trip (i.e. home to home) and not a one-way trip, then the record will be removed from the database.

Post-Processing Additional Checks

After all records were reviewed by the Transit Review Team, the next step in this process involved the application of a series of QA/QC "non-trip" checks. Non-trip checks are described as anything not pertaining to the respondent's actual trip, i.e. demographic information.

Non-trip related checks included:

- Ensuring the respondents who indicated that they were employed also reported that at least one member of their household was employed.
- Ensuring the time of day, determining if a survey was completed was reasonable given the published operating schedule for the route.
- Ensuring that the appropriate fare type was used in response to the age of respondent.
- Checking that there is a representative demographic distribution based on age, gender, and income status.
- Removing any personal contact information used for quality control purposes during the data collection portion of the project to protect the anonymity of the respondents.

Once all records had gone through the pre-processing and post-processing QA/QC checks, those that were deemed complete and usable were then used to update the completion report used by the Field Staff to ensure that all contractual goals had been met. After the final high-level review was completed, metadata (a codebook) was created to suitably explain the data in the database.

On-to-Off Quality Assurance/Quality Control (QA/QC) Plan

Pre-Processing Quality Assurance/Quality Control

A thorough analysis of the stop list within the study area is conducted by ETC Institute's GIS Analyst before the study. Effective stop geocoding depends on the initial quality of the stop data. Some of the specific checks that are conducted during the pre-processing phase include:

- Sort and delete low confidence records that were created. Confidence levels are created based on the *on-to-off* software's QA/QC algorithm (described below)
- Check completeness of all fields for each record
- Verify the time of day when a survey set was completed was reasonable given the published operating schedule for the route

QA/QC algorithm

The record matching algorithm uses the barcode value and time stamp of the scan to match the ON and OFF records. The level of confidence of the match, expressed as a number (e.g. 100 means perfect match) is determined based on auxiliary attributes of the scans falling within certain tolerances or matching expected values. These auxiliary attributes include:

- Route and Direction of the candidate scans should match; if one or both do not match, the reliability of the match is affected and marked
- Enter and Exit modes – the ON scan is expected to have the Enter mode tag while the OFF scan should have the Exit mode tag; if either scan does not, a capture error is recorded and match reliability is affected
- Paired device ID – the OFF scan is expected to have been captured on a device that was paired up with the ON-scan device
- Session Number – an auto-generated globally unique session ID assigned to each scan and is combined with the device ID and the ID of any paired devices
- Time gap between two consecutive candidate scans must be between a minimum and a maximum value, e.g. 1 min to 3 hours; the maximum value is set for the specific transit system under study
- If travel time is greater than X (e.g. 30 min), vehicle speed must be greater than Y (e.g. 5 mph)
- Distance between location of two matching scans must be greater than L (e.g. 0.1 mile)

Post-Processing Quality Assurance / Quality Control

After all boardings/alightings were successfully geocoded, the next step in this process involved the application of a series of QA/QC checks.

Directional Check

Following the boarding and alighting stop locations being geocoded, the direction of travel for each record was confirmed. Stop locations and IDs were then updated based on established direction. Figure 5-10 shows actions that were taken if the direction was incorrect.

FIGURE 5-10: O2O DIRECTION CHECK

Issue	Description of Issue	Suggested Action
Directionality of Record	Boarding and alighting locations indicate that the trip is going in the opposite direction of what was selected by the surveyor.	Change Direction of Route Selected and if necessary update boarding and alighting locations based on appropriate direction.

Speed/Distance/Time Check

After directions were finalized, the next step was to run each record through the speed/distance/time checks. If any of the conditions in Figure 5-11 were met, the record was flagged for further review.

FIGURE 5-11: SPEED/DISTANCE/TIME CHECK

On-to-Off Check Name	Check	Condition 1	Flag?
Speed Check	Checks Speed between boarding and alighting pair	< 1mph	Yes
		>70mph	Yes
Distance Check	Checks Distance between boarding and alighting pair	< 0.12 miles	Yes
		Exceeds route terminus to terminus distance	Yes
Time Check	Checks time between boarding and alighting pair	< 1 minute	Yes
		Exceeds route terminus to terminus average time	Yes

Survey Weighting and Expansion

Data Expansion Overview

When survey goals are created, they are typically based off a percentage of the average weekday ridership for the routes in the system. That is further broken down by time periods and directions. The time periods that are created (6am to 9am for example) are based off the specific request of the client and match the Travel Demand Model. Once a sample percentage is agreed upon, the goals for the survey collection are based off the ridership for each route by time period and direction, and then multiplied by the sampling percentage. For "Circular" or "Loop" routes, the ridership is typically only broken down into time period as there are many riders that will board going in one direction but alight going the other direction due to the functionality of the route. This typically is also the case if there are directional routes where many riders travel through the terminus and alight going the opposite direction of initial boarding.

The purpose of developing survey goals is to collect an appropriate number of survey records that will be "Expanded" to represent the total average weekday ridership of each route by time period and direction. To further increase the specificity of the expansion process, segments were created for each route. Stops were grouped into segments along the route so that boarding segments could be paired with alighting segments when creating the expansion factor. Segmentation occurs on bus routes because it is unrealistic to expand bus survey data at the stop level. Stop, or station, level expansion is generally reserved for rail lines.

Sources of Ridership Data for Expansion

ETC created Stop-Level Ridership data by normalizing the Boarding & Alighting Survey results to the daily ridership totals. See Table 5-15 to see the process for creating Stop-Level Ridership. The new Stop-Level Ridership created by ETC was used to fine tune the collection and conduct the expansion; the data was from average daily ridership from September through October 2016. Routes with conducted Boarding-Alighting Counts were expanded to match the daily average ridership by route/direction/time of day and the result distribution was used to produce segments based on boarding percentages (see: Route Segmentation with Stop-Level Ridership Data).

TABLE 5-15: EXAMPLE: CREATING STOP-LEVEL RIDERSHIP FROM AVERAGE DAILY RIDERSHIP

Ridership of Route X = 50						
Time Period 1 going Eastbound						
Route X	Boarding & Alighting Counts		Distribution of Boarding & Alighting Counts Stop divided by Total		Applying B&A Distibution to Ridership Figures	
	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Stop 1	60	0	55%	0%	27.3	0.0
Stop 2	20	10	18%	9%	9.1	4.5
Stop 3	5	30	5%	27%	2.3	13.6
Stop 4	10	10	9%	9%	4.5	4.5
Stop 5	10	20	9%	18%	4.5	9.1
Stop 6	5	40	5%	36%	2.3	18.2
TOTAL	110	110	100%	100%	50	50

Route Segmentation with Stop-Level Ridership Data

There are two ways ETC creates segments for bus routes: 1) boarding percentages of the route from Ridership data, and 2) based on the number of stops for the route. When possible, segmenting routes using Stop-Level Ridership data is the preferred way to segment routes as opposed to segmenting routes based on the number of stops. Routes with Stop-Level Ridership data were separated based on direction, then divided into three segments based on the total boardings. After approximately one-third of the route's total ridership had boarded, a new segment began. After approximately two-thirds of the route's total ridership had boarded the final third segment began. Table 5-16 is a simplified example of segmentation with stop-level ridership. *(Note: Iterative Proportional Fitting (IPF) is used in multiple types of expansion discussed later in this document. In order for IPF to work properly, the boarding totals must match the alighting totals. For this reason, ridership alightings are adjusted using a multiplying factor in order to make sure their totals match the boarding totals. These are typically nominal alterations; however, if there are significant differences in boarding and alighting totals by direction of a route, it may require additional review of the functionality of the route to ensure that the surveys are both collected and expanded appropriately.)*

TABLE 5-16: EXAMPLE: SEGMENTATION WITH STOP-LEVEL RIDERSHIP

Segmentation with STOP-LEVEL RIDERSHIP Example					
Direction: Eastbound	STOP-LEVEL RIDERSHIP		Segmentation		
Stops	Boardings	Alightings	Running Total of Boardings	Running Percentage of Total Boardings	Segment
Stop 1	35	0	35	23.0%	1
Stop 2	20	10	55	36.2%	1
Stop 3	20	5	75	49.3%	2
Stop 4	15	10	90	59.2%	2
Stop 5	5	12	95	62.5%	2
Stop 6	4	4	99	65.1%	2
Stop 7	19	4	118	77.6%	3
Stop 8	12	3	130	85.5%	3
Stop 9	15	5	145	95.4%	3
Stop 10	3	10	148	97.4%	3
Stop 11	2	15	150	98.7%	3
Stop 12	2	11	152	100.0%	3
Stop 13	0	10	152	100.0%	3
Stop 14	0	15	152	100.0%	3
Stop 15	0	38	152	100.0%	3
	152	152			

Route Segmentation without Stop-Level Ridership Data

Routes without Stop-Level Ridership data were divided into three segments based on the number of stops. After approximately one-third of the route's stops occurred, a new segment began. After approximately two-third of the route's stops occurred, the final third segment was determined. Table 5-17 is an example of segmenting without Stop-Level Ridership data.

TABLE 5-17: SEGMENTATION WITH NUMBER OF STOPS

Segmentation with STOP-LEVEL RIDERSHIP Example															
Direction: Eastbound															
Stops	Stop 1	Stop 2	Stop 3	Stop 4	Stop 5	Stop 6	Stop 7	Stop 8	Stop 9	Stop 10	Stop 11	Stop 12	Stop 13	Stop 14	Stop 15
Segment	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3

FIGURE 5-12A: ROUTE SEGMENTATION PER HRT ROUTE TYPE CHART

ROUTE 5-12B: ROUTE SEGMENTATION TYPE CHART

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
30 Wave: Atlantic Avenue Shuttle INBOUND [HRT]	30	STOP METHOD	403 Buckroe Shopping Center OUTBOUND [HRT]	403	STOP METHOD
30 Wave: Atlantic Avenue Shuttle OUTBOUND [HRT]	30	STOP METHOD	405 NNTC/Buckroe INBOUND [HRT]	405	STOP METHOD
31 Wave: Aquarium and Campground Shuttle INBOUND [HRT]	31	STOP METHOD	405 NNTC/Buckroe OUTBOUND [HRT]	405	STOP METHOD
31 Wave: Aquarium and Campground Shuttle OUTBOUND [HRT]	31	STOP METHOD	414 NNTC/Jefferson/Oakland INBOUND [HRT]	414	STOP METHOD
32 Wave: Shoppers Shuttle INBOUND [HRT]	32	STOP METHOD	414 NNTC/Jefferson/Oakland OUTBOUND [HRT]	414	STOP METHOD
32 Wave: Shoppers Shuttle OUTBOUND [HRT]	32	STOP METHOD	415 NNTC/Denbigh OUTBOUND [HRT]	415	STOP METHOD
33 (General Booth) North Seashore/Municipal Center INBOUND [HRT]	33	STOP METHOD	430 Denbigh Fringe INBOUND [HRT]	430	STOP METHOD
33 (General Booth) North Seashore/Municipal Center OUTBOUND [HRT]	33	STOP METHOD	430 Denbigh Fringe OUTBOUND [HRT]	430	STOP METHOD
36 (Holland) Pembroke East INBOUND [HRT]	36	B&A/STOP-LEVEL METHOD	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	918	STOP METHOD
36 (Holland) Pembroke East OUTBOUND [HRT]	36	B&A/STOP-LEVEL METHOD	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	918	STOP METHOD
41 Downtown Portsmouth/Cradock INBOUND [HRT]	41	STOP METHOD	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	919	STOP METHOD
41 Downtown Portsmouth/Cradock OUTBOUND [HRT]	41	STOP METHOD	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	919	STOP METHOD
43 County Street / Bart Street INBOUND [HRT]	43	STOP METHOD	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk INBOUND [HRT]	922	STOP METHOD
43 County Street / Bart Street OUTBOUND [HRT]	43	STOP METHOD	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk OUTBOUND [HRT]	922	STOP METHOD
44 Norfolk General Hospital/Midtown Portsmouth INBOUND [HRT]	44	STOP METHOD	960 MAX Virginia Beach to Norfolk INBOUND [HRT]	960	STOP METHOD
44 Norfolk General Hospital/Midtown Portsmouth OUTBOUND [HRT]	44	STOP METHOD	960 MAX Virginia Beach to Norfolk OUTBOUND [HRT]	960	STOP METHOD
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	45	B&A/STOP-LEVEL METHOD	961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	961	B&A/STOP-LEVEL METHOD
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	45	B&A/STOP-LEVEL METHOD	961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	961	B&A/STOP-LEVEL METHOD
47 Downtown Portsmouth/Churchland INBOUND [HRT]	47	B&A/STOP-LEVEL METHOD	965 MAX Patrick Henry Mall to Naval Station Norfolk INBOUND [HRT]	965	STOP METHOD
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	47	B&A/STOP-LEVEL METHOD	965 MAX Patrick Henry Mall to Naval Station Norfolk OUTBOUND [HRT]	965	STOP METHOD
50 Academy Park/Victory Crossing INBOUND [HRT]	50	STOP METHOD	966 MAX Silverleaf Park & Ride/Newport News Transit Center INBOUND [HRT]	966	STOP METHOD
50 Academy Park/Victory Crossing OUTBOUND [HRT]	50	STOP METHOD	966 MAX Silverleaf Park & Ride/Newport News Transit Center OUTBOUND [HRT]	966	STOP METHOD
55 Greenbrier Circulator TO GREENBRIER MALL	55	STOP METHOD	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) INBOUND [HRT]	967	STOP METHOD
55 Greenbrier Circulator TO ROBERT HALL BLVD	55	STOP METHOD	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) OUTBOUND [HRT]	967	STOP METHOD
57 Robert Hall Boulevard/Airline Boulevard INBOUND [HRT]	57	STOP METHOD	Elizabeth River Ferry	90	STOP METHOD
57 Robert Hall Boulevard/Airline Boulevard OUTBOUND [HRT]	57	STOP METHOD	The Tide (Light Rail)	800	STATION-TO-STATION

Types of Data Expansion

The type of bus data expansion conducted depended on the data available for the specific bus route. The three (3) types of data that created the combinations that guided the type of expansion used were: Stop-Level Ridership (from Client/BA Counts collected by ETC), On-to-Off Counts Data (collected by ETC), and Origin & Destination (O&D) Survey Data (collected by ETC). Figure 5-13 below shows the data combinations, the corresponding route segmentation, and type of expansion used.

FIGURE 5-13: TYPES OF DATA EXPANSION

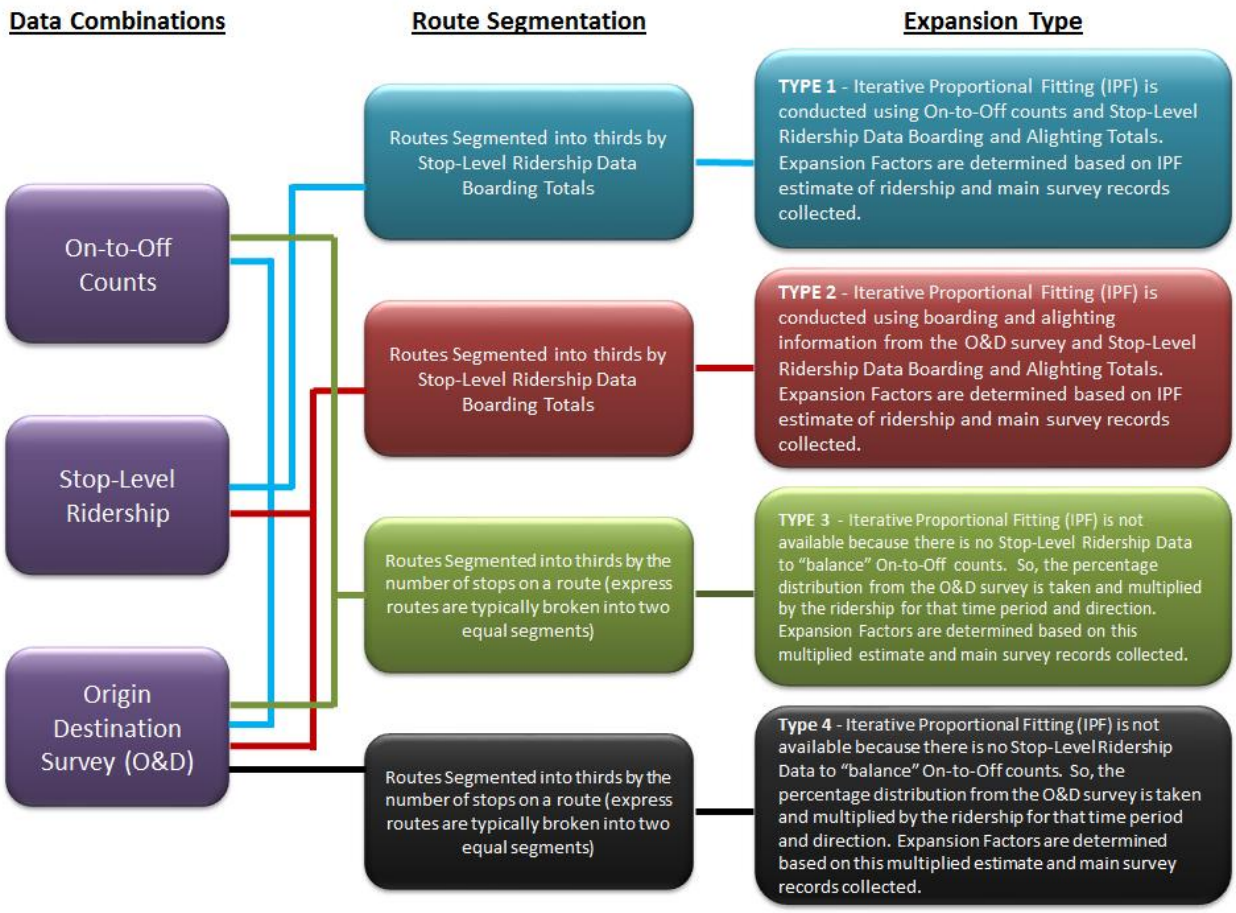


Figure 5-14 below shows the type of expansion used per HRT route.

FIGURE 5-14A: TYPES OF DATA EXPANSION

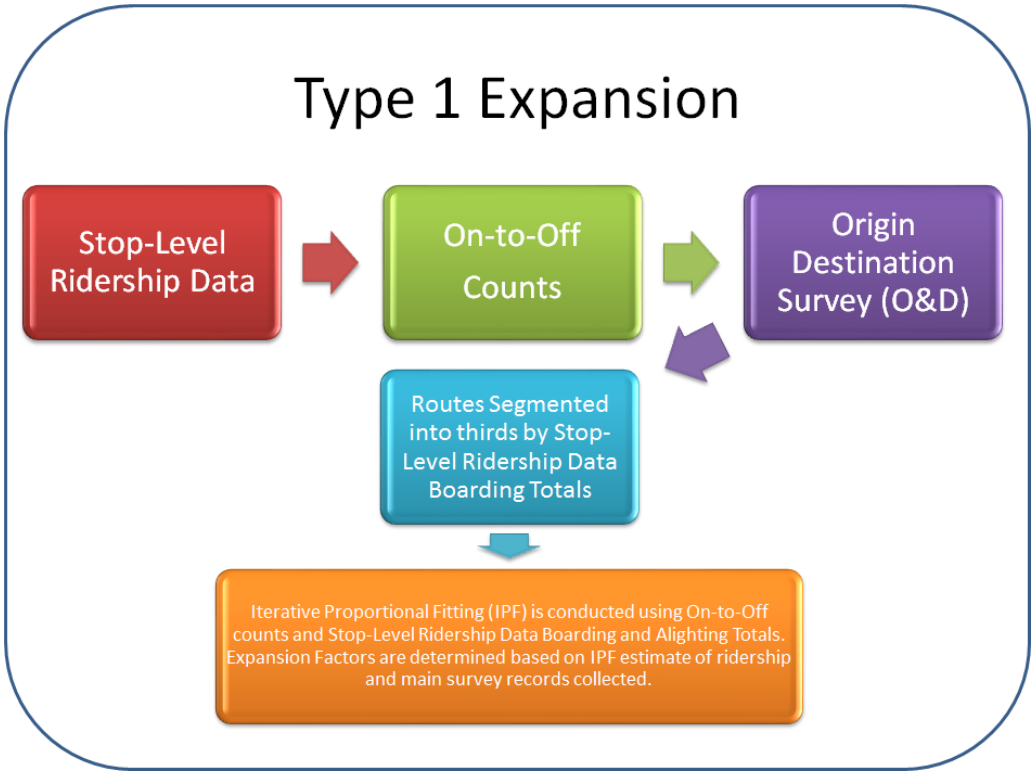
ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
1 Downtown Norfolk Pembroke East INBOUND [HRT]	1	TYPE 1 EXPANSION	58 South Norfolk/Bainbridge Boulevard INBOUND [HRT]	58	TYPE 4 EXPANSION
1 Downtown Norfolk Pembroke East OUTBOUND [HRT]	1	TYPE 1 EXPANSION	58 South Norfolk/Bainbridge Boulevard OUTBOUND [HRT]	58	TYPE 4 EXPANSION
2 Naval Station Norfolk/Hampton Blvd INBOUND [HRT]	2	TYPE 1 EXPANSION	64 To Smithfield/Gwaltney and Newport News Shipyard INBOUND [HRT]	64	TYPE 4 EXPANSION
2 Naval Station Norfolk/Hampton Blvd OUTBOUND [HRT]	2	TYPE 1 EXPANSION	64 To Smithfield/Gwaltney and Newport News Shipyard OUTBOUND [HRT]	64	TYPE 4 EXPANSION
3 Downtown Norfolk/Naval Station INBOUND [HRT]	3	TYPE 1 EXPANSION	101 (Kecoughtan) Downtown Newport News/Downtown Hampton INBOUND [HRT]	101	TYPE 1 EXPANSION
3 Downtown Norfolk/Naval Station OUTBOUND [HRT]	3	TYPE 1 EXPANSION	101 (Kecoughtan) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	101	TYPE 1 EXPANSION
4 Downtown Norfolk/ODU INBOUND [HRT]	4	TYPE 4 EXPANSION	102 (Coliseum) Peninsula Town Center/Downtown Hampton INBOUND [HRT]	102	TYPE 4 EXPANSION
4 Downtown Norfolk/ODU OUTBOUND [HRT]	4	TYPE 4 EXPANSION	102 (Coliseum) Peninsula Town Center/Downtown Hampton OUTBOUND [HRT]	102	TYPE 4 EXPANSION
5 Willoughby – Evelyn Butts INBOUND [HRT]	5	TYPE 4 EXPANSION	103 (Shell Rd.) Downtown Newport News/Downtown Hampton INBOUND [HRT]	103	TYPE 1 EXPANSION
5 Willoughby – Evelyn Butts OUTBOUND [HRT]	5	TYPE 4 EXPANSION	103 (Shell Rd.) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	103	TYPE 1 EXPANSION
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd INBOUND [HRT]	6	TYPE 1 EXPANSION	104 (Marshall) Downtown Newport News/Newmarket INBOUND [HRT]	104	TYPE 1 EXPANSION
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd OUTBOUND [HRT]	6	TYPE 1 EXPANSION	104 (Marshall) Downtown Newport News/Newmarket OUTBOUND [HRT]	104	TYPE 1 EXPANSION
8 Downtown Norfolk / Evelyn T. Butts Ave INBOUND [HRT]	8	TYPE 1 EXPANSION	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center INBOUND [HRT]	105	TYPE 1 EXPANSION
8 Downtown Norfolk / Evelyn T. Butts Ave OUTBOUND [HRT]	8	TYPE 1 EXPANSION	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center OUTBOUND [HRT]	105	TYPE 1 EXPANSION
9 Downtown Norfolk/Sewells Point Road INBOUND [HRT]	9	TYPE 1 EXPANSION	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis INBOUND [HRT]	106	TYPE 1 EXPANSION
9 Downtown Norfolk/Sewells Point Road OUTBOUND [HRT]	9	TYPE 1 EXPANSION	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis OUTBOUND [HRT]	106	TYPE 1 EXPANSION
11 Downtown Norfolk/Colonial Place INBOUND [HRT]	11	TYPE 4 EXPANSION	107 Newport News / Warwick Boulevard / Denbigh INBOUND [HRT]	107	TYPE 1 EXPANSION
11 Downtown Norfolk/Colonial Place OUTBOUND [HRT]	11	TYPE 4 EXPANSION	107 Newport News / Warwick Boulevard / Denbigh OUTBOUND [HRT]	107	TYPE 1 EXPANSION
12 South Norfolk/TCC – Virginia Beach INBOUND [HRT]	12	TYPE 1 EXPANSION	108 Patrick Henry Mall / Lee Hall INBOUND [HRT]	108	TYPE 4 EXPANSION
12 South Norfolk/TCC – Virginia Beach OUTBOUND [HRT]	12	TYPE 1 EXPANSION	108 Patrick Henry Mall / Lee Hall OUTBOUND [HRT]	108	TYPE 4 EXPANSION
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake INBOUND [HRT]	13	TYPE 1 EXPANSION	109 (Pembroke) Downtown Hampton/Buckroe INBOUND [HRT]	109	TYPE 4 EXPANSION
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake OUTBOUND [HRT]	13	TYPE 1 EXPANSION	109 (Pembroke) Downtown Hampton/Buckroe OUTBOUND [HRT]	109	TYPE 4 EXPANSION
14 Robert Hall Blvd / TCC Chesapeake INBOUND [HRT]	14	TYPE 4 EXPANSION	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson INBOUND [HRT]	110	TYPE 1 EXPANSION
14 Robert Hall Blvd / TCC Chesapeake OUTBOUND [HRT]	14	TYPE 4 EXPANSION	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson OUTBOUND [HRT]	110	TYPE 1 EXPANSION
15 Evelyn Butts to Robert Hall/Greenbrier Mall INBOUND [HRT]	15	TYPE 1 EXPANSION	111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh INBOUND [HRT]	111	TYPE 1 EXPANSION
15 Evelyn Butts to Robert Hall/Greenbrier Mall OUTBOUND [HRT]	15	TYPE 1 EXPANSION	111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh OUTBOUND [HRT]	111	TYPE 1 EXPANSION
18 Downtown Norfolk/Ballentine Boulevard INBOUND [HRT]	18	TYPE 4 EXPANSION	112 Downtown Newport News / Patrick Henry Mall INBOUND [HRT]	112	TYPE 1 EXPANSION
18 Downtown Norfolk/Ballentine Boulevard OUTBOUND [HRT]	18	TYPE 4 EXPANSION	112 Downtown Newport News / Patrick Henry Mall OUTBOUND [HRT]	112	TYPE 1 EXPANSION
20 Downtown Norfolk/Virginia Beach Oceanfront INBOUND [HRT]	20	TYPE 1 EXPANSION	114 (Weaver Rd.) Newmarket/Downtown Hampton INBOUND [HRT]	114	TYPE 1 EXPANSION
20 Downtown Norfolk/Virginia Beach Oceanfront OUTBOUND [HRT]	20	TYPE 1 EXPANSION	114 (Weaver Rd.) Newmarket/Downtown Hampton OUTBOUND [HRT]	114	TYPE 1 EXPANSION
21 Little Creek Rd. INBOUND [HRT]	21	TYPE 1 EXPANSION	115 Buckroe/Willow Oaks/Downtown Hampton INBOUND [HRT]	115	TYPE 4 EXPANSION
21 Little Creek Rd. OUTBOUND [HRT]	21	TYPE 1 EXPANSION	115 Buckroe/Willow Oaks/Downtown Hampton OUTBOUND [HRT]	115	TYPE 4 EXPANSION
22 Newtown Road Station/Joint Expeditionary Base Little Creek INBOUND [HRT]	22	TYPE 4 EXPANSION	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop INBOUND [HRT]	116	TYPE 4 EXPANSION
22 Newtown Road Station/Joint Expeditionary Base Little Creek OUTBOUND [HRT]	22	TYPE 4 EXPANSION	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop OUTBOUND [HRT]	116	TYPE 4 EXPANSION
23 Medical Tower/Military Circle/JANAF INBOUND [HRT]	23	TYPE 1 EXPANSION	117 (Phoebus) Hampton University/V.A. Hospital INBOUND [HRT]	117	TYPE 4 EXPANSION
23 Medical Tower/Military Circle/JANAF OUTBOUND [HRT]	23	TYPE 1 EXPANSION	117 (Phoebus) Hampton University/V.A. Hospital OUTBOUND [HRT]	117	TYPE 4 EXPANSION
25 (Newtown) Military Circle/Princess Anne INBOUND [HRT]	25	TYPE 4 EXPANSION	118 (Magruder) Langley/Semple Farm Road INBOUND [HRT]	118	TYPE 1 EXPANSION
25 (Newtown) Military Circle/Princess Anne OUTBOUND [HRT]	25	TYPE 4 EXPANSION	118 (Magruder) Langley/Semple Farm Road OUTBOUND [HRT]	118	TYPE 1 EXPANSION

FIGURE 5-14B: TYPES OF DATA EXPANSION

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
26 Lynnhaven Mall / TCC Virginia Beach INBOUND [HRT]	26	TYPE 4 EXPANSION	119 Fishing Point Dr/Riverside Regional Medical Center INBOUND [HRT]	119	TYPE 4 EXPANSION
26 Lynnhaven Mall / TCC Virginia Beach OUTBOUND [HRT]	26	TYPE 4 EXPANSION	119 Fishing Point Dr/Riverside Regional Medical Center OUTBOUND [HRT]	119	TYPE 4 EXPANSION
27 Pleasure House Rd./Newtown Road Light Rail Station INBOUND [HRT]	27	TYPE 4 EXPANSION	120 (Mallory) Downtown Hampton/Mallory/Buckroe INBOUND [HRT]	120	TYPE 4 EXPANSION
27 Pleasure House Rd./Newtown Road Light Rail Station OUTBOUND [HRT]	27	TYPE 4 EXPANSION	120 (Mallory) Downtown Hampton/Mallory/Buckroe OUTBOUND [HRT]	120	TYPE 4 EXPANSION
29 (Lynnhaven) Pleasure House Road INBOUND [HRT]	29	TYPE 4 EXPANSION	121 Newport News Transportation Center / Williamsburg INBOUND [HRT]	121	TYPE 4 EXPANSION
29 (Lynnhaven) Pleasure House Road OUTBOUND [HRT]	29	TYPE 4 EXPANSION	121 Newport News Transportation Center / Williamsburg OUTBOUND [HRT]	121	TYPE 4 EXPANSION
30 Wave: Atlantic Avenue Shuttle INBOUND [HRT]	30	TYPE 3 EXPANSION	403 Buckroe Shopping Center OUTBOUND [HRT]	403	TYPE 4 EXPANSION
30 Wave: Atlantic Avenue Shuttle OUTBOUND [HRT]	30	TYPE 3 EXPANSION	405 NNTC/Buckroe INBOUND [HRT]	405	TYPE 4 EXPANSION
31 Wave: Aquarium and Campground Shuttle INBOUND [HRT]	31	TYPE 4 EXPANSION	405 NNTC/Buckroe OUTBOUND [HRT]	405	TYPE 4 EXPANSION
31 Wave: Aquarium and Campground Shuttle OUTBOUND [HRT]	31	TYPE 4 EXPANSION	414 NNTC/Jefferson/Oakland INBOUND [HRT]	414	TYPE 4 EXPANSION
32 Wave: Shoppers Shuttle INBOUND [HRT]	32	TYPE 4 EXPANSION	414 NNTC/Jefferson/Oakland OUTBOUND [HRT]	414	TYPE 4 EXPANSION
32 Wave: Shoppers Shuttle OUTBOUND [HRT]	32	TYPE 4 EXPANSION	415 NNTC/Denbigh OUTBOUND [HRT]	415	TYPE 4 EXPANSION
33 (General Booth) North Seashore/Municipal Center INBOUND [HRT]	33	TYPE 4 EXPANSION	430 Denbigh Fringe INBOUND [HRT]	430	TYPE 4 EXPANSION
33 (General Booth) North Seashore/Municipal Center OUTBOUND [HRT]	33	TYPE 4 EXPANSION	430 Denbigh Fringe OUTBOUND [HRT]	430	TYPE 4 EXPANSION
36 (Holland) Pembroke East INBOUND [HRT]	36	TYPE 1 EXPANSION	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	918	TYPE 4 EXPANSION
36 (Holland) Pembroke East OUTBOUND [HRT]	36	TYPE 1 EXPANSION	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	918	TYPE 4 EXPANSION
41 Downtown Portsmouth/Cradock INBOUND [HRT]	41	TYPE 4 EXPANSION	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	919	TYPE 4 EXPANSION
41 Downtown Portsmouth/Cradock OUTBOUND [HRT]	41	TYPE 4 EXPANSION	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	919	TYPE 4 EXPANSION
43 County Street / Bart Street INBOUND [HRT]	43	TYPE 4 EXPANSION	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk INBOUND [HRT]	922	TYPE 4 EXPANSION
43 County Street / Bart Street OUTBOUND [HRT]	43	TYPE 4 EXPANSION	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk OUTBOUND [HRT]	922	TYPE 4 EXPANSION
44 Norfolk General Hospital/Midtown Portsmouth INBOUND [HRT]	44	TYPE 4 EXPANSION	960 MAX Virginia Beach to Norfolk INBOUND [HRT]	960	TYPE 4 EXPANSION
44 Norfolk General Hospital/Midtown Portsmouth OUTBOUND [HRT]	44	TYPE 4 EXPANSION	960 MAX Virginia Beach to Norfolk OUTBOUND [HRT]	960	TYPE 4 EXPANSION
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	45	TYPE 1 EXPANSION	961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	961	TYPE 1 EXPANSION
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	45	TYPE 1 EXPANSION	961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	961	TYPE 1 EXPANSION
47 Downtown Portsmouth/Churchland INBOUND [HRT]	47	TYPE 1 EXPANSION	965 MAX Patrick Henry Mall to Naval Station Norfolk INBOUND [HRT]	965	TYPE 4 EXPANSION
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	47	TYPE 1 EXPANSION	965 MAX Patrick Henry Mall to Naval Station Norfolk OUTBOUND [HRT]	965	TYPE 4 EXPANSION
50 Academy Park/Victory Crossing INBOUND [HRT]	50	TYPE 4 EXPANSION	966 MAX Silverleaf Park & Ride/Newport News Transit Center INBOUND [HRT]	966	TYPE 4 EXPANSION
50 Academy Park/Victory Crossing OUTBOUND [HRT]	50	TYPE 4 EXPANSION	966 MAX Silverleaf Park & Ride/Newport News Transit Center OUTBOUND [HRT]	966	TYPE 4 EXPANSION
55 Greenbrier Circulator TO GREENBRIER MALL	55	TYPE 4 EXPANSION	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) INBOUND [HRT]	967	TYPE 4 EXPANSION
55 Greenbrier Circulator TO ROBERT HALL BLVD	55	TYPE 4 EXPANSION	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) OUTBOUND [HRT]	967	TYPE 4 EXPANSION
57 Robert Hall Boulevard/Airline Boulevard INBOUND [HRT]	57	TYPE 4 EXPANSION	Elizabeth River Ferry	90	TYPE 4 EXPANSION
57 Robert Hall Boulevard/Airline Boulevard OUTBOUND [HRT]	57	TYPE 4 EXPANSION	The Tide (Light Rail)	800	RAIL EXPANSION

Type 1 Expansion: Bus Routes with Stop-Level Ridership Data, On-to-Off Counts Data, and O&D Survey Data

Of the four types of bus expansion discussed, Type 1 Expansion was the preferred method as it incorporated all three types of data that were available. Typically, On-to-Off data collection is reserved for more heavily traveled routes. These heavier ridership routes are also typically more likely to have adequate Stop-Level Ridership. ETC Institute created Stop-Level Ridership data by normalizing the Boarding & Alighting Survey results to the daily ridership totals. See Table 5-15 for the process of creating Stop-Level Ridership with boarding & alighting counts. This type of expansion was conducted on the more heavily traveled routes in the system and occurred after route stops were divided into three segments based on total boarding distribution by direction, as described previously. The segments were then appended to both the On-to-Off counts and O&D data based on the boarding and alighting locations. Type 1 Expansion was used for 38% percent of the HRT routes. See Figure 5-13: Types of Data Expansion for route details. The methodology for Type 1 Expansion is as follows:



Type 1: Expansion Methodology for Bus Routes with Stop-Level Ridership Data, On-to-Off Data and O&D Survey Data

Once the segments were appended to the On-to-Off counts and O&D survey databases, the records were ready for expansion. The process for how the data was expanded in Type 1 Expansion is explained below:

Figure 5-15 shows the segmented results for the On-to-Off counts that was administered for a certain route, direction, and time period. Each row in the Table identifies the segment where passengers boarded the bus. The columns in the Table identify the segments where people alighted the bus. For example, 20 of the On-to-Off counts had riders board in segment 2 and alight in segment 3.

FIGURE 5-15: BUS DATA EXPANSION TABLE RESULTS OF ON-TO-OFF SURVEY

TABLE 1: RESULTS OF THE ON-TO-OFF SURVEY				
Route: Example Eastbound (6am-9am)		ACTUAL RIDERSHIP COUNTS FROM THE ON/OFF SURVEY		
Segment	Total	1	2	3
1	60	5	15	40
2	45		25	20
3	10			10
Total	115	5	40	70

Figure 5-16 shows the distribution of the data in Figure 5-15 expressed as a percentage of all boardings for the specific time period and direction. Figure 5-16 was created by dividing each on-to-off cell in Figure 5-15 by the sum of all On-to-Off counts in Figure 5-15, which is 115. For example, 20/115 (17.4%) of all trips boarded in segment 2 and alighted in segment 3 as shown in Figure 5-16.

FIGURE 5-16: BUS DATA EXPANSION TABLE DISTRIBUTION OF ON-TO-OFF SURVEY

TABLE 2: DISTRIBUTION OF THE ON-TO-OFF SURVEY				
Route: Example Eastbound (6am-9am)		PERCENTAGE DISTRIBUTION OF RIDERSHIP COUNTS FROM THE ON/OFF SURVEY		
Segment	Total	1	2	3
1	52.2%	4.3%	13.0%	34.8%
2	39.1%	0.0%	21.7%	17.4%
3	8.7%	0.0%	0.0%	8.7%
Total	100.0%	4.3%	34.8%	60.9%

The total ridership for the route, time period, and direction was applied to the on-to-off distribution percentages shown in Figure 5-16.

Figure 5-16 produces an estimate of the ridership flow for the boarding segment to the alighting segment as shown in Figure 5-17. Applying the actual ridership of 320 creates an initial estimate of 56 trips (17.4% x 320) boarding in segment 2 and alighting in segment 3.

FIGURE 5-17: BUS DATA EXPANSION TABLE INITIAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN SEGMENTS

TABLE 3: INITIAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN STATION

(percentages in table 2 were applied to the total boardings for this time period in this direction)

Route: Example Eastbound (6am-9am)		PROJECTED RIDERSHIP BASED ON THE ON-TO-OFF SURVEY		
Segment	Total	1	2	3
1	167	14	42	111
2	125	0	70	56
3	28	0	0	28
Total	320	14	111	195

In order to develop a more accurate estimate of the ridership flows between segments on each route, ETC developed an Iterative Proportional Fitting (IPF) Algorithm to balance the differences between the ridership projected from the On-to-Off counts (shown in Figure 5-17) and the Stop-Level ridership for each segment (shown in Figure 5-18). The IPF process is described below:

FIGURE 5-18: STOP-LEVEL RIDERSHIP

TABLE 4: BOARDINGS and ALIGHTINGS BY STATION

Route: Example Eastbound (6am-9am)				
Average Weekday Ridership	Total	1	2	3
BOARDINGS	320	100	100	120
ALIGHTINGS	320	20	100	200
DIFFERENCE FROM PROJECTED				
BOARDINGS	0	-67	-25	92
ALIGHTINGS	0	6	-11	5

Step 1: Correction for the Boardings. The estimated ridership from the On-to-Off counts for each route (as shown in Figure 5-17) was multiplied by the ratio of the actual boardings from Stop-Level Ridership Data for each segment by the estimated boardings for each segment. For example, if the actual boardings for Segment

1 were 120 and the estimated boardings were 100, each cell associated with Segment 1 would have been multiplied by 1.2 (120/100) to adjust the estimated boardings to actual boardings.

Step 2: Correction for the Alightings. Once the correction in Step 1 was applied, the estimated boardings would be equal to the actual boardings. However, the adjustment to the boardings total may have changed the alighting estimates. To correct the alighting estimates, the new values calculated in Step 1 were adjusted by multiplying the ratio of the actual alightings from the Stop-Level Ridership Data for each stop by the estimated alightings for each segment from Step 1. For example, if the actual alightings for Segment 2 were 220 and the estimated alightings from Step 1 were 200, each cell associated with Segment 2 would have been multiplied by 1.1 (220/200) to adjust the estimated alightings from Step 1 to actual alightings.

The processes described in Steps 1 and Steps 2 were repeated sequentially until the difference between the actual and estimated boardings and alightings was zero. Figure 5-19 shows that after seven balancing iterations in this algorithm, there were no differences between the projected distribution and the actual boardings and alightings.

FIGURE 5-19: ITERATIVE BALANCE PROCESS

7th STEP of ITERATIVE BALANCING TO CORRECT DISTRIBUTION OF RIDERSHIP BY ALIGHTING Location					
Segment	Total	DIFFERENCE FROM ACTUAL BOARDINGS	1	2	3
1	100	0	20	32	49
2	100	0	0	68	32
3	120	0	0	0	120
Total	320	0	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0		0	0	0

7th STEP of ITERATIVE BALANCING TO CORRECT DISTRIBUTION OF RIDERSHIP BY ALIGHTING Location					
Segment	Total	DIFFERENCE FROM ACTUAL BOARDINGS	1	2	3
1	100	0	20	32	48
2	100	0	0	68	32
3	120	0	0	0	120
Total	320	0	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0		0	0	0

The final estimate for ridership flows is shown in Figure 5-20.

FIGURE 5-20: FINAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN STATIONS

TABLE 6: FINAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN STATIONS

Route: Example Eastbound (6am-9am)

Segment	Total	1	2	3
1	100	20	32	48
2	100	0	68	32
3	120	0	0	120
Total	320	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0	0	0	0

The actual number of O&D records completed for each boarding to alighting segment pair is shown in Figure 5-21. To calculate the expansion factors, the final estimate of ridership between segments shown in Figure 5-20 was divided by the actual number of O&D records collected, as shown in Figure 5-21. This calculation produces the expansion factors shown in Figure 5-22. For example, the 32 estimated riders projected to board in segment 2 and alight in segment 3 were divided by the 10 O&D records to produce an expansion factor of 3.15 to be applied to records who board in segment 2 and alighting in segment 3 as shown in Figure 5-22.

FIGURE 5-21: NUMBER OF COMPLETED SURVEYS (BUS)

TABLE 7: NUMBER OF COMPLETED SURVEYS

Route: Example Eastbound (6am-9am)

Segment	Total	1	2	3
1	32	3	9	20
2	17		7	10
3	8			8
Total	57	3	16	38

FIGURE 5-22: WEIGHTING FACTORS (BUS)

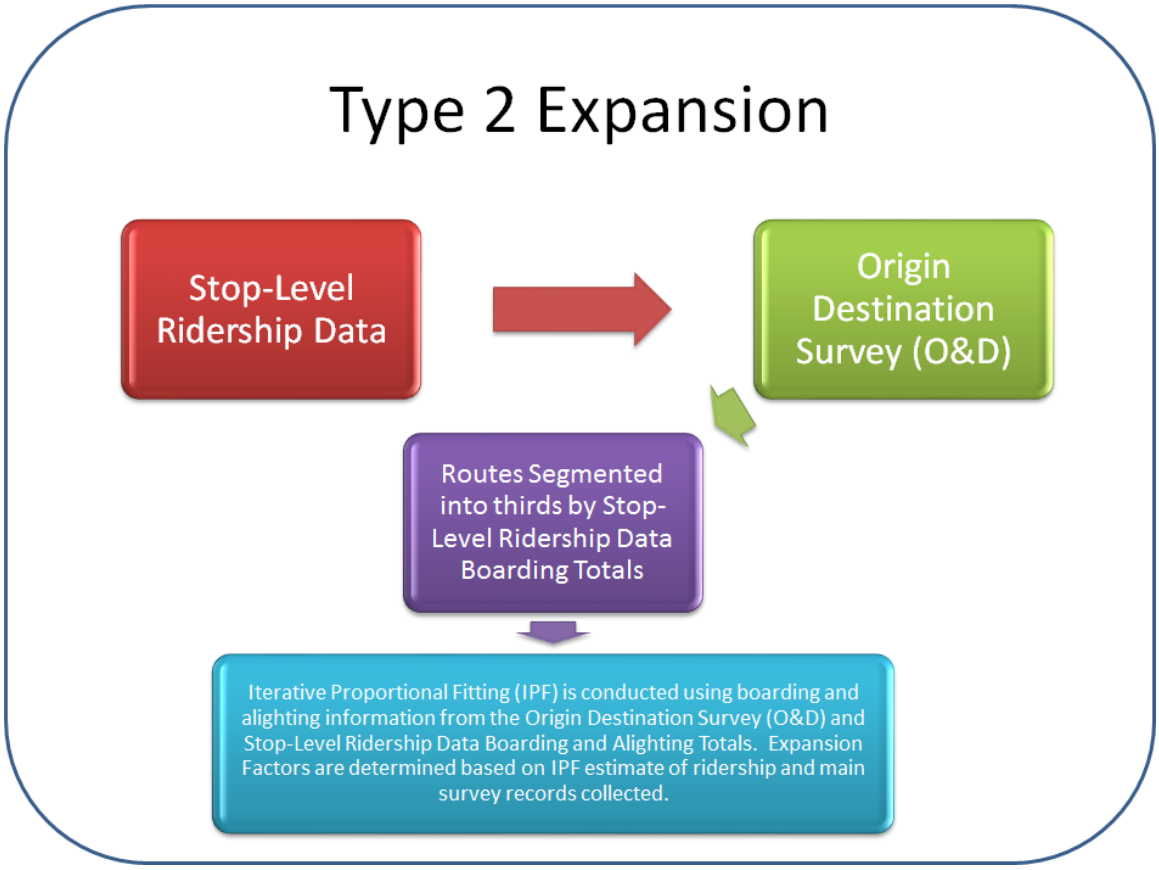
TABLE 8: WEIGHTING FACTORS

Route: Example Eastbound (6am-9am)

Segment	Total	1	2	3
1	3.13	6.67	3.50	2.42
2	5.88	0.00	9.78	3.15
3	15.00	0.00	0.00	15.00
Total	5.61	6.67	6.25	5.26

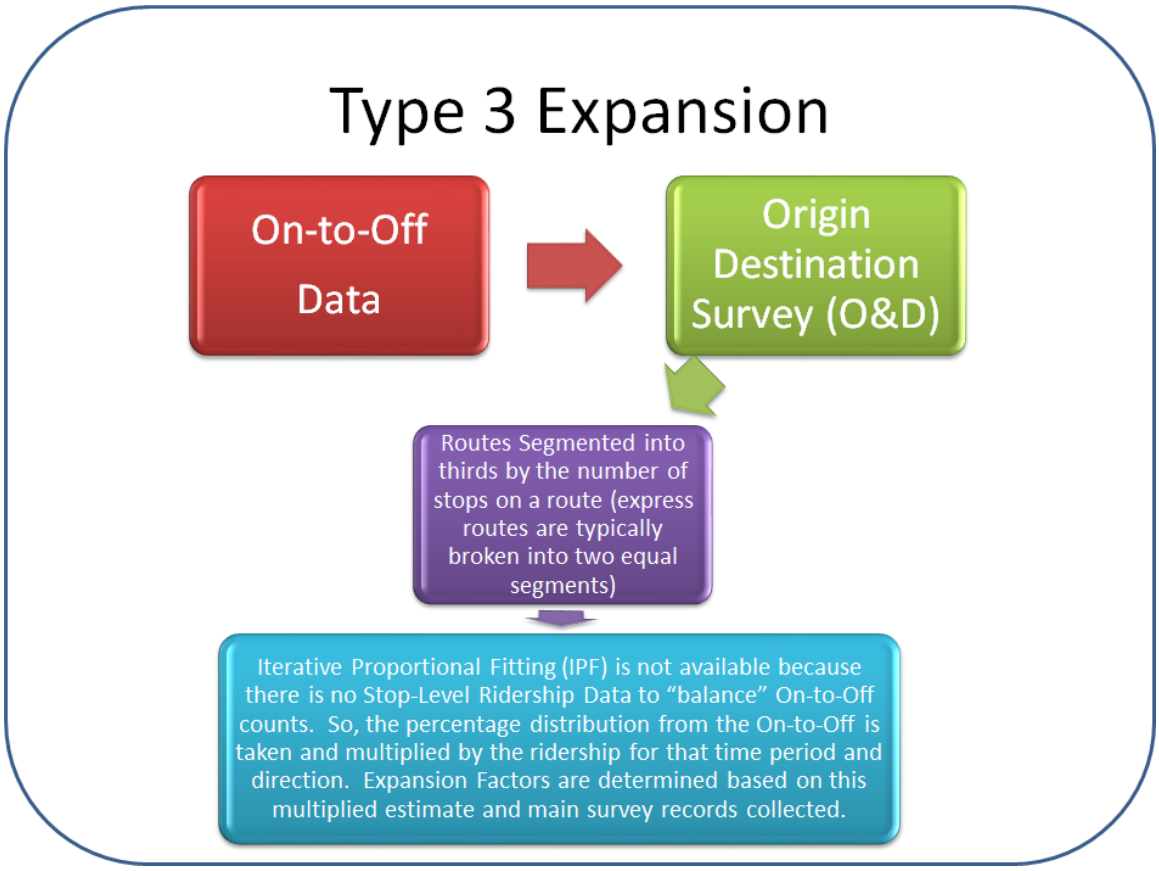
Type 2 Expansion: Bus Routes with Stop-Level Ridership Data, O&D Survey Data, but no On-to-Off Counts Data

On-to-Off counts are not collected for lower ridership routes. However, sometimes these routes will have Stop-Level Ridership Data available. In this case, Type 2 Expansion is appropriate. This type of expansion also divided stops into three segments based on total boarding distribution by direction. These segments were then appended to the O&D records based on the boarding and alighting locations. The expansion method is similar to Type 1 Expansion, the only difference being that the distribution of O&D records was substituted for the On-to-Off counts data in Table 1. This type of Expansion was not utilized for the HRT Expansion. See Figure 5-13: Types of Data Expansion for route details.



Type 3 Expansion: Bus Routes with On-to-Off Counts and O&D Survey Data, but without Stop-Level Ridership Data

Type 3 Expansion is utilized for routes where On-to-Off counts are collected, but Stop-Level Ridership Data is not available. Routes without Stop-Level Ridership Data are segmented into three segments based on number of stops along a route. These segments were then appended to the On-to-Off and O&D Survey databases. This expansion method is less complex than the two types of expansion previously discussed. Type 3 Expansion was just utilized for VB Wave (Route 30). The methodology for Type 3 expansion is as follows:



Type 3: Expansion Methodology for Bus Routes with On-to-Off Counts and O&D Survey Data but without Stop-Level Ridership Data

Figure 5-23 displays the results for the On-to-Off counts. Each row in the Table identifies the segment where passengers board the bus. The columns in the Table identify the segments where people alight the bus. For example, 20 of the On-to-Off counts captured riders boarding on Segment 2 and alighting on Segment 3.

FIGURE 5-23: BUS DATA EXPANSION TABLE RESULTS OF ON-TO-OFF SURVEY

TABLE 1: ON-TO-OFF SURVEYS COMPLETED		Total Boardings this Direction During this Time Period =	300
Route: Example Eastbound (6-9am)	DISTRIBUTION OF COMPLETED ON2OFF SURVEYS		
Segment		1	2	3
1	55	5	20	30
2	30		10	20
3	15			15
Total	100	5	30	65

Figure 5-24 shows the distribution of the data in Figure 5-23 expressed as a percentage of all boardings for the route, time period, and direction. Figure 5-24 was created by dividing each on-to-off cell in Figure 5-23 by the sum of all on-to-off counts (100) in Figure 5-23. For example, 20/100 (20.00%) of all trips board in Segment 2 and alight in Segment 3 as shown in Figure 5-24.

FIGURE 5-24: BUS DATA EXPANSION TABLE DISTRIBUTION OF ON-TO-OFF SURVEY

TABLE 2: DISTRIBUTION OF THE ON-TO-OFF SURVEY				
Route: Example Eastbound (6-9am)	DISTRIBUTION OF ON2OFF SURVEYS AS % OF ALL COMPLETED ON2OFF SURVEYS			
Segment		1	2	3
1	55.00%	5.00%	20.00%	30.00%
2	30.00%	0.00%	10.00%	20.00%
3	15.00%	0.00%	0.00%	15.00%
Total	100%	5.00%	30.00%	65.00%

The total ridership for the route, time period, and direction was applied to the on-to-off distribution shown in Figure 5-24. This produces an estimate of the ridership flow on the route based on the boarding to the alighting segment, shown in Figure 5-25. Applying the actual ridership (300) to the distribution creates an estimate that 60 trips (20.00% x 300) boarded in Segment 2 and alighted in Segment 3.

FIGURE 5-25: BUS DATA EXPANSION TABLE INITIAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN SEGMENTS

TABLE 3: ESTIMATE OF RIDERSHIP FLOWS BETWEEN SEGMENTS				
(percentages in Table 2 were applied to the total boardings for this time period in this direction)				
Route: Example Eastbound (6-9am)	ESTIMATED RIDERSHIP BASED ON THE ON-TO-OFF SURVEY			
Segment		1	2	3
1	165	15	60	90
2	90	0	30	60
3	45	0	0	45
Total	300	15	90	195

The actual number of O&D records completed for each boarding to alighting segment is shown in Figure 5-26. To calculate the expansion factors, the estimate of ridership between segments, shown in Figure 5-25, was divided by the actual number of O&D records completed between segments, shown in Figure 5-26. The calculation produces the expansion factors shown in Figure 5-27. So, the 60 estimated riders were divided by the seven (7) O&D records to produce a factor of 8.57 to be applied to riders who board in Segment 2 and alighting in Segment 3 as shown in Figure 5-27.

FIGURE 5-26: NUMBER OF COMPLETED SURVEYS

TABLE 4: NUMBER OF COMPLETED INTERCEPT SURVEYS		Total Number of Surveys =	30	
Route: Example Eastbound (6-9am)	NUMBER OF COMPLETED SURVEYS			
Segment		1	2	3
1	16	4	4	8
2	10		3	7
3	4			4
Total	30	4	7	19

FIGURE 5-27: WEIGHTING FACTORS

TABLE 5: Weighting Factors

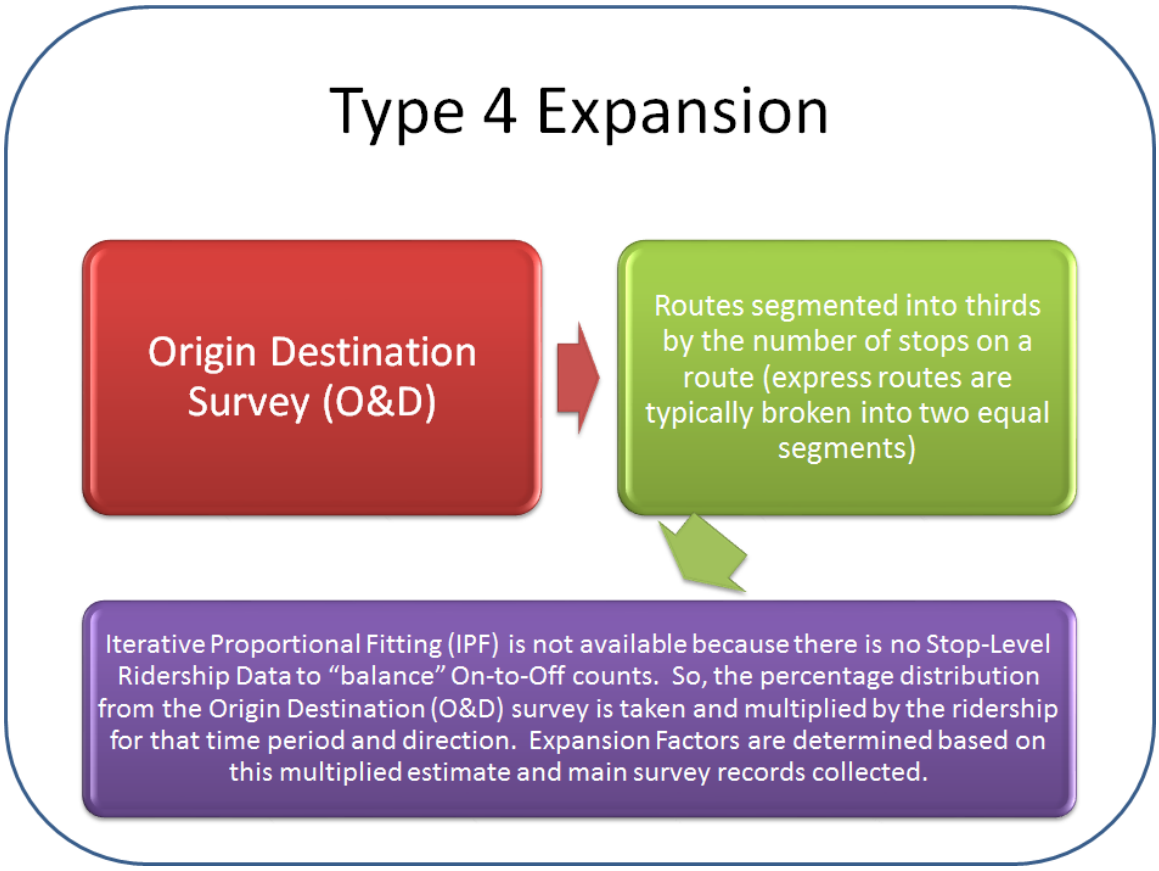
Route: Example Eastbound (6-9am)

Segment		1	2	3
1	10.312500	3.750000	15.000000	11.250000
2	9.000000		10.000000	8.571429
3	11.250000			11.250000
Total	10.000000	3.750000	12.857143	10.263158

Once all the expansion factors were calculated, each factor was applied to all surveys with the same route, direction, time of day, boarding segment, and alighting segment.

Type 4 Expansion: Bus Routes with O&D Survey Data, without On-to-Off Counts Data or Stop-Level Ridership Data

For routes that only have O&D Survey data, Type 4 Expansion is utilized. Routes are divided into three segments based on number of stops along a route. These segments were then appended to the O&D Survey database. Type 4 Expansion was used for 60% percent of the routes. The methodology for Type 4 Expansion is as follows:



Type 4: Expansion Methodology for Bus Routes with O&D Survey Data, without On-to-Off Counts Data or Stop-Level Ridership Data

Figure 5-28 shows the segmented results from the O&D survey that replaced the On-to-Off counts. Each row in the Table identifies the segment where passengers boarded the bus. The columns in the Table identify the segments where people alighted. For example, seven (7) of the O&D surveys had riders board in Segment 2 and alight in Segment 3.

FIGURE 5-28: BUS DATA EXPANSION TABLE RESULTS OF ON-TO-OFF SURVEY

TABLE 1: Main Survey Results (Replacing On-to-Off Results)		Total Boardings this Direction During this Time Period =	300
Route: Example Eastbound (6-9am)	DISTRIBUTION OF COMPLETED ON2OFF SURVEYS		
Segment		1	2	3
1	16	4	4	8
2	10		3	7
3	4			4
Total	30	4	7	19

Figure 5-29 shows the distribution of the data in Figure 5-28 as a percentage of all boardings for the route. Figure 5-29 was created by dividing each on-to-off cell in Figure 5-28 by the sum of all O&D records replacement data in Figure 5-28, which is 30. For example, 7/30 or 23.33% of all trips that boarded in Segment 2, alighted in Segment 3 as shown in Figure 5-29.

FIGURE 5-29: BUS DATA EXPANSION TABLE DISTRIBUTION OF ON-TO-OFF SURVEY

TABLE 2: DISTRIBUTION OF THE ON-TO-OFF SURVEY				
Route: Example Eastbound (6-9am)	DISTRIBUTION OF ON2OFF SURVEYS AS % OF ALL COMPLETED ON2OFF SURVEYS			
Segment		1	2	3
1	53.33%	13.33%	13.33%	26.67%
2	33.33%	0.00%	10.00%	23.33%
3	13.33%	0.00%	0.00%	13.33%
Total	100%	13.33%	23.33%	63.33%

The total ridership for the route, time period, and direction was applied to the on-to-off distribution shown in Figure 5-29. This produces an estimate of the ridership flow on the route based on the boarding segment to the alighting segment as shown in Figure 5-30. Applying the actual ridership of 300 to the distribution creates an estimate that 70 trips (23.33% x 300) board in Segment 2 and alight in Segment 3.

FIGURE 5-30: BUS DATA EXPANSION TABLE INITIAL ESTIMATE OF RIDERSHIP FLOWS BETWEEN SEGMENTS

TABLE 3: ESTIMATE OF RIDERSHIP FLOWS BETWEEN SEGMENTS				
(percentages in Table 2 were applied to the total boardings for this time period in this direction)				
Route: Example Eastbound (6-9am)	ESTIMATED RIDERSHIP BASED ON THE ON-TO-OFF SURVEY			
Segment		1	2	3
1	160	40	40	80
2	100	0	30	70
3	40	0	0	40
Total	300	40	70	190

The actual number of O&D records that were completed for each boarding to alighting segment pair is shown in Figure 5-31. To calculate the expansion factors, the estimate of ridership between segments, shown in Figure 5-30, was divided by the actual number of O&D records that were completed between segments shown in Figure 5-31. This calculation produces the expansion factors shown in Figure 5-32. So, the 70 estimated riders were divided by the seven (7) completed O&D records to produce a factor of 10.00 to be applied to riders who boarded in Segment 2 and alighted in Segment 3 as shown in Figure 5-32.

FIGURE 5-31: NUMBER OF COMPLETED SURVEYS

TABLE 4: NUMBER OF COMPLETED INTERCEPT SURVEYS		Total Number of Surveys = 30		
Route: Example Eastbound (6-9am)	NUMBER OF COMPLETED SURVEYS			
Segment		1	2	3
1	16	4	4	8
2	10		3	7
3	4			4
Total	30	4	7	19

FIGURE 5-32: WEIGHTING FACTORS

TABLE 5: Weighting Factors

Route: Example Eastbound (6-9am)

Segment		1	2	3
1	10.00	10.00	10.00	10.00
2	10.00		10.00	10.00
3	10.00			10.00
Total	10.00	10.00	10.00	10.00

Once all the expansion factors are calculated, each factor is applied to all surveys with the same route, direction, time of day, boarding segment, and alighting segment.

General Rule for Expansion Factors

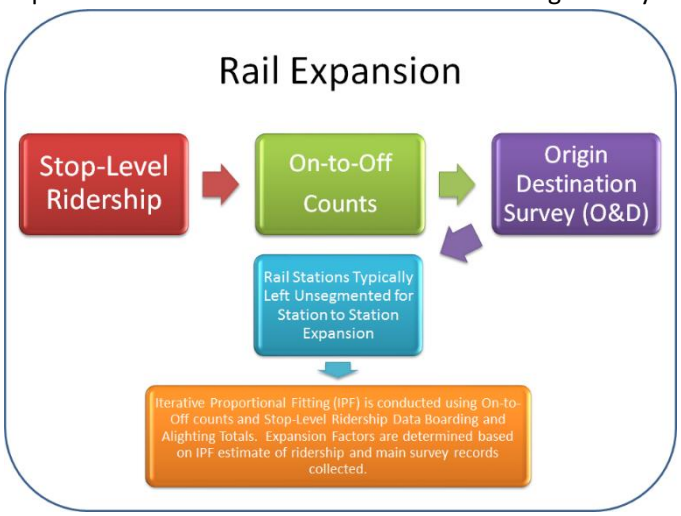
While there are no specific guidelines for the expansion factor values, ETC Institute uses a guideline of keeping expansion factors below 3 times the average expansion factor based on the sampling percentage. This is done to keep any one record from representing a markedly high number of riders in the system. The formula for determining this guideline is:

1/(Sampling %) x 3 = Guideline Weight Factor

If the expansion factor for a boarding segment to alighting segment pair is greater than 3 times the average expansion factor, then it is aggregated into the adjacent boarding to alighting segment where it will have the least impact on the previously existing expansion factors. This guideline is standard for all the various expansion types.

Rail Expansion

Rail expansion is typically conducted in a similar manner to Type 1 Bus Expansion with one major exception. Rail expansion is typically conducted by boarding station to alighting station rather than boarding segment to alighting segment, although segment to segment expansion for rail lines do occur. Rail lines are generally of great interest to transit authorities as they usually transport a significantly higher number of riders than most bus routes. Additionally, rail lines typically have considerably fewer stops than bus routes, thus allowing boarding station to alighting station expansion to be possible. The only other table difference for rail line expansion is the use of dummy/mock records.



Rail Expansion- Dummy Records

Since rail expansion is conducted at such a precise level it makes capturing all possible boarding station to alighting station IPF estimates for every time period and direction extremely difficult. For this reason, boarding station to alighting station pairs that are projected in the IPF rider estimates for each time period and direction that do not have a corresponding O&D survey is filled with a dummy record. A dummy record is a record in the database that has: an ID, the name of the rail line in the route code, a direction of travel, a time period, a boarding station, an alighting station, and a factor representing the missing ridership value. The use of dummy records is kept to a minimum using detailed sampling plans created using the IPF process involving Stop-Level Ridership Data and On-to-Off counts prior to the O&D survey. The use of dummy records is usually greater in the more extreme time periods/off-peak time periods where the logistics of data collection are more complex. In addition, more extreme/off-peak time periods usually have more variability in ridership patterns increasing the difficulty in creating accurate sampling plans.

Weekend Expansion

For weekend routes, ETC used average weekend ridership from September through October 2016. Without having Boarding and Alighting data, ETC was unable to produce Stop-Level Ridership for any of the weekend routes. For this reason, Type 4 Expansion was utilized for expanding all weekend data. Routes were divided into three segments based on the number of stops along a route. These segments were then appended to the O&D Survey database. See Type 4 Expansion for details.

Park-n-Ride Expansion

After the initial expansion, which resulted in the unlinked and linked weighting factors, the number of riders captured accessing the various HRT park-and-ride locations was reviewed. This ridership information was then compared to person count data that was collected at those same park-and-ride locations. The O&D surveys that were collected were not necessarily collected at the same time as the count data. Since there is variability in the number of people who access transit at various park-and-ride locations on a day-to-day basis, the weighted ridership data collected during the O&D survey was not expected to completely match the count data. Instead the weighted data was expected to be within +/- 20% of the count data figures. For example, if the weighted unlinked ridership equaled 90 riders and the count data showed 100 (acceptable range of 80 to 120) riders, the park-and-ride location would have been within the acceptable range. If the unlinked ridership for the park-and-ride location was not within the acceptable range, the O&D weight factors for those records that included those specific park-and-ride locations were adjusted within their appropriate route, time period and direction so that the weight factors still reflected the appropriate ridership for that route, time period and direction while also accounting for the number of riders accessing that park-and-ride location.

Summary

After all the factors are appended to the O&D survey database (regardless of type of expansion) the factors are summed by route, time period, and direction. If expansion was done properly, the summed factors will equal the boarding ridership provided in the Stop-Level Ridership Data by route, time period, and direction.

Linked Trip Expansion Factors for All Records

The linked trip expansion factor helps to account for the number of transfers that were made by each passenger, so the linked expansion factors should better represent the overall system. Linked expansion factors are generated after the unlinked expansion factors are created.

The equation that is used to calculate the linked trip multiplying factor is shown below:

Linked Trip Multiplying Factor = [1 / (1 + # of transfers)]

If a passenger did not make a transfer, the linked trip multiplying factor would be 1.0 because the person would have only boarded one vehicle. If a person made two transfers, the linked trip expansion factor would be 0.33 because the person would have boarded three transit vehicles during his/her one-way trip. An example of how the linked trip expansion factors were calculated is provided in Figure 5-33.

FIGURE 5-33: SAMPLE CALCULATIONS OF LINKED TRIP MULTIPLYING FACTORS

Number of Transfers	Calculation [1/(1+Number of Transfers)]	Linked Trip Multiplying Factor
0	[1/(1+0)]	1
1	[1/(1+1)]	0.5
2	[1/(1+2)]	0.33
3	[1/(1+3)]	0.25

Once the linked trip multiplier is created it is multiplied by the unlinked expansion factor to create the linked expansion factor.

APPENDICES

APPENDIX A: SURVEY INSTRUMENT

Hampton Roads Transit (HRT) 2016 OnBoard Survey

Please take a few minutes to be counted as we plan the future of your transit system.

All personal information will be kept strictly confidential and WILL NOT be shared or sold.

What is your **HOME ADDRESS** (please be specific, ex: 123 W. Main St):
(If you are visiting the Hampton Roads area, please list the hotel name or address where you are staying)

Street Address _____ City _____ State _____ Zip Code _____

COMING FROM?

1. What type of place are you **COMING FROM NOW?** (the starting place for your one-way trip)

O Your usual WORKPLACE
O Other business related
O College / University (students only)
O Airport (as an air passenger)
O Recreation / sightseeing
O Medical appointment / doctor's visit
O Social visits (friends/relatives)
O Personal business (bank, post office)
O Pick up/drop off someone (daycare, school)
O Your **HOME** → *Go to Question #4*
O Your **HOTEL** → *Go to Question #4*
O Other: _____
O Shopping
O Eating/Dining Out
O School (K-12)
O Sporting event

2. What is the **NAME** of the place you are coming from now?

_____

3. What is the **EXACT ADDRESS** of this place? (**OR** Intersection if you do not know the exact address:)

_____

City: _____ State: _____ Zip: _____

4. How did you **GET FROM** your origin (the place in Question #1) TO THE VERY **FIRST** bus / train you used for this one-way trip?

O Walk
O Wheelchair or scooter
O Bike
O Was dropped off by someone (answer 4a)
O Drove alone and parked (answer 4a)
O Drove or rode with others and parked (answer 4a)
O Car share (e.g. Zipcar, etc.) (answer 4a)
O Taxi. (answer 4a)
O Uber, Lyft, etc. (answer 4a)
O Other

4a. Where did you board the first bus / train you used for this one-way trip (Nearest intersection / Park-n-Ride lot):

_____

5. Where did you get ON this bus? Please provide the nearest intersection / station name / Park-n-Ride lot:

_____

GOING TO?

6. What type of place are you **GOING TO NOW?** (the ending place for your one-way trip)

O Your usual WORKPLACE
O Other business related
O College / University (students only)
O Airport (as an air passenger)
O Recreation / sightseeing
O Medical appointment / doctor's visit
O Social visits (friends/relatives)
O Personal business (bank, post office)
O Pick up/drop off someone (daycare, school)
O Your **HOME** → *Go to Question #9*
O Your **HOTEL** → *Go to Question #9*
O Other: _____
O Shopping
O Eating/Dining Out
O School (K-12)
O Sporting event

7. What is the **NAME** of the place you are going to now?

_____

8. What is the **EXACT ADDRESS** of this place? (**OR** Intersection if you do not know the exact address:)

_____

City: _____ State: _____ Zip: _____

9. How will you **GET TO** your destination (listed in Question #6) after you get off the **LAST** bus / train you will use for this one-way trip?

O Walk
O Wheelchair or scooter
O Bike
O Be picked up by someone (answer 9a)
O Get in a parked vehicle & drive alone (answer 9a)
O Get in a parked vehicle & drive/ride w/others (answer 9a)
O Car share (e.g. Zipcar, etc.) (answer 9a)
O Taxi (answer 9a)
O Uber, Lyft, etc. (answer 9a)
O Other

9a. Where will you get off the last bus / train you are using for this one-way trip (Nearest intersection / Park-n-Ride lot):

_____

10. Where will you get OFF this bus? Please provide the nearest intersection / station name / Park-n-Ride lot:

_____

11a. Did you transfer FROM another bus/train BEFORE getting on this vehicle? O Yes O No

11b. Will you transfer TO another bus/train AFTER getting off this vehicle? O Yes O No

11c. Please list the BUS / TRAIN ROUTES in the exact order you use them for this one-way trip

START → [ ] → [ ] → [ ] → [ ] → END

1st Route 2nd Route 3rd Route 4th Route

Continue

OTHER INFORMATION ABOUT THIS TRIP

12. What time did you BOARD this bus/train? _____ : _____ am / pm (circle one)

13. Will you (or did you) make this same trip in exactly the opposite direction today? O No
O Yes - At what time did/will you leave for this trip in the opposite direction? ____:____ am/pm (circle one)

14. How did you pay for your trip today? O Cash O Credit/Debit O Other

15. Specifically, what type of fare did you use for your trip today?
O 1-Day Go Pass O 7-Day Go Pass O 30-Day Go Pass O 2-Ride Go Pass O 1-Day MAX Pass
O 30-Day MAX Pass O GoPass 365 O e-Tide Ticket O One trip fare (cash) O Try Transit 1 day
O Try Transit 30 day O GoSemester O Shuttle (Wave) 1 Day O Shuttle (Wave) 3 day
O Student Freedom Pass (skip to 17)

16. Did you receive any of the following special fare discounts for your trip today? (Check one)
O Youth O Senior O Disabled O HRT Employees/Spouse/Retirees

17. Since you most recently left your home and the next time you will return home, did you or will you... *(check all that apply)*
O No other trip O Go to work O Go to school
O Go shopping O Buy a meal/beverage O Visit friend/relative or attend a religious/social event
O Other errands O Other (please specify):_____

18. On average, how often) do you use public transportation in the Hampton Roads area?
O first time O few times per year O at least once per month O once per week O 2 days per week
O 3 days per week O 4 days per week O 5 days per week O 6 days per week O 7 days per week

ABOUT YOU AND YOUR HOUSEHOLD

19. Are you a visitor to the Hampton Roads region? O No O Yes (if YES, please skip to Q25 after a & b)
19a. [Visitors & Wave Only] Did the trolley's appearance influence your choice to ride today? O Yes O No
19b. [Visitors & Wave Only] Do you feel safer boarding a trolley than a traditional bus? O Yes O No

20. What is your employment status? (check the one response that BEST describes you)
O Employed full-time O Not currently employed – seeking work O Retired
O Employed part-time O Not currently employed – not seeking work O Homemaker

21. What is your student status? (check the one response that BEST describes you)
O Not a student or internet O Yes – Full time College/University (institution name):_____
O Yes – K - 12th grade O Yes – Part time College/University (institution name):_____
O Other, institution name_____

22. How many working vehicles (cars, trucks, motorcycles) are available to your household? _____ vehicles
22a. [If #22 is more than "0"] Could you have used one of these vehicles for this trip? O Yes O No

23. Including YOU, how many people live in your household? _____ people

24. Including YOU, how many people at least age 16 in your household are employed full/part time?___ people

25. Do you have a valid driver's license? O Yes O No

26. What is your AGE? O 15 and Under O 16-17 O 18-24 O 25-34 O 35-44
O 45-54 O 55-64 O 65-84 O 85 and over

27. What is your race / ethnicity? *(check all that apply)*
O American Indian/Alaska Native O Asian O Black/African/African American O Hispanic/Latino
O Native Hawaiian/Pacific Islander O White O Other: _____

28. What is your gender? O Male O Female O Other (ask like income if unsure)

29. Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2015 before taxes?
O Less than $10,000 O $14,000 - $24,999 O $35,000 - $49,999 O $75,000 or more
O $10,000 - $14,999 O $25,000 - $34,999 O $50,000 – $74,999

30. Do you speak language other than English at home? O No O Yes - Which language? _____
30a. [If #30 is Yes] How well do you speak English? O Very Well O Well O Less than well O Not at all

31. Do you have a disability that has been verified by Hampton Roads Transit or another organization that limits your mobility? O Yes – HRT Verified disability O Yes – other verified O No
[If "Yes" to 31] 31a. Do you use a mobility device or service animal when going places? *(check all that apply)*
O No O Service Animal O Wheelchair O Scooter O Walker O Prosthesis
O Cane O White Cane O Crutches O Other_____

32. Do you have a smartphone *(e.g. iPhone, Android / Windows Phone, Blackberry, etc.)*? O Yes O No

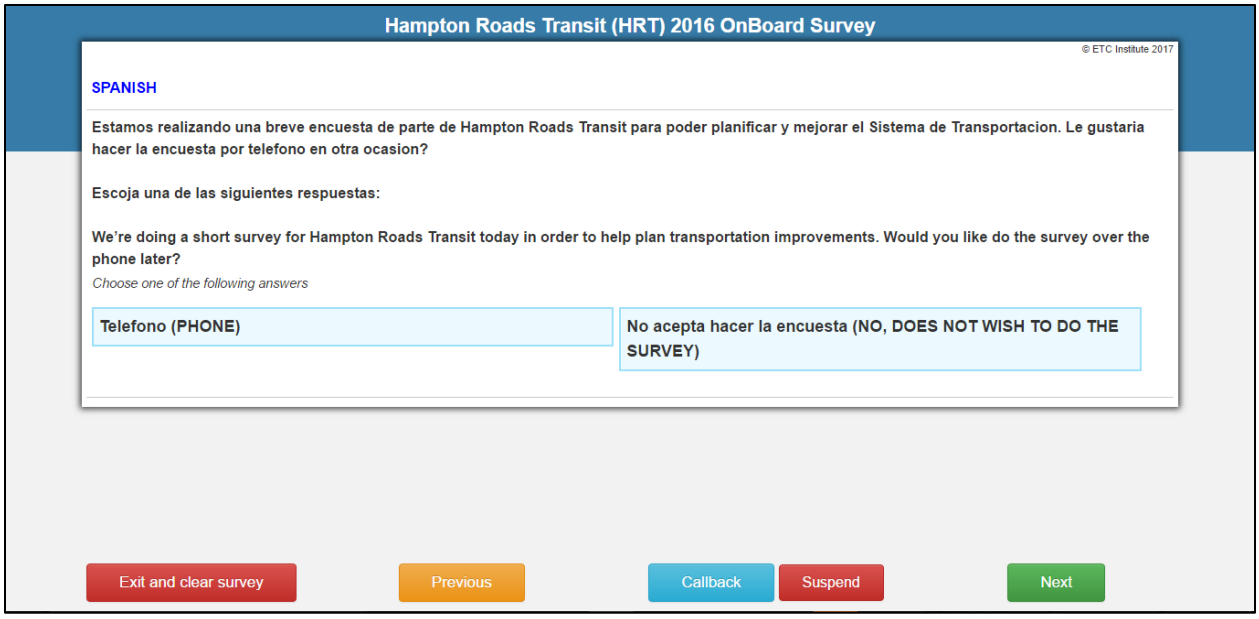
REGISTER TO WIN $100

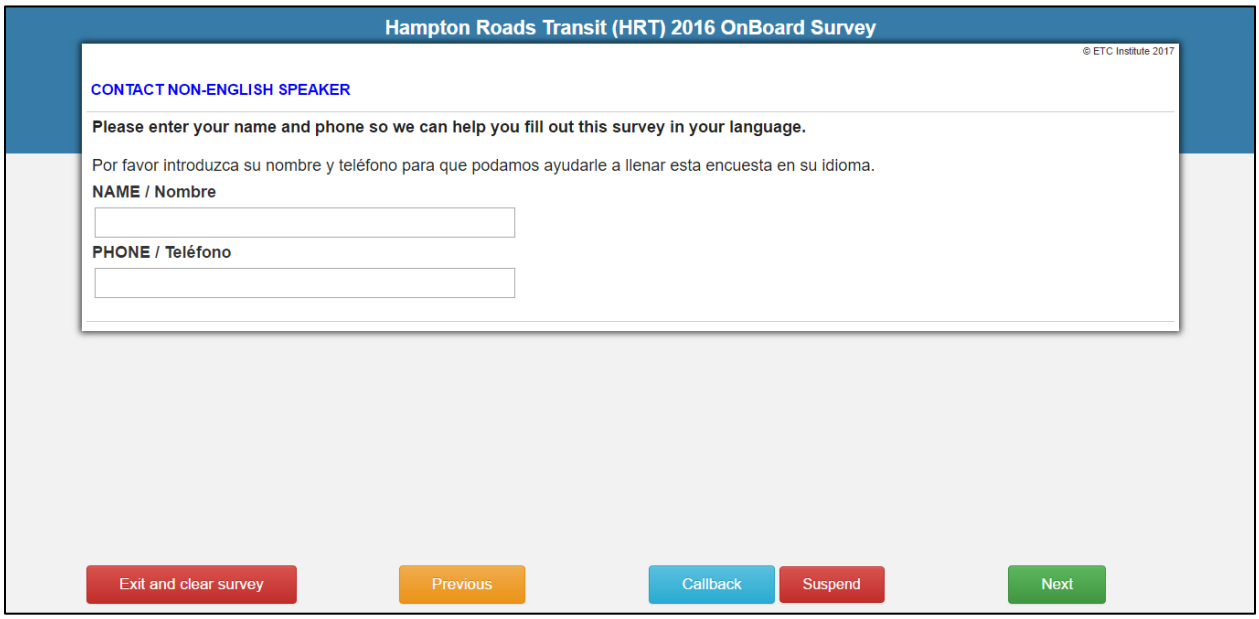
People who submit an accurately completed survey will be entered in a random drawing for one of Five $100 Visa gift cards. You must provide your home address at the beginning of the survey and answer all questions to be eligible.

Your Name: _____

Phone Number: (____) _____

Thank you for your help!


Hampton Roads Transit (HRT) 2016 OnBoard Survey
© ETC Institute 2017
SPANISH
Estamos realizando una breve encuesta de parte de Hampton Roads Transit para poder planificar y mejorar el Sistema de Transportacion. Le gustaria hacer la encuesta por telefono en otra ocasion?
Escoja una de las siguientes respuestas:
We're doing a short survey for Hampton Roads Transit today in order to help plan transportation improvements. Would you like do the survey over the phone later?
Choose one of the following answers
Telefono (PHONE)
No acepta hacer la encuesta (NO, DOES NOT WISH TO DO THE SURVEY)
Exit and clear survey
Previous
Callback
Suspend
Next


Hampton Roads Transit (HRT) 2016 OnBoard Survey
© ETC Institute 2017
CONTACT NON-ENGLISH SPEAKER
Please enter your name and phone so we can help you fill out this survey in your language.
Por favor introduzca su nombre y teléfono para que podamos ayudarle a llenar esta encuesta en su idioma.
NAME / Nombre
PHONE / Teléfono
Exit and clear survey
Previous
Callback
Suspend
Next

APPENDIX B: DATA DICTIONARY

FIELD NAME	DESCRIPTION	CODE VALUES
ID	Unique Identifier for each record	Actual Value
COMPLETED	Date survey was completed	Actual Value
DAY_TYPE	Day of the week survey was completed	Actual Value
ROUTE_SURVEYED[Code]	Route survey was conducted on (Code)	Actual Value
ROUTE_SURVEYED	Route survey was conducted on	Actual Value
HOME_OR_HOTEL_ADDR [ADDR]	Home Address where the respondent lives	Actual Value
HOME_OR_HOTEL_ADDR [CITY]	Home City where the respondent lives	Actual Value
HOME_OR_HOTEL_ADDR [STATE]	Home State where the respondent lives	Actual Value
HOME_OR_HOTEL_ADDR [ZIP]	Zip code where the respondent lives	Actual Value
HOME_OR_HOTEL_ADDR [LAT]	Latitude coordinates where the respondent lives	Actual Value
HOME_OR_HOTEL_ADDR [LONG]	Longitude coordinates where the respondent lives	Actual Value
ORIGIN_PLACE_TYPE[Code]	Type of place respondent is coming from now (Code)	1=Your usual WORKPLACE 2=Other business related 3=College or University (students only) 4=Airport (as an air passengers) 5=Recreation / Sightseeing 6=Medical appointment / doctor's visit 7=Social visits (friends / relatives) 8=Personal business (bank, post office) 9=Pick up/drop off someone (daycare, school) 10=Your HOME 11=Your HOTEL 12=Shopping 13=Eating / Dining Out 14=School (K-12) 15=Sporting event 99=Other
ORIGIN_PLACE_TYPE	Type of place respondent is coming from now	Actual Value
ORIGIN_ADDRESS [ADDR]	Street address where the trip began	Actual Value
ORIGIN_ADDRESS [CITY]	City where the trip began	Actual Value
ORIGIN_ADDRESS [STATE]	State where the trip began	Actual Value
ORIGIN_ADDRESS [ZIP]	Zip code where the trip began	Actual Value
ORIGIN_ADDRESS [LAT]	Latitude coordinates where the trip began	Actual Value
ORIGIN_ADDRESS [LONG]	Longitude coordinates where the trip began	Actual Value
STOP_ON_BUS [ADDR]	Name/description/intersection where the respondent boarded transit	Actual Value
STOP_ON_BUS [STPID]	Unique Stop ID for transit	Actual Value
STOP_ON_BUS [LAT]	Latitude coordinates of the boarding location	Actual Value
STOP_ON_BUS [LONG]	Longitude coordinates of the boarding location	Actual Value
PREV_TRANSFERS[Code]	Number of transfers a respondent took before surveyed route from Origin (Code)	0=(0) None 1=(1) One 2=(2) Two 3=(3) Three 4=(4+) Four or more

PREV_TRANSFERS	Number of transfers a respondent took before surveyed route from Origin	Actual Value
TRIP_FIRST_ROUTE[Code]	First Transfer from Origin (Code)	Actual Value
TRIP_FIRST_ROUTE	First Transfer from Origin	Actual Value
TRIP_SECOND_ROUTE[Code]	Second Transfer to Origin (Code)	Actual Value
TRIP_SECOND_ROUTE	Second Transfer to Origin	Actual Value
TRIP_THIRD_ROUTE[Code]	Third Transfer to Origin (Code)	Actual Value
TRIP_THIRD_ROUTE	Third Transfer to Origin	Actual Value
TRIP_FOURTH_ROUTE[Code]	Fourth Transfer to Origin (Code)	Actual Value
TRIP_FOURTH_ROUTE	Fourth Transfer to Origin	Actual Value
ORIGIN_TRANSPORT[Code]	How respondent got from their origin to transit (Code)	L001=Walk L002=Wheelchair or scooter L003=Bike L004=Was dropped off by someone L005=Drove alone and parked L006=Drove or rode with others and parked L008=Taxi L009=Uber, Lyft, etc. L999=Other
ORIGIN_TRANSPORT	How respondent got from their origin to transit	Actual Value
ORIGIN_PARK_YN_PNR[Code]	For respondents who used a vehicle as their origin transport mode, whether respondent parked or was dropped off at a park and ride lot (Code)	1=Yes 2=No
ORIGIN_PARK_YN_PNR	For respondents who used a vehicle as their origin transport mode, whether respondent parked or was dropped off at a park and ride lot	Actual Value
ORIGIN_PARK_PNR	For respondents who used a vehicle as their origin transport mode, and who parked or were dropped off at a park and ride lot, the lot location	Actual Value
ORIGIN_PARK_PNR [Other]	For respondents who used a vehicle as their origin transport mode, and who parked or were dropped off at a park and ride lot, the lot location (Other)	Actual Value
ORIGIN_DROPOFF [ADDR]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (ADDRESS)	Actual Value
ORIGIN_DROPOFF [CITY]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (CITY)	Actual Value
ORIGIN_DROPOFF [STATE]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (STATE)	Actual Value
ORIGIN_DROPOFF [ZIP]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (ZIP)	Actual Value
ORIGIN_DROPOFF [LAT]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (LAT)	Actual Value
ORIGIN_DROPOFF [LONG]	If respondent used a vehicle for their origin transport mode, the location they parked or got dropped off (LON)	Actual Value
DESTIN_PLACE_TYPE[Code]	Type of place respondent is going to now (Code)	1=Your usual WORKPLACE 2=Other business related 3=College or University (students only) 5=Recreation / Sightseeing 6=Medical appointment / doctor's visit 7=Social visits (friends / relatives) 8=Personal business (bank, post

		office) 9=Pick up/drop off someone (daycare, school) 10=Your HOME 11=Your HOTEL 12=Shopping 13=Eating / Dining Out 14=School (K-12) 15=Sporting event 99=Other
DESTIN_PLACE_TYPE	Type of place respondent is going to now	Actual Value
DESTIN_ADDRESS [ADDR]	Street address where the trip ended	Actual Value
DESTIN_ADDRESS [CITY]	City where the trip ended	Actual Value
DESTIN_ADDRESS [STATE]	State where the trip ended	Actual Value
DESTIN_ADDRESS [ZIP]	Zip code where the trip ended	Actual Value
DESTIN_ADDRESS [LAT]	Latitude coordinates where the trip ended	Actual Value
DESTIN_ADDRESS [LONG]	Longitude coordinates where the trip ended	Actual Value
STOP_OFF_BUS [ADDR]	Name/description/intersection where the respondent alighted transit	Actual Value
STOP_OFF_BUS [STPID]	Unique Stop ID for transit	Actual Value
STOP_OFF_BUS [LAT]	Latitude coordinates of the alighting location	Actual Value
STOP_OFF_BUS [LONG]	Longitude coordinates of the alighting location	Actual Value
NEXT_TRANSFERS[Code]	Number of transfers a respondent took after surveyed route to Destination (Code)	0=(0) None 1=(1) One 2=(2) Two 3=(3) Three 4=(4+) Four or more
NEXT_TRANSFERS	Number of transfers a respondent took after surveyed route to Destination	Actual Value
TRIP_NEXT1ST_ROUTE[Code]	First Transfer to Destination (Code)	Actual Value
TRIP_NEXT1ST_ROUTE	First Transfer to Destination	Actual Value
TRIP_NEXT1ST_ROUTE [Other]	First Transfer to Destination (Other)	Actual Value
TRIP_AFTER2ND_ROUTE[Code]	Second Transfer to Destination (Code)	Actual Value
TRIP_AFTER2ND_ROUTE	Second Transfer to Destination	Actual Value
TRIP_3RD_ROUTE[Code]	Third Transfer to Destination (Code)	Actual Value
TRIP_3RD_ROUTE	Third Transfer to Destination	Actual Value
TRIP_3RD_ROUTE [Other]	Third Transfer to Destination (Other)	Actual Value
DESTIN_TRANSPORT[Code]	How respondent got from transit to their destination (Code)	L001=Walk L002=Wheelchair or scooter L003=Bike L004=Picked up by someone L005=Got in parked vehicle and drove alone L006=Got in parked vehicle and drove/rode with others L007=Car share (e.g. Zipcar, etc.) L008=Taxi L009=Uber, Lyft, etc. L999=Other
DESTIN_TRANSPORT	How respondent got from transit to their destination	Actual Value
DESTIN_PARK_YN_PNR[Code]	For respondents who used a vehicle as their destination transport mode, whether or not respondent drove off or was picked up at a park and ride lot (Code)	1=Yes 2=No

DESTIN_PARK_YN_PNR	For respondents who used a vehicle as their destin transport mode, whether respondent drove off or was picked up at a park and ride lot	Actual Value
DESTIN_PARK_PNR	For respondents who used a vehicle as their destin transport mode, and who drove off or were picked up at a park and ride lot, the lot location	Actual Value
DESTIN_DROPOFF [ADDR]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (ADDRESS)	Actual Value
DESTIN_DROPOFF [CITY]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (CITY)	Actual Value
DESTIN_DROPOFF [STATE]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (STATE)	Actual Value
DESTIN_DROPOFF [ZIP]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (ZIP)	Actual Value
DESTIN_DROPOFF [LAT]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (LAT)	Actual Value
DESTIN_DROPOFF [LONG]	If respondent used a vehicle for their destin transport mode, the location they parked or got picked up (LON)	Actual Value
TIME_ON[Code]	At what time did respondent board this bus (Code)	1=Before 6:00 am 2=6:00 - 7:00 am 3=7:00 - 8:00 am 4=8:00 - 9:00 am 5=9:00 - 10:00 am 6=10:00 - 11:00 am 7=11:00 am - 12:00 pm 8=12:00 pm - 1:00 pm 9=1:00 - 2:00 pm 10=2:00 - 3:00 pm 11=3:00 - 4:00 pm 12=4:00 - 5:00 pm 13=5:00 - 6:00 pm 14=6:00 - 6:30 pm 15=6:30 - 7:00 pm 16=7:00 - 8:00 pm 17=8:00 - 9:00 pm 18=After 9:00 pm
TIME_ON	At what time did respondent board this bus	Actual Value
TIME_PERIOD	Time period respondent boarded this bus	Actual Value
Trip_in_Opposite_Dir[Code]	Did respondent take same trip in exact opposite direction (Code)	1=Yes 2=No
Trip_in_Opposite_Dir	Did respondent take same trip in exact opposite direction	Actual Value
Opp_Dir_Trip_Time[Code]	Time when respondent took same trip in exact opposite direction	1=Before 6:00 am 2=6:00 - 7:00 am 3=7:00 - 8:00 am 4=8:00 - 9:00 am 5=9:00 - 10:00 am 6=10:00 - 11:00 am 7=11:00 am - 12:00 pm 8=12:00 pm - 1:00 pm 9=1:00 - 2:00 pm 10=2:00 - 3:00 pm 11=3:00 - 4:00 pm 12=4:00 - 5:00 pm 13=5:00 - 6:00 pm 14=6:00 - 6:30 pm 15=6:30 - 7:00 pm

		16=7:00 - 8:00 pm 17=8:00 - 9:00 pm 18=After 9:00 pm
Opp_Dir_Trip_Time	Period of Day the reverse trip was Administered	Actual Value
PAYMENT_METHOD[Code]	Type of payment method used for trip (Code)	1=Cash 2=Credit / Debit 99=Other
PAYMENT_METHOD	Type of payment method used for trip	Actual Value
PAYMENT_METHOD [Other]	Type of payment method used for trip (Other)	Actual Value
FARE_TYPE[Code]	Type of fare respondent used for their trip (Code)	1=1-Day Go Pass 2=7-Day Go Pass 3=30-Day Go Pass 4=2-Ride Go Pass 5=1-Day MAX Pass 6=30-Day MAX Pass 7=GoPass 365 8=e-Tide Ticket 9=One trip fare (cash) 10=Try Transit 1 day 11=Try Transit 30 day 12=GoSemester 13=Shuttle (Wave) 1 Day 14=Shuttle (Wave) 3 day 15=Student Freedom Pass 99=Other
FARE_TYPE	Type of fare respondent used for their trip	Actual Value
FARE_TYPE [Other]	Type of fare respondent used for their trip (Other)	Actual Value
FARE_DISCOUNTS[Code]	Whether respondent received any fare discounts (Code)	1=Youth 2=Senior 3=Disabled 4=HRT Employees/Spouse/Retirees 5=Regular 99=Other
FARE_DISCOUNTS	Whether respondent received any fare discounts	Actual Value
OTHER_ACTIVITIES [NO OTHER TRIP]	If respondent participated in other activities during the day of their trip (No Other Trip)	Actual Value
OTHER_ACTIVITIES [GO TO WORK]	If respondent participated in other activities during the day of their trip (Go to Work)	Actual Value
OTHER_ACTIVITIES [GO TO SCHOOL]	If respondent participated in other activities during the day of their trip (Go to School)	Actual Value
OTHER_ACTIVITIES [GO SHOPPING]	If respondent participated in other activities during the day of their trip (Go Shopping)	Actual Value
OTHER_ACTIVITIES [BUY A MEAL/BEVERAGE]	If respondent participated in other activities during the day of their trip (Buy a Meal/Beverage)	Actual Value
OTHER_ACTIVITIES [VISIT FRIEND/RELATIVE OR ATTEND A RELIGIOUS/SOCIAL EVENT]	If respondent participated in other activities during the day of their trip (Visit friend/relative or attend a religious/social event)	Actual Value
OTHER_ACTIVITIES [OTHER ERRANDS]	If respondent participated in other activities during the day of their trip (Other Errands)	Actual Value
OTHER_ACTIVITIES [Other]	If respondent participated in other activities during the day of their trip (Other)	Actual Value
FREQ_USE_TRANSIT[Code]	How often respondent uses transit system (Code)	1=first time 2=few times per year 3=at least once per month 4=once per week

		5=2 days per week 6=3 days per week 7=4 days per week 8=5 days per week 9=6 days per week 10=7 days per week
FREQ_USE_TRANSIT	How often respondent uses transit system	Actual Value
VISITOR[Code]	If respondent is a visitor of the area (Code)	1=No 2=Yes
VISITOR	If respondent is a visitor of the area	Actual Value
Trolley_Opinion[Code]	If respondent was a visitor to the area and rode on the Wave, whether the trolley appearance influenced if they rode the wave on their day of travel (Code)	1=Yes 2=No
Trolley_Opinion	If respondent was a visitor to the area and rode on the Wave, whether the trolley appearance influenced if they rode the wave on their day of travel	Actual Value
Trolley_Safety[Code]	If respondent was a visitor to the area and rode on the Wave, if respondent felt safer boarding a trolley than a traditional bus (Code)	1=Yes 2=No
Trolley_Safety	If respondent was a visitor to the area and rode on the Wave, if respondent felt safer boarding a trolley than a traditional bus	Actual Value
COUNT_VH_HH[Code]	Number of Vehicles in respondent's household (Code)	0=None (0) 1=One (1) 2=Two (2) 3=Three (3) 4=Four (4) 5=Five (5) 6=Six (6) 9=Nine (9) 10P=Ten or more (10+)
COUNT_VH_HH	Number of Vehicles in respondent's household	Actual Value
CAN_USE_VEH_TRIP[Code]	Whether respondent could have used a vehicle for their trip (Code)	1=Yes 2=No
CAN_USE_VEH_TRIP	Whether respondent could have used a vehicle for their trip	Actual Value
COUNT_MEMBER_HH[Code]	Number of household members in respondent's house (Code)	1=One (1) 2=Two (2) 3=Three (3) 4=Four (4) 5=Five (5) 6=Six (6) 7=Seven (7) 8=Eight (8) 9=Nine (9) 10=Ten or More (10+)
COUNT_MEMBER_HH	Number of household members in respondent's house	Actual Value
COUNT_EMPLOYED_HH[Code]	Number of employed household members in respondent's house (Code)	0=None (0) 1=One (1) 2=Two (2) 3=Three (3) 4=Four (4) 5=Five (5) 6=Six (6) 7=Seven (7) 8=Eight (8) 9=Nine (9)
COUNT_EMPLOYED_HH	Number of employed household members in respondent's house	Actual Value

STATUS_EMPLOYMENT[Code]	Employment Status of respondent (Code)	1=Employed Full-time 2=Employed Part-time 3=Not currently employed - seeking work 4=Not currently employed - not seeking work 5=Retired 6=Homemaker
STATUS_EMPLOYMENT	Employment Status of respondent	Actual Value
STUDENT_STATUS[Code]	Respondent student status (Code)	1=Not a student or internet 2=Yes - Full time College/University 3=Yes - K - 12th grade 4=Yes - Part time College/University 99=Other
STUDENT_STATUS	Respondent student status	Actual Value
STUDENT_STATUS [Other]	Respondent student status (Other)	Actual Value
SCHOOL_NAME[Code]	Name of school respondent attends if indicated they are a student (Code)	Actual Value
SCHOOL_NAME	Name of school respondent attends if indicated they are a student	Actual Value
SCHOOL_NAME [Other]	Name of school respondent attends if indicated they are a student (Other)	Actual Value
HAS_DRIVE_LICENSE[Code]	Whether respondent has driver's license (Code)	1=Yes 2=No
HAS_DRIVE_LICENSE	Whether respondent has driver's license	Actual Value
AGE[Code]	Age of respondent (Code)	1=Under 15 2=16-17 3=18-24 4=25-34 5=35-44 6=45-54 7=55-64 8=65-84 9=85 and Over
AGE	Age of respondent	Actual Value
RACE_ETHNICITY [AMERICAN INDIAN / ALASKA NATIVE]	Whether respondent indicated they were American Indian/Alaskan Native	Actual Value
RACE_ETHNICITY [ASIAN]	Whether respondent indicated they were Asian	Actual Value
RACE_ETHNICITY [BLACK/AFRICAN/AFRICAN AMERICAN]	Whether respondent indicated they were Black/African American	Actual Value
RACE_ETHNICITY [HISPANIC/LATINO]	Whether respondent indicated they were Hispanic/Latino	Actual Value
RACE_ETHNICITY [NATIVE HAWAIIAN / PACIFIC ISLANDER]	Whether respondent indicated they were Native Hawaiian/Pacific Islander	Actual Value
RACE_ETHNICITY [WHITE]	Whether respondent indicated they were White	Actual Value
RACE_ETHNICITY [Other]	Whether respondent indicated they were another race or ethnicity	Actual Value
INCOME[Code]	Total annual household income (Code)	1=Less than $10,000 2=$10,000 - $14,999 3=$14,000 - $24,999 4=$25,000 - $34,999

		5=$35,000 - $49,999 6=$50,000 - $74,999 7=$75,000 or more 99=Unknown
INCOME	Total annual household income	Actual Value
HOME_LANG_OTHER[Code]	Does respondent speak a language other than English spoken in home (Code)	1=Yes 2=No
HOME_LANG_OTHER	Does respondent speak a language other than English spoken in home	Actual Value
HOME_OTHER_LANG[Code]	Language respondent speaks at home other than English (Code)	Actual Value
HOME_OTHER_LANG	Language respondent speaks at home other than English	Actual Value
HOME_OTHER_LANG [Other]	Language respondent speaks at home other than English (Other)	Actual Value
ENGLISH_ABILITY[Code]	How well did respondent speaks English (Code)	A1=Very well A2=Well A4=Less than well
ENGLISH_ABILITY	How well did respondent speaks English	Actual Value
DISABILITY[Code]	Whether respondent has a verified disability that limits their mobility (Code)	1=Yes - HRT Verified disability 2=Yes - other verified 3=No
DISABILITY	Whether respondent has a verified disability that limits their mobility	Actual Value
MOBILITY_DEVICES[Code]	If respondent indicated they do have a disability, whether they use a mobility device or service animal when travelling (Code)	1=No 3=Wheelchair 4=Scooter 5=Walker 6=Prosthesis 7=Cane 9=Crutches 99=Other
MOBILITY_DEVICES	If respondent indicated they do have a disability, whether they use a mobility device or service animal when travelling	Actual Value
MOBILITY_DEVICES [Other]	If respondent indicated they do have a disability, whether they use a mobility device or service animal when travelling (Other)	Actual Value
SMARTPHONE[Code]	If respondent has a smartphone (Code)	1=Yes 2=No 3=Unknown
SMARTPHONE	If respondent has a smartphone	Actual Value
GENDER[Code]	Gender of respondent (Code)	1=Male 2=Female 3=Other
GENDER	Gender of respondent	Actual Value
HRT_EASYUSE[Code]	Is the HRT system easy to use? (Code)	1=Yes 2=No
HRT_EASYUSE	Is the HRT system easy to use?	Actual Value
HRT_STOPLOC[Code]	Are your bus stops conveniently located? (Code)	1=Yes 2=No
HRT_STOPLOC	Are your bus stops conveniently located?	Actual Value
HRT_STOPACCESS[Code]	Are your bus stops accessible for all people (handicap)? (Code)	1=Yes 2=No
HRT_STOPACCESS	Are your bus stops accessible for all people (handicap)?	Actual Value
HRT_SATIS[Code]	Are you satisfied with this route? (Code)	1=Yes 2=No
HRT_SATIS	Are you satisfied with this route?	Actual Value
HRT_SAFE_RIDE[Code]	Do you feel safe while riding HRT services? (Code)	1=Yes 2=No

HRT_SAFE_RIDE	Do you feel safe while riding HRT services?	Actual Value
HRT_SAFE_WAIT[Code]	Do you feel safe while waiting at the bus stop? (Code)	1=Yes 2=No
HRT_SAFE_WAIT	Do you feel safe while waiting at the bus stop?	Actual Value
HRT_STOP_CLEAN[Code]	Are your bus stops generally clean? (Code)	1=Yes 2=No
HRT_STOP_CLEAN	Are your bus stops generally clean?	Actual Value
HRT_BIKERACK_FULL[Code]	Have you ever been unable to ride the bus because the bike rack was full? (Code)	1=Yes 2=No
HRT_BIKERACK_FULL	Have you ever been unable to ride the bus because the bike rack was full?	Actual Value
HRT_BIKERACK_SAFE[Code]	Do you feel safe leaving your bike at a bus stop if the bike rack on the bus is full? (Code)	1=Yes 2=No
HRT_BIKERACK_SAFE	Do you feel safe leaving your bike at a bus stop if the bike rack on the bus is full?	Actual Value
HRT_PROF_HELP[Code]	Are the bus operators professional and helpful? (Code)	1=Yes 2=No
HRT_PROF_HELP	Are the bus operators professional and helpful?	Actual Value
HRT_FOR_FUN[Code]	Do you use public transportation to go to recreational or cultural activities? (Code)	1=Yes 2=No
HRT_FOR_FUN	Do you use public transportation to go to recreational or cultural activities?	Actual Value
WGHT_NAME	Unique expansion identifier for record, indicating Route_Direction_TimePeriod_BoardingSegment_AlightingSegment	Actual Value
UNLINKED_WGHT_FACTOR	Weight factor given to each record meant to represent number of boardings per day	Actual Value
TOTAL_TRANSFERS	Total number of previous and next transfers	Actual Value
LINKED_WGHT_FCTR	Adjusted unlinked weight factor meant to represent the number of trips per day instead of number of boardings per day	Actual Value
PNR_ADJ_UNLK_WGHT_FCTR	Adjusted unlinked weight factor meant to adjust for park and ride counts	Actual Value
PNR_ADJ_LNKD_WGHT_FCTR	Adjusted linked weight factor meant to adjust for park and ride counts	Actual Value

APPENDIX C: ROUTE SEGMENT/EXPANSION TYPES

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
1 Downtown Norfolk Pembroke East INBOUND [HRT]	1	B&A/STOP-LEVEL METHOD	58 South Norfolk/Bainbridge Boulevard INBOUND [HRT]	58	STOP METHOD
1 Downtown Norfolk Pembroke East OUTBOUND [HRT]	1	B&A/STOP-LEVEL METHOD	58 South Norfolk/Bainbridge Boulevard OUTBOUND [HRT]	58	STOP METHOD
2 Naval Station Norfolk/Hampton Blvd INBOUND [HRT]	2	B&A/STOP-LEVEL METHOD	64 To Smithfield/Gwaltney and Newport News Shipyard INBOUND [HRT]	64	STOP METHOD
2 Naval Station Norfolk/Hampton Blvd OUTBOUND [HRT]	2	B&A/STOP-LEVEL METHOD	64 To Smithfield/Gwaltney and Newport News Shipyard OUTBOUND [HRT]	64	STOP METHOD
3 Downtown Norfolk/Naval Station INBOUND [HRT]	3	B&A/STOP-LEVEL METHOD	101 (Kecoughtan) Downtown Newport News/Downtown Hampton INBOUND [HRT]	101	B&A/STOP-LEVEL METHOD
3 Downtown Norfolk/Naval Station OUTBOUND [HRT]	3	B&A/STOP-LEVEL METHOD	101 (Kecoughtan) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	101	B&A/STOP-LEVEL METHOD
4 Downtown Norfolk/ODU INBOUND [HRT]	4	STOP METHOD	102 (Coliseum) Peninsula Town Center/Downtown Hampton INBOUND [HRT]	102	STOP METHOD
4 Downtown Norfolk/ODU OUTBOUND [HRT]	4	STOP METHOD	102 (Coliseum) Peninsula Town Center/Downtown Hampton OUTBOUND [HRT]	102	STOP METHOD
5 Willoughby - Evelyn Butts INBOUND [HRT]	5	STOP METHOD	103 (Shell Rd.) Downtown Newport News/Downtown Hampton INBOUND [HRT]	103	B&A/STOP-LEVEL METHOD
5 Willoughby - Evelyn Butts OUTBOUND [HRT]	5	STOP METHOD	103 (Shell Rd.) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	103	B&A/STOP-LEVEL METHOD
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd INBOUND [HRT]	6	B&A/STOP-LEVEL METHOD	104 (Marshall) Downtown Newport News/Newmarket INBOUND [HRT]	104	B&A/STOP-LEVEL METHOD
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd OUTBOUND [HRT]	6	B&A/STOP-LEVEL METHOD	104 (Marshall) Downtown Newport News/Newmarket OUTBOUND [HRT]	104	B&A/STOP-LEVEL METHOD
8 Downtown Norfolk / Evelyn T. Butts Ave INBOUND [HRT]	8	B&A/STOP-LEVEL METHOD	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center INBOUND [HRT]	105	B&A/STOP-LEVEL METHOD
8 Downtown Norfolk / Evelyn T. Butts Ave OUTBOUND [HRT]	8	B&A/STOP-LEVEL METHOD	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center OUTBOUND [HRT]	105	B&A/STOP-LEVEL METHOD
9 Downtown Norfolk/Sewells Point Road INBOUND [HRT]	9	B&A/STOP-LEVEL METHOD	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis INBOUND [HRT]	106	B&A/STOP-LEVEL METHOD
9 Downtown Norfolk/Sewells Point Road OUTBOUND [HRT]	9	B&A/STOP-LEVEL METHOD	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis OUTBOUND [HRT]	106	B&A/STOP-LEVEL METHOD
11 Downtown Norfolk/Colonial Place INBOUND [HRT]	11	STOP METHOD	107 Newport News / Warwick Boulevard / Denbigh INBOUND [HRT]	107	B&A/STOP-LEVEL METHOD
11 Downtown Norfolk/Colonial Place OUTBOUND [HRT]	11	STOP METHOD	107 Newport News / Warwick Boulevard / Denbigh OUTBOUND [HRT]	107	B&A/STOP-LEVEL METHOD
12 South Norfolk/TCC - Virginia Beach INBOUND [HRT]	12	B&A/STOP-LEVEL METHOD	108 Patrick Henry Mall / Lee Hall INBOUND [HRT]	108	STOP METHOD
12 South Norfolk/TCC - Virginia Beach OUTBOUND [HRT]	12	B&A/STOP-LEVEL METHOD	108 Patrick Henry Mall / Lee Hall OUTBOUND [HRT]	108	STOP METHOD
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake INBOUND [HRT]	13	B&A/STOP-LEVEL METHOD	109 (Pembroke) Downtown Hampton/Buckroe INBOUND [HRT]	109	STOP METHOD
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake OUTBOUND [HRT]	13	B&A/STOP-LEVEL METHOD	109 (Pembroke) Downtown Hampton/Buckroe OUTBOUND [HRT]	109	STOP METHOD
14 Robert Hall Blvd / TCC Chesapeake INBOUND [HRT]	14	STOP METHOD	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson INBOUND [HRT]	110	B&A/STOP-LEVEL METHOD
14 Robert Hall Blvd / TCC Chesapeake OUTBOUND [HRT]	14	STOP METHOD	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson OUTBOUND [HRT]	110	B&A/STOP-LEVEL METHOD
15 Evelyn Butts to Robert Hall/Greenbrier Mall INBOUND [HRT]	15	B&A/STOP-LEVEL METHOD	111 (Denbigh - TNCC) Thomas Nelson/Riverside/Denbigh INBOUND [HRT]	111	B&A/STOP-LEVEL METHOD
15 Evelyn Butts to Robert Hall/Greenbrier Mall OUTBOUND [HRT]	15	B&A/STOP-LEVEL METHOD	111 (Denbigh - TNCC) Thomas Nelson/Riverside/Denbigh OUTBOUND [HRT]	111	B&A/STOP-LEVEL METHOD
18 Downtown Norfolk/Ballentine Boulevard INBOUND [HRT]	18	STOP METHOD	112 Downtown Newport News / Patrick Henry Mall INBOUND [HRT]	112	B&A/STOP-LEVEL METHOD
18 Downtown Norfolk/Ballentine Boulevard OUTBOUND [HRT]	18	STOP METHOD	112 Downtown Newport News / Patrick Henry Mall OUTBOUND [HRT]	112	B&A/STOP-LEVEL METHOD
20 Downtown Norfolk/Virginia Beach Oceanfront INBOUND [HRT]	20	B&A/STOP-LEVEL METHOD	114 (Weaver Rd.) Newmarket/Downtown Hampton INBOUND [HRT]	114	B&A/STOP-LEVEL METHOD
20 Downtown Norfolk/Virginia Beach Oceanfront OUTBOUND [HRT]	20	B&A/STOP-LEVEL METHOD	114 (Weaver Rd.) Newmarket/Downtown Hampton OUTBOUND [HRT]	114	B&A/STOP-LEVEL METHOD
21 Little Creek Rd. INBOUND [HRT]	21	B&A/STOP-LEVEL METHOD	115 Buckroe/Willow Oaks/Downtown Hampton INBOUND [HRT]	115	STOP METHOD
21 Little Creek Rd. OUTBOUND [HRT]	21	B&A/STOP-LEVEL METHOD	115 Buckroe/Willow Oaks/Downtown Hampton OUTBOUND [HRT]	115	STOP METHOD
22 Newtown Road Station/Joint Expeditionary Base Little Creek INBOUND [HRT]	22	STOP METHOD	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop INBOUND [HRT]	116	STOP METHOD
22 Newtown Road Station/Joint Expeditionary Base Little Creek OUTBOUND [HRT]	22	STOP METHOD	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop OUTBOUND [HRT]	116	STOP METHOD
23 Medical Tower/Military Circle/JANAF INBOUND [HRT]	23	B&A/STOP-LEVEL METHOD	117 (Phoebus) Hampton University/V.A. Hospital INBOUND [HRT]	117	STOP METHOD
23 Medical Tower/Military Circle/JANAF OUTBOUND [HRT]	23	B&A/STOP-LEVEL METHOD	117 (Phoebus) Hampton University/V.A. Hospital OUTBOUND [HRT]	117	STOP METHOD
25 (Newtown) Military Circle/Princess Anne INBOUND [HRT]	25	STOP METHOD	118 (Magruder) Langley/Semple Farm Road INBOUND [HRT]	118	B&A/STOP-LEVEL METHOD
25 (Newtown) Military Circle/Princess Anne OUTBOUND [HRT]	25	STOP METHOD	118 (Magruder) Langley/Semple Farm Road OUTBOUND [HRT]	118	B&A/STOP-LEVEL METHOD
26 Lynnhaven Mall / TCC Virginia Beach INBOUND [HRT]	26	STOP METHOD	119 Fishing Point Dr/Riverside Regional Medical Center INBOUND [HRT]	119	STOP METHOD
26 Lynnhaven Mall / TCC Virginia Beach OUTBOUND [HRT]	26	STOP METHOD	119 Fishing Point Dr/Riverside Regional Medical Center OUTBOUND [HRT]	119	STOP METHOD
27 Pleasure House Rd./Newtown Road Light Rail Station INBOUND [HRT]	27	STOP METHOD	120 (Mallory) Downtown Hampton/Mallory/Buckroe INBOUND [HRT]	120	STOP METHOD
27 Pleasure House Rd./Newtown Road Light Rail Station OUTBOUND [HRT]	27	STOP METHOD	120 (Mallory) Downtown Hampton/Mallory/Buckroe OUTBOUND [HRT]	120	STOP METHOD
29 (Lynnhaven) Pleasure House Road INBOUND [HRT]	29	STOP METHOD	121 Newport News Transportation Center / Williamsburg INBOUND [HRT]	121	STOP METHOD
29 (Lynnhaven) Pleasure House Road OUTBOUND [HRT]	29	STOP METHOD	121 Newport News Transportation Center / Williamsburg OUTBOUND [HRT]	121	STOP METHOD

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
30 Wave: Atlantic Avenue Shuttle INBOUND [HRT]	30	STOP METHOD	403 Buckroe Shopping Center OUTBOUND [HRT]	403	STOP METHOD
30 Wave: Atlantic Avenue Shuttle OUTBOUND [HRT]	30	STOP METHOD	405 NNTC/Buckroe INBOUND [HRT]	405	STOP METHOD
31 Wave: Aquarium and Campground Shuttle INBOUND [HRT]	31	STOP METHOD	405 NNTC/Buckroe OUTBOUND [HRT]	405	STOP METHOD
31 Wave: Aquarium and Campground Shuttle OUTBOUND [HRT]	31	STOP METHOD	414 NNTC/Jefferson/Oakland INBOUND [HRT]	414	STOP METHOD
32 Wave: Shoppers Shuttle INBOUND [HRT]	32	STOP METHOD	414 NNTC/Jefferson/Oakland OUTBOUND [HRT]	414	STOP METHOD
32 Wave: Shoppers Shuttle OUTBOUND [HRT]	32	STOP METHOD	415 NNTC/Denbigh OUTBOUND [HRT]	415	STOP METHOD
33 (General Booth) North Seashore/Municipal Center INBOUND [HRT]	33	STOP METHOD	430 Denbigh Fringe INBOUND [HRT]	430	STOP METHOD
33 (General Booth) North Seashore/Municipal Center OUTBOUND [HRT]	33	STOP METHOD	430 Denbigh Fringe OUTBOUND [HRT]	430	STOP METHOD
36 (Holland) Pembroke East INBOUND [HRT]	36	B&A/STOP-LEVEL METHOD	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	918	STOP METHOD
36 (Holland) Pembroke East OUTBOUND [HRT]	36	B&A/STOP-LEVEL METHOD	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	918	STOP METHOD
41 Downtown Portsmouth/Cradock INBOUND [HRT]	41	STOP METHOD	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	919	STOP METHOD
41 Downtown Portsmouth/Cradock OUTBOUND [HRT]	41	STOP METHOD	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	919	STOP METHOD
43 County Street / Bart Street INBOUND [HRT]	43	STOP METHOD	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk INBOUND [HRT]	922	STOP METHOD
43 County Street / Bart Street OUTBOUND [HRT]	43	STOP METHOD	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk OUTBOUND [HRT]	922	STOP METHOD
44 Norfolk General Hospital/Midtown Portsmouth INBOUND [HRT]	44	STOP METHOD	960 MAX Virginia Beach to Norfolk INBOUND [HRT]	960	STOP METHOD
44 Norfolk General Hospital/Midtown Portsmouth OUTBOUND [HRT]	44	STOP METHOD	960 MAX Virginia Beach to Norfolk OUTBOUND [HRT]	960	STOP METHOD
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	45	B&A/STOP-LEVEL METHOD	961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	961	B&A/STOP-LEVEL METHOD
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	45	B&A/STOP-LEVEL METHOD	961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	961	B&A/STOP-LEVEL METHOD
47 Downtown Portsmouth/Churchland INBOUND [HRT]	47	B&A/STOP-LEVEL METHOD	965 MAX Patrick Henry Mall to Naval Station Norfolk INBOUND [HRT]	965	STOP METHOD
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	47	B&A/STOP-LEVEL METHOD	965 MAX Patrick Henry Mall to Naval Station Norfolk OUTBOUND [HRT]	965	STOP METHOD
50 Academy Park/Victory Crossing INBOUND [HRT]	50	STOP METHOD	966 MAX Silverleaf Park & Ride/Newport News Transit Center INBOUND [HRT]	966	STOP METHOD
50 Academy Park/Victory Crossing OUTBOUND [HRT]	50	STOP METHOD	966 MAX Silverleaf Park & Ride/Newport News Transit Center OUTBOUND [HRT]	966	STOP METHOD
55 Greenbrier Circulator TO GREENBRIER MALL	55	STOP METHOD	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) INBOUND [HRT]	967	STOP METHOD
55 Greenbrier Circulator TO ROBERT HALL BLVD	55	STOP METHOD	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) OUTBOUND [HRT]	967	STOP METHOD
57 Robert Hall Boulevard/Airline Boulevard INBOUND [HRT]	57	STOP METHOD	Elizabeth River Ferry	90	STOP METHOD
57 Robert Hall Boulevard/Airline Boulevard OUTBOUND [HRT]	57	STOP METHOD	The Tide (Light Rail)	800	STATION-TO-STATION

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
1 Downtown Norfolk Pembroke East INBOUND [HRT]	1	TYPE 1 EXPANSION	58 South Norfolk/Bainbridge Boulevard INBOUND [HRT]	58	TYPE 4 EXPANSION
1 Downtown Norfolk Pembroke East OUTBOUND [HRT]	1	TYPE 1 EXPANSION	58 South Norfolk/Bainbridge Boulevard OUTBOUND [HRT]	58	TYPE 4 EXPANSION
2 Naval Station Norfolk/Hampton Blvd INBOUND [HRT]	2	TYPE 1 EXPANSION	64 To Smithfield/Gwaltney and Newport News Shipyard INBOUND [HRT]	64	TYPE 4 EXPANSION
2 Naval Station Norfolk/Hampton Blvd OUTBOUND [HRT]	2	TYPE 1 EXPANSION	64 To Smithfield/Gwaltney and Newport News Shipyard OUTBOUND [HRT]	64	TYPE 4 EXPANSION
3 Downtown Norfolk/Naval Station INBOUND [HRT]	3	TYPE 1 EXPANSION	101 (Kecoughtan) Downtown Newport News/Downtown Hampton INBOUND [HRT]	101	TYPE 1 EXPANSION
3 Downtown Norfolk/Naval Station OUTBOUND [HRT]	3	TYPE 1 EXPANSION	101 (Kecoughtan) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	101	TYPE 1 EXPANSION
4 Downtown Norfolk/ODU INBOUND [HRT]	4	TYPE 4 EXPANSION	102 (Coliseum) Peninsula Town Center/Downtown Hampton INBOUND [HRT]	102	TYPE 4 EXPANSION
4 Downtown Norfolk/ODU OUTBOUND [HRT]	4	TYPE 4 EXPANSION	102 (Coliseum) Peninsula Town Center/Downtown Hampton OUTBOUND [HRT]	102	TYPE 4 EXPANSION
5 Willoughby – Evelyn Butts INBOUND [HRT]	5	TYPE 4 EXPANSION	103 (Shell Rd.) Downtown Newport News/Downtown Hampton INBOUND [HRT]	103	TYPE 1 EXPANSION
5 Willoughby – Evelyn Butts OUTBOUND [HRT]	5	TYPE 4 EXPANSION	103 (Shell Rd.) Downtown Newport News/Downtown Hampton OUTBOUND [HRT]	103	TYPE 1 EXPANSION
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd INBOUND [HRT]	6	TYPE 1 EXPANSION	104 (Marshall) Downtown Newport News/Newmarket INBOUND [HRT]	104	TYPE 1 EXPANSION
6 Downtown Norfolk/South Norfolk/Robert Hall Blvd OUTBOUND [HRT]	6	TYPE 1 EXPANSION	104 (Marshall) Downtown Newport News/Newmarket OUTBOUND [HRT]	104	TYPE 1 EXPANSION
8 Downtown Norfolk / Evelyn T. Butts Ave INBOUND [HRT]	8	TYPE 1 EXPANSION	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center INBOUND [HRT]	105	TYPE 1 EXPANSION
8 Downtown Norfolk / Evelyn T. Butts Ave OUTBOUND [HRT]	8	TYPE 1 EXPANSION	105 (Briarfield) Maple Avenue & 27th Street/Peninsula Town Center OUTBOUND [HRT]	105	TYPE 1 EXPANSION
9 Downtown Norfolk/Sewells Point Road INBOUND [HRT]	9	TYPE 1 EXPANSION	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis INBOUND [HRT]	106	TYPE 1 EXPANSION
9 Downtown Norfolk/Sewells Point Road OUTBOUND [HRT]	9	TYPE 1 EXPANSION	106 Newport News / Warwick Boulevard / Denbigh / Fort Eustis OUTBOUND [HRT]	106	TYPE 1 EXPANSION
11 Downtown Norfolk/Colonial Place INBOUND [HRT]	11	TYPE 4 EXPANSION	107 Newport News / Warwick Boulevard / Denbigh INBOUND [HRT]	107	TYPE 1 EXPANSION
11 Downtown Norfolk/Colonial Place OUTBOUND [HRT]	11	TYPE 4 EXPANSION	107 Newport News / Warwick Boulevard / Denbigh OUTBOUND [HRT]	107	TYPE 1 EXPANSION
12 South Norfolk/TCC – Virginia Beach INBOUND [HRT]	12	TYPE 1 EXPANSION	108 Patrick Henry Mall / Lee Hall INBOUND [HRT]	108	TYPE 4 EXPANSION
12 South Norfolk/TCC – Virginia Beach OUTBOUND [HRT]	12	TYPE 1 EXPANSION	108 Patrick Henry Mall / Lee Hall OUTBOUND [HRT]	108	TYPE 4 EXPANSION
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake INBOUND [HRT]	13	TYPE 1 EXPANSION	109 (Pembroke) Downtown Hampton/Buckroe INBOUND [HRT]	109	TYPE 4 EXPANSION
13 Downtown Norfolk/Robert Hall Blvd/TCC – Chesapeake OUTBOUND [HRT]	13	TYPE 1 EXPANSION	109 (Pembroke) Downtown Hampton/Buckroe OUTBOUND [HRT]	109	TYPE 4 EXPANSION
14 Robert Hall Blvd / TCC Chesapeake INBOUND [HRT]	14	TYPE 4 EXPANSION	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson INBOUND [HRT]	110	TYPE 1 EXPANSION
14 Robert Hall Blvd / TCC Chesapeake OUTBOUND [HRT]	14	TYPE 4 EXPANSION	110 (Thomas Nelson) Downtown Hampton/Thomas Nelson OUTBOUND [HRT]	110	TYPE 1 EXPANSION
15 Evelyn Butts to Robert Hall/Greenbrier Mall INBOUND [HRT]	15	TYPE 1 EXPANSION	111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh INBOUND [HRT]	111	TYPE 1 EXPANSION
15 Evelyn Butts to Robert Hall/Greenbrier Mall OUTBOUND [HRT]	15	TYPE 1 EXPANSION	111 (Denbigh – TNCC) Thomas Nelson/Riverside/Denbigh OUTBOUND [HRT]	111	TYPE 1 EXPANSION
18 Downtown Norfolk/Ballentine Boulevard INBOUND [HRT]	18	TYPE 4 EXPANSION	112 Downtown Newport News / Patrick Henry Mall INBOUND [HRT]	112	TYPE 1 EXPANSION
18 Downtown Norfolk/Ballentine Boulevard OUTBOUND [HRT]	18	TYPE 4 EXPANSION	112 Downtown Newport News / Patrick Henry Mall OUTBOUND [HRT]	112	TYPE 1 EXPANSION
20 Downtown Norfolk/Virginia Beach Oceanfront INBOUND [HRT]	20	TYPE 1 EXPANSION	114 (Weaver Rd.) Newmarket/Downtown Hampton INBOUND [HRT]	114	TYPE 1 EXPANSION
20 Downtown Norfolk/Virginia Beach Oceanfront OUTBOUND [HRT]	20	TYPE 1 EXPANSION	114 (Weaver Rd.) Newmarket/Downtown Hampton OUTBOUND [HRT]	114	TYPE 1 EXPANSION
21 Little Creek Rd. INBOUND [HRT]	21	TYPE 1 EXPANSION	115 Buckroe/Willow Oaks/Downtown Hampton INBOUND [HRT]	115	TYPE 4 EXPANSION
21 Little Creek Rd. OUTBOUND [HRT]	21	TYPE 1 EXPANSION	115 Buckroe/Willow Oaks/Downtown Hampton OUTBOUND [HRT]	115	TYPE 4 EXPANSION
22 Newtown Road Station/Joint Expeditionary Base Little Creek INBOUND [HRT]	22	TYPE 4 EXPANSION	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop INBOUND [HRT]	116	TYPE 4 EXPANSION
22 Newtown Road Station/Joint Expeditionary Base Little Creek OUTBOUND [HRT]	22	TYPE 4 EXPANSION	116 (Mall Hall) Lee Hall/Patrick Henry Mall Loop OUTBOUND [HRT]	116	TYPE 4 EXPANSION
23 Medical Tower/Military Circle/JANAF INBOUND [HRT]	23	TYPE 1 EXPANSION	117 (Phoebus) Hampton University/V.A. Hospital INBOUND [HRT]	117	TYPE 4 EXPANSION
23 Medical Tower/Military Circle/JANAF OUTBOUND [HRT]	23	TYPE 1 EXPANSION	117 (Phoebus) Hampton University/V.A. Hospital OUTBOUND [HRT]	117	TYPE 4 EXPANSION
25 (Newtown) Military Circle/Princess Anne INBOUND [HRT]	25	TYPE 4 EXPANSION	118 (Magruder) Langley/Semple Farm Road INBOUND [HRT]	118	TYPE 1 EXPANSION
25 (Newtown) Military Circle/Princess Anne OUTBOUND [HRT]	25	TYPE 4 EXPANSION	118 (Magruder) Langley/Semple Farm Road OUTBOUND [HRT]	118	TYPE 1 EXPANSION

ROUTE NAME	ROUTE	METHOD	ROUTE NAME	ROUTE	METHOD
26 Lynnhaven Mall / TCC Virginia Beach INBOUND [HRT]	26	TYPE 4 EXPANSION	119 Fishing Point Dr/Riverside Regional Medical Center INBOUND [HRT]	119	TYPE 4 EXPANSION
26 Lynnhaven Mall / TCC Virginia Beach OUTBOUND [HRT]	26	TYPE 4 EXPANSION	119 Fishing Point Dr/Riverside Regional Medical Center OUTBOUND [HRT]	119	TYPE 4 EXPANSION
27 Pleasure House Rd./Newtown Road Light Rail Station INBOUND [HRT]	27	TYPE 4 EXPANSION	120 (Mallory) Downtown Hampton/Mallory/Buckroe INBOUND [HRT]	120	TYPE 4 EXPANSION
27 Pleasure House Rd./Newtown Road Light Rail Station OUTBOUND [HRT]	27	TYPE 4 EXPANSION	120 (Mallory) Downtown Hampton/Mallory/Buckroe OUTBOUND [HRT]	120	TYPE 4 EXPANSION
29 (Lynnhaven) Pleasure House Road INBOUND [HRT]	29	TYPE 4 EXPANSION	121 Newport News Transportation Center / Williamsburg INBOUND [HRT]	121	TYPE 4 EXPANSION
29 (Lynnhaven) Pleasure House Road OUTBOUND [HRT]	29	TYPE 4 EXPANSION	121 Newport News Transportation Center / Williamsburg OUTBOUND [HRT]	121	TYPE 4 EXPANSION
30 Wave: Atlantic Avenue Shuttle INBOUND [HRT]	30	TYPE 3 EXPANSION	403 Buckroe Shopping Center OUTBOUND [HRT]	403	TYPE 4 EXPANSION
30 Wave: Atlantic Avenue Shuttle OUTBOUND [HRT]	30	TYPE 3 EXPANSION	405 NNTC/Buckroe INBOUND [HRT]	405	TYPE 4 EXPANSION
31 Wave: Aquarium and Campground Shuttle INBOUND [HRT]	31	TYPE 4 EXPANSION	405 NNTC/Buckroe OUTBOUND [HRT]	405	TYPE 4 EXPANSION
31 Wave: Aquarium and Campground Shuttle OUTBOUND [HRT]	31	TYPE 4 EXPANSION	414 NNTC/Jefferson/Oakland INBOUND [HRT]	414	TYPE 4 EXPANSION
32 Wave: Shoppers Shuttle INBOUND [HRT]	32	TYPE 4 EXPANSION	414 NNTC/Jefferson/Oakland OUTBOUND [HRT]	414	TYPE 4 EXPANSION
32 Wave: Shoppers Shuttle OUTBOUND [HRT]	32	TYPE 4 EXPANSION	415 NNTC/Denbigh OUTBOUND [HRT]	415	TYPE 4 EXPANSION
33 (General Booth) North Seashore/Municipal Center INBOUND [HRT]	33	TYPE 4 EXPANSION	430 Denbigh Fringe INBOUND [HRT]	430	TYPE 4 EXPANSION
33 (General Booth) North Seashore/Municipal Center OUTBOUND [HRT]	33	TYPE 4 EXPANSION	430 Denbigh Fringe OUTBOUND [HRT]	430	TYPE 4 EXPANSION
36 (Holland) Pembroke East INBOUND [HRT]	36	TYPE 1 EXPANSION	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	918	TYPE 4 EXPANSION
36 (Holland) Pembroke East OUTBOUND [HRT]	36	TYPE 1 EXPANSION	918 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	918	TYPE 4 EXPANSION
41 Downtown Portsmouth/Cradock INBOUND [HRT]	41	TYPE 4 EXPANSION	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk INBOUND [HRT]	919	TYPE 4 EXPANSION
41 Downtown Portsmouth/Cradock OUTBOUND [HRT]	41	TYPE 4 EXPANSION	919 MAX Virginia Beach to Joint Forces Staff College Norfolk/Naval Station Norfolk OUTBOUND [HRT]	919	TYPE 4 EXPANSION
43 County Street / Bart Street INBOUND [HRT]	43	TYPE 4 EXPANSION	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk INBOUND [HRT]	922	TYPE 4 EXPANSION
43 County Street / Bart Street OUTBOUND [HRT]	43	TYPE 4 EXPANSION	922 MAX Chesapeake-Virginia Beach to Naval Station Norfolk OUTBOUND [HRT]	922	TYPE 4 EXPANSION
44 Norfolk General Hospital/Midtown Portsmouth INBOUND [HRT]	44	TYPE 4 EXPANSION	960 MAX Virginia Beach to Norfolk INBOUND [HRT]	960	TYPE 4 EXPANSION
44 Norfolk General Hospital/Midtown Portsmouth OUTBOUND [HRT]	44	TYPE 4 EXPANSION	960 MAX Virginia Beach to Norfolk OUTBOUND [HRT]	960	TYPE 4 EXPANSION
45 Downtown Norfolk/Portsmouth INBOUND [HRT]	45	TYPE 1 EXPANSION	961 MAX Newport News-Hampton to Norfolk INBOUND [HRT]	961	TYPE 1 EXPANSION
45 Downtown Norfolk/Portsmouth OUTBOUND [HRT]	45	TYPE 1 EXPANSION	961 MAX Newport News-Hampton to Norfolk OUTBOUND [HRT]	961	TYPE 1 EXPANSION
47 Downtown Portsmouth/Churchland INBOUND [HRT]	47	TYPE 1 EXPANSION	965 MAX Patrick Henry Mall to Naval Station Norfolk INBOUND [HRT]	965	TYPE 4 EXPANSION
47 Downtown Portsmouth/Churchland OUTBOUND [HRT]	47	TYPE 1 EXPANSION	965 MAX Patrick Henry Mall to Naval Station Norfolk OUTBOUND [HRT]	965	TYPE 4 EXPANSION
50 Academy Park/Victory Crossing INBOUND [HRT]	50	TYPE 4 EXPANSION	966 MAX Silverleaf Park & Ride/Newport News Transit Center INBOUND [HRT]	966	TYPE 4 EXPANSION
50 Academy Park/Victory Crossing OUTBOUND [HRT]	50	TYPE 4 EXPANSION	966 MAX Silverleaf Park & Ride/Newport News Transit Center OUTBOUND [HRT]	966	TYPE 4 EXPANSION
55 Greenbrier Circulator TO GREENBRIER MALL	55	TYPE 4 EXPANSION	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) INBOUND [HRT]	967	TYPE 4 EXPANSION
55 Greenbrier Circulator TO ROBERT HALL BLVD	55	TYPE 4 EXPANSION	967 MAX Virginia Beach-Chesapeake to Newport News (MHS) OUTBOUND [HRT]	967	TYPE 4 EXPANSION
57 Robert Hall Boulevard/Airline Boulevard INBOUND [HRT]	57	TYPE 4 EXPANSION	Elizabeth River Ferry	90	TYPE 4 EXPANSION
57 Robert Hall Boulevard/Airline Boulevard OUTBOUND [HRT]	57	TYPE 4 EXPANSION	The Tide (Light Rail)	800	RAIL EXPANSION

HAMPTON ROADS TRANSIT

gohrt.com

Appendix C: Route Sheets

The following section contains detailed information on the recommended changes to the Hampton Roads Transit (HRT) Bus Network. These changes are proposed as part of the Transit Development Plan (TDP) FY 2018 – FY 2027 and would serve as the Agency's blueprint for the next 10 years. We encourage you to review this document and provide feedback on the recommendations. Your feedback is vital for ensuring that the transit needs of the region are met.

The following document includes a written description of proposed changes, a table with levels of service, estimated costs of the recommendation, and maps of the route alignment. The information in the table is described below:

Table	Description
Span	The hours of service each route would operate on Weekdays, Saturday, and Sunday.
Origins and Destinations	The beginning and end locations of each route. Some routes have trips that terminate at different locations along the route. These different endpoints are differentiated with a " / . For example, a route with three endpoints would be appear as "Endpoint 1 / Endpoint 2 / Endpoint 3".
Headway	How often the bus would arrive at a bus stop during various time periods. On weekdays the periods shown are approximately associated with the following times, but would vary based on demand: • Early - Before 6:00 AM • AM Peak - 6:00 AM to 9:00 AM • Base - 9:00 AM to 2:30 PM • PM Peak - 2:30 PM to 5:30 PM • Evening - 5:30 PM to 10:00 PM • Late Night - After 10:00 PM Routes with multiple endpoints would have the headway between the starting location and each endpoint differentiated with a " / ". For example, the headway for a route with multiple endpoints may appear as "15/30/60".

ROUTE 1

Granby Street

Service Type: Local
Jurisdictions Served: Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

Operate Route 1 along its current alignment between the Downtown Norfolk Transit Center (DNTC) and the west gate of Joint Expeditionary Base (JEB) Little Creek at increased frequencies. Service east of the JEB Little Creek would be discontinued on Route 1; however, service along the discontinued segments would be covered by proposed extensions to Routes 21 (JEB Little Creek to Pleasure House Road) and 36 (Pleasure House Road to Pembroke East).

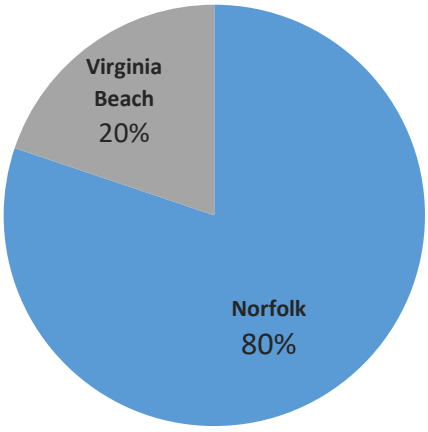
Truncating the route at JEB Little Creek would simplify the operations of the route which can improve the reliability of the service. By doing so, a small portion of the route's riders would be impacted. On an average weekday, only ten percent of passengers board Route 1 east of JEB Little Creek. The pattern of boardings and alightings on this route suggests that most riders do not continue their trip past JEB Little Creek.

On weekdays, operate 15-minute service during the early, morning peak, midday, and afternoon peak periods. After 7:00 PM, provide service every 30 minutes; and increase to an hourly frequency after 11:00 PM. Increasing the frequency on the route is recommended to meet the demand for service. Between 6:00 AM and 5:00 PM, Route 1 consistently carries over 150 passengers per hour, with over 200 passengers per hour during peak periods; supporting the need for a 15-minute headway. Later in the day, as demand decreases, the route should operate at 30 and 60 minute headways in the evening and late-night periods, respectively.

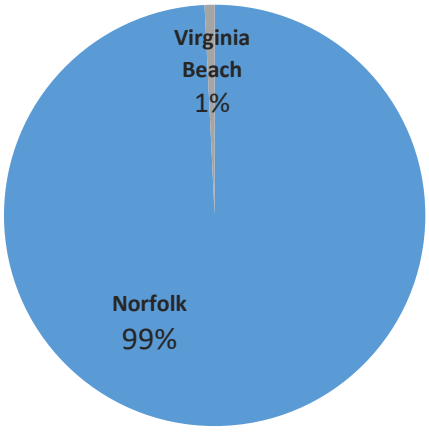
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:44 AM - 1:30 AM	4:44 AM - 1:30 AM
Saturday		4:40 AM - 1:31 AM	4:40 AM - 1:31 AM
Sunday		5:37 AM - 1:30 AM	5:37 AM - 1:30 AM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Ocean View / Joint Expeditionary Base Little Creek / Pembroke East	Ocean View and Joint Expeditionary Base Little Creek
Headway			
		Existing	**Proposed**
Weekday	Early	30 / 30 / 60	15
	AM Peak	15 / 30 / 45	15
	Midday	30 / 55 / 60	15
	PM Peak	15 / 30 / 50	15
	Evening	40 / 60 / 60	30
	Late Night	60 / 60 / -	60
Saturday		30 / 60 /60	30
Sunday		60 /60 / -	60

Weekly Service Mile Change by Jurisdiction

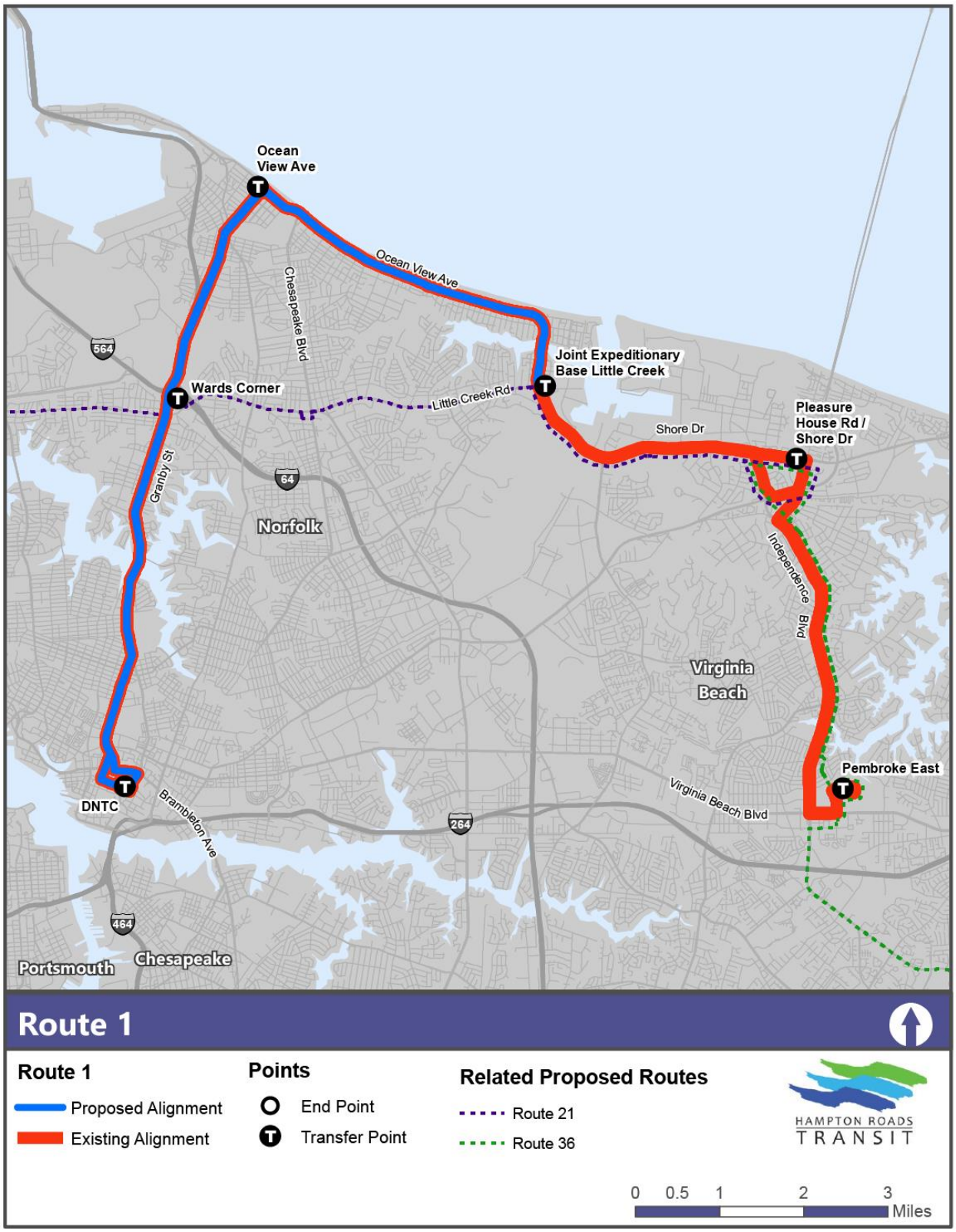


Existing



Proposed

Route Alignment Map



ROUTE 2

Hampton Boulevard

Service Type: Local
Jurisdictions Served: Norfolk

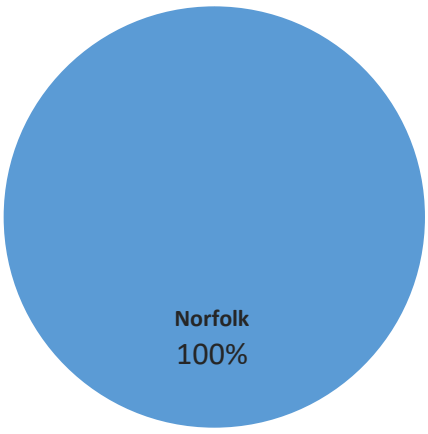
POTENTIAL SERVICE IMPROVEMENTS

The existing Route 2 alignment provides a direct connection between Downtown Norfolk and Old Dominion University/Naval Station Norfolk. These areas are major activity generators that would benefit from connections with higher frequencies, so the recommendation calls for increased service frequencies during the weekday peak periods. The levels of service would be increased to every 15-minutes during the peak periods.

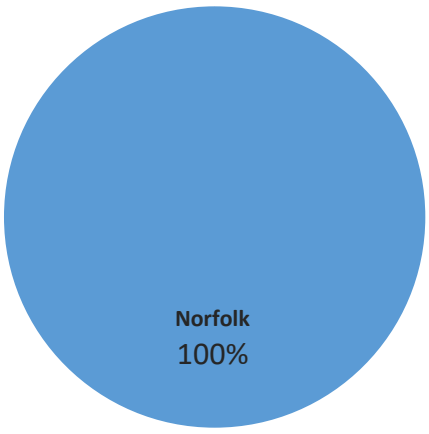
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:51 AM - 11:42 PM	4:51 AM - 11:42 PM
Saturday		5:11 AM - 1:04 AM	5:11 AM - 1:04 AM
Sunday		5:28 AM - 12:10 AM	5:28 AM - 12:10 AM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Navy Exchange Mall	Navy Exchange Mall
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	15
	Midday	30	30
	PM Peak	30	15
	Evening	60	60
	Late Night	60	60
Saturday		60	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

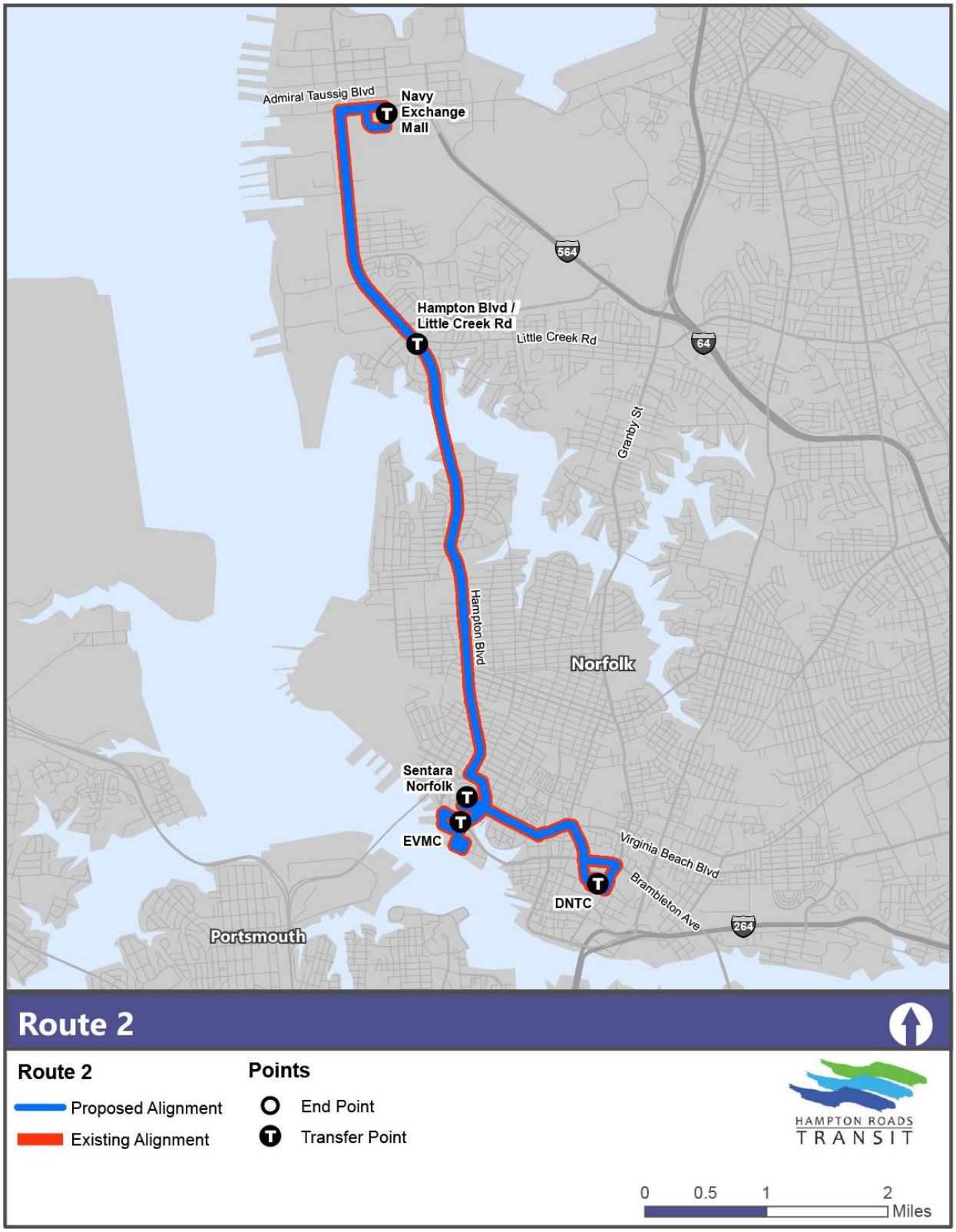


Existing



Proposed

Route Alignment Map



ROUTE 3

Chesapeake Boulevard

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

The recommendation for the Route 3 is to realign the northern end of the route to serve Willoughby Spit rather than Naval Station Norfolk. Operate along its current alignment until First Street and then continue along Ocean View Avenue until the end of the Willoughby Spit. Additionally, increase the weekday frequency of the route between the Downtown Norfolk Transit Center and the transfer location at Duffy Lane and Ocean View Avenue.

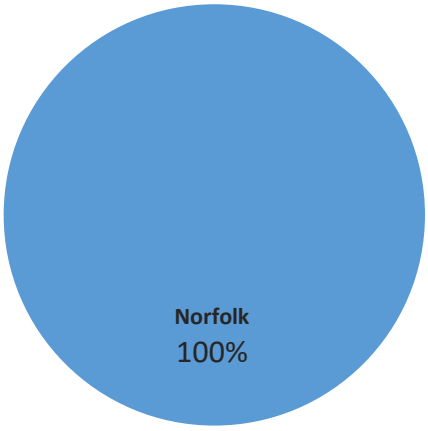
Discontinuing service to Naval Station Norfolk on Route 3 would impact the travel patterns of approximately 124 current riders. To reach the Navy Exchange, the closest point to the base where service would be provided, passengers may transfer at Evelyn T. Butts to Route 21. The peak frequency has been increased on Route 21 to help facilitate transfers. Realigning the route to Willoughby allows for the discontinuation of Route 5 while still improving the level of service in Willoughby.

The segment of the route between Downtown Norfolk and Duffy Lane at Ocean View Avenue should operate at 15-minute headways from 6:00 AM to 5:30 PM, and at 30 minute headways at all other time. Route 3 consistently sees over 100 boardings per hour from 6:00 AM to 6:00 PM, justifying higher frequency service between Downtown Norfolk and Ocean View. The extension to Willoughby would operate every other trip; providing 30-minute headways during the peak and midday periods and 60-minute headways at all other times. Earlier service should also be offered on this trip, starting at 4:30 AM, as the current 5:00 AM hour service carries approximately 75 passengers in the peak direction, which suggests that earlier service is warranted.

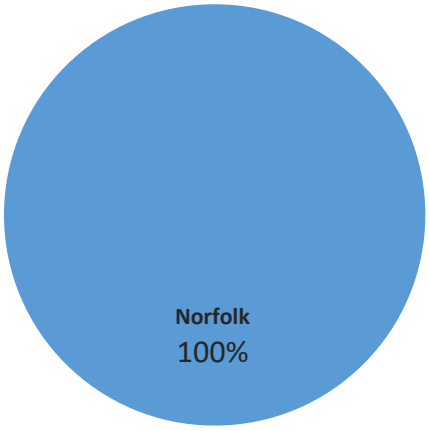
Existing and Proposed Level of Service

Span			
		Existing	**Proposed**
Weekday		5:01 AM - 12:50 AM	4:30 AM - 12:50 AM
Saturday		5:34 AM - 1:35 AM	5:34 AM - 1:35 AM
Sunday		6:00 AM - 12:35 AM	6:00 AM - 12:35 AM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Evelyn T Butts / Ocean View / Naval Station Norfolk	Evelyn T Butts and Ocean View / Willoughby
Headway			
		Existing	**Proposed**
Weekday	Early	30 / 30 / 60	30 / 30
	AM Peak	15 / 30 / 60	15 / 30
	Midday	30 / 30 / 60	15 / 30
	PM Peak	15 / 30 / 60	15 / 30
	Evening	30 / 40 / 60	30 / 30
	Late Night	60 / 60 / 60	30 / 60
Saturday		30 / 30 / 60	30 / 30
Sunday		60 / 60 / 60	60 / 60

Weekly Service Mile Change by Jurisdiction

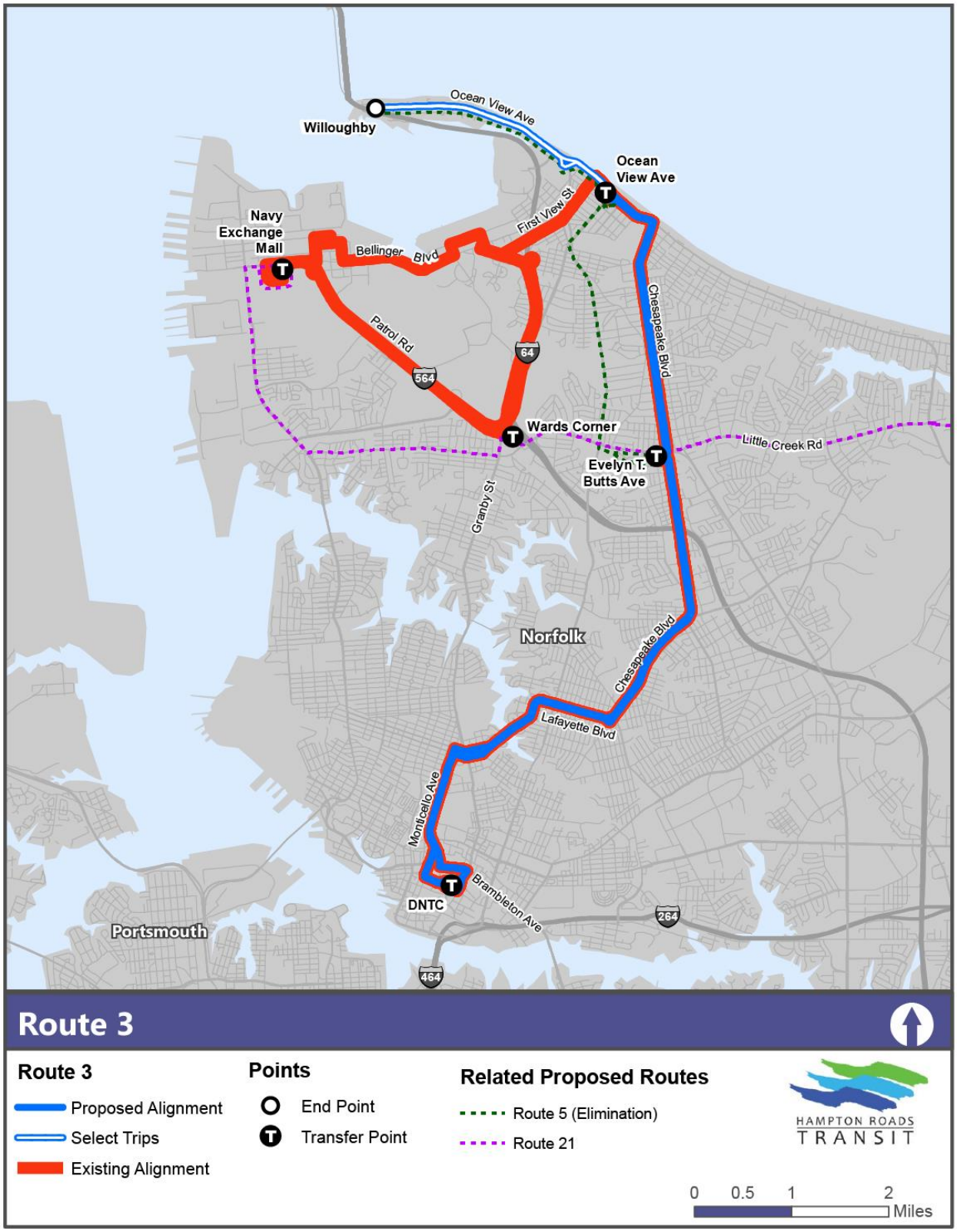


Existing



Proposed

Route Alignment Map



ROUTE 4

Church Street

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

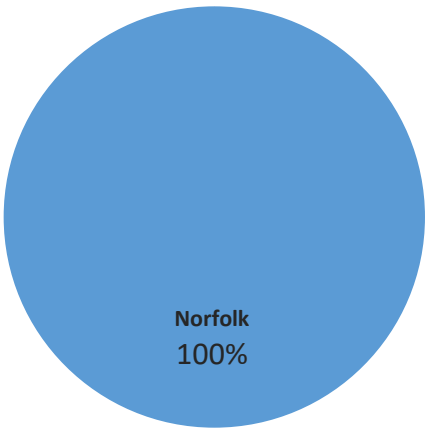
The recommendation for Route 4 calls for a streamlined alignment that would provide quicker service along the entire alignment. While operating between Virginia Beach Boulevard and Goff Street, the route's alignment would no longer serve Goff Street, Tidewater Drive, Princess Anne Road, Chapel Street, and Virginia Beach Boulevard, but would rather remain on Church Street. Eliminating this diversion would improve travel times while minimally affecting existing riders. Except for the stop on Goff Street just off Tidewater Drive (which serves one daily passenger), all stops proposed for consolidation are located within a quarter mile of the proposed Route 4 alignment.

On weekdays, it is recommended that service should be ended at 9:00 PM due to low existing utilization during the evening and late-night hours. Fewer than 10 riders use Route 4 after 9:00 PM, ending weekday service early would permit reallocation of resources to other services.

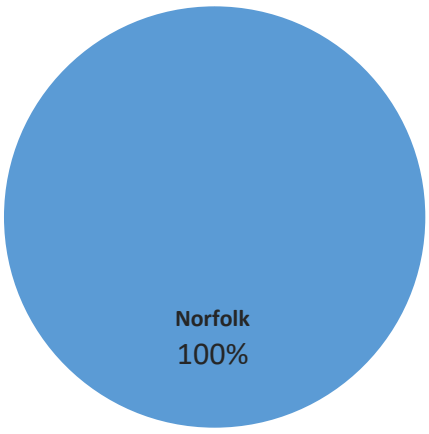
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:55 AM - 11:15 PM	5:55 AM - 9:00 PM
Saturday		7:00 AM - 11:02 PM	7:00 AM - 11:02 PM
Sunday		8:00 AM - 10:54 PM	8:00 AM - 10:54 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Old Dominion University	Old Dominion University
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	70	60
	Midday	70	60
	PM Peak	70	60
	Evening	70	60
	Late Night	-	-
Saturday		70	60
Sunday		70	60

Weekly Service Mile Change by Jurisdiction

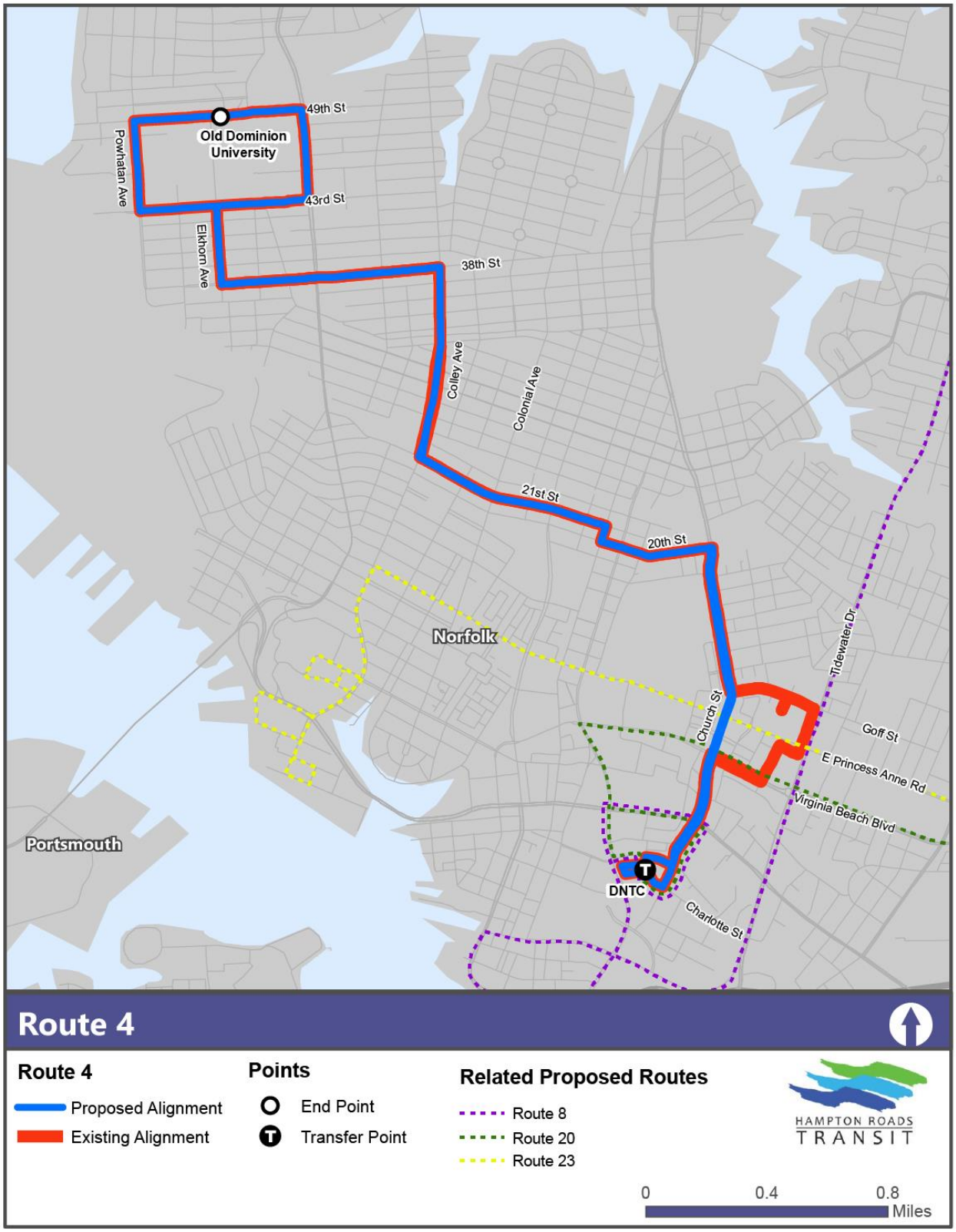


Existing



Proposed

Route Alignment Map



ROUTE 5

Willoughby

Service Type: Local
Jurisdictions Served: Norfolk

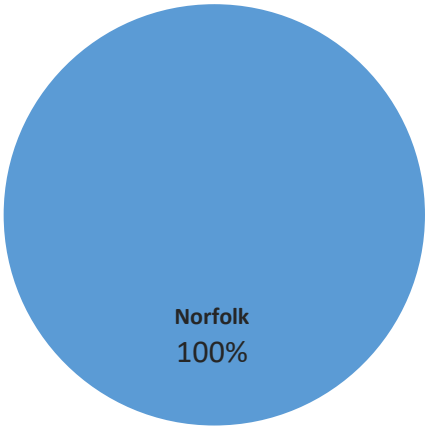
POTENTIAL SERVICE IMPROVEMENTS

It is recommended that this route be eliminated. Service on W Ocean Avenue to Willoughby would be provided by the proposed Route 3; service on Granby Street would be replaced by the new alignment of the recommended Route 1. Service on Tidewater Drive between Little Creek Road and Ocean View Avenue would be discontinued. Replace service on Little Creek Road with Route 8 and Route 21. Under this plan, the busiest corridors and bus stops on the current Route 5 – including Ocean View Shopping Center and Little Creek Road – would receive service via proposed Routes 3, 8, and 21. Eliminating service on Tidewater Drive would affect 39 daily weekday passengers. However, as Tidewater Drive represents the lowest performing segment of this route, the elimination of service along this corridor would allow HRT to direct more service resources toward other routes, including north/south high frequency service on nearby Granby Street.

Existing and Proposed Level of Service

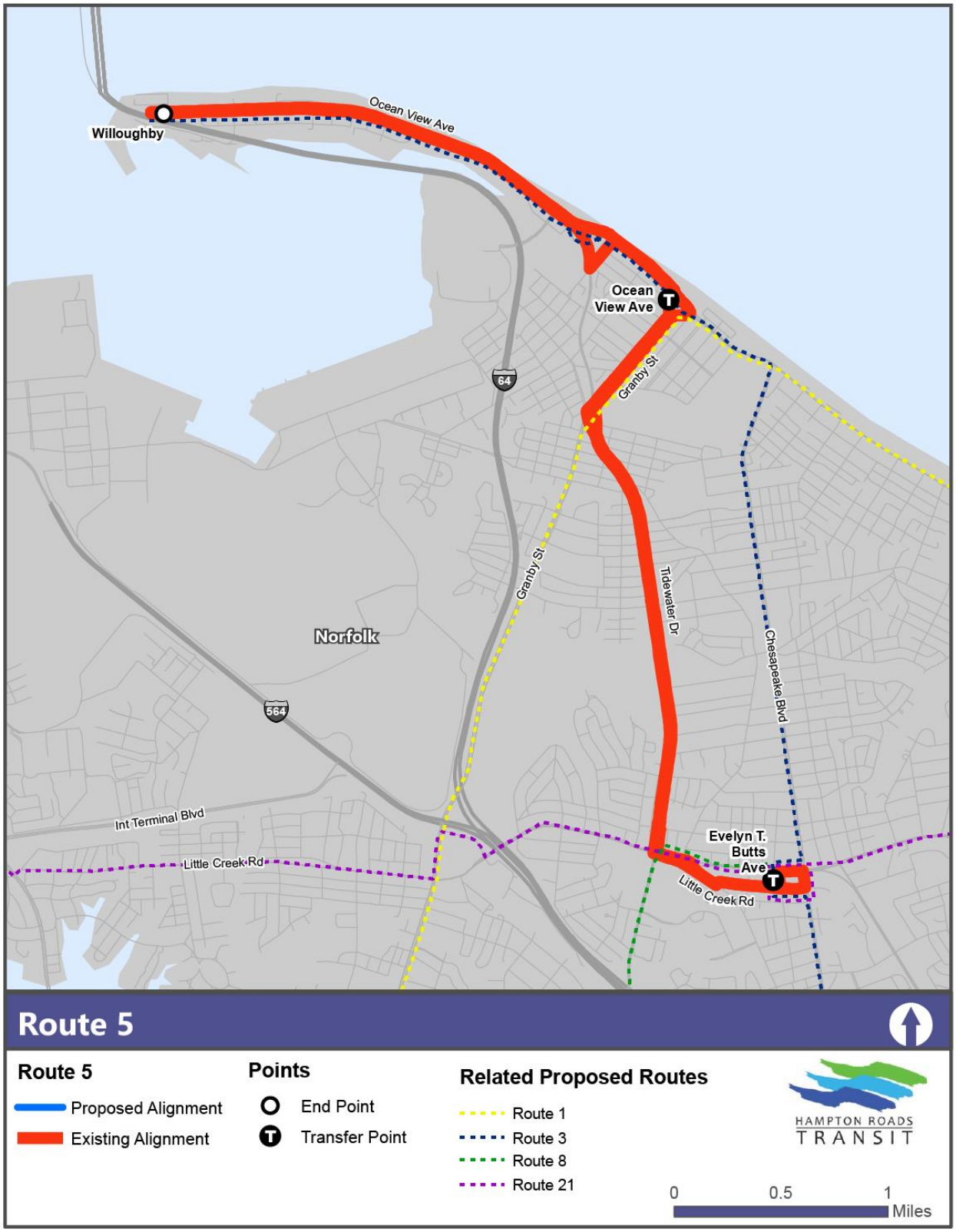
Span			
		Existing	Proposed
Weekday		6:12 AM - 6:14 PM	-
Saturday		7:17 AM - 6:12 PM	-
Sunday		-	-
Origin and Destinations			
		Existing	Proposed
From		Willoughby	-
To		Evelyn T Butts	-
Headway			
		Existing	Proposed
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	90	-
	Late Night	-	-
Saturday		60	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 6

South Norfolk

Service Type: Local
Jurisdictions Served: Chesapeake and Norfolk

POTENTIAL SERVICE IMPROVEMENTS

Service is recommended to be discontinued on Campostella Road, west of Battlefield Boulevard. The proposed Route 6 would instead continue onto Battlefield Boulevard to serve Chesapeake Crossing. The route should be extended to provide service along the majority of the current Route 14 alignment (which is marked for elimination), continuing south on Battlefield Boulevard after exiting Chesapeake Crossing until turning right onto Cedar Road and serve the Chesapeake Municipal Center. Then operate through the Cahoon Commons shopping center, exiting back onto Grassfield Parkway traveling south. Turn left onto Cahoon Parkway and cross Cedar Road to serve the TCC-Chesapeake shelter. Northbound, from TCC-Chesapeake, turn left onto Cedar Road, and then follow the reverse alignment thereafter.

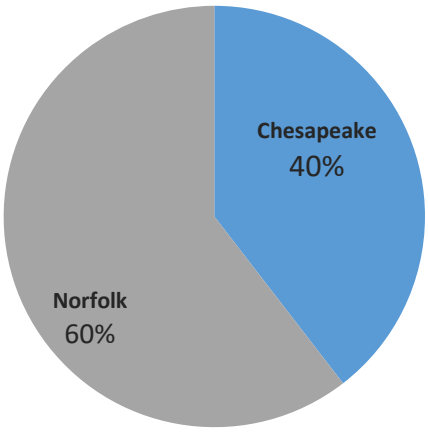
Eliminating the diversion onto Campostella Road would directly affect 30 daily weekday boardings. However, by streamlining service along Battlefield Boulevard, this proposal would improve route directness and travel times. Moreover, passengers would receive a frequent, convenient, one-seat ride from Chesapeake to Downtown Norfolk, which is not currently available. Riders would also be able to connect to other high frequency services at Downtown Norfolk Transit Center, as well as Chesapeake Crossing.

On weekdays, operate 15-minute service during the peak, 30-minute service during the midday and Saturdays, and hourly service at all other times.

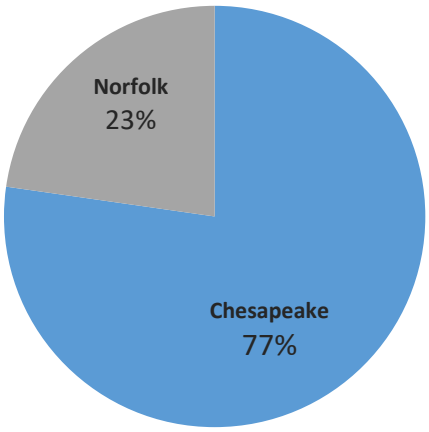
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:32 AM - 11:45 PM	5:32 AM - 11:45 PM
Saturday		5:32 AM - 12:45 AM	5:32 AM - 12:45 AM
Sunday		5:54 AM - 6:44 PM	5:54 AM - 6:44 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk	Downtown Norfolk
To		Seaboard Ave & Liberty St / Robert Hall Blvd	Seaboard Ave & Liberty St and Robert Hall Blvd and TCC-Chesapeake
Headway			
		Existing	**Proposed**
Weekday	Early	30 / 60	30
	AM Peak	30 / 60	15
	Midday	60 / 60	30
	PM Peak	30 / 60	15
	Evening	60 / -	30
	Late Night	60 / -	30
Saturday		60 / 60	30
Sunday		60 / -	60

Weekly Service Mile Change by Jurisdiction

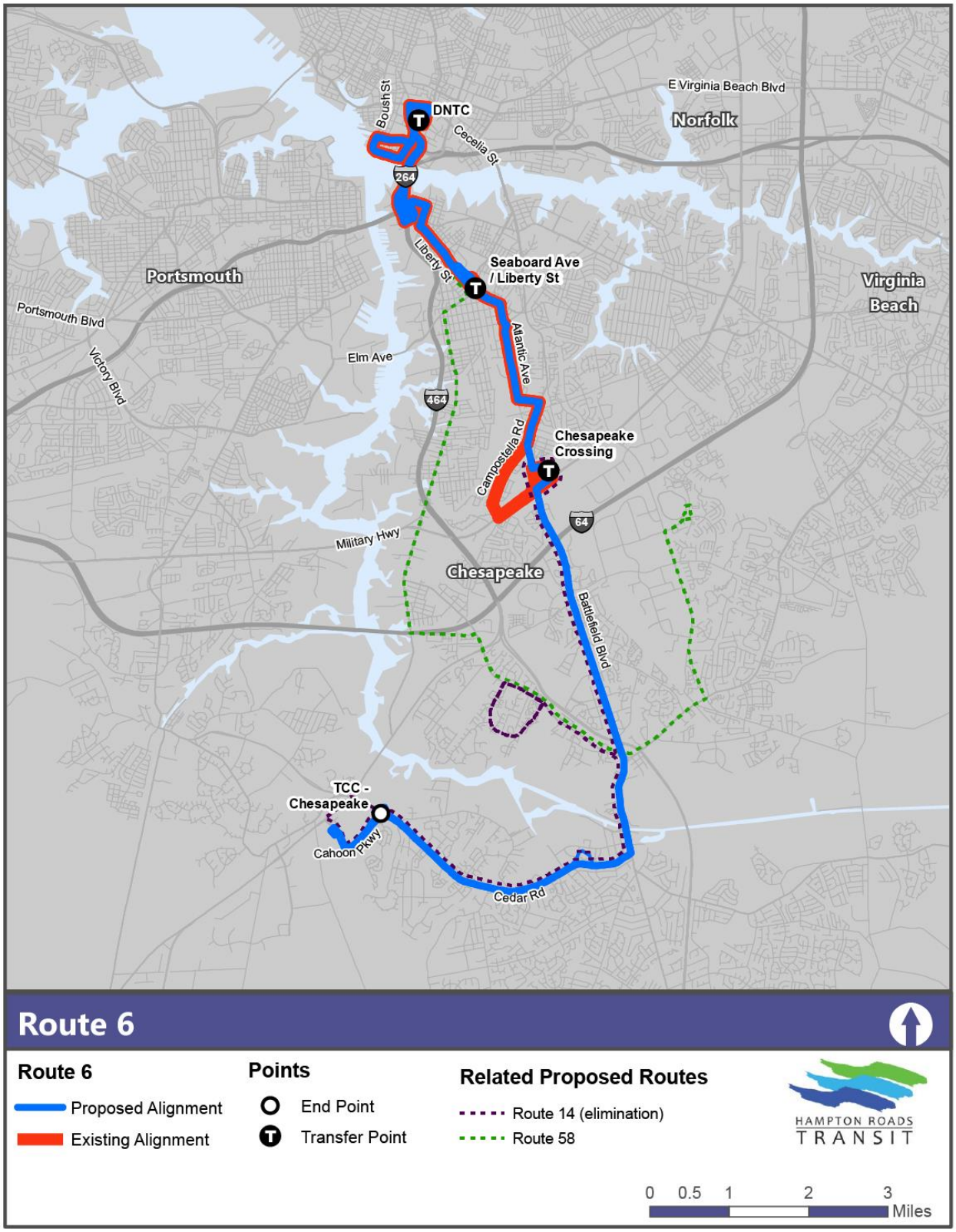


Existing



Proposed

Route Alignment Map



ROUTE 8

Tidewater Drive

Service Type: Local
Jurisdictions Served: Norfolk

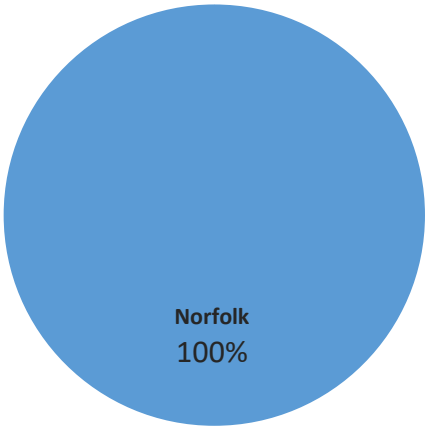
POTENTIAL SERVICE IMPROVEMENTS

On weekdays, peak period frequency would be increased to every 15-minutes to provide an enhanced high frequency connection between Downtown Norfolk and Evelyn T Butts, which acts as a transfer hub for many of the local routes. This improved frequency would enhance the transfer experience to these feeder routes and increase connectivity throughout Norfolk. During the early morning and evening periods, it is recommended that service be reduced to every 60-minutes which would match the existing demand for service. Currently, less than 30 passengers per hour use Route 8 in the peak direction.

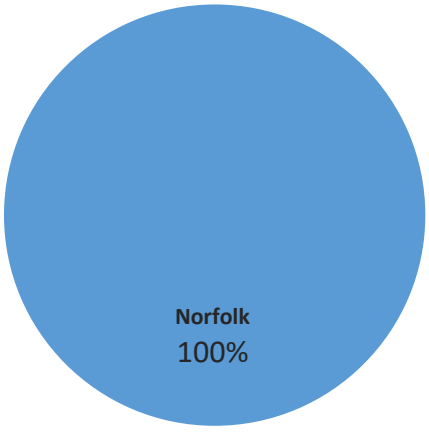
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:18 AM - 12:15 AM	5:18 AM - 12:15 AM
Saturday		5:43 AM - 12:45 AM	5:43 AM - 12:45 AM
Sunday		6:40 AM - 8:58 PM	6:40 AM - 8:58 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Evelyn T Butts	Evelyn T Butts
Headway			
		Existing	**Proposed**
Weekday	Early	30	60
	AM Peak	30	15
	Midday	30	30
	PM Peak	30	15
	Evening	45	60
	Late Night	60	60
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

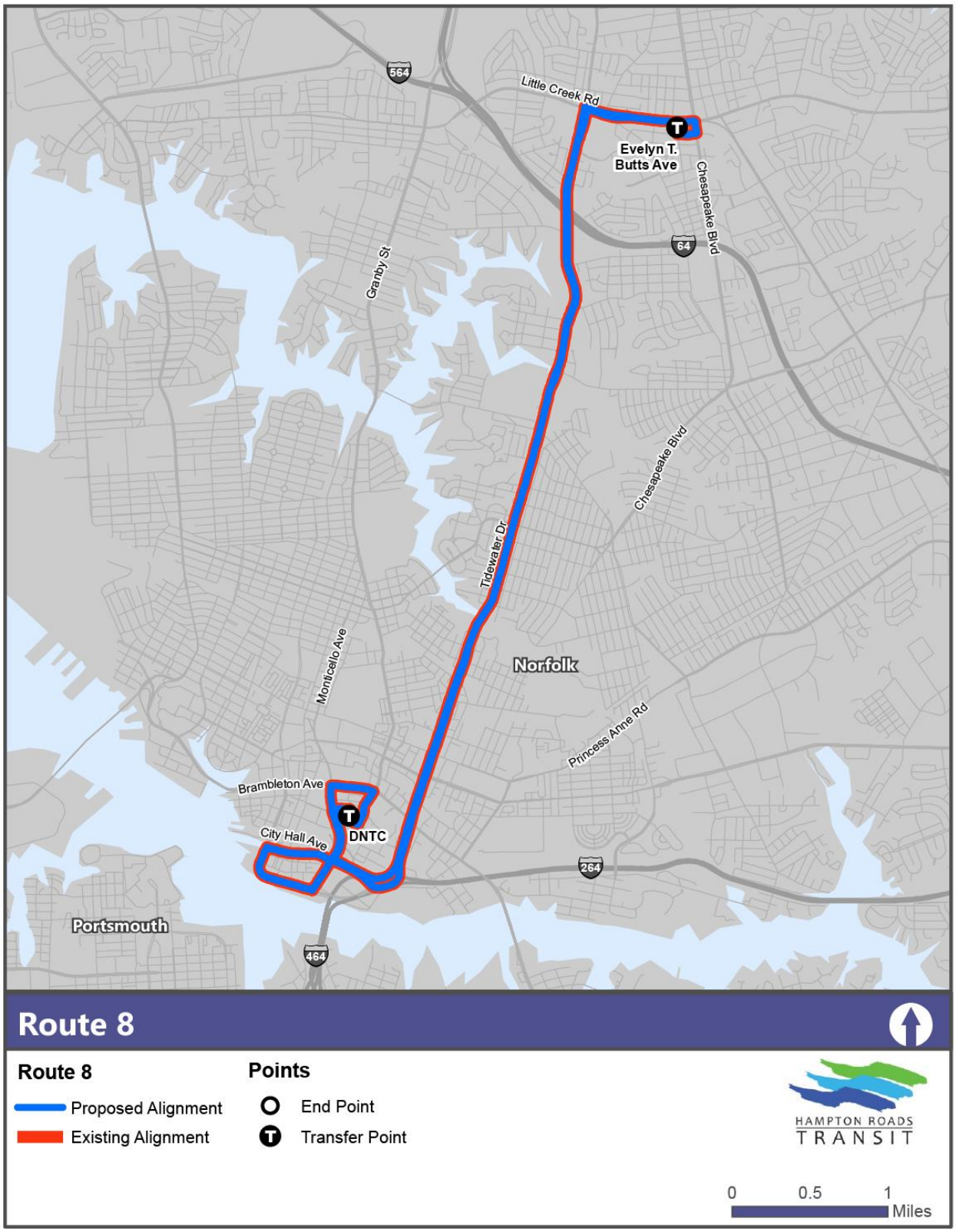


Existing



Proposed

Route Alignment Map



ROUTE 9

Sewells Point Road

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

The proposal for Route 9 calls for the elimination of two existing diversions along the current route. Rather than deviating via Widgeon Road, Tidewater Drive and Philpotts Road, the proposed Route 9 would continue straight on Sewells Point Road. Route 9 would also no longer deviate via Ingleside Road, Gatling Avenue and Scott Street, but rather continue straight along Virginia Beach Boulevard.

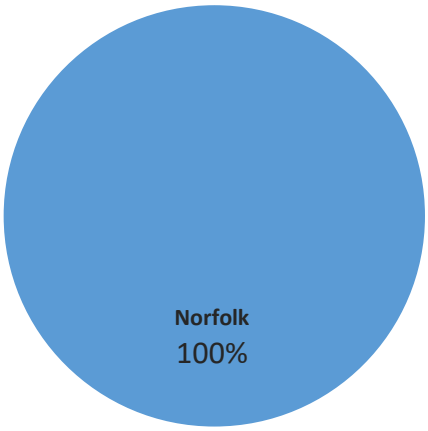
Route 9 does not currently meet HRT's minimum on-time performance standard of 85%. Eliminating the deviation onto Philpotts Road and Widgeon Road would improve route directness, travel times, and on-time performance. The removal of the diversion would affect approximately 41 current passengers (four percent of the current ridership).

On weekdays, after 7:00 PM the frequency of service should be reduced to hourly, as boardings rarely surpass 30, justifying hourly service.

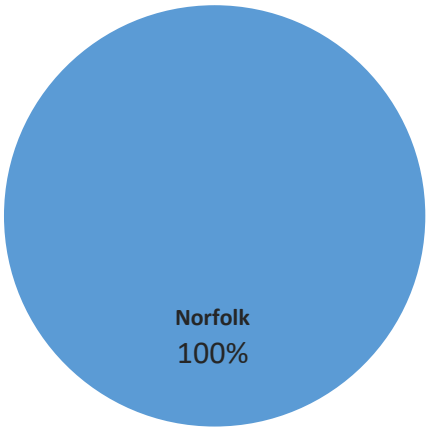
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:48 AM - 11:13 PM	5:48 AM - 11:13 PM
Saturday		5:32 AM - 12:15 AM	5:32 AM - 12:15 AM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Evelyn T Butts	Evelyn T Butts
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	30
	Midday	30	30
	PM Peak	30	30
	Evening	45	60
	Late Night	60	60
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

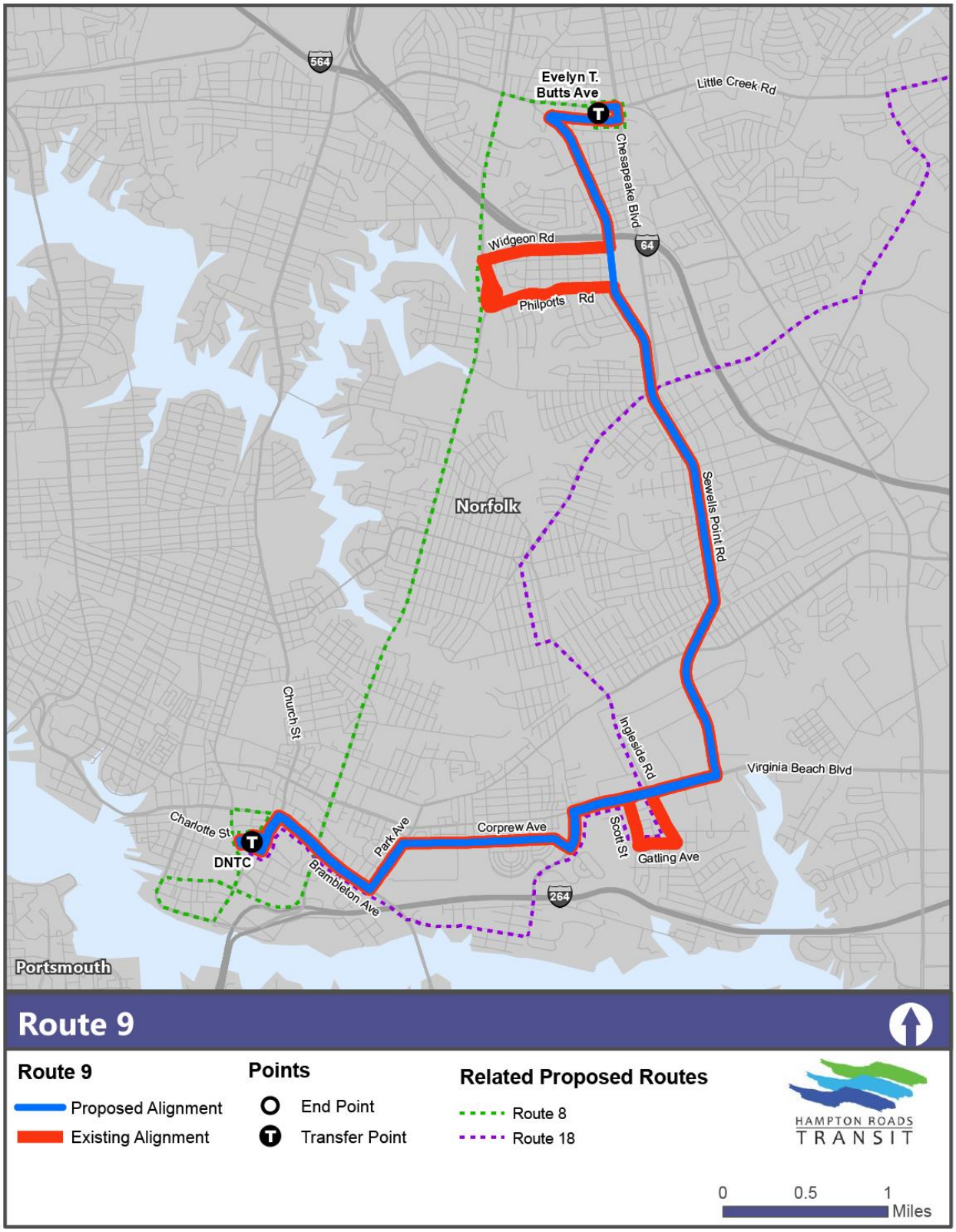


Existing



Proposed

Route Alignment Map



ROUTE 11

Colonial Avenue

Service Type: Local
Jurisdictions Served: Norfolk

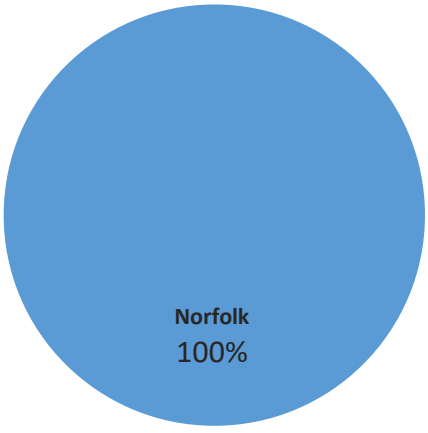
POTENTIAL SERVICE IMPROVEMENTS

Weekday service on the Route 11 would remain unchanged, with the alignment and levels of service remaining the same. Route 11 weekend service should be eliminated, with resources being used for more productive locations. Route 11 averages less than 150 passengers during weekend operation, which equates to approximately 7 passengers per hour.

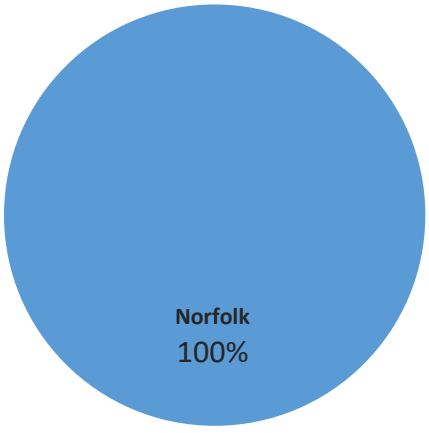
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:05 AM - 6:30 PM	6:05 AM - 6:30 PM
Saturday		6:05 AM - 6:27 PM	-
Sunday		8:40 AM - 5:39 PM	-
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Colonial Place	Colonial Place
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	-
Sunday		60	-

Weekly Service Mile Change by Jurisdiction

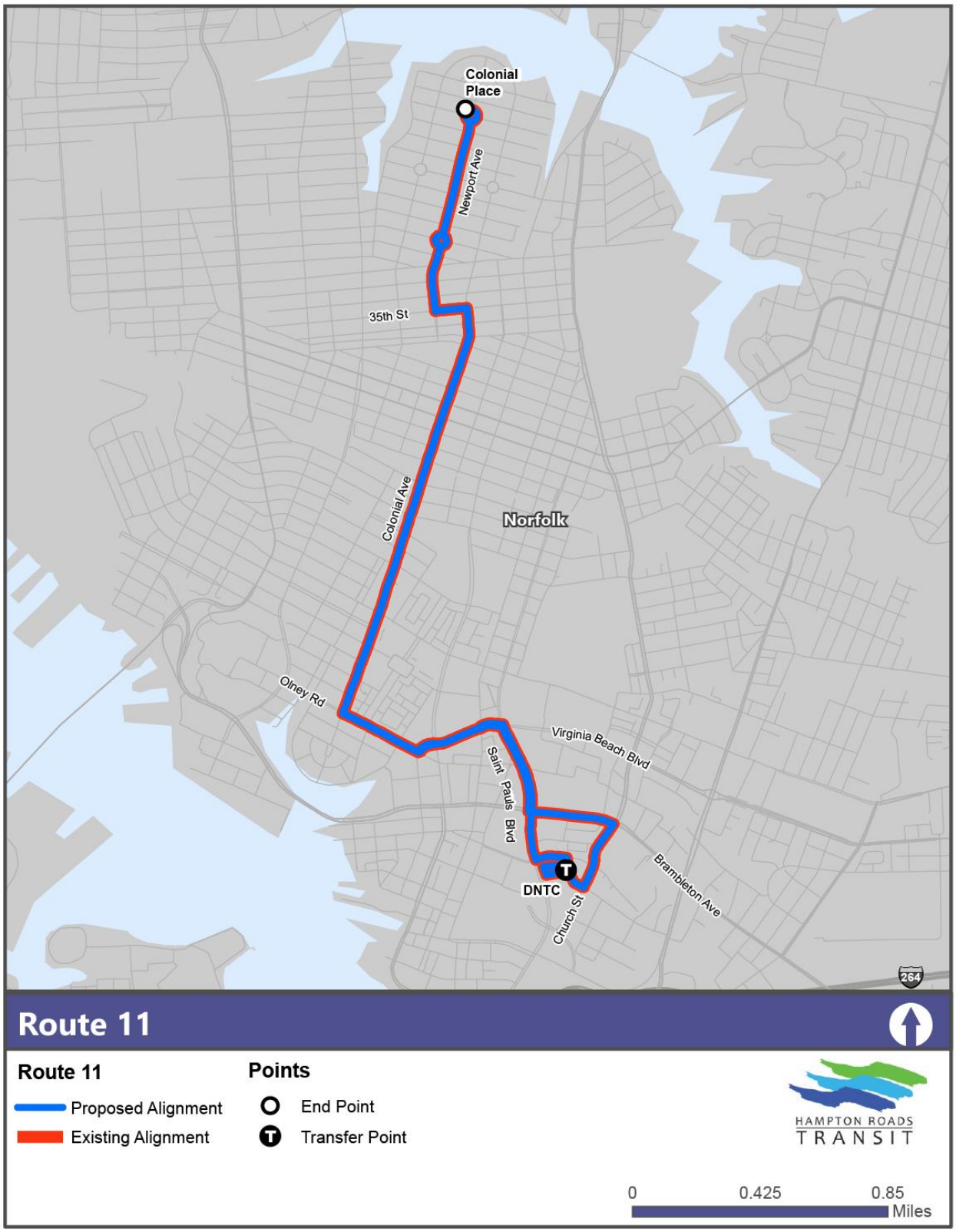


Existing



Proposed

Route Alignment Map



ROUTE 12

Indian River Road

Service Type: Local
Jurisdictions Served: Chesapeake, Norfolk, and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

Service on Wilson Road and Indian River Road, between Campostella Road and Wingfield Avenue, as well as on Indian Lakes Boulevard and Lynnhaven Parkway, is recommended to be discontinued. The route would instead operate eastbound via Liberty Street and then turn right onto Campostella Road, left onto Parkside Drive, right onto Fireside Road, left onto Stalham Road, left onto Border Road, right onto Wingfield Avenue, right onto Tatemstown Road, and right onto Indian River Road. From this point, the route would continue via the current alignment until the intersection of Indian Lakes Road, where it would continue straight on Ferrell Parkway, followed by a right turn onto Princess Anne Road, left onto Community College Place, and left onto Michael Labouve Drive/George Pass Drive, serving Tidewater Community College (TCC) – Virginia Beach. Operating westbound from the TCC the route would turn left onto Facility Boulevard, right onto S Rosemont Road, right onto Dam Neck Road, right onto Wellness Way, right onto Medical Parkway, right onto Concert Drive, and left onto Princess Anne Road. The service would then follow eastbound alignment in reverse for the remainder of the route.

The discontinued service on Lynnhaven Parkway / S Independence Boulevard / Buckner Boulevard would be replaced with the new proposed Route 38 (Greenbrier Mall – Lynnhaven Mall – Virginia Beach Oceanfront), which would connect with the proposed Route 13 (Greenbrier Mall – Downtown Norfolk), providing access to both the Seaboard Avenue & Liberty Street Hub and Downtown Norfolk.

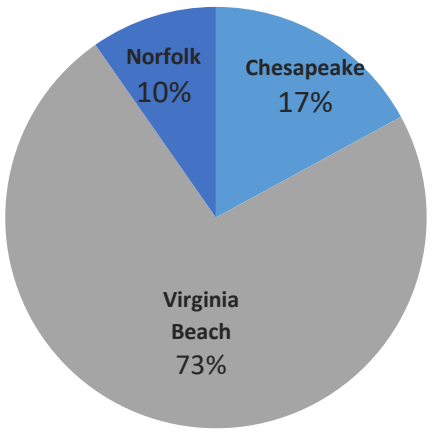
The proposed alignment would greatly improve route directness, allowing this route to serve the TCC-Virginia Beach, the NSU-ODU Higher Education Center, and Sentara Princess Anne Hospital. Moreover, Route 13 and Route 38 are within a reasonable walking distance to the majority of the approximately 45 riders that would be affected by this route adjustment.

On weekdays, increase the route's frequency to every 30-minutes during peak periods, 6:00 AM - 9:00 AM and 1:00 PM - 5:00 PM. Increasing the frequency during peak period would provide better transfer opportunities between this route and the proposed high frequency corridors, enhancing regional connectivity.

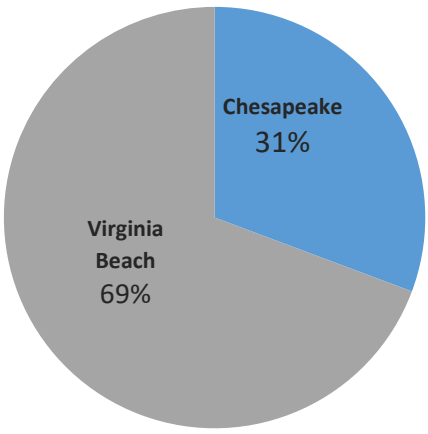
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:48 AM - 9:35 PM	5:48 AM - 9:35 PM
Saturday		5:48 AM - 9:35 PM	5:48 AM - 9:35 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Seaboard Ave & Liberty St	Seaboard Ave & Liberty St
To		TCC-Virginia Beach	TCC-Virginia Beach
Headway			
		Existing	**Proposed**
Weekday	Early	60	60
	AM Peak	60	30
	Midday	60	60
	PM Peak	60	30
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

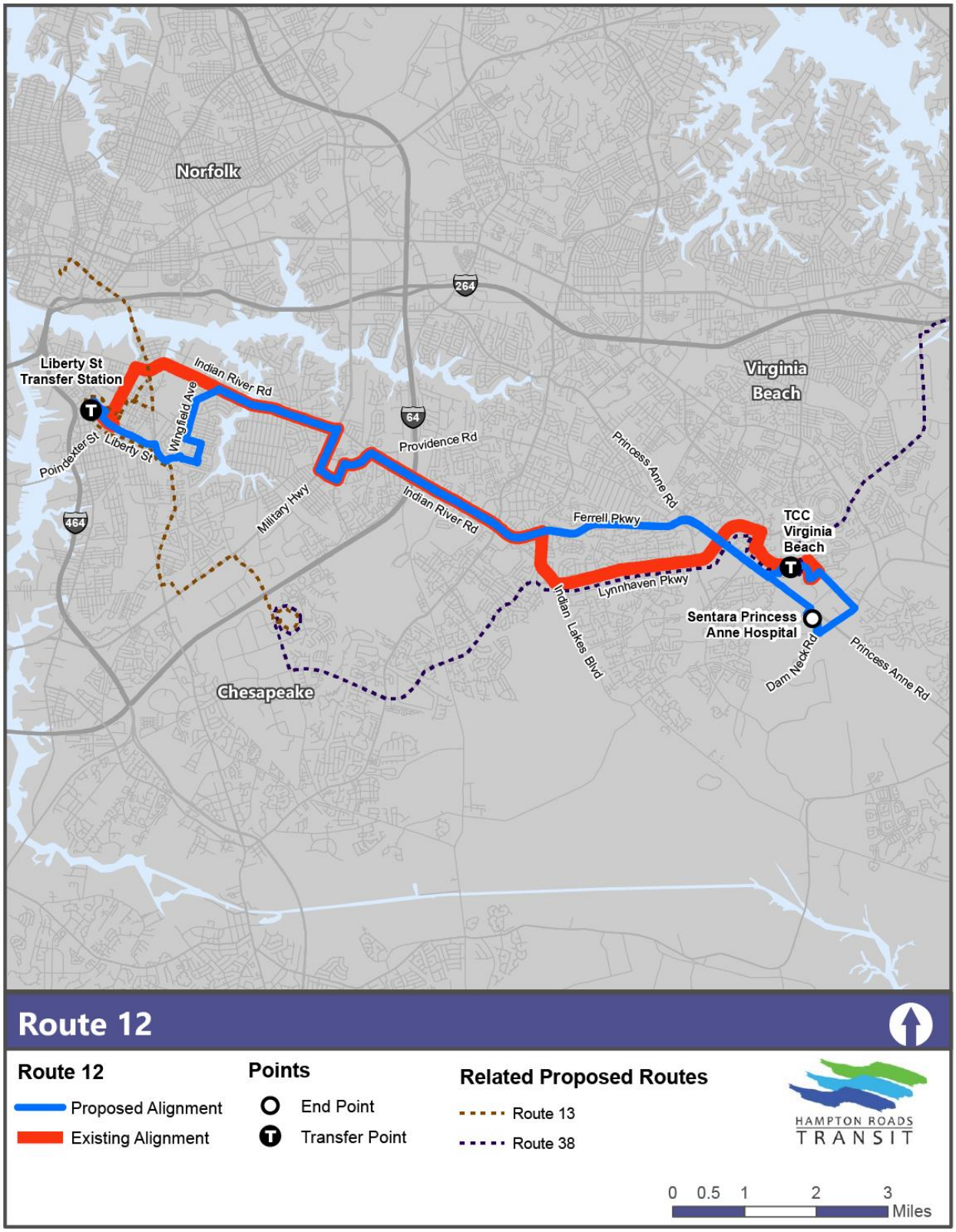


Existing



Proposed

Route Alignment Map



ROUTE 13

Campostella Road

Service Type: Local
Jurisdictions Served: Chesapeake and Norfolk

POTENTIAL SERVICE IMPROVEMENTS

The proposal for Route 13 calls for discontinued service via Bethel Road, Harling Drive, Border Road, Fireside Road, and Parkside Drive from Liberty Street. The route would instead continue onto Campostella Road, and then at Chesapeake Crossing the route would turn left onto Robert Hall Boulevard, and left onto Military Highway. The service would then turn right onto Greenbrier Parkway, left onto the mall service road, and serve Greenbrier Mall using Ring Road. The route would follow the reverse alignment in the opposite direction.

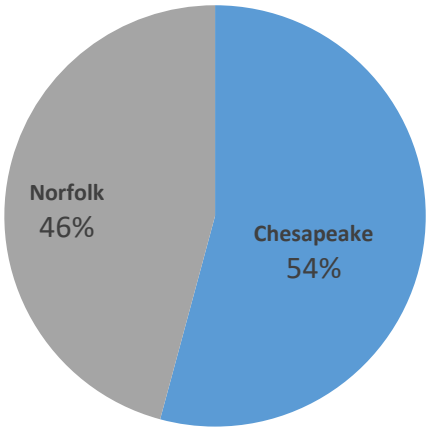
This alignment would eliminate diversions into the neighborhood just off Campostella Road, decreasing the route's total travel time and supporting high frequency direct connections. The removal of service this neighborhood would affect 34 daily weekday boardings, or three percent of the route's existing ridership. However, all stops proposed for consolidation are located within a quarter mile of either the proposed Route 12 or new Route 13 alignment. In addition, new trips to Greenbrier Mall, a proposed transit hub, would permit connections to several other routes, as well as the proposed high frequency network.

The recommendation also calls for increased weekday frequencies to every 15-minutes during peak periods, to every 30-minutes during midday and evening periods, and to every 30-minutes on Saturdays. With increased peak period frequencies, this route would provide frequent connections between three major Chesapeake transfer hubs and Downtown Norfolk, the passengers per hour during peak periods has consistently surpassed 80 boardings. During midday, the route has reported over 60 passengers per hour, and can support 30-minute service.

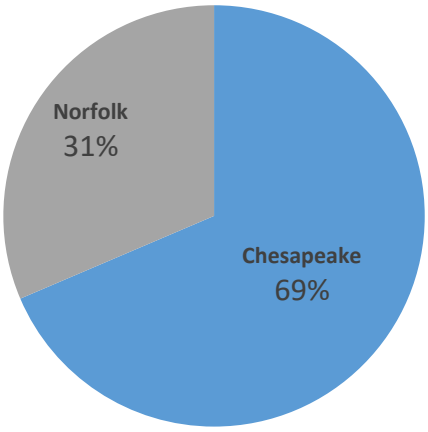
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:48 AM - 11:45 PM	4:48 AM - 11:00 PM
Saturday		5:26 AM - 12:45 AM	5:26 AM - 12:45 AM
Sunday		5:52 AM - 10:35 PM	5:52 AM - 10:35 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Seaboard Ave & Liberty St / Robert Hall Blvd	Greenbrier Mall
Headway			
		Existing	**Proposed**
Weekday	Early	60 / 60	30
	AM Peak	30 / 60	15
	Midday	60 / 60	30
	PM Peak	30 / 60	15
	Evening	60 / -	30
	Late Night	60 / -	60
Saturday		60 / 60	30
Sunday		60 / -	60

Weekly Service Mile Change by Jurisdiction

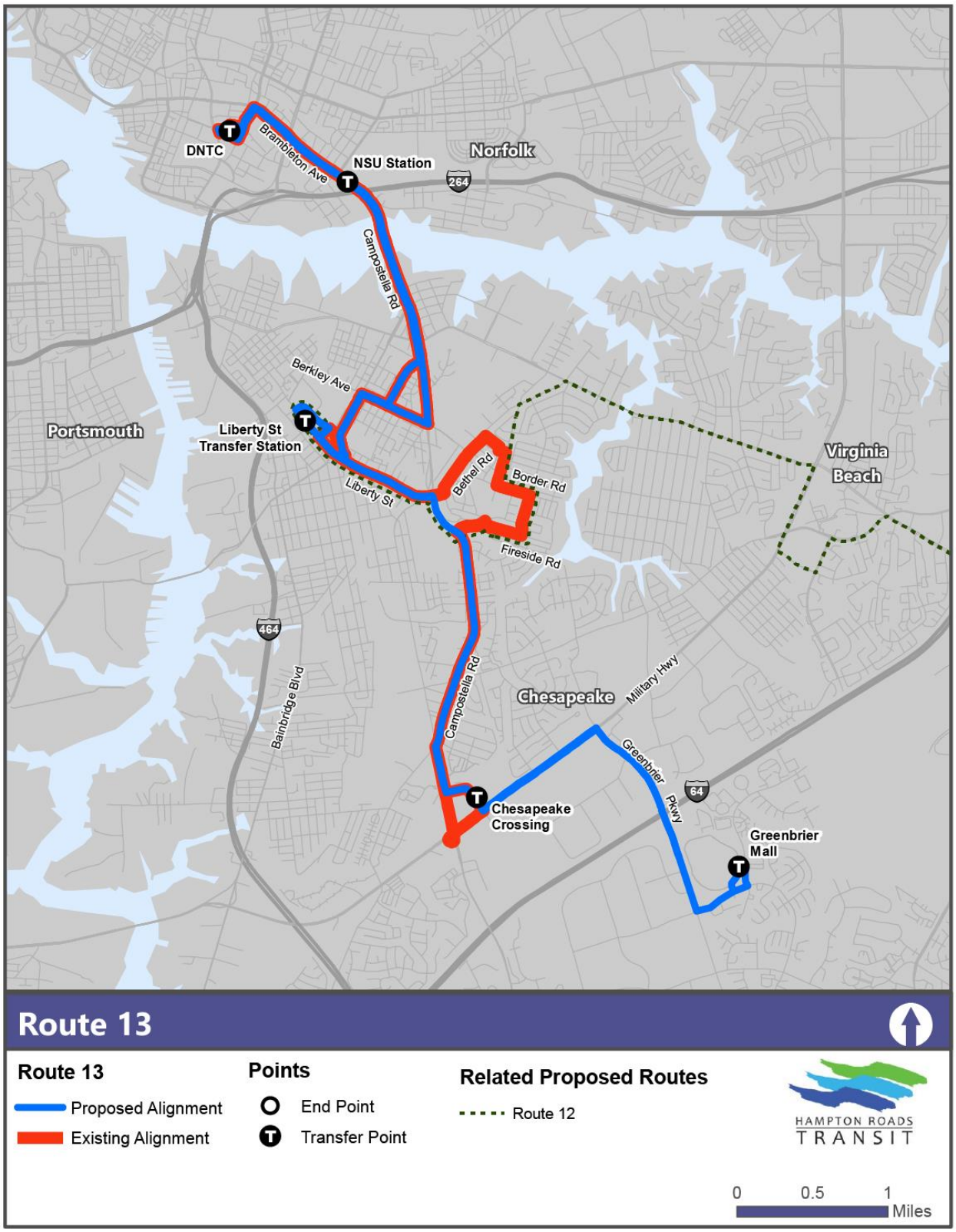


Existing



Proposed

Route Alignment Map



ROUTE 14

Battlefield Boulevard

Service Type: Local
Jurisdictions Served: Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

Route 14 is a low performing route, failing to meet the agency's minimum standard for on-time performance and falling below system averages for farebox recovery and passengers per hour performance measures. Based on its poor performance, Route 14 is recommended for elimination. Much of this route's current alignment would be covered by the proposed Route 6, which would provide stronger north/south connections in this region with more frequent service. The new Route 6 would serve many destinations, giving passengers a one-seat ride to Downtown Norfolk, Chesapeake Crossing, Chesapeake General Hospital, and the TCC – Chesapeake.

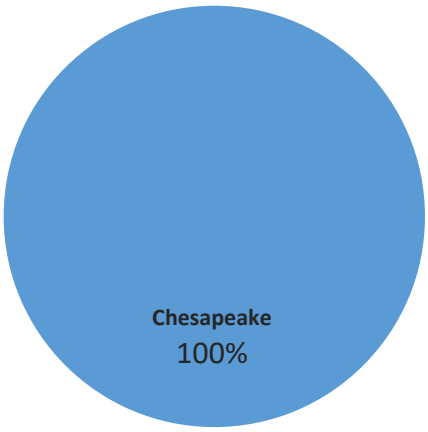
Service on Great Bridge Boulevard would be replaced by the proposed Route 58 (Greenbrier Mall-Seaboard Avenue/Liberty Street), and along all other segments (with the exception of the loop along River Walk Parkway) with Route 6 (TCC Chesapeake – Chesapeake Crossing – Seaboard Avenue/Liberty Street – Downtown Norfolk).

The elimination would leave one segment, River Walk Parkway, with no transit service. The bus stop along this segment currently has approximately eight weekday passengers, this stop is located less than a quarter mile from the proposed Route 58.

Existing and Proposed Level of Service

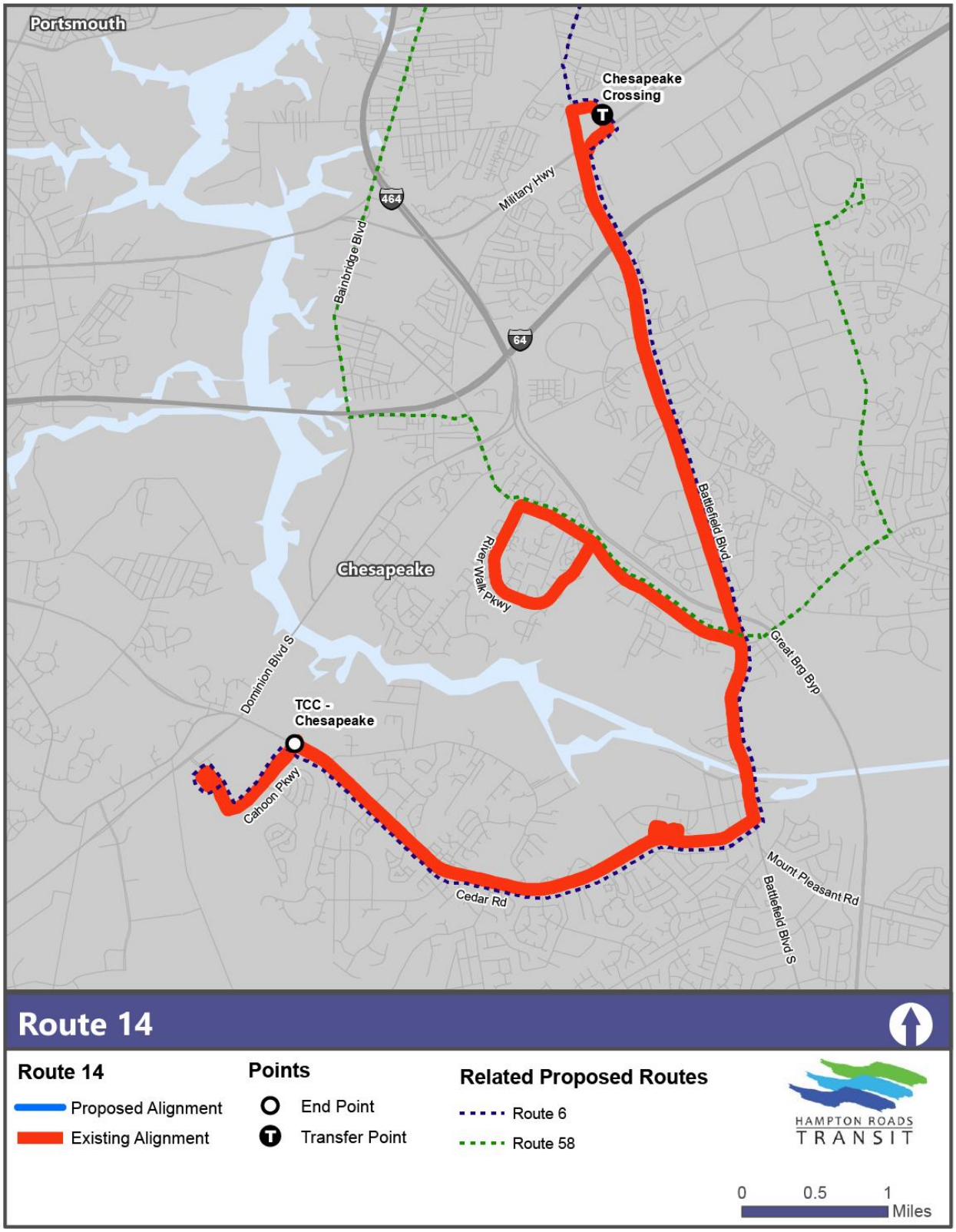
Span			
		Existing	Proposed
Weekday		6:17 AM - 7:13 PM	-
Saturday		6:17 AM - 7:11 PM	-
Sunday		-	-
Origin and Destinations			
		Existing	Proposed
From		Robert Hall Blvd	-
To		TCC-Chesapeake	-
Headway			
		Existing	Proposed
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 15

Military Highway

Service Type: Local
Jurisdictions Served: Chesapeake, Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

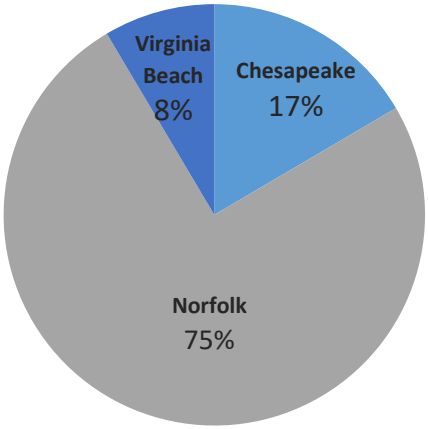
It is recommended that Route 15 be Streamline along Military Highway, eliminating the diversion onto Azalea Garden Road and Robin Hood Road. Upon reaching Old Greenbrier Road, serve Greenbrier Mall using the route's current alignment. Eliminate service to Chesapeake Crossing via Military Highway; replace this service with Route 57 (Greenbrier Mall – Chesapeake Crossing – Victory Crossing – High Street/Florida Avenue).

The elimination of the diversion onto Robin Hood Road/Azalea Garden Road would affect 134 daily riders, or five percent of the current Route 15's alignment. Two consolidated stops, accounting for about a third of these riders, are situated within a quarter mile of the proposed Route 15. This change would speed up travel time, improve route directness, and enhance frequent connections between Norfolk and Chesapeake.

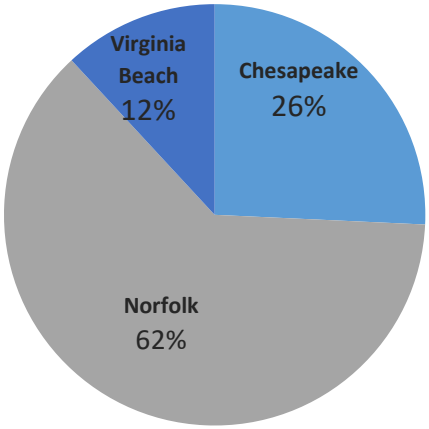
Serving Greenbrier Mall in lieu of Chesapeake Crossing would allow Route 15 to connect with several other HRT routes, including east/west high frequency service via the proposed Route 38 (Greenbrier Mall – Lynnhaven Mall – Virginia Beach Oceanfront). Moreover, service to Chesapeake Crossing can easily be replaced entirely by Route 57.

From 6:00 AM to 7:00 PM, provide 15-minute high frequency service between Military Circle and Greenbrier Mall. Throughout the service day Route 15 routinely surpasses 100 passengers per hour, reaching 150 and 200 during several hours within the peak periods. Therefore, the route can support peak and midday high frequency service.

Weekly Service Mile Change by Jurisdiction



Existing

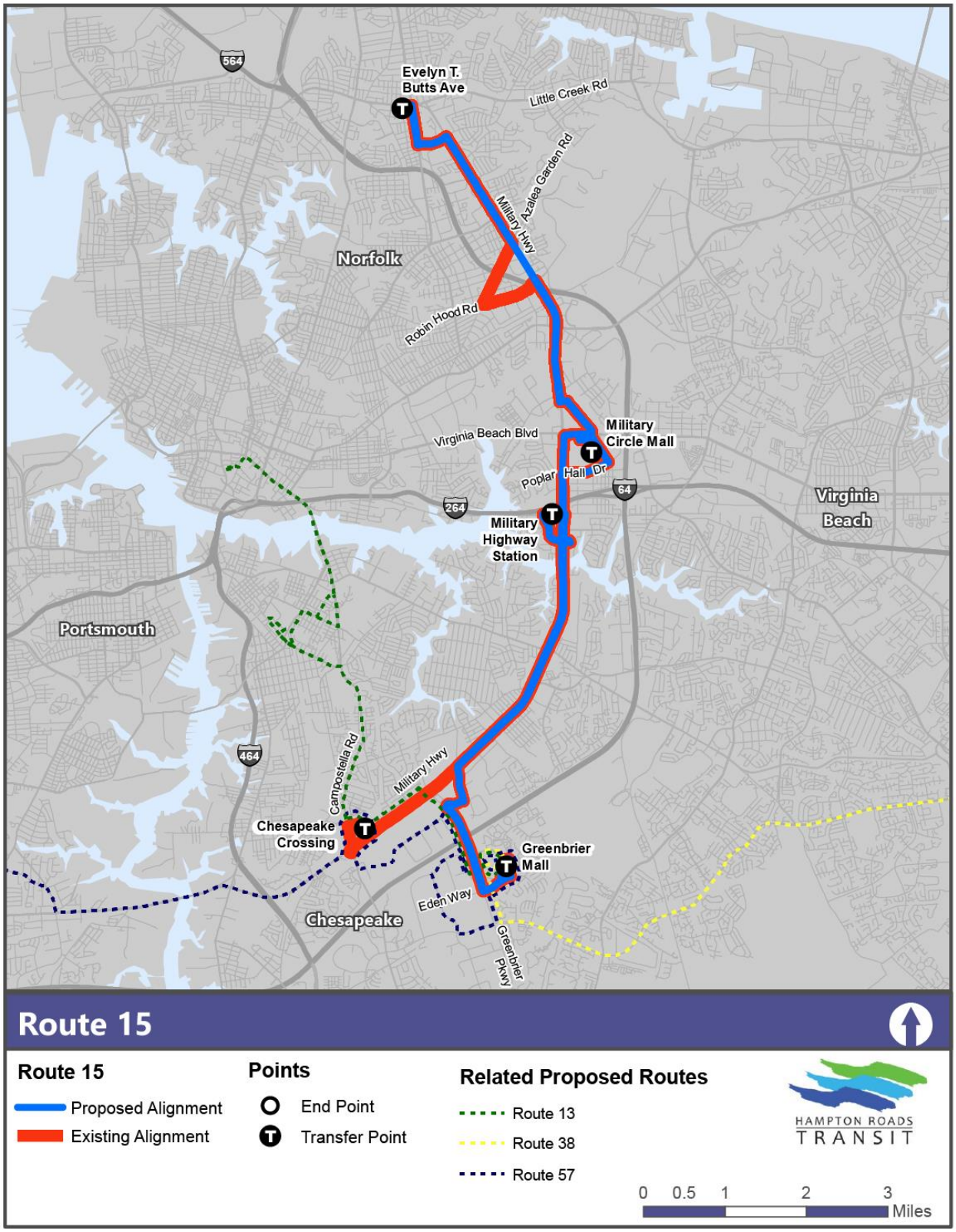


Proposed

Existing and Proposed Level of Service

Span			
		Existing	**Proposed**
Weekday		4:48 AM - 1:16 AM	4:48 AM - 1:16 AM
Saturday		5:18 AM - 12:45 AM	5:18 AM - 12:45 AM
Sunday		6:46 AM - 12:45 AM	6:46 AM - 12:45 AM
Origin and Destinations			
		Existing	**Proposed**
From		Evelyn T Butts	Evelyn T Butts
To		Military Circle / Military Hwy Station / Robert Hall Blvd or Greenbrier Mall	Greenbrier Mall
Headway			
		Existing	**Proposed**
Weekday	Early	30 / 30 / 60	15
	AM Peak	15 / 15 / 30	15
	Midday	30 / 30 / 30	15
	PM Peak	15 / 15 / 30	15
	Evening	30 / 30 / 60	30
	Late Night	60 / - / -	60
Saturday		30 / 30 /30	30
Sunday		60 / 60 /60	60

Route Alignment Map



ROUTE 18

Ballentine Boulevard

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

The proposed Route 18 discontinues direct service to Grandy Village via Kimball Terrace, and would instead continue onto Ballentine Boulevard via Broad Creek Station. After continuing past the Broad Creek Station, the route would operate along Ballentine Boulevard and Virginia Beach Boulevard, followed by a right onto Scott Street, left onto Gatling Avenue, left onto Ingleside Road, left onto Tait Terrace, and right to return to Ballentine Boulevard. This would result in discontinued service on Ballentine Boulevard between Virginia Beach Boulevard and Tait Terrace.

The route would also be extended to the JEB Little Creek by continuing north on Ballentine Boulevard, right onto Chesapeake Boulevard, merge right onto Norview Avenue, left onto Azalea Garden Road, and right onto Little Creek Road, terminating at JEB Little Creek.

The existing Route 18 only serves approximately 169 passengers per day and performs well below the agency average for passengers per hour, performing only slightly better than the agency minimum standard for this performance measure. Ridership is quite low along the segment of Ballentine Boulevard, where service is proposed for removal. The recommended realignment, while improving route directness and travel times, would allow for a one-seat ride from Downtown Norfolk Transit Center to JEB Little Creek.

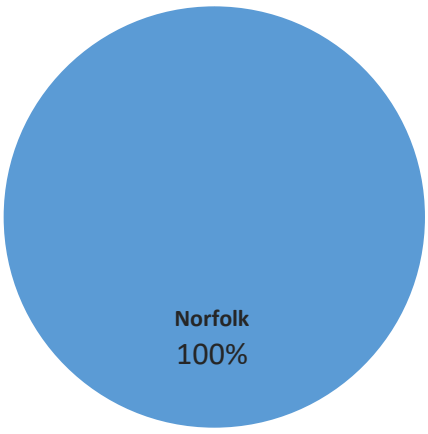
The re-alignment would affect approximately 53 current riders, most of whom are located along Ballentine Boulevard between Tait Terrace and Virginia Beach Boulevard and in Grandy Village. At most, Grandy Village residents would be located approximately a half mile from proposed service. While the majority of Ballentine Boulevard passengers would be located within walking distance of the new Route 18, or Routes 20 or 23, approximately seven riders would not be located within a quarter mile of a proposed service.

The existing weekday service should end at 8:00 PM based on extremely limited passenger activity (i.e., averaging three passengers per trip) during the existing evening period.

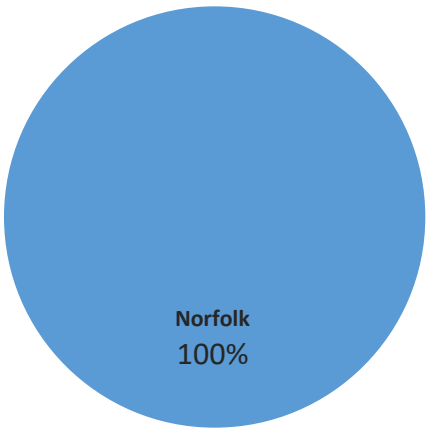
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:42 AM - 10:38 PM	5:42 AM - 8:00 PM
Saturday		6:16 AM - 10:18 PM	6:16 AM - 10:18 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Hanbury St & Ballentine Blvd	Joint Expeditionary Base Little Creek
Headway			
		Existing	**Proposed**
Weekday	Early	60	60
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

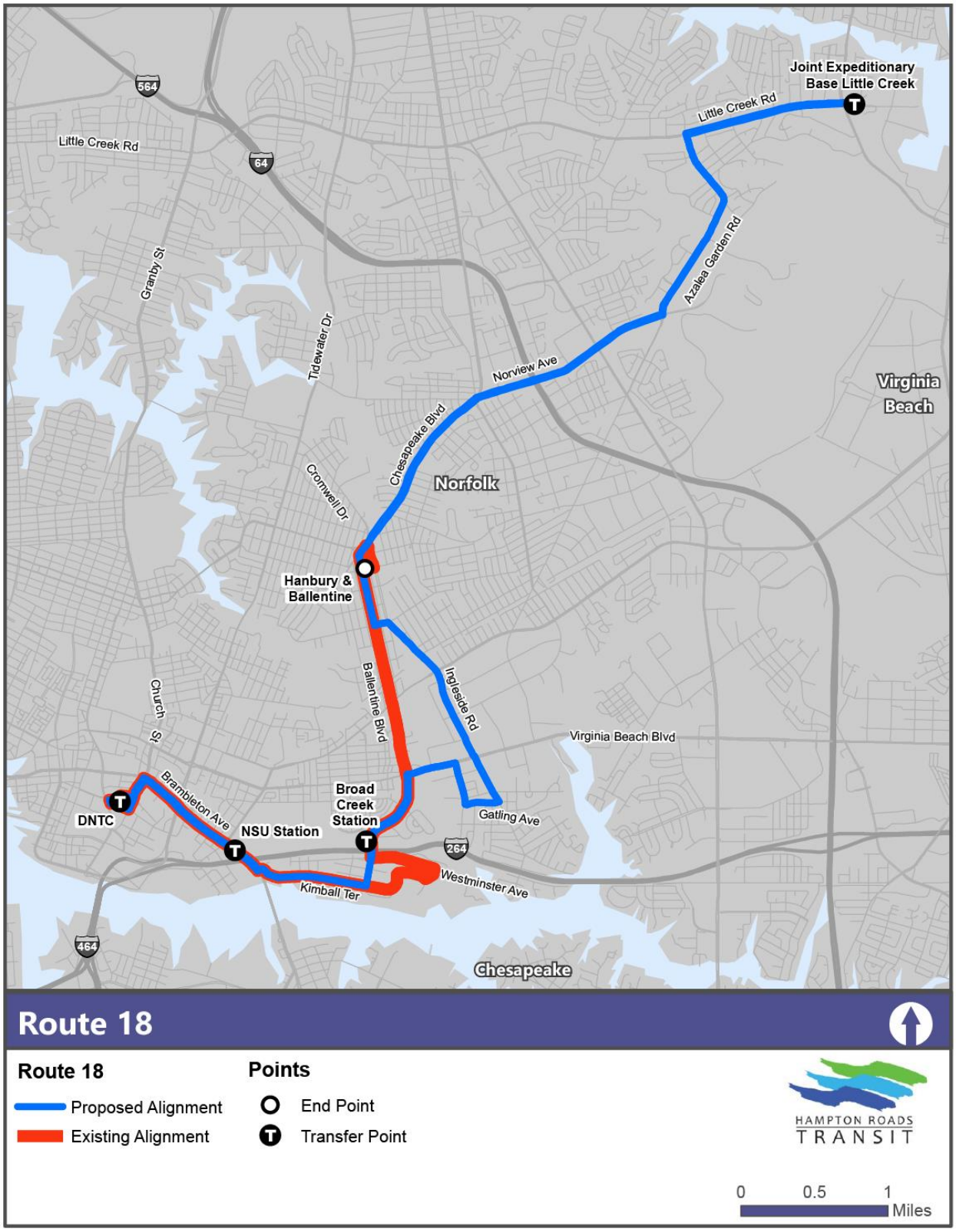


Existing



Proposed

Route Alignment Map



ROUTE 20

Virginia Beach Boulevard

Service Type: Local
Jurisdictions Served: Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

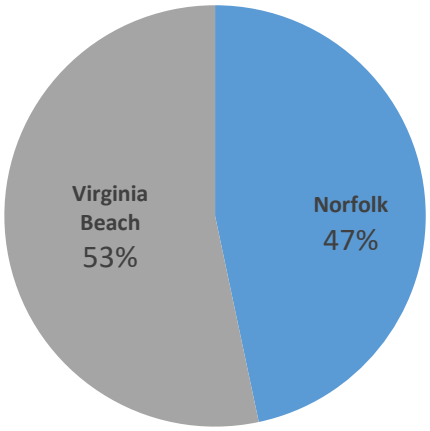
No alignment changes are being proposed for Route 20; however, frequency should be increased to 15-minutes during the peak periods, between Pembroke East and the Virginia Beach Oceanfront, and during the midday periods across the entire route. During the evening and late-night periods service should be increased to every 30-minutes.

This high frequency service would provide an enhanced regional connection between Downtown Norfolk and Virginia Beach. Route 20 routinely experiences over 100 passengers per hour, in both directions, between 5:00 AM and 6:00 PM. Existing and Proposed Level of Service

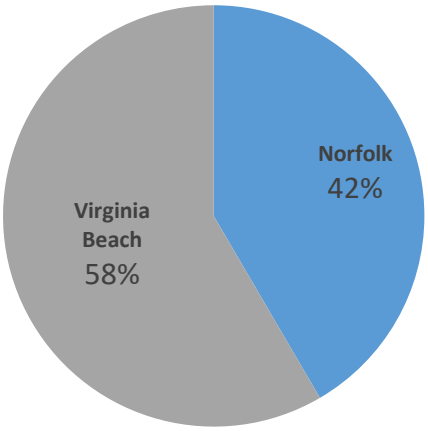
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:52 AM - 1:15 AM	4:52 AM - 1:15 AM
Saturday		5:22 AM - 1:14 AM	5:22 AM - 1:14 AM
Sunday		6:23 AM - 1:13 AM	6:23 AM - 1:13 AM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Pembroke East / Virginia Beach Oceanfront	Virginia Beach Oceanfront
Headway			
		Existing	**Proposed**
Weekday	Early	15 / 30	30
	AM Peak	15 / 30	15
	Midday	30 / 30	15
	PM Peak	15 / 30	15
	Evening	60 / 60	30
	Late Night	60 / 60	30
Saturday		30 / 30	30
Sunday		60 / 60	60

Weekly Service Mile Change by Jurisdiction

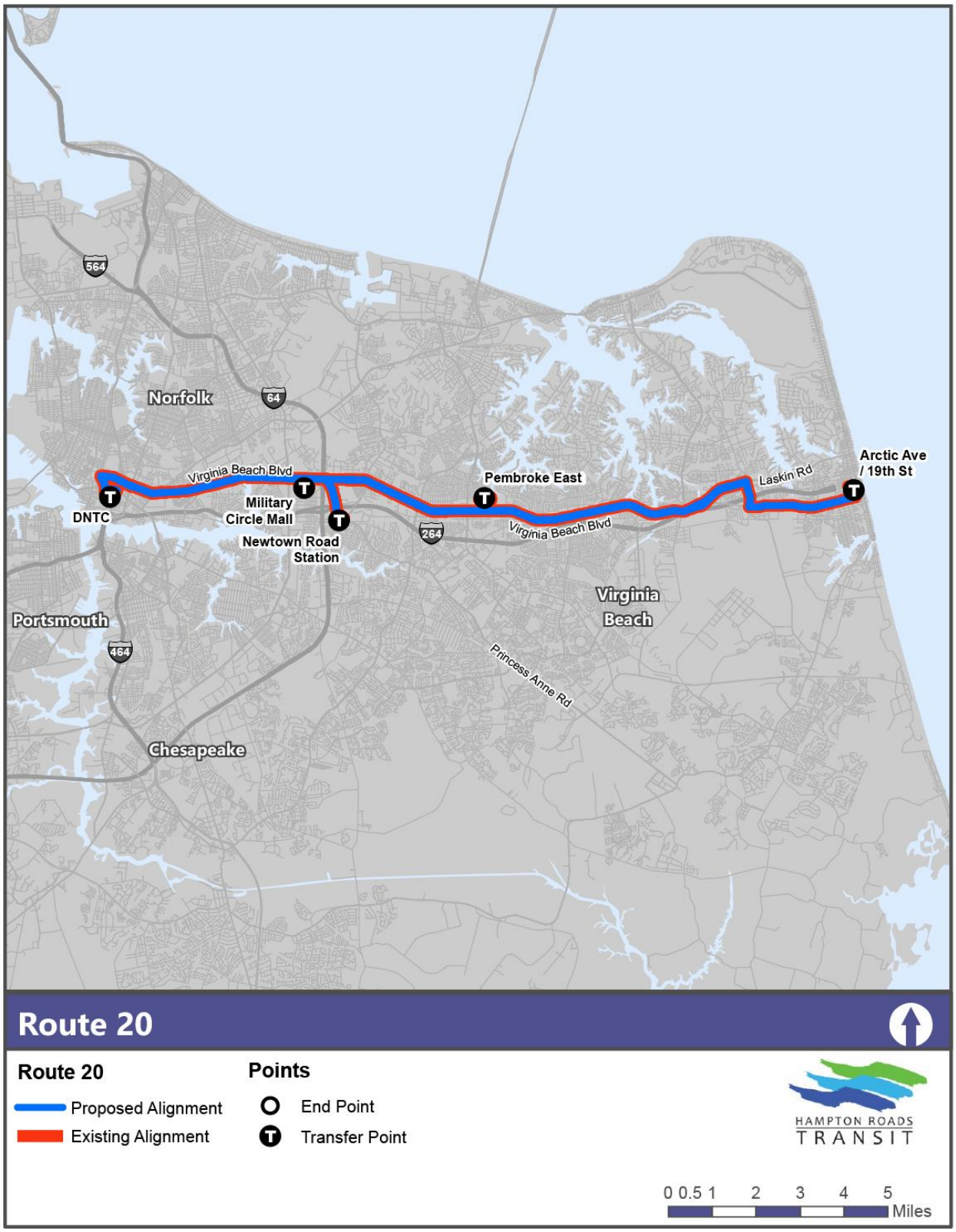


Existing



Proposed

Route Alignment Map



ROUTE 21

Little Creek Road

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

Due to multiple gate closures at Naval Station Norfolk, service to this military base is being recommended for elimination, making the western terminus of this route the Navy Exchange Mall. The recommendation does call for Route 21 to be extended past its current eastern terminus, JEB Little Creek, to Pleasure House Road & Shore Drive. Heading eastbound from JEB Little Creek, the service would turn right onto Shore Drive and continue to the intersection at Pleasure House Road and Shore Drive. To return, turn right onto Pleasure House Road, right onto Northampton Boulevard, right onto Independence Boulevard, and left onto Shore Drive, continuing the return route to JEB.

Average total boardings per hour on Route 21 regularly surpasses 100 passengers. This, coupled with the fact the route serves two major military bases along with a major corridor, Little Creek Road, supports the need for high frequency service from 5:00 AM to 6:00 PM. Beginning at 7:00 PM, hourly boardings significantly drop, indicating that 30-minute and ultimately, hourly frequency would be sufficient based upon demand.

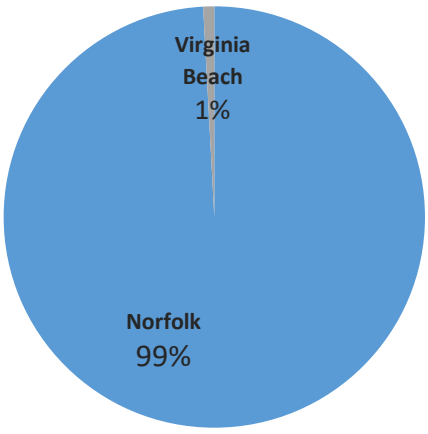
Extending the route's full alignment to Pleasure House Road & Shore Drive would cover a segment previously covered by Routes 1 and 22. As Route 22 is recommended for elimination, Route 21 would serve as the only local bus connection along this section of Shore Drive. The removal of service from the interior of Naval Station Norfolk would affect approximately 81 current passengers. 52 of these passengers can be attributed to one stop that is within a quarter mile of the proposed Route 21 alignment.

On weekdays, increase the early, peak and midday service to JEB Little Creek to every 15-minutes and evening service to every 30-minutes. Provide service to Pleasure House & Shore Road every 15-minutes during peak periods, and every 30-minutes during early and midday periods.

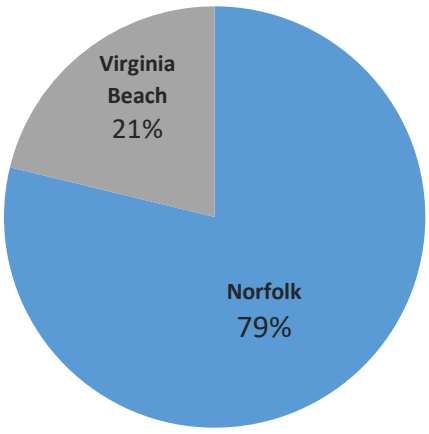
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:11 AM - 1:17 AM	5:11 AM - 1:17 AM
Saturday		5:12 AM - 1:21 AM	5:12 AM - 1:21 AM
Sunday		6:43 AM - 1:21 AM	6:43 AM - 1:21 AM
Origin and Destinations			
		Existing	**Proposed**
From		Naval Station Norfolk	Naval Station Norfolk
To		Joint Expeditionary Base Little Creek	Joint Expeditionary Base Little Creek / Pleasure House Rd & Shore Dr
Headway			
		Existing	**Proposed**
Weekday	Early	30	15 / 30
	AM Peak	30	15 / 15
	Midday	30	15 / 30
	PM Peak	30	15 / 15
	Evening	45	30 / 60
	Late Night	60	60 / 60
Saturday		30	30 / 60
Sunday		60	60 / 60

Weekly Service Mile Change by Jurisdiction

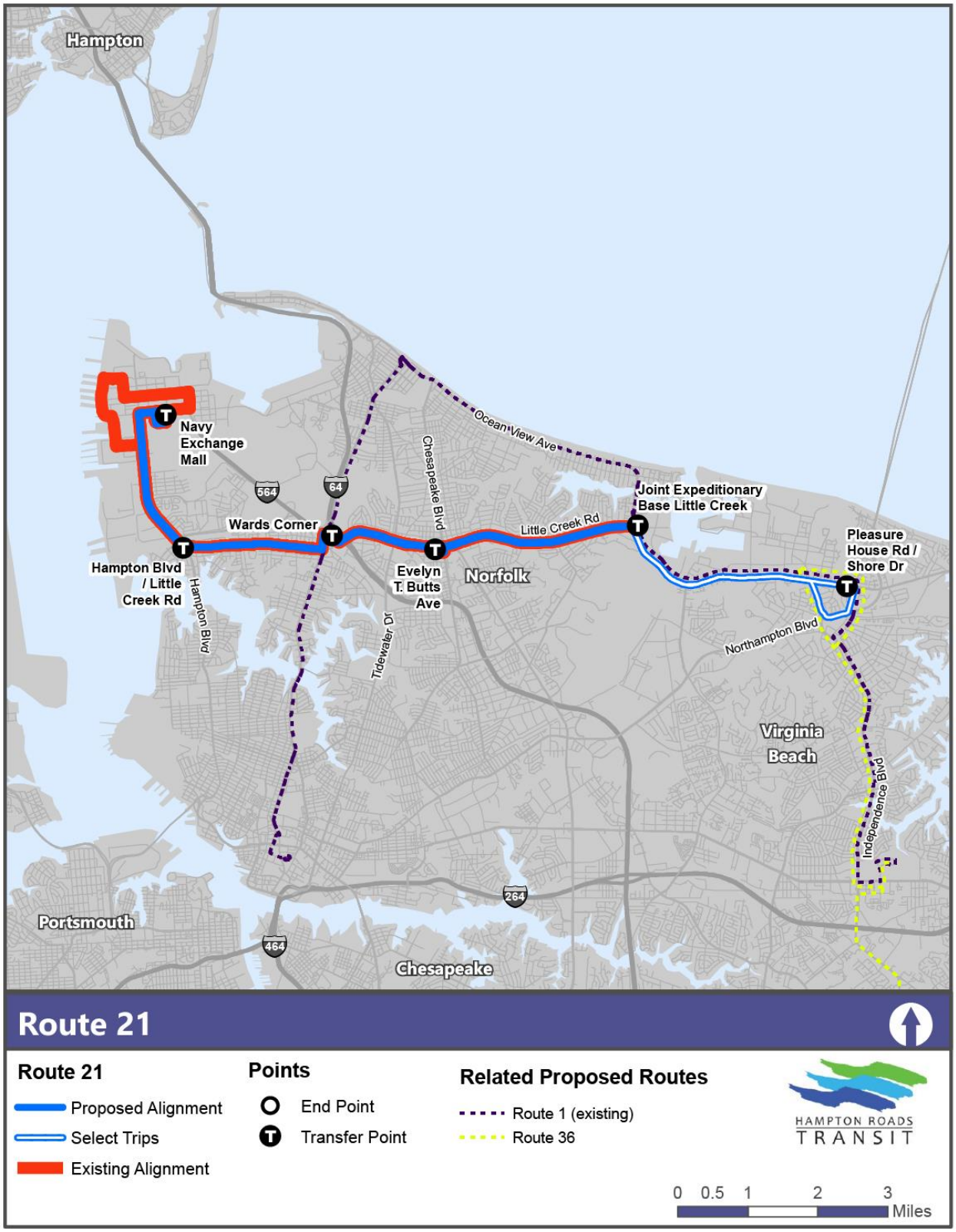


Existing



Proposed

Route Alignment Map



ROUTE 22

Haygood Road

Service Type: Local
Jurisdictions Served: Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

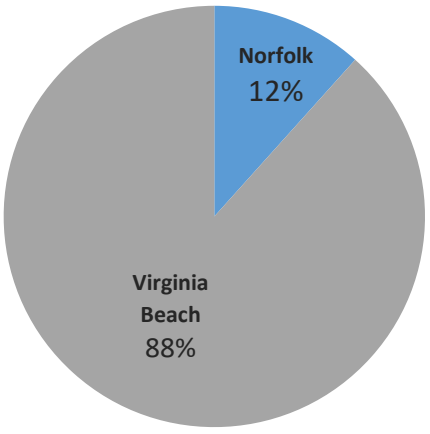
Based on the poor performance of the existing Route 22, the service should be eliminated. Route 22 ranks 40th in weekday ridership and 61st in passengers per revenue hour, necessitating change. The majority of this route's alignment can be replaced easily by other proposed services that would cover its most successful portions. Under this proposal, 91 riders would no longer receive direct service, 67 of whom are not located within walking distance (i.e., the segment of the existing Route 22 operating between Newtown Road at Baker Road to Haygood Road at Independence) of proposed services. Nonetheless, this proposal would serve the region most effectively.

Service on Newtown Road from the light rail station to Virginia Beach Boulevard would be replaced by the proposed Route 27 (Military Circle Mall – Newtown Road Station – Pleasure House Road/Shore Drive). Service on Independence Boulevard from Haygood Road to Pleasure House Road would be replaced with recommended Route 36 (Pleasure House Road/Shore Drive – Pembroke East – TCC Virginia Beach). Service on Shore Drive between Little Creek Road and Pleasure House Road would be provided by the proposed Route 21 (Naval Station Norfolk –Joint Expeditionary Base Little Creek – Pleasure House Road/Shore Drive).

Existing and Proposed Level of Service

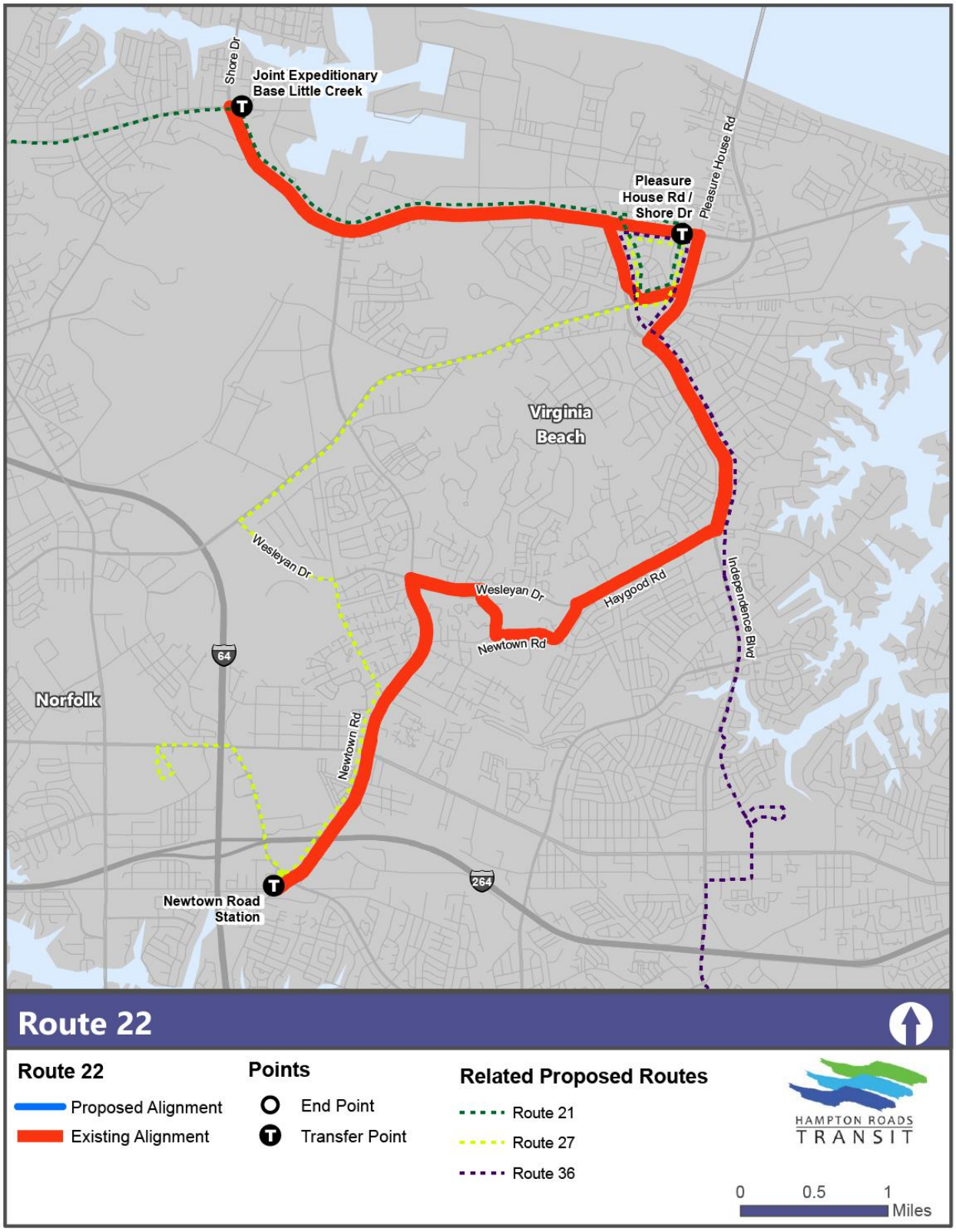
Span			
		Existing	Proposed
Weekday		6:03 AM - 6:56 PM	-
Saturday		6:03 AM - 6:50 PM	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newtown Road Station	-
To		Joint Expeditionary Base Little Creek	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 23

Princess Anne Road

Service Type: Local
Jurisdictions Served: Norfolk

POTENTIAL SERVICE IMPROVEMENTS

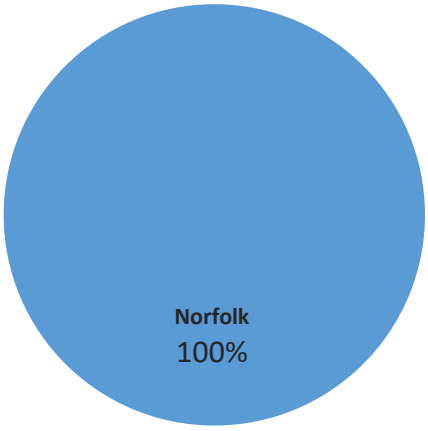
This route would be extended further along Northampton Boulevard and would loop through IKEA. The extension of this route would provide service to the IKEA.

Evening period frequency would be increased to every 30-minutes as service during the evening period regularly exceeds 30 passengers per hour.

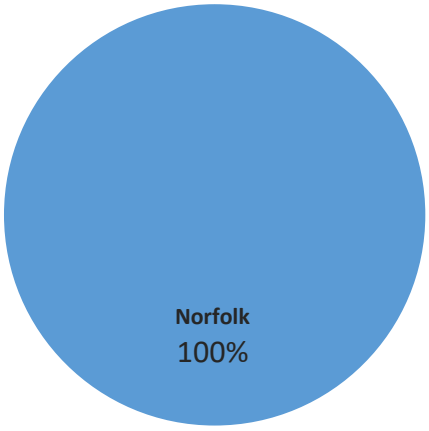
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:06 AM - 12:56 AM	5:06 AM - 12:56 AM
Saturday		5:05 AM - 1:19 AM	5:05 AM - 1:19 AM
Sunday		6:25 AM - 9:25 PM	6:25 AM - 9:25 PM
Origin and Destinations			
		Existing	**Proposed**
From		Norfolk General	Norfolk General
To		Military Circle	Military Circle
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	30
	Midday	30	30
	PM Peak	30	30
	Evening	60	30
	Late Night	60	60
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

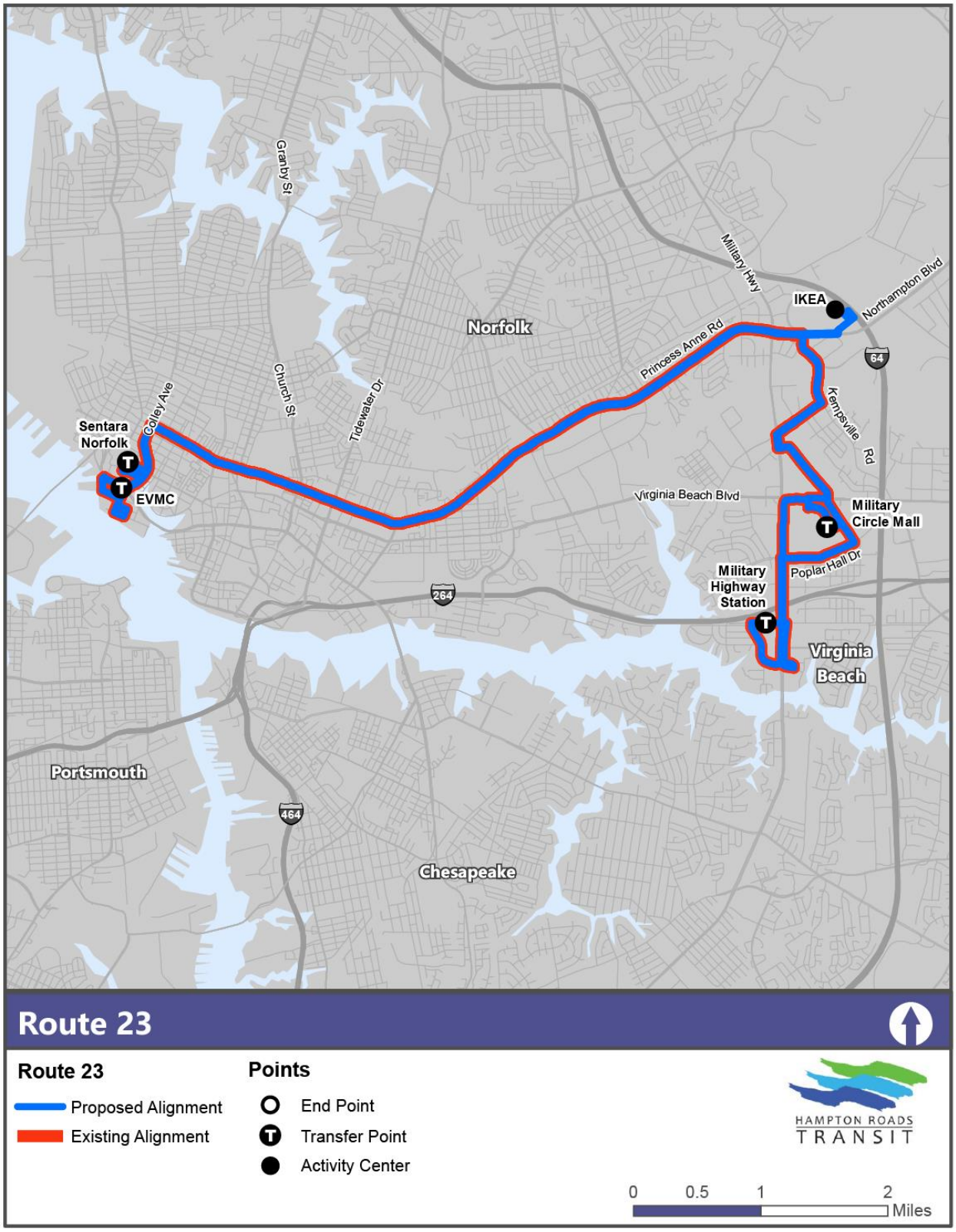


Existing



Proposed

Route Alignment Map



ROUTE 24

Kempsville Road

Service Type: Local
Jurisdictions Served: Virginia Beach and Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

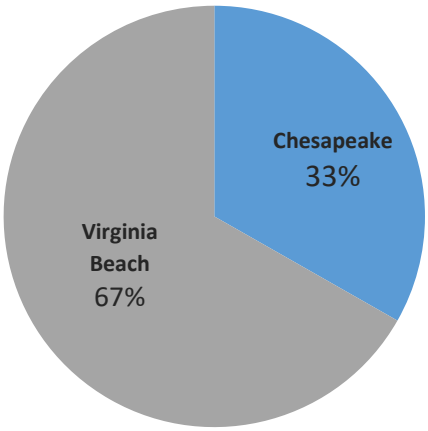
The proposed Route 24 is a new service that would connect Greenbrier Mall directly with Pembroke East. This route would provide service along Kempsville Road and N Witchduck Road; both corridors currently do not have access to transit. These areas were identified as having moderate to high propensities for transit oriented and commuter populations, and peak hour services in general.

During peak periods, service would operate every 30-minutes, and during midday, evening, Saturday and Sunday, this route would operate every 60-minutes.

Existing and Proposed Level of Service

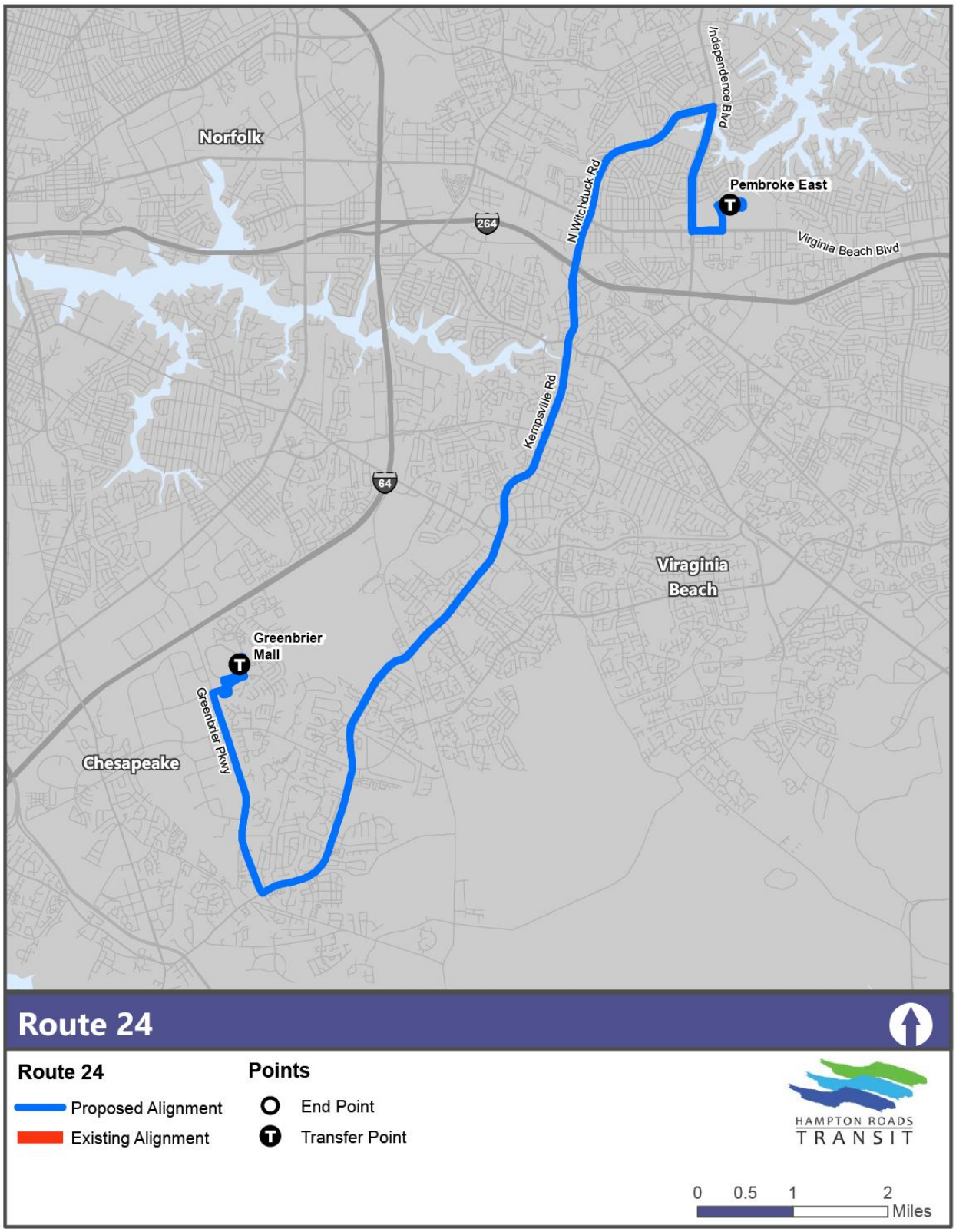
Span			
		Existing	Proposed
Weekday		-	6:00 AM - 11:00 PM
Saturday		-	6:00 AM - 11:00 PM
Sunday		-	6:00 AM - 11:00 PM
Origin and Destinations			
		Existing	**Proposed**
From		-	Greenbrier Mall
To		-	Pembroke Mall
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	-	30
	Midday	-	60
	PM Peak	-	30
	Evening	-	60
	Late Night	-	60
Saturday		-	60
Sunday		-	60

Weekly Service Mile Change by Jurisdiction



Proposed

Route Alignment Map



ROUTE 25

Newtown Road

Service Type: Local
Jurisdictions Served: Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

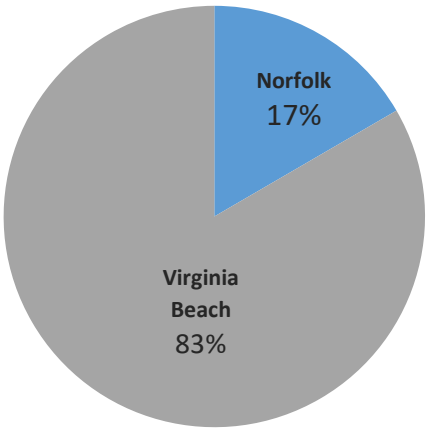
The proposed Route 25 calls for the route to terminate at Sentara Princess Anne Hospital, with service between the hospital and the Virginia Beach Municipal Center being provided via the proposed Route 33 (TCC Virginia Beach – Virginia Beach Oceanfront). Route 25 has an on-time performance of only 70 percent, failing to meet the minimum standard, necessitating an alignment change to create a more reliable service. Route 33 would provide the same level of service between the TCC Virginia Beach and the Virginia Beach Municipal Center as the existing Route 25. With this proposal, 19 passengers boarding at one stop along George Mason Drive – located just over a quarter mile from Route 33 – would lose direct transit service.

On weekdays, Route 25 should operate 15-minute service during peak periods and 30-minute service during the midday. During the peak periods, hourly ridership typically exceeds 75 passengers, and this route provides a direct regional connection between Virginia Beach and the Tide Light Rail, justifying a frequency increase to every 15-minutes. In addition, the route's final trip, which carries less than five passengers, is recommended for elimination due to low ridership.

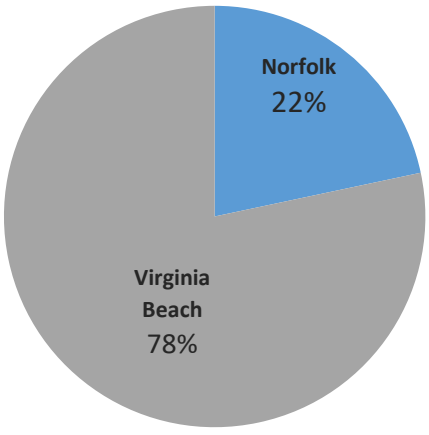
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:02 AM - 11:45 PM	6:02 AM - 10:45 PM
Saturday		6:03 AM - 12:45 AM	6:03 AM - 12:45 AM
Sunday		-	6:03 AM - 12:45 AM
Origin and Destinations			
		Existing	**Proposed**
From		Military Circle and Newtown Station	Military Circle
To		TCC Virginia Beach and Municipal Center	TCC Virginia Beach and Sentara Princess Ann Hospital
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	15
	Midday	60	30
	PM Peak	60	15
	Evening	60	60
	Late Night	60	60
Saturday		60	30
Sunday		-	60

Weekly Service Mile Change by Jurisdiction

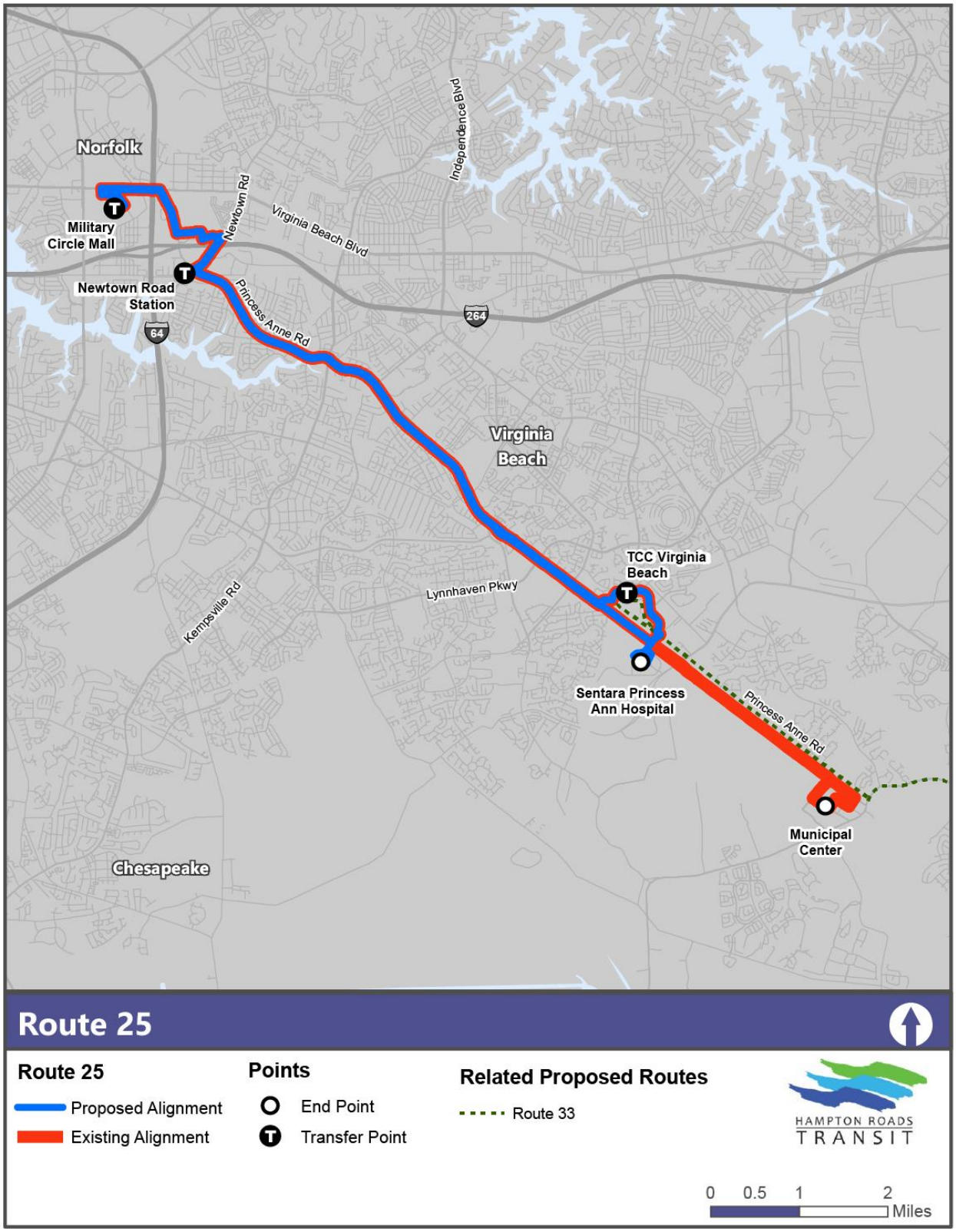


Existing



Proposed

Route Alignment Map



ROUTE 26

Lynnhaven Mall

Service Type: Local
Jurisdictions Served: Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

The recommendation for Route 26 suggests an alignment extension to Pembroke Mall from TCC Virginia Beach. From Rosemont Road, take a left onto Bonney Road, right onto Constitution Drive, and right onto Corporation Lane, ending at Pembroke East. Service is proposed to be discontinued on Lynnhaven Parkway between Rosemont Road and Lynnhaven Mall, which would be replaced with the new Route 38 (Greenbrier Mall – Lynnhaven Mall – Virginia Beach Oceanfront), and on Holland Road between Lynnhaven Parkway and Rosemont Road, which would be replaced by the Route 36 (TCC Virginia Beach – Pembroke East – Pleasure House Road & Shore Drive).

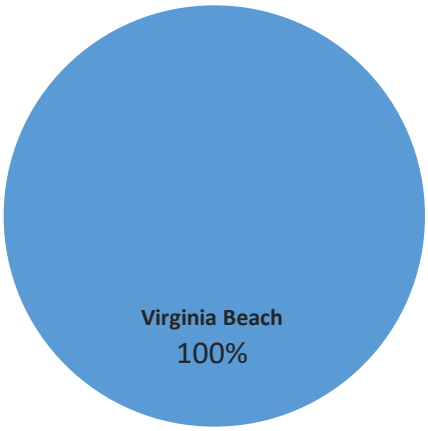
Route 26 consistently performs below average in passengers per hour and farebox recovery. The new alignment would provide transit access to residents on Bonney Road and on Rosemont Road north of Holland, where no direct transit options currently exist.

Additionally, the service frequency would be reduced throughout the weekday to every 60-minutes based on the existing utilization of the route.

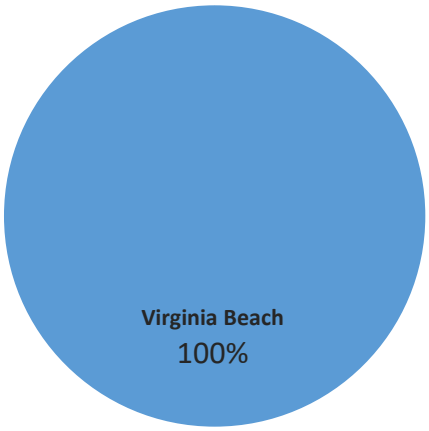
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:29 AM - 6:45 PM	6:29 AM - 6:45 PM
Saturday		7:32 AM - 6:46 PM	7:32 AM - 6:46 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		TCC-Virginia Beach	TCC-Virginia Beach
To		Lynnhaven Mall	Pembroke East
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	30	60
	Midday	30	60
	PM Peak	30	60
	Evening	30	60
	Late Night	-	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

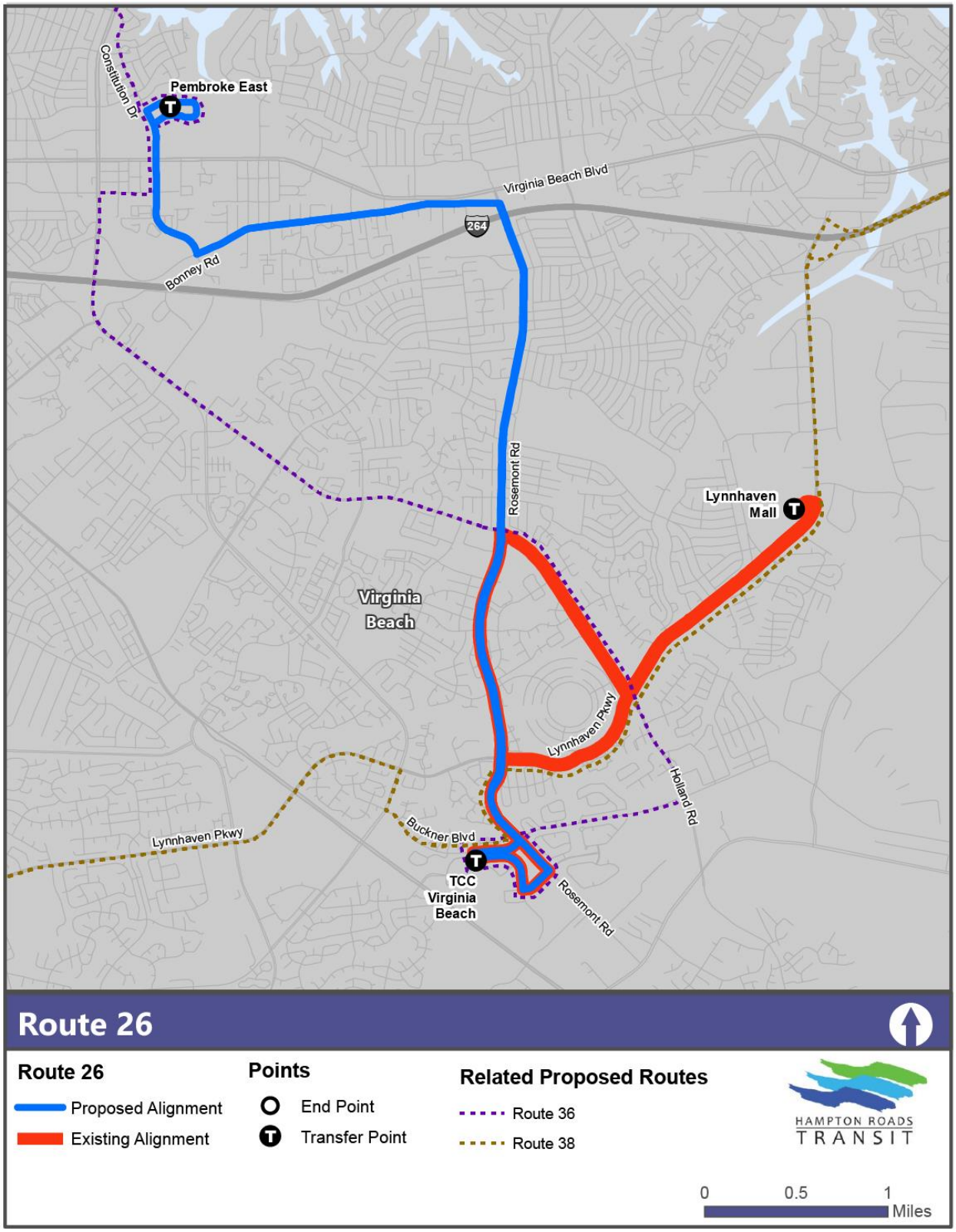


Existing



Proposed

Route Alignment Map



ROUTE 27

Northampton Boulevard

Service Type: Local
Jurisdictions Served: Norfolk and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

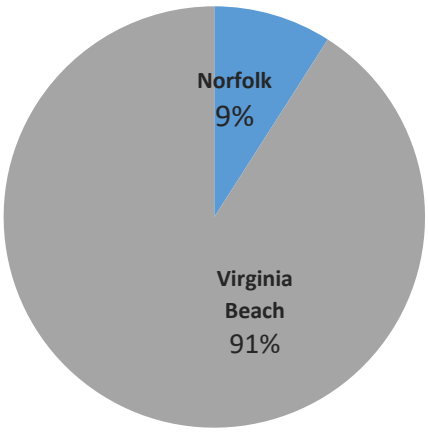
The Route 27 should be extended to Military Circle Mall. From Newtown Road Light Rail, travel north on Kempsville Road, turn left onto Virginia Beach Boulevard, left into the mall entrance, and left onto Ring Road to serve Military Circle Mall. The new route alignment to the Military Highway Station would provide a direct one-seat ride between Pleasure House Road & Shore Drive and Military Circle Mall via the Newtown Road Light Rail Station. By connecting with Military Circle Mall, the route would now link to a major transit hub, as well as north/south high frequency service.

On weekdays, service frequencies would be decreased to hourly during the early morning and peak based on existing demand along the current service. It is also recommended that the service end at 11:00 PM, as boardings per hour consistently drop below 10 passengers during this hour.

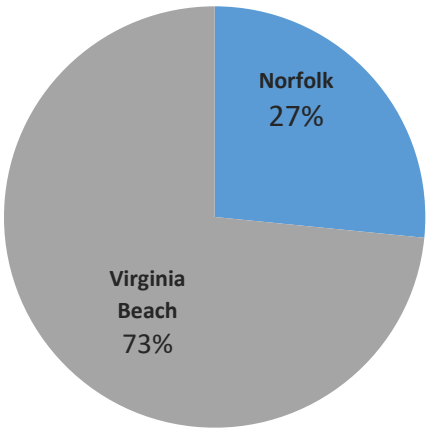
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:48 AM - 11:54 PM	5:48 AM - 11:00 PM
Saturday		5:48 AM - 1:03 AM	5:48 AM - 1:03 AM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newtown Road Station	Military Circle Mall
To		Pleasure House Road	Pleasure House Road
Headway			
		Existing	**Proposed**
Weekday	Early	30	60
	AM Peak	30	60
	Midday	60	60
	PM Peak	30	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

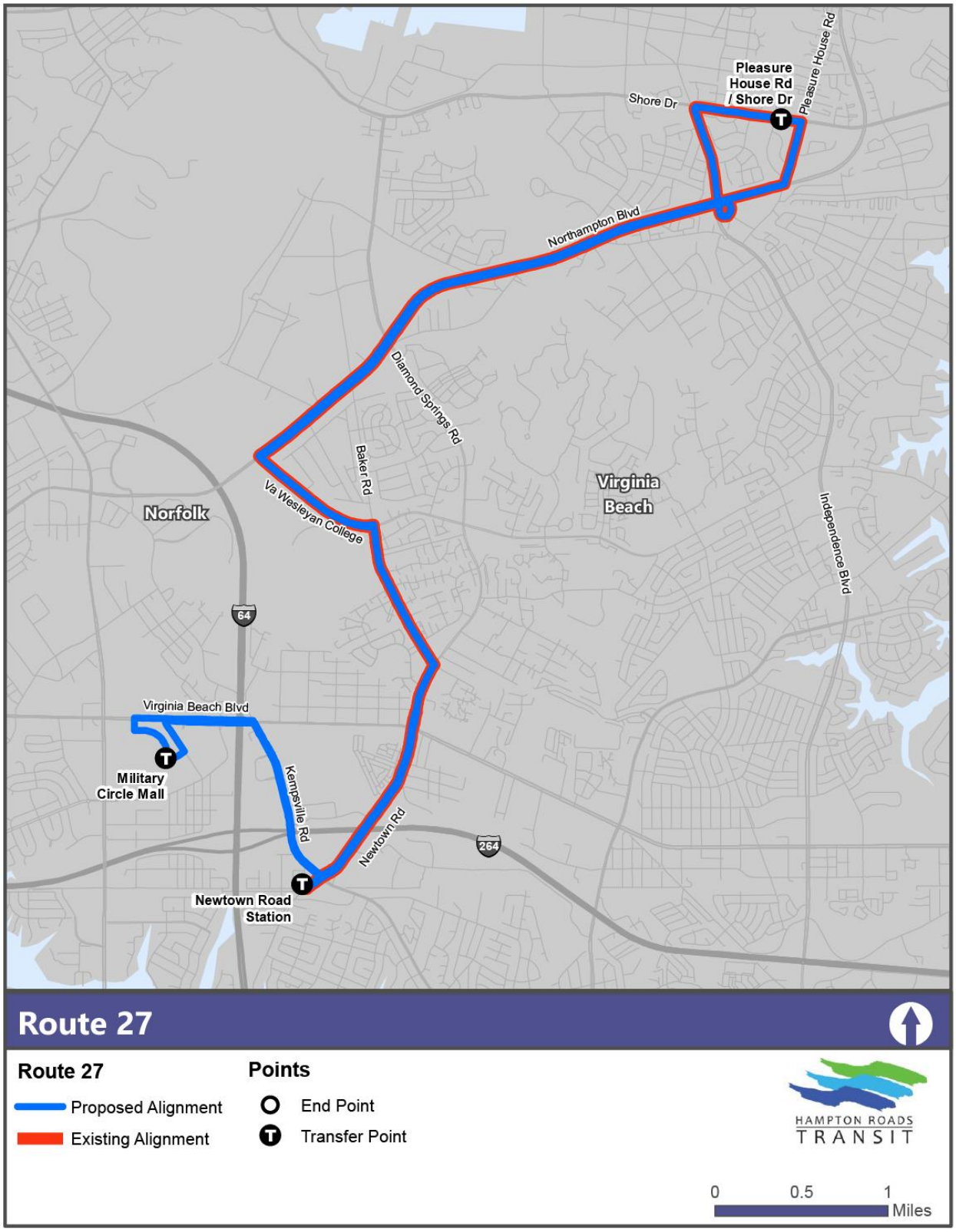


Existing



Proposed

Route Alignment Map



ROUTE 29

Lynnhaven Parkway

Service Type: Local
Jurisdictions Served: Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

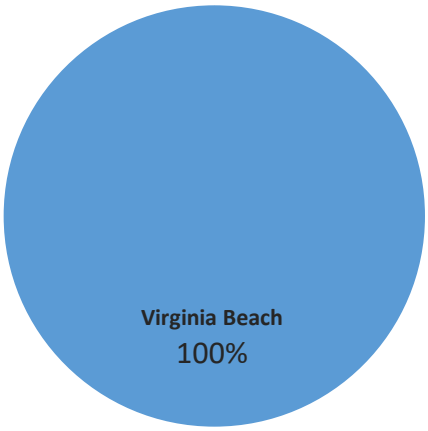
Service to Lynnhaven Mall via Route 29 is proposed for elimination, with the route instead terminating at the Arctic Avenue & 19th Street Transfer Hub on the Virginia Beach Oceanfront. From First Colonial Road, turn left onto Laskin Road, and right onto Arctic Avenue, ending at the Arctic Avenue & 19th Street Transfer Hub. Replace service on Virginia Beach Boulevard with the Route 20 (Downtown Norfolk – Pembroke East – Virginia Beach Oceanfront), while the new Route 38 (Greenbrier Mall – Lynnhaven Mall – Virginia Beach Oceanfront) would replace service on Lynnhaven Parkway. Given that service south of Virginia Beach Boulevard would be provided entirely by a new proposed route (Route 38), this proposal would not eliminate bus service at any stops and would help the agency avoid duplicative service.

On weekdays, the service should begin one trip earlier in the 6:00 AM hour as boardings are regularly above 20 passengers, which suggests that earlier morning service might be attractive to existing and potential passengers.

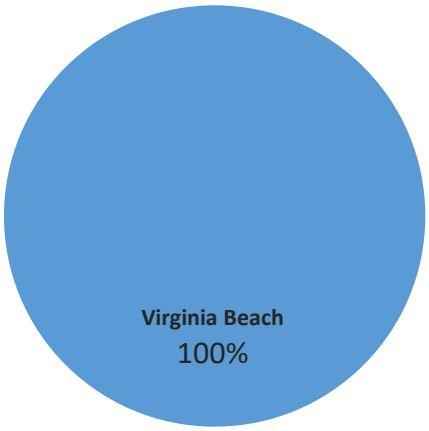
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:48 AM - 10:19 PM	6:15 AM - 10:19 PM
Saturday		6:48 AM - 10:25 PM	6:48 AM - 10:25 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Pleasure House Road	Pleasure House Road
To		Lynnhaven Pkwy	Virginia Beach Oceanfront
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

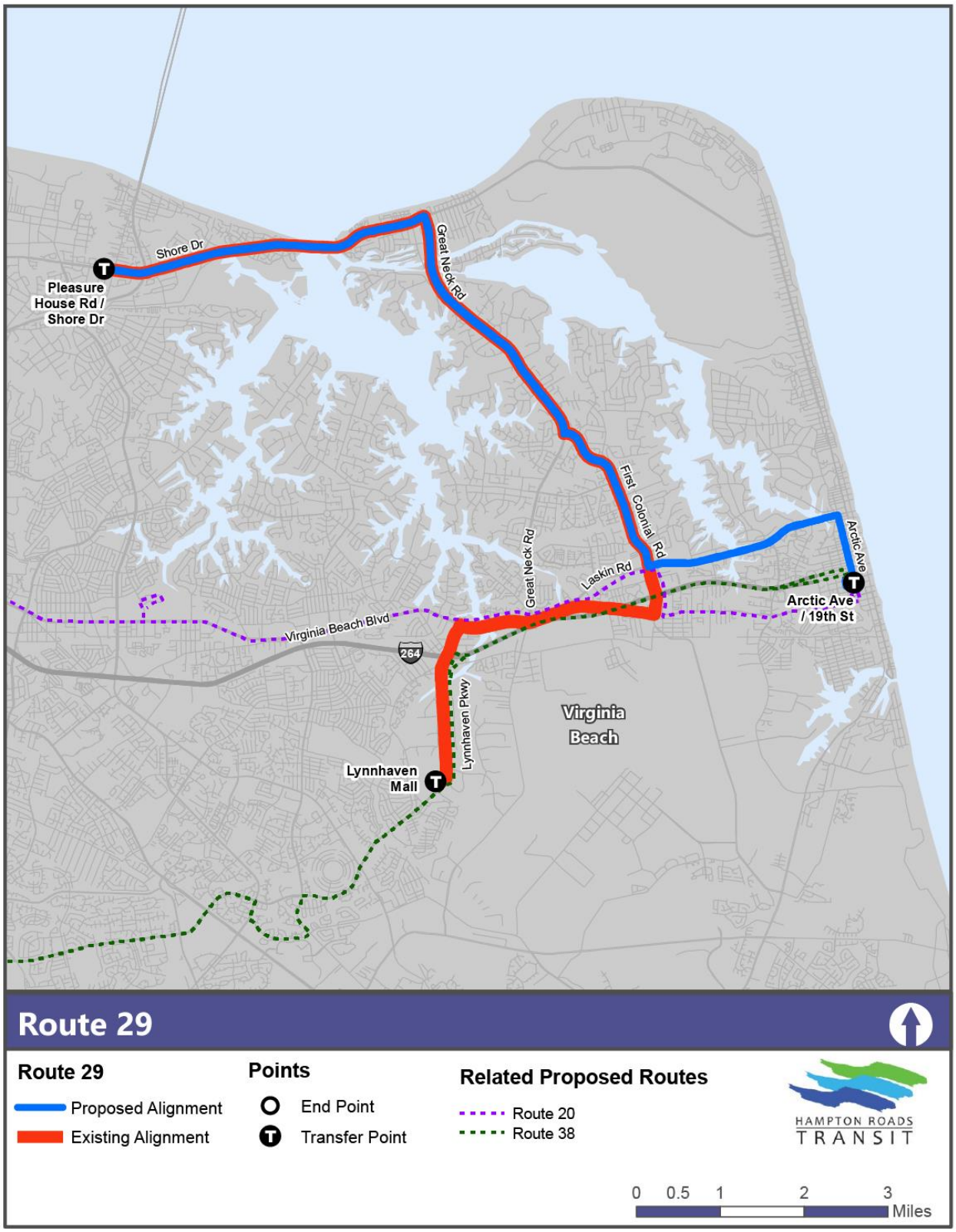


Existing



Proposed

Route Alignment Map



ROUTE 30

Atlantic Avenue Shuttle

Service Type: Circulator
Jurisdictions Served: Virginia Beach

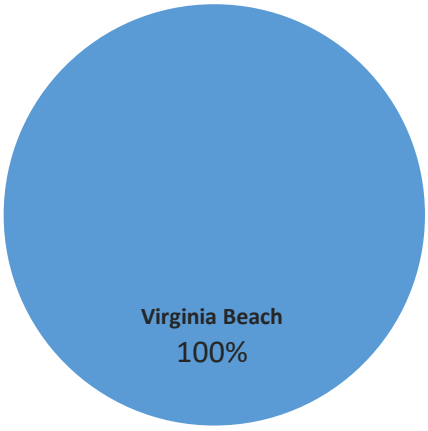
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

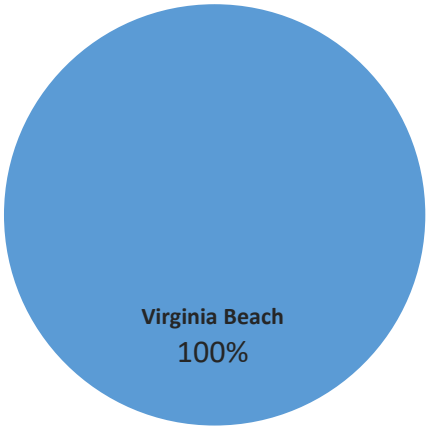
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		8:01 AM - 2:07 AM	8:01 AM - 2:07 AM
Saturday		8:01 AM - 2:07 AM	8:01 AM - 2:07 AM
Sunday		8:01 AM - 2:07 AM	8:01 AM - 2:07 AM
Origin and Destinations			
		Existing	**Proposed**
From		North Atlantic Avenue	North Atlantic Avenue
To		South Atlantic Avenue	South Atlantic Avenue
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	25	25
	Midday	15	15
	PM Peak	10	10
	Evening	5	5
	Late Night	20	20
Saturday		10	10
Sunday		10	10

Weekly Service Mile Change by Jurisdiction

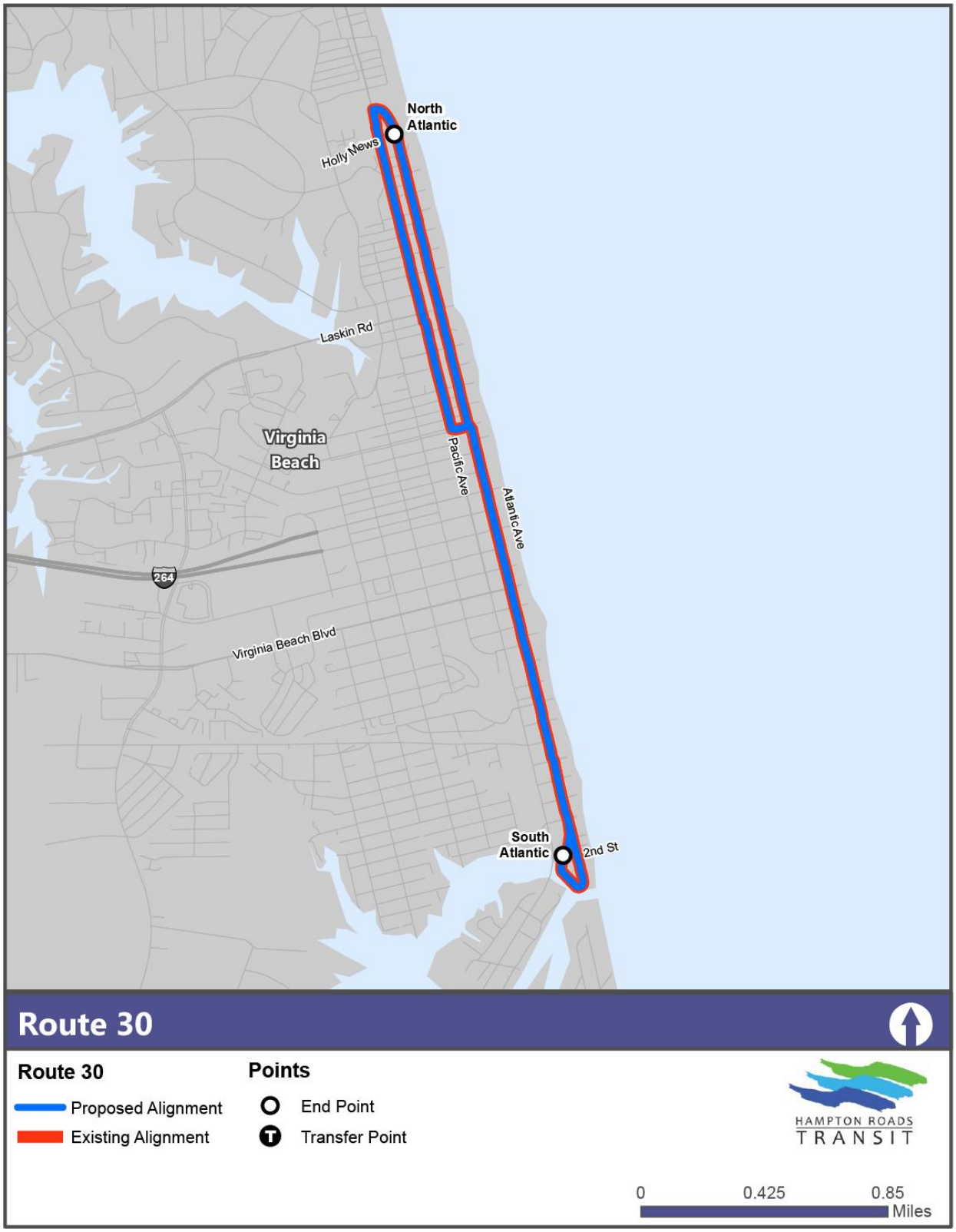


Existing



Proposed

Route Alignment Map



ROUTE 31

Museum Shuttle

Service Type: Circulator
Jurisdictions Served: Virginia Beach

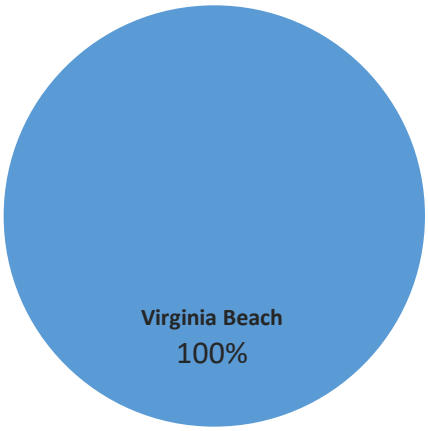
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

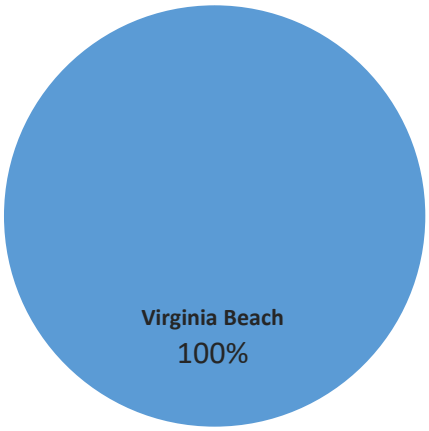
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		9:30 AM - 11:10 PM	9:30 AM - 11:10 PM
Saturday		9:30 AM - 11:10 PM	9:30 AM - 11:10 PM
Sunday		9:30 AM - 11:10 PM	9:30 AM - 11:10 PM
Origin and Destinations			
		Existing	**Proposed**
From		Campgrounds	Campgrounds
To		South Atlantic Avenue	South Atlantic Avenue
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	-	-
	Midday	20	20
	PM Peak	20	20
	Evening	20	20
	Late Night	20	20
Saturday		20	20
Sunday		20	20

Weekly Service Mile Change by Jurisdiction

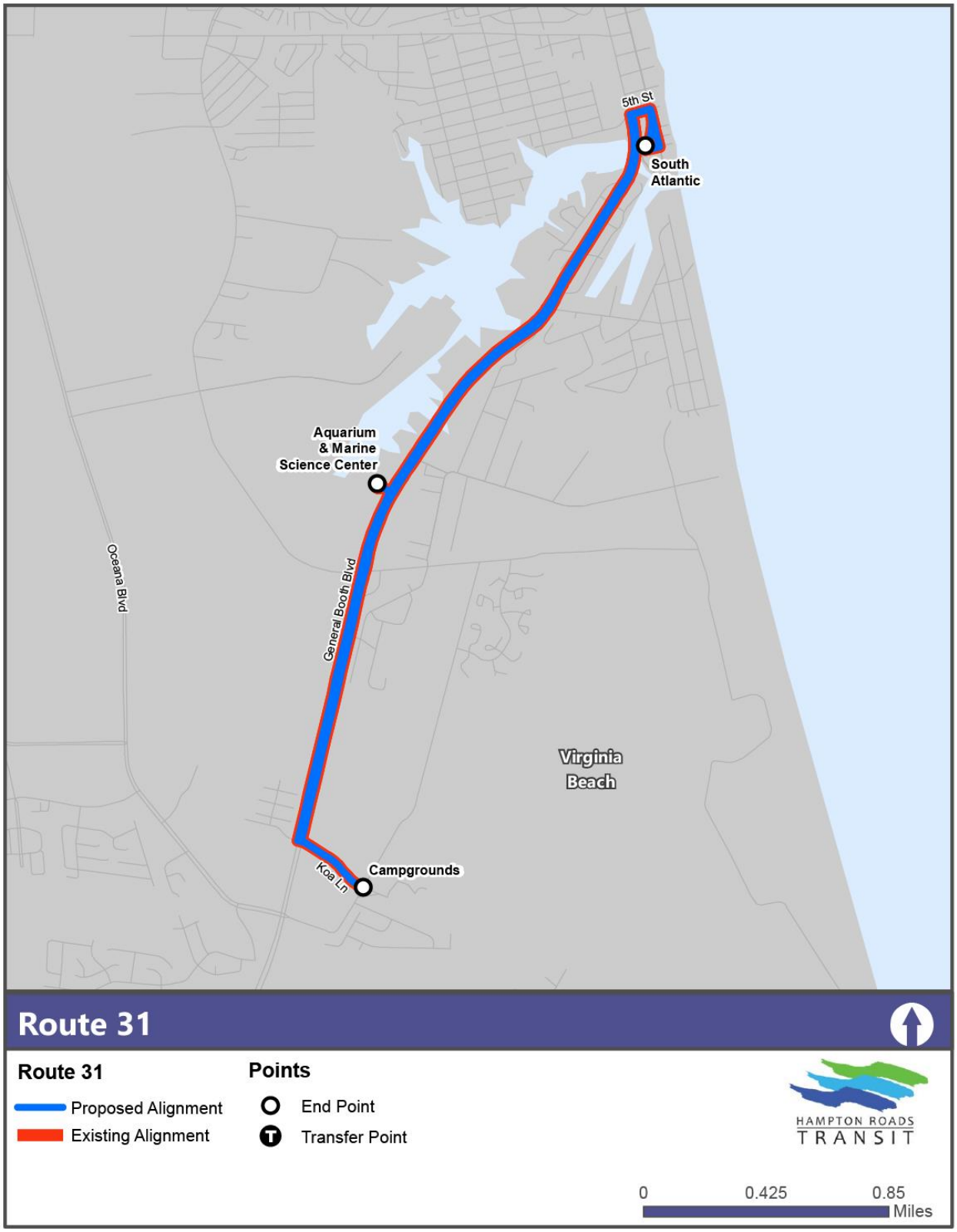


Existing



Proposed

Route Alignment Map



ROUTE 33

General Booth Boulevard

Service Type: Local
Jurisdictions Served: Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

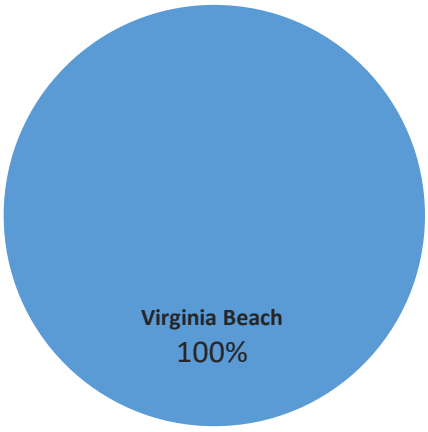
Route 33 is proposed to be realigned onto Virginia Beach Boulevard and Birdneck Road. Service on Pacific Avenue, south of the Arctic Avenue & 19th Street Hub, and on General Booth Boulevard, between Birdneck Road and Pacific Avenue, would be replaced with the proposed Route 35 (Pleasure House Road & Shore Drive – Vista Circle – Arctic Avenue & 19th Street). This proposal would provide service to Birdneck Road, between General Booth Boulevard and Virginia Beach Boulevard, which does not currently have direct access to transit.

On weekdays, start Route 33 service should start one trip earlier, while the peak frequency should be offered at every 30 minutes. On weekdays, average boardings per hour approach 60 riders between 6:00 AM and 7:00 AM, suggesting that an earlier start time would attract additional passengers. On average, boardings per hour during peak periods are approximately 70 passengers, which justifies 30-minute service. Hourly service would sufficiently meet demand during the remainder of the day, including during the early morning period.

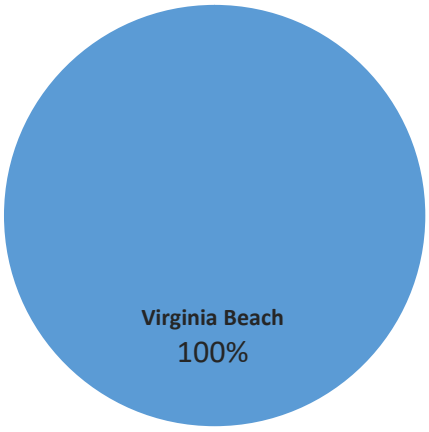
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:35 AM - 10:46 PM	5:35 AM - 10:46 PM
Saturday		6:30 AM - 10:47 PM	6:30 AM - 10:47 PM
Sunday		6:00 AM - 6:56 PM	6:00 AM - 6:56 PM
Origin and Destinations			
		Existing	**Proposed**
From		Virginia Beach Oceanfront	Virginia Beach Oceanfront
To		TCC-Virginia Beach	TCC-Virginia Beach
Headway			
		Existing	**Proposed**
Weekday	Early	-	60
	AM Peak	60	30
	Midday	60	60
	PM Peak	60	30
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		45	45

Weekly Service Mile Change by Jurisdiction

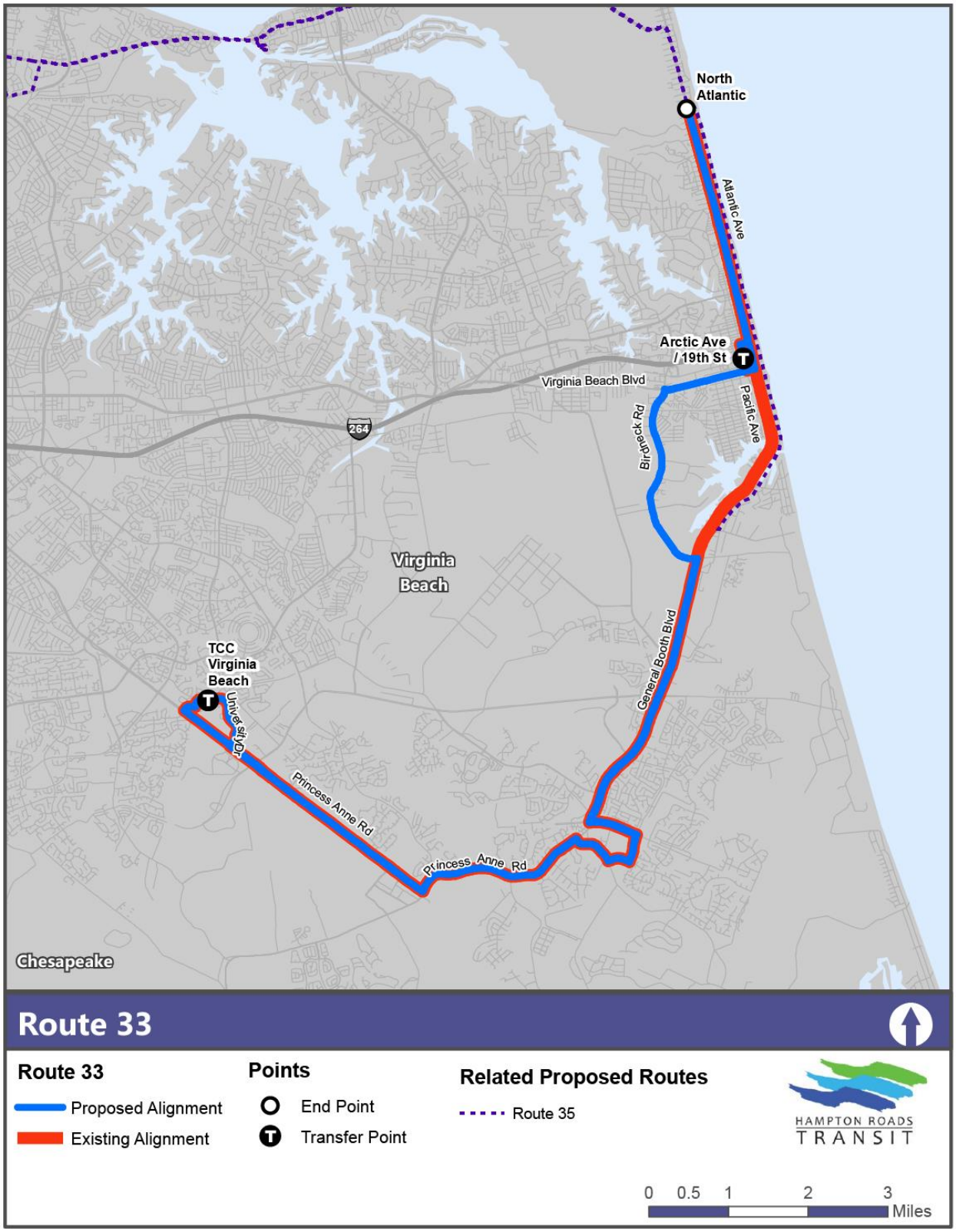


Existing



Proposed

Route Alignment Map



ROUTE 35

Shore Drive Shuttle

Service Type: Circulator
Jurisdictions Served: Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

Route 35 should be extended from its western terminus at Vista Circle to Pleasure House Road & Shore Drive. Westbound trips would continue on Shore Drive, bypassing Vista Circle, and would then turn left onto Pleasure House Road, right onto Northampton Boulevard, right onto Independence Boulevard, and right onto Shore Drive. The extension of this route to Pleasure House Road & Shore Drive would provide connections with Route 21, which service the JEB Little Creek and Naval Station Norfolk; Route 27, which connects directly with the Tide Light Rail; and Route 36, which connect with the Pembroke Mall and TCC Virginia Beach. Overall this extension would increase regional accessibility for these passengers and residents along the route.

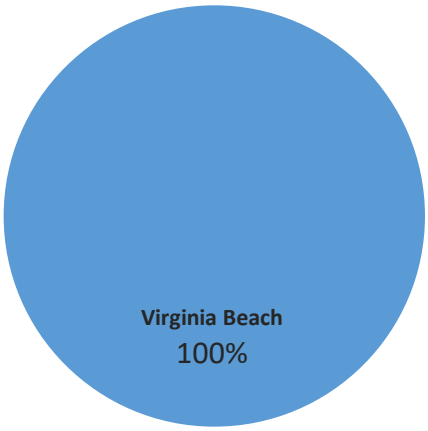
This route is also being proposed for service all year-round rather than seasonally. By making this an annual route, Virginia Beach residents along Shore Drive, Atlantic Avenue and Pacific Avenue would have consistent access to transit that they can rely on for more daily activities.

The frequency of service on Route 35 would be increased to every 30 minutes (the current service provides 45-minute frequencies). This increase in service would match the demand for transit along this travel corridor, and would also provide better connections to other services at Pleasure House Road at Shore Drive, and at Arctic Avenue at 19th Street.

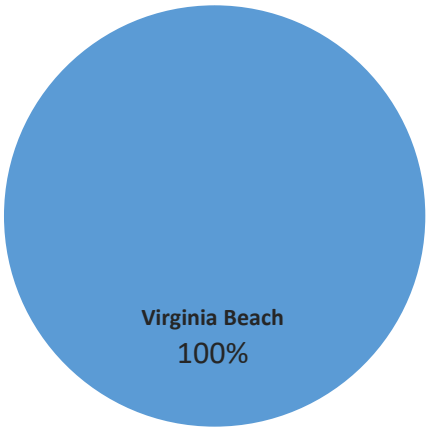
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		8:00 AM - 12:22 AM	8:00 AM - 12:22 AM
Saturday		8:00 AM - 12:22 AM	8:00 AM - 12:22 AM
Sunday		8:00 AM - 12:22 AM	8:00 AM - 12:22 AM
Origin and Destinations			
		Existing	**Proposed**
From		Virginia Beach Oceanfront	Virginia Beach Oceanfront
To		Vista Circle	Pleasure House Rd / Shore Dr
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	45	30
	Midday	45	30
	PM Peak	45	30
	Evening	45	30
	Late Night	45	60
Saturday		45	30
Sunday		45	60

Weekly Service Mile Change by Jurisdiction

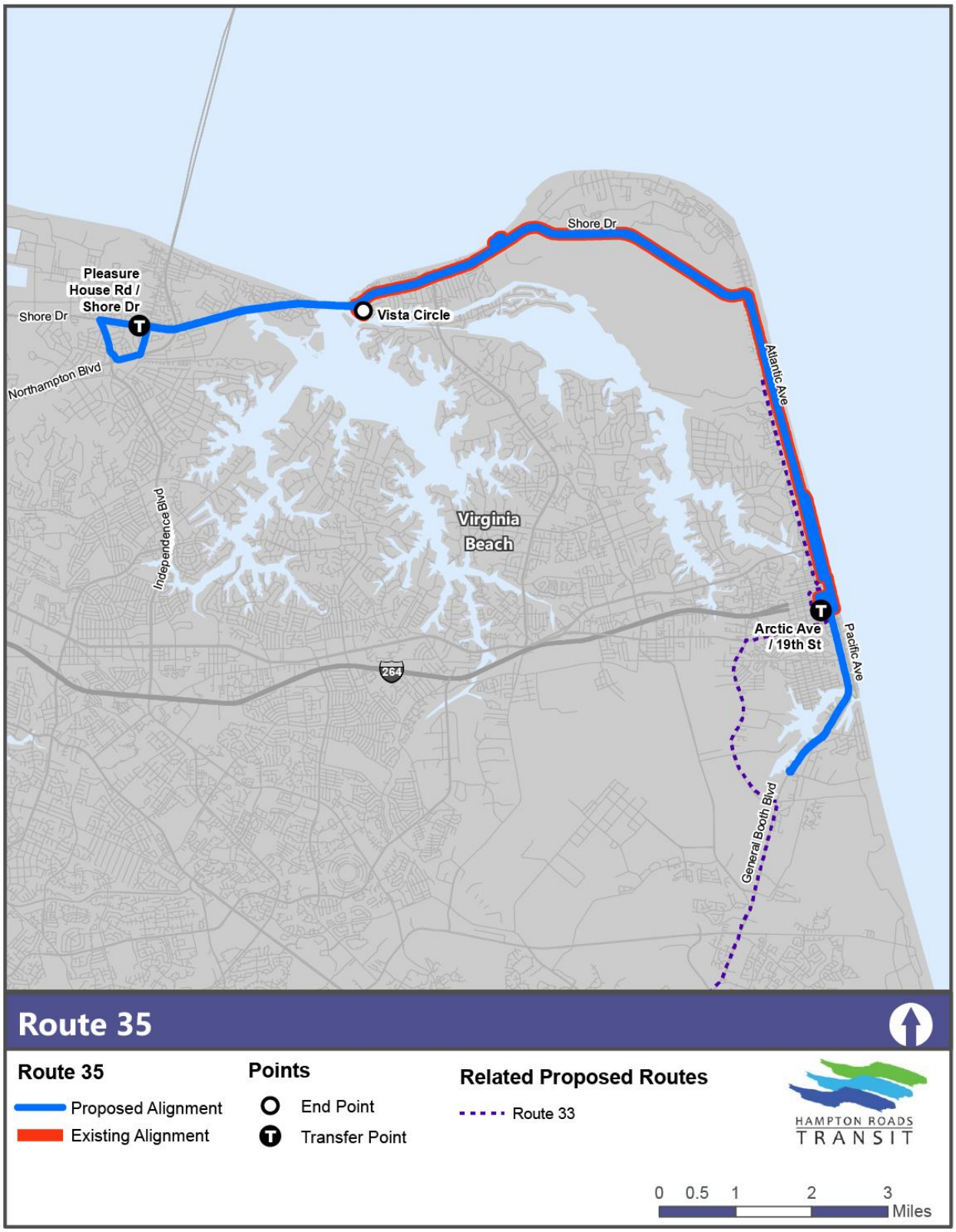


Existing



Proposed

Route Alignment Map



ROUTE 36

Holland Road

Service Type: Local
Jurisdictions Served: Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

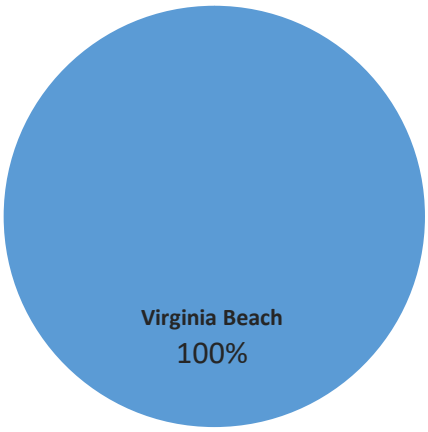
Route 36 is proposed to be extended to Pleasure House Road & Shore Drive north of Pembroke East. The extension would operate northbound via Corporation Lane, then a left onto Constitution Drive, a right onto Virginia Beach Boulevard, a right onto Independence Boulevard, right onto Pleasure House Road, and left onto Shore Drive, ending just after the intersection. Route 36 would cover the Independence Boulevard corridor previously served by Route 1. The Route 36 would now provide a cross regional connection between Shore Drive and TCC Virginia Beach, which previously required a transfer.

During the weekday peak periods, service between Pembroke East and Pleasure House Road & Shore Drive should be offered every 15-minutes, while midday service should operate every 30-minutes. Outside of those weekday periods the existing frequencies should be maintained. On Saturdays, increase the service along the length of the route to every 30-minutes, and add hourly Sunday service. The additional Sunday service would satisfy the request of residents to have more consistent accessibility across the region during the weekends.

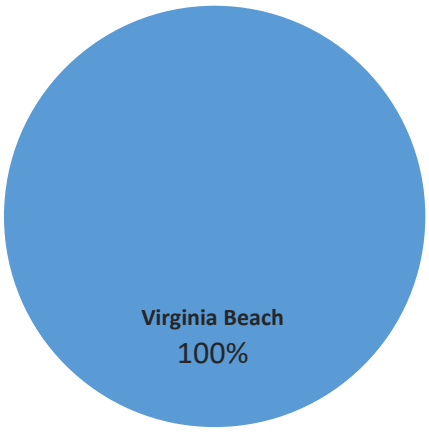
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:48 AM - 10:41 PM	5:48 AM - 10:41 PM
Saturday		6:10 AM - 10:43 PM	6:10 AM - 10:43 PM
Sunday		-	6:10 AM - 10:43 PM
Origin and Destinations			
		Existing	**Proposed**
From		TCC-Virginia Beach	Pleasure House Rd / Shore Dr
To		Pembroke East	Pembroke East / TCC-Virginia Beach
Headway			
		Existing	**Proposed**
Weekday	Early	30	30 / 60
	AM Peak	30	15 / 30
	Midday	60	30 / 60
	PM Peak	30	15 / 30
	Evening	60	60 / 60
	Late Night	60	60 / 60
Saturday		60	30
Sunday		-	60

Weekly Service Mile Change by Jurisdiction

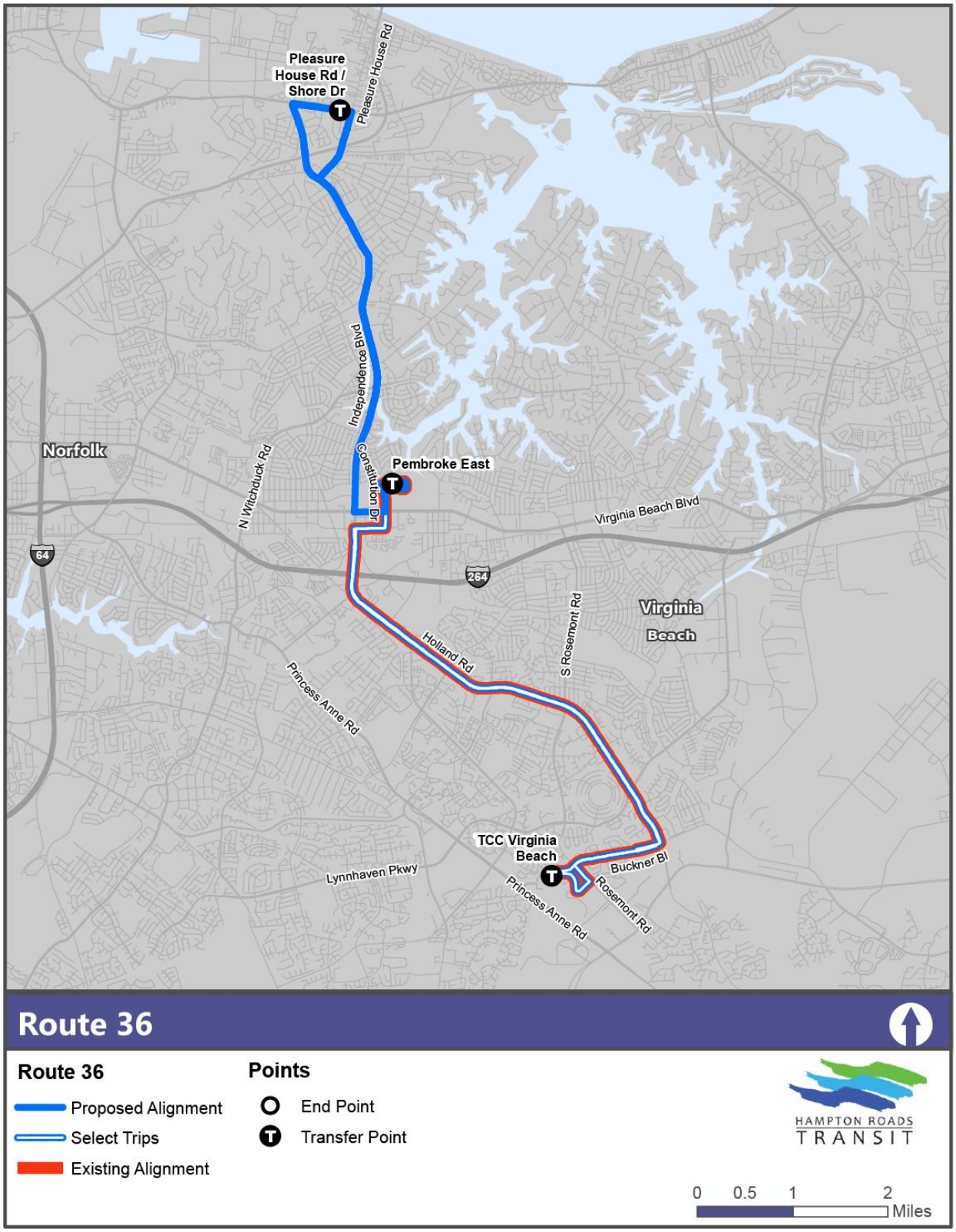


Existing



Proposed

Route Alignment Map



ROUTE 38

Lynnhaven Parkway

Service Type: Local
Jurisdictions Served: Virginia Beach and Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

This new route would provide a high frequency connection from the Virginia Beach Oceanfront to Greenbrier Mall. Heading westbound, the route would begin at the Arctic Avenue & 19th Street Transfer Hub, turn right onto 19th Street, right onto Park Avenue, and left onto 22nd Street to access I-264 West. Exit onto Lynnhaven Parkway and continue towards the TCC Virginia Beach. The route would then turn left onto Rosemont Road, right onto Buckner Boulevard, service the TCC Virginia Beach, and then right onto Independence Boulevard, and left onto Lynnhaven Parkway. The route would then continue onto Volvo Parkway, turn right onto Greenbrier Parkway, and right onto Ring Road to serve the Greenbrier Mall.

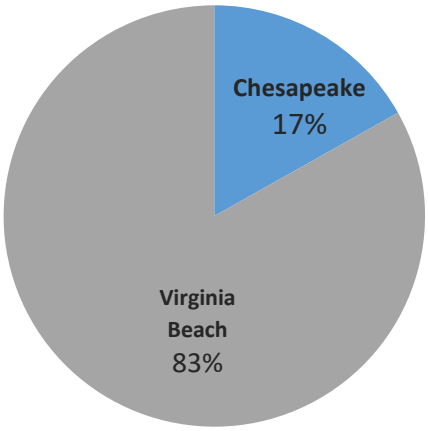
Route 38 would fill a need for a high frequency connection between major activity centers in Virginia Beach and Chesapeake. Activity centers served would include Virginia Beach Oceanfront, Lynnhaven Mall, Tidewater Community College, Pleasant Valley Marketplace, Orchard Square Shopping Center, Greenbrier Mall, and Greenbrier County Club. In replacing discontinued segments on Routes 12, 26, and 29, Route 38 would allow these routes to more efficiently serve the communities they serve.

On weekdays, Route 38 should operate with 15-minute frequency during morning and afternoon peak periods; 30-minute frequencies during midday and evening periods; and hourly frequency during the late-night period. On Saturdays, operate on a 30-minute frequency; on Sunday, service operate hourly service. The projected demand for service in this region justifies high frequency service during peak periods, and lower frequency service during other periods.

Existing and Proposed Level of Service

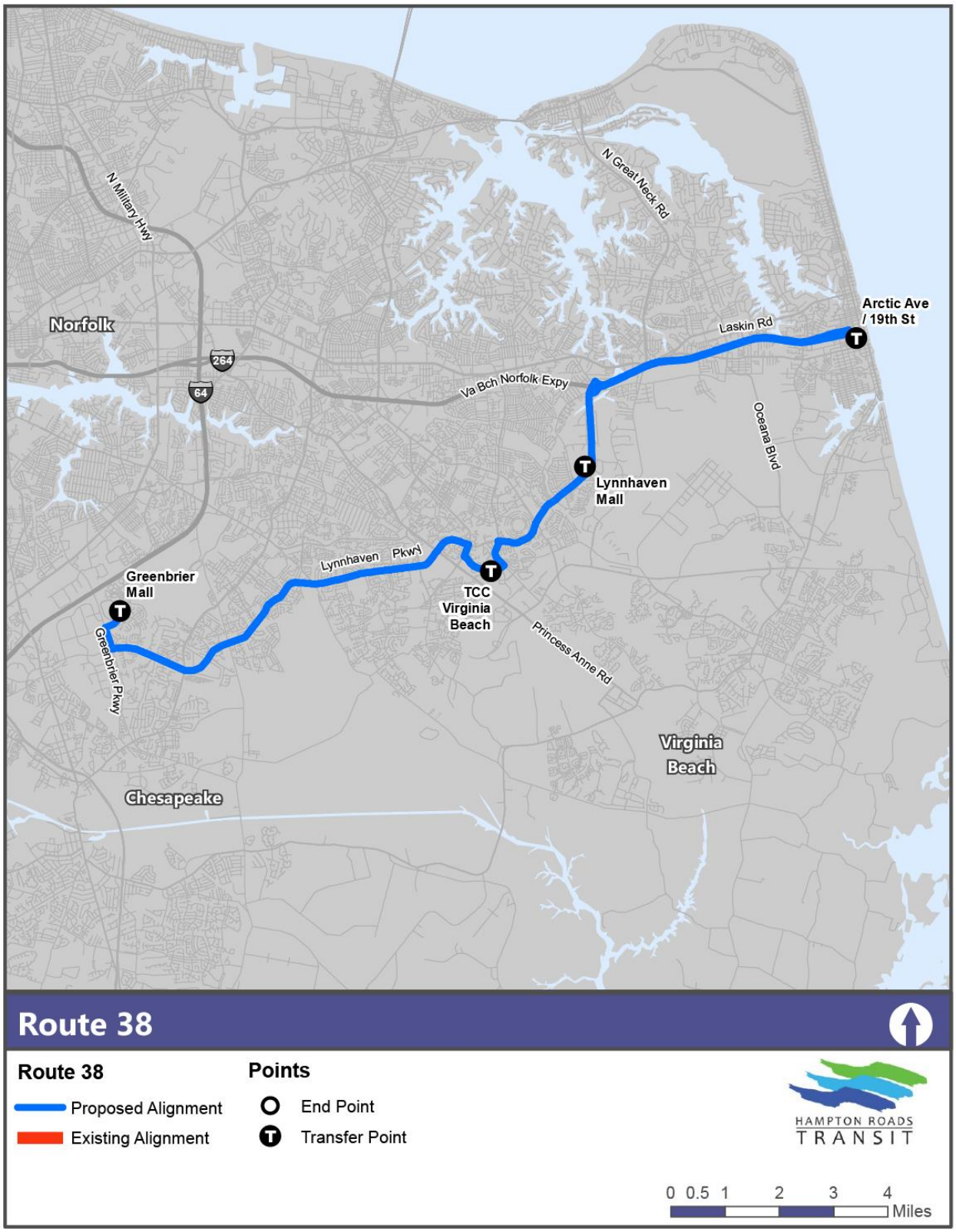
Span			
		Existing	Proposed
Weekday		-	6:00 AM - 12:00 AM
Saturday		-	6:00 AM - 12:00 AM
Sunday		-	6:00 AM - 12:00 AM
Origin and Destinations			
		Existing	**Proposed**
From		-	Greenbrier Mall
To		-	Virginia Beach Oceanfront
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	-	15
	Midday	-	30
	PM Peak	-	15
	Evening	-	30
	Late Night	-	60
Saturday		-	30
Sunday		-	60

Weekly Service Mile Change by Jurisdiction



Proposed

Route Alignment Map



ROUTE 41

Cradock

Service Type: Local
Jurisdictions Served: Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

The recommendation for Route 41 calls for an extension to the Downtown Norfolk Transit Center. Operating from the County Street & Court Street Hub the route would continue westbound via County Street, a left on Effingham Street, left onto Bart Street, and then access I-264. The route would use the Downtown Tunnel to get to Downtown Norfolk. Upon exiting the tunnel, the service would turn left on St Pauls Boulevard, right on Waterside Drive, merge onto Boush Street, right on City Hall Avenue, left on St Pauls Boulevard, right on Brambleton Avenue, right on Church Street and right on E Charlotte Street to access the Downtown Norfolk Transit Center.

In Portsmouth, the route would no longer serve Port Centre Parkway, 7th Street, Lincoln Street, 8th Street and Portsmouth Boulevard, east of Effingham Street, but would instead continue straight onto County Street after leaving the Court & County Hub, and then turn left on Effingham to continue onto George Washington Highway. The Route would also no longer deviate onto Afton Parkway and would bypass the existing deviation onto Gust Lane, Avondale Road, Roosevelt Boulevard, and Greenwood Drive, but would instead continue straight on Victory Boulevard and take a right onto Greenwood Drive. The service would then follow the existing route to Victory Crossing. Service on Gust Lane, Avondale Road, Roosevelt Boulevard and Greenwood Drive would be replaced with Route 57 (Greenbrier Mall – Chesapeake Crossing – Victory Crossing – High Street & Florida Avenue), and service along Portsmouth Boulevard and Port Centre Parkway would be replaced with Route 45 (Starmount & Jolliff – Victory Crossing – County Street & Court Street – Downtown Norfolk).

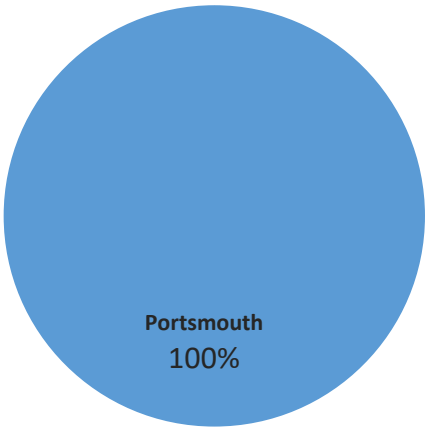
The Route 41 currently does not meet the system-wide standard for on-time performance; the proposed alignment, with fewer deviations, would provide a more direct connection from Downtown Norfolk to Victory Crossing, and minimized diversions along with greatly improved route directness would help improve the service's performance. Although this proposal would remove service from stops serving 137 passengers, approximately a third of those stops are within a quarter mile of other proposed local bus services. The extension to Downtown Norfolk would be coordinated with Route 45 trips through the tunnel, providing more direct access from Portsmouth to Downtown Norfolk.

On weekdays, the service should operate with 30-minute frequency during early morning, peak and midday periods, as well as on Saturdays. Weekday service should be extended to 10:00 PM, as boardings per hour regular surpass 70 passengers between 7:00 AM and 5:00 PM (and often continue through the 6 o'clock hour), which suggests that this route can support 30-minute service until 7:00 PM. In addition, because this new alignment would cover the portion of the current Route 45 to and from Downtown Norfolk (replacing every other Route 45 trip), Route 41 would now operate until 10:00 PM to match the span of service of the existing Route 45. Demand also suggests that Sunday service would be successful on this route, which should be initially offered every 60-minutes.

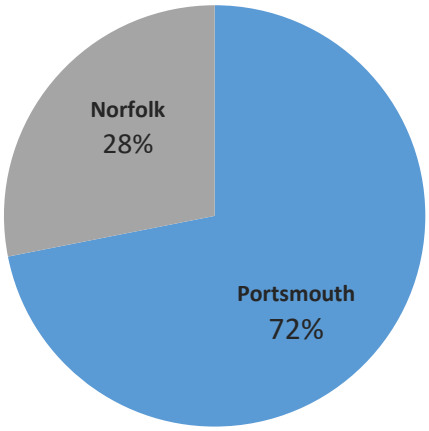
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:56 AM - 6:53 PM	5:56 AM - 10:00 PM
Saturday		6:03 AM - 6:55 PM	6:03 AM - 6:55 PM
Sunday		-	6:03 AM - 6:55 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Portsmouth	Downtown Norfolk Transit Center
To		Victory Crossing	Victory Crossing
Headway			
		Existing	**Proposed**
Weekday	Early	60	30
	AM Peak	60	30
	Midday	60	30
	PM Peak	60	30
	Evening	60	60
	Late Night	-	-
Saturday		60	30
Sunday		-	60

Weekly Service Mile Change by Jurisdiction

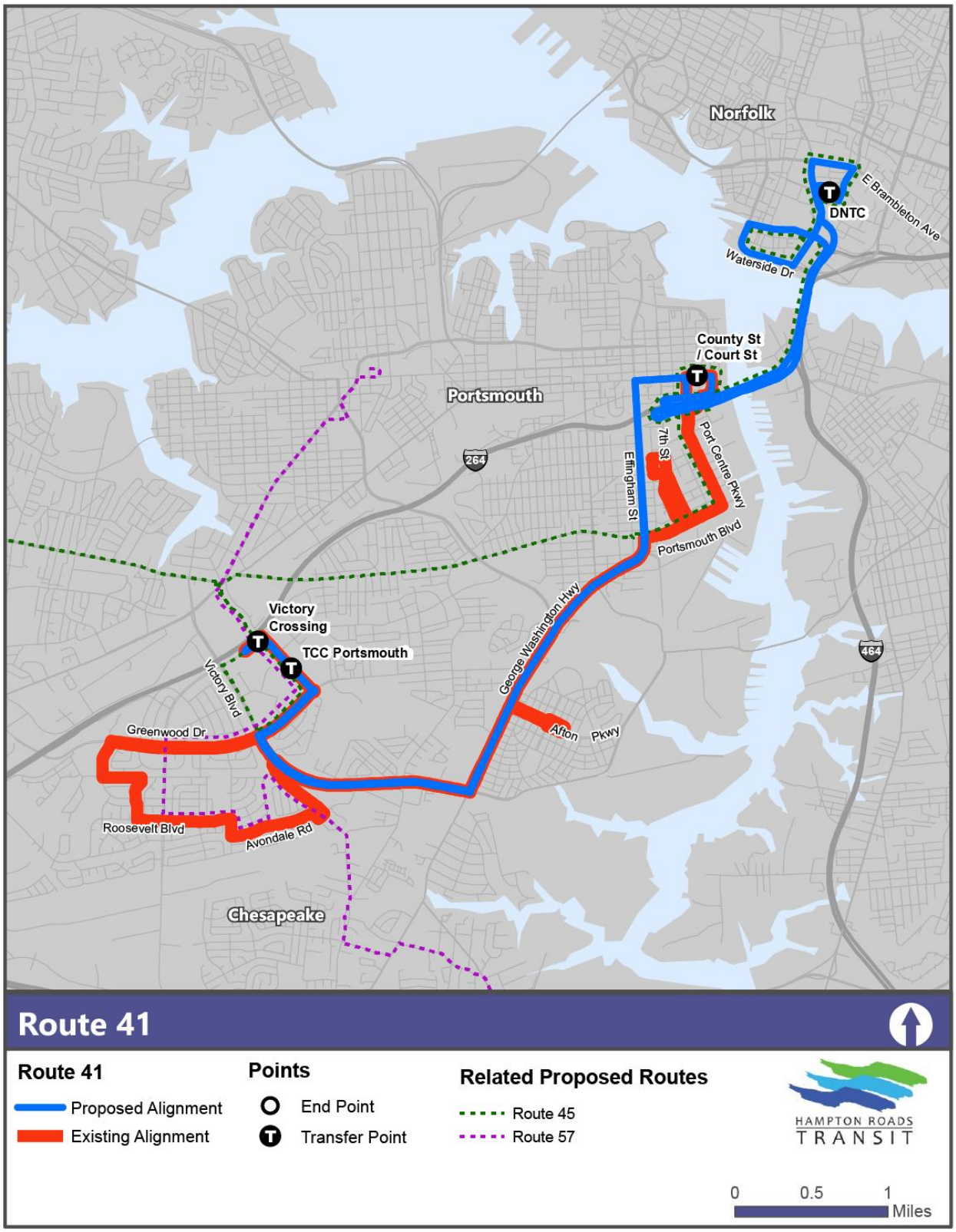


Existing



Proposed

Route Alignment Map


Norfolk
DNTC
E Brambleton Ave
Waterside Dr
County St / Court St
Portsmouth
264
7th St
Effingham St
Port Centre Pkwy
Portsmouth Blvd
George Washington Hwy
Victory Crossing
TCC Portsmouth
Victory Blvd
Greenwood Dr
Roosevelt Blvd
Avondale Rd
Afton Pkwy
464
Chesapeake
Route 41
Route 41
Proposed Alignment
Existing Alignment
Points
End Point
Transfer Point
Related Proposed Routes
Route 45
Route 57
HAMPTON ROADS TRANSIT
0 0.5 1
Miles

ROUTE 43

Parkview

Service Type: Local
Jurisdictions Served: Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

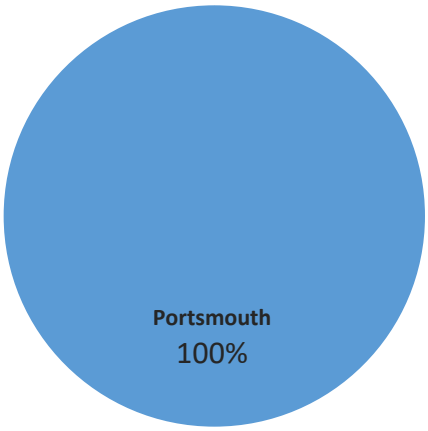
Route 43 is recommended for elimination, with the service being replaced with the proposed Route 47 (College & Lakeview – High Street & Florida Avenue – County Street & Court Street), which would continue the connection between High Street and Florida Avenue, and County Street & Court Street Hub; the proposed Route 50 (Victory Crossing – County Street & Court Street), which would provide service on Crawford Parkway, Effingham Street and High Street; and the proposed Route 57 (High Street & Florida Avenue – Victory Crossing – Chesapeake Crossing – Greenbrier Mall), which would continue to connect the Mid-City Shopping Center with High Street and Florida Avenue.

Route 43 is one of HRT's lowest performing routes. It consistently performed below average in the passenger per hour, farebox recovery and subsidy per passenger metrics. It averages approximately 129 passengers on each weekday, ranking 55th out of HRT's 70 existing routes. The consolidation of this route with other services would improve the efficiency of the overall system. Although the proposed alignment would seemingly eliminate direct local service for 48 passengers, the majority of these boardings occur at Mid-City Shopping Center, which would be served by Route 57.

Existing and Proposed Level of Service

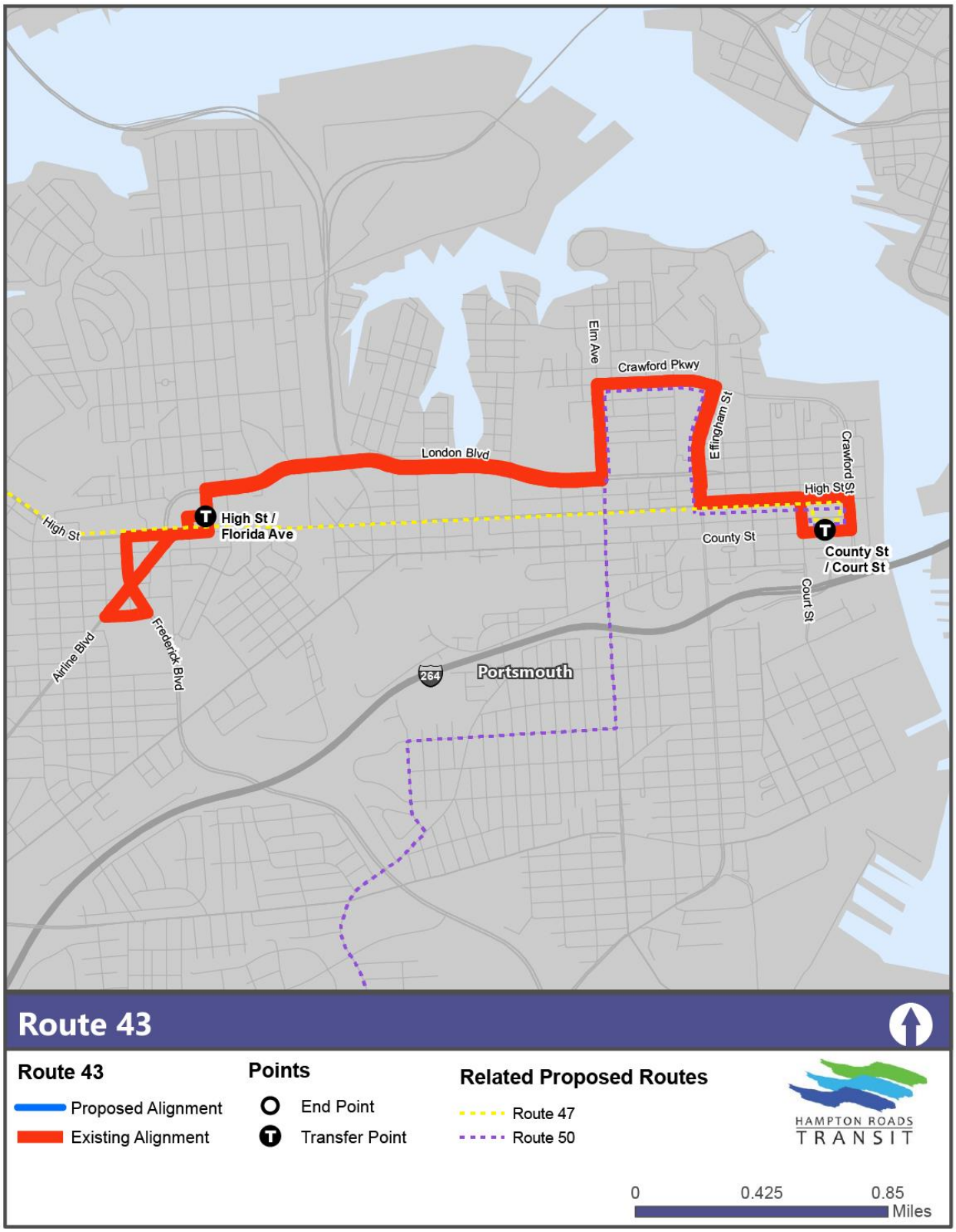
Span			
		Existing	Proposed
Weekday		6:36 AM - 6:23 PM	-
Saturday		6:47 AM - 6:01 PM	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		County Street	-
To		Bart Street	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 44

Midtown

Service Type: Local
Jurisdictions Served: Chesapeake, Norfolk and Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

Route 44 is proposed to be extended southbound after serving Victory Crossing via Airline Boulevard until Sunkist Road and Airline Boulevard, and extended eastbound to the Downtown Norfolk Transit Center. Service would be discontinued on Portsmouth Boulevard west of Turnpike Road, which would be serviced by the proposed Route 45 (Starmount & Jolliff – Victory Crossing & County & Court Street – Downtown Norfolk).

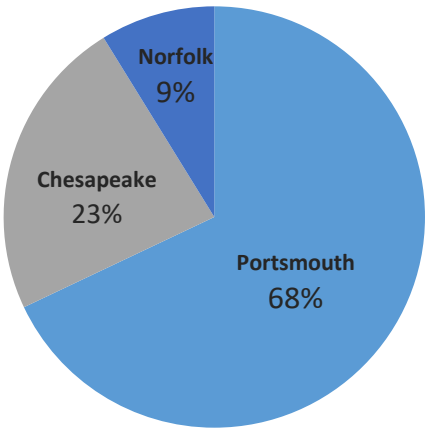
The recommended alignment provides a more direct service along Airline Boulevard that would improve Route 44's on-time performance, which is currently 73 percent (below the agency standard). The east-west connection along Portsmouth Boulevard to Victory Crossing and beyond would be more efficiently served by the proposed Route 45. This proposed alignment swap would not eliminate bus service at any stops.

The extension to the DNTC in Downtown Norfolk and service on Sundays is a result of feedback received during the TDP public outreach process.

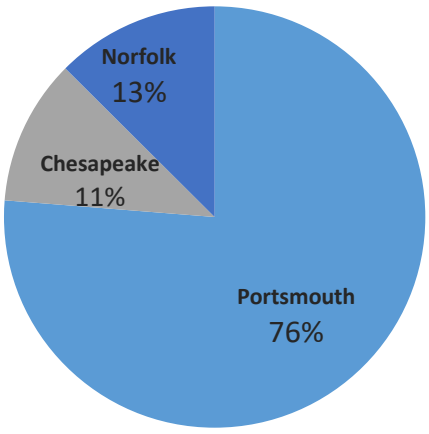
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:05 AM - 10:02 PM	6:05 AM - 10:02 PM
Saturday		6:05 AM - 10:01 PM	6:05 AM - 10:01 PM
Sunday		-	6:05 AM – 6:55 PM
Origin and Destinations			
		Existing	**Proposed**
From		Sentara Norfolk General Hospital	Sentara Norfolk General Hospital
To		Starmount Parkway	Airline Blvd
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	60

Weekly Service Mile Change by Jurisdiction

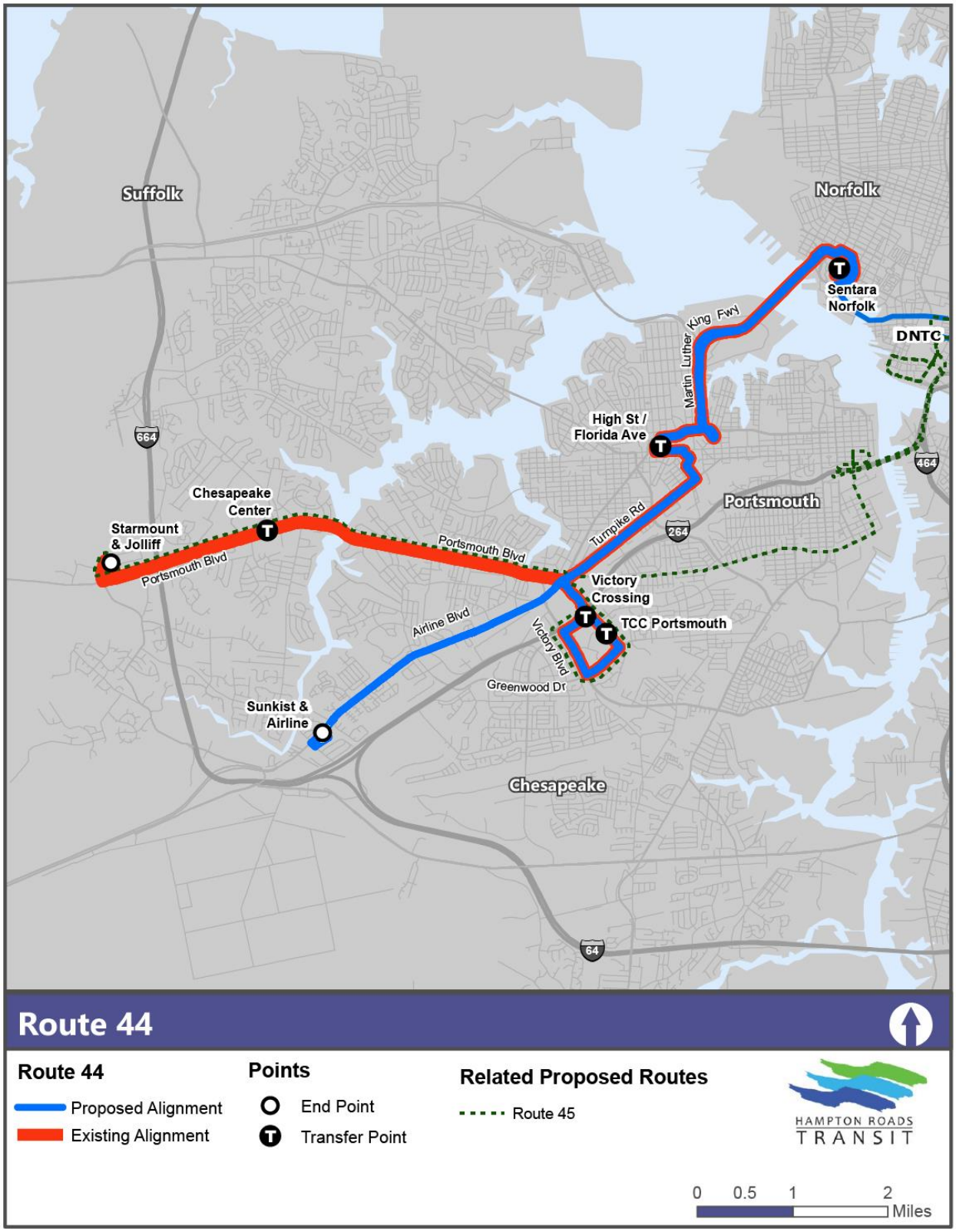


Existing



Proposed

Route Alignment Map



ROUTE 45

Portsmouth Boulevard

Service Type: Local
Jurisdictions Served: Norfolk, Chesapeake and Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

The recommended Route 45 would be realigned to operate via Port Centre Parkway and Portsmouth Boulevard, instead of via Effingham Street and Court Street (service along these corridors would be replaced with the realigned Route 41 (Victory Crossing – County Street & Court Street – Downtown Norfolk). Route 45 would also be extended from Victory Crossing to Starmount & Jolliff, via Portsmouth Boulevard.

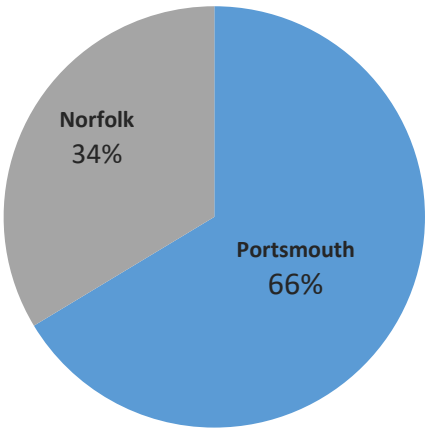
Route 45 is a high performing route in farebox recovery and performs above average in subsidy per passenger and the passengers per hour metrics, and is ranked sixth in weekday ridership. Transferring service off County and Effingham Streets and onto Port Centre Parkway, to cover an area previously served by Route 41, would improve route directness and decreasing travel times for the current passengers. In addition, the proposed extension via Portsmouth Boulevard to Starmount Parkway would provide an enhanced east/west connection across the Portsmouth region. Finally, passengers looking to travel to and from Downtown Norfolk along Portsmouth Boulevard would enjoy an enhanced one-seat ride. The proposed alignment would not eliminate bus service at any stops.

The span and frequency of service for the Route 45 would remain the same; however, service between Victory Crossing and Starmount Parkway would only be offered hourly.

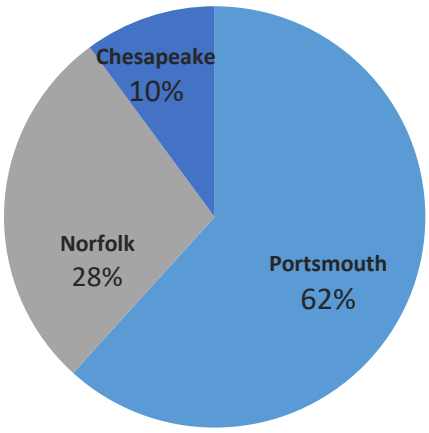
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:39 AM - 11:54 PM	4:39 AM - 11:54 PM
Saturday		5:10 AM - 12:51 AM	5:10 AM - 12:51 AM
Sunday		6:06 AM - 10:51 PM	6:06 AM - 10:51 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Victory Crossing & TCC - Portsmouth	Victory Crossing & TCC - Portsmouth / Starmount Parkway
Headway			
		Existing	**Proposed**
Weekday	Early	30	30 / 60
	AM Peak	15	15 / 60
	Midday	30	30 / 60
	PM Peak	15	15 / 60
	Evening	60	60 / 60
	Late Night	60	60 / 60
Saturday		30	30 / 60
Sunday		60	60 / 60

Weekly Service Mile Change by Jurisdiction

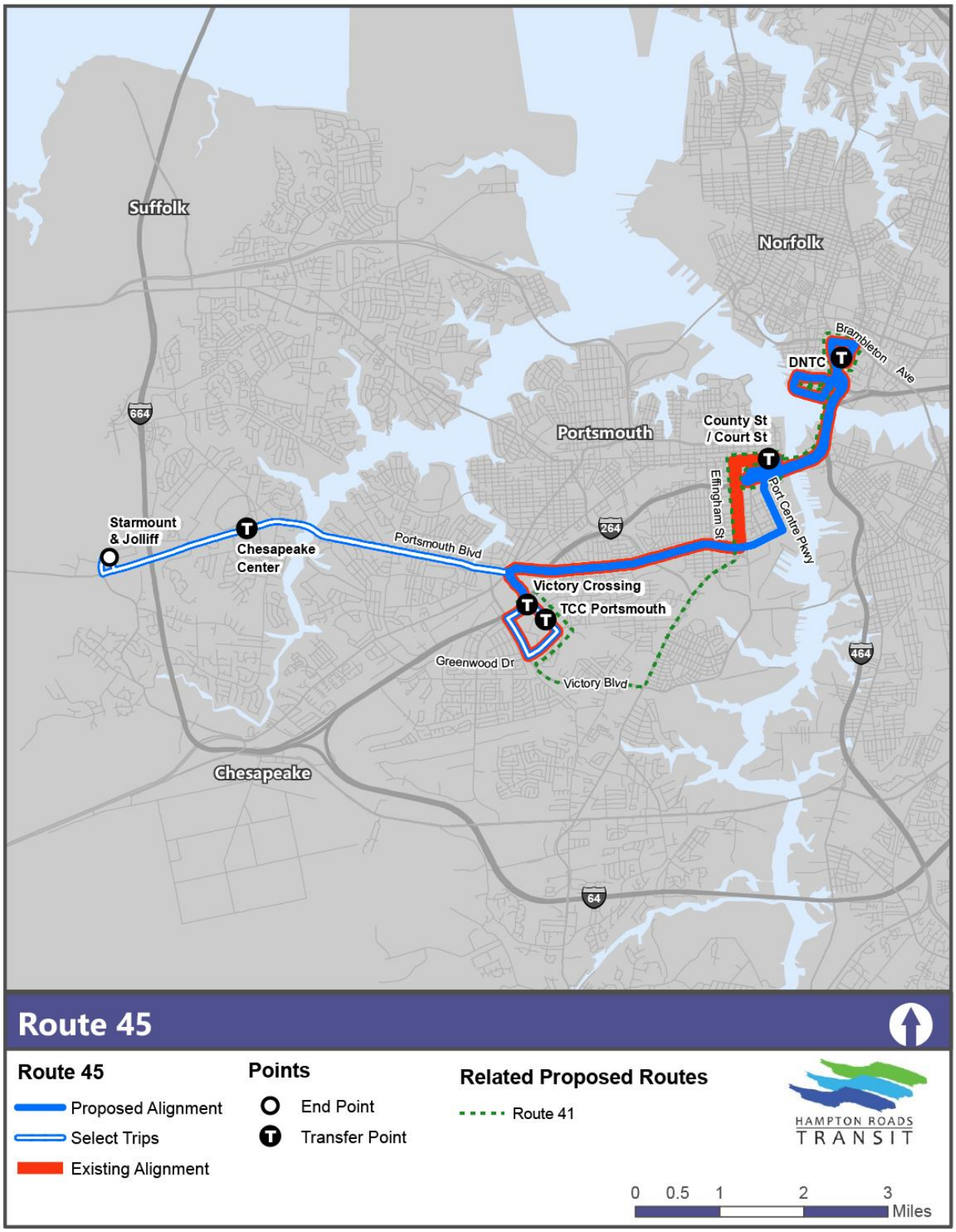


Existing



Proposed

Route Alignment Map



ROUTE 47

High Street

Service Type: Local
Jurisdictions Served: Portsmouth and Suffolk

POTENTIAL SERVICE IMPROVEMENTS

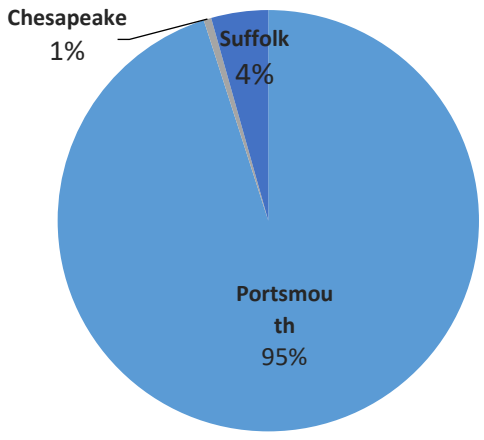
Service between Churchland and Lake View & College will be increased to every 30-minutes during the weekdays and added at a frequency of every 60-minutes on Saturdays.

This improvement is a result of feedback received during the TDP public outreach process.

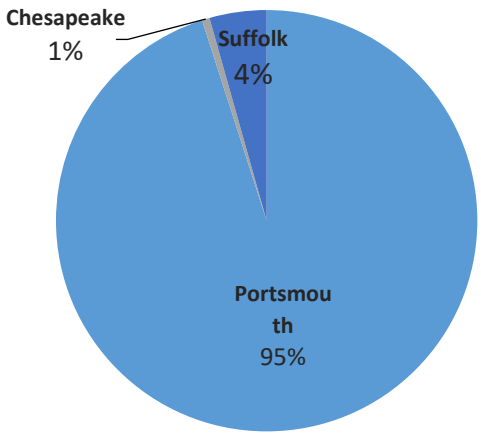
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:49 AM - 10:30 PM	5:49 AM - 10:30 PM
Saturday		6:03 AM - 10:30 PM	6:03 AM - 10:30 PM
Sunday		6:33 AM - 7:30 PM	6:33 AM - 7:30 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Portsmouth	Downtown Portsmouth
To		Churchland / Lakeview Industrial Park	Churchland / Lakeview Industrial Park
Headway			
		Existing	**Proposed**
Weekday	Early	30 / 60	30 / 30
	AM Peak	15 / 60	15 / 30
	Midday	30 / 60	30 / 30
	PM Peak	15 / 60	15 / 30
	Evening	30 / 60	30 / 30
	Late Night	60 / -	60 / 60
Saturday		30 / -	30 / 60
Sunday		60 / -	60 / 60

Weekly Service Mile Change by Jurisdiction

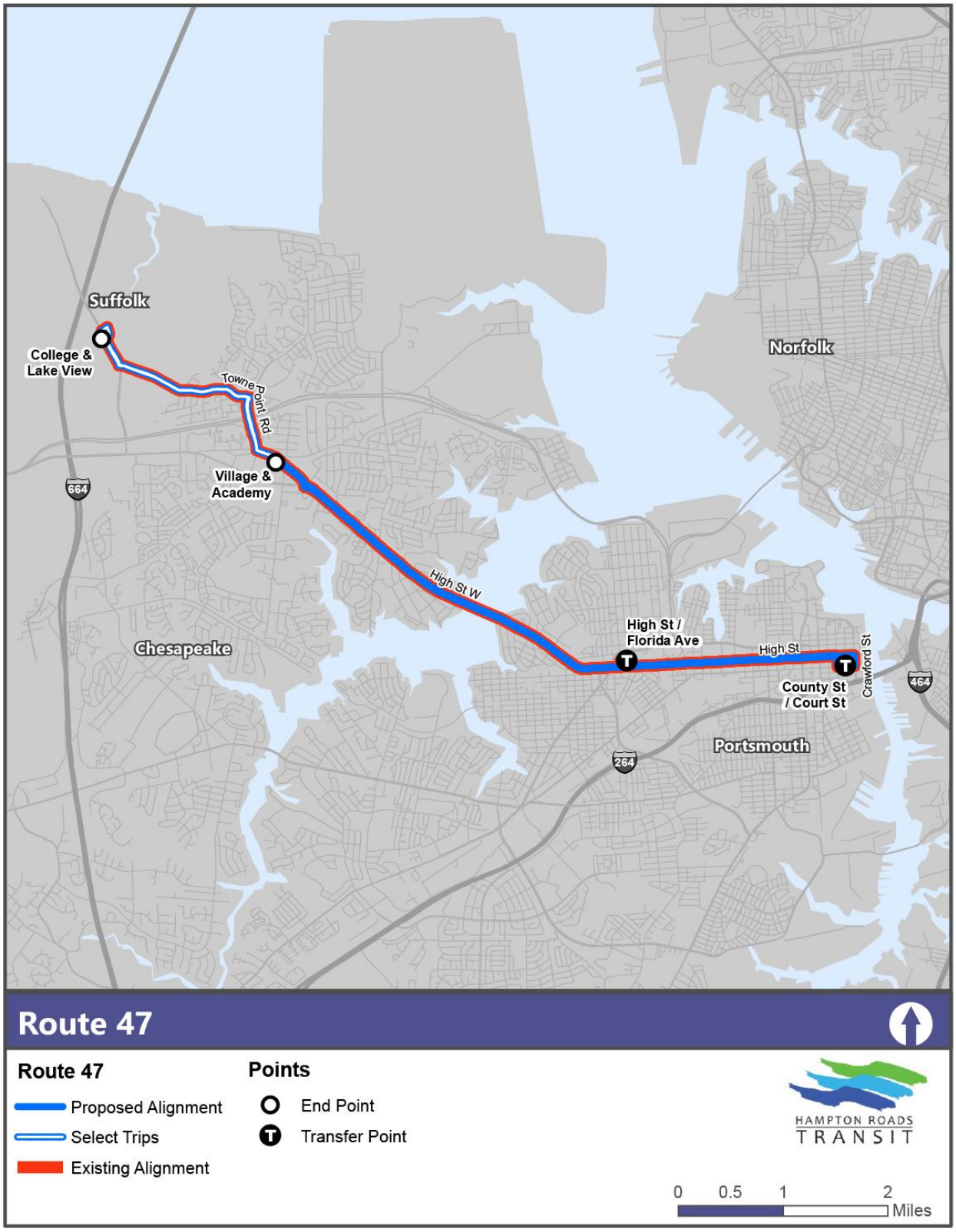


Existing



Proposed

Route Alignment Map



ROUTE 50

Academy Park

Service Type: Local
Jurisdictions Served: Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

Realign the route off County Street, replacing service on County Street, east of Effingham Street, with Route 41 (Victory Crossing – County Street & Court Street – Downtown Norfolk). The new alignment, upon exiting County Street & Court Street Hub would turn right onto Court Street, a left on High Street, a right on Effingham Street, a left Crawford Parkway, and a right on Elm Street, where it would continue its existing route alignment after County Street to Victory Crossing.

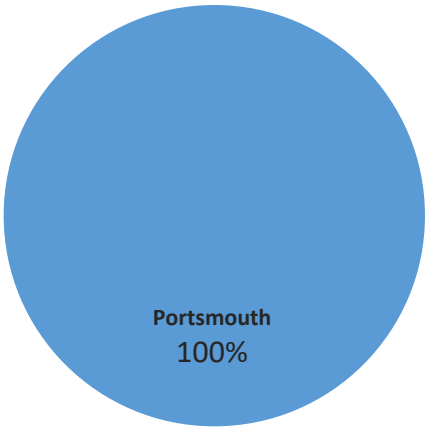
This realignment would provide transit coverage to areas previously covered by the eliminated Route 43. It would also prevent duplicative service along County Street, the eastern portion of which would be served by Route 41. Although 14 daily weekday boardings would be impacted, these stops are each within a quarter mile of the proposed Route 50 and Route 41 alignments.

It is also recommended to add Sunday service at a frequency of every 60-minutes. This recommendation is a result of feedback received during the TDP public outreach process.

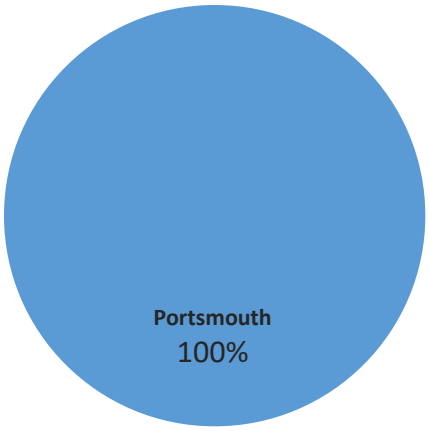
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:03 AM - 6:55 PM	6:03 AM - 6:55 PM
Saturday		7:03 AM - 6:29 PM	7:03 AM - 6:29 PM
Sunday		-	7:03 AM - 6:29 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Portsmouth	Downtown Portsmouth
To		Victory Crossing	Victory Crossing
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	60

Weekly Service Mile Change by Jurisdiction

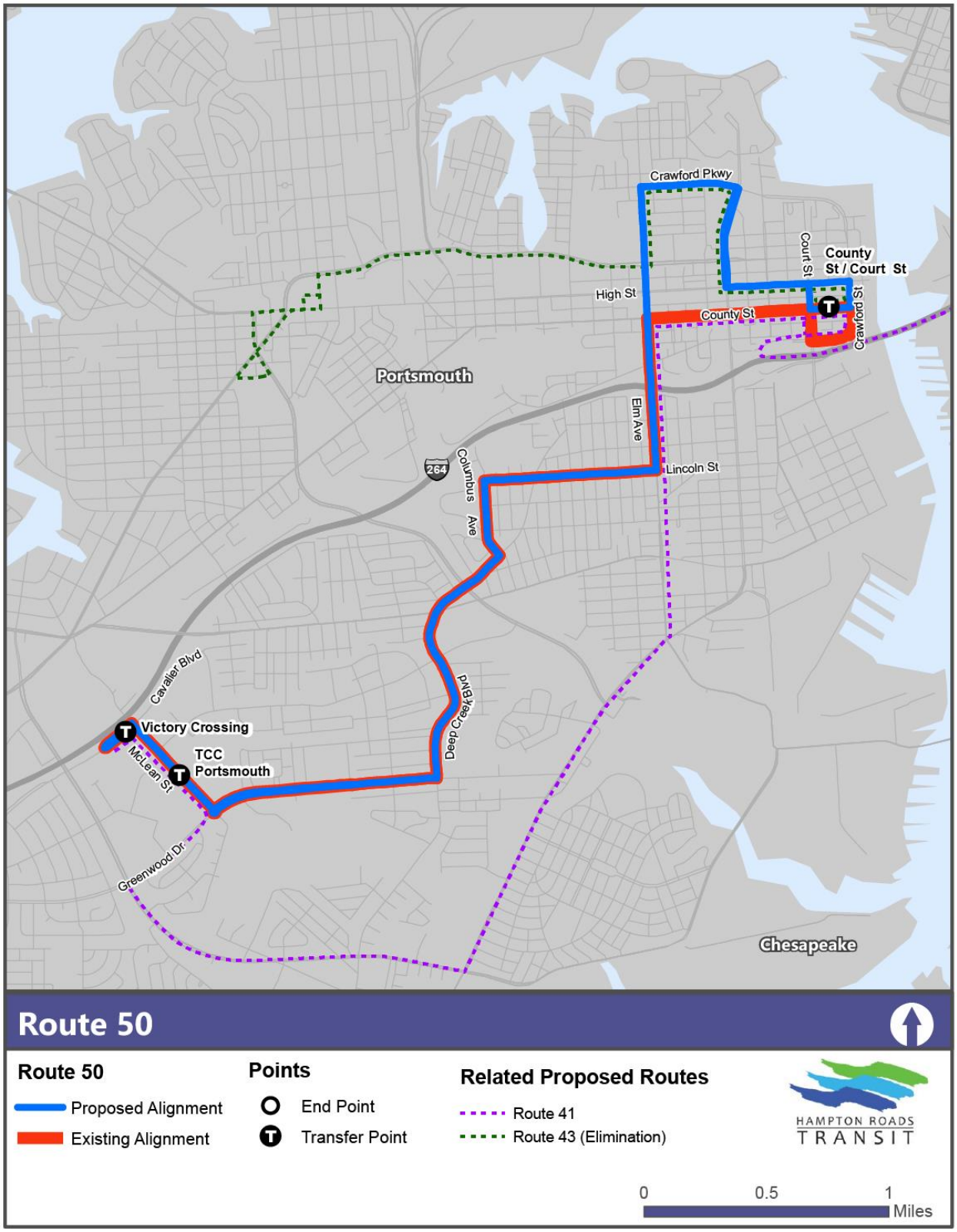


Existing



Proposed

Route Alignment Map



ROUTE 55

Greenbrier Circulator

Service Type: Local
Jurisdictions Served: Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

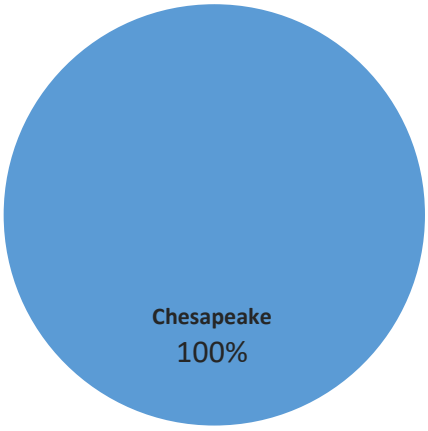
It is recommended that the Route 55 be eliminated and replaced by the proposed Route 57 (Greenbrier Mall – Chesapeake Crossing – Victory Crossing – High Street & Florida Avenue), which would provide service on Greenbrier Parkway, Crossways Boulevard, Kristina Way, and Volvo Parkway, and by Route 13 (Greenbrier Mall – Chesapeake Crossing – Seaboard Avenue & Liberty Street – Downtown Norfolk), which would offer service on Military Highway and Greenbrier Parkway.

Both Route 13 and 57 would connect Chesapeake Crossing to Greenbrier Mall, with Route 57 also providing connections to the neighborhoods surrounding the Greenbrier Mall.

Existing and Proposed Level of Service

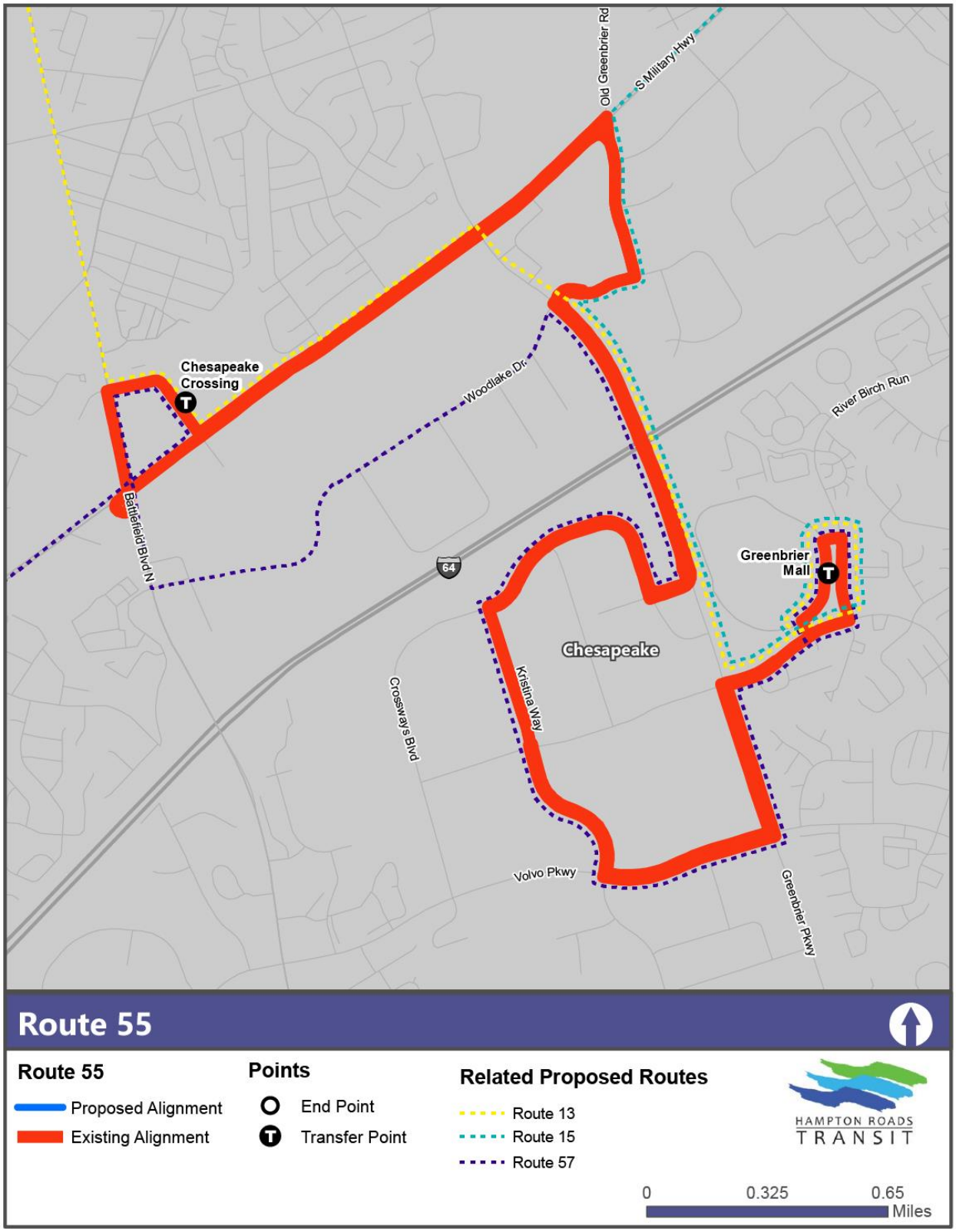
Span			
		Existing	Proposed
Weekday		6:30 AM - 7:56 PM	-
Saturday		7:48 AM - 8:12 PM	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Robert Hall Blvd	-
To		Greenbrier Mall	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 57

Deep Creek

Service Type: Local
Jurisdictions Served: Portsmouth and Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

In Chesapeake, the Route 57 would be extended from Chesapeake Crossing to Greenbrier Mall. The Route would operate south on N Battlefield Boulevard, take a right onto Woodlake Drive, a right on Greenbrier Parkway, a right on Crossways Boulevard, a left on Kristina Way, a left on Volvo Parkway, a left back onto Greenbrier Parkway and access the Greenbrier Mall on the right.

Service would be discontinued on Camelot Boulevard, west of Deep Creek Boulevard, as well as on King Arthur Drive, Aaron Drive, Sir Galahad Drive, and Guinevere Drive. The proposed Route 57 would instead be realigned onto Deep Creek Boulevard, and would then continue onto Gust Lane, a left on Bunche Boulevard, right on Roosevelt Boulevard, right on Cavalier Boulevard and a right onto Greenwood Drive, to continue onto TCC Portsmouth and Victory Crossing.

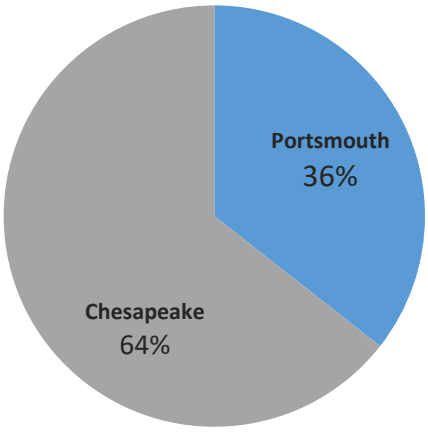
Service on the Route 57 would also be discontinued on Airline Boulevard, between Victory Boulevard and Sunkist Road. Route 57 would instead extend northward to High Street and Florida Avenue. After exiting Victory Crossing, take a right on Airline Boulevard, right on Bart Street, left on Frederick Boulevard, right on Airline Boulevard, right on High Street, left on Douglas Avenue, right on Queen Street, and right on Florida Avenue to end at the High Street & Florida Avenue Hub.

The proposal for Route 57 involves covering almost the entire alignment of the current Route 55 and providing a more direct connection from Chesapeake to Victory Crossing. By allowing Route 57 to remain on main thoroughfares, this proposal would improve route directness, minimize diversions, and raise on-time performance rates (at 71 percent, Route 57 falls well short of the agency standard for this metric). Despite these benefits, approximately 39 of current passengers would lose direct access to local bus service, particularly in the neighborhood off Camelot Boulevard. However, 22 of these passengers would be located within a quarter mile of proposed transit services.

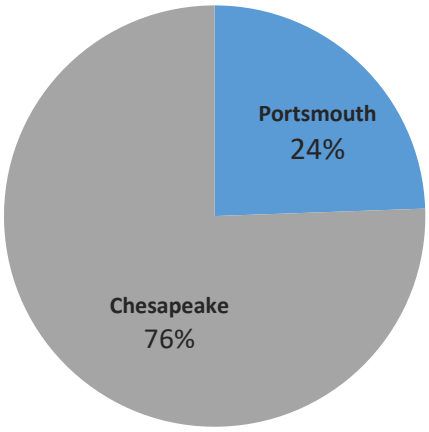
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:19 AM - 7:20 PM	6:19 AM - 7:20 PM
Saturday		6:18 AM - 7:20 PM	6:18 AM - 7:20 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Robert Hall Blvd	Greenbrier Mall
To		Airline Blvd	High Street & Florida Avenue
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

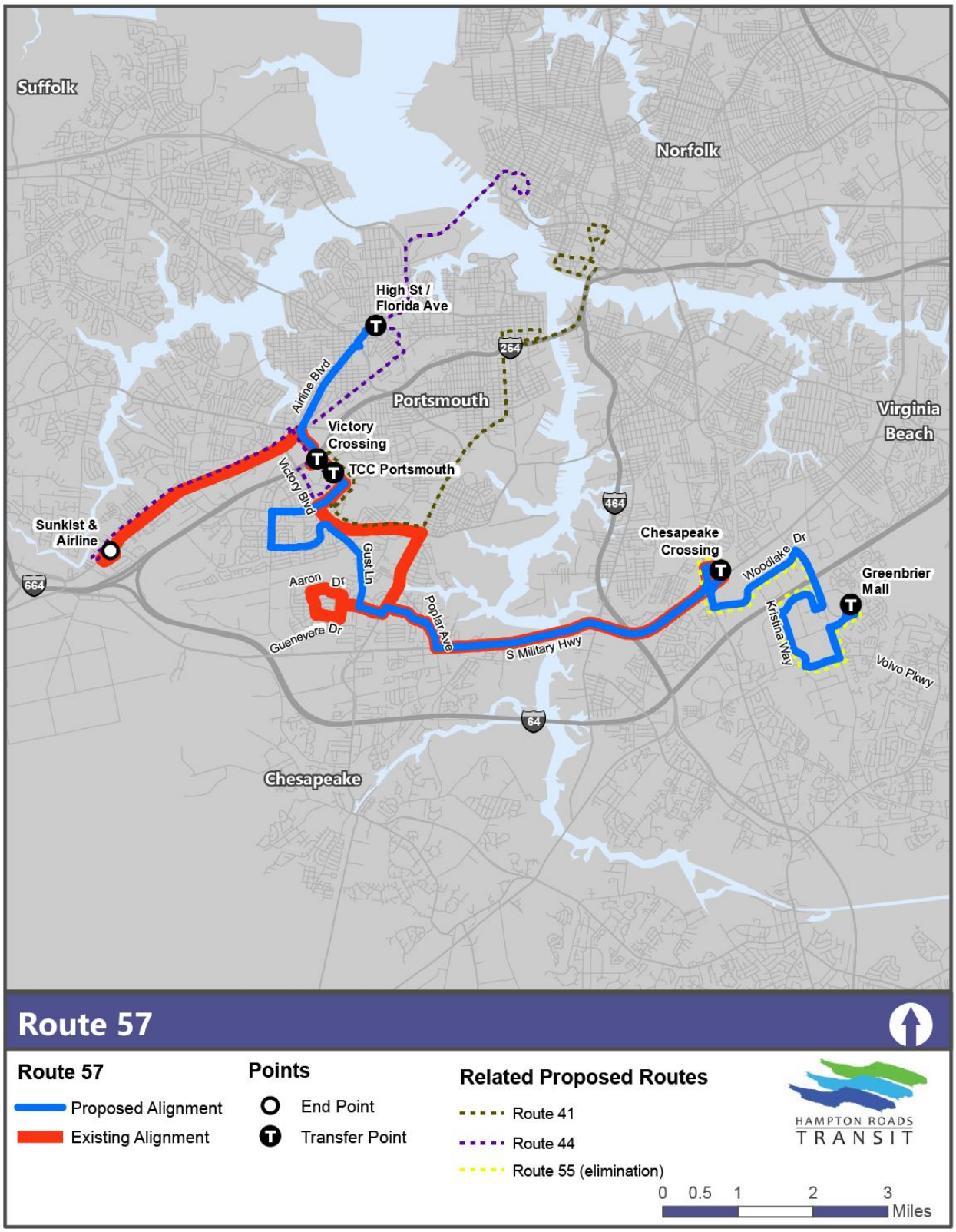


Existing



Proposed

Route Alignment Map



ROUTE 58

Bainbridge Boulevard

Service Type: Local
Jurisdictions Served: Chesapeake

POTENTIAL SERVICE IMPROVEMENTS

It is proposed that Route 58 service to Chesapeake Crossing via Great Bridge Boulevard, Campostella Road and Military Highway be discontinued. Service along Military Highway to Chesapeake Crossing would be offered on the proposed Route 57 (Greenbrier Mall – Chesapeake Crossing – Victory Crossing – High Street & Florida Avenue).

The Route 58 would instead be extended to Greenbrier Mall. From Libertyville Road, turn right onto Great Bridge Road, left onto Kempsville Road, left onto Greenbrier Parkway, and right onto Ring Road to serve Greenbrier Mall.

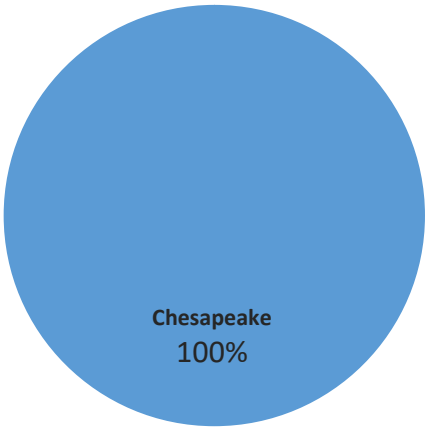
Route 58 would replace service lost via Route 14 along Great Bridge Boulevard between Riverwalk and Battlefield Boulevard. Route 58 is currently a low performing route, ranking 46th in weekday ridership, failing to meet the agency standard for on-time performance, and falling below the system averages for passengers per hour and passengers per trip. The changes to the route would attract new connections, the route would now serve Greenbrier Mall, a proposed major transfer hub with connections to high frequency service.

Under the proposed alignment, approximately 20 passengers would no longer receive direct transit service on Campostella Road between Military Highway and Libertyville Road.

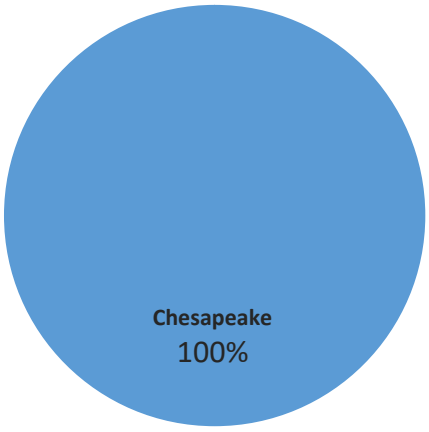
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:48 AM - 7:15 PM	5:48 AM - 7:15 PM
Saturday		5:48 AM - 7:15 PM	5:48 AM - 7:15 PM
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Seaboard Ave & Liberty St	Seaboard Ave & Liberty St
To		Chesapeake Crossing	Greenbrier Mall
Headway			
		Existing	**Proposed**
Weekday	Early	60	60
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

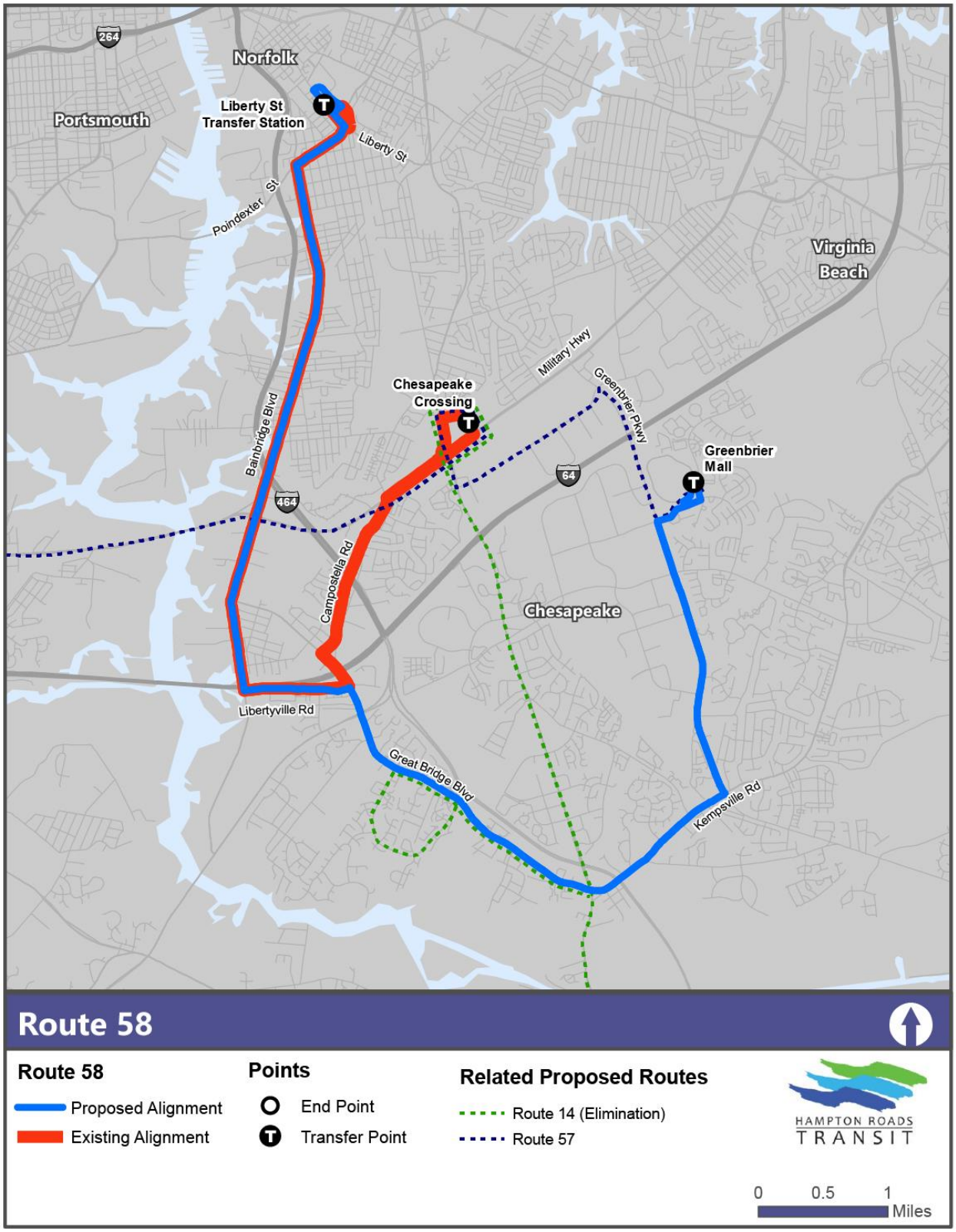


Existing



Proposed

Route Alignment Map



ROUTE 64

Smithfield

Service Type: Express
Jurisdictions Served: Newport News and Smithfield

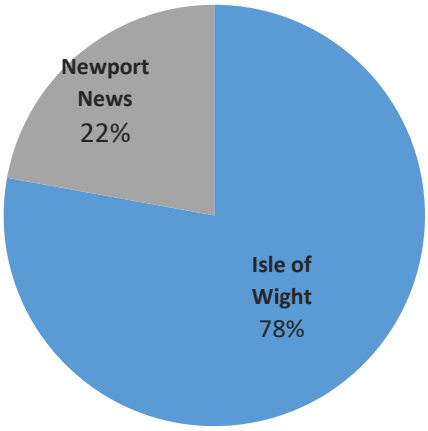
POTENTIAL SERVICE IMPROVEMENTS

To better serve Newport News Shipbuilding the existing service should be scheduled to meet shift start/end times.

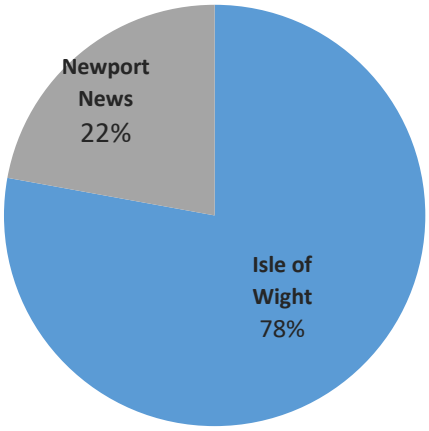
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:40 AM – 7:52 AM; 2:10 PM – 5:27 PM	4:40 AM – 7:52 AM; 2:10 PM – 5:27 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newport News	Newport News
To		Smithfield	Smithfield
Headway			
		Existing	**Proposed**
Weekday	Early	1 Trip	1 Trip
	AM Peak	1 Trip	1 Trip
	Midday	1 Trip	1 Trip
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

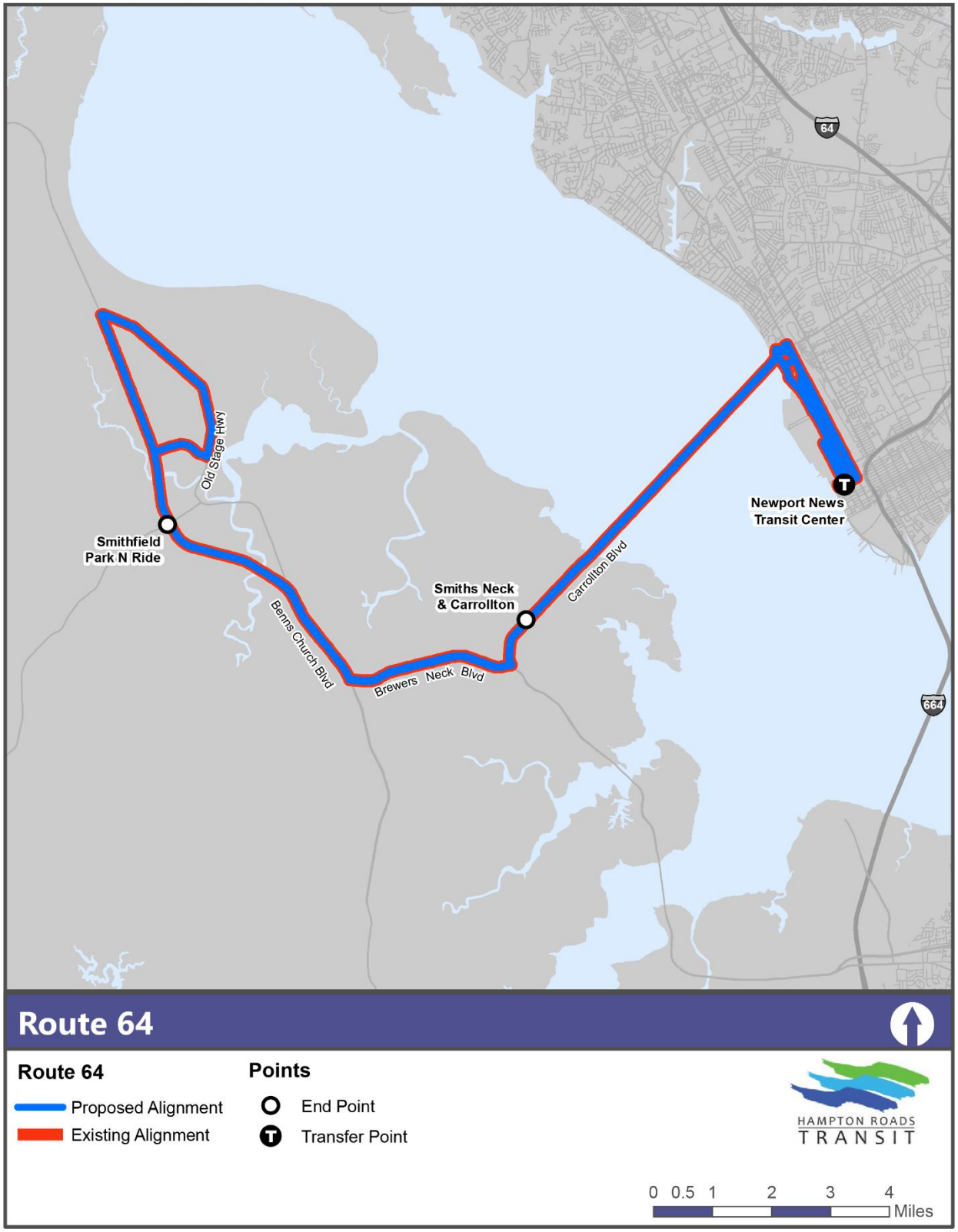


Existing



Proposed

Route Alignment Map



ROUTE 101

Kecoughtan Road

Service Type: Local
Jurisdictions Served: Hampton and Newport News

POTENTIAL SERVICE IMPROVEMENTS

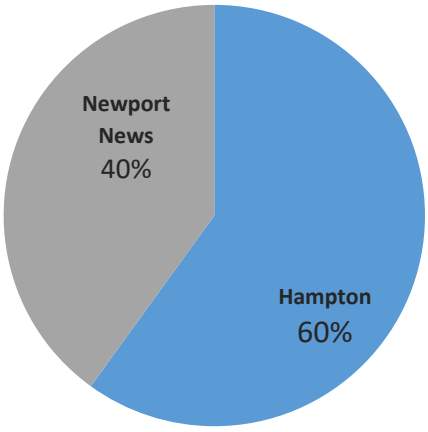
No alignment changes are proposed for the Route 101; however, service levels would be increased to match the demand along the service corridor. On weekdays, it is proposed that the Route 101 would increase frequency during the peak periods to every 15-minutes, and during early, midday and evening periods to every 30-minutes. In general, Route 101 is a high performing route in terms of passengers per hour and subsidy per passenger in comparison to other local routes, which justifies an increase in the level of service. Route 101 also reaches 80 average boardings during the 7:00 AM, 11:00 AM, and 4:00 PM hours, and 120 boardings during the 3:00 PM hour. These figures, coupled with the expectation of additional boardings, make the case for high frequency service during peak periods. During off-peak periods, boardings average between 30 and 40 passengers per hour, indicating that the route can support 30-minute service.

On Saturdays, the frequency of service would also be increased, to every 30-minutes.

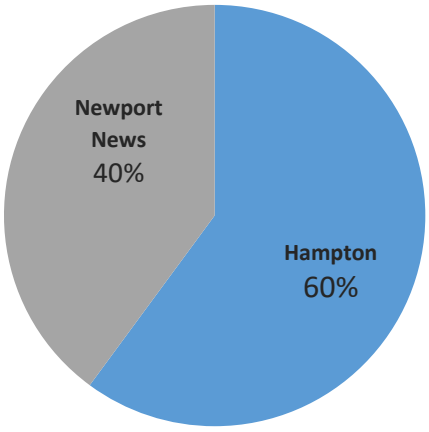
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:15 AM - 12:10 AM	5:15 AM - 12:10 AM
Saturday		5:15 AM - 12:10 AM	5:15 AM - 12:10 AM
Sunday		5:45 AM - 8:08 PM	5:45 AM - 8:08 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Newport News	Downtown Newport News
To		Downtown Hampton	Downtown Hampton
Headway			
		Existing	**Proposed**
Weekday	Early	35	30
	AM Peak	35	15
	Midday	35	30
	PM Peak	35	15
	Evening	45	30
	Late Night	60	60
Saturday		35	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction



Existing



Proposed

Route Alignment Map

ROUTE 102

Queen Street

Service Type: Local
Jurisdictions Served: Hampton

POTENTIAL SERVICE IMPROVEMENTS

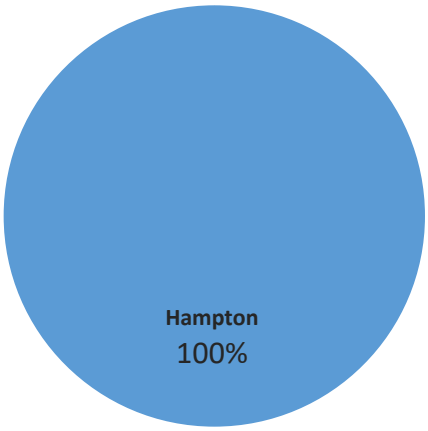
The recommendation for the Route 102 is for the service to be eliminated. Existing service on W Queen Street, between Power Plant Parkway to Michigan Drive, would be replaced by the proposed Route 110 (Newport News Transit Center – Hampton Transit Center – Mallory Street & Buckroe Avenue). The proposed Route 105 (Newport News Transit Center – Peninsula Town Center) would replace service on Mercury Boulevard, between Power Plant Parkway and Coliseum Drive, as well as service on Coliseum Drive within Peninsula Town Center, and on Cunningham Drive between Executive Drive and Power Plant Parkway. Service on Coliseum Drive, between Mercury Boulevard and Hardy Cash Drive, would be replaced by service on the proposed Route 118 (Hampton Transit Center – Thomas Nelson Community College – Langley Research & Development Park).

Route 102 carries approximately 211 people on an average weekday, ranking it 49th of 70 routes in the HRT system. In terms of passengers per hour, farebox recovery, and subsidy per passenger, it consistently performs below average. This proposal would leave approximately 70 current passengers without direct transit service. However, the vast majority of these stops are within a quarter mile of other proposed HRT routes. By consolidating this route into other services, the resources would be able to be used to provide additional service and coverage throughout Hampton.

Existing and Proposed Level of Service

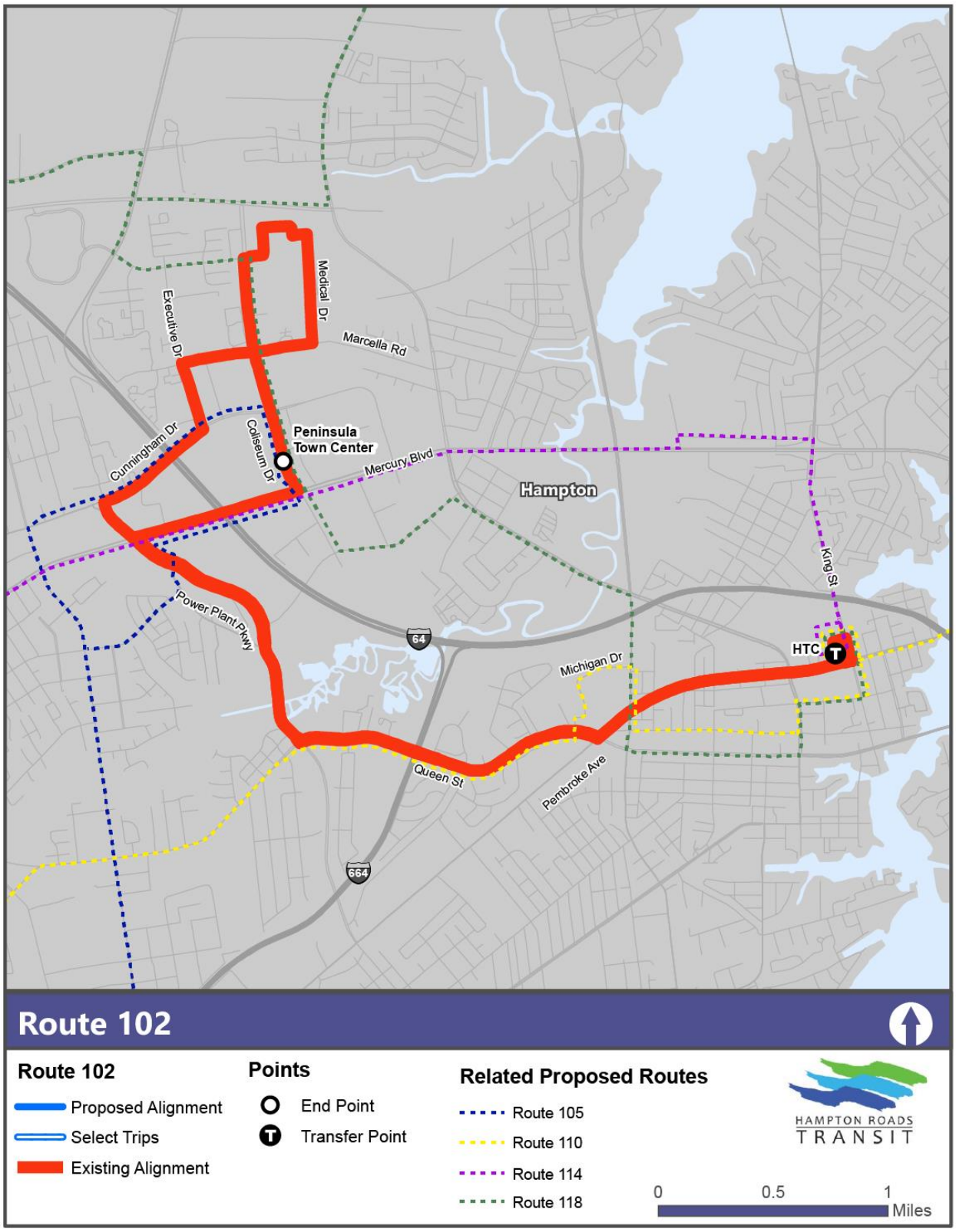
Span			
		Existing	Proposed
Weekday		6:19 AM - 8:10 PM	-
Saturday		7:19 AM - 7:10 PM	-
Sunday		8:20 AM - 7:08 PM	-
Origin and Destinations			
		Existing	**Proposed**
From		Peninsula Town Center	-
To		Downtown Hampton	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		60	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 103

Shell Road

Service Type: Local
Jurisdictions Served: Hampton and Newport News

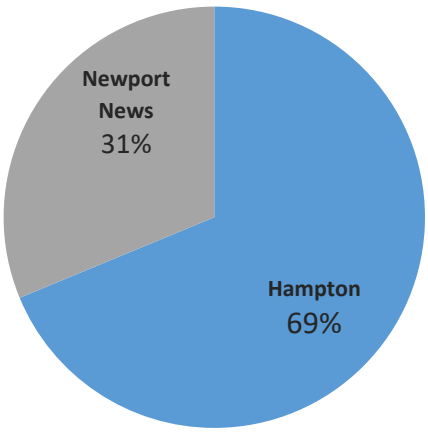
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

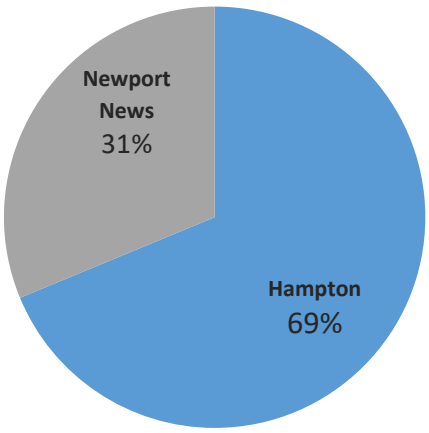
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:15 AM - 11:52 PM	5:15 AM - 11:52 PM
Saturday		5:15 AM - 11:52 PM	5:15 AM - 11:52 PM
Sunday		7:15 AM - 7:52 PM	7:15 AM - 7:52 PM
Origin and Destinations			
		Existing	**Proposed**
From		Newport News Transit Center	Newport News Transit Center
To		Downtown Hampton	Downtown Hampton
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	30
	Midday	30	30
	PM Peak	30	30
	Evening	45	45
	Late Night	60	60
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction



Existing



Proposed

Route Alignment Map

ROUTE 104

Newsome Park

Service Type: Local
Jurisdictions Served: Newport News and Hampton

POTENTIAL SERVICE IMPROVEMENTS

It is recommended that service on 76th Street, Martha Lee Drive and 79th Street be removed on the Route 104's alignment. The service would instead continue straight on Marshall Avenue to the NetCenter. After serving the NetCenter, the route would continue straight on Kennedy Drive, take a right on Threechopt Road, and a left on Orcutt Avenue. The route would then follow the current alignment of the existing Route 110 via Orcutt Avenue, then turn right on Todds Lane, left on Big Bethel Road, right on Thomas Nelson Drive, and straight into Thomas Nelson Community College.

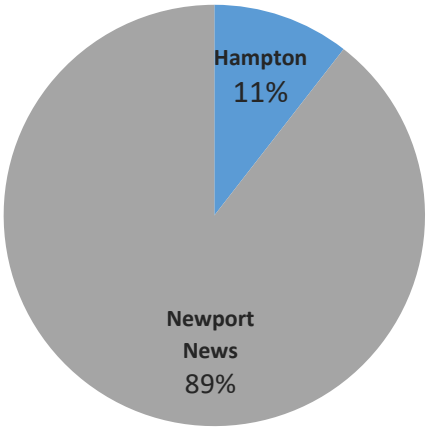
The removal of the deviation via 76th and 79th Streets, affects 83 passengers, 65 of those passengers are farther than a quarter mile from the proposed alignment. The elimination of this diversion improves route directness for this route, which would continue past NetCenter to Thomas Nelson Community College, providing a one-seat ride between the Community College, the NetCenter, and Downtown Newport News.

On weekdays, Saturdays and Sundays, the Route 104 would provide hourly service to Thomas Nelson Community College. During the weekday evening period, the frequency of service to the NetCenter would be increased to every 30-minutes. Between 6:00 AM and 8:00 PM, average hourly boardings reach at least 40, and are often higher; thus, the route can support 30-minute weekday service between Newport News Transit Center and NetCenter for most of the operating day. However, ridership decreases significantly after 8:00 PM, with hardly anyone using the service by midnight, so the service would terminate its weekday operations at 11:00 PM, with service offered at hourly frequencies between 8:00 PM and 11:00 PM.

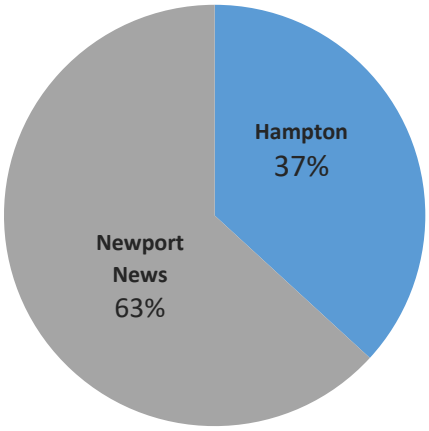
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:45 AM - 12:41 AM	5:45 AM - 11:00 PM
Saturday		5:45 AM - 12:41 AM	5:45 AM - 12:41 AM
Sunday		5:45 AM - 7:43 PM	5:45 AM - 7:43 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Newport News	Downtown Newport News
To		NetCenter	NetCenter / Thomas Nelson Community College
Headway			
		Existing	**Proposed**
Weekday	Early	30	30 / 60
	AM Peak	30	30 / 60
	Midday	30	30 / 60
	PM Peak	30	30 / 60
	Evening	60	30 / 60
	Late Night	60	60 / 60
Saturday		30	30 / 60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

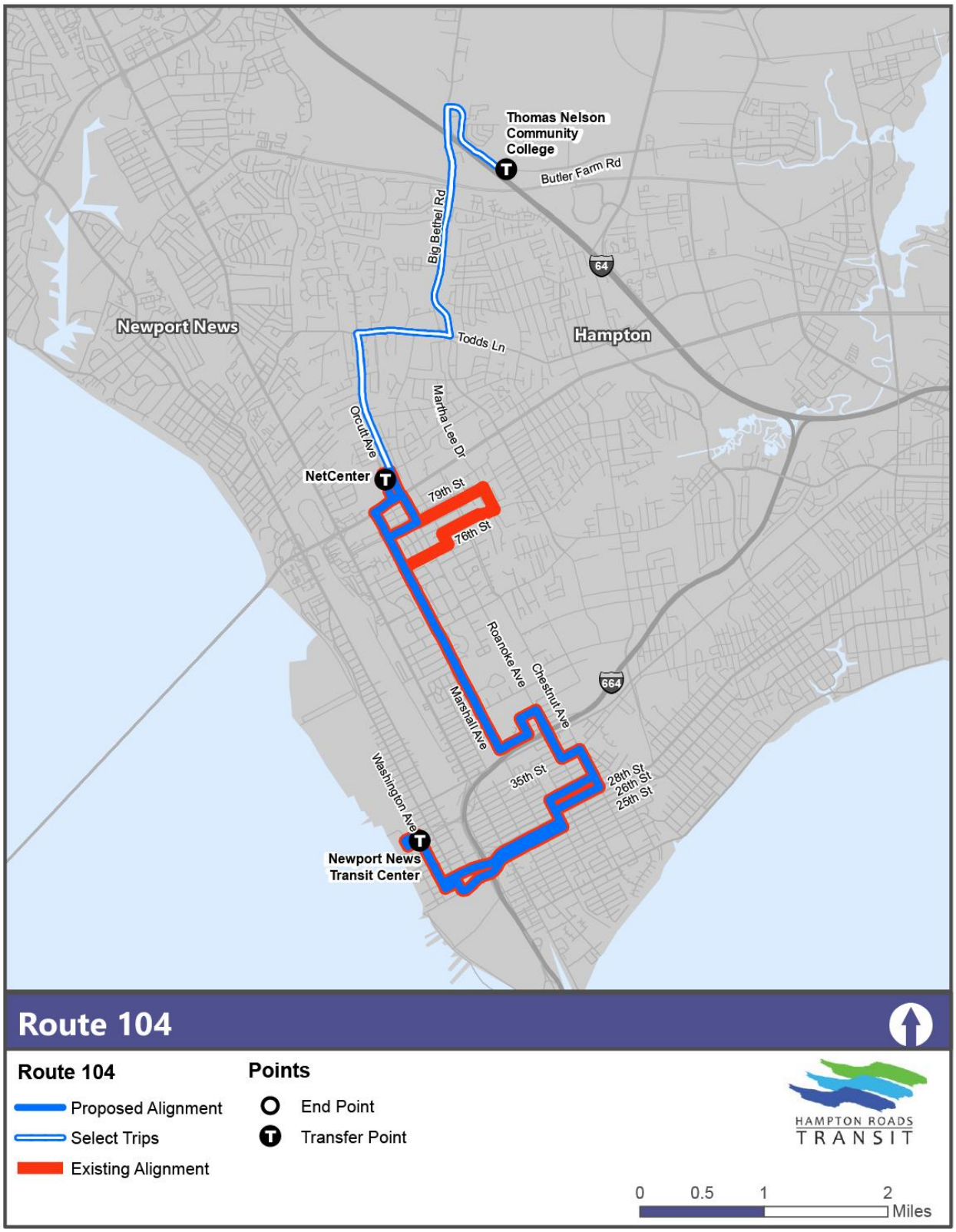


Existing



Proposed

Route Alignment Map



ROUTE 105

Briarfield Road

Service Type: Local
Jurisdictions Served: Hampton and Newport News

POTENTIAL SERVICE IMPROVEMENTS

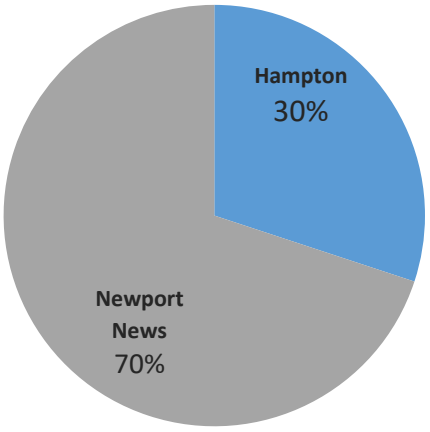
The existing Route 105 service on Briarfield Road, Marshall Avenue, and Madison Avenue is proposed to be discontinued and replaced with service via proposed Route 110 (Newport News Transit Center – Hampton Transit Center – Mallory Street & Buckroe Avenue). Route 105 service would instead be realigned onto Aberdeen Road. The proposed route would continue southbound onto Buxton Avenue, and turn right on Blair Avenue, left on Walnut Avenue, right on 16th Street, left on Jefferson Avenue, left on 6th Street, left on Ivy Avenue, left on 16th Street, right on Jefferson Avenue, left on 28th Street, and right on Washington Avenue terminating at Newport News Transit Center. This would also result in service being discontinued on Hampton Avenue, Wickham Avenue, Roanoke Avenue, Garden Drive and Maple Avenue.

This proposal is designed to eliminate diversions and improve route directness. Remaining on Aberdeen Road (north/south) and 16th Street (east/west) would allow the route to operate more efficiently. While this realignment would remove direct service from stops seeing approximately 164 passengers per days, many of the removed stops are close to 16th Street/Buxton Avenue area and within 0.3 miles or less of the proposed Route 105 alignment.

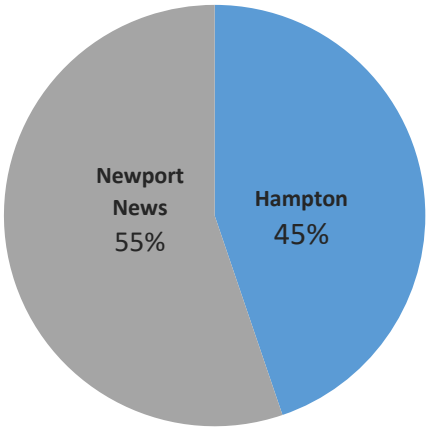
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:12 AM - 12:13 AM	6:12 AM - 12:13 AM
Saturday		6:15 AM - 12:13 AM	6:15 AM - 12:13 AM
Sunday		8:15 AM - 8:13 PM	8:15 AM - 8:13 PM
Origin and Destinations			
		Existing	**Proposed**
From		Maple Ave & 27th St	Downtown Newport News
To		Peninsula Town Center	Peninsula Town Center
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

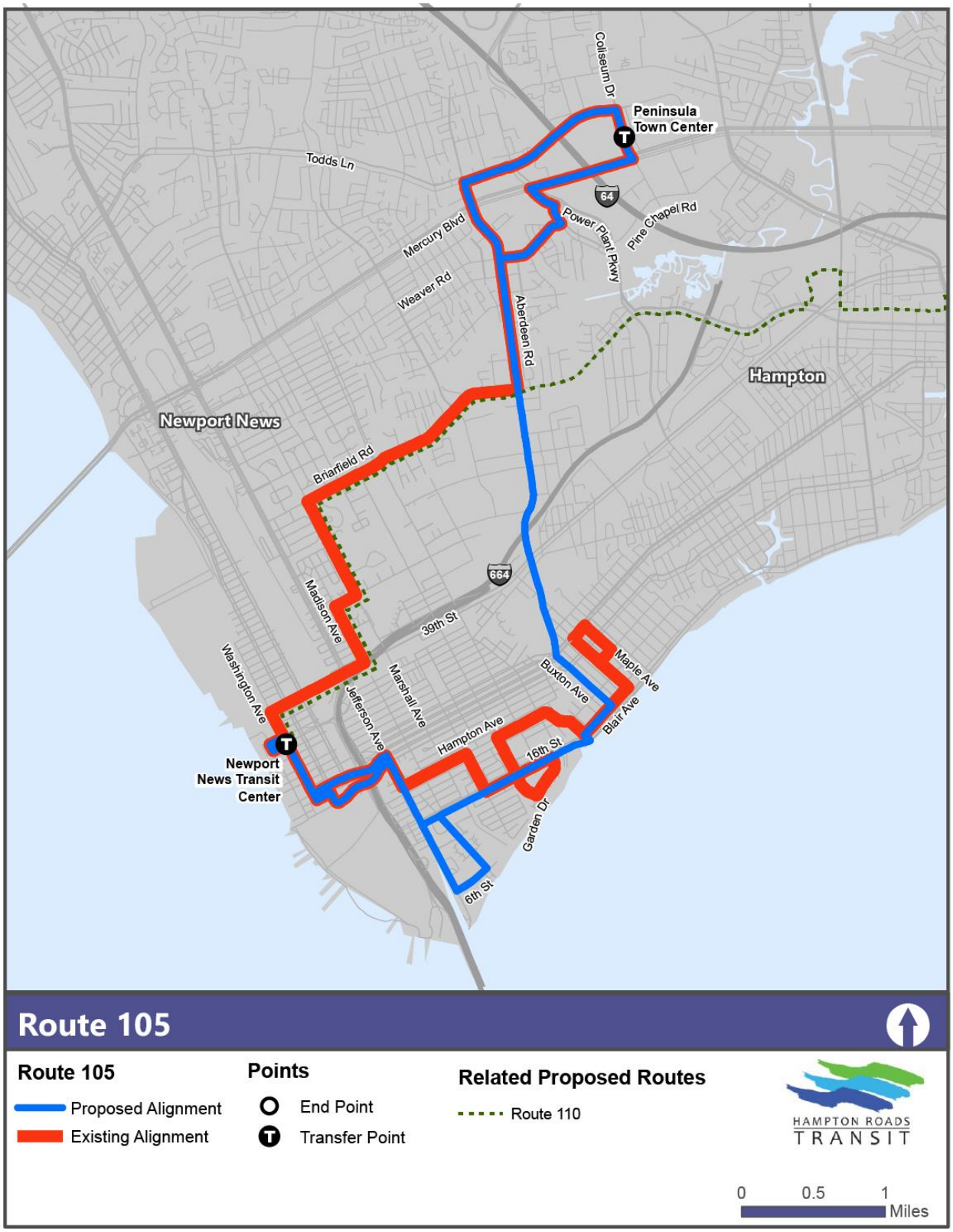


Existing



Proposed

Route Alignment Map



ROUTE 106

Warwick Boulevard

Service Type: Local
Jurisdictions Served: Newport News

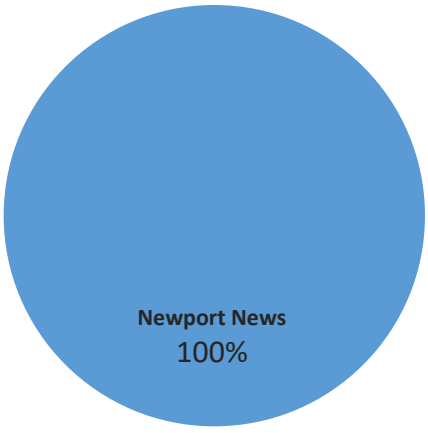
POTENTIAL SERVICE IMPROVEMENTS

No alignment changes have been proposed for Route 106; however, early morning service would begin a half hour earlier and would be offered every 30-minutes throughout the early morning period, and during the peak periods service would also be increased to every 30-minutes. Peak period service frequencies would also be increased to 30-minutes on Route 107, which means that along most of Warwick Boulevard, 15-minute frequencies would be offered throughout the AM and PM peak periods. The increase of service along Warwick Boulevard for Route 106 provides additional resources to a corridor that warrants improved service due to the current demand for transit. The increase also provides a north-south high frequency route that provides service to many transit generators and connections to other peninsula transit services.

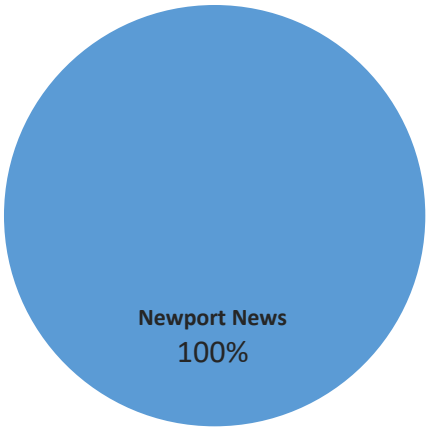
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:09 AM - 12:42 AM	4:39 AM - 12:42 AM
Saturday		5:09 AM - 12:42 AM	5:09 AM - 12:42 AM
Sunday		5:59 AM - 8:19 PM	5:59 AM - 8:19 PM
Origin and Destinations			
		Existing	**Proposed**
From		Newport News	Newport News
To		Fort Eustis	Fort Eustis
Headway			
		Existing	**Proposed**
Weekday	Early	60	30
	AM Peak	60	30
	Midday	60	60
	PM Peak	60	30
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

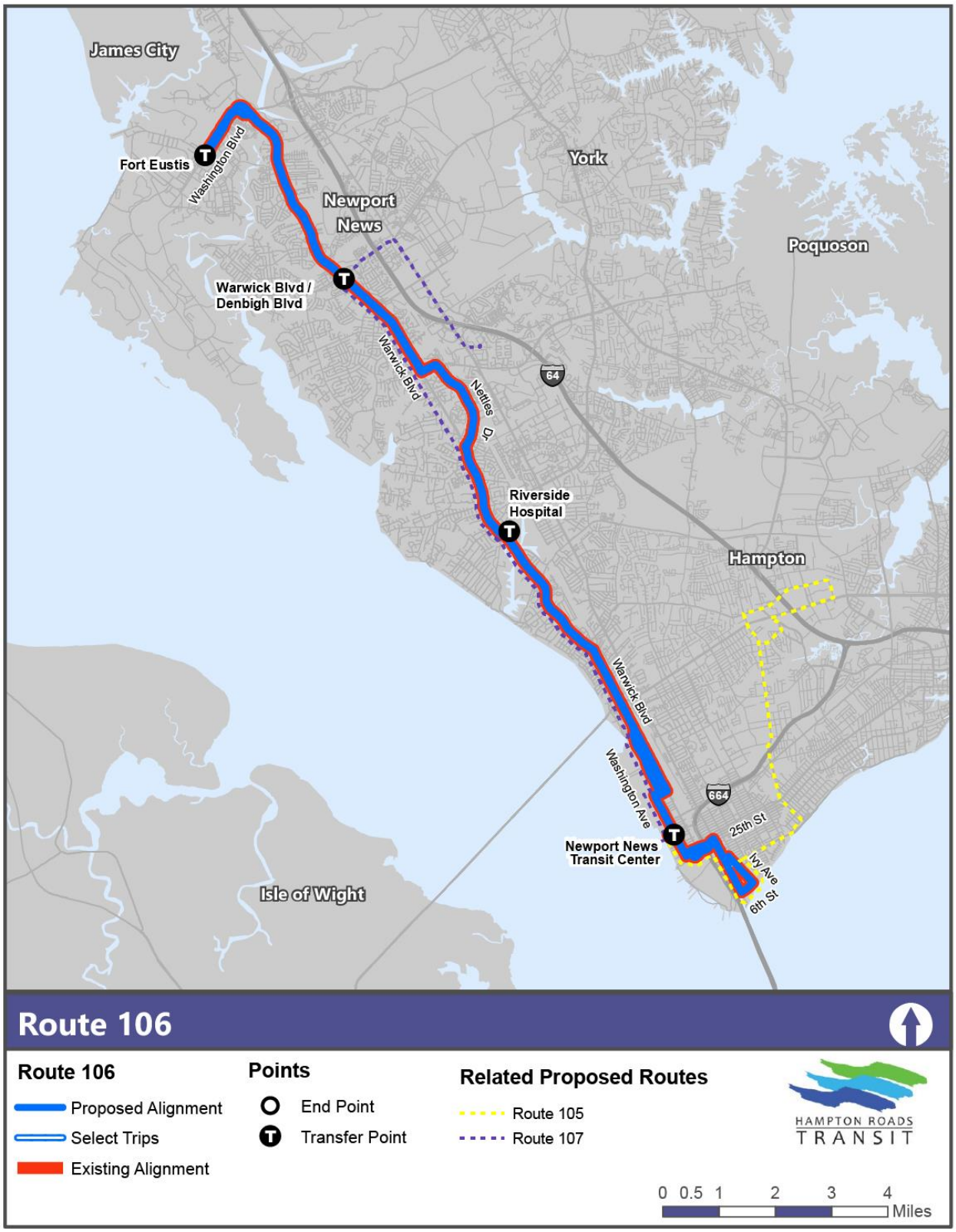


Existing



Proposed

Route Alignment Map



ROUTE 107

Warwick/Denbigh Boulevard

Service Type: Local
Jurisdictions Served: Newport News

POTENTIAL SERVICE IMPROVEMENTS

Several changes are being proposed for Route 107 to streamline service, which would help improve on-time performance and decrease overall travel time. Service would no longer be offered south of the Newport News Transit Center on Route 107; however, service would still be provided in this area via Route 105 and Route 106. Service would no longer deviate off Warwick Boulevard to provide service along Nettles Drive, but service would continue to be offered on Nettles Drive via the proposed Route 106. Service along Jefferson Avenue to Patrick Henry Mall from points south of the Mall would also be removed from Route 107, but would be maintained via the proposed Route 116. Lastly, service to Woodside Lane would no longer be provided by Route 107, but would continue to be served by the proposed Route 116. Service along Oyster Point between Nettles Drive and Jefferson Avenue would be eliminated. Upon reaching Denbigh Boulevard the route would turn right, followed by a right turn onto Jefferson Avenue, to operate to Patrick Henry Mall where the route would terminate. The service would operate in the opposite direction for the return trip to the Newport News Transit Center.

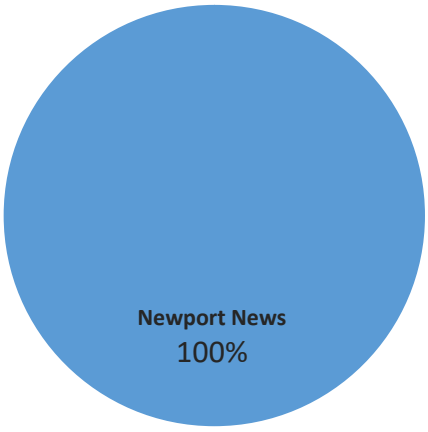
This proposal would remove direct service from stops seeing an average of 65 passengers; however, most of these stops are within walking distance of proposed service.

In addition to the alignment changes, the Route 107 would increase morning and afternoon peak period service to 30-minute frequencies. In conjunction with Route 106, 15-minute frequencies would be offered along most of Warwick Boulevard during the weekday peak periods.

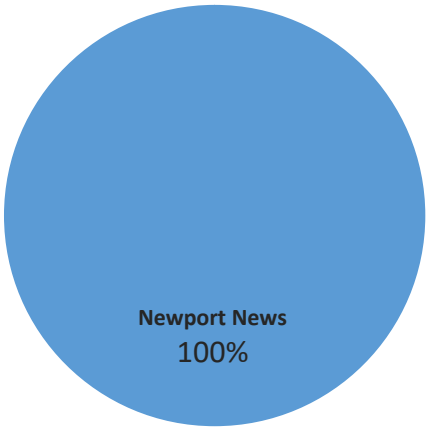
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:59 AM - 12:24 AM	5:59 AM - 12:24 AM
Saturday		5:59 AM - 12:24 AM	5:59 AM - 12:24 AM
Sunday		7:07 AM - 8:27 PM	7:07 AM - 8:27 PM
Origin and Destinations			
		Existing	**Proposed**
From		Newport News Transit Center	Newport News Transit Center
To		Woodside Lane	Patrick Henry Mall
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	30
	Midday	60	60
	PM Peak	60	30
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

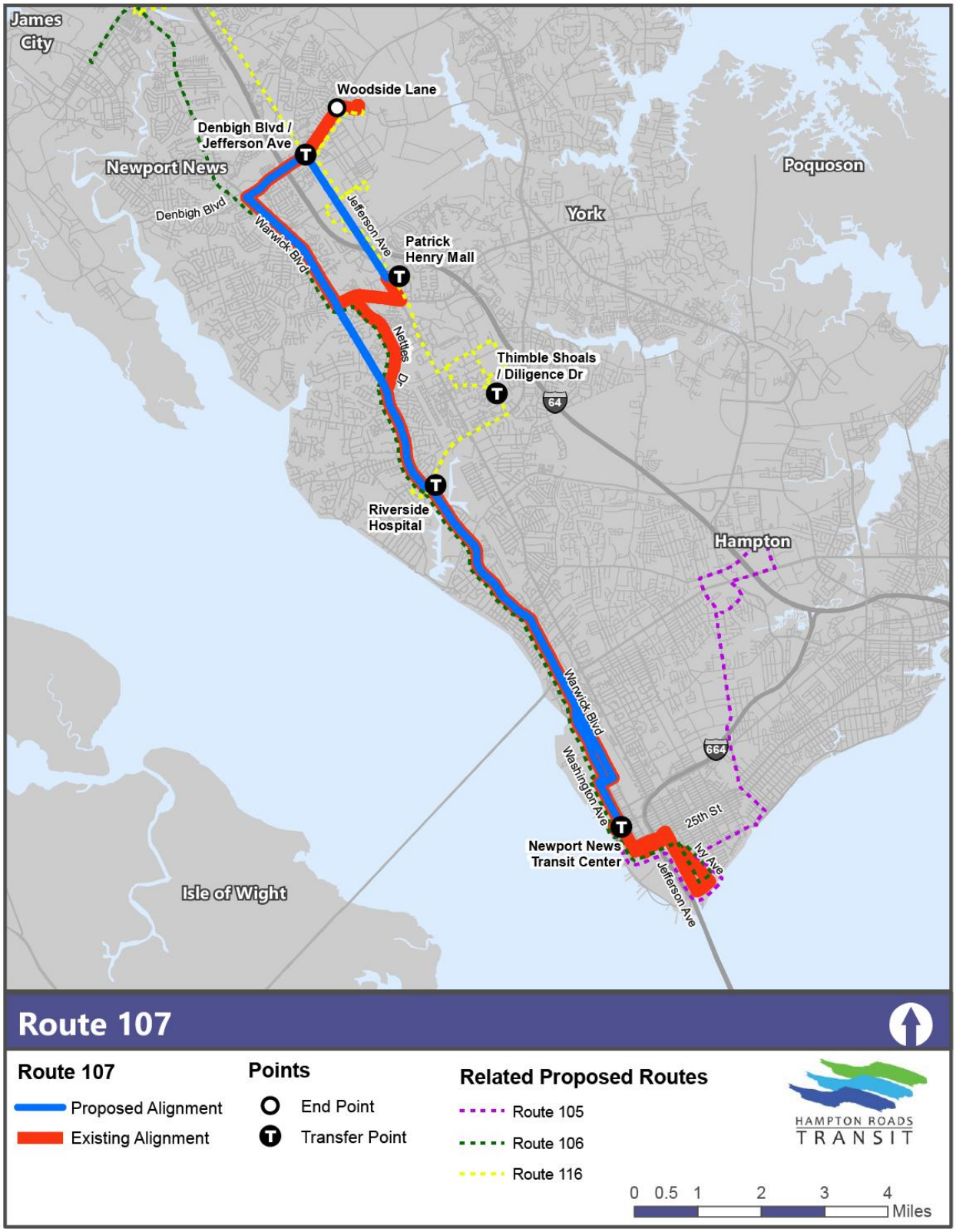


Existing



Proposed

Route Alignment Map



ROUTE 108

Warwick/Lee Hall

Service Type: Local
Jurisdictions Served: Newport News

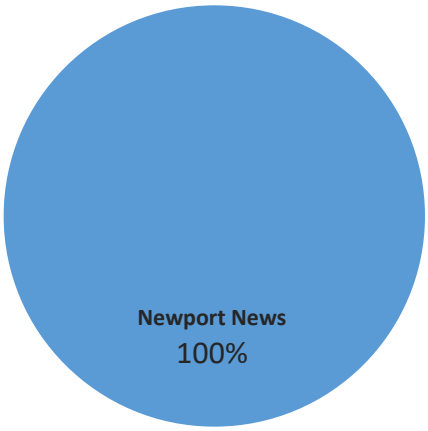
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

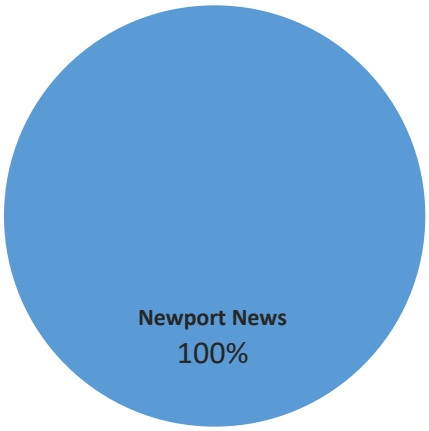
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:55 AM - 11:03 PM	5:55 AM - 11:03 PM
Saturday		5:55 AM - 11:02 PM	5:55 AM - 11:02 PM
Sunday		6:30 AM - 6:57 PM	6:30 AM - 6:57 PM
Origin and Destinations			
		Existing	**Proposed**
From		Patrick Henry Mall	Patrick Henry Mall
To		Lee Hall	Lee Hall
Headway			
		Existing	**Proposed**
Weekday	Early		-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

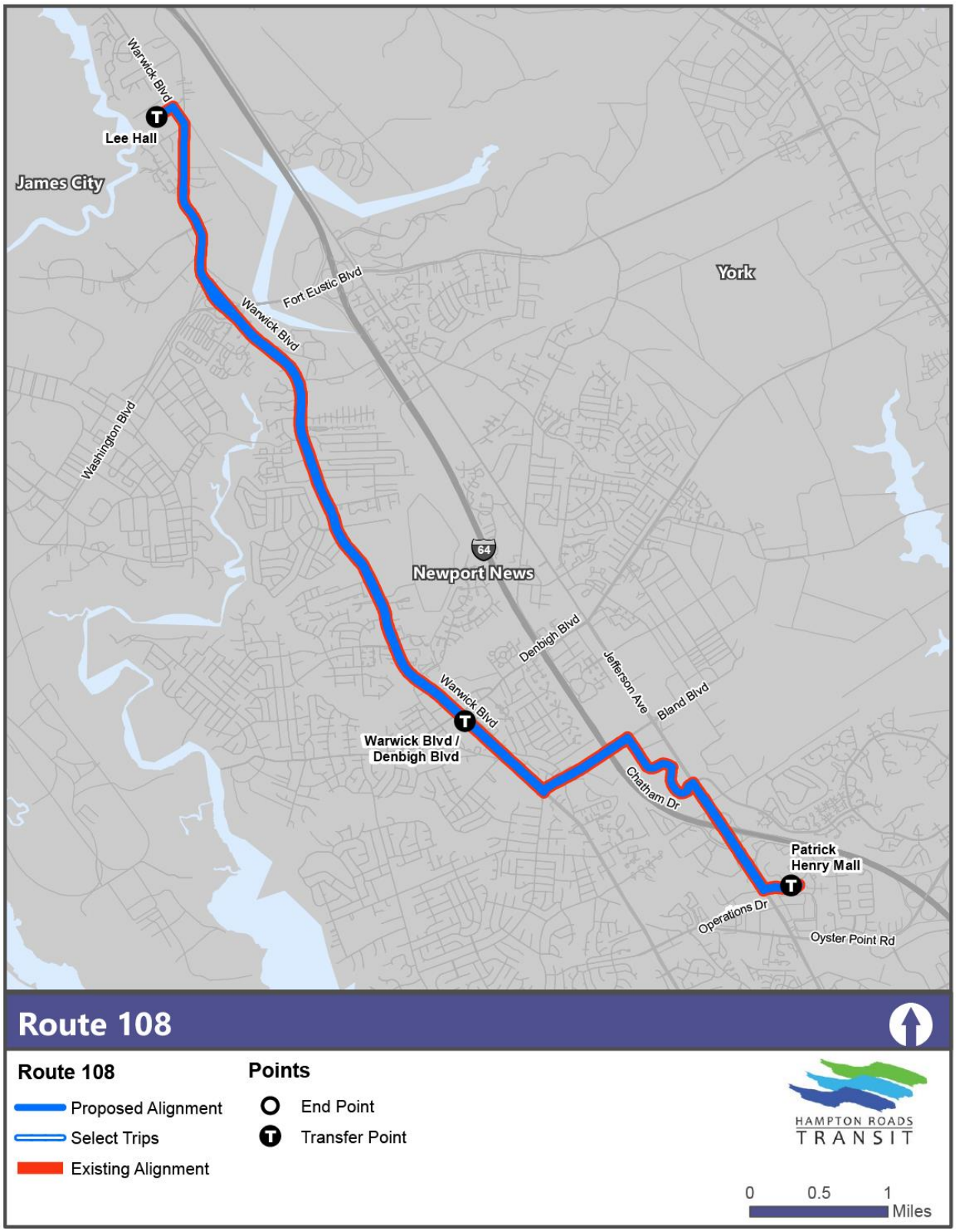


Existing



Proposed

Route Alignment Map



ROUTE 109

Buckroe

Service Type: Local
Jurisdictions Served: Hampton

POTENTIAL SERVICE IMPROVEMENTS

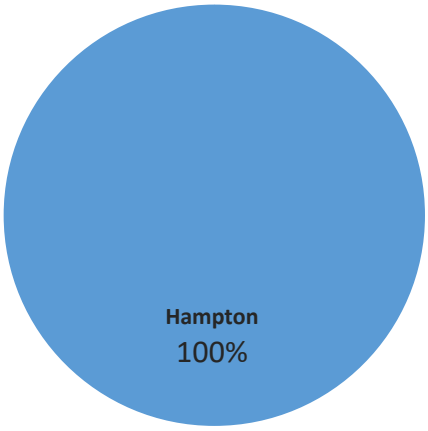
It is recommended that the Route 109 be eliminated with service on E Pembroke Avenue, Buckroe Avenue and Old Buckroe Avenue being replaced by the proposed Route 110 (Newport News Transit Center – Hampton Transit Center – Mallory Street & Buckroe Avenue), and service on Amherst Road and Skyland Drive would be replaced by the proposed Route 115 (Hampton University – Hampton Transit Center – Mallory Street & Buckroe Avenue).

Route 109 has a short alignment and ranks low in weekday ridership (47th out of all 70 routes). It consistently performs below average in passengers per hour, farebox recovery and subsidy per passenger metrics, and does not meet HRT's on-time performance standard. Transferring service along this alignment to other routes would allow resources to be more efficiently dispersed throughout Hampton. In particular, the improved connectivity of Route 110 to this area and other transfer hubs and activity centers would provide better access to more destinations. The majority of bus stops previously served by Route 109 would be covered by other services.

Existing and Proposed Level of Service

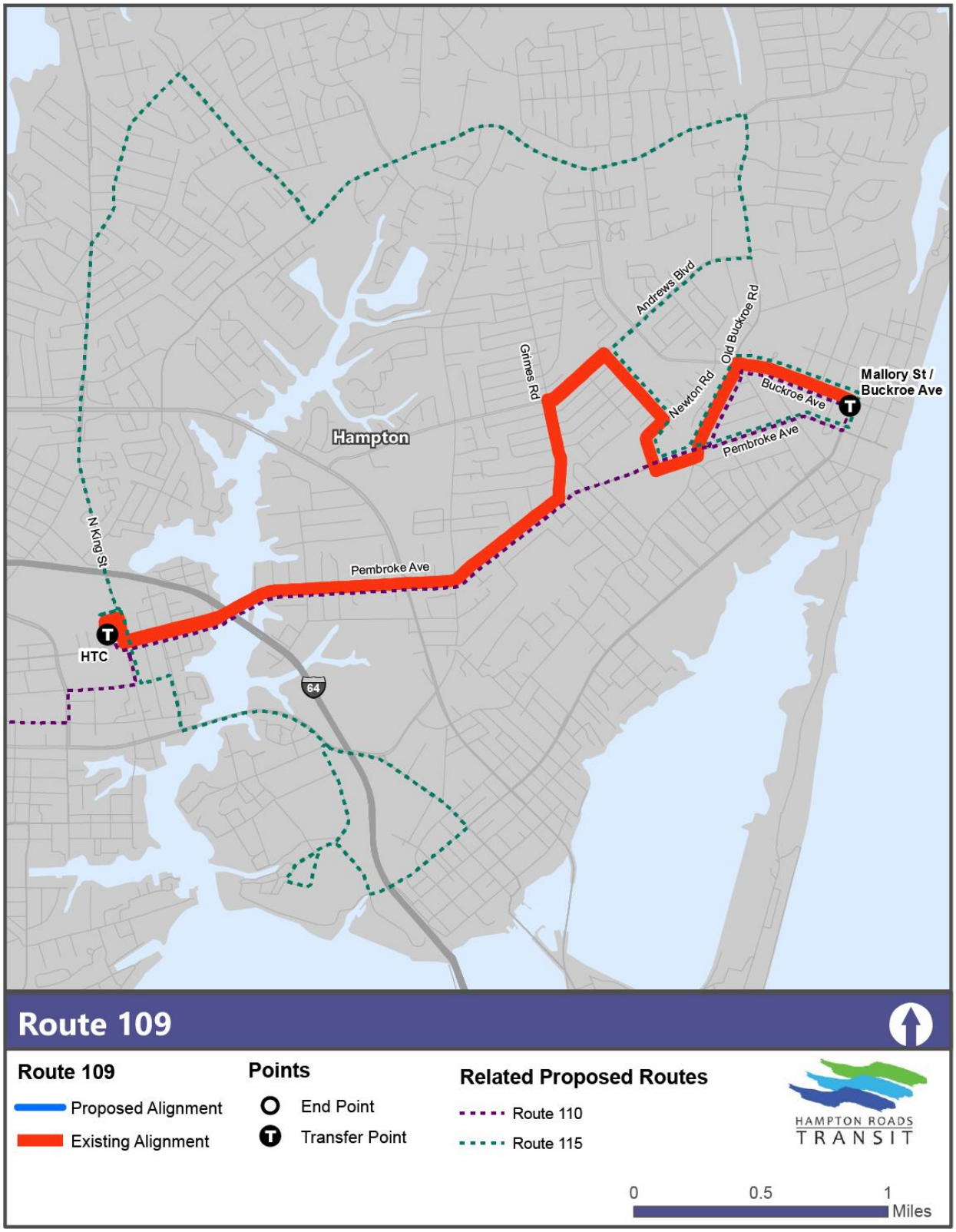
Span			
		Existing	Proposed
Weekday		6:51 AM - 10:07 PM	-
Saturday		7:47 AM - 9:10 PM	-
Sunday		6:47 AM - 7:10 PM	-
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	-
To		Buckroe	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		60	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 110

Thomas Nelson Community College

Service Type: Local
Jurisdictions Served: Hampton and Newport News

POTENTIAL SERVICE IMPROVEMENTS

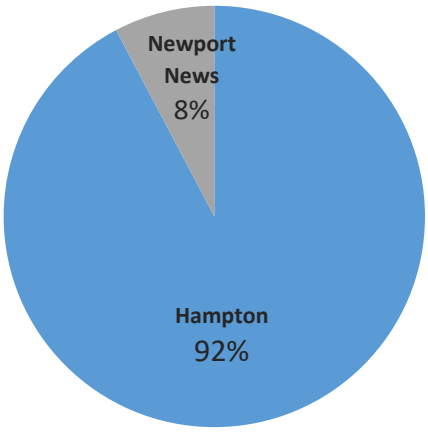
The recommendation for Route 110 calls for service to Thomas Nelson Community College, NetCenter, and service on Big Bethel Road, Todds Lane, Orcutt Avenue, 79th Street and Lassiter Drive to be discontinued. This service would be replaced by the Route 104 (Newport News Transit Center – NetCenter – Thomas Nelson CC). Route 110 would instead be extended to the Newport News Transit Center, via Briarfield Road, then a left on Marshall Avenue, right on 48th Street, left on Madison Avenue, right on 39th Street and a left on Huntington Avenue to serve Newport News Transit Center. The route would also be extended from Hampton Transit Center via Pembroke Avenue, then a left on N Mallory Street, left on Buckroe Avenue, and left on Old Buckroe Road, terminating at Mallory Street & Buckroe Avenue.

Combining portions of current Routes 105, 109, and 110, this proposal allows for Route 110 to serve as a direct Hampton (Buckroe Beach) – Hampton Transit Center – Newport News connection. Ridership by stop data highlights the fact that the NetCenter is a logical point to split the existing Route 110 since most passengers are not traveling past the NetCenter. Route 104 would now cover the segment of this route from NetCenter north, while Route 110 would offer service along a major portion of the existing Route 105. In addition, passengers may ride Route 114 for a direct connection from the Hampton Transit Center to NetCenter. Approximately, 33 passengers between Briarfield Road and the NetCenter, would lose service under this proposal.

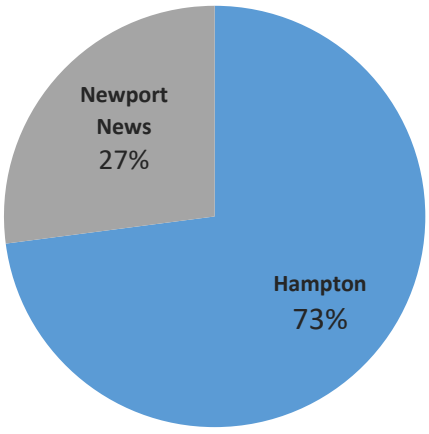
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:00 AM - 10:50 PM	6:00 AM - 10:50 PM
Saturday		7:00 AM - 10:50 PM	7:00 AM - 10:50 PM
Sunday		8:00 AM - 7:48 PM	8:00 AM - 7:48 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	Downtown Newport News
To		Thomas Nelson Community College	Mallory St & Buckroe Ave
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

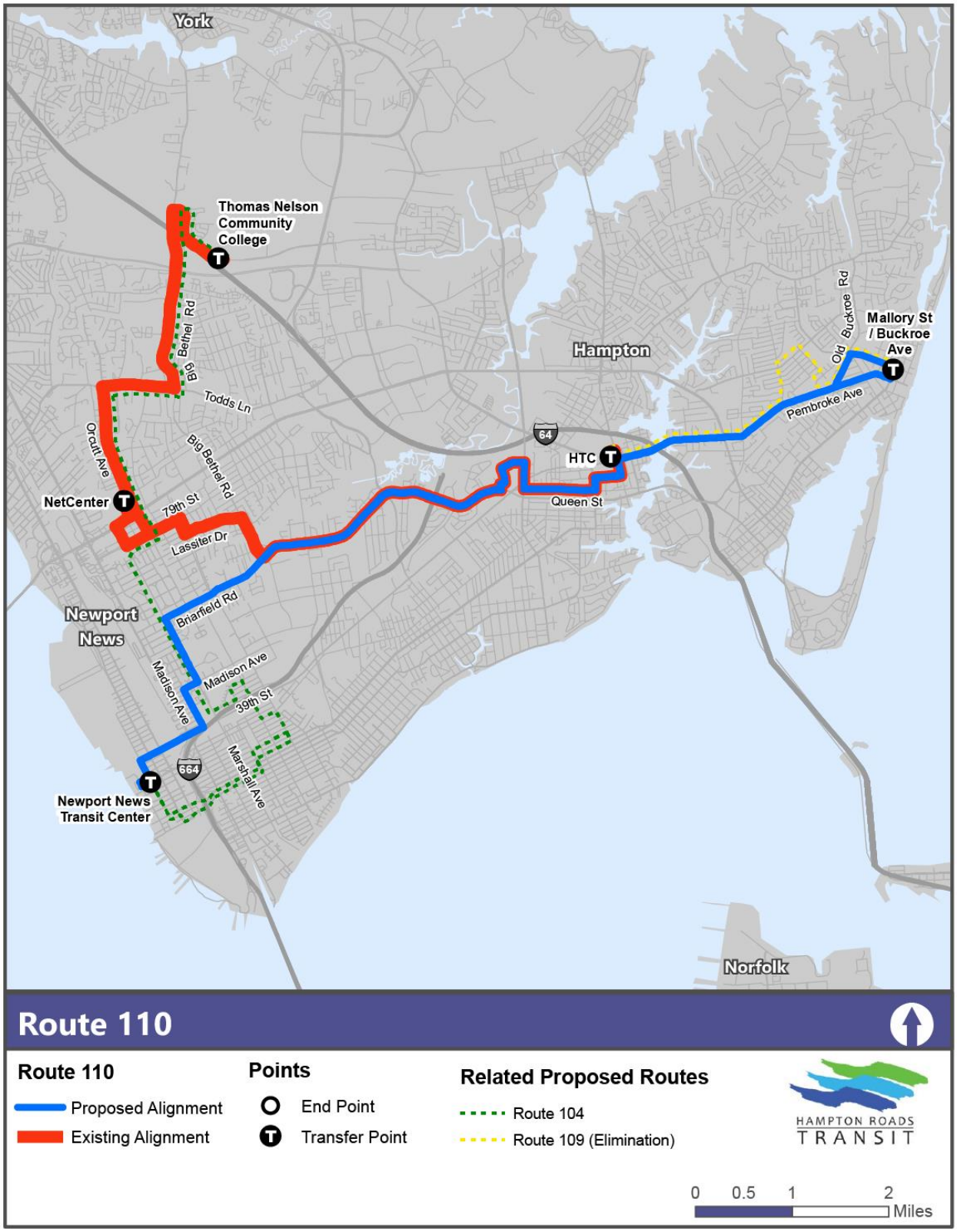


Existing



Proposed

Route Alignment Map



ROUTE 111

Jefferson/Riverside

Service Type: Local
Jurisdictions Served: Hampton and Newport News

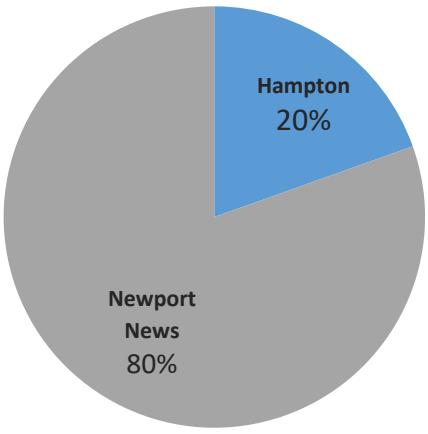
POTENTIAL SERVICE IMPROVEMENTS

The proposal for Route 111 calls for the service between Patrick Henry Mall and Patrick Henry Lane to be discontinued and replaced by the proposed Route 116 (Riverside Hospital – Patrick Henry Mall – Denbigh Boulevard & Jefferson Avenue – Lee Hall). Proposed Route 107 (Newport News Transit Center – Riverside Hospital – Denbigh Boulevard & Jefferson Avenue – Patrick Henry Mall) will also offer service between Patrick Henry Mall and Jefferson Avenue & Denbigh Boulevard. Route 111 is designed to offer a direct efficient connection from Thomas Nelson Community College to Patrick Henry Mall. A bus stop serving just one rider daily loses service under this proposal.

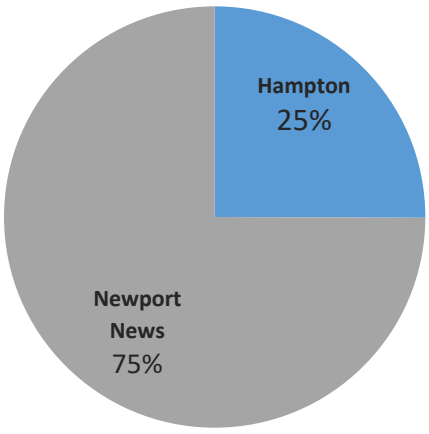
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:25 AM - 10:40 PM	6:50 AM - 10:40 PM
Saturday		6:50 AM - 10:40 PM	6:50 AM - 10:40 PM
Sunday		7:50 AM - 7:40 PM	7:50 AM - 7:40 PM
Origin and Destinations			
		Existing	**Proposed**
From		Thomas Nelson Community College	Thomas Nelson Community College
To		Patrick Henry Drive	Patrick Henry Mall
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

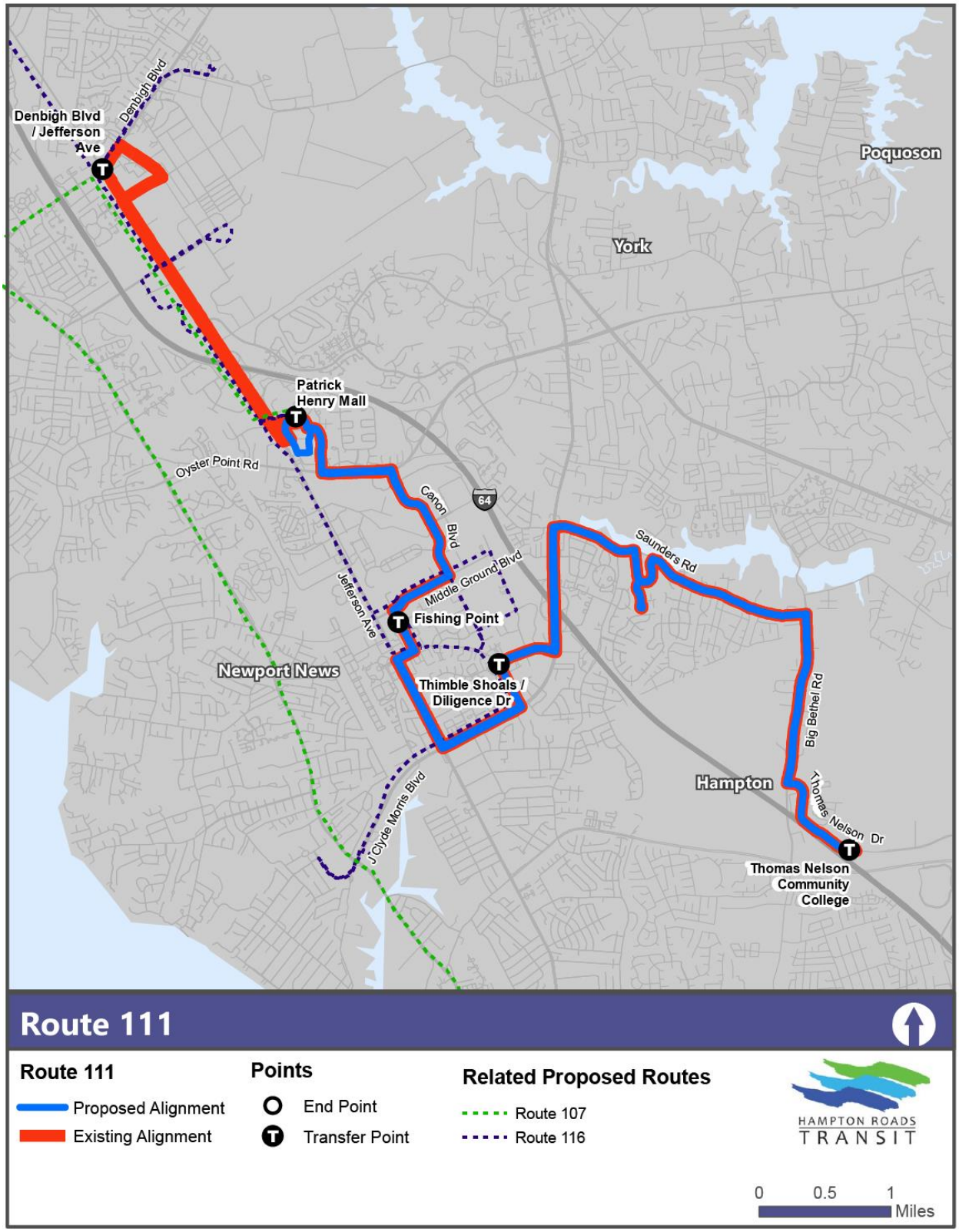


Existing



Proposed

Route Alignment Map



ROUTE 112

Jefferson Avenue

Service Type: Local
Jurisdictions Served: Newport News and Hampton

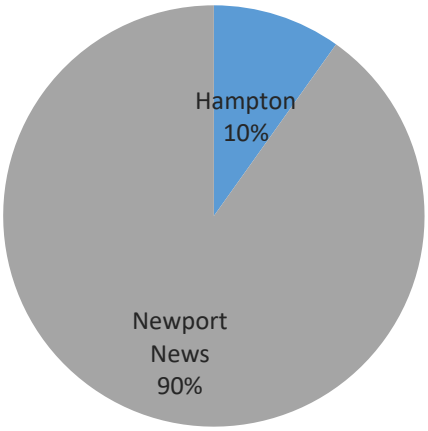
POTENTIAL SERVICE IMPROVEMENTS

No alignment change is proposed for the Route 112; however, service frequency would be increased during peak periods to every 15-minutes. Route 112 ranks 7th out of 70 routes in weekday ridership, with average weekday hourly boardings above 90 passengers during the first hour of service and growing ridership throughout the morning and early afternoon, surpassing 140 during the 3:00 PM hour. Following the 4:00 PM hour, ridership begins to decrease, until the end of service. Therefore, the route can support 15-minute service during peak periods and 30-minute service during off-peak periods. Saturday and Sunday service levels would remain the same as currently offered.

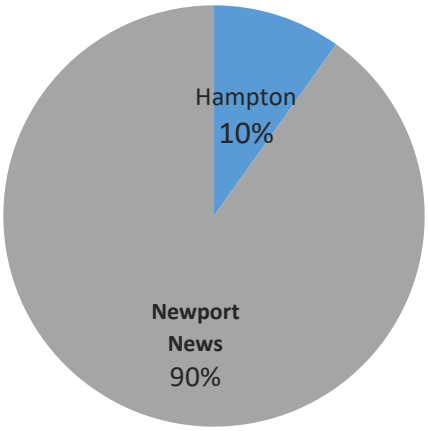
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:15 AM - 12:03 AM	5:15 AM - 12:03 AM
Saturday		5:15 AM - 12:03 AM	5:15 AM - 12:03 AM
Sunday		6:15 AM - 8:01 PM	6:15 AM - 8:01 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Newport News	Downtown Newport News
To		Patrick Henry Mall	Patrick Henry Mall
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	15
	Midday	30	30
	PM Peak	30	15
	Evening	30	30
	Late Night	30	30
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

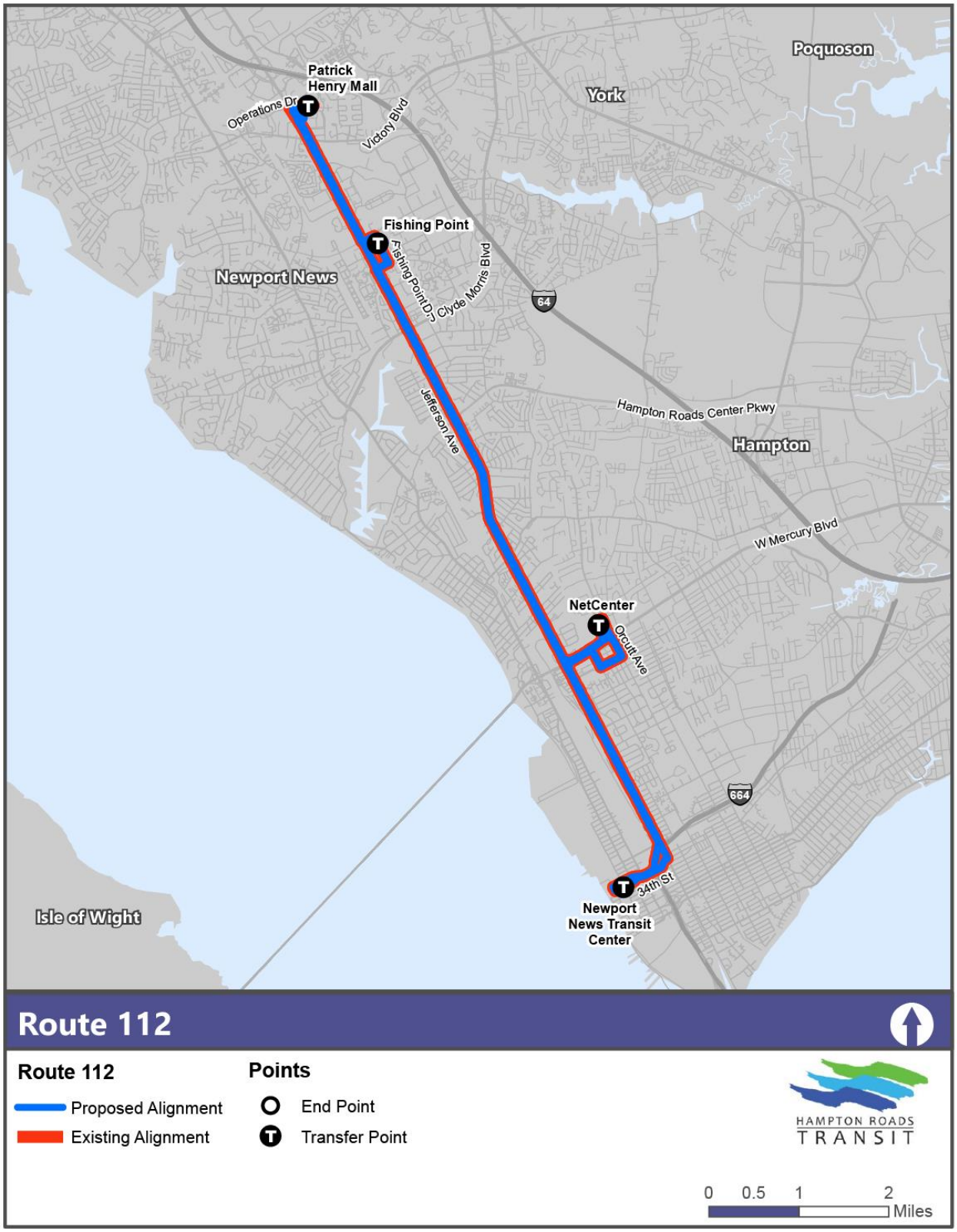


Existing



Proposed

Route Alignment Map



ROUTE 114

Weaver Road

Service Type: Local
Jurisdictions Served: Hampton and Newport News

POTENTIAL SERVICE IMPROVEMENTS

Route 114 is recommended to operate exclusively along Mercury Boulevard between the NetCenter and Aberdeen Road, and Coliseum Drive and LaSalle Avenue, to improve route directness, decrease travel time, and improve route efficiency. Operating on Mercury Boulevard would increase the ability of the route to directly serve this important commercial corridor, with regular, high frequency transit service, which would help to attract additional users to the service and the system. Route 114 service would no longer be provided via 79th Street, Weaver Road, and Power Plant Parkway. Service would also no longer be provided via Coliseum Drive (south of Mercury Boulevard), Pine Chapel Road, N Armistead Avenue, and LaSalle Avenue; however, these segments – except for LaSalle Avenue – would be replaced with service on the proposed Route 118 (Hampton Transit Center – Thomas Nelson CC – Langley Research & Development Park).

This proposal would minimize deviations, reduce necessary vehicle turns, and increase average speeds.

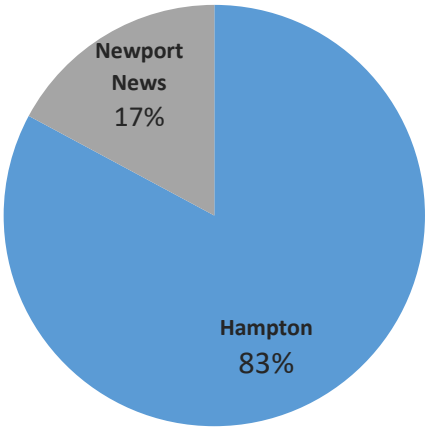
This proposal would eliminate direct bus service for 294 riders, including on Weaver Road, Todds Lane, and Cunningham Drive. Bus stops on Weaver Road are located just over a quarter mile from Mercury Boulevard;

On weekdays, service frequency would be increased to every 15-minutes during peak periods and every 30-minutes during evening and late-night periods. The proposed increase to 15-minute service on weekdays is justified by Route 114's boardings per hour, which rise steadily from 52 during the 6:00 AM hour to well over 100 during the 3:00 PM hour. Route 114 would continue to support 30-minute service during off-peak hours. On weekdays, an additional trip in the morning will be added based on feedback received during the TDP public outreach process.

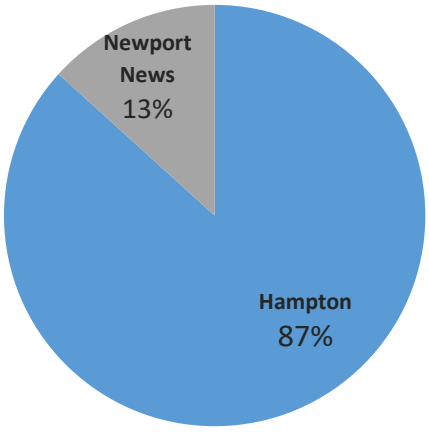
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:20 AM - 11:41 PM	6:00 AM - 11:41 PM
Saturday		6:45 AM - 11:41 PM	6:45 AM - 11:41 PM
Sunday		6:45 AM - 7:41 PM	6:45 AM - 7:41 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	Downtown Hampton
To		73rd Street & Warwick Boulevard	73rd Street & Warwick Boulevard
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	30	15
	Midday	30	30
	PM Peak	30	15
	Evening	40	30
	Late Night	60	30
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

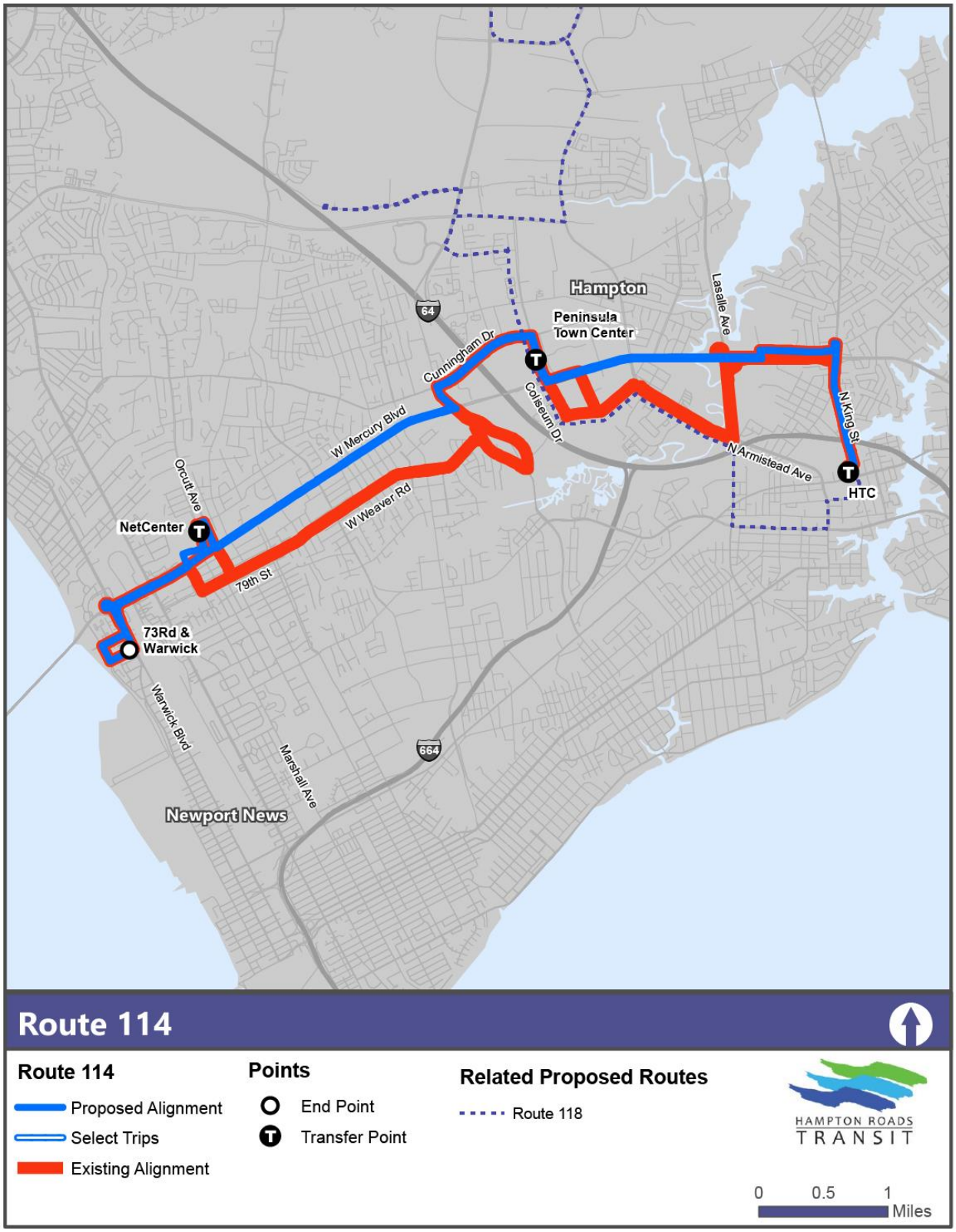


Existing



Proposed

Route Alignment Map



ROUTE 115

Fox Hill Road

Service Type: Local
Jurisdictions Served: Hampton

POTENTIAL SERVICE IMPROVEMENTS

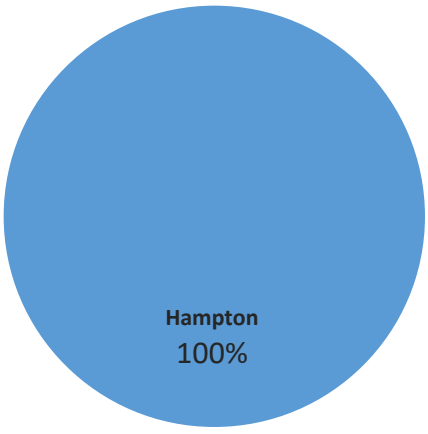
The proposed Route 115 would be extended to the Veteran Administration Hospital by operating southbound on N King Street, then a left on Lincoln Street, right on Eaton Street, left on Settlers Landing Road, merge onto W County Street, right on S Mallory Street, right on Martin Luther King Jr Boulevard, left on Harris Avenue, left on Black Avenue, and serve the VA Hospital. After serving the VA Hospital, the route would return to the Hampton Transit Center by continuing straight on Black Avenue, left on McClellan Avenue, right on Harris Avenue, left on Emancipation Drive, right on E. Tyler Street, left on Settlers Landing Road, right on Eaton Street, left on Lincoln Street and right on N King Street.

The proposed Route 115 extension would replace the existing Route 117, which is proposed for elimination. This would improve the simplicity of HRT's services in Hampton, while also providing greater access for Hampton University students to more of the HRT transit network; students and residents around the University would receive a direct connection to Buckroe Shopping Center and Buckroe Beach, as well as to high frequency service at the Hampton Transit Center.

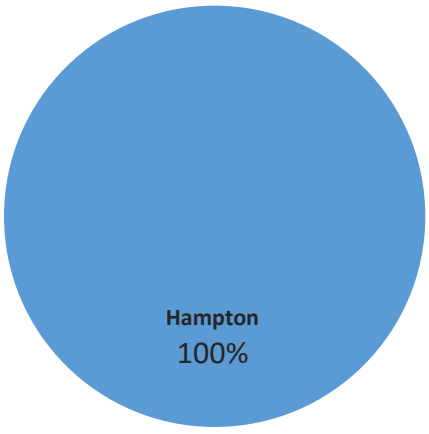
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:45 AM - 12:07 AM	5:45 AM - 12:07 AM
Saturday		6:11 AM - 10:08 PM	6:11 AM - 10:08 PM
Sunday		8:11 AM - 7:37 PM	8:11 AM - 7:37 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	Buckroe
To		Buckroe	Hampton University
Headway			
		Existing	**Proposed**
Weekday	Early	60	60
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

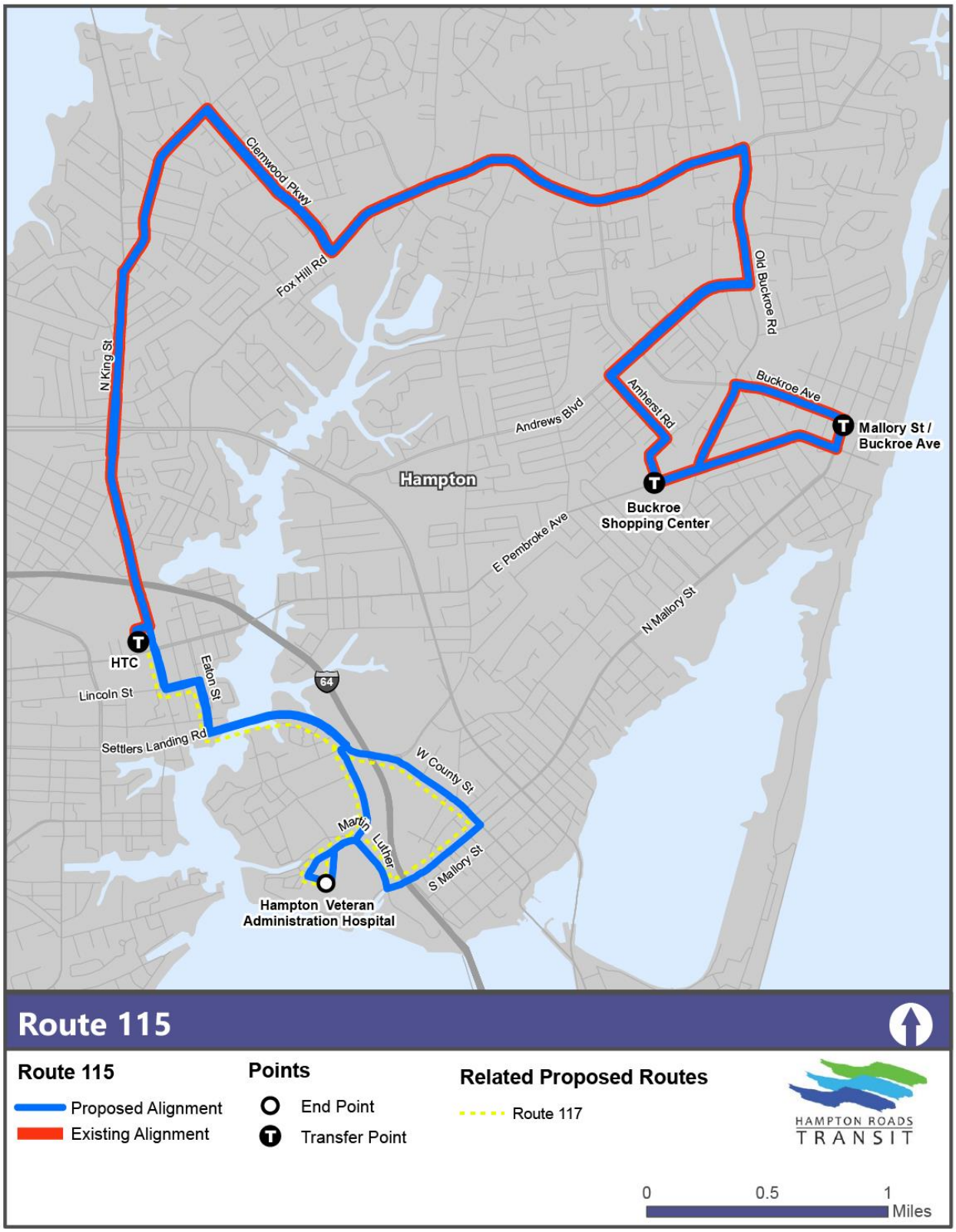


Existing



Proposed

Route Alignment Map



ROUTE 116

Jefferson/Lee Hall

Service Type: Local
Jurisdictions Served: Newport News

POTENTIAL SERVICE IMPROVEMENTS

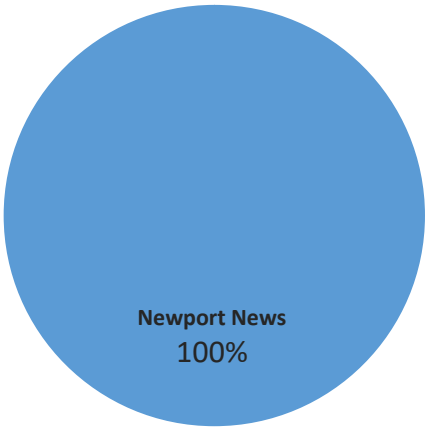
The proposed Route 116 would be extended south of Patrick Henry Mall to Christopher Newport University providing service to Riverside Regional Medical Center and City Center at Oyster Point. After serving Patrick Henry Mall, the route would continue south on Jefferson Avenue, then left onto City Center Boulevard, right onto Fishing Point Drive, left onto Thimble Shoals Boulevard, left onto Canon Boulevard, right onto City Center Boulevard, right onto Rock Landing Drive, right onto Omni Boulevard, left onto Canon Boulevard, left onto Thimble Shoals Boulevard, and right onto J Clyde Morris Boulevard. The route would then continue straight onto Avenue of the Arts to serve Christopher Newport University, and would then continue onto J Clyde Morris Boulevard to enter Riverside Regional Medical Center.

Route 116 would provide regular service to Riverside Regional Medical Center previously provided by Route 119. The route would also offer a one-seat ride to students and staff at Christopher Newport University, as well as staff at Riverside Regional Medical Center, to additional destinations throughout Newport News, including City Center at Oyster Point (as the current Route 119 does), Patrick Henry Mall, Denbigh Boulevard and Lee Hall. The route will also provide service to Woodside Lane, which has been removed from the proposed Route 107.

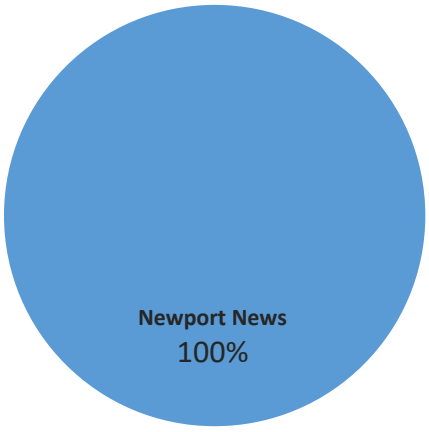
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:33 AM - 11:09 PM	6:33 AM - 11:09 PM
Saturday		6:33 AM - 11:11 PM	6:33 AM - 11:11 PM
Sunday		7:33 AM - 7:09 PM	7:33 AM - 7:09 PM
Origin and Destinations			
		Existing	**Proposed**
From		Lee Hall	Riverside Hospital
To		Patrick Henry Mall	Lee Hall
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	60	60
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

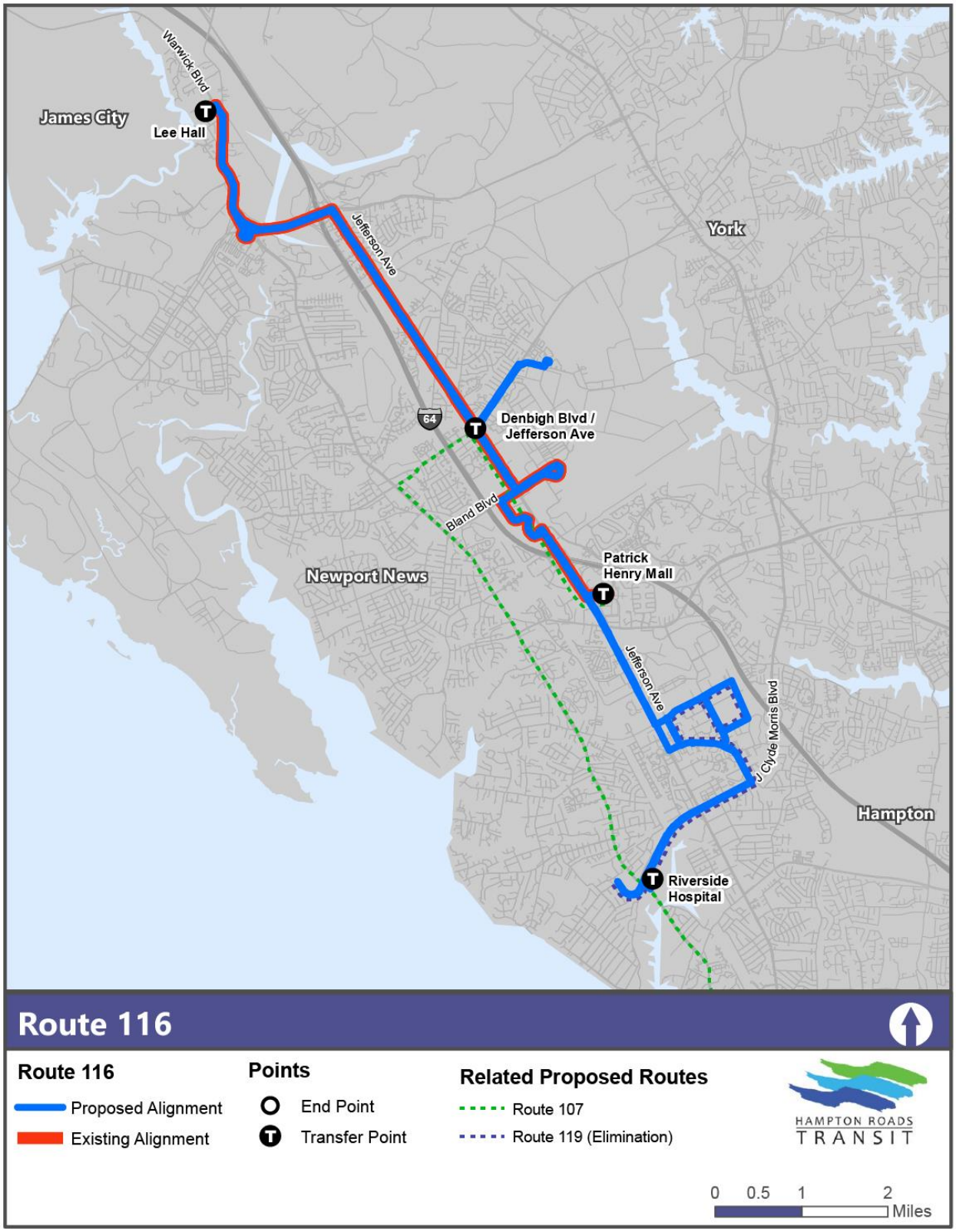


Existing



Proposed

Route Alignment Map



ROUTE 117

Phoebus

Service Type: Local
Jurisdictions Served: Hampton

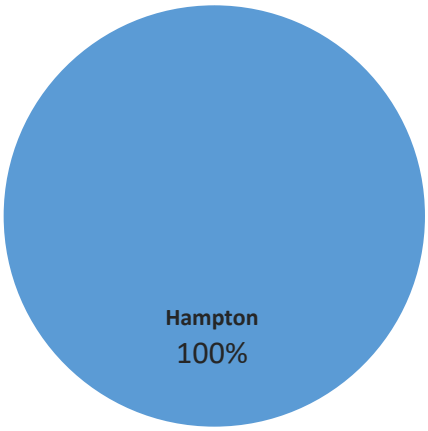
POTENTIAL SERVICE IMPROVEMENTS

Route 117 service is proposed for elimination, with the service being fully replaced by the proposed Route 115 (Mallory Street & Buckroe Avenue – Hampton Transit Center – VA Hospital) extension. Route 115 would operate to Hampton University via the existing Route 117's alignment. This would improve the simplicity of HRT's service in Hampton while providing greater access for Hampton University students to additional regional destinations. Students and residents around the University would receive a direct connection to Buckroe Beach, as well as high frequency service to points west.

Existing and Proposed Level of Service

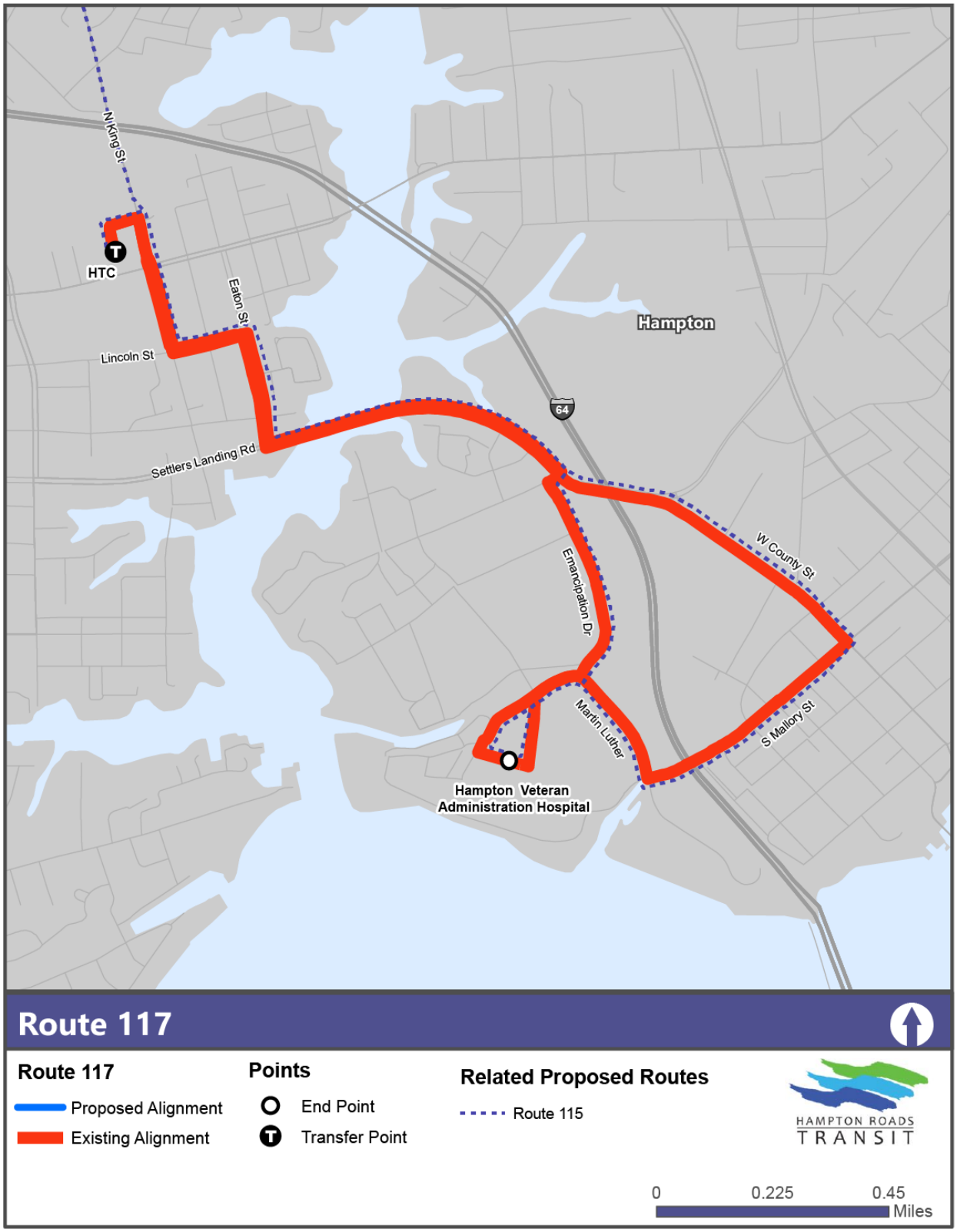
Span			
		Existing	Proposed
Weekday		6:15 AM - 7:38 PM	-
Saturday		8:15 AM - 7:38 PM	-
Sunday		8:15 AM - 6:38 PM	-
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	-
To		VA Hospital	-
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	-	-
Saturday		60	-
Sunday		60	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 118

Armistead Avenue

Service Type: Local
Jurisdictions Served: Hampton

POTENTIAL SERVICE IMPROVEMENTS

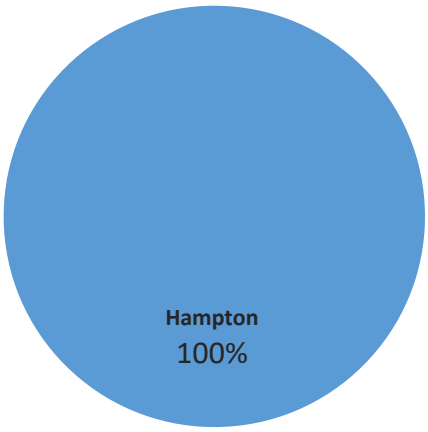
Route 118 is proposed to no longer enter Langley Air Force Base via Sweeney Boulevard. The removal of direct service to Langley Air Force Base fulfills a request to remove HRT services from limited access military facilities. This change would remove stops serving 20 current passengers. However, this change would improve on-time performance, which, at below 70%, does not meet the agency standard for this metric.

The proposed Route 118 would also serve the Boo Williams Sportsplex. The service between the Hampton Transit Center and the Thomas Nelson Community College would remain the same. Upon leaving the college, the proposed route would turn right onto Magruder Boulevard, left onto Hampton Roads Center Parkway and then continue left onto Armistead Avenue to serve the Sportsplex and follow the current alignment through Commander Shepard Boulevard and Magruder Boulevard. The Boo Williams Sportsplex will also be served on the return trip via Armistead Avenue.

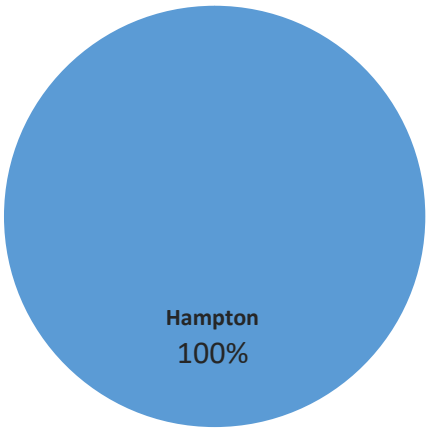
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:15 AM - 10:18 PM	6:15 AM - 10:18 PM
Saturday		6:15 AM - 10:18 PM	6:15 AM - 10:18 PM
Sunday		8:15 AM - 7:18 PM	8:15 AM - 7:18 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Hampton	Downtown Hampton
To		Semple Farm Road	Semple Farm Road
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

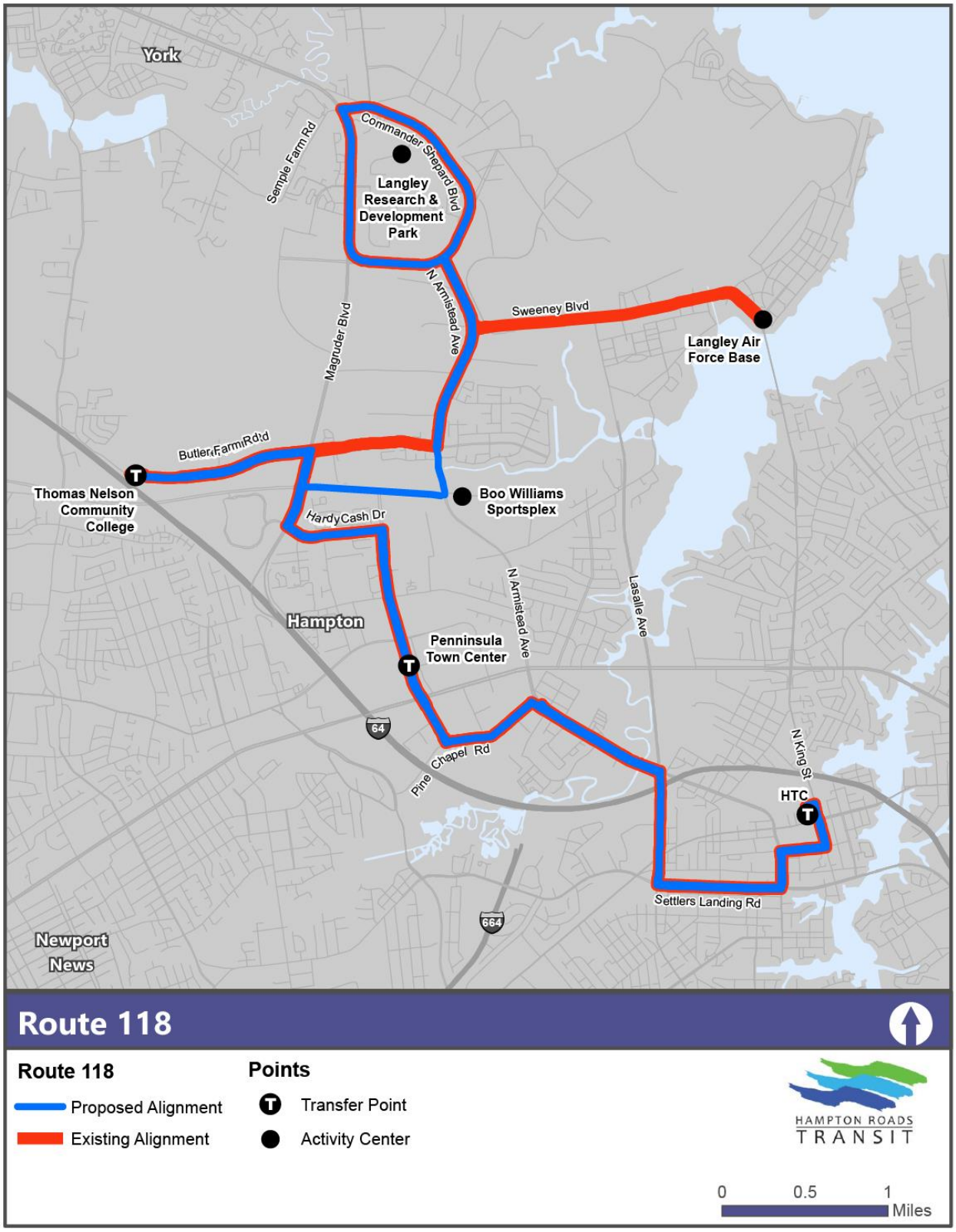


Existing



Proposed

Route Alignment Map



ROUTE 119

Oyster Point

Service Type: Local
Jurisdictions Served: Newport News and Portsmouth

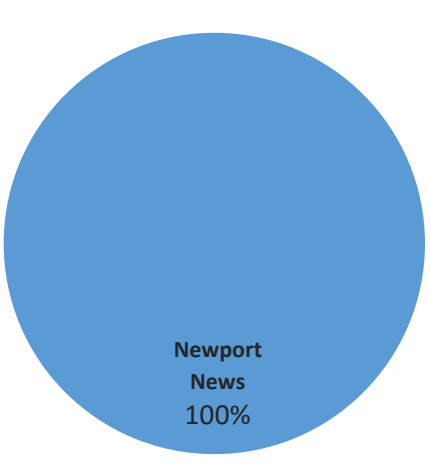
POTENTIAL SERVICE IMPROVEMENTS

The existing Route 119 is proposed for elimination, as proposed Route 116 (Riverside Hospital – Patrick Henry Mall – Denbigh Boulevard & Jefferson Avenue – Lee Hall) would now offer service along this alignment. By combining the two routes, more passengers would be able to directly access activity centers – such as City Center at Oyster Point, Riverside Regional Medical Center, and Christopher Newport University – via a one-seat ride on Route 116.

Existing and Proposed Level of Service

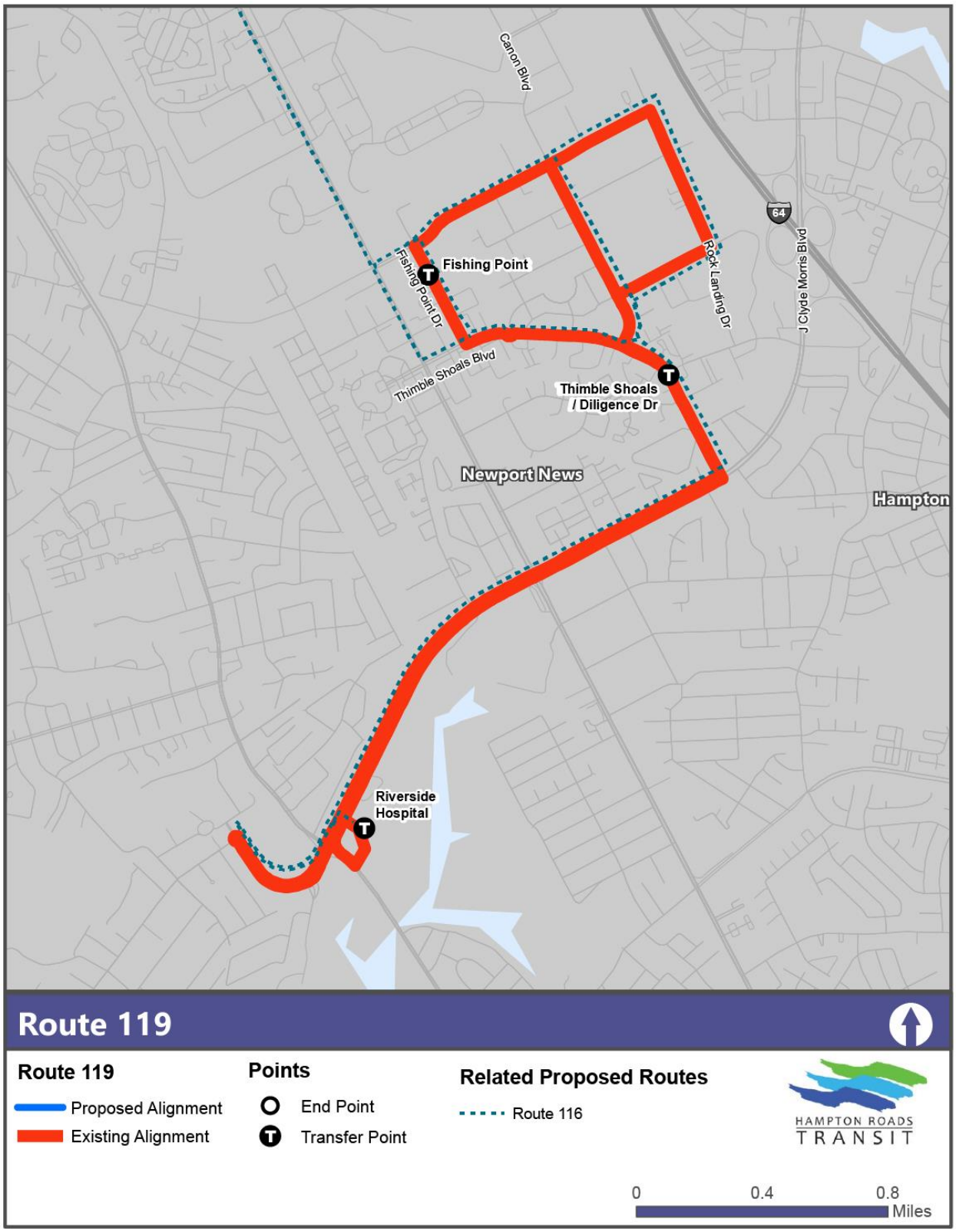
Span			
		Existing	Proposed
Weekday		5:52 AM - 11:51 PM	-
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	Proposed
From		Fishing Point Dr	-
To		Riverside Regional Medical Center	-
Headway			
		Existing	Proposed
Weekday	Early	-	-
	AM Peak	60	-
	Midday	60	-
	PM Peak	60	-
	Evening	60	-
	Late Night	60	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 120

Mallory Street

Service Type: Local
Jurisdictions Served: Hampton

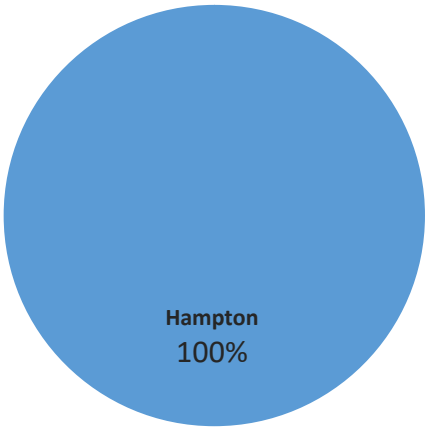
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

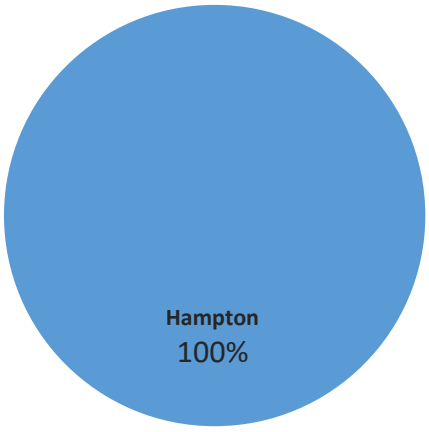
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		7:10 AM - 8:48 PM	7:10 AM - 8:48 PM
Saturday		8:10 AM - 8:48 PM	8:10 AM - 8:48 PM
Sunday		8:10 AM - 6:48 PM	8:10 AM - 6:48 PM
Origin and Destinations			
		Existing	Proposed
From		Downtown Hampton	Downtown Hampton
To		Buckroe	Buckroe
Headway			
		Existing	Proposed
Weekday	Early	-	-
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

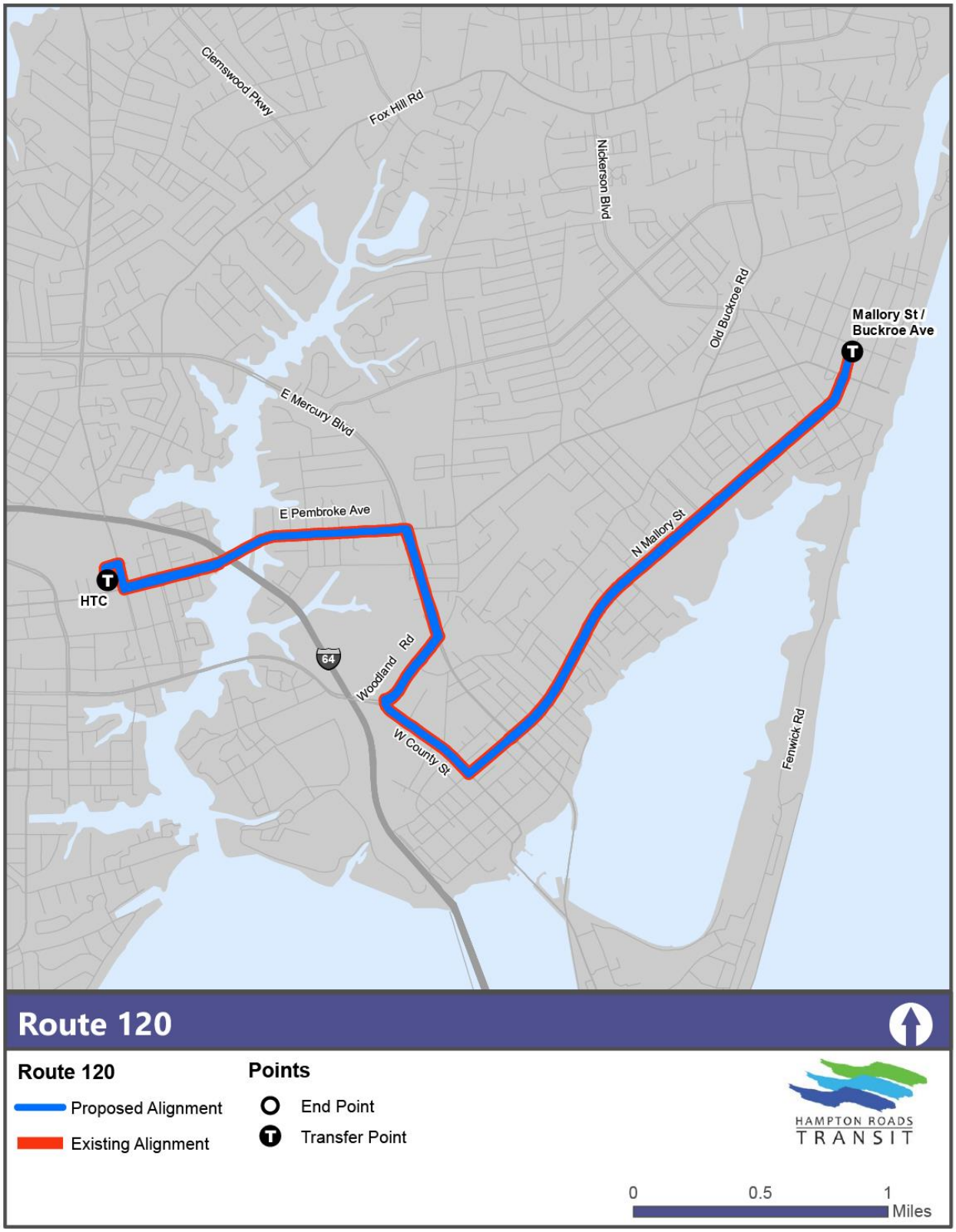


Existing



Proposed

Route Alignment Map



ROUTE 121

Williamsburg

Service Type: Express
Jurisdictions Served: Newport News and Williamsburg

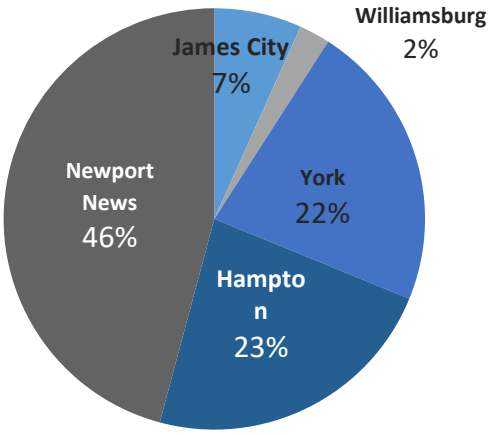
POTENTIAL SERVICE IMPROVEMENTS

Service will be maintained between the Newport News Transit Center and Williamsburg with one morning peak period trip and one afternoon peak period trip. Service would also be extended to Newport News Shipyard, which should help attract additional passengers to the service.

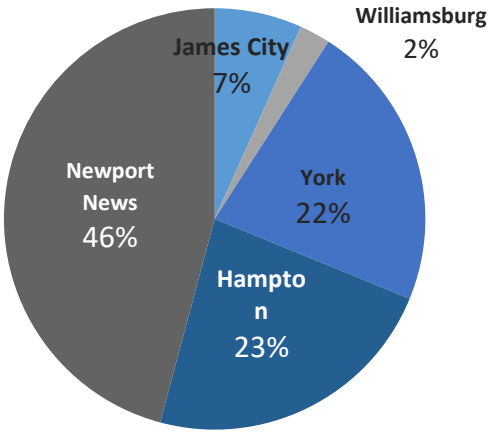
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:15 AM – 8:00 AM; 4:05 PM – 5:50 PM	6:15 AM – 8:00 AM; 4:05 PM – 5:50 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newport News Transit Center	Newport News Transit Center
To		Williamsburg	Williamsburg
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	1 Trip	1 Trip
	Midday	-	-
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

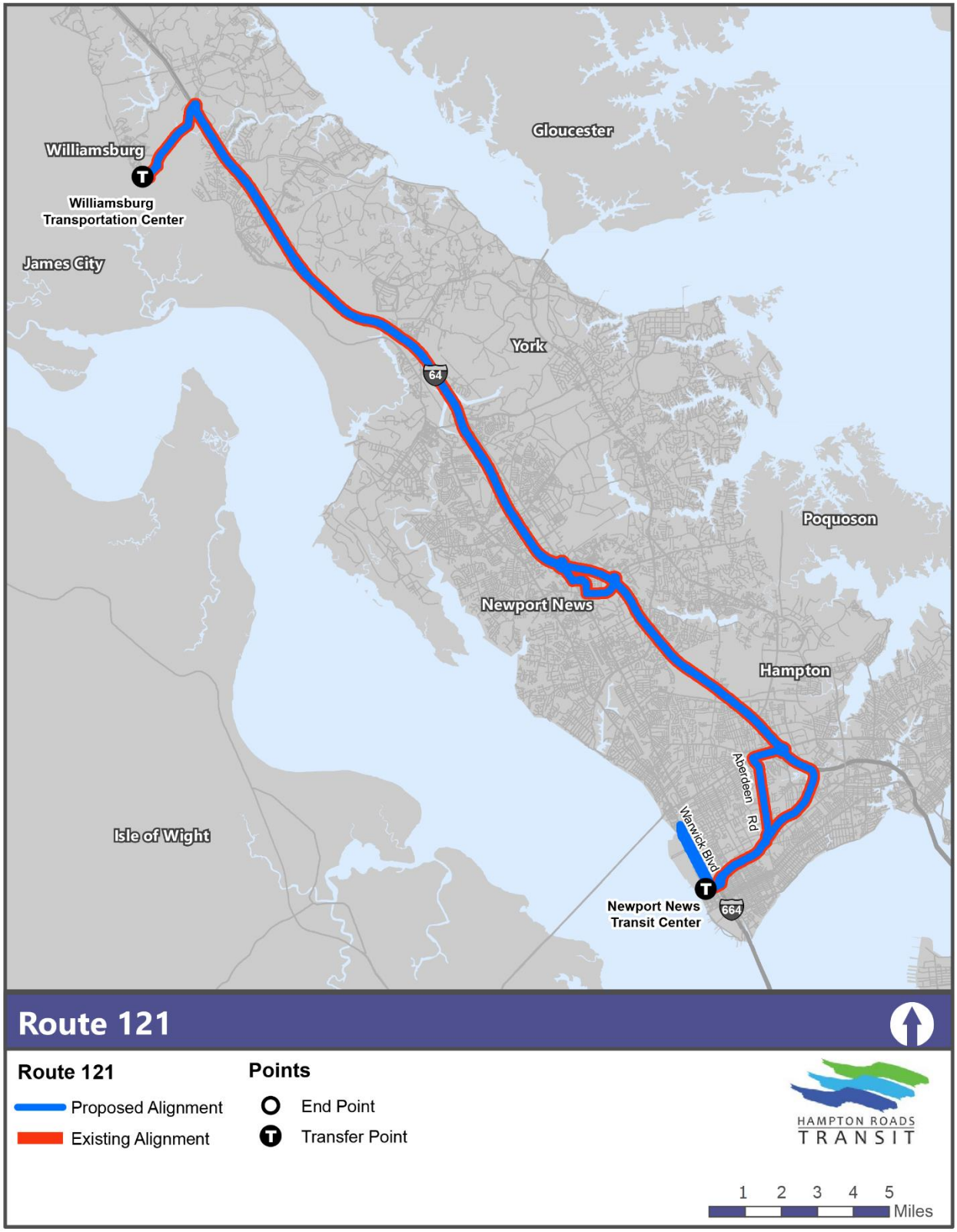


Existing



Proposed

Route Alignment Map



ROUTE 403

Buckroe Shopping Center - Newport News Shipyard

Service Type: Express
Jurisdictions Served: Hampton and Newport News

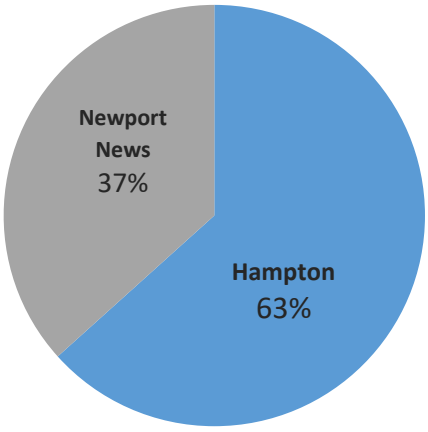
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

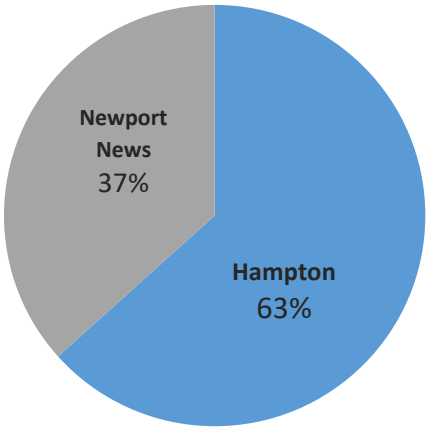
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:28 AM - 6:14 AM	5:28 AM - 6:14 AM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Buckroe Shopping Center	Buckroe Shopping Center
To		Newport News Shipyard	Newport News Shipyard
Headway			
		Existing	**Proposed**
Weekday	Early	1 Trip	1 Trip
	AM Peak	-	-
	Midday	-	-
	PM Peak	-	-
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

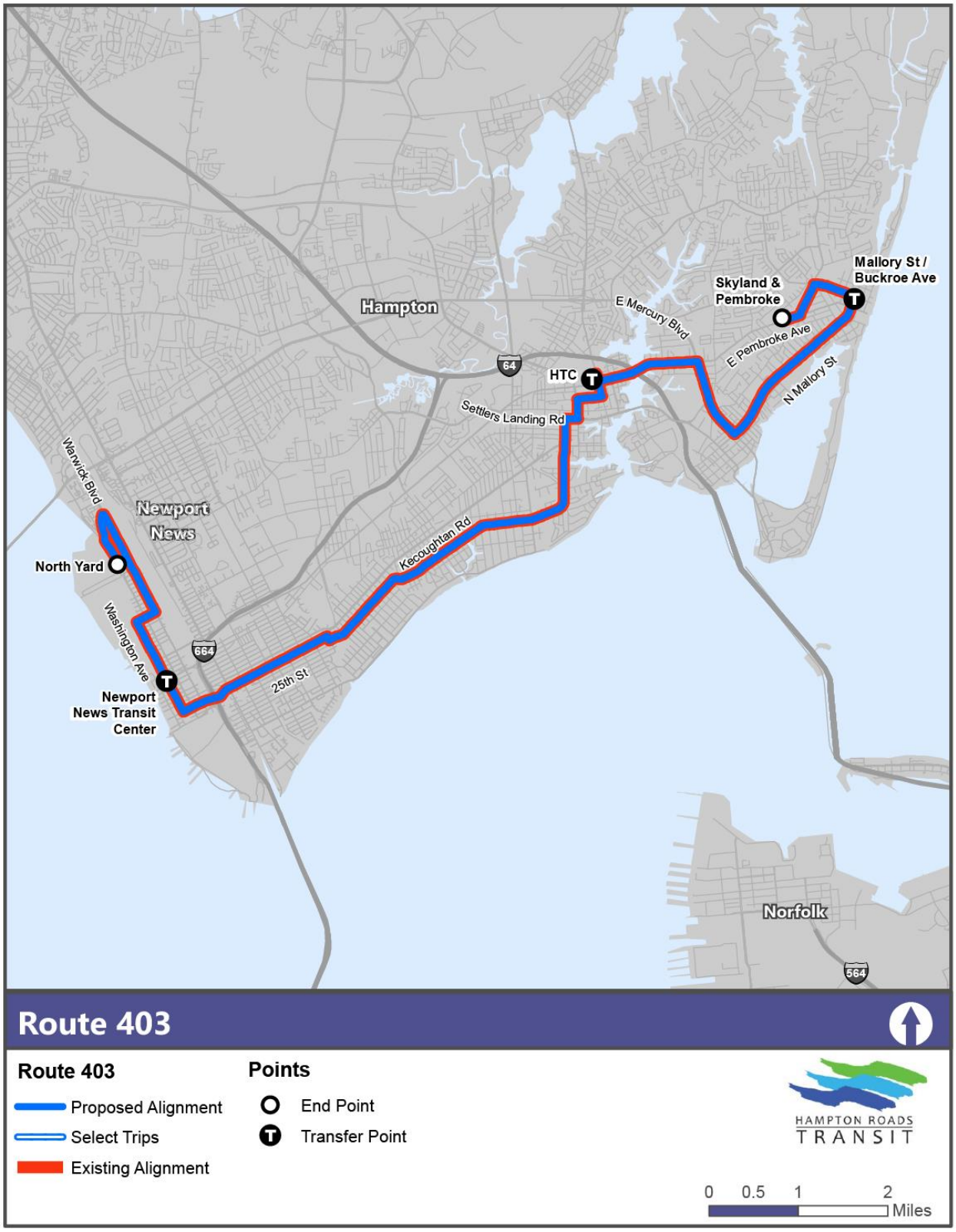


Existing



Proposed

Route Alignment Map



ROUTE 405

Buckroe/Willow Oaks/NetCenter - Newport News Shipyard

Service Type: Express
Jurisdictions Served: Hampton and Newport News

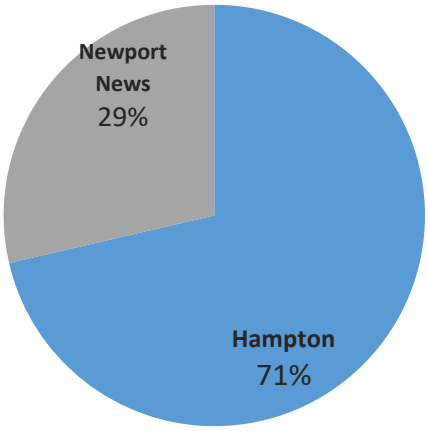
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

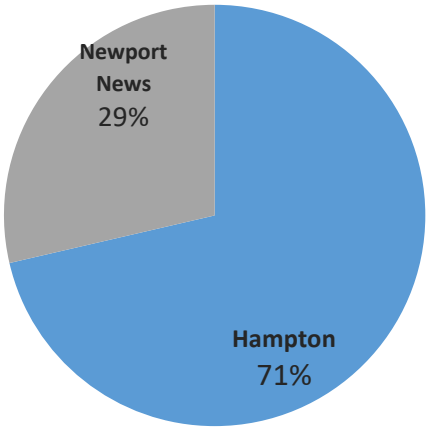
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:50 AM - 6:37 AM; 3:40 PM – 4:31 PM	5:50 AM - 6:37 AM; 3:40 PM – 4:31 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newport News Transit Center	Newport News Transit Center
To		Buckroe Shopping Center	Buckroe Shopping Center
Headway			
		Existing	**Proposed**
Weekday	Early	1 Trip	1 Trip
	AM Peak	-	-
	Midday	-	-
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

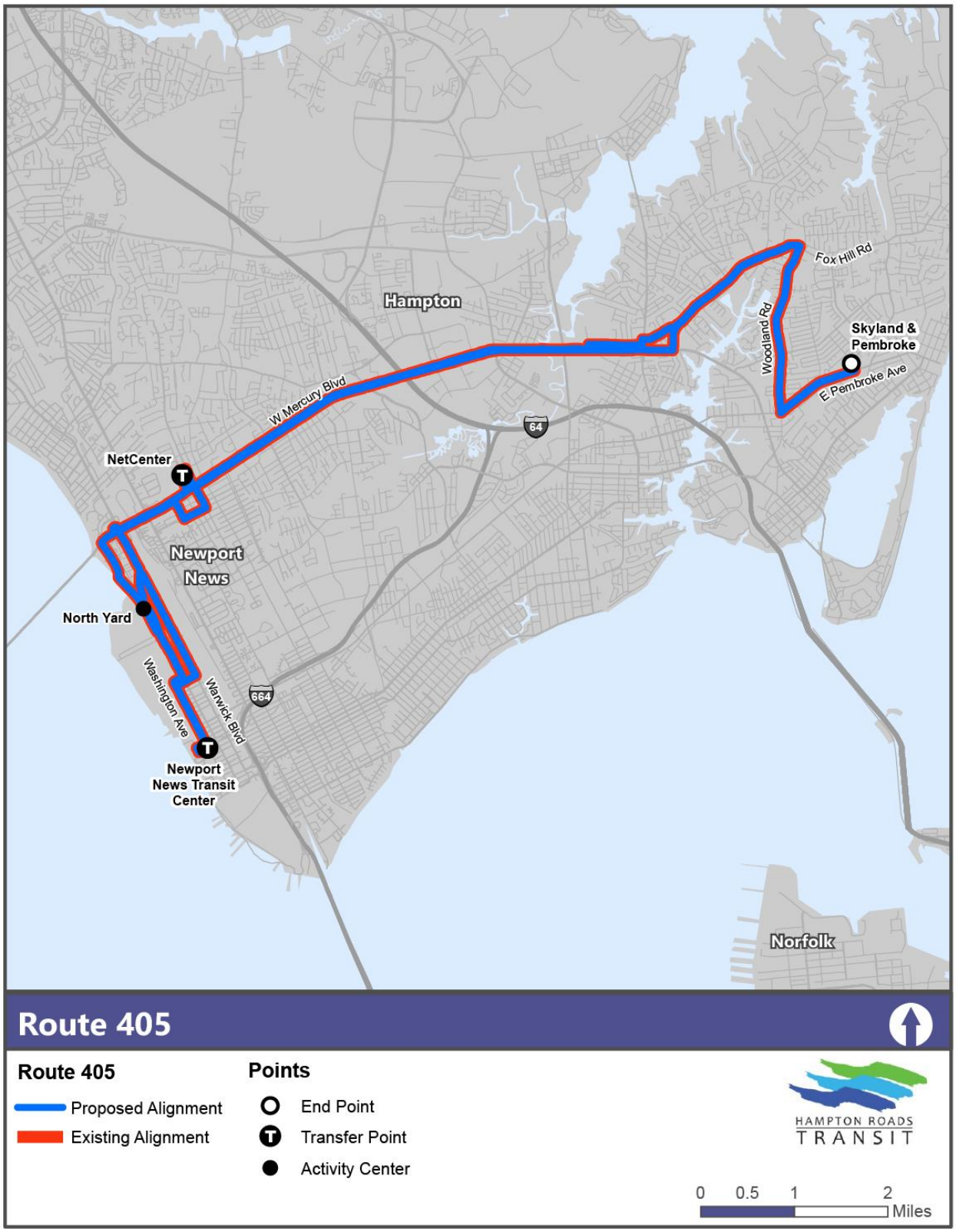


Existing



Proposed

Route Alignment Map



ROUTE 414

Newport News Transit Center - Oakland Industrial

Service Type: Express
Jurisdictions Served: Newport News

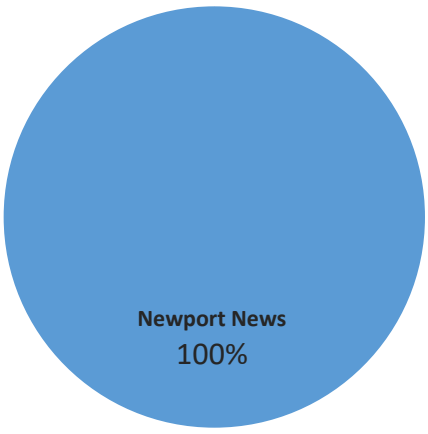
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

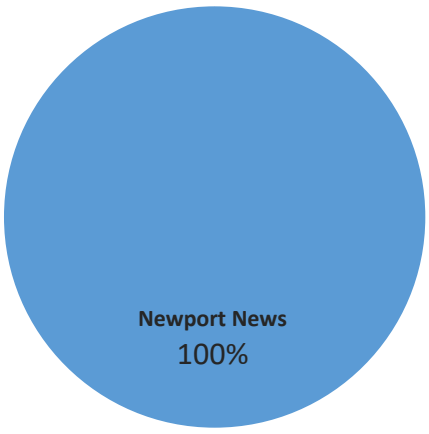
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:20 AM - 7:49 AM; 4:12 PM – 6:24 PM	5:20 AM - 7:49 AM; 4:12 PM – 6:24 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Newport News Transit Center	Newport News Transit Center
To		Oakland	Oakland
Headway			
		Existing	**Proposed**
Weekday	Early	1 Trip	1 Trip
	AM Peak	1 Trip	1 Trip
	Midday	-	-
	PM Peak	3 Trip	3 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

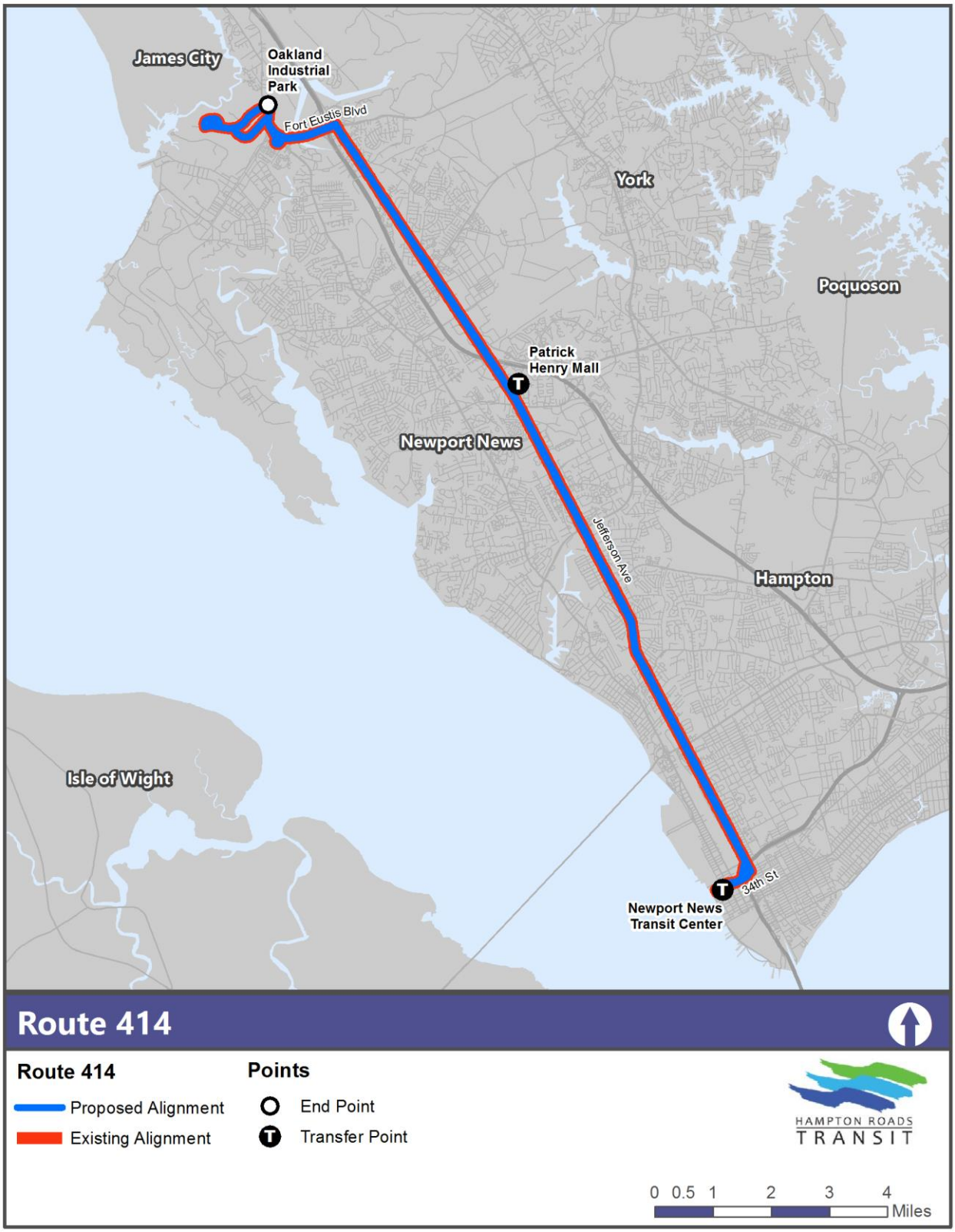


Existing



Proposed

Route Alignment Map



ROUTE 415

Denbigh Park and Ride – Newport News Shipyard

Service Type: Express
Jurisdictions Served: Newport News

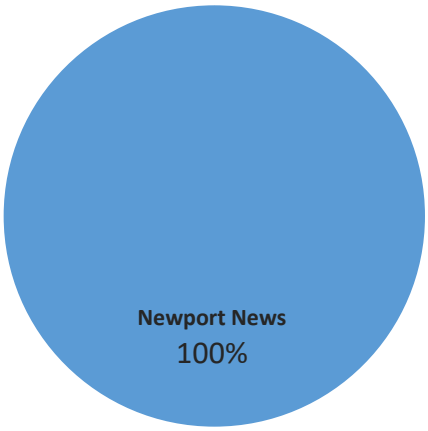
POTENTIAL SERVICE IMPROVEMENTS

It is recommended that Route 415 service be eliminated, as the proposed Route 430 covers the entire alignment of this current route, and the two routes have overlapping trip times. To avoid duplicative service, Route 415 should be eliminated.

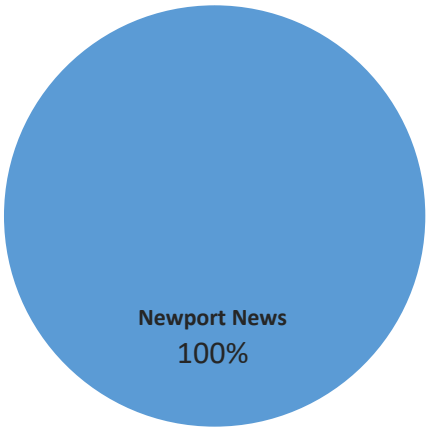
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		3:45 PM - 4:30 PM	-
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	Proposed
From		Denbigh Fringe Park and Ride	-
To		Newport News Transit Center	-
Headway			
		Existing	Proposed
Weekday	Early	-	-
	AM Peak	-	-
	Midday	-	-
	PM Peak	1 Trip	-
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

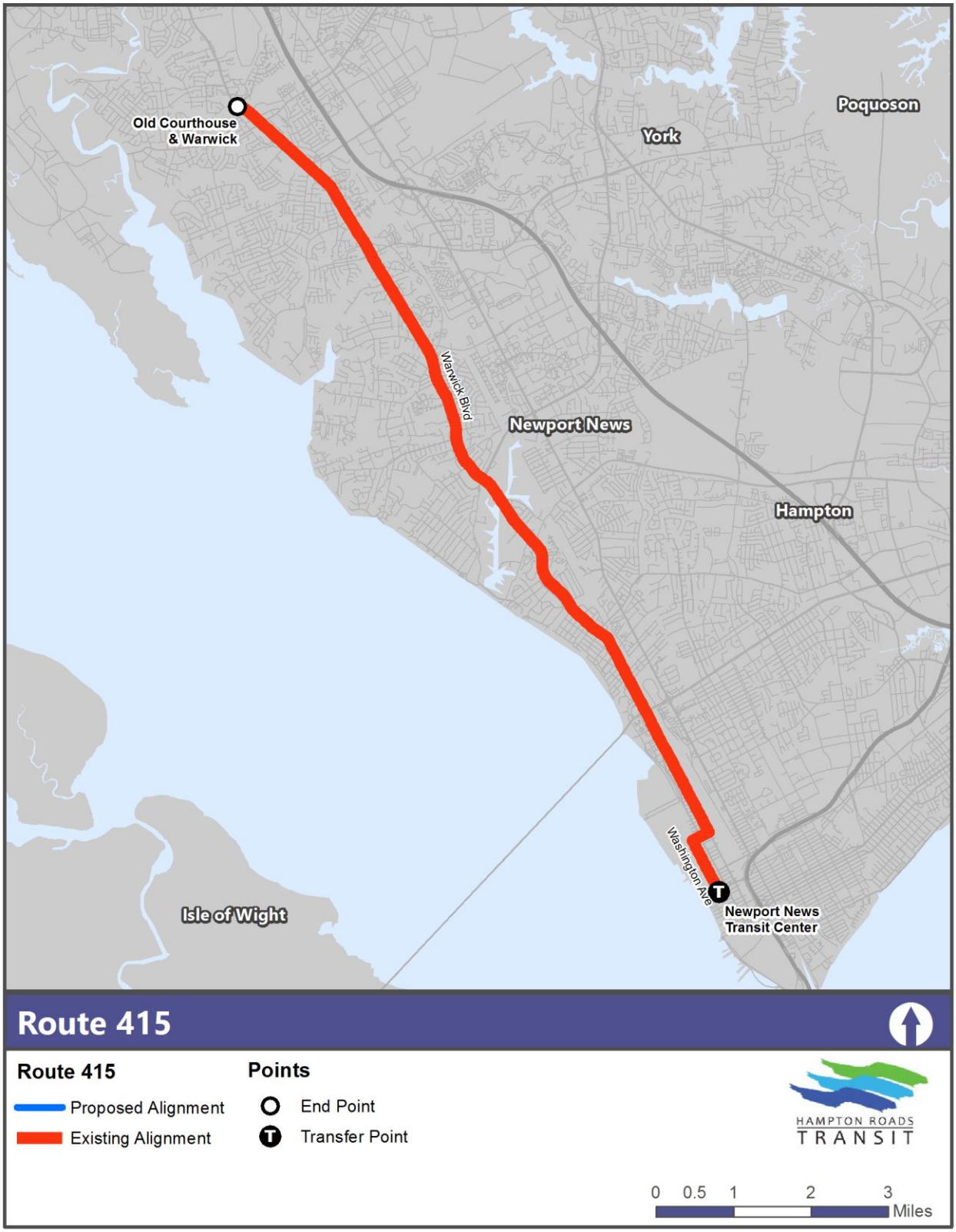


Existing



Proposed

Route Alignment Map



ROUTE 430

Denbigh Park and Ride - Newport News Shipyard

Service Type: Express
Jurisdictions Served: Newport News

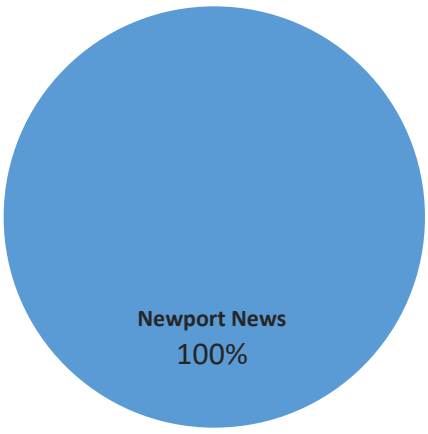
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

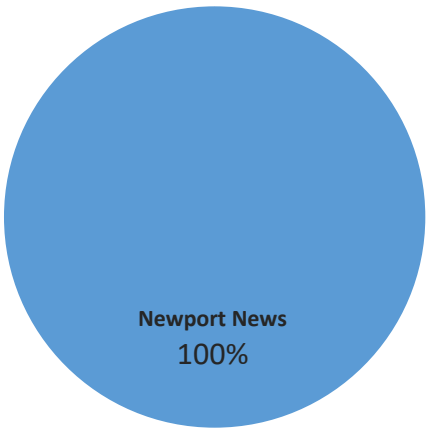
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:35 AM – 6:30 AM; 3:45 PM – 4:29 PM	5:35 AM – 6:30 AM; 3:45 PM – 4:29 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Denbigh Fringe Park and Ride	Denbigh Fringe Park and Ride
To		Newport News Shipyard	Newport News Shipyard
Headway			
		Existing	**Proposed**
Weekday	Early	2 Trip	2 Trip
	AM Peak	-	-
	Midday	-	-
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

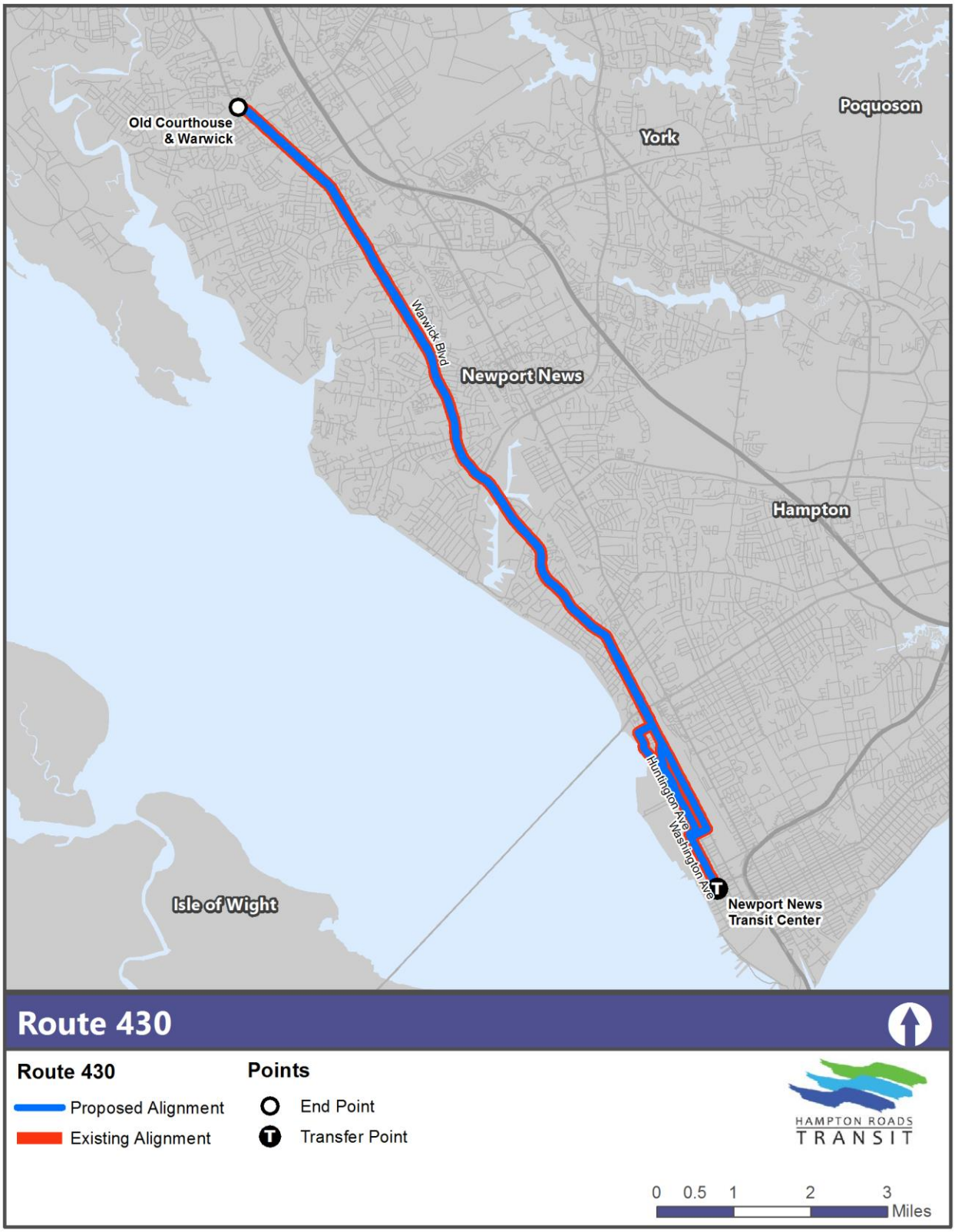


Existing



Proposed

Route Alignment Map



ROUTE 918

MAX Silverleaf-NSA/Joint Force Staff College/Lafayette River Annex

Service Type: Express
Jurisdictions Served: Norfolk and Virginia Beach

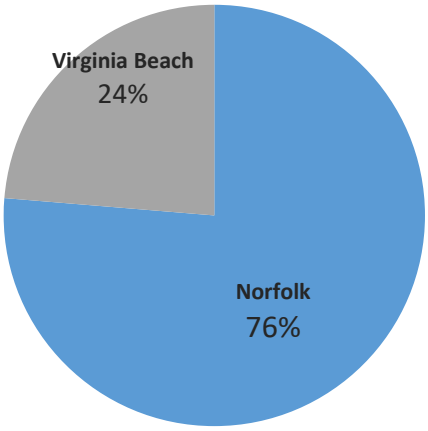
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

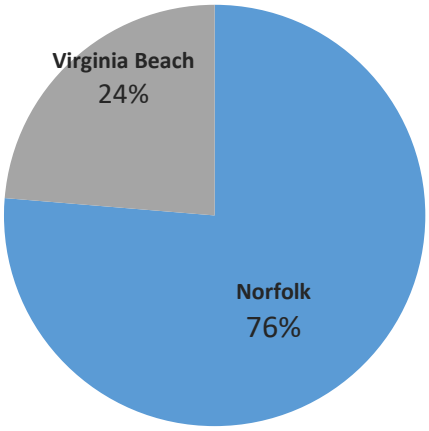
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		6:00 AM – 6:46 AM; 4:03 PM – 4:44 PM	6:00 AM – 6:46 AM; 4:03 PM – 4:44 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Silverleaf Park and Ride	Silverleaf Park and Ride
To		Lafayette River Annex	Lafayette River Annex
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	1 Trip	1 Trip
	Midday	-	-
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

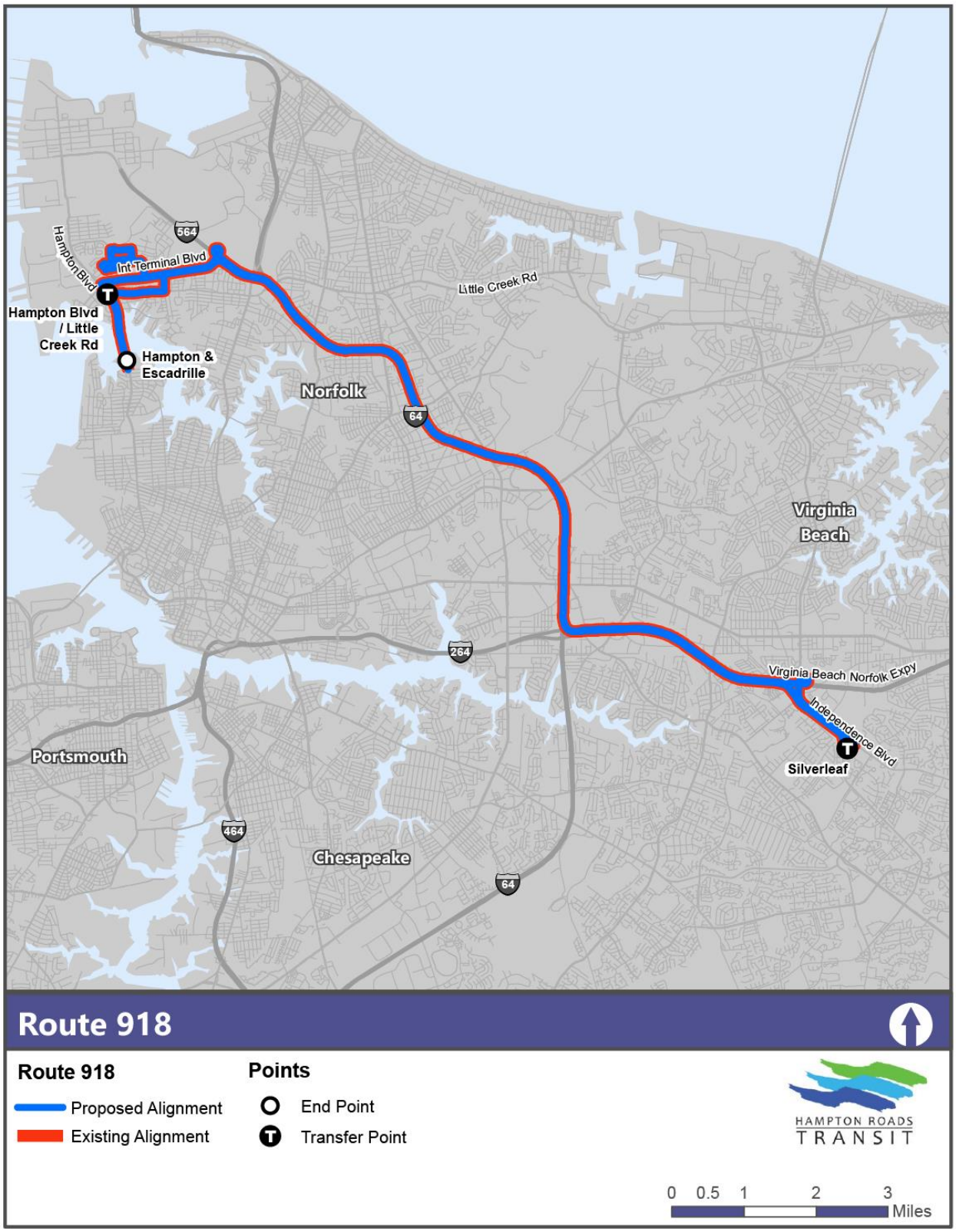


Existing



Proposed

Route Alignment Map



ROUTE 919

MAX Silverleaf/Naval Station
Norfolk

Service Type: Express
Jurisdictions Served: Norfolk and Virginia Beach

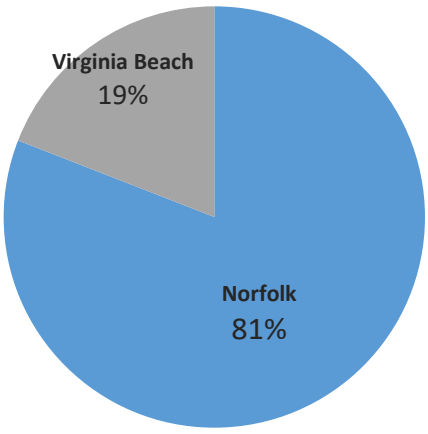
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

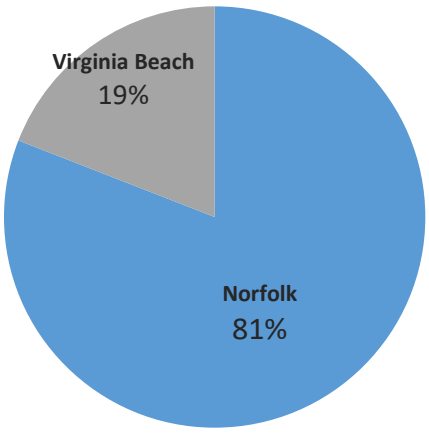
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:00 AM – 7:46 AM; 2:54 PM - 5:03 PM	5:00 AM – 7:46 AM; 2:54 PM - 5:03 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Silverleaf Park and Ride	Silverleaf Park and Ride
To		Naval Station Norfolk	Naval Station Norfolk
Headway			
		Existing	**Proposed**
Weekday	Early	20	20
	AM Peak	20	20
	Midday	-	-
	PM Peak	20	20
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

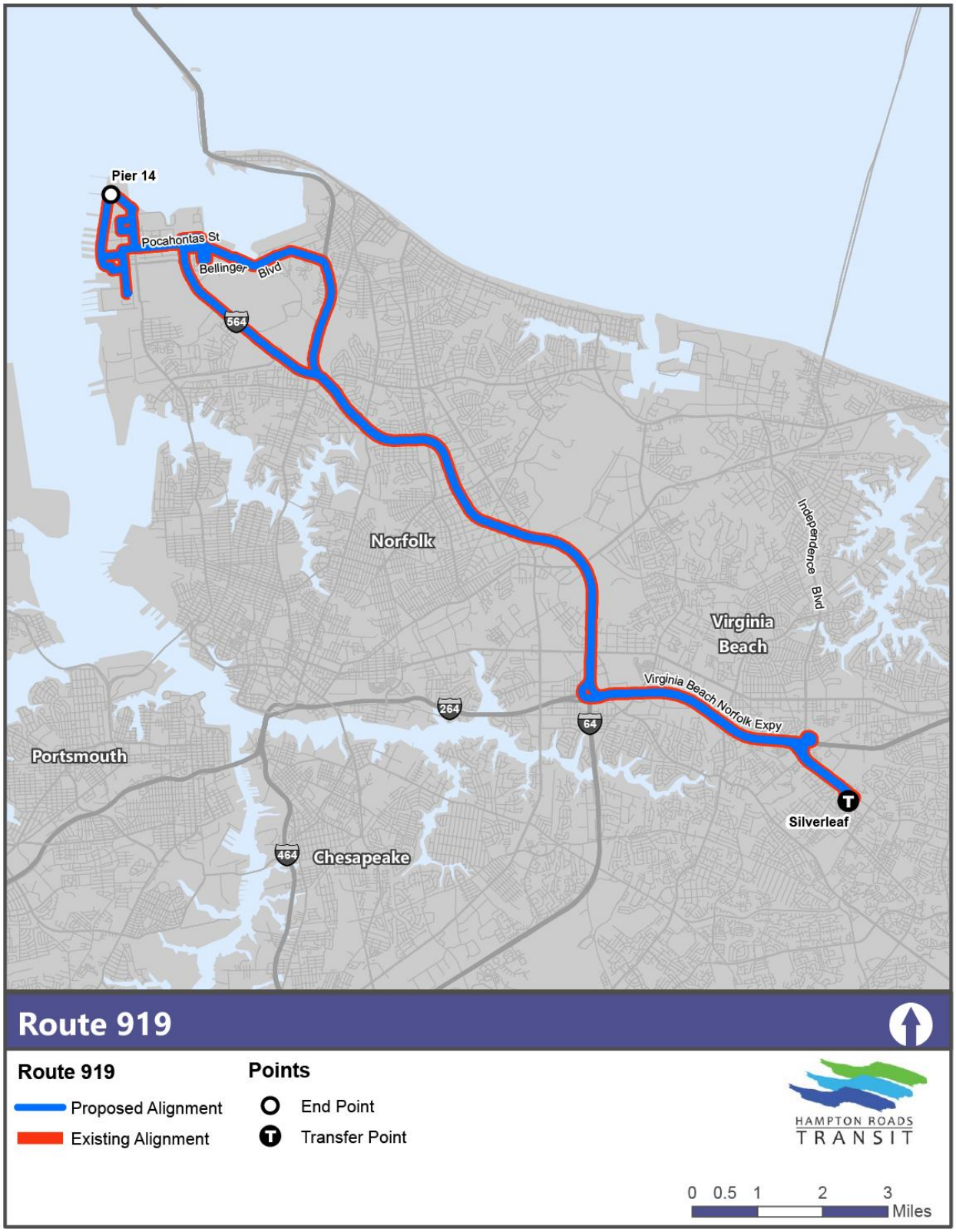


Existing



Proposed

Route Alignment Map



ROUTE 922

MAX Greenbrier/Indian River/Naval Station Norfolk

Service Type: Express
Jurisdictions Served: Chesapeake, Norfolk, and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

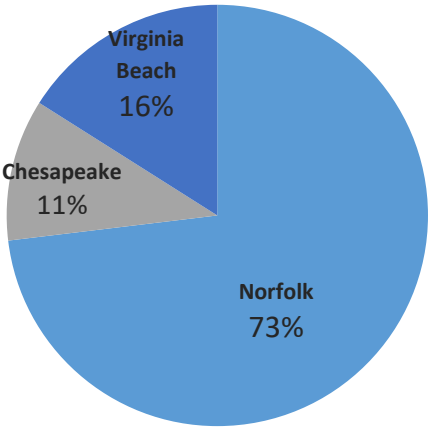
Existing and Proposed Level of Service

Span		
	Existing	**Proposed**
Weekday	5:00 AM – 7:13 AM; 2:55 PM – 5:18 PM	5:00 AM – 7:13 AM; 2:55 PM – 5:18 PM
Saturday	-	-
Sunday	-	-

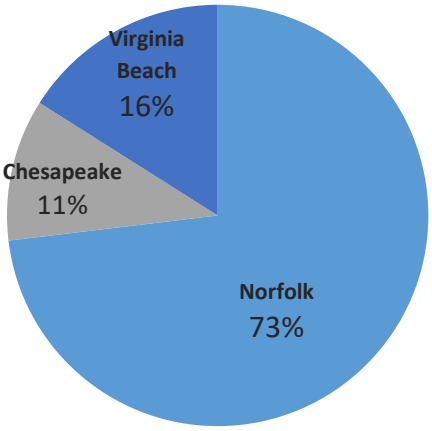
Origin and Destinations		
	Existing	**Proposed**
From	Greenbrier Mall Park and Ride	Greenbrier Mall Park and Ride
To	Naval Station Norfolk	Naval Station Norfolk

Headway			
		Existing	**Proposed**
Weekday	Early	15	15
	AM Peak	15	15
	Midday	-	-
	PM Peak	15	15
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

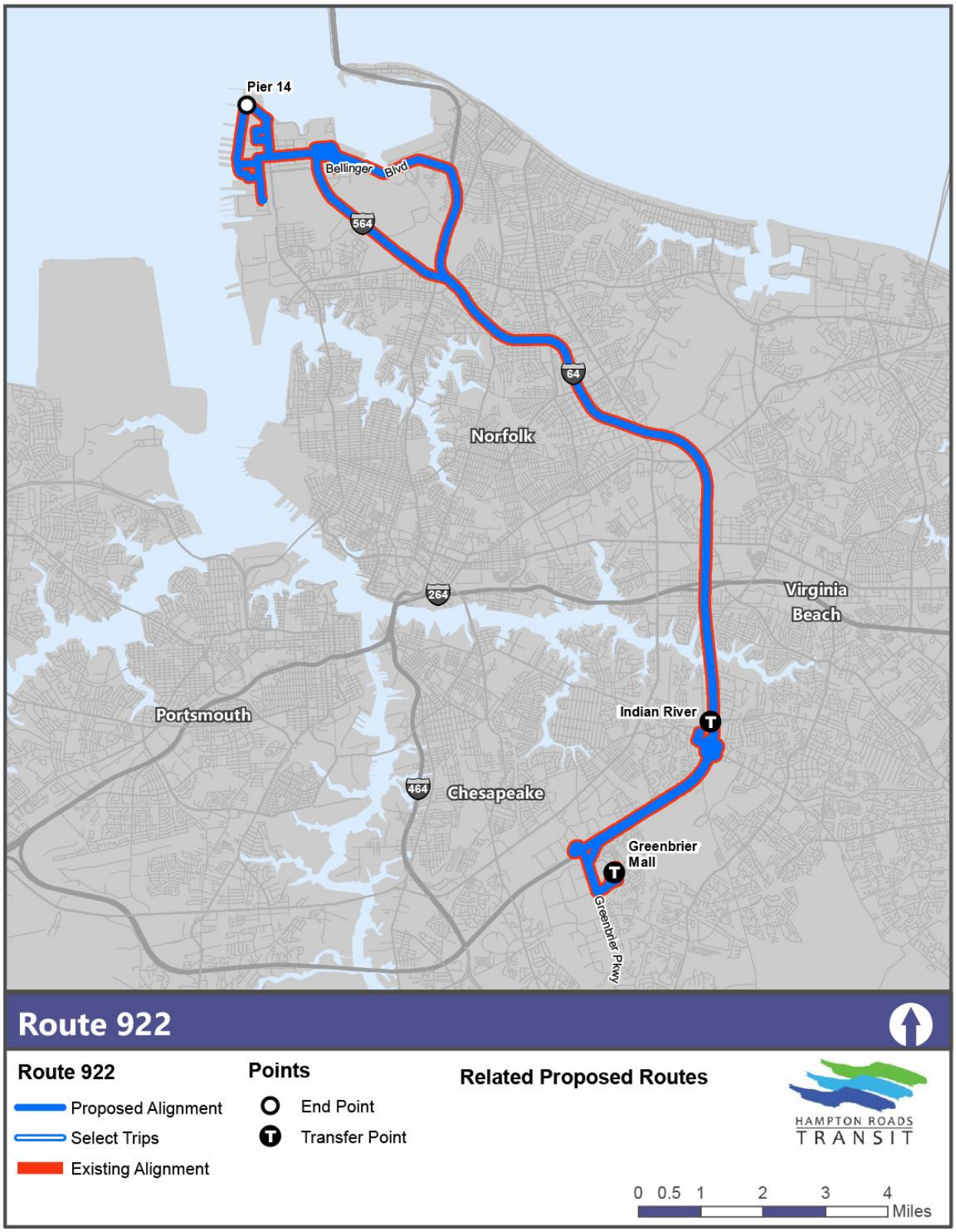


Existing



Proposed

Route Alignment Map



ROUTE 960

MAX Virginia Beach-Norfolk Express

Service Type: Limited
Jurisdictions Served: Norfolk and Virginia Beach

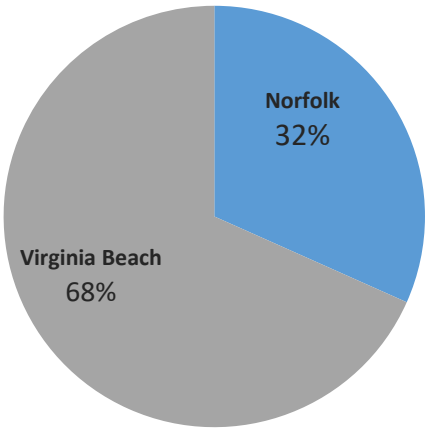
POTENTIAL SERVICE IMPROVEMENTS

It is recommended that the Route 960 service to Silverleaf Park and Ride be discontinued. The removal of this deviation would allow the service to improve route directness and increase overall on-time performance. The proposed route would provide service between Downtown Norfolk Transit Center and the Virginia Beach Oceanfront with a stop at the Newtown Light Rail Station. No other alignment or service level changes are recommended.

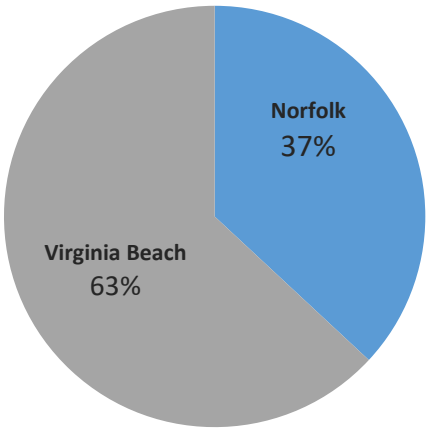
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:35 AM - 8:19 PM	5:35 AM - 8:19 PM
Saturday		6:30 AM - 8:19 PM	6:30 AM - 8:19 PM
Sunday		7:50 AM - 8:44 PM	7:50 AM - 8:44 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Virginia Beach Oceanfront	Virginia Beach Oceanfront
Headway			
		Existing	**Proposed**
Weekday	Early	60	60
	AM Peak	60	60
	Midday	60	60
	PM Peak	60	60
	Evening	60	60
	Late Night	-	-
Saturday		60	60
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

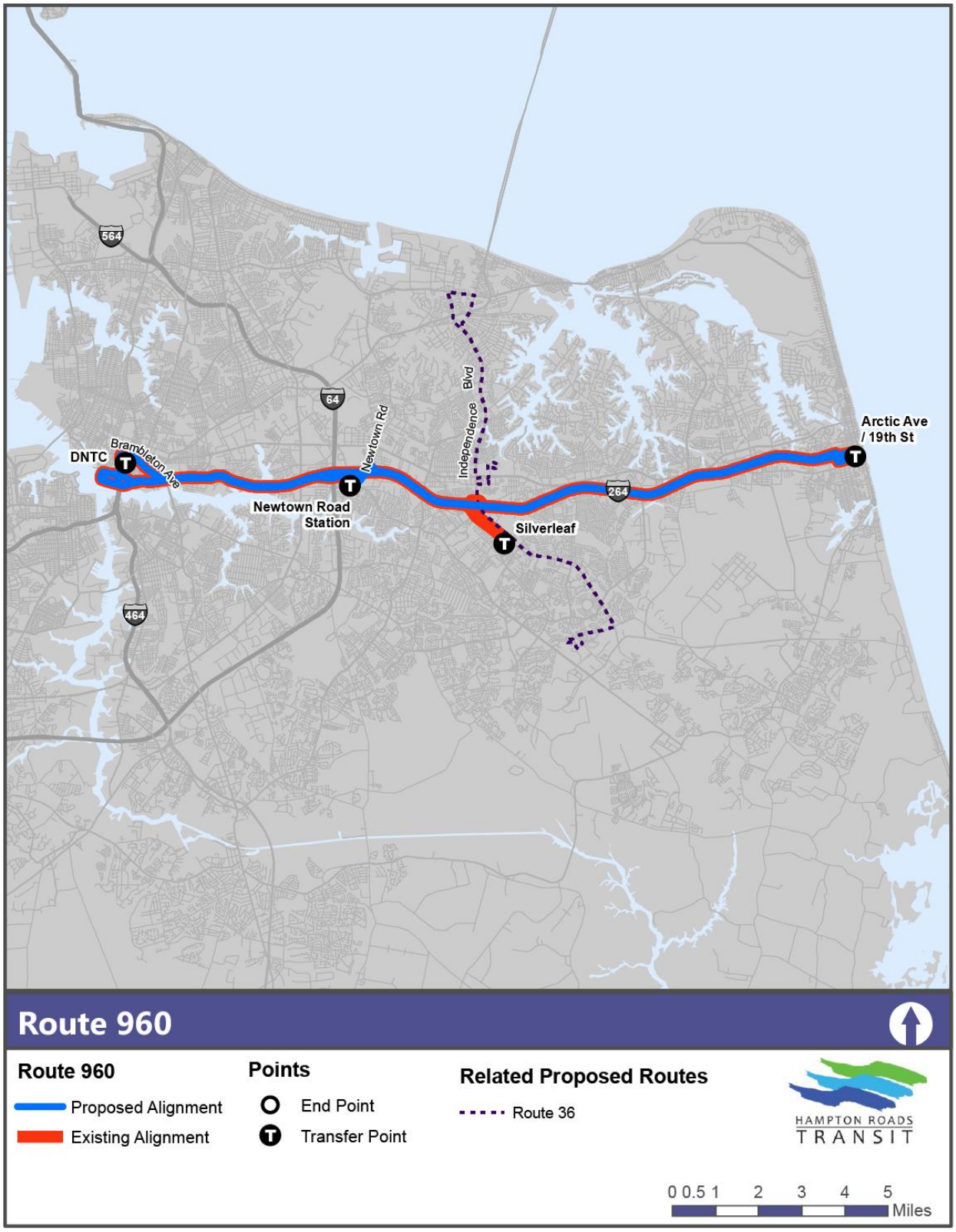


Existing



Proposed

Route Alignment Map



ROUTE 961

MAX Newport News/Hampton/Norfolk

Service Type: Limited
Jurisdictions Served: Hampton, Newport News and Norfolk

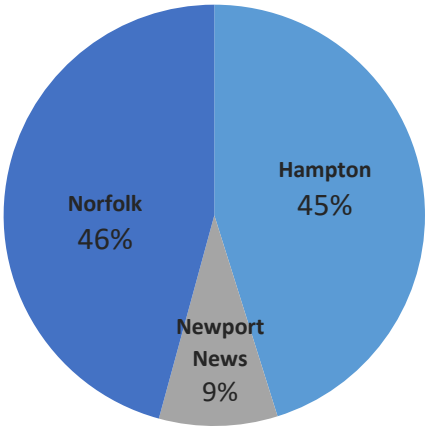
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

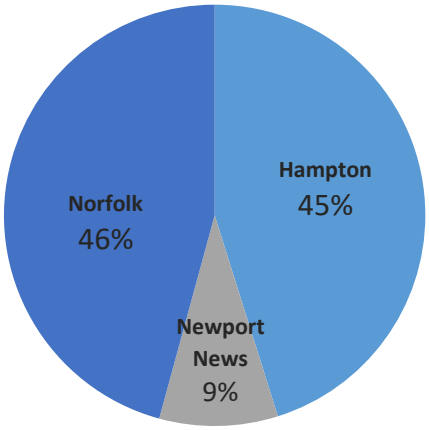
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		4:55 AM - 11:12 PM	4:55 AM - 11:12 PM
Saturday		4:58 AM - 10:57 PM	4:58 AM - 10:57 PM
Sunday		7:00 AM - 8:58 PM	7:00 AM - 8:58 PM
Origin and Destinations			
		Existing	**Proposed**
From		Downtown Norfolk Transit Center	Downtown Norfolk Transit Center
To		Newport News Transit Center	Newport News Transit Center
Headway			
		Existing	**Proposed**
Weekday	Early	30	30
	AM Peak	30	30
	Midday	60	60
	PM Peak	30	30
	Evening	60	60
	Late Night	60	60
Saturday		30	30
Sunday		60	60

Weekly Service Mile Change by Jurisdiction

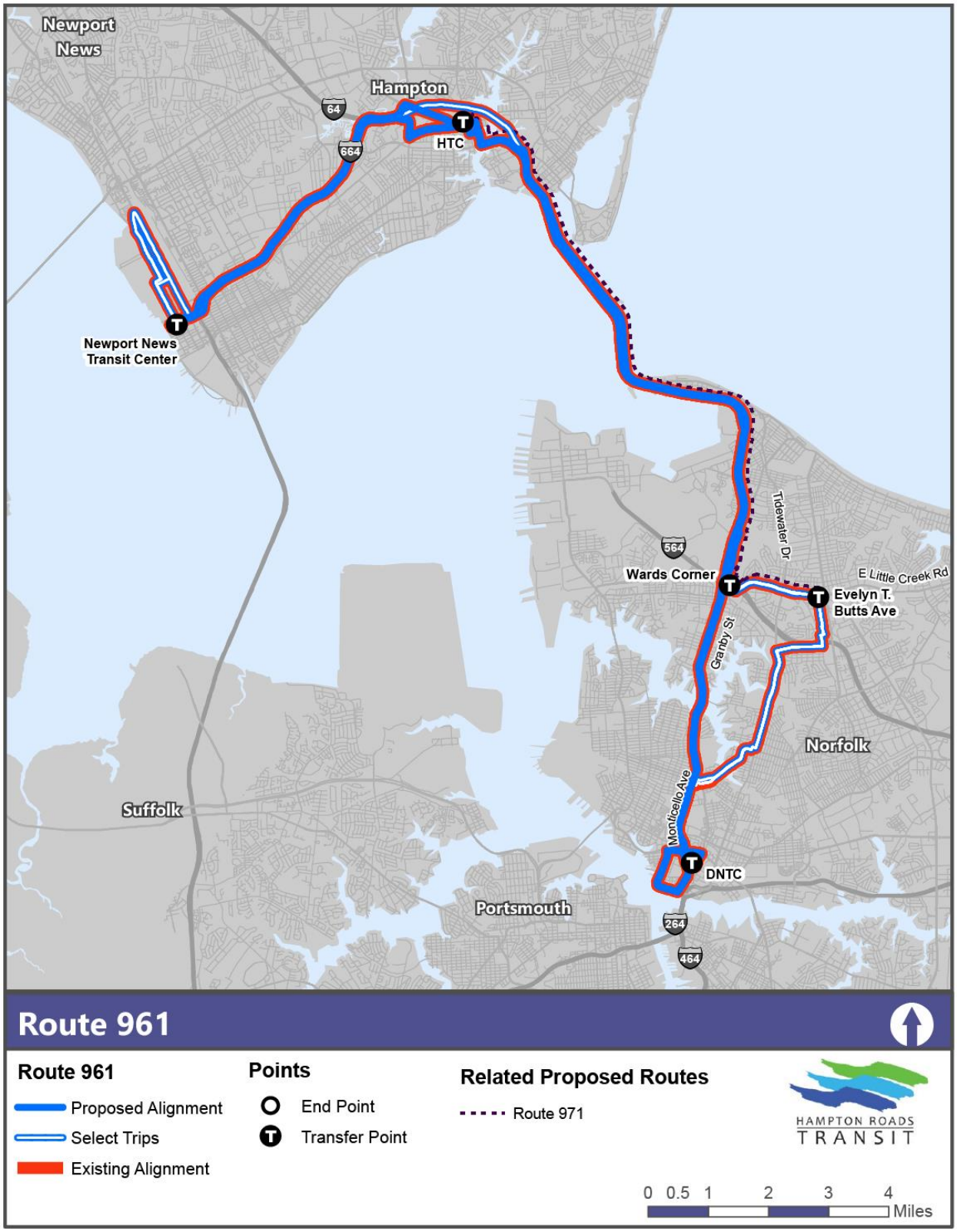


Existing



Proposed

Route Alignment Map



ROUTE 965

MAX Patrick Henry/Peninsula Town Center/Naval Station Norfolk

Service Type: Express
Jurisdictions Served: Hampton, Newport News and Norfolk

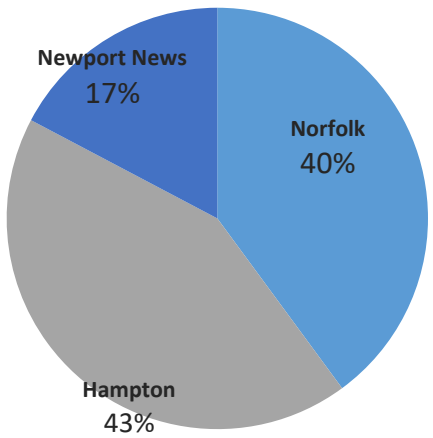
POTENTIAL SERVICE IMPROVEMENTS

Route 965 has very low ridership. To save resources, this route should be eliminated. This would result in a loss of service for 26 passengers, many of whom are currently boarding at Naval Station Norfolk.

Existing and Proposed Level of Service

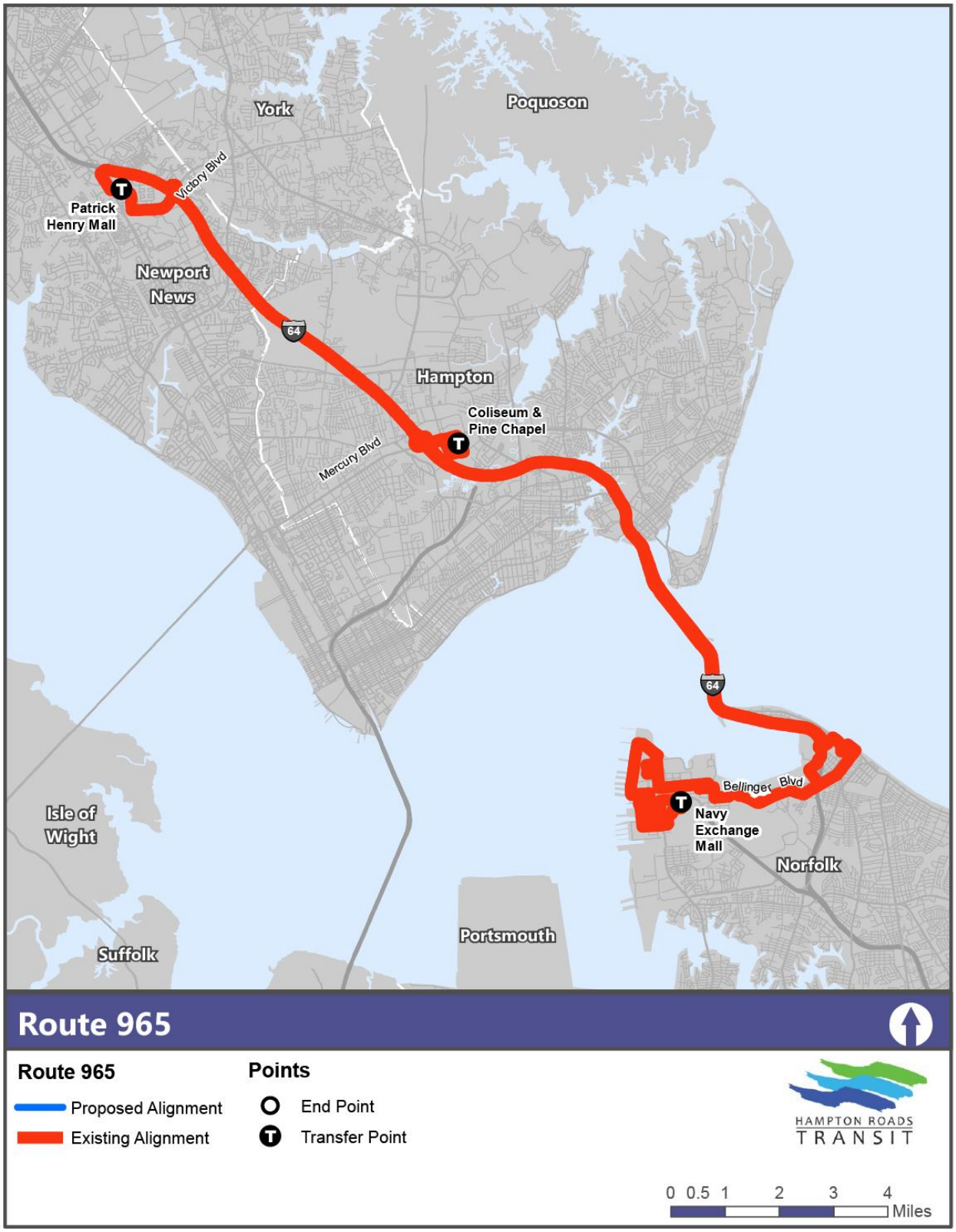
Span			
		Existing	Proposed
Weekday		5:15 AM - 5:15 PM	-
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	Proposed
From		Patrick Henry Mall	-
To		Naval Station Norfolk	-
Headway			
		Existing	Proposed
Weekday	Early	1 Trip	-
	AM Peak	1 Trip	-
	Midday	-	-
	PM Peak	2 Trips	-
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing

Route Alignment Map



ROUTE 966

MAX Silverleaf/Newport News Shipbuilding

Service Type: Express
Jurisdictions Served: Newport News and Virginia Beach

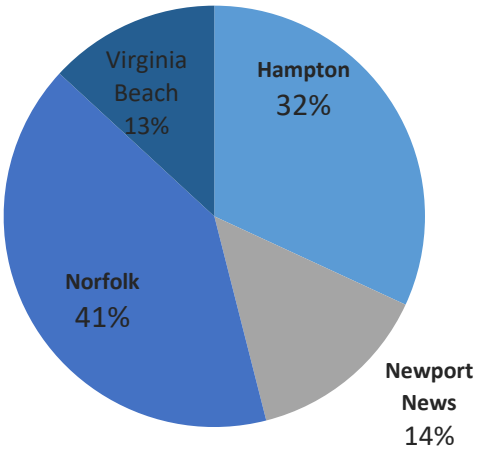
POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

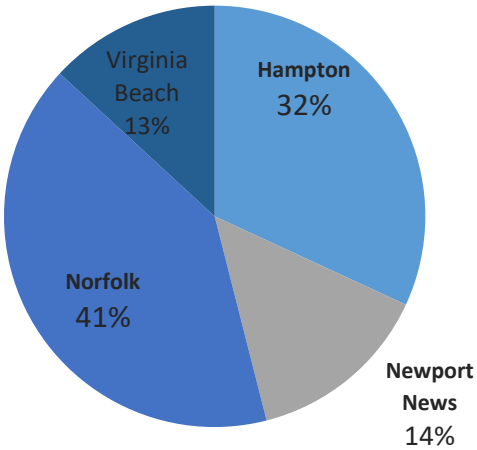
Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		5:40 AM – 6:31 AM; 3:40 PM – 4:53 PM	5:40 AM – 6:31 AM; 3:40 PM – 4:53 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		Silverleaf Park and Ride	Silverleaf Park and Ride
To		Newport News Transit Center	Newport News Transit Center
Headway			
		Existing	**Proposed**
Weekday	Early	1 Trip	1 Trip
	AM Peak	-	-
	Midday	-	-
	PM Peak	1 Trip	1 Trip
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Existing



Proposed

Route Alignment Map

ROUTE 967

MAX Virginia Beach-Newport News Express

Service Type: Express
Jurisdictions Served: Chesapeake, Newport News and Virginia Beach

POTENTIAL SERVICE IMPROVEMENTS

No alignment or level of service changes are proposed.

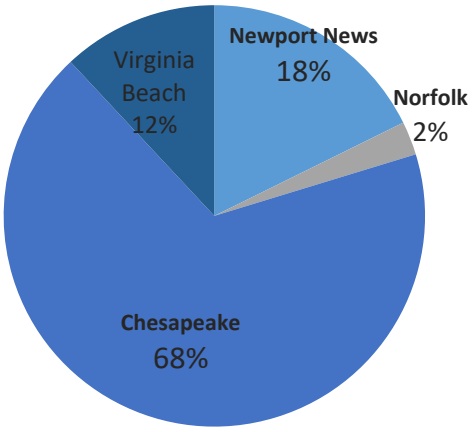
Existing and Proposed Level of Service

Span		
	Existing	**Proposed**
Weekday	4:35 AM – 7:14 AM; 3:00 PM – 6:39 PM	4:35 AM – 7:14 AM; 3:00 PM – 6:39 PM
Saturday	-	-
Sunday	-	-

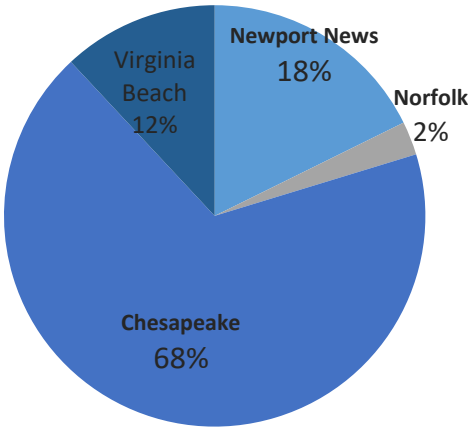
Origin and Destinations		
	Existing	**Proposed**
From	Military Highway Station	Military Highway Station
To	Newport News Transit Center	Newport News Transit Center

Headway			
		Existing	**Proposed**
Weekday	Early	20	20
	AM Peak		
	Midday	-	-
	PM Peak	20	20
	Evening		
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction

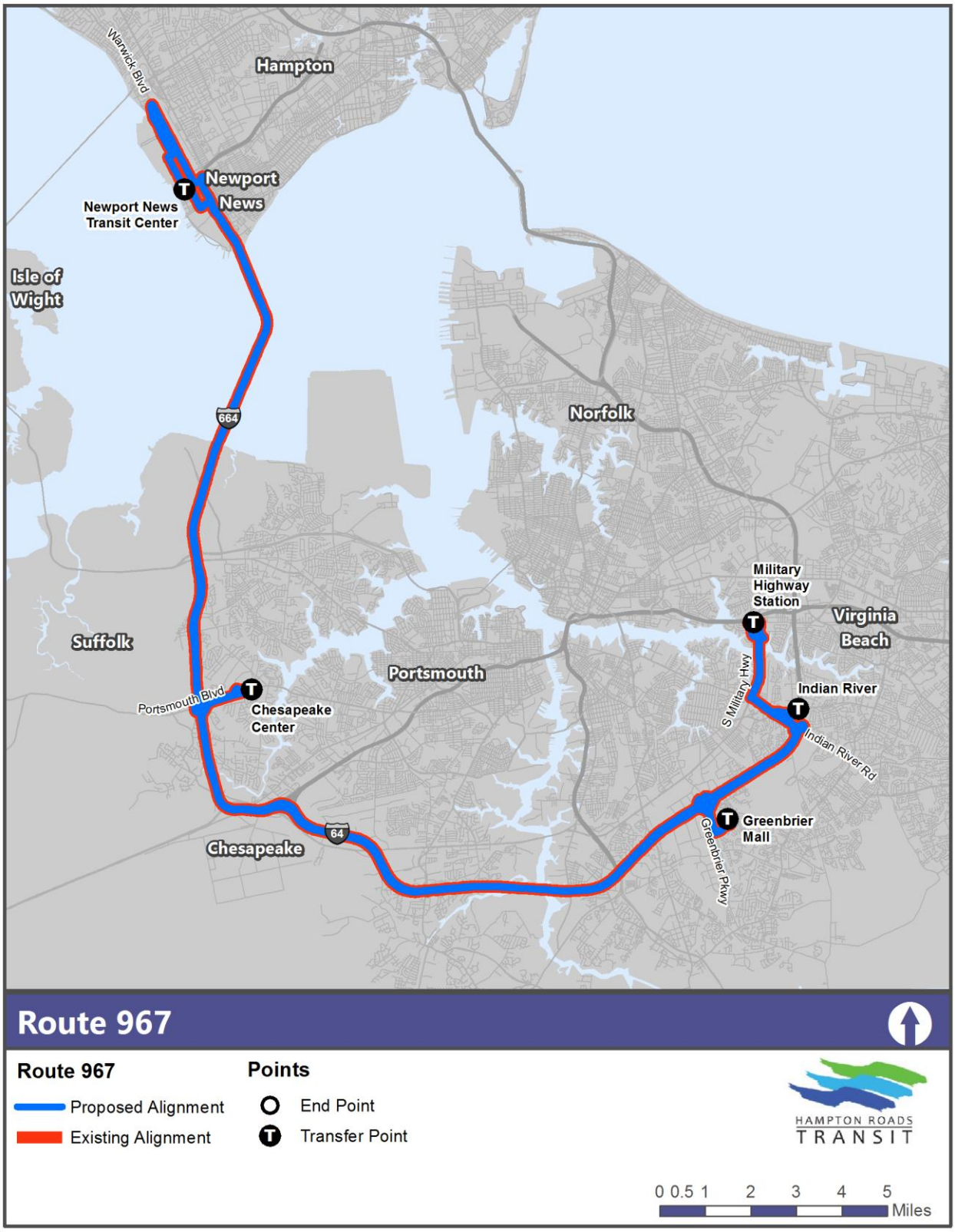


Existing



Proposed

Route Alignment Map



ROUTE 970

MAX Newport News - Portsmouth Express

Service Type: Express
Jurisdictions Served: Newport News and Portsmouth

POTENTIAL SERVICE IMPROVEMENTS

This new route would provide express service between Downtown Portsmouth and Newport News. It would operate four trips in the morning and afternoon peak periods, operating in both directions. It would begin at the County Street & Court Street Hub, traveling west on County Street, turn right onto Court Street, left onto High Street, right onto Effingham Street, and left onto London Street. Continue straight onto London Boulevard, merge onto SR 164, then merge unto onto I-664. Exit onto 35th Street, take a right onto Warwick Boulevard, turn left onto Huntington Avenue, and serve the Newport News Shipyard.

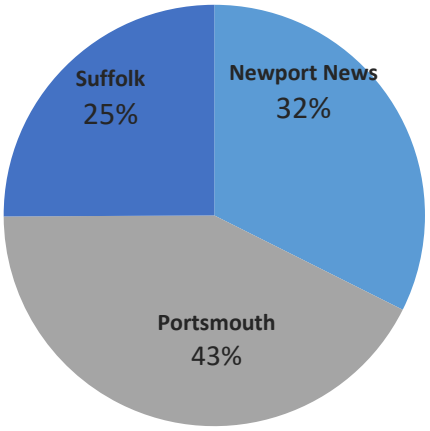
The return trip would begin at Newport News Shipyard, continuing straight on Huntington Avenue, right onto 50th Street, left onto Washington Avenue, right onto 35th Street, left onto West Avenue, and left onto 34th Street, serving the Newport News Transit Center, continuing east on 34th Street, followed by a right onto Washington Avenue, left onto 25th Street, right onto Huntington Avenue, left onto US-60, and right onto I-664. The route would then exit onto SR 164, and then quickly exit onto London Boulevard eastbound, then turn right onto Effingham Street, left onto High Street, right onto Crawford Street, and right onto County Street to terminate at the County Street & Court Street Hub.

Route 970 would serve a need for a new peak hour service between Downtown Portsmouth and Newport News Transit Center and Shipyard. This route would be the final missing link in a proposed comprehensive MAX service across the region.

Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		-	5:00 AM – 7:00 AM; 4:00 PM – 7:00 PM
Saturday		-	-
Sunday		-	-
Origin and Destinations			
		Existing	**Proposed**
From		-	Newport News Transit Center
To		-	Downtown Portsmouth
Headway			
		Existing	**Proposed**
Weekday	Early	-	2 Trips
	AM Peak	-	2 Trips
	Midday	-	-
	PM Peak	-	4 Trips
	Evening	-	-
	Late Night	-	-
Saturday		-	-
Sunday		-	-

Weekly Service Mile Change by Jurisdiction



Proposed

Route Alignment Map

ROUTE 971

MAX Hampton/North Norfolk

Service Type: Express
Jurisdictions Served: Hampton and Norfolk

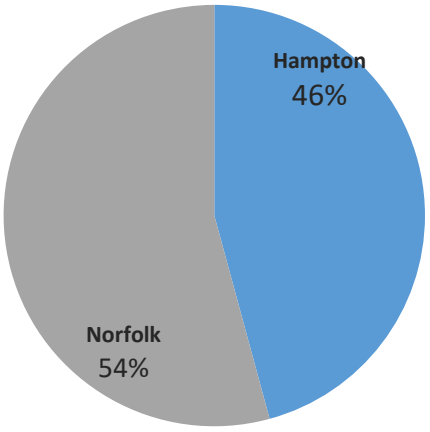
POTENTIAL SERVICE IMPROVEMENTS

This new route would connect Norfolk with Hampton. It would provide service every 30-minutes during peak periods, and hourly service during midday, evening and late periods. Saturdays and Sundays would also have hourly service. This proposed Route 971 would provide needed supplementary service to the existing Route 961 between the Hampton Transit Center and Wards Corner. The two routes together would be part of the high frequency network, providing 15-minute service frequencies between the Peninsula and the Southside, enhancing connectivity between high frequency services.

Existing and Proposed Level of Service

Span			
		Existing	Proposed
Weekday		-	6:00 AM - 12:00 AM
Saturday		-	6:00 AM - 12:00 AM
Sunday		-	6:00 AM - 12:00 AM
Origin and Destinations			
		Existing	**Proposed**
From		-	Newport News Transit Center
To		-	Downtown Portsmouth
Headway			
		Existing	**Proposed**
Weekday	Early	-	-
	AM Peak	-	30
	Midday	-	60
	PM Peak	-	30
	Evening	-	60
	Late Night	-	60
Saturday		-	60
Sunday		-	60

Weekly Service Mile Change by Jurisdiction



Proposed

Route Alignment Map

Appendix D: Recommendation Package Description

Package	Route(s)	Description
A	1, 21, 22, 36	[Route 1] Truncate the route at JEB Little Creek. [Route 21] Extend the route to Pleasure House Road & Shore Drive every 60-minutes. [Route 22] Eliminate route. [Route 36] Realign to Pleasure House & Shore Drive every 60-minutes.
AA	33	Increase peak frequency to every 30-minutes. Provide Sunday service on the full length of the route.
AC	36	Increase frequency to Pleasure House & Shore Drive to every 15-minutes during peak periods, 30-minutes during the midday. Add Sunday service every 60-minutes.
AD	41, 44, 45, 57	[Route 41] Increase peak frequency to every 30-minutes. Extend route to the Downtown Norfolk Transit Center. Realign the route onto Effingham Street and discontinue the deviations onto Afton Parkway and Gust Lane, Avondale Road, Roosevelt Boulevard, and Greenwood Drive. [Route 44] Realign the route to Sunkist & Airline. [Route 45] Realign onto Port Centre Parkway, reduce frequency to every 30-minutes to coordinate trips across the Downtown Tunnel with Route 41. Realign to Starmount & Jolliff every 60-minutes. [Route 57] Extend the route to High Street & Florida Avenue. Discontinue service to the Camelot neighborhood. Realign the route onto Deep Creek Boulevard, Gust Lane, Bunche Boulevard, Roosevelt Boulevard, Cavalier Boulevard and Greenwood Drive.
AE	43, 50	[Route 43] Eliminate route. [Route 50] Realign onto Crawford Parkway.
AF	55, 57	[Route 55] Eliminate route. [Route 57] Extend the route to Greenbrier Mall, following the current Route 55 alignment.
AG	64	Adjust schedule
AH	101	Increase peak frequency to every 15-minutes.
AK	102, 104, 105, 109, 110	[Route 102] Eliminate route. [Route 104] Extend the route to Thomas Nelson Community College. [Route 105] Realign the route onto Aberdeen Road, Buxton Avenue, Blair Avenue, Walnut Avenue,16th Street, Jefferson Avenue,6th Street, Ivy Avenue, 16th Street, Jefferson Avenue, 28th Street, and Washington Avenue. [Route 109] Eliminate route. [Route 110] Extend the route to the Newport News Transit Center and Buckroe Beach, discontinue service to Thomas Nelson Community College.
AL	106, 107	[Route 106] Increase peak frequency to every 30-minutes. Add an additional early morning trip. [Route 107] Increase peak frequency to every 30-minutes.
AM	107, 111, 116, 119	[Route 107] Realign the route onto Denbigh Boulevard and Jefferson Avenue. Discontinue service south of the Newport News Transit Center and on Woodside Lane. [Route 111] Truncate the route at the Patrick Henry Mall. [Route 116] During the weekdays, extend the route to the Riverside Hospital and Woodside Lane. [Route 119] Eliminate route.
AN	112	Increase peak frequency to every 15-minutes.
AP	114	Realign the route onto Mercury Boulevard.
AQ	115, 117	[Route 115] Extend the route to Hampton Veteran Administration Hospital, maintaining the existing Route 117 level of service in this area. [Route 117] Eliminate route.
AR	118	Realign route to serve the Boo Williams Sportsplex. Discontinue service to the Langley Air Force Base.
AS	121	Adjust schedule
AT	415	Eliminate route.
AU	960	Eliminate the deviation to the Silverleaf Park and Ride.

Package	Route(s)	Description
AV	965	Eliminate route.
AW	971	New Max route between North Norfolk and Hampton.
AX	970	New Max route between Portsmouth and Newport News.
AY	15	Increase peak and midday frequency to Greenbrier Mall to every 15-minutes.
AZ	12, 13, 26, 29, 38	[Route 12] Discontinue service on Wilson Road and Indian River Road, between Campostella Road and Wingfield Avenue, as well as on Indian Lakes Boulevard and Lynnhaven Parkway. [Route 13] Eliminate deviation onto Bethel Road, Harling Drive, Border Road, Fireside Road, and Parkside Drive. [Route 26] Extend the route to Pembroke East via Rosemont Road, and discontinue service to Lynnhaven Mall. Reduce weekday frequency to every 60-minutes. [Route 29] Realign the route to Artic Avenue & 19th Street (Virginia Beach Oceanfront) and discontinue service to Lynnhaven Mall. [Route 38] New route operating between Greenbrier Mall and Artic Avenue & 19th Street (Virginia Beach Oceanfront) via Lynnhaven Parkway. Operates every 30-minutes weekdays and Saturdays, and 60-minutes on Sundays.
B	1	Increase peak and midday frequency to every 15-minutes.
BA	13	Increase peak, midday, evening, and Saturday frequency to Greenbrier Mall to every 30-minutes.
BB	44	Add Sunday service every 60-minutes.
BC	47	Increase weekday frequency to Lakeview Industrial Park to every 30-minutes. Add Saturday and Sunday service to Lakeview Industrial Park every 60-minutes.
BD	50	Add Sunday service every 60-minutes.
BE	45	Increase peak frequency to every 15-minutes between Downtown Norfolk and Victory Crossing.
BF	21	Increase frequency to Pleasure House Road & Shore Drive to every 30-minutes.
BG	38	Increase peak frequency to every 15-minutes.
BH	114	Increase peak frequency to every 15-minutes. Add additional early morning trip.
BI	35	Extend the northern terminus of the route to Pleasure House & Shore Drive, and the southern terminus to Atlantic Avenue & 3rd Street.
BJ	44	Extend the route to the Downtown Norfolk Transit Center.
BK	116	Provide weekend service to the Riverside Hospital.
BL	115	Increase level of service between the Hampton Transit Center and Hampton Veteran Administration Hospital to be consistent across the route.
C	2	Increase peak frequency to every 15-minutes and Saturday frequency to every 30-minutes.
D	3, 5	[Route 3] Realign the northern terminus of the route to serve the Willoughby Spit rather than Naval Station Norfolk (every 30-minutes during peak ad midday periods and 60-minutes off-peak). End service to the Willoughby Spit at 7:00 PM. [Route 5] Eliminate route.
E	3	Increase peak and midday frequency to every 15-minutes to Ocean View.
F	4	Eliminate the deviation onto Goff Street, Tidewater Drive, Princess Anne Road, Chapel Street, and Virginia Beach Boulevard, and end service at 9:00 PM.
G	6	Increase peak frequency to Robert Hall to every 15-minutes. and to TCC-Chesapeake to every 30-minutes.
H	6, 14, 58	[Route 6] Extend service to TCC-Chesapeake every 60-minutes. [Route 14] Eliminate route. [Route 58] Extend the route to the Greenbrier Mall, discontinue service to Robert Hall.
I	6	Increase peak frequency to TCC-Chesapeake to every 15-minutes and increase off-peak and Saturday frequency to every 30-minutes.

Package	Route(s)	Description
J	8	Increase peak frequency to every 15-minutes.
K	9	Eliminate two deviations: on Widgeon Road, Tidewater Drive and Philpotts Road, and Ingleside Road, Gatling Avenue and Scott Street. Reduce evening frequency to every 60-minutes.
L	11	Eliminate weekend service.
N	12	Increase peak frequency to every 30-minutes.
O	13, 15	[Route 13] Extend the route to the Greenbrier Mall every 60-minutes, weekdays, Saturdays and Sundays. [Route 15] Eliminate the deviation onto Azalea Garden Road and Robin Hood Road. Discontinue service to Robert Hall terminating the route at the Greenbrier Mall).
P	13	Increase peak frequency to every 15-minutes.
Q	18	Eliminate the deviation to Grandy Village via Kimball Terrace. Realign route onto Scott Street, Gatling Avenue, Ingleside Road, and Tait Terrace, and extend the route to JEB Little Creek. End weekday service at 8:00 PM.
R	20	Increase peak and midday frequency to Virginia Beach Oceanfront to every 15-minutes, and off-peak frequency to every 30-minutes.
S	21	Increase peak frequency to every 15-minutes to Pleasure House Road & Shore Drive and increase midday frequency to every 15-minutes to JEB Little Creek.
T	23	Realign the route up Northampton Boulevard to the IKEA. Increase evening frequency to every 30-minutes.
U	24	New route operating between Greenbrier Mall and Pembroke East via Kempsville Road. Operates every 30-minutes during peak periods, 60-minutes off-peak, Saturday and Sunday.
V	25	Terminate route at Sentara Princess Anne Hospital.
W	25	Increase peak, midday and Saturday frequency to every 30-minutes. End weekday service at 10:45 PM.
X	25	Increase peak frequency to every 15-minutes.
Y	27	Extend the route to Military Circle Mall. Reduce peak frequency to every 60-minutes.
Z	33, 35	[Route 33] Realign route onto Birdneck Road and Virginia Beach Boulevard. [Route 35] Extend the route to the Virginia Aquarium & Marine Science Center. Provide service all year long, increase weekday and Saturday frequency to every 30-minutes.

Appendix E: High Capacity Transit Network Memo

High frequency transit networks play an important role in connecting people and businesses to resources, and providing safe, affordable access to employment, education, and other daily needs. The ability to move quickly, without the need to memorize a schedule, from one destination to another is also valuable to attracting choice riders.

To enhance HRT's fixed-route service and to create a competitive mode that will effectively serve the Hampton Roads region, a High Frequency Transit Network overlay on the HRT Transit Development Plan recommendations is being recommended to connect major activity centers throughout the six-member jurisdictions.

With the implementation of the high frequency route recommendations, the number of people with access to high frequency services will increase by 279 percent and the number of employment opportunities will increase by 162 percent (**Table E-1**).

Table E-1 | High Frequency Transit Network Impacts

Network	Service Area (sq mi)	Population	Employment Opportunities
Existing	22.6	91,279	85,043
Proposed	87.5	346,374	222,575
Percent Increase	***287%***	***279%***	***162%***

The costs for full implementation of the High Frequency Transit Network recommendations described in this memo would be $71.5 million[77], or a $28.5 million incremental cost increase over existing services. The High Frequency Transit Network recommendations, fully implemented, would require a total of 181 vehicles operated in maximum service.

Table E-2 summarizes the number of corridor miles of High Frequency Transit Network and the number of routes proposed to pass through each HRT jurisdiction. With 89.9 corridor miles and 12 routes, Norfolk would experience the greatest level of high frequency service. In all, the network described herein would span nearly 230 miles over 21 routes.

Table E-2 | High Frequency Transit Network Summary by Jurisdiction

Jurisdiction	Corridor Miles	Total Corridors
Chesapeake	27.2	4
Hampton	19.6	4
Newport News	24.4	4
Norfolk	89.9	12
Portsmouth	14.2	2
Virginia Beach	51.6	7
Total	***226.9***	***19***

The following technical memorandum details assumed service parameters, costs and benefits, and overall operational and capital costs for the proposed High Frequency Transit Network. This body of information represents an empirically sound starting point to advance the concept and future implementation of a High Frequency Transit Network in the Hampton Roads region.

[77] This is based on a $98.45 cost per revenue hour, adopted from HRT's Fiscal Year 2018 budget.

E.1 SERVICE PARAMETERS

The following minimum levels of service for high frequency corridors are being evaluated in this proposal.

Hours of service:

- **Weekdays:** 6:00 am - 11:00 pm;
- **Saturday:** 6:00 am - 11:00 pm; and
- **Sunday**: 7:00 am - 8:00 pm.

Frequency by time period:

- **Early Morning:** 60-minutes
- **Morning Peak**: 15-minutes
- **Midday:** 30-minutes
- **Afternoon Peak:** 15-minutes
- **Evening:** 30-minutes
- **Late Night:** 60-minutes
- **Saturday**: 30-minutes
- **Sunday:** 60-minutes

E.2 RECOMMENDED ROUTE STRUCTURE

Twenty-two route recommendations on twenty different corridors were developed to provide high frequency service throughout the Hampton Roads Region. These recommendations were developed based on the following factors:

1. Existing Levels of Service
2. High-Capacity Propensity
3. Regional Travel Flows
4. Connections across the region

By route, **Table E-3** (proposed span) and **Table E-4** (proposed frequency) summarize the proposed level of service on the High Frequency Transit Network. On certain corridors two proposed routes work in coordination, or are interlined, in order to create an "effective headway" of one bus arriving every 15-minutes. The instances where the "effective headways" create the desired high frequency service occur on Routes 106 and 107, along Warwick Boulevard between the Newport News Transit Center and Denbigh Boulevard; and on Routes 961 and 971 between the Hampton Transit Center and Wards Corner.

On the Peninsula, the High Frequency Transit Network is composed of seven routes (**Figure E-1**). Five of these recommendations provide connections between activity centers on the Peninsula, including: Downtown Newport News, Downtown Hampton, Newmarket, Net Center, Oyster Point, and the Patrick Henry Mall. The other two Peninsula routes interlined provide a high frequency connection across the Bridge Tunnel, to the Southside, connecting to Wards Corner.

Overall, there were 16 routes that create the High Frequency Transit Network on the southside. Two of these routes connect the Peninsula and Southside, as mentioned earlier. The other 14 high frequency routes were designed to connect across the four-member jurisdictions, encouraging cross city connections. **Figure E-2** illustrates these recommendations.

Table E-3 | High Frequency Transit Network Proposed Span

Route	From	To	Proposed Span		
			Weekday	*Saturday*	*Sunday*
1	Downtown Norfolk Transit Center	Ocean View and Joint Expeditionary Base Little Creek	4:44 AM-1:30 AM	4:40 AM-1:31 AM	5:37 AM-1:30 AM
2	Downtown Norfolk Transit Center	Navy Exchange Mall	4:51 AM-11:42 PM	5:11 AM-1:04 AM	5:28 AM-12:10 AM
3	Downtown Norfolk Transit Center	Evelyn T Butts and Ocean View / Willoughby	4:30 AM-12:50 AM	5:34 AM-1:35 AM	6:00 AM-12:35 AM
6	Downtown Norfolk Transit Center	Seaboard Avenue & Liberty Street and Robert Hall Blvd and TCC-Chesapeake	5:32 AM-11:45 PM	5:32 AM-12:45 AM	5:54 AM-6:44 PM
8	Downtown Norfolk Transit Center	Evelyn T Butts	5:18 AM-12:15 AM	5:43 AM-12:45 AM	6:40 AM-8:58 PM
13	Downtown Norfolk Transit Center	Greenbrier Mall	4:48 AM-11:00 PM	5:26 AM-12:45 AM	5:52 AM-10:35 PM
15	Evelyn T Butts	Greenbrier Mall	4:48 AM-1:16 AM	5:18 AM-12:45 AM	6:46 AM-12:45 AM
20	Downtown Norfolk Transit Center	Virginia Beach Oceanfront	4:52 AM-1:15 AM	5:22 AM-1:14 AM	6:23 AM-1:13 AM
21	Naval Station Norfolk	Joint Expeditionary Base Little Creek / Pleasure House Rd & Shore Drive	5:11 AM-1:17 AM	5:12 AM-1:21 AM	6:43 AM-1:21 AM
25	Military Circle	TCC Virginia Beach and Sentara Princess Ann Hospital	6:02 AM-10:45 PM	6:03 AM-12:45 AM	6:03 AM-12:45 AM
36	Pleasure House Road & Shore Drive	Pembroke East / TCC-Virginia Beach	5:48 AM-10:41 PM	6:10 AM-10:43 PM	6:10 AM-10:43 PM
38	Greenbrier Mall	Virginia Beach Oceanfront	6:00 AM-12:00 AM	6:00 AM-12:00 AM	6:00 AM-12:00 AM
45	Downtown Norfolk Transit Center	Victory Crossing & TCC – Portsmouth / Starmount Parkway	4:39 AM-12:00 AM	5:10 AM-12:51 AM	6:06 AM-10:51 PM
47	Downtown Portsmouth	Churchland / Lakeview Industrial Park	5:49 AM-10:30 PM	6:03 AM-10:30 PM	6:33 AM-7:30 PM
101	Newport News Transit Center	Hampton Transit Center	5:15 AM-12:10 AM	5:15 AM-12:10 AM	5:45 AM-8:08 PM
106	Newport News Transit Center	Fort Eustis	4:39 AM-12:42 AM	5:09 AM-12:42 AM	5:59 AM-8:19 PM
107	Newport News Transit Center	Patrick Henry Mall	5:59 AM-12:24 AM	5:59 AM-12:24 AM	7:07 AM-8:27 PM
112	Newport News Transit Center	Patrick Henry Mall	5:15 AM-12:03 AM	5:15 AM-12:03 AM	6:15 AM-8:01 PM

Route	From	To	Proposed Span		
			Weekday	*Saturday*	*Sunday*
114	Hampton Transit Center	73rd Street & Warwick Boulevard	6:00 AM-11:41 PM	6:45 AM-11:41 PM	6:45 AM-7:41 PM
961	Newport News Transit Center	Hampton Transit Center & Downtown Norfolk	4:55 AM-11:12 PM	4:58 AM-10:57 PM	7:00 AM-8:58 PM
971	Hampton Transit Center	North Norfolk	6:00 AM-12:00 AM	6:00 AM-12:00 AM	6:00 AM-12:00 AM

Table E-4 | High Frequency Transit Network Proposed Frequency

Route	From	To	Proposed Frequency			
			Peak	*Off-Peak*	*Saturday*	*Sunday*
1	Downtown Norfolk Transit Center	Ocean View and Joint Expeditionary Base Little Creek	15	15	30	60
2	Downtown Norfolk Transit Center	Navy Exchange Mall	15	30	30	60
3	Downtown Norfolk Transit Center	Evelyn T Butts and Ocean View / Willoughby	15 / 30	15 / 30	30	60
6	Downtown Norfolk Transit Center	Seaboard Avenue & Liberty Street and Robert Hall Boulevard and TCC-Chesapeake	15	30	30	60
8	Downtown Norfolk Transit Center	Evelyn T Butts	15	30	30	60
13	Downtown Norfolk Transit Center	Greenbrier Mall	15	30	30	60
15	Evelyn T Butts	Greenbrier Mall	15	15	30	60
20	Downtown Norfolk Transit Center	Virginia Beach Oceanfront	15	15	30	60
21	Naval Station Norfolk	Joint Expeditionary Base Little Creek / Pleasure House Road & Shore Drive	15	15 / 30	30 / 60	60
25	Military Circle	TCC Virginia Beach and Sentara Princess Ann Hospital	15	30	30	60

Route	From	To	Proposed Frequency			
			Peak	*Off-Peak*	*Saturday*	*Sunday*
36	Pleasure House Road & Shore Drive	Pembroke East / TCC - Virginia Beach	15 / 30	30 / 60	30	60
38	Greenbrier Mall	Virginia Beach Oceanfront	15	30	30	60
45	Downtown Norfolk Transit Center	Victory Crossing & TCC – Portsmouth / Starmount Parkway	15 / 60	30 / 60	30 / 60	60
47	Downtown Portsmouth	Churchland / Lakeview Industrial Park	15 / 30	30 / 30	30 / 60	60
101	Newport News Transit Center	Hampton Transit Center	15	30	30	60
106 / 107	Newport News Transit Center	Denbigh Boulevard	15	30	30	60
106	*Newport News Transit Center*	*Fort Eustis*	*30*	*60*	*60*	*60*
107	*Newport News Transit Center*	*Patrick Henry Mall*	*30*	*60*	*60*	*60*
112	Newport News Transit Center	Patrick Henry Mall	15	30	30	60
114	Hampton Transit Center	73rd Street & Warwick Boulevard	15	30	30	60
961 / 971	Hampton Transit Center	Wards Corner	15	30	30	60
961	*Newport News Transit Center*	*Hampton Transit Center & Downtown Norfolk*	*30*	*60*	*45*	*60*
971	*Hampton Transit Center*	*North Norfolk*	*30*	*60*	*60*	*60*

Figure E-1 | Peninsula Potential High Frequency Transit Routes / Corridors

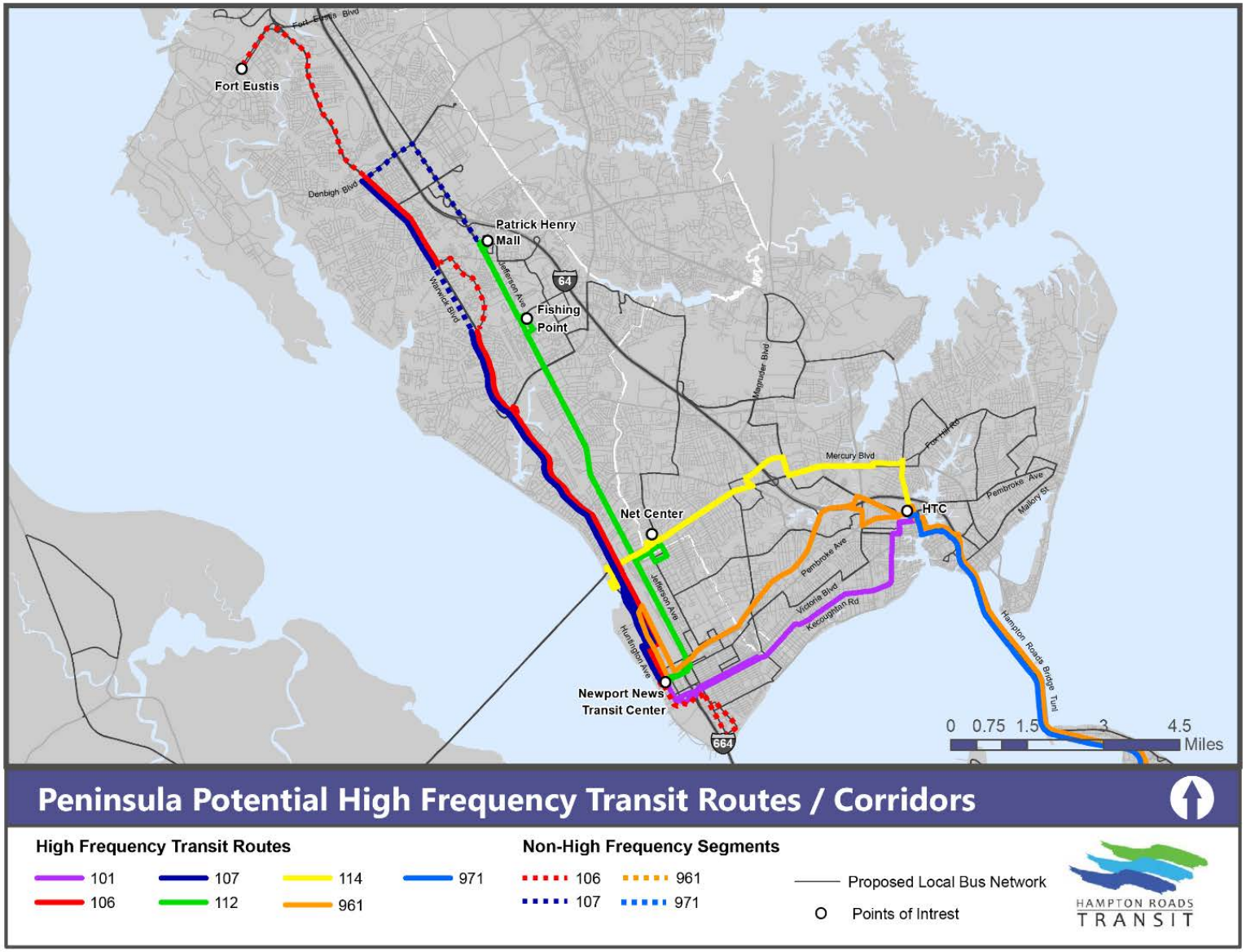
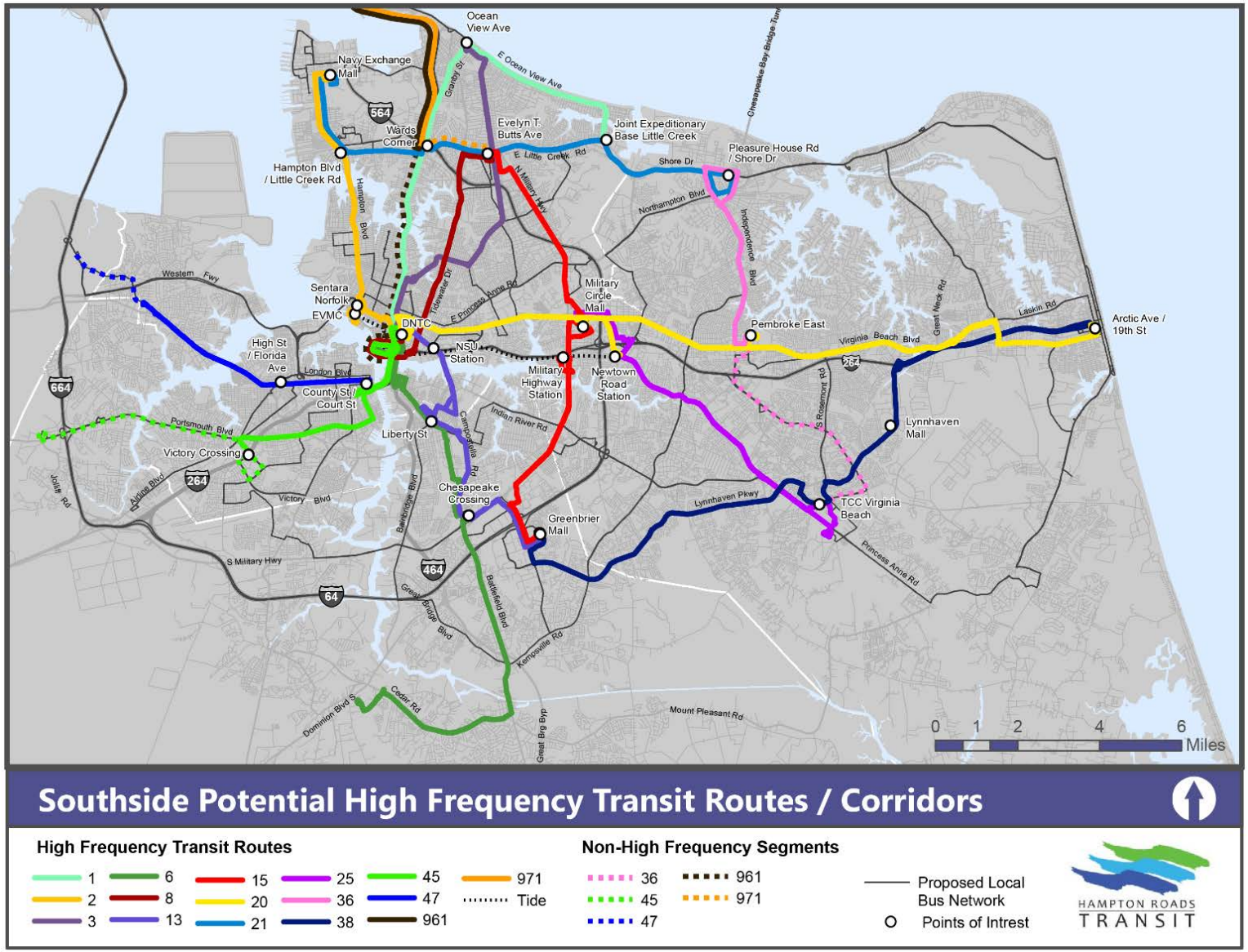


Figure E-2 | Southside Potential High Frequency Transit Routes / Corridors



E.3 PRELIMINARY OPERATION AND CAPITAL COST ESTIMATES

Based on the proposed level of service for each route within the High Frequency Transit Network, the TDP consultant team developed preliminary sets of cost estimates. Overall, the total cost, including operating and administrative costs, for all routes within the High Frequency Transit Network was estimated to be $71.5 million, an increase of $28.5 million when compared to the total costs of the existing services on these routes.

Table E-5 summarizes High Frequency Transit Network total (operating and administrative) costs for both the existing and proposed systems. Overall, with the implementation of the High Frequency Transit Network, the City of Norfolk would take on the highest levels of new investments, while Portsmouth would incur the smallest financial obligation. The figures in **Table E-6** are based on a total operating unit cost of $93.45 per service hour (adopted from HRT's Fiscal Year 2018 budget) multiplied times the additional service hours for the Core 20 routes. However, it is important to underscore these are preliminary estimates which will be further refined as discussions and additional planning efforts for the High Frequency Transit Network are advanced between HRT, its six member cities, and community stakeholders who will ultimately fund and benefit from the system.

The implementation of the High Frequency Transit Network described in this memo would require approximately 181 peak vehicles, which would be an additional 88 vehicles, 73 revenue vehicles and 15 spares, on top of the existing 108 vehicles that operate on these corridors during peak hours. These additional 88 vehicles incur a total capital cost of approximately $43.1 million.[78] **Table E-7** provides an overview of the annual revenue hours, miles and peak vehicle need by route, while

Table E-5 | High Frequency Transit Network: Total Operating Costs by Jurisdiction

Funding Source	Existing Annual Operating Costs	Proposed Annual Operating Costs	Incremental Change in Annual Operating Costs
Chesapeake	$1,689,790	$8,540,389	$6,850,599
Hampton	$2,127,237	$2,826,925	$699,688
Newport News	$6,795,554	$8,993,508	$2,197,954
Norfolk	$20,885,968	$29,602,367	$8,716,399
Portsmouth	$3,531,343	$4,283,584	$752,241
Virginia Beach	$5,740,530	$14,159,697	$8,419,167
Crossroads	$2,173,554	$3,079,084	$905,531
Total	**$42,943,977**	**$71,485,553**	**$28,541,577**

[78] Assumed a standard 40' vehicle at $489,599 per unit

Table E-6 | High Frequency Transit Network: Annual Operating Costs

Route	Existing Annual Operating Costs	Proposed Annual Operating Costs	Incremental Change in Annual Operating Costs
1	$3,700,050	$4,601,873	$901,822
2	$1,939,772	$2,812,775	$873,004
3	$3,145,782	$4,908,566	$1,762,784
6	$1,238,733	$5,131,743	$3,893,010
8	$1,627,693	$2,407,875	$780,182
13	$1,262,639	$3,550,211	$2,287,572
15	$3,461,583	$4,421,151	$959,568
20	$5,748,105	$7,983,026	$2,234,921
21	$2,891,419	$6,140,875	$3,249,456
25	$1,248,891	$2,222,483	$973,593
36	$976,964	$2,879,482	$1,902,519
38	---	$3,718,551	$3,718,551
45	$2,755,532	$3,956,954	$1,201,422
47	$1,850,469	$1,850,469	---
101	$1,085,827	$1,881,445	$795,619
106	$2,009,198	$2,610,340	$601,142
107	$1,701,193	$2,263,379	$562,186
112	$2,234,196	$2,955,222	$721,026
114	$1,892,377	$2,110,046	$217,670
961	$2,173,553	$2,173,553	---
971	---	$905,531	$905,531
Total	**$42,943,976**	**$71,485,550**	**$28,541,578**

Table E-7 | High Frequency Transit Network: Annual Revenue Hours, Annual Revenue Miles and Peak Vehicle Need

Route	Actual			Proposed			Incremental Change		
	Revenue Hours	Revenue Miles	Peak Vehicles	Revenue Hours	Revenue Miles	Peak Vehicles	Revenue Hours	Revenue Miles	Peak Vehicles
1	39,594	463,082	9	49,244	565,817	10	9,650	102,735	1
2	20,757	229,802	5	30,099	322,562	8	9,342	92,760	3
3	33,663	384,916	9	52,526	574,199	9	18,863	189,283	-
6	13,256	132,584	5	54,914	555,753	14	41,659	423,169	9
8	17,418	192,843	3	25,766	259,786	7	8,349	66,943	4
13	13,511	124,627	3	37,990	329,350	10	24,479	204,723	7
15	37,042	452,496	9	47,310	638,261	10	10,268	185,765	1
20	61,510	679,125	18	85,426	1,042,293	18	23,916	363,168	-
21	30,941	342,536	5	65,713	601,647	12	34,772	259,112	7
25	13,364	186,332	2	23,783	308,384	6	10,418	122,052	4
36	10,454	122,944	3	30,813	305,149	8	20,359	182,205	5
38	-	-	-	42,399	557,828	11	42,399	557,828	11
45	29,487	308,967	6	42,343	416,220	10	12,856	107,253	4
47	19,802	226,553	6	19,802	226,553	6	-	-	-
101	11,619	159,232	3	20,133	224,964	5	8,514	65,732	2
106	21,500	310,796	3	27,933	381,493	7	6,433	70,697	4
107	18,204	241,855	3	24,220	271,279	6	6,016	29,424	3
112	23,908	321,144	4	31,624	421,699	8	7,716	100,555	4
114	20,250	250,969	4	22,579	272,781	6	2,329	21,812	2
961	23,259	464,143	8	23,259	464,143	8	-	-	-
971	-	-	-	9,690	125,368	3	9,690	125,368	3
Total	**459,540**	**5,594,947**	**108**	**767,566**	**8,865,529**	**182**	**308,028**	**3,270,584**	**74**

E.4 ROUTE DIRECTNESS AND DEVIATIONS ANALYSIS

High frequency transit service warrants a direct, efficient, and simplified network with minimal deviations off main roads. As such, to validate improvements associated with the High Frequency Transit Network, route directness and route deviations analyses were performed to compare existing HRT routes with new alignments and to determine travel time savings that can be attributed to the removal of deviations.

A route directness analysis measures the ratio of actual route path distance to the straight-line mileage between route timepoints. In practice, the distance from one timepoint to the next should be no more than 100 percent greater than the straight-line distance between these timepoints. **Table E-8** summarizes the results of the route directness analysis, which was performed on the entirety of each existing and proposed route. Seven routes – Routes 2, 8, 20, 47, 101, 106, and 961 – do not have proposed alignment changes and thus maintain the same directness ratio. In addition, Routes 38 and 971 are new routes with no original baseline ratio for comparison. Of the remaining routes, with the exception of Route 25, all High Frequency Transit Network routes are slated to become more direct with the implementation of the proposed system.

Table E-8 | High Frequency Transit Network: Route Directness Analysis

Route	Directness Ratio		
	Existing	*Proposed*	*Difference (Proposed – Existing)*
1	1.18	1.10	- 0.08
2	1.50	1.50	No Change in Routing
3	1.30	1.18	- 0.11
6	1.88	1.59	- 0.29
8	1.58	1.58	No Change in Routing
13	1.56	1.46	- 0.10
15	1.58	1.41	- 0.17
20	1.32	1.32	No Change in Routing
21	1.90	1.24	- 0.66
25	1.24	1.26	0.03
36	1.59	1.44	- 0.15
38	N/A	1.30	New Route
45	2.23	1.71	- 0.52
47	1.15	1.15	No Change in Routing
101	1.21	1.21	No Change in Routing
106	1.21	1.21	No Change in Routing
107	1.19	1.06	- 0.14
112	1.48	1.38	- 0.10
114	1.96	1.33	- 0.63
961	1.39	1.39	No Change in Routing
971	N/A	1.19	New Route

In addition, to streamline High Frequency Transit Network routes and allow them to operate more quickly, major deviations were removed on four alignments.

Table E-9 summarizes deviations removed as well as assumed hours during a typical service day spent on each deviation. Under the proposed system, Route 13 will save the greatest number of hours – including over 18 hours on a typical weekday – by removing its deviations. Overall the removal of deviations should be viewed as a passenger travel time (rather than operational) savings mechanism.

Table E-9 | High Frequency Transit Network: Route Deviation Analysis

Route	Description	Weekday (hours)	Saturday (hours)	Sunday (hours)
6	Removed deviation onto Campostella Road	5.0	3.7	-
13	Removed deviation onto Bethel Road/ Border Road/ Fireside Rd	18.4	7.2	7.5
15	Removed deviation onto Azalea Gardens Road / Robinhood Road	9.9	5.1	2.8
114	Realigned route onto Mercury Boulevard	16.9	10.5	4.7

E.4 BENEFITS ANALYSIS

Out of the High Frequency Transit Network routes, Route 38 will reach the greatest number of residents (50,132); Route 20 will reach the most employment opportunities (48,709); and Route 20 will reach the greatest number of activity centers (19). In all, the High Frequency Transit Network will reach over 346,000 residents, over 222,000 employment opportunities, and 106 activity centers. **Table E-10** summarizes estimated population, employment opportunities, and activity centers located within a quarter mile of high frequency segments of the proposed routes.

Table E-10 | Population/Jobs Reached by the High Frequency Network

Route	Population	Employment	Activity Centers
1	31,780	21,989	12
2	23,989	38,574	14
3	32,765	18,500	12
6	26,545	43,200	16
8	22,836	27,870	13
13	21,276	20,441	11
15	22,420	20,743	7
20	46,497	48,709	19
21	31,403	15,506	5
25	20,704	14,360	7
36	11,466	5,248	3
38	50,132	17,252	13
45	15,206	34,988	16
47	10,766	10,445	6
101	15,666	8,287	7
106	15,552	14,511	8
107	15,552	14,511	8
112	22,242	11,553	8
114	15,028	9,723	13
961	12,481	12,712	9
971	12,481	12,712	9

Route	Population	Employment	Activity Centers
Total	346,374	222,575	106

Table E-11 summarizes existing and forecasted annual ridership on the entire alignments of High Frequency Transit Network routes. Ridership is expected to grow by the largest percentage (134 percent) on Route 6. Overall, on routes part of the high frequency transit network, ridership is anticipated to grow by 11.1 million riders, or 32 percent.

Table E-11 | High Frequency Transit Network: Existing and Forecasted Annual Ridership[79]

Route	Existing Annual Ridership	Forecasted Annual Ridership	Percent Change
1	868,159	955,391	10%
2	261,475	301,415	15%
3	620,954	826,227	33%
6	221,593	522,806	136%
8	384,575	432,789	13%
13	318,403	499,164	57%
15	731,736	947,311	29%
20	1,204,112	1,342,377	11%
21	580,076	837,465	44%
25	131,053	199,156	52%
36	169,905	341,952	101%
38	-	506,809	-
45	546,052	586,659	7%
47	272,963	317,194	16%
101	294,214	351,744	20%
106	402,249	525,087	31%
107	308,686	349,705	13%
112	523,512	582,898	11%
114	394,028	570,460	45%
961	199,237	199,402	0%
971	-	157,715	-
Total	**8,432,982**	**11,353,727**	**35%**

[79] Includes portions of the route without high frequency service.

Appendix F: Fleet Master Strategy

Table F-1 | Bus Fleet Master Strategy

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
1201	15GGB1816X1070607	1999	35-ft	-	-	2017	2022
1202	15GGB1818X1070608	1999	35-ft	-	-	2016	2021
1203	15GGB181XX1070609	1999	35-ft	-	-	2014	2018
1204	15GGB1816X1070610	1999	35-ft	-	-	2016	2021
1205	15GGB1818X1070611	1999	35-ft	-	-	2016	2021
1206	15GGB181XX1070612	1999	35-ft	-	-	2017	2022
1207	15GGB1811X1070613	1999	35-ft	-	-	2016	2021
1208	15GGB1813X1070614	1999	35-ft	-	-	2016	2021
1209	15GGB1815X1070615	1999	35-ft	-	-	2016	2021
1210	15GGB1817X1070616	1999	35-ft	-	-	2016	2021
1211	15GGB1819X1070617	1999	35-ft	-	-	2016	2021
1212	15GGB1810X1070618	1999	35-ft	-	-	2014	2018
1213	15GGB1812X1070619	1999	35-ft	-	-	2017	2022
1214	15GGB1819X1070620	1999	35-ft	-	-	2017	2022
1215	15GGB1810X1070621	1999	35-ft	-	-	2016	2021
1216	15GGB1812X1070622	1999	35-ft	-	-	2016	2021
1217	15GGB1814X1070623	1999	35-ft	-	-	2017	2022
1218	15GGB1816X1070624	1999	35-ft	-	-	2016	2021
1219	15GGB1818X1070625	1999	35-ft	-	-	2017	2022
1220	15GGB1818X1070633	1999	35-ft	-	-	2017	2022
1221	15GGB1819X1070634	1999	35-ft	-	-	2016	2021
1222	15GGB1810X1070990	1999	35-ft	-	-	2016	2021
1223	15GGB1814X1070627	1999	35-ft	-	-	2017	2022
1225	15GGB1818X1070629	1999	35-ft	-	-	2017	2022
1226	15GGB1814X1070630	1999	35-ft	-	-	2017	2022
1227	15GGB1812X1070626	1999	35-ft	-	-	2016	2021
1230	15GCD181XY1110338	2000	40-ft	2018	-	-	-
1235	15GCD1813Y1110343	2000	40-ft	2018	-	-	-
1237	15GCD1817Y1110345	2000	40-ft	2018	-	-	-
1238	15GCD1819Y1110346	2000	40-ft	2018	-	-	-
1240	15GCB1814Y1110538	2001	35-ft	2018	-	-	-
1241	15GCB1814Y1110539	2001	35-ft	2018	-	-	-
1243	15GCB181511110541	2001	35-ft	2018	-	-	-
1244	15GCB181711110542	2001	35-ft	2018	-	-	-
1245	15GCB181911110543	2001	35-ft	-	-	2014	2018

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
1247	15GCB181211110545	2001	35-ft	2018	-	-	-
1248	15GCB181411110546	2001	35-ft	2018	-	-	-
1250	15GCB181811110548	2001	35-ft	2018	-	-	-
1251	15GCB181X11110549	2001	35-ft	2018	-	-	-
1252	15GCB181611110550	2001	35-ft	2018	-	-	-
1253	15GCB181811110551	2001	35-ft	2018	-	-	-
1254	15GCB181X11110552	2001	35-ft	2018	-	-	-
1255	15GCB181111110553	2001	35-ft	2018	-	-	-
1257	15GCB181311110555	2001	35-ft	2018	-	-	-
1258	15GCB181511110556	2001	35-ft	2019	-	-	-
1259	15GCB181711110557	2001	35-ft	2018	-	-	-
1263	15GCB181911110561	2001	35-ft	2019	-	-	2017
1302	15GGE1818Y1090295	2000	29-ft	-	-	2014	2018
1400	1C9B5BFS31W535086	2002	29-ft	-	-	2013	2018
1401	1C9B5BFS51W535087	2002	29-ft	2019	-	2014	
1403	1C9B5BFS91W535089	2002	29-ft	-	-	2014	2018
1404	1C9B5BFS51W535090	2002	29-ft	2019	-	2014	
1405	1C9B5BFS71W535091	2002	29-ft	-	-	2014	2018
1406	1C9B5BFS91W535092	2002	29-ft	-	-	2014	2018
1407	1C9B5BFS01W535093	2002	29-ft	-	-	2014	2018
1408	1C9B5BFS21W535094	2002	29-ft	-	-	2014	2018
1409	1C9B5BFS41W535095	2002	29-ft	2018	-	-	-
1410	1Z9B6BSS06W216336	2006	29-ft	2018	-	-	-
1500	15GGB181521072510	2002	35-ft	-	-	-	2018
1501	15GGB181721072511	2002	35-ft	-	-	2016	2021
1503	15GGB181021072513	2002	35-ft	-	-	2016	2021
1504	15GGB181221072514	2002	35-ft	-	-	2016	2021
1505	15GGB181421072515	2002	35-ft	-	-	2016	2021
1506	15GGB181621072516	2002	35-ft	-	-	2017	2022
1507	15GGB181821072517	2002	35-ft	-	-	2017	2022
1508	15GGB181X21072518	2002	35-ft	-	-	2017	2022
1509	15GGB181121072519	2002	35-ft	-	-	-	2018
1510	15GGB181821072520	2002	35-ft	-	-	-	2018
1511	15GGB181X21072521	2002	35-ft	-	-	-	2018
1512	15GGB181121072522	2002	35-ft	-	-	-	2018
1513	15GGB181321072523	2002	35-ft	-	-	-	2018
1515	15GGB181721072525	2002	35-ft	-	-	-	2019
1516	15GGB181931072995	2002	35-ft	-	-	-	2019
1600	15GGE181621090540	2002	29-ft	-	-	-	2018

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
1601	15GGE181821090541	2002	29-ft	-	-	-	2018
1602	15GGE181X21090542	2002	29-ft	-	-	-	2018
1603	15GGE181121090543	2002	29-ft	-	-	-	2018
1604	15GGE181321090544	2002	29-ft	-	-	-	2018
1605	15GGE181521090545	2002	29-ft	-	-	-	2018
1606	15GGE181721090546	2002	29-ft	-	-	-	2018
1607	15GGE181921090547	2002	29-ft	-	-	-	2018
1608	15GGE181021090548	2002	29-ft	-	-	-	2018
1609	15GGE181221090549	2002	29-ft	-	-	-	2018
1610	15GGE181921090550	2002	29-ft	-	-	-	2018
1611	15GGE181021090551	2002	29-ft	-	-	-	2018
1612	15GGE181221090552	2002	29-ft	-	-	-	2018
1613	15GGE181421090553	2002	29-ft	-	-	-	2018
1614	15GGE181621090554	2002	29-ft	-	-	-	2018
1700	15GCB181531111922	2003	35-ft	2019	-	-	-
1701	15GCB181731111923	2003	35-ft	2018	-	-	-
1702	15GCB181931111924	2003	35-ft	2019	-	-	-
1704	15GCB181231111926	2003	35-ft	2019	-	-	-
1705	15GCB181431111927	2003	35-ft	2019	-	-	-
1706	15GCB181631111928	2003	35-ft	2019	-	-	-
1707	15GCB181831111929	2003	35-ft	-	-	-	2018
1708	15GCB181431111930	2003	35-ft	2018	-	-	-
1709	15GCB181631111931	2003	35-ft	2018	-	-	-
1710	15GCB181831111932	2003	35-ft	-	-	-	2018
1712	15GCB181131111934	2003	35-ft	-	-	-	2018
1713	15GCB181331111935	2003	35-ft	-	-	-	2018
1714	15GCB181531111936	2003	35-ft	2018	-	-	-
1715	15GCB181731111937	2003	35-ft	2019	-	-	-
1800	15GCD291241112591	2004	40-ft	-	-	-	2017
1801	15GCD291441112592	2004	40-ft	-	-	-	2018
1802	15GCD291641112593	2004	40-ft	-	-	-	2018
1803	15GCD291841112594	2004	40-ft	-	-	-	2018
1805	15GCD291141112596	2004	40-ft	-	-	-	2018
1806	15GCD291341112597	2004	40-ft	-	-	-	2018
1807	15GCD291541112598	2004	40-ft	2019	-	-	-
1808	15GCD291741112599	2004	40-ft	-	-	-	2018
1809	15GCD291X41112600	2004	40-ft	2018	-	-	-
1810	15GCD291141112601	2004	40-ft	-	-	-	2018
1900	15GGD291041074425	2004	40-ft	2019	-	-	-

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
1902	15GGD291441074427	2004	40-ft	2019	-	-	-
1904	15GGD291841074429	2004	40-ft	2019	-	-	-
1905	15GGD291441074430	2004	40-ft	2019	-	-	-
1906	15GGD291641074431	2004	40-ft	2019	-	-	-
1907	15GGD291841074432	2004	40-ft	2019	-	-	-
2000	15GGD291061077621	2006	40-ft	-	-	-	2018
2001	15GGD291261077622	2006	40-ft	-	2016	-	2019
2002	15GGD291461077623	2006	40-ft	-	2015	-	2019
2003	15GGD291661077624	2006	40-ft	-	2015	2019	2024
2004	15GGD291861077625	2006	40-ft	-	2015	2019	2024
2005	15GGD291X61077626	2006	40-ft	-	2015	-	2019
2006	15GGD291161077627	2006	40-ft	-	2015	2019	2024
2007	15GGD291361077628	2006	40-ft	-	2015	2019	2024
2008	15GGD291561077629	2006	40-ft	-	2015	-	2020
2009	15GGD291161077630	2006	40-ft	-	2015	-	2020
2010	15GGD291361077631	2006	40-ft	-	2016	-	2020
2011	15GGD291561077632	2006	40-ft	-	2016	2019	2024
2012	15GGD291761077633	2006	40-ft	-	2016	2019	2024
2013	15GGD291961077634	2006	40-ft	-	2016	2019	2024
2014	15GGD291061077635	2006	40-ft	-	-	-	2020
2015	15GGD291261077636	2006	40-ft	-	-	-	2020
2016	15GGD291461077637	2006	40-ft	-	2016	-	2020
2017	15GGD291661077638	2006	40-ft	-	2016	-	2020
2018	15GGD291861077639	2006	40-ft	-	2016	2019	2024
2019	15GGD291461077640	2006	40-ft	-	-	2019	2024
2020	15GGD291661077641	2006	40-ft	-	-	2019	2024
2021	15GGD291861077642	2006	40-ft	-	2016	2019	2024
2022	15GGD291871077643	2007	40-ft	-	2016	2019	2024
2023	15GGD291X71077644	2007	40-ft	-	2016	-	2020
2024	15GGD291171077645	2007	40-ft	-	2016	-	2020
2025	15GGD291371077646	2007	40-ft	-	2016	-	2019
2026	15GGD291571077647	2007	40-ft	-	2016	-	2019
2027	15GGD291771077648	2007	40-ft	-	2016	-	2019
2028	15GGD291971077649	2007	40-ft	-	2016	-	2019
2029	15GGD291571077650	2007	40-ft	-	2016	-	2019
2030	15GGD291771077651	2007	40-ft	-	2016	-	2019
2031	15GGD291971077652	2007	40-ft	-	2018	-	2020
2032	15GGD291071077653	2007	40-ft	-	2016	2019	2024
2033	15GGD291271077654	2007	40-ft	-	2016	-	2019

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
2034	15GGD291471077655	2007	40-ft	-	2016	-	2019
2035	15GGD291671077656	2007	40-ft	-	2016	-	2019
2036	15GGD291871077657	2007	40-ft	-	2016	-	2020
2037	15GGD291X71077658	2007	40-ft	-	2018	-	2020
2038	15GGD291171077659	2007	40-ft	-	2016	-	2020
2039	15GGD291871077660	2007	40-ft	-	2016	-	2020
2040	15GGD271581079970	2008	40-ft	-	2016	-	2021
2041	15GGD271781079971	2008	40-ft	-	2018	-	2021
2042	15GGD271981079972	2008	40-ft	-	2016	-	2021
2043	15GGD271081079973	2008	40-ft	-	2018	-	2021
2044	15GGD271281079974	2008	40-ft	-	2018	-	2021
2045	15GGD271481079975	2008	40-ft	-	2018	-	2021
2046	15GGD271681079976	2008	40-ft	-	2018	-	2021
2047	15GGD2716B1179776	2011	40-ft	-	2018	-	2023
2048	15GGD2718B1179777	2011	40-ft	-	2018	-	2023
2049	15GGD271XB1179778	2011	40-ft	-	2018	-	2023
2050	15GGD2711B1179779	2011	40-ft	-	2018	-	2023
2051	15GGD2718B1179780	2011	40-ft	-	2018	-	2023
2052	15GGD271XB1179781	2011	40-ft	-	2018	-	2023
2101	15GGD2718F1188324	2015	40-ft	-	2023	-	2028
2102	15GGD271XF1188325	2016	40-ft	-	2023	-	2028
2103	15GGD2711F1188326	2015	40-ft	-	2023	-	2028
2104	15GGD2713F1188327	2015	40-ft	-	2023	-	2028
2105	15GGD2715F1188328	2015	40-ft	-	2023	-	2028
2106	15GGD2717F1188329	2016	40-ft	-	2023	-	2028
2107	15GGD2713F1188330	2016	40-ft	-	2023	-	2028
2108	15GGD2715F1188331	2015	40-ft	-	2023	-	2028
2109	15GGD2717F1188332	2016	40-ft	-	2023	-	2028
2110	15GGD2719F1188333	2015	40-ft	-	2023	-	2028
2111	15GGD2710F1188334	2016	40-ft	-	2023	-	2028
2112	15GGD2712F1188335	2016	40-ft	-	2023	-	2028
2113	15GGD2714F1188336	2016	40-ft	-	2023	-	2028
2114	15GGD2716F1188337	2016	40-ft	-	2023	-	2029
2115	15GGD2718F1188338	2016	40-ft	-	2023	-	2028
2116	15GGD2718G1188339	2016	40-ft	-	2023	-	2028
2117	15GGD2714G1188340	2016	40-ft	-	2023	-	2028
2118	15GGD2716G1188341	2016	40-ft	-	2023	-	2028
2119	15GGD2718G1188342	2016	40-ft	-	2023	-	2028
2120	15GGD271XG1188343	2016	40-ft	-	2023	-	2028

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
2121	15GGD2711G1188344	2016	40-ft	-	2023	-	2028
2122	15GGD2713G1188345	2016	40-ft	-	2023	-	2028
2123	15GGD2715G1188346	2016	40-ft	-	2023	-	2028
2124	15GGD2717G1188347	2016	40-ft	-	2023	-	2028
2125	15GGD2719G1188348	2016	40-ft	-	2023	-	2028
2126	15GGD2710G1188349	2016	40-ft	-	2023	-	2028
2127	15GGD2717G1188350	2016	40-ft	-	2023	-	2028
2128	15GGD2719G1188351	2016	40-ft	-	2023	-	2028
2129	15GGD2710G1188352	2016	40-ft	-	2023	-	2028
3000	15GGD271971078514	2007	40-ft	-	2016	2020	2025
3001	15GGD271071078515	2007	40-ft	-	2016	2020	2025
3002	15GGD271271078516	2007	40-ft	-	2016	2020	2025
3003	15GGD271471078517	2007	40-ft	-	2016	2020	2025
3004	15GGD271671078518	2007	40-ft	-	2016	2020	2025
3005	15GGD271871078519	2007	40-ft	-	2018	2020	2025
3006	15GGD271471078520	2007	40-ft	-	2016	2020	2025
3007	15GGD271671078521	2007	40-ft	-	2016	2020	2025
3008	15GGD271871078522	2007	40-ft	-	2016	2020	2025
3009	15GGD271X71078523	2007	40-ft	-	2016	2020	2025
3010	15GGD271171078524	2007	40-ft	-	2016	2020	2025
3011	15GGD271371078525	2007	40-ft	-	2016	2020	2025
3012	15GGD271571078526	2007	40-ft	-	2018	2020	2025
3013	15GGD271771078527	2007	40-ft	-	2018	2020	2025
3014	15GGD271971078528	2007	40-ft	-	2018	2020	2025
3015	15GGD271071078529	2007	40-ft	-	2018	2020	2025
3016	15GG27D1871078530	2007	40-ft	-	2018	2020	2025
3017	15GG27D1X71078531	2007	40-ft	-	2018	2020	2025
3018	15GG27D1171078532	2007	40-ft	-	2018	2020	2025
3019	15GG27D1371078533	2007	40-ft	-	2018	-	2020
3020	15GGD271471078534	2007	40-ft	-	2018	-	2020
3021	15GGD271671078535	2007	40-ft	-	2018	-	2020
3022	15GGD271871078536	2007	40-ft	-	2018	-	2020
3023	15GGD271X71078537	2007	40-ft	-	2018	-	2020
3024	15GGD271171078538	2007	40-ft	-	2018	-	2020
3025	15GGD271371078539	2007	40-ft	-	2018	-	2020
3026	15GGD271X71078540	2007	40-ft	-	2018	-	2020
3027	15GGD271171078541	2007	40-ft	-	2018	-	2020
3028	15GGD271371078542	2007	40-ft	-	2018	-	2020
3029	15GGD271881079963	2008	40-ft	-	2018	-	2021

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
3030	15GGD271X81079964	2008	40-ft	-	2018	-	2021
3031	15GGD271181079965	2008	40-ft	-	2018	-	2022
3032	15GGD271381079966	2008	40-ft	-	2018	-	2023
3033	15GGD271581079967	2008	40-ft	-	2018	-	2022
3034	15GGD271781079968	2008	40-ft	-	2018	-	2023
3035	15GGD271981079969	2008	40-ft	-	2019	-	2022
4000	15GG30E1871091538	2007	29-ft	-	-	-	2018
4001	15GG30E1X71091539	2007	29-ft	-	-	-	2018
4002	15GG30E1671091540	2007	29-ft	-	-	-	2018
4003	15GG30E1871091541	2007	29-ft	-	-	-	2019
4004	15GGE301671091542	2007	29-ft	-	-	-	2018
4005	15GGE301871091543	2007	29-ft	-	-	-	2018
4006	15GGE301X71091544	2007	29-ft	-	-	-	2018
4007	15GGE301171091545	2007	29-ft	-	-	-	2019
4008	15GGE301371091546	2007	29-ft	-	-	-	2018
4009	15GGE301571091547	2007	29-ft	-	-	-	2018
4010	15GGE301781091566	2008	29-ft	-	-	-	2018
4011	15GGE301981091567	2008	29-ft	-	-	-	2020
4012	15GGE301081091568	2008	29-ft	-	-	-	2020
4013	15GGE301281091569	2008	29-ft	-	-	-	2019
4014	15GGE301981091570	2008	29-ft	-	-	-	2018
4015	15GGE301081091571	2008	29-ft	-	-	-	2020
4016	15GGE301281091572	2008	29-ft	-	-	-	2020
4017	15GGE301481091573	2008	29-ft	-	-	-	2020
4018	15GGE301681091574	2008	29-ft	-	-	-	2019
4019	15GGE301881091575	2008	29-ft	-	-	-	2019
4020	15GGE301X81091576	2008	29-ft	-	-	-	2019
4021	15GGE301181091577	2008	29-ft	-	-	-	2019
4022	15GGE301381091578	2008	29-ft	-	-	-	2019
4023	15GGE301581091579	2008	29-ft	-	-	-	2019
4024	15GGE301X91091580	2009	29-ft	-	2019	-	2022
4025	15GGE301191091581	2009	29-ft	-	2019	-	2022
4026	15GGE3016B1092246	2011	29-ft	-	2019	-	2024
4027	15GGE3018B1092247	2011	29-ft	-	2019	-	2025
4028	15GGE301XB1092248	2011	29-ft	-	2019	-	2023
4029	15GGE3011B1092249	2011	29-ft	-	2019	-	2026
4030	15GGE3018B1092250	2011	29-ft	-	2019	-	2025
4031	15GGE301XB1092251	2011	29-ft	-	2019	-	2025
4032	15GGE3011B1092252	2011	29-ft	-	2019	-	2022

Unit	VIN	Year	Length	Fiscal Year of Action			
				Retirement	Overhaul	Rebuild	Replacement
4033	15GGE3013B1092253	2011	29-ft	-	2019	-	2025
4034	15GGE3015B1092254	2011	29-ft	-	2019	-	2022
4035	15GGE3017B1092255	2011	29-ft	-	2019	-	2022
4036	15GGE3019B1092256	2011	29-ft	-	2019	-	2024
5000	15GGB2715B1180021	2012	35-ft	-	2018	-	2025
5001	15GGB2717B1180022	2012	35-ft	-	2018	-	2024
5002	15GGB2719B1180023	2012	35-ft	-	2018	-	2025
5003	15GGB2710B1180024	2012	35-ft	-	2018	-	2026
5004	15GGB2712B1180025	2012	35-ft	-	2018	-	2025
5005	15GGB2714B1180026	2012	35-ft	-	2018	-	2025
5006	15GGB2716B1180027	2012	35-ft	-	2018	-	2025
5007	15GGB2716C1180028	2012	35-ft	-	2018	-	2024
5008	15GGB2718C1180029	2012	35-ft	-	2019	-	2024
5009	15GGB2714D1182099	2013	35-ft	-	2020	-	2025
5010	15GGB2717D1182100	2013	35-ft	-	2020	-	2025
5011	15GGB2719D1182101	2013	35-ft	-	2020	-	2025
5012	15GGB2710D1182102	2013	35-ft	-	2020	-	2025
5013	15GGB2712D1182103	2013	35-ft	-	2020	-	2025
5014	15GGB2716F1186898	2015	35-ft	-	2023	-	2028
5015	15GGB2718F1186899	2015	35-ft	-	2023	-	2028
5016	15GGB2715G1188353	2016	35-ft	-	2023	-	2030
5017	15GGB2717G1188354	2016	35-ft	-	2023	-	2030
5018	15GGB2719G1188355	2016	35-ft	-	2023	-	2030
5101	4RKYL82U1D4500278	2013	40-ft	-	2022	-	2027
5102	4RKYL82U3D4500279	2013	40-ft	-	2022	-	2027
5103	4RKYL82UXD4500280	2013	40-ft	-	2022	-	2028
5104	4RKYL82UOD4500403	2013	40-ft	-	2022	-	2027
5105	4RKYL82U6D4500406	2013	40-ft	-	2022	-	2027
5106	4RKYL82U8D4500407	2013	40-ft	-	2022	-	2027
5107	4RKYL82UXD4500408	2013	40-ft	-	2022	-	2027

Table F-2 | Paratransit Fleet Master Strategy

Unit	VIN	Year	Type	Replacement Fiscal Year(s)
10001	1FDFE4FS9FDA03262	2015	Cutaway	2019, 2024
10002	1FDFE4FS8FDA00787	2015	Cutaway	2019, 2024
10003	1FDFE4FS9FDA03259	2015	Cutaway	2019, 2024
10004	1FDFE4FS9FDA00782	2015	Cutaway	2019, 2024
10005	1FDFE4FS6FDA03266	2015	Cutaway	2019, 2024
10006	1FDFE4FS3FDA00762	2015	Cutaway	2019, 2024

Unit	VIN	Year	Type	Replacement Fiscal Year(s)
10007	1FDFE4FS7FDA00764	2015	Cutaway	2019, 2024
10008	1FDFE4FS5FDA00780	2015	Cutaway	2019, 2024
10009	1FDFE4FS7FDA00781	2015	Cutaway	2019, 2024
10010	1FDFE4FS1FDA00792	2015	Cutaway	2019, 2024
10011	1FDFE4FS4FDA03301	2015	Cutaway	2019, 2024
10012	1FDFE4FS9FDA03309	2015	Cutaway	2019, 2024
10013	1FDFE4FS1FDA03305	2015	Cutaway	2019, 2024
10014	1FDFE4FS3FDA03306	2015	Cutaway	2019, 2024
10015	1FDFE4FS8FDA03303	2015	Cutaway	2019, 2024
10016	1FDFE4FS7FDA03289	2015	Cutaway	2019, 2024
10017	1FDFE4FS6FDA03283	2015	Cutaway	2019, 2024
10018	1FDFE4FS0FDA03277	2015	Cutaway	2019, 2024
10019	1FDFE4FS2FDA03281	2015	Cutaway	2019, 2024
10020	1FDFE4FS4FDA03282	2015	Cutaway	2019, 2024
10021	1FDFE4FS4FDA03315	2015	Cutaway	2019, 2024
10022	1FDFE4FS1FDA03319	2015	Cutaway	2019, 2024
10023	1FDFE4FS3FDA03323	2015	Cutaway	2019, 2024
10024	1FDFE4FS1FDA03322	2015	Cutaway	2019, 2024
10025	1FDFE4FS2FDA03328	2015	Cutaway	2019, 2024
10026	1FDFE4FS9FDA03312	2015	Cutaway	2019, 2024
10027	1FDFE4FSXFDA03318	2015	Cutaway	2019, 2024
10028	1FDFE4FS6FDA03316	2015	Cutaway	2019, 2024
10029	1FDFE4FS6FDA03297	2015	Cutaway	2019, 2024
10030	1FDFE4FS8FDA03317	2015	Cutaway	2019, 2024
10031	1FDFE4FS2FDA03295	2015	Cutaway	2019, 2024
10032	1FDFE4FS0FDA03313	2015	Cutaway	2019, 2024
10033	1FDFE4FS4FDA03329	2015	Cutaway	2019, 2024
10034	1FDFE4FS7FDA03325	2015	Cutaway	2019, 2024
10035	1FDFE4FS7FDA03292	2015	Cutaway	2019, 2024
10036	1FDFE4FS5FDA03291	2015	Cutaway	2019, 2024
10037	1FDFE4FS4FDA03346	2015	Cutaway	2019, 2024
10038	1FDFE4FS2FDA03314	2015	Cutaway	2019, 2024
10039	1FDFE4FS0FDA03330	2015	Cutaway	2019, 2024
10040	1FDFE4FS3FDA03340	2015	Cutaway	2019, 2024
10041	1FDFE4FS6FDA03302	2015	Cutaway	2019, 2024
10042	1FDFE4FS5FDA03307	2015	Cutaway	2019, 2024
10043	1FDFE4FS6FDA03347	2015	Cutaway	2019, 2024
10044	1FDFE4FS2FDA03278	2015	Cutaway	2019, 2024
10045	1FDFE4FS5FDA07499	2015	Cutaway	2019, 2024
10046	1FDFE4FS3FDA07517	2015	Cutaway	2019, 2024

Unit	VIN	Year	Type	Replacement Fiscal Year(s)
10047	1FDFE4FS5FDA07518	2015	Cutaway	2019, 2024
10048	1FDFE4FS7FDA07519	2015	Cutaway	2019, 2024
10049	1FDFE4FS5FDA07521	2015	Cutaway	2019, 2024
10050	1FDFE4FS5FDA07535	2015	Cutaway	2019, 2024
10051	1FDFE4FS6FDA07530	2015	Cutaway	2019, 2024
10052	1FDFE4FS0FDA07488	2015	Cutaway	2019, 2024
10053	1FDFE4FS6FDA07527	2015	Cutaway	2019, 2024
10054	1FDFE4FS3FDA07520	2015	Cutaway	2019, 2024
10055	1FDFE4FS2FDA07489	2015	Cutaway	2019, 2024
10056	1FDFE4FS4FDA07512	2015	Cutaway	2019, 2024
10057	1FDFE4FS7FDA07522	2015	Cutaway	2019, 2024
10058	1FDFE4FSXFDA07532	2015	Cutaway	2019, 2024
10059	1FDFE4FS3FDA07534	2015	Cutaway	2019, 2024
10060	1FDFE4FS9FDA07537	2015	Cutaway	2019, 2024
10061	1FDFE4FS5FDA03324	2015	Cutaway	2019, 2024
10062	1FDFE4FS5FDA03341	2015	Cutaway	2019, 2024
10063	1FDFE4FS7FDA03308	2015	Cutaway	2019, 2024
10064	1FDFE4FS5FDA03310	2015	Cutaway	2019, 2024
10065	1FDFE4FS0FDA00797	2015	Cutaway	2019, 2024
10066	1FDFE4FS8FDA03298	2015	Cutaway	2019, 2024
10067	1FDFE4FSXFDA03304	2015	Cutaway	2019, 2024
10068	1FDFE4FS7FDA03311	2015	Cutaway	2019, 2024
10069	1FDFE4FSXFDA03321	2015	Cutaway	2019, 2024
10070	1FDFE4FS9FDA03326	2015	Cutaway	2019, 2024
10071	1FDFE4FS6FDA03333	2015	Cutaway	2019, 2024
10072	1FDFE4FS5FDA03338	2015	Cutaway	2019, 2024
10073	1FDFE4FS9FDA03343	2015	Cutaway	2019, 2024
10074	1FDFE4FS6FDA07513	2015	Cutaway	2019, 2024
10075	1FDFE4FS8FDA03320	2015	Cutaway	2019, 2024
10076	1FDFE4FS8FDA03334	2015	Cutaway	2019, 2024
20001	1FA6P0G79F5124231	2015	Sedan	2020, 2027
20002	1FA6P0G77F5124227	2015	Sedan	2019, 2025
20003	1FA6P0G7XF5124223	2015	Sedan	2020, 2027
20004	1FA6P0G73F5124225	2015	Sedan	2019, 2025
20005	1FA6P0G79F5124228	2015	Sedan	2019, 2025
20006	1FA6P0G77F5124230	2015	Sedan	2019, 2025
20007	1FA6POG76F5124235	2015	Sedan	2019, 2025
20008	1FA6POG74F5124234	2015	Sedan	2019, 2025
20009	1FA6POG76F5124221	2015	Sedan	2019, 2025
20010	1FA6POG72F5124233	2015	Sedan	2019, 2025

Unit	VIN	Year	Type	Replacement Fiscal Year(s)
20011	1FA6POG75F5124226	2015	Sedan	2019, 2025
20012	1FA6POG71F5124224	2015	Sedan	2019, 2024
20013	1FA6POG78F5124222	2015	Sedan	2019, 2025
20014	1FA6POG70F5124229	2015	Sedan	2019, 2025
20015	1FA6POG72F5124216	2015	Sedan	2019, 2025
20016	1FA6POG70F5124215	2015	Sedan	2019, 2025
20017	1FA6POG74F5124220	2015	Sedan	2019, 2025
20018	1FA6POG78F5124219	2015	Sedan	2019, 2025
20019	1FA6POG76F5124218	2015	Sedan	2019, 2024
20020	1FA6POG79F5124214	2015	Sedan	2019, 2025
20021	1FA6POG75F5124212	2015	Sedan	2019, 2025
20022	1FA6POG71F5124207	2015	Sedan	2020, 2027
20023	1FA6POG71F5124210	2015	Sedan	2019, 2025
20024	1FA6POG77F5124213	2015	Sedan	2019, 2024
20025	1FA6POG75F5124209	2015	Sedan	2019, 2025
20026	1FA6POG73F5124208	2015	Sedan	2019, 2025
20027	1FA6POG74F5124217	2015	Sedan	2019, 2024
20028	1FA6POG70F5124232	2015	Sedan	2019, 2025
20029	1FA6POG73F5124211	2015	Sedan	2019, 2024
20030	1FA6P0G71E5384511	2014	Sedan	2021
V- 120	1FBSS3BL4CDA59114	2012	15-pass	2020, 2025
V-121	1FBSS3BL6CDA59115	2012	15-pass	2020, 2025
V-123	1FBSS3BLXCDA59117	2012	15-pass	2020, 2025

Appendix G: Capital Program

G.1 FISCALLY CONSTRAINED CAPITAL PROGRAM

Project ID & Name	Total	FY2019	FY2020	FY21	FY2022	FY2023	FY2024
EF3600 - HRT Paving Program	**$4,826,000**	$0	$2,742,000	$0	$612,000	$965,000	$507,000
EF3810 - Evelyn T Butts Transfer Center Upgrade	**$2,951,000**	$0	$0	$0	$0	$577,000	$2,374,000
IT0100 - HASTUS	**$1,120,000**	$1,120,000	$0	$0	$0	$0	$0
IT0199 - HASTUS (Upgrade)	**$1,182,000**	$0	$0	$0	$1,182,000	$0	$0
IT0200 - Bus CAD AVL System Upgrades	**$1,677,000**	$506,000	$580,000	$591,000	$0	$0	$0
IT0300 - Large Technology Infrastructure	**$2,150,000**	$611,000	$0	$0	$0	$1,539,000	$0
IT0500 - Technology Hardware, Mobile and Network Equipment	**$1,350,000**	$0	$1,202,000	$105,000	$21,000	$22,000	$0
IT0700 - Bus Technology Fare Payment Upgrade	**$3,165,000**	$0	$0	$3,165,000	$0	$0	$0
IT0800 - IT Network Security	**$1,087,000**	$1,087,000	$0	$0	$0	$0	$0
IT1610 - Financial Information Software	**$750,000**	$750,000	$0	$0	$0	$0	$0
IT1699 - Financial Information Software (Upgrade)	**$1,235,000**	$0	$0	$0	$1,235,000	$0	$0
IT1799 - PeopleSoft HCM (Upgrade)	**$1,222,000**	$1,222,000	$0	$0	$0	$0	$0
IT1999 - Real-Time System (Upgrade)	**$1,640,000**	$0	$0	$0	$0	$1,640,000	$0
IT2219 - Transit Asset Management System (Upgrade)	**$2,356,000**	$0	$0	$0	$0	$0	$2,356,000
LR0120 - Light Rail Systems State of Good Repair	**$1,843,000**	$475,000	$544,000	$157,000	$667,000	$0	$0

Project ID & Name	Total	FY2019	FY2020	FY21	FY2022	FY2023	FY2024
LR0130 - Light Rail Vehicle State of Good Repair	**$1,925,000**	$701,000	$658,000	$333,000	$182,000	$51,000	$0
NR0120 - Non-Revenue Fleet Replacement Operations	**$340,000**	$0	$0	$340,000	$0	$0	$0
OP0110 - Transit Bus Replacement	**$64,386,000**	$11,870,000	$13,145,000	$13,860,000	$10,930,000	$4,808,000	$9,773,000
OP0120 - Transit Bus Mid-Life Repower Project	**$7,030,000**	$3,289,000	$389,000	$0	$564,000	$2,788,000	$0
OP0130 - Transit Bus Overhaul Project	**$7,836,000**	$3,000,000	$4,836,000	$0	$0	$0	$0
OP1110 - Paratransit Fleet Replacement	**$9,949,000**	$4,642,000	$187,000	$0	$0	$0	$5,120,000
OP1120 - Paratransit Fleet Expansion	**$7,488,000**	$0	$0	$2,201,000	$2,620,000	$2,667,000	$0
SS0200 - Upgrade the Video Recording Equipment for Buses	**$6,056,000**	$1,782,000	$1,399,000	$1,425,000	$1,450,000	$0	$0
SS0210 - Upgrade the Video Recording Equipment for LRT	**$111,000**	$0	$0	$0	$111,000	$0	$0
SS079 - Wayside Warning Device Upgrade	**$113,000**	$0	$0	$0	$113,000	$0	$0
TOTAL	**$133,788,000**	**$31,055,000**	**$25,682,000**	**$22,177,000**	**$19,687,000**	**$15,057,000**	**$20,130,000**

G.2 UNCONSTRAINED CAPITAL PROGRAM

Figures in $1000s; Only reflects capital needs not already supported by a programmed funding award

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
Bus Lease Debt Servicing	0	0	0	0	0	0	0	0	0	0	**0**
3400 Victoria Boulevard Renovation: Phase 1	0	0	0	0	0	0	0	0	0	0	**0**
3400 Victoria Boulevard Renovation: Phase 2	0	0	3,467	0	0	0	0	0	0	0	**3,467**
Parks Avenue Garage Relocation and Replacement	0	0	0	0	0	6,223	57,405	0	0	0	**63,628**
ADA Bus Stop Access Upgrades	0	350	350	350	350	350	350	0	0	0	**2,100**
Bus Stop Amenity Program	0	400	400	400	400	400	400	0	0	0	**2,400**
HRT Paving Program	0	6,772	1,077	1,097	1,116	1,136	1,157	0	0	0	**12,355**
HRT Paving Program (Unfunded)	0	0	0	0	0	0	0	0	0	0	**0**
Newport News Transit Center Upgrades	0	0	0	0	0	0	0	0	0	0	**0**
Hampton Transit Center Upgrades	0	0	0	0	0	0	0	0	0	0	**0**
Wards Corner Transfer Center Upgrades	0	359	0	0	0	0	0	0	0	0	**359**
Evelyn T Butts Transfer Center Upgrades	0	0	0	538	2,208	0	0	0	0	0	**2,746**
Silverleaf Transfer Center Upgrades	0	0	0	1,077	0	0	0	0	0	0	**1,077**
Victory Crossing Park and Ride Phase 2	0	0	0	0	1,656	0	0	0	0	0	**1,656**
Victory Crossing Safety Upgrades	0	359	0	0	0	0	0	0	0	0	**359**
Greenbrier Park and Ride	0	359	0	0	0	0	0	0	0	0	**359**
Reon Drive Transfer Center Upgrades	0	0	0	0	0	0	1,740	0	0	0	**1,740**
Warwick and Elmhurst Transfer Center	0	1,025	0	0	0	0	0	0	0	0	**1,025**
HASTUS	0	1,100	0	0	0	0	0	0	0	0	**1,100**
HASTUS (Upgrade)	0	0	0	0	1,101	0	0	0	0	1,101	**2,202**
Bus CAD AVL System Upgrades	0	1,459	0	0	0	0	0	0	0	0	**1,459**
Large Technology Infrastructure	0	611	0	0	0	1,539	0	0	0	0	**2,150**
Technology Hardware, Mobile and Network Equipment	0	1,161	21	105	21	22	0	0	0	0	**1,330**
Bus Technology Fare Payment Upgrade	0	0	0	3,165	0	0	0	0	0	0	**3,165**
IT Network Security	0	1,087	0	0	0	0	0	0	0	0	**1,087**
Passenger Information Displays - Bus Facilities	0	0	614	0	0	0	0	0	0	0	**614**
Passenger Information Displays - Light Rail	0	0	1,704	0	0	0	0	0	0	0	**1,704**
Onboard Wi-Fi	0	0	0	844	0	0	0	0	0	0	**844**
Audio Monitoring System (Phone + Control Room)	0	356	0	0	0	0	0	0	0	0	**356**
Mobile Vault System	0	662	0	0	0	0	0	0	0	0	**662**

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
Financial Information Software	0	750	0	0	0	0	0	0	0	0	**750**
Financial Information Software (Upgrade)	0	0	0	0	1,235	0	0	0	0	1,235	**2,470**
PeopleSoft HCM (Upgrade)	0	1,222	0	0	0	0	0	1,222	0	0	**2,443**
Real-Time System	0	0	0	0	0	0	0	0	0	0	**0**
Real-Time System (Upgrade)	0	0	0	0	0	1,640	0	0	0	0	**1,640**
IVR Phone System Upgrade	0	407	0	0	0	0	0	0	0	0	**407**
Ticket Vending Machines for Bus Facilities	0	0	0	0	92	373	75	0	0	0	**540**
Ticket Vending Machines for Ferry Docks	0	0	0	0	0	0	0	0	0	0	**0**
Ticket Vending Machines for Light Rail	0	0	0	0	2,109	0	0	0	0	0	**2,109**
Transit Asset Management System	0	0	0	0	0	0	0	0	0	0	**0**
Transit Asset Management System (Upgrade)	0	0	0	0	2,274	0	0	0	0	2,274	**4,547**
Transportation Statistics Database	0	412	0	0	0	0	0	0	0	0	**412**
Light Rail Systems SGR	0	897	494	568	168	703	0	0	0	0	**2,829**
Light Rail Radio System Upgrade	0	0	0	220	0	0	0	0	0	0	**220**
Light Rail Vehicle SGR	0	701	658	333	182	51	0	0	0	0	**1,926**
Light Rail Cab Signaling	0	0	0	0	0	8,486	0	0	0	0	**8,486**
Light Rail Vehicle Paint and Body Shop	0	0	0	0	5,370	0	0	0	0	0	**5,370**
Norfolk Tide Facility Track Embedding	0	0	207	0	0	0	0	0	0	0	**207**
Non-Revenue Fleet Replacement - General	0	592	0	93	30	65	0	0	68	64	**912**
Non-Revenue Fleet Replacement - LRT	0	340	109	37	32	38	0	48	69	132	**804**
Non-Revenue Fleet Replacement - Operations	0	285	44	0	0	0	0	187	34	0	**550**
Non-Revenue Fleet Replacement - Bus Maintenance	0	137	0	0	0	0	33	0	0	41	**211**
Non-Revenue Fleet Replacement - Facilities	0	115	0	0	0	0	0	0	0	41	**156**
Non-Revenue Fleet Replacement - Radio/Revenue	0	157	31	29	0	0	0	93	0	0	**310**
Non-Revenue Fleet Replacement -Safety and Security	0	55	0	0	0	32	0	33	34	0	**154**
Non-Revenue Fleet Expansion - Security	0	520	0	0	0	0	0	0	0	0	**520**
Transit Bus Replacement	0	11,870	13,145	13,860	10,930	4,808	9,773	18,213	1,114	0	**83,712**
Transit Bus Mid-Life Repower Project	0	3,289	389	0	564	2,788	0	0	0	88	**7,118**
Transit Bus Overhaul Project	0	3,000	4,836	0	0	0	0	0	0	0	**7,836**
Centralized Command and Control Center	0	0	0	0	0	0	11,597	0	0	0	**11,597**
Paratransit Operations Center	0	0	0	0	0	0	5,120	204	0	0	**5,324**
Paratransit Fleet Replacement	0	4,642	187	0	0	0	5,075	816	830	986	**12,536**

Project Name	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
Paratransit Fleet Expansion	0	4,459	560	633	709	722	801	0	0	0	**7,883**
Bus Operator Driving Simulator	0	0	359	0	0	0	0	0	0	0	**359**
Bus Maintenance Training System	0	351	0	0	0	0	0	0	0	0	**351**
Portable Oil Analysis Lab	0	167	0	0	0	0	0	0	0	0	**167**
Peninsula Corridor Study	0	0	0	0	0	0	0	0	0	0	**0**
Naval Station Norfolk Transit Extension Studies - DEIS and AA	0	0	0	0	0	0	0	0	0	0	**0**
Chesapeake Corridor Study	0	0	0	0	0	0	0	0	0	0	**0**
Peninsula Corridor Study Phase 2 - Environmental Study	0	0	0	0	0	0	0	0	0	0	**0**
Upgrade the Video Recording Equipment for Buses	0	0	6,012	0	0	0	0	0	0	0	**6,012**
Upgrade the Video Recording Equipment for Light Rail	0	0	0	0	111	0	0	0	0	0	**111**
Mobile Camera Units for Transfer Centers	0	102	0	111	0	0	0	0	0	0	**213**
Wayside Advance Warning Device Upgrade	0	0	0	0	112	0	0	0	0	0	**112**
Replacement of Fixed-Camera Equipment	0	0	713	343	0	0	0	0	0	0	**1,056**
OCC Uninterrupted Power Source Upgrade	0	0	0	0	0	0	0	0	0	0	**0**
Store Room Fork Lifts	0	0	93	53	54	55	56	0	0	0	**310**
Expansion Fixed-Cameras	0	51	52	0	0	0	0	0	0	0	**103**
Replacement of Key Card Readers	0	0	714	0	0	0	0	0	0	0	**714**
North Side Server Room	0	814	0	0	0	0	0	0	0	0	**814**
Expansion Bus Fleet Procurement	0	0	0	4,136	1,052	1,071	2,181	10,548	34,475	0	**53,465**
Expansion Bus Repower	0	0	0	0	0	0	0	544	0	0	**544**
Expansion Paratransit	0	0	0	0	0	0	0	0	0	0	**0**
Mobile Ticketing Phase II	0	0	0	0	0	0	0	2,377	2,472	0	**4,849**
Cellular Modem and Access Points	0	0	0	0	0	0	0	374	389	0	**762**

(Page Intentionally Left Blank)

Appendix H: Public Outreach

The major goal of the Hampton Roads Transit's Transit Development Plan (TDP) outreach effort was to capture feedback from members of the public, key regional stakeholders, and both existing and potential riders, that was applied to the service planning process. Public feedback is one of the most meaningful data points used to improve service plans, in addition to other local bus service planning data, and will be used to ultimately support service and capital recommendations presented in the finalized TDP document.

H.1 PHASE 1 OUTREACH

HRT completed the first phase of public outreach between March 2017 and June 2017. This phase focused on presenting the findings of the HRT TDP Chapter 3: Service and System Evaluation. The main goal was to receive a comprehensive understanding of transit needs throughout the service area by connecting with HRT operators and diverse constituencies throughout the region, with feedback obtained via online surveys and open houses. This information will be utilized to inform the HRT TDP Chapter 4: Service Expansion Concepts. During Phase Two Outreach, these recommendations will be discussed with the public, HRT operators and service planning staff through a series of outreach events and activities.

Stakeholder Working Group

To ensure that the TDP public involvement strategy was effectively coordinated across the region, a Stakeholder Working Group (SWG) was established with key partners in the region that have a political, economic, and civic investment in the success of the plan.

Participants of the SWG included representatives from:

- Transit Riders Advisory Committee (TRAC)
- Paratransit Advisory Committee (PAC)
- Regional Planning Departments:
  - City of Chesapeake
  - City of Hampton
  - City of Norfolk
  - City of Newport News
  - City of Portsmouth
  - City of Virginia Beach
- Virginia Department of Transportation (VDOT) - Hampton Roads District
- Department of Rail and Public Transportation (DRPT)
- Hampton Roads Planning District Commission (HRPDC)
- Hampton Roads Transportation Planning Organization (HRTPO)
- Citizens Transportation Advisory Committee (CTAC)

The group's first meeting was on March 6, 2017. The SWG received a presentation on the purpose and goals of the TDP, a preview of the phase one outreach approach, and details of event strategies. At the SWG meeting, the members provided feedback on the overall transit network and provided route-specific comments. Two members of the PAC and one member of the TRAC also provided input to the SWG liaison regarding improvements to the public outreach process, with their suggestions echoed by representatives of the regional planning departments in attendance. On March 7th, 2017, the service planning team provided the same presentation to the TRAC as it did the SWG, but

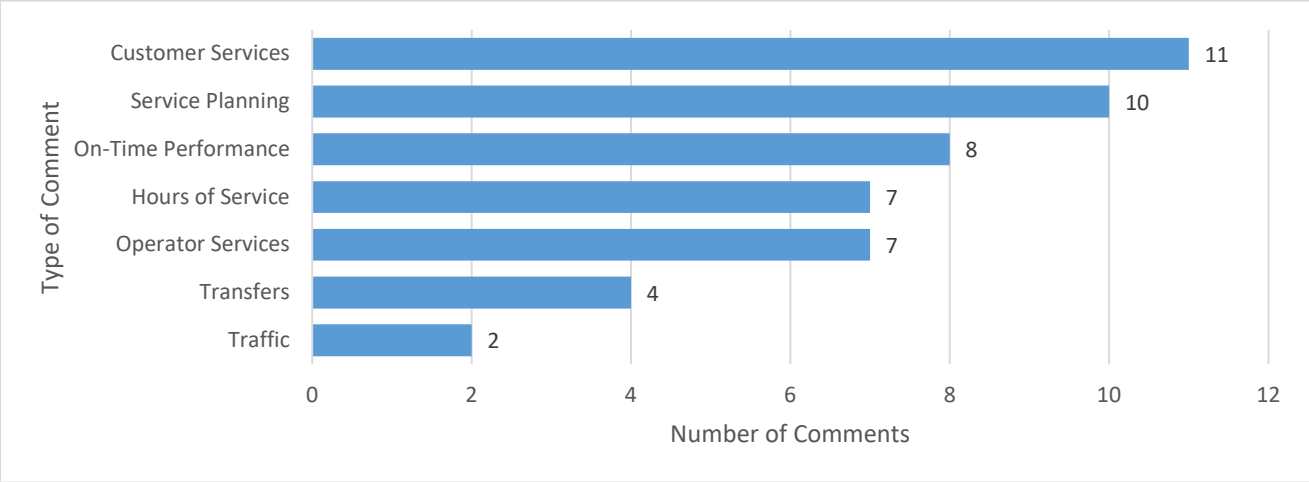
discussion focused on route-specific concerns in more detail.

Operator Open House

Operator Open Houses were held on March 6 and 7, 2017, coinciding with the bi-annual Operator Roundtable. This effort captured feedback directly from operations staff on how HRT can improve the operation of transit services. Informational boards were setup near the dispatch window in the division with details regarding the purpose and goals of the TDP, initial findings from the Service and System Evaluation, and printed forms for operators to provide comments on the existing service.

On the TDP Operator Feedback Form, operators were asked to provide feedback on which existing routes should be changed, removed, or added, and to make any other service-related suggestions. A total of 53 operators provided comments about HRT bus service. **Figure H-1** shows the frequency with which topics were commented on.

Figure H-1 | Types of Comments from Operators



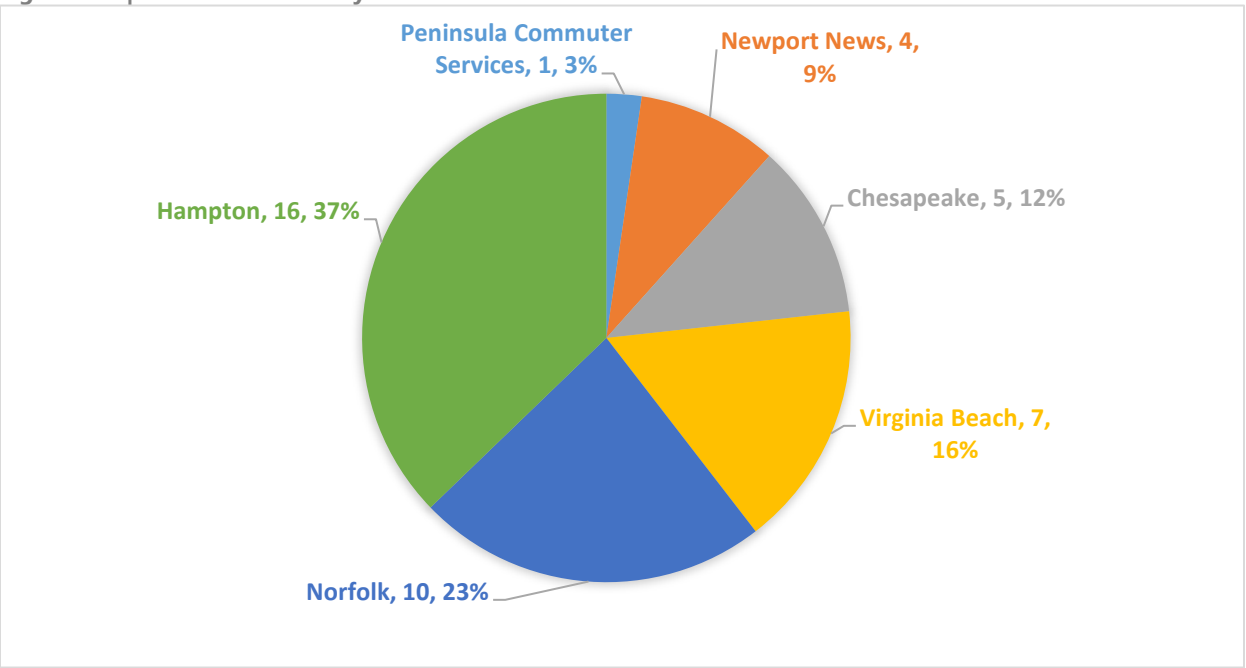
The following summary details Operator comments by category:

- **Customer Services:** Operators expressed ideas for improved customer services, including off-board fare payment, limiting cash fare payments, and creating more visible bus stops so that operators can more easily see passengers waiting to board at night. Some operators expressed frustration with enforcing HRT rules, including fare enforcement and the prohibition against drinking on buses, and others were frustrated by HRT rules like the "no hold" policy.
- **Service planning:** Operators suggested span, frequency and route alignment changes to better serve residents, avoid heavy traffic, and provide more frequent service.
- **On-Time Performance:** Bus operators commented that the "no hold" policy negatively affects their ability to serve customers. Suggestions were made to improve schedule times to consider how the no hold policy affects transfers at stops.
- **Hours of Service:** Operators commented that expanding evening hours in the

summer would be beneficial, as more people are likely to ride the bus at these times. They noted that this is especially critical in portions of the service area where service ends at 6:00pm and service is limited on weekends.

- **Operator Services:** Operators requested additional time to take breaks, use the restroom, and request bus maintenance.
- **Transfers:** Drivers commented on routes that thought could be adjusted, as well as ways to facilitate transfers more efficiently. The count of comments on routes by location are listed in **Figure H-2.**
- **Traffic:** Operators identified a variety of high-traffic areas that affect the performance of bus routes.

Figure H-2 | Routes Mentions by Location



Pop-Up Events and Postcard Distribution Events

A "take one" postcard was developed for distribution starting the week of March 13, 2017. These postcards provided an overview of the purpose and goals of the TDP, promotion of the HRT website project page, and information regarding how to sign-up for TDP Focus Groups**.**

Ten postcard distribution events took place from March 28 to April 8, 2017 at key transit centers and locations to ensure that HRT riders were directly contacted about participating in the focus group process. Dates, locations, and the number of postcards distributed are listed in **Table H-1.** Through these events, a total of 2,544 postcards were distributed and 104 hard-copy surveys were completed. At select events, staff members were also equipped with tablets with the focus group participation surveys to increase the number of low-income and Limited English Proficient (LEP) populations signing up for in the focus groups.

Figure H-3 | Take One Postcard

Table H-1 | Postcard Distribution Events, March-April 2017

Location	Date	Postcards Distributed	Tablet/ Hard Copy Surveys
Downtown Norfolk Transit Center	Tuesday, March 28, 2017	363	20
Newport News Transit Center	Wednesday, March 29, 2017	352	35
Hampton Transit Center	Thursday, March 30, 2017	400	28
Newtown Road Light Rail Station	Friday, March 31, 2017	357	1
Silverleaf Park & Ride	Tuesday, April 4, 2017	62	0
Indian River Park & Ride	Tuesday, April 4, 2017	70	0
County Street and Court Street	Tuesday, April 4, 2017	360	20
Robert Hall	Wednesday, April 5, 2017	146	0
Tidewater Community College (Virginia Beach)	Friday, April 8, 2017	398	0
MacArthur Square Light Rail Station	Saturday, April 8, 2017	36	0

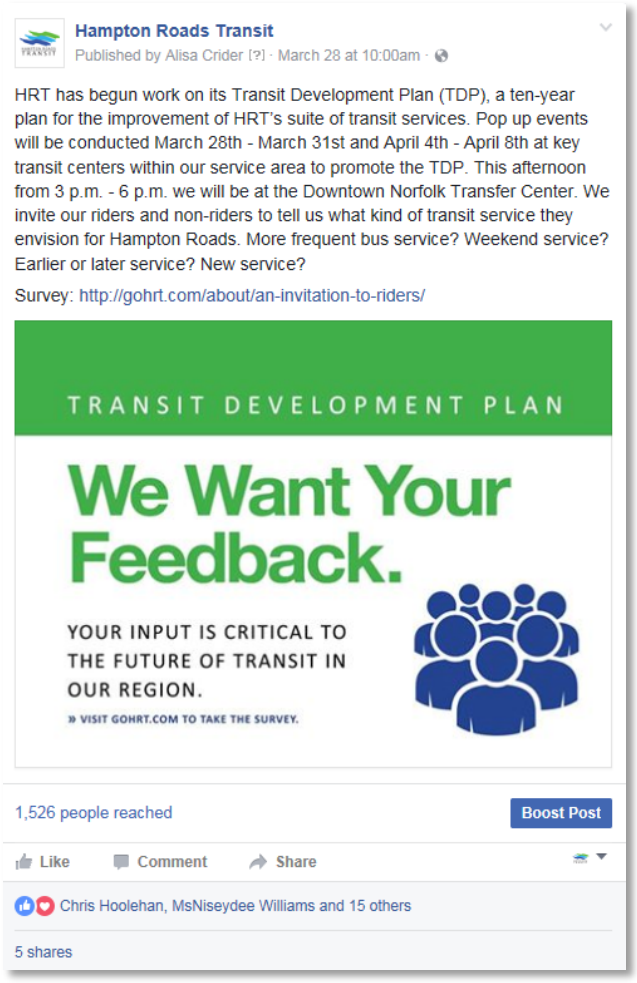
HRT staff also distributed postcards promoting the TDP and outreach process at other HRT events (including the winter branding campaign), and provided over 800 postcards to several major community partners. These postcards were delivered to 18 locations across Newport News, Chesapeake, Norfolk, Portsmouth, and Virginia Beach from March 31, 2017, to April 5, 2017. In addition, the postcard was sent via email to the Commands at Naval Station Norfolk and Norfolk Supply Activity and to GOPass users.

Online Engagement

The TDP outreach effort was coordinated with the existing online platforms used by HRT's Marketing Program. The public was able to learn about the TDP and engage the project team through the following platforms:

- **Gohrt.com:** The HRT TDP page on gohrt.com provided information on both the TDP and outreach. The website contained a project description, links to the previous TDP and other pertinent studies, a digital feedback form to sign up for focus groups, and links to social media. From March 13 to April 14, 2017, the website experienced a total of 478 pageviews, with most of the visitors from Norfolk (25 percent) and Virginia Beach (23 percent). The average viewer remained on the page for 2 minutes and 17 seconds. Pageviews peaked at the beginning of April 2017.
- **Social Media:** HRT used Facebook posts to promote the project website, advertise postcard distribution events, and capture feedback on the TDP in the comment section. On March 28, HRT's Facebook post reached 1,526 people, garnering 17 likes and five shares. HRT's April 5th post reached 2,144 people, received nine likes, one share, and three comments.

Figure H-4 | March 28, 2017 Facebook Post



Focus Groups

Participation Survey

A survey was conducted to identify potential focus group participants. This survey was made available to the public through postcards distributed at pop-up events, local public hearings, winter outreach events, online marketing, and at all major transfer centers. The Focus Group Participation Survey asked respondents to include their general contact information, transportation mode choice, current

level of transit usage, and availability for a focus group during the defined meeting period. Responses were categorized by interest type, and potential participants were invited to the appropriate focus group.

A total of 200 survey responses were received, 96 percent of respondents were transit users, with their modes of transit use illustrated in **Figure H-5**. Sixty-four percent of respondents currently use HRT services more than ten times per month. When asked to describe themselves, 16 percent identified themselves as employees or employers in the region, 9 percent as students, 7 percent as community members, 6 percent as representatives of faith-based or social service organizations, 5 percent as military members. Most respondents reported living in Norfolk, with 10 percent reported a 23504 zip code (Downtown Norfolk), eight percent reported a 23607 zip code (southern Newport News), and five percent reported a 23669 zip code (downtown Hampton and surrounding neighborhoods). The most common work zip codes were 23607 (southern Newport News) and 23320 (central Chesapeake), with 8 percent and 5 percent of commuters, respectively, reporting a work location there. Most participants identified as Black or African American (52 percent), White (25 percent), or two or more races (8 percent). Income levels of respondents are shown in **Figure H-7** and levels of education are shown in **Figure H-8.** Ninety-four percent of respondents listed English as their first language, with French, Spanish, Vietnamese, and Korean listed as other primary languages.

Figure H-5 | Types of Transit Used by Survey Respondents

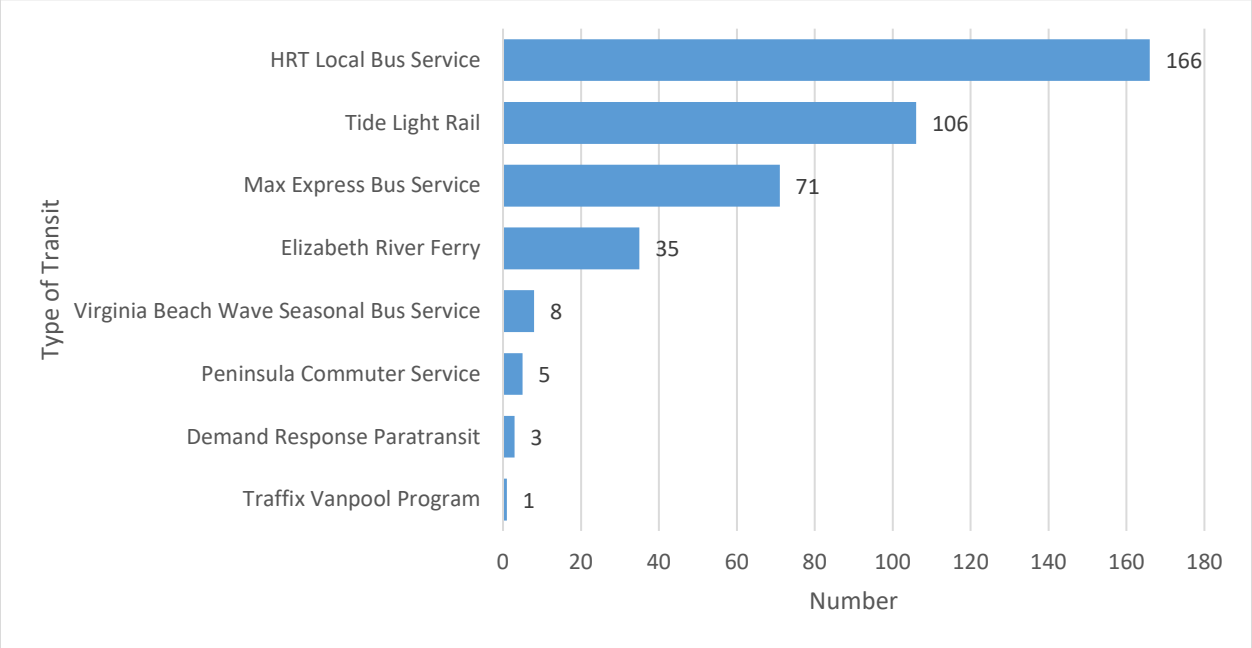


Figure H-6 | Race/Ethnicity of Survey Respondents

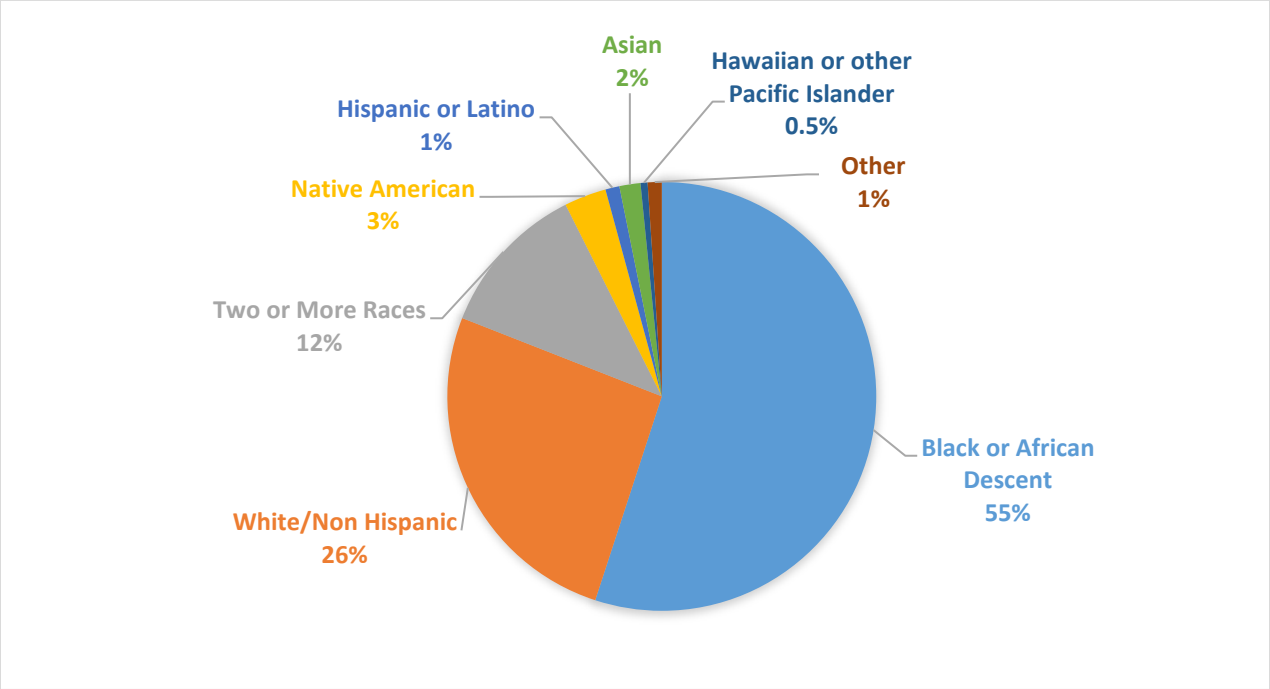
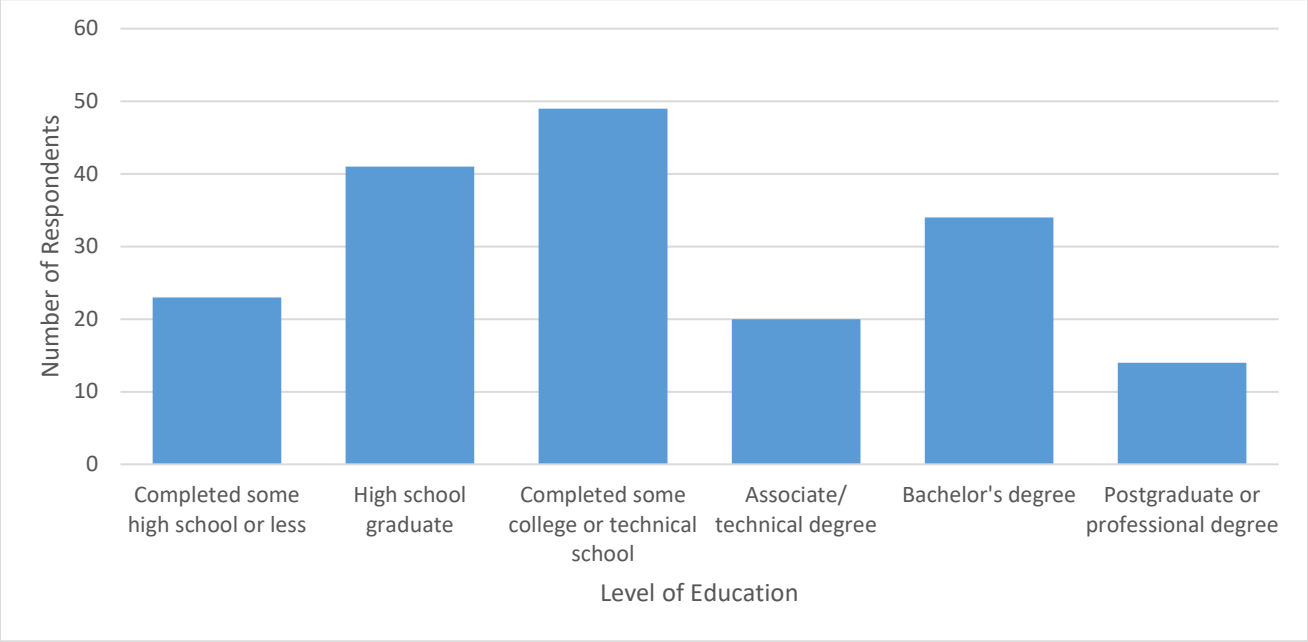


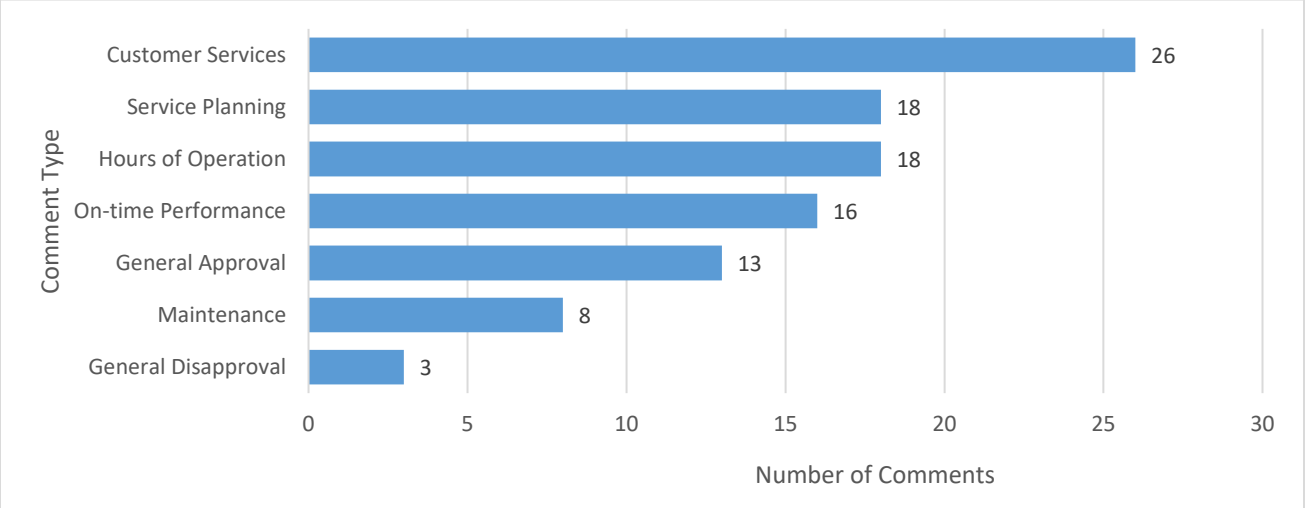
Figure H-7 | Income Level of Survey Respondents

Figure H-8 | Level of Education of Survey Respondents



Respondents provided comments on their interactions with bus operators, their general approval of the project, concerns about on-time performance, and suggestions for service improvements. Comment types are listed in **Figure H-9**. Commenters frequently requested expanded hours of service in the evenings and during weekends across a variety of routes. Some riders were concerned about the on-time performance of buses, which also affects the ease with which they can transfer between buses. Some commenters also asked for better communication between bus drivers and customers as well as new technologies on HRT vehicles, such as expanded options for fare payment.

Figure H-9 | Comment Types



The following summary details focus group survey comments by category:

- **Service Planning:** Riders suggested more frequent service, adding routes and stops in key locations, and enhancing opportunities for transfers. In addition, riders requested a better customer experience with comments regarding additional bus shelters.
- **Hours of Operation:** Riders asked for consistent service hours between cities and expanded evening and weekend hours.
- **On-Time Performance:** Riders said that buses are not on time often enough, limiting riders' abilities to plan their trips in advance.
- **Customer Services**: Riders frequently requested customer support tools, including better digital tools on the agency website and trip planning support.
- **Maintenance:** Riders requested that buses be cleaned more often.

Meetings Summary

Three focus groups were held during the first phase of outreach to discuss how the transit impacts different communities and interest groups. Individuals who completed the Focus Group Participation Survey were invited to attend these focus groups. A PowerPoint Presentation was made to each of the focus groups, with digital voting used to enhance group participation. Each of the three meetings focused on a different category of interests, with discussion at each meeting summarized below.

Disability Rights, Faith-Based and Social Service Organizations Community Focus Group

Held on April 28, 2017, this focus group included seniors, persons with disabilities, healthcare constituencies, and community- and faith-based organizations that support the needs of low-income individuals and families. A total of 11 participants attended in person or by webinar. Participants in this focus group live in Virginia Beach, Chesapeake, Norfolk, or Portsmouth. These individuals use HRT local bus service, express bus service, and paratransit, and one participant drives alone regularly. Nearly half (43 percent) of participants use transit monthly.

One participant expressed a need for consistent service, and that return trips from a destination should be available. Participants recommended increased service frequency on Routes 1, 6, 13, 14, 20, 57, 58, 106, 107, and 112. They recommended evening and weekend hours on Routes 6, 13, 14, 20, 22, 25, 41, 45, 57, and 58. They suggested that the Routes 1, 20, and 41 could be shortened or split into multiple routes. Of participants who use paratransit, one user said that increased knowledge of fixed route services could make using bus service a possibility.

Tourism, Regional Collaborators, and HRT Staff Focus Group

Held on April 30, 2017, this focus group was organized as an employee focus group. Participants recommended higher frequency on Routes 106, 107, 112, and 114, and realignments on some routes, including Routes 12, 15, 57, 107, and 119. They recommended that Routes 102 and 117 be combined, while Routes 1 and 57 should be split in half. Participants also commented that passengers on Routes 55 and 57 could benefit from extended hours of service.

Multimodal Transportation Community Focus Group

Held on May 4, 2017, this focus group included existing transit users (Bus, Light Rail, Ferry) and representatives from the Tidewater Bicycle Association, Safe Routes to Schools, and the Pedestrian and Bicycle Advisory Committee. A total of 20 participants attended this focus group. Half of this group use local bus service to commute, with the other half driving alone.

The group recommended 18 routes that should have higher frequency, including Route 44. They recommended that 15 routes should start earlier or end later, including Routes 14, 55, and 967. They recommended that 24 routes be realigned, including Routes 41 and 57. They recommended 10 routes be combined to provide better service, including Routes 1 and 21; 1 and 36; and 23 and 27. They recommended Routes 5, 11, 18, and 119 for elimination. They recommended new routes or stops at Patrick Henry Mall, Woodlake Drive, Norfolk Airport, and the new Norfolk Premium Outlet Mall. Some participants recommended splitting Route 1 into two routes.

Follow-Up Survey

A follow-up survey was sent to all focus group participants and invitees and closed on May 15, 2017. This survey provided attendees with the opportunity to provide any additional recommendations not captured during these meeting. It also provided the opportunity for those who were unable to attend a focus group to provide feedback and recommendations. The survey received a total of 19 responses. The survey asked the following 11 questions:

- Which routes do you think need higher or lower frequency (come more or less often)?
- Which routes do you think need to start earlier or end later?
- Which routes do you think need to be realigned (changed or modified)?
- Are there two routes you believe should be combined?
- Is there a route you believe should be split in half?
- Are there any areas or places you believe a route should be extended to serve?
- Are there any new areas or places you believe should be served by a new route?
- Are there any service types or routes that should be altered to meet the demands of its riders?
- Are there any routes that you think should be eliminated?
- Are there any bus stops that you think should be eliminated?
- Are there any bus stops that you think should be added?

Participants recommended increasing bus service to Virginia Beach, especially on weekends. Routes 8, 13, 110, and 25 were identified as having the potential to benefit from higher frequency service. Participants recommended that The Tide have later hours during the summer months, as there is higher ridership at that time. These respondents also suggested combining the following pairs of routes: 112 and 119; 26 and 29; and 43 and 44. Conversely, some participants suggested splitting the following into two routes: 1, 14, 20, 41, and 118. They recommended providing new service or stops at universities, Copeland Industrial Park, Lynnhaven, Azalea Garden Road, Fort Monroe, Yankee candle, Baxter Road, and Yorktown.

Phase 1 Summary

Phase 1 of outreach ended the week of May 15, 2017. The 274 service comments received in total were comprehensively reviewed and summarized. Comments were evaluated and incorporated into

the proposed service recommendations where appropriate.

H.2 PHASE 2 OUTREACH

The major goal of the Phase 2 outreach effort was to capture feedback on the proposed local bus service recommendations from key stakeholders, members of the public (both existing and potential riders), and bus operators. Public feedback is a key data point that is used to inform and improve service plans recommended in the final TDP document.

During Phase 2 of Public Outreach, the HRT TDP Chapter 4: Service Expansion Concepts preliminary recommendations were prepared to be shared more broadly with representatives of all jurisdictional partners, the public; and HRT operators and service planning staff.

Due to the considerable number of HRT public involvement programs that were being implemented over the same time period as the Phase 2 of Public Outreach (i.e., HRT Fare Change, Virginia Beach Light Rail Outreach, HRT Peninsula Corridor Study, Naval Station Norfolk Corridor Study, Norfolk Tide Before and After Study), the TDP outreach effort was designed to be implemented in a targeted manner within the HRT service area and to be visible to the public, but not duplicative of other efforts.

Stakeholder Working Group

Individual meetings were held with the six member jurisdictions. The meetings were held the following dates:

- Norfolk – July 25, 2017
- Chesapeake – August 4, 2017
- Portsmouth – July 19, 2017
- Virginia Beach – July 17, 2017
    - City Council Briefing – August 15, 2017
- Newport News – August 9, 2017
- Hampton – August 25, 2017
    - City Council Briefing – September 13, 2017

At each of these meetings the preliminary recommendations were presented and comments were recorded. **Section F.5: Phase 2 Jurisdictional Feedback** contains a detailed log of comments and responses by the service planning team.

Operator Open House

A second round of Operator Open Houses were held on **October 9, 2017**. The goal of the Operator Open House was to ensure that the local bus service recommendations included in the TDP were operationally feasible, and to obtain general feedback from the HRT operational staff.

Operators provided comments through the survey and are included in the online survey summary (**Section F.6: Online Survey Responses**).

Pop-Up Events and Postcard Distribution Events

Six pop up events were conducted by HRT Planning, Marketing, and Community Relations staff during the weeks of **September 11 and September 17, 2017**, to engage the public on the preliminary recommendations associated with the TDP and promote upcoming community workshops,

These events included a jurisdictional transit

network map, promotional postcard, route booklets with details of service recommendations across the network, digital surveys, and program giveaways. Scheduled locations and postcard distribution levels are displayed in **Table H-2** for the popup events.

Table H-2 | Popup Event Locations, September 2017

City	Location	Date	Postcards Distributed
Portsmouth	County & Court Transit Hub	September 13, 2017	200
Norfolk	Downtown Norfolk Transit Center	September 14, 2017	250
Hampton	Hampton Transit Center	September 13, 2017	200
Chesapeake	Robert Hall Transit Hub	September 14, 2017	75
Newport News	Newport News Transit Center	September 19, 2017	250
Virginia Beach	Tidewater Community College	September 20, 2017	100
		Total	**1075**

Promotional collateral were dropped off at key civic and business locations (**Table H-3**). In addition, the members of the Stakeholder Working Group (which was convened in the first phase of the the overall outreach effort) were encouraged to distribute postcards at community events in the region, as well as the digital survey link.

Table H-3 | Collateral Drop-Off Locations, September 2017

City	Activity Center	Delivered
Newport News	Christopher Newport University	25
	Canon	25
Virginia Beach	Bryant & Stratton College	25
	Meyera E. Oberndorf Central Library	50
Chesapeake	Chesapeake Public Library	50
	Tidewater Community College	50
Hampton	Hampton University	50
Norfolk	TRAFFIX - Naval Station Norfolk	50
	Kroc Center	25
	Norfolk State University	25
	Old Dominion University	25
	Slover Library	25
	Salvation Army (Hope Village)	25
Portsmouth	Tidewater Community College	25
	Portsmouth Public Library	50
	Total	**525**

Online Engagement

During Phase 2, the public could learn about the preliminary recommendations and engage the project team through the following platforms:

- **Gohrt.com:** From August 24th through October 15th, the website experienced a total of 957 pageviews, with most visitors from Norfolk (29 percent) and Virginia Beach (23 percent). The average viewer remained on the page for 1 minutes and 46 seconds. Pageviews peaked in September 2017.
- **Social Media:** HRT's Facebook posts reached 1,047 people, garnering 36 likes, and three shares. HRT's September 18th post had the highest interaction level, reaching 782 people, received nine likes, and three shares.

Online Survey

A digital online survey tool was developed to solicit feedback from the public on the HRT TDP's draft recommendations for local bus service. The survey requested respondents identify the bus route they wanted to comment on, their level of agreement with the proposed change (if any) on a Likert scale, and gave them the opportunity to submit any additional comments related to the route. In addition, participants had the option of providing demographic information in addition to their feedback to ensure Title VI compliance and improve the quality of the public engagement datasets.

The survey instrument was embedded in the HRT TDP project website and printed for use at the pop up and workshop events held in the Fall of 2017. The survey website was cited in a URL link on all marketing material used on board transit vehicles and at each outreach events, including the project postcard. Digital tablets were also made available at public events so that outreach event participants could use the survey instrument while interacting with HRT staff. If a member of the public was unable to participate in the outreach events or was unable to comment their feedback at an outreach event, they were encouraged to visit the project's web address so that they can submit feedback online between **August 25, 2017 - September 30, 2017**.

Figure H-10 | Survey Postcard

A total of 75 public and operator comments were captured through the Phase 2 survey effort. Eighty-four percent of the comments were submitted via a written comment form, with only 12 comments submitted online. The majority of survey responses were generated during the pop-up events.

Twenty-five individual route recommendations were commented on. **Table H-4** details general sentiments reported by respondents about recommendations. Approximately, 94 percent of respondents agreed or strongly agreed with the presented recommendations. Routes 20 and 114 received the most comments, with 9 and 7 comments received, respectively. Routes 11, 102 and 112 each received one disagreeing response. **Section F.6: Online Survey Responses** provides a summary of the survey responses.

Table H-4 | Summary of Survey Responses

Route	Attitude/Feeling Toward Recommendation					Total Comments
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
1	---	---	---	2	4	6
2	---	---	---	1	1	2
3	---	---	---	2	---	2
4	---	---	---	2	---	2
6	---	---	---	1	1	2
8	---	---	1	2	3	6
9	---	---	---	2	---	2
11	---	1	---	1	1	3
13	---	---	---	1	3	4
20	---	---	---	4	5	9
21	---	---	---	1	---	1
43	---	---	---	---	1	1
45	---	---	---	1	1	2
50	---	---	---	---	1	1
64	---	---	---	---	1	1
101	---	---	---	1	2	3
102	---	1	---	1	---	2
103	---	---	---	---	1	1
105	---	---	---	1	---	1
112	---	1	---	1	1	3
114	---	---	---	3	4	7
115	---	---	---	---	1	1
118	---	---	---	---	1	1
120	---	---	---	---	1	1
961	---	---	---	1	1	2
Percent of Total Responses	**0%**	**5%**	**2%**	**42%**	**52%**	

Public Workshops

Two workshops were held during the week of **September 17, 2017**. These events contained information regarding the overall HRT TDP program, results of Phase 1 of the public outreach effort, the service recommendations, and the print survey on the proposed recommendations. The locations were all selected to be transit accessible community sites and were promoted through the pop-up events at transit centers and major activity centers (**Table H-5**).

Table H-5 | Public Workshop Locations, September 2017

Location	Date/Time	Attendees
HRT Facility – 3400 Victoria Boulevard, Hampton	Thursday, September 21, 6:00– 8:00 pm	1
HRT Facility – 509 E. 18th Street, Norfolk	Saturday, September 23, 1:00– 3:00 pm	7

Although the turnout at community workshops was not a significant as the pop up events and operator inputs to the overall feedback dataset, the options were made available for transit dependent populations that wished discuss the TDP effort with an HRT staff member. The feedback collected at the event was used to support the finalization of the TDP document.

6.3.1 Phase 2 Summary

The draft TDP recommendations will be finalized based on the input received from Phase 2 Public Outreach.

H.3 OUTREACH SCHEDULE

Phase I Outreach Schedule

TASK	Product Development	6-Feb	13-Feb	20-Feb	27-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	17-Apr	24-Apr	1-May	8-May	15-May	22-May	29-May
Management	Project Team Meeting																	
	Marketing Team Meetings																	
Stakeholder Meetings	Stakeholders Working Group (SWG)	*										*						
	TRAC/ PAC Meetings																	
	E-Blast																	
	Website																	
	Social Media																	
	Collateral and Giveaways																	
Public Involvement	Operator Inreach																	
	Focus Groups						*											
	Postcard Distribution Events																	
Data Collection and Reporting	Focus Group Survey																	
	Outreach Report (Phase One)																	
	Project Development																	
*	E-Blast Invite for Stakeholder/Focus Group Meetings																	
	Implementation																	

Phase II Outreach Schedule

TASK	Product Development	20-Aug	27-Aug	3-Sep	10-Sep	17-Sep	24-Sep	1-Oct	8-Oct	15-Oct	22-Oct	29-Oct	6-Nov
Management	Project Team Meeting												
	Marketing Team Meetings												
Stakeholder Meetings	Stakeholders Working Group (SWG)								*				
	TRAC/ PAC Meetings										*		
	HRT Board Meeting								*				
	E-Blast												
	Website												
	Social Media												
	Collateral and Giveaways												
Public Involvement	Route Sheet Booklet												
	Outreach Boards												
	Jurisdictional Maps												
	Pop Up Events (including Informational Boards and Route Proposals)												
	Interactive Public Workshops												
	Operator Inreach					*							
	Collateral Drop Offs												
Data Collection and Reporting	Outreach Survey												
	Online Outreach Period												
	Outreach Reports (Program Overview and Complete Project Report)												
	Project Development												
*	E-Blast Invite for Stakeholder												
	Implementation												
	Project Delays												

H.4 PHASE 1 FOCUS GROUP MINUTES

Meeting #1

Date: April 28, 2017
Time: 10:30AM-12:00PM
Location: HRT 509 East 18th Street, Norfolk, VA
Theme: Disability Rights, Faith Base and Social Service Organizations

Attendees

- Kimberly A. Hylton,
- Laura Liane
- Bernard M. Cannady,
- Paul Atkinson, Jr.,
- Gary Dubour
- Mark Gedudig-Yatrosky
- Graylin Saint-Louis

Minutes

Welcome

The project team provided an overview of the Transit Development Plan

Members of the group made the following comments or questions throughout the focus group, which were addressed by the project team.

- Paul Atkinson Jr. asked about the purpose of the survey and the overall goal of the TDP effort. Was it, for instance, to increase ridership?
- Bernard M. Cannady asked the project team to define urban planning for the focus group.
- Mark Gedudig-Yatrosky suggested changing the frequency of services, and not just for those commuting to work.
- Paul Atkingson, Jr. asked HRT to consider expanding the paratransit service area beyond a ¾ mile radius around fixed route services.
- Participants noted that Route 14 in Portsmouth continues to need improvements.

Digital Voting

The project team described the Transit Development Plan and solicited feedback via a digital voting mechanism.

Question 1: Where do you commute for work, recreation, medical or other trips?
Response 1:

- Virginia Beach
- Portsmouth
  - What service are you using to go to beach? Is it the Wave service? Route 25
  - How are people getting to Norfolk? Tunnel from Portsmouth, Bus 45 and Bus 15
  - Portsmouth what service are you using? Bus 45, 57, 44

Question 2: What zip code do you reside in?
Response 2:

- 23508
- 23504
- 23509
- Project team notes that these zip codes and others are representative of the region

Question 3: What modes of service do you use throughout the week?
Responses 3:

- 63% are bus users, and one is a paratransit user
- No cross section of bus users using paratransit
- Another participant does not use HRT service, and instead drives for convenience and reliability.

Question 4: How often do you use bus service?
Response 4:

- Daily
- Weekly
- Monthly - Majority of voters use monthly
- Others bicycle, walk, use ride hailing apps (Uber) or carpool with neighbors

Question 5: What routes should have a higher or lower frequency?
Response 5:

- 1 (increase service between Duffys Lane and Joint Expeditionary Base)
- 6 (increase all day service)
- 7 (increase peak service)
- 13 (increase all day service)
- 14 (increase all day service)
- 20 (increase mid-day service)
- 57 (increase all day service)
- 106 (increase peak service)
- 112 (increase peak service)
- Paratransit (increase service)

Question 6: What routes should start earlier or end later?
Response 6:

- 57 (evening service) 58 and 41 (evening service), 20 (morning and evening),25 (weekends), 22, 12 (earlier service) ,13 & 14 (evening) and 45 (evening service)

Question 6: What routes should be realigned?
Response 6:

- 1 & 20: Should be shortened or combined with other routes.
- 41: Should be shorted in the Cavalier Manor community and focus on George Washington highway,
- 55: Should serve Woodlake, which doesn't have any bus stops.

Question 7: What routes should be split in half?
Response 7:

- 1, 20, 106 on 6th Ave/Ivy. and J. Clyde and 41

Question 8: Are there any areas that a route should be extended to?
Response 8:

- 14 (closer to Walmart)
- 120 and 961 also need extensions

Question 9: Are there any locations that need bus stops?
Response 9:

- Churchland north of High Street
- Truxton
- VA Hospital
- Yorktown Kroger area
- Robert Hall
- VA Beach
- Military Highway
- Every middle school and high school

Question 10: Are there any routes that should be altered to meet the demand of its riders?
Response 10:

- Warwick Blvd. routes
- Churchland service, circulator needs
- Improved service from Northside of Peninsula to downtown
- Route 12 Norfolk into VA Beach should be shortened

Question 11: Are there any stops that need to be added?
Response 11:

- Safety concerns at some stops

Questions 12: How often do you, a client or a relative use paratransit?
Response 12:

- 44% of participants use paratransit service to some extent
- Participants report typically waiting 30 minutes for service
- Participants suggest:
    - Reexamining seasonal changes to existing levels of service
    - Empowering the community on how to use the service(s) as well
    - Ensuring bus service works for underserved populations

Closing

The project team explained next steps in public outreach.

Meeting #2

Date: April 30, 2017
Time: 2:00PM-3:30PM
Location: Northampton Public Library, Hampton, VA
Theme: Tourism and Regional Collaborators

Attendees

- Antoinette White (HRT)
- Brian Chenault (HRT)
- Marie Arnt (HRT)
- Richard Arnt (Newport News Shipyard Retiree)

Minutes

Digital Voting

Those in attendance were asked to provide feedback on the following:

Question 1: What routes do you think need higher or lower frequency?

Response 1: Routes 106, 107, 112, 114 should have an increase in frequency. No comments were made on decreasing the frequency on any routes.

Question 2: What route do you think need to be realigned?
Response 2: Routes 114 (streamline the route. Remove service along LaSalle Avenue, Doolittle Road, Seldondale and Armistead Avenue.

- Route 57 – Remove service through Camelot. Route 9 – Remove service along Philpotts Road, Tidewater Drive and Widgeon Road.
- Route 12 – remove service along Military Highway, Auburn Drive and Providence Road.
- Route 15 – remove service along Azalea Garden and Robinhood Roads.
- Route 107 should no longer service Nettles, Old Oyster Point Road or Riverside Convalescent and Patrick Henry Mall should be the end of the line for Route 107. Fixed (local) routes should not service the Military Bases.
- Route 119 should be realigned to provide service from Riverside Hospital to Fishing Point (City Center) to Patrick Henry Mall to Riverside Convalescent.
- Route 1 should terminate at Shore Drive/Pleasure House. Route 36 should be realigned to provide service between Shore Drive/Pleasure House and TCC (VB campus).
- Route 26 should be realigned to provide service from TCC (VB campus) to Pembroke East via Rosemont Rd. to Bonney Rd. to Constitution Drive.
- Route 29 should be realigned to provide service from Pleasure House Road to TCC

(VB campus) via Shore Drive to Great Neck Road to First Colonial Road to Virginia Beach Boulevard to Lynnhaven Parkway (service Lynnhaven Mall) to Rosemont Road to Buckner to TCC.

- Route 33 should only provide service between TCC (VB campus) and Arctic/19th Street. Eliminate service between Arctic/19th Street and Atlantic/68th Street.
- If Route 43 is kept. The route should be extended from Bart Street to Victory Crossing via Airline Boulevard then service Airline and Quailshire via Airline Boulevard.
- Route 55 should cover more territory.
- Route 18 should be extended to operate beyond Ballentine Boulevard and Hanbury to Little Creek/Shore Drive (Joint Exp. Base Little Creek) via Ballentine Boulevard to Chesapeake Boulevard to Norview Avenue to Azalea Garden Road to Little Creek Road to JEB (outside of Gate 1- If the route is not eliminated.)

Question 3: Are there two routes you believe should be combined?
Response 3: Routes 102 & 117

Question 4: Is there a route you believe should be split in half?
Response 4: Route 1 at Shore Drive/Pleasure House. Route 57 at Victory Crossing.

Question 5: What routes do you think need to start earlier or end later?
Response 5: Route 55 and 57 should have later service.

Question 6: Are there any areas or places you believe should have service?
Response 6: Bonney Road between Rosemont Road and Constitution Drive, Rosemont Road between Holland Road and Bonney Road, Lynnhaven Parkway between Indian River Road and Volvo Parkway, the Witchduck/Kempsville corridors, Salem Road area of Virginia Beach, S. Independence between Holland Road and Salem Road

Question 7: Are there any routes that you think should be eliminated?
Response 7: Routes 11, 18, 43, 121, 918, 965

Question 8: Are there any bus stops that you think should be eliminated?
Response 8: No responses were given.

Question 9: Are there any bus stops that you think should be added?
Response 9: No responses were given.

Michael Weinberger ended the meeting at 3:25 pm but HRT staff and Mr. Arnt continued to discuss other needed changes. Those changes are noted in the meeting minutes.

Meeting #3

Date: May 4, 2017
Time: 1:00pm – 2:30pm
Location: HRT 509 East 18th St, Norfolk, VA
Theme: Multimodal

Attendees

- Antoinette White (HRT)
- Bill Douglas (Rider)
- Brian Chenault (HRT)
- Carl Jackson (VDOT)
- Dana Ali (Rider)
- Deborah Ward (Rider)
- Doren Douglas (Rider)
- Ernestine Jenkins (Bus Operator)
- Garland St. Louis (Rider)

- Jeff Deal (HRT)
- Jamie Battle (TRAC Chair)
- Kim Darden (HRT)
- Marie Arnt (HRT)
- Roberta Brown (HRT)
- Stephanie Salzone (HRT)

Minutes

Welcome

Michael Weinberger began the meeting by welcoming the group. Introductions were next then Michael asked if the participants utilize HRT services. Most participants use HRT services. Some use local bus, MAX, rail, ferry and some use bus and drive at times.

Most participants use the service at least five days per week. Some stated that they use the service daily and some monthly.

Michael explained that two focus groups had taken place previously and those focus groups were the Disability Rights, Faith Base and Social Service Organizations and Tourism and Regional Collaborators. Mr. Weinberger began the presentation with a discussion on the project overview, goals and objectives, fixed route service, public involvement, ridership, on-time performance and service planning concepts.

Digital Voting

Those in attendance were asked to provide feedback on the following through digital voting.

Question 1: What zip code do you live in?
Response 1:

- 9% live in 23324
- 9% live in 23509
- 18% live in 23320
- 18% live in 23703
- 45% other

Question 2: How do you commute to work?

Response 2: 50% drive alone and 50% use local bus service.

Question 3: If you use bus service how often do you ride?

Responses 3:

- 8% Everyday
- 12% Weekly
- 17% Never
- 25% Monthly
- Five Days a Week 33%

Question 4: What routes should have a higher or lower frequency?
Response 4: 6, 8, 11, 12, 14, 15, 20, 23, 33, 36, 41, 47, 55, 57, 112, 117, 118 & 961. Dana Ali stated that Route 44 should have 15-minute service all day. Carl Jackson mentioned that Route 44 should operate daily (add Sunday service) and connect to light rail. Mr. Douglas stated that the City of Chesapeake and Portsmouth should increase their transit budget.

Question 5: What routes should start earlier or end later?
Response 5: 5, 14, 12, 26, 29, 41, 44, 47, 55, 57, 102, 117, 918, 922 and 967. Mr. Jackson stated that Route 967 should operate during the mid-day not just during peak periods. One participant stated that Route 14 should operate beyond 7:00 pm for students attending Tidewater Community College in Chesapeake. Service should be available for night classes. Route 55 should operate later than 8:00 pm.

Question 6: What routes should be realigned?
Response 6: 3, 5, 9, 11, 14, 15, 18, 20, 23, 26, 27, 33, 41, 44, 55, 57, 106, 109, 110, 112, 114, 120, 918 & 922. Mr. St. Louis stated that Route 41 should no longer service Cavalier Manor. Service along Route 41 should be streamlined. He also mentioned that service through Camelot should

be removed and Route 57 should provide service to the Camelot neighborhood via George Washington Highway.
A participant via webinar stated that all operations should be moved from Evelyn T. Butts Transit Location to Wards Corner Transit Center. He also mentioned that parking should be available at Wards Corner for commuters. Commuters are currently parking at the surrounding shopping centers.

Question 7: What two routes should be combined?
Response 7:

- Routes 1 & 21
- Routes 1 & 36
- Routes 4 & 11
- Routes 23 & 27
- Routes 26 & 29
- Routes 44 & 45
- Routes 43 & 57
- Routes 101 & 103
- Routes 102 & 120
- Routes 106 & 107

Question 8: Are there any areas that a route should be extended to?
Response 8:

- Route 961 should be extended to Patrick Henry Mall. Limited stop service is needed to connect Chesapeake, Portsmouth and Newport News. Ms. Ward stated that a route should be created to help Route 20. Route 28 should never have been eliminated. Route 20 is too long and it's always crowded.
- Route 20 and 29 does not have appropriate time transfer connections at Hilltop (First Colonial Road and Laskin Road).
- Ms. Douglas stated that Route 55 should be extended to service Woodlake Drive between Greenbrier Parkway and Battlefield Boulevard.

Question 9: Are there any routes that should be eliminated?
Response 9: 5, 11, 18 & 119

Question 10: Are there any locations that need bus stops?
Response 10:

- Battlefield & Debraun
- Atlantic & Strawberry Lane
- New Norfolk Premium Outlet Mall
- Norfolk Airport
- Edinburgh & Airline Boulevard
- Rosemond & Witchduck Road
- Poindexter and Liberty
- Battlefield and Kempsville
- Along Virginia Beach Boulevard

Question 11: Is there a route that should be split in half?
Response 11: Route 1

Additional Notes
Ms. Ward was not happy with the focus group survey outcome (200 completed). She felt that the postcard distribution should have been conducted at all schools and other locations for a higher/better result.

H.5 PHASE 2 JURISDICTIONAL FEEDBACK

The following sections summarize comments made by the six member jurisdictions planning staff on the preliminary recommendations. It includes a detailed response to each comment

and a description of how these comments were incorporated into the final TDP service plan.

Virginia Beach

Comment: Is there demand for service along Birdneck Road in Virginia Beach between General Booth and Virginia Beach Boulevard?

Response: Yes. Route 33 was re-aligned to serve this area.

Comment: Show service from Arctic Avenue/19th Street to 68th Street/Atlantic Avenue as an alternative via Route 33.

Response: Route 33 was extended back up to 68th Street as it does now.

Comment: Route 35 should be extended to Atlantic Avenue/2nd. Remove the deviation to Arctic/19th Street. Service should operate between Atlantic/2nd & Pleasure House/Shore Drive.

Response: Extended Route 35 to Pleasure House/Shore Drive. Continued to service Artic/19th Street because it provides connections to other routes.

Comment: Sunday service should be included in the plan.

Response: Added additional Sunday service where there were gaps in Sunday service throughout the service area.

Comment: Include service span improvements if needed.

Response: Added additional evening service where there were gaps in evening service throughout the service area.

Comment: Should Route 38 operate as two different routes? Should the City of Chesapeake decide not to share in the funding of Route 38, where would the route end within the city limits of Virginia Beach?

Response: There is no good turnaround point within the Virginia Beach boundaries and Greenbrier Mall is an important trip generator on this route.

Portsmouth

Comment: Route 57 should provide service to Airline and Bart Street to service the existing stop at Walmart then terminate at High & Florida Avenue.

Response: Made this change.

Comment: Service to Afton Parkway (Craddock) should be considered as an alternative

Response: Bus Stop level ridership does not justify continuing to service this area.

Comment: Maintain service to Cavalier Manor or provide service closer to the Cavalier Manor neighborhood.

Response: Extended Route 57 to continue servicing this area.

Comment: Sunday service should be included in the plan.

Response: Added additional Sunday service where there were gaps in Sunday service throughout the service area.

Comment: Include service span improvements if needed.

Response: Added additional evening service where there were gaps in evening service throughout the service area.

Comment: Norfolk Naval Shipyard wants additional transit service. The installation is losing approximately 2,000 parking spaces as they add new facilities

Response: Route 41 will service the Naval Shipyard with increased service levels.

Comment: Need to promote park and ride service for MAX routes in Portsmouth.

Comment: Is there demand to provide service along South Street between Elm Street and Columbus Avenue. If not, please provide an explanation.

Response: The ridership didn't justify making this change.

Norfolk

Comment: Route 971 – Bypass Wards Corner and provide service between Evelyn T. Butts, HTC, NNTC and North Yard.

Response: Serving Wards Corner allows this route to interline with Route 961 and to create a high frequency route between the Hampton Transit Center and Wards Corner using fewer resources.

Comment: Route 23 – Show service extended along Northampton Boulevard to the new IKEA site.

Response: Made this change.

Comment: Provide the cost for making changes to the base network without frequency improvements

Response: This will be part of the implementation plan.

Comment: Provide the cost for making changes to the base network and frequency improvements

Response: This will be part of the implementation plan.

Comment: Provide the cost for making changes to the base network and frequency improvements and High Frequency Network

Response: This will be part of the implementation plan.

Comment: A park and ride lot should be developed near Evelyn Butts transfer center. HRT should also work with VDOT to develop a park and ride lot near Wards Corner or Evelyn Butts to provide MAX service to the Peninsula to help with traffic mitigation during HRBT construction

Response: This will be considered in the Capital Improvement Plan.

Chesapeake

Comment: bus operations will be relocated from the current transfer location at 20th & Seaboard Avenue to Liberty Street. All recommendations should be updated to reflect the change.

Response: This change was reflected in the recommendations.

Comment: A meeting will be scheduled with mall management to see if permission will be granted by management to move all operations from Robert Hall to Greenbrier Mall. The City will also look at purchasing land at Robert Hall to construct a transfer facility or create a on street linear line-up near Greenbrier Mall

Comment: Is there demand for service along Dominion Boulevard.

Response: Evaluated this, based on the land uses this area does not justify its own route.

Comment: Modify Route 58 to operate from Bainbridge to Libertyville to Great Bridge Boulevard. Service along Mullens to Mains Creek should be eliminated. A left turn from Mains Creek to Great Bridge Boulevard is no longer permitted.

Response: This change was reflected in the recommendations.

Comment: Modify Route 6 to provide service to the Municipal Center via Albemarle Drive from Battlefield Boulevard.

Response: This change was reflected in the recommendations.

Newport News

Comment: Revise the routing on Route 105. Extend service along 16th Street to Jefferson Avenue to 6th Street to Ivy.

Response: This change was reflected in the recommendations.

Comment: Route 116 should pick up the entire alignment loss by Route 119 to include service along Thimble Shoals, Omni Way, Canon Boulevard, Rock Landing and Blue Crab.

Response: This change was reflected in the recommendations.

Comment: Huntington Pointe should be served (new development in Newport News)

Response: This development isn't expected to be operational until after the timeframe of the TDP. This should be considered in future updates.

H.6 ONLINE SURVEY RESPONSES

The table below summarizes the comments received through the survey and how they were addressed in the finalized recommendations.

Table H-6 | Survey Response Summary

Route	Summarized Comments	Response
1	Riding three buses to Pembroke is tedious.	No change to the recommendation. This impacts a limited number of passengers.
4	Need an earlier morning trip, and need hourly service instead of 70-minute service.	The route data doesn't support the addition of an earlier trip. Hourly service will be provided.
5/8	Cover the Evelyn-Duffy's leg by the Route 8.	No change to the recommendation. This segment had low productivity.
6	City of Chesapeake would like to maintain direct service to the Municipal Center	Route 6 will continue serving this.
9	Need Sunday Service	No change to the recommendation. Route 9 is covered by other routes with Sunday Service, except on Sewell's Point Road.
11	Needs weekend service	No change to the recommendation. This route does not justify it.

Route	Summarized Comments	Response
13	Provide 30-minute service until 11:00 pm	No change to the recommendation. Has 60-minute service and the demands justifies that.
15	No matter how much I don't like the deviation via Robin Hood and Azalea Garden, I feel it should be maintained due to the high number of apartments there.	No change to the recommendation. The removal of this deviation only affects 5 percent of the ridership, and 1/3 of those people are within walking distance of the proposed route alignment.
18	Large vehicles are NOT allowed on Azalea Garden. Do not add service along Azalea Garden Road between Norview Avenue and Little Creek Road via proposed Route 18.	No change to the recommendation.
22	Route 22 ridership has been steady for the past several years and has a solid ridership base. Consider modifying but not cutting out Newtown Road/Haygood portion of Route 22 that connects major community and educational resources and household densities. Not cutting out this segment of Route 22 is critically important.	No change to the recommendation. We covered the most productive parts with other routes.
24	Should the City of Chesapeake decide not to share in the funding of Route 24, where could the route end within the city limits of Virginia Beach?	Greenbrier Mall will be a major trip generator on this route and the connection should be maintained.
28	Bring back bus 28, runs on Monday - Saturday	This previously discontinued route is covered with increased service on Route 20
29	What about Great Neck Road and the retail area that's along that as well as the hospital?	No change to the recommendation. Great Neck Road is still served, as well as the hospital on First Colonial Road.
36	What route has service to Pembroke via Holland Road and service to Silverleaf	Route 36 serves this.
38	Should the City of Chesapeake decide not to share in the funding of Route 38, where could the route end within the city limits of Virginia Beach?	Greenbrier Mall will be a major trip generator on this route and the connection should be maintained.
43	Much needed route for transit dependent, would like to see longer hours and on Sunday	No change to the recommendation. This route was eliminated, for the most part covered by Route 47 which has Sunday service.
44	Continue to light rail station. Runs on Sundays	Extended the route to the Downtown Norfolk Transit Center and added Sunday service.

Route	Summarized Comments	Response
47	Run 30-minutes to lakeview & College drive on Monday-Friday and 60-minutes on Saturday	Added this increased level of service.
50	Much needed route for transit dependent, would like to see longer hours and on Sunday	Added Sunday service.
58	Needs to serve the human services on Campostella	No change to the recommendation. The proposed route does serve.
64	Don't convert to a MAX service.	Route won't be converted to Max service.
102	Don't change because a lot of people need it to ride the bus out there to get to the Community Service Board programs	No change to the recommendation. This area is within a 1/4 mile of the proposed Route 118.
106	If you can increase a late at night time from Fort Eustis to downtown Newport news to include after midnight. It would be much appreciated	No change to the recommendation. It is already running after midnight.
112	Limited bus. Eliminate fishing point and NetCenter, needs to start going back to Riverside Hospital	No change to the recommendation. Both Fishing Point and Net Center have significant ridership, Route 116 serves Riverside
114	Can the route run earlier for shipyard workers to get to the Hampton Transit Center	Earlier trip will be added.
117	Would like to see the 117 run every half hour, instead of every hour, to meet the needs of veterans going to the veteran's affairs medical center	No change to the recommendation. Does not justify 30-minute service and is being replaced by the Route 115.
118	Need 30-minutes service during rush hours	No change to the recommendation. Demand does not justify 30-minute service during both peak hour periods.
121	Don't convert to a MAX service.	Route won't be converted to Max service.
967	Runs all day long includes Saturday	No change to the recommendation. Current ridership does not justify it
970	Should the route operate bi-directional service to take passengers from Portsmouth to Newport News/Shipyard and bring passengers from Newport News to Portsmouth to access Norfolk Naval Shipyard?	Will add four additional trips a day
	Would be great if included MAX routes between Portsmouth and Virginia Beach.	No change to the recommendation.

(Page Intentionally Left Blank)

HAMPTON ROADS TRANSIT

gohrt.com