Blacksburg Transit Development Plan FY2019 – FY2028

Final Report

Blacksburg TRANSIT

September 2018

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Executive Summary

Introduction

The Blacksburg Transit Development Plan provides a vision for the transit agency to meet demand over the next ten years. The plan consists of the following chapters:

- Chapter 1: Transit System Overview
- Chapter 2: Goals, Objectives, and Service Design Standards
- Chapter 3: Service and System Evaluation
- Chapter 4: Service and Capital Improvement Plan
- Chapter 5: Implementation Plan
- Chapter 6: Financial Plan

The focus of this plan was to meet the growing demand found in the towns of Blacksburg and Christiansburg, identify ways to responsibly expand BT's service area to areas with high demand, and to recommend improvements that would provide better regional connections across Montgomery County, Radford, and Pulaski County.

Gap Analysis

In addition to an overview of the current BT network and update to the agency's goals and service standards, one of the main components of this plan is the identification of "gaps" in the current transit network. These "gaps" include areas with high transit demand that do not have service or do not have the right amount of service, connections that are prevalent in the region's travel patterns that cannot be made using transit, and inadequate service levels (frequencies and hours of operation, or span) on existing routes that result in overcrowding or underutilized services. The gaps found in the BT network are summarized in the following table:

Gaps in Transit Coverage, Connections, and Service Levels

Gap Type	Service	Period	Location
Coverage	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor in northeast Blacksburg
	Full & Reduced	All-Day	Glade Road corridor in northwest Blacksburg
	Full & Reduced	All-Day	Eastern Blacksburg neighborhoods, including the Clay Street corridor and Alleghany neighborhood
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road, Peppers Ferry Road west of NRV Mall)
	Full & Reduced	All-Day, Long Term	Prices Fork Road west of elementary school
Connection	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor to Virginia Tech
	Full & Reduced	All-Day	Clay Street corridor and Alleghany neighborhood to Virginia Tech

Gap Type	Service	Period	Location
	Full & Reduced	All-Day	Glade Road corridor to Virginia Tech
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road) to Virginia Tech
	Full & Reduced	All-Day, Long Term	Belview to Virginia Tech
	Full & Reduced	Peak Period, Long Term	Riner to Christiansburg or Virginia Tech
	Full & Reduced	All-Day, Long Term	Northern Blacksburg neighborhoods (Shenandoah to McBryde and Hethwood)
	Full	All-Day, Long Term	Satellite lots (particularly on west and south sides of VT campus) to Drillfield Area
	Full & Reduced	All-Day, Long Term	Blacksburg/Christiansburg to proposed Amtrak station
Service Level	Full	All-Day	Prices Fork Road and Hethwood neighborhood – increased frequency
	Full	All-Day	Toms Creek Road – increased frequency
	Full	All-Day	Progress Street – increased frequency
	Full	All-Day	Patrick Henry Drive – increased frequency

Service and Capital Improvements

The service and capital improvements developed for this plan include service changes and new services to fill the "gaps" identified in the Gap Analysis, service changes to ensure that all BT routes meet the service standards outlined in the plan, service changes and new services to improve regional transit connectivity, and the capital investments needed to support these service recommendations and ensure that BT maintains a state of good repair on all of its capital assets. The following two tables summarize the service recommendations included in the plan, which are also illustrated in the following figure for BT's Full Service schedule.

Summary of Proposed Improvements by Route

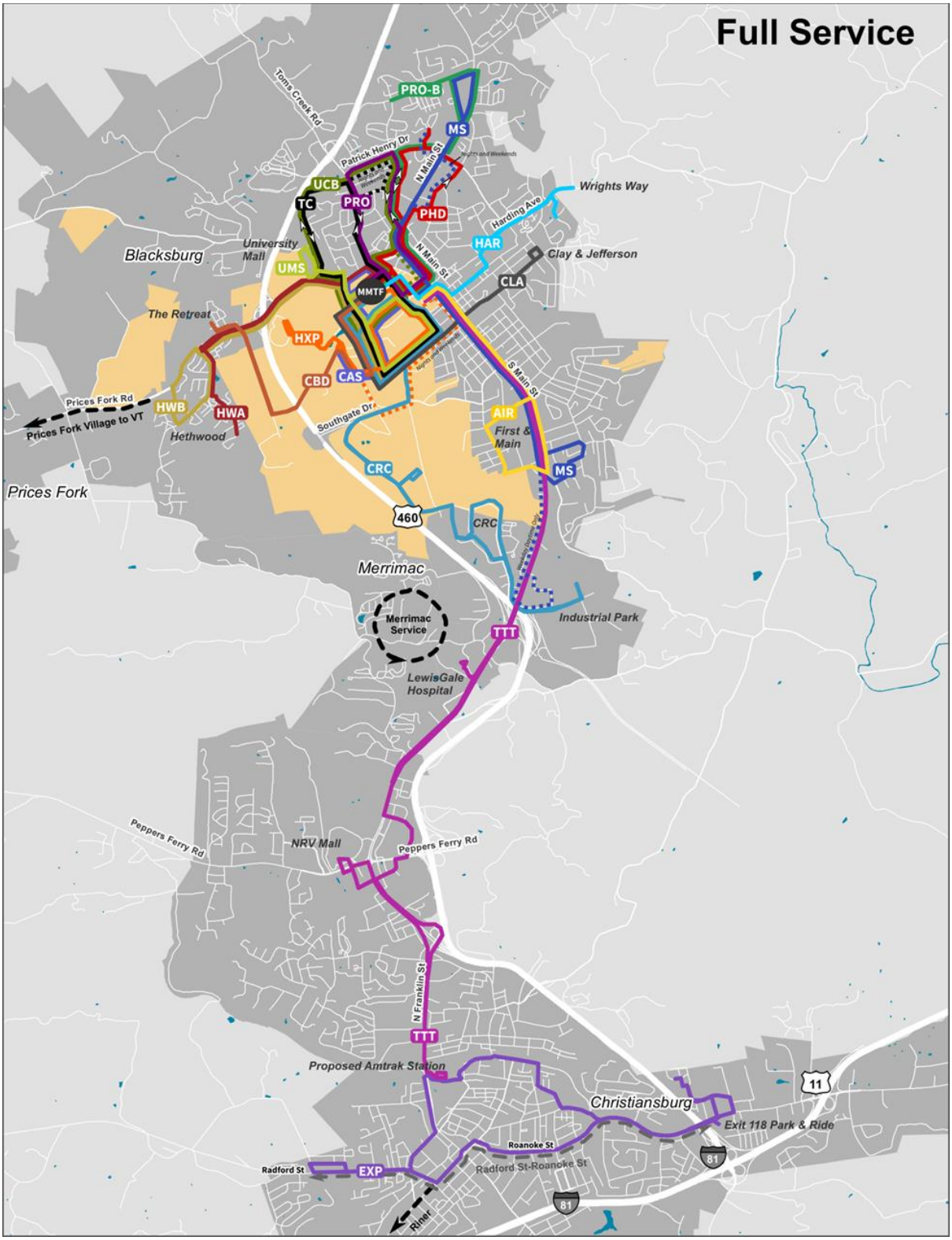
Route	Proposed Improvement	Proposed Timeframe
BT Commuter	Eliminate or restructure service on this route	Short term (1-3 years)
Carpenter Blvd	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted via Plantation Road/Smithfield Road	Mid term (3-10 years)
CRC Shuttle	Full service frequency reduced to 45 minutes after 7:00 PM	Short term (1-3 years)
	All trips serve Industrial Park	Short term (1-3 years)
	Service rerouted to MMTF	Short term (1-3 years)
	Service provided to a new remote parking lot near the airport	Short term (1-3 years)
	Saturday service added year-round	Long term (10 plus years)
Harding Ave	Service extended to Wrights Way	Long term (10 plus years

Route	Proposed Improvement	Proposed Timeframe
	Service rerouted to MMTF	Short term (1-3 years)
Hethwood A	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hethwood B	Service rerouted to MMTF	Short term (1-3 years)
	Full service peak frequency improved to 10 minutes	Short term (1-3 years)
	Service rerouted to Litton Reeves Hall	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hethwood-Harding Combined	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hokie Express	Service rerouted to MMTF and to Kent Street	Short term (1-3 years)
Main Street North	Full service peak frequency improved to 12 minutes	Short term (1-3 years)
Main Street South	Full service peak frequency improved to 12 minutes	Short term (1-3 years)
Patrick Henry	Service rerouted to MMTF	Short term (1-3 years)
Progress Street	Service rerouted to MMTF	Short term (1-3 years)
The Explorer	Extend route along Radford Street to town line	Mid term (3-10 years)
	Timed transfer to Two Town Trolley created at Christiansburg Amtrak Station	Mid term (3-10 years)
	Year-round frequencies improved to 45 minutes	Mid term (3-10 years)
	Service to the planned Amtrak station near Aquatic Center	Mid term (3-10 years)
Toms Creek	Service rerouted to MMTF	Short term (1-3 years)
Two Town Trolley	Service extended to proposed Amtrak station in Christiansburg	Mid term (3-10 years)
	Service will operate in both directions between the NRV Mall, Walmart, and the DMV	Mid term (3-10 years)
	Service will be added to the Target plaza	Mid term (3-10 years)
	Year-round frequencies will be increased to 45 minutes during weekday peak and Saturday service	Mid term (3-10 years)
	Service will be extended until 6:45 PM during reduced service weekends and on full service Sundays	Mid term (3-10 years)
University City Boulevard	Service rerouted to MMTF	Short term (1-3 years)
University Mall Shuttle	Service rerouted to MMTF	Short term (1-3 years)
	Full service spans will begin at 7:00 AM	Short term (1-3 years)
	Full service peak service frequencies will be increased to 10 minutes	Short term (1-3 years)

Summary of Proposed New Routes

New Route	Areas Served	Justification	Time Frame
Progress Street B	Progress Street corridor	Reduces overcrowding on existing Progress Street route	Short term (1 to 3 years)
	Givens Lane corridor	Provides service to a high transit need area	
Airport Acres	Airport Road and Country Club Drive	Provides service to an area with transit need and no existing service	Mid term (3-10 years)
	South Main Street	Supplements existing service to reduce overcrowding on existing service	
Clay Street	Clay Street and Jefferson Street	Provides service to an area with transit need and no existing service	Mid term (3-10 years)
Campus Shuttle	Duckpond Dr, West Campus Dr, Drillfield	Supplements existing service to help with overcrowding	Short term (1 to 3 years)
Merrimac	Merrimac	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Prices Fork	Prices Fork Road corridor	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Riner	Riner to Christiansburg or Blacksburg	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Neighborhood Flex Services (Demand-Response)	Mount Tabor	Provides service to an area with transit need and no existing service	Long term (10 plus years, pilot program)
	Glade Road	Provides service to an area with transit need and no existing service	
	Highland Park	Provides service to an area with transit need and no existing service	
Radford St – Roanoke St	Christiansburg	Provides additional service to a corridor with high transit need	Short term (1 – 3 years)

Blacksburg Transit Recommendations for Full Service

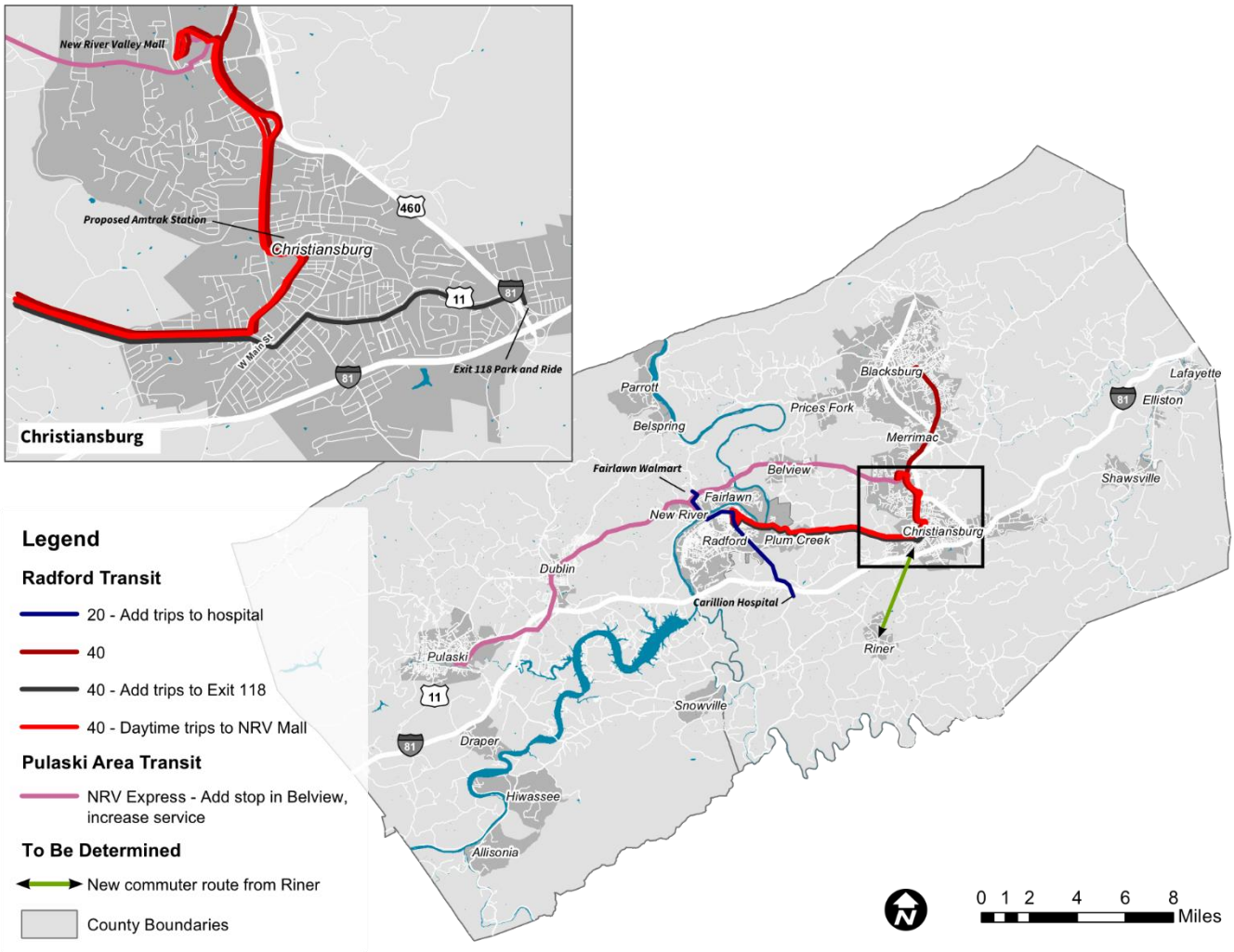


The regional improvements in this plan that integrate BT service with Radford Transit and Pulaski Area Transit service are summarized in the following table and figure. With these recommendations in place, New River Valley residents will be able to travel seamlessly across the region with ease and will be able to reach major regional destinations via transit.

Regional Integration Recommendations Summary

Service	Recommendation	Regional Benefit
RT Route 40	Operate route between Radford University and the NRV Mall between 7:00 am and 2:40 pm, and then between Radford University and Squires after 2:40 pm (current alignment)	All-day service provided between Radford and Christiansburg, with easy transfer to Blacksburg services during morning and midday periods
	Operate select trips to the Exit 118 Park and Ride in Christiansburg	Connection between Radford and regional Park and Ride with Virginia Breeze service
	Add a stop at the proposed Amtrak station in Christiansburg.	Connection between Radford and interstate Amtrak service
RT Route 20	Extend certain trips to Carillion Hospital in Radford	Provide dedicated service to a regional medical center
	Coordinate schedules with PAT NRV Express at the Fairlawn Walmart	Seamless travel between Pulaski, Dublin, Fairlawn, Radford, and the Carillion Hospital
PAT NRV Express	Increase span of service to 10:00 pm on weekdays, and to 6:00 pm on Saturdays	Increased utility of this route for travel between Pulaski, Dublin, Fairlawn, and Christiansburg, including the proposed Amtrak Station
	Increase frequencies incrementally to 90 minutes and then 60 minutes	Increased utility of this route for travel between Pulaski, Dublin, Fairlawn, and Christiansburg
	Coordinate schedules with RT Route 20 at the Fairlawn Walmart	Seamless travel between Pulaski, Dublin, Fairlawn, Radford, and the Carillion Hospital
BT Two Town Trolley	Coordinate schedule with the PAT NRV Express at the NRV Mall	Seamless travel between Pulaski, Dublin, Fairlawn, Christiansburg, and Blacksburg
	Add a stop at the proposed Amtrak station in Christiansburg	Connection between Blacksburg and interstate Amtrak service
BT Explorer	Add a stop at the proposed Amtrak station in Christiansburg	Connection between Christiansburg and interstate Amtrak service
Riner	Operate new year-round peak hour commuter route between Riner and Christiansburg, Blacksburg, or both	Provide commuter service between southern Montgomery County and Christiansburg/Blacksburg

Regional Integration Recommendations Summary



The capital improvements in the plan include the following items:

- The regular replacement of vehicles when they reach the end of their useful life,
- The purchase of new vehicles to supplement service expansion recommendations,
- New bus stops to support service expansion recommendations,
- Upgrades to the existing BT administration, garage, and maintenance facility, and
- Technology, equipment, parts, and maintenance upgrades.

Implementation and Financial Plans

The implementation plan outlines the steps needed to carry out the recommended service and capital improvements and illustrates the difference between providing the baseline service requirements and implementing the service recommendations.

The financial plan provides a planning-level forecast of BT's costs and revenue over the 10-year plan time-frame and is composed of both an operating and capital component.

The operating budget is associated with regularly reoccurring costs such as labor, maintenance, insurance, and administration. These costs are stable over time and are closely tied to the amount of service provided. The operating budget is broken further down by the cost of operating existing service and the cost associated with implementing the plan recommendations. The additional cost associated with the recommendations would require additional funds above BT's current projected funding allocation. Capital costs reflect investments in procurement of replacement or expansion assets such as vehicles, buildings, and IT systems. These figures fluctuate considerably year over year.

As BT relies extensively on grants and contract revenue to support its operating and capital budget, the agency is susceptible to changes in funding and policy at the state and federal level, including:

- Changes or the complete abolishment of the flexible STP program in the next highway bill.
- Major increases in transit service within Virginia (e.g. Silver Line Phase II) that will reduce BT's share of state operating assistance.
- Changes in state capital match rates.
- Changes in the state's method for allocating operating funds.

The operating and capital budget forecasts for this plan are summarized in the following tables.

Operating Budget Forecast (Figures in 1000s)

		Short Term Recommendations				Mid Term Recommendations				
Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating Revenue										
Fare Revenue	$ 174.78	$ 178.28	$ 181.85	$ 185.48	$ 189.19	$ 192.98	$ 196.84	$ 200.77	$ 204.79	$ 208.88
Advertising Revenue	$ 85.00	$ 87.55	$ 90.18	$ 92.88	$ 95.67	$ 98.54	$ 101.49	$ 104.54	$ 107.68	$ 110.91
Contract Services - Virginia Tech	$ 4,223.29	$ 4,441.51	$ 4,663.18	$ 4,841.77	$ 5,049.98	$ 5,270.92	$ 5,447.41	$ 5,629.57	$ 5,817.60	$ 6,011.66
Contract Services - Christianburg	$ 119.81	$ 122.38	$ 128.49	$ 133.41	$ 139.15	$ 134.58	$ 139.09	$ 143.74	$ 148.54	$ 153.50
Ops Revenue Subtotal	$ 4,602.88	$ 4,829.73	$ 5,063.70	$ 5,253.54	$ 5,473.99	$ 5,697.01	$ 5,884.83	$ 6,078.62	$ 6,278.60	$ 6,484.95
Grants										
Federal	$ 1,692.44	$ 1,727.99	$ 1,764.27	$ 1,801.32	$ 1,839.15	$ 1,877.77	$ 1,917.21	$ 1,957.47	$ 1,998.57	$ 2,040.54
State	$ 2,450.89	$ 2,450.89	$ 2,450.89	$ 2,502.36	$ 2,530.81	$ 2,564.48	$ 2,641.41	$ 2,720.65	$ 2,802.27	$ 2,886.34
Grant Revenue Subtotal	$ 4,143.34	$ 4,178.88	$ 4,215.17	$ 4,303.68	$ 4,369.96	$ 4,442.25	$ 4,558.62	$ 4,678.12	$ 4,800.85	$ 4,926.88
Total Revenue	**$ 8,746.22**	**$ 9,008.60**	**$ 9,278.86**	**$ 9,557.23**	**$ 9,843.95**	**$ 10,139.26**	**$ 10,443.44**	**$ 10,756.74**	**$ 11,079.45**	**$ 11,411.83**
Operating Cost										
Existing Service	$ 8,746.22	$ 9,008.60	$ 9,278.86	$ 9,557.23	$ 9,843.95	$ 10,139.26	$ 10,443.44	$ 10,756.74	$ 11,079.45	$ 11,411.83
Net Cost of TDP Recommendations	$ -	$ 233.95	$ 241.22	$ 248.71	$ 256.44	$ 1,006.87	$ 1,037.42	$ 1,068.89	$ 1,101.32	$ 1,134.72
Total Operating Costs	**$ 8,746.22**	**$ 9,242.56**	**$ 9,520.08**	**$ 9,805.94**	**$ 10,100.38**	**$ 11,146.13**	**$ 11,480.86**	**$ 11,825.64**	**$ 12,180.76**	**$ 12,546.55**
Additional Funding Need to Implement TDP	**$ -**	**$ 233.95**	**$ 241.22**	**$ 248.71**	**$ 256.44**	**$ 1,006.87**	**$ 1,037.42**	**$ 1,068.89**	**$ 1,101.32**	**$ 1,134.72**

Capital Budget Forecast (Figures in 1000s)

Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capital Revenue										
Federal (Flex STP)	$ 1,276.10	$ 4,430.52	$ 2,876.37	$ 3,131.21	$ 5,128.30	$ 4,577.32	$ 2,885.65	$ 3,489.52	$ 4,679.08	$ 4,565.70
State	$ 255.22	$ 886.10	$ 575.27	$ 626.24	$ 1,025.66	$ 915.46	$ 577.13	$ 697.90	$ 935.82	$ 913.14
Local	$ 63.80	$ 221.53	$ 143.82	$ 156.56	$ 256.42	$ 228.87	$ 144.28	$ 174.48	$ 233.95	$ 228.28
Total Capital Revenue	$ 1,595.12	$ 5,538.14	$ 3,595.46	$ 3,914.02	$ 6,410.38	$ 5,721.65	$ 3,607.06	$ 4,361.90	$ 5,848.85	$ 5,707.12
Capital Costs	**$ 1,595.12**	**$ 5,538.14**	**$ 3,595.46**	**$ 3,914.02**	**$ 6,410.38**	**$ 5,721.65**	**$ 3,607.06**	**$ 4,361.90**	**$ 5,848.85**	**$ 5,707.12**

1 System Overview

1.1 HISTORY

In 1983, Blacksburg Transit (BT) was established as a department of the Town of Blacksburg. Initially, maintenance facilities were shared with the town's Department of Public Works. The first fixed route services consisted of three local routes with a hub on the Virginia Tech (VT) university campus. After the start of fixed route service, complementary door-to-door demand response service (BT Access) was added for qualified rides within Blacksburg.

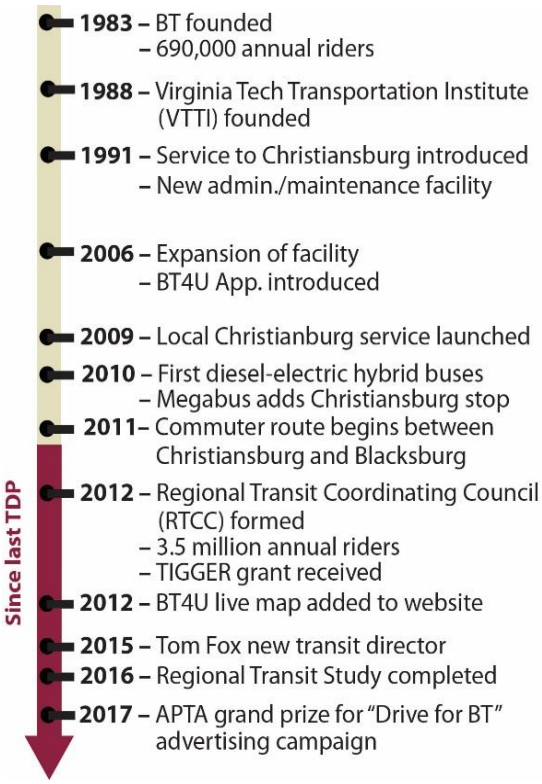
In the mid-1980s service was added to the Montgomery Regional Hospital area, with additional routes added to further connect other parts of town to the VT campus. In 1991, the first service outside of the Blacksburg town limits was introduced, with the Two-Town Trolley route providing fixed-route service between Blacksburg and Christiansburg. Also in 1991 BT moved into a new standalone administrative and maintenance facility. In the mid-1990s, BT received funding to develop an Automated Vehicle Location (AVL) systems on its vehicles. The goal was to provide information for dispatching and reporting, and ultimately to share the information with riders. In 1998, BT received the first of 15 New Flyer vehicles, representing BT's first wheelchair-accessible buses, and among the first heavy-duty low floor coaches to run in the Commonwealth of Virginia.

In 2001, BT's director received the Virginia Transit Association (VTA) Outstanding Public Transportation Service Award. The award noted that since starting operations, BT had progressed from a transit start up to a national model for transit in small urban university communities.

In 2009, local service within Christiansburg began operating on two fixed routes and one demand responsive route. Local funding for this service was provided by the Town of Christiansburg. Also in 2009, BT provided new information-technology services through the in-house development of an application allowing riders to text, phone or use the web to look up predicted departure information for stops they commonly use, called BT4U.

In 2010, BT added 60' diesel-electric hybrid articulated buses to its fleet. In 2012, the Regional Transit Coordinating Council (RTCC), was established to provide increased dialogue and coordination among

Figure 1 : Organizational Timeline



regional transit providers. The RTCC identified two key priorities for the region's public transportation partners to work on: 1) identify a common technology platform between service providers; and 2) enhance the presence of public transit stops at overlapping service locations.

In 2013, BT participated in a grant study program developed by the Federal Transit Administration (FTA) and U.S. Department of Transportation (USDOT) called the Transit Investment in Greenhouse Gas and Energy Reduction (TIGGER). The goal of TIGGER is to help reduce greenhouse gas emissions by improving routing and scheduling efficiency.

In 2016, the New River Valley Metropolitan Planning Organization (NRVMPO) released a Regional Transit Study to focus on identifying overlapping and high-volume transit stops among the various service providers operating in the region.

In recent years, BT has faced increasing demand and shortages of drivers able to provide the service. During a driver shortage in 2015-2016, BT's Operations Manager earned VTA's inaugural Transit Employee Unsung Hero Award for individual contributions to help ease the impact on riders. Driver shortages have prompted BT to take new approaches toward recruitment. As a result, in 2017 BT received the Outstanding Public Transportation Marketing Award for their "Drive for BT" advertising campaign which resulted in driver recruitment in excess of original goals.

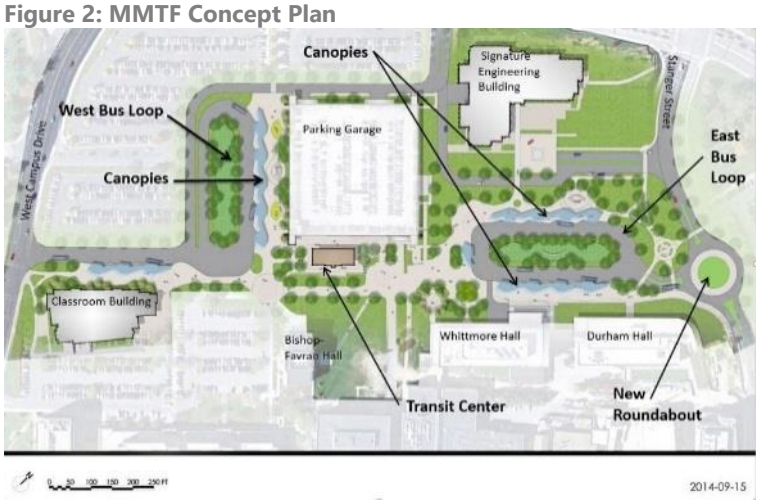
1.1.1 Current Initiatives

Multi-Model Transit Facility (MMTF)

BT has been advancing plans for the construction of the MMTF in conjunction with Virginia Tech. The initiative would relocate the current hub from the VT Drillfield to a proposed location on the north side of campus.

The purpose for the MMTF is to serve the bus passenger transfer and multi-modal transportation needs of the Blacksburg community. The MMTF would also further integrate connections to Home Ride and the Smart Way bus for travel outside the New River Valley. Additionally, transit access from the core campus areas to the Corporate Research Center (CRC) would be facilitated via the MMTF to accommodate the increasing presence of Virginia Tech offices, research, and laboratories housed at the CRC.

Figure 2: MMTF Concept Plan



Plans for the MMTF include two bus loops, one on its east side with access to Stanger Street and one on its west side with access to West Campus Drive. Nine bus bays are planned for the east side and eight bus bays are planned for the west side. A study was conducted in 2014 to outline new routing recommendations for the system to maximize the benefit and efficiencies of the MMTF.

Increased Capacity

Pressure to align transit service and vehicles with passenger loads remains a continuous initiative as Virginia Tech grows. Currently, if a route experiences overcrowding, BT employs scheduled tandem extra buses (formerly referred to as "trippers") to pick up individuals who were left behind when the regular route bus becomes full during Full Service weekdays. During the first two weeks of class when Virginia Tech is in session BT preemptively schedules these extra buses along popular routes where there has been a history of commuter riders frequently outnumbering the bus capacities.

A longer-term approach to crowding involves the expansion of the BT fleet to be able to continue to accommodate the community's future transportation needs. Capital requests include purchasing articulated buses which carry more passengers as replacements for traditional buses. The need for additional buses is currently being evaluated for inclusion as a future capital request.

Starting in December 2016, BT also began planning for a regional bike share system that was implemented in July 2018 (http://gotchabike.com/roamnrv/). Managed by BT's planning division, with oversight from the Director and a bike share advisory committee, appointed by the New River Valley Metropolitan Planning Organization, bike share will offer a form of personal transit as a way to connect to pathways and to bus stops in the region.

1.2 GOVERNANCE

Blacksburg Transit forms its own department within the Town and is administered by Blacksburg's Town Council. The seven-member Blacksburg Town Council is led by a Mayor and elected to staggered four-year terms.

- **Leslie Hager-Smith, Mayor** – Term expires 12/31/21
- **Susan Anderson** – Vice Mayor - Term expires 12/31/21
- **John Bush** – Term expires 12/31/19
- **Lauren Colliver** – Term expires 12/31/21
- **Jerry Ford** – Term expires 11/6/18
- **Susan Mattingly –** Term expires 12/31/21
- **Michael Sutphin** – Term expires 12/31/19

Town Council is the legislative body of the Blacksburg local government, adopting all ordinances and resolutions and establishing the general policies of the Town. The Council also sets the real estate tax rate and approves and adopts the annual operating budget. A town manager is responsible for the direction and supervision of all departments, including Blacksburg Transit.

Although the Town operates BT, the service is fully funded by federal and state transit grants, fare box revenues, partnerships, advertising, and a portion of Virginia Tech student activity fees. Thus, BT has traditionally provided local service within the Town of Blacksburg for students commuting to the Virginia Tech campus and the CRC. There is currently no general fund subsidy from the Town for regular Blacksburg Transit service into the Town's residential neighborhoods. In FY 2017, BT received over $3.1 million in operating funds from Virginia Tech, representing approximately half of all annual external funding for the agency.

The New River Valley Metropolitan Planning Organization (NRVMPO) is the transportation policymaking organization serving the Towns of Blacksburg and Christiansburg, the City of Radford, and parts of Montgomery

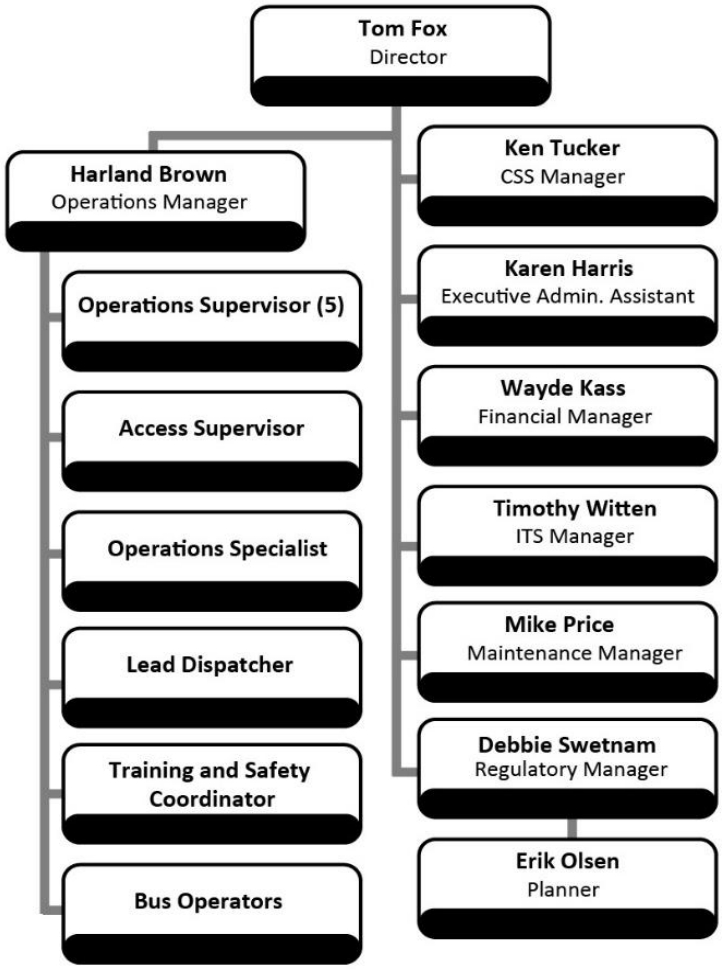
and Pulaski counties. The New River Valley Regional Commission (NRVRC) is an organization comprised of 12 local governments and two universities for the purpose of encouraging collaboration to address regionally significant issues and opportunities. The NRVMPO and NRVRC have facilitated the Regional Transit Coordinating Council initiatives, most recently the completion of a Regional Transit Study in 2016 that prioritized a 3-year and 6-year action plan for high-volume stop locations and overlapping service areas.

1.3 ORGANIZATIONAL STRUCTURE

BT is managed by a Transit Director and six Managers overseeing 29 full-time and 12 part-time employees, along with 7 full-time and 145 part-time bus operators. The organizational chart is comprised of six departments – Operations, Maintenance, Finance, Regulatory, ITS, and Marketing (see Figure 2). The current transit director, Tom Fox, joined BT in 2015.

The majority of BT's drivers are part-time employees, making BT a popular employer with Virginia Tech students. Overall, there are three types of bus operators: 1) part-time employees required to work a minimum of nine hours per week, 2) part-time employees working up to 30 hours per week, and 3) full time employees working 40 hours per week. The majority of the service's full-time staff consists of administrative and supervisory positions.

Figure 3: Organizational Chart



1.4 SERVICES PROVIDED AND AREAS SERVED

In FY2017 BT provided 3.7 million passenger trips per year and serves over 28 square miles with approximately 279 transit stops. BT provides fixed-route, demand response, and special event services within the Blacksburg-Christiansburg-Montgomery area. Ridership generally consists of 90 percent students, 5 percent staff and 5 percent from the local community.

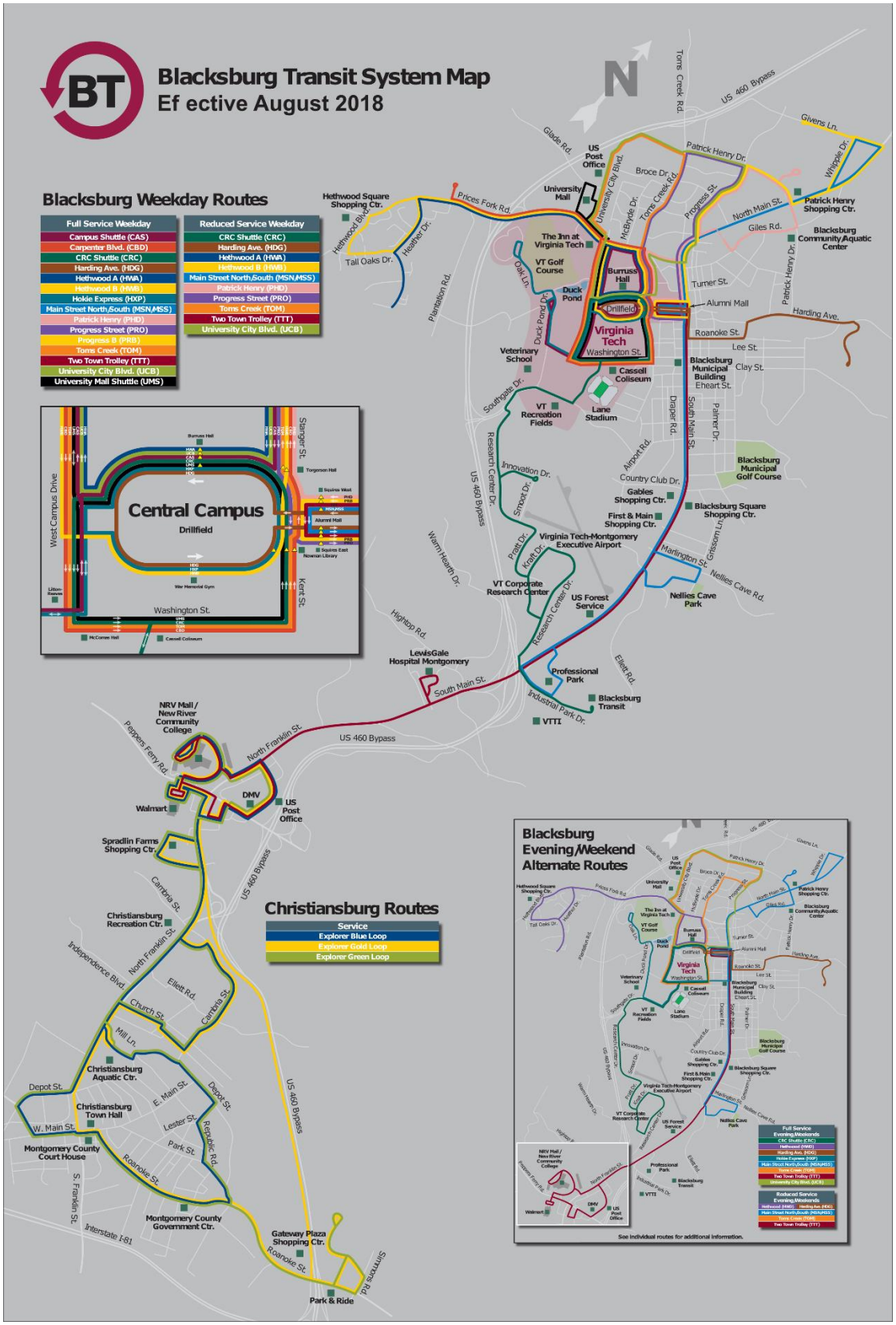
In terms of on-campus enrollment (fall 2017), Virginia Tech has approximately 32,000 on-campus students, 27,000 of which are enrolled in undergraduate programs. The central VT campus is roughly bordered by Prices Fork Road to the northwest, Plantation Drive to the west, Main Street to the east, and U.S. Route 460 bypass to the south. The VT campus, with 130 buildings covers 1.73 square-miles and accounts for 9.6 percent of the town of Blacksburg's land area.

Figure 4: BT on Campus Services

Service provided includes eleven fixed routes, deviated-fixed, and demand response service. BT operates at three different service levels throughout the year, Full Service, Intermediate Service and Reduced Service, which roughly track Virginia Tech's academic calendar. Typically, Full Service operates from the end of August until mid-December, and again from mid-January until the beginning of May. Intermediate Service features the same service spans and hours of operation, but at reduced frequency. There are only nine service days at this level of service, including the week prior to the beginning of the fall semester in August and select holidays. Reduced Service is operated during the summer and fall, winter, and spring breaks. BT runs no service on New Year's Day, Memorial Day, Independence Day, Thanksgiving, and Christmas.

Blacksburg Full Service is operated over fourteen fixed routes on weekdays. Seven routes continue into late evening service, with a much later span of services offered on Friday and Saturday (typically 2:30 am). When Reduced Service is in place, ten Blacksburg routes operate on weekdays and five on weekends. (see **Table 1**). Several routes that operate during Full Service are combined with other routes during Intermediate/Reduced service.

Figure 5: System Map



1.4.1 Fixed Route Bus

In general, local routes serve the Town of Blacksburg with an express route linking Blacksburg to Christiansburg, serving the Montgomery Regional Hospital and Route 460 Business corridor. Christiansburg service is provided through an agreement with the Town of Christiansburg and is operated at the same level year-round, except for the November-December holiday season, where hours are extended on some days. There are three services connecting to and within Christiansburg: 1) The Explorer route covers many of the residential areas and businesses in Christiansburg and the shopping district near the New River Valley Mall; 2) The Commuter route provides morning and evening service between Christiansburg and Blacksburg; 3) The Two Town Trolley connects the Virginia Tech campus, (at Squires Student Center), Downtown Blacksburg, the First & Main shopping center, LewisGale Hospital Montgomery, Wal-Mart, and the New River Valley Mall in Christiansburg.

Table 1: BT Fixed Route Service Summary

14 ROUTES									
Route	Service Days/Times (FULL SCHEDULE)						Mon.-Thurs. Span (Hrs.)	Mon.-Fri. Freq. (Mins.)	Peak Vehicles
	Mon.-Fri.								
	Peak	Midday	Sat.	Sun.	Late PM	All Year			
Carpenter Boulevard	●	●					11:45	30	1
CRC Shuttle	●	●			●	●	15:15	20	2
Harding Avenue	●	●	●	●	●	●	16:55	15	5
Hethwood	●	●	●	●	●	●	14:30	10-15	3
Hokie Express	●	●	●	●	●		17:30	10	3
Main Street	●	●	●	●	●	●	17:30	15	4
Patrick Henry	●	●				●	11:30	10	3
Progress Street	●	●					14:30	10	3
Toms Creek	●	●	●	●	●	●	17:30	10	3
Two Town Trolley	●	●	●	●		●	10:55	60	1
University City Boulevard	●	●	●	●	●	●	14:30	10	3
University Mall	●	●					12:10	15	2
Explorer Route	●	●				●	11:00	120	1
BT Commuter	●					●	N/A	N/A	1

Carpenter Boulevard

Operates Monday through Friday from 7am until 6:45pm during Full and Intermediate service. The route provides a connection between The Retreat, an 829-bedroom student apartment complex off Prices Fork Road and the Virginia Tech campus. The route operates in a counter clockwise loop around campus, features 19 stops, and has a 30-minute headway throughout the day. This route was introduced in 2016.

CRC Shuttle

Provides service from central VT campus to the Corporate Research Center (including the Edward Via College of Osteopathic Medicine - VCOM) and the neighborhoods adjacent to the CRC. The entire CRC encompasses 230 acres with approximately 3,000 employees. This route also serves the Virginia Tech/Montgomery Executive Airport and directly serves the BT administrative building. The service features 30 stops, operating Monday through Friday during Full Service on 20-minute headways. The service span is from 6:45am to 10:00pm. During Intermediate Service scheduled Saturday service is also available at 30-minute headways. During Full Service, the Saturday service is only by reservation (see CRC Saturday Connector Service).

CRC Saturday Connector Service

Provides transportation to and from the CRC area to three stops in the BT system, (Fairfax Road, McComas and Newman Library), on Saturdays from 10:00am to 9:00pm. The service is a demand response or "dial a ride" service that only operates during Full Service. The service does not operate during VT Game Days.

Harding Avenue

Provides service from central campus to parts of Main Street, Roanoke Street, Harding Avenue and Ascot Lane before returning to campus via the same route. The route includes 28 stops and operates every 15 minutes (Full Service) from 7:00am until 11:55pm. After 9:45pm the route combines with the Hethwood route with one bus providing hourly service. The route operates Monday-Sunday and operates year-round with lower frequencies (30 minutes) as well as expanded combination with the Hethwood Route (i.e. all weekend service is combined as part of the Reduced Service schedule).

Hethwood

This service is provided as two independent routes (Hethwood A and Hethwood B) operating separately from 7:00am to 9:30pm Monday through Friday. Both routes travel along Heather Drive and Prices Fork Rd., in their connection to campus. Hethwood A only serves Stroubles Circle and Hethwood B only serves Tall Oaks Drive. During evenings after 9:45pm, the Hethwood A & B and Harding Avenue routes combine and operate as one route. These routes also combine on weekends and operate from 9:30am until 2:30am. All spans of service reflect a Full Service schedule. Service frequencies are generally every ten minutes on the A Route and 15 minutes on the B Route, with some reduction in frequency on the A route on Friday afternoons/evenings (15 minutes).

Hokie Express

This route circulates between central campus and the Oak Lane Community during Full and Intermediate Service only. The route operates from 7:00am until 12:30am Monday-Thursday. Service spans on other days include: 7:00am-2:30am Friday, 9:30am-2:30am Saturday, and 11:30am-11:30pm on Sunday. The Hokie Express follows an Alternate Route beginning at 10 p.m. on weekdays and all day on weekends. The Alternate Route services Spring Road, Washington Street and Main Street and timechecks at Squires Westbound on Alumni Mall. There is no reduced/year-round service available for this route.

Main Street

This route provides service along Main Street as far north as Whipple Drive and as far south as Industrial Park Drive. The span of service is identical to the Hokie express, with the exception that this route does operate year-round under a Reduced Service schedule. During all evenings and weekends when Intermediate and Reduced

Service schedules are in effect, the route will not provide service to the Industrial Park, but will serve Giles Road, Patrick Henry Drive and Seneca Circle. This route features 61 stops.

Patrick Henry

Operates Monday through Friday only. The route supplements North Main, Progress Street and University City Boulevard route buses by serving those passengers along the busy Seneca Drive/Patrick Henry Drive/Progress Street corridor. The span of service is from 7:00am-6:30pm. The service frequency is every ten minutes prior to 12:15pm and then every 15 minutes to 6:30pm. The route features 22 stops.

Progress Street

Operates as a counter-clockwise loop connecting campus with North Main Street, Progress Street, Patrick Henry Drive, and Toms Creek Road. The route operates during Full and Intermediate Service weekdays only. The service span is from 7:00am until 9:30pm with a frequency of service of every 10 minutes during Full Service and 30 minutes after 6:15pm as well as 30 minutes all-day during Intermediate Service schedules. This route features 15 overall stops.

Toms Creek

This route provides service from Torgersen Hall along Toms Creek, University City Boulevard, completing the loop back to Torgersen Hall via West Campus Drive, Washington Street and Kent Street. The Full Service span of service is from 7:00am-12:30am Monday-Thursday, with later start times and service extending to 2:30am on Friday and Saturday. Sunday service is provided from 11:30am-11:30pm. During evenings (after 9:30pm), weekends and all Reduced Service schedules this route follows an alternate route along Broce Drive, Progress Street and Patrick Henry Drive. The route has a total of 20 stops with six additional stops provided on the alternate route.

University City Boulevard

This route operates in a clockwise loop along University City Boulevard, Patrick Henry Drive and Progress Street. The route also serves the VT Math Emporium at the University Mall. The Full Service span extends from 7:00am-9:30pm Mondays-Thursday, with extended service until 2:30am on Friday and Saturday. A daytime frequency of 10 minutes changes to 15 minutes after 4:00pm and then 30 minutes after 6:15pm. No Sunday Service is provided with the Intermediate Schedule and no weekend service is provided during Reduced Service. Patrons are advised to use the Toms Creek route when this service is not operating. There are 17 stops on the weekday route.

University Mall Shuttle

This route provides a more direct service to/from the VT campus to the University Mall area. The route travels along West Campus Boulevard, with loops around campus and the mall location (Old Glade Road). Route operates on weekdays only, from 8:45am-8:55pm during Full and Intermediate Service schedules. Frequency is every 15 minutes until after 6:15pm when it becomes 30 minutes. There are ten stops along this route.

Two Town Trolley (Christiansburg)

This service connects the Virginia Tech campus, (at Squires Student Center), Downtown Blacksburg, the First & Main shopping center, LewisGale Hospital Montgomery, Wal-Mart, and the New River Valley Mall in Christiansburg. This route provides the same level of service year-round, with a Monday-Friday span of service form 7:15am-5:55pm. Saturday service extends from 10:15am-5:45pm and Sunday service from 12:15pm-5:45pm. All service frequencies are 60 minutes. Additional late night service is provided until 12:45am on Fridays and

Saturday's during Full and Intermediate Service. The route does not serve the Hospital on weekends. There is a total of seven stops in Blacksburg and 10 stops in Christiansburg.

The Explorer (Christiansburg)

This local Christiansburg service is known by three color coded loops. All routes generally cover the same residential areas and the businesses in Christiansburg and the shopping district near the NRV Mall. The route differences occur from the direction of travel or the time of day. Initially, the Explorer route follows the Blue Loop beginning at 7:15am; then it becomes the Gold Loop (first run at 8:00am) and rotates between the two every hour. Stops in the NRV Mall area are served hourly; stops in the downtown business district are served once every two hours, with hourly service upon request (route deviations). The Green Loop represents the last trip of the day, from 5:45pm-6:45pm. There are 16 stops served by these loops.

1.4.2 Other Transportation Services

BT Access

Within the town limits of Blacksburg, fixed route service is complemented by Americans with Disabilities Act (ADA) paratransit service, BT Access, for qualified individuals who cannot complete their trip on the fixed route system. Any person traveling to Blacksburg with a valid ADA Eligibility Card from another locality may also ride BT Access. Within the town limits of Christiansburg, paratransit service is handled with the Go Anywhere demand response route. Individuals can apply to become certified to use BT Access, with travel training provided to teach seniors and people with certain disabilities that it may be possible to travel safely and independently on a fully accessible low floor fixed-route bus. The 2014 National Transit Database reported approximately 31,600 unlinked trips provided by this service, or less than one percent of fixed route ridership.

BT Commuter

The BT Commuter route provides service between Christiansburg and Blacksburg, Monday through Friday based around a traditional work schedule of 8am and 5pm. In Christiansburg it serves neighborhoods in the downtown area and Oak Tree Town Homes development. The route starts at the intersection of Simmons Road/Hammes Street at 7 am (east of downtown Christiansburg), proceeding along Main Street to North Franklin Street. There are a total of 15 stops in Christiansburg. The last Christiansburg stop is made at Northgate Village at 7:30 am. All stops are served in the reverse direction in the afternoon, starting with Northgate Plaza at 5:45pm and ending at Simmons/Hammes at 6:10pm.

In Blacksburg, the first stop is on Prices Fork Road by the University Gateway Center (7:40 am). The route then serves West Campus Drive and the Drillfield before making its last drop-off at the Blacksburg Municipal Building (7:55am). There are a total of six stops in Blacksburg. Return service to Christiansburg starts at 5:05pm. The service provides over 5,000 commuter trips annually.

Warm Hearth Service

Warm Hearth Village is a retirement community located just outside of the Town of Blacksburg limits. The Village includes a 220-acre wooded campus with walking trails and numerous amenities. A continuum of living options is available from independent living to long-term nursing care. Transit service began in December 2011 with connector service every Tuesday between the Village and LewisGale Hospital Montgomery. In July 2014, service expanded to three days of the week (Tuesday-Thursday). Trips must be scheduled in advance from 10am to 3:15pm, with trips available to Christiansburg on Tuesday and Thursday and trips to Blacksburg available on Wednesday and Thursday. Warm Hearth Village is currently home to more than 550 senior residents.

Figure 6: BT Warm Hearth Services

Go Anywhere (Christiansburg)

This demand responsive service requires advance reservations and provides service from any place in Christiansburg to any destination within the town. Hours of operation Monday-Thursday are from 7am-6pm, on Friday from 7am-10pm, and on Saturday from 8am-11pm. There is no service available on Sunday. Reservations can be made Monday-Friday 7am to 12pm.

Corporate Research Center (CRC) Saturday Connector Service

The CRC Saturday Connector service is a demand-response service between the CRC area and three stops in the BT system, (Fairfax Road, McComas and Newman Library), on Saturdays between 10:00am and 9:00pm during full service periods.

Other Special Services

In addition to the scheduled fixed routes and demand response services previously mentioned, BT also operates special services for Virginia Tech, including special shuttles for events on campus and athletic shuttles for major sporting events on campus.

1.4.3 Bus Stops and Shelters

Blacksburg Transit maintains and serves approximately 279 transit stops. Forty-one of Blacksburg Transit's stops have bus shelters and benches, with a number of additional stops having benches only. Shelters are primarily located on the Virginia Tech campus and at large apartment complexes. BT installed its first solar-powered bus shelters on the Virginia Tech campus in August 2013. Several apartment complexes also have their own shelters that are self-maintained, however many of these are not ADA-accessible and do not have glass panels.

Current BT policy now states that bus stops with 50 or more average daily boardings warrant a bus shelter, while those with between 25 and 50 average daily boardings warrant a bench. In service design and review, Blacksburg Transit tries to maintain a minimum distance of 0.2 miles between bus stops.

Figure 7: BT Bus Stop Sign

A bus stop safety and accessibility study for the Town of Blacksburg was conducted in 2014. A total of 65 bus stops were identified as needing improvement. Accessibility recommendations concentrated on the following four key corridors: Tall Oaks Drive, Giles Road, Roanoke Street, and Progress Street. The corridor-based recommendations include stop consolidation along Roanoke Street and the completion of sidewalk connectivity along Tall Oaks Drive and Progress Street. Additional street lighting and roadway striping were also recommended to improve safety along Giles Road. In all, there are eleven shared stops currently being served by at least two transit systems. Currently there is no particular branding or information at these locations to identify regional connections, nor are there shelters that could be of use to patrons waiting for connecting services.

Each Blacksburg Transit bus stop sign post contains the standard BT circular sign and customer information sign that provides riders with detailed route and stop information. All bus stops are assigned a unique stop number, allowing BT to identify the exact stop and aiding in trip planning. Currently BT is seeking to further standardize the heights of bus stop signs, to aid in ADA compliance, and has recently added larger stop numbers to help passengers identify stops from within the bus.

1.4.4 Park and Ride Facilities

Within the region, one official Virginia Department of Transportation (VDOT) Park and Ride lot is designated at Exit 118 on Interstate 81 in Christiansburg. This lot represents the relocation and expansion of the former Park and Ride facility near the Falling Branch Elementary School. The new parking capacity provides over 250 spaces. This location serves as a mini transit hub for the region for inter-city services. Currently it is served by Blacksburg Transit, Radford Transit, SmartWay, and Virginia Breeze.

Unofficial lots are those that are not maintained by VDOT and are not expressly intended for commuter use. They might be other public spaces, such as parks or recreation centers, or the private lots of shopping centers or other businesses. All identified Park and Ride locations in the NRV are listed in **Table 2**.

Table 2: Park and Ride Locations

Park & Ride Lot	Location	Dedicated Spaces	BT Routes
I-81 @ Exit 118C	Route 460 Bypass at Roanoke St.	250	Explorer
Deli Mart	Deli Mart – Route 8 and Moose Dr.	25	n/a
I-81 @ Exit 114	Route 8, Riner Rd. & Flangan Dr	12	n/a

Park & Ride Lot	Location	Dedicated Spaces	BT Routes
Shopping Center Parking Lot	US Highway 460 Business, N Franklin St and Laurel St.	82	Two Town Trolley, Explorer

1.5 FARE STRUCTURE

The BT fare structure has not changed since service was initiated. The fare categories and costs are the same as in the previous TDP. BT accepts single-ride cash fares, prepaid 1-month or 6-month passes, and several forms of prepaid identification to ride fixed route services.

During the school year, only three to six percent of all riders are non-VT passengers and therefore these riders pay a cash/monthly fare. Actual cash farebox revenue of $71,800 was reported in FY2016 against total operating expenses of $6,665,947.

Monthly passes are available for purchase at the following locations:

- Blacksburg: Blacksburg Municipal Building, located at 300 S. Main St.
- Christiansburg: Christiansburg Town Hall, the Aquatic Center and the Recreation Center.

Blacksburg Transit offers fare free service during the following events:

- Fourth of July, (shuttles only)
- Steppin' Out, (local summer festival held the first weekend in August)
- Virginia Tech home basketball games, (shuttles only)

On Virginia Tech Football Game Days, the regular fare structure is modified on Blacksburg routes.

Table 3: Fare Structure

	FARES	1 MONTH PASS	6 MONTH PASS
Adult	$0.50	$8	$37.50
Ages 3-7	$0.25	$4	$18.75
> 3	Free	Free	Free
65+	$0.25	$4	$18.75
Disabilities/Medicare (not valid on BT Access)	$0.25	$4	$18.75
VT Students, Facility, Staff	Pre-Paid	Pre-Paid	Pre-Paid
VCOM Students	Pre-Paid	Pre-Paid	Pre-Paid
LCI Student Passes	Pre-Paid	Pre-Paid	Pre-Paid

1.6 FLEET

BT owns and maintains a total vehicle fleet that includes 51 standard and articulated buses and 18 body-on chassis buses and vans. For all fixed route bus services, approximately 33 vehicles are required for maximum service (standard and articulated buses), with eight vehicles required in maximum service for BT Access one vehicle required for Christiansburg operations. This results in spare vehicle ratios of 35 and 36 percent respectively. The highly variable nature of passenger demand experienced by BT necessitates these vehicle

reserves for tripper service when excessive crowding occurs. BT Access and Christiansburg service operate mostly with body-on-chassis buses.

The vast majority of revenue vehicles are New Flyer 40-foot diesel buses (27) and Supreme 25' medium-duty cutaway vehicles (16). BT also has eleven 60' articulated buses for use on the heaviest ridership routes. BT purchased some diesel-electric hybrid vehicles (9) in 2010, however it has elected to no longer grow its hybrid fleet with additional vehicles. Full fleet information is found in **Table 4** and **Table 5**.

Table 4: BT Fixed Route Heavy Duty Bus Fleet

Make/Model	Year	Type	Fuel Type	Seats	Quantity	Average Miles	Min. Replace Year
New Flyer D60LF	2002	60' Bus	Diesel	55	2	277,842	Past Due
New Flyer D35LF	2007	35' Bus	Diesel	30	1	154,322	2019
New Flyer D40LF	2007	40' Bus	Diesel	39	2	143,819	2019
New Flyer D40LFR	2009	40' Bus	Diesel	39	14	103,388	2021
New Flyer D40LFR	2010	40' Bus	Hybrid Diesel	39	7	91,668	2022
New Flyer D60LFR	2010	60' Articulated Bus	Hybrid Diesel	55	2	67,014	2022
New Flyer XD35	2012	35' Bus	Diesel	30	4	53,694	2024
New Flyer XD35	2013	35' Bus	Diesel	30	4	38,450	2025
New Flyer XD60	2013	60' Articulated Bus	Diesel	55	2	35,911	2025
New Flyer XD35	2014	35' Bus	Diesel	30	4	14,980	2026
New Flyer XD40	2014	40' Bus	Diesel	39	4	20,024	2026
New Flyer XD60	2014	60' Articulated Bus	Diesel	55	1	18,315	2026
New Flyer XD60	2018	60' Articulated Bus	Diesel	55	4	0	2030

Table 5: BT Access and Christiansburg Bus Fleet

Make/Model	Year	Type	Fuel Type	Seats	Quantity	Average Miles	Min. Replace Year
Raised Roof Van Econoline Van	2009	Van	Diesel	12	1	52,430	Past Due
Ford Braun Raised Roof Van Econoline Van	2011	Van	Gas	N/A	1	58,069	Past Due
Ford Supreme BOC	2012	Cutaway >30'	Diesel	28	1	66,386	2019
Chevrolet Supreme BOC Express Cutaway	2012	Cutaway >30'	Diesel	12	1	45,553	2019
Chevrolet Supreme BSSN	2013	Cutaway >30'	Diesel	N/A	1	80,962	2020
Chevrolet Supreme BOC Express Cutaway	2014	Cutaway >30'	Diesel	12	1	83,287	2021
Ford Senator II	2016	Cutaway >30'	Diesel	18	2	23,064	2023
Starcraft Allstar BOC	2016	Cutaway >30'	Diesel	12	4	39,951	2023
Starcraft Allstar BOC	2016	Cutaway >30'	Diesel	18	2	34,465	2023
Starcraft Allstar BOC	2017	Cutaway >30'	Gas	15	4	20,369	2024

Figure 8: BT 60′ Articulated Bus

The replacement year calculations for BT fleet vehicles has historically been calculated for large heavy-duty transit vehicles as 12 years / 500,000, for medium-size, medium duty vehicles (Supreme Startrans) as 7 years / 200,000 miles, and for all other cutaway (BOC) buses a useful life of 5 years / 150,000 miles. New Federal Transit Administration Useful Life Benchmarks (ULB) for these vehicle types have extended the recommended replacement cycle (See Chapter 5). This reflects a shift to transit asset management (TAM) which incorporates the condition assessment of individual vehicles rather that set limits. Supporting this shift, several BT vehicles currently past their historically calculated minimum replacement year in terms of age still had well below the FTA recommended mileage threshold for replacement. This may indicate that while the large fleet is needed to accommodate crowding, the route distances remain relatively short. Lower vehicle mileage, with continued preventative maintenance, could enable BT to support the longer FTA default ULB thresholds.

Currently, BT has approximately 17 support vehicles that are used for travel, route checks, shift changes, maintenance and other official purposes.

1.7 EXISTING FACILITIES

Blacksburg Transit's administrative and maintenance facility is located at 2800 Commerce Street, approximately 4.7 miles from Burruss Hall on the Virginia Tech campus. The facility was constructed in 1991 and was later expanded in 2006 to a total of 50 garage bays and 5 maintenance bays comprising over 94,000 square feet. The majority of fleet vehicles are stored inside. The facility also houses the administrative wing of Blacksburg Transit. An office reconfiguration and construction project has been identified for FY2018-FY2019.

The facility contains:

- Administrative offices, including a reception area, manager's suite, and conference area;
- Daily operations areas, including dispatch center, operator's lounge and training facilities;
- Maintenance garage, including 5 maintenance bays, 3 above-ground bus lifts, 1 cutaway lift, 2 pits, and a wash bay; and
- Indoor storage garage with 50 vehicle bays for overnight parking.
- Diesel and gasoline fueling facilities are located on the property.

1.8 TRANSIT SECURITY PROGRAM

A Facility Emergency Plan is in place which outlines staff procedures and responsibilities in the event of fire, bomb, accident, criminal behavior, or other suspicious or dangerous activity at the BT administrative and operations

facility or on one of its vehicles. The plan includes evacuation and notification procedures and emergency contact information and protocols.

Incidents and activity on the road that threaten BT bus operators and riders are required to be radioed in to the dispatch center or a supervisor, who then can advise appropriate action. Depending on the vehicle's location, either Blacksburg Police, Virginia Tech Police, or Christiansburg Police will be called upon to assist.

Supplementing the Facility Emergency Plan is a Homeland Security Policy, which outlines department protocols to follow at each security threat level designated by the Department of Homeland Security Advisory System. These protocols are designed to be in place regardless of an actual incident or threat to BT.

1.9 INTELLIGENT TRANSPORTATION SYSTEM (ITS) PROGRAM

BT embraces technology across all facets of its operations. Initial and ongoing issues identified in the previous TDP and subsequent studies include capacity constraints due to unpredictable demand driven by classroom dismissals and student behavior. Without being able to dynamically accommodate this demand and with limitations in vehicle size, the instances where waiting passengers were being passed by full buses was increasing. BT began using technology to better understand variations in passenger demand and assess trends associated with time of year, time of day, the Virginia Tech academic and event calendars, and public holidays.

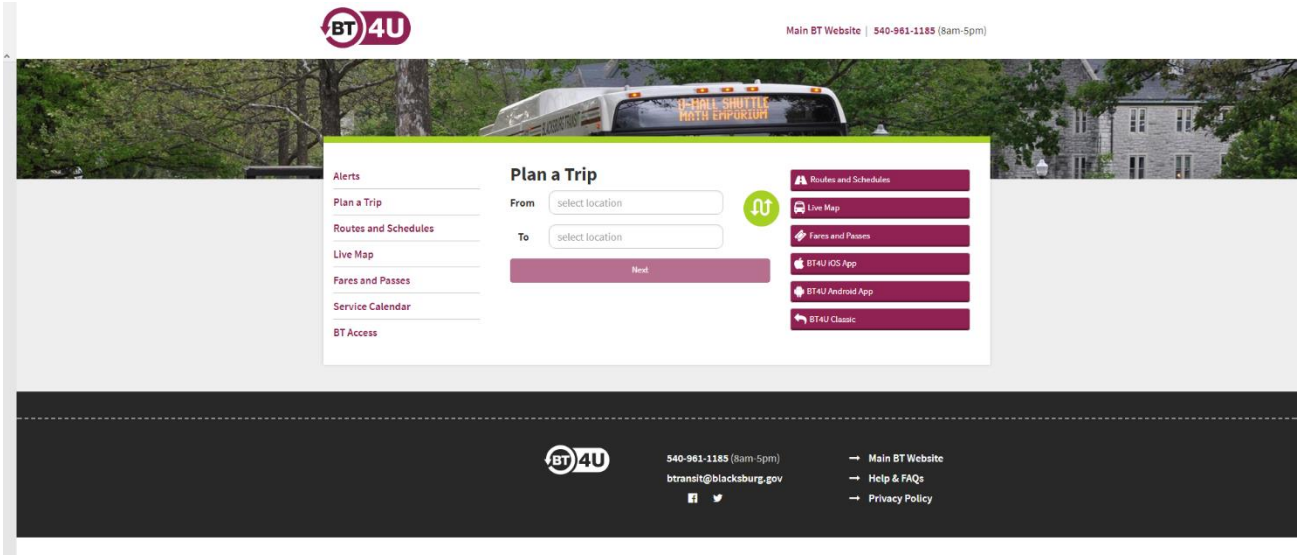
The term "BT4U" previously referred to both the internal backend system and the outward facing customer information tools. This generated a certain amount of confusion, primarily within BT as the name had different meanings depending on context. To streamline this, and to create a stronger brand recognition with BT's passengers all outward facing tools are known collectively as BT customer information tools.

The customer information tools provide users with up-to-date information about buses and bus stops. Users can access the service using an app or web browser, by texting, and over the phone using interactive voice response. The classic version, BT4U Classic, provides users with the next three times a bus will depart from a particular stop. The BT app not only displays data and plans trips for the passengers, but also sends a unique ID and app-based data to the content-management software on BT's server in order to collect a record of passenger behavior. For instance, if a rider looks up a specific route or plans a trip, that event is captured, and if they actually complete that trip, that event is also collected.

Many of the same features found in the app can also be found on BT's website, **www.ridebt.org**, including the trip planner (**Figure 9**) and live map. The Android version of the app underwent a major update in 2017, a similar update is scheduled for the iOS version in 2018. In addition to the app updates, BT will also update and combine the current btransit.org and ridebt.org websites.

In 2016 BT was pioneering use of Bluetooth Low Energy (BLE) technology to identify the locations of transit buses when they are parked in its garage. Devices designed to discover and locate Bluetooth beacons and Bluetooth-using smartphones or tablets within its vicinity were installed not only in storage areas but in maintenance and wash bays. Known as Fathom Hub, the information provided has enabled BT to better manage the dispatching and maintenance of its fleet. For example, BT plans to coordinate the service history for each bus using the Fathom Control dashboard. Fathom will streamline record management for fleet servicing and facilitate the scheduling of maintenance and upkeep routines. Fathom will also enable key performance indicators and analytics that are currently not possible.

Figure 9: BT Trip Planning Interface



Blacksburg Transit identified through the Capital Improvement Program that a variety of Intelligent Transportation Systems (ITS) investments over the past decade will be approaching their end of life during the timeframe of this TDP analysis. Systems such as Computer Aided Dispatch, Automatic Vehicle Location, Customer Information, Demand Response Scheduling\Dispatching and Data collection systems will be studied as part of an ITS needs assessment to be conducted in FY2017. BT anticipates up to $1.5 million will be needed from FY2017-FY2020 to update these ITS systems.

1.10 DATA COLLECTION, RIDERSHIP AND REPORTING METHODOLOGY

BT has digitally collected and stored ridership data since January 2011. Passenger counts come from a Trapeze system, which has two units. One is a ranger, a console that the drivers use to enter passenger type as the passengers enter the bus and part of a fare-tracking system. The other is an Automatic Passenger Counter (APC) utilizing an infrared sensor on the bus that counts passenger entries. The passenger counts from the Trapeze system are transferred wirelessly to a database, where they can be accessed by the demand-assessment algorithm. The subsequent BT passenger-count database is a foundation for demand assessment.

BT provides detailed monthly ridership reports. This information includes summary statistics on ridership, service levels, and fare types. The ridership totals for Blacksburg and Christiansburg routes are broken down separately.

Route-level information is provided, such as passengers per revenue hour and overall passenger productivity by day of the week/time of day.

BT uses a CAD/AVL program to digitally collect and generate instant reports on who was taking the bus at any given time. This methodology was necessary due to recurring issues with trip density and a need to react quickly to bus crowding. The fixed route software with automated rider counting capacity enabled more efficient and responsive operations. BT benefits from improved information management, automatically generated fare reporting for VT, and rapid assessment and modification of bus schedules to accommodate passenger load data.

1.11 COORDINATION WITH OTHER TRANSPORTATION SERVICE PROVIDERS

The New River Valley Regional Transit Coordinating Council (RTCC) enables dialog among the region's transit providers and provides a stronger multi-jurisdictional/multi-system perspective. A Regional Transit Study in 2016 identified enhanced coordination at high-volume and overlapping stops which are served by numerous routes. In the BT service area, these locations included the New River Valley (NRV) Mall, I-81 Exit 118 Park and Ride, Laurel Street in Christiansburg, Squires Student Center, Andrews Building (CRC), and Blacksburg Municipal Building. Strategies were identified to better align schedules for easy transfers, co-brand the stops, and provide some passenger amenities. In addition to BT, the key providers for enhanced connectivity included Radford Transit, Pulaski Transit, and the Smart Way bus. Other providers are also listed in this section.

Radford Transit

Radford Transit provides a direct connection on Monday-Saturday (Route 40) between Radford and the Regal Cinemas/NRV Mall (Christiansburg) and the Squires Student Center on the VT campus. This service operates in the afternoons only, from 2:40pm to 8:55pm (Monday-Thursday) and 1:55am on Friday and Saturday.

Pulaski Area Transit

This service connects the NRV Mall and New River Community College (Christiansburg) with Fairlawn (Radford), Dublin and the Town of Pulaski. Two daily trips are provided Monday-Friday, arriving in Christiansburg at 8:50am and 1:50pm.

SmartWay Bus

The SmartWay Bus is a commuter bus service operated by Valley Metro of Roanoke that serves Blacksburg, Christiansburg and Roanoke, providing transfer locations to other regional bus service and the Roanoke-Blacksburg Regional Airport. The Smart Way bus stops in Blacksburg and Christiansburg include: Squires Student Center at Virginia Tech, the Blacksburg Municipal Building, Corporate Research Center in Blacksburg, Laurel Street in Christiansburg, Park and Ride lot in Christiansburg (near Exit 118 on I-81). BT provides connecting service to and from SmartWay Bus stops in Blacksburg.

Figure 10: SmartWay Coach

Campus to Campus Bus

Virginia Tech's Campus-to-Campus Bus provides employees, students, and their guests with safe and convenient transportation between the university's campuses in the Blacksburg/Roanoke and Ballston/Arlington areas. The bus departs from/arrives in Blacksburg and the National Capital region twice each weekday and once each weekend day and operates year-round, except on university holidays.

Home Ride

Provides weekend and holiday bus service for college students from Radford University, Virginia Tech, James Madison University, and the University of Virginia to Northern Virginia, Richmond, Hampton, Harrisonburg, and Charlottesville. Generally, the service departs VT on Friday afternoons from Lane Stadium and returns Sunday evening. There are at most three northbound departures, leaving Blacksburg at 12:30pm, 2:30pm, and/or 4:30pm on Fridays and arriving in Vienna at 5:00pm, 7:00pm, and/or 9:00pm respectively. On less busy weekends, the service may run less than three trips, so riders need to call in advance regarding the specific service provided for a particular date. The return trip leaves Vienna at 5:30pm Sunday, picks up at Harrisonburg or Charlottesville at 7:30pm, and reaches Blacksburg at 10:00pm.

Community Transit

Provides fixed route services as well as medical trips for individuals with disabilities and/or special needs in Blacksburg, Radford, Christiansburg, Pulaski, Floyd, Montgomery, Dublin, and areas of Giles County. Community Transit serves contracts with Medicaid, Virginia Premier, Optimal Translation & Transportation, Radford Department of Social Services, Radford City Public Schools and New River Community Action.

Ride Solutions

RIDE Solutions is a grant-funded program made possible through the partnership agencies of Virginia Department of Rail and Public Transportation (DRPT), Roanoke-Valley Alleghany Regional Commission, New River Valley Planning District Commission, and Region 2000 Local Government Council. Ride Solutions provides alternative transportation options – ridesharing (carpooling and vanpooling), biking, public transit, walking, and guaranteed ride home services – to residents living within the greater New River and Roanoke Valleys.

Virginia Breeze

The Virginia Breeze is a new intercity bus service connecting Blacksburg with Union Station in Washington, D.C. The daily route includes stops in the New River Valley, Shenandoah Valley and Northern Virginia.

1.12 PUBLIC OUTREACH

BT's existing public outreach process is centered on its Public Participation Policy, which defines that a public hearing shall occur for any service change that affects more than five percent of a route's service hours, service miles or stop locations. Notices for public hearings are to be placed on all BT buses, the BT website, Blacksburg Alert, at the Blacksburg Municipal Building and through the Montgomery County Public Information Office. Additionally, notices must be published for two consecutive days in local newspapers.

BT also actively participates in annual community events, including Virginia Tech events (housing fairs, freshmen/transfer orientation and international orientation), Christiansburg community events and Sustainability Week activities. Content is also frequently distributed in Virginia Tech football and basketball game day transit guides, in apartment newsletters and radio ads and newspaper press releases.

BT also holds informational meetings and focus groups as well as conducts surveys with various community groups, including seniors, persons with disabilities, low-income residents and major employers. The last BT survey was conducted in May 2016, prepared by the Virginia Tech Center for Survey Research, and featured over 5,800 responses.

Currently, BT uses a number of different materials and media for marketing, including a website, social media, brand identification, and customer service. The BT4U program and smart phone application is a "best practices" example of how a system can use technology to promote their system, and their services, while also providing detailed schedule information to a majority of the system's transit users.

In 2017, BT earned the 2017 Outstanding Public Transportation Marketing Award for their "Drive for BT" advertising campaign. This outreach highlighted their unique social media advertising efforts that helped solve their driver shortage issue. By adding social media to their advertising mix and strategically targeting three age groups with intriguing creative material, BT increased staffing by 22 percent. The goal was to bring in 200 applications over a 12-month period. The goal was exceeded as a result of this campaign in just five months.

BT has three main types of bus-wraps: advertisements, hybrid vehicle and Virginia Tech specific. Also, BT recently finished a multi-year design process to come up with new identifying graphics for the fleet. This represents a refresh of the current bus branding since 1983. The new look will gradually be introduced into the system starting in the summer of 2018.

Figure 11: BT Proposed New Branding

2 Goals, Objectives, and Service Design Standards

To facilitate review and assure sufficient coverage, the goals and objectives in this section have been categorized into six areas of activity for the public transit operator. These categories summarize the wide variety of goal/objective statements present in the relevant agency, municipal, and regional planning documents. Areas with limited coverage were targeted for enhanced goal/objective development during the TDP process. These categories are:

GROWTH / NEW OPPORTUNITIES (GO) – Objectives related to the expansion of service geographically or in terms of frequency, including development of new ridership markets, new connections with other service providers, or expanded facilities and fleet.

OPERATIONAL EXCELLENCE (OE) – Objectives that enhance the training and effectiveness of the workforce, address the monitoring and continual improvement of service delivery, and utilize studies or resources to support streamlined operations or project implementation.

COMMUNITY INTEGRATION (CI) – Objectives that further coordinate transit with economic development and local land use preferences and represent participation in studies or locally-based planning initiatives.

FINANCIAL ACCOUNTABILITY (FA) – Objectives that address efficiency of operations and cost recovery, as well as the pursuit of expanded or new revenue sources.

REGULATORY COMPLIANCE (RC) – Objectives that support meeting the agency's regulatory requirements. These should align with guidance and reporting requirements while and establishing or exceeding any applicable performance metrics.

ENVIRONMENTAL STEWARDSHIP (ES) – Objectives that seek to reduce emissions via technology, promote travel alternatives other than driving alone, and reduce energy consumption at facilities.

The results of a review of relevant and recent planning documents that addressed transit goals, objectives, and service standards for the region are presented in the following sections.

2.1 PREVIOUS GOALS AND OBJECTIVES

The previous TDP for Blacksburg Transit (BT) provided one overarching goal/mission statement and eleven (11) objectives. The results of the prior study also noted that BT does not currently utilize a comprehensive set of performance standards to address the efficiency and effectiveness of service or measure actual outcomes against the department's goals and objectives. In addition to categorizing these previous goals/objectives they were also identified as one time or continuous activities. A status, if known, was provided for any one-time objectives proposed in the previous TDP major update.

Blacksburg Transit Goal/Mission Statement: *Blacksburg Transit provides safe, courteous, reliable, accessible, and affordable public transportation to the citizens of the Town of Blacksburg, Virginia Tech, Town of Christiansburg and the partnering communities within the New River Valley.*

Table 6: Previous Major TDP Update BT Objectives

Objective	Category(ies)	Status
Evaluate system and individual route performance and recommend service modifications within identified route service functions (campus circulators, off-campus circulators, and local/non-university services).	OE	Ongoing
Plan for the capital expenses and route modifications necessary to support a Multimodal Transfer Facility on the Virginia Tech campus.	FA / OE	One-Time
Define a local community route plan connecting neighborhoods directly to a core system, accounting for changes in land use and demographics and increasing potential for economic development.	CI	Ongoing
Define a regional and commuter service plan linking the BT service area to the rest of the New River Valley, accounting for changes in land use and demographics and increasing potential for economic development.	CI	Ongoing
Identify activity centers that could naturally support transit hubs and transfer points within the system, along with providing opportunities for mixed use, transit-oriented development.	GO	Ongoing
Identify a capital improvement plan that modernizes the BT fleet and utilizes technology to improve service efficiencies and customer accessibility.	FA / OE	Ongoing
Develop a financial plan and cost allocation process that maximizes local investment and insures partner equity.	FA	One-Time
Establish a comprehensive and quantitative process to regularly measure BT's performance to its core commitments – safety, courtesy, reliability, accessibility, affordability, and the environment – and provide accountability to current and new partners.	OE	Ongoing

2.2 ALIGNMENT WITH REGIONAL GOALS/REGULATIONS (STATE, FEDERAL)

This section reviews the alignment with the previous goals and objectives developed for BT with relevant transit/transportation goals for the region and by localities within the service area. This TDP update will afford the opportunity to further incorporate and/or strengthen BT goals, objectives, and service standards to align with the strategic planning elements of these adopted plans, especially those adopted since the last major TDP update.

The most recent long-range planning update for the region does not address BT goals/objectives directly yet provides some overarching themes and insight into the role of transit expansion in other strategic planning initiatives.

NRV 2040 Long Range Transportation Plan (Draft) - The goals and scope of the NRV LRTP 2040 Update are the same as the goals of VTrans 2040 addressing the following transportation issues and needs within the planning area:

1. Economic Competitiveness and Prosperity
2. Accessible and Connected Places
3. Safety for All Users
4. Proactive System Management
5. Healthy and Sustainable Communities

The other municipal plans and Virginia Tech planning documents identified potential objectives that were ascribed to BT service. These are summarized in the following tables.

Blacksburg Comprehensive Plan (2016 Update)

GOAL: *Provide an interconnected, multi-modal transportation system that is safe and efficient, serves a diverse population, and supports land use.*

Table 7: Blacksburg Comprehensive Plan Transit-Related Objectives

Objective	Category(ies)	Status
Complete a Blacksburg Transit Comprehensive Operational Analysis every five (5) years while updating the Transportation Development Plan annually.	RC / OE	Ongoing
Monitor the public transportation provided to ensure effectiveness and efficiency while maintaining the priorities of safety, courtesy and scheduling.	OE	Ongoing
Operate the transit system in a cost-effective, fiscally sound manner that is well supported by federal and state grants.	FA / RC	Ongoing
Enhance transit accessibility and convenience; lower parking demand, energy use, and air pollution by reducing traffic on local roads; and educate the community on the positive environmental impact from using public transit to encourage its overall use throughout the Town.	ES / GO	Ongoing
Work regionally and locally to develop satellite park-and-ride facilities with bus service to reduce traffic congestion in the region.	GO / CI	Ongoing

Objective	Category(ies)	Status
Comply with all federal and state environmental regulations and guidelines by using best available technologies and other innovative systems. Support Blacksburg Transit's continued use of alternative fuels and acquisitions of hybrid electric buses by providing needed additional funding.	RC	Ongoing
Stimulate economic development by expanding public transit's role in supporting tourism and as a tool to attract new businesses and aid existing local businesses in employee retention.	CI	Ongoing
Upgrade the Blacksburg Transit fleet to provide wireless internet access and implement new technologies for vehicles, equipment, and/or communications in cooperation with Virginia Tech.	OE	Ongoing
Increase the number of covered bus shelters and covered bike parking provided at transit stops where appropriate.	GO	Ongoing
During the development review process, ensure that transit service and access to/from the transit stop and the development are provided.	CI	Ongoing
Ensure that transit service is accommodated in designing Town projects.	CI	Ongoing
Expand Blacksburg Transit to become a full-service network for permanent residents to meet their commuting, shopping, sporting or leisure activities.	GO	Ongoing
Better serve riders with up-to-date route information.	OE	Ongoing
Work with other entities in the region to explore expansion of Blacksburg Transit and alternative transportation to increase mobility between localities in the region and reduce individual commuting by automobile.	GO / CI	Ongoing

Virginia Tech Parking and Transportation Master Plan (2016)

GOAL: *To support the transit opportunities identified in this plan.*

Table 8: Virginia Tech Parking and Transportation Objectives for BT

Objective	Category(ies)	Status
Continue to support Blacksburg Transit as an important mode of access to campus for the local community.	CI	Ongoing
Facilitate transition to the Multi-Modal Transit Facility.	OE	Ongoing
Develop additional shuttles to support changes to the parking system.	GO / CI	Ongoing
Balance service preferences (high frequency/high capacity) with cost and operational considerations.	OE / FA	Ongoing

Federal Transit Administration Rulemaking (2016): In August, 2016, FTA published a final rule for the Public Transportation Safety Program, which provides the overall framework for FTA to monitor, oversee, and enforce safety in the public transportation industry. This builds upon implementing a Safety Program that is both scalable and flexible through the application of Safety Management System (SMS) principles. SMS builds on existing transit safety practices by using data to proactively identify, avoid, and mitigate risks to safety.

Just prior to this rulemaking, in July 2016, the FTA published a **Final Rule for Transit Asset Management** (TAM). The rule requires FTA grantees to develop asset management plans for their public transportation assets, including vehicles, facilities, equipment, and other infrastructure. FTA's national Transit Asset Management System Rule:

- Defines "state of good repair";
- Requires grantees to develop a TAM plan;
- Establishes performance measures;
- Establishes annual reporting requirements to the National Transit Database; and
- Requires FTA to provide technical assistance.

These federal rules also inform DRPT updates of TDP guidance and performanced-based monitoring of transit grantees throughout the Commonwealth.

Christiansburg Plan Comprehensive Plan (2013)

Overarching goal is to continually assess the feasibility of regional administration for transit service as regional transit connections among localities increase.

GOAL #1: *Improve access to transit and increase convenience of transit service while maintaining safety, reliability, and efficiency. Promote the integration of bus, rail, air, and other modes of travel into the Christiansburg transportation system.*

Table 9: Christiansburg Comprehensive Plan Transit-Related Objectives for Goal #1

Objective	Category(ies)	Status
Maintain and enhance bus service throughout Town and connecting to other regional facilities.	GO	Ongoing
Increase the number of residents and visitors that utilize bus service.	GO	Ongoing
Consider new bus routes where demand is found.	GO	Ongoing
Consider additional bus stops and extended routes where demand is found.	GO	Ongoing
Increase the hours for bus service to make local and regional travel more convenient.	GO	Ongoing
Match resident needs with bus service provision through stop locations and scheduling.	GO	Ongoing
Enhance amenities and increase convenience for riders at bus stops.	OE	Ongoing
Increase the number of covered bus shelters, benches, and bicycle parking at transit stops.	OE / GO	Ongoing
Support amenities such as shelters, benches, and improved signage at high usage stops as described in Project No. 19 of the Blacksburg Transit 2011- 2017 TDP.	OE	Ongoing
Support the creation of the NRV Mall Transit Center with bus bays and passenger amenities as described in Project No. 16 of the Blacksburg Transit 2011-2017 TDP with location preference at the existing New River Valley Mall.	GO	Ongoing

Objective	Category(ies)	Status
Support the creation of the Downtown Christiansburg Mini-Hub Transfer Station with space for several buses and amenities as described in Project No. 18b of the Blacksburg Transit 2011-2017 TDP.	GO	Ongoing

GOAL #2: *Enhance transit access throughout Town and connecting to other regional facilities.*

Table 10: Christiansburg Comprehensive Plan Transit-Related Objectives for Goal #2

Objective	Category(ies)	Status
Create incentives for creating public transit stops when developing or redeveloping property.	CI	Ongoing
Consider transit accommodations in future Town transportation projects.	CI	Ongoing
Support the possibility of developing a Transit Center located in the Mall UDA.	CI / GO	Ongoing
Work to improve Park and Ride facilities at I-81 Exit 118 - Falling Branch with the inclusion of a covered shelter and emergency phone at minimum. Consider relocation for expansion to reduce conflict with adjacent Falling Branch Elementary School. Support improvements such as indoor waiting areas, restrooms, and traffic separation as described in Project No. 17 of the Blacksburg Transit 2011-2017 TDP.	CI	One-time

2.3 RATIONALE FOR CHANGE

Upon review of additional plans and studies, it was determined that BT may benefit from additional diversity in its goals/objectives. Key areas not addressed directly by BT's established objectives include Environmental Stewardship and Regulatory Compliance. These objectives are found within regional planning documentation, for example regarding Environmental Stewardship local objectives seek to "explore cost-effective, environmentally friendly solutions to the public transportation needs in the region." An objective in this area could support changes in fleet composition, energy efficiency projects at facilities, or promote the continued integration of low impact amenities (i.e. solar powered bus shelters). Specific Organizational Excellence goals/objectives related to system safety/security and customer service are also missing direct emphasis in the objectives established for BT. Finally, the regulatory environment has changed since the last major TDP update and new performance-based state/national requirements need to be incorporated. In particular, the BT goals/objectives and standards need to address the Transit Asset Management (TAM) minimum standards to demonstrate compliance and help keep BT assets operating smoothly and efficiently.

Additional Organizational Excellence goals will also support the inclusion of newly identified service standards. While a comprehensive list was prepared in the prior TDP, service standards for safety and service reliability were absent. This TDP update effort seeks to consolidate and repackage goals/objectives to allow for targeted measures, strategies and timelines to show continued success or progress toward desired results. In this reorganization, service standards are now directly associated with an objective to provide the measurable target that is proposed.

Review of other strategic goals for the region indicates additional preference for Growth / New Opportunities and Community Integration. It is recommended that additional emphasis be placed on BT's goals and objectives in some of these areas. Not all regional goals lend themselves to the establishment of measurable targets, which is discussed further in the following section.

Certain elements are outside BT's ability to control or influence. The goals and objectives to be developed in this major TDP update are intended to be accomplished by BT without completely depending on outside actors. This is important so that the agency is not held to unrealistic targets. Any goals or objectives that may require assistance, approval, or coordination will be noted.

Several historic BT objectives and other regional goals have focused extensively on economic development, land use changes and response to demographic shifts. While BT will ultimately accomplish many of these items in providing quality transit options, no specific nor measurable objectives were recommended to be included in the New Goals and Objectives developed in this major TDP update.

2.4 NEW GOALS AND OBJECTIVES

New goals and objectives were developed incorporating agency, regional, and state priorities. Examples of potential measures, desired targets, and strategies for reaching/maintaining targets in a timely fashion are provided. Additional detail is provided on potential sources of data or technology necessary to facilitate the measurements. Measures have been selected that best reflect BT's unique operating environment. For example, due to extensive non-fare paying ridership though the service agreement with Virginia Tech, it is more logical to focus on overall cost efficiency than direct farebox recovery or net subsidy per route. Many measures presented will relate directly to the service design standards found in the next section.

GOAL 1: Evaluate system and individual route performance and recommend service and capital improvements.

Objective 1.1: Implement an internal performance monitoring program by route. (OE, FA)		
MEASURE	**TARGET**	**STRATEGY**
Route metrics compiled for passengers per hour, passengers per mile, operating expense per passenger trip, and operating expense per capita.	Conduct service adjustments for routes 50% below route type average of metric over two consecutive quarters.	Monitor route performance category of service type (Fixed route, Community Circulator, BT Access).
Data collection sources: ***Farebox, APC, schedule data, operations logs, financial data.***		

Objective 1.2: Continued enhancement of multimodal facilities, amenities and connectivity to promote seamless travel across a variety of regional transit service options. (GO, CI, RC)		
MEASURE	**TARGET**	**STRATEGY**
Number of locations where transfers can be made to other modes and transit operators.	Complete a minimum of at least two previously identified projects or schedule adjustments to improve regional connectivity.	Execute strategy suggestions provided in the Regional Transit Study.
Percent of stops meeting ADA accessibility standards.	90 percent of all fixed route stops meet ADA compliance.	Ensure compatibility during shelter upgrades, demonstrate annual progress toward target.
Data collection sources: ***Manual counting/field inspections, bus stop/facility database, in-house documentation, RTCC reporting.***		

Objective 1.3: Monitor and improve safety on transit service and with facilities. (OE)		
MEASURE	**TARGET**	**STRATEGY**
Preventable bus accident rate per 100,000 miles.	Less than 1 per 100,000 miles.	Establish/maintain driver safety recognition program, conduct refresher training for routes/operators as needed.
Total safety incidents per 100,000 boardings.	Less than 0.7 per 100,000 boardings.	Identify locations or practices disproportionately contributing to incidents and target awareness campaigns or physical improvements.
Data collection sources: ***Operations logs, farebox, APC.***		

GOAL 2: Pursue continued growth of service options for the local community.

Objective 2.1: Implement strategies to avoid overcrowding. (OE)		
MEASURE	**TARGET**	**STRATEGY**
Number of times vehicles exceed capacity (load standards) and pass-bys recorded on route stops.	No more than 5% of all monthly trips exceed capacity for greater than 10 minutes, and no more than two (2) pass-bys per route per day.	Continued use of technology to manage real-time demand. Expand fleet or acquire larger vehicles as necessary to provide sufficient peak capacity.
Passenger trips per vehicles operated in maximum service.	Less than 110,000.	Monitor the systemwide supply of revenue service based upon demand.
Data collection sources: ***Operations logs, CAD/AVL system.***		

Objective 2.2: Provide appropriate amenities in response to service demand. (GO)		
MEASURE	**TARGET**	**STRATEGY**
Percent of stops with shelters and benches that exceed service standards for such amenities.	90 percent of stops with over 50 boardings have a shelter; 95 percent of stops with over 25 boardings have a bench.	Monitor and identify locations where additional investment is needed. Proactively engage partners as needed to accommodate upgrades.
Data collection sources: ***Manual counting/field inspections, bus stop/facility database.***		

Objective 2.3: Establish and maintain the appropriate balance between community services and other fixed route services. (OE, CI)		
MEASURE	**TARGET**	**STRATEGY**
Percent of service hours/miles for community service routes compared to total system hours/miles.	At least 20 percent of all system hours/miles dedicated to community service.	Monitor service levels, adjust community service when increasing fixed route service, report on progress to those requesting community service expansion.
Data collection sources: ***CAD/AVL system, in-house documentation.***		

GOAL 3: Improve financial efficiency and demonstrate accountability to current and new partners.

Objective 3.1: Contain operating costs by monitoring and adjusting system performance while exploring cost savings measures. (FA)		
MEASURE	**TARGET**	**STRATEGY**
Operating expense growth (non-fuel).	Not to exceed 4 percent per year.	Monitor cost trends, adjust service accordingly to maintain budgetary constraints.
Operating expense per revenue hour/revenue mile.	Below VA average for all NTD reporting agencies.	Compare with statewide NTD reporting.
Data collection sources: ***Financial data, CAD/AVL system, operations logs.***		

Objective 3.2: Maximize and preserve the existing transit system. (OE)		
MEASURE	**TARGET**	**STRATEGY**
State of Good Repair backlog as a percentage of overall budget.	No more than 10 percent of annual budget.	Track items needing attention as indicated in TAM database/reporting.
Miles Between Service Road Calls.	6,500 miles.	Maintain preventative maintenance schedules.
Percent of fleet exceeding lifespan (years/miles).	No more than 20 percent of fleet.	Adherence to FTA Useful Life Benchmarks for vehicle classifications. Calculate separately for BT Access fleet.
Missed trips due to operational failures.	95 percent or more of all scheduled trips operated. 95 percent of all pull outs dispatched.	Reconcile schedule data with operating data/dispatch logs on a monthly basis.
Data collection sources: ***Maintenance logs, TAM reporting, fleet inventory.***		

Objective 3.3: Maintain compliance with all applicable outside guidance and reviews of BT operations. (RC)		
MEASURE	**TARGET**	**STRATEGY**
Findings from compliance reviews.	No more than 1 finding per year. No consecutive findings.	Establish recommended processes, timely close-out of any identified issues.
Data collection sources: ***In house documentation.***		

Objective 3.4: Demonstrate savings through energy efficiency and positive environmental impacts. (ES)		
MEASURE	**TARGET**	**STRATEGY**
Energy consumption reduction through alternative sources or technology upgrades (facilities/amenities).	5 percent reduction in energy consumption from 2017 baseline over life of TDP.	Continued pursuit of solar power, LEED certification for new facilities, and retrofit of inefficient lighting, HVAC, etc.
Ratio of vehicle miles / total fuel consumption (gallons).	No net decrease from previous year.	Monitor annually, investigate fuel conservation practices to achieve overall fleet fuel efficiency and investigate the purchase of electric or hybrid/electric vehicles.
Data collection sources: ***Manual counting, financial data, maintenance logs, schedule data, fleet data.***		

GOAL 4: Deliver an excellent customer experience

Objective 4.1: Provide more comfortable, more efficient, and safer operation to include a focus on security, cleanliness, and efficient customer service. (OE)		
MEASURE	**TARGET**	**STRATEGY**
Number of customer complaints per 100,000 boardings by mode.	Less than 20.	Continued quality control for vehicle cleanliness, monitoring and correction of any recurring scheduling/capacity issues (see Objective 2.1).
On-time performance.	Greater than 85 percent per route.	Monitor and adjust schedules as needed.
Average number of monthly systemwide NTD Reportable Crimes.	Less than 1.	Adherence to a consolidated System Security Program.
Data collection sources: ***In-house documentation/survey, CAD/AVL system, NTD reporting.***		

Objective 4.2: Improve communication with customers via technology applications, website enhancements, social media presence and call center information dissemination. (OE)		
MEASURE	**TARGET**	**STRATEGY**
Uptime of website, smartphone applications. **Call center wait time.**	99.9% website uptime. Call wait time – 30 seconds.	Monitor applications, refresh content of website daily, push out service alerts. Monitor call logs for BT Access.
Data collection sources: ***Telephony logs, in-house documentation.***		

2.5 SERVICE DESIGN STANDARDS

Service design standards are critical planning tools to evaluate the effectiveness of existing service and to assure impartiality in service modification decisions. Service standards are typically developed in several categories of service, such as service coverage, passenger convenience, fiscal condition, and passenger comfort. The most effective service standards are straightforward and relatively easy to calculate and understand. Service standards reinforce the performance measurement necessary to meet many of BT's objectives.

Service guidelines from the 2006 Comprehensive Operational Analysis were reiterated in the previous 2011 TDP. For this TDP update, service standards that were advisory in nature (no measure attached) and that reflected service design philosophy have been pulled out as introductory material to this section. Remaining service

standard measures are then identified with a status of either maintained, modified, or new for the purposes of this TDP update. Modifications are underlined to identify the newly proposed changes.

Overall fixed route design and organization philosophy from the 2011 TDP included the following principles:

- Blacksburg Transit routes should be divided into two categories for the purpose of determining route design and performance standards: Fixed Routes and Community Circulator services. (Currently, the only route that would be considered a Community Circulator service is the Explorer).
- Routes should be predominantly bi-directional in nature. Large one-way loops, with over 30 minutes running time, should be avoided if possible.
- Travel times between major destinations should be minimized by providing some routes that operate on the fastest and most direct route, and by scheduling timed transfers between routes to minimize wait times.
- Scheduled headways should conform to regularly recurring clock intervals.
- An appropriate loading standard should be established any time BT adds a new vehicle size or type to the fleet.
- BT should regularly evaluate the performance of individual bus routes based upon the passengers per revenue hour and passengers per revenue mile.

Table 11: Proposed BT Service Standards

SERVICE STANDARD	Status	Objective
Hours of Operation		
During Full Service, the maximum span of service should be from 7:00 a.m. to 12:45 a.m. from Monday to Thursday, 7:00 a.m. to 2:45 a.m. on Fridays, 9:30 a.m. to 2:45 a.m. on Saturdays, and from 11:30 a.m. to 11:30 p.m. on Sundays.	Maintained	N/A
During Full Service, the maximum span of service should be 7:00 a.m. to 10:15 p.m. on weekdays, 9:30 a.m. to 7:15 p.m. on Saturdays, and 11:30 a.m. to 7:15 p.m. on Sundays.	Maintained	N/A
Community circulator and other non-campus-oriented routes should be operated during consistent hours year-round and vary according to the need of the service and the community.	Maintained	2.3
Service Levels		
Peak periods for Fixed Routes are defined as 9:00 a.m. to 4:00 p.m. on weekdays during full service.	Maintained	N/A
Peak service on Community Circulators is generally between the weekday hours of 6:00 a.m. and 9:00 a.m., and between 3:00 p.m. and 6:00 p.m.	Maintained	N/A
Evening periods are from 6:00 p.m. to 9:00 p.m. and night periods are from 9:00 p.m. to 3:00 a.m.	Maintained	N/A
Off-peak service is provided at all other times except for evening/night periods.	Maintained	N/A
Frequency of Service		

SERVICE STANDARD	Status	Objective
Maximum policy headways for Fixed Routes are 10 to 15 minutes during peak periods and 30 to 60 minutes during off-peak periods. Community Circulator routes should be 60 to 120 minutes during peak hours and off-peak hours.	Maintained	N/A
Loading Standard		
The loading standard should be a maximum average load factor of 1.2 (ratio of total passengers to seated passengers) during the weekday peak periods, and 1.0 at all other time periods.	Maintained	2.1
For individual trips, loading standards should not be exceeded for time periods greater than 10 minutes.	Maintained	2.1
The maximum number of passengers on-board must not exceed 120 passengers for 60-foot articulated buses, 80 passengers for 40-foot buses, and 70 passengers for 35-foot buses at any time.	Modified	2.1
Passenger Stops		
The spacing of bus stops will vary by location, but as a general rule, there should be bus stops no closer than every 0.2 miles.	Maintained	N/A
Bus Shelters and Benches		
Bus stops with more than 50 passengers boarding daily should have a bus shelter.	Maintained	2.2
Benches should be provided at bus stops with more than 25 passengers per day.	Maintained	2.2
Passenger Productivity		
FIXED ROUTE Category — Pax./Rev. Hr — Pax./Rev. Mi. Good — > 25 — > 3.0 Satisfactory — 20-25 — 2.0-3.0 Marginal — 15-20 — 1.0-2.0 Unsatisfactory — < 15 — < 1.0	Maintained	1.1
COMMUNITY CIRCULATOR Category — Pax./Rev. Hr — Pax./Rev. Mi. Good — > 10 — > 1.0 Satisfactory — 7-10 — 0.6-1.0 Marginal — 4-7 — 0.3-0.6 Unsatisfactory — < 4 — < 0.3	Maintained	1.1
Schedule Adherence		
Category — Percent between 0 and 5 minutes late Good — > 90% Satisfactory — 85% - 90% Marginal — 80-85% Unsatisfactory — < 80%	Maintained	1.1
Layover		

SERVICE STANDARD	Status	Objective
The amount allocated for layover time will be a minimum of 7 percent of the total cycle time.	Maintained	N/A
Service Reliability		
Maintain fewer than 6,500 miles between service road calls.	New	3.2
Less than 5 percent missed trips due to operational failures.	New	3.2
No more than 20 percent of fleet exceeding the FTA ULB for its vehicle classification.	New	3.2
Customer Service		
Less than 20 customer complaints per 100,000 boardings by mode.	New	4.1
Average call center wait time less than 30 seconds.	New	4.2
Safety and Security		
Less than 1 monthly systemwide NTD Reportable Crimes.	New	4.1
Service Type Thresholds		
Service Type Population/Employment Density Fixed Route 2,500 p+e / sq. mi. Route Deviation 1,500 to 2,500 p+e / sq. mi. Dial-a-Ride < 1,500 p+e / sq. mi.	Maintained	N/A
Provide a minimum of 20 percent of service (hours/miles) as Community Circulator designated routes.	New	2.3

2.6 MEASURING PERFORMANCE

This section provides additional details on the definition and measurement approaches for some of the service standards presented in Table 11. These approaches should be monitored on a recurring basis with adjustments made to avoid any excessively cumbersome data collection and/or measurement practices. Where possible, the agency will leverage technology (operations, maintenance, or financial systems) to streamline measurements. The measurement methodology should be documented in agency policies and procedures and the results should be reported at least quarterly, unless otherwise noted.

2.6.1 Dependability

The system should be resilient to impacts caused by accidents, breakdowns, traffic delays, driver/vehicle availability, and other factors that could cause a scheduled trip to be missed. Service should also not be curtailed due to the unavailability of either a driver or a vehicle upon initial pull out from the garage or home location for a scheduled pick up. A final component to system reliability is the average distance in service miles between when all vehicles in revenue service incur component failures that prevent starting or finishing a run.

Measurement Approach

- Logs shall be maintained and updated daily to accurately reflect vehicle status at the start of the trip. Vehicles unable to begin their assigned trip or that require an additional vehicle to be dispatched due to operability shall be reported as a missed trip.

- An operations/maintenance log shall be maintained to record all service failures of a vehicle in revenue service. This measurement can be calculated each month by dividing the number of revenue miles operated by the number of road calls.

2.6.2 Safety

The National Transit Database (NTD) defines a reportable incident as one in which one or more of the following conditions applies: 1) A fatality; 2) Injuries requiring medical attention away from the scene for one or more persons; or 3) Property damage equal to or exceeding $25,000.

Measurement Approach

- BT should maintain and review quarterly safety logs of all incidents and report this information to NTD. As necessary, BT should use additional incident forms to record whether incidents were preventable, caused by other drivers, or caused by outside influences. For preventable incidents, the measurement should also identify operators who may need additional training following one or more occurrences.

3 Service and System Evaluation

As of Fall 2017, Blacksburg Transit operates 13 fixed-route services in Blacksburg, four fixed-route services in Christiansburg, and two services (Two Town Trolley and BT Commuter) that connect the two towns. The Blacksburg area services are mainly focused around the Virginia Tech campus, with many routes providing transfer possibilities at either the Alumni Mall or at the Drillfield. All Christiansburg routes serve the New River Valley Mall and the retail area surrounding it, where riders can access the Two Town Trolley service to Blacksburg. Most Blacksburg services run all day, five days a week, with some providing additional late-night and weekend service at reduced frequencies. Christiansburg services have more limited hours, and the Two Town Trolley is the only fixed-route service operating in Christiansburg on weekends. Some Blacksburg routes do not operate, and others operate with reduced frequency or on different routes, in the reduced service plan, which is implemented when Virginia Tech is not in session. Christiansburg routes are not affected by the reduced service plan. **Table 12** lists all Blacksburg Transit fixed-route services, while **Figure 12** and **Figure 13** show, respectively, the full service and reduced service route patterns.

Table 12: Blacksburg Transit Routes and Service Types

Route	From	To	Service Type	Full Service/Reduced Service
BT Commuter	Christiansburg (Simmons and Hammes)	Blacksburg (Municipal Building)	Weekday Peak Only[1]	Full and Reduced Service
Carpenter Boulevard	Squires West	Redd Circle	Weekday Only	Full and Reduced Service
Corporate Research Center (CRC) Shuttle	Newman Library	Tech Center Drive/Knollwood	Weekday Only[2]	Full and Reduced Service
The Explorer: Blue Loop	NRV Mall[3]	Shoppers Way	Weekday Only	Full and Reduced Service
The Explorer: Gold Loop	NRV Mall	Shoppers Way	Weekday Only	Full and Reduced Service
The Explorer: Green Loop	NRV Mall	NRV Mall	Weekday Peak Only[4]	Full and Reduced Service
Harding Avenue	Squires East	Ascot Lane/Hampton Court	Weekday Only	Full and Reduced Service
Hethwood A	Burruss Hall	Stroubles Circle	Weekday Day Only	Full and Reduced Service

[1] Operates from Christiansburg to Blacksburg in the AM, and from Blacksburg to Christiansburg in the PM.
[2] On most Saturdays during Full Service, a demand-response service is operated along this route.
[3] One trip per day originates at the Montgomery County Government Center.
[4] Operates one trip per day during the PM peak.

Route	From	To	Service Type	Full Service/Reduced Service
Hethwood B	Torgerson Hall	Tall Oaks/Foxhunt	Weekday Day Only	Full and Reduced Service
Hethwood Combined	Burruss Hall	Stroubles Circle	Weekday Evenings Only	Full and Reduced Service
Hethwood/Harding Combined Route	Ascot Lane/Hampton Court	Stroubles Circle	Weekends	Full and Reduced Service
Hokie Express	Newman Library/Squires West[5]	Oak Lane North	Weekdays and Weekends	Full Service Only
Main Street	Squires West	Fairfax/Ellett	Weekdays and Weekends	Full and Reduced Service
Patrick Henry	Squires West	Patrick Henry/Seneca	Weekday Only	Full and Reduced Service
Progress Street	Squires East	The Village on Patrick Henry	Weekday Only	Full Service Only
Toms Creek	Torgerson Hall	University City/Toms Creek	Weekdays and Weekends[6]	Full and Reduced Service
Two Town Trolley	Squires East	NRV Mall	Weekdays and Weekends	Full and Reduced Service
University City Boulevard	Burruss Hall	Patrick Henry/Toms Creek	Weekdays and Weekends	Full and Reduced Service[7]
University Mall Shuttle	Burruss Hall	University Mall	Weekday Only	Full Service Only

[5] Squires West is the origin point during late nights and all day on weekends.
[6] Route does not operate on certain Sundays.
[7] Route does not operate on weekends during Reduced Service.

Figure 12: Blacksburg Transit Routes – Full Service

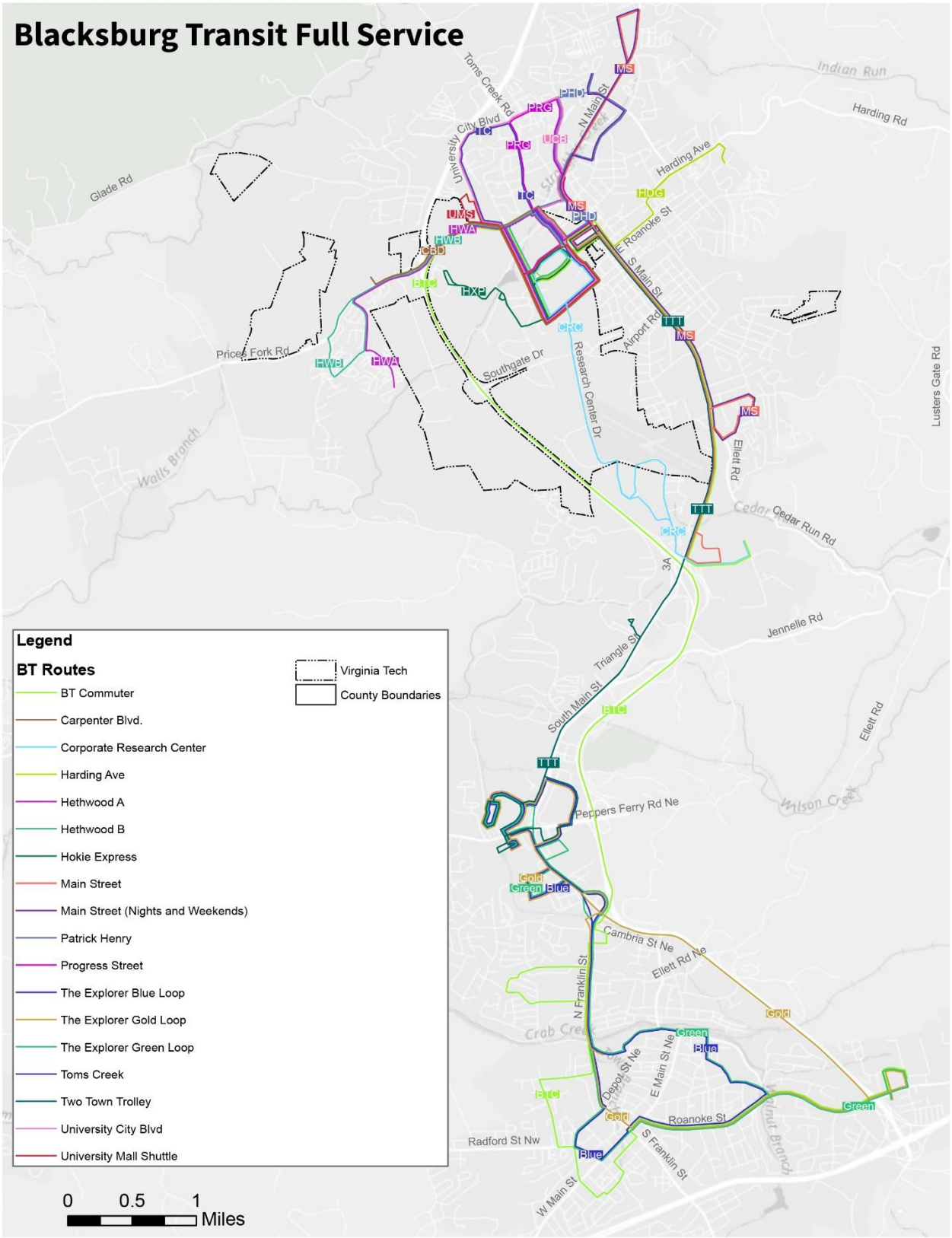
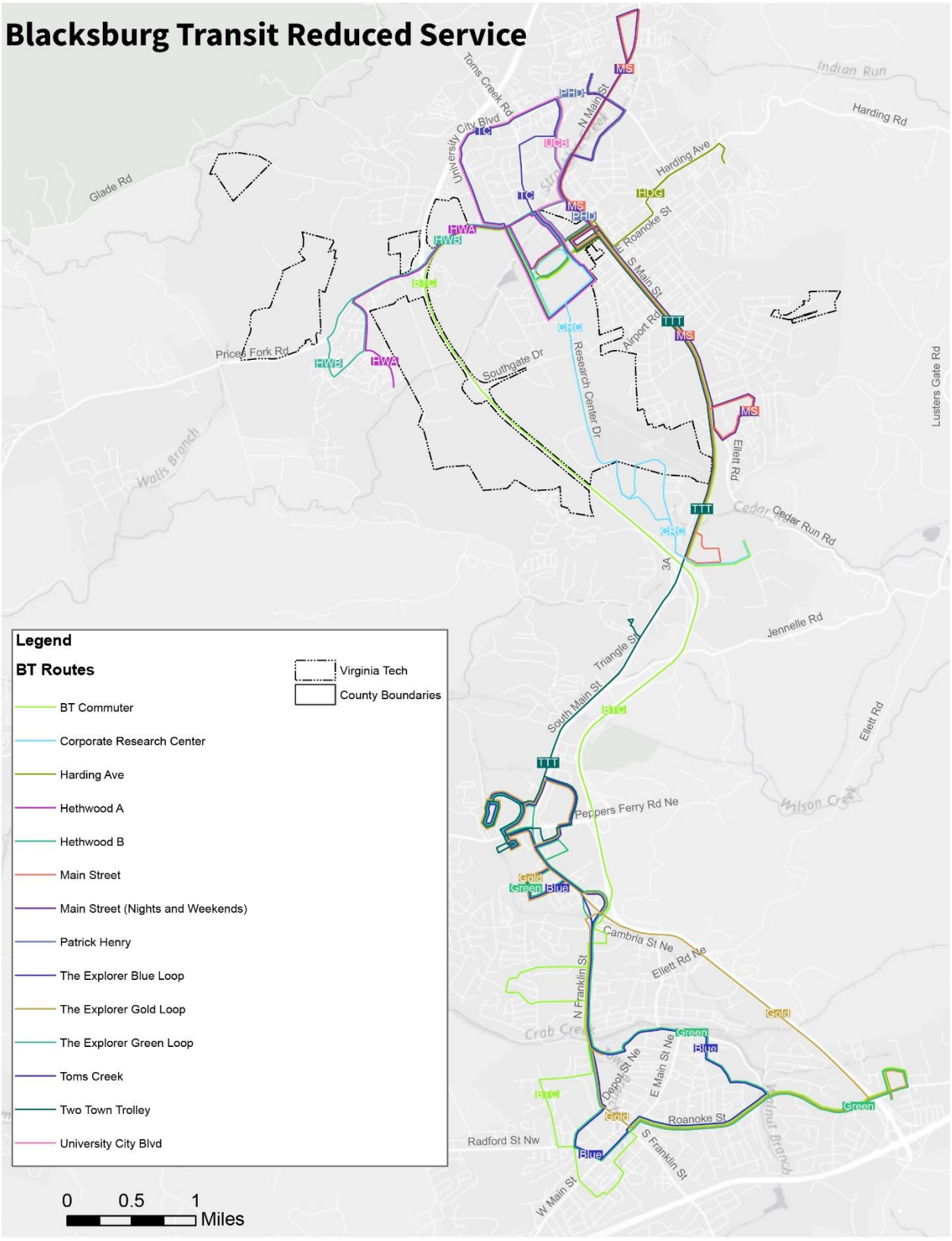


Figure 13: Blacksburg Transit Routes – Reduced Service



3.1 ROUTE LEVEL OF SERVICE

Blacksburg Transit operates two main schedules: full service for when Virginia Tech classes are in session and reduced service for when Virginia Tech classes are not in session. Additionally, BT operates an "intermediate" service on nine days per year that are typically "in between" periods at Virginia Tech. General operating hours during full service periods are 7:00am to 12:00am Monday through Friday, 9:30am to 12:00am on Saturdays and 11:30am to 11:00pm on Sundays. During full service periods, additional late-night service is offered on several routes, some of which are deviated from their regular alignments or combined with other routes.

Several routes have peak headways of ten minutes during full service periods, including Hethwood A, Hokie Express, Patrick Henry, Progress Street, Toms Creek, and University City Boulevard. Effective headways are less than 10 minutes on several key corridors in Blacksburg due to route overlaps, and in some cases, are less than five minutes. The Drillfield North, Stanger Street, and West Campus Drive on the Virginia Tech campus and portions of Prices Fork Road have effective headways less than five minutes. For passengers traveling to and from the Virginia Tech campus on these corridors, this means schedules do not need to be consulted during peak periods. Just over 25 percent of daily ridership on the BT system occurs along these corridors.

Routes serving Christiansburg with the exception of the Two Town Trolley generally have much lower levels of service. The BT Commuter route only has two trips per weekday while the Explorer only has 12 trips per weekday.

General operating hours during reduced service periods are 7:00am to 10:00 pm on weekdays, 9:30am to 9:00pm on Saturdays and 11:30am to 7:00pm on Sundays. All routes operate during reduced service periods except Progress Street, Hokie Express, and University Mall Shuttle. Levels of service are greatly reduced during this period, with most routes having 30-60 minute headways on weekdays and 60 minute headways on weekends. Additionally, there is no late-night service during reduced service periods.

Table 13, **Figure 14**, and **Figure 15** summarize levels of service during full service periods while **Table 14**, **Figure 16**, and **Figure 17** summarize levels of service during reduced service periods. **Figure 18** illustrates effective headways at the stop level during full service periods, and **Figure 19** illustrates the same during reduced service periods.

Table 13: Blacksburg Transit Level of Service by Route – Full Service

Route	Weekday								Saturday			Sunday		
	Span	Headway						Trips	Span	Headway	Trips	Span	Headway	Trips
		AM Peak	Midday	PM Peak	Evening	Late	Fri Late	Reg/ Fri						
BT Commuter	7:00a 6:10p	1 trip	-	1 trip	-	-	-	2	-	-	-	-	-	-
Carpenter Boulevard	7:00a 6:25p	30	30	30	-	-	-	23	-	-	-	-	-	-
CRC	6:45a 10:00p	20	20	20	30	1 trip	-	42	-	-	-	-	-	-
The Explorer Blue Loop	7:15a 5:40p	117	120	120	-	-	-	6	-	-	-	-	-	-
The Explorer Gold Loop	8:00a 4:30p	105	120	-	-	-	-	5	-	-	-	-	-	-
The Explorer Green Loop	5:45p 6:45p	-	-	1 trip	-	-	-	1	-	-	-	-	-	-
Harding	7:00a 9:45p	15	15	15/30[8]	30	-	-	52	-	-	-	-	-	-
Hethwood A	7:00a 9:30p	10	10	10/15[9]	30	-	-	72/ 67	-	-	-	-	-	-
Hethwood B	7:00a 9:30p	15	15	15	30	-	-	52	-	-	-	-	-	-
Hethwood Combined	10:15p 12:30a	-	-	-	-	60	60[11]	3/5	-	-	-	-	-	-

[8] 30 minute headways begin at 6:15 pm
[9] 15 minute headways begin at 5:45 pm

Route	Weekday								Saturday			Sunday		
	Span	Headway						Trips	Span	Headway	Trips	Span	Headway	Trips
		AM Peak	Midday	PM Peak	Evening	Late	Fri Late	Reg/ Fri						
Hethwood/ Harding	9:45p 2:30a[10]	-	-	-	-	-	-	-	9:30a 2:30a	60	18	11:30a 11:30p	60	12
Hokie Express	7:00a 2:30a[10]	10	10	10/ 15[11]	30	30	30	81/80	9:30a 2:30a	30	35	11:30a 11:30p	30	25
Main Street	7:00a 2:30a[11]	15	15	15	30	60	30	57/62	9:30a 2:30a	60/30 late	24	11:30a 11:30p	60	13
Patrick Henry	7:00a 6:30p	10	10/15[12]	15	-	-	-	58	-	-	-	-	-	-
Progress Street	7:00a 9:30p	10	10	10/ 15[11]	30	-	-	75/70	-	-	-	-	-	-
Toms Creek	7:00a 2:30a[11]	10	10	10/ 15[13]	30	30	30	81/80	9:30a 2:30a	30	35	11:30a 11:30p	30	25
Two Town Trolley	7:00a 12:45a[14]	60	60	60	60	-	60	12/19	10:15a 12:45a	60	15	12:15p 5:45p	60	6
University City Blvd	7:00a 2:30a[15]	10	10	10/ 15[13]	30	-	30	75/80	9:30a 2:30a	30	35	11:30a 11:30p	30	25
University Mall Shuttle	8:45a 8:55p	1 trip	15	15	30	-	-	45	-	-	-	-	-	-

[10] Service until 2:30 am only on Friday, all other days service ends at 12:30 am
[11] On Monday-Thursday, 15 minute headways begin at 5:45 pm. On Friday, 15 minute headways throughout pm peak.
[12] 15 minute headways begin at 12:15 PM
[13] On Monday-Thursday, 15 minute headways begin at 6:00 pm. On Friday, 15 minute headways throughout pm peak.
[14] Service after 5:55 pm on Fridays only
[15] Service until 2:30 am only on Friday, all other days service ends at 9:30 pm

Table 14: Blacksburg Transit Level of Service by Route – Reduced Service

Route	Weekday							Saturday			Sunday		
	Span	Headway					Trips	Span	Headway	Trips	Span	Headway	Trips
		AM Peak	Midday	PM Peak	Evening	Late / Fri Late							
BT Commuter	7:00a 6:10p	1 trip	-	1 trip	-	- / -	2	-	-	-	-	-	-
CRC	7:05a 6:30p	40	40	40	-	- / -	18	-	-	-	-	-	-
The Explorer Blue Loop	7:15a 5:40p	117	120	120	-	- / -	6	-	-	-	-	-	-
The Explorer Gold Loop	8:00a 4:30p	105	120	-	-	- / -	5	-	-	-	-	-	-
The Explorer Green Loop	5:45p 6:45p	-	-	1 trip	-	- / -	1	-	-	-	-	-	-
Harding	7:00a 9:55p	30	30	30	30	- / -	33	-	-	-	-	-	-
Hethwood A	7:00a 6:30p	30	30	30	-	- / -	24	-	-	-	-	-	-
Hethwood B	7:00a 6:30p	30	30	30	-	- / -	24	-	-	-	-	-	-
Hethwood Combined	6:45p 9:30p	-	-	-	30	- / -	6	-	-	-	-	-	-
Hethwood/ Harding	-	-	-	-	-	- / -	-	9:30a 8:55p	60	13	11:30a 6:55p	60	9
Main Street	7:00a 10:00p	30	30	30	30	- / -	32	9:30a 9:00p	60	13	11:30a 7:00p	60	9
Patrick Henry	7:00a 6:30p	30	30	30	-	- / -	24	-	-	-	-	-	-
Toms Creek	7:00a 10:00p	30	30	30	30	- / -	31	9:30a 9:00p	30	24	11:30a 7:00p	30	16
Two Town Trolley	7:00a 5:55p	60	60	60	-	- / -	12	10:15a 5:45p	60	8	12:15p 5:45p	60	6

Route	Weekday							Saturday			Sunday		
	Span	Headway					Trips	Span	Headway	Trips	Span	Headway	Trips
		AM Peak	Midday	PM Peak	Evening	Late	Fri Late						
University City Boulevard	7:00a 6:30p	30	30	30	-	-	-	24	-	-	-	-	-	-

Figure 14: Blacksburg Transit Level of Service by Route – Full Service Weekdays

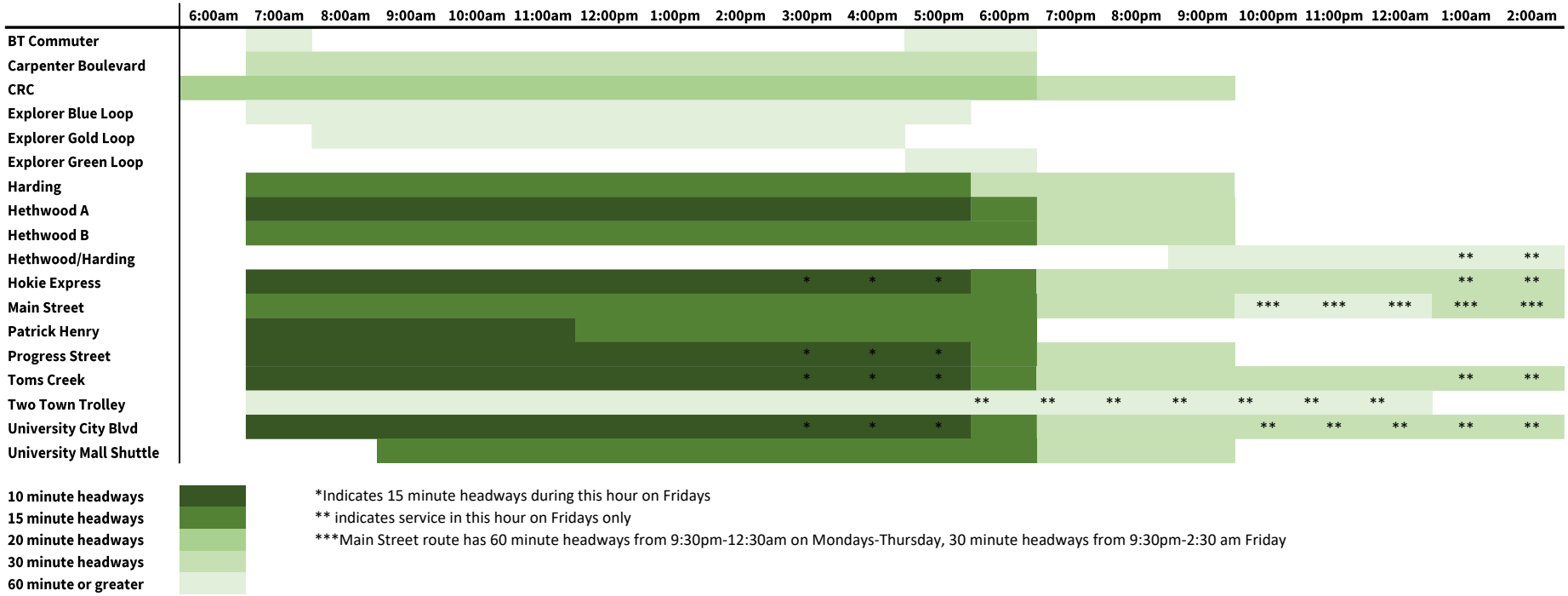


Figure 15: Blacksburg Transit Level of Service by Route -- Full Service Weekends

	9:00am	10:00am	11:00am	12:00pm	1:00pm	2:00pm	3:00pm	4:00pm	5:00pm	6:00pm	7:00pm	8:00pm	9:00pm	10:00pm	11:00pm	12:00am	1:00am	2:00am
Hethwood/Harding	*	*														*	*	*
Hokie Express	*	*														*	*	*
Main Street	*	*											**	**	**	*	*	*
Toms Creek	*	*														*	*	*
Two Town Trolley		*	*							*	*	*	*	*	*	*		
University City Blvd	*	*														*	*	*

30 minute headways
60 minute headways

* Saturdays only
** 60 minute headways on Sundays

Figure 16: Blacksburg Transit Level of Service by Route – Reduced Service Weekdays

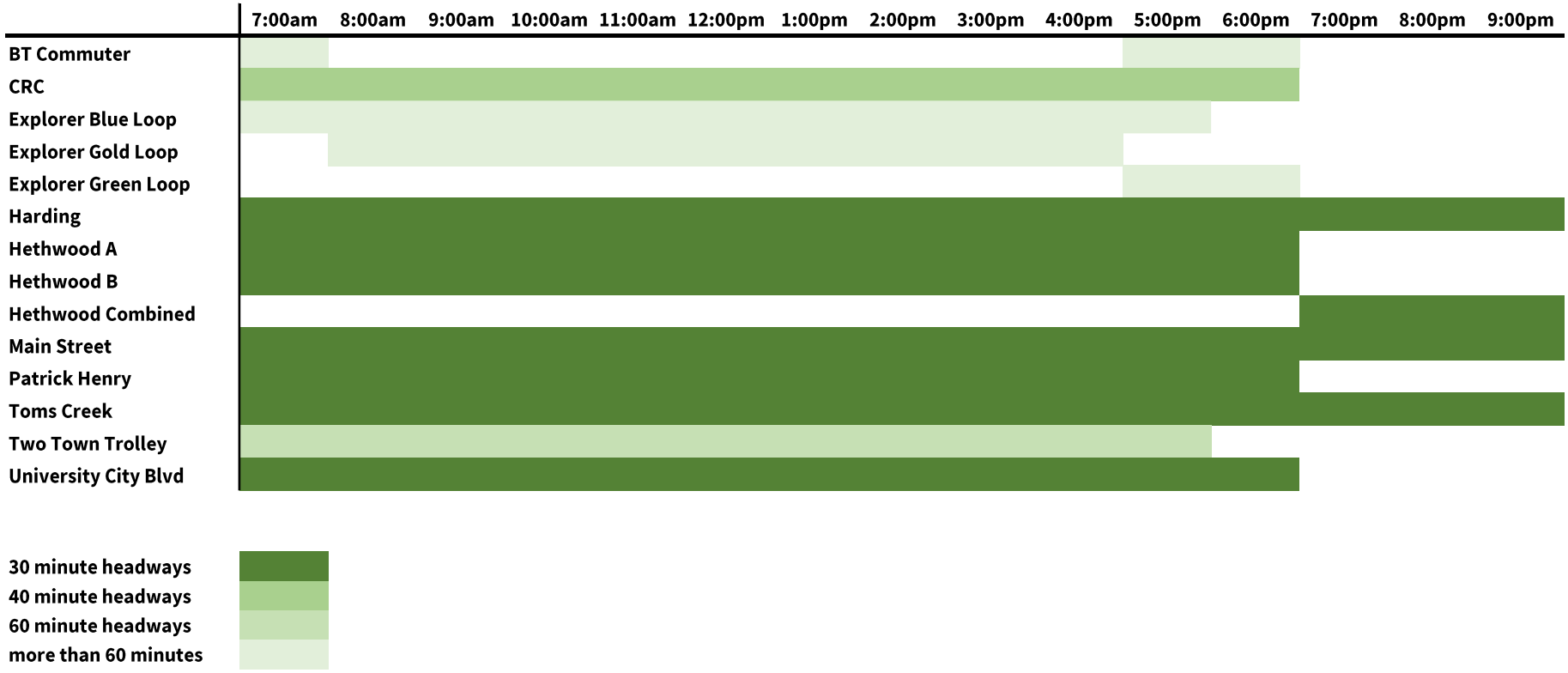


Figure 17: Blacksburg Transit Level of Service by Route -- Reduced Service Weekends

	9:00am	10:00am	11:00am	12:00pm	1:00pm	2:00pm	3:00pm	4:00pm	5:00pm	6:00pm	7:00pm	8:00pm
Hethwood/Harding	*	*									*	*
Main Street	*	*									*	*
Toms Creek	*	*									*	*
Two Town Trolley		*	*									

30 minute headways

60 minute headways

* Saturdays only

Figure 18: Blacksburg Transit Level of Service by Stop – Full Service

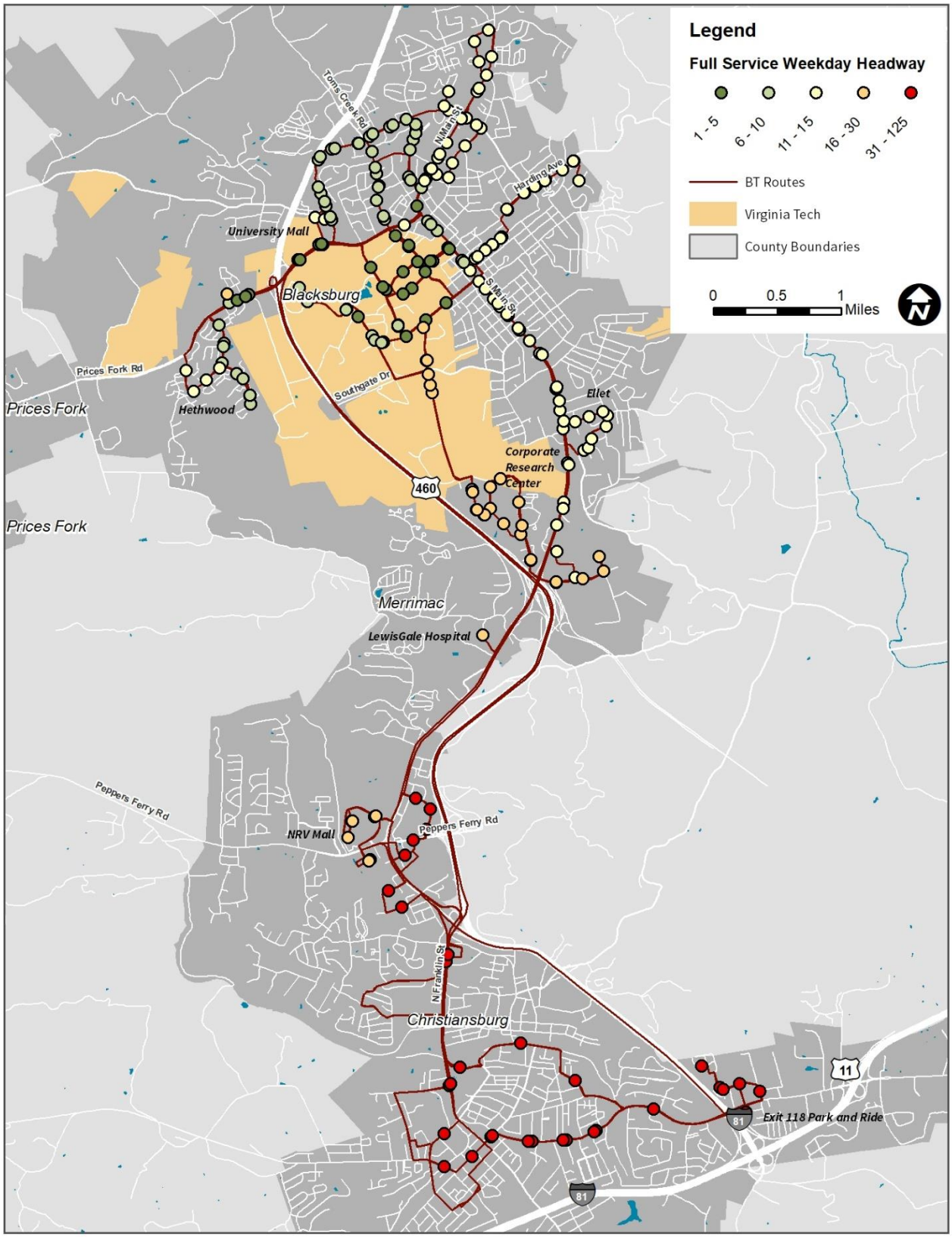
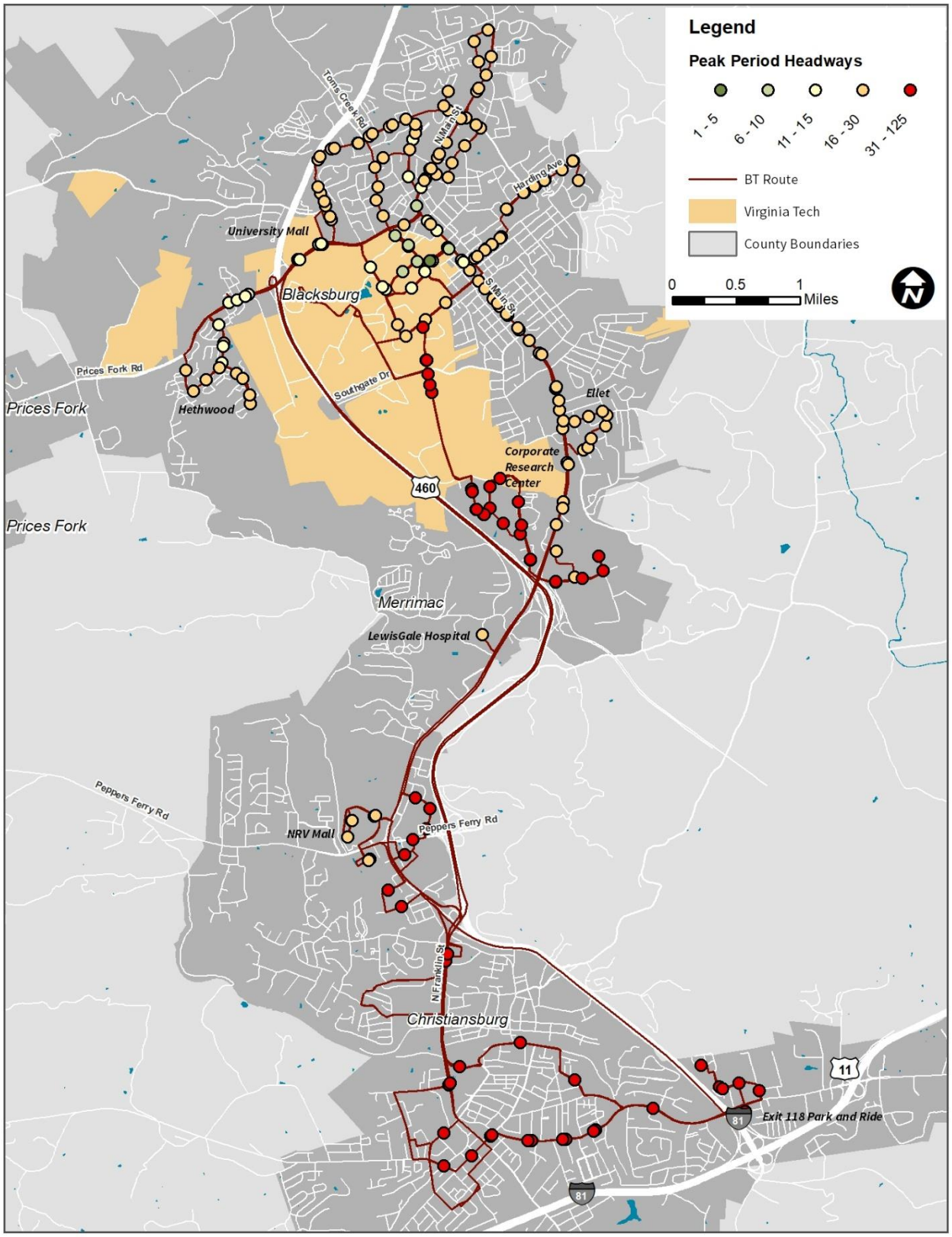


Figure 19: Blacksburg Transit Level of Service by Stop – Reduced Service

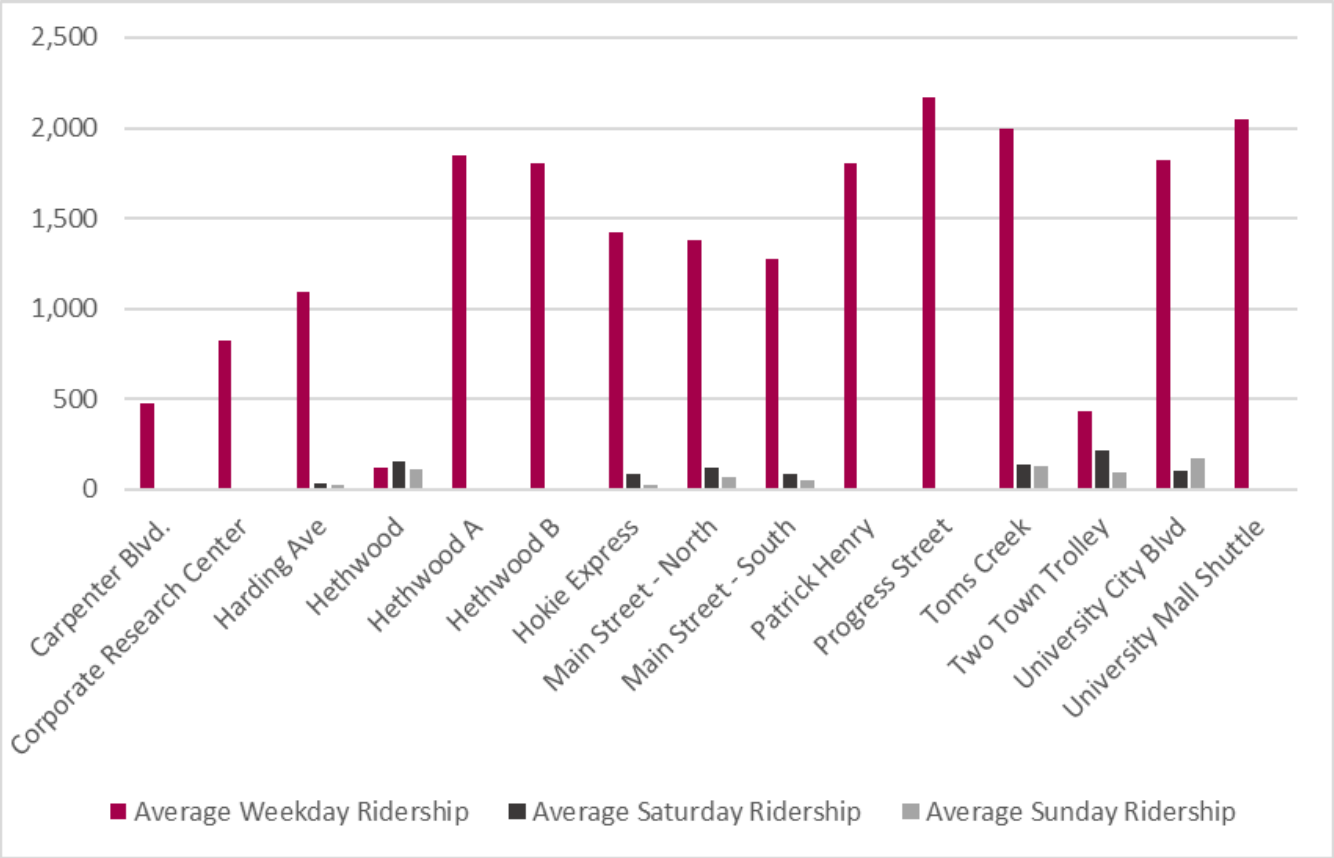


3.2 RIDERSHIP

3.2.1 Ridership by Route

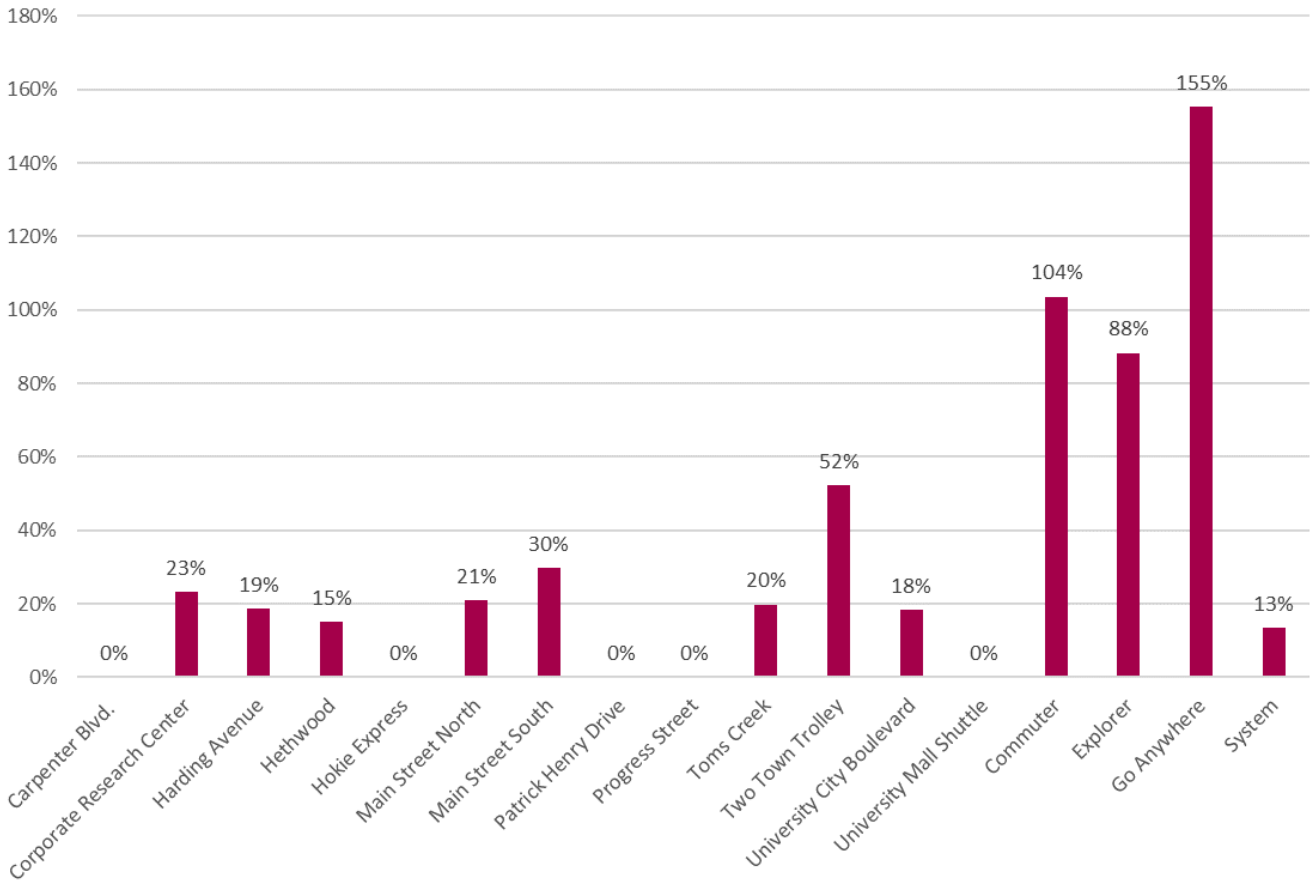
Ridership by Route during the latest full service period is summarized in **Figure 20**. On weekdays, Progress Street, University Mall Shuttle, and Toms Creek have the highest ridership, each with approximately 2,000 boardings per day. The Hethwood route has the lowest ridership – this is because this route combines Hethwood A and Hethwood B and operates during the evening only. On Saturdays the Two Town Trolley has the highest ridership, likely due to the fact that it serves a number of retail destinations. On Sundays, the University City Boulevard route has the highest ridership.

Figure 20: Blacksburg Transit Average Daily Ridership by Route – Full Service



During reduced service, Commuter and GoAnywhere on-demand service have higher ridership than during the full service period (**Figure 21**). However, all fixed route services have less ridership during reduced service than full service. This is likely due to the fact that less service is offered on fixed-routes during reduced service, so many riders switch to the on-demand services during reduced service. Two Town Trolley has the highest percentage of ridership during reduced service for fixed route at 52 percent. For all other routes, reduced service accounts for 30 percent or less of the total full service ridership.

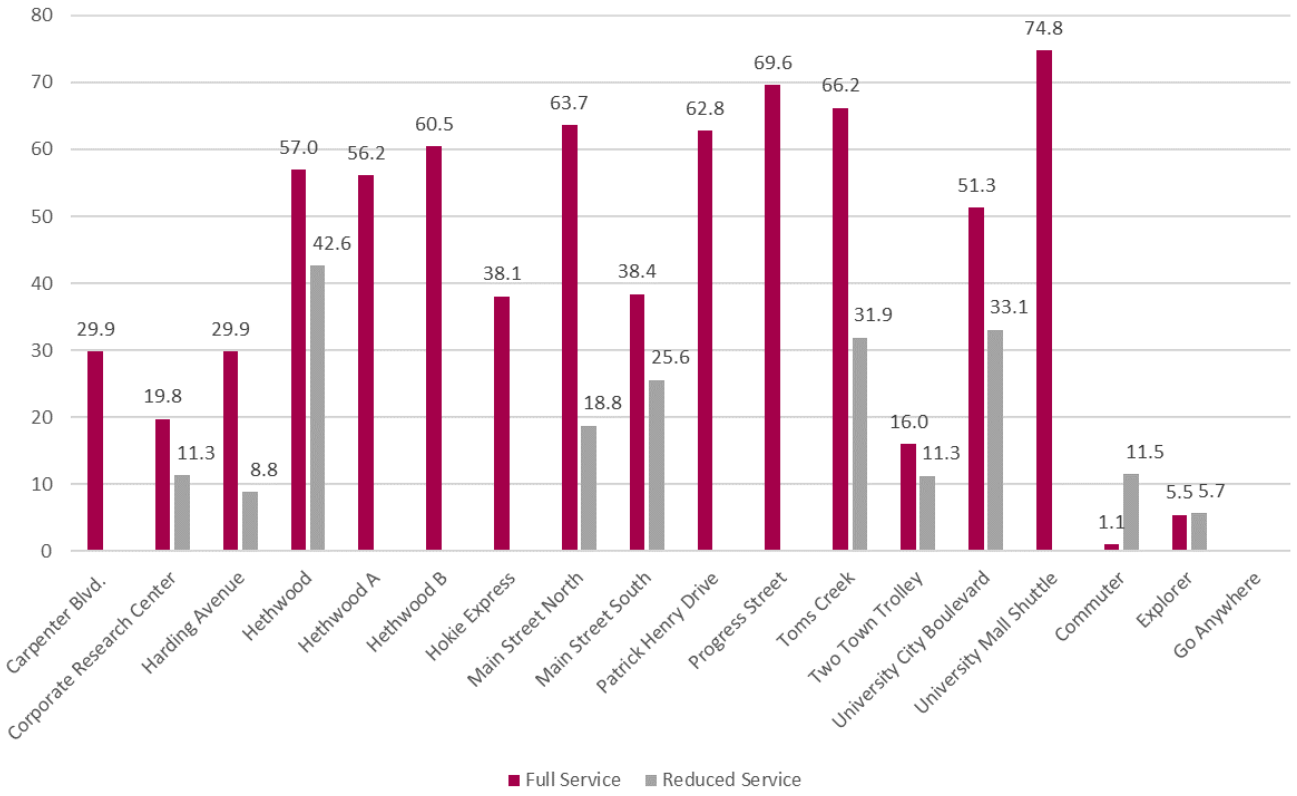
Figure 21: Blacksburg Transit Reduced Service Percent of Full Service



During Full Service, University Mall Shuttle which serves has the highest average monthly passengers per revenue hour, 74.8. Progress Street, Toms Creek, Main Street North, Patrick Henry, and Hethwood B have over 60 average monthly passengers per revenue hour (**Figure 22**). During reduced service, Hethwood has the highest average monthly passengers per revenue hour, 42.6. University City Boulevard and Toms Creek have over 30 average monthly passengers per revenue hour.

Overall, most routes with the highest passengers per hour during full service do not operate in the reduced service period, as their primary purpose is to move Virginia Tech students who live off campus to the actual campus. Main Street North has the largest performance shift between full and reduced service periods. During full service, it ranks 4th but during reduced service, it ranks 7th.

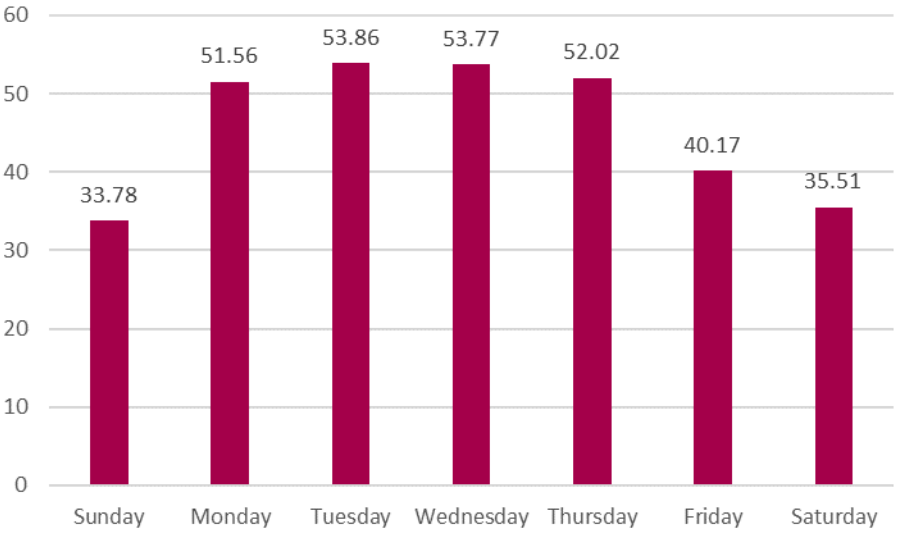
Figure 22: Average Monthly Passengers Per Revenue Hour by Route (Full Service vs. Reduced Service)



On average, passengers per revenue hour is higher Monday through Thursday than on Friday and weekends. Tuesday and Wednesday have the highest average monthly passenger per hours at 53.9 and 53.8 respectively (

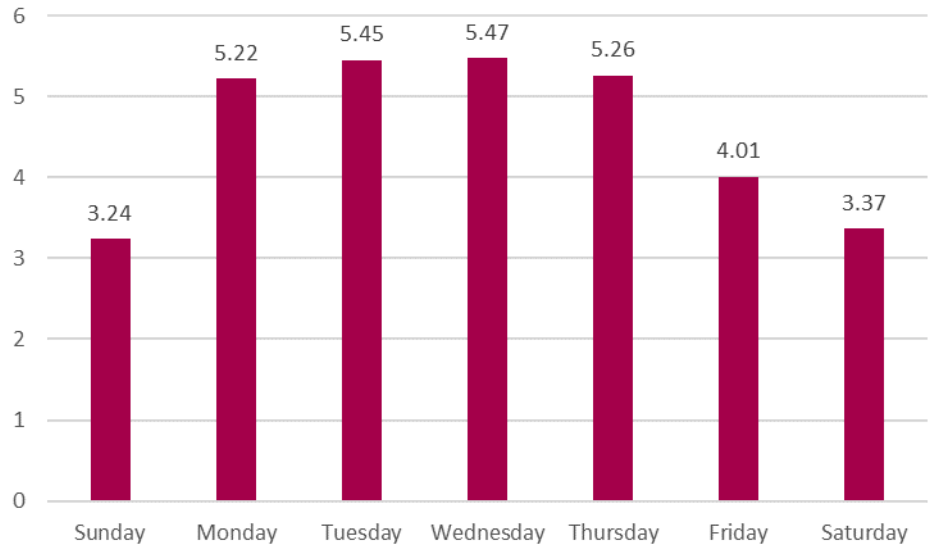
Figure 23). Lower ridership on Friday reflects Virginia Tech's class schedules, which offer fewer classes to students on Fridays.

Figure 23: Average Monthly Passengers Per Revenue Hour by Service Day



On average, passengers per revenue mile is higher Monday through Thursday than on Friday and weekends. Tuesday and Wednesday have the highest average monthly passenger per mile at 5.5 (**Figure 24**). Again, this trend reflects the Virginia Tech class schedule.

Figure 24: Average Monthly Passengers Per Revenue Mile by Service Day



3.2.2 Ridership by Stop

As expected, the highest ridership stops in the Blacksburg Transit system are on the Virginia Tech campus around the Drillfield, the Alumni Mall, along Stanger Street, and near the intersection of West Campus Drive and Washington Street (Litton Reaves Hall and McComas Hall, see **Figure 25**). Off campus, the highest ridership stops are located at the University Mall, in Hethwood, and along Patrick Henry Drive and Progress Street. Hethwood, Patrick Henry Drive, and Progress Street are home to numerous large apartment complexes that are primarily occupied by Virginia Tech students. The University Mall is home to the Virginia Tech Math Emporium, an off-campus bookstore, and several retail and restaurant establishments.

Figure 25: Stops on the Virginia Tech Campus

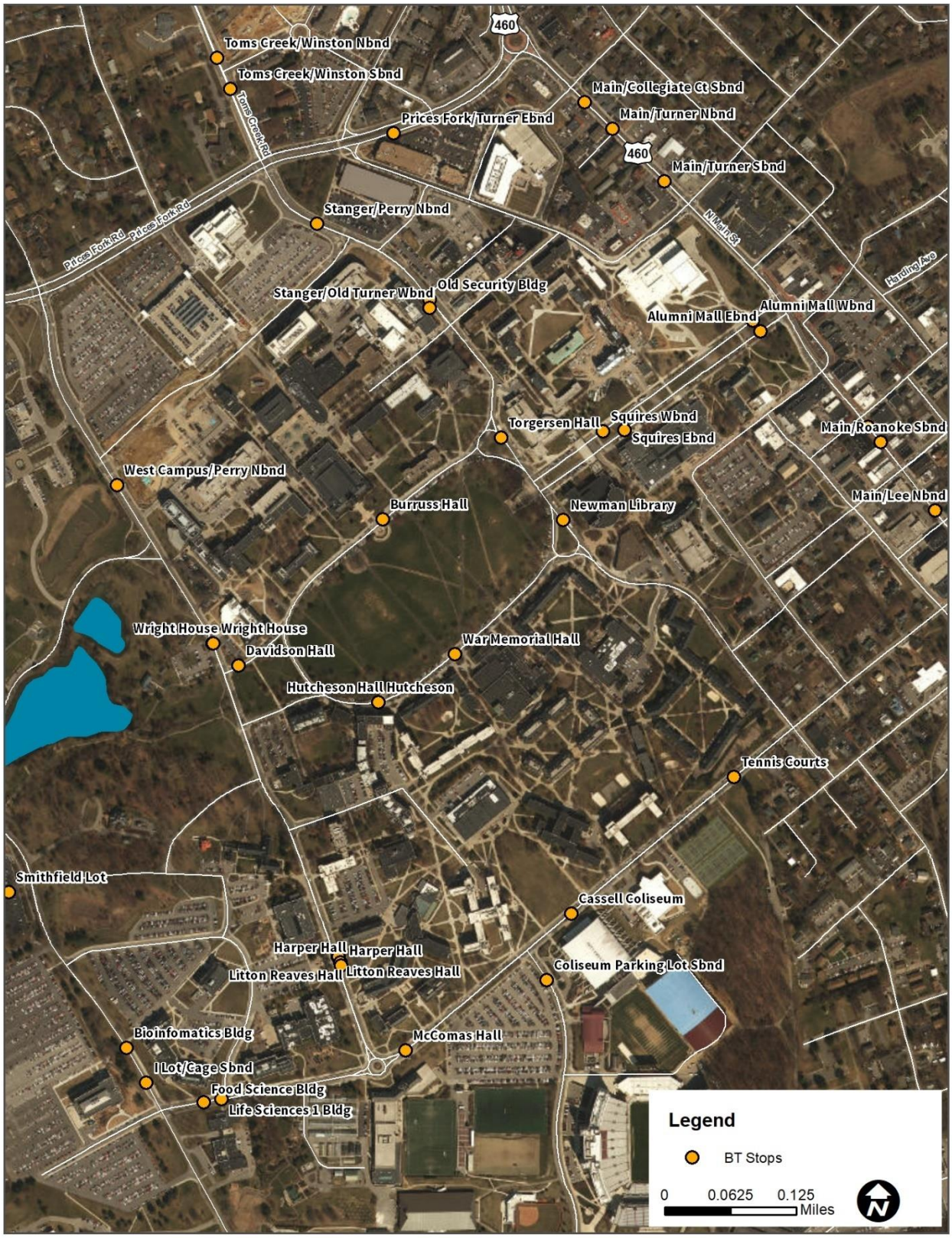


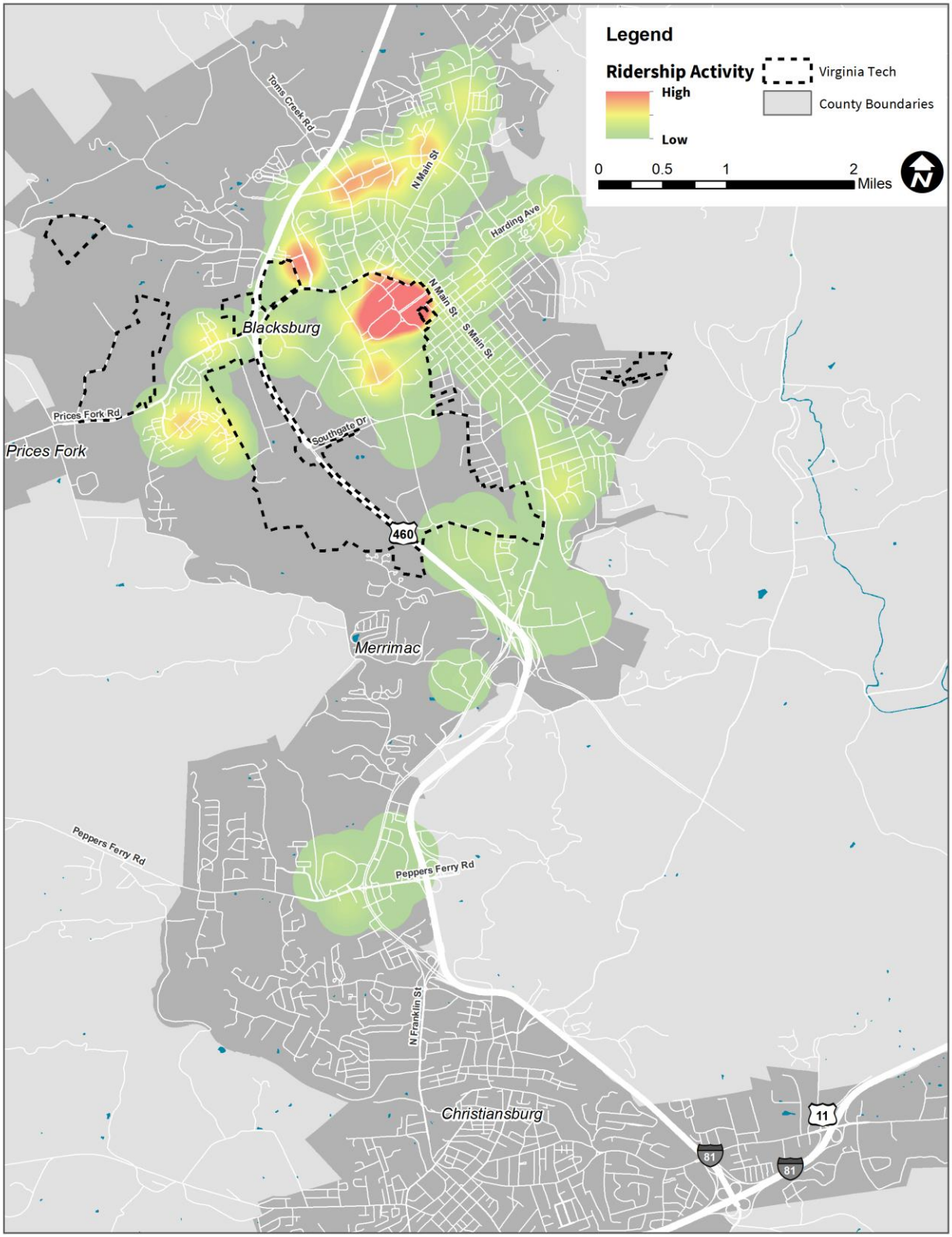
Table 15 summarizes the highest ridership stops on weekdays during full service. The top five stops are all on the Virginia Tech campus. The highest ridership stops off campus are all in locations outlined above, including University Mall, Progress Street, and Hethwood. **Figure 26** illustrates ridership by stop on weekdays during full service in heat map format.

Table 15: Blacksburg Transit Highest Ridership Stops – Full Service

Stop Name	Annual Weekday Boardings	Routes
Burruss Hall	54,487	Corporate Research Center, Harding Ave, Hethwood, Hethwood A, Hokie Express, University City Blvd, University Mall Shuttle
Squires Ebnd	49,735	Carpenter Blvd., Harding Ave, Hethwood, Main Street - North, Main Street - South, Progress Street, Two Town Trolley
Squires Wbnd	30,057	Carpenter Blvd., Harding Ave, Hethwood, Hokie Express, Main Street - North, Main Street - South, Patrick Henry, University City Blvd
Torgersen Hall	24,218	Carpenter Blvd., Hethwood B, Patrick Henry, Toms Creek
Newman Library	9,764	Carpenter Blvd., Corporate Research Center, Hokie Express, Toms Creek, University Mall Shuttle
University Mall Main Entrance	8,077	University Mall Shuttle
Old Security Bldg	13,886	Carpenter Blvd., Hethwood B, Patrick Henry, Toms Creek
Progress/Hunt Club Sbnd	10,557	Patrick Henry, University City Blvd
The Village on Patrick Henry Wbnd	9,671	Progress Street, Toms Creek
Tall Oaks/Foxhunt Ebnd	8,268	Hethwood, Hethwood B
Stanger/Old Turner Wbnd	7,667	Hethwood, Hethwood A, Progress Street, University City Blvd
Litton Reaves Hall	7,566	Carpenter Blvd., Corporate Research Center, Hokie Express, Toms Creek, University Mall Shuttle
University City/Toms Creek Wbnd	7,185	Toms Creek
West Campus/Perry Nbnd	7,007	Hethwood, Hethwood A, University City Blvd, University Mall Shuttle
Main/Red Maple Nbnd	6,918	Main Street - North
Stanger/Perry Nbnd	6,410	Carpenter Blvd., Hethwood B, Patrick Henry, Toms Creek
McComas Hall	6,089	Carpenter Blvd., Corporate Research Center, Hokie Express, Toms Creek, University Mall Shuttle

Stop Name	Annual Weekday Boardings	Routes
Patrick Henry/Seneca Wbnd	6,037	Main Street - North, Patrick Henry
Pheasant Run	5,968	Main Street - North, Patrick Henry
Ascot/Hampton	5,485	Harding Ave

Figure 26: Blacksburg Transit Average Weekday Ridership by Stop



Saturday ridership is similar to weekday ridership in the sense that the highest activity stops are similar, with a few exceptions:

- Oak Lane (where Virginia Tech's Greek fraternity/sorority housing is located) has the highest ridership outside of the Drillfield and Alumni Mall.
- The Walmart on Peppers Ferry Road across from the New River Valley Mall has some of the highest ridership.

Figure 27 illustrates ridership by stop on Saturdays during full service in heat map format.

Sunday ridership by stop closely resembles weekday ridership by stop, except for a high concentration of ridership at the Walmart on Pepper's Ferry Road like on Saturdays. **Figure 28** illustrates ridership by stop on Sundays during full service in heat map format.

Figure 27: Blacksburg Transit Average Saturday Ridership by Stop

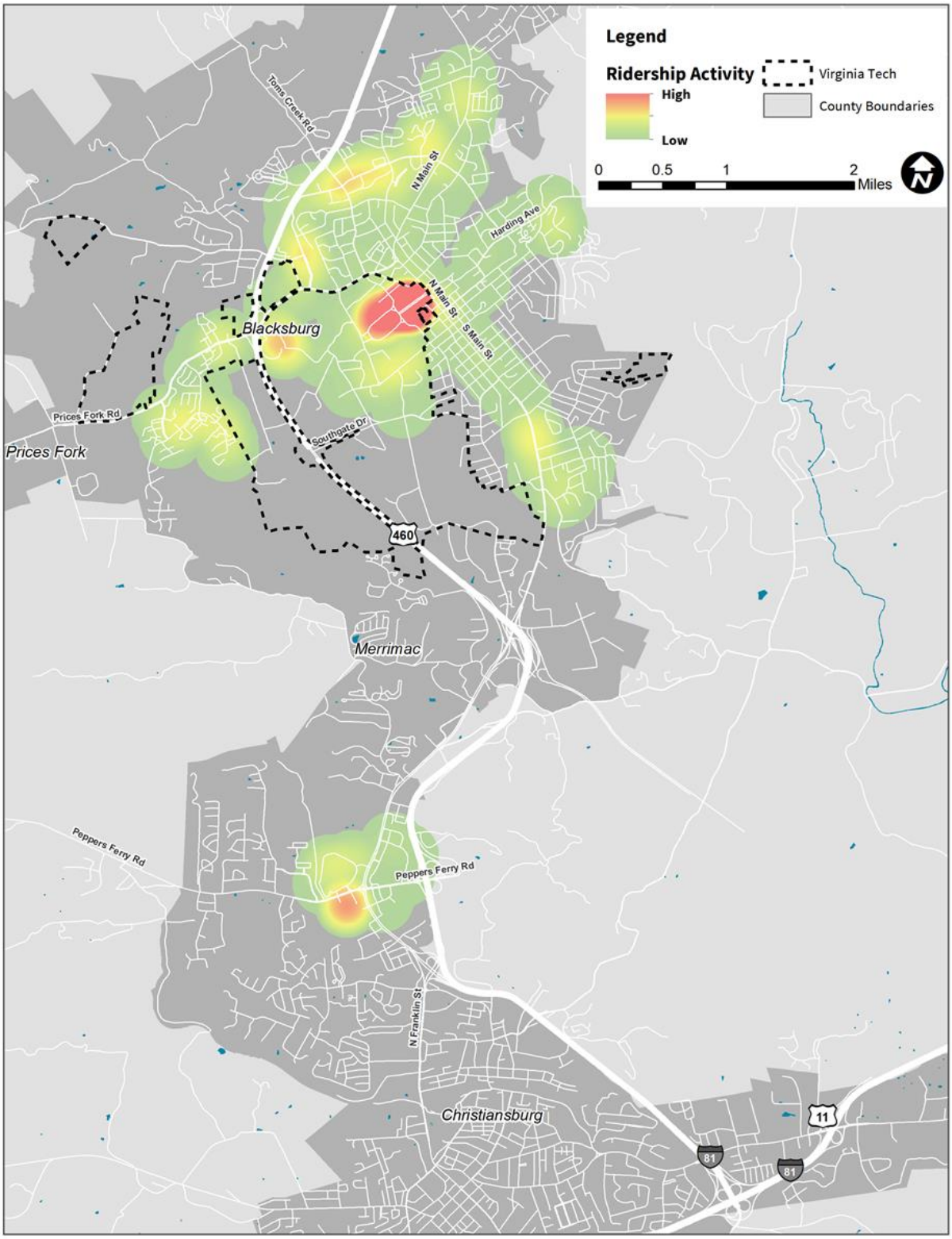
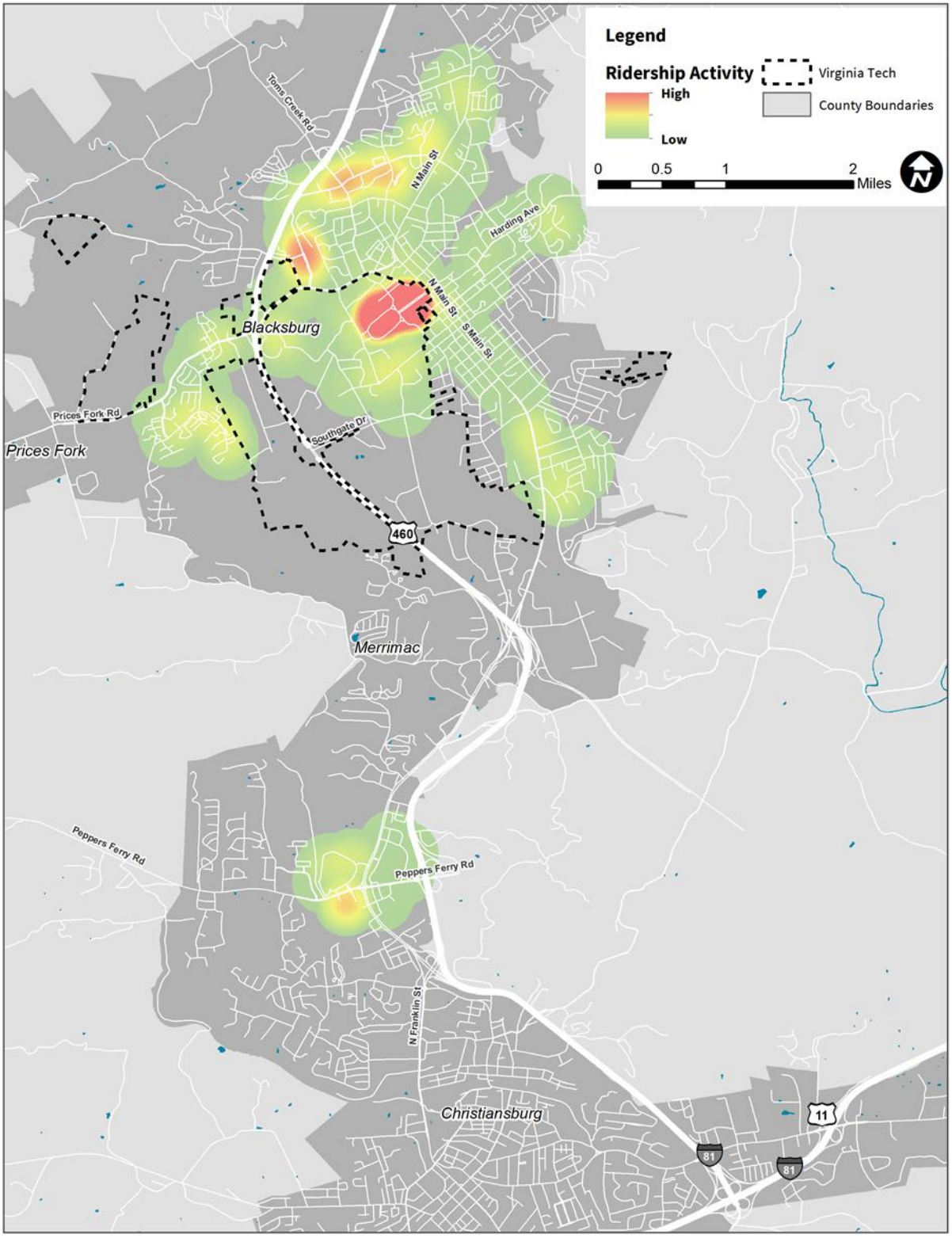


Figure 28: Blacksburg Transit Average Sunday Ridership by Stop



3.2.3 Transfers

Blacksburg Transit tracks transfers by the number of requests of transfer slips from cash paying customers only (**Table 16**). Through previous outreach efforts, Blacksburg Transit knows that a great number of students transfer between routes to get from off campus locations to classes. However, the system is unable to track student transfers because students use passes and the system is ID and Pass access driven.

Table 16: Blacksburg Transit Annual Transfers

Measure	Data
Total MB Passengers	3,705,429
Total Cash Fares	78,270
% Cash Fares of Total	2.1%
Total Transfers (Cash)	4,399
% Transfer of Total Cash Fares	5.6%
% Transfer of Total MB Passengers	0.1%

3.2.4 Pass-bys

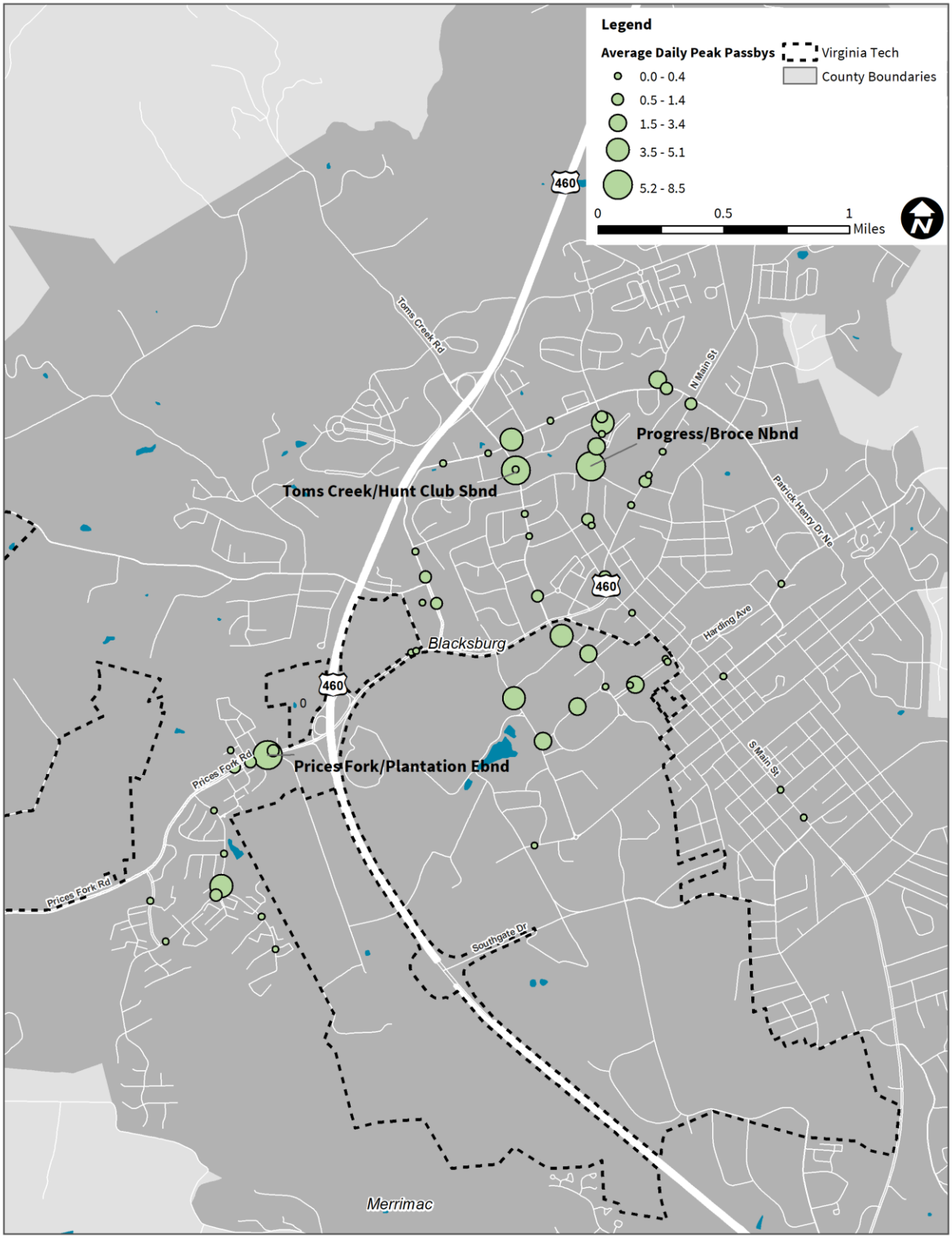
"Pass-bys" are Blacksburg Transit's way of tracking instances where buses are at 100 percent seated and standing capacity and therefore have to pass by passengers waiting at stops along the remainder of the route. Given a lack of accurate passenger load data, this dataset provides a snapshot of where routes experience the most overcrowding.

Pass-by data was obtained for the months of February and September, 2017, and averaged for weekdays and Saturdays. **Figure 29** illustrates pass-bys occurring during the peak times of 7:00am to 7:00pm on weekdays. During this period, they are concentrated in five locations, inbound to Virginia Tech:

- On the Virginia Tech campus along West Campus Drive, Stanger Street, and the Drillfield,
- In Hethwood on Hethwood Blvd,
- On Prices Fork Road near Plantation Road (near the Preserve development),
- Near Toms Creek Road and Patrick Henry Drive, and
- On Progress Street.

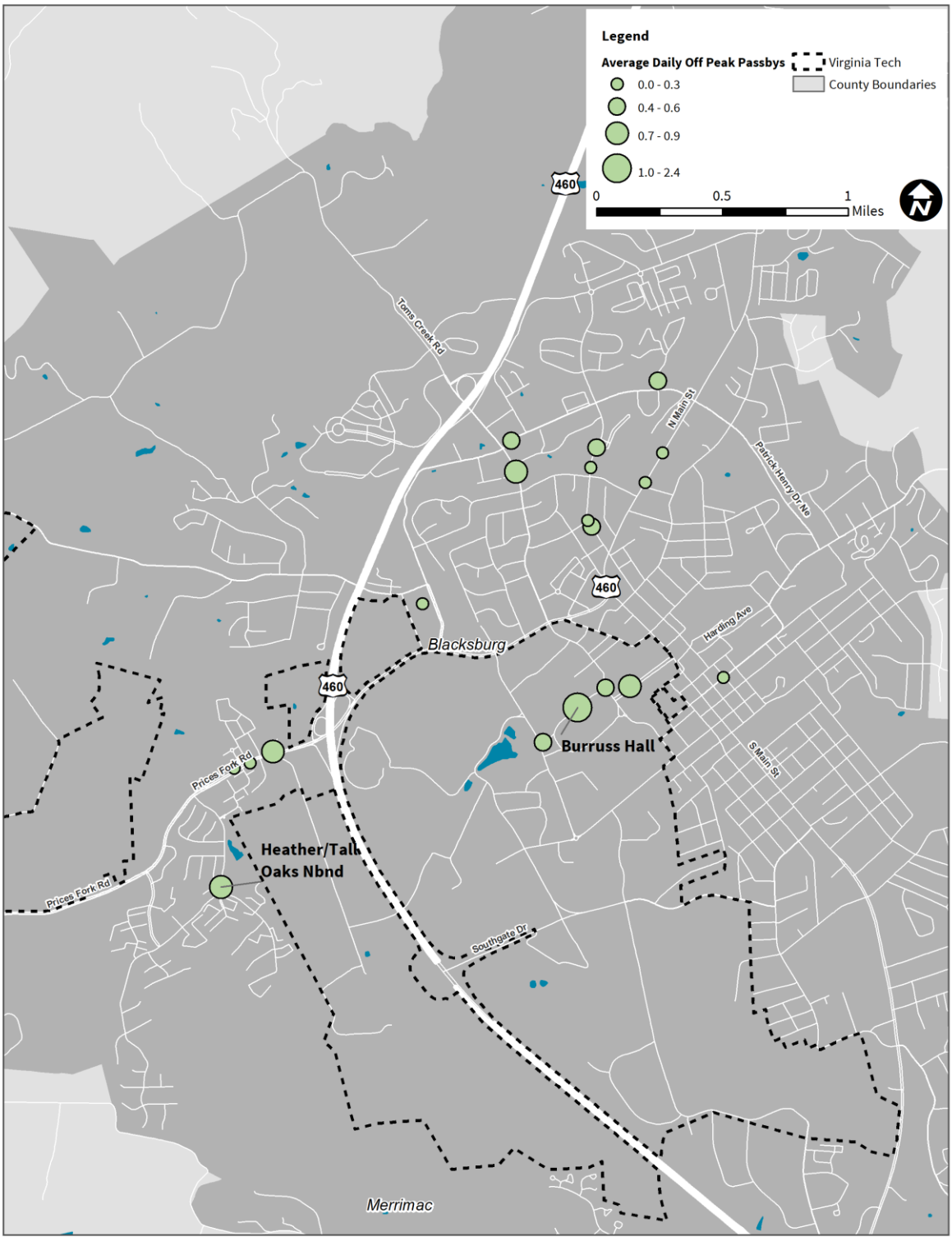
Outside of the Virginia Tech campus, all of these locations are adjacent to clusters of apartment complexes that are primarily occupied by Virginia Tech students.

Figure 29: Average Daily Peak Passbys



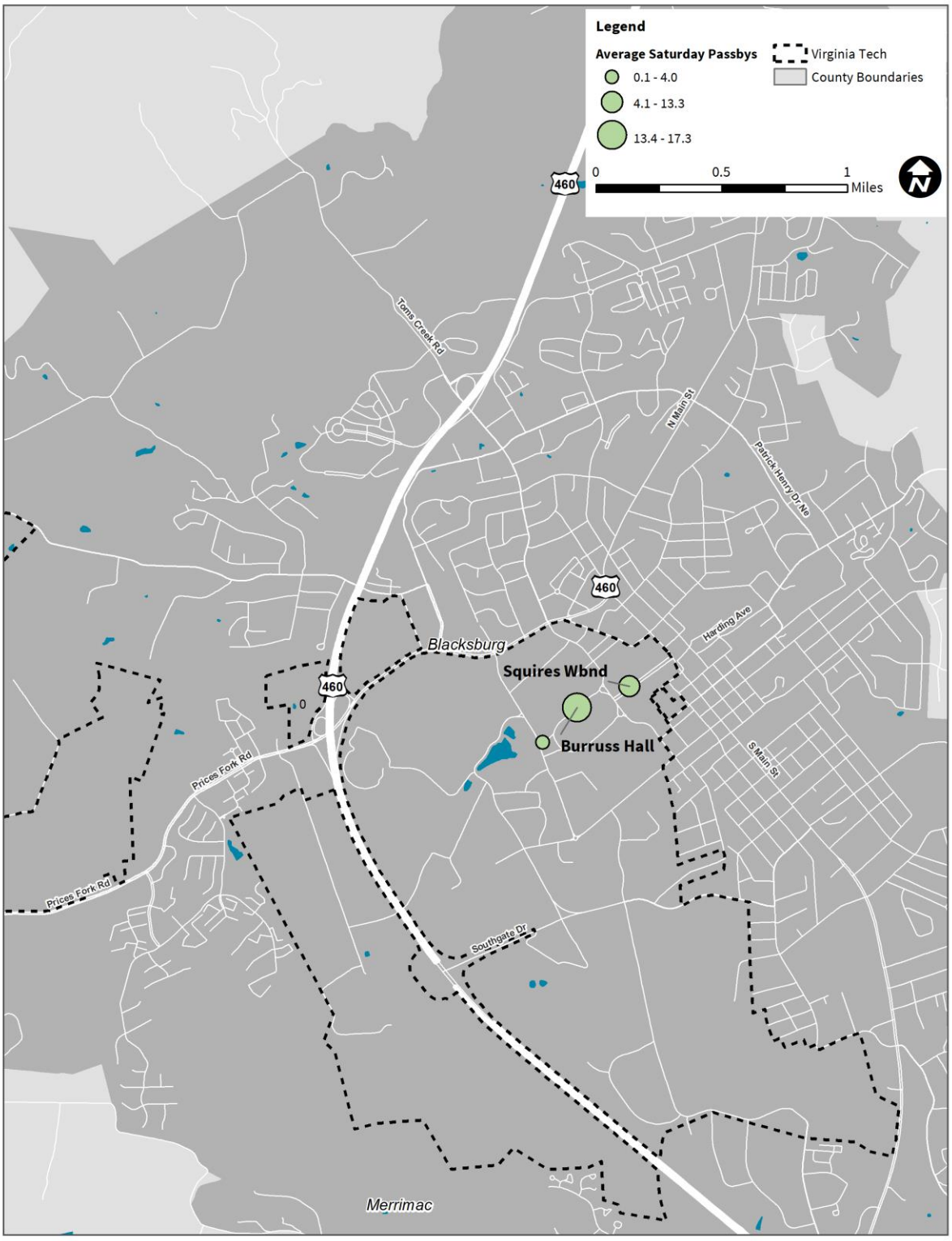
Pass-bys are slightly less frequent during off-peak periods (before 7:00am or after 7:00pm) but are concentrated in the same areas as peak periods. **Figure 30** illustrates pass-bys occurring during off-peak periods on weekdays

Figure 30: Average Daily Off-Peak Passbys



There are significantly fewer pass-bys on Saturdays, with the highest concentration occurring on the Virginia Tech campus at the Drillfield and the Alumni Mall (**Figure 31**).

Figure 31: Average Saturday Passbys



3.2.5 Operating Statistics

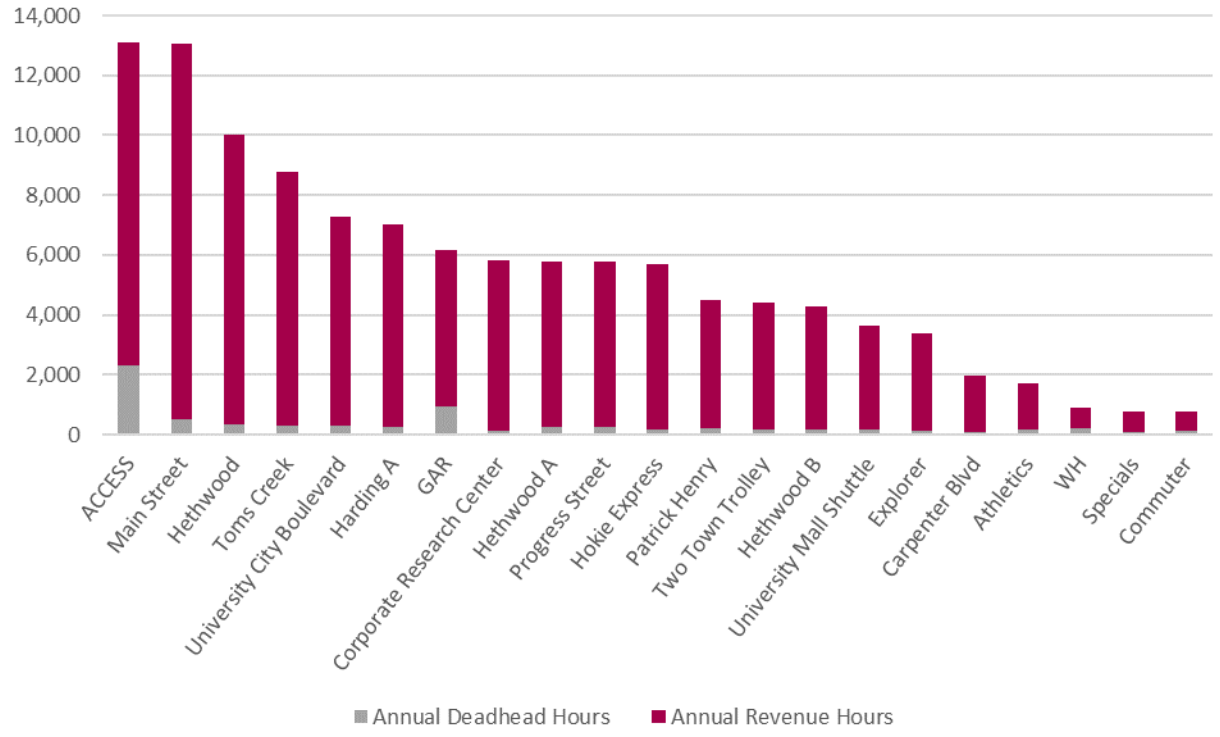
Data on hours, miles, and vehicles used were obtained for fiscal year 2017 and are summarized in this section.

Hours

Revenue hours and deadhead hours by route are summarized in **Figure 32** for fiscal year 2017. Routes that operate during full service and reduced service tend to have higher amounts of hours, as is expected. Main Street (North and South combined) has the highest of the fixed-routes as it has frequent service and operates year-round. The Hethwood routes combined would have the highest number of revenue hours, however.

Deadhead hours are highest on BT Access (ACCESS) and Go Anywhere (GAR), which is expected since they are demand-response services. Among the fixed routes, Main Street also has the highest number of deadhead hours. Given the compact nature of the BT system and the location of its garage, deadhead hours are low overall compared to revenue hours.

Figure 32: Blacksburg Transit Annual Revenue Hours and Deadhead Hours by Route



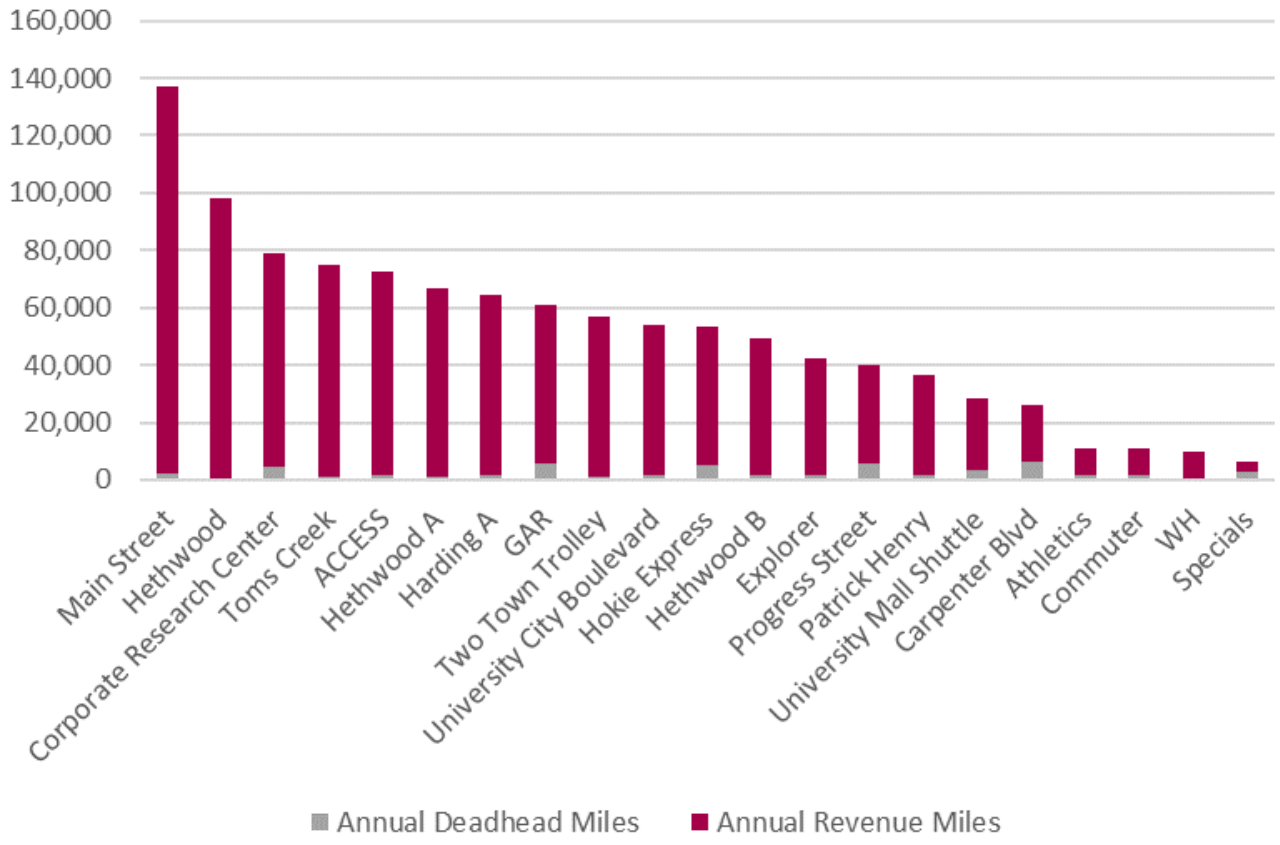
Miles

Revenue miles and deadhead miles are summarized in **Figure 33** for fiscal year 2017. Routes that operate during full service and reduced service tend to have higher amounts of miles, as is expected. Main Street (North and South combined) has the highest of the fixed-routes as it has frequent service, operates year-round, and is one of the longest routes in the system.

Deadhead miles are highest on BT Access (ACCESS) and Go Anywhere (GAR), which is expected since they are demand-response services. Among the fixed routes, Main Street also has the highest number of deadhead miles.

Given the compact nature of the BT system and the location of its garage, deadhead miles are low overall compared to revenue hours.

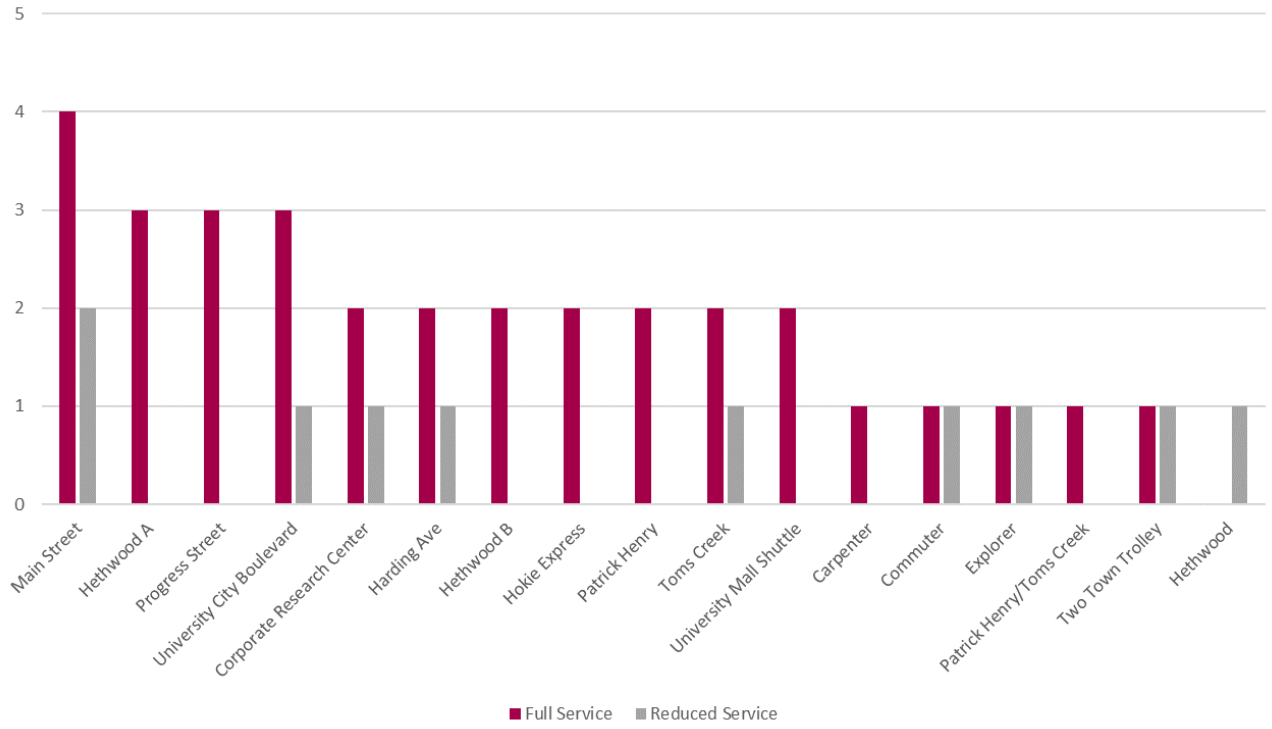
Figure 33: Blacksburg Transit Annual Revenue Miles/Deadhead Hours by Route



Vehicles

The peak vehicle requirement during full service and reduced service periods by route are illustrated in **Figure 34**. Six routes only need one vehicle to operate during the peak period. Main Street requires the highest number of peak vehicles, four, during full service. Overall, 32 vehicles are needed to operate peak full service and 12 are needed to operate peak reduced service.

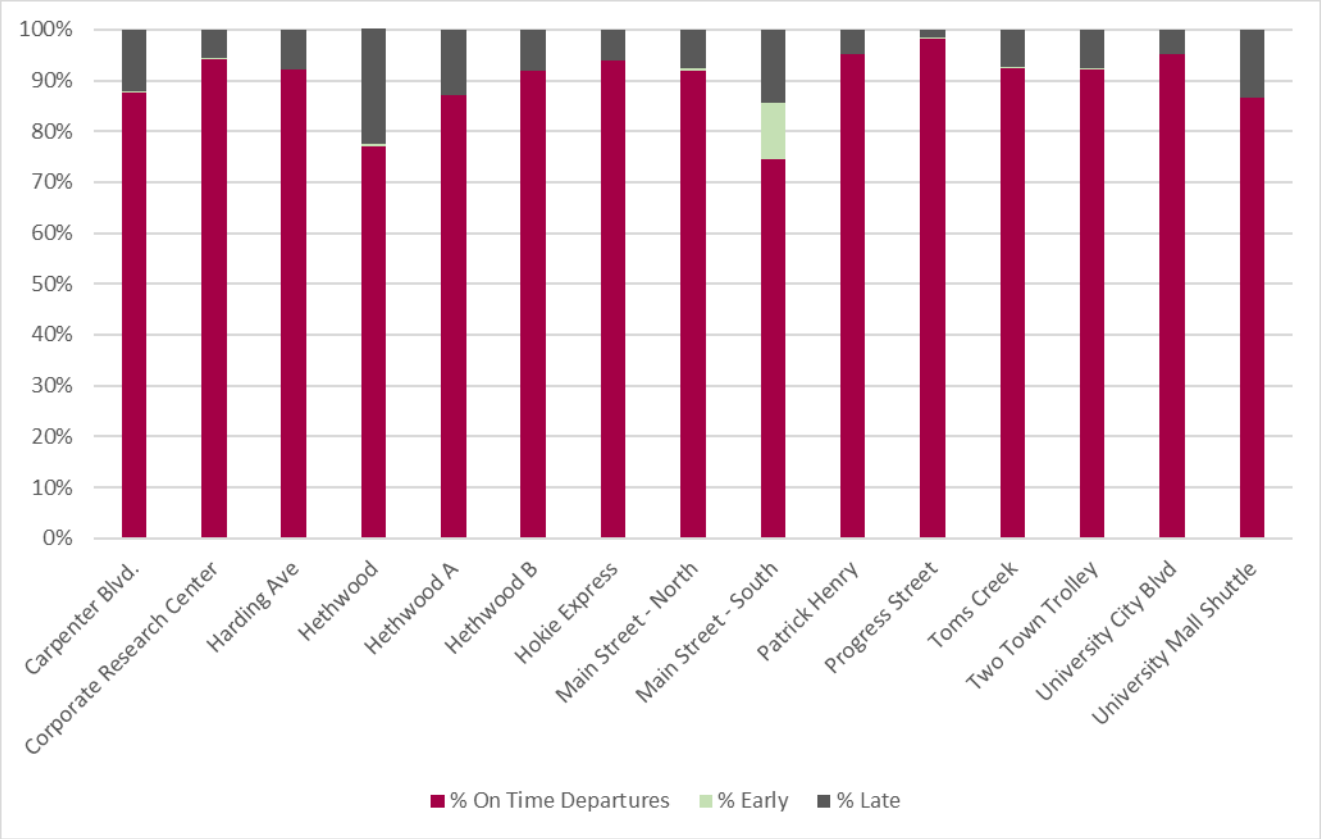
Figure 34: Blacksburg Transit Peak Vehicle Need by Route – Full Service vs Reduced Service



On-Time Performance

On-time performance statistics by route for April 2017 are summarized in **Figure 35**. Poor on-time performance can be indicative of several issues, including the need for more accurate running time in schedules (when late or early), traffic congestion (when late), and overcrowding (when late). Overall, most routes operate over 90 percent on-time. Only one route has issues with operating early: Main Street South. A few routes operated late more than 10 percent of the time, including Carpenter Blvd, Hethwood, Hethwood A, Main Street South, and University Mall Shuttle. Carpenter Blvd, Hethwood, Hethwood A, and University Mall Shuttle all operate along the Prices Fork Road corridor which has issues with traffic congestion around Route 460. The length of these routes varies, so it is unlikely that route length is what is impacting on-time performance. Given that Main Street South also has issues with operating early, the route may need running time adjustments to reflect variations in traffic speeds over different periods of the day.

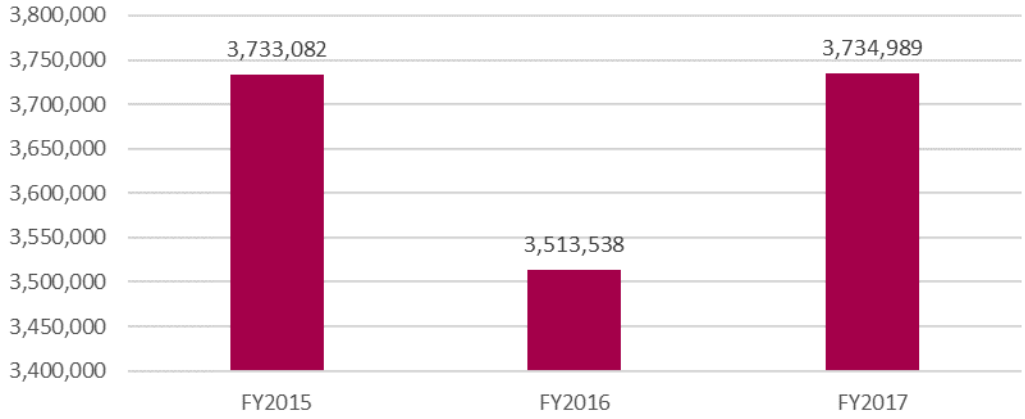
Figure 35: On-Time Performance by Route



3.3 3-YEAR TREND ANALYSIS

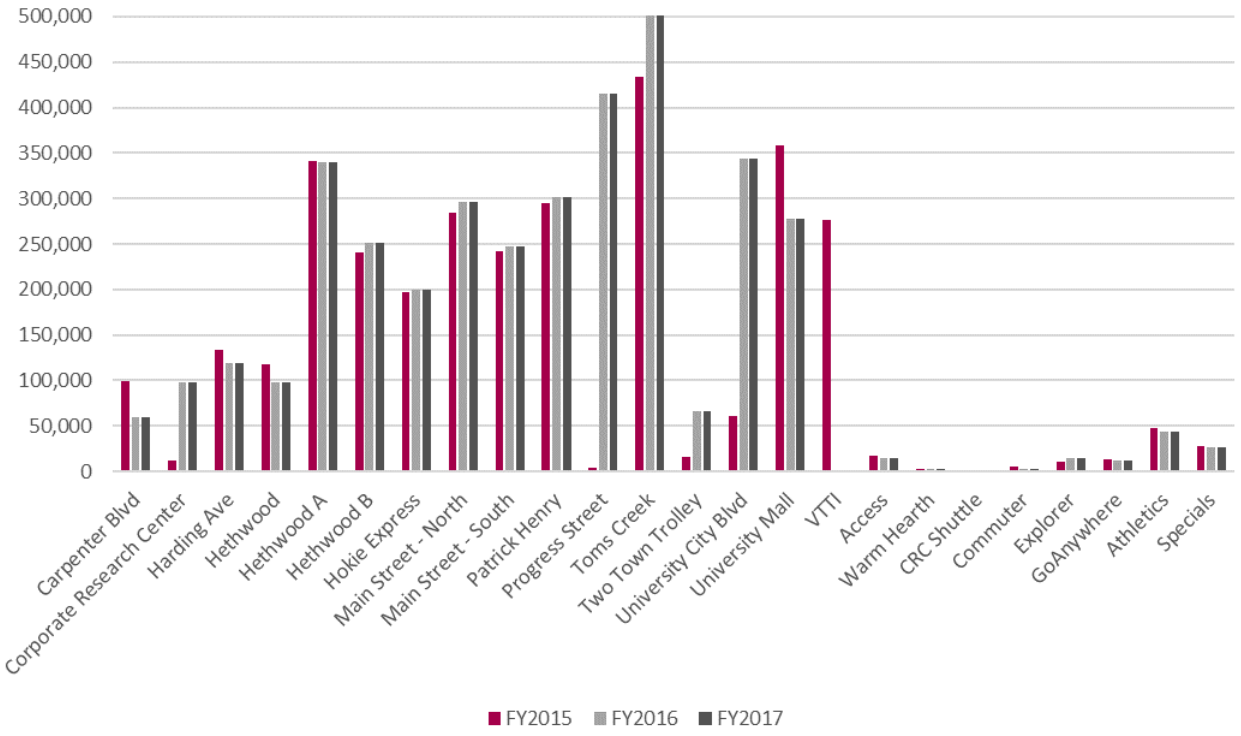
Annual Ridership declined by six percent between 2015 and 2016. However, ridership increased by six percent between 2016 and 2017, rebounding above the 2016 level (**Figure 36**).

Figure 36: Blacksburg Transit Annual Ridership, FY2015-FY2017



For the majority of routes, ridership stayed the same between FY2015 and FY2017. Ridership on Progress Street, Toms Creek, and University City Blvd increased the most during the time period. Declines were seen on Carpenter Blvd, Harding Ave, Hethwood, and University Mall from FY2015 to FY2016 (**Figure 37**).

Figure 37: Blacksburg Transit Ridership by Route, FY2015-FY2017



Annual revenue hours remained fairly consistent from FY2014 through FY2015 and then decreased by approximately 10 percent into FY2016 (**Figure 38**). Passengers per revenue hour have increased steadily since FY2015, despite a dip in ridership from FY2015 to FY2016, as this dip was coupled with a dip in revenue hours as well (**Figure 39**).

Figure 38: Blacksburg Systemwide Revenue Hours, FY2014-FY2016

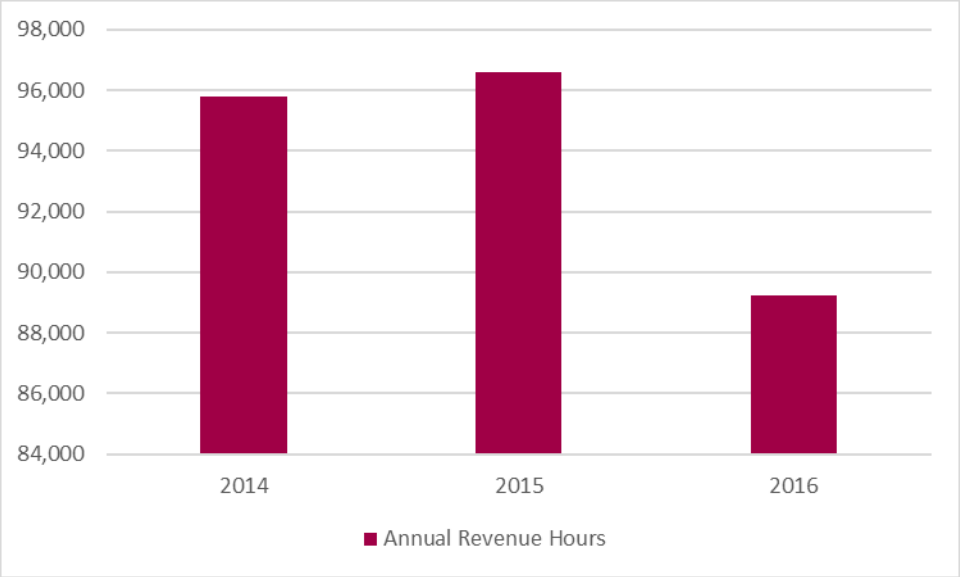
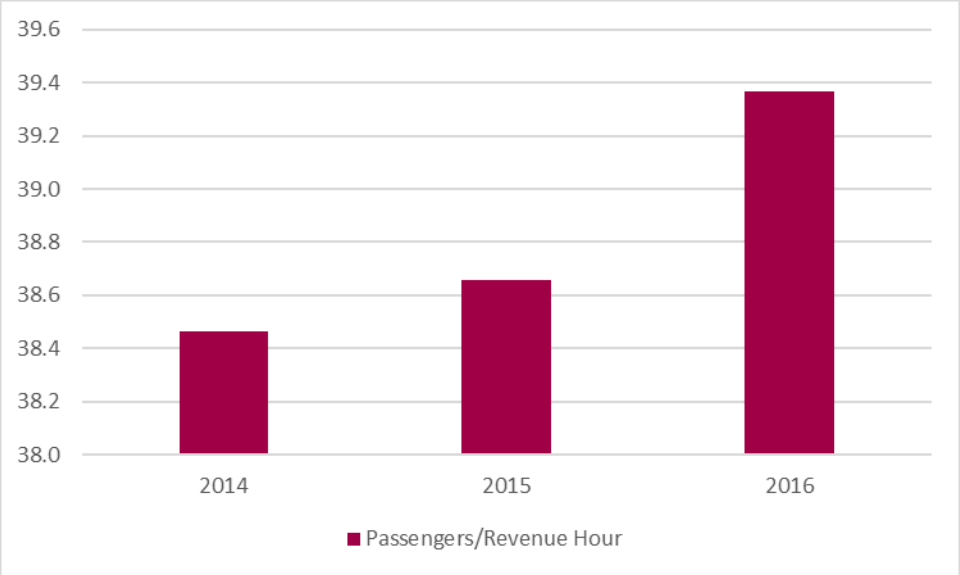


Figure 39: Blacksburg Systemwide Passengers per Revenue Hour, FY2014-FY2016



Annual revenue miles increased between FY2014 and FY2015 and then decreased by nearly 60,000 into FY2016 (**Figure 40**). This follows the same trend as revenue hours. Passengers per revenue mile decreased slightly from FY2014 into FY2015 but then increased slightly in FY2016 (**Figure 41**).

Figure 40: Blacksburg Systemwide Annual Revenue Miles, FY2014-FY2016

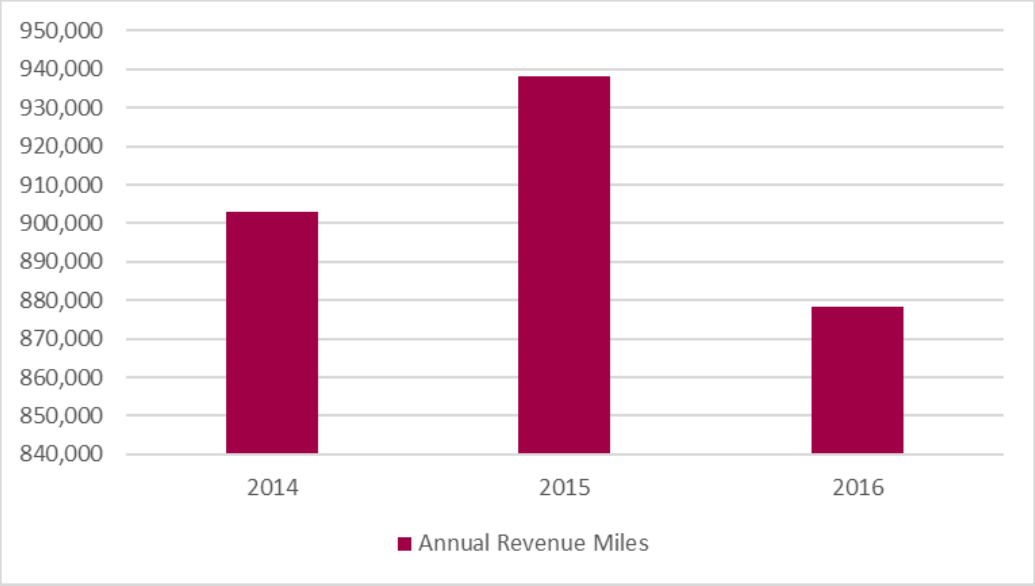
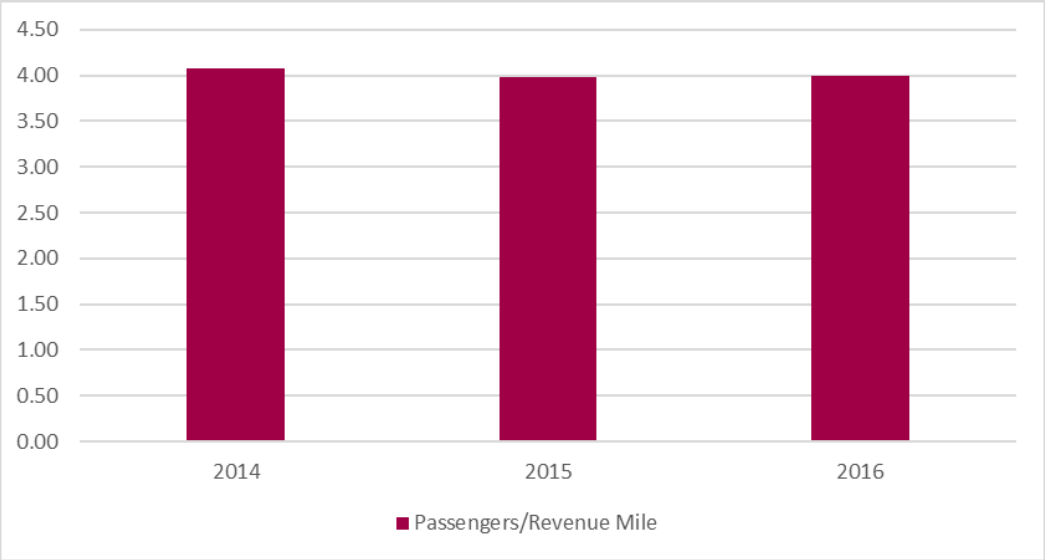


Figure 41: Blacksburg Systemwide Passengers Per Revenue Mile, FY2014-FY2016



The operating cost per passenger over the last three years is summarized in **Figure 42**. Since Virginia Tech students ride for free and instead the university contributes roughly 35 to 50 percent of BT's annual budget, actual fare revenue is very low in the BT system and therefore, the total operating cost per passenger is summarized.

Figure 42: Blacksburg Transit Cost Per Passenger, FY2014-FY2016

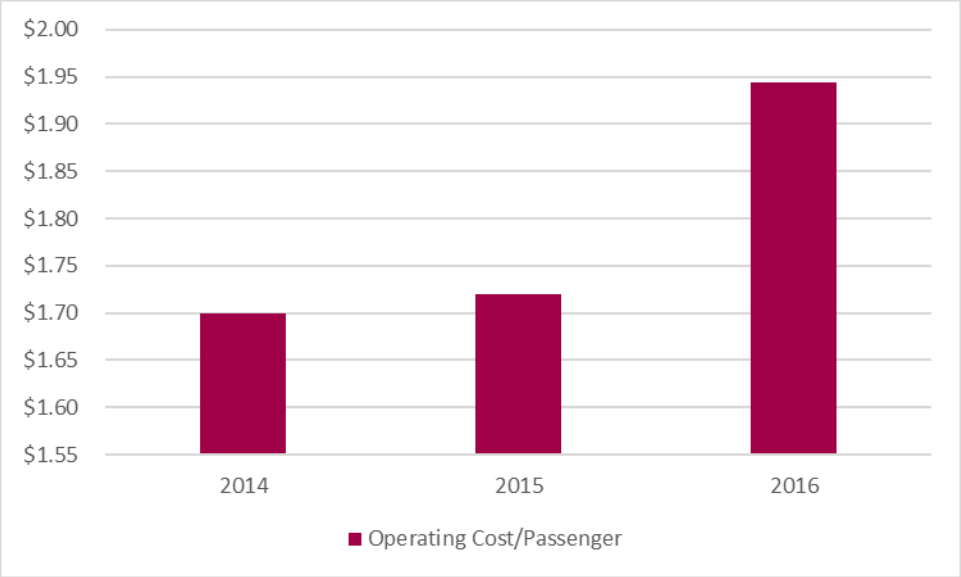


Table 17 summarizes the operating statistics for Blacksburg Transit from FY2014 through FY2016. Overall, a similar trend was seen in terms of annual passenger trips and annual revenue miles – an increase between FY2014 and FY2015 and then a decrease into FY2016. The trend in revenue hour efficiency, however, outpaced that in revenue miles efficiency, resulting in a steady increase in passengers per revenue hour each year. This is due to an overall increase in the agency's average operating speed, from 9.4 miles per hour in FY2014 to 9.8 miles per hour in FY2016.

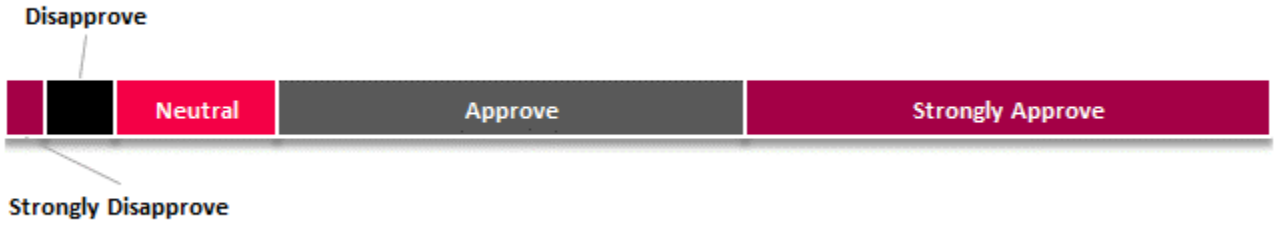
Table 17: Summary of Operating Statistics, FY2014 – FY2016

Fiscal Year	Annual Revenue Hours	Annual Revenue Miles	Annual Passenger Trips	Total Operating Funds Expended	Operating Cost/Passenger	Passengers/ Revenue Hour	Passengers/ Revenue Mile
2014	95,807	902,879	3,685,000	$6,264,642	$1.70	38.5	0.56
2015	96,570	938,336	3,733,082	$6,422,029	$1.72	38.7	0.56
2016	89,251	878,242	3,513,538	$6,830,209	$1.94	39.4	0.56

3.4 RIDER SURVEY RESULTS

An on-board rider survey was distributed on all BT routes in September and November of 2017 with an identical online version available during the same time period. Overall, 802 surveys were returned. Blacksburg Transit riders are generally satisfied with the quality of service they receive. To gauge overall satisfaction, scores for nine different measures of satisfaction were counted, with the total count of each providing an equal contribution to the final score. These measured satisfaction with elements of service such as reliability, span, frequency, and cost, among others. As seen in Figure 43, this method demonstrates high scores for most elements of the system: 79 percent of scores were either approving or strongly approving of the quality of service, with a further 13 percent of scores neutral. Only nine percent of scores expressed dissatisfaction with the system. Riders had the highest approval for the system's fares, its comfortable buses, and its professional staff, and were least happy with the system's app and its printed materials.

Figure 43: Rider Survey General Satisfaction Score



Blacksburg Transit's riders are demographically distinct. As seen in **Figure 44**, over 65 percent are part-time or full-time students, with 13 percent part-time workers. Full-time workers and retirees make up seven percent and nine percent of ridership, respectively.

Figure 44: Employment Status of Surveyed Transit Riders

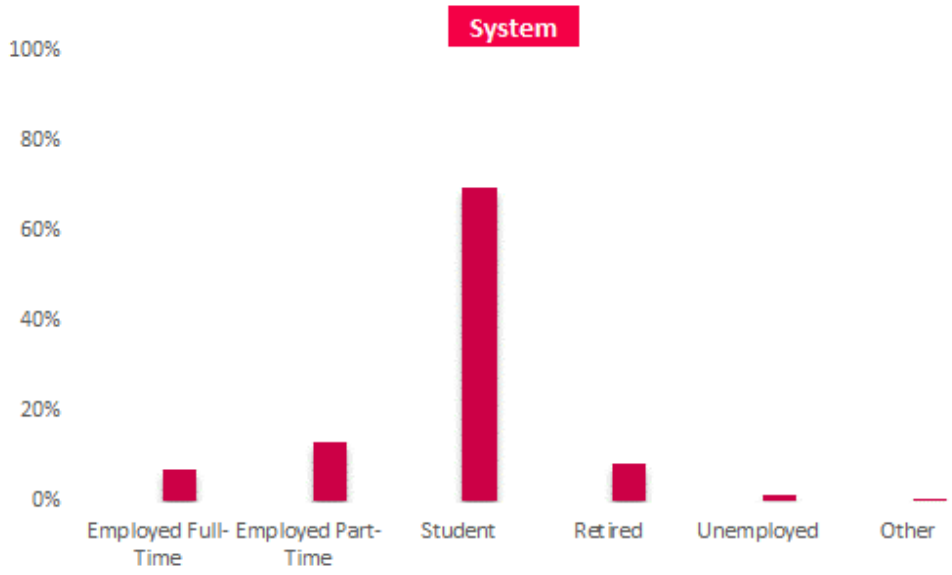


Figure 45 compares the household incomes of BT riders to statewide income distribution. BT's riders are disproportionately low-income, with 32 percent making less than $10,000 annually, and a further 11 percent making between $10,000 and $20,000 per year. This is likely due to the fact that over 65 percent of riders are students. The comparable figures for the state as a whole are seven percent and five percent, respectively. Approximately 31 percent of riders make more than $75,000 per year, compared with 36 percent of Virginia residents. An approximate 67 percent of riders are white, while 18 percent of riders are Asian and six percent are black (**Figure 46)**.

Figure 45: Income Comparison of Virginia and Surveyed Riders

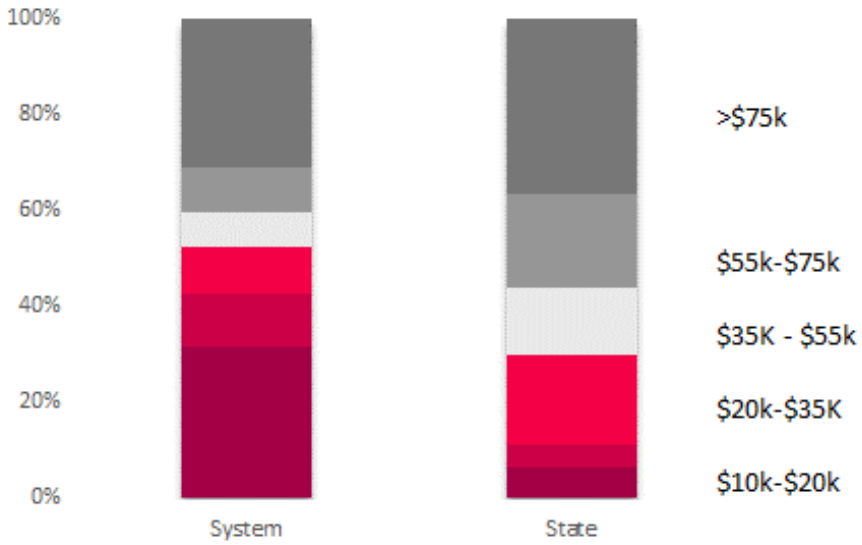
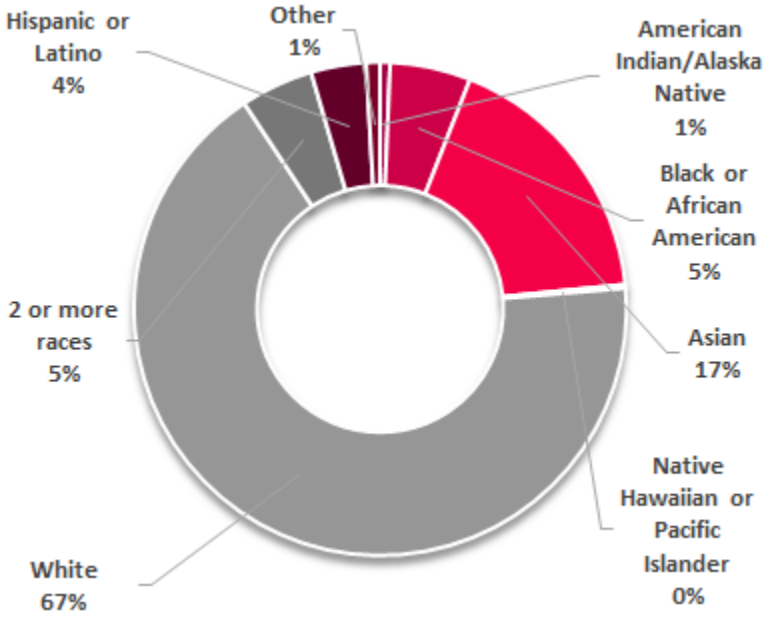


Figure 46: Racial Breakdown of Surveyed Riders



Not surprisingly, given that 70 percent of BT riders are students, the system is used most commonly by University students, to get to and from school. As shown in **Figure 47**, 95 percent of riders use their University IDs to pay their fare aboard the bus. 82 percent of surveyed riders indicated that the purpose of their trip on which they were surveyed was to attend school, with a further ten percent using it to get to or from work (**Figure 48**).

Figure 47: Fare Type Used by Surveyed Riders

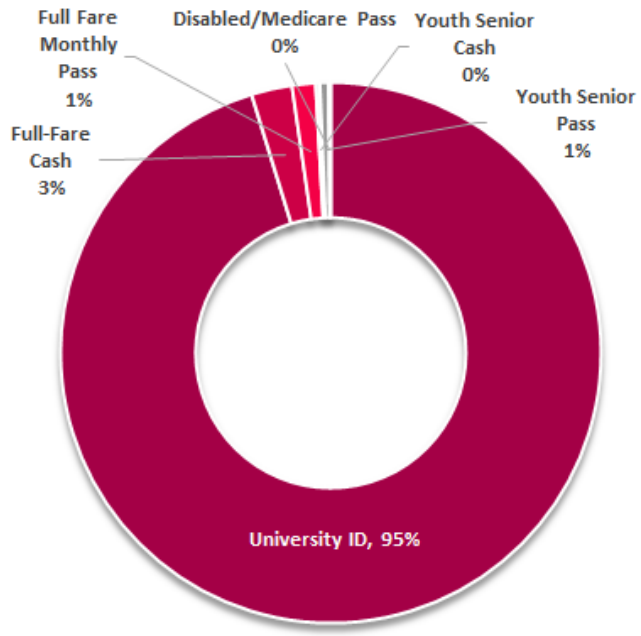
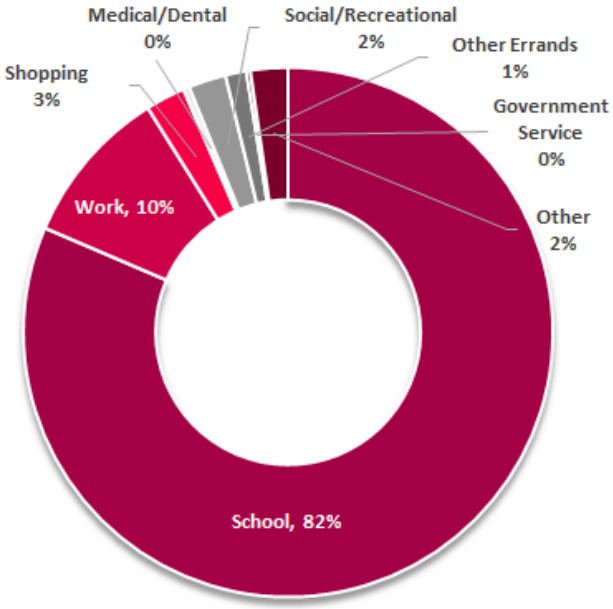
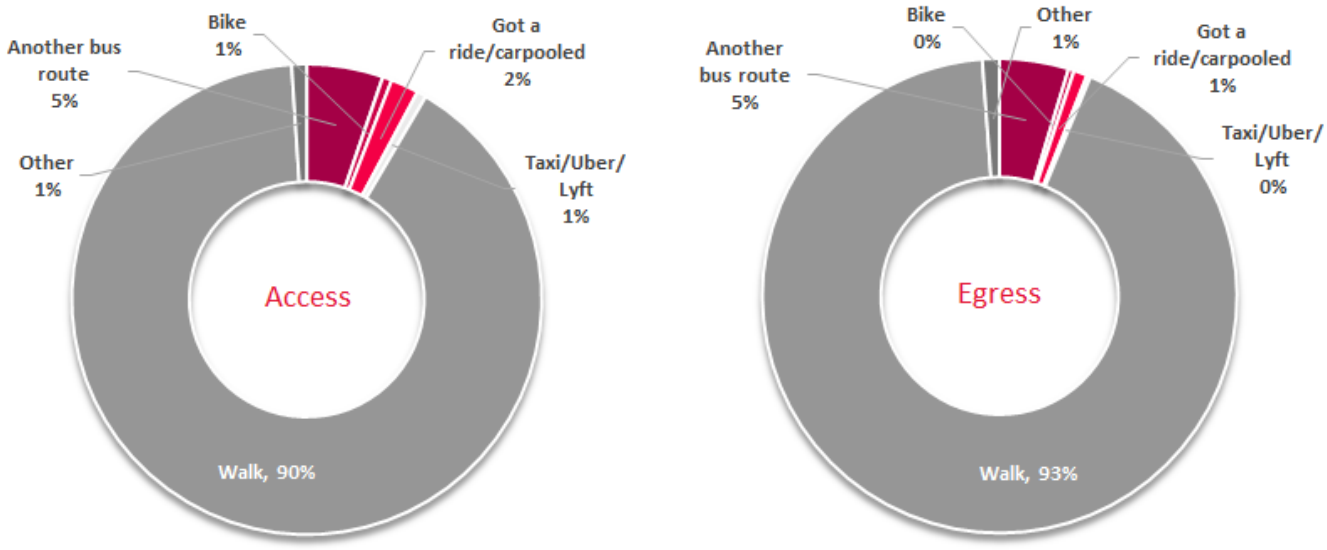


Figure 48: Trip Purpose for Surveyed Riders



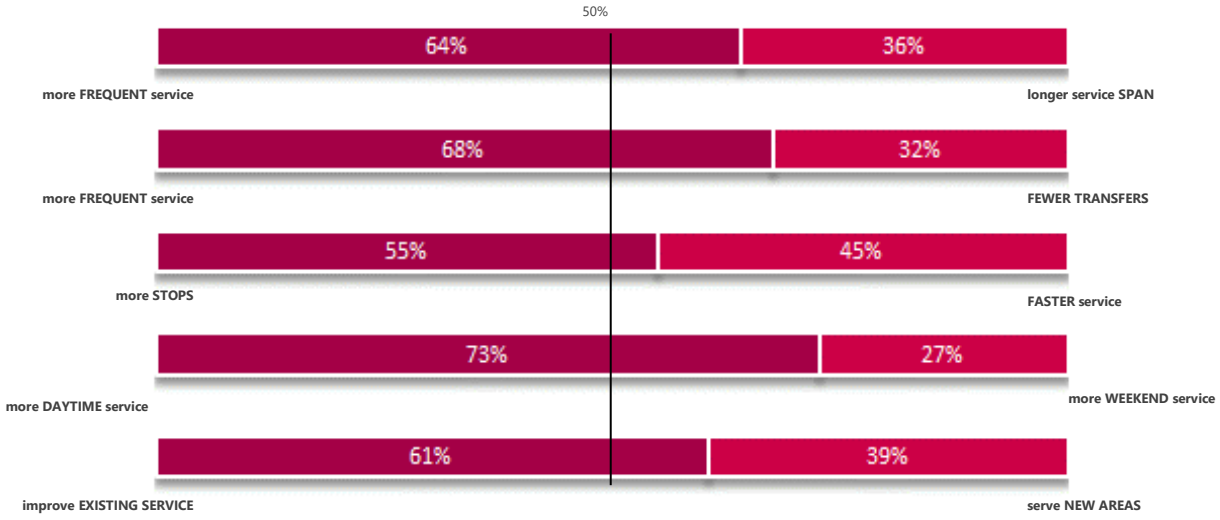
Transfers between lines are relatively rare: only six percent of surveyed riders reported getting to their bus from another bus, and only five percent reported that they would be boarding another bus after alighting from the one on which they were surveyed. Most riders got from their origin to the bus, and from the bus to their final destination, on foot: 91 percent of riders reported getting to the bus in this manner, and 93 percent reported that they would walk from their bus stop to their final destination. No other mode of access of access or egress was cited even two percent of the time (**Figure 49**).

Figure 49: Mode of Access and Egress



Surveyed riders were also offered opportunities to express general preferences about how service might be improved, and the results of those questions can be seen in **Figure 50**. When offered a choice between longer span of service and more frequent service, 64 percent opted for more frequent service. More frequent service on fewer streets was also preferred over less frequent service on more streets, by a margin of 68 percent to 32 percent. Riders were roughly evenly split on stop spacing, with 55 percent preferring more bus stops and 45 percent preferring fewer. Riders prioritized improvements to weekday service over improvements to weekend service, 73 percent to 27 percent, and improvements to existing service over adding new services, 61 percent to 39 percent.

Figure 50: Service Improvement Prioritization Preferences for Surveyed Riders



Survey results at the individual route level can be found in **Appendix A: Rider Survey Summary.**

3.5 SERVICE AREA CHARACTERISTICS

This section describes the demographic and land use characteristics of the Blacksburg Transit service area, particularly those characteristics that typically equate to a need for transit service. This analysis includes a detailed transit propensity, travel flow analysis, and a transit gap analysis to identify where improvements to transit service or new transit service might be needed.

The Blacksburg Transit service area is approximately 26 square miles in Blacksburg, Merrimac, and Christiansburg.

3.5.1 Population and Employment

Figure 51 shows the places in which population and job densities are at their highest. Population and jobs in each census block were summed and then divided by the number of acres in each. Combined population and employment densities above six per acre are typically supportive of transit service. Blacksburg's highest densities of population and employment can be found on the Virginia Tech campus, as well as in the student housing areas along Patrick Henry Drive, in the Hethwood area, and near Fairfax/Ellett. Lower, but still significant, densities of population and employment can be found near LewisGale Montgomery Hospital, University Mall, and in the Corporate Research Center. The only area with higher densities that does not currently have fixed route transit service is in Merrimac along Peppers Ferry Road west of the New River Valley Mall and in Blacksburg along Mt Tabor Road and Glade Road.

The location and size of the major student apartment complexes are also illustrated in **Figure 51**. These were identified using information from the New River Valley Apartment Council. Many of the areas with high concentrations of student apartments are also areas with high population density.

Figure 51: Transit Potential

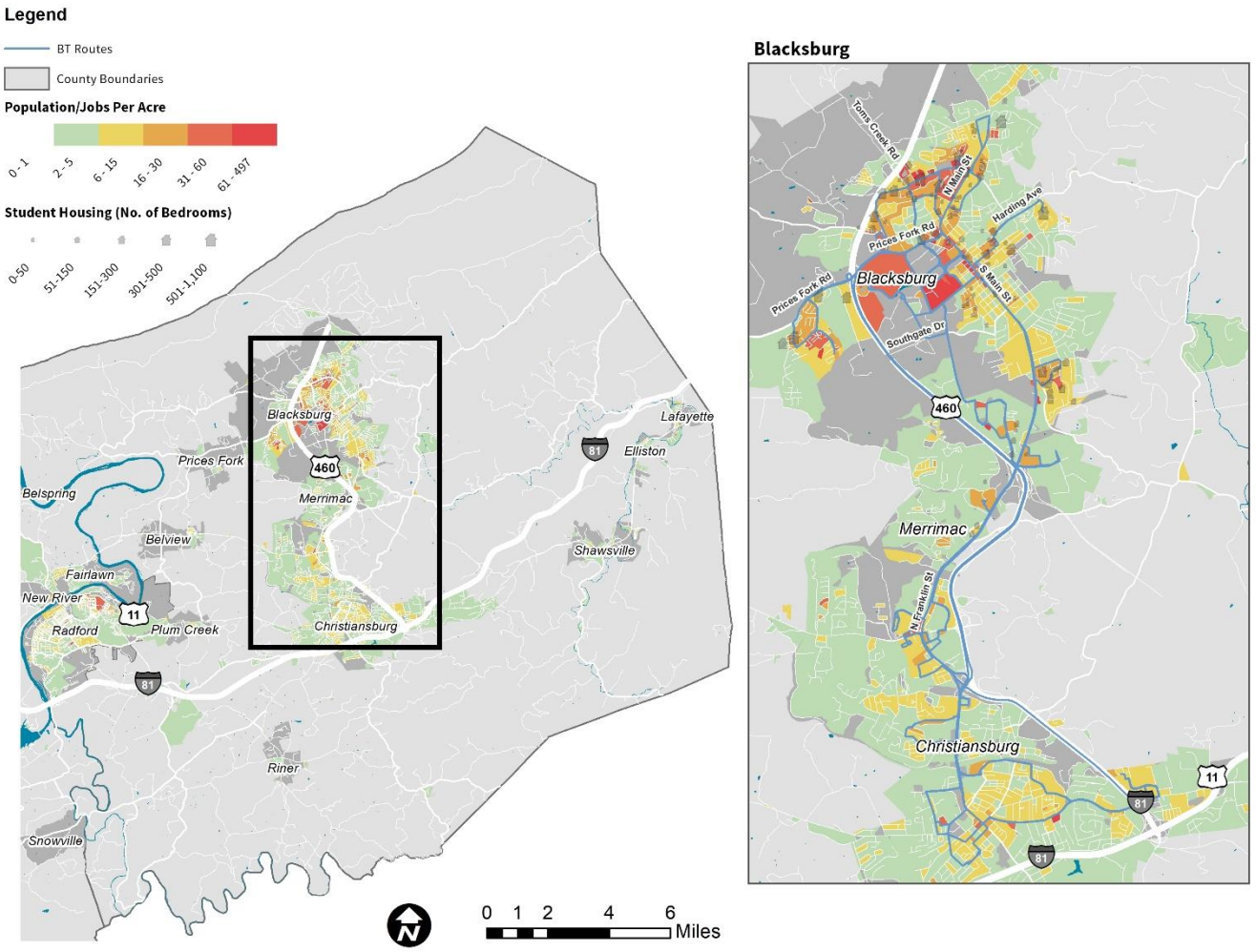


Figure 52 illustrates 2035 projected population densities for Blacksburg and Christiansburg by Transportation Analysis Zone (TAZ), a geography similar in size to census block groups. Population densities are projected to be highest on the Virginia Tech campus, with other areas of relatively high density being found in the Shenandoah, McBryde (Toms Creek Road), and Ellett neighborhoods. The Prices Fork corridor and Merrimac are also projected to see increases in population density.

Figure 52: Projected Population Density by TAZ in 2035

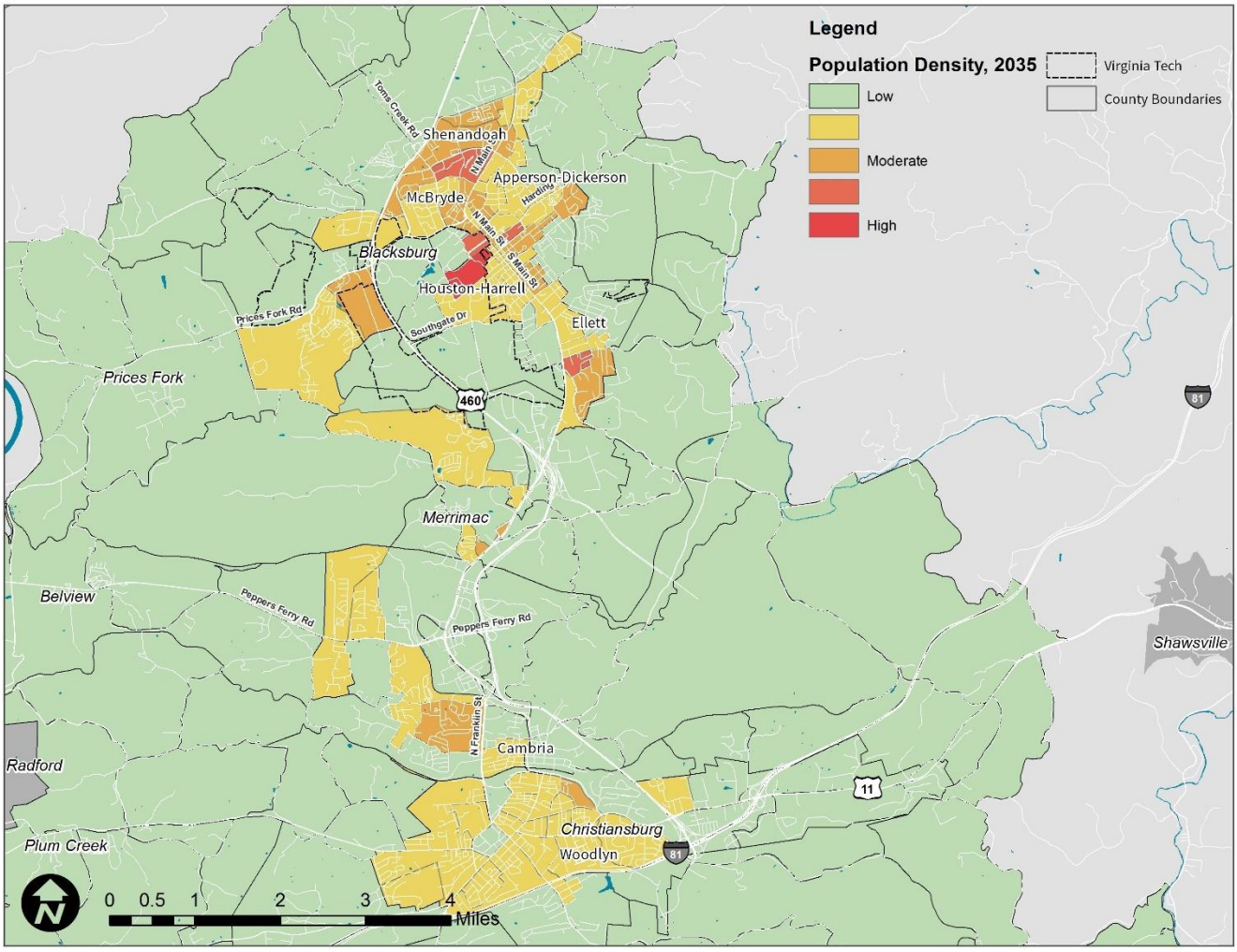
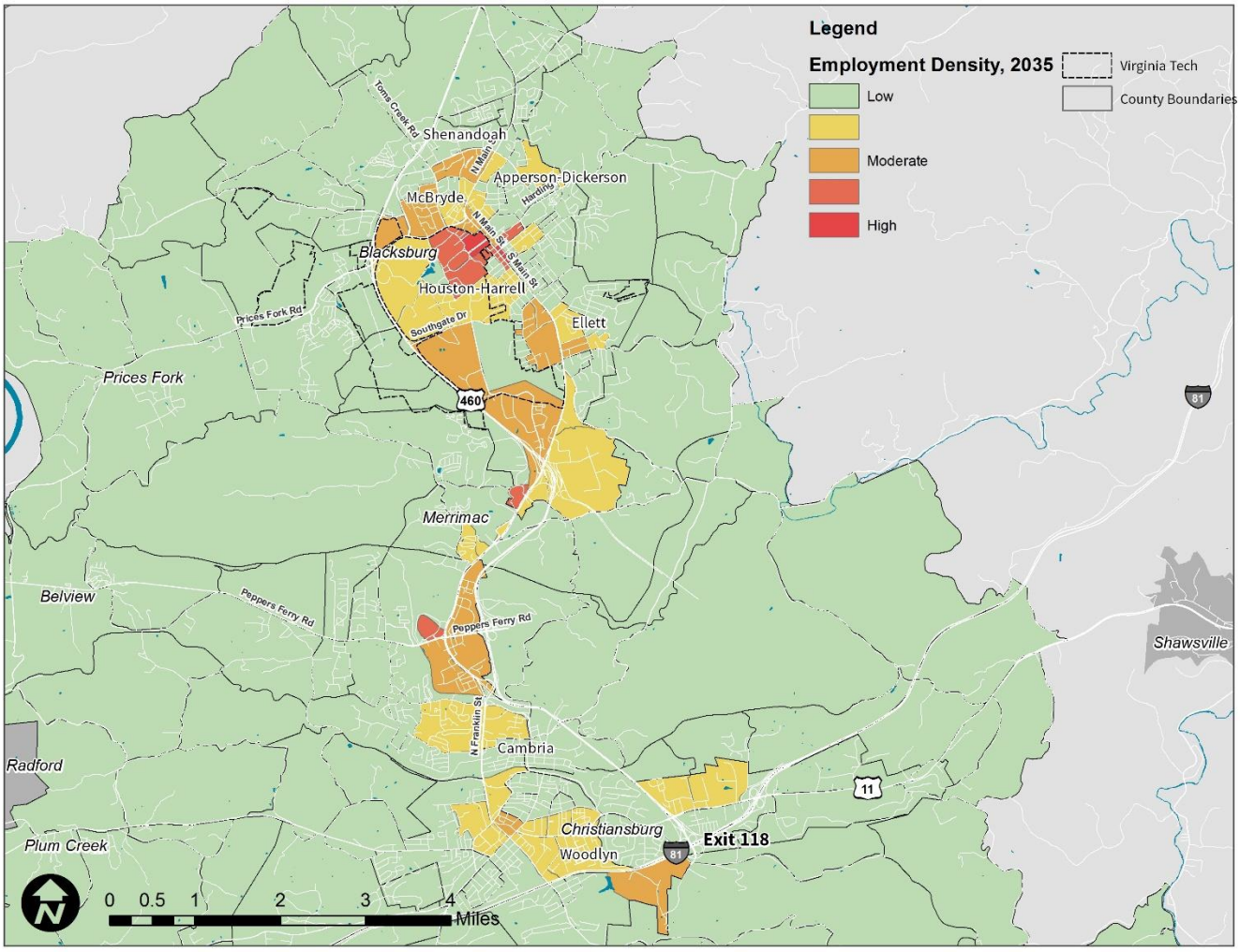


Figure 53 illustrates projected employment density by TAZ in 2035. Employment densities are projected to be highest on the Virginia Tech campus and in downtown Blacksburg, with other relatively high employment densities projected for the areas around the existing LewisGale Hospital and the New River Valley Mall. Significant increases are also projected in the Exit 118 area of Christiansburg (Technology Drive).

Figure 53: Projected Employment Density by TAZ in 2035



3.5.2 Transit Need Analysis

In order to determine transit need in the New River Valley region, a transit need analysis was performed. This analysis uses a number of different demographic factors to determine geographic areas of high transit origin and destination need. The analysis consists of four transit indexes: Commuter, Transit-Oriented Populations, Workplace, and Non-Work. These four indexes combine to show two types of transit need: all-day service and peak service. The analysis combines a number of different metrics that are typically used to describe transit setting, including population density, employment density, household density, and the locations of transit-dependent populations.

Each index is comprised of weighted categories, and each weighted category is comprised of individual data sets obtained from the 2011 – 2015 American Community Survey (ACS) or the Longitudinal Employer-Household Dynamic (LEHD) at the block group level. Weighting is based on the expected overall contribution of each category to the overall index. Data sets typically include both raw totals and densities to ensure the most comprehensive scoring. The end result for each index is a score from 0 to 100 for each block group in the New River Valley area. The scores are calculated by comparing the figures for each block group in each data set to all the block groups analyzed.

All-Day Service Need

The need for All-Day Service is determined using two transit indexes: the Transit-Oriented Population Index and the Non-Work Index. When combined, these two indexes show where populations that are likely dependent on transit live and what non-work destinations transit riders will likely want to access.

Transit-Oriented Population Index

The transit-oriented population index consists of six categories: population, age, households, income, vehicle ownership, and disabled persons. The data sets that contribute to these categories are all indicative of higher population or household density, or persons that are likely to be more reliant on transit. Therefore, this index is indicative of where transit-dependent populations live. The weights for each category are based on the projected impact of each in defining transit-oriented populations. **Table 18** summarizes the data sets that are inputs to the transit-oriented populations index.

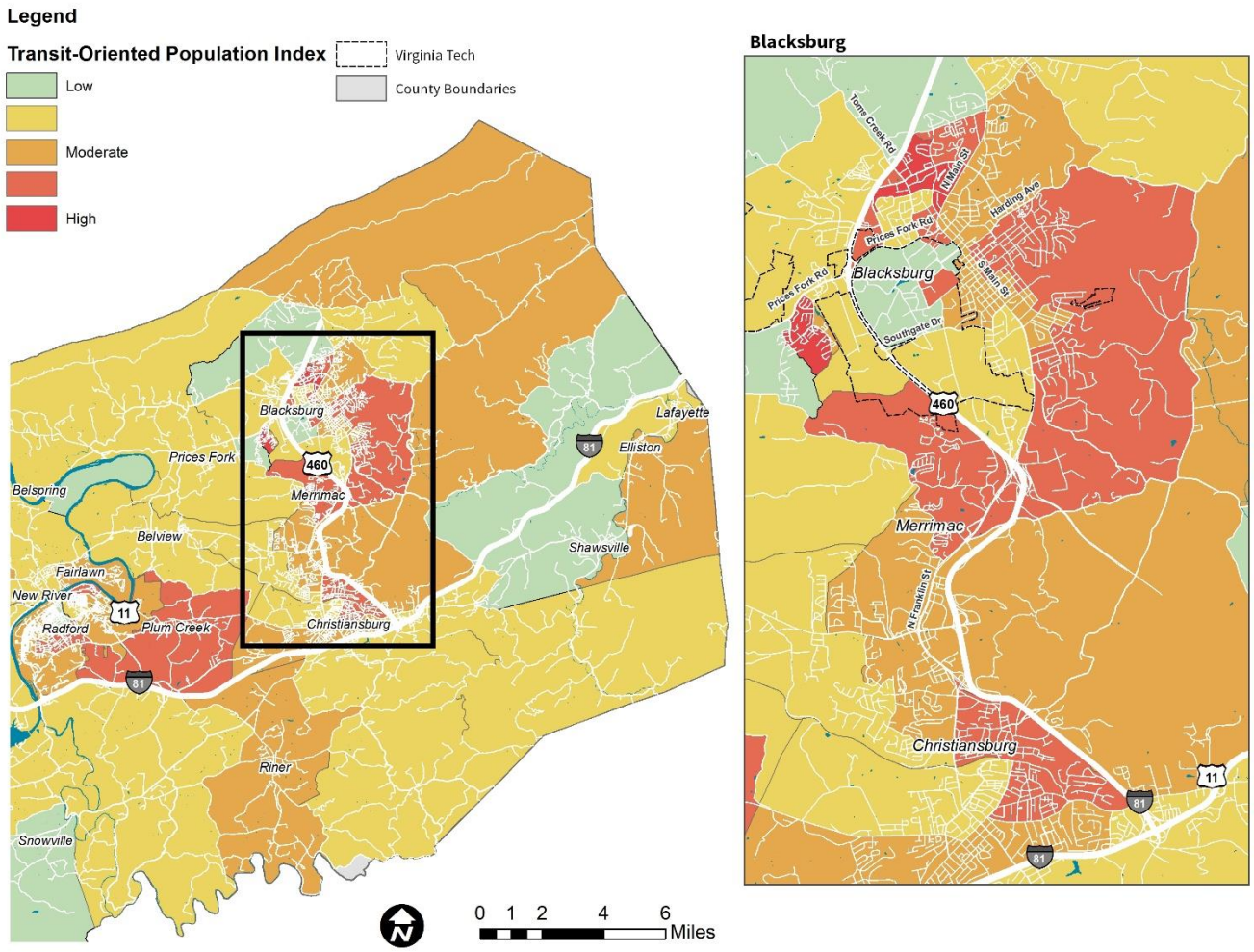
Table 18: Transit-Oriented Population Index

Index	Category	Weight	Dataset
Transit-Oriented Population	Population	30	Total Population
			Population Density
	Age	10	Total Seniors (65+)
			Senior Density
			Seniors % of Population
			Total Youth (<24)
			Youth Density
			Youths % of Population
	Households	20	Total Households
			Household Density
	Income	10	Low-Income Households

Index	Category	Weight	Dataset
			Low-Income Household Density
			% Low-Income Households
	Vehicle Ownership	20	Total Zero-Car Households
			% Zero-Car Households
			Zero-Car Household Density
			Total One-Car Households
			% One-Car Households
			One-Car Household Density
	Disabled Person	10	Disabled Population
			Disabled Population Density
			% Disabled Persons

Transit-oriented populations are highest in a ring surrounding Virginia Tech, with particular concentrations in the Hethwood area just to the west of VT and the Toms Creek area just to the north, both of which are home to many student apartment complexes (**Figure 54**). Higher concentrations of transit-oriented populations can also be found just north and east of the center of Christiansburg, and in the Plum Creek area near Radford.

Figure 54: Transit-Oriented Population Index Results



Non-Work Index

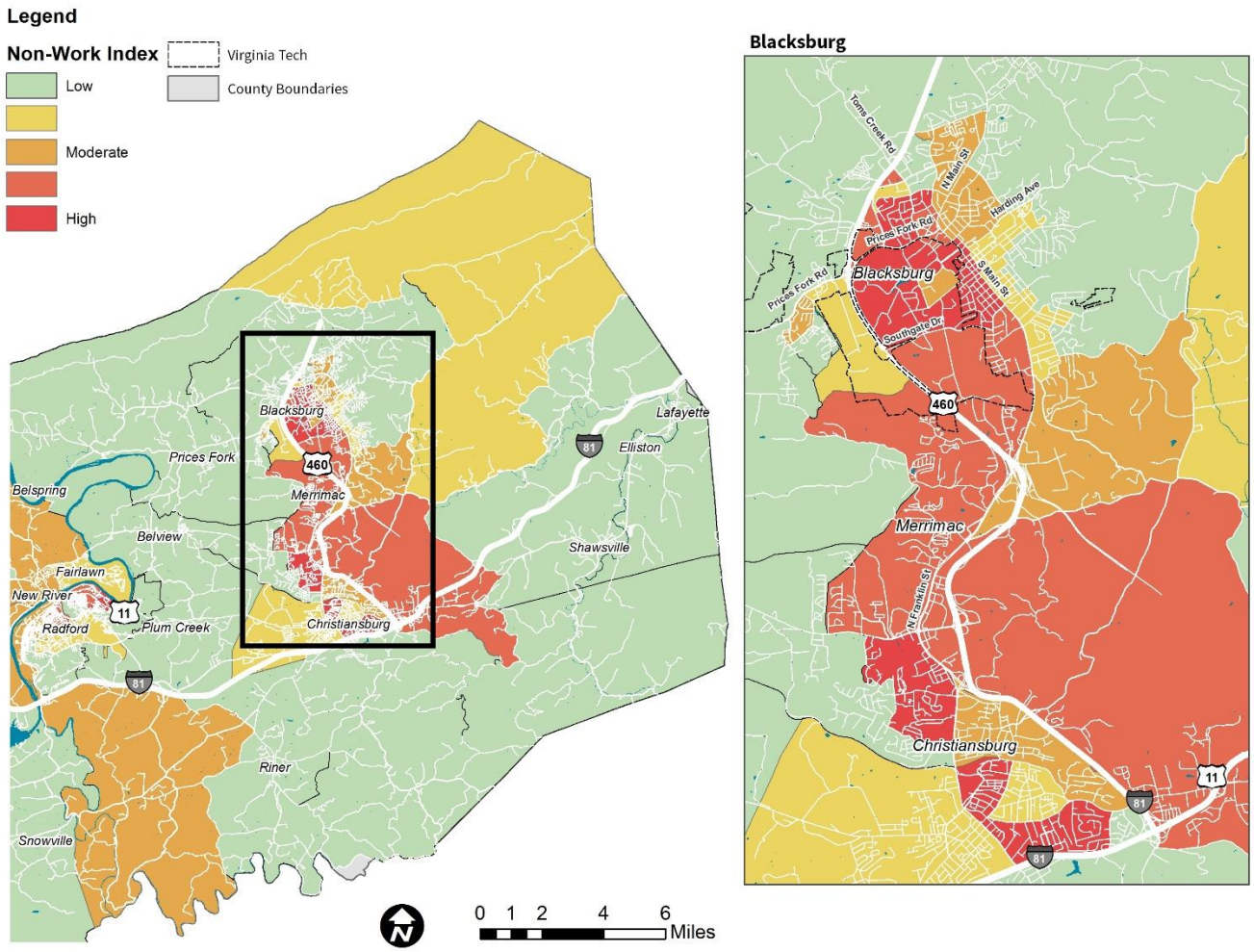
The non-work destination index has five categories: retail/restaurant, recreation, healthcare/social assistance, education, and government. These categories are weighted based on the typical trip purpose proportions for transit commuters. The data sets that make up these categories are employment in the sectors represented by these categories (i.e. the recreation category contains data sets from the entertainment sector and the recreation sector). The employment by sector data sets serve as proxies for how much travel demand businesses that fall into these sectors would produce, and therefore, this index is indicative of where people make non-work trips. **Table 19** summarizes the non-work destination index categories, weights, and the data sets that contribute to each category.

Table 19: Non-Work Index

Index	Category	Weight	Data Set
Non-Work	Retail/ Restaurant	20	Retail Jobs/Density
			Restaurant Jobs/Density
	Recreation	10	Entertainment/ Recreation Jobs/Density
	Healthcare/ Social Assistance	35	Healthcare & Social Assistance Jobs/Density
	Education	25	Education Jobs/Density
	Government	10	Public Admin. Jobs/Density

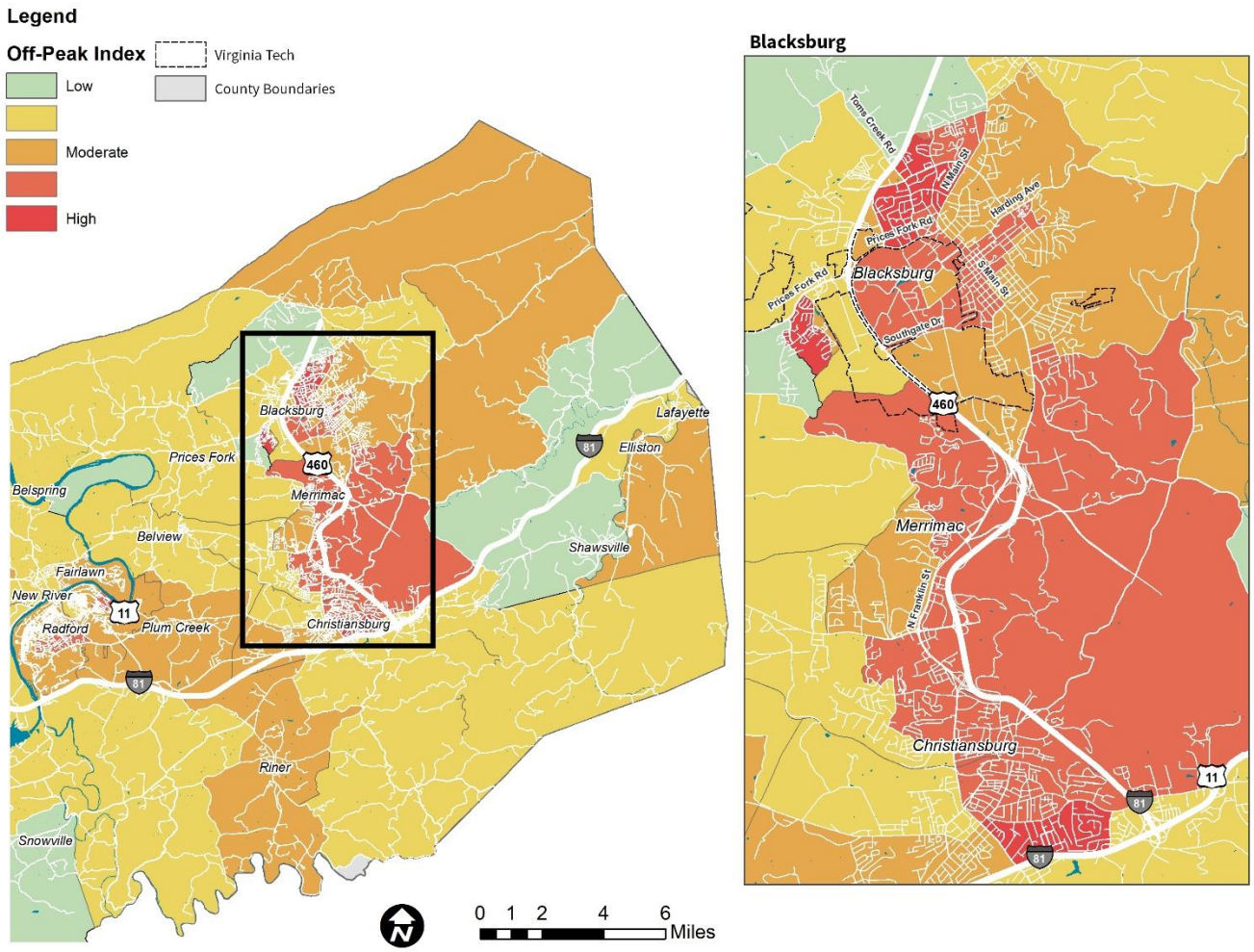
High non-work index scores can be found along the 460 corridor between Blacksburg and Christiansburg **(Figure 55**). The highest scores include the Virginia Tech campus and the center of Christiansburg, as well as the area around the New River Valley Mall. The Virginia Tech campus scores highly because of its concentration of education-related jobs, while the Christiansburg area has a high concentration of public administration jobs, due to its status as a county seat and the number of government/social services located there. The New River Valley Mall area has high concentrations of retail establishments.

Figure 55: Non-Work Index Results



The overall off-peak service need (combining the transit-oriented population index with the non-work index) is highest in the area between US-11 and I-81 in Christiansburg, as well as in the Hethwood and Tom's Creek areas of Blacksburg (**Figure 56**). There is also significant demand for all-day service along the 460 corridor between Christiansburg and Blacksburg. All of these areas currently have fixed-route service, though the service provided in Christiansburg on the Explorer routes is much less frequent than Blacksburg service.

Figure 56: Off-Peak Service Need



Rush Hour Service Need

The need for Rush Hour Commuter Service is determined using two transit indexes: the Commuter Index and the Workplace Index. When combined, these two indexes show where commuter populations live and work. In the Blacksburg Transit service area, the rush hour periods do not necessarily equate to peak ridership times since the majority of the riding population are students with varying class start and end times.

Commuter Index

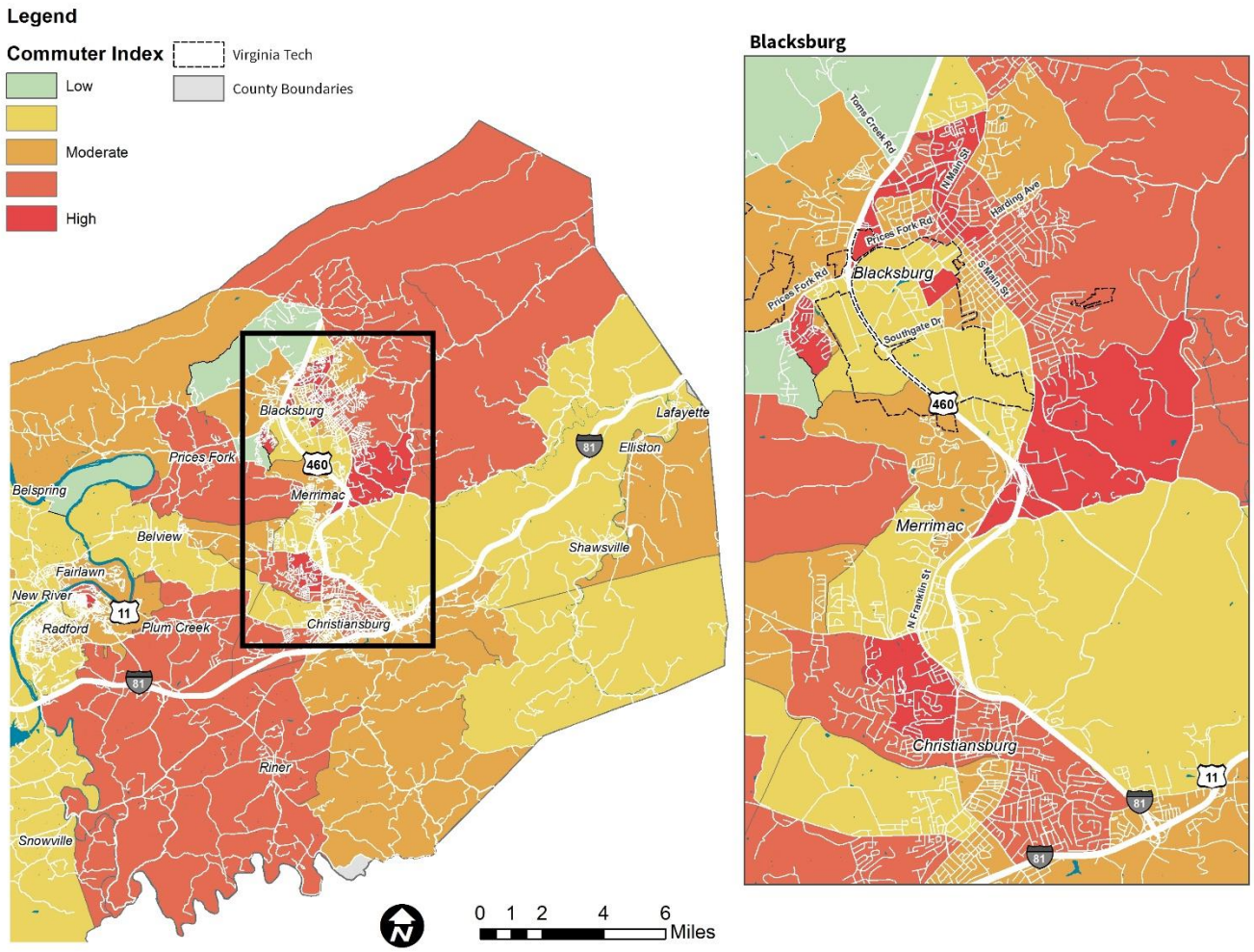
The commuter index consists of two categories: labor force and commute mode. Employed persons, commuters, and transit commuters all contribute to this index, which is indicative of where traditional peak hour commuters live, and where those that currently use transit to commute live. **Table 20** summarizes the commuter index categories, weights, and the data sets that contribute to each category.

Table 20: Commuter Index

Index	Category	Weight	Data Set
Commuters	Labor Force	70	Labor Force Size
			Labor Force Density
			Employed Persons
			Employed Person Density
			% Employed
			Total Commuters
			Commuter Density
	Commute Mode	30	Total Transit Commuters
			% Transit Commuters
			Transit Commuter Density

Commuter index scores are highest north and west of the center of Blacksburg, particularly in the Hethwood and Toms Creek areas (**Figure 57**). This is driven by high existing transit usage in those areas. Another area with a fairly high commuter index score is the area just east of South Main Street around Ellett Road, driven by its relatively high labor force and commuter scores. Moderately-high scores are also found northeast of Blacksburg and in Plum Creek and Riner. The area northeast of Blacksburg is primarily driven by new residential development along North Main Street and Mt Tabor Road.

Figure 57: Commuter Index Results



Workplace Index

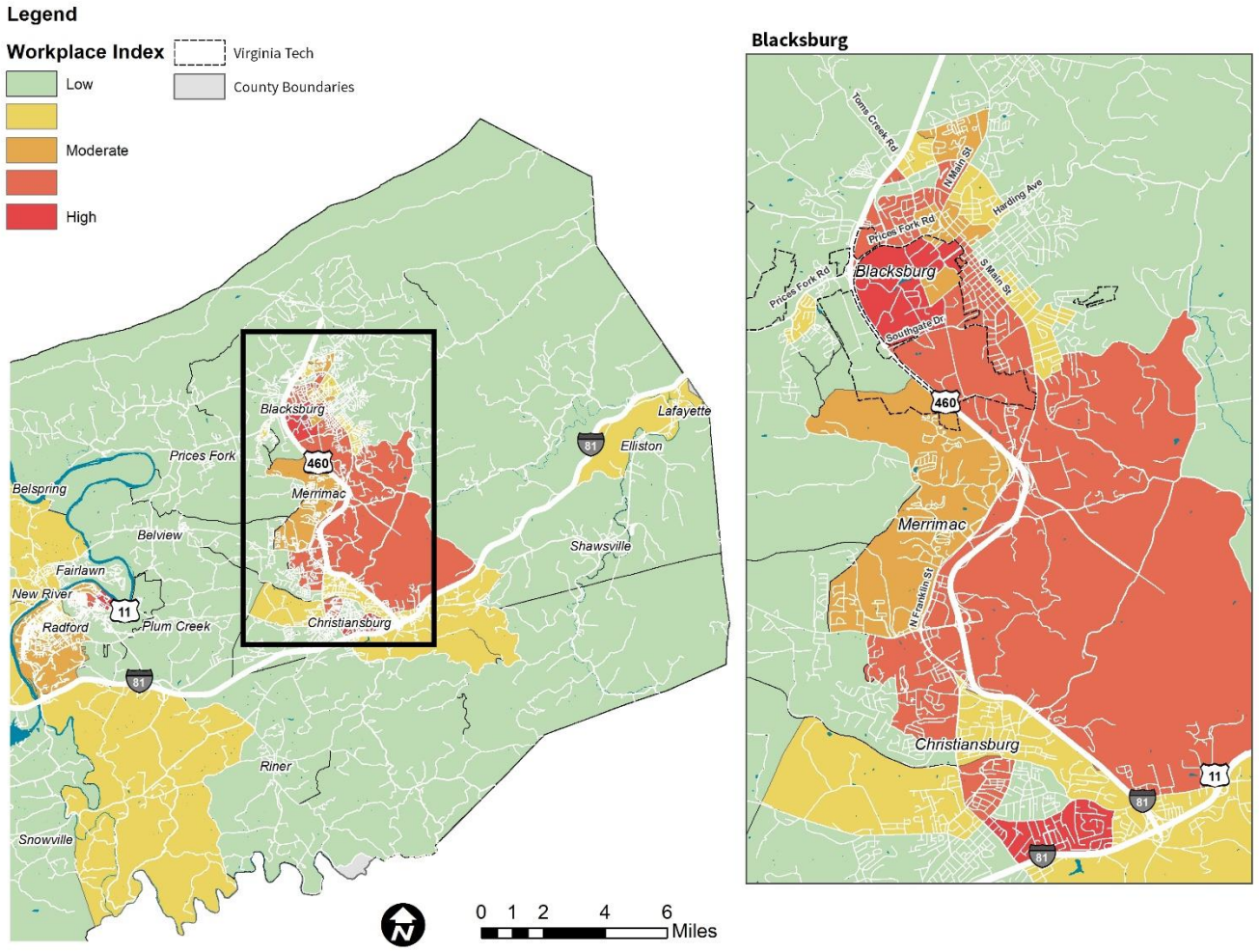
The workplace index has a single category: employment. Total employment and employment density contribute to this index, which is indicative of where people commute to for work purposes. **Table 21** summarizes the workplace index categories, weights, and the data sets that contribute to each category.

Table 21: Workplace Index

Index	Category	Weight	Data Set
Workplace	Employment	100	Total Employment
			Employment Density

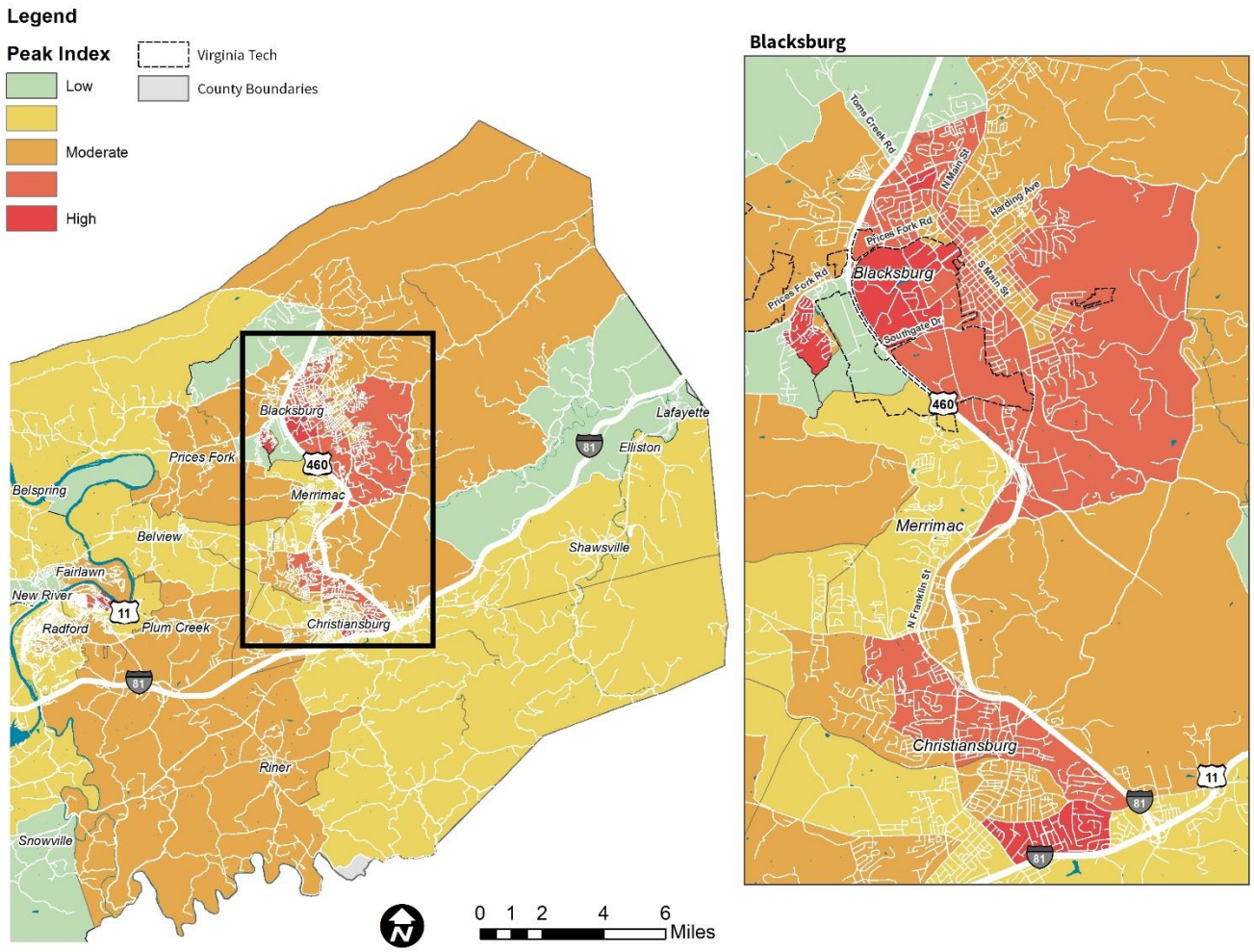
Workplace Index scores are highest on the Virginia Tech campus, as well as the area in between the center of Christiansburg and I-81 (**Figure 58**). The Virginia Tech campus features the highest scores in the region for both employee quantity and employee density, while the aforementioned area of Christiansburg scores in the top five in the region in both categories. While these areas have the highest scores, most of the US-460 corridor between Blacksburg and I-81 has workplace index scores above the regional mean.

Figure 58: Workplace Index Results



Rush hour service need is highest in the area between US-11 and I-81 in Christiansburg, as well as on the Virginia Tech campus, and in the Hethwood and Tom's Creek areas of Blacksburg. The biggest differences between the demand for peak service and the demand for off-peak service are that the demand for rush-hour service is higher than the demand for off-peak service east of South Main Street in Blacksburg, whereas the opposite is true in the area along Ellett Road just northeast of Christiansburg (**Figure 59**).

Figure 59: Rush Hour Service Need



Travel Flow Analysis

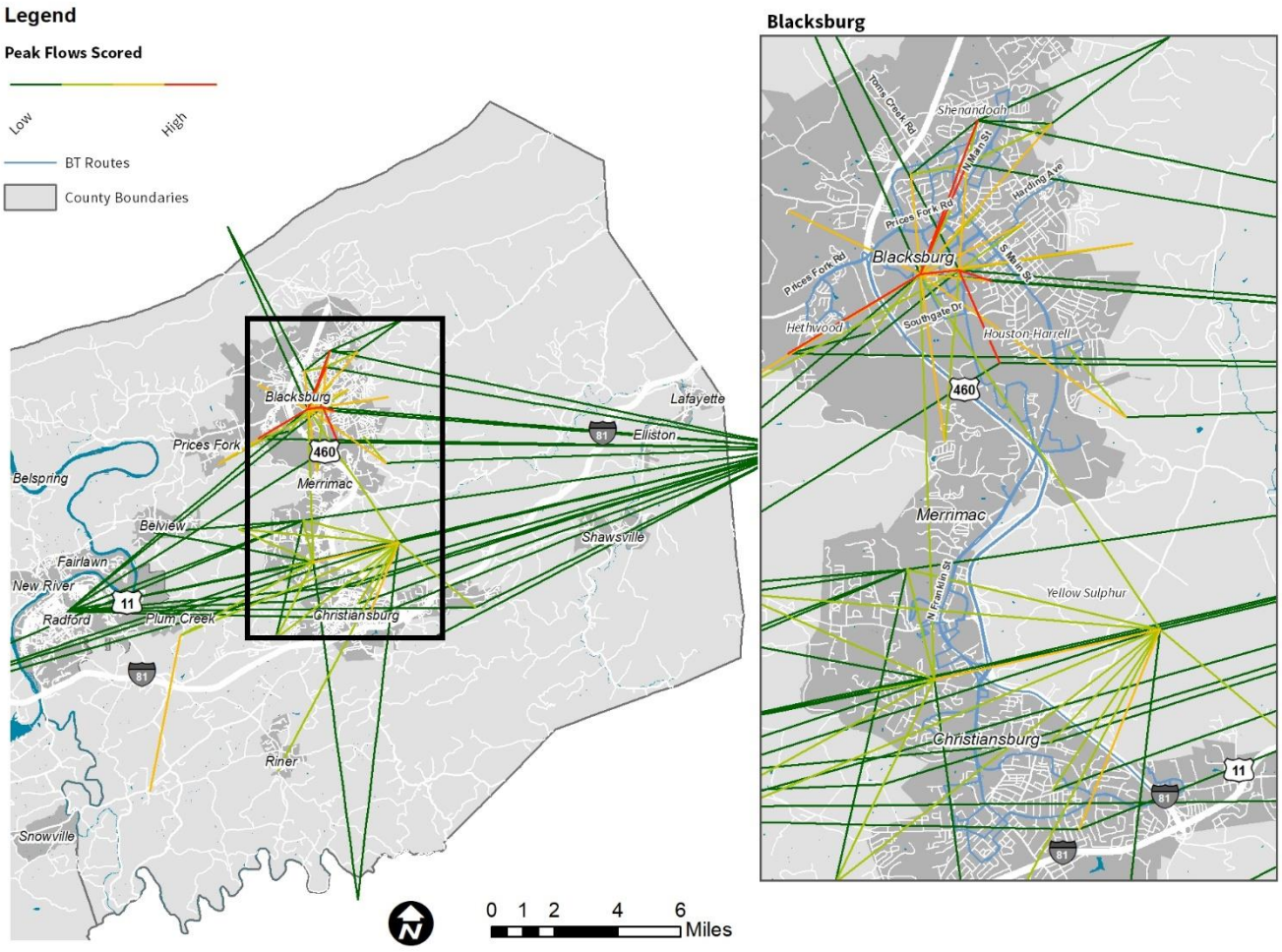
Future travel flows from the New River Valley MPO travel demand model (2035) were compiled and each origin-destination flow was scored for peak periods and all-day using the peak period and all-day service transit indexes and the total flows from the model. This analysis identifies the major connections that would benefit the most from being served by transit both during peak periods and all-day.

Travel Demand Model Rush Hour Flows

Figure 60 illustrates the scored peak period travel flows from the travel demand model. The majority of the highest scored flows are all between the Virginia Tech campus and nearby neighborhoods in Blacksburg, including Hethwood, Shenandoah, Houston-Harrell, and the Harding Ave and North Main Street corridors. All of these neighborhoods have existing service to Virginia Tech at high frequencies. There are also moderately-scored flows between northwest Blacksburg (along Glade Road) and Virginia Tech, the Alleghany neighborhood of Blacksburg and Virginia Tech, and southeast Blacksburg and Virginia Tech.

High scored flows outside of Blacksburg connect Christiansburg and Yellow Sulphur – Ellet, and Merrimac and Virginia Tech. A significant number of flows also exist between Radford and Christiansburg, Radford and Blacksburg, and Blacksburg and Christiansburg to areas east of Montgomery County, including Roanoke. While these flows are not scored as highly, they do show a potential need for intra and inter-regional connections.

Figure 60: Peak Period Travel Flows Scored, 2035



Travel Demand Model All-Day Flows

Figure 61 illustrates the scored all-day travel flows from the travel demand model. The highest scored flows generally connect to Virginia Tech and northern Christiansburg from the following areas:

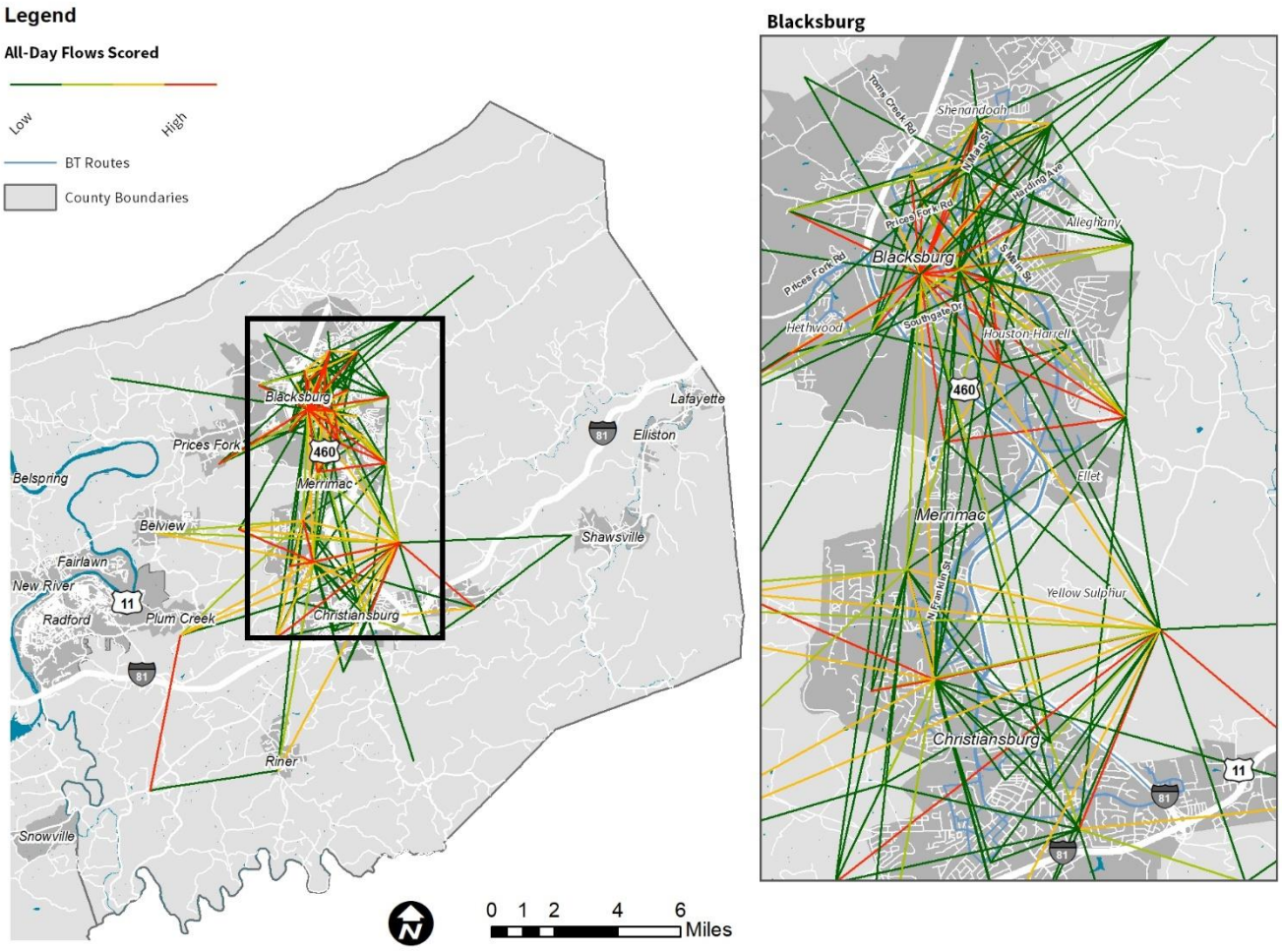
- Shenandoah, Hethwood, Harding Ave corridor, and North Main St corridors in Blacksburg;
- Southeast Blacksburg;
- Yellow Sulphur and Ellet neighborhood of Blacksburg;
- Merrimac;
- Belview;
- Riner; and

- Plum Creek.

While the areas in Blacksburg currently have transit service, Yellow Sulphur, Belview, Riner, Plum Creek, and the area to the southeast of Blacksburg do not. Additionally, service in Merrimac is limited to that along South Main Street, while service within Christiansburg has limited frequencies.

Additionally, there is likely some demand for a crosstown service between northern Blacksburg neighborhoods, including Shenandoah, McBryde (University City Boulevard corridor), and Hethwood. While service to all of these areas exists today, a transfer is required to travel between them.

Figure 61: All-Day Travel Flows Scored, 2035



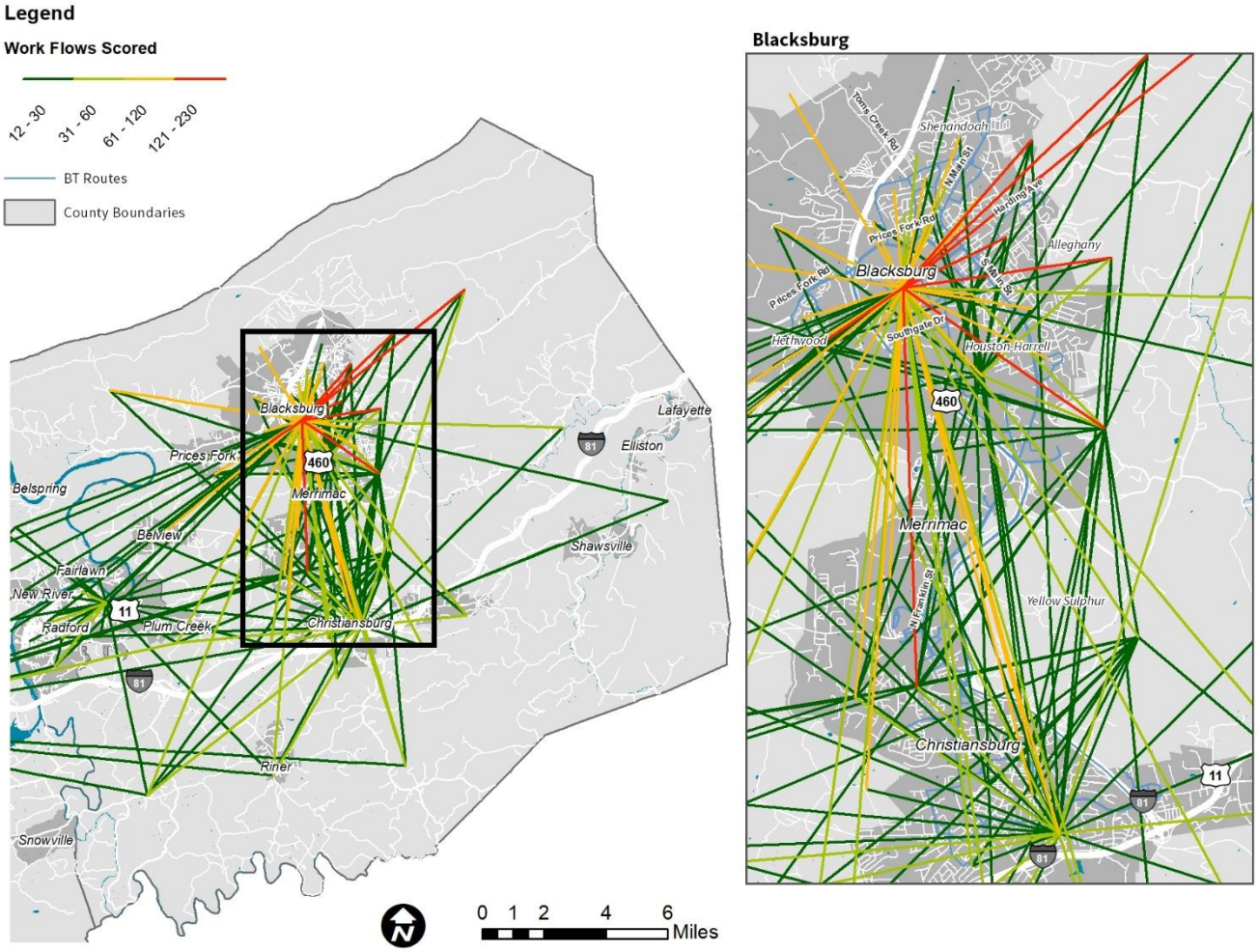
LODES Home to Work Flows

To supplement the travel demand model flows summarized in the previous section, LEHD Origin-Destination Employment Statistics (LODES) home to work travel flows were compiled for the New River Valley counties for 2015, the latest year available. These travel flows were aggregated to the block group level and then scored based on the number of flows in each pair, the commuter index score of the origin block group, and the workplace score of the destination block group.

The results of this analysis are illustrated in **Figure 62**. Like the travel demand model analysis, the highest scored flows all involve Virginia Tech, with origins in the Shenandoah, Hethwood, and Alleghany neighborhoods of Blacksburg, northeast Montgomery County (the Route 624 – Mt Tabor Road and Route 648 corridors), southeast Blacksburg and northern Christiansburg near the New River Valley Mall.

There is also significant travel between neighborhoods in Blacksburg north of Virginia Tech, the Yellow Sulphur area of Montgomery County, and downtown Christiansburg. Regionally, there is significant travel between Radford and Virginia Tech and also between Riner and Christiansburg, Riner and Virginia Tech, and the Route 693 corridor in southeast Montgomery County and Virginia Tech.

Figure 62: Home to Work (LODES) Travel Flows Scored

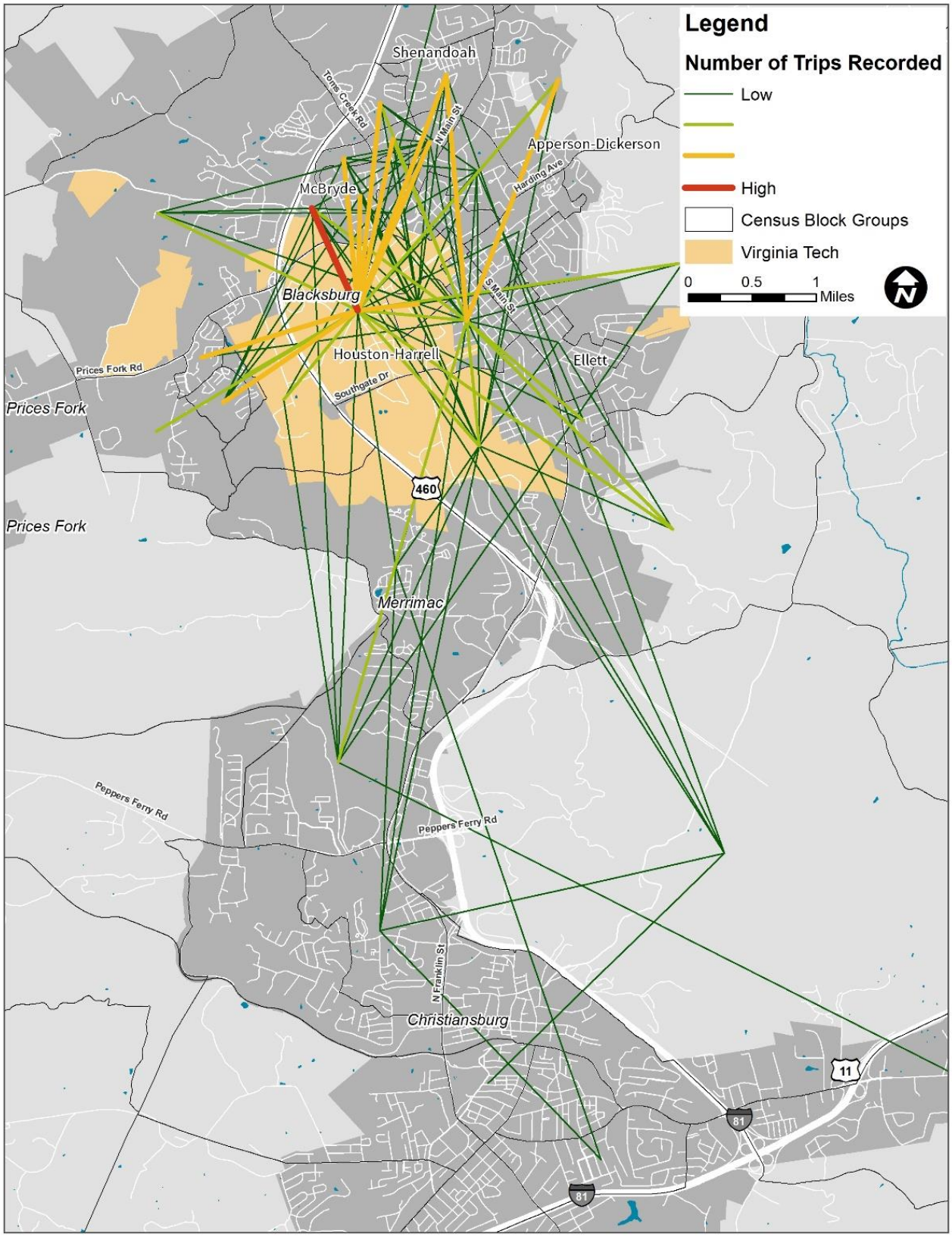


Rider Survey Travel Flows

In addition to the travel demand model and LODES travel flows, rider surveys also asked BT riders to describe the start and end points of their journeys. The responses were then geocoded and aggregated at the census block group level, with flows between each unique pair of block groups grouped together and counted.

The results of this analysis can be seen in **Figure 63**. The highest travel flow runs between the Virginia Tech campus and the McBryde neighborhood just north of it, in the vicinity of University Mall. Other relatively high travel flows run between the Virginia Tech campus and other areas to the north and west, including Shenandoah, Apperson-Dickerson, and Hethwood. These likely reflect large numbers of students traveling between their school and the housing and retail options available in these communities. Travel flows to areas south of the Virginia Tech campus are relatively low for all block groups, though there are numerous trips between the New River Valley Mall area and neighborhoods in Blacksburg.

Figure 63: Rider Survey Travel Flows



3.6 STAKEHOLDER INPUT

Stakeholder input on the Blacksburg Transit system was gathered from Blacksburg Transit staff, the town of Blacksburg, the town of Christiansburg, the New River Valley MPO and Regional Commission, Montgomery County, and Virginia Tech.

- Blacksburg Transit:
  - Two new senior housing developments are proposed at Whipple and Givens, and on Prices Fork Road just west of the new elementary school.
  - Neighborhood flex service could be considered for Clay Street, Giles Road, Mount Tabor Road, Progress Street extension, and Airport Acres.
  - New development is also proposed for the area near Southgate Drive west of the Corporate Research Center, west of Blacksburg High School, and along Merrimac Road.
  - Virginia Tech is continuing to grow, so the focus should be on increasing the frequencies of existing routes instead of expanding geographically.
  - More student apartments are being added on University City Blvd north of the University Mall.
  - Airport Acres area (behind First and Main) has had several requests for service.
- New River Valley MPO:
  - Some services are duplicative regionally – i.e. the Radford Transit Route 40 and the Blacksburg Transit service to Christiansburg.
  - A connection to the Exit 118 Park and Ride from Radford should be considered.
  - A new Amtrak station will likely be constructed in Christiansburg, just east of Franklin Street.
  - A bike share system will likely begin operation in the spring of 2018 in Blacksburg.
- Montgomery County:
  - The county has two urban development areas designated: Merrimac between the LewisGale Hospital Montgomery and Christiansburg, and Exit 109 in Radford (near the Carillion Hospital).
  - Three other areas of likely growth include Prices Fork village, Warm Hearth (Merrimac), and Cedar Orchard (Clay Street near the Blacksburg Golf Course).
- Virginia Tech:
  - The majority of complaints from students are regarding the mobile app and capacity issues (overcrowding) on routes.
  - The Hokie Express route needs increases frequency.
  - VT is looking into a remote parking lot that would need bus service, possibly near Prices Fork Road/Route 460 or in the CRC near the airport runway.
  - New residence halls and a Life Sciences building are planned for the VT golf course.
- Town of Christiansburg:
  - A large new housing development (168 apartments, 90 townhomes) is planned just west of the New River Valley Mall.
  - 200 new housing units are also planned for Providence Blvd.
  - New retail stores are planned for the old Kmart site (craft store and grocery store).
- Town of Blacksburg:

- VT is moving toward satellite parking lots on the periphery of the campus – this will necessitate new bus connections.
- Neighborhood Flex Service and regional connections remain priorities.
- A "shopping trolley" remains a consideration – to connect North Main Street with University City Blvd.
- The Two Town Trolley needs increased frequency and span of service.
- For the Hethwood routes – consideration should be given to realigning them down Plantation Way (the "back way") into the VT campus.
- A new road connection is planned between Prices Fork Road near University City Blvd and Southgate Drive – this could be a new bus route alignment.
- The town recently completed a survey for its Comprehensive Plan update:
  - 55 percent of respondents were "worried" about traffic congestion.
  - 13 percent of respondents wanted increased transit options.
- The Old Middle School site is still slated for redevelopment in the next three years.

3.7 GAP ANALYSIS

Existing transit services were compared to the results of the transit need analysis and the travel flow analysis in order to identify gaps in transit coverage throughout the New River Valley. Based on this comparison, gaps in coverage and missing connections were identified and summarized in **Table 22**. Additionally, the ridership and pass-by data was compared to the service levels provided to identify gaps in service levels – specifically, where service levels are not meeting demand.

Overall, there are several coverage gaps where the transit need index indicates a need for service where service does not exist. These areas are typically on the outskirts of Blacksburg where population growth has been significant. There are also several connection gaps between Blacksburg neighborhoods, Merrimac, and outlying areas of Montgomery County to Virginia Tech. Finally, there are service level gaps in neighborhoods along a number of existing routes where ridership is very high and pass-bys are frequent.

Table 22: Gaps in Transit Coverage, Connections, and Service Levels

Gap Type	Service	Period	Location
Coverage	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor in northeast Blacksburg
	Full & Reduced	All-Day	Glade Road corridor in northwest Blacksburg
	Full & Reduced	All-Day	Eastern Blacksburg neighborhoods, including the Clay Street corridor and Alleghany neighborhood
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road, Peppers Ferry Road west of NRV Mall)
	Full & Reduced	All-Day, Long Term	Prices Fork Road west of elementary school
Connection	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor to Virginia Tech
	Full & Reduced	All-Day	Clay Street corridor and Alleghany neighborhood to Virginia Tech

Gap Type	Service	Period	Location
	Full & Reduced	All-Day	Glade Road corridor to Virginia Tech
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road) to Virginia Tech
	Full & Reduced	All-Day, Long Term	Belview to Virginia Tech
	Full & Reduced	Peak Period, Long Term	Riner to Christiansburg or Virginia Tech
	Full & Reduced	All-Day, Long Term	Northern Blacksburg neighborhoods (Shenandoah to McBryde and Hethwood)
	Full	All-Day, Long Term	Satellite lots (particularly on west and south sides of VT campus) to Drillfield Area
	Full & Reduced	All-Day, Long Term	Blacksburg/Christiansburg to proposed Amtrak station
Service Level	Full	All-Day	Prices Fork Road and Hethwood neighborhood – increased frequency
	Full	All-Day	Toms Creek Road – increased frequency
	Full	All-Day	Progress Street – increased frequency
	Full	All-Day	Patrick Henry Drive – increased frequency

4 Service and Capital Improvement Plan

This chapter recommends changes to existing services and new services to fill gaps in the existing transit network and improve unproductive services. The capital needs of the agency to maintain a state of good repair and to support the service recommendations are also included.

4.1 SERVICE IMPROVEMENTS AND NEEDS

The service improvements for Blacksburg Transit generally fall into three categories: recommendations to fill the gaps in the transit network that were identified in section **3.7**, strategies to improve the productivity of the network, and service level adjustments to meet service standards and to better match demand. Since Blacksburg Transit operates two different services annually based on whether Virginia Tech is in session or not (Full Service and Reduced Service), the service in which each recommendation will take place is noted throughout the following sections.

4.1.1 Recommendations to Fill Gaps

The Gap Analysis in section 3.7 identified transit service gaps that fall into three categories: coverage gaps, connection gaps, and service level gaps (see **Table 22**). Service improvements were developed to "fill" each of these gaps, as summarized in **Table 23**. The proposed improvements include strategies such as restructuring existing routes, route extensions, new routes, service increases, and new flex services for three Blacksburg neighborhoods. While two proposed new fixed routes and the proposed new flex services would expand service within the town of Blacksburg to several neighborhoods, the remainder would expand service into Montgomery County outside of Blacksburg and Christiansburg and therefore would require coordination with the county, including a discussion of a county contribution toward the funding of new services that would operate outside BT's current service area. The modifications to the Two Town Trolley and Explorer would allow people to travel further into Christiansburg on the Two Town Trolley before they would need to transfer to the Explorer and would increase the frequency of both routes. Further details on individual route recommendations can be found in Appendix C.

The neighborhood flex services would be a pilot demand-response services operating during peak periods initially, providing morning service from the Mt Tabor, Highland Park, and Glade Road neighborhoods of Blacksburg to employment hubs in Blacksburg (including Virginia Tech, the Corporate Research Center, and the Industrial Park), and operating in the reverse direction in the evening. The services could be operated using several different methods, including a voucher service with taxis and TNCs, through a private van operator, or directly by BT using its own vehicles. The final determination would be made following further study.

Table 23: Recommendations to Fill Gaps in the Transit System

Gap Type	Service	Period	Location	Outside Blacksburg or Christiansburg	Service Improvement
Coverage	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor in northeast Blacksburg	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Glade Road corridor in northwest Blacksburg	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Eastern Blacksburg neighborhoods, including the Alleghany neighborhood	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Eastern Blacksburg neighborhoods, including the Clay Street corridor	No	New Clay St (CLY) route
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road, Peppers Ferry Road west of NRV Mall)	Yes	New Merrimac (MER) route
	Full & Reduced	All-Day, Long Term	Prices Fork Road west of Hethwood	Yes	New Prices Fork (PFO) route
Connection	Full & Reduced	All-Day	Mt Tabor Road (Rte 624) corridor to Virginia Tech	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Clay Street corridor to Virginia Tech	No	New Clay St (CLY) route
	Full & Reduced	All-Day	Alleghany neighborhood to Virginia Tech	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Glade Road corridor to Virginia Tech	No	New Neighborhood Flex Service
	Full & Reduced	All-Day	Merrimac (Hightop Road, Merrimac Road) to Virginia Tech	Yes	New Merrimac (MER) service
	Full & Reduced	All-Day, Long Term	Belview to Virginia Tech	Yes	Additional stop on Pulaski Area Transit New River Valley Express route
	Full & Reduced	Peak Period, Long Term	Riner to Christiansburg or Blacksburg/Virginia Tech	Yes	New Riner commuter route (RIN)
	Full & Reduced	All-Day, Long Term	Northern Blacksburg neighborhoods (Progress St/Patrick Henry Dr and Hethwood)	No	New Progress St B route
	Full	All-Day, Long Term	Satellite lots (particularly on west and south sides of VT campus) to Drillfield Area	No	Improvements to Hokie Express (HXP) and CRC routes
	Full & Reduced	All-Day, Long Term	Blacksburg/Christiansburg to proposed Amtrak station	No	Improvements to The Explorer (EXP) and Two Town Trolley (TTT)
Service Level	Full	All-Day	Prices Fork Road and Hethwood neighborhood – increased frequency	No	Increase frequency of Hethwood B
	Full	All-Day	Toms Creek Road – increased frequency	No	New Progress Street B route
	Full	All-Day	Progress Street – increased frequency	No	New Progress Street B route
	Full	All-Day	Patrick Henry Drive – increased frequency	No	New Progress Street B route

4.1.2 Unproductive Services

Table 24 summarizes Blacksburg Transit's productivity and schedule adherence standards, as outlined in Chapter 2. **Table 25** shows each route's performance on each of those standards. The Explorer is currently the only route that is classified as a Community Circulator. The Main Street route is split into its north and south halves in BT's data reporting systems, and therefore is shown as two separate routes.

Table 24: Blacksburg Transit Service Standards

	Measure	Fixed Route	Community Circulator
Passengers per Revenue Hour	Good	More than 25	More than 10
	Satisfactory	20-25	7-10
	Marginal	15-20	4-7
	Unsatisfactory	Less than 15	Less than 4
Passengers per Revenue Mile	Good	More than 3.0	Greater than 1.0
	Satisfactory	2.0-3.0	0.6-1.0
	Marginal	1.0-2.0	0.3-0.6
	Unsatisfactory	Less than 1.0	Less than 0.3
Schedule Adherence ***(Percent of buses between 0 and 5 minutes late)***	Good	More than 90%	More than 90%
	Satisfactory	85%-90%	85%-90%
	Marginal	80%-85%	80%-85%
	Unsatisfactory	Less than 80%	Less than 80%

Table 25: Blacksburg Transit Productivity Service Standards Summary by Route

Route	Passengers/ Rev. Hour	Passengers/ Rev. Mile	Schedule Adherence	Passengers/ Rev. Hour Standard	Passengers/ Rev. Mile Standard	Schedule Adherence Standard
BT Commuter	1.1	N/A	N/A	Unsatisfactory	Unsatisfactory	N/A
Carpenter Blvd	29.9	3.0	87.8%	Good	Satisfactory	Satisfactory
CRC Shuttle	19.8	1.3	94.2%	Satisfactory	Marginal	Good
Harding Avenue	29.9	1.9	92.1%	Good	Marginal	Good
Hethwood A	56.2	5.2	87.0%	Good	Good	Satisfactory
Hethwood B	60.5	5.3	91.9%	Good	Good	Good
Hethwood-Harding Combined	57.0	1.0	76.9%	Good	Marginal	Unsatisfactory
Hokie Express	38.1	4.1	93.9%	Good	Good	Good
Main Street North	63.7	4.0	91.9%	Good	Good	Good
Main Street South	38.4	4.0	74.6%	Good	Good	Unsatisfactory
Patrick Henry	62.8	8.6	95.2%	Good	Good	Good
Progress Street	69.6	12.1	98.3%	Good	Good	Good
The Explorer	5.5	0.4	N/A	Marginal	Marginal	N/A
Toms Creek	66.2	6.8	92.5%	Good	Good	Good
Two Town Trolley	16.0	1.2	92.1%	Marginal	Marginal	Good
University City Blvd	51.3	6.6	95.2%	Good	Good	Good
University Mall Shuttle	74.8	11.1	86.6%	Good	Good	Satisfactory

The BT Commuter is considered "unsatisfactory" for each productivity standard, while the Main Street South and the Hethwood-Harding Combined Routes are both considered "unsatisfactory" in the schedule adherence standards. Therefore the following changes are recommended for each in order to help improve productivity and efficiency:

- BT Commuter:
  - Route will be restructured or eliminated due to low ridership.
- Main Street South
  - Daytime frequencies will be increased on the Main Street route as a whole (North and South) so buses arrive every 12 minutes instead of every 15 minutes. This will reduce overcrowding on buses and reduce dwell time at stops, improving on time performance.
- Hethwood-Harding Combined
  - A new Western Perimeter Road will be built on the Virginia Tech Campus in the next 3-10 years; when this is complete, the route will be realigned to that road, to avoid congestion on Price's Fork Road at the Route 460 interchange a major congestion point) and hopefully improve on-time performance.

4.1.3 Level of Service Improvements

The level of service standards outlined in Chapter 2 for Blacksburg Transit are summarized in **Table 26**. Most Blacksburg Transit routes provide service above the fixed-route level of service standards for frequency, though that is usually justified by high ridership on those routes. The only routes that do not exceed systemwide frequency standards during at least part of their service day are the BT Commuter, The Explorer, and the Two Town Trolley. Recommendations for frequency increases or decreases are driven primarily by ridership data. Routes recommended for more frequent service include the Hethwood B, Hokie Express, Main Street, the Explorer, and the University Mall Shuttle. The CRC shuttle is recommended for less frequent service during off-peak periods to better match demand, and the Two Town Trolley is recommended for more frequent service. Furthermore, the BT Commuter is recommended for restructuring or elimination.

Eight routes do not meet span of service standards, however there are logical explanations for why most of them do not:

- BT Commuter operates during peak hours only since it is intended to be a commuter express route.
- Carpenter Blvd does not have evening, late night, or weekend service however the Hethwood routes (which parallel this route) do.
- CRC does not have late night or weekend service as the majority of businesses in the CRC and the Industrial Park have traditional 9 to 5 business hours. If Virginia Tech substantially increases the number of classes in the CRC, additional service may be warranted. Saturday service should be considered in the future, however.
- Patrick Henry does not have evening, late night, or weekend service, however Toms Creek and Main Street do, and both of these routes have alternate night and weekend alignments that provide service to the majority of the Patrick Henry route alignment.

- Progress Street does not have evening, late night, or weekend service however Toms Creek and University City Blvd do, and both of these routes provide service to the Progress Street, Patrick Henry Drive, and Toms Creek Road corridors.
- The Two Town Trolley does not have late night service except on Fridays and Saturdays, and this service ends at 12:45 am. However, the Main Street corridor in Blacksburg has late night service that meets standards, and demand for late night service in Christiansburg is low. Expanded service on weekends is recommended to ensure retail employees in Christiansburg can use the route to get to and from work.
- University Mall Shuttle does not have evening, late night, or weekend service, since the purpose of this route is to serve the Virginia Tech Math Emporium. Earlier service will be provided on weekdays, however, since the Math Emporium opens at 8:00 am and has high demand at this time.

Table 27 summarizes service level changes that are recommended by route.

Table 26: Blacksburg Transit Level of Service Standards

	Period	Fixed Routes	Community Circulator
Maximum Span of Service ***(Full Service)***	**Monday-Thursday**	7:00 AM-12:45 AM	Consistent year-round and based on demand
	Friday	7:00 AM-2:45 AM	
	Saturday	9:30 AM-2:45 AM	
	Sunday	11:30 AM-11:30 PM	
Maximum Service Frequency	**Peak Hours** ***(9:00 AM-4:00 PM weekdays)***	10 - 15 minutes	60 - 120 minutes
	Off-Peak Hours	30 - 60 minutes	60 - 120 minutes

Table 27: Blacksburg Transit Level of Service Standards and Proposed Improvements Summary by Route

Route	Frequency Standard	Span of Service Standard	Proposed Level of Service Improvement
BT Commuter	Meets	Does not meet	Route restructured or eliminated due to low ridership
Carpenter Blvd	Meets	Does not meet	No level of service changes proposed
CRC	Exceeds	Does not meet	Weekday evening frequency reduced due to low ridership and Saturday service added year-round
Harding Avenue	Exceeds	Meets	No changes proposed
Hethwood A	Exceeds	Meets	No changes proposed
Hethwood B	Exceeds	Meets	Frequency increased during full service weekday peak from 15 minutes to 10 minutes due to high ridership
Hethwood-Harding Combined	Meets	Meets	No changes proposed
Main Street North	Exceeds	Meets	Full service peak frequency increased from 15 minutes to 12 minutes due to high ridership
Main Street South	Exceeds	Meets	Full service peak frequency increased from 15 minutes to 12 minutes due to high ridership
Patrick Henry	Exceeds	Does not meet	No changes proposed
Progress Street	Exceeds	Does not meet	No changes proposed, however new Progress St B route will add frequency to the Progress St corridor year-round
The Explorer	Meets	Meets	Year-round frequency increased from 60-120 minutes to 45 minutes at all times. Saturday service added year-round

Route	Frequency Standard	Span of Service Standard	Proposed Level of Service Improvement
Toms Creek	Exceeds	Meets	No changes proposed
Two Town Trolley	Meets	Does not meet	Year-round weekday, Saturday and Sunday frequency increased from 60 minutes to 45 minutes to facilitate timed transfer with The Explorer. Spans extended on weekends to match retail business hours year-round
University City Blvd	Exceeds	Meets	No changes proposed
University Mall Shuttle	Exceeds	Does not meet	Full service peak frequency increased from 15 minutes to 10 minutes due to high ridership and service span expanded to begin at 7:00 AM

4.1.4 System Integration

Ensuring that there is regional connectivity in the New River Valley is vital to the success of the three transit systems that operate in this area, including Blacksburg Transit, Radford Transit and Pulaski Area Transit. Currently, there are two intraregional services that operate within the region, and one service that connects the region to Roanoke:

- Intraregional services:
  - Radford Transit Route 40, operating between Radford University and Christiansburg/Blacksburg/Virginia Tech.
  - Pulaski Area Transit New River Valley Express, operating between Pulaski, Dublin, Fairlawn, and Christiansburg.
- Interregional services:
  - Smartway, operating between Christiansburg, Blacksburg, and Roanoke.

While these services exist, they have limited service levels that do not currently provide adequate regional service:

- RT Route 40 does not operate before 2:40pm on weekdays and Saturdays, has no Sunday service, and does not operate during Reduced Service. Route 40 stops in Christiansburg, Blacksburg, and at Virginia Tech.
- PAT NRV Express only operates between 7:45am and 5:05pm on weekdays and between 10:00am and 2:00pm on Saturdays. There are only two trips to the NRV Mall on weekdays at 8:50am and 1:50pm, and no service to the NRV on Saturdays. The NRV Express stops in Christiansburg.
- There is no schedule coordination between RT Route 40 and any of the Blacksburg Transit routes, and no schedule coordination between PAT NRV Express, RT Route 20, and the BT Two Town Trolley and Explorer.

Additionally, there is some overlap between routes operating in different systems, mainly RT Route 40 and the BT Two Town Trolley on Franklin Street in Christiansburg and Main Street in Blacksburg.

In order to improve connectivity within the New River Valley region, several recommendations were developed and are summarized in **Table 28** and illustrated in **Figure 64**. The majority of these recommendations involve

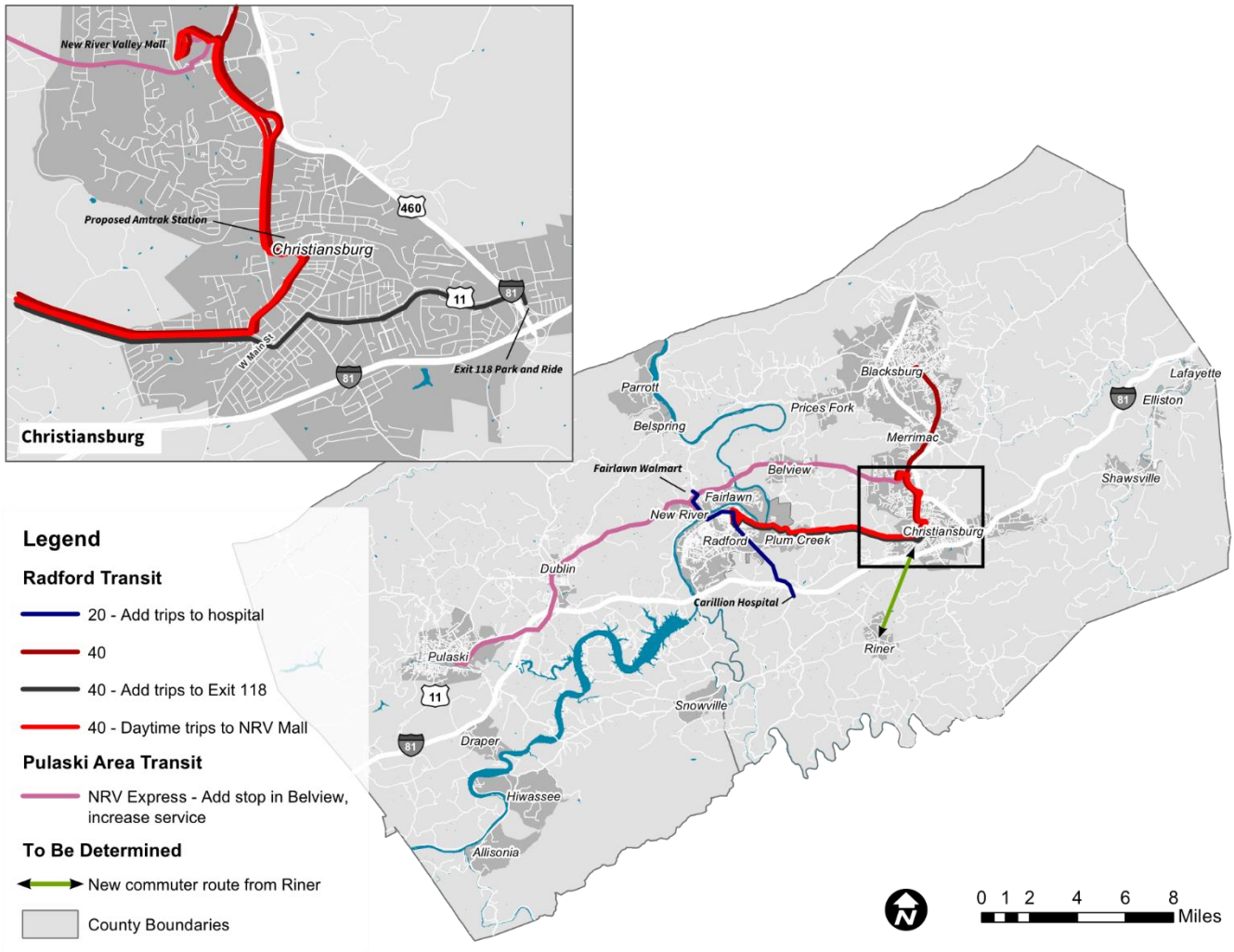
coordination of schedules across the three systems in the region, however two involve the extension of existing Radford Transit routes to benefit the regional overall.

Table 28: Regional Integration Recommendations Summary

Service	Recommendation	Regional Benefit
RT Route 40	Operate route between Radford University and the NRV Mall between 7:00 am and 2:40 pm, and then between Radford University and Squires after 2:40 pm (current alignment)	All-day service provided between Radford and Christiansburg, with easy transfer to Blacksburg services during morning and midday periods
	Operate select trips to the Exit 118 Park and Ride in Christiansburg	Connection between Radford and regional Park and Ride with Virginia Breeze service
	Add a stop at the proposed Amtrak station in Christiansburg.	Connection between Radford and interstate Amtrak service
RT Route 20	Extend certain trips to Carillion Hospital in Radford	Provide dedicated service to a regional medical center
	Coordinate schedules with PAT NRV Express at the Fairlawn Walmart	Seamless travel between Pulaski, Dublin, Fairlawn, Radford, and the Carillion Hospital
PAT NRV Express	Increase span of service to 10:00 pm on weekdays, and to 6:00 pm on Saturdays	Increased utility of this route for travel between Pulaski, Dublin, Fairlawn, and Christiansburg, including the proposed Amtrak Station
	Increase frequencies incrementally to 90 minutes and then 60 minutes	Increased utility of this route for travel between Pulaski, Dublin, Fairlawn, and Christiansburg
	Coordinate schedules with RT Route 20 at the Fairlawn Walmart	Seamless travel between Pulaski, Dublin, Fairlawn, Radford, and the Carillion Hospital
BT Two Town Trolley	Coordinate schedule with the PAT NRV Express at the NRV Mall	Seamless travel between Pulaski, Dublin, Fairlawn, Christiansburg, and Blacksburg
	Add a stop at the proposed Amtrak station in Christiansburg	Connection between Blacksburg and interstate Amtrak service
BT Explorer	Add a stop at the proposed Amtrak station in Christiansburg	Connection between Christiansburg and interstate Amtrak service
Riner	Operate new year-round peak hour commuter route between Riner and Christiansburg, Blacksburg, or both	Provide commuter service between southern Montgomery County and Christiansburg/Blacksburg

Eliminating the duplication of service along Franklin Street and South Main Street between the Blacksburg Two Town Trolley and Radford Route 40 was considered as an additional recommendation, however Radford Transit does not want to potentially lose ridership by forcing a transfer between Route 40 and the Two Town Trolley during the late night periods when this route is viewed as a safety measure to reduce impaired driving between the two towns. Therefore, this service will continue to operate as it does today, however new "short" trips on Route 40 will be added between Radford and the NRV Mall during the morning and early afternoon and an additional stop will be added at South Main Street and Ardmore Street in Blacksburg (serving First and Main).

Figure 64: Regional Integration Recommendations Summary



With these recommendations in place, New River Valley residents will be able to travel seamlessly across the region with ease and will be able to reach major regional destinations via transit. Additionally, increased access to the proposed Amtrak station in Christiansburg will enable residents in Blacksburg, Christiansburg, and Radford to reach this interstate service using only a single route, and residents of Pulaski, Dublin, and Fairlawn the ability to reach it using only two routes.

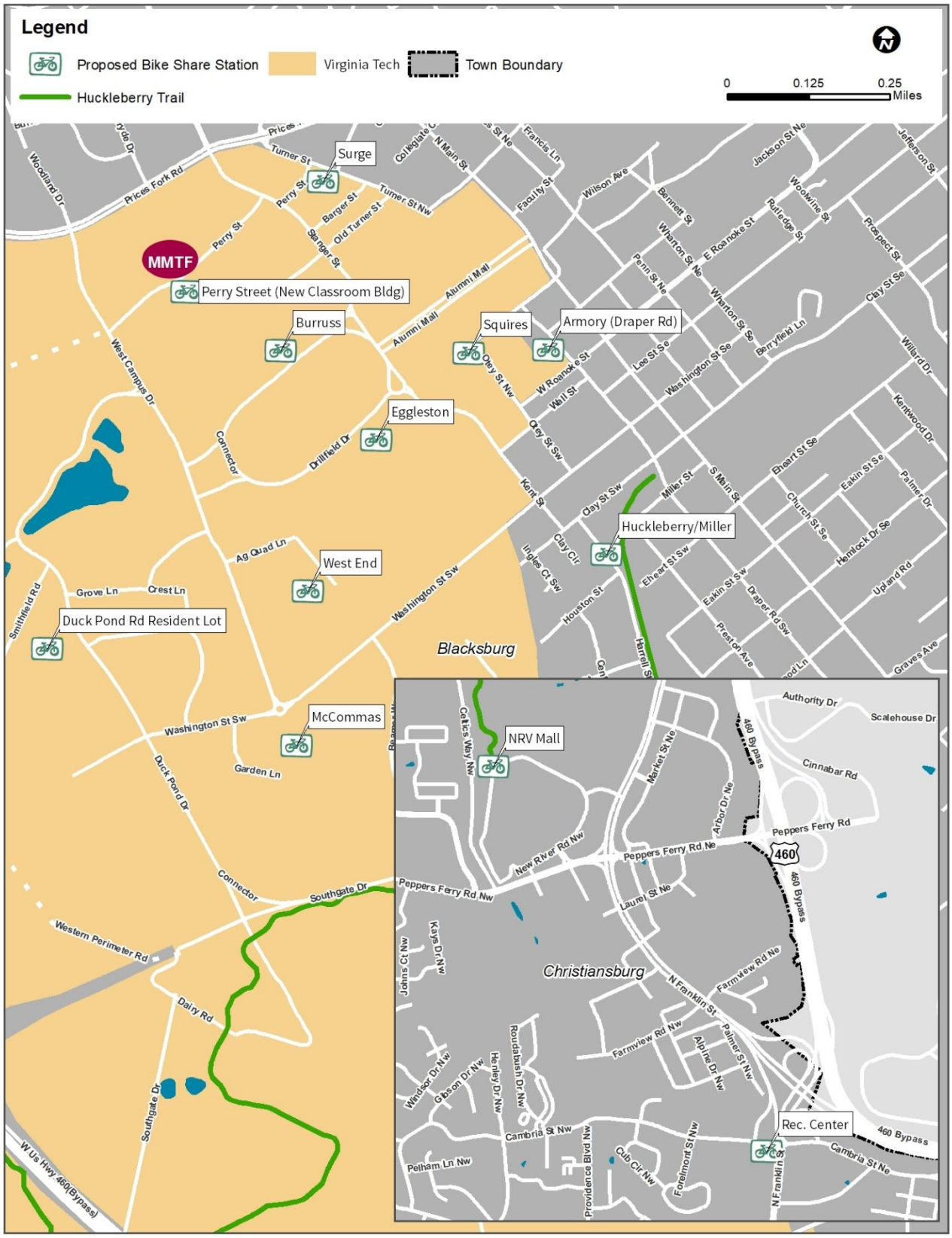
4.1.5 Bike Share

A new bike share system called "Roam NRV" was introduced in July 2018 with hubs in Blacksburg, Christiansburg, and on the Virginia Tech campus. The system has 12 stations total, including eight on the Virginia Tech campus, two in Blacksburg, and two in Christiansburg. Bike share is expected to play an important role as a first mile/last mile connection to Blacksburg Transit for affiliates of Virginia Tech and for local citizens within Montgomery County.

A station has been installed on Perry Street near the New Classroom Building, which is located near the future MMTF location. Other stations have been located around the campus at strategic locations near academic

buildings and parking lots. In conjunction with the Hokie Express, University Mall Shuttle, and the CRC routes, bike share will ensure that there is adequate internal circulation available on the Virginia Tech campus. Bike share will also allow another option for Virginia Tech students, faculty/staff, and other citizens to access the NRV Mall in Christiansburg via the Huckleberry Trail, as a station has been installed the northwest side of the Mall, as well as at the Christiansburg Recreation Center. **Figure 65** illustrates the proposed bike share locations.

Figure 65: Proposed Bike Share Locations



4.1.6 Summary of All Improvements

A summary of all the recommended improvements by route is included in **Table 29**, while a summary of proposed new routes can be found in **Table 30**. For further details on these proposed changes, see the detailed route change sheets in Appendix C. The Riner, Prices Fork, and Merrimac services would operate outside of Blacksburg and Christiansburg and therefore would require coordination with Montgomery County. Many of the new services are recommended for areas with high transit need, as outlined in the Transit Need and Gap analyses in Chapter 3. Additionally, a new campus shuttle on the Virginia Tech campus is recommended to help shuttle students between main campus and commuter lots as well as between the multi-modal transit facility and academic buildings is opened, in addition to the improvements recommended for the Hokie Express, Corporate Research Center, and University Mall routes. Figure 66 illustrates the recommended changes during Full Service, while **Figure 67** illustrates the recommendations during Reduced Service.

Table 29: Summary of Proposed Improvements by Route

Route	Proposed Improvement	Proposed Timeframe
BT Commuter	Eliminate or restructure service on this route	Short term (1-3 years)
Carpenter Blvd	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted via Plantation Road/Smithfield Road	Mid term (3-10 years)
CRC Shuttle	Full service frequency reduced to 45 minutes after 7:00 PM	Short term (1-3 years)
	All trips serve Industrial Park	Short term (1-3 years)
	Service rerouted to MMTF	Short term (1-3 years)
	Service provided to a new remote parking lot near the airport	Short term (1-3 years)
	Saturday service added year-round	Long term (10 plus years)
Harding Ave	Service extended to Wrights Way	Long term (10 plus years
	Service rerouted to MMTF	Short term (1-3 years)
Hethwood A	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hethwood B	Service rerouted to MMTF	Short term (1-3 years)
	Full service peak frequency improved to 10 minutes	Short term (1-3 years)
	Service rerouted to Litton Reeves Hall	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hethwood-Harding Combined	Service rerouted to MMTF	Short term (1-3 years)
	Service rerouted to use planned Western Perimeter Road (to avoid congestion on Prices Fork Rd)	Long term (10 plus years)
Hokie Express	Service rerouted to MMTF and to Kent Street	Short term (1-3 years)
Main Street North	Full service peak frequency improved to 12 minutes	Short term (1-3 years)
Main Street South	Full service peak frequency improved to 12 minutes	Short term (1-3 years)
Patrick Henry	Service rerouted to MMTF	Short term (1-3 years)
Progress Street	Service rerouted to MMTF	Short term (1-3 years)

Route	Proposed Improvement	Proposed Timeframe
The Explorer	Extend route along Radford Street to town line	Mid term (3-10 years)
	Timed transfer to Two Town Trolley created at Christiansburg Amtrak Station	Mid term (3-10 years)
	Year-round frequencies improved to 45 minutes	Mid term (3-10 years)
	Service to the planned Amtrak station near Aquatic Center	Mid term (3-10 years)
Toms Creek	Service rerouted to MMTF	Short term (1-3 years)
Two Town Trolley	Service extended to proposed Amtrak station in Christiansburg	Mid term (3-10 years)
	Service will operate in both directions between the NRV Mall, Walmart, and the DMV	Mid term (3-10 years)
	Service will be added to the Target plaza	Mid term (3-10 years)
	Year-round frequencies will be increased to 45 minutes during weekday peak and Saturday service	Mid term (3-10 years)
	Service will be extended until 6:45 PM during reduced service weekends and on full service Sundays	Mid term (3-10 years)
University City Boulevard	Service rerouted to MMTF	Short term (1-3 years)
University Mall Shuttle	Service rerouted to MMTF	Short term (1-3 years)
	Full service spans will begin at 7:00 AM	Short term (1-3 years)
	Full service peak service frequencies will be increased to 10 minutes	Short term (1-3 years)

Table 30: Summary of Proposed New Routes

New Route	Areas Served	Justification	Time Frame
Progress Street B	Progress Street corridor	Reduces overcrowding on existing Progress Street route	Short term (1 to 3 years)
	Givens Lane corridor	Provides service to a high transit need area	
Airport Acres	Airport Road and Country Club Drive	Provides service to an area with transit need and no existing service	Mid term (3-10 years)
	South Main Street	Supplements existing service to reduce overcrowding on existing service	
Clay Street	Clay Street and Jefferson Street	Provides service to an area with transit need and no existing service	Mid term (3-10 years)
Campus Shuttle	Duckpond Dr, West Campus Dr, Drillfield	Supplements existing service to help with overcrowding	Short term (1 to 3 years)
Merrimac	Merrimac	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Prices Fork	Prices Fork Road corridor	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Riner	Riner to Christiansburg or Blacksburg	Provides service to an area with transit need and no existing service	Long term (10 plus years)
Neighborhood Flex Services (Demand-Response)	Mount Tabor	Provides service to an area with transit need and no existing service	Long term (10 plus years, pilot program)
	Glade Road	Provides service to an area with transit need and no existing service	

New Route	Areas Served	Justification	Time Frame
	Highland Park	Provides service to an area with transit need and no existing service	
Radford St – Roanoke St	Christiansburg	Provides additional service to a corridor with high transit need	Short term (1 – 3 years)

4.1.7 MMTF Service Details

The multimodal transit facility (MMTF) will become the new major transfer point for BT service on the Virginia Tech campus, along with Squires on Alumni Mall. The MMTF will have two sets of bus bays, east and west, with the east side having access from Stanger Street and the west side having access from West Campus Drive. The east side is proposed to have nine bus bays, and the west side is proposed to have eight bus bays. Recommendations on which side of the MMTF each route will serve were based on a number of factors, including:

- Each route's access point to the Virginia Tech campus,
- Each route's runtime and direction (for one-way loop routes), and
- The capacity of each side of the MMTF.

Table 31 summarizes which side of the MMTF (if applicable) each route will serve along with the peak number of buses per hour.

Table 31: MMTF Assignments by Route

	Route	MMTF Side	Proposed Peak Buses/Hour
Current Routes	Carpenter Blvd	West	2.0
	CRC	West	4.0
	Explorer	-	1.3
	Harding Ave	East	4.0
	Hethwood Combined (off-peak route)	East	0.0
	Hethwood A	East	6.0
	Hethwood B	West	6.0
	Hokie Express	East	6.0
	Main St	Squires	5.0
	Patrick Henry	East	6.0
	Progress St	East	6.0
	Toms Creek	East	6.0
	Two Town Trolley	Squires	1.3
	University City	East	6.0
	University Mall	West	6.0
New Routes	Airport Acres	Squires	2.0
	Clay St	West	2.0
	Campus Shuttle	West	3.0
	Merrimac	-	1.0
	Neighborhood Flex Service	TBD	0.0

	Route	MMTF Side	Proposed Peak Buses/Hour
	Prices Fork	TBD	1.0
	Progress St B	Squires	2.0
	Riner	TBD	0.8
	Radford St-Roanoke St	-	TBD

Overall, each side of the MMTF is projected to have no more than five buses per hour per bus bay on average, as outlined in **Table 32**. As each route will likely be dedicated to a single bus bay and many routes have 10-minute headways, most bus bays will see approximately six buses per hour. The east side of the MMTF would be served by seven routes, and the west side would be served by six.

Table 32: MMTF Service Details

MMTF	Buses/Hour	Bays	Buses/Bay/Hour	Routes
East	40	9	4.4	7
West	23	8	2.9	6

Figure 66: Proposed Recommendations for Full Service

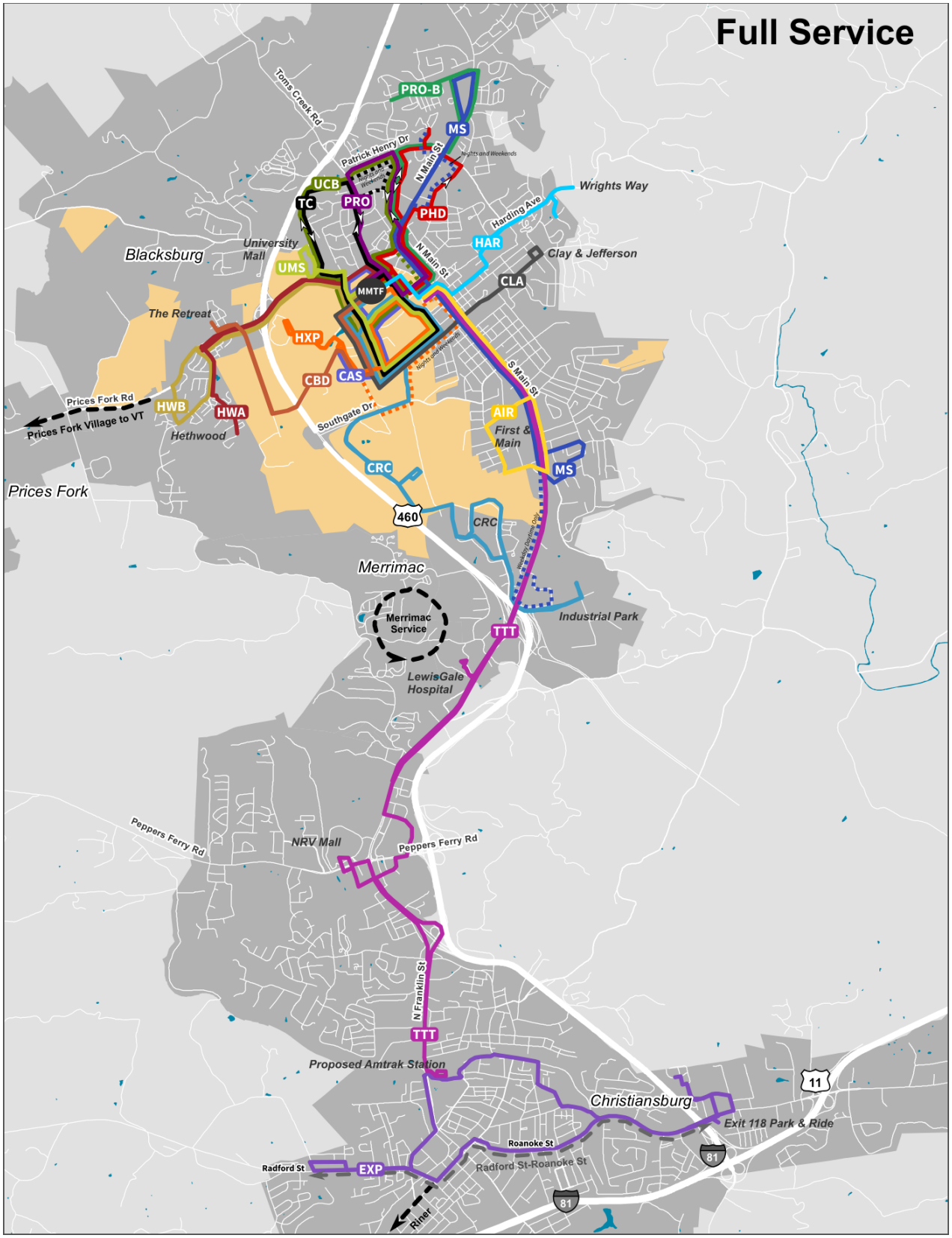
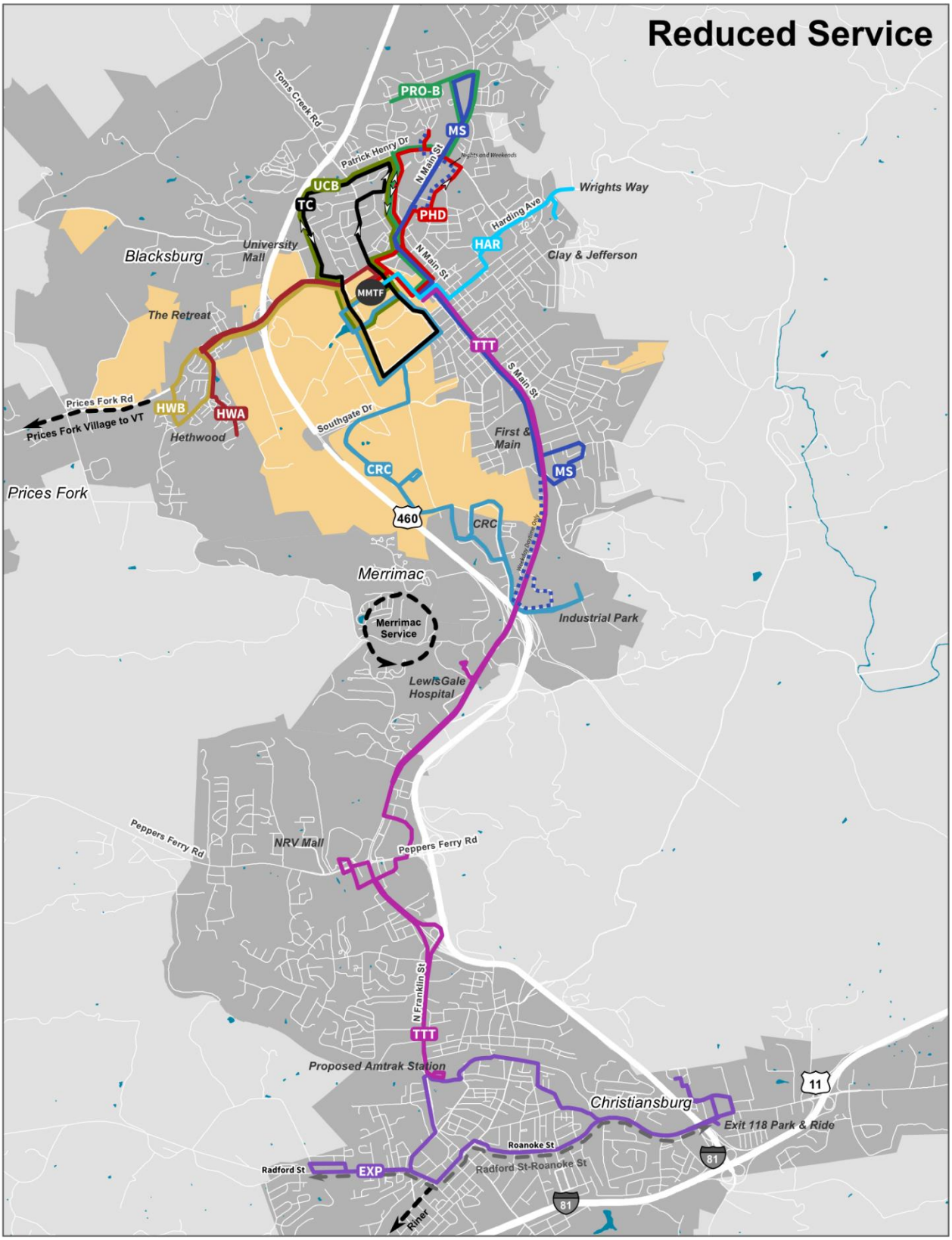


Figure 67: Proposed Recommendations for Reduced Service



4.1.8 Ridership Estimates

Ridership estimates at the route level (incorporating all the proposed recommendations) were developed by comparing the projected revenue hours to each route's current revenue hours in FY2017. For existing routes, a revenue hours to ridership elasticity of +1.01 was used, based on case studies present in TCRP Report 95[16]. For new routes, a projected passengers per revenue hour was estimated based on the performance of similar routes. The special services and demand response services that BT operates (including Access, Athletics, the CRC Shuttle, GoAnywhere, Specials, Warm Hearth, and Other, which includes tripper service) are also included in this table so that the total system ridership is represented. The results are summarized in **Table 33**. Overall, ridership is expected to increase by 29 percent systemwide when all of the proposed changes are implemented.

Table 33: Ridership Estimates by Route/Service

	Current		Future		
Route	**Annual Revenue Hours**	**Ridership**	**Annual Revenue Hours**	**Projected Passengers/ Revenue Hour (if used)**	**Projected Ridership**
Access	10,796	15,090	10,796	-	15,090
Athletics	1,538	43,709	1,538	-	43,709
Carpenter Blvd	1,892	59,830	1,818	-	57,466
Commuter	628	2,125	0	-	0
CRC	5,717	98,521	7,383	-	127,560
CRC Shuttle	4	34	4	-	34
Explorer	3,221	14,491	3,205	-	14,421
GoAnywhere	5,217	12,056	5,217	-	12,056
Harding Ave	6,769	119,759	6,797	-	120,257
Hethwood	9,685	98,411	1,194	-	11,645
Hethwood A	5,548	340,123	6,853	-	420,989
Hethwood B	4,112	251,202	6,853	-	420,833
Hokie Express	5,503	199,242	7,400	-	268,748
Main St	12,550	543,728	15,636	-	678,905
Other (Trippers)	430	296	430	-	296
Patrick Henry	4,295	301,667	6,613	-	466,538
Progress St	5,553	415,237	5,920	-	443,002
Specials	695	26,513	695	-	26,513
Toms Creek	8,457	502,604	7,186	-	426,352
Two Town Trolley	4,224	65,893	8,040	-	126,298
University City	6,939	344,438	7,983	-	396,820
University Mall	3,467	277,640	5,358	-	430,933

[16] TRB, 2004. Transit Cooperative Research Program Report 95: Traveler Response to Transportation System Changes, Chapter 9: Transit Scheduling and Frequency. Available at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c9.pdf. Accessed on 4/15/19.

	Current		Future		
Route	**Annual Revenue Hours**	**Ridership**	**Annual Revenue Hours**	**Projected Passengers/ Revenue Hour (if used)**	**Projected Ridership**
Warm Hearth	687	2,380	687	-	2,380
New Routes					
Airport Acres	-	-	2,190	20.0	43,800
Clay St	-	-	2,190	12.0	26,280
Campus Shuttle	-	-	2,293	30.0	68,800
Merrimac	-	-	0	4.5	0
Neighborhood Flex Service	-	-	0	1.5	0
Prices Fork	-	-	0	5.0	0
Progress St B	-	-	3,060	35.0	107,100
Riner	-	-	0	5.0	0
Radford St-Roanoke St	-	-	3,060	4.5	13,770
Total	-	3,734,989	142,038	-	4,815,907

4.2 SERVICE AND NEEDS PRIORITIZATION

Overall, the recommended changes to the system will result in an increase in annual revenue hours and therefore an increase in annual operating costs. The recommendations in this plan would require just over 140,000 annual revenue hours annually at an operating cost of $10.6 million. Additionally, the number of peak vehicles required during Full Service will increase to 48. Much of this increase results from the addition of new routes. The implementation plan and financial plan in subsequent chapters will provide further details on how the recommended system will be implemented with financial constraint. **Table 34** summarizes the proposed annual revenue hours, operating costs, and peak vehicle requirements for each route (including special services), separated by current routes versus new routes. Operating costs are based on the FY2019 estimated cost per revenue hour of $74.92.

Table 34: Proposed System Estimations by Route

	Annual Revenue Hours			Annual Operating Cost			Peak Vehicles	
Route	**Full**	**Reduced**	**Total**	**Full**	**Reduced**	**Total**	**Full**	**Reduced**
Existing								
Access	10,796	0	10,796	$808,848	$0	$808,848	0	0
Athletics	1,538	0	1,538	$115,213	$0	$115,213	0	0
Carpenter Blvd	1,818	0	1,818	$136,167	$0	$136,167	1	0
Commuter	0	0	0	$0	$0	$0	0	0
CRC	6,092	1,291	7,383	$456,413	$96,684	$553,097	3	1
CRC Shuttle	4	0	4	$318	$0	$318	0	0

	Annual Revenue Hours			Annual Operating Cost			Peak Vehicles	
Route	**Full**	**Reduced**	**Total**	**Full**	**Reduced**	**Total**	**Full**	**Reduced**
Explorer	1,984	1,221	3,205	$148,641	$91,477	$240,119	1	1
GoAnywhere	5,217	0	5,217	$390,820	$0	$390,820	0	0
Harding Ave	5,158	1,639	6,797	$386,400	$122,822	$509,222	2	1
Hethwood	700	494	1,194	$52,444	$36,973	$89,417	0	0
Hethwood A	5,760	1,093	6,853	$431,539	$81,850	$513,389	3	1
Hethwood B	5,760	1,093	6,853	$431,539	$81,850	$513,389	3	1
Hokie Express	7,400	0	7,400	$554,408	$0	$554,408	3	0
Main St	12,345	3,291	15,636	$924,887	$246,524	$1,171,412	5	2
Other	430	0	430	$32,234	$0	$32,234	0	0
Patrick Henry	5,520	1,093	6,613	$413,558	$81,850	$495,409	3	1
Progress St	5,920	0	5,920	$443,526	$0	$443,526	3	0
Specials	695	0	695	$52,060	$0	$52,060	0	0
Toms Creek	5,320	1,866	7,186	$398,574	$139,763	$538,338	2	1
Two Town Trolley	5,349	2,691	8,040	$400,747	$201,628	$602,376	2	2
University City	6,890	1,093	7,983	$516,199	$81,850	$598,049	3	1
University Mall	5,358	0	5,358	$401,384	$0	$401,384	3	0
Warm Hearth	687	0	687	$51,472	$0	$51,472	0	0
Existing Total	100,739	16,862	117,601	$7,547,393	$1,263,273	$8,810,666	37	12
New								
Airport Acres	2,190	0	2,190	$164,075	$0	$164,075	1	0
Campus Shuttle	2,293	0	2,293	$171,817	$0	$171,817	1	0
Clay St	2,190	0	2,190	$164,075	$0	$164,075	1	0
Merrimac	2,712	1,667	4,379	$203,183	$124,892	$328,075	1	1
Neighborhood Flex Service	1,920	1,140	3,060	$143,846	$85,409	$229,255	3	3
Prices Fork	1,920	1,140	3,060	$143,846	$85,409	$229,255	1	1
Progress St B	1,920	1,140	3,060	$143,846	$85,409	$229,255	1	1
Radford St-Roanoke St	1,920	1,140	3,060	$143,846	$85,409	$229,255	1	1
Riner	670	475	1,145	$50,196	$35,587	$85,783	1	1
New Total	17,735	6,702	24,437	$1,328,731	$502,114	$1,830,845	11	8
Grand Total	**118,475**	**23,564**	**142,038**	**$8,876,124**	**$1,765,387**	**$10,641,511**	**48**	**20**

BT Access revenue hours are expected to grow when some of the new services and route extensions are implemented. **Table 35** summarizes the expected impact to Access for the recommendations that would increase the BT service area.

Table 35: Expected Impact to BT Access for Proposed Route Extensions and New Services

Recommendation	Expected Impact to BT Access
Extend Harding Ave	Minimal – little development on Harding Ave east of Wrights Way.

Recommendation	Expected Impact to BT Access
Extend Explorer	None – route allows for deviations and therefore Access service is not required.
Airport Acres	None – route is within Town of Blacksburg limits
Clay St	None – route is within Town of Blacksburg limits
Merrimac	None – this route would allow for deviations and therefore Access service would not be required.
Prices Fork	Minor – this would require a minor expansion of service beyond the town boundary.
Riner	None – this would be a peak only route and therefore would not require Access service within ¾-mile.
Neighborhood Flex Service	None – this service would already be a demand-response service.

4.2.1 Capital Projects and Facility Needs

The primary capital needs for Blacksburg Transit include the regular replacement of vehicles, the purchase of new vehicles for service expansions, the purchase of replacement equipment, technology enhancements, and upgrades to its administration, garage, and maintenance facility as well as a site assessment.

Other improvements to several roadways may be needed in order to support the service recommendations, primarily in the form of pavement improvements and widening so that they can properly support bus service. There are three corridors that may require these types of upgrades:

- Plantation Road/Smithfield Road, so the Carpenter Blvd route can use this corridor;
- Clay Street/Eheart Street, so the proposed Clay St route can use this corridor; and
- Hightop Road/Merrimac Road, so the Merrimac route could potentially use this corridor.

The level of upgrades to these corridors is unknown at this point but should be studied prior to the implementation of these route recommendations. For the Clay St and Merrimac routes, the use of smaller vehicles such as body-on-chassis vehicles might enable the routes to be implemented prior to any upgrades. Upgrades to these corridors is not currently included in the Capital Improvement Plan or in any other planning documents.

Alternatively, implementing new service along these corridors, funding could be shifted to providing adequate pedestrian facilities and connections to nearby services. Particularly, pedestrian improvements on Clay Street and Eheart Street could allow for potential riders to walk and access nearby services on Harding Avenue/Roanoke Street and Main Street. These types of improvements would require further study in order to provide cost estimates.

4.2.2 Prioritization

In order to prioritize the recommendations for Blacksburg Transit, a methodology was developed that would evaluate each route's importance to the overall network. Three main categories were used for this analysis, summarized in **Table 36**. This approach ensures that each route's full function in the network is accounted for.

Table 36: Prioritization Methodology

Measure	Based On:	Maximum Score
Ridership	Projected Ridership after recommendations are implemented	0.50

Measure	Based On:	Maximum Score
Service to Transit-Dependent Populations	Estimated number of low-income households, zero-car households, persons with disabilities, and seniors within ½-mile of each route	0.25
Access to Jobs	Estimated number of jobs within ½-mile of each route	0.25
	Total	**1.0**

The results of this analysis are summarized in **Table 37**. The highest ranked route is Main Street (MS), followed by Toms Creek (TC), Patrick Henry Drive (PHD), and University City Boulevard (UCB), all of which have high ridership and serve high numbers of transit-dependent populations. This prioritization will be used in the implementation plan as an addition to operating cost to help decide in what year in each range (short term, mid term, or long term) each route's recommendations should be implemented.

Table 37: Prioritization of Routes

Route	Score
Main St	0.92
Toms Creek	0.71
Patrick Henry	0.69
University City Blvd	0.68
Progress St	0.67
Hethwood B	0.62
University Mall	0.62
Hethwood B	0.58
Two Town Trolley	0.54
Hokie Express	0.53
Campus Shuttle	0.47
CRC	0.45
Progress St B	0.42
Carpenter Blvd	0.32
Airport Acres	0.30
Harding Ave	0.30
Clay St	0.30
Hethwood Combined	0.28
Prices Fork	0.24
Explorer	0.24
Merrimac	0.21
Riner	0.18
Neighborhood Flex Service	0.03

The capital recommendations in terms of fleet replacements and new bus stops associated with each route recommendation would also follow this prioritization. The other capital items outlined in the Capital Improvement

Plan have already been prioritized by Blacksburg Transit when this plan was finalized, and therefore are not further prioritized in this plan.

5 Implementation Plan

This chapter of the Blacksburg Transit (BT) TDP illustrates the difference between providing the baseline service requirements and implementing the expanded service recommendations described in Chapter 4. All elements of this chapter reinforce the timing of the BT capital improvement program (CIP) throughout a ten-year planning horizon. Primary capital components include the fleet and facilities. Essential maintenance, rehabilitation, and state of good repair projects are identified to inform BT's ongoing transit asset management program and to assure no service degradation results from the timing of improvements. This chapter will inform the project funding costs and revenue sources detailed in Chapter 6. Where applicable, this chapter will also distinguish those projects in the CIP which BT reasonably anticipates local funding to be available, and those with no current funding allocated.

5.1 ROLLING STOCK UTILIZATION

This section presents the vehicle replacement and expansion needs to provide envisioned services throughout this TDP period. Included in this section are the implications of vehicle life-cycle maintenance, technological retrofit, and any impacts to the overall utilization of the fleet during the implementation of new services outlined in Chapter 4.

5.1.1 Fleet Inventory

As of FY2019, BT has a fleet of 51 fixed route vehicles and 18 demand response (BT Access) vehicles for revenue service. All fixed-route vehicles are heavy-duty buses and all demand response vehicles are of the body-on-chassis (BOC) type. BT also features 17 support vehicles for non-revenue service, such as vans, trucks, and SUVs.

The most recent adjustments reflected in the Federal Transit Administration Useful Life Benchmark (ULB) are used in this inventory reporting, for each representative vehicle class. All future ULB adjustments in subsequent years should be informed with a qualitative condition assessment as part of the BT Asset Management program. All vehicle information for BT's fixed route, demand response and support vehicles are provided in **Table 38**, **Table 39**, and **Table 40**. Vehicle replacement and retirement analysis in the subsequent sections will begin starting with FY2019.

Table 38: BT Fixed Route Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2002	New Flyer D60LF	60	52	14	2	2015, 2025
2007	New Flyer SR1140 D35LF	35	30	14	1	2701
2007	New Flyer SR1140 D40LF	40	39	14	2	2711, 2712
2009	New Flyer SR-1360 D40LFR	40	39	14	14	1911 - 1924
2010	New Flyer- hybrid SR-1439 DE40LFR	40	39	14	7	6011 - 6017

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2010	New Flyer- hybrid SR-1440DE60LFR	60	52	14	2	6021, 6022
2012	New Flyer SR-1614 XD35	35	30	14	4	6201, 6202, 6203, 6204
2013	New Flyer SR-1733 XD35	35	30	14	4	6305, 6306, 6307, 6308
2013	New Flyer SR-1734 XD60	60	52	14	2	6323, 6324
2014	New Flyer SR-1841 XD35	35	30	14	4	6401, 6402, 6403, 6404
2014	New Flyer SR-1840 XD40	40	39	14	4	6411, 6412, 6413, 6414
2014	New Flyer SR-1842 XD60	60	52	14	1	6425
2018	New Flyer SR-2219	60	52	14	4	6726, 6727, 6728, 6729
				Total Fleet (In Service)	**51**	

Table 39: BT Access/Christiansburg Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2009	Raised Roof Van Econoline Van	<30	12	8	1	50
2011	Ford Braun Raised Roof Van Econoline Van	<30	N/A	8	1	102
2012	Ford Supreme BOC	>30	28	10	1	504
2012	Chevrolet Supreme BOC Express Cutaway	<30	12	10	1	30
2013	Chevrolet Supreme BSSN	<30	N/A	10	1	59
2014	Chevrolet Supreme BOC Express Cutaway	<30	12	10	1	25
2016	Ford Senator II	<30	18	10	2	505, 506
2016	Starcraft Allstar BOC	<30	12	10	4	26, 27, 28, 29
2016	Starcraft Allstar BOC	<30	18	10	2	53, 54
2017	Starcraft Allstar BOC	<30	15	10	4	19, 51, 104, 105
				Total Fleet (In Service)	**18**	

Table 40: BT Support Vehicle Inventory

Year	Make/Model	Use	ULB (Years)	Number of Vehicles	Unit Number
2004	GMC Savannah Van	Shift change van	8	1	90
2008	Ford F450	Maintenance Vehicle - Shelters	10	1	87
2009	Ford F350	Operations support vehicle	8	1	80
2010	Ford Explorer	Operations (ACCESS/Training)	8	2	94, 95
2010	GMC Savannah Van	Shift change van	8	1	97
2011	Ford Truck	Maintenance shop trucks	8	2	83, 84
2013	GMC Savannah Van	Shift change van	8	1	98
2016	Ford Explorer	Operations support vehicles	8	2	63, 64
2017	Dodge Durango	Administration vehicles	8	6	65, 66, 86, 88, 93, 99

Year	Make/Model	Use	ULB (Years)	Number of Vehicles	Unit Number
		Total Support Vehicles	**17**		

5.1.2 Vehicle Replacement

From FY2019-2028, BT's baseline fleet requirements would entail procuring a total of 83 vehicles. The fixed-route fleet spare ratio was reduced from 27.5 percent in FY2019 to 22.9 percent by FY2022 by retiring and not replacing three vehicles. No adjustments to the spare ratio were made for the BT Access fleet, due to the variable nature and need for responsive capacity. The timing of vehicle replacement was adjusted slightly where possible so that there was a minimal extension of service life beyond the ULB. This exercise was performed in order to spread out vehicle procurements and avoid years that may require extensive vehicle replacement compared to an adjacent year with minimal vehicle purchases anticipated.

The vehicle replacement costs used in this analysis are presented in **Table 41**. Total replacement costs were calculated using base vehicle costs for 11 vehicle types. All costs were inflated to FY2019 dollars.

Table 41: Vehicle Cost Estimates

Vehicle Type	FY2019 Est. Replacement Cost
Heavy-Duty Bus (60')	$666,000
Heavy-Duty Bus (40')	$655,000
Heavy-Duty Bus (35')	$596,000
28 Passenger BOC	$178,000
21 Passenger BOC	$180,000
18 Passenger BOC	$123,000
15 Passenger BOC	$130,000
12 Passenger BOC	$89,000
Truck	$38,000
Van	$36,000
SUV	$34,000

Future vehicle replacement costs are projected to increase at four percent per year beginning with FY2020. The results of the baseline vehicle replacement program, identifying the vehicle type by replacement year and subsequent overall costs are presented in **Table 42**, **Table 43**, and **Table 44**.

Table 42: BT Fixed Route Baseline Vehicle Replacement Schedule

	Fiscal Year									
	FY2019	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**FY2028**
Carryover	51	51	51	49	48	48	48	48	48	48
Retire	0	2	5	5	7	7	2	4	6	6
New	0	2	3	4	7	7	2	4	6	6
Total Fleet	51	51	49	48	48	48	48	48	48	48
VOMS	37	37	37	37	37	37	37	37	37	37

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Spare Ratio	27.5%	27.5%	24.5%	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%
Exceeding ULB	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	6.3%

Table 43: BT Access/Explorer Baseline Vehicle Replacement Schedule

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Carryover	18	18	18	18	18	18	18	18	18	18
Retire	0	0	4	0	3	0	0	7	4	0
New	0	0	4	0	3	0	0	7	4	0
Total Fleet	18	18	18	18	18	18	18	18	18	18
VOMS	8	8	8	8	8	8	8	8	8	8
Spare Ratio	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%
Exceeding ULB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 44: BT Overall Baseline Vehicle Replacement (Revenue and Support) by Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
35' Bus	0	0	1	0	0	0	0	4	4	1
40' Bus	0	0	2	4	7	5	2	0	0	4
60' Bus	0	2	0	0	0	2	0	0	2	1
12 Pax BOC	0	0	1	0	1	0	0	4	0	0
15 Pax BOC	0	0	0	0	0	0	0	0	1	0
18 Pax BOC	0	1	0	0	2	0	0	3	3	0
21 Pax BOC	0	0	0	0	0	0	0	0	0	0
28 Pax BOC	0	0	1	0	0	0	0	0	0	0
Truck	0	0	2	0	4	0	0	0	0	0
Van	0	1	2	0	2	0	0	0	0	1
SUV	0	0	0	2	0	2	6	0	1	2
Total Vehicles	0	4	9	6	16	9	8	11	11	9
Fixed Route Cost ($000s)	$0	$1,385	$2,062	$2,947	$5,364	$5,605	$1,658	$3,137	$5,086	$5,525
Access/ Explorer Cost ($000s)	$0	$128	$366	$0	$389	$0	$0	$928	$659	$0
Support Cost ($000s)	$0	$37	$82	$76	$262	$83	$258	$0	$47	$148
Total Annual Cost (000s)	$0	$1,551	$2,510	$3,024	$6,014	$5,688	$1,916	$4,065	$5,791	$5,673

5.1.3 Vehicle Expansion

For BT to operate the services identified in Chapter 4, the fleet would require two fixed route expansion vehicles from FY2020-FY2024, and a total of five fixed route expansion vehicles through the TDP planning horizon of FY2028. The three additional vehicles required for FY2019 service are included in the baseline calculations. BT's fixed route VOMs will increase from a baseline of 37 (FY2019) to 39 by FY 2024 and to 42 by FY2028. All new vehicle purchases necessary for new services and VOMS are based upon the full schedule of service operated by BT.

The timing and implementation of Chapter 4 fixed route recommendations that increase VOMS are as follows:

- FY2019 – Hethwood B – Increased frequency (1 additional vehicle)
- FY2019 – Progress Street B – New route (1 additional vehicle)
- FY2019 – Campus Shuttle – New route (1 additional vehicle)
- FY2020 – Commuter – Discontinue route (1 less vehicle)
- FY2020 – Radford St/Roanoke St – New route (1 additional vehicle)
- FY2020 – University Mall Shuttle – Increased frequency (1 additional vehicle)
- FY2020 – Main Street – Increased frequency (1 additional vehicle)
- FY2025 – Airport Acres – New Route (1 additional vehicle)
- FY2025 – Two Town Trolley – Increased frequency (1 additional vehicle)
- FY2026 – Clay Street – New route (1 additional vehicle)

Three additional fixed route vehicles (Prices Fork, Riner, and Merrimac) and three additional flex vehicles (neighborhood services) are planned for services implemented beyond this TDP timeframe (after FY2029). Vehicle procurements for the new Neighborhood Flex Service coverage beyond the TDP timeframe could be drawn from the existing spare fleet for BT Access, as it is envisioned that these services would use similar vehicles.

The results of the expansion vehicle acquisitions and baseline replacement program for the existing fleet is presented in in **Table 45** and **Table 46.**

Table 45: BT Fixed Route Expansion Vehicle Replacement Schedule

	Fiscal Year									
	FY2019	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**FY2028**
Carryover	51	51	53	51	50	50	50	52	53	53
Retire	0	2	5	5	7	7	2	4	6	6
New	0	4	3	4	7	7	4	5	6	6
Total Fleet	51	53	51	50	50	50	52	53	53	53
VOMS	37	39	39	39	39	39	41	42	42	42
Spare Ratio	27.5%	26.4%	23.5%	22.0%	22.0%	22.0%	21.2%	20.8%	20.8%	20.8%
Exceeding ULB	0.0%	0.0%	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	5.7%

Table 46: BT Overall Expansion Vehicle Replacement (Revenue and Support) by Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
35' Bus	0	0	1	0	0	0	0	4	4	1
40' Bus	0	1	2	4	7	5	4	0	0	4
60' Bus	0	3	0	0	0	2	0	0	2	1
12 Pax BOC	0	0	1	0	1	0	0	4	0	0
15 Pax BOC	0	0	0	0	0	0	0	0	1	0
18 Pax BOC	0	1	0	0	2	0	0	3	3	0
21 Pax BOC	0	0	0	0	0	0	0	1	0	0
28 Pax BOC	0	0	1	0	0	0	0	0	0	0
Truck	0	0	2	0	4	0	0	0	0	0
Van	0	1	2	0	2	0	0	0	0	1
SUV	0	0	0	2	0	2	6	0	1	2
Total Vehicles	0	6	9	6	16	9	10	12	11	9
Fixed Route Cost ($000s)	$0	$2,759	$2,062	$2,947	$5,364	$5,605	$3,315	$3,374	$5,086	$5,525
Access/ Explorer Cost ($000s)	$0	$128	$366	$0	$389	$0	$0	$928	$659	$0
Support Cost ($000s)	$0	$37	$82	$76	$262	$83	$258	$0	$47	$148
Total Annual Cost (000s)	$0	$2,924	$2,510	$3,024	$6,014	$5,688	$3,573	$4,302	$5,791	$5,673

5.1.4 Baseline and Expansion Comparison

This section contrasts baseline and expansion implementation requirements. **Figure 68** represents the total annual vehicle replacements required for the TDP period from FY2019-FY2028 for both baseline and expansion plans. **Figure 69** represents the net effect on the total BT fleet size over the same period because of the baseline and expansion vehicle acquisition and replacement programs. **Figure 70** represents the cumulative expenditure over the entire duration between the baseline and expansion programs.

Figure 68: Annual Vehicle Procurements FY2019-FY2028

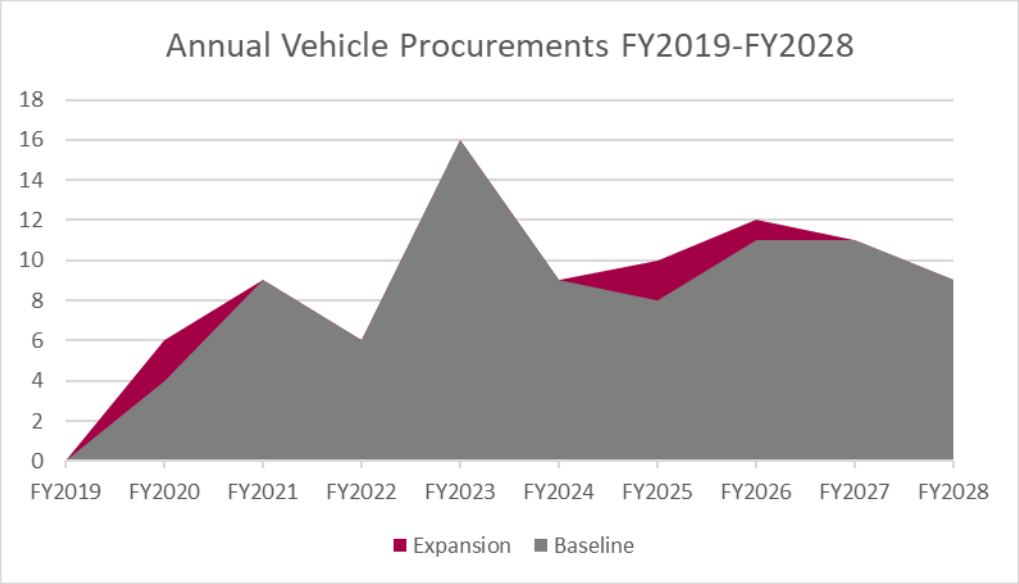


Figure 69: Total Revenue Fleet Size FY2019-FY2028

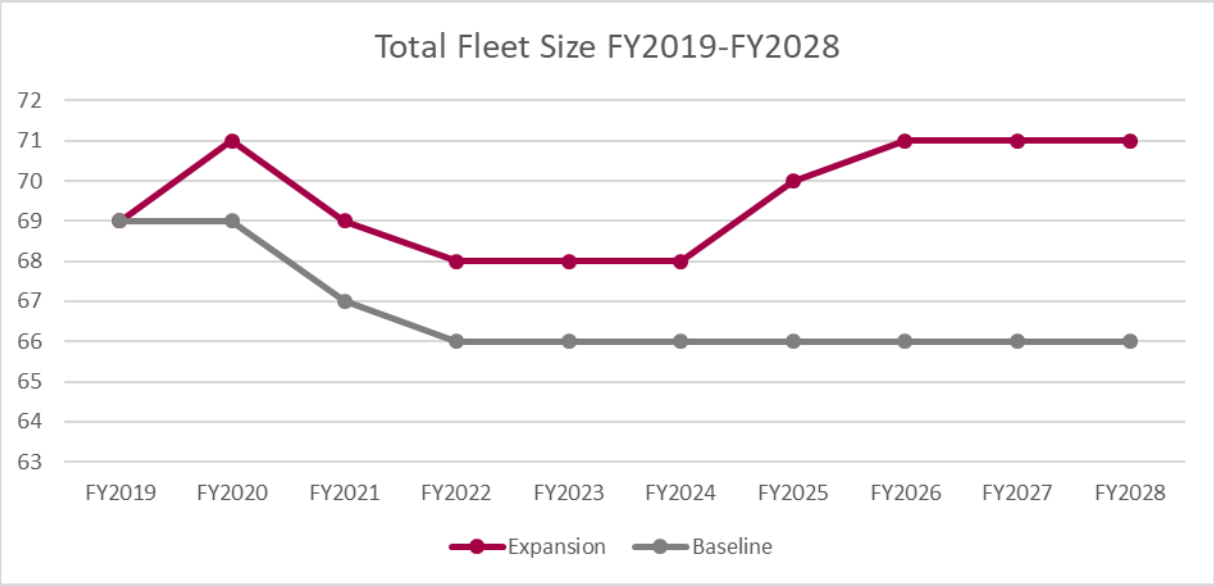
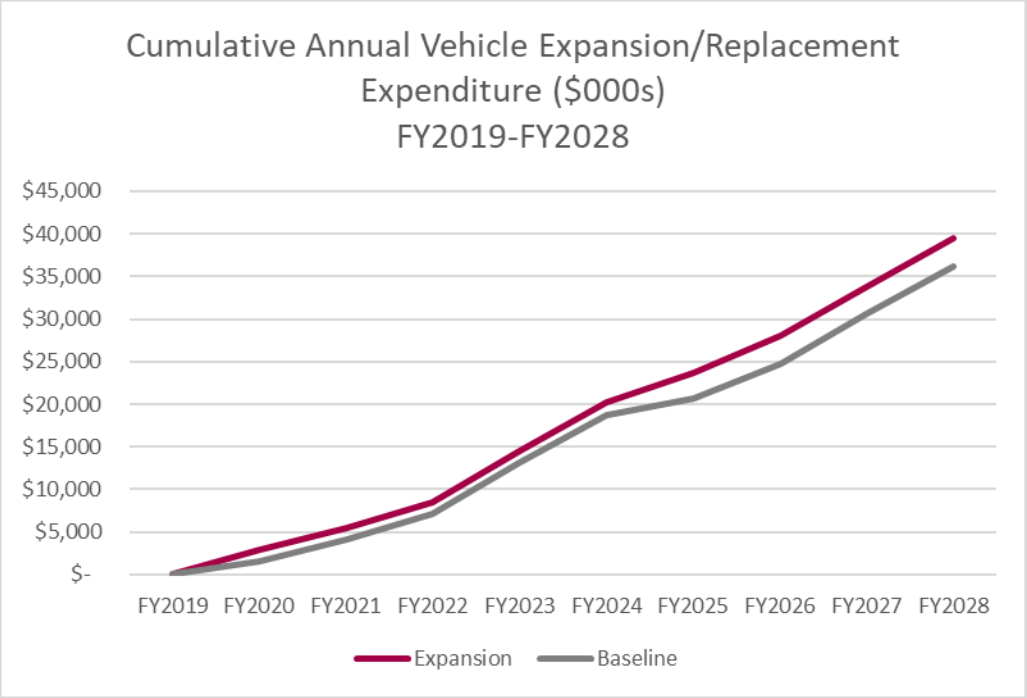


Figure 70: Cumulative Annual Vehicle Expansion/Replacement Expenditure FY2019-FY2028



Results for both the six-year and full TDP timeframe are depicted in **Table 47**.

Table 47: BT Baseline and Expansion Cost Comparisons by Timeframe

	Fiscal Years			
	FY2019-FY2024		FY2019-FY2028	
	Baseline	Expansion	Baseline	Expansion
Total New/Replacement Vehicles	44	46	83	88
Total Cost (000s)	$18,786	$20,160	$36,231	$39,500

5.2 MAJOR SYSTEM MAINTENANCE AND OPERATIONS FACILITIES

The FY2019 – FY2023 Capital Improvement Plan (CIP) also includes upgrades to Blacksburg Transit's administration, garage, and maintenance facility located at 2800 Commerce Street in Blacksburg. Based on the results of the 2017 Space Planning Study, it is estimated that the facility currently has a 20 percent deficiency in office space. Compounding this space issue are aging fixed building components as documented in the 2015 Facilities Assessment Report and outdated security/building access systems.

The upgrade would include the following:

1. Replacement and/or updates to building components that have exceeded their useful economic life,
2. Repurposing of underutilized spaces for office space,
3. Renovation of men's and women's restrooms, and

4. Consolidation of divisional staff office.

The CIP includes this upgrade in FY2020 at an estimated cost of $1,513,974.

5.3 PASSENGER AMENITIES

To facilitate long range improvements to campus transit services, this project involves moving the current transit hub from the front of Burruss Hall to a future transit hub located in the vicinity of Perry Street, north of the academic core. The Multi-Modal Transit Facility (MMTF) will accommodate ridership waiting/transfers and will serve multiple modes of alternative transportation. The MMTF is included in the FY2018 SYIP, and as of the preparation of this TDP is being re-evaluated for value engineering potential to remain within initial cost estimates.

The FY2019 – FY2023 Capital Improvement Plan (CIP) includes a number of new shelters and bus stop improvements in Blacksburg and Christiansburg. Additionally, new stops would be necessary for the recommended new routes (Progress St B, Clay St, Airport Rd, Prices Fork Village, Merrimac, and Riner) and for the extension of the Explorer on Radford Street. **Table 48** summarizes the number of shelters and bus stop improvements needed by year from the Capital Improvement Plan through FY2023 and the number of new bus stops that would be needed beyond FY2024 to implement the proposed new routes. An estimate of $13,000 per new bus stop for new bus stops was used, based on the FY2022 estimate for bus stop improvements in the CIP. This figure represents the cost of signage and an ADA-compliant concrete pad which may not be required at all locations. However, this figure was used in order to provide the most conservative estimate of cost outside of an engineering analysis of these locations.

Table 48: Bus Stop and Shelter Needs by Year

Town	Amenity	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024-FY2028	Beyond FY2028
Blacksburg	4' by 12' Solar Shelters	2						
	Bus Stop Improvements	2						
	4' by 12' Solar Shelters		2					
	Bus Stop Improvements		1					
	4' by 12' Solar Shelters			2				
	Bus Stop Improvements			1				
	Bus Stop Improvements				1			
	Bus Stop Improvements					NA		
	Bus Stops - Progress St B						2*	
	Bus Stops - Clay St						5	
	Bus Stops - Airport Rd						3	
	Bus Stops - Prices Fork							6
Christiansburg	4' by 8' Solar Shelters	2						
	4' by 8' Solar Shelters		2					
	4' by 12' Solar Shelters			1				
	Bus Stops - Explorer						3	

Town	Amenity	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024-FY2028	Beyond FY2028
Montgomery County	Bus Stops - Merrimac							8
	Bus Stops - Riner							3
	Total Cost	**$55,889**	**$56,740**	**$37,541**	**$13,000**	**$39,000**	**$169,000**	**$221,000**

*Route would be implemented in the short term (1 to 3 years), however funding is not included in the CIP through FY23

5.4 NEW TECHNOLOGY SYSTEMS OR UPGRADES

The FY2019 – FY2023 Capital Improvement Plan includes several line items for equipment, parts, and maintenance. Significant expenditure items include Fare Automation, Fleet Camera Systems and ITS. Expenditure items as outlined in the BT Capital Improvement Program are presented in **Table 49**.

Table 49: Equipment and Parts Line Items in FY2019-FY2023 Capital Improvement Plan

Item	FY2019	FY2020	FY2021	FY2022	FY2023
Fare Automation System	$305,668	$30,000	$165,000	-	-
Fleet Camera System	$630,512	$79,579	-	-	-
ITS	$321,737	$500,000	$500,000	$500,000	-
Radio Replacement	$20,487	$8,453	$13,007	$15,069	$11,096
Technology Replacement	$62,443	$124,418	$144,421	$130,456	$103,717
Transit Facility Maintenance	$198,388	$300,500	$225,102	$231,856	$238,810
Total	**$1,539,235**	**$1,042,950**	**$1,047,530**	**$877,381**	**$353,623**

6 Financial Plan

The purpose of the Financial Plan is to provide a planning-level forecast of BT's costs and revenue over the 10-year TDP time-frame. The Financial Plan is composed of both an operating and capital component.

The operating budget is associated with regularly reoccurring costs such as labor, maintenance, insurance, and administration. These costs are stable over time and are closely tied to the amount of service provided. The operating budget is broken further down by the cost of operating existing service and the cost associated with implementing the TDP recommendations. The additional cost associated with the TDP recommendations would require additional funds above BT's current projected funding allocation.

Capital costs reflect investments in procurement of replacement or expansion assets such as vehicles, buildings, and IT systems. These figures fluctuate considerably year over year.

6.1 DATA ASSUMPTIONS AND SOURCES

To develop this financial plan, a range of assumptions were made. Long-range budgets such as this one are a projection based on a snapshot in time, and as such should be updated regularly to ensure accuracy. Generally, certainty over costs and revenues decreases further into the future.

6.1.1 Operating Budget Assumptions

Direct Revenue

Direct operating revenue includes funds raised from fares, contracted services, sale of assets, advertising, or any other revenue-generated directly by a transit property. The direct revenue figures are based on estimates for FY2019 reported in DRPT's FY2019 Six-Year Improvement Plan (SYIP). They are broken into three categories: fare revenue, advertising, and contract services (direct reimbursements for services by partners like Virginia Tech and the Town of Christiansburg).

These figures have been escalated over time based on the 3 percent annual growth assumption suggested by DRPT in the TDP guidance. The only exceptions to this escalation are fares, which are assumed to grow by 2 percent annually.

Fare revenue for new service is based off the estimated change in ridership developed in Chapter 4, multiplied by BT's average fare revenue per trip of 5 cents. BT's low fare revenue per trip means that ridership gains have a relatively modest anticipated impact on fare revenue.

Operating Grant Revenue

The federal government and the Commonwealth of Virginia provide operating assistance to BT in the form of grants. Virginia Tech and the Town of Christiansburg fund BT through contracted services. The base year allocation for federal and state funding is derived from DRPT's FY2019 Six-Year Improvement Plan (SYIP). Contract

services cover the remaining balance after all other revenues (fares, advertising, federal grants, and state grants) are accounted for.

BT's Federal funding for operations comes from Section 5307 Urbanized Area formula funds. This funding is expected to grow year-over-year by 2.1 percent, the nationwide average growth of the Federal formula fund program.

State funding is escalated off the FY2019 base year according to changes DRPT's projected statewide transit operating assistance budget from FY2020 to FY24 as reported by the FY2019 SYIP. After FY2024, state operating assistance is assumed to grow by 3 percent.

Operating Costs

Operating costs are assumed to grow by 3 percent a year over the FY2019 cost per revenue hour of $74.92. The operating budget assumes that the TDP short-term recommendations are implemented in FY2020, with the mid-term recommendations introduced in FY2024.

6.1.2 Capital Budget Assumptions

Capital Revenue

BT relies of Federal Flexible STP funding for the federal portion of most of its capital needs. The capital budget assumes federal funds will continue to support 80 percent of capital needs, with 16 percent coming from state matching funds, and 4% from local matching funds.

Capital Costs

BT's capital costs are derived from the CIP outlined in Chapter 5. Costs from the FY2019 – FY2023 Capital Improvement Plan were assumed to have been escalated from FY19 values by 3 percent a year to account for inflation. Vehicle costs are escalated by 4 percent annually.

6.2 OPERATING BUDGET

Table 50 presents the 10-year operating budget forecast for BT. The budget includes the cost of operating existing service, as well as the net cost associated with the TDP recommendations.

BT's operating budget is primarily funded through federal and state grants and revenues from fares, advertising, and contract service.

The short-term TDP recommendations require a relatively modest overall operating cost increase of about 2.5% for full implementation.

Mid-term recommendations, which are expected to start in FY2024, will yield a more substantial increase in net operating costs of just over $1 million in 2024. No funding has been identified to cover these costs; new sources of revenue, or increased revenues from the current sources, will be required to implement the mid-term recommendations

6.3 CAPITAL BUDGET

Table 51 presents the 10-year capital budget forecast for BT. BT's capital needs are expected to average $3.87 million (in FY2019 dollars) over the 10-year TDP planning timeframe. Needs fluctuate considerably year-over-year based on vehicle, facility, and equipment needs.

6.4 CONCLUSION

As BT relies extensively on grants and contract revenue to support its operating and capital budget, the agency is susceptible to changes in funding and policy at the state and federal level, including:

- Changes or the complete abolishment of the flexible STP program in the next highway bill.
- Major increases in transit service within Virginia (e.g. Silver Line Phase II) that will reduce BT's share of state operating assistance.
- Changes in state capital match rates.
- Changes in the state's method for allocating operating funds.

At the local level, any fluctuations in revenue may impact the ability of jurisdictions to support BT service. As BT relies in significant part on Virginia Tech funding, any change to this funding agreement would also affect BT's operating budget. While long-term recommendations are not included in the financially-constrained plan, these recommendations are largely new routes and services outside of BT's current service area and therefore would likely require funding from the local jurisdictions in which they operate, including the Town of Blacksburg and Montgomery County. The Town of Christiansburg will continue to be responsible for the local share of costs of their existing service and any expansion.

Table 50: Operating Budget Forecast (Figures in 1000s)

		Short Term Recommendations				Mid Term Recommendations				
Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating Revenue										
Fare Revenue	$ 174.78	$ 178.28	$ 181.85	$ 185.48	$ 189.19	$ 192.98	$ 196.84	$ 200.77	$ 204.79	$ 208.88
Advertising Revenue	$ 85.00	$ 87.55	$ 90.18	$ 92.88	$ 95.67	$ 98.54	$ 101.49	$ 104.54	$ 107.68	$ 110.91
Contract Services - Virginia Tech	$ 4,223.29	$ 4,441.51	$ 4,663.18	$ 4,841.77	$ 5,049.98	$ 5,270.92	$ 5,447.41	$ 5,629.57	$ 5,817.60	$ 6,011.66
Contract Services - Christianburg	$ 119.81	$ 122.38	$ 128.49	$ 133.41	$ 139.15	$ 134.58	$ 139.09	$ 143.74	$ 148.54	$ 153.50
Ops Revenue Subtotal	$ 4,602.88	$ 4,829.73	$ 5,063.70	$ 5,253.54	$ 5,473.99	$ 5,697.01	$ 5,884.83	$ 6,078.62	$ 6,278.60	$ 6,484.95
Grants										
Federal	$ 1,692.44	$ 1,727.99	$ 1,764.27	$ 1,801.32	$ 1,839.15	$ 1,877.77	$ 1,917.21	$ 1,957.47	$ 1,998.57	$ 2,040.54
State	$ 2,450.89	$ 2,450.89	$ 2,450.89	$ 2,502.36	$ 2,530.81	$ 2,564.48	$ 2,641.41	$ 2,720.65	$ 2,802.27	$ 2,886.34
Grant Revenue Subtotal	$ 4,143.34	$ 4,178.88	$ 4,215.17	$ 4,303.68	$ 4,369.96	$ 4,442.25	$ 4,558.62	$ 4,678.12	$ 4,800.85	$ 4,926.88
Total Revenue	**$ 8,746.22**	**$ 9,008.60**	**$ 9,278.86**	**$ 9,557.23**	**$ 9,843.95**	**$ 10,139.26**	**$ 10,443.44**	**$ 10,756.74**	**$ 11,079.45**	**$ 11,411.83**
Operating Cost										
Existing Service	$ 8,746.22	$ 9,008.60	$ 9,278.86	$ 9,557.23	$ 9,843.95	$ 10,139.26	$ 10,443.44	$ 10,756.74	$ 11,079.45	$ 11,411.83
Net Cost of TDP Recommendations	$ -	$ 233.95	$ 241.22	$ 248.71	$ 256.44	$ 1,006.87	$ 1,037.42	$ 1,068.89	$ 1,101.32	$ 1,134.72
Total Operating Costs	**$ 8,746.22**	**$ 9,242.56**	**$ 9,520.08**	**$ 9,805.94**	**$ 10,100.38**	**$ 11,146.13**	**$ 11,480.86**	**$ 11,825.64**	**$ 12,180.76**	**$ 12,546.55**
Additional Funding Need to Implement TDP	**$ -**	**$ 233.95**	**$ 241.22**	**$ 248.71**	**$ 256.44**	**$ 1,006.87**	**$ 1,037.42**	**$ 1,068.89**	**$ 1,101.32**	**$ 1,134.72**

Table 51: Capital Budget Forecast (Figures in 1000s)

Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capital Revenue										
Federal (Flex STP)	$ 1,276.10	$ 4,430.52	$ 2,876.37	$ 3,131.21	$ 5,128.30	$ 4,577.32	$ 2,885.65	$ 3,489.52	$ 4,679.08	$ 4,565.70
State	$ 255.22	$ 886.10	$ 575.27	$ 626.24	$ 1,025.66	$ 915.46	$ 577.13	$ 697.90	$ 935.82	$ 913.14
Local	$ 63.80	$ 221.53	$ 143.82	$ 156.56	$ 256.42	$ 228.87	$ 144.28	$ 174.48	$ 233.95	$ 228.28
Total Capital Revenue	$ 1,595.12	$ 5,538.14	$ 3,595.46	$ 3,914.02	$ 6,410.38	$ 5,721.65	$ 3,607.06	$ 4,361.90	$ 5,848.85	$ 5,707.12
Capital Costs	**$ 1,595.12**	**$ 5,538.14**	**$ 3,595.46**	**$ 3,914.02**	**$ 6,410.38**	**$ 5,721.65**	**$ 3,607.06**	**$ 4,361.90**	**$ 5,848.85**	**$ 5,707.12**

Appendix A: Rider Survey Summary

Transit Rider Survey

Please help Blacksburg Transit improve its service by completing the survey below. All results will be kept strictly confidential

Take this survey online or on your smartphone at: **btransit.org/2017btridersurvey**

1. On what route did you receive this survey? _____

2. Where did you begin this one-way trip?
   Name of location: _____
   Address or Intersection: _____
   Town: _____

3. Where is your final destination on this one-way trip?
   Name of location: _____
   Address or Intersection: _____
   Town: _____

4. How did you get to this bus today?
   - ☐ Another bus route: Agency: _____ Route: _____
   - ☐ Biked
   - ☐ Got a ride/carpooled
   - ☐ Taxi/Uber/Lyft
   - ☐ Walked
   - ☐ Other: _____

5. How will you get from this bus to your final destination today?
   - ☐ Another bus route: Agency: _____ Route: _____
   - ☐ Bike
   - ☐ Get a ride/carpool
   - ☐ Taxi/Uber/Lyft
   - ☐ Walk
   - ☐ Other: _____

6. How did you pay your bus fare today?
   - ☐ University ID (VT, VCOM, LCI)
   - ☐ Full-Fare Cash
   - ☐ Full-Fare Monthly Pass
   - ☐ Youth/Senior Cash
   - ☐ Youth/Senior Pass
   - ☐ Disabled/Medicare Cash
   - ☐ Disabled/Medicare Pass

7. What is the purpose of your trip today?
   - ☐ School
   - ☐ Work
   - ☐ Shopping
   - ☐ Medical/Dental
   - ☐ Social/Recreational
   - ☐ Other Errands
   - ☐ Government Service (Social Security, etc)
   - ☐ Other: _____

8. If this route/service didn't exist, how would you have made this trip today?
   - ☐ Another bus route
   - ☐ Drove alone
   - ☐ Got a ride/carpool
   - ☐ Taxi/Uber/Lyft
   - ☐ Walked
   - ☐ Biked
   - ☐ Other: _____

9. Which of the following describe the main reasons that you use Blacksburg Transit? (check all that apply)
   - ☐ I do not own a car
   - ☐ My car is temporarily out of service
   - ☐ I cannot drive for legal or health reasons
   - ☐ I prefer to spend time on things other than driving
   - ☐ Parking is not available or is expensive at my destination
   - ☐ Taking the bus is cheaper than gas and car maintenance
   - ☐ I am doing my part for the environment
   - ☐ Other: _____

10. What is your age? _____ Years

11. What is your sex? ☐ Male ☐ Female ☐ Other

12. What is the primary language you speak in your home?
    ☐ English ☐ Spanish ☐ Korean ☐ Chinese ☐ Other: _____

13. What is your race/ethnicity?
    ☐ American Indian/Alaska Native ☐ Black or African-American
    ☐ Asian ☐ Native Hawaiian or Pacific Islander ☐ White ☐ 2 or more races
    ☐ Hispanic or Latino ☐ Other :

14. What is your approximate household income?
    ☐ Less than $10,000 ☐ $10,000-$19,999 ☐ $20,000-$34,999
    ☐ $35,000-$54,999 ☐ $55,000-$74,999 ☐ $75,000 or more

15. Which of the following best describes your employment status?
    ☐ Employed Full-Time ☐ Student
    ☐ Employed Part-Time ☐ Unemployed
    ☐ Retired ☐ Other: _____

16. Based on your experience riding Blacksburg Transit services, how strongly do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Service is reliable	☐	☐	☐	☐	☐
Routes get me where I need to go	☐	☐	☐	☐	☐
Hours of service meet my needs	☐	☐	☐	☐	☐
Frequency of service meets my needs	☐	☐	☐	☐	☐
Fares are reasonable	☐	☐	☐	☐	☐
Buses are comfortable and well-kept	☐	☐	☐	☐	☐
Staff is professional and courteous	☐	☐	☐	☐	☐
Maps and schedules are easy to understand	☐	☐	☐	☐	☐
Mobile app is easy to use and understand	☐	☐	☐	☐	☐

The following questions ask your preference. Please check ONE box per row:

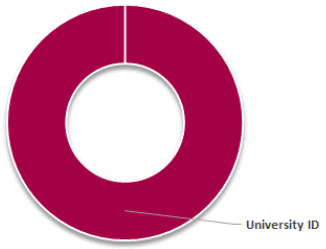
More frequent bus service	☐ **OR** ☐	Longer hours of service
Weekday service	☐ **OR** ☐	Weekend Service
More bus stops for a shorter walk to/from bus stops	☐ **OR** ☐	Less bus stops for faster service
Buses running more frequently but on fewer streets	☐ **OR** ☐	Buses running on more streets but less frequently
Add more routes/services	☐ **OR** ☐	Improve existing routes/services

Please include any additional comments in the space below:

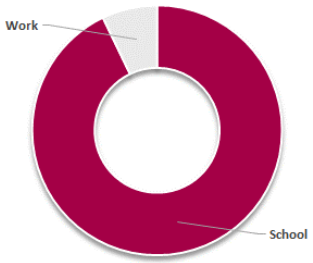
Carpenter Boulevard

Trip Characteristics

Fare Type

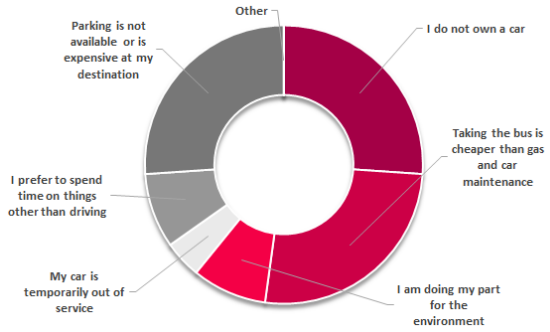


Trip Purpose



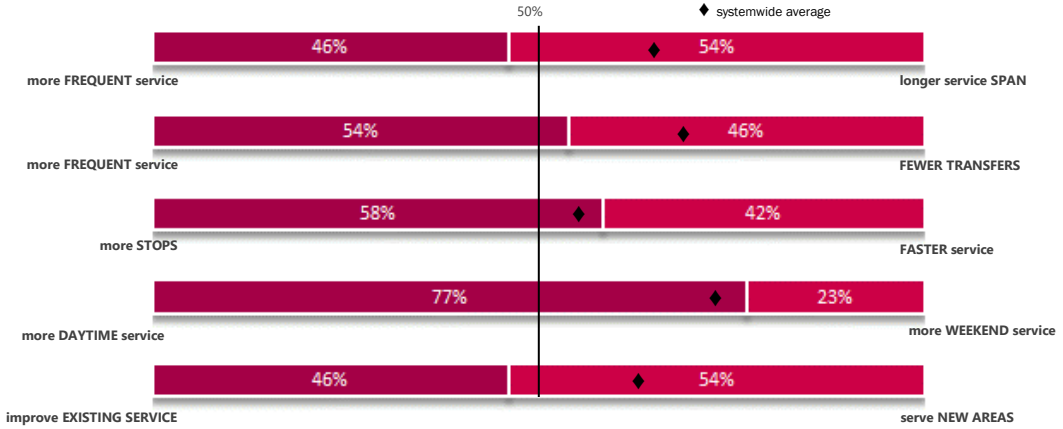
Satisfaction with Service

Reason for Riding



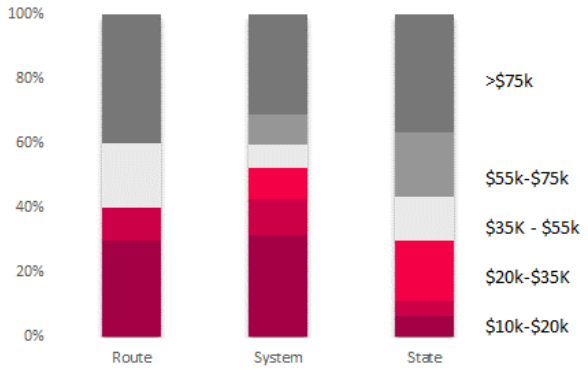
Mode of Access & Egress

Rider Preferences

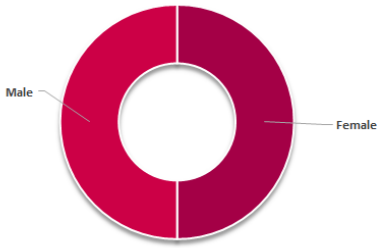


Rider Demographics

Household Income

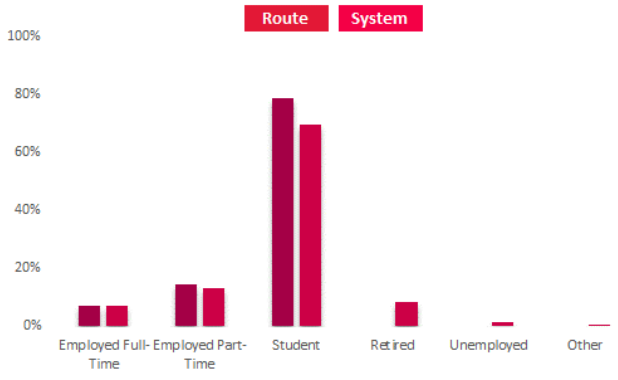


Gender

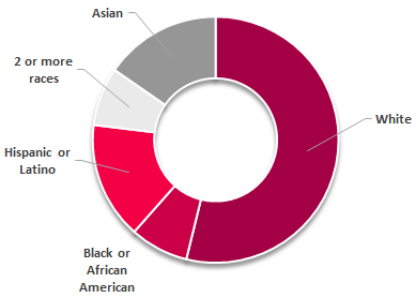


Employment Status

note: respondents could check more than one answer



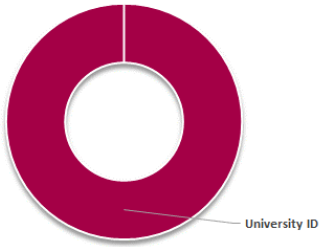
Race/Ethnicity



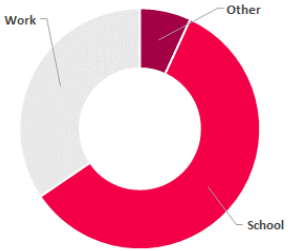
CRC Shuttle

Trip Characteristics

Fare Type

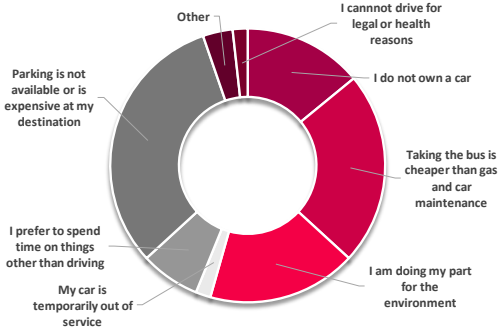


Trip Purpose



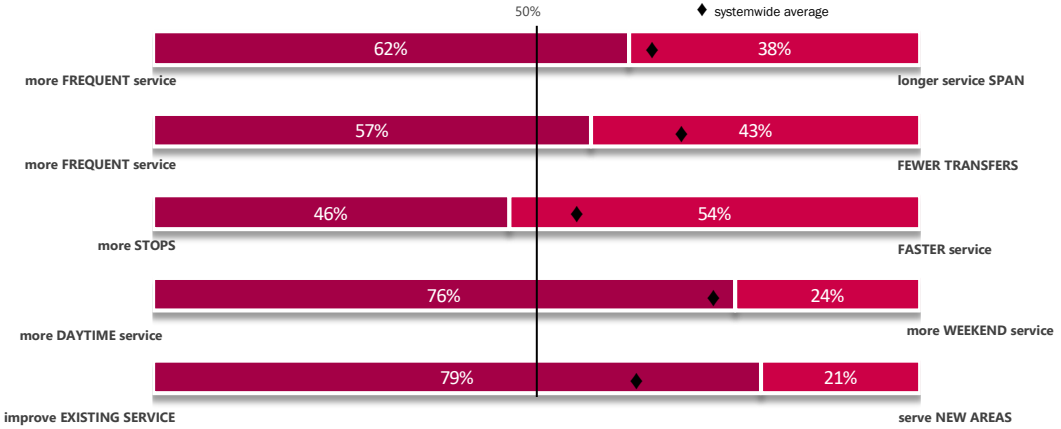
Satisfaction with Service

Reason for Riding



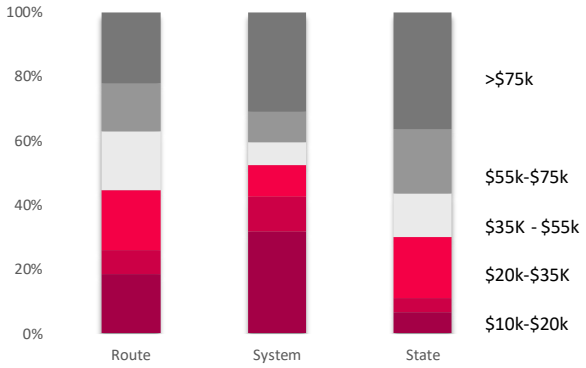
Mode of Access & Egress

Rider Preferences

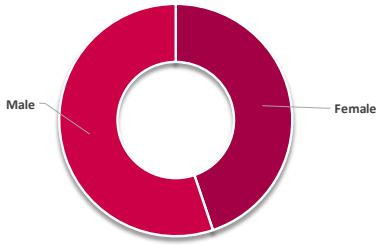


Rider Demographics

Household Income

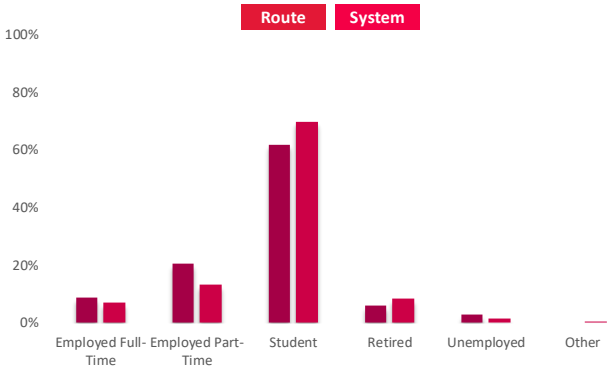


Gender

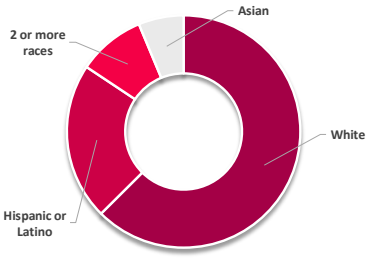


Employment Status

note: respondents could check more than one answer



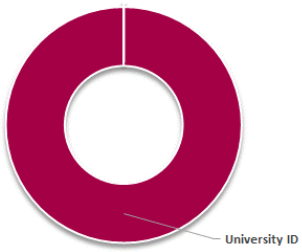
Race/Ethnicity



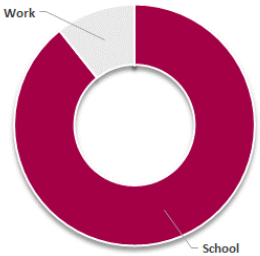
Harding Avenue

Trip Characteristics

Fare Type

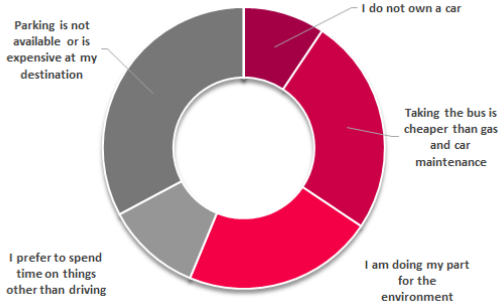


Trip Purpose

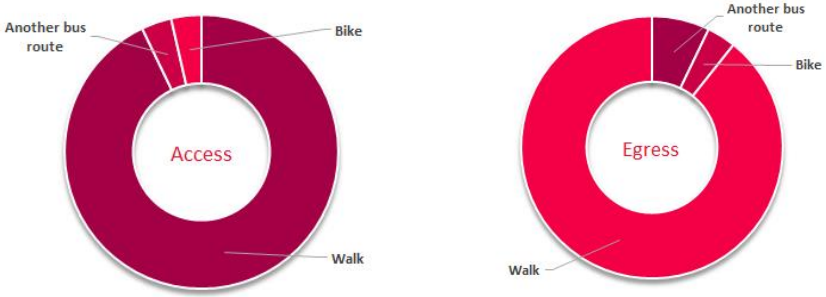


Satisfaction with Service

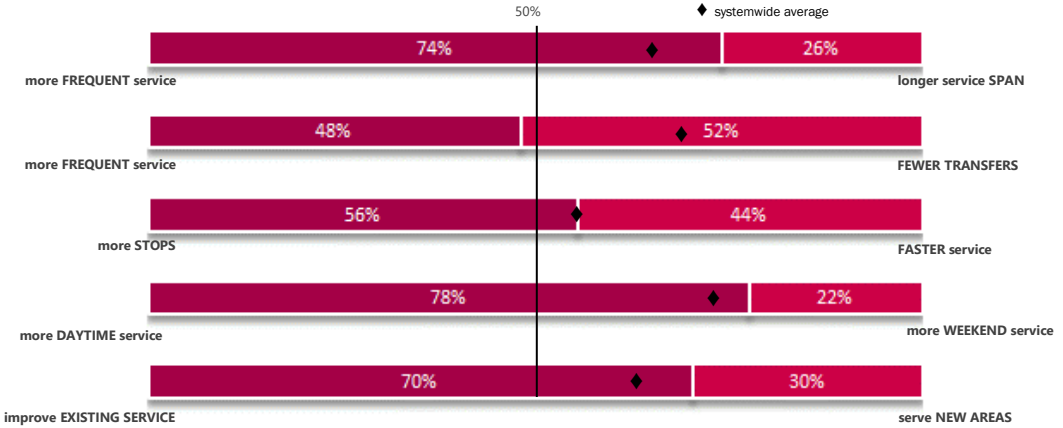
Reason for Riding



Mode of Access & Egress

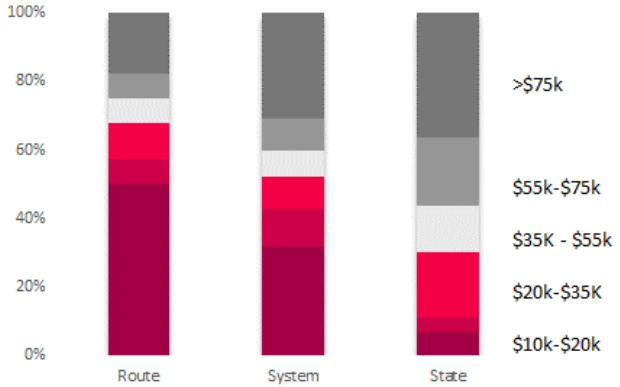


Rider Preferences

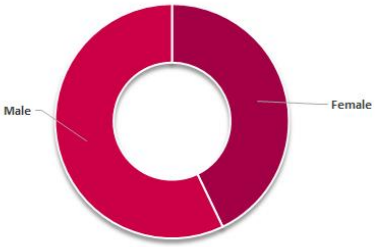


Rider Demographics

Household Income

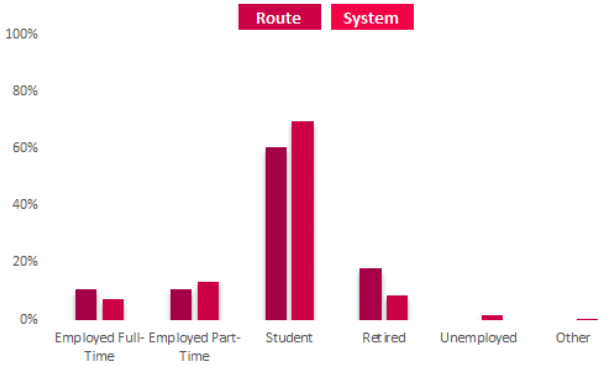


Gender

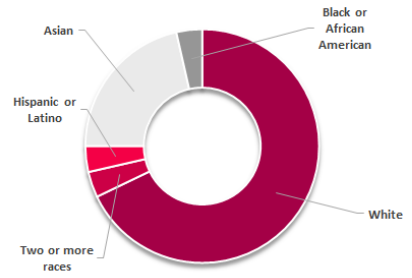


Employment Status

note: respondents could check more than one answer



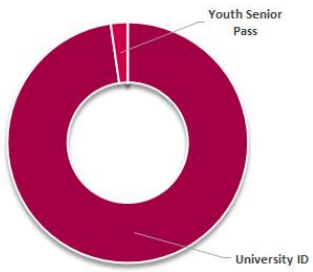
Race/Ethnicity



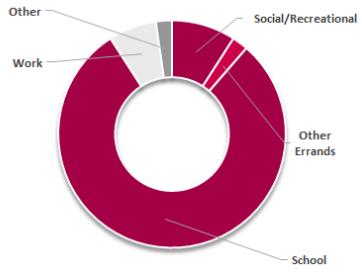
Hethwood A

Trip Characteristics

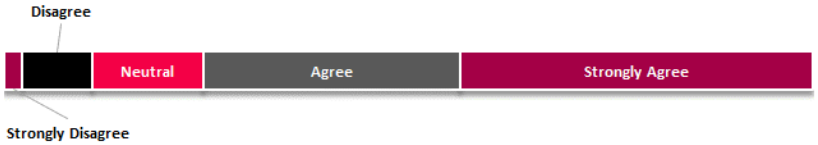
Fare Type



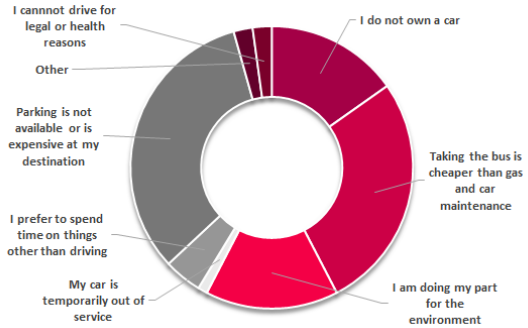
Trip Purpose



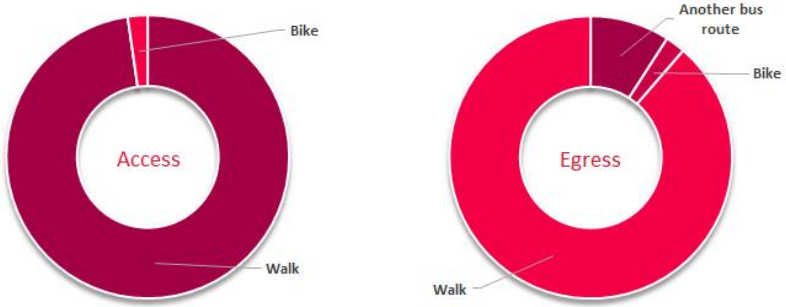
Satisfaction with Service



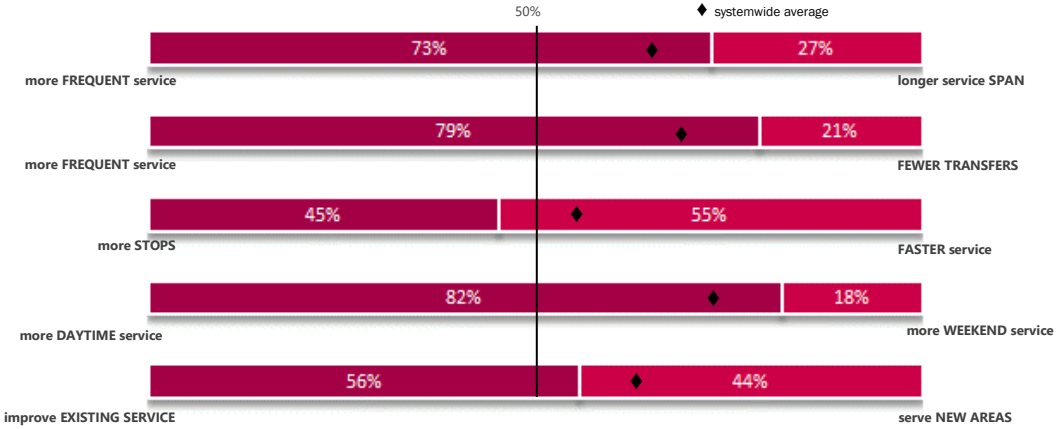
Reason for Riding



Mode of Access & Egress

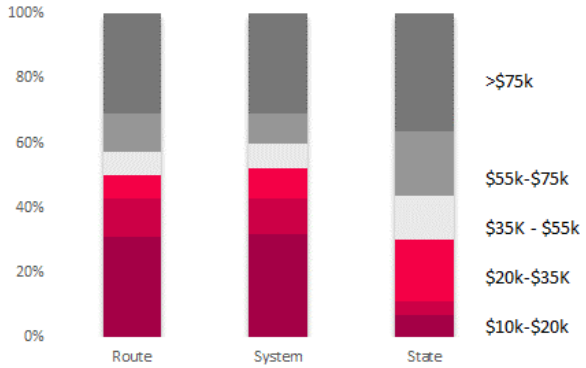


Rider Preferences

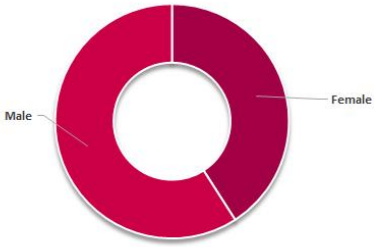


Rider Demographics

Household Income

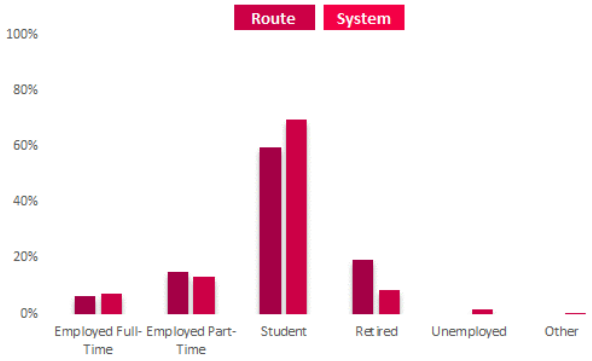


Gender

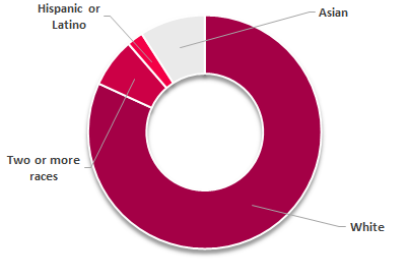


Employment Status

note: respondents could check more than one answer



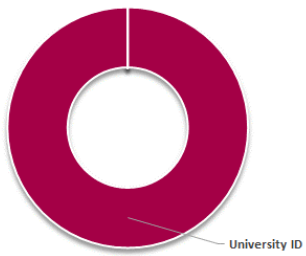
Race/Ethnicity



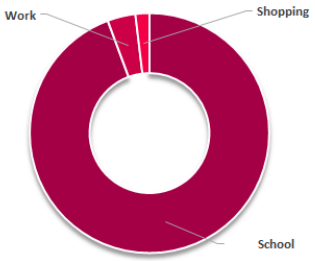
Hethwood B

Trip Characteristics

Fare Type

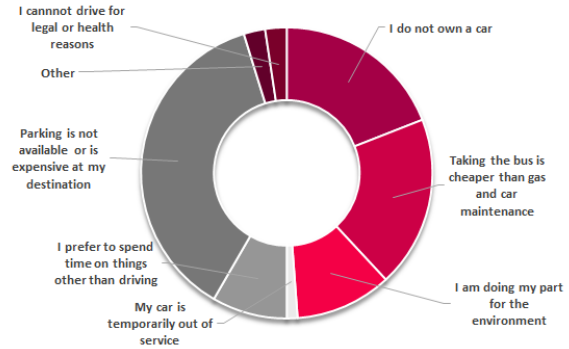


Trip Purpose

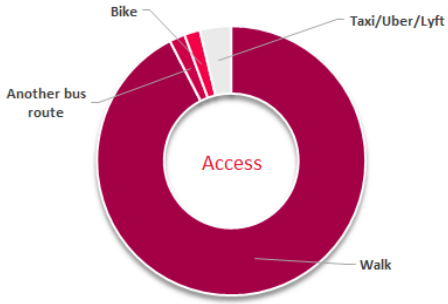


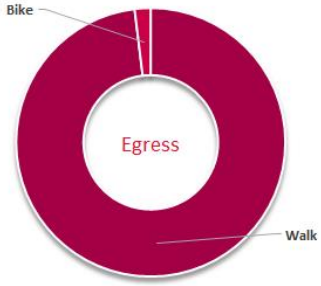
Satisfaction with Service

Reason for Riding

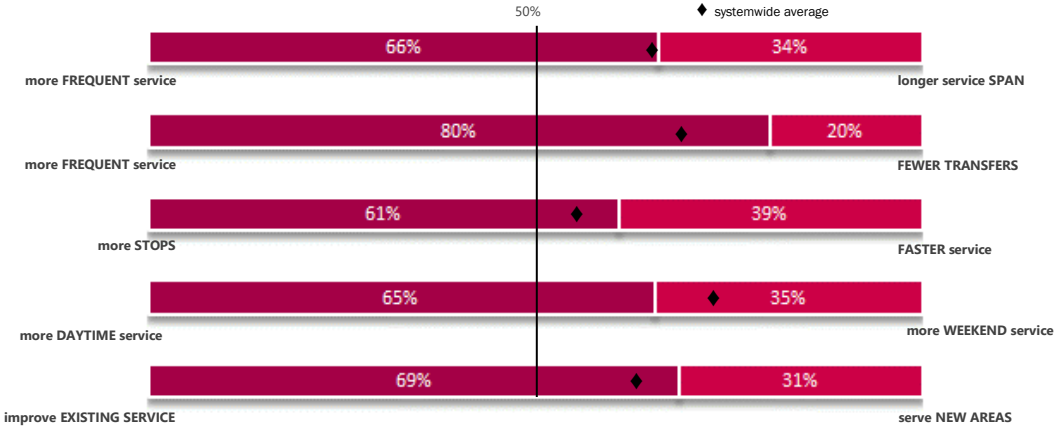


Mode of Access & Egress



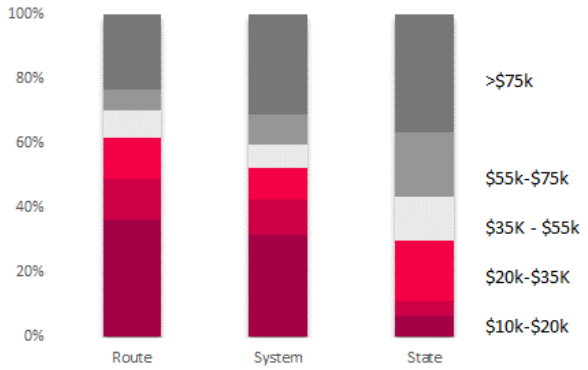


Rider Preferences

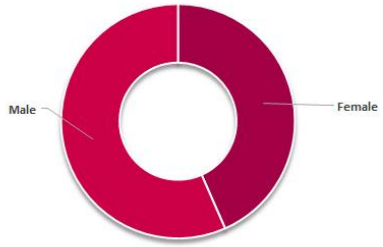


Rider Demographics

Household Income

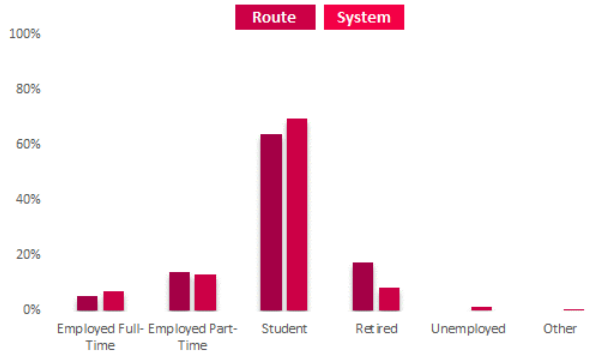


Gender

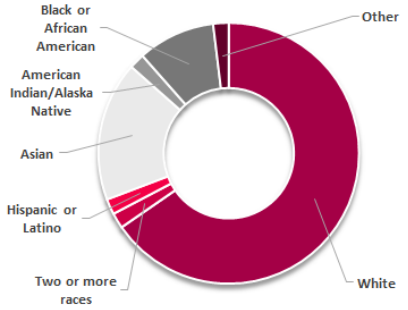


Employment Status

note: respondents could check more than one answer



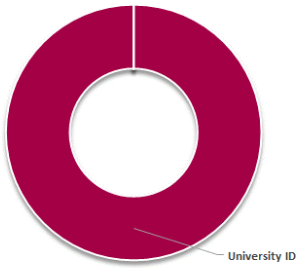
Race/Ethnicity



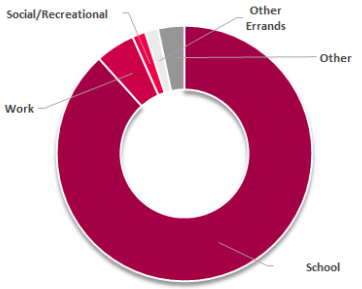
Hokie Express

Trip Characteristics

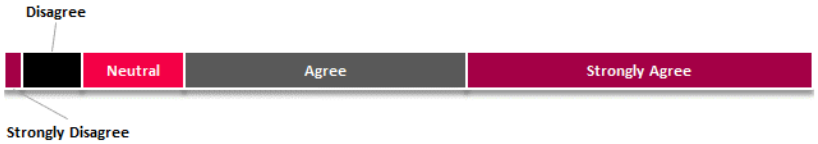
Fare Type



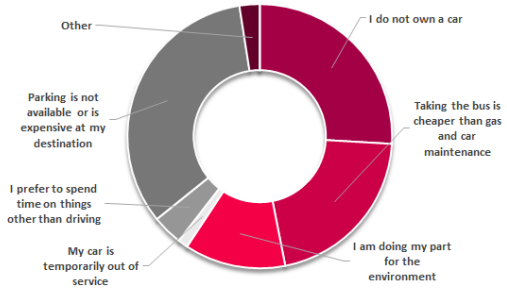
Trip Purpose



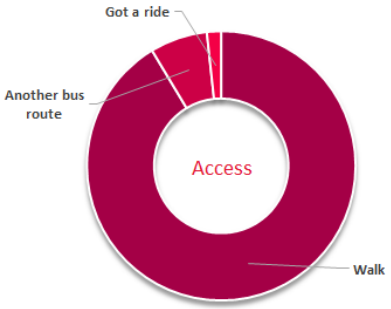
Satisfaction with Service

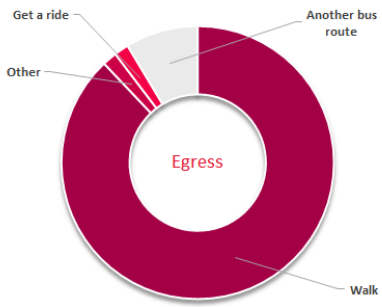


Reason for Riding

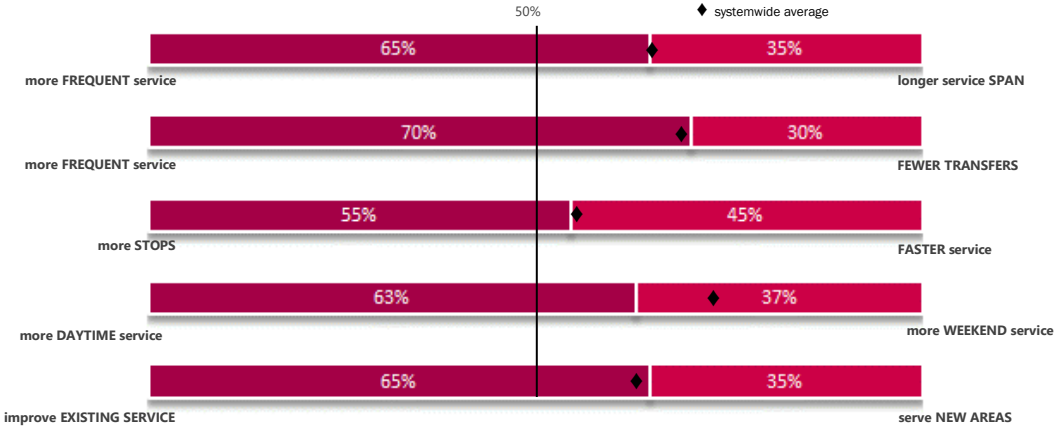


Mode of Access & Egress



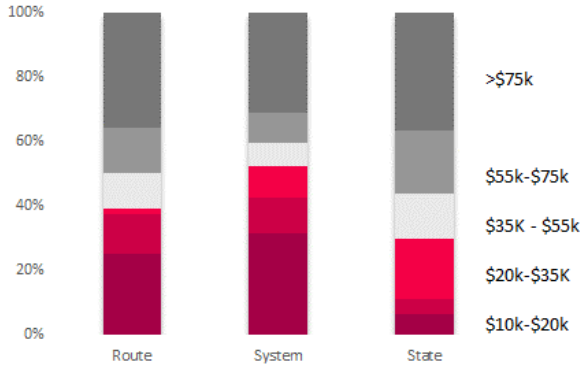


Rider Preferences

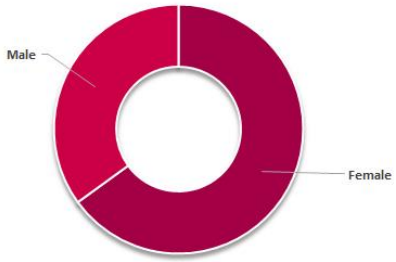


Rider Demographics

Household Income

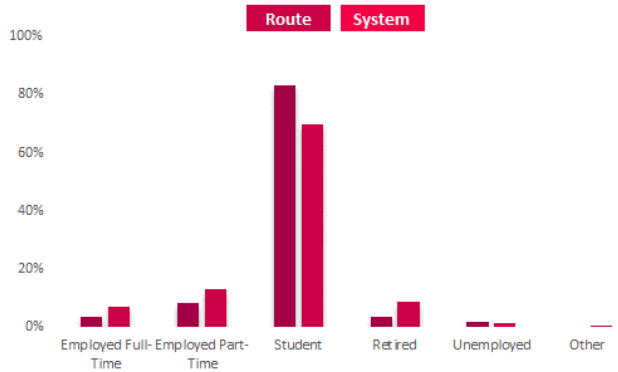


Gender

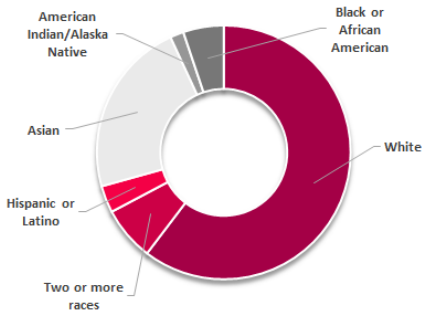


Employment Status

note: respondents could check more than one answer



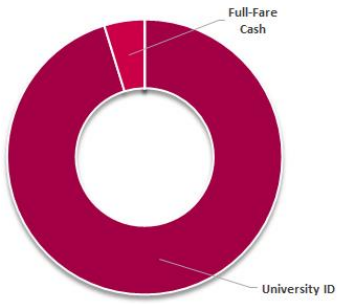
Race/Ethnicity



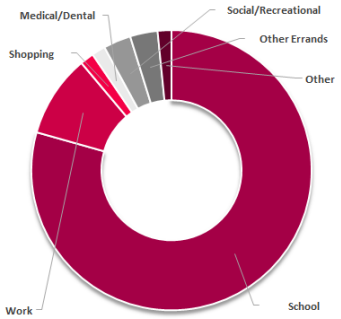
Main Street North

Trip Characteristics

Fare Type

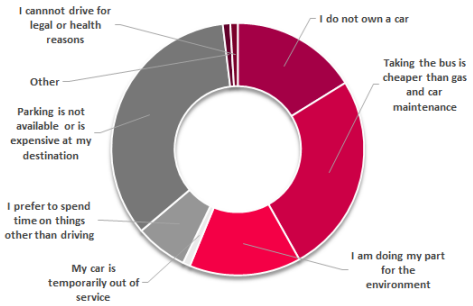


Trip Purpose

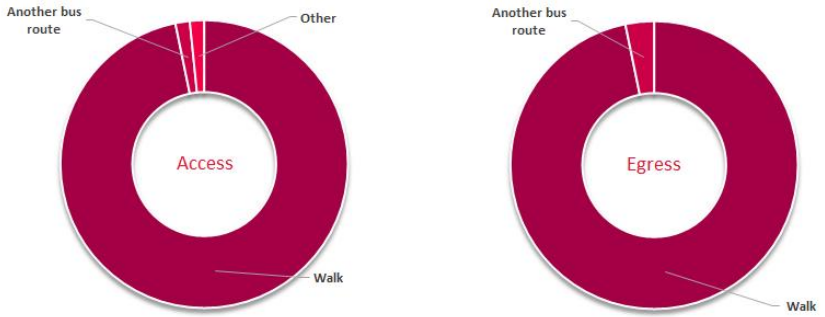


Satisfaction with Service

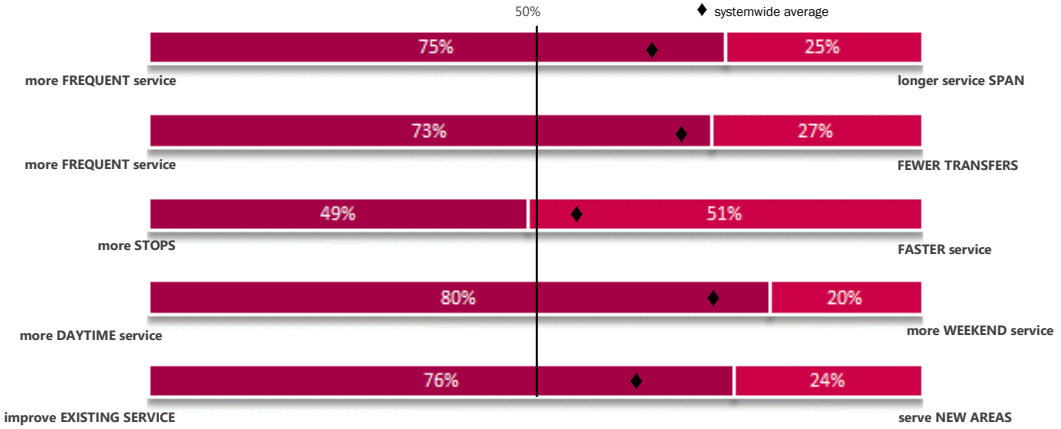
Reason for Riding



Mode of Access & Egress

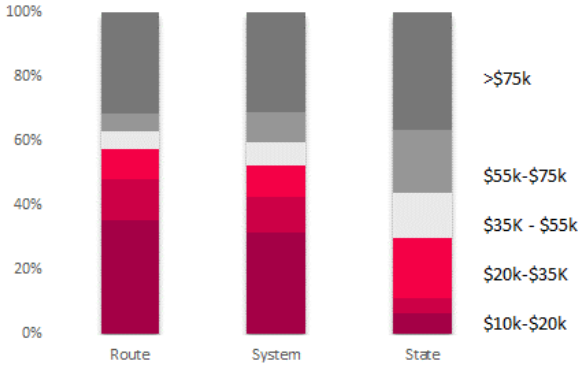


Rider Preferences

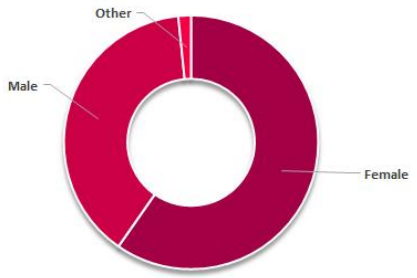


Rider Demographics

Household Income

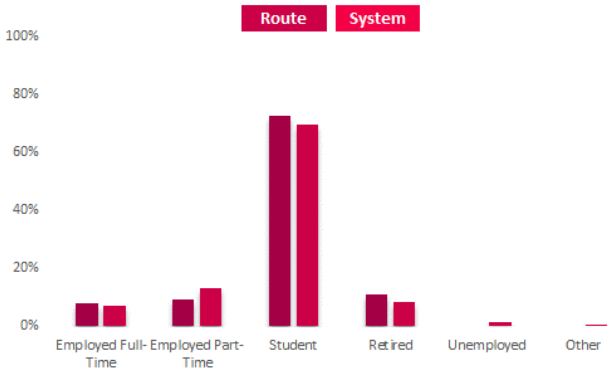


Gender

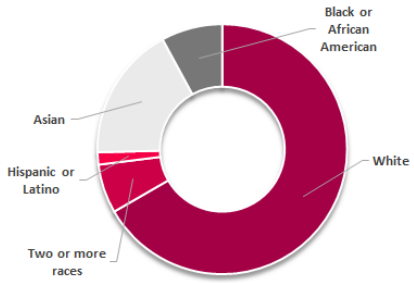


Employment Status

note: respondents could check more than one answer



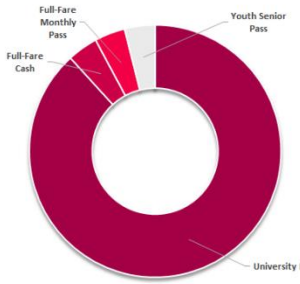
Race/Ethnicity



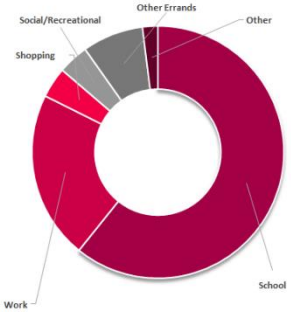
Main Street South

Trip Characteristics

Fare Type

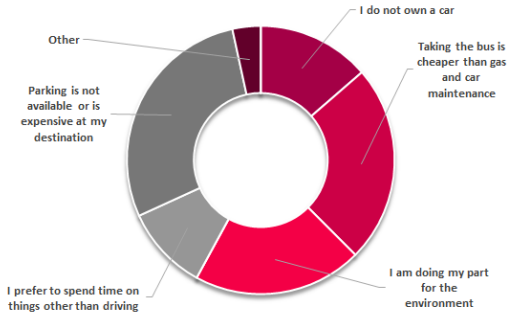


Trip Purpose

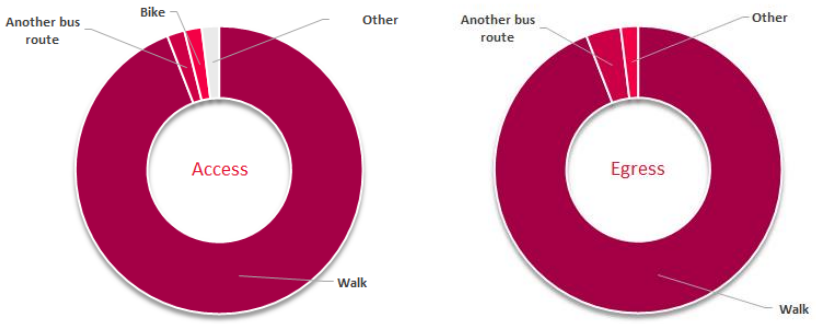


Satisfaction with Service

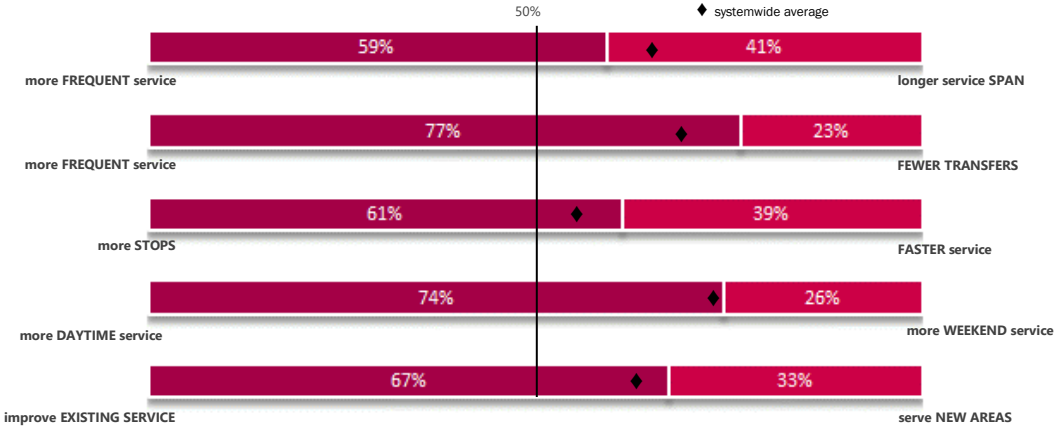
Reason for Riding



Mode of Access & Egress

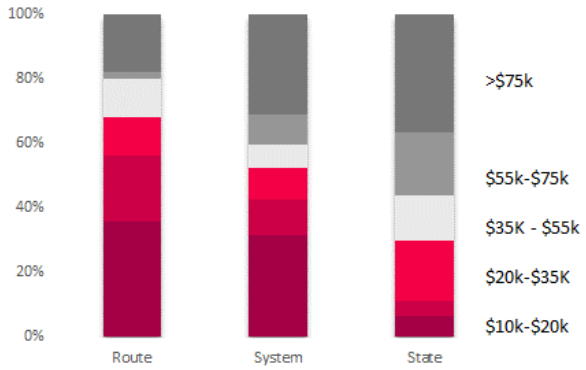


Rider Preferences

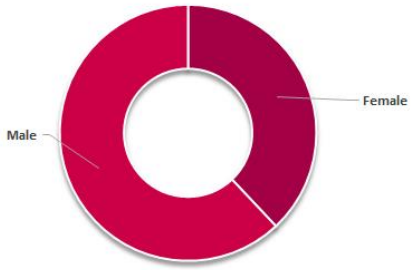


Rider Demographics

Household Income

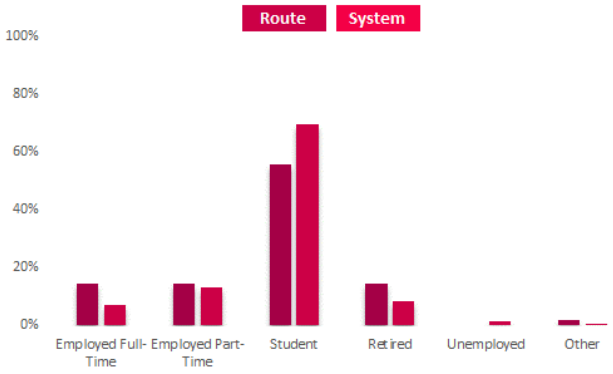


Gender

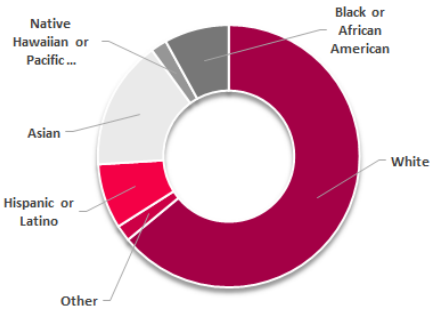


Employment Status

note: respondents could check more than one answer



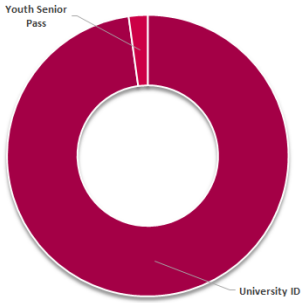
Race/Ethnicity



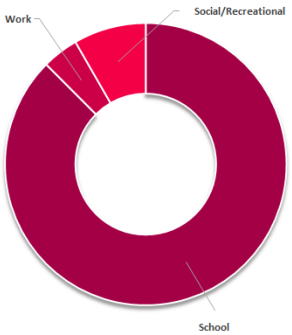
Patrick Henry

Trip Characteristics

Fare Type

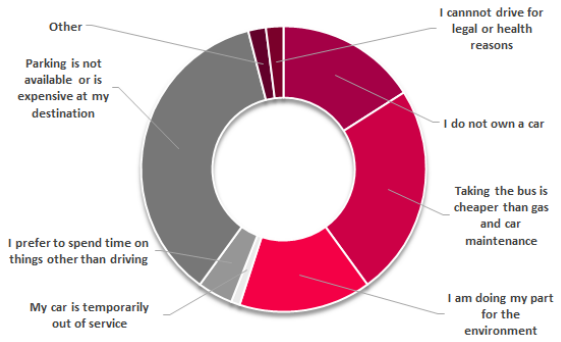


Trip Purpose

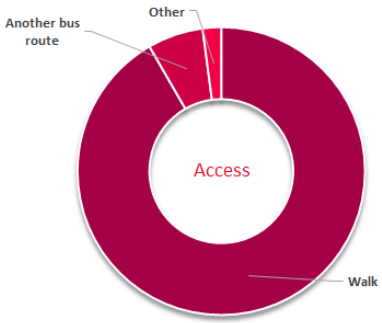


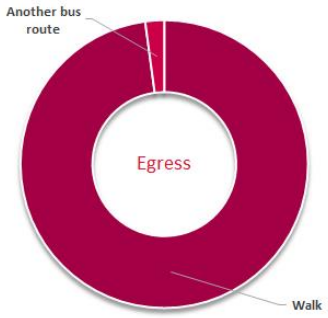
Satisfaction with Service

Reason for Riding

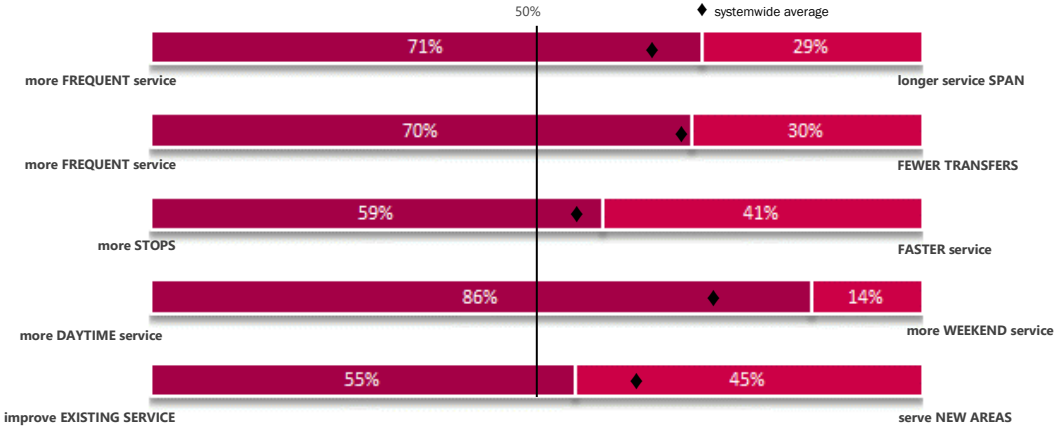


Mode of Access & Egress



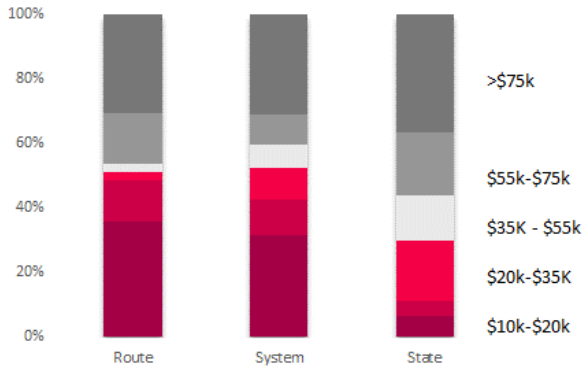


Rider Preferences

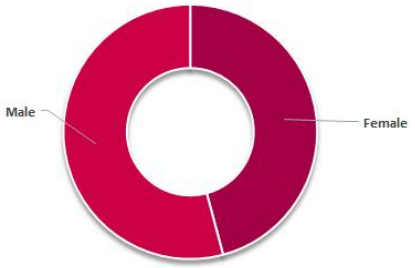


Rider Demographics

Household Income

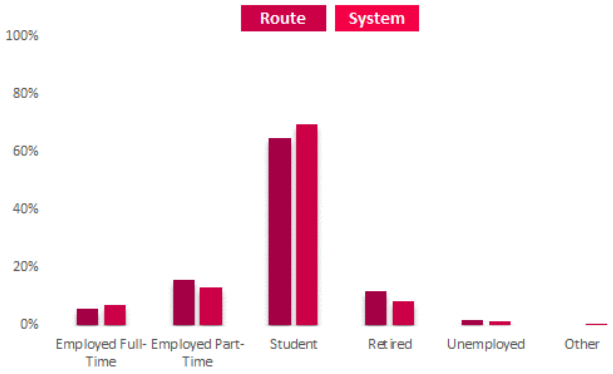


Gender

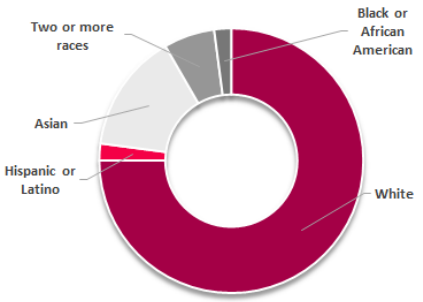


Employment Status

note: respondents could check more than one answer



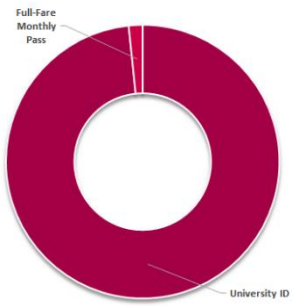
Race/Ethnicity



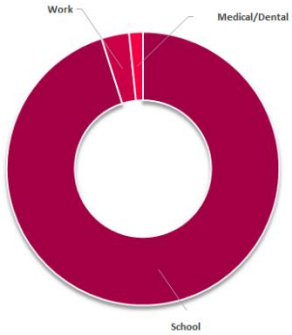
Progress Street

Trip Characteristics

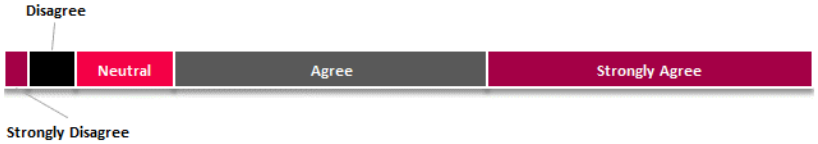
Fare Type



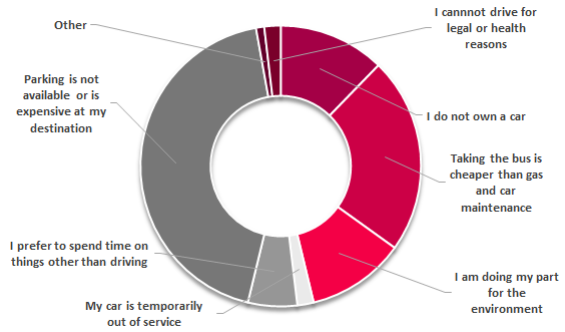
Trip Purpose



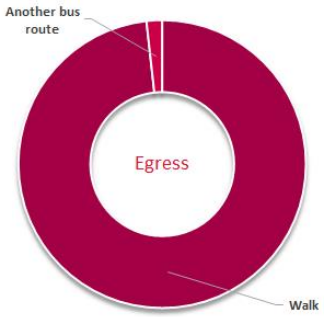
Satisfaction with Service



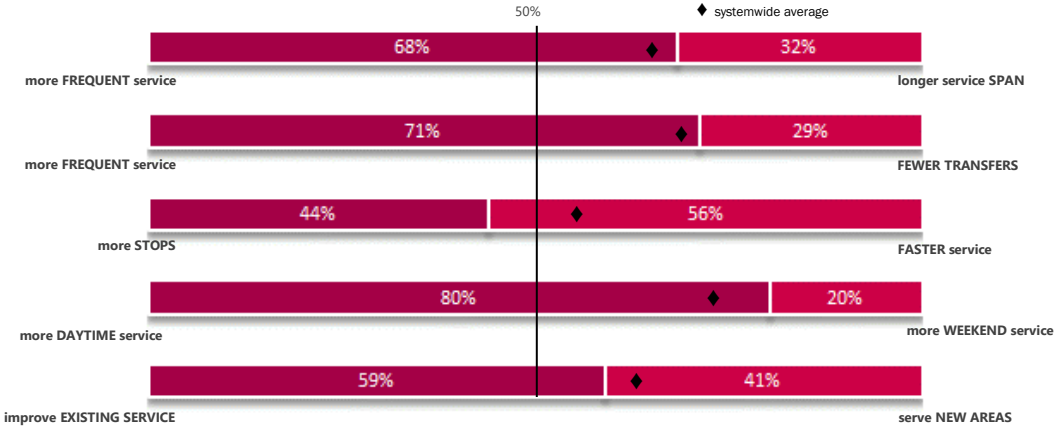
Reason for Riding



Mode of Access & Egress

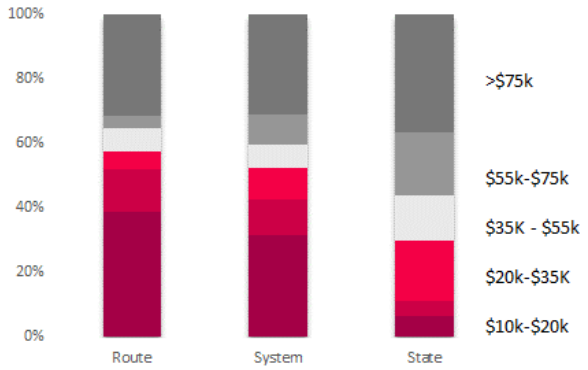


Rider Preferences

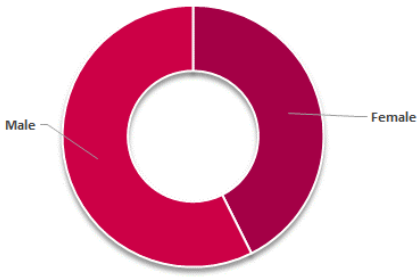


Rider Demographics

Household Income

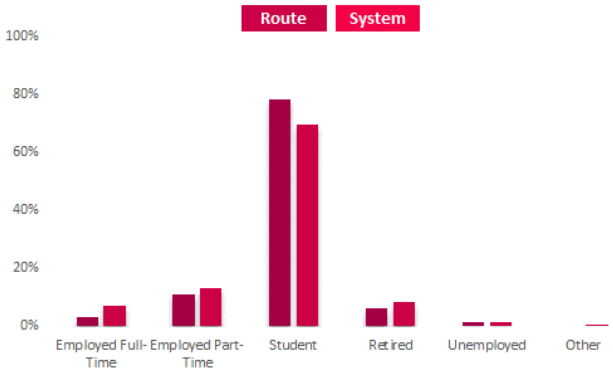


Gender

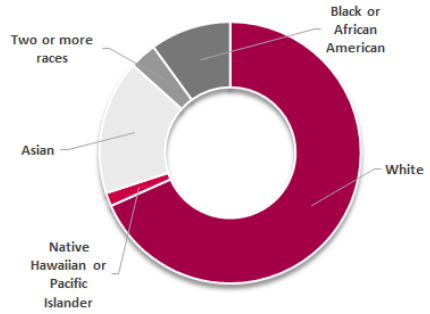


Employment Status

note: respondents could check more than one answer



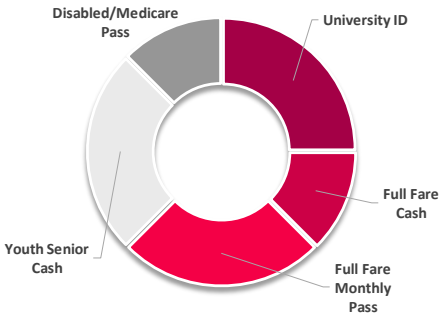
Race/Ethnicity



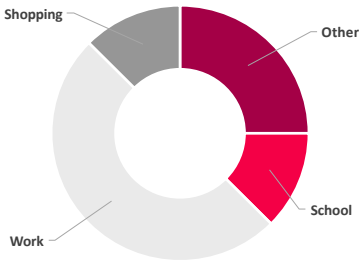
The Explorer

Trip Characteristics

Fare Type

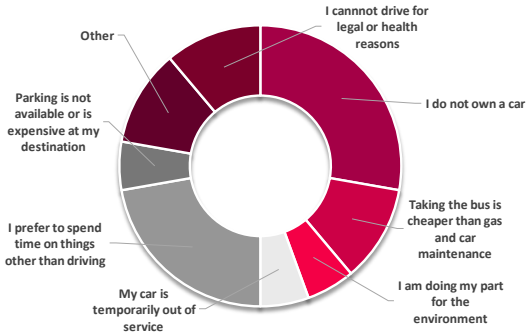


Trip Purpose

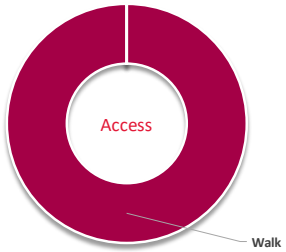


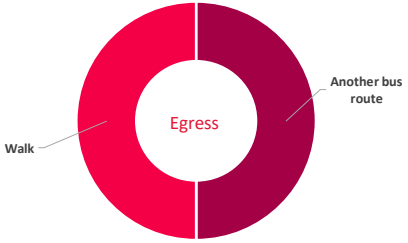
Satisfaction with Service

Reason for Riding

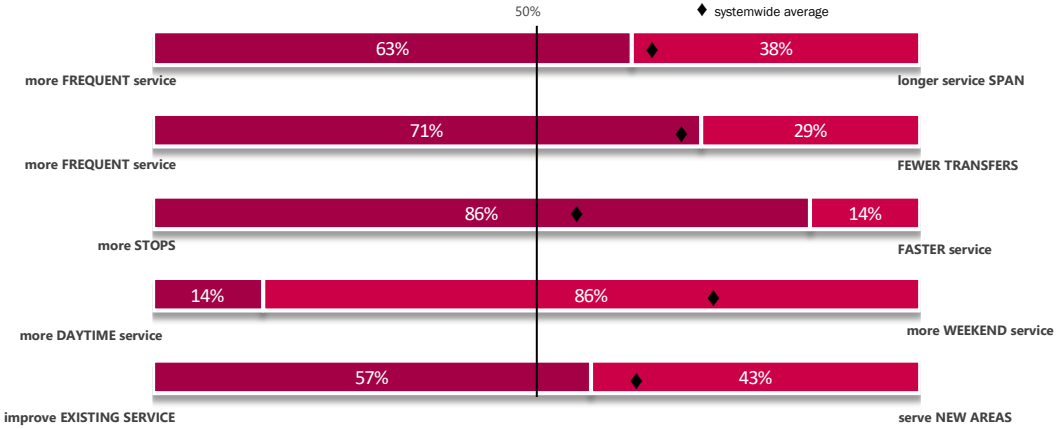


Mode of Access & Egress



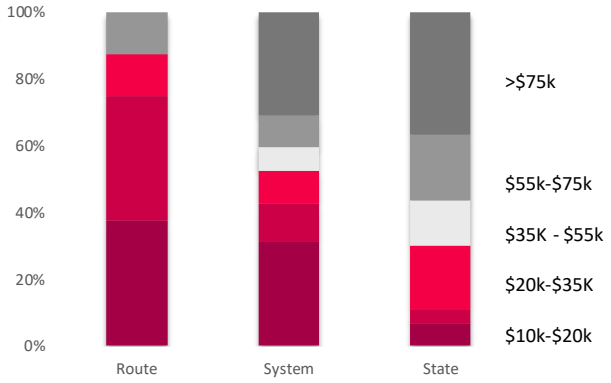


Rider Preferences

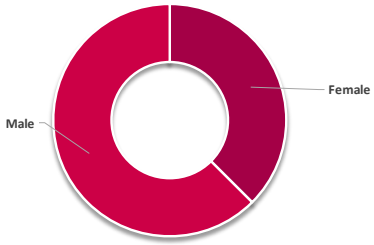


Rider Demographics

Household Income

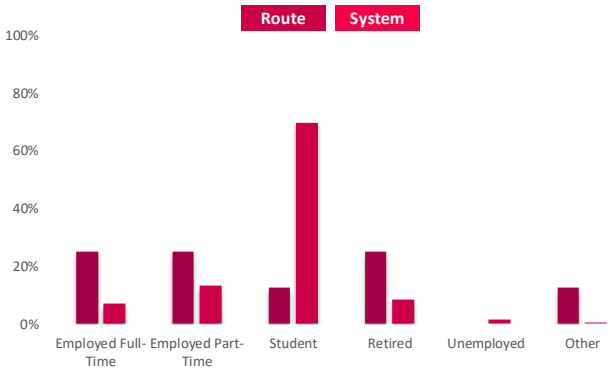


Gender

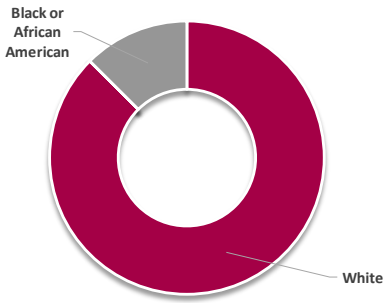


Employment Status

note: respondents could check more than one answer



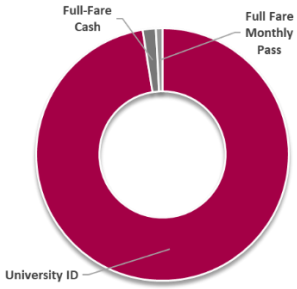
Race/Ethnicity



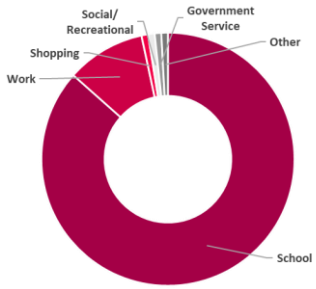
Blacksburg TRANSIT Toms Creek

Trip Characteristics

Fare Type

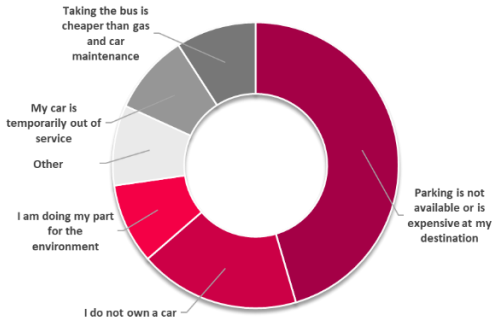


Trip Purpose

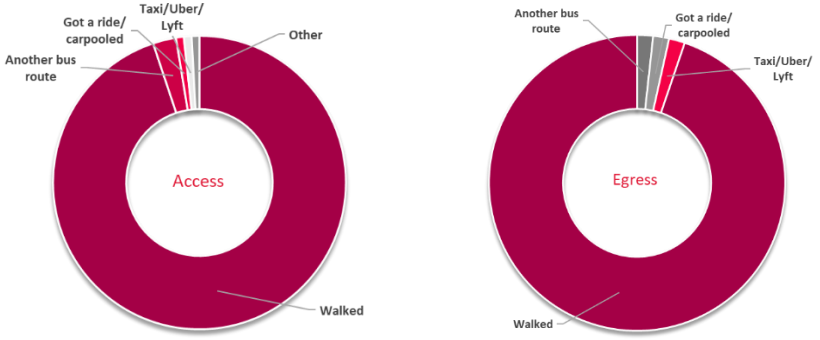


Satisfaction with Service

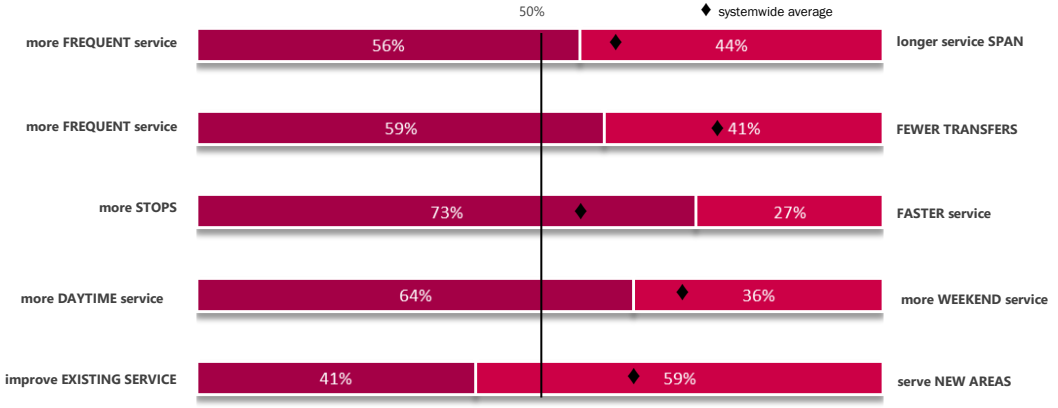
Reason for Riding



Mode of Access & Egress

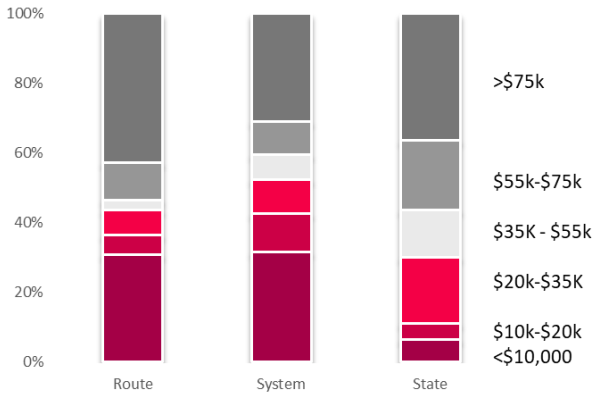


Rider Preferences

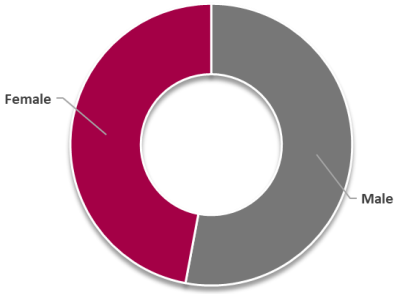


Rider Demographics

Household Income

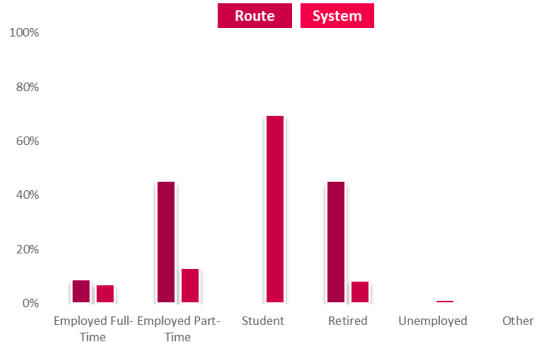


Gender

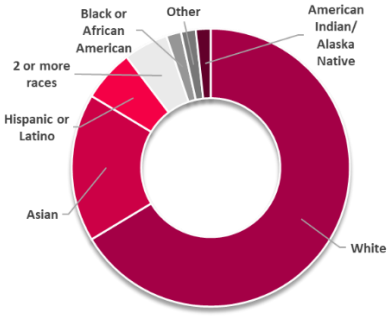


Employment Status

note: respondents could check more than one answer



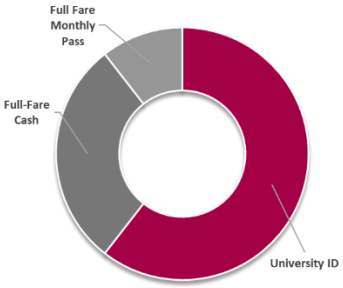
Race/Ethnicity



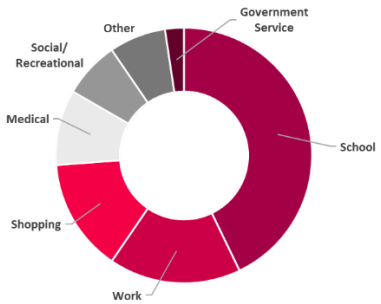
Blacksburg TRANSIT Two Town Trolley

Trip Characteristics

Fare Type

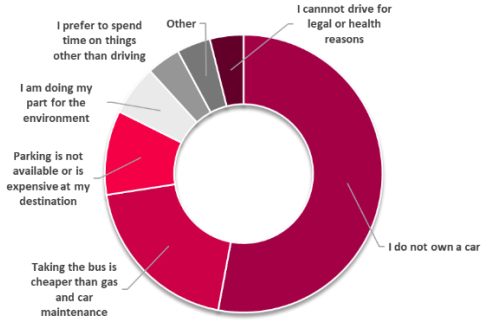


Trip Purpose

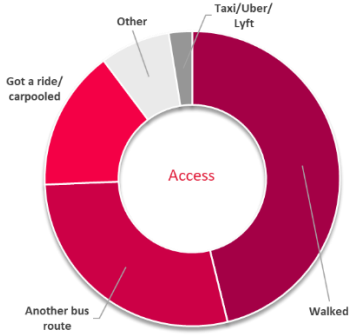


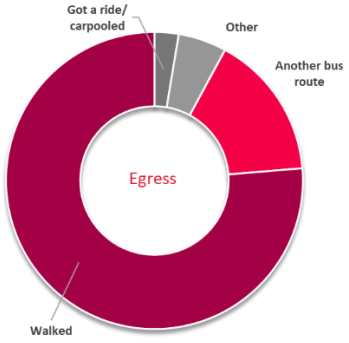
Satisfaction with Service

Reason for Riding

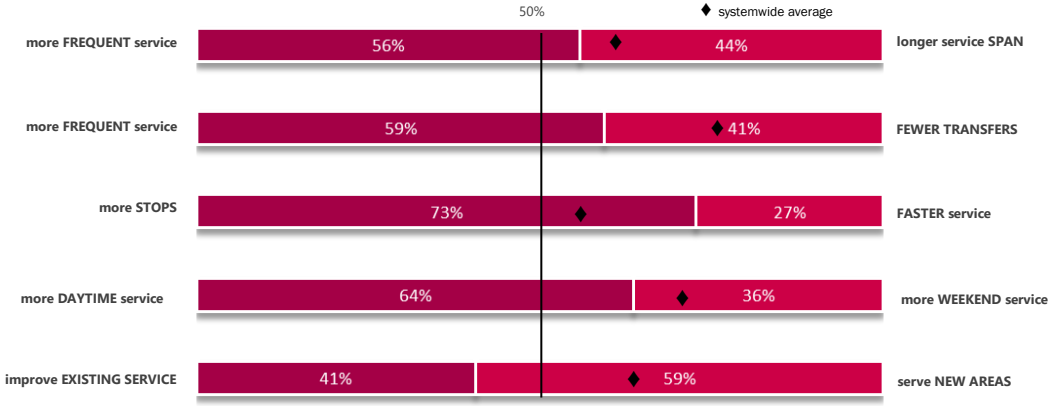


Mode of Access & Egress



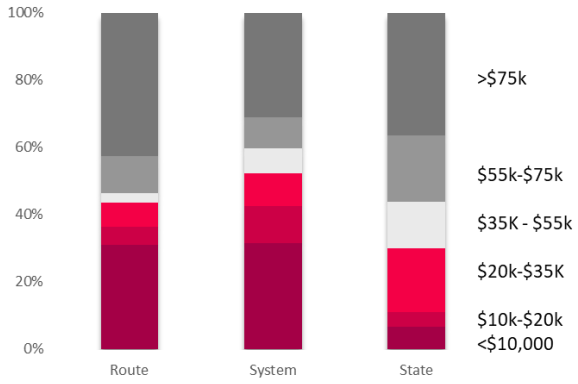


Rider Preferences

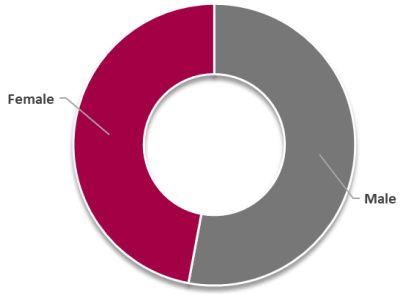


Rider Demographics

Household Income

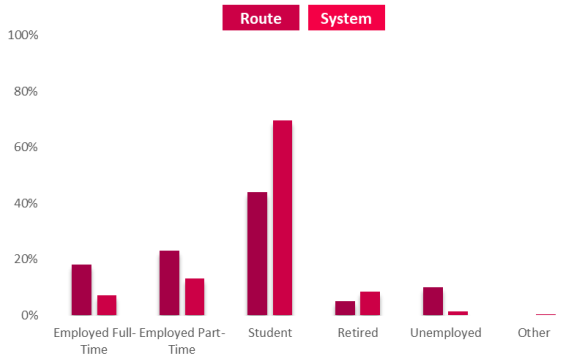


Gender

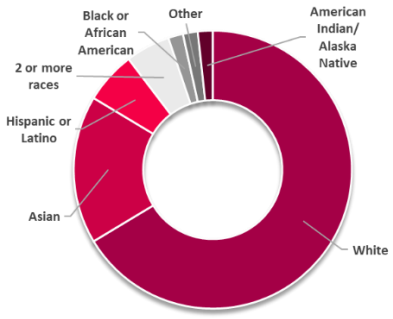


Employment Status

note: respondents could check more than one answer



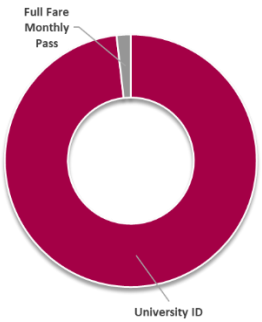
Race/Ethnicity



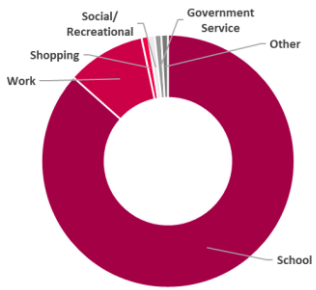
University City Boulevard

Trip Characteristics

Fare Type

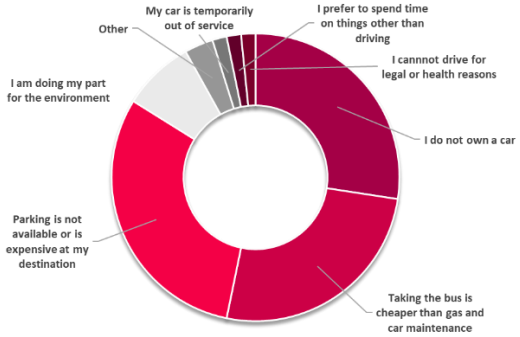


Trip Purpose

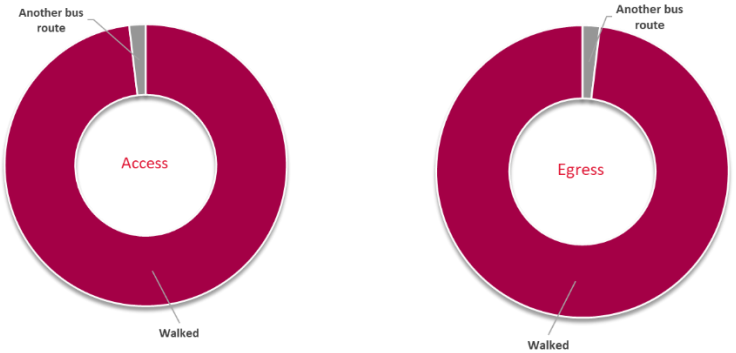


Satisfaction with Service

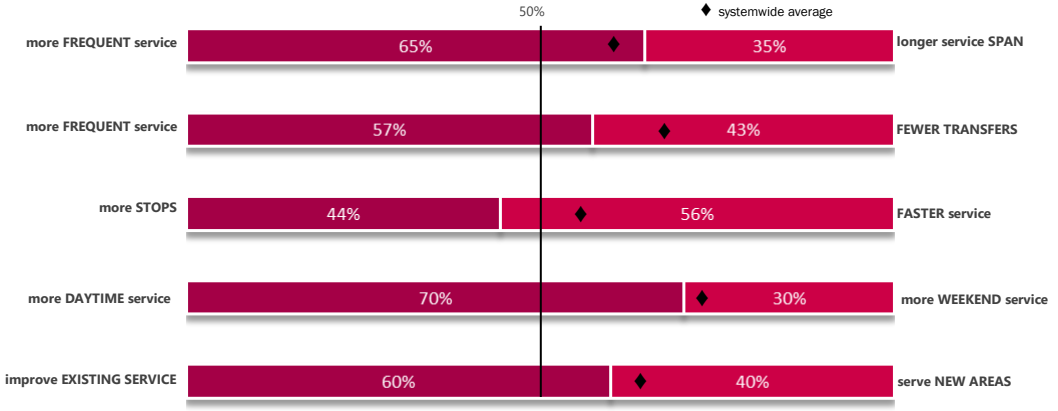
Reason for Riding



Mode of Access & Egress

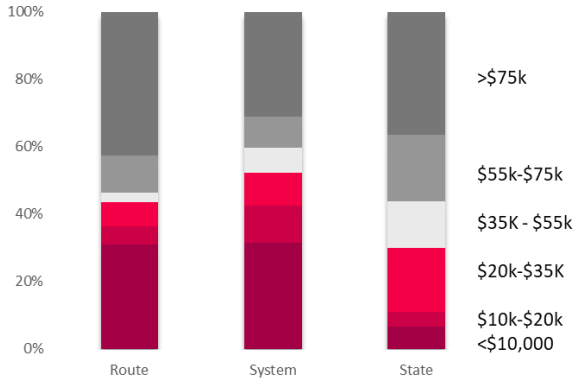


Rider Preferences

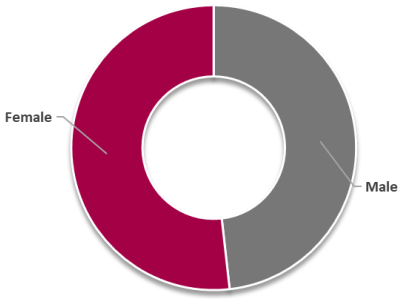


Rider Demographics

Household Income

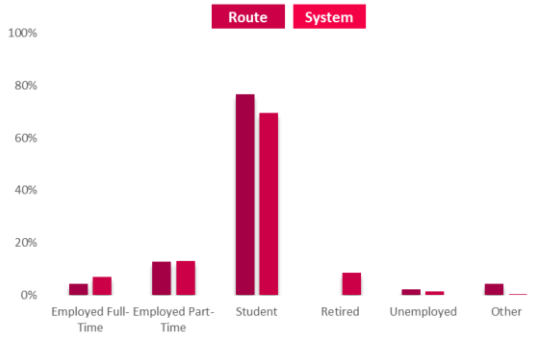


Gender

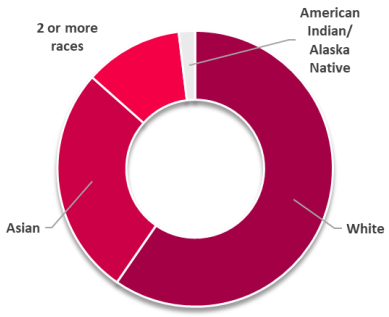


Employment Status

note: respondents could check more than one answer



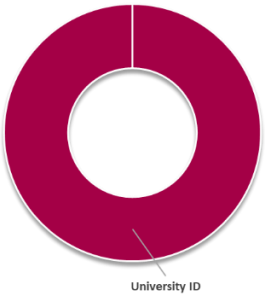
Race/Ethnicity



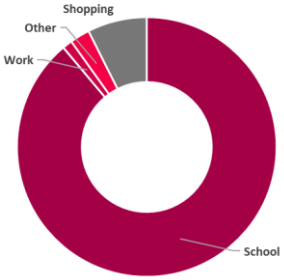
University Mall Shuttle

Trip Characteristics

Fare Type

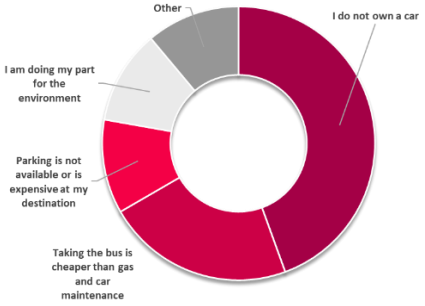


Trip Purpose

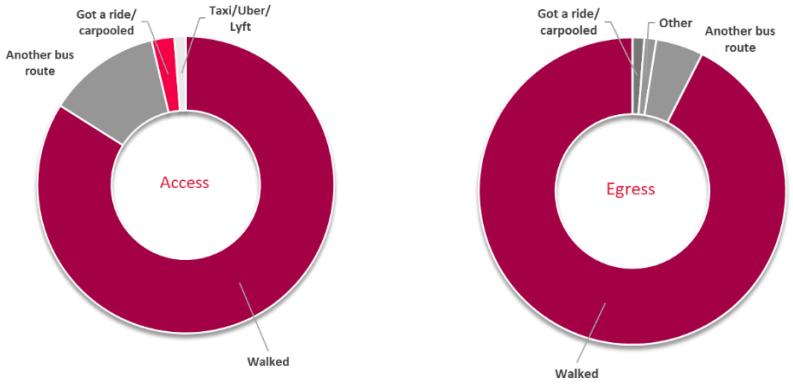


Satisfaction with Service

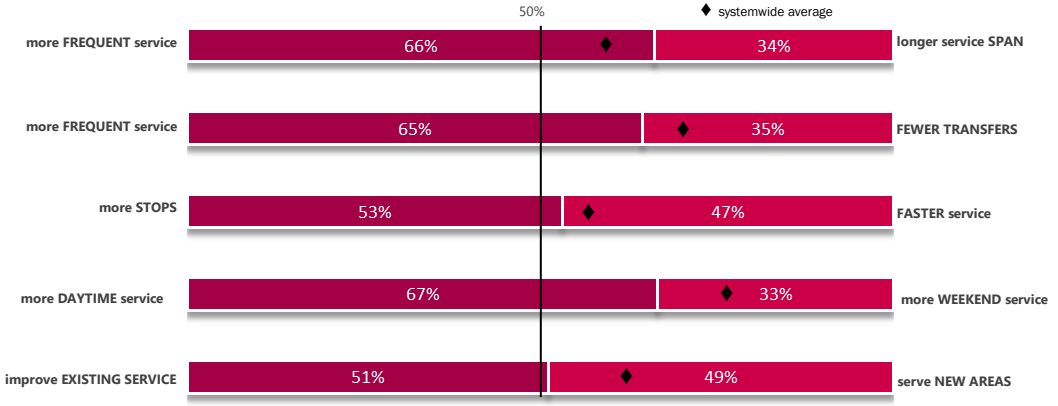
Reason for Riding



Mode of Access & Egress

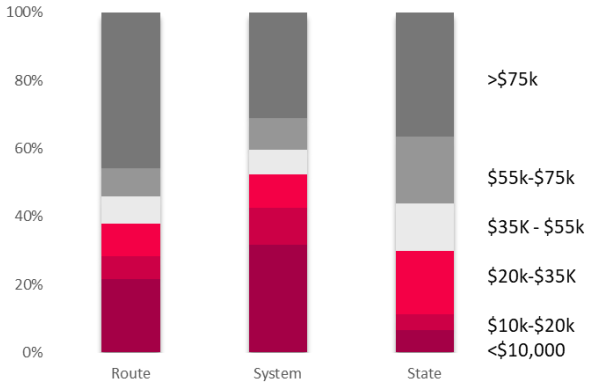


Rider Preferences

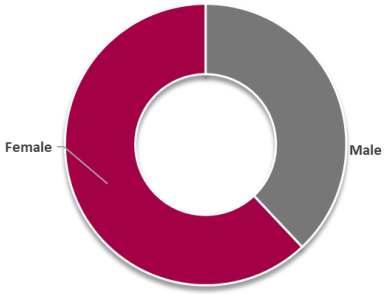


Rider Demographics

Household Income

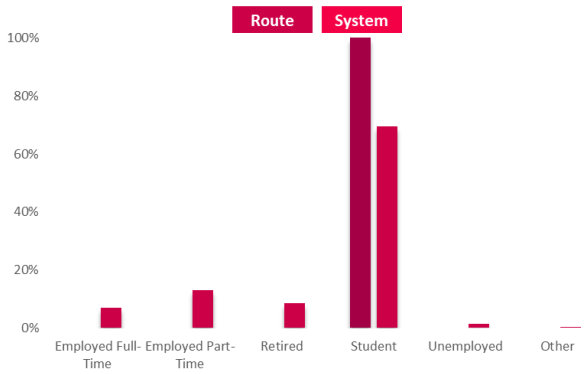


Gender

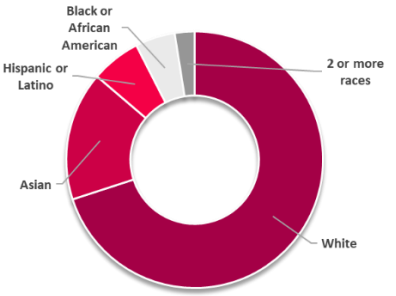


Employment Status

note: respondents could check more than one answer



Race/Ethnicity



Appendix B: Route Profiles

Service Productivity and Level of Service Standards

Blacksburg Transit fixed-route services are evaluated on the basis of passengers per revenue hour, passengers per revenue mile, and schedule adherence. Routes are graded as good, satisfactory, marginal, or unsatisfactory, with the criteria for each laid out in Table 1 below. Additionally, routes are expected to adhere to maximums for hours of operation and frequency of service, which are also described in Table 1.

Table 1: Blacksburg Transit Minimum Service Standards

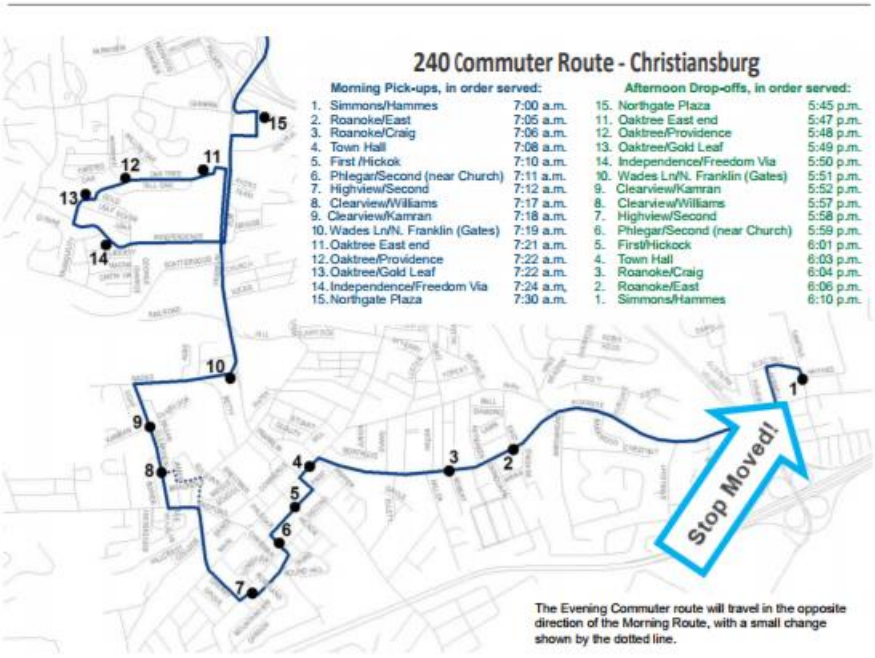
Passengers per Revenue Hour	**Good**	More than 25
	Satisfactory	20-25
	Marginal	15-20
	Unsatisfactory	Less than 15
Passengers per Revenue Mile	**Good**	More than 3.0
	Satisfactory	2.0-3.0
	Marginal	1.0-2.0
	Unsatisfactory	Less than 1.0
Schedule Adherence *(Percent of buses between 0 and 5 minutes late)*	**Good**	More than 90%
	Satisfactory	85%-90%
	Marginal	80%-85%
	Unsatisfactory	Less than 80%
Maximum Span of Service *(Full Service, Fixed Route)*	**Monday-Thursday**	7:00 AM-12:45 AM
	Friday	7:00 AM-2:45 AM
	Saturday	9:30 AM-2:45 AM
	Sunday	11:30 AM-11:30 PM
Maximum Service Frequency	**Peak Hours** *(9:00 AM-4:00 PM weekdays)*	10 - 15 minutes (Fixed Route) 60 – 120 minutes (Community Circulator)
	Off-Peak Hours	30 - 60 minutes (Fixed Route) 60 – 120 minutes (Community Circulator)

BT Commuter

SERVICE DESCRIPTION

The BT Commuter route (shown in Figure 1) operates during weekday rush hours only, serving Christiansburg and Blacksburg via the 460 Bypass. The route travels primarily along Roanoke Street, Clearview Street, Franklin Street, Oaktree Street, the 460 Bypass, Prices Fork Road, West Campus Road, and the Drillfield. There is one trip daily in each direction: a morning rush trip from Christiansburg to Blacksburg, and an evening rush trip from Blacksburg to Christiansburg.

Figure 1: BT Commuter Map



OPERATING CHARACTERISTICS

The route operates once daily in each direction and is intended to move commuters from Christiansburg to Blacksburg in the morning and back in the evening. It operates under both full and reduced schedules but does not operate outside of rush hours or on weekends. Table 2 summarizes the route's operating characteristics.

Table 2: Operating Characteristics

Destination	From		Simmons/Hammes
	To		Blacksburg Municipal Building
Full Service Span	Weekday		7:00 AM – 6:10 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:00 AM – 6:10 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	1 trip per direction per day
		Off-Peak	--
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	1 trip per direction per day
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			13
Key Destinations			Christiansburg, Virginia Tech

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data by stop was not available for this route. With 1.1 passengers per revenue hour, BT Commuter ranks 18th in the system and falls well below the system average of 43.6. The route similarly falls below average in passengers per trip (3), also ranking 18th. The route rates as unsatisfactory by passenger productivity metrics and does not meet system-wide standards for hours of operation or frequency of service. Table 3 summarizes service productivity metrics for BT Commuter.

Table 3: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	Passengers per Trip
Average 43.6 1.1	Average 25.6 3

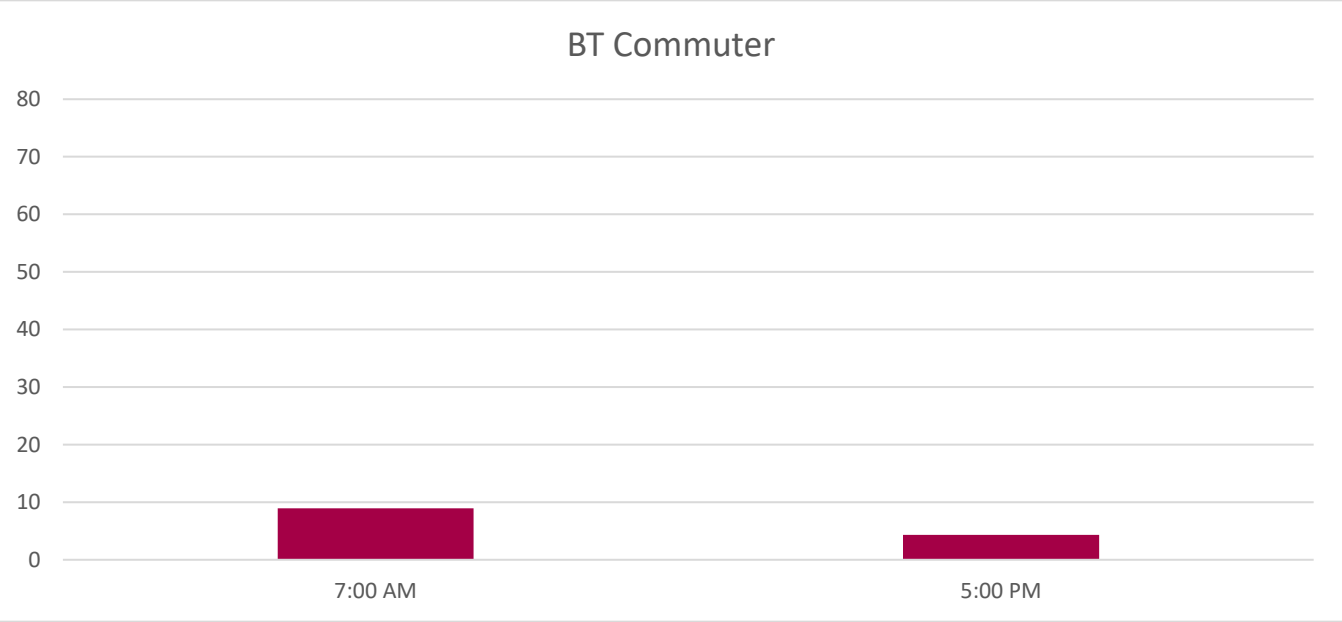
RIDERSHIP

Ridership for Blacksburg Transit routes was examined during April and September 2017 (full service). During this time period, BT Commuter service averaged 13 daily boardings, making it the lowest-performing fixed-route service offered by BT on an absolute basis.

Ridership by Trip

Figure 2 shows the boardings for each trip over the course of a full service day. Ridership in each direction is relatively low, and somewhat higher in the morning than in the afternoon. This may be due to the fact that the BT Commuter's morning run provides the earliest available connection from Christiansburg to Blacksburg, while in the afternoon rush, the combination of the Two Town Trolley and The Explorer provide alternative service from Blacksburg to Christiansburg.

Figure 2: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Only direct service from Blacksburg to Christiansburg.
- First AM service from Blacksburg to Christiansburg.
- Serves major job centers in Blacksburg.
- Serves VT Campus, allowing connections to other routes.

Weaknesses

- Only one round-trip per day.
- Does not serve job centers around the NRV Mall, LewisGale Hospital Montgomery, or the Blacksburg Industrial Park.
- Low ridership and productivity.
- No weekend or off-peak service.

Opportunities

- Consider a year or two pilot program that increases the number of trips to try and grow ridership.

- Realign route to serve the MMTF when it opens.

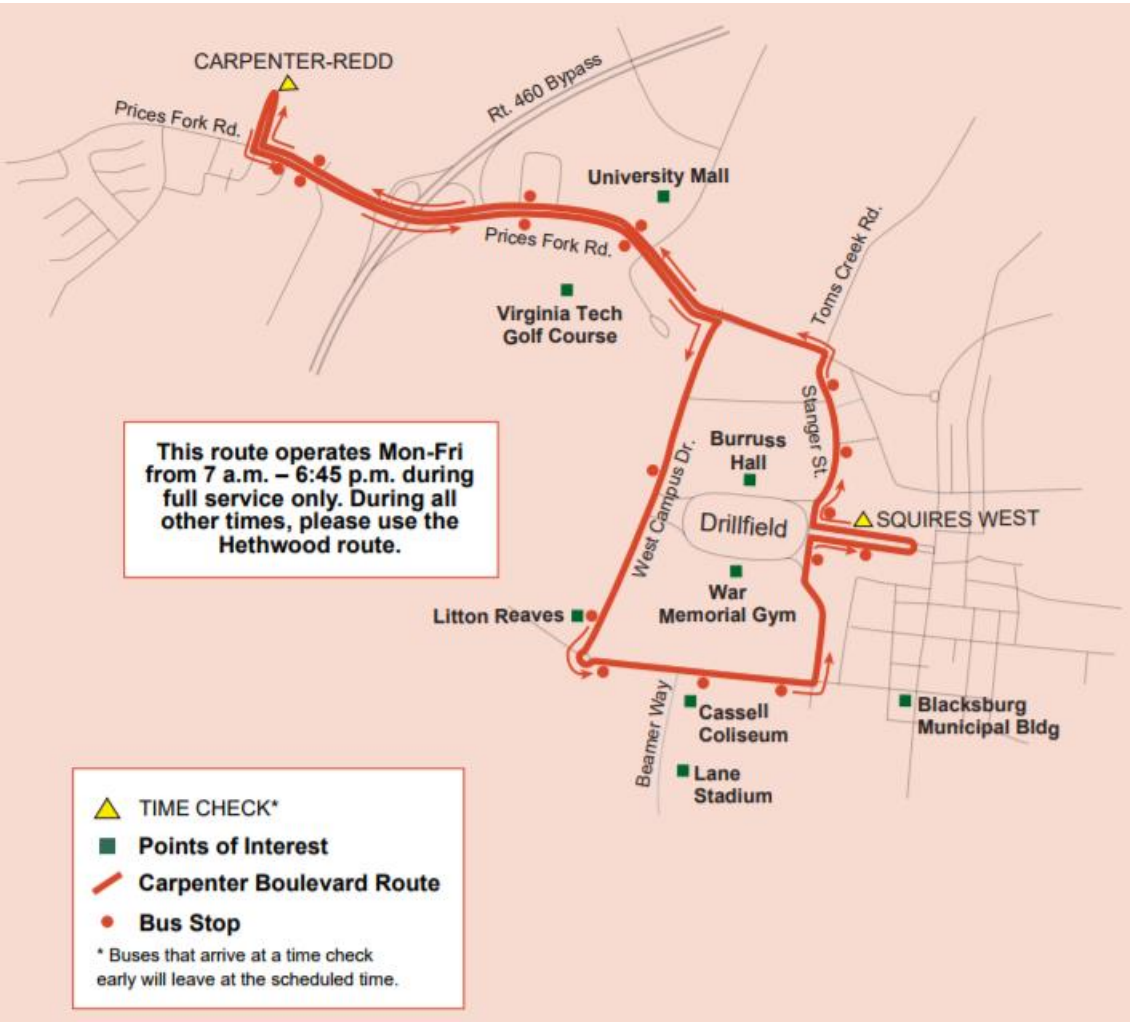
Carpenter Boulevard

SERVICE DESCRIPTION

Carpenter Boulevard (shown in Figure 3) operates on weekdays only during full service, between the Retreat area and Virginia Tech's campus. The route travels primarily along Prince Fork Road, West Campus Drive and Stanger Street. Some segments of Carpenter Boulevard, such as West Campus Drive and Stanger Street, are served in one direction only.

Passengers may transfer between Carpenter Boulevard and other BT fixed-route services at the terminus on the Virginia Tech campus, which is served by all BT routes except The Explorer.

Figure 3: Carpenter Boulevard Map



OPERATING CHARACTERISTICS

The route operates on a half hour frequency from 6:00 am to 6:25 pm every weekday. The route offers connections to all routes excluding The Explorer, and serves a variety of activity generators, including the University Mall, and a variety of locations on the Virginia Tech Campus (e.g. Litton Reaves, Cassell Coliseum). It operates during full service

weekdays only, providing no service on weekends or during reduced service. Table 4 summarizes Carpenter Boulevard's operating characteristics.

Table 4: Operating Characteristics

Destination	**From**		Squires West
	To		Redd Circle (The Retreat)
Full Service Span	**Weekday**		7:00 AM – 6:25 PM
	Saturday		--
	Sunday		--
Reduced Service Span	**Weekday**		--
	Saturday		--
	Sunday		--
Full Service Frequency	**Weekday**	**Peak**	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Reduced Service Frequency	**Weekday**	**Peak**	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			480
Key Destinations			Virginia Tech, University Mall, The Retreat

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected in April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 29.9 passengers per revenue hour, Carpenter Boulevard ranks 13th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (19.6), ranking 12th. Carpenter Boulevard's on-time rate is 87.8 percent, ranking 12th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and satisfactory by schedule adherence metrics. It does not exceed system-wide standards for hours of operation, service levels, or frequency of service. Table 5 summarizes service productivity metrics for Carpenter Boulevard.

Table 5: Service Productivity Metrics

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 29.9	Average 90% — 87.75%

Passengers per Trip
Average 25.6 — 19.6

RIDERSHIP

Carpenter Boulevard averages 480 passengers per weekday (ranking 13th out of 15 BT fixed route services) over 24 trips.

Ridership by Stop

Figure 4 and Figure 5 summarize total activity (boardings and alightings) by stop for this route during full service. Boardings are highest at the two ends of the route, at Squires West and Redd/Carpenter. Alightings are highest at Redd/Carpenter, as well as at two locations on campus: Newman Library and Wright House.

Figure 4: Ridership by Stop

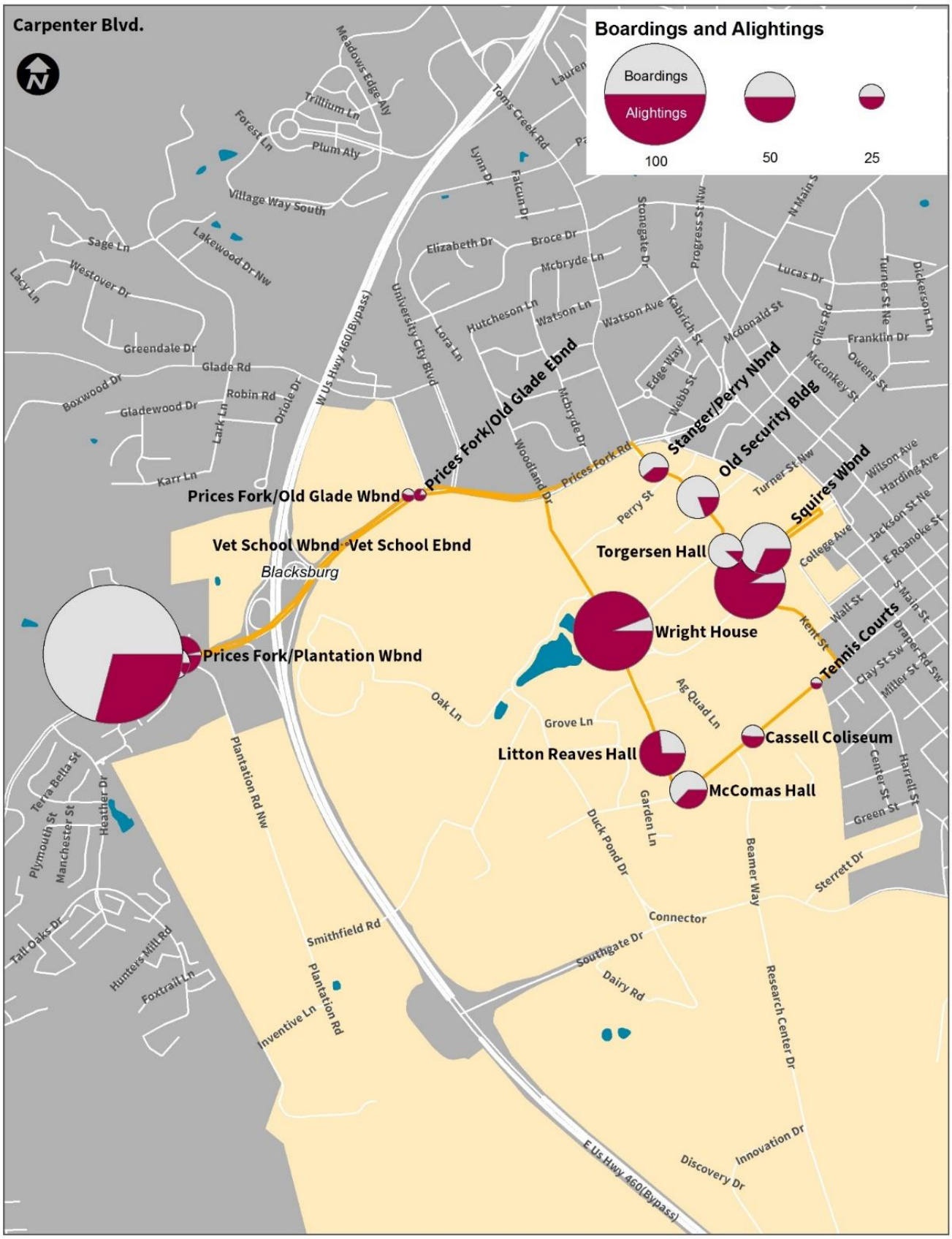
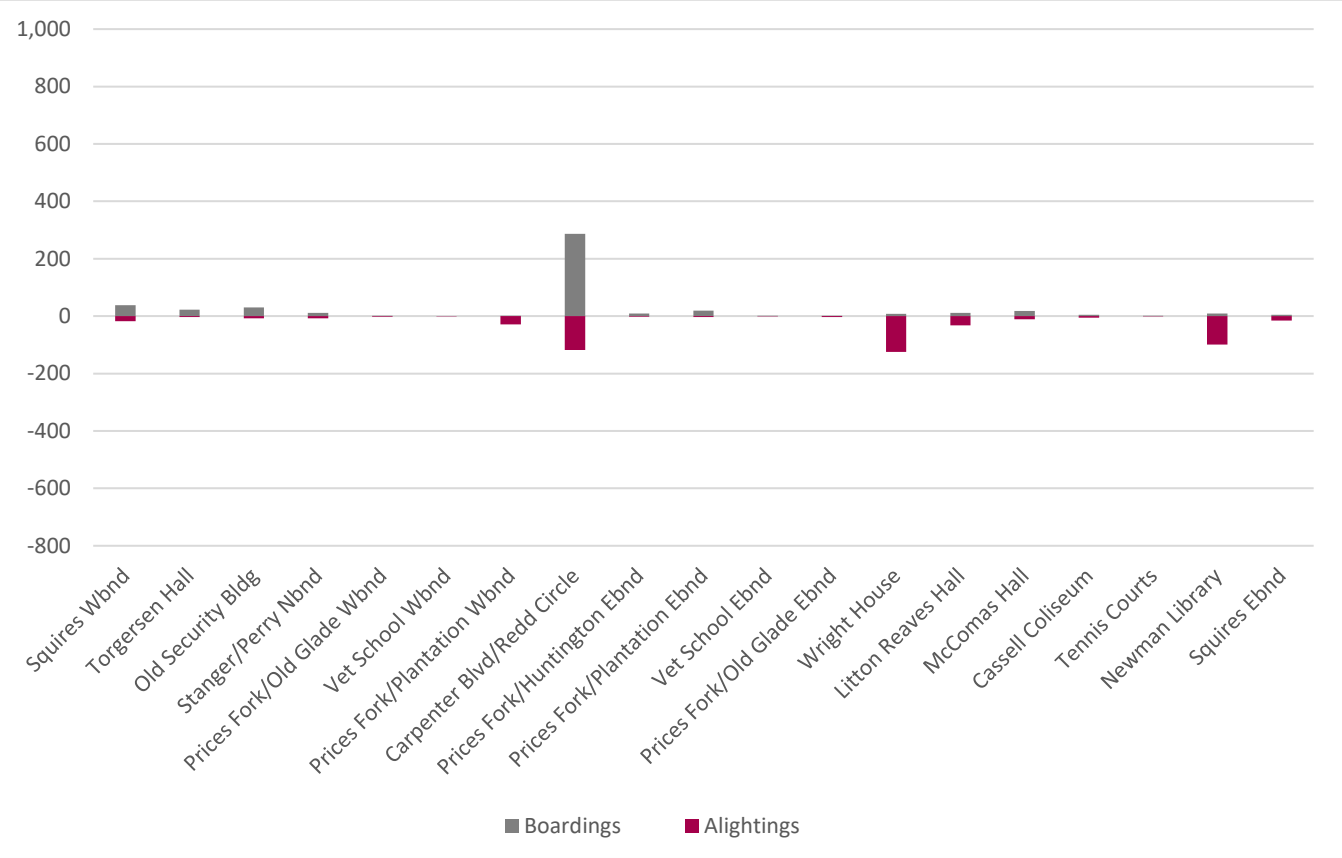


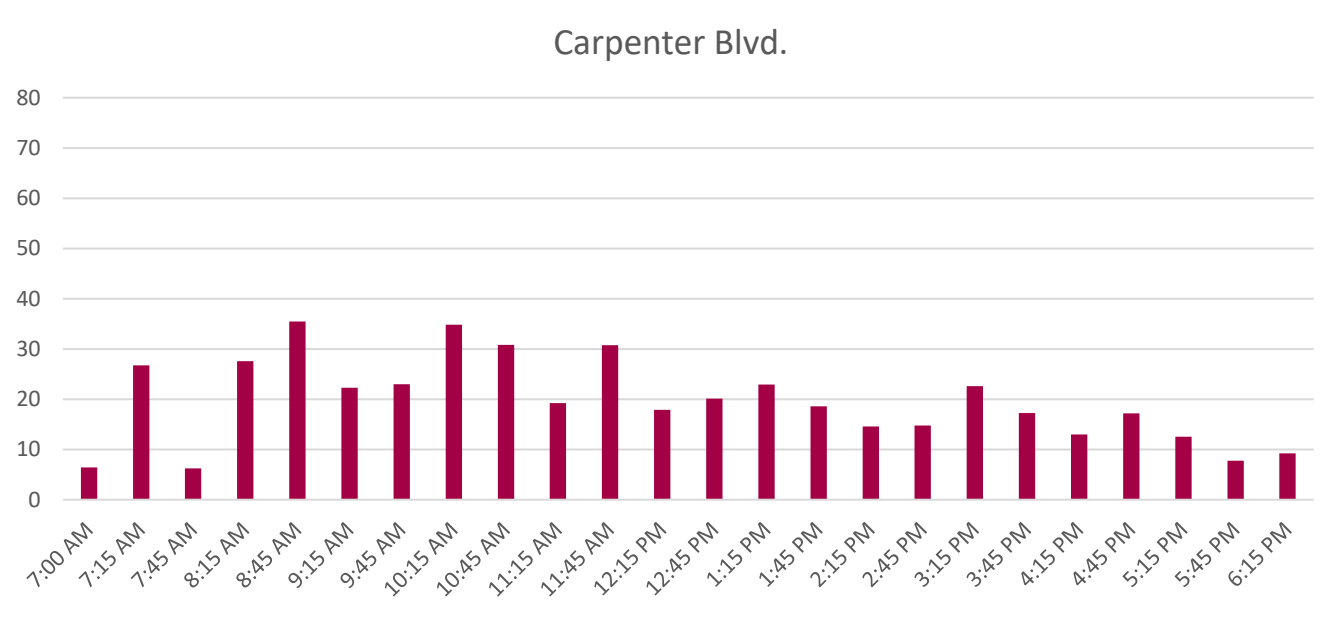
Figure 5: Boardings and Alightings by Stop



Ridership by Trip

Figure 6 shows the boardings for each trip over the course of a full service day. Ridership is higher in the mornings than in the afternoons: all four of the highest ridership trips—the only four trips with more than 30 passengers—operate in the morning. Of the 13 afternoon trips, only two see more than 20 passengers.

Figure 6: Ridership by Trip



SUMMARY OF OBSERVATIONS

Strengths

- The only route to serve Redd/Carpenter (The Retreat), a location with established transit demand.
- Easy-to-remember clock-face frequency.
- Multiple connection opportunities on the Virginia Tech campus.
- Provides additional service to University Mall and the Prices Fork Road corridor to help relieve overcrowding on the Hethwood routes.

Weaknesses

- Low frequency.
- No weekend or reduced service trips.
- Low ridership and productivity.
- Most of the route is duplicative of other services with higher ridership.

Opportunities

- Consider realigning route to use Plantation Way (the "back way" into the Virginia Tech campus), as this would provide a more convenient stop location for Smiths Landing residents, and would provide service between the Duck Pond commuter lot and the center of campus.
- Consider realigning route to use the new roadway slated for construction between Prices Fork Road and Southgate Drive.
- Consider a future extension of the route further west to serve new developments west of Blacksburg High School and in Prices Fork Village.
- Realign route to serve the MMTF when it opens.

CRC Shuttle

SERVICE DESCRIPTION

The CRC Shuttle (shown in Figure 7) operates on weekdays only between Newman Library and Knollwood, via the Corporate Research Center and the Industrial Park. The route travels primarily along the Drillfield, Washington Street, Beamer Way, Tech Center Drive, Pratt Drive, Kraft Drive, and Industrial Drive. Some segments of Research Center Drive and Kraft Drive are served in one direction only. Research Center Drive south of Kraft Drive and Industrial Drive are not served during full service after 7:00 pm. While there is no fixed-route service on Saturdays, demand-responsive service is offered on this route on Saturdays during full service.

Passengers may transfer between the CRC and other services at the Virginia Tech campus, which is served by all BT routes except The Explorer.

Figure 7: CRC Shuttle Map

OPERATING CHARACTERISTICS

During full service, the route operates every 20 minutes from 6:45 am to 10:00 pm, with parts of the route not being offered after 7:00 pm, as described in the previous section. During reduced service, the route operates every 40 minutes from 7:05 am until 6:30 pm. The route offers connections to all routes excluding The Explorer. It provides a connection from the VT Campus to the Corporate Research Center, the Industrial Park, and the Virginia Tech Airport. Table 6 summarizes the route's operating characteristics.

Table 6: Operating Characteristics

Destination	From		Newman Library
	To		Knollwood
Full Service Span	Weekday		6:50 AM – 10:00 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:05 AM – 6:30 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	45
		Off-Peak	45
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			823
Key Destinations			Virginia Tech, Corporate Research Center, Virginia Tech Airport, Blacksburg Transit, Virginia Tech Transportation Institute

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 19.8 passengers per revenue hour, Corporate Research Center ranks 15th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (13), ranking 16th. Corporate Research Center's on-time rate is 94.2 percent, ranking 4th and falling above the weekday system average. The route rates as satisfactory by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation but does meet them for frequency of service during both peak and off-peak hours. Table 7 summarizes service productivity metrics for Corporate Research Center.

Table 7: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6; 19.8	Average 90%; 94.16%

Passengers per Trip
Average 25.6; 13

RIDERSHIP

The CRC Shuttle averages 823 passengers per weekday, ranking 11th of 15 BT fixed-route services over 43 trips.

Ridership by Stop

Figure 8 and Figure 9 summarize total activity (boardings and alightings) by stop during full service. The most common origin stops for CRC Shuttle riders are at Burruss Hall and Newman Library on the Virginia Tech campus, and North Knollwood in the Research Center, while alightings are most common at Newman Library, with other common destinations for riders including other on-campus stops and the Knowledgeworks 1 building.

Figure 8: Ridership by Stop

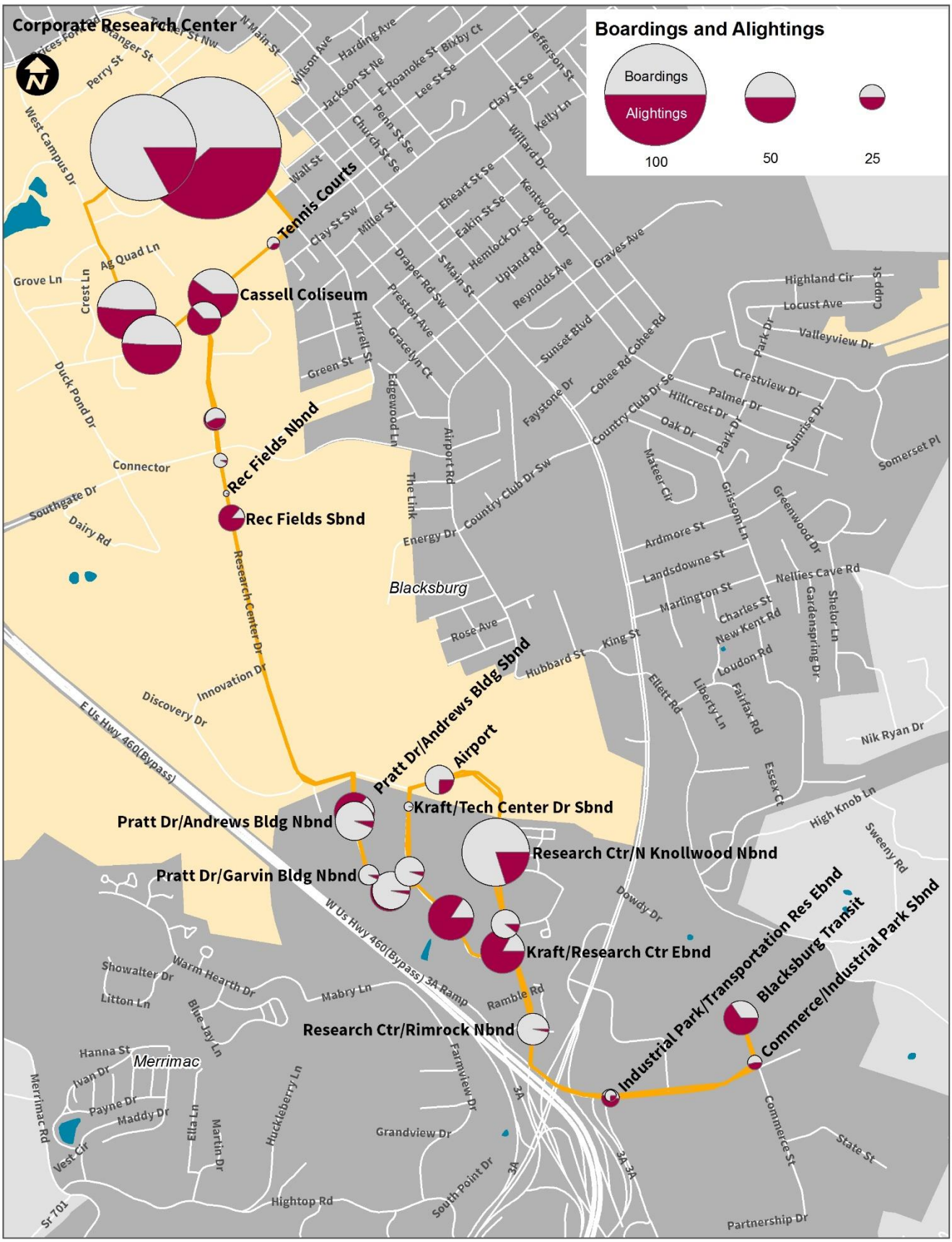
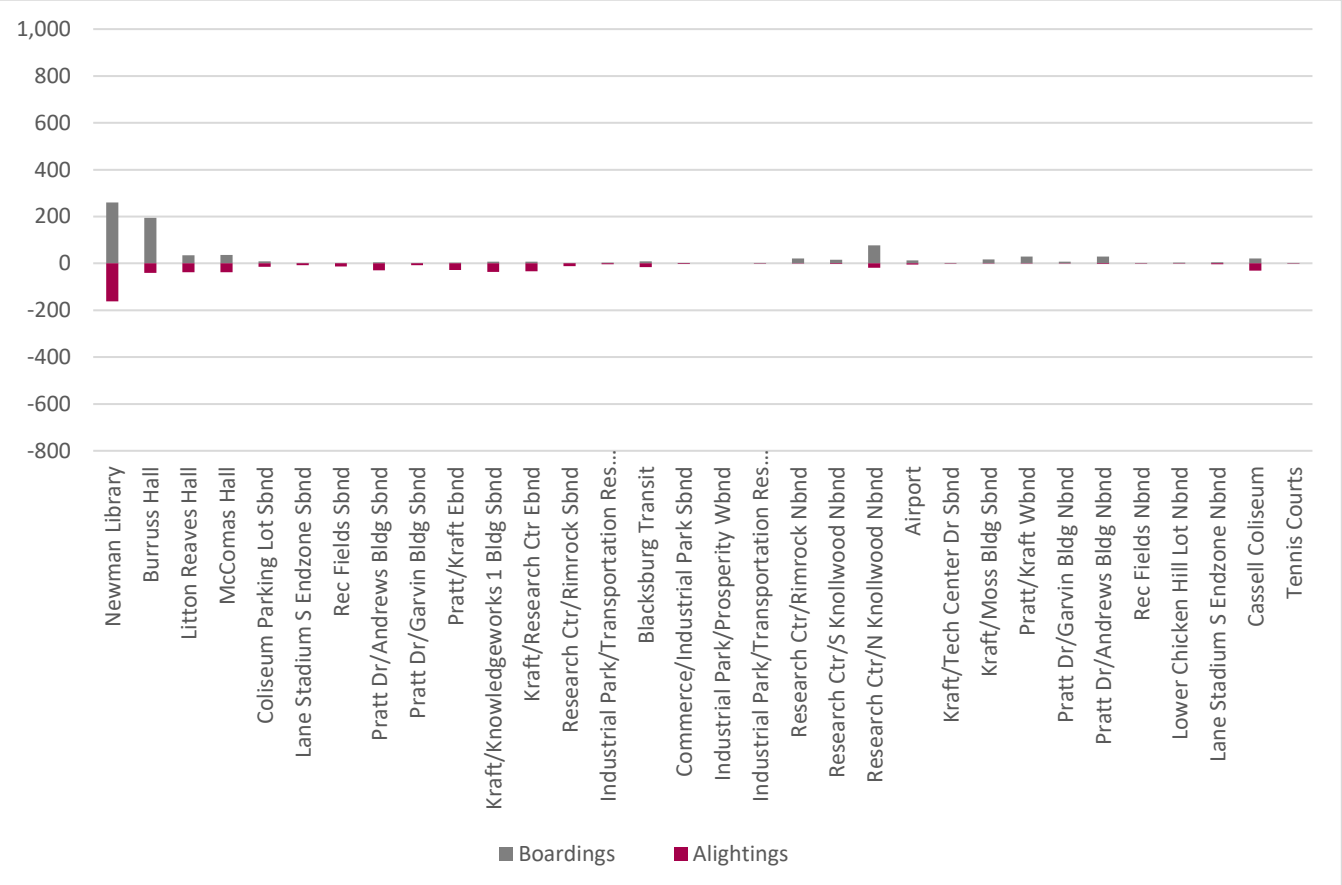


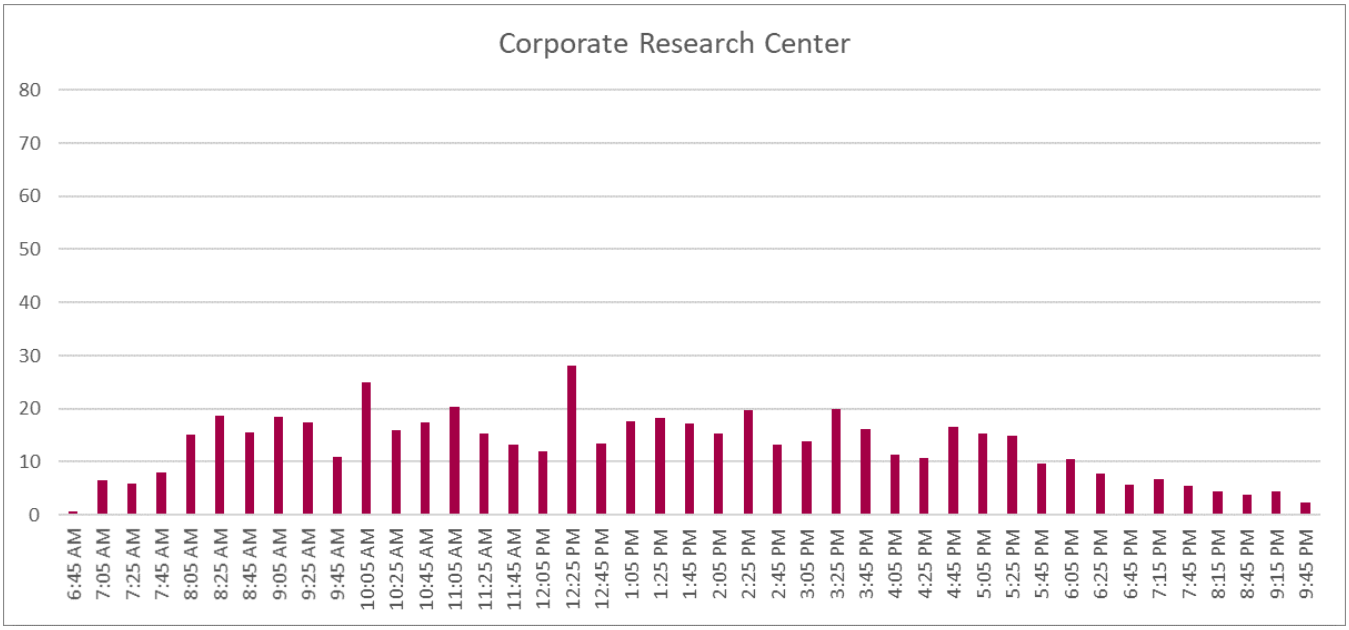
Figure 9: Boardings and Alightings by Stop



Ridership by Trip

Figure 10 shows the boardings for each trip over the course of a full service day. The most highly-used trips are found in the late morning and early afternoon with the highest-ridership trip taking place at 12:25 pm, with 28 daily boardings recorded. Only one other trip, the 10:05 am trip, saw more than 20 passengers. Ridership after 6:05 pm is low with no trip recording more than eight boardings.

Figure 10: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Only route serving the Corporate Research Center, the Airport, or the Blacksburg Industrial Park – all major employers.
- Extensive span of service (6:45 am – 10:00 pm) during full service.
- Multiple connection opportunities at the Virginia Tech campus.

Weaknesses

- Portions of route with one-way service make accessing the bus less convenient for riders.
- Limited weekend service.
- Low frequencies during reduced service.
- Relatively low ridership and productivity.

Opportunities

- Realign route to Innovation Drive, as this area has new growth in businesses.
- Realign route to serve the MMTF when it opens.
- Consider an extension of the route into the Merrimac area.

Harding Avenue

SERVICE DESCRIPTION

Harding Avenue (shown in Figure 11) operates as a standalone route on weekdays only, running from Squires East to Ascot Lane/Hampton Court. The route travels primarily along the Drillfield, Alumni Mall, Main Street, Roanoke Street, Harding Avenue, and Ascot Lane. On late nights and weekends, this service is combined with the Hethwood route in public-facing timetables.

Passengers may transfer between Harding Avenue and other BT fixed-route services at the terminus on the Virginia Tech campus, which is served by all BT routes except The Explorer.

Figure 11: Harding Avenue Map

OPERATING CHARACTERISTICS

As a standalone route, Harding Avenue service operates from 7:00 am to 9:45 pm on weekdays during full service, running every 15 minutes from start of service until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. During reduced service, it operates every 30 minutes from 7:00 am until 9:55 pm. The route offers connections to all other routes excluding The Explorer. Its primary purpose is to connect the student housing complexes on Ascot Lane to the VT campus. Table 8 summarizes the route's operating characteristics.

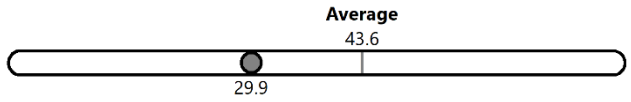
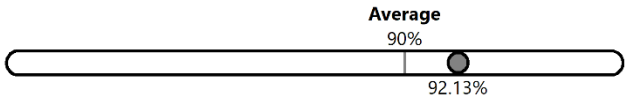
Table 8: Operating Characteristics

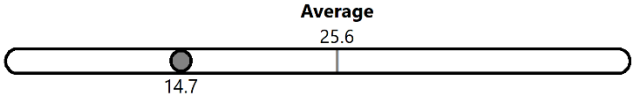
Destination	From		Squires East
	To		Ascot Lane/Hampton Court
Full Service Span	Weekday		7:00 AM – 9:45 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:00 AM – 9:55 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15/30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			449
Key Destinations			Virginia Tech

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 29.9 passengers per revenue hour, Harding Avenue ranks 14th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (14.7), ranking 15th. Harding Avenue's on-time rate is 92.1 percent, ranking 7th and falling above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation (the combined Hethwood-Harding route continues service however) but does meet them for frequency of service during both peak and off-peak hours. Table 9 summarizes service productivity metrics for Harding Avenue.

Table 9: Service Productivity Metrics

Passengers per Revenue Hour	On-Time Performance
	

Passengers per Trip


RIDERSHIP

Harding Avenue averages 1,089 passengers per weekday (ranking 11th out of 15 BT Blacksburg services) over 61 trips. (Note that this includes weekday late-night trips served by the Hethwood-Harding Combined service: while these trips are combined in public schedules, their ridership statistics are tracked separately. The Harding Avenue route alone average 449 passengers per weekday).

Ridership by Stop

Figure 12 and Figure 13 summarize total boardings and alightings by stop during full service. The stops that see the most boardings are Squires East on the Virginia Tech campus, and Ascot/Hampton in the middle of the student housing complex. Alightings are most frequent at Ascot/Hampton, as well as at Squires West and Burruss Hall at Virginia Tech.

Figure 12: Ridership by Stop

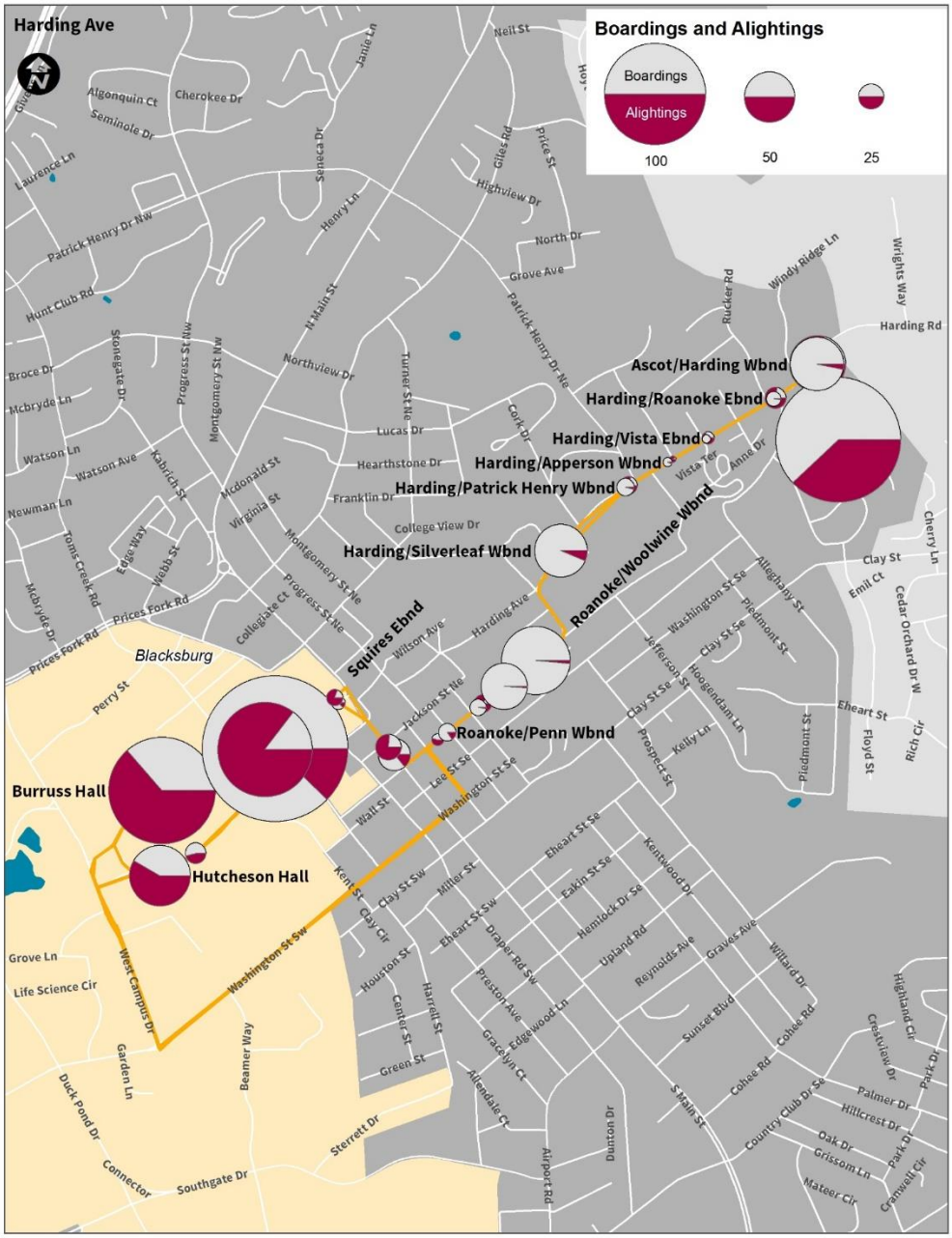
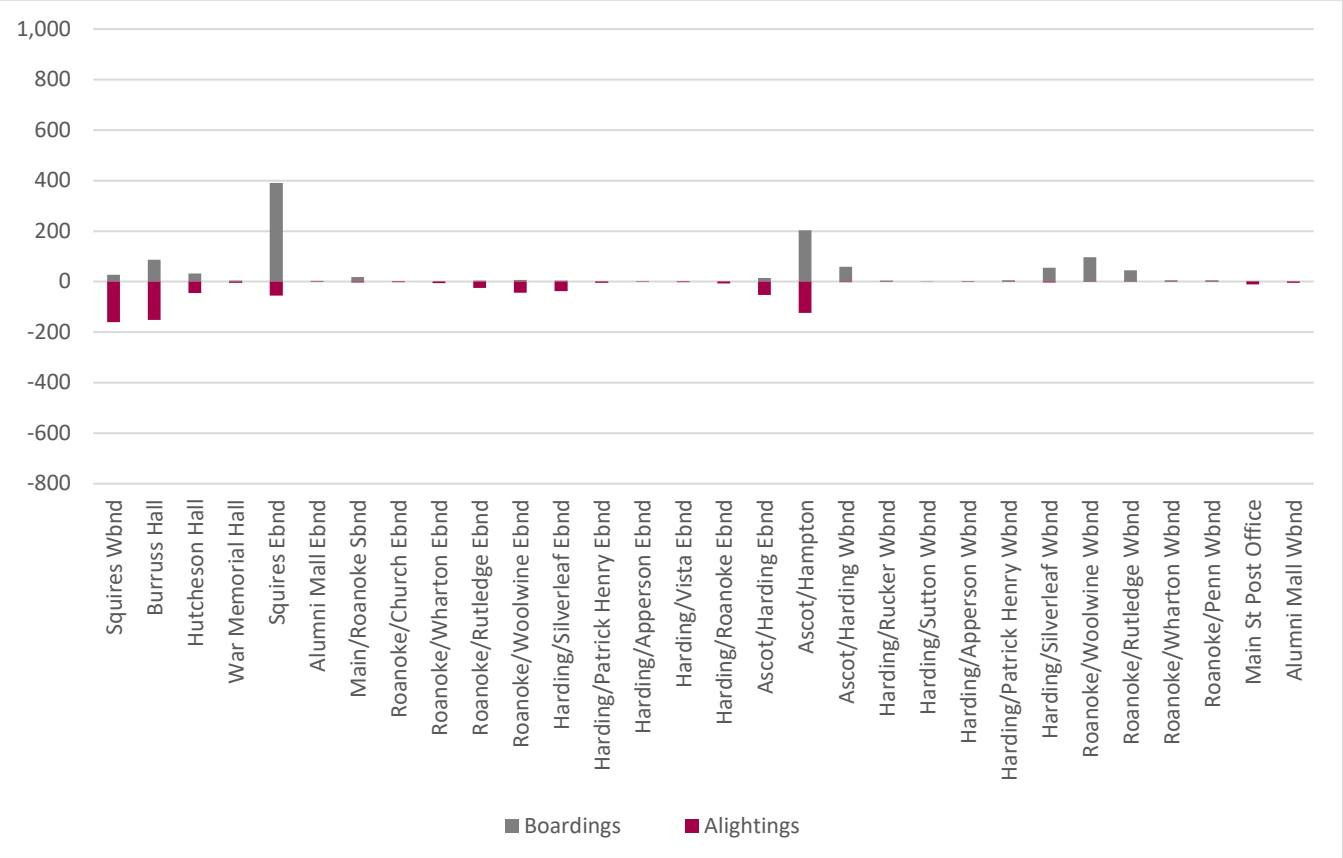


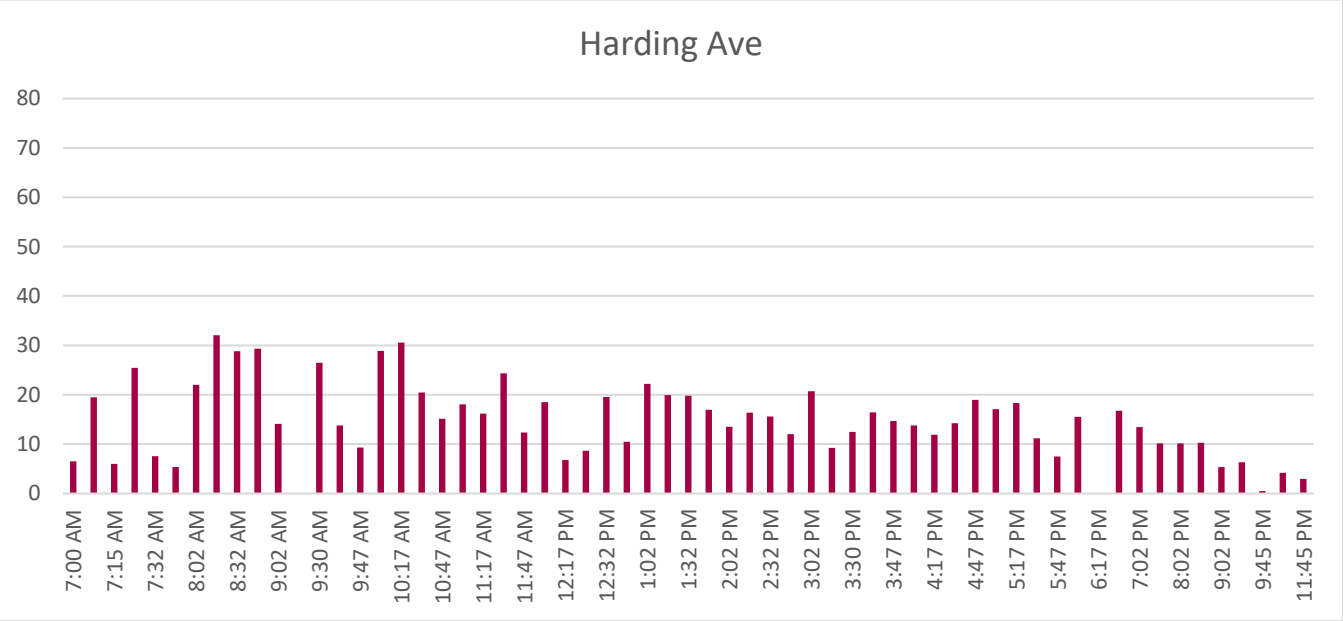
Figure 13: Boardings and Alightings by Stop



Ridership by Trip

Figure 14 shows the boardings for each trip over the course of a full service day. Ridership is highest in the morning, reaching a peak of 32 riders at 8:17 am. Afternoon ridership is generally between 10 and 20 riders per trip, while no trip after 7:02 pm sees more than 10 riders.

Figure 14: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Provides important service for Virginia Tech students to get to campus.
- Frequent all-day service.
- Multiple connection opportunities on the Virginia Tech campus.

Weaknesses

- Relatively low ridership and productivity.
- Night and weekend combination with Hethwood service could be confusing to new riders.

Opportunities

- Realign route to serve the MMTF when it opens.

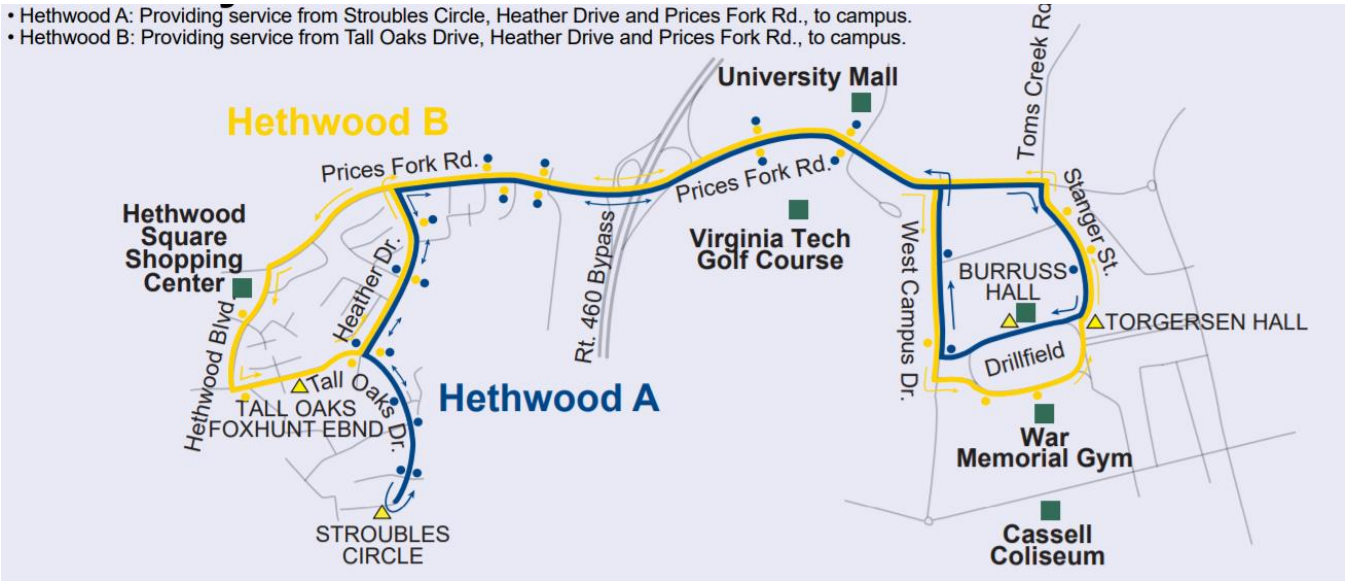
Hethwood A

SERVICE DESCRIPTION

Hethwood A (shown in Figure 15) operates as a separate service on weekdays only, between Burruss Hall and Stroubles Circle. The route travels primarily along the Drillfield, West Campus Drive, Prices Fork Road, Heather Drive, Tall Oaks Drive, and Stanger Street. Segments of the route on Stanger Street and West Campus Drive operate in one direction only. During nights and weekends, the route is combined with Hethwood B and Harding Avenue as a single route.

Passengers may transfer between Hethwood A and other services on the Virginia Tech campus, which is served by every BT route except The Explorer.

Figure 15: Hethwood A Map



OPERATING CHARACTERISTICS

During full service, Hethwood A operates from 7:00 am to 9:30 pm. It operates every 10 minutes from start of service until 5:45 pm, every 15 minutes from 5:45 pm to 6:45 pm, and every 30 minutes from then until end of service. During reduced service, it operates every 30 minutes from 7:00 am until 6:30 pm. The route offers connections to all routes excluding The Explorer. It serves the Virginia Tech Campus, University Mall, and some of the student housing complexes in the Hethwood area. Table 10 summarizes Hethwood A's operating characteristics.

Table 10: Operating Characteristics

Destination	From		Burruss Hall
	To		Stroubles Circle
Full Service Span	Weekday		7:00 AM – 9:30 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:00 AM – 6:30 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	10/15
		Off-Peak	10/30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			1,845
Key Destinations			Virginia Tech, University Mall

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 56.2 passengers per revenue hour, Hethwood A ranks 8th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (31.8), also ranking 8th. Hethwood A's on-time rate is 87 percent, ranking 13th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and satisfactory by schedule adherence metrics. It does not meet system-wide standards for hours of operation (however the route continues as the Hethwood-Harding combined route) but does meet them for frequency of service during both peak and off-peak hours. Table 11 summarizes service productivity metrics for Hethwood A.

Table 11: Service Productivity Metrics

Passengers per Revenue Hour	On-Time Performance
Average 43.6 / 56.2	Average 90% / 87%

Passengers per Trip
Average 25.6 / 31.8

RIDERSHIP

Hethwood A averages 1,845 passengers per weekday (ranking 4th of 15 Blacksburg services) over 72 trips.

Ridership by Stop

Figure 16 and Figure 17 summarize total boardings and alightings by stop during full service. Boardings are highest at Burruss Hall on the VT campus and at Tall Oaks/Copper Croft in the Hethwood area. Alightings are highest at Stanger and Old Turner and Burruss Hall on the Virginia Tech campus, and at Tall Oaks/Colonial and Tall Oaks/Foxtrail in the Hethwood area.

Figure 16: Ridership by Stop

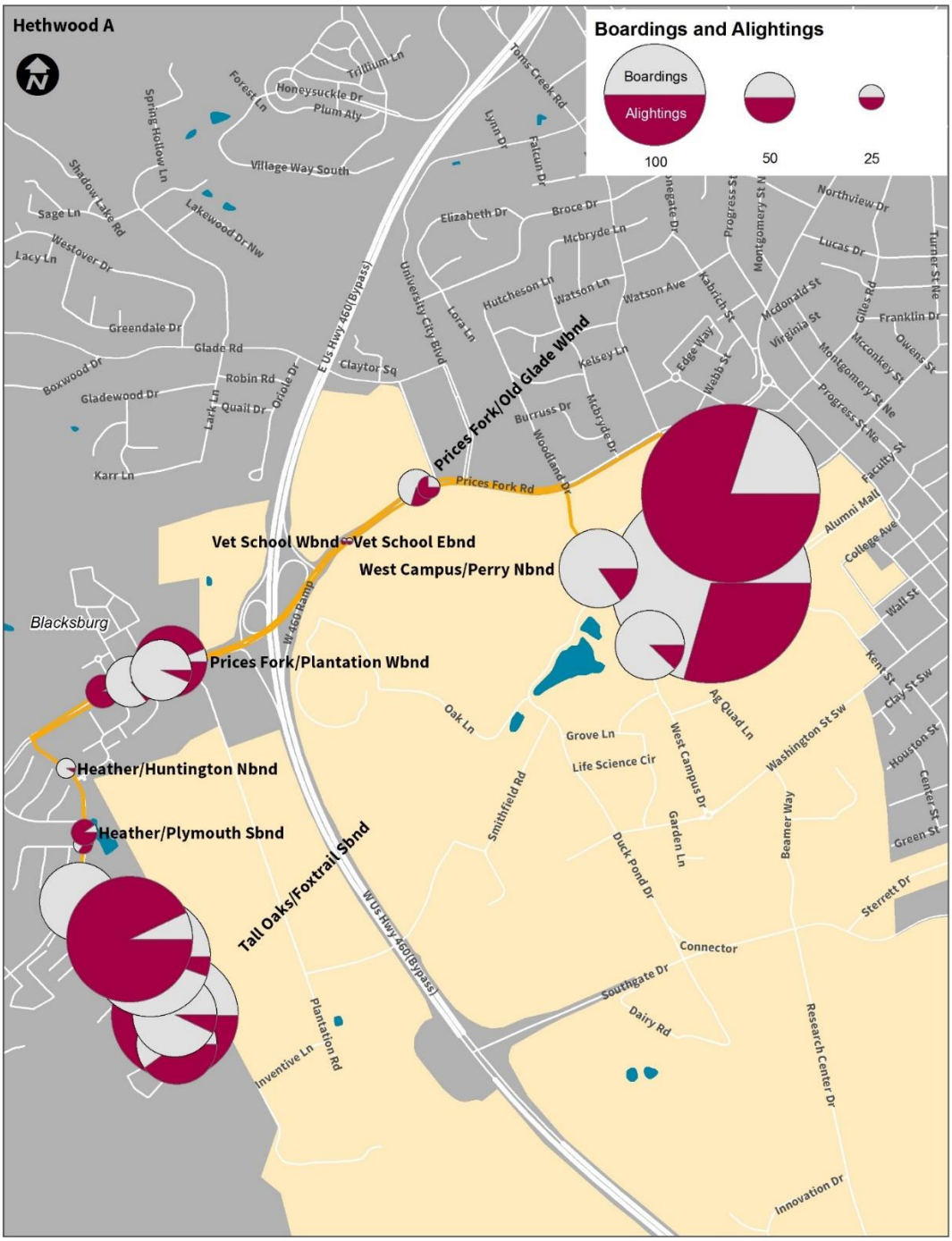
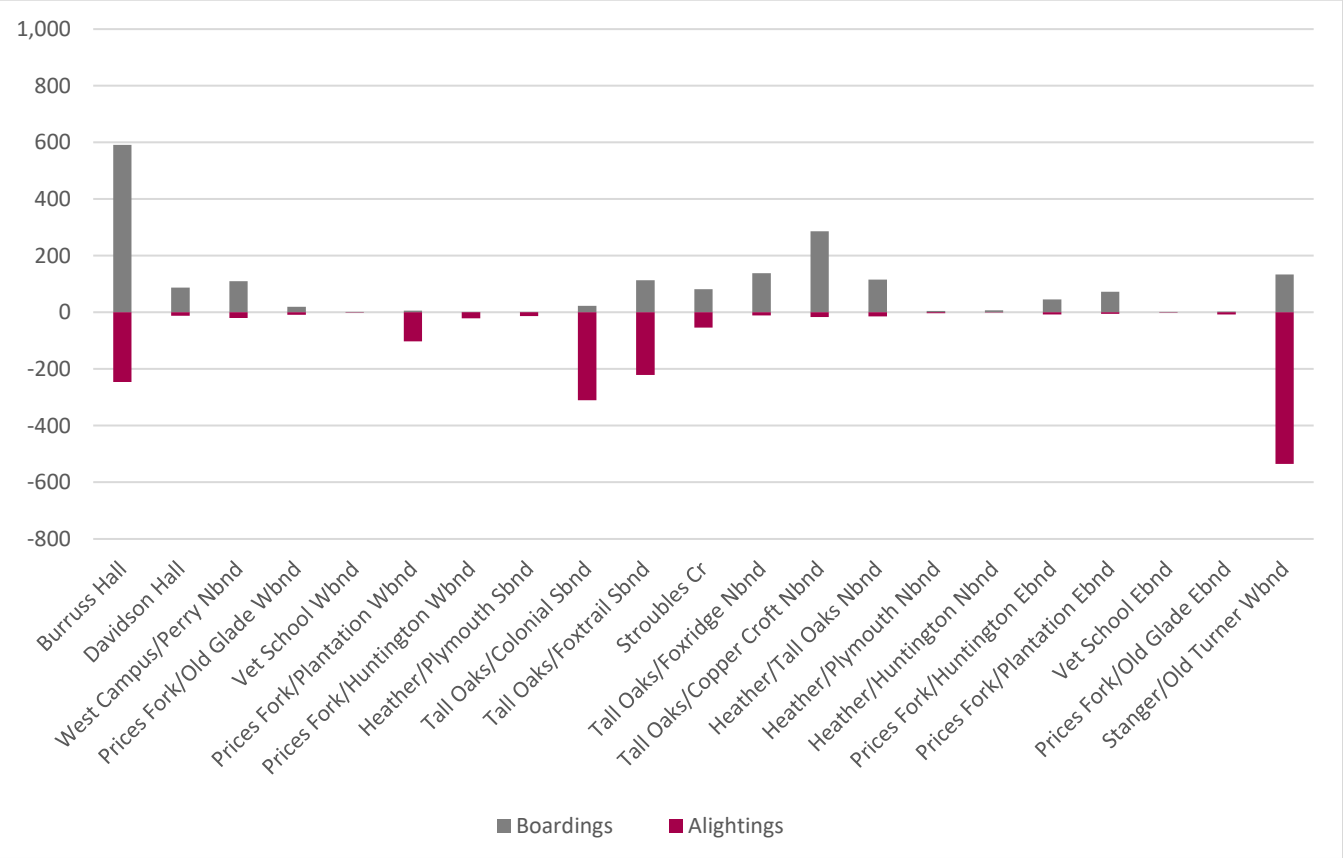


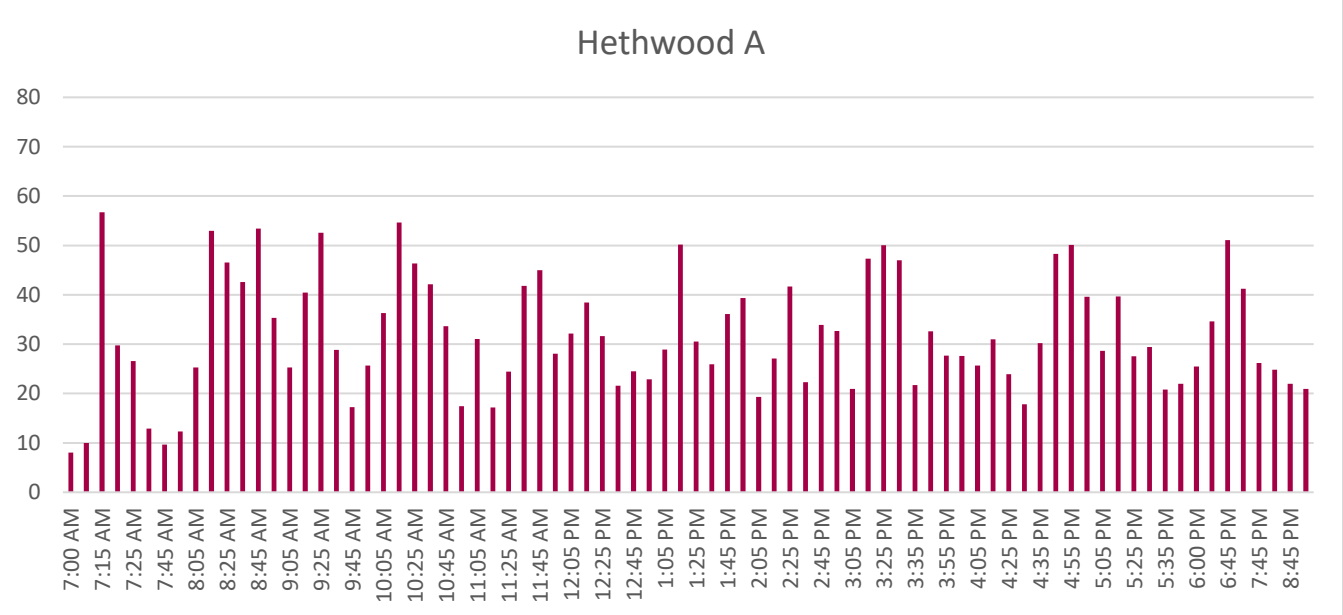
Figure 17: Boardings and Alightings by Stop



Ridership by Trip

Figure 18 shows the boardings for each trip over the course of a full service day. While ridership is highest in the morning, ridership also remains high all day. The highest-ridership trip, at 7:15 am, sees 57 riders per day, though there are trips with ridership above 50 as late as 6:45 pm and trips at or near that level of ridership throughout the day.

Figure 18: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Relatively high ridership and productivity.
- Frequent all-day service between dense student apartment complexes and Virginia Tech.
- Serves key destinations, including University Mall.
- Provides connections to other services at Virginia Tech.

Weaknesses

- Hethwood-Harding combination service on late nights and weekends could be confusing to new riders.
- Limited service during reduced service periods.
- Below average on-time performance, likely due to traffic congestion on the Prices Fork Road corridor.

Opportunities

- Increase frequencies between 8:00 am and 11:00 am during full service weekdays.
- Realign route to serve the MMTF when it opens.
- Consider realigning route to enter the VT campus via the new road slated for future construction between Prices Fork Road and Southgate Drive. This would also help avoid congestion on Prices Fork Road.

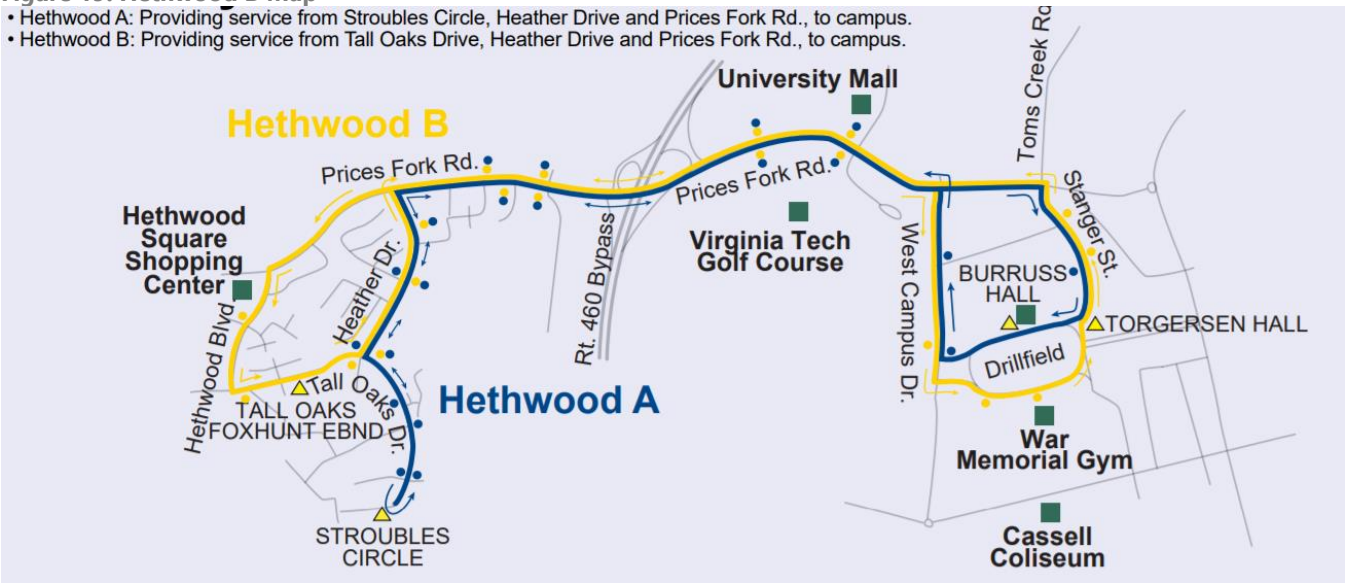
Hethwood B

SERVICE DESCRIPTION

Hethwood B (shown in Figure 19) operates on weekdays only, between Torgersen Hall and Tall Oaks/Foxhunt. The route travels primarily along Stanger Street, Prices Fork Road, Hethwood Boulevard, Tall Oaks Drive, Heather Drive, West Campus Drive, and the Drillfield. Except for a section of the route on Prices Fork Road, much of this service operates as a one-way loop. During nights and weekends, this service operates in combination with Hethwood A and Harding Avenue.

Passengers may transfer between Hethwood B and other services on the Virginia Tech Campus, which is served by every BT route except The Explorer.

Figure 19: Hethwood B Map



OPERATING CHARACTERISTICS

During full service, Hethwood B operates from 7:00 am to 9:30 pm It operates every 15 minutes from start of service until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. During reduced service, it operates every 30 minutes all day, from 7:00 pm to 6:30 pm. The route offers connections to all BT routes except The Explorer. It serves key destinations, including the Virginia Tech campus, University Mall, and the Hethwood Square shopping center. Table 12 summarizes Hethwood B's operating characteristics.

Table 12: Operating Characteristics

Destination	From		Torgerson Hall
	To		Tall Oaks/Foxhunt
Full Service Span	Weekday		7:00 AM – 9:30 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:00 AM – 6:30 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15/30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			1,808
Key Destinations			Virginia Tech, University Mall, Hethwood Square

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 60.5 passengers per revenue hour, Hethwood B ranks 6th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (34), also ranking 6th. Hethwood B's on-time rate is 91.9 percent, ranking 10th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation (though it does continue as the Hethwood-Harding combined route) but does meet them for frequency of service during both peak and off-peak hours. Table 13 summarizes service productivity metrics for Hethwood B.

Table 13: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 60.5	Average 90% — 91.9%

Passengers per Trip
Average 25.6 — 34

RIDERSHIP

Hethwood B averages 1,808 passengers per weekday (ranking 6th of 15 Blacksburg services) over 52 trips.

Ridership by Stop

Figure 20 and Figure 21 summarize total boardings and alightings by stop during full service. The most common places for both boarding and alighting are Torgersen Hall on the VT campus, and Tall Oaks/Foxhunt in the Hethwood area. Other places with relatively high numbers of boardings include the Old Security Building, Hethwood Square, and Tall Oaks/Hethwood, while other common places to alight include Wright House, Prices Fork/Plantation, and Hethwood Square.

Figure 20: Ridership by Stop

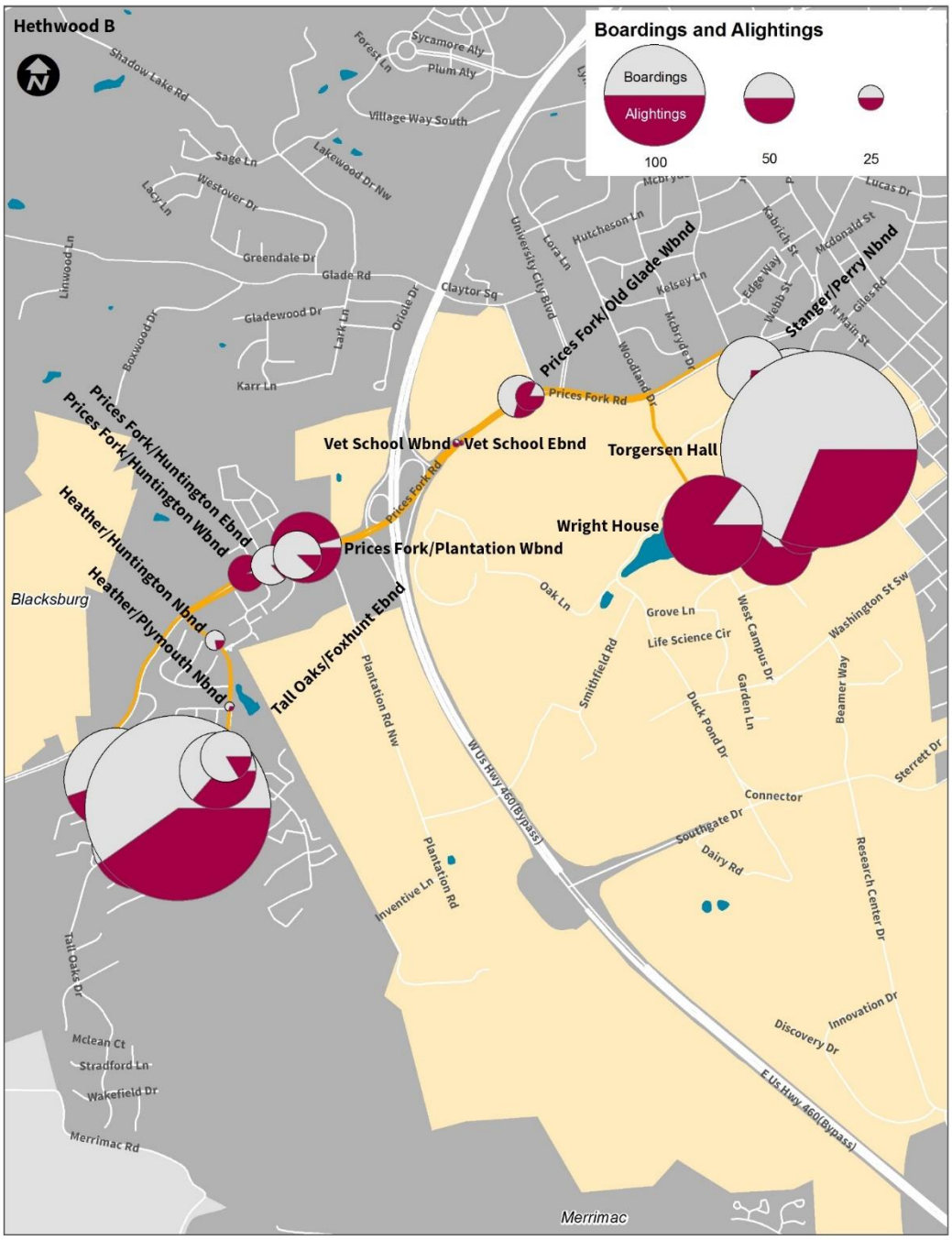
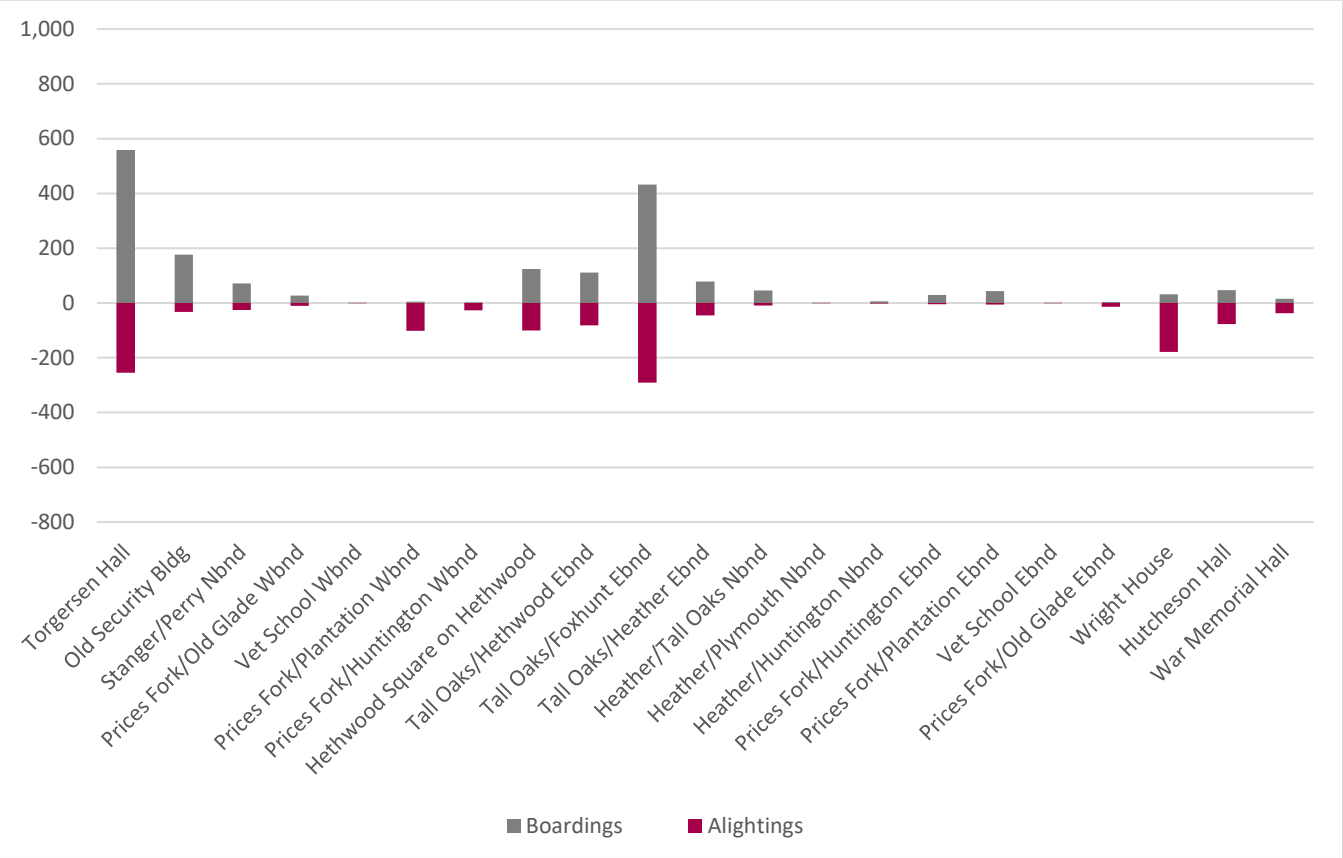


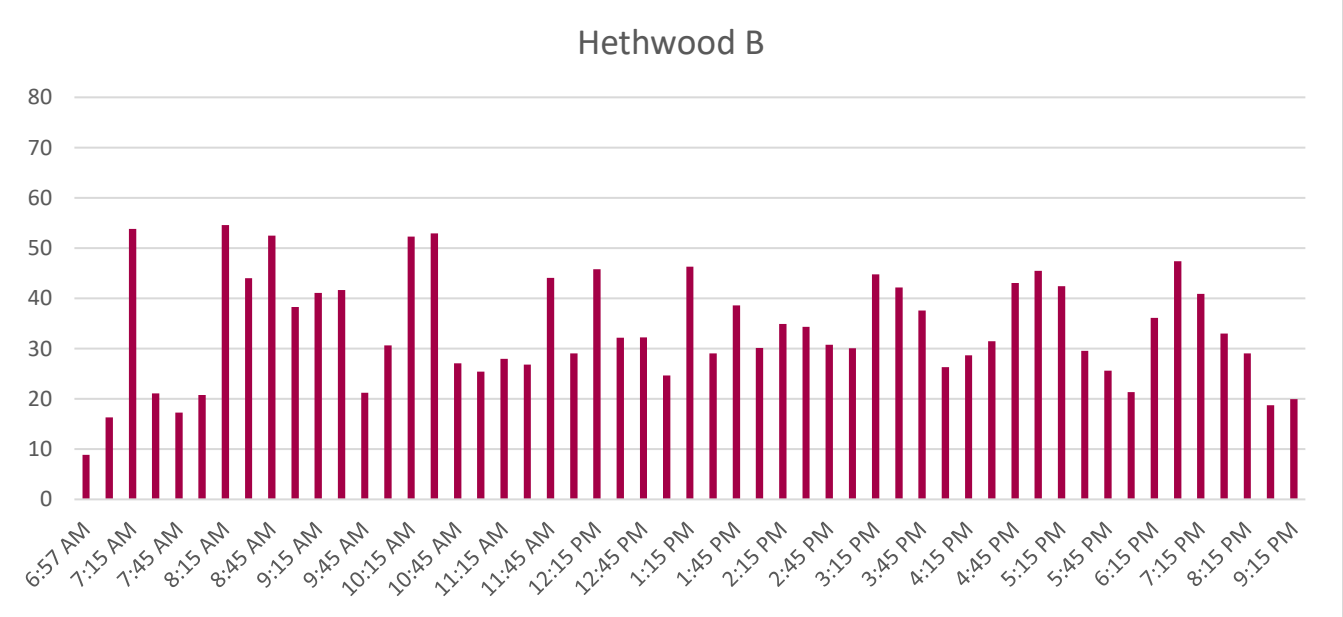
Figure 21: Boardings and Alightings by Stop



Ridership by Trip

Figure 22 shows the boardings for each trip over the course of a full service day. Ridership levels are highest in the morning, with all trips over 50 passengers taking place between 7:15 am and 10:30 am, peaking at 55 passengers at 8:15 am. There is still significant ridership on afternoon trips, with passenger per trip figures between 30 and 50 seen until 8:15 pm.

Figure 22: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Relatively high ridership and productivity.
- Frequent all-day service between dense student apartment complexes and Virginia Tech.
- Serves key destinations, including University Mall.
- Provides connections to other services at Virginia Tech.

Weaknesses

- Hethwood-Harding combination service on late nights and weekends could be confusing for new riders.
- Limited service during reduced service periods.
- Below average on-time performance, likely due to traffic congestion on the Prices Fork Road corridor.

Opportunities

- Increase frequencies between 8:00 am and 11:00 am during full service weekdays.
- Realign route to serve the MMTF when it opens.
- Consider realigning route to enter the VT campus via the new road slated for future construction between Prices Fork Road and Southgate Drive. This would also help avoid congestion on Prices Fork Road.
- Consider a future extension of the route further west to serve new development west of Blacksburg High School and near Prices Fork Village.

Hethwood-Harding Combined

SERVICE DESCRIPTION

The Hethwood-Harding Combined Route (shown in Figure 23) operates nights and weekends only, from Squires East to Stroubles Circle via Ascot Lane and Burruss Hall. The route travels primarily along Roanoke Street, Harding Ave, the Drillfield, Stanger Street, West Campus Drive, Prices Fork Road, Hethwood Boulevard, Tall Oaks Drive, and Heather Drive. Some segments of the route, including segments on Stanger Street, West Campus Drive, Prices Fork Road, Hethwood Boulevard, Tall Oaks Drive, and Heather Drive, operate in one direction only.

Passengers may transfer to all other BT routes except The Explorer on the Virginia Tech campus.

Figure 23: Hethwood-Harding Route Map

OPERATING CHARACTERISTICS

During full service, the route operates from 9:45 pm to 12:30 am Mondays through Thursdays, 9:45 pm to 2:30 am Fridays, 9:30 am to 2:30 am on Saturdays, and 11:30 am to 11:30 pm on Sundays. During all these periods, it provides hourly service. During reduced service, it operates from 6:45 pm to 9:30 pm on weekdays, 9:30 am to 8:55 pm on Saturdays, and 11:30 am to 6:55 pm on Sundays. It provides half-hourly service during reduced service weekdays, and hourly service on reduced service weekends. The route offers connections to all routes excluding The Explorer, and serves a variety of activity generators, including University Mall, the Hethwood Plaza shopping center, Virginia Tech, and student housing complexes in Hethwood and on Ascot Lane. Table 14 summarizes the Hethwood/Harding Combined Route's operating characteristics.

Table 14: Operating Characteristics

Destination	From		Squires East
	To		Stroubles Circle
Full Service Span	Weekday		9:45 PM – 2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM
Reduced Service Span	Weekday		6:45 PM – 9:30 PM
	Saturday		9:30 AM – 8:55 PM
	Sunday		11:30 AM – 6:55 PM
Full Service Frequency	Weekday	Peak	--
		Off-Peak	60
	Saturday		60
	Sunday		60
Reduced Service Frequency	Weekday	Peak	--
		Off-Peak	30
	Saturday		60
	Sunday		60
Average Weekday Ridership (Full Service)			121
Key Destinations			Virginia Tech, University Mall, Hethwood Square

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 57 passengers per revenue hour, Hethwood-Harding ranks 7th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (30.9), ranking 9th. Hethwood-Harding's on-time rate is 76.9 percent, ranking 15th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and unsatisfactory by schedule adherence metrics. It does not meet system-wide standards for hours of operation or frequency of service however when combined with the Hethwood A, Hethwood B, and Harding Avenue routes they collectively do. Table 15 summarizes service productivity metrics for Hethwood-Harding.

Table 15: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6; 57	Average 90%; 76.92%

Passengers per Trip
Average 25.6; 30.9

RIDERSHIP

Hethwood-Harding service averages 121 passengers per weekday, making it the lowest-performing Blacksburg route. However, it only operates during the evening period on weekdays and it averages 159 passengers per Saturday and 108 passengers per Sunday, which rank 2nd and 3rd, respectively, among services offered in Blacksburg on these days.

Ridership by Stop

Figure 24 and Figure 25 summarize total activity (boardings and alightings) by stop during full service. This data is maintained separately for the Hethwood Combined route and the Harding route, so these figures cover only the combined Hethwood service, and do not include any Harding route stops. Burruss Hall is by far the most popular place to board the bus. Common destinations include Tall Oaks/Foxhunt and Prices Fork/Plantation.

Figure 24: Ridership by Stop

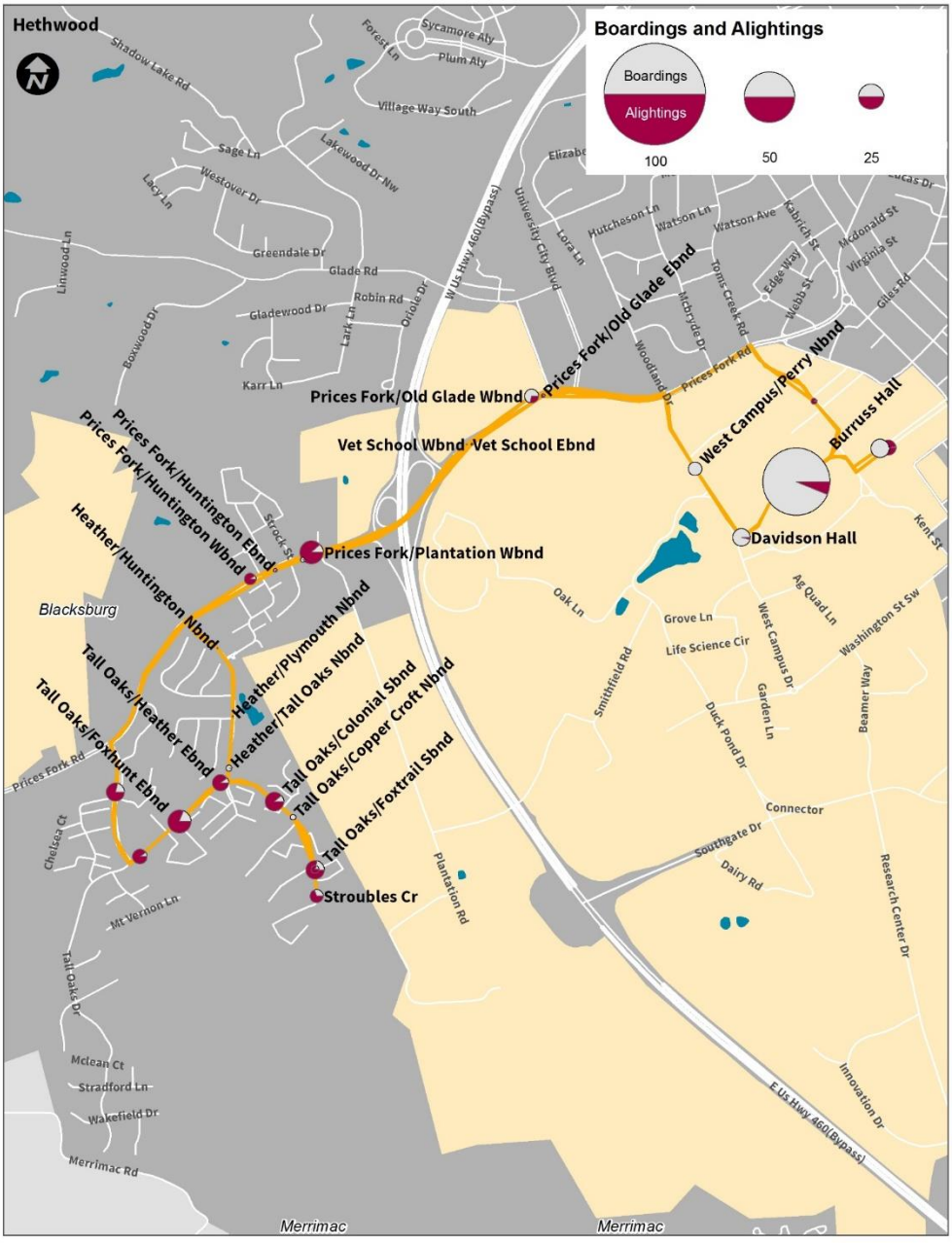
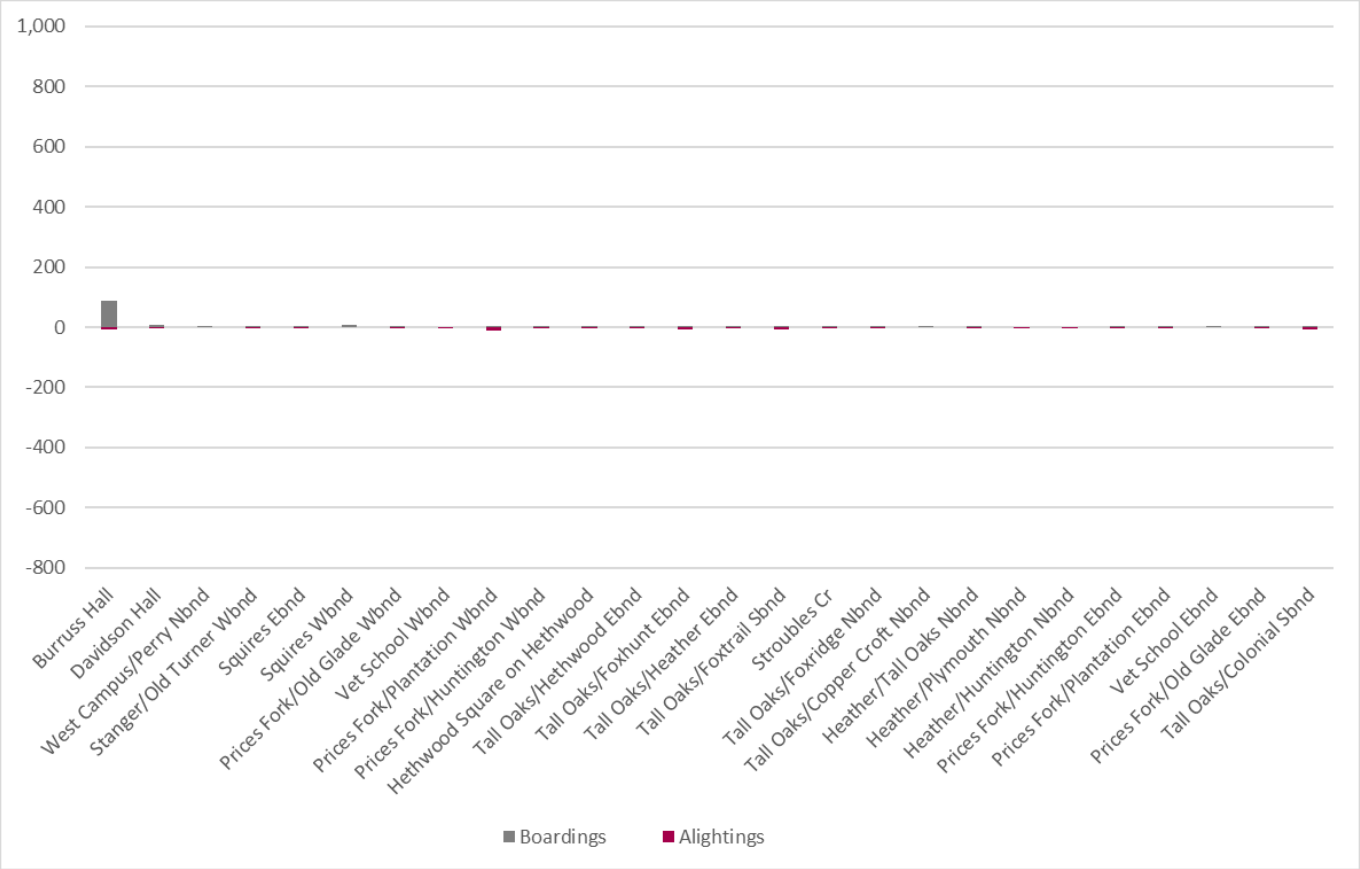


Figure 25: Boardings and Alightings by Stop



Ridership by Trip

Ridership by trip data was not available for the Hethwood-Harding route.

SUMMARY OF OBSERVATIONS

Strengths

- Relatively high ridership and productivity (when operating).
- Frequent all-day service between dense student apartment complexes and Virginia Tech.
- Serves key destinations, including University Mall.
- Provides connections to other services at Virginia Tech.

Weaknesses

- Hethwood-Harding combination service on late nights and weekends could be confusing to new riders.
- Below average on-time performance, likely due to inaccurate scheduled running times.

Opportunities

- Realign route to serve the MMTF when it opens.
- Consider realigning route to enter the VT campus via the new road slated for future construction between Prices Fork Road and Southgate Drive. This would also help avoid congestion on Prices Fork Road.

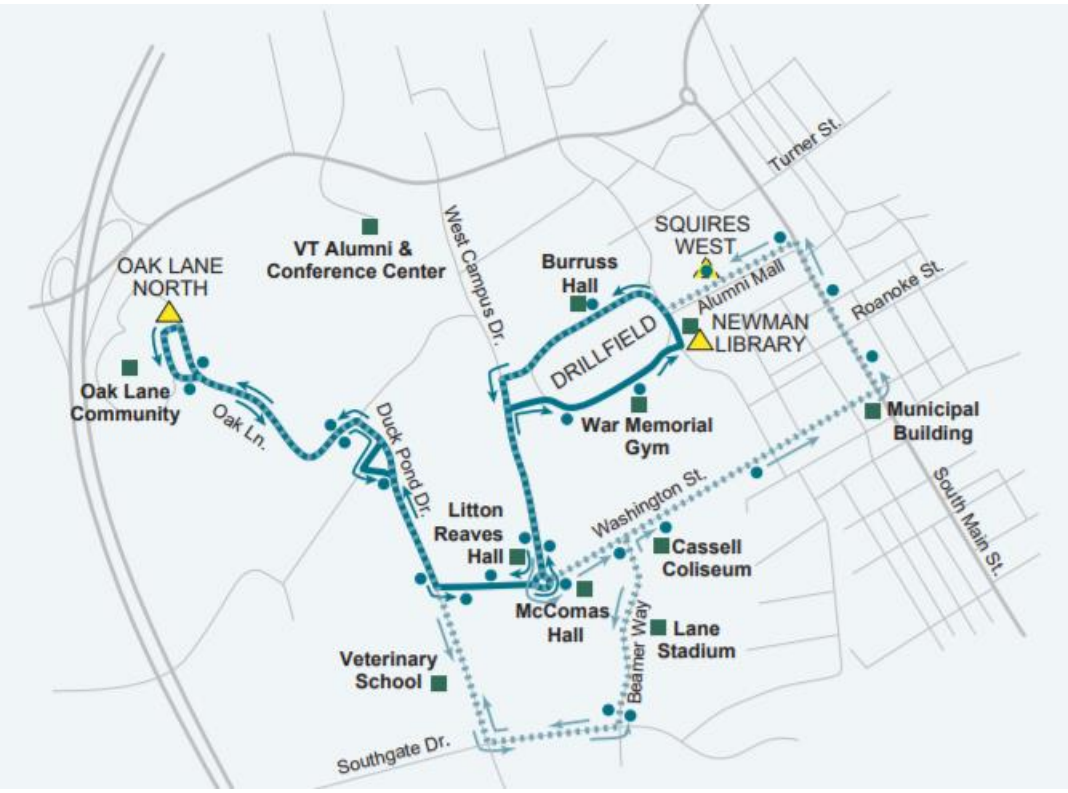
Hokie Express

SERVICE DESCRIPTION

Hokie Express (shown in Figure 26) operates seven days a week, connecting the Oak Lane community (where Virginia Tech's Greek housing is located) with the Newman Library. The route travels primarily along the Drillfield, West Campus Drive, Washington Street, Duck Pond Drive, and Oak Lane. The route travels in a one-way loop around the Drillfield.

Passengers may transfer between Hokie Express and all other BT services except The Explorer at the Virginia Tech campus. During late nights and weekends, the route has an alternate routing along Southgate Drive, Beamer Way, Washington Street, Main Street, and Alumni Mall, terminating at Squires West.

Figure 26: Hokie Express Map



OPERATING CHARACTERISTICS

The route operates during full service only. On Monday through Thursday, the route operates from 7:00 am until 12:30 am, on Fridays from 7:00 am until 2:30 am, on Saturdays from 9:30 am to 2:30 am, and on Sundays from 11:30 am to 11:30 pm. On Mondays through Thursdays, it operates every 10 minutes from start of service until 5:45 pm, every 15 minutes from 5:45 pm until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. On Fridays, it operates every 10 minutes from start of service until 3:15 pm, every 15 minutes from 3:15 pm until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. On Saturdays and Sundays, the route operates every 30 minutes for the entire service day. The route offers connections to all routes except The Explorer on the Virginia Tech campus, and serves activity generators including the VT campus and the Oak Lane community. Table 16 summarizes Hokie Express's operating characteristics.

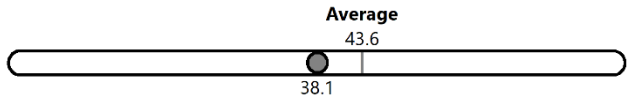
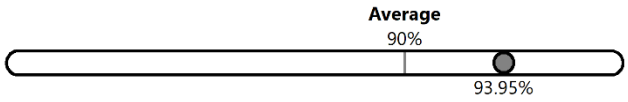
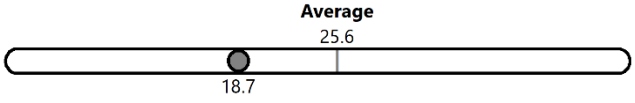
Table 16: Operating Characteristics

Destination	From		Newman Library
	To		Oak Lane North
Full Service Span	Weekday		7:00 AM – 2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM –11:30 PM
Reduced Service Span	Weekday		--
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	10/15
		Off-Peak	10/30
	Saturday		30
	Sunday		30
Reduced Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			1,422
Key Destinations			Virginia Tech, Oak Lane Community

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 38.1 passengers per revenue hour, Hokie Express ranks 12th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (18.7), ranking 13th. Hokie Express's on-time rate is 93.9 percent, ranking 5th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It meets system-wide standards for hours of operation and frequency of service during both peak and off-peak hours. Table 17 summarizes service productivity metrics for Hokie Express.

Table 17: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
	
Passengers per Trip	
	

RIDERSHIP

Hokie Express averages 1,422 weekday boardings, ranking 8th among the 15 Blacksburg services.

Ridership by Stop

Figure 27 and Figure 28 summarize total activity (boardings and alightings) by stop during full service. Boardings are most common on the Virginia Tech campus, specifically at Newman Library and Burruss Hall. Newman Library and Litton-Reaves Hall are the most common destinations for Hokie Express riders, with Oak Lane North the most common destination outside of those two.

Figure 27: Ridership by Stop

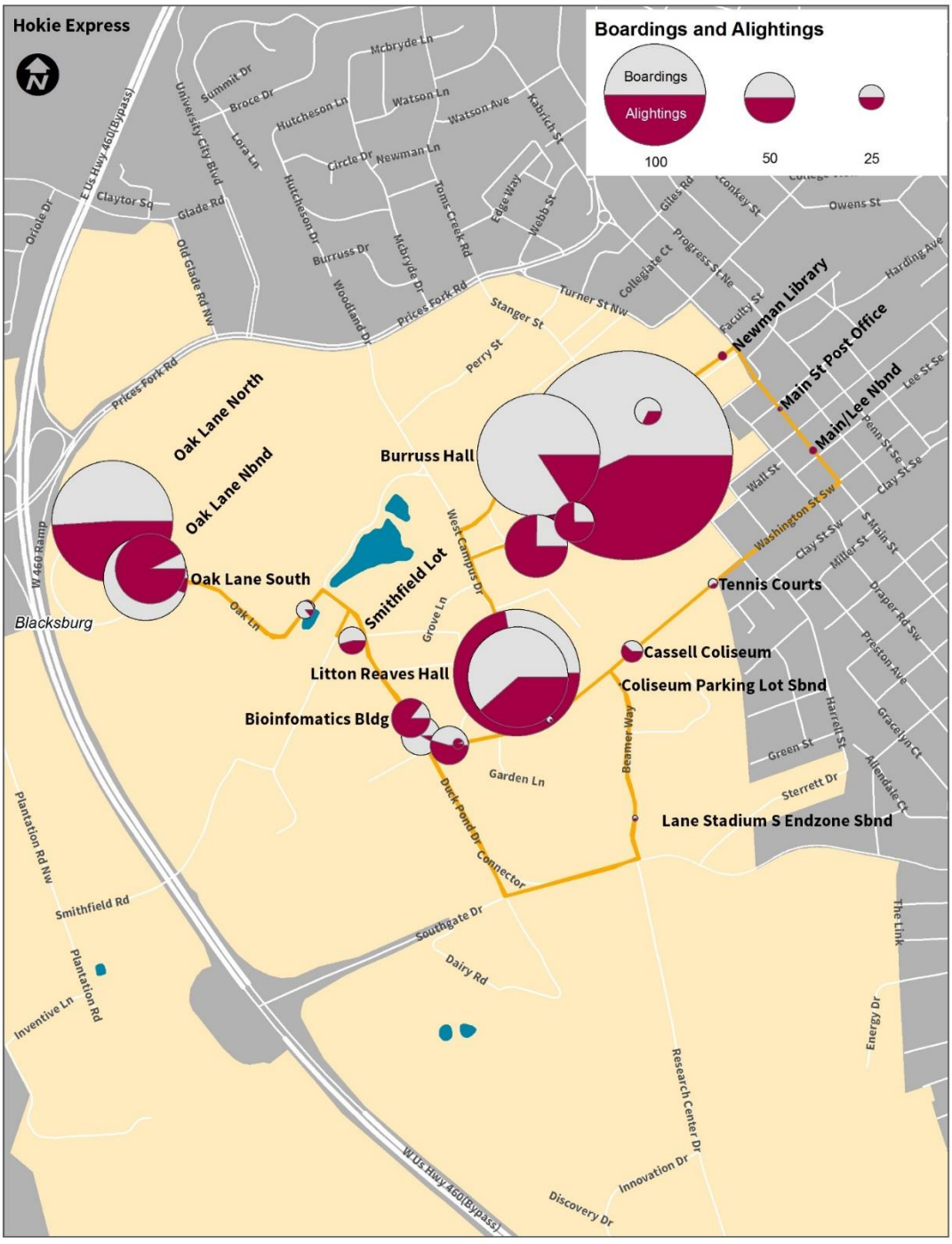
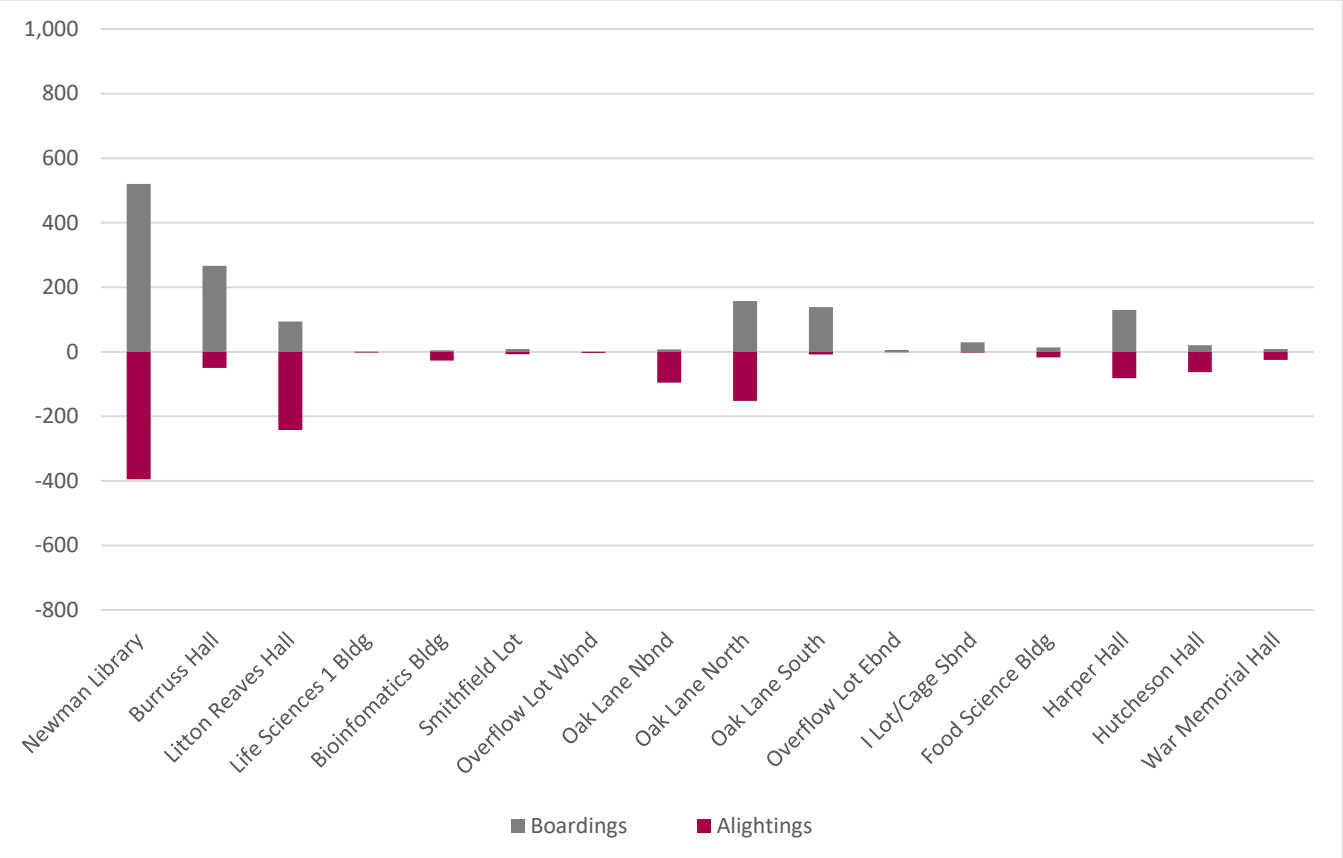


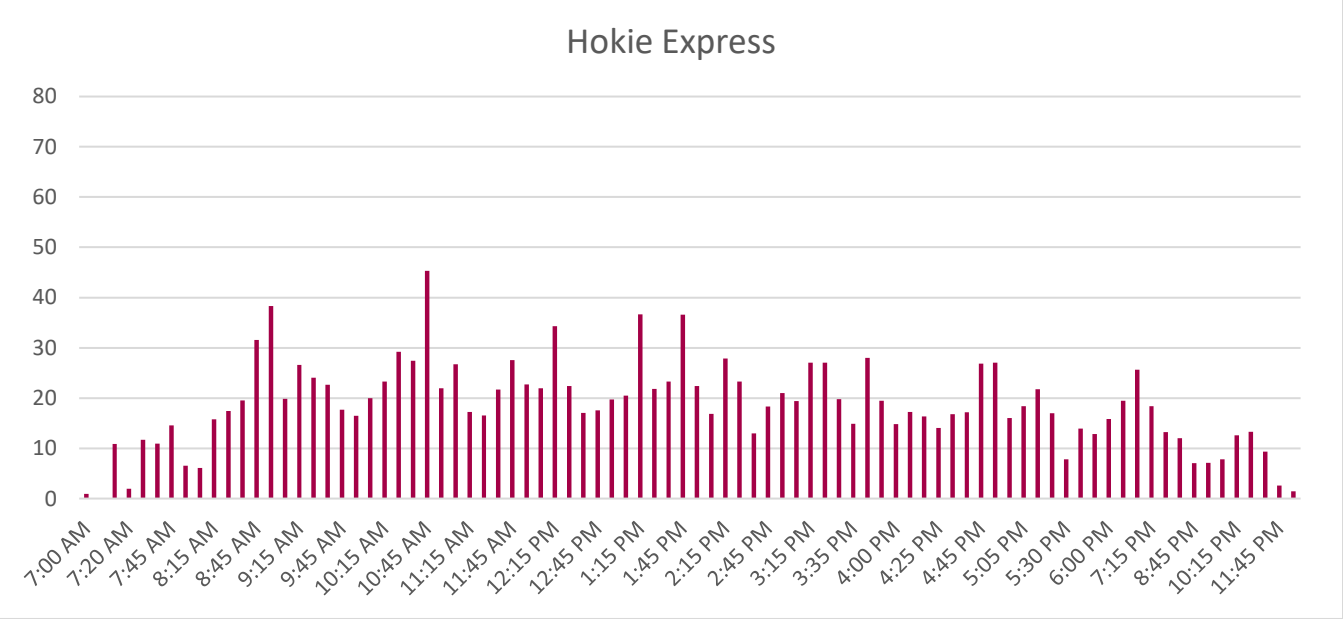
Figure 28: Boardings and Alightings by Stop



Ridership by Trip

Figure 29 shows the boardings for each trip over the course of a full service day. Ridership peaks at 45 passengers at 10:45 am. Other trips with more than 30 passengers take place at 8:45 am, 8:55 am, 12:15 pm, 1:15 pm, and 1:45 pm. Service demand is limited after 5:15 pm, with only one trip after that time seeing more than 20 passengers.

Figure 29: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Frequent all-day service that aids in shuttling students around the Virginia Tech campus.
- Connections to many other routes on the Virginia Tech campus.
- Service seven days a week.

Weaknesses

- No reduced service.
- Different alignment on weekends can be confusing to passengers.

Opportunities

- Realign route to serve the MMTF when it opens.
- Per Virginia Tech, increase frequencies during peak periods.
- Consider a future restructuring of the route to serve satellite parking lots on the VT campus.

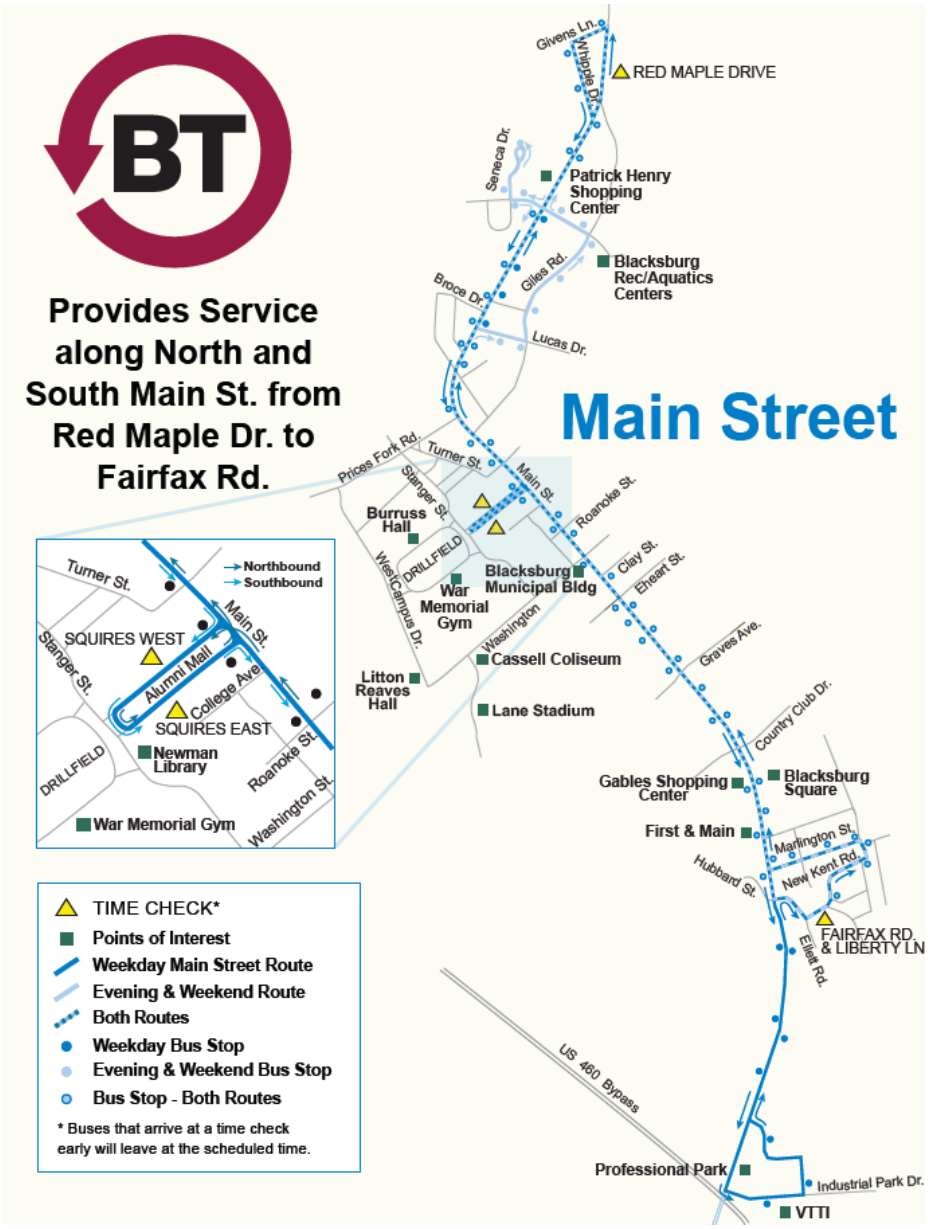
Main Street North

SERVICE DESCRIPTION

Main Street North (shown in Figure 30) operates seven days a week, between Squires West and Red Maple Drive. The route travels primarily along Alumni Mall and Main Street. On late nights and weekends, the route has an alternate alignment along Lucas Drive, Giles Road, and Seneca Drive. On public maps and schedules, the route is co-listed with the Main Street South service.

Passengers may transfer between Main Street North and other services at the Virginia Tech campus, where transfers are available to every route except The Explorer.

Figure 30: Main Street North Map



OPERATING CHARACTERISTICS

The route operates seven days a week, during full and reduced service. During full service, it operates from 7:00 am until 12:30 am Monday through Thursday, 7:00 am to 2:30 am Friday, 9:30 am to 2:30 am Saturday, 11:30 am to 11:30 pm Sunday. Monday through Friday, it operates every 15 minutes from start of service until 6:30 pm, and every half hour until 9:30 pm. On Monday through Thursday, it runs hourly from 9:30 pm until end of service, while it runs half-hourly on Friday evenings from 9:30 until end of service. During reduced service, the route operates from 7:00 am until 10:00 pm on weekdays, 9:30 am until 9:00 pm on Saturdays, and 11:30 am until 7:00 pm on Sundays. On weekdays, it runs with half-hour headways, while it runs with one-hour headways on weekends. The route offers connections to all routes excluding The Explorer. It serves activity centers including Virginia Tech, the Blacksburg Aquatic Center, and the Patrick Henry shopping center. Table 18 summarizes Main Street North's operating characteristics.

Table 18: Operating Characteristics

Destination	**From**		Squires West
	To		Main/Red Maple
Full Service Span	**Weekday**		7:00 AM – 2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM
Reduced Service Span	**Weekday**		7:00 AM – 10:00 PM
	Saturday		9:30 AM – 9:00 PM
	Sunday		11:30 AM –7:00 PM
Full Service Frequency	**Weekday**	**Peak**	15
		Off-Peak	15/30/60
	Saturday		30/60
	Sunday		60
Reduced Service Frequency	**Weekday**	**Peak**	30
		Off-Peak	30
	Saturday		60
	Sunday		60
Average Weekday Ridership (Full Service)			1,384
Key Destinations			Virginia Tech, Blacksburg Rec Center, Patrick Henry Shopping Center

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 63.7 passengers per revenue hour, Main Street North ranks 4th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (33.1), ranking 7th. Main Street North's on-time rate is 91.9 percent, ranking 9th and falling above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It meets system-wide standards for hours of operation and frequency of service during both peak and off-peak hours. Table 19 summarizes service productivity metrics for Main Street North.

Table 19: Service Productivity Metrics

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 63.7	Average 90% — 91.96%

Passengers per Trip
Average 25.6 — 33.1

RIDERSHIP

Main Street North averages 1,384 passengers per weekday (ranking 9th of 15 routes).

Ridership by Stop

Figure 31 and Figure 32 summarize total activity (boardings and alightings) by stop during full service. The most popular places to board the bus include Squires North and Main/Red Maple. These stops, along with Main/Collegiate Court, are also the most common places passengers get off the bus.

Figure 31: Ridership by Stop

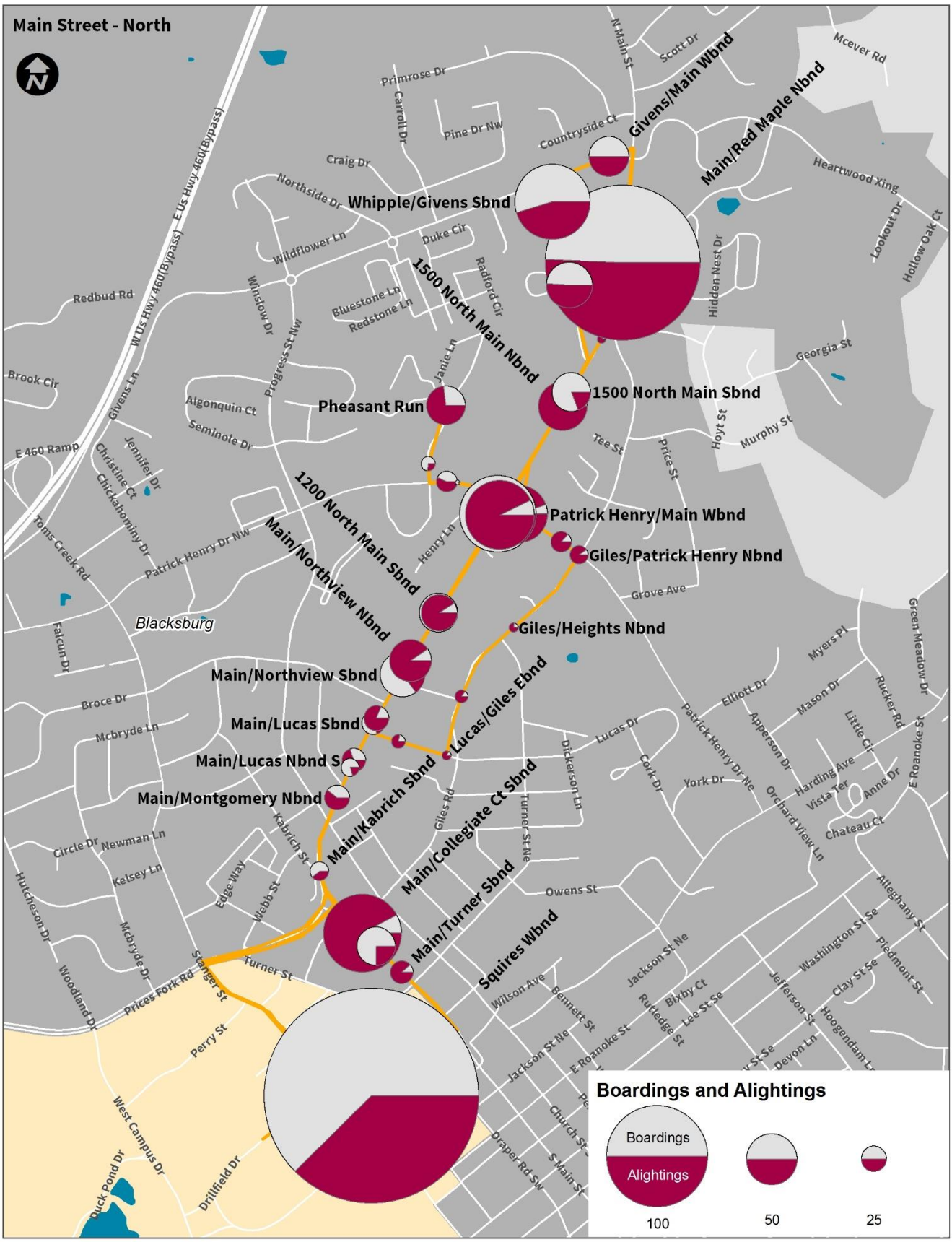
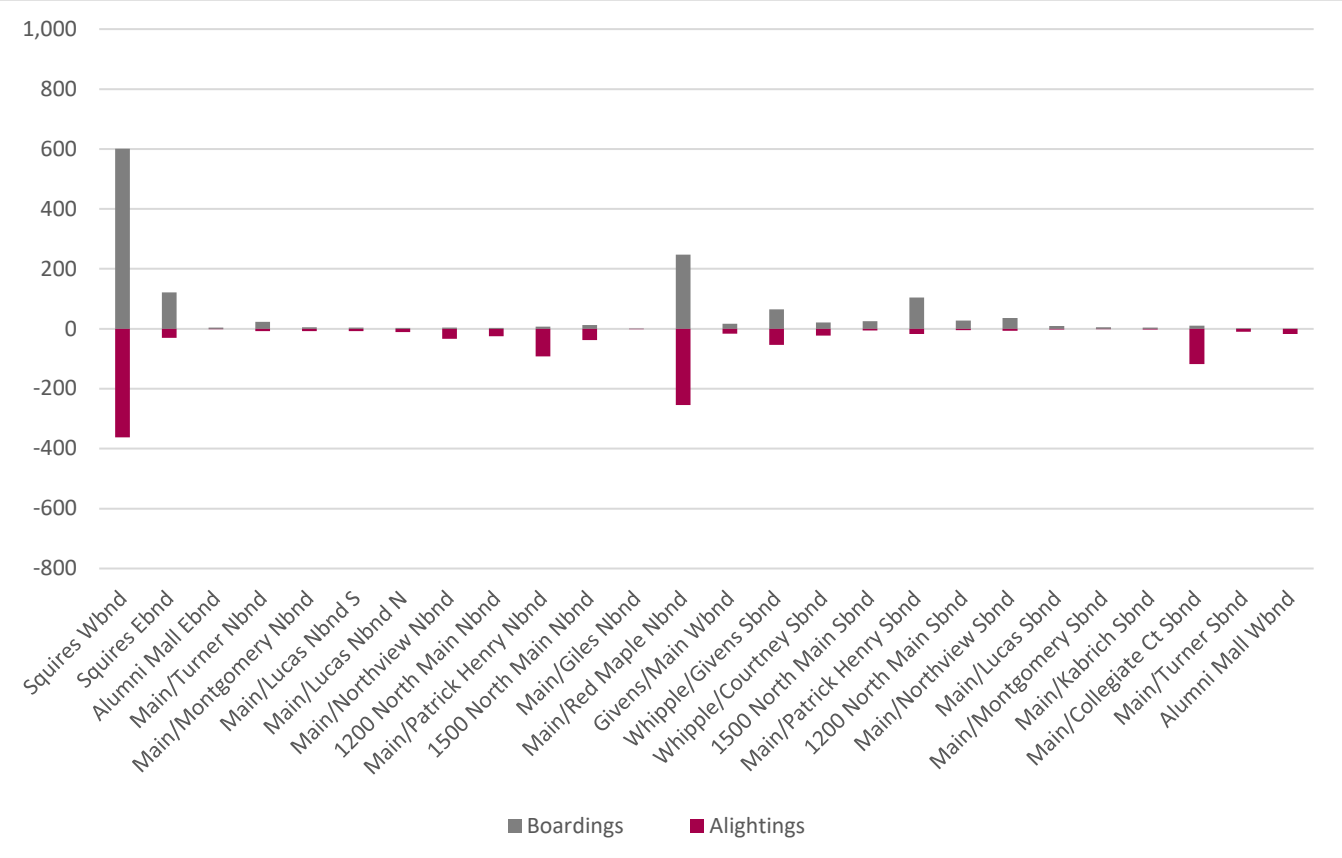


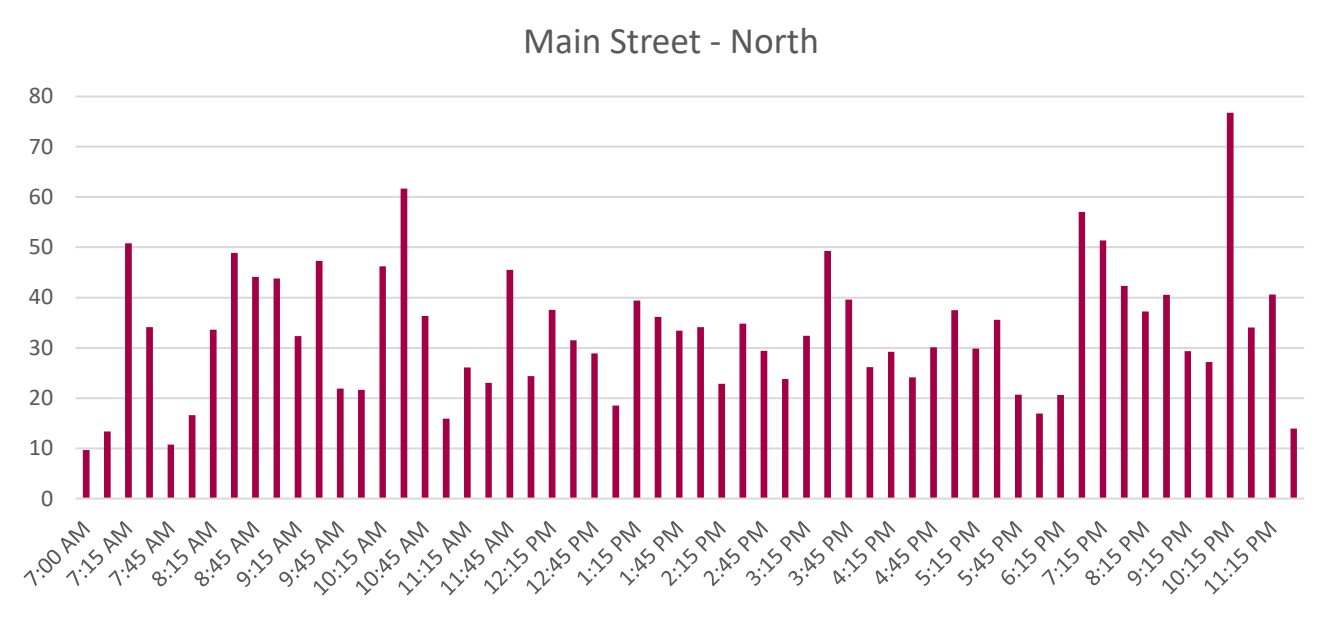
Figure 32: Boardings and Alightings by Stop



Ridership by Trip

Figure 33 shows the boardings for each trip over the course of a full service day. There is strong all-day ridership on this route. The most heavily ridden trip is the 10:15 pm trip, which averages 77 passengers per day, though there are four other trips that average at least 50 passengers, ranging from 7:15 am to 7:15 pm.

Figure 33: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Frequent all-day service.
- Service 7 days a week.
- Above-average on time performance.
- Connections to many other routes at the Virginia Tech campus.
- Service to major student apartment complexes from Virginia Tech.

Weaknesses

- Infrequent during reduced service.
- Infrequent on weekends.

Opportunities

- Realign route to serve the MMTF when it opens.
- Consider adding trips during peak times for a 10-minute headway instead of a 15-minute headway.
- Consider a consistent alignment all-day, with a new route to serve Giles Road.
- Consider an extension of the route during peak commuting periods to the Mount Tabor Road area.

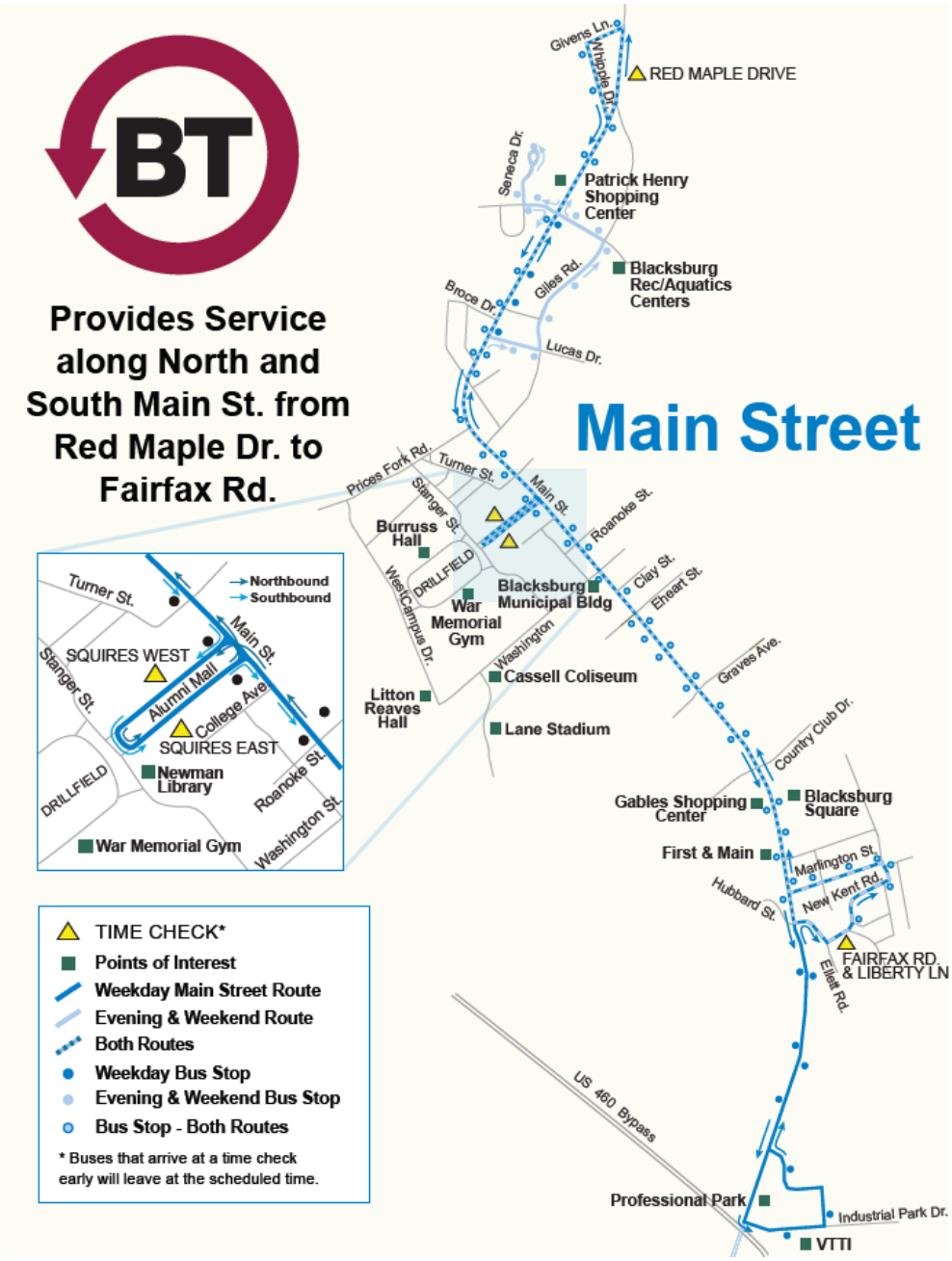
Main Street South

SERVICE DESCRIPTION

Main Street South (shown in Figure 34) operates seven days a week between Squires East and Fairfax/Ellett. The route travels primarily along Alumni Mall and Main Street, also using Industrial Park Road, New Kent Road, and Marlington Street. On late nights and weekends, the route does not travel south of Ellett Road on Main Street. On public maps and schedules, the route is co-listed with the Main Street North service.

Passengers may transfer between Main Street South and other services at the Virginia Tech campus, where transfers are available to every route except The Explorer.

Figure 34: Main Street South Map



OPERATING CHARACTERISTICS

The route operates seven days a week, during full and reduced service. During full service, it operates from 7:00 am until 12:30 am Monday through Thursday, 7:00 am to 2:30 am Friday, 9:30 am to 2:30 am Saturday, 11:30 am to 11:30 pm Sunday. Monday through Friday, it operates every 15 minutes from start of service until 6:30 pm, and every half hour until 9:30 pm. On Monday through Thursday, it runs hourly from 9:30 pm until end of service, while it runs half-hourly on Friday evenings from 9:30 until end of service. During reduced service, the route operates from 7:00 am until 10:00 pm on weekdays, 9:30 am until 9:00 pm on Saturdays, and 11:30 am until 7:00 pm on Sundays. On weekdays, it runs with half-hour headways, while it runs with one-hour headways on weekends. The route offers connections to all routes excluding The Explorer. It serves activity centers including Virginia Tech, Blacksburg Municipal Building, Gables Shopping Center, First and Main, Blacksburg Square, Professional Park, and VTTI. Table 20 summarizes Main Street North's operating characteristics.

Table 20: Operating Characteristics

Destination	From		Squires East
	To		Fairfax/Ellett
Full Service Span	Weekday		7:00 AM – 2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM
Reduced Service Span	Weekday		7:00 AM – 10:00 PM
	Saturday		9:30 AM – 9:00 PM
	Sunday		11:30 AM –7:00 PM
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15/30/60
	Saturday		30/60
	Sunday		60
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		60
	Sunday		60
Average Weekday Ridership (Full Service)			1,384
Key Destinations			Virginia Tech, Blacksburg Municipal Building, Gables Shopping Center, First and Main, Blacksburg Square, Professional Park, VTTI

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 38.4 passengers per revenue hour, Route 1 ranks 11th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (23.7), also ranking 11th. Main Street South's on-time rate is 74.6 percent, ranking 16th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and unsatisfactory by schedule adherence metrics. It meets system-wide standards for hours of operation and frequency of service during both peak and off-peak hours. Table 21 summarizes service productivity metrics for Main Street South.

Table 21: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 38.4	Average 90% 74.61%

Passengers per Trip
Average 25.6 23.7

RIDERSHIP

Main Street North averages 1,384 passengers per weekday (ranking 10th of 15 routes).

Ridership by Stop

Figure 35 and Figure 36 summarize total activity (boardings and alightings) by stop during full service. The most common places passengers boarded the bus included Squires West and Squires East, Fairfax/Ellett, and Marlington/Grayland. The first three of those, along with Main/King and Gables Shopping Center, were also the most common destinations for riders of this bus.

Figure 35: Ridership by Stop

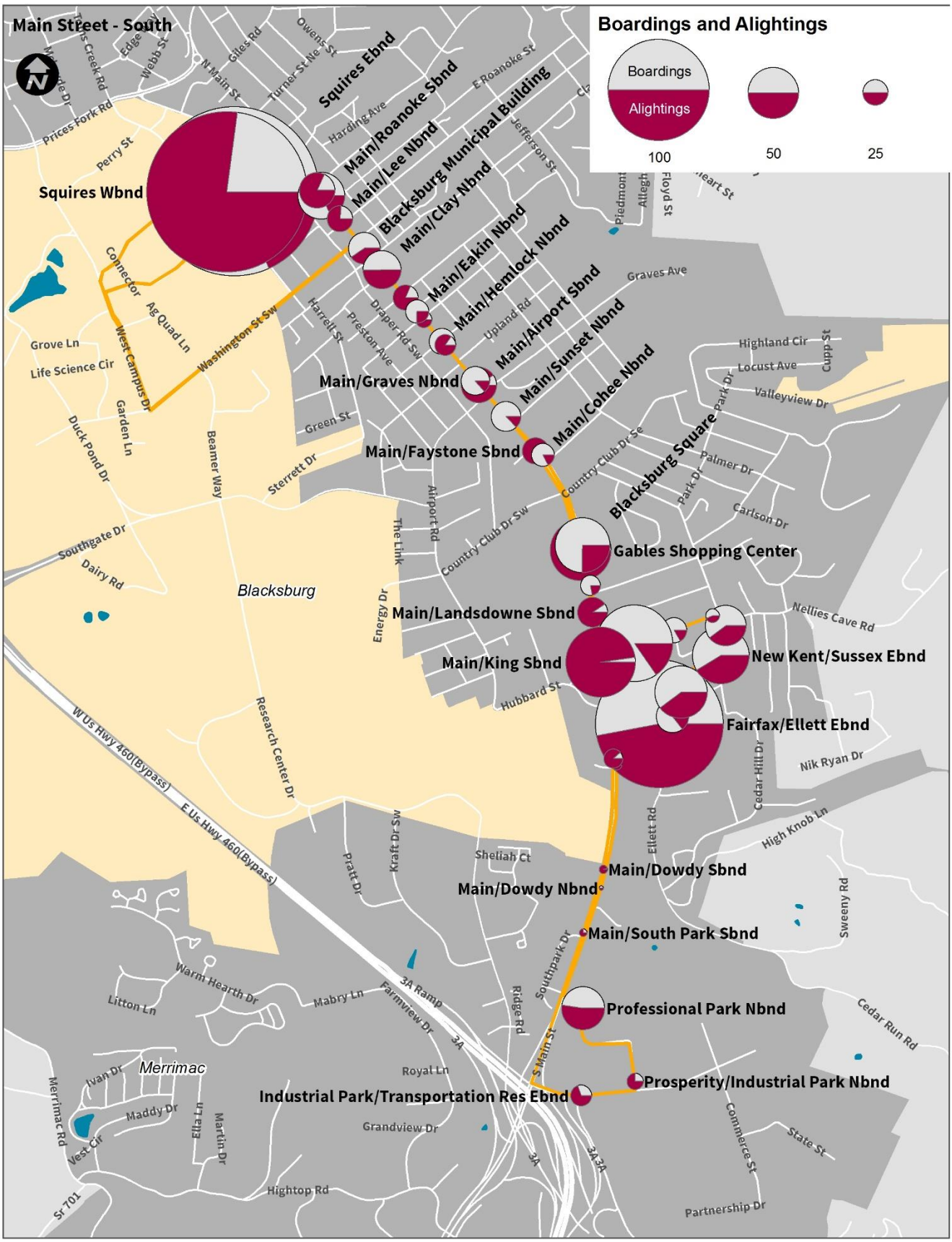
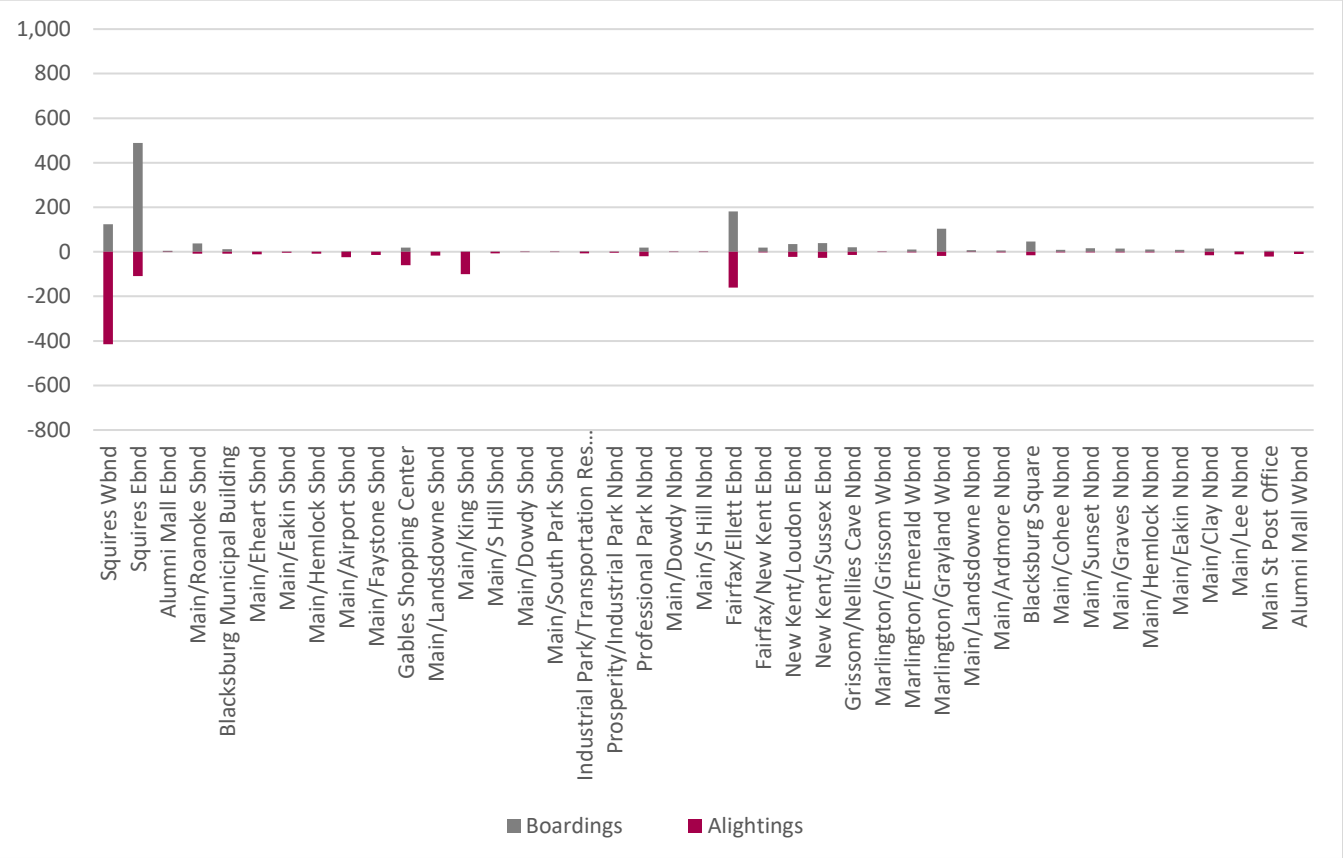


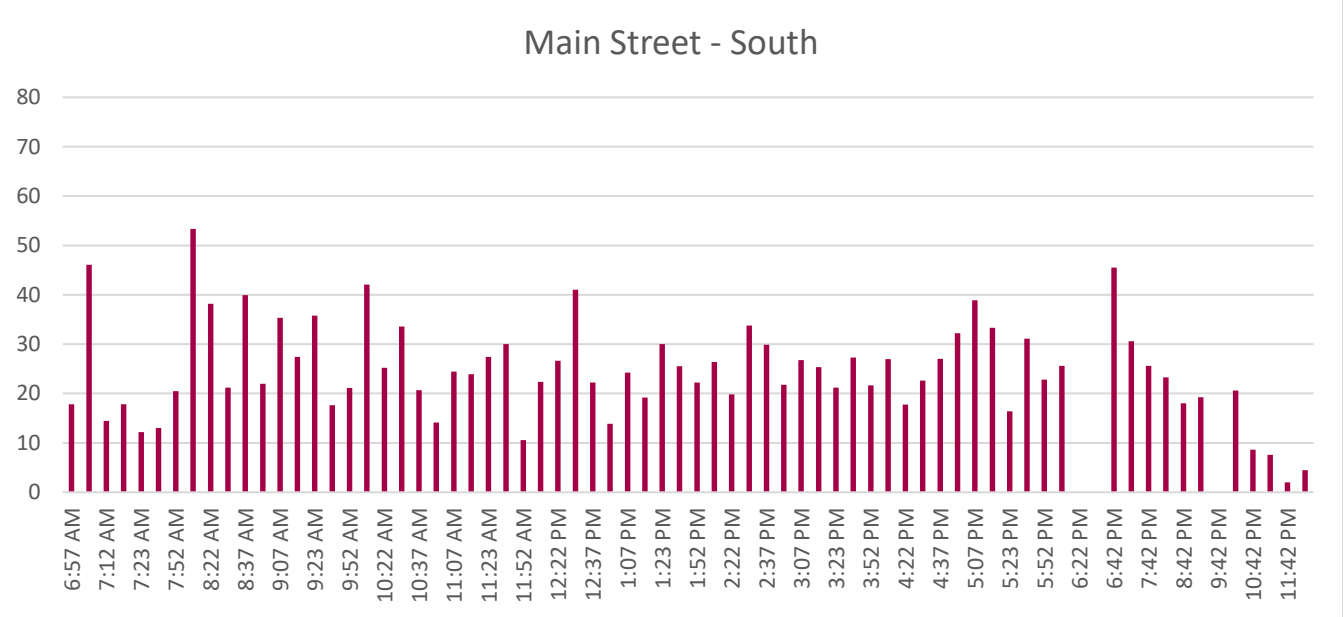
Figure 36: Boardings and Alightings by Stop



Ridership by Trip

Figure 37 shows the boardings for each trip over the course of a full service day. The most heavily used trip is the 8:07 am, which sees an average of 52 passengers. Five other trips average 40 or more passengers per day, from the 7:07 am trip to the 6:42 pm trip. Average ridership drops off quickly after the 6:42 pm trip. Data is missing for the 6:22 pm trip.

Figure 37: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Serves key educational, employment, and retail destinations off the Virginia Tech campus.
- Provides service between large student apartment complexes and the Virginia Tech campus.
- Provides frequent all-day service.
- Service 7 days a week.
- Connections to many other routes at the Virginia Tech campus.

Weaknesses

- Infrequent during reduced service.
- Infrequent on weekends.
- Some trips are overcrowded during peak times.
- Low on-time performance, likely due to inaccurate scheduled runtimes.

Opportunities

- Realign route to serve the MMTF when it opens.
- Increase service to 10 or 12 minute headways.
- Adjust route runtimes to improve on-time performance.

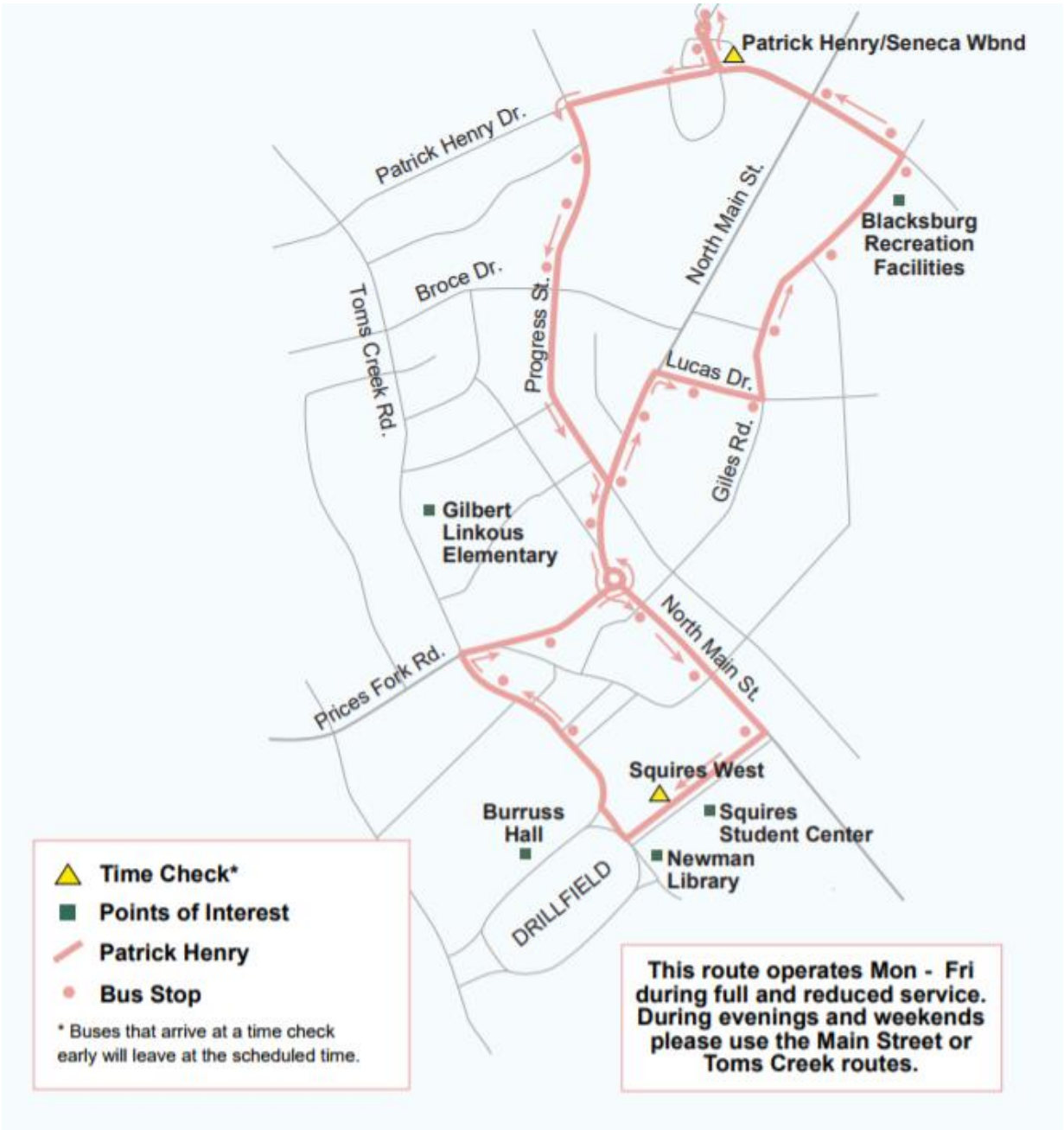
Patrick Henry

SERVICE DESCRIPTION

Patrick Henry (shown in Figure 38) operates on weekdays only, running from Squires West to Patrick Henry and Seneca. The route travels primarily along Alumni Mall, Stanger Street, Prices Fork Road, North Main Street, Lucas Drive, Giles Road, Patrick Henry Drive, and Progress Street. Except for a short stretch of North Main Street, each of these streets are served in one direction only.

Passengers may transfer between Patrick Henry and other services on the Virginia Tech campus, where transfers are available for all BT routes except The Explorer.

Figure 38: Patrick Henry Map



OPERATING CHARACTERISTICS

The route operates on weekdays only during both full and reduced service, from 7:00 am to 6:30 pm. During full service, the route operates with 10 minute headways from start of service until 12:30 pm, and with 15 minute headways from 12:30 pm until end of service. During reduced service, the route operates with 30 minute headways for its entire span of service. The route offers connections to all routes excluding The Explorer and serves the Virginia Tech campus and the Blacksburg Recreation Center. Table 22 summarizes Patrick Henry's operating characteristics.

Table 22: Operating Characteristics

Destination	From		Squires West
	To		Patrick Henry/Seneca
Full Service Span	Weekday		7:00 AM – 6:30 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:00 AM – 6:30 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	10/15
		Off-Peak	--
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			1,805
Key Destinations			Virginia Tech, Blacksburg Rec Center

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 62.8 passengers per revenue hour, Patrick Henry ranks 5th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (37.3), ranking 2nd. Patrick Henry's on-time rate is 95.2 percent, ranking 3rd and falling above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation but does meet them for frequency of service during both peak and off-peak hours. Table 23 summarizes service productivity metrics for Patrick Henry.

Table 23: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 62.8	Average 90% — 95.15%

Passengers per Trip
Average 25.6 — 37.3

RIDERSHIP

Patrick Henry averages 1,805 passengers per weekday, ranking 7th of 15 services.

Ridership by Stop

Figure 39 and Figure 40 summarize total activity (boardings and alightings) by stop during full service. The most common places passengers board the bus include Squires West, Patrick Henry and Seneca, and Pheasant Run. These stops, along with Main and Collegiate Court, are also the most common places passengers alight from the bus.

Figure 39: Ridership by Stop

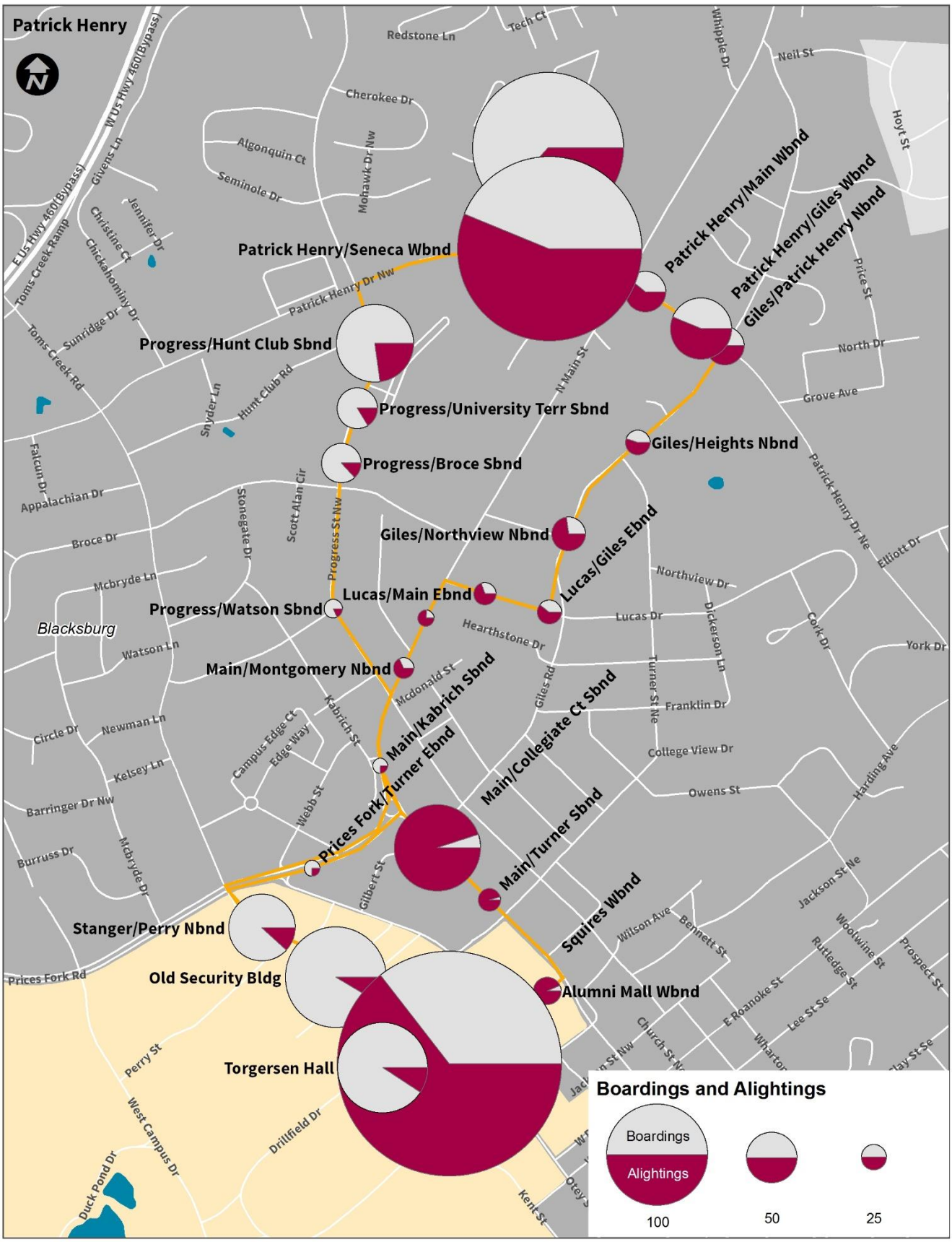
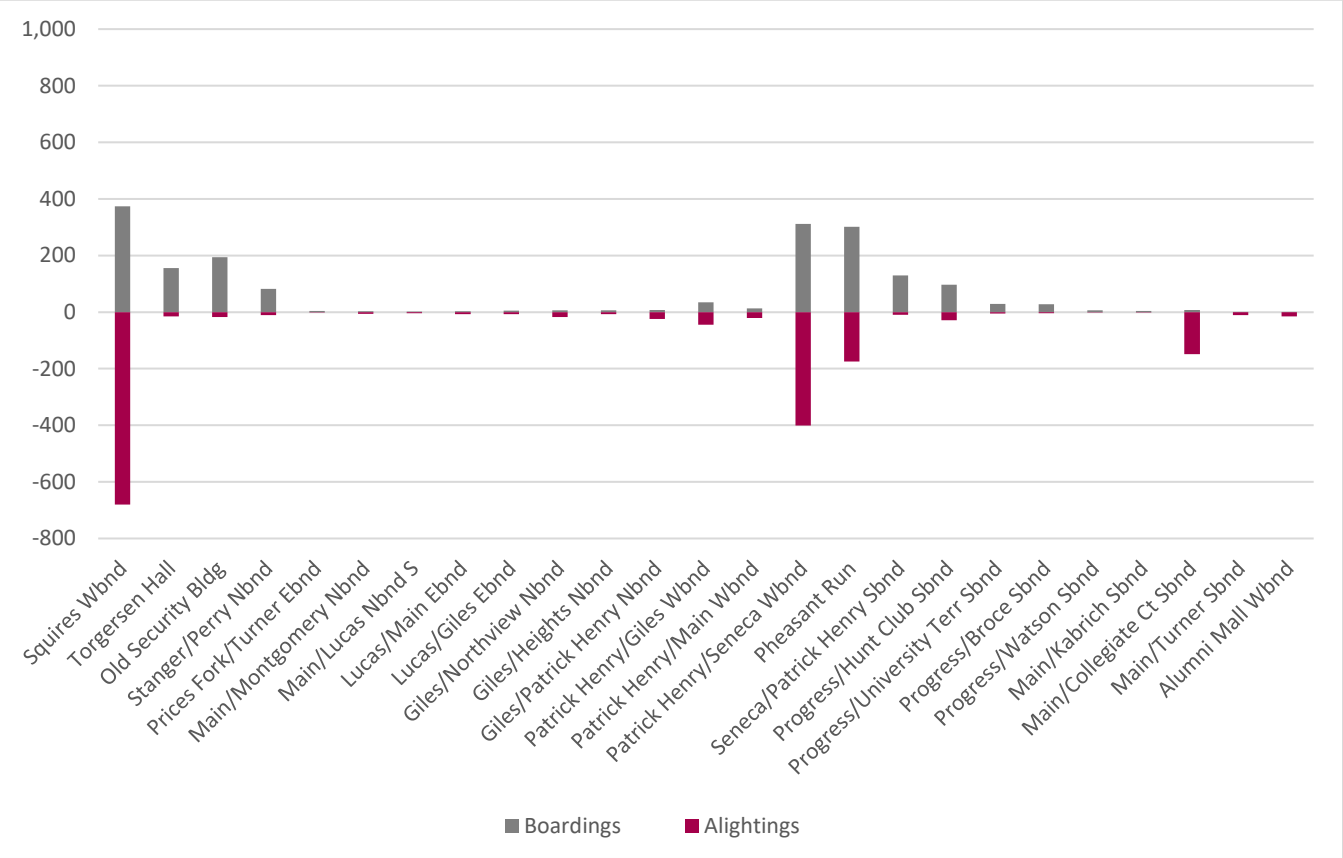


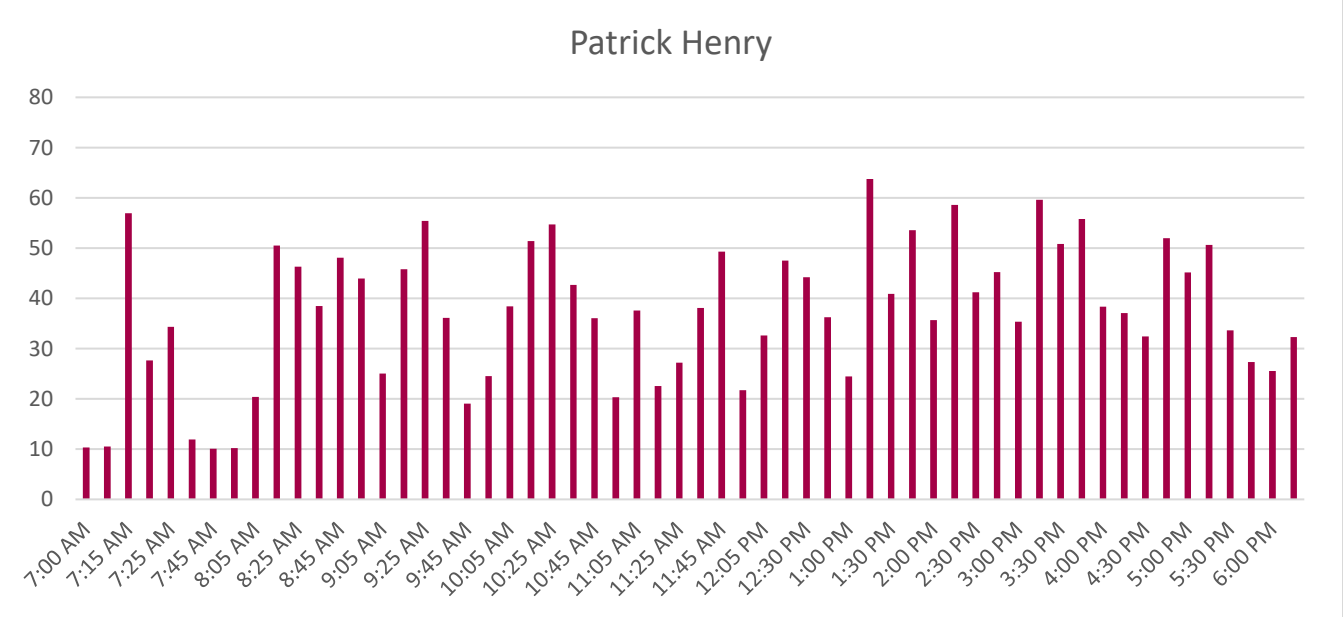
Figure 40: Boardings and Alightings by Stop



Ridership by Trip

Figure 41 shows the boardings for each trip over the course of a full service day. Average ridership levels are high throughout the day, but are highest at 1:15 PM, which trip averages 64 passengers. While this is the only trip to average more than 60 passengers per day, many other trips average 50 or more passengers per day, with these high demand trips as early as 7:15 AM and as late as 5:15 PM.

Figure 41: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- High-frequency service all day.
- Above-average on time performance.
- Provides a connection between an area of dense student housing and the Virginia Tech campus.
- Connections to many other routes on the Virginia Tech campus.

Weaknesses

- No weekend service – passengers must use the Main Street North or Toms Creek route instead
- Infrequent service during reduced service periods.
- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route.

Opportunities

- Realign route to serve the MMTF when it opens.
- Increase frequencies or provide additional service in the opposite direction.

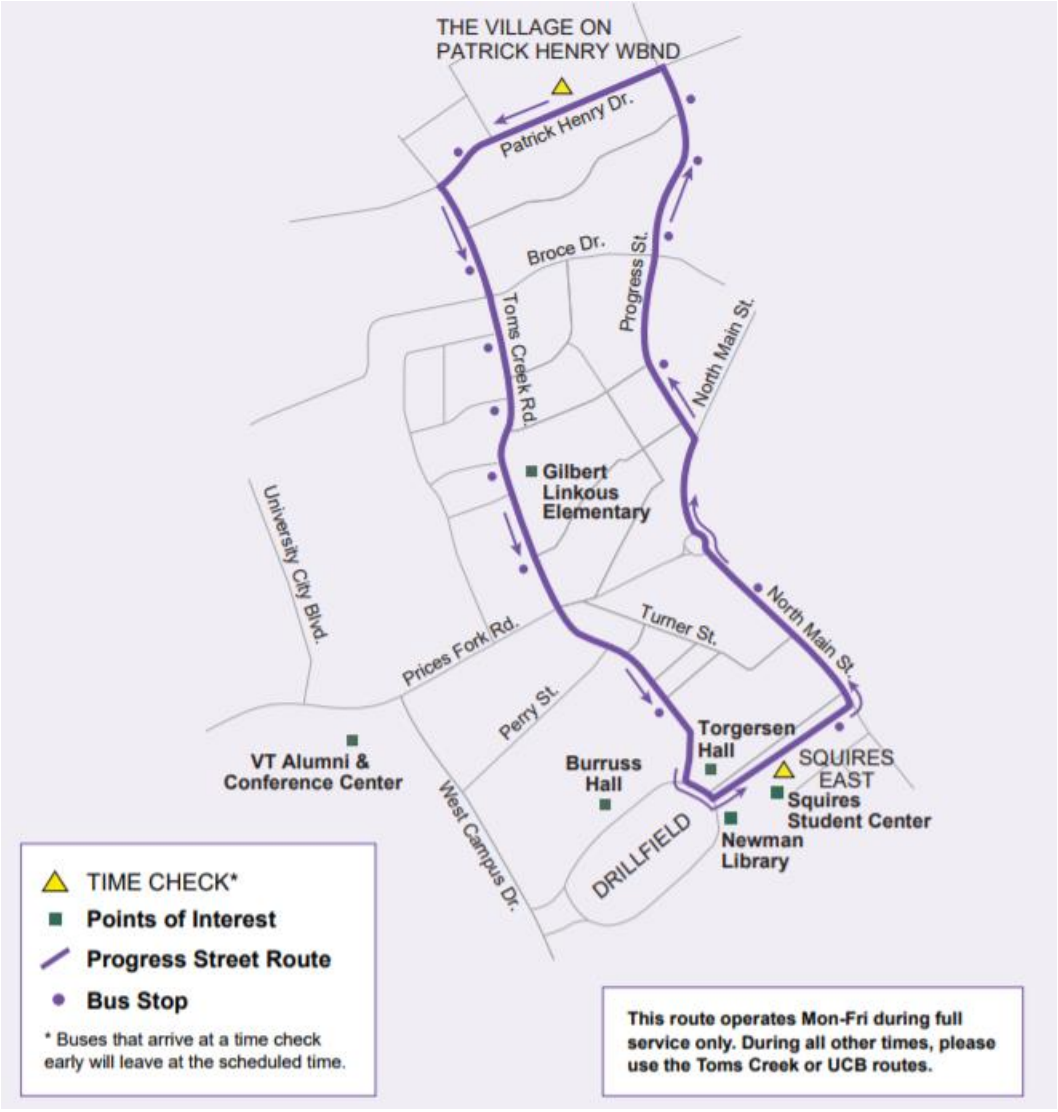
Progress Street

SERVICE DESCRIPTION

Progress Street (shown in Figure 42) operates on weekdays only from Squires East to The Village on Patrick Henry. The route travels primarily along Alumni Mall, North Main Street, Progress Street, Patrick Henry Drive, and Toms Creek Road. The route operates as a one-way loop, meaning that each stop only gets served in one direction.

Passengers may transfer between Progress Street and other services at the Virginia Tech campus, where transfers are available to every BT route except The Explorer.

Figure 42: Progress Street Map



OPERATING CHARACTERISTICS

The route operates during full service weekdays only. It operates from 7:00 am to 9:30 pm. On Monday through Thursday, it operates every 10 minutes from start of service until 5:45 pm, every 15 minutes from 5:45 pm until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. On Fridays, the route operates every 10 minutes from start of service until 3:15 pm, every 15 minutes from 3:15 pm until 6:15 pm and every 30 minutes from 6:15 pm until

end of service. The route offers connections to all routes excluding The Explorer and serves Virginia Tech and Gilbert Linkous Elementary School. Table 24 summarizes Progress Street's operating characteristics.

Table 24: Operating Characteristics

Destination	From		Squires East
	To		The Village on Patrick Henry
Full Service Span	Weekday		7:00 AM – 9:30 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		--
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	10/15
		Off-Peak	30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			2,169
Key Destinations			Virginia Tech, Gilbert Linkous Elementary School

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 69.6 passengers per revenue hour, Progress Street ranks 2nd in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (35.5), ranking 4th. Progress Street's on-time rate is 98.3 percent, ranking 1st and well above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation but does meet them for frequency of service during both peak and off-peak hours. Table 25 summarizes service productivity metrics for Progress Street.

Table 25: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 69.6	Average 90% — 98.28%

Passengers per Trip
Average 25.6 — 35.5

RIDERSHIP

Progress Street averages 2,169 passengers per weekday (ranking 1st among 15 services).

Ridership by Stop

Figure 43 and Figure 44 summarize total activity (boardings and alightings) by stop during full service. The most common places passengers board this service are at Squires East and The Village on Patrick Henry. The most frequent stops at which passengers alight from the bus include both of the aforementioned stops, along with Stanger/Old Turner.

Figure 43: Ridership by Stop

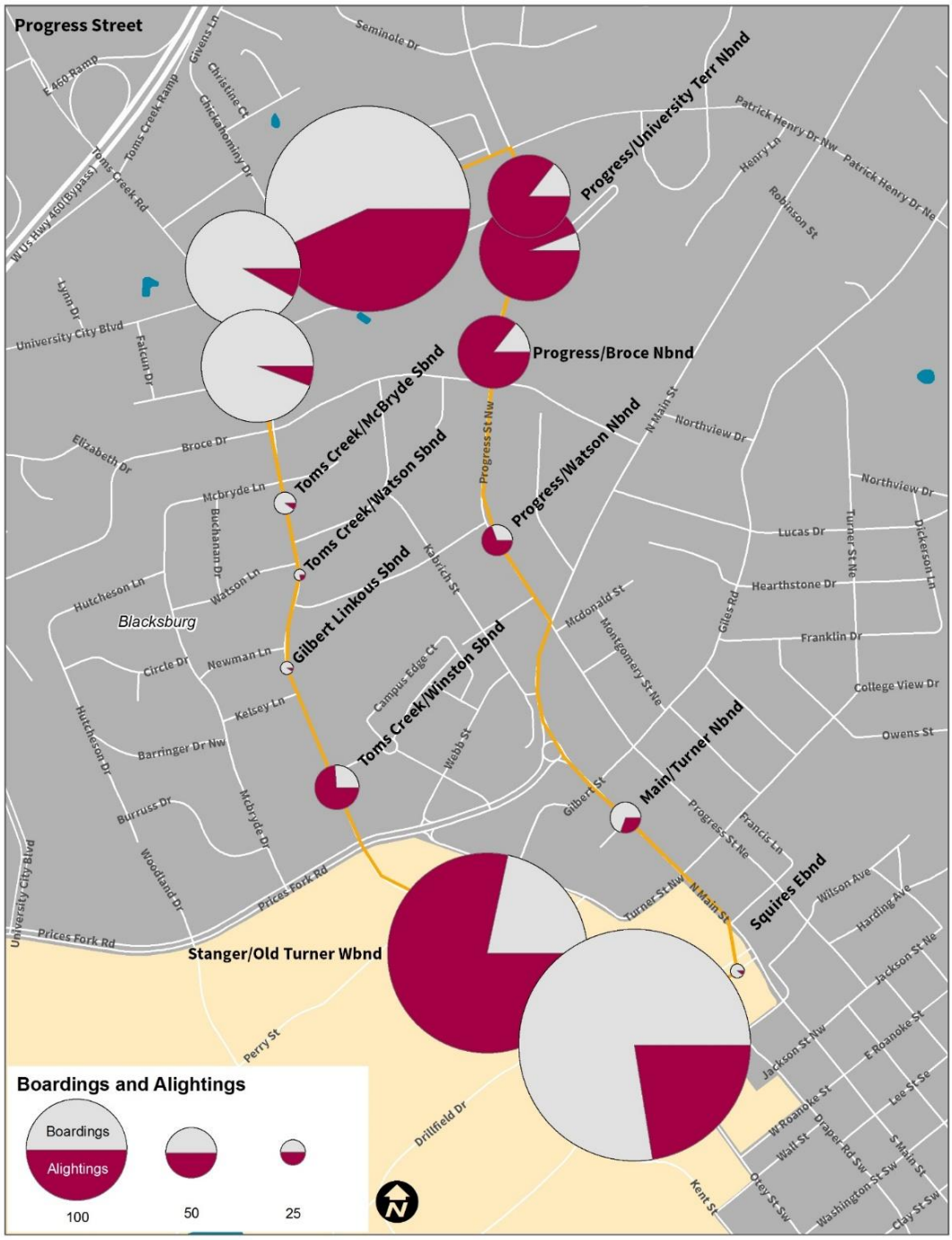
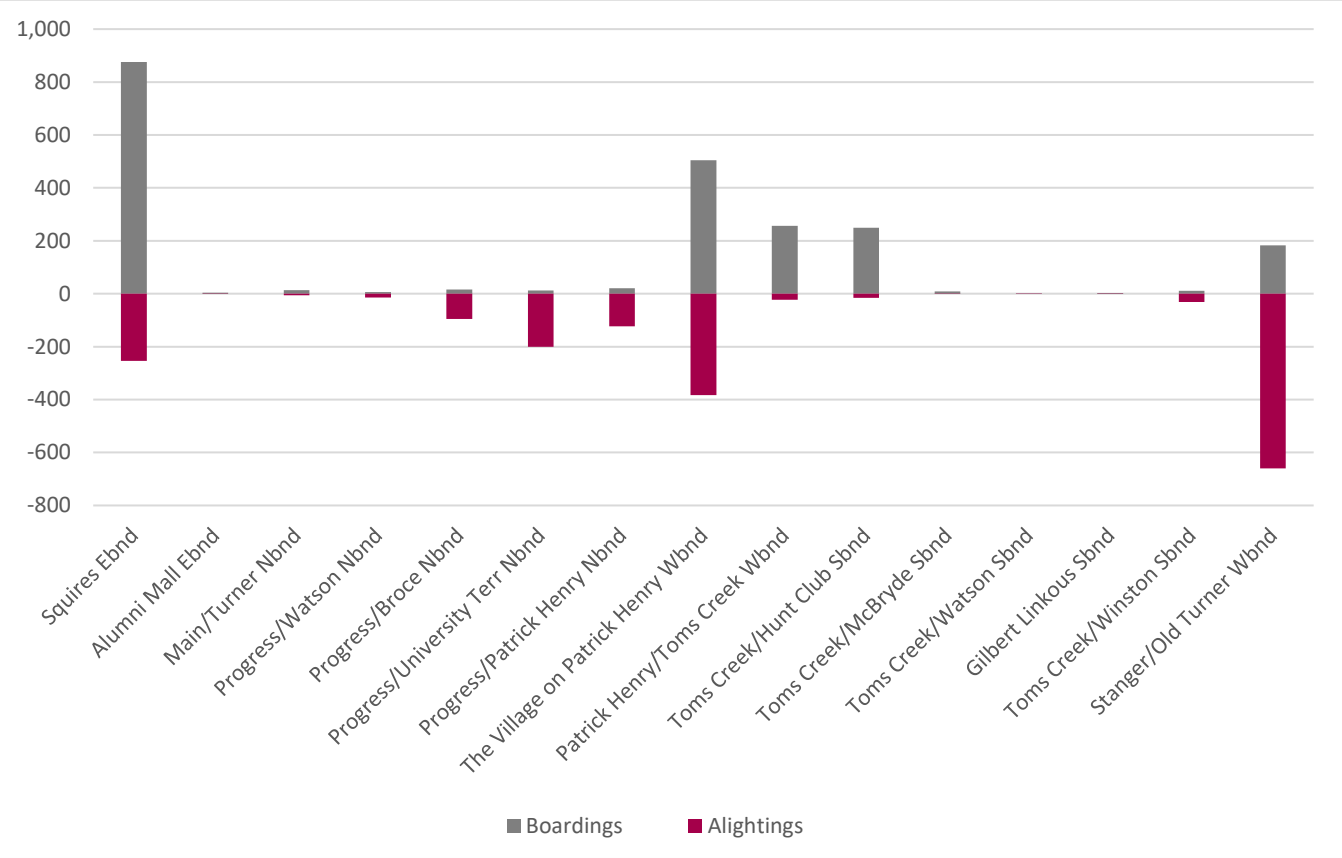


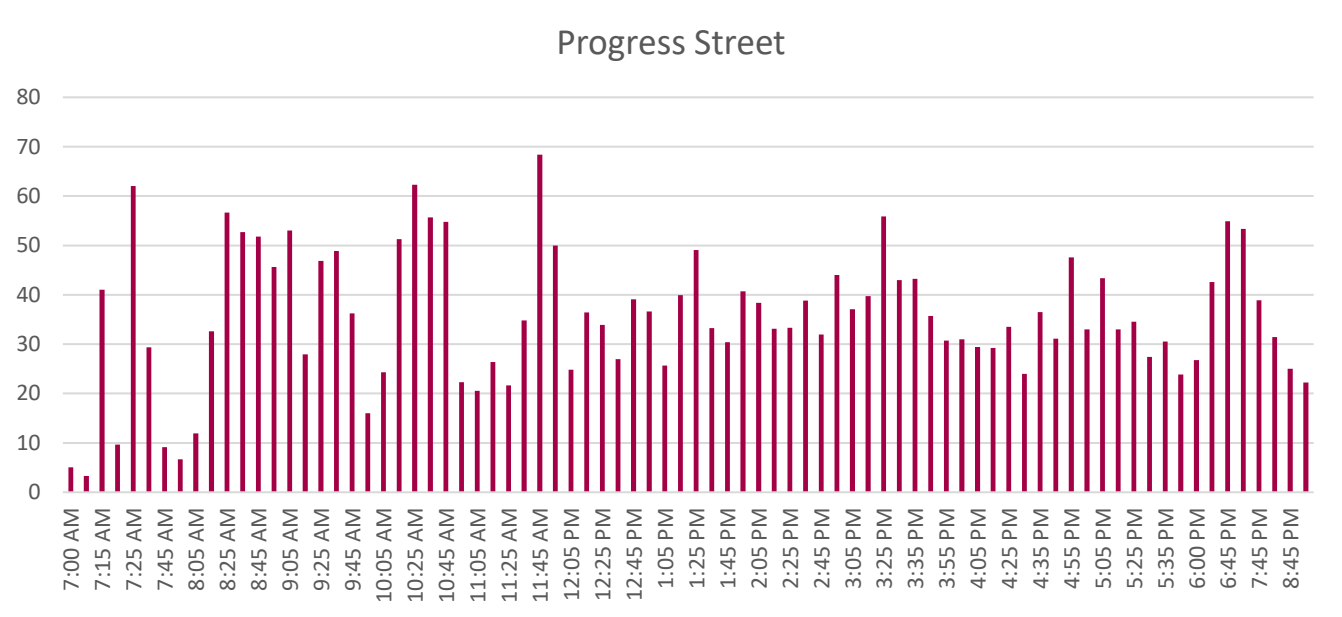
Figure 44: Boardings and Alightings by Stop



Ridership by Trip

Figure 45 shows the boardings for each trip over the course of a full service day. Progress Street trips have high average ridership throughout the service day. The highest-ridership trip, the 11:45 am, averages 68 passengers. Two other morning trips also average over 60 passengers, including the 7:25 am and the 10:25 am, while trips averaging over 50 passengers run as late as 7:15 pm.

Figure 45: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Frequent morning and afternoon service.
- High average weekday ridership and productivity.
- Provides connection between dense student apartment complexes and Virginia Tech.
- High on-time performance.

Weaknesses

- No weekend service – passengers must use the Toms Creek or University City Boulevard routes instead
- Low reduced service frequencies.
- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route .

Opportunities

- Realign route to serve the MMTF when it opens.
- Increase frequencies or provide additional service in the opposite direction.

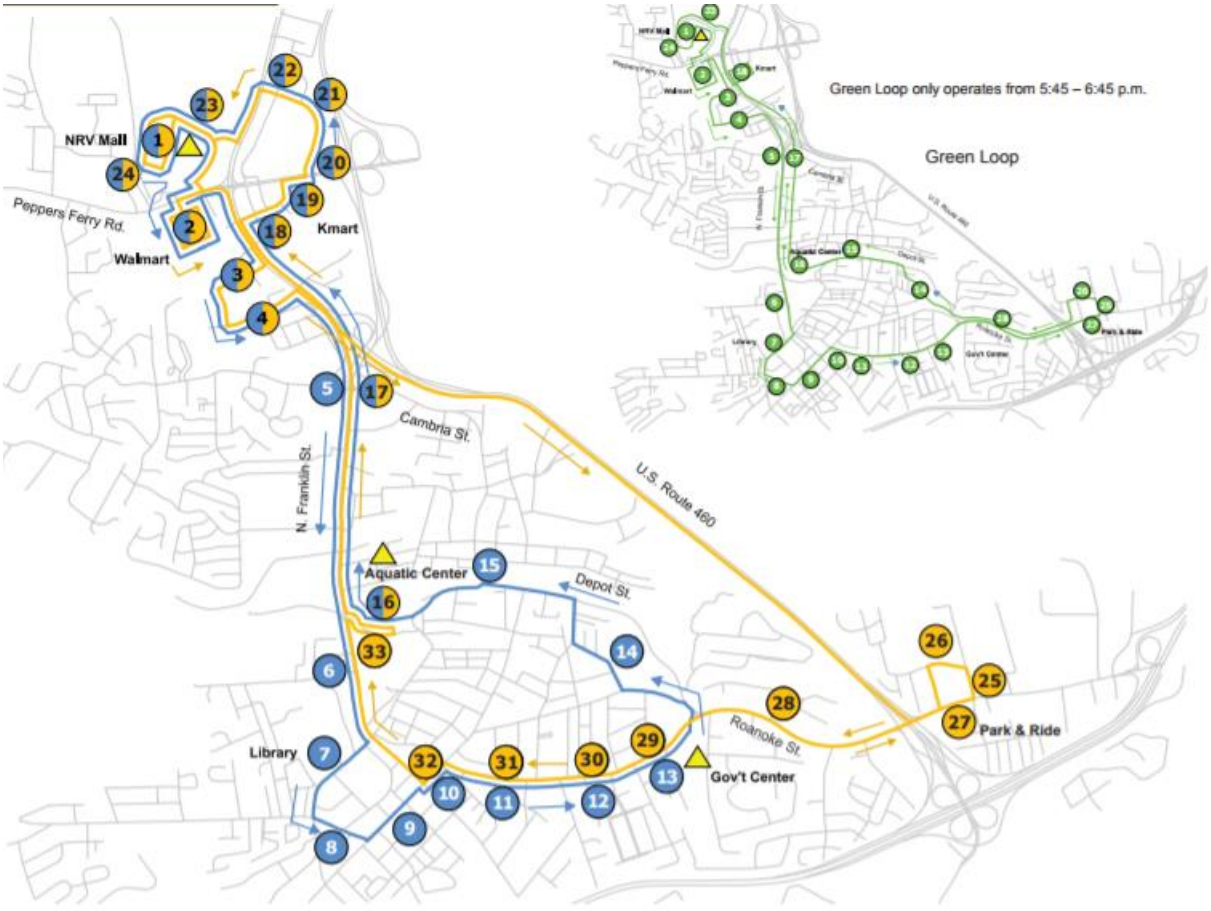
The Explorer

SERVICE DESCRIPTION

The Explorer (shown in Figure 46) operates on weekdays only, connecting Christiansburg with the New River Valley Mall. It is comprised of three different loop routes, the Gold Loop, the Blue Loop, and the Green Loop. All three loops run along Franklin Street near the NRV Mall, diverting frequently to serve shopping destinations along this corridor. The Green and Blue Loops use Franklin Street to travel from the NRV Mall area to downtown Christiansburg in both directions, while the Gold Loop travels northbound on Franklin and uses the Route 460 Bypass to travel southbound. The Green and Gold Loops serve the Christiansburg Park and Ride on Roanoke Street, using Roanoke Street to travel from there to the Government Center. The Green Loop uses Depot Street to get from there to Franklin Street, while the Gold Loop stays on Roanoke Street to get to Franklin Street. The Blue Loop travels eastbound on Depot Street from the Government Center, returning on Roanoke Street, with a diversion to serve the public library.

Transfers are available at the Park and Ride to the BT Commuter, and at NRV Mall to the Two Town Trolley.

Figure 46: The Explorer Map



OPERATING CHARACTERISTICS

Each of the three Explorer loops operates at a different frequency. The Blue Loop offers six trips per day, operating every 120 minutes between 7:15 am and 5:40 pm. The Green Loop offers five trips per day, operating every two hours between 8:00 am and 4:30 pm. These two routes combine to create 60 minute headways at some stops,

including the shopping destinations at and near the NRV Mall. The Green Loop operates one trip per day, departing the NRV Mall at 5:45 pm and returning to it at 6:45 pm. Each loop operates Monday through Friday during full and reduced service, and does not operate on weekends. The route offers connections to the BT Commuter and the Two Town Trolley. It serves the NRV Mall, Christiansburg Library, Christiansburg Aquatic Center, and Christiansburg Government Center. Table 26 summarizes The Explorer's operating characteristics.

Table 26: Operating Characteristics

Destination	From		NRV Mall
	To		NRV Mall/Shoppers Way at Best Buy
Full Service Span	Weekday		7:15 AM – 6:45 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		7:15 AM – 6:45 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	60/120
		Off-Peak	--
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	60/120
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			38
Key Destinations			NRV Mall, Christiansburg

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 5.5 passengers per revenue hour, The Explorer ranks 17th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (3), also ranking 17th. The route rates as marginal by passenger productivity metrics. It does meet the Community Circulator standards for hours of operation and frequency of service. Table 27 summarizes service productivity metrics for The Explorer.

Table 27: Service Productivity Metrics

Passengers per Revenue Hour	Passengers per Trip
Average 43.6 5.5	Average 25.6 3

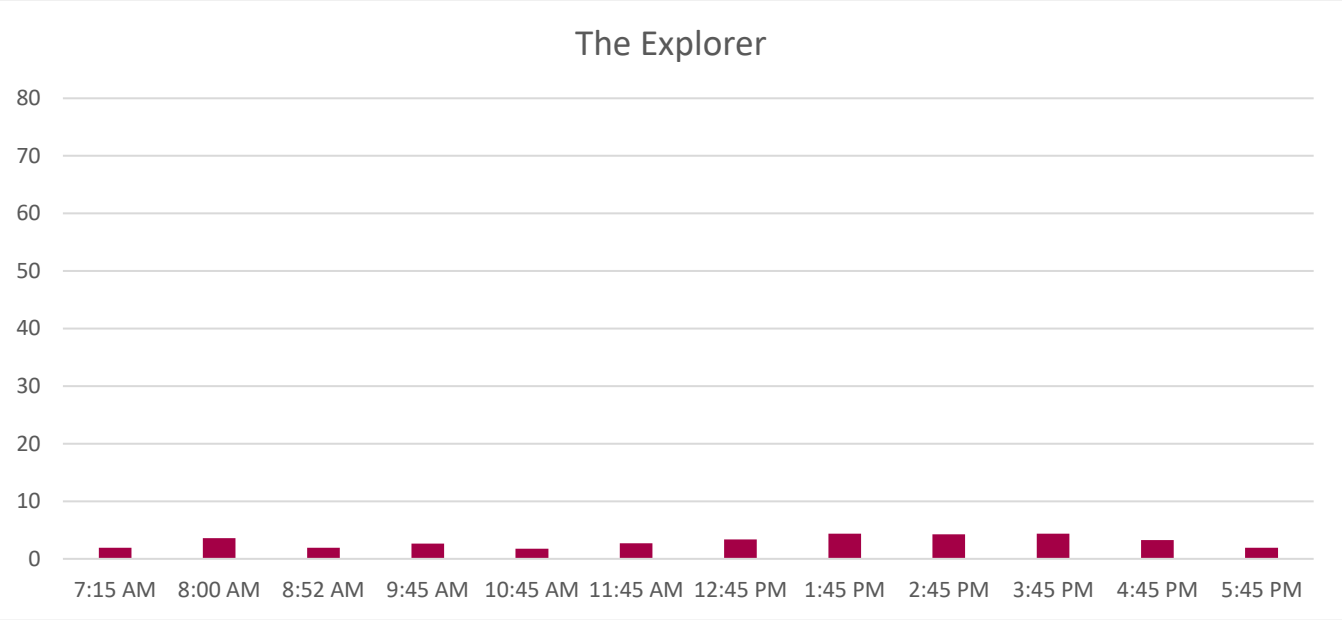
RIDERSHIP

Combined, The Explorer routes average 38 daily boardings per weekday.

Ridership by Trip

Figure 47 shows the boardings for each trip over the course of a full service day. No trip averages more than four passengers per day. The three trips that reach four passengers per day on average are the 1:45 pm, 2:45 pm, and 3:45 pm trips.

Figure 47: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Only route with all day service to downtown Christiansburg.
- Only route connecting Christiansburg to the NRV Mall.

Weaknesses

- Very low ridership.
- Multiple service patterns and one-way loops make service less efficient and more confusing to riders.
- Very low frequency.
- No weekend service.

Opportunities

- Consider an extension to the new Amtrak station if proposed for the Christiansburg site.
- Consider an extension of the route into the Merrimac area.

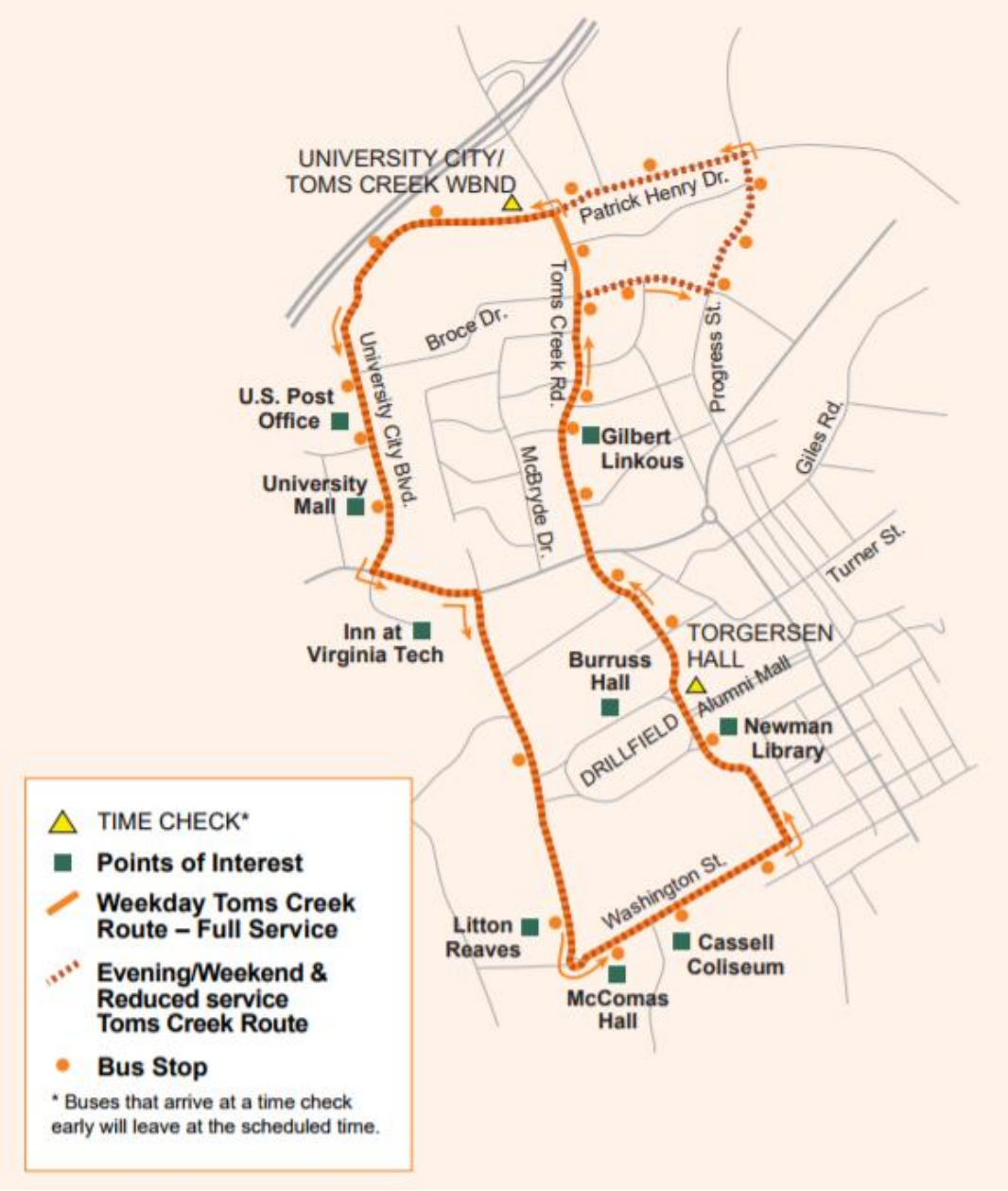
Toms Creek

SERVICE DESCRIPTION

Toms Creek (shown in Figure 48) operates seven days a week between Torgerson Hall and University City/Toms Creek. The route travels primarily along Stanger Street, Toms Creek Road, University City Boulevard, Prices Fork Road, West Campus Drive, and Washington Street. On late nights, weekends, and during reduced service, the service uses an alternative route, traveling on Broce Drive, Progress Street, and Patrick Henry Drive. The route operates as a one-way loop, so all stops are served in one direction only.

Passengers may transfer between Toms Creek and other services on the Virginia Tech campus, with connections available to all routes except The Explorer.

Figure 48: Toms Creek Map



OPERATING CHARACTERISTICS

The route operates seven days per week, during both full and reduced service. During full service, it operates Monday through Thursday from 7:00 am until 12:30 am, Friday from 7:00 am until 2:30 am, Saturday from 9:30 am to 2:30 am, and Sunday from 11:30 am to 11:30 pm. On Monday through Thursday, it operates every 10 minutes from start of service until 5:45 pm, every 15 minutes from 5:45 pm until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. On Friday, it operates every 10 minutes from start of service until 3:15 pm, every 15 minutes from 3:15 pm until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. On Saturdays and Sundays, the route operates every 30 minutes all day. During reduced service, the route operates from 7:00 am until 10:00 pm on weekdays, from 9:30 am until 9:00 pm on Saturdays, and from 11:30 am until 7:00 pm on Sundays. During reduced service, the route operates with 30 minute headways at all times. The route offers connections to all routes excluding The Explorer, and serves a variety of activity generators, including Virginia Tech, Gilbert Linkous Elementary School, University Mall, and the Inn at Virginia Tech. Table 28 summarizes Toms Creek's operating characteristics.

Table 28: Operating Characteristics

Destination	**From**		Torgerson Hall
	To		University City/Toms Creek
Full Service Span	**Weekday**		7:00 AM – 12:30 AM/2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM
Reduced Service Span	**Weekday**		7:00 AM – 10:00 PM
	Saturday		9:30 AM – 9:00 PM
	Sunday		11:30 AM –7:00 PM
Full Service Frequency	**Weekday**	**Peak**	10/15
		Off-Peak	10/30
	Saturday		30
	Sunday		30
Reduced Service Frequency	**Weekday**	**Peak**	30
		Off-Peak	30
	Saturday		30
	Sunday		30
Average Weekday Ridership (Full Service)			1,997
Key Destinations			Virginia Tech, Gilbert Linkous Elementary School, University Mall, Inn at Virginia Tech

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 66.2 passengers per revenue hour, Toms Creek ranks 3rd in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (36.9), also ranking 3rd. Toms Creek's on-time rate is 92.5 percent, ranking 6th and falling above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It meets system-wide standards for hours of operation and frequency of service during both peak and off-peak hours. Table 29 summarizes service productivity metrics for Toms Creek.

Table 29: Service Productivity Metrics

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 66.2	Average 90% — 92.54%

Passengers per Trip
Average 25.6 — 36.9

RIDERSHIP

Toms Creek averages 1,997 passengers per weekday (ranking 3rd of 15 services).

Ridership by Stop

Figure 49 and Figure 50 summarize total activity (boardings and alightings) by stop during full service. Most common boarding locations include Torgersen Hall, Old Security Building, and Toms Creek/University City. The most common destination stops for passengers on this route include Toms Creek/Hunt Club, Wright House, and Newman Library.

Figure 49: Ridership by Stop

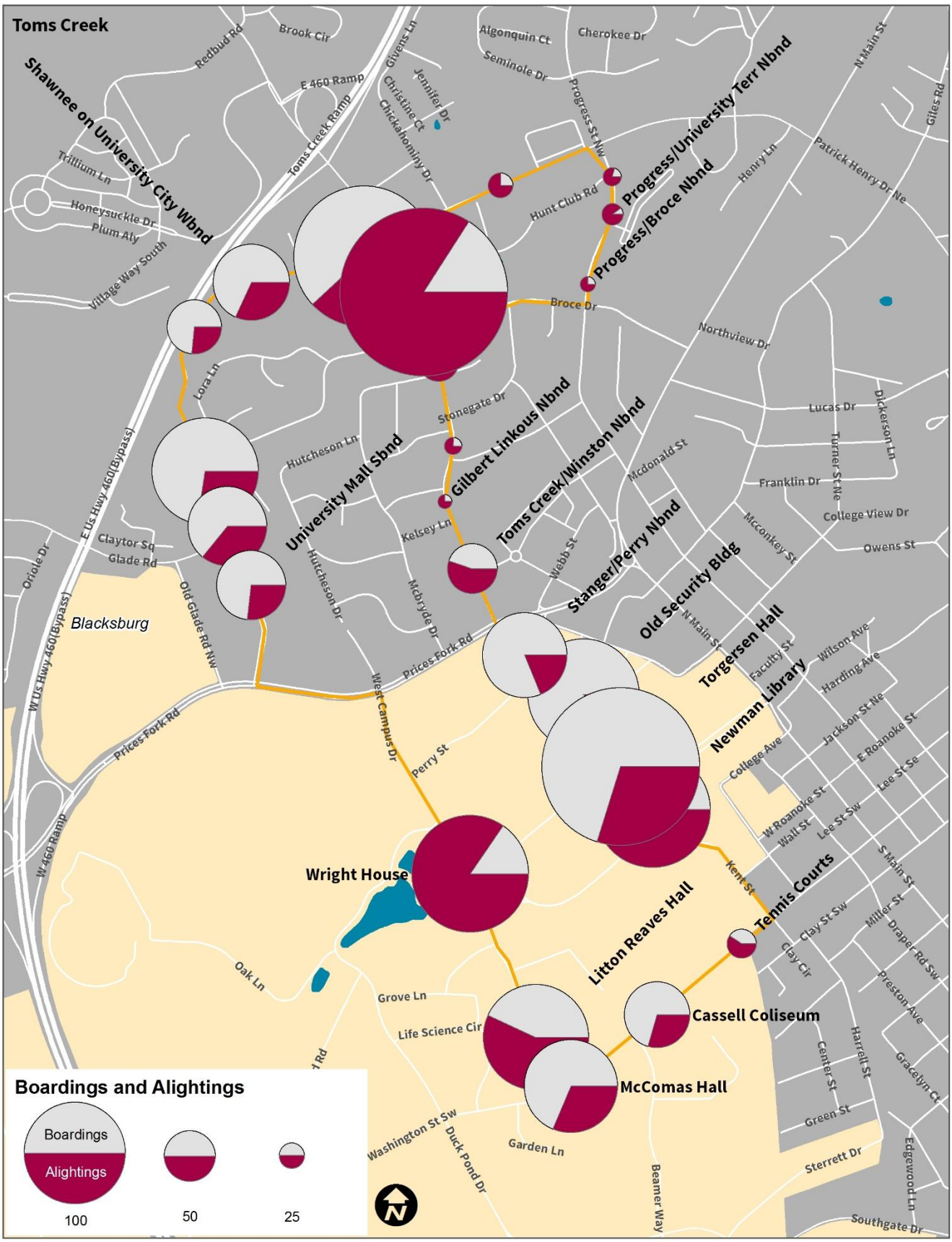
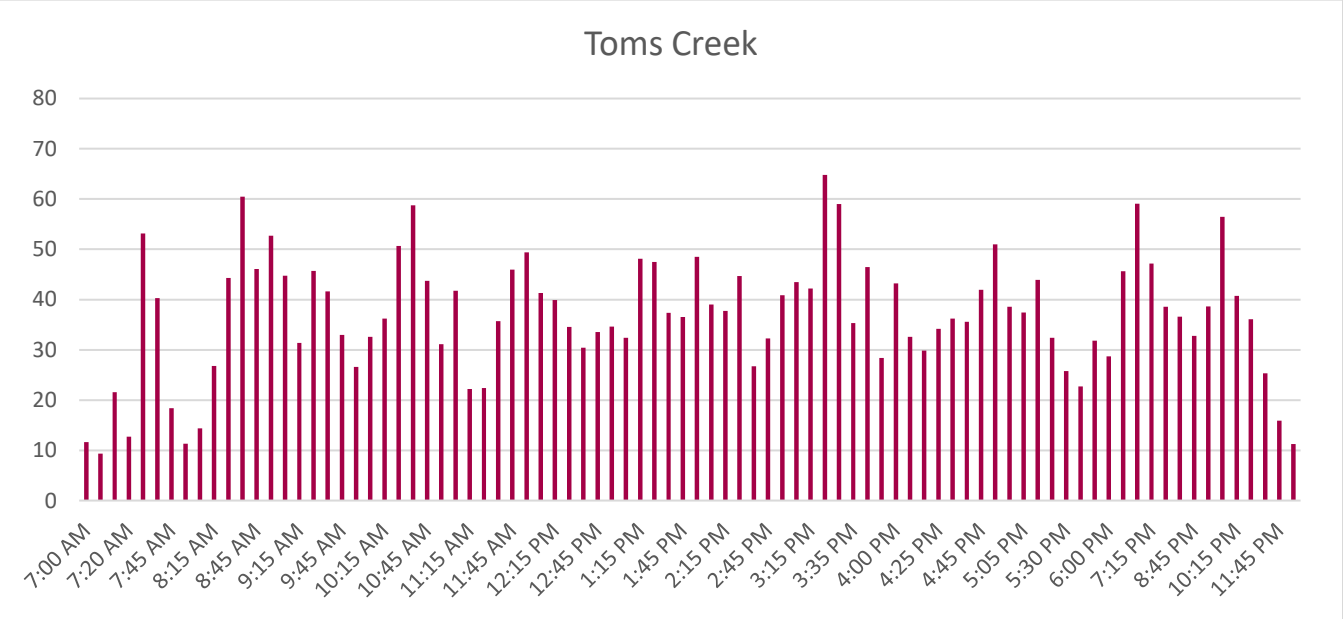


Figure 50: Boardings and Alightings by Stop

Ridership by Trip

Figure 51 shows the boardings for each trip over the course of a full service day. Ridership is strong all day. The highest ridership trips can be found on the 3:25 pm departure, with 65 passengers riding the bus on an average day. Nine other trips average over 50 passengers per day, including trips as early as 7:25 am and as late as 9:45 pm.

Figure 51: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- High ridership.
- High frequencies all day during full service.
- Provides a connection between dense student apartment complexes, the University Mall, and Virginia Tech.
- Above-average on time performance.
- Transfers available to many other BT services.

Weaknesses

- Low reduced service and weekend frequencies.
- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route.

Opportunities

- Realign route to serve the MMTF when it opens.
- Increase frequency or provide additional service in the opposite direction.

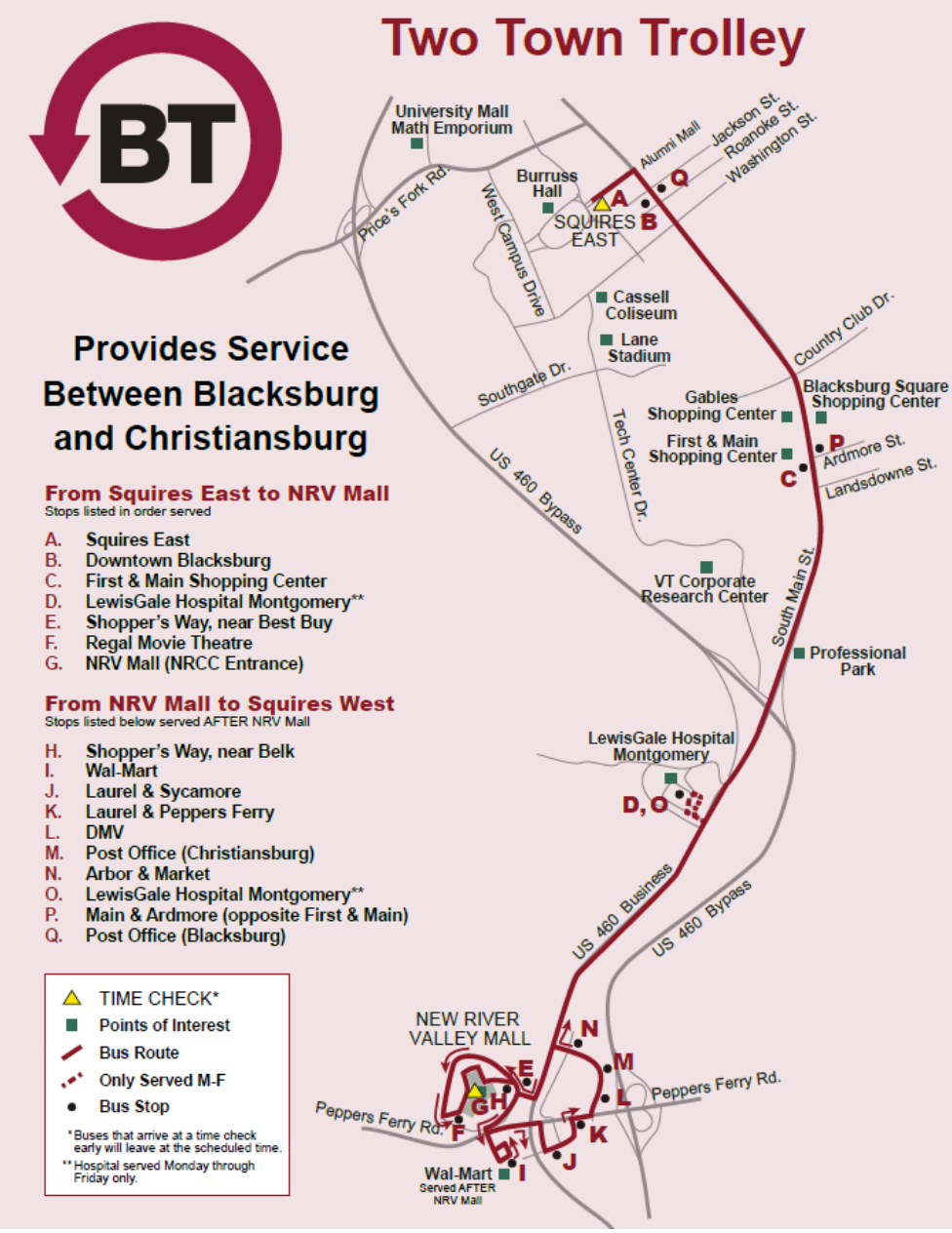
Two Town Trolley

SERVICE DESCRIPTION

Two Town Trolley (shown in Figure 52) operates seven days a week between Squires East and the New River Valley Mall. The route travels primarily along Alumni Mall, South Main Street, and US 460 Business, with deviations to serve the LewisGale Hospital Montgomery (weekdays only) and shopping destinations near the New River Valley Mall. The area around the New River Valley Mall is served as a one-way loop, with stops only being served in one direction.

Passengers may transfer between Two Town Trolley and other services at several locations. Transfers are available at the Virginia Tech campus to all BT routes except The Explorer. Transfers are available to The Explorer (all loops) at NRV Mall.

Figure 52: Two Town Trolley Map



OPERATING CHARACTERISTICS

The route operates seven days a week during both full and reduced service. During full service, the route operates from 7:00 am until 5:55 pm Monday through Thursday, 7:00 am to 12:45 am on Friday, 10:15 am to 12:45 am on Saturdays, and 12:15 pm to 5:45 pm on Sundays. During reduced service, the route operates weekdays from 7:00 am to 5:55 pm, Saturdays from 10:15 am to 5:45 pm, and Sundays from 12:15 pm to 5:45 pm. During both full and reduced service, the route operates with hourly frequencies at all times. The route offers connections to all BT routes, and serves a variety of activity generators, including Virginia Tech, Gables Shopping Center, Blacksburg Square Shopping Center, First and Main Shopping Center, Professional Park, LewisGale Hospital Montgomery (weekdays only), Wal-Mart, and the New River Valley Mall. Table 30 summarizes Two Town Trolley's operating characteristics.

Table 30: Operating Characteristics

Destination	From		Squires East
	To		New River Valley Mall
Full Service Span	Weekday		7:00 AM – 5:55 PM/12:45 AM
	Saturday		10:15 AM – 12:45 AM
	Sunday		12:15 PM – 5:45 PM
Reduced Service Span	Weekday		7:00 AM – 5:55 PM
	Saturday		10:15 AM – 5:45 PM
	Sunday		12:15 PM – 5:45 PM
Full Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		60
Reduced Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		60
Average Weekday Ridership (Full Service)			435
Key Destinations			Virginia Tech, Gables Shopping Center, Blacksburg Square Shopping Center, First and Main Shopping Center, Professional Park, LewisGale Hospital Montgomery, Walmart, New River Valley Mall

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 16 passengers per revenue hour, Two Town Trolley ranks 16th in the system and falls below the system average of 43.6. The route similarly falls below average in passengers per trip (16.4), ranking 14th. Tow Town Trolley's on-time rate is 92.1 percent, ranking 8th and falling above the weekday system average. The route rates as marginal by passenger productivity metrics, and good by schedule adherence metrics. It does not meet system-wide standards for hours of operation or frequency of service. Table 31 summarizes service productivity metrics for Two Town Trolley.

Table 31: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 16	Average 90% 92.12%
Passengers per Trip	
Average 25.6 16.4	

RIDERSHIP

Two Town Trolley averages 435 passengers per weekday, ranking 14th of 15 Blacksburg routes.

Ridership by Stop

Figure 53 and Figure 54 summarize total stop activity (boardings and alightings) by stop during full service. The most popular places to both board and alight the bus include Squires East, NRV Mall, and Walmart. The Two Town Trolley is a limited stop service and therefore does not stop at many of the lower ridership stops on South Main Street that are served by the Main Street South route.

Figure 53: Ridership by Stop

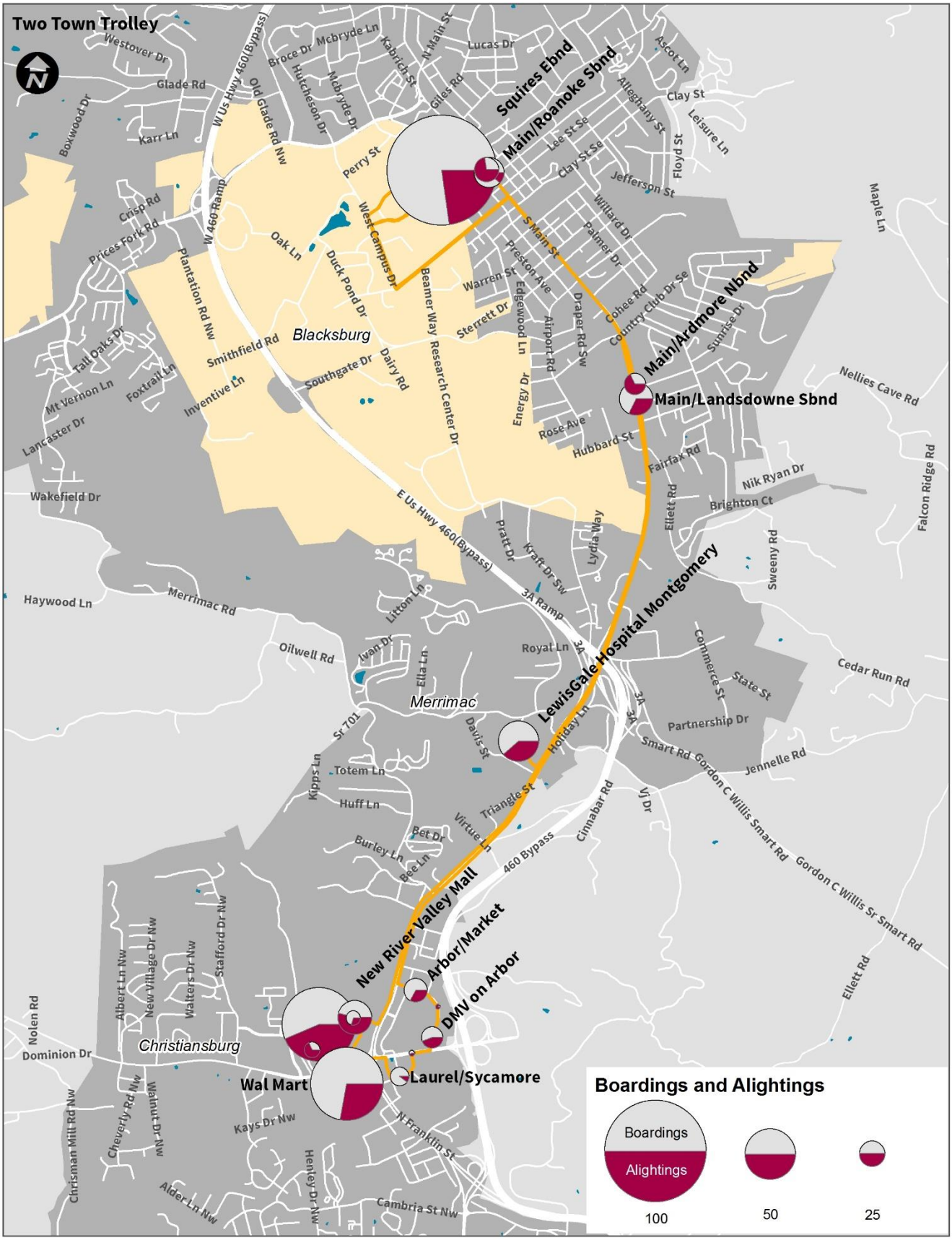
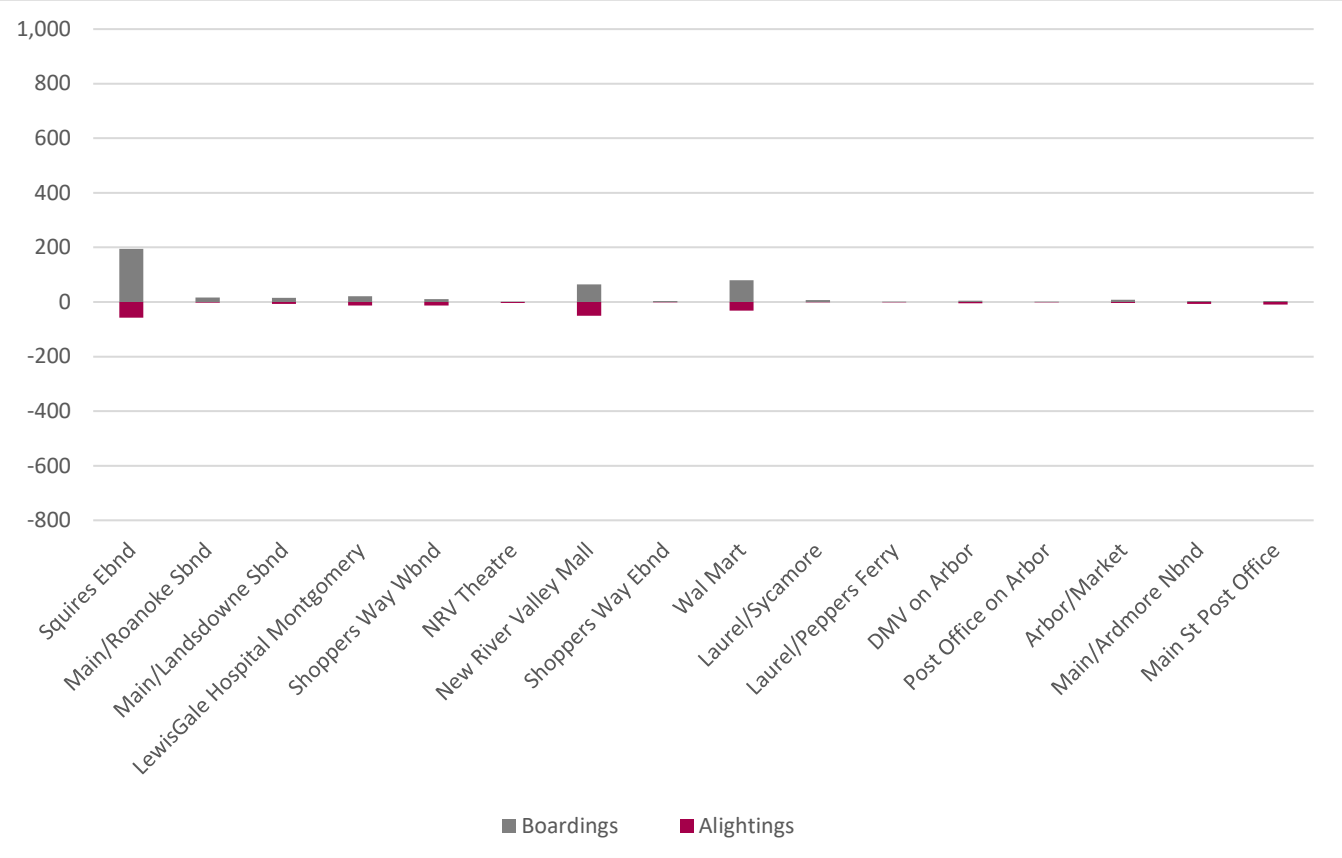


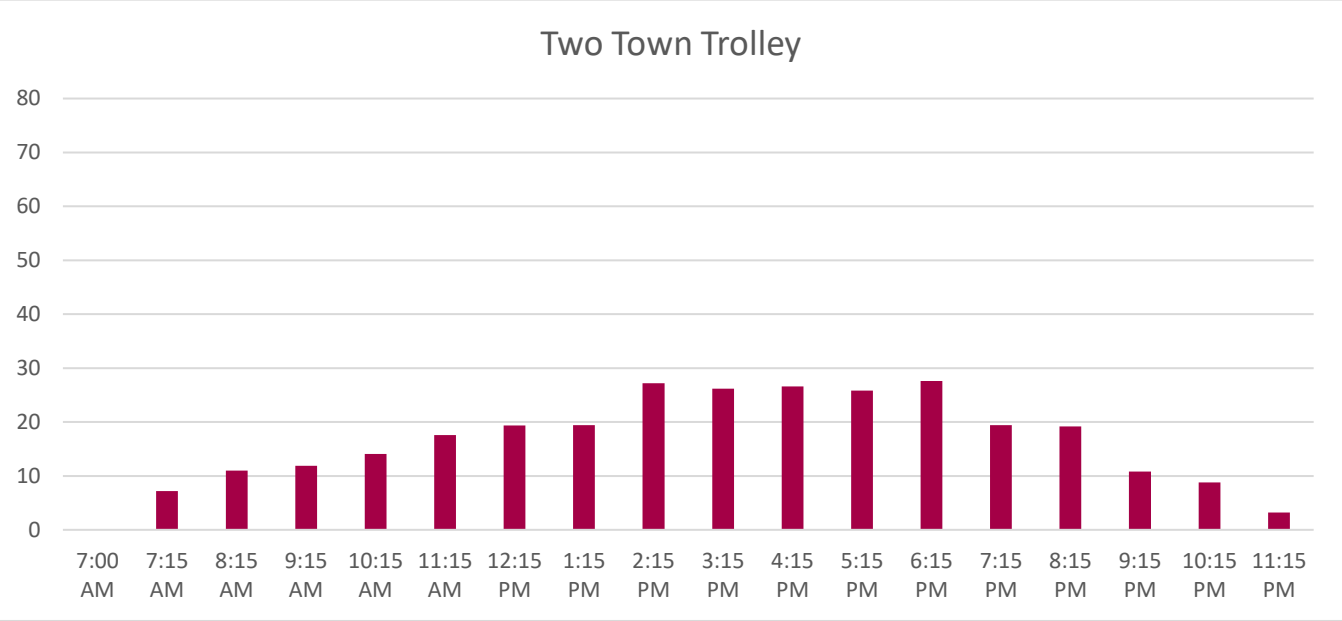
Figure 54: Boardings and Alightings by Stop



Ridership by Trip

Figure 55 shows the boardings for each trip over the course of a full service day. Average ridership is highest on the route's afternoon trips, with all five of the trips with the highest average ridership taking place between 2:15 pm and 6:15 pm. These are the only trips that average more than 20 passengers per day.

Figure 55: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Only route with direct service from NRV Mall to Blacksburg.
- Only route with service to LewisGale Hospital Montgomery.
- Limited number of stops help with runtimes and on-time performance.
- Above-average on-time performance.
- Transfers available to all other BT routes.

Weaknesses

- Low ridership.
- Low frequencies.
- Limited span of service on weekends.
- No weekend service to LewisGale Hospital Montgomery.

Opportunities

- Realign route to serve the MMTF when it opens.

University City Boulevard

SERVICE DESCRIPTION

University City Boulevard (shown in Figure 56) operates seven days a week between Burruss Hall and Patrick Henry/Toms Creek. The route travels primarily along the Drillfield, West Campus Drive, Prices Fork Road, University City Boulevard, Patrick Henry Drive, Progress Street, North Main Street, and Stanger Street. During late nights and weekends, the route diverts along North Main Street to Alumni Mall, bypassing Stanger Street. The route operates in a one-way loop, meaning each stop is only served in one direction.

Passengers may transfer between University City Boulevard and other services at Virginia Tech, where connections are available with all BT routes except The Explorer.

Figure 56: University City Boulevard Map

OPERATING CHARACTERISTICS

During full service, the route operates seven days a week. Monday through Thursday, it operates from 7:00 am to 9:30 pm. On Friday, it operates 7:00 am to 2:30 am. On Saturday, it operates 9:30 am to 2:30 am. On Sunday, it operates from 11:30 am to 11:30 pm. Monday through Thursday, it offers 10 minute headways from start of service until 5:45 pm, 15 minute headways from 5:45 pm to 6:15 pm, and 30 minute headways from 6:15 pm to end of service. On Fridays, it offers 10 minute headways from start of service until 3:15 pm, 15 minute headways from 3:15 pm until 6:15 pm, and 30 minute headways from 6:15 pm until end of service. On Saturdays and Sundays, it offers 30 minute headways all day. During reduced service, the route operates weekdays only from 7:00 am to 6:30 pm, offering 30 minute headways all day. The route offers connections to all routes excluding The Explorer, and serves activity generators including Virginia Tech and University Mall. Table 32 summarizes University City Boulevard's operating characteristics.

Table 32: Operating Characteristics

Destination	From		Burruss Hall
	To		Patrick Henry/Toms Creek
Full Service Span	Weekday		7:00 AM – 9:30 AM/2:30 AM
	Saturday		9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM
Reduced Service Span	Weekday		7:00 AM – 6:30 PM
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	10/15
		Off-Peak	10/30
	Saturday		30
	Sunday		30
Reduced Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			1,826
Key Destinations			Virginia Tech, University Mall

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 51.3 passengers per revenue hour, University City Boulevard ranks 9th in the system and falls above the system average of 43.6. The route similarly falls above average in passengers per trip (34.7), ranking 5th. University City Boulevard's on-time rate is 95.2 percent, ranking 2nd and falling above the weekday system average. The route rates as good by passenger productivity metrics, and good by schedule adherence metrics. It meets system-wide standards for hours of operation and frequency of service during both peak and off-peak hours. Table 33 summarizes service productivity metrics for University City Boulevard.

Table 33: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6 — 51.3	Average 90% — 95.23%

Passengers per Trip
Average 25.6 — 34.7

RIDERSHIP

University City Boulevard averages 1,826 passengers per weekday (ranking 5th of 15 Blacksburg services).

Ridership by Stop

Figure 57 and Figure 58 summarize total activity (boardings and alightings) by stop during full service. The most common boarding locations include Burruss Hall, Progress/Hunt Club, and West Campus/Perry. The most common places where passengers alight from the bus include Burruss Hall, University Mall, and Stanger/Old Turner.

Figure 57: Ridership by Stop

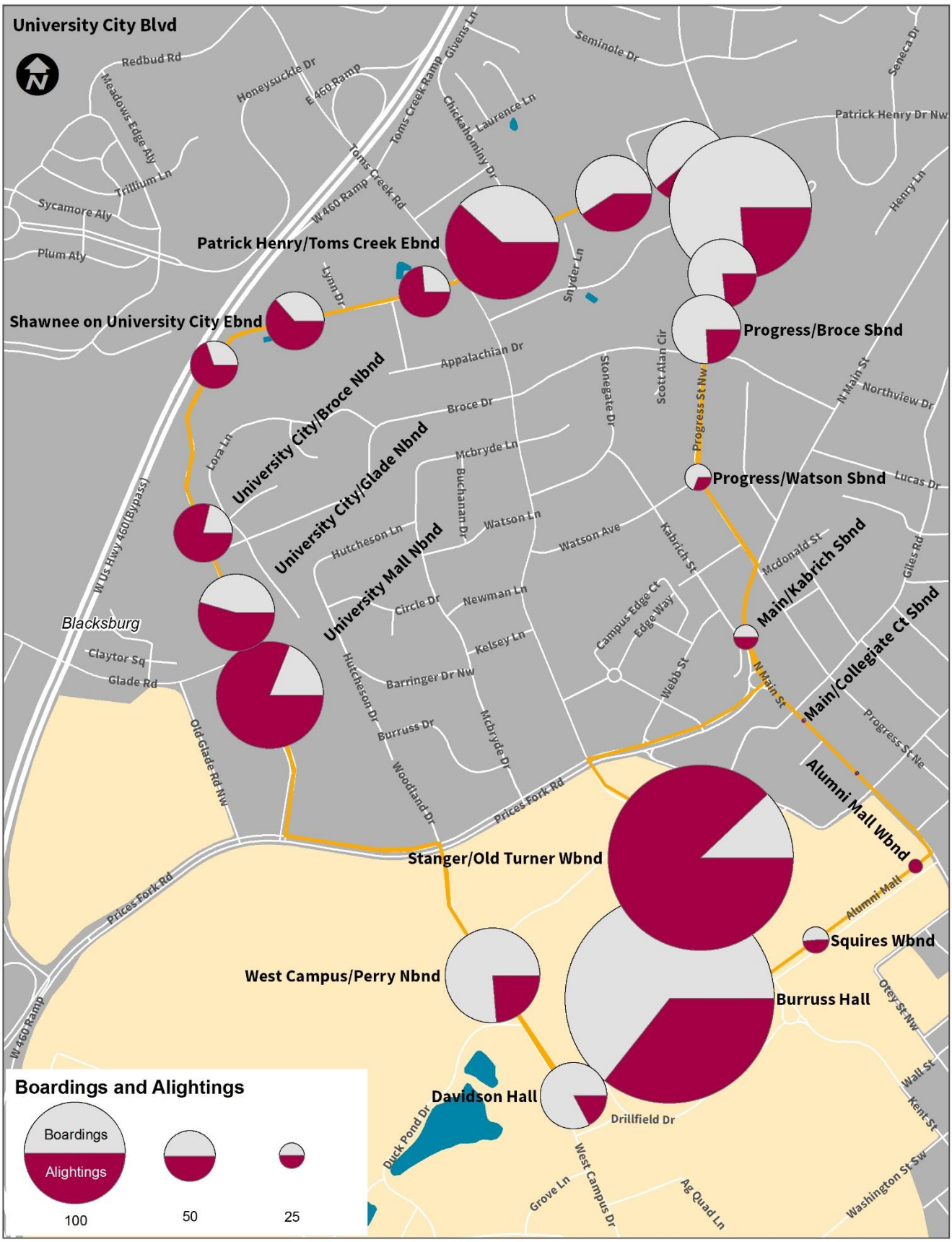
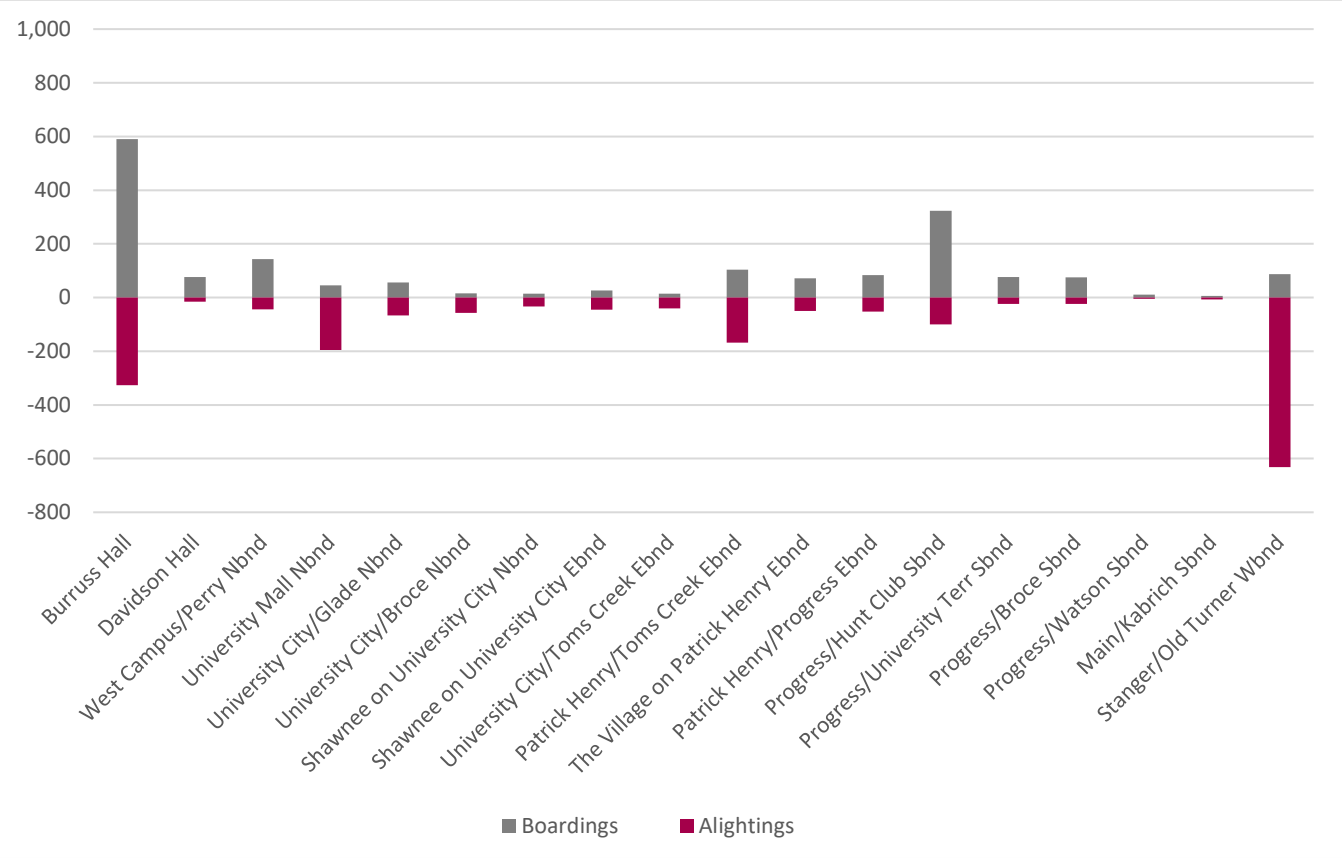


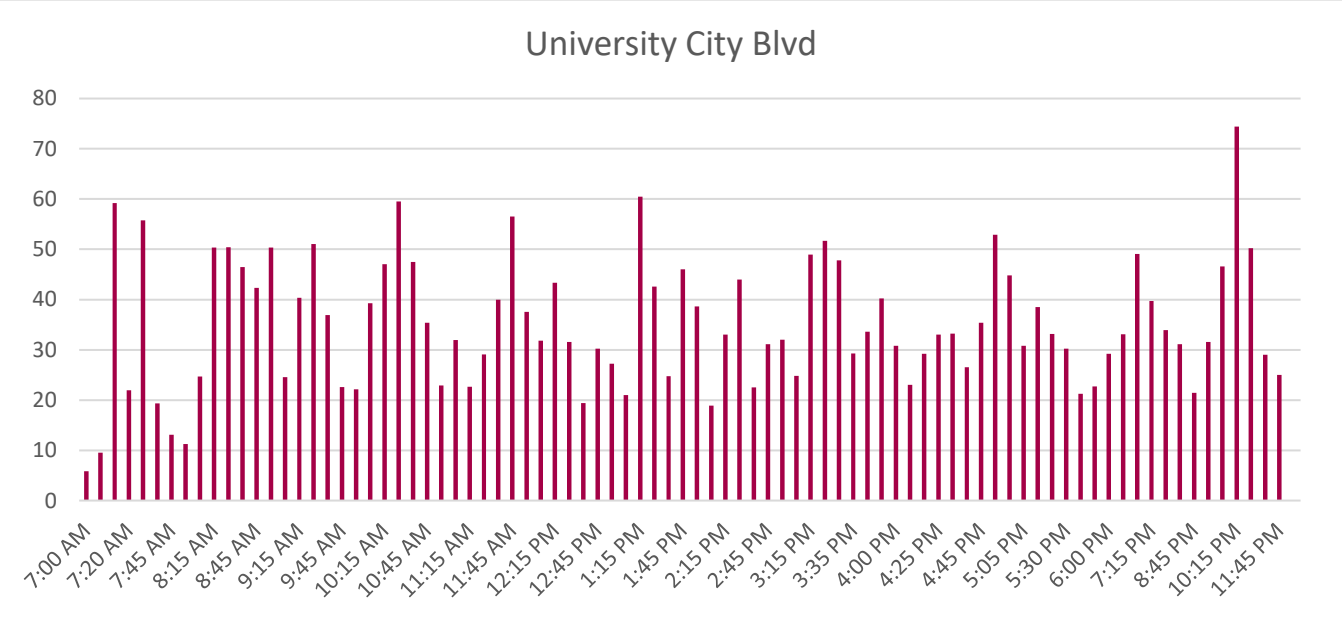
Figure 58: Boardings and Alightings by Stop



Ridership by Trip

Figure 59 shows the boardings for each trip over the course of a full service day. Ridership is high all day: the trip with the highest ridership is the 10:15 pm trip, which averages 74 passengers per day, but 12 other trips average 50 or more passengers each day, ranging from the 7:15 am trip to the 10:45 pm trip.

Figure 59: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- High frequency all-day service.
- Above-average on time performance.
- High ridership and productivity.
- Transfers available to many BT services.
- Provides service between dense student apartment complexes, Virginia Tech, and the University Mall.

Weaknesses

- No weekend service during reduced service.
- Infrequent weekend service during full service.
- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route.

Opportunities

- Realign route to serve the MMTF when it opens.
- Increase frequency or provide additional service in the opposite direction.

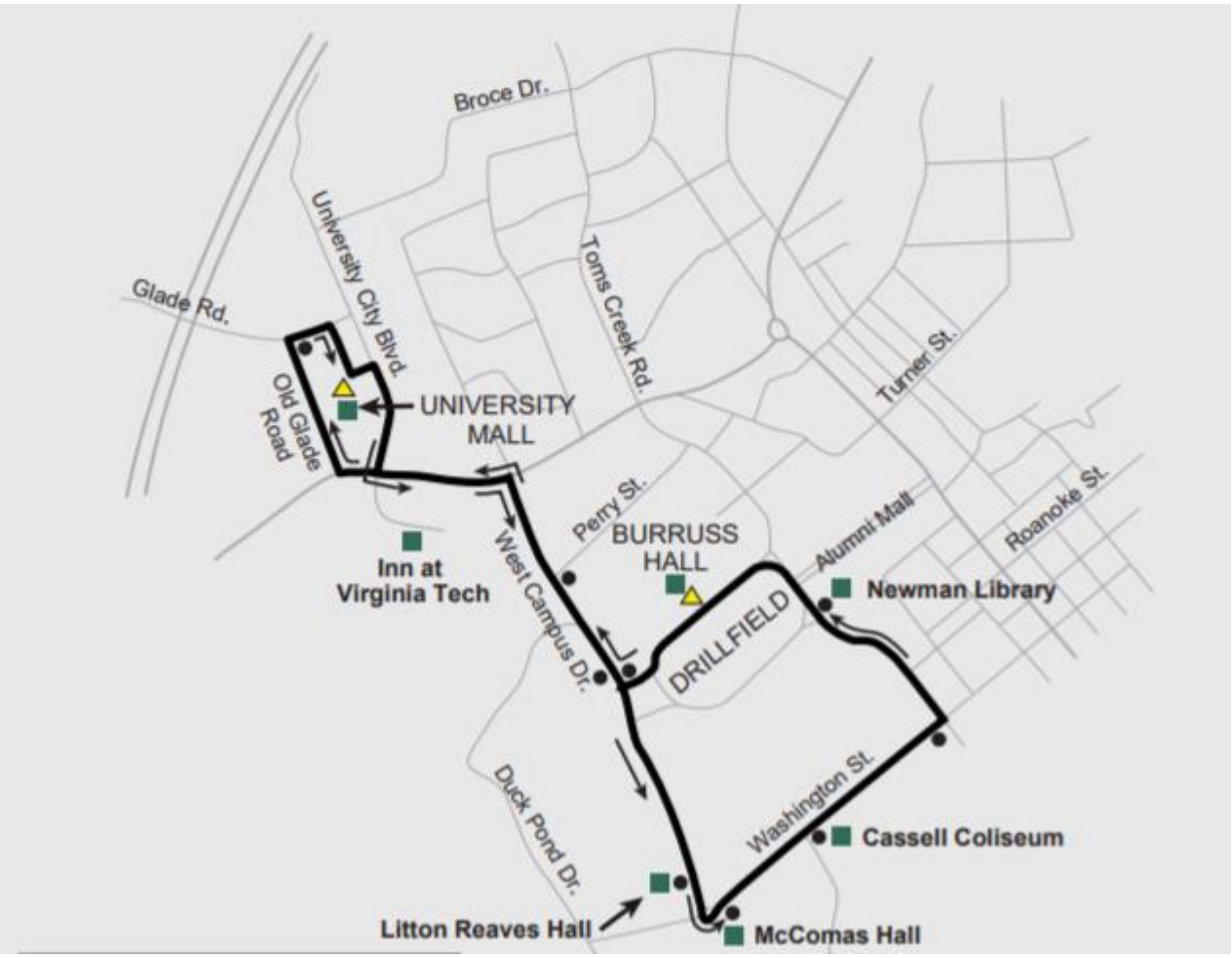
University Mall Shuttle

SERVICE DESCRIPTION

University Mall Shuttle (shown in Figure 60) operates on weekdays only, connecting Burruss Hall with University Mall. The route travels primarily along the Drillfield, West Campus Drive, Prices Fork Road, Old Glade Road, Glade Road, University City Boulevard, Washington Street, and Stanger Street. With the exception of segments on West Campus Drive and Prices Fork Road, the route functions as a one-way loop, meaning that most stops are only served in one direction.

Passengers may transfer between University Mall Shuttle and other services on the Virginia Tech campus, where transfers are available to all BT services except The Explorer.

Figure 60: University Mall Shuttle Map



OPERATING CHARACTERISTICS

The route operates on weekdays during full service only, from 8:45 am to 8:55 pm. It operates every 15 minutes from start of service until 6:15 pm, and every 30 minutes from 6:15 pm until end of service. The route offers connections to every BT route except The Explorer and serves key destinations like Virginia Tech and University Mall. Table 34 summarizes University Mall Shuttle's operating characteristics.

Table 34: Operating Characteristics

Destination	From		Burruss Hall
	To		University Mall
Full Service Span	Weekday		8:45 AM – 8:55 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		--
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15/30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Weekday Ridership (Full Service)			2,044
Key Destinations			Virginia Tech, University Mall

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from April and September 2017 (full service). Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 74.8 passengers per revenue hour, University Mall Shuttle ranks 1st in the system and falls well above the system average of 43.6. The route similarly falls above average in passengers per trip (45.5), also ranking 1st. University Mall Shuttle's on-time rate is 86.6 percent, ranking 14th and falling below the weekday system average. The route rates as good by passenger productivity metrics, and satisfactory by schedule adherence metrics. It does not meet system-wide standards for hours of operation but does meet them for frequency of service during both peak and off-peak hours. Table 35 summarizes service productivity metrics for University Mall Shuttle.

Table 35: Service Productivity Metrics: Weekday

Passengers per Revenue Hour	On-Time Performance
Average 43.6	Average 90%
74.8	86.56%

Passengers per Trip
Average 25.6
45.5

RIDERSHIP

University Mall Shuttle averages 2,044 passengers per weekday, ranking 2nd out of 15 Blacksburg routes.

Ridership by Stop

Figure 61 and Figure 62 summarize total activity (boardings and alightings) by stop during full service. Most passengers using the route board at either University Mall or at Burruss Hall. University Mall is home to the Math Emporium and other Virginia Tech-affiliated entities. The most common stops at which passengers alight from the bus include University Mall and Newman Library.

Figure 61: Ridership by Stop

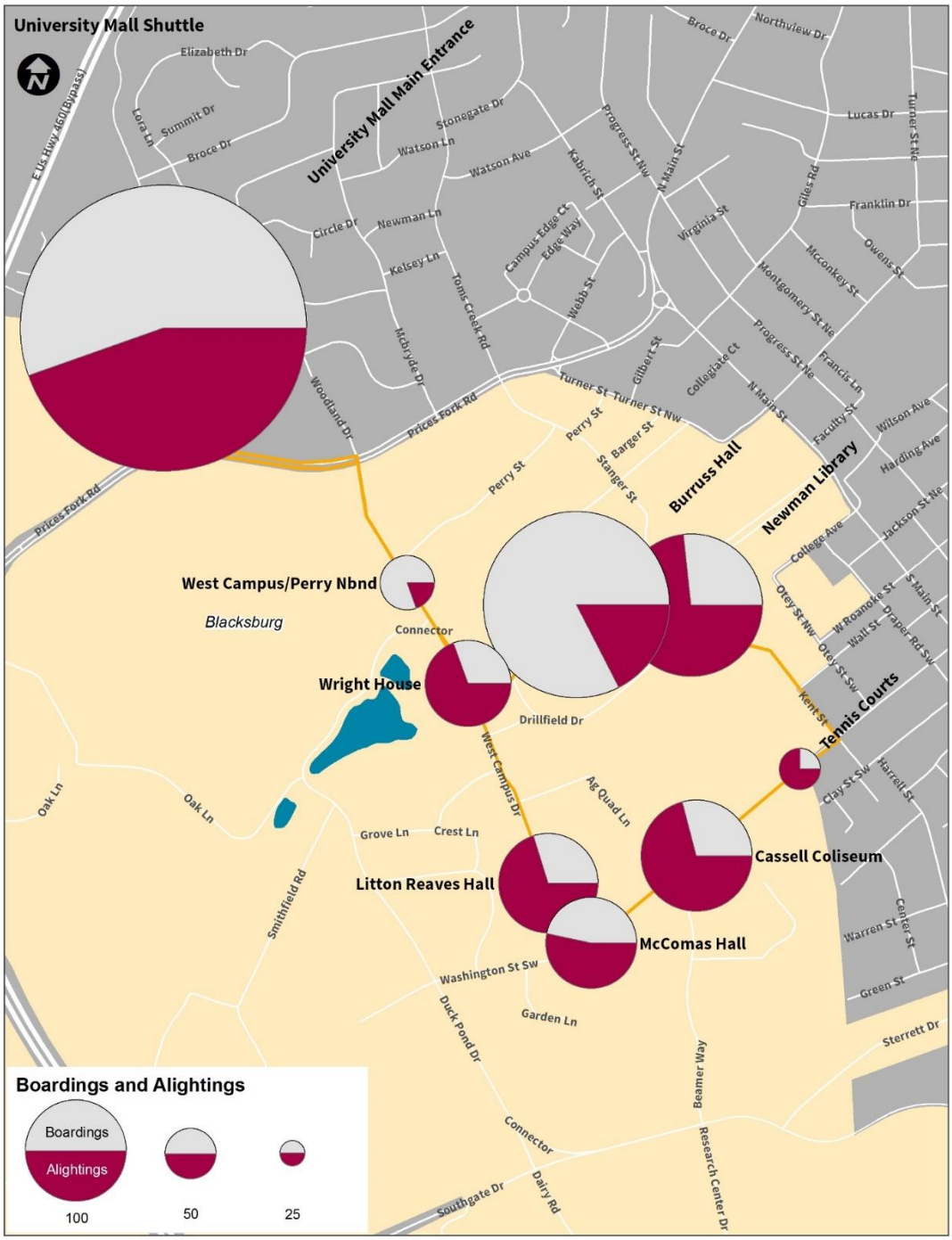
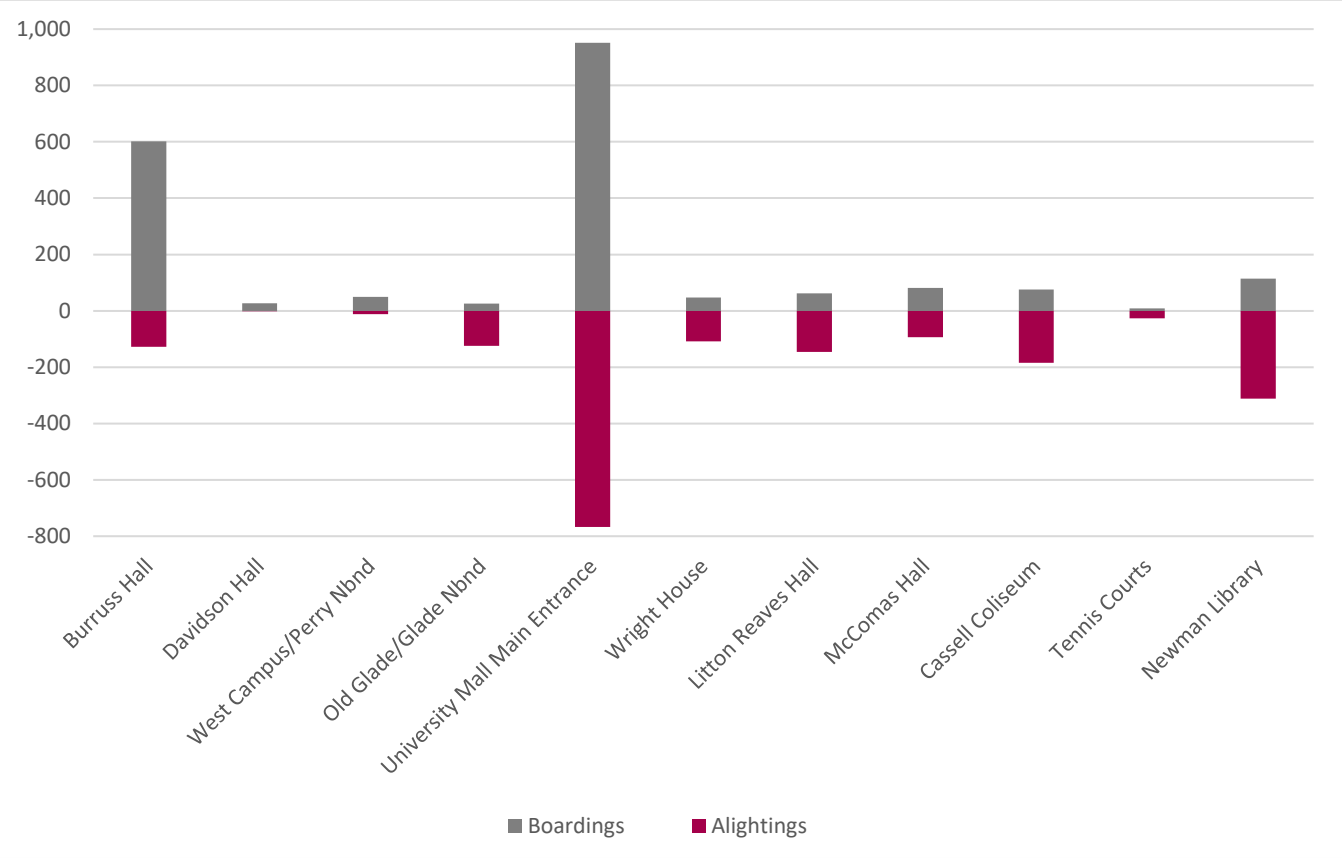


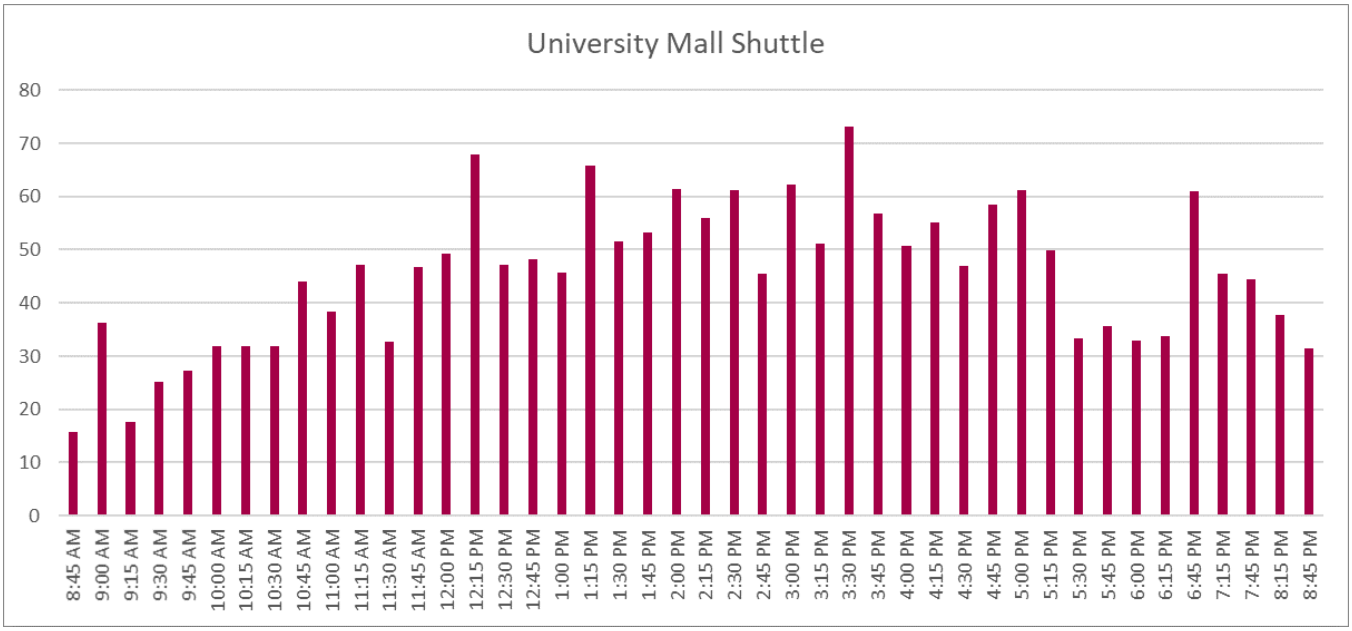
Figure 62: Boardings and Alightings by Stop



Ridership by Trip

Figure 63 shows the boardings for each trip over the course of a full service day. The highest ridership trips are all found in the afternoon. The trip with the highest average ridership, the 3:30 pm trip, averages 73 passengers per day, and seven other trips average over 60 passengers per day, ranging from 12:15 pm to 6:45 pm.

Figure 63: Ridership per Trip



SUMMARY OF OBSERVATIONS

Strengths

- Very high ridership and highest productivity in the system.
- Frequent daytime service.
- Provides direct service to key educational and retail locations at the University Mall.
- Transfers available to most other BT routes.

Weaknesses

- No weekend service.
- Below-average on time performance.
- No reduced service – passengers must ride the University City Boulevard route instead.

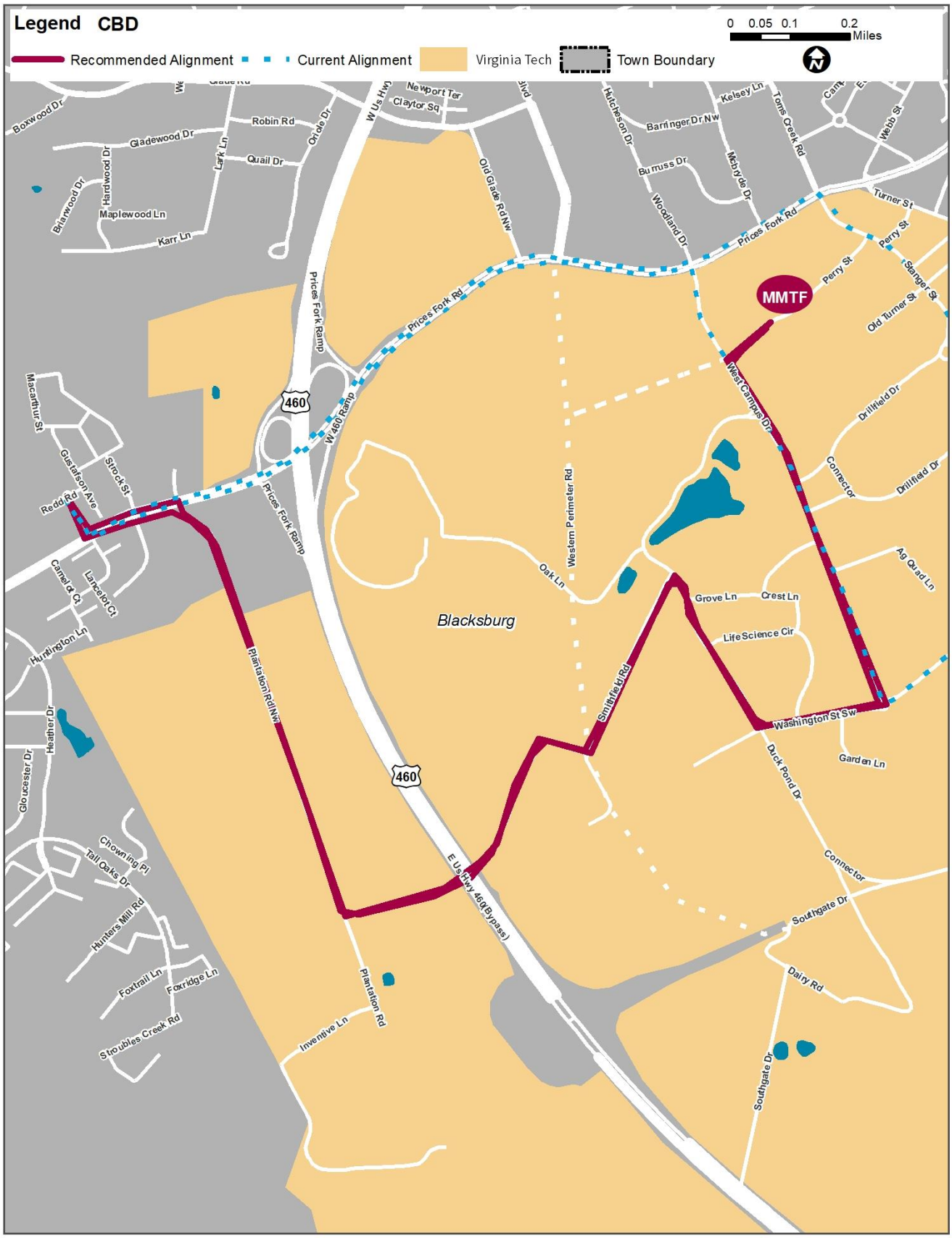
Opportunities

- Realign route to serve the MMTF when it opens.
- Increase frequencies between 11:00 am and 7:00 pm.
- Consider using new roadway slated for construction between Prices Fork Road and Southgate Drive.

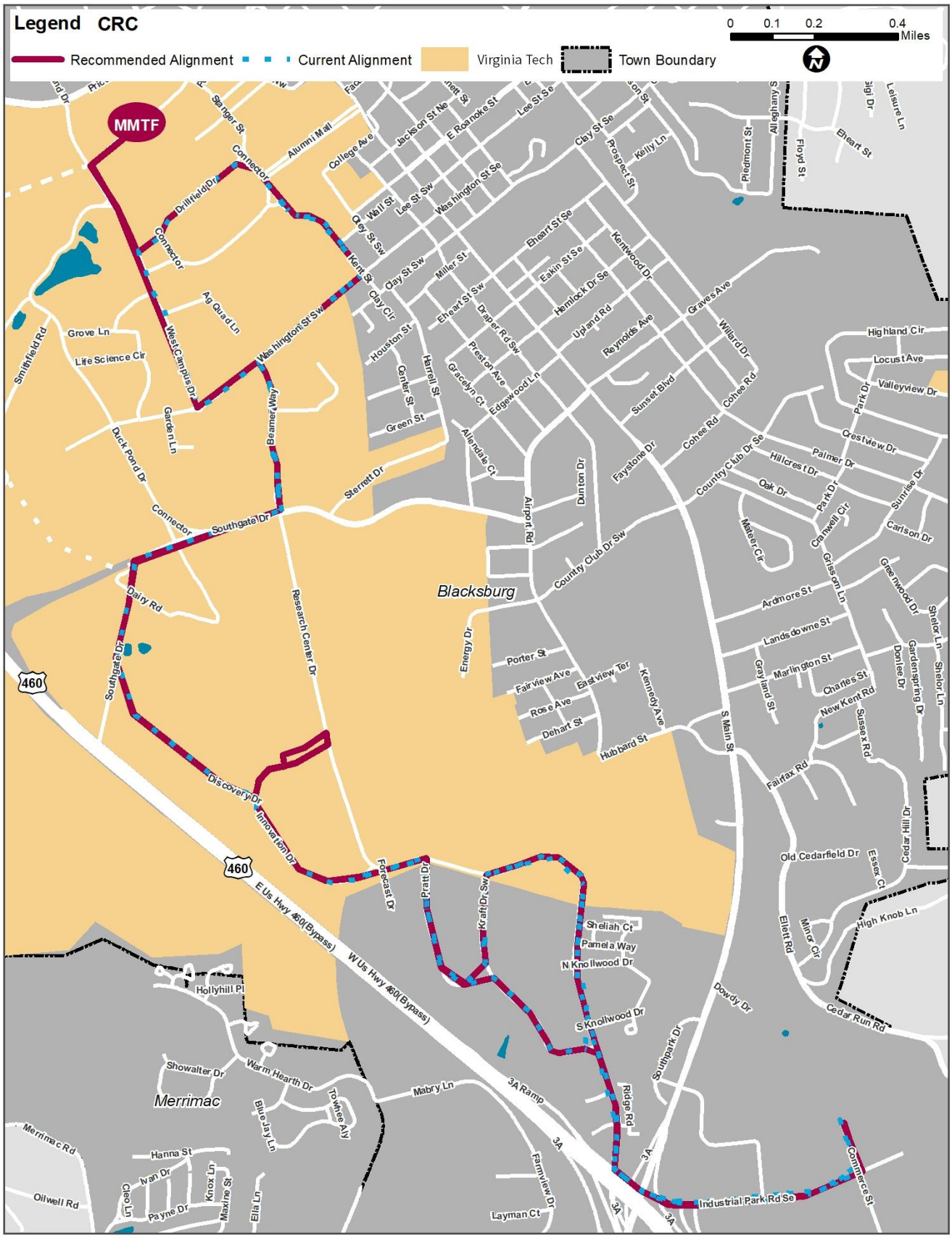
Appendix C: Route Recommendation Details

BT Commuter			Existing	Proposed
	From		Simmons/Hammes	--
	To		Blacksburg Municipal Building	--
Full Service Span	Weekday		7:00 AM – 6:10 PM	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		7:00 AM – 6:10 PM	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	The BT Commuter will be discontinued due to very low ridership. The Two Town Trolley will be extended to the proposed Amtrak station in Christiansburg, so riders with later work start times will be able to commute via that route.			
Justification for Change	Very low ridership (only 13 boardings per day)			
Areas with Reduced Service	Riders from Christiansburg will have one less trip in each peak period to reach Blacksburg. They will be able to use the Explorer to reach the Two Town Trolley, however.			
Implementation Timeframe	Short term (1 to 3 years)			

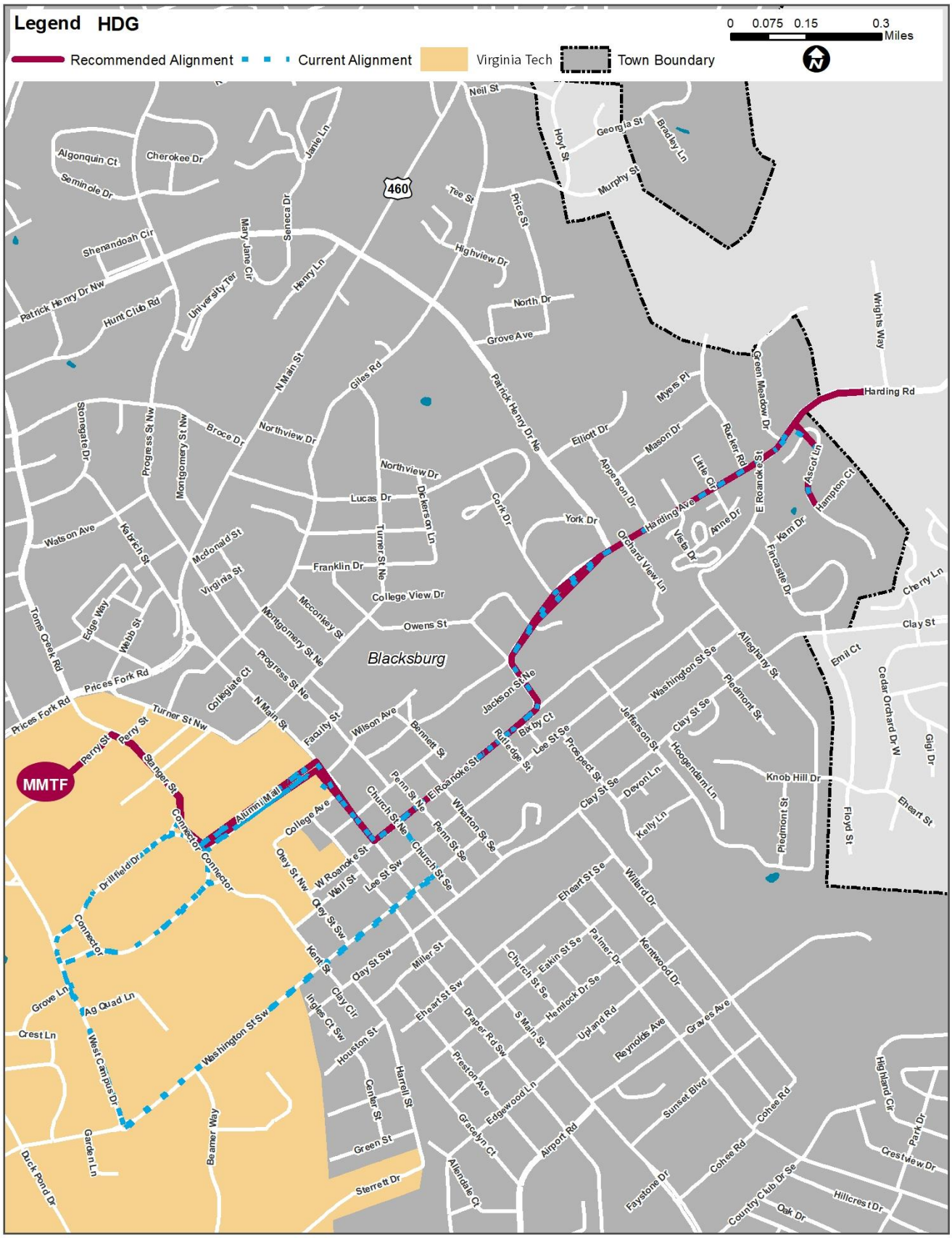
Carpenter Blvd.			Existing	Proposed
	From		Squires West	MMTF
	To		Redd Circle	Redd Circle
Full Service Span	**Weekday**		7:00 AM – 6:25 PM	7:00 AM – 6:25 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	In the short term, service on the Virginia Tech Campus will be rerouted to the planned Multimodal Transportation Facility (MMTF) on Perry Street. Service will also be rerouted via Plantation Road in the mid term if the roadway network is improved in this area.			
Justification for Change	Rerouting will speed service by avoiding congestion on Prices' Fork Road, and will also better serve Smiths Landing. Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	Prices Fork Road will see a reduction in service between West Campus Drive and Plantation Way.			
Implementation Timeframe	Service reduction and MMTF: Short term (1 to 3 years) / Rerouting to Plantation Road: Mid term (3 to 5 years)			


Legend CBD
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.05 0.1 0.2 Miles
MMTF
Blacksburg
460
Prices Fork Rd
Prices Fork Ramp
W 460 Ramp
E Us Hwy 460 (Bypass)
W Us Hwy
Old Glade Rd NW
Plantation Rd NW
Plantation Rd
Smithfield Rd
Western Perimeter Rd
West Campus Dr
Washington St SW
Life Science Cir
Grove Ln
Crest Ln
Oak Ln
Duck Pond Dr
Garden Ln
Connector
Southgate Dr
Dairy Rd
Inventive Ln
Drillfield Dr
Ag Quad Ln
Old Turner St
Perry St
Turner St
Stanger St
Newport Ter
Claytor Sq
Robin Rd
Oriole Dr
Gladewood Dr
Quail Dr
Lark Ln
Hardwood Dr
Briarwood Dr
Maplewood Ln
Karr Ln
Boxwood Dr
Hutcheson Dr
Barringer Dr NW
Bumuss Dr
Woodland Dr
Mcbryde Dr
Toms Creek Rd
Kelsey Ln
Webb St
Macarthur St
Gustafson Ave
Strock St
Redd Rd
Camelot Ct
Lancelot Ct
Huntington Ln
Heather Dr
Gloucester Dr
Chowning Pl
Tall Oaks Dr
Hunters Mill Rd
Foxtrail Ln
Foxridge Ln
Stroubles Creek Rd

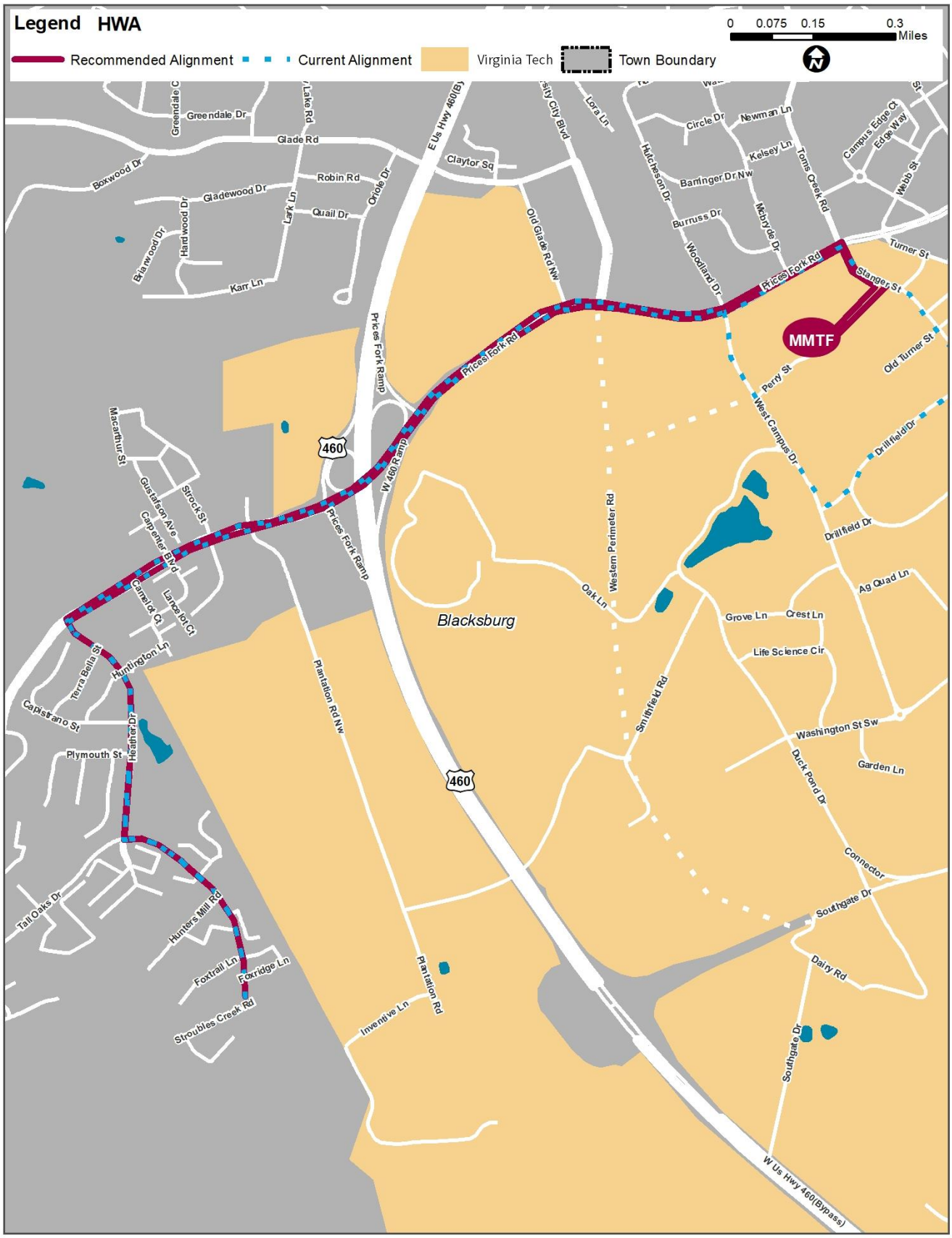
CRC			Existing	Proposed
	From		Newman Library	MMTF
	To		Knollwood	Industrial Park
Full Service Span	**Weekday**		6:50 AM – 10:00 PM	6:50 AM – 10:00 PM
	Saturday		--	9:30 AM – 6:30 PM
	Sunday		--	--
Reduced Service Span	**Weekday**		7:05 AM – 6:30 PM	7:05 AM – 6:30 PM
	Saturday		--	9:30 AM – 6:30 PM
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	15	15
		Off-Peak	15	45
	Saturday		--	45
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	45	45
		Off-Peak	45	45
	Saturday		--	45
	Sunday		--	--
Description of Change	In the short term, frequency of service will be reduced to every 45 minutes after 7:00 PM, and all trips will be extended to the Industrial Park. Service on the Virginia Tech Campus will be rerouted to the planned Multimodal Transportation Facility (MMTF) on Perry Street, and to a new remote parking lot near the airport. In the long term, Saturday service will be added year-round.			
Justification for Change	Reduction in service after 7:00 PM will allow the route to have a single, consistent alignment to the Industrial Park and continue to serve the residential area of Ridge Road in the evening. Additionally, there are less than 10 riders per trip after 7:00 PM. Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes. Extension to the new Virginia Tech remote parking lot will allow for commuters to use this lot and reach campus quickly.			
Areas with Reduced Service	Entire route after 7:00 PM.			
Implementation Timeframe	Short term (1 to 3 years).			


Legend CRC
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.1 0.2 0.4 Miles
MMTF
Blacksburg
Merrimac
460
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
3A Ramp
Industrial Park Rd Se
Commerce St
Ridge Rd
S Knollwood Dr
N Knollwood Dr
Pamela Way
Sheliah Ct
Pratt Dr
Forecast Dr
Innovation Dr
Discovery Dr
Research Center Dr
Southgate Dr
Connector
Drillfield Dr
West Campus Dr
Washington St Sw
Beamer Way
Duck Pond Dr
Garden Ln
Grove Ln
Life Science Cir
Smithfield Rd
Ag Quad Ln
Alumni Mall
College Ave
Stanger St
Kent St
Clay St Sw
Wall St
Lee St Sw
Washington St Se
Jackson St Ne
E Roanoke St
Lee St Se
Clay St Se
Prospect St
Kelly Ln
Piedmont St
Allegheny St
Floyd St
Eheart St
Leisure Ln
Eheart St Se
Eakin St Se
Kentwood Dr
Hemlock Dr Se
Upland Rd
Graves Ave
Willard Dr
Highland Cir
Locust Ave
Valleyview Dr
Park Dr
Crestview Dr
Palmer Dr
Sunrise Dr
Carlson Dr
Greenwood Dr
Shelor Ln
Gardenspring Dr
Donlee Dr
Charles St
New Kent Rd
Sussex Rd
Fairfax Rd
Cedar Hill Dr
Old Cedarfield Dr
Essex Ct
High Knob Ln
Minor Cir
Elliett Rd
Cedar Run Rd
Dowdy Dr
Southpark Dr
Miller St
Draper Rd Sw
Preston Ave
Edgewood Ln
Gracelyn Ct
Harrell St
Houston St
Center St
Green St
Sterrett Dr
Allendale Ct
Airport Rd
Dunton Dr
Fayestone Dr
Sunset Blvd
Cohee Rd
Country Club Dr Se
Hillcrest Dr
Oak Dr
Park Dr
Cranwell Cir
Meteer Cir
Grissom Ln
Country Club Dr Sw
Ardmore St
Landsdowne St
Marlington St
Grayland St
Energy Dr
Porter St
Fairview Ave
Eastview Ter
Rose Ave
Dehart St
Kennedy Ave
Hubbard St
S Main St
Kraft Dr Sw
Hollyhill Pl
Showalter Dr
Warm Hearth Dr
Mabry Ln
Townsee Aly
Blue Jay Ln
Merrimac Rd
Hanna St
Ivan Dr
Knox Ln
Maxine St
Ella Ln
Cleo Ln
Payne Dr
Oilwell Rd
Farmview Dr
Layman Ct

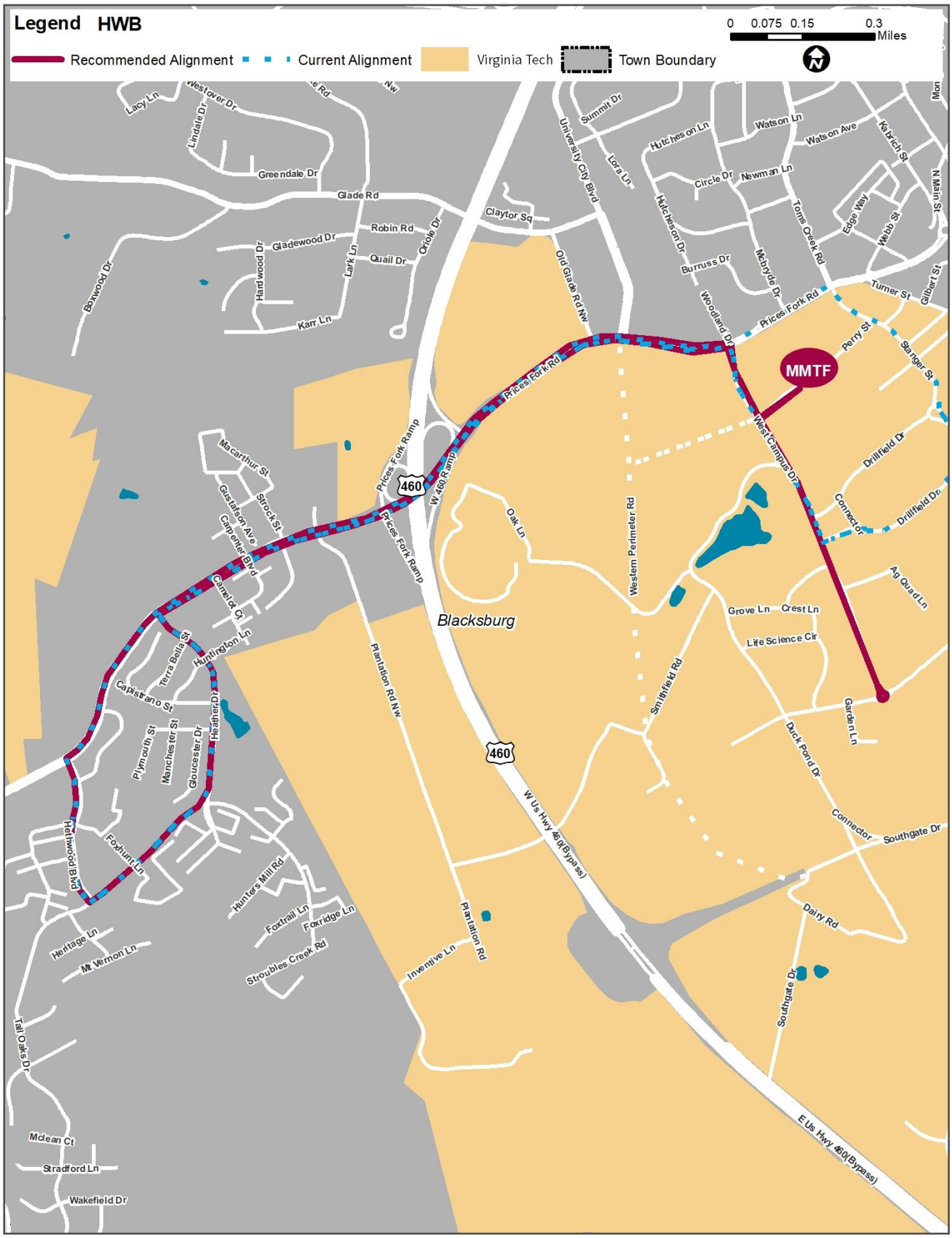
Harding Ave			Existing	Proposed
	From		Squires East	MMTF
	To		Ascot Lane/Hampton Court	Ascot Lane/Hampton Court/Wrights Way
Full Service Span	**Weekday**		7:00 AM – 11:55 PM / 1:55 AM	7:00 AM – 11:55 PM / 1:55 AM
	Saturday		9:45 AM – 1:55 AM	9:45 AM – 1:55 AM
	Sunday		11:45 AM – 10:55 PM	11:45 AM – 10:55 PM
Reduced Service Span	**Weekday**		7:00 AM – 9:55 PM	7:00 AM – 9:55 PM
	Saturday		9:45 AM – 8:55 PM	9:45 AM – 8:55 PM
	Sunday		11:45 AM – 6:55 PM	11:45 AM – 6:55 PM
Full Service Frequency	**Weekday**	**Peak**	15	15
		Off-Peak	15/30/60	15/30/60
	Saturday		60	60
	Sunday		60	60
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		60	60
	Sunday		60	60
Description of Change	Service will be extended past Ascot Lane to Wrights Way when this area is developed, likely in the long term. Service will be rerouted from the Drillfield to the planned Multimodal Transportation Facility (MMTF) on Perry Street.			
Justification for Change	Extension to Wrights Way will serve planned development there. Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	MMTF: Short term (1 to 3 years) / Extension: Long term (10 plus years)			


Legend HDG
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.075 0.15 0.3
Miles
Blacksburg
MMTF
460
Neil St
Georgia St
Bradley Ln
Hoyt St
Murphy St
Algonquin Ct
Cherokee Dr
Seminole Dr
Janie Ln
Seneca Dr
Tee St
Price St
Highview Dr
Shenandoah Cir
Mary Jane Cir
Henry Ln
University Ter
Patrick Henry Dr Nw
Hunt Club Rd
North Dr
Grove Ave
Wrights Way
Green Meadow Dr
Myers Pl
Harding Rd
N Main St
Giles Rd
Patrick Henry Dr Ne
Elliott Dr
Mason Dr
Rucker Rd
E Roanoke St
Ascot Ln
Hampton Ct
Stonegate Dr
Progress St Nw
Montgomery St Nw
Broce Dr
Northview Dr
Lucas Dr
Dickerson Ln
Cork Dr
York Dr
Appleton Dr
Little Cir
Harding Ave
Anne Dr
Kim Dr
Fincastle Dr
Watson Ave
Kerbrich St
Mcdonald St
Turner St Ne
Franklin Dr
College View Dr
Owens St
Orchard View Ln
Vista Dr
Cherry Ln
Clay St
Emil Ct
Toms Creek Rd
Edge Way
Webb St
Virginia St
Mcconkey St
Montgomery St Ne
Progress St Ne
Prices Fork Rd
Colleglate Ct
N Main St
Faculty St
Wilson Ave
Bennett St
Jackson St Ne
Washington St Se
Allegheny St
Piedmont St
Cedar Orchard Dr W
Gigi Dr
Turner St Nw
Perry St
Stanger St
Alumni Mall
College Ave
Penn St Ne
Church St Ne
E Roanoke St
Ruffledge St
Bixby Cir
Lee St Se
Prospect St
Jefferson St
Clay St Se
Devon Ln
Hoogendam Ln
Knob Hill Dr
Eheart St
Floyd St
Kelly Ln
Wharton St Se
Penn St Se
Church St Se
Connector
Drillfield Dr
Okey St Nw
W Roanoke St
Wall St
Lee St Sw
Okey St Sw
Eheart St Se
Wilbrd Dr
Kentwood Dr
Palmer Dr
Eakin St Se
Hemlock Dr Se
Upland Rd
Reynolds Ave
Graves Ave
Clay St Sw
Miller St
Kent St
Clay Cir
Ingles Ct Sw
Houston St
Eheart St Sw
Draper Rd Sw
S Main St
Preston Ave
Edgewood Ln
Gracelyn Ct
Airport Rd
Sunset Blvd
Cohee Rd
Highland Cir
Park Dr
Crestview Dr
Hillcrest Dr
Oak Dr
Country Club Dr Se
Faystone Dr
Allendale Ct
Grove Ln
Ag Quad Ln
Crest Ln
West Campus Dr
Washington St Sw
Center St
Harrell St
Green St
Sterrett Dr
Beamer Way
Garden Ln
Duck Pond Dr

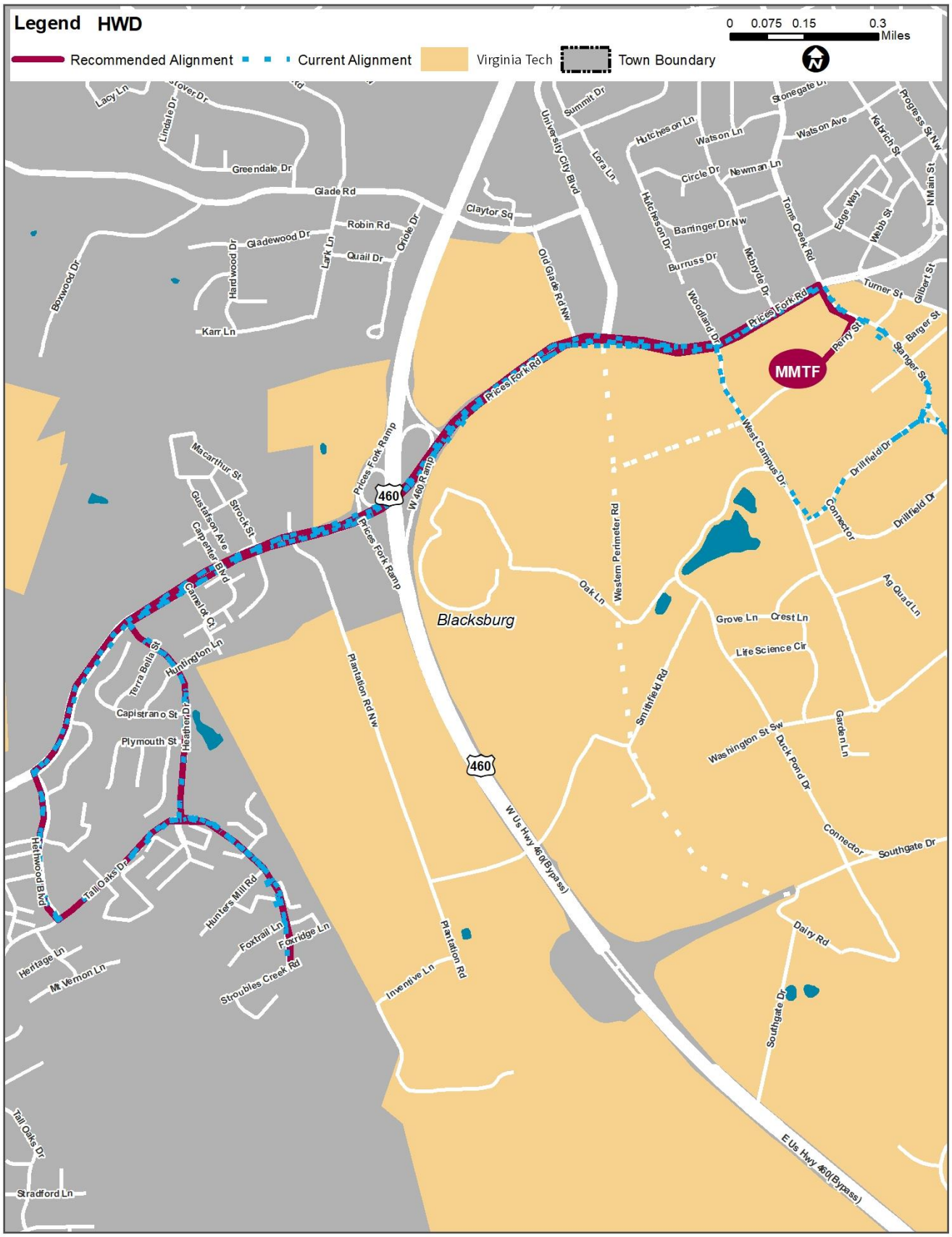
Hethwood A			Existing	Proposed
	From		Burruss Hall	MMTF
	To		Stroubles Circle	Stroubles Circle
Full Service Span	**Weekday**		7:00 AM – 9:30 PM	7:00 AM – 9:30 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	**Weekday**		7:00 AM – 6:30 PM	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	10	10
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Description of Change	Service on the Virginia Tech Campus will be rerouted to the planned Multimodal Transportation Facility (MMTF) on Perry Street. In the long term, service will be realigned to use the proposed Western Perimeter Road on the Virginia Tech campus.			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years) / Long term (10 plus years)			


Legend HWA
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.075 0.15 0.3 Miles
MMTF
Blacksburg
460
Prices Fork Rd
Prices Fork Ramp
W 460 Ramp
E Us Hwy 460(By
W Us Hwy 460(Bypass)
Turner St
Stanger St
Old Turner St
Perry St
West Campus Dr
Drillfield Dr
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Washington St Sw
Garden Ln
Duck Pond Dr
Connector
Southgate Dr
Dairy Rd
Western Perimeter Rd
Oak Ln
Smithfield Rd
Plantation Rd Nw
Plantation Rd
Old Glade Rd Nw
Lora Ln
Circle Dr
Newman Ln
Kelsey Ln
Toms Creek Rd
Campus Edge Ct
Edge Way
Webb St
Hutcheson Dr
Barringer Dr Nw
Burruss Dr
Mcbryde Dr
Woodland Dr
Claytor Sq
Greendale Dr
Glade Rd
Boxwood Dr
Gladewood Dr
Robin Rd
Oriole Dr
Quail Dr
Lark Ln
Hartwood Dr
Briarwood Dr
Karr Ln
Lake Rd
Macarthur St
Gustafson Ave
Strock St
Carpenter Blvd
Camelot Ct
Lancelot Ct
Huntington Ln
Terra Bella St
Capistrano St
Plymouth St
Heather Dr
Tall Oaks Dr
Hunters Mill Rd
Foxtrail Ln
Foxridge Ln
Stroubles Creek Rd
Inventive Ln

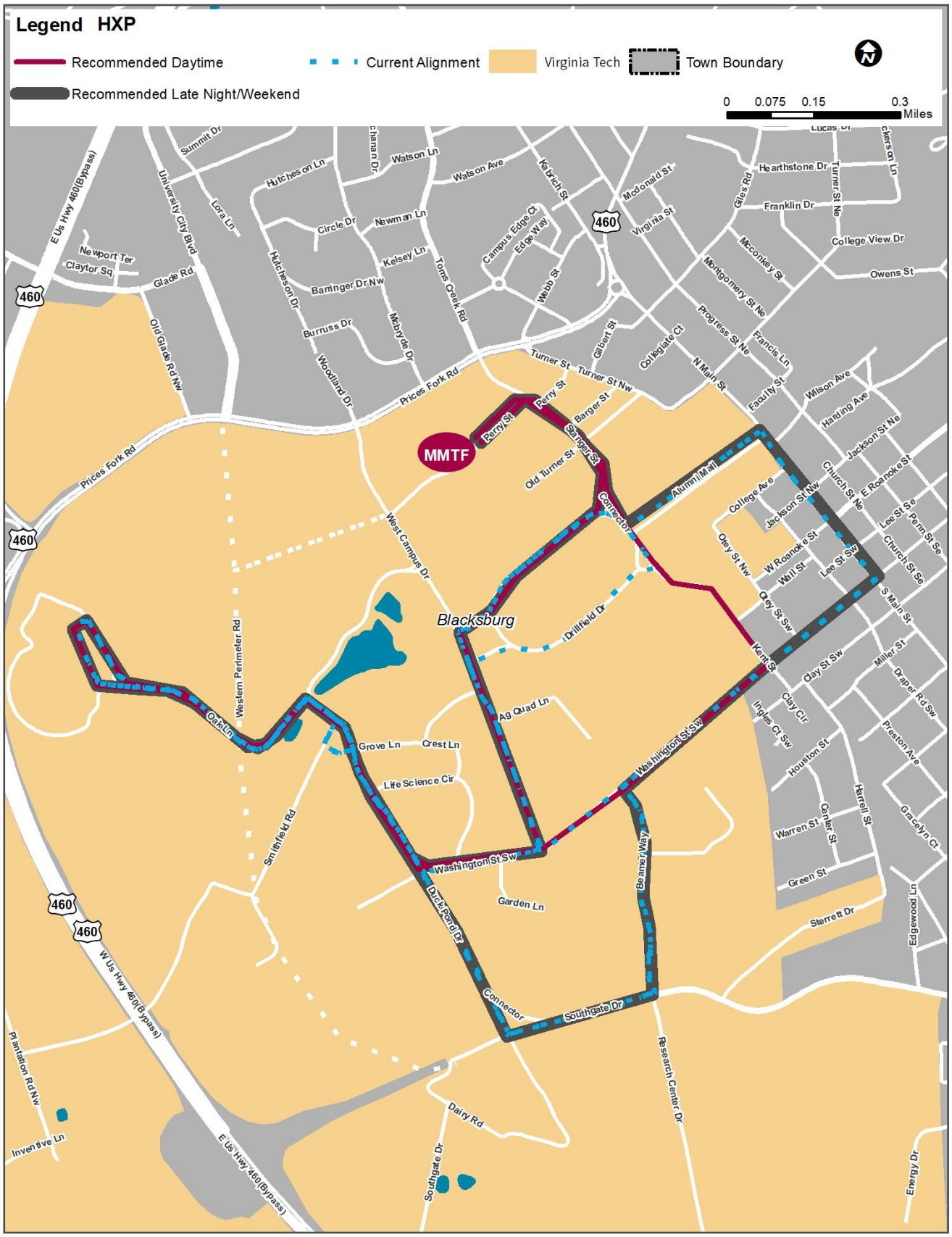
Hethwood B			Existing	Proposed
	From		Torgerson Hall	Litton Reeves Hall
	To		Tall Oaks/Foxhunt	Tall Oaks/Foxhunt
Full Service Span	**Weekday**		7:00 AM – 9:30 PM	7:00 AM – 9:30 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	**Weekday**		7:00 AM – 6:30 PM	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	15	10
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Description of Change	Peak frequency will be improved to every 10 minutes. Service on the Virginia Tech Campus will be rerouted to the Washington Street/West Campus Drive intersection (Litton Reeves Hall) and the planned Multimodal Transportation Facility (MMTF) on Perry Street. In the long term, service will be realigned to use the proposed Western Perimeter Road on the Virginia Tech campus.			
Justification for Change	Increase in frequency will help reduce overcrowding. Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes. Extension to Washington Street will allow students to reach Litton Reeves Hall without transferring.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years) / Long term (10 plus years)			


Legend HWB
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.075 0.15 0.3
Miles
MMTF
Blacksburg
460
W 460 Ramp
Prices Fork Ramp
Prices Fork Rd
West Campus Dr
Perry St
Stanger St
Turner St
Gilbert St
Drillfield Dr
Connector
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Garden Ln
Duck Pond Dr
Southgate Dr
Dairy Rd
Smithfield Rd
Western Perimeter Rd
Oak Ln
Plantation Rd Nw
Plantation Rd
Inventive Ln
W Us Hwy 460(Bypass)
E Us Hwy 460(Bypass)
Prices Fork Rd
Woodland Dr
Old Glade Rd Nw
University City Blvd
Summit Dr
Lora Ln
Hutcheson Ln
Watson Ln
Watson Ave
Circle Dr
Newman Ln
Toms Creek Rd
Edge Way
Webb St
N Main St
Mcbryde Dr
Burruss Dr
Claytor Sq
Robin Rd
Glade Rd
Greendale Dr
Gladewood Dr
Quail Dr
Oriole Dr
Lark Ln
Hardwood Dr
Karr Ln
Boxwood Dr
Lacy Ln
Westover Dr
Lindale Dr
Macarthur St
Gustafson Ave
Strock St
Carpenter Blvd
Cornelia Ct
Huntington Ln
Terra Bella St
Capistrano St
Heather Dr
Gloucester Dr
Manchester St
Plymouth St
Hettwood Blvd
Foxhunt Ln
Hunters Mill Rd
Foxtrail Ln
Foxridge Ln
Stroubles Creek Rd
Heritage Ln
Mt Vernon Ln
Tall Oaks Dr
Mclean Ct
Stradford Ln
Wakefield Dr

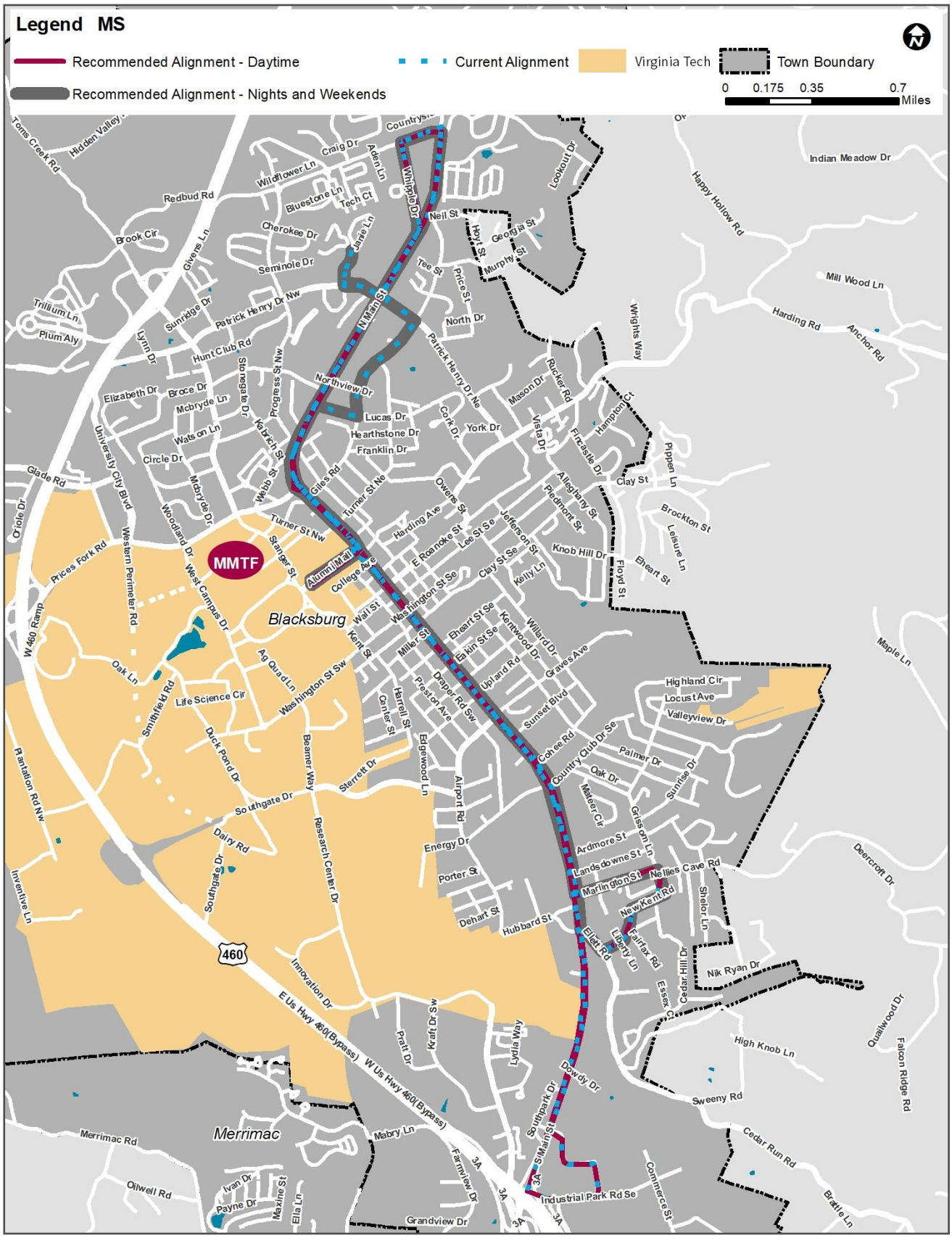
Hethwood Combined			Existing	Proposed
	From		Squires East	MMTF
	To		Stroubles Circle	Stroubles Circle
Full Service Span	**Weekday**		9:30 PM – 12:30 AM / 2:30 AM	9:30 PM – 12:30 AM / 2:30 AM
	Saturday		9:30 AM – 2:30 AM	9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM	11:30 AM – 11:30 PM
Reduced Service Span	**Weekday**		6:30 PM – 9:30 PM	6:30 PM – 9:30 PM
	Saturday		9:30 AM – 8:55 PM	9:30 AM – 8:55 PM
	Sunday		11:30 AM – 6:55 PM	11:30 AM – 6:55 PM
Full Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	60	60
	Saturday		60	60
	Sunday		60	60
Reduced Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	30	30
	Saturday		60	60
	Sunday		60	60
Description of Change	Service on the Virginia Tech Campus will be rerouted to the planned Multimodal Transportation Facility (MMTF) on Perry Street. In the long term, service will be realigned to use the proposed Western Perimeter Road on the Virginia Tech campus.			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years) / Long term (10 plus years)			


Legend HWD
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.075 0.15 0.3 Miles
MMTF
Blacksburg
460
W 460 Ramp
Prices Fork Ramp
Prices Fork Rd
Plantation Rd Nw
Plantation Rd
W Us Hwy 460 (Bypass)
E Us Hwy 460 (Bypass)
Western Perimeter Rd
Old Glade Rd Nw
University City Blvd
Smithfield Rd
West Campus Dr
Connector
Drillfield Dr
Ag Quad Ln
Life Science Cir
Grove Ln
Crest Ln
Oak Ln
Duck Pond Dr
Washington St Sw
Garden Ln
Southgate Dr
Dairy Rd
Inventive Ln
Perry St
Barger St
Stanger St
Turner St
Gilbert St
Progress St Nw
N Main St
Webb St
Edge Way
Toms Creek Rd
Mcbryde Dr
Burruss Dr
Barringer Dr Nw
Hutcheson Dr
Circle Dr
Newman Ln
Watson Ln
Watson Ave
Hutcheson Ln
Summit Dr
Stonegate Dr
Kerrick St
Lora Ln
Claytor Sq
Greendale Dr
Glade Rd
Robin Rd
Oriole Dr
Quail Dr
Lark Ln
Gladewood Dr
Hardwood Dr
Boxwood Dr
Lacy Ln
Lindale Dr
Karr Ln
Woodland Dr
Macarthur St
Gustafson Ave
Strock St
Carpenter Blvd
Camelot Ct
Huntington Ln
Terra Bella St
Capistrano St
Plymouth St
Heather Dr
Hethwood Blvd
Tall Oaks Dr
Hunters Mill Rd
Foxtrail Ln
Foxridge Ln
Stroubles Creek Rd
Heritage Ln
Mt Vernon Ln
Tall Oaks Dr
Stradford Ln

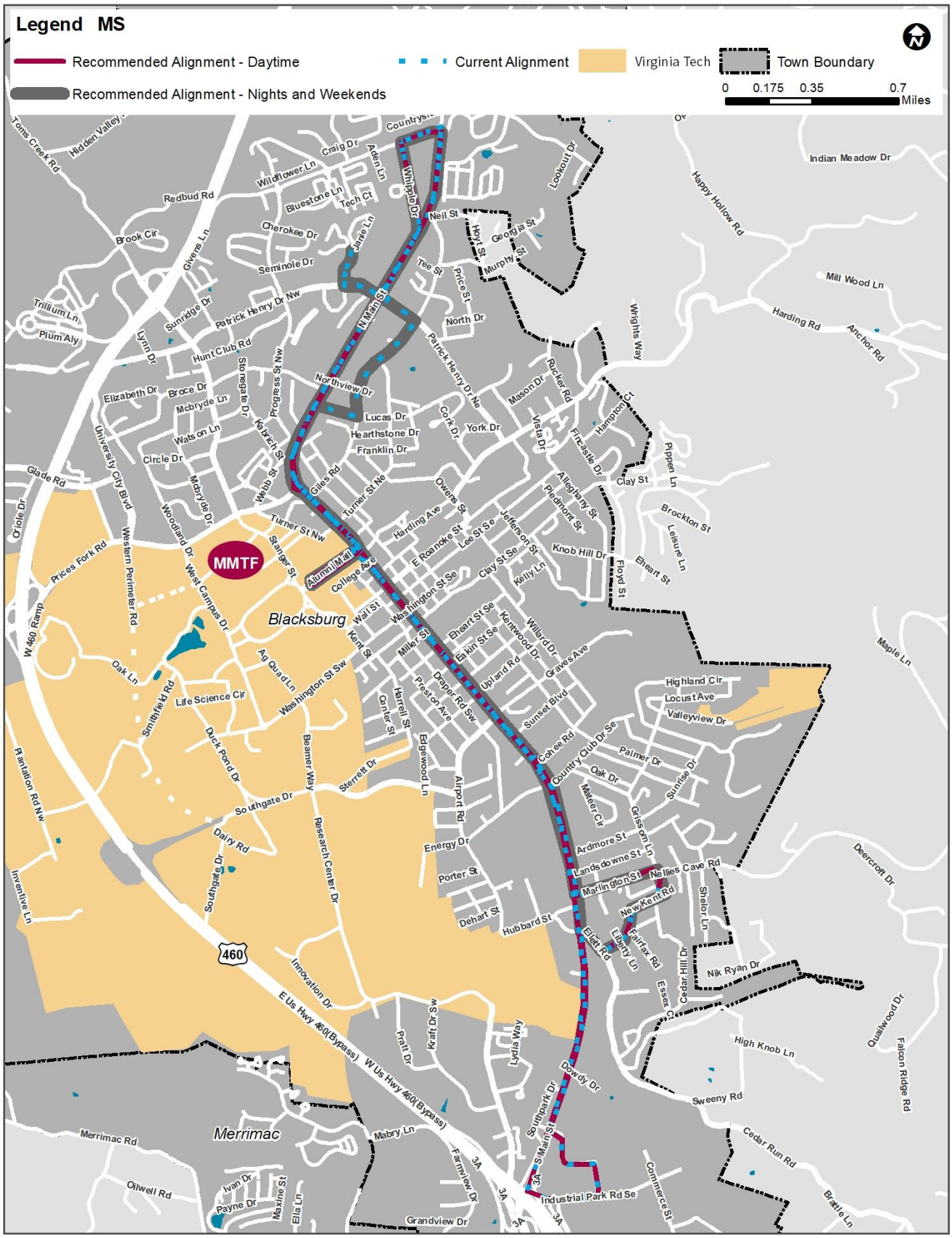
Hokie Express			Existing	Proposed
	From		Newman Library	MMTF
	To		Oak Lane North	Oak Lane North
Full Service Span	**Weekday**		7:00 AM – 12:30 AM / 2:30 AM	7:00 AM – 12:30 AM / 2:30 AM
	Saturday		9:30 AM – 2:30 AM	9:30 AM – 2:30 AM
	Sunday		11:30 AM –11:30 PM	11:30 AM –11:30 PM
Reduced Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	10/15	10
		Off-Peak	10/30	10/30
	Saturday		30	30
	Sunday		30	30
Reduced Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	All trips will be rerouted to the planned Multimodal Transportation Facility (MMTF) on Perry Street and to Kent Street. Late night and weekend service will continue to serve downtown and south campus.			
Justification for Change	The rerouting on the Virginia Tech campus will enable the route to better function as an internal Virginia Tech campus circulator in conjunction with the CRC route and the UMS route.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend HXP
Recommended Daytime
Current Alignment
Virginia Tech
Town Boundary
Recommended Late Night/Weekend
0 0.075 0.15 0.3
Miles
MMTF
Blacksburg
460
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
Prices Fork Rd
Perry St
Barger St
Stanger St
Old Turner St
Alumni Mall
Connector
West Campus Dr
Drillfield Dr
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Washington St Sw
Duck Pond Dr
Garden Ln
Beamer Way
Southgate Dr
Research Center Dr
Dairy Rd
Southgate Dr
Energy Dr
Edgewood Ln
Sterrett Dr
Green St
Warren St
Center St
Harrell St
Gracelyn Ct
Houston St
Preston Ave
Draper Rd Sw
Miller St
Clay St Sw
Clay Cir
Ingles Ct Sw
Kent St
Oak Ln
Western Perimeter Rd
Smithfield Rd
Plantation Rd Nw
Inventive Ln
Old Glade Rd Nw
Glade Rd
Newport Ter
Claytor Sq
University City Blvd
Summit Dr
Lora Ln
Hutcheson Ln
Hutcheson Dr
Circle Dr
Newman Ln
Watson Ln
Watson Ave
Barringer Dr Nw
Kelsey Ln
Burruss Dr
Mcbryde Dr
Woodland Dr
Toms Creek Rd
Campus Edge Ct
Edge Way
Webb St
Ksa Brich St
Mcdonald St
Virginia St
Giles Rd
Hearthstone Dr
Franklin Dr
Turner St Ne
College View Dr
Owens St
Mcconkey St
Montgomery St Ne
Progress St Ne
Francis Ln
Gilbert St
Collegiate Ct
N Main St
Faculty St
Turner St
Turner St Nw
Wilson Ave
Harding Ave
Jackson St Ne
E Roanoke St
Church St Ne
College Ave
Jackson St Nw
Obey St Nw
W Roanoke St
Wall St
Lee St Sw
Lee St Se
Penn St Se
Church St Se
S Main St
Obey St Sw

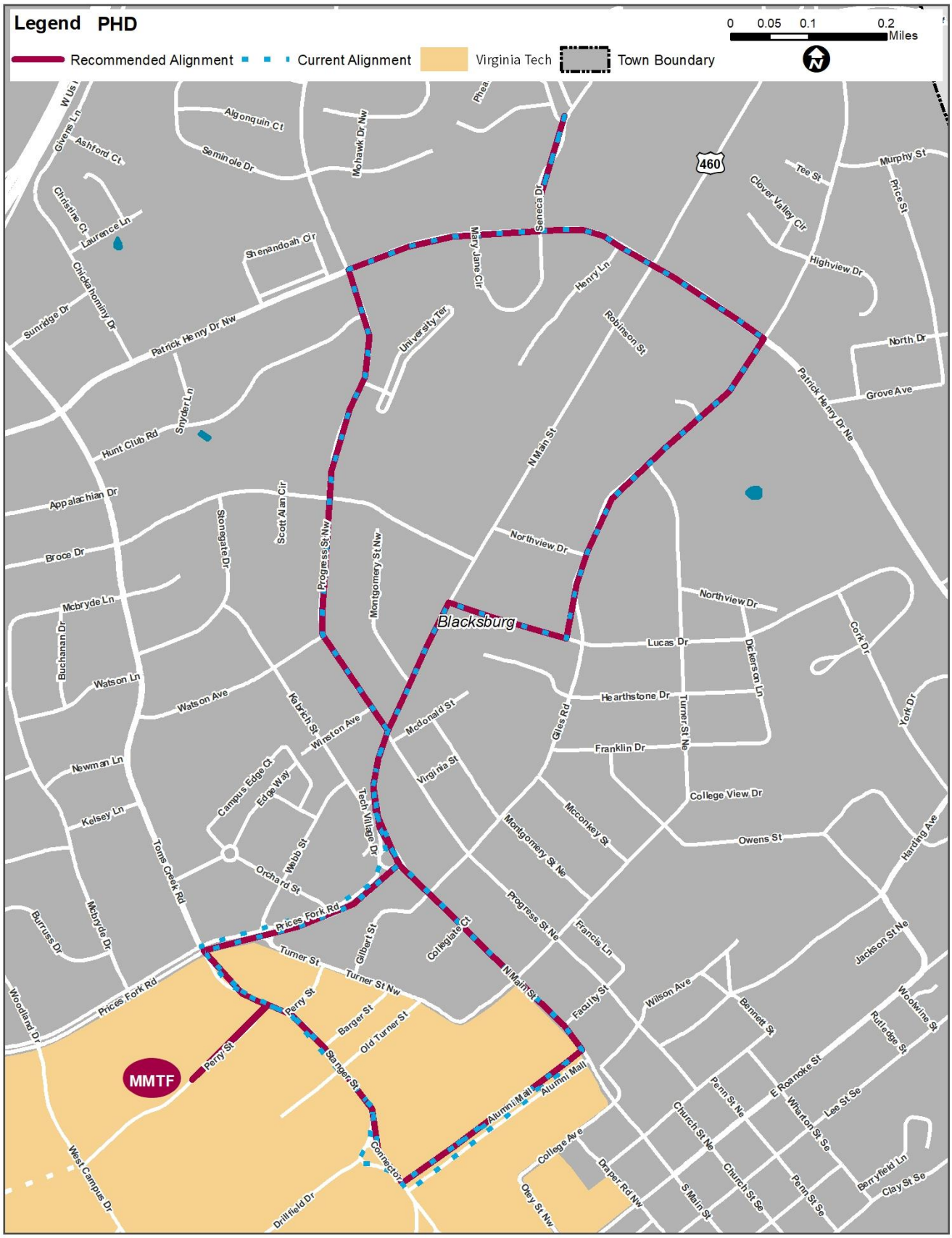
Main Street Daytime			Existing	Proposed
	From		Squires	Squires
	To		Main & Red Maple / Industrial Park Dr	Main & Red Maple / Industrial Park Dr
Full Service Span	Weekday		7:00 AM – 6:45 PM	7:00 AM – 6:45 PM
	Saturday		See Main St Evening/Weekend	See Main St Evening/Weekend
	Sunday		See Main St Evening/Weekend	See Main St Evening/Weekend
Reduced Service Span	Weekday		7:00 AM – 6:45 PM	7:00 AM – 6:45 PM
	Saturday		See Main St Evening/Weekend	See Main St Evening/Weekend
	Sunday		See Main St Evening/Weekend	See Main St Evening/Weekend
Full Service Frequency	Weekday	Peak	15	12
		Off-Peak	See Main St Evening/Weekend	See Main St Evening/Weekend
	Saturday		See Main St Evening/Weekend	See Main St Evening/Weekend
	Sunday		See Main St Evening/Weekend	See Main St Evening/Weekend
Reduced Service Frequency	Weekday	Peak	30	30
		Off-Peak	See Main St Evening/Weekend	See Main St Evening/Weekend
	Saturday		See Main St Evening/Weekend	See Main St Evening/Weekend
	Sunday		See Main St Evening/Weekend	See Main St Evening/Weekend
Description of Change	Service will be increased during peak periods to 12 minute frequencies.			
Justification for Change	Increase in service during peak periods will help reduce overcrowding.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend MS
Recommended Alignment - Daytime
Current Alignment
Virginia Tech
Town Boundary
Recommended Alignment - Nights and Weekends
0 0.175 0.35 0.7
Miles
MMTF
Blacksburg
Merrimac
460
Toms Creek Rd
Hidden Valley
Redbud Rd
Brook Cir
Givens Ln
Wildflower Ln
Craig Dr
Aden Ln
Bluestone Ln
Tech Ct
Cherokee Dr
Seminole Dr
Trillium Ln
Plum Aly
Sunridge Dr
Patrick Henry Dr NW
Lynn Dr
Hunt Club Rd
Elizabeth Dr
Broce Dr
Mcbryde Ln
Watson Ln
Circle Dr
Mcbryde Dr
Glade Rd
Oriole Dr
University City Blvd
Woodland Dr
Prices Fork Rd
Western Perimeter Rd
W 460 Ramp
West Campus Dr
Stanger St
Turner St NW
Alumni Mall
College Ave
Wall St
Kent St
Oak Ln
Ag Quad Ln
Life Science Cir
Smithfield Rd
Duck Pond Dr
Washington St SW
Beamer Way
Plantation Rd NW
Inventive Ln
Sterrett Dr
Southgate Dr
Dairy Rd
Southgate Dr
Research Center Dr
Innovation Dr
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
Merrimac Rd
Oilwell Rd
Ivan Dr
Payne Dr
Maxine St
Ella Ln
Mabry Ln
Pratt Dr
Kraft Dr SW
Lydia Way
Farmview Dr
Grandview Dr
3A
Industrial Park Rd SE
Commerce St
Southpark Dr
S Main St
Dowdy Dr
Sweeny Rd
Cedar Run Rd
Brattle Ln
High Knob Ln
Quailwood Dr
Falcon Ridge Rd
Deercroft Dr
Nik Ryan Dr
Cedar Hill Dr
Essex Ct
Liberty Ln
Fairfax Rd
New Kent Rd
Nellies Cave Rd
Sheler Ln
Marlington St
Landsdowne St
Ardmore St
Grissom Ln
Meiser Cir
Oak Dr
Palmer Dr
Sunrise Dr
Country Club Dr SE
Cohee Rd
Valleyview Dr
Locust Ave
Highland Cir
Maple Ln
Graves Ave
Willard Dr
Kentwood Dr
Upland Rd
Sunset Blvd
Draper Rd SW
Preston Ave
Harrell St
Center St
Edgewood Ln
Airport Rd
Energy Dr
Porter St
Dehart St
Hubbard St
Elliott Rd
Miller St
Eakin St SE
Eheart St SE
Washington St SE
Clay St SE
Kelly Ln
Knob Hill Dr
Floyd St
Eheart St
Leisure Ln
Brockton St
Pippen Ln
Clay St
Allegheny St
Piedmont St
Fincastle Dr
Hampton Ct
Vista Dr
Rucker Rd
Mason Dr
Wrights Way
Harding Rd
Anchor Rd
Mill Wood Ln
Happy Hollow Rd
Indian Meadow Dr
Lookout Dr
Whipple Dr
Neil St
Hoyt St
Georgia St
Murphy St
Tee St
Price St
North Dr
N Main St
Patrick Henry Dr NE
Northview Dr
Lucas Dr
Hearthstone Dr
Franklin Dr
Cork Dr
York Dr
Giles Rd
Turner St NE
Owens St
Harding Ave
E Roanoke St
Lee St SE
Jefferson St
Webb St
Kabrich St
Progress St NW
Stonegate Dr
Jane Ln

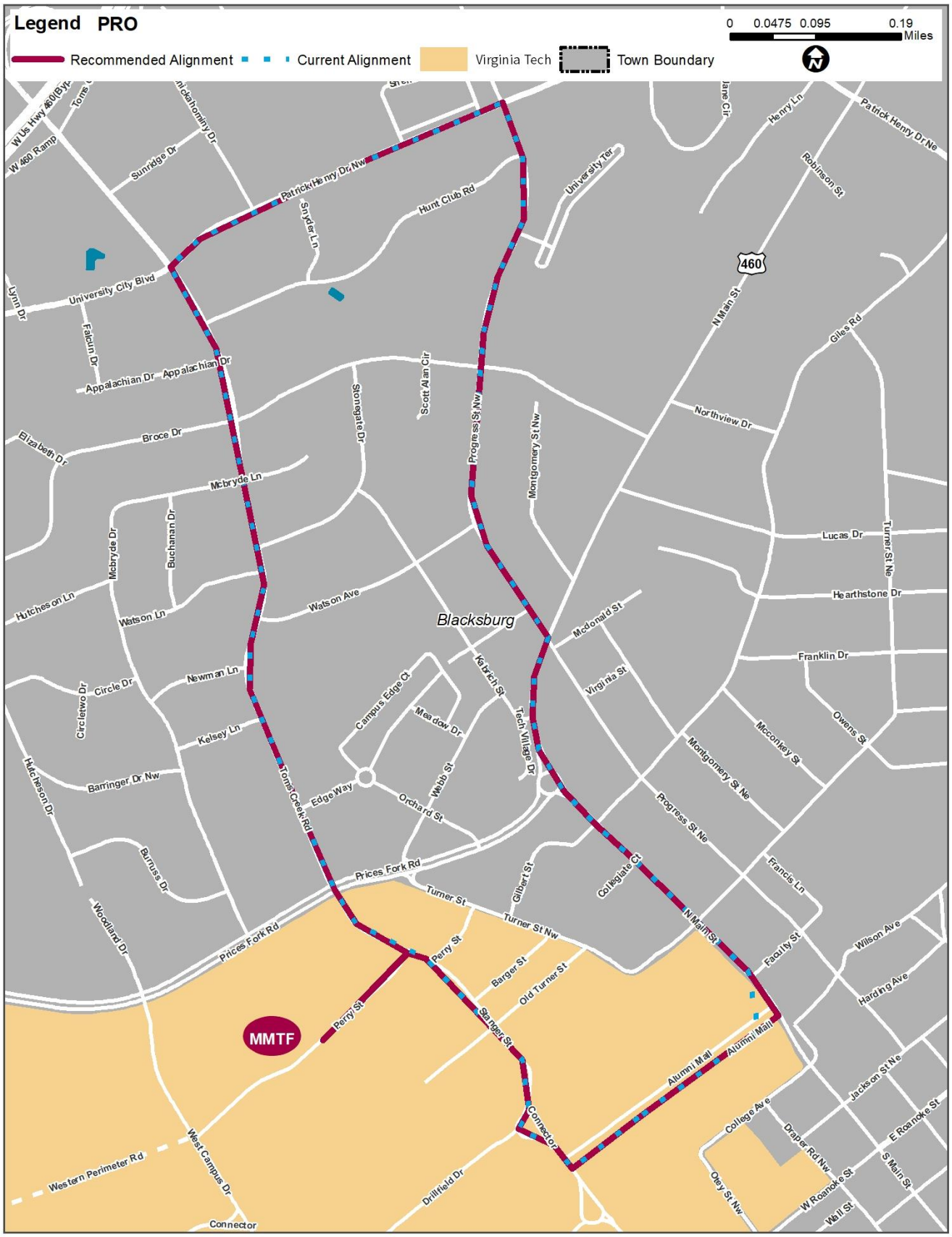
Main Street Evening/Weekend			Existing	Proposed
	From		Squires	Squires
	To		Main & Red Maple / Fairfax & Ellet	Main & Red Maple / Fairfax & Ellet
Full Service Span	Weekday		6:45 PM – 12:00 AM / 2:30 AM	6:45 PM – 12:00 AM / 2:30 AM
	Saturday		9:30 AM – 2:30 AM	9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM	11:30 AM – 11:30 PM
Reduced Service Span	Weekday		6:45 PM – 10:00 PM	6:45 PM – 10:00 PM
	Saturday		9:30 AM – 9:00 PM	9:30 AM – 9:00 PM
	Sunday		11:30 AM –7:00 PM	11:30 AM –7:00 PM
Full Service Frequency	Weekday	Peak	See Main St Daytime	See Main St Daytime
		Off-Peak	30/60	30/60
	Saturday		60/30	60/30
	Sunday		60	60
Reduced Service Frequency	Weekday	Peak	See Main St Daytime	See Main St Daytime
		Off-Peak	30	30
	Saturday		60	60
	Sunday		60	60
Description of Change	No changes.			
Justification for Change	-			
Areas with Reduced Service	None.			
Implementation Timeframe	-			


Legend MS
Recommended Alignment - Daytime
Recommended Alignment - Nights and Weekends
Current Alignment
Virginia Tech
Town Boundary
0 0.175 0.35 0.7
Miles
Blacksburg
Merrimac
MMTF
460
N Main St
Patrick Henry Dr NE
Northview Dr
Lucas Dr
Hearthstone Dr
Franklin Dr
Giles Rd
Turner St NE
Turner St NW
Harding Ave
College Ave
Alumni Mall
Wall St
Washington St SE
Miller St
Draper Rd SW
Prestwood Ave
Upland Rd
Sunset Blvd
Cohee Rd
Country Club Dr SE
Oak Dr
Palmer Dr
Sunrise Dr
Graves Ave
Kelly Ln
Knob Hill Dr
Floyd St
Eheart St
Clay St
Pippen Ln
Brockton St
Leisure Ln
Piedmont St
Allegheny St
Fincastle Dr
Hampton Ct
Vista Dr
Rucker Rd
Mason Dr
Wrights Way
North Dr
Price St
Tee St
Murphy St
Georgia St
Neil St
Whipple Dr
Lookout Dr
Indian Meadow Dr
Happy Hollow Rd
Mill Wood Ln
Harding Rd
Anchor Rd
Maple Ln
Highland Cir
Locust Ave
Valleyview Dr
Deercroft Dr
Nellies Cave Rd
Marlington St
Landsdowne St
Ardmore St
Grissom Ln
Meiser Cir
Shelor Ln
New Kent Rd
Fairfax Rd
Liberty Ln
Elliott Rd
Nik Ryan Dr
Cedar Hill Dr
Essex Dr
Dowdy Dr
Lydia Way
High Knob Ln
Sweeny Rd
Cedar Run Rd
Brattle Ln
Commerce St
Industrial Park Rd SE
Southpark Dr
S Main St
Falcon Ridge Rd
Quailwood Dr
Kraft Dr SW
Pratt Dr
Innovation Dr
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
Farmview Dr
Grandview Dr
Mabry Ln
Merrimac Rd
Oilwell Rd
Ivan Dr
Payne Dr
Maxine St
Ella Ln
Airport Rd
Energy Dr
Porter St
Dehart St
Hubbard St
Edgewood Ln
Harrell St
Center St
Kent St
Washington St SW
Ag Quad Ln
Life Science Cir
Smithfield Rd
Duck Pond Dr
Beamer Way
Sterrett Dr
Southgate Dr
Dairy Rd
Research Center Dr
Plantation Rd NW
Inventive Ln
W 460 Ramp
Oak Ln
Prices Fork Rd
Western Perimeter Rd
West Campus Dr
Stranger St
Woodland Dr
University City Blvd
Glade Rd
Oriole Dr
Circle Dr
Mcbryde Dr
Webb St
Kabrich St
Progress St NW
Stonegate Dr
Hunt Club Rd
Watson Ln
Elizabeth Dr
Broce Dr
Mcbryde Ln
Lynn Dr
Sunridge Dr
Patrick Henry Dr NW
Trillium Ln
Plum Aly
Seminole Dr
Cherokee Dr
Brook Cir
Givens Ln
Redbud Rd
Bluestone Ln
Wildflower Ln
Craig Dr
Aden Ln
Jane Ln
Tech Ct
Toms Creek Rd
Hidden Valley

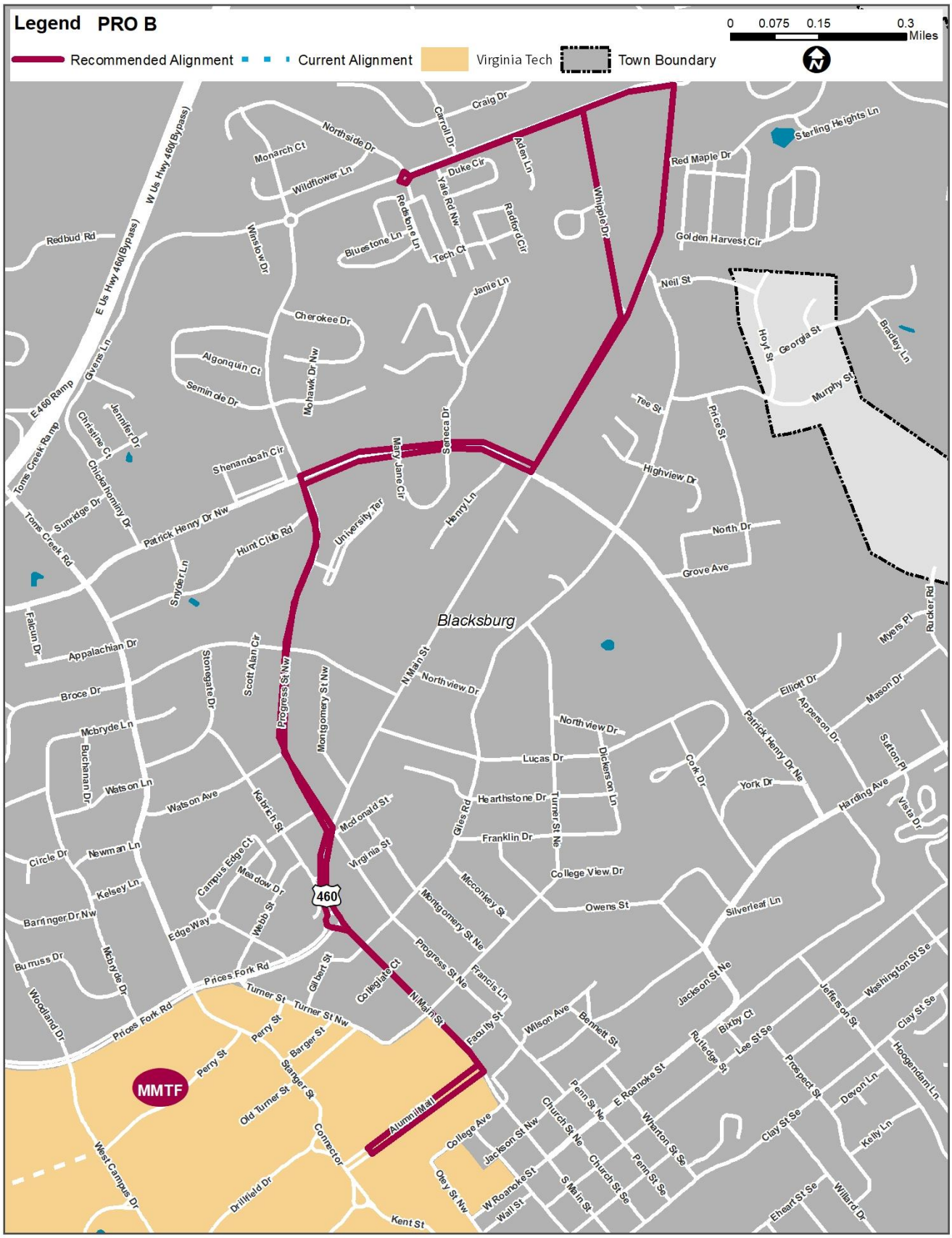
Patrick Henry			Existing	Proposed
	From		Squires West	MMTF
	To		Patrick Henry/Seneca	Patrick Henry/Seneca
Full Service Span	**Weekday**		7:00 AM – 6:30 PM	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	**Weekday**		7:00 AM – 6:30 PM	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	10/15	10
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	On the Virginia Tech campus, the route will serve the new Multimodal Transfer Facility (MMTF).			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend PHD
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.05 0.1 0.2
Miles
Blacksburg
MMTF
460
Algonquin Ct
Seminole Dr
Mohawk Dr Nw
Seneca Dr
Mary Jane Cir
Henry Ln
Robinson St
Tee St
Murphy St
Price St
Clover Valley Cir
Highview Dr
North Dr
Grove Ave
Patrick Henry Dr Ne
Patrick Henry Dr Nw
University Ter
N Main St
Shenandoah Cir
Christine Ct
Laurence Ln
Chickahominy Dr
Sunridge Dr
Snyder Ln
Hunt Club Rd
Appalachian Dr
Broce Dr
Mcbryde Ln
Buchanan Dr
Watson Ln
Watson Ave
Stonegate Dr
Scott Alan Cir
Progress St Nw
Montgomery St Nw
Northview Dr
Northview Dr
Lucas Dr
Dickerson Ln
Cork Dr
York Dr
Hearthstone Dr
Turner St Ne
Giles Rd
Franklin Dr
College View Dr
Owens St
Harding Ave
Jackson St Ne
Woolwine St
Rutledge St
E Roanoke St
Lee St Se
Wharton St Se
Berryfield Ln
Clay St Se
Penn St Ne
Church St Ne
Church St Se
Penn St Se
S Main St
Draper Rd Nw
College Ave
Obey St Nw
Alumni Mall
Alumni Mall
Connector
Faculty St
Wilson Ave
Bennett St
Francis Ln
Progress St Ne
Mcconkey St
Montgomery St Ne
Virginia St
Mcdonald St
Giles Rd
Kabrich St
Wingston Ave
Tech Village Dr
Campus Edge Ct
Edge Way
Webb St
Orchard St
Kelsey Ln
Newman Ln
Toms Creek Rd
Prices Fork Rd
Prices Fork Rd
Turner St
Turner St Nw
Gilbert St
Collegiate Ct
N Main St
Perry St
Perry St
Barger St
Old Turner St
Stanger St
Mcbryde Dr
Burruss Dr
Woodland Dr
West Campus Dr
Drillfield Dr

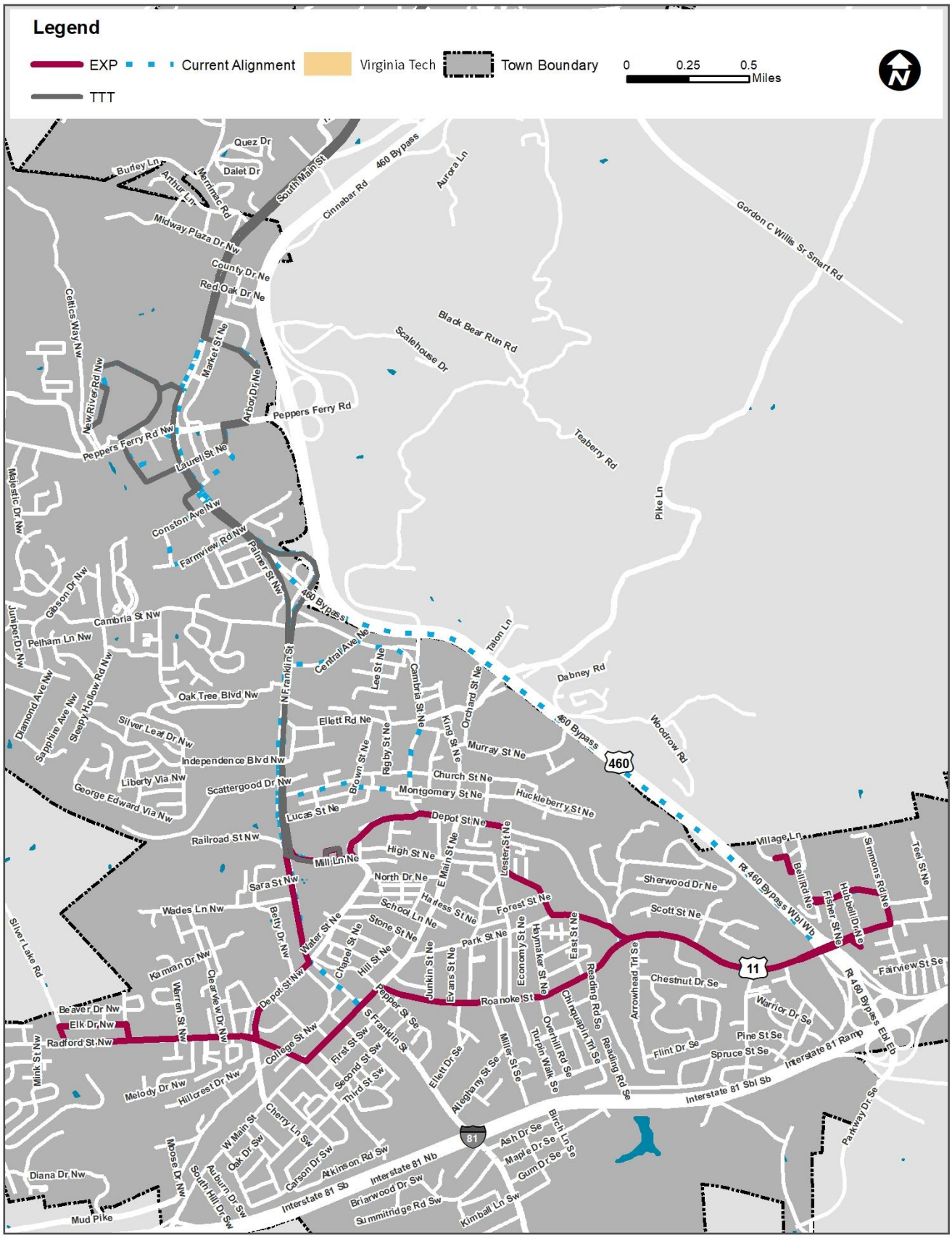
Progress Street			Existing	Proposed
	From		Squires East	MMTF
	To		The Village on Patrick Henry	The Village on Patrick Henry
Full Service Span	**Weekday**		7:00 AM – 9:30 PM	7:00 AM – 9:30 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	10/15	10/15
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	On the Virginia Tech campus, the route will serve the new Multimodal Transfer Facility (MMTF).			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend PRO
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.0475 0.095 0.19
Miles
Blacksburg
MMTF
460
Patrick Henry Dr Nw
Hunt Club Rd
University Ter
Henry Ln
Patrick Henry Dr Ne
Robinson St
Sunridge Dr
Snyder Ln
University City Blvd
Lynn Dr
Falcon Dr
Appalachian Dr
Stonegate Dr
Scott Alan Cir
Progress St Nw
Montgomery St Nw
N Main St
Giles Rd
Northview Dr
Broce Dr
Elizabeth Dr
Mcbryde Ln
Mcbryde Dr
Buchanan Dr
Lucas Dr
Turner St Ne
Hearthstone Dr
Hutcheson Ln
Watson Ln
Watson Ave
Mcdonald St
Franklin Dr
Newman Ln
Circle Dr
Circletwo Dr
Kelsey Ln
Campus Edge Ct
Meadow Dr
Ksbrich St
Tech Village Dr
Virginia St
Mcconkey St
Owens St
Montgomery St Ne
Progress St Ne
Barringer Dr Nw
Hutcheson Dr
Toms Creek Rd
Edge Way
Orchard St
Webb St
Burruss Dr
Prices Fork Rd
Turner St
Gilbert St
Collegiate Ct
Francis Ln
Woodland Dr
Turner St Nw
Perry St
Barger St
Old Turner St
Faculty St
Wilson Ave
Harding Ave
Stanger St
Alumni Mall
Jackson St Ne
College Ave
Drapers Rd Nw
E Roanoke St
S Main St
W Roanoke St
Obey St Nw
Will St
Connector
Drillfield Dr
West Campus Dr
Western Perimeter Rd

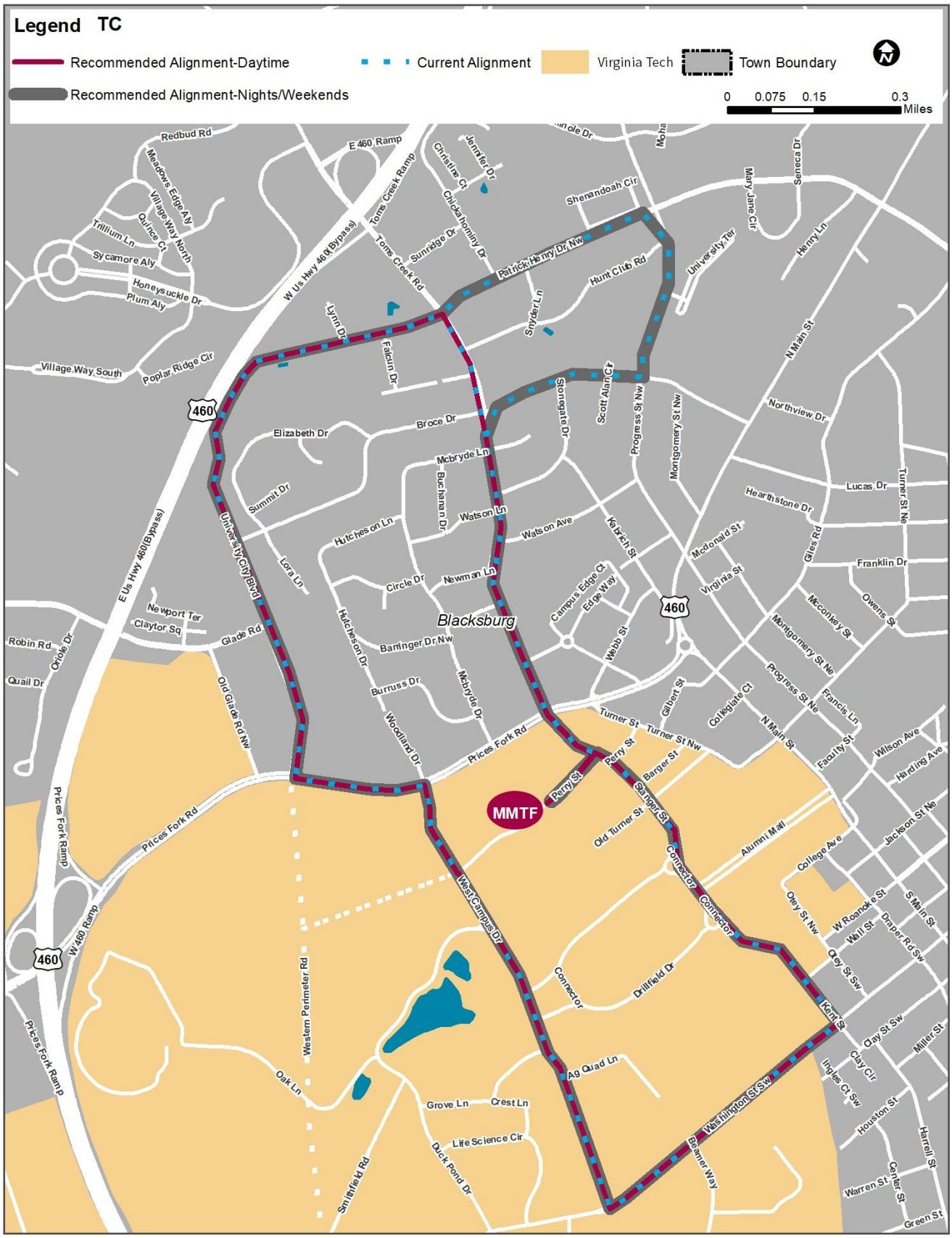
Progress Street B			Existing	Proposed
	From		--	Squires
	To		--	Givens Lane
Full Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	30
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	30
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	This will be a new route that will serve the Progress Street corridor in both directions and the Givens Lane corridor. The route will operate year-round.			
Justification for Change	The route will help reduce overcrowding on the Progress Street route and the Toms Creek route and will also serve an area of high transit need on Givens Lane. It will also provide service to Seneca and Givens Lane during Reduced Service.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend PRO B
0 0.075 0.15 0.3 Miles
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
Blacksburg
MMTF
460
W Us Hwy 460(Bypass)
E Us Hwy 460(Bypass)
E 460 Ramp
Toms Creek Ramp
Toms Creek Rd
Redbud Rd
Givens Ln
Jennifer Dr
Christine Ct
Chickahominy Dr
Sunridge Dr
Patrick Henry Dr Nw
Hunt Club Rd
Snyder Ln
Falcon Dr
Appalachian Dr
Broce Dr
Mcbryde Ln
Buchanan Dr
Watson Ln
Watson Ave
Circle Dr
Newman Ln
Kelsey Ln
Barringer Dr Nw
Burruss Dr
Mcbryde Dr
Woodland Dr
Prices Fork Rd
Edge Way
Webb St
Campus Edge Ct
Meadow Dr
Kabrich St
Stonegate Dr
Scott Alan Cir
Progress St Nw
Montgomery St Nw
Monarch Ct
Northside Dr
Wildflower Ln
Carroll Dr
Craig Dr
Duke Cir
Yale Rd Nw
Adler Ln
Whipple Dr
Redstone Ln
Bluestone Ln
Tech Ct
Radford Cir
Winslow Dr
Cherokee Dr
Algonquin Ct
Seminole Dr
Mohawk Dr Nw
Janie Ln
Mary Jane Cir
Seneca Dr
Shenandoah Cir
University Ter
Henry Ln
N Main St
Northview Dr
Lucas Dr
Dickerson Ln
Hearthstone Dr
Turner St Ne
Franklin Dr
College View Dr
Owens St
Silverleaf Ln
Giles Rd
McDonald St
Virginia St
McConkey St
Montgomery St Ne
Progress St Ne
Francis Ln
Faculty St
Wilson Ave
Bennett St
Jackson St Ne
Gilbert St
Collegiate Ct
Turner St
Turner St Nw
Perry St
Barger St
Stanger St
Old Turner St
Connector
West Campus Dr
Drillfield Dr
Alumni Mall
College Ave
Jackson St Nw
Church St Ne
Penn St Ne
E Roanoke St
Rutledge St
Bixby Ct
Lee St Se
Prospect St
Jefferson St
Washington St Se
Clay St Se
Hoogendam Ln
Devon Ln
Kelly Ln
Wharton St Se
Penn St Se
Church St Se
S Main St
W Roanoke St
Wall St
Oley St Nw
Kent St
Eheart St Se
Willard Dr
Highview Dr
Tee St
Price St
Neil St
Golden Harvest Cir
Red Maple Dr
Sterling Heights Ln
Hoyt St
Georgia St
Murphy St
Bradley Ln
North Dr
Grove Ave
Myers Pl
Rucker Rd
Elliott Dr
Mason Dr
Apperson Dr
Patrick Henry Dr Ne
Cook Dr
York Dr
Harding Ave
Sutton Pl
Vista Dr

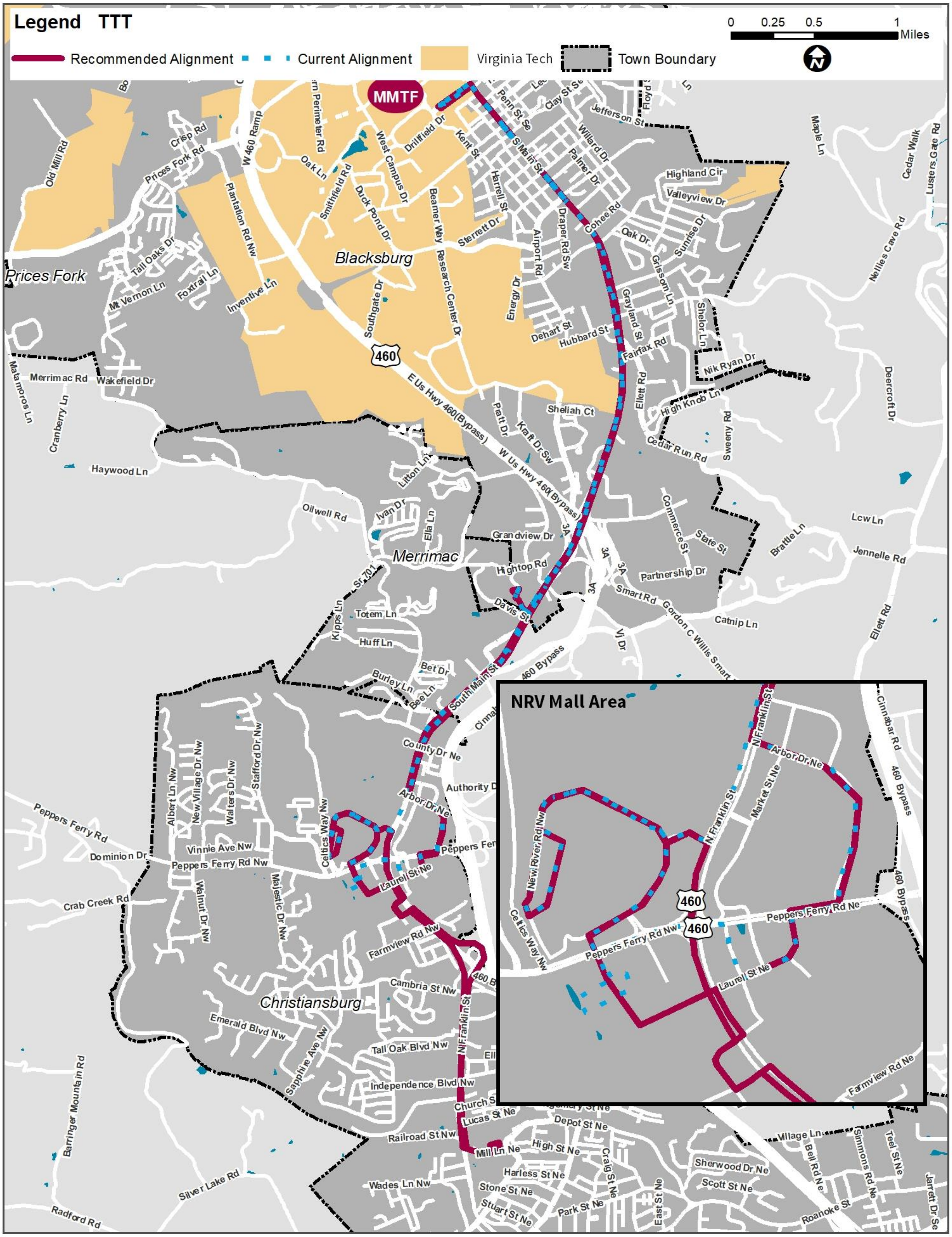
The Explorer			Existing	Proposed
	From		NRV Mall	Linden Green Apartments
	To		NRV Mall/Shoppers Way at Best Buy	Silver Lake Road
Full Service Span	**Weekday**		7:15 AM – 6:45 PM	7:00 AM – 6:00 PM
	Saturday		--	9:30 AM – 5:30 PM
	Sunday		--	--
Reduced Service Span	**Weekday**		7:15 AM – 6:45 PM	7:00 AM – 6:00 PM
	Saturday		--	9:30 AM – 5:30 PM
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	60/120	45
		Off-Peak	--	--
	Saturday		--	45
	Sunday		--	--
Reduced Service Frequency	**Weekday**	**Peak**	60/120	45
		Off-Peak	--	--
	Saturday		--	45
	Sunday		--	--
Description of Change	The Explorer will be restructured into an east-west route in Christiansburg and extended west on Radford Street to the town line. Franklin Street service north of the Aquatic Center will be shifted to the Two Town Trolley, which will be extended to the proposed Christiansburg Amtrak Station. The route will serve the proposed Christiansburg Amtrak across from the Aquatic Center (final alignment dependent on station layout), where a timed transfer will be available to the Two Town Trolley. Frequencies will be increased, with buses arriving every 45 minutes.			
Justification for Change	These changes provide more frequent and more efficient service, while limiting duplication of service. The extension on Radford Street will serve an area with high transit demand. The increase in frequency will better match demand and increase ridership potential. Service to the proposed Amtrak station will increase regional connectivity.			
Areas with Reduced Service	Passengers traveling between the NRV Mall area and Roanoke Street would have to transfer, however this would be a timed transfer to minimize additional travel time.			
Implementation Timeframe	Mid term (3 to 10 years)			


Legend
EXP
Current Alignment
Virginia Tech
Town Boundary
0
0.25
0.5
Miles
TTT
Quez Dr
Burley Ln
Dalet Dr
Arthur Ln
Merrimac Rd
South Main St
460 Bypass
Cinnabar Rd
Aurora Ln
Gordon C Willis Sr Smart Rd
Midway Plaza Dr Nw
County Dr Ne
Red Oak Dr Ne
Celtics Way Nw
Market St Ne
Black Bear Run Rd
Scalehouse Dr
New River Rd Nw
Arbor Dr Ne
Peppers Ferry Rd
Peppers Ferry Rd Nw
Laurel St Ne
Teaberry Rd
Pike Ln
Majestic Dr Nw
Conston Ave Nw
Farmview Rd Nw
Palmer St Nw
460 Bypass
Gibson Dr Nw
Juniper Dr Nw
Cambria St Nw
Pelham Ln Nw
Central Ave Ne
Lee St Ne
Cambria St Ne
Talon Ln
Dabney Rd
Diamond Ave Nw
Sapphire Ave Nw
Sleepy Hollow Rd Nw
Oak Tree Blvd Nw
N Franklin St
Orchard St Ne
Woodrow Rd
Silver Leaf Dr Nw
Ellett Rd Ne
King St Ne
Rigby St Ne
Murray St Ne
460
Independence Blvd Nw
Liberty Via Nw
Brown St Ne
Church St Ne
Scattergood Dr Nw
Montgomery St Ne
Huckleberry St Ne
George Edward Via Nw
Lucas St Ne
Depot St Ne
Railroad St Nw
Village Ln
Mill Ln Ne
High St Ne
E Main St Ne
Lester St Ne
Sara St Nw
North Dr Ne
Sherwood Dr Ne
Rt 460 Bypass Wbl Wb
Bell Rd Ne
Simmons Rd Ne
Teel St Ne
Hubbell Dr Ne
Fisher St Ne
Wades Ln Nw
Harless St Ne
Forest St Ne
Scott St Ne
School Ln Ne
Betty Dr Nw
Stone St Ne
Park St Ne
Economy St Ne
Heymaker St Ne
East St Ne
Silver Lake Rd
Water St Nw
Chapel St Nw
Hill St Nw
Junkin St Ne
Evans St Ne
Reading Rd Se
Arrowhead Trl Se
Chestnut Dr Se
11
Fairview St Se
Kamran Dr Nw
Warren St Nw
Clearview Dr Nw
Depot St Nw
Roanoke St
Chinquapin Trl Se
Warrior Dr Se
Beaver Dr Nw
Elk Dr Nw
Radford St Nw
Pepper St Se
S Franklin St
Overhill Rd Se
Pine St Se
Rt 460 Bypass Ebl Eb
Mink St Nw
College St Nw
First St Sw
Second St Sw
Third St Sw
Turpin Walk Se
Flint Dr Se
Spruce St Se
Interstate 81 Ramp
Melody Dr Nw
Hillcrest Dr Nw
Ellett Dr Se
Allegheny St Se
Miller St Se
Interstate 81 Sbl Sb
Parkway Dr Se
W Main St
Cherry Ln Sw
Ash Dr Se
Birch Ln Se
Maple Dr Se
Gum Dr Se
Moose Dr Nw
Oak Dr Sw
Carson Dr Sw
Atkinson Rd Sw
Interstate 81 Nb
Briarwood Dr Sw
Diana Dr Nw
South Hill Dr Sw
Auburn Dr Sw
Interstate 81 Sb
Summitridge Rd Sw
Kimball Ln Sw
Mud Pike

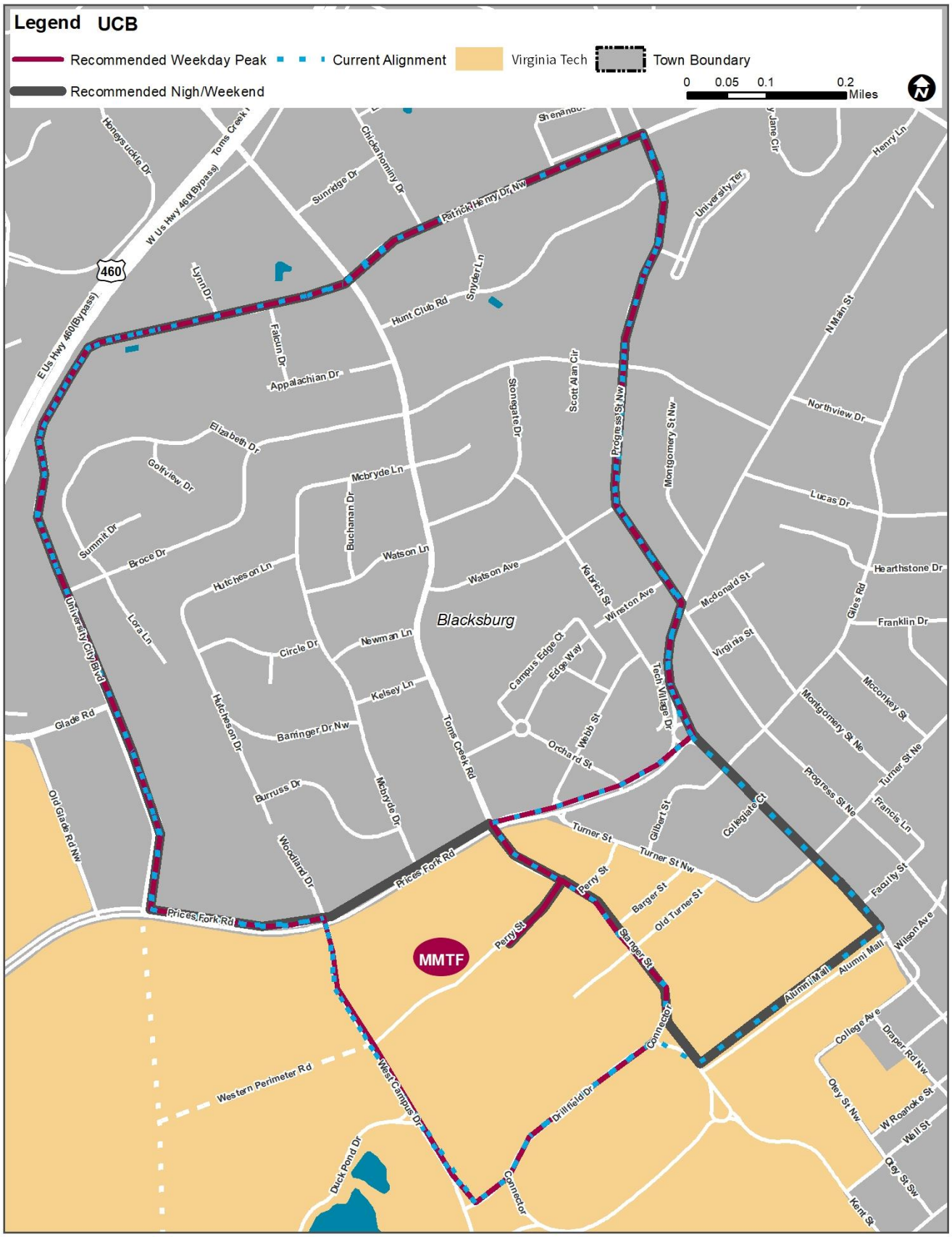
Toms Creek			Existing	Proposed
	From		Torgerson Hall	MMTF
	To		University City / Toms Creek	University City / Toms Creek
Full Service Span	**Weekday**		7:00 AM – 12:30 AM/2:30 AM	7:00 AM – 12:30 AM/2:30 AM
	Saturday		9:30 AM – 2:30 AM	9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM	11:30 AM – 11:30 PM
Reduced Service Span	**Weekday**		7:00 AM – 10:00 PM	7:00 AM – 10:00 PM
	Saturday		9:30 AM – 9:00 PM	9:30 AM – 9:00 PM
	Sunday		11:30 AM –7:00 PM	11:30 AM – 7:00 PM
Full Service Frequency	**Weekday**	**Peak**	10/15	10/15
		Off-Peak	10/30	10/30
	Saturday		30	30
	Sunday		30	30
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		30	30
	Sunday		30	30
Description of Change	On the Virginia Tech campus, the route will serve the new Multimodal Transfer Facility (MMTF).			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend TC
Recommended Alignment-Daytime
Current Alignment
Virginia Tech
Town Boundary
Recommended Alignment-Nights/Weekends
0 0.075 0.15 0.3 Miles
N
Blacksburg
MMTF
460
Redbud Rd
E 460 Ramp
Toms Creek Ramp
Christine Ct
Jennifer Dr
Shenandoah Cir
Mary Jane Cir
Seneca Dr
Meadows Edge Aly
Village Way North
Quince Ct
Trillium Ln
Sycamore Aly
Honeysuckle Dr
Plum Aly
W Us Hwy 460(Bypass)
Toms Creek Rd
Sunridge Dr
Chickahominy Dr
Patrick Henry Dr Nw
Hunt Club Rd
University Ter
Henry Ln
Lynn Dr
Falcon Dr
Snyder Ln
N Main St
Village Way South
Poplar Ridge Cir
Elizabeth Dr
Broce Dr
Stonegate Dr
Scott Alan Cir
Progress St Nw
Montgomery St Nw
Northview Dr
Mcbryde Ln
Buchanan Dr
Summit Dr
Hutcheson Ln
Watson Ln
Watson Ave
Lucas Dr
Turner St Ne
Hearthstone Dr
Mcdonald St
Giles Rd
Franklin Dr
Virginia St
Owens St
Mcconkey St
Montgomery St Ne
Progress St Ne
Francis Ln
Faculty St
Wilson Ave
Harding Ave
Jackson St Ne
College Ave
Alumni Mall
Old Turner St
Connector
Oley St Nw
W Roanoke St
Wall St
Draper Rd Sw
S Main St
Oley St Sw
Kent St
Clay St Sw
Miller St
Clay Cir
Ingles Ct Sw
Houston St
Harrell St
Center St
Warren St
Green St
Beamer Way
Washington St Sw
Drillfield Dr
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Duck Pond Dr
Smithfield Rd
Oak Ln
Western Perimeter Rd
West Campus Dr
Prices Fork Rd
Perry St
Barger St
Stanger St
Turner St
Turner St Nw
Gilbert St
Collegiate Ct
N Main St
Campus Edge Ct
Edge Way
Webb St
Ivy Birch St
University City Blvd
Lora Ln
Circle Dr
Newman Ln
Barringer Dr Nw
Hutcheson Dr
Mcbryde Dr
Burruss Dr
Woodland Dr
Old Glade Rd Nw
Glade Rd
Claytor Sq
Newport Ter
Robin Rd
Oriole Dr
Quail Dr
E Us Hwy 460(Bypass)
Prices Fork Ramp
W 460 Ramp

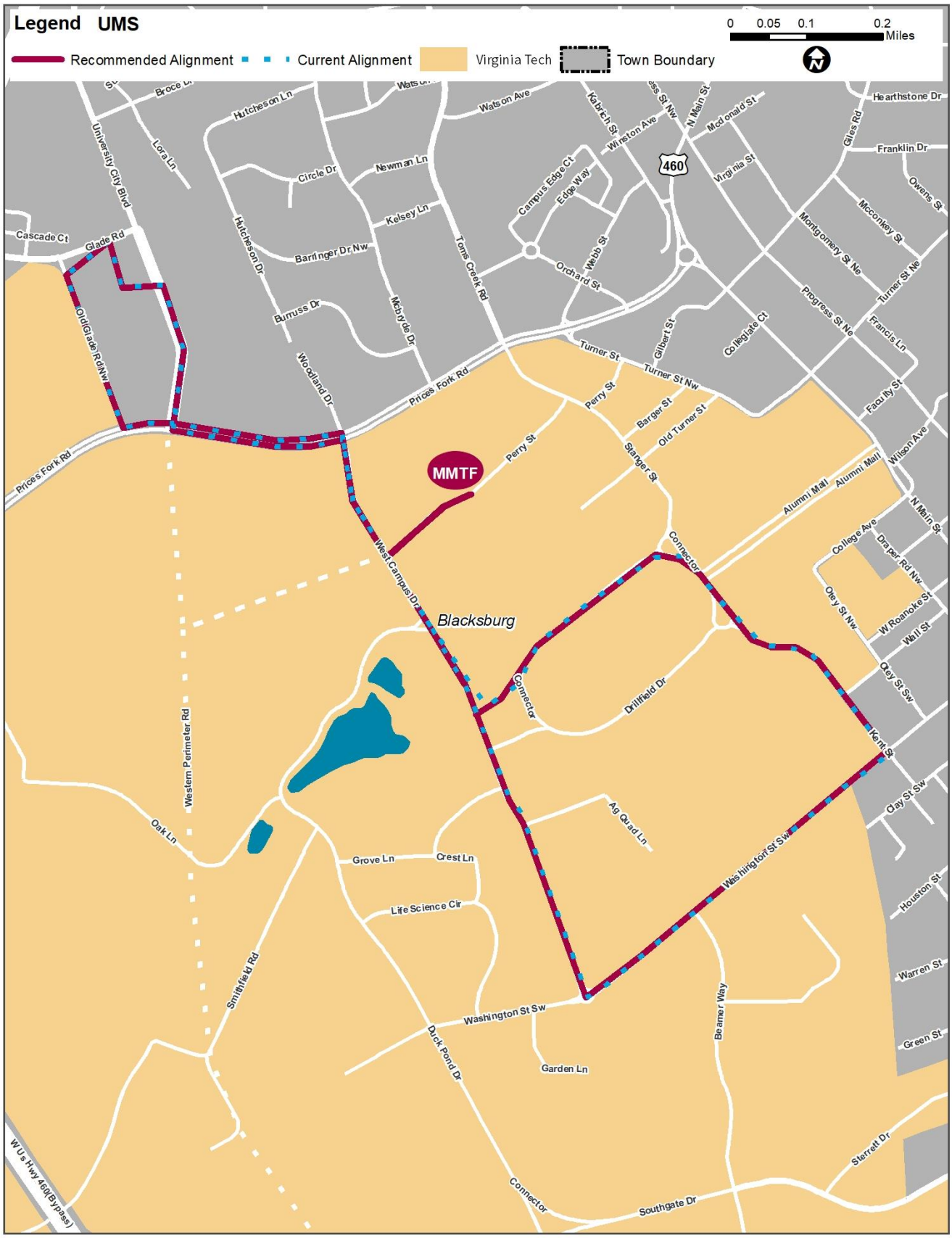
Two Town Trolley			Existing	Proposed
	From		Squires East	Squires East
	To		New River Valley Mall	Christiansburg Amtrak Station
Full Service Span	Weekday		7:00 AM – 5:55 PM/12:45 AM	7:00 AM – 7:00 PM/12:45 AM
	Saturday		10:15 AM – 12:45 AM	10:15 AM – 12:45 AM
	Sunday		12:15 PM – 5:45 PM	12:15 PM – 6:45 PM
Reduced Service Span	Weekday		7:00 AM – 5:55 PM	7:00 AM – 7:00 PM
	Saturday		10:15 AM – 5:45 PM	10:15 AM – 6:45 PM
	Sunday		12:15 PM – 5:45 PM	12:15 PM – 6:45 PM
Full Service Frequency	Weekday	Peak	60	45
		Off-Peak	60	45
	Saturday		60	45
	Sunday		60	45
Reduced Service Frequency	Weekday	Peak	60	45
		Off-Peak	60	45
	Saturday		60	45
	Sunday		60	45
Description of Change	The route will be extended to the proposed Amtrak station in Christiansburg, where a timed transfer will be available to The Explorer (The Explorer will no longer serve the NRV Mall). Service near the NRV Mall will be restructured to operate in both directions between Walmart, the NRV Mall, and the DMV, and service will be added to the Target shopping plaza. The route will serve the proposed Christiansburg Amtrak across from the Aquatic Center (final alignment dependent on station layout). Frequencies will be increased on Weekdays and Saturdays so buses arrive every 45 minutes. Service on weekends will be extended to 6:45 PM during reduced service. Future adjustments to the service span may be needed when the Amtrak schedule is finalized.			
Justification for Change	Provides more efficient service to Christiansburg and the NRV Mall, while limiting duplication of service. The increase in frequencies and additional service to Target will help increase ridership. The later service on weekends will allow more employees near the NRV Mall to use the route for commuting to and from work. Service to the proposed Amtrak station will increase regional connectivity.			
Areas with Reduced Service	Current passengers who use the Explorer from Roanoke Street to access the NRV Mall area would have to transfer. This would be a timed transfer, however, to minimize additional travel time.			
Implementation Timeframe	Mid term (3 to 10 years)			


Legend TTT
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0
0.25
0.5
1
Miles
MMTF
Blacksburg
Prices Fork
Merrimac
Christiansburg
NRV Mall Area
Penn St Se
Clay St Se
Jefferson St
Drillfield Dr
Kent St
S Main St
Willard Dr
Palmer Dr
Highland Cir
Valleyview Dr
West Campus Dr
Oak Ln
Smithfield Rd
Duck Pond Dr
Beamer Way
Harrell St
Sterrett Dr
Draper Rd Sw
Airport Rd
Cohee Rd
Oak Dr
Sunrise Dr
Grissom Ln
Old Mill Rd
Crisp Rd
Prices Fork Rd
W 460 Ramp
Plantation Rd Nw
Perimeter Rd
Tall Oaks Dr
Foxtrail Ln
Mt Vernon Ln
Inventive Ln
Southgate Dr
Research Center Dr
Energy Dr
Dehart St
Hubbard St
Grayland St
Fairfax Rd
Shelor Ln
Nik Ryan Dr
Maple Ln
Cedar Walk
Lusters Gate Rd
Nellies Cave Rd
Deercroft Dr
460
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
Matamoros Ln
Merrimac Rd
Wakefield Dr
Cranberry Ln
Haywood Ln
Sheliah Ct
Pratt Dr
Kraft Dr Sw
Ellett Rd
High Knob Ln
Cedar Run Rd
Sweeny Rd
Litton Ln
Oilwell Rd
Ivan Dr
Ella Ln
Grandview Dr
Hightop Rd
Davis St
Commerce St
State St
Partnership Dr
Smart Rd
Gordon C Willis Smart Rd
Catnip Ln
Vt Dr
Brattle Ln
Lcw Ln
Jennelle Rd
3A
St 701
Kipps Ln
Totem Ln
Huff Ln
Bet Dr
Burley Ln
Bee Ln
South Main St
460 Bypass
County Dr Ne
Arbor Dr Ne
Authority D
Peppers Fer
Peppers Ferry Rd
Dominion Dr
Albert Ln Nw
New Village Dr Nw
Walters Dr Nw
Stafford Dr Nw
Vinnie Ave Nw
Peppers Ferry Rd Nw
Celtics Way Nw
Laurel St Ne
Crab Creek Rd
Walnut Dr Nw
Majestic Dr Nw
Farmview Rd Nw
Cambria St Nw
N Franklin St
Emerald Blvd Nw
Sapphire Ave Nw
Tall Oak Blvd Nw
Independence Blvd Nw
Church St
Lucas St Ne
Railroad St Nw
Mill Ln Ne
High St Ne
Depot St Ne
Craig St Ne
Harless St Ne
Stone St Ne
Stuart St Ne
Park St Ne
Wades Ln Nw
East St Ne
Village Ln
Sherwood Dr Ne
Scott St Ne
Bell Rd Ne
Simmons Rd Ne
Teel St Ne
Roanoke St
Jarrett Dr Se
Barringer Mountain Rd
Silver Lake Rd
Radford Rd
Cinnabar Rd
New River Rd Nw
Market St Ne
Peppers Ferry Rd Ne
Farmview Rd Ne

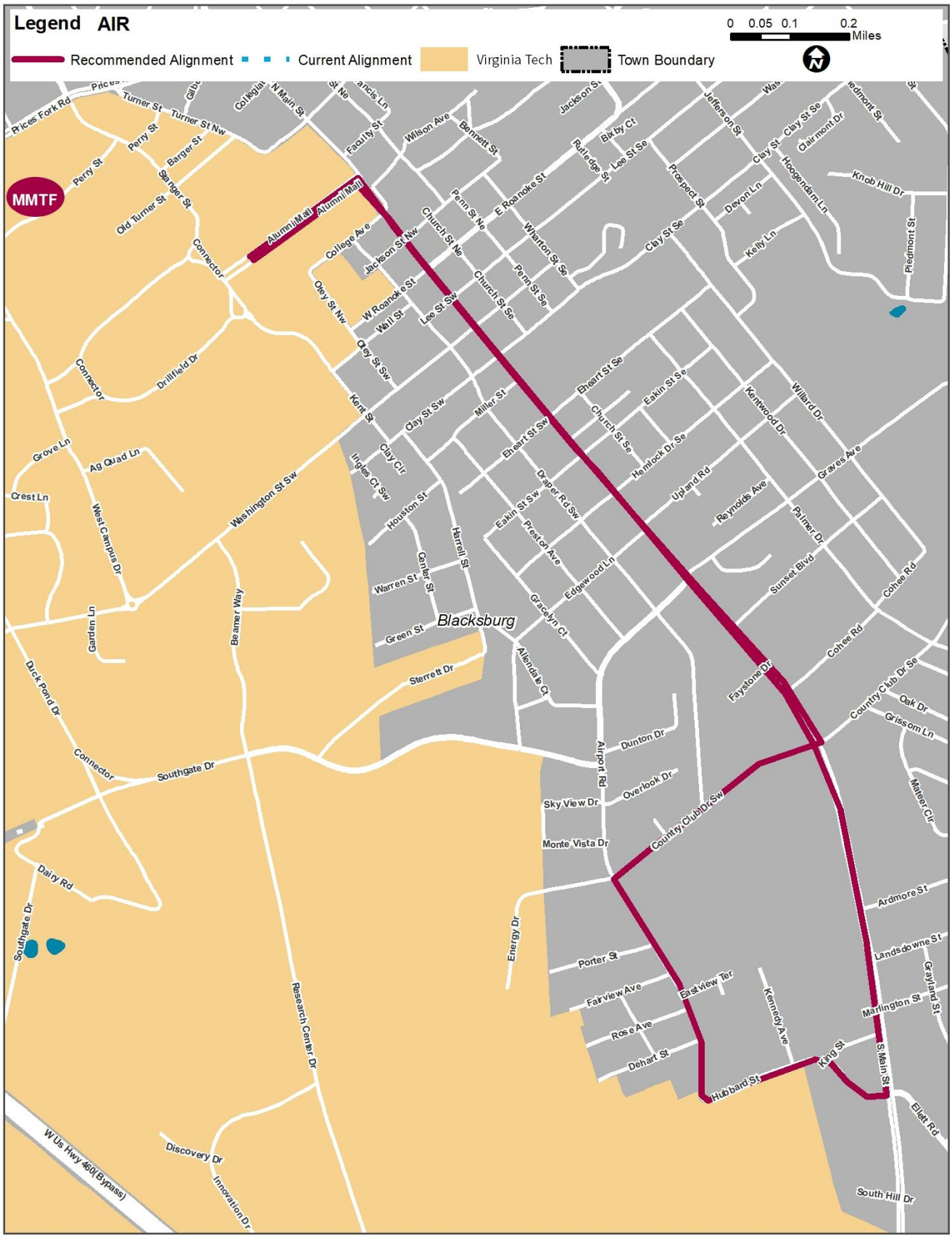
University City Blvd			Existing	Proposed
	From		Burruss Hall	MMTF
	To		Patrick Henry/Toms Creek	Patrick Henry/Toms Creek
Full Service Span	**Weekday**		7:00 AM – 9:30 AM/2:30 AM	7:00 AM – 9:30 AM/2:30 AM
	Saturday		9:30 AM – 2:30 AM	9:30 AM – 2:30 AM
	Sunday		11:30 AM – 11:30 PM	11:30 AM – 11:30 PM
Reduced Service Span	**Weekday**		7:00 AM – 6:30 PM	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	**Weekday**	**Peak**	10/15	10/15
		Off-Peak	10/30	10/30
	Saturday		30	30
	Sunday		30	30
Reduced Service Frequency	**Weekday**	**Peak**	30	30
		Off-Peak	30	30
	Saturday		--	--
	Sunday		--	--
Description of Change	On the Virginia Tech campus, the route will serve the new Multimodal Transfer Facility (MMTF).			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes.			
Areas with Reduced Service	None			
Implementation Timeframe	Short term (1 to 3 years)			


Legend UCB
Recommended Weekday Peak
Current Alignment
Virginia Tech
Town Boundary
Recommended Nigh/Weekend
0 0.05 0.1 0.2 Miles
Blacksburg
MMTF
460
E Us Hwy 460(Bypass)
W Us Hwy 460(Bypass)
Toms Creek
Honeysuckle Dr
Sunridge Dr
Chickahominy Dr
Patrick Henry Dr Nw
Shenandoah
University Ter
Henry Ln
Lynn Dr
Falcon Dr
Hunt Club Rd
Snyder Ln
Appalachian Dr
Elizabeth Dr
Golfview Dr
Summit Dr
Broce Dr
Hutcheson Ln
Lora Ln
University City Blvd
Mcbryde Ln
Buchanan Dr
Watson Ln
Watson Ave
Stonegate Dr
Scott Alan Cir
Progress St Nw
Montgomery St Nw
N Main St
Northview Dr
Lucas Dr
Hearthstone Dr
Giles Rd
Franklin Dr
Virginia St
Mcconkey St
Montgomery St Ne
Turner St Ne
Progress St Ne
Francis Ln
Faculty St
Wilson Ave
Alumni Mall
College Ave
Draper Rd Nw
Oley St Nw
W Roanoke St
Wall St
Oley St Sw
Kent St
Kabrich St
Winston Ave
Mcdonald St
Circle Dr
Newman Ln
Kelsey Ln
Barringer Dr Nw
Hutcheson Dr
Burruss Dr
Mcbryde Dr
Woodland Dr
Old Glade Rd Nw
Glade Rd
Campus Edge Ct
Edge Way
Webb St
Orchard St
Tech Village Dr
Toms Creek Rd
Collegiate Ct
Gilbert St
Turner St
Turner St Nw
Perry St
Barger St
Old Turner St
Stanger St
Connector
Prices Fork Rd
Western Perimeter Rd
West Campus Dr
Drillfield Dr
Duck Pond Dr

University Mall			Existing	Proposed
	From		Burruss Hall	MMTF
	To		University Mall	University Mall
Full Service Span	Weekday		8:45 AM – 8:55 PM	7:00 AM – 8:55 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	15	10
		Off-Peak	15/30	15/30
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	Service on the Virginia Tech Campus will be extended to the planned Multimodal Transportation Facility (MMTF) on Perry Street. Service will begin earlier, and frequencies will be increased to every 10 minutes.			
Justification for Change	Extension to MMTF, when that facility is built, will allow for easier transfer between BT routes. The earlier service is due to high demand before 8:45am for students traveling to the Virginia Tech Math Emporium, and so the route can better function as a Virginia Tech circulator (most other routes begin service at 7:00am). Frequency increase will reduce overcrowding.			
Areas with Reduced Service	None.			
Implementation Timeframe	Short Term (1 to 3 years)			


Legend UMS
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.05 0.1 0.2 Miles
MMTF
Blacksburg
460
Hearthstone Dr
Franklin Dr
Owens St
Mcconkey St
Giles Rd
Virginia St
Mcdonald St
N Main St
Winston Ave
Kabrich St
Watson Ave
Hutcheson Ln
Broce Dr
University City Blvd
Lora Ln
Circle Dr
Newman Ln
Kelsey Ln
Barringer Dr Nw
Burruss Dr
Hutcheson Dr
Cascade Ct
Glade Rd
Old Glade Rd Nw
Mcbryde Dr
Woodland Dr
Toms Creek Rd
Campus Edge Ct
Edge Way
Webb St
Orchard St
Montgomery St Ne
Progress St Ne
Turner St Ne
Francis Ln
Collegiate Ct
Gilbert St
Turner St
Turner St Nw
Prices Fork Rd
Perry St
Barger St
Old Turner St
Stanger St
Faculty St
Wilson Ave
Alumni Mall
College Ave
Draper Rd Nw
N Main St
Connector
West Campus Dr
Oley St Nw
W Roanoke St
Wall St
Oley St Sw
Drillfield Dr
Kent St
Clay St Sw
Ag Quad Ln
Washington St Sw
Houston St
Warren St
Green St
Beamer Way
Western Perimeter Rd
Oak Ln
Grove Ln
Crest Ln
Life Science Cir
Smithfield Rd
Duck Pond Dr
Garden Ln
Sterrett Dr
Southgate Dr
W Us Hwy 460 (Bypass)

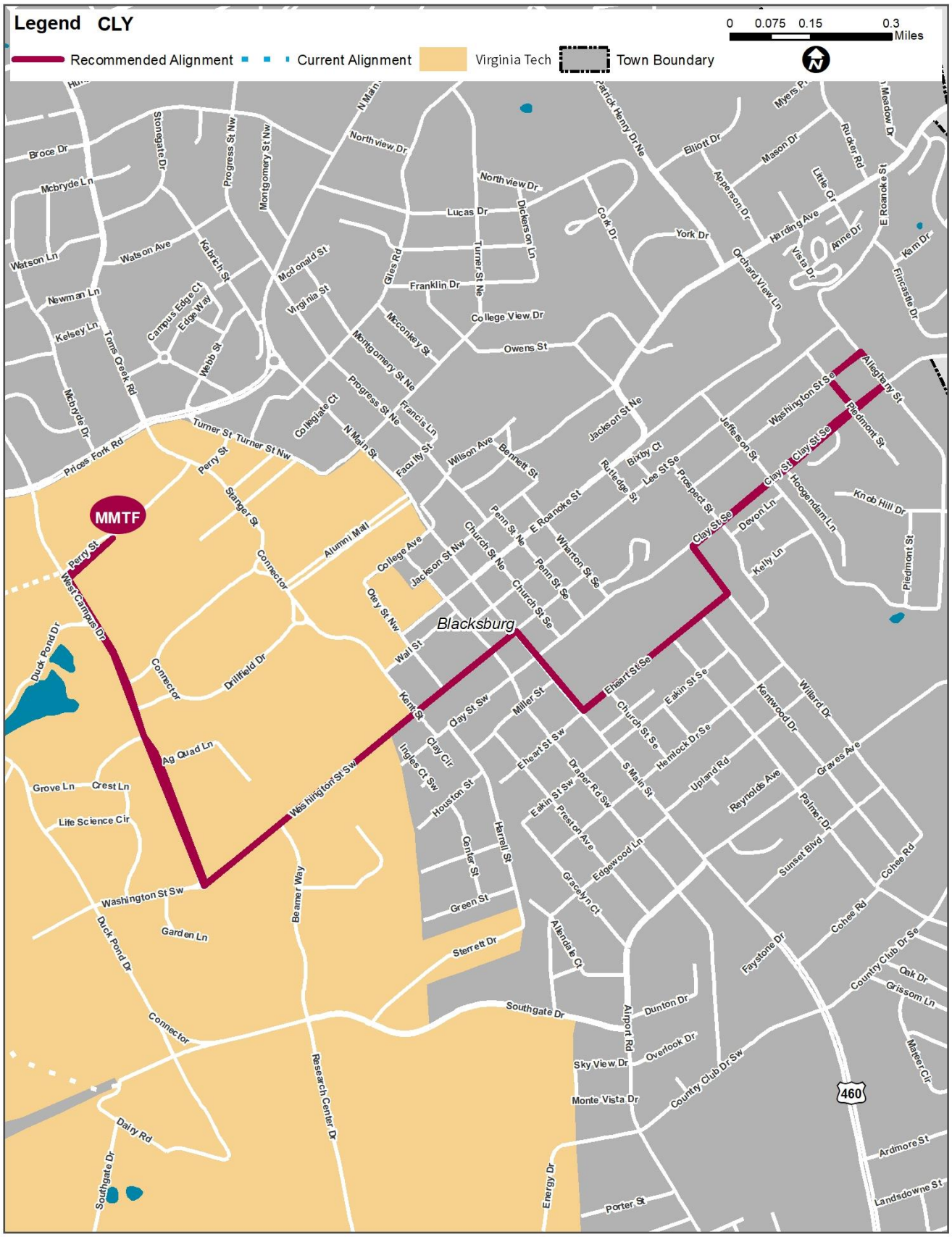
Airport Acres			Existing	Proposed
	From		--	Squires
	To		--	First & Main
Full Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	30
		Off-Peak	--	60
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This route will operate between Hubbard Street and the Multimodal Transfer Center (MMTF) on the Virginia Tech campus via Airport Road, Country Club Drive, and Main Street.			
Justification for New Route	This connection was identified as a gap in the market analysis based on high transit need and lack of existing transit service. The route will also help reduce overcrowding on the Main Street route by adding service between First and Main and Virginia Tech.			
Implementation Timeframe	Mid Term (3 to 10 years)			


Legend AIR
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.05 0.1 0.2
Miles
MMTF
Blacksburg
Prices Fork Rd
Turner St
Turner St Nw
Perry St
Barger St
Stanger St
Old Turner St
Connector
Alumni Mall
College Ave
Jackson St Nw
Church St Nw
Penn St Nw
E Roanoke St
Wharton St Se
Clay St Se
Devon Ln
Kelly Ln
Piedmont St
Knob Hill Dr
Hoogendam Ln
Clairmont Dr
Prospect St
Jefferson St
Bixby Ct
Rutledge St
Lee St Se
Bennett St
Wilson Ave
Faculty St
N Main St
Gilbert St
Collegiate Ln
Okey St Nw
W Roanoke St
Wall St
Lee St Sw
Church St Se
Penn St Se
Okey St Sw
Drillfield Dr
Kent St
Clay St Sw
Miller St
Eheart St Se
Eakin St Se
Church St Se
Hemlock Dr Se
Kentwood Dr
Willard Dr
Graves Ave
Upland Rd
Reynolds Ave
Palmer Dr
Sunset Blvd
Cohee Rd
Eheart St Sw
Draper Rd Sw
Eakin St Sw
Preston Ave
Edgewood Ln
Gracelyn Ct
Allendale Ct
Faystone Dr
Country Club Dr Se
Oak Dr
Grissom Ln
Mateer Cir
Clay Cir
Ingles Ct Sw
Houston St
Harrell St
Center St
Warren St
Green St
Grove Ln
Ag Quad Ln
Crest Ln
West Campus Dr
Washington St Sw
Garden Ln
Beamer Way
Duck Pond Dr
Connector
Southgate Dr
Sterrett Dr
Dunton Dr
Airport Rd
Overlook Dr
Sky View Dr
Monte Vista Dr
Country Club Dr Sw
Dairy Rd
Southgate Dr
Energy Dr
Porter St
Fairview Ave
Eastview Ter
Kennedy Ave
Rose Ave
Dehart St
Hubbard St
King St
S Main St
Marlington St
Ardmore St
Landsdowne St
Grayland St
Ellett Rd
South Hill Dr
Research Center Dr
W Us Hwy 460 (Bypass)
Discovery Dr
Innovation Dr

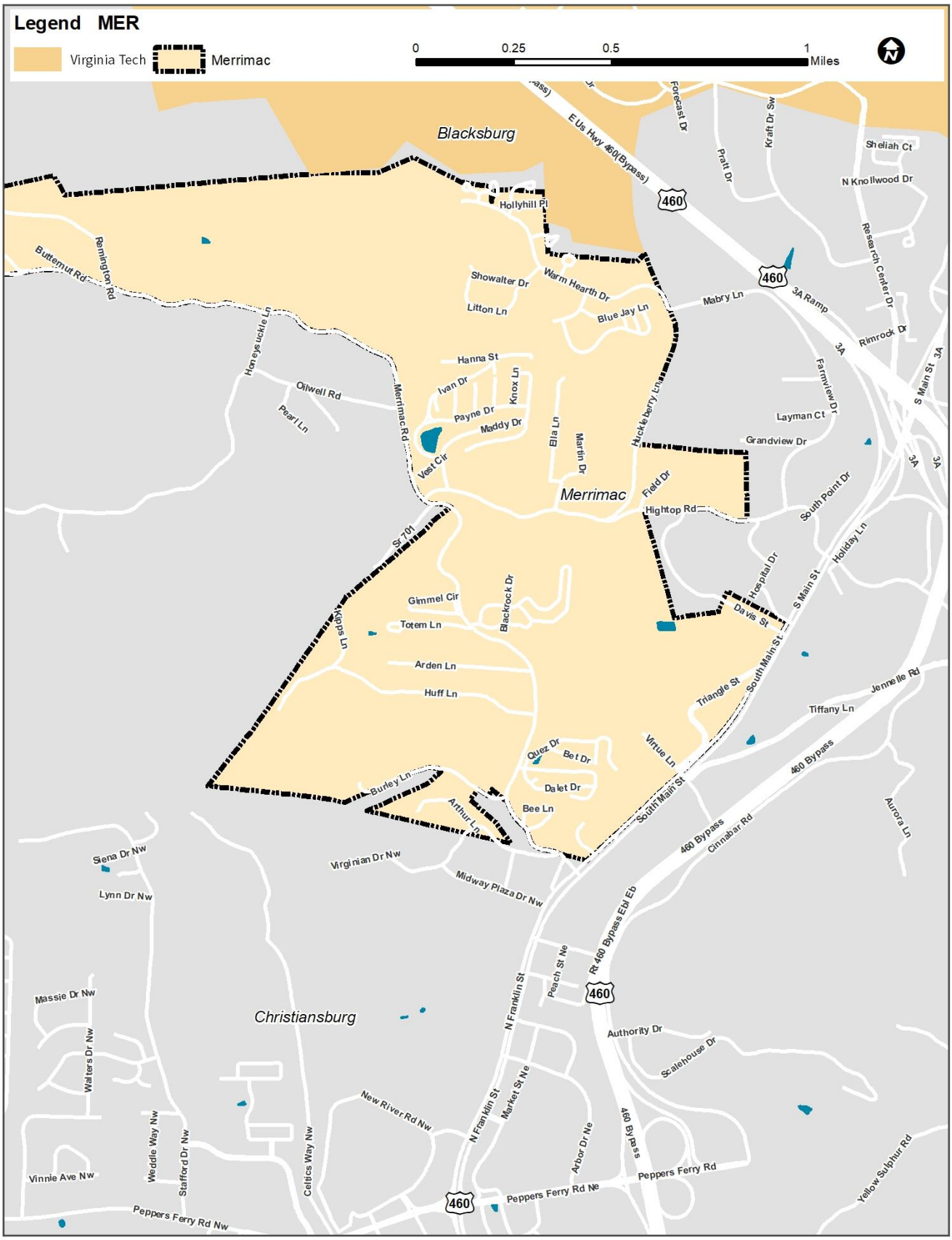
Campus Shuttle			Existing	Proposed
	From		--	MMTF
	To		--	Smithfield Lot
Full Service Span	Weekday		--	7:00 AM – 6:30 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	20
		Off-Peak	--	20
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This route will operate between the Smithfield Lot on Duckpond Drive and the Multimodal Transfer Center (MMTF) on the Virginia Tech campus via Airport Road, Duckpond Drive, Washington Street, West Campus Drive, Prices Fork Road, Stanger Street, and the Drillfield.			
Justification for New Route	This route will supplement the Hokie Express route and add additional service to the busiest portion of it and act as a campus circulator.			
Implementation Timeframe	Short Term (1 to 3 years)			


Legend CAS
0 0.035 0.07 0.14 Miles
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
Prices Fork Rd
Woodland Dr
Turner St
Gilbert St
Turner St Nw
Perry St
Barger St
Old Turner St
MMTF
Stanger St
Alumni Mall
Connector
Western Perimeter Rd
West Campus Dr
Drillfield Dr
Kent St
Blacksburg
Oak Ln
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Washington St Sw
Smithfield Rd
Duck Pond Dr
Beamer Way

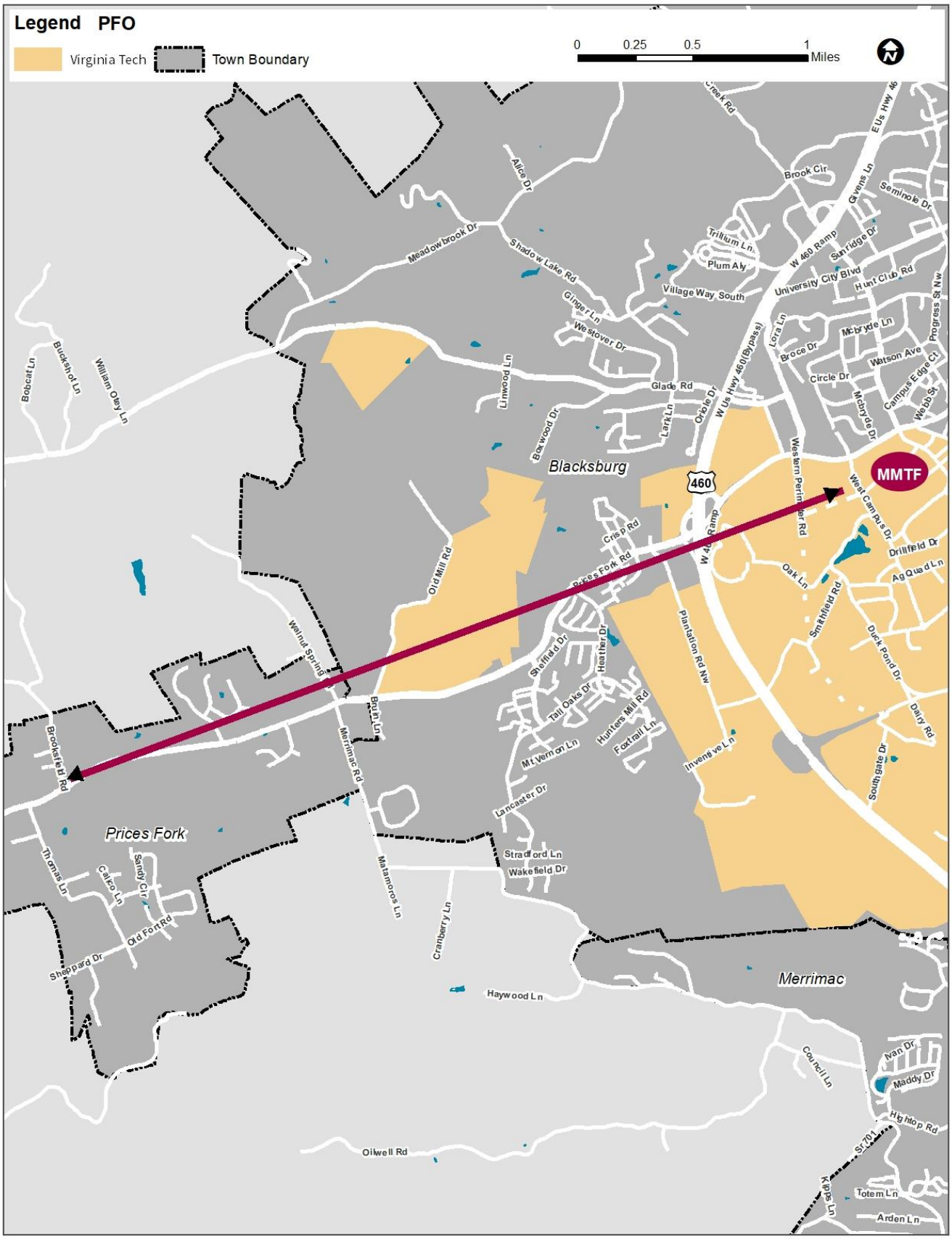
Clay Street			Existing	Proposed
	From		--	MMTF
	To		--	Jefferson Apartments
Full Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	--
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	30
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This route will operate between the planned MMTF and Jefferson Apartments via West Campus Drive, Washington Street, and Clay Street. A future extension to a newly proposed development at Clay Street and Cherry Street will be considered in the long term. This would require significant safety improvements to the corridor east of Jefferson Street, however, including a speed study and new sidewalks and pedestrian crossings. The service would use body-on-chassis vehicles instead of 35 or 40-foot buses, as significant upgrades to Clay Street would be necessary in order to use full-size buses. New sidewalks would be necessary along Eheart Street as part of the redevelopment of the old Blacksburg Middle School as well.			
Justification for New Route	This connection was identified as a gap in the market analysis based on high transit need and lack of existing transit service. The route would also serve the old Blacksburg Middle School site on Eheart Street which is slated for redevelopment.			
Implementation Timeframe	Mid Term (3 to 10 years) / Long term (10 plus years)			


Legend CLY
Recommended Alignment
Current Alignment
Virginia Tech
Town Boundary
0 0.075 0.15 0.3
Miles
MMTF
Blacksburg
460
Broce Dr
Mcbryde Ln
Stonegate Dr
Progress St Nw
Montgomery St Nw
North view Dr
N Main
Patrick Henry Dr Ne
Elliott Dr
Myers Pl
Meadow Dr
Mason Dr
Rucker Rd
E Roanoke St
Little Cir
Harding Ave
Anne Dr
Kam Dr
Fincastle Dr
Watson Ln
Watson Ave
Kabrich St
Newman Ln
Campus Edge Ct
Edge Way
Kelsey Ln
Toms Creek Rd
Webb St
Mcbryde Dr
Prices Fork Rd
Turner St
Turner St Nw
Perry St
Stanger St
Alumni Mall
Connector
College Ave
Jackson St Nw
Oley St Nw
Wall St
West Campus Dr
Duck Pond Dr
Drillfield Dr
Ag Quad Ln
Grove Ln
Crest Ln
Life Science Cir
Washington St Sw
Beamer Way
Garden Ln
Duck Pond Dr
Connector
Research Center Dr
Dairy Rd
Southgate Dr
Sterrett Dr
Green St
Center St
Harrell St
Houston St
Ingles Ct Sw
Clay Cir
Clay St Sw
Kent St
Miller St
Eheart St Sw
Draper Rd Sw
Eakin St Sw
Preston Ave
Edgewood Ln
Gracelyn Ct
Allendale Ct
Airport Rd
Dunton Dr
Overlook Dr
Sky View Dr
Monte Vista Dr
Country Club Dr Sw
Southgate Dr
Energy Dr
Porter St
Ardmore St
Landsdowne St
Meter Cir
Grissom Ln
Oak Dr
Country Club Dr Se
Cohee Rd
Faystone Dr
Palmer Dr
Sunset Blvd
Graves Ave
Reynolds Ave
Upland Rd
Hemlock Dr Se
S Main St
Eakin St Se
Church St Se
Eheart St Se
Willard Dr
Kentwood Dr
Clay St Se
Washington St Se
Allegheny St
Piedmont St
Knob Hill Dr
Devon Ln
Kelly Ln
Hoogendam Ln
Piedmont St
Jefferson St
Bixby Ct
Lee St Se
Prospect St
Rutledge St
Jackson St Ne
Wilson Ave
Bennett St
Faculty St
N Main St
Collegiate Ct
Progress St Ne
Francis Ln
Mcconkey St
Montgomery St Ne
Owens St
College View Dr
Franklin Dr
Giles Rd
Turner St Ne
Dickerson Ln
Lucas Dr
North view Dr
Cork Dr
York Dr
Orchard View Ln
Vista Dr
Church St Ne
Penn St Ne
E Roanoke St
Penn St Se
Wharton St Se
Church St Se

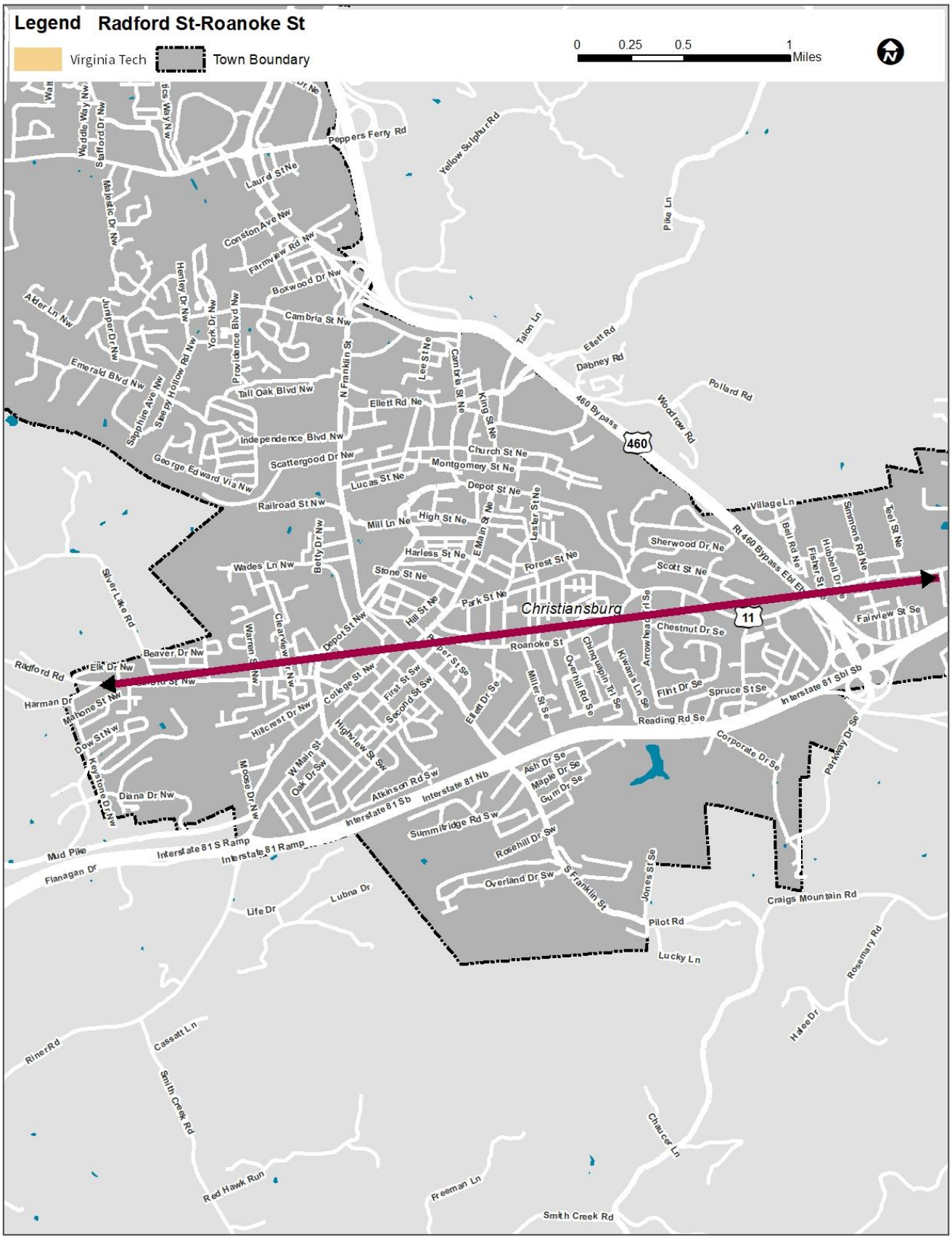
Merrimac			Existing	Proposed
	From		--	Merrimac
	To		--	Blacksburg and Christiansburg
Full Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	10:00 AM – 7:00 PM
	Sunday		--	--
Reduced Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	10:00 AM – 7:00 PM
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	60
		Off-Peak	--	--
	Saturday		--	60
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	60
		Off-Peak	--	--
	Saturday		--	60
	Sunday		--	--
Description of New Route	This long term service would connect Merrimac with Blacksburg and Christiansburg along an alignment to be determined. The service could either be demand-response, fixed-route with deviations allowed, or entirely fixed-route. Smaller vehicles would be necessary to deal with the challenging topography and narrow roadways common in this area. The planning for this route would have to be closely coordinated with Montgomery County and would need a local funding match from the county.			
Justification for New Route	This connection was identified as a gap in the market analysis based on high transit need and lack of existing transit services. Potential riders include residents in Merrimac without access to a vehicle that would want to reach the services located around the NRV Mall, the hospital, and the CRC.			
Implementation Timeframe	Long Term (10 plus years)			


Legend MER
Virginia Tech
Merrimac
0
0.25
0.5
1
Miles
Blacksburg
Merrimac
Christiansburg
E Us Hwy 460(Bypass)
460
Forecast Dr
Pratt Dr
Kraft Dr Sw
Sheliah Ct
N Knollwood Dr
Research Center Dr
Rimrock Dr
S Main St
3A
3A Ramp
Mabry Ln
Hollyhill Pl
Showalter Dr
Warm Hearth Dr
Litton Ln
Blue Jay Ln
Buttermut Rd
Rennington Rd
Honeysuckle Ln
Oilwell Rd
Pearl Ln
Merrimac Rd
Hanna St
Ivan Dr
Knox Ln
Payne Dr
Maddy Dr
Vest Cir
Ella Ln
Martin Dr
Huckleberry Ln
Layman Ct
Farmview Dr
Grandview Dr
Field Dr
Hightop Rd
South Point Dr
Holiday Ln
Hospital Dr
Davis St
S Main St
South Main St
Triangle St
Tiffany Ln
Jennelle Rd
460 Bypass
Aurora Ln
Cinnabar Rd
Virtue Ln
Quez Dr
Bet Dr
Dalet Dr
Bee Ln
Arthur Ln
Burley Ln
Rt 460 Bypass Ebl Eb
Peach St Ne
N Franklin St
Authority Dr
Scalehouse Dr
Market St Ne
Arbor Dr Ne
Peppers Ferry Rd
Peppers Ferry Rd Ne
Yellow Sulphur Rd
Peppers Ferry Rd Nw
Vinnie Ave Nw
Weddle Way Nw
Stafford Dr Nw
Celtics Way Nw
New River Rd Nw
Walters Dr Nw
Massie Dr Nw
Siena Dr Nw
Lynn Dr Nw
Virginian Dr Nw
Midway Plaza Dr Nw
St 701
Kipps Ln
Gimmel Cir
Totem Ln
Blackrock Dr
Arden Ln
Huff Ln

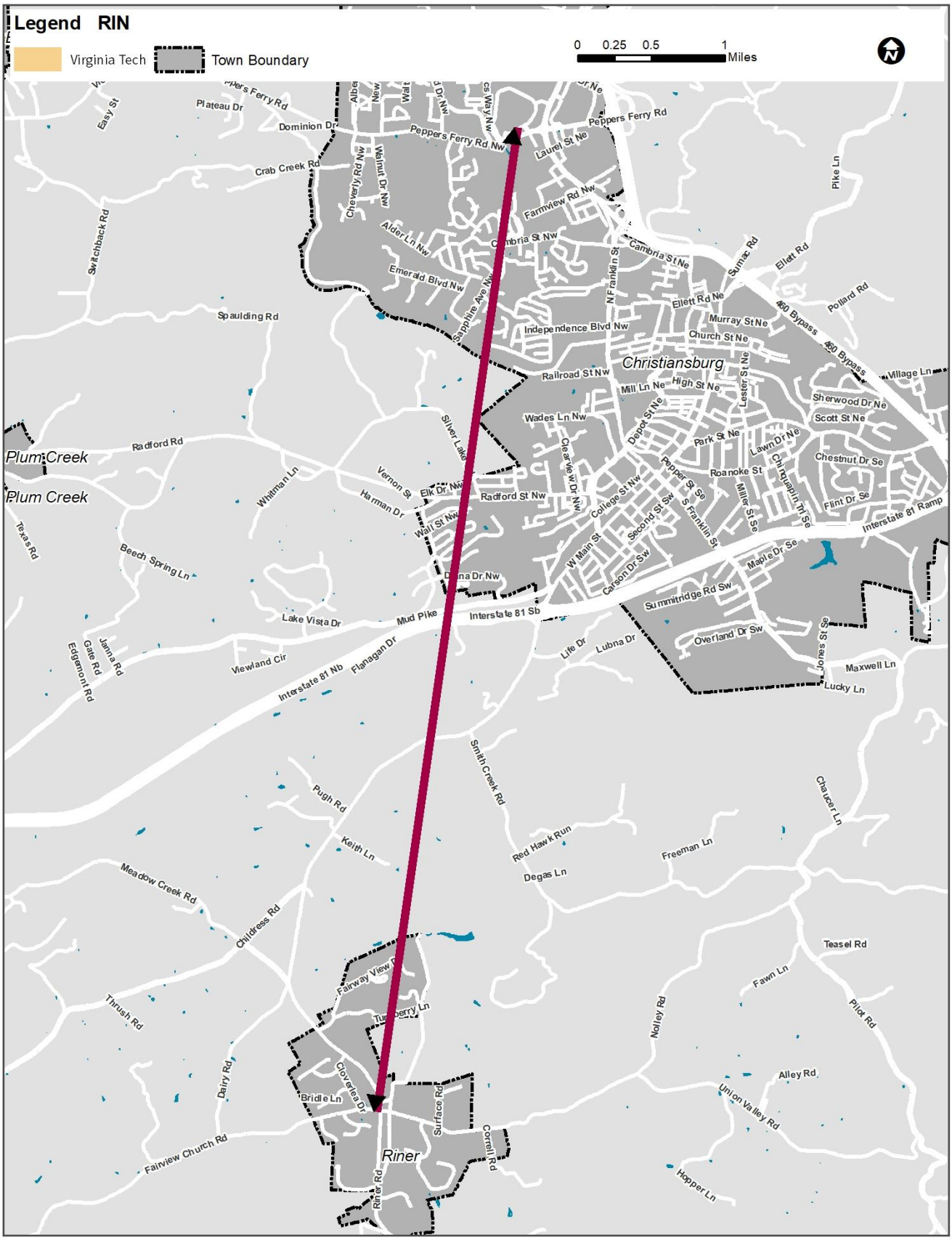
Prices Fork			Existing	Proposed
	From		--	MMTF
	To		--	Prices Fork Village
Full Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	7:00 AM – 7:00 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	60
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	60
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This long term route would operate between the planned MMTF and Prices Fork Village. The planning for this route would have to be closely coordinated with Montgomery County and would need a local funding match from the county.			
Justification for New Route	This connection was identified as a gap in the market analysis based on high transit need and lack of existing transit service. Several new developments have been proposed for the area, including senior housing.			
Implementation Timeframe	Long Term (10 plus years)			


Legend PFO
Virginia Tech
Town Boundary
0 0.25 0.5 1 Miles
Blacksburg
Prices Fork
Merrimac
MMTF
460
Creek Rd
E Us Hwy 460
Alice Dr
Brook Cir
Gwens Ln
Seminole Dr
Meadowbrook Dr
Shadow Lake Rd
Trillium Ln
Plum Aly
W 460 Ramp
Sunridge Dr
Village Way South
University City Blvd
Hunt Club Rd
Ginger Ln
Westover Dr
Lora Ln
Mcbryde Ln
Progress St Nw
Bobcat Ln
Buckshot Ln
William Otey Ln
Broce Dr
Watson Ave
Circle Dr
Campus Edge Ct
Webb St
Linwood Ln
Glade Rd
Boxwood Dr
Lark Ln
Oriole Dr
W Us Hwy 460(Bypass)
Mcbryde Dr
Western Perimeter Rd
West Campus Dr
Drillfield Dr
Ag Quad Ln
Crisp Rd
Old Mill Rd
Peppers Fork Rd
W 460 Ramp
Oak Ln
Smithfield Rd
Duck Pond Dr
Walnut Spring
Sheffield Dr
Heather Dr
Plantation Rd Nw
Tall Oaks Dr
Hunters Mill Rd
Foxtrail Ln
Dairy Rd
Brookefield Rd
Barn Ln
Merrimac Rd
Mt Vernon Ln
Inventive Ln
Southgate Dr
Lancaster Dr
Stradford Ln
Wakefield Dr
Thomas Ln
Calico Ln
Sandy Cir
Old Fort Rd
Sheppard Dr
Matamoros Ln
Cranberry Ln
Haywood Ln
Oilwell Rd
Council Ln
Ivan Dr
Maddy Dr
Highton Rd
Sr 701
Kipps Ln
Totem Ln
Arden Ln

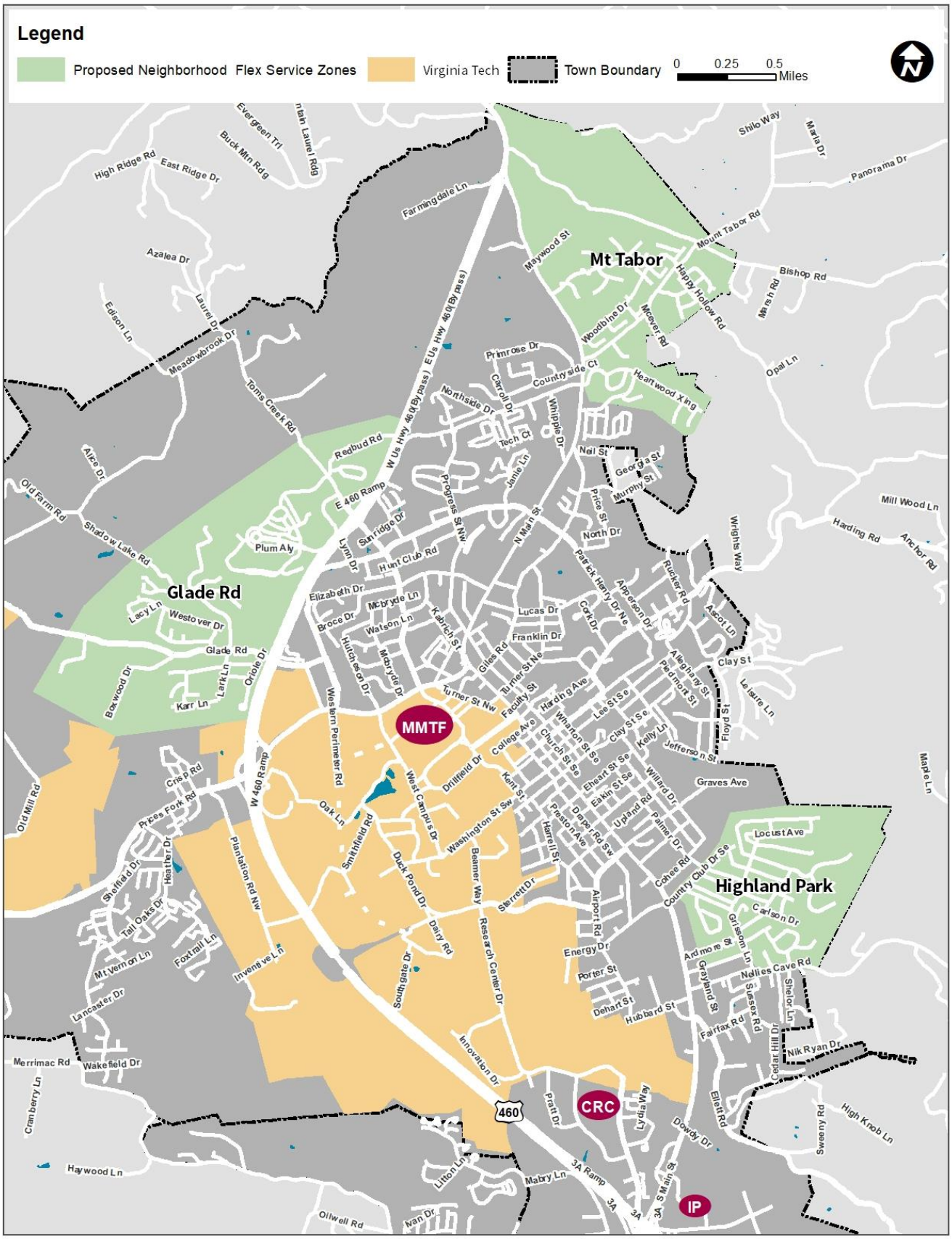
Radford St – Roanoke St			Existing	Proposed
	From		--	Radford St/Roanoke St corridors
	To		--	-
Full Service Span	Weekday		--	TBD
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	TBD
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	TBD
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	TBD
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This route would operate along the Radford Street and Roanoke Street corridors in Christiansburg with an exact alignment and endpoints to be determined in the future.			
Justification for New Route	This route would supplement The Explorer and add additional service to an area of high transit demand in Christiansburg.			
Implementation Timeframe	Short term (1 to 3 years)			


Legend
Radford St-Roanoke St
Virginia Tech
Town Boundary
0
0.25
0.5
1
Miles
Christiansburg
11
460
460 Bypass
Peppers Ferry Rd
Yellow Sulphur Rd
Pike Ln
Laurel St Ne
Conston Ave Nw
Farmview Rd Nw
Boxwood Dr Nw
Cambria St Nw
Talon Ln
Ellett Rd
Dabney Rd
Pollard Rd
Woodrow Rd
Ellett Rd Ne
Tall Oak Blvd Nw
Independence Blvd Nw
Scattergood Dr Nw
George Edward Via Nw
Railroad St Nw
Lucas St Ne
Church St Ne
Montgomery St Ne
Depot St Ne
Mill Ln Ne
High St Ne
Harless St Ne
Stone St Ne
Wades Ln Nw
Forest St Ne
Park St Ne
Hill St Ne
Depot St Nw
Roanoke St
Chestnut Dr Se
Sherwood Dr Ne
Scott St Ne
Village Ln
Rt 460 Bypass Ebl Ent
Fairview St Se
Beaver Dr Nw
Elk Dr Nw
Radford Rd
College St Nw
First St Sw
Second St Sw
Hillcrest Dr Nw
Highview St Sw
Overhill Rd Se
Kiwanis Ln Se
Flint Dr Se
Spruce St Se
Reading Rd Se
Interstate 81 Sbl Sb
Corporate Dr Se
Parkway Dr Se
Ash Dr Se
Maple Dr Se
Gum Dr Se
Atkinson Rd Sw
Interstate 81 Nb
Interstate 81 Sb
Summitridge Rd Sw
Rosehill Dr Sw
Overland Dr Sw
Interstate 81 S Ramp
Interstate 81 Ramp
Mud Pike
Flanagan Dr
Life Dr
Lubna Dr
Craigs Mountain Rd
Pilot Rd
Lucky Ln
Rosemary Rd
Haee Dr
Chaucer Ln
Freeman Ln
Smith Creek Rd
Red Hawk Run
Riner Rd
Cassatt Ln
Smith Creek Rd
Diana Dr Nw
Keystone Dr Nw
Dow St Nw
Harman Dr
Methone St Nw
Moose Dr Nw
W Main St
Oak Dr Sw
Miller St Se
Elliott Dr Se
Jones St Se
N Franklin St
Lee St Ne
King St Ne
E Main St
Lester St Ne
Betty Dr Nw
Silver Lake Rd
Clearview Dr Nw
Warren St Nw
Fisher St
Bell Rd Ne
Hubbell Dr
Simmons Rd Ne
Teel St Ne
Arrowhead Cir Se
Chinquapin Trl Se
Majestic Dr Nw
Weddle Way Nw
Safford Dr Nw
Akler Ln Nw
Juniper Dr Nw
Emerald Blvd Nw
Sapphire Ave Nw
Steep Hollow Rd Nw
Providence Blvd Nw
Henley Dr Nw
York Dr Nw

Riner			Existing	Proposed
	From		--	Riner
	To		--	Christiansburg
Full Service Span	Weekday		--	6:30 AM – 8:30 AM; 3:00 PM – 5:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	6:30 AM – 8:30 AM; 3:00 PM – 5:00 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	4 trips per day
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	4 trips per day
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This long term route would operate between Riner and Christiansburg on a route to be determined. Possible endpoints in Christiansburg include the NRV Mall or the proposed Amtrak station, where passengers could transfer to the Two Town Trolley. Which agency in the region would operate this route and how it would be funded is still to be determined in coordination with Montgomery County.			
Justification for New Route	This connection was identified as a gap in the market analysis based on high transit need and lack of existing transit service.			
Implementation Timeframe	Long Term (10 plus years)			


Legend RIN
Virginia Tech
Town Boundary
0 0.25 0.5 1
Miles
Christiansburg
Riner
Plum Creek
Plum Creek
Peppers Ferry Rd
Peppers Ferry Rd NW
Dominion Dr
Plateau Dr
Crab Creek Rd
Cheverly Rd NW
Walnut Dr NW
Alder Ln NW
Emerald Blvd NW
Sapphire Ave NW
Switchback Rd
Spaulding Rd
Laurel St NE
Farmview Rd NW
Cambria St NW
Cambria St NE
N Franklin St
Independence Blvd NW
Railroad St NW
Wades Ln NW
Silver Lake
Radford Rd
Vernon St
Elk Dr NW
Whitman Ln
Herman Dr
Radford St NW
Wall St NW
Clearview Dr NW
College St NW
Depot St NE
Park St NE
Lawn Dr NE
Roanoke St
Pepper St SE
S Franklin St
Second St SW
W Main St
Carson Dr SW
Miller St SE
Chiquapin Trl SE
Flint Dr SE
Chestnut Dr SE
Interstate 81 Ramp
Maple Dr SE
Summitridge Rd SW
Overland Dr SW
Jones St SE
Maxwell Ln
Lucky Ln
Lubna Dr
Life Dr
Interstate 81 Sb
Mud Pike
Lake Vista Dr
Viewland Cir
Flanagan Dr
Interstate 81 Nb
Edgemont Rd
Gate Rd
Janna Rd
Texas Rd
Beech Spring Ln
Pugh Rd
Keith Ln
Meadow Creek Rd
Childress Rd
Thrush Rd
Dairy Rd
Fairview Church Rd
Bridle Ln
Cloverlea Dr
Surface Rd
Cornell Rd
River Rd
Smith Creek Rd
Red Hawk Run
Degas Ln
Freeman Ln
Chaucer Ln
Teasel Rd
Fawn Ln
Pilot Rd
Nolley Rd
Alley Rd
Union Valley Rd
Hopper Ln
Pike Ln
Sumac Rd
Ellett Rd
Ellett Rd NE
Pollard Rd
460 Bypass
460 Bypass
Murray St NE
Church St NE
Village Ln
Mill Ln NE
High St NE
Lester St NE
Sherwood Dr NE
Scott St NE

Neighborhood Flex Service			Existing	Proposed
	Neighborhoods		--	Highland Park, Glade Road, Mt Tabor
Full Service Span	Weekday		--	6:30 AM – 8:30 AM; 3:00 PM – 5:00 PM
	Saturday		--	--
	Sunday		--	--
Reduced Service Span	Weekday		--	6:30 AM – 8:30 AM; 3:00 PM – 5:00 PM
	Saturday		--	--
	Sunday		--	--
Full Service Frequency	Weekday	Peak	--	24-hour reservation
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Reduced Service Frequency	Weekday	Peak	--	24-hour reservation
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of New Route	This would be a new pilot flex service that could be operated via a voucher service with taxi companies or TNC's, through a contractor, or directly by BT. The three neighborhood services would be demand response services that would pick up passengers who have made a reservation at any safe location in each zone and drop them off at designated locations, including the MMTF, the CRC, and the Blacksburg Industrial Park. The opposite movement would take place during the afternoon and evening, with pick-ups at these designated locations and drop-offs at any safe locations in each zone. Free transfers would be available to any BT fixed route. The service would target peak hour commuters to Virginia Tech, the CRC, or the Industrial Park that live outside of a reasonable walking distance from routes that serve these areas. In the years following initial implementation, service would be expanded to the midday period if warranted.			
Justification for New Route	These neighborhoods were identified as having moderate transit need in the market analysis and lack existing service.			
Implementation Timeframe	Long Term (10 plus years)			


Legend
Proposed Neighborhood Flex Service Zones
Virginia Tech
Town Boundary
0 0.25 0.5 Miles
Mt Tabor
Glade Rd
Highland Park
MMTF
CRC
IP
460
W 460 Ramp
E 460 Ramp
W Us Hwy 460(Bypass)
E Us Hwy 460(Bypass)
3A Ramp
Evergreen Trl
Buck Mtn Rdg
High Ridge Rd
East Ridge Dr
Farmingdale Ln
Azalea Dr
Laurel Dr
Edison Ln
Meadowbrook Dr
Toms Creek Rd
Redbud Rd
Alice Dr
Old Farm Rd
Shadow Lake Rd
Plum Aly
Lacy Ln
Westover Dr
Glade Rd
Boxwood Dr
Lark Ln
Oriole Dr
Karr Ln
Lynn Dr
Sunridge Dr
Hunt Club Rd
Elizabeth Dr
Mcbryde Ln
Broce Dr
Watson Ln
Hutcheson Dr
Western Perimeter Rd
Old Mill Rd
Crisp Rd
Prices Fork Rd
Sheffield Dr
Heather Dr
Tall Oaks Dr
Mt Vernon Ln
Foxtrail Ln
Lancaster Dr
Merrimac Rd
Wakefield Dr
Cranberry Ln
Haywood Ln
Oilwell Rd
Ivan Dr
Litton Ln
Mabry Ln
Plantation Rd Nw
Inventive Ln
Oak Ln
Smithfield Rd
West Campus Dr
Driffield Dr
Duck Pond Dr
Dairy Rd
Southgate Dr
Innovation Dr
Research Center Dr
Beamer Way
Washington St Sw
Sterrett Dr
Pratt Dr
Drillfield Dr
College Ave
Turner St Nw
Faculty St
Turner St Ne
Giles Rd
Franklin Dr
Lucas Dr
Kabrich St
Progress St Nw
Janie Ln
Tech Ct
Whipple Dr
Northside Dr
Carroll Dr
Primrose Dr
Countryside Ct
Heartwood Xing
Woodbine Dr
Mcever Rd
Maywood St
Happy Hollow Rd
Mount Tabor Rd
Bishop Rd
Marsh Rd
Opal Ln
Shilo Way
Maria Dr
Panorama Dr
Nail St
Georgia St
Murphy St
Price St
North Dr
N Main St
Patrick Henry Dr Ne
Cork Dr
Appleton Dr
Rucker Rd
Wrights Way
Mill Wood Ln
Harding Rd
Anchor Rd
Ascot Ln
Clay St
Leisure Ln
Allegheny St
Piedmont St
Floyd St
Harding Ave
Lee St Se
Clay St Se
Whaton St Se
Church St Se
Eheart St Se
Eakin St Se
Kelly Ln
Jefferson St
Willard Dr
Graves Ave
Maple Ln
Kent St
Preston Ave
Harrell St
Deepe Rd Sw
Upland Rd
Palmer Dr
Cohee Rd
Country Club Dr Se
Locust Ave
Carlson Dr
Grisson Ln
Ardmore St
Grayland St
Nellies Cave Rd
Sussex Rd
Shelor Ln
Fairfax Rd
Cedar Hill Dr
Nik Ryan Dr
Airport Rd
Energy Dr
Porter St
Dehart St
Hubbard St
Elliott Rd
Dowdy Dr
Pay Ln
Sweeny Ln
High Knob Ln
S Main St