Radford Transit Development Plan FY2019 – FY2028

Final Report

September 2018

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Introduction

The Radford 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 city of Radford and Pulaski County, identify ways to responsibly expand RT's service area to areas with high demand, and to recommend improvements that would provide better regional connections across Radford, Montgomery County, and Pulaski County.

Gap Analysis

In addition to an overview of the current RT 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 RT network are summarized in the following table:

Gaps in Transit Coverage, Connections, and Service Levels

Gap Type	Period	Location
Coverage	All-Day	Carilion New River Valley Hospital
	All-Day	Route 11 in Fairlawn – additional stops
Connection	Peak Periods	Southwest Radford to Pulaski County Corporate Center
	All-Day	Southwest Radford (West Main Street) direct to Fairlawn
Service Level	All-Day	Rock Rd, Willow Woods neighborhood direct to Fairlawn
	All-Day	Southwest Radford (West Main Street)
	All-Day	Willow Woods and Rock Road industrial area
	All-Day	Fairlawn

Service and Capital Improvements

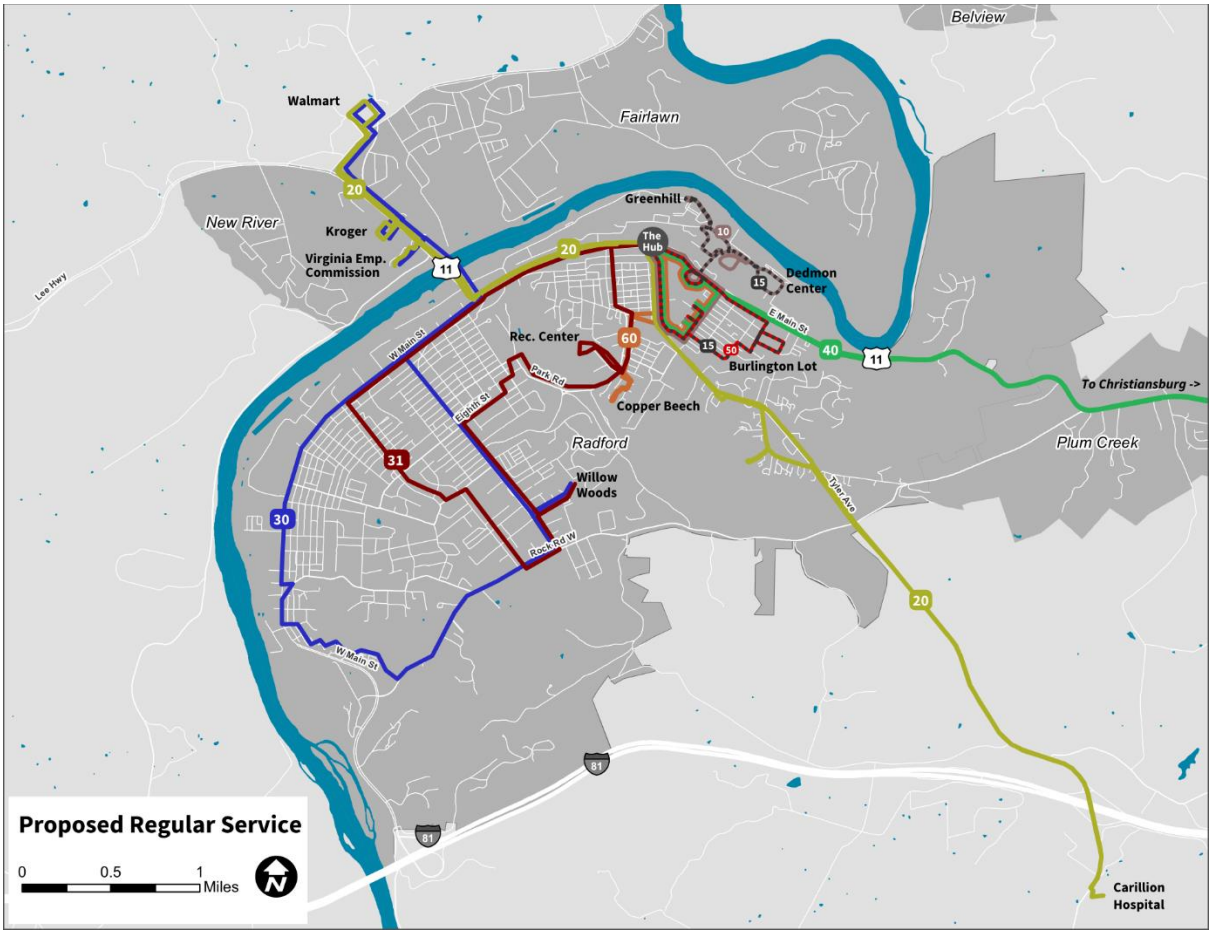
The service and capital improvements developed for this plan include service changes and new services to fill the "gaps" identified in the Gap Analysis, service changes to ensure that all RT routes meet the service standards outlined in the plan, service changes and new services to improve regional transit connectivity,

and the capital investments needed to support these service recommendations and ensure that RT maintains a state of good repair on all of its capital assets. The following table and figure summarize the service recommendations included in the plan.

Summary of Proposed Improvements by Route

Route	Proposed Improvement	Proposed Timeframe
10	Improve peak headway to 7 – 8 minutes by adding a vehicle to this route.	Short term (1-3 years)
	Eliminate late night service on Thursdays.	Short term (1-3 years)
15	No changes	-
20	Add an additional stop near the intersection of US 11 and Peppers Ferry Road when this intersection is redesigned and add a stop at the Virginia Employment Commission office on University Park Drive in Fairlawn.	Short term (1-3 years)
	Add service to Carillion Hospital every 2 hours using an additional vehicle – these trips will also serve Walmart resulting in a 30 to 60 minute headway overall to Walmart.	Mid term (3 to 10 years)
	Eliminate service on Main Street east of The Hub and on Jefferson Street to reduce service duplication.	Mid term (3 to 10 years)
	Add Sunday service.	Mid term (3 to 10 years)
30/31	Extend span of service to 10pm on Weekdays and Saturdays.	Short term (1-3 years)
	Add Sunday service.	Short term (1-3 years)
	Restructure route. Route 30 will be a counterclockwise one way loop between the Fairlawn Walmart to Jeffries Drive. Route 31 will be a clockwise one way loop from Willow Woods to The Hub. The two routes will have a timed transfer at NRVCS. Route 30 will operate every hour, while Route 31 will operate every half-hour.	Short term (1-3 years)
40	Add stops at major destinations in Blacksburg, including First and Main.	Short term (1-3 years)
	Eliminate late night service on Thursdays.	Short term (1-3 years)
	Add select trips to the Exit 118 Park and Ride in Christiansburg to connect with the Virginia Breeze Bus using an additional vehicle (call the 40B).	Mid term (3 to 10 years)
50	Operate this route in the clockwise direction.	Short term (1-3 years)
60	No changes	Short term (1-3 years)

Radford Transit Recommendations for Regular Service



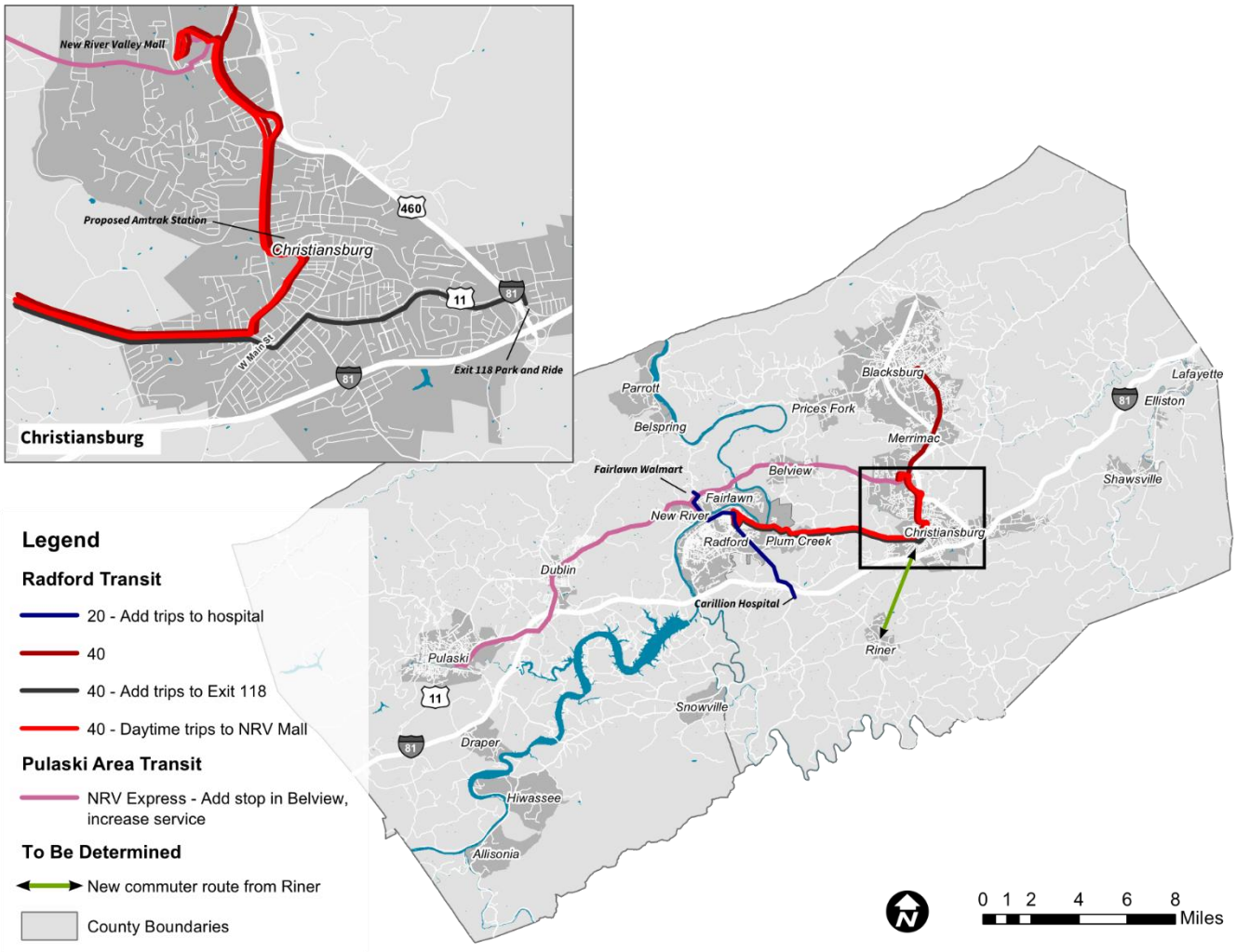
The regional improvements in this plan that integrate RT service with Blacksburg Transit and Pulaski Area Transit service are summarized in the following table and figure. With these recommendations in place, New River Valley residents will be able to travel seamlessly across the region with ease and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

Service	Recommendation	Regional Benefit
	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,
- A new administration, garage, and maintenance facility, and
- Equipment and parts purchases.

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 RT'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 RT'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 RT relies extensively on grants 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 to, or the abolishment of, federal funding programs in the next transportation bill.
- Major increases in transit service within Virginia (e.g. Silver Line Phase II) that will reduce RT's share of state operating assistance.
- Changes in state capital match rates.

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	$ 20.00	$ 20.40	$ 20.81	$ 21.22	$ 21.65	$ 22.08	$ 22.52	$ 22.97	$ 23.43	$ 23.90
Advertising Revenue	$ 10.00	$ 10.30	$ 10.61	$ 10.93	$ 11.26	$ 11.59	$ 11.94	$ 12.30	$ 12.67	$ 13.05
Operating Revenue Subtotal	$ 30.00	$ 30.70	$ 31.42	$ 32.15	$ 32.90	$ 33.67	$ 34.46	$ 35.27	$ 36.10	$ 36.95
Grants										
Federal	$ 449.13	$ 458.56	$ 468.19	$ 478.03	$ 488.07	$ 498.31	$ 508.78	$ 519.46	$ 530.37	$ 541.51
State	$ 340.13	$ 340.13	$ 340.13	$ 347.27	$ 351.22	$ 355.89	$ 366.57	$ 377.57	$ 388.89	$ 400.56
Local (City)	$ 168.43	$ 176.80	$ 185.43	$ 192.70	$ 201.00	$ 209.43	$ 216.79	$ 224.39	$ 232.25	$ 240.36
Radford University	$ 567.09	$ 595.24	$ 624.30	$ 648.80	$ 676.73	$ 705.11	$ 729.89	$ 755.49	$ 781.94	$ 809.26
Grant Revenue Subtotal	$1,524.78	$1,570.73	$1,618.05	$1,666.80	$1,717.02	$1,768.75	$1,822.03	$1,876.92	$1,933.45	$1,991.69
Total Revenue	**$1,554.78**	**$1,601.43**	**$1,649.47**	**$1,698.95**	**$1,749.92**	**$1,802.42**	**$1,856.49**	**$1,912.19**	**$1,969.55**	**$2,028.64**
Operating Cost										
Existing Service	$1,554.78	$1,601.43	$1,649.47	$1,698.95	$1,749.92	$1,802.42	$1,856.49	$1,912.19	$1,969.55	$2,028.64
Net Cost of TDP Recommendations	$ -	$ 148.30	$ 152.77	$ 157.37	$ 162.11	$ 371.17	$ 382.35	$ 393.87	$ 405.74	$ 417.97
Total Operating Costs	**$1,554.78**	**$1,749.73**	**$1,802.24**	**$1,856.32**	**$1,912.03**	**$2,173.59**	**$2,238.84**	**$2,306.06**	**$2,375.29**	**$2,446.61**
Additional Funding Need to Implement TDP Recommendations	**$ -**	**$ 148.30**	**$ 152.77**	**$ 157.37**	**$ 162.11**	**$ 371.17**	**$ 382.35**	**$ 393.87**	**$ 405.74**	**$ 417.97**

Capital Budget Forecast (Figures in 1000s)

Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capital Revenue										
Federal	$ 77.38	$ 622.08	$ 1,361.98	$ 389.33	$ 199.20	$ 216.28	$ 385.30	$ 910.92	$ 947.36	$639.47
State	$ 15.48	$ 124.42	$ 272.40	$ 77.87	$ 39.84	$ 43.26	$ 77.06	$ 182.18	$ 189.47	$127.89
Local	$ 3.87	$ 31.10	$ 68.10	$ 19.47	$ 9.96	$ 10.81	$ 19.27	$ 45.55	$ 47.37	$ 31.97
Total Capital Revenue	**$ 96.72**	**$ 777.60**	**$ 1,702.48**	**$ 486.66**	**$ 249.00**	**$ 270.35**	**$ 481.63**	**$ 1,138.65**	**$ 1,184.20**	**$ 799.33**
Capital Costs	**$ 96.72**	**$ 777.60**	**$ 1,702.48**	**$ 486.66**	**$ 249.00**	**$ 270.35**	**$ 481.63**	**$ 1,138.65**	**$ 1,184.20**	**$ 799.33**

1 Transit System Overview

1.1 HISTORY

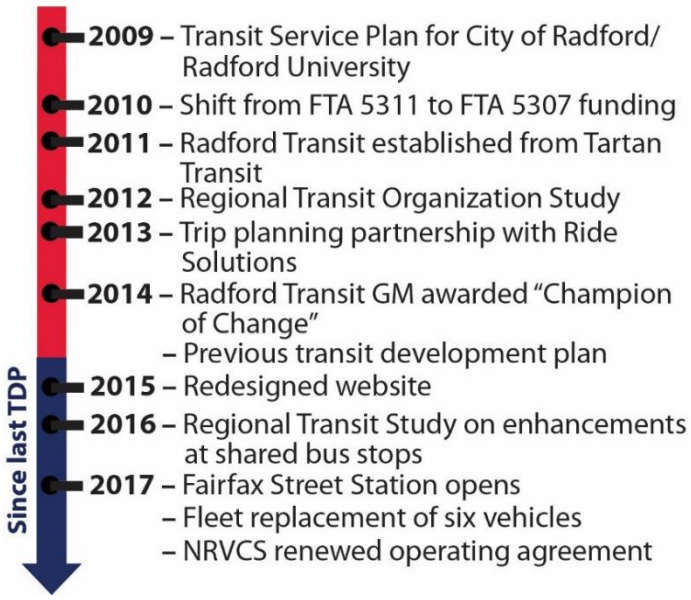
Radford Transit is a public transportation provider in Radford, Virginia and surrounding New River Valley. Public transportation in Radford focuses on the University of Radford circulation with local services also provided for area residents. The main campus of Radford University (RU) is located in the northeastern part of the City of Radford, on approximately 76 acres spanning three quadrangles and a pedestrian thoroughfare. Another large part of the campus is separated from the main campus by railroad tracks and is located along the New River. This portion of the overall campus holds the university's athletic facilities, student parking lots, and student apartments. The separate campuses, limited connections over the railroad tracks, and limited parking at the main campus initially prompted Radford University to offer a shutte service for students and faculty known as Tartan Transit. The service was funded primarily through student fees and parking revenue. Tartan Transit served RU students, faculty, and staff with a campus and city loop. The city loop connected the University and nearby housing to the East End Downtown, the Food Lion Shopping Center on Tyler Avenue, and the Wal-Mart in Pulaski County. The city loop did not have any weekend service.

The New River Valley Community Services (NRVCS) Community Transit also provided transportation to the Radford area for individuals with disabilities and special needs. A vision for further growing transit's presence on the campus began with the Radford University 2008-2018 Master Plan, which conceived of a new Fairfax Transit Mall and future expanded services. Up until this point, however, no Tartan Transit or Community Transit routes were open to the general public.

The effort to establish a transit service for the general public began in 2009 with a feasibility study that demonstrated the need and economic viability for a public bus system. As a result of this study and through a joint partnership between Radford University, Radford City, the Virginia Department of Rail and Public

Transportation (DRPT), and the Federal Transit Administration (FTA), a new Radford Transit service began serving both student populations and the public in August 2011. The new service was operated by NRVCS, which was awarded an initial 3-year contract, from several responses to a request for proposal. Radford University pays for the routes primarily used by students, and the city funds those primarily used by residents as specified by agreement.

Figure 1: Operational Timeline



Although the bus system is jointly administered by RU and city, the city owns the vehicle fleet. Service began with five routes and 100 stops, three connecting directly to the university. The RT University Express route served the RU campus and was the most popular route during its first months of service. Other destinations included the Radford Recreation Center, the Fairlawn shopping area, the New River Valley Mall in Christiansburg, and Blacksburg. By 2012, the system had provided 178,410 passenger trips in its first nine months of service. Eventually, low ridership caused Radford Transit to scale back its service to the Carilion New River Valley Medical Center (NRVMC) to demand response only.

Prior to the 2010 Census, the NRV MPO area did not include the City of Radford or any sections of Pulaski County. When new populations determined by the census showed the area more urbanized, the result was a significant shift for transit funding in the region. Radford Transit as a result of this census became available for Federal Transit Administration 5307 funding, along with Blacksburg Transit, and was no longer eligible for the rural funding programs it had used previously.

In 2013 Radford Transit partnered with RIDE Solutions[1] and the Pulaski Area Transit to provide up-to-date routing and schedule information via Google Maps. Bus riders in the New River Valley could now plan a transit trip across the region's three systems – Radford Transit, Pulaski Area Transit, and Blacksburg Transit.

Josh Baker, then General Manager of Radford Transit, was honored by the White House Champions for Change Program in 2014, recognizing his efforts in bringing public transit back to Radford. Radford Transit also completed its first Transit Development Plan in 2014. Reported ridership was approximately 322,650 annual unlinked trips.

In 2017, NRVCS was the sole respondant and awarded the contract for a new five-year operating term with a possible two-year extension. In the summer of 2017 the Fairfax Street Station, located between Cook Hall and the Bonnie Hurlburt Student Center, opened for use.

Today, the transit system continued to work toward advancing the connections between the university community as well as the citizens of Radford to various transit systems all over the New River Valley. Meanwhile, Radford University has grown to a total student population of roughly 9,400, with approximately 2,800 students housed in 15 residence halls. With other private housing options located in surrounding neighborhoods within walking distance of the campus, the demand for both university and community-based public transit will endure.

1.2 GOVERNANCE

The New River Valley Metropolitan Planning Organization (NRV MPO) Policy Board has authorized the City Manager of the City of Radford on behalf of the NRV MPO to seek federal and state funding to support transit services. The Transit Department is one of nine departments under the City's Administrative Services which is

[1] Ride Solutions is a grant-funded Transportation Demand Management (TDM) Agency – providing 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 and Region 2000 regions of southwestern Virginia.

overseen by the City Manager. The interests of Radford University are represented through a Stakeholder Committee composed of City and University representatives which acts as the policy board for Radford Transit. Committee members are appointed by the City and University administrations.

The committee meets quarterly (or as needed) and includes:

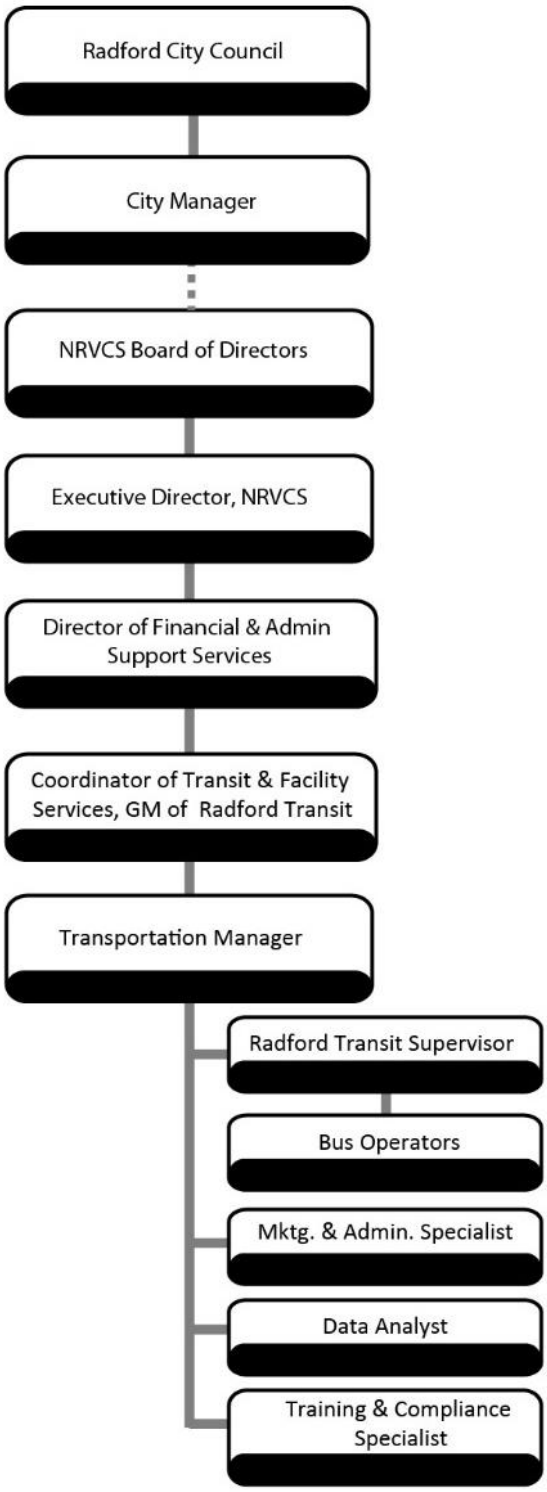
- Patrice Strachan – DRPT
- Melissa Skelton – City of Radford
- David Ridpath – City of Radford
- Chad Reed- Radford University
- James Perkins – Radford University
- James Pritchet – New River Valley Community Services
- Trevor Sakry - New River Valley Community Services
- Mishell Evans - New River Valley Community Services

Radford Transit does not currently have a citizens advisory committee.

The City of Radford and RU have a Memorandum of Understanding (MOU) that sets out how the transit system is operated and evaluated and how costs are shared. The MOU designates "University routes," "City routes," and "University/City shared routes." Each entity is responsible for capital and operating costs based upon those routes and their service hours. The City prepares and submits monthly invoices to Radford University for its share of operating costs, along with monthly ridership reports. Radford University currently pays 80 percent of local costs and the city pays 20 percent, but the local costs are a low percentage of total cost with state funds making up the majority. A new MOU is anticipated in 2018.

The City of Radford has a Transit Fund to reflect the special revenue characteristics of this department. The fund receives revenues from the Federal Government, State of Virginia, Radford University, fares, advertising and the City of Radford.

Figure 2: Organizational Chart



1.3 ORGANIZATIONAL STRUCTURE

The City of Radford is governed by a five-member City Council that includes the Mayor and Vice Mayor. The City Manager and the Transit Coordinator report to the City Council and oversee managing Radford Transit and the NRVCS contract.

Radford Transit employs approximately 60 full and part-time employees and is a functioning department of New River Valley Community Services (NRVCS) within the agency's transit services department. This arrangement is similar to NRVCS's operation of Community Transit to provide ADA and paratransit transportation within the same service area. NVRCS staff members are shared between these two departments.

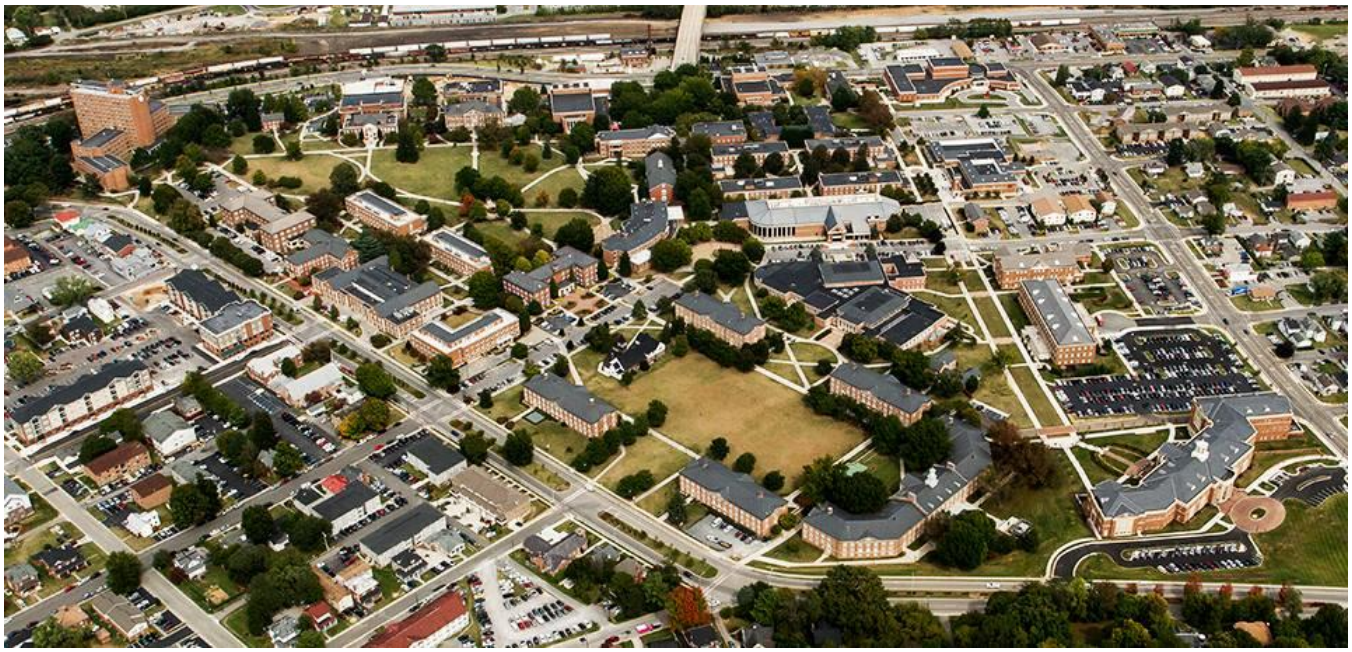
Brian Booth, Radford Transit's former transportation manager left in 2017 to become the general manager of the Greater Lynchburg Transit Company. The Transportation Manager also oversees approximately 20 positions associated with Community Transit operations only.

1.4 SERVICES PROVIDED AND AREAS SERVED

Radford Transit provides a fixed route network of bus service for the entire City of Radford, Radford University campus, the nearby community of Fairlawn (Pulaski County), and the Carillion New River Valley Medical Center. Limited service also includes connecting routes to Blacksburg and Christiansburg. Service is provided year-round with reduced service provided during times when Radford University is not in session. The reduced service, referred to as "City Only Service" typically occurs May through August and during Radford University's winter break.

The service for all routes operates as a "deviated fixed-route" which enables any person requesting a deviation to do so with 24-hour notice. Buses may deviate up to ¾ mile from the nearest bus stop. Radford Transit has in place policy guidelines for route deviation scheduling, approval process, and limits on the number of deviations per hour.

Figure 3: Radford University Campus



Approximately 80 percent of system riders are affiliated with Radford University, 13 percent local residents not affiliated with the University and the remaining seven percent estimated as visitors and residents of Christiansburg or Blacksburg.

1.4.1 Fixed Route Bus

Radford Transit currently operates six weekday local/regional routes. Route 10, Route 40, and Route 60 do not operate during "City Only Service". Route 20 takes the place of Route 10 and Route 50 takes the place of Route 60 during these times. Route 10 and Route 50, mainly stick to campus running between the parking lots on campus and over the bridge near the athletic facilities and the Armstrong Complex. Radford Transit does not offer trips to Christiansburg or Blacksburg during "City Only Service".

All service to the Carillion NRV Medical Center is by reservation and available on weekdays from 9:00am to 6:00pm. All Radford Transit buses are accessible for mobility devices, such as wheelchairs, electric scooters, walkers, and crutches. Drivers are trained to assist disabled passengers boarding or exiting the vehicle.

More detailed route characteristics include the following:

Route 10 (University Express)

This route serves the University Campus, parking areas and Athletic Complex. It begins its route on New River Drive. Route 10 serves Green Hill Apartments, The Dedmon Center, and the Armstrong Complex. Route 10's campus stops are Lot A, Fairfax Station, Waldron Hall, Kyle Hall, Moffett Hall, Walker Hall, Muse Hall, the corner of Tyler and Main, and Lot C. Buses operate every ten minutes from 7:00am-5:50pm. The frequency then drops, with buses coming every 15 minutes from 6:05pm until 8:05pm and every 30 minutes until 10:20pm (the last trip on Monday-Wednesday). Later service is provided on Thursday and Friday, with the last run at 2:20am and 2:35am respectively. The Route 10 does not run on Saturday, but a Sunday shuttle is provided running every 30 minutes in the evening from 5:50pm until 11:45pm. For the Sunday shuttle, an additional boarding location, Cupp Stadium was added to the existing boarding location at University Drive. To expedite boarding, the Sunday shuttle picks up riders from Green Hill before it arrives at Cupp Stadium and University Drive. There are 26 stops served by this route.

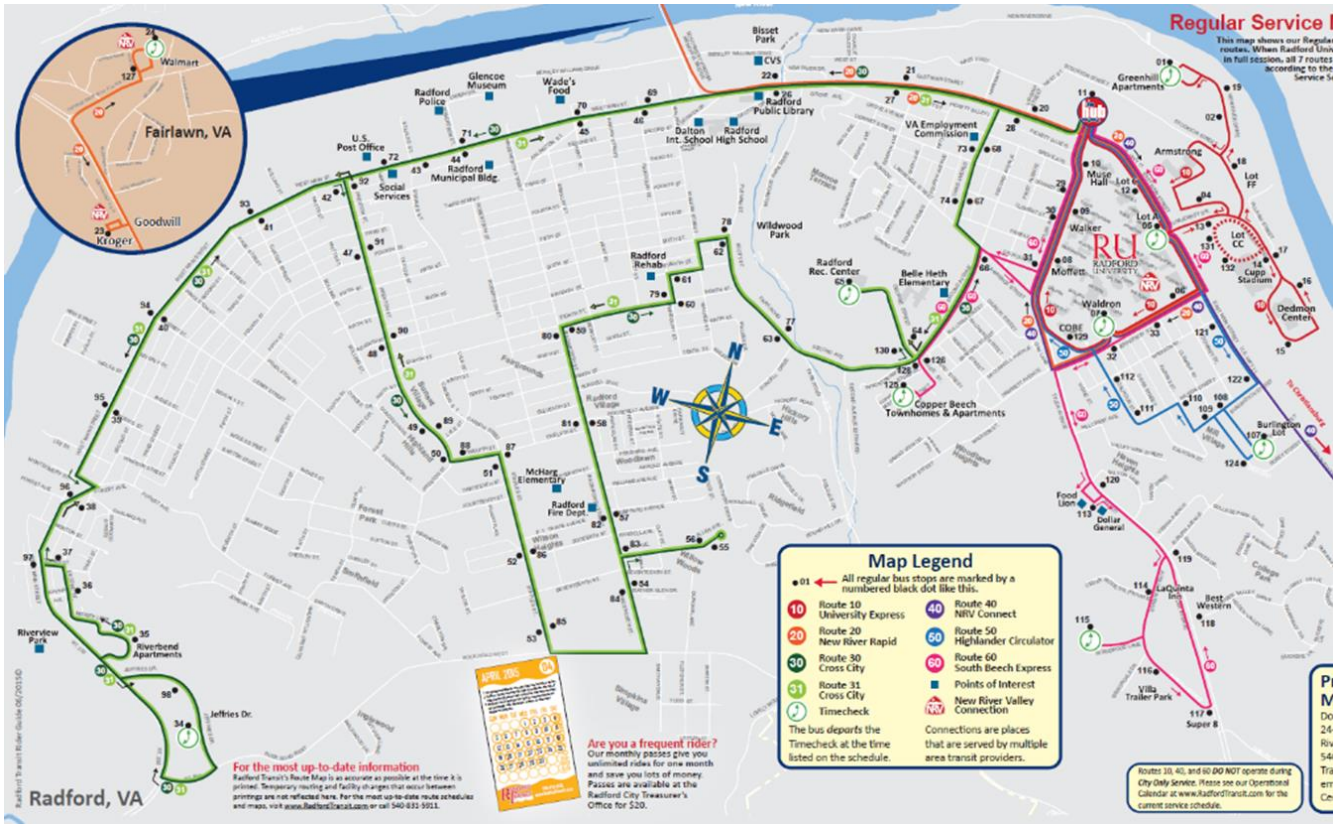
Route 15 (University Highlander)

This is a hybrid route that provides Saturday-only service along the Route 10 when Radford University is in session, and then during "City Only Service" it combines the Route 10 and Route 50 which do not operate at this time. By covering Route 10 and Route 50 simultaneously, the route proceeds from the Hub to Greenhill and back to Lot A, via the normal Route 10 path. Upon departing Lot A (after returning from Greenhill), the route the proceeds along Main St. to Burlington St, where from then on the route follows the normal Route 50 to Waldron Hall and back to the Hub. During Regular Service intervals, the Saturday-only span of service is from 10:20am – 2:50am, with a bus operating every 30 minutes. When "City Only Service" is in effect, the bus has a span from 7:20am-8:00pm Monday-Friday, with Saturday service ending earlier at 8:00pm. There are 28 total stops served by this route.

Table 1: Radford Transit Fixed Route Service Summary

7 ROUTES										
Route	Service Days/Times						Mon. - Wed. Span (Hrs.)	Thurs. - Fri. Span (Hrs.)	Mon. - Fri. Freq. (Mins.)	Peak Vehicles
	Mon.-Fri.									
	Peak	Midday	Sat.	Sun.	Late PM	All Year				
Route 10- University Express	•	•		•	•		15:20	19:50	10	2
Route 15 – University Highlander			•			•	N/A	N/A	N/A	1
Route 20 – New River Rapid	•	•	•		•	•	14:40	14:40	30	1
Route 30/31 – Cross City	•	•	•			•	13:20		60	2
Route 40 – NRV Connect			•		•		7:00	12:00	60	2
Route 50 – Highlander Circulator	•	•			•		15:10		10	2
Route 60 – South Beech Express	•	•			•		15:00		15	2

Figure 4: Radford Transit System Map



Route 20 (New River Rapid)

Providing service from Radford and Central Campus to Food Lion and Auburn Avenue, as well as Walmart and Kroger in Fairlawn. This route also connects with Pulaski Area Transit (PAT) at Kroger and Walmart in Fairlawn. Route 20 (along with Route 30) directly serve downtown Radford via East Main Street. The route operates year-round on a 60 minute frequency. The service span from 7:00am-9:40pm Monday-Friday and 10:00am-9:40pm on Saturday ends two hours earlier during City Only Service. There are 24 stops served by this route.

Route 30/31 (Cross City)

Serves West Radford, Recreation Center, and Downtown Main Street year-round. Route 30 proceeds along Main St. to the Hub and comes back through town via the Radford Recreation Center to Jeffries Drive. This route is operated as a bidirectional loop with two route designations serving the same stops. Route 30 is the designation for clockwise service that loops around downtown Radford. Route 31 is the designation for the counter clockwise loop. The service span for Route 30 is from 7:00am-8:00pm on Monday-Friday and from 10:00am-8:00pm on Saturday. Route 31 has a service span offset at 20 minutes later than Route 30. Buses operate every 60 minutes in each direction and serve 46 stops.

Route 40 (NRV Connect)

This route represents Radford Transit's regional service and provides connections to Blacksburg Transit (BT) in Christiansburg at Regal Cinemas and at the New River Valley Mall. Route 40 also connects with BT in Blacksburg at Virginia Tech's Squires Center. During weekdays, the service does not start until the mid-afternoon (2:40pm) and

continues hourly until 9:40pm Monday-Wednesday and until 2:40am on Thursday-Friday. The Saturday span of service is from 10:40am-2:40am. A total of 6 roundtrips are provided Monday-Wednesday, 10 roundtrips on Thursday-Friday, and 15 roundtrips on Saturday. Nine local stops are served with 3 stops in Christiansburg and 2 stops in Blacksburg. Recently, this route was redirected off Route 114 and now utilizes US 11 due to safety concerns with the Route 114 corridor.

Route 50 (Highlander Circulator)

The Highlander Circulator operates service from East Main Street and Burlington Lot to the Radford University campus and the Hub Transfer Center. The route only runs during a Regular Service Schedule. During City Only Service this route is operated as Route 15 and Route 15 is also utilized to provide Saturday-only coverage on this route year-round. The span of service is from 7:00am-10:10pm Monday-Friday. Bus frequency is every 10 minutes with a total of 24 stops served.

Route 60 (South Beech Express)

This route serves Copper Beech Apartments, University Campus, Food Lion and the Auburn Avenue area. The route does not run during City Only Service. The span of service is from 7:00am-10:00pm Monday-Friday. Service frequency is every 15 minutes to a total of 14 stops.

1.4.2 Other Transportation Services

Move-in-Shuttles

Radford Transit provides move-in shuttles Thursday and Friday from 7:30am to 7:30 pm at 10-minute intervals during the week before the start of the academic year.

Community Transit

NRVCS also provides subscription trip service branded as Community Transit, with service in the City of Radford as well as Pulaski, Montgomery and Floyd Counties. Trip purposes include medical trips for individuals with disabilities and/or for those with special transportation needs. Community Transit also provides transportation through contractual agreements with Medicaid, Virginia Premier, Optimal Translation and Transportation, Radford Department of Social Services, Radford City Public Schools and New River Community Action.

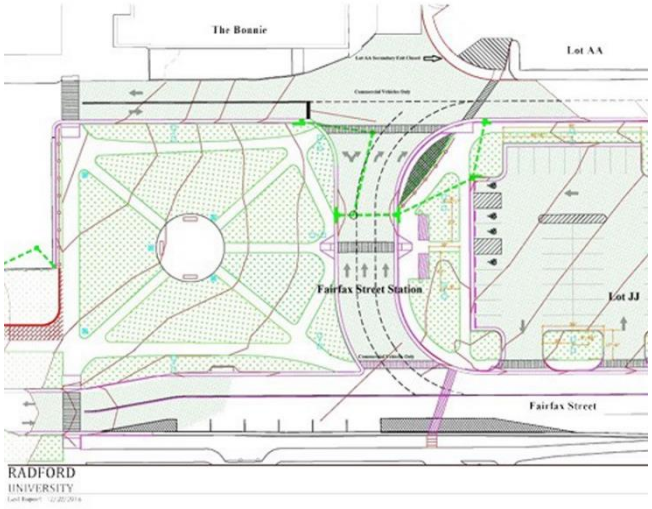
1.4.3 Transit Hubs

The Hub is Radford Transit's central transfer stop. It is located in an empty lot at the intersection of Tyler Avenue and East Main Street, adjacent to the Norfolk Southern railroad tracks. It is just across East Main Street from Muse Hall on the Radford University Campus. The hub has striped bus parking bays for six vehicles and includes a passenger shelter. Arrival times are also displayed digitally at this location. Radford University and the City share costs related to upgrades of the Radford Transit Hub.

Figure 5: Bus Line up at the Hub

In August 2017, Fairfax Street Station opened, located between Cook Hall and the Bonnie Hurlburt Student Center. Fairfax Street Station serves as the new bus hub on Radford University's main campus. This hub was a recommendation from the 2014 TDP for Radford Transit, which cited the historic Lot A configuration causing congestion and safety hazards for transit vehicles. All routes except Route 30 serve this location.

Figure 6: Schematic for Franklin St. Station



1.4.4 Bus Stops and Shelters

The City received a grant to install shelters, benches, and new bus sign holders throughout the system in 2013. Plans included the installation of six shelters on the Radford University campus and seven to be located throughout the City. The typical size of the shelters will hold nine bus riders.

All bus stops are coded with a unique number on route maps and feature signage that list all routes that stop at that location. Stops are also identified through Google Transit. Bus stops are generally located every few blocks along Local bus routes. A total of 130 bus stops are currently designated.

1.4.5 Park and Ride Facilities

Park and ride information, along with additional commuter assistance, is provided by Ride Solutions, a grant-funded program made possible through many partnerships, including the New River Valley Planning District Commission (NRVPDC). The closest park and ride in proximity to Radford is designated an "unofficial" lot adjacent to Exit 109 on Interstate 81. 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 New River Valley are listed in Table 2.

Table 2: Park and Ride Locations

Park & Ride Lot	Location	Dedicated Spaces	RT Routes
Marathon Mart	Route 177 and Mud Pike Rd.	25	n/a
Falling Branch (I-81 @ Exit 118C)	Route 460 Bypass at Roanoke St.	54	n/a

Park & Ride Lot	Location	Dedicated Spaces	RT Routes
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
Kmart Parking Lot	US Highway 460 Business, N Franklin St and Laurel St.	82	n/a

1.5 FARE STRUCTURE

One-way public fare is $1.00, while seniors (65 and over) and children (12 and under) ride free. Exact fare is required when boarding or Radford Transit offers a single ride, one-way ticket. Radford University students, faculty, and staff ride free with a valid university ID card. Free transfer slips are distributed by drivers and are good for one hour. An unlimited ride monthly pass is also available for $20.00. Passes can be purchased in advance at the Radford City Treasurer's Office, accessible via Route 30. Initial FY2018 reporting (through September 2017) indicates that over 70 percent of fares are attributed to an RU ID. Other major categories included Senior/Disabled fares, accounting for 11 percent and Full fare payment amounting to six percent of total fares collected to date.

Local transfers are free, and currently Radford Transit does not have transfer agreements with other systems in the region. There also is no additional fare charges for extended regional travel to Christiansburg and Blacksburg.

As of September 1, 2017, individuals with disabilities are able to participate in the Free Fare Program. The program allows persons with certain disabilities to ride Radford Transit's fixed routes for free upon completion of an application that is processed within 10 business days.

Table 3: Radford Transit Fare Structure

Fare Type	Cost
General Cash Fare	$1.00
Persons aged 65+, Persons with disabilities and Medicare Card Holders	Free
12 & Under	Free
Radford University	Free w/ RU ID Card
Single Ride Pass	$1.00
Monthly Pass	$20.00

1.6 FLEET

Radford Transit's fleet consists of twenty (20) vehicles, including twelve (12) body-on-chassis (Cutaway) style buses, two (2) 29-passenger medium duty body-on-chassis (Cutaway) style buses, and six (6) low floor heavy duty transit buses. Two vehicles are listed as in poor condition (as of 10/2017) and are not in active service.

Figure 7: Radford Transit New Flyer Bus

Radford Transit has been transitioning away from body-on-chassis (BOC) vehicles due to the heavy passenger loading on all but the Route 30 services. Radford Transit has a goal for future vehicle procurement to acquire replacement and expansion buses that are less than 30-foot and 30-foot medium duty vehicles for "local" RU services, and 40-foot medium duty buses for the "regional" service. Radford Transit has six new vehicles anticipated to be added to the fleet in 2017. This includes three (3) medium duty vehicles from ARBOC and three Ford/Starcraft BOC vehicles to replace vehicles that have exceeded their minimum replacement year. See Table 4 for fleet statistics.

Table 4: Radford Transit Fleet

Make/Model	Manufacture Year	Type	Fuel	Seats	Quantity	Avg. Miles	Min. Replace Year
New Flyer	2002	30' Bus	Diesel Fuel	28	2	312,000	Past Due
New Flyer	2002	35' Bus	Diesel Fuel	32	2	244,216	Past Due
New Flyer	2013	35' Bus	Diesel Fuel	32	2	63,824	2025
Ford 550	2013	BOC	Gasoline	23	2	84,012	2020
Ford	2011	BOC	Gasoline		7	171,218	Past Due
Chevrolet	2012	BOC	Gasoline		3	140,893	2017
Ford	2016	BOC	Gasoline		2	32,530	2021

*Includes two (2) Vehicles listed as inactive.

The replacement year for Radford Transit fleet vehicles is calculated based upon the FTA's default Useful Life Benchmark (ULB) as codified in FTA C 5010.1E (2017). The ULB for large heavy-duty transit vehicles is 12 years / 500,000, for medium-size, medium duty vehicles a useful life of 7 years / 200,000 miles, and for all other cutaway (BOC) buses a useful life of 5 years / 150,000 miles. Prior to delivery of anticipated new vehicles, a total of 11 vehicles, or 55 percent of the fleet is currently beyond replacement age but not in excess of replacement mileage. Vehicles operated in maximum service is twelve, resulting in a spare ratio of 50 percent (not including the inactive fleet).

Radford Transit has four (4) support vehicles, the oldest being two Ford Explorers (2013) which exceeded the minimum replacement term in June 2017, however these vehicles have very low mileage for their age (average of 31,000 miles).

1.7 EXISTING FACILITIES

The NRVCS Headquarters and Board Administration is located at 700 University City Boulevard in Blacksburg. NRVCS leases a former FedEx property for the Radford Transit Administrative Office, located at 2 Corporate Drive in Radford. The facility is a two-story office building (3,600 square feet) with two attached (6,000 square feet each) garage bays. One of the bays is conditioned for maintenance use; the other is strictly additional parking space and cannot be used for maintenance work. Staff expressed that this facility does not have onsite fueling or sufficient parking, as it was not originally intended for transit operations. NRVCS currently is under a three-year lease with two (1-year) extensions available (the original lease term ended December 2014).

The construction of a new facility, possibly co-located with Pulaski Transit, continues to be considered by the agency. The development of a dedicated Radford Transit facility was also included in DRPT's Six Year Improvement Plan for FY14-19, which has a line item for "Bus Engineering & Design of Administrative and Maintenance Facility" and identified $250,000 through FY2019.

1.8 TRANSIT SECURITY PROGRAM

NRVCS has both an employee training program and an emergency preparedness plan. Under the training program, all new employees must pass a background and criminal check along with a drug test. In addition to a two-day general employee orientation, new operators complete route specific training sessions and instruction on wheelchair loading, pre/post trip inspection, etc. New operators must be able to obtain a CDL Class B learners permit and must attend defensive driving, first aid/CPR, and diversity training courses.

Under the emergency preparedness plan, the following measures are in place:

Communications

In the event of an emergency or accident, Radford Transit staff and drivers are trained to first call 911. Staff can then use the PA system to disseminate a warning message within the building. Drivers are instructed to utilize two-way radios to reach the office or, if necessary, their personal cell phones. In the event of severe weather or any other shelter-in-place situation, the Radford Recreation Center is the designated safe shelter location.

Safety Equipment

All Radford Transit vehicles are equipped with two-way radios, fire extinguishers, emergency triangles, first aid/bloodborne pathogens kits, and seat belt cutters. Vehicles also have on-board GPS units which include silent alarms.

Training

As noted above, all staff are trained in first aid/CPR and emergency response procedures.

System Security

Staff are instructed to report all suspicious people, objects, and activities, and drivers are required to wear ID badges when operating vehicles or on transit property. Fares are stored in a tamper proof money vault system.

1.9 INTELLIGENT TRANSPORTATION SYSTEM (ITS PROGRAM)

Radford Transit uses an onboard Automatic Vehicle Location (AVL) system, which feeds into a NextBus web tool to predict bus locations. The information can be accessed by mobile devices and the Radford Transit website. NextBus uses GPS satellite technology to track the exact location of buses and estimate real time arrivals to specific stops. Arrival times are also displayed digitally at the Main Street and Tyler Avenue Transfer Hub.

In partnership with the NRVPDC, Radford Transit via the Ride Solutions has participated in the development of a GIS data portal in support of transit planning initiatives. The purpose of the project is to improve coordination and regional connectivity among public transit service providers operating in the New River Valley. Project meetings were held with stakeholders to discuss transit planning processes, GIS technologies and existing data sources. Radford Transit shared transit-related data, including General Transit Feed Specification (GTFS) files from transit operators, to update route and stop information. An interactive web map was created to visualize some of the most important regional transit data layers.

Radford Transit is currently installing Automated Passenger Counter (APC) Systems to improve customer service, record keeping and reporting compliance, accountability, and overall effectiveness of the transit service. In 2017 they issued an RFP to provide a real-time information customer interface using an APC Information System that improves upon the customer experience by integrating or replacing the existing AVL data that provides real-time vehicle location information and stop predictions to customers via a website and mobile phone. The system is anticipated to be in place in early 2018.

1.10 DATA COLLECTION, RIDERSHIP AND REPORTING METHODOLOGY

Radford Transit provides Quarterly Ridership and Performance Reports to the Stakeholder Committee as appointed by the City and University administrations. The reporting tracks monthly system ridership with six-years of historical trends. Route ridership, fare type utilized, and trends in growth are presented for all routes. Detailed breakdowns and monitoring of Route performance for Route 40 is provided due to its regional service.

Currently, passenger counts are tracked manually by drivers and compared to fare box revenues for accuracy. Radford Transit has identified that this method leaves room for human error and is time consuming and clumsy. The new RFP for on-board APC technology is anticipated to address this issue.

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. Many overlap areas identified where in the vicinity of Christiansburg and Blacksburg where Radford Transit (Route 40) and Blacksburg Transit (BT) service overlap. Specific areas included the New River Valley (NRV) Mall, Aquatics

Center (Christiansburg), Squires Student Center (Virginia Tech), and Blacksburg Municipal Building. Strategies were identified to better align schedules for easy transfers, co-brand the stops, and provide some passenger amenities.

A listing of all key providers that interface with Radford Transit includes:

Blacksburg Transit (BT)

BT serves the towns of Blacksburg and Christiansburg. While BT primarily connecting major residential areas to the Virginia Tech campus and commercial areas, the system also provides connecting service to Christiansburg as well. Radford Transit Route 40 connects with BT in Christiansburg at Regal Cinemas and at the New River Valley Mall. Radford Transit also connects with BT in Blacksburg at Virginia Tech's Squires Center.

Pulaski Area Transit (PAT)

PAT provides service connecting Pulaski, Dublin and Fairlawn with one extended run to the New River Mall in Christiansburg. Radford Transit Route 20 meets this service at the Kroger and Walmart in Fairlawn. PAT service operates on Monday-Friday to the Fairlawn location with a total of three daily round trips. In addition to the communities served, this connection also provides Radford Transit customers access to the New River Community College in Dublin. PAT fares for this service are $2.00.

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 Radford on Friday afternoons from The Hub location and returns Sunday evening and drops off at the Fairfax Street Station. There are at most three northbound departures, leaving Radford at 11:45am, 1:45pm, and/or 3:45pm 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 Radford at 10:30pm.

Smart Way Bus

The SmartWay Bus is a commuter bus service operated by Valley Metro of Roanoke that links the Roanoke Valley to the New River Valley. Service is provided between downtown Roanoke and the Virginia Tech Squires Student Center with stops in downtown Blacksburg, the CRC, Christiansburg, and Roanoke Regional Airport, plus several Park & Ride areas. Blacksburg Transit provides connecting service to and from SmartWay Bus stops in Blacksburg. The Smart Way bus system serves Blacksburg, Christiansburg, Roanoke, Bedford, and Lynchburg providing transfer locations to other regional bus service, the Roanoke-Blacksburg Regional Airport and the Lynchburg Amtrak station. Bus stops in Blacksburg and Christiansburg include: Squires Student Center at Virginia Tech, Corporate Research Center in Blacksburg, Laurel Street in Christiansburg, Falling Branch Park and Ride lot in Christiansburg (near Exit 118 on I-81).

1.12 PUBLIC OUTREACH

Radford Transit redesigned its website in 2015 to better support mobile applications and to improve site navigation. The agency website is the primary resource Radford Transit uses to push out information to the riding

public. News regarding service changes is also extensively publicized on the Radford University website to target the student population. Radford Transit is also active on Facebook and Twitter to engage its riders and the public. The NextBus system also allows users to program various alerts that will notify users of route changes due to delay, weather or holiday schedules. The alerts can be one-time use, time specific or route specific.

During the previous TDP stakeholder outreach, it was noted that the perception remains that the service is geared primarily toward Radford University students. Stakeholders pointed out that marketing and communication to the general public is a weakness. Not all city residents, especially those in the West End, have embraced transit as a form of transportation.

Radford Transit provides Title VI information on it's website. This includes a notice of non-discrimination, links to procedures, and links to a complaint form. These website notices are included in both fixed-route and accessible transportation (ADA) pages. Public notice is also provided for the free fare program for persons with disabilities. A Title VI notice is also included in the PDF and print versions of the system map/schedule.

2 Goals, Objectives, and Service 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 Radford Transit identified seven goals and sixteen (16) objectives. It is noted that these goals and objectives date from the 2009 planning process to initiate public transit service in the City. Therefore, the prior TDP acknowledged that some are no longer relevant given Radford Transit's establishment and subsequent operations. In addition to categorizing these previous goals/objectives this TDP update process also identified any goals reflecting one time or continuous activities. A status, if known, was provided for any one-time objectives presented in the previous TDP document.

Table 5: Previous Major TDP Update Radford Transit Goals/Objectives

Goals/Objectives	Category(ies)	Status
Goal #1: Connect Radford University students to off-campus destinations outside walking distance and City of Radford residents to area locations and services.	CI	One time
Expand transportation services from University to area grocery stores (i.e. Food Lion and Wade's), restaurants (i.e. Applebee's and Sal's), locations in Pulaski County (i.e. Wal-Mart, Kroger, banks), Virginia Tech, Christiansburg, and the Smart Way commuter bus service to Roanoke.	GO	One time
Implement transportation services to connect City of Radford residents to similar locations, as well as other services (i.e. medical facilities, Department of Social Services offices).	CI	One time
Identify opportunities to build upon current services operated by Radford University and New River Valley Community Services.	OE	One time
Goal #2: Support City of Radford's desire to "go green" and reduce the number of cars on the road and Radford University's to be a "green" campus.	ES	On going
Explore park-and-ride opportunities, especially for students who live off campus and to limit traffic in downtown Radford.	GO	On going
Identify appropriate vehicle fleet for serving residential halls.	OE	On going
Provide sufficient transit services to allow the University to reconsider the car use policy.	CI, ES	On going
Promote the development of intermodal transportation connections, facilities, and services.	GO	On going
Goal #3: View transportation services from a regional perspective.	CI	On going
Provide access to regional destinations (i.e. Carilion New River Valley Medical Center, Virginia Tech, Roanoke).	GO	On going
Provide transportation connections between the campuses of Radford University, Virginia Tech, and New River Community College.	GO	One time
Goal #4: Engage and involve the community in the transportation planning process.	CI	On going

Goals/Objectives	Category(ies)	Status
Conduct appropriate outreach activities (i.e. surveys) to gain information on specific needs.	CI	On going
Keep local elected officials and other key community stakeholders informed of planning process through appropriate outreach activities.	CI	On going
Goal #5: Identify organizational arrangement options to allow Radford University not to operate transportation services.	CI	One time
Determine appropriate funding by the University to support an alternative transportation operator.	FA	One time
Goal #6: Provide easy access to information on available mobility options.	OE	On going
Maintain central location for information on transportation services and options, including consideration of New River Valley Planning District Commission's mobility manager project.	OE, CI	One time
Promote awareness and use of all transportation alternatives through marketing and education.	CI	On going
Goal #7: Provide transportation services in support of economic development.	CI	On going
Provide access to area retailers, restaurants, and other services and locations.	CI, GO	On going
Provide transportation services that promote downtown Radford.	CI	On going

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

This section reviews the alignment of previous goals and objectives developed for Radford Transit with relevant transit/transportation goals for the region or by localities within the service area. This TDP update will afford the opportunity to further incorporate and/or strengthen Radford Transit 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.

City of Radford Comprehensive Plan (2017 Update): The 2009 City of Radford Comprehensive Plan is currently undergoing an update at the time of preparation of this TDP update. The new City plan will include a 15-year implementation horizon. The plan notes that significant advancements towards creating alternative transportation options, modernizing public safety department technologies and equipment, and sustaining a high quality of life for residents have been a key focus since the last plan update. New goals/strategies reflect the desire for the City to maintain a safe, efficient, accessible, and multimodal transportation system. Radford transportation stakeholders, New River Valley Regional Commission's Transportation Technical Advisory Committee, and NRVMPO Technical Advisory Committee have identified key transportation priorities in the City. Two transit priorities include:

- Address public transit congestion and safety issues in Lot A (Radford University)

- Expand transit services – provide more connections to employment and childcare, and increase connectivity with surrounding systems.

Table 6 presents policy goals developed as a component of the 2030 Comprehensive Plan, as reviewed and updated by a working committee in 2014. All goals relate to the Comprehensive Plan's Transportation Policy 1 statement - "Multimodal Transportation Opportunities: To provide multi-modal transportation opportunities throughout the community."

Table 6: City of Radford Transit Goals/Objectives

Goals/Objectives	Category(ies)	Status
Goal T-1: Actively work with the New River Valley Metropolitan Planning Organization and Regional Commission to evaluate and identify transportation options and improve connectivity between modes for both residents and visitors.	CI	On going
Goal T-2: Provide safe and accessible facilities for pedestrians, bicyclists, transit users, and motorists.	OE	On going
Goal T-3: Promote economic development within the City that includes multi-modal options for employees.	CI	On going
Goal T-6: Educate the public about existing transportation needs.	CI	On going
Goal T-7: Look for synergies among transportation improvement efforts for different modes and populations.	CI	On going
Bolster the partnership between the City and Radford University to implement projects that are identified in Radford Transit's Transportation Development Plan.	CI	On going
Identify and evaluate potential transportation services for the elderly population.	OE, CI	On going
Identify technologies that support and encourage ride-sharing programs and public transportation.	OE, CI	On going
Address downtown parking and alternative modes of transportation (transit, bike, and pedestrian) to meet the needs of business.	CI	On going

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.

Regional Transit Study (NRVMPO – 2016): This study process was led by the New River Valley Regional Transit Coordinating Council (RTCC). The purpose of the study was to investigate potential enhancements at overlapping and high-volume bus stop locations that could improve the perception of public transportation in the region. The plan established a prioritized short-term and long-term action plan. Each action plan identified potential partnerships, investments, and policy goals for the next three to six years. A total of 14 goals to support the action plan are listed in Table 7 alongside activity area categories and statuses.

Table 7: NRVMPO Regional Transit Study Goals/Objectives

Goals/Objectives	Category(ies)	Status
Establish a time-check at existing higher-volume overlapping stops, synchronizing arrival/departure to meet demand.	OE	On-time COMPLETE
Establish additional overlapping service stops. Improve connectivity of regional network and decrease waiting times.	OE, GO	On-time COMPLETE
Ensure that all overlapping stops are handicapped accessible and create connections with surrounding bicycle and pedestrian infrastructure within a ½-mile radius	CI	On-going (2019)
Expand existing services. Examples: Christiansburg and Radford morning connection that features more stops downtown (both locations), and new services to the Carilion NRV Medical Center	GO	On-going (2019)
Provide a phone number and schedule at enhanced and hub service environment stops.	OE	On-going (2018)
Incorporate more amenities (passenger information, seating, shelter, etc.) at enhanced and/or hub service environment stops.	OE	On-going (2020)
Improve and/or create communication between overlapping services. Ability to inform potential user transfers.	OE	On-going (2020)
Construct a regional transit hub at the proposed NRV Passenger Rail Station.	GO	On-going (2020)
Create rapid commuter bus lines at key times between the universities and the Town of Christiansburg.	GO	On-going (2021)
Create and/or expand services that provide access to and from affordable housing developments.	GO, CI	On-going (2021)
Enhance connectivity between NRV services and the Smart Way.	CI	On-going (2022)

Goals/Objectives	Category(ies)	Status
Create a method for transit users to cross services platforms with a single ID and/or fare.	OE	On-going (2022)
Overlapping service stops get branded and marketed.	CI	On-going (2022)
Establish a method for bus operators to report user feedback, and evaluate service/amenity improvements.	OE, RC	On-going (2022)

NRV 2040 Long Range Transportation Plan (2015) - 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

2.3 RATIONALE FOR CHANGE

Initially, the goals and objectives for Radford Transit, which pre-date the start of actual transit operations, needed to be updated to reflect completed one-time activities. Also, upon review of additional plans and studies, it was determined that Radford Transit may benefit from additional diversity in its goals/objectives. Key areas not addressed directly by Radford Transit's established objectives include Financial Accountability and Regulatory Compliance. While these objectives are not necessarily found within regional planning documentation, they represent an emphasis on operating an efficient and compliant transit system. Specific Organizational Excellence goals/objectives related to system safety/security and customer service are also missing direct emphasis in the objectives established for Radford Transit. Finally, the regulatory environment has changed since the last major TDP update and new performance-based state/national requirements need to be incorporated. The Radford Transit goals/objectives and standards need to address the Transit Asset Management (TAM) minimum standards to demonstrate compliance and help keep Radford Transit 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 a preference to preserve the emphasis on Community Integration-oriented objectives. Not all outside agency planning goals for transit/transportation lend themselves to the establishment of measurable targets. Certain elements are outside Radford Transit's ability to control or influence. The goals and objectives to be developed in this major TDP update are intended to be accomplished by Radford Transit 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 planning objectives and other regional goals focused extensively on economic development, land use changes and response to demographic shifts. While Radford Transit 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 by incorporating agency, regional, and state priorities. Several objectives/recommendations from the past TDP were carried forward as ongoing initiatives. 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 Radford Transit's unique operating environment.

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

Objective 1.1: Maintain 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 60% below route type average of metric over two consecutive quarters.	Monitor route performance by category of primary route market (campus vs. city).
Data collection sources: *Farebox, APC, schedule data, operations logs, financial data.*		

Objective 1.2: Promote continued enhancement of multimodal facilities, and regional connectivity to foster seamless travel across a variety of regional transit service options. (GO, CI, RC)		
MEASURE	**TARGET**	**STRATEGY**
Implementation of NRV Transit Study short-term strategies for Fairlawn bus stops.	Complete short-term strategies by no later than 2021.	Work with PAT to align stop locations/timing (Kroger) and install amenities as permitted (Walmart).
Data collection sources: *Route schedules, in-house documentation*		

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: Communicate the value and positive impact of transit service to all groups of riders.

Objective 2.1: Educate the public about existing transportation needs. (CI)		
MEASURE	**TARGET**	**STRATEGY**
Outreach events held on an annual basis	At least four events focused on the local community needs (non-university affiliated)	Include "Try Transit" and other promotional events, increase business outlets to provide schedule information, develop/streamline graphical materials.
Rider survey results - respondents citing confusing schedules	Demonstrated reduction from previous survey results	Implement previous TDP recommendations to increase the number of timepoints provided for route schedules.
Data collection sources: *Marketing plan, in-house documents*		

Objective 2.2: Provide appropriate amenities in response to service demand. (GO)		
MEASURE	**TARGET**	**STRATEGY**
Explore park-and-ride opportunities, especially for students who live off campus and to limit traffic in downtown Radford.	Investigate when existing individual park and ride lot utilization exceeds 80 percent or greater.	Conduct appropriate outreach activities (i.e. surveys) to gain information on suitable locations.
Data collection sources: *Manual counting/field inspections, surveys*		

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 in line with budgetary constraints.
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).	Follow State sponsored TAM group Plan	Adherence to FTA Useful Life Benchmarks for vehicle classifications.
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 monthly.
Data collection sources: *Maintenance logs, TAM reporting, fleet inventory.*		

Objective 3.3: Maintain compliance with all applicable outside guidance and reviews of Radford Transit 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.
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.	Less than 20.	Continued quality control for vehicle cleanliness, monitoring and correction of any recurring scheduling/capacity issues.
On-time performance	Greater than 85 percent per route	Monitor and adjust schedules as needed.
Data collection sources: *In-house documentation/survey, CAD/AVL system.*		

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.	99.9% website uptime. Content current, well organized.	Monitor applications, refresh content of website daily, push out service alerts.
Data collection sources: *Technology 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 Radford Transit's objectives.

Service guidelines for the Harrisonburg Department of Public Transportation (HDPT) were presented in the previous TDP document and recommended for Radford Transit to adopt due to similar operating characteristics. Each existing service standard has been 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. Each measurable service standard is also associated with the most relevant objective (if applicable) in Table 8.

Table 8: Proposed Radford Transit Service Standards

SERVICE STANDARD	Status	Objective
Hours of Operation:		
RU Service Span **7:00am-10:00pm** M-Th; **7am-2:50am** Fr; **10:00am-2:50am** Sat; **6:00pm-12:00am** Sun City Service Span **7:00am-8:00 pm** weekdays, **10:00am-8:00pm** Sat	Modified	N/A
Frequency of Service		
RU Service Frequency **15** minutes City Service / City Route Frequency **60** minutes	Modified	N/A
Loading Standard		
Standees for short periods acceptable, but up to 25% of total passenger load.	Maintained	4.1
Passenger Stops		
Core area stops from 5-7 per mile. Fringe area stops from 4-5 per mile, based on land uses.	Maintained	2.2
Bus Shelters and Benches		
Bus stops with more than **50 passenger** boardings daily should have a bus shelter.	Modified	2.2
Benches should be provided at bus stops with more than 25 passengers per day.	New	2.2
Passenger Productivity		
Review and modify, if possible, services that exhibit **productivity less than 60%** of the system average	Modified	1.1
Cost Effectiveness		
Review and modify, if possible, services that exhibit **higher cost than 60%** of the system average.	Modified	1.1
Schedule Adherence		
90% on-time service (0 to 5 minutes late) -- No trips leaving early.	New	4.1
Service Reliability		
Maintain fewer than 6,500 miles between service road calls.	New	3.2
Follow State sponsored TAM Plan/targets	New	3.2
Less than 5 percent missed trips due to operational failures.	Modified	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
Schedules, maps, signage, and website current	Maintained	2.1

SERVICE STANDARD	Status	Objective
and accurate.		
Revenue equipment and facilities kept in clean and good condition.	Maintained	4.1
Safety		
0.10 or fewer "reportable incidents" per 100,000 miles, as defined by the National Transit Database.	New	1.3

2.6 MEASURING PERFORMANCE

This section provides additional details on the definition and measurement approaches for some of the service standards presented in Table 8. 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 policy/procedures and the results should be reported as part of recurring (no less than quarterly) reporting unless otherwise noted.

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. Keeping the age/miles per vehicle within the FTA Useful Life Benchmark can also help to promote more reliable operations. A related component for this reliability is tracking the average distance in service miles between when all vehicles in revenue service incur mechanical failures that prevent starting or finishing a run. The inclusion of dependability measures is new for Radford Transit.

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 logs 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.

Passengers Per Revenue Hour / Cost Per Revenue Hour

These represent measures of passenger productivity and cost effectiveness. These measures represent industry wide standards used to assess overall performance and route efficiency. While existing Radford Transit service measures included these metrics, a threshold of 60% of the system average has been introduced to align with other Virginia systems as a benchmark for exploring route or operational adjustments. It may also be advisable to establish specific passengers per hour/cost per hour targets for each route category (University vs. City) since the service expectations of these two route categories is different.

Measurement Approach

- Look at historic Radford Transit system trends by route category in conjunction with financial data to establish appropriate benchmarks of productivity considering expected financial outcomes of operating that route (ridership vs. coverage). A conservative target starting point can be 60 percent of the historic average to identify the need for potential service adjustments. This would reflect routes with less than 60 percent of the average passenger productivity or routes 60 percent above the average cost per hour measure.
- Potentially establish a more aggressive intervention approach for route adjustments if under performance is observed during consecutive intervals or if the deviation from the system averages is excessive (larger percentage).

Safety

As defined from the National Transit Database (NTD) defines the conditions of a reportable incident. A reportable incident is one in which one or more of the following conditions apply: 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

- Radford Transit should maintain and review quarterly safety logs of all incidents. As a limited NTD reporter, even if this information is not required to be reported, it would provide valuable operation insight. The incident logs should be reviewed no less than a quarterly basis for determination of any trends requiring service/training adjustments. As necessary, Radford Transit should use 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.

Load Factor

For university-based systems, overcrowding can become problematic. Load standards are thresholds of the ratio of passengers on board to seats available. A fully seated passenger load would have a load factor of 1.0. Other considerations include the timing of maximum load and allowing for higher loads at peak periods. Also, other transit agencies consider the overall length of time the bus operates above a 1.0 load factor, with a desire to limit the maximum time a passenger may be left standing. Radford Transit's current Load Factor service measures could be made more specific to reflect a greater emphasis on addressing overcrowding.

Measurement Approach

- On-board surveys, can be conducted in conjunction with passenger boarding sampling. Passenger counters can help target the most crowd-prone times/routes, with on-board observation helping to determine length of individual standees and other issues that come from excessive loads (such as increased dwell times or, pass bys, etc.).

3 Service and System Evaluation

Radford Transit operates eight fixed-route services in Radford, two of which connect Radford to neighboring communities. Route 40 provides a connection to the New River Valley Mall and to the Virginia Tech campus in Blacksburg, while Route 20 crosses the New River to serve shopping centers in Fairlawn. All services have a terminus at the Hub, a transfer point located at the intersection of East Main Street and Tyler Avenue, adjacent to the Radford University campus. Radford Transit operates a pulse transfer system at the Hub, with all routes departing the Hub at :40 past the hour, though some routes run more frequently than once per hour. Only one service, the 10, a campus circulator for Radford University, runs on Sundays, with most other services operating six days a week. When Radford University is not in session, Radford Transit operates on a City Service plan, with only four routes operating. Table 9 lists all Radford Transit fixed-route services, while Figure 8 and Figure 9 show, respectively, the regular service and city service route patterns. Further details on all Radford Transit routes including performance statistics can be found in Appendix B.

Table 9: Radford Transit Routes and Service Types

Route	From	To	Service Type	Regular Service/ City Service
10: University Express	New River Drive	Waldron Hall	Weekdays, Saturdays and Sundays	Regular Service Only
15: University Highlander	The Hub	Waldron Hall	Weekdays and Saturdays[2]	Regular and City Service
20: New River Rapid	Fairlawn Walmart	The Hub	Weekdays and Saturdays	Regular and City Service
30/31: Cross City	Radford Recreation Center	Jeffries Drive	Weekdays and Saturdays	Regular and City Service
40: NRV Connect	The Hub	Squires Student Center	Weekdays and Saturdays	Regular Service Only
50: Highlander Circulator	Burlington Lot	The Hub	Weekdays Only	Regular Service Only
60: South Beech Express	Copper Beech Apartments	Fairfax Street	Weekdays Only	Regular Service Only

[2] Weekday service during City Service periods only.

Figure 8: Radford Transit Routes – Full Service

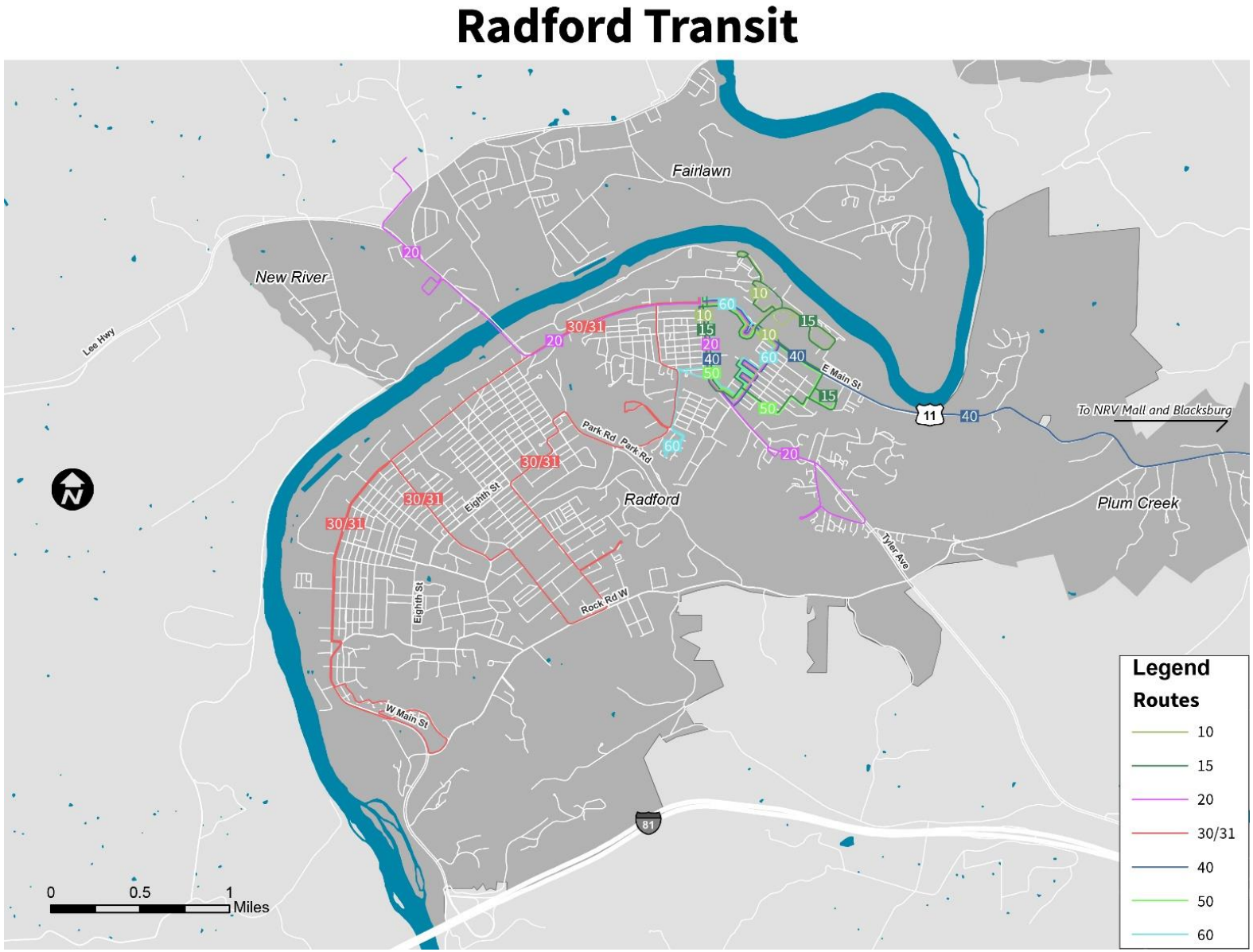
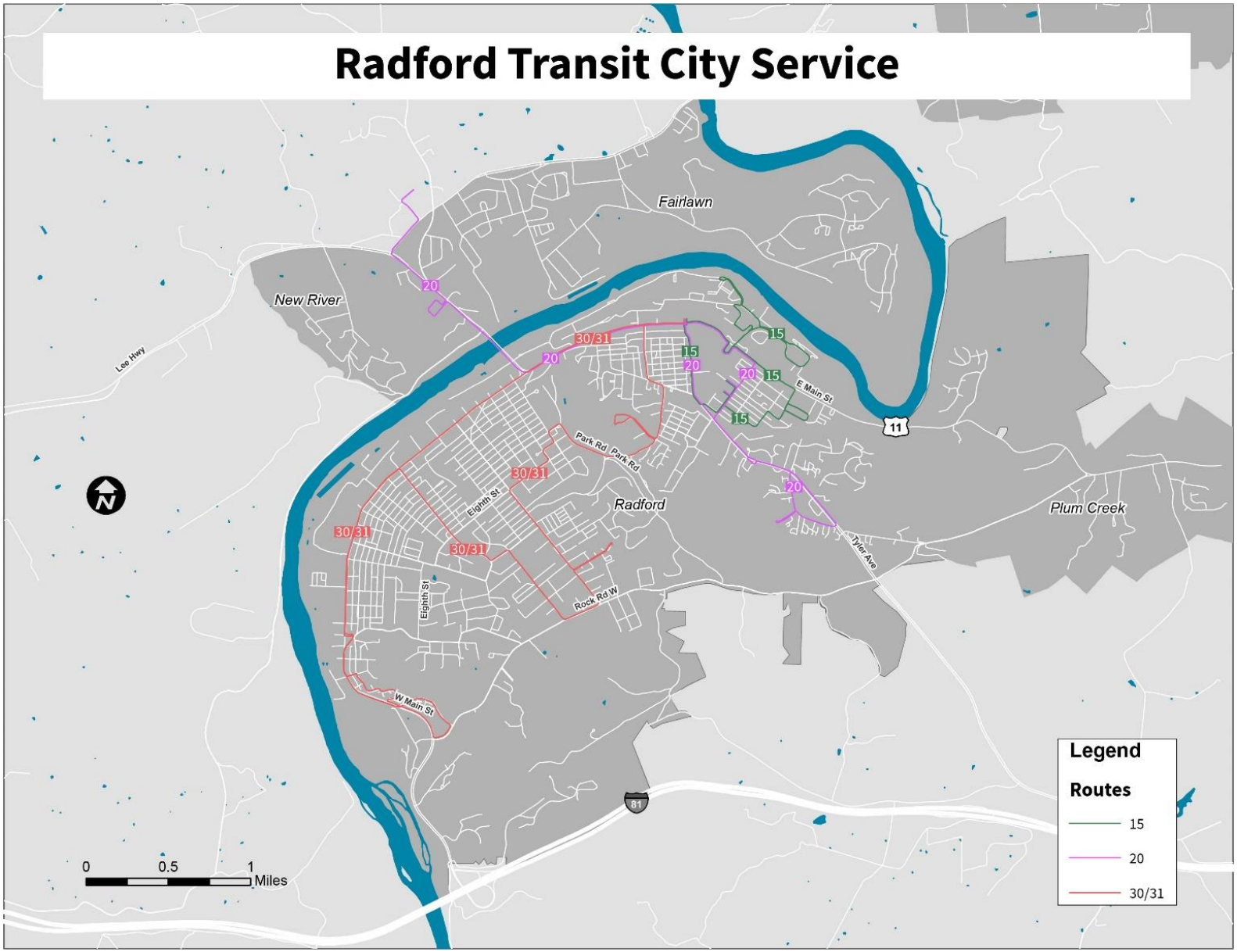


Figure 9: Radford Transit Routes – City Service



3.1 ROUTE LEVEL OF SERVICE

During full service periods, most Radford Transit routes operate between 7:00am and 8:00pm or 10:00pm Monday through Wednesday. On Thursdays and Fridays Route 10 and Route 40 provide late night service until nearly 3:00am. Routes 15, 20, 30 and 40 provide Saturday service and Route 10 provides Sunday service in the evening. Headways vary from 10 minutes to 60 minutes, with 10-minute headways provided on Routes 10 and 50 during the day on weekdays and 15-minute headways provided on Route 60. Routes 10 and 50 act as Radford University circulators, and therefore provide high levels of service. Table 10 summarizes service levels during full service periods. Figure 10 illustrates service levels on weekdays during full service while Figure 11 illustrates service levels on weekends during full service.

During city service, only Routes 15, 20, and 30 operate, generally between 7:00am and 8:00pm on weekdays and 10:00am and 8:00pm on Saturdays. There is no service on Sundays. 30-minute headways are provided on Route 15 and 60-minute headways are provided on Routes 20 and 30. Table 11 summarizes service levels during city service periods. Figure 12 illustrates service levels on weekdays during city service while Figure 13 illustrates service levels on weekends during city service.

Table 10: Radford 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	Thur & Fri Late	Reg/ Thur & Fri						
10: University Express	7:00a 2:50a[3]	10	10	10	15	30	30	78/87	-	-	-	5:50p 11:50p	30	12
15: University Highlander	-	-	-	-	-	-	-	-	10:20a 2:50a	30	33	-	-	-
20: New River Rapid	7:00a 7:40p	60	60	60	60	-	-	11	10:00a 7:40p	60	8	-	-	-
30/31: Cross City	7:00a 8:20p	60	60	60	60[4]	-	-	12	10:00a 8:20p	60	9	-	-	-
40: NRV Connect	2:40p 2:40a[5]	-	60	60	60	-	60	6/11	10:40a 2:40a	60	15	-	-	-
50: Highlander Circulator	7:00a 10:10p	10	10	10	20	-	-	81	-	-	-	-	-	-
60: South Beech Express	7:00a 10:00p	15	15	15	30	-	-	54	-	-	-	-	-	-

[3] Mondays, Tuesdays, and Wednesdays until 10:20pm
[4] Routes 30 and 31 each have a headway of 60 minutes.
[5] Mondays, Tuesdays, and Wednesdays until 9:40pm

Table 11: Radford Transit Level of Service by Route – City Service

Route	Weekday								Saturday		
	Span	Headway						Trips	Span	Headway	Trips
		AM Peak	Midday	PM Peak	Evening	Late	Thur & Fri Late	Reg/ Thur & Fri			
15: University Highlander	7:20a 8:00p	30	30	30	30	-	-	26	10:20a 8:00p	30	20
20: New River Rapid	7:00a 7:40p	60	60	60	60	-	-	12	10:00a 7:40p	60	9
30/31: Cross City	7:00a 8:20p	60	60	60	60	-	-	12	10:00a 8:20p	60	9

Figure 10: Radford Transit Level of Service by Route – Full Service Weekday

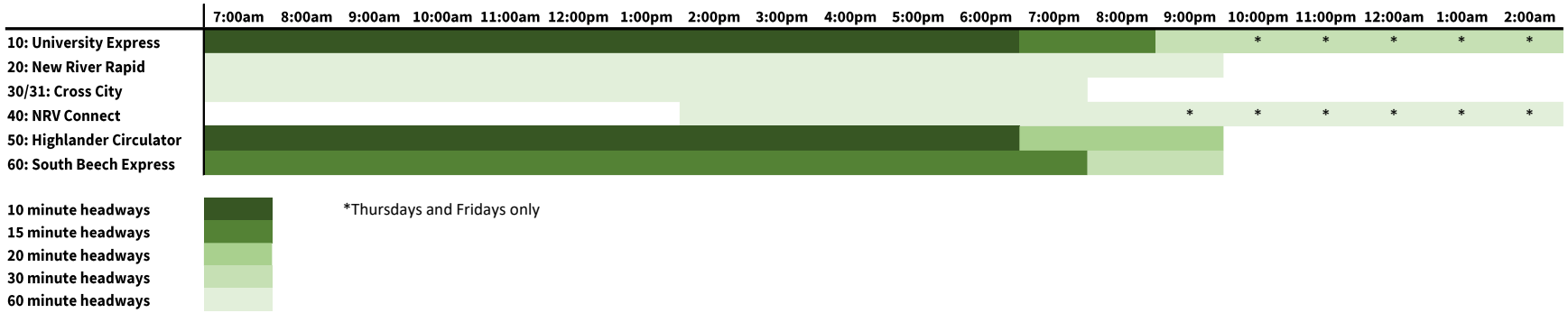


Figure 11: Radford Transit Level of Service by Route--Full Service Weekend

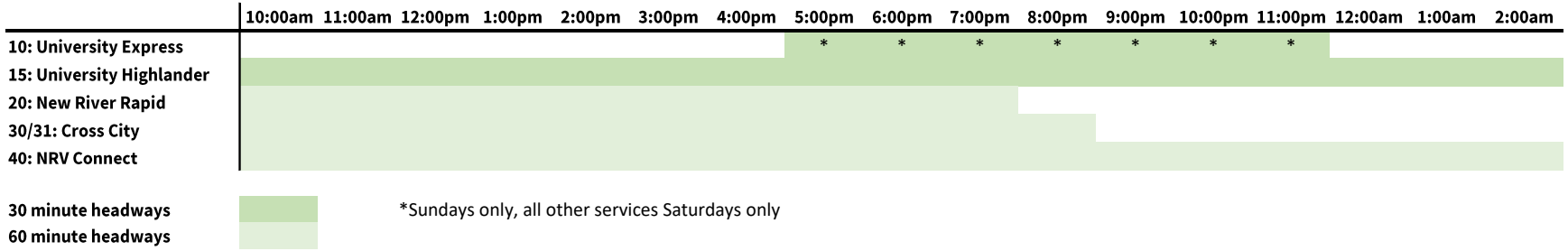


Figure 12: Radford Transit Level of Service by Route – City Service Weekday

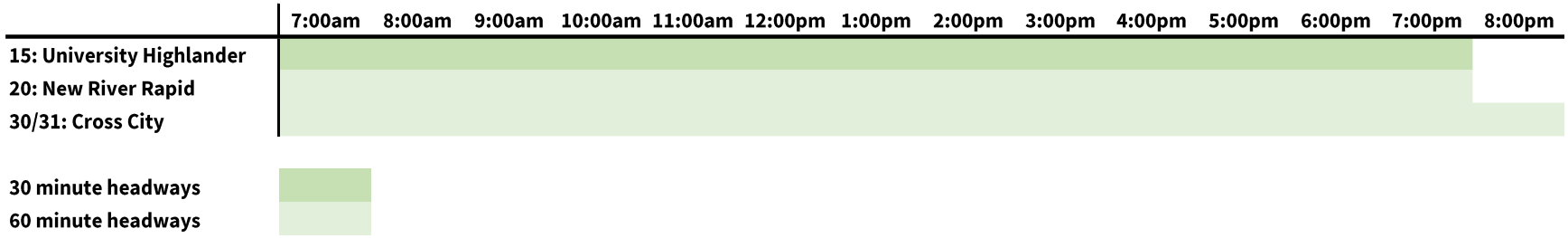
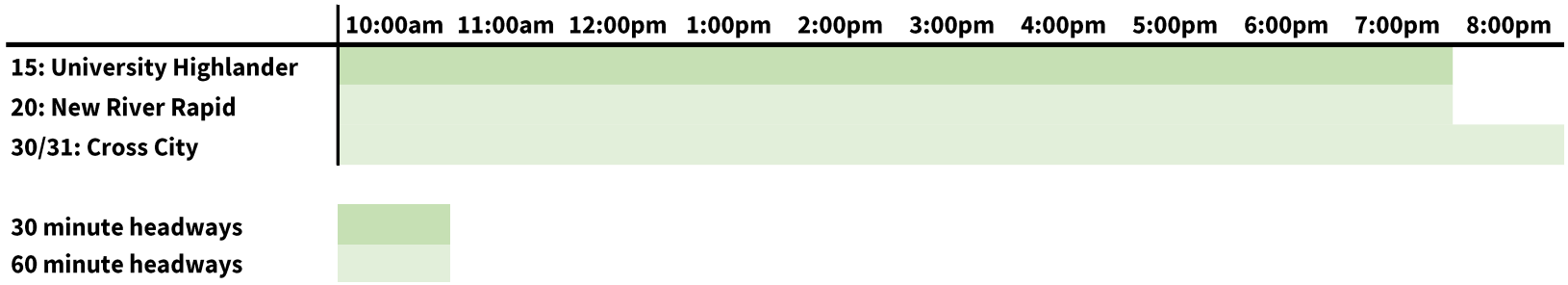


Figure 13: Radford Transit Level of Service by Route--City Service Saturday



3.2 DEMAND RESPONSE SERVICE

Radford Transit provides on-demand service to Carilion New River Valley Medical Center on SR 177 near I-81 (exit 109). Reservations must be made 24-hours in advance and service will be provided to and from Radford Transit's hub on East Main Street.

Radford Transit also allows for deviations on its fixed routes. Deviations must be reserved 24-hours in advance, must be within ¾-mile of the fixed route alignment, and can only be made once per hour per route. This service configuration is in place of providing a separate demand-response system.

3.3 OTHER REGIONAL SERVICES

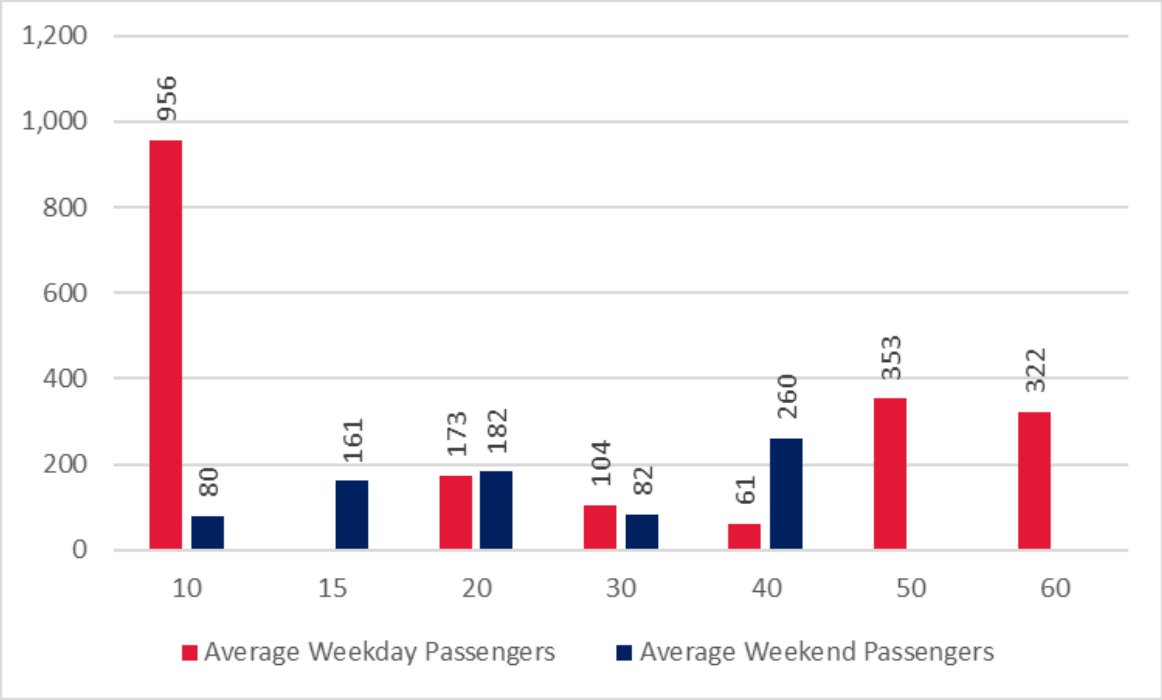
Pulaski Area Transit's New River Express route provides service between Pulaski, Dublin (New River Community College), Fairlawn, and Christiansburg (New River Valley Mall). Stops in Fairlawn include Walmart and Kroger, where passengers can transfer to Route 20.

3.4 RIDERSHIP

3.4.1 Ridership by Route

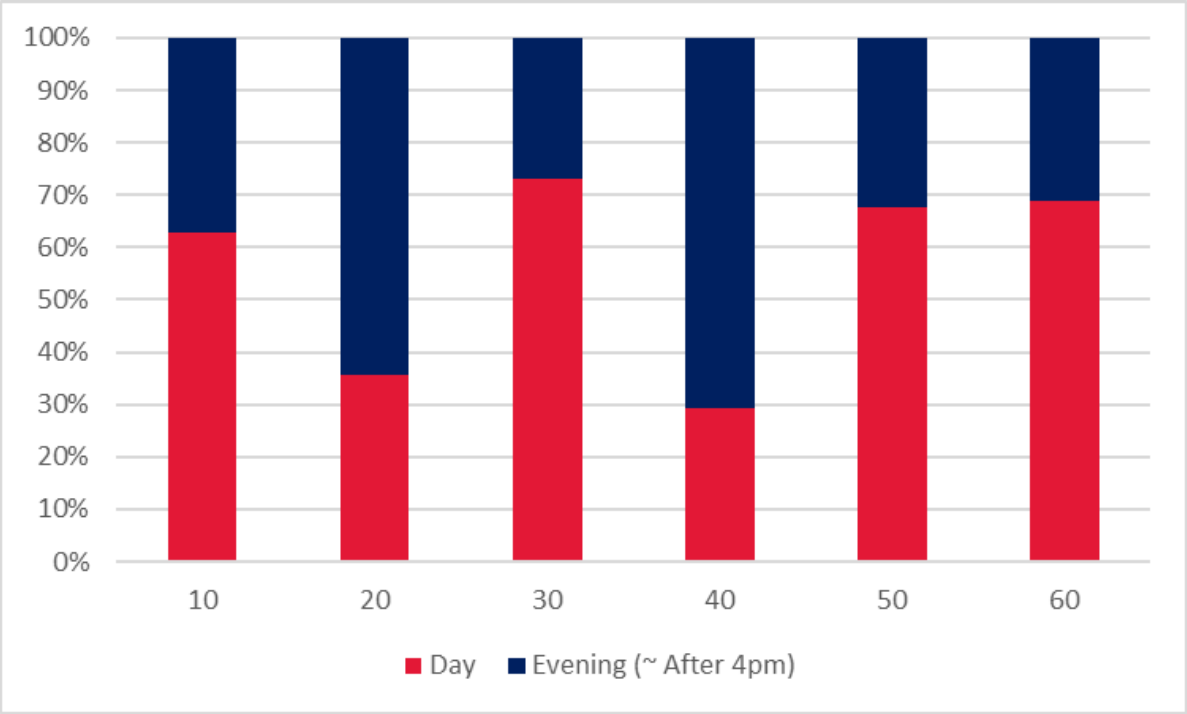
Daily ridership data was obtained for September 2017, when Radford Transit is operating regular service (Figure 14). Route 10 has the highest average weekday passengers at approximately 956 riders. Route 50 has the second highest average daily ridership. While Route 40 has one of the lowest average weekday passenger rates, the route has the highest average weekend passengers at approximately 260. While Route 15 appears to have low ridership, this route only operates on Saturdays during regular service.

Figure 14: Radford Transit Average Daily Ridership by Route



Overall, average weekday ridership is higher during the daytime period for all routes except Route 20 and Route 40, which does not begin service on weekdays until 2:40pm (Figure 15). Route 10 and the shuttle have the highest average weekday ridership during the daytime period at 99, and Route 10 has the highest average weekday ridership during the evening period.

Figure 15: Radford Transit Average Weekday Ridership by Time Period



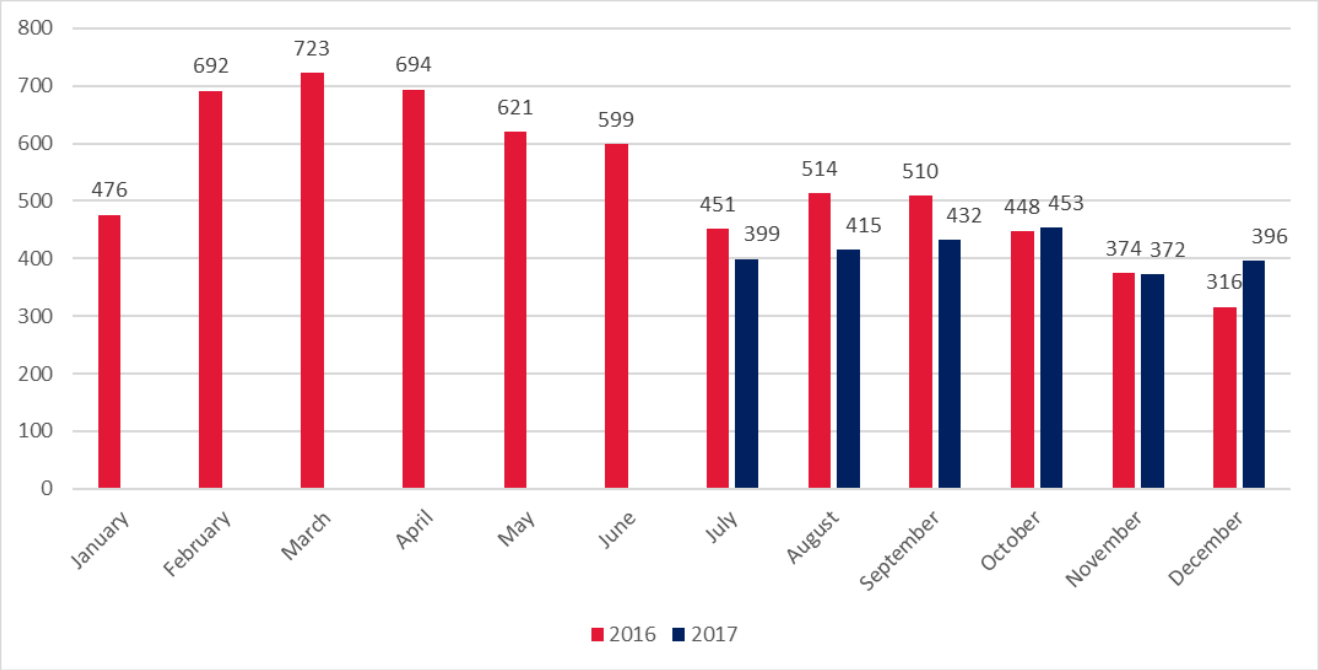
3.4.2 Ridership by Stop

Ridership by stop is detailed by route in Appendix B. Automatic passenger counter (APC) units are expected to be installed in 2018, at which point this data will become available on a continual basis.

3.4.3 Transfers

Overall there is slight seasonal variations in transfer levels. Transfer levels are higher between late winter and early spring (February – April), and are lowest in the winter and summer months. On average, there are 493 transfers per month.

Table 12: Radford Transit Monthly Transfers



3.4.4 Operating Statistics

Hours

Figure 16 summarizes average weekday revenue hours, deadhead hours and non-revenue hours by route during full service. The deadhead to revenue ratio is high for this type of system, particularly on the higher frequency routes like Route 10 (near 1:1). Scheduling efficiencies will likely need to be sought in order to lessen deadheading.

Miles

Average weekday route miles by route during full service are summarized in Figure 17. Route miles are highest on Routes 10 and 30 – Route 10 due to its high frequency and Route 30 due to its length as this route circulates around much of the city of Radford. Route 40 also has fairly high miles despite its limited service span due to its length.

Figure 16: Radford Transit Average Daily Revenue Hours/Deadhead Hours by Route

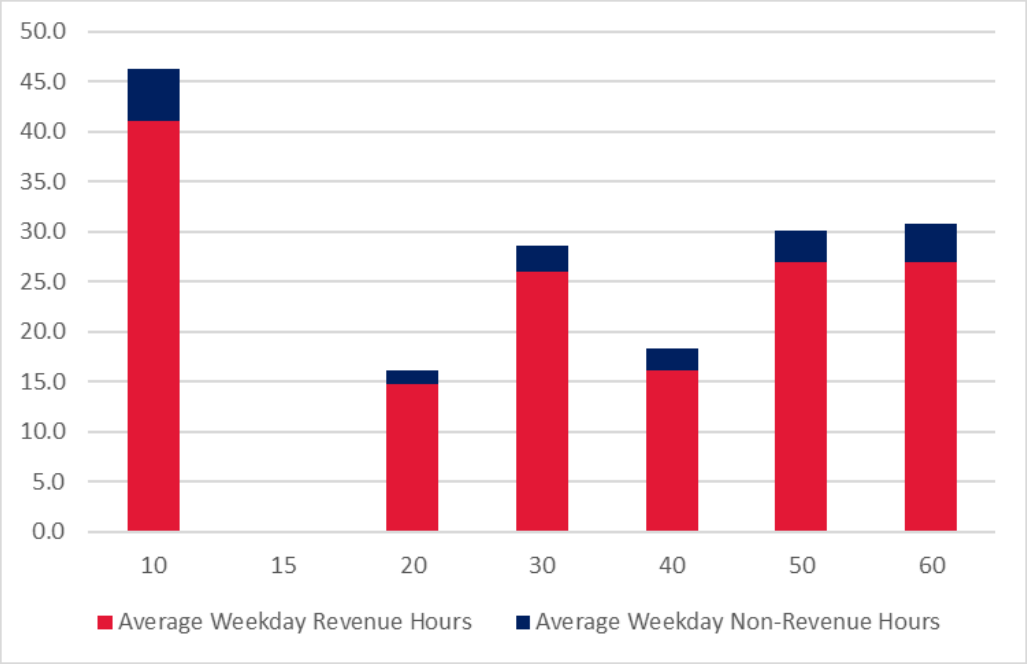
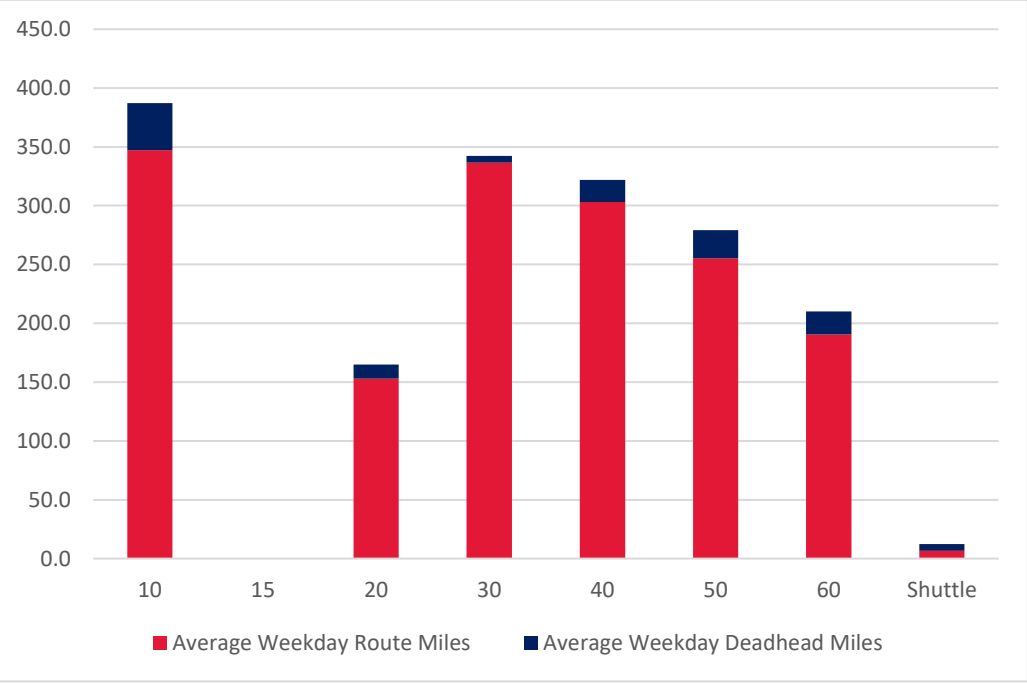


Figure 17: Radford Transit Annual Miles by Route



Operating Costs

Radford Transit's annual operating cost is approximately $1.4 million. Nearly 95 percent is for the transportation – contract, while less than 4 percent supports Legal Services, Other Professional Services and Risk Management (**Table 13**).

Table 13: Radford Transit Annual Operating Cost

Item	Actual FY2016
Legal Services	18,459
Other Professional Services	25,063
Transportation – Contract	1,324,494
Risk Management	10,251
Total	1,396,268

Fare Use

Fare types used for FY2017 are summarized in Table 14. More than 80 percent of fares are Radford University ID, approximately six percent is senior/disabled, which is discounted. Only four percent of collected fares are full fare, and less than two percent is transfers.

Table 14: Radford Transit Fare by Fare Type

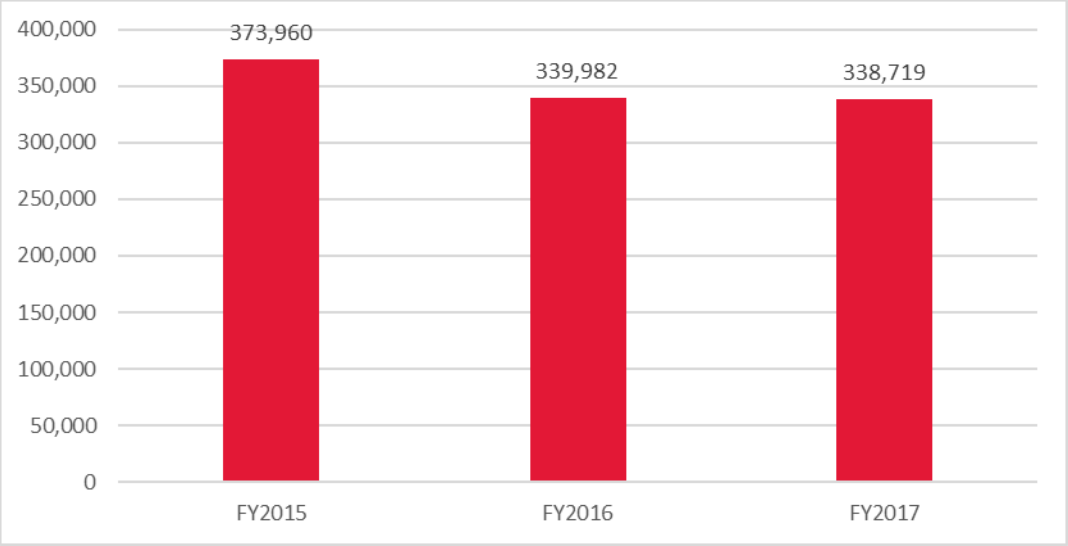
Rider Type	Total Fare	Percent of Total
Radford University ID	275,192	81.2%
Senior/Disabled	21,815	6.4%
Full Fare	14,783	4.4%
Special	11,167	3.3%
Monthly Pass	6,514	1.9%
Children	4,340	1.3%
Transfers	4,908	1.4%

Further details on all Radford Transit routes including performance statistics can be found in the individual route profiles in Appendix B.

3.5 3-YEAR TREND ANALYSIS

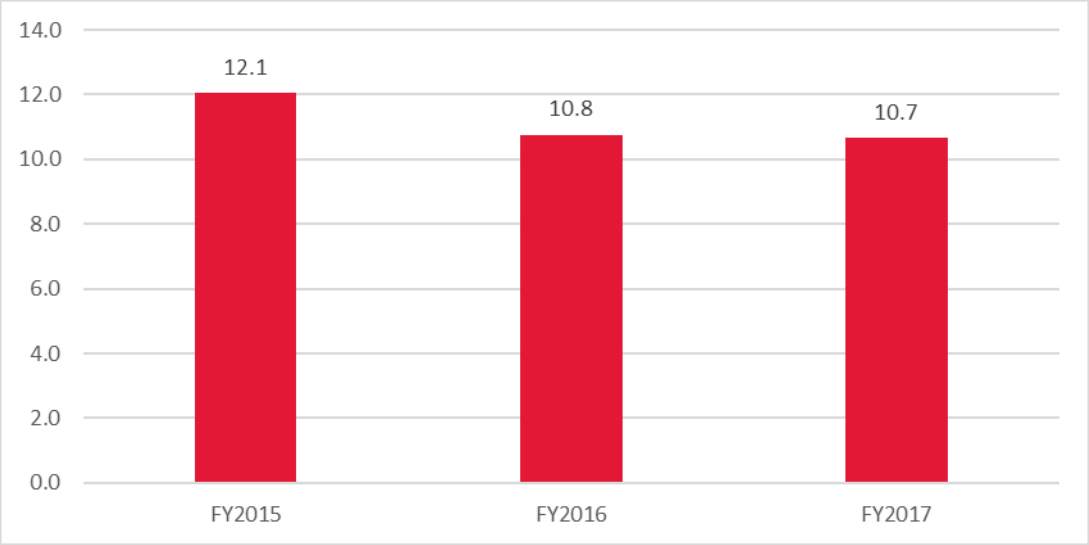
Overall, Radford Transit ridership declined by approximately nine percent between FY2015 and FY2017. Ridership experienced the steepest decline (nine percent) between FY2015 and FY2016, and a less than one percent decline between FY2016 and FY2017 (Figure 18).

Figure 18: Radford Transit Annual Ridership, FY2015-FY2017



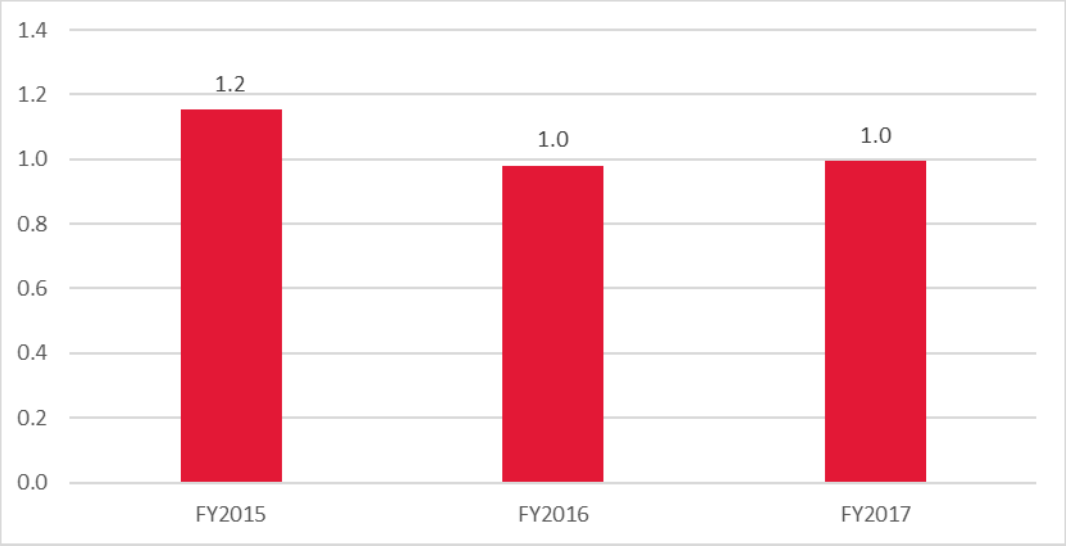
Overall, Radford Transit's passengers per revenue hour declined by 11 percent between FY2015 and FY2017 (Figure 19). This trend reflects the decline in ridership that occurred during the same period.

Figure 19: Radford Transit Passengers Per Revenue Hour, FY2015-FY2017



Overall, Radford Transit's passengers per revenue mile declined by 13 percent between FY2015 and FY2017 (Figure 20). This trend reflects the decline in ridership that occurred during the same period.

Figure 20: Radford Transit Passengers Per Revenue Mile, FY2015-FY2017



Radford Transit's Farebox Recovery declined by 21 percent between FY2015 and FY2017 (Figure 21). While there was a minor decline between FY2015 and FY2016, there was a major drop, 19 percent, between FY2016 and FY2017. The overall low farebox recovery, around one percent, is because the majority of riders are students, who ride for free.

Figure 21: Radford Transit Farebox Recovery, FY2015-FY2017

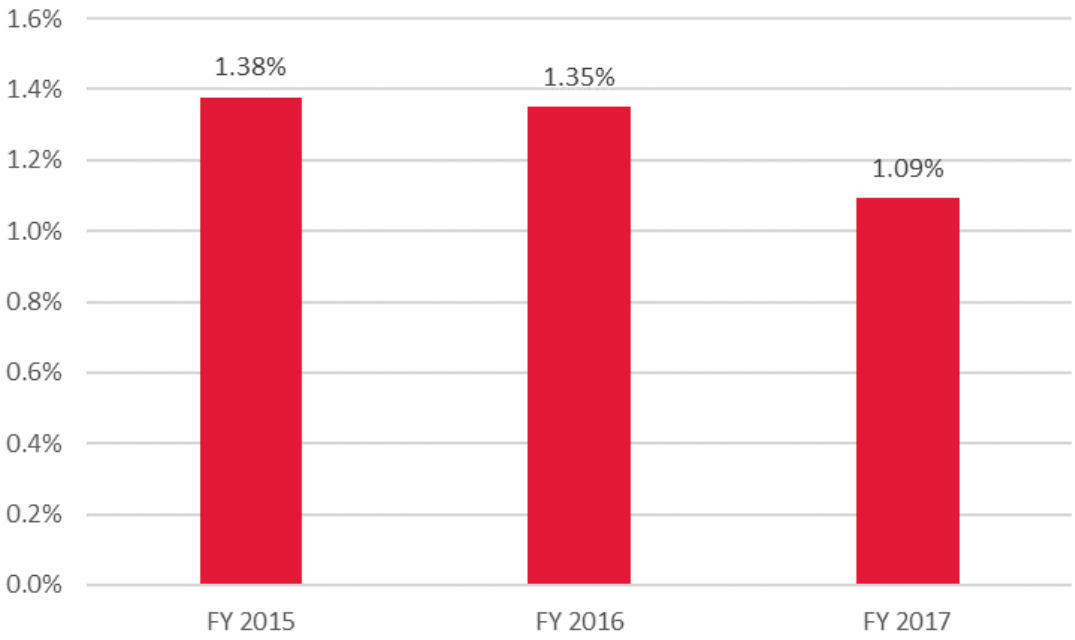


Table 15 summarizes the changes in total passengers, revenue hours, revenue miles, and productivity measures over the past three years (FY2015-FY2017). Overall, ridership declined over the three-year period while the service provided (revenue hours and miles) increased, resulting in the decline in productivity outlined above.

Table 15: 3-Year Trend Summary

	Total Passengers	Revenue Hours	Revenue Miles	Passengers Per Rev. Hour	Passengers Per Rev. Mile	Farebox Recovery
FY2015	373,960	31,013	324,076	12.1	1.2	1.38%
FY2016	339,982	31,578	346,840	10.8	1.0	1.35%
FY2017	338,719	31,759	340,436	10.7	1.0	1.09%

3.6 RIDER SURVEY RESULTS

An on-board rider survey was conducted in September and November of 2017 in order to gather information on existing Radford Transit riders. Overall, 157 surveys were returned. Radford 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 22, this method demonstrates high scores for most elements of the system: 82 percent of scores were either approving or strongly approving of the quality of service, with a further nine percent of the scores neutral. Another nine percent of the scores expressed dissatisfaction with the system (including "disapprove" and "strongly disapprove" comments). 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 printed materials and its hours of service.

Figure 22: Rider Survey General Satisfaction Score

Radford Transit's riders are demographically distinct. As seen in Figure 23, 53 percent are part-time or full-time students, with 27 percent part-time workers. Full-time workers and unemployed people make up ten percent and five percent of the ridership, respectively. Figure 24 compares the household incomes of Radford Transit riders to statewide income distribution. Radford Transit's riders are disproportionately low-income, with 46 percent making less than $10,000 annually, and a further 19 percent making between $10,000 and $20,000 per year. The comparable figures for the state are seven percent and five percent, respectively. Approximately 12 percent of Radford's riders make more than $75,000 per year, compared with 36 percent of Virginia residents. Approximately 47 percent of riders identify as black or African American, while 34 percent identify as white and nine percent identify as two or more races, (Figure 25). Women outnumber men among Radford Transit riders by two to one, (Figure 26).

Figure 23: Employment Status of Surveyed Transit Riders

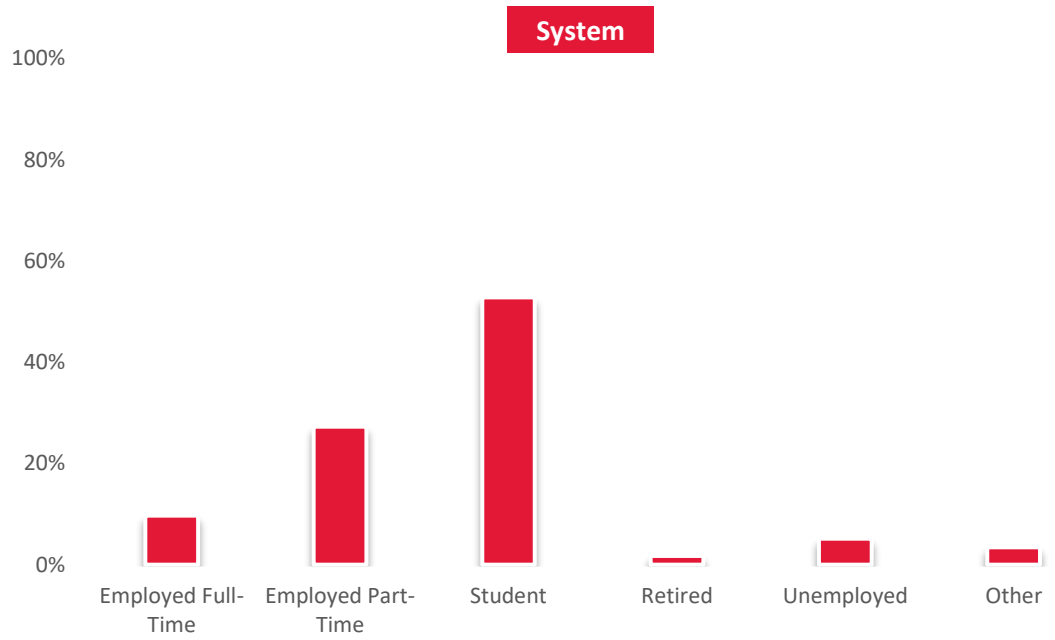


Figure 24: Income Comparison of Virginia and Surveyed Riders

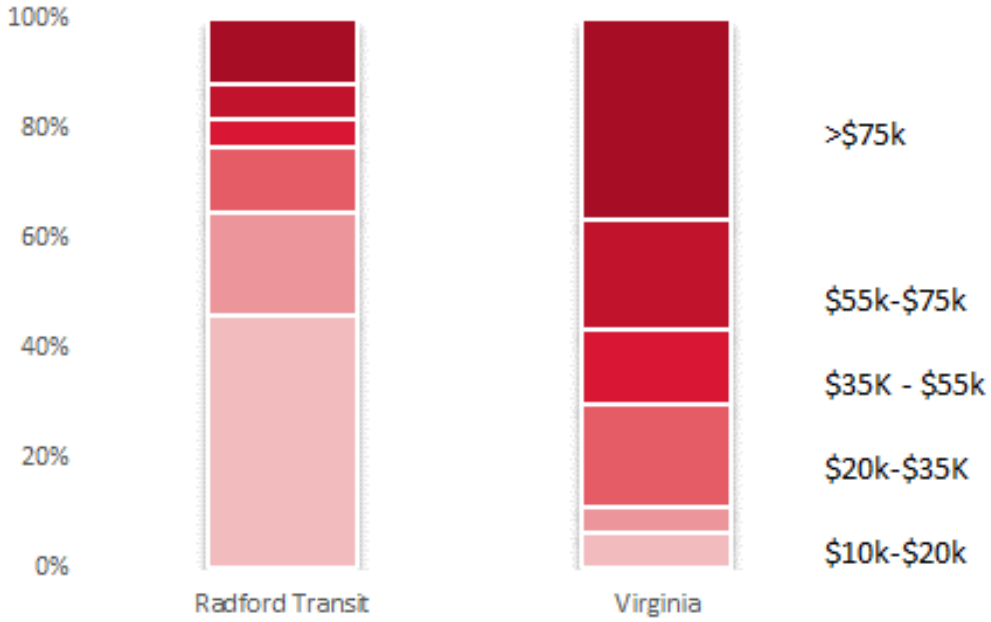


Figure 25: Racial Breakdown of Surveyed Riders

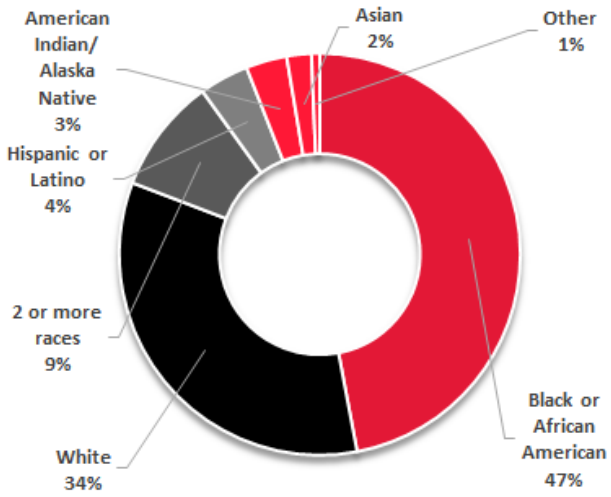
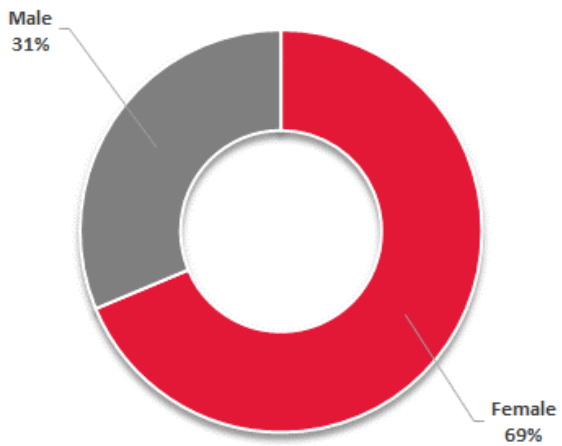


Figure 26: Gender Breakdown of Surveyed Riders



The system is used most commonly by University students, to get to and from school. As shown in Figure 27, 85.7% of riders use their University IDs to pay their fare aboard the bus. Two-thirds of surveyed riders indicated that the purpose of their trip on which they were surveyed was to attend school, with a further 21.4% using it to get to work or to go shopping (Figure 28).

Figure 27: Fare Type for Surveyed Riders

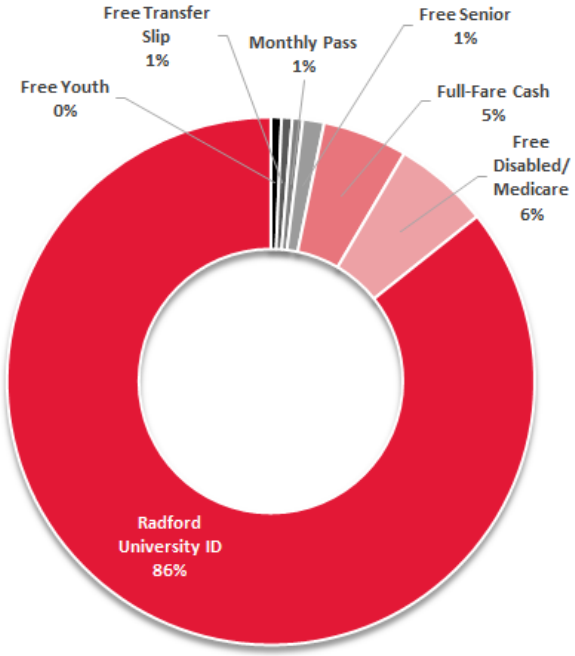
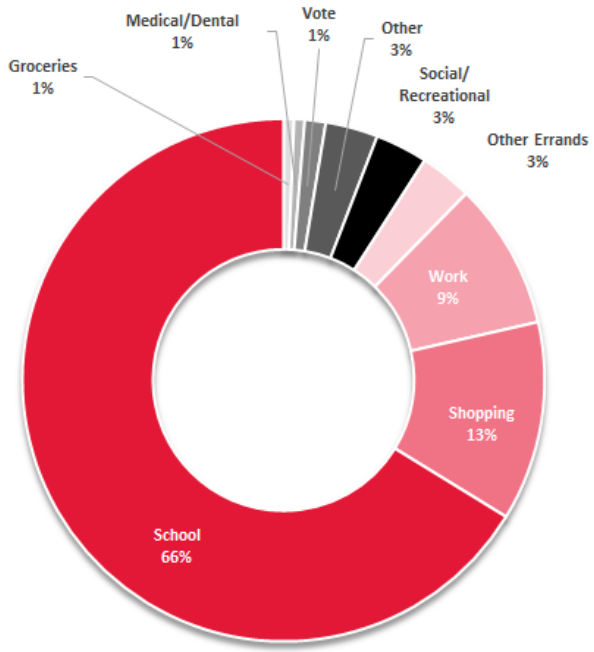


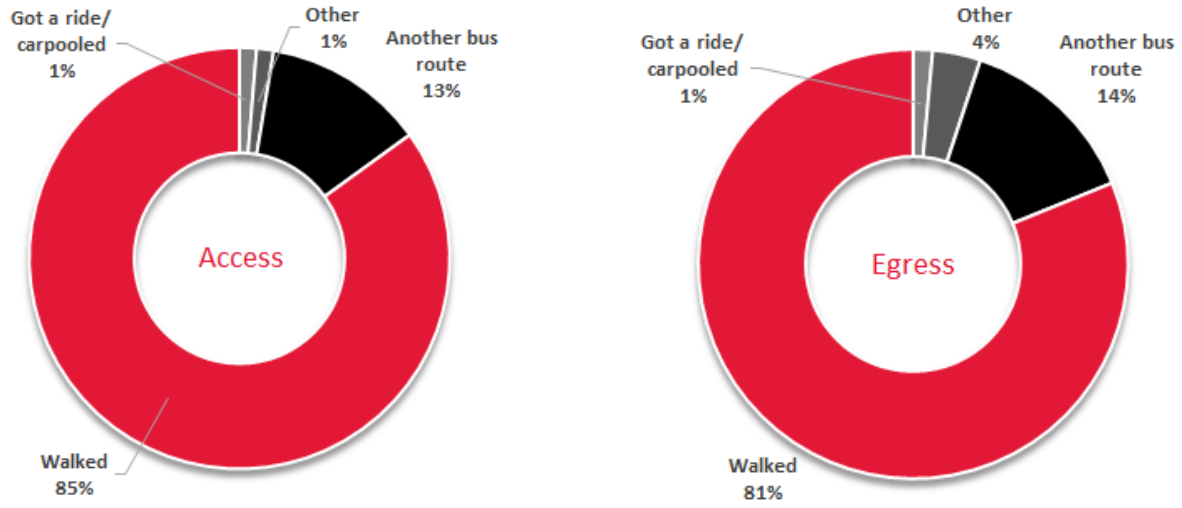
Figure 28: Trip Purpose of Surveyed Riders



Transfers between lines are not common: approximately 12 percent of surveyed riders reported getting to their bus from another bus, and another 14 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: 85 percent of riders reported getting to the bus in this manner, and 81 percent reported

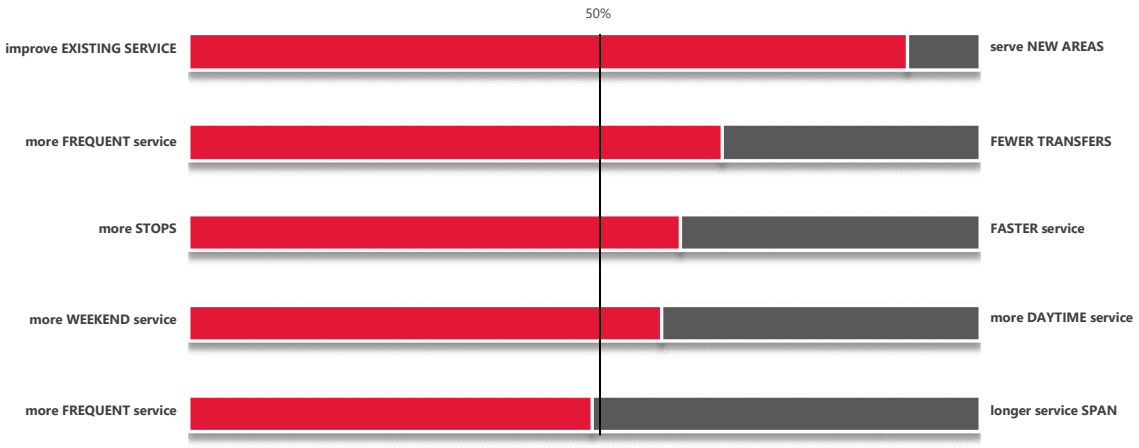
that they would walk from their bus stop to their final destination. No other mode of access of access or egress was cited even four percent of the time (Figure 29).

Figure 29: Mode of Access and Egress for Surveyed Riders



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 30. When offered a choice between longer span of service and more frequent service, opinions were evenly split, with 51 percent preferring a longer span of service. Riders prioritized improvements to weekday service over improvements to weekend service, 60 percent to 40 percent, and preferred more stops over fewer stops by a similar margin (62 percent to 38 percent). Riders preferred more frequent service on fewer streets to less frequent service on more streets by a 67 percent to 33 percent margin, and overwhelmingly preferred improving existing service over adding new service, 91 percent% to nine percent.

Figure 30: Service Improvement Prioritization Preferences for Surveyed Riders



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

3.7 SERVICE AREA CHARACTERISTICS

This section describes the demographic and land use characteristics of the Radford 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.

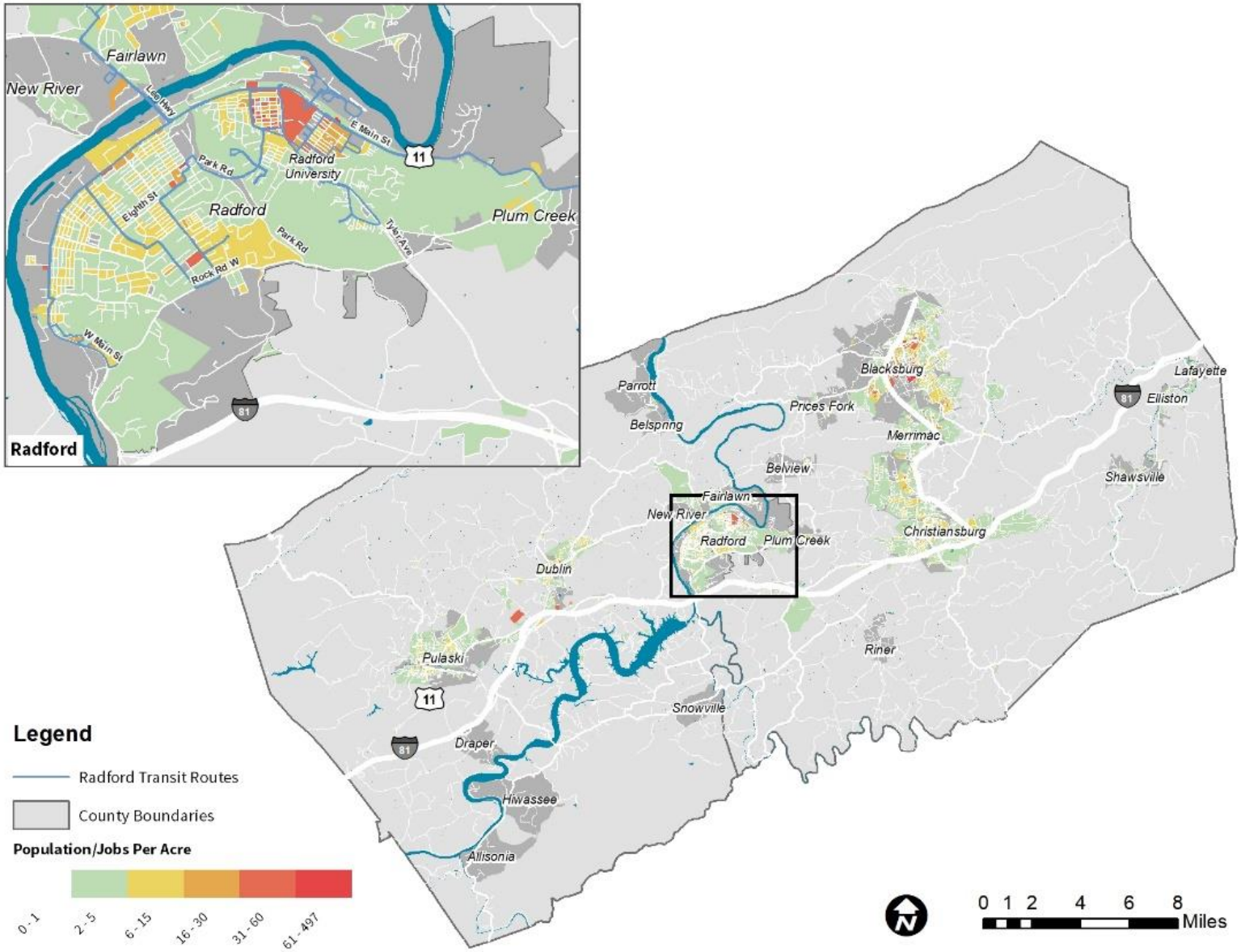
The Radford Transit service area is approximately 27 square miles and encompasses nearly the entire city of Radford, portions of Fairlawn, and portions of Montgomery County (Christiansburg, Merrimac, and Blacksburg due to Route 40).

3.7.1 Population and Employment

Combined population and employment density are illustrated by census block in Figure 31. For each block, the population and jobs were summed together 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. In Radford, the highest densities are found around Radford University's campus, with additional pockets of demand in the Willow Woods neighborhood, much of western Radford along West Main Street, in Plum Creek, and near the Fairlawn Kroger.

Future population and employment estimates for the Radford area are not available, as this area is outside the boundaries of the New River Valley travel demand model.

Figure 31: Transit Potential



3.7.2 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

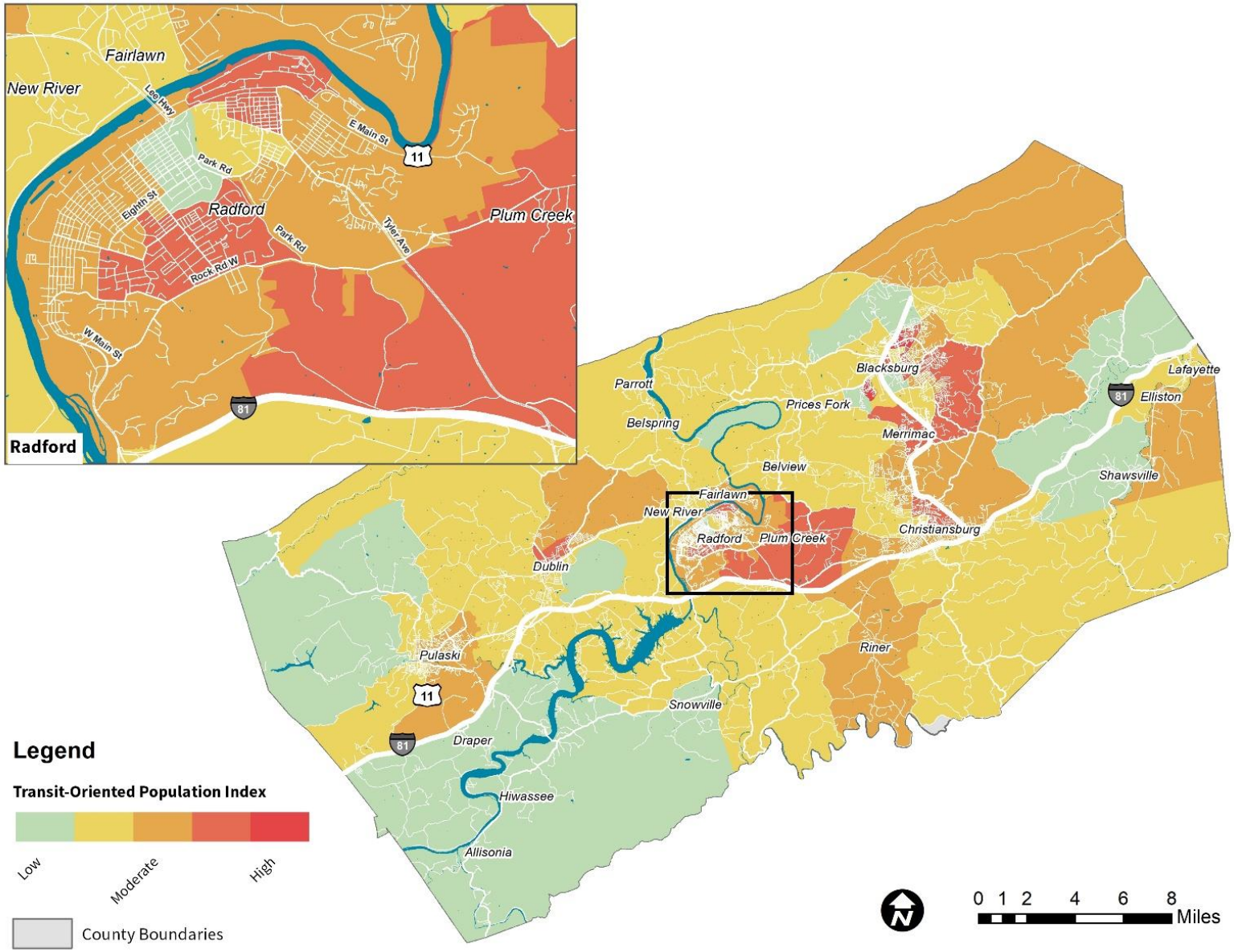
The transit-oriented population index consists of six categories: population, age, households, income, vehicle ownership, and disabled persons. The data sets that contribute to these categories are all indicative of higher population or household density, or persons that are likely to be more reliant 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 16 summarizes the data sets that are inputs to the transit-oriented populations index.

Table 16: 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
			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 population index scores are highest in the area immediately to the northwest of the Radford University campus, as well as at the southern edge of Radford's center (the Willow Woods neighborhood), to the north of Rock Road (Figure 32). The cluster near the Radford University campus is likely made up heavily of students, and is served by every Radford Transit route except the 30 and 31. The latter cluster in Willow Woods is less well served by transit, as only the 30 and 31 serve this area, and has a smaller concentration of students, and higher concentrations of low-income residents.

Figure 32: 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 17 summarizes the non-work destination index categories, weights, and the data sets that contribute to each category.

Table 17: 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 East Main Street corridor (Figure 33). The highest score can be found in the area just southeast of Radford University's campus, though there are also high scoring areas encompassing the campus itself, the area just to its west, and the area just west of the gorge separating the University from the rest of the town (Park Road). This latter area is home to many government jobs and therefore a number of social and government services, while the high scores for the areas around the University can be chalked up to the University's presence in that area.

Combining the transit-oriented population index and the non-work index, off-peak service need is highest in the area just southeast of Radford University, as well as in the area just north of Rock Road (Willow Woods), as illustrated in Figure 34. Off-peak service need is moderate in most of the rest of Radford's town center.

Figure 33: Non-Work Index Results

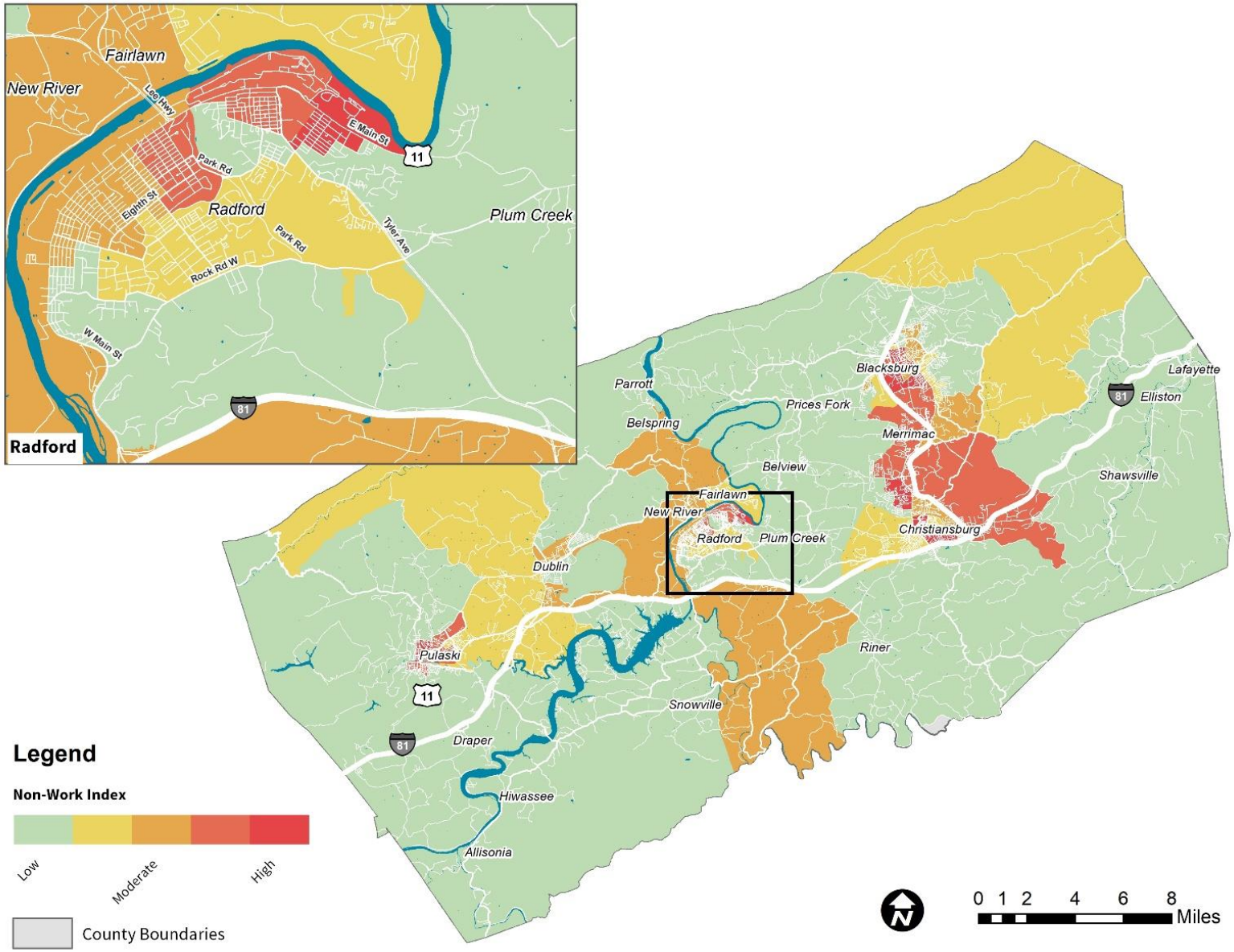
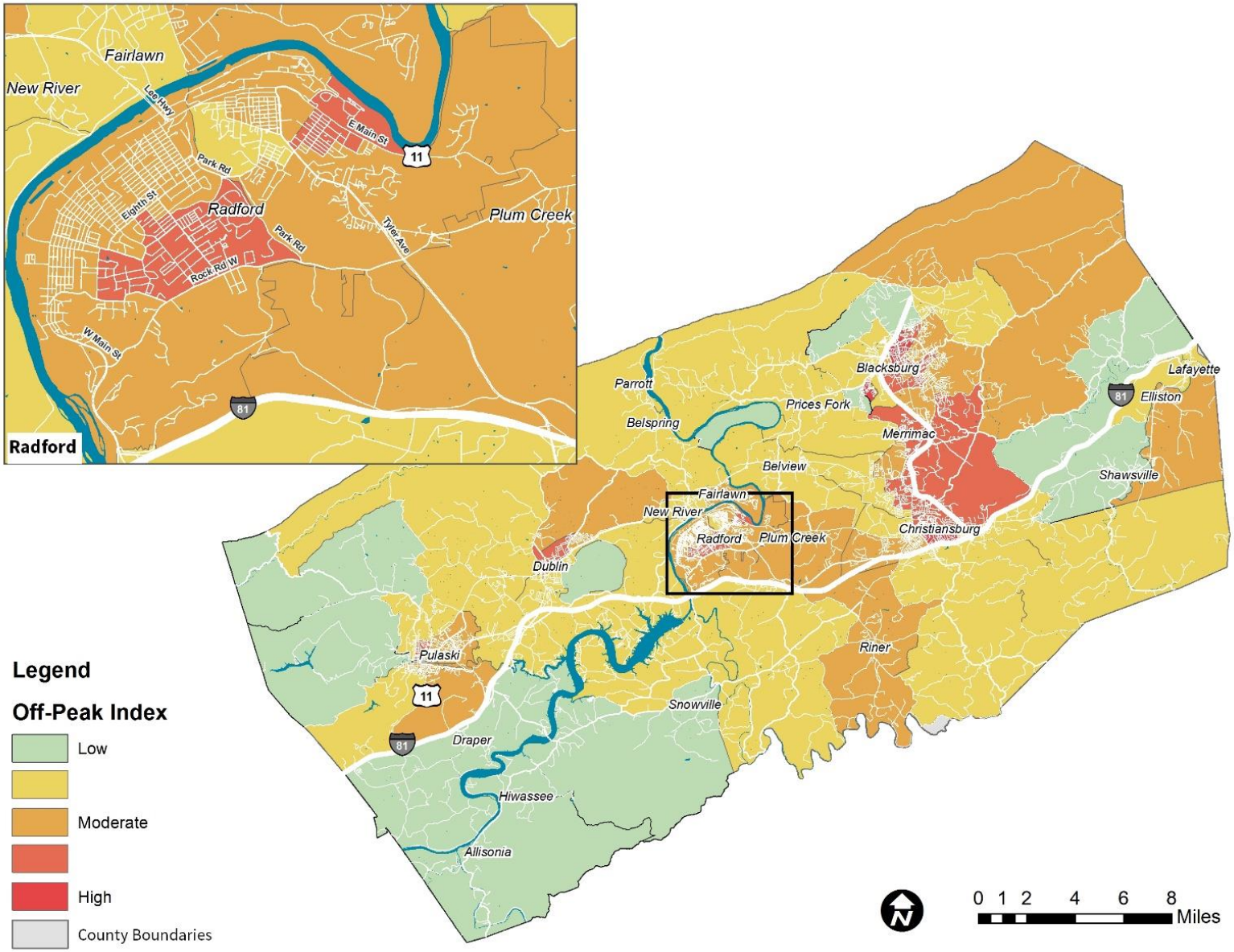


Figure 34: Off-Peak Service Need



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 Radford 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

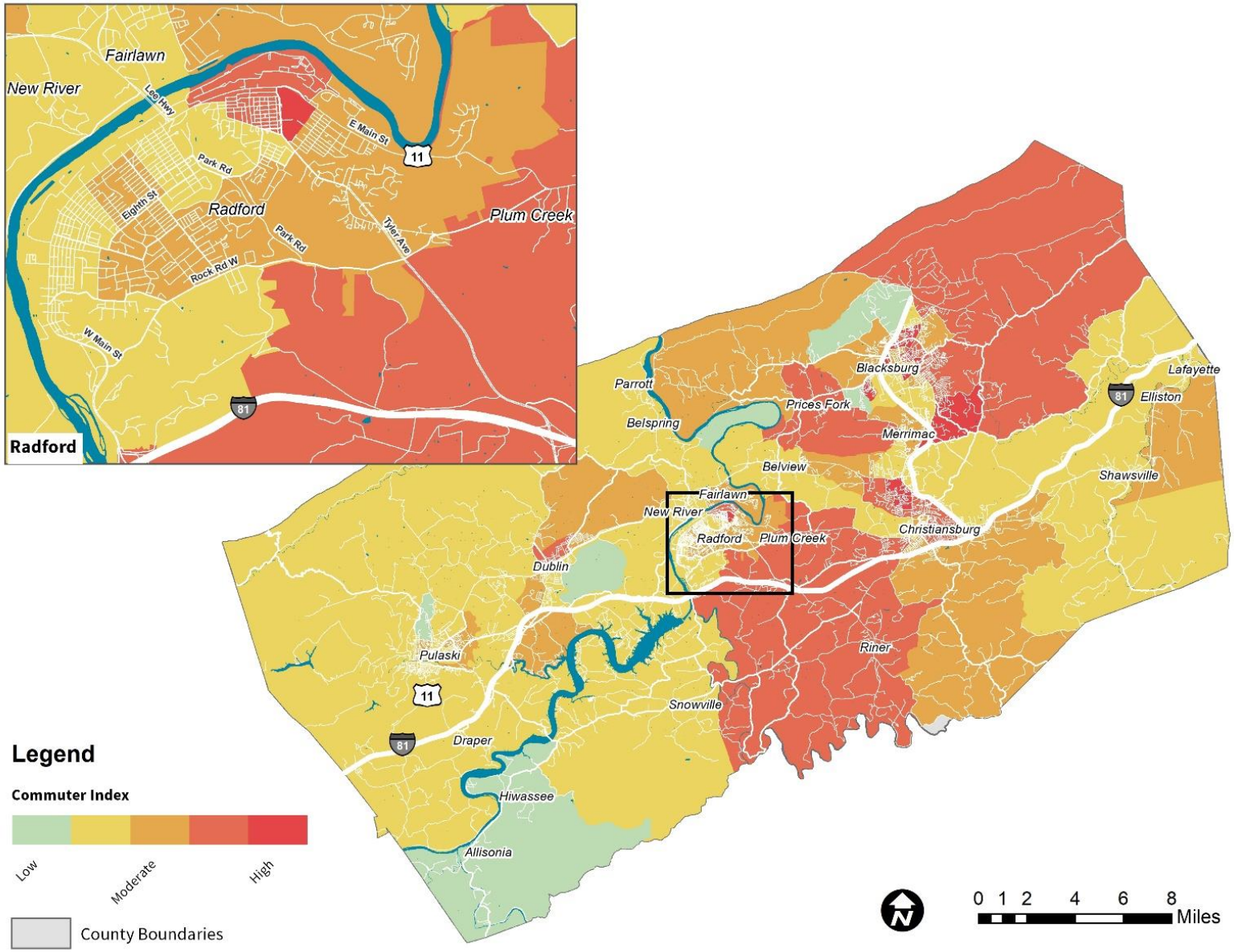
The commuter index consists of two categories: labor force and commute mode. Employed persons, commuters, and transit commuters all contribute to this index, which is indicative of where traditional peak hour commuters live, and where those that currently use transit to commute live. Table 18 summarizes the commuter index categories, weights, and the data sets that contribute to each category.

Table 18: 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 on the Radford University campus, as well as immediately to its north and east, and to the south of the city, on the south side of Interstate 81 (Figure 35). While the high scores around the university are highest as a result of the university's presence there, the high scoring area southeast of the city is likely driven by Plum Creek and Riner, and is otherwise sparsely populated and not in need of transit service. The rest of the city of Radford, including the Willow Woods neighborhood (which had a high transit-oriented population index) has only a moderate commuter index score.

Figure 35: 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 19** summarizes the workplace index categories, weights, and the data sets that contribute to each category.

Table 19: Workplace Index

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

The highest workplace index scores can be found on the Radford University campus, as well as in the area immediately to its southeast (Figure 36). This can be chalked up to the university's presence and its large number of jobs. Much of the rest of Radford's town center has moderate workplace index scores, including areas along West Main Street and in the Willow Woods neighborhood. This is largely driven by the jobs located in the city center and the large industrial employers on Rock Road near Wadsworth Street. The block group containing the Carilion New River Valley Hospital also has a moderate workplace index – entirely driven by the presence of the hospital.

The combined need for rush hour transit is highest on the Radford University campus, as well as in the area immediately to its southeast (Figure 37). As with the workplace index, this is due to the large number of people working at the university. Other areas with moderate rush hour transit need include the area immediately to the east of the university, the area south of Radford through which I-81 passes, as well as the area just north of Rock Road. All of these areas have been identified in the commuter and workplace indexes above.

Figure 36: Workplace Index Results

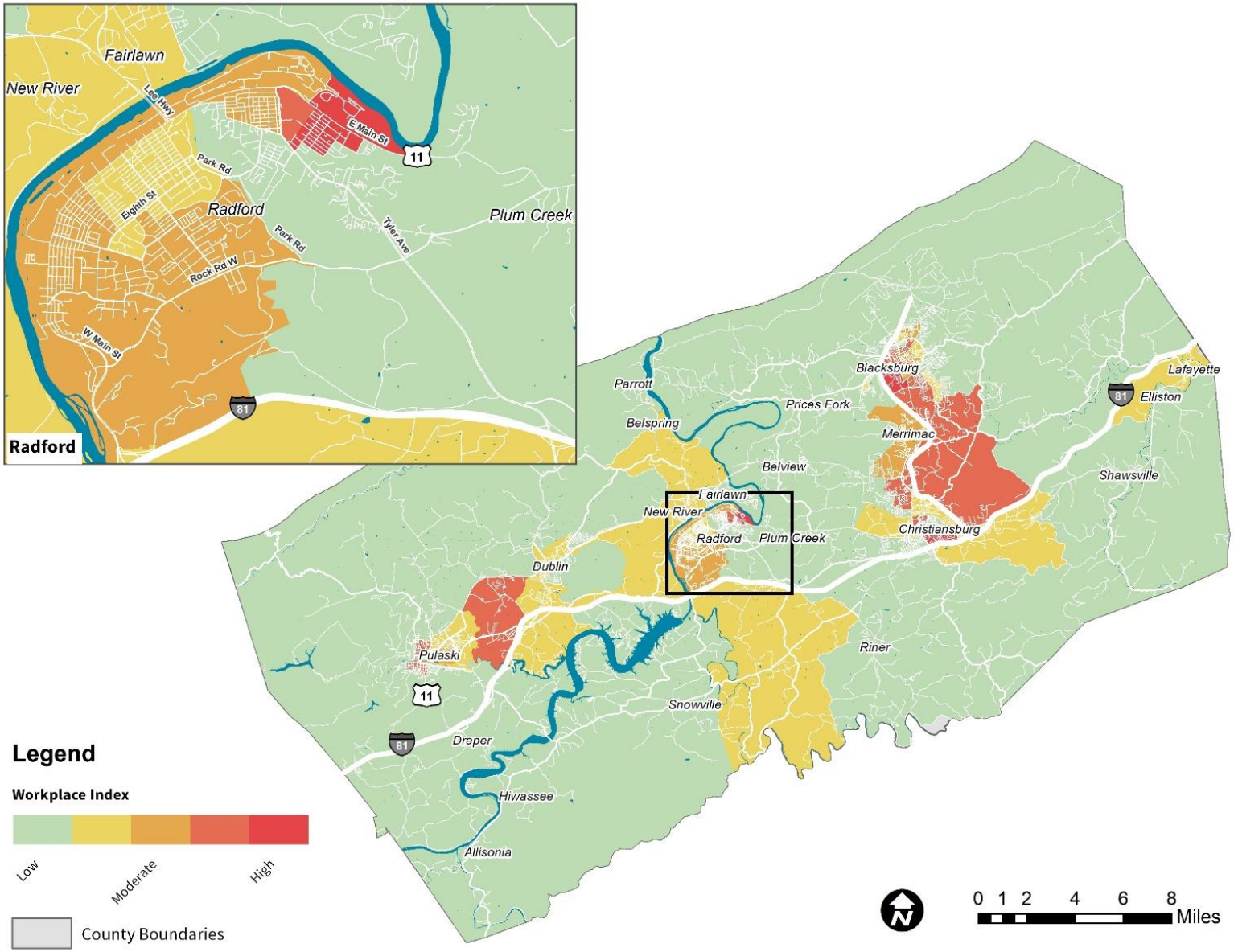
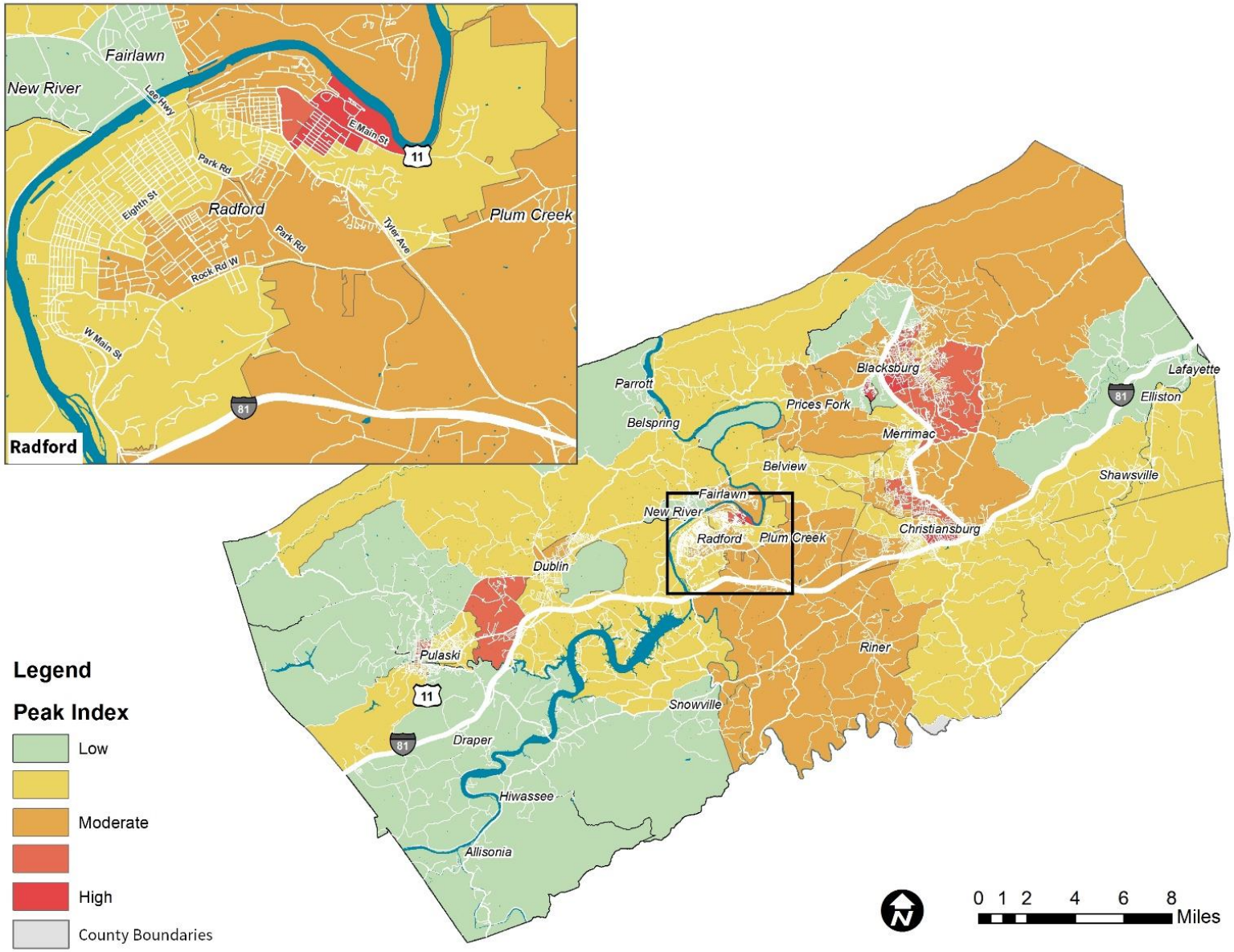


Figure 37: Rush Hour Service Need



Travel Flow Analysis

The New River Valley MPO travel demand model is centered on Blacksburg/Christiansburg and does not include the City of Radford. However, there are several nodes that represent roads that connect with Radford and therefore, the model can be used to estimate general travel between Radford and Blacksburg/Christiansburg.

Future travel flows from the 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 between Radford and Blacksburg/Christiansburg.

Travel Demand Model Rush Hour Flows

Figure 38 illustrates the scored peak period travel flows from the travel demand model. The flows involving Radford all score fairly low and primarily connect with Virginia Tech, the LewisGale Hospital area, the New River Valley Mall area of Christiansburg, and downtown Christiansburg.

Travel Demand Model All-Day Flows

Figure 39 illustrates the scored all-day travel flows from the travel demand model. There are no significantly-scored flows involving Radford represented in the model.

Figure 38: Peak Period Travel Flows Scored, 2035

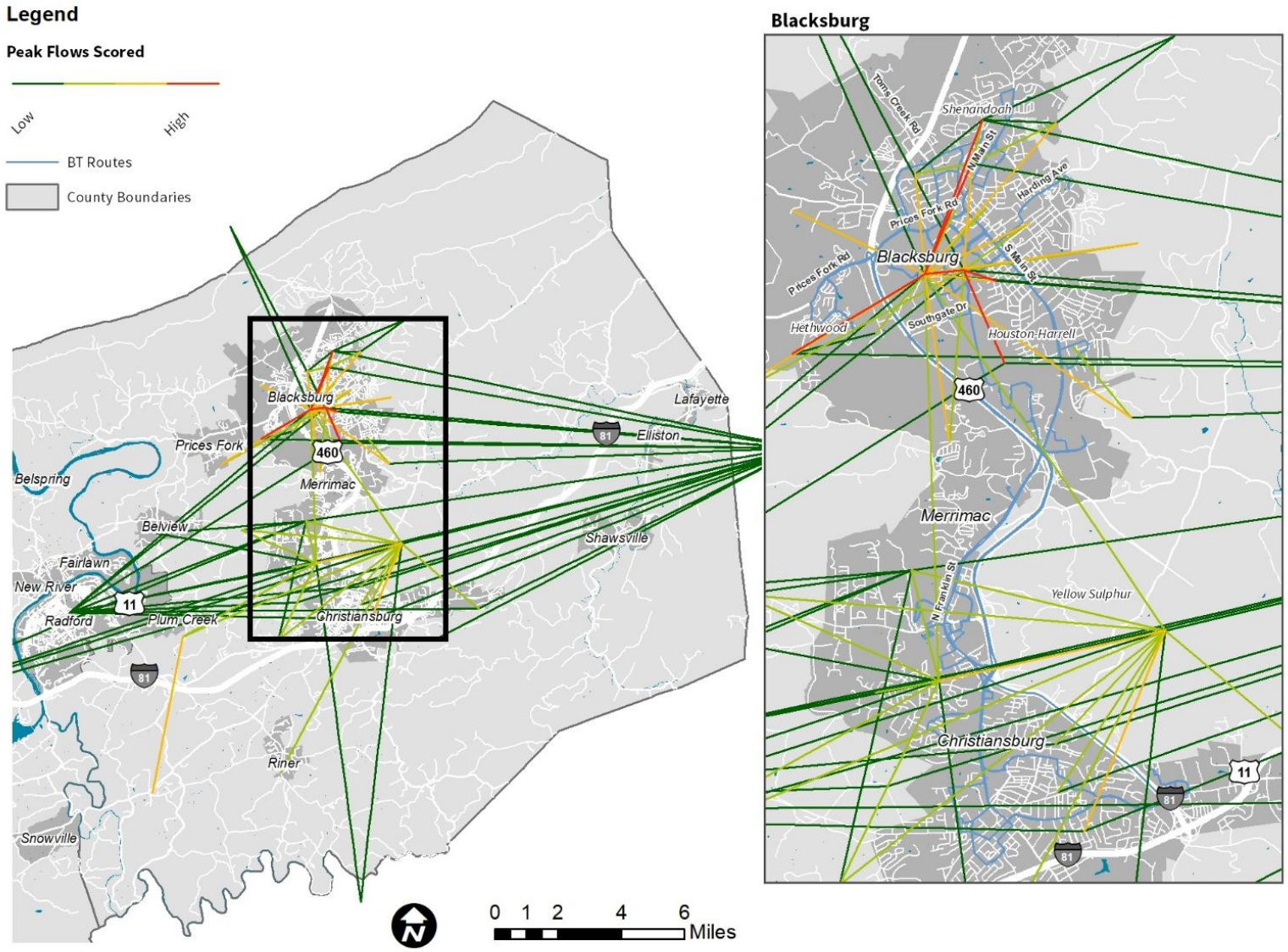
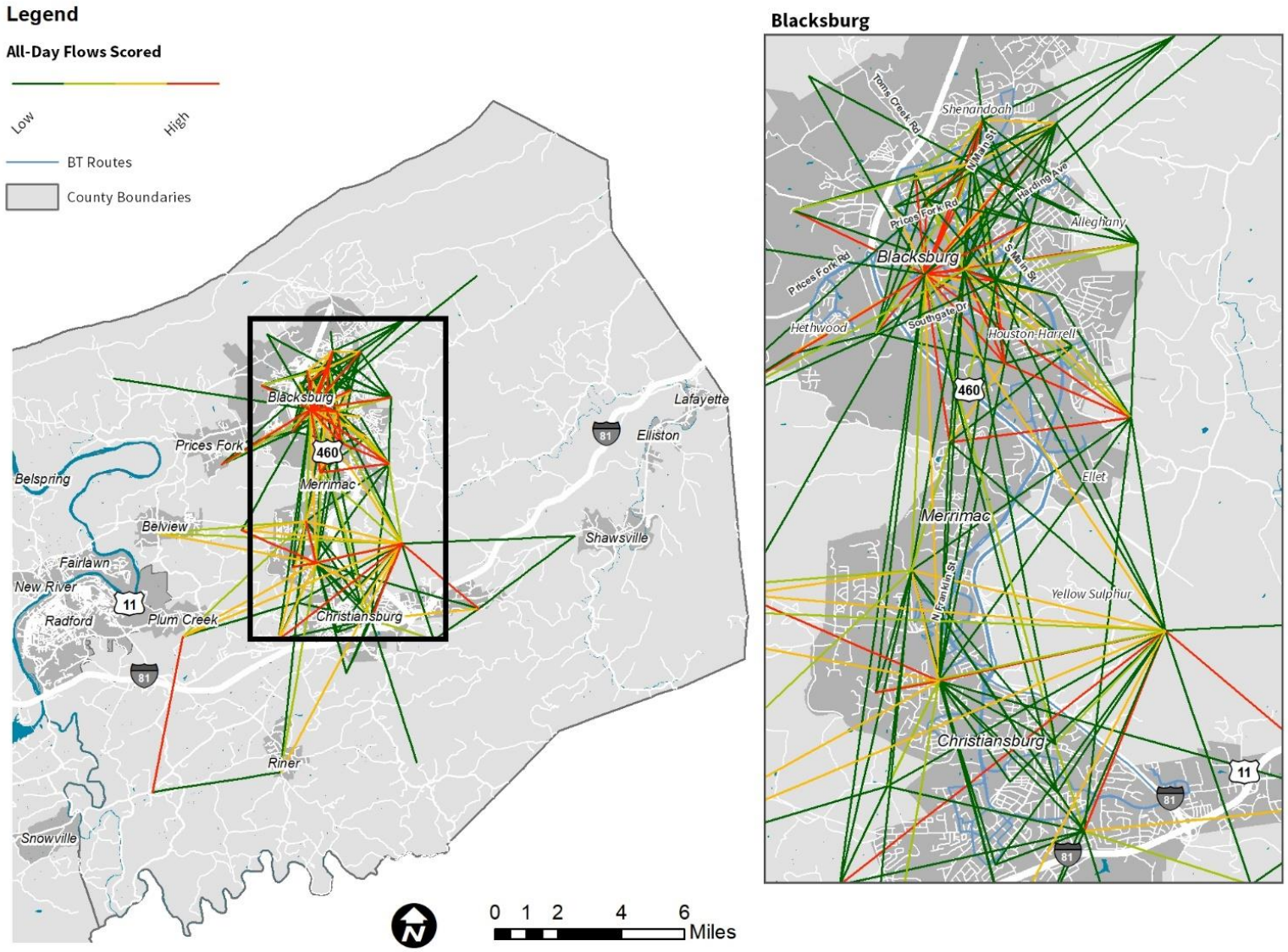


Figure 39: All-Day Travel Flows Scored, 2035



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. Unlike the travel demand model flows, these flows are available for the entire New River Valley region.

The results of this analysis are illustrated in Figure 40. The majority of the travel flows in Radford involve Radford University. While no flows score particularly high when compared to the Blacksburg and Christiansburg area, the moderately-scored flows connect the University with several neighborhoods in Radford, including

External flows between Radford and the rest of the region are primarily concentrated with Virginia Tech, the LewisGale Hospital area of Merrimac, the New River Valley Mall area of Christiansburg, and the Pulaski County Corporate Center area of northeast Pulaski between US-11 and I-81.

Rider Survey Travel Flows

In addition to the travel demand and LODES models, rider surveys also asked Radford Transit 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 41. The highest travel flows run between Radford University and adjacent communities to the south and north. This can likely be explained by students traveling between campus and housing and the Radford Plaza Shopping Center on Peppers Ferry Road. Another relatively high travel flow exists between the University and a community to the east – likely the apartment complexes along Ridgewood Lane and Auburn Avenue. Travel flows to and between Radford's western communities are relatively low.

Figure 40: Home to Work (LODES) Travel Flows Scored

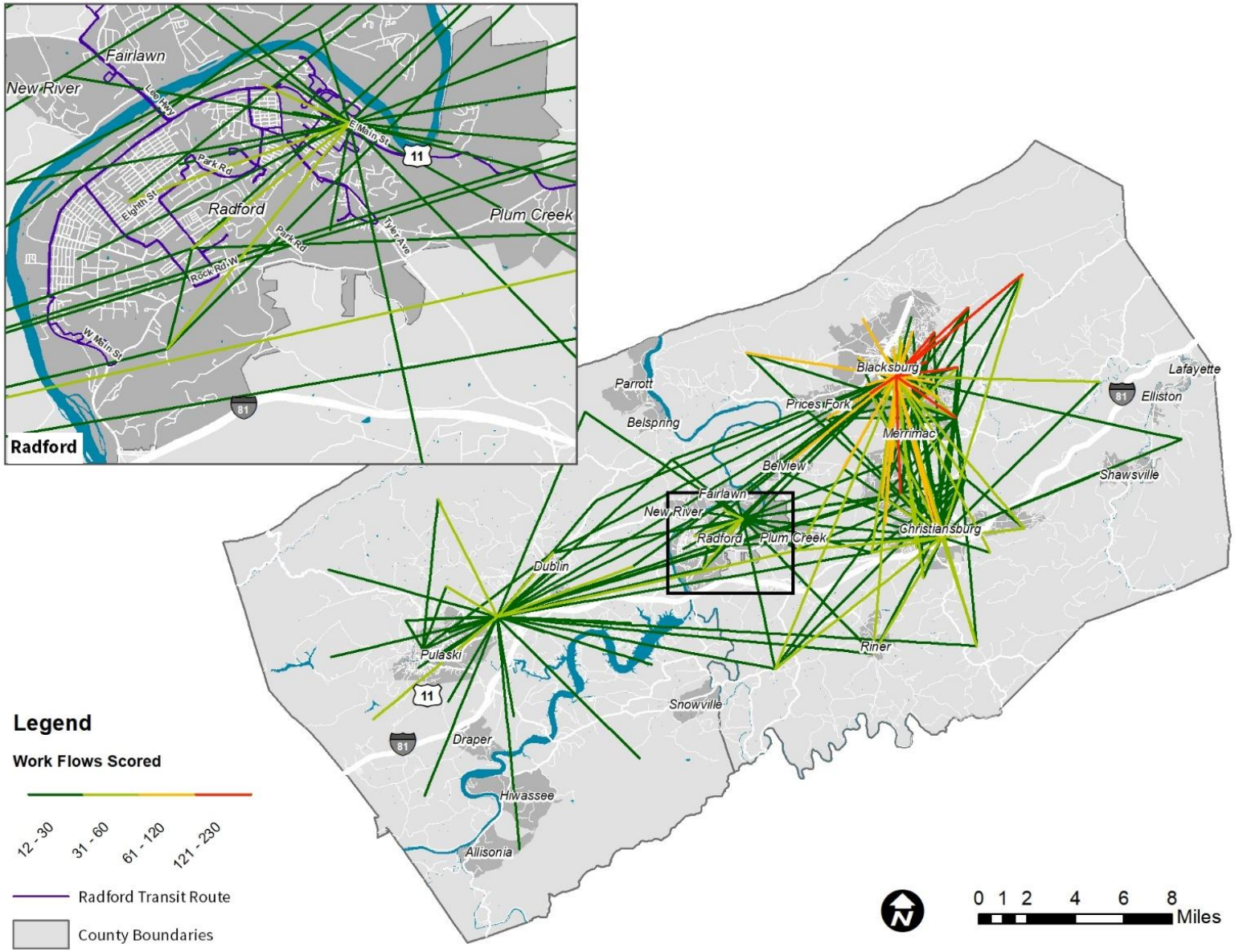
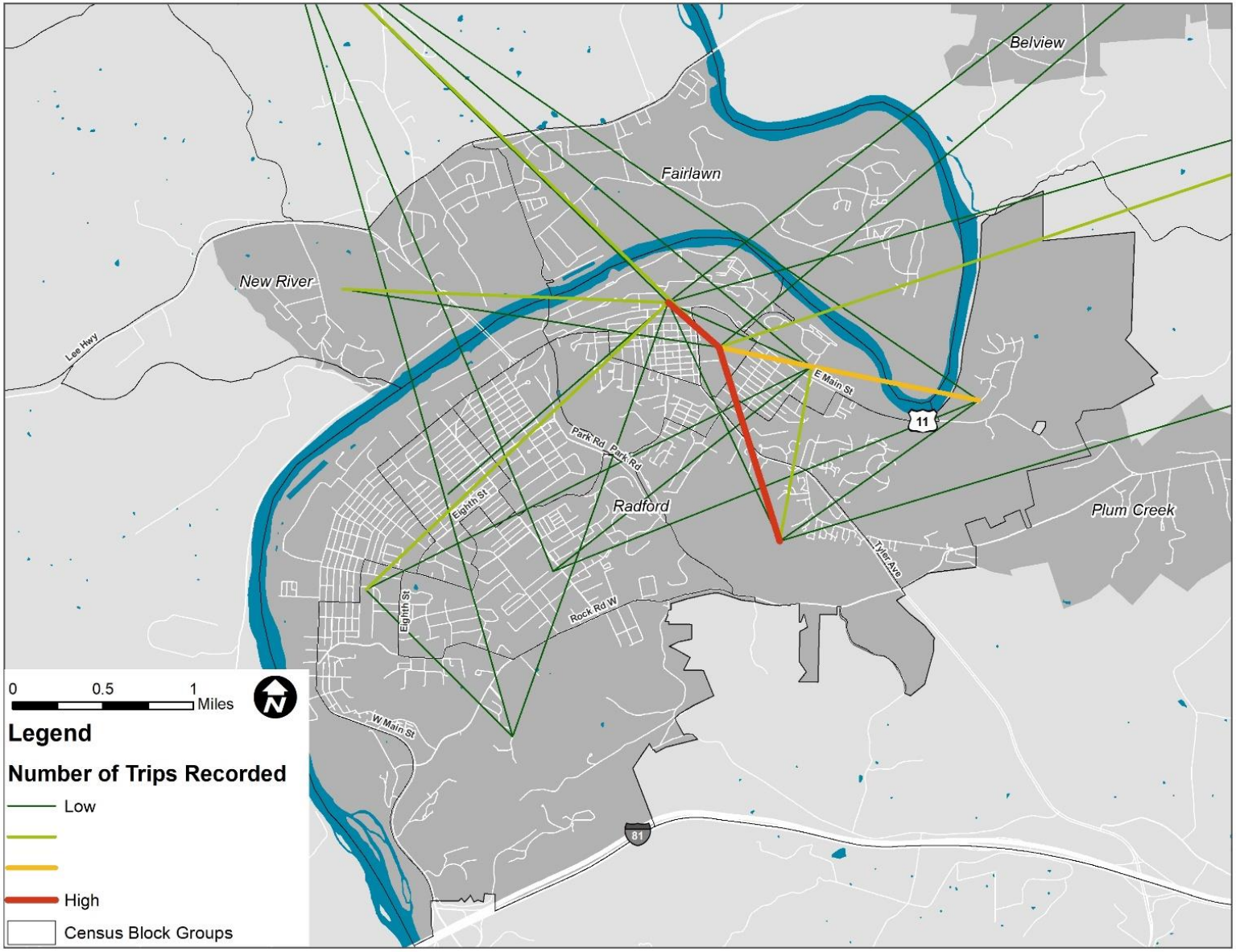


Figure 41: Rider Survey Travel Flows



3.8 STAKEHOLDER INPUT

Stakeholder input on the Radford Transit system was gathered from Radford University and the New River Valley MPO and Regional Commission and is summarized below.

- Radford University:
    - Copper Beach and Green Hill are major areas where students tend to live.
    - Some decisions need to be based on safety concerns (e.g. providing late-night service even when it is not productive).
    - The University wants to promote the Smartway Bus to Roanoke.
    - There is a need to validate the demand for Amtrak in the NRV area.
    - The City has 8 uninstalled shelters, and the College has 6 uninstalled shelters.
    - There is no station on campus, so the University is trying to shift possible transfers to a new location.
    - The University does not serve Megabus at the Route 118 Park and Ride any longer due to very little demand.
        - This Park and Ride has been significantly expanded.
    - Students are happy with existing services and are concerned with safety and maintaining the service.
    - Route 40 should stop at the Blacksburg Municipal Building and at the 1st and Main Shopping Center.
    - There are new apartment developments occurring along Route 60.
    - About 25% of students live off-campus in pocketed areas.
    - Better service to the Carillion Hospital for nursing students and hotel workers should be looked into.
- New River Valley MPO and Regional Commission:
    - There is some duplication of service between Radford Route 40 and the Blacksburg Transit Two Town Trolley – there may be a way to eliminate this duplication with timed transfers.

3.9 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 in the Radford area. Based on this comparison, gaps in coverage and missing connections were identified and summarized in Table 20. Additionally, the transit need analysis was compared to the service levels currently provided to identify gaps in service levels – basically, where service levels may not meeting demand either in frequency or service span.

While the Radford University area is appropriately served well by routes with high levels of service, the rest of the city (including the West Main Street area, Rock Road, the Willow Woods neighborhood, and Fairlawn) has limited service levels on Routes 30/31 and 20, which only have hourly service between roughly 7:00am and 8:00pm.

Connections between areas with moderate to high transit-oriented population index scores and non-work index scores, in particular southwest Radford to Fairlawn and Willow Woods to Fairlawn are also not ideal, as a transfer between Routes 30/31 and 20 are necessary.

Table 20: Gaps in Transit Coverage, Connections, and Service Levels

Gap Type	Period	Location
Coverage	All-Day	Carilion New River Valley Hospital
	All-Day	Route 11 in Fairlawn – additional stops
Connection	Peak Periods	Southwest Radford to Pulaski County Corporate Center
	All-Day	Southwest Radford (West Main Street) direct to Fairlawn
Service Level	All-Day	Rock Rd, Willow Woods neighborhood direct to Fairlawn
	All-Day	Southwest Radford (West Main Street)
	All-Day	Willow Woods and Rock Road industrial area
	All-Day	Fairlawn

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 Radford Transit generally fall into two categories: recommendations to fill the gaps in the transit network that were identified in Chapter 3, and strategies to improve the productivity of the network.

4.1.1 Recommendations to Fill Gaps

The Gap Analysis in Chapter 3 identified transit service gaps that fall into three categories: coverage gaps, connection gaps, and service level gaps (see Table 20). Service improvements were developed to "fill" each of these gaps, as summarized in Table 21. The improvements include strategies such as restructuring existing routes, route extensions, and service increases. For further details on these proposed changes, see the detailed route change sheets in Appendix C.

Table 21: Recommendations to Fill Gaps in Transit Coverage, Connections, and Service Levels

Gap Type	Period	Location	Service Improvement
Coverage	All-Day	Carilion New River Valley Hospital	Add select trips to the hospital on Route 20 (call the 20H)
	All-Day	Route 11 in Fairlawn – additional stops	Add additional stops at the corner of US-11 and Peppers Ferry Road once this intersection is improved
Connection	Peak Periods	Southwest Radford to Pulaski County Corporate Center	Timed transfer to PAT NRV Express Route, which will serve this location on select trips
	All-Day	Southwest Radford (West Main Street) direct to Fairlawn	Restructure Routes 30 and 31 and extend Route 30 to Fairlawn
Service Level	All-Day	Rock Rd, Willow Woods neighborhood direct to Fairlawn	Restructure Routes 30 and 31 and extend Route 30 to Fairlawn
	All-Day	Southwest Radford (West Main Street)	Restructure Routes 30 and 31 and extend Route 30 to Fairlawn
	All-Day	Willow Woods and Rock Road industrial area	Add frequency to Route 31 and extend span into evening
	All-Day	Fairlawn	Restructure Routes 30 and 31 and extend Route 30 to Fairlawn

4.1.2 Unproductive Services

Table 22 summarizes whether each route in the system meets the productivity service standards outlined in Chapter 2. Routes 30/31 and 40 do not meet productivity standards, and therefore the following changes are recommended for each in order to help improve productivity and efficiency:

- Route 30/31:
  - Split the route into two different alignments.
    - Route 30 would operate between the Fairlawn Walmart, Jeffries Drive, and Willow Woods in a counterclockwise loop via West Main Street, Rock Road, and Wadsworth Street every 60 minutes.
    - Route 31 would operate between the Hub and Rock Road/Willow Woods in a clockwise loop via West Main Street, Preston Street, and Wadsworth Street every 30 minutes.
    - Both routes would have a timed transfer at the new New River Valley Community Services building on West Main Street.
  - The span of service on each route would also be increased until 10:00pm, and Sunday service will be added.
- Route 40:
  - Eliminate late night service on Thursdays.
  - Begin service at 8:00 am on Weekdays and Saturdays.
  - Extend select trips to the Exit 118 Park and Ride in Christiansburg.
  - The route will also serve the proposed Christiansburg Amtrak Station on Miller Road across from the Christiansburg Aquatic Center.

These recommendations for Routes 30/31 and 40 will help concentrate service in the area of highest demand, eliminate unproductive trips, and in the case of the 31, improve frequencies to help build ridership into the future. For further details on these proposed changes, see the detailed route change sheets in Appendix C

Table 22: Radford Transit Productivity Service Standards Summary by Route

Route		Passengers/Rev. Hour	Passengers/Rev. Mile	Passengers/Rev. Hour Standard	Passengers/Rev. Mile Standard
	Standard	**5.3**	**0.7**		
	10	23.3	2.8	Meets	Meets
	20	11.8	1.1	Meets	Meets
	30/31	4	0.3	Does Not Meet	Does Not Meet
	40	3.8	0.2	Does Not Meet	Does Not Meet
	50	13.1	1.4	Meets	Meets
	60	11.9	1.7	Meets	Meets

4.1.3 Level of Service Improvements

The level of service standards for Radford Transit are summarized in Table 23. Routes 10, 20, and 30/31 all meet these standards while Routes 50 and 60 meet them within what is reasonable for the demand found on each of

these routes. Additional improvements to service levels on Routes 10, Routes 20 and 30/31 are recommended, however, in order to improve the functionality and usability of these routes. The recommendations for Route 40 are to ensure that this route does meet service standards, as it currently does not. Table 24 summarizes service level changes that are recommended by route. For further details on these proposed changes, see the detailed route change sheets in Appendix C

Table 23: Radford Transit Level of Service Standards

Standard	Service	Day	Standard
Minimum Span of Service	**Regular Service**	Monday-Thursday	7:00 AM-10:00 PM
		Friday	7:00 AM-2:50 AM
		Saturday	10:00 AM-2:50 AM
		Sunday	6:00 PM-12:00 AM
	City Service / City Route	Weekday	7:00 AM-8:00 PM
		Saturday	10:00 AM-8:00 PM
Minimum Frequency	**Regular Service**	15 minutes	
	City Service / City Route	60 minutes	

Table 24: Radford Transit Level of Service Standards and Proposed Improvements Summary by Route

Route	LOS Standard	Proposed Improvement
10	Meets	Improve headway to 7 – 8 minutes during peak periods.
15	Does Not Meet	None. Route 15 replaces Routes 10 and 50 during late nights and Saturdays, and both of these routes meet standards, so no improvements are necessary.
20	Meets	Add Sunday service year-round and improve frequency to 30 – 60 minutes.
30/31	Meets	Add evening service on weekdays and add Sunday service. Improve frequency on Route 31 to every 30 minutes.
40	Does Not Meet	Add morning service on Weekdays and Saturdays to meet standards.
50	Meets with Reasonable Exception	None. Route 50 is replaced by Route 15 on Saturdays.
60	Meets with Reasonable Exception	None. There is little demand for late night service on this route.

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 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 2:40 pm 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 7:45 am and 5:05 pm on weekdays and between 10:00 am and 2:00 pm 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 25 and illustrated in Figure 42. 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.

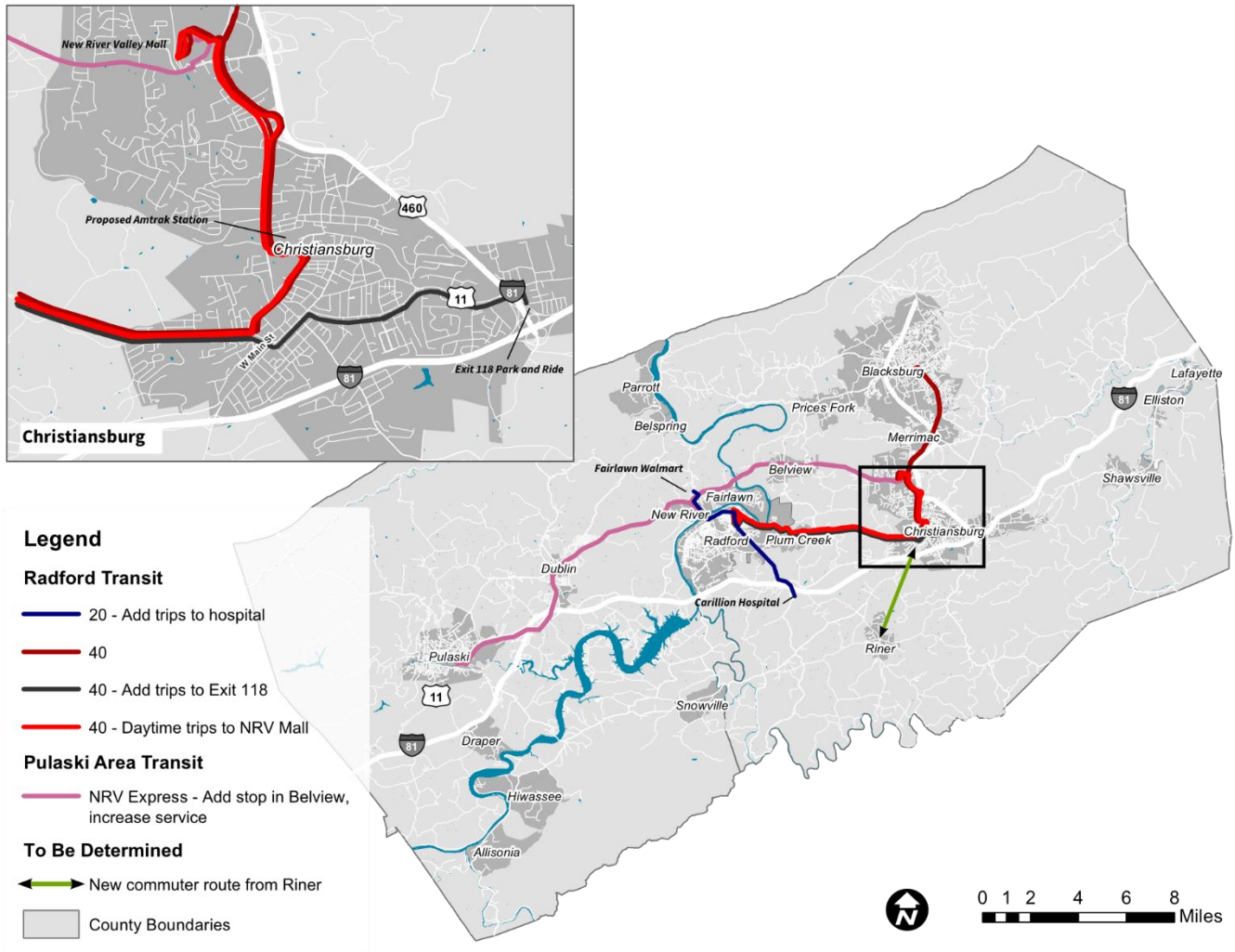
Table 25: Regional Integration Recommendations Summary

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

Service	Recommendation	Regional Benefit
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, 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 42: 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 Summary of All Improvements

A summary of all the recommended improvements by route is included in Table 26. For further details on these proposed changes, see the detailed route change sheets in Appendix C. Figure 43 illustrates the recommended changes during Regular Service, while Figure 44 illustrates the recommendations during City Service.

Table 26: Summary of Proposed Improvements by Route

Route	Proposed Improvement	Proposed Timeframe
10	Improve peak headway to 7 – 8 minutes by adding a vehicle to this route.	Short term (1-3 years)
	Eliminate late night service on Thursdays.	Short term (1-3 years)
15	No changes	-
20	Add an additional stop near the intersection of US 11 and Peppers Ferry Road when this intersection is redesigned and add a stop at the Virginia Employment Commission office on University Park Drive in Fairlawn.	Short term (1-3 years)
	Add service to Carillion Hospital every 2 hours using an additional vehicle – these trips will also serve Walmart resulting in a 30 to 60 minute headway overall to Walmart.	Mid term (3 to 10 years)
	Eliminate service on Main Street east of The Hub and on Jefferson Street to reduce service duplication.	Mid term (3 to 10 years)
	Add Sunday service.	Mid term (3 to 10 years)
30/31	Extend span of service to 10pm on Weekdays and Saturdays.	Short term (1-3 years)
	Add Sunday service.	Short term (1-3 years)
	Restructure route. Route 30 will be a counterclockwise one way loop between the Fairlawn Walmart to Jeffries Drive. Route 31 will be a clockwise one way loop from Willow Woods to The Hub. The two routes will have a timed transfer at NRVCS. Route 30 will operate every hour, while Route 31 will operate every half-hour.	Short term (1-3 years)
40	Add stops at major destinations in Blacksburg, including First and Main.	Short term (1-3 years)
	Eliminate late night service on Thursdays.	Short term (1-3 years)
	Add select trips to the Exit 118 Park and Ride in Christiansburg to connect with the Virginia Breeze Bus using an additional vehicle (call the 40B).	Mid term (3 to 10 years)
50	Operate this route in the clockwise direction.	Short term (1-3 years)
60	No changes	Short term (1-3 years)

Figure 43: Proposed Recommendations – Regular Service

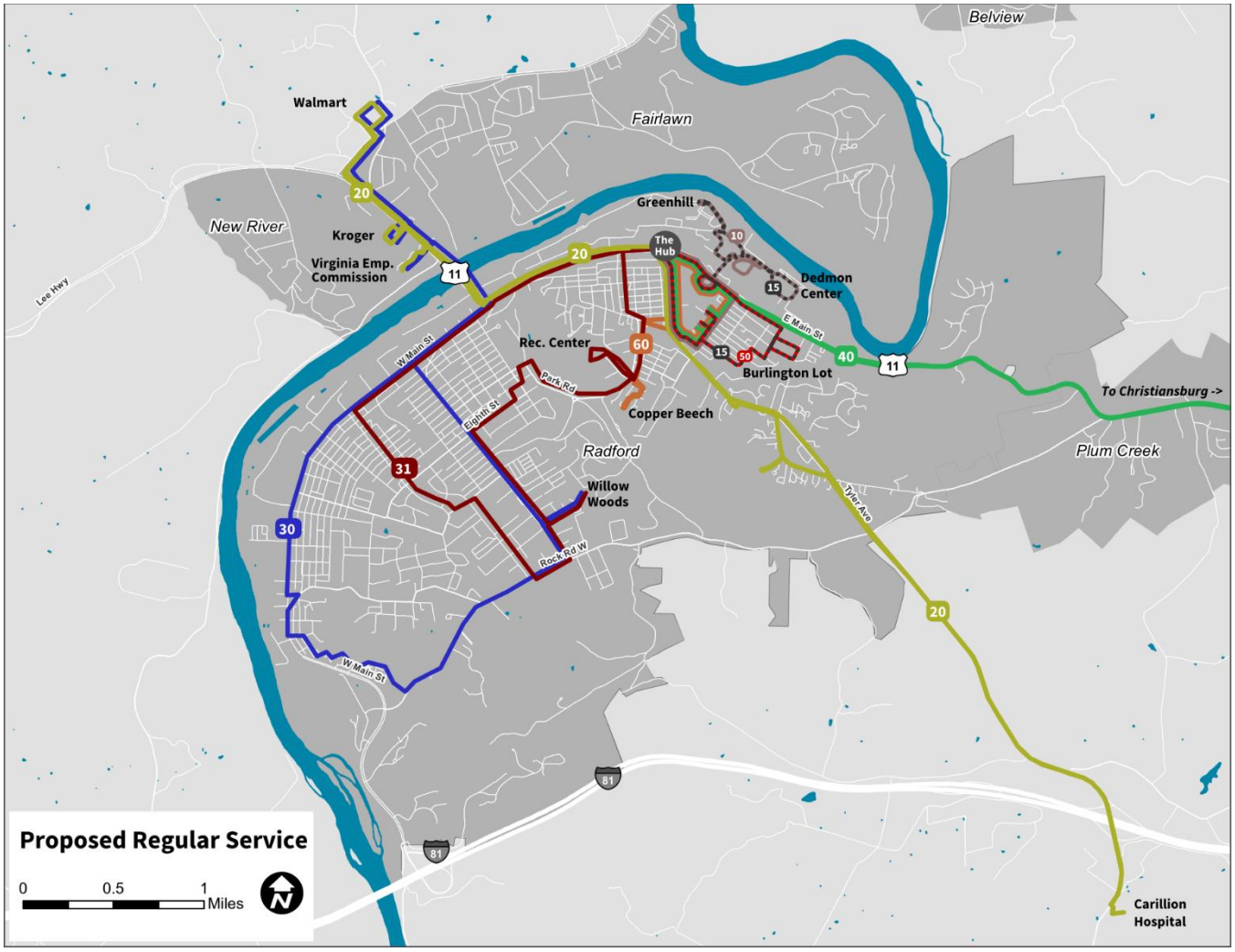
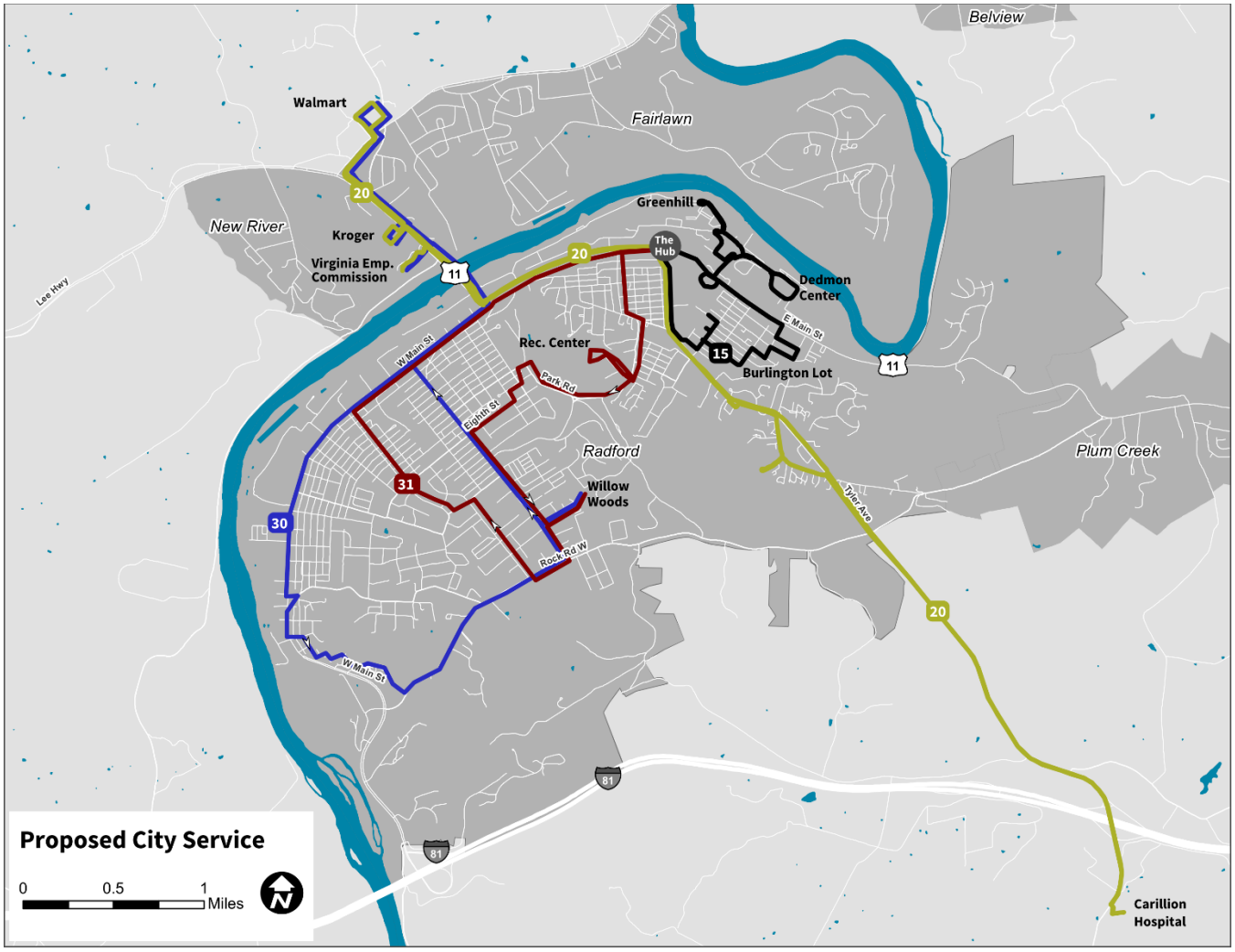


Figure 44: Proposed Recommendations – City Service



4.1.6 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 FY2018. A revenue hours to ridership elasticity of +1.01 was used, based on case studies present in TCRP Report 95[6]. The results are summarized in Table 27. Overall, ridership is expected to increase by 16 percent systemwide when all of the proposed changes are implemented in the long term.

[6] 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.

Table 27: Ridership Estimates by Route

	Current		Projected (Long Term)	
Route	Annual Revenue Hours	Annual Ridership	Annual Revenue Hours	Annual Ridership
10	6,783	158,038	7,728	180,302
15	2,275	19,333	2,007	17,034
20	3,998	27,983	7,301	51,438
30/31	7,328	21,985	9,129	27,449
40	3,100	11,780	4,203	16,020
50	3,973	52,051	4,033	52,839
60	4,098	48,760	4,135	49,208
Total	**31,554**	**339,929**	**38,536**	**394,289**

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 (see Table 28). In FY2018, Radford Transit plans to operate 35,500 revenue hours; the recommendations in this plan would increase that figure by approximately 3,000 revenue hours annually. The annual operating cost in FY2019 dollars would also increase over the FY2018 operating budget, from approximately $1,486,191 to $1,539,121. Additionally, the number of peak vehicles required will increase from the current 12 during Regular Service to 15. The implementation plan and financial plan in subsequent chapters will provide further details on how the recommended system will be implemented with financial constraint. Additional operating cost for the demand-response service to Carillion Hospital will still be necessary until the extension of Route 20 is implemented (Route 20H).

Table 28: Proposed System Estimations by Route

	Annual Revenue Hours			Annual Operating Cost (FY2019 Dollars)			Peak Vehicles	
Route	Regular	City	Total	Regular	City	Total	Regular	City
10	7,728	0	**7,728**	$308,663	$0	**$308,663**	4	0
15	462	1,545	**2,007**	$18,452	$61,687	**$80,140**	0	1
20	2,368	1,716	**4,084**	$94,578	$68,537	**$163,115**	1	1
20H	1,887	1,330	**3,217**	$75,380	$53,120	**$128,500**	1	1
30	2,711	1,863	**4,574**	$108,277	$74,408	**$182,686**	1	1
31	2,641	1,914	**4,555**	$105,482	$76,458	**$181,940**	1	1
40	3,104	205	**3,309**	$123,954	$8,201	**$132,155**	2	0
40B	894	0	**894**	$35,706	$0	**$35,706**	1	0
50	4,033	0	**4,033**	$161,075	$0	**$161,075**	2	0
60	4,135	0	**4,135**	$165,142	$0	**$165,142**	2	0
Total	**29,963**	**8,573**	**38,536**	**$1,196,709**	**$342,412**	**$1,539,121**	**15**	**5**

4.2.1 Capital Projects and Facility Needs

The primary capital needs for Radford Transit include the regular replacement of vehicles, the purchase of new vehicles for service expansions, the purchase of replacement equipment, and a new, independent administration, garage, and maintenance facility. Information from the FY2020-FY2024 Capital Improvement Plan (CIP) for Radford Transit provides insight into baseline needs with the timing and inclusion of expansion activities detailed in Chapter 5 of this TDP. Key components include:

- Revisions to Radford Transit's vehicle replacement schedule
- Additional new bus stop signage (7 locations) and shelters
- Incorporation of a programmed administration and maintenance facility
- Incorporation of programmed purchases of equipment and parts

4.2.2 Prioritization

In order to prioritize the recommendations for Radford 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 29. This approach ensures that each route's full function in the network is accounted for.

Table 29: Prioritization Methodology

Measure	Based On:	Maximum Score
Ridership	Annual ridership in FY2017	0.50
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 30. The highest ranked route is Route 10, followed by Routes 40 and 50. Routes 30 and 31 rank the lowest, primarily due to their low ridership. 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 30: Prioritization of Routes

Route	Score
10	0.63
40	0.57
40B	0.32
50	0.32
60	0.30
20H	0.26
20	0.26
15	0.22
31	0.20
30	0.15

5 Implementation Plan

This chapter of the Radford 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 Radford Transit 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 Radford Transit'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 Radford Transit 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 right-sizing the fleet/spare ratio, 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

Radford Transit has a fleet of 20 vehicles for fixed-route revenue service. Radford Transit also maintains a fleet of four (4) support vehicles, including SUVs, a small van, and a shop truck.

The following adjustments were made to the Federal Transit Administration Useful Life Benchmark (ULB) in this inventory reporting. A ULB of 14 years for heavy-duty over the road buses was used which is specified by FTA and 2-years in excess of current Radford Transit ULB calculations. A ULB of 10 years for medium-duty buses (less than 30') was used, which is 3 years in excess of current Radford Transit ULB calculations, and 8 years for body on chassis (BOC) vehicles, 4 years in excess of current Radford ULB calculations yet still a lower ULB than prescribed by the FTA. These ULB figures were established based on most recent FTA guidance and the observed actual retirement of Radford Transit vehicles, which routinely exceed their previously prescribed benchmarks. All future ULB adjustments in subsequent years should be informed with a qualitative condition assessment as part of Radford Transit's Asset Management program.

All vehicle information for Radford Transit's fixed route and support vehicles is provided in Table 31 and Table 32. Vehicle replacement and retirement analysis in the subsequent sections will begin starting with FY2019.

Table 31: Radford Transit Fixed Route Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2002	New Flyer Low Floor	30	28	14	2	3201, 3202
2002	New Flyer Low Floor	35	32	14	2	3503, 3504
2011	Ford BOC			8	2	303, 306
2012	Chevy BOC			8	2	312, 313
2013	Ford (550) BOC	<30	23	10	2	351, 352
2013	New Flyer Low Floor	35	32	14	2	3501, 3502
2016	Ford BOC			8	2	314, 315
2017	Chevy (G450) BOC	<30	23	10	3	353, 354, 355
2017	Ford/Starcraft BOC			8	3	316, 317, 318
Total Fleet (In Service)					**20**	

Table 32: Radford Transit Support Vehicle Inventory

Year	Make/Model	Use	ULB (Years)	Unit Number
2013	Ford Explorer	Administrative	10	391, 392
2016	Ford F-250	Service Truck	10	393
2017	Ford Transit	Van	10	394
Total Support Vehicles			**4**	

5.1.2 Vehicle Replacement

From FY2019-2028, Radford Transit's baseline fleet requirements would entail retiring a total of 20 vehicles, but only replacing 16 vehicles. This is primarily due to a gradual reduction in the fleet size to better align with the vehicles operated in maximum service (VOMS). During this planning period, a spare ratio of 40 percent (carry over from 2018) is reduced to 25.0 percent by FY2028.

Radford Transit anticipates replacement of retired vehicles with vehicles of a comparable size. The exception is the retirement of the 30' heavy duty buses which would be replaced with 35' equivalents. The baseline vehicle replacement schedule and analysis are presented in Table 33. This estimate differs from the current Radford Transit CIP primarily due to the gradual reduction in fleet size and the slightly longer ULB for all vehicles. Total replacement costs were calculated using base vehicle costs for three vehicle types. All costs were inflated to FY2018 dollars. Vehicle cost estimates used in these calculations include (FY2018 dollars):

- 35' New FLyer Low Floor Heavy Duty Bus $416,000
- <30' Low Floor Medium Duty ARBOC $180,000
- Light Duty BOC $93,000

Future vehicle replacement costs are projected to increase at 4 percent per year beginning with FY2020. The results of the baseline vehicle replacement program, identifying the vehicle type by replacement year and subsequent overall cost is presented in Table 34.

Table 33: Radford Transit Fixed Route Baseline Vehicle Replacement Schedule

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Carryover	20	19	18	19	19	18	18	17	17	17
Retire	2	2	0	0	2	2	3	2	2	3
New	1	1	1	0	1	2	2	2	2	2
Total Fleet	19	18	19	19	18	18	17	17	17	16
VOMS	12	12	12	12	12	12	12	12	12	12
Spare Ratio	36.8%	33.3%	36.8%	36.8%	33.3%	33.3%	29.4%	29.4%	29.4%	25.0%
Exceeding ULB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 34: Radford Transit Baseline Vehicle Replacement by Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
35' Bus								2	2	
ARBOC			1		1					2
Light Duty BOC	1	1				2	2			
Total Vehicles	1	1	1		1	2	2	2	2	2
Annual Cost	$96,720	$100,589	$202,476	$0	$218,998	$235,349	$244,763	$1,138,649	$1,184,195	$532,888

5.1.3 Vehicle Expansion

For Radford Transit to operate the services identified in Chapter 4, the fleet would not need to be expanded above its current size. This is achieved through right-sizing the fleet and new vehicle purchase/replacement needs being offset by reducing the existing spare ratio. VOMs will increase from a baseline of 12 to 15 by FY 2023. Two expansion vehicles will be used to provide this additional service, with the additional vehicle being used from the spare fleet.

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

- FY2020 – Route 10 Enhancements (1 additional vehicle)
- FY2021 – Route 40 Enhancements (1 additional vehicle)
- FY2022 – Route 20 Enhancements (1 additional vehicle)

Vehicle types needed for new services were envisioned to maintain the same vehicles used on the respective routes to be enhanced. Thus, while expansion vehicles will be used for the largest capacity needs, the baseline

spare ratio was maintained (25 percent) to assure an adequate supply of similar vehicles lower capacity routes to have service enhancements.

From FY2019-FY2028 Radford Transit's fixed route fleet expansion would require 2 additional vehicles over baseline. These additional vehicle purchases would occur in FY2020 and FY2022. Two additional vehicles would be procured to maintain the established 25 percent spare ratio of the expanded fleet in FY2025 and FY2028. The results of the expansion vehicle acquisitions and baseline replacement program for the existing fleet is presented in Table 36.

Table 35: Radford Transit Fixed Route Expansion Vehicle Replacement Schedule

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Carryover	20	19	19	20	21	20	20	20	20	20
Retire	2	2	0	0	2	2	3	2	2	3
New	1	2	1	1	1	2	3	2	2	3
Total Fleet	**19**	**19**	**20**	**21**	**20**	**20**	**20**	**20**	**20**	**20**
VOMS	12	13	14	15	15	15	15	15	15	15
Spare Ratio	36.8%	31.6%	30.0%	28.6%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Exceeding ULB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 36: Radford Transit Fleet Expansion Vehicle Acquisition and Baseline Replacement by Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
35' Bus		1		1				2	2	
ARBOC			1		1		1			3
Light Duty BOC	1	1				2	2			
Total Vehicles	1	2	1	1	1	2	3	2	2	3
Annual Cost	$96,720	$550,534	$202,476	$486,661	$218,998	$235,349	$481,631	$1,138,649	$1,184,195	$799,332

5.1.4 Baseline and Expansion Comparison

This section contrasts baseline and expansion implementation requirements. Figure 45 represents the total annual vehicle replacements required for the TDP period from FY2019-FY2029 for both baseline and expansion plans. Figure 46 represents the net effect on the total Radford Transit fleet size over the same period because of the

baseline and expansion vehicle acquisition and replacement programs. Figure 47 represents the cumulative expenditure over the entire duration between the baseline and expansion programs.

Figure 45: Annual Vehicle Procurements FY2019-FY2029

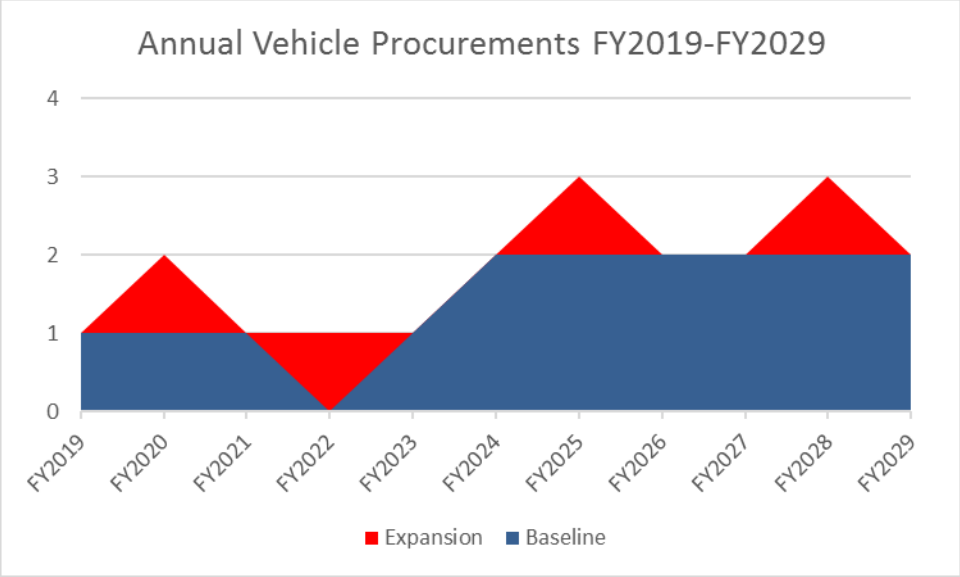


Figure 46: Total Fleet Size FY2019-FY2029

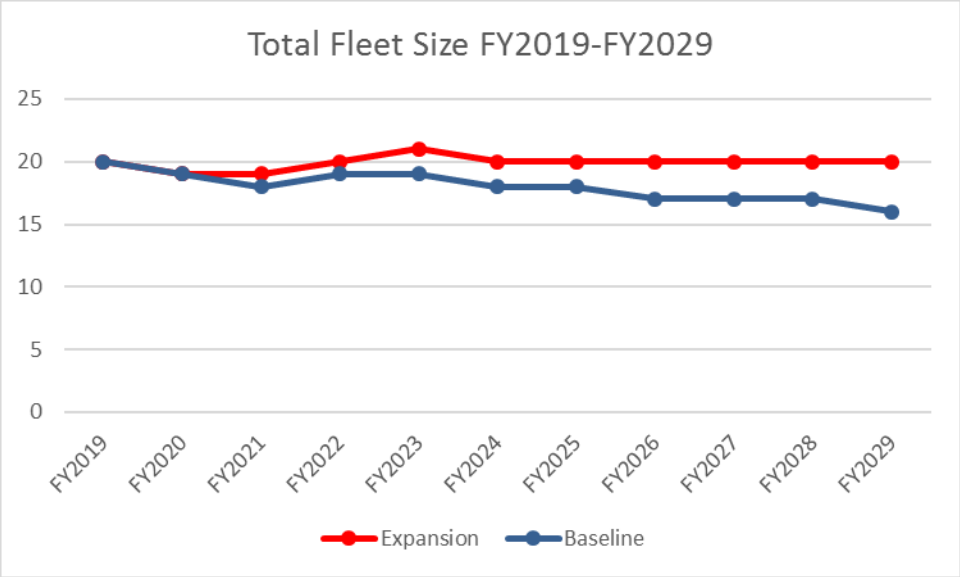
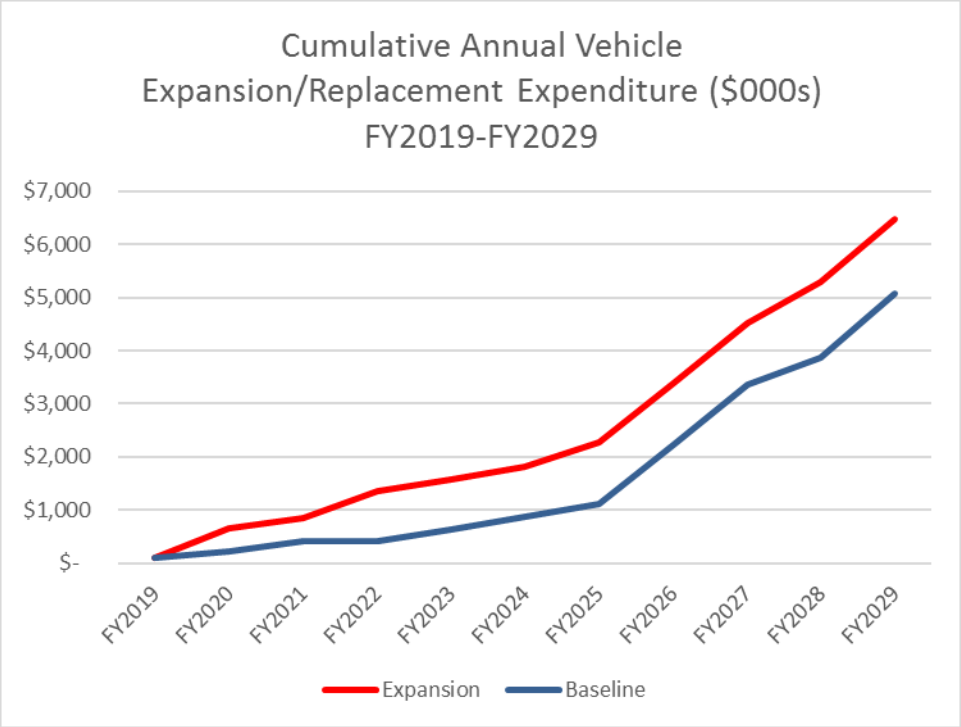


Figure 47: Cumulative Annual Vehicle Expansion/Replacement Expenditure FY2019-FY2029



Results for both the six-year and full TDP timeframe are depicted in Table 37.

Table 37: Radford Transit Baseline and Expansion Cost Comparisons by Timeframe

	Fiscal Years			
	FY2019-FY2024		FY2019-FY2028	
	Baseline	Expansion	Baseline	Expansion
Total New/Replacement Vehicles	6	8	16	20
Total Cost	$854,131	$1,790,738	$3,954,627	$5,394,546

5.2 MAJOR SYSTEM MAINTENANCE AND OPERATIONS FACILITIES

As of this plan, the process of locating a site and designing a new facility has yet to begin, however, the size of the facility has been estimated using the APTA maintenance facility design calculator (see Appendix D for further details). This new facility is also included in the Radford Transit FY2020 – FY2024 Capital Improvement Plan, including $150,000 for a feasibility study in FY2020 and $1.5 million for design and construction in FY2021.

Overall, a new facility with enough space for administration, maintenance, and storage for 22 revenue vehicles plus three non-revenue vehicles would require approximately 43,900 square feet for buildings and parking and a 1.5 to 1.8 acre lot overall.

5.3 PASSENGER AMENITIES

The FY2020 – FY2024 Capital Improvement Plan (CIP) includes 150 new bus stops signs at a total cost of $6,750 in FY2020. In addition to these new bus stop signs, a new bus shelter would be necessary for the new transfer point at the New River Valley Community Services building for passengers transferring between Routes 30 and 31. The estimated cost of a new bus shelter is $25,000, and this is also included in the CIP in FY2020. Additionally, new stops would be necessary on Routes 20 and 30 in Fairlawn, Route 20 at Carillion New River Valley Hospital, and on Route 50 since it will be operating in the opposite direction:

- FY 2019 - Routes 20 and 30:
  - 1 stop at the intersection of US-11 and Peppers Ferry Road (for Routes 20 and 30).
- FY 2021 - Route 50:
  - Lot C on East Main Street
  - Muse Hall on Tyler Avenue
  - Walker Hall on Tyler Avenue
  - Moffett Hall on Tyler Avenue
  - COBE on Tyler Avenue
- FY 2025 - Route 20:
  - 1 stop at Carillion New River Valley Hospital

These seven new stops will only require bus stops signage, as they all have existing sidewalks. The total cost for these seven additional bus stop signs (at $45 each) is approximately $315.

5.4 NEW TECHNOLOGY SYSTEMS OR UPGRADES

There are no specific recommendations for equipment within the TDP timeframe, however regular replacement of equipment is included in the Radford Transit CIP. $45,000 is budgeted in FY2020 (alignment equipment), $30,000 is budgeted in FY2023 (spare parts) and $35,000 is budgeted in FY2024 (training equipment).

6 Financial Plan

The purpose of the Financial Plan is to provide a planning-level forecast of RT'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 tend to be 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 local, state, or federal funds above RT's existing projected funding allocation.

Capital costs reflect one-off 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 are a projection based on a snapshot in time, and as such should be updated regularly to ensure accuracy. Generally, certainty over costs and revenue decrease 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 FY19 Six-Year Improvement Plan (SYIP). The two types of operating revenues RT receives are fare revenues and advertising revenues.

These figures have been escalated over time based on the 3% annual growth assumption suggested by DRPT in the TDP guidance. The only exception to this escalation is fare revenue, which is assumed to grow by 2%.

Fare revenue for new service is based off the estimated change in ridership developed in Chapter 4, multiplied by RT's average fare revenue per trip of 6 cents. RT's average fare revenue per trip is very low due in part to the high percentage of ridership (70%) coming from students who use their IDs to ride the bus (at no additional cost).

Operating Grant Revenue

The Federal government, Commonwealth of Virginia, and local jurisdictions provide operating assistance to RT in the form of grants. The base year allocation for federal and state funding is derived from DRPT's FY19 Six-Year Improvement Plan (SYIP). Local funds cover the remaining balance after all other revenues are accounted for. Local funding needs identified in this financial plan are assumed to be split between Radford University and the City of Radford, with each party contributing the same percentage of total revenues that they contributed in FY2018 (76.7% and 23.3%, respectively).

RT's federal funding comes from Section 5307 Urbanized Area formula funds. This funding is expected to grow year-over-year by 2.1%, the nationwide average growth of the Federal Formula fund program.

State funding is escalated off the FY19 base year according to changes DRPT's projected statewide transit operating assistance budget from FY20 to FY24 as reported by the FY19 SYIP. After FY24, state operating assistance is assumed to grow by 3%.

Operating Costs

Operating costs are assumed to grow by 3% a year over the FY18 cost per revenue hour of $39.94. The operating budget assumes that the TDP short-term recommendations are implemented in FY20, with the mid-term recommendations introduced in FY24.

6.1.2 Capital Budget Assumptions

Capital Revenue

RT relies of Federal Section 5307 funding for most of its capital needs. The capital budget assumes federal funds will continue to support 80% of capital needs, with 16% coming from state matching funds, and 4% from local matching funds.

Capital Costs

RT's capital costs are derived from the CIP outlined in Chapter 4. Vehicle costs are escalated from FY19 values by 4% a year to account for inflation, per DRPT requirements. All other costs are escalated from FY19 values by 3% a year to account for inflation, also per DRPT requirements.

6.2 OPERATING BUDGET

Table 38 presents the 10-year operating budget forecast for RT. The budget includes the cost of operating existing service, as well as the net cost associated with the TDP recommendations.

RT's operating budget is primarily funded through Federal, State, and Local operating grants. Local funding is forecasted to grow faster than the other sources as State and Local funding is forecasted to grow slower than operating costs.

The Short-Term TDP recommendations are anticipated to require an additional $143,900 (in FY2019 dollars) in operating revenues in FY2020. No funding has been identified yet to cover these additional costs.

Mid-term recommendations in FY2024 will yield a more substantial increase in net operating costs of $319,500 (in FY2019 dollars) in FY2024. No funding has been identified to cover these costs and new sources of revenue will be required to implement the mid-term recommendations

6.3 CAPITAL BUDGET

Table 39 presents the 10-year capital budget forecast for RT. RT's capital needs are expected to average $608,000 per year (in FY2019 dollars) over the 10-year TDP planning timeframe. Needs fluctuate considerably year-over-year based on fleet replacement needs.

6.4 CONCLUSION

As RT relies extensively on grants 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 to, or the abolishment of, federal funding programs in the next transportation bill
- Major increases in transit service within Virginia (e.g. Silver Line Phase II) that will reduce RT's share of state operating assistance.
- Changes in state capital match rates.

At the local level, any fluctuations in local general fund revenue may impact the ability of jurisdictions to support RT service. As RT relies in part on Radford University funding to support particular routes, any change to this funding agreement would also affect RT's operating budget.

Table 38: 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	$ 20.00	$ 20.40	$ 20.81	$ 21.22	$ 21.65	$ 22.08	$ 22.52	$ 22.97	$ 23.43	$ 23.90
Advertising Revenue	$ 10.00	$ 10.30	$ 10.61	$ 10.93	$ 11.26	$ 11.59	$ 11.94	$ 12.30	$ 12.67	$ 13.05
Operating Revenue Subtotal	$ 30.00	$ 30.70	$ 31.42	$ 32.15	$ 32.90	$ 33.67	$ 34.46	$ 35.27	$ 36.10	$ 36.95
Grants										
Federal	$ 449.13	$ 458.56	$ 468.19	$ 478.03	$ 488.07	$ 498.31	$ 508.78	$ 519.46	$ 530.37	$ 541.51
State	$ 340.13	$ 340.13	$ 340.13	$ 347.27	$ 351.22	$ 355.89	$ 366.57	$ 377.57	$ 388.89	$ 400.56
Local (City)	$ 168.43	$ 176.80	$ 185.43	$ 192.70	$ 201.00	$ 209.43	$ 216.79	$ 224.39	$ 232.25	$ 240.36
Radford University	$ 567.09	$ 595.24	$ 624.30	$ 648.80	$ 676.73	$ 705.11	$ 729.89	$ 755.49	$ 781.94	$ 809.26
Grant Revenue Subtotal	$1,524.78	$1,570.73	$1,618.05	$1,666.80	$1,717.02	$1,768.75	$1,822.03	$1,876.92	$1,933.45	$1,991.69
Total Revenue	**$1,554.78**	**$1,601.43**	**$1,649.47**	**$1,698.95**	**$1,749.92**	**$1,802.42**	**$1,856.49**	**$1,912.19**	**$1,969.55**	**$2,028.64**
Operating Cost										
Existing Service	$1,554.78	$1,601.43	$1,649.47	$1,698.95	$1,749.92	$1,802.42	$1,856.49	$1,912.19	$1,969.55	$2,028.64
Net Cost of TDP Recommendations	$ -	$ 148.30	$ 152.77	$ 157.37	$ 162.11	$ 371.17	$ 382.35	$ 393.87	$ 405.74	$ 417.97
Total Operating Costs	**$1,554.78**	**$1,749.73**	**$1,802.24**	**$1,856.32**	**$1,912.03**	**$2,173.59**	**$2,238.84**	**$2,306.06**	**$2,375.29**	**$2,446.61**
Additional Funding Need to Implement TDP Recommendations	**$ -**	**$ 148.30**	**$ 152.77**	**$ 157.37**	**$ 162.11**	**$ 371.17**	**$ 382.35**	**$ 393.87**	**$ 405.74**	**$ 417.97**

Table 39: Capital Budget Forecast (Figures in 1000s)

Fiscal Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Capital Revenue										
Federal	$ 77.38	$ 622.08	$ 1,361.98	$ 389.33	$ 199.20	$ 216.28	$ 385.30	$ 910.92	$ 947.36	$639.47
State	$ 15.48	$ 124.42	$ 272.40	$ 77.87	$ 39.84	$ 43.26	$ 77.06	$ 182.18	$ 189.47	$127.89
Local	$ 3.87	$ 31.10	$ 68.10	$ 19.47	$ 9.96	$ 10.81	$ 19.27	$ 45.55	$ 47.37	$ 31.97
Total Capital Revenue	$ 96.72	$ 777.60	$ 1,702.48	$ 486.66	$ 249.00	$ 270.35	$ 481.63	$ 1,138.65	$ 1,184.20	$ 799.33
Capital Costs	**$ 96.72**	**$ 777.60**	**$ 1,702.48**	**$ 486.66**	**$ 249.00**	**$ 270.35**	**$ 481.63**	**$ 1,138.65**	**$ 1,184.20**	**$ 799.33**

Appendix A: Rider Survey Summary

Transit Rider Survey

Please help Radford 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:
radfordtransit.com/ridersurvey

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

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

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

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

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

6. How did you pay your bus fare today?
   - ☐ Radford University ID
   - ☐ Full-Fare Cash
   - ☐ Monthly Pass
   - ☐ Free Transfer Slip
   - ☐ Free Senior
   - ☐ Free Youth
   - ☐ Free Disabled/Medicare

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 Radford 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 ☐ Retired
    ☐ Employed Part-Time ☐ Unemployed
    ☐ Student ☐ Other: _____

16. Based on your experience riding Radford 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	☐	☐	☐	☐	☐

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

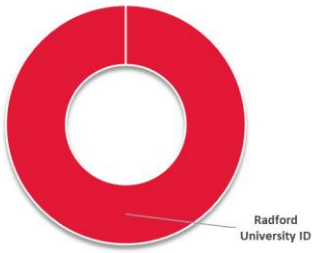
More frequent bus service	☐ **OR** ☐	Longer hours of service
Weekday service	☐ **OR** ☐	Weekend Service
More bus stops for a shorter walk to/from bus stops	☐ **OR** ☐	Less bus stops for faster service
Buses running more frequently but on fewer streets	☐ **OR** ☐	Buses running on more streets but less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

Please include any additional comments in the space below:

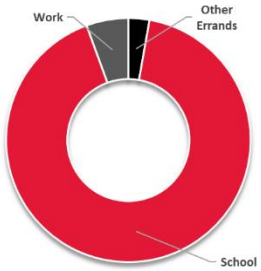
Route 10

Trip Characteristics

Fare Type

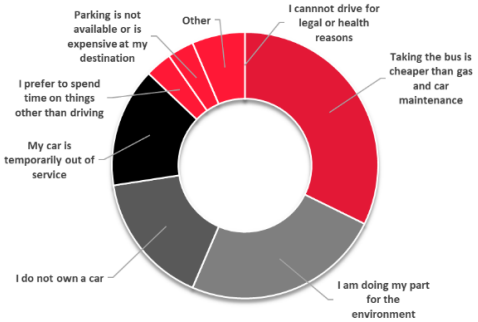


Trip Purpose

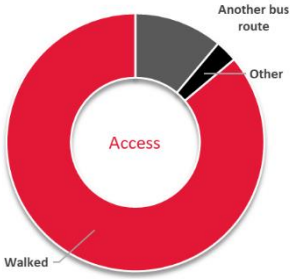


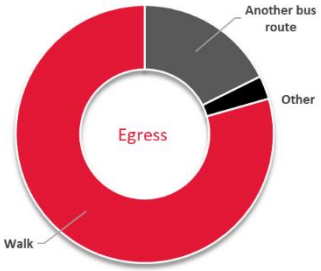
Satisfaction with Service

Reason for Riding

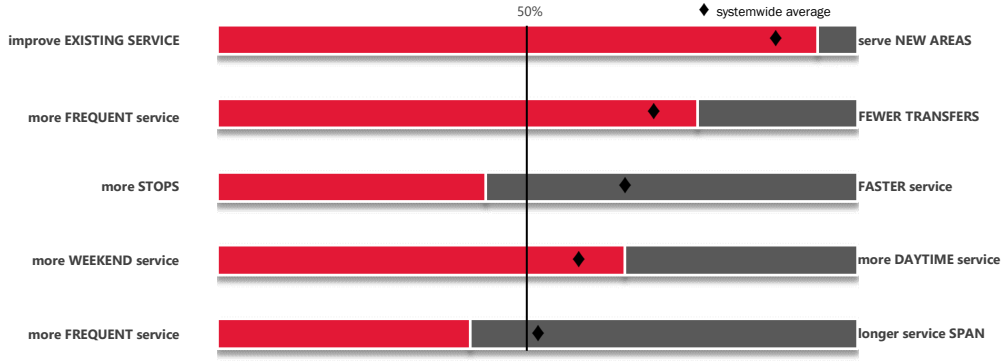


Mode of Access & Egress



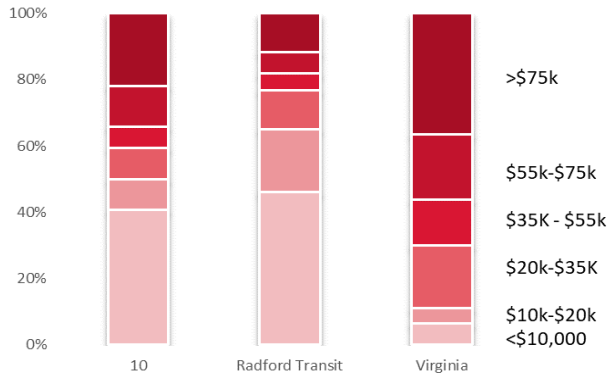


Rider Preferences

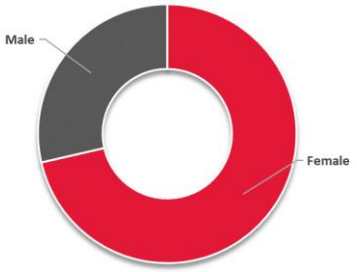


Rider Demographics

Household Income

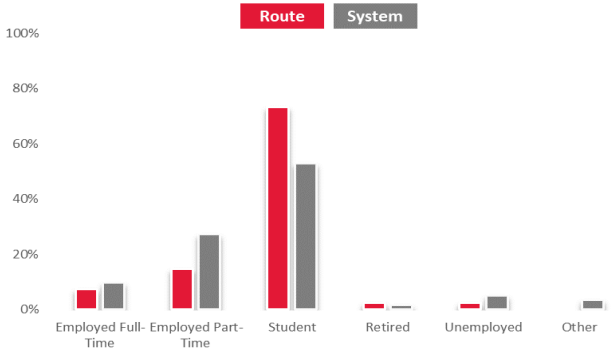


Gender

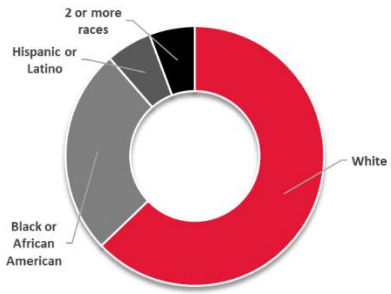


Employment Status

note: respondents could check more than one answer



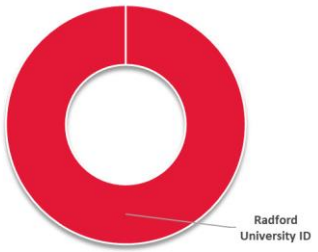
Race/Ethnicity



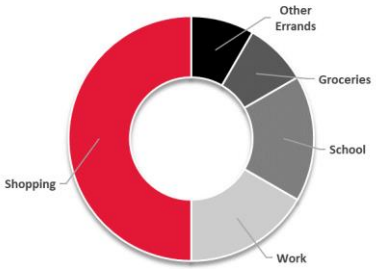
Route 20

Trip Characteristics

Fare Type

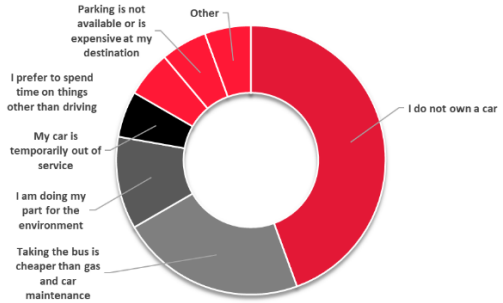


Trip Purpose

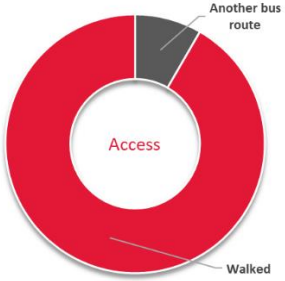


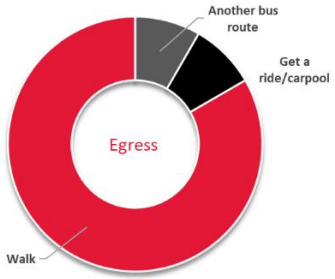
Satisfaction with Service

Reason for Riding

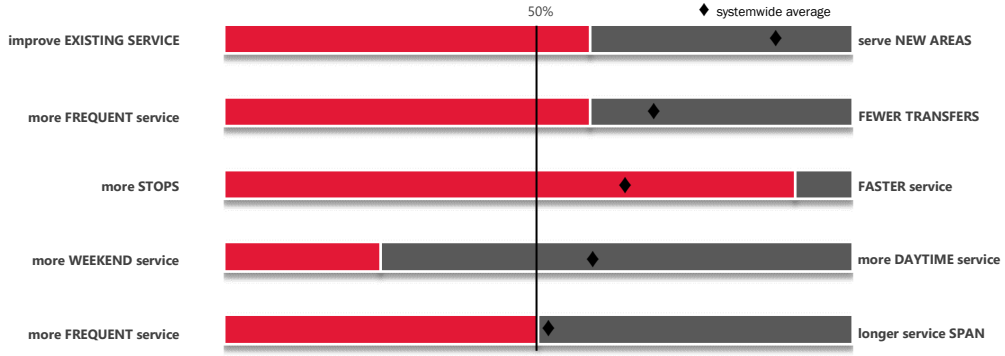


Mode of Access & Egress



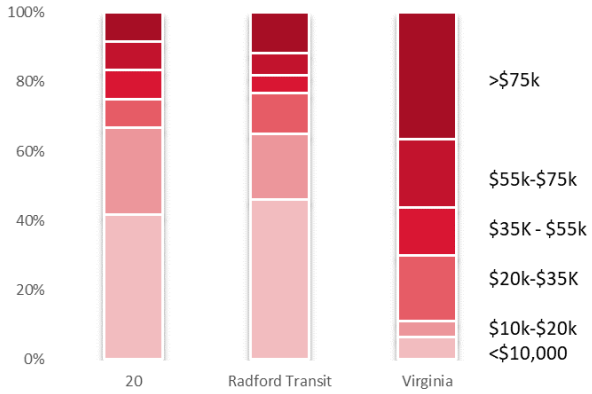


Rider Preferences

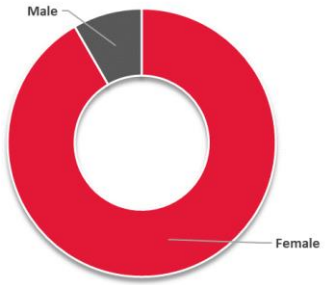


Rider Demographics

Household Income

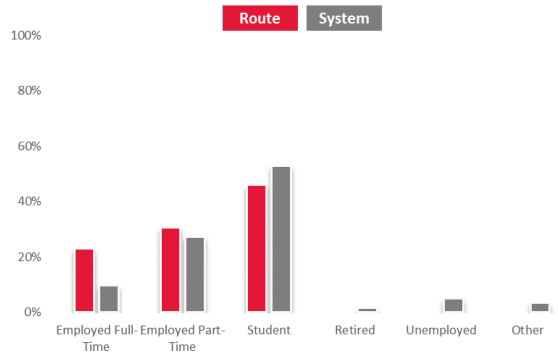


Gender

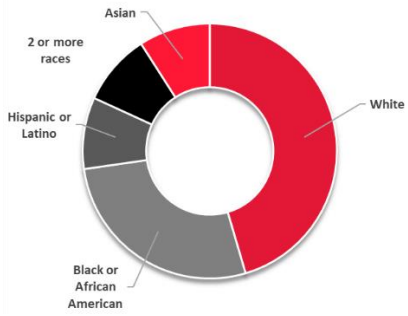


Employment Status

note: respondents could check more than one answer



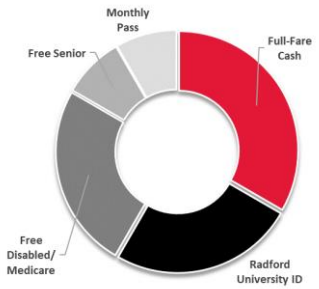
Race/Ethnicity



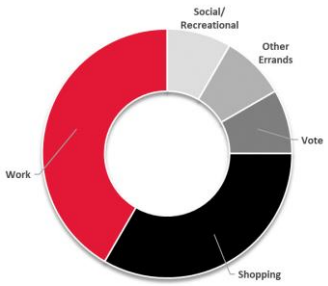
Route 30

Trip Characteristics

Fare Type

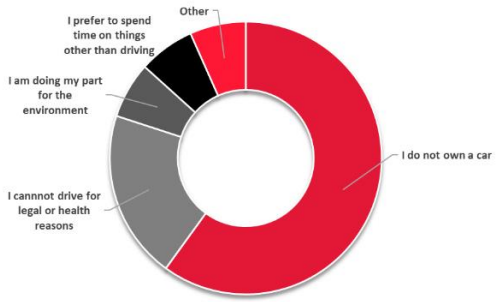


Trip Purpose

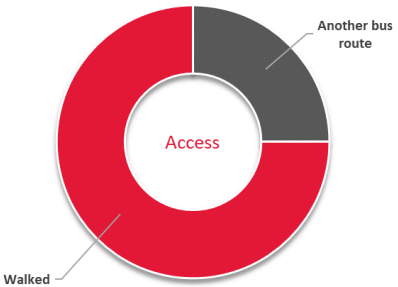


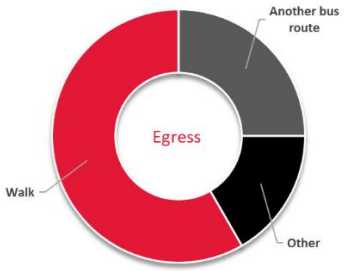
Satisfaction with Service

Reason for Riding

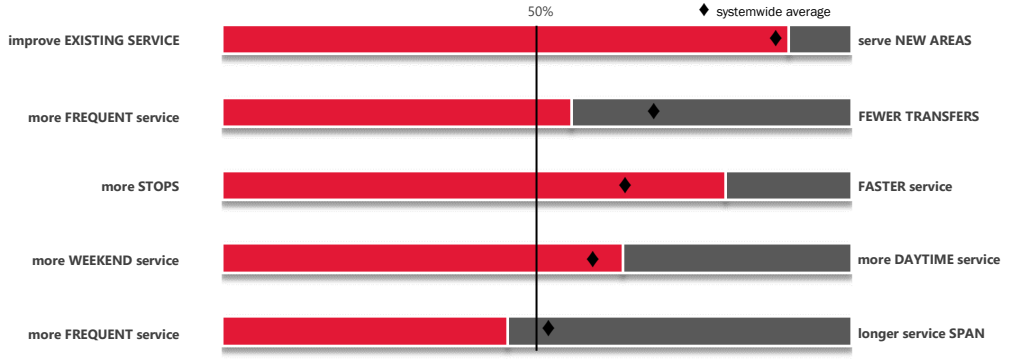


Mode of Access & Egress



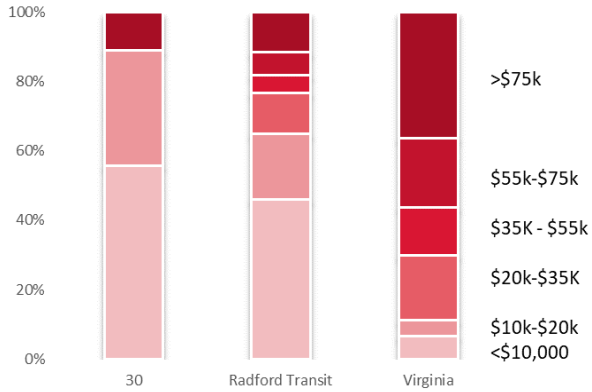


Rider Preferences

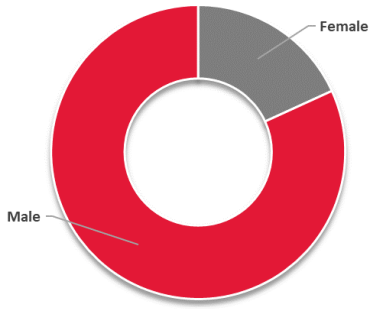


Rider Demographics

Household Income

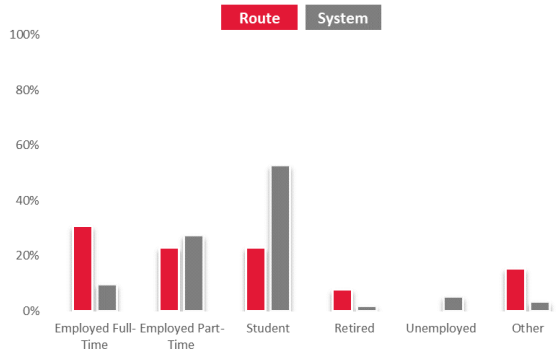


Gender

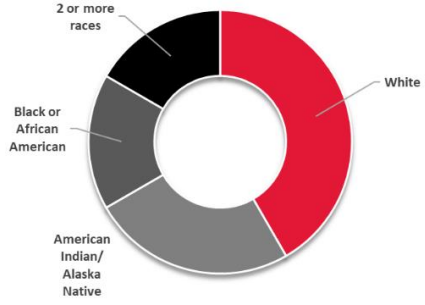


Employment Status

note: respondents could check more than one answer



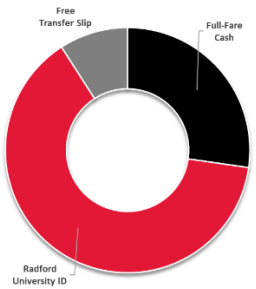
Race/Ethnicity



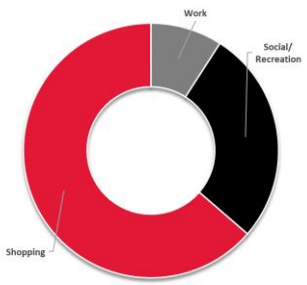
Route 40

Trip Characteristics

Fare Type

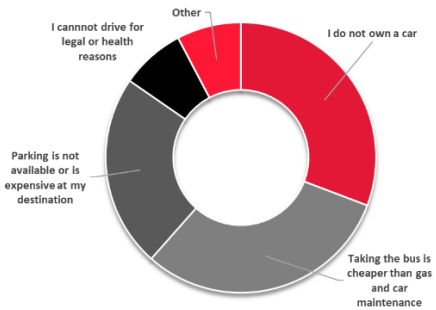


Trip Purpose

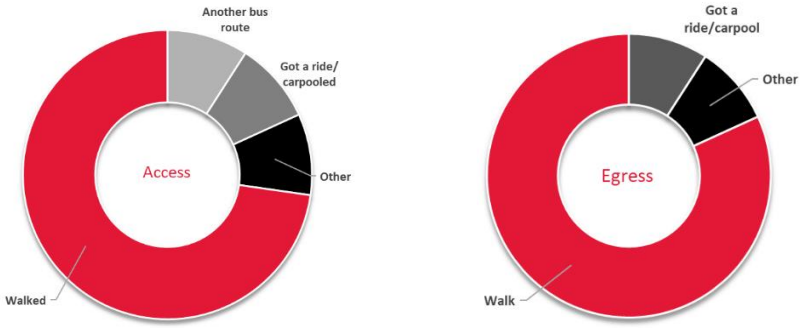


Satisfaction with Service

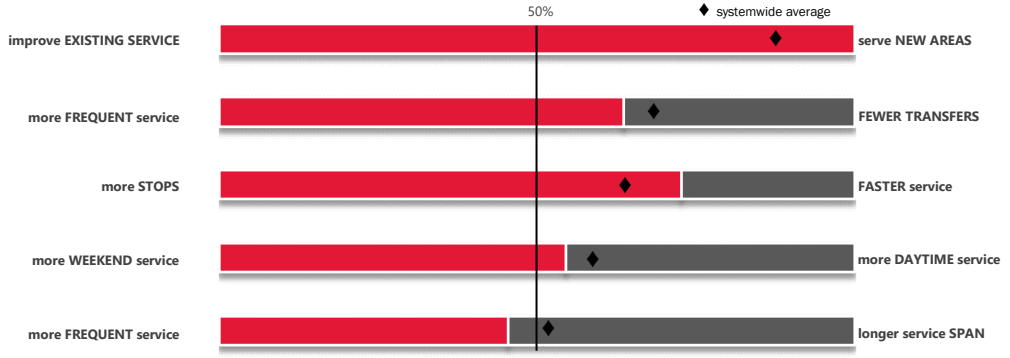
Reason for Riding



Mode of Access & Egress

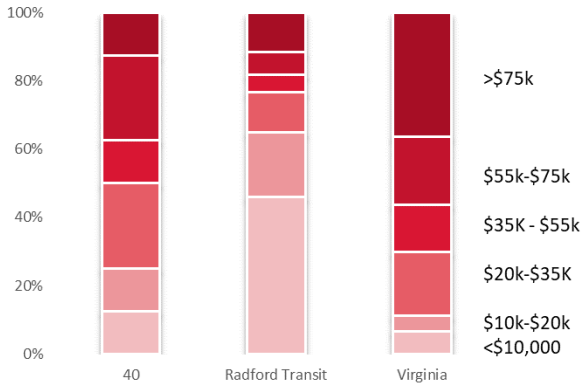


Rider Preferences

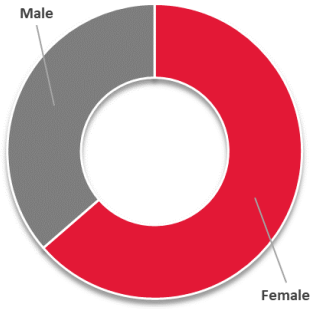


Rider Demographics

Household Income

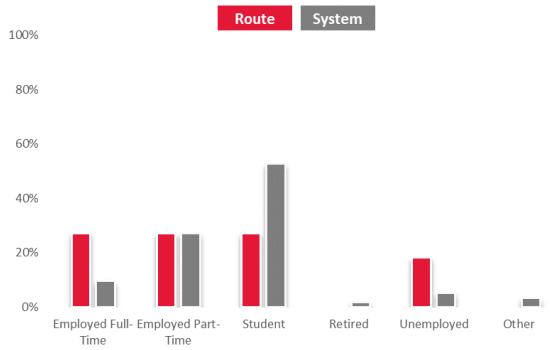


Gender

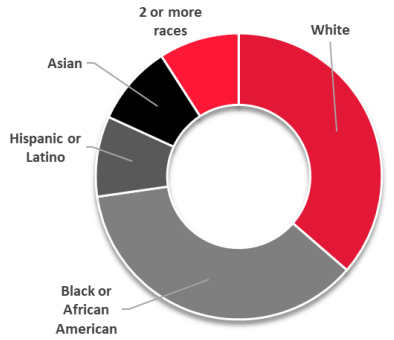


Employment Status

note: respondents could check more than one answer



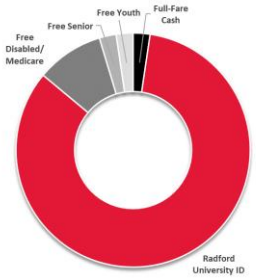
Race/Ethnicity



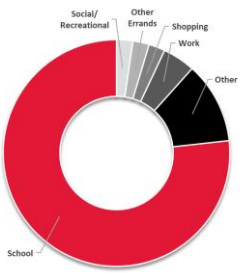
Route 50

Trip Characteristics

Fare Type

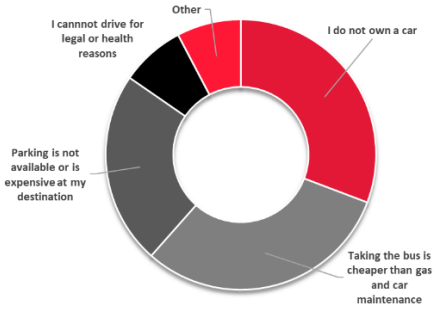


Trip Purpose

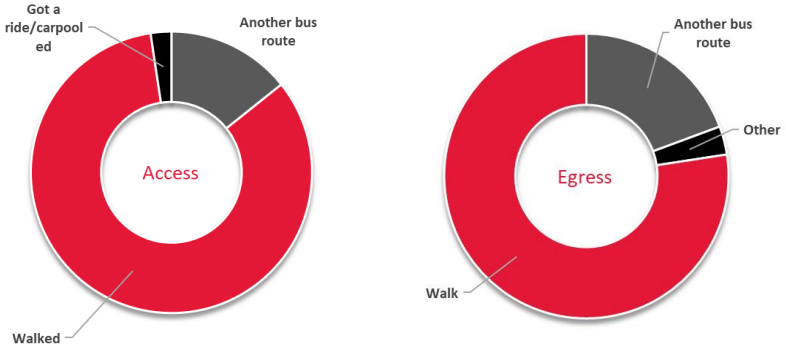


Satisfaction with Service

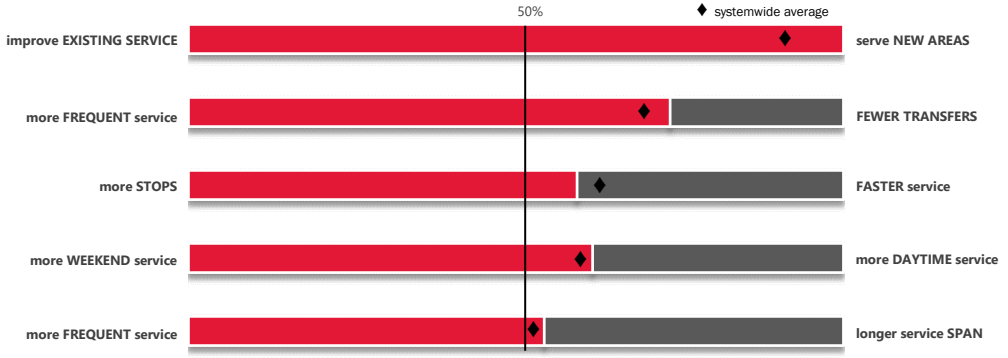
Reason for Riding



Mode of Access & Egress

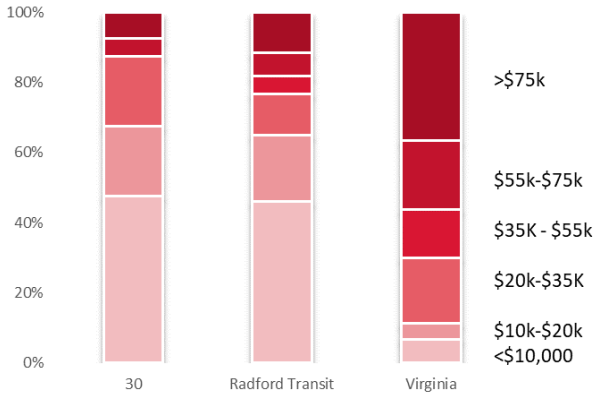


Rider Preferences

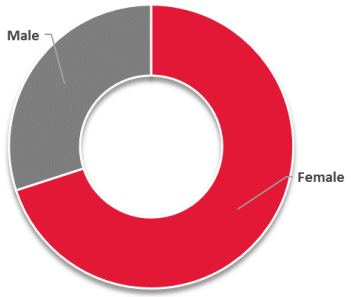


Rider Demographics

Household Income

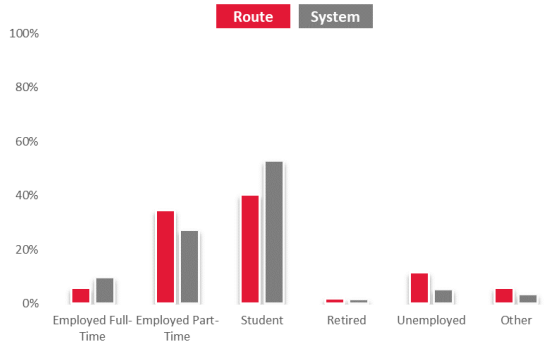


Gender

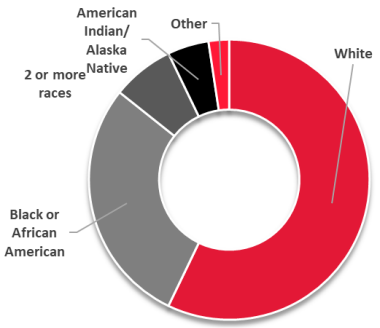


Employment Status

note: respondents could check more than one answer



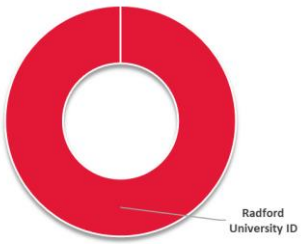
Race/Ethnicity



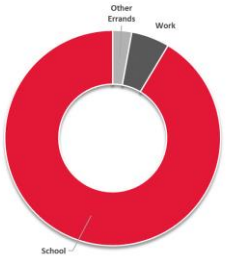
Route 60

Trip Characteristics

Fare Type

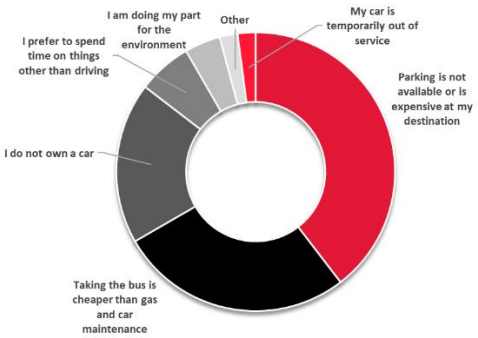


Trip Purpose

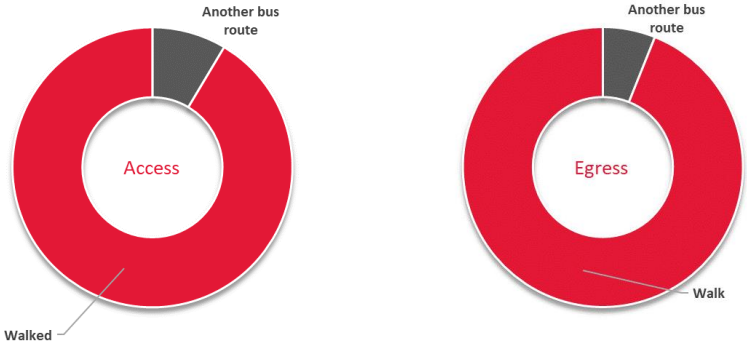


Satisfaction with Service

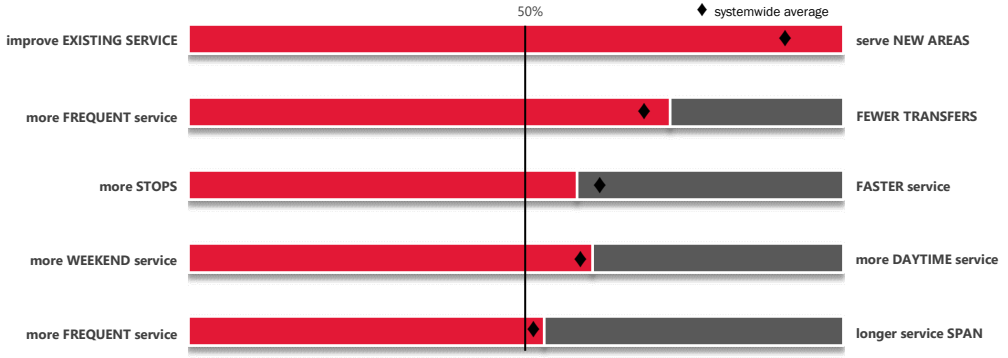
Reason for Riding



Mode of Access & Egress

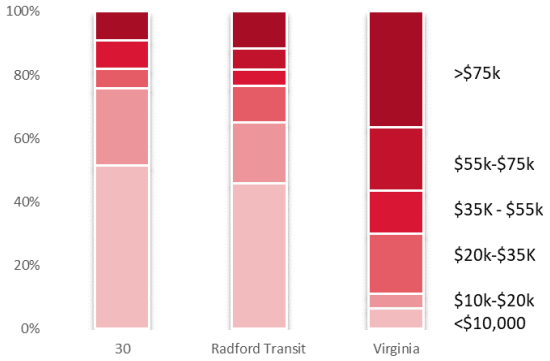


Rider Preferences

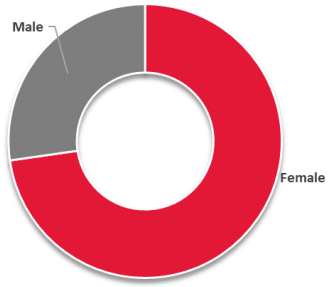


Rider Demographics

Household Income

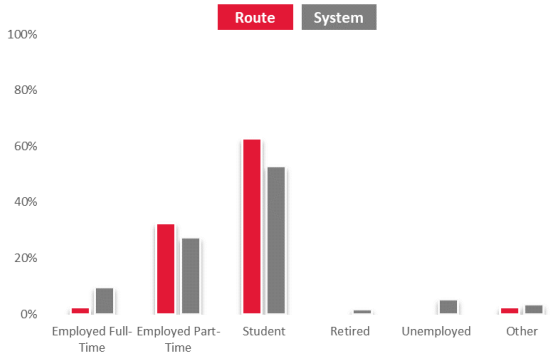


Gender

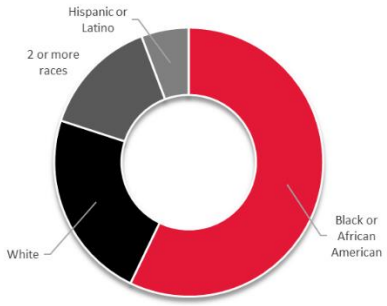


Employment Status

note: respondents could check more than one answer



Race/Ethnicity



Appendix B: Route Profiles

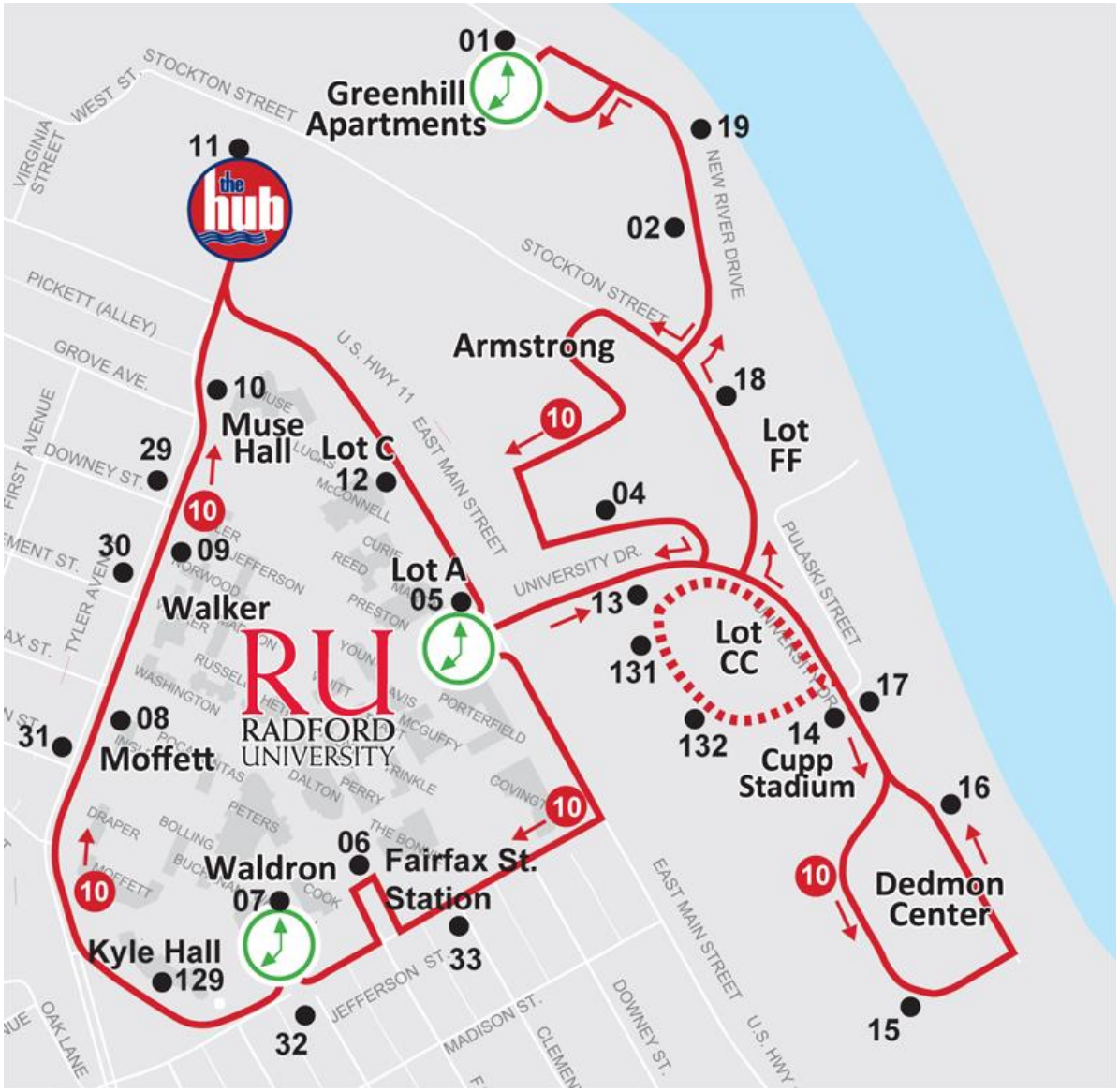
Route 10: University Express

SERVICE DESCRIPTION

Route 10 (shown in Figure 1) operates on weekdays only, between New River Drive and Waldron Hall, via the Hub. The route travels primarily along New River Drive, Stockton Street, University Drive, East Main Street, Jefferson Street, and Tyler Avenue. Most of Route 10 operates as a one-way loop, meaning most stops are only served in one direction.

Passengers may transfer between Route 10 and other services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 1: Route 10 Map



OPERATING CHARACTERISTICS

The route operates every day except Saturday during regular service only. During city service and on Saturdays during regular service, Route 15 provides a similar service that also extends to Burling Street and Mill Village. On weekdays, it operates every 10 minutes from start of service until 5:50 PM, every 15 minutes from 5:50 PM until 8:05 PM, and every 30 minutes from 8:05 PM until end of service. Monday through Wednesday, service ends at 10:05 PM, while service runs until 2:50 AM on Thursday and Friday. On Sundays, the route operates from 5:50 PM until 11:50 PM, with 30 minute headways for the entire service day. The route offers connections to all other Radford Transit routes, and connects Radford University with The Hub. Table 1 summarizes Route 10's operating characteristics.

Table 1: Operating Characteristics

Destination	From		New River Drive
	To		Waldron Hall
Regular Service Span	Weekday		7:00 AM – 10:05 PM/2:50 AM
	Saturday		--
	Sunday		5:50 PM – 11:50 PM
City Service Span	Weekday		--
	Saturday		--
	Sunday		--
Regular Service Frequency	Weekday	Peak	10
		Off-Peak	10/15/30
	Saturday		--
	Sunday		30
City Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Daily Ridership			956
Key Destinations			Radford University, The Hub, Greenhill Apartments

The route meets level of service standards during Regular Service.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. With 23.3 passengers per hour, Route 10 ranks 1st in the system and falls well above the system average of 13.3. The route similarly falls above average in passengers per mile (2.8), ranking 2nd. The route meets productivity standards. Table 2 summarizes service productivity metrics for Route 10.

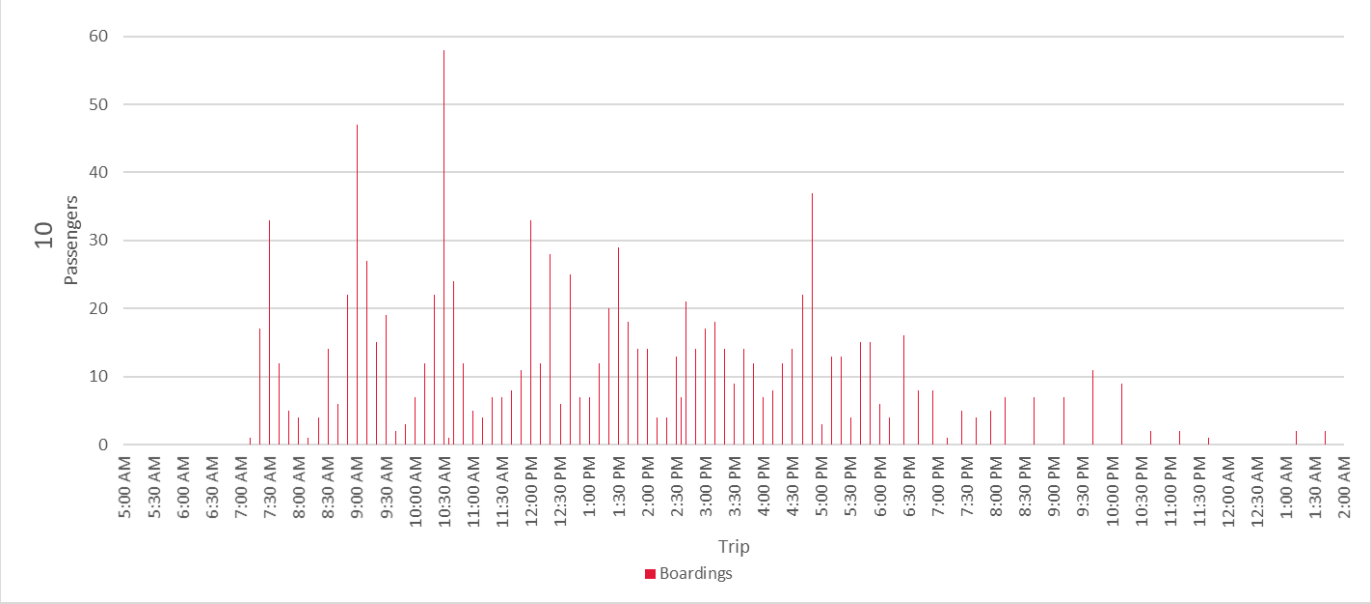
Table 2: Service Productivity Metrics: Weekday

Passengers per Hour	Passengers Per Mile
Average 13.3 — 23.3	Average 1.8 — 2.8

RIDERSHIP

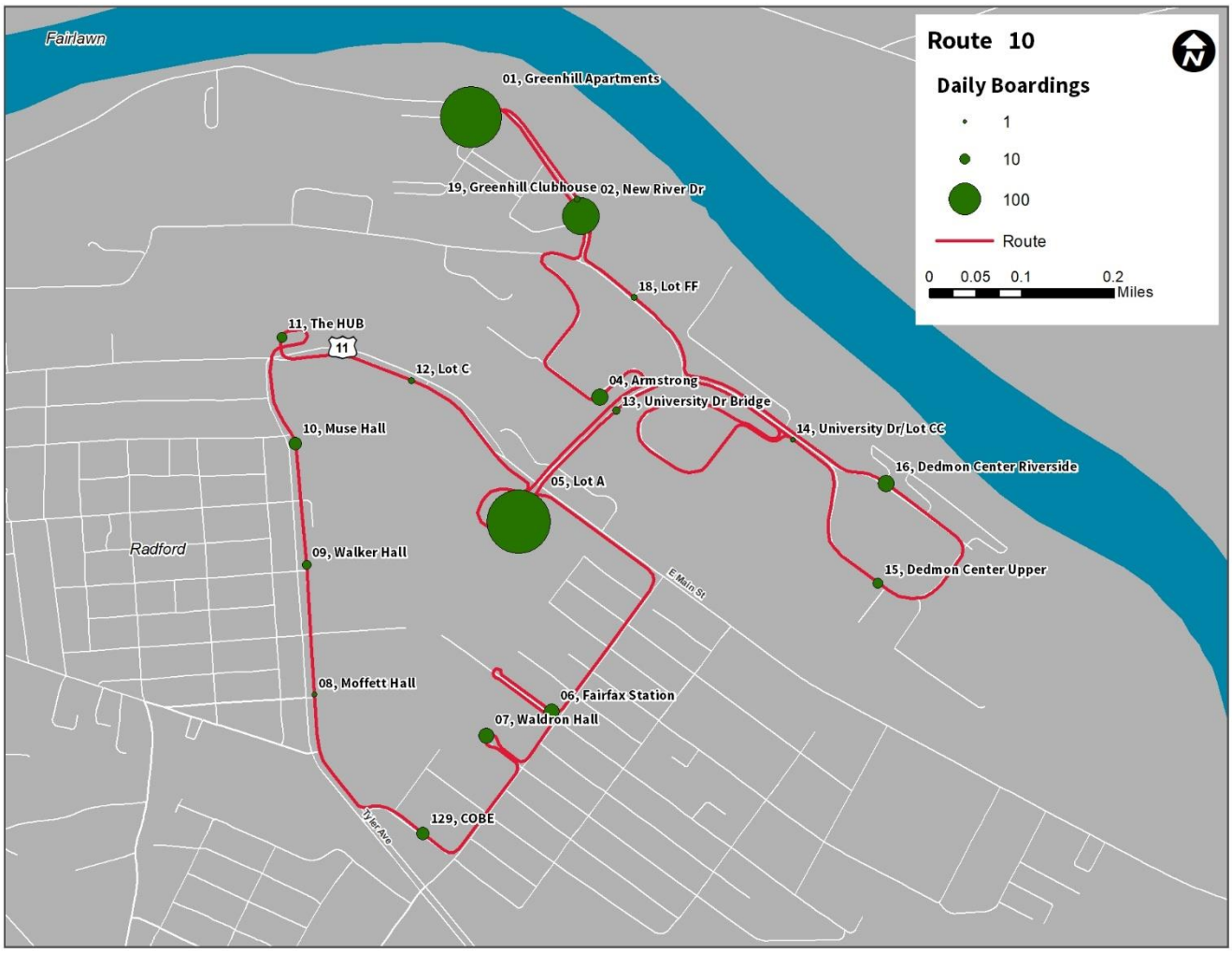
Route 1 averages 956 passengers per day, ranking 1st among Radford Transit services. At the trip level, the highest ridership occurs around 7:30 am, 9:00 am, 10:30 am, noon, and 4:40 pm.

Figure 2: Route 10 Ridership by Trip



The busiest stops on Route 10 are at the Greenhill Apartments and Lot A.

Figure 3: Route 10 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- High ridership and productivity
- Extensive span of service
- Frequent all-day service
- Provides necessary connections between the major academic, residential, and athletic buildings on the Radford University campus, including those on University Drive
- Multiple connection opportunities at The Hub

Weaknesses

- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route
- Low ridership after 10:00 pm.
- No Saturday service
- Limited frequency and span of service on Sundays

Opportunities

- Operate every other trip in the opposite direction. This would reduce the frequency by direction but would eliminate the need for passengers to ride the entire route when they want to travel between stops that might be nearby.
- Eliminate late night service on Thursdays by ending service at 10:00 pm. Late night service would still be provided on Fridays and Saturdays.

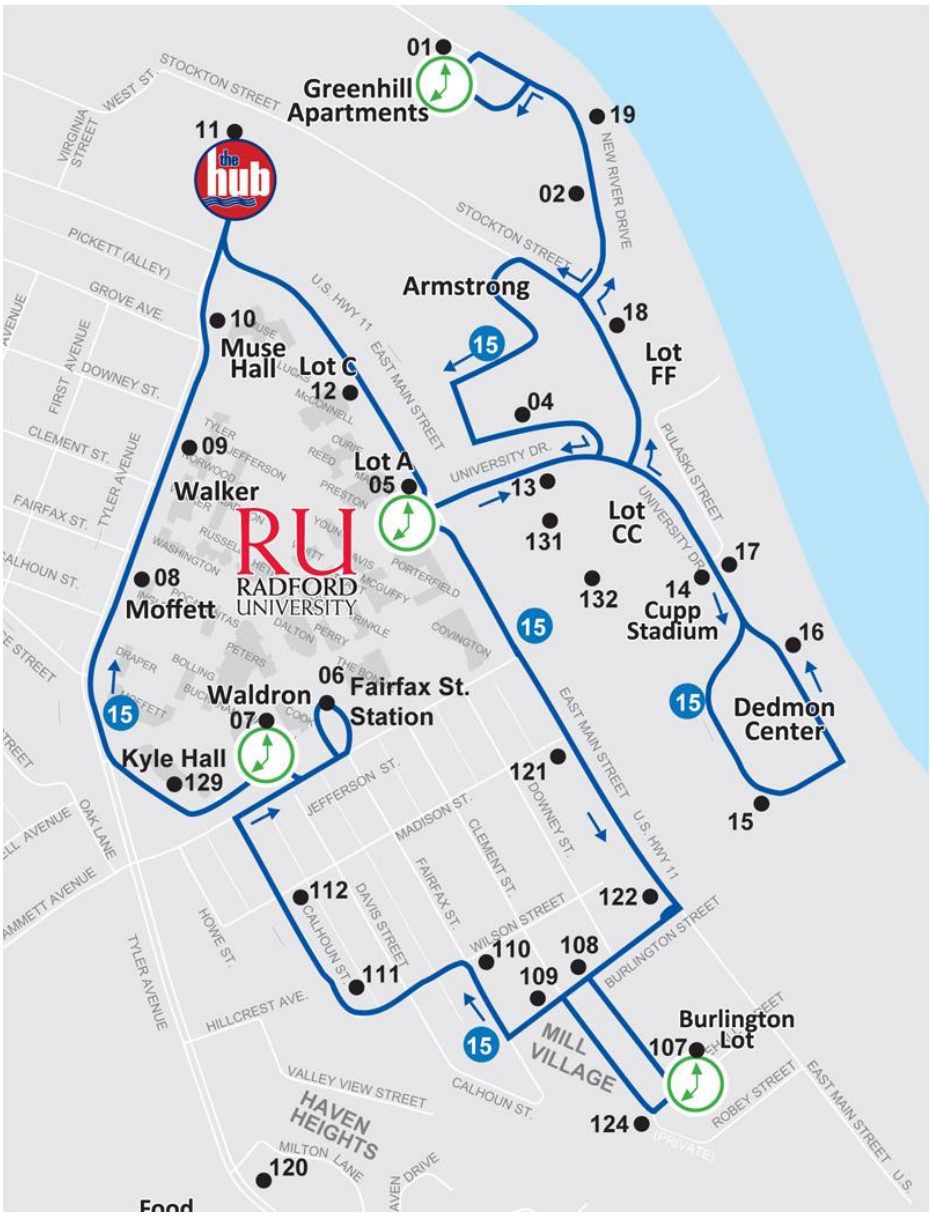
Route 15: University Highlander

SERVICE DESCRIPTION

Route 15 (shown in Figure 4) operates Monday through Saturday only, between The Hub and Waldron Hall. The route travels primarily along New River Drive, Stockton Street, University Drive, East Main Street, Burlington Street, Calhoun Street, Jefferson Street, and Tyler Avenue. Most of Route 15 operates as a one-way loop, meaning most stops are only served in one direction.

Passengers may transfer between Route 15 and other services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 4: Route 15 Map



OPERATING CHARACTERISTICS

During regular service, the route operates on Saturday only, from 10:20 AM to 2:50 AM, operating with half hour frequencies the entire service day. During city-only service, the route operates Monday through Saturday. On weekdays, it operates from 7:20 AM to 8:00 PM, and on Saturday, it operates from 10:20 AM until 8:00 PM. It operates with half-hour frequencies at all times during city service. The route acts as a replacement for Route 10 on regular service Saturdays and during city service. It offers connections to all other Radford Transit routes at The Hub. It connects activity generators including Mill Village and Radford University to The Hub. Table 3 summarizes Route 15's operating characteristics.

Table 3: Operating Characteristics

Destination	From		The Hub
	To		Waldron Hall
Regular Service Span	Weekday		--
	Saturday		10:20 AM – 2:50 AM
	Sunday		--
City Service Span	Weekday		7:20 AM – 8:00 PM
	Saturday		10:20 AM – 8:00 PM
	Sunday		--
Regular Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		30
	Sunday		--
City Service Frequency	Weekday	Peak	30
		Off-Peak	30
	Saturday		30
	Sunday		--
Average Daily Ridership			161
Key Destinations			Radford University, The Hub, Mill Village

This service does not meet systemwide LOS standards during regular service, but does meet them during city service. Since the route combines Routes 10 and 50 during regular service and those routes do meet standards, this is acceptable.

RIDERSHIP

Route 15 averages 161 passengers per day, ranking 5th among Radford Transit services.

SUMMARY OF OBSERVATIONS

Strengths

- Extensive span of service during regular service
- Multiple connection opportunities available at The Hub

- Provides necessary connections between the major academic, residential, and athletic buildings on the Radford University campus, including those on University Drive

Weaknesses

- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route.
- Limited frequency during both regular and city service
- No Sunday service

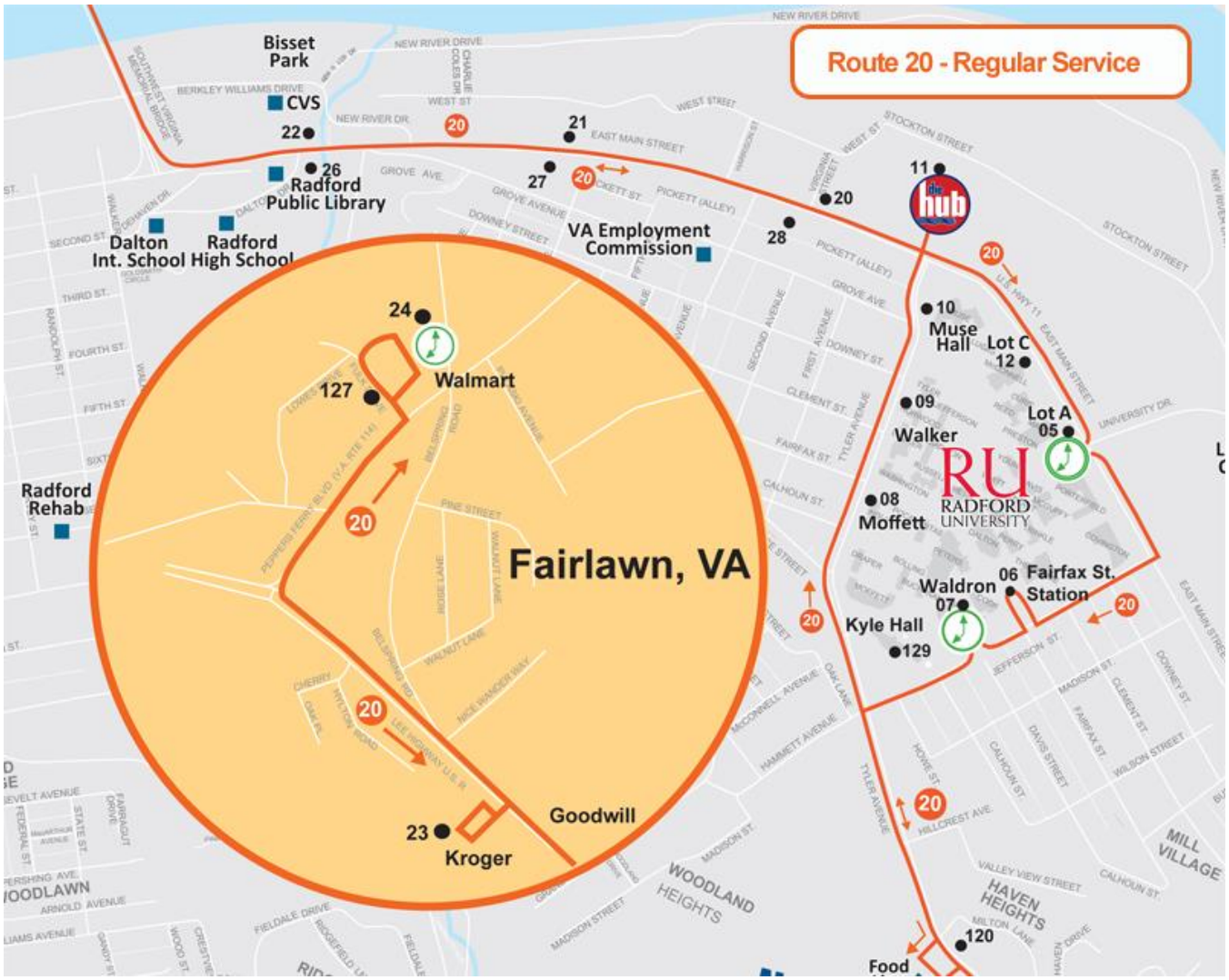
Route 20: New River Rapid

SERVICE DESCRIPTION

Route 20 (shown in Figure 5) operates on weekdays and Saturday only, between the Hub and the Fairlawn Walmart. The route travels primarily along East Main Street, Jefferson Street, Tyler Avenue, Lee Highway, and Peppers Ferry Boulevard. Segments of this route on East Main Street, Jefferson Street, and Tyler Avenue operate as a one-way loop, with stops serviced only in one direction.

Passengers may transfer between Route 20 and other services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 5: Route 20 Map



OPERATING CHARACTERISTICS

The route operates Monday through Saturday during both regular service and city service. During both regular and city service, it operates from 7:00 AM to 7:40 PM on weekdays, and 10:00 AM to 7:40 PM on Saturday, operating once per hour throughout its span of service. The route offers connections to all routes at The Hub, and serves

several activity generators, including the Walmart and Kroger in Fairlawn, the Radford Public Library, Radford University, the Food Lion in Radford, and The Hub. Table 4 summarizes Route 20's operating characteristics.

Table 4: Operating Characteristics

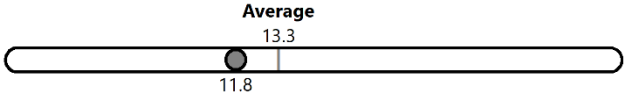
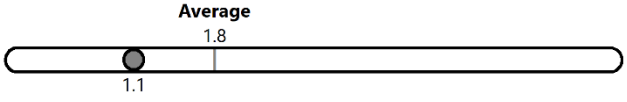
Destination	From		Fairlawn Walmart
	To		The Hub
Regular Service Span	Weekday		7:00 AM – 7:40 PM
	Saturday		10:00 AM – 7:40 PM
	Sunday		--
City Service Span	Weekday		7:00 AM – 7:40 PM
	Saturday		10:00 AM – 7:40 PM
	Sunday		--
Regular Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		--
City Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		--
Average Daily Ridership			219
Key Destinations			Walmart, Kroger, Radford Public Library, Radford University, Food Lion, The Hub

This route meets systemwide LOS standards during city service, but fails to meet them during regular service, as it has no evening or late-night service, nor does it have Sunday service.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. With 11.8 passengers per hour, Route 20 ranks 5th in the system and falls below the system average of 13.3. The route similarly falls below average in passengers per mile (1.8), also ranking 5th. Additionally, it does not have sufficient frequency to meet LOS standards. **Table 2** summarizes service productivity metrics for Route 20.

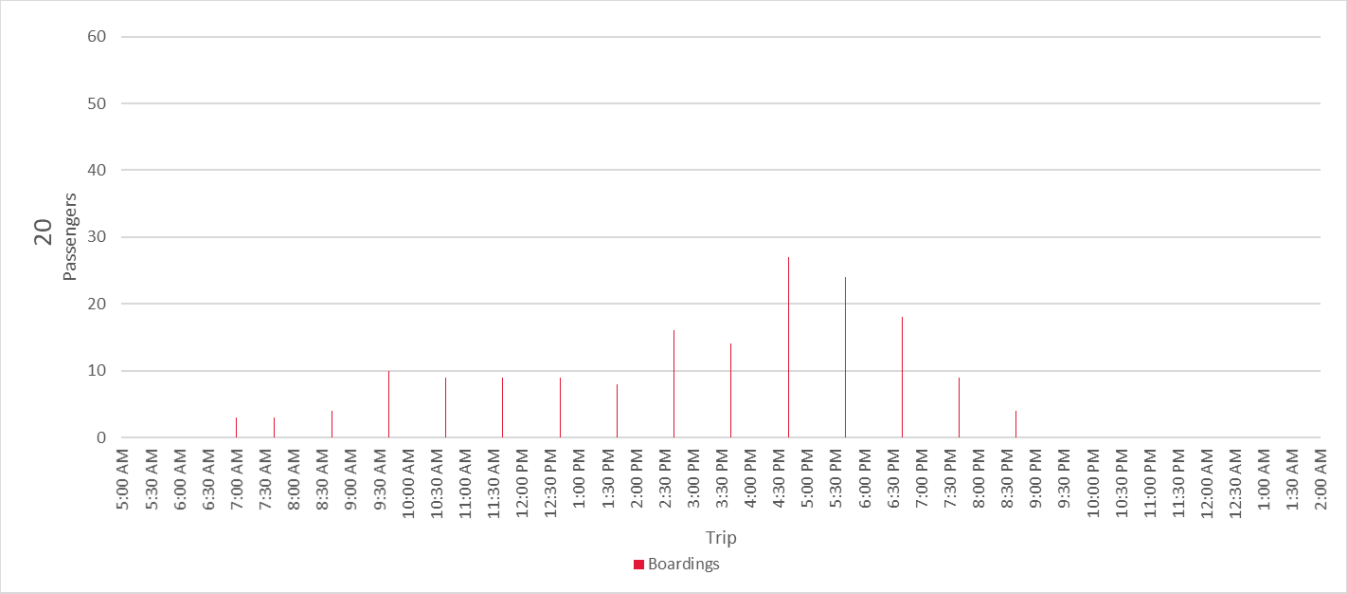
Table 5: Service Productivity Metrics: Weekday

Passengers per Hour	Passengers Per Mile
	

RIDERSHIP

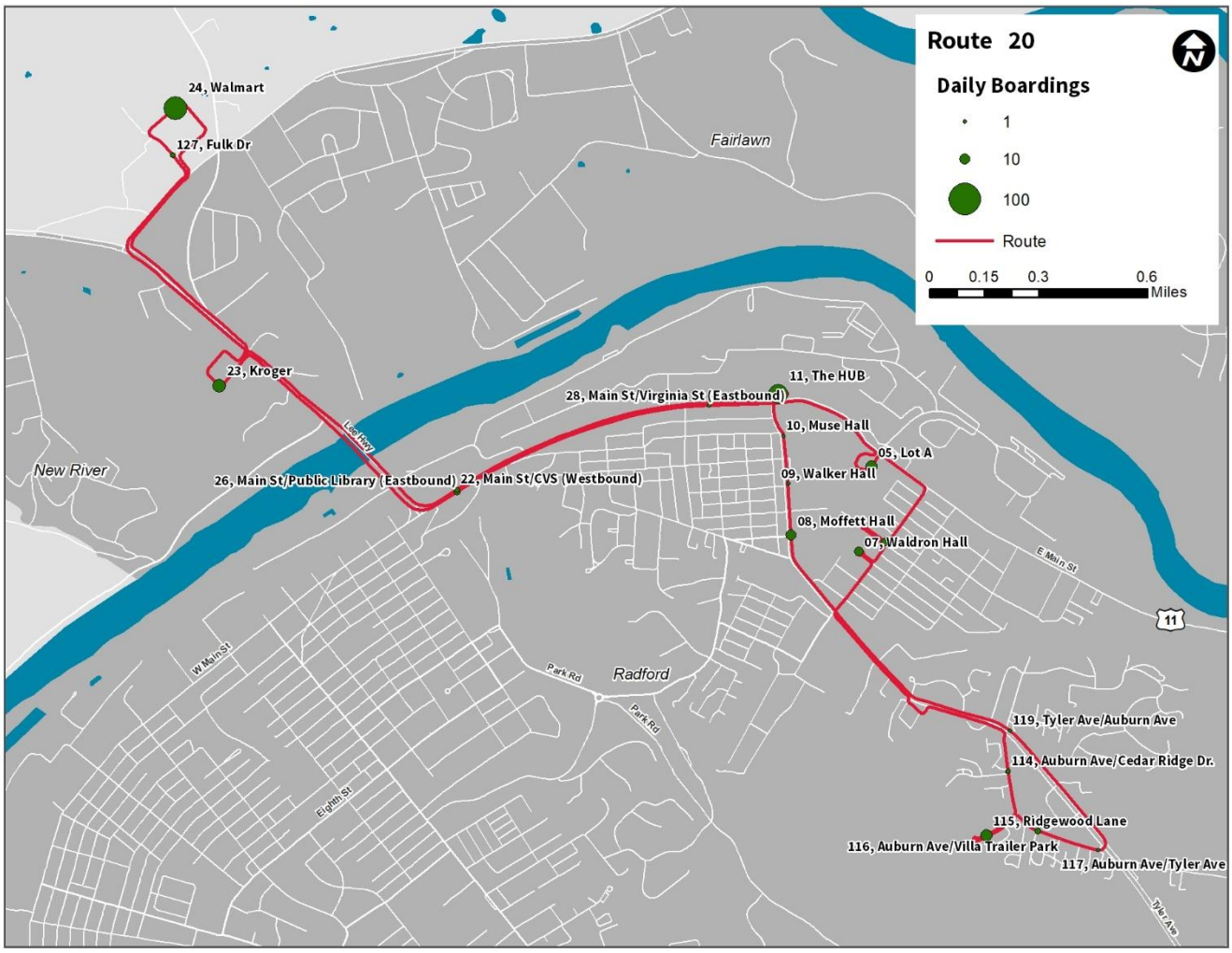
Route 20 averages 219 passengers per day, ranking 4th among Radford Transit services. The busiest trips on Route 20 are in the afternoon and evening between 4:30 pm and 7:00 pm.

Figure 6: Route 20 Ridership by Trip



The busiest stops on Route 20 are Walmart, Kroger, the Hub, and the Villa Trailer Park.

Figure 7: Route 20 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- Only route to serve Fairlawn, which has key retail destinations
- Multiple connection opportunities available at The Hub

Weaknesses

- Low frequencies at all times
- No evening service
- Below average productivity and ridership
- No Sunday service
- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route near Radford University

Opportunities

- Add additional stops in Fairlawn on Route 11 to serve the employment office and the Goodwill store

- Expand span of service on weekdays so passengers can access retail establishments in Fairlawn in the evening

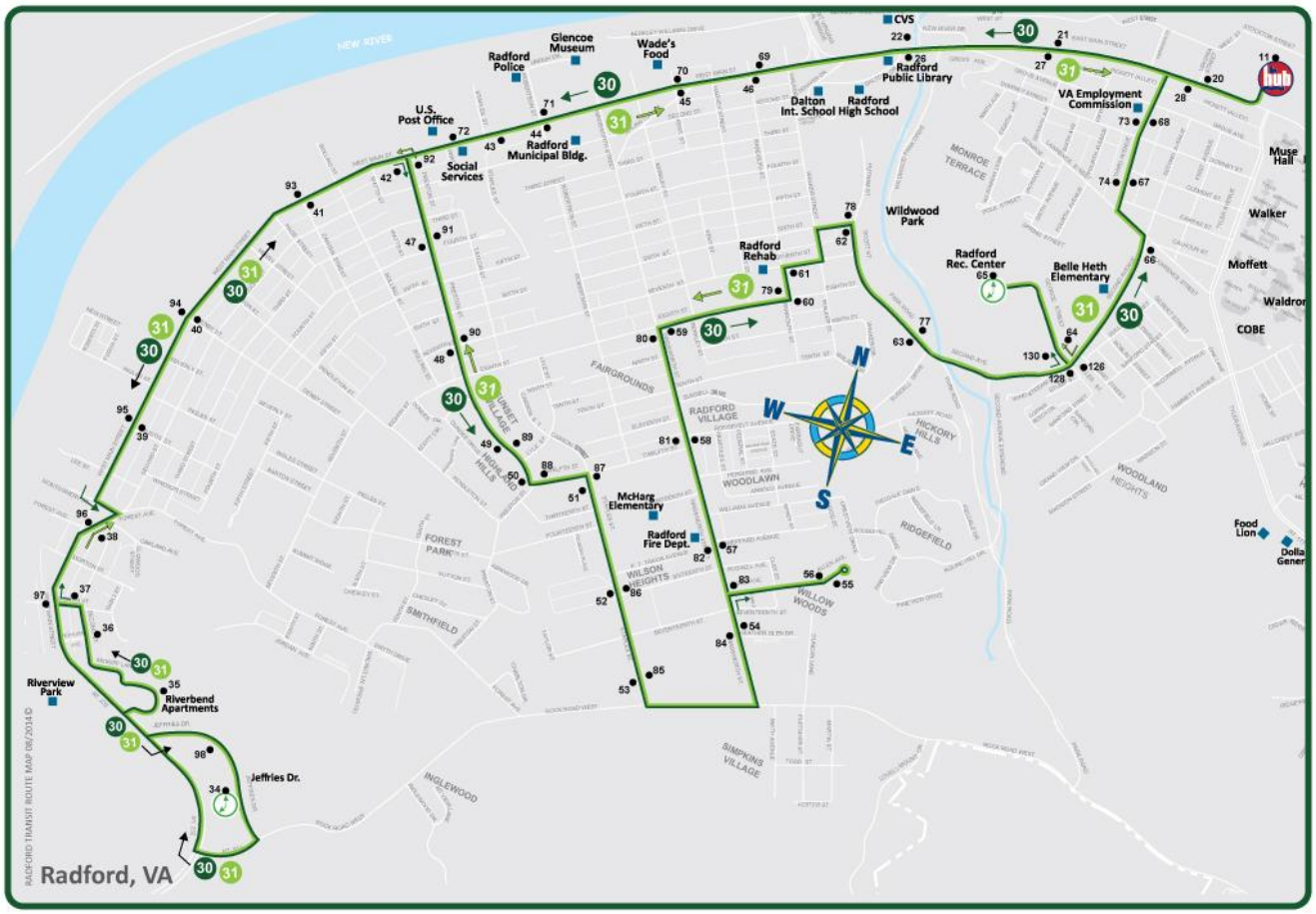
Routes 30/31: Cross City

SERVICE DESCRIPTION

Routes 30 and 31 (shown in Figure 8) operate Monday through Saturday, between Radford Recreation Center and Jeffries Drive. Each route is a one-way loop, serving the same streets in opposite directions, and are grouped together in public-facing route maps and timetables. The route travels primarily along George Street, 2nd Avenue, 3rd Avenue, East Main Street, West Main Street, 2nd Street, Jeffries Drive, Preston Street, Staples Street, Rock Road West, Staples Drive, Allen Avenue, 8th Street, Randolph Street, 6th Street, and Park Road.

Passengers may transfer between Routes 30 and 31 and other Radford Transit routes at The Hub, which offers timed transfers at :40 past every service hour.

Figure 8: Routes 30/31 Map



OPERATING CHARACTERISTICS

The routes operate weekdays and Saturday during both regular and city service. Under both service patterns, the routes operate weekdays from 7:00 AM until 8:20 PM, and on Saturday from 10:00 AM to 8:20 PM. The routes operate once per hour, for the routes' entire span of service. The routes offer connections to all other routes at The Hub. These routes serve a variety of activity generators, including the Radford Recreation Center, Radford Rehab,

Radford Fire Department, Riverview Park, Radford Municipal Building, VA Employment Commission, and The Hub. Table 6 summarizes Routes 30 and 31's operating characteristics.

Table 6: Operating Characteristics

Destination	From		Radford Recreation Center
	To		Jeffries Drive
Regular Service Span	Weekday		7:00 AM – 8:20 PM
	Saturday		10:00 AM – 8:20 PM
	Sunday		--
City Service Span	Weekday		7:00 AM – 8:20 PM
	Saturday		10:00 AM – 8:20 PM
	Sunday		--
Regular Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		--
City Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		--
Average Daily Ridership			125
Key Destinations			Radford Recreation Center, Radford Rehab, Radford Fire Department, Riverview Park, Radford Municipal Building, VA Employment Commission, The Hub

The route meets level of service standards during city service but does not during regular service.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. Boarding and alighting data was recorded at each stop for every scheduled trip on a typical weekday. With 4 passengers per hour, Route 30 ranks 6th in the system and falls well below the system average of 13.3. The route similarly falls well below average in passengers per mile (0.3), also ranking 6th. This route does not meet productivity thresholds of 60% below system average for either passengers per hour or passengers per mile. It meets systemwide LOS standards during city service, but fails to meet them during regular service, as it has no evening or late-night service, nor does it have Sunday service. Table 7 summarizes service productivity metrics for Route 30.

Table 7 | Service Productivity Metrics: Weekday

Passengers per Hour	Passengers per Mile
Average 13.3 4	Average 1.8 0.3

RIDERSHIP

Routes 30 and 31 average 125 passengers per day, ranking 7th among Radford Transit services. The busiest trips on Routes 30 and 31 are in the afternoon and evening, between 2:30 pm and 7:00 pm.

Figure 9: Route 30 Ridership by Trip

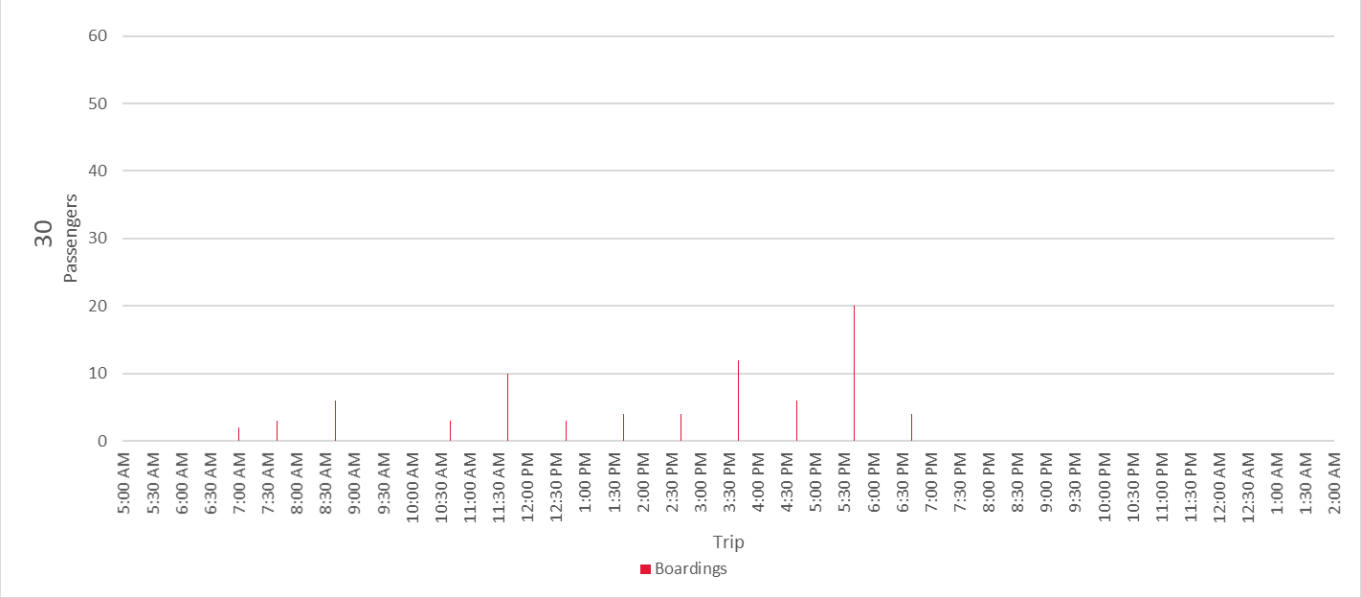
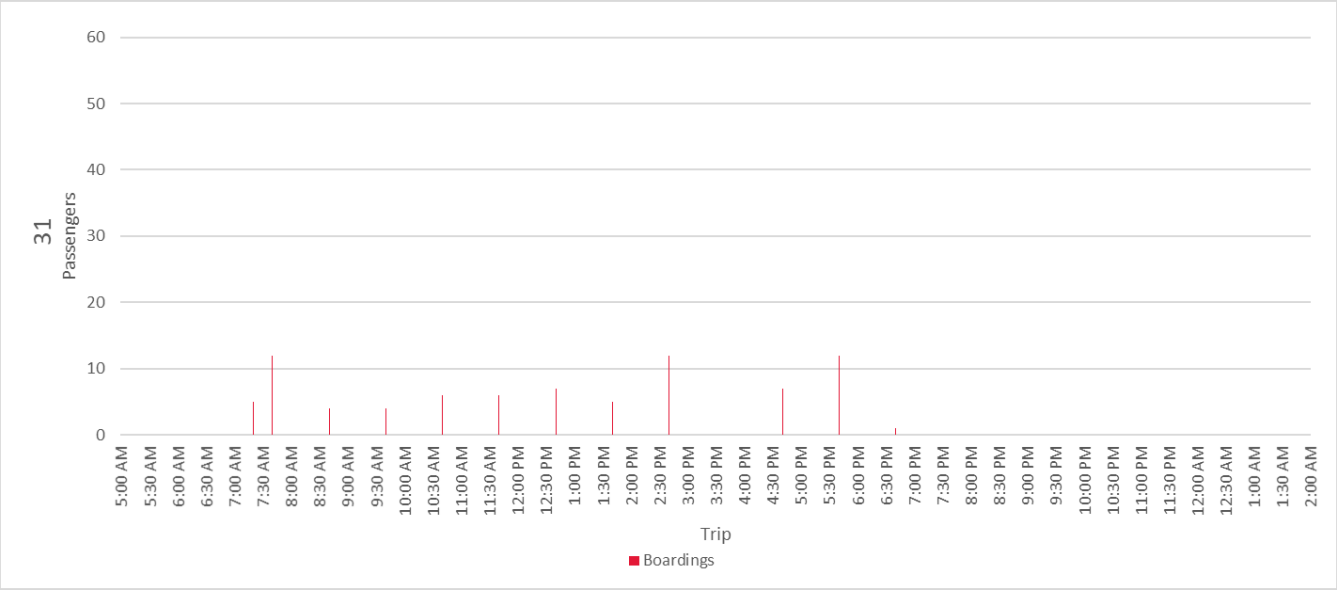


Figure 10: Route 31 Ridership by Trip



The busiest stops on Routes 30 and 31 are The Hub, Jeffries Drive, Main at Preston, and Staples at Travis.

Figure 11: Route 30 Ridership by Stop

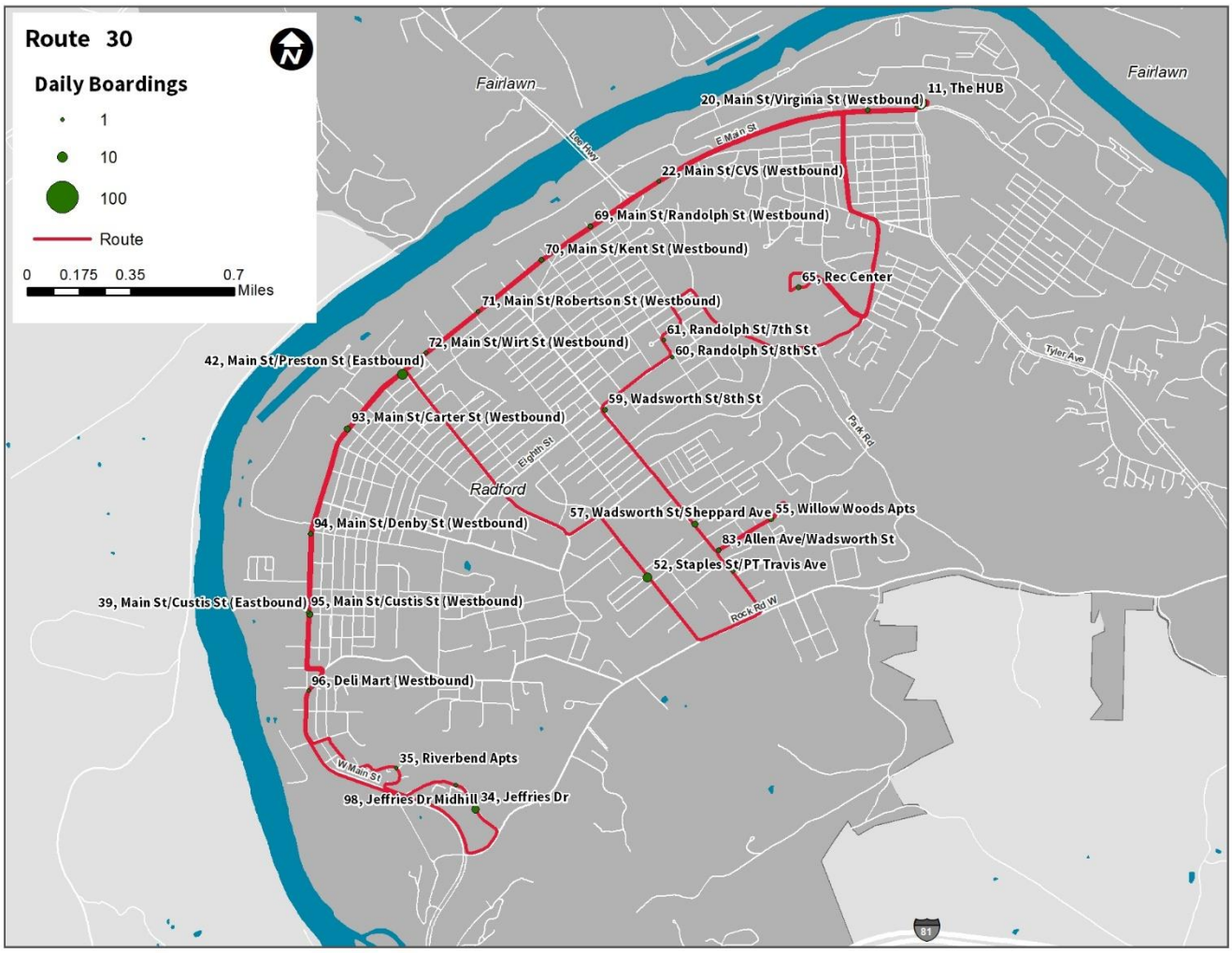
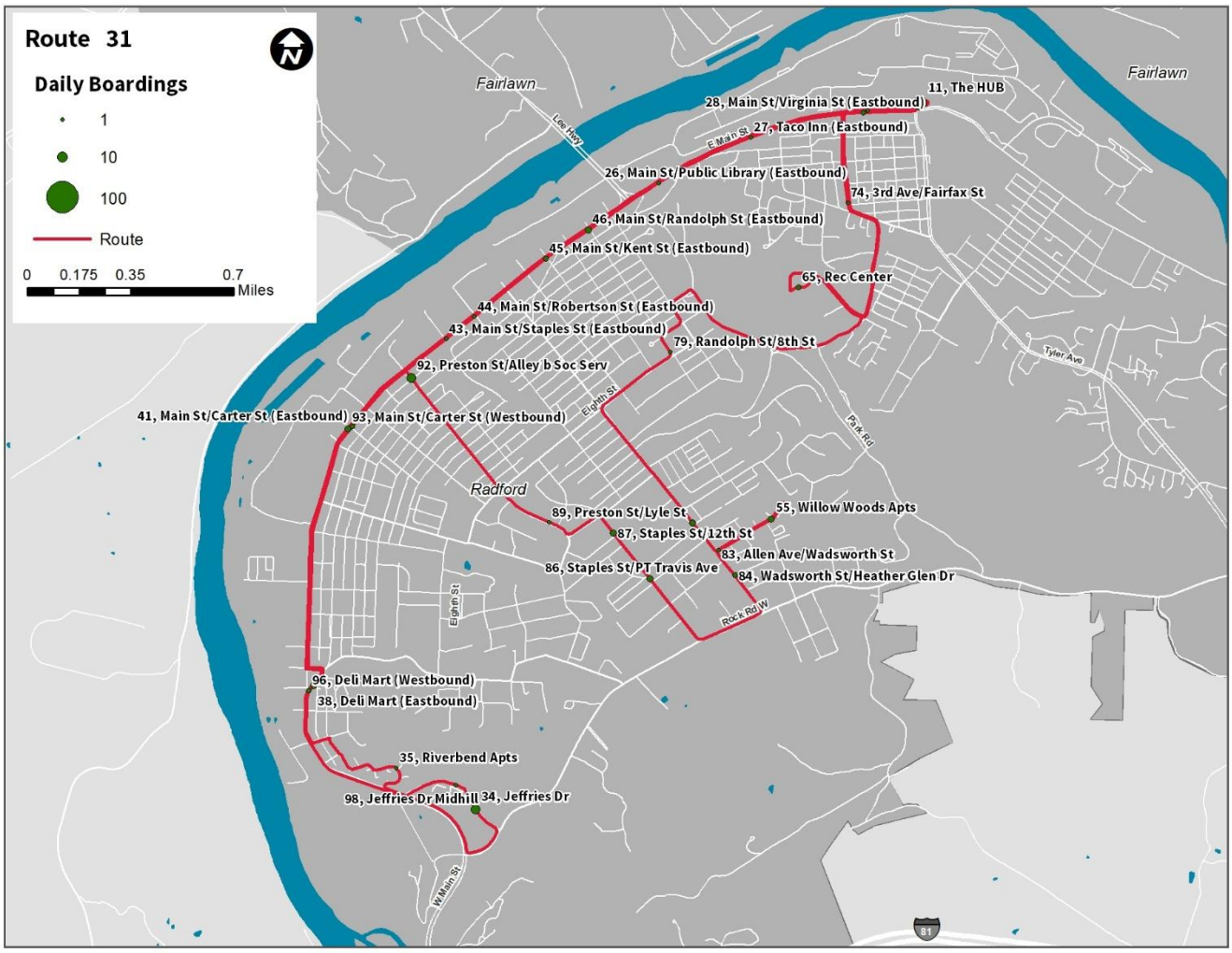


Figure 12: Route 31 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- Only route providing service to communities on the western side of Radford and the Rock Road/Willow Woods area, which has a number of employers and apartments
- Multiple connection opportunities available at The Hub

Weaknesses

- Lowest ridership of any Radford Transit route
- Limited frequency during both regular and city service
- No later evening service
- No Sunday service
- No direct service to Radford University

Opportunities

- Increase span of service on weekday evenings in conjunction with a similar increase on Route 20 so passengers can access retail establishments in Fairlawn

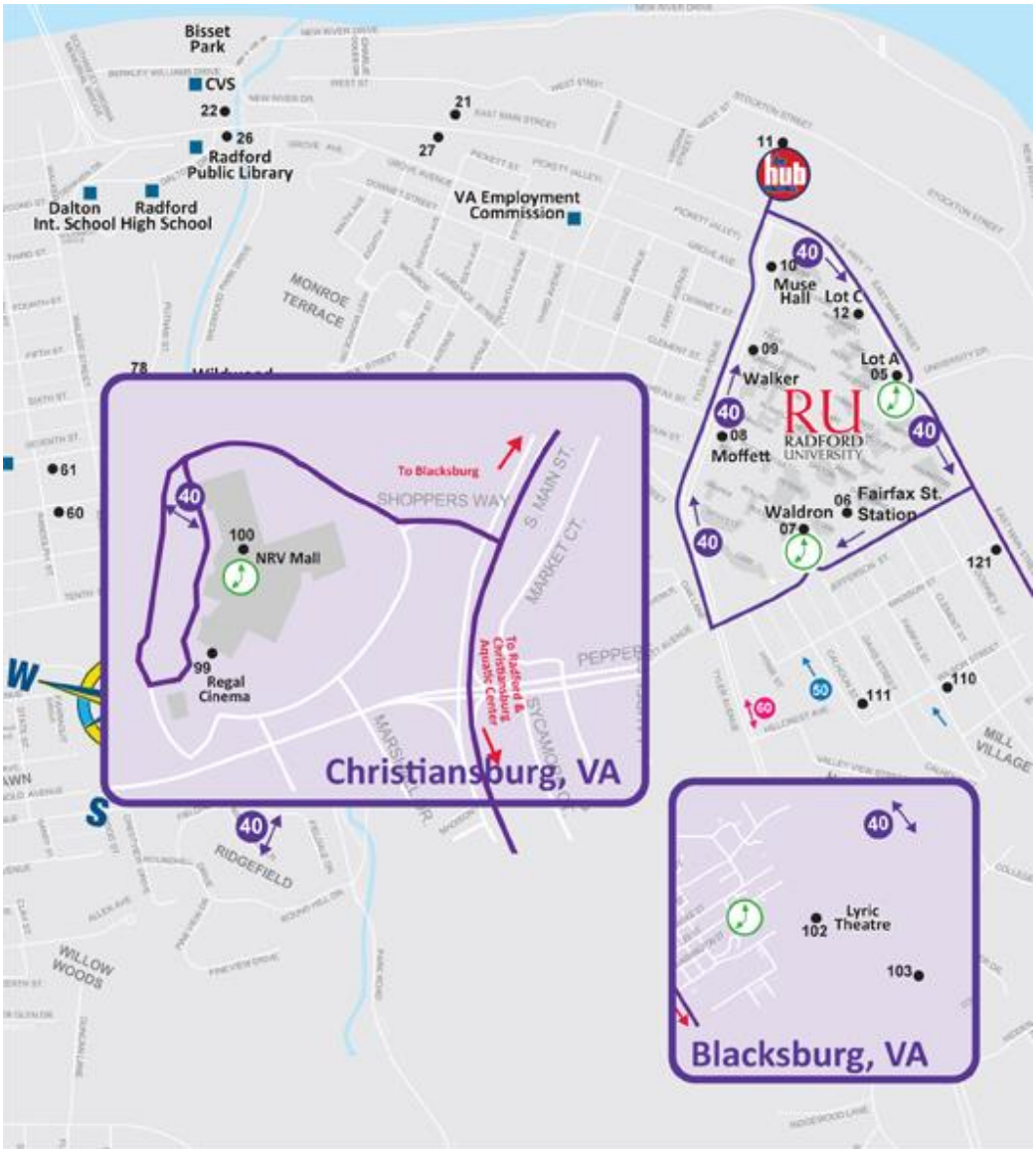
Route 40: NRV Connect

SERVICE DESCRIPTION

Route 40 (shown in Figure 13) operates Monday through Saturday between The Hub and Squires Student Center on the Virginia Tech campus in Blacksburg, via Christiansburg. The route travels primarily along East Main Street, Route 11, North Franklin Street, South Main Street, Alumni Mall, Jefferson Street, and Tyler Avenue. The route operates in a one-way loop around the Radford University campus, including parts of East Main Street, Jefferson Street, and Tyler Avenue, with stops serviced in only one direction.

Passengers may transfer between Route 40 and other services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 13: Route 40 Map



OPERATING CHARACTERISTICS

The route operates Monday through Saturday, during regular service only. On Monday, Tuesday, and Wednesday, the route operates from 2:40 PM to 9:40 PM. On Thursday and Friday, the route operates from 2:40 PM until 2:40 AM, and on Saturday, it operates from 10:40 AM until 2:40 AM. It operates once per hour during the entirely of its span of service. The route offers connections to all routes at The Hub, and also offers connections to most Blacksburg Transit routes at Squires Student Center and at the New River Valley Mall. It serves a variety of activity generators, including The Hub, Radford University, Christiansburg, New River Valley Mall, Blacksburg, and the Virginia Tech campus. Table 8 summarizes Route 40's operating characteristics.

Table 8: Operating Characteristics

Destination	From		The Hub
	To		Squires Student Center
Regular Service Span	Weekday		2:40 PM – 9:40 PM/2:40 AM
	Saturday		10:40 AM – 2:40 AM
	Sunday		--
City Service Span	Weekday		--
	Saturday		--
	Sunday		--
Regular Service Frequency	Weekday	Peak	60
		Off-Peak	60
	Saturday		60
	Sunday		--
City Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Daily Ridership			126
Key Destinations			The Hub, Radford University, Christiansburg, New River Valley Mall, Blacksburg, Virginia Tech

The route does not meet level of service standards, however it provides adequate service for its purpose of providing afternoon and late connections to Blacksburg.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. With 3.8 passengers per hour, Route 40 ranks 7th in the system and falls well below the system average of 13.3. The route similarly falls below average in passengers per mile (0.2), also ranking 7th. This route does not meet productivity thresholds of 60% below system average for either passengers per hour or passengers per mile. It does not meet systemwide LOS standards during regular service, as it has no morning service, nor does it have Sunday service. Table 9 summarizes service productivity metrics for Route 40.

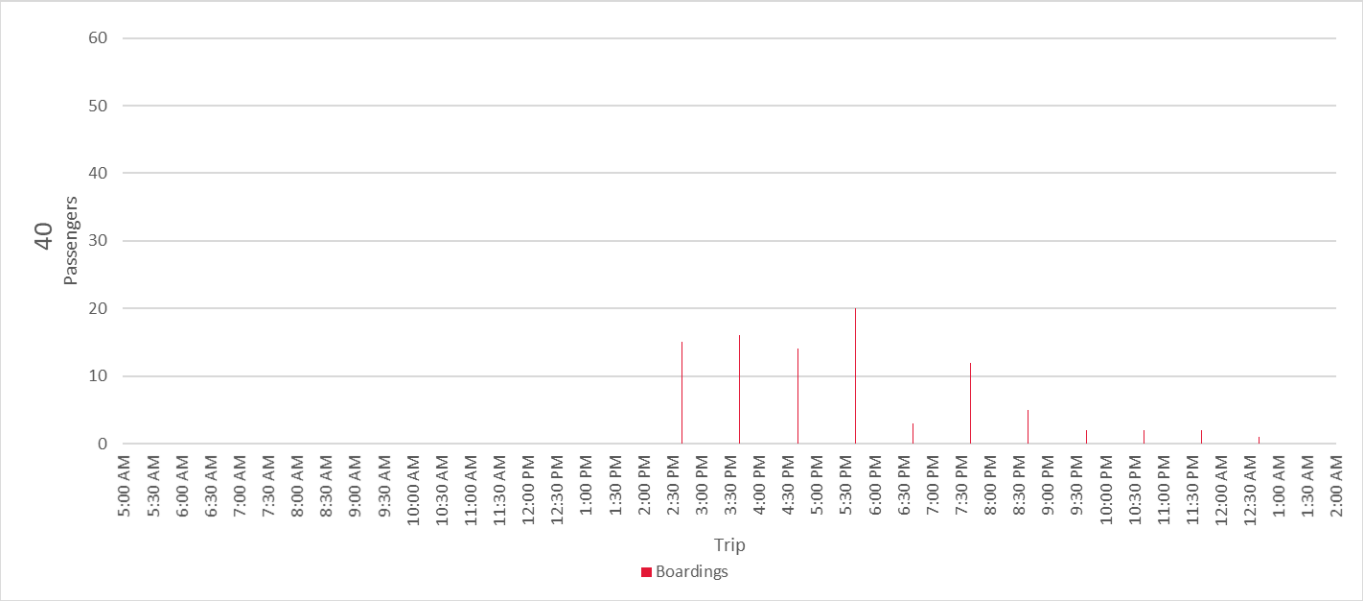
Table 9: Service Productivity Metrics

Passengers per Hour	Passengers per Mile
Average 13.3 3.8	Average 1.8 0.2

RIDERSHIP

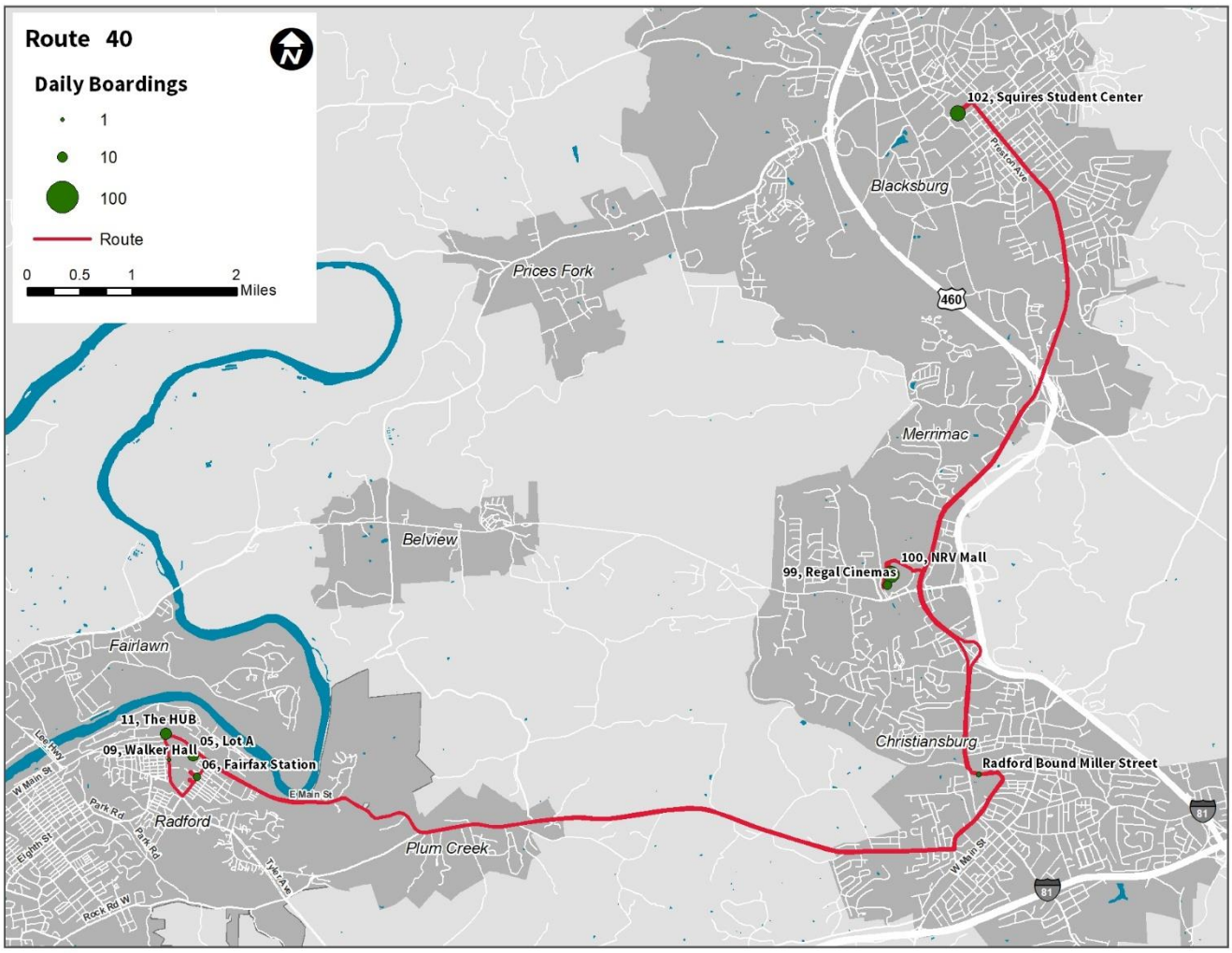
Route 40 averages 126 passengers per day, ranking 6th among Radford Transit routes. The busiest trips are between 2:40 pm and 7:30 pm.

Figure 14: Route 40 Ridership by Trip



The busiest stops are the Hub, the New River Valley Mall, and the Squires Student Center on the Virginia Tech campus in Blacksburg.

Figure 15: Route 40 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- Only route with direct service to Blacksburg, Christiansburg, and New River Valley Mall
- Multiple connection opportunities at The Hub
- Late night service on Thursday, Friday, and Saturday

Weaknesses

- Very low frequencies at all times
- Very low ridership on trips after 7:40 pm
- No Sunday service
- No city service
- No weekday morning service
- Low ridership and productivity

- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route around Radford University

Opportunities

- Provide morning and midday service on weekdays and Saturdays to at least Christiansburg so that Radford University students and Radford residents can access services there
- Eliminate late night service on Thursdays due to low ridership.

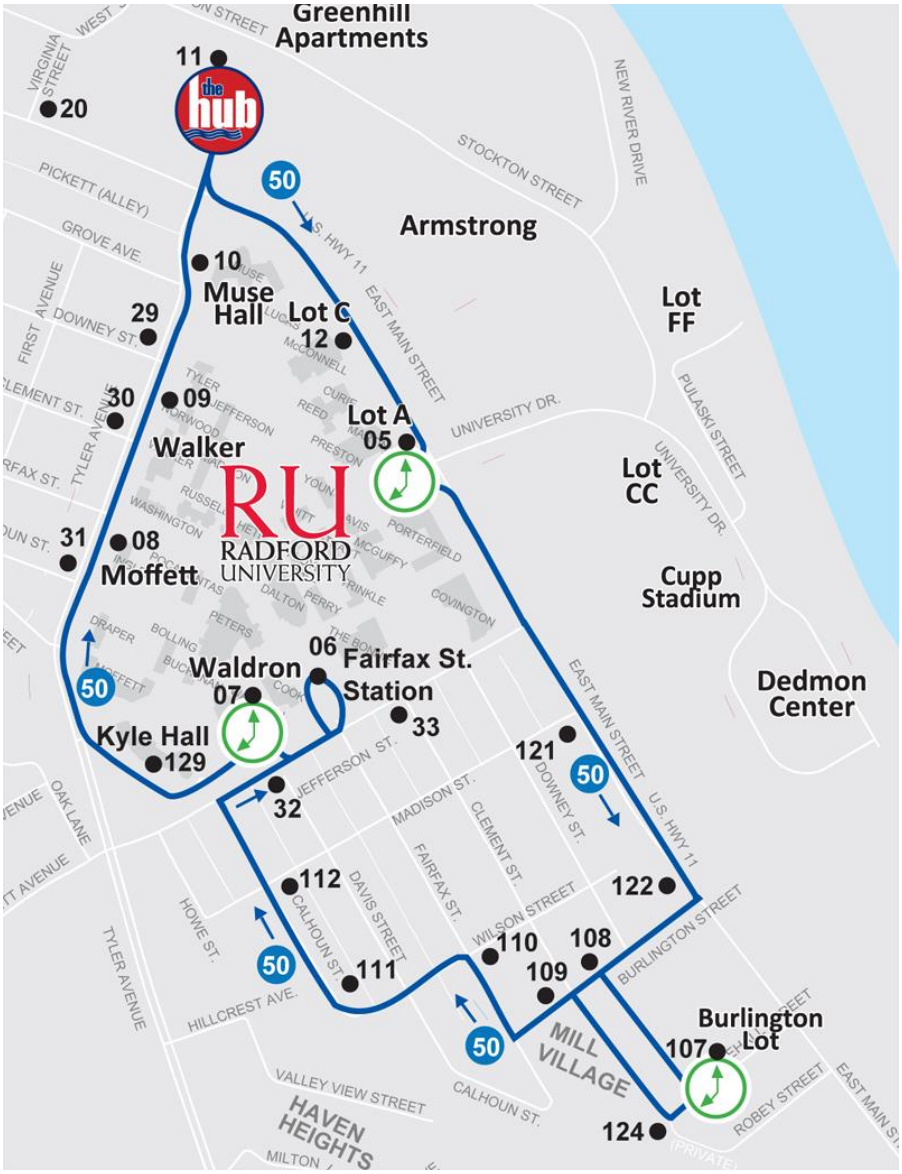
Route 50: Highlander Circulator

SERVICE DESCRIPTION

Route 50 (shown in Figure 16) operates on weekdays only during regular service, between Burlington Lot and The Hub. The route travels primarily along Burlington Street, Fairfax Street, Wilson Street, Calhoun Street, Jefferson Street, Tyler Avenue, and East Main Street. The route operates as a one-way loop, with all stops served in only one direction. On Saturdays during regular service and during city service, the route is replaced by Route 15.

Passengers may transfer between Route 50 and other Radford Transit services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 16: Route 50 Map



OPERATING CHARACTERISTICS

The route operates during regular service weekdays only, from 7:00 AM until 10:05 PM. It operates every 10 minutes from start of service until 6:50 PM, and every 20 minutes from 6:50 PM until end of service. The route offers connections to all Radford Transit routes at The Hub, and serves activity generators such as Mill Village, Radford University, and The Hub. Table 10 summarizes Route 50's operating characteristics.

Table 10: Operating Characteristics

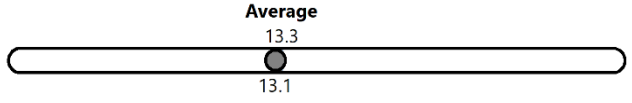
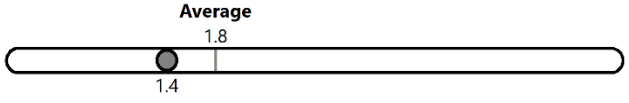
Destination	From		Burlington Lot
	To		The Hub
Regular Service Span	Weekday		7:00 AM – 10:05 PM
	Saturday		--
	Sunday		--
City Service Span	Weekday		--
	Saturday		--
	Sunday		--
Regular Service Frequency	Weekday	Peak	10
		Off-Peak	10/20
	Saturday		--
	Sunday		--
City Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Daily Ridership			353
Key Destinations			Mill Village, Radford University, The Hub

This route fails meets level of service standards during regular service; while it does not have weekend service, Route 15, which combines Routes 10 and 50, does have weekend service.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. With 13.1 passengers per hour, Route 50 ranks 3rd in the system and falls right below the system average of 13.3. The route similarly falls below average in passengers per mile (1.4), ranking 4th. Table 11 summarizes service productivity metrics for Route 50.

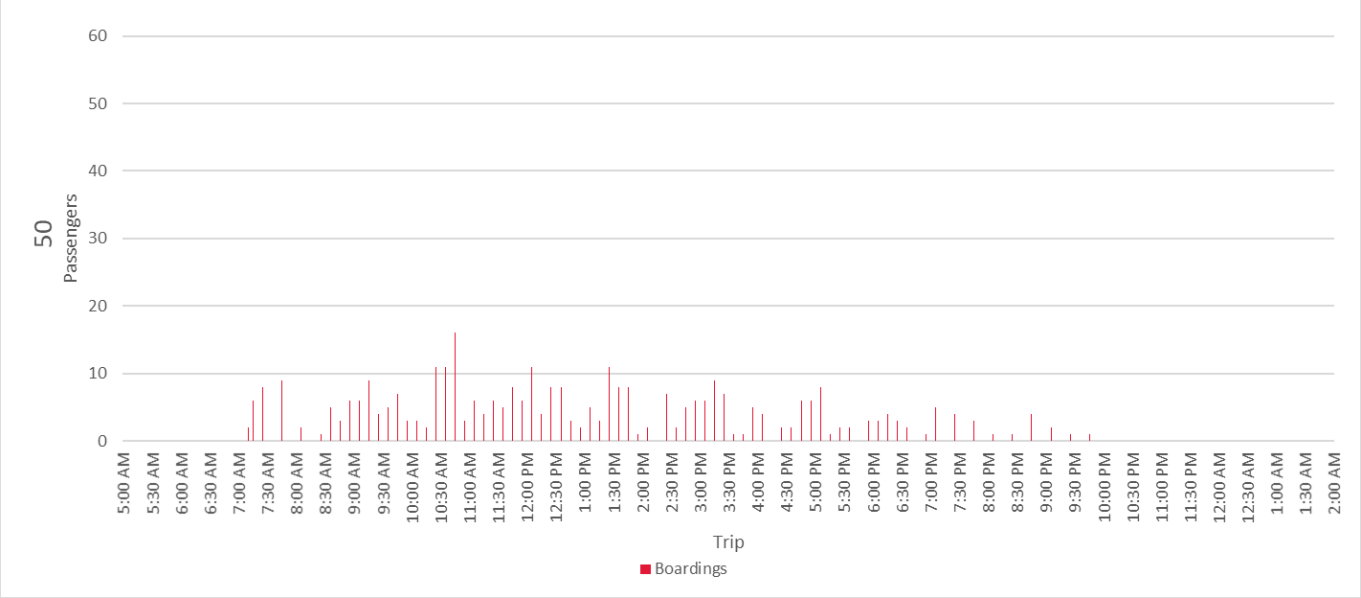
Table 11: Service Productivity Metrics: Weekday

Passengers per Hour	Passengers Per Mile
	

RIDERSHIP

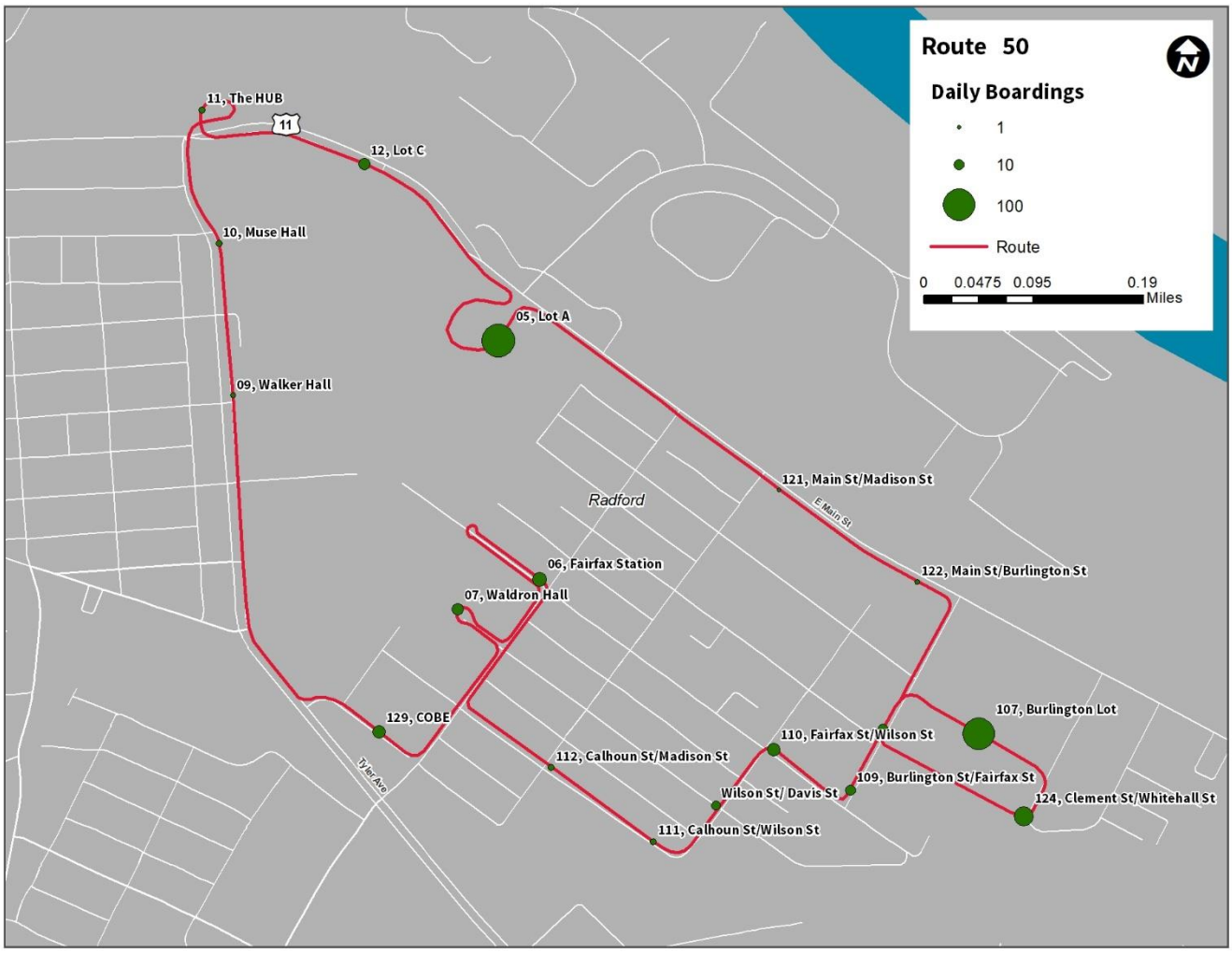
Route 50 averages 353 passengers per day, ranking 2nd among Radford Transit routes. The busiest trips are between 10:30 am and 1:30 pm.

Figure 17: Route 50 Ridership by Trip



The busiest stops are Lot A, Burlington Lot, and Clement at Whitehall.

Figure 18: Route 50 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- Extensive span of service during regular service
- Multiple connection opportunities available at The Hub
- High frequency service all day
- Serves key Radford destinations like Radford University and Mill Village

Weaknesses

- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route and is duplicative of Route 10 alignment
- Regular service Saturdays and city service is provided by Route 15, which may be confusing to passengers

Opportunities

- Operate the service in the opposite direction. This would provide a two-way loop around Radford University in conjunction with Route 10.

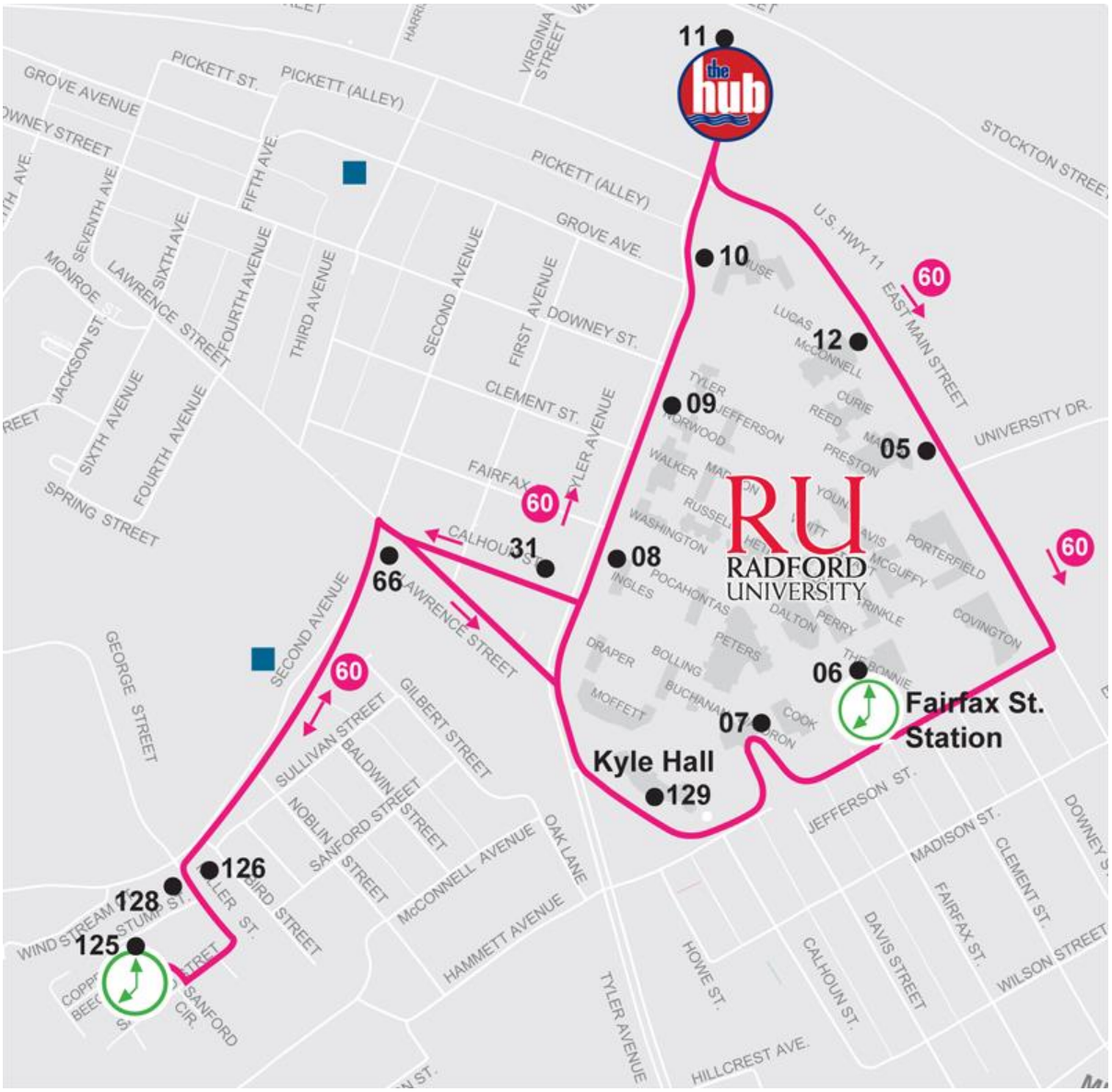
Route 60: South Beech Express

SERVICE DESCRIPTION

Route 60 (shown in Figure 19) operates on weekdays only, between Copper Beech Apartments and Fairfax Street, via The Hub. The route travels primarily along Miller Street, 2nd Avenue, Lawrence Street, Calhoun Street, Tyler Avenue, East Main Street, and Jefferson Street. Segments on Tyler Avenue, East Main Street, and Jefferson Street, near Radford University, operate as a one-way loop, with stops served in one direction only.

Passengers may transfer between Route 60 and other Radford Transit services at The Hub, which offers timed transfers at :40 past every service hour.

Figure 19: Route 60 Map



OPERATING CHARACTERISTICS

The route operates during regular service weekdays only. It operates from 7:00 AM until 9:45 PM, running every 15 minutes from start of service until 7:45 PM, and every half hour from 7:45 PM until end of service. The route offers connections to all Radford Transit routes at The Hub, and serves a variety of activity generators, including Copper Beech Apartments, Radford University, and The Hub. Table 12 summarizes Route 60's operating characteristics.

Table 12: Operating Characteristics

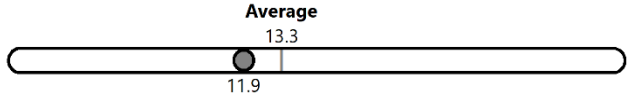
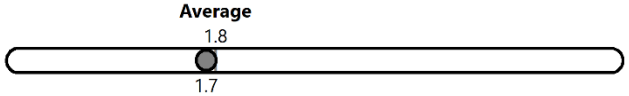
Destination	From		Copper Beech Apartments
	To		Fairfax Street
Full Service Span	Weekday		7:00 AM – 9:45 PM
	Saturday		--
	Sunday		--
Reduced Service Span	Weekday		--
	Saturday		--
	Sunday		--
Full Service Frequency	Weekday	Peak	15
		Off-Peak	15/30
	Saturday		--
	Sunday		--
Reduced Service Frequency	Weekday	Peak	--
		Off-Peak	--
	Saturday		--
	Sunday		--
Average Daily Ridership			322
Key Destinations			Copper Beech Apartments, Radford University, The Hub

This route fails to meet level of service standards during regular service, as it lacks weekend service. Additionally, off-peak service frequencies fall below level of service standards during some parts of the day.

SERVICE PRODUCTIVITY

The following analyses are based on weekday ridership data collected from September 1 to September 18, 2017. With 11.9 passengers per hour, Route 60 ranks 4th in the system and falls below the system average of 13.3. The route similarly falls slightly below average in passengers per mile (1.7), ranking 3rd. Table 13 summarizes service productivity metrics for Route 60.

Table 13: Service Productivity Metrics: Weekday

Passengers per Hour	Passengers per Mile
	

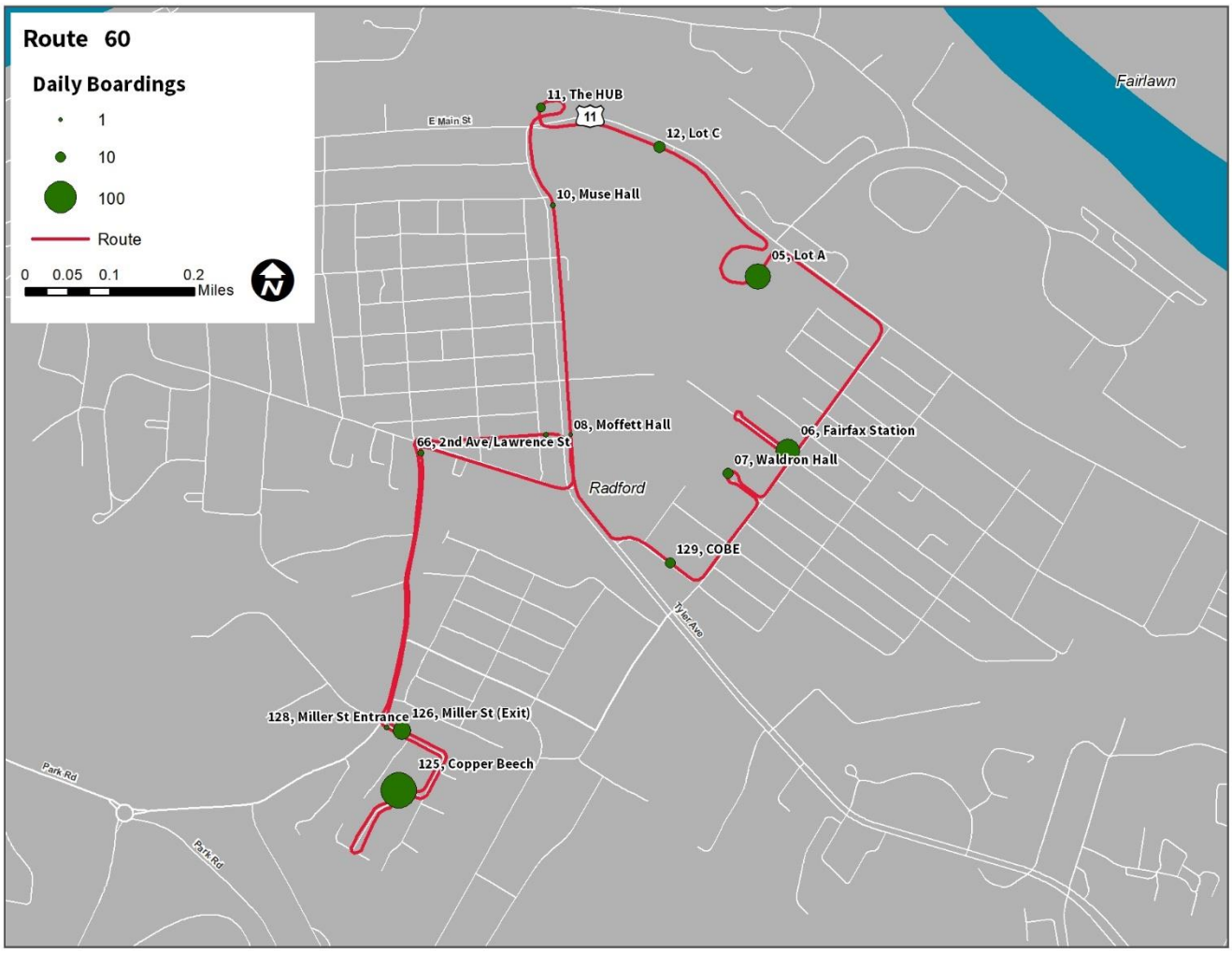
RIDERSHIP

Route 60 averages 322 passengers per day, ranking 3rd among Radford Transit services. The busiest trips are around 9:15 am, 12:15 pm, 1:45 pm, and 3:15 pm.

Figure 20: Route 60 Ridership by Trip

The busiest stops are Copper Beech, Lot A, and Fairfax Station.

Figure 21: Route 60 Ridership by Stop



SUMMARY OF OBSERVATIONS

Strengths

- High daytime frequencies
- Multiple connection opportunities available at The Hub
- Provides service between Copper Beech Apartments (a major student apartment complex) and Radford University

Weaknesses

- One-way loop forces passengers boarding in certain locations to ride a longer, circuitous route
- No weekend or city service – passengers from Copper Beech have to walk further to access Routes 30/31
- Limited evening frequencies

Opportunities

- Operate in the opposite direction around Radford University to provide two-way loop service in conjunction with Route 10

- Add Saturday service during regular service, or consider extending Routes 30/31 into Copper Beech on Saturdays

Appendix C: Route Change Sheets

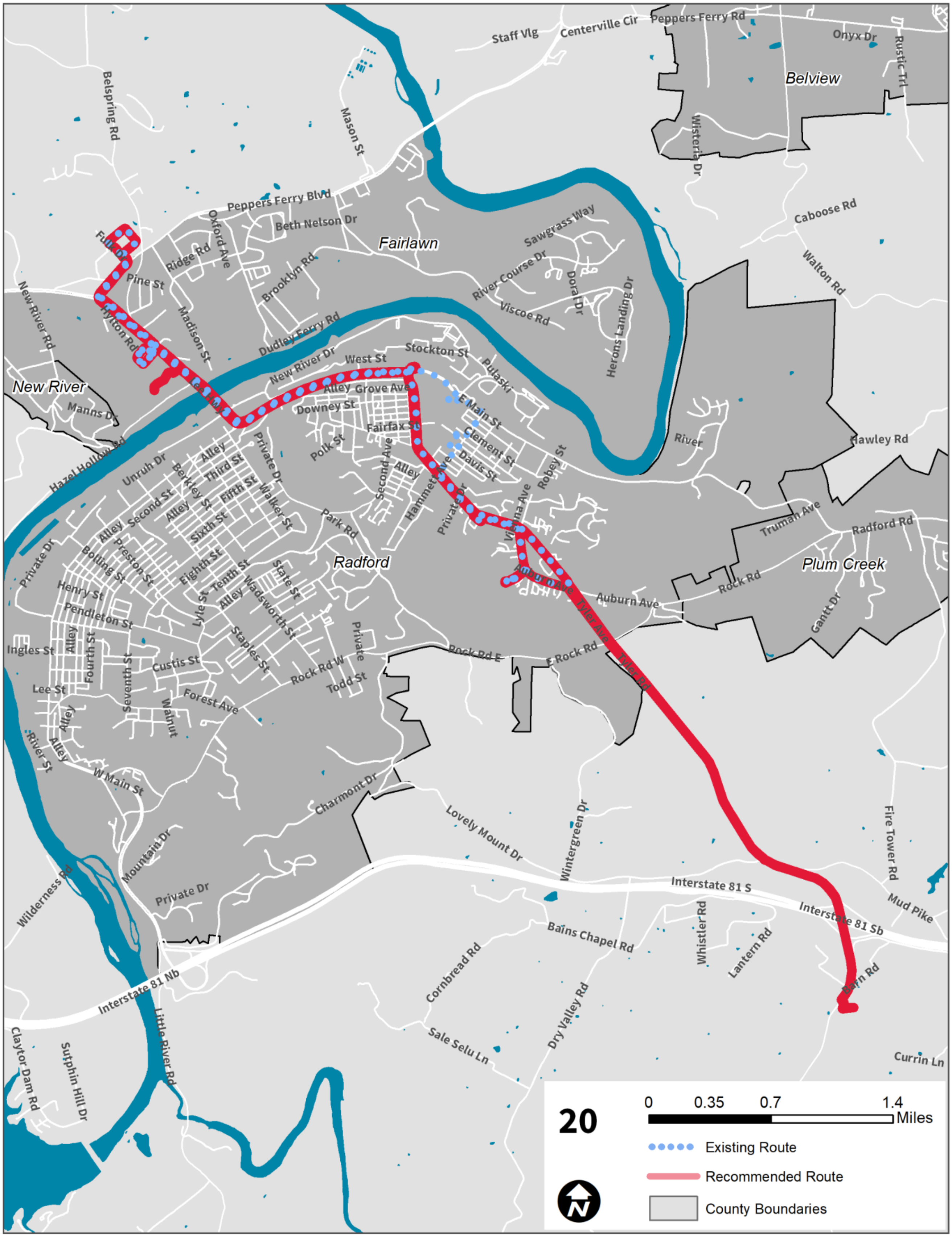
Route 10			Existing	Proposed
	From		New River Drive	New River Drive
	To		Waldron Hall	Waldron Hall
Regular Service Span	**Weekday**		7:00 AM – 10:05 PM/2:50 AM	7:00 AM – 10:05 PM/2:50 AM
	Saturday		--	--
	Sunday		5:50 PM – 11:50 PM	5:50 PM – 11:50 PM
City Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Regular Service Frequency	**Weekday**	**Peak**	10	8
		Off-Peak	10/15/30	10/15/30
	Saturday		--	--
	Sunday		30	30
City Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	Service will be added during peak times to ensure that buses do not become overcrowded in the future. Service will end at 10:05 PM on Thursdays instead of 2:50 AM due to low ridership after 10:00 PM.			
Justification for Change	Radford Transit will be using smaller buses in the future, so to prevent overcrowding an additional vehicle will be used on the route.			
Areas with Reduced Service	None			
Implementation Timeframe	Short Term (1 to 3 years)			


Valley Center Dr
Herons Landing Dr
Viscoe Rd
Fairlawn
Private Dr
Rockford St
Stockton St
Private Dr
Private Dr
Private Dr
Pulaski
University Dr
Alley
Grove Ave
Private Dr
Downey St
Alley
Clement St
Radford
Adams St
Alley
First Ave
Fairfax St
Private St
Private Dr
Alley
Clement St
Madison St
Downey St
Calhoun St
Lawrence St
Alley
E Main St
Burlington St
Adams St
Private St
Howe St
Fairfax St
Alley
Gilbert St
Alley
Calhoun St
Davis St
Wilson St
Whitehall St
Robey St
Baldwin St
Sanford St
Oak Ln
Howe St
Alley
Tyler Ave
Noblin St
Mcconnell Ave
Hammett Ave
Hillcrest Ave
Howe St
Bird St
10
0 0.05 0.1 0.2
Miles
Existing Route
Recommended Route
County Boundaries

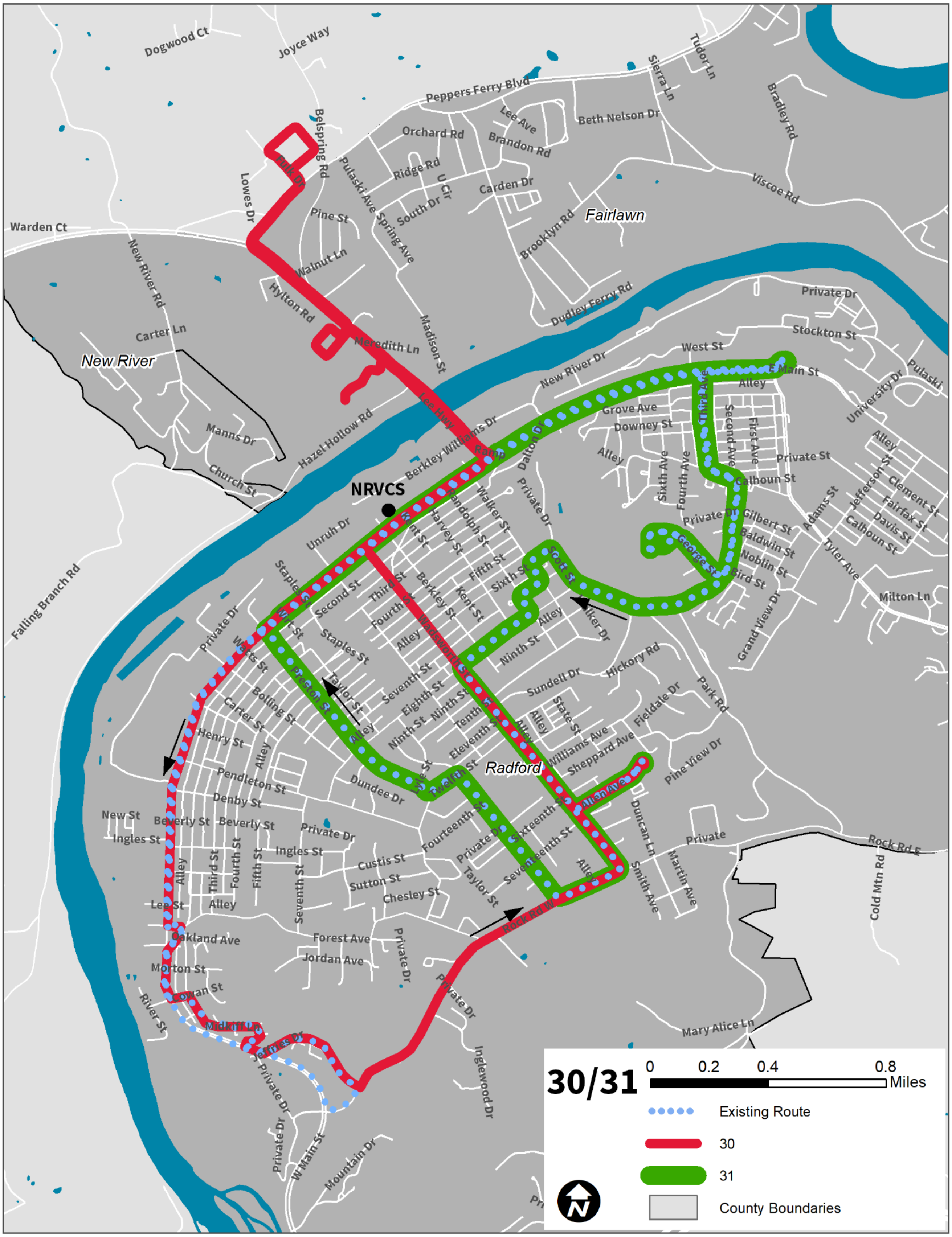
Route 15			Existing	Proposed
	From		The Hub	The Hub
	To		Waldron Hall	Waldron Hall
Regular Service Span	**Weekday**		--	--
	Saturday		10:20 AM – 2:50 AM	10:20 AM – 2:50 AM
	Sunday		--	--
City Service Span	**Weekday**		7:20 AM – 8:00 PM	7:20 AM – 8:00 PM
	Saturday		10:20 AM – 8:00 PM	10:20 AM – 8:00 PM
	Sunday		--	--
Regular Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		30	30
	Sunday		--	--
City Service Frequency	Weekday	Peak	30	30
		Off-Peak	30	30
	Saturday		30	30
	Sunday		--	--
Description of Change	No changes are proposed for Route 15.			
Justification for Change	--			
Areas with Reduced Service	None			
Implementation Timeframe	--			


Fairlawn
Radford
Herons Landing Dr
Viscoe Rd
Private Dr
Rockford St
Stockton St
Pulaski
Alley
Grove Ave
Downey St
Clement St
First Ave
Fairfax St
Private St
Calhoun St
Lawrence St
Adams St
Madison St
E Main St
Gilbert St
Baldwin St
Sanford St
Oak Ln
Tyler Ave
Howe St
Davis St
Robey St
McConnell Ave
Noblin St
Hammett Ave
Bird St
Madison St
Hillcrest Ave
Valley
15
0 0.05 0.1 0.2
Miles
Existing Route
Recommended Route
County Boundaries

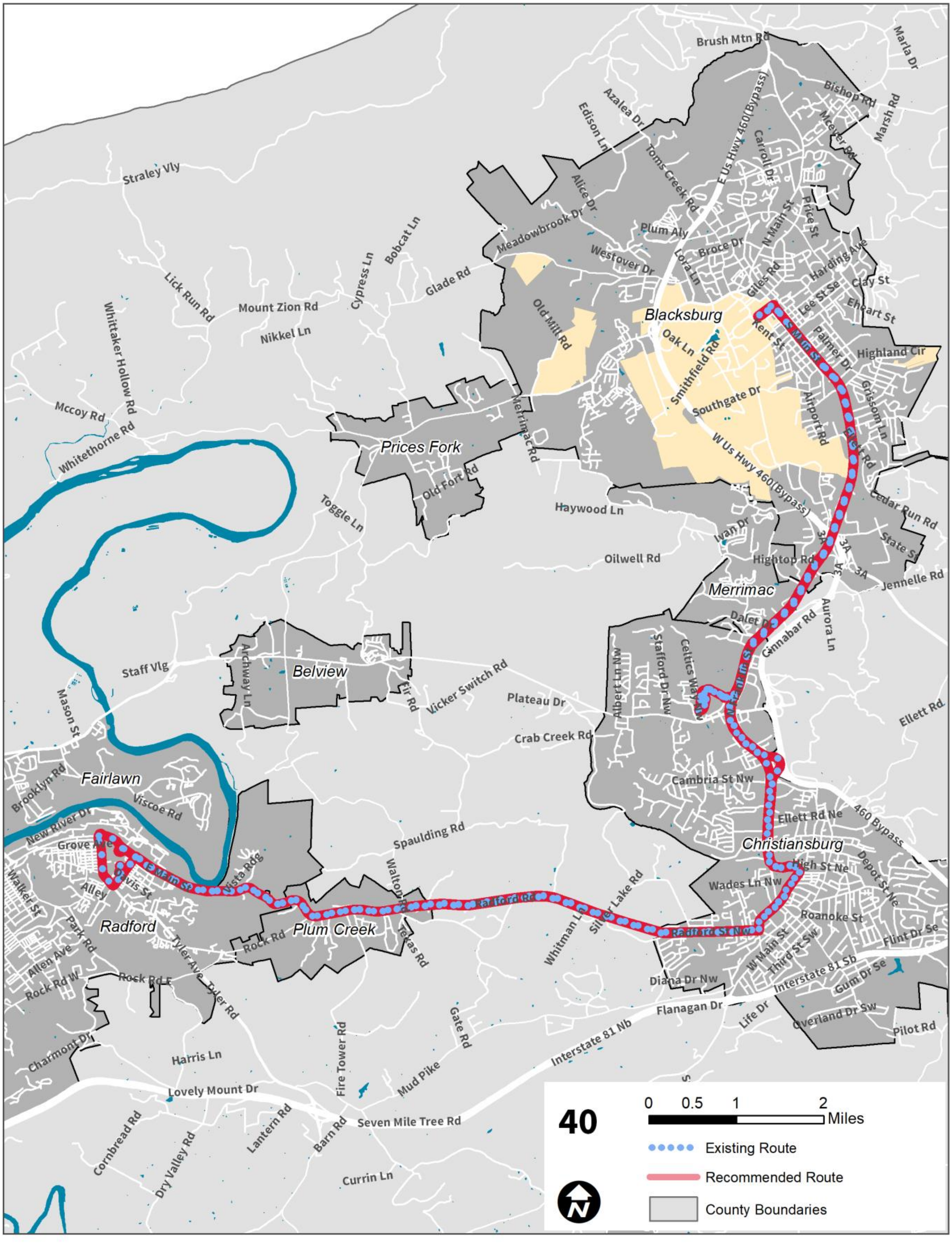
Route 20			Existing	Proposed
	From		The Hub	Carillion Hospital/The Hub
	To		Fairlawn Walmart	Fairlawn Walmart
Regular Service Span	**Weekday**		7:00 AM – 7:40 PM	7:00 AM – 7:40 PM
	Saturday		10:00 AM – 7:40 PM	10:00 AM – 7:40 PM
	Sunday		--	11:00 AM – 6:00 PM
City Service Span	**Weekday**		7:00 AM – 7:40 PM	7:00 AM – 7:40 PM
	Saturday		10:00 AM – 7:40 PM	10:00 AM – 7:40 PM
	Sunday		--	11:00 AM – 6:00 PM
Regular Service Frequency	**Weekday**	**Peak**	60	30-60 / 120
		Off-Peak	60	60
	Saturday		60	60
	Sunday		--	60
City Service Frequency	**Weekday**	**Peak**	60	30-60 / 120
		Off-Peak	60	60
	Saturday		60	60
	Sunday		--	60
Description of Change	In the short term, an additional stop will be added near the intersection of US 11 and Peppers Ferry Road when this intersection is redesigned, and the route will also serve the Virginia Employment Commission office on University Park Drive in Fairlawn. In the mid term, service will be added to Carillion Hospital every 2 hours – these trips will also serve Walmart resulting in a 30 to 60 minute headway overall to Walmart. To reduce service duplication, the route will no longer use East Main Street (east of The Hub) or Jefferson Street in the mid term. Finally, Sunday service will be added in the mid term.			
Justification for Change	Carillion Hospital has high demand for service as identified in the plan. There is also planned developments around the hospital that will increase future demand for transit service.			
Areas with Reduced Service	The route will no longer use East Main Street east of The Hub or Jefferson Street. Passengers can transfer to the route at The Hub or along Tyler Avenue.			
Implementation Timeframe	Short term (1 to 3 years) / Mid term (3 to 10 years)			


20
0
0.35
0.7
1.4
Miles
Existing Route
Recommended Route
County Boundaries
Radford
Fairlawn
Belview
New River
Plum Creek
Peppers Ferry Blvd
Peppers Ferry Rd
Staff Vlg
Centerville Cir
Onyx Dr
Rustic Trl
Wisteria Dr
Caboose Rd
Walton Rd
Hawley Rd
Mason St
Belspring Rd
Beth Nelson Dr
Oxford Ave
Ridge Rd
Brooklyn Rd
Sawgrass Way
River Course Dr
Doral Dr
Herons Landing Dr
Viscoe Rd
Pine St
Hylton Rd
Madison St
Dudley Ferry Rd
New River Dr
West St
Stockton St
Pulaski
Grove Ave
Downey St
Fairfax St
Polk St
E Main St
Clement St
Davis St
Robey St
Second Ave
Hammet Ave
Virginia Ave
Auburn Ave
Tyler Ave
Tyler Rd
Truman Ave
Radford Rd
Rock Rd
Gantt Dr
Manns Dr
Hazel Hollow Rd
Unruh Dr
Third St
Fifth St
Sixth St
Eighth St
Tenth St
Berkley St
Private Dr
Walker St
Park Rd
Preston St
Bolling St
Henry St
Pendleton St
Ingles St
Fourth St
Seventh St
Lee St
Custis St
Wadsworth St
Staples St
State St
Lyle St
Rock Rd W
Rock Rd E
E Rock Rd
Todd St
Forest Ave
Walnut
River St
W Main St
Charmont Dr
Lovely Mount Dr
Wintergreen Dr
Mountain Dr
Wilderness Rd
Interstate 81 S
Interstate 81 Sb
Interstate 81 Nb
Fire Tower Rd
Mud Pike
Bains Chapel Rd
Whistler Rd
Lantern Rd
Cornbread Rd
Dry Valley Rd
Sale Selu Ln
Currin Ln
Little River Rd
Claytor Dam Rd
Sutphin Hill Dr
River

Route 30/31			Existing	Proposed
	From		Radford Recreation Center	Fairlawn Walmart/Radford Recreation Center
	To		Jeffries Drive	Jeffries Drive/The Hub
Regular Service Span	**Weekday**		7:00 AM – 8:20 PM	7:00 AM – 10:00 PM
	Saturday		10:00 AM – 8:20 PM	10:00 AM – 10:00 PM
	Sunday		--	11:00 AM – 6:00 PM
City Service Span	**Weekday**		7:00 AM – 8:20 PM	7:00 AM – 10:00 PM
	Saturday		10:00 AM – 8:20 PM	10:00 AM – 10:00 PM
	Sunday		--	11:00 AM – 6:00 PM
Regular Service Frequency	**Weekday**	**Peak**	60	30/60
		Off-Peak	60	30/60
	Saturday		60	30/60
	Sunday		--	30/60
City Service Frequency	**Weekday**	**Peak**	60	30/60
		Off-Peak	60	30/60
	Saturday		60	30/60
	Sunday		--	30/60
Description of Change	In the short term, the service span on the route will be extended until 10:00 PM on weekdays and Saturdays, and Sunday service will be added. In the mid term, the route will be split into two. Route 30 will be a one way loop between the Fairlawn Walmart to Jeffries Drive, heading east on West Rock Road, and north on Wadsworth Street to Main Street, and returning from the Walmart westbound on West Main Street. Route 31 will be a one way loop from Willow Woods to The Hub, heading west on Scott Street, south on Wadsworth Street, and north on Preston Street. The two routes will have a timed transfer at NRVCS, 407 West Main Street. Route 30 will operate every hour, while Route 31 will operate every half-hour.			
Justification for Change	The route serves many city residents who need access to service later in the evening to reach shopping destinations and jobs with non-traditional work hours. Extending the route will also eliminate the need for city residents to transfer to Route 20 to reach the shopping destinations and jobs in Fairlawn.			
Areas with Reduced Service	None			
Implementation Timeframe	Short term (1 to 3 years) / Mid term (3 to 10 years)			


30/31
0 0.2 0.4 0.8 Miles
Existing Route
30
31
County Boundaries
NRVCS
Radford
Fairlawn
New River
Peppers Ferry Blvd
Dogwood Ct
Joyce Way
Belspring Rd
Park Dr
Lowes Dr
Pulaski Ave
Orchard Rd
Lee Ave
Brandon Rd
Beth Nelson Dr
Sierra Ln
Tudor Ln
Bradley Rd
Viscoe Rd
Ridge Rd
U Cir
South Dr
Carden Dr
Brooklyn Rd
Spring Ave
Pine St
Walnut Ln
Warden Ct
New River Rd
Hylton Rd
Meredith Ln
Madison St
Dudley Ferry Rd
Private Dr
Stockton St
Carter Ln
Manns Dr
Church St
Hazel Hollow Rd
Lee Hwy
Berkley Williams Dr
Ramp
Dalton Dr
New River Dr
West St
E Main St
Alley
Grove Ave
Downey St
Third Ave
Second Ave
First Ave
Sixth Ave
Fourth Ave
Calhoun St
Gilbert St
Baldwin St
Noblin St
Bird St
George St
Adams St
Jefferson St
Clement St
Fairfax St
Davis St
Tyler Ave
University Dr
Pulaski
Milton Ln
Grand View Dr
Falling Branch Rd
Unruh Dr
Walker St
Randolph St
Harvey St
Fifth St
Sixth St
Scott St
Second St
Third St
Fourth St
Berkley St
Kent St
Staples St
Wadsworth St
Ninth St
Hickory Rd
Park Rd
Sundell Dr
Watts St
Bolling St
Carter St
Henry St
Preston St
Taylor St
Seventh St
Eighth St
Tenth St
Eleventh St
Twelfth St
State St
Williams Ave
Sheppard Ave
Fieldale Dr
Pine View Dr
Pendleton St
Denby St
Dundee Dr
Allen Ave
New St
Beverly St
Ingles St
Private Dr
Custis St
Sutton St
Chesley St
Fourteenth St
Sixteenth St
Seventeenth St
Duncan Ln
Smith Ave
Martin Ave
Private
Rock Rd E
Cold Mtn Rd
Lee St
Oakland Ave
Morton St
Cowan St
Forest Ave
Jordan Ave
Rock Rd W
River St
Jeffries Dr
W Main St
Mountain Dr
Inglewood Dr
Mary Alice Ln

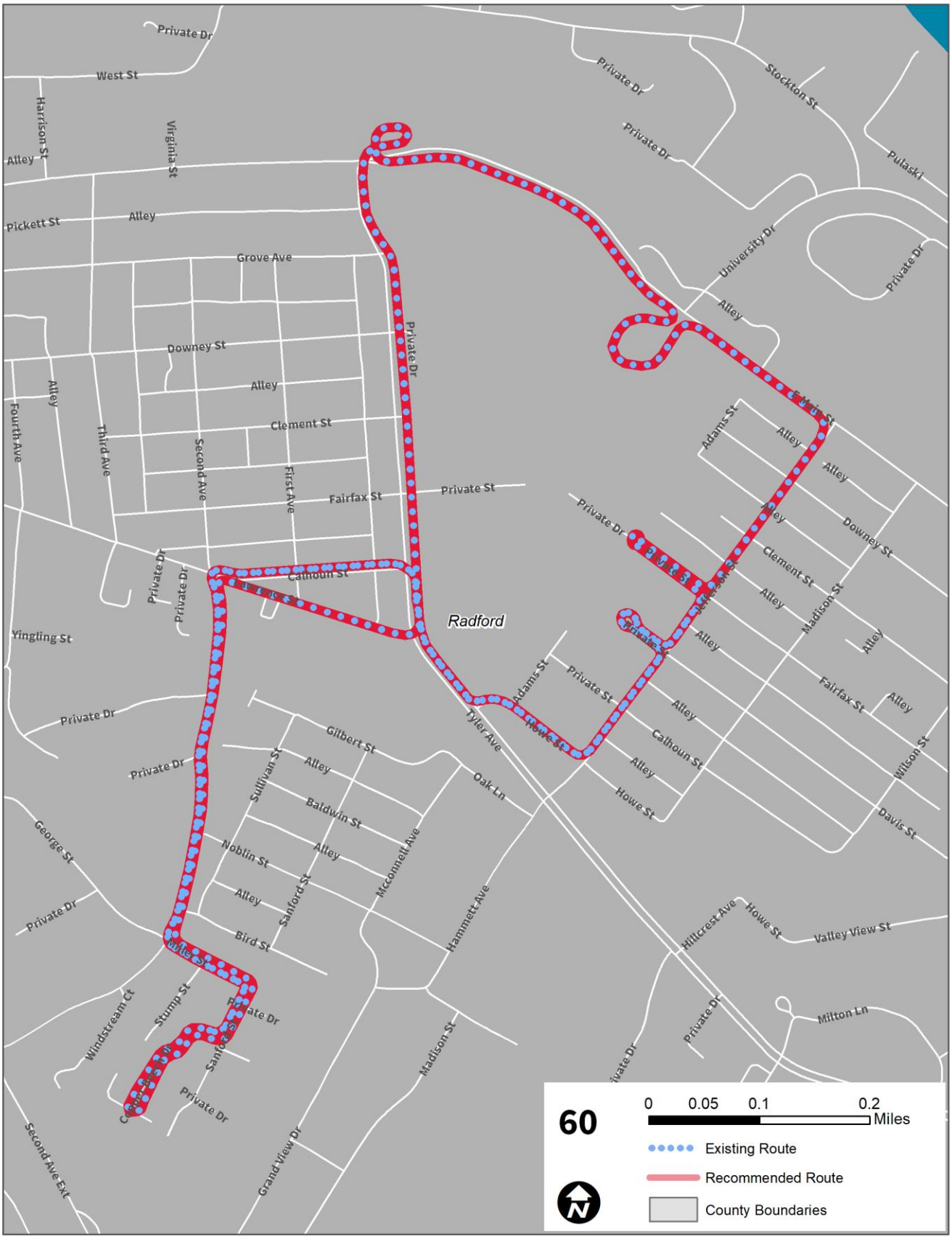
Route 40			Existing	Proposed
	From		The Hub	The Hub
	To		Squires Student Center	Squires Student Center
Regular Service Span	**Weekday**		2:40 PM – 9:40 PM/2:40 AM	7:00 AM – 2:40 PM (to NRV Mall only); 2:40 PM – 9:40 PM/2:40 AM
	Saturday		10:40 AM – 2:40 AM	10:40 AM – 2:40 AM
	Sunday		--	--
City Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Regular Service Frequency	**Weekday**	**Peak**	60	60
		Off-Peak	60	60
	Saturday		60	60
	Sunday		--	--
City Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	In the short term, additional stops will be added to the route in Blacksburg along Main Street at major destinations, including First and Main. Thursday late night service will end at 9:40 PM due to low ridership after that time. In the mid term, select trips will be deviated to the Exit 118 Park and Ride in Christiansburg to connect with the Virginia Breeze bus and the route will serve the proposed Amtrak Station across from the Christiansburg Aquatic Center. Additionally, morning service will be added between The Hub and the NRV Mall in Christiansburg on weekdays in the long term.			
Justification for Change	The additional stops will increase ridership by offering riders more destinations and increasing connectivity. The addition of morning service will also increase ridership by providing a more consistent schedule and allowing for commuting to Blacksburg and Christiansburg.			
Areas with Reduced Service	The entire route after 9:40 PM on Thursdays.			
Implementation Timeframe	Short Term (1 to 3 years) / Mid term (3 to 10 years) / Long term (10 plus years)			


40
0 0.5 1 2
Miles
Existing Route
Recommended Route
County Boundaries
Blacksburg
Prices Fork
Merrimac
Belview
Fairlawn
Radford
Plum Creek
Christiansburg

Route 50			Existing	Proposed
	From		Burlington Lot	Burlington Lot
	To		The Hub	The Hub
Regular Service Span	**Weekday**		7:00 AM – 10:05 PM	7:00 AM – 10:05 PM
	Saturday		--	--
	Sunday		--	--
City Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Regular Service Frequency	**Weekday**	**Peak**	10	10
		Off-Peak	10/20	10/20
	Saturday		--	--
	Sunday		--	--
City Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	In the long term, improvements will be made to The Hub that would allow for buses to turn into the hub from Main Street – this would allow for Route 50 to operate in a counterclockwise direction, giving riders at Radford University two-way service along Tyler Avenue and Main Street.			
Justification for Change	Route 50 duplicates Route 10 on Tyler Avenue and Main Street; running the route in the opposite direction would reduce travel times for riders traveling from certain parts of campus to others.			
Areas with Reduced Service	None			
Implementation Timeframe	Long term (10 plus years)			


Fairlawn
Radford
Viscoe Rd
New River Dr
Private Dr
Rockford St
Stockton St
E Main St
Alley
Grove Ave
Downey St
Clement St
First Ave
Fairfax St
Private St
Calhoun St
Lawrence St
Putaski
University Dr
Adams St
Jefferson St
Madison St
Howe St
Gilbert St
Baldwin St
Sanford St
Oak Ln
Noblin St
McConnell Ave
Hammett Ave
Bird St
Grand View Dr
Valley View St
Tyler Ave
College Park Dr
Robey St
Davis St
50
0 0.05 0.1 0.2
Miles
Existing Route
Recommended Route
County Boundaries

Route 60			Existing	Proposed
	From		Copper Beech Apartments	Copper Beech Apartments
	To		Fairfax Street	Fairfax Street
Regular Service Span	**Weekday**		7:00 AM – 9:45 PM	7:00 AM – 9:45 PM
	Saturday		--	--
	Sunday		--	--
City Service Span	**Weekday**		--	--
	Saturday		--	--
	Sunday		--	--
Regular Service Frequency	**Weekday**	**Peak**	15	15
		Off-Peak	15/30	15/30
	Saturday		--	--
	Sunday		--	--
City Service Frequency	**Weekday**	**Peak**	--	--
		Off-Peak	--	--
	Saturday		--	--
	Sunday		--	--
Description of Change	No changes are proposed.			
Justification for Change	--			
Areas with Reduced Service	None			
Implementation Timeframe	--			


Private Dr
West St
Harrison St
Virginia St
Alley
Pickett St
Alley
Grove Ave
Downey St
Alley
Clement St
Fourth Ave
Third Ave
Second Ave
First Ave
Fairfax St
Private St
Calhoun St
Howe St
Yingling St
Radford
Private Dr
Gilbert St
Sullivan St
Baldwin St
Noblin St
Sanford St
Bird St
Mcconnell Ave
Oak Ln
Tyler Ave
Hammett Ave
George St
Windstream Ct
Stump St
Madison St
Grand View Dr
Second Ave Ext
Stockton St
Pulaski
University Dr
Adams St
Madison St
Wilson St
Davis St
Hillcrest Ave
Valley View St
Milton Ln
60
0 0.05 0.1 0.2
Miles
Existing Route
Recommended Route
County Boundaries

Appendix D: APTA Maintenance Facility Calculator

APTA Bus Maintenance Facility Program/Space Calculator Last updated:08/27/2009

Input Requirements

APTA AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

Program Inputs

Fleet Information	Veh. Maint. & Stored	Veh. Maint., Not Stored
# of Buses (longer than 40 feet)	0	0
# of Buses (up to and incl. 40 feet	2	0
# of Mobility/ ParaTransit Vehicles	20	0
# of Non-Revenue Vehicles	3	0
Total Vehicles	**25**	**0**
Spaces for Visitor Parking	5	

	Staffing Information
3	Administration Staff
4	Operations Staff
3	Maintenance Staff
10	**Total Staff**
15	Fixed Route Operators
0	ParaTransit Operators
0	Other Staff
15	**Total Operators**

Facility Circulation Pattern: Exterior Circulation

Bus Parking Pattern: In-Line (head to tail)

Facility Type: Level III Facility

Program Calculator

Programmed Space		
Administration		
Operations Office staff		
Operations Vehicle Operators		
Maintenance		
Articulated Bays		
Paratransit Bays		
Work Bays		
Service Lanes		
Fueling Lanes		
Interior Parking (buses)	○	
Exterior Parking (buses)	◉	
Exterior Parking (cars)		

	Parameters
3	# of Admin office staff
4	# of Ops office staff
15	# of Vehicle Operators
25	# of vehicles maintained
0	# of articulated bays
1	# of paratransit bays
1	# of work bays
25	# of vehicles thru service lane
1	# of fueling lanes
23	# of cars parked

Unit (Net Sq. Ft.)	Grossing Factor	GSF (Nearest 100)	Existing GSF
115	1.32	500	0
115	1.32	600	0
45	1.20	800	0
		3,800	0
1,600	1.10	0	0
500	1.10	600	0
1,200	1.10	1,300	0
4,200	1.20	5,000	0
0	1.14		
bus parking pattern factor	1.00	0	0
building subtotal		10,700	0
Level of Facility factor	1.10		
Total Building Area		11,800	0
10,900 *exterior bus parking*		10,900	0
200 *automobile parking*	1.65	7,400	0
bus parking pattern factor	1.33	14,500	
terior parked bus site circulation	1.20	17,400	
terior parked bus site circulation	0.50	0	
exterior parking subtotal		24,800	0
total building area + all parking	1.20	43,900	0
Site Required (USABLE acres)		1.1	
*Total Site Required (acres)**	1.35	1.5 - 1.8	
		Difference in Acreage	*-1.5*

*Tranist Bus Facility Site Size National Averages

Buses	Urban (acres)	Suburban (acres)
50	3 to 4	5 to 6
100	6 to 7	10 to 11
150	8 to 10	14 to 16
200	11 to 13	19 to 21
250	14 to 17	24 to 27

Your site size may vary