RADAR

Transit Development Plan

FY2018 - FY2027

FINAL REPORT

August 2018

Prepared for
Roanoke Agency Dial A Ride (RADAR)

Under contract to
Virginia Department of Rail and Public Transportation

Prepared by
KFH Group, Inc.

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INTRODUCTION

Virginia's Department of Rail and Public Transportation (DRPT) requires that any public transit operator receiving state funding prepare, adopt, and submit a Transit Development Plan (TDP). These plans also provide a solid foundation for funding requests and feed directly into the programming process.

Beyond these administrative motivations, TDPs help transit operators in the Commonwealth of Virginia improve their efficiency and effectiveness by identifying the need and required resources for modifying and enhancing services provided to the general public. It is helpful to approach the preparation of a transit development plan as a strategic planning and visioning process. A TDP is not an operations plan. By its very nature, the TDP must address strategic issues. The TDP offers opportunities to rethink transit's mission in a given area and define actions to help the agency achieve its mission.

PURPOSES OF THE TRANSIT DEVELOPMENT PLAN

DRPT provides a set of TDP requirements that form the basis of the planning effort. The purposes of a transit development plan are to:

1. Serve as a planning, management, and policy document for the transit operators.
2. Inform DRPT of transit operators' capital, operating and maintenance needs.
3. Provide the basis for inclusion of an operator's capital and operating programs in planning and programming documents such as: the Six Year Improvement Program (SYIP), Statewide Transportation Improvement Program (STIP), Transportation Improvement Program (TIP) and Constrained Long Range Plan (CLRP).
4. Provide a clear understanding of unmet or unfunded needs.
5. Develop and track the progress of mid- and long-term visions for transit in the region.
6. Plan to continually improve efficiency and effectiveness of public transportation services.
7. Be better prepared to respond to internal and external factors.

PLANNING HORIZON

The planning horizon for a TDP is ten years; this includes the fiscal year for which funds are being sought and the subsequent nine years. The minimum ten-year planning horizon will provide a clearer understanding of unmet or unfunded needs. Affordability is not a reliable measure of what is needed. A longer planning allows for agencies to better prepare for SMART SCALE and other discretionary grant programs. A longer planning horizon also reflects significant capital replacement/rehabilitation needs, or the capital and operating budget implications of significant service expansion.

TRANSIT DEVELOPMENT PLAN UPDATE FREQUENCY

At a minimum, a new transit development plan (referred to as a "major update") must be prepared every six years. The purpose of the six-year TDP major update is to take a fresh look at conditions and accordingly develop plans. This major update will be a new transit development plan and must include, with a high level of detail, each of the six required TDP chapters discussed in this required document.

The most recent RADAR TDP was completed in October 2009 and outlined fiscal years 2010 through 2015 transit improvement needs. This TDP for RADAR serves as the major update to meet DRPT requirements and highlights the transit program for FY 2018-FY 2027. In addition to the TDP, RADAR recently participated in the Roanoke Valley Transit Vision Plan, which was led by the Roanoke Valley Transportation Planning Organization. Completed in 2016, the Vision Plan was a three-year effort that identified the following goals:

- Record the region's vision, goals and strategies for improving the transit mode of transportation in the Roanoke Valley as identified through input from citizens and local leaders.
- Serve as a resource guide for transit service planning in the Roanoke Valley.
- Encourage local governments to incorporate transit supportive development and infrastructure in local ordinances, policies, plans, and related guiding documents.
- Identify and map all existing and proposed transit services.
- Identify and map locations where transit services are needed and desired.
- Provide strategies for accomplishing the needed services in a reasonable timeframe.[1]

[1] Roanoke Valley Transit Vision Plan, Executive Summary, September 2016, prepared by the Roanoke Valley Transportation Planning Organization with assistance by Foursquare Integrated Transportation Planning and Michael Baker International.

Given the recent and comprehensive transit planning tasks that were accomplished through the Roanoke Valley Transit Vision Plan, much of the data, analysis, and short-term recommendations generated for the Vision Plan will be incorporated into the current TDP.

DRPT recognizes that a TDP is a living document. The planning process must provide flexibility to address major changes in areas such as: organizational/governance changes, fare changes, new services/facilities, available funding, economic conditions, demographic and employment patterns, and changes in federal and state laws and regulations. To reflect and address these changes, the plan must be amended every year if necessary. Though minor, these annual updates serve as intermediate corrections in accounting for unexpected changes.

The annual TDP update must replace any language that is no longer accurate or conflicts with updated language. If there are no major changes or inaccuracies in the language, the only update required is a financial plan that removes the previous year and adds a new tenth year (rolling basis). Using this format, the TDP covers the present ten-year period beginning with the current year.

The TDP will serve as a management and policy document for RADAR, provide DRPT with an up-to-date set of related transit capital and operating budgets, and provide the basis for including capital and operating programs in the Six Year Improvement Program (SYIP), the Statewide Transportation Improvement Program (STIP), and the Constrained Long-Range Multimodal Transportation Plan (CLRMTP).

PLAN REQUIREMENTS

This TDP is structured in the following order to address all plan requirements:

- **Chapter 1: Overview of RADAR** (this chapter) provides an overview of the system and background information and data of the transit program and background information and data that will be used for subsequent data collection, analysis and eventual recommendations.

- **Chapter 2: Goals, Objectives, and Service Design Standards** describes the current goals, objectives and service design standards, and the process for establishing, reviewing and updating these goals, objectives, and standards.

- **Chapter 3: Service and System Evaluation and Transit Needs Analysis** includes performance measures to evaluate route-level and system-wide performance against the performance standards for each mode and/or type of services operated by RADAR.

- **Chapter 4: Service and Capital Improvement Plan** is the centerpiece of the plan, as it focuses on improving transit service by modifying existing services and by meeting previously unmet needs.

- **Chapter 5: Implementation Plan** provides guidance to carry out the operations and services described in Chapter 4.

- **Chapter 6: Financial Plan** projects service costs and identifies financial resources related to the service improvements that can be realistically achieved and when those service improvements should be implemented..

RADAR Background

The Unified Human Services Transportation Systems, Inc. known as Roanoke Area Dial-A-Ride (RADAR) operates rural public transit services and specialized transit predominately in the Greater Roanoke Valley. RADAR provides complementary ADA paratransit, termed Specialized Transit, and Arranged Rides (STAR). Major roadway corridors in the region include I-81, I-581, US 220, US 460, US 11, US 221, and the Blue Ridge Parkway. Roanoke also serves as a significant rail hub for the Norfolk-Southern Railway.

According to the 2015 American Community Survey, the estimated population for the jurisdictions within the service area was 399,097. Table 1-1 identifies county and city populations within the service area. Town populations are included in the county population (shaded in gray in the table below).

Table 1-1: Population in RADAR Service Jurisdictions

Jurisdiction	2000 Census Population	2010 Census Population	Percent Change 2000-2010	2015 Population Estimate	Percent Change 2010-2015
Allegany County	12,926	16,250	26%	15,677	-4%
Clifton Forge	4,289	3,884	-9%	3,839[2]	-1%
Iron Gate	404	388	-4%	354	-9%
Buena Vista	6,349	6,650	5%	6,618	-0.48%
Covington	6,303	5,961	-5%	5,658	-5%
Franklin County	47,286	56,159	19%	56,264	0.19%
Rocky Mount	4,066	4,799	18%	4,794	-0.10%
Henry County	57,930	54,151	-7%	51,881	-4%
Lexington	6,867	7,042	3%	7,262	3%
Martinsville	15,416	13,821	-10%	13,645	-1%
Roanoke	94,911	97,032	2%	99,897	3%
Roanoke County	85,778	92,376	8%	94,409	2%

[2] 2015 Population Estimate unavailable, population number is from 2015 ACS-data

Jurisdiction	2000 Census Population	2010 Census Population	Percent Change 2000-2010	2015 Population Estimate	Percent Change 2010-2015
Town of Vinton	7,782	8,098	4%	8,162[3]	1%
Rockbridge County	20,808	22,307	7%	22,354	0.21%
Salem	24,747	24,802	0.22%	25,432	3%
Total	**379,321**	**396,551**	**5%**	**399,097**	**1%**

Note: Towns are shaded grey
Cities and Counties are shaded blue
Source: U.S. Census Bureau, 2015 Population Estimates

HISTORY

Public transportation in the Roanoke Valley began with the introduction of the railway streetcar in the late 1800s. The Roanoke Street Railway Company provided streetcar service covering two miles of track with four mule-pulled cars. In 1889, another operator provided service to Vinton and Salem from Roanoke offering steam dummy engines designed to look like passenger cars and rail lines that were expanded by eight and a half miles. In 1892, the electric railway car was introduced to Roanoke. This set a precedent of modernization and service expansions for Roanoke's rail service for the next couple of decades. During this period the Roanoke Railway and Electric Company (RR&E) was founded.[4]

Though 1925 served as the height of RR&E and the electric rail car service, it was also the year of Roanoke's first bus service. The Safety Motor Transit Company (SMT) operated seven routes that covered 23 miles. SMT also began to compete with RR&E. Eventually RR&E would acquire SMT in 1928.[5]

The Great Depression in 1929 began to have an impact on Roanoke's streetcar industry as it did in many cities across the United States. From 1929 to 1948, RR&E began to transition from streetcars to bus service due to its economic viability. Bus transportation remained popular in the 1940s and 1950s showing increases in ridership, service, and routes. However, the 1960s challenged the viability of privately operated and funded public transportation. Roanoke City Lines took over local and regional bus service in the Roanoke Valley but ridership and revenue began to decline leading to Roanoke City Lines being dissolved. The Greater Roanoke Transit Company (GRTC), also known as Valley Metro, was formed in 1975 to take over the provision of public transportation in the City of Roanoke.[6]

[3] 2015 Population Estimate unavailable, population number is from 2015 ACS-data.
[4] Roanoke Transit Vision Plan, Background and Existing Conditions, page 1
[5] Roanoke Transit Vision Plan, Background and Existing Conditions, page 1
[6] Roanoke Transit Vision Plan, Background and Existing Conditions, page 3

Also, in 1975 RADAR service began out of an increased need to transport seniors, individuals with disabilities, and social service clients. In 1985, County of Roanoke Transportation (CORTRAN) was formed expanding RADAR's service area.[7]

GOVERNANCE AND ORGANIZATIONAL STRUCTURE

The Board of Directors consists of twelve members - President, Vice President, Treasurer Secretary, eight At-Large Directors, and the Executive Director (see Table 1-2). Additionally, RADAR has developed local Advisory Committees for each area that is provided service.

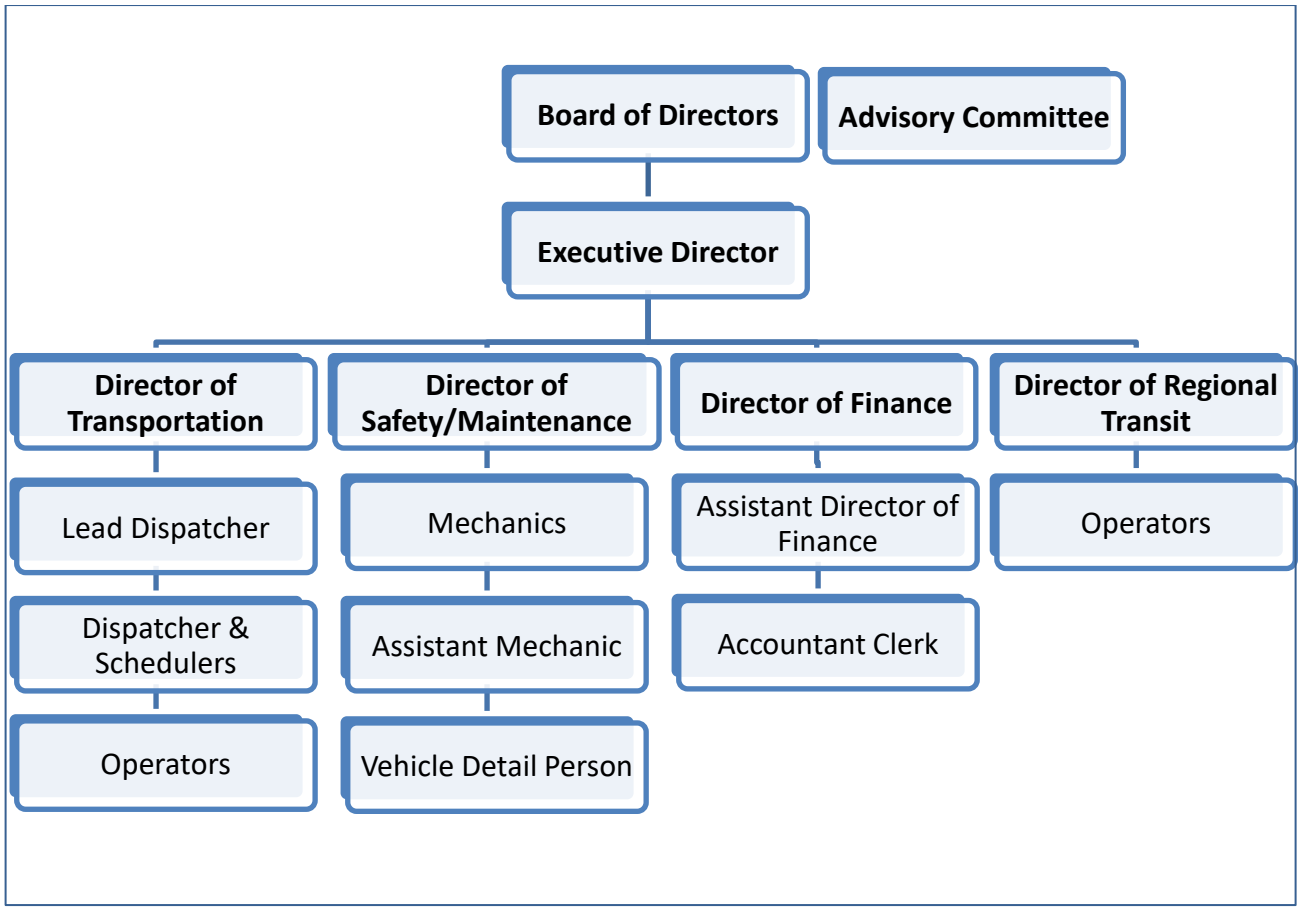
Table 1-2: RADAR Board of Directors

Name	Title
Sam Long	President
Freda Smith	Vice President
Stebbins Hubard	Treasurer
Tom Roberts	Secretary
Claude Reynolds	At-Large
Thelma Haynesworth	At-Large
Bill Stephenson	At-Large
Andy Kelderhouse	At-Large
Bruce Hollar	At-Large
Scott McCoy	At-Large
Dennis Traubert	At-Large
Doris Ennis	At-Large

Figure 1-1 presents RADAR's organizational chart, identifying the four departments the Executive Director is responsible for managing.

[7] Roanoke Transit Vision Plan, Background and Existing Conditions, page3

Figure 1-1: RADAR's Organizational Chart[8]



TRANSIT SERVICES PROVIDED AND AREAS SERVED

RADAR operates fixed-route, deviated fixed-route, and demand-response services within Roanoke, Alleghany, Franklin, Henry, and Rockbridge counties, including the cities of Roanoke, Salem, Covington, Buena Vista, Lexington, and Martinsville, and the towns of Vinton, Clifton Forge, Iron Gate, and Rocky Mount. Figure 1-2 presents RADAR's service area and Table 1-3 presents the six transportation services, including the service type, service area, number of routes, and span of service.

[8] The Director of Regional Transit is responsible for the three deviated-fixed-route services outside of the Roanoke Valley, and the Director of Transportation is responsible for all other services.

Figure 1-2: RADAR Service Area

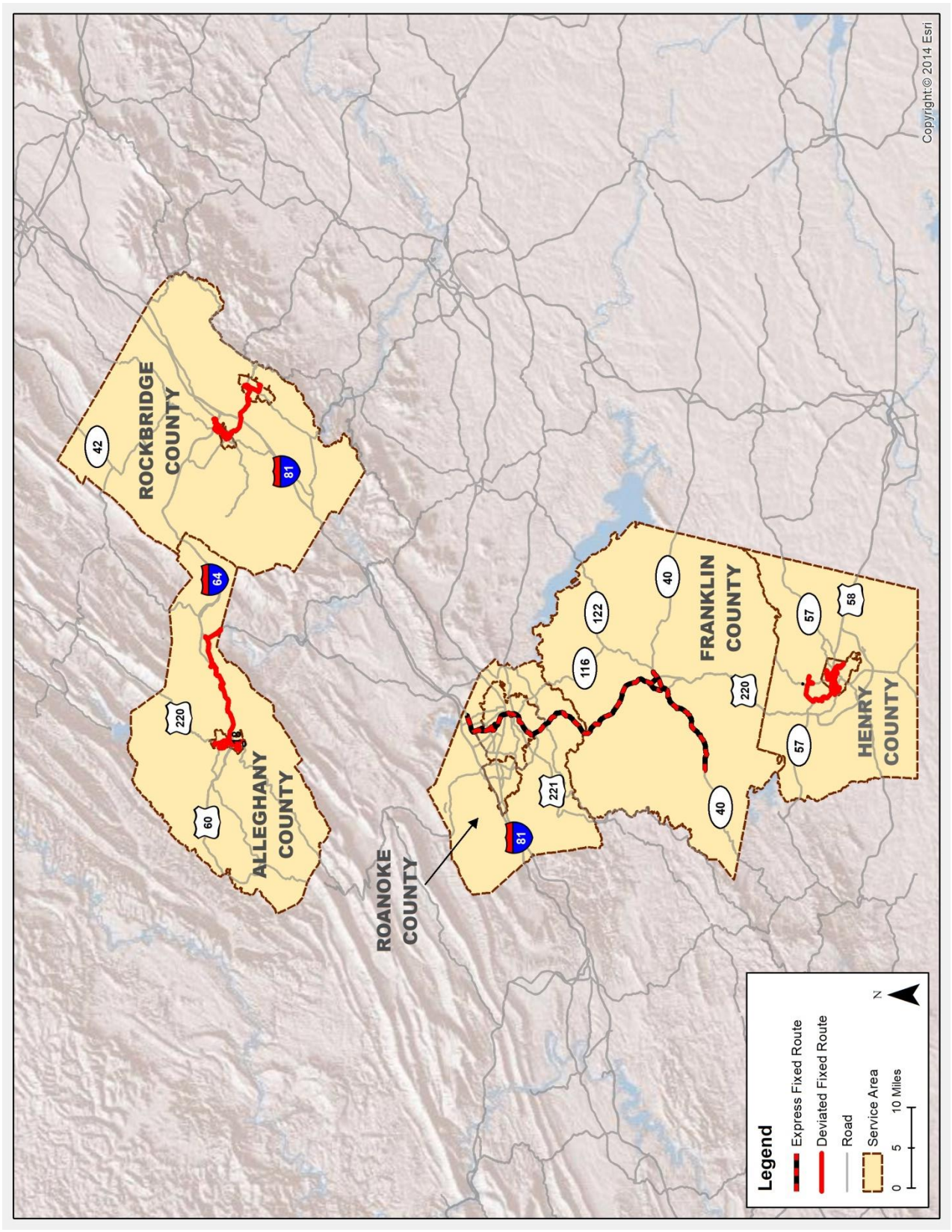


Table 1-3: RADAR Transit Services

Transportation Services		Service Type	Eligibility	Service Area	Route(s)	Span of Service		
						Day(s)	Times	Headway
Valley Metro STAR		Demand-response	• ADA certified – any age with a disability	• Roanoke County (3/4-mile radius from fixed-routes) • City of Roanoke • City of Salem • Town of Vinton	NA	Weekdays Saturdays	5:45 a.m. - 8:45 p.m. (24-hour advance reservation required)	NA
CORTRAN		Demand-response	• ADA certified – any age with a disability • 60+	• Roanoke County • City of Salem • City of Roanoke • Town of Vinton	NA	Weekdays	7:00 a.m. - 6:00 p.m. (24-hour advance reservation required)	NA
Mountain Express		Deviated Fixed-route	• General Public • ADA certified – any age with a disability	• Alleghany County • City of Covington • Town of Clifton Forge • Town of Iron Gate	1 (¾ -mile ADA certified deviation)	Weekdays	8:00 a.m. - 5:00 p.m.	90 min.
Maury Express		Deviated Fixed-route	• General Public • ADA certified – any age with a disability	• Rockbridge County • City of Buena Vista • City of Lexington	2 (¾ -mile ADA certified deviation)	Weekdays Saturdays	8:00 a.m. - 6:00 p.m. 10:00 a.m. - 4:00 p.m.	60 min.
PART		Deviated Fixed-route	• ADA certified – any age with a disability • 60+	• Henry County • City of Martinsville	3 (¾ -mile ADA certified deviation)	Weekdays	7:30 a.m. - 5:30 p.m.	60 min.
College Express	Ferrum Express	Fixed-route (Express)	• Open to the public	• City of Roanoke • Ferrum College • Town of Rocky Mount	2	Thurs, Fri Saturday	5:00 p.m. -11:00 p.m. 1:00 p.m.-11:00 p.m.	60 min. 120 min.
	Hollins Express		• Students, faculty and staff	• City of Roanoke • Hollins College • Roanoke County	1	Wed.-Thur. Friday Saturday	6:00 p.m. - 10:00 p.m. 6:00 p.m. - 12:00 a.m. 12:00 p.m. - 12:00 a.m.	60 min. 60 min. 60 min.

RADAR Transit Services

Valley Metro STAR

Valley Metro STAR operates demand-response service within the City of Roanoke, the City of Salem, the Town of Vinton, and within a ¾-mile radius of the fixed-routes, a small portion of Roanoke County (see Figure 1-3). Service operates Monday through Saturday 5:45 a.m. to 8:45 p.m. The last scheduled pick up time is 8:15 p.m. ADA approved passengers are required to reserve a trip 24 hours in advance.

CORTRAN

CORTRAN operates Roanoke County and surrounding areas, to include the cities of Salem and Roanoke, and the town of Vinton (see Figure 1-4). Service operates weekdays 7:00 a.m. to 6:00 p.m. ADA approved passengers are required to reserve a trip 24 hours in advance.

The Mountain Express

Mountain Express operates one deviated fixed-route within Alleghany County, the City of Covington, and the Towns of Clifton Forge and Iron Gate (see Figure 1-5). Service operates Monday through Friday 8:00 a.m. and 5:00 p.m. on 90-minute headways. ADA certified passengers may request the van to deviate from its route to make pickups and drop offs. The distance may not exceed a ¾-mile radius off the route.

Maury Express

Maury Express operates two deviated fixed-routes within Rockbridge County, providing service to Lexington and Buena Vista and (see Figure 1-6) and (see Figure 1-7). Service operates on weekdays 8:00 a.m. to 6:00 p.m. and Saturdays 10:00 a.m. to 4:00 p.m. Service operates on 60 minute headways. ADA certified passengers may request the van to deviate from its route to make pickups and drop offs. The distance may not exceed a ¾-mile radius off the route.

Piedmont Area Regional Transport (PART)

PART operates three deviated fixed-routes – the Northern County/Collinsville Route (see Figure 1-8), the Martinsville Route (see Figure 1-9), and the Southern County Route (see Figure 1-10). All three routes operate Monday through Friday 7:30 a.m. to 5:30 p.m. on 60-minute headways. Service is only provided when Martinsville schools are in session. ADA certified passengers may request the van to deviate from its route to make pickups and drop offs. The distance may not exceed a ¾-mile radius off the route.

Ferrum Express and Hollins Express

RADAR operates two college express fixed-routes – the Ferrum Express (see Figure 1-11) and the Hollins Express (see Figure 1-12). The Ferrum Express operates Thursday and Friday 5:00 p.m. to 11:00 p.m. between Ferrum College and Rocky Mount, and Saturday 1:00 p.m. to 12:00 a.m. between Ferrum College and Roanoke via Rocky Mount. The Hollins Express operates Thursday and Friday 4:00 p.m. to 11:00 p.m., and Saturday 11:00 a.m. to 11:00 p.m. Both routes operate within the City of Roanoke and Roanoke County, providing service to Hollins University.

FARE STRUCTURE

Table 1-4 outlines fares that vary depending on the service. In all cases, riders paying in cash must have the exact fare. Fares are determined by the localities and colleges.

Table 1-4: RADAR Fare Structure

Fare Category	Adults	Seniors and Medicare Card Holders	Students	Children
Valley Metro STAR Paratransit One-Way Cash Fare	$ 3.50	$ 3.50	n/a	Under 6 free
Valley Metro STAR Paratransit Unlimited Monthly Pass	$ 96.00	$ 96.00	n/a	n/a
CORTRAN	$ 4.00	$ 4.00	n/a	Under 6 free
Mountain Express	$ 1.00	n/a	n/a	Under 6 free
Maury Express	$ 0.50	n/a	Free	Under 6 free
PART	$ 0.50	n/a	n/a	Under 6 free
Ferrum Express	$ 2.00	$ 2.00	Free	Free
Hollins Express	No General Public	No General Public	Free	n/a

Figure 1-3: Valley Metro STAR Service Area

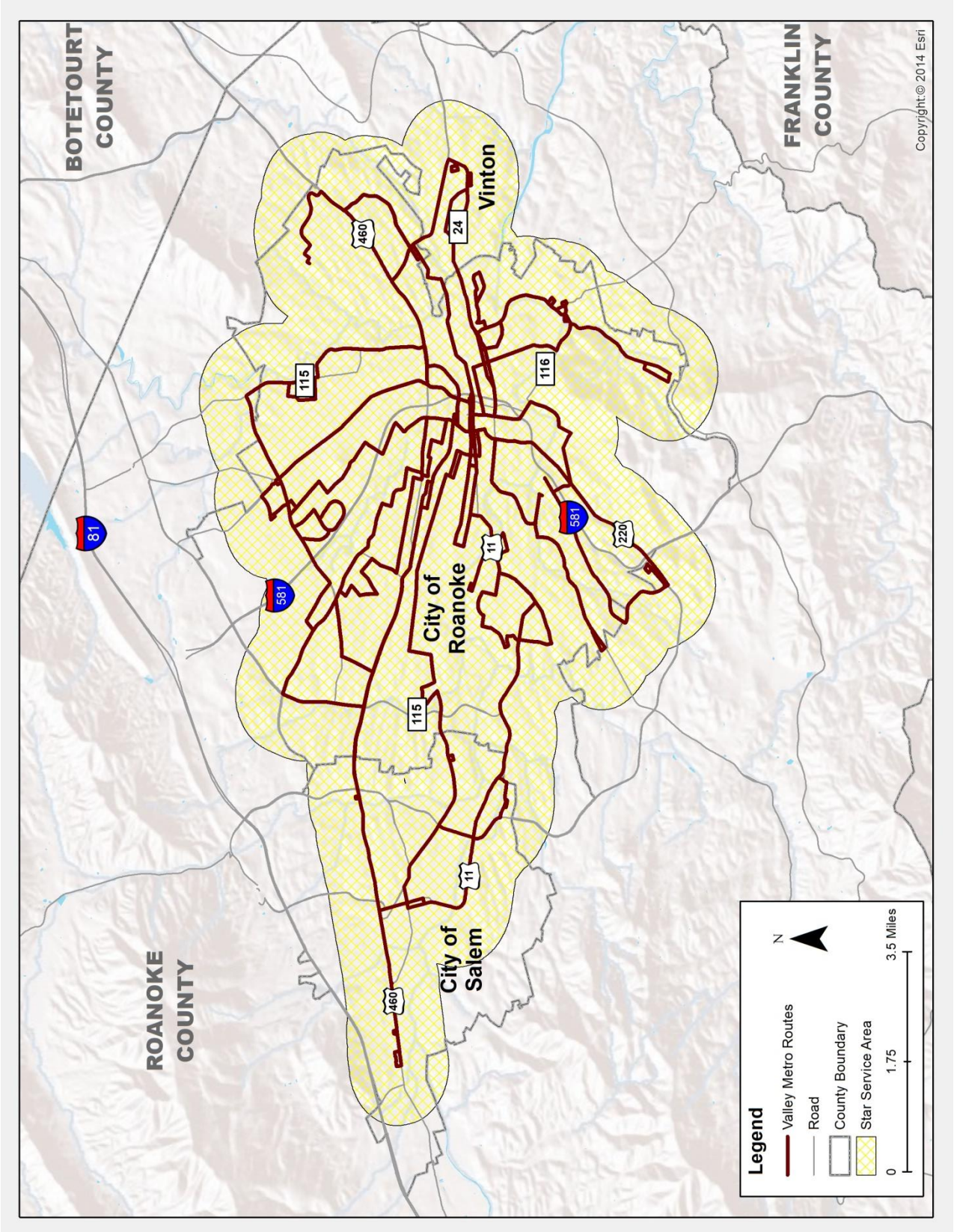


Figure 1-4: CORTRAN Service Area

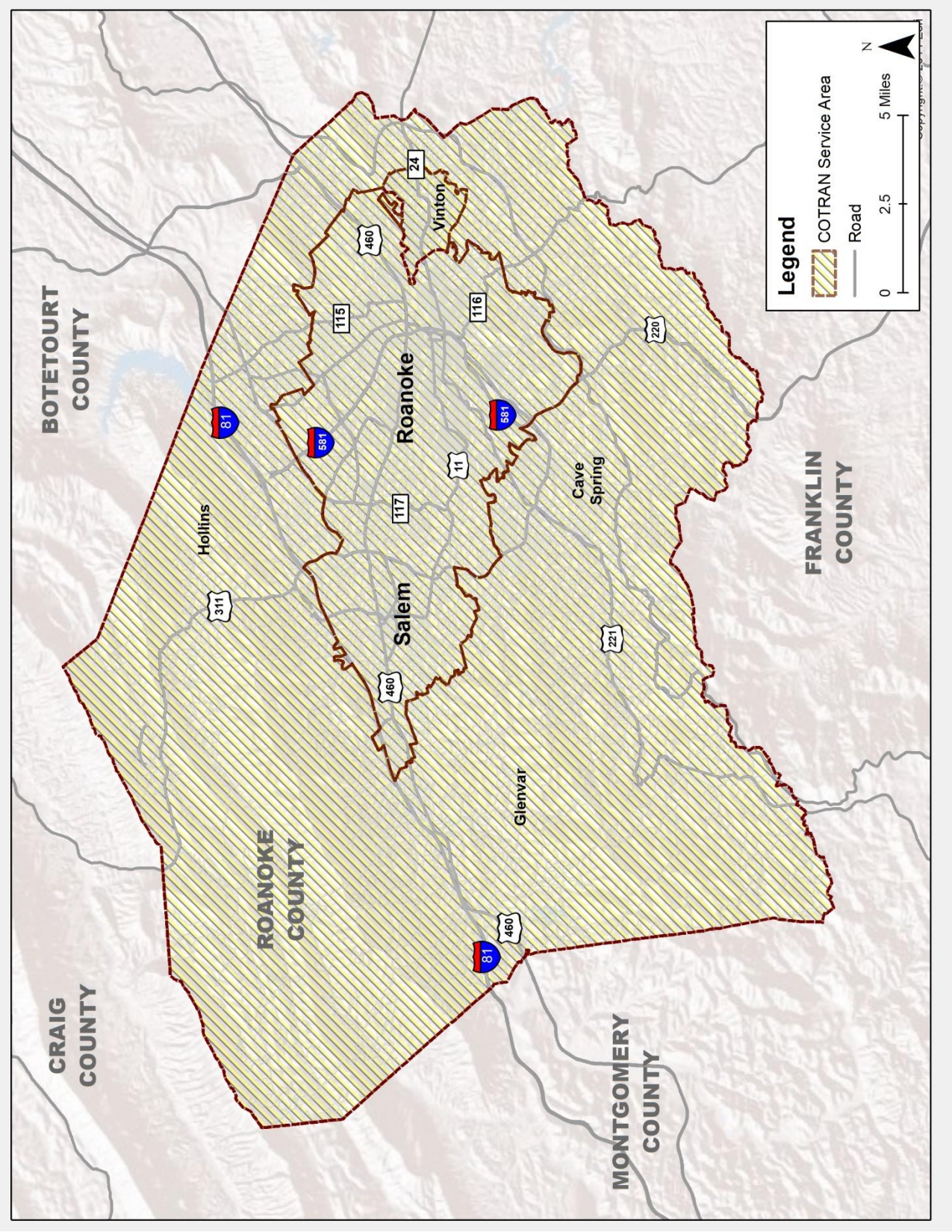


Figure 1-5: The Mountain Express Service Area

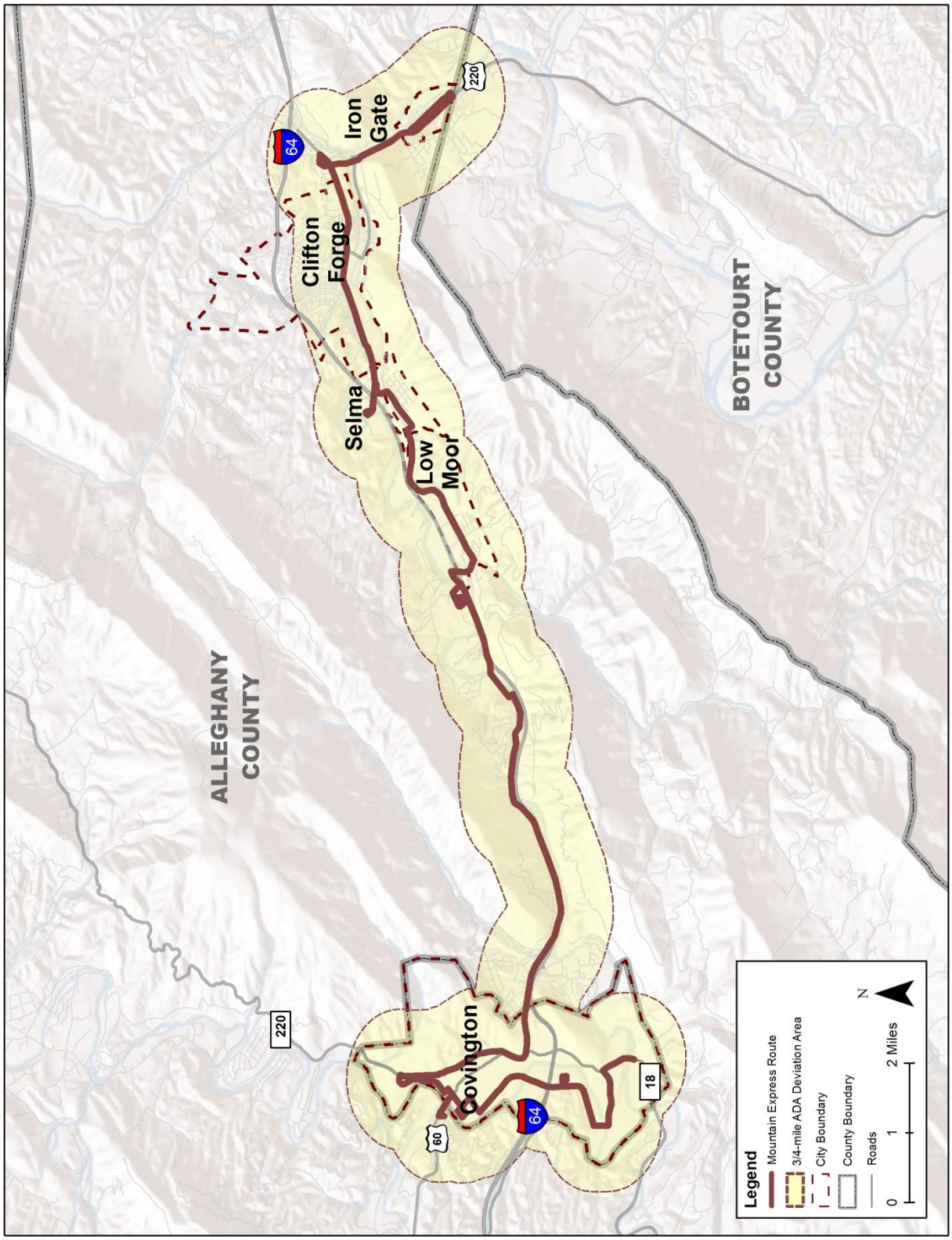


Figure 1-6: Maury Express Service Area - Lexington Route

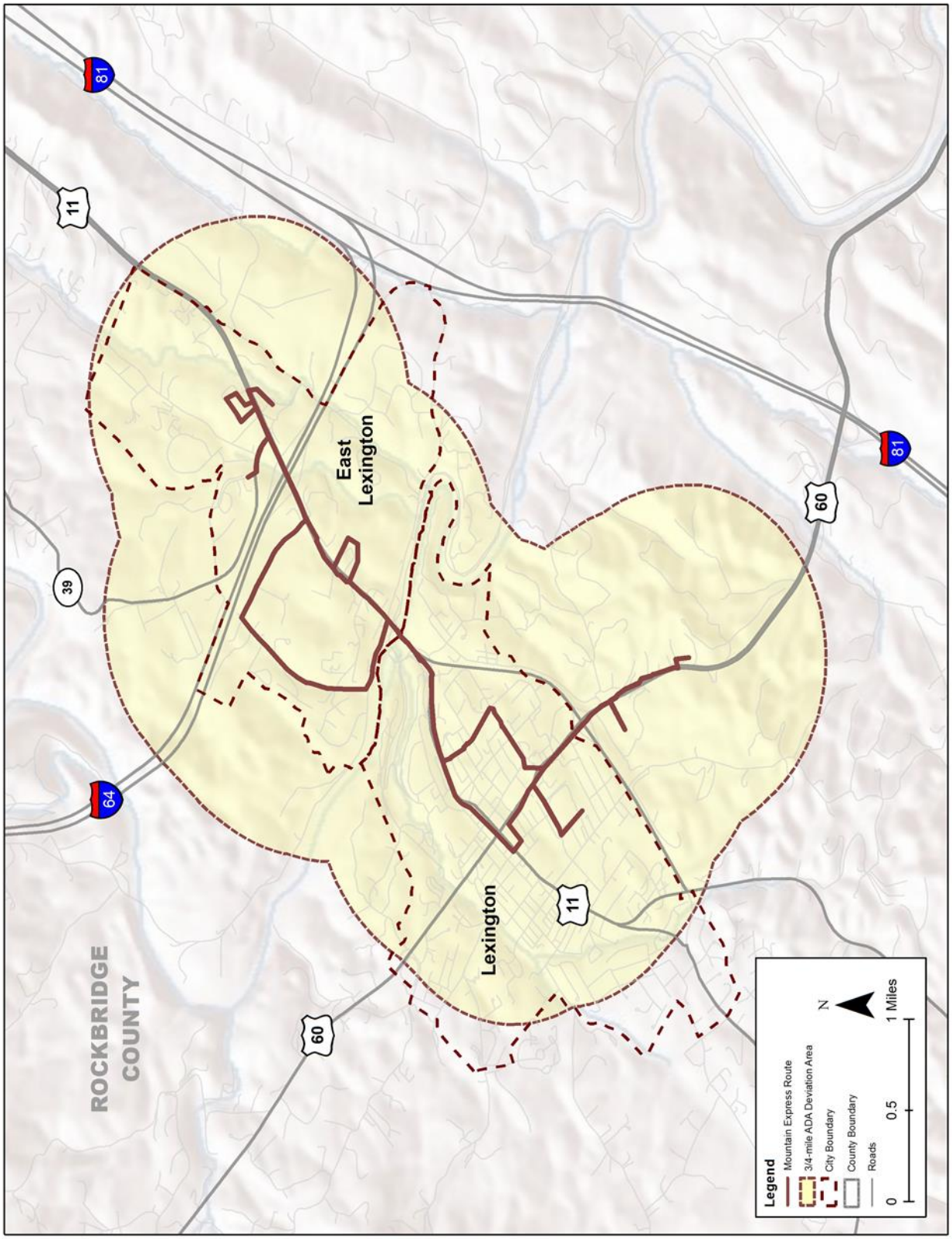


Figure 1-7: Maury Express Service Area - Buena Vista Route

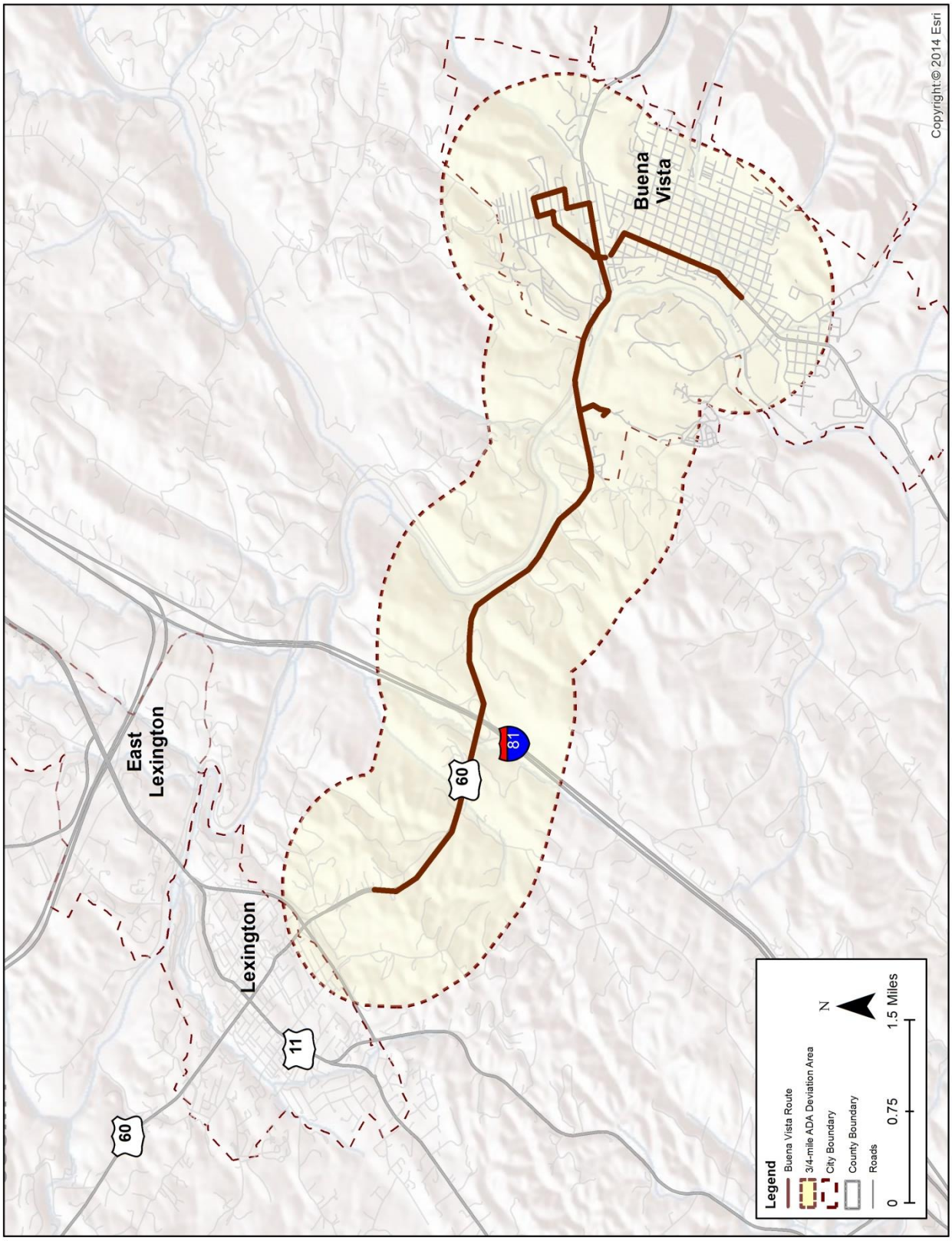


Figure 1-8: PART Service Area - Collinsville Route

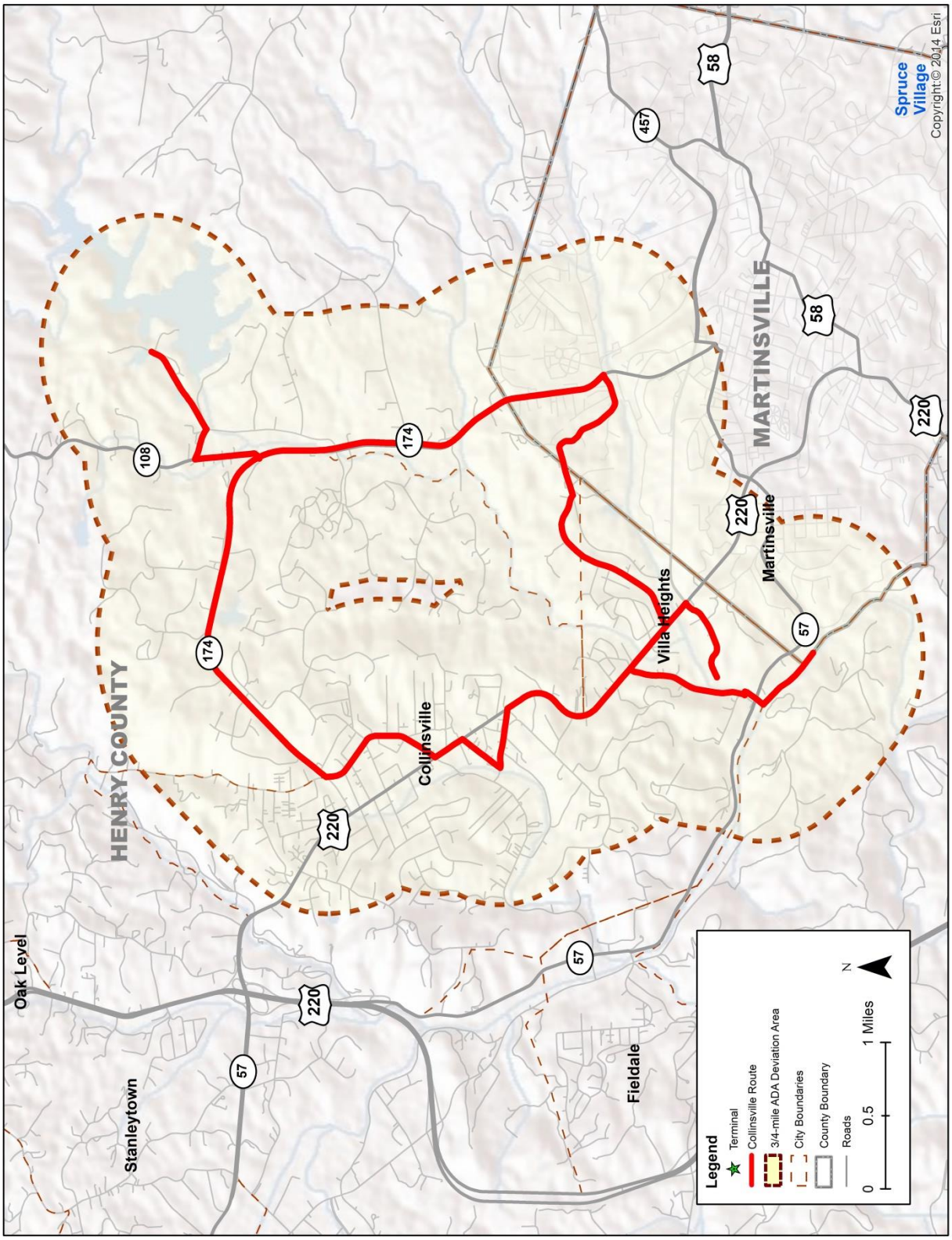


Figure 1-9: PART Service Area -Martinsville Route

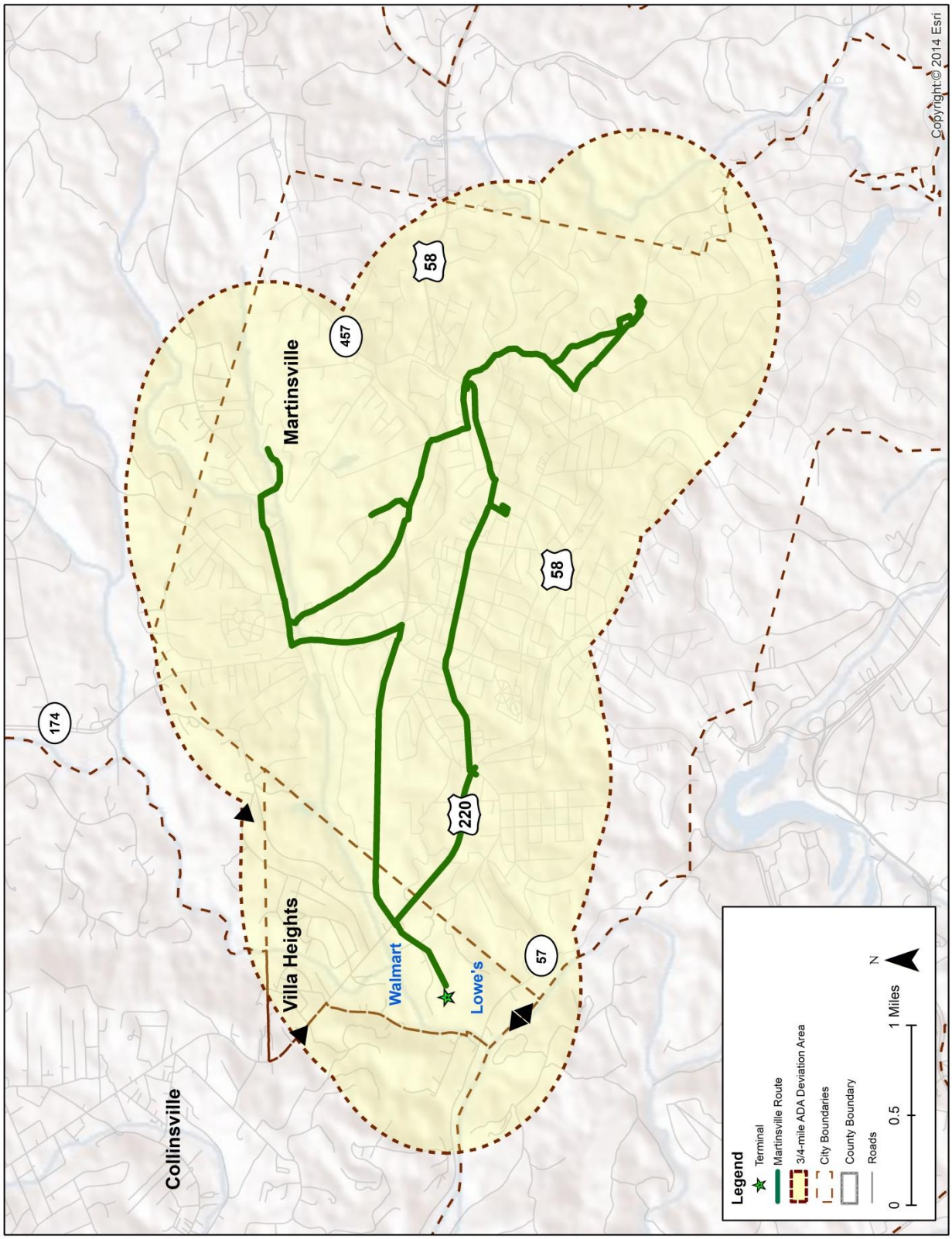


Figure 1-10: PART Service Area - Southside Route

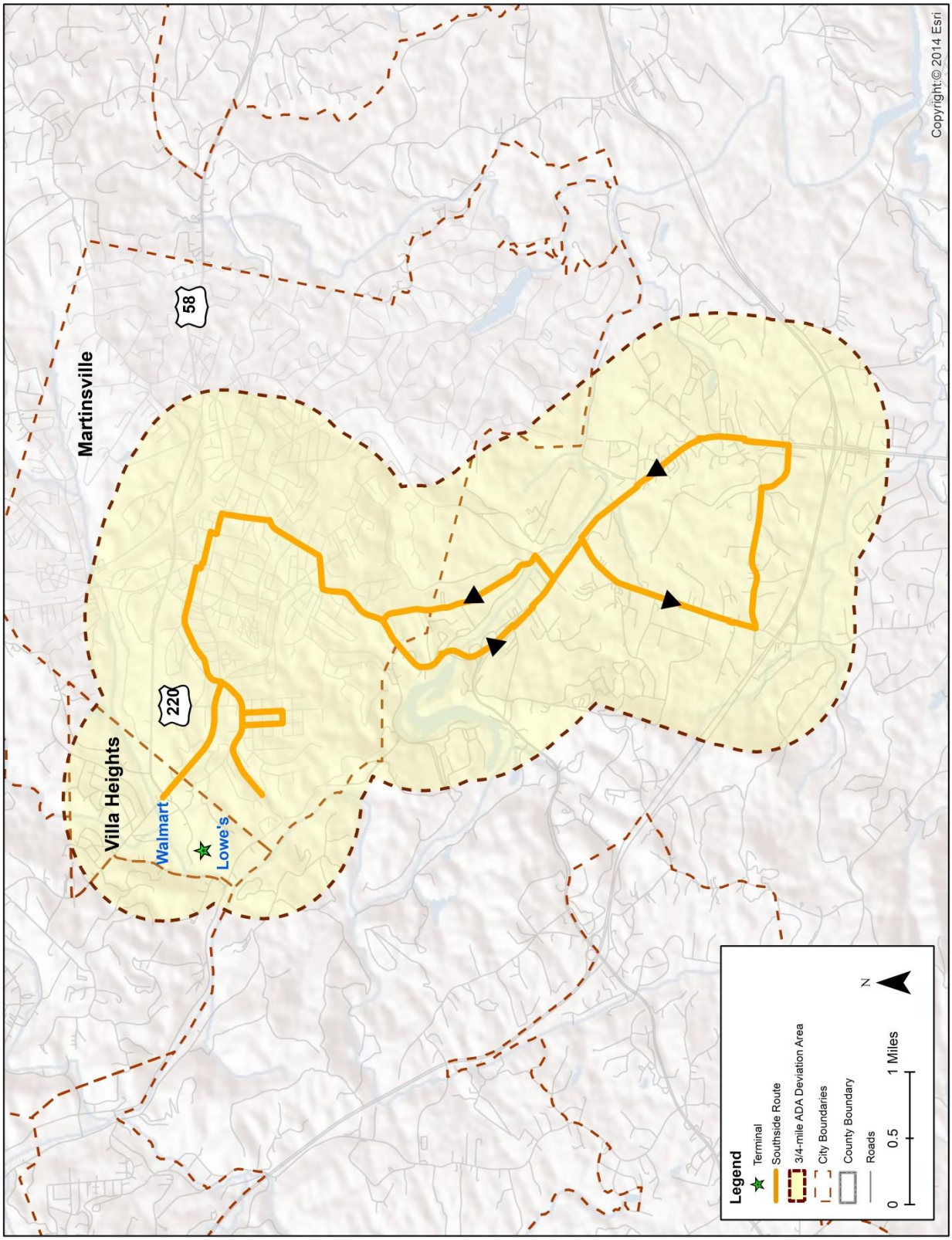


Figure 1-11: Ferrum Express Service Area

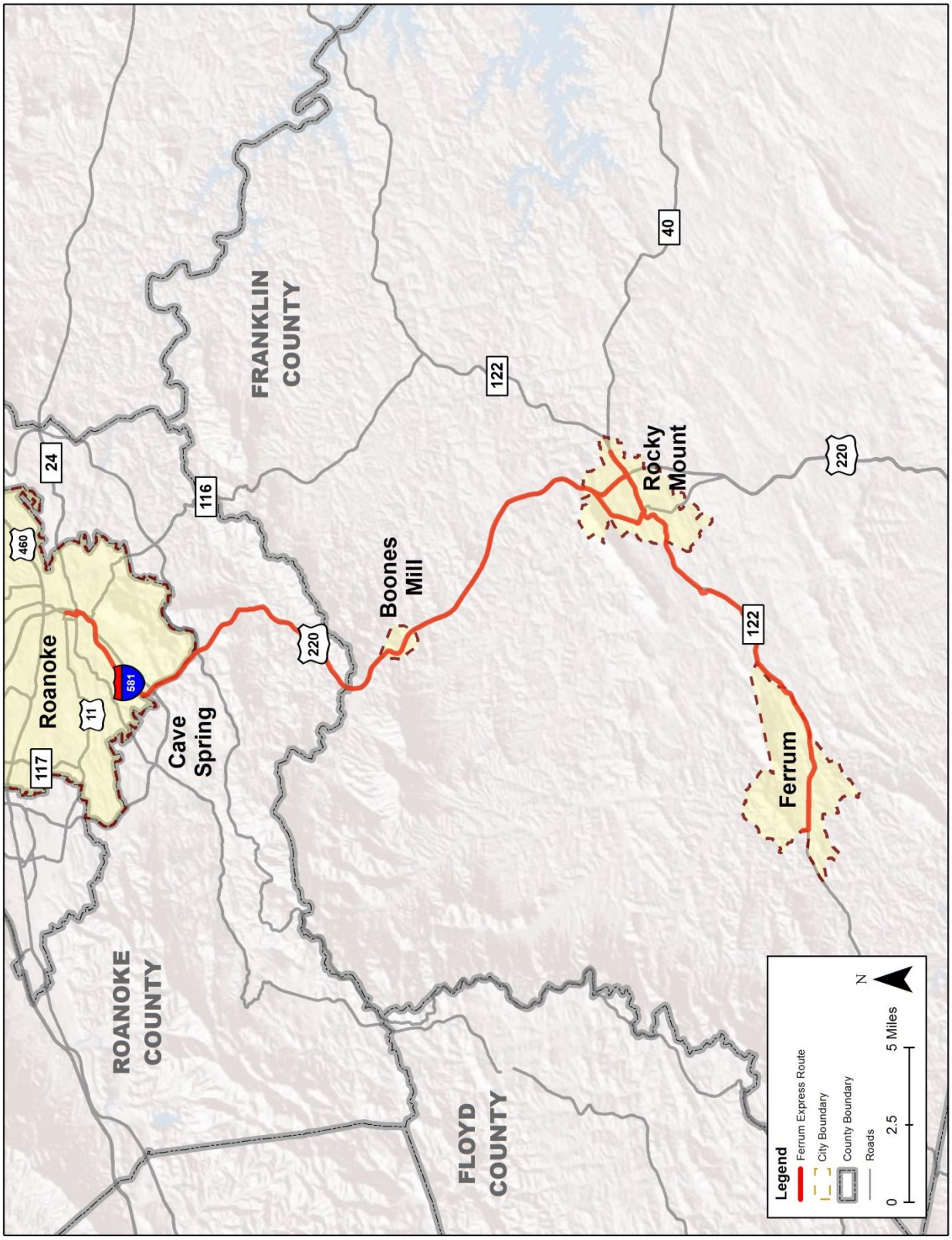
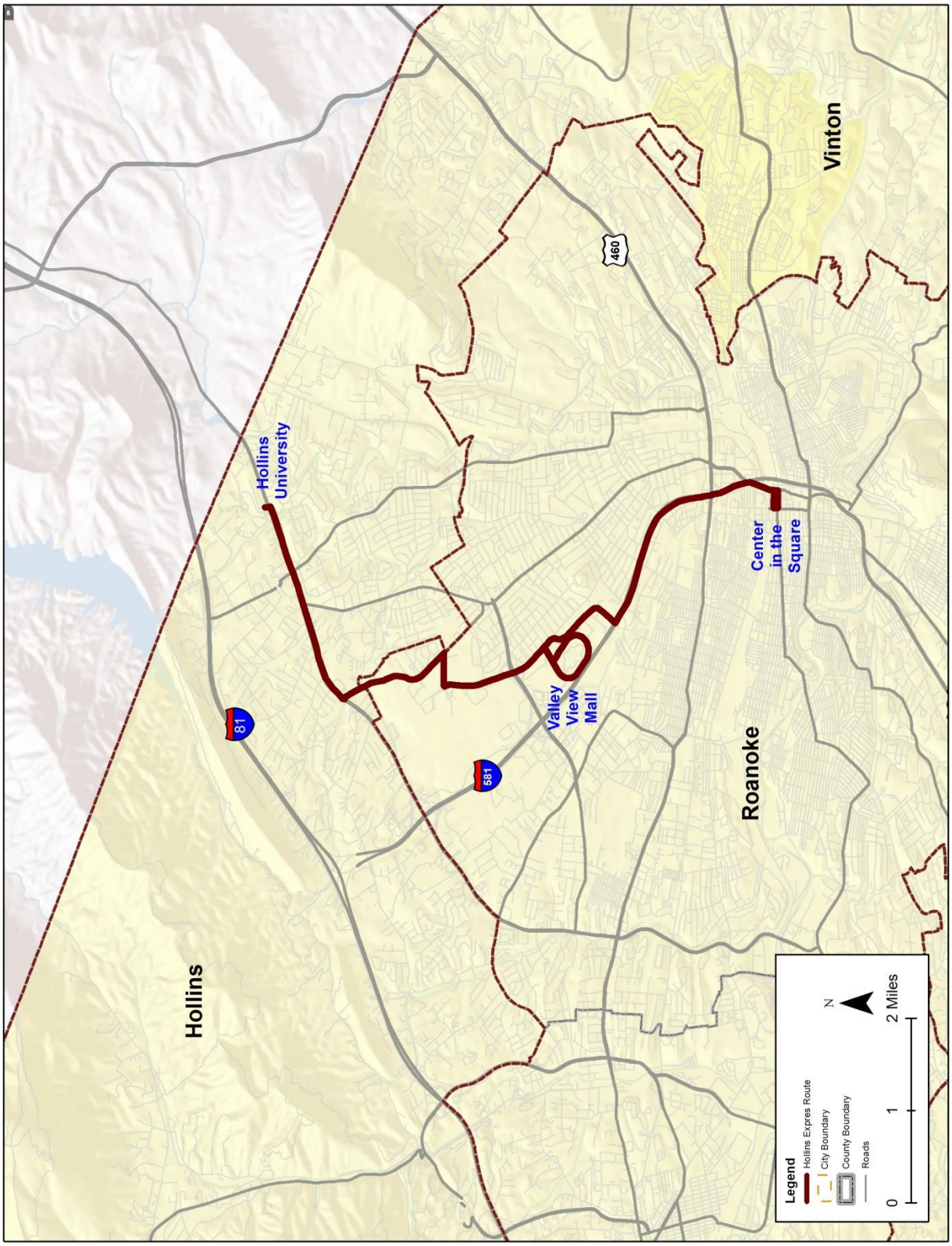


Figure 1-12: Hollins Express Service Area



FLEET

RADAR currently owns a fleet of 53 vehicles. Table 1-5 identifies the make, type, year, mileage (as of June 30, 2018), and passenger capacity. RADAR owns all of their vehicles.

Table 1-5: Vehicle Fleet Inventory

Number	Vin Number	Year	Type[1]	ADA	Mileage	Funding
1	T1BD1EB0EU029541	2014	Car	No	30,252	--
3	1FDFE4FS5EDA05931	2014	BOC	Yes	71,972	5311
4	1FDFE4FS8FDA14477	2015	BOC	Yes	49,994	5311
6	1FMCU9HXXDUB78631	2013	Car	No	61,341	RADAR
7	1FD3E35S18DA81035	2008	BOC	Yes	212,259	FY 2008-5310
8	1FDFE4FS7FDA28032	2015	BOC	Yes	32,915	FY 2008-5310
10	1FDFE4FS4GDC49265	2016	BOC	Yes	6,545	5311
11	1FDFEFS4FDA14475	2015	BOC	Yes	27,784	5311
12	1FDEE3FS7HDC51471	2017	BOC	Yes	--	5311
15	1FDFE4FSOGDC49263	2016	BOC	Yes	5,186	FY 2008-5311
20	1FDFE4FS8ADA55880	2010	BOC	Yes	119,096	FY 2010-state
23	1GB6G5BG8C1182787	2012	BOC	Yes	107,948	5310
24	1FDFE4FS5EDA60539	2014	BOC	Yes	69,131	5311
25	1FDFE4FS3EDA60555	2014	BOC	Yes	52,283	--
26	1FM5K8D84DGB12615	2013	Car	No	53,342	RADAR
30	1FD4E45S48DA81041	2008	BOC	Yes	264,145	5310
34	1FDFE4ES7BDA39400	2011	BOC	Yes	149,974	5310
36	1FDFE4FSFDA14476	2015	BOC	Yes	36,307	5311
37	1FDFE4FS9EDB18720	2014	BOC	Yes	59,531	5310
40	1FDFE4FS6EDA60534	2014	BOC	Yes	57,910	5311
41	1FD7X2B62BEA13003	2011	Truck	No	36,401	FY 2010-5311
43	1FDEE3FSOHDC51473	2017	BOC	Yes	--	5310
44	1FDFE4FS9EDA60544	2014	BOC	Yes	68,480	5311
45	1FDFE4FS7EDA05929	2014	BOC	Yes	87,134	--
46	1FDFE4FS3EDA05930	2014	BOC	Yes	75,580	5311
47	1FDFE4FS8FDA14480	2015	BOC	Yes	43,926	5311
48	1GB6G5BG2C1181005	2012	BOC	Yes	129,118	5310
49	1FDEE3FS1HDC22371	2017	BOC	Yes	--	5310
50	1FDEE3FS3HDC22372	2017	BOC	Yes	--	5310

Number	Vin Number	Year	Type[1]	ADA	Mileage	Funding
51	1FMCU9JX7EUB76928	2014	Car	No	28,954	RADAR
52	JMTB38A580129389	2008	Car	No	120,901	RADAR
53	2G1WT57K091315235	2009	Car	No	78,300	RADAR
54	1FDEE3FS5HDC22373	2017	BOC	Yes	--	5310
55	1FDFE4FS3EDB18728	2014	BOC	Yes	59,269	5310
56	1FDFE4FS1ADA55882	2010	BOC	Yes	168,208	FY2010-State
57	1FDFE4FSOADA76075	2010	BOC	Yes	172,831	5310
58	1FDFE4FS9BDA39401	2011	BOC	Yes	141,557	5310
59	1FDFE4FS8GDC49270	2016	BOC	Yes	5,551	5311
60	1GB6G5G6D1189027	2013	BOC	Yes	73,372	5310
61	1GB6G5BG5D1190623	2013	BOC	Yes	73,276	5310
69	1FDFE4FS5GDC46455	2016	BOC	Yes	12,582	5310
70	1FDFE4FS0GDC46458	2016	BOC	Yes	14,179	5310
71	1GB6G5BG5C1182519	2012	BOC	Yes	117081	5310
72	1GB6G5BG2D1174802	2013	BOC	Yes	105,592	5311
73	1GB6G5BG5D1176639	2013	BOC	Yes	121,160	5311
74	1GB6G5BG8D1176599	2013	BOC	Yes	127,448	5311
75	1FDFE4FS0EDA88393	2014	BOC	Yes	54,636	5311
76	1FDFE4FS8EDA83720	2014	BOC	Yes	61,322	5311
77	1FDFE4FS5HDC20858	2017	BOC	Yes	--	5311
78	1FDFE4FS2HDC51498	2017	BOC	Yes	--	5311
79	1FDFE4FS7HDC51500	2017	BOC	Yes	--	5311
80	1FDFE4FS3HDC51512	2017	BOC	Yes	--	5311
81	1FDFE4FSOHDC51516	2017	BOC	Yes	--	5311
82	1FDFE4FS5HDC51513	2017	BOC	Yes	--	5311
83	1FMCU9HD2JUB27187	2018	Car	No	--	RADAR
84	1FDFE4FS6HDC78901	2018	BOC	Yes	--	5311

EXISTING FACILITIES

RADAR's administrative offices and maintenance facility is located at 2762 Shenandoah Avenue, NW, Roanoke, Virginia, 24017. RADAR does not own any passenger facilities such as bus stations, bus stops, or right-of way.

TRANSIT SECURITY PROGRAM

RADAR has developed multiple plans and programs that address security and protection of its riders, employees and the general public. RADAR's System Security and Emergency Preparedness Plan was developed in 2009 and reveals RADAR's process for addressing system security and emergency preparedness.

Several methods are used to secure RADAR's transit facility and headquarters. Access to the fleet parking lot and garage is controlled by electronic gates requiring a personal identification number. Security cameras monitor the exterior and interior of the facility and recordings are kept on file pending the need for a review. Pin-controlled locks are installed on internal doors to files, the counting room, computer service, and administrative areas.

A five or six camera system is located inside and outside of revenue vehicles. RADAR is currently in the process of upgrading the six camera systems by REI to five camera systems by Angel Trax. The current camera systems in use have a capacity of retaining two months of audio and video data per vehicle.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PROGRAM

RADAR utilizes RouteMatch for its scheduling software. RouteMatch allows for computerized scheduling of all demand-response and deviated fixed-route demand trips throughout RADAR. Additionally, RouteMatch is used to assign routes and vehicles for deviated fixed-routes. The centralized software system syncs with onboard tablet computers that provide schedules and manifests to operators. In recent years, onboard tablets have replaced onboard data terminals for demand-response services operating in the Roanoke Valley, while tablets on deviated fixed-route systems were installed in April 2016.

Data Collection/Fare Collection Process

RADAR collects data both manually and electronically. Each day drivers are given a Driver's Summary Sheet and Manifest created from RouteMatch. Drivers enter passenger trips, revenue hours, and revenue miles into tablets that are located onboard vehicles. At the end of each driver's run, a Driver's Summary Sheet and Manifest are given to dispatch and verified the next day. Once the information is verified, passenger trips, revenue hours, and revenue miles are recorded. This information is recorded on daily and monthly. Once the totals are verified back to the source document, RADAR records the data into OLGA.

PUBLIC OUTREACH

RADAR has implemented an aggressive advertising campaign to increase and educate the public about the service that RADAR provides. This campaign includes presentations to local

civic groups, radio and newspaper ads, soliciting suggestions from the ridership, and working with human service agencies and colleges located in different areas. RADAR has given presentations to local MPOs, localities, and funding partners to educate them about RADAR services.

AREA PUBLIC TRANSPORTATION PROVIDERS/SERVICES

Public Transportation

Valley Metro

Valley Metro provides the following fixed-route public transportation services throughout the Roanoke Valley region.

Fixed-Routes

Valley Metro operates 25 fixed-routes throughout the Cities of Roanoke and Salem, and the Town of Vinton. Service operates Monday and Saturday. All routes serve the Campbell Court Transportation Center, which serves as the region's intermodal bus station.

Smart Way Bus

Smart Way Bus links Roanoke Valley and New River Valley. Smart Way Bus service originates at Campbell Court Transportation Center, with stops at Hotel Roanoke, Roanoke Regional Airport, two park and ride lots along Interstate 81 at exits 140 and 118A, Christiansburg Kmart, Virginia Tech Corporate Research Center, Blacksburg, and Squires Student Center on the Campus of Virginia Tech. The service operates daily.

Star Line Trolley

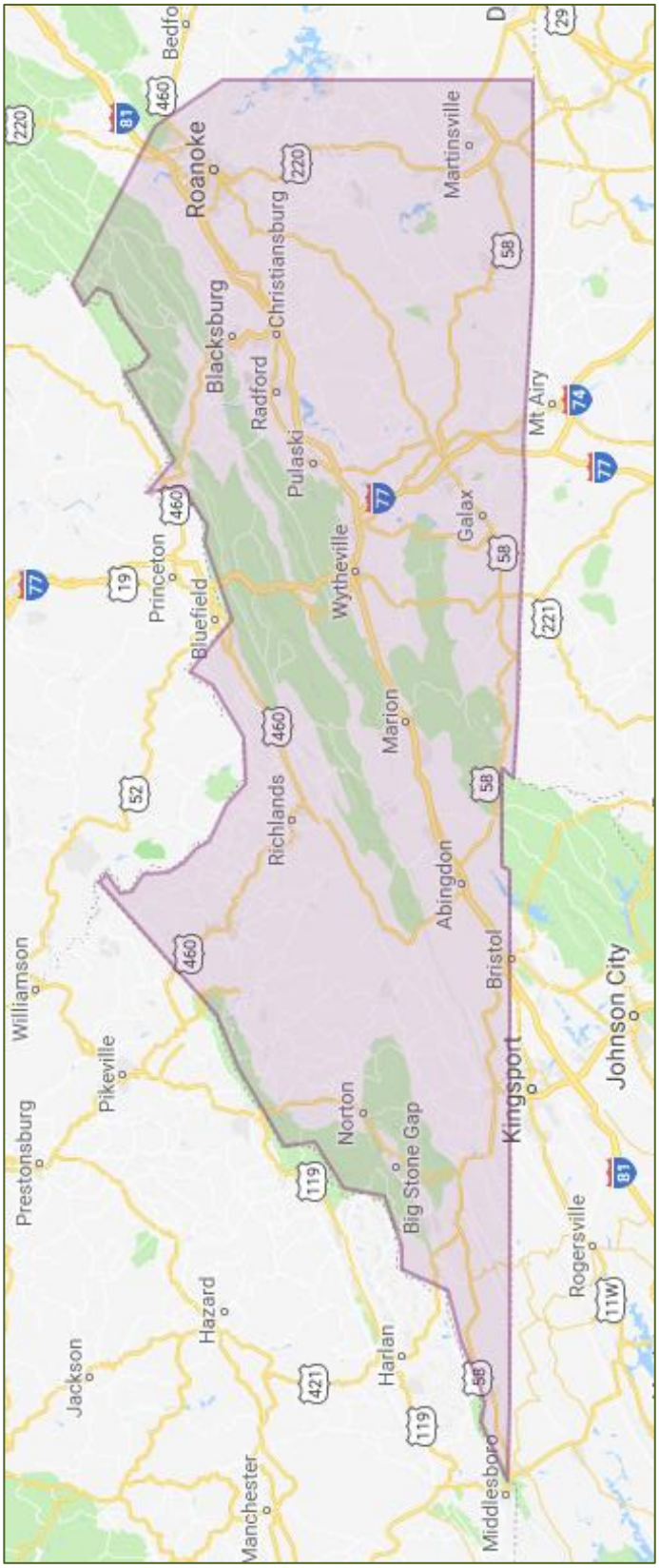
Star Line Trolley is a free service that travels along Jefferson Street between downtown Roanoke and Carilion Roanoke Memorial Hospital. Service operates weekdays 7 a.m. to 7 p.m.

Transportation Network Companies

Uber and Lyft provide service within areas of the Roanoke Valley, New River Valley, and Lynchburg. According to the Uber and Lyft websites, on demand e-hailing transportation service is available to any person within the designated zone as identified in Figure 1-13 and Figure 1-14.

Figure 1-13: Uber Catchment Area

Figure 1-14: Lyft Catchment Area



Bike Share

Zagster Bike Share launched in April 2017. As of July 2018, there are 17 bike stations throughout Roanoke. Using a smartphone (Apple IOS or Android) Zagster app, customers can reserve a bike at one of the 17 locations, and ride for free for one hour, then pay $3 per hour.

Intercity Bus

Greyhound provides intercity bus service to Roanoke, Virginia. Greyhound stops at the Campbell Court Transportation Center, operating three daily trips eastward to Lynchburg, Virginia and one trip westward to Kingsport, Tennessee. From Lynchburg and Kingsport, connecting service is available to additional cities within Greyhound's network. In addition, the Virginia Breeze is a relatively new service that provides intercity bus service from the New River Valley (Blacksburg and Christiansburg) to Lexington, Staunton, Harrisonburg, Front Royal, Dulles Airport, Arlington, and Washington, DC.

Intercity Rail

In October 2017, Amtrak service returned to Roanoke. The station is located in downtown, and offers one daily roundtrip between Roanoke and Lynchburg. From Lynchburg, customers can continue northeast to Washington, DC and additional cities. At the Lynchburg station, customers can also transfer to trains, and continue to southeast cities.

Taxi

The following taxi companies operate within the region:

- Lloyd Lewis, Inc. Taxi Service, Covington
- Virginian Taxicab Co., Clifton Forge
- E's-Rider Cab & Transportation, Lexington
- New Virginian Taxicab, Clifton Forge
- Rockbridge Taxi Service, Buena Vista
- Yellow Cab Services, Roanoke
- B Early Cab Service, Salem
- C J Taxi Service, Martinsville
- Delivery Boys, Salem
- Help Mates Delivery and Transportation, Martinsville
- North West Cab, Roanoke
- Roanoke and Salem Taxi, Salem
- Salem Cab Service, Roanoke
- Salem Taxi, Roanoke
- Speedy Taxi, Roanoke

- V & W Transport, Martinsville
- Yellow Cab, Roanoke

Human Service Transportation

RADAR is a coordinated transportation system and provides service to over 25 human service agencies, governments and private organizations. They contract to provide transportation to their meal sites for the Local Office on Aging. Additionally, RADAR provides service for (Total Action for Progress) TAP Head Start. Human service transportation is provided by the respective county's Department of Aging. Transportation services are available to aging populations to and from meal sites, socialization and recreational activities, medical appointments, and shopping to persons age 60 years and older. Specialized Transportation is available for individuals with disabilities, and medical transportation is provided for Medicaid recipients who lack transportation for medical services.

Medicaid Transportation

LogistiCare arranges Medicaid transportation for Roanoke Valley region.

Chapter 2
Goals, Objectives, and Service Design Standards

INTRODUCTION

This chapter presents RADAR's vision, mission statement, guiding principles, and priority goals. The 2009 TDP identified goals and objectives for the FY 2010 – FY 2015 time period. This TDP updates the goals and objectives to reflect FY 2018 – FY 2027. To guide the achievement of the goals and objectives, service standards and performance measurement are presented. This chapter concludes with discussing the process for updating the service standards.

VISION, MISSION, GUIDING PRINCIPLES, AND PRIORITY GOALS

The 2007 Unified Human Services Transportation System Incorporation Strategic Plan identified RADAR's vision, mission statement, and guiding principles.

Vision

> *"We envision RADAR to be a premier community transportation provider committed to safety, courtesy, quality, responsiveness, efficiency, and innovation."*

Mission Statement

> *"The mission of RADAR is to provide public, specialized, and coordinated transportation which are safe, dependable, and cost effective thereby enhancing the quality of life and the environment in our service area."*

Based on the vision and mission statement, the Strategic Plan presented a description of the agency's Guiding Principles and Priority Goals.

Guiding Principals

Develop Community Benefit

- To provide the community with benefits in an overall manner, not merely a transit focused manner. Enhance the ability of citizens to make a number of choices for

transportation and provide alternative transportation for people who do not have their own private transportation.

Connectivity

- To create ease of service between people, places, and modes, by assuring that reasonable ways to connect providers (of transit services) and modes of transportation are available, easy to understand, and easy to use.

Geographic Reach

- To assure that the geographic locations and concerns of all stakeholders, rural, urban, remote or local, are thoughtfully integrated into planning and delivery of transit services to the greatest degree possible.

Customer Service

- To make the customer the focus point of processes, and assure that the ease of use, flexibility of service, and satisfaction of the customer is an important concern to RADAR, providers, and other partners, keeping in mind the restrictions placed upon RADAR by its funding sources and partners.

Teamwork

- To work in collaboration, with partners, stakeholders, and the public by demonstrating and practicing willingness to continually improve how RADAR works together for the benefit of the community.

Communicate – Openly, Directly, and Constantly

- The underpinning for the success of the other principles. By this principle we are declaring that we are not only in this together, but we are willing to work in an open and honest manner; that background conversations will be brought to the foreground, gossip will be turned into an opportunity for mutual learning, and mistakes will be acknowledged, forgiven, and used as the learning and growth opportunity that they represent.

Priority Goals

Priority 1: Secure Stable Funding

- Secure long-term funding from local, state, and federal sources to implement a regional community transportation system.

Goal 1: Develop an integrated financial plan for RADAR.

Goal 2: Create effective legislative support for funding by supporting the efforts of the Community Transportation Association of Virginia.

Goal 3: Continue to support and maintain capital needs of coordinated human service/ public transportation.

Priority 2: Public Education / Public Outreach

- Promote community transportation through building a better understanding of the benefits to the community, and building grassroots supports for future funding discussions.

Goal 1: Increase visibility and use of existing transportation services.

Goal 2: Raise public awareness about community benefits of community transportation and future services.

Goal 3: Develop a RADAR branding campaign.

Goal 4: Gain community leader support (public and private sectors) for partners and services.

Goal 5: Expand outreach and information on available transportation options in the region.

Priority 3: Providing Efficient Service – Maintain Services

- Focus on enhancing existing services by maximizing available resources, coordinating services to increase benefits to existing and potential passengers, and developing mobility management strategies through the integration of modes, facilities, and modern technology.

Goal 1: Provide an integrated and coordinated regional community transportation system that provides service on a more frequent basis.

Goal 2: Provide excellent transportation customer service to residents living in our service area.

Goal 3: Coordinate specialized transportation services (seniors and disabled).

Goal 4: Coordinate administrative policies and procedures to make the service that is being offered safe, courteous, and as efficient as possible.

Goal 5: Strengthen existing technology and communication infrastructure and expand when needed.

Priority 4: Develop, Improve, and Increase Partnerships

- Develop community partnerships with the public and private sector leaders and stakeholders within the region and statewide.

Goal 1: Establish public- private partnership to support the services being offered by the agency.

Goal 2: Build statewide understanding and support for Virginia transportation needs by being a member of local, state, and national associations.

Goal 3: Create an advocacy program and land use policies that support the agency's transportation program.

Goal 4: Provide technical assistance to the community regarding developing and planning projects located in the agency's service area.

TRANSIT PROGRAM GOALS AND OBJECTIVES

As part of this TDP process, more specific goals and objectives are defined to guide RADAR's operations and activities for the FY 2018-FY 2027 period. The goals are centered on themes, and the objectives are measurable.

Goal 1: **Provide efficient and effective public transportation services that support the mobility and economic development goals of the community served.**

Objectives

- Evaluate and monitor system wide performance to ensure appropriate allocation of resources.
- Consider changing or eliminating service that does not meet established performance standards.
- Consider the establishment of new services to meet regional mobility and economic development goals.

Goal 2: **Maintain current ridership base while seeking opportunities to increase ridership and serve new markets.**

Objectives

- Sustain and improve current public transit services to serve both transit-dependent and discretionary riders.

- Identify opportunities to better serve existing markets, such as providing service on additional days or extending hours of service.

- Identify opportunities to serve new markets by fully exploring the demand for service to neighboring "activity centers".

Goal 3: **Maintain strong relationships with area human service transportation providers and neighboring transit programs to maximize mobility options in the region.**

Objectives

- Meet regularly with area human service agencies and other providers in the region to continue to improve mobility options for agency clients and the public, while reducing duplication where it may exist.

- Coordinate service and transfer opportunities with other transit providers in the region, where feasible.

Goal 4: **Strengthen and market a brand identity for the transit program.**

Objectives

- Build and strengthen the chosen brand identity through marketing and advertising efforts.

- Maintain accurate and up-to-date transit information on the RADAR website.

- Distribute system brochures throughout the communities served.

Goal 5: **Responsibly leverage federal and state funds with local funds and fare revenue to ensure the financial viability of the system.**

Objectives

- Develop and monitor a multi-year financial plan.

- Research available federal and state funding programs to ensure the region is maximizing its federal and state transit funding opportunities.

- Review the fare structure annually to determine if fares are both affordable for riders and economical for the operations of the system.

- Explore additional partnership opportunities with local businesses, employers, educational institutions, and other community stakeholders to maximize financial support for transit.

- Identify and explore strategies to secure new revenue sources, such as advertising, fundraising, and/or other grant opportunities.

SERVICE STANDARDS AND PERFORMANCE

Service standards are benchmarks by which RADAR, as well as individual routes and services, can be evaluated. These standards are typically developed in categories such as performance (productivity, fiscal condition); safety; and service (service coverage, passenger convenience, passenger comfort). The most effective standards are straightforward and relatively easy to calculate and understand. Recent DRPT TDP guidance suggests that these standards be based on SMART principles – Specific, Measurable, Agreed, Realistic, and Time-Bound.

Title VI and Environmental Justice Compliance

Service standards are used as a measure of compliance with Title VI of the Civil Rights Act of 1964 and Environmental Justice Order 12898. This ensures that services are provided equitably to all persons in the service area, regardless of race, color or national origin, and socioeconomic status.

FTA Circular 4702.1B: Title VI Requirements and Guidelines for Federal Transit Administration Recipients identify minority populations as:

1. **Black or African American,** which refers to people having origins in any of the Black racial groups of Africa.

2. **American Indian and Alaska Native,** which refers to people having origins in any of the original peoples of North and South America (including Central America), and who maintain tribal affiliation or community attachment.

3. **Asian,** which refers to people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

4. **Hispanic or Latino,** which includes persons of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

5. **Native Hawaiian or Other Pacific Islander,** which refers to people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

FTA Circular 4703.1: Environmental Justice Policy Guidance for Federal Transit Administration Recipients identifies low-income populations as:

- Persons whose median household income is at or below the U.S. Department of Health and Human Services poverty guidelines. A low-income population means any readily identifiable group of low-income persons who live in geographic proximity.

Service Types

RADAR operates three types of bus services – demand-response; fixed-route bus; and deviated fixed-route bus. This policy identifies service standards for each of the three services separately.

Demand-Response

According to FTA Circular 49. C.F.R. Section 604.3(g) demand-response is any non-fixed-route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, non-profit agencies, and private providers. FTA Circular 2710.2A further asserts that a demand-response system is one where passenger trips are generated by calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passenger and transport them to their destination. The operation is characterized by the following:

- Vehicles do not operate over a fixed-route or on a fixed schedule except, perhaps, on a temporary basis to satisfy a special need.

- Typically, the vehicle may be dispatched to pick up several passengers at different pick-up points before taking them to their respective destinations and may even be interrupted en-route to these destinations to pick up other passengers.

The following types of operations fall under the above demand-response definitions provided they are not on a scheduled fixed-route basis:

1. Many origins – many destinations: The typical operation as described above.

2. Many origins – one destination: For example, a pre-arranged operation for a person with disabilities or senior citizen which picks up passengers at their home and takes them to a shopping or recreation center.

3. One origin – many destinations: For example, a vehicle meets a commuter train, picks up passengers, and drives them to their homes.

4. One origin – one destination: For example, a group of senior citizens is transported from a nursing home to a recreation center and then returned to the nursing home.

RADAR operates one demand-response service that is operated by:

- CORTRAN

Fixed-Route

Fixed route buses pick up and drop off at designated bus stops and times. RADAR operates two fixed-routes under the College Express program:

- Ferrum Express

Deviated Fixed-Route

According to TCRP Report 140, deviated fixed-route service is a vehicle that operates on a regular schedule along a well-defined path, with or without marked bus stops that deviate to serve demand-responsive requests within a zone around the path. The width or extent of the zone may be precisely established or flexible. RADAR operates three deviated fixed-route systems.

- Mountain Express
- Maury Express
- Piedmont Area Regional Transport

Service Standards

Service standards are used to guard against service design or operational decisions. Within the RADAR Title VI Plan and Procedures 2015, there are service standards outlined for service availability, vehicle load, vehicle headway, and on-time performance. Based on the Title VI Plan, these four standards are determined and are detailed below.

Service Availability

Service availability is the measure of the distribution of routes within a transit provider's service area of the span of service. The standard for service availability is to provide coverage of the primary destinations in a given area, as recommended by officials from respective localities. The following standards guide RADAR's performance in service availability, and are based on current service characteristics (FY 2016).

Coverage

Fixed-route: At least 70% of all residents should be within ¼ mile of RADAR's service. (¼ mile is considered a reasonable walking distance to access RADAR service at designated bus stops.)

Service Span

Span of service refers to the hours during which service is available. RADAR has established span of service standards, defining the expected hours that each service will operate. This provides passengers with the confidence that particular types of services will be available throughout the day.

Table 2-1 presents the service span by transportation services. Span of service hours are distinct for weekdays and Saturday. Service begins when the first trip of the day starts, and service ends when the last bus completes its trip.

Table 2-1: Service Span

Transportation Services	Service Plan	
	Weekday	Saturday
Demand-Response		
CORTRAN	7:00 a.m. – 6:00 p.m.	No service
Fixed-Route		
Ferrum Express	5:00 p.m. – 11:00 p.m.*	1:00 p.m. – 11:00 p.m.
Deviated Fixed-Route		
Mountain Express	8:00 a.m. – 5:00 p.m.	No service
Maury Express	8:00 a.m. – 6:00 p.m.	10:00 a.m. – 4:00 p.m.
PART	7:30 a.m. – 5:30 p.m.	No service

* Ferrum Express operates on Thursdays and Fridays.

Vehicle Headway

Vehicle headways heavily influence transit ridership. Vehicle headway is the amount of time between two vehicles traveling in the same direction on a given route. A shorter headway corresponds to more frequent service. Table 2-2 presents RADAR's headways by mode and service day.

Vehicle Load

Vehicle load is expressed as the ratio of passengers to the total number of seats on a vehicle at its maximum load point. The standard for maximum vehicle load is 1.00.

Table 2-2: RADAR Vehicle Fixed-Route Headways

Transportation Services	Headways	
	Weekday	Saturday
Fixed-Route		
Ferrum Express	60 minutes	120 minutes
Deviated Fixed-Route		
Mountain Express	90 minutes	No service
Maury Express	60 minutes	60 minutes
PART	60 minutes	No service

On-Time Performance

On-time is a measure of runs completed as scheduled. This criterion first must define what is considered to be "on-time." The standard for on-time performance is no later than 10 minutes from scheduled or published pick-up/departure times.

Productivity

RADAR measures ridership productivity as passenger trips per revenue mile and passenger trips per revenue hour. RADAR should review service and consider modifications if productivity falls below the FY 2016 levels (see Table 2-3):

Table 2-3: Productivity Measures

Transportation Services	Passenger Trips per Revenue Mile	Passenger Trips per Revenue Hour
Demand-Response		
CORTRAN	0.11	2.08
Fixed-Route		
Ferrum Express	0.11	3.49
Deviated Fixed-Route		
Mountain Express	0.19	2.90
Maury Express	0.22	3.32
PART	0.26	4.26

Service Efficiency

RADAR measures service efficiency as operating cost per revenue mile and operating cost per revenue hour. RADAR should review service and consider modifications if efficiency falls below the FY 2016 levels (see Table 2-4).

Table 2-4: Service Efficiency

Transportation Services	Operating Cost per Revenue Mile	Operating Cost per Revenue Hour
Demand-Response		
CORTRAN	$2.62	$42.54
Fixed-Route		
Ferrum Express	$1.71	$54.36
Deviated Fixed-Route		
Mountain Express	$3.17	$47.60
Maury Express	$2.47	$38.09
PART	$2.63	$42.87

Cost Effectiveness

RADAR measures cost effectiveness as operating cost per trip. RADAR should review service and consider modifications if effectiveness falls below the FY 2016 levels (see Table 2-5):

Table 2-5: Cost Effectiveness

Transportation Services	Operating Cost per Trip
Demand-Response	
CORTRAN	$39.34
Fixed-Route	
Ferrum Express	$19.59
Deviated Fixed-Route	
Mountain Express	$16.44
Maury Express	$11.49
PART	$10.06

PROCESS FOR UPDATING GOALS, OBJECTIVES, AND STANDARDS

It is recommended that RADAR use these standards to gauge route and service performance, and adjust services as warranted and feasible. It is also recommended that an annual review of service standards take place as part of the grant preparation cycle to ensure that performance standards are relevant and reasonable. Any changes for these measurement tools can be included in the annual TDP update.

Chapter 3
Service and System Evaluation and Transit Needs Analysis

INTRODUCTION

This chapter of the TDP focuses on two primary analyses. The first focus is a description and analysis of the recent performance of RADAR, including analyses of trends, peers, recent ridership, and a passenger survey. The second area of focus provides an analysis of transit needs, and includes a demographic and 3
land use analysis and a review of employment travel patterns.

The review of existing service includes a general description of the structure of RADAR and its system characteristics. The operating statistics and performance evaluation and trends sections render a detailed examination of RADAR's operating performance. The peer review is presented for both fixed-route and demand-response systems and provides an opportunity for RADAR to determine how their operating statistics compare to similar peer transit agencies.

SYSTEM OVERVIEW

Service Levels

RADAR provides oversight for five transportation program operators; one demand-response (CORTRAN), three deviated fixed-route services (The Mountain Express, Maury Express, and Piedmont Area Regional Transport (PART)), and one fixed-route (Ferrum Express). As shown in Table 3-1, service primarily operates on weekdays. Maury Express provides service on weekdays and Saturdays, and Ferrum Express operates three days per week. Most of the services operate between 7 a.m. and 6 p.m., with service frequencies ranging from 60 to 120 minutes. Service is not provided on major holidays (New Year's Day, Good Friday, Memorial Day, July Fourth, Labor Day, Thanksgiving Day, and Christmas Day) for any of the RADAR transportation program providers.

Table 3-1: Span of Service

Transportation Services	Service Type	Span of Service		
		Day (s)	Times	Frequency (Minutes)
CORTRAN	Demand Response	Weekdays	7:00 a.m. - 6:00 p.m. (24-hour advance)	NA
The Mountain Express	Deviated Fixed-Route	Weekdays	8:00 a.m. - 5:00 p.m.	90
Maury Express	Deviated Fixed-Route	Weekdays Saturdays	8:00 a.m. - 6:00 p.m. 10:00 a.m. - 4:00 p.m.	60
PART	Deviated Fixed-Route	Weekdays	7:30 a.m. - 5:30 p.m.	60
Ferrum Express	Fixed-Route	Thursday, Friday Saturday	5:00 p.m. -11:00 p.m. 1:00 p.m.-11:00 p.m.	60 120

Note: Service span as of July 2018

Table 3-2 presents RADAR's daily service levels. On weekdays, RADAR supplies 996 revenue miles, (this figure does not include route deviation miles). There are 68 weekday revenue hours supplied system wide. On Saturdays, service levels are reduced by about 60%.

Table 3-2: Service Levels

Transportation Services	Daily Revenue Miles		Daily Revenue Hours	
	Weekday	Saturday	Weekday	Saturday
Mountain Express	306	-	18	-
Maury Express	204	123	19	11
PART	380	-	26	-
Ferrum Express	106	228	6	12
Total	**996**	**351**	**68**	**23**

SERVICE PERFORMANCE – CURRENT AND TRENDS

To assess how efficiently RADAR supplies service and how effective those services meet the needs of the area, a three-year trend performance analysis was conducted. Using TCRP Report 141: *A Methodology for Performance Measurements and Peer Comparison in the Public Industry* (2010) and the *SBI140 Performance-Based Funding Allocation Study* (2014), performance metrics were identified to evaluate RADAR system wide and by individual transportation program providers that RADAR operates. Performance data was collected and divided into five sections:

1. **Service Supplied** - identifies how much service was provided for the passengers to consume. The following metrics are used to measure service supplied:

- Revenue Miles are the total number of miles that the service is operated while in revenue service. They exclude miles traveled when passengers are not able to board (deadhead travel). Revenue miles increasing faster than total vehicle miles generally indicates a positive operational trend and point to a decreasing proportion of deadhead miles over time relative to total miles.

- Revenue Hours measures the amount of service provided while the bus is picking and dropping off passengers.

2. **Service Utilization** - measures how passengers use the service that is provided. The following metric is used to measure utilization:

    - Passenger Trips is the number of times a person boarded the bus.

3. **Service Effectiveness (or Productivity)** - measures ridership productivity. Prodctivity measures the number of passengers that are served per unit of service – miles, hours, and vehicles. The metrics used to measure service effectiveness are:

    - Passenger Trips per Vehicle Revenue Mile evaluates effectiveness by measuring the number of passenger boardings (ridership) transported per revenue mile of service provided.

    - Passenger Trips per Vehicle Revenue Hour evaluates effectiveness by measuring the number of passenger boardings (ridership) carried per revenue hour of service provided.

4. **Cost efficiency** - measures compare the cost of providing service to the outcomes resulting from the provided service. The following metrics are used to measure cost effectiveness:

    - Operating Cost per Passenger Trip tells an agency how much it costs to transport a passenger.

    - Operating Cost per Passenger Mile tells the agency how much it costs to transport a passenger one mile.

    - Operating Cost per Passenger Hour tells the agency how much it costs to transport a passenger per hour.

5. **Service Quality** - measures customer satisfaction.

    - Average Speed evaluates how fast the bus travels by dividing miles by hours.

System Wide Performance – FY 2016

Table 3-3 displays current (FY 2016) system wide performance, including passenger trips, revenue miles, revenue hours, and operating cost. There were 65,547 system wide passenger trips. PART accounts for 33.6% of the trips, the most of all transportation program providers. Maury Express supplies the most service – revenue miles (25.4%) and revenue hours (26.9%). The Mountain Express accounts for the highest operating cost (29.6%).

Table 3-3: System Wide Performance – FY 2016

Transportation Services	Passenger Trips	Revenue Miles	Revenue Hours	Operating Cost	System Wide			
					Percent of Passenger Trips	Percent of Revenue Miles	Percent of Revenue Hours	Percent of Operating Cost
CORTRAN	4,452	66,947	4,117	$ 175,139	6.8%	18.9%	18.9%	18.6%
Mountain Express	16,924	87,828	5,845	$ 278,201	25.8%	24.8%	26.9%	29.6%
Maury Express	19,379	90,079	5,845	$ 222,612	29.6%	25.4%	26.9%	23.7%
PART	22,055	84,262	5,176	$ 221,888	33.6%	23.8%	23.8%	23.6%
Ferrum Express	2,737	24,898	785	$ 42,675	4.2%	7.0%	3.6%	4.5%
Total	**65,547**	**354,014**	**21,768**	**$ 940,515**				

Table 3-4 displays current (FY 2016) system wide performance measurements for productivity, cost efficiency, and service quality. PART is the most productive transportation program provider, transporting 0.26 passengers per mile and 4.26 passengers per hour. Cost efficiency varies among the providers for each of the metrics, the most efficient for each category are:

- Cost per passenger trip – PART ($10.06)
- Cost per passenger mile – College Express ($1.71)
- Cost per passenger hour – Maury Express ($38.09)

All of the transportation program providers' service speeds (with the exception of one) linger around 15 to 16 mph. The College Express which travels primarily on the freeway has an average speed of 32 mph, the highest of the transportation services.

Table 3-4: System Wide Performance Measurements, FY 2016

Transportation Services	Productivity		Cost Efficiency			Service Quality
	Passenger Trips per Mile	Passenger Trips per Hour	Cost per Passenger Trip	Cost per Passenger Mile	Cost per Passenger Hour	Speed
CORTRAN	0.07	1.08	$39.34	$2.62	$42.54	16
Mountain Express	0.19	2.90	$16.44	$3.17	$47.60	15
Maury Express	0.22	3.32	$11.49	$2.47	$38.09	15
PART	0.26	4.26	$10.06	$2.63	$42.87	16
Ferrum Express	0.11	3.49	$15.59	$1.71	$54.36	32

System Wide Performance Trends, FY 2014 – FY 2016

Passenger Trips

Table 3-5 presents system wide ridership between FY 2014 and FY 2016, as provided by RADAR. In FY 2016 there were 65,547 boarding's; this is 12.90% fewer than FY 2014 levels. During FY 2014, Maury Express accounted for 33.83% of the total ridership, the highest performer. For the past two fiscal years, PART has accounted for the greatest ridership. Following a national trend, ridership is declining for four of the five transportation services. The Ferrum Express is the only service in which ridership is increasing (26.89%).

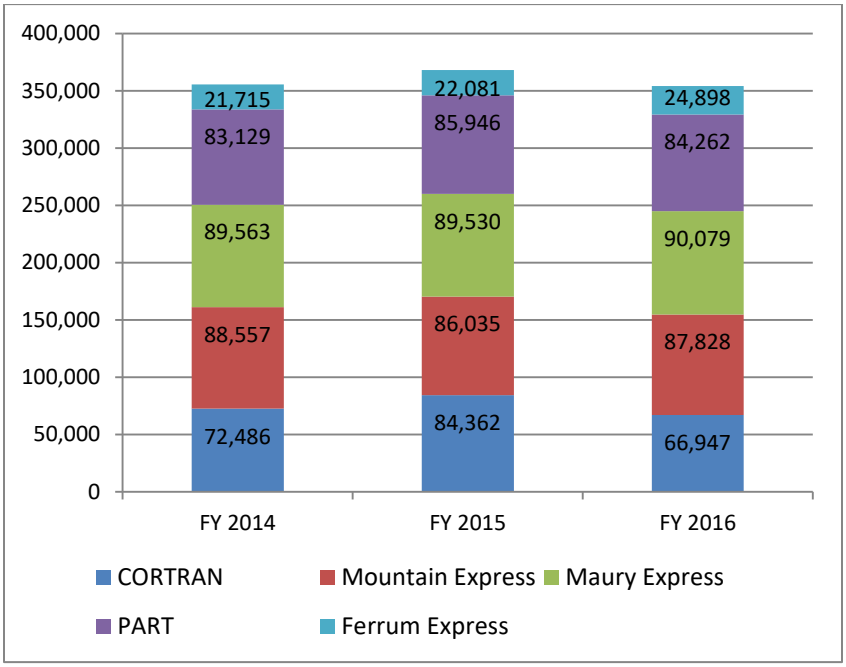
Table 3-5: System Wide Ridership

Transportation Services	FY 2014	FY 2015	FY 2016	FY 2014 Versus FY 2016 Variance
CORTRAN	5,037	5,711	4,452	-11.61%
Mountain Express	18,630	16,599	16,924	-9.16%
Maury Express	25,461	22,581	19,379	-23.89%
PART	23,972	25,192	22,055	-8.00%
Ferrum Express	2,157	2,141	2,737	26.89%
Total	**75,257**	**72,224**	**65,547**	**-12.90%**

Revenue Miles

Figure 3-1 shows that system wide revenue miles remained relatively the same during the three-year time period.

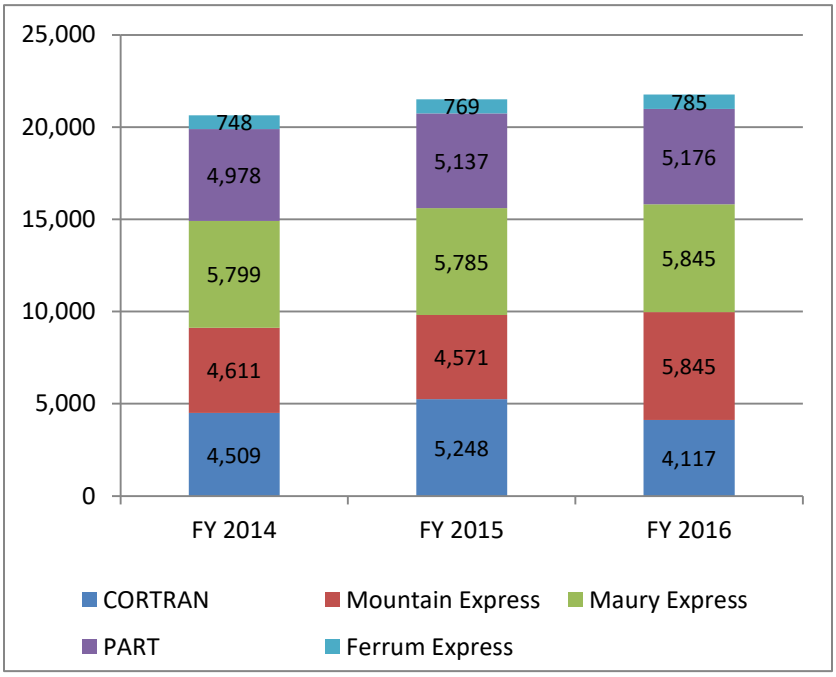
Figure 3-1: System Wide Revenue Miles, FY 2014 - FY 2016



Revenue Hours

Figure 3-2 displays that system wide, about 5.0% more revenue hours were supplied in FY 2016 as compared to FY 2014.

Figure 3-2: System Wide Revenue Hours, FY 2014 - FY 2016



System Wide Performance Measurements

Table 3-6 displays system wide performance measurements between FY 2014 and FY 2016. All of the performance metrics decreased during this time period. This change was not unexpected based on the declining ridership that was documented earlier in the report.

Table 3-6: System Wide Performance Measurements, FY 2014 – FY 2016

Performance Measurement	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Passenger Trips per Mile	0.21	0.20	0.19	-12.55%
Passenger Trips per Hour	3.65	3.36	3.01	-17.40%
Operating Cost per Trip	$11.37	$13.18	$14.35	26.16%
Operating Cost per Mile	$2.41	$2.59	$2.66	10.33%
Operating Cost per Hour	$41.46	$44.27	$43.21	4.21%
MPH	17.22	17.11	16.26	-5.54%

Transportation Program Provider Profiles: Performance and Trends

This section includes detailed provider profiles and performance statistics for each transportation service. Each profile includes a service area description with tables presenting the current service and operating characteristics and performance metrics between FY 2014 and FY 2016. A map is provided for each service displaying the route alignment trip generators when appropriate.

CORTRAN

CORTRAN operates demand-response service to Roanoke County residents (ages 60+ or any age with a disability) for trips within Roanoke County, City of Roanoke, City of Salem, and the Town of Vinton. Service operates weekdays 7:00 a.m. to 6:00 p.m. ADA approved passengers are required to reserve a trip 24 hours in advance. Table 3-7 presents CORTRAN's performance characteristics and measurements between FY 2014 and FY 2016.

Table 3-7: CORTRAN Performance Characteristics and Measurements, FY 2014-FY 2016

Performance	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Characteristic				
Passenger Trips	5,037	5,711	4,452	-11.61%
Operating Costs	$176,784	$204,889	$175,139	-0.93%
Revenue Miles	72,486	84,362	66,947	-7.64%
Revenue Hours	4,509	5,248	4,117	-8.69%
MPH	16.08	16.08	16.26	1.15%
Measurement				
Passenger Trips per Mile	0.07	0.07	0.07	-4.30%
Passenger Trips per Hour	1.12	1.09	1.08	-3.20%
Operating Cost per Trip	$35.10	$35.88	$39.34	12.09%
Operating Cost per Mile	$2.44	$2.43	$2.62	7.27%
Operating Cost per Hour	$39.21	$39.04	$42.54	8.50%

The Mountain Express

The Mountain Express operates one deviated fixed-route within the City of Covington, and the towns of Clifton Forge and Iron Gate. Two buses provide weekday service. ADA certified passengers may request the bus to deviate from its route to make pickups and drop offs. The distance may not exceed a ¾-mile radius off the route. Table 3-8 displays the service and operating characteristics to include service span, headways, the number of one-way trips, cycle time, and daily service miles and hours. Table 3-9 presents Mountain Express performance characteristics and measurements between FY 2014 and FY 2016. Figure 3-3 displays the major trip destinations served along the route.

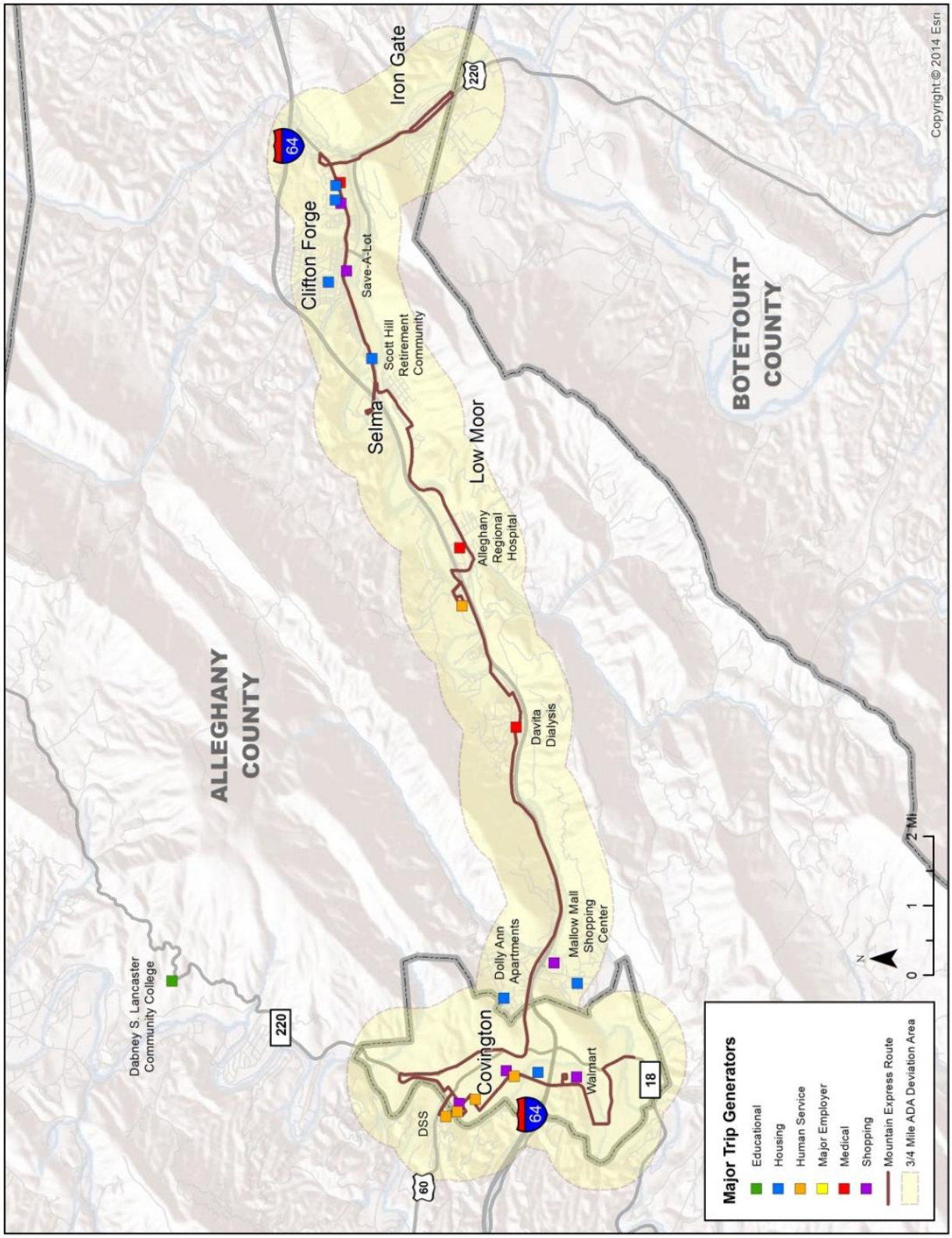
Table 3-8: The Mountain Express Service and Operating Characteristics, FY 2016

Service and Operating Characteristics	Weekdays
Service Span	8:00 a.m. – 5:00 p.m.
Frequency (Minutes)	90
One-Way Trips	12
Cycle Time (Minutes)	90
Daily Service Miles	306
Daily Service Hours	18

Table 3-9: The Mountain Express Performance Characteristics and Measurements, FY 2014 - FY 2016

Performance	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Characteristic				
Passenger Trips	18,630	16,599	16,924	-9.16%
Operating Costs	$221,153	$259,950	$278,201	25.80%
Revenue Miles	88,557	86,035	87,828	-0.82%
Revenue Hours	4,611	4,571	5,845	26.76%
MPH	19.21	18.82	15.03	-21.76%
Measurement				
Passenger Trips per Mile	0.21	0.19	0.19	-28.34%
Passenger Trips per Hour	4.04	3.63	2.90	-8.40%
Operating Cost per Trip	$11.87	$15.66	$16.44	38.48%
Operating Cost per Mile	$2.50	$3.02	$3.17	26.84%
Operating Cost per Hour	$47.96	$56.87	$47.60	-0.76%

Figure 3-3: The Mountain Express Major Trip Generators



Maury Express

Maury Express operates two deviated bus routes – Lexington, and Buena Vista. Individuals who are ADA eligible may request a deviation for pick-ups and drop-offs. The deviation distance may not exceed a ¾-mile radius off the route.

Table 3-10 presents the service and operating characteristics to include service span, headways, the number of one-way trips, cycle time, and daily service miles and hours. Table 3-11 presents the performance characteristics and measurements between FY 2014 and FY 2016. Figure 3-4 and Figure 3-5 display the major trip destinations served along the routes.

Table 3-10: Maury Express Service and Operating Characteristics, FY 2016

Service and Operating Characteristic	Weekdays	Saturdays
Service Span	8:00 a.m. – 6:00 p.m.	10:00 a.m. – 4:00 p.m.
Frequency (Minutes)	60	60
One-Way Trips	20	12
Cycle Time (Minutes)	111	111
Daily Service Miles	204	123
Daily Service Hours	19	11

Table 3-11: Maury Express Performance Characteristics and Measurements, FY 2014 - FY 2016

Performance	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Characteristic				
Passenger Trips	25,461	22,581	19,379	-23.89%
Operating Costs	$212,692	$222,910	$222,612	4.66%
Revenue Miles	89,563	89,530	90,079	0.58%
Revenue Hours	5,799	5,785	5,845	0.80%
MPH	15.45	15.48	15.41	-0.22%
Measurement				
Passenger Trips per Mile	0.28	0.25	0.22	-24.49%
Passenger Trips per Hour	4.39	3.90	3.32	-24.32%
Operating Cost per Trip	$8.35	$9.87	$11.49	37.51%
Operating Cost per Mile	$2.37	$2.49	$2.47	4.06%
Operating Cost per Hour	$36.68	$38.53	$38.09	3.83%

Figure 3-4: Maury Express - Lexington Trip Generators

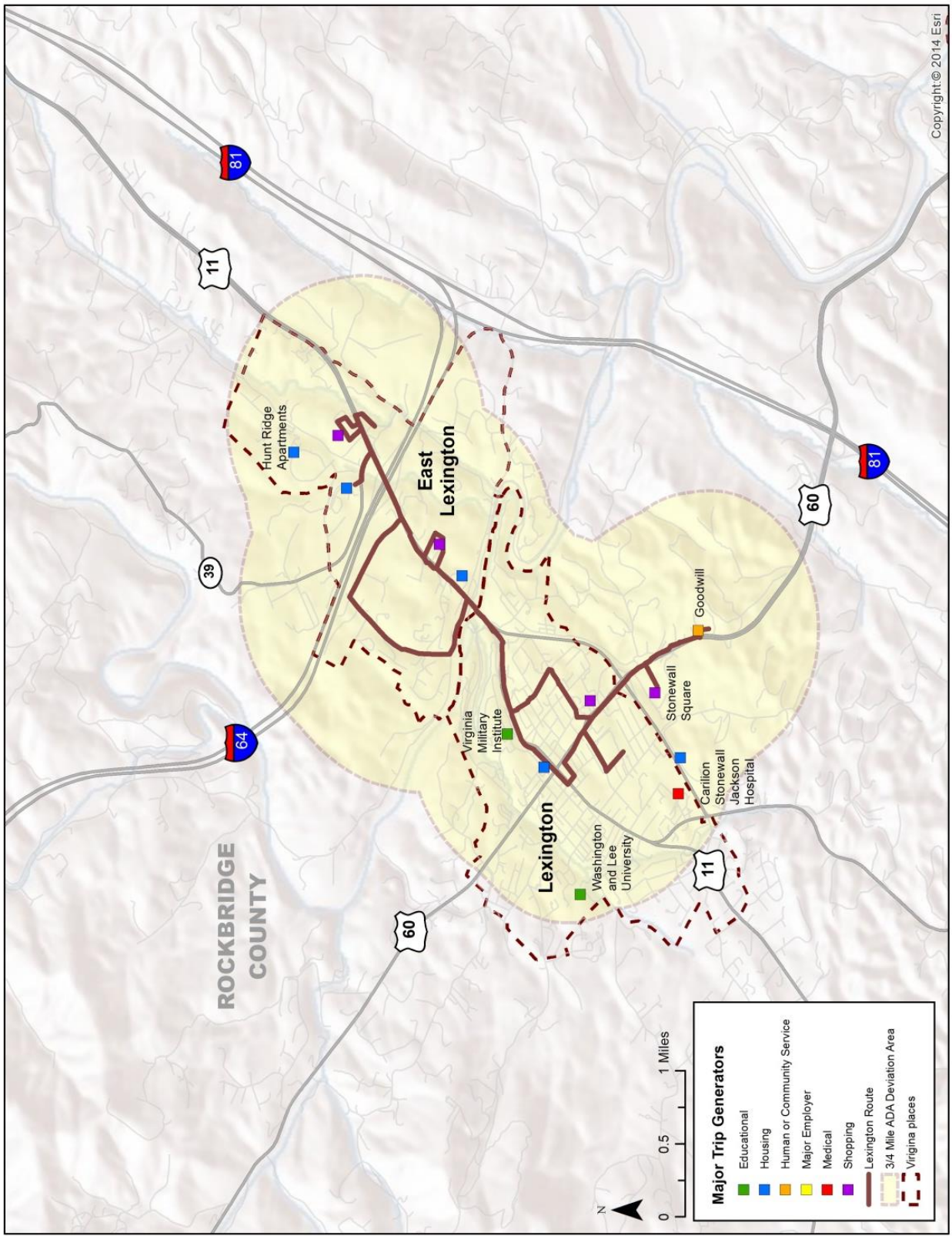
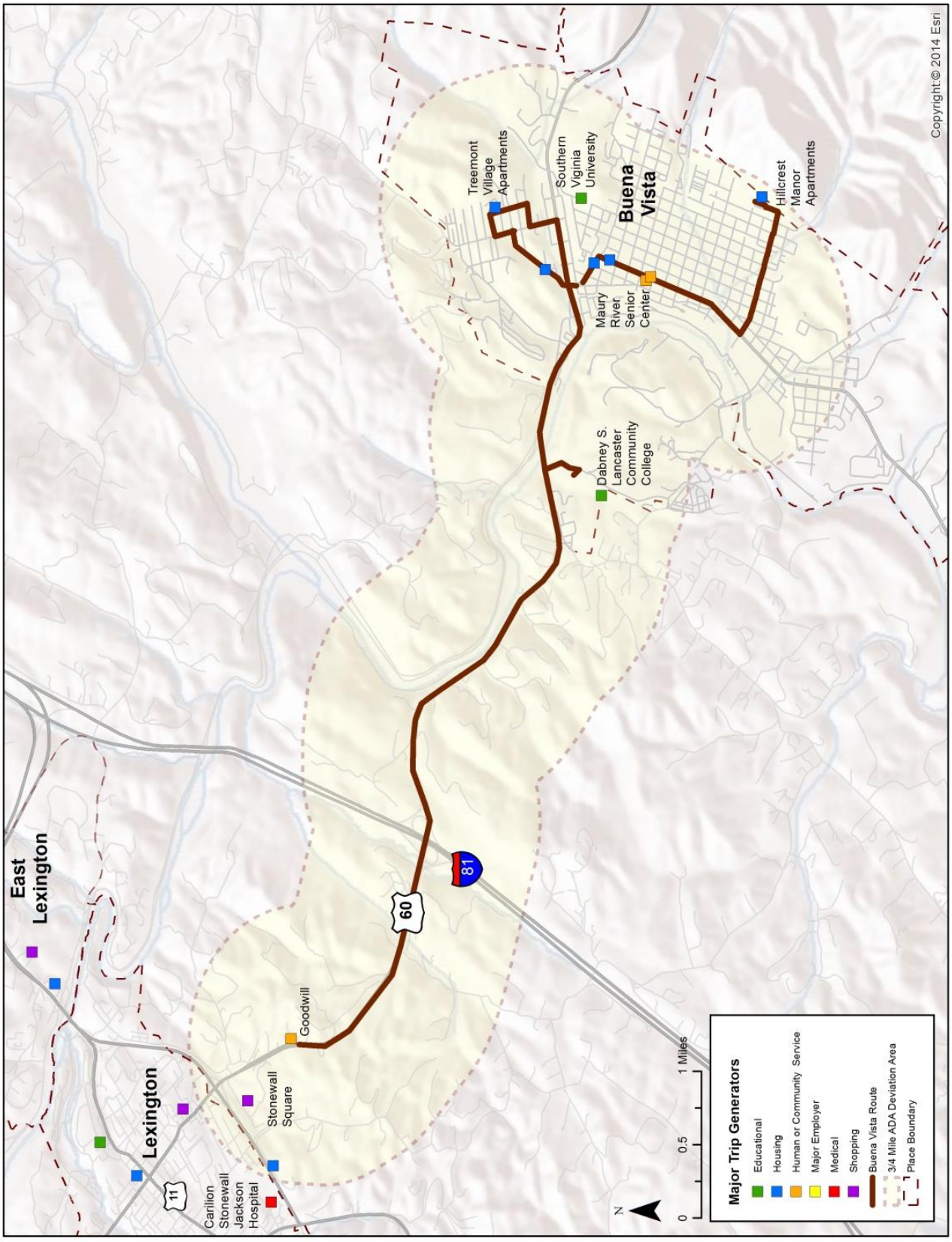


Figure 3-5: Maury Express - Buena Vista Trip Generators



Piedmont Area Regional Transit (PART)

PART operates three deviated bus routes – Collinsville, Martinsville, and Southside. Individuals who are ADA eligible may request a deviation for pick-ups and drop-offs. The deviation distance may not exceed a ¾-mile radius off the route.

The three routes are interlined and both buses start and end service at Lowe's Home Improvement in Martinsville. Table 3-12 presents the service and operating characteristics to include service span, headways, the number of one-way trips, cycle time, and daily service miles and hours. Table 3-13 presents the performance characteristics and measurements between FY 2014 and FY 2016. Figure 3-6 through Figure 3-8 display the major trip destinations served along the routes.

Table 3-12: PART Service and Operating Characteristics, FY 2016

Service and Operating Characteristic	Weekdays
Service Span	7:30 a.m. – 5:30 p.m.
Frequency (Minutes)	60
One-Way Trips	20
Cycle Time (Minutes)	60
Daily Service Miles	380
Daily Service Hours	26

Table 3-13: PART Performance Characteristics and Measurements, FY 2014 - FY 2016

Performance	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Characteristic				
Passenger Trips	23,972	25,192	22,055	-8.00%
Operating Costs	$205,002	$223,483	$221,888	8.24%
Revenue Miles	83,129	85,946	84,262	1.36%
Revenue Hours	4,978	5,137	5,176	3.97%
MPH	16.70	16.73	16.28	-2.51%
Measurement				
Passenger Trips per Mile	0.29	0.29	0.26	-11.51%
Passenger Trips per Hour	4.82	4.90	4.26	-9.23%
Operating Cost per Trip	$8.55	$8.87	$10.06	17.64%
Operating Cost per Mile	$2.47	$2.60	$2.63	6.78%
Operating Cost per Hour	$41.18	$43.51	$42.87	4.10%

Figure 3-6: PART - Collinsville Trip Generators

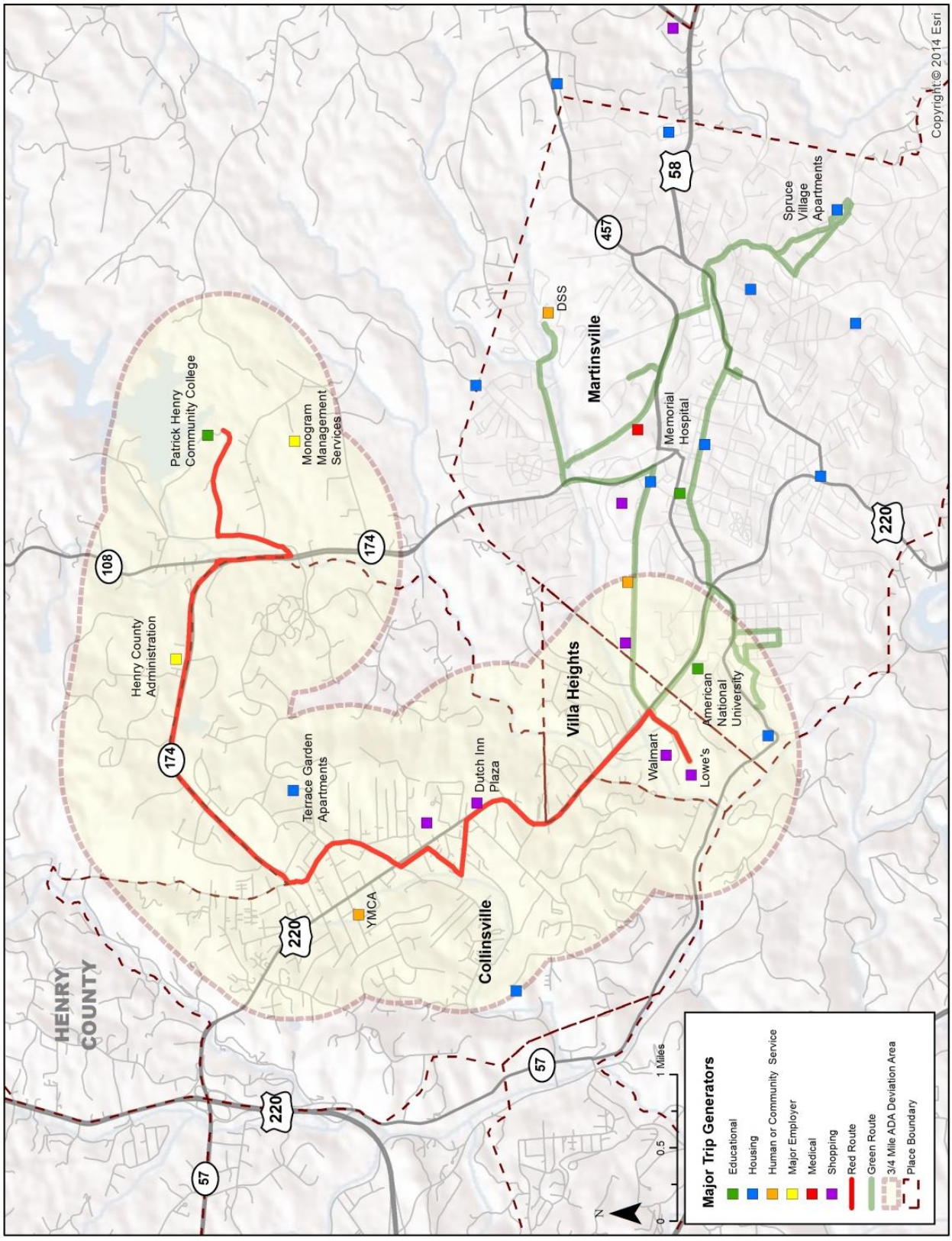


Figure 3-7: PART - Martinsville Trip Generators

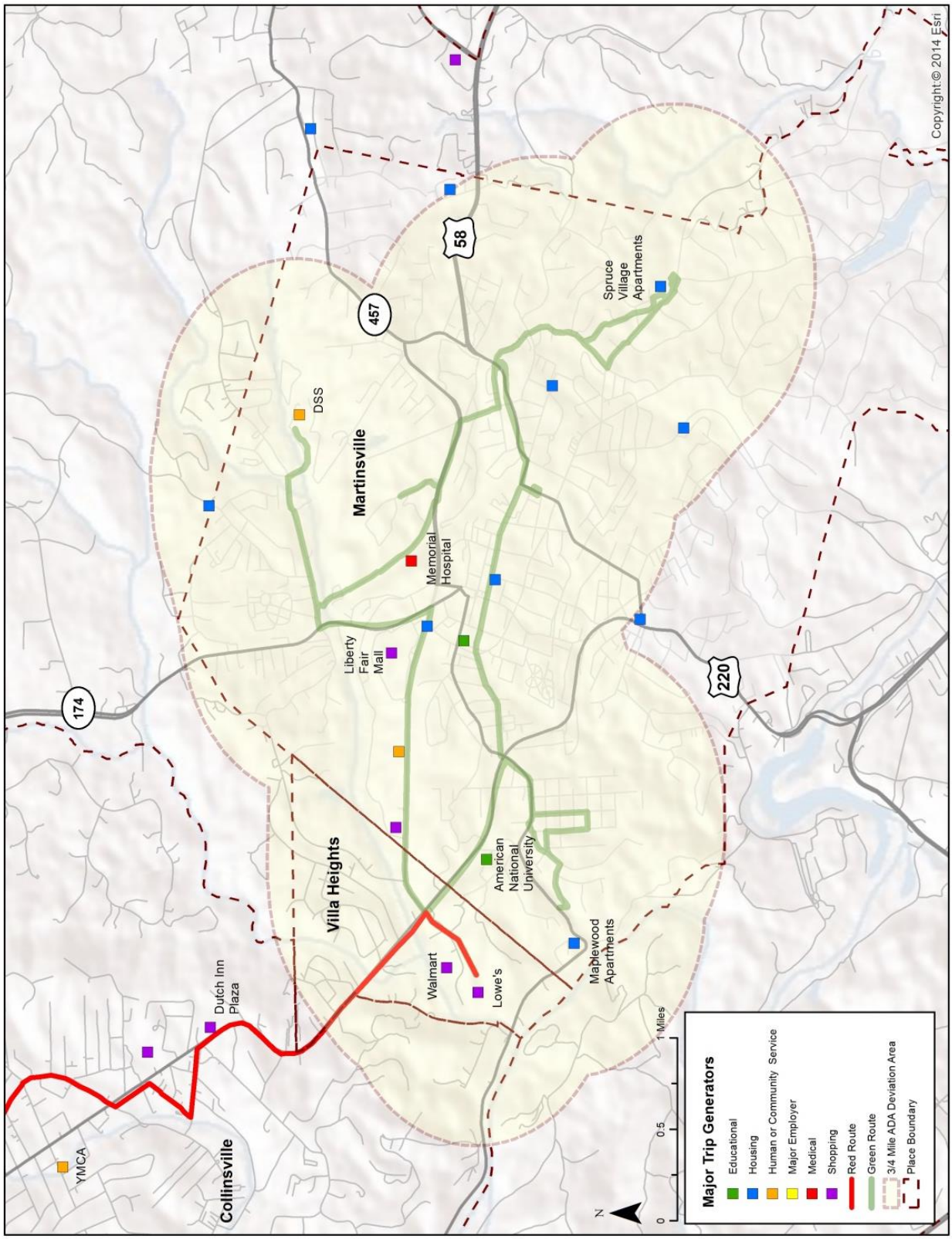
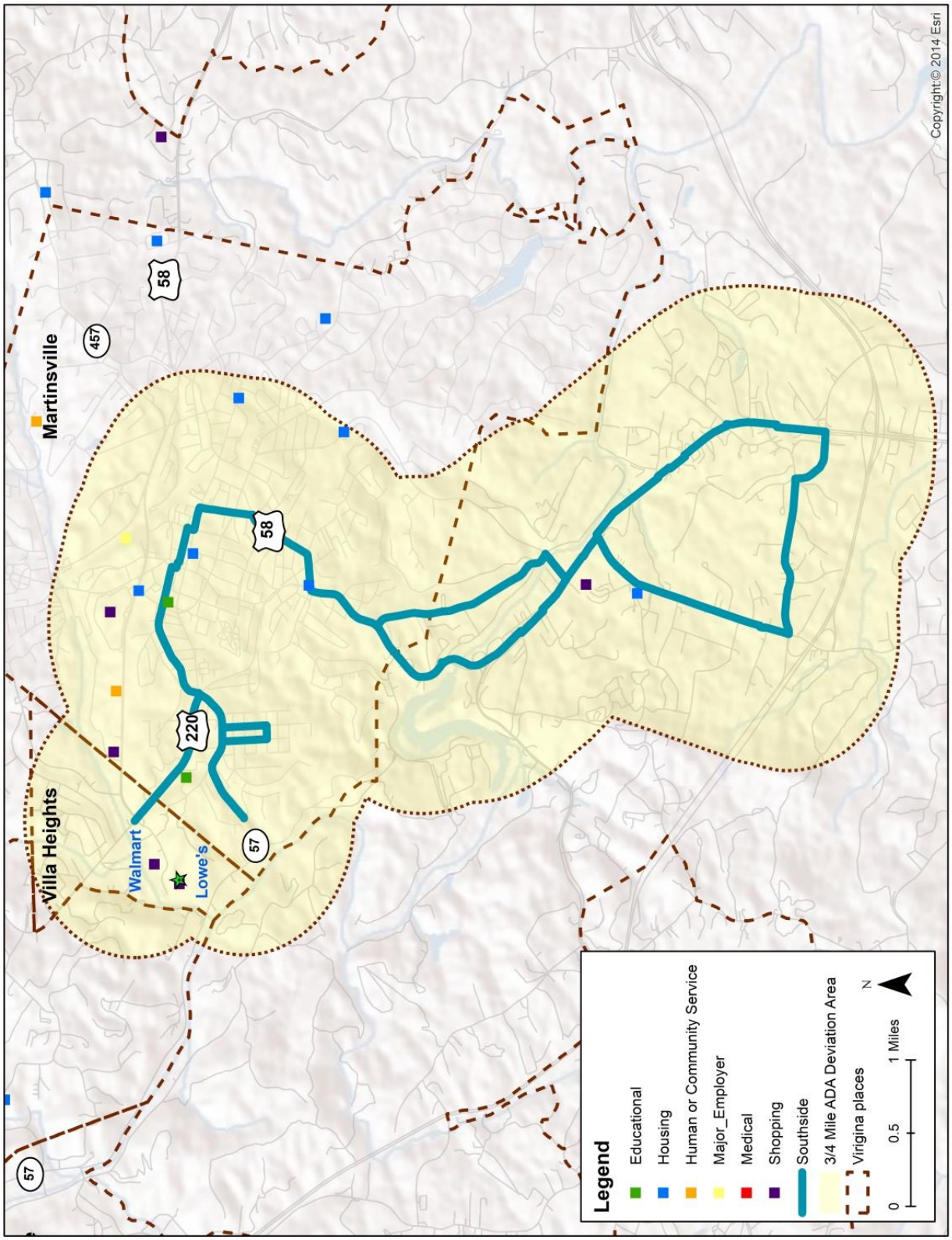


Figure 3-8: PART - Southside Trip Generators



Ferrum Express

Ferrum Express operates fixed-route bus service between Ferrum College, Rocky Mount and the City of Roanoke, three days a week. Table 3-14 presents the service and operating characteristics to include service span, headways, the number of one-way trips, cycle time, and daily service miles and hours.
Table 3-15 presents the performance characteristics and measurements between FY 2014 and FY 2016. Figure 3-9 displays the major trip destinations served along the route.

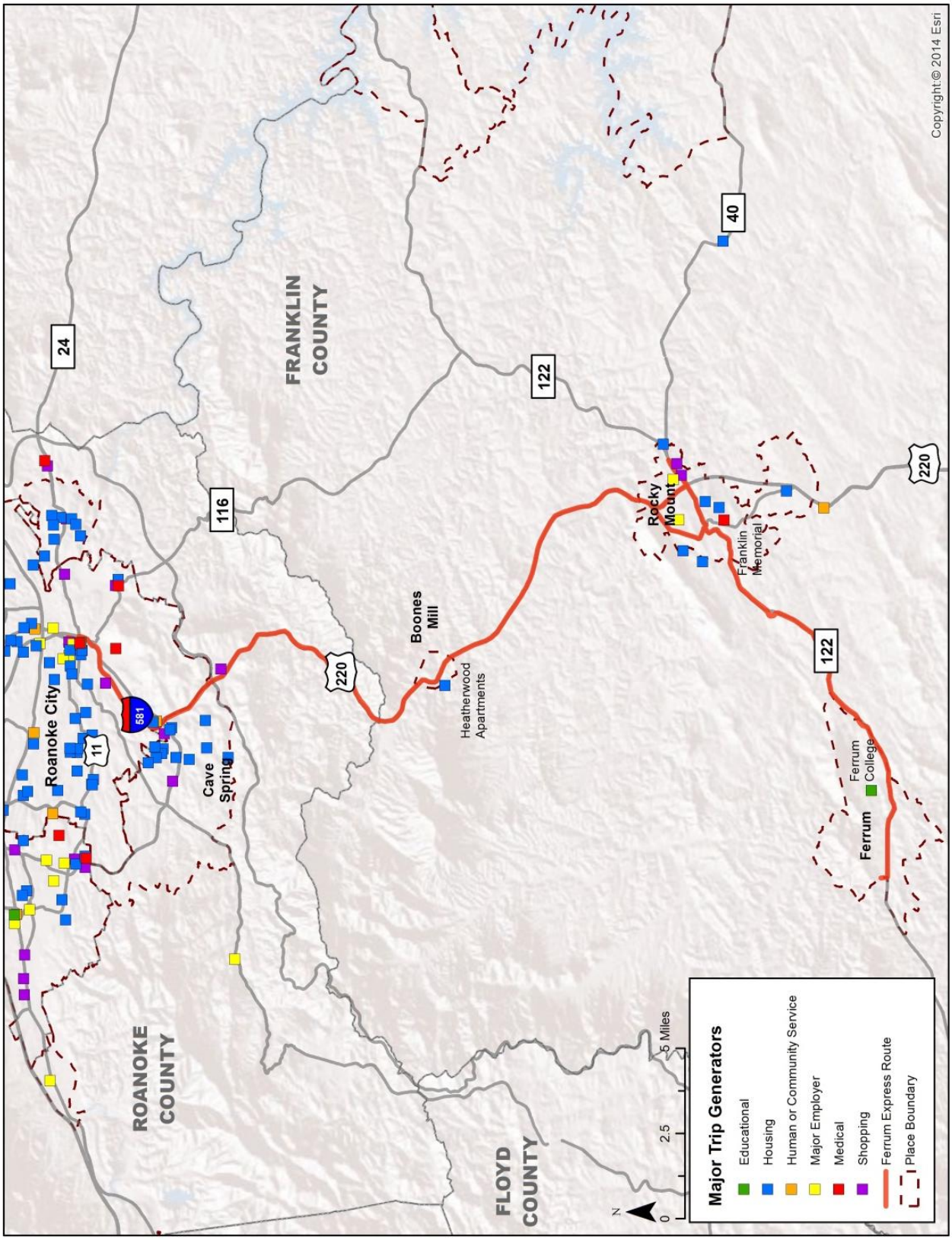
Table 3-14: Ferrum Express Service and Operating Characteristics

Service and Operating Characteristic	Thursday, Friday	Saturday
Service Span	5:00 p.m. – 11:00 p.m.	1:00 p.m. – 11:00 p.m.
Frequency (Minutes)	60 minutes	120 minutes
One-Way Trips	6	6
Cycle Time	60	120
Daily Service Miles	106	228
Daily Service Hours	6	12

Table 3-15: Ferrum Express Performance Characteristics and Measurements

Performance	FY 2014	FY 2015	FY 2016	FY 2014 versus FY 2016 Variance
Characteristic				
Passenger Trips	2,157	2,141	2,737	26.89%
Operating Costs	$40,312	$40,901	$42,675	5.86%
Revenue Miles	21,715	22,081	24,898	14.66%
Revenue Hours	748	769	785	4.91%
MPH	29.02	28.73	31.72	9.29%
Measurement				
Passenger Trips per Mile	0.10	0.10	0.11	20.95%
Passenger Trips per Hour	2.88	2.79	3.49	10.67%
Operating Cost per Trip	$18.69	$19.10	$15.59	-16.57%
Operating Cost per Mile	$1.86	$1.85	$1.71	-7.67%
Operating Cost per Hour	$53.88	$53.22	$54.36	0.91%

Figure 3-9: Ferrum Express Trip Generators



PEER REVIEW

While it is most relevant for a transit agency to examine its own performance over time, it is valuable to know the performance statistics for transit programs that could be considered "peers," either by virtue of location, service area characteristics or size, to see if local transit data is "in the ballpark" of typical peer operating data. Although each of the services RADAR operates are somewhat "peerless", each of the systems reviewed offers some similarities for analysis purposes. As a part of this TDP process, a peer review was conducted to gain a snapshot of comparable agencies. The primary purpose of this peer review was to explore how RADAR transit performs compared with a group of similar transit agencies. The analysis helps identify areas in which RADAR is performing better than peers and areas that it is lagging.

Since RADAR operates deviated fixed-route and demand-response services, performance was compared against these particular modes. The agencies identified for comparison and analysis are presented below.

Demand-response peers reviewed:

- Bay Aging (BA); Urbanna, Virginia
- Mountain Lynx Transit (MLT) -(formerly District Three Public Transit); Marion, Virginia
- Greene County Transit (GCT); Stanardsville, Virginia
- JAUNT Inc. (JI); Charlottesville, West Virginia

Deviated fixed-route peers reviewed:

- Blackstone Area Bus Service (BABS); Blackstone, Virginia
- Four County Transit (FCT); Cedar Bluff, Virginia
- Virginia Regional Transit (VRT); Culpeper County

Using the Rural National Transit Database (NTD), performance data for FY 2014 was extracted for the above mentioned agencies[1]. The same performance measurements were used in this analysis as the ones analyzed in the system performance section.

Demand-Response Comparison Results

RADAR's demand-response service, CORTRAN transports the least passenger trips per mile (0.11) and passenger trips per hour (1.92) when compared to the four peer agencies. While the operating cost per trip ($24.34) is the highest among the group, the operating cost per mile ($2.65) is the second lowest. Lastly, the operating cost per hour falls in the middle among the peer group. The results of the peer review are presented in Table 3-16 and Figure 3-10 (demand-response services – CORTRAN).

[1] At the time this TDP was developed, FY 2014 data was the latest available.

Table 3-16: Peer Comparison, Demand-Response Services

Agency	CORTRAN	BA	MLT	GCT	JI
Passenger Trips	**85,836**	143,170	173,132	60,005	306,443
Revenue Miles	**787,870**	1,134,900	545,122	328,972	1,618,117
Revenue Hours	**44,708**	55,130	43,781	16,266	111,543
Operating Cost	**$2,088,998**	$3,075,066	$1,874,349	$679,586	$5,646,954
Fare Revenues	**$197,248**	$197,813	$61,265	$50,726	$883,090
Trips per Mile	**0.11**	0.13	0.32	0.18	0.19
Trips per Hour	**1.92**	2.60	3.95	3.69	2.75
Cost per Trip	**$24.34**	$21.48	$10.83	$11.33	$18.43
Cost per Mile	**$2.65**	$2.71	$3.44	$2.07	$3.49
Cost per Hour	**$46.72**	$55.78	$42.81	$41.78	$50.63
Farebox Recovery Ratio	**9.44%**	6.43%	3.27%	7.46%	15.64%
Average Speed (mph)	**18**	21	12	20	15

Source: Rural NTD, FY 2014

Deviated Fixed-Route Comparison Results

RADAR transports the most passenger trips per mile (0.26), and the second most passenger trips per hour (4.42) when compared to their peers. The operating cost per trip ($9.51) is the lowest among the group, while the operating cost per mile ($2.48) is the highest among peer agencies, see Table 3-17 and Figure 3-11.

Table 3-17: Peer Comparison, Deviated Fixed-Route Services

Agency	RADAR*	BABS	FCT	VRT
Passenger Trips	**68,063**	39,128	158,516	126,236
Revenue Miles	**261,249**	393,550	885,671	688,874
Revenue Hours	**15,388**	13,549	41,574	21,687
Operating Cost	**$647,300**	$399,917	$1,691,991	$1,596,372
Fare Revenues	**$29,775**	$22,124	$18,705	$39,426
Trips per Mile	**0.26**	0.10	0.18	0.18
Trips per Hour	**4.42**	2.89	3.81	5.82
Cost per Trip	**$9.51**	$10.20	$10.67	$12.65
Cost per Mile	**$2.48**	$1.02	$1.91	$2.32
Cost per Hour	**$42.07**	$29.52	$40.70	$73.61
Farebox Recovery Ratio	**4.60%**	5.53%	1.11%	2.47%
Average Speed (mph)	**17**	29	21	32

Source: Rural NTD, FY 2014

*Mountain Express, Maury Express, PART, and Ferrum Express

Figure 3-10: Peer Comparison, Demand-Response

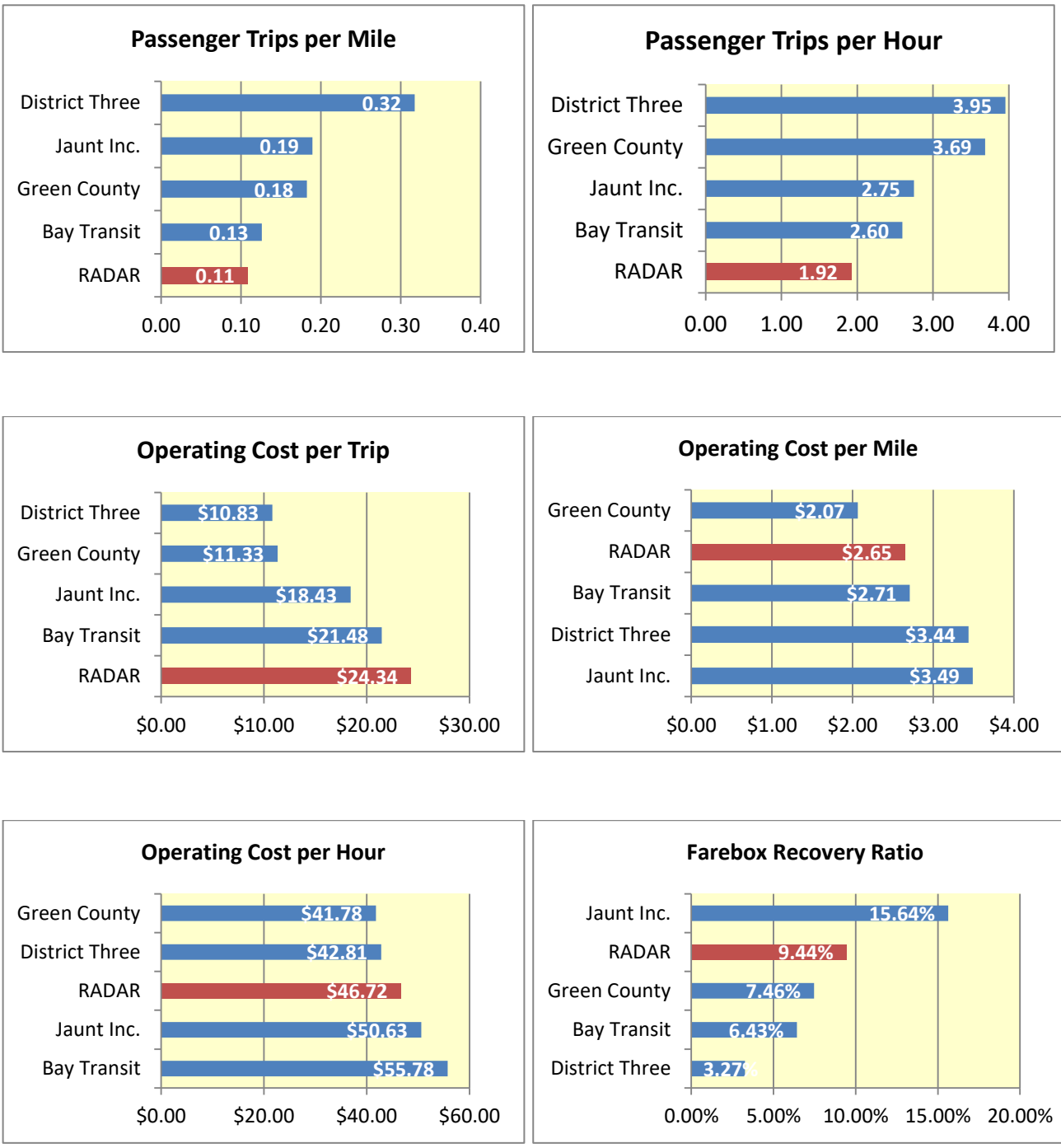
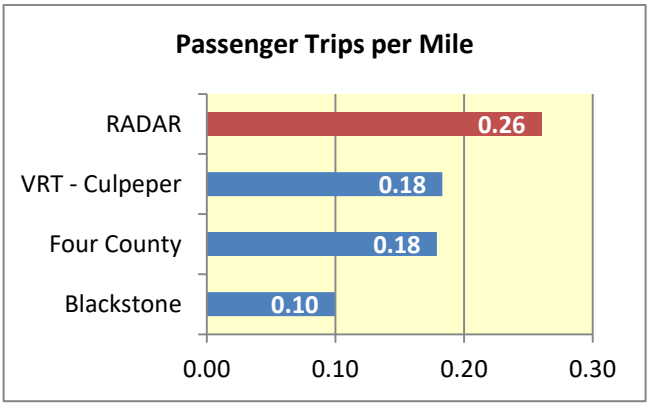
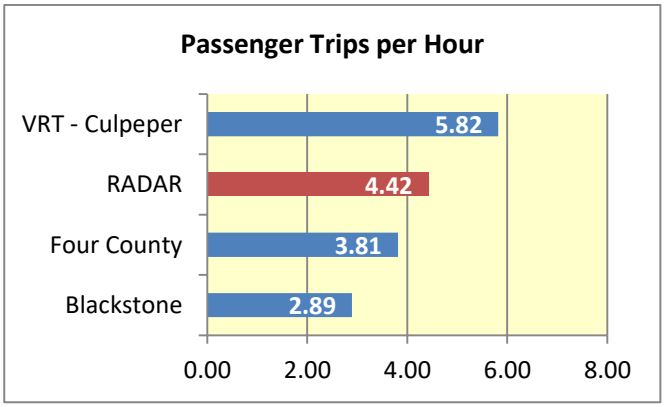
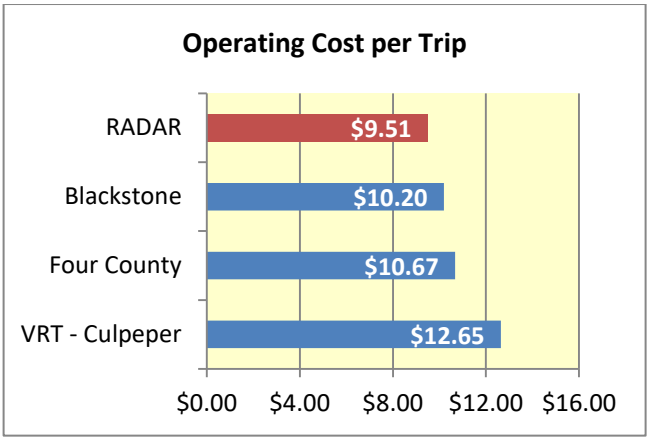
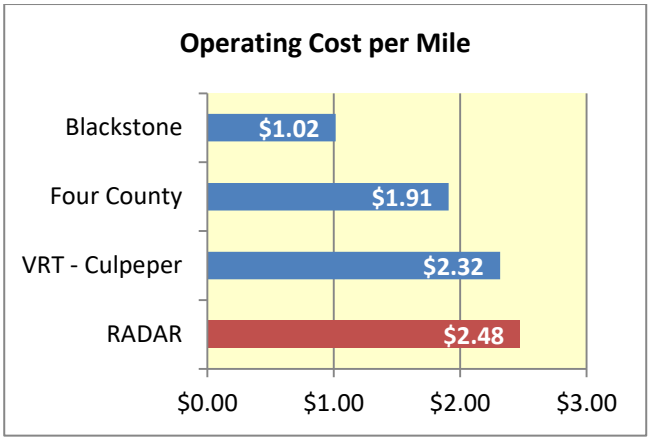


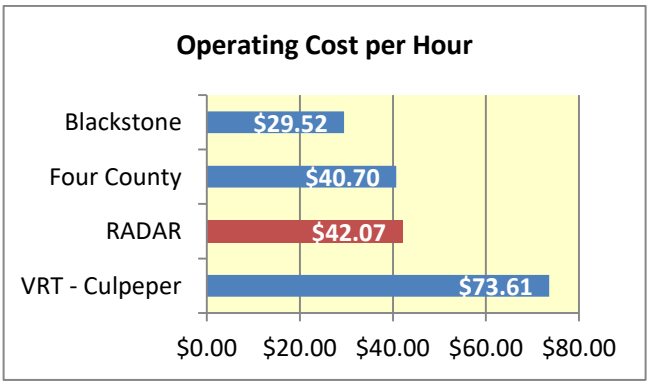
Figure 3-11: Peer Comparison, Deviated Fixed-Route

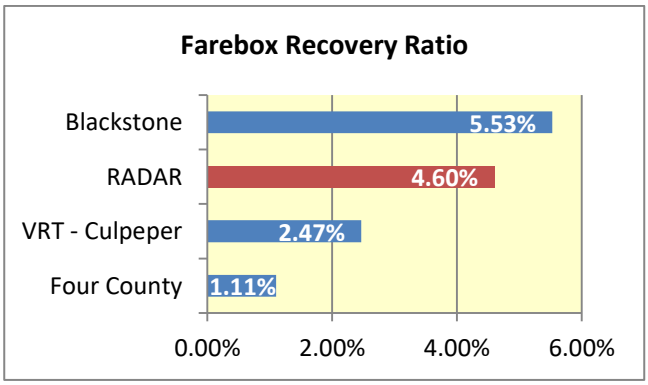












FINANCIAL ANALYSIS

Funding Sources

According to the Survey of State Funding for Public Transportation (2016), RADAR receives capital and operating funds from the Federal Transit Administration (FTA), Virginia Department of Rail and Public Transportation (DRPT), and local sources.[2]

Capital Budget

RADAR's FY 2016 capital budget totals $804,700 (Table 3-18). The greatest expenditure is the replacement of five vans, totaling $335,000. For FY 2017, RADAR received $614,160 (76%) in federal capital grants. The Commonwealth of Virginia contributed $139,032 (17%), and local sources accounted for 6% of the capital funding assistance.

Table 3-18: RADAR Capital Budget, FY 2017

Expenditure*	Federal	State	Local	Total
5 Replacement Vans	$268,000	$53,600	$13,400	$335,000
Bus Rehab/Administration Maintenance Facility Renovation	$64,800	$12,960	$3,240	$81,000
Purchase ADP Hardware	$5,200	$1,040	$260	$6,500
Purchase Surveillance/Security Equipment	$104,160	$20,832	$5,208	$130,200
Purchase Shop Equipment	$12,000	$2,400	$600	$15,000
19 Pass Body on Chassis w/Wheelchair Lift	$56,000	$11,200	$2,800	$70,000
Facility Maintenance Assessment & Plan Development	-	$18,500	-	$18,500
2-14 Passenger BOC w/Lift	$104,000	-	$26,000	$130,000
Total	**$614,160**	**$120,532**	**$51,508**	**$786,200**

*Note: Section 5310 vehicles not included.

Operating Budget

The FY 2016 operating budget for RADAR is $3.65 million (Table 3-19).

[2] Survey of State Funding for Public Transportation, 2016, http://scopt.transportation.org/Documents/SSFP-10-UL.pdf

Table 3-19: RADAR Operation Budget, FY 2014 – FY 2016

Operating Expenses	FY 2014	FY 2015	FY 2016
Salaries	$1,668,673	$1,668,673	$1,668,673
Fringes and Insurance	$348,257	$392,354	$393,767
Contractual Services	$2,729	$3,209	$3,135
Maintenance	$45,566	$45,566	$38,494
Fuel	$598,056	$445,137	$461,816
Employee Screening	$7,966	$13,044	$10,424
New Freedom Pass Thru	$0	$0	$70,000
Depreciation	$0	$0	$500,000
Other Operating Expenses	$334,300	$383,891	$503,173
Total	**$3,005,547**	**$2,951,874**	**$3,649,482**

RECENT COMPLIANCE RESULTS

The Virginia Department of Rail and Public Transportation (DRPT) is required to conduct periodic oversight reviews of each organization that receives FTA Section 5310 and Section 5311 grant funding. RADAR completed a Section 5310 and Section 5311 Compliance Review on October 28, 2015.

The review focused on RADAR's compliance in the following areas:

- Organizational Management
- Project Management/ Grant Administration
- Financial Management
- Satisfactory Continuing Control
- Procurement
- Personnel Issues
- Operations and Service Requirements
- Service Provisions
- Planning and Coordination

The review focused on procedures and practices in place for the past three years. RADAR had one finding during the review period. The finding was that 27% of preventative maintenance was completed later than scheduled.

RADAR RIDER SURVEYS

An important task for the TDP was to gather opinions from current customers concerning deviated fixed-route services, as well as to develop a passenger profile. With input from RADAR

staff and the appropriate Advisory Committees, on board surveys were prepared for Maury Express and PART services. The survey was administered on board vehicles by RADAR staff from June 21 to July 1, 2017. A copy of each survey is provided in Appendix A.

Maury Express Rider Survey

Of the 17 survey respondents, notable findings are:

- The majority of riders are White and between the ages of 35 and 54 years old. Most respondents are employed part-time, have an estimated annual household income of $14,999 or less, and reside in Buena Vista and Lexington.

- The number one reason for the trip purpose was shopping/errands, followed closely by work and social/recreation trips.

- Most respondents ride the bus every service day.

Service Satisfaction

Survey respondents were overwhelmingly satisfied with the service provided by Maury Express. No respondents indicated any level of neutrality or dissatisfaction. As shown in Figure 3-12, all respondents are either satisfied or strongly satisfied with the service. Additionally, most riders are strongly satisfied with the cost of the bus fare ($0.50 per trip).

Survey respondents were asked to list what they liked less about the bus service and identify what service improvements are needed. The respondents' comments can be summarized in three categories:

1. **Common themes**

    - No Sunday/ evening service
    - Faster service
    - Expand the route
    - Service to the hospital

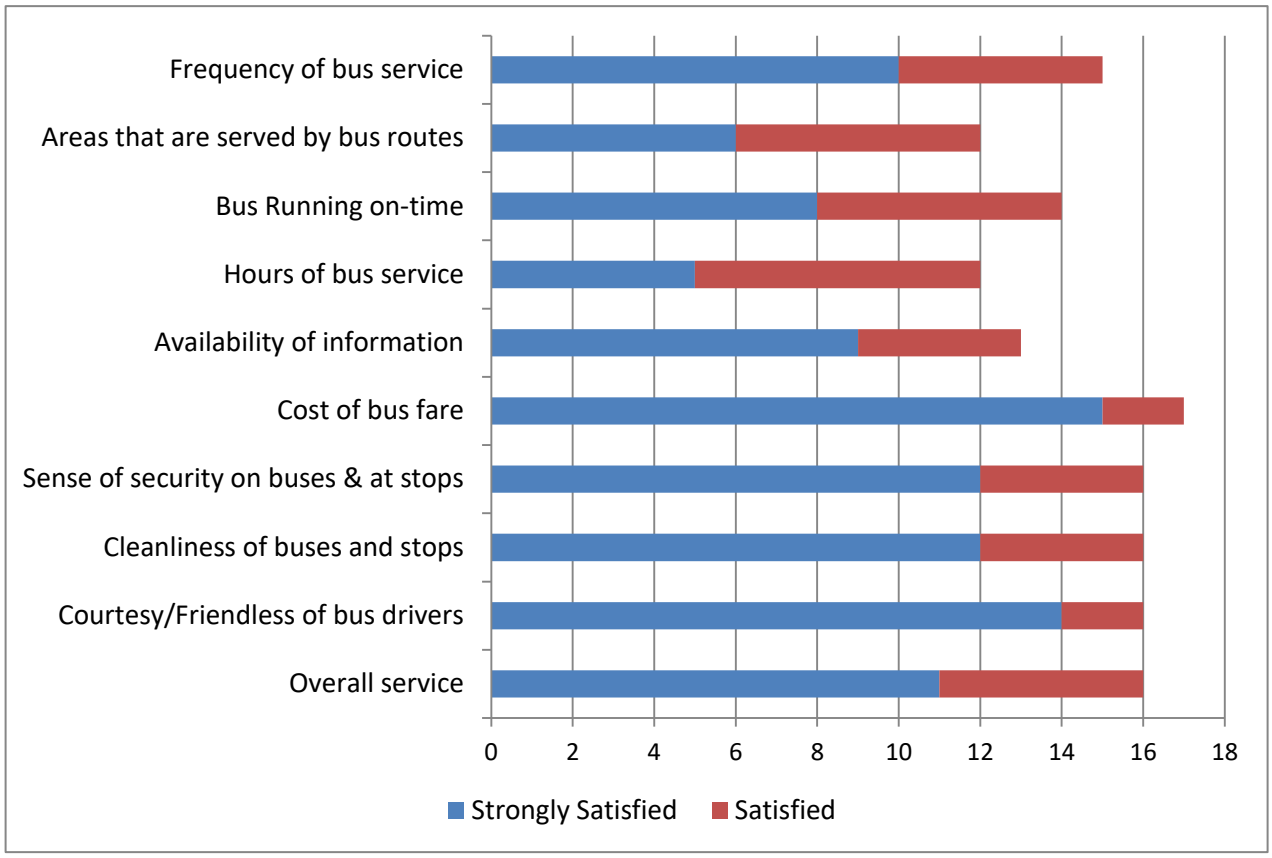
2. **Like most about the service**

    - Cheap bus fare
    - Convenient and reliable
    - Friendly drivers

3. **Places the bus should go**

- Virginia Horse Center
- Glen Maury Park
- Roanoke Amtrak Station
- Lynchburg Amtrak Station

Figure 3-12: Service Satisfaction



PART Rider Survey

Of the 24 survey respondents, notable findings are:

- The majority of riders are Black and between the ages of 35 and 64 years old. Most respondents are unemployed and have an estimated annual household income of $14,999 or less.

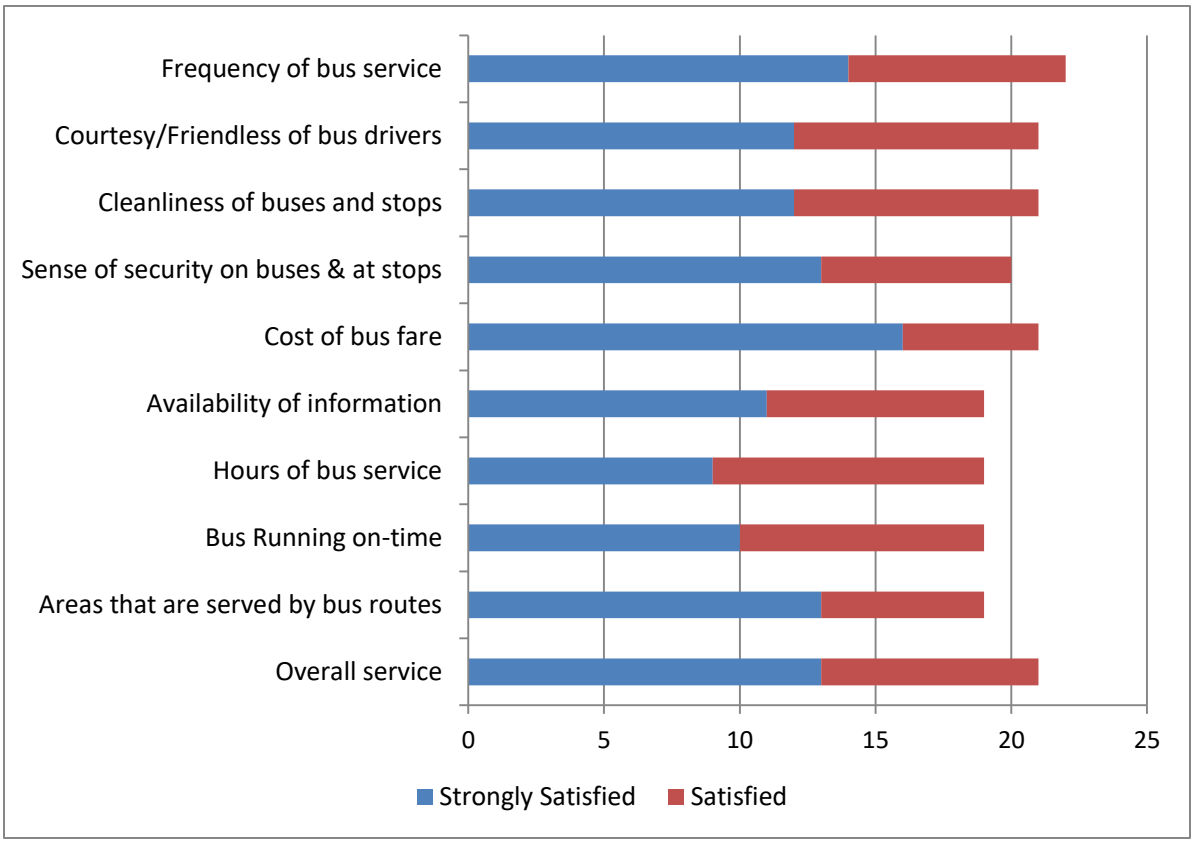
- The number one reason for the trip purpose was shopping/errands, followed closely by work and social/recreation trips.

- Most respondents ride the bus three days per week.

Service Satisfaction

Survey respondents were overwhelmingly satisfied with the service provided by PART. No respondents indicated any level of neutrality or dissatisfaction. As shown in Figure 3-13, all respondents are either satisfied or strongly satisfied with the service. Additionally, most riders are strongly satisfied with the cost of the bus fare ($0.50 per trip).

Figure 3-13: Service Satisfaction



Survey respondents were asked to list what they liked less about the bus service and identify what service improvements are needed. The respondents' comments can be summarized in three categories:

1. **Common themes**

- Provide service to more areas
- Bus stop amenities
- Expand service hours, no evening and weekend service
- Expand the route
- Bus pulse

2. **Like most about the service**

- Cheap bus fare
- Convenient, safe and reliable
- Friendly drivers

3. **Places the bus should go**

- Bassett Family Practice
- Reservoir
- Stanley town
- Laurel Park
- Christ's Church Spruce
- Northview Garden Apartments

ROANOKE VALLEY TRANSIT VISION PLAN TECHNICAL REPORT ON PRELIMINARY SURVEYS AND DATA ANALYSIS

The Roanoke Valley Transit Vision Plan conducted an extensive outreach and data collection effort as part of its survey and data analysis. Surveys and data were collected from RADAR, Valley Metro, the general public, and Botetourt County Senior and Accessible Van Program. The information pertinent to RADAR has been included in this section.

CORTRAN

The Roanoke Valley Transit Vision Plan analyzed two years of RADAR's trip data covering January 2012 through December 2013. Customer and trip data was collected from both CORTRAN and STAR. For the purpose of this TDP, only CORTRAN will be discussed.

Passenger Profile

As seen in Table 3-20, 68% of CORTRAN riders reported using a wheelchair. Sixty-one percent of CORTRAN riders are at least 60 years old. Out of these riders, 84% indicated that they use a wheelchair. For riders younger than age 60, 44% use a wheelchair. Figure 3-14 depicts the age breakdown of CORTRAN customers and Figure 3-15 shows the mobility type by age of CORTRAN customers.

Table 3-20: Passenger Mobility Type

Mobility Type	Number	Percent
Ambulatory	210	17%
Ambulatory/Visually Impaired	21	2%
Cane	60	5%
Crutches	2	0%
Stretcher	0	0%
Visually Impaired	11	1%
Walker	65	5%
Wheelchair	822	68%
Wide Wheelchair	11	1%

Figure 3-14: Age of Riders

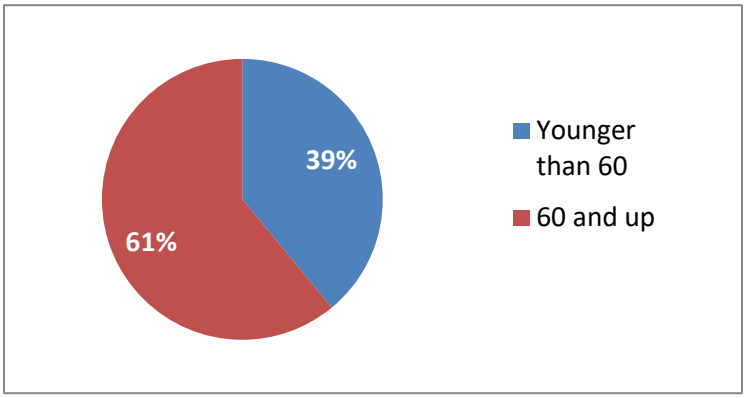
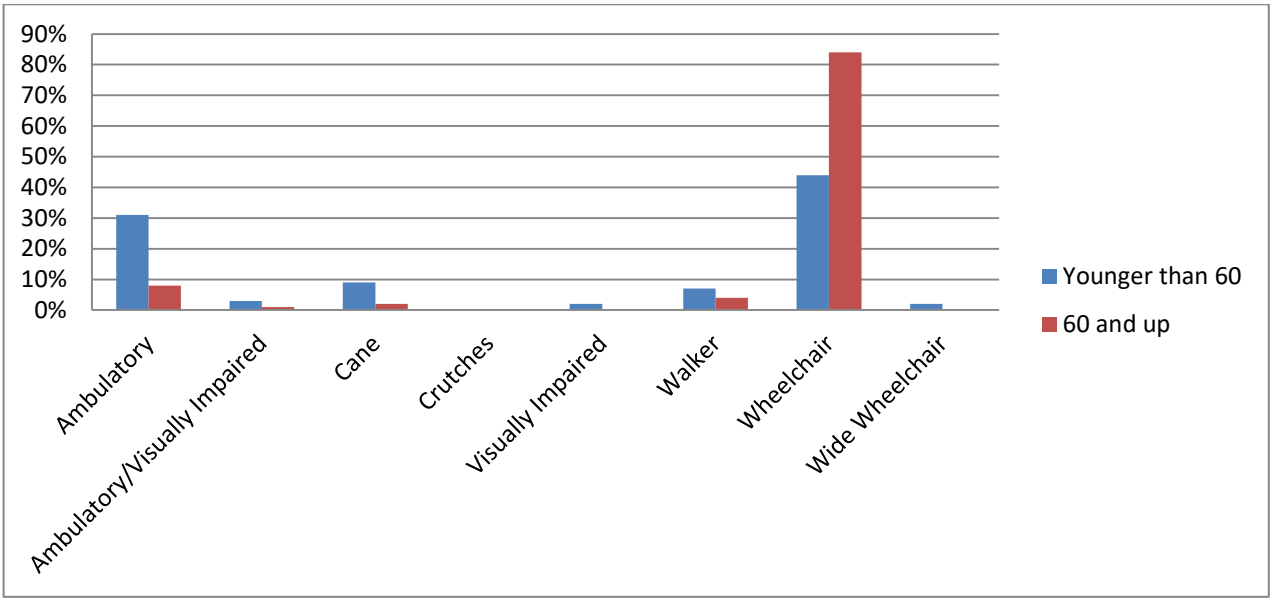


Figure 3-15: Mobility Type by Age



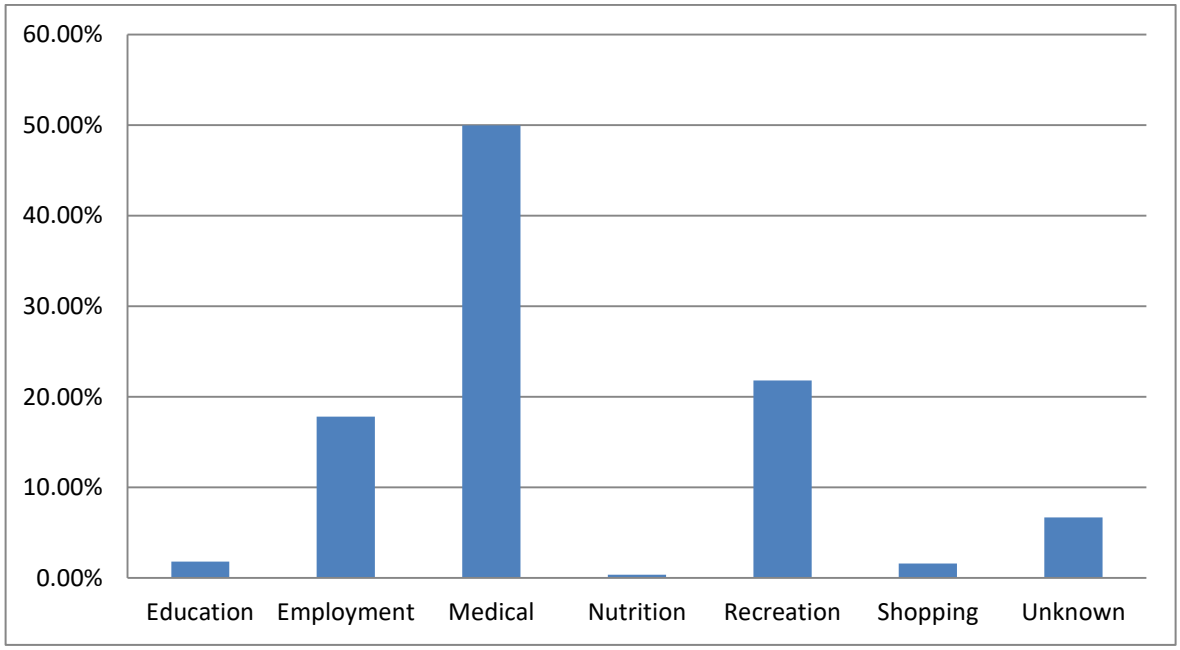
Service Overview

The two-year period of data that was collected resulted in 218,199 trips with 52,924 coming from CORTRAN customers. Analysis showed that the average CORTRAN trip was 6.1 miles. Also, Monday, Wednesday and Friday had the most ridership.

Trip Purpose

Figure 3-16 shows the trip purpose for CORTRAN customers. The majority of riders used CORTRAN for medical purposes (41%) followed by recreation (29%) and employment (16%).

Figure 3-16: Trip Purpose



Part of the survey and data analysis documented in the Roanoke Valley Transit Vision Plan includes RADAR's most frequent pick-up and drop-off locations. These locations are documented in Table 3-21 and Table 3-22.

Table 3-21: Highest RADAR Pick-Up Locations

Place	Locality	Pick-Up Address	CORTRAN Trips (CY 2012-CY 2013)
Adult Care Center	Salem	2321 Roanoke Blvd	6071
Friendship Retirement Community	Roanoke	327 Hershberger Road	1200
Lewis Gale Physicians	Salem	1802 Braeburn Drive	857
VA Medical Center	Salem	1970 Roanoke Blvd	807
Lewis Gale Medical Center	Salem	1900 Braeburn Drive	790
Carilion Clinic	Roanoke	3 Riverside Circle	704
Northwest Dialysis	Roanoke	1326 7th Street NE	606
Fresenius Medical Care Roanoke	Salem	2021 Apperson Drive	593
Towers Shopping Center	Roanoke	614 Brandon Ave SW	536
Roanoke Valley Workforce Center	Roanoke	1351 Hershberger Road NW	426
YMCA	Salem	1126 Kime Lane	387
All Star Bingo	Roanoke	3435 Melrose Ave NW	292
Valley View	Roanoke	4870 Valley View Blvd NW	128
Fresenius Medical Care BMA-Crystal Spring	Roanoke	404 McClanahan Street SW	104
Clearview Manor	Vinton	1150 Vinyard Road	93
Walmart	Salem	1841 W Main Street	64
Friendship Retirement Community	Roanoke	320 Hershberger Road	64
Melrose Towers	Roanoke	3038 Melrose Ave NW	56
Lakeside Plaza	Salem	161 Electric Road	39
Veterans Care Center	Roanoke	1945 Roanoke Blvd	13
Goodwill Industries	Roanoke	2520 Melrose Ave NW	5
Fresenius Medical Care Friendship Manor Inc	Roanoke	331 Hershberger Road NW	3
Fairington Apartments	Roanoke	4930 Grandin Road SW	1
Stratford Park	Roanoke	3780 Stratford Park Drive SW	0

Table 3-22: Highest RADAR Drop-Off Locations

Place	Locality	Drop-Off Location	CORTRAN Trips (CY 2012-CY 2013)
Adult Care Center	Salem	2321 Roanoke Blvd	5162
Friendship Retirement Community	Roanoke County	327 Hershberger Rd NW	1277
VA Medical Center	Salem	1970 Roanoke Blvd	710
Lewis Gale Physicians	Salem	1802 Braeburn Drive	670
Carilion Clinic	Roanoke	3 Riverside Circle	636
Lewis Gale Medical Center	Salem	1900 Braeburn Drive	593
Fresenius Medical Care Roanoke	Salem	2021 Apperson Drive	562
Northwest Dialysis	Roanoke	1326 7th Street Ne	534
Towers Shopping Center	Roanoke	614 Brandon Ave SW	507
Roanoke Valley Workforce Center	Roanoke	1351 Hershberger Road	428
Virginia Western Community College	Roanoke	3095 Colonial Ave SW	358
YMCA	Salem	1126 Kime Lanr	319
Valley View	Roanoke	4870 Valley View Blvd	156
Fresenius Medical Care BMA-Crystal Spring	Roanoke	404 Mc Clanahan Street	108
Clearview Manor	Vinton	1150 Vinyard Road	93
Walmart	Salem	1841 W Main Street	68
Melrose Towers	Roanoke	3038 Melrose Ave NW	62
Friendship Retirement Community	Roanoke	320 Hershberger Road	62
Veterans Care Center	Roanoke	1945 Roanoke Blvd	9
Goodwill Industries	Roanoke	2520 Melrose Ave NW	6
Fresenius Medical Care Friendship Manor	Roanoke County	331 Hershberger Road	2
Fairington Apartments	Roanoke	4930 Grandin Road SW	2
Planet Fitness	Roanoke	672 Brandon Ave SW	1
Stratford Park	Roanoke	3780 Stratford Park Drive	0

As shown in Figure 3-17, the zip code with the greatest number of pick-ups and drop-offs is 24153 (Salem). The Vision Plan attributes this to the fact that the two highest trip generators, Adult Care Center and the VA Medical Center, are located there.

Figure 3-17: Pick-Up and Drop-Off by Zip Code

DEMOGRAPHICS AND LAND USE

This section provides an analysis of current and future population trends in the jurisdictions served by RADAR, as well as an analysis of the demographics of population groups that often depend on transportation options beyond an automobile. Data sources for this analysis include the 2010 U.S. Census Bureau and the American Community Survey (ACS) 2011-2015, 5-year estimates.

Population Trends

Table 3-23 shows the U.S. Census population counts for the Commonwealth of Virginia and the jurisdictions served by RADAR between the years 1990-2010. The total population of the study area as of the 2010 Census was 364,021. The City of Roanoke is the most populated locality in the service area followed by Roanoke County. The least populated locality is the City of Buena Vista. Between the periods of the 1990 and 2010 Census, Franklin County experienced the greatest population increase (42%) while Covington's population declined the most (15%).

Table 3-23: Historical Populations

Place	1990	2000	2010	1990 - 2000 Percent Change	2000 - 2010 Percent Change	1990 - 2010 Percent Change
Virginia	6,187,358	7,078,515	8,001,024	14%	13%	29%
Alleghany County	13,176	12,926	16,250	-2%	26%	23%
Buena Vista	6,406	6,349	6,650	-1%	5%	4%
Covington	6,991	6,303	5,961	-10%	-5%	-15%
Franklin County	39,549	47,286	56,159	20%	19%	42%
Henry County	56,943	57,930	54,151	2%	-7%	-5%
Lexington	6,959	6,867	7,042	-1%	3%	1%
Martinsville	16,162	15,416	13,821	-5%	-10%	-14%
Roanoke	96,397	94,911	97,032	-2%	2%	1%
Roanoke County	79,332	85,778	92,376	8%	8%	16%
Rockbridge	18,350	20,808	22,307	13%	7%	22%
Salem	23,756	24,747	24,802	4%	0.22%	4%
Region	**364,021**	**379,321**	**396,551**	**4%**	**5%**	**9%**

Source: U.S. Census, American Factfinder

Table 3-24 illustrates recent population trends in the region. Since the 2010 Census, RADAR's service area has seen a modest population increase of 0.37%. The City of Roanoke's population grew the most by 2%. Covington's population decreased the most by 4%.

Table 3-24: Recent Population Trends

Place	2010	2015	2010 - 2015 Percent Change
Virginia	**8,001,024**	**8,256,630**	**3%**
Alleghany County	16,250	16,066	-1%
Buena Vista	6,650	6,666	0%
Covington	5,961	5,736	-4%
Franklin County	56,159	56,315	0.3%
Henry County	54,151	52,580	-3%
Lexington	7,042	7,071	0%
Martinsville	13,821	13,624	-1%
Roanoke	97,032	98,736	2%
Roanoke County	92,376	93,633	1%
Rockbridge	22,307	22,444	1%
Salem	24,802	25,165	1%
Region Total	**396,551**	**398,036**	**0.37%**

Source: 2011-2015 ACS5, American Factfinder

Population Forecast

The Weldon Cooper Center for Public Service, Demographics and Workforce Group prepares population forecasts for the Roanoke Valley region. Table 3-25 provides population projections for the years 2020-2040. Over the next two decades, the study area's population is projected to increase slightly by 2%. Despite the study area's anticipated growth, some jurisdictions will see a population decline. Martinsville's population is estimated to decline the most (22%) followed by Alleghany County (18%), Henry County (16%), then Covington (5%). The greatest population increase is projected to take place in Franklin County (18%) making it the only jurisdiction estimated to experience a double-digit increase in population. Roanoke County (8%), Lexington (6%), Buena Vista (6%), Rockbridge County (5%), the City of Roanoke (3%), and Salem (1%) are also expected to see population increases.

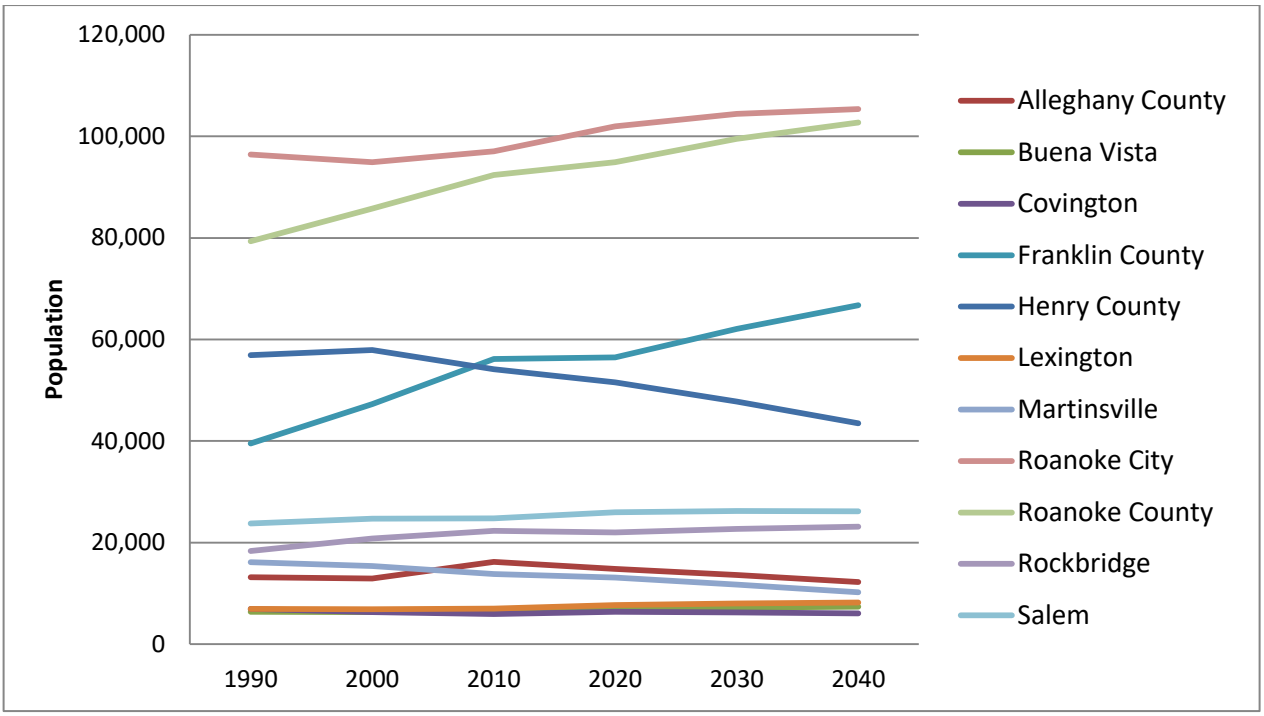
Table 3-25: Population Forecast

Place	2020 Population	2030 Population	2040 Population
Virginia	**8,744,273**	**9,546,958**	**10,201,530**
Alleghany County	14,851	13,622	12,231
Buena Vista	6,959	7,220	7,377
Covington	6,409	6,294	6,096
Franklin County	56,462	62,085	66,736
Henry County	51,552	47,811	43,489
Lexington	7,745	8,051	8,239
Martinsville	13,143	11,766	10,255
Roanoke	101,951	104,398	105,357
Roanoke County	94,883	99,516	102,683
Rockbridge County	21,993	22,737	23,152
Salem	25,979	26,256	26,165
Region Total	**401,927**	**409,756**	**411,780**

Source: Weldon Cooper Center for Public Service, Demographics & Workforce Group, 2016

Figure 3-18 provides a visualization of population growth from historical to projected population numbers for the region. If current population projections are correct, the study area can anticipate a 13% increase in population from 1990 and projected to 2040. However, this growth is not expected to occur in all jurisdictions. Martinsville is expected to have the greatest population decline (37%) followed by Henry County (24%), Covington (13%), and Alleghany County (7%). The greatest population increase is predicted to occur in Franklin County (69%) followed by Roanoke County (29%), Rockbridge County (26%), Lexington (18%), Buena Vista (15%), Salem (10%), and the City of Roanoke (9%).

Figure 3-18: Study Area Population Trends

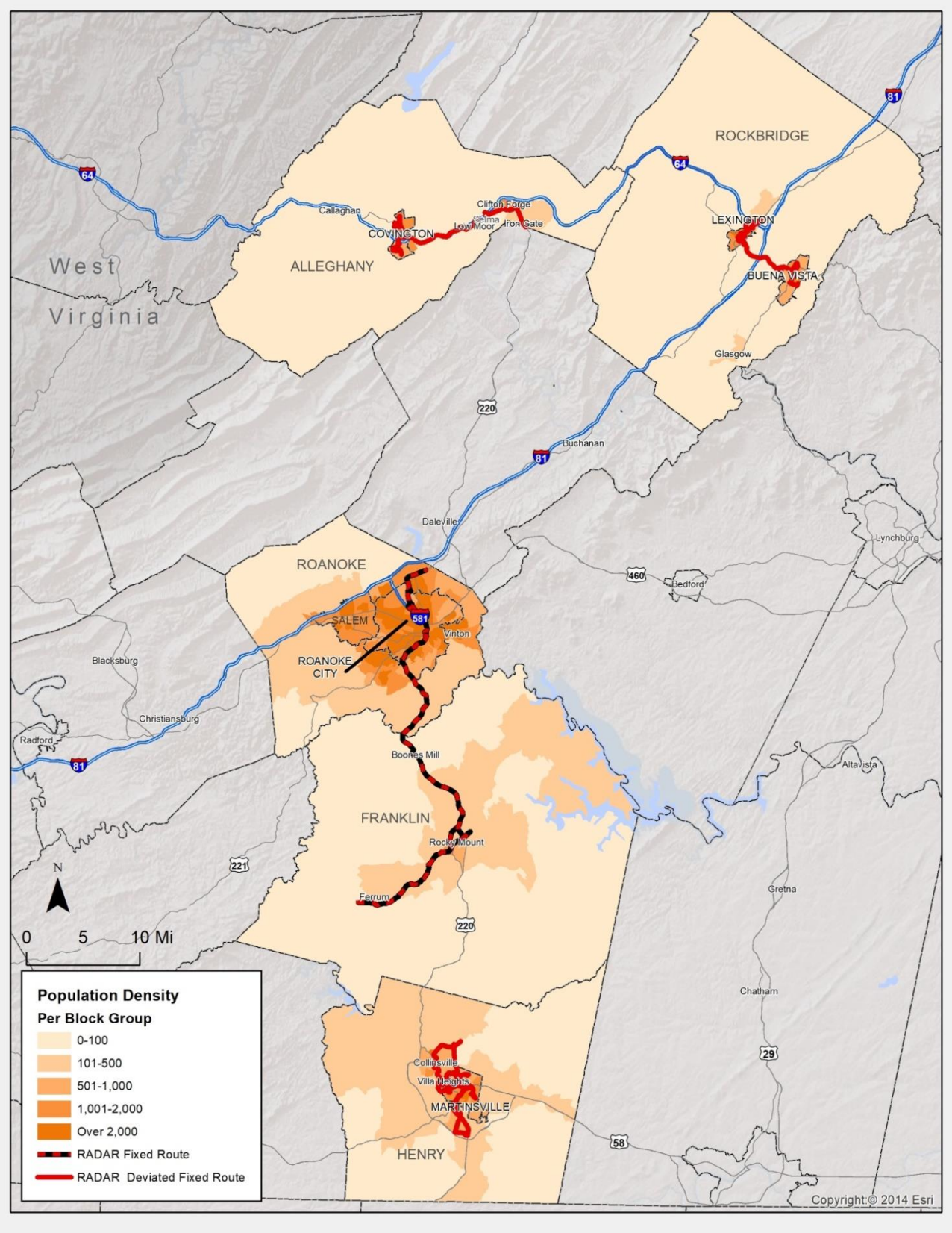


Population Density

Population density is often used as a determinate for the type of public transportation service that is feasible in an area. Typically, an area with a density greater than 2,000 persons per square mile will be able to sustain frequent daily fixed-route bus service. Whereas, an area with a population density below 2,000 persons per square mile may be better suited for deviated fixed-route, flex schedule, or dial-a-ride service.

Figure 3-19 shows population density at the Census block group level. The majority of RADAR's service area is not densely populated and rural in nature. The City of Roanoke and Roanoke County are the most densely populated localities in the study area.

Figure 3-19: 2010 Population Density of RADAR Service Area



Demographic Factors Influencing Transit Use

Identifying the size and location of segments within the general population that are more likely to use public transportation is important when defining public transportation needs. These demographic factors include access to an automobile, age, disability status and income. The population data for the study area was analyzed at the Census block group level to better understand the extent to which people who may need public transportation are served by the current public transportation network.

Autoless Households

Households without a personal vehicle are more likely to depend upon the mobility offered by public transit than households with access to a car. Displaying this segment of the population is important because many land uses in the region are at distances too far for non-motorized travel. As seen in Figure 3-20, the census block groups with very high numbers of autoless households are located in Alleghany County, Buena Vista, Franklin County, Henry County, Martinsville, and Roanoke County.

Senior Adult Population

Individuals ages 65 and older may scale back their use of personal vehicles as they age, leading to a greater reliance on public transportation compared to those in other age brackets. Illustrated in Figure 3-21, the block groups with very high senior adult populations are in Franklin County, Henry County, the City of Roanoke, Roanoke County, Rockbridge County, and Salem.

Youth Population

Youths and teenagers, age 10 to 17 years, who cannot drive or are just starting to drive but do not have an automobile available appreciate the continued mobility from public transportation. Block groups with very high youth populations are in Alleghany County, Franklin County, Henry County, the City of Roanoke, and Roanoke County. Figure 3-22 illustrates the concentration of youth in the study area.

Individuals with Disabilities

Figure 3-23 illustrates individuals with disabilities in the study area. Persons with disabilities often rely on public transportation for their transportation needs. Block groups with high populations of individuals with disabilities are in Franklin County, Henry County, the City of Roanoke, Roanoke County, and Rockbridge County.

Figure 3-20: Autoless Households in the Study Area

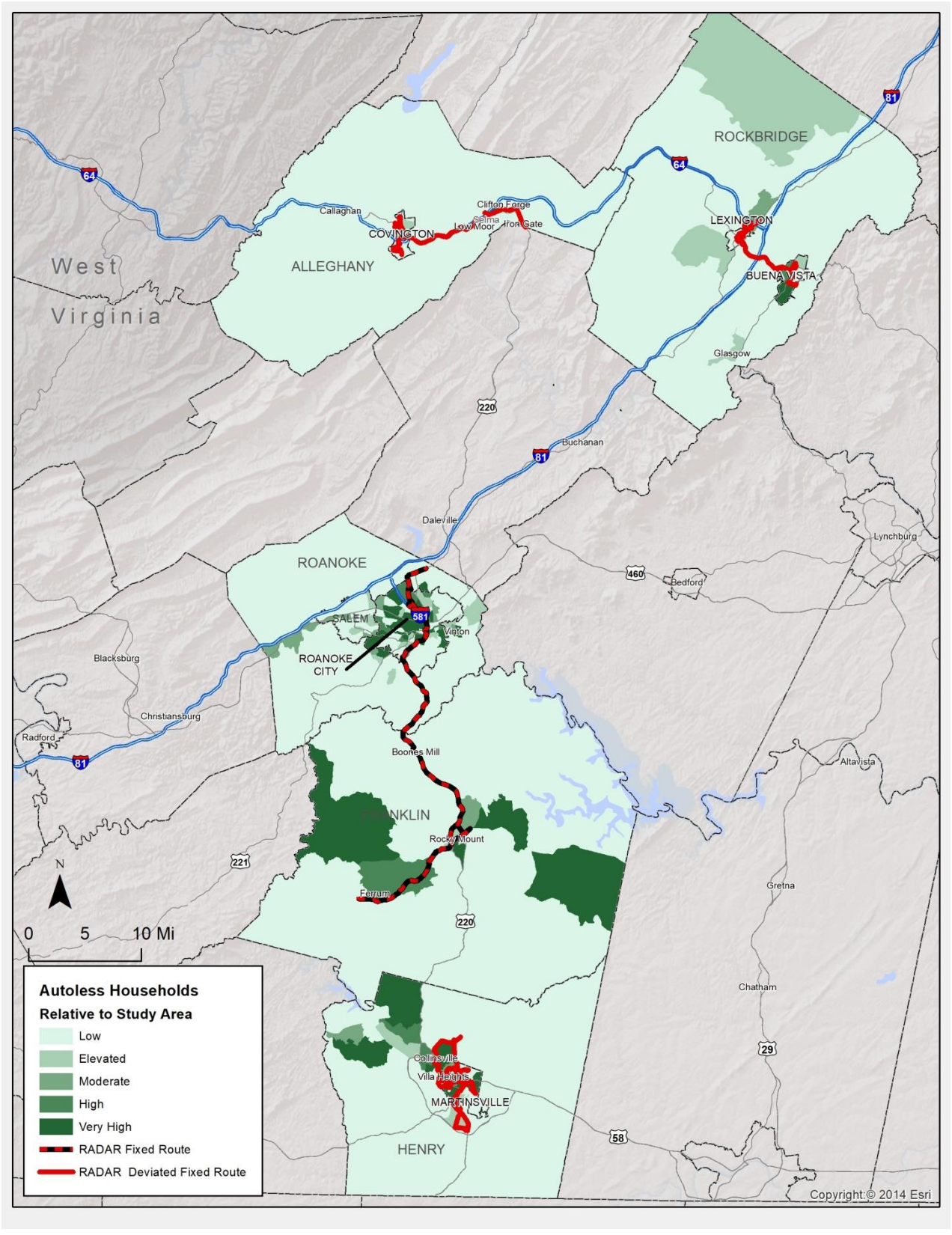


Figure 3-21: Senior Adults in the Study Area

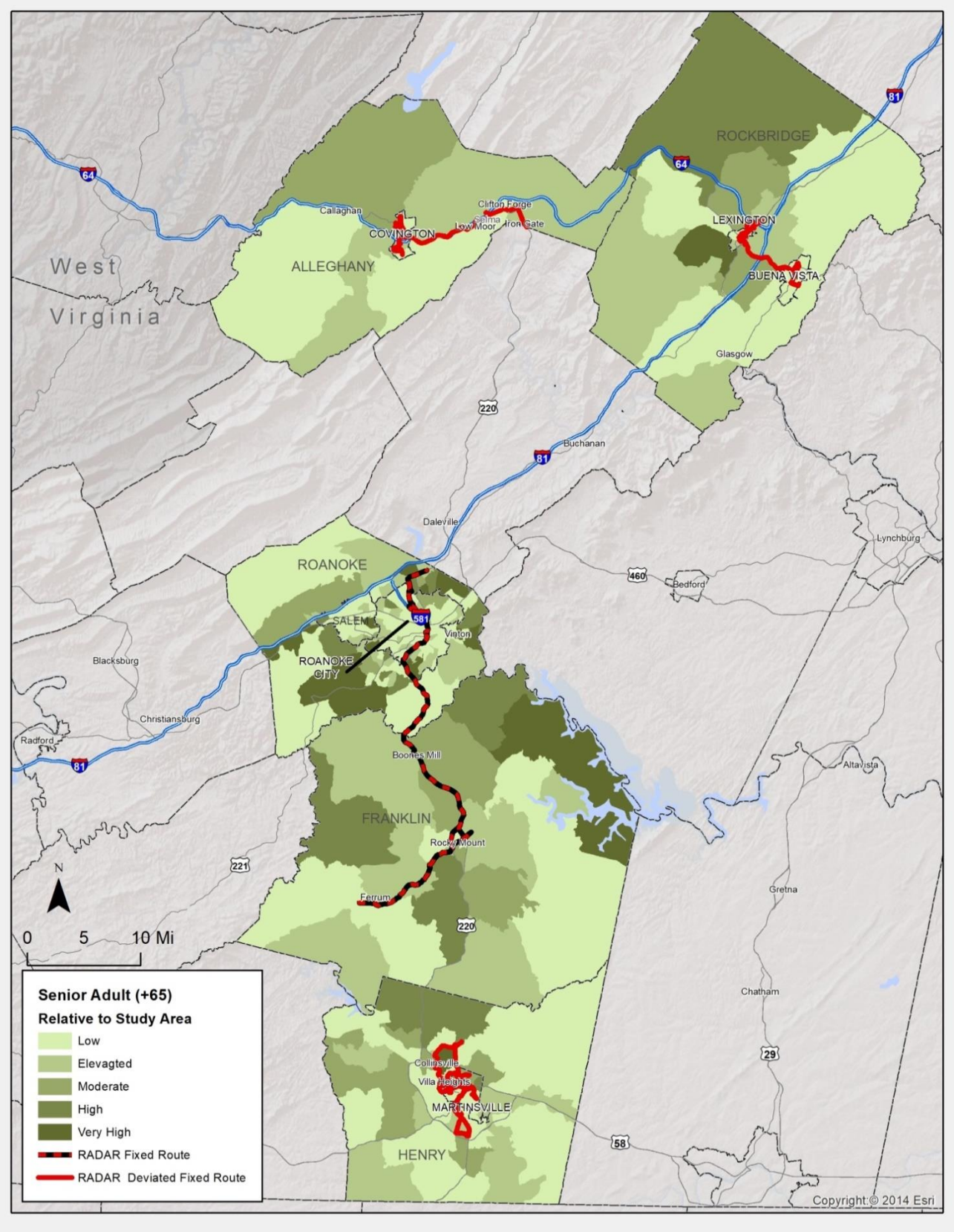


Figure 3-22: Youth Population in the Study Area

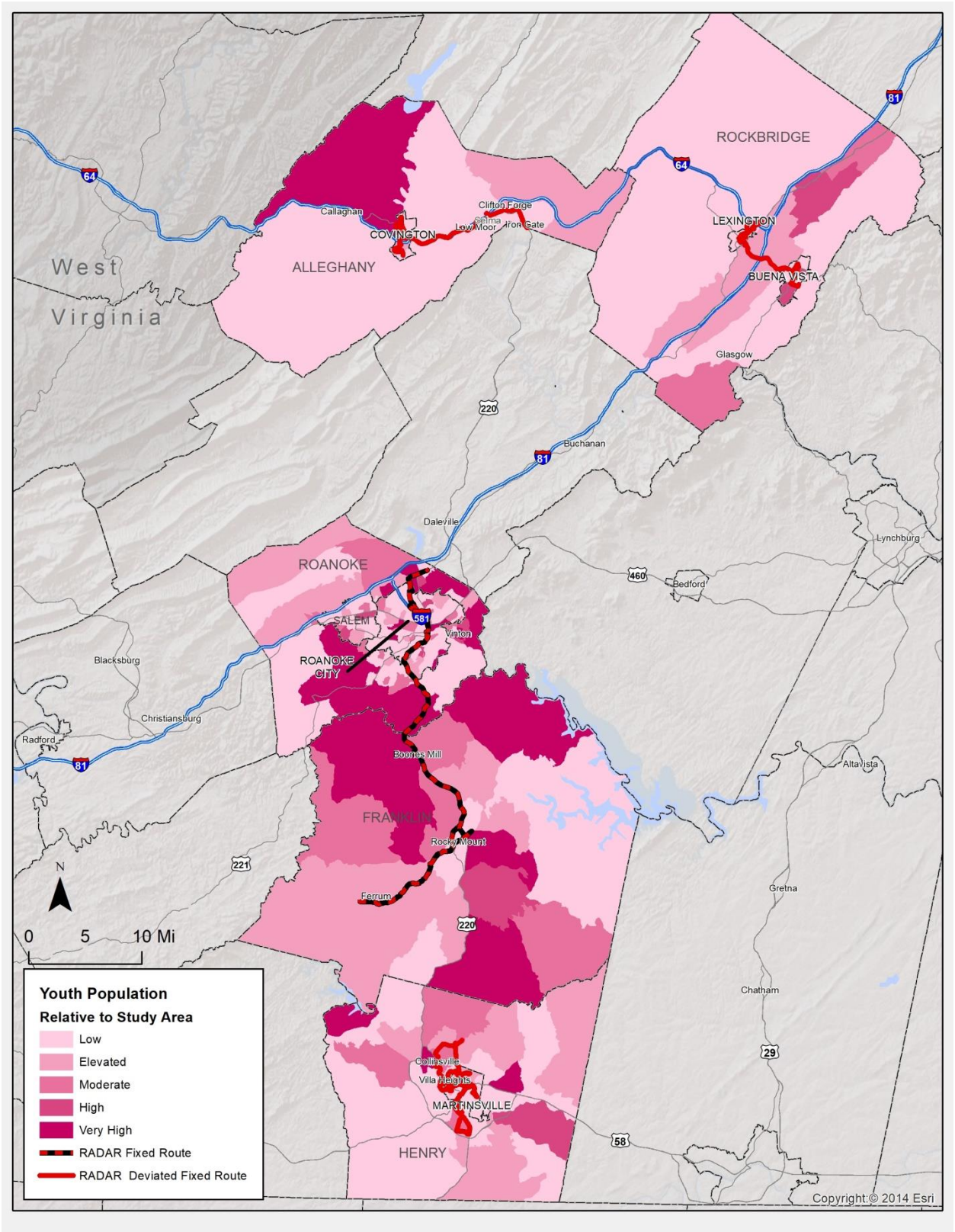
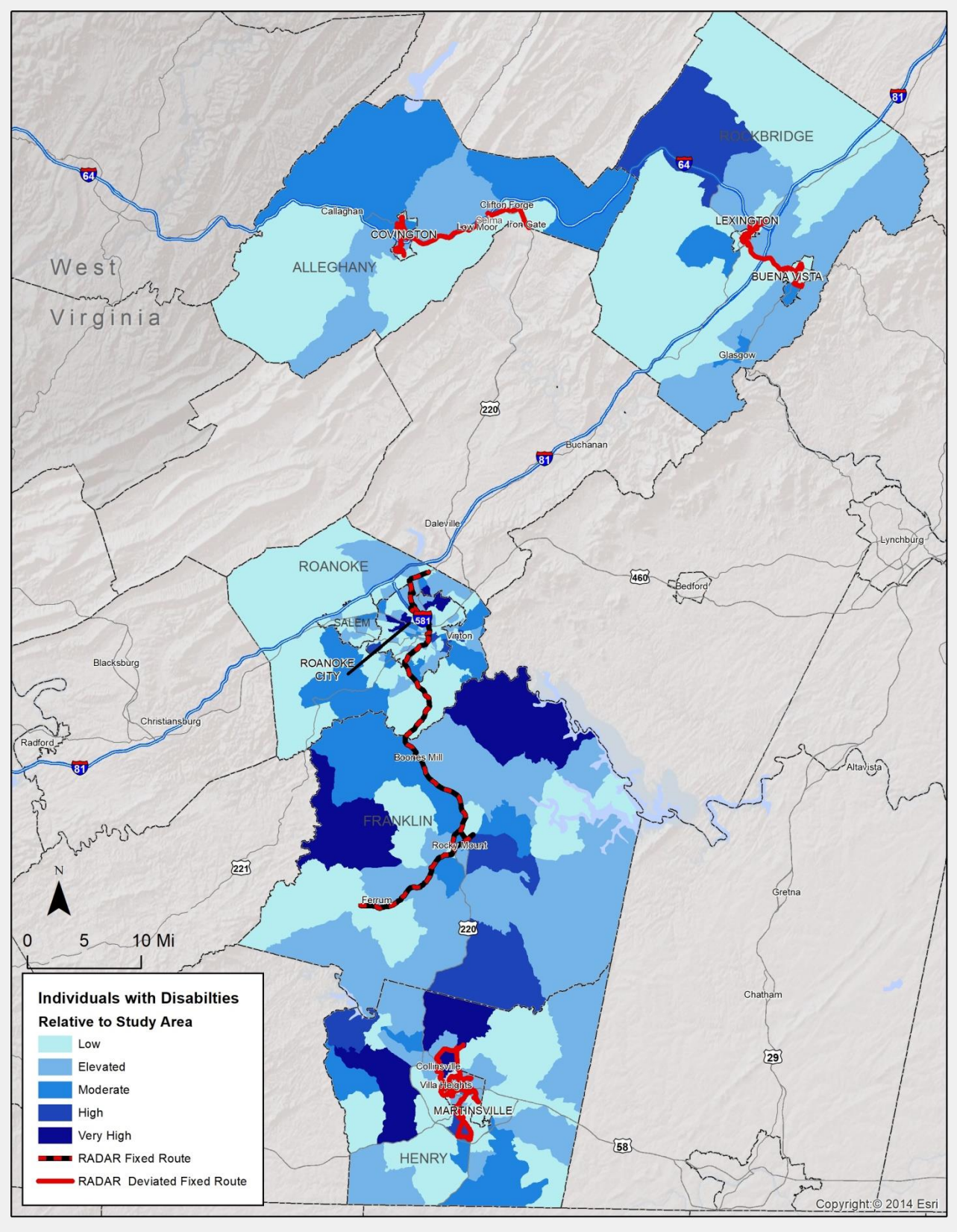


Figure 3-23: Individuals with Disabilities in the Study Area



Determining the Likelihood of Transit Need

As previously mentioned, identifying the size and location of segments within the general population that are more likely to use public transportation is important when defining public transportation needs.

One of the approaches to identifying public transportation need is to provide an objective measure when mapping the segments of the population more likely to use public transportation. The approach used in this analysis is the Transit Need Index.

Transit Need Index

The Transit Need Index (TNI) is an aggregate measure that utilizes recent data from the American Community Survey (ACS) five-year estimates and the United States Decennial Census to display relative concentrations of transit dependent populations. The following formula was used to calculate the TNI.

Transit Need = PD [AVNV + AVE + AVY + AVBP]

Whereas:

- PD = population per square mile
- AVNV = amount of vulnerability based on presence of no vehicle households
- AVE = amount of vulnerability based on presence of older adult population
- AVY = amount of vulnerability based on presence of youth population
- AVYA = amount of vulnerability based on presence of young adult population
- AVBP = amount of vulnerability based on presence of below-poverty population

For each factor, individual block groups were classified according to the prevalence of the vulnerable population relative to the study area average. For this TDP, the study area was defined as the counties of Alleghany, Franklin, Henry, Roanoke, and Rockbridge, and the cities of Buena Vista, Covington, Lexington, Martinsville, Roanoke, and Salem. The factors were then entered into the TNI equation to determine the relative transit dependence of each block group (low, elevated, moderate, high, or very high). From a transit perspective, the TNI illustrates the areas of greatest overall need. While some block groups show low need, they may include major destinations that should be served by transit.

Figure 3-24 provides the results of the TNI analysis. As the map illustrates, the majority of the study area has low transit need based on density. There are 50 block groups in the study area that are ranked as having high or very high transit need. Predominantly these block groups are located in the City of Roanoke followed by Roanoke County. The City of Roanoke has 21 block groups with very high need and ten with high need, and Roanoke County has seven block groups with very high transit need and five with high need. Henry County and Martinsville have two block groups with high need and one with very high need. Salem has only one block group with high transit need.

Transit Dependence Index Percentage

The Transit Need Index Percentage (TNIP) provides a complementary analysis to the TDI measure. It is nearly identical to the TNI measure except for the removal of the population density factor.

By removing the population per square mile factor, the TNIP measures the degree rather than the amount of vulnerability. The TNIP represents the percentage of the population within the block group with above socioeconomic characteristics, and it follows the TNI five-tier categorization of very low to very high. It differs in that it does not highlight block groups that are likely to have higher concentrations of vulnerable populations only because of their population density.

As seen in Figure 3-25, without the population density metric there is mostly low to elevated transit need in the study area. Out of the 290 block groups in the study area only fourteen ranked as having high or very high transit need based on percentage. The City of Roanoke is the only locality in the study area that has a block group with very high transit; the City of Roanoke has nine block groups with high transit need; Martinsville contains two block groups with high transit need; and Alleghany County and Lexington each contain one block group with high transit need.

Figure 3-24: Transit Need Index

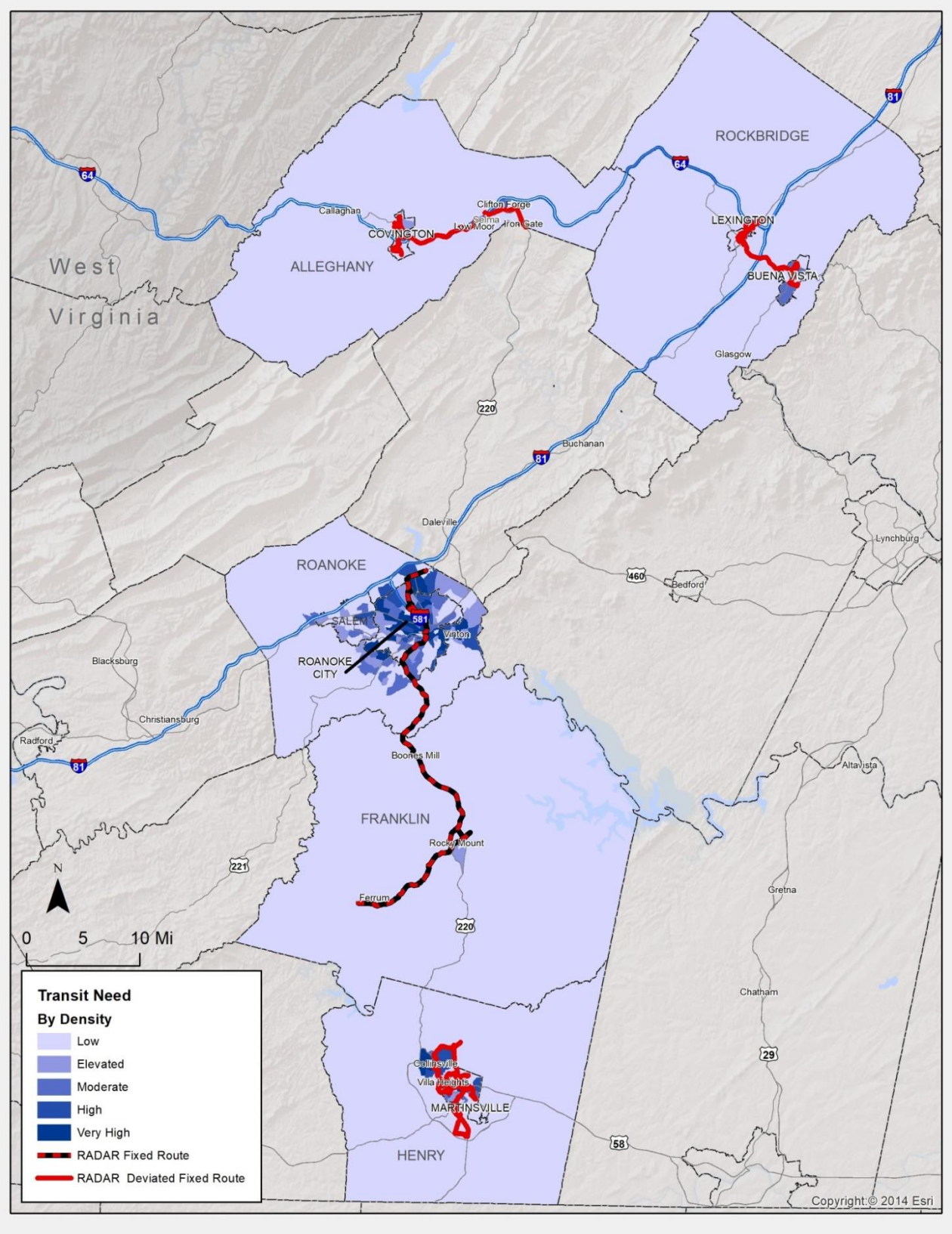
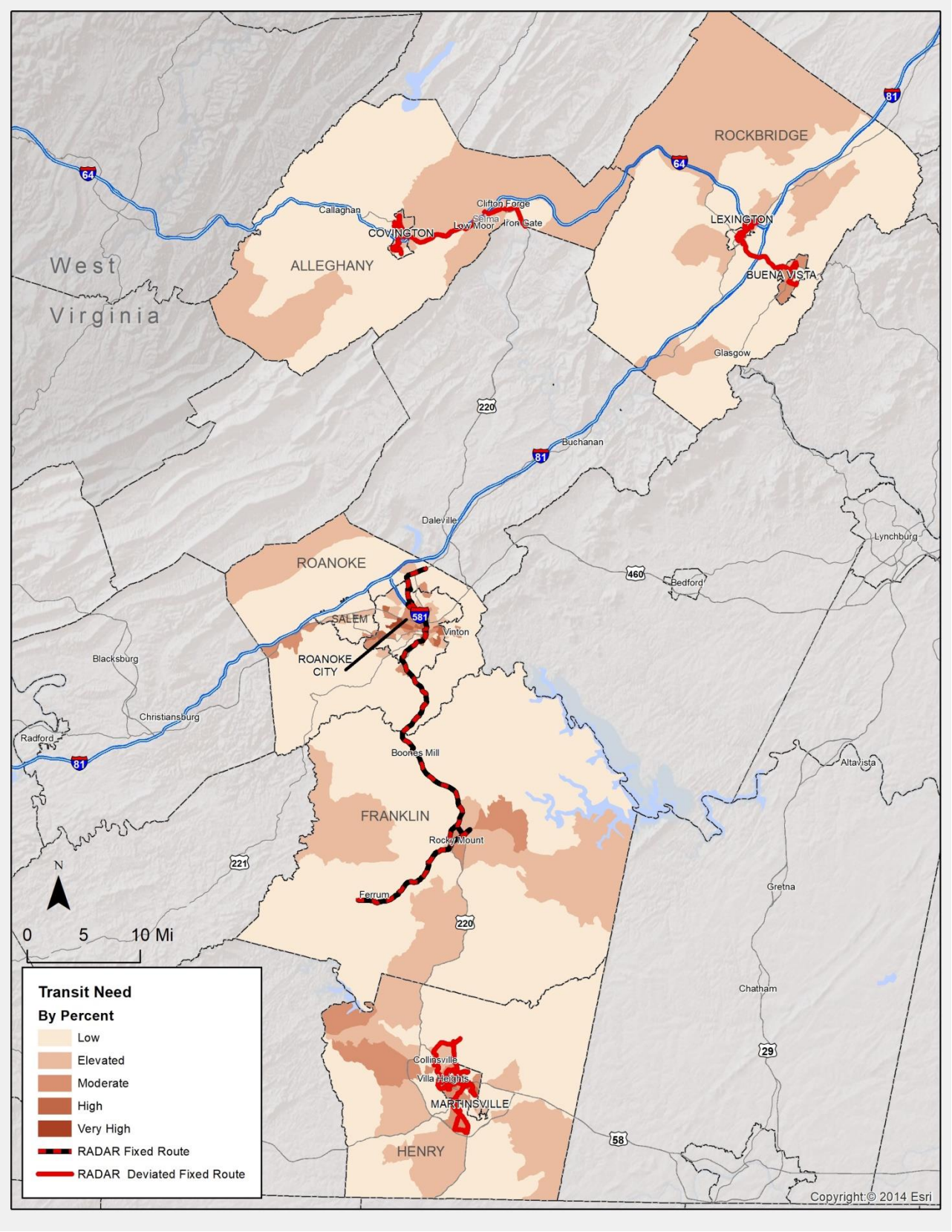


Figure 3-25: Transit Need Index Percentage



TITLE VI ANALYSIS

Title VI of The Civil Rights Act of 1964 prohibits discrimination on the basis of race, color or national origin in programs and activities receiving federal subsidies. This includes agencies providing federally funding for public transportation. In accordance with Title VI, the following section examines the minority and below poverty populations in the service area. It also summarizes the prevalence of residents with Limited-English Proficiency (LEP) in the service area.

Minority Population

In accordance with Title VI of the Civil Rights Act of 1964, it is important to ensure that areas with a higher than average concentration of racial and/or ethnic minorities are not negatively impacted by proposed alterations to existing public transportation services. To determine whether an alteration would have an adverse impact it is necessary to first understand where concentrations of minority individuals reside. Figure 3-26 provides a map of the service area showing the Census block groups shaded according to whether they have minority populations of above or below the service area average (21.6%).

Low-Income Population

This socioeconomic group represents individuals who earn less than the federal poverty level. These individuals face financial hardships that make owning and providing the necessary maintenance of a personal vehicle difficult. For this segment of the population, public transportation may be the more economical choice. Figure 3-27 provides a map that shows the census block groups according to whether the poverty rate is above or below the study area average of 16.3%. According to the map, above average concentrations of below poverty individuals reside in Alleghany County, Buena Vista, Covington City, Franklin County, Henry County, Lexington, Martinsville, the City of Roanoke, Roanoke County, Rockbridge County, and Salem.

Figure 3-26: Areas Above and Below the Study Area Average for Minority Populations

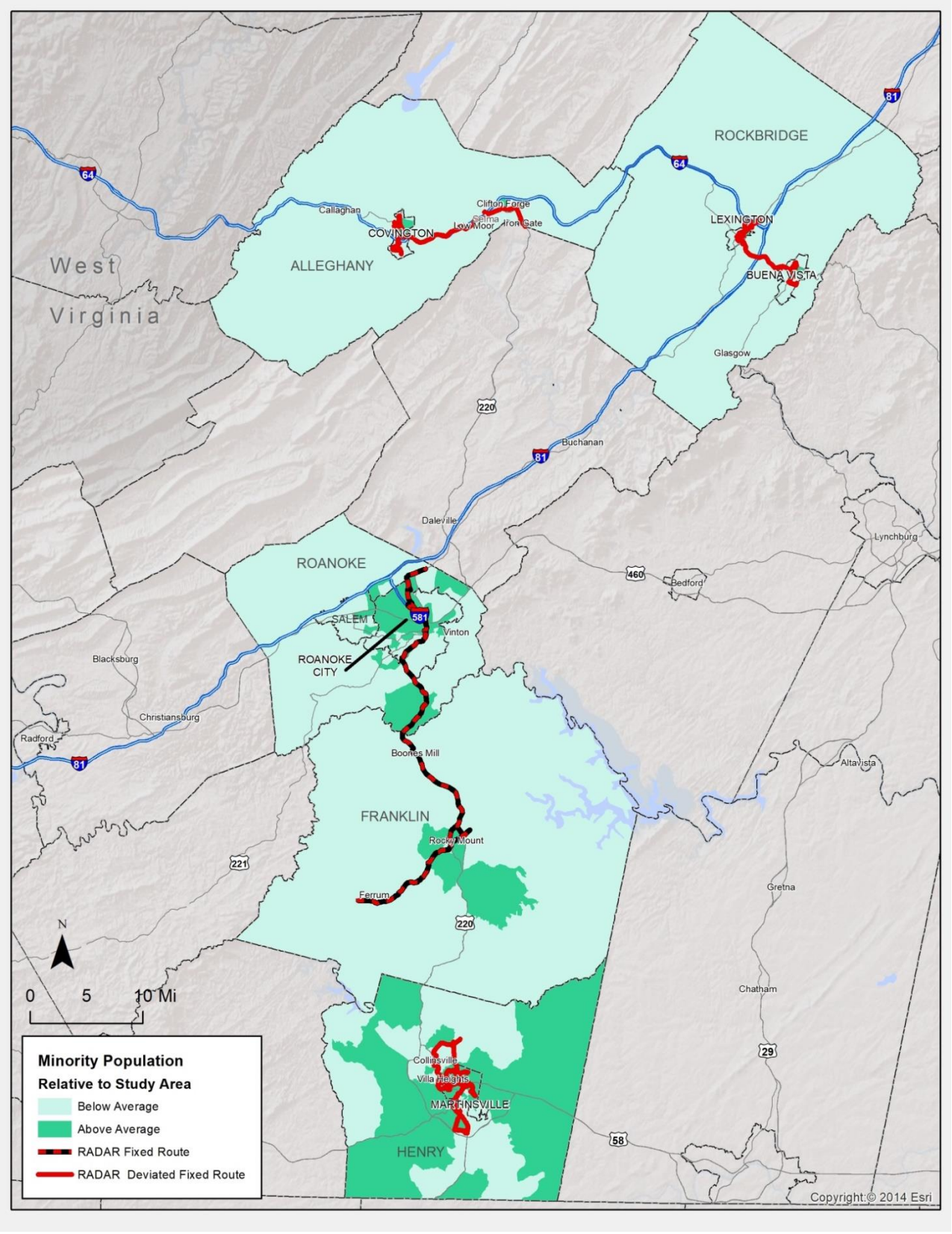
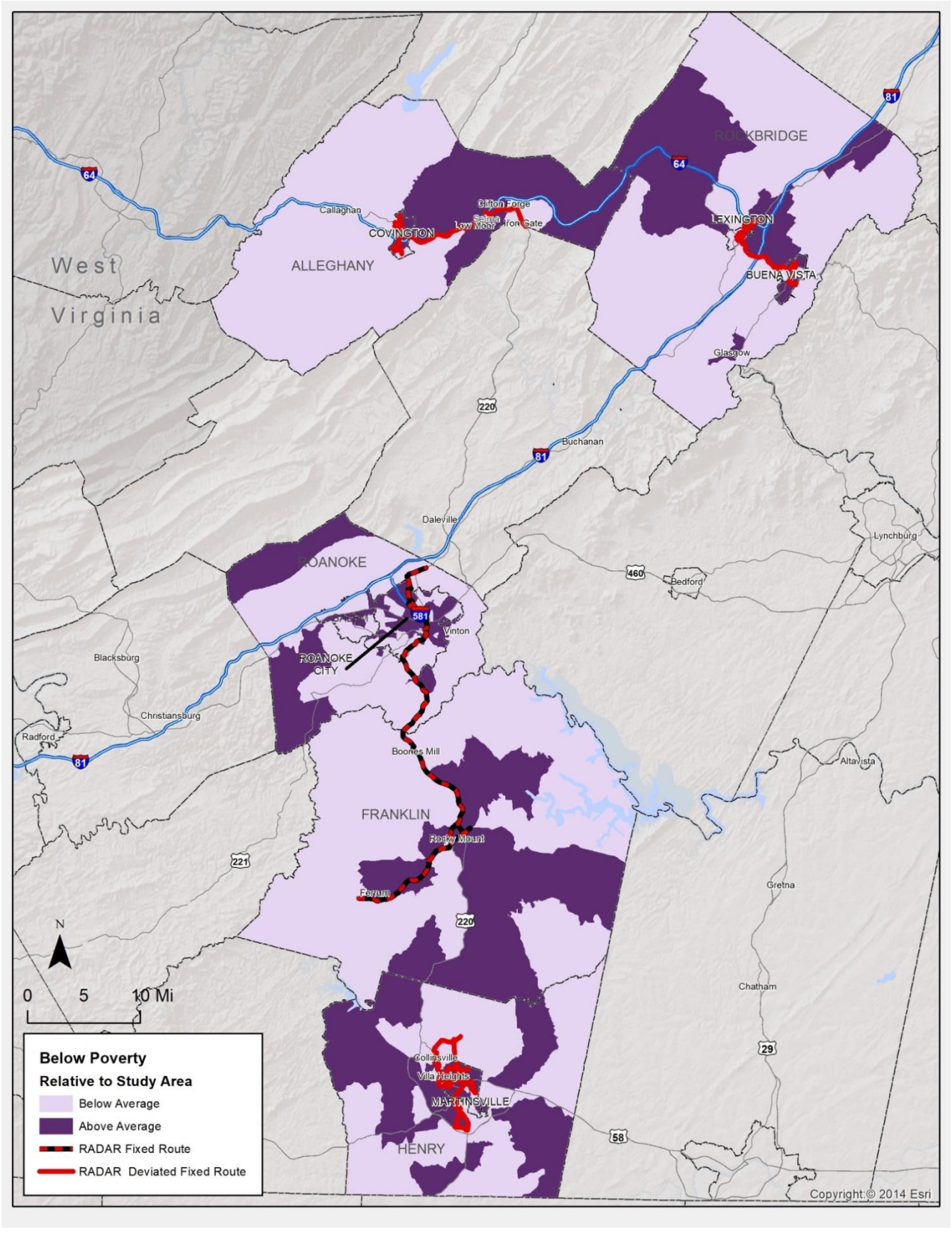


Figure 3-27: Areas Above and Below the Study Area Average for Poverty



Limited-English Proficiency (LEP)

Ensuring that public transportation is being provided equitably to individuals of diverse socioeconomic backgrounds is essential, but it is also important to recognize the variety of languages that are spoken in the study area so that public information can be disseminated and understood by individuals who speak languages other than English. According to the American Community Survey's five-year estimates for 2011-2015 (LEP data presented in Table 3-26), English is the most predominately spoken language of residents. The City of Roanoke has the highest percentage of non-English speakers (9%) followed by Lexington (7%), Henry County (6%), Roanoke County (6%), Martinsville (5%), and Salem (5%).

Table 3-26: Limited-English Proficiency

	Alleghany County		Buena Vista		Covington		Franklin County	
Age 5 years and up	15,266		6,279		5,435		53,608	
Languages Spoken	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**# Number**	**Percent**
English	14,914	98%	6,050	96%	5,300	98%	51,757	97%
Non-English	352	2%	229	4%	135	2%	1,851	3%
Spanish	210	1%	111	2%	91	2%	1,188	2%
Indo-European	97	1%	106	2%	8	0.1%	431	1%
Asian/Pacific Island	37	0.2%	12	0.2%	31	1%	232	0.4%
Other	8	0.1%	0	0%	5	0.1%	0	0.0%
Ability to Speak English	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
"Very Well" or "Well"	261	74%	229	100%	135	100%	1,532	83%
"Not Well" or "Not at All"	91	26%	0	0%	0	0%	319	17%

	Henry County		Lexington		Martinsville		Roanoke	
Age 5 years and up	49,787		6,889		12,726		91,650	
Languages Spoken	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
English	46,962	94%	6,403	93%	12,111	95%	83,161	91%
Non-English	2,825	6%	486	7%	615	5%	8,489	9%
Spanish	2,369	5%	75	1%	427	3%	3,853	4%
Indo-European	237	0%	108	2%	147	1%	2,204	2%
Asian/Pacific Island	203	0%	284	4%	10	0%	1,233	1%
Other	16	0%	19	0%	31	0%	1,199	1%
Ability to Speak English	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
"Very Well" or "Well"	2,025	72%	435	90%	538	87%	6,445	76%
"Not Well" or "Not at All"	800	28%	51	10%	77	13%	2,044	24%

	Roanoke County		Rockbridge County		Salem	
5 years and up	89,106		21,388		23,866	
Languages Spoken	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
English	83,458	94%	20,665	97%	22,579	95%
Non-English	5,648	6%	723	3%	1,287	5%
Languages Spoken	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Spanish	1,802	2%	313	1%	565	2%
Indo-European	2,066	2%	302	1%	512	2%
Asian/Pacific Island	1,269	1%	107	1%	154	1%
Other	511	1%	1	0%	56	0%
Ability to Speak English	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
"Very Well" or "Well"	4,932	87%	677	94%	1,122	87%
"Not Well" or "Not at All"	716	13%	46	6%	165	13%

Source: American Community Survey, Five-Year Estimates (2011-2015), Table B16004.

LAND USE PROFILE

Major Trip Generators

Identifying land uses and major trip generators in the study area complements the above demographic analysis by indicating where transit services may be most needed. Trip generators attract transit demand and include common origins and destinations, like multi-unit housing, major employers, medical facilities, educational facilities, non-profit and government agencies, and shopping centers. Figure 3-28 illustrates the major trip generators in the study area.

Employment Travel Patterns

In addition to considering the locations of the major employers, it is also important to account for the commuting patterns of residents working inside and outside of the service area. Table 3-27 illustrates the journey to work patterns for the study area. In Alleghany County, Franklin County, Henry County, Lexington, and the City of Roanoke, residents tend to work inside the county/city of residence. In Buena Vista, Covington, Martinsville, Roanoke County, Rockbridge County, and Salem residents tend to work in locations outside of their county/ city of residence. According to ACS five-year estimates, the majority of residents in the study area drive alone to work. The City of Roanoke has the highest percentage of residents in the study area that uses public transportation as a means to work.

Figure 3-28 Major Trip Generators in the Study Area

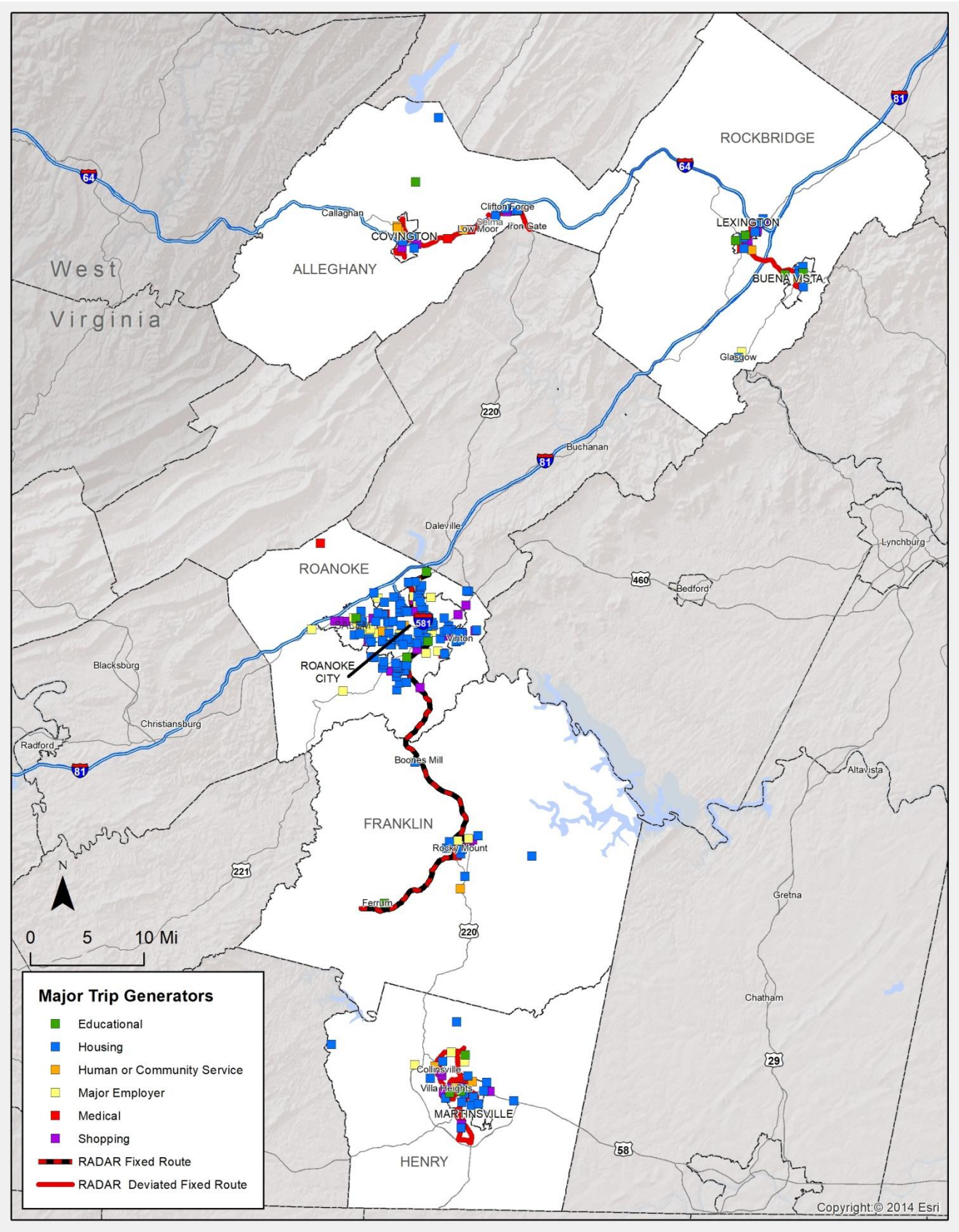


Table 3-27: Journey to Work Patterns for Study Area

	Place of Residence							
	Alleghany County		Buena Vista		Covington		Franklin County	
Workers (Age 16 and up)	6,420		2,791		2,231		24,714	
Employment Location	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
In State of Residence	6,078	95%	2,791	100%	2,070	93%	24,555	99%
In County	3,910	61%	1,086	39%	667	30%	13,915	56%
Outside of County	2,168	34%	1,705	61%	1,403	63%	10,640	43%
Outside State of Residence	342	5%	0	0%	161	7%	159	1%
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Car, Truck, or Van - drove alone	5,515	86%	2,354	84%	2,068	93%	19,447	79%
Car, Truck, or Van - carpooled	595	9%	134	5%	104	5%	2,800	11%
Public Transportation	67	1%	0	0%	9	0%	118	0%
Walked	58	1%	195	7%	25	1%	755	3%
Taxicab, motorcycle, bicycle, other	85	1%	69	2%	11	0%	297	1%
Worked at Home	100	2%	39	1%	14	1%	1,297	5%

	Place of Residence							
	Henry County		Lexington		Martinsville		Roanoke	
Workers (Age 16 and up)	21,086		2,052		5,100		45,584	
Employment Location	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
In State of Residence	18,953	90%	2,026	99%	4,858	95%	45,227	99%
In County	11,226	53%	1,286	63%	2,149	42%	28,280	62%
Outside of County	7,727	37%	740	36%	2,709	53%	16,947	37%
Outside State of Residence	2,133	10%	26	1%	242	5%	357	1%
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Car, Truck, or Van - drove alone	18,516	88%	1,009	49%	3,936	77%	36,466	80%
Car, Truck, or Van - carpooled	1,872	9%	163	8%	787	15%	4,578	10%
Public Transportation	54	0%	0	0%	49	1%	1,385	3%
Walked	47	0%	651	32%	106	2%	1,137	2%
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Taxicab, motorcycle, bicycle, other	133	1%	54	3%	124	2%	911	2%
Worked at Home	464	2%	175	9%	98	2%	1,107	2%

	Place of Residence					
	Roanoke County		Rockbridge County		Salem	
Workers (Age 16 +)	44,580		9,506		12,362	
Employment Location	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
In State of Residence	44,076	99%	9,382	99%	12,287	99%
In County	15,096	34%	4,715	50%	6,085	49%
Outside of County	28,980	65%	4,667	49%	6,202	50%
Outside State of Residence	504	1%	124	1%	75	1%
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Car, Truck, or Van - drove alone	39,142	88%	8,154	86%	9,990	81%
Car, Truck, or Van - carpooled	2,977	7%	629	7%	1,208	10%
Public Transportation	176	0%	22	0%	133	1%
Walked	297	1%	34	0%	517	4%
Taxicab, motorcycle, bicycle, other	336	1%	132	1%	115	1%
Worked at Home	1,652	4%	535	6%	399	3%

Source: ACS, Five-Year Estimates (2010-2014), Table B08130

Another source of data that provides an understanding of employee travel patterns is the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) dataset. Table 3-28 provides the results of this analysis.

Table 3-28: Top Ten Employment Destinations for County and City Residents

Alleghany County		
Place	**Number**	**Percent**
Covington city, VA	1311	20.8%
Clifton Forge town, VA	371	5.9%
Roanoke city, VA	336	5.3%
Hot Springs CDP, VA	138	2.2%
Lynchburg city, VA	126	2.0%
Salem city, VA	119	1.9%
Cave Spring CDP, VA	87	1.4%
Richmond city, VA	72	1.1%
Harrisonburg city, VA	67	1.1%
Waynesboro city, VA	63	1.0%
All Other Locations	3,622	57.4%

Buena Vista		
Place	**Number**	**Percent**
Buena Vista city, VA	904	30.1%
Lexington city, VA	306	10.2%
Glasgow town, VA	156	5.2%
East Lexington CDP, VA	112	3.7%
Roanoke city, VA	109	3.6%
Lynchburg city, VA	63	2.1%
Richmond city, VA	38	1.3%
Staunton city, VA	36	1.2%
Waynesboro city, VA	30	1.0%
Harrisonburg city, VA	28	0.9%
All Other Locations	1,221	40.7%

Covington		
Place	**Number**	**Percent**
Covington city, VA	694	27.6%
Roanoke city, VA	136	5.4%
Clifton Forge town, VA	80	3.2%
Hot Springs CDP, VA	58	2.3%
Lynchburg city, VA	52	2.1%
Salem city, VA	41	1.6%
Richmond city, VA	35	1.4%
Staunton city, VA	29	1.2%
Waynesboro city, VA	28	1.1%
Harrisonburg city, VA	23	0.9%
All Other Locations	1,341	53.3%

Franklin County		
Place	**Number**	**Percent**
Rocky Mount town, VA	5,145	23.6%
Roanoke city, VA	4,113	18.9%
Salem city, VA	1,072	4.9%
Cave Spring CDP, VA	667	3.1%
Martinsville city, VA	512	2.4%
Westlake Corner CDP, VA	383	1.8%
Hollins CDP, VA	373	1.7%
Danville city, VA	372	1.7%
Ferrum CDP, VA	327	1.5%
Greensboro city, NC	223	1.0%
All Other Locations	8,576	39.4%

Henry County		
Place	**Number**	**Percent**
Martinsville city, VA	3,554	17.3%
Collinsville CDP, VA	1,752	8.6%
Danville city, VA	1,167	5.7%
Roanoke city, VA	754	3.7%
Rocky Mount town, VA	737	3.6%
Eden city, NC	448	2.2%
Villa Heights CDP, VA	323	1.6%
Bassett CDP, VA	252	1.2%
Salem city, VA	249	1.2%
Greensboro city, NC	233	1.1%
All Other Locations	11,019	53.8%

Lexington		
Place	**Number**	**Percent**
Lexington city, VA	738	35.3%
Buena Vista city, VA	96	4.6%
Roanoke city, VA	81	3.9%
East Lexington CDP, VA	53	2.5%
Harrisonburg city, VA	37	1.8%
Lynchburg city, VA	33	1.6%
Richmond city, VA	33	1.6%
Staunton city, VA	31	1.5%
Glasgow town, VA	23	1.1%
Salem city, VA	22	1.1%
All Other Locations	942	45.1%

Martinsville		
Place	**Number**	**Percent**
Martinsville city, VA	1,421	26.1%
Danville city, VA	414	7.6%
Collinsville CDP, VA	255	4.7%
Roanoke city, VA	197	3.6%
Rocky Mount town, VA	127	2.3%
Greensboro city, NC	71	1.3%
Villa Heights CDP, VA	63	1.2%
Eden city, NC	59	1.1%
Salem city, VA	52	1.0%
Chatmoss CDP, VA	48	0.9%
All Other Locations	2,730	50.2%

Roanoke City		
Place	**Number**	**Percent**
Roanoke city, VA	18,806	44.80%
Salem city, VA	4,713	11.20%
Cave Spring CDP, VA	2,551	6.10%
Hollins CDP, VA	2,152	5.10%
Lynchburg city, VA	537	1.30%
Vinton town, VA	493	1.20%
Blacksburg town, VA	395	0.90%
Glenvar CDP, VA	381	0.90%
Christiansburg town, VA	360	0.90%
Richmond city, VA	357	0.80%
All Other Locations	11,279	26.80%

Roanoke County		
Place	**Number**	**Percent**
Roanoke city, VA	15,200	34.40%
Salem city, VA	5,876	13.30%
Cave Spring CDP, VA	3,642	8.24%
Hollins CDP, VA	2,204	4.99%
Vinton town, VA	732	1.66%
Lynchburg city, VA	670	1.52%
Blacksburg town, VA	636	1.44%
Christiansburg town, VA	556	1.26%
Glenvar CDP, VA	503	1.14%
Rocky Mount town, VA	416	0.94%
All Other Locations	13,747	31.11%

Rockbridge County		
Place	**Number**	**Percent**
Lexington city, VA	1,614	17.0%
Buena Vista city, VA	816	8.6%
Roanoke city, VA	408	4.3%
East Lexington CDP, VA	362	3.8%
Glasgow town, VA	353	3.7%
Staunton city, VA	217	2.3%
Lynchburg city, VA	205	2.2%
Harrisonburg city, VA	157	1.7%
Stuarts Draft CDP, VA	139	1.5%
Waynesboro city, VA	127	1.3%
All Other Locations	5,100	53.7%

Salem		
Place	**Number**	**Percent**
Salem City, VA	3,247	29.7%
Roanoke City, VA	2,900	26.5%
Cave Spring CDP, VA	627	5.7%
Hollins CDP, VA	484	4.4%
Glenvar CDP, VA	225	2.1%
Blacksburg town, VA	148	1.4%
Lynchburg city, VA	129	1.2%
Christiansburg town, VA	92	0.8%
Richmond city, VA	90	0.8%
Daleville CDP, VA	66	0.6%
All Other Locations	2,943	26.9%

Source: Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2014.

CHAPTER SUMMARY

The system evaluation and needs analysis involved collecting and reviewing data and input from many different sources:

- Performance data
- Passenger survey
- Demographics
- Land use and transportation plans

The results of the system evaluation and the priorities identified in this needs analysis, combined with input from regional stakeholders included in Chapter 2, were used in the development of service alternatives and improvements discussed in Chapter 4.

Chapter 4
Service and Capital Improvement Plan

INTRODUCTION

This chapter is the centerpiece of the TDP, focusing on possible modifications and expansions to RADAR's services to meet identified needs. The service improvements were developed based on data compiled and analyzed in Chapters 1-3, and combined with input from RADAR and DRPT staff. These service improvements were developed based on the analysis of current service levels, demographic and socioeconomic data, and input received from riders and stakeholders.

This chapter also projects anticipated levels of service using current services as a base, and incorporating proposed service expansions. In doing so, operating and capital cost estimates associated with service improvements are ascertained. While the plan is constrained based on reasonably expected revenues, it is also designed to allow RADAR to adapt to changing circumstances and to consider accelerated implementation. Thus, the alternatives are those projects that should be pursued during the TDP's ten-year planning horizon, though long-term, or vision, projects have also been documented.

SERVICE IMPROVEMENTS AND NEEDS IDENTIFICATION

The previous chapters provided an evaluation of current RADAR services and an analysis of transit needs based on quantitative data and input from riders and other key stakeholders. This chapter draws on that information and proposes service and organizational improvements focused on the following:

- Route and schedule adjustments
- Saturday and Sunday service
- Later evening hours
- More frequent service

The following service improvements were developed through the analysis of specific route performance data, coupled with gaps in current services identified through input from riders and RADAR staff. Each service improvement is detailed in this section and includes:

- A summary of the service improvement
- Potential advantages and disadvantages
- An estimate of operating and capital costs
- Estimates of ridership

The improvements serve as a starting point to be modified based on changing needs and additional input, as well as inevitable funding uncertainty.

The cost information for these improvements is expressed as the fully allocated costs, which means all program costs on a per unit basis are considered when contemplating expansions. This overstates the incremental cost of minor service expansions, as there are likely to be some administrative expenses that would not be increased with the addition of a few service hours.

The improvements are categorized first by transportation program provider:

- CORTRAN
- The Mountain Express
- Maury Express
- Piedmont Area Regional Transport (PART)

Improvements are then divided into short-term (1-2 years), medium-term (3-6 years), and long-term (6 years and beyond) improvements. The short-term alternatives incur minimal costs, and the medium-term improvements address high priorities but are anticipated to add additional operating and/or capital expenses. Projects highlighted in the short and medium term allow for implementation during the TDP's ten-year planning horizon. In contrast, the long-term alternatives include vision projects that may not fall within the implementation timeframe of this TDP but should be considered as warranted by emerging needs and available funding.

CORTRAN

Short-Term Improvements

Extend Weekday Service Hours

CORTRAN currently operates demand-response service from 7:00 a.m. to 6:00 p.m., Monday through Friday. This improvement would extend weekday service hours from 6:00 p.m. to 7:00 p.m.

Add Saturday Service

CORTRAN currently provides no weekend service. This improvement proposes to add eleven hours (same as weekday service) of demand-response Saturday service.

Medium-Term Improvements

Extend Weekday Service Hours

If the short-term weekday service hour expansion proves successful, this improvement proposes to extend the hours of operation an additional hour in the evening, from 7:00 p.m. to 8:00 p.m.

Add Sunday Service

If the short-term Saturday service day proves successful, this improvement proposes to implement Sunday service (11 hours).

Advantages and Disadvantages

The following advantages and disadvantages apply to both the short-term and medium-term improvements.

Advantages

- Expanding weekday service hours and implementing weekend service would provide increased demand-response service levels for Roanoke residents.
- Longer service hours could potentially result in increased passenger trips and fare revenue.

Disadvantages

- Extending service hours would increase the annual operating expenses.
- There would be additional mileage occurred on current vehicles, thereby accelerating the need to replace vehicles in the current fleet.

Ridership and Expenses

Short-Term

- One additional weekday service hour and the addition of Saturday service have the potential to add 864 passengers annually. The increased service levels cost an estimated $35,181 annually.

Medium-Term

- Adding one weekday service hour and the addition of Sunday service have the potential to add 864 passengers annually. The increased service levels could cost an estimated $35,181 annually.

Table 4-1 shows CORTRAN's service improvements and includes daily service hours and estimated annual ridership and cost.

Table 4-1: CORTRAN Service Improvements

Service Improvement	Daily Service Hours	Estimated Annual Ridership	Estimated Annual Cost
Short-Term			
Expand weekday service hours	1	270	$10,848
Add Saturday service	11	594	$24,333
Short-Term Total	**12**	**864**	**$35,181**
Medium-Term			
Expand weekday service hours	1	270	$10,848
Add Sunday service	11	594	$24,333
Medium-Term Total	**12**	**864**	**$35,181**

THE MOUNTAIN EXPRESS

Short-Term Improvements

Extend Weekday Service Hours

The Mountain Express currently operates weekdays from 8:00 a.m. to 5:00 p.m. This improvement suggests that one additional hour is added to the weekday service, extending service to 6:00 p.m.

Increase Weekday Frequency - Add a Vehicle

Currently, The Mountain Express operates on 90 minute headways. This improvement suggests adding a vehicle to each route, increasing the frequency from 90 minutes to 45 minutes.

Add Saturday Service

The Mountain Express only provides weekday service. A survey of Mountain Express riders revealed that 64% of respondents desired weekend service, making it the top service improvement requested. This alternative recommends adding Saturday service, at the same weekday service levels (9 hours).

Medium-Term Improvements

Add Sunday Service

If the Saturday service proves successful, this improvement proposes to add Sunday service at the same level (9 hours).

Advantages and Disadvantages

The following advantages and disadvantages apply to both the short-term and medium-term improvements.

Advantages

- Expanding weekday service hours and adding weekend service may lead to:
  - An increase in ridership and fare revenue
  - An increase in the mobility of Mountain Express customers.

- Increased service levels addresses a desired service improvement articulated in the rider survey.

- Adding a vehicle to each route on weekdays will reduce the wait time for riders, potentially attracting more choice riders.

Disadvantages

- Extending weekday service and adding weekend service will increase operating expenses.

- Adding a vehicle to each route would require additional capital funding.

- Adding a vehicle to each route would require an additional driver, maintenance, and ancillary costs.

Ridership and Expenses

Short-Term

- The addition of one weekday service hour, increased frequencies, and the implementation of Saturday service will potentially add an estimated 7,704 passengers annually and cost an estimated $143,657 annually.

Medium-Term

- Implementing Sunday service could increase annual ridership by 679 passengers and cost an estimated $22,277 annually.

Table 4-2 shows The Mountain Express service alternatives, and includes daily service hours and estimated annual ridership and cost.

Table 4-2: The Mountain Express Service Improvements

Service Improvement	Daily Service Hours	Estimated Annual Ridership	Estimated Annual Cost
Short-Term			
Expand weekday service hours	1	370	$12,138
Increase frequency	9	6,656	$109,242
Add Saturday service	9	679	$22,277
Short-Term Total	**16**	**7,704**	**$143,657**
Medium-Term			
Add Sunday service	9	679	$22,277
Medium-Term Total	**9**	**679**	**$22,277**

MAURY EXPRESS

Short-Term Improvements

Extend Weekday Service Hours

Maury Express operates two deviated fixed-routes on weekdays from 8:00 a.m. to 6:00 p.m. This improvement proposes to extend one service hour each weekday, increasing service time to 7:00 p.m.

Medium-Term Improvements

Extend Weekday Service Hours

If one additional service hour on weekdays proves successful, this improvement proposes to add another service hour, extending the operating hours to 8:00 p.m.

Increase Weekday Frequency - Add a Vehicle

The Maury Express operates on 60-minute headways on weekdays. This improvement suggests reducing the headway to 30 minutes by adding one vehicle to each route.

Long-Term Improvements

Extend Saturday Service Hours

The hours of operation on Saturdays are from 10:00 a.m. to 4:00 p.m. In the long-term, the Maury Express could extend Saturday service by one hour, ending operations at 5:00 p.m.

Add Sunday Service

Another long-term improvement for the Maury Express is to add Sunday service from 10:00 a.m. to 4:00 p.m.

Advantages and Disadvantages

The following advantages and disadvantages apply to short-term, medium-term, and long-term improvements.

Advantages

- Extending weekday service hours by one hour may lead to an increase in ridership and fare revenue. This addresses the top service improvement suggested by riders.
- Increasing the frequency levels makes the service more appealing and decreases customer wait times.

Disadvantages

- Extending service hours would increase the annual operating expenses.
- Extending service hours would result in additional mileage on current vehicles, thereby accelerating the need to replace vehicles in the current fleet.

- Adding a vehicle to each route may require additional capital funding.

- Adding a vehicle will have extra costs associated such as needing an additional driver, maintenance, and ancillary costs.

Ridership and Expenses

Short-Term

- Adding one weekday service hour could add an estimated 625 passengers annually and cost an estimated $9,713 annually.

Medium-Term

- Adding one weekday service hour and increasing the frequency has the potential to add an estimated 8,245 passengers annually and cost an estimated $97,130 annually.

Long-Term

- Adding one Saturday service hour and implementing Sunday service has the potential to add an estimated 875 passengers annually and cost an estimated $21,597 annually.

Table 4-3 shows Maury Express service improvements including daily service hours, estimated annual ridership and cost.

Table 4-3: Maury Express Service Improvements

Service Improvement	Daily Service Hours	Estimated Annual Ridership	Estimated Annual Cost
Short-Term			
Extend weekday service hours	1	625	$9,713
Total	**1**	**625**	**$9,713**
Medium-Term			
Expand weekday service Hours	1	625	$9,713
Increase weekday frequency	9	7,620	$87,417
Total	**10**	**8,245**	**$97,130**
Long-Term			
Extend Saturday service hours	1	125	$9,713
Add Sunday service	6	750	$11,884
Total	**7**	**875**	**$21,597**

PIEDMONT AREA REGIONAL TRANSPORT (PART)

Short-Term Improvements

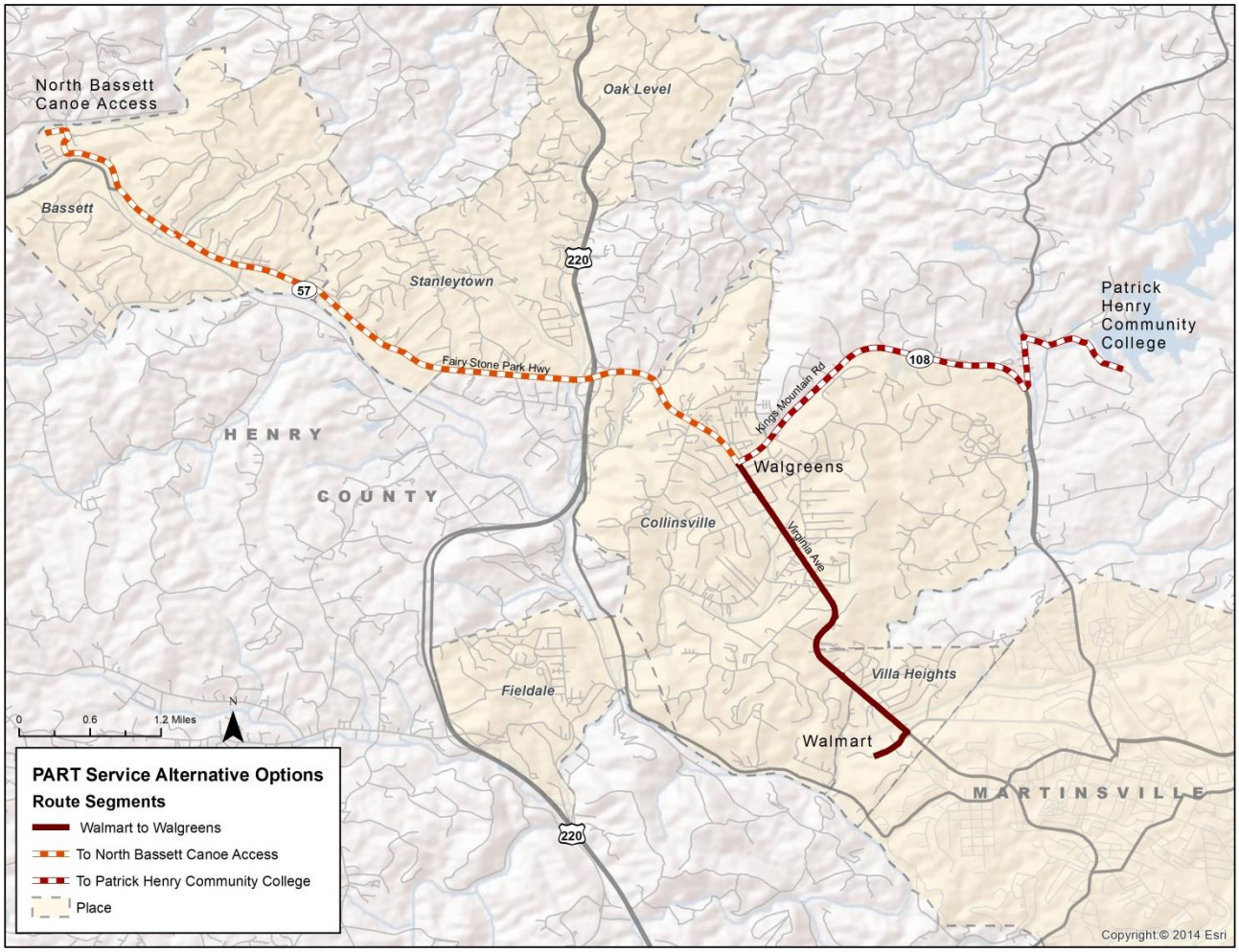
Expand Service Area

Rider feedback gained from surveys and public outreach efforts indicated that one of the top service improvements desired by customers is access to more areas. Many of the locations that riders requested service to are in the western part of Henry County, such as Bassett Family Practice, Stanleytown, and North Bassett Canoe Access. This improvement proposes the following route alignment:

- Walmart-Walgreens- Stanleytown- North Bassett Canoe Access
- Walmart-Walgreens-Patrick Henry College

The route is proposed to operate three times per day, with 60 minute headways between Walmart and Walgreens, and 120 minute headways between Walgreens-North Bassett Canoe Access and Walgreens-Patrick Henry College (see Figure 4-1).

Figure 4-1: Proposed Expansion of Walmart-Walgreens Route (North Bassett Canoe Access and Patrick Henry College)



Medium-Term Improvements

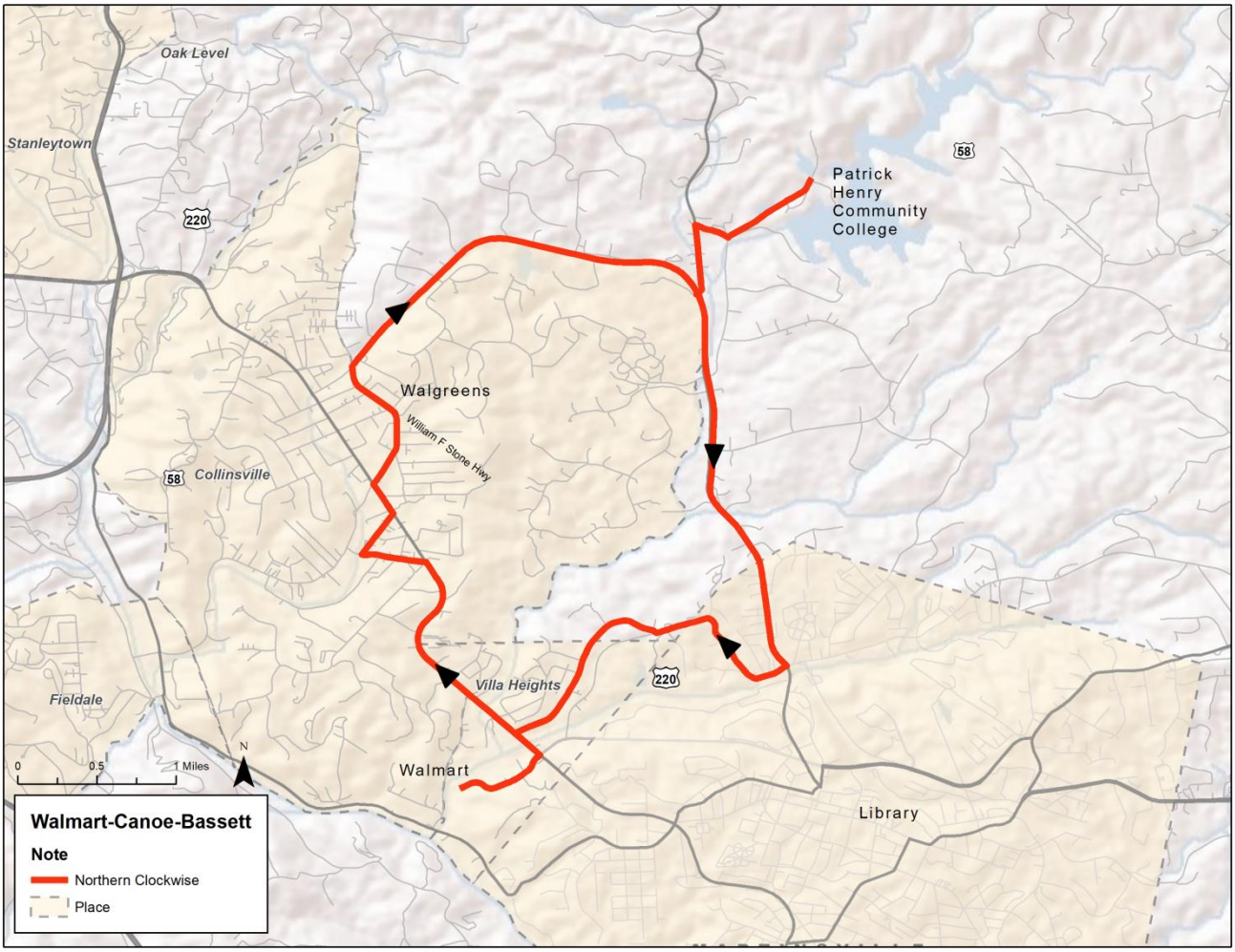
Expand Service Hours

This improvement adds one trip in the morning and one trip in the evening to the Martinsville Route and to the Northern/Collinsville Route.

Increase Service – Add a Vehicle

The Northern/Collinsville Route currently operates hourly service in a counter-clockwise direction. This recommendation proposes adding a bus on the route that will operate in a clockwise alignment. Figure 4-2 displays the route that will now be bi-directional.

Figure 4-2: Proposed Bi-Directional Service - Northern/Collinsville Route



Long-Term Improvements

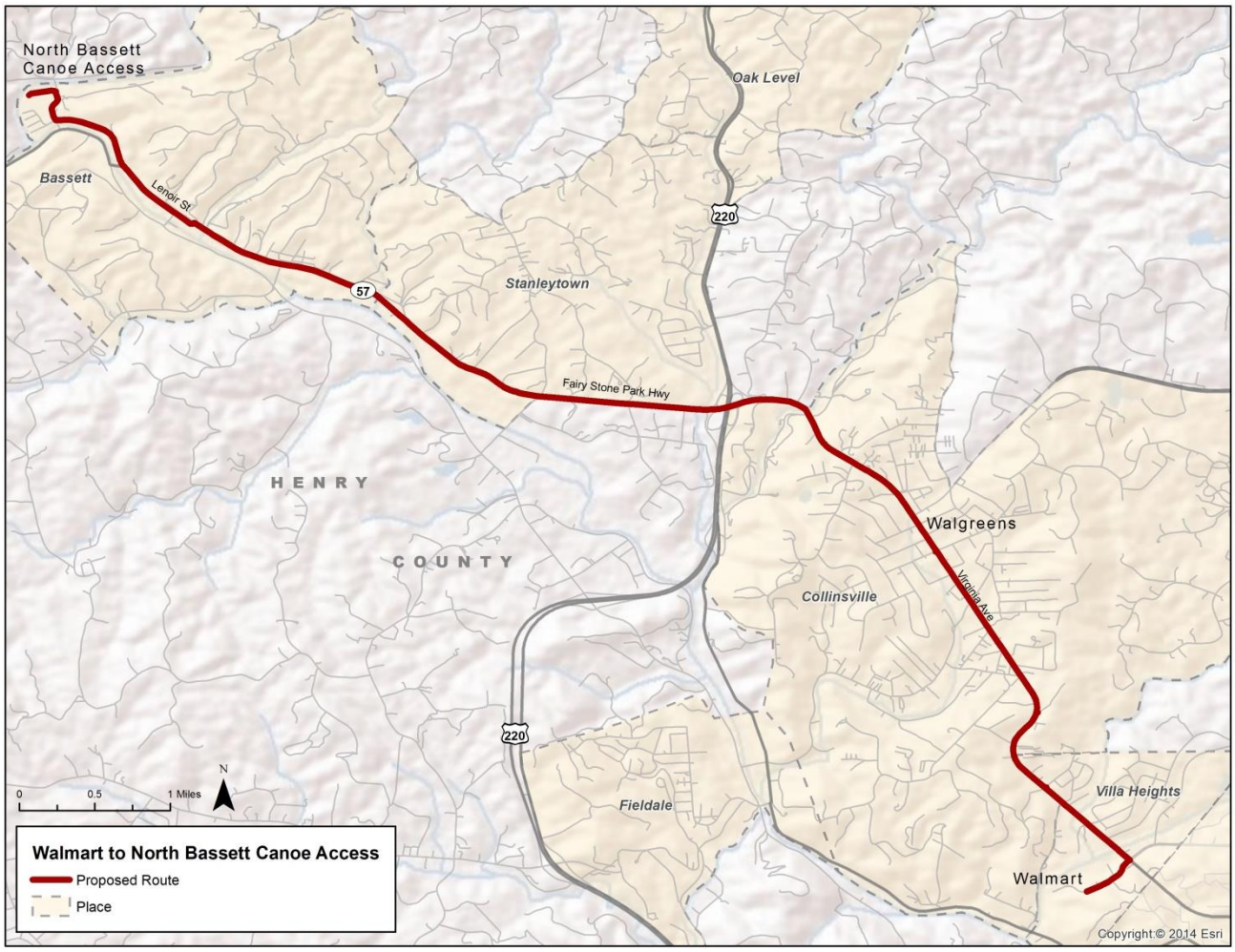
Add New Route

This improvement proposes to add a new route between Walmart and North Bassett Canoe Access. Figure 4-3 shows the proposed route alignment.

Southern Route - Extension

This improvement proposes to extend the southern Route to the Town of Ridgeway to serve the Ridgeway Library (see Figure 4-4).

Figure 4-3: Proposed Walmart-North Bassett Canoe Access Service Improvement



Advantages and Disadvantages

The following advantages and disadvantages apply to short-term, medium-term, and long-term improvements.

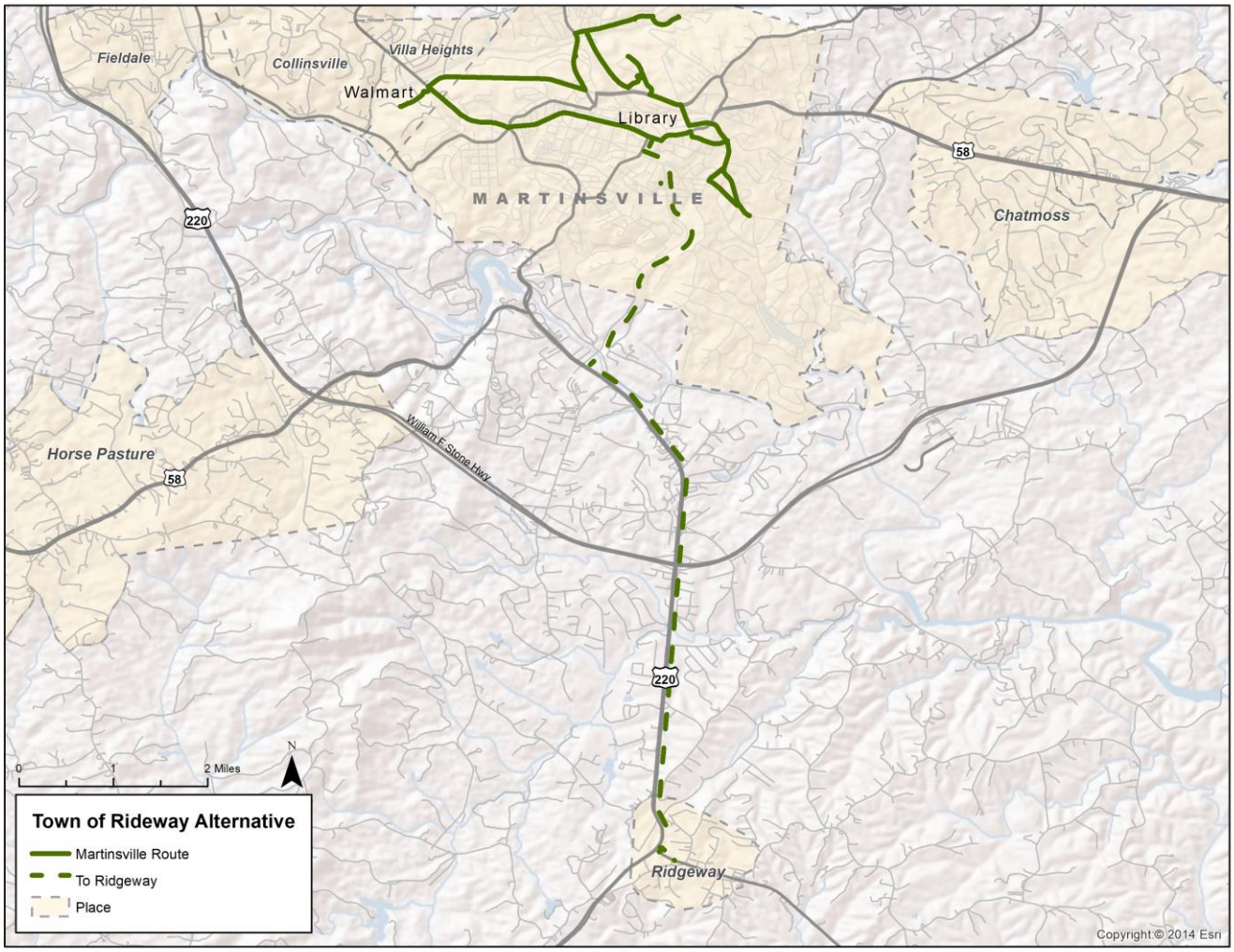
Advantages

- Longer hours provide for the possibility of increased passenger trips and fare revenue.
- Expanding service to Canoe Bassett increases access for riders in western Henry County.

Disadvantages

- Extending hours would increase annual operating expenses.
- A new bus would be needed, thereby increasing the capital cost.

Figure 4-4: Proposed Southern Route – Town of Ridgeway Library



Ridership and Expenses

Short-Term

- Adding an alternating route between Walmart-Walgreens-North Bassett Canoe Access and Walmart-Walgreens-Patrick Henry College has the potential to add 3,259 annual passenger boardings and cost an estimated $65,591 annually.

Medium-Term

- Adding one trip in the morning and one trip in the evening to the two existing routes, and the implementation of a clockwise route will potentially add 10,500 annual boardings and cost an estimated $153,046 annually.

Long-Term

- Implementing the Walmart-North Bassett Canoe Route has the potential to add 3,750 annual passenger trips, with an estimated cost of $65,591 annually. Extending the southern Route to the Town of Ridgeway would add four daily service hours, about 2,500 annual passenger boardings, and cost an estimated $43,290 annually.

Table 4-4 shows PART's service improvements which include daily service hours, estimated annual ridership and cost.

Table 4-4: PART Service Improvements

Service Improvement	Daily Service Hours	Estimated Annual Ridership	Estimated Annual Cost
Short-Term			
Walmart-Walgreens-North Bassett	3	2,250	$32,796
Walmart-Walgreens-College	3	2,250	$32,796
Total Short-Term	**6**	**4,500**	**$65,591**
Medium-Term			
Add weekday - 1 morning and 1 evening trip	4	3,000	$43,727
Northern Route - Add a counter clock wise route	10	7,500	$109,319
Total Medium-Term	**14**	**10,500**	**$153,046**
Long-Term			
Walmart-Canoe Bassett	6	3,750	$65,591
Southern Route - Extend to Ridgeway Library	4	2,500	$43,290
Total Long-Term	**10**	**6,250**	**$65,591**

REGIONAL CONNECTIONS – ADDITIONAL OPPORTUNITIES

Short- and Medium-Term Improvements

Explore Service Connection between Roanoke and Rocky Mount

Stakeholders from the local planning commission, Ferrum College, planning staff of Franklin County, Virginia DOT, and DRPT recognize the growing need to provide an enhanced regional connection between Roanoke and Rocky Mount beyond the limited service offered by the Ferrum Express. Additionally, as noted in the Roanoke Valley Transportation Planning Organization's *Roanoke Valley Transit Vision Plan 2016*, the Roanoke Valley is the largest urban area in southwest Virginia. "As such, there is a desire for places outside the valley to be better connected to it for a number of reasons, such as access to medical services, jobs, shopping, entertainment, and transferring to other regional transportation via the Roanoke-Blacksburg Regional Airport, the Roanoke Amtrak station or intercity buses." One key area where a transit connection with the Roanoke Valley is desired is in Rocky Mount. Two key factors that will influence the type of "transportation" connection will be:

1. Funding – source and amount
2. Mode – public transit, vanpool, etc.

Coordinate STAR/CORTRAN Services

A key recommendation of the Roanoke Valley Transportation Planning Organization's *Roanoke Valley Transit Vision Plan 2016* was to "improve connectivity by regionalizing services for persons with disabilities and for seniors across jurisdictional boundaries." A potential opportunity exists by coordinating STAR and CORTRAN services for people with disabilities to enable them to travel to destinations around the Roanoke Valley without jurisdictional barriers. This is a key regional need that was repeatedly identified as a huge barrier by citizens.

Long-Term Improvement

Connection between Daleville/Botetourt County and Downtown Roanoke

As the region continues to grow, employment opportunities in neighboring counties are also developing. Specifically, new business announcements have the potential to spur additional travel in southern Botetourt County as they transpire over the next several years. These new developments and additional future growth plans in Botetourt County will stimulate new transit connection opportunities among key destinations in the southern part of the county and connect with nearby destinations in the northeast Roanoke County area and Downtown Roanoke.

This plan recommends watching these developments closely, with the goal of creating a new connection that would provide access between Greenfield/Daleville, Bonsack, and Downtown Roanoke.

This recommendation is based upon input from the public, the Botetourt County Planning Commission, and from the workforce propensity and Home-Based Work Trip Flow analyses as noted Roanoke Valley Transportation Planning Organization's *Roanoke Valley Transit Vision Plan 2016*.

Depending upon the demand and anticipated origins/destinations, the proposed route could begin as a commuter shuttle. The service would provide a morning and afternoon commuter express bus service between the Daleville area, Hollins area, and Downtown Roanoke.

Advantages and Disadvantages

The following advantages and disadvantages apply to short-term, medium-term, and long-term improvements.

Advantages

- Provides new service in the region.
- Provides connections with existing route system allowing greater access to key destinations.
- Responds to connections identified in the *Roanoke Valley Transit Vision Plan 2016*.

Disadvantages

- Requires additional operating costs for expanded service.
- Requires additional vehicles to operate new services.

SUMMARY

This chapter provides a range of short-, medium-, and long-term improvements for RADAR to consider. The basic premise behind the improvements is twofold:

1. Maintain and expand coverage to serve residential and employment growth areas.
2. Improve the appeal of RADAR through increases in service, span, and frequency.

The improvements presented are meant as a starting point. Based on feedback and guidance from RADAR, DRPT and the advisory groups, the improvements will be modified into a recommended plan.

Chapter 5
Implementation Plan

INTRODUCTION

This chapter of the RADAR Transit Development Plan provides the required guidance for maintaining current services and implementing the service recommendations described in Chapter 4. Particular attention is paid to rolling stock utilization and major capital projects needed to support the provision of public transit services. Costs associated with this Implementation Plan are provided in the Financial Plan in Chapter 6.

ROLLING STOCK UTILIZATION

This section presents details of the vehicle replacement and expansion plan, including vehicle useful life standards and estimated costs. A vehicle replacement and expansion plan is necessary to maintain a high quality fleet and to dispose of vehicles that have reached their useful life. The capital program for vehicles was developed by applying Federal Transit Administration (FTA)/Virginia Department of Rail and Public Transit (DRPT) vehicle replacement standards to the current vehicle fleet, which was presented in Chapter 1.

Useful Life Standards

The useful life standards used by DRPT are developed based on the manufacturer's designated vehicle life-cycle and results of independent FTA testing. If vehicles are allowed to exceed their pre-scripted useful life they become much more susceptible to break downs which may increase operating costs and decrease the reliability of scheduled service. The DRPT vehicle useful life policy, shown in Table 5-1, is provided in the state's Section 5311 State Management Plan.

Table 5-1: DRPT's Vehicle Useful Life Policy

Vehicle Type	Useful Life
Service Vehicle	Minimum of 4 Years or 100,000 Miles
Vans	Minimum of 4 Years or 100,000 Miles
Body on Chassis Vehicles	Minimum of 4 Years or 100,000 Miles
Light Duty Bus (25'-35')	Minimum of 5 Years or 150,000 Miles
Medium Duty Bus (25'-35')	Minimum of 7 Years or 200,000 Miles
Heavy Duty Bus (~30')	Minimum of 10 Years or 350,000 Miles
Heavy Duty Bus (35' – 40')	Minimum of 12 Years or 500,000 Miles

Source: DRPT's Section 5311 State Management Plan (January 2015)

Vehicle Plan – Baseline Estimate

The current RADAR fleet is primarily body- on- chassis vehicles, some cars and one truck. The DRPT useful life policy was applied to the existing fleet by vehicle type to develop an estimate of RADAR's capital needs to maintain current service levels for the next six years. Table 5-2 provides the current fleet with the estimated fiscal year that each vehicle is programed for replacement.

Vehicle Plan

The annual schedule for vehicle replacement and expansion is shown in Table 5-3. This schedule is based on estimates, as actual vehicle needs may vary depending upon service changes and unexpected economic or societal shifts. This plan follows the recommended replacement years for vehicles shown in Table 5-2, and considers vehicles previously programmed as noted in Chapter 3 and additions to the revenue vehicle fleet based on the service expansions included in the Service and Capital Improvement Plan. The Vehicle Plan also projects replacement for vehicles not yet in the RADAR fleet to meet the ten year planning horizon.

Table 5-2: RADAR's Vehicle Inventory with Replacement Years Baseline Estimate*

Number	Vin Number	Year	Type	ADA	Mileage	Estimated Replacement Year
1	T1BD1EB0EU029541	2014	Car	No	30,252	FY 2024
3	1FDFE4FS5EDA05931	2014	BOC	Yes	108,578	FY 2019
4	1FDFE4FS8FDA14477	2015	BOC	Yes	92,933	FY 2020
6	1FMCU9HXXDUB78631	2013	Car	No	61,341	FY 2023
10	1FDFE4FS4GDC49265	2016	BOC	Yes	55,699	FY 2024
11	1FDFEFS4FDA14475	2015	BOC	Yes	64,066	FY 2022
12	1FDFE4FS5BDB00582	2011	BOC	Yes	201,041	FY 2019
15	1FDFE4FSOGDC49263	2016	BOC	Yes	61,331	FY 2024
24	1FDFE4FS5EDA60539	2014	BOC	Yes	115,676	FY 2019
25	1FDFE4FS3EDA6055	2014	BOC	Yes	95,868	FY 2019
26	1FM5K8D84DGB12615	2013	Car	No	53,342	FY 2024
36	1FDFE4FSFDA14476	2015	BOC	Yes	84,569	FY 2023
40	1FDFE4FS6EDA60534	2014	BOC	Yes	103,204	FY 2023
41	1FD7X2B62BEA13003	2011	Truck	No	46,037	FY 2024
44	1FDFE4FS9EDA60544	2014	BOC	Yes	118,462	FY 2019
45	1FDFE4FS7EDA05929	2014	BOC	Yes	133,474	FY 2022

Number	Vin Number	Year	Type	ADA	Mileage	Estimated Replacement Year
46	1FDFE4FS3EDA05930	2014	BOC	Yes	114,701	FY 2019
47	1FDFE4FS8FDA14480	2015	BOC	Yes	96,011	FY 2020
51	1FMCU9JX7EUB76928	2014	Car	No	28,954	FY 2024
52	JMTB38A580129389	2008	Car	No	120,901	FY 2019
53	2G1WT57K091315235	2009	Car	No	78,300	FY 2020
59	1FDFE4FS8GDC49270	2016	BOC	Yes	57,990	FY 2024
72	1GB6G5BG2D1174802	2013	BOC	Yes	142,876	FY2021
73	1GB6G5BG5D1176639	2013	BOC	Yes	180,021	FY 2018
74	1GB6G5BG8D1176599	2013	BOC	Yes	188,663	FY 2018
75	1FDFE4FS0EDA88393	2014	BOC	Yes	114,404	FY 2019
76	1FDFE4FS8EDA83720	2014	BOC	Yes	111,996	FY 2019
77	1FDFE4FS5HDC20858	2017	BOC	Yes	---	FY 2025
78	1FDFE4FS2HDC51498	2017	BOC	Yes	---	FY 2025
79	1FDFE4FS7HDC51500	2017	BOC	Yes	---	FY 2025
80	1FDFE4FS3HDC51512	2017	BOC	Yes	---	FY 2025
81	1FDFE4FSOHDC51516	2017	BOC	Yes	---	FY 2025
82	1FDFE4FS5HDC51513	2017	BOC	Yes	---	FY 2025
83	1FMCU9HD2JUB27187	2018	Car	No	---	FY 2026
84	1FDFE4FS6HDC78901	2018	BOC	Yes	---	FY 2026

*Vehicle Inventory does not include Section 5310 vehicles.

Table 5-3: Vehicle Replacement and Expansion Schedule*

Vehicle Type	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Replacement	2	8	2	1	2	4	11	9	3	4
Expansion	0	0	1	1	2	2	0	0	0	0
Service	0	1	1	0	0	1	4	0	1	0
Total Vehicles	**2**	**9**	**4**	**2**	**4**	**7**	**15**	**9**	**4**	**4**

*Vehicle replacement and expansion schedule does not include Section 5310 vehicles.

Major System Maintenance and Operations Facilities

No major capital costs related to the current RADAR facility are anticipated during the TDP planning period.

Passenger Amenities

As noted in Chapter 3, a priority expressed by current riders through the on-board customer surveys was for additional/improved bus stop amenities. Looking ahead, RADAR could assess and prioritize potential candidate stops. Therefore the financial plan includes projected costs for improved passenger amenities. Overall, the addition of bus stop amenities supports the growth of the system and should be considered for installation when funds become available.

New Technology Systems or Upgrades

There are no recommendations for equipment within the TDP timeframe although needs may change in future years. The only capital costs related to equipment are for ADP Hardware and ADP Software as noted in the commonwealth's Six-Year Improvement Program (SYIP).

Chapter 6
Financial Plan

INTRODUCTION

This chapter provides a financial plan for funding existing and proposed RADAR services. The financial plan addresses both operations and capital budgets, focusing on financially constrained project recommendations. It should be noted that there are currently a number of unknown factors that will likely affect transit finance over the course of this planning period, including the future economic condition of the region and the Commonwealth of Virginia, the availability of funding from the Federal Section 5311 program, Commonwealth Transportation Fund, and local sources.

OPERATING EXPENSES AND FUNDING SOURCES

Table 6-1 provides a financial plan for the operation of RADAR services through the ten year planning horizon. The top half of the table summarizes annual revenue hours of service for the existing transit program and recommended service projects; and the bottom half of the table provides operating cost estimates and funding sources associated with these service projects.

A variety of assumptions were used in developing the operating cost and funding estimates:

- Implementation years are based on the estimated years included in Chapter 4. Actual implementation will be based on funding availability.

- Operating costs are initially based on FY 2016 costs. A cost of $46.72 per hour was used for demand-response services and $42.07 per hour for deviated fixed-route services. It also assumes a 4% annual inflation rate to project operating expenses associated with maintaining the current level of service and service expansions.

- Federal, state and local funding source amounts are based on the net operating deficit. The net operating deficit is calculated by subtracting the projected farebox revenues from the total operating expenses.

- Funding from the Commonwealth of Virginia is 20% based on DRPT estimates – each year the actual amount changes.

- The projected farebox recovery rate of 9.44% for demand-response services and 4.60% for deviated fixed-route services was used (Chapter 3 data). Since no fare increases are anticipated, these rates were used throughout the planning period.

Table 6-1: RADAR TDP Financial Plan for Operations

Projects (1)	FY2018 Base	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027
CORTRAN										
Current Annual Revenue Hours	4,117	4,117	4,117	4,117	4,117	4,117	4,117	4,117	4,117	4,117
Expand Weekday Service Hours	-	250	250	250	250	250	250	250	250	250
Add Saturday Service	-	-	550	550	550	550	550	550	550	550
Expand Weekday Service Hours	-	-	-	-	-	250	250	250	250	250
Add Sunday Service	-	-	-	-	-	-	550	550	550	550
Subtotal Transit Service Hours	4,117	4,367	4,917	4,917	4,917	5,167	5,717	5,717	5,717	5,717
The Mountain Express										
Current Annual Revenue Hours	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845
Expand Weekday Service Hours	-	250	250	250	250	250	250	250	250	250
Increase Frequency	-	-	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250
Add Saturday Service	-	-	450	450	450	450	450	450	450	450
Add Sunday Service	-	-	-	-	-	-	450	450	450	450
Subtotal Transit Service Hours	5,845	6,095	8,795	8,795	8,795	8,795	9,245	9,245	9,245	9,245
Maury Express										
Current Annual Revenue Hours	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845	5,845
Extend Weekday Service Hours	-	-	250	250	250	250	250	250	250	250
Expand Weekday Service Hours	-	-	-	-	250	250	250	250	250	250
Increase Weekday Frequency	-	-	-	-	-	2,250	2,250	2,250	2,250	2,250
Extend Saturday Service Hours	-	-	-	-	-	-	50	50	50	50
Add Sunday Service	-	-	-	-	-	-	300	300	300	300
Subtotal Transit Service Hours	5,845	5,845	6,095	6,095	6,345	8,595	8,945	8,945	8,945	8,945
Piedmont Area Regional Transit (PART)										
Current Annual Revenue Hours	5,176	5,176	5,176	5,176	5,176	5,176	5,176	5,176	5,176	5,176
Expand Service: Walmart-Walgreens-North Bassett	-	750	750	750	750	750	750	750	750	750
Expand Service: Walmart-Patrick Henry College	-	-	750	750	750	750	750	750	750	750
Expand Service Hours	-	-	-	-	1,000	1,000	1,000	1,000	1,000	1,000
Increase Service Frequency	-	-	-	-	-	2,500	2,500	2,500	2,500	2,500
Add New Route: Walmart - North Bassett	-	-	-	-	-	-	1,500	1,500	1,500	1,500
Southern Route Extension to Town of Ridgeway	-	-	-	-	-	-	1,000	1,000	1,000	1,000
Subtotal Transit Service Hours	5,176	5,926	6,676	6,676	7,676	10,176	12,676	12,676	12,676	12,676
RADAR Demand Response Total Service Hours	**4,117**	**4,367**	**4,917**	**4,917**	**4,917**	**5,167**	**5,717**	**5,717**	**5,717**	**5,717**
RADAR Deviated Fixed Route Total Service Hours	**16,866**	**17,866**	**21,566**	**21,566**	**22,816**	**27,566**	**30,866**	**30,866**	**30,866**	**30,866**

Table 6-1: RADAR TDP Financial Plan for Operations (*continued from previous page*)

Projects	FY2018 Base	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027
Projected Operating Expenses										
Cost Per Revenue Hour for Demand Response (2)	$ 46.72	$ 48.59	$ 50.53	$ 52.55	$ 54.66	$ 56.84	$ 59.12	$ 61.48	$ 63.94	$ 66.50
Cost Per Revenue Hour for Deviated Fixed Route (2)	$ 42.07	$ 43.75	$ 45.50	$ 47.32	$ 49.22	$ 51.18	$ 53.23	$ 55.36	$ 57.58	$ 59.88
Current Level of Service	$ 901,899	$ 993,875	$ 1,229,783	$ 1,278,975	$ 1,391,654	$ 1,704,657	$ 1,981,023	$ 2,060,263	$ 2,142,674	$ 2,228,381
CORTRAN										
Expand Weekday Service Hours	$ -	$ 12,147	$ 12,633	$ 13,138	$ 13,664	$ 14,211	$ 14,779	$ 15,370	$ 15,985	$ 16,624
Add Saturday Service	$ -	$ -	$ 27,793	$ 28,905	$ 30,061	$ 31,263	$ 32,514	$ 33,814	$ 35,167	$ 36,573
Expand Weekday Service Hours	$ -	$ -	$ -	$ -	$ -	$ 14,211	$ 14,779	$ 15,370	$ 15,985	$ 16,624
Add Sunday Service	$ -	$ -	$ -	$ -	$ -	$ -	$ 32,514	$ 33,814	$ 35,167	$ 36,573
The Mountain Express										
Expand Weekday Service Hours	$ -	$ 10,938	$ 11,376	$ 11,831	$ 12,304	$ 12,796	$ 13,308	$ 13,840	$ 14,394	$ 14,970
Increase Frequency	$ -	$ -	$ 102,382	$ 106,477	$ 110,736	$ 115,165	$ 119,772	$ 124,563	$ 129,545	$ 134,727
Add Saturday Service	$ -	$ -	$ 20,476	$ 21,295	$ 22,147	$ 23,033	$ 23,954	$ 24,913	$ 25,909	$ 26,945
Add Sunday Service	$ -	$ -	$ -	$ -	$ -	$ -	$ 23,954	$ 24,913	$ 25,909	$ 26,945
Maury Express										
Extend Weekday Service Hours	$ -	$ -	$ 11,376	$ 11,831	$ 12,304	$ 12,796	$ 13,308	$ 13,840	$ 14,394	$ 14,970
Expand Weekday Service Hours	$ -	$ -	$ -	$ -	$ 12,304	$ 12,796	$ 13,308	$ 13,840	$ 14,394	$ 14,970
Increase Weekday Frequency	$ -	$ -	$ -	$ -	$ -	$ 115,165	$ 119,772	$ 124,563	$ 129,545	$ 134,727
Extend Saturday Service Hours	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,662	$ 2,768	$ 2,879	$ 2,994
Add Sunday Service	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,970	$ 16,608	$ 17,273	$ 17,964
Piedmont Area Regional Transit (PART)										
Expand Service: Walmart-Walgreens-North Bassett	$ -	$ 32,815	$ 34,127	$ 35,492	$ 36,912	$ 38,388	$ 39,924	$ 41,521	$ 43,182	$ 44,909
Expand Service: Walmart-Patrick Henry College	$ -	$ -	$ 34,127	$ 35,492	$ 36,912	$ 38,388	$ 39,924	$ 41,521	$ 43,182	$ 44,909
Expand Service Hours	$ -	$ -	$ -	$ -	$ 49,216	$ 51,185	$ 53,232	$ 55,361	$ 57,576	$ 59,879
Increase Service Frequency	$ -	$ -	$ -	$ -	$ -	$ 127,961	$ 133,080	$ 138,403	$ 143,939	$ 149,697
Add New Route: Walmart - North Bassett	$ -	$ -	$ -	$ -	$ -	$ -	$ 79,848	$ 83,042	$ 86,364	$ 89,818
Southern Route Extension to Town of Ridgeway	$ -	$ -	$ -	$ -	$ -	$ -	$ 53,232	$ 55,361	$ 57,576	$ 59,879
RADAR Total Demand Response Operating Expenses	***$192,346***	***$ 224,334***	***$ 288,893***	***$ 300,449***	***$ 312,467***	***$ 353,387***	***$ 432,550***	***$ 449,852***	***$ 467,846***	***$ 486,559***
RADAR Total Deviated Fixed Route Operating Expenses	***$709,553***	***$825,440***	***$1,195,179***	***$1,242,987***	***$1,415,746***	***$1,958,629***	***$2,388,306***	***$2,483,838***	***$2,583,191***	***$2,686,519***
RADAR TOTAL OPERATING EXPENSES	**$901,899**	**$1,049,775**	**$1,484,073**	**$1,543,436**	**$1,728,213**	**$2,312,016**	**$2,820,855**	**$2,933,689**	**$3,051,037**	**$3,173,078**

(1) Implementation years are estimated. Implementation will be based on funding availability.

(2) Based initially on FY2016 cost per hour; then assumes a 4% annual inflation rate.

Anticipated Funding Sources	FY2018 Base	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027
Federal										
Section 5311	$ 425,551	$ 495,314	$ 700,912	$ 728,948	$ 816,796	$ 1,094,280	$ 1,335,080	$ 1,388,483	$ 1,444,023	$ 1,501,784
State										
Formula Assistance (3)	$ 170,220	$ 198,125	$ 280,365	$ 291,579	$ 326,718	$ 437,712	$ 534,032	$ 555,393	$ 577,609	$ 600,713
Local										
Local Contribution	$ 255,331	$ 297,188	$ 420,547	$ 437,369	$ 490,078	$ 656,568	$ 801,048	$ 833,090	$ 866,414	$ 901,070
Revenues- Farebox (4)	$ 50,797	$ 59,147	$ 82,250	$ 85,540	$ 94,621	$ 123,457	$ 150,695	$ 156,723	$ 162,991	$ 169,511
Total Projected Operating Revenues	**$ 901,899**	**$ 1,049,775**	**$ 1,484,073**	**$ 1,543,436**	**$ 1,728,213**	**$ 2,312,016**	**$ 2,820,855**	**$ 2,933,689**	**$ 3,051,037**	**$ 3,173,078**

(3) Assumes 20% based on DRPT estimates.

(4) Maintained at base levels - 9.44% and 4.60%.

CAPITAL EXPENSES AND FUNDING SOURCES

Table 6-2 provides a financial plan for vehicle replacement and expansion for the ten year planning horizon. The assumptions involved in developing the capital cost and funding estimates are the following:

- Using current capital budgets discussed in Chapter 3 as a base.
- Incorporating capital needs detailed in Chapter 5.
- Using estimated vehicle costs included in the current capital budget.
- Estimating cost amounts for use in installing shelters at appropriate locations.
- Using DRPT Tier 1 estimates that project an 80% federal/ 16% state/ 4% local funding allocation for replacement and expansion vehicles.
- Using DRPT Tier 2 estimates that project an 80% federal/ 16% state/ 4% local funding allocation for infrastructure/facilities for purchase and installation of bus shelters.
- Using DRPT Tier 3 estimates that project an 80% federal/ 16% state/ 4% local funding allocation for other capital equipment, including computer hardware.

Table 6-2: RADAR TDP Financial Plan for Capital

Tier 1 Capital Needs	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027
Vehicle Replacement										
BOC Vehicle	$ 150,000	$ 600,000	$ 150,000	$ 75,000	$ 150,000	$ 300,000	$ 825,000	$ 675,000	$ 225,000	$ 300,000
Service Vehicle	$ -	$ 30,000	$ 30,000	$ -	$ -	$ 30,000	$ 120,000	$ -	$ 30,000	$ -
Vehicle Replacement Total	***$ 150,000***	***$ 630,000***	***$ 180,000***	***$ 75,000***	***$ 150,000***	***$ 330,000***	***$ 945,000***	***$ 675,000***	***$ 255,000***	***$ 300,000***
Vehicle Expansion										
BOC Vehicle	$ -	$ -	$ 75,000	$ 75,000	$ 150,000	$ 150,000	$ -	$ -	$ -	$ -
Vehicle Expansion Total	***$ -***	***$ -***	***$ 75,000***	***$ 75,000***	***$ 150,000***	***$ 150,000***	***$ -***	***$ -***	***$ -***	***$ -***
Tier 2 Capital Needs	**FY2018**	**FY2019**	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**
Facilities										
Shop Equipment	$ -	$ 100,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Bus Shelters	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Facilities Sub Total	***$ -***	***$ 100,000***	***$ 50,000***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***
Tier 3 Capital Needs	**FY2018**	**FY2019**	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**
Equipment										
ADP Hardware	$ -	$ -	$ 40,000	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ -
ADP Software	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Equipment Sub Total	***$ -***	***$ -***	***$ 90,000***	***$ -***	***$ -***	***$ 40,000***	***$ -***	***$ -***	***$ -***	***$ -***
CAPITAL NEEDS TOTAL	**$ 150,000**	**$ 730,000**	**$ 395,000**	**$ 150,000**	**$ 300,000**	**$ 520,000**	**$ 945,000**	**$ 675,000**	**$ 255,000**	**$ 300,000**
Anticipated Funding Sources										
Federal	$ 120,000	$ 584,000	$ 316,000	$ 120,000	$ 240,000	$ 416,000	$ 756,000	$ 540,000	$ 204,000	$ 240,000
State	$ 24,000	$ 116,800	$ 63,200	$ 24,000	$ 48,000	$ 83,200	$ 151,200	$ 108,000	$ 40,800	$ 48,000
Local	$ 6,000	$ 29,200	$ 15,800	$ 6,000	$ 12,000	$ 20,800	$ 37,800	$ 27,000	$ 10,200	$ 12,000
TOTAL FUNDING	**$ 150,000**	**$ 730,000**	**$ 395,000**	**$ 150,000**	**$ 300,000**	**$ 520,000**	**$ 945,000**	**$ 675,000**	**$ 255,000**	**$ 300,000**

Appendix A

Survey Instruments

- Maury Express Rider Survey
- Mountain Express Rider Survey
- Piedmont Area Regional Transit (PART) Rider Survey
- Mountain Express Community Survey

Maury Express

Serving Buena Vista, Lexington, & Rockbridge County

RADAR

THE MAURY EXPRESS ON-BOARD RIDER SURVEY

Please take a few minutes to complete the following survey to improve RADAR's Maury Express service. Please complete only one survey per person. Thank you!

1. Where did you get on the bus?
Please indicate an address, intersection, or landmark.

_____

_____

2. Where are you getting off the bus?
Please indicate an address, intersection, or landmark.

_____

_____

3. Which days of the week do you normally ride the bus?
You may check more than one.

❑ Monday ❑ Thursday
❑ Tuesday ❑ Friday
❑ Wednesday ❑ Saturday

4. How many trips do you generally take on the bus per week?

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
<1	1	2	3	3	4	5	6	7	8	9	10	>10

5. Was a car available for this trip?
❑ Yes ❑ No

6. Do you have a driver's license?
❑ Yes ❑ No

7. Are there places where you need to go that bus does not serve? ❑ Yes ❑ No

If yes, where: _____

8. What is the purpose of your trip today?
You may check more than one.

❑ Work ❑ School / College
❑ Social/Recreation ❑ Government Agency
❑ Shopping/Errands ❑ Medical
❑ Other: _____

9. If you were not riding the bus, how would you make this trip?

❑ Drive myself ❑ Ride with family/friends
❑ Walk ❑ Bike
❑ Taxi ❑ Wouldn't make the trip

10. What do you like <u>most</u> about the bus?

_____

_____

11. What do you like <u>least</u> about the bus?

_____

_____

12. If RADAR was to make service improvements, what would be your top three choices?

(1) _____

(2) _____

(3) _____

13. Please rate RADAR in the following areas:

		<u>Strongly Satisfied</u>	<u>Satisfied</u>	<u>Neutral</u>	<u>Dis-satisfied</u>	<u>Strongly Dis-satisfied</u>
a.	Frequency of Bus Service	❑	❑	❑	❑	❑
b.	Areas that are Served by Bus Routes	❑	❑	❑	❑	❑
c.	Bus Running On-Time	❑	❑	❑	❑	❑
d.	Hours of Bus Service	❑	❑	❑	❑	❑
e.	Availability of Schedules & Route Information	❑	❑	❑	❑	❑
f.	Cost of the Bus Fare	❑	❑	❑	❑	❑
g.	Sense of Security on Buses & at Stops	❑	❑	❑	❑	❑
h.	Cleanliness of Buses and Stops	❑	❑	❑	❑	❑
i.	Courtesy/Friendliness of Bus Drivers	❑	❑	❑	❑	❑
j.	Overall Service	❑	❑	❑	❑	❑

Over Please →

Please tell us a little bit about yourself:

14. Where do you currently live?

❑ Buena Vista ❑ East Lexington ❑ Fairfield
❑ Glasgow ❑ Goshen ❑ Lexington
❑ Other: _____

15. What is your gender?

❑ Male ❑ Female

16. Do you have a disability?

❑ Yes ❑ No

17. Does your disability prevent you from using traditional, non-accessible forms of transportation?

❑ Yes ❑ No ❑ N/A

18. What is your current employment status?

You may check more than one.

❑ Employed Full-Time
❑ Employed Part-Time
❑ Student Full-Time
❑ Student Part-Time
❑ Retired
❑ Unemployed
❑ Homemaker
❑ Other

19. What is your age?

❑ 0-15 ❑ 16-24 ❑ 25-34
❑ 35-54 ❑ 55-64 ❑ 65+

20. Including yourself, how many people live in your household? _____

21. Are you of Hispanic origin?

❑ Yes ❑ No

22. How would you classify yourself?

❑ Asian or Pacific Islander
❑ Black
❑ Native American
❑ White
❑ Other

23. What is the primary language spoken in your household?

❑ English ❑ Spanish ❑ Other: _____

24. What is your annual household income?

❑ $14,999 or less ❑ $45,000-$59,999
❑ $15,000-$29,999 ❑ $60,000-$74,999
❑ $30,000-$44,999 ❑ $75,000 or higher

Please provide any comments you may have concerning the bus:

_____

_____

_____

_____

_____

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_____

_____

Thank You!

THE MOUNTAIN EXPRESS ON-BOARD RIDER SURVEY

Please take a few minutes to complete the following survey to improve RADAR's Mountain Express service.
Please complete only one survey per person. Thank you!

1. Where did you get on the bus?
Please indicate an address, intersection, or landmark.

_____

_____

2. Where are you getting off the bus?
Please indicate an address, intersection, or landmark.

_____

_____

3. Which days of the week do you normally ride the bus?

❑ Monday ❑ Thursday
❑ Tuesday ❑ Friday
❑ Wednesday

4. How many trips do you generally take on the bus per week?

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
<1	1	2	3	3	4	5	6	7	8	9	10	>10

5. Was a car available for this trip?
❑ Yes ❑ No

6. Do you have a driver's license?
❑ Yes ❑ No

7. Are there places where you need to go that bus does not serve? ❑ Yes ❑ No

If yes, where: _____

8. What is the purpose of your trip today?
You may check more than one.

❑ Work ❑ School / College
❑ Social/Recreation ❑ Government Agency
❑ Shopping/Errands ❑ Medical
❑ Other: _____

9. If you were not riding the bus, how would you make this trip?

❑ Drive myself ❑ Ride with family/friends
❑ Walk ❑ Bike
❑ Taxi ❑ Wouldn't make the trip

10. What do you like <u>most</u> about the bus?

_____

_____

11. What do you like <u>least</u> about the bus?

_____

_____

12. If RADAR was to make service improvements, what would be your top three choices?

(1) _____

(2) _____

(3) _____

13. Please rate RADAR in the following areas:

		<u>Strongly Satisfied</u>	<u>Satisfied</u>	<u>Neutral</u>	<u>Dis-satisfied</u>	<u>Strongly Dis-satisfied</u>
a.	Frequency of Bus Service	❑	❑	❑	❑	❑
b.	Areas that are Served by Bus Routes	❑	❑	❑	❑	❑
c.	Bus Running On-Time	❑	❑	❑	❑	❑
d.	Hours of Bus Service	❑	❑	❑	❑	❑
e.	Availability of Schedules & Route Information	❑	❑	❑	❑	❑
f.	Cost of the Bus Fare	❑	❑	❑	❑	❑
g.	Sense of Security on Buses & at Stops	❑	❑	❑	❑	❑
h.	Cleanliness of Buses and Stops	❑	❑	❑	❑	❑
i.	Courtesy/Friendliness of Bus Drivers	❑	❑	❑	❑	❑
j.	Overall Service	❑	❑	❑	❑	❑

Over Please →

Please tell us a little bit about yourself:

14. Where do you currently live?
- ❑ Clifton Forge ❑ Covington ❑ Iron Gate
- ❑ Low Moor ❑ Mallow ❑ Selma
- ❑ Other:_____

15. What is your gender?
- ❑ Male ❑ Female

16. Do you have a disability?
- ❑ Yes ❑ No

17. Does your disability prevent you from using traditional, non-accessible forms of transportation?
- ❑ Yes ❑ No ❑ N/A

18. What is your current employment status?
You may check more than one.
- ❑ Employed Full-Time
- ❑ Employed Part-Time
- ❑ Student Full-Time
- ❑ Student Part-Time
- ❑ Retired
- ❑ Unemployed
- ❑ Homemaker
- ❑ Other

19. What is your age?
- ❑ 0-15 ❑ 16-24 ❑ 25-34
- ❑ 35-54 ❑ 55-64 ❑ 65+

20. Including yourself, how many people live in your household? _____

21. Are you of Hispanic origin?
- ❑ Yes ❑ No

22. How would you classify yourself?
- ❑ Asian or Pacific Islander
- ❑ Black
- ❑ Native American
- ❑ White
- ❑ Other

23. What is the primary language spoken in your household?
- ❑ English ❑ Spanish ❑ Other: _____

24. What is your annual household income?
- ❑ $14,999 or less ❑ $45,000-$59,999
- ❑ $15,000-$29,999 ❑ $60,000-$74,999
- ❑ $30,000-$44,999 ❑ $75,000 or higher

Please provide any comments you may have concerning the bus:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Thank You!

PART
Piedmont Area Regional Transport
Serving Martinsville and Henry County

RADAR

THE PIEDMONT AREA REGIONAL TRANSPORT (PART) ON-BOARD RIDER SURVEY

Please take a few minutes to complete the following survey to improve RADAR's PART service. Please complete only one survey per person. Thank you!

1. **Where did you get on the bus?**
   Please indicate an address, intersection, or landmark.

   _____

   _____

2. **Where are you getting off the bus?**
   Please indicate an address, intersection, or landmark.

   _____

   _____

3. **Which days of the week do you normally ride the bus?**
   You may check more than one.
   - ❑ Monday
   - ❑ Tuesday
   - ❑ Wednesday
   - ❑ Thursday
   - ❑ Friday

4. **How many trips do you generally take on the bus per week?**

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
<1	1	2	3	3	4	5	6	7	8	9	10	>10

5. **Was a car available for this trip?**
   ❑ Yes ❑ No

6. **Do you have a driver's license?**
   ❑ Yes ❑ No

7. **Are there places where you need to go that bus does not serve?** ❑ Yes ❑ No

   If yes, where: _____

8. **What is the purpose of your trip today?**
   You may check more than one.
   - ❑ Work
   - ❑ School / College
   - ❑ Social/Recreation
   - ❑ Government Agency
   - ❑ Shopping/Errands
   - ❑ Medical
   - ❑ Other: _____

9. **If you were not riding the bus, how would you make this trip?**
   - ❑ Drive myself
   - ❑ Ride with family/friends
   - ❑ Walk
   - ❑ Bike
   - ❑ Taxi
   - ❑ Wouldn't make the trip

10. **What do you like <u>most</u> about the bus?**

    _____

    _____

11. **What do you like <u>least</u> about the bus?**

    _____

    _____

12. **If RADAR was to make service improvements, what would be your top three choices?**

    (1) _____

    (2) _____

    (3) _____

13. **Please rate RADAR in the following areas:**

		<u>Strongly Satisfied</u>	<u>Satisfied</u>	<u>Neutral</u>	<u>Dis-satisfied</u>	<u>Strongly Dis-satisfied</u>
a.	Frequency of Bus Service	❑	❑	❑	❑	❑
b.	Areas that are Served by Bus Routes	❑	❑	❑	❑	❑
c.	Bus Running On-Time	❑	❑	❑	❑	❑
d.	Hours of Bus Service	❑	❑	❑	❑	❑
e.	Availability of Schedules & Route Information	❑	❑	❑	❑	❑
f.	Cost of the Bus Fare	❑	❑	❑	❑	❑
g.	Sense of Security on Buses & at Stops	❑	❑	❑	❑	❑
h.	Cleanliness of Buses and Stops	❑	❑	❑	❑	❑
i.	Courtesy/Friendliness of Bus Drivers	❑	❑	❑	❑	❑
j.	Overall Service	❑	❑	❑	❑	❑

Over Please →

Please tell us a little bit about yourself:

14. Where do you currently live?

❑ Bassett ❑ Chatmoss ❑ Collinsville
❑ Horsepasture ❑ Martinsville ❑ Stanleytown
❑ Other: _____

15. What is your gender?

❑ Male ❑ Female

16. Do you have a disability?

❑ Yes ❑ No

17. Does your disability prevent you from using traditional, non-accessible forms of transportation?

❑ Yes ❑ No ❑ N/A

18. What is your current employment status?

You may check more than one.

❑ Employed Full-Time
❑ Employed Part-Time
❑ Student Full-Time
❑ Student Part-Time
❑ Retired
❑ Unemployed
❑ Homemaker
❑ Other

19. What is your age?

❑ 0-15 ❑ 16-24 ❑ 25-34
❑ 35-54 ❑ 55-64 ❑ 65+

20. Including yourself, how many people live in your household? _____

21. Are you of Hispanic origin?

❑ Yes ❑ No

22. How would you classify yourself?

❑ Asian or Pacific Islander
❑ Black
❑ Native American
❑ White
❑ Other

23. What is the primary language spoken in your household?

❑ English ❑ Spanish ❑ Other: _____

24. What is your annual household income?

❑ $14,999 or less ❑ $45,000-$59,999
❑ $15,000-$29,999 ❑ $60,000-$74,999
❑ $30,000-$44,999 ❑ $75,000 or higher

Please provide any comments you may have concerning the bus:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Thank You!

COMMUNITY SURVEY

RADAR is conducting a Public Transportation Survey. Please help us learn more about community transportation needs by completing this survey. Please return this survey to the collection box where you picked it up, or alternatively, you can complete this survey on-line at www.surveymonkey.com

Please complete only one survey per person. Thank you!

---

1. **Where do you currently live?**
   ❑ Clifton Forge ❑ Covington ❑ Iron Gate ❑ Low Moor ❑ Mallow ❑ Selma ❑ Other:_____

2. **Are you aware of the bus service provided by RADAR?**
   ❑ Not aware
   ❑ Aware; I feel positive about it
   ❑ Aware; I feel neither positive or negative about it
   ❑ Aware; I feel negative about it

3. **Do you currently use RADAR?**
   ❑ Yes *(if **yes**, please skip to question 6)*
   ❑ No

4. **If you don't use RADAR, why not?**
   ❑ Did not know about RADAR
   ❑ Did not know RADAR was open to the public
   ❑ Have to wait too long for the bus
   ❑ Need my car for work/school
   ❑ Buses are unreliable/late
   ❑ No service near my home/work/school
   ❑ Trip is too long/takes too much time
   ❑ The fare is expensive
   ❑ The bus is uncomfortable
   ❑ I have limited mobility/hard to use the bus
   ❑ Hours of operation are too limited
   ❑ Days of operation are too limited
   ❑ Other:_____

5. **Would you consider using RADAR if there were services that met your travel needs?**
   ❑ Yes ❑ No ❑ Not at this time

6. **If you use RADAR, how often do you ride per week?**

❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
0	<1	1	2	3	4	5	6	7	8	9	10	>10

7. **Are there places in the area that you need to go that the bus does not serve?**
   ❑ Yes ❑ No

   Where? _____

8. **Which improvements would you like to see?**
   ❑ More frequent service
   ❑ Stop improvements (signs, benches, shelters)
   ❑ Service earlier in the morning (before ___ am)
   ❑ Service later in the evening (after ___ pm)
   ❑ Additional weekend service
   ❑ More direct service
   ❑ None at this time
   ❑ Other:_____

Over Please→

9. What is your primary mode of transportation for the following trips?

	Drive Myself	Ride w/ Family/Friend	Public Transit/Bus	Walk/Bicycle	Other	N/A
a. Work	❑	❑	❑	❑	❑	❑
b. School	❑	❑	❑	❑	❑	❑
c. Medical	❑	❑	❑	❑	❑	❑
d. Social/Recreation	❑	❑	❑	❑	❑	❑
e. Shopping/Errands	❑	❑	❑	❑	❑	❑

10. Do you have a driver's license?
❑ Yes ❑ No

11. What is your gender?
❑ Male ❑ Female

12. Do you have a disability?
❑ Yes ❑ No

13. Does your disability prevent you from using traditional, non-accessible forms of transportation?
❑ Yes ❑ No ❑ N/A

14. What is your employment status?
(you may check more than one)
❑ Employed Full-Time ❑ Retired
❑ Employed Part-Time ❑ Unemployed
❑ Student Full-Time ❑ Homemaker
❑ Student Part-Time ❑ Other

15. Including yourself, how many people live in your household? _____

16. Are you of Hispanic origin?
❑ Yes ❑ No

17. How would you classify yourself?
❑ White
❑ Black
❑ Asian or Pacific Islander
❑ Native American
❑ Other_____

18. What language is spoken at home?
❑ English ❑ Other: _____

19. How well do you speak English:
❑ Very well ❑ Less than very well

20. What is your age?
❑ 0-15 ❑ 16-24 ❑ 25-34
❑ 35-54 ❑ 55-64 ❑ 65 +

21. What is your annual household income?
❑ $14,999 or less ❑ $45,000 - $59,999
❑ $15,000 - $29,999 ❑ $60,000 - $74,999
❑ $30,000 - $44,999 ❑ $75,000 or higher

***Please provide any comments you may have concerning the bus*:**

_____

_____

_____

_____

Thank You!