Fredericksburg Regional Transit

Transit Development Plan

FY2017 - FY2022





May 2017

Prepared for

FRED
FREDERICKSBURG REGIONAL TRANSIT

and

DRPT
Virginia Department of Rail and Public Transportation

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Chapter 1
Overview of Public Transportation in the Region

INTRODUCTION

A transit development plan (TDP) is a six-year transit plan that outlines services that a transit provider could implement with local, state, and federal government support, estimates what resources will be needed, and what funding opportunities are likely to be available. The Virginia Department of Rail and Public Transportation (DRPT) requires that any public transit (bus, rail, ferry) operator receiving state funding prepare, adopt, and submit a TDP at least every six years. DRPT provides a set of TDP requirements that form the basis of the planning effort.

The current Fredericksburg Regional Transit TDP was completed in 2010 and outlined planning years that included fiscal year (FY) 2011 (July 2010 to June 2011) through FY2016 (July 2015 to June 2016). This TDP update for FRED highlights the transit program for FY2017-FY2022.

The TDP serves as a management and policy document for FRED, provides DRPT with an up-to-date set of related transit capital and operating budgets, as well as providing the basis for including capital and operating programs in the Six Year Improvement Program (SYIP), the Statewide Transportation Improvement Program (STIP), and the Long Range Transportation Plan (LRTP). The TDP also provides guidance that FRED can use to prepare its Transit Asset Management Plan (TAM), which is a relatively new requirement from the Federal Transit Administration (FTA).

This first chapter of the plan provides an overview of the transit program and provides background information and data that was used for subsequent data collection, analysis, and eventual recommendations for the six-year plan.

BACKGROUND

FRED provides public transit services in the City of Fredericksburg and the counties of Caroline, Spotsylvania, and Stafford. These jurisdictions, along with King George County, comprise the Greater Fredericksburg region. The region is located in central Virginia, on the I-95 Corridor, between the Washington, D.C., and Richmond Metropolitan Areas. The City of Fredericksburg is 58 miles north of Richmond and 50 miles south of Washington, D.C.

Major travel corridors include I-95, US Route 1, US Route 17, US Route 301, VA Route 3, and the north/south CSX rail line, on which the Virginia Railway Express (VRE) and Amtrak trains operate.

The total population of the region (2015 estimate) is 325,935, which is 7.1% greater than the 2010 Census population of 304,189.[1] The City of Fredericksburg is experiencing the fastest growth in the region (11%) and Caroline County the slowest (4%). The statewide average growth rate for the same time period is 4.8%. These data are shown in Table 1-1.

Table 1-1: Population in the Region

Jurisdiction	2010 Census Population [1]	2015 Population Estimate [2]	Percent Change
Caroline County	28,545	29,792	4%
City of Fredericksburg	24,286	26,969	11%
Spotsylvania County	122,397	128,998	5%
Stafford County	128,961	140,176	9%
Total	**304,189**	**325,935**	**7.1%**

(1) US Census, 2010.
(2) Weldon-Cooper Center.

FRED's service area includes both urban and rural areas, with the City of Fredericksburg and portions of Spotsylvania and Stafford Counties forming the Fredericksburg Urbanized Area. In addition, a relatively large area of north-central Stafford County is part of the Washington, DC- VA-MD Urbanized Area. Significant portions of Spotsylvania County, central Stafford County, and all of Caroline County remain rural. The urban and rural distinctions are important to document, as federal transit funding sources are different for each, with the federal section 5307 funding program available to assist transit programs operating in urbanized areas and the federal section 5311 funding program available to assist transit programs operating in non-urbanized areas. Figure 1-1 provides a map of the region, showing both urbanized areas, overlaid with FRED's deviated fixed routes. FRED reports all operations as "urban" on its National Transportation Database (NTD) submissions, as all Caroline County (rural area) routes start and/or terminate within the Fredericksburg urbanized area. The 2010 total service area population, defined as the number of people residing within ¾ mile of a FRED route, is 113,716.

[1] Weldon-Cooper Center. This population figure does not include King George County, which is not currently served by FRED.

Figure 1-1: FRED Service and the Urbanized Areas

Source: Review of FTA Funding Under 2010 Census, 2014, prepared by KFH Group for DRPT.

HISTORY

FRED was formed in 1996 to provide public transit service to the City of Fredericksburg. The original system consisted of four routes and five vehicles. The system has grown significantly over the years into a regional system of 21 routes and 30 revenue vehicles. The following milestones show FRED's incremental growth from a local transit system to a regional transit provider.

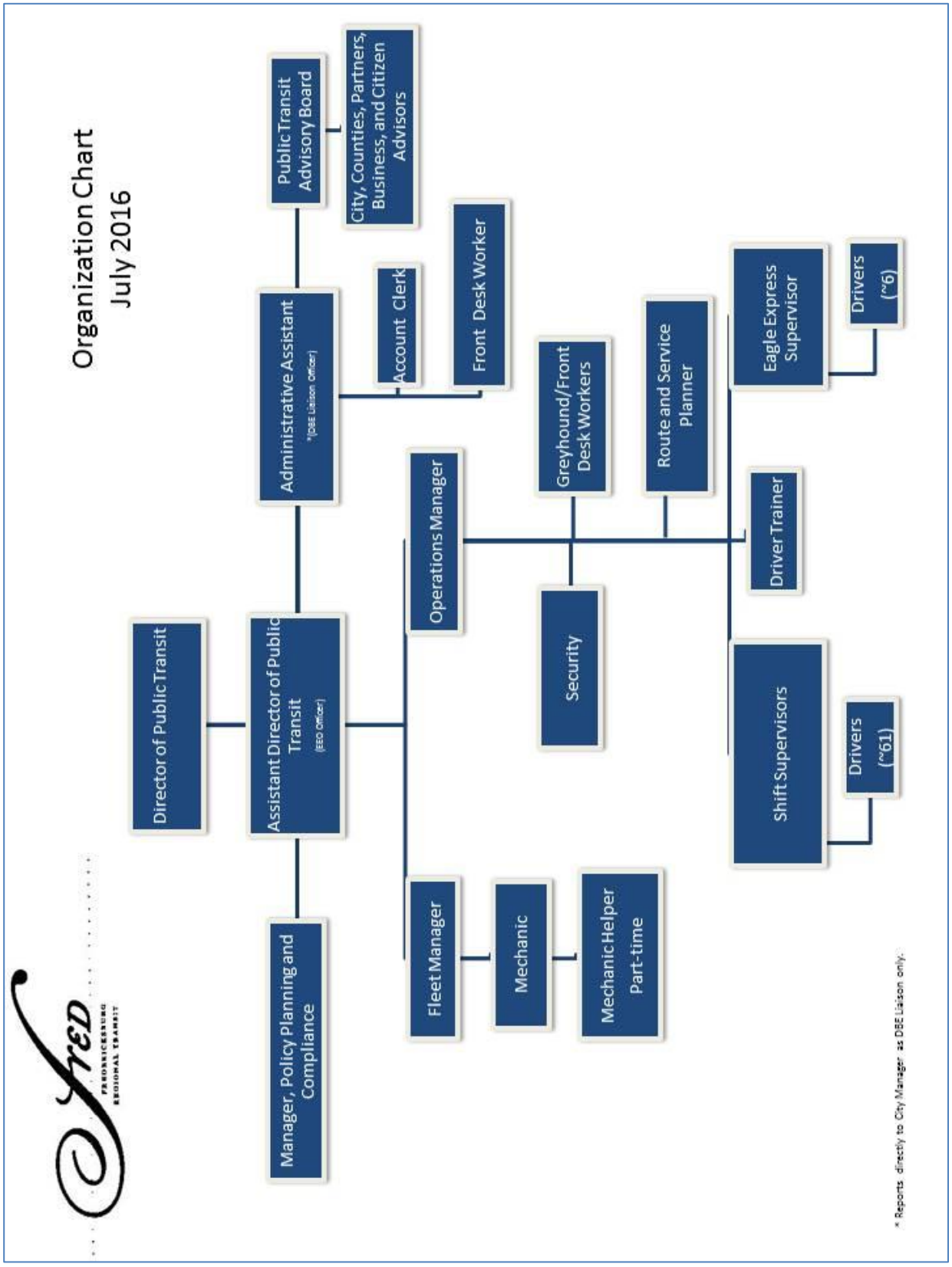
- 1996 – FRED is formed to provide service to residents of the City of Fredericksburg.
- 1997 – FRED becomes the local ticketing agent for Greyhound.
- 1998 – FRED expands service to Spotsylvania County.
- 1999 – FRED Express begins weekend operations for the University of Mary Washington.
- 2001 – FRED expands service to Stafford County.
- 2002 – FRED expands service to Caroline County.
- 2005 – FRED expands service into northern Stafford County and King George County *(King George County has since discontinued FRED service due to budget constraints)*
- 2007 – FRED begins feeder service for the Virginia Railway Express
- 2007 – FRED opens the Lawrence A. Davies Transit Center (FRED Central)
- 2015 - FRED opens the Maintenance and Training Facilities at the Bowman Center.

GOVERNANCE AND ORGANIZATIONAL STRUCTURE

FRED is a department of the City of Fredericksburg and is governed by the City Council. As a city department, FRED is directly managed and operated by City of Fredericksburg employees, which include 15 full-time and 75 part-time positions. The Director of Public Transit reports directly to the City Manager. The organizational structure for the program is shown in Figure 1-2. FRED also takes advice and direction from the Public Transit Advisory Board (PTAB). The purpose of PTAB is, "to provide citizen and private and public partner input on the public transit needs of the city and the region; to evaluate the operational and financial performance of the region's public transit system; and to advise the City Council on any public transit issues that the PTAB considers appropriate for City Council consideration."[2]

[2] Fredericksburg Area MPO website, 4/1/2016.

Figure 1-2: FRED Organizational Chart



PTAB consists of one member from:

- Each locality that receives transit services from FRED (City of Fredericksburg, Spotsylvania County, Caroline County, and Stafford County),
- Any private partner contributing $25,000 or more to FRED per year in cash or in-kind match (Currently this includes Mary Washington Healthcare, University of Mary Washington, Germanna Community College, Star Radio Group, and The Free Lance- Star),
- The Fredericksburg Area Chamber of Commerce,
- The George Washington Regional Commission,
- The Disability Resource Center, and
- Citizen Representatives.

PTAB meetings are held the first Wednesday of February, April, June, July, August, October and December. PTAB served as an advisory body for development of the TDP.

TRANSIT SERVICES PROVIDED AND AREAS SERVED

FRED operates a total of 21 deviated fixed routes. Service is primarily provided Monday through Friday from 6:00 a.m. to 8:30 p.m.; although FRED also provides early morning VRE feeder shuttles Monday through Friday to meet most VRE trains at the Fredericksburg VRE Station. Late night service on Thursday, Friday and Saturday and weekend service is also provided through an agreement with University of Mary Washington; this service is called Eagle Express and operates only during the fall and spring academic sessions. Table 1-2 provides a brief overview of FRED's services with in-depth service analysis provided in Chapter 3. Maps of FRED's routes in each of the service jurisdictions are displayed in Figures 1- 3 through 1-6 on the following pages.

Table 1-2: FRED Deviated Fixed Route Services

Route	Description	Origin-Destination
C1	Caroline	Carmel-Bowling Green – Fredericksburg
C2	Caroline	Carmel-Bowling Green – Fredericksburg
D1	South Stafford	Fredericksburg Train Station- Old Forge
D2	South Stafford	FRED Central-Old Forge - England Run- GEICO
D3	North Stafford	Stafford Courthouse - Stafford Marketplace
D4	North Stafford	Stafford Marketplace - Vista Woods
D5	South Stafford	FRED Central - Stafford Courthouse
D6	North Stafford	North Commuter Lot- South Commuter Lot
E1	Eagle Express	University of Mary Washington - Central Park- Fredericksburg
E2	Eagle Express	University of Mary Washington - Central Park - Spotsylvania Towne Centre
E2LN	Eagle Express Late Night	University of Mary Washington - Central Park - Spotsylvania Towne Centre
F1	Fredericksburg	FRED Central - Central Park - Spotsylvania Towne Centre
F2	Fredericksburg	FRED Central - Cowan Blvd.- Jeff Davis Hwy. - Lee's Hill Center
F3	Fredericksburg	FRED Central - Lafayette Blvd. - Lee's Hill Center
F4	Fredericksburg	FRED Central - River Club - Central Park
F5	Fredericksburg	Downtown Loop
S1	Spotsylvania County	Lee's Hill Center - Spotsylvania Towne Center
S5	Spotsylvania County	Spotsylvania Ave. - Germanna College
S4	Spotsylvania County	Lee's Hill Center - Spotsylvania Courthouse
VF1	Fredericksburg VRE Shuttle	Idlewild - Cowan Blvd - Fredericksburg Train Station
VS1	Spotsylvania County VRE Shuttle	Gordon Road Commuter Lot- Fredericksburg Train Station

Figure 1-3: FRED Routes in the Fredericksburg Service Area

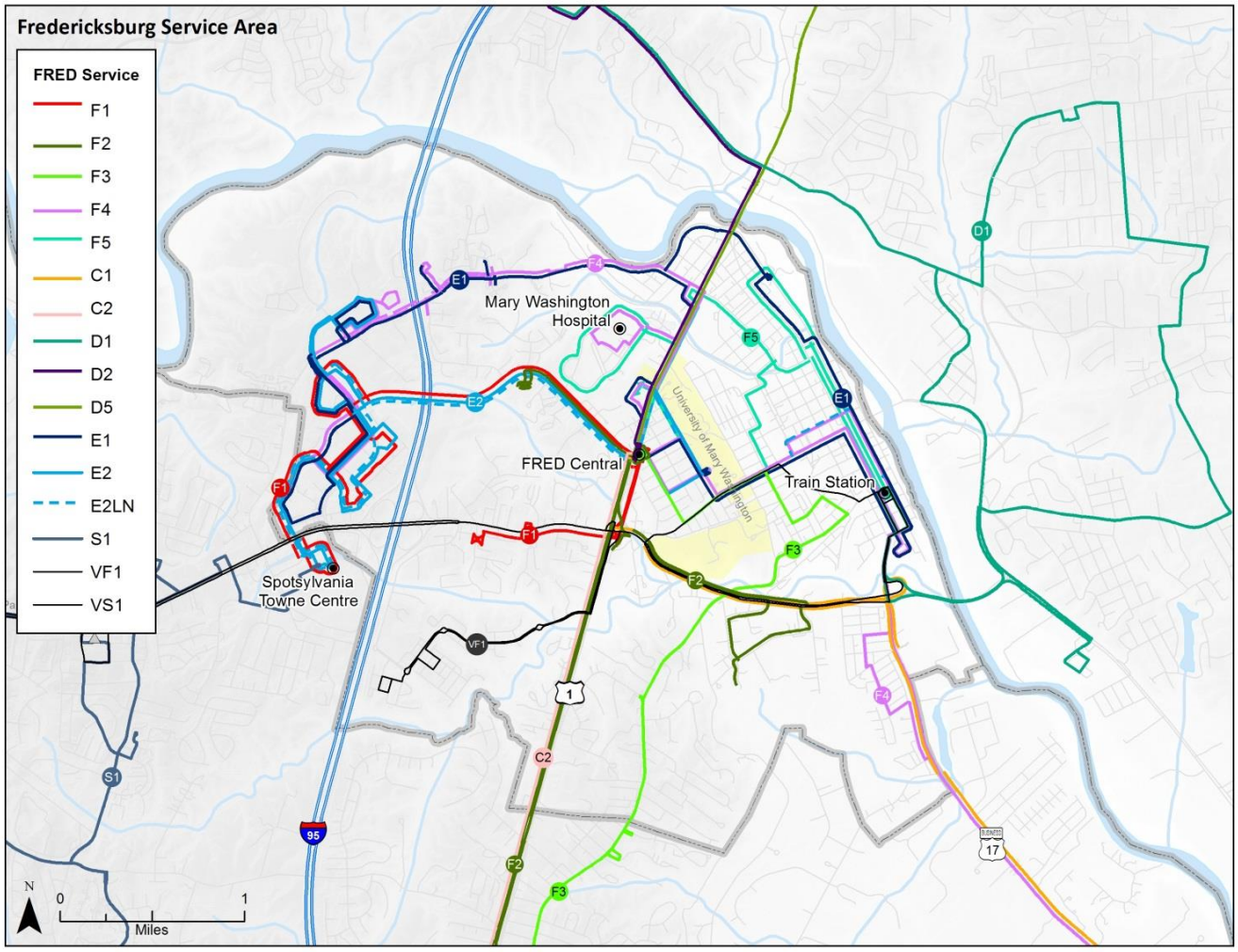


Figure 1-4: FRED Routes in the Spotsylvania County Service Area

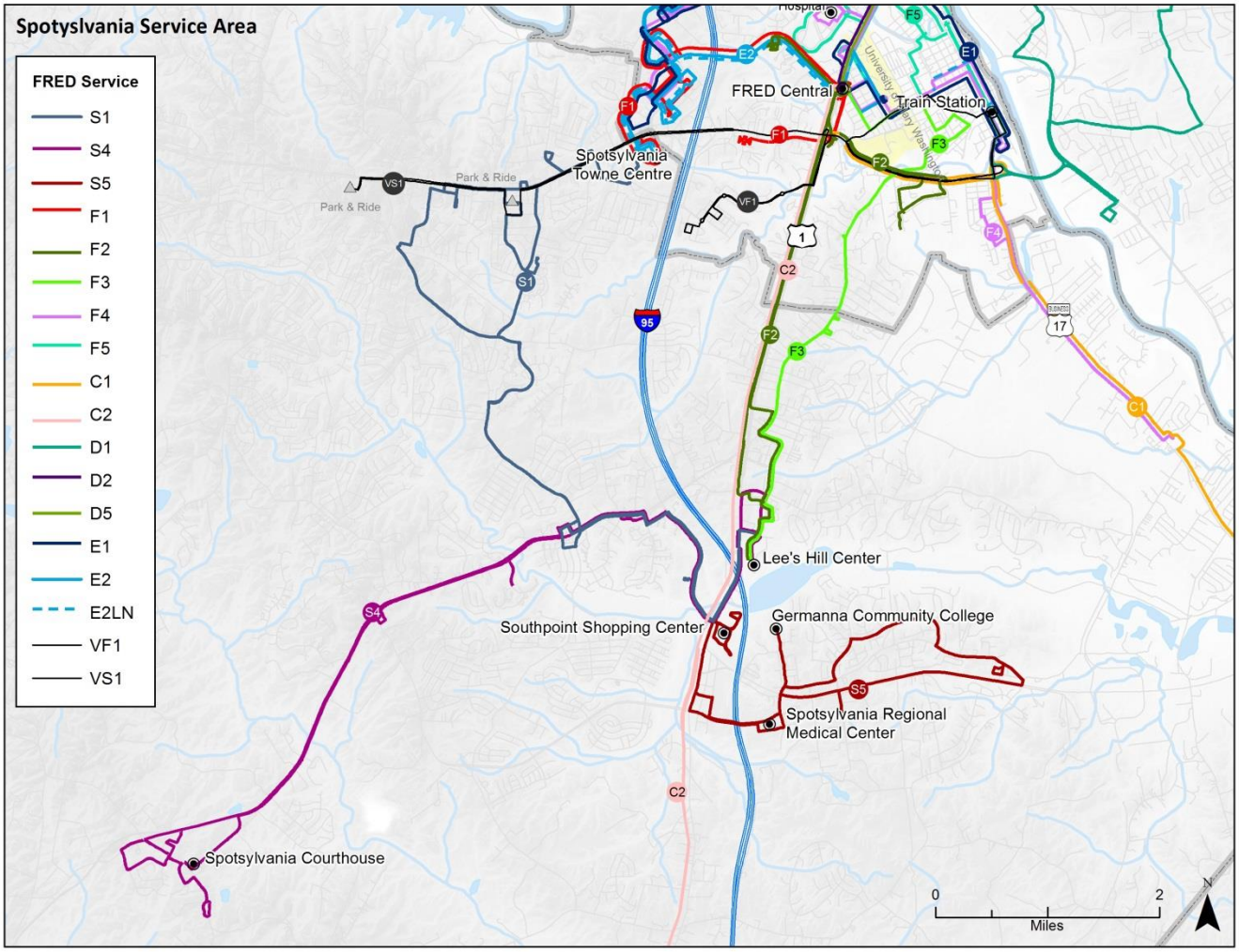


Figure 1-5: FRED Routes in the Stafford County Service Area

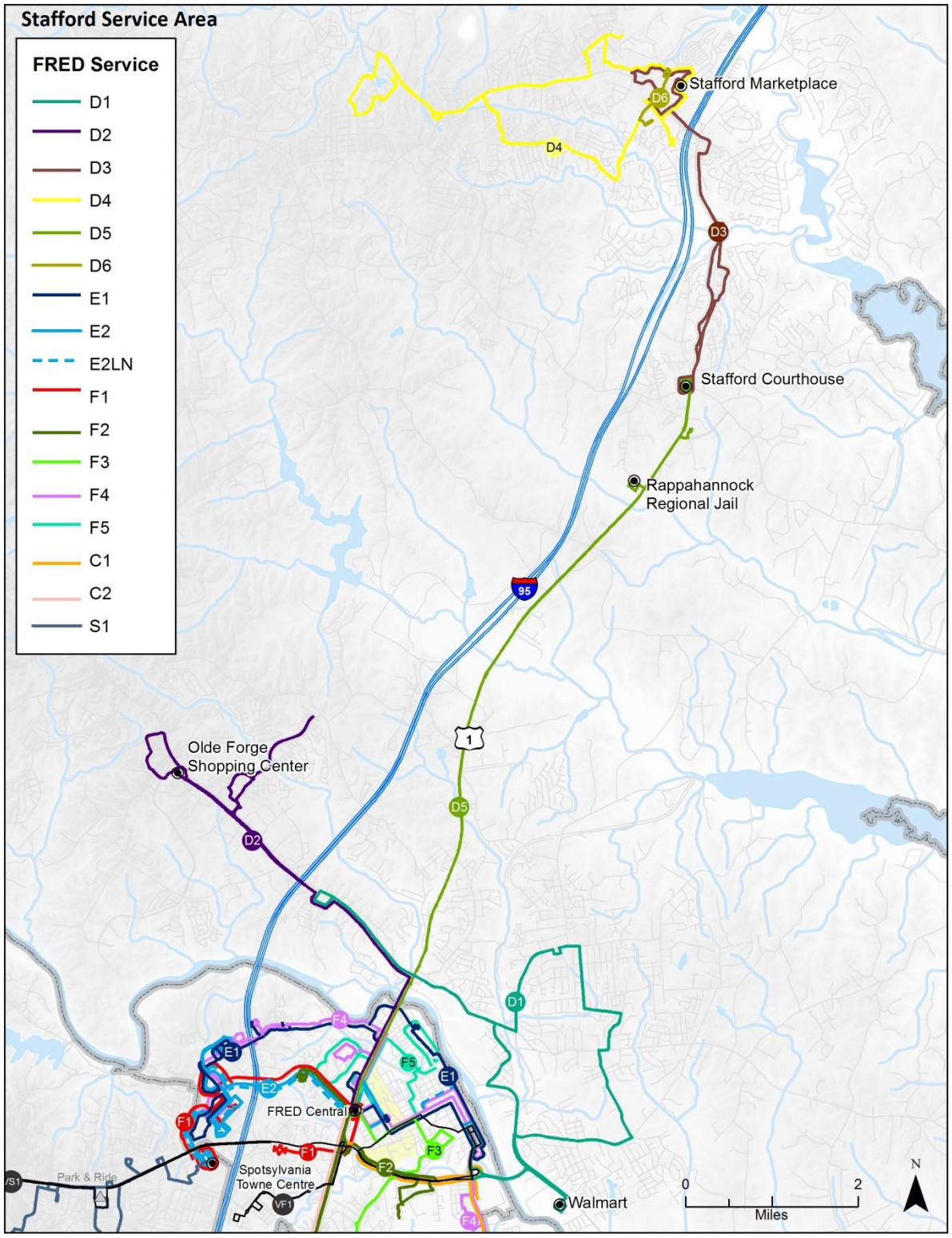
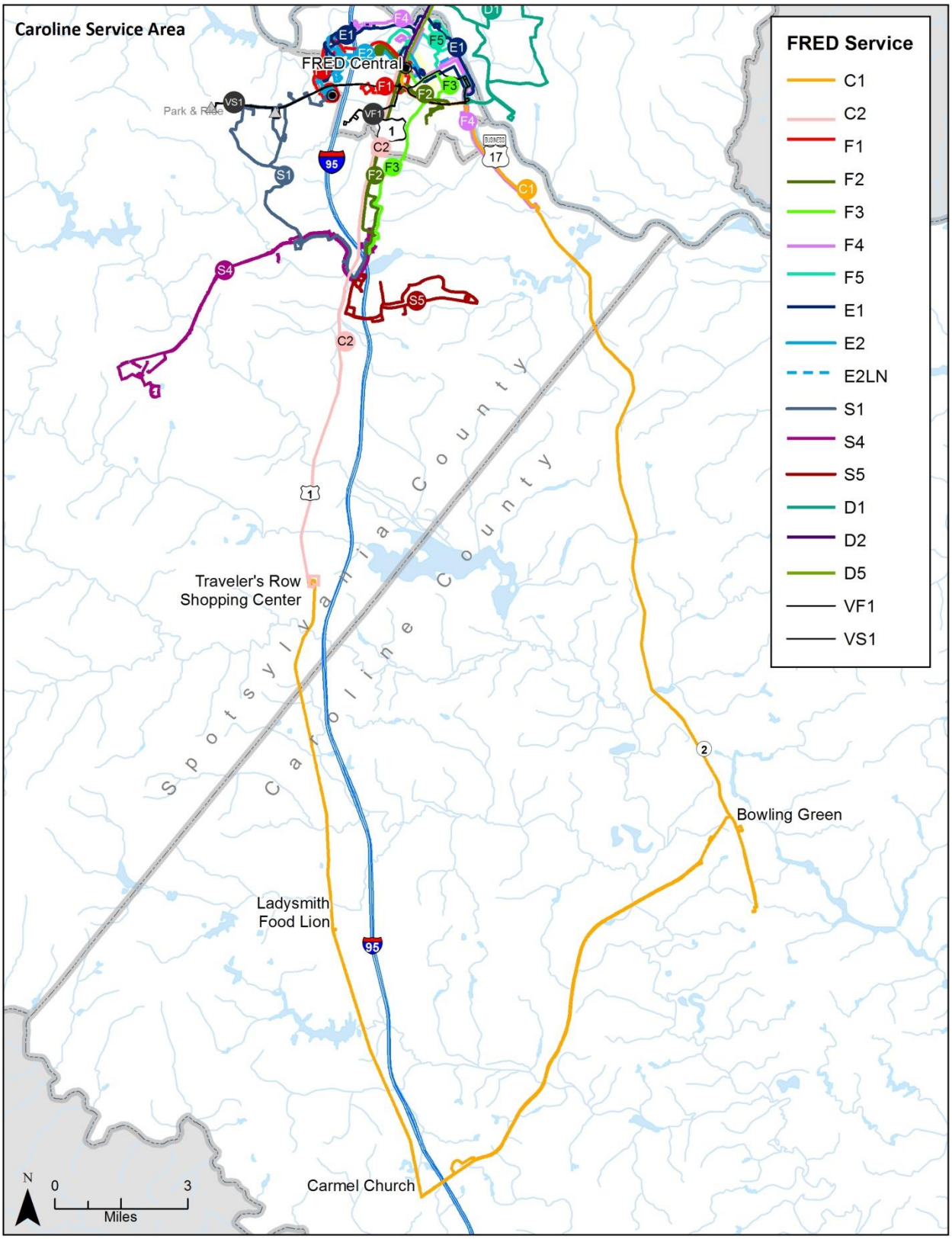


Figure 1-6: FRED Routes in the Caroline County Service Area



Accessibility For People With Disabilities

FRED's route deviation service is designed to allow for vehicles to travel off of regular service fixed routes (up to ¾ mile, no more than three minutes, and safe to traverse) to pick up or discharge a passenger who may find it difficult to access designated bus stops. Passengers who need to use this service are instructed to register with FRED by completing a deviated stop request form. Once approved, riders who need an off-route pick-up or drop-off are instructed to call FRED 24 hours in advance. There is no requirement for users of FRED's route deviation service to provide any evidence of a disability or limited mobility. Each of FRED's revenue vehicles is equipped with wheelchair lifts to accommodate people with disabilities.

Fare Structure

FRED's fare structure is detailed in Table 1-3. FRED accepts exact fare in cash only or in the form of FRED-issued tickets and pre-paid passes. The adult fare for a one-way trip is $1.00 for regular FRED routes and $1.50 for VRE feeder routes. Children under the age of three ride free. FRED has agreements with Medicorp Health System, the University of Mary Washington, the Star Radio Group, the Free Lance-Star, and Germanna Community College to allow all associated employees, faculty, staff, and students to ride free with a valid ID. FRED also offers a half-fare rate of $0.50 to those ages 65 and over, Medicare recipients, and persons with disabilities. The half-fare is offered during all hours of operation.

Table 1-3: FRED's Fare Structure

Rider	One-Way Trip	Monthly Pass	Yearly Pass
Adults - Regular Service	$1.00	$40.00	$225.00
Adults - VRE Feeder Service	$1.50	$50.00[1]	
Children under 3 years	Free		
Medicorp Health System	Free (Must Show ID)		
University of Mary Washington	Free (Must Show ID)		
Star Radio Group	Free (Must Show ID)		
The Free Lance-Star	Free (Must Show ID)		
Germanna Community College	Free (Must Show ID)		
Half-fare Program Fare[2,3]	$0.50		

(1) VRE Feeder Service Monthly Pass entitles the pass holder to all FRED services at no additional charge.
(2) Half-fare rates are only available to those ages 65 and over, all current Medicare recipients, and persons with disabilities.
(3) No Free Transfers; each boarding costs $0.50 to $1.50.

FLEET

FRED' s vehicle fleet consists of 33 vehicles including one maintenance vehicle, three carpool vehicles, and 29 revenue service vehicles. FRED's revenue service fleet consists of 5 GMC 4500s, 11 Ford F-650s, and 13 Freightliner P/S2Cs; all shown below. Table 1-4 provides a summary of FRED's vehicle fleet.

GMC 4500

Ford F-650

Freightliner P/S2C

Table 1-4: FRED's Vehicle Fleet

Vehicle No.	Service Type	Make and Model	Year	Passenger Capacity	Vehicle Mileage (June 2016)
700	Pool Vehicle	Ford Expedition	2002	8	112,717
701	Service Vehicle	Ford F-250	2008	3	98,325
702	Pool Vehicle	Ford Escape	2009	5	31,844
705	Pool Vehicle	Ford Focus	2010	5	59,388
706	Regular Service	Ford Focus	2010	5	38,201
740	Regular Service	GMC 4500	2007	14	365,132
741	Regular Service	GMC 4500	2007	20	223,766
742	Regular Service	GMC 4500	2007	20	254,351
748	Regular Service	GMC 4500	2008	20	282,300
749	Regular Service	GMC 4500	2008	20	276,399
750	Regular Service	Ford F-650	2010	26	142,242
751	Regular Service	Ford F-650	2010	26	143,708
752	Regular Service	Ford F-650	2010	20	226,040
753	Regular Service	Ford F-650	2010	20	218,724
754[1]	Regular Service	Ford F-650	2010	20	200,500
755	Regular Service	Ford F-650	2010	20	231,484
756	Regular Service	Ford F-650	2010	20	238,496
757	Regular Service	Ford F-650	2010	20	204,952
758	Regular Service	Ford F-650	2011	20	159,631
759	Regular Service	Ford F-650	2011	20	158,451
760	Regular Service	Ford F-650	2011	26	122,231
761	Regular Service	Ford F-650	2011	26	107,782
762	Regular Service	Freightliner P/S2C	2013	20	114,814
763	Regular Service	Freightliner P/S2C	2013	20	119,431
764	Regular Service	Freightliner P/S2C	2013	20	130,451
765	Regular Service	Freightliner P/S2C	2013	20	126,471
766	Regular Service	Freightliner P/S2C	2013	20	126,209
767	Regular Service	Freightliner P/S2C	2013	20	130,039
768	Regular Service	Freightliner P/S2C	2013	20	126,145
769	Regular Service	Freightliner P/S2C	2013	20	114,077
770	Regular Service	Freightliner P/S2C	2013	20	131,152
771	Regular Service	Freightliner P/S2C	2013	20	122,477
772	Regular Service	Freightliner P/S2C	2013	20	115,791
773	Regular Service	Freightliner P/S2C	2014	20	87,730
774	Regular Service	Freightliner P/S2C	2014	20	77,355

[1] Removed from service due to vehicle fire.

EXISTING FACILITIES

FRED Central

The Lawrence A. Davies Transit Center, commonly known as "FRED Central" is located at 1400 Jefferson Davis Highway in Fredericksburg. The facility is owned by the City of Fredericksburg and houses FRED's administrative offices and main transfer facility. The transfer facility includes eight bus bays, outdoor sheltered seating, an indoor waiting area, restrooms, vending machines, and a ticket and information office. While FRED Central does have limited parking on site, the city has an agreement with an adjacent church for additional parking. Greyhound Lines, Inc. contracts with FRED to operate a ticket and package office in FRED Central.

FRED Central (Street View)

FRED Central (Rear View)

Bowman Center Complex

The Bowman Center Complex is FRED's vehicle maintenance and administration /training facility. The complex is located at 11710 / 11716 Main Street in an industrial complex in Spotsylvania County, just outside the Fredericksburg city limits. The facility consists of an administrative building, a maintenance building, and covered parking for 25 transit vehicles. This is a relatively new facility for FRED, with construction completed in 2015.

Bowman Center Administrative Building

Bowman Center Vehicle Maintenance Building

Bowman Center Covered Parking

Bowman Center Vehicle Maintenance Building Interior

Other Passenger Facilities

FRED has a number of bus stop passenger amenities throughout the service area that include benches, shelters, and solar lights. An inventory of passenger amenities is provided in Table 1-5.

Table 1-5: FRED Passenger Amenities

Stop No.	Amenity	Route(s) Served	Location
6	Bench	F5,F4,D1	Caroline Street Train Station
15	Bench	F1	Altoona Drive near Burlington Coat Factory
14	Bench	F4	Crestview Apartments on Fall Hill Avenue
12	Shelter	F3	RACSB @ Jackson Street -- OB
18	Shelter	F2	Thurman Brisben Center / RGI Laundry
46	Shelter	C1	Town Center Bowling Green Municipal Parking Lot
47	Shelter	C1	Rte. 301 south of Bowling Green @ VA Dept. of Social
48	Shelter	D4	Garrisonville Rd & Garrison Woods Drive across from car
53	Shelter	D5	Route 1 and Manning St
27	Solar Lights	C1	Fredericksburg Turnpike/Farmer Road @ VDOT
27	Solar Lights	C1	Omaha @ Westmont Drive
28	Solar Lights	C1	Rt. 1 @ Turn Lane for Ladysmith Commons Blvd
28	Solar Lights	C1	Rt. 1 South @ Clara Smith Street
28	Solar Lights	C1	Rogers Clark Blvd. @ Caroline County High School
28	Solar Lights	C1	Rogers Clark Blvd.@ Econo Lodge
29	Solar Lights	C1	Rte. 1 @ County Fair Lane (Va Sports Complex)
47	Solar Lights	C1	Rte. 207 Business Bowling Green across from Food Lion
48	Solar Lights	C1	Rte. 2 Corbin's Store
42	Solar Lights	D1	Sherwood/Edwards
43	Solar Lights	D1	Culpeper & Greenwood -- IB
45	Solar Lights	D2	Plantation Drive @ Lancelot -- OB
45	Solar Lights	D2	Lichfield/McKendree
46	Solar Lights	D2	Plantation Lane / Goshen Drive
46	Solar Lights	D2	Plantation Drive & Lyons Blvd @ Temple
53	Solar Lights	D3	Rte. 1 & Twin Brook Lane
53	Solar Lights	D3	Rte. 1 & Canterbury Village
41	Solar Lights	D4	Garrisonville Road @ DMV
41	Solar Lights	D4	Vista Woods Road/Steven Road
24	Solar Lights	S1	Harrison Road @ Meadow's MHP
24	Solar Lights	S1	Harrison Road @ Meadow's MHP
24	Solar Lights	S1	Harrison Road / Battlefield Green Drive
24	Solar Lights	S1	Salem Station Blvd. @ Kings Crest
25	Solar Lights	S1	Leavells Road / Oak Grove Drive
25	Solar Lights	S1	Leavells Road & Massaponax Road
30	Solar Lights	S4	Blue Bird Drive & Wild Turkey Drive (Git-N-Go)
60	Solar Lights	S4	Poole Drive & Crestar Drive
31	Solar Lights	S5	Lees Hill School Drive & Plaza View Way
32	Solar Lights	S5	Monticello Drive & Ferndale Court
32	Solar Lights	S5	Monticello Drive & Lees Hill School Road

TRANSIT SECURITY PROGRAM

FRED's transit security program is comprised of two major components – security-focused staff members and security infrastructure. FRED employs three part-time security officers stationed in shifts at FRED Central. These officers patrol the property and escort drivers to the money room when fareboxes are pulled. The officers make bank deposits for FRED. Security staff provides an additional safety measure for patrons and staff, given FRED Central's location along busy Route 1 corridor, coupled with its service as an intercity bus station. Both FRED Central and the maintenance facility include fire and intrusion alarm systems and electronic key card building access control systems. The maintenance facility also includes a perimeter fence for limiting access to the site and security cameras.

FRED's vehicles and facilities are equipped with surveillance cameras and vehicles and dispatch center are outfitted with "panic" buttons that contact the police if there is an emergency that requires immediate assistance.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PROGRAM

ITS programs in public transportation encompass a broad range of communication-based information and electronics technologies that serve to improve safety, efficiency and service, through use of real-time information.

FRED recently implemented real-time vehicle information for drivers and dispatch using a product developed by RouteMatch, Inc. The system includes GPS equipment on each vehicle, as well as computer tablets that record boardings, stops, times, and odometer information. Drivers are using tablets to record passengers by fare type at each stop, which provides a significant level of valuable information to FRED. Real-time information for customers (Route Shout) is due to be implemented in the near-term.

DATA COLLECTION AND RIDERSHIP AND REVENUE REPORTING METHODOLOGY

FRED currently uses a blend of paper and electronic methods to capture and report statistical and fare information. Drivers are provided a paper mileage and sales report that they use to record the following information:

- Number of fare cards sold by category
- Fueling information
- Driver and bus number
- Tablet times at run start, first stop, last stop, and run end
- Odometer readings at run start, first stop, last stop, and run end
- Vehicle change information

Each driver uses a tablet to record ridership by stop by fare type. Tablets record other pertinent statistical information such as mileage and time. There is some minor redundancy between systems that is captured in order to validate the data collected via the tablets and GPS. There is some data that is only recorded via paper, such as pass sales.

Information entered by drivers via the tablets and reviewed for accuracy by a supervisor on a daily basis. The supervisor corrects any data discrepancies and/or enters pertinent information that is recorded by drivers on the daily mileage and sales report if for any reason the software fails to capture the data. Revenue tabulations are cross- checked with actual farebox revenue turned in by drivers.

Once supervisors have checked the electronic data and entered the paper-based data, ridership and revenue reporting is completed using statistical reports available through the RouteMatch system.

PUBLIC OUTREACH

As a city department, decision-making regarding FRED's budget and services are made through a public process. FRED is also advised by PTAB.

FRED advertises to the public via a number of venues, including:

- FRED website
- City website
- Newspapers
- Radio
- Notices on the transit vehicles
- Postings in FRED Central and
- Inclusion in Fredericksburg Area Metropolitan Plan Organization's (FAMPO) public participation plan.

OTHER AREA PUBLIC TRANSPORTATION PROVIDERS/SERVICES

Virginia Railway Express (VRE)

VRE is a commuter rail service that provides transportation from the Fredericksburg and Manassas areas into the Washington, D.C. Metro Area. As seen in Figure 1-7, VRE's Fredericksburg Line provides service to multiple destinations while en route to Washington's Union Station. FRED provides bus service to meet most VRE trains that arrive and depart the downtown Fredericksburg Station on Caroline Street. VRE runs eight trains from Fredericksburg to Union Station; leaving Fredericksburg from 5:05 a.m. to 7:36 a.m.

Outbound service from Washington, D.C. consists of one early afternoon arrival at 2:31 p.m. and seven evening arrivals from 4:46 p.m. to 8:24 p.m.

The fares are zone-based, with Fredericksburg and Spotsylvania stations located in Zone 9, and Stafford stations located in Zone 8. The fares for these zones to Union Station, Washington, D.C., are listed in Table 1-6.

Figure 1-7: VRE System Map

Table 1-6: VRE Fares from Zone 8 & 9 to Union Station

Type of Fare	Zone 8 Stafford	Zone 9 Fredericksburg & Spotsylvania
Single Ride	$10.85	$11.5
Day Pass	$21.70	$23.1
Five-Day	$86.20	$91.8
Ten-Ride	$99.30	$105.60
Monthly	$298.90	$318.10

Source: VRE website, January, 2017.

Amtrak

Amtrak service is provided at the downtown Fredericksburg Train Station. The Fredericksburg Station is served by Amtrak's Carolinian/Piedmont, Northeast Regional, and Silver Service/Palmetto lines. Major destinations along these lines include Boston, Charlotte, Raleigh, Richmond, Miami, New York City, Norfolk, Orlando, Savannah, Tampa, and Washington, D.C.

The weekday schedule is as follows: Southbound trains leave Fredericksburg at 8:36 a.m., 11:56 a.m., 3:40 p.m., 5:12 p.m., 7:01 p.m., 8:17 p.m., and 8:33 p.m. Northbound trains leave Fredericksburg at 6:56 p.m., 8:00 a.m., 9:19 p.m., 12:08 p.m., 3:06 p.m., and 7:57 p.m.

On Saturday and Sunday, the schedule is as follows: Southbound trains leave Fredericksburg at 8:05 a.m., 11:56 a.m., 4:01 p.m., 6:08 p.m., 8:10 p.m. (8:12 p.m. on Sundays), and 8:33 p.m. There is an additional train on Sunday at 5:10 p.m. Northbound trains leave Fredericksburg at 7:33 a.m., 8:32 a.m. (except Sunday), 9:25 a.m., 11:17 a.m., 3:06 p.m., and 7:57 p.m.

Greyhound

Greyhound provides intercity bus service in Fredericksburg with a stop at FRED Central. The Fredericksburg stop is along two of Greyhound's routes including the Philadelphia-Baltimore- Washington-Richmond Route and the Washington-Charlottesville Route.

The current daily schedule for southbound service is: 7:40 a.m., 2:15 p.m., and 9:25 p.m. The current daily schedule for northbound service is: 9:10 a.m., 10:30 a.m., 1:00 p.m., 6:40 p.m., and 9:15 p.m.

Martz Group

Martz Group offers commuter coach service from Fredericksburg and Stafford to Crystal City, Pentagon, and Washington, D.C. Martz provides seven inbound morning runs and seven outbound afternoon runs. Multi-trip tickets, daily, and monthly passes are available.

The Martz commuter buses stop at the following locations in the service area:

- Route 17 and Falls Run Drive commuter lot, located at 633 Warrenton Road
- Route 3/Salem Church Road commuter lot, located at 4250 Plank Road
- Route 208 Park and Ride, located at 10800 Hood Drive
- Route 610 North Lot – North Commuter lot, located on Staffordboro Boulevard in Stafford.

The Martz Bus fares are provided in Table 1-7.

Table 1-7: Martz Commuter Bus Fares

Type of Fare	Cost
1 day or 1 way	$ 50.00
20- punch	$ 225.00
32- punch	$ 250.00
One-month	$ 300.00

Source: Martzgroup.va.com/commuter-fares, January 2017.

GW Ride Connect

GW Ride Connect, sponsored by the George Washington Regional Commission, maintains a database of hundreds of carpools primarily in and out of the Washington, D.C. area and to other regional destinations. The service is free to commuters and only requires an online application form.

Chapter 2
Goals, Objectives, and Standards

FREDERICKSBURG REGIONAL TRANSIT MISSION

The mission statement for FRED is:

"It is the purpose of FREDericksburg Regional Transit (FRED) to provide accessible, affordable, dependable, efficient, environmentally sound, and safe and secure transportation for people who reside or work or visit within the Fredericksburg, Virginia region (i.e., the City of Fredericksburg and the counties of Caroline, Spotsylvania and Stafford)."

FRED management and staff are proactive in keeping FRED's mission up to date, as well as actively re-visiting transit program goals and objectives twice each year.

FRED PROCESS FOR DEVELOPING GOALS AND OBJECTIVES

FRED management works together with the Public Transit Advisory Board (PTAB) to develop specific goals and transit year activities (objectives), for the program annually. The prior year's goals and objectives are reviewed, typically at the July PTAB meeting, including a status report for each one. Once this review is complete, the goals and objectives are updated to reflect the projects that have been completed and the priorities for the coming year. In addition to the annual review, FRED management conducts a mid-year review of the goals and objectives with PTAB. The mid-year review typically occurs at the February PTAB meeting.

The goals and supporting objectives for "Transit Year 2017" (fiscal year 2017- FY2017) are outlined below.

TRANSIT PROGRAM GOALS AND OBJECTIVES

GOAL A Provide a widely accessible public transit service to the region.

Transit Year Activities for Goal A

A.1 Investigate ways to make public transit more competitive with private means of transportation in terms of trip times, convenience (in the context of specific time-of-day and day-of-week trips), safety, and cost to the individual user, and comfort.

A.2 Investigate the needs of those who are underserved by the existing transit system.

A.3 Investigate the needs of those in the region that are transit-dependent.

A.4 Work with local county governments to define needs and apply for funding for existing and additional service.

A.5 Publicize service to attract "choice riders" (those who have other transportation options) to the FRED system.

A.6 Educational outreach to partners, residents and business leaders on the benefits and value of FRED.

A.7 Continue to provide access to social service, recreational, employment and tourist areas.

A.8 Educate employees of Partners on how to use the FRED system.

A.9 Continue "Smart Benefits Program" (a program developed to cover the cost of mass transit for some government employees) to our VRE feeder service patrons.

A.10 Install FRED stops at all appropriate locations.

A.11 Review requests for the use of training space at the Bowman Center location.

A.12 Monitor new growth and development within FRED service area that may have impact on FRED operations.

A.13 Utilize social and digital media solutions to increase access to FRED Transit information.

A.14 Respond to local government requests to review proffers, rezoning and site development plans.

A.15 Maintain FRED ridership at TY2016 levels as a benchmark in each jurisdiction.

A.16 Implement new technologies and systems that permit FRED to take maximum advantage of its newly acquired GPS, GIS and related capabilities by the end of TY2017.

A.17 Conduct, at minimum, seven "Ride FRED" seminars to educate the public on how to use the system with the help of Rappahannock Area Agency on Aging (RAAA).

A.18 RAAA trainer to conduct 75 individual training sessions on how to ride FRED.

A.19 Conduct at least three "Ride FRED" seminars to educate employees of Partners on how to use the system.

GOAL B Provide an affordable public transit service to the region through funding by grants and contributions from local, state and federal funding entities and public/private partnerships.

Transit Year Activities for Goal B

B.1 Continue to access all funding opportunities to assist jurisdictions in the Fredericksburg region.

B.2 Maintain current private Partnership funding levels.

B.3 Actively seek new private Partners through the Public Transit Advisory Board's (PTAB) Partnership/Marketing Committee and jurisdictional planners.

B.4 Conduct annual review of fares and schedules.

B.5 Collect information related to the half-fare program (i.e. number of users, money collected, and impact on revenues).

B.6 Attend Transit Award Management System (TrAMS) training sessions when made available by Federal Transit Administration (FTA).

B.7 Monitor staff time and number of staff ID and half-fare program badges created.

B.8 Request federal and state funding in a timely manner.

B.9 Increase, in collaboration with PTAB's Partnership/Marketing Committee and jurisdictional planners, total Partnership/Marketing funding for FRED by $5,000 in cash or in kind by meeting with a minimum of one business.

B.10 Market and track the number of "in-bus" advertising inquiries with a goal of raising $1,500.

B.11 Explore the feasibility of creating Virginia Railway Express (VRE) shuttle service from Caroline County to the new VRE train station in Spotsylvania during TY2017.

B.12 Explore the feasibility of creating a Fredericksburg downtown shuttle on a seasonal basis in TY2017.

GOAL C Provide dependable transit service within the region.

Transit Year Activities for Goal C

C.1 Continue training drivers on the policies and procedures they are required to follow.

C.2 Maintain on-time performance of FRED service within the Fredericksburg region.

C.3 Continue the process of review and improvement of service.

C.4 Collect information provided by the real-time information system to include on-time performance, ridership, route efficiency, and possible schedule adjustments.

C.5 Plan for service adjustments by October 2016 for implementation in following fiscal year.

C.6 Implement plan to improve FRED's preventive maintenance program by better monitoring vendors and having most preventive maintenance performed internally by the end of TY2017.

C.7 Replace eight buses in existing fleet with more efficient and heavier duty buses.

C.8 Replace two employee transfer vehicles and purchase one additional maintenance service vehicle.

C.9 Conduct at least 50 spot checks of drivers per quarter to ensure that drivers are fulfilling their responsibilities (using on-board video for 40 spot checks and on-bus or drive behind method for the remaining 10 spot checks).

GOAL D Increase the efficiency of the movement of people.

Transit Year Activities for Goal D

D.1 Continue to provide FRED service to major employment, healthcare, tourism and social service centers within the Fredericksburg region.

D.2 Promote FRED as a way to alleviate congestion within the Fredericksburg region.

D.3 Continue analysis of performance measures using FRED's new real-time information system for existing routes in entire system in terms of:

Effectiveness, such as number of trips and trips per vehicle hour,

Efficiency, such as cost per trip and cost per vehicle hour.

Quality, such as transit times, safety, and reliability.

D.4 Explore the feasibility of acquiring electronic fare boxes for the fleet.

D.5 Provide regional Partners with transit services to encourage and promote economic development opportunities within their respective jurisdictions.

D.6 Conduct at least six outreach sessions for local businesses, civic groups, schools and other constituencies to inform them on how to use FRED for their benefit and the benefit of their employees, customers and clients.

D.7 Conduct at least three outreach sessions to special needs high school students.

D.8 Add one full-time Assistant Operations Manager, one part-time mechanic helper and one part-time fleet administrative assistant to FRED staff.

D.9 Prioritize list of future technology expansions.

GOAL E Promote safety and security in maintaining and operating the FRED system to include personnel, ridership and facilities within the Fredericksburg region.

Transit Year Activities for Goal E

E.1 Continue to meet Americans with Disabilities Act requirements ensuring that drivers are properly trained to meet requirements of transporting persons with disabilities.

E.2 Continue the comprehensive safety and security training program for FRED employees.

E.3 Continue the wheelchair securement training program for all FRED drivers.

E.4 Continue the CPR, AED, First Aid, and Blood Borne Pathogen training program for all FRED employees.

E.5 Monitor and review daily reports related to suspicious activity and incident reports, counterterrorism, security awareness, and cyber security.

E.6 Explore the impact of redistributing staff among FRED facilities.

E.7 Explore the impact of establishing a leadership team(s) to assist Senior Management with strategic and operational needs.

E.8 Explore feasibility of installing shelters, benches and trash receptacles at appropriate locations in the region.

E.9 Security officers will apply to become "Conservators of the Peace" and receive additional equipment during TY2017.

E.10 Create and utilize a leadership team(s) to assist Senior Management with strategic and operational needs.

E.11 Construct a 5-bus transfer center adjacent to the new Rappahannock Goodwill Industry located in Spotsylvania during TY2017.

E.12 Reduce the number of preventable vehicle accidents by at least five percent.

E.13 Hold a minimum of two safety awareness meetings to be attended by all drivers.

E.14 Develop a FRED Roadeo Team.

E.15 Purchase and install gate for rear access at FRED Central.

GOAL F Comply with city, state and federal policies and regulations.

Transit Year Activities for Goal F

F.1 Continue attending state and federal training seminars to keep abreast of current regulations.

F.2 Continue to foster positive working relationships with state and federal grant managers.

F.3 Prepare for the City of Fredericksburg audit.

F.4 Prepare for Drug and Alcohol Testing Program audit.

F.5 Prepare for upcoming FTA Triennial Review expected to take place in Spring/Summer of 2017.

F.6 Complete reports required by the state and federal agencies to include:

a. TrAMS milestones and financial status reports
b. FTA annual National Transit Data report

c. Virginia Department of Rail and Public Transportation (DRPT) annual performance data report

F.7 Complete all grant applications by February 1, 2017.

F.8 Apply for grant funding for two replacement buses.

PERFORMANCE, SAFETY, AND SERVICE STANDARDS

Performance, safety, and service standards are benchmarks by which a system, as well as individual routes and services, can be evaluated. These standards are typically developed in several categories, such as performance (productivity, fiscal condition); safety; and service (service coverage, passenger convenience, and passenger comfort). The most effective standards are straightforward and relatively easy to calculate and understand.

Transit systems use these standards to help identify where to focus their efforts when desiring to improve the safety, reliability, productivity, effectiveness, and efficiency.

Service standards are also used as a measure of compliance with Title VI of the Civil Rights Act of 1964, to ensure that services are provided equitably to all persons in the service area, regardless of race, color, or national origin.

Within the goals and objectives set forth by FRED for Transit Year 2017, there are several references to performance, safety, and service standards, including the following:

Objective A.15 Maintain FRED ridership at FY2016 levels as a benchmark in each jurisdiction.

Objective C.2 Maintain on-time performance of FRED service within the Fredericksburg region.

Objective D.3 Continue analysis of performance measures using FRED's new real-time information system for existing routes in entire system in terms of:

Effectiveness – total number of passenger trips and passenger trips per revenue hour;

Efficiency – cost per trip and cost per revenue vehicle hour; and

Quality – travel time, safety, and reliability.

These objectives are reflected in the performance standards outlined below.

Performance Standards

The following performance standards reflect measures of productivity (i.e., how much service is being consumed for each unit of service provided); and cost effectiveness (i.e. how much does each unit of service cost). These standards provide a gauge by which each route and service can be evaluated.

Productivity Standards

The first set of service standards presents the overall system wide productivity in terms of passenger trips per revenue hour and passenger trips per revenue mile, for both the current services and from the 2010 TDP. Both of these measures are used widely throughout the transit industry.

Table 2-1: System wide Productivity Measures – 2010 TDP, FY2015 and FY2016

Systemwide	2010 TDP	FY2015	FY2016
Passengers /Revenue Hour	8.7	9.2	8.5
Passengers /Revenue Mile	0.6	0.6	0.53

As these data show, the FY2015 system wide productivity measure of trips per revenue hour was higher in 2015 than it was in 2010, showing that more service was being consumed per unit of service provided, when considering revenue hours as the unit of service. However, the FY2016 data showed a significant dip in productivity, largely due to the drop in ridership.

These baseline measures of overall system performance provide a snapshot of how the system is performing as a whole. The FY2016 measures will serve as a baseline for the FY2017-FY2022 TDP.

FRED currently also tracks overall performance statistics by urban and rural categories, to reflect the different values typically achieved in each of these categories. As discussed in Chapter 1, parts of the FRED service area are in the Fredericksburg UZA, parts are in the Washington, D.C.-Northern Virginia- Maryland UZA, and parts are rural. These performance data are shown in Table 2-2.

Using these measures, the urbanized area route standard for productivity would be 6.6 passenger trips per revenue hour and .61 passenger trips per revenue mile for UZA 8; and 9.9 passenger trips per revenue hour and .71 passenger trips per revenue mile for UZA 231. The rural standard would be 3.0 passenger trips per revenue hour and .09 passenger trips per revenue mile.

Table 2-2: FY2015 Productivity Data by Type of Service

By Service Center, 2015	FY2015 Trips/Revenue Hour	FY2015 Trips/Revenue Mile
UZA 8	6.62	0.61
UZA 231	9.91	0.71
Urban Subtotal	**9.51**	**0.70**
Caroline – Rural	3.03	0.09
Total	**9.20**	**0.60**

UZA 8 = northern Stafford County; Routes D3, D4, and D6
UZA 231 = southern Stafford County (Routes D1, D2, and D5); Spotsylvania County, Fredericksburg City; VRE; and UMW

Establishing performance standards defined by the nature of the service area recognizes that transit services in higher density areas are able to provide more trips per unit of service that those in lower density areas. These more specific measures can be used to help gauge the performance of the FRED routes based on where within the system they operate.

Cost Effectiveness Standards

The FY2015 cost effectiveness measures, in terms of cost per passenger trip, cost per revenue hour, and cost per revenue mile are presented in Table 2-4, in the urban and rural categories. The cost per trip measure is an important one to track, as it addresses both the cost to provide service and the amount of service that is consumed. The difference in the two cost per trip measures for FRED show how much more expensive it is (on a per passenger trip basis) to provide service for lower density areas.

The cost per hour and cost per mile represent how much it costs FRED per unit of service provided. These measures are also important, particularly since they can be controlled to a certain extent by FRED. These data show how similar the costs are for FRED to provide service for either a rural or urban area, on a per hour basis. As would be expected, with the longer distances between stops and the higher operating speeds, the cost per revenue mile for the rural area services are less than half of the cost per revenue mile for the urban areas.

The FY2016 overall cost per trip was $8.47, which is significantly higher than the overall FY2015 cost per trip. This measure was influenced by the drop in ridership more than by an increase in expenses, as the FY2016 ridership was 10% lower than the FY2015 ridership and the FY2016 operating expenses were 6% higher than the FY2015 operating expenses.

Table 2-4: FY2015 Cost Effectiveness Standards

By Type of Service, 2015	FY2015 Cost per Trip	FY2015 Cost per Revenue Hour	FY2015 Cost per Revenue Mile
Urban	$ 6.91	$ 65.68	$ 4.86
Caroline	$ 21.71	$ 65.79	$ 2.04
Overall	**$ 7.14**	**$ 65.69**	**$ 4.39**

On-Time Performance Standard

FRED's Title VI Plan includes an on-time performance objective of 90%, using the on-time definition of 0-10 minutes late. The actual on-time performance on the day of the boarding/alighting counts was significantly lower than this at 68%. Additional data collection will be needed to verify if the count day performance was an anomaly or is typical.

There are a number of issues that affect FRED's on-time performance, including: traffic congestion; lack of a tripper bus option for supplementing service; and the timed transfer model, where buses are held in order for riders to make transfers.

FRED management has indicated that they would like to establish a goal to improve on-time performance to 90%, based on an on-time definition of 0-5 minutes late. Steps they are considering to reach this goal include: adding a tripper bus (or buses); tightening the transfer policy; pursuing traffic control options (signal preemption); and increasing headways.

Safety Standard

FRED does not have a published safety standard, but does have a goal of reducing preventable accidents by 5% between FY2016 and FY2017. FRED exceeded this goal between FY2015 and FY2016, with 10 preventable accidents recorded in FY2015, and 6 recorded in FY2016.

FRED may want to use this accident reduction goal to develop a safety standard that includes a consideration of the level of service provided. Many transit agencies use the number of preventable accidents per 100,000 revenue miles of service as the basis for developing a safety standard. Using this metric, in FY2015 FRED experienced 1.29 preventable accidents for every 100,000 revenue miles. Assuming that a similar number of revenue miles were provided in FY2016 as in FY2015, FRED experienced 0.78 preventable accidents for every 100,000 revenue miles. FRED may want to choose a standard that is in between these two values, such as 1 preventable accident for every 100,000 revenue miles of service.

PROCESS FOR UPDATING GOALS, OBJECTIVES, AND STANDARDS

FRED already has a process in place to develop annual goals, including specific activities to help meet these goals. FRED also has a process in place to check the progress of goal attainment mid-year. This process is helpful in keeping FRED focused on the transit program's mission. It is anticipated that this process will continue through the six-year planning period. The performance standards discussed in the previous section should also be reviewed and adjusted as needed to reflect what is feasible for FRED to achieve, with consideration of the data collection requirements. Once refined, it is recommended that FRED use these standards to gauge route and service performance and adjust services as is warranted and feasible. It is 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 transit development plan (TDP) focuses on two primary analyses. The first focus is a description and analysis of the recent performance of Fredericksburg Regional Transit including analyses of trends, peers, recent ridership and a passenger survey. The second area of focus provides an analysis of transit needs including a demographic and land use analysis, stakeholder input, and review of relevant studies and plans.

This chapter has ten major components that are presented in the order shown below:

1. Trend and Performance Data and Characteristics
2. Boarding/Alighting Process and Data
3. Financial Analysis
4. Recent Compliance Results
5. Peer Review and Analysis
6. Onboard Rider Surveys
7. Stakeholder Opinions
8. Demographics and Land Use
9. Review of Previous Plans and Studies
10. Chapter Summary and Focus for Alternatives

TREND AND PERFORMANCE DATA AND CHARACTERISTICS

System Wide

Table 3-1 provides the operating statistics for FRED for fiscal years 2013 to 2016, as reported by FRED. Overall ridership has declined by 19.4% over the period. The operating cost per passenger trip has risen from $6.55 (FY2013) to $8.20 (FY2016). This equates to about 8.3% per year. An important goal for FRED during FY2017 should be to try to understand the causes for the dip in ridership. Some of the ridership decline is likely due to lower gas prices, but there may be other factors involved as well.

Table 3-1: System-Wide Performance and Trend Data

	FY2013	FY2014	FY2015	FY2016
Passenger Trips	530,690	495,501	477,169	427,487
Revenue Miles	773,237	765,936	775,529	800,043
Revenue Hours	52,053	51,554	51,843	52,112
Trips per Mile	0.69	0.65	0.62	0.53
Trips per Hour	10.20	9.61	9.20	8.20
MPH	14.85	14.86	14.96	15.35
Operating Costs	$3,477,708	$3,558,357	$3,405,584	$3,620,194
Cost per Trip	$6.55	$7.18	$7.14	$8.47
Cost per Revenue Hour	$66.81	$69.02	$65.69	$69.47
Cost per Revenue Mile	$4.50	$4.65	$4.39	$4.52

Route Level Operating Statistics

Table 3-2 provides the route level operating statistics for FY2015. These data show that the highest ridership among all routes is the F4, which also has the highest level of service with two vehicles assigned to the route. In FY2015, the route provided 67,040 annual passenger trips. When looking at passenger trips per revenue hour the most productive route in FY205 was the VS1, with 28.4 passenger trips per revenue hour. This is logical, given its targeted service to meet the trains and its low number of annual revenue service hours. Of the routes that provide service throughout the day, the F1 exhibited the highest productivity (16.3 trips per revenue hour), followed by the F3 at 14.9 trips per revenue hour.

Of the six "D" routes that serve primarily Stafford County, the D4 is the most productive with 11.25 trips per revenue hour and the D6 is least productive, providing 3.5 passenger trips per revenue hour. The three Spotsylvania routes that provide service throughout the day range in productivity from a high of 8.75 passenger trips per revenue hour (S5) to a low of 5.13 passenger trips per revenue hour (S4).

The C1 and C2 (Caroline County) exhibit significantly different productivities. The C1 produces fewer than half as many trips per hour as the C2, largely because the C1 provides three times as many revenue service hours and revenue service miles.

Table 3-2: FY2015 Route Level Operating Statistics

Route	One Way Passenger Trips	Revenue Service Miles	Revenue Service Hours	Trips per Mile	Trips per Hour	Average MPH
F1	45,955	33,132	2,761	1.39	16.64	12.00
F2	32,806	43,674	3,263	0.75	10.05	13.38
F3	48,699	45,180	3,263	1.08	14.92	13.85
F4	67,040	40,788	5,773	1.64	11.61	7.07
F5	33,200	30,120	3,012	1.10	11.02	10.00
VF1	10,324	13,720	1,082	0.75	9.54	12.68
D1	9,643	50,200	2,510	0.19	3.84	20.00
D2	27,079	48,192	3,012	0.56	8.99	16.00
D3	27,056	27,610	2,761	0.98	9.80	10.00
D4	21,654	26,104	1,924	0.83	11.25	13.56
D5	12,874	60,240	3,012	0.21	4.27	20.00
D6	3,967	9,789	1,130	0.41	3.51	8.67
S1	35,002	77,810	5,020	0.45	6.97	15.50
S4	15,437	48,192	3,012	0.32	5.13	16.00
S5	26,301	48,192	3,012	0.55	8.73	16.00
VS1	37,677	19,600	1,327	1.92	28.39	14.77
C1	6,477	95,430	3,012	0.07	2.15	31.68
C2	5,691	34,136	1,004	0.17	5.67	34.00
E1 & E2*	10,287	23,420	1,953	0.44	5.27	11.99
Total	**477,169**	**775,529**	**51,843**	**0.62**	**9.20**	**14.96**

*Miles and hours estimated for the E1 and the E2

FRED Transit Route Deviations

FRED offers route deviations of up to three quarters of a mile from existing routes. Service is available to all who face difficulty reaching FRED's bus stops; however, those individuals must apply to receive the service in advance so that FRED staff can survey the route deviation to ensure that it falls within the parameters and is safe to operation. The service will provide curb-to-curb service from origin to destination as long as the locations are within three quarters of a mile of an existing route.

Table 3-3 provides the top ten route deviation origins and destinations. The top deviation location is Goodwill near Lee's Hill Center. A number of routes provide service to Lee's Hill Center with a bus stop located near Goodwill. Due to gaps in the sidewalk network and other issues, those with mobility assistance devices must be picked up and dropped off at the facility entrance. With the planned completion of the Lee's Hill Center transfer facility, most of the Goodwill deviations will likely be unnecessary.

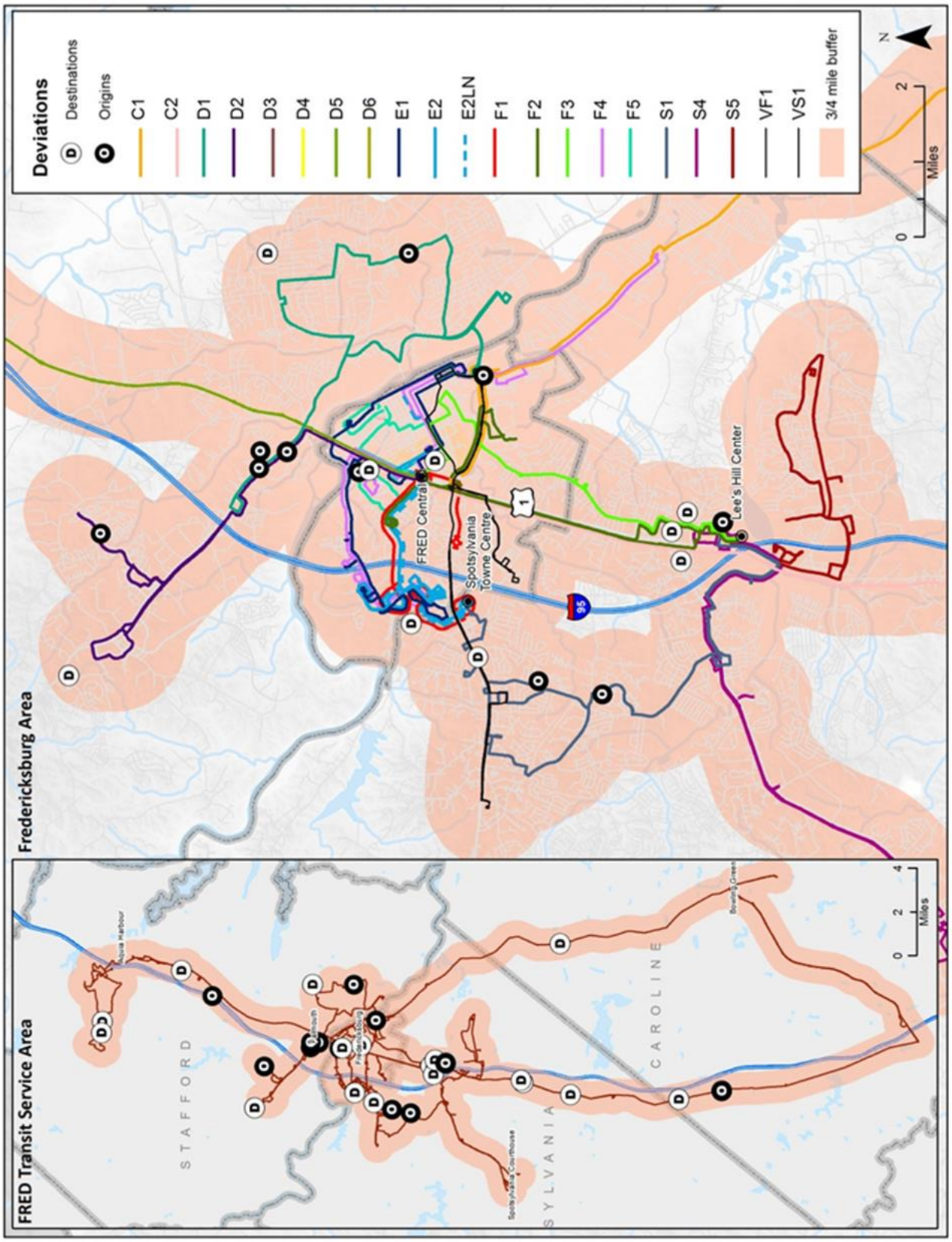
Table 3-3 Top 10 Route Deviation Locations for FY2015

Ranking	Location	Total Origins and Destinations
1	Goodwill, Lee's Hill	423
2	MWH Dialysis, Fredericksburg	139
3	602 Woodford Street, Fredericksburg	138
4	Fasmart, Massaponax Church Road, Thornburg	135
5	Meadows Apartments	111
6	10 Boston Court, Stafford	93
7	Sheetz, Massaponax Church Road, Thornburg	92
8	Cedon	69
9	Village Parkway Walmart, Route 17, Stafford	48
10	Town & Country, Stafford	43

Figure 3-1 provides a visual illustration of the route deviation origin and destination locations. As the map shows, these locations are dispersed throughout the community.

In FY2015, FRED Transit made 1,678 route deviations on 1,561 one-way passenger trips to a total of 30 unique origins and destinations. Of all deviated trips, 1,415 had an origin or destination at an official fixed route stop. The remaining 146 trips had both an origin and a destination at a deviated stop. There were 487 trips that originated at a deviated stop and 987 trips with a deviated stop as the destination.

Figure 3-1: FRED Transit Route Deviation Origins and Destinations, FY2015



BOARDING/ALIGHTING PROCESS AND DATA

In order to better understand ridership patterns for each route, as well as provide an opportunity to distribute and collect passenger surveys, KFH Group hired temporary workers to ride each run of each route for the entire service day and record boardings and alightings by stop. Time checks were also performed. The primary counts were conducted on Saturday, April 9; Sunday, April 10; and Monday, April 11, 2016. There were a few unreliable temporary workers who participated in the boarding/alighting count process, so data for a few of the runs were re-captured by KFH Group staff later in the same week of April.

This process produced a large volume of data with regard to ridership patterns for FRED routes. The study team considers these data to be a "snapshot" of FRED's ridership characteristics, rather than a true statistically valid sample, as they were collected on three of FRED's 250 service days. These data were used in conjunction with the annual route level data, rider opinion, and stakeholder input, as a way to identify issues that that were addressed within the TDP alternatives. These data are presented and analyzed below in a number of sections, each with a different focus.

These sections include:

- Route Profiles
- Highest Activity Stops
- Ridership by Time of Day
- On-Time Performance
- Data Comparison

Route Profiles

The following subsection includes detailed data for each of FRED's deviated fixed routes. Each profile includes a service description followed by a brief narrative covering major stops and destinations. Passenger boarding and alighting data collected during the boarding/alighting effort are presented in the form of a map for each route. The routes are presented in alphabetical order by route letter/number.

Route C1 – Bowling Green / Carmel Church / Ladysmith

Route C1 connects FRED Central in Fredericksburg with destinations in Caroline County and southern Spotsylvania County, including Bowling Green, the Rogers Clark Boulevard corridor, Carmel Church, Ladysmith, and Traveler's Row Shopping Center. Transfers are available to Route C2 at Traveler's Row and to Routes D2, D5, F1, F2, F3, F4, and F5 at FRED Central.

The most frequently served stops on Route C1 have approximately 90 minute headways, although some stops are only served a few times per day. Stops along Tidewater Trail and VA 2 are only served on the southbound 6:00 a.m. and 1:30 p.m. runs from FRED Central and the northbound stops on the same corridor are served only on the 11:15 a.m. and 6:45 p.m. runs from Community Service Center in Bowling Green. The first run of the day departs FRED Central at 6:00 a.m. and the last run arrives back at FRED Central at 7:30 p.m. Route C1 operates Monday through Friday.

Route C1 serves a wide variety of land uses, including shopping centers, government offices (including Caroline County Administrative Office, Bowling Green Town Hall, Ladysmith Post Office), Caroline County High School and a Rappahannock Area Community Services Board (RACSB) location.

Rider activity is highest at shopping center stops. The three highest-activity stops all serve shopping centers with Food Lion stores. Thirteen of the 31 stops on Route C1 had zero activity on the day of ridership counts. Figure 3-2 provides a map of the route with boarding/alighting data.

Route C2 – Fredericksburg / Caroline County

Route C2 connects FRED Central in Fredericksburg with Traveler's Way Shopping Center in Thornburg via US 1. Along the way it stops at a number of shopping centers and housing developments. The bus makes four runs per day, in the morning at 7:00 a.m. and 8:30 a.m., and in the afternoon at 4:00 p.m. and 5:30 p.m. The last run of the day arrives back at FRED Central at 6:30 p.m. Route C2 operates Monday through Friday. Riders can transfer to Route C1 at Traveler's Row, and to Routes D2, D5, F1, F2, F3, F4, and F5 at FRED Central.

The two terminal stops, FRED Central and Traveler's Row, experienced the greatest activity on the day of ridership counts. This suggests that most riders on this route are making at least one transfer to complete their trips. Stop activity on this route is low, with seven of ten stops showing one or fewer boardings or alightings during ridership counts. Figure 3-3 provides a map of the route with the boarding/alighting data.

Figure 3-2: Route C1 – Bowling Green / Carmel Church / Ladysmith Route Profile

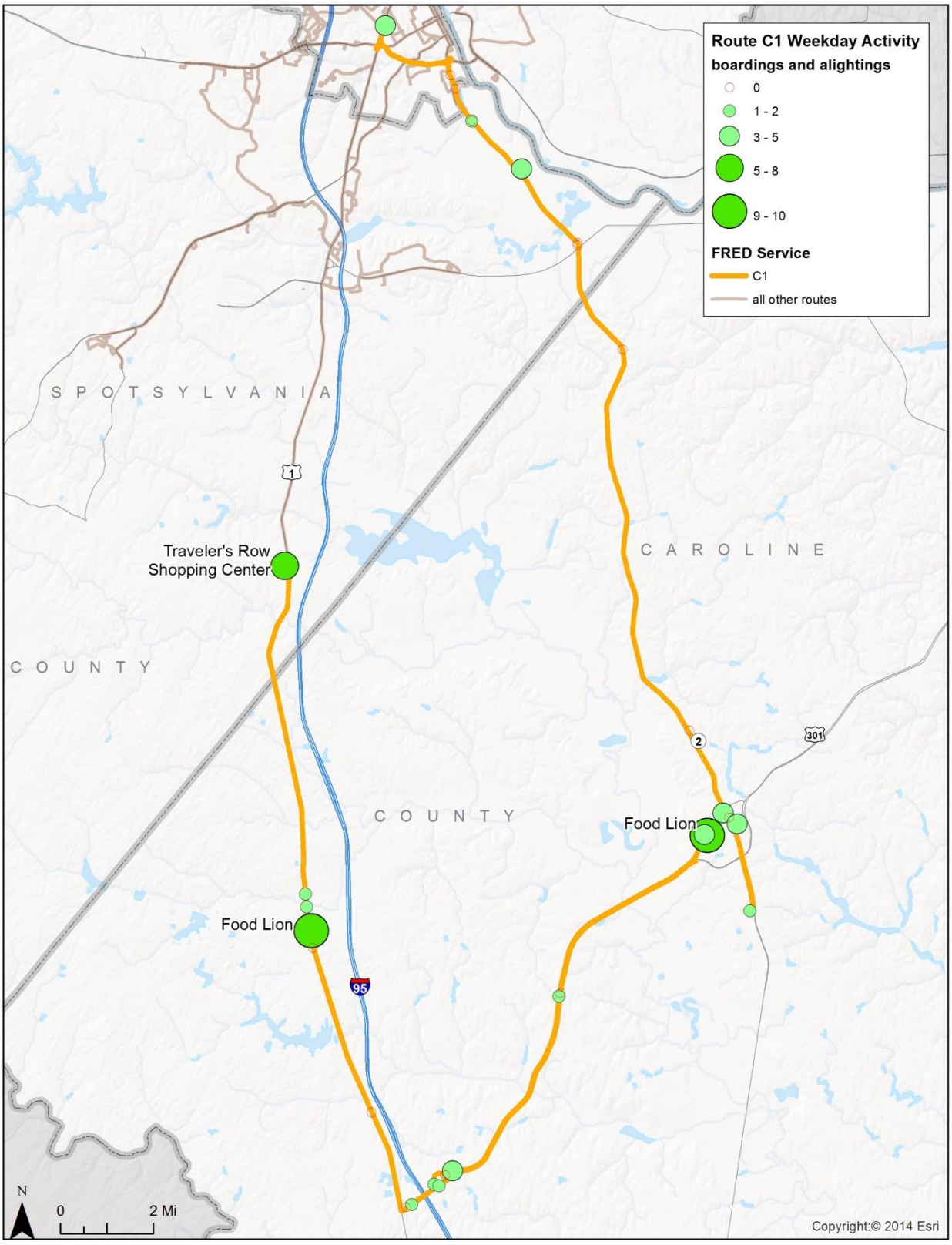
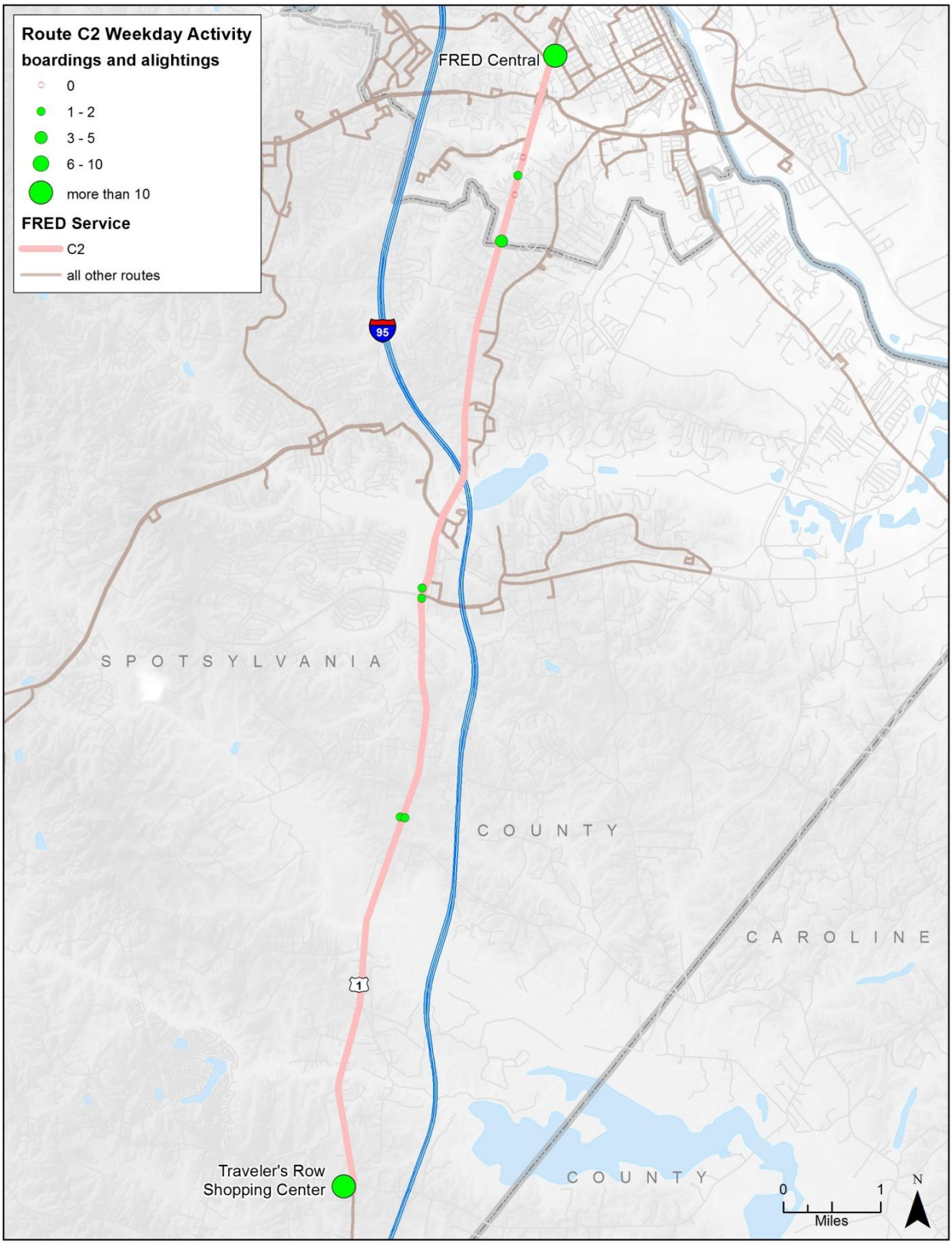


Figure 3-3: Route C2 – Fredericksburg / Caroline County Route Profile



Route D1 – Train Station to Olde Forge

Route D1 connects the Fredericksburg train station on Caroline Street with Olde Forge Shopping Center on Warrenton Road via Dixon Street, Blue and Gray Parkway, Washington Square Walmart, Kings Highway, Chatham Heights Road, and Butler Road. The route returns to Walmart via Warrenton and Butler Roads, Deacon Road, Town and Country Drive, Ferry Road and Kings Highway before returning to the train station.

This route primarily serves shopping and housing land uses. Stops in residential areas show relatively dispersed activity compared to the two major shopping stops at Olde Forge and Walmart. The train station has the highest daily activity, along with Walmart, Olde Forge Shopping Center and the Butler Road YMCA.

Route D1 runs on hourly headways. The first run leaves Fredericksburg train station at 9:00 a.m. and the last run arrives back at the train station at 7:00 p.m. The route operates Monday through Friday. Riders can transfer to Route D2 at Olde Forge Shopping Center, and to routes F4 and F5 at Fredericksburg train station. Figure 3-4 provides a map of the route with boarding/alighting data.

Route D2 – FRED Central / Olde Forge / England Run / GEICO

Route D2 connects FRED Central to Giant Food and the GEICO Regional Office via US 1, Olde Forge Shopping Center, and residential areas along Plantation Drive. From Giant the route stops at GEICO and returns to FRED Central via Warrenton Road, Olde Forge Shopping Center and US 1.

Olde Forge Shopping Center, Giant, and FRED Central had the highest activity, with each stop having more than 20 boardings and alightings. Activity is somewhat evenly dispersed throughout the rest of the route, although six stops showed activity of one or fewer boardings or alightings. Timed transfers are available to Route D1 at Olde Forge and to Routes D5 and C2 at FRED Central.

Route D2 operates on hourly headways. The first run departs FRED Central at 8:00 a.m. and the last run arrives back at FRED Central at 8:00 p.m. The route operates Monday through Friday. Figure 3-5 provides a map of the route with boarding/alighting data.

Figure 3-4: Route D1 – Fredericksburg Train Station to Olde Forge Route Profile

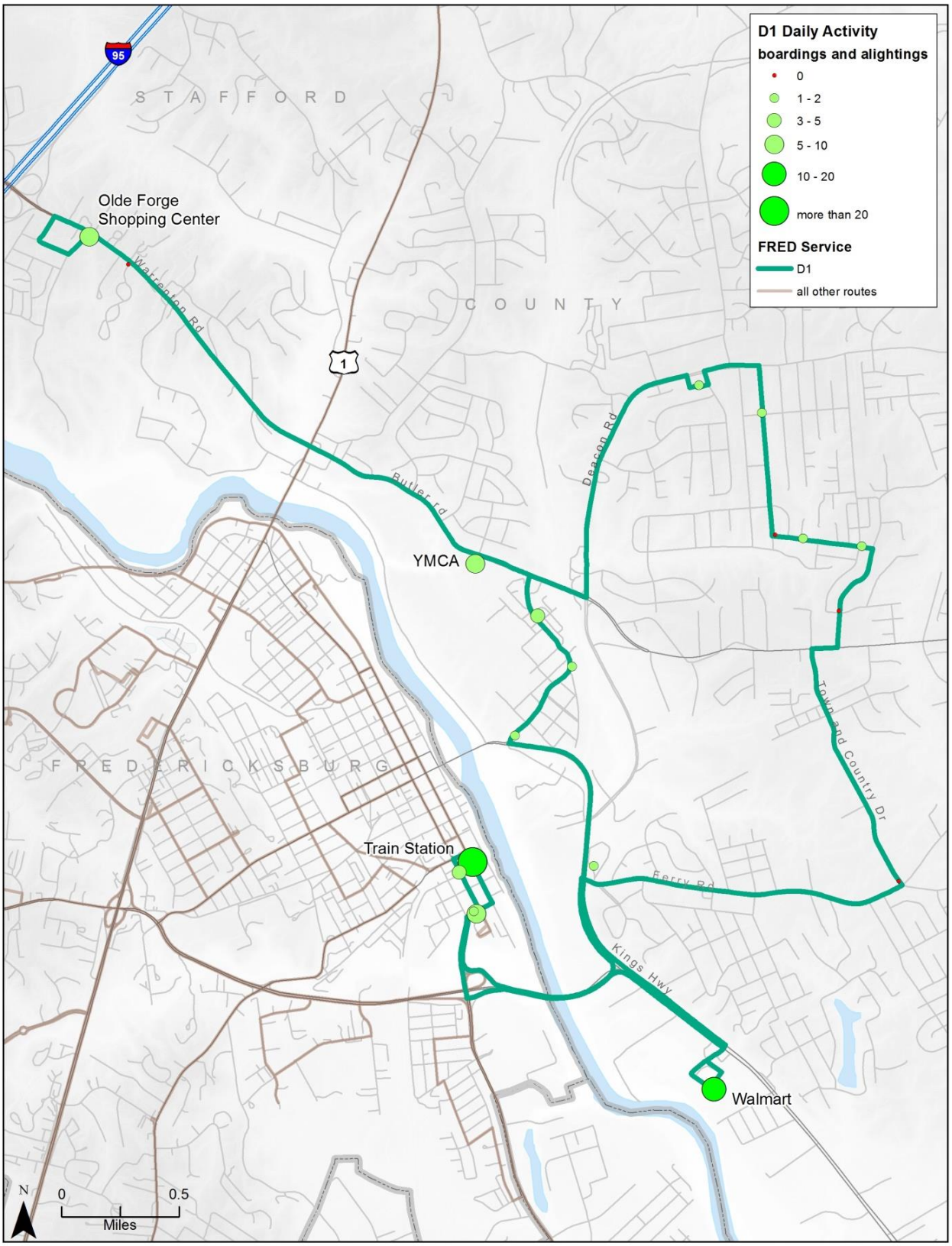
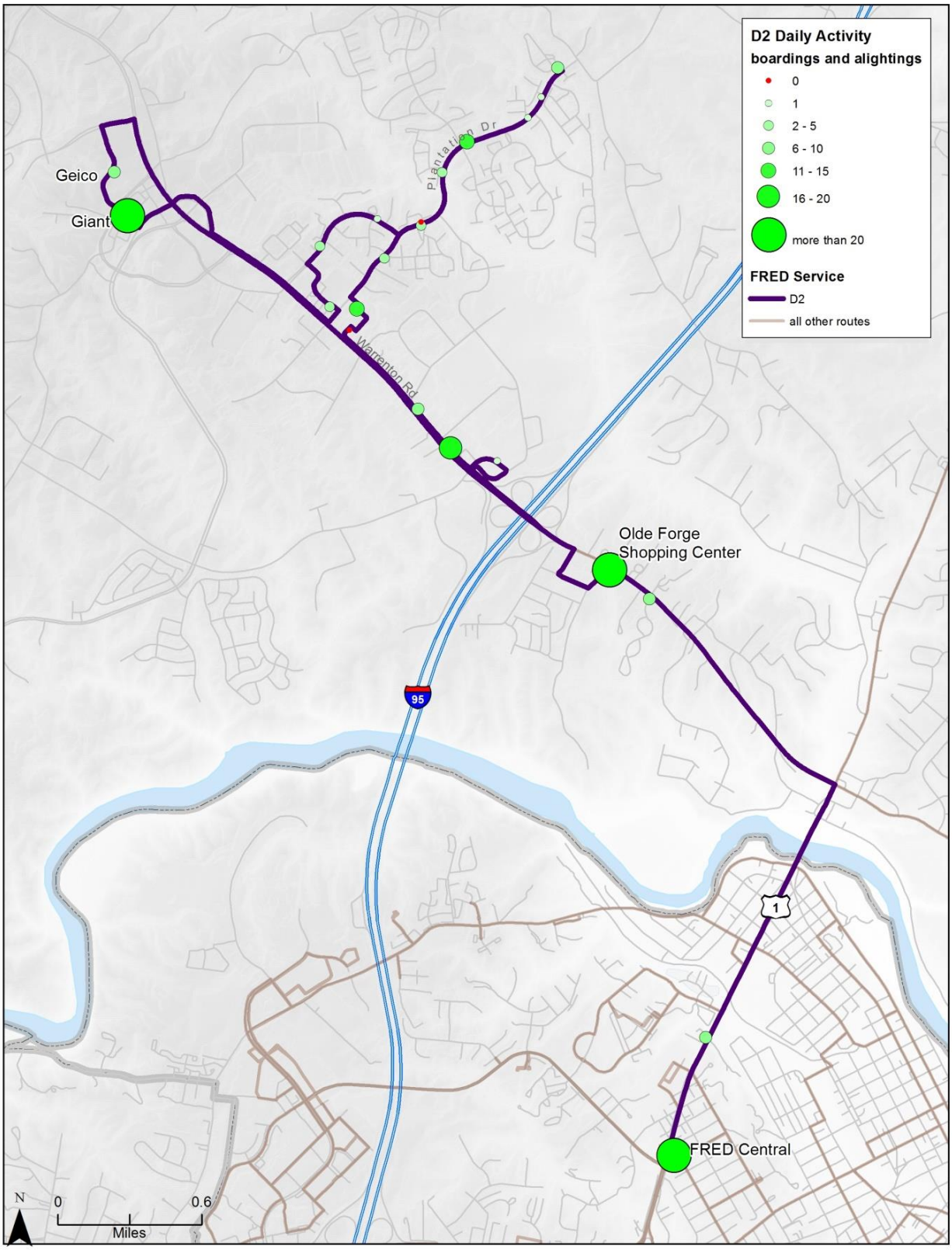


Figure 3-5: Route D2 – FRED Central / Olde Forge / England Run / GEICO Route Profile



Route D3 - The Shopping Loop

Route D3 connects Stafford County Courthouse with shopping centers and housing developments along US 1, Crescent Boulevard, and Garrisonville Road. The bus travels north on US 1 from the courthouse, then along Crescent Boulevard before resuming on US 1 north. The route has a stop at Forreston Village Center Food Lion and then continues north on US 1. The route then goes through Aquia Towne Center before turning west and crossing Interstate 95. The route then serves a number of shopping centers and residential neighborhoods along Garrisonville Road, and a Virginia Department of Transportation (VDOT) commuter lot. After the VDOT lot the route continues to Walmart and then back to Stafford Courthouse.

Stop activity is dispersed along this route. Walmart and Stafford Courthouse have the highest activity. There is only one stop with zero activity for the day of ridership counts.

Timed transfers are available to Route D5 at the courthouse and to Route D4 at Stafford Market Place. The route runs with hourly headways. The first run departs Stafford County Courthouse at 7:30 a.m. and the last run arrives back at 6:30 p.m. The route operates Monday through Friday. Figure 3-6 provides a map of the route with boarding/alighting data.

Route D4 – Stafford Market Place to Vista Woods

Route D4 connects Stafford Market Place with residential areas along Garrisonville Road, including Garrison Woods and Vista Woods, before returning to Stafford Market Place via Northampton Boulevard and Mine Road Walmart. The route primarily connects housing and shopping land uses, as well as the Porter Library on Northampton Boulevard.

Activity on Route D4 is highest at Stafford Market Place, Walmart, and Garrison Woods. Fourteen of the 31 stops on this route had zero activity during ridership counts.

Route D4 operates on hourly headways. The first run of the day departs Stafford Market Place at 8:50 a.m. and the last run arrives at Mine Road Walmart – the last stop – at 4:30 p.m. The route operates Monday through Friday. Timed transfers to Route D3 are available at Stafford Market Place. Figure 3-7 provides a map of the route with boarding/alighting data.

Figure 3-6: Route D3 - Shopping Loop Route Profile

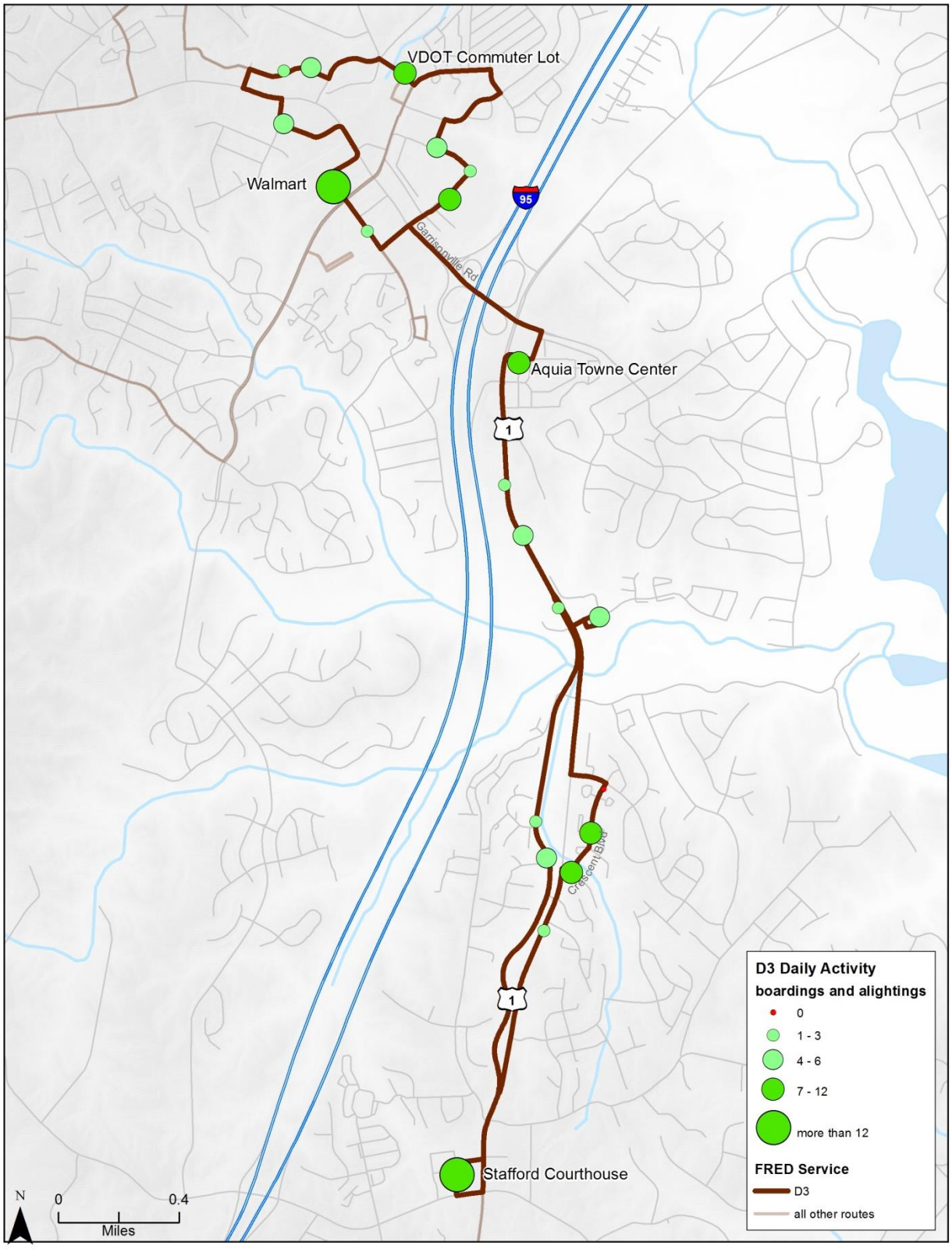
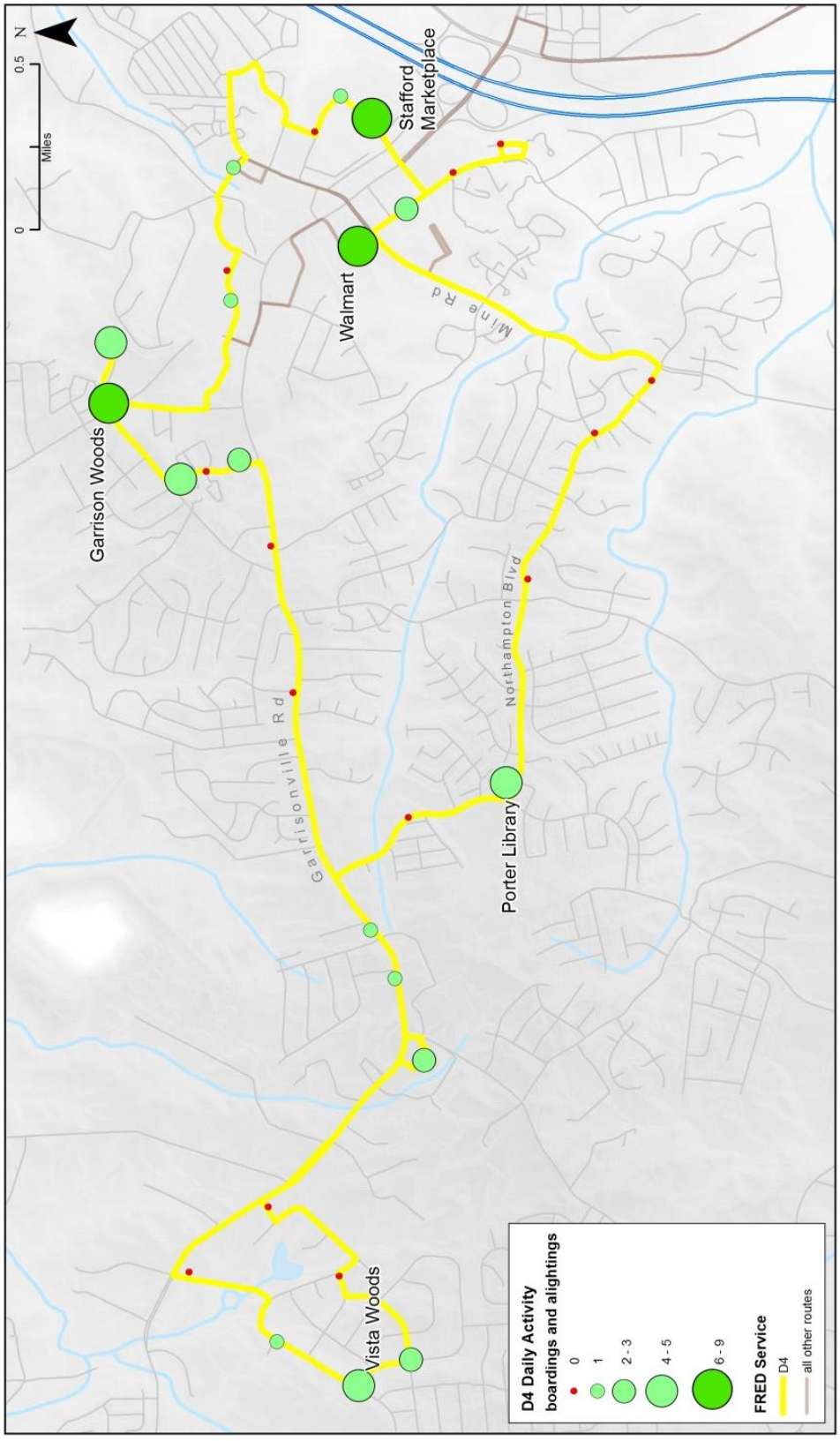


Figure 3-7: Route D4 – Stafford Market Place to Vista Woods Route Profile



Route D5 – FRED Central / Stafford Courthouse

Route D5 connects FRED Central to Stafford Courthouse via US 1 and Rappahannock Regional Jail. Activity on Route D5 is highly concentrated; Rappahannock Regional Jail, FRED Central, and Stafford Courthouse all had more than 40 boardings and alightings during ridership counts. The stop with the next highest activity had only ten boardings and alightings.

Route D5 runs with hourly headways. The first run of the day leaves FRED Central at 7:00 a.m. and the last run of the day arrives back at 7:00 p.m. The route operates Monday through Friday. Timed transfers are available to Route D2 at FRED Central and to Route D3 at Stafford Courthouse. Figure 3-8 provides a map of the route with boarding/alighting data.

Route D6 – Stafford County

Route D6 is a continuous shuttle service between two VDOT commuter lots. There is commuter bus service available at the North Commuter Lot and, according to Slug-Lines.com, slug lines form at both lots – from 5:45 a.m. to 7:30 a.m. at the North Lot and from 4:30 a.m. to 6:30 a.m. at the South Lot.

Activity is low on this route, with less than one boarding or alighting per run. Both lots had a total activity of six boardings and alightings during ridership counts. Interestingly Stafford Market Place, despite not being listed on the schedule, showed the highest activity. The study team suspects that the counts for the Stafford Market Place should actually be recorded for the D4, as the D6 becomes the D4 after the morning commuter period and the data recorder may not have realized that the bus had switched routes.

Route D6 begins service at 6:30 a.m. and continues until 8:15 a.m. Service resumes at 4:15 p.m. and ends for the day at 7:15 p.m. The route operates Monday through Friday. Figure 3-9 provides a map of the route with the boarding/alighting data.

Figure 3-8: Route D5 – FRED Central / Stafford Courthouse Route Profile

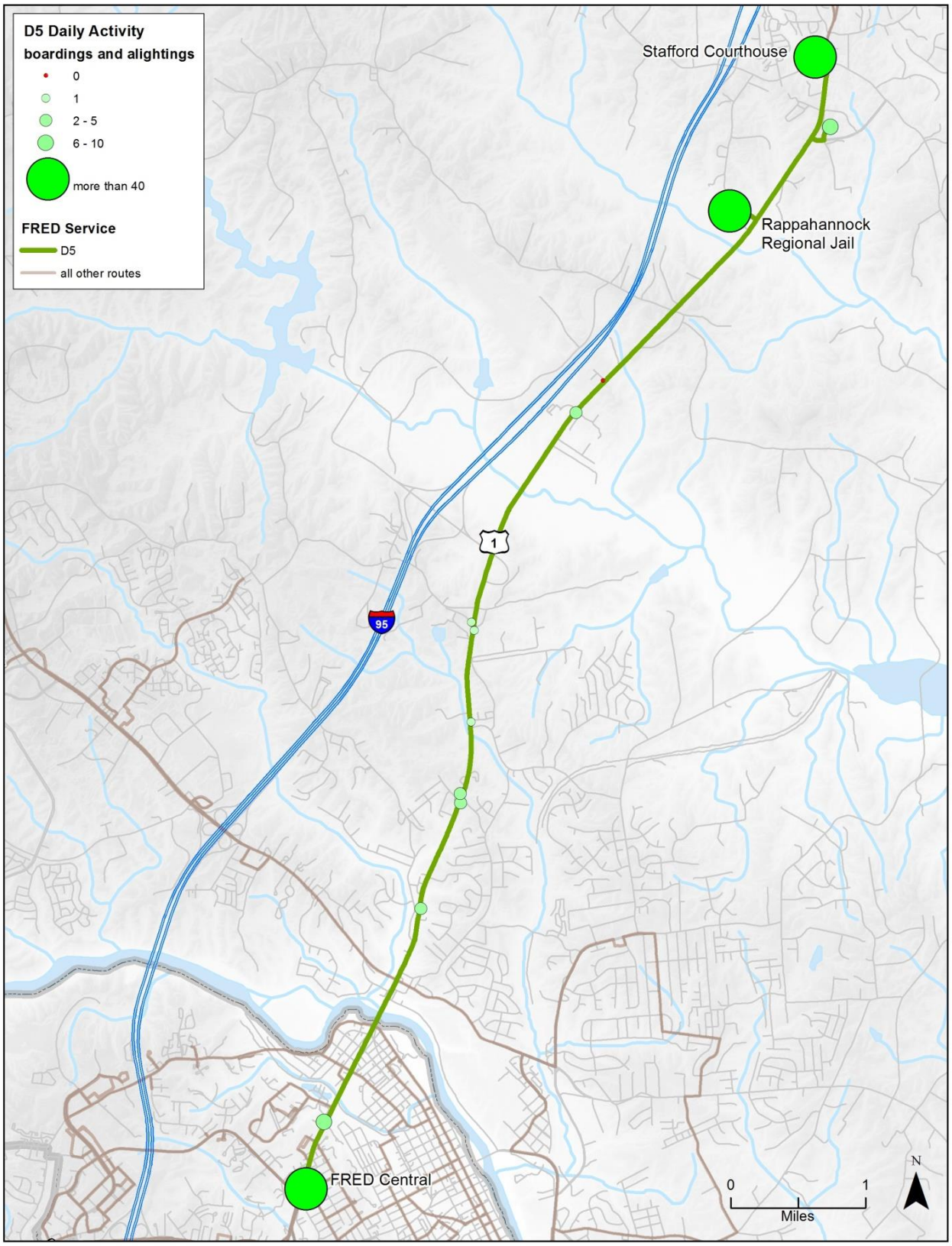


Figure 3-9: Route D6 – Stafford County EXPRESS Route Profile

Route E1 – Eagle Express Downtown / Central Park

Route E1 connects the University of Mary Washington (UMW) campus with downtown Fredericksburg, Fall Hill Avenue, and Central Park. Primarily, this route serves to connect members of the university community to social, recreational, and shopping destinations. The route also serves a number of apartment complexes and is open to the general public and not limited to UMW students or employees.

This route runs only on Saturdays and Sundays, with hourly headways on both days. Both days show a similar distribution of rider activity along the route, with Walmart and FRED Central having the highest levels of activity. The first run on Saturday departs the UMW main entrance at 8:30 a.m. and the last run arrives back at 9:30 p.m. On Sunday the first run departs at 9:30 a.m. and the last run arrives at 6:30 p.m. Figure 3-10 provides a map of the route with boarding/alighting data.

Route E2 – UMW Eagle Express Central Park / Spotsylvania Towne Centre

Route E2 connects the University of Mary Washington campus with shopping centers west of Interstate 95, via Cowan Boulevard. The route stops at several apartment complexes along Cowan Boulevard, but primarily serves shopping destinations.

The two terminals, UMW main entrance and Spotsylvania Towne Centre, had the highest activity on both count days. On Saturday, both terminals had over 36 boardings and alightings, with the next highest-activity stop having no more than fifteen. It appears from the count data that riders are primarily riding from campus to the mall at Spotsylvania Towne Centre.

The route operates Thursday through Sunday with 75-minute headways. On Thursday and Friday the first run departs UMW at 7:00 p.m. and the last run arrives back at 10:00 p.m. On Saturday the first run leaves at 9:00 a.m. and the last run arrives at 10:00 p.m. On Sunday the first run leaves at 10:00 a.m. and the last run arrives back at 7:00 p.m. Figure 3-11 provides a map of the route with boarding/alighting data.

Figure 3-10: Route E1 – Eagle Express Downtown / Central Park Route Profile

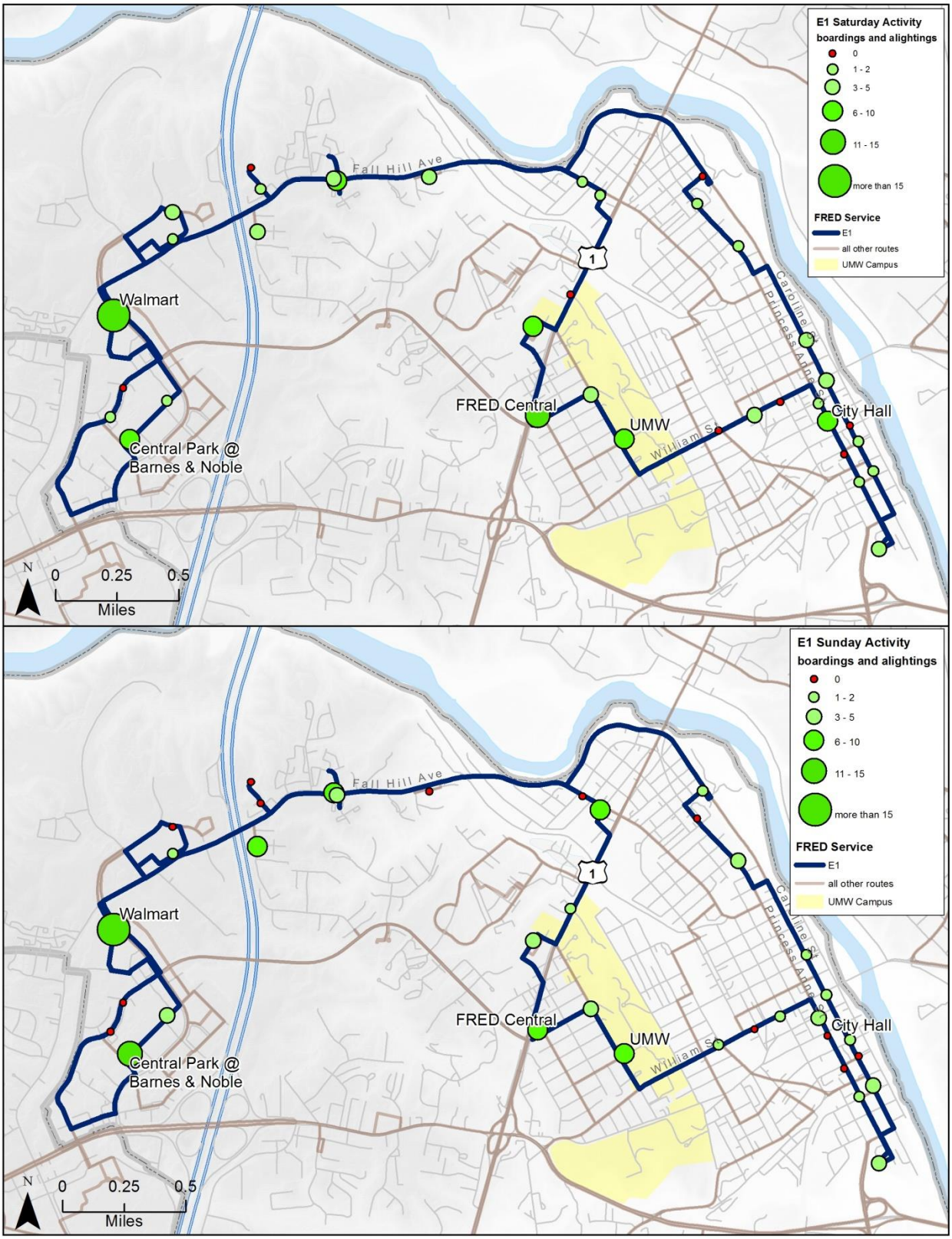
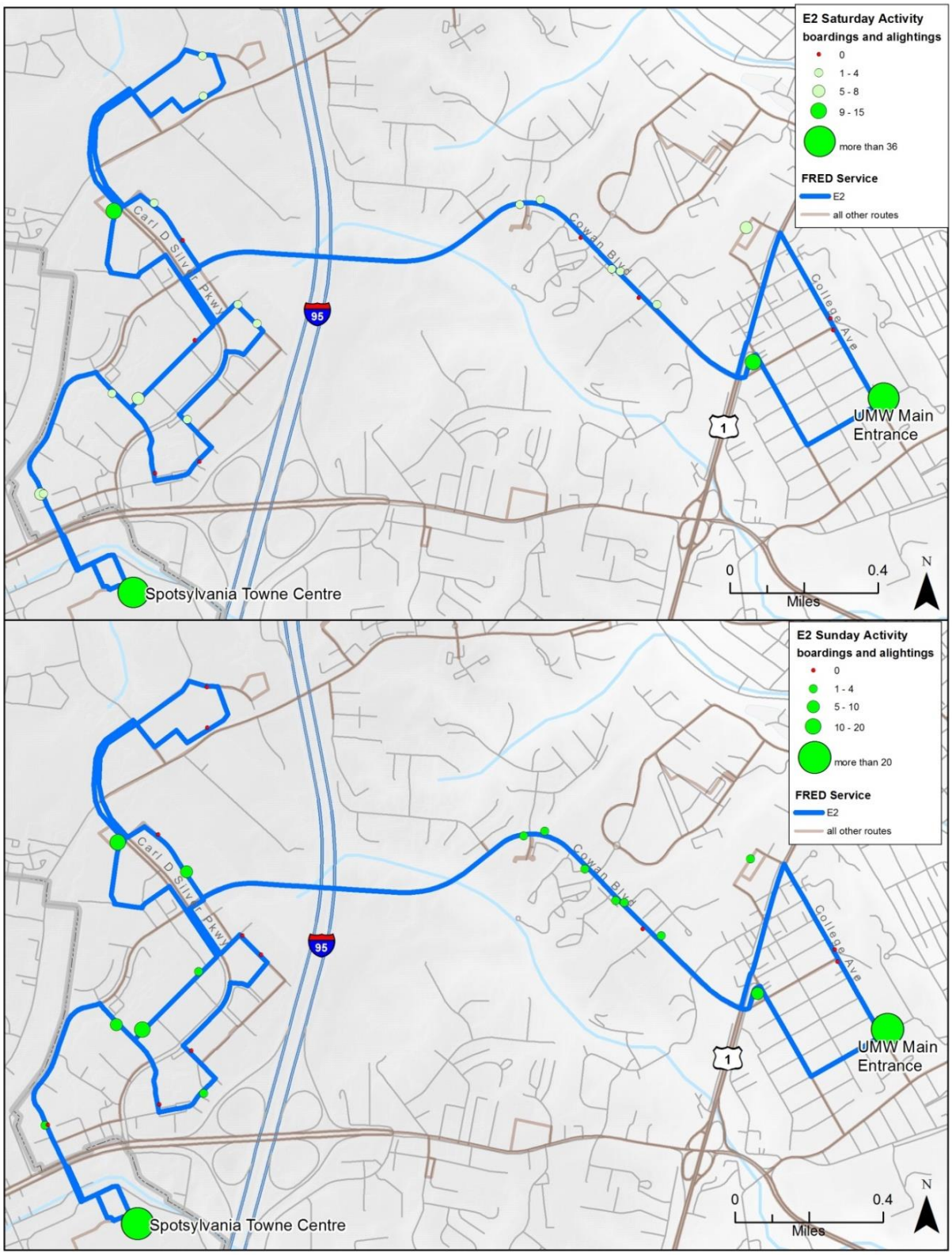


Figure 3-11: Route E2 – UMW Eagle Express Central Park / Spotsylvania Towne Centre Route Profile



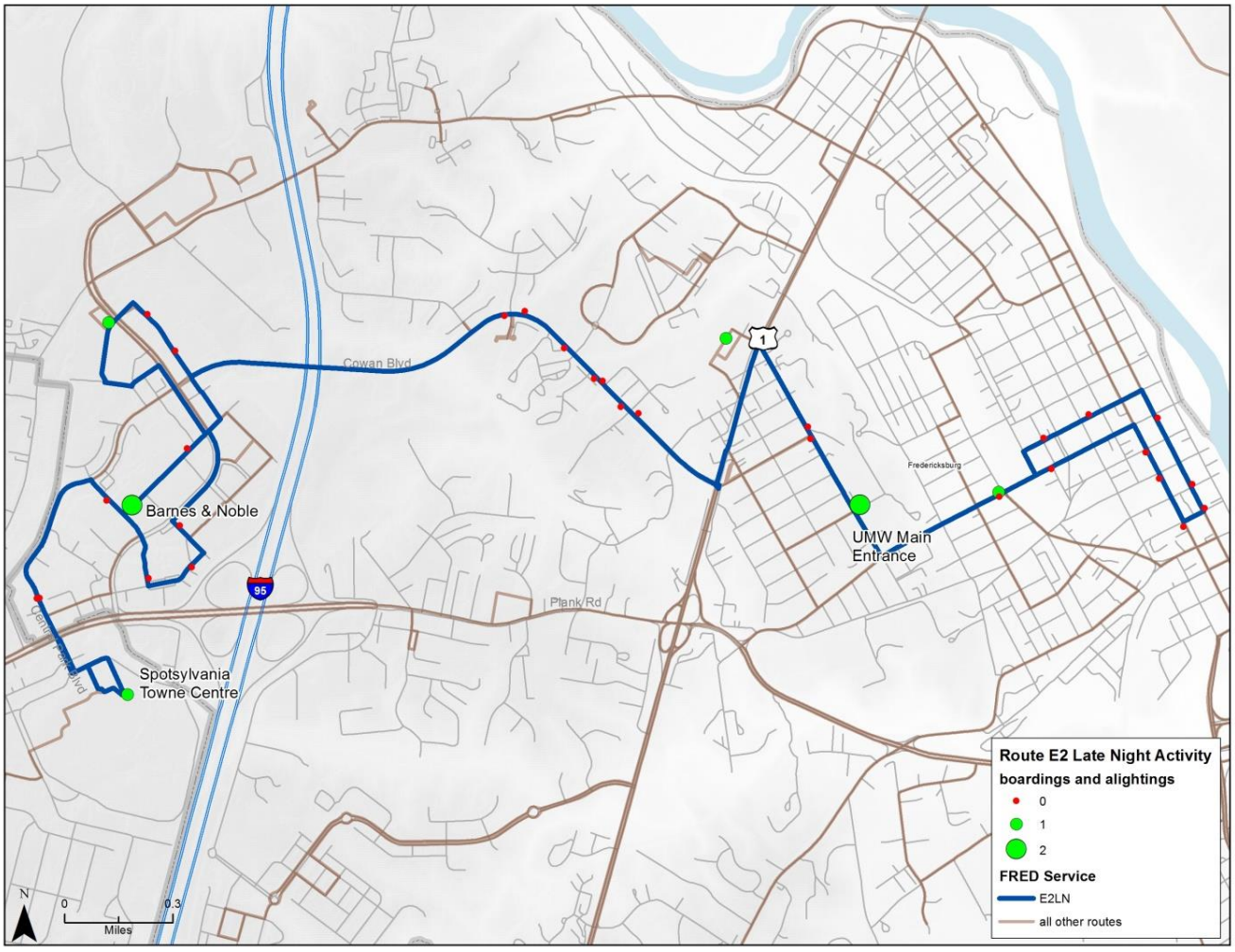
Route E2 Late Night – UMW Eagle Express FRED Central / UMW / Downtown / Central Park / Spotsylvania Towne Centre

Route E2 Late Night connects UMW to downtown Fredericksburg and to Central Park via Cowan Boulevard. The route serves residential and commercial land uses.

The entire route showed extremely low activity during ridership counts. Twenty-eight stops had zero activity, and no stop had more than two boardings and alightings.

Route E2 Late Night runs with hourly headways. The route operates Friday and Saturday. The first run departs UMW at 10:00 p.m. and the last run arrives back at 1:00 a.m. Figure 3-12 provides a map of the route with boarding/alighting data.

Figure 3-12: Route E2 Late Night – UMW Eagle Express FRED Central / UMW / Downtown / Central Park / Spotsylvania Towne Centre Route Profile

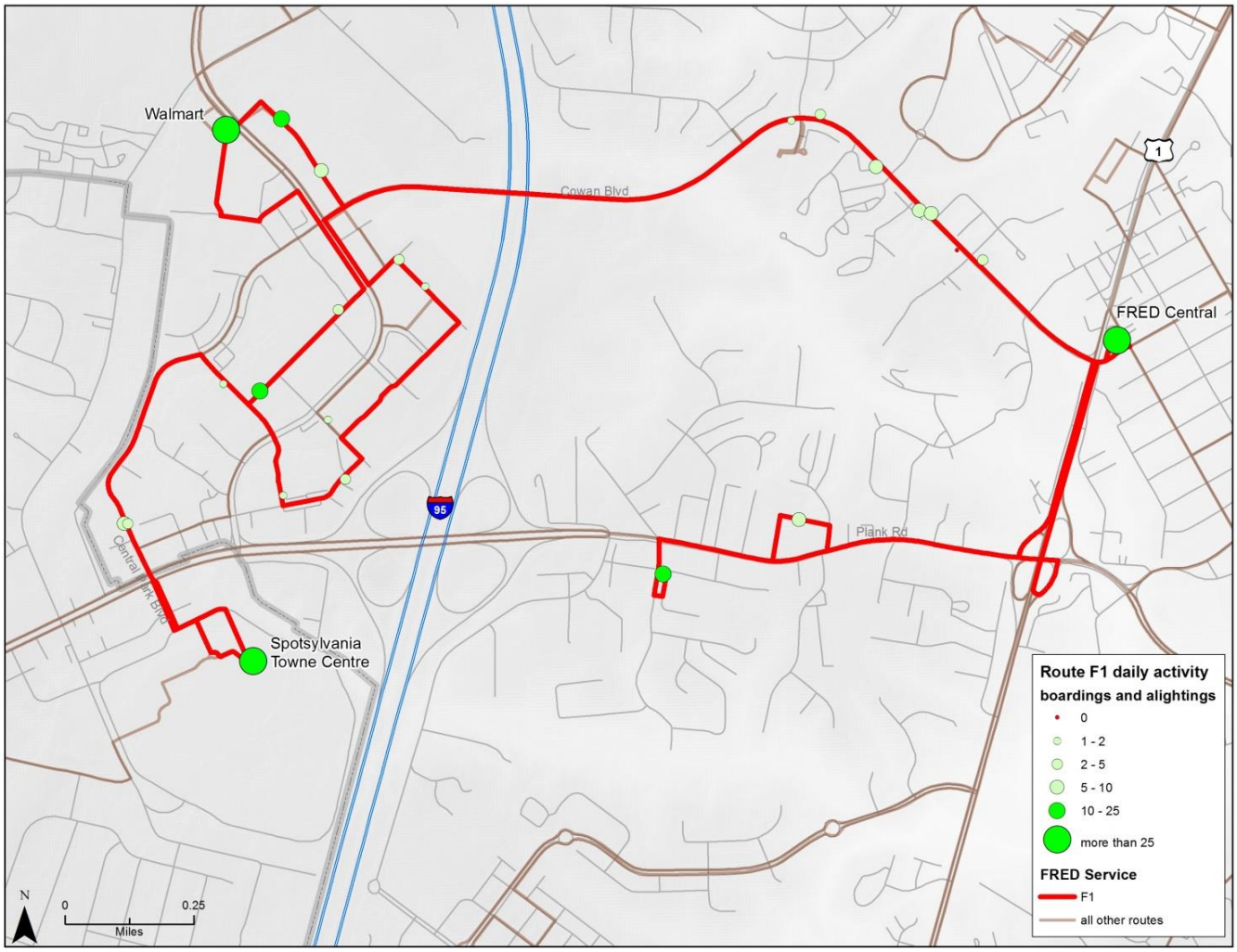


Route F1 – FRED Central / Central Park / Spotsylvania Towne Centre

Route F1 connects FRED Central with Spotsylvania Towne Centre via Greenbrier Shopping Center on Plank Road, Cowan Boulevard, and Central Park. This route almost exclusively serves residential and retail land uses. Activity on the route is highest at FRED Central, followed by Spotsylvania Towne Centre and Walmart. Only three stops had less than two boardings and alightings during ridership counts.

Route F1 operates with hourly headways. The first run leaves FRED Central at 8:30 a.m. and the last run arrives back at 7:30 p.m. The route operates Monday through Friday. Timed transfers are available to Routes F2, F3, F4, F5, and S1 at Spotsylvania Towne Centre and to Routes C1, C2, F2, F3, F4, and F5 at FRED Central. Figure 3-13 provides a map of the route with the boarding and alighting data.

Figure 3-13: Route F1 – FRED Central / Central Park / Spotsylvania Towne Centre Route Profile



Route F2 – FRED Central / Cowan Blvd / Jeff Davis Hwy / Lee's Hill Center

Route F2 connects FRED Central with Lee's Hill Center, via US 1, and Falcon Drive. On select runs, the F2 also connects to the Thurman Brisben Center via Blue and Gray Parkway. The route primarily serves residential and commercial land uses, as well as centers of employment.

Activity is highest at the terminals. FRED Central has the highest daily activity. Lee's Hill Center and Spotsylvania Avenue at the former Friendly's restaurant have the next highest activity. The remaining activity on the route is quite dispersed, excepting the two stops with zero activity.

Route F2 runs with hourly headways. The first run leaves FRED Central at 7:30 a.m. and the last run arrives back at 8:30 p.m. The route operates Monday through Friday. Timed transfers are available to routes F3, S1, S4, and S5 at Lee's Hill Center and to Routes C1, F1, F3, F4, and F5 at FRED Central. Figure 3-14 provides a map of the route with activity data.

Route F3 – FRED Central / Lafayette Boulevard / Lee's Hill Center

Route F3 connects FRED Central to Lee's Hill Center via the Rappahannock Area Community Services Board (RACSB) office in downtown Fredericksburg, Lafayette Boulevard, and Falcon Drive. The route serves a variety of land uses, including residential areas, shopping centers, human service agencies, employment centers, and recreational facilities.

Activity is highest at the terminal stops. Other stops with notable activity are the RACSB and the laundry at Old Greenwich Drive.

The route runs with hourly headways. The first run leaves FRED Central at 7:30 a.m. and the last run arrives back at 8:30 p.m. The route operates Monday through Friday. Timed transfers are available to Routes F2, S1, S4, and S5 at Lee's Hill Center and to Routes C1, C2, F1, F2, F4, and F5 at FRED Central. Figure 3-15 provides a map of the route with the activity data.

Figure 3-14: Route F2 – FRED Central / Cowan Blvd / Jeff Davis Hwy / Lee's Hill Center Route Profile

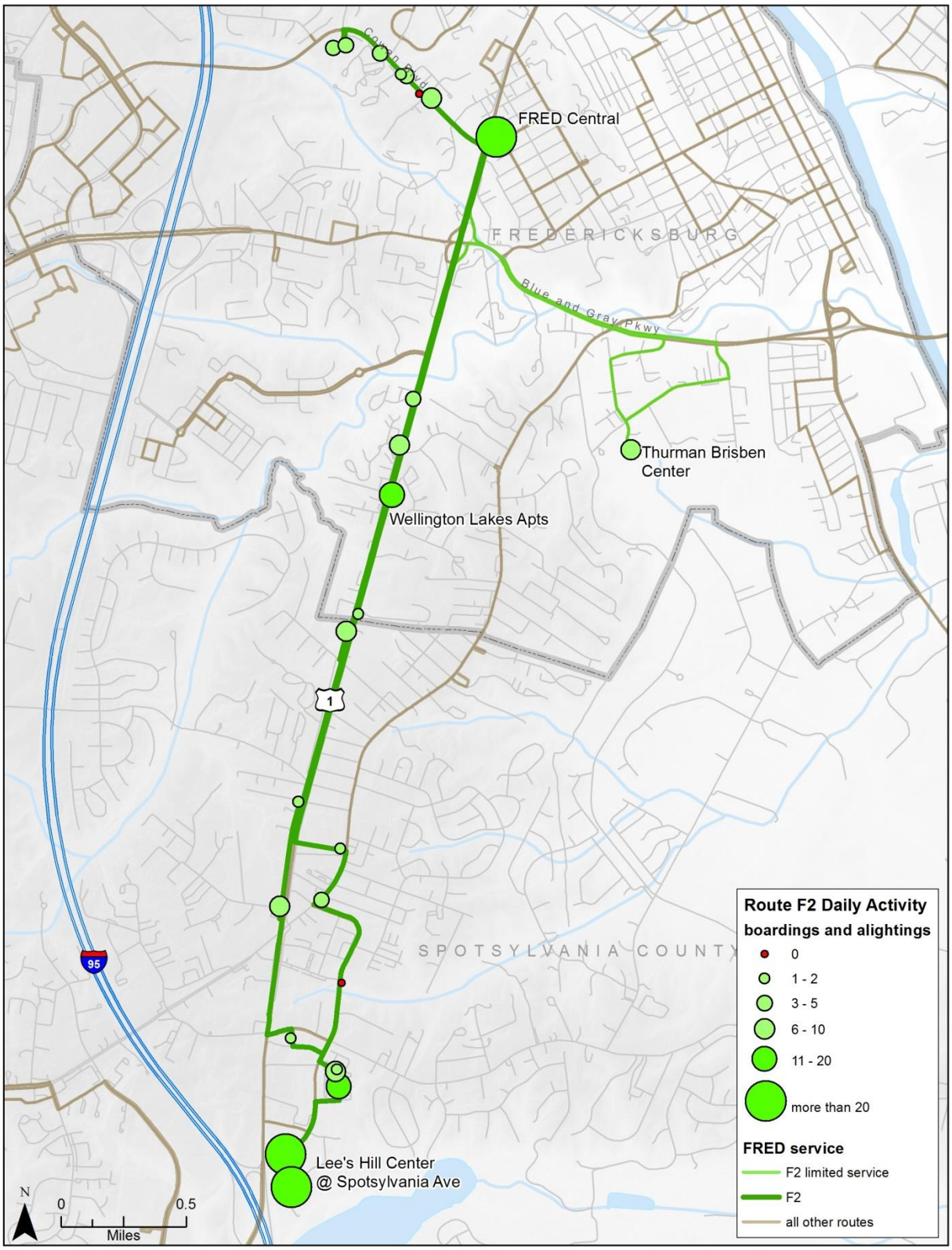
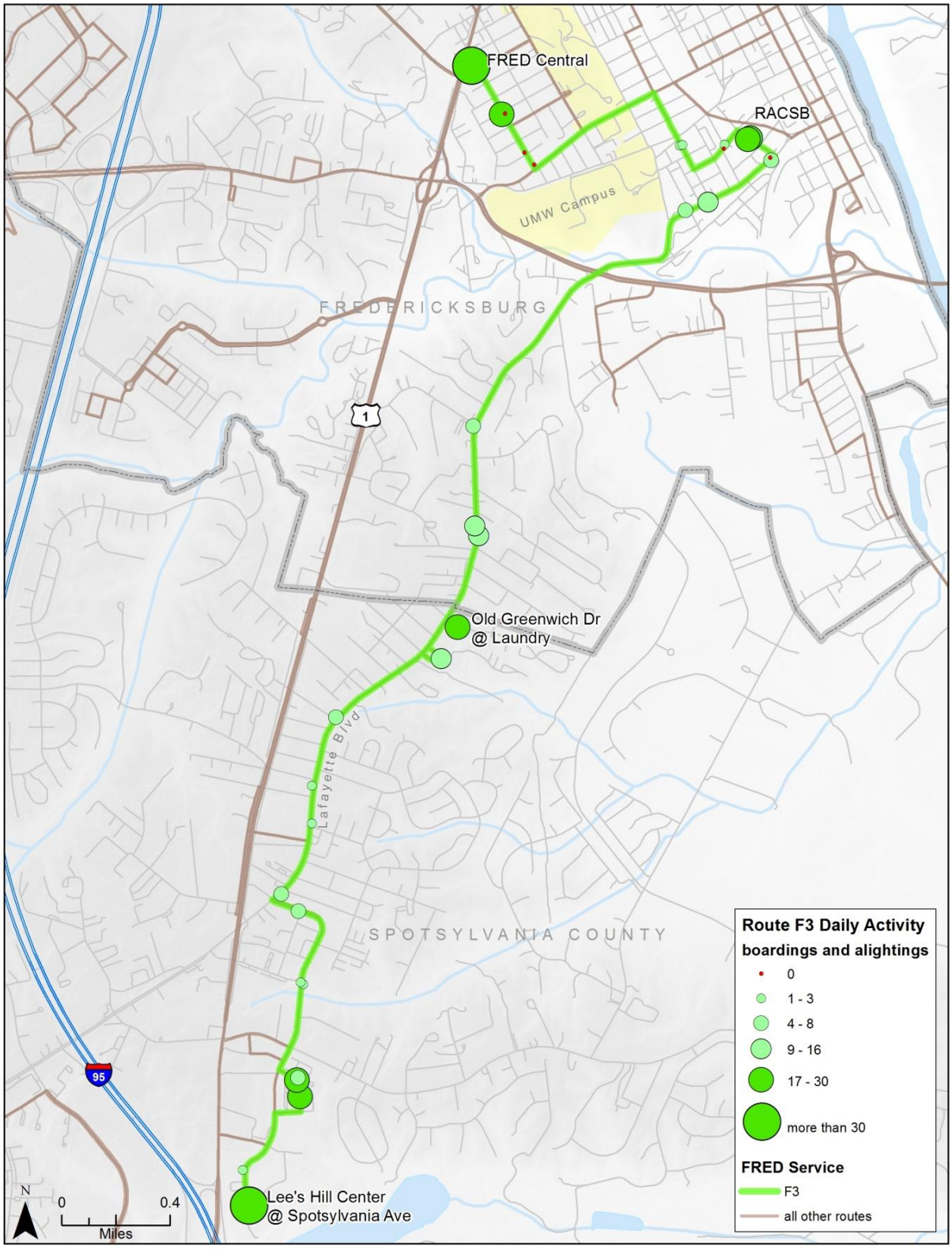


Figure 3-15: Route F3 – FRED Central / Lafayette Boulevard / Lee's Hill Center Route Profile



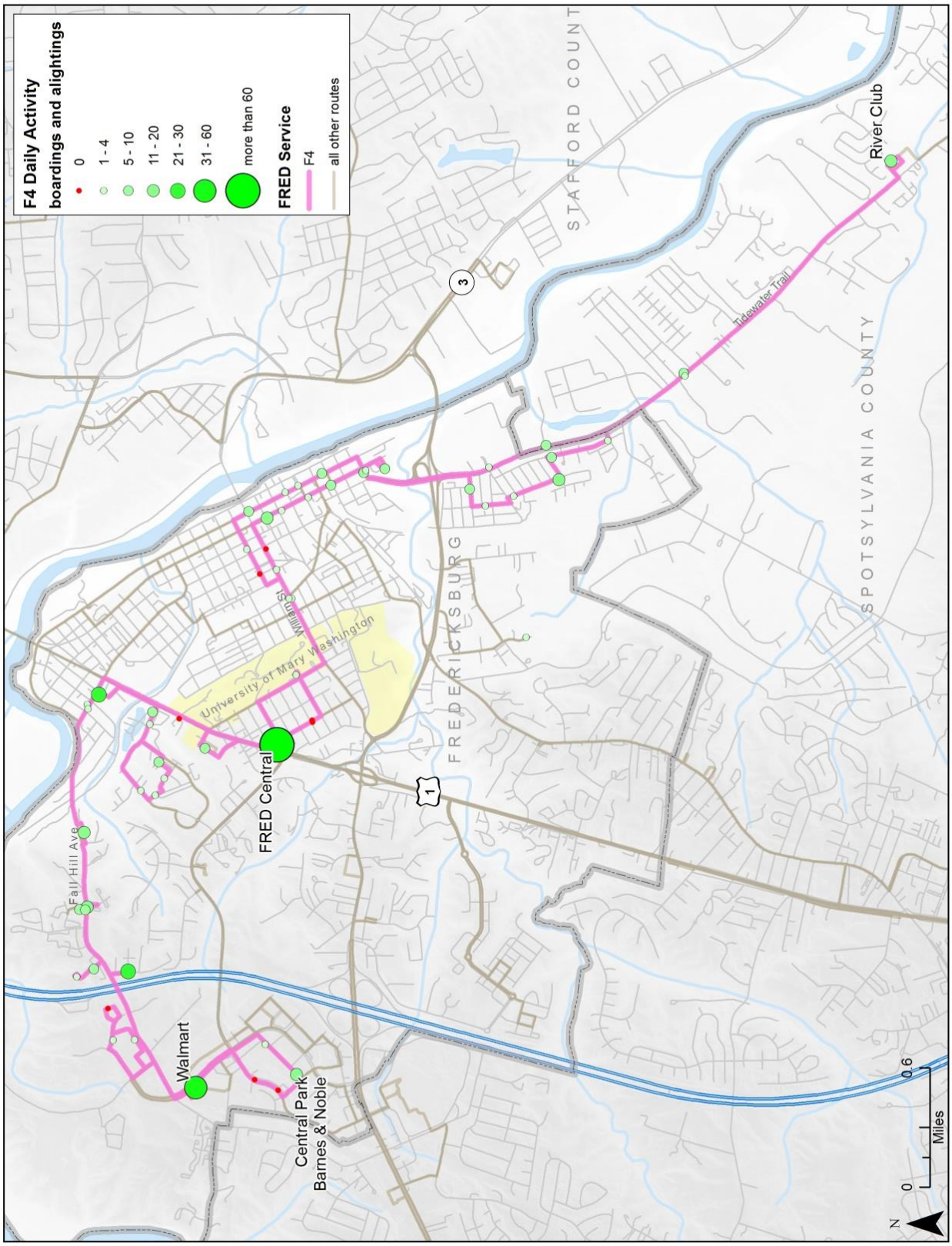
Route F4 – FRED Central / River Club / Central Park

Route F4 connects Central Park, FRED Central, downtown Fredericksburg, and River Club Shopping Center. The route serves a wide variety of land uses including major shopping centers, residential neighborhoods, downtown destinations, human service agencies, Mary Washington Hospital, and the University of Mary Washington campus.

FRED Central is the highest-activity stop on Route F4, followed by Walmart. Ridership activity is fairly dispersed among the remaining stops, excepting four stops with zero activity.

Route F4 runs with hourly headways. The first runs depart FRED Central, one toward River Club and one toward Central Park, at 7:30 a.m. The last runs both return to FRED Central at 8:30 p.m. The route operates Monday through Friday. Timed transfers are available to Routes C1, C2, F1, F2, F3, and F5 at FRED Central. Figure 3-16 provides a map of the route with boarding/alighting data.

Figure 3-16: Route F4 – FRED Central / River Club / Central Park Route Profile



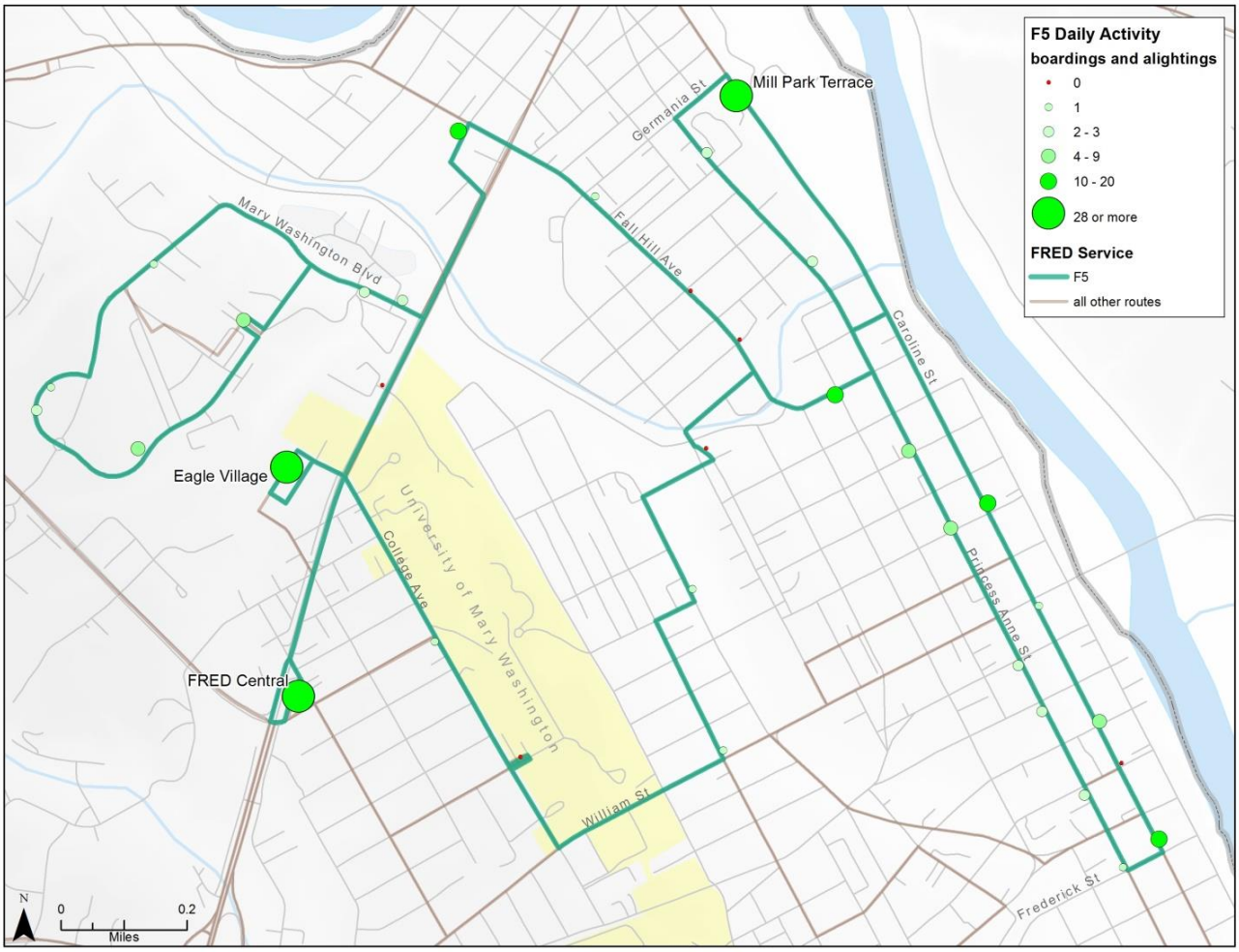
Route F5 – Downtown Loop

Route F5 connects FRED Central with downtown Fredericksburg, Mary Washington Hospital, University of Mary Washington campus, and Eagle Village Shopping Center on US 1. The route serves a wide variety of land use types including residential areas, medical facilities, shopping destinations, and the downtown historic district.

Ridership at downtown stops is fairly dispersed. FRED Central, Eagle Village Shopping Center, and the Mill Park Terrace apartment building showed the highest activity. Six stops had zero activity on the day of ridership counts.

The route runs with hourly headways. The first run departs FRED Central at 8:30 a.m. and the last run returns at 8:30 p.m. Route F5 operates Monday through Friday. Timed transfers are available at FRED Central to Routes C1, F1, F2, F3, and F4. Figure 3-17 provides a map of the route with the activity data.

Figure 3-17: Route F5 – Downtown Loop Route Profile



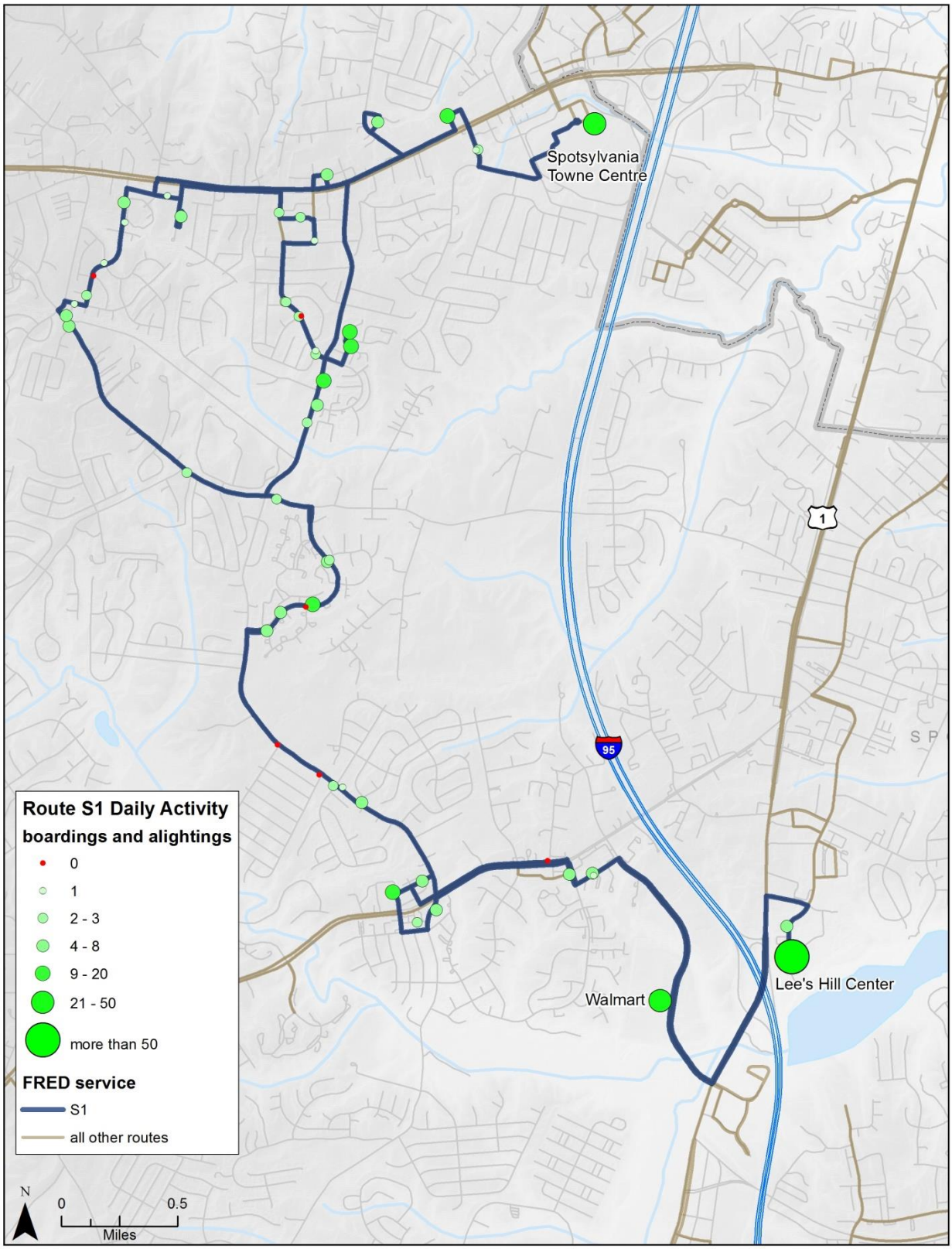
Route S1 – Spotsylvania Towne Centre / Lee's Hill Center

Route S1 connects the mall at Spotsylvania Towne Centre to Lee's Hill Center via primarily residential areas west of Interstate 95. The route also serves community centers such as Salem Church Library, medical facilities, and major employment centers.

Lee's Hill Center has the highest stop activity, as it is a major employment center and also a transfer point. Ridership along the rest of the route is quite evenly dispersed, excepting six stops with zero activity.

The route runs with hourly headways, except for the last four hours of the schedule when a single vehicle serves the route, providing two-hour headways. The first run leaves Lee's Hill Center at 8:00 a.m. and the last run returns at 8:00 p.m. Route S1 operates Monday through Friday. Timed transfers are available to Route F1 at Spotsylvania Towne Centre and to Routes F2, F3, S4, and S5 at Lee's Hill Center. Figure 3-18 provides a map of the route with activity data.

Figure 3-18: Route S1 – Spotsylvania Towne Centre / Lee's Hill Center Route Profile



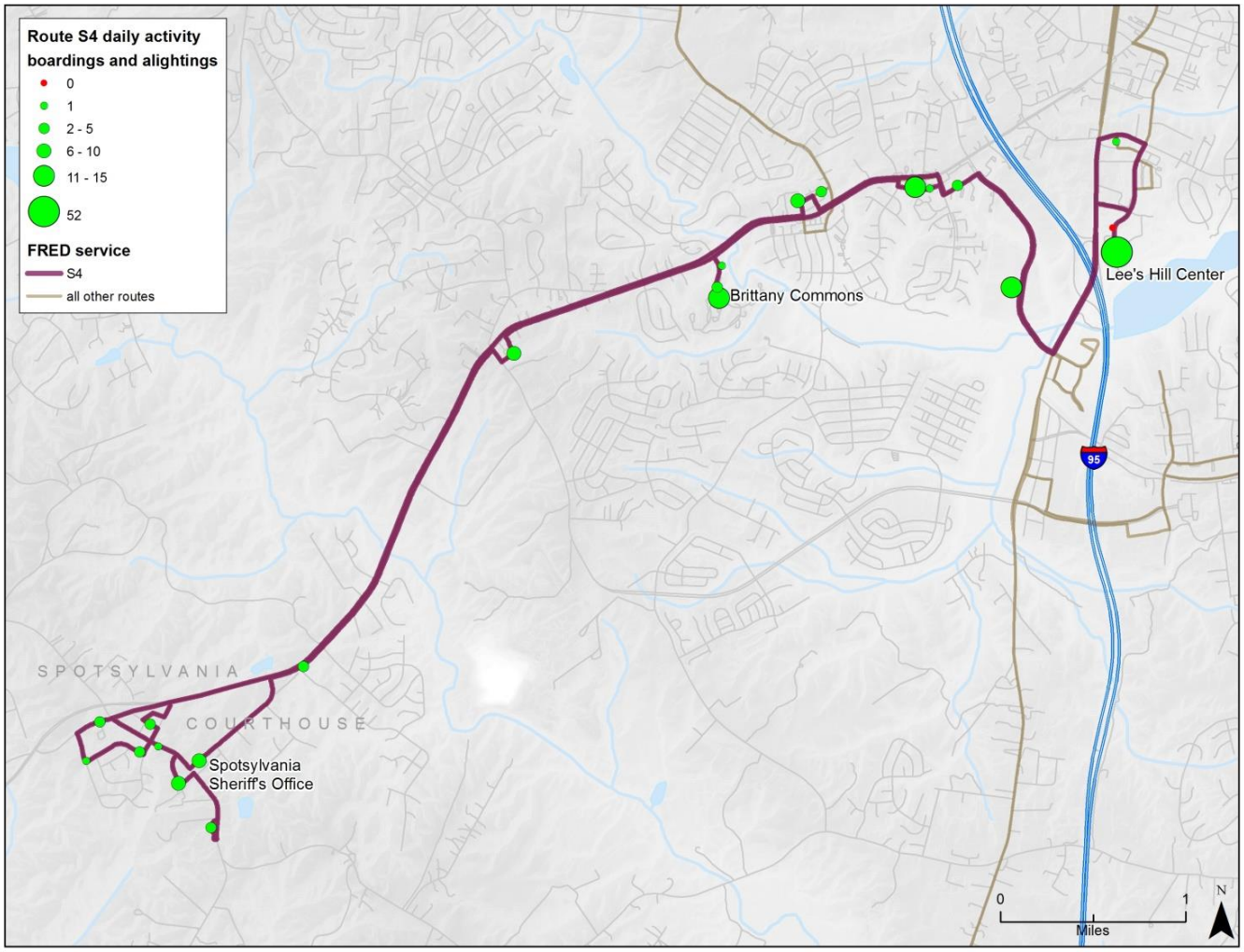
Route S4 – Lee's Hill Center / Spotsylvania Courthouse

Route S4 connects Spotsylvania Courthouse to Lee's Hill Center via Courthouse Road and Walmart. The route serves residential neighborhoods, government offices, and shopping and employment destinations.

Lee's Hill Center is by far the highest-activity stop, with 52 boardings and alightings during ridership counts. The next highest-activity stop had only fifteen. This suggests that most S4 riders must transfer to reach their destinations.

This route runs with hourly headways. The first run leaves Lee's Hill Center at 8:00 a.m. and the final run returns at 8:00 p.m. Route S4 operates Monday through Friday. Timed transfers to Routes F2, F3, S1, and S5 are available at Lee's Hill Center. Figure 3-19 provides a map of the route with the activity data.

Figure 3-19: Route S4 – Lee's Hill Center / Spotsylvania Courthouse Route Profile



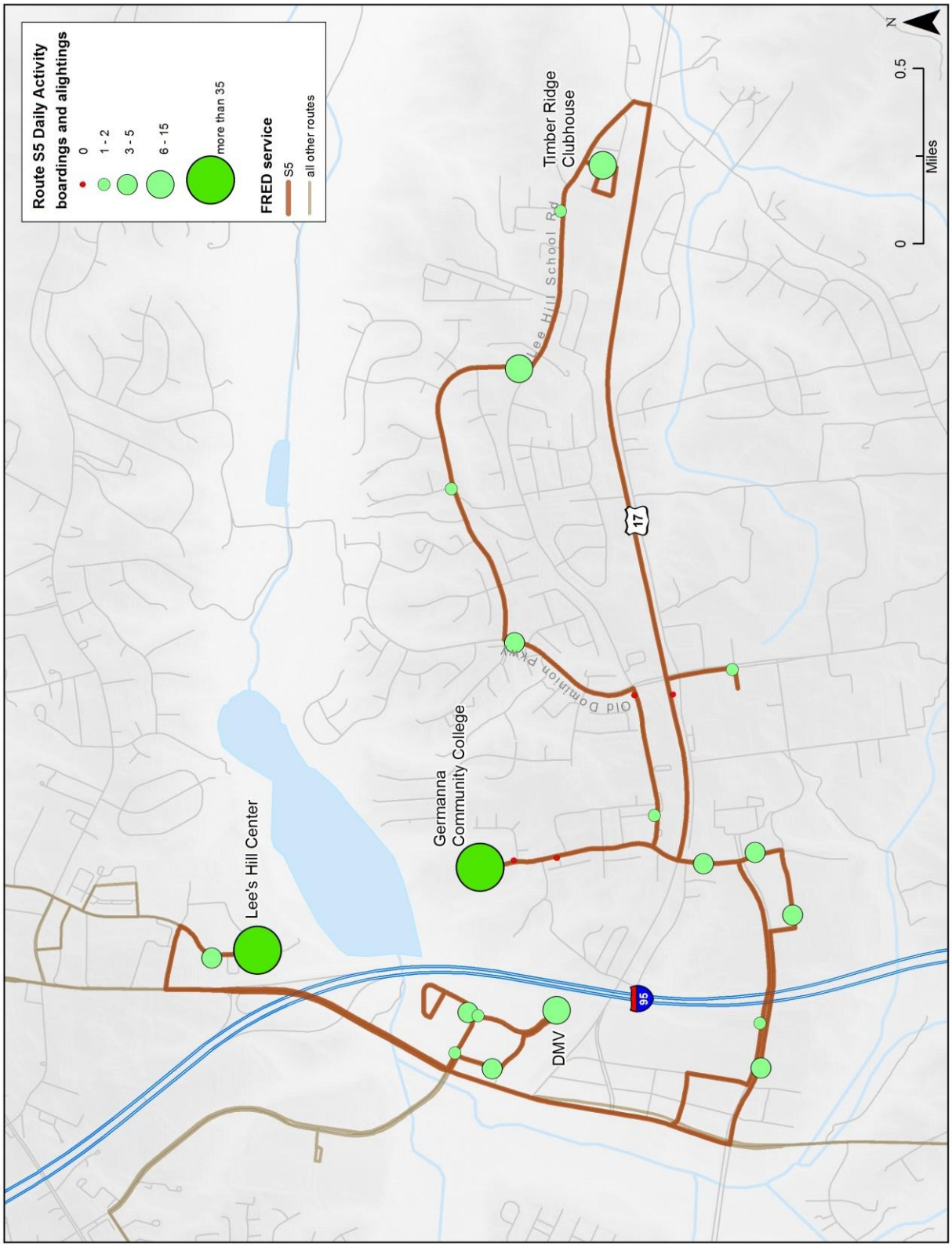
Route S5 – Lee's Hill Center / Germanna College

Route S5 connects Lee's Hill Center with Germanna Community College via residential neighborhoods including Timber Ridge, government offices including the Departments of Motor Vehicles and Social Services, and Spotsylvania Regional Medical Center.

Stop activity is highest at Lee's Hill Center and Germanna Community College. Ridership activity is dispersed among the remaining stops. The two terminal stops both had over 35 boardings and alightings during ridership counts. The next highest-activity stop had a maximum of fifteen.

Route S5 runs with hourly headways. The first run departs Lee's Hill Center at 8:00 a.m. and the last run returns at 8:00 p.m. The route operates Monday through Friday. Timed transfers are available to Routes F2, F3, S1, and S4 at Lee's Hill Center. Figure 3-20 provides a map of the route with the activity data.

Figure 3-20: Route S5 – Lee's Hill Center / Germanna College Route Profile



Route VF1 – VRE Feeder Service Idlewild / Cowan Boulevard

Route VF1 connects residential neighborhoods to VRE commuter train service from the station in downtown Fredericksburg. This route runs only toward the train station in the morning and only away from the station in the afternoon and evening. The route provides connections to five VRE trains in the morning and from six trains in the afternoon and evening.

Activity is dispersed throughout the residential areas except for Cowan Boulevard, where activity is low. Service to Cowan Boulevard is by request only in the afternoon.

The first run leaves at 4:30 a.m. to meet the 5:05 a.m. VRE train. The last run departs the train station at 8:20 p.m. The route operates Monday through Friday. Figure 3-21 provides a map of the route with boarding/alighting data. VRE bus service does not operate when VRE trains are not running.

Route VS1 – Spotsylvania County VRE Feeder Service

Route VS1 connects two park and ride lots along Plank Road with VRE service from Downtown Fredericksburg.

Activity is dispersed fairly evenly between the two lots. Overall activity is higher in the afternoon and evening. This route serves six trains in the morning and seven trains in the afternoon and evening.

The first run leaves Gordon Road Commuter lot at 4:35 a.m. and the last run of the day returns to Gordon Road at 8:45 p.m. The route is timed to meet VRE trains and runs Monday through Friday. Figure 3-22 provides a map of the route with activity data.

Figure 3-21: Route VF1 – VRE Feeder Service Idlewild / Cowan Boulevard Route Profile

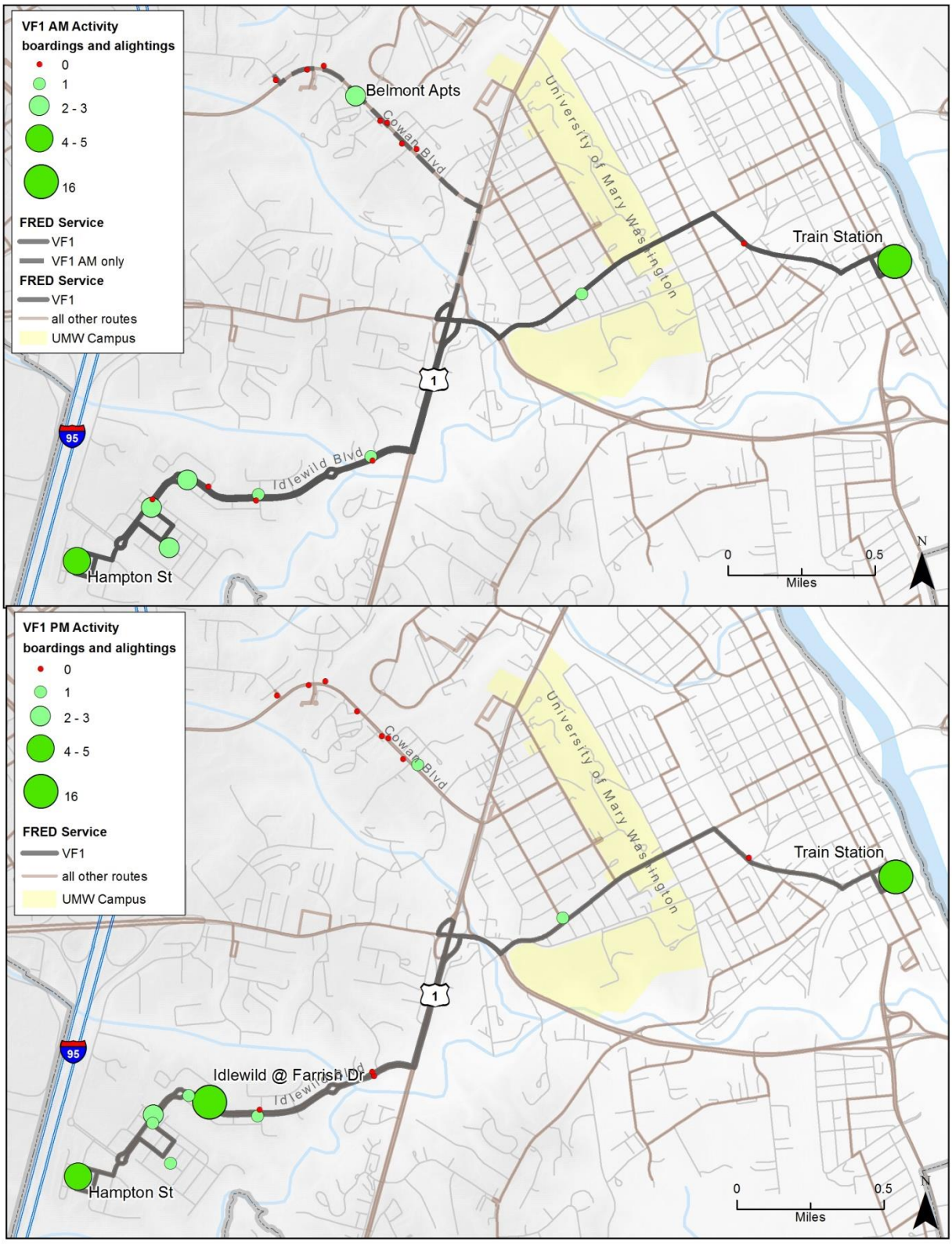
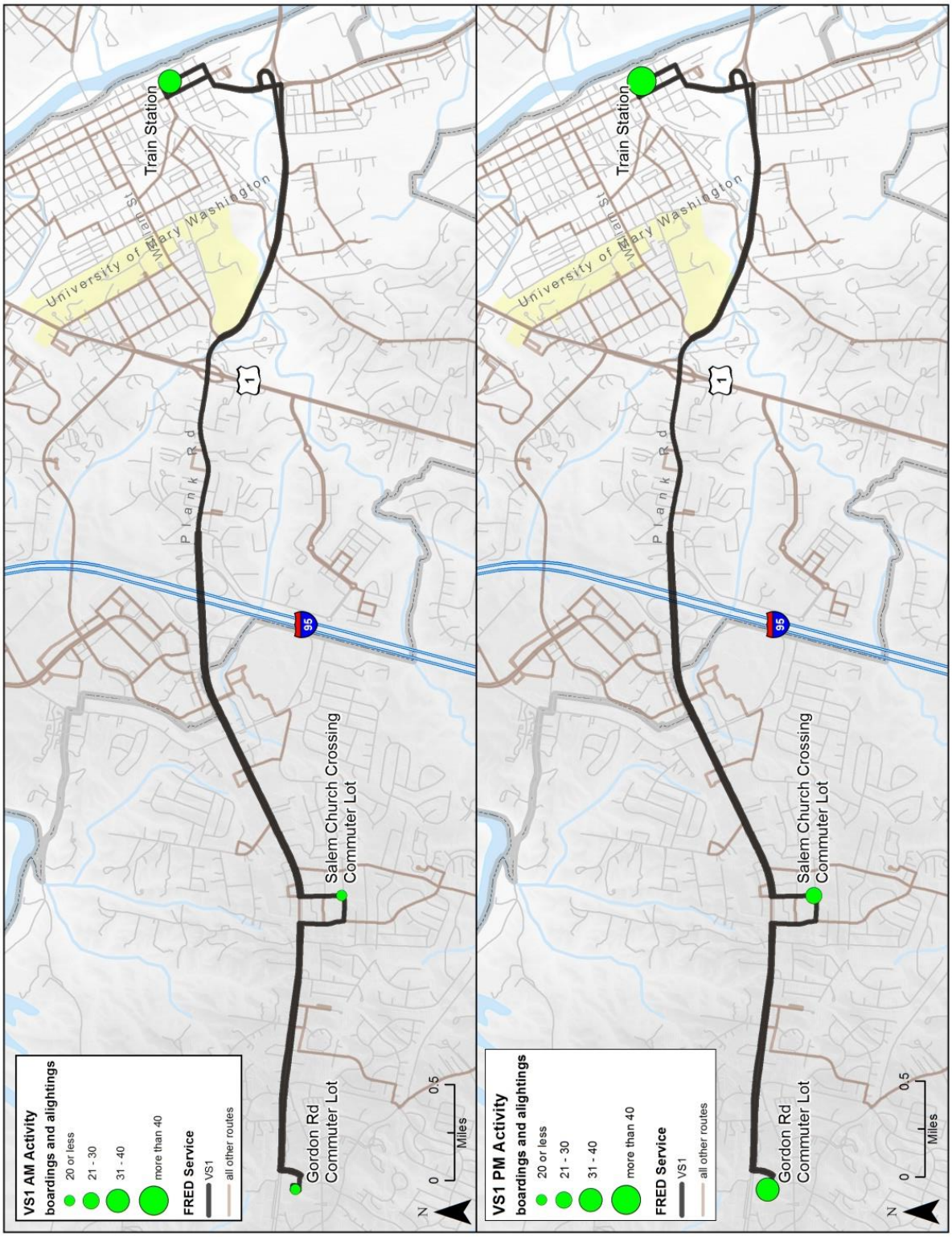


Figure 3-22: Route VS1 – Spotsylvania County VRE Feeder Service Route Profile



Highest Activity Stops

As shown in Table 3-4, the highest activity centers for FRED on the day of the counts were FRED Central, Lee's Hill Center, Fredericksburg VRE/Amtrak station, Walmart on Carl D. Silver Parkway, and Spotsylvania Towne Center. The top three stops serve as major transit transfer points and the fourth and fifth stop are both major shopping destinations served by more than one route.

Table 3-4: Highest Activity FRED Bus Stops- Boarding/Alighting Counts

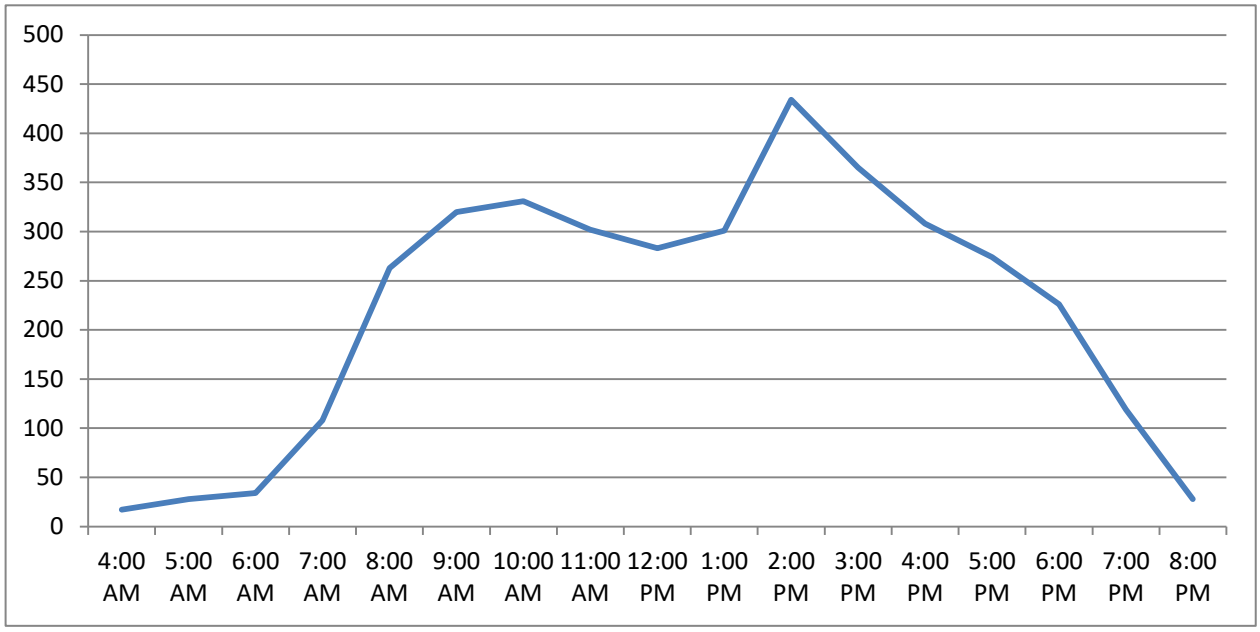
Stop Name	Boardings	Alightings	Total Activity
FRED Central	464	457	**921**
Lee's Hill Center @ Spotsylvania Ave	130	148	**278**
VRE / Amtrak Train Station	101	75	**176**
Carl D. Silver Pkwy @ Walmart	94	82	**176**
Spotsylvania Towne Centre	73	79	**152**
University of Mary Washington Main Entrance	56	59	**115**
Stafford County Courthouse	33	43	**76**
Central Park @Barnes & Noble	32	40	**72**
Eagle Village Shopping Center @ Giant	29	32	**61**
Fall Hill Avenue @ Fredericksburg Shopping Center	28	22	**50**
Stafford Marketplace @ Center Point	23	20	**43**
Fall Hill Avenue @ Heritage Park Apartments	22	21	**43**
Southpoint II @ Walmart	15	27	**42**
Rappahannock Regional Jail	14	27	**41**
Salem Church Crossing Commuter Lot	19	21	**40**
Olde Forge Drive @ Warrenton Rd	16	23	**39**
The Shops at Lee's Hill @ Food Lion	24	14	**38**
Germanna Community College	21	16	**37**
Spotsylvania Avenue @ Truong / Friendly's	12	21	**33**
Jackson Street @ RACSB / Health Department	23	10	**33**

Ridership by Time of Day

Another interesting dataset that was collected via boarding/alighting counts was system activity by time of day for each route. This section presents these data, using a series of graphs to show the data for the entire system, and then for each route, grouped alphabetically by route letter, starting with weekday services, followed by weekend services.

As shown in Figure 3-23, FRED's total system activity peaked at about 2:30 p.m. for the Monday count day, with activity levels of between 400 and 450 boardings/alightings. Activity was less than half of this peak prior to 8:00 a.m. and after 6:00 p.m.

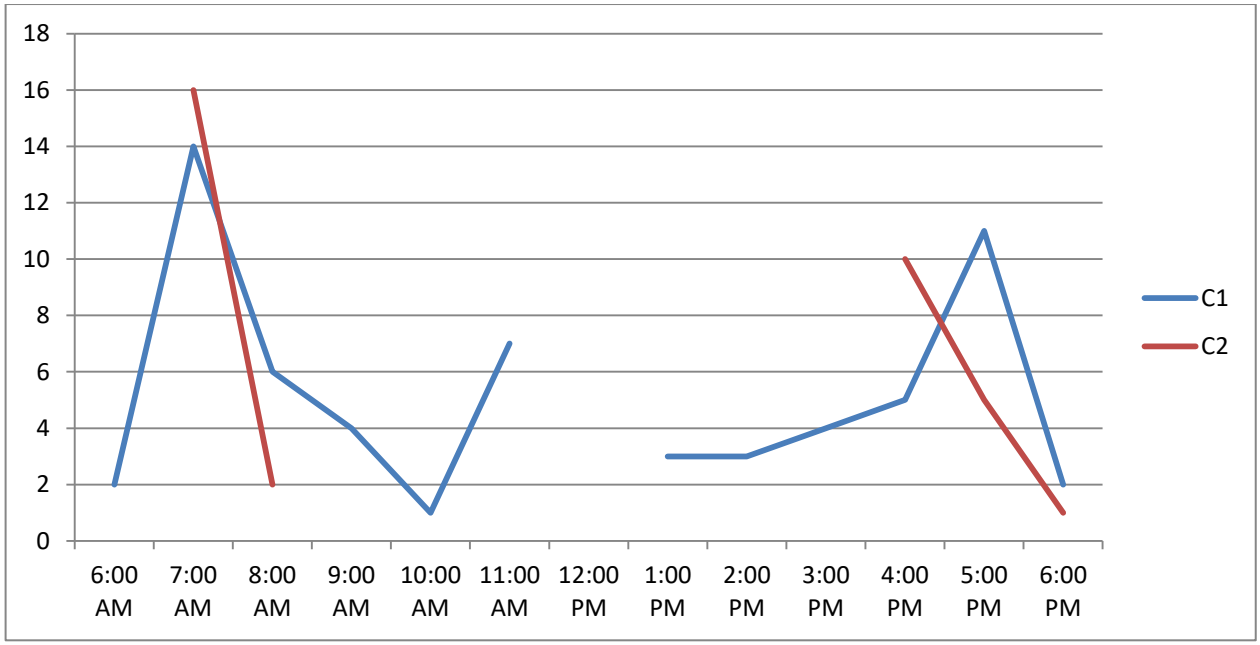
Figure 3-23: Total Activity by Time of Day, Entire System, Monday, April 11, 2016



C Routes Caroline County Service

As shown in Figure 3-24, activity on the C1 and C2 peaked in the morning at 7:00 a.m. for both routes. In the afternoon, the C2 peaked at 4:00 p.m. and the C1 peaked at 5:00 p.m.

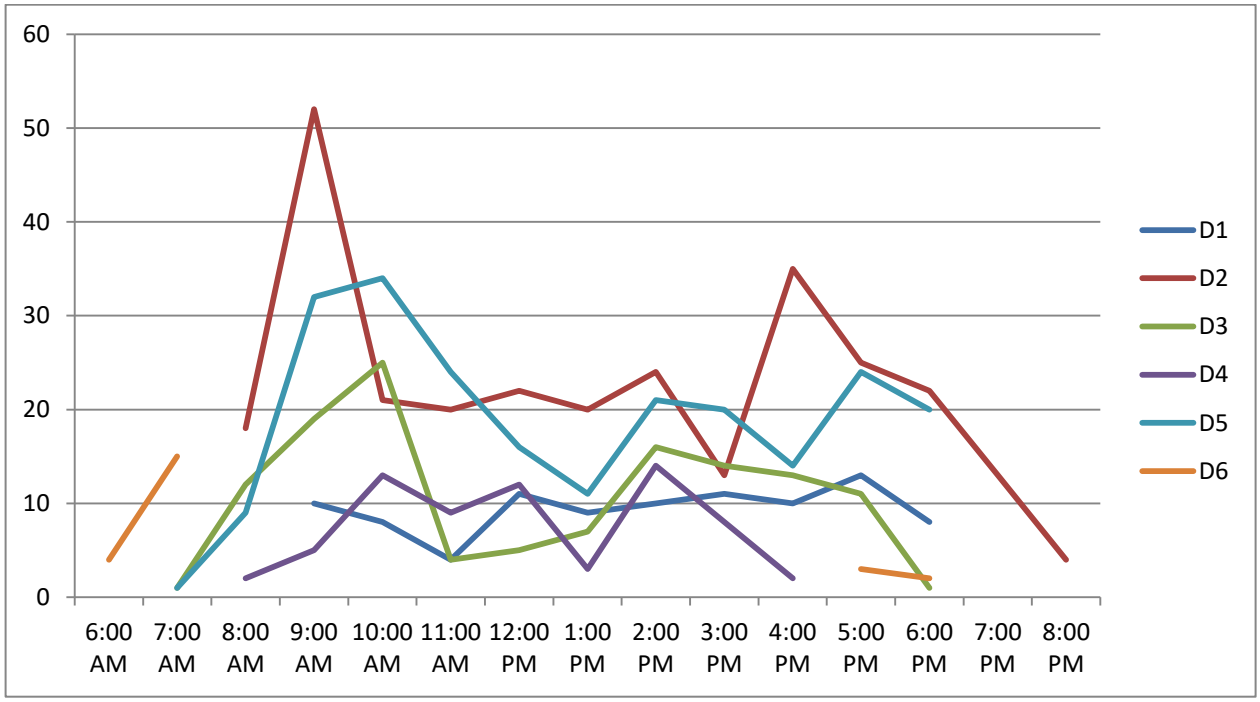
Figure 3-24: Route C1 and C2, Total Activity by Time of Day, April 11, 2016



D Routes- Stafford County Service

Boarding/alighting patterns by time of day are shown in Figure 3-25 for the D routes, which generally serve Stafford County. As the graph indicates, with the exception of the D6, routes generally had morning peaks between 9:00 a.m. and 10:00 a.m., which were the highest activity recorded for the day, and then a mid-day dip in activity. The D4 had a second peak at 2:00 p.m., and ended service at 4:00 p.m. The D3 had a 2:00 p.m. peak, with declining activity until the 6:00 p.m. terminus. The D2's second highest activity peak was at 4:00 p.m., and the D5 and D5 had second peaks at 5:00 p.m.

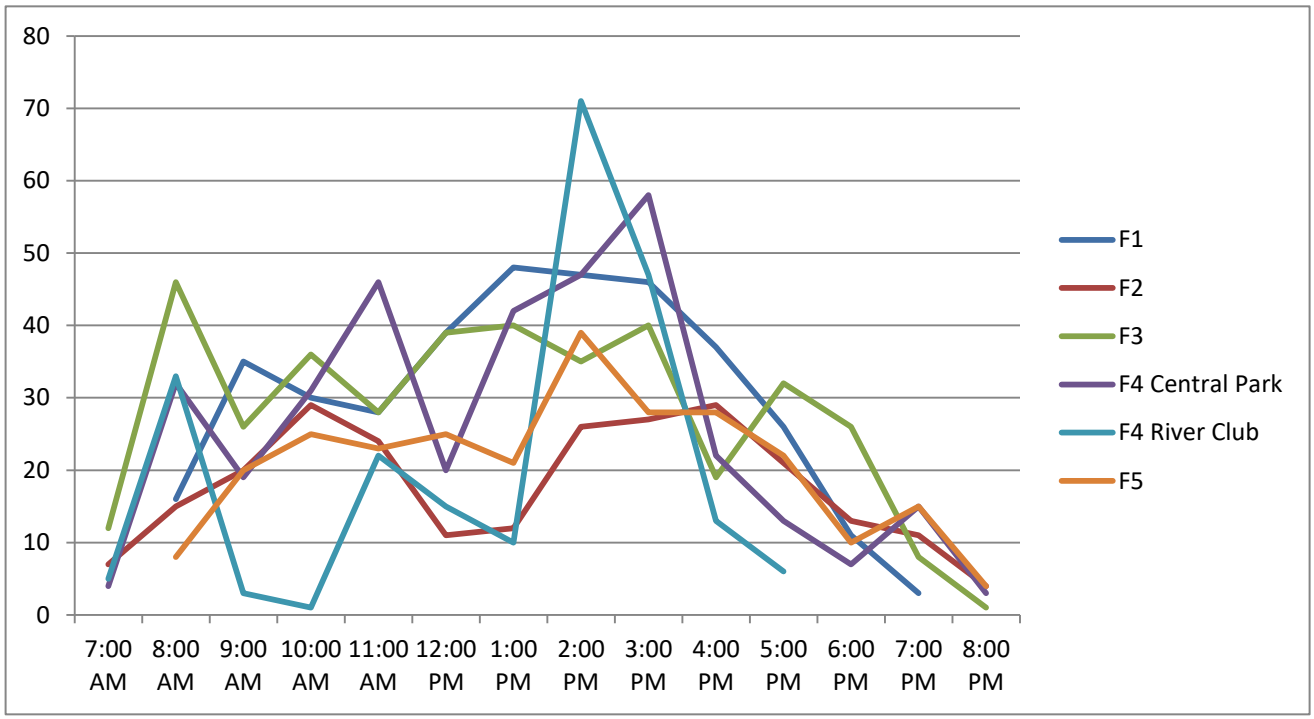
Figure 3-25: D Routes, Total Activity by Time of Day, April 11, 2016



F- Routes – Fredericksburg Service

Three of the Fredericksburg-area routes (F1, F4, and F5) experienced highest activity for the day in mid-afternoon (2:00 p.m. – 3:00 p.m.). Activity on all routes generally had some type of morning peak, followed by a mid-day decline and an afternoon peak. Activity on all of the F routes dropped significantly after 5:00 p.m. These data are shown in Figure 3-26.

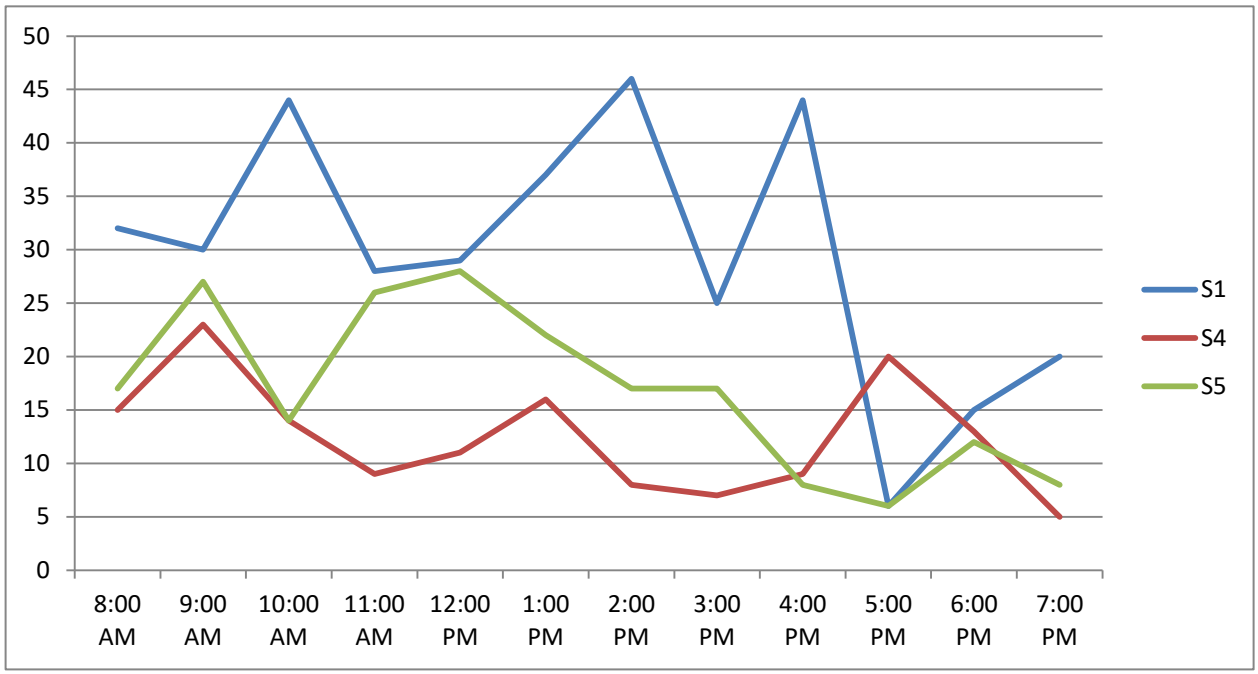
Figure 3-26: Fredericksburg Routes, Total Activity by Time of Day, April 11, 2016



S Routes - Spotsylvania

Activity patterns for the three S routes are shown in Figure 3-27. Each of the three routes exhibited a different activity pattern. The S1 had activity peaks at 10:00 a.m.; 2:00 p.m.; and 4:00 p.m. Both the S4 and the S5 had morning peaks at 9:00 a.m., and a dip at 10:00 a.m. Activity on the S5 rose again at 11:00 a.m. and noon; whereas activity on the S4 did not increase again until 1:00 p.m. Activity on the S5 slowed throughout the afternoon, while activity on the S4 showed an activity increase at 5:00 p.m.

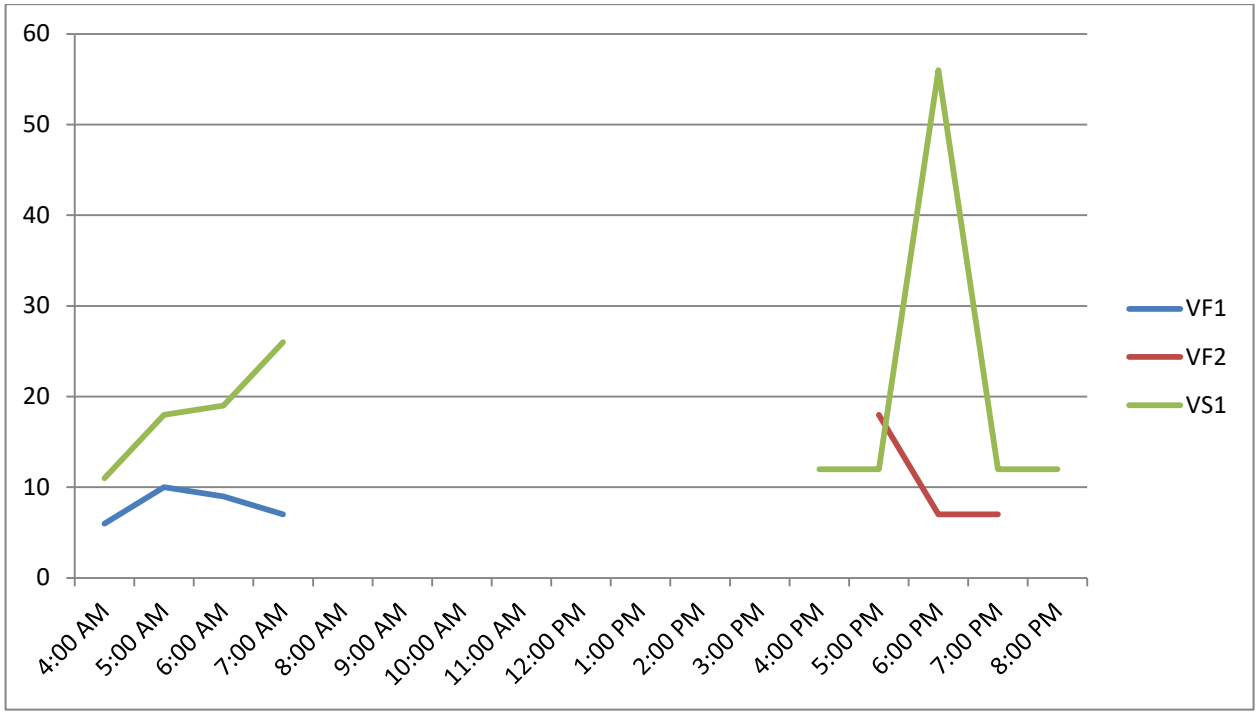
Figure 3-27: Spotsylvania County Service, Total Activity by Time of Day, April 11, 2016



VRE Feeder Routes

Of the three VRE feeder routes, the highest activity was seen between 6:00 p.m. and 7:00 p.m. on the VS1. Afternoon activity on this route was significantly higher than morning activity, as shown in Figure 3-28.

Figure 3-28: VRE Feeder Routes, Total Activity by Time of Day, April 11, 2016



University of Mary Washington Routes (E Routes)

The E1 and E2 are currently the only FRED routes that operate on Saturday and Sunday. Total activity by time of day was collected for these routes on Saturday, April 9 and Sunday, April 10, 2016. These data are presented in Figures 3-29 and 3-30.

On Saturday, the E1 had the highest activity at 1:00 p.m., while the E2 had two equally high peaks – 1:00 p.m. and 4:00 p.m. Both routes showed a dip in activity at 5:00 p.m. The late night service had very low ridership.

On Sunday, both routes showed an early afternoon peak, with the E1 peaking at 2:00 p.m. and the E2 peaking at 1:00 p.m.

Figure 3-29: E Routes, Total Activity by Time of Day, Saturday, April 9, 2016

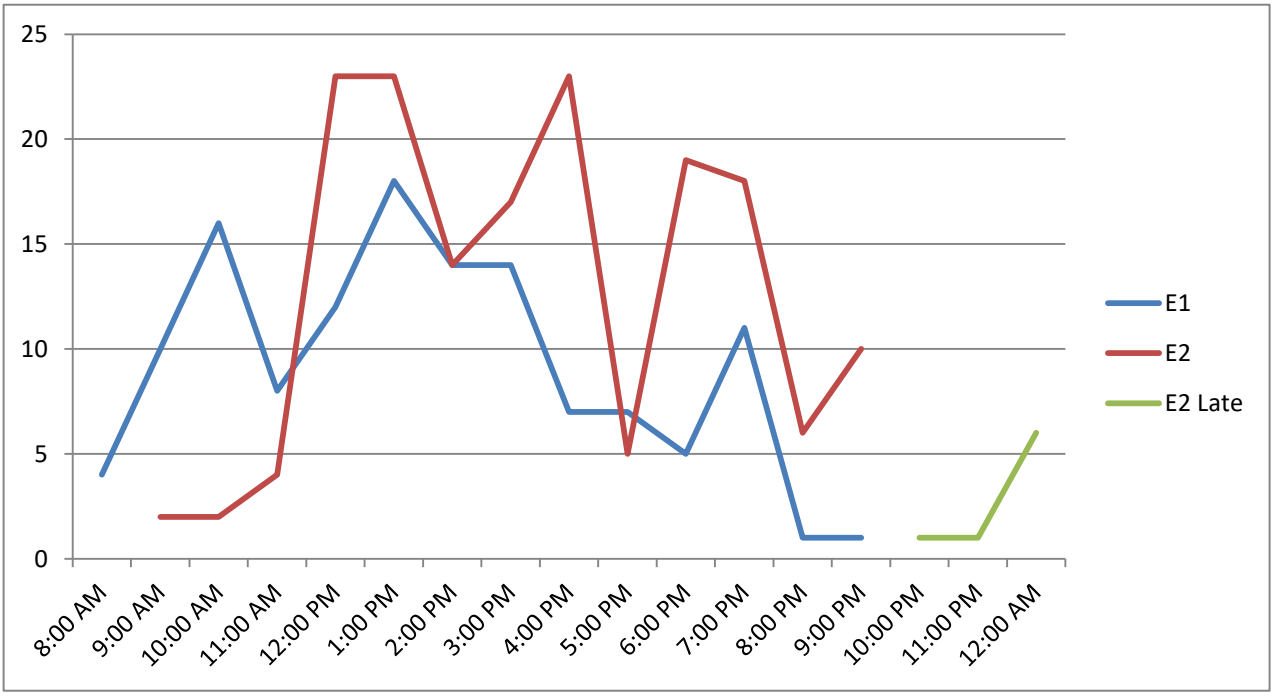
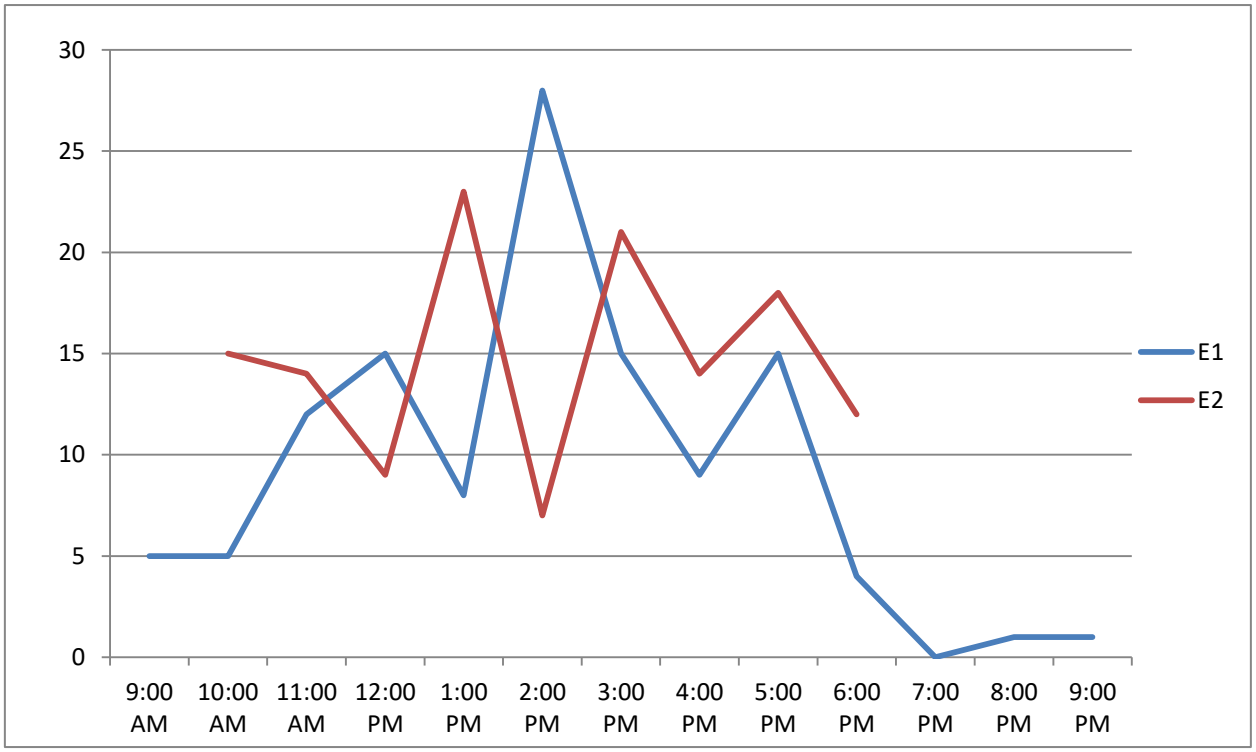


Figure 3-30: E Routes, Total Activity by Time of Day, Sunday, April 10, 2016



On-Time Performance

Time checks conducted in conjunction with boarding/alighting counts involved documenting actual departure time of the bus at time points listed on the schedules and comparing them to published times. Over the course of the three days, a total of 838 time checks were performed. Table 3-5 presents results of time checks by route. The VRE feeder routes were excluded from this table, as their timeliness is somewhat dependent upon the VRE arrival times. The D6 parking lot shuttle was also excluded, as time points are not published for this route.

- Early – Systems should avoid departing stops early as this can have a major negative impact on the rider's trip, particularly on routes with long headways. From a rider's perspective, a bus leaving early would mean they would have to wait one headway for the next vehicle. System wide, not including the VRE shuttles or the D6, 18% of the departures were considered early. The late night service had the highest incidence of early departures, most likely because the ridership was very low, making the running time faster than it would be with more passenger boardings and alightings.

- On-time – While the window of on-time can vary from agency to agency, the most common definition is zero minutes early to five minutes late[1]. FRED uses a standard of zero minutes early to ten minutes late. Routes that had the best on-time percentage were Routes D4, F1, E2, C1 and F3. Conversely, routes with the worst on-time percentages were Routes D1, E2 Late Night, S5, and C2.

- Late – Buses departing more than ten minutes after the scheduled time are considered late. Approximately 10% of time checks conducted over the survey period were considered late. If one or more route is running behind it can impact the entire system, given the timed transfer system that is in place.

[1] TCRP Report 98, A Guidebook for Developing a Transit Performance-Measurement System.

Table 3-5: On-Time Performance by Route

FRED Transit On-Time Performance- April 9-11, 2016							
Route	Early		On-Time			Late	
	4+ Minutes	1-3 Minutes	0-5 Minutes	6-10 Minutes	0-10 Minutes	11-19 Minutes	20+ Minutes
C1	0%	10%	60%	20%	80%	10%	0%
C2	0%	10%	60%	0%	60%	30%	0%
D1	0%	27%	39%	7%	46%	10%	17%
D2	4%	19%	58%	15%	73%	4%	0%
D3	18%	14%	68%	0%	68%	0%	0%
D4	0%	0%	100%	0%	100%	0%	0%
D5	8%	25%	54%	13%	67%	0%	0%
E1	0%	3%	47%	19%	66%	18%	13%
E2	0%	0%	85%	9%	94%	6%	0%
E2 Late Night	10%	40%	40%	10%	50%	0%	0%
F1	0%	3%	73%	24%	97%	0%	0%
F2	21%	9%	61%	3%	64%	6%	3%
F3	13%	7%	73%	5%	78%	2%	0%
F4	4%	17%	48%	21%	69%	10%	0%
F5	0%	0%	56%	24%	80%	20%	0%
S1	19%	5%	58%	13%	71%	5%	0%
S4	0%	19%	42%	21%	63%	14%	4%
S5	16%	15%	42%	12%	54%	15%	0%
System Wide	**6%**	**12%**	**59%**	**12%**	**71%**	**8%**	**2%**

Note: Not including the VRE feeder service or the D6 parking lot shuttle.

Data Comparison

In order to see how accurate the boarding/alighting counts were, the study team compared data collected on the count days with ridership data provided by FRED. These data show that the boarding/alighting counts recorded 6.3% more boardings than the FRED data. While it is not possible to determine which numbers are the most accurate, the general patterns of ridership by stop and ridership by time of day for the boarding/alighting data are likely to be valid. Our previous experiences with boarding/alighting counts suggest that over- or under-counting typically occurs at the transfer location, where this activity can be confusing to verify. These data are provided in Table 3-6.

Table 3-6: Data Comparison

Route	Observed Boardings	FRED Data-Run Level	Number Difference	Percent Difference	Notes
C1	31	25	6	19%	
C2*	17	20	-3	-18%	
D1	47	46	1	2%	
D2	145	143	2	1%	
D3	64	83	-19	-30%	
D4*	34	37	-3	-9%	
D5	113	116	-3	-3%	
D6	16	12	4	25%	
E1 SAT	65	58	7	11%	
E1 SUN	62	58	4	6%	
E2 LN	4	0	4	100%	
E2 SAT	81	44	37	46%	No FRED data for PM
E2 SUN	65	60	5	8%	
F1	183	143	40	22%	
F2	128	124	4	3%	
F3	199	181	18	9%	
F4	296	279	17	6%	
F5	134	137	-3	-2%	
S1A*	104	114	-10	-10%	
S1B	77	58	19	25%	
S4	75	71	4	5%	
S5	99	101	-2	-2%	
VF1 NORTH	16	16	0	0%	
VF1 SOUTH	18	18	0	0%	
VS1A NORTH	21	15	6	29%	
VS1A SOUTH	28	28	0	0%	
VS1B NORTH	16	18	-2	-13%	
VS1B SOUTH	25	22	3	12%	
Totals	**2,163**	**2,027**	**6.3%**		

* For these routes, some of the ridership by run data were collected later in the week, so the two sets of data were not expected to be the same.

FINANCIAL ANALYSIS

Operating Expenses

The fiscal year 2015 actual operating expenses for FRED were $3.4 million. Table 3-7 provides the individual line item expenses for the year. These expenses are broken down by cost center, including the City of Fredericksburg, Spotsylvania County, University of Mary Washington, Stafford County, and Caroline County.

The FY2016 actual operating expenses for FRED were $3,620,194. The FY2016 expenses were not provided by line item.

Table 3-7: FY2015 Operating Expenses by Cost Center

Operating Item	Cost Center					FRED Total
	City	Spotsylvania County	UMW	Stafford	Caroline	
Salaries & Wages - Regular	$268,802	$180,971	$22,694	$190,197	$51,807	$714,471
Overtime Pay	$2	$2	$0	$2	$0	$6
Salaries & Wages - Part Time	$486,190	$333,275	$41,823	$350,266	$95,408	$1,306,961
FICA Benefits	$56,727	$38,634	$4,847	$40,604	$11,060	$151,872
Retirement – Other	$281	$193	$24	$203	$55	$756
Hospital/Medical Plan	$53,950	$36,982	$4,641	$38,867	$10,587	$145,027
Dental Insurance	$1,232	$862	$108	$906	$247	$3,355
Health Spending Account – Employer	$1,116	$765	$96	$804	$219	$3,000
Group Life Insurance	$3,122	$2,140	$269	$2,249	$613	$8,393
Long Term Disability	$166	$114	$14	$119	$33	$446
Worker's Compensation	$26,885	$18,429	$2,313	$19,369	$5,276	$72,271
Cell Phone Allowances	$893	$612	$77	$643	$175	$2,400
VRS Pension Benefits	$21,251	$14,567	$1,828	$15,310	$4,170	$57,127
Professional Services – Accounting	$37,200	$25,500	$3,200	$26,800	$7,300	$100,000
Professional Services - Other	$20,361	$13,957	$1,752	$14,669	$3,996	$54,735
Custodial Services	$10,284	$7,049	$885	$7,409	$2,018	$27,644
Repairs & Maintenance	$10,610	$7,396	$928	$7,951	$2,117	$29,002
Maintenance Service Contracts	$8,725	$5,981	$751	$6,286	$1,712	$23,453
Printing & Binding	$3,397	$2,329	$1,167	$2,448	$667	$10,008
Advertising	$12,251	$8,398	$3,002	$8,826	$2,404	$34,880
Electrical Services	$13,683	$9,380	$1,177	$9,858	$2,685	$36,783
Heating Services	$3,738	$2,562	$322	$2,693	$734	$10,048

Operating Item	Cost Center					FRED Total
	City	Spotsylvania County	UMW	Stafford	Caroline	
Water & Sewer Services	$1,492	$1,023	$128	$1,075	$293	$4,010
Postage & Postal Service	$210	$144	$18	$151	$41	$565
Telecommunications	$17,870	$11,740	$1,467	$12,285	$3,295	$46,658
Motor Vehicle Insurance	$17,517	$12,040	$1,558	$12,654	$3,447	$47,215
Lease/Rental of Equipment	$610	$418	$53	$440	$120	$1,641
Mileage	($106)	$31	$4	$32	$9	($30)
Subsistence & Lodging	$4,616	$688	$86	$723	$197	$6,310
Convention & Education	$2,737	$712	$89	$748	$204	$4,490
Dues & Association Memberships	$665	$456	$57	$479	$131	$1,788
Office Supplies	$5,898	$4,043	$507	$4,249	$1,157	$15,856
Janitorial Supplies	$768	$526	$66	$553	$151	$2,064
Repair & Maintenance Supplies	$51,315	$35,175	$4,414	$36,969	$10,070	$137,943
Motor Fuel & Lube	$130,217	$67,401	$7,898	$69,444	$39,617	$314,577
Vehicle/Power Equip. Supplies	$5,347	$3,666	$460	$3,852	$1,049	$14,375
Uniforms & Wearing Apparel	$5,504	$3,773	$473	$3,965	$1,080	$14,796
Books & Subscriptions	$0	$0	$0	$0	$0	$0
Educational & Recreational Supplies	$209	$144	$18	$151	$41	$563
Other Operating Supplies	$47	$32	$4	$34	$9	$125
Total Operating	**$2,135,013**	**$856,385**	**$109,753**	**$898,773**	**$265,417**	**$3,405,584**

Capital Expenses

Table 3-8 provides capital expenses for FY2015, which included motor vehicle equipment and ADP equipment replacements; additional machinery, furniture, communications equipment; motor vehicle equipment, and ADP software. The largest entry in the table is for depreciation on facilities and buses, which is not a true capital expense.

Table 3-8: FY2015 Capital Expenses by Cost Center

Capital Items	Fredericksburg	Spotsylvania County	UMW	Stafford	Caroline	Total Urban	FRED Total
Motor Vehicles & Equipment- Replacement	$1,120	$768	$96	$807	$220	$2,790	$3,010
ADP Equipment - Replacement	$9,186	$199	$25	$210	$57	$9,620	$9,677
Depreciation	$834,099	$0	$0	$0	$0	$834,099	$834,099
ADP Software - Replacement	$0	$0	$0	$0	$0	$0	$0
Improvements & Betterments – Replacement	$252	$173	$22	$182	$50	$629	$679
Machinery & Equipment - Additions	$1,361	$933	$117	$981	$267	$3,393	$3,660
Furniture & Fixtures - Additions	$550	$377	$47	$397	$108	$1,371	$1,479
Communications Equipment- Additions	$0	$0	$0	$0	$0	$0	$0
Motor Vehicles & Equipment – Additions	$0	$0	$0	$0	$0	$0	$0
ADP Equipment – Additions	$1,323	$907	$114	$953	$260	$3,297	$3,557
ADP Software – Additions	$0	$0	$0	$0	$0	$0	$0
Improvements & Betterments – Additions	$1,338	$917	$115	$964	$262	$3,333	$3,595
Total Capital Outlays	**$849,230**	**$4,275**	**$536**	**$4,492**	**$1,224**	**$858,533**	**$859,757**
Total Capital Less Depreciation	**$15,131**	**$4,275**	**$536**	**$4,492**	**$1,224**	**$24,434**	**$25,658**

Funding Sources

FRED's operating expenses are funded through fare revenue, contract revenue, as well as federal, state, and local assistance. Table 3-9 provides the detailed breakdown of FRED's operating funding for FY2015.

FRED's capital expenses, not including depreciation, were funded primarily through federal (80%) and state funds (16%), with a 4% local match.

Table 3-9: FY2015 Operating Funding Sources for FRED

Funding Source	Caroline	FRED	Totals
Revenue			
Fare Revenue	$ 10,300	$ 393,621	$ 403,921
Contract Revenue	0	$ 75,128	$ 75,128
Other Revenue	$ -	$ 99,500	$ 99,500
	$ 10,300	$ 568,248	$ 578,549
Gov't Assist.			
Federal	$ 129,144	$ 866,097	$ 995,241
State	$ 53,625	$ 669,884	$ 723,509
Local	$ 71,124	$ 1,037,161	$ 1,108,285
	$ 253,893	$ 2,573,142	$ 2,827,035
Total Funding	$ 264,193	$ 3,141,390	$ 3,405,584

RECENT COMPLIANCE RESULTS

In 2014, a Federal Transit Administration (FTA) Triennial Review of FRED was conducted. A Triennial Review is required every three years for recipients of Section 5307 Urbanized Area Formula Grants. The review focused on FRED's compliance in 17 compliance areas. These areas included:

- Financial Management and Financial Capacity
- Technical Capacity
- Maintenance
- Americans with Disability Act (ADA)
- Title VI
- Procurement
- Disadvantaged Business Enterprise (DBE)
- Legal
- Satisfactory Continuing Control
- Planning/Program of Projects
- Public Comment on Fare Increases and Major Service Reductions
- Half Fare
- Charter Bus
- School Bus
- Security
- Drug Free Workplace and Drug and Alcohol Program
- Equal Employment Opportunities (EEO)

The review focused on procedures and practices in place for the past three years.

The Triennial Review found FRED to be compliant in 14 of the 17 compliance areas. The areas in which there were deficiencies included procurement (12 deficiencies), disadvantaged business enterprise (2 deficiencies), and half fare (1 deficiency). FRED worked with the FTA to close out each of the findings and received a close-out letter from the FTA dated March 24, 2015.

PEER REVIEW AND ANALYSIS

In order to better understand how FRED's operating and performance characteristics compare to peers within the transit industry, data on five peer systems were collected from the FY204 National Transit Database (NTD). Annual data collected for the peer review focused on the following basic operating statistics: unlinked passenger trips; revenue miles; revenue hours; operating expenses; and fare revenue.

Locating peers for FRED is somewhat difficult, as there are few systems of FRED's size that operate deviated fixed routes services. In addition, unlike FRED, most small city systems do not operate in multiple jurisdictions that include both urban and rural areas. The study team used the following basic criteria for peer systems: 1) operate both urban and rural services; 2) located in an exurban area; 3) located within a few hundred miles of Fredericksburg; 4) number of annual revenue service hours; 5) annual operating expenses; and 6) fleet size.

The following programs were used as peers:

- Charles County VanGO, Port Tobacco, Maryland
- TransIT Services of Frederick County, Frederick, Maryland
- Greenville Transit Authority, Greenville, South Carolina
- Harford Transit, Abingdon, Maryland
- Williamsburg Area Transit Authority, Williamsburg, Virginia (directly operated service only)

Key findings from the peer review were as follows:

- FRED was the only one of six agencies that uses route deviation rather than providing ADA complementary paratransit.

- FRED provided fewer annual passenger trips than the mean of the group. In FY2014 FRED recorded 495,501 passenger trips as compared to the fixed route mean of 718,072 passenger trips.

- FRED's productivity in terms of passenger trips per revenue hour was lower than peer systems, even when fixed route and paratransit modes were combined for peers.

- FRED's annual operating expenses were lower than all but one of the peer systems and FRED's cost per hour was the lowest among the peer group.

- FRED's farebox recovery was slightly lower than the mean combined farebox recovery for the peer group. (11.3% for FRED; 12% for the peer group as a whole, including both fixed route and demand response modes).

Given these data, it appears that FRED's strength as compared to the peer group is in controlling costs. FRED did not compare as favorably for the measures that include ridership. It should be noted that the service area population for FRED is lower than the mean of the peer group, as is population density. These characteristics have a direct effect on FRED's ridership. Peer data is provided in Table 3-10.

Table 3-10: Selected Peer Comparison

Feature	Mode	FRED	Charles County VanGo (Maryland)	Frederick Transit (Maryland)	Greenville Transit Authority (South Carolina)	Harford Transit (Maryland)	Williamsburg Area Transit Authority (1)	Mean
Number of Vehicles	MB	20	15	16	16	15	23	18
	DR		11	18	5	14	4	10
Vehicle Revenue Hours	MB	51,554	59,558	56,277	46,962	25,196	56,230	49,296
	DR		20,262	21,089	6,349	17,467	2,300	13,493
Vehicle Revenue Miles	MB	765,935	1,168,442	635,027	653,965	463,141	940,642	771,192
	DR		230,250	423,813	84,417	281,516	36,750	211,349
Passenger Trips	MB	495,501	736,428	770,028	996,071	313,676	996,725	718,072
	DR		32,235	69,269	8,939	40,067	4,302	30,962
Operating Expenses	MB	$3,757,573	$4,663,561	$4,215,177	$5,153,902	$2,195,313	$4,823,336	4,134,810
	DR		$1,239,778	$1,602,301	$788,386	$1,402,282	$232,397	1,053,029
Fare Revenue	MB	$423,081	$362,507	$617,511	$966,083	$217,294	$594,586	530,177
	DR		$12,492	$387,519	$31,701	$75,007	$7,329	102,810
Base FR Fare		$1.00	$1.00	$1.50	$1.50	$1.00	$1.25	1.21
Trips/Hour	MB	9.6	12.4	13.7	21.2	12.4	17.7	14.6
	DR	-	1.6	3.3	1.4	2.3	1.9	2.3
Trips/Mile	MB	0.6	0.6	1.2	1.5	0.7	1.1	0.9
	DR	-	0.14	0.16	0.11	0.14	0.12	0.15
Miles/Hour	MB	14.9	19.6	11.3	13.9	18.4	16.7	15.6
	DR	-	11.4	20.1	13.3	16.1	16.0	15.7
Cost/Trip	MB	$7.58	$6.33	$5.47	$5.17	$7.00	$4.84	$5.76
	DR	$0.00	$38.46	$23.13	$88.20	$35.00	$54.02	$34.01
Cost/Hour	MB	$72.89	$78.30	$74.90	$109.75	$87.13	$85.78	$83.88
	DR	$0.00	$61.19	$75.98	$124.17	$80.28	$101.04	$78.04
Farebox Recovery	MB	11.3%	7.8%	14.6%	18.7%	9.9%	12.3%	12.8%
	DR	n.a.	1.0%	24.2%	4.0%	5.3%	3.2%	9.8%
Service Area Size (sq.mi)		242	461	73	227	131	144	213
Service Area Population		113,716	146,551	141,576	248,173	218,590	57,000	154,268
Population Density		470	318	1,939	1,093	1,669	396	724

(1) Data includes only WATA operated services

Source: 2014 NTD and Internet research

ONBOARD RIDER SURVEYS

An important task for the TDP was to gather opinions from system users concerning FRED's current deviated fixed route services, and to develop a generalized passenger profile. With input from FRED staff, an onboard survey was prepared for these purposes. The survey was administered on board FRED vehicles on April 9, April 10 and April 11, 2016, in conjunction with boarding/alighting counts. Temporary workers, supervised by KFH Group staff, distributed and collected surveys from riders. A copy of the onboard survey is provided in Appendix A.

Results

The survey effort resulted in 296 completed surveys. Using standard statistical tables for determining sample size requirements for finite populations, this level of survey participation indicates that we can be 95% confident (+/- between 5% and 10%) that survey responses reflect the views of FRED riders. The finite population of FRED riders was estimated to be approximately 4,000.

Responses by Route

As shown in Table 3-11, completed surveys were received from all routes in the system with the exception of Route D3 North Stafford and Route E2LN Eagle Express. A significant portion of responders (25%) did not indicate the route they were on. The most number of surveys were collected were from routes D2 South Stafford and F4 Fredericksburg.

Table 3-11: Survey Responses by Route

Route	Count	Percent
C1/C2 Caroline	13	4%
D1 South Stafford	9	3%
D2 South Stafford	32	11%
D3 North Stafford	0	0%
D4 North Stafford	1	0%
D5 South Stafford	17	6%
D6 North Stafford	0	0%
E1 Eagle Express	6	2%
E2 Eagle Express	12	4%
E2LN Eagle Express	0	0%
F1 Fredericksburg	12	4%
F2 Fredericksburg	9	3%
F3 Fredericksburg	4	1%
F4 Fredericksburg	28	10%
F5 Fredericksburg	11	4%
S1 Spotsylvania	20	7%
S4 Spotsylvania	13	4%
S5 Spotsylvania	19	6%
VF1 Fred. VRE	4	1%
VS1 Spots. VRE	11	4%
No Responses	75	25%
Total Answering Question	**296**	**100%**

Trip Information

The survey asked participants if their trip is part of a round-trip on the bus. Forty-two percent of those who responded indicated that their trip is part of a round-trip.

Table 3-12 identifies the number of FRED buses it took to complete the one-way portion of the participant's trip. According to the survey responses it took at least two buses for the majority of the riders to complete the one-way portion of their trip.

Table 3-12: Number of FRED Buses to Complete One-Way Trip

Number of FRED buses	Count	Percent
1	88	32%
2	122	44%
3	44	16%
4+	25	9%
Total Answering Question	**279**	**100%**

Trip Purpose

The survey responses indicated that work was the primary trip purpose (45%) followed by Shopping/ Errands (18%) and Other Purposes (14%). Table 3-13 summarizes the trip purposes for FRED riders.

Table 3-13: Trip Purpose

Trip Purpose	Count	Percent
Work	122	45%
Shopping/Errands	48	18%
Other	38	14%
Medical/Dental	23	8%
School	20	7%
Social/Recreational	18	7%
Tourism	3	1%
Child Care	2	1%
Total Answering Question	**274**	**100%**

Where passengers are coming from and how do they access FRED?

The next set of questions was asked to gain understanding of where FRED riders' trips are starting and how passengers are getting to the bus stop. The results show that over half of the trips start from home (64%) followed by other (12%) and work (10%). This information is not particularly meaningful, as riders were instructed to complete only one survey. It is assumed that the passenger would complete a survey on his/her first trip of the day, which would likely be from home.

The next element of this analysis is meaningful and indicates the different ways FRED riders travel to bus stops. Walking is by far the method most used (72%), followed by driving alone

(7%) and using another bus (6%). Those who indicated walking typically walk between one and four blocks to reach their bus stop.

FRED riders mostly walk in order to get to their final destinations once they are off the bus (65%) followed by catching another bus (17%). Those who reported walking from their final destination typically walk one to two blocks. The data from this question may have been confusing for riders, as some appeared to interpret the question as getting off of the particular bus that they were riding, while others interpreted the question as getting off of the final bus that they need to take to get to their destination.

Satisfaction with FRED and Requested Service Improvements

FRED riders were asked several questions pertaining to their satisfaction with different aspects of FRED service. These questions were also asked to solicit input on what FRED riders like the most and least about the service and to obtain suggestions for improvements that would make service better.

Passengers Satisfaction

Specifically, riders were asked to rate their level of satisfaction with FRED services from strongly satisfied to having no opinion about the service. Figure 3-31 illustrates the levels of satisfaction or dis-satisfaction with the overall service FRED offers. The results show that 40% of riders are satisfied with FRED's overall service and 30% are strongly satisfied.

Figure 3-31 Overall Service Satisfaction Level

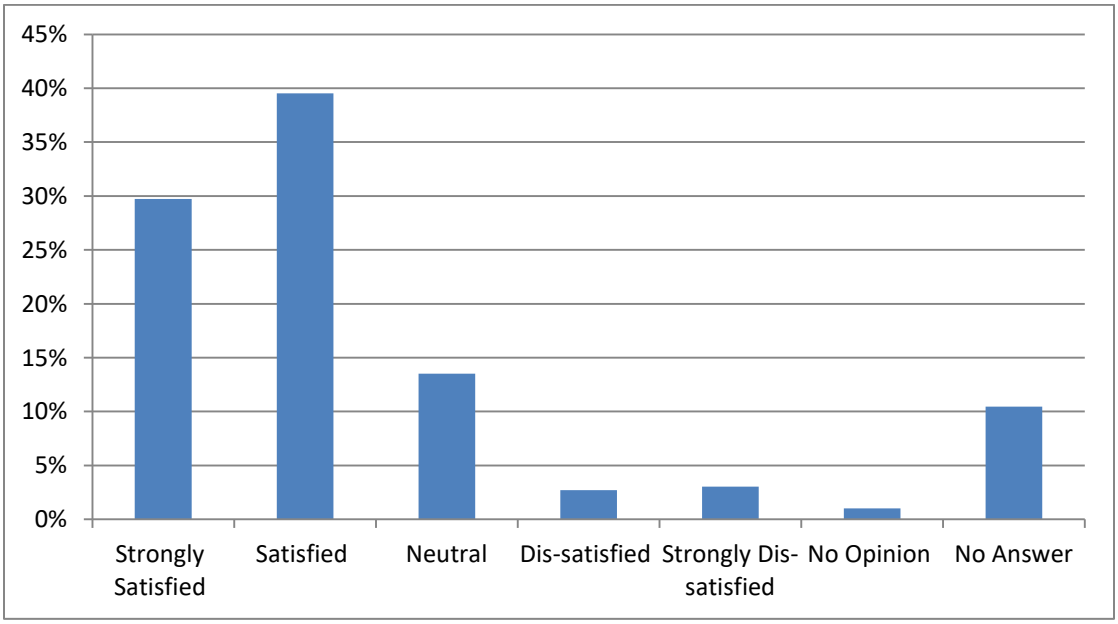


Table 3-14 displays a list of several service characteristics for FRED. Participants were asked to rate their level of satisfaction with each characteristic. Riders are strongly satisfied with the cleanliness of the buses (39%) followed closely by the courtesy and friendliness of bus drivers (38%). While none of the characteristics exhibited predominantly negative ratings, the four areas that had the most negative results were the hours of bus service (28% negative), the on-time performance (16% negative), the areas served by the buses (16% negative) and frequency of bus service (16% negative). It should be noted that 70% of the respondents indicated that they were either satisfied or strongly satisfied with the overall service, with only 6% reporting negative opinions for the overall service category.

Table 3-14: Satisfaction Level of FRED Service

Areas of Satisfaction	Strongly Satisfied	Satisfied	Neutral	Dissatisfied	Strongly Dissatisfied	No Opinion	No Answer
Frequency of Bus Service	25%	35%	15%	8%	8%	1%	8%
Areas that are served by Bus-Routes	25%	32%	14%	9%	7%	1%	11%
Bus Running On-Time	23%	35%	16%	11%	5%	0%	9%
Hours of Bus Service	18%	26%	16%	15%	13%	1%	12%
Availability of Transit Information	29%	35%	15%	2%	3%	1%	14%
Cost of the Bus Fare	34%	34%	13%	5%	3%	1%	10%
Sense of Security on Buses	32%	39%	14%	2%	2%	1%	10%
Sense of Security at Stops	29%	36%	17%	4%	2%	2%	10%
Cleanliness of Buses and Stations	39%	37%	10%	2%	3%	0%	8%
Courtesy/Friendliness of Bus Drivers	38%	32%	13%	4%	2%	1%	9%
Overall Service	30%	40%	14%	3%	3%	1%	10%

Passengers Likes and Dislikes

The survey asked participants to address what they like most and least about FRED. Participants were not given choices but instead were able to write in their responses. Those results were then placed into the categories listed in Table 3-15. The most frequently mentioned positive attribute of FRED was its dependability and availability, followed by price and drivers.

Table 3-15: What Riders like Most about FRED

Category	Count	Percent
Dependability/Availability	78	32%
Price	46	19%
Drivers	45	18%
Convenience	32	13%
Amenities	10	4%
Experience	9	4%
Fast/Quick	6	2%
Everything	5	2%
Nothing	5	2%
Cleanliness	4	2%
Frequency	2	1%
NA	2	1%
Total Answering Question	**244**	**100%**

Service availability and hours were documented as being what riders liked least about FRED (40%). Table 3-16 summarizes what FRED riders like least about FRED.

Table 3-16: What Riders Like Least about FRED

Category	Count	Percent
Service Availability/ Hours	87	40%
No Complaints	33	15%
Late/Early	29	13%
Amenities and Technology	17	8%
Travel Time	14	6%
Customer Service/ Drivers	11	5%
All Other Answers	10	5%
Cleanliness	7	3%
Frequency	6	3%
Price	3	1%
Total Answering Question	**217**	**100%**

Forty-six percent of FRED riders feel there are places in the region that they need to go but currently FRED does not provide service to that area. Survey participants were then asked to indicate locations of these places. There were a variety of places listed, with the most responses for the Walmart on Route 17 (Stafford Lakes area), Spotsylvania County, King George, Harrison Crossing, King George, and Ashland.

When asked if they believe FRED is a good value for the services received, 84% indicated that it is.

Improvements

FRED riders were asked to choose the top three improvements they deemed to be most useful. The top three improvements riders suggested were weekend service (59%), followed by more frequent service (32%) and bus stop shelters/benches (32%).

Survey participants were also asked to indicate what service improvement they would make if they were able to only make one service improvement. Forty-two percent of FRED riders who offered a suggestion said weekend service would be their top improvement followed by earlier and/or extended hours (18%). These results are provided in Table 3-17.

In the general comments section, there were also specific suggestions to meet every VRE train, to offer free transfers, to participate in Google Maps, to offer more service near Spotsylvania Courthouse, and easier to read maps.

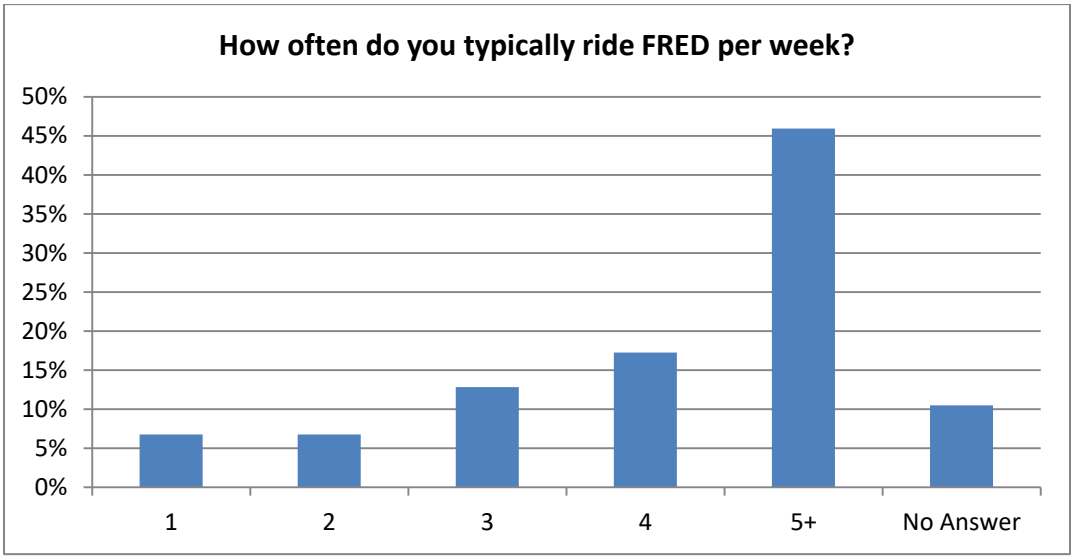
Table 3-17: Suggested Service Improvements

Category	Count	Percent
Weekend Service	76	42%
Earlier/ Extended Hours	33	18%
Frequency	18	10%
All Other Answers	16	9%
Amenities and Technology	14	8%
Bus Stop Shelters/ Benches	14	8%
More Bus Stops, Buses, Routes	7	4%
Improved Travel Time	2	1%
Total Providing a Suggestion	**180**	**100%**

Passenger Profile

Several questions on the survey asked riders to provide information about themselves. These responses are summarized below to form the FRED passenger profile. Figure 3-32 shows that FRED riders often take the bus more than five times a week.

Figure 3-32: Passenger Ridership per Week



Residency

The survey asked riders to identify their home ZIP code. The majority of ZIP codes reported are in the Fredericksburg area (22401 – 22406). Table 3-18 includes the full listing of ZIP codes reported by survey participants.

Table 3-18: ZIP Codes of Survey Participants

Zip Code	Count	Zip Code	Count
22401	84	23015	1
22407	40	24060	1
22408	29	22046	1
22405	26	22402	1
22406	20	22404	1
22427	3	22560	1
22485	3	20019	1
22403	2	33407	1
22514	2	22191	1
22534	2	22193	1
22555	2	23693	1

Zip Code	Count	Zip Code	Count
22546	7	27401	1
22553	6	22580	1
22551	4	22545	1
22554	4	22026	1
22556	4	22015	1

Number of People in the Household

Survey participants were asked how many people live in their household. The majority of FRED riders have at least 2 people living in their household. Table 3-19 shows the number of people in FRED riders' households, as reported in the survey.

Table 3-19: Number of People Living in Household

Number of People in Household	Count
1	35
2	60
3	49
4	33
5	25
6	16
7	13
8	1
9	1
10	1
No Answer	62

Gender

Of the 261 survey participants that provided a response, 51% reported that they are male and 49% reported that they are female.

Age

The age distribution of FRED riders is provided in Table 3-20. As the data show, majority of FRED riders are working-age adults.

Table 3-20: Age of Survey Participants

Age	Count	Percent
12 or younger	2	1%
13-17	1	0%
18-24	41	16%
25-34	43	16%
35-49	85	32%
50-64	70	27%
65 and older	22	8%
Total Answering Question	**264**	**100%**

Driver's License and Car Availability

Just fewer than half of the total survey participants who answered the question reported that they have a driver's license (47%). All of the VRE shuttle riders (15 surveys) reported that they have driver's licenses. The majority of FRED riders reported having at least two vehicles in the household. More than half of the overall survey participants (62%) reported that a vehicle was not available for their travel on the day of the survey, while all of the VRE shuttle riders reported that a vehicle was available for their trips. Table 3-21 shows the number of household vehicles reported by all survey respondents, and with a second analysis with the VRE shuttle rider surveys removed. The VRE shuttle riders all reported having at least 2 vehicles in their households.

Table 3-21: Number of Vehicles in Household

	All Surveys		Without VRE Shuttle Responses	
Number of Vehicles in Household	Count	Percent	Count	Percent
0	71	27%	71	28%
1	31	12%	31	12%
2	143	54%	132	52%
3 or more	22	8%	18	7%
Total Answering Question	**267**	**100%**	**252**	**100%**

Cell Phone and Internet Access

When asked to indicate if they have a cell phone with Internet access (a smart phone), 75% of survey participants indicated yes.

Employment Status

The majority of the total survey respondents reported that they are employed either full-time (46%) or part-time (21%). Of the 15 VRE shuttle respondents, 14 reported full-time employment and one reported part time employment. Eight percent of FRED riders reported that they are full-time students. These results are provided in Table 3- 22. Survey respondents could check more than one response if that best described their employment status.

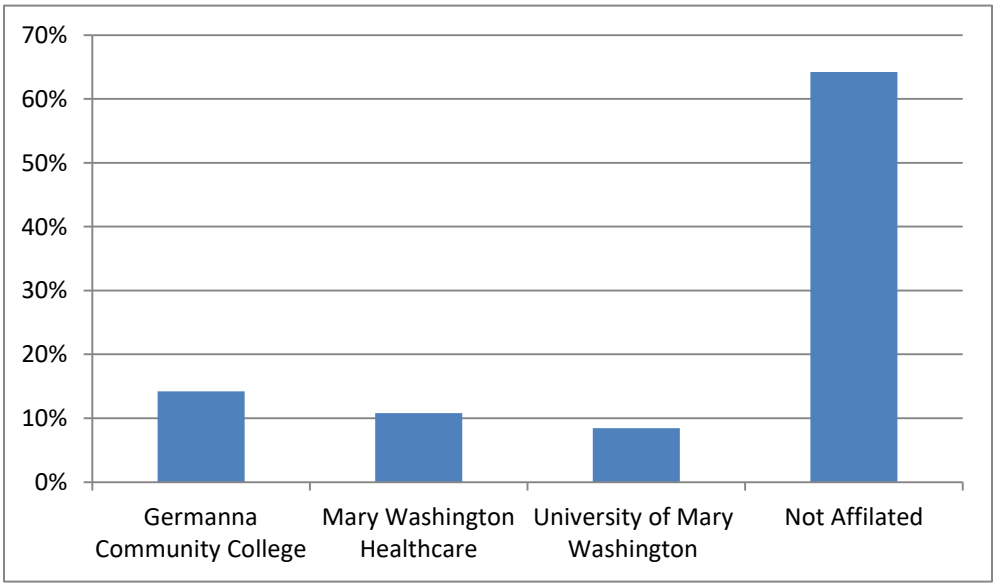
Table 3-22: Employment Status

	All Surveys		Without VRE Shuttle Responses	
Employment Status	**Count**	**Percent**	**Count**	**Percent**
Employed full-time	123	46%	109	43%
Employed part-time	57	21%	56	22%
Not Employed	36	13%	36	14%
Retired	33	12%	33	13%
Student	21	8%	21	8%
Total Answering Question	**270**	**100%**	**255**	**100%**

Partner Affiliation

Participants were asked if they were affiliated with any of FRED's local institutional partners. Germanna Community College was the most frequently listed, with 14% of the participants indicating an affiliation with the school, followed by Mary Washington Healthcare (11%) and the University of Mary Washington (8%). Figure 3-33 summarizes these results.

Figure 3-33: Partner Affiliation



Household Income

FRED riders reported relatively low incomes, with 45% reporting a household income of less than $20,000, and 24% indicating a household income between $20,000 and $39,999. In comparison, the median household income (2010-2014) for the jurisdictions served is as follows:

- Caroline County - $58,417
- Fredericksburg City - $49,454
- Spotsylvania County - $ 78,505
- Stafford County - $98,721[2]

The full results with regard to income are provided in Table 3-23, both with and without the VRE riders.

Table 3-23: Household Income

	All Survey Respondents		Without VRE Shuttle Responses	
Reported Income	**Count**	**Percent**	**Count**	**Percent**
Under $20,000	113	45%	112	47%
$20,000-$39,000	61	24%	61	26%
$40,000-$59,999	23	9%	21	9%
$60,000-$79,999	6	2%	5	2%
Over $80,000	14	6%	6	3%
Don't Know	34	14%	32	14%
Total Answering Question	**251**	**100%**	**237**	**100%**

Race and Ethnicity

The survey asked respondents to indicate their race using the Census-designated race categories. Survey participants mostly identified as African-American/ Black (37%) or Caucasian/ White (36%). The full results for this question are provided in Table 3-24.

[2] U.S. Census, American Community Survey, 2010-2014

Table 3-24: Race Data

Race	Count	Percent
African American/ Black	109	43%
Asian or Pacific Islander	7	3%
Caucasian/ White	108	42%
Native American	11	4%
Other	21	8%
Total Answering Question	**256**	**100%**

Survey participants were asked separately if they were of Hispanic origin. Fewer than 9% of survey respondents who answered the question consider themselves to be of Hispanic origin.

Passenger Survey Summary

- FRED riders typically use FRED services to travel to work and to complete errands or go shopping. Most riders walk to the bus stop from their homes and walk from the bus stop to their destination.

- Passengers are generally satisfied with the services that FRED provides. Riders reported being most satisfied with the cleanliness of buses and stations, courtesy of drivers, and cost of the bus fare. Though riders are generally satisfied with FRED, the most common areas of dissatisfaction include hours of bus service, on-time performance, areas served by the bus, and frequency of bus service.

- Question 10 of the survey asked participants to write what they like the most about FRED. Some of the most common responses to this question related to the dependability and availability of service. The following are examples of some of the responses received for this question.

    - "Availability"
    - "Able to get around"
    - "Dependable"
    - "Gets me to work"
    - "It gets me where I'm going"
    - "It's there when I need it most"

- Question 11 of the survey asked participants to write what they like least about FRED. Common responses to this question related to service availability and hours of FRED. The following are examples of some of the responses received for this question.

    - "Doesn't run on weekends"

  - "Doesn't run late"
  - "Doesn't start early enough"
  - "No weekend/late night for residents"
  - "Barely any weekend service"
  - "Hours of operation"
  - "Needs more locations and better times"

- Passengers feel that overall FRED services are valuable. However if they could choose three improvements that would be useful, those improvements would be: weekend service, more frequent service, and bus stop shelters/benches.

STAKEHOLDER OPINIONS

Public Transit Advisory Board (PTAB) Input

The consulting team attended FRED's regularly scheduled PTAB meeting in April 2016 to discuss the TDP process and hear from PTAB members. Committee members articulated issues, unmet needs, and goals in a number of different topic areas. These are summarized by topic area below and are not prioritized.

Service Improvements – Existing Service Area

- More frequent service is needed.
- Saturday service is needed.
  - Currently weekend service is primarily geared toward University of Mary Washington (UMW) students. While open to the general public, this service is only provided during UMW's fall and spring semesters.
  - Saturday service is needed in other parts of the region, with service in the Route 17 corridor to GEICO specifically mentioned.
  - Senior citizens have expressed interest in both Saturday and Sunday service for errands and attending church services.
- Service earlier in the morning and later in the evening is needed.
  - There are people with disabilities who attend work training programs and some are candidates for 2nd or 3rd shift jobs, but transportation is not available.
- There is a need to optimize routing throughout the network.

New Technologies

- The City Council has expressed interest in new vehicle technologies, including low emission vehicles and electric vehicles.
- UMW is interested in looking at environmentally friendly vehicle and fuel options, as well as general technological improvements that could serve riders.
- FRED is in the process of implementing real-time bus information through the Route Match Route Shout program.
- Germanna Community College and UMW are both interested in developing an onboard card-swipe system so they can gather more information about college ridership.

Commuter Improvements

- Feeder Service to Spotsylvania and Stafford VRE Stations. Currently FRED provides feeder service to the VRE station in the City of Fredericksburg. Local bus feeder service is not currently provided to VRE stations in Spotsylvania or Stafford Counties. It has been reported that parking spaces at Spotsylvania VRE station are often fully occupied.
- A new commuter lot is being built in Massaponax.

Facilities

- There may be a need for a northern local bus transfer location in Stafford County.
- There is a need for more passenger waiting shelters throughout the system.

Service to New Developments

- There are major new developments planned in the region, including Whitewater in Stafford County and Walmart in Ladysmith (Caroline County). There are currently no plans in place to serve these locations, but there is likely a need for service.

Service for People with Disabilities

- The current route deviations affect the ability to keep to a schedule. Some routes are too busy to accommodate deviations and also stay on schedule, particularly the Stafford County routes.

- There may be a need to investigate development of an ADA paratransit program to help the system run more smoothly while continuing to serve people with disabilities.

Traffic

- Congestion is a major issue in the region. Can FRED implement any services to help alleviate congestion?

- Priority signal lights for transit vehicles may be an option as the city upgrades some existing traffic lights.

Marketing

- There is a need to make the public more aware of services that are available.

Vision

- A downtown circulator could help alleviate parking issues in downtown Fredericksburg. The city is interested in offering this as a free seasonal service in the near future. This service could have a different look/vehicle and be oriented toward serving tourists.

- More frequent service is needed in rural areas. Service that is frequent enough to meet work schedules was mentioned.

- There is a need to examine changing demographics and population shifts in the region to make sure transit services are the most appropriate for future demand.

Additional Stakeholder Outreach

During June and July 2016, surveys were sent to additional local stakeholders to gain an understanding of transportation needs, challenges, and opportunities in the region. The stakeholders represent civic, educational, housing, and human service agencies. The study team received input from:

- Disability Resource Center
- George Washington Regional Commission
- Germanna Community College
- Spotsylvania County
- University of Mary Washington

This section is organized to highlight the overarching themes that emerged from the surveys. Much of the stakeholder opinion echoes what PTAB members discussed at the April meeting.

Strengths and Weaknesses of the Existing Service

- FRED provides helpful, low cost sustainable transportation service for the underserved and community at large.
- Many stakeholders are happy with promotion of service and customer service experiences.
- FRED offers a large fleet of accessible vehicles that are very convenient for the disabled community.

Unmet Transportation Needs

- There is a need for service earlier in the mornings and later in the evenings.
- There is interest in providing weekend service through Fredericksburg and Sunday morning service for church services and events.
- New developments are being planned for the Fredericksburg area. FRED representatives need to work with local development review boards to ensure these developments can be served by transit.

How Existing Service Could Be Improved

- Add a smart phone mobile application to track buses and provide schedules; this is currently in development.
- Add electronic fare boxes.
- Add onboard card readers for Mary Washington and Germanna Community College students and faculty.
- As the system grows, the currently available deviated service may need to be studied to assess if shifting to an on-demand service may be more viable.

Desired Improvements and Visions for the Future

- Increased frequency across all routes that warrant expansion.

- Weekend service on local Fredericksburg routes.
- Weekend service along the Route 17 corridor including the GEICO Regional Office.
- Service to the Spotsylvania VRE Station.
- The University of Mary Washington is interested in exploring an additional shuttle route for the campus; however, funding is a significant factor in that decision.
- There is interest in exploring more environmentally conscious vehicles.
- As congestion in the area grows there is interest in developing priority signaling and bus lanes.

DEMOGRAPHICS AND LAND USE

This section provides an analysis of current and future population trends in the jurisdictions served by FRED, 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 and the American Community Survey (ACS) 2010-2014 5-year estimates.

Population Trends

Table 3-25 shows the U.S. Census population counts for the Commonwealth of Virginia and the jurisdictions served by FRED between the years 1990-2010. The total population of the jurisdictions served by FRED, as of the 2010 Census, was 304,189. Stafford County is the most populated jurisdiction in the region, followed closely by Spotsylvania County. The City of Fredericksburg was the least populated with 24,286 residents. From 1990-2010, all jurisdictions in the region experienced significant population increases, with Spotsylvania and Stafford counties experiencing triple-digit growth.

Table 3-25: Historical Populations

Population						
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%
Caroline County	19,217	22,121	28,545	15%	29%	49%
Fredericksburg	19,027	19,279	24,286	1%	26%	28%
Spotsylvania County	57,403	90,395	122,397	57%	35%	113%
Stafford County	61,236	92,446	128,961	51%	39%	111%
Region Total	**156,883**	**224,241**	**304,189**	**43%**	**36%**	**94%**

Source: U.S. Census, American Factfinder

Table 3-26 illustrates recent population trends in the region. Since the 2010 Census, Fredericksburg has seen the biggest increase in population (9.7%). Also there continues to be population increases overall for the region. Caroline County experienced the lowest population increase among the four jurisdictions (1.8%).

Table 3-26: Recent Population Trends

Population			
Place	2010	2014	2010-2014 Percent Change
Virginia	8,001,024	8,185,131	2.3%
Caroline County	28,545	29,057	1.8%
Fredericksburg	24,286	26,632	9.7%
Spotsylvania County	122,397	126,200	3.1%
Stafford County	128,961	134,672	4.4%
Region Total	**304,189**	**316,561**	**4.1%**

Source: 2010-2014 ACS5, American Factfinder

Population Forecast

Table 3-27 provides population projections for the years 2020-2040. Overall the region is anticipated to continue to grow over the next two decades. Stafford County's population is projected to grow by 87% by 2040. Caroline County and Fredericksburg are expected to experience the least population growth (12.3%). The senior population is estimated to become a larger percentage of the population for each jurisdiction, as well as for the Commonwealth of

Virginia over the next twenty years, which will likely affect the need for public transportation service. The most significant percentage increase in senior population is projected for Caroline County (4.5% increase), followed by Spotsylvania County (3.6% increase).

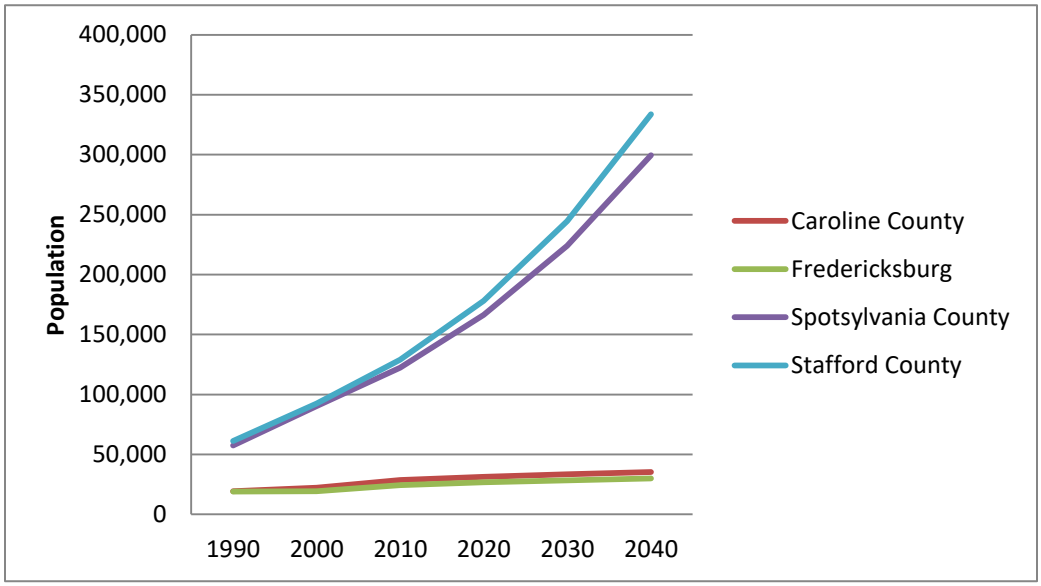
Table 3-27: Population Forecast

	2020 Population Projection		2030 Population Projection		2040 Population Projection	
Age of Resident	**Population**	**Percent**	**Population**	**Percent**	**Population**	**Percent**
Virginia	**8,811,513**	-	**9,645,281**	-	**10,530,227**	-
0-19	2,214,871	25.1%	2,396,544	24.8%	2,657,634	25.2%
20-64	5,237,474	59.4%	5,481,396	56.8%	5,968,324	56.7%
65+	1,359,168	15.4%	1,767,340	18.3%	1,904,269	18.1%
Caroline County	**31,400**	-	**33,447**	-	**35,259**	-
0-19	8,007	25.5%	8,100	24.2%	8,495	24.1%
20-64	18,400	58.6%	18,948	56.7%	19,941	56.6%
65+	4,993	15.9%	6,398	19.1%	6,823	19.4%
Fredericksburg	**26,647**	-	**28,383**	-	**29,917**	-
0-19	7,428	27.9%	7,503	26.4%	8,070	27.0%
20-64	16,393	61.5%	17,552	61.8%	18,350	61.3%
65+	2,825	10.6%	3,328	11.7%	3,497	11.7%
Spotsylvania County	**166,236**	-	**223,917**	-	**299,632**	-
0-19	46,759	28.1%	62,665	28.0%	84,391	28.2%
20-64	97,066	58.4%	123,191	55.0%	163,866	54.7%
65+	22,411	13.5%	38,061	17.0%	51,375	17.1%
Stafford County	**178,152**	-	**244,410**	-	**333,654**	-
0-19	53,462	30.0%	74,334	30.4%	102,211	30.6%
20-64	107,318	60.2%	139,937	57.3%	191,952	57.5%
65+	17,372	9.8%	30,139	12.3%	39,492	11.8%
Total Region	**402,434**		**530,157**		**698,462**	
0-19	115,656	29%	152,602	29%	203,167	29%
20-64	239,177	59%	299,629	57%	394,108	56%
65+	47,601	12%	77,926	15%	101,187	14%

Source: Weldon Cooper Center for Public Service, Demographics & Workforce Group, November 2012

Figure 3-34 provides a visualization of population growth from historical and projected population numbers for the region. If currently population projections are correct, the total population of the region will more than double by 2040.

Figure 3-34: Study Area Population Trends

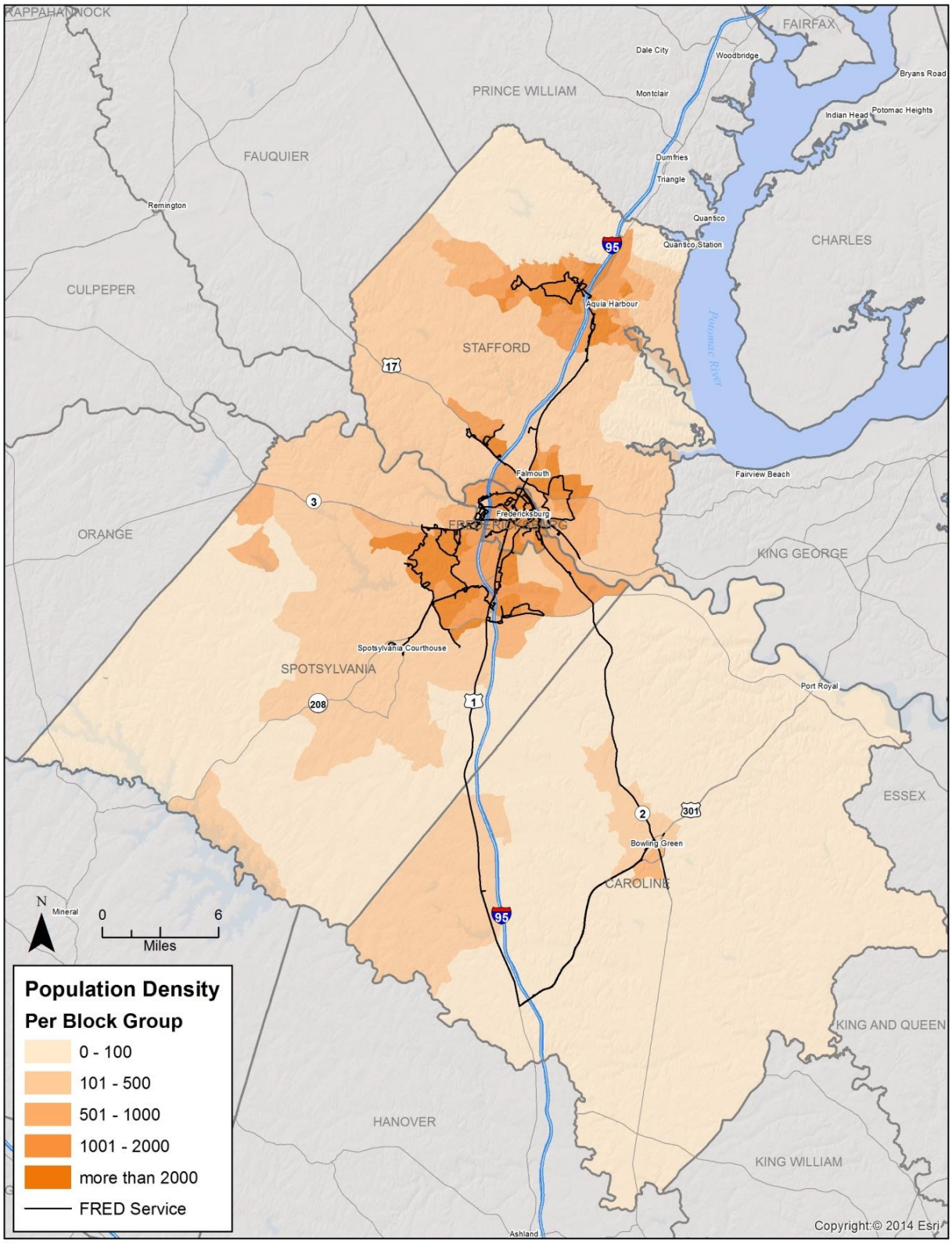


Population Density

Population density is a key factor in determining how rural or urban an area is, which in turn affects the type of public transportation that may be most viable. For instance, while exceptions will always exist, an area with a density above 2,000 persons per square mile will generally be able to sustain a frequent, daily fixed route bus service. Conversely, an area with a population density below 2,000 persons per square mile may be better suited for a deviated fixed route, flex schedule or dial-a-ride service.

Figure 3-35 shows population density by Census block group and FRED's deviated fixed route network in the jurisdictions served by FRED, which includes the City of Fredericksburg, Stafford County, Spotsylvania County, and Caroline County. Areas with population densities above 2,000 persons per square mile are clustered in a few core areas: in the City of Fredericksburg, east of I-95; in Stafford County in and around Falmouth; in Stafford, Garrisonville, and Aquia Harbor in northern Stafford County; and in Spotsylvania County to the south and west of Fredericksburg. This map shows how very rural Caroline County is, with population densities of less than 100 people per square mile for much of the county. The overlay of the FRED route network indicates that FRED's routes touch almost all of the high population block groups, with the exception of on to the north and east of Aquia Harbor in Stafford County.

Figure 3-35: 2010 Population Density of Fredericksburg, Stafford County, Spotsylvania County, and Caroline County and FRED's Route Network



Transit Dependent Populations

Public transportation needs are defined in part by identifying the relative size and location of those segments within the general population that are most likely to depend on transit services. These transit dependent populations include individuals who may not have access to a personal vehicle or are unable to drive themselves due to age or income status. Determining the locations of transit dependent populations helps to focus planning efforts for public transportation services.

To provide an objective measure when mapping population groups a relative measurement was used based on the study area's average for each demographic characteristic. The study area is defined as the City of Fredericksburg and the Counties of Caroline, Spotsylvania, and Stafford. A threshold of low, elevated, moderate, high, and very high was used for each demographic group. The low threshold consists of those block groups with below average concentrations of a specific demographic group; while the very high threshold consists of those block groups with more than twice the average concentration. The thresholds elevated, moderate, and high make up the middle ground between the average and twice the average and are divided into thirds.

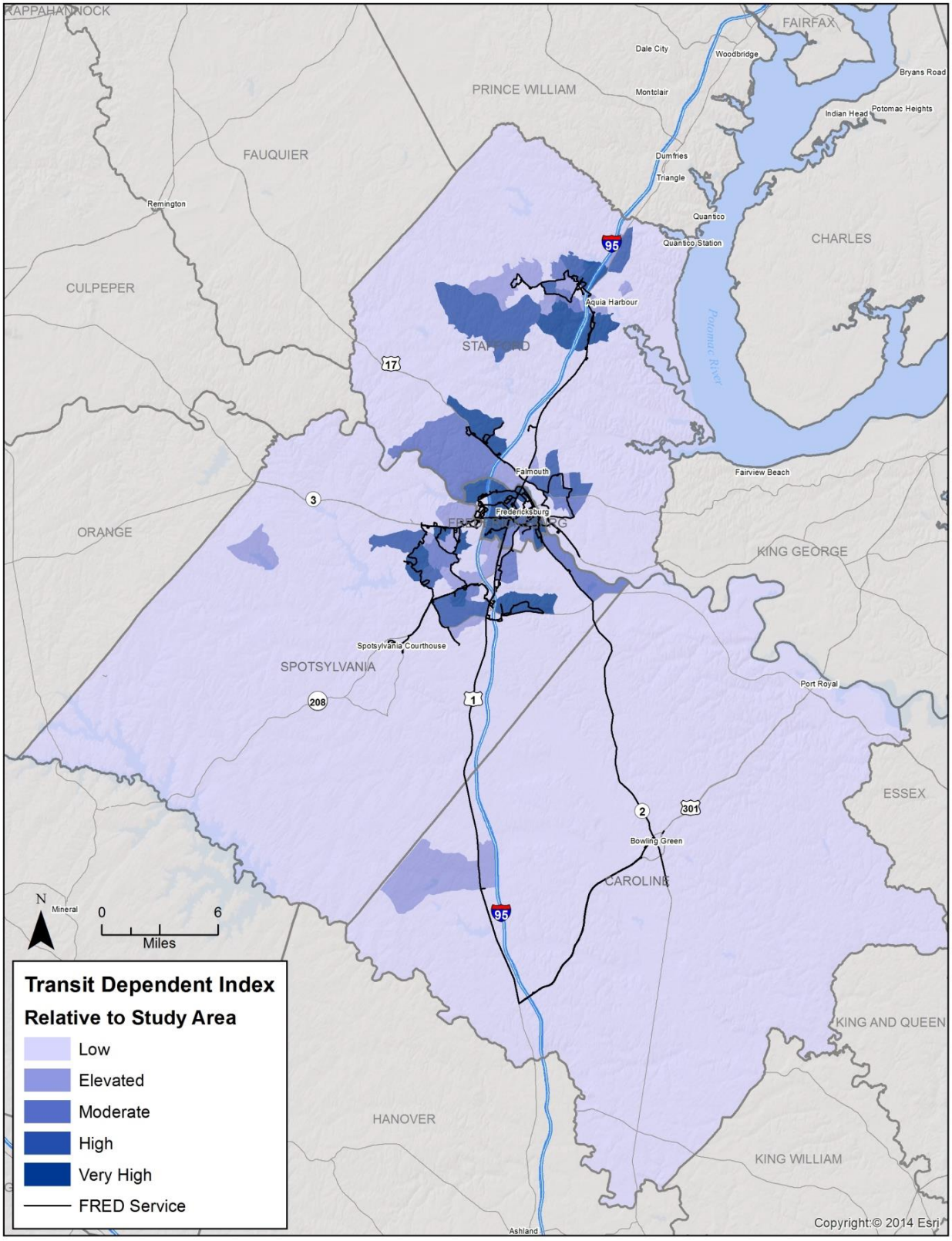
Transit Dependent Index

The Transit Dependence Index (TDI) 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. Five factors make up the TDI calculation:

- Population density per square mile,
- Zero vehicle households,
- Elderly population,
- Youth population, and
- 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. The factors were then plugged into the TDI equation to determine the relative transit dependence of each block group (low, elevated, moderate, high, or very high). From a transit perspective, the TDI illustrates the areas of greatest overall need. While some block groups show low need, they may actually include major destinations that should be served by transit. Figure 3-36 provides the results of the TDI analysis. As seen in the map, areas with very high transit needs are located primarily in Fredericksburg west of US 1 and southeast of the Historic District, in Spotsylvania County to the south and west of Fredericksburg, in Stafford County along the north side of US 17 west of I-95, and in Stafford, Aquia Harbor and along I-95 in northern Stafford County. FRED serves all of the very high need areas, as indicated by the route overlay.

Figure 3-36: Transit Dependence Index and the FRED Route Network



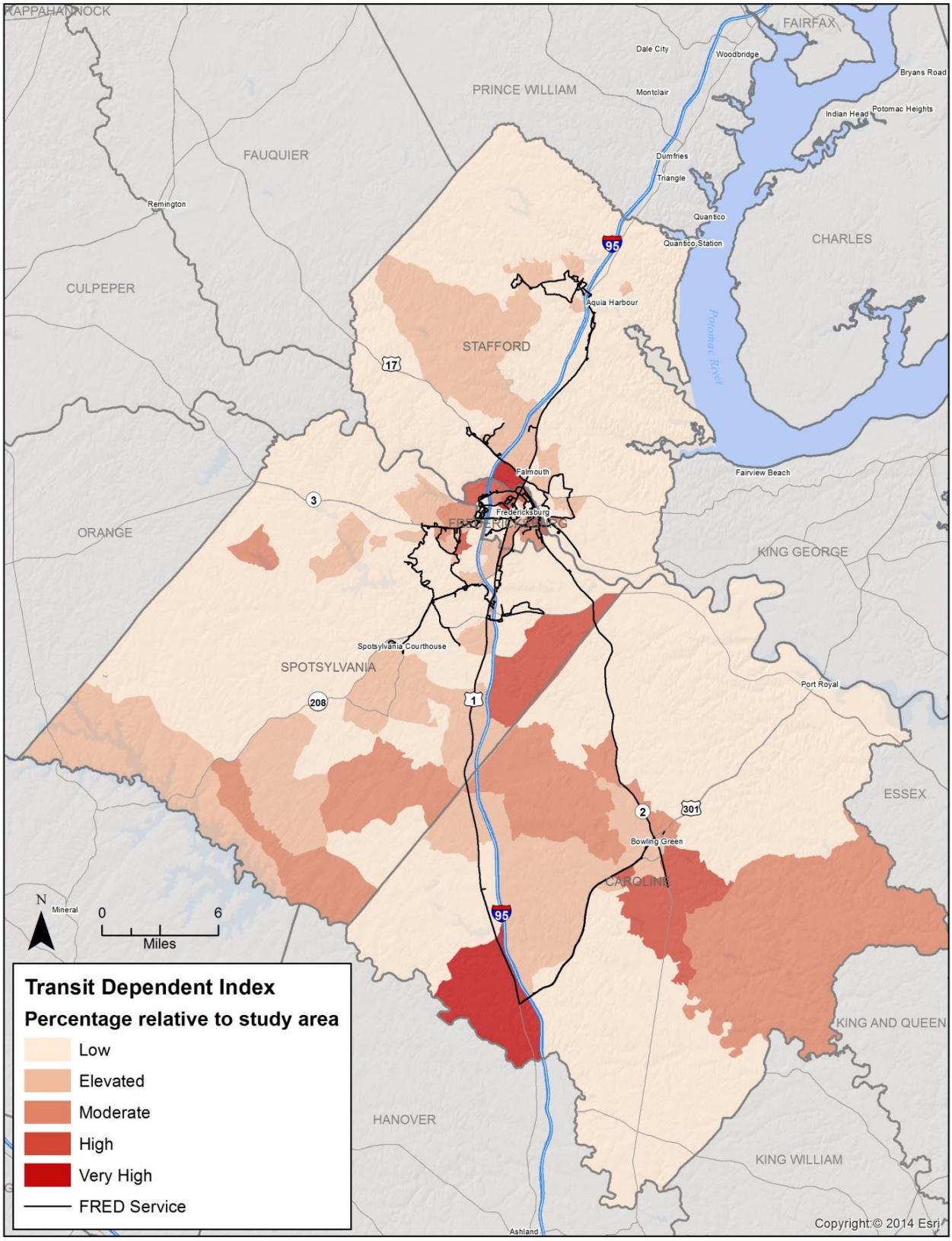
Transit Dependence Index Percentage

The Transit Dependence Index Percentage (TDIP) provides a complementary analysis to the TDI measure. It is nearly identical to the TDI measure with the exception of the population density factor.

By removing the population per square mile factor the TDIP measures the degree rather than the amount of vulnerability. The TDIP represents the percentage of the population within the block group with above socioeconomic characteristics, and it follows the TDI's five-tiered 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 3-37 without the population density metric, the highest degrees of transit dependence are found in Stafford County east of I-95 and south of US 17, in Fredericksburg west of US 1 along Cowan Boulevard, and in western Caroline County between the North Anna River and I-95. High need areas include northern and eastern Fredericksburg, Spotsylvania County to the southwest of Fredericksburg, and along the border between Caroline and Spotsylvania Counties east of I-95. Moderate and elevated degrees of transit dependence can be seen in several other block groups around the study area. The route overlay shows that FRED service is available to at least parts of all of the very high and high need areas census block groups.

Figure 3-37: Transit Dependence Index Percentage and FRED Route Network



Autoless Households

Households without at least one personal vehicle are more likely to depend upon the mobility offered by public transit than those 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 3-38, the census block groups with the greatest density of autoless households are primarily concentrated in Fredericksburg and northeastern Spotsylvania County. All of the block groups within the region with 15 or more autoless households per square mile are served by FRED to some extent.

Senior Adult Population

Individuals age 65 years 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 3-39, the greatest densities of senior adults are found in the Fredericksburg area and are generally served by FRED. There are some other pockets of relatively high densities of senior citizens that are not served by FRED, including an area in Spotsylvania County near the Orange County border, south of VA Route 3; an area of Spotsylvania County to the southwest of Fredericksburg; and central Stafford County, to the west and south of the FRED routes.

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. As Figure 3-40 shows, the highest densities of youth population are found in Stafford County, to the east and west of Aquia Harbor; and in Spotsylvania County, south of VA Route 3. FRED does not provide service to either the pocket of youth density south of VA Route 3, or the pocket of youth density to the east of Aquia Harbor. There are additional areas of more than 100 youth per square mile that generally follow the overall population density patterns.

Figure 3-38: Density of Autoless Households in the Study Area and FRED Route Network

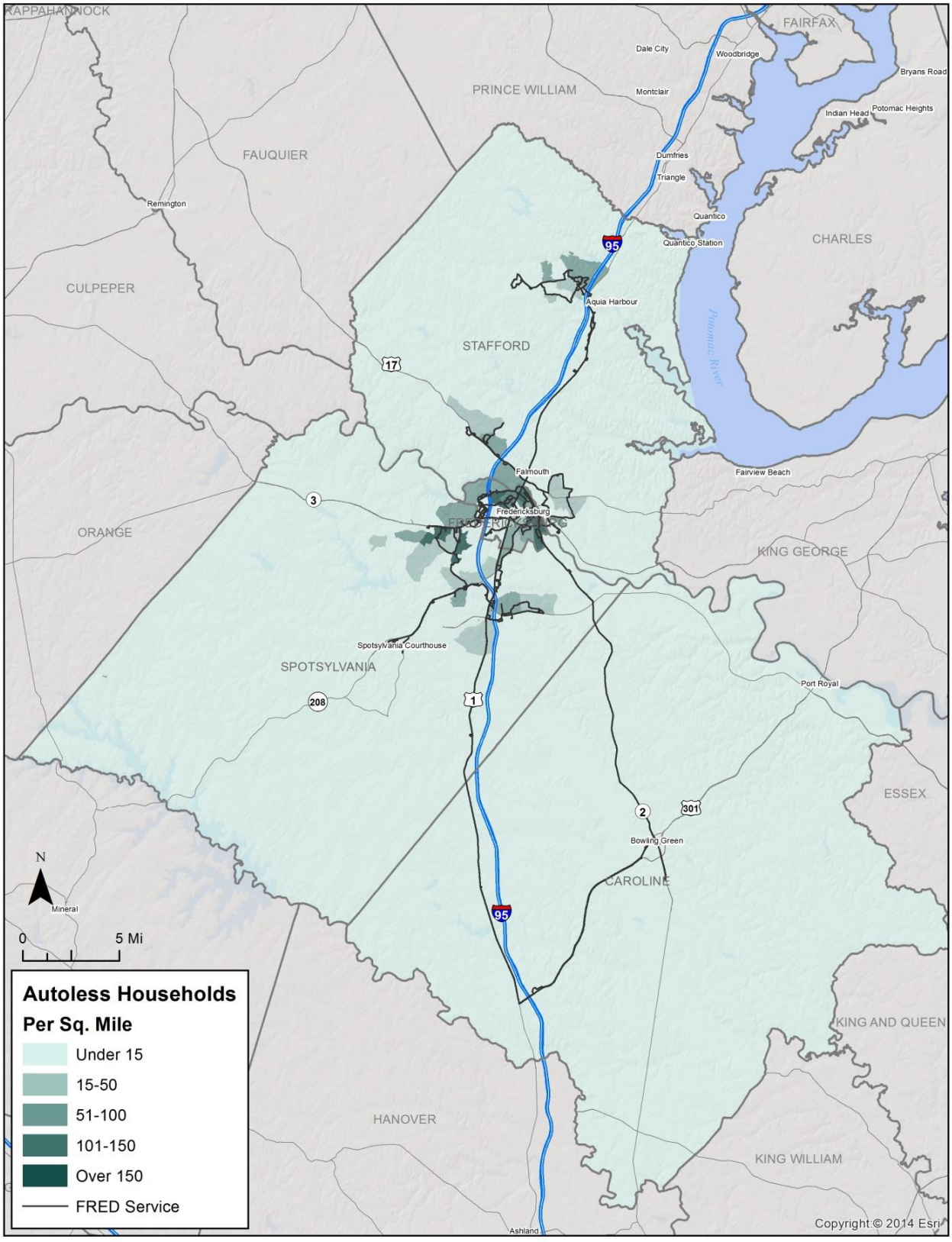


Figure 3-39: Density of Senior Adults in the Study Area and the FRED Route Network

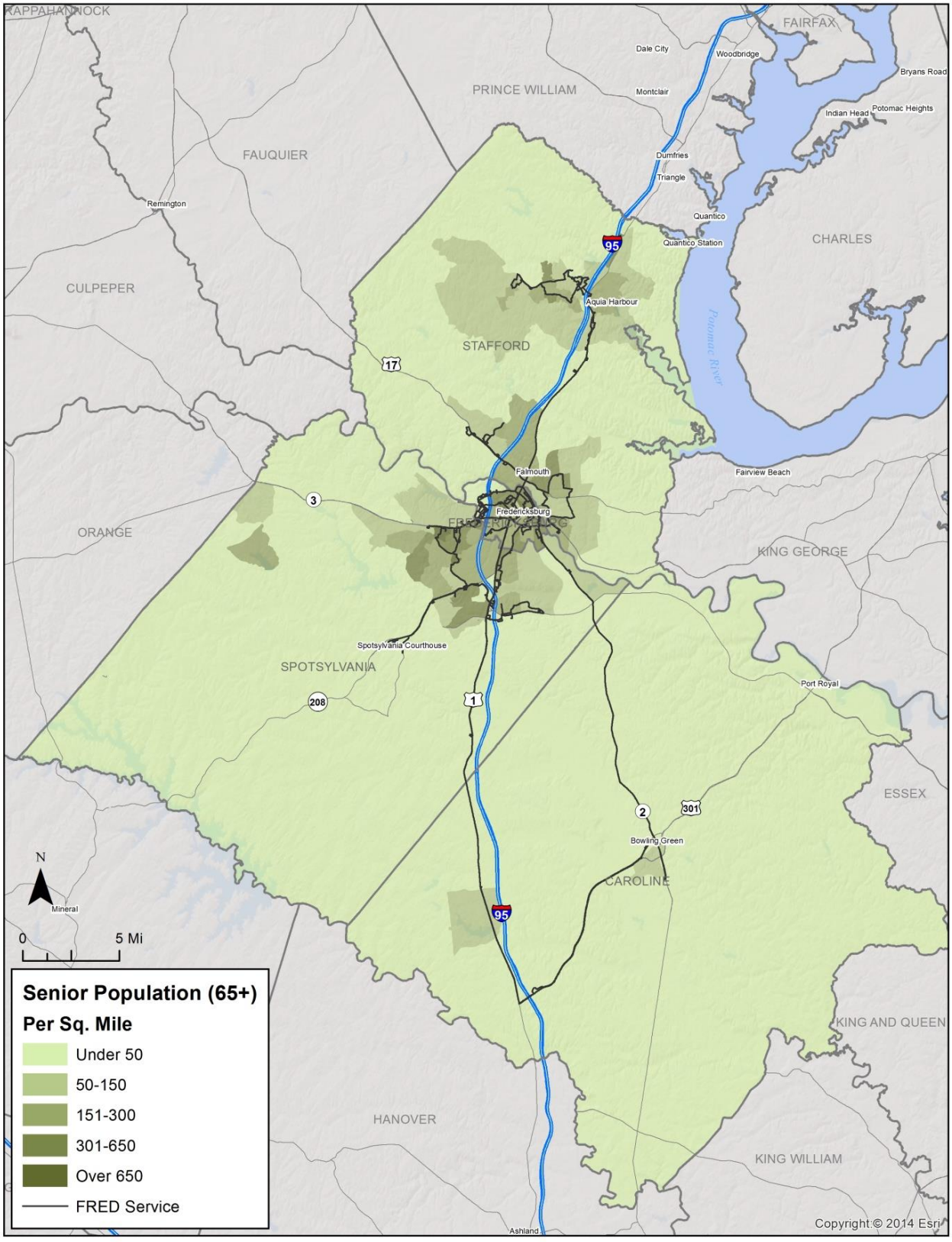
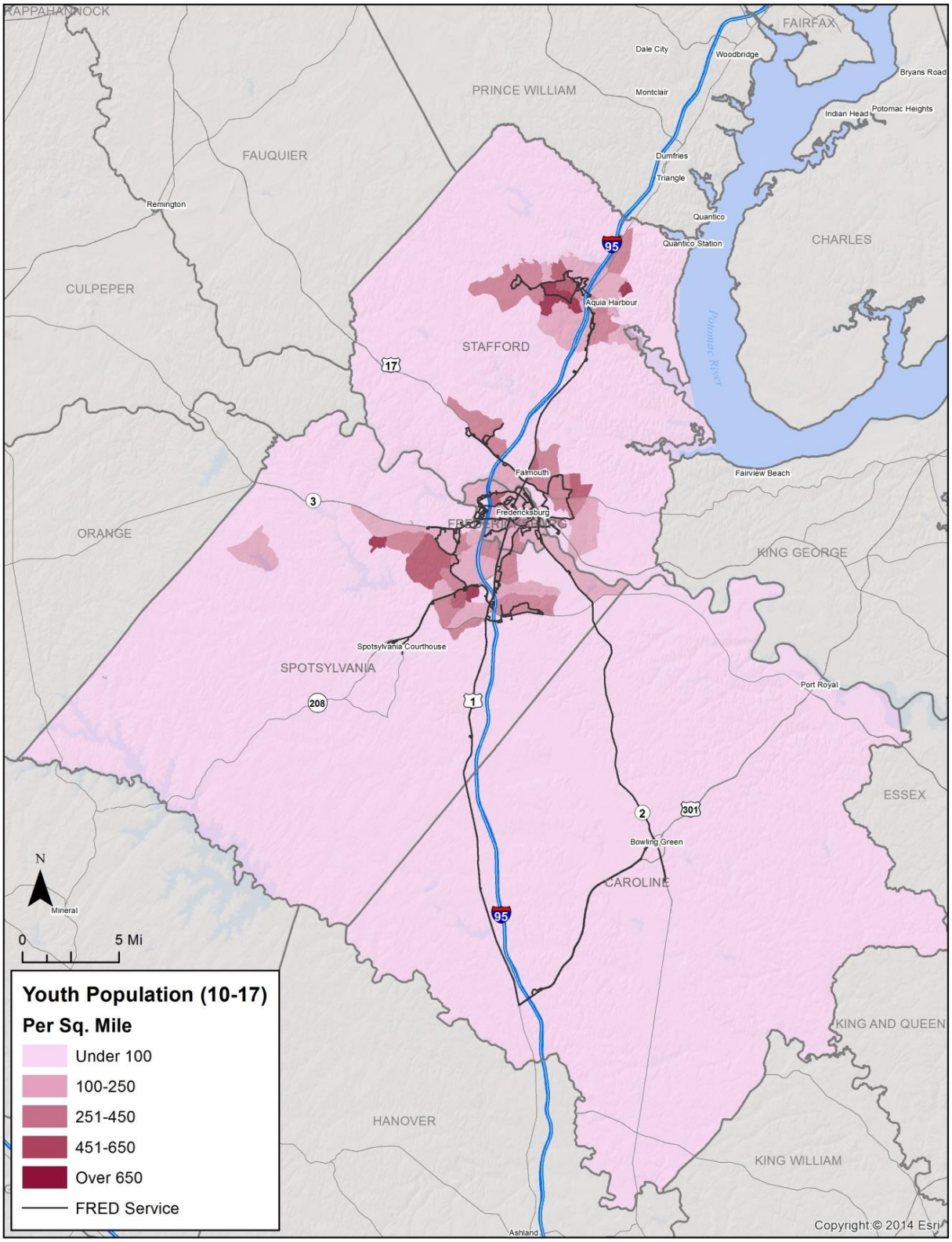


Figure 3-40: Density of the Youth Population in the Study Area and the FRED Route Network



Title VI Analysis

As part of the Civil Rights Act of 1964, Title VI prohibits discrimination on the basis of race, color or national origin in programs and activities receiving federal subsidies. This includes agencies providing federally funding public transportation. In accordance with Title VI, the following section examines the minority and below poverty populations in the service area. This section 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 within the service area 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 upon Fredericksburg's, Spotsylvania County's, Stafford County's, or Caroline County's minority populations, it is necessary to first understand where concentrations of individuals reside. Figure 3-41 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 (28.6%). Above average concentrations of minorities reside in northern and southern Stafford County, a pocket in western Spotsylvania County, central Spotsylvania County, eastern Spotsylvania County, western Fredericksburg, and much of central and southern Caroline County. FRED service is provided for many of these areas, with the following exceptions: northern Stafford County, the pocket in western Spotsylvania County, central Spotsylvania County, southern Caroline County, and northeastern Caroline County.

Low-Income Population

This socioeconomic group represents those individuals who earn less than the federal poverty level. These individuals face financial hardships that make the ownership and maintenance of a personal vehicle difficult, and thus they may be more inclined to depend upon public transportation. Figure 3-42 provides a map that shows the census block groups according to whether the poverty rate is above or below the study area average of 13.4%. As the map indicates, above average low-income populations are found in northeastern Fredericksburg (barring the Historic District); southern Stafford County around Falmouth; northern Stafford County all along the border with Prince William County; much of Caroline County, specifically the eastern half of the county (where the notably named unincorporated community Poorhouse Corner is located); and in block groups around Spotsylvania County, along the Caroline and Orange County borders, and south of Spotsylvania Courthouse. Several of these areas are not currently served by FRED, including northern Stafford County, the pockets in western, central, and southern Spotsylvania County; and the southwestern and eastern portions of Caroline County.

Figure 3-41: Areas Above and Below the Study Area Average for Minority Populations and FRED Transit Service

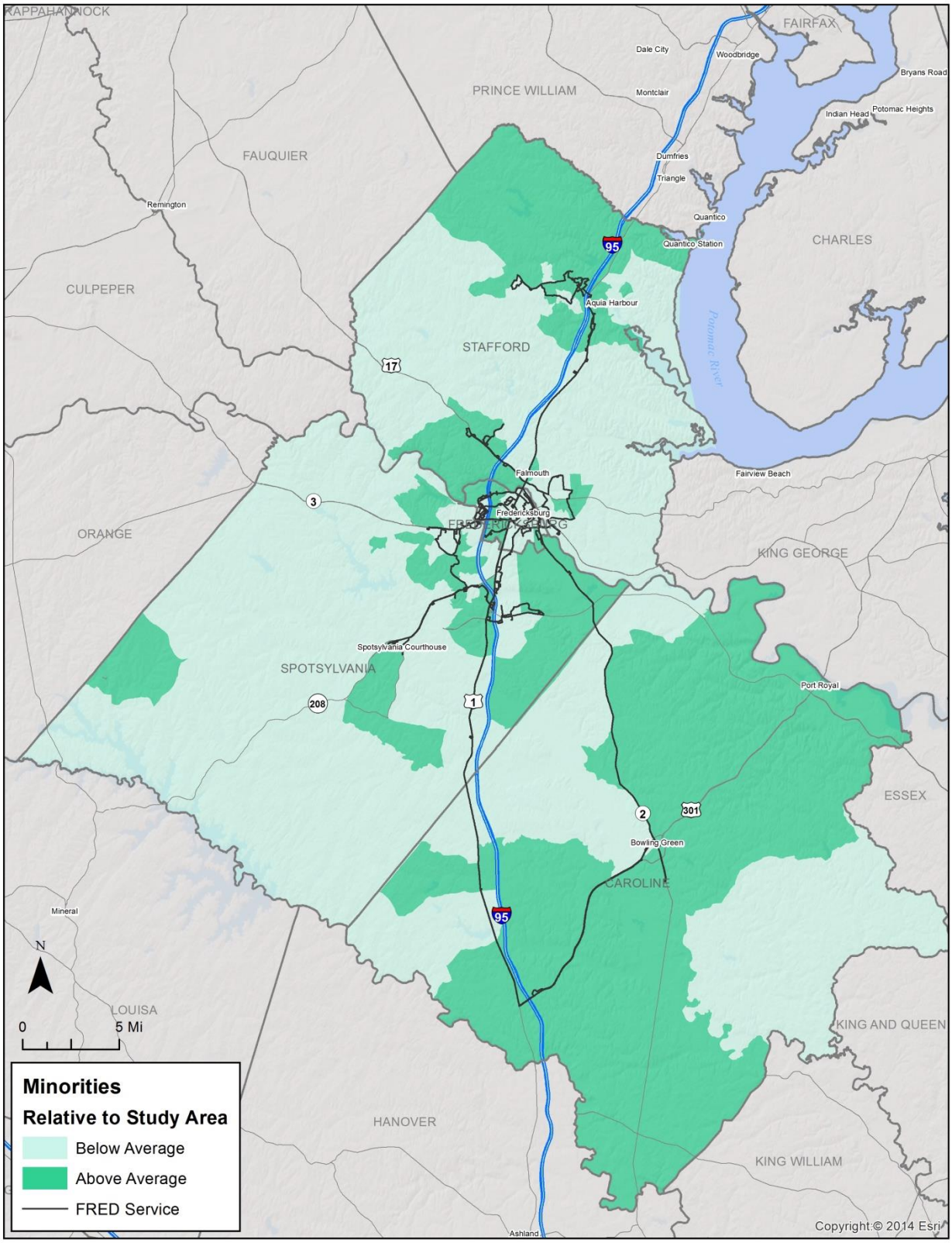
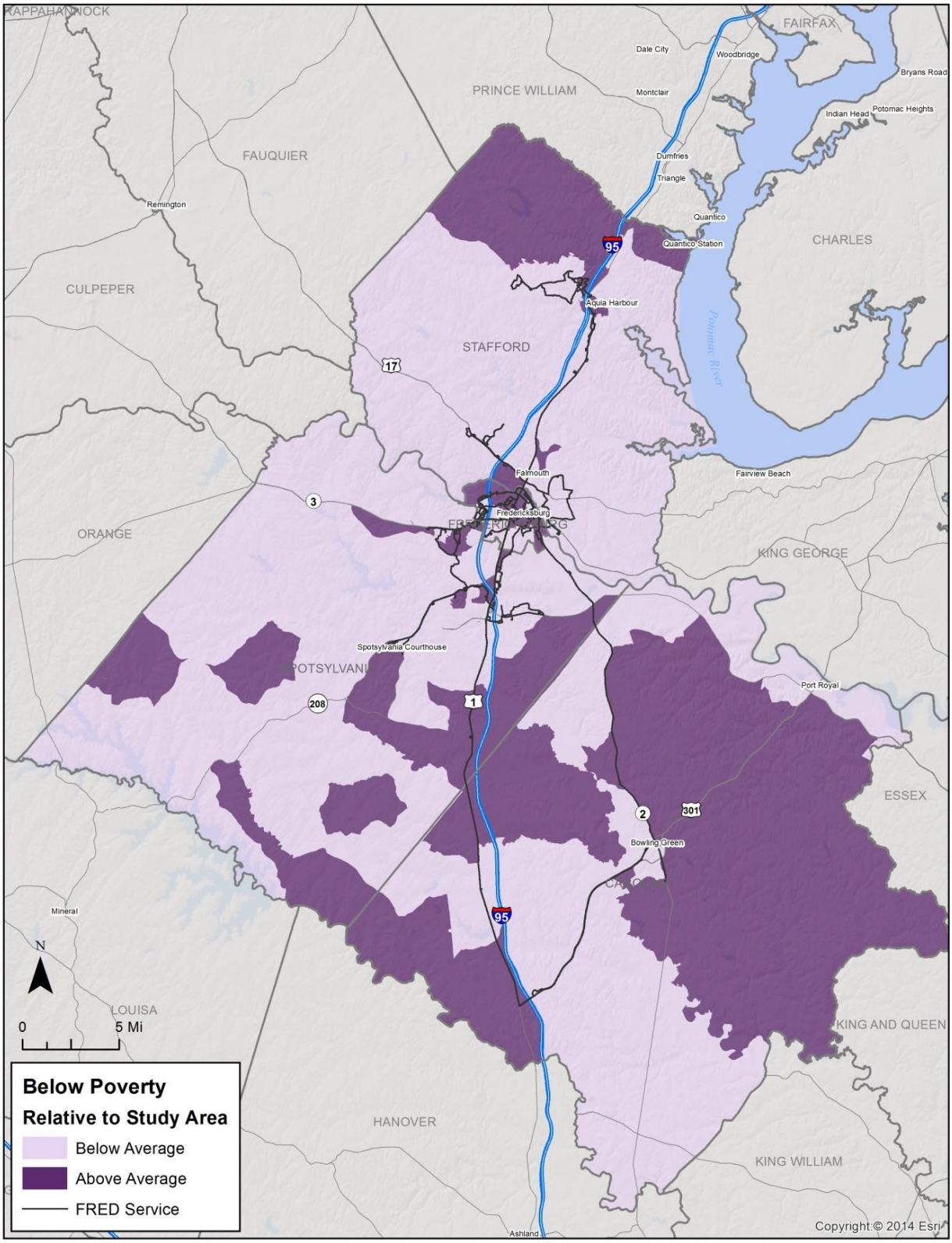


Figure 3-42: Areas Above and Below the Study Area Average for Poverty and FRED Transit Service



Limited-English Proficiency (LEP)

In addition to equitably providing public transportation to individuals of diverse socioeconomic backgrounds, it is also important to realize the variety of languages spoken by area residents so that public information can be provided in other languages, if needed by the public. According to the American Community Survey's five-year estimates for 2010-2014, English is the most predominately spoken language among 89% of residents. As seen in Table 3-28, Spanish is spoken by 6.6% of the region's residents, followed by Indo-European languages (2.5%). Only 1.5% of the region's residents reported that they speak English either "not well" or "not at all", which is below the Safe Harbor threshold of 5% for requiring the translation of written documents. FRED does need to ensure that it takes reasonable steps to ensure meaningful access to benefits, services, information, and other important portions of their programs and activities for individuals who are limited-English proficient (LEP).

Table 3-28: Limited-English Proficiency

County	Caroline		Fredericksburg		Spotsylvania		Stafford		Total	
Ages 5 and up	27,160		24,750		118,194		125,851		295,955	
Languages Spoken	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
English	25,786	94.9%	21,717	87.8%	106,373	90.0%	109,212	86.8%	263,088	89%
Non-English	1,374	5.1%	3,030	12.2%	11,821	10.0%	16,639	13.2%	32,864	11.1%
Spanish	759	2.8%	1,992	8.0%	7,069	6.0%	9,695	7.7%	19,515	6.6%
Indo- European Languages	370	1.4%	578	2.3%	2,460	2.1%	3,910	3.1%	7,318	2.5%
Asian/Pacific Island Languages	192	0.7%	326	1.3%	1,722	1.5%	2,129	1.7%	4,369	1.5%
Other	53	0.2%	134	0.5%	570	0.5%	905	0.7%	1,662	0.6%
Ability to Speak English	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
"Very Well" or "Well"	1,286	4.7%	2,534	10.2%	10,140	8.6%	14,649	11.6%	28,609	9.7%
"Not Well" or "Not at All"	88	0.3%	633	2.6%	1,723	1.5%	1,990	1.6%	4,434	1.5%

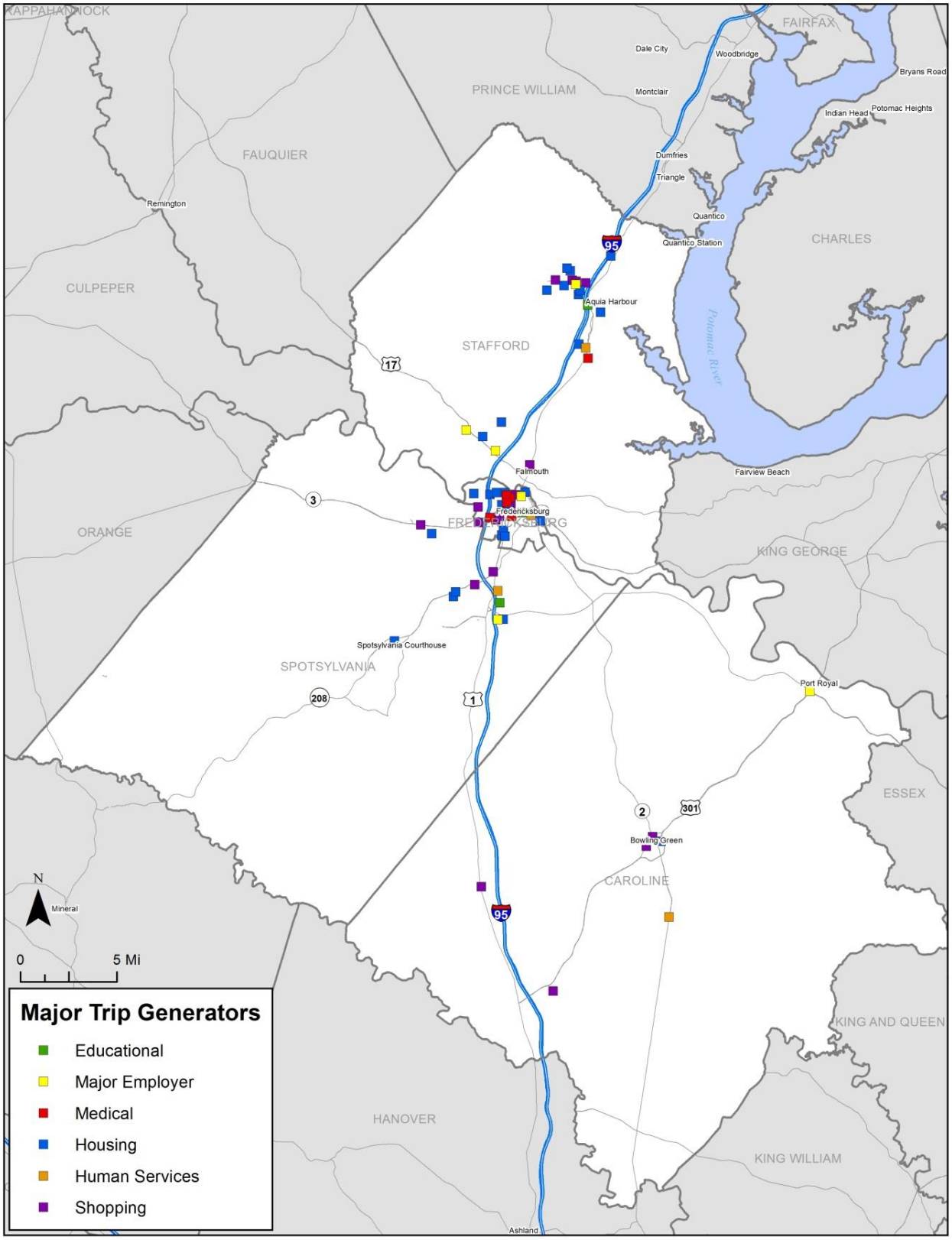
Source: American Community Survey, Five-Year Estimates (2010-2014), Table B16004.

Land Use Profile

Major Trip Generators

Identifying land uses and major trip generators in the study area complemented 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 governmental agencies, and shopping centers. As shown in Figure 3-43 the City of Fredericksburg has a high concentration of trip generators as does the Aquia Harbor area of Stafford County.

Figure 3-43: Major Trip Generators



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. The service area is closely linked to employment in Washington, DC and Northern Virginia, and in some cases Richmond. According to ACS five-year estimates, a majority of residents in the service area work in Virginia but tend to work outside their county of residence. Caroline County has the highest percentage of residents that work outside the county. Stafford County has the greatest percentage of residents who do not work in Virginia. A majority of the service area drive alone to work. Carpooling is the second most prevalent means to work in the service area. Fredericksburg and Stafford County residents have the highest percentages of residents that use public transportation as a means of transportation to work (4%). Caroline County has the fewest number of residents that take public transportation to get to work (1%). Table 3-29 illustrates commuting patterns of residents in the service area.

Table 3-29: Journey to Work Patterns for Study Area

Place of Residence	Caroline County		Fredericksburg		Spotsylvania County		Stafford County	
Workers (Ages 16 +)	13,241		12,304		60,828		66,797	
Employment Location	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
In State of Residence	12,384	94%	11,526	94%	56,902	94%	59,650	89%
In County	3,325	25%	4,940	40%	22,745	37%	21,981	33%
Outside of County	9,059	68%	6,586	54%	34,157	56%	37,669	56%
Outside State of Residence	857	6%	778	6%	3,926	6%	7,147	11%
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Car, Truck, or Van - drove alone	10,566	80%	8,785	71%	48,474	80%	48,938	73%
Car, Truck, or Van - carpooled	1,579	12%	1,644	13%	7,113	12%	10,195	15%
Public Transportation	110	1%	481	4%	1,593	3%	2,601	4%
Walked	258	2%	728	6%	326	1%	1372	2%
Taxicab, motorcycle, bicycle, other	133	1%	139	1%	719	1%	570	1%
Worked at Home	595	4%	527	4%	2,603	4%	3,121	5%

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 3-30 provides the results of this analysis.

Table 3-30: Top Ten Employment Destinations for County and City Residents

Caroline County			Spotsylvania County		
Place	**Number**	**Percent**	**Place**	**Number**	**Percent**
Fredericksburg	859	5.8%	Fredericksburg	6,962	12.9%
Richmond	752	5.0%	Washington D.C.	1,734	3.2%
Washington D.C.	436	2.9%	Southern Gateway CDP- Route 17, west of I-95	1,470	2.7%
Ashland	352	2.4%	Stafford Courthouse CDP	1,105	2.1%
Bowling Green	312	2.1%	Arlington CDP	893	1.7%
Southern Gateway CDP- Route 17, west of I-95	242	1.6%	Alexandria	780	1.4%
Arlington CDP	203	1.4%	Chantilly CDP	678	1.3%
Mechanicsville CDP	200	1.3%	Spotsylvania Courthouse CDP	571	1.1%
Innsbrook CDP	197	1.3%	Fair Oaks CDP	508	0.9%
Virginia Beach	177	1.2%	Tysons Corner CDP	507	0.9%
All Other Locations	11,175	75.0%	All Other Locations	38,616	71.7%
Fredericksburg			**Stafford County**		
Place	**Number**	**Percent**	**Place**	**Number**	**Percent**
Fredericksburg	2,326	22.5%	Stafford Courthouse CDP	4,093	7.9%
Stafford Courthouse CDP	377	3.7%	Fredericksburg	3,645	7.0%
Washington D.C.	349	3.4%	Washington D.C.	3,398	6.5%
Southern Gateway CDP- Route 17, west of I-95	255	2.5%	Arlington CDP	1,506	2.9%
Arlington CDP	192	1.9%	Alexandria	1,222	2.4%
Alexandria	153	1.5%	Southern Gateway CDP- Route 17, west of I-95	1,169	2.2%
Tysons Corner CDP	110	1.1%	Chantilly CDP	955	1.8%
Richmond	97	0.9%	Springfield CDP	926	1.8%
Chantilly CDP	94	0.9%	Tysons Corner CDP	825	1.6%
Potomac Mills CDP	78	0.8%	Fair Oaks CDP	784	1.5%
All Other Locations	6,284	60.9%	All Other Locations	33,444	64.4%

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

These data can be further examined by combining the most common employment destinations from each jurisdiction to get an understanding of the regional employment travel patterns. These data are shown in Table 3-31.

Table 3-31: Combined Commute Patterns

Top Five Out of Region Commuting Locations from All 4 Jurisdictions	
Washington DC	5,917
Arlington CDP	2,794
Chantilly CDP	2,627
Alexandria	2,155
Tysons Corner CDP	1,442

Top Four In-Region Commuting Destinations	
Fredericksburg	13,792
Stafford Courthouse CDP	5,127
Southern Gateway CDP-Route 17, west of I-95	3,136
Spotsylvania Courthouse CDP	571

These data show that Washington, D.C. and Northern Virginia are the predominant out-of-region work destinations and Fredericksburg is by far the predominant in-region work destination. From a transit service perspective, these data show that a Fredericksburg hub is appropriate, and supports additional focus for the Stafford Courthouse and Southern Gateway areas. FRED's role in providing VRE connecting service is also supported by these data showing that almost 11,000 regional commuters travel to destinations directly served by VRE (Washington, Arlington, and Alexandria).

REVIEW OF PREVIOUS PLANS AND STUDIES

Caroline County Comprehensive Plan 2030

The Caroline County Comprehensive Plan 2030 was adopted by the Board of Supervisors on January 12, 2010 and serves as the county's guide to growth and development over the next two decades. The transportation chapter analyzes the county's transportation system and determines the necessary improvements needed to accommodate growth. The plan notes that due to the Caroline County's low population density and rural nature, supporting alternative modes of transportation is a challenge. However, changes to transportation legislation in 2007, such as expansion of conditional zoning authority, urban development areas, traffic impact analysis, road impact fees, enhanced impact fees, and performance measures, have helped link transportation and land use, and the county's effort to begin looking at all of modes of transportation. Caroline County's Comprehensive Plan explains that the expansion of FRED service in the county is dependent on development. More emphasis is being placed on development options and policies that encourage transit service. The plan acknowledges that providing more transit service in the county may be a vital step in the expansion of commuter/ passenger rail service to Caroline County.

Fredericksburg Virginia Comprehensive Plan

The Fredericksburg Virginia Comprehensive Plan was adopted by the Fredericksburg City Council on September 8, 2015. It is an update of the previous comprehensive plan completed in 2007. This plan identifies two transportation challenges that the City of Fredericksburg faces. The first challenge is inter-regional and interstate through traffic, which includes commuter traffic along major corridors such as Interstate-95, U.S. Route 1, U.S. Route 17, and State Route 2. The second challenge is local transportation within the city boundary. In terms of transit, the comprehensive plan discusses the increased need for bus service including earlier and later hours of operations as well as weekend service. Transit is incorporated into many of the plan's transportation goals, policies, and initiatives.

Spotsylvania County Comprehensive Plan

The Spotsylvania County Comprehensive Plan was adopted November 14, 2013 by the Spotsylvania County Board of Supervisors. It provides a long range land use vision for the county. The plan examines the county's existing transportation system and provides insight into the decision making process for transportation. The plan identifies Spotsylvania County's goal for transportation which is to "develop a sustainable transportation network that supports the county's Comprehensive Plan and achieves a level of service that promotes safe and efficient operation and movement of people and goods." There are five polices and subsequent strategies to help achieve the county's transportation goal. Policy Three incorporates transit by calling for the promotion of alternative modes of transportation and multi-modal facilities. Strategies identified to help implement Policy Three include:

- Promoting Transportation Demand Management measures, such as rideshare programs.
- Avoiding conflicts between automobiles, pedestrians, and bicycles by identifying and constructing appropriate pedestrian and bicycle facilities.
- Promoting the design and construction of transportation facilities that consider the needs of persons with disabilities as well as the needs of an aging population.
- Coordinating with a regional transit service to provide timely and efficient bus routes that meet the needs of local transit users.

Stafford County Comprehensive Plan 2010-2030

The Stafford County Comprehensive Plan was adopted December 14, 2010 and has been amended from 2011-2015. The plan's purpose is to guide the physical development of Stafford County. It identifies future expansion and improvements of roadway facilities including the addition of new roadways, expanding existing transit, and constructing "new facilities to support increased options for transportation." The plan notes that Stafford County is supportive of many initiatives to reduce traffic congestion and expand multi-modal transit options. Some of these initiatives are expanding carpool and vanpool operations, supporting commuter rail service, and encouraging all new, reconstructed, or expanded roadways to

include bicycle and pedestrian routes. The plan supports expanding privately operated bus services. The plan states that future central parking areas used for commuters should be designed to accommodate bus stops. Developers of large communities should be encouraged to support transit programs and provide a coordinated effort to accommodate bus and commuter parking services.

Fredericksburg Regional Transit, Transit Development Plan Fiscal Year 2011-2016

Fredericksburg Reginal Transit TDP was prepared by Connetics Transportation Group under subcontract to PBSJ Corporation under contract to Virginia Department of Rail and Public Transportation in October, 2010. The existing service evaluation revealed that in 2009 FRED services provided 543,325 trips. Evaluations, stakeholder meetings, and demographic analyses completed in this TDP help identify service and facility needs. The TDP revealed the following needs:

- Increase weekday span of service
- Weekend service on select routes (Routes: F1, F2, F3, F4 F5, D2, D3, D4, D5, S1, and S2A)
- Route deviation service
- Specific route needs
- High value, low-cost targets of opportunity

Facility and equipment needs recognized in the plan included:

- Continued replacement and purchase of vehicles in its fleet as needed and when new routes are added.
- Continuation of maintenance performed in-house as needed.
- Secondary transfer points do not provide secure overnight vehicle storage for FRED buses.
- Benches and shelters at stops.
- Replacement of 500 bus stops (in progress at time of TDP)
- Increase some part-time staff members to full-time employees, add new positions (Evening Shift Mechanic, Customer Service Representatives, dispatchers, Security Officer for FRED Central, Data Entry Clerk, Field Supervisor)
- Route planning software

2040 Long Range Transportation Plan

Fredericksburg Area Metropolitan Planning Organization's long range plan was adopted on April 15, 2014 and provides a long term transportation vision for the Fredericksburg area which includes the Counties of Stafford, King George, Caroline, Spotsylvania, and the City of Fredericksburg. The plan addresses the region's future transportation system for all modes of

transportation. The plan includes unconstrained and constrained scenarios. The transit and transportation needs identified in the plan are to focus on two different transit markets (regional and commuter), increase FREDericksburg Regional Transit services in the region, increase commuter services in the I-95 corridor, and increase current Transportation Demand Management Programs.

VTrans 2035: Virginia's Long-Range Multimodal Transportation Plan

VTrans 2035 is the Commonwealth of Virginia's long range multimodal policy plan that sets the vision, goals, and investment priorities for Virginia's transportation systems. It was completed in 2010 and updated in 2013. The update to VTrans 2035 focused on "transforming the existing components of VTrans 2035 into a new framework for linking system-wide performance evaluations to planning, policy development, and funding decisions". VTrans 2035's predecessor, VTrans 2025, made policy recommendations that included investing more in transit and rail, strengthening the planning process by integrating transportation and land use and encouraging consideration of multimodal improvements at all levels of transportation planning. As a result of those recommendations the Commonwealth of Virginia has a dedicated rail fund, increased transit and rail funding, and new laws related to traffic impact analysis of development.

The key needs identified as a result of anticipated growth patterns, changes in environmental quality, changes in technology, changes in global connections, and changes in institutional decision making as it relates to transit are;

- Increased transit to address mobility needs of older citizens as well as disabled population groups and to reduce daily vehicle miles of travel associated with growth.
- Increased commuter choices, including transit, passenger rail, and carpooling/ vanpooling.
- Increased use of information systems to improve efficiency and safety.
- Stronger ties to regional and local agencies.
- Incentives for cooperation (i.e., land use plans that support transportation decisions and investments).

The plan identifies two major corridors that run through the study area: Washington to North Carolina Corridor (I-95) and the Tidewater Corridor (U.S. 17). The Washington to North Carolina Corridor connects Washington D.C. to Richmond and North Carolina and in addition to I-95 the corridor includes U.S. Highway 1 and U.S. Highway 301. Potential Strategies listed to improve the efficiency of travel in these corridors include: increasing rail capacity (including passenger rail), increase transit options and transit capacity, and improving rural transit.

VTrans 2040 is currently underway, which will serve as a comprehensive update to VTrans 2035.

George Washington Regional Commission (PDC 16) Coordinated Human Service Mobility Plan

Moving Ahead for Progress in the 21st Century (MAP-21) was signed into law on July 6, 2012 by President Obama. In addition to program changes such as the repeal of Section 5316 (Job Access and Reverse Commute-JARC Program), Section 5317 (New Freedom Program), and enhancing Section 5310; MAP-21 continued the required coordination planning requirements established in previous laws. MAP-21 requires that projects funded through Section 5310 must be "included in a locally developed, coordinated public transit-human services transportation plan".

The Virginia Department of Rail and Public Transportation (DRPT) in collaboration with rural and small urban areas around the Commonwealth of Virginia developed Coordinated Human Service Mobility (CHSM) Plans in 2008. The enactment of MAP-21 stated the process of updating the CHSM Plans. The updated plan for the George Washington Regional Commission (PDC 16) Coordinated Human Service Mobility plan was completed in September 2013 by KFH Group, Inc. under subcontract to Cambridge Systematics, Inc.

A demographic analysis, in addition to stakeholder input, revealed a list of unmet needs for senior adults, individuals with disabilities, and low-income individuals. Some of the unmet needs include:

- Access to jobs within and outside the region.
- Transportation to educational programs and employment locations for low-income people.
- Medical transportation (local and long distance).
- Expanded evening and weekend transportation options on a regional level.
- Access to jobs outside of FRED service hours.
- A focus on more trips within the Fredericksburg service region for people with lower incomes.
- Need local decision-makers onboard to obtain input and funding. Local county boards and county administrators "need to be there from the beginning."

- Need to inform state-level leaders of the importance of human service/public transportation.

- Need to advertise transportation availability.

Stakeholder input gained during the CHSM planning process helped identify and prioritize strategies for addressing the unmet needs. These strategies include:

- Continuing to support and maintain capital needs for coordinated human service/ public transportation providers.

- Providing flexible transportation options and more specialized or one-to one services through expanded use of volunteers.

- Building coordination and collaboration among existing public, private, and human service transportation providers.

- Expanding availability of demand response and specialized transportation services to provide additional trips for older adults, people with disabilities, veterans, and people with lower incomes.

CHAPTER SUMMARY AND FOCUS FOR ALTERNATIVES

The data compiled and analyzed for this chapter provided a solid understanding of the characteristics of the FRED bus system, as well as the public transportation network in the region. The examination of the trend data and the boarding alighting data revealed the following areas that were explored during the development of the service alternatives:

- Ridership – the trend over the past few years is downward, even as the population has grown. There may be ways to re-deploy the current resources so that ridership improves.

- Specific route performance – the following non-rural routes exhibit relatively low performance, based on passengers per revenue hour: D1; D5; D6; S4; E1 and E2. These routes were further examined for potential improvements.

- On-time performance – there may be a need to re-examine the deviation model for the urban routes; consider occasional tripper service; look at overall route structure/timing; and/or evaluate the timed transfer protocol.

Riders and stakeholders indicated general satisfaction with FRED, but did offer a number of suggestions for improvement that will be addressed in the development of the alternatives. These suggestions include:

- Weekend service, additional hours of service, more frequency of service, better on-time performance; and service to additional areas:
    - Ashland; Courthouse Road, Harrison Crossing; King George, Spotsylvania; and the Walmart on U.S. 17.
- New technologies- electronic fareboxes; environmentally friendly vehicles; signal priority; Google maps.
- Feeder service to Spotsylvania and Stafford VRE stations
- Northern bus transfer location in Stafford County
- Downtown circulator
- Service to new developments

The demographic overview indicated that the region's population is expected to continue to grow, with Stafford and Spotsylvania Counties leading the way. This growth will likely fuel the need for additional transit services for these counties.

Commute data show that Fredericksburg is the predominant employment destination in the local region, with Washington DC /Northern Virginia serving as the predominant employment destinations out of the region. Continuing to serve the commute market will be important for FRED over the six-year TDP period.

Chapter 4
Initiatives for Consideration

INTRODUCTION

This fourth chapter prepared for the FRED TDP describes a range of organizational and service initiatives that FRED staff and stakeholders considered when planning transit services for the six-year TDP horizon. These initiatives were developed based on the data compiled and analyzed in Chapters 1-3, combined with initiatives already underway in the region. For each initiative there is a description of the concept; for those where a decision regarding implementation had not yet been determined, there is also a discussion concerning the advantages and disadvantages, and a cost estimate. Organizational initiatives are presented first, followed by service initiatives. These initiatives were designed to serve as a starting point for the six-year plan projects with modifications and refinements provided for the six-year plan. Most of these initiatives, with some modifications, were carried through to the Operations Plan (Chapter 5), which provides more specificity with regard to implementation.

ORGANIZATIONAL AND INFRASTRUCTURE INITIATIVES

Organizational and infrastructure initiatives include proposals for potential changes that affect the way that transit is guided, administered, managed, or staffed in the region, as well as those that consider additional facilities and technology. There are several potential changes that fall within this category that were relevant to consider for the six-year plan, most of which have already been identified by FRED as priorities.

Initiative #1 – Expand Staff to Accommodate System Growth

FRED's internal planning process identified the need for additional staff positions to assist with operations and maintenance. The following new staff positions are identified in FRED's transit year 2017 goals:

- Assistant operations manager
- Part-time mechanic's helper
- Part-time fleet administrative assistant

In addition, as FRED's use of advanced technology devices increases (i.e., RouteMatch, Route Shout, security cameras, future electronic fare boxes); there will likely be a need for a full-time staff position that focuses on transit technology.

The assistant operations manager position was officially requested by FRED for FY2017, but was not funded. The need for the position will likely increase as FRED grows, particularly if additional weekend hours are implemented.

The opening of the Bowman Center maintenance facility has allowed FRED to conduct more maintenance tasks in-house, which has led to a need for additional maintenance staff (vehicle mechanic) support.

Advantages

- Provides the staff with resources needed to accommodate system growth.
- Improves vehicle reliability and saves time and money through timely, in-house vehicle maintenance.

Disadvantages

- Adds operating expenses without a corresponding increase in the level of transit service.

Cost

- The following salary/wage rates have been proposed by FRED for the three positions identified by FRED:
    - Assistant operations manager - $43,250
    - Part-time mechanic's helper - $26,000 ($21.42 per hour)
    - Part-time fleet administrative assistant - $22,000 ($17.67 per hour)

FRED's average fringe rate is 10.9% for part-time employees and 37.1% for full-time employees.

Initiative #2-
Develop the Lee's Hill Transfer Center in Spotsylvania County

There are currently five FRED routes that make a timed connection at the Lee's Hill Center in Spotsylvania County. The vehicles have a circular paved area where they can pull to the side of the road on Spotsylvania Avenue, shown in Figure 4-1. As is evident in the photos, the roadway is crowded and there are no passenger or driver amenities at this location. Drivers can use the Golden Corral restroom, which is located across the street from the transfer stop.

Figure 4-1: Current Lee's Hill Transfer Location

Facing South on Spotsylvania

Facing North on Spotsylvania

In addition, transit service in Spotsylvania County is expected to grow, with service to the Spotsylvania County VRE station contemplated for implementation during this current TDP planning period, and additional future services likely as the population increases and new development continues. Development data from the county indicate there are 14,856 residential units that have development approval, but have not yet been built.

This transfer center project was identified by FRED as new development occurred in the Market Street/Spotsylvania Avenue area. As part of the development agreement, the developer has agreed to provide a strip of land adjacent to the parking area of the Rappahannock Goodwill Industries building to be used as a bus transfer location. The preliminary design calls for five-bus bays, benches, a canopy to provide shelter, and a trash receptacle. Drivers will be able to use the restrooms located in the Rappahannock Goodwill building.

Advantages

- Provides a passenger waiting area that is protected from the weather.
- Provides a safe place for FRED buses to layover.
- Provides an opportunity to increase the visibility of FRED through the presence of a fixed facility.
- There are significant costs associated with building a more formal transfer facility (as compared to the planned design).

Disadvantages

- The parcel of land currently available does not allow for growth.

Cost

- A preliminary design has been completed for the transfer center. This design provided a construction cost estimate of $350,000.

Initiative #3 – Provide Additional Shelters and Benches

FRED currently has just six shelters throughout the service area, though there are others that have been made available through property owners. FRED Central also provides sheltered waiting areas for riders. The focus of this initiative is to provide passenger waiting shelters and amenities at additional locations throughout the service area. Additional passenger shelters and amenities were suggested by about 8% of riders who completed a passenger survey.

Bus Stop at Carl D Silver Parkway

It is suggested that FRED prioritize the potential candidate stops for shelters based on the number of boardings at each stop. The boarding/alighting data collected for the TDP indicated that the following stops experience 20 or more boardings per day:

- FRED Central
- Lee's Hill Center
- VRE/Amtrak
- Carl D Silver Parkway – Walmart
- Spotsylvania Towne Center
- University of Mary Washington (UMW) Main Entrance
- Stafford County Courthouse
- Central Park Barnes and Noble
- Eagle Village Shopping Center
- Fall Hill Avenue- Fredericksburg Shopping Center
- Stafford Marketplace
- Fall Hill Avenue at Heritage Park Apartments

Of these stops, the following do not have either passenger waiting shelters or some kind of building overhang where passengers can wait out of the weather:

- Lee's Hill Center (transfer point)
- VRE/Amtrak at the Caroline Street stop
- Carl D. Silver Parkway Walmart
- Central Park Barnes and Noble
- Fall Hill Avenue – Fredericksburg Shopping Center
- Stafford Marketplace
- Fall Hill Avenue at the Heritage Park Apartments

In addition, there have been requests from riders from the Mayfield neighborhood for benches. There are six stops that serve the Mayfield neighborhood, which is located west of Business Route 17 across from Dixon Park. There are four stops in the neighborhood that FRED staff is evaluating for the installation of benches and trash cans.

The possible shelter locations listed above are based on both ridership or rider requests, and do not reflect whether or not it is physically feasible to install passenger amenities at each particular location. The implementation of passenger amenities at each stop must take into consideration if there is enough right-of-way and adequate sidewalk and curb ramp connections.

Advantages

- Provides shelter from inclement weather for people waiting to ride the bus, as well as providing a place to sit down.

- Improves visibility of the system and offers a marketing opportunity.

Disadvantages

- The only disadvantages are the capital cost to purchase and install the shelters and the ongoing maintenance costs.

Cost

- The cost to improve bus stops with passenger amenities can range from $200 to $15,000 depending on the level and type of improvement. In some instances it can exceed $15,000 if extensive engineering is required to install the amenities and comply with the Americans with Disabilities Act (ADA). Table 4-1 provides cost estimates for potential stop improvements. For planning purposes, this initiative is estimated to cost $120,000 for the six-year period.

Table 4-1: Estimated Bus Stop Improvement Costs

Improvement	Unit Cost
Shelter (installed)	$5,000 - $10, 000
Bench (installed)	$1,500 - $2,500
4' Wide Sidewalk	$17.50 - $25.00 per linear foot
Bicycle Racks	$200 - $500
Curb Ramps	$2,000 - $2,500

Initiative #4 – Add Parking Capacity at FRED Central

The current FRED Central site does not have a sufficient number of parking spaces to accommodate the number of staff and visitors that are routinely present at the facility. FRED has addressed this problem through a lease agreement with the Kingdom Baptist Church, located on the north side of Stafford Avenue, across the street from the FRED Central entrance. FRED staff members park in the church lot, leaving FRED Central and street parking spots for visitors.

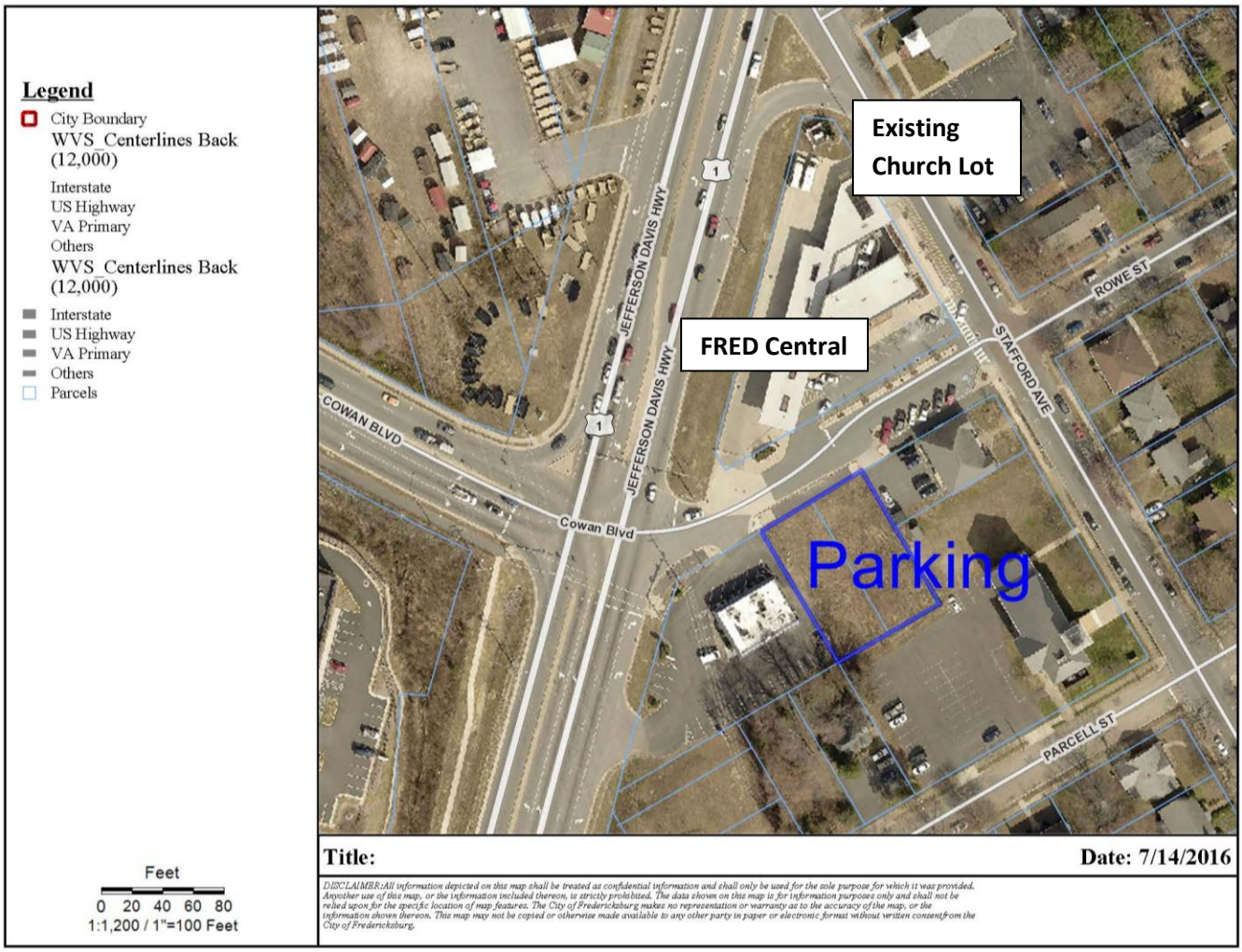
This arrangement has worked well for FRED; however, the Kingdom Baptist Church is presently for sale and the parking lot may not be available in the future to accommodate FRED's parking needs. In recognition of this situation, FRED has investigated other options. One option is the purchase or lease of two nearby parcels of unimproved land. These parcels, shown in Figure 4- 2, have a current tax assessment value of $165,000 each.

The two parcels together comprise about 8,000 square feet. Preliminary research suggests that all of the costs associated with site preparation, asphalt paving, and striping are about $15.00 per square foot.[1] This is a rough planning estimate that does not consider any site specific conditions. If 7,000 of the 8,000 available square feet were paved for the lot, the planning cost estimate is $105,000. This would result in about 24 parking spaces for cars.

The total cost estimate (land purchase, site preparation, and paving) is $435,000, assuming the land could be purchased at the assessed value. This estimate should be reviewed by the city's real estate and public works staff and refined as appropriate. This project is included for FY2019 and was not presented in the draft version of Chapter 4.

[1] Based on "How to Estimate the Cost of a Parking Lot at the Conceptual Level," a paper presented at the American Society of Professional Estimators, 2012.

Figure 4- 2: Proposed Land Parcels for FRED Central Parking Lot Addition



Initiative #5–
Convert the FRED Fleet to Alternative Fuels

The use of alternative fuels for public fleets has increased significantly over the past several years. Proponents of alternative fuels cite reduced costs, increased used of domestic energy, and reduced emissions as the primary reasons for making the switch from either gasoline or diesel. There have also been grants available to help with conversion and infrastructure through the Virginia Clean Cities program and the U.S. Department of Energy.

FRED stakeholders have indicated a desire to investigate the possibility of converting the FRED fleet to either propane or compressed natural gas (CNG). Electric vehicles may also be a consideration, as these have become increasingly available. Locally, Spotsylvania County converted 24 fleet vehicles (sheriffs' cars, fleet service trucks, and school buses) in 2011 and 2012 with funding assistance through the Southeast Propane Autogas Development Program.

The gasoline powered replacement buses, to be delivered in FY2017, are capable of conversion to propane or natural gas. In order to test the concept of implementing alternative fuels for the FRED fleet, the following activities should be considered:

- Undertake a study of infrastructure needs and develop a cost estimate for fuel conversion.
- Install the needed infrastructure to support the implementation of alternative fuels.
- Convert three of FRED's vehicles and monitor their performance.
- Convert the remaining eight vehicles.

This project was mentioned as a priority for City of Fredericksburg stakeholders.

Initiative #6 – Route Shout

Route Shout is the public interface associated with the automatic vehicle location (AVL) program that FRED is in the process of implementing. The AVL information is already available for FRED operations staff and the next step is to make this real-time schedule information available to the public. This project will allow riders to know in real-time when the next bus will be arriving at a particular stop. Real-time information improves the transit experience for riders as they have an increased level of confidence knowing that the bus is actually on the way and what time it is expected to arrive.

Because this initiative is currently in process, the advantages, disadvantages, and cost information are not discussed. It has been included in the discussion so the reader knows that this project is moving forward. Several riders requested this feature via the on-board survey.

FRED is already using the Route Shout program internally and plans to implement the public interface as soon as the vendor (Route Match) upgrades FRED's version of Route Match (the companion software program that stores much of the route and schedule data). The newer version of the program offers a better integration of the programs than the version that FRED currently uses. This upgrade is expected to occur by the end of FY2017.

Initiative #7 – Google Transit

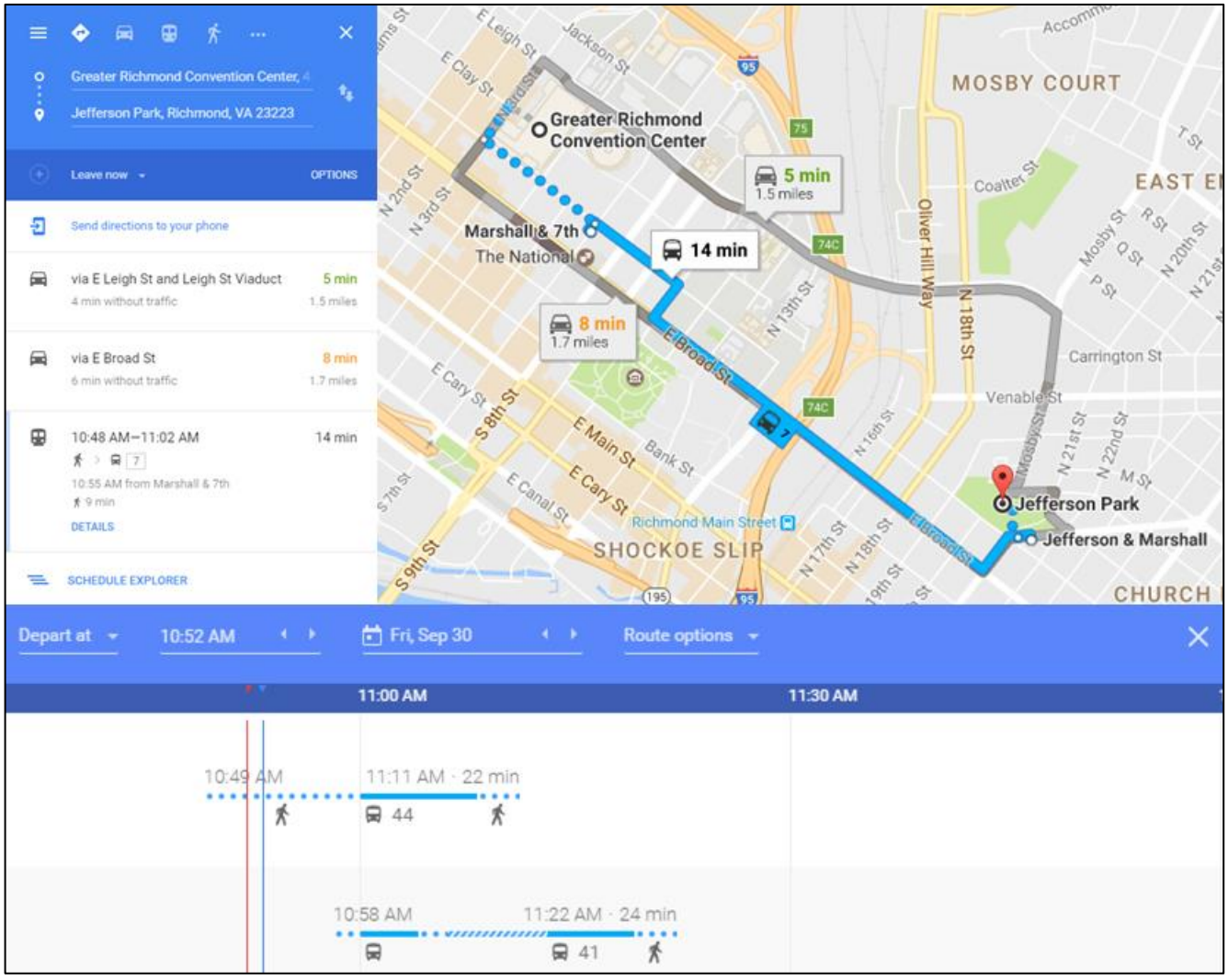
Google Transit is a free trip planning tool that many transit agencies use to help the public navigate riding public transportation. Participation in Google Transit allows a transit program's bus stops and schedules to be viewed as part of Google Maps' directions, under the public transportation mode.

Google Transit is also a good marketing tool, as the bus stop locations show up on Google Maps. An example of how Google Transit appears to the public is shown in Figure 4-3, which is a screen view of google maps from Richmond, Virginia, showing the Greater Richmond Transit Company (GRTC) services.

In order to participate with Google Transit, FRED will need to set up a number of data files, in a specific structure as defined by the General Transit Feed Specification (GTFS). FRED will then need to upload these files to Google Transit. Once the files have been uploaded, they will also need to be maintained as routes and schedules change.

FRED indicated that much of this work has already been accomplished by FRED's route and service planner, so this initiative may be close to implementation.

Figure 4-3: Example of Google Transit from Richmond, Virginia



Advantages

- Allows FRED's stops and routes to be viewed by the public on Google Maps.
- Allows FRED to be included in Google Maps public transportation directions.
- Increases awareness of FRED services within the community.

Disadvantages

- There will be either staff time or a consultant's time required to maintain the files as routes and schedules change.

Cost

- A portion of the route and service planner's time has already been invested in setting up the GTFS.

- If a third-party company were to develop the GTFS, it is estimated to cost $6,000 initially, and between $3,000 and $5,000 annually.

Initiative #8 – Electronic Fare Boxes

Electronic fare boxes automate the fare collection process by determining the exact fare required of the trip and then collecting and recording fares consisting of cash, electronic swipe cards, tickets, and passes. The fare boxes eliminate the need for drivers to handle fares and automatically record the amount of fares collected daily.

Another important feature of electronic fare boxes is the ability to handle electronic fare media. Current technologies include the "tap" technology, where the rider holds the fare card close to the reader (like WMATA's Smart Cards), and older "swipe" technology, where the fare card has a magnetic strip that is swiped through a reader. Electronic fare systems provide a good way for systems to record usage data from various constituent groups such as university students or hospital employees. A typical electronic fare box ranges between $12,000 and $15,000 per vehicle.

Advantages

- Improves accuracy of fare collection.
- Reduces the role of the driver in handling cash.
- Provides a mechanism for tracking ridership.
- Automates recording of fare information.
- Adds convenience for customers by accepting credit and debit cards (some systems).

Disadvantages

- Implementing electronic fare boxes may require the expertise of an information technology (IT) staff person.

- Electronic fare boxes are expensive.

Cost

- With 30 revenue vehicles, at between $12,000 and $15,000 per vehicle, the cost for implementation would be between $360,000 and $450,000. There are also ongoing maintenance expenses associated with keeping the fare boxes operable. The cost of an IT staff person was previously discussed under the staffing initiatives.

Initiative #9 – Update the Route Maps and Schedules

The current public route maps provide a good base of information for passengers and the major stops are well-labeled; however, the maps do not depict the names of major roadways. Adding some key road names to the maps would help riders better understand the path of travel for the routes. In addition, it appears that some of the timing is off – for example, the S1 and the S4 have the same path of travel from Lee's Hill Center to the Hilltop Plaza; however the S1 schedule shows 14 minutes to accomplish this segment and the S4 allows just 8 minutes. On the day of the counts, the actual times varied from 14 minutes after the hour to 32 minutes after the hour for the 12 runs. This discrepancy impacted the on-time performance data for the S4, as this stop is represented by 12 time points throughout the day.

Some maps are not completely accurate. For example, the S4 returns to Lee's Hill Center via Courthouse Road and Hood Drive, rather than back through the Southpoint development. The stop numbering convention, as displayed on the schedule, is helpful for FRED from a data collection standpoint, but can be confusing for riders. Improvements to route maps and schedules were requested by riders via the survey.

Advantages

- Improves public information for FRED.
- Responds to feedback received via the customer survey.

Disadvantages

- The only real disadvantage is the cost involved with re-designing and printing route maps and schedules.

Cost

- Re-designing and printing the route and schedule information is estimated to cost about $20,000 if performed by a vendor.

Initiative #10 – Comprehensive Route and Schedule Analysis

While there are several route and schedule suggestions contained within these TDP initiatives, a full comprehensive routing analysis is beyond the scope of the TDP. Given the significant growth in the region, particularly in Stafford and Spotsylvania Counties, a comprehensive route and schedule analysis would be helpful to further refine FRED's route network.

Advantages

- Builds on the route and schedule initiatives discussed within the TDP.
- Provides a more detailed and thorough examination of each FRED route, including how the routes work together as a system, with the goal of developing more efficient routes and reduced headways.

Disadvantages

- Staff time and/or consultant cost to conduct more detailed route planning tasks.

Cost

- If a consultant were hired for this task, it would likely cost between $75,000 and $100,000.

SERVICE INITIATIVES

Introduction

The service initiatives were developed through the analysis of specific route performance data coupled with the gaps in current services identified through input from riders, residents, and other stakeholders. The proposed initiatives draw on the information gathered in the previous three chapters and focus on the following:

- Schedule initiatives

- Specific route initiatives
- Additional routes

Each service initiative is detailed in this section, and includes:

- A summary of the service initiative
- Potential advantages and disadvantages
- An estimate of operating and capital costs
- Ridership estimates (if applicable)

Cost information for these initiatives is expressed as the fully allocated costs, which means we have considered all of the program's costs on a per unit basis when contemplating expansions. This does overstate the incremental cost of minor service expansion as there are likely to be some administrative expenses that would not be increased with the addition of a few service hours. These cost estimates were based on FRED's estimated FY2017 operating cost of $85 per revenue hour.

The initiatives outlined in this section focus on a number of scheduling projects that apply to more than one route or service. The origin for most of these proposed initiatives was either the customer survey or the stakeholder input.

Initiative #11- Operate Additional Weekend Service

The most frequently requested service improvement from the rider surveys was for additional weekend service. Currently the only services that operate on the weekends are the E1 and E2 Routes, which provide service between the University of Mary Washington (UMW)/downtown Fredericksburg and Central Park via Fall Hill Avenue and between UMW and the Spotsylvania Towne Center via Cowan Boulevard and Central Park.

The focus of this initiative is to provide mobility to a larger geographic area on Saturdays and possibly on Sundays, based on the likely demand for weekend service. The following routes should be considered for weekend service:

- F1, F3, F4 – in a coordinated manner with the E Routes to maximize service and minimize duplication of effort. The F5 Route was not included, as it is duplicative of the E Routes and a downtown circulator is proposed as a route initiative.

- D1, D2, D3, D4, D5

- S1, S5

If a ten hour service day were to be provided on each of these routes, the additional revenue service hours would be 100 per Saturday. If service were to be provided on 51 Saturdays, the additional annual revenue hours would be 5,100. It is assumed that the E1 and E2 Routes would be coordinated with the F Routes to reduce the total additional Saturday service hours to 4,460 annually.

If Sunday service were also to be provided during a similar span of service, the additional annual revenue hours would be 4,460.

Advantages

- Addresses the most frequently requested service improvement.
- Provides access to work opportunities on Saturday and possibly Sunday.
- Provides access to shopping and recreational opportunities on Saturday and possibly Sunday.

Disadvantages

- Adds service that is not likely to be as productive as Monday through Friday service.
- Adds operating expenses.

Cost

- 4,460 annual hours of service for Saturdays will cost about $379,100 annually.
- Assuming a similar schedule, Sunday service would also cost $379,100.
- Additional capital would not be required.

Ridership

- Given the more robust network that would be offered, as compared to the current E Routes, Saturday ridership is expected to be higher on a per revenue service hour basis than it is currently in the E Routes. Saturday ridership will likely attract between 8 and 10 passenger trips per revenue hour, for an additional 27,000 annual passenger trips.
- Sunday service is not likely to attract as many riders.

Initiative #12-
Start Regular Route Service Earlier in the Morning

Other than the VRE feeder routes and the C1, FRED's public transportation services do not start operating until after 7:00 a.m., and for some routes not until 8:30 a.m. or 9:00 a.m. This schedule does not allow for earlier work assignments or for attendance at 8:00 a.m. classes at Germanna Community College or UMW. Table 4-2 provides an overview of the proposed earlier start times for each route.

Table 4-2: Proposed Earlier Start Times

Route	Current Start Time	Proposed Start Time	Difference in hours
C1	6:00 a.m.	5:00 a.m.	1
C2	7:00 a.m.	6:00 a.m.	1
D1	9:00 a.m.	8:00 a.m.	1
D2	8:00 a.m.	7:00 a.m.	1
D3	7:30 a.m.	6:30 a.m.	1
D4	8:50 a.m.	7:50 a.m.	1
D5	7:00 a.m.	6:00 a.m.	1
F1	8:30 a.m.	7:30 a.m.	1
F2	7:30 a.m.	6:30 a.m.	1
F3	7:30 a.m.	6:30 a.m.	1
F4 - 2 buses	7:30 a.m.	6:30 a.m.	2
F5	8:30 a.m.	7:30 a.m.	1
S1 - 2 buses	8:00 a.m.	7:00 a.m.	2
S4	8:00 a.m.	7:00 a.m.	1
S5	8:00 a.m.	7:00 a.m.	1
Total additional hours each weekday			**17**
Total additional hours each week			**85**

Advantages

- Allows riders greater employment opportunities by providing additional access to 7:00 a.m. and 8:00 a.m. start times for work.
- Allows riders greater educational opportunities by providing access to 8:00 a.m. classes.
- Responds to customer suggestions received via the rider survey.

Disadvantages

- Will require significant changes to driver scheduling patterns.
- Will require a change to interlining between D4 and the D6 and the VRE feeder buses.
- Will add operating costs.

Costs

- Adding 85 hours each week will cost about $368,475 annually, based on $85 per hour and 51 weeks of service (4,335 additional revenue hours)

- No capital costs will be required.

Ridership Impact

- Using a productivity of 8 passenger trips per revenue hour, this service expansion is likely to generate about 34,700 annual passenger trips.

Initiative #13-
End Regular Route Service Later in the Evening

The current FRED regular routes end service for the day as early as 4:30 p.m. (D1) and as late as 8:30 p.m. (F2, F3, F4, F5). The focus of this initiative is to add 1-2 hours of service for the routes that end earlier than 8:30 p.m. to start to move toward a more standardized ending time for all routes, where demand justifies longer hours. Table 4-3 provides an overview of the proposed end times for each route.

Table 4-3: Proposed Later Ending Times

Route	Current End Time	Proposed End Time	Difference in hours
C1	No change		0
C2	No change		0
D1	7:00 p.m.	8:00 p.m.	1
D2	No change		0
D3	6:30 p.m.	7:30 p.m.	1
D4	4:30 p.m.	6:30 p.m.	2
D5	7:00 p.m.	8:00 p.m.	1
F1	No change		0
F2	No change		0
F3	No change		0
F4 - 2 buses	No change		0

Route	Current End Time	Proposed End Time	Difference in hours
F5	No change		0
S1 - 2 buses	Add one at 5:00 p.m.		2
S4	No change		0
S5	No change		0
Total additional hours each weekday			**7**
Total additional hours each week			**35**

Advantages

- Provides later travel options for riders of the D1, D3, D4, and D5.
- Closes a service gap for the S1.
- Begins to streamline ending times for the routes.
- Responds to suggested improvements received via the passenger survey.

Disadvantages

- Will require significant changes to driver scheduling patterns.
- Will require a change to interlining between the D4 and the D6 and the S1 and the VS1.
- Will add operating costs.

Cost

- Adding 35 hours each week will cost about $ 151,725 annually, based on $85 per hour and 51 weeks of service (1,785 additional revenue hours)

- Additional capital is not required.

Ridership Impact

- Using a productivity of 8 passenger trips per revenue hour, this service expansion is likely to generate about 14,280 annual passenger trips.

Initiative #14-
Increase the Frequency of Service

Another improvement that is desired by riders and stakeholders is more frequent service. From an efficiency standpoint, it makes sense to prioritize frequency improvements based on service productivity, with more frequent service offered on routes that are the most productive. FRED

may also want to develop a guideline to use when making decisions regarding improving the frequency of service (i.e., if the productivity of a route is above a certain number of passenger trips per revenue hour, the route would be considered for 30 minute frequency).

Not including the VRE feeder routes, the schedules of which are dictated by the VRE schedules, the most productive FRED routes (based on FY2015 data) are: F1; F3; F4; F5; and F2. Of these five, the F1 and the F3 were the most productive, at 16.6 and 14.9 trips per hour, respectively. These two routes also cover important travel corridors in the Fredericksburg area. The F4A, which is the western segment of the F4, is another heavily used travel corridor with high productivity.

The focus of this initiative is to offer 30-minute frequency for the routes that have demonstrated a high level of demand for service. To start, the F1 and the F3 are suggested, and the productivity standard for 30-minute service would be 15 passenger trips per revenue hour (rounding up the F3's 14.9 figure). The initial implementation may also consider 30-minute frequencies for only the peak demand hours. The boarding/alighting data showed peak ridership at 8:00 a.m. and 2:00 p.m. for these routes.

Advantages

- Reduces wait time for riders.
- Provides a higher level of transit service for routes that have high productivity.
- Addresses a need that has been articulated by stakeholders and the public.

Disadvantages

- Adds significant expenses, both operating and capital.
- May be confusing for riders if only two of the routes offer 30-minute frequencies for part of the service day.

Cost

- If an additional six hours per day were to be provided for both the F1 and the F3 (assuming a three hour morning peak and a three hour afternoon peak), 12 additional weekday service hours would be added, at an annual cost of about $260,100.
- Two additional vehicles would be needed. The vehicles in-service for these routes cost about $150,000 each.

Ridership Impact

- Adding frequency on these routes will improve ridership, but will not double it for each hour of service on the routes, as the current and newly induced demand is spread out over additional operating hours.

SPECIFIC ROUTE INITIATIVES

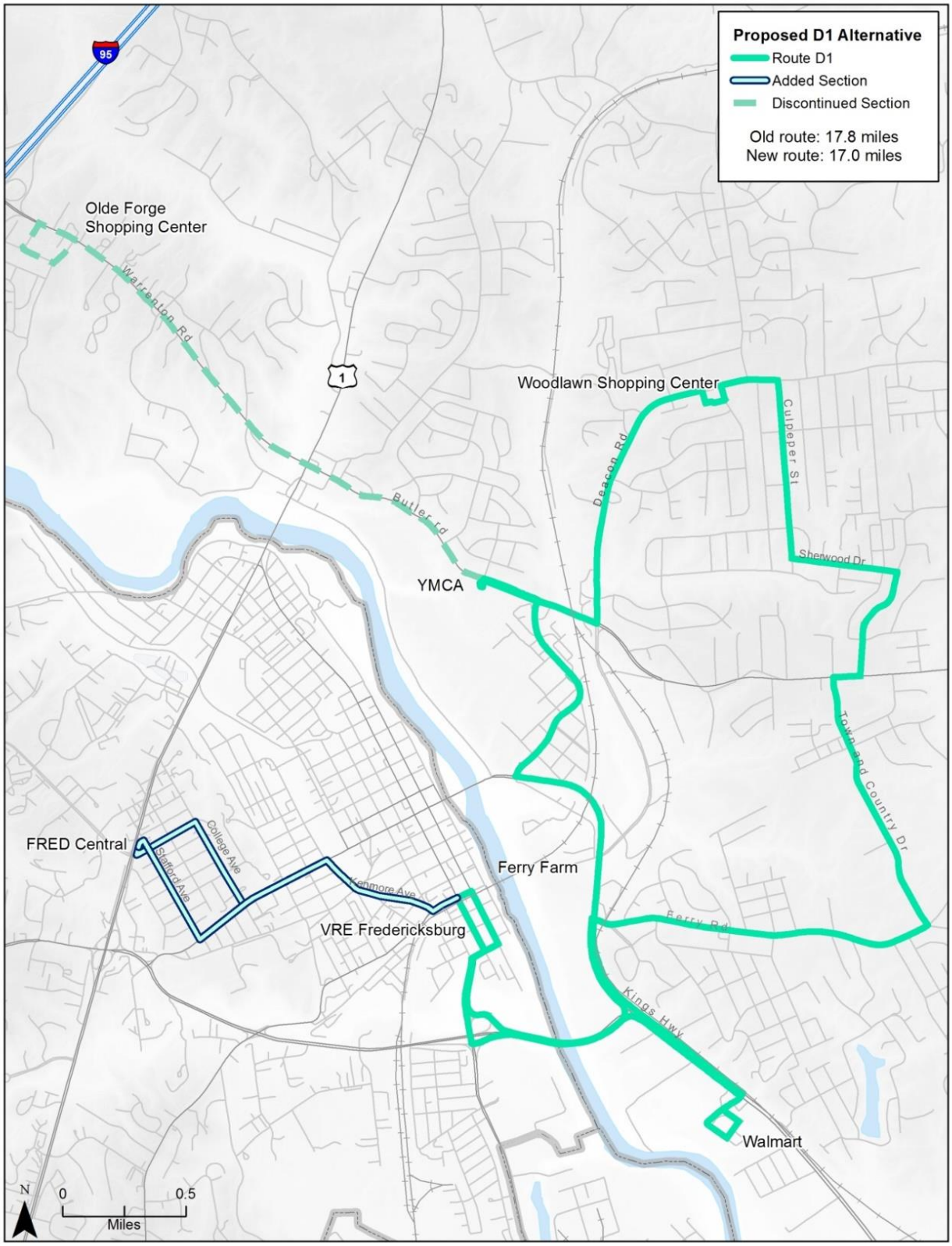
The initiatives set out in this section represent potential changes to routes, schedules, operations, and technologies and are intended to enhance service, efficiency, and the passenger experience. They were developed based on discussions with FRED Transit staff, ideas surfaced by members of the Public Transit Advisory Board, suggestions provided by customers via the on-board survey, and input from other stakeholders. The initiatives are not ranked in any particular order; nor have they been vetted with or approved by the jurisdictions in which FRED operates, the Fredericksburg Metropolitan Planning Organization, or Federal or Virginia grant agencies. Additionally, the details of the initiatives (e.g., routings, stops, spans of service and associated costs) are likely to change as FRED undertakes further analysis of the merits of the initiatives individually and as elements of the overall system.

Initiative #15 – Modify the D1

The D1 currently provides service from the Fredericksburg Train Station to the Stafford County neighborhoods/destinations of Washington Square, Ferry Farm, Chatham Heights, Olde Forge Drive, the YMCA, Woodlawn Shopping Center, and Town and Country Drive. While there are transfer options at Olde Forge Road (D2) and at the Fredericksburg Train Station (F4, F5), neither offers a convenient, timed connection to the full route network.

The focus of this alternative is to better connect the D1 to the full route network and eliminate a route segment that is duplicated by the D2 (Warrenton Road between U.S. 1 and Olde Forge). The proposed route adjustment would change the route origin of the D1 to FRED Central, then travel to the train station, then follow the current route to and from the YMCA, eliminating the segment between the YMCA and Olde Forge Road. This proposed change is highlighted in Figure 4-4.

Figure 4-4: Proposed Modification for the D1 Route



Advantages

- Provides a better connection to the full route network for riders who use the D1.
- Eliminates a duplicative route segment.
- Reduces the route length by close to a mile, which will help with on-time performance.

Disadvantages

- Changes trip patterns for riders, which can be inconvenient.

Cost

- This change is generally cost neutral, with some minor fuel savings likely, given the small reduction in mileage.

Ridership

- Ridership on the D1 is likely to increase, as this option adds a segment with more ridership opportunities and provides another opportunity to connect FRED Central and the Train Station. In addition, the segment eliminated from the D1 (to Olde Forge Road), has very low ridership.

Initiative #16 – Add Service in the Stafford Lakes Area and Revise D2

The Stafford Lakes area is rapidly developing and there are significant trip generators that are not currently served by FRED. These trip generators include Walmart, the University of Mary Washington (UMW) - Stafford Campus, Stafford Lakes Apartments, Malvern Lakes Apartments, and additional trip generators under construction.

In looking at how to serve this area, the first potential solution is to extend the D2; however, there is not sufficient time in the schedule to add additional mileage and the neighborhoods off of Plantation Drive are already only served in one direction. This initiative proposes to add a new route (D7), which would be a local Stafford route that stays on the west side of I-95, serving housing, shopping, employment, and civic destinations that are located west of I-95. It would serve the Plantation Drive neighborhood in both directions in addition to serving the newly developing Stafford Lakes area, Walmart, and the UMW facility. The new route would make a timed transfer with the D2 so that riders could get to the rest of the route network. In addition, this initiative proposes to take the Plantation Drive neighborhoods off of the D2 so that it can provide more direct service between FRED Central and the route terminus (GEICO). If this gives the route too much extra time, it could be extended to Walmart and UMW Stafford

Campus. The basic premise of this idea is to have a local circulator route in this area (D7), supported by a direct route back to FRED Central (D2).

The new proposed D7 map is shown in Figure 4-5 and the revised D2 map is shown in Figure 4-6.

Advantages

- Provides a more direct trip from FRED Central to GEICO, which is a major employment center.
- Frees up time for the D2 to be extended to Walmart and UMW Stafford Campus.
- Provides more convenient local service for people who live in the U.S. 17 Corridor, west of I-95, by not requiring that they travel all the way to Fredericksburg for their trip back from the grocery store.

Disadvantages

- Adds the expense of a new route.
- Changes ridership patterns for existing riders.

Cost

- If the new route operates 12 hours per day, Monday through Friday, the total annual operating hours would be about 3,060, at an operating cost of $260,100.
- An expansion vehicle would be required at a cost of $150,000.

Ridership

- Ridership on the D2 averages about 9 passenger trips per revenue hour. If this productivity is seen on the new route, and 3,060 annual hours are operated, the ridership is estimated to be 27,540 annual passenger trips.

Figure 4-5: Proposed New Stafford Lakes Route – D7

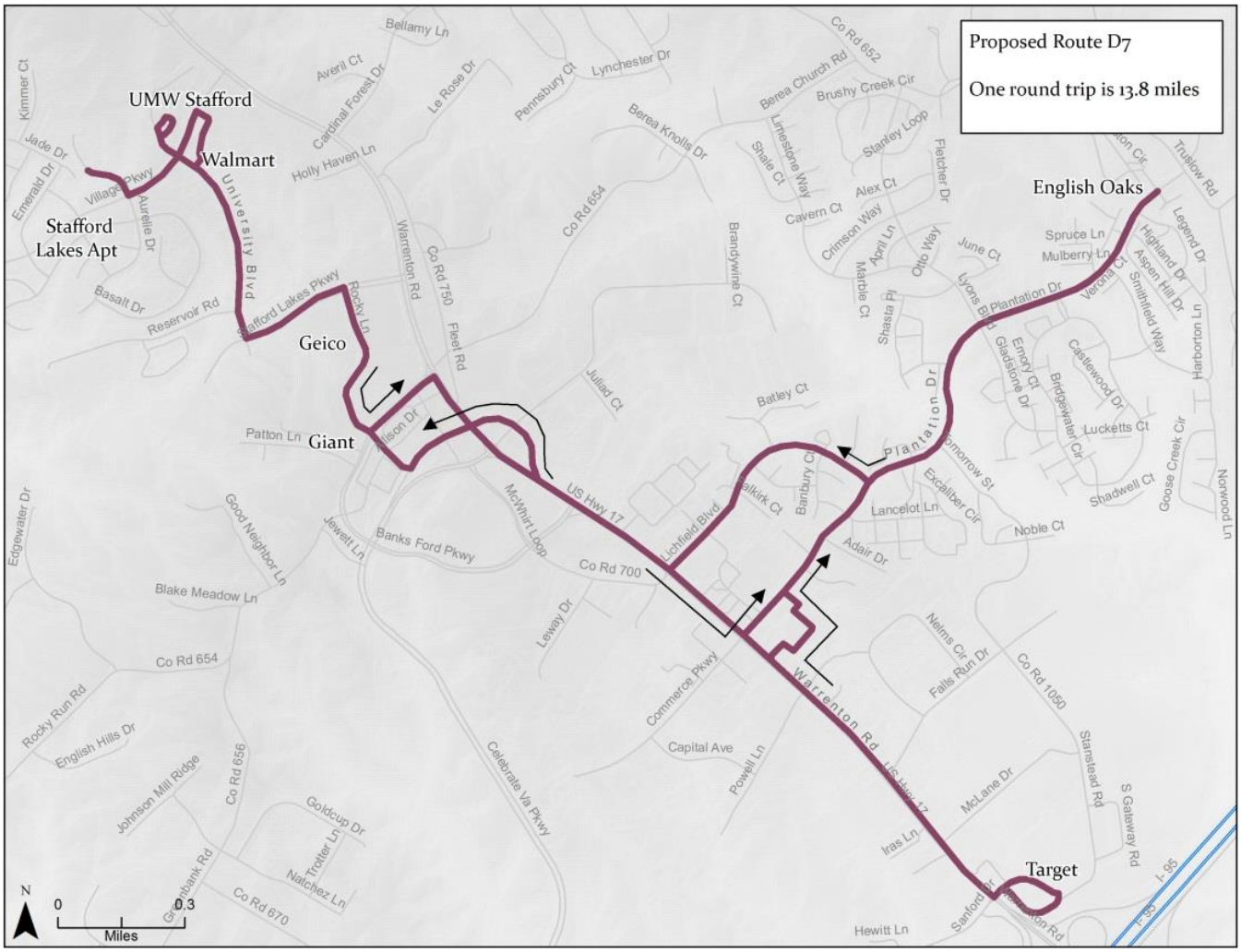
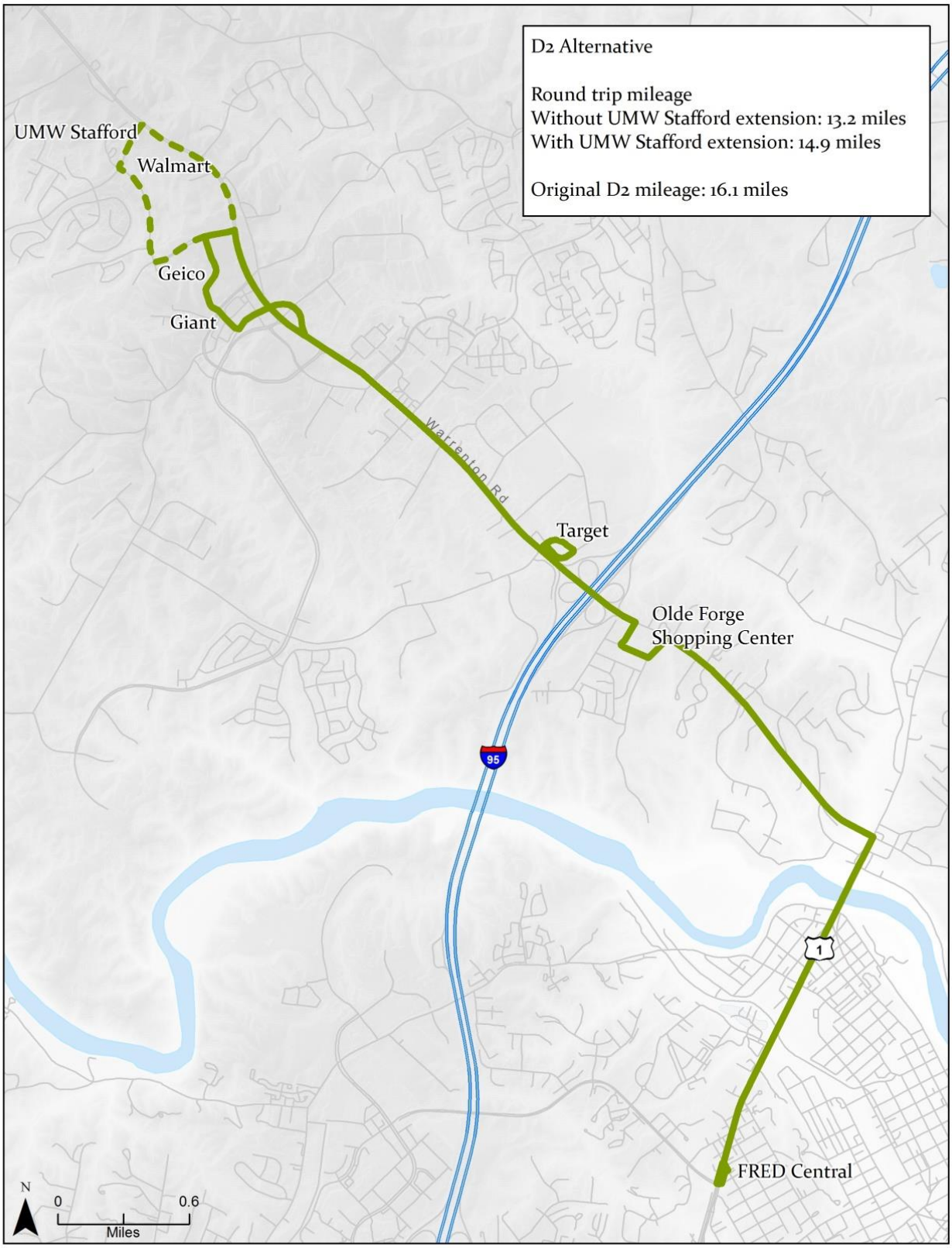


Figure 4-6: Proposed Revision to the D2



Initiative #17 – Additional VRE Feeder Service

VRE feeder service is currently provided by FRED to the Fredericksburg VRE and Amtrak station from commuter parking areas in Spotsylvania County (Gordon Road Lot and Salem Church Lot – VS1) and from residential areas in Fredericksburg (VF1). The focus of this initiative is to provide additional service, both for the existing feeder patterns and to the two newer VRE stations.

No changes are proposed for the VS1 Route, as it currently meets almost all of the Fredericksburg trains. In addition, this route is the most productive route in the FRED network. Two vehicles are used for the service.

Initiative #17A – Provide Feeder Service to the Spotsylvania Station

There is currently no feeder bus service provided to the relatively new Spotsylvania Station, which opened in November 2015. The station is located at 9442 Crossroads Parkway, along the U.S. 17 Corridor, east of I-95.

While development is planned adjacent to the station, the closest current population center is Cosner's Corner, located 4.5 miles west of the station area, generally between I-95 and U.S. 1. This area is rapidly developing, including apartments (Station Square), retail, and the Spotsylvania Medical Center.

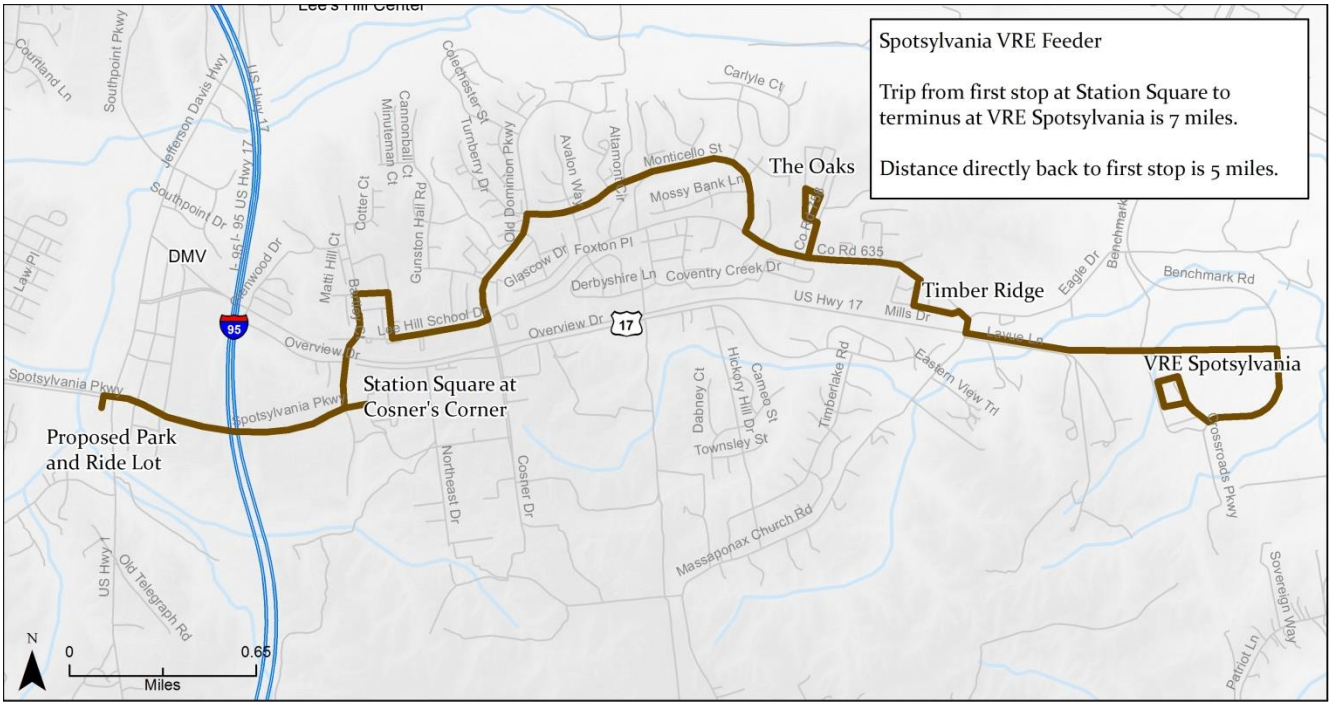
This initiative focuses on providing feeder service from the proposed new park and ride lot at Exit 126 of I-95, Cosner's Corner and potentially from some other developments to the Spotsylvania VRE Station. There was also input early in the study process that suggested a need for service from Caroline County, which could be accomplished via an additional early morning version of the C2, with a diversion to the Spotsylvania Station. These concepts are detailed below.

17A.1 – Local Feeder Service to the Spotsylvania Station

A feeder route from the proposed park and ride at Exit 126, Cosner's Corner and developments along the path of travel to the station is proposed initially. The route would serve the park and ride lot, Station Square development and travel to the Spotsylvania Station. The proposed service map is shown in Figure 4-7.

Feedback received from the George Washington Regional Commission indicated that the feeder bus should meet all of the trains. The current schedules include eight morning and eight afternoon trains. This level of service will likely require two vehicles per commute period, with one added tripper for both morning and evening. The total daily revenue service hours are estimated to be 15.

Figure 4-7: Local Feeder Service to the Spotsylvania VRE Station



Advantages

- Provides opportunities for Cosner's Corner and other local area residents to access the Spotsylvania VRE station without driving.
- Responds to stakeholder and rider input.

Disadvantages

- May not be as productive as the VF 1 and VS 1 Routes, as the population density is lower and there are fewer households with no automobiles in the Cosner's Corner area than in the service area covered by the VF1 and VS1.
- Requires additional vehicles that may not be used during the mid-day, depending upon other chosen initiatives.
- The split shift nature of this service will complicate driver scheduling and potentially negatively affect driver morale.

Cost

- The total annual operating costs for a two-bus feeder route with an added tripper are estimated to be $325,125 annually.

- Each vehicle is estimated to cost $150,000. Two vehicles are needed, assuming a tripper vehicle from the existing fleet could be used for one of the morning runs and one of the afternoon runs.

17A.2 Adjustments to the C2 to Provide VRE Feeder Service

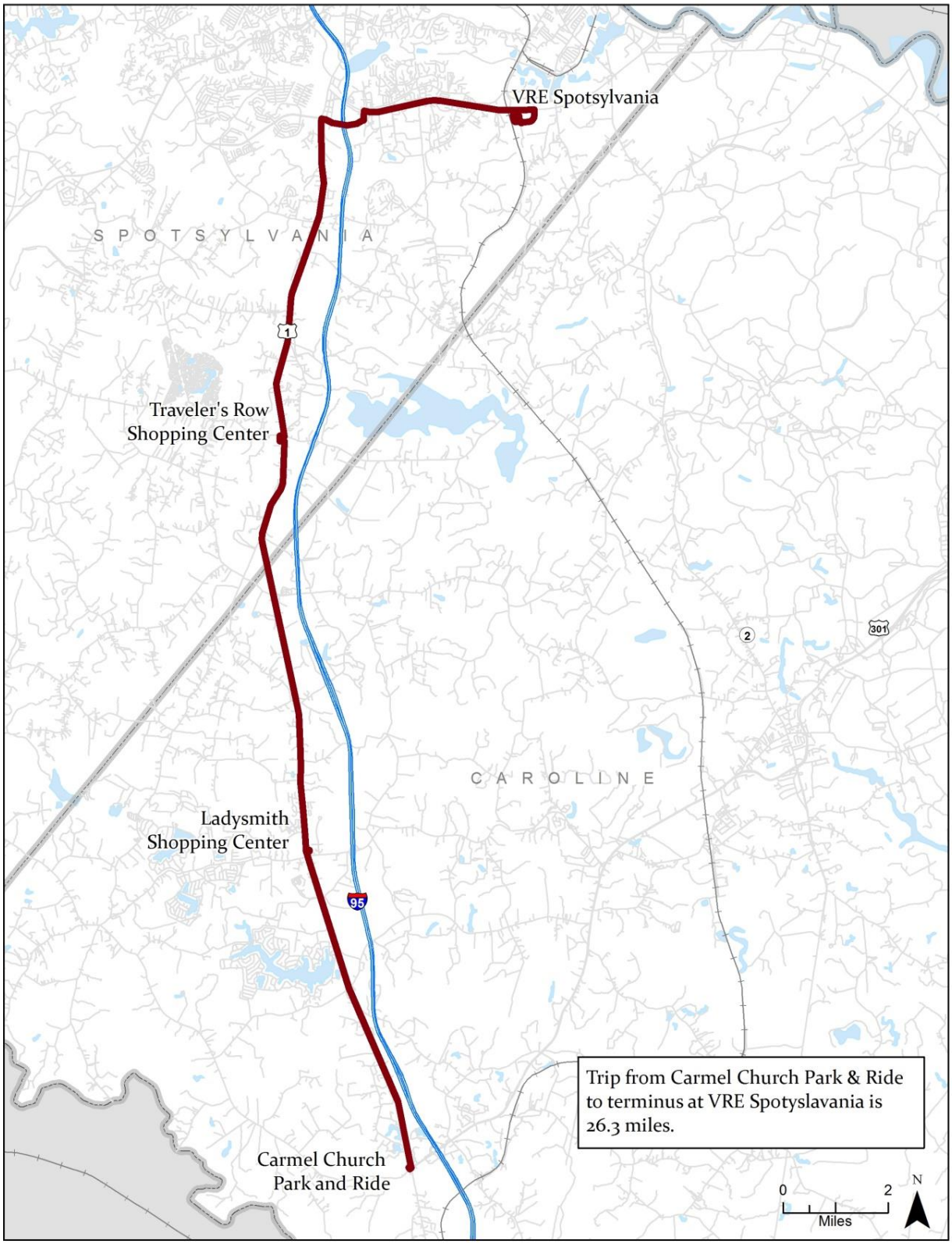
This initiative proposes to provide two early runs from the Carmel Church Park and Ride and the Ladysmith Shopping Center to the Spotsylvania VRE Station prior to the current start of the C2 service day. The route could make additional stops at Traveler's Row, Clayton Homes, and Route 1 and Spotsylvania Parkway on its way to the VRE Station. This route option is shown in Figure 4- 8.

A possible two run morning schedule could be as follows:

Trip 1:
4:20 a.m. at Carmel Church Park and Ride to get to VRE Station at 5:15 a.m., ahead of the 5:23 train

Trip 2:
6:10 a.m. at Carmel Church Park and Ride to get to VRE Station at 7:00 a.m., ahead of the 7:08 train

Figure 4-8: Modified C2 Feeder Service to the Spotsylvania VRE Station



Given the current C2 schedule, it would not be possible for the C2 to provide VRE afternoon feeder service with the same vehicle. A second vehicle, separate from the C2, would be needed to provide service from the station back to Ladysmith in the afternoon. The afternoon service could be as follows:

Trip 1:
Meet the 5:54 p.m. train from Spotsylvania Station and travel to Traveler's Row and Ladysmith, arriving at Carmel Church Park and Ride at about 6:45 p.m. Travel back to VRE Station.

Trip 2:
Meet the 7:44 p.m. train from Spotsylvania Station and travel to Traveler's Row, Ladysmith, and Carmel Church Park and Ride.

The morning and evening services combined total about 5 revenue hours per day for a total of about 1,275 annual revenue service hours.

Advantages

- Provides access to the VRE service for Caroline County residents who do not or choose not to drive.
- Offers a small reduction in the number of cars that need to park at Spotsylvania Station.

Disadvantages

- Relatively expensive on a cost per trip basis.
- Requires an additional vehicle for the afternoon service, which may not be used during the morning and mid-day, depending upon other chosen initiatives.

Cost

- The operating cost for service based on 1,275 annual revenue service hours, is estimated to be about $108,375 annually.
- An additional vehicle would be needed at a cost of about $150,000.

Ridership

- Ridership on the current C2 Route is about 5.25 trips per revenue hour. If productivity is similar for the feeder routes, ridership is expected to be about 6,693 annual passenger trips.

Initiative #17B- Provide Feeder Service to the Brooke Station

The final VRE feeder initiative calls for the introduction of local feeder bus service to the Brooke VRE Station in Stafford County. The station is somewhat remotely located, about 4 miles southeast of Stafford on Brooke Road. This feeder concept calls for the route to originate at the VDOT Park and Ride lot at Courthouse Road and I-95. The route would then serve the multi-family housing to the east of I-95 (along Red Oak Drive and Davenport Drive), then serve the Courthouse area and proceed along Courthouse Road and Brooke Road to the station. The one-way route length is about 6.1 miles and the one-way travel time is estimated to be about 20 minutes (with stops). The proposed service map is shown in Figure 4-9.

Using one vehicle, the following schedule could be achieved:

Morning Trips:

- Trip 1: Leave park and ride at 4:45 a.m. to access the 5:18 train
- Trip 2: Leave park and ride at 5:50 a.m. to access the 6:24 train
- Trip 3: Leave park and ride at 6:50 a.m. to access the 7:29 train

Afternoon Trips:

- Trip 1: Meet the 4:29 p.m. VRE Train at the Brooke Station
- Trip 2: Meet the 5:29 p.m. VRE Train at the Brooke Station
- Trip 3: Meet the 6:34 p.m. VRE Train at the Brooke Station
- Trip 4: Meet the 7:19 p.m. VRE Train at the Brooke Station

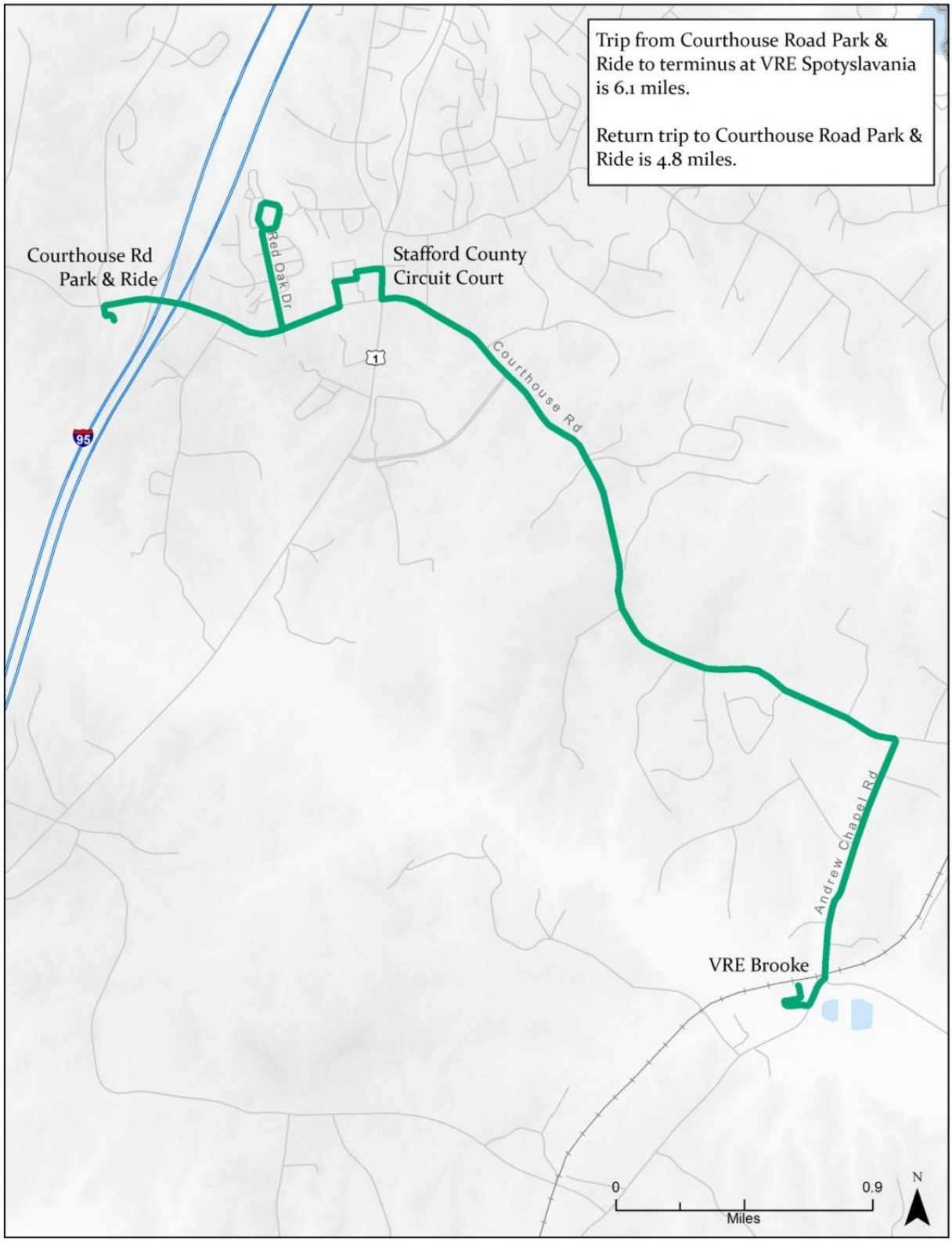
Advantages

- Connects a park and ride in the I-95 corridor to the VRE.
- Provides access to the VRE from Stafford for people who do not or choose not to drive.
- Provides additional travel and park and ride options for the region.
- Reduces congestion on local roadways.

Disadvantages

- Adds expense.
- May have low demand given the limited residential density in the Stafford area.
- Requires an additional vehicle that may not be used during the mid-day, depending upon other chosen initiatives.
- The split shift nature of this service will complicate driver scheduling and potentially negatively affect driver morale.

Figure 4-9: Feeder Service to the Brooke VRE Station



Cost

- The schedule listed above totals about 5.75 revenue hours per weekday, for an annual total of 1,466 revenue service hours, which corresponds to about $124,631 in annual operating costs.

- A vehicle will also likely be needed, at a cost of $150,000.

Ridership

- Ridership on this feeder route is likely to be lower than the ridership that is experienced on the VF1 and VS1, as the population base is less in this service corridor, and parking is more readily available at the Brooke Station than it is at the Fredericksburg Station. It is estimated that this service could achieve about 9,300 passenger trips per year.

Initiative #18 – Downtown Fredericksburg Circulator / Hotel Connector

The information gathered from area stakeholders indicated there is interest in initiating a tourist-oriented downtown circulator in the City of Fredericksburg. Downtown circulators are a good way to manage parking, allow visitors to see more of the city than they might on foot, assist travelers who may have luggage, and highlight the city's attractions. Four options have been developed for the City of Fredericksburg to review.

The first option is the shortest and focuses on the Historic District, including stops at Battlefield Visitor Center, the Train Station, Fredericksburg Visitor Center, Sophia Street Parking Garage, three museums, and Hugh Mercer Apothecary. This route is 3.2 miles in length, which would allow 20 minute headways using one vehicle. The route is displayed in Figure 4-10.

Option 2 replicates the walking tour that is promoted through the Greater Fredericksburg Tourism Partnership and is 4.4 miles in length. It serves a larger area than Option 1, serving additional attractions. Using one vehicle, this route could likely accomplish 30 minute headways. Figure 4-11 displays Option 2 for the circulator.

The third option, the Plantation/Battlefield option is the longest of the three downtown options and includes a trip across the river to Chatham Manor and Washington Ferry Farm. The trip length is 6.3 miles and one vehicle could likely accomplish 30 minute headways. This route is displayed in Figure 4-12.

The fourth option is the development of a connector from downtown Fredericksburg to the primary lodging areas of Fredericksburg, which are located along Hospitality Lane, west of I-95, adjacent to the Fredericksburg Expo and Conference Center. This route is about 9 miles round-

trip, which would allow one vehicle to provide 45-60 minute headways. It is envisioned that the connector route would allow direct transfers to the downtown circulator. This route is displayed in Figure 4-13.

The final route recommendation could include elements from all four of these options, or other new options, depending upon feedback received from the city and the tourism community. Other important considerations for this service will be the type of vehicle used for service and the days and hours of operation.

Advantages

- Provides downtown circulator service that will allow residents and visitors to travel through the downtown without driving.
- Serves to highlight downtown attractions.
- Provides a mechanism to manage parking demand.
- Potentially provides a connection to area hotels from the VRE Station and downtown Fredericksburg.

Disadvantages

- The only significant disadvantage is cost.

Cost

- The cost to provide service will vary considerably depending upon the level of service provided. For planning purposes, we will assume 40 hours a week of service, using two vehicles (assuming the connector route is also implemented). These 80 hours could be provided during the periods of highest visitation to Fredericksburg.
- If 80 hours of service are provided each week, the annual operating cost will be about $353,600.
- A specialty vehicle will also be needed. Trolleys have a significant price range, depending upon their expected useful life. For planning purposes, the vehicles are estimated to cost between $200,000 and $400,000 each.

Ridership

- Downtown circulators can typically see relatively high productivity, as passengers board and alight along a route that travels through highly developed areas. Depending upon the route chosen, we can estimate a range of between 12 and 15 passenger trips per revenue hour. If 4,160 revenue hours are provided, the annual ridership is likely to range between 49,920 and 62,400 passenger trips.

Figure 4-10: Option 1- Historic District Circulator

Figure 4-11: Option 2 - Walking Tour Circulator with VRE Station

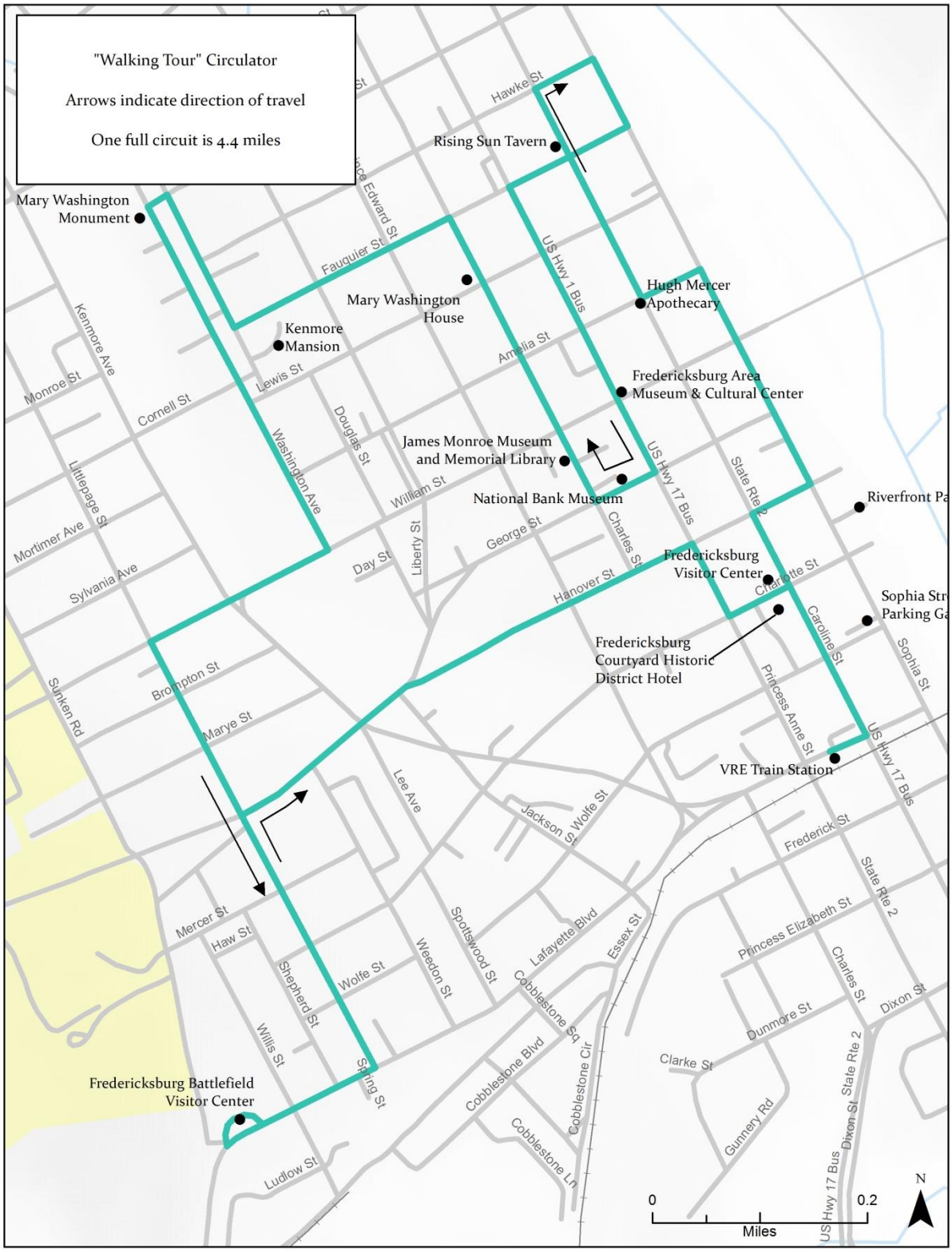


Figure 4-12: Option 3 - Plantation/Battlefield Circulator

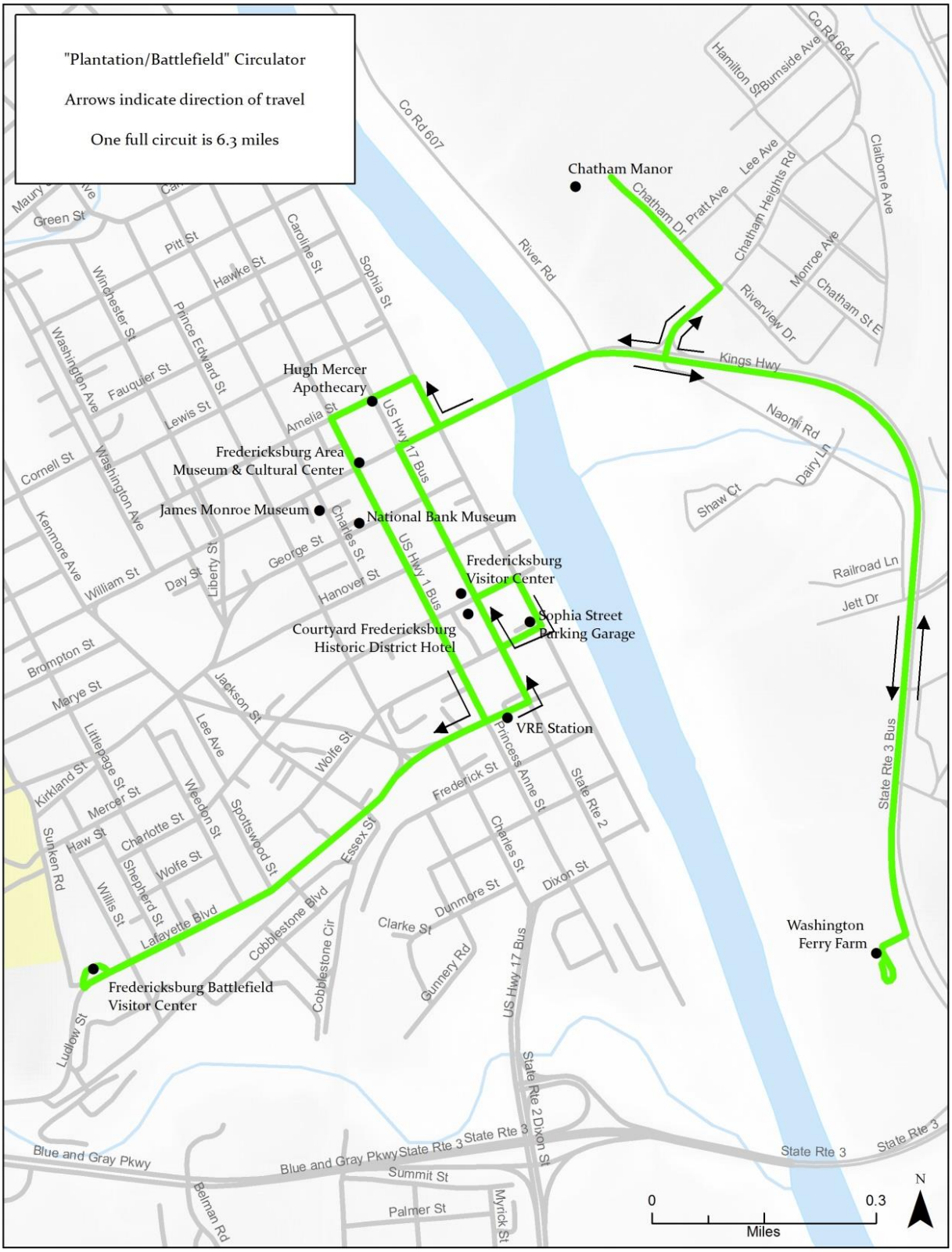
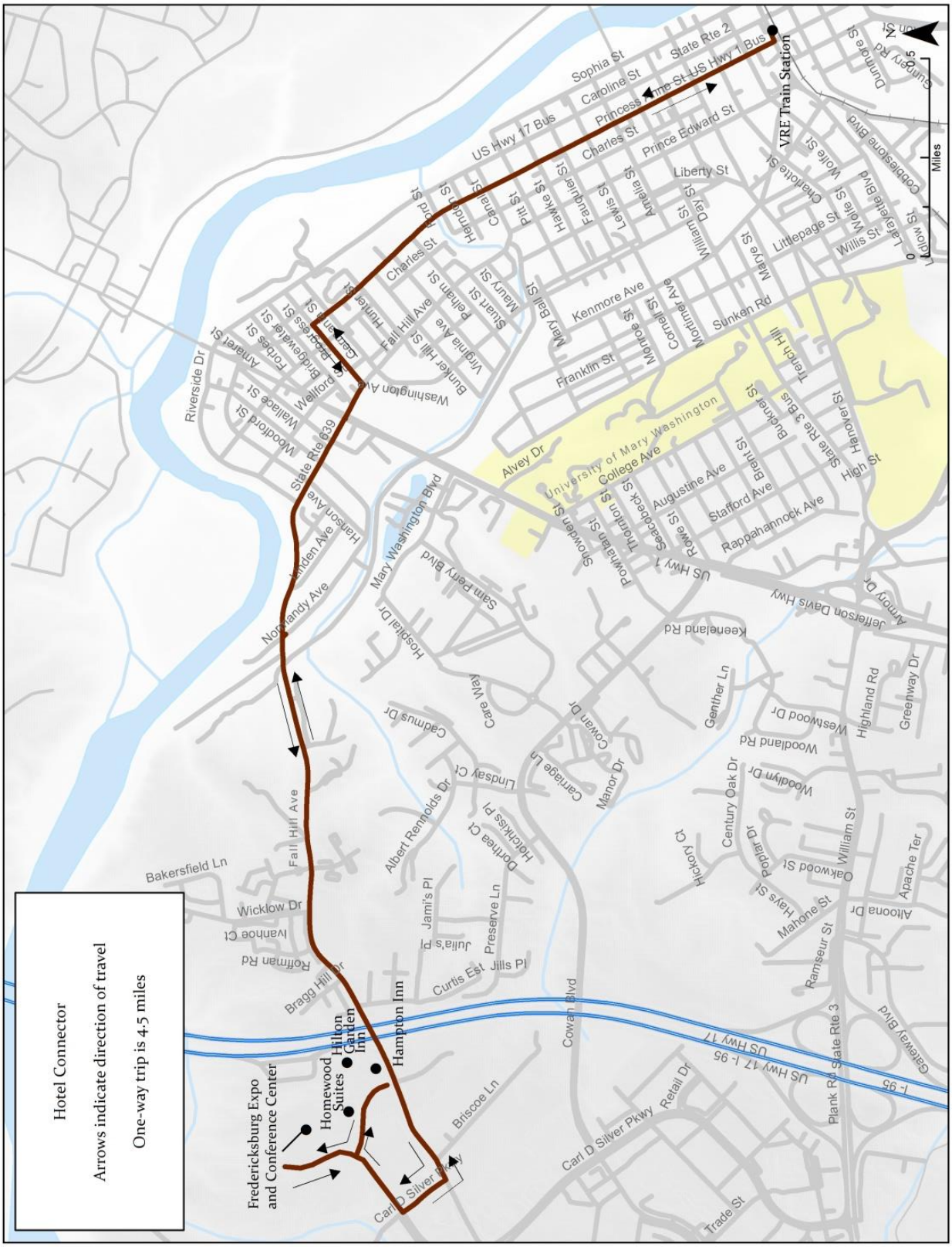


Figure 4-13: Option 4 – Hotel Connector



Initiative #19 – Add Commuter Service to the Naval Surface Warfare Center in Dahlgren

The focus of this service initiative is to provide a public transportation option for commuters who travel from the FRED service area to the Naval Surface Warfare Center in Dahlgren. The route would originate at the park and ride lot that is planned for Plank Road (State Route 3) and Salem Church Road, make additional stops at Idlewild Boulevard and the VRE Station and travel to Dahlgren via Route 3 and U.S. 301. This routing is based on a recent Transportation Demand Management (TDM) project that was conducted through GW Ride Connect and the Fredericksburg Area Metropolitan Planning Organization. Data provided from the study indicated there are 10,000 daily trips that travel to the Naval Surface Warfare Center (NSWC) and no public transit available. There are currently about 20 vanpools making this trip, according to GW Ride Connect.

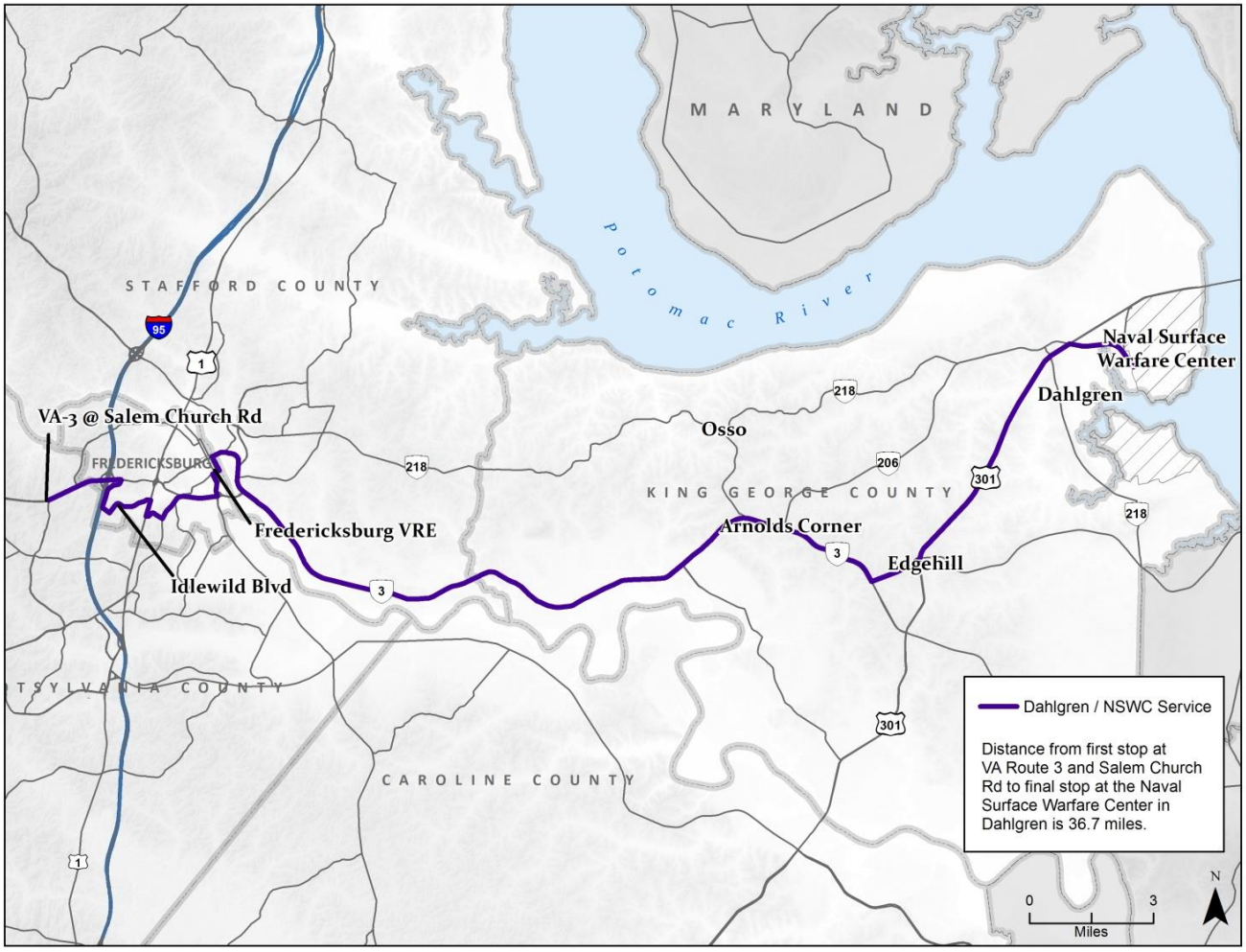
There may also be an opportunity to provide service for residents of King George County to travel to the NSWC, or to Fredericksburg, if local match is provided by King George County. A map of the proposed route is provided as Figure 4-14.

The route is long, at 38 miles each way, or 76 miles round-trip. With the higher average operating speeds experienced on commuter services, it is likely that one bus could make a round trip in about two hours. The preliminary service design calls for two vehicles to each make a round trip in the morning and the afternoon to provide two travel options for each commute period. If additional trips are desired, one of the vehicles could make a second trip during each commute period.

If two vehicles are assigned, each making one round trip per commute period, the weekday revenue service hours would be about 8, for an annual total of 2,040 hours. If a third run is desired, the annual revenue service hours would increase by 1,020 annually. The capital requirement for this service design is two vehicles.

This project was not included in the original version of the initiatives, as the TDM study was not completed until mid-December, 2016.

Figure 4-14: Service between Fredericksburg and the Naval Surface Warfare Center



Cost

- The annual operating cost for 2,040 annual revenue hours is estimated to be about $173,400 annually.

- Two expansion vehicles would be required at a cost of $150,000 each.

Ridership

- Ridership for this route is somewhat difficult to estimate, as FRED does not currently operate a similar service and it is unknown if at this time there will be bi-directional travel (i.e., Will King George residents have service?) or will the service be focused on NSWC employees only? Prior to implementation, it is recommended that FRED work with the NSWC to help gauge the level of demand for the service. Preliminary data provided by GW Ride Connect suggests that 20 vanpools are currently making this trip, so there may be strong demand for this service.

SUMMARY OF INITIATIVES AND NEXT STEPS

As the region grows and develops, FRED will likely need to expand service and provide more transit options for area residents. The initiatives highlighted in this chapter provide a range of options that were considered for the six-year TDP period. Some of the options address immediate needs (such as additional weekend service and a longer service day), while others are focused on serving additional markets and newly developing areas. Tables 4-4 and 4-5 provide summaries of the initiatives outlined in this chapter, with Table 4-4 focusing on infrastructure initiatives and Table 4-5 focusing on service initiatives.

The next step in the planning process was for FRED staff and stakeholders to consider which of these initiatives were appropriate to implement during the six-year period. It should be noted that the initiatives outlined in this chapter served as a starting point for consideration and were modified several times to meet the needs of the communities served for the six-year planning period (Chapter 5). Additional projects were considered and included in this revised description of the initiatives as they came to light after the initial review of potential initiatives.

Table 4-4: Summary of Infrastructure Initiatives

Initiative Number	Organizational and Infrastructure Initiatives	One-Time Operating Cost	Annual Operating Cost	Capital
1	Expand Staff to Accommodate Growth [1]		$112,528	
2	Develop Lee's Hill Transfer Center - Spotsylvania County			$350,000
3	Provide Additional Shelters and Benches			$120,000
4	Add Parking Capacity at FRED Central			$435,000
5	Convert FRED Fleet to Alternative Fuels	To be determined		
6	Route Shout	Already included in annual budget		
7	Google Transit		$4,000	
8	Electronic Fare Boxes		$12,000	$400,000
9	Update Route Maps and Schedules	$20,000		
10	Comprehensive Route and Schedule Analysis	$80,000		
Totals		**$100,000**	**$128,528**	**$1,305,000**

(1) Assumes 10.9% fringe for part-time and 37.1% fringe for full-time

Table 4-5: Summary of Proposed Service Initiatives

Initiative Number	Service Initiatives	Annual Operating Hours	Annual Operating Costs	Capital
11	Additional Weekend Service - Saturday	4,460	$379,100	$0
11	Additional Weekend Service - Sunday	4,460	$379,100	$0
12	Earlier Morning Service	4,335	$368,475	$0
13	Later Evening Service	1,785	$151,725	$0
14	Increase Frequency - F1, F3	3,060	$260,100	$300,000
15	Modify the D1		Cost neutral	
16	Add Service – Stafford Lakes and Revise D2	3,060	$260,100	$150,000
17a-1	Additional VRE Feeder Service – Spotsylvania Local	3,825	$325,125	$300,000
17a-2	Additional VRE Feeder Service – Spotsylvania Caroline	1,275	$108,375	$150,000
17b	Additional VRE Feeder Service - Brooke	1,466	$124,631	$150,000
18	Downtown Fredericksburg Circulator and Hotel Connector	4,160	$353,600	$400,000
19	Commuter Service- Dahlgren	2,040	$173,400	$300,000
Totals		**33,926**	**2,883,731**	**1,750,000**

Chapter 5
Operations Plan

INTRODUCTION

The Operations Plan describes the service and infrastructure improvements and expansions that have been recommended for implementation by Fredericksburg Regional Transit (FRED) over the six-year planning period (FY2017-FY2022) covered by the Transit Development Plan (TDP). These recommendations address the operating, infrastructure, and transportation needs identified in Chapter 3. The details for each of these projects were introduced in Chapter 4.

An implementation year has been assigned to each initiative for planning purposes, though the initiatives that require additional funding will be subject to DRPT's and FRED's annual budget process. DRPT has advised grantees that capital funding may be constrained over the next few years as the agency works to develop a replacement funding source for the 2007 capital bonds that recently expired. If funding is not available during the recommended year, FRED can adjust the implementation schedule within the annual TDP update letter that it prepares for the Virginia Department of Rail and Public Transportation (DRPT).

The plan is organized into two broad categories: organizational, infrastructure and communications initiatives; and service initiatives. An implementation schedule is provided by year, following the descriptions of the initiatives. A summary table that includes the planning estimates for revenue hours, revenue miles, ridership, and expenses for each initiative completes Chapter 5.

Following the Operations Plan, Chapter 6 outlines the capital needs associated with these projects, as well as capital replacement needs for the current vehicle fleet and associated infrastructure. Chapter 7 provides the financial plan to support FRED's transit program over the six-year period.

ORGANIZATIONAL, INFRASTRUCTURE, AND COMMUNICATIONS INITIATIVES

Organizational, infrastructure, and communications initiatives include proposals for changes that affect the way that transit is guided, administered, managed, or staffed in the region, as well as those that consider additional facilities, technology, planning, and communications improvements. There are several initiatives recommended for implementation during the six-

year TDP period that fall within these categories. These are described below, along with the overall cost and recommended implementation year for each.

Organizational - Expand Staff to Accommodate System Growth

FRED's internal planning process has identified the need for additional staff positions to assist with operations and maintenance. The following new staff positions are identified in FRED's transit year 2018 goals:

- Assistant operations manager
- Part-time mechanic's helper
- Conversion of two part-time driver positions to full-time

The assistant operations manager position was officially requested by FRED for FY2017, but was not funded. The need for the position will likely increase as FRED grows, particularly if additional weekend hours are implemented. The opening of the Bowman Center maintenance facility has allowed FRED to conduct more maintenance tasks in-house, which has led to a need for additional maintenance staff support.

These three positions are included in FY2018 (year two) of the TDP and are expected to cost just over $112,500 annually. To control costs the budgeted hours for part-time drivers were reduced thereby limiting the budget impact to an increase of only $30,000 to cover the requested personnel changes.

Infrastructure - Develop the Lee's Hill Transfer Center in Spotsylvania County

There are currently five FRED routes that make a timed connection at the Lee's Hill Center in Spotsylvania County. The vehicles have a circular paved area where they can pull to the side of the road on Spotsylvania Avenue, shown in Figure 5-1. As is evident in the photos, the roadway is crowded and there are no passenger or driver amenities at this location. Drivers can use the Golden Corral restroom, which is located across the street from the transfer stop.

Transit service in Spotsylvania County is expected to grow, with service to the Spotsylvania County VRE station contemplated for implementation during this current TDP planning period, and additional future services are likely as the population increases and new development continues. Data provided by Spotsylvania County indicates that there are currently 14,846 approved housing units in the development pipeline. These housing units are located in 20 different developments and will likely be home to an estimated 31,470 residents.[1] This transfer center project was identified by FRED as new development occurred in the Market Street/Spotsylvania Avenue area. As part of the development agreement, the

[1] Planning data provided in November, 2016, by the Spotsylvania County Department of Planning's "Future Development" spreadsheet.

developer has agreed to provide a strip of land adjacent to the parking area of the Rappahannock Goodwill Industries building to be used as a bus transfer location. The preliminary design calls for five bus bays, benches, a canopy to provide shelter, and a trash receptacle. Drivers will be able to use the restrooms located in the Rappahannock Goodwill building.

Figure 5-1: Current Lee's Hill Transfer Location

Facing South on Spotsylvania

Facing North on Spotsylvania

FRED has been actively working on the development of this center. As such, a preliminary design has been completed, along with a construction cost estimate. This project, estimated to cost $350,000, has been included for FY2018 (year two of the TDP).

Infrastructure - Provide Additional Shelters and Benches

FRED currently has just six shelters throughout the service area, though there are others that have been made available through property owners. FRED Central also provides sheltered waiting areas for riders. The focus of this initiative is to provide passenger waiting shelters and amenities at additional locations throughout the service area. Additional passenger shelters and amenities were suggested by about 8% of the riders who completed a passenger survey.

It is suggested that FRED prioritize the potential candidate stops for shelters based on the number of boardings at each stop. The boarding/alighting data collected for the TDP indicated that the following 12 stops experience 20 or more boardings per day:

Bus Stop at Carl D Silver Parkway

- FRED Central
- Lee's Hill Center
- VRE/Amtrak
- Carl D Silver Parkway – Walmart
- Spotsylvania Towne Center
- University of Mary Washington (UMW) Main Entrance
- Stafford County Courthouse
- Central Park Barnes and Noble
- Eagle Village Shopping Center
- Fall Hill Ave- Fredericksburg Shopping Center
- Stafford Marketplace
- Fall Hill Avenue at the Heritage Park Apartments

Of these stops, the following seven do not have either passenger waiting shelters or some kind of building overhang where passengers can wait out of the weather:

- Lee's Hill Center (Transfer Facility)
- VRE/Amtrak at the Caroline Street stop
- Carl D. Silver Parkway Walmart
- Central Park Barnes and Noble
- Fall Hill Avenue – Fredericksburg Shopping Center
- Stafford Marketplace
- Fall Hill Avenue at the Heritage Park Apartments

In addition, there have been requests from riders from the Mayfield neighborhood for benches. There are six stops that serve the neighborhood, which is located west of Business Route 17 across from Dixon Park. There are four stops in the neighborhood that FRED staff is evaluating for installation of benches and trash cans.

The possible shelter locations listed above are based on both ridership and rider requests, and do not reflect whether or not it is physically feasible to install the different types of passenger amenities at each particular location. The implementation of passenger amenities at each stop must take into consideration if there is enough right-of-way and adequate sidewalk and curb ramp connections.

For the six-year plan, a budget of $20,000 has been included for each plan year. This level of funding should allow FRED to add shelters, benches, and other bus stop improvements over the course of the six-year period. The typical costs for a number of different types of bus stop improvements are provided in Table 5-1.

Table 5-1: Estimated Bus Stop Improvement Costs

Improvement	Unit Cost
Shelter (installed)	$5,000 - $10, 000
Bench (installed)	$1,500 - $2,500
4' Wide Sidewalk	$17.50 - $25.00 per linear foot
Bicycle Racks	$200 - $500
Curb Ramps	$2,000 - $2,500

Infrastructure – Add Parking Capacity at FRED Central

The current FRED Central site does not have a sufficient number of parking spaces to accommodate the number of staff and visitors that are routinely present at the facility. FRED has addressed this problem through a lease agreement with the Kingdom Baptist Church, located on the north side of Stafford Avenue, across the street from the FRED Central entrance. FRED staff members park in the church lot, leaving the FRED Central and street parking spots for visitors.

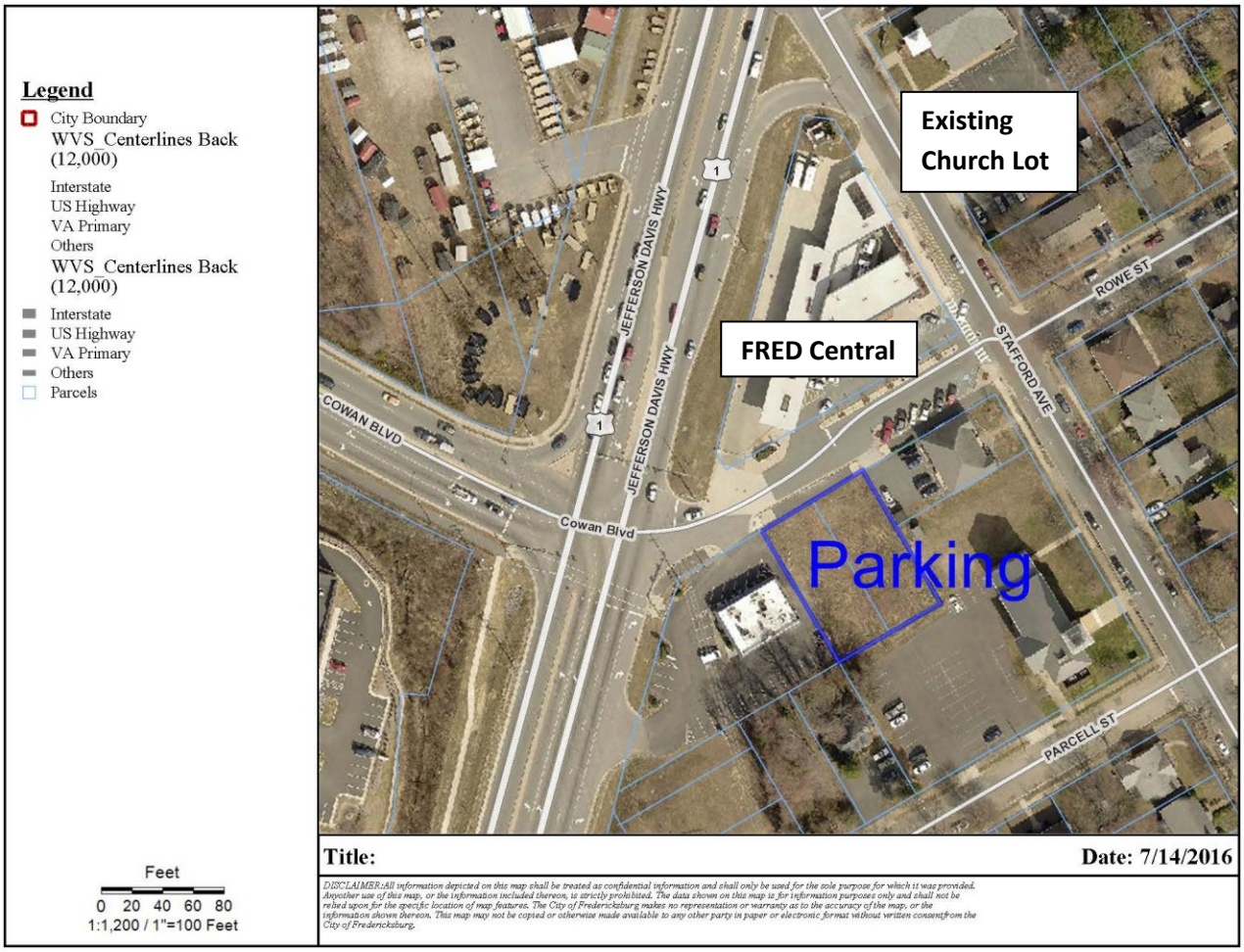
This arrangement has worked well for FRED; however, Kingdom Baptist Church is presently for sale and the parking lot may not be available in the future to accommodate FRED's parking needs. In recognition of this situation, FRED has investigated other options. One of these options is the purchase or lease of two nearby parcels of unimproved land. These parcels, shown in Figure 5- 2, have a current tax assessment value of $165,000 each.

Both parcels together comprise about 8,000 square feet. Preliminary research suggests that all of the costs associated with site preparation, asphalt paving, and striping are about $15.00 per square foot.[2] This is a rough planning estimate that does not consider site specific conditions. If 7,000 of the 8,000 available square feet were paved for the lot, the planning cost estimate is $105,000. This would result in about 24 parking spaces for cars.

The total cost estimate (land purchase, site preparation, and paving) is $435,000, assuming the land could be purchased at the assessed value. This estimate should be reviewed by the city's real estate and public works staff and refined as appropriate. This project is included for FY2019.

[2] Based on "How to Estimate the Cost of a Parking Lot at the Conceptual Level," a paper presented at the American Society of Professional Estimators, 2012.

Figure 5- 2: Proposed Land Parcels for FRED Central Parking Lot Addition



Infrastructure – Convert the FRED Fleet to Alternative Fuels

The use of alternative fuels for public fleets has increased significantly over the past several years. Proponents of alternative fuels cite reduced costs, increased used of domestic energy, and reduced emissions as the primary reasons for making the switch from either gasoline or diesel. There have also been grants available to help with conversion and infrastructure through the Virginia Clean Cities program and the U.S. Department of Energy.

FRED stakeholders have indicated a desire to investigate the possibility of converting the FRED fleet to either propane or compressed natural gas (CNG). Electric vehicles may also be a consideration, as these have become increasingly available. Locally, Spotsylvania County converted 24 fleet vehicles (sheriffs' cars, fleet service trucks, and school buses) in 2011 and 2012 with funding assistance through the Southeast Propane Autogas Development Program. In order to test the concept of implementing alternative fuels for the FRED fleet, the following activities are included for the six-year plan:

- 2017 – A significant vehicle purchase is planned for the first year of the plan, with 11 vehicles due for replacement. During the purchase process, FRED will ensure that fuel conversion is a possibility for these vehicles. This will keep options open for future implementation of alternative fuels.

- 2019- FRED will undertake a study of infrastructure needs and develop a cost estimate and implementation plan for fuel conversion. FRED staff anticipates that consultant assistance will be needed to lead the study. There are several regional examples of fleet conversions that should be able to provide data for the study (Spotsylvania County, Virginia; Shore Transit, Salisbury, Maryland; Yadkin Economic Development District, Boonville, North Carolina; Delaware Transit Corporation, DART First State, Delaware; and others).

- 2020 – Install the needed infrastructure to implement alternative fuels.

- 2021 – Convert three of FRED's vehicles and monitor their performance.

- 2022 – Convert the remaining eight vehicles.

The costs for this multi-year project will be added to FRED's six-year financial plan through FRED's Annual TDP Letter, once the 2019 study has been completed. The consultant study is estimated to cost about $20,000. This project was mentioned as a priority for City of Fredericksburg stakeholders.

Technology/ Communication - Route Shout – Real Time Schedule Information

Route Shout is the public interface associated with the automatic vehicle location (AVL) program that FRED is in the process of implementing. The AVL information is already available for FRED operations staff and the next step is to make this real-time schedule information available to the public. This project will allow riders to know in real-time when the next bus will be arriving at a particular stop. Real-time information improves the transit experience for riders, as they have an increased level of confidence knowing that the bus is actually on the way and what time it is expected to arrive.

FRED is already using the Route Shout program internally and plans to implement the public interface as soon as the vendor (Route Match) upgrades FRED's version of Route Match (the companion software program that stores much of the route and schedule data). The newer version of the program offers a better integration of the programs than the version that FRED currently uses. This upgrade is expected to occur by the end of FY2017. It should be noted that several riders requested this feature via the on-board survey. FRED has already paid for Route Shout.

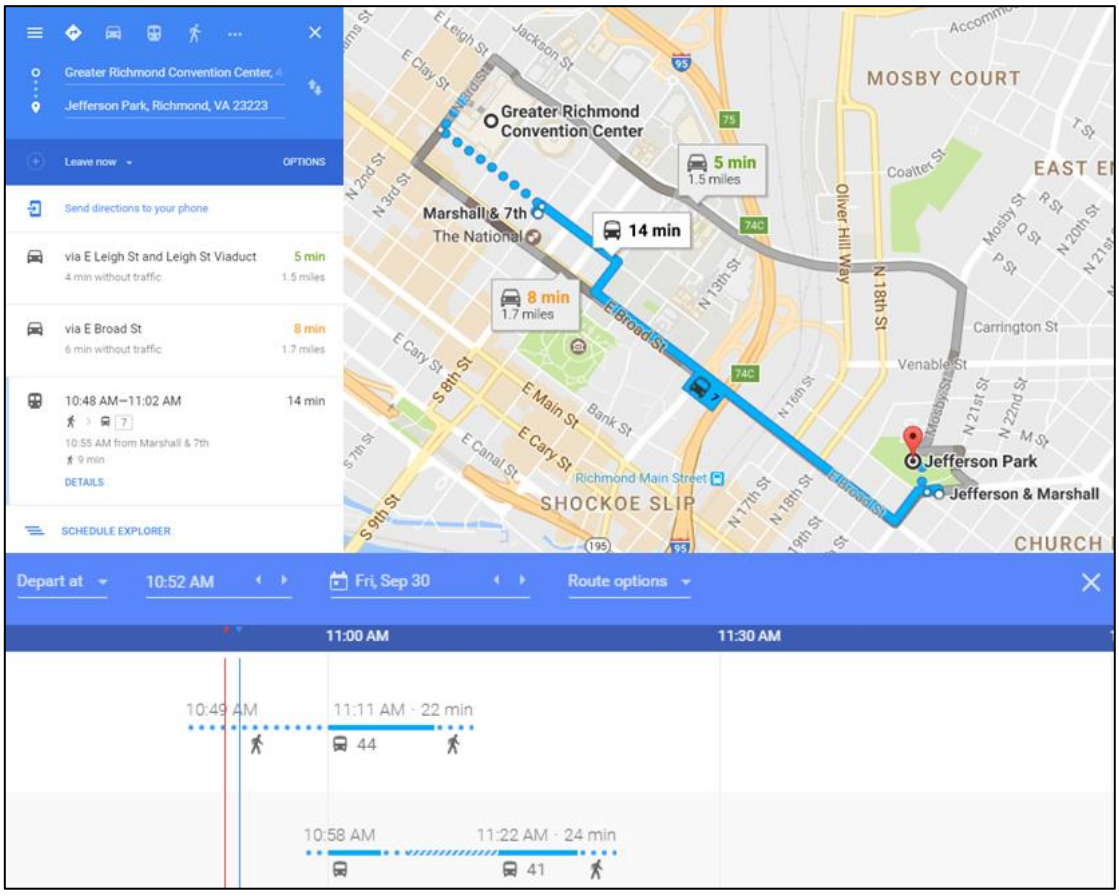
Technology/ Communication - Google Transit

Google Transit is a free trip planning tool that many transit agencies use to help the public navigate riding public transportation. Participation in Google Transit allows a transit program's bus stops and schedules to be viewed as part of Google Maps' directions, under the public transportation mode.

Google Transit is also a good marketing tool, as the bus stop locations show up on Google Maps. An example of how Google Transit appears to the public is shown in Figure 5-3, which is a screen view of google maps from Richmond, Virginia, showing the Greater Richmond Transit Company (GRTC) services.

In order to participate with Google Transit, FRED will need to set up a number of data files, in a specific structure, as defined by the General Transit Feed Specification (GTFS). FRED will then need to upload these files to Google Transit. Once the files have been uploaded, they will need to be maintained as routes and schedules change. FRED staff indicated that much of this work has already been accomplished by FRED's route and service planner, so this initiative is close to implementation.

Figure 5-3: Example of Google Transit from Richmond, Virginia



A portion of the route and service planner's time has already been invested in setting up the GTFS. If a third-party company is needed to complete the project, it is estimated to cost $6,000. Annual upkeep, based on a third party company, is estimated to cost between $3,000 and $5,000 annually. Rather than using a third-party, the route and service planner could keep the GTFS up to date if he has time among his other duties. The Google Transit initiative is scheduled for FY2017.

Technology - Electronic Fare Boxes

Electronic fare boxes automate the fare collection process by determining the exact fare required of the trip and then collecting and recording fares consisting of cash, electronic swipe cards, tickets, and passes. The fare boxes eliminate the need for drivers to handle fares and automatically record the amount of fares collected daily.

Another important feature of electronic fare boxes is the ability to handle electronic fare media. Current technologies include the "tap" technology, where the rider holds the fare card close to the reader (like WMATA Smart Cards), and older "swipe" technology, where the fare card has a magnetic strip that is swiped through a reader. Electronic fare systems provide a good way for systems to record usage data from various constituent groups, such as university students or hospital employees.

Electronic fare boxes are expensive, ranging from $12,000 and $15,000 per vehicle. The cost to purchase electronic fare boxes for the entire fleet is estimated to cost between $350,000 and $460,000. Given the expense and relatively low benefit to riders, FRED has scheduled this project for FY2022.

Planning – Comprehensive Route and Schedule Analysis

While there are several route and schedule suggestions contained within these TDP initiatives, a full comprehensive routing analysis is beyond the scope of the TDP. Given the significant growth in the region, particularly in Stafford and Spotsylvania Counties, a comprehensive route and schedule analysis would be helpful to further refine FRED's route network.

If a consultant were hired for this task, it would likely cost between $75,000 and $100,000. This initiative is included for year three of the plan (FY2019).

Communication - Update the Route Maps and Schedules

The current public route maps provide a good base of information for passengers and the major stops are well-labeled; however, the maps do not depict the names of major roadways. Adding key road names to maps would help riders better understand the path of travel for the routes.

Some maps are not completely accurate. For example, the S4 returns to Lee's Hill Center via Courthouse Road and Hood Drive, rather than back through the Southpoint development. The stop numbering convention, as displayed on the schedule, is helpful for FRED from a data collection standpoint, but can be confusing for riders. Improvements to the route maps and schedules were also requested by riders via the survey.

Re-designing and printing the route and schedule information is estimated to cost about $20,000 if performed by a vendor. This improvement has been included for FY2019.

SERVICE INITIATIVES

The initiatives set out in this section represent recommended changes to routes, schedules, and operations, and are intended to enhance service, efficiency, and the passenger experience. They were developed based on discussions with FRED Transit staff, ideas provided by members of the Public Transit Advisory Board (PTAB), suggestions provided by customers via the on-board survey, and input from other stakeholders.

The proposed initiatives draw on the information gathered for Chapters 1 through 3 and refined from the potential options outlined in Chapter 4. The initiatives are presented in the following three categories:

- Scheduling Initiatives
- Changes to Existing Routes
- New Services

The cost estimates provided are based on FRED's estimated fully-allocated cost per revenue service hour of $85. This method of estimating the incremental costs for transit improvements tends to over-state the actual costs, as the fully-allocated cost includes administrative costs that are not likely to change with a modest operational expansion.

Most of the service expansions are scheduled for years four through six of the plan (FY2020 – FY2022) so that FRED has sufficient time to fully vet the concepts, refine the implementation costs, and build the consensus necessary to obtain local matching funds. It should be noted that the initiatives associated with providing feeder service to the VRE may be eligible for funding through the I-95/I-395 toll lanes project, beginning in FY2021 or so. FRED should continue to stay informed regarding the implementation of the I-95/I-395 toll lanes project and how to apply for funding through the program. Additionally, new services may be eligible for Congestion Mitigation and Air Quality (CMAQ) funding, which allows the federal share of operating and capital expenses to exceed the levels permitted under Sections 5307 and 5311.

Scheduling Initiatives

Operate Additional Weekend Service

The most frequently requested service improvement from the rider surveys was for additional weekend service. Currently the only services that operate on weekends are the E1 and E2 Routes, which provide service between the University of Mary Washington/downtown Fredericksburg and Central Park via Fall Hill Avenue and between the University of Mary Washington and the Spotsylvania Towne Center via Cowan Boulevard and Central Park.

The focus of this initiative is to provide mobility to a larger geographic area on Saturdays and possibly on Sundays, based on the likely demand for weekend service. The following routes should be considered for weekend service:

- F1, F3, F4 – in a coordinated manner with the E routes to maximize service and minimize duplication of effort. The F5 was not included, as it is duplicative of the E routes and a downtown circulator is proposed as a route initiative.
- D1, D2, D3, D4, D5
- S1, S5

If a ten hour service day were to be provided on all of these routes, the additional revenue service hours would be 100 per Saturday. If service were to be provided on 51 Saturdays, the additional annual revenue hours would be 5,100. It is assumed that the E1 and E2 routes would be coordinated with the F routes to reduce the total additional Saturday service hours to about 4,460 annually.

If Sunday service is also provided during a similar span of service, the additional annual revenue hours would be another 4,460.

Cost

- 4,460 hours of service for Saturdays will cost about $379,100 annually.
- Assuming a similar schedule, Sunday service would also cost $379,100 annually.
- Additional capital will not be required.

Ridership

- Saturday ridership is estimated to attract about 35,000 annual passenger trips. This is based on a productivity of 8 passenger trips per revenue service hour, which is higher than the current E routes, but about 13% lower than the overall system average.

- Sunday ridership is estimated to attract about 27,000 annual passenger trips. This is based on a productivity of 6 passenger trips per revenue hour.

Implementation

- Weekend service has been assigned to year four of the plan (FY2020). This implementation schedule is dependent upon the availability of federal, state, and local funds.

Start Regular Route Service Earlier in the Morning

Other than the VRE feeder routes and the C1, the public transportation services in the region operated by FRED do not start operating until after 7:00 a.m. and for some routes not until 8:30 or 9:00 a.m. This schedule does not allow for earlier work assignments or for attendance at 8:00 a.m. classes at Germanna Community College or the University of Mary Washington. Table 5-2 provides an overview of the proposed earlier start times for each route.

Table 5-2: Proposed Earlier Start Times

Route	Current Start Time	Proposed Start Time	Difference in hours
C1	6:00 a.m.	5:00 a.m.	1
C2	7:00 a.m.	6:00 a.m.	1
D1	9:00 a.m.	8:00 a.m.	1
D2	8:00 a.m.	7:00 a.m.	1
D3	7:30 a.m.	6:30 a.m.	1
D4	8:50 a.m.	7:50 a.m.	1
D5	7:00 a.m.	6:00 a.m.	1
F1	8:30 a.m.	7:30 a.m.	1
F2	7:30 a.m.	6:30 a.m.	1
F3	7:30 a.m.	6:30 a.m.	1
F4 - 2 buses	7:30 a.m.	6:30 a.m.	2
F5	8:30 a.m.	7:30 a.m.	1
S1 - 2 buses	8:00 a.m.	7:00 a.m.	2
S4	8:00 a.m.	7:00 a.m.	1
S5	8:00 a.m.	7:00 a.m.	1
Total additional hours each weekday			**17**
Total additional hours each week			**85**

Cost

- Adding 85 hours each week will cost about $368,475 annually, based on $85 per hour and 51 weeks of service (4,335 additional revenue hours)

- No capital costs will be required.

Ridership

- Using a productivity of 8 passenger trips per revenue hour, this service expansion is likely to generate about 34,700 annual passenger trips.

Implementation

- This improvement is scheduled for implementation in FY2021, which is year five of the plan. This implementation schedule is dependent upon the availability of federal, state, and local funds.

End Regular Route Service Later in the Evening

The current FRED regular routes end service for the day as early as 4:30 p.m. (the D1) and as late as 8:30 p.m. (F2, F3, F4, F5). The focus of this initiative is to add 1-2 hours of service for the routes that end earlier than 8:30 p.m. to start to move toward a more standardized ending time for all routes, where demand justifies longer hours. Table 5-3 provides an overview of the proposed end times for each route.

Table 5-3: Proposed Later Ending Times

Route	Current End Time	Proposed End Time	Difference in hours
C1	No change		0
C2	No change		0
D1	7:00 p.m.	8:00 p.m.	1
D2	No change		0
D3	6:30 p.m.	7:30 p.m.	1
D4	4:30 p.m.	6:30 p.m.	2
D5	7:00 p.m.	8:00 p.m.	1
F1	No change		0
F2	No change		0
F3	No change		0
F4 - 2 buses	No change		0
F5	No change		0
S1 - 2 buses	Add one at 5:00 p.m.		2
S4	No change		0
S5	No change		0
Total additional hours each weekday			**7**
Total additional hours each week			**35**

Cost

- Adding 35 hours each week will cost about $ 151,725 annually, based on $85 per hour and 51 weeks of service (1,785 additional revenue hours)

- Additional capital is not required.

Ridership

- Using a productivity of 8 passenger trips per revenue hour, this service expansion is likely to generate about 14,280 annual passenger trips.

Implementation

- This improvement is scheduled for implementation in FY2021, which is year five of the plan. This implementation schedule is dependent upon the availability of federal, state, and local funds.

Increase the Frequency of Service

Another scheduling improvement that is desired by riders and stakeholders is more frequent service. From an efficiency standpoint, it makes sense to prioritize frequency improvements based on service productivity, with more frequent service offered on routes that are the most productive. FRED may also want to develop a guideline to use when making decisions regarding improving the frequency of service (i.e., if the productivity of a route is above a certain number of passenger trips per revenue hour, the route would be considered for 30 minute frequency).

Not including the VRE feeder routes, the schedules of which are dictated by the VRE schedules, the most productive FRED routes (based on FY15 data) are: F1; F3; F4; F5; and F2. Of these five, the F1 and the F3 were the most productive, at 16.6 and 14.9 trips per hour, respectively. These two routes also cover important travel corridors in the Fredericksburg area. The F4A portion of the F4 is another heavily used travel corridor with high productivity.

The focus of this initiative is to offer 30-minute frequency for the routes that have demonstrated a high level of demand for service. To start, the F1 and the F3 are suggested, and the productivity standard for 30-minute service would be 15 passenger trips per revenue hour (rounding up the F3's 14.9 figure). The initial implementation may also consider 30-minute frequencies for only the peak demand hours. The boarding/alighting data showed peak ridership at 8:00 a.m. and at 2:00 p.m. for these routes.

Cost

- If an additional six hours per day were to be provided for both the F1 and the F3 (assuming a three hour morning peak and a three hour afternoon peak), 12 additional weekday service hours would be added, at an annual cost of about $260,000.

- Two additional vehicles would be needed. The vehicles in-service for these routes cost about $150,000 each.

Ridership

- Adding frequency on these routes will improve ridership, but will not double it for each hour of service on the routes, as the current and newly induced demand is spread out over additional operating hours. For planning purposes, we have assumed the additional hours will generate ten passenger trips per revenue hour, for a total of 30,600 additional trips.

Implementation

- Providing more frequent service on highly productive routes is planned for year six of the TDP (FY2022), pending funding availability from federal, state, and local partners.

Changes to Existing Routes

The initiatives set out in this section represent potential changes to existing routes and schedules and were developed based on discussions with FRED Transit staff, ideas offered by members of the PTAB, suggestions provided by customers via the on-board survey, and input from other stakeholders.

Modify the D1

The D1 currently provides service from the Fredericksburg Train Station to the Stafford County neighborhoods/destinations of Washington Square, Ferry Farm, Chatham Heights, Olde Forge Drive, the YMCA, Woodlawn Shopping Center, and Town and Country Drive. While there are transfer options at Olde Forge Road (D2) and at the Train Station (F4, F5), neither offers a convenient timed connection to the full route network.

The focus of this route modification is to better connect the D1 to the full route network and eliminate a route segment that is duplicated by the D2 (Warrenton Road between U.S. 1 and Olde Forge). The recommended route adjustment would change the route origin of the D1 to FRED Central, then travel to the train station, and then follow the current route to and from the YMCA, eliminating the segment between the YMCA and Olde Forge Road. This proposed change is highlighted in Figure 5-4.

Cost

- This change is generally cost neutral, with some minor fuel savings likely, given the small reduction in mileage. The fuel savings is estimated to be about $600 per year.

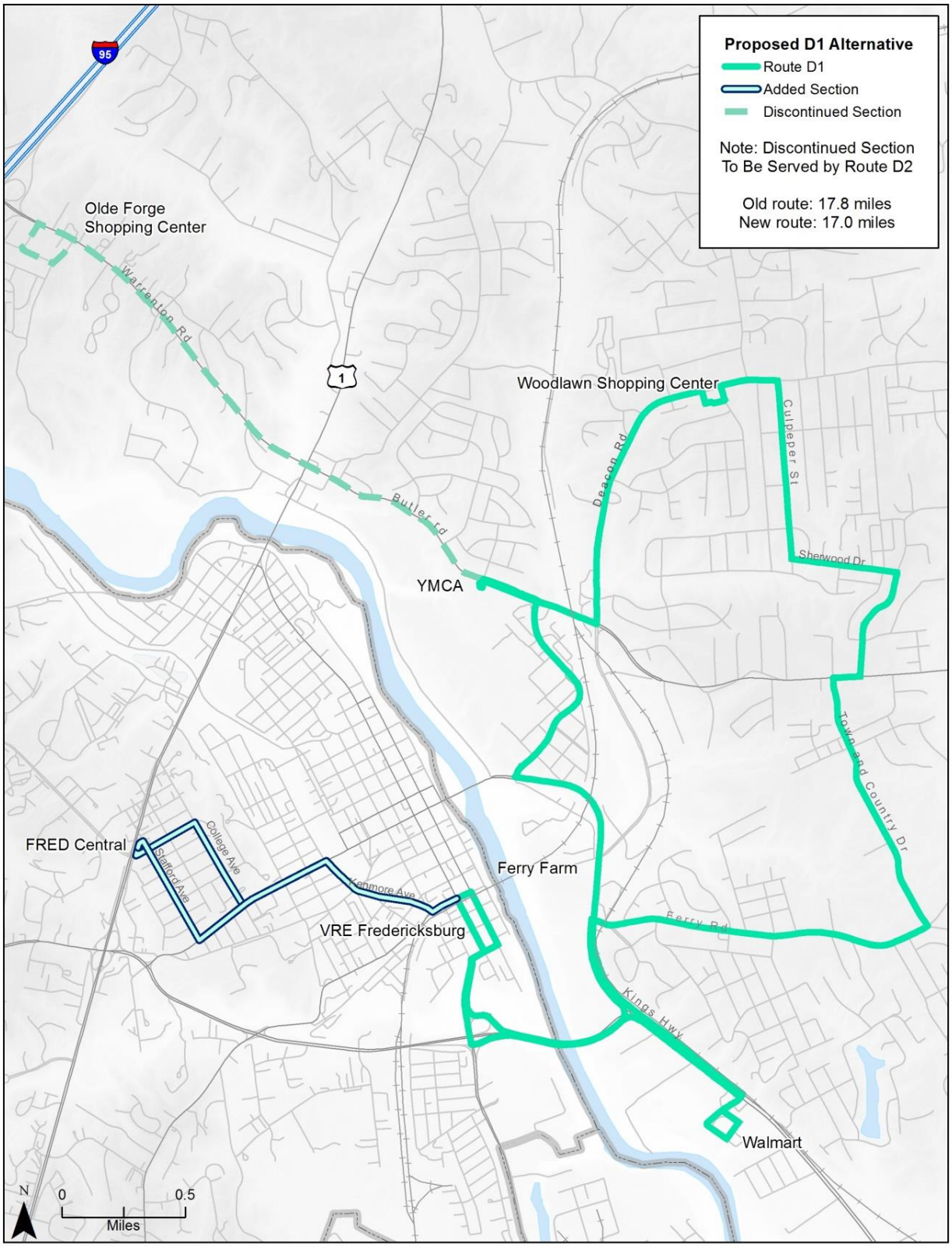
Ridership

- Ridership on the D1 is likely to increase, as this option adds a segment with more ridership opportunities and provides another opportunity to connect FRED Central and the Train Station. In addition, the segment eliminated from the D1 (to Olde Forge Road), has very low ridership. It is estimated that ridership on the D1 will increase by about 965 passenger trips annually. The only negative consequences for riders would be for those who originate on the D1 and travel to the areas served by the D2. These riders will have a slightly longer trip by moving their transfer location from Olde Forge Road to FRED Central. Similarly, riders who originate on the D2 and currently transfer to the D1 at Old Forge Road will also have a slightly longer trip by moving the transfer location.

Implementation

- This route initiative is scheduled for implementation in FY2018, which is year two of the plan.

Figure 5-4: Proposed Modification of the D1 Route



New Services

Downtown Fredericksburg Circulator and Hotel Connection

The information gathered from area stakeholders indicated that there is interest in initiating a tourist-oriented downtown circulator in the City of Fredericksburg and potentially adding a direct connection to the hotel areas, west of I-95. Downtown circulators are a good way to manage parking, allow visitors to see more of the City than they might on foot, assist travelers who may have luggage, and highlight the City's attractions. Three options for the circulator and one for the connecting service have been developed for the City to review. Other variants may be put forth as the leadership continues to consider the benefits and costs.

The first option is the shortest and focuses on the Historic District, including stops at the Battlefield Visitor Center, the Train Station, the Fredericksburg Visitor Center, the Sophia Street Parking Garage, the three museums, and the Hugh Mercer Apothecary. This route is 3.2 miles in length, which would allow 20 minute headways using one vehicle. The route is displayed in Figure 5-5.

Option 2 replicates the walking tour that is promoted through the Greater Fredericksburg Tourism Partnership and is 4.4 miles in length. It serves a larger area than Option 1, serving additional attractions. Using one vehicle, this route could likely accomplish 30 minute headways. Figure 5-6 displays Option 2 for the circulator.

The third option, the Plantation/Battlefield option is the longest of the three downtown circulators and includes a trip across the river to Chatham Manor and Washington Ferry Farm. The trip length is 6.3 miles and one vehicle could likely accomplish 30 minute headways on this route. This route is displayed in Figure 5-7.

The fourth option is the development of a connector from downtown Fredericksburg to the primary lodging areas of Fredericksburg, which are located along Hospitality Lane, west of I-95, adjacent to the Fredericksburg Expo and Conference Center. This route is about 9 miles round trip, which would allow one vehicle to provide 45-60 minute headways. It is envisioned that the connector route would allow direct transfers to the downtown circulator. This route is displayed in Figure 5-8.

The final route recommendation could include elements from all four of these options, or other new options, depending upon the feedback received from the City and the tourism community. Other important considerations for this service will be the type of vehicle used for service and the days and hours of operation.

Figure 5-5: Option 1- Historic District Circulator

Figure 5-6: Option 2 - Walking Tour Circulator

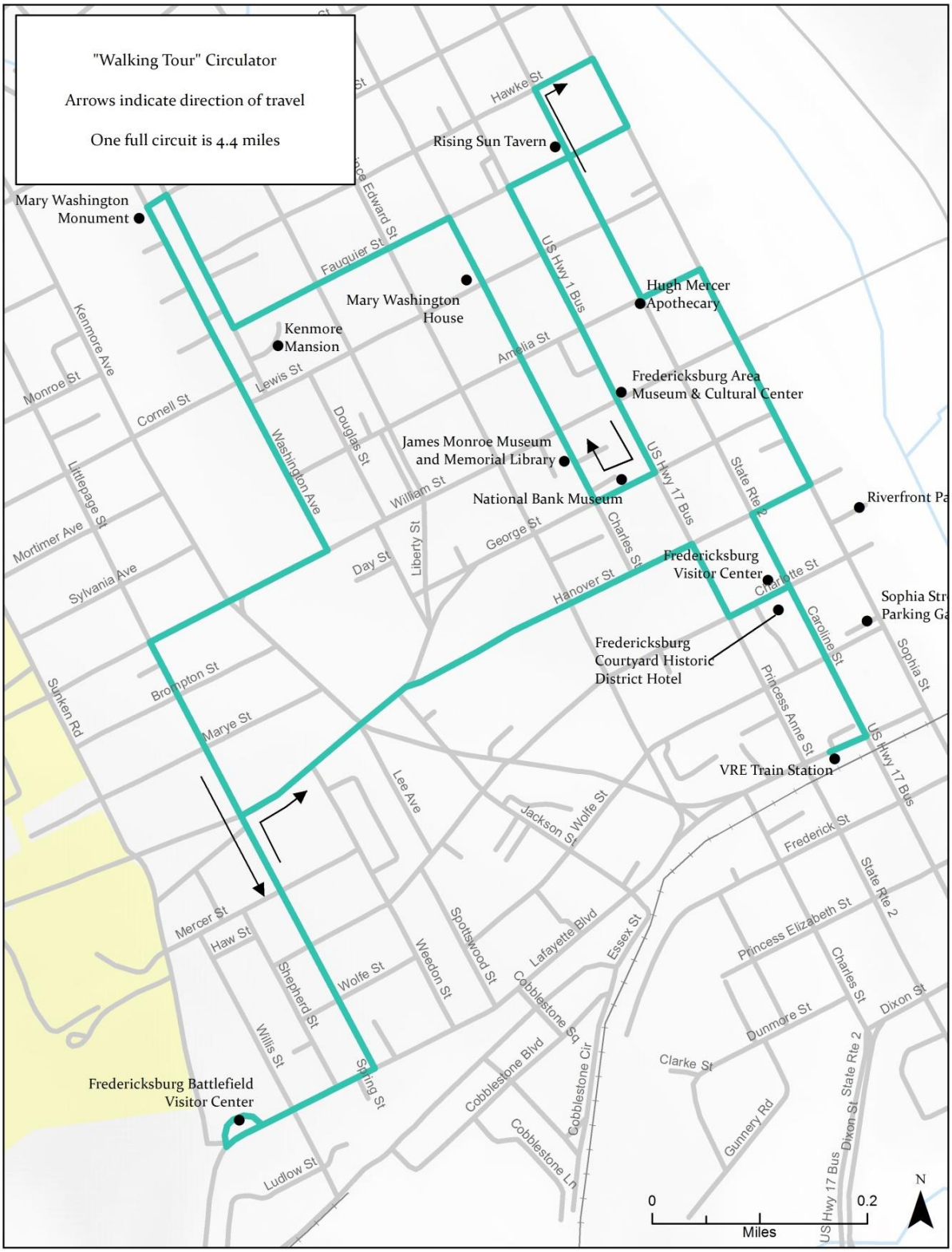


Figure 5-7: Option 3 - Plantation/Battlefield Circulator

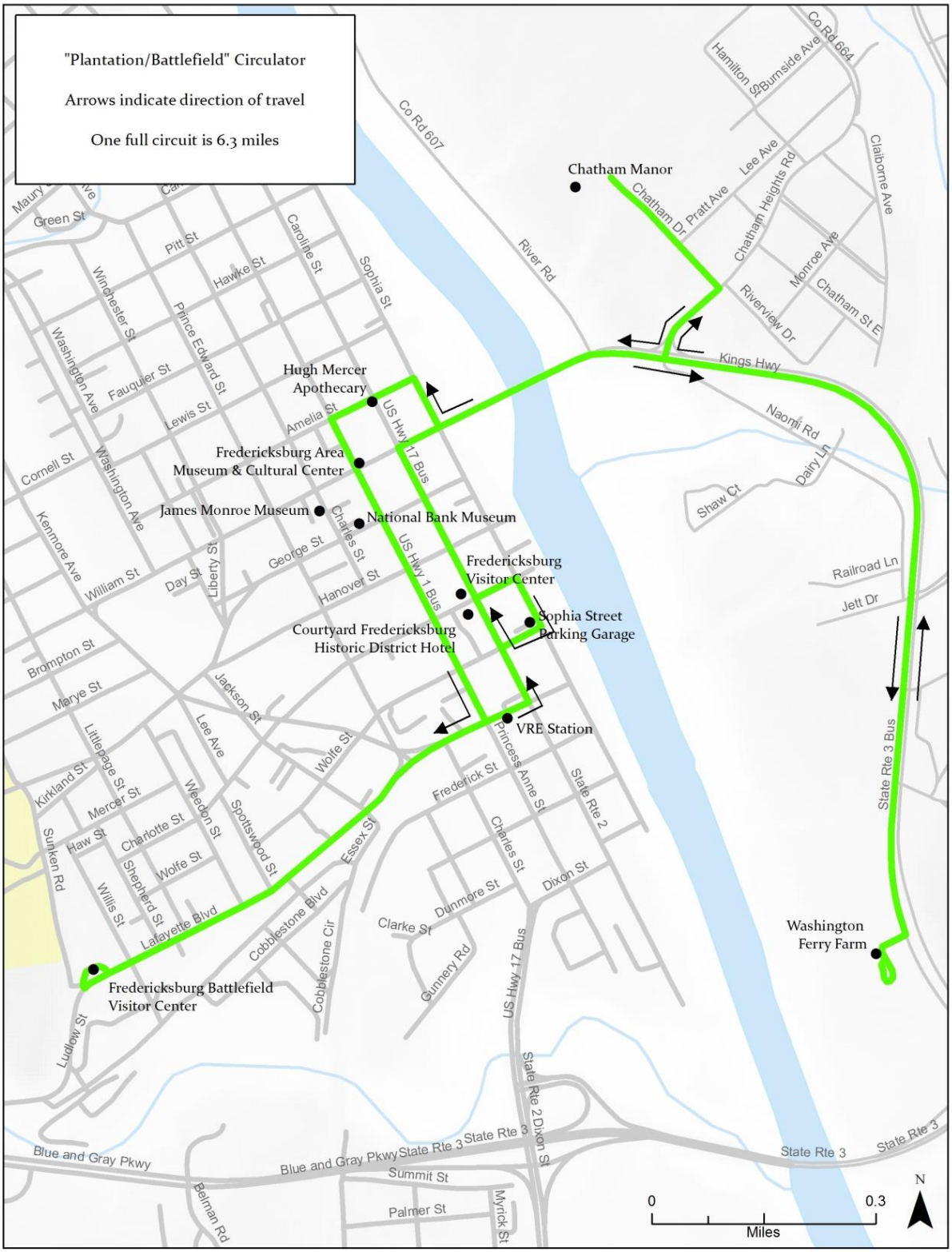
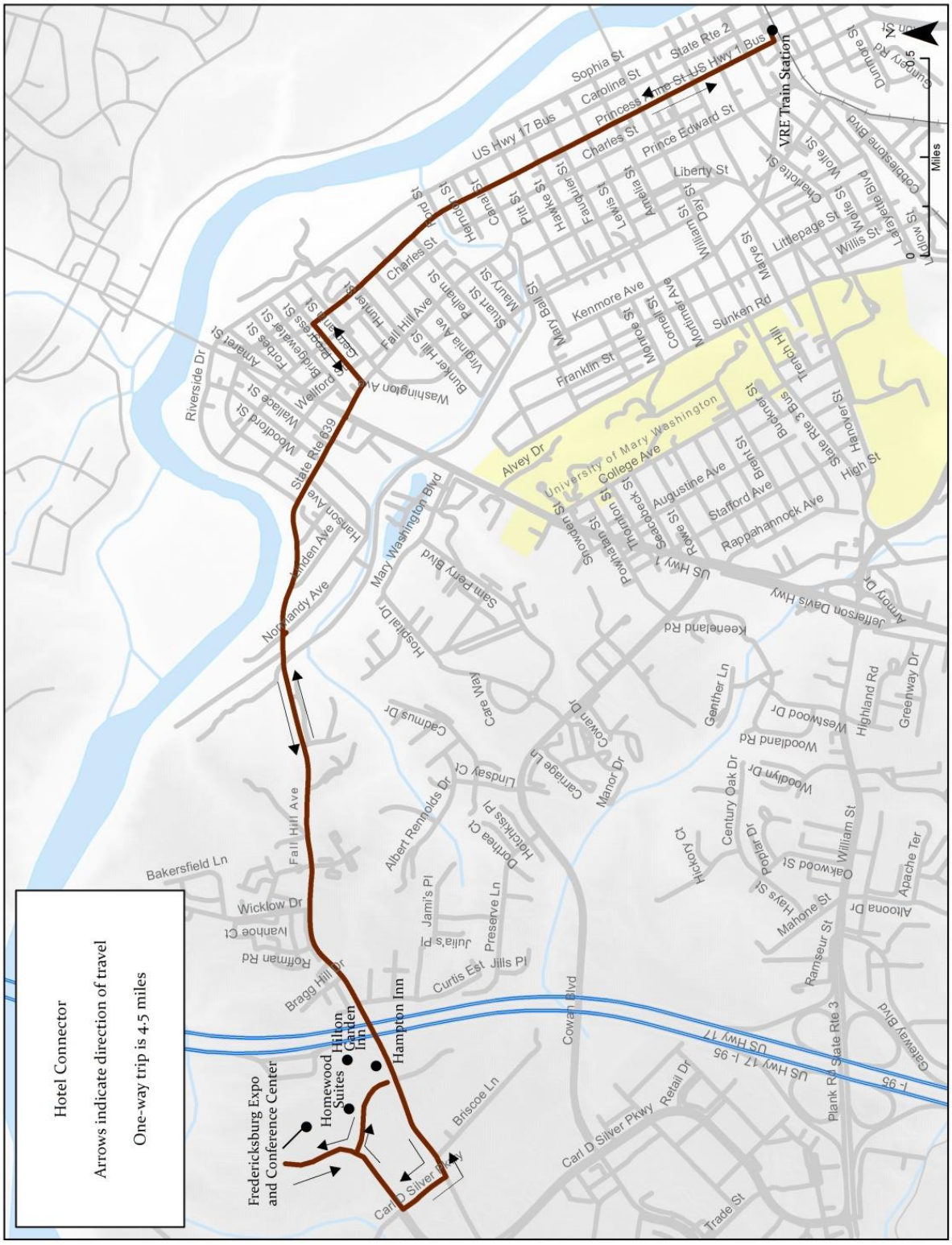


Figure 5-8: Option 4 – Hotel Connection



Cost

- The cost to provide service will vary considerably depending upon the level of service provided. For planning purposes, we will assume 80 hours a week of service, using two vehicles (assuming the connector route is also implemented). These 80 hours could be provided during the periods of highest visitation to Fredericksburg.

- If 80 hours of service are provided each week, the annual operating cost will be about $353,600.

- Specialty vehicles will also be needed. Trolleys have a significant price range, depending upon their expected useful life. For planning purposes, the vehicles are estimated to cost between $200,000 and $400,000, with two needed.

Ridership

- Downtown circulators can typically see relatively high productivity, as passengers board and alight along a route that travels through highly developed areas. Depending upon the route chosen, we can estimate a range of between 12 and 15 passenger trips per revenue hour. If 4,160 revenue hours are provided, the annual ridership is likely to range between 49,920 and 62,400 passenger trips.

Implementation

- Implementation of the Downtown Fredericksburg Circulator is planned for FY2019, pending funding availability and approval from the City of Fredericksburg.

Additional VRE Feeder Service

VRE feeder service is currently provided by FRED to the Fredericksburg VRE and Amtrak station from commuter parking areas in Spotsylvania County (Gordon Road Lot and Salem Church Lot – VS1) and from residential areas in Fredericksburg (VF1). The focus of this initiative is to provide additional service, both for the existing feeder patterns and to the two newer VRE stations.

No changes are proposed for the VS1 route, as it currently meets almost all of the Fredericksburg trains. In addition, this route is the most productive route in the FRED network. Two vehicles are used for the service.

Provide Feeder Service to the Spotsylvania Station

There is currently no feeder bus service provided to the relatively new Spotsylvania Station, which opened in November, 2015. The station is located at 9442 Crossroads Parkway, along the Route 17 Corridor, east of I-95.

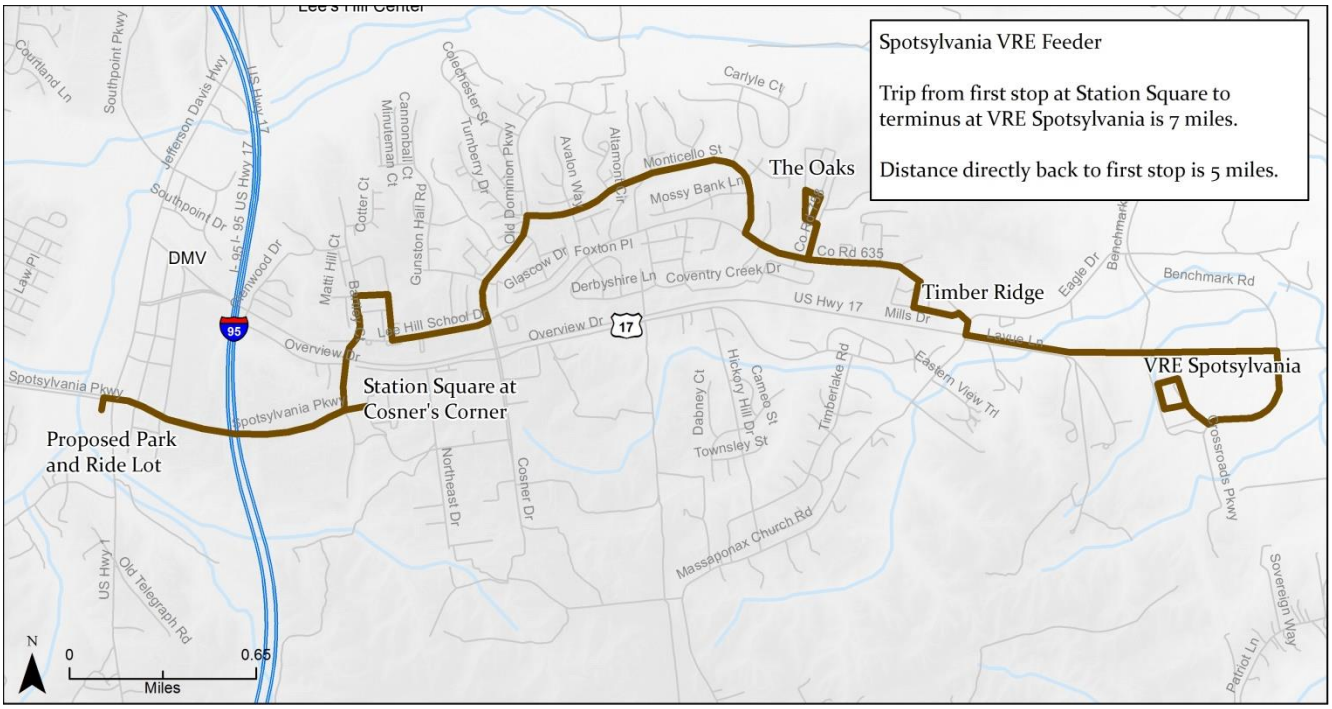
While development is planned adjacent to the station, the closest current population center is Cosner's Corner, located 4.5 miles west of the station area, generally between I-95 and U.S. 1. This area is rapidly developing, including apartments (Station Square), retail, and the Spotsylvania Medical Center.

This initiative focuses on providing feeder service from the proposed park and ride lot at Exit 126 (I-95), Cosner's Corner, and potentially from some other developments along the path of travel to the Spotsylvania VRE Station. There was also input early in the study process that suggested a need for service from Caroline County, which could be accomplished via an additional early morning version of the C2, with a diversion to the Spotsylvania Station. These concepts are detailed below.

Local Feeder Service to the Spotsylvania Station

A feeder route from the proposed park and ride lot at Exit 126 (I-95), Cosner's Corner and developments along the path of travel to the station is recommended initially. The route would serve the Station Square development and travel to the Spotsylvania Station. The proposed service map is shown in Figure 5-9.

Figure 5-9: Local Feeder Service to the Spotsylvania VRE Station



Feedback received from the George Washington Regional Commission indicated that this feeder service should meet all of the VRE trains that operate to the Spotsylvania Station. The current schedules include eight morning and eight afternoon trains. Given the timing of the arrivals and departures, this level of service will likely require two vehicles per commute

period, with one added tripper for both morning and evening. The total daily revenue hours are estimated to be 15.

This level of service, assuming two vehicles and a tripper are used, equates to about 15 revenue service hours each weekday, or about 3,825 annually.

Cost

- The total annual operating costs for a two-bus feeder route with one tripper are estimated to be $325,125.

- Two vehicles are estimated to cost $150,000 each. It is proposed that the tripper come from FRED's existing fleet.

Ridership

- Ridership is estimated to be about 32,000 annual passenger trips, based on the performance of the VF1 route.

Implementation

- This service is scheduled for implementation in FY2020, which is year four of the plan. It should be noted that funding for this project may be available through the I-95/I-395 toll lane project. Feeder routes to the VRE were included in the toll lane project plan. Funding details for the I-95/I-395 projects are not yet available.

Modify the C2 to Provide VRE Feeder Service

This initiative proposes to provide two early runs from the Carmel Church Park and Ride and the Ladysmith Shopping Center to the Spotsylvania VRE Station prior to the current start of the C2 service day. The route could make additional stops at Traveler's Row, Clayton Homes, and Route 1 and Spotsylvania Parkway on its way to the VRE Station. This route option is shown in Figure 5- 10.

A possible two-run morning schedule could be as follows:

Trip 1: 4:20 a.m. at the Carmel Church Park and Ride to get to the VRE Station at 5:15 a.m., ahead of the 5:23 train.

Trip 2: 6:10 a.m. at the Carmel Church Park and Ride to get to the VRE Station at 7:00 a.m., ahead of the 7:08 train.

Given the current C2 schedule, it would not be possible for the C2 to provide VRE afternoon feeder service with the same vehicle. A second vehicle, separate from the C2, would be needed to provide service from the station back to Ladysmith in the afternoon. The afternoon service could be as follows:

Trip 1: Meet the 5:54 p.m. train from the Spotsylvania Station and travel to Traveler's Row and Ladysmith, arriving at the Carmel Church Park and Ride at about 6:45 p.m. Travel back to the VRE Station.

Trip 2: Meet the 7:44 p.m. train from the Spotsylvania Station and travel to Traveler's Row, Ladysmith, and the Carmel Church Park and Ride.

The morning and evening services combined total about 5 revenue hours per day for a total of about 1,275 annual revenue service hours.

Cost

- The operating cost for service based on 1,275 annual revenue service hours, is estimated to be about $108,375 annually.
- An additional vehicle would be needed at a cost of about $150,000.

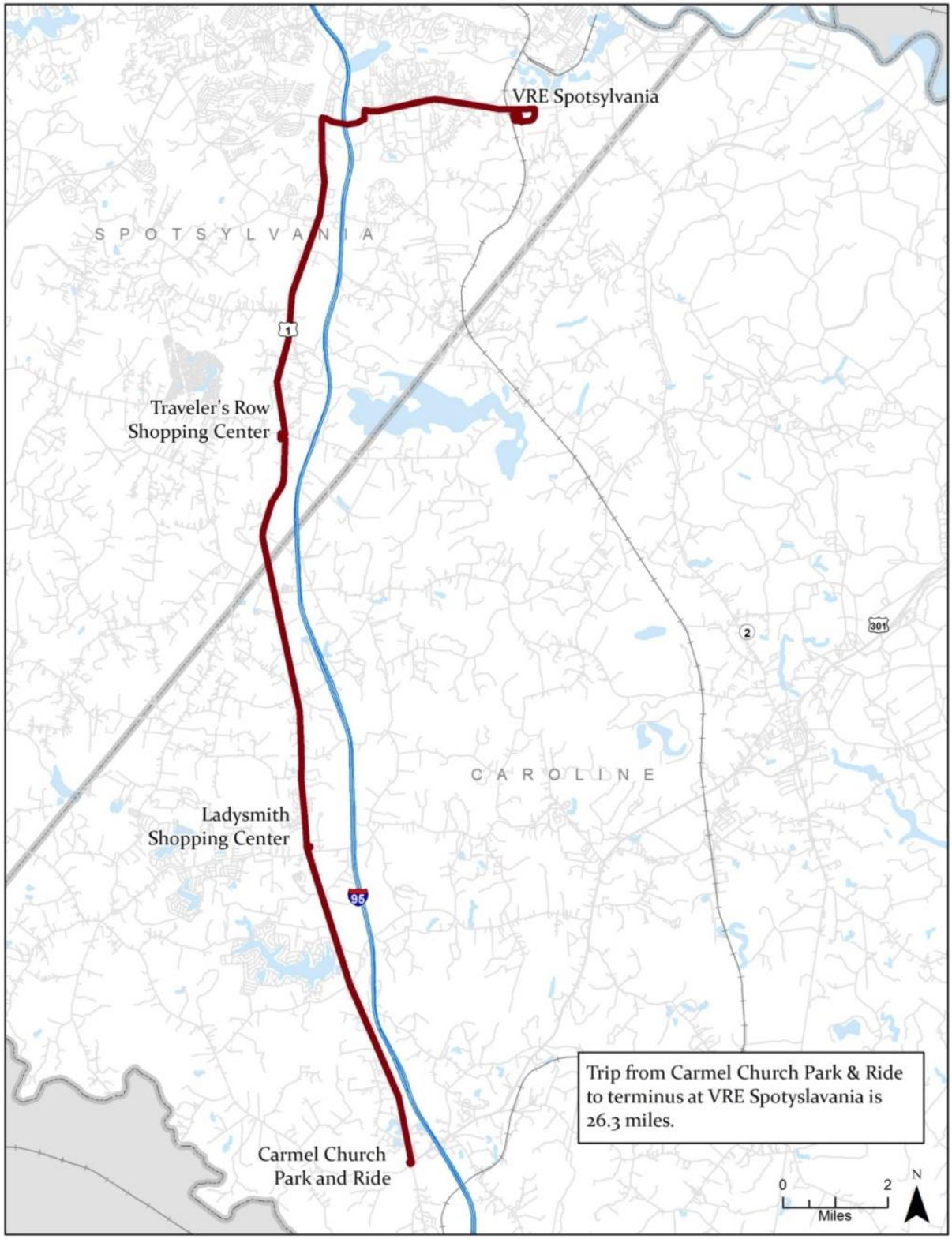
Ridership

- Ridership on the current C2 route is about 5.25 trips per revenue hour. If productivity is similar for the feeder routes, ridership is expected to be about 6,693 annual passenger trips.

Implementation

- This service is scheduled for implementation in FY2020, which is year four of the plan. It should be noted that funding for this project may be available through the I-95/I-395 toll lane project. Feeder routes to the VRE were included in the toll lane project plan. Funding details for the I-95/I-395 projects are not yet available.

Figure 5-10: Modified C2 Feeder Service to the Spotsylvania VRE Station



Provide Feeder Service to the Brooke Station

The final VRE feeder initiative calls for the introduction of local feeder bus service to the Brooke VRE Station in Stafford County. The station is somewhat remotely located, about 4 miles southeast of Stafford on Brooke Road. This feeder concept calls for the route to originate at the VDOT Park and Ride lot at Courthouse Road and I-95. The route would then serve the multi-family housing to the east of I-95 (along Red Oak Drive and Davenport Drive), then serve the Courthouse area and proceed along Courthouse Road and Brooke Road to the station. The one-way route length is about 6.1 miles and the one-way travel time is estimated to be about 20 minutes (with stops). The proposed service map is shown in Figure 5-11.

Using one vehicle, the following schedule could be achieved:

Morning Trips:

- Trip 1: Leave park and ride at 4:45 a.m. to access the 5:18 train
- Trip 2: Leave park and ride at 5:50 a.m. to access the 6:24 train
- Trip 3: Leave park and ride at 6:50 a.m. to access the 7:29 train

Afternoon Trips:

- Trip 1: Meet the 4:29 p.m. VRE Train at the Brooke Station
- Trip 2: Meet the 5:29 p.m. VRE Train at the Brooke Station
- Trip 3: Meet the 6:34 p.m. VRE Train at the Brooke Station
- Trip 4: Meet the 7:19 p.m. VRE Train at the Brooke Station

Cost

- The schedule listed above totals about 5.75 revenue hours per weekday, for an annual total of 1466 revenue service hours, which corresponds to about $124,631 in annual operating costs.
- A vehicle will also likely be needed, at a cost of $150,000.

Ridership

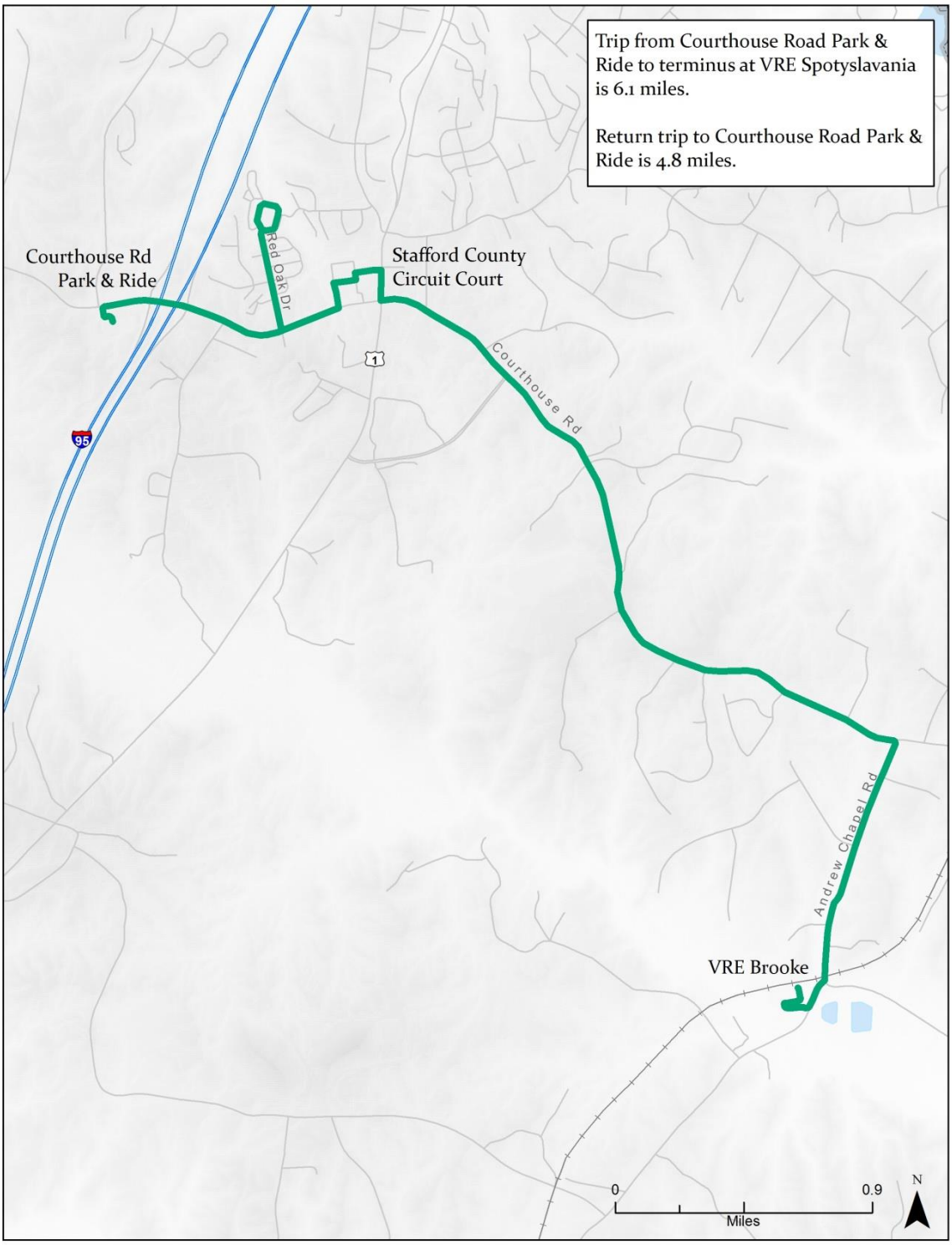
- Ridership on this feeder route is likely to be lower than the ridership than is experienced on the VF1 and VS1, as the population base includes fewer people in this service corridor, and parking is more readily available at the Brooke Station than it is at the Fredericksburg Station. It is estimate that this service could achieve about 9,300 passenger trips per year.

Implementation

- This service is scheduled for implementation in FY2022, which is year six of the plan. It should be noted that funding for this project may be available through the I-95/I-395

toll lane project. Feeder routes to the VRE were included in the toll lane project plan. Funding details for the I-95/I-395 projects are not yet available.

Figure 5-11: Feeder Service to the Brooke VRE Station



Add Service in the Stafford Lakes Area

The Stafford Lakes area is rapidly developing and there are significant trip generators that are not currently served by FRED. These trip generators include Walmart, the University of Mary Washington (UMW) - Stafford Campus, Stafford Lakes Apartments, Malvern Lakes Apartments, and additional trip generators under construction.

In looking at how to serve this area, the first potential solution is to extend the D2; however, there is not sufficient time in the schedule to add additional mileage and the neighborhoods off of Plantation Drive are already only served in one direction. This initiative proposes to add a new route (D7), which would be a local Stafford route that stays on the west side of I-95, serving housing, shopping, employment, and civic destinations that are located west of I-95. It would serve the Plantation Drive neighborhood in both directions, in addition to serving the newly developing Stafford Lakes area, Walmart, and the UMW facility. The new route would make a timed transfer with the D2 so that people could get to the rest of the route network. In addition, this initiative proposes to take the Plantation Drive neighborhoods off the D2 so that it can provide more direct service between FRED Central and the route terminus (GEICO). If this gives the route too much extra time, it could be extended to Walmart and UMW Stafford Campus. The basic premise of this idea is to have a local circulator route in this area (D7), supported by a direct route back to FRED Central (D2).

The new proposed D7 map is shown in Figure 5-12 and the revised D2 map is shown in Figure 5-13.

Figure 5-12: Proposed New Stafford Lakes Route – D7

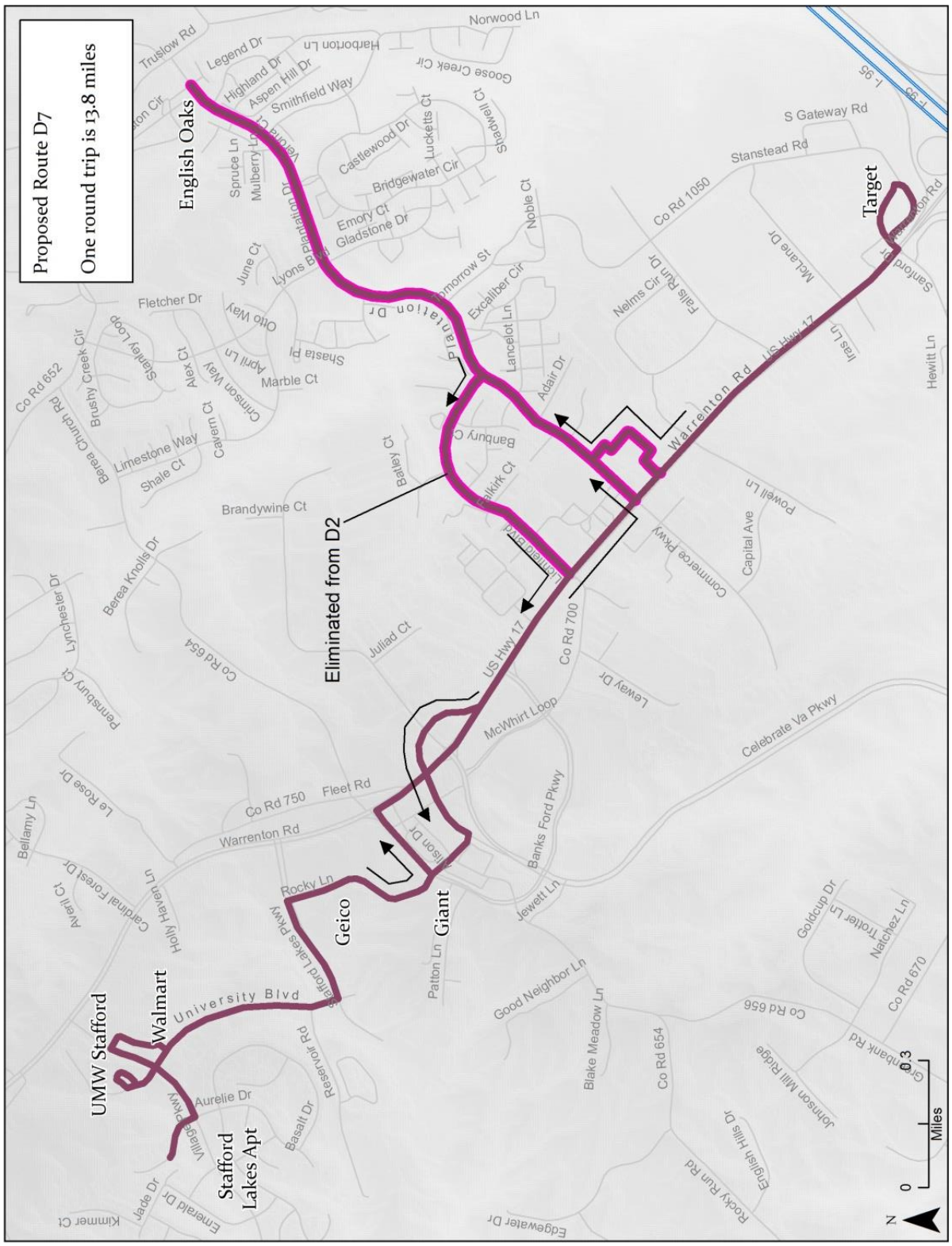
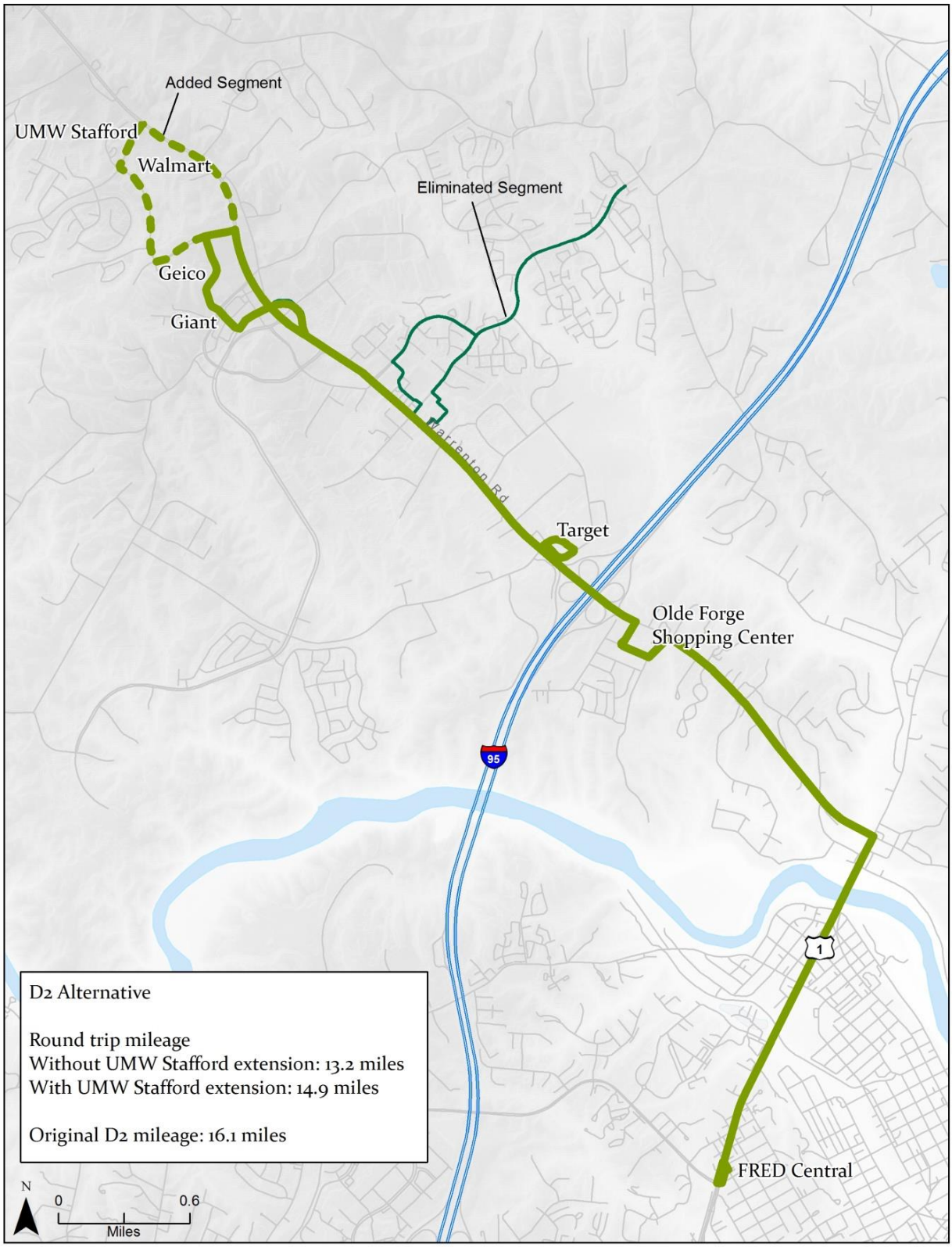


Figure 5-13: Proposed Revision to the D2



Cost

- If the new route operates 12 hours per day, Monday through Friday, the total annual operating hours would be about 3,060, at an operating cost of $260,100.

- An expansion vehicle would be required at a cost of $150,000.

Ridership

- Ridership on the D2 averages about 9 passenger trips per revenue hour. If this productivity is seen on the new route, and 3,060 annual hours are operated, the ridership is estimated to be 27,540 annual passenger trips.

Implementation

- This improvement is scheduled for FY2022; assuming funding is available to implement an additional route for the Stafford Lakes area. In addition to traditional federal funding under the Section 5307 program, this new service could potentially be eligible for Federal Congestion Mitigation and Air Quality (CMAQ) grant funding.

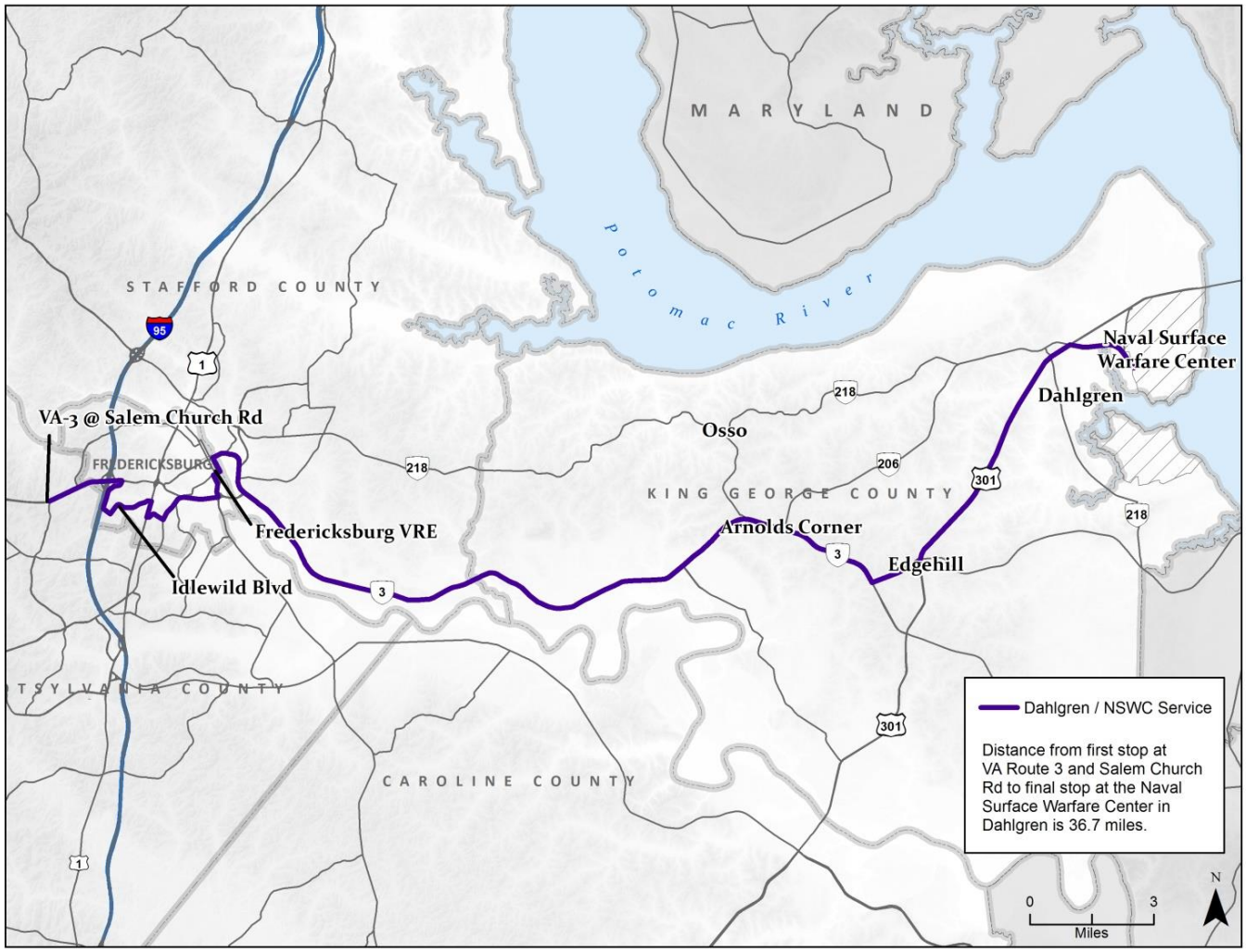
Add Commuter Service to the Naval Surface Warfare Center in Dahlgren

The focus of this service is to provide a public transportation option for commuters who travel from the FRED service area to the Naval Surface Warfare Center (NSWC) in Dahlgren. The route would originate at the park and ride lot that is planned for Plank Road (State Route 3) and Salem Church Road, make additional stops at Idlewild Boulevard and the VRE Station and travel to Dahlgren via Route 3 and U.S. 301. This routing is based on a recent Transportation Demand Management (TDM) project that was conducted through GW Ride Connect and the Fredericksburg Area Metropolitan Planning Organization. Data provided via the study indicated that there are 10,000 daily trips that travel to NSWC and no public transit available. There are currently about 20 vanpools making this trip, according to GW Ride Connect.

There may also be an opportunity to provide service for residents of King George County to travel to the NSWC, or to Fredericksburg, if local match is provided by King George County. A map of the proposed route is provided as Figure 5-14.

The route is long, at 37 miles each way, or 74 miles round-trip. With the higher average operating speeds experienced on commuter services, it is likely that one bus could make a round trip in about two hours. The preliminary service design calls for two vehicles to each make a round trip in the morning and the afternoon to provide two travel options for each commute period. If additional trips are desired, one of the vehicles could make a second trip

Figure 5-14: Service between Fredericksburg and the Naval Surface Warfare Center



during each commute period. Due to the length of the route, the agency may consider acquiring buses more suited to the longer travel times.

If two vehicles are assigned, each making one round-trip per commute period, the weekday revenue service hours would be about 8, for an annual total of 2,040. If a third run is desired, the annual revenue service hours would increase by 1,020 annually. The capital requirement for this service design is two vehicles.

Cost

- The annual operating cost for 2,040 annual revenue hours is estimated to be about $173,400 annually.
- Two expansion vehicles would be required at a cost of $150,000 each.

Ridership

- Ridership for this route is somewhat difficult to estimate, as FRED does not currently operate any similar service and it is unknown if at this time if there will be bi-directional travel (i.e., Will King George residents have service?) or will the service be focused on NSWC employees only? Prior to implementation it is recommended that FRED work with the NSWC to help gauge the level of demand for the service. Preliminary data provided by GW Ride Connect suggests that 20 vanpools are currently making this trip, so there may be strong demand for this service.

Implementation

- This improvement is scheduled for FY2022; assuming funding is available and a sufficient level of demand has been established. In addition to the traditional federal funding under the Section 5307/5311 programs, this new service could potentially be eligible for Federal Congestion Mitigation and Air Quality (CMAQ) grant funding. King George County could also be a potential partner. Historically, military bases do not pay for commuter transportation through direct subsidy to transit providers, but their employees could be enrolled in the federal transit benefits program, through which public transit trips are subsidized.

TRANSIT DEVELOPMENT PLAN INITIATIVES BY YEAR

Each of the initiatives described in the first two sections of the plan is listed below by year of implementation, rather than by type of initiative. This information will be used to build the six-year capital and financial plans, which are presented in Chapters 6 and 7.

FY2017

- Provide additional shelters and benches
- Implement Route Shout
- Implement Google Transit

FY2018

- Develop Lee's Hill Transfer Center in Spotsylvania County
- Provide additional shelters and benches
- Expand staff to accommodate system growth
- Modify the D1 from Olde Forge to FRED Central

FY2019

- Construct additional parking for FRED Central
- Provide additional shelters and benches
- Conduct a comprehensive route and schedule analysis
- Conduct an infrastructure needs analysis to consider alternate fuels
- Implement a Downtown Fredericksburg Circulator
- Update route maps and schedules

FY2020

- Provide additional shelters and benches
- Install alternative fuel infrastructure at a city site or at the FRED maintenance facility
- Implement additional weekend service
- Provide additional VRE feeder service in Spotsylvania County

FY2021

- Provide additional shelters and benches
- Convert three vehicles to alternative fuels
- Start service earlier in the morning
- End service later in the evening

FY2022

- Provide additional shelters and benches
- Convert eight vehicles to alternative fuels
- Purchase electronic fare boxes
- Increase the frequency of service for the F1 and F3
- Add service in the Stafford Lakes area and modify the D2
- Provide additional VRE feeder service in Stafford County to the Brooke Station
- Add service to the Naval Surface Warfare Center in Dahlgren

SUMMARY OF FY2017- FY2022 INITIATIVES

Table 5- 4 provides a summary of the proposed initiatives described within this chapter. The table is organized by year and includes estimates of annual revenue hours, miles, and ridership (for service initiatives), and cost estimates for all of the initiatives proposed for the six-year plan. The cost estimates are in current dollars. An inflation factor will be applied within the financial plan (Chapter 7).

Table 5-4: Summary of Proposed TDP Initiatives

	Planning Estimates						
TDP Initiatives	**Annual Revenue Hours**	**Annual Revenue Miles**	**Ridership**	**Annual Fully-Allocated Operating Costs**	**One Time Operating/ Planning/ Marketing Cost**	**Capital Costs**	**Proposed TDP Year**
Provide Additional Shelters and Benches	*Capital Project*					$20,000	FY2017
Route Shout	*Technology Project*			*Already Budgeted*			FY2017
Google Transit	*Technology Project*			$4,000	$6,000	$0	FY2017
Subtotal, FY2017	**0**	**0**	**0**	**$4,000**	**$6,000**	**$20,000**	**FY2017**
Develop Lee's Hill Transfer Center	*Capital Project*					$350,000	FY2018
Provide Additional Shelters and Benches	*Capital Project*					$20,000	FY2018
Expand Staff to Accommodate Growth- Net Cost	*Organizational Support*			$30,000	$0	$0	FY2018
Modify the D1 - same # hours	-	-2510	965	-$627	$0	$0	FY2018
Subtotal, FY2018	**0**	**-2510**	**965**	**$29,373**	**$0**	**$370,000**	**FY2018**
Construct Additional Parking for FRED Central	*Capital Project*					$435,000	FY2019
Provide Additional Shelters and Benches	*Capital Project*					$20,000	FY2019
Comprehensive Route and Schedule Analysis	*Planning Project*				$80,000	$0	FY2019
Infrastructure Needs Analysis- Alt. Fuels	*Planning Project*				$20,000	$0	FY2019
Update Route Maps and schedules	*Planning/Marketing Project*				$20,000	$0	FY2019
Downtown Fredericksburg Circulator	4,160	41,600	49,920	$353,600	$0	$400,000	FY2019
Subtotal, FY2019	**4,160**	**41,600**	**49,920**	**$353,600**	**$120,000**	**$855,000**	**FY2019**
Provide Additional Shelters and Benches	*Capital Project*					$20,000	FY2020
Install Alternative Fuel Infrastructure	*Capital Project*					TBD	FY2020
Additional Weekend Service - Saturday	4,460	62,440	35,000	$379,100	$0	$0	FY2020
Additional Weekend Service - Sunday	4,460	62,440	27,000	$379,100	$0	$0	FY2020
Additional VRE Feeder Service - Spotsylvania Local	3,825	65,280	32,000	$325,125	$0	$300,000	FY2020
Additional VRE Feeder Service - Spotsylvania Caroline	1,275	26,826	6,693	$108,375	$0	$150,000	FY2020
Subtotal, FY2020	**14,020**	**216,986**	**100,693**	**$1,191,700**	**$0**	**$470,000**	**FY2020**
Provide Additional Shelters and Benches	*Planning Project*				$0	$20,000	FY2021
Convert 3 Vehicles to Alternative Fuels	*Capital Project*				$0	TBD	FY2021
Earlier Morning Service	4,335	64,852	34,700	$368,475	$0	$0	FY2021
Later Evening Service	1,785	26,704	14,280	$151,725	$0	$0	FY2021
Subtotal, FY2021	**6,120**	**91,555**	**48,980**	**$520,200**	**$0**	**$20,000**	**FY2021**
Provide Additional Shelters and Benches	*Capital Project*					$20,000	FY2022
Convert 8 Vehicles to Alternative Fuels						TBD	FY2022
Electronic Fare Boxes	*Technology/Capital Project*			$12,000	$0	$400,000	FY2022
Increase Frequency - F1, F3	3,060	39,474	30,600	$260,100	$0	$300,000	FY2022
Add Service -Stafford Lakes- Modify D2	3,060	42,228	27,540	$260,100	$0	$150,000	FY2022
Additional VRE Feeder Service - Brooke	1,466	19,456	9,300	$124,631	$0	$150,000	FY2022
Additional Service - Dahlgren	2,040	77,520	16,320	$173,400	$0	$300,000	FY2022
Subtotal, FY2022	**9,626**	**178,678**	**83,760**	**$830,231**	**$0**	**$1,320,000**	**FY2022**
Total Planned Improvements	**33,926**	**526,309**	**284,318**	**$2,929,104**	**$126,000**	**$3,055,000**	
Current System Data (FY2016)	**52,112**	**800,043**	**427,487**	**$3,620,194**			
Total FRED Service, FY2022	**86,038**	**1,326,352**	**711,805**	**$6,549,298**			

Notes: Dollars are current, without inflation. Chapter 7 provides the six-year budgets with inflation and capital replacement.

Chapter 6
Capital Improvement Program

INTRODUCTION

This chapter outlines the capital infrastructure projects needed to implement the service recommendations described in Chapter 5. The Capital Improvement Program (CIP) provides the basis for FRED's requests to DRPT for federal and state funding for capital replacement, rehabilitation, and expansion projects. The recommended projects are those for which FRED reasonably anticipates local funding to be available. As discussed in Chapter 5, DRPT has advised grantees that capital funding may be constrained over the next few years as the agency works to develop a replacement funding source for the 2007 capital bonds that recently expired.

The recommendations for different types of capital projects, including vehicles, passenger amenities, facilities, equipment, and technology, are described below. While preventive maintenance for vehicles and facilities is reimbursed through federal financial assistance as a capital expense, this chapter addresses true capital items, rather than budget items that can be capitalized.

VEHICLE REPLACEMENT AND EXPANSION PLAN

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 FTA/DRPT vehicle replacement standards to the current vehicle fleet, which was presented in Chapter 1.

Useful Life Standards

The useful life standards used by the FTA were developed based on the manufacturer's designated vehicle life-cycle and the results of independent FTA testing. Standards indicate expected lifespans for different vehicle types. If vehicles are allowed to exceed their useful life they become much more susceptible to break-downs, which may increase operating costs and decrease the reliability of scheduled service. With some exceptions for defective vehicles, DRPT/FTA funds are not available to replace vehicles that have not yet met the useful life criteria. The FTA vehicle useful life policy for a number of different vehicle types is shown in Table 6-1. DRPT's useful life policy mirrors the FTA useful life policy.

Table 6-1: FTA Rolling Stock Useful Life Policy

Vehicle Type	Useful Life
Light Duty Vans, Sedans, Light Duty Buses and All Bus Models Exempt from Testing Under 49 CFR, Part 665	Minimum of 4 Years or 100,000 Miles
Medium, Light Duty Transit Bus	Minimum of 5 Years or 150,000 Miles
Medium, Medium Duty Bus	Minimum of 7 Years or 200,000 Miles
Small, Heavy Duty Transit Bus	Minimum of 10 Years or 350,000 Miles
Large, Heavy Duty Transit Bus	Minimum of 12 Years or 500,000 Miles

Source: FTA Circular 5100.1: Bus and Bus Facilities Formula Program Guidance.

Vehicle Plan – Baseline Estimate

The majority of FRED's revenue service vehicles are medium-duty buses, with a useful life of seven years or 200,000 miles. Using this standard, FRED currently has 11 vehicles that are eligible for replacement. FRED plans to replace these vehicles in Calendar Year 2017, using federal and state funds from Fiscal Years 2015, 2016, and 2017, supplemented by local funds.

Table 6-2 provides the existing fleet inventory with the estimated calendar year that each vehicle is eligible for replacement. The operating condition of the vehicles, as well as the availability of funding, will dictate the actual replacement year. While budgets are typically presented following fiscal years, vehicles' models are typically associated with calendar years. This plan reflects this practice, with the vehicle replacement schedule presented by calendar year and the budgets presented by fiscal year.

Table 6-2: FRED Fleet Inventory and Replacement Schedule

Vehicle Number	Service Type	Make and Model	Year	Passenger Capacity	Vehicle Mileage (June 2016)	Estimated Replacement - Calendar Year
740	Regular Service	GMC 4500	2007	14	365,132	2017
741	Regular Service	GMC 4500	2007	20	223,766	2017
742	Regular Service	GMC 4500	2007	20	254,351	2017
748	Regular Service	GMC 4500	2008	20	282,300	2017
749	Regular Service	GMC 4500	2008	20	276,399	2017
752	Regular Service	Ford F-650	2010	20	226,040	2017
753	Regular Service	Ford F-650	2010	20	218,724	2017
754	Destroyed by fire -9/25/16	Ford F-650	2010	20	200,500	2017
755	Regular Service	Ford F-650	2010	20	231,484	2017
756	Regular Service	Ford F-650	2010	20	238,496	2017
757	Regular Service	Ford F-650	2010	20	204,952	2017
700 [1]	Pool Vehicle	Ford Expedition	2002	8	112,717	2018
701	Service Vehicle	Ford F-250	2008	3	98,325	2018
750	Regular Service	Ford F-650	2010	26	142,242	2019
751	Regular Service	Ford F-650	2010	26	143,708	2019
758	Regular Service	Ford F-650	2011	20	159,631	2019
759	Regular Service	Ford F-650	2011	20	158,451	2019
705	Pool Vehicle	Ford Focus	2010	5	59,388	2020
762	Regular Service	Freightliner P/S2C	2013	20	114,814	2020
763	Regular Service	Freightliner P/S2C	2013	20	119,431	2020
764	Regular Service	Freightliner P/S2C	2013	20	130,451	2020
765	Regular Service	Freightliner P/S2C	2013	20	126,471	2020
766	Regular Service	Freightliner P/S2C	2013	20	126,209	2020
767	Regular Service	Freightliner P/S2C	2013	20	130,039	2020
768	Regular Service	Freightliner P/S2C	2013	20	126,145	2020
769	Regular Service	Freightliner P/S2C	2013	20	114,077	2020
770	Regular Service	Freightliner P/S2C	2013	20	131,152	2020
771	Regular Service	Freightliner P/S2C	2013	20	122,477	2020
772	Regular Service	Freightliner P/S2C	2013	20	115,791	2020
702	Pool Vehicle	Ford Escape	2009	5	31,844	2021
706	Pool Vehicle	Ford Focus	2010	5	38,201	2021
760	Regular Service	Ford F-650	2011	26	122,231	2021
761	Regular Service	Ford F-650	2011	26	107,782	2021
773	Regular Service	Freightliner P/S2C	2014	20	87,730	2021
774	Regular Service	Freightliner P/S2C	2014	20	77,355	2021

(1) This vehicle will be replaced with a minivan equipped to transport two wheelchairs

In addition to helping FRED and DRPT plan future fleet needs, this vehicle replacement plan will also feed FRED's Transit Asset Management Plan (TAM), which is an FTA-required plan that must include an asset inventory; condition assessments of inventoried assets; and a prioritized list of investments to improve the state of good repair of its capital assets.[1] The new TAM requirements also establish state of good repair standards and four state of good repair performance measures. FRED is required to set performance targets for its capital assets based on the state of good repair measures and report these, as well as the condition of its capital assets, to the National Transit Database.

Vehicle Plan

The annual schedule for vehicle replacement and expansion, based on the implementation schedule provided in Chapter 5 and the FTA vehicle useful life standards, is shown in Table 6-3. This schedule is based on estimates; actual vehicle purchases may vary depending upon service changes, funding availability, and unexpected economic shifts. Changes to this vehicle replacement and expansion schedule can be made by FRED within its annual TDP update letter to DRPT, if needed. As shown in the table, the most number of vehicle purchases are scheduled for CY2017 and CY2020.

Table 6-3: Vehicle Replacement and Expansion Schedule

Number of Vehicles	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022
Replacement	11	0	4	11	4	0
Expansion	0	0	2	3	0	6
Service	0	2	0	1	2	0
Total Vehicles	**11**	**2**	**6**	**15**	**6**	**6**

Estimated Vehicle Costs

The estimated vehicle replacement costs are presented in Table 6-4. These costs are based on vehicle costs experienced throughout the Commonwealth as referenced in the FY2017 Six Year Improvement Program (SYIP). For FY2018 to FY2022 a two percent inflationary factor was applied. These cost estimates were used to develop the capital budget, which is included with the Financial Plan in Chapter 7. The plan includes the replacement of the entire fleet, as well as seven expansion vehicles. Potential funding sources for the replacement and expansion vehicles include FTA Section 5307 and Section5311 funds, DRPT Mass Transit Trust Fund and Mass Transit Capital Fund, Surface Transportation Program (STP) funds, and local funds. All service vehicles purchased will be lift or ramp-equipped and have bicycle racks (with the

[1] Federal Register, Volume 81, No. 143, Tuesday July 26, 2016, Rules and Regulations, DOT, FTA, 49 CFR Parts 625 and 630, Transit Asset Management; National Transit Database.

possible exception of the proposed trolley for the downtown Fredericksburg circulator, upon which it may not be feasible to attach a bike rack).

Table 6-4: Estimated Costs of New Vehicles

Fiscal Year	Estimated Per Vehicle Cost			
	20- Passenger Body-On-Chassis	28-29- Passenger Medium Duty	Trolley	Service Vehicles
2017	$100,000	$150,000	$200,000	$30,000
2018	$102,000	$153,000	$204,000	$30,600
2019	$104,040	$156,060	$208,080	$31,212
2020	$106,121	$159,181	$212,242	$31,836
2021	$108,243	$162,365	$216,486	$32,473
2022	$110,408	$165,612	$220,816	$33,122
2023	$112,616	$168,924	$225,232	$33,785

The Commonwealth of Virginia recently implemented a tiered capital allocation policy, which is presented in Figure 6-1. This policy results in different state funding match ratios for vehicles, infrastructure/facilities, and other items (which includes technology). This methodology may change as DRPT updates its capital funding program.

Figure 6-1: DRPT Tiered Capital Allocation

	Actual FY 2015 State Match	Prior Method State Match	Δ
Replacement Vehicles (Tier 1)			
80 Percent Federal Funding	**16%**	16%	(-)
No Federal Funding	**68%**	35%	(+33)
Expansion Vehicles (Tier 1)			
80 Percent Federal Funding	**16%**	7%	(+9)
No Federal Funding	**68%**	35%	(+33)
Infrastructure/Facilities (Tier 2)			
80 Percent Federal Funding	**16%**	7%	(+9)
No Federal Funding	**34%**	35%	(-1)
Other (Tier 3)			
80 Percent Federal Funding	**16%**	7%	(+9)
No Federal Funding	**17%**	35%	(-18)

Note: Impact of 80 percent federal funding is illustrated because it is the maximum federal match rate for which most projects are eligible, and is therefore the most common match rate for projects receiving federal funds; some projects receive a lower federal match.

FACILITIES

An important project for FRED, scheduled for FY2018, is the development of a passenger transfer center in Spotsylvania County, near the current on-street Lee's Hill transfer location. A strip of land adjacent to the parking area of the Rappahannock Goodwill industries building was provided by a developer to use for the transfer center. A preliminary design has been completed, along with a construction cost estimate. The cost estimate is $350,000.

In addition, FRED and regional stakeholders are interested in pursuing the implementation of alternative fuel vehicles. The plan includes a study to research the details and costs regarding implementing propane or compressed natural gas (CNG) fuel. This project, if deemed favorable, will result in the installation of the infrastructure required to fuel vehicles, as well as the conversion of the 11 vehicles to be purchased in 2017. This project is expected to take several years to fully implement, with the planning study scheduled for 2019.

The third facility project included in the six-year plan is an expansion of the public and visitor parking lot at FRED Central. As outlined in Chapter 5, two adjacent unimproved parcels are available for purchase. The plan includes the purchase of these parcels and the site improvements and paving necessary to develop a parking lot that will have approximately 24 standard car spaces. This project is scheduled for 2019, with a preliminary cost estimate of $435,000.

PASSENGER AMENITIES

The provision of additional passenger shelters and benches is included in the six-year plan. A budget of $20,000 is included for each plan year. This level of funding should allow FRED to add shelters, benches, and other bus stop amenities over the course of the six-year period.

TECHNOLOGY AND EQUIPMENT

FRED is in the process of implementing Route Shout, the public interface associated with the automatic vehicle location (AVL) system that FRED uses. This project is included for FY2017, although the funds to pay for it were previously allocated. Additional technology/equipment projects include Google Transit (FY2017) and electronic fare boxes (FY2022). The routine replacement of computer hardware and software, shop equipment and spare parts are also included in the plan.

Chapter 7
Financial Plan

INTRODUCTION

This chapter provides a financial plan for funding existing and proposed Fredericksburg Regional Transit services for the TDP's six-year planning period. The financial plan addresses both operations and capital budgets, focusing on the financially constrained project recommendations that were highlighted in Chapter 5. It should be noted that over the course of the six-year period there are a number of unknown factors that could affect transit finance, including: future economic condition of the jurisdictions served by FRED and the Commonwealth of Virginia; availability of funding from the federal Sections 5307 and 5311 programs; Commonwealth Transportation Fund; local sources; and results of the 2020 U.S. Census. In addition, DRPT has advised grantees that capital funding may be constrained over the next few years as the agency works to develop a replacement funding source for the 2007 capital bonds that recently expired.

OPERATING EXPENSES AND FUNDING SOURCES

Tables 7-1 through 7-3 provide a financial plan for the operation of FRED's services under the financially constrained six-year plan. As discussed in the Operations Plan (Chapter 5), the financially constrained plan projects are moderate in scope, reflecting the current economic climate and the anticipated availability of local match. Table 7-1 summarizes the annual revenue hours of service for the existing transit program as well as the service projects that are recommended. Table 7-2 provides operating cost estimates, and Table 7-3 identifies the funding sources associated with these service projects. A number of assumptions used in the development of the operating cost estimates are described below.

For FY2017, the first year of the plan, the expenses and revenues are based on FRED's adopted budget for the fiscal year. The projected cost per revenue hour and operating costs to maintain the current level of service between FY2018 and FY2022 assume a 3% annual inflation rate. It is understood that neither DRPT, the City of Fredericksburg, nor FRED's partner jurisdictions, are committing to these funding levels, but that they are planning estimates. Specific funding amounts for each year will be determined during the annual SYIP adoption and budget cycle for the commonwealth and the city. It should be noted that future state operating funding is estimated to decline between FY2017 and FY2018, and then increase only modestly over the six-year period. FRED and its local partners will need to provide a higher percentage of the local match than they currently do, beginning in FY2018. The state match figures included in these tables were provided by DRPT, and may change as DRPT

implements recommendations made by the Transit Service Delivery Advisory Committee (TSDAC).

Table 7-1: FRED TDP Financial Plan for Operations – Planned Revenue Hours

Projects	FY2017 Current Year Budget	FY2018	FY2019	FY2020	FY2021	FY2022
Projected Incremental Annual Revenue Hours						
Current Level of Service	**52,112**	**52,112**	**52,112**	**52,112**	**52,112**	**52,112**
Modify the D1 - same number of service hours; fewer miles	-	-	-	-	-	-
Downtown Fredericksburg Circulator	-	-	4,160	4,160	4,160	4,160
Modify the D6 - same number of service hours, more miles	-	-	-	-	-	-
Additional Weekend Service- Saturday	-	-	-	4,460	4,460	4,460
Additional Weekend Service- Sunday	-	-	-	4,460	4,460	4,460
Additional VRE Service - Spotsylvania Local	-	-	-	3,825	3,825	3,825
Additional VRE Service - Spotsylvania Caroline	-	-	-	1,275	1,275	1,275
Earlier Morning Service	-	-	-	-	4,335	4,335
Later Evening Service	-	-	-	-	1,785	1,785
Increase Frequency - F1, F3						3,060
Add Service - Stafford Lakes						3,060
Additional VRE Service - Brooke Station	-	-	-	-	-	1,466
Add Commuter Service to Dahlgren						2,040
Total Transit Revenue Hours	**52,112**	**52,112**	**56,272**	**70,292**	**76,412**	**86,038**

Table 7-2: FRED TDP Financial Plan for Operations – Annual Operating Expenses

Projects	FY2017 Current Year Budget	FY2018	FY2019	FY2020	FY2021	FY2022
Projected Operating Expenses						
Cost Per Revenue Hour*	$85.38	$88.11	$92.86	$90.49	$92.05	$93.28
Current Level of Service	$4,449,135	$4,561,977	$4,698,836	$4,839,801	$4,984,995	$5,134,545
Expand staff to accommodate system growth	$0	$30,000	$30,900	$31,827	$32,782	$33,765
Google Transit - included in base	$0	$0	$0	$0	$0	$0
Route and Schedule Analysis	$0	$0	$84,872	$0	$0	$0
Alternate Fuels Study	$0	$0	$20,000	$0	$0	$0
Update route maps and schedules	$0	$0	$21,218	$0	$0	$0
Modify the D1	$0	-$646	-$665	-$685	-$706	-$727
Downtown Fredericksburg Circulator	$0	$0	$370,365	$381,476	$392,920	$404,708
Additional weekend service-Saturday	$0	$0	$0	$341,149	$351,384	$361,925
Additional weekend service-Sunday	$0	$0	$0	$341,149	$351,384	$361,925
Additional VRE service - Spotsylvania Local	$0	$0	$0	$328,262	$338,109	$348,253
Additional VRE Service - Spotsylvania Caroline	$0	$0	$0	$97,526	$100,452	$103,465
Earlier Morning Service	$0	$0	$0	$0	$341,536	$351,782
Later Evening Service	$0	$0	$0	$0	$140,632	$144,851
Increase Frequency - F1, F3	$0	$0	$0	$0	$0	$248,317
Add Service - Stafford Lakes	$0	$0	$0	$0	$0	$248,317
Additional VRE Service - Brooke Station	$0	$0	$0	$0	$0	$118,673
Add Service to Dahlgren	$0	$0	$0	$0	$0	$165,544
Total Projected Operating Expenses	**$4,449,135**	**$4,591,331**	**$5,225,526**	**$6,360,505**	**$7,033,488**	**$8,025,343**
% Change Year by Year		**3%**	**14%**	**22%**	**11%**	**14%**

Table 7-3: FRED TDP Financial Plan for Operations – Annual Operating Funding and Revenue

Anticipated Funding Sources	FY2017 Current Year Budget	FY2018	FY2019	FY2020	FY2021	FY2022
Federal	**$1,851,000**	**$2,063,956**	**$2,102,115**	**$2,141,037**	**$2,141,037**	**$2,141,037**
Section 5307	$1,692,942	$1,907,952	$1,946,111	$1,985,033	$1,985,033	$1,985,033
Section 5311	$158,058	$156,004	$156,004	$156,004	$156,004	$156,004
State	**$709,561**	**$646,540**	**$663,680**	**$667,145**	**$677,202**	**$693,693**
Formula Assistance	$709,561	$646,540	$663,680	$667,145	$677,202	$693,693
Local	**$1,888,574**	**$1,880,835**	**$2,459,731**	**$3,552,323**	**$4,215,250**	**$5,190,613**
Revenues - Farebox	$393,874	$406,333	$462,459	$562,905	$622,464	$710,243
Local Funds	$1,494,700	$1,474,502	$1,997,272	$2,989,418	$3,592,786	$4,480,370
Total Projected Operating Funds	**$4,449,135**	**$4,591,331**	**$5,225,526**	**$6,360,505**	**$7,033,489**	**$8,025,343**

CAPITAL EXPENSES AND FUNDING SOURCES

Replacement and Expansion Vehicle Expenses and Funding

Table 7-4 offers the financial plan for Tier 1 projects including vehicle expansion and replacement over the six-year period. Eligible activities for funding under Tier 1 include[1]:

- Replacement and expansion vehicles
- Assembly line inspection
- Fare collection equipment
- Automated passenger counters
- On-vehicle radios and communication equipment
- Surveillance cameras
- Aftermarket installation of farebox, radios, and surveillance cameras
- Vehicle tracking hardware and software
- Rebuilds and mid-life repower of rolling stock

Over this plan's six-year timeline a total of eleven expansion and thirty replacement vehicles are recommended in addition to funding for the associated fare collection equipment and bicycle racks. In FY2022, electronic fareboxes are included as a separate line item capital

[1] DRPT FY2015 Revised Budget. http://www.drpt.virginia.gov/media/1293/fy15-drpt-agency-budget-revised.pdf

expense. We have also included a place-holder for the conversion of 11 of FRED's vehicles to alternative fuels. More specific planning estimates will be provided via FRED's annual TDP letter.

Federal and state matching ratios for Tier 1 projects are as follows: federal – 80%; state – 16%.

Table 7-4: Tier 1 Projected Capital Expenses and Funding

Type of Vehicle	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
Replacement						
Medium Duty	11	0	4	11	4	0
Expansion						
Medium Duty	0	0	0	3	0	6
Trolley	0	0	2	0	0	0
Sub-Total Vehicles	**11**	**0**	**6**	**14**	**4**	**6**
Vehicle Costs						
Replacement	$1,650,000	$0	$624,240	$1,750,991	$649,460	$0
Expansion	$0	$0	$416,160	$477,543	$0	$993,672
Conversion to Alternative Fuels	$0	$0	$0	$0	TBD	TBD
Sub-Total Vehicle Costs	**$1,650,000**	**$0**	**$1,040,400**	**$2,228,534**	**$649,460**	**$993,672**
Equipment Costs						
Fareboxes [1]	$0	$0	$0	$0	$0	$469,234
Sub-Total Equipment Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$469,234**
Total Costs	**$1,650,000**	**$0**	**$1,040,400**	**$2,228,534**	**$649,460**	**$1,462,906**
Anticipated Funding Sources - Current Federal/State/Local Matching Ratios						
Federal	$1,320,000	$0	$832,320	$1,782,827	$519,568	$1,170,325
State	$264,000	$0	$166,464	$356,565	$103,914	$234,065
Local	$66,000	$0	$41,616	$89,141	$25,978	$58,516
Total Funding	**$1,650,000**	**$0**	**$1,040,400**	**$2,228,534**	**$649,460**	**$1,462,906**

(1) Manual fareboxes included in vehicle prices for years FY17-FY21. The FY22 budget includes electronic fareboxes

Bike racks are also included in base vehicle costs

Infrastructure Facilities Expenses and Funding

Table 7-5 provides the financial plan for infrastructure facilities, considered Tier 2 capital projects. Eligible activities under this funding tier include[2]:

- Construction of infrastructure or facilities for transit purposes
- Real estate used for a transit purpose
- Signage
- Surveillance/security equipment for facilities
- Rehabilitation or renovation of infrastructure and facilities
- Major capital projects

The focus of the Tier 2 projects for FRED is to improve passenger facilities, including the new transfer center for Spotsylvania County and additional shelters and benches. In order to help improve bus stops throughout the service area, a budget of $20,000 per year of the TDP was included. Estimated unit costs for bus stop improvements (e.g. shelters and benches) are shown in Table 7-6.

In addition, FRED has a need to expand parking at FRED Central, as the current lease arrangement with the Kingdom Baptist Church is likely to end when the property is sold. As detailed in Chapter 5, the parking lot expansion will require the purchase of two lots, as well as site improvements, paving, and striping.

FRED is also interested in pursuing the conversion of its fleet to alternative fuels. Until a more detailed study of the process and associated expenses is completed (scheduled for FY2019), the cost line items for this project will read "TBD."

State matching ratios for Tier 2 projects will be changing during the TDP period, as outlined in DRPT's Transit Service Advisory Committee (TSDAC) guidelines. The federal match will remain 80%, however the state match will decline over the period from 16% in FY2017 and FY2018 to 8% in FY2019; 6% in FY20; and 0% thereafter.

[2] DRPT FY2015 Revised Budget. http://www.drpt.virginia.gov/media/1293/fy15-drpt-agency-budget-revised.pdf

Table 7-5: Tier 2 Projected Capital Expenses and Funding

Capital Need	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY2022
Transit Infrastructure Facilities						
Transfer center- Spotsylvania County	$0	$357,000	$0	$0	$0	$0
Additional shelters and benches	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Parking Lot Expansion- FRED Central	$0	$0	$435,000	$0	$0	$0
Alternative Fuel Infrastructure	$0	$0	$0	TBD	$0	$0
Total Costs	**$20,000**	**$377,000**	**$455,000**	**$20,000**	**$20,000**	**$20,000**
Anticipated Funding Sources- Current Federal/State/Local Matching Ratios						
Federal	$16,000	$301,600	$364,000	$16,000	$16,000	$16,000
State	$3,200	$60,320	$36,400	$1,200	$0	$0
Local	$800	$15,080	$54,600	$2,800	$4,000	$4,000
Total Funding	**$20,000**	**$377,000**	**$455,000**	**$20,000**	**$20,000**	**$20,000**

Table 7-6: Bus Stop Improvement Costs

Improvement	Unit Cost
Shelter (installed)	$5,000 - $10, 000
Bench (installed)	$1,500 - $2,500
4’ Wide Sidewalk	$17.50 - $25.00 per linear foot
Bicycle Racks	$200 - $500
Curb Ramps	$2,000 - $2,500

Other Capital Expenses and Funding Sources

Other capital expenses, considered Tier 3 capital projects, are presented in Table 7-7. Capital projects eligible for funding under this tier include[3]:

- All support vehicles
- Shop equipment
- Spare parts
- Hardware and software not installed on a vehicle
- Project development expenses for capital projects
- Office furniture and other equipment

- Handheld radios
- Landscaping
- Other transit-related capital items

State matching ratios for Tier 3 projects will also be changing during the TDP period, as outlined in DRPT's TSDAC guidelines. The federal match will remain 80%, however the state match will decline over the period from 16% in FY2017 and FY2018 to 0% thereafter.

Table 7-7: Tier 3 Projected Capital Expenses and Funding

Capital Need	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Support Vehicle						
Service Truck		1				
Minivan		1				
Sedan				1	2	
Total Number of Support Vehicles	0	2	0	1	2	0
Cost of Support Vehicles	$0	$61,200	$0	$21,200	$43,200	$0
Other Capital Costs						
Shop Equipment/Parts	$150,350	$155,000	$158,100	$161,262	$164,487	$167,777
ADP Hardware/Software	$11,640	$12,000	$12,240	$12,485	$12,734	$12,989
Subtotal, Equipment	**$161,990**	**$167,000**	**$170,340**	**$173,747**	**$177,222**	**$180,766**
Total - Support Vehicles and Equipment	**$161,990**	**$228,200**	**$170,340**	**$194,947**	**$220,422**	**$180,766**
Anticipated Funding Sources - Current Federal/State/Local Matching Ratios						
Federal	$129,592	$182,560	$136,272	$155,957	$176,337	$144,613
State	$25,918	$36,512	$0	$0	$0	$0
Local	$6,480	$9,128	$34,068	$38,989	$44,084	$36,153
Total Funding	**$161,990**	**$228,200**	**$170,340**	**$194,947**	**$220,422**	**$180,766**

Total Capital Expenses over TDP Timeframe

Table 7-8 presents a summary of the total capital program categorized by tier for the TDP period. Under each tier, the projects are listed by fiscal year. Actual project implementation will be determined each year based on statewide need and available funds. This table reflects the guidance received from DRPT with regard to the TSDAC guidelines.

Table 7-8: Fredericksburg Regional Transit Capital Budget- FY2017-FY2022

	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Tier 1 Costs						
Replacement	$1,650,000	$0	$624,240	$1,750,991	$649,460	$0
Expansion	$0	$0	$416,160	$477,543	$0	$993,672
Fareboxes	$0	$0	$0	$0	$0	$469,234
Alternative Fuel Conversion	$0	$0	$0	$0	TBD	TBD
Sub-Total Cost	**$1,650,000**	**$0**	**$1,040,400**	**$2,228,534**	**$649,460**	**$1,462,906**
Tier 2 Costs						
Lee's Hill Transfer Station	$0	$357,000	$0	$0	$0	$0
Additional Shelters and Benches	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Parking Lot Expansion- FRED Central	$0	$0	$435,000	$0	$0	$0
Alt Fuel Infrastructure	$0	$0	$0	TBD	$0	$0
Sub-Total Cost	**$20,000**	**$377,000**	**$455,000**	**$20,000**	**$20,000**	**$20,000**
Tier 3 Costs						
Support Vehicles	$0	$61,200	$0	$21,200	$43,200	$0
Shop Equipment/Parts	$150,350	$155,000	$158,100	$161,262	$164,487	$167,777
ADP Hardware/Software	$11,640	$12,000	$12,240	$12,485	$12,734	$12,989
Sub-Total Cost	**$161,990**	**$228,200**	**$170,340**	**$194,947**	**$220,421**	**$180,766**
Total Capital Cost	**$1,831,990**	**$605,200**	**$1,665,740**	**$2,443,481**	**$889,881**	**$1,663,672**
Anticipated Funding Sources - Federal/State/Local Matching Ratios						
Federal	$1,465,592	$484,160	$1,332,592	$1,954,785	$711,905	$1,330,938
State	$293,118	$96,832	$202,864	$357,765	$103,914	$234,065
Local	$73,280	$24,208	$130,284	$130,931	$74,063	$98,669
Total Funding	**$1,831,990**	**$605,200**	**$1,665,740**	**$2,443,481**	**$889,882**	**$1,663,673**

Chapter 8
Monitoring and Evaluation

INTRODUCTION

As described in the introduction of Chapter 1, this Transit Development Plan (TDP) is a guiding document that should be reviewed and updated annually to reflect any changes in community priorities, funding availability or other factors that may impact FRED services. Several analyses regarding operations, service performance, community transportation needs and service alternatives have been completed as part of the TDP process. Chapters 5 and 6 detailed the recommended operations and capital projects, respectively, and Chapter 7 provided the financial plan for these recommendations. It is important to remember that the TDP is a planning document. As such, when it comes time to develop grant applications and implement projects, FRED staff together with Public Transit Advisory Board (PTAB) should revisit the TDP to ensure that the recommendations are appropriate and feasible given community needs and fiscal realities.

During the course of the development of this TDP, DRPT changed the TDP requirements. The new requirements feature a six-chapter document with a ten-year horizon. Given that the FRED TDP was in the draft final stage at the time the new requirements were released, FRED will not be required to change the structure of the document, but will be required to extend the recommendations to a 10-year period. This extension will take place prior to September 2017.

This brief chapter describes the processes that are recommended to periodically monitor and evaluate the progress that FRED has made each year in implementing the TDP. Such processes include integrating TDP projects with relevant planning documents, monitoring service performance, and submitting an annual update to DRPT. Monitoring and evaluation efforts are particularly important to ensure that FRED is meeting the goals, objectives and standards that were described in Chapter 2.

COORDINATION WITH OTHER PLANS AND PROGRAMS

Chapter 3 included the review of various transportation and land use plans developed by a number of agencies and municipalities throughout the region. The purpose of this review was to ensure that the TDP is consistent with local and regional transportation goals and efforts. If relevant plans are updated in the coming years, FRED staff or PTAB representatives should seek to participate in efforts to ensure that projects recommended in this TDP are included in

these area plans and studies where fitting. Many PTAB members are involved as advisors or participants with other community groups.

At the state level, FRED should ensure that the recommended projects from this TDP are incorporated into the public transportation element of the DRPT State Transportation Improvement Program (STIP) and Six-Year Improvement Plan (SYIP).

Service Performance Monitoring

Chapter 2 included goals and objectives, as well as several proposed performance standards for FRED, the purpose of which was to develop some objective measurements that FRED can use to monitor transit service performance in the future and make performance-based service planning decisions.

FRED should continue to monitor system performance. At least annually, FRED should conduct a review, and based on performance, should consider amending the standards and/or undertaking steps to improve performance.

The results of this regular monitoring should be shared with the PTAB and with DRPT through the annual TDP update.

Annual TDP Monitoring

FRED currently has a robust annual goal-setting process built into its annual monitoring, with several specific tasks attached to each goal. FRED should continue this process, as it allows for continuous examination and adjustment of system goals and objectives. This process can also be used to evaluate FRED's status with regard to implementing the TDP.

DRPT guidance currently requires that grantees submit an annual TDP update letter that describes the progress that has been made toward implementing the adopted TDP. While the TDP has planned for the implementation of service improvements in particular years, the actual implementation may be delayed to future years if the proposed funding arrangements do not come to fruition or community priorities change. In this case, the TDP may need to be updated during the six-year planning period to reflect such changes. FRED's annual update to DRPT should document the results of the activities described above and include the following elements:

- Operating statistics for the twelve-month period, including the ridership attributed to any new proposals implemented as a result of the TDP.
- Any changes to system goals, objectives or service standards.

- A description of any service or facility improvements that have been implemented during the twelve-month period.

- An update to the TDP recommendations to identify additional projects, deferment of projects to later years, or elimination of projects.

- Updates to the financial plan to more accurately reflect current funding scenarios.

Appendix A
On-Board Survey

FIXED ROUTE ON-BOARD RIDER SURVEY

Fredericksburg Regional Transit (FRED) is seeking input concerning our services. Please take a minute to complete this survey during your bus trip. Please complete only one survey. Thank you!

1. Which FRED route did you board?

- ❑ C1/C2 Caroline
- ❑ D1 South Stafford
- ❑ D2 South Stafford
- ❑ D3 North Stafford
- ❑ D4 North Stafford
- ❑ D5 South Stafford
- ❑ D6 North Stafford
- ❑ E1 Eagle Express
- ❑ E2 Eagle Express
- ❑ E2LN Eagle Exp.
- ❑ F1 Fredericksburg
- ❑ F2 Fredericksburg
- ❑ F3 Fredericksburg
- ❑ F4 Fredericksburg
- ❑ F5 Fredericksburg
- ❑ S1 Spotsylvania
- ❑ S4 Spotsylvania
- ❑ S5 Spotsylvania
- ❑ VF1 Fred. VRE
- ❑ VS1 Spots. VRE

2. How many FRED buses will it take to complete this one-way trip today?

❑ 1 ❑ 2 ❑ 3 ❑ 4+

3. What is the purpose of your trip today?

You may check more than one.

- ❑ Work
- ❑ School
- ❑ Social/Recreation
- ❑ Medical/Dental
- ❑ Shopping/Errands
- ❑ Tourism
- ❑ Child Care
- ❑ Other

4. Is your trip part of a round-trip on the bus?

❑ Yes ❑ No ❑ Don't Know

Where are you COMING FROM?

5. Where did this one-way trip start?

Please select only one.

- ❑ Home
- ❑ School
- ❑ Work
- ❑ Child Care
- ❑ Shopping/Errands
- ❑ Medical/Dental Office
- ❑ Social or Recreational Activity
- ❑ Other

6. How did you get to the bus stop for this bus?

You may check more than one.

- ❑ Walked – How many blocks? _____
- ❑ Another bus – Which route? _____
- ❑ Car – Drove Alone
- ❑ Car - Carpooled
- ❑ Bicycle
- ❑ VRE
- ❑ Other: _____

Where are you GOING TO?

7. Where will this one-way trip end?

Please select only one.

- ❑ Home
- ❑ School
- ❑ Work
- ❑ Child Care
- ❑ Shopping/Errands
- ❑ Medical/Dental Office
- ❑ Social or Recreational Activity
- ❑ Other

8. How will you get to your final destination once off the bus? *You may check more than one.*

- ❑ Walk – How many blocks? _____
- ❑ Another bus – Which route? _____
- ❑ Car – Drive Alone
- ❑ Car - Carpool
- ❑ Bicycle
- ❑ VRE
- ❑ Other: _____

9. Please rate FRED in the following areas:

		Strongly Satisfied	Satisfied	Neutral	Dis-satisfied	Strongly Dis-satisfied	No Opinion
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 Transit Information	❑	❑	❑	❑	❑	❑
f.	Cost of the Bus Fare	❑	❑	❑	❑	❑	❑
g	Sense of Security on Buses	❑	❑	❑	❑	❑	❑
h.	Sense of Security at Stops	❑	❑	❑	❑	❑	❑
i.	Cleanliness of Buses and Stations	❑	❑	❑	❑	❑	❑
j	Courtesy/Friendliness of Bus Drivers	❑	❑	❑	❑	❑	❑
k	Overall Service	❑	❑	❑	❑	❑	❑

Turn Over Please ☞

10. What do you like the <u>MOST</u> about FRED?

_____

11. What do you like the <u>LEAST</u> about FRED?

_____

12. Are there places in the region that you need to go that FRED does not serve?
❑ Yes ❑ No
If yes, where?

_____

13. Do you think FRED is a good value for the services you receive? ❑ Yes ❑ No

14. Which of the following improvements would be MOST useful to you? *Please choose your top 3.*
❑ More frequent service ❑ Weekend service
❑ Bus stop shelters/benches ❑ Shorter travel times
❑ Earlier morning service ❑ Later evening service
❑ Real-time arrival info ❑ Wifi onboard buses
❑ Other: _____

15. If FRED were to make one service improvement, what would be your top choice?

_____

16. How often do you typically ride FRED per week?
❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5+

17. What is your home ZIP Code? _____

18. Are you: ❑ Male ❑ Female

19. How many people live in your household? _____

20. What is your age?
❑ 12 or younger ❑ 35 – 49
❑ 13 – 17 ❑ 50 – 64
❑ 18 – 24 ❑ 65 and older
❑ 25 – 34

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

22. How many cars are in your household?
❑ 0 ❑ 1 ❑ 2 ❑ 3 or more

23. Was a car available to you for this trip?
❑ Yes ❑ No

24. Do you have a cell phone with Internet access?
❑ Yes ❑ No

25. What is your employment status?
You may check more than one.
❑ Employed Full-Time ❑ Employed Part-Time
❑ Student ❑ Retired
❑ Not Employed

26. Are you affiliated with any of the following institutions? Please check all that apply.
❑ Germanna Community College
❑ Mary Washington Healthcare
❑ University of Mary Washington

27. What is your total annual household income?
❑ Under $20,000 ❑ $60,000 - $79,999
❑ $20,000-$39,999 ❑ Over $80,000
❑ $40,000 - $59,999 ❑ Don't Know

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

29. How would you classify yourself?
❑ African American/Black
❑ Asian or Pacific Islander
❑ Caucasian/White
❑ Native American
❑ Other: _____

Comments:

_____

_____

_____

ROUTE: _____ DATE: _____ TIME: _____