GRTC Transit Development Plan

July 2018

GRTC TRANSIT SYSTEM

DRAFT:

GRTC Transit System
Transit Development Plan
Fiscal Years 2018-2022

Approved _____

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Background

This Transit Development Plan (TDP) for GRTC Transit System (GRTC) represents the first full TDP since 2011. In that time much has changed at GRTC and many major initiatives are currently underway that will dramatically change GRTC in the next year. The two biggest initiatives that will change GRTC are the new "Pulse" Bus Rapid Transit (BRT) line and the associated redesign of the rest of the GRTC network in the City and Henrico as a result of the Richmond Transit Network Plan (RTNP). Because of these major initiatives, the existing network that GRTC operates today will largely be replaced within a year, and therefore, this TDP is slightly different from the typical TDP for a transit agency.

Since the last TDP, GRTC has welcomed a new CEO, David Green. GRTC has also implemented new fare passes and begun conversion of its fleet from diesel to compressed natural gas (CNG). CNG revenue vehicles were first introduced in 2012 and by summer 2017, approximately 54% of the total vehicle fleet was CNG. Full-fleet deployment of exclusively CNG buses is expected by 2024.

In 2017, the Virginia Department of Rail and Public Transportation (DRPT), in cooperation with the Richmond Regional Transportation Planning Organization (TPO) and GRTC completed the Greater RVA Transit Vision Plan to look at what a regional public transit network might look like by 2040, including Henrico, Chesterfield, Hanover and the City of Richmond. Also, DRPT, VDOT and GRTC are working together to complete construction on the region's first BRT line, the GRTC Pulse, which will run on Broad and Main Streets from Willow Lawn, through downtown to Rocketts Landing. The line is expected to open in 2018.

Major Current Initiatives

GRTC has recently finished and is currently undertaking several large initiatives to improve service and the customer experience:

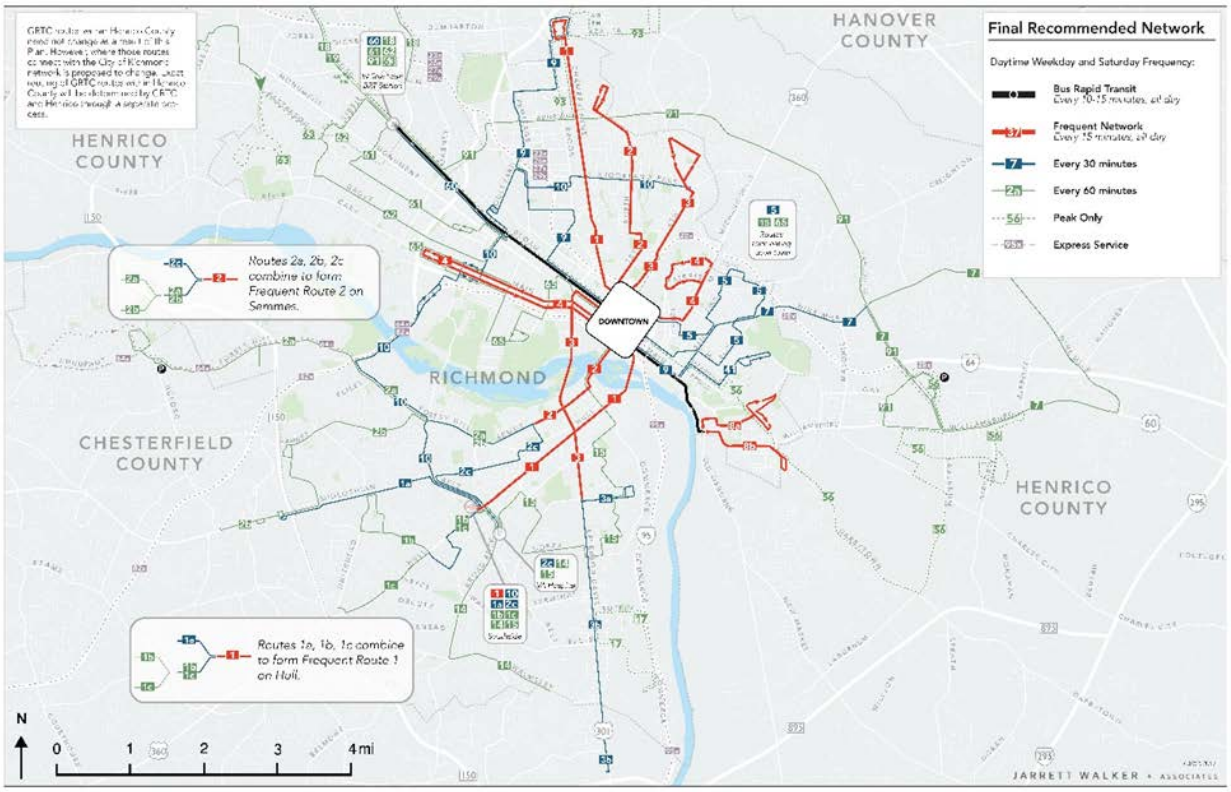
- In April 2014, a Temporary Transfer Plaza began operation. The three-block stretch of sidewalk is located along 9th and Leigh Streets and contains 13 bus bays. This area is designated by the City of Richmond as the primary point at which bus riders may transfer from one route to another until GRTC secures a site for and builds a permanent facility. Bus shelters, benches, trash cans, and signage have been installed for the convenience of the approximately 5,000-8,000 riders per day who use the plaza.
- Beginning in 2015, GRTC started to upgrade all 2,000 of its basic bus signs. The new signs represent the first major upgrade in 20 years, and feature a taller, more visible pole as well as signs with the bus stop number, GRTC customer contact information, and route(s) serviced by that bus stop. Some basic bus stop signs will also feature a lower level sign displaying a printed schedule and map relevant to that specific route and stop.
- "The Pulse" BRT, a 7.6-mile frequent bus route from Rocketts Landing (East) to Willow Lawn, Henrico County (West), is under construction and is anticipated to open in 2018.

The Richmond Transit Network Plan, a City of Richmond-led planning effort, aimed to review the entire GRTC route system within the city, and create a new system of routes to better integrate with the new BRT and serve the city better. The Recommended Network shifts the recommended balance of service toward more high-frequency routes in busy and dense places and fewer low frequency service in lower density places. The new network was designed to cost the same as the 2017-2018 operating budget for GRTC service in the city.

TDP Challenges

This TDP plan represents a set of challenges for GRTC as it plans for the expansion of a new system that does not exist yet. Therefore, GRTC expects minimal service changes in the first two years within the City of Richmond as the agency will need time to see how the significant network changes and Pulse BRT implementation will change ridership and operating patterns. There are, however, key improvements programmed in the first few years in the city that are necessary to serve the redesigned network: the Southside transfer center is programmed for 2019 and the Downtown transfer center is programmed for 2020.

Figure E-1 Richmond Transit Network Plan Recommended Routes and Frequencies



Process

The Richmond Transit Network Plan planning study began in 2016 and featured extensive public and stakeholder outreach to design an entirely new system of GRTC bus routes to suit a changing city and integrate with the new BRT line. The process included dozens of public meetings, multiple public surveys and updates and meetings with City Council members and the GRTC Board. Throughout that process, the public and others provided input on major improvements and enhancements that they would like to see in the GRTC system in the city. Since the RTNP process was about redesigning the network within the existing operating budget, many ideas could not be incorporated into the recommended network because of funding constraints. Nevertheless, many of these ideas were considered and included as possible improvements in the list of future improvements included in the RTNP Final Report. This TDP includes ideas from that list of recommended future service enhancements and includes other ideas provided by the public, stakeholders and elected officials during the RTNP outreach process.

Since the RTNP process was focused on changes for the network within the City of Richmond, there was limited consideration of service in Henrico or Chesterfield County. There were, however, some clear needs to adjust the network in Henrico based on the results of the changes in the city, since some routes are currently shared between the two jurisdictions (such as Route 1 Monument) but will be removed based on the RTNP recommended network.

This TDP included a specific network design and outreach process for Henrico County that built off of the RTNP and featured both stakeholder and public meetings throughout the county to solicit feedback about Henrico-specific planned improvements. This process included development of two long-term network concepts that provided the public and stakeholders with differing visions of how to design a larger, more comprehensive transit network for the county. One concept was called the Ridership Concept and included fewer routes with higher frequency service focused on the busiest and densest corridors. (See Figure E-2 below). The other concept was called the Coverage Concept and had more routes to more parts of the county, but with lower frequency service. (See Figure E-3 below).

The public and stakeholders provided feedback on the preferred direction for how to design a future network for Henrico County and the general consensus of the public was split about half-way between the two concepts, while the stakeholder group leaned more strongly toward the Ridership Concept. This public input, plus coordination with Henrico County staff, led to the recommendations for improvements in Henrico County included in this TDP.

For Chesterfield County, GRTC and consultant staff coordinated with Chesterfield County staff to determine preferences for major service improvements and timing of those improvements in the county.

Figure E-2 Henrico Ridership Concept

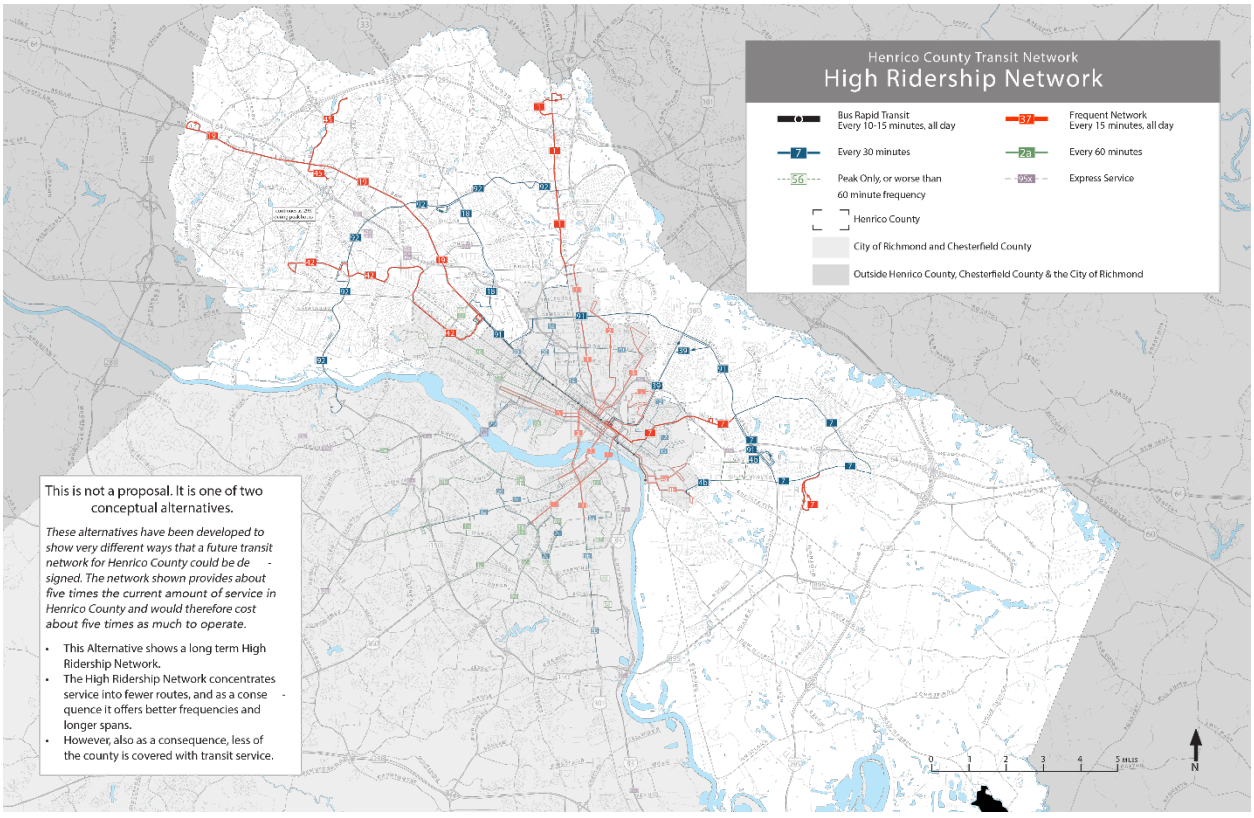
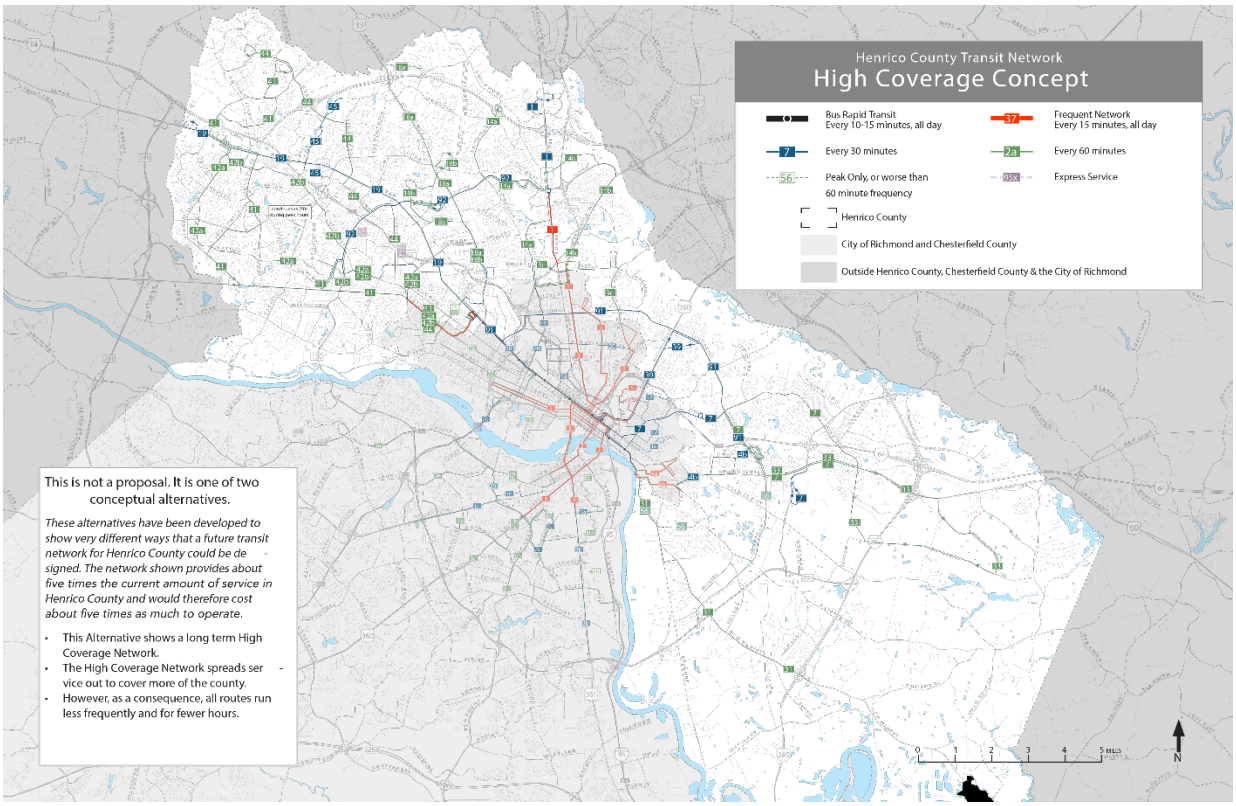


Figure E-3 Henrico Coverage Concept



Recommendations

This section provides a short summary of the major recommended service improvements and major capital projects included in this TDP. Chapter 4 provides details on each recommended improvement, while Chapters 5 and 6 detail the financial projections and timing for each improvement. It is important to note that all expansion of GRTC service depends on increases in funding from local jurisdictions.

Route Extensions and Enhancements Considered

GRTC is considering service extensions west along Broad Street to Short Pump, north along Brook Road to Virginia Center Commons and possibly to a park and ride lot in Ashland, west to a new Park and Ride at the old Clover Hill High School, northwest along Cox Rd to Nuckols Rd to serve Innsbrook and possibly an additional Park and Ride lot near Twin Hickory/Nuckols and south to Chesterfield Town Center. GRTC is also considering extending the span of all high-frequency City of Richmond routes to 2am and most Henrico routes to 11pm.

Major Capital Projects

GRTC plans to begin planning several large capital projects in the next few years. One is a Southside Transfer Center near Hull St and Belt Blvd that would provide a safe, sheltered place for riders making connections between Routes 1a, 1b, 1c, 2c, 86, 87 and 88. It would also provide layover facilities for Routes 86, 87, 88. GRTC also plans to construct a downtown transfer facility with 13 bus bays and facilities for driver break and layover needs.

GRTC also plans to study the construction of one or more future Bus Rapid Transit routes in other parts of the City.

Recommended Short-Term Expansion (Years 1-5)

GRTC expects minimal service changes in the 2019, 2020 and 2021 within the City of Richmond as the agency evaluates changes in ridership and operating patterns after BRT and Transit Network Plan implementation. However, evening span of service increases on hourly routes are planned for 2022 and increased frequency on the Orbital route is planned for 2023. Additionally, two large capital projects within the City of Richmond are planned for the short-term. The Southside transfer center is programmed in 2019 and the Downtown transfer center is programmed in 2020.

However, significant increases in service are planned in Henrico in the short-term due to interest from the public and decision-makers in expanded service. Planned service expansions include major extensions to new areas with major job centers first (Short Pump and Brook and Parham) and the addition of evening and weekend service.

In Chesterfield, one new express route is planned to service Cogbill Road and the 82x is planned to be extended to the Career and Technical Center.

See Table E-1 for an overview of short-term expansion expenditures.

Table E-1 Short-Term Improvements (1-5 Years)

Year	Improvements	Incremental Cost (in Million $)
2019	Changes to Henrico routes: extending Route 19 (Pemberton) to Short Pump, extending Route 1 to shopping center at Brook/Parham and simplifying Route 18 to provide two-way service from Willow Lawn via Broad.	$1.55
2020	Changes to Henrico routes: extending Route 77 (Patterson) to downtown and extending the span of service to 11pm on Route 7 (Nine Mile, Henrico), Route 19 (Pemberton), Route 79 (Patterson/Parham) and Route 91 (Laburnum Connector). Changes to Chesterfield routes: extending route 82x to a new Park and Ride at the old Clover Hill High School and creatnig a new express route (89x) from downtown to a new park and ride at Cogbill Road and Chippenham Parkway	$2.44
2021	Making network changes to routes 88, 1b and 1c as well as extending Route 29X via Cox Rd to Nuckols Rd to serve Innsbrook and an additional Park and Ride lot near Twin Hickory/Nuckols.	$2.95
2022	Extending evening span of service to 10pm on Route 76 (Patterson), Route 77 (Grove), Route 78 (Cary/Maymont), Route 87 (Bellemeade/Hopkins), Route 88 (Ruffin Bells Shuttle), Route 86 (Broad Rock/Walmsley). Adding weekend service from 6am-11pm on Route 7 (Nine Mile), Route 19 (Pemberton), Route 79 (Patterson/Parham) and Route 91 (Laburnum Connector). Extend service along Brook Rd to Virginia Center Commons and create a new express route to Virginia Center Commons.	$5.47
2023	Increase frequency on Route 20 (Orbital) from 30-minutes to 15-minutes and extend service from midnight to 1am.	$2.12

Recommended Mid-Term Expansion (Years 6-10)

Within the next 10 years, GRTC expects to increase the late night span of service on most of its routes until 2am, increase frequency on Route 20 (Orbital) and increase Sunday frequency on its 15-minute network.

Table E-22 Mid-Term Improvements (6-10 Years)

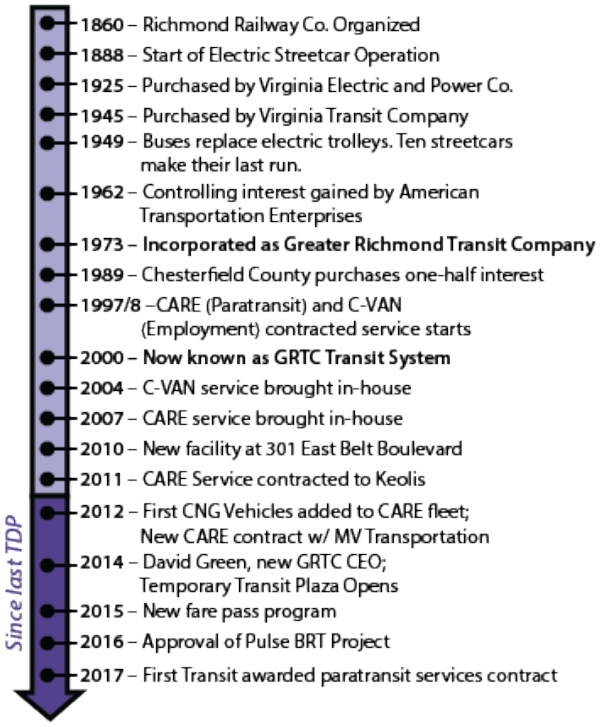
Year	Improvements	Incremental Cost (in Million $)
2024	Extending the span of service to 2am on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis), Route 4a (Montrose), Route 4b (Darbytown) and Route 5 (Cary/Main/Whitcomb). Increasing the frequency of Route 12 to 15 minutes, and on Route 91 (Laburnum Connector) from 60-minute to 30-minute. Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.	$4.61
2025	Extending service to Stony Point Fashion Park, Arboretum Place and creating a new express route (22x) from Short Pump to downtown. Extending span of service on Route 18 (Henrico Government Center) to 11pm and adding weekend service on Route 18 (Henrico Government Center) from 6am-11pm. Increasing frequency to 15 minutes on Route 7 (Nine Mile) and increasing Mon-Sat evening frequency of service to 15 minutes from 7pm-10pm on Route 1 (Chamberlayne/Hull), Route 2 (North Avenue/Semmes), Route 3, Route 4a, Route 4b and Route 5.	$6.72
2026	Extending the span of service to 2am on Route 8 (Nine Mile, Richmond only), Route 12 (Church Hill), Route 13 (Oakwood), Route 14 (Hermitage/East Main), Route 20 (Orbital) and Route 50 (Broad Street local). Increasing frequency to 30 minutes on Route 76 (Patterson), Route 77 (Grove), Route 78 (Cary/Maymont), Route 87 (Bellemeade/Hopkins) and Route 86 (Broad Rock/Walmsley). Extending the span of Route 8 so that it runs in tandem with Route 7 to provide 15-minute service during the day.	$9.83
2027	Increase Sunday frequency to 15-minutes from 6am-7pm on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis), Route 4a (Montrose), Route 4b (Darbytown), Route 5 (Cary/Main/Whitcomb) and Route 20 (Orbital). Increasing the frequency on Route 18 (Henrico Government Center) from 60-minute to 30-minute. Create a new route between Downtown and Mechanicsville/Laburnum via Mosby. Extending service to Old Buckingham/Woolridge. Increasing frequency of Route 79 to every 30 minutes.	$8.20
2028	Creating a new route (Route 92) along Brook Road and Parham to Regency which could be extended to Stony Point Fashion Park. Extending service to White Oak Village via Williamsburg Rd/ Gay Ave and along Hull and Elkhardt to Genito Road.	$4.02

CHAPTER 1: Introduction

1.1 Introduction

The roots of the GRTC Transit System (GRTC) can be traced back to 1860 when the Richmond Railway Company served the City of Richmond, Virginia. Starting in the 1930s, the streetcars began to be replaced by buses, with the last electric trolley to run on Richmond streets in December 1949. At that point, the former "trolley barn" at Robinson and Cary became a bus-only depot. In 1973, the Greater Richmond Transit Company was created as a new public service company. The GRTC system of today remains primarily focused on the City of Richmond, however in 1989 it became jointly owned by the City and Chesterfield County and today also provides service to Henrico County and Petersburg. GRTC currently operates 45 local and express bus routes along with demand-response paratransit curb-to-curb transportation for eligible clients unable to use fixed route service. GRTC also oversees the RideFinders transportation demand management (TDM) entity, offering commuter-based ride matching, marketing, and incentives to reduce single occupant vehicle travel across multiple central Virginia counties and jurisdictions. GRTC's last Transit Development Plan was prepared for the Virginia Department of Rail and Public Transportation in November 2011.

Figure 4 History of GRTC

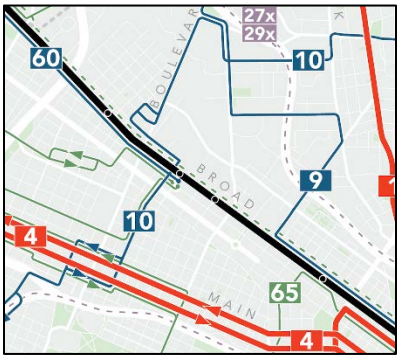


1.2 Current Initiatives

As of early 2017 there are five major ongoing initiatives at GRTC, which include:

- **Richmond Transit Network Plan** – This planning study began in 2016 and incorporated extensive public and stakeholder outreach to conceive an entirely new system of GRTC bus routes in the context of a changing city and integration with a new Bus Rapid Transit route along Broad Street. The Recommended Network outlines a whole new design for the city's bus network that shifts the balance of service toward more high-frequency routes in busy and dense places and less low frequency service in lower density places. The new network was designed to cost the same as the 2017-2018 operating budget for GRTC service in the city. With existing routes completely changing, this current Transit Development Plan will outline ways to both baseline and quantify system wide and corridor performance improvements beyond the traditional route-level analysis approach.

Highlights of system wide improvements resulting from implementing the new network plan include:



- *LESS WAITING* New high frequency routes (every 15min.)
- *MORE OFF PEAK SERVICE* Less peaking of service during the day.
- *CLOCKFACE FREQUENCIES* Easier for customers to plan their trips and connections.
- *LESS TRANSFERS* More one-seat rides across town.
- *ENHANCED BRT ACCESS* At eight Pulse BRT Stations.
- *COST NEUTRAL* Reallocates existing budget with 3% contingency.

- **Pulse Bus Rapid Transit Introduction** - On February 8, 2016, the Richmond City Council voted to authorize the City's Chief Administrative Officer to sign the first legal agreement to advance this project into the construction phase. The 7.6-mile route extends from Rocketts Landing (East) to Willow Lawn, Henrico County (West). The project is under construction and is anticipated to open in 2018. Changes to existing local service on Broad Street will follow the recommendations of the Transit Network Plan.

- **Conversion of Fleet to CNG** – As of April 2017, GRTC services consist of a revenue fleet of 236 vehicles, providing fixed route bus transit, express service, and specialized transportation for those needing individualized care. CNG revenue vehicles were first introduced in 2012, and GRTC continues to retire and replace diesel-fueled buses with CNG-fueled counterparts. Following many new vehicle deliveries due by summer 2017, approximately 54% of the total vehicle fleet will have been converted to CNG. Full-fleet deployment of exclusively CNG buses is expected by 2024. In April 2014, GRTC opened its own fueling station, one of the largest natural gas compression stations in Virginia, to support the growing CNG needs of this fleet.

- **Temporary Transfer Plaza** - A Temporary Transfer Plaza began operation in April 2014, located along 9th and Leigh Streets with 13 bus bays. The Temporary Transfer Plaza is not a structure, but a three-block stretch of sidewalk designated by the City of Richmond as the primary point at which bus riders may transfer from one route to another for up to three (3) years. Bus shelters, benches, trash cans, and signage have been installed for the convenience of the approximately 5,000-8,000 riders per day who use the plaza. GRTC still plans to secure up to a one-acre centralized location and has set aside $30M in capital expenditures for a permanent facility.

- **Enhanced Bus Stop Signs** – Beginning in 2015, GRTC started to upgrade all basic bus signs, which includes approximately 2,000 signs. The new signs represent the first major upgrade in 20 years, and feature an updated design and additional functionality. The new basic bus stop signs feature a taller, more visible pole in accordance with Virginia Department of Transportation (VDOT) standards (7 feet off the ground) with a bus icon at the top. Beneath, are signs featuring the bus stop number, GRTC customer contact information, and route(s) serviced by that bus stop. An additional feature on some basic bus stop signs will also be a lower level sign displaying a printed schedule and map relevant to that specific route and stop.
- **ADA Plan** – Beginning in summer 2018, GRTC will work with the City of Richmond to install ADA-compliant landing pad at all non-compliant stops, unless they cannot be brought up to

compliance. Braille stop numbers will also be installed at each stop. This is a 2-year plan with $360,000 set aside.

1.3 Governance

GRTC's transit system is 50 percent owned by the City of Richmond and 50 percent owned by Chesterfield County. GRTC's overall direction is guided by a six-member Board of Directors, appointed annually in October by the City Council of Richmond (three) and the Board of Supervisors for Chesterfield County (three). Members include:

George Braxton – City of Richmond	Daniel K. Smith – Chesterfield County
Benjamin P. Campbell – City of Richmond	Gary Armstrong (Chair) – Chesterfield County
Eldridge F. Coles (Vice-Chair) – City of Richmond	David W. Mathews – Chesterfield County

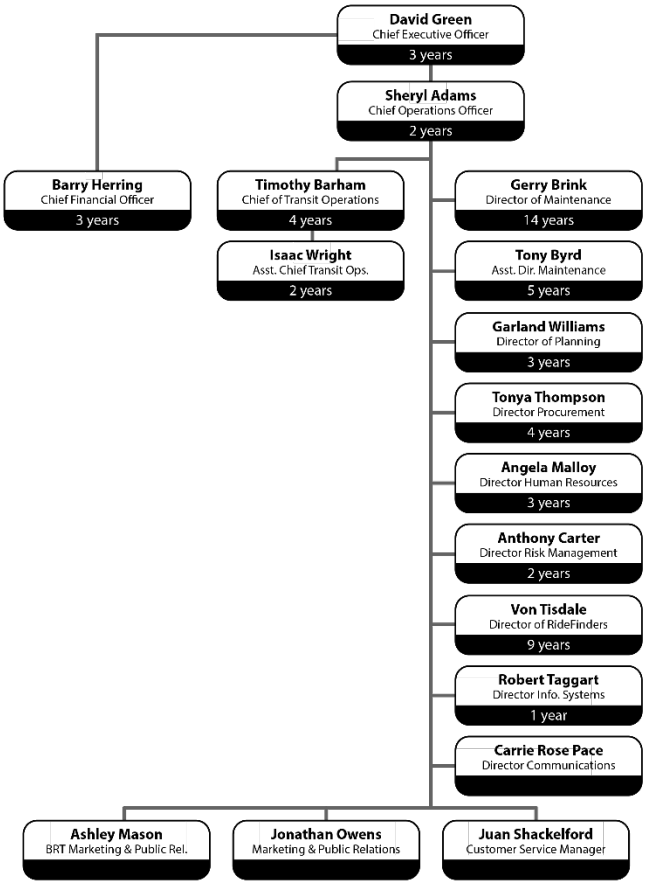
A significant shift in route planning autonomy occurred for GRTC in 2013. Based upon recommendations from a City of Richmond Task Force, the City Code was changed to remove City Council's responsibility and final authority in designating and changing GRTC routes within the City boundaries. This, among other things, allowed GRTC to efficiently adjust the timing of up to 21 routes in support of splitting cross-town service and establishing the temporary transfer plaza. GRTC currently has no dedicated regional funding mechanism, and is reliant upon annual appropriations from jurisdictions. This results in frequent adjustments to best preserve the continuity of operations within available resources.

1.4 Organizational Structure

The organizational structure and tenure of key staff is detailed in Figure 1-2. David Green was appointed by the Board to replace Eldridge Coles as Chief Executive Officer, assuming the role in January 2014. GRTC has eleven different departments headed by nine Directors. There are numerous staff members that provide support to each of the manager and directors listed on the organizational chart.

GRTC has 383 full time employees and 48 part-time employees. Of these employees, 291 from the Maintenance and Transportation Departments are represented by Amalgamated Transit Union Local 1220. Union contracts are re-negotiated every three years, with the current contract extending through September 30, 2017. GRTC CARE paratransit services (drivers, dispatchers, supervisors) are provided under a third-party contract. The approximately 114 full and part time employees for these services are covered by a separate agreement with the union. RideFinders, the region's (seven county plus five independent jurisdictions) Transportation Demand Management (TDM) agency, is a division of GRTC and is officially governed by the Board of Directors.

Figure 5 GRTC Organizational Chart



1.5 Services Provided and Areas Served

The mix of both the type and quantity of service offered within the GRTC service area varies, and is based on factors including population and/or job density, ridership levels, historical service areas, popular destinations, and funding availability. Historically, GRTC features radial fixed bus routes that provide the spokes of a traditional transit hub and spoke system. Downtown Richmond historically has served as the hub. GRTC has a reported service area of 227 square miles, including service beyond the City into adjacent Henrico and Chesterfield Counties. In addition to local fixed route service, express routes provide direct service on a limited stop basis between downtown Richmond and residential and business areas in outlying jurisdictions. The CARE program is a demand responsive, curb-to-curb paratransit service provided to Americans with Disabilities Act (ADA) eligible persons within the City of Richmond, Henrico County and parts of Chesterfield County. C-VAN provides transportation assistance to participants in the Virginia Initiative for Employment not Welfare (VIEW) program.

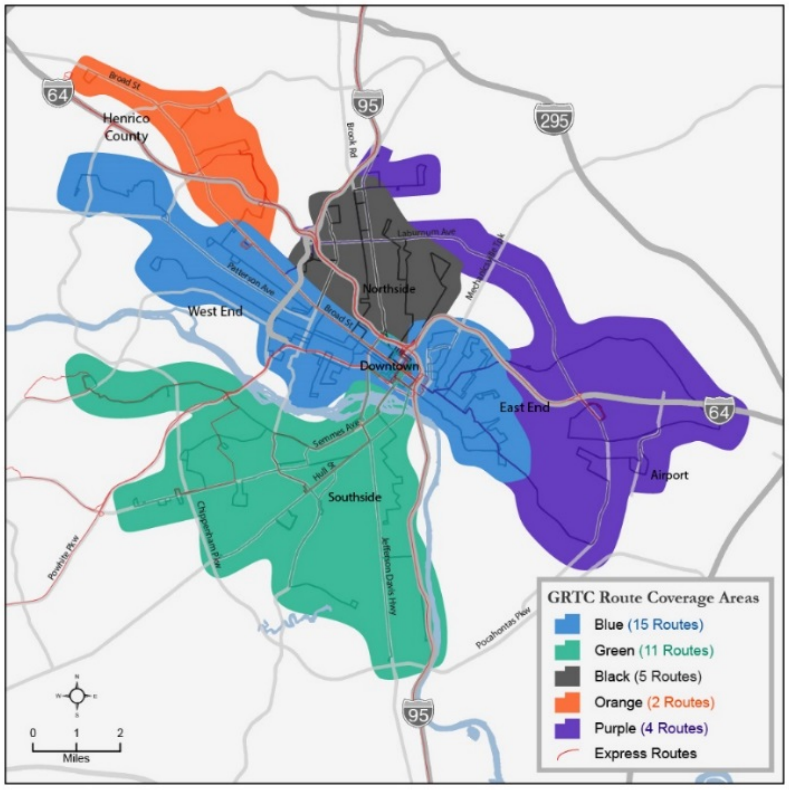
1.5.1 *Fixed Route Bus*

During the development of this plan, GRTC has been preparing for the most significant changes in its service in decades. Two major projects, the Pulse BRT and the Richmond Transit Network Plan, will both launch on June 24, 2018 and will remake fixed route bus service in much of the GRTC service area. This section will describe the bus service as it existed prior to June 24, 2018 and the service as it is expected to operate after that date.

1.5.1.1 Bus Network before June 24, 2018

Fixed route service follows a radial/crosstown network design, with routes extending out from the Central Business District along key corridors. GRTC currently identifies routes in public schedules based upon the various neighborhoods and geographies of Richmond that are served. The routes identified in the blue section serve downtown, the Fan district, Church Hill and portions of the West End, south of Broad Street. The purple routes serve the far East End, including the Richmond International Airport. Henrico County is primarily served by the orange routes. The black routes serve the North Side and cross into Henrico County in the vicinity of the former Azalea Mall. Finally, the green routes serve the Southside of Richmond (see Figure 1-3). A number of express routes are characterized with a red color and include an "x" designation in addition to their route number.

Figure 6 GRTC Fixed Route Service Area Map through June 2017



In 2014, GRTC switched from operating service through the CBD to having routes terminate at a central transfer center, allowing for greater schedule reliability and recovery time. This was also done to reduce the number of transit vehicles along Broad Street, assisting with the logistics of national and international cycling events held in 2014 and 2015.

Most of the city is within a ¼-mile of a transit route with a span of service of 12-18 hours and a headway from 25-45 minutes. The level of transit service tends to decrease as the distance from downtown increases. Routes are predominantly point-to-point, with many featuring a turn-around loop at their respective suburban destination. The highest levels of service are along the Broad Street corridor (Blue) and Northside routes (Black). The Southside has less service coverage due in large part to the lower density of population in the more auto-dominated land-use patterns in the western portions of the Hull Street, Midlothian Turnpike and Forest Hill Avenue corridors (see Figure 1-3).

Figure 7 GRTC Fixed Route Service Summaries by Region

BLUE									14 ROUTES
		Service Days/Times						Mon.-Fri.	Peak
		Mon.-Fri.					Mon.-Fri.	Midday	Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Freq. (Mins.)	
1 - Monument	Arterial	●	●	●	●	●	18:31	25-45	2
2 - Patterson	Arterial	●	●	●	●	●	19:28	25-45	3
3 - Robinson/South Meadow	Arterial	●	●	●	●	●	20:33	25-45	2
4 - Robinson/South Belmont	Arterial	●	●	●	●	●	20:21	25-45	2
6 - Broad Street	Core Arterial	●	●	●	●	●	20:58	17-24	8
10 - Riverview	Community Radial	●	●	●	●	●	19:58	25-45	2
16 - Grove	Community Radial	●					9:49	N/A	6
41 - Church Hill Oakwood Rd	Community Radial	●	●	●	●	●	19:17	25-45	1
43 - Fairmount/Whitcomb	Community Radial	●	●	●	●	●	19:41	25-45	2
44 - Fairfield/Fairmount	Community Radial	●	●	●	●	●	19:20	25-45	2
45 - Jefferson	Community Radial	●	●	●	●	●	20:00	25-45	2
51 - Briel/Church Hill	Community Radial	●	●	●	●		13:03	< 60	2
52 - East Main/Montrose	Community Radial	●	●	●	●	●	18:35	25-45	1
53 - Darbytown/East Main	Community Radial	●	●	●	●	●	18:33	25-45	2

GREEN									11 ROUTES
		Service Days/Times						Mon.-Fri.	Peak
		Mon.-Fri.					Mon.-Fri.	Midday	Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Freq. (Mins.)	
60 - Chippenham Mall/Hull St.	Core Arterial	●	●	●	●	●	20:15	25-45	6
61 - Crutchfield/Midlothian	Arterial	●	●	●	●	●	19:01	25-45	4
63 - Chippenham Sq./Midlothian	Arterial	●	●	●		●	18:53	45-60	2
68 - Broad Rock/Walmsley Blvd.	Arterial	●	●			●	18:52	45-60	3
70 - Forest Hill/Stony Point	Arterial	●	●	●	●	●	18:00	25-45	3
71 - Forest Hill/Spring Rock	Arterial	●	●	●	●	●	16:19	25-45	2
72 - Ruffin Road	Community Radial	●				●	13:07	N/A	1
73 - Ampthill	Arterial	●	●	●	●	●	20:03	25-45	6
74 - Oak Grove	Community Radial	●	●	●	●	●	20:10	25-45	4
101 - Soutshide Plaza/Belt Blvd.	Circulator/Feeder	○	●	●			11:15	45-60	1

BLACK									5 ROUTES
		Service Days/Times						Mon.-Fri.	Peak
		Mon.-Fri.					Mon.-Fri.	Midday	Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Freq. (Mins.)	
21 - Brook	Community Radial	●		●	●		13:26	N/A	2
24 - Crestwood/Westbrook	Arterial	●	●	●	●	●	18:30	45-60	2
32 - Ginter Park	Arterial	●	●	●	●	●	19:58	17-24	9
34 - Highland Park	Arterial	●	●	●	●	●	19:45	17-24	3
37 - Chamberlayne	Core Arterial	●	●	●	●	●	22:06	17-24	5

ORANGE									2 ROUTES
		Service Days/Times						Mon.-Fri.	Peak
		Mon.-Fri.					Mon.-Fri.	Midday	Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Freq. (Mins.)	
18 - Henrico Government Center	Circulator/Feeder	●	●				12:19	45-60	1
19 - Pemberton	Arterial	●					10:30	N/A	4

PURPLE									4 ROUTES
		Service Days/Times						Mon.-Fri.	Peak
		Mon.-Fri.					Mon.-Fri.	Midday	Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Freq. (Mins.)	
7 - Seven Pines	Core Arterial	●					14:35	45-60	4
56 - South Laburnam	Arterial	●					4:00	N/A	1
91 - Laburnam Connector	Circulator/Feeder	●					11:55	45-60	2
93 - Azalea Connector	Circulator/Feeder	●					12:46	< 60	2

EXPRESS									9 Routes
		Service Days/Times							Peak
		Mon.-Fri.					Mon.-Fri.		Vehicles
Route	Category	Peak	Midday	Sat.	Sun.	Late PM	Span (Hrs.)	Trips	
23x - Glenside/Parham	Seasonal	○					0:57	2	1
26x - Parham	Express	●					3:41	14	3
27x - Glenside	Express	●					3:21	16	3
28x - White Oak Village	Express	●					3:20	4	1
29x - Gaskins	Express	●					5:01	18	5
64x - Stony Point	Express	●					5:25	21	4
82x - Commonwealth 20	Express	●					3:20	6	1
95x - Richmond/Petersburg	Express	●					4:11	8	2
102 - Kings Dominion	Seasonal	●		●	●	●	13:40	18	1

GRTC identifies six service category types, reflecting different tiers of service frequency and route design characteristics, namely:

- **Core Arterial** – Highest capacity and frequency service on most developed and transit conducive corridors, with highest speed and greatest span of services.
- **Arterial** – Key component of the network, following established street corridors with extensive service coverage and higher operating speeds.
- **Community Radial** – Providing service connection and circulation to specific community areas, often with all-day service.
- **Circulator/Feeder/Connector** – Targeting a network connection or local circulation need with various sized vehicles often in less transit conducive areas during limited service hours.
- **Express** - Freeway or key corridor based commute operating only at peak travel periods.
- **Special/Seasonal** – Routes in this category operate for a unique purpose, such as seasonal service.

GRTC used to provide a shuttle category of service. This was reserved for routes provide via contractual arrangement on behalf of Virginia Commonwealth University (VCU). A total of six of these routes were reduced to three in the fall of 2011. Of the remaining routes, Route 84 (VCU Campus Connector) was a top performing route for GRTC from FY 2010- 2012. VCU contracted with Groome Transportation to take over the service from GRTC under a five-year contract which took effect July 1 2012. The VCU shuttle service, called "RamRide", now carries about 1 million students, faculty and staff annually on three routes that connect the Medical Campus (MCV) and Monroe Park campuses and pick up from two parking lots. In addition to GRTC's loss of providing shuttle service, at the start of the Fall 2013 semester VCU stopped providing free bus passes to full-time students for use on all GRTC local routes. Instead, VCU now provides a subsidized GRTC bus pass at reduced student rates ($100 a semester for full time students, and $50 a semester for part time students).

An example of a more recent service change was initiated in March 2016 when the Chesterfield County Board of Supervisors voted to end the 81x service. The Route 82x remained the only route supported by the county that connects Chesterfield and Richmond at that time. Table 1-1 summarizes all major (changed routes or days) service changes that have occurred since the last TDP.

Table 1-1 2012-2016 Major Service Changes

Service Introduced		Service Removed	
Route	**Date**	**Route**	**Date**
45 – Jefferson *(split from Route 10)*	2012	84-86-87 – VCU Shuttle Service	July 2012
41-51 – Church Hill *(split from Route 1/2)*	April 2014	Mechanicsville Express	July 2013
43-44 – Fairmount *(split from Route 3/4)*	April 2014	11 – Oliver Hill/17th St. (*Saturday Service)*	August 2014
52-53 – East Main *(split from Route 6)*	April 2014	22 – Hermitage	August 2014
60-62-68 – Hill Street/Broad Rock *(rebranded)*	January 2015	67 – Chippenham	August 2014
61-63 Midlothian *(rebranded)*	January 2015	81x – Chesterfield Express	July 2016
102x – Kings Dominion *(re-introduced seasonal)*	May – Oct 2015	66x – Spring Rock Green	August 2016
60 – Hull Street *(Sunday Service)*	October 2015	62- Hull Street/Southwood *(routes became part of route 60)*	August 2016
71 Forest Hill *(Sunday Service)*	January 2016		

1.5.1.2 Bus Network after June 24, 2018

In March 2017, the City of Richmond and GRTC completed the Richmond Transit Network Plan (RTNP) which resulted in a recommendation to adjust all City of Richmond routes and service. This new network plan was developed in part because the impending construction of the Pulse BRT made it clear that a redesign of the rest of the network would reinforce the value of the new spine BRT service and because the existing GRTC network had not been thoroughly rethought in decades.

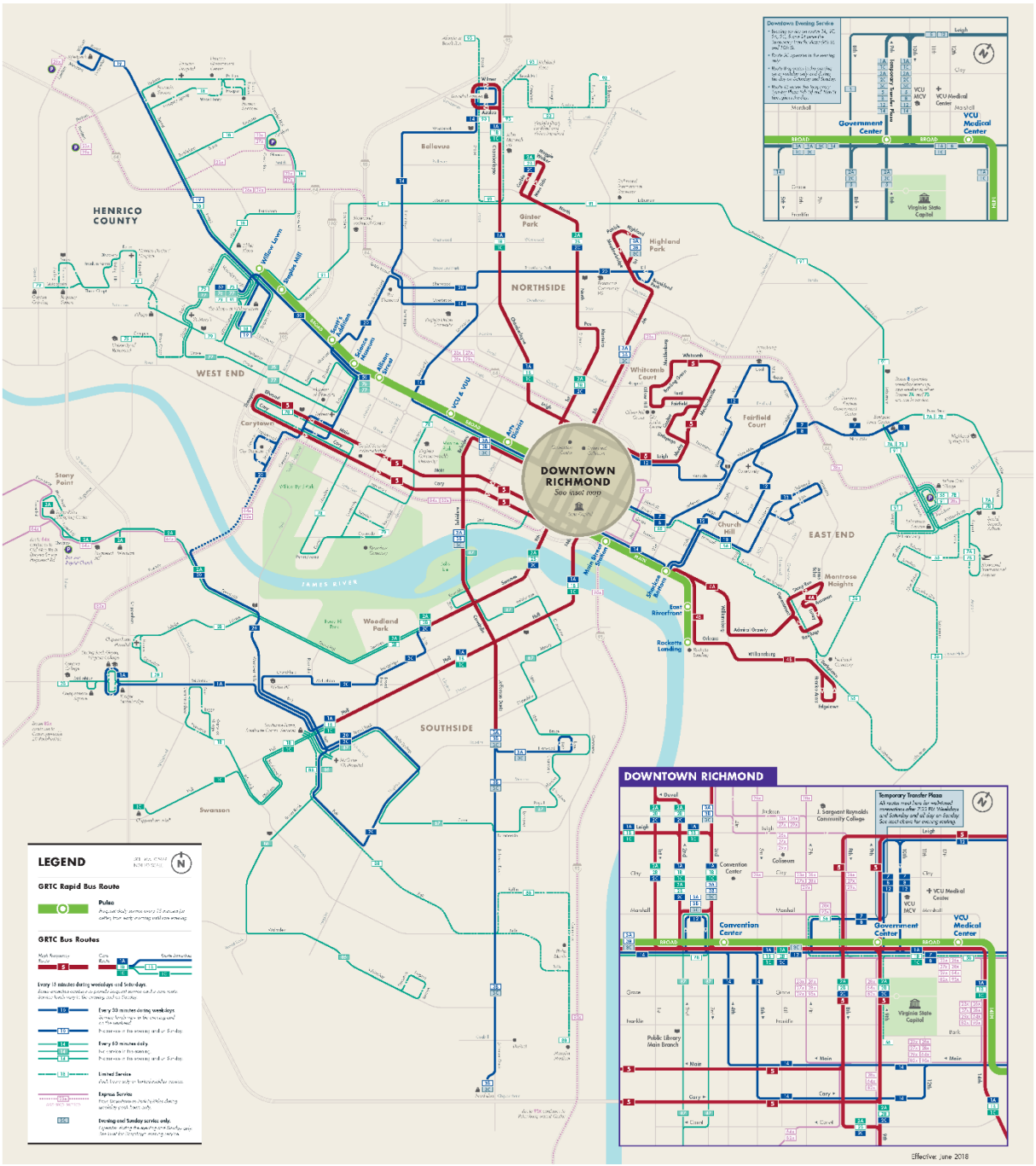
The RTNP used an approach to assess how much service was focused on places where high ridership relative to cost is a likely outcome (called Ridership service) compared to service provided for reasons other than maximizing ridership, such as providing lifeline transit service in low density areas (called Coverage service).

The analysis in the RTNP indicated that the existing system in the city focused 50 percent of resources toward high ridership service and 50 percent toward coverage-oriented service. The planning process for the RTNP included dozens of public meetings to consider the trade-offs of changing this balance and the trade-offs in changing other elements of the existing system, such as the balance between peak period service versus all-day and weekend service.

The outcome of the RTNP process led to a recommendation to shift that balance to 70 percent Ridership and 30 percent Coverage. As a result, many recognizable elements of the historic network will soon be replaced with new routings, maps, and schedules in the near-term years considered by this TDP study. Figure 1-5 shows the new route network beginning June 24, 2018. The lime green line is the Pulse BRT, which will operate every 10 minutes in the peak and every 15 minutes off peak. Red lines indicate the other frequent routes, which will operate every 15 minutes from 5 am to 7 pm and every 30 minutes thereafter. Blue lines will operate every 30 minutes and light green lines will operate every hour.

Many elements similar to the existing network are still visible, such as the highly radial nature of the network, with most routes coming downtown. But a number of changes have shifted the network toward a spiderweb (or polar) grid pattern. The addition of Route 20, the orbital route, provides a direct connection from the northside, to the west end and to southside without going downtown is one key change that provides easier connections and reorients the system toward the new design.

Figure 8 New GRTC Network, Effective June 24, 2018



More information on this planning process and the choices that led to this change, see the project website at http://www.richmondtransitnetwork.com/.

Table 1-2 on the following page shows each route, its primary frequency during the day and the span of service for the new routes.

Table 1-2 June 24, 2018 GRTC Transit Network

Route Number	Route Name	Day Frequencies	Span
PULSE	Pulse	10/15	Weekday: 5:30 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
1A	Chamberlayne/Hull/Midlothian	30	Weekday: 5:00 am - 1:00 am / Saturday: 6:00am - 12:00 am Sunday: 6:00 am - 12:00 am
1B	Chamberlayne/Hull/Warwick	60	Weekday: 5:00 am - 7:00 pm Saturday: 6:00 am - 7:00 pm
1C	Chamberlayne /Hull/Elkhardt	60	Weekday: 6:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
2A	North Ave/Forest Hill	60	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
2B	North Ave/Jahnke/Midlothian	60	Weekday: 5:00 am - 7:00 pm Saturday: 7:00 am - 8:00 pm
2C	North Ave/Midlothian/Belt Blvd	30	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
3A	Highland/Jeff Davis/Harwood	30	Weekday: 5:00 am - 7:00 pm Saturday: 6:00 am - 7:00 pm
3B	Highland/Jeff Davis	30	Weekday: 5:00 am - 7:00 pm Saturday: 6:00 am - 7:00 pm
3C	Highland/Harwood/Jeff Davis	30	Weekday: 7:00 pm - 1:00 am / Saturday: 7:00 pm - 12:00 am Sunday: 6:00 am - 12:00 am
4A	Montrose	15	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
4B	Darbytown	15	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
5	Cary/Main/Whitcomb	15	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
7A	Nine Mile Henrico	30	Weekday: 6:00 am - 7:00 pm
7B	Nine Mile Henrico	30	Weekday: 6:00 am - 7:00 pm
8	Nine Mile Richmond	30	Weekday: 7:00 pm - 10:00 pm / Saturday: 6:00 am - 7:00 pm Sunday: 6:00 am - 7:00 pm
12	Church Hill	30	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
13	Oakwood	30	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
14	Hermitage/East Main	30	Weekday: 5:00 am - 1:00 am / Saturday: 6:00 am - 12:00 am Sunday: 6:00 am - 12:00 am
18	Henrico Government Center	60	Weekday: 7:00 am - 7:00 pm

Route Number	Route Name	Day Frequencies	Span
19	Pemberton	30	Weekday: 7:00 am - 7:00 pm
20	Orbital	30	Weekday: 5:00 am - 10:00 pm / Saturday: 6:00 am - 10:00 pm Sunday: 6:00 am - 10:00 pm
50	Broad Street	30	Weekday: 5:00 am - 11:00 pm / Saturday: 6:00 am - 11:00 pm Sunday: 6:00 am - 11:00 pm
56	South Laburnum	60	Weekday: 6:00 am - 6:00 pm (limited service)
75	Three Chopt	60	Weekday: 6:00 am - 6:00 pm (peak only)
76	Patterson	60	Weekday: 5:00 am - 7:00 pm / Saturday: 7:00 am - 7:00 pm Sunday: 7:00 am - 7:00 pm
77	Grove	60	Weekday: 5:00 am - 7:00 pm / Saturday: 7:00 am - 7:00 pm Sunday: 7:00 am - 7:00 pm
78	Cary/Maymont	60	Weekday: 5:00 am - 7:00 pm / Saturday: 7:00 am - 7:00 pm Sunday: 7:00 am - 7:00 pm
79	Patterson/Parham	60	Weekday: 6:00 am - 7:00 pm
86	Broad Rock/Walmsley	60	Weekday: 5:00 am - 7:00 pm / Saturday: 7:00 am - 6:00 pm Sunday: 7:00 am - 6:00 pm
87	Bellemeade/Hopkins	60	Weekday: 5:00 am - 7:00 pm / Saturday: 7:00 am - 7:00 pm Sunday: 7:00 am - 7:00 pm
88	Belt/Bells/Ruffin	30	Weekday: 6:00 am - 7:00 pm (peak only) Saturday: 6:00 am - 7:00 pm (peak only)
91	Laburnum Connector	60	Weekday: 7:00 am - 6:00 pm
93	Azalea Connector	60	Weekday: 7:00 am - 6:00 pm (peak only)
23	Glenside/Parham Express	Varies	Weekday: Peak Only
26	Parham Express	Varies	Weekday: Peak Only
27	Glenside Express	Varies	Weekday: Peak Only
28	White Oak Village Express	Varies	Weekday: Peak Only
29	Gaskins Express	Varies	Weekday: Peak Only
64	Stony Point Express	Varies	Weekday: Peak Only
95	Petersburg	Varies	Weekday: Peak Only
82	Commonwealth 20	Varies	Weekday: Peak Only
102	Kings Dominion	Varies	Seasonal Summer

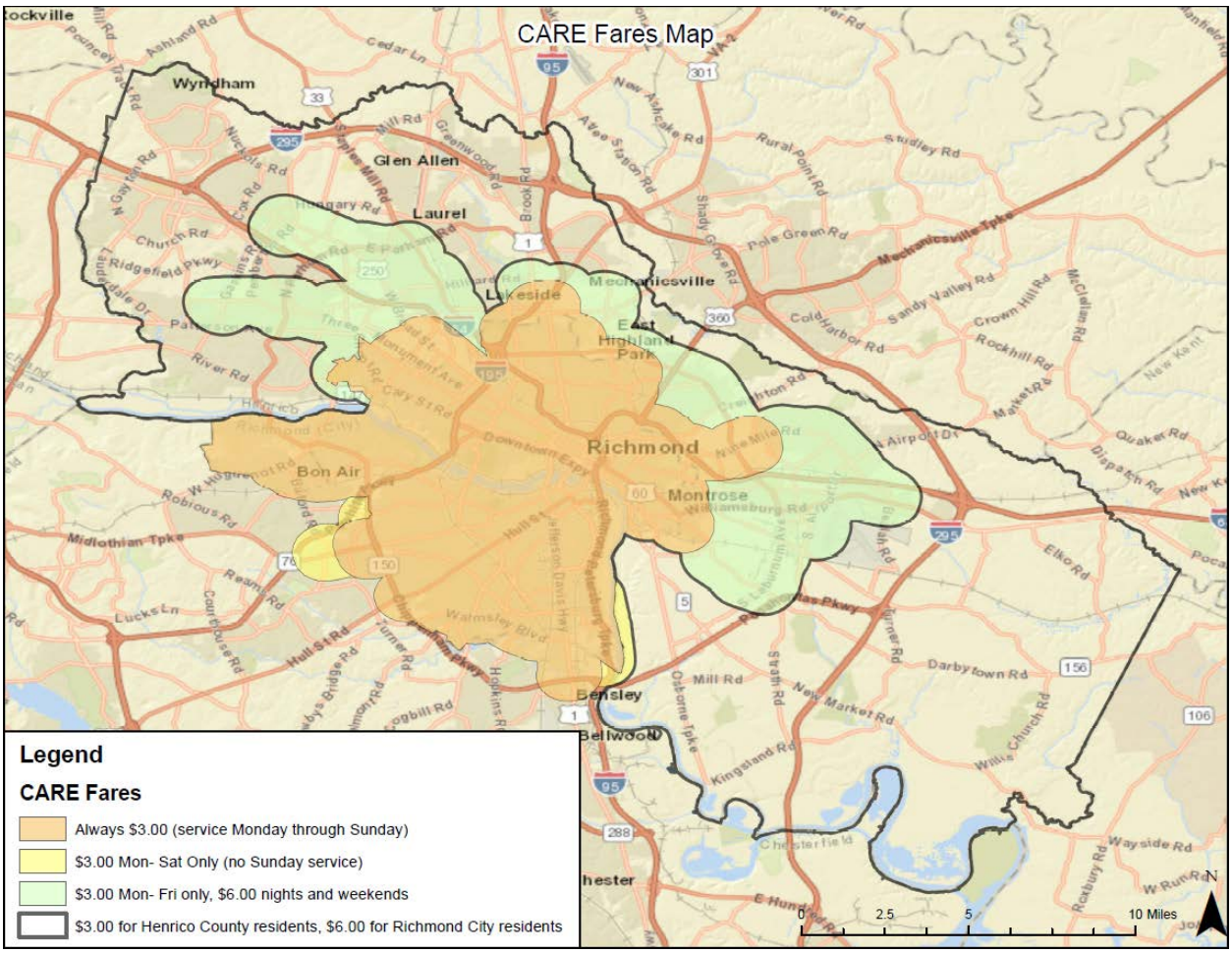
1.5.2 *Other Transportation Services*

GRTC CARE and CARE Plus Service represent specialized transportation services in compliance with the Americans with Disabilities Act (ADA). The service represents demand-response curb-to-curb service provided to members of the public who could not otherwise travel using fixed route services. Customers using these services must be pre-registered and book trips in advance. The distinction between the two levels of service as introduced in July 2014 is as follows:

- CARE trips are required by the Americans with Disabilities Act (ADA). This service operates within GRTC's fixed route coverage area and extends 3/4 of a mile beyond GRTC's fixed route bus lines. Service hours are generally from 5:00am – 1:00am for City of Richmond residents and from 6:00am – 11:00pm for Henrico County residents. The exact timing and locations vary based upon the fixed route service operating at the desired time of travel.
- CARE Plus service is not required by the Americans with Disabilities Act (ADA). A trip will be designated as a CARE Plus trip if the origin or destination location is more than 3/4 of a mile from GRTC's fixed route bus line, or if travel is desired to a destination in Henrico County on a day or time when GRTC's fixed route buses are not running in Henrico County. Service hours are generally from 6:00am – 8:00pm for City of Richmond residents and from 6:00am – 11:00pm for Henrico County residents.

CARE ridership by jurisdiction showed it equally divided between Richmond and Henrico County. A 2014 survey indicated that approximately 49 percent of CARE users also ride fixed route service. Clients who are certified with CARE have the option of riding fixed route service for free.

Figure 9 Map of CARE Fare Zones



Beginning in August 2017, GRTC began a partnership with outside vendors to provide an optional service for CARE riders to book same-day, non-stop, direct trips with another operator. The service began with one vendor, UZURV, but recently added another, Roundtrip. The CARE On-Demand service, as it is branded, is an optional service. Customers pay the $6.00 fare upfront, GRTC pays up to $15.00 more and the customer is responsible for any additional cost. The service has many benefits for customers including same-day reservations, the option to ride solo, requesting a specific driver, and other ride options.

C-VAN, a division of GRTC, provides door-to-door transportation service that connects Virginia Initiative for Employment Not Welfare (VIEW) participants to jobs and daycare facilities.

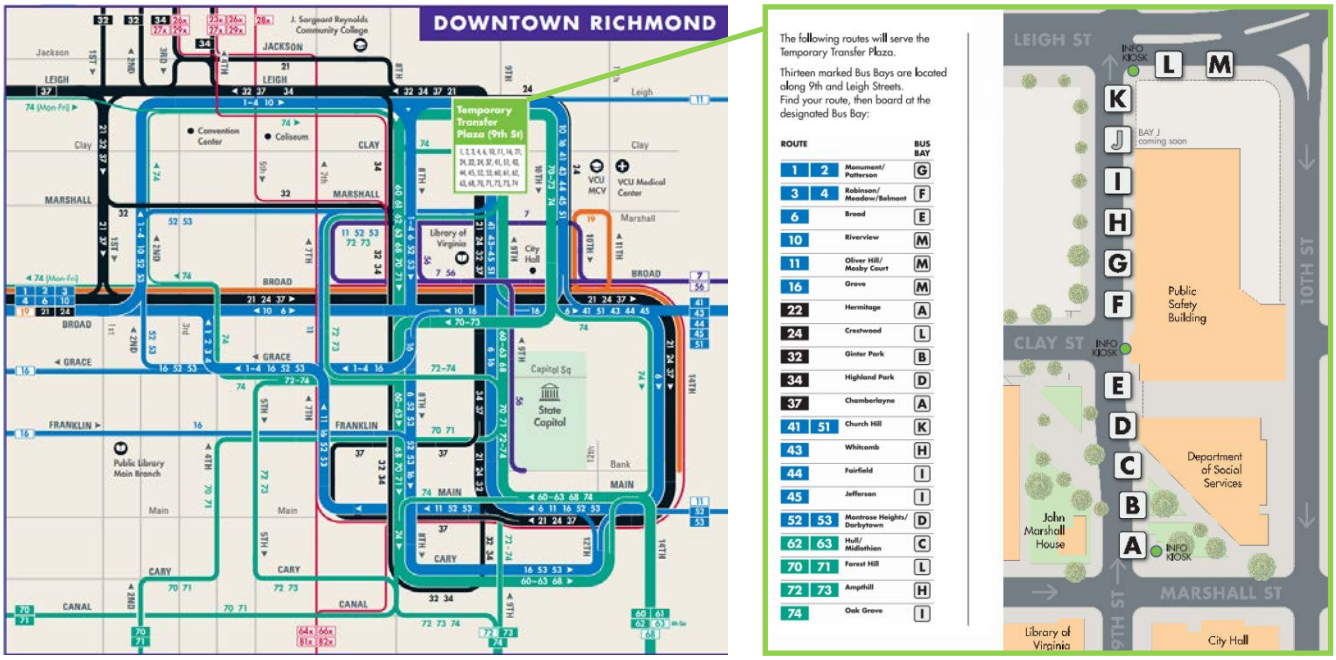
Vanpool service is coordinated by RideFinders through Vanpool formation services and collaborative recruitment efforts with 3 third-party vendors. RideFinders also services as the liaison between the vendors and GRTC for contractual arrangements and guidelines. GRTC subsidizes the cost of the Vanpools and RideFinders supports the Vanpools with VanSave and VanStart for those that meet the eligibility requirements. Each vendor provides GRTC with NTD data reports on a monthly basis. In December 2015, GRTC staff began working with Ridefinders to brand the Vanpool program to be implemented in early 2016. Individual Vanpools set their own routes and schedules, based on member needs.

Effective May 2017, GRTC will be transitioning contract responsibility for operating the CARE and C-VAN specialized transportation services. A new procurement cycle is anticipated to address customer experience issues related to vehicle availability and sufficient driver staffing levels.

1.5.3 *Temporary Transfer Plaza*

Because of the fixed route system design, the need for a downtown transfer plaza has been discussed by the GRTC staff and local officials since a comprehensive operational analysis was prepared in 2008. This need was reiterated in the 2011 TDP. In April 2014, a temporary transfer plaza was opened in downtown Richmond. The plaza includes 13 marked bus bays along 9th and Leigh Streets. The temporary transfer plaza was developed to serve the GRTC fixed route transit service for three years, while a more permanent solution is identified. The location and layout of this temporary plaza are illustrated in Figure 1-5.

Figure 10 GRTC Temporary Transfer Plaza Context



1.5.4 *Bus Stops and Shelters*

GRTC maintains a significant number of amenities at its stop locations. Recent estimates of GRTC amenities include 75 stops, 325 benches, and 275 trash cans.

GRTC is currently implementing a 5 Phase System-wide Sign Project. When complete the project will result in the upgrade of more than 2,000 bus stop signs. The new signs will be uniform and display more information about the stop, bus arrival times, and possible destination points. Three major areas for improvement focus on Basic Bus Stop Signs, Information Kiosks, and Schedule Information Solar Panels. The project seeks to make the GRTC bus system more user-friendly and the kiosks/solar panels enable the use of a smartphone application to access information. The entire project was completed in 2017.

GRTC's current process of bus shelter replacement is request based, which requires an individual to make a request to GRTC for the amenities to be reviewed and evaluated. If the identified stop meets the

frequency criteria for a shelter, then it is discussed with Henrico County or the City of Richmond. Once approved by the jurisdiction, the placement is released for public comment (if it is within the City of Richmond). If there are no justified concerns, then the shelter installation is arranged with a contractor. In the future, the process will include internal identification of shelter placement based on stop use frequency as well as external requests.

It should be noted GRTC is currently undergoing a bus stop consolidation study to suggest adjusting the bus stop spacing to eliminate stops too closely spaced in the corridor (defined as less than 1/3 of a mile).

City CMAQ funds for Transit Access and Sidewalk Improvements.

- FY19 ($100,000)
- FY20 ($266,280)
- FY22 ($593,720)

1.5.5 *Park and Ride Facilities*

GRTC currently has stops at 10 park-and-ride lots throughout the service area, but they do not own or lease any of these lots. The lots are either privately owned and shared, or publicly owned by VDOT or a municipality, as listed below in Table 1-3:

Table 1-3 Park and Ride Locations

Park & Ride Lot	Location	Spaces	GRTC Routes
White Oak Village	4551 S. Laburnum Avenue	Unknown	7, 28x, 56, 91
Glenside (VDOT)	Glenside and Staples Mill	444	18, 23x, 27x
Gaskins (VDOT)	Gaskins and Maryland	423	19, 23x, 29
Parham (VDOT)	Parham and Fordson	306	23x, 26x
Commonwealth 20 (VDOT)	Route 754 and Hull Street	250	82x
Bon Air Baptist Church	2531 Buford Rd.	Unknown	64x, 70
Spring Rock Green	Midlothian and Chippenham	Unknown	63, 71
Petersburg Transit Center	100 W Washington Street	Unknown	95x
Southside Plaza (VDOT)*	US 360 and Hull Street	70	62, 101
Closed K-Mart (VDOT)*	US 60 and Arcadia Street	122	63

* Not advertised via GRTC Park and Ride webpage

1.6 Fare Structure

Unlimited ride passes were introduced in November 2015. GRTC's previous payment system was based largely on cash and prepaid cards, and riders can continue to pay using those methods as detailed in Table 1-4.

Table 1-4 GRTC's Fare Structure

Cash Fare System (One-Way)		
Service	**Fare**	**Previous Fare (Date Changed)**
E-Pass/U-Pass	N/A	
Base Fare (Local Routes)	$1.50	$1.25 (2010)
Base Transfer	$0.25	$0.15 (2010)
Express Fare (Route 19)	$2.00	$1.75 (2010)
Extended Express (Petersburg)	$3.50	$5.00 (2012)
Extended Express (Chesterfield)	$6.00	$3.50/$4.00 (2014)
King's Dominion Pass (Public / Employee)	$5.00 / $3.00	
Reduced Fare (Seniors/Disabled/Medicare/Minor)	$0.75	
Fixed Route CARE Customer Fare	Free	$0.75
CARE	$3.00	$2.50 (2014)
CARE Plus (Richmond residents)	$6.00	
Pass Program		
Service	**Fare**	
One Ride (Local)	$1.50	
One Ride Plus Pass (Local)	$1.75	
One Day Unlimited Ride Pass (Local)	$3.50	
One Day Unlimited Ride Pass (Express)	$4.50	
One-Ride Pass - Chesterfield	$6.00	
One Day Unlimited Ride Pass (Extended Express)	$7.00	
Unlimited 7-Day Pass (Local)	$17.50	
Unlimited 7-Day Pass (Express)	$22.50	
Unlimited 7-Day Pass (Extended Express)	$35.00	
One-Ride Weekly Pass (Chesterfield)	$65.00	
Unlimited 30-Day Pass (Local)	$60.00	
Unlimited 30-Day Pass (Express)	$80.00	
Unlimited 30-Day Pass (Extended Express)	$130.00	
Special UCI Event 11-Day Pass (2015)	$35.00	

E-Pass/U-Pass is a program for tap-pass technology that is available to University of Richmond and Virginia Commonwealth University (VCU) students and eligible employees. As part of the improvements to fare technology, a new, secure online store opened for customers to purchase passes using their credit or debit cards. Passes are then mailed to the customer.

1.7 Fleet

GRTC's fixed route transit service is provided through the use of 145 revenue vehicles. The type and size of revenue vehicles varies, as does the age and mileage. Details for GRTC's fixed route fleet are displayed in Table 1-5 and details for GRTC's specialized fleet and support vehicles in Table 1-6.

The oldest buses in the GRTC fixed route fleet are 15-year-old Gillig Phantoms and Gillig Low Floors. There are 25 of these vehicles still in service with an average of nearly 500,000 miles. These vehicles are all due for replacement in spring 2018 with the fulfillment of an order for 26 new low-floor CNG buses. Additionally, 10 BRT Plus CNG vehicles were delivered in spring 2017 for implementing the Pulse BRT service. In total, 25 fixed route vehicles exceed their lifecycle age (12 years) and 8 vehicles exceed lifecycle miles (500,000). For the paratransit fleet, 38 vehicles exceed their lifecycle age (5 years) and 51 vehicles exceed lifecycle miles (150,000). A total of 23 new paratransit vehicles are scheduled for delivery in 2018. Replacement of all non-CNG fixed route and paratransit vehicles is scheduled to be completed by FY2023.

Table 1-5 GRTC Fixed Route Fleet

Make/Model	Year	Type	Seats	Quantity	Average Miles
Gillig Low Floor	2003	40 ' Standard Bus	38	9	513,332
Gillig Phantom	2003	40 ' Standard Bus	43	16	472,840
MCI D4500	2007	45' Commuter Coach	57	3	296,783
Gillig Low Floor	2008	40 ' Standard Bus	38	18	359,070
Chevy C5500	2009	29' Low-Floor Mini Bus	24	6	151,330
Chevy C5500	2009	29' High-Floor Mini Bus	24	2	159,373
Gillig Low Floor	2010	40 ' Standard Bus	38	13	339,553
MCI D4500	2010	45' Commuter Coach	57	5	226,657
Gillig Low Floor	2012	40 ' Standard Bus	38	8	217,223
El Dorado Passport	2012	29' Low-Floor Mini Bus	24	6	90,054
Gillig Low Floor	2013	40 ' Standard Bus (CNG)	38	8	189,105
Gillig Low Floor	2014	40 ' Standard Bus (CNG)	38	21	181,688
Gillig Low Floor	2014	40 ' Standard Bus (CNG)	38	8	181,390
Gillig Low Floor	2014	35' Standard Bus (CNG)	32	5	140,652
Gillig BRT Plus	2016	40' BRT Bus (CNG)	38	1	4,361*
Gillig BRT Plus	2016	40' BRT Bus (CNG)	38	9	3,275*
Gillig Low Floor	2017	40 ' Standard Bus (CNG)	38	3	2,970*
Gillig Low Floor	2017	40 ' Standard Bus (CNG)	38	10	45,507
Gillig Low Floor	2017	35' Low-Floor Bus	32	4	32,889
Gillig Low Floor	2017	29' Low-Floor Mini Bus	23	4	37,019
Gillig Low Floor	2018	40 ' Standard Bus (CNG)	38	17	0
Gillig Low Floor	2018	29' Low-Floor Mini Bus	23	6	0

**Bus(es) not in service yet*

Table 1-6 GRTC Specialized Fleet

Make/Model	Year	Type	Seats	Quantity	Average Miles
Ford E-350 StarTrans	2009	Cutaway Van	12	8	361,444
Chevy Supreme	2012	Cutaway Van	12	5	236,129
Ford E-450 StarTrans	2012	Cutaway Van (CNG)	20	15	211,795
Ford E-450 StarTrans	2013	Cutaway Van (CNG)	20	15	180,488
Ford E-450 StarTrans	2016	Cutaway Van (CNG)	20	12	78,097
Ford E-450 Star Craft	2017	Cutaway Van (CNG)	20	23	30,059
Taurus SEL AWD	2018	Cutaway Van (CNG)	20	8	508
Ford E-450 Star Craft	2018	Cutaway Van (CNG)	20	23	0

*Does not include support vehicles

1.8 Existing Facilities

GRTC has been especially innovative in the design and capabilities of its facilities, and has been recognized as embracing green technology into new facilities.

1.8.1 *Headquarters, Maintenance and Operations*

GRTC is headquartered at 301 East Belt Boulevard in Richmond. The 12-acre site accommodates outdoor bus storage, a three-story 26,600 square foot administration building, and an adjacent two-story 100,600 square foot maintenance building. The maintenance building includes fueling lanes, automatic bus washers, maintenance bays, and a body shop. The facility has a state of the art data center to transfer and receive data from the GRTC fleet. The facility is the first public building in Richmond to achieve LEED Silver Certification.

On May 22, 2015, GRTC issued a Request for Proposals (RFP) to sell the former administrative building and bus depot property at 101 S. Davis Ave in Richmond's Fan District. The site is considered a contributing element of the Fan Area District Extension and was determined eligible for the National Register of Historic Places. The property was purchased in November 2015 by a partnership between Tom Dickey and Chris Johnson of Monument Companies and Howard Kellman of the Edison Companies Monument Construction, an arm of Monuments Companies, and is currently being redeveloped as apartment units and commercial space.

1.8.2 *Special Transit Vehicle Parking*

In summer of 2012 GRTC acquired the 2.5 acre "Driscoll Parcel" by FTA approval of an Administrative Settlement. GRTC developed the engineering plans, contracted for construction, and accepted completion of a parking lot on October 1, 2015. While designed specifically for parking of GRTC's Specialized Transit fleet, the property also features a bio-retention pond meeting the Chesapeake Bay Preservation Act requirements, sub-grade storm-water management, drainage, grading, asphalt paving and street access linkages, lighting, signage, security fencing and access control, parking for 75 special transit vehicles, and potential closed-circuit TV monitoring. In 2017, GRTC acquired the Antioch Church property for storage of buses and amenities. A conceptual site plan is underway for the 3.3 acre site, expected to accommodate a 21,000 square foot building and up to 91 vehicle parking spaces.

1.8.3 *CNG Fueling Station*

GRTC is converting its fixed route fleet of buses from diesel to Compressed Natural Gas (CNG). Currently GRTC has 43 fixed route and 42 Specialized Transportation CNG vehicles in its fleet. Upon receipt of additional CNG buses in 2017, the number of CNG vehicles will increase to 125, or 54% of GRTC's entire revenue fleet. In concert with the ordering of CNG buses to replace current diesel buses that have reached the end of their useful life, GRTC partnered with the City of Richmond to retrofit the maintenance and operations facilities to allow on-site maintenance and fueling of the CNG vehicles. The $4.7 million fueling station allows two vehicles to be fueled simultaneously.

1.9 Transit Security Program

GRTC prepared a system security plan in 2013, with modification made in 2016. The plan outlines processes that allow informed decisions appropriate for the operations, passengers, employees and communities regarding the development and implementation of a comprehensive security and emergency preparedness program. Key elements of the Safety Security Program Plan include:

1. An evaluation of current capabilities to identify and prevent security incidents that may occur.
2. Development of a Vulnerability Assessment Program to identify weaknesses and guide planning activities.
3. Improved Physical Security.
4. Review and expansion of training programs for security and emergency response.
5. Enhanced emergency planning and procedures development.

Existing methods, procedures, and actions to prevent, or minimize security incidents include:

- Controlled access gates at property entrance with video surveillance to help to discourage violators. Electronic equipment admits visitors onto the property.
- All visitors are required to register at the switchboard and given a GRTC Visitor Pass. The employee they are visiting is required to accompany the visitor while in the building.
- Only authorized personnel can access the finance department where the money room is located.
- Administrative Staff is familiar with the Emergency Response Plan and responsibilities in the event of an incident.
- Video and audio surveillance equipment exists throughout the property in an effort to discourage criminal activity.
- Camera surveillance exists on all revenue vehicles that will discourage and assist in solving criminal activity.
- Bus operators do not give change or handle any company money.
- Training operators to secure buses when leaving for any reason protects equipment and passengers.
- Local police respond to all unruly passenger calls placed by bus operators to the GRTC radio dispatcher. Bus operators do not handle these situations themselves.
- Global positioning satellites systems (GPS) monitor all buses at all times, on the street supervision assist when available.
- System Security information is circulated to all employees.
- Local police administer bomb threat training to bus operators in revenue service.

- Emergency managers administer suspicious packages and mail handling training to employees.

GRTC recently upgraded the Security Access Control System for its headquarters. The 2nd and 3rd floor elevators were upgraded to include access control systems that limit access to these floors. Additional access controls were added to the Information Systems and Finance Departments to restrict unauthorized personnel from entering these sensitive areas of the organization. Additionally, card readers and cameras were added to the back annex lot in 2017, and cameras will be installed in the administrative building parking lot in 2018.

1.10 Intelligent Transportation System (ITS) Program

GRTC implemented a Computer Aided Dispatch/Automatic Vehicle Locator (CAD/AVL) technology system in 2007. The CAD/AVL system connects the buses to a back office scheduling and dispatch software (HASTUS) and automatically collects data used by dispatchers such as GPS locations, and schedule adherence. Additionally, on-board cameras were installed on all fixed route and specialized transit vehicles.

In 2016, GRTC began reporting Automatic Passenger Counter (APC) ridership numbers for fixed route bus service. In previous reporting, GRTC utilized GFI data (farebox). This is an important step as fare revenues from registering fare boxes have become less correlated with boardings across individual one way vehicle trips over time as GRTC has introduced the use of unlimited fare passes.

GRTC launched its first mobile apps for iPhone and Android in 2013. The mobile app provides real time bus tracker information, locates nearby bus stops, stores favorite stops and routes, and service updates. This allows customers to have direct communication with GRTC.

1.11 Data Collection, Ridership and Reporting Methodology

1.11.1 *Ridership*

Ridership data is collected on GRTC's fixed route buses. It is primarily collected using Clever Devices Automatic Person Counters (APCs), and the farebox is used as a secondary source. The APC's collect the stop level, boarding, and alighting data, which are collected on both the front and back doors. The APC data is uploaded at the end of every trip, and is stored in an in-house server. GRTC has developed a reporting dashboard with important metrics to analyze performance.

GRTC was approved by the FTA in 2013 for NTD reporting by APCs. Ride check sampling is conducted for NTD reporting purposes. A minimum of 250 one-way checks are required for GRTC's size, and GRTC completed 422 samples in 2016. GRTC has the ability to back-fill any routes at the end of the fiscal year if the data shows there was an invalid sample for a particular route during a specific schedule type, using valid APC data. The APC equipment is regularly tested by the electronics department, and the planning department also monitors any discards in data to determine if the vehicle has any potential hardware issues.

Ridership for CARE services is tracked using RouteMatch. A productivity report is created monthly and provided to management for tracking ridership performance.

1.11.2 *Operations*

Currently, revenue miles data for fixed route buses is primarily based on the scheduled miles obtained from HASTUS scheduling software. Daily adjustments are made in an Access database by the dispatcher based on route deviations from the schedule. The CAD/AVL system is used as a secondary source for

comparison. Planning and scheduling continues to extensively use run-time, boarding and alighting data collected by the AVL/APC system to develop better route schedules. Operations staff continues to use the AVL system to locate buses, identify and correct bus bunching, determine detours, and improve schedule adherence. Planning staff review the database for AVL/APC data weekly.

The specialized transit vehicles rely primarily on tablets that are deployed in these vehicles.

1.12 Coordination with Other Transportation Service Providers

1.12.1 *University Partnerships*

In an effort to promote more affordable, convenient and sustainable commuting options, Virginia Commonwealth University (VCU) has partnered with GRTC to offer a subsidized transit pass program. All VCU faculty, staff and students are able to purchase a GRTC transit pass, which allows for unlimited rides on GRTC's local bus service operations. Full time students pay $100 per semester, and part time students pay $50 per semester. Full-time employees pay $500 a year, which can be paid via pre-tax payroll deductions. Hourly employees pay $300 a year.

Faculty, staff and full-time students at the University of Richmond are eligible to receive a free GRTC bus pass, which covers free bus ridership to and from campus. The University also operates The Daily Connector, a free hourly shuttle which travels between the UR campus, Willow Lawn, Target and the Carytown Walgreen parking lot.

1.12.2 *Petersburg Area Transit*

Express service was initiated to Petersburg in 2003, providing connections to all destinations served by Petersburg Area Transit (PAT). Historically, the city of Petersburg has provided a subsidy to GRTC for this route, the 95x, which connects with their system at the downtown Petersburg Multimodal Passenger Station.

1.12.3 *Access Chesterfield*

Access Chesterfield, Chesterfield County's Coordinated Transportation Program, provides transportation services for any Chesterfield County resident who is disabled, aged 60 or older, or who meets federal income guidelines. This curb-to-curb service started in June, 2014.

The following local connections are available via Access Chesterfield service:

- Route 60 at Walmsley Boulevard or Hull Street Road at Chippenham Mall
- Route 63 at Chippenham Square/Spring Rock Green or Kroger (Monday - Saturday)
- Route 68 at Banton & DuPont (Monday-Friday)
- Route 71 at Kroger or Spring Rock Green
- Route 72 at Commerce Road (Monday - Friday)
- Route 73 at Chippenham and Jefferson Davis Highway

The following express bus connections are available, on weekdays during limited hours:

- Route 82x at Commonwealth 20 Park 'N Ride
- Route 95x at Petersburg Transit Center Park 'N Ride

1.12.4 *Taxi Voucher Program*

Starting in fall 2016, GRTC began exploring a pilot program to use taxis or online ride-sharing companies like Uber and Lyft as options for CARE customers. This would be defined as a premium service and would allow the following:

- Riders also would not have to pre-schedule service, but could call on the day they want the service.
- Rides may be scheduled 24 hours a day, seven days a week.
- The driver would take passengers to their requested destination without any other stops.

The service, branded as CARE On Demand would feature a set price per trip. The City of Richmond adopted an ordinance approving this program on February 5, 2017. The pilot period initially extended to December 31, 2017 but has been popular and the program continues into 2018.

1.13 Public Outreach

GRTC has in place a Public Comment Process to ensure that the public is participating in GRTC's service planning and development process. GRTC's Public Comment Process applies when:

- A fare change of any type is proposed;
- A major service change of any type is proposed; and
- Major Planning Programs (capital projects) are proposed, to include public meetings and public comment periods.

For minor schedule and service changes not rising to the level of a major service change, GRTC will post service change notices online, and on appropriate buses and park-and-ride lots in advance of the change date.

In 2016, GRTC completed installation of its largest bus advertising campaign in company history. The educational campaign called "Did You Know?" highlighted nine key facts about GRTC riders and transit's positive impacts on the communities served by GRTC. GRTC developed the key messages using research and data collected by a local marketing research company.

In order to smoothly transition from the Go Card and cash-based fare system, GRTC organized the new unlimited ride period passes by each jurisdiction's fare structure and make all of those choices easy to understand by the customer. Innovatively using a "destination-driven" marketing campaign, GRTC built video and photographic material to tell relatable and real stories of riders connecting to destinations, choosing the pass that's right for them. The videography enabled GRTC to create five new helpful "How To"-style customer videos to educate and inform riders about changes and new choices available. Real GRTC riders and GRTC employees, some of whom volunteered on their days off, participated in the videos. Additionally, GRTC's Marketing Department created five TV ads that ran for six weeks on local TV stations NBC12, CBS6 and WRIC8 from November 2015 into December 2015, before and after the launch date of the fare passes.

1.13.1 *Transit Network Plan*

GRTC's Marketing Department will oversee a complete marketing campaign for the forthcoming implementation of the Richmond Transit Network Plan. This plan will be branded as "Your New GRTC." The overall goal of this campaign will be to educate, inform and excite the community and customers about the new network, bus routes and policies.

This effort, to be supported by the City of Richmond through procured expertise, will develop all marketing materials between April 2017 and December 2017, including: TV and radio commercials; educational videos and PSAs; educational documents; still photography; bus advertisements (external and internal); magazine and newspaper announcements (both print and digital); social media graphics and content; bus shelter and kiosk notices; and public meeting materials. Other deliverables may be deemed appropriate and necessary during this collaboration.

Additional outreach will occur through further public meetings, travel buddies and outreach ambassadors. Public meetings are expected to occur throughout the City in 2018. Travel buddies will provide free turn-by-turn training on new travel patterns to riders. Outreach ambassadors will provide one-on-one engagement with riders and residents from June – November, potentially extending into December, to help riders learn about the new routes and adjust once they are operating. Finally, GRTC plans to temporarily extend its daily Customer Service call center hours to assist riders before, during and after the transition.

1.13.2 *BRT - Pulse*

GRTC is conducting ongoing, in person outreach along the entire Pulse corridor. These outreach activities complement ongoing meetings with specific property owners, neighborhood and business associations, as well as quarterly Public Meetings. A record is kept of every touch made, and feedback is documented after each outreach day. When a connection is made, the outreach specialist provides a folder with information about the current status of the project, FAQs, feedback forms and contact information. The specialist gathers the connection's contact information, logs the date of the visit, and any comments provided during the meeting.

CHAPTER 2: GOALS, OBJECTIVES, AND SERVICE DESIGN STANDARDS

Establishing agreed upon goals, objectives, and service design standards creates a framework for transit agencies to establish managerial direction and outline how to pursue and measure progress. GRTC goals and objectives have evolved over the years to reflect new initiatives and agency priorities that encompass much more than just the deployment of services. The goals and objectives reflect areas such as achieving organizational excellence, enhancing mobility choice, projecting a positive public image, providing responsible stewardship of resources, and integrating with regional plans and processes.

During the preparation of this TDP, the Greater RVA Transit Vision Plan and Richmond's MPO 'Plan 2040' were consulted to further ensure the strategic goals of the regional plans are incorporated in the TDP.

Overall, the TDP goals and objectives are in line with Richmond's regional plans, particularly in the areas of environmental efficiency, system reliability and operational efficiency, and safety and security. The comprehensive focus of the regional plans emphasizes a broader view that touches upon GRTC's overall mission and role in congestion mitigation, access to employment, and multimodal connectivity. While GRTC seeks to address these regional priorities through their operations, their goals and objectives naturally are more focused for decision-makers and partners to concentrate on internal operations and service efficiency.

While goals generally define a longer-term purpose toward which an endeavor is directed, objectives provide additional details, or targets for how the goal will be achieved and in what intermediate timeframe. The goals and objectives presented in this chapter represent an iterative process with GRTC staff in balancing operations objectives representing near-term, relatively low-cost operations strategies that provide immediate improvements to the transportation system and longer-term improvement objectives that may require time to fully achieve. Goals and objectives are revisited on an annual basis, and historically have a strong emphasis on the implementation and status of projects to advance outcomes.

2.1 Current Goals and Objectives

Through the annual TDP update process, GRTC has established eight current goals and associated objectives that reflect various projects and initiatives. During the current TDP study, additional collaboration occurred among GRTC staff on identifying specific and measurable performance targets that would result from pursuing the strategies represented by specific projects. The specific measures and targets have been applied to each objective to facilitate the tracking of progress.

2.1.1 *Goal 1 – Improve Employee Experience*

Objective 1.1: Provide opportunities for improving and maintaining health, to include health fairs, wellness programs, and walking programs.

MEASURE	TARGET	STRATEGY
Number of flu shots distributed at annual health fair.	3% increase from previous year.	Health Fair expansion beyond Temporary Transfer Plaza.
Employee participation in the walking program.	33% of all full and part-time employees by 2022.	Annual Monument Avenue 10K.

Objective 1.2: Provide opportunities for operator input on schedules, through a designated liaison between operators and the Planning and Scheduling Department.

MEASURE	TARGET	STRATEGY
Number of scheduling issues identified; number of times needed to revisit/adjust bookings due to schedule adherence.	Less than 20% of all trips per route incur missed /reduced layover time.	Provide liaison for operators to communicate with the Planning & Scheduling Department.

Objective 1.3: Position GRTC as an employer of choice that provides recognition, identifies non-traditional benefits, maintains competitive salary, and keeps employees better informed throughout the organization.

MEASURE	TARGET	STRATEGY
Number of volunteer/community service hours logged by employees and interns.	Achieve community service equivalent of 8 hours per year per full-time employee by 2024.	Volunteer program to reimburse employees for up to 4 hours of service. Summer program for high school interns.
Turnover and absenteeism rates.	Achieve rates less than the Virginia transit system average by 2020.	HR and Marketing outreach to employees on benefits in comparison to other transit companies. Review and adjust salary/pay bands.

2.1.2 *Goal 2 – Promote Safety First, Service Always*

Objective 2.1: Minimize all preventable vehicle accidents.

MEASURE	TARGET	STRATEGY
Preventable bus accident rate per month.	Less than 20 per month.	Continued monitoring/reporting by the Risk Management Department. Refresher-training as needed and identified.
Preventable bus accident rate per 100,000 miles.	Less than 5 per 100,000 miles.	Continue to recognize operators through the Safety Rewards Program. Conduct Quarterly Safety Meeting.
Preventable bus accidents		Pursue DRPT and other grant resources to implement advanced and connected vehicle technologies such as pedestrian detection systems and incorporate them into existing or new vehicles where possible.

Objective 2.2: Minimize injuries to employees and passengers.

MEASURE	TARGET	STRATEGY
Passenger and employee injury rates	Passengers - Less than 3 per 1 million trips. Employees - Less than 3 per 100 FTE per year.	Physical improvements, changes in workplace practice, awareness campaigns.

Objective 2.3: Improve security for customers and employees, through the creation of a consolidated System Security Program

MEASURE	TARGET	STRATEGY
Average number of monthly systemwide NTD Reportable Crimes.	NTD Part 1 (serious) crimes – Less than 0.40 per 100,000 riders. NTD Part 2 (petty) crimes – Less than 1.75 per 100,000 riders.	Update and maintain System Security Program.
Percent of vehicles and facilities under video surveillance.	100%	Ongoing facility improvements.

2.1.3 *Goal 3 – Improve Operational Efficiency*

Objective 3.1: Implement an internal performance monitoring program by route.

MEASURE	TARGET	STRATEGY
Route metrics compiled for passengers per hour, passengers per mile, net revenue per passenger, farebox recovery and passengers per trip.	Conduct service adjustments for routes 50% below route type average of metric over two consecutive bookings.	Monitor route performance by route and category of service type (i.e. core, arterial, etc.).

Objective 3.2: Review and assess system performance on a monthly basis, utilizing CAD/AVL to the greatest extent possible to assess schedule and time point adherence.

MEASURE	TARGET	STRATEGY
On-time arrival for all fixed route services.	Achieve and maintain monthly 80% on-time arrival	Utilize supervisors and CleverCAD to monitor schedules along with soliciting feedback from operators. Improve bus stop spacing.

Objective 3.3: Strategically adjust the size of the fleet to align with service demand.

MEASURE	TARGET	STRATEGY
Revenue vehicle spare ratio – calculated as maximum required vehicles to operate current/planned service divided by total revenue fleet.	Not to exceed 20% (annually)	Continue to implement the BusReplacement Program. Continue to add mini buses to the fleet.

Objective 3.4: Implement a more efficient route and schedule structure.

MEASURE	TARGET	STRATEGY
Operating expense per revenue mile.		Continue to explore clockface scheduling.

2.1.4 *Goal 4 – Improve Paratransit Operations*

Objective 4.1: Utilize technology to operate more efficiently.

MEASURE	TARGET	STRATEGY
Vehicle dwell time.	Reduce and maintain average dwell time for vehicles during the pick-up window.	Continued CleverCAD upgrades to improve efficiency in collecting data. Continued pursuit of a comprehensive, intraoperative and fully integrated "system of ITS technologies."
Productivity	Minimum of 2 passenger trips per revenue hour	

Objective 4.2: Utilize technology to enhance customer experience.

MEASURE	TARGET	STRATEGY
Vehicle dwell time.	Reduce and maintain average dwell time for vehicles during the pick-up window.	Information Systems to continue to refine the mobile app and address needed improvements.
Average hold time	2 minutes or less.	

Objective 4.3: Implement strategies to avoid capacity constraints.

MEASURE	TARGET	STRATEGY
Operator vacancies.		Hold regular meetings with contractor staff to review how runs are structured and to discuss problems that have been encountered with operator feedback to facilitate closer working relationship between scheduling and contract operations.

Objective 4.4: Explore opportunities to present fixed-route service as a viable mobility option through travel training and fare-free programs.

MEASURE	TARGET	STRATEGY
Client participation in travel training.	Increase by 10% by 2020.	Offer free local fixed route service to paratransit customers. Continued utilization of certified travel training instructor

2.1.5 *Goal 5 – Promote Environmental Efficiency*

Objective 5.1: Continue to pursue Green building and practices that reduce the consumption of non-renewable resources, and continues the transition of the revenue and support vehicle fleets to alternative-fuel sources.

MEASURE	TARGET	STRATEGY
Percent of revenue fleet that utilizes CNG.	75% by 2020.	Continue transitioning to an all CNG fleet. Continue to move the requisition process to a paperless system.

2.1.6 *Goal 6 – Improve Financial Efficiency*

Objective 6.1: Contain operating costs by reducing redundancy in facilities, reducing overtime labor, and exploring cost savings measures.

MEASURE	TARGET	STRATEGY
Systemwide cost per revenue mile.	Maximum cost per revenue mile not to exceed 3 percent growth per year.	Dispose excess property, expand bus storage capacity adjacent to the operations center, monitor staffing to control overtime expenditures.
Systemwide cost per revenue hour.	Maximum cost per revenue hour not to exceed 3 percent growth per year.	
Overtime percentage.	6% overtime goal.	

Objective 6.2: Explore and secure new revenue sources through research into and application for new grant funding opportunities and expansion of fare sales outlets.

MEASURE	TARGET	STRATEGY
Number of grant applications	Maintain or increase number of new grant applications on an annual basis.	Increased grant research. Conduct outreach to local retails and development of a potential vendor purchase incentive program.

Objective 6.3: Ensure contract compliance in administration and controls.

MEASURE	TARGET	STRATEGY
Findings from FTA Triennial Review	Zero findings in the area of contract compliance.	Ensure all invoices are correct and reviewed properly.

Objective 6.4: Benchmark GRTC's financial efficiency against peers.

MEASURE	TARGET	STRATEGY
Benchmark against Finance Department peer analysis.	Rank above median in all performance areas with respect to peers.	Track the following metrics: unlinked passenger trips per revenue mile, net operating loss per unlinked passenger trip and net operating loss per unlinked passenger trip.

2.1.7 *Goal 7 – Improve Public Image*

Objective 7.1: Increase awareness of GRTC's strengths and the quality of services provided through public outreach, promotions, branding, and strategic partnering.

MEASURE	TARGET	STRATEGY
Number of community/stakeholder outreach events per major service change.	Conduct a minimum of two public outreach events for community/stakeholder per month.	Continued video productions, marketing campaigns ("GRTC: Did you know?"), and support outreach to ease transition to new services such as Pulse and new Network Plan, route designations, timing, etc.
Number of social media endorsements.	Achieve quarterly increase in number of social media endorsements.	

Objective 7.1: Expand outreach to the Hispanic community.

MEASURE	TARGET	STRATEGY
Number of Spanish language format outreach events per year.	Conduct a minimum of six public outreach events for Hispanic population groups per year.	Continued partnership with the City of Richmond's Office of Multicultural Affairs (OMA). Update and expand Spanish-translated documents printed and online.

2.1.8 *Goal 8 – Improve Customer Satisfaction*

Objective 8.1: Provide more comfortable, more efficient, and safer operation to include a focus on security, cleanliness, efficient customer service and improved service frequency.

MEASURE	TARGET	STRATEGY
Number of customer complaints per 100,000 boardings by mode.	Less than 20 complaints.	Continued Quality Control Inspection Program for shop foremen to ensure that vehicle cleaning, fueling and repairs on each shift are completed in a timely fashion, correctly and to a high standard

Objective 8.2: Improve bus stop amenities through redesign of bus stop shelters.

MEASURE	TARGET	STRATEGY
Identification of non-motorized access deficiencies at all transit stops.	100% all hubs, Pulse stops and major bus stops (more than one route) are ADA compliant.	Continued to inventory and analyze each bus stop to identify any improvements that are needed in all jurisdictions.

Objective 8.3: Improve communication with customers via technology applications, website enhancements, social media presence and call center information dissemination.

MEASURE	TARGET	STRATEGY
Uptime of website, smartphone applications. Call center wait time.	99.9% website uptime. Call wait time – 30 seconds.	Monitor applications, refresh content of website daily, push out service alerts via the App, BusTracker and Twitter.

Objective 8.4: Diversify fare purchase and payment options.

MEASURE	TARGET	STRATEGY
Percentage of fare purchases not from the fare-box or point of sale location (i.e. online, other).		Implementation of a new Specialized Transportation fare collection system that moves from paper ticket system to a smartcard based system.

Objective 8.5: Explore customer rewards program.

MEASURE	TARGET	STRATEGY
Number of participating merchants.		"RIDE GRTC REWARDS" program

2.2 Summary of Changes from Prior TDPs

A historic review of GRTC's Goals and Objectives revealed that numerous changes occurred with the introduction of new executive leadership in 2015. This is an opportune time for new leadership to reassess organizational goals and priorities to inform employees where the direction and plans to achieve even greater success at the organization. Other changes noted include the changing of objectives as specific projects completed their implementation phases. Table 2-1 below also illustrates the order of goals was adjusted in 2015 to reflect a change in emphasis.

Table 2-1 GRTC Objectives, 2015

Current FY 2016 Goals	2015 Change in Order from Last TDP	New/Modified Objectives (year)
Goal 1 – Improve Employee Experience	+7	**Objective 1.3:** Position GRTC as an employer of choice (2015) – newly added to focus upon employee satisfaction, recognition, and non-traditional benefits for employees.
Goal 2 – Promote Safety First, Service Always	No Change	**Objective 2.1:** Minimize all preventable vehicle accidents (2017) – Consolidated two separate vehicle accident rate objectives. **Objective 2.2:** Minimize injuries to employees and passengers (2017) –added to also include non-vehicle related accidents. **Objective 2.3:** Improve security for customers and employees (2015) – newly added to focus on facility security and consolidate security documents into one System Security Program.
Goal 3 – Improve Operational Efficiency	+1	**Objective 3.4:** Strategically align fleet to service demand (2014) – modified to include intent to implement a more efficient route and schedule structure. Also removed emphasis on providing coach buses on long-haul express routes.
Goal 4 – Improve Paratransit Operations	+4	**Objective 4.2:** Utilize technology to enhance customer experience (2015) – added to address role of technology in reducing hold times through a call-back feature. **Objective 4.3:** Implement strategies to ensure capacity constraints are not encountered (2015, 2016) – added to address technological and operational issues with the service provider.
Goal 5 – Promote Environmental Efficiency	-4	No changes
Goal 6 – Improve Financial Efficiency	-1	**Objective 6.1:** Contain operating costs (2015) – modified to replace "reduce costs" with "contain costs". Added emphasis on tracking overtime expenditures. **Objective 6.2:** Explore and secure new revenue sources (2015) – modified to emphasize grant pursuits and fare sale outlets. **Objective 6.3:** Ensure contract compliance (2015) – newly added with emphasis on oversight of contracts and invoice accuracy. **Objective 6.4:** Benchmark GRTC's financial efficiency against peers (2015) – newly added to have the Finance Department review the most recently published NTD data from other transit agencies and compare to GRTC, identifying strengths and areas where the company can improve.

Current FY 2016 Goals	2015 Change in Order from Last TDP	New/Modified Objectives (year)
Goal 7 – Improve Public Image	-1	**Objective 7.1:** Increase awareness of GRTC's strengths and the quality of services provided (2015) – modified to include seeking more speaking opportunities and branding initiatives. **Objective 7.2:** Expand outreach to the Hispanic community (2015) - added to include numerous projects (radio ads, printed materials, and Google Translate) to assist with reaching members of this community.
Goal 8 – Improve Customer Satisfaction	-5	**Objective 8.2** Improve bus stop amenities (2015) – newly created as a separate objective from "Improve Communication with Customers". Specifically identifies a bus stop redesign project.

2.3 Service Design Standards

Service design standards are critical planning tools to evaluate the effectiveness of existing service and to assure impartiality in service modification decisions. GRTC's standards reflect a focus on creating a logical, efficient and integrated route system, with additional emphasis on customer convenience and fiscal responsibility. Several of the service standards reflect different criteria dependent upon the intensity of service frequency and passenger boardings, as represented by six service category types:

- **BRT** – This is a new category added for the Pulse BRT service to begin in 2018 and any future BRT expansions. The routes in this category have high frequency with dedicated lanes. They have limited stops, referred to as stations. BRT service is primarily focused on high ridership goals.
- **Core Arterial** – The routes in this category are considered GRTC trunk routes. They are a combination of other routes to create frequent service on a corridor. Their entire route runs on a major corridor/thoroughfare. The majority of stops have high population density within .25 miles. Activity centers are serviced along these routes. Examples of Core Arterial routes in the new network include Routes 1, 2, and 3. Core Arterial routes are primarily focused on high ridership goals.
- **Arterial** – The routes in this category travel more than 50% of their route on major corridor/ thoroughfare. Terminus stops are major activity centers. Examples of Arterial routes in the new network include the branches of Routes 1, 2, and 3, and Routes 14 and 19. Arterial routes may have portions that primarily serve ridership goals and portions that primarily serve coverage goals.
- **Community Radial** – The routes in this category serve as the neighborhood network. These routes travel through the neighborhoods for the majority of their service, connecting neighborhoods to the main corridors. Examples of Community Radial routes in the new network include Route 12 and 76. Community Radial routes may have portions that serve ridership goals, but most sections of Community Radial routes serve coverage goals.
- **Circulator/Feeder/Connector** – Routes in this category connect outlying sections of the service area to each other. The routes have a stop at an activity center at one or both terminus. This stop additionally allows for connection to an arterial or core arterial route. Examples of Circulator/Feeder/Connector routes in the new network include Route 86 and 88. Some of these routes or portions of these routes may serve ridership goals but most serve coverage goals.

- **Express** – The routes in this category feature limited stops, run within freeways and along key commuting corridors operating only at peak travel periods. Express routes may be ridership-oriented or coverage-oriented depending on their markets and design.
- **Special/Seasonal** – Routes in this category operate for a unique purpose, such as seasonal service.

Modifications to these service design standards from prior TDP reporting reflect both the system-wide and route-specific processes used to establish the new routes as envisioned under the Richmond Transit Network Plan and follow on planning to reorient the existing network. For example, the stop spacing standard has been updated based on the RTNP process that reflected the public willingness to widen stop spacing to achieve higher speeds and more service per dollar spent. Similarly, the Service Coverage Allocation standard is a direct result of the planning process of the RTNP.

2.3.1 *Service Frequency*

The frequency of service during peak and off-peak hours provides a measure of service availability. More frequent service is most attractive to potential ridership, but also more expensive to operate. Therefore, service availability should be directly related to both the size of the ridership market and travel patterns (all day vs. peak only) along any given route. See Table 2-2 for minimum service frequency by service category.

Table 2-2 Minimum Service Frequency (Minutes)

Category	Weekday			Saturday			Sunday		
	Peak	Off-Peak	Late Night	Peak	Off-Peak	Late Night	Peak	Off-Peak	Late Night
BRT	10	15	30	10	15	30	30	30	30
Core Arterial	15	15	30	15	15	30	30	30	30
Arterial	60	60	60	60	60	60	60	60	60
Community Radial	60	60	60	60	60	60	60	60	60
Circulator/Feeder/Connector	60	60	60	60	60	60	60	60	60
Express	Demand Driven								
Seasonal	Demand Driven								

2.3.2 *Span of Service*

The time between the first and last trip operated on a route defines the span of service. The start and end times of certain routes are often established to allow for access to work (up to 2nd shift returns). Weekend service may not be necessary on all routes, and demand may dictate starting later and ending sooner. Note - The end of service typically refers to the departure time of the last scheduled trip for that route, therefore vehicles would remain in service beyond that time until they complete the trip and return to the garage. See Table 2-3 for minimum span of service by service category.

Table 2-3 Minimum Span of Service

	Minimum Span of Service			
Day of Week	**Route Category**	**Start of Service**	**End of Service**	**Hours**
Weekday	BRT	5:30 AM	1:00 AM	19.5
	Core Arterial	5:30 AM	1:00 AM	19.5
	Arterial	5:30 AM	10:00 PM	16.5
	Community Radial	5:30 AM	7:00 PM	13.5
	Circulator/Feeder/Connector	5:30 AM	7:00 PM	13.5
Saturday	BRT	6:00 AM	1:00 AM	19
	Core Arterial	6:00 AM	1:00 AM	19
	Arterial	6:00 AM	10:00 PM	16
	Community Radial	7:00 AM	7:00 PM	12
	Circulator/Feeder/Connector	7:00 AM	7:00 PM	12
Sunday	BRT	6:00 AM	1:00 AM	19
	Core Arterial	6:00 AM	1:00 AM	19
	Arterial	6:00 AM	10:00 PM	16
	Community Radial	7:00 AM	7:00 PM	12
	Circulator/Feeder/Connector	7:00 AM	7:00 PM	12

2.3.3 *Routing Path Considerations*

GRTC uses four measures specific to route design for new services:

Service Coverage Allocation – The distribution of revenue service hours system-wide, as based upon balancing 1) high frequency routes in areas with densities large enough to support such transit and 2) lower frequency, less productive routes in areas that serve a population with a need for transit.

Directness – Unless for compelling reasons (i.e. large trip generator) and due to prevailing land use patterns/street grid, routes should minimize deviation from the most direct alignment between endpoints.

Interconnectivity Capability – Routes should be designed to serve the most desired origin-destination pairs, thereby minimizing the number of transfers required.

Transfer Wait Time - Routes should be designed to make timed transfers to and from major connecting services with minimum delay to the overall trip.

See Table 2-4 below for routing standards.

Table 2-4 Routing Standards

Routing Standard	Metric	Target
Service Coverage Allocation	Percent of revenue hours allocated toward frequent routes / Percent of revenue hours allocated to less frequent routes.	70% / 30%
Directness	1) Terminal distance in excess of straight line mileage. 2) Maximum percentage of passengers requiring a transfer.	1) 70% or 1.7 2) 50%
Interconnect Capability	Percent of transfer passengers system-wide.	15%
Transfer Wait Time	Maximum peak hour wait time / Maximum off-peak hour wait time	5 – 10 minutes / 30 minutes.

2.3.4 *Bus Stop Spacing*

The number of stops along a bus route, while convenient for shorter walks to passenger origin/destinations, also negatively impacts the speed of the service and inconveniences through passengers through longer trip times. As more walk-friendly features are prevalent in the urban core and speed impacts are more pronounced due to increased traffic volumes, the standard for stop spacing in this particular service area has been increased as a result of the Richmond Network Plan. See Table 2-5 below for bus stop spacing guidelines.

Table 2-5 Bus Stop Spacing Guidelines

Service Area Type	Distance Between Stops (feet)	Stops per Mile
Core (Richmond CBD)	900-1200	5
Urban	600-1200	4-5
Suburban	600-2500	Varies[1]
Rural	600-2500	Varies[1]
[1] In suburban and rural areas, the predominant factor affecting stop spacing and location is the ability to find safe locations for stops along the road and where riders can cross the street. Stop spacing can be closer together and not reduce the average speed of buses in these areas, because the lower density of activity typically means that most stops will not have riders waiting during every trip.		

2.3.5 *Speed Standards*

This service design standard captures GRTC's intent to maximize average speed for the bus and minimize travel time for passengers while maintaining access to service. See Table 2-6 for GRTC's Speed Standards.

Table 2-6 Speed Standards

Service Area Type	Target Route Speed (mph)
Core	10 - 13
Urban	13 - 15
Suburban / Rural	12 - 18

2.3.6 *On-Time Performance*

On-time performance is a measure of runs completed within an acceptable window based upon the published schedule. For this window, GRTC considers a bus to be on-time if it arrives between zero minutes early and five minutes late. The standard recognizes the increased sensitivity of making a timed transfer during night operations. See Table 2-7 below for on-time performance targets.

Table 2-7 On-Time Performance

Time of Day	Percent on Time Target		
	All Local Service	Express Bus	BRT
Day	80%	80%	90%
Night	85%	N/A	90%

2.3.7 *System Reliability*

GRTC uses three measures specific to service reliability on a system-wide basis:

Trips Operated – The system should be resilient to impacts caused by accidents, breakdowns, traffic delays, and other factors that could cause a scheduled trip to be missed.

Pull-Outs Dispatched – Service should not be curtailed due to the unavailability of either driver or vehicle upon initial pull out from the garage for a scheduled run.

Miles Between Service Road Calls – The average distance in service miles between when all vehicles in revenue service incur a component failure which causes it to not start or finish its assigned run should be maximized.

Table 2-8 System Reliability

Reliability Standard	Metric	Target
Trips Operated	Percent of trips operated with respect to trips scheduled.	95%
Pull-Outs Dispatched	Percent of on-time pull out from the garage.	95%
Miles Between Service Road Calls	Average distance of all miles operated between road calls	4,000 miles

2.3.8 *Farebox Recovery*

The percentage of operating expenses recouped by farebox revenues. There are system-wide and route type specific targets. This productivity measure is one of several primary measures to rank the performance of a group of routes to identify areas for improvement.

Table 2-9 Farebox Recovery

Category	Target
System	21%
Express	21%
Core	30%
Core Arterial	30%
Arterial	17%
Community Radial	23%
Circulator/Feeder/Connector	12%

2.3.9 *Passengers per Revenue Hour*

The minimum level of ridership a category of service should attract, expressed as the average number of passengers for each hour of revenue service provided. This measure is an industry wide standard to assess overall performance and route efficiency.

Table 2-10 Passengers Per Revenue Hour

Category	Target
System	18
Express	18
Core	25
Core Arterial	25
Arterial	16
Community Radial	18
Circulator/Feeder/Connector	22

CHAPTER 3: SERVICE AND SYSTEM EVALUATION

3.1 Demographics and Land Use

This section provides a review of existing and projected population and employment changes across Chesterfield County, Henrico County, and the City of Richmond which comprise 744.32 square miles. This area provides the regional context for the GRTC service area needs. The larger Richmond metropolitan region, consisting of New Kent County and 14 additional localities, with a combined 2016 population of 1,281,708, represents the 45th largest metropolitan area in the U.S.

3.1.1 *Service Area Demographic Trends*

Current and future population projections are essential to determining short-term service adjustments and potential needs for transit expansion in the next 10 years and beyond. Table 3-1 details current and projected population shifts in the region and includes the overall Commonwealth of Virginia figures for comparison. The 2010 figures are U.S. Census figures, with 2016 figures based on American Fact Finder as of July 1, 2016. Population figures for 2020 and 2030 represent projections from the Weldon Cooper Center (WCC) for Public Service.

3.1.1.1 Population Projection

Analysis reveals that all areas are expected to see population growth through 2030. The fastest growing area is the city of Richmond, which exceeds the state average growth by 5 percent. The city of Richmond grew 1.6 percent in the past year and 9.3 percent since 2010. Its population in 2016 ranks it as the 10th most populous locality in Virginia. The recent growth of the city represents a reversal of past trends of declining population. One factor contributing to this growth is the conversion of former commercial buildings into apartments and condominiums in response to increased market demand for urban housing choices. The conversion of many of Richmond's commercial buildings has created thousands of new housing units in the city.[1] WCC projections in future years for Henrico and Chesterfield counties reflect a statewide trend of slower population growth due to out-migration and an aging population. Virginia's population gains, however, are projected to remain concentrated in the Northern Virginia, Richmond, and Hampton Roads areas.

Table 3-1 Total County and State Population Projections

Current Population Estimates			Population Projections		
Location	2010	2016	2020	2030	%change 2016 to 2030
Chesterfield County	316,236	339,009	349,182	395,440	16.6%
Henrico County	306,395	326,501	333,100	369,454	13.2%
Richmond City	204,214	223,170	230,720	242,451	8.6%
Virginia	*8,001,024*	*8,411,808*	*8,744,273*	*9,546,958*	*13.5%*

Source: US Census and Weldon Cooper Center for Public Service.

3.1.1.2 Seniors

The Weldon Cooper Center for public service (WCC) provides projections for different ages, including ages 65 and older. Table 3-2 shows 2010, 2016, and projected share of population for senior citizens in

[1] http://statchatva.org/2016/01/27/population-growth-in-virginia-is-reversing-decades-old-trend-estimates-show/

each county. In this category, all counties are projected to have higher share of senior citizens by 2030, aligning with national and statewide trends for an aging population. The total number of seniors in the region is expected to grow from over 115,000 in 2016 to almost 180,000 by 2030. For the Richmond area, the growth in senior population is disproportionate in suburban areas. Chesterfield County, in particular, is expected to experience a 128% increase in its baseline senior population by 2030. In contrast, the city of Richmond during this same timeframe is projected to experience only a 44% growth in its senior population. These projected shifts in senior population will influence the balance of transit services provided and ridership growth potential for the GRTC system. As the population ages, seniors need alternative transit options when driving is no longer a viable option. According to the 2015 GRTC Current Rider survey, nearly all riders of the GRTC System are born after 1945. The Baby boomer generation makes up about 37% of the riders, while Generation X makes up 35% and Millennials make up 25%.

Table 3-2 Senior Citizen (65+) Percentage of Total County and State Population Projection

Current Senior Population Percentages			Projections	
Location	**2010**	**2016**	**2020**	**2030**
Chesterfield County	10.4%	13.9%	16.3%	19.0%
Henrico County	12.4%	13.3%	16.5%	19.2%
Richmond City	11.1%	11.0%	11.7%	13.5%
Virginia	*12.2%*	*13.4%*	*15.9%*	*18.9%*

Source: U.S. Census, 2011-2015 American Community Survey 5-Year Estimates, WCC Projections

3.1.1.3 Employment

As with population, all areas of the Richmond region are currently experiencing increased employment, a trend anticipated to continue through 2030. Table 3-3 details current and projected employment shifts in the region and includes the overall Commonwealth of Virginia figures for comparison. The Richmond metropolitan area's employment growth exceeds the state and the national job growth averages. Key growth sectors include professional and business services, such as advanced manufacturing, logistics and commercial retail. In contrast to the population growth, the suburban counties are projected to continue to outpace the city of Richmond both in percentage of new employment and in net jobs created. Future projections of slower employment growth for the city along with higher employment growth in outlying areas may indicate an increased demand for reverse commute trips in the future, as more Richmond residents travel to work opportunities outside of the city.

Table 3-3 Total County and State Employment Projections

Current Employment Estimates			Employment Projections		
Location	2010	2016	2020	2030	% change
Chesterfield County	116,434	123,867	131,774	152,804	31.2%
Henrico County	178,665	187,826	197,456	222,767	24.7%
Richmond City	146,268	149,699	153,211	162,197	10.9%
Virginia	3,957,204	4,051,276	4,195,314	4,577,694	15.7%

Source: 2012-2040 Socioeconomic Data Report, Richmond Regional Transportation Planning Organization, April, 2015.

3.1.1.4 Activity Density

The Greater RVA Transit Vision Plan (2016) outlined the relationship between population and employment forecasts and the calculation of an activity density for the region. The activity density metric serves as a guideline for the highest level of transit service able to be supported as a function of service area demographics. Activity density is calculated from the sum of population and employment figures, to then estimate the concentration of development on a per acre basis. This level of analysis is more narrowly focused than the regional level presentation of demographics due to the variations across large geographies. The basis for the supported transit investment presented in Table 3-4 is from the DRPT Transit Service Design Guidelines and Federal Transit Administration (FTA) guidelines for transit supportiveness.

Table 3-4 Multimodal Center Types and Supportive Transit Investment Based on Activity Density

Multimodal Center Types		Activity Density (Jobs+People/Acre)	Supported Transit Investment
P-6	Urban Core	70 or more	Light Rail Transit (LRT) /Rail
P-5	Urban Center	33.75 to 70	Bus Rapid Transit (BRT)/LRT
P-4	Large Town or Suburban Center	13.75 to 33.75	Express Bus
P-3	Medium Town or Suburban Center	6.63 to 13.75	Fixed Route Bus
P-2	Small Town or Suburban Center	2.13 to 6.63	Demand Response
P-1	Rural or Village Center	2.13 or less	Demand Response
SP	Special Purpose Center	Varies	Varies

Source: Greater RVA Transit Vision Plan Land Use Analysis Memo (DRPT Guidelines)

Illustrations of current (2012) activity density calculations from the Greater RVA Transit Vision Plan are presented in Figure 3-1. Increases in activity density from 2012-2040, highlighting areas for potential reassessment of transit investment is presented in Figure 3-2. Specific locations of activity density increases include south of Rocketts Landing (between James River and Route 5), Brandermill, Short Pump, Mechanicsville, and the airport area.

Figure 11 Projected Activity Density in Richmond Region (2012)

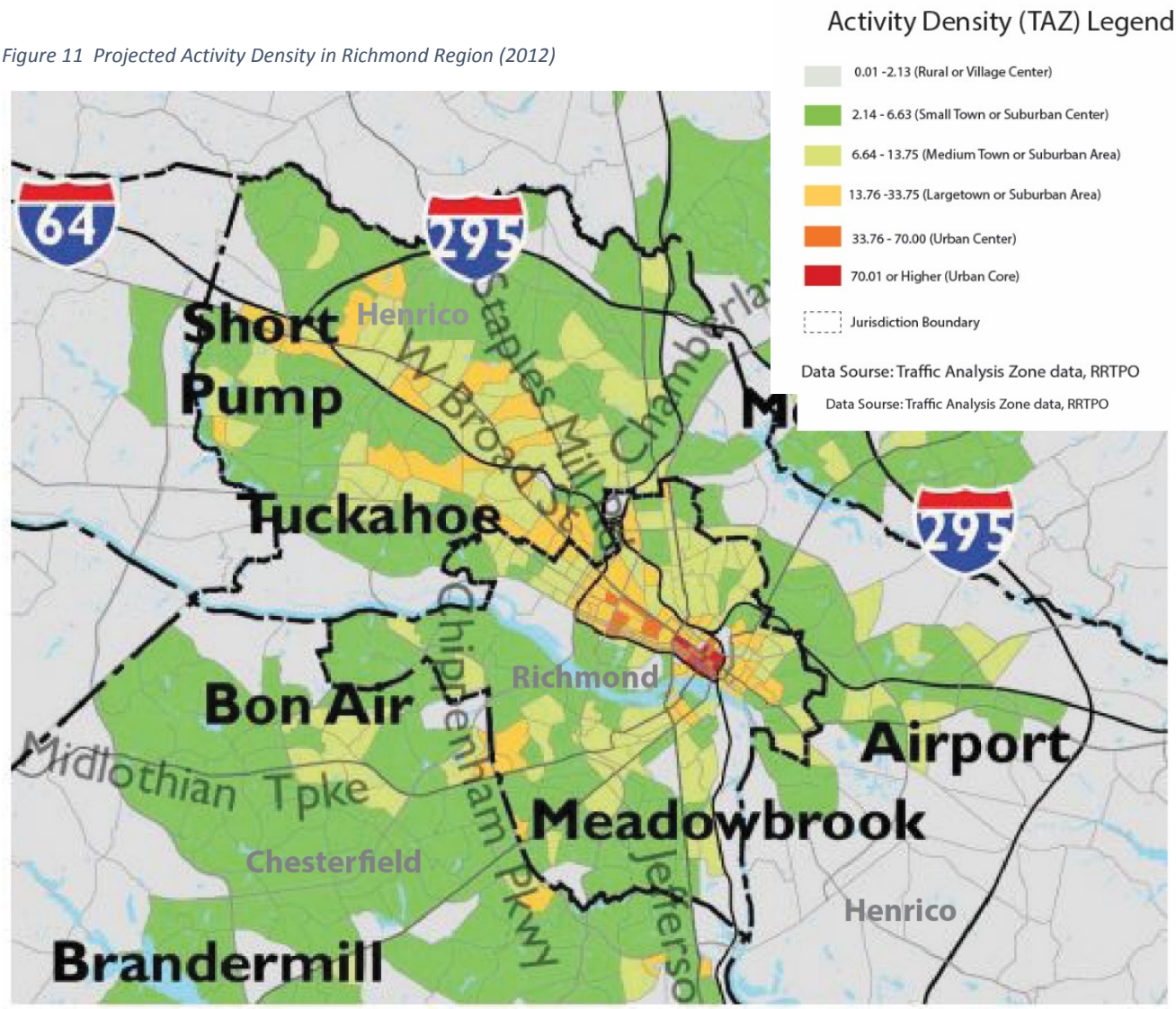
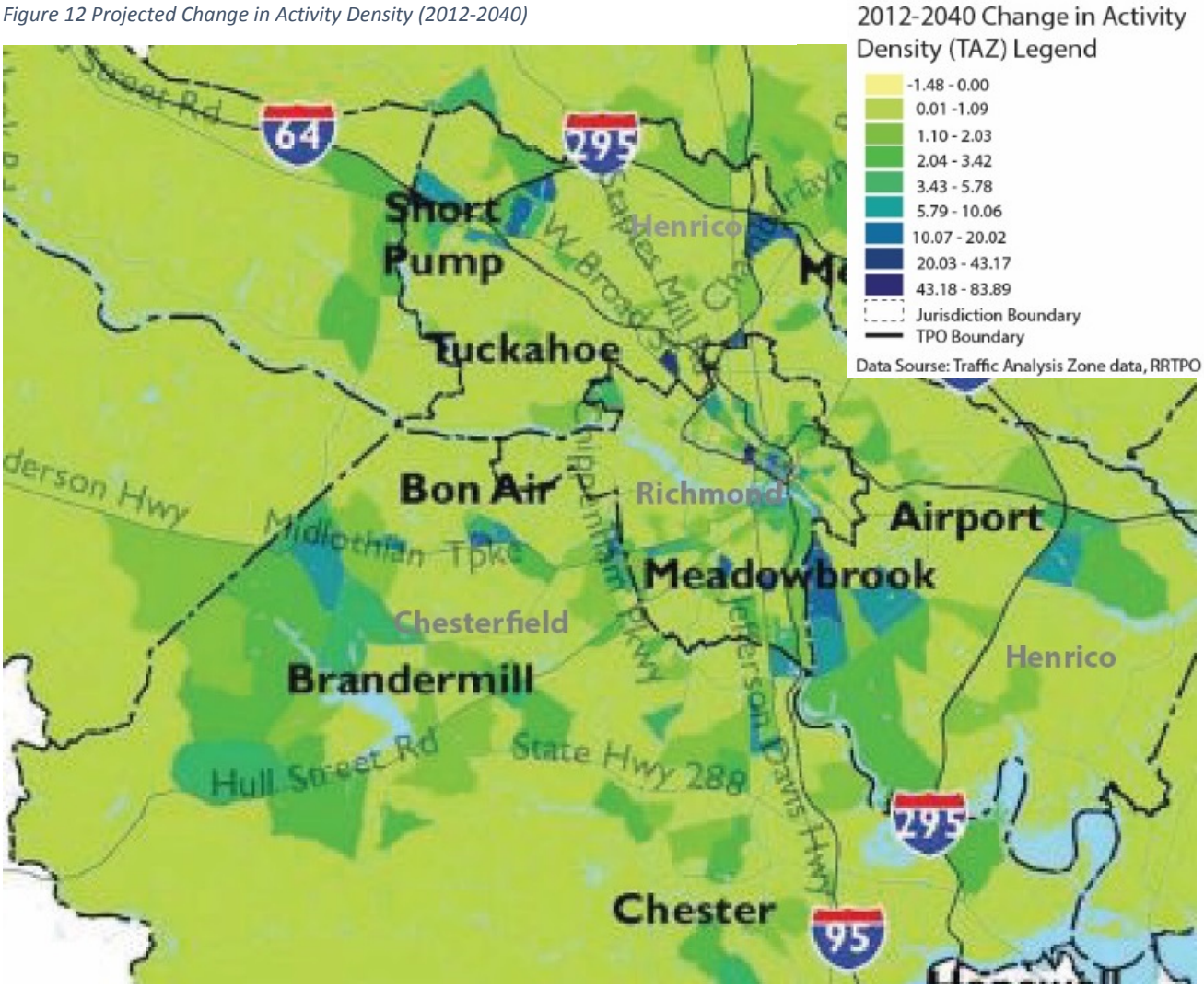


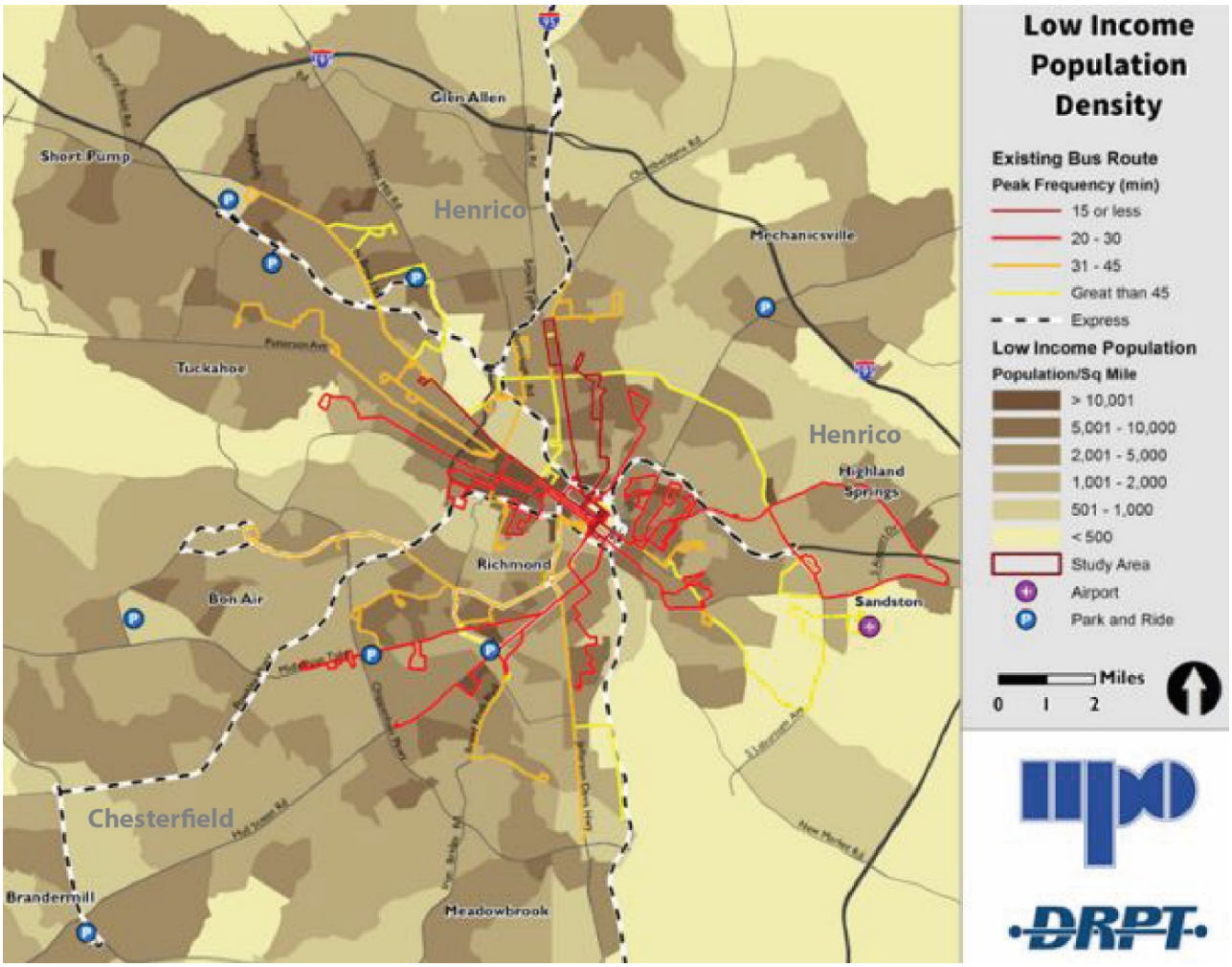
Figure 12 Projected Change in Activity Density (2012-2040)



3.1.1.5 Low-Income Population

The propensity for future transit need was further explored by the Greater RVA Transit Vision Plan. Specific analysis for low-income populations and a composite all-day propensity were determined as a part of this plan. High concentrations of Low-Income populations exist in along Broad Street and Staples Mill Roads, the far west end of Tuckahoe, and older areas of Chesterfield such as Bon Air and portions of the Jefferson Davis Highway corridor (See Figure 3-3). These areas have very little existing transit service with only a few express routes reaching out beyond the core and into these areas. Within the City of Richmond, the analysis found a wide range of areas with concentrations of low-income populations. There are pockets of low-income populations that have no existing transit service to the north and west of the downtown.

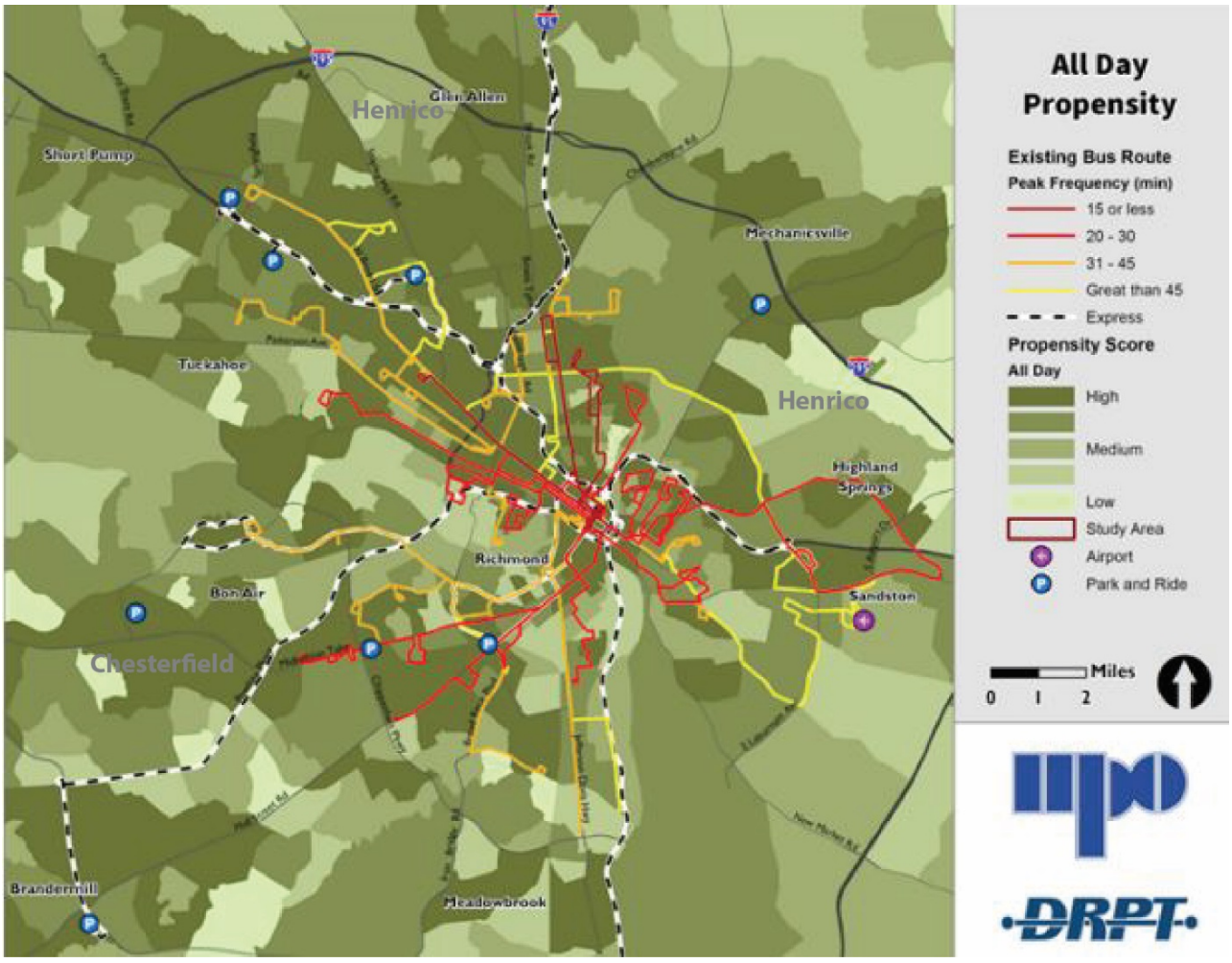
Figure 13 Low Income Population Density



3.1.1.6 All-Day Transit Propensity

The Greater RVA Transit Vision Plan further defined a composite metric of All-Day Propensity as a combination of attractors (where people work and make destination trips) and generators (where commuters and transit-oriented populations live). The analysis defined areas (see Figure 3-4) most likely to have high trip creation/attraction all day long thus lending themselves to more high capacity/ frequency service.

Figure 14 All Day Transit Propensity Analysis

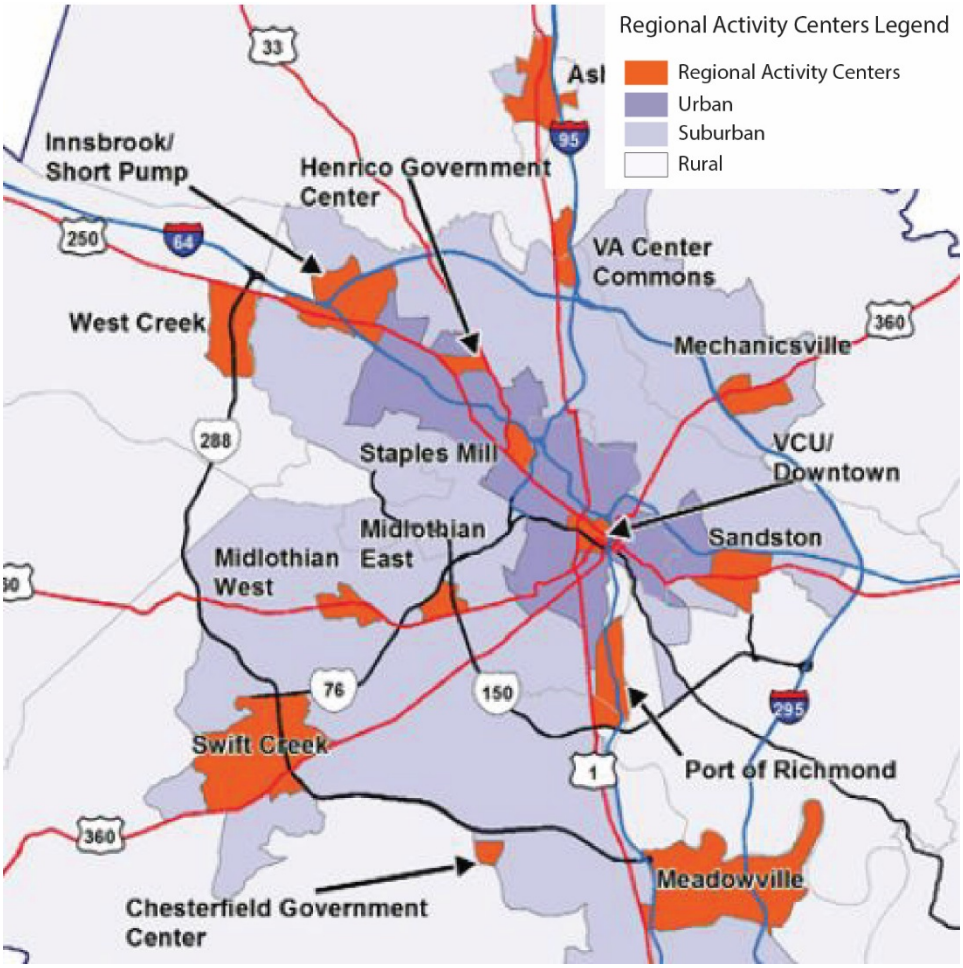


3.1.2 *Service Area Land Use*

The Richmond Regional Planning District Commission (RRPDC) is a regional planning agency that serves the Town of Ashland, the City of Richmond and the counties of Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, and Powhatan. The RRPDC focuses on areas of transportation, local technical assistance and information services including demographic, economic and geographic information systems.

A review of comprehensive land use plans was conducted to gain a better understanding of current conditions and any anticipated changes within the GRTC service area. While historically the most intensive land uses occurred along major arterials such as Broad Street or Midlothian Turnpike, development in more suburban areas tend to be concentrated into regional activity centers as depicted in Figure 3-5. These regional activity centers show the underlying trends to forecast population for the region and concentrations of population and employment. Chesterfield, Henrico, and Richmond continue to be the largest centers for employment.

Figure 15 Richmond Regional Activity Centers



Current trends also indicate that development of the region as a whole is spreading southwest at a more rapid pace than any other area in the region. Planned new transportation facilities, such as an extension of the Powhite Parkway in Chesterfield County from its current terminus to Route 360 exemplify this shift. Additional insight into existing and planned future land uses for each jurisdiction is provided in this section. Information gathered and summarized represents the most recent comprehensive plan and other documentation that identified planned or desired development which may shape future transit service.

3.1.2.1 Chesterfield County (2015)

As of 2015, Chesterfield County is approximately 79 million square feet of commercial (34 percent), office (14 percent) and industrial (52 percent) development. The Comprehensive Plan for Chesterfield County stated the commercial development has followed the growth of residential areas radiating outward from the urbanized areas of the Cities of Richmond, Petersburg and Colonial Heights along Midlothian Turnpike, Hull Street Road, Route 10 and Jefferson Davis Highway. Major commercial, office and other industrial centers have also developed in proximity to limited access interchanges along Chippenham Parkway, Powhite Parkway, Route 288, and Interstates 95 and 295. [2] The county provided new retail, office and industrial development which added an increased employment in the area.

According to the Comprehensive Plan for Chesterfield, the county has a strong housing market. The market has a strong influence from senior and millennial generations which are driving new housing types that are integrated, connected, and walkable communities. Chesterfield is attracting the senior and millennial generations due to the different levels of community connectivity in the neighborhoods.

In 2017, the community launched a new department focusing on community enhancement and care for the aging population. The department is working closely with neighborhoods and business, redeveloping aging commercial corridors, and working in the Northern Jefferson Davis area as part of a special plan in development for that area that will become part of the county's Comprehensive Plan.[3]

The following Chesterfield County recommendations were made from the Greater RVA Transit Vision Plan:

- **Midlothian** - Develop a comprehensive vision plan for transit-oriented development at key focus areas on the corridor, for example at the Spring Rock Green Shopping Center, Chesterfield Towne Center, and Midlothian Village.
- **Hull Street** - Establish a vision for transit-supportive development nodes on the corridor. The 2013 Hull Street Corridor Revitalization Plan recommends several key locations and provides suggested small area redevelopment plans.
- **Jefferson Davis Corridor to Chester** - Continue progress on the current small area/corridor planning for Jefferson Davis Highway, and include recommendations to support transit-supportive development nodes along the corridor

[2] http://www.chesterfield.gov/compplan/

[3] http://www.chesterfield.gov/smartdata.aspx?id=8590140805&terms=%20(%20%40PressRelease_DateandTimeofPressRelease_ReleaseDate_10%20%20%3E%3d%202017%2f01%2f01%20and%20%40PressRelease_DateandTimeofPressRelease_ReleaseDate_10%20%3C%3d%202017%2f12%2f31%20)%20

3.1.2.2 Henrico County (2009)

Henrico County Vision 2026 Comprehensive Plan discussed both current and projected land uses. Similarly to Chesterfield, the housing market demand and the new developments in technology have contributed to land use changes. New residences and businesses have joined the community, which contributed to increased and developed land. Currently, a significant amount of land designated as "vacant" is used for agricultural use. Some of the "vacant" land is the flood plains, wetlands, and other sensitive lands, which makes it undevelopable.

The plan defined land use groups into categories: rural, residential, mixed use, office/service/industrial, retail/commercial, and civic. The plan identifies four focus areas that go beyond the land use policies: existing character protection areas, mixed use/ village areas, neighborhood enhancement study areas and privatization/reinvestment opportunity areas.[4]

Existing Character Protection Areas are corridors and neighborhoods exhibiting a distinctive natural or built character that contributes to the identity of the surrounding area or the county as a whole5. The five Existing Character Protection Areas are River Road Corridor, Marion Hill, The James River Corridor-East, Osborne Turnpike Corridor and New Market Road Corridor. These areas are identified because protection and enhancement of their qualities are important to the general welfare of the community.

W. Broad Street – West area and Varina Village are identified as Mixed-Use/Village Areas, which have unique challenges and opportunities, such as existing development, or natural/cultural resources. W. Broad Street – West Area is located on U.S. Route 50 and is currently experiencing development pressures to convert from rural and agricultural uses to commercial development. 2040 activity densities will likely support the BRT, but current land use plans and zoning do not encourage or envision transit supportive urban design patterns along most of the corridor.[6] Master plans for the future should incorporate connectivity within and outside the area. The future land use map recommends this area for a combination of Urban mixed-use and Traditional Neighborhood development.

Neighborhood Enhancement Study Areas include seven established residential neighborhoods: The Beverly Hills and Regency Park/Farmington, Ridgehaven, Fort Hill, Bloomingdale/Hermitage Court, Laburnum Ave-West District and Sandston/Seven Pines. These neighborhoods are experiencing a transition in their built conditions due to encroachment of new development, ageing housing and a need for revitalization.

The fourth Special Focus Area category, designated as Revitalization/Reinvestment Opportunity Areas, includes fifteen areas targeted for revitalization or reinvestment opportunities. These areas have been broadly evaluated and found to show signs of disinvestment by the private sector, and could benefit from a strategic approach to revitalization or reinvestment.

The following Henrico County recommendations were made from the Greater RVA Transit Vision Plan:

- **Broad Street -** Develop a comprehensive vision plan for transit-oriented development on the Broad Street corridor, linking the Willow Lawn and Short Pump areas. Build on the vision already established for the Innsbrook area.

[4] http://henrico.us/pdfs/planning/2026plan/chap7.pdf

[5] Ibid.,

[6] Greater RVA Transit Vision Plan

- **West End South (Cary/Main/Patterson) -** Develop a comprehensive vision plan for transit-oriented development on the Cary/Main/ Patterson corridor. This begins with a focus on the very large, single-owner parcels that create significant TOD redevelopment potential. This includes shopping center parcels at Quioccasin/N. Parham, and the large single-owner office parks and apartment complexes along Three Chopt Road.
- **Route 1 to Ashland -** Activity density projections show low densities from I-95 to Virginia Center Commons, with the exception of the Brook Road/I-95 intersection. This small area shows a node of future growth supported by both Urban Mixed Use (UMU) and Traditional Neighborhood Design (TND) plans.
- **Mechanicsville Turnpike -** Land uses lining the Turnpike between I-64 and the Chickahominy River are primarily very low density strip commercial development and auto-related industries.
- **Airport via Route 60 -** Work with other jurisdictions to further evaluate the purpose of the transit connection to the airport, and shape the service for that end (service for employees and/or service for travelers).

3.1.2.3 City of Richmond (2010)

Richmond published a master plan for 2000-2010. The plan envisions a newly created Town Center in the Belt Boulevard corridor, between Hull Street and Midlothian Turnpike. This town center is intended to follow current urban trends of mixed-use, pedestrian development and activity. The goal is to accommodate higher density residential, retail, office, and public uses, and connect to key areas of the city via enhanced roadway network and key transit services. This revitalization serves as a catalyst for positive change in the adjacent Midlothian Turnpike corridor and in the Hull street area. In the Greater RVA Transit Vision Plan they recommend to continue to progress the current BRT land use and transit planning vision, which will support transit oriented development.[7] Critical to the success of the Town Center is the transportation access which includes three critical elements: construction of a link to Interstate 95 at Bellemeade Ave, improvement and reconfiguration of the intersection of Belt Boulevard and Midlothian Turnpike, and the provision of public transportation access directly to downtown, ultimately through a light rail connection.

The master plan recognizes that Downtown as the primary business and employment district for Richmond. Downtown is critical to the success of the region. Creating a variety but viable land uses can strengthen the employment center, entertainment and visual destination and residential neighborhood. Transit, public facilities and land use needs to be supportive of the vital role of Downtown.

The plan asks for a revitalization of the Midlothian Turnpike Corridor from Belt Boulevard to the Chesterfield County line. This corridor is an Economic Opportunity Area, which means it has opportunities for new commercial, office, or industrial uses. Much of the area has abandoned retail, so the intent is to transition those spaces into mixed use.

The plan also calls for focusing on recreating the gateways and image corridors. The city wants to maintain a high level visual environment, meaning the locations where visitors first enter Richmond and major roadways. Investment in the land use, redevelopment or infrastructure should be give high priority in order to improve the image of the city.

[7] Greater RVA Vision Plan

The Greater RVA Transit Vision Plan recommends that the City of Richmond connections to all Henrico and Chesterfield corridors be considered for transit enhancements. The BRT development along the Broad Street corridor should continue to further support transit-oriented development. In other areas the recommendation is to compliment enhanced transit services by ensuring safe pedestrian and bicycle facilities, including wide sidewalks and well-marked crosswalks and pedestrian signals, throughout the corridor. The recommendations also emphasize the identification of hubs and nodes that can serve as locations for future transit transfer stations.

The Pulse BRT planning efforts have identified existing corridor land-use. While downtown hosts the largest concentration of commercial uses, residential uses are dominant to the east and west of downtown. Scott's Addition and Greater Fulton are where most of the industrial land use is located among all other station areas (See Figure 3-6). Future recommendations for the City include rezoning the corridor to match anticipate land use conditions. Priority areas along the corridor identified in the Pulse Corridor Plan include the vicinity of the Cleveland Station, Science Museum, Allison Arts District, Main Street Station, and Orleans (see Figure 3-7).

Figure 16 Pulse BRT Corridor – Existing Land Use

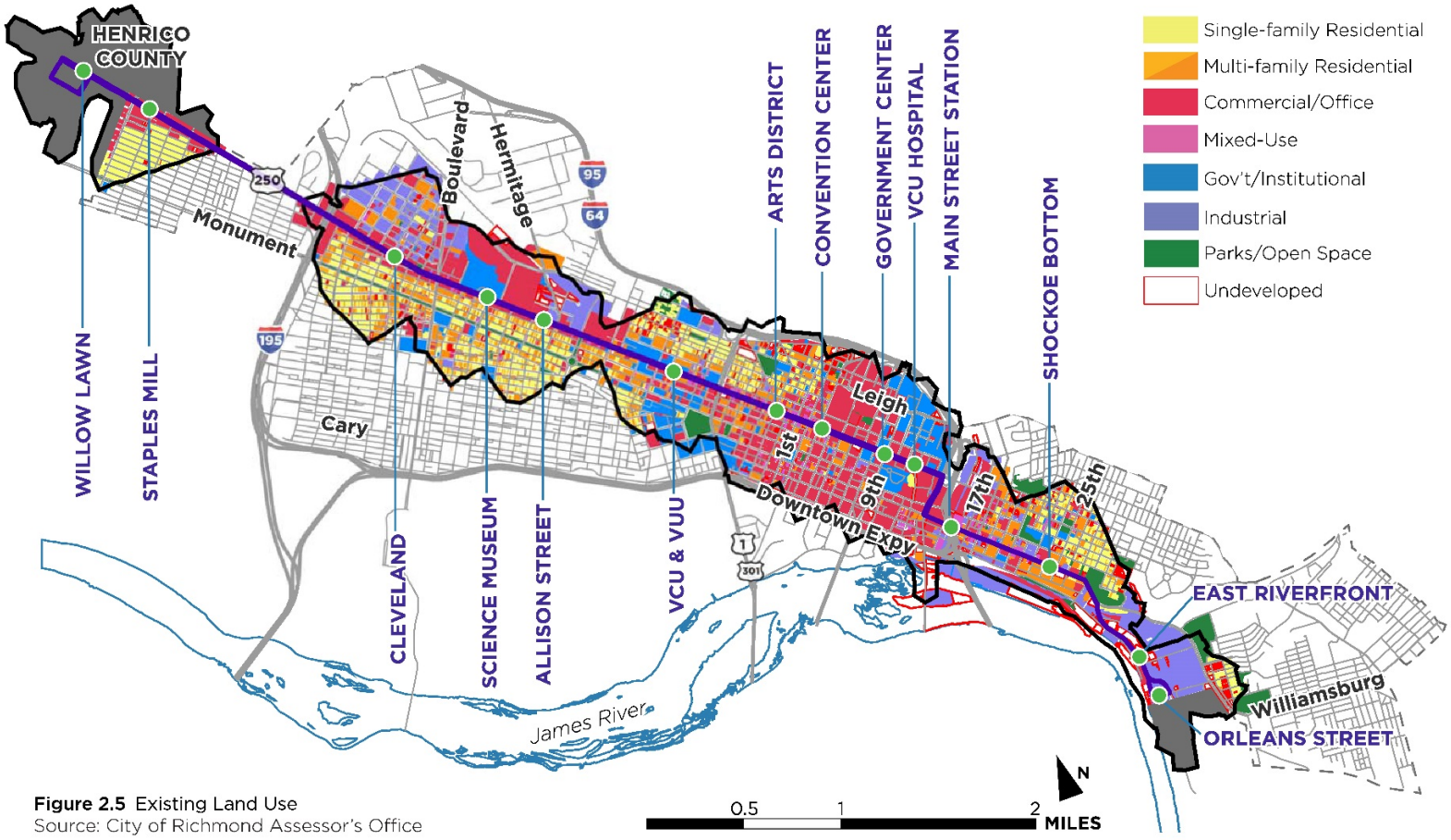
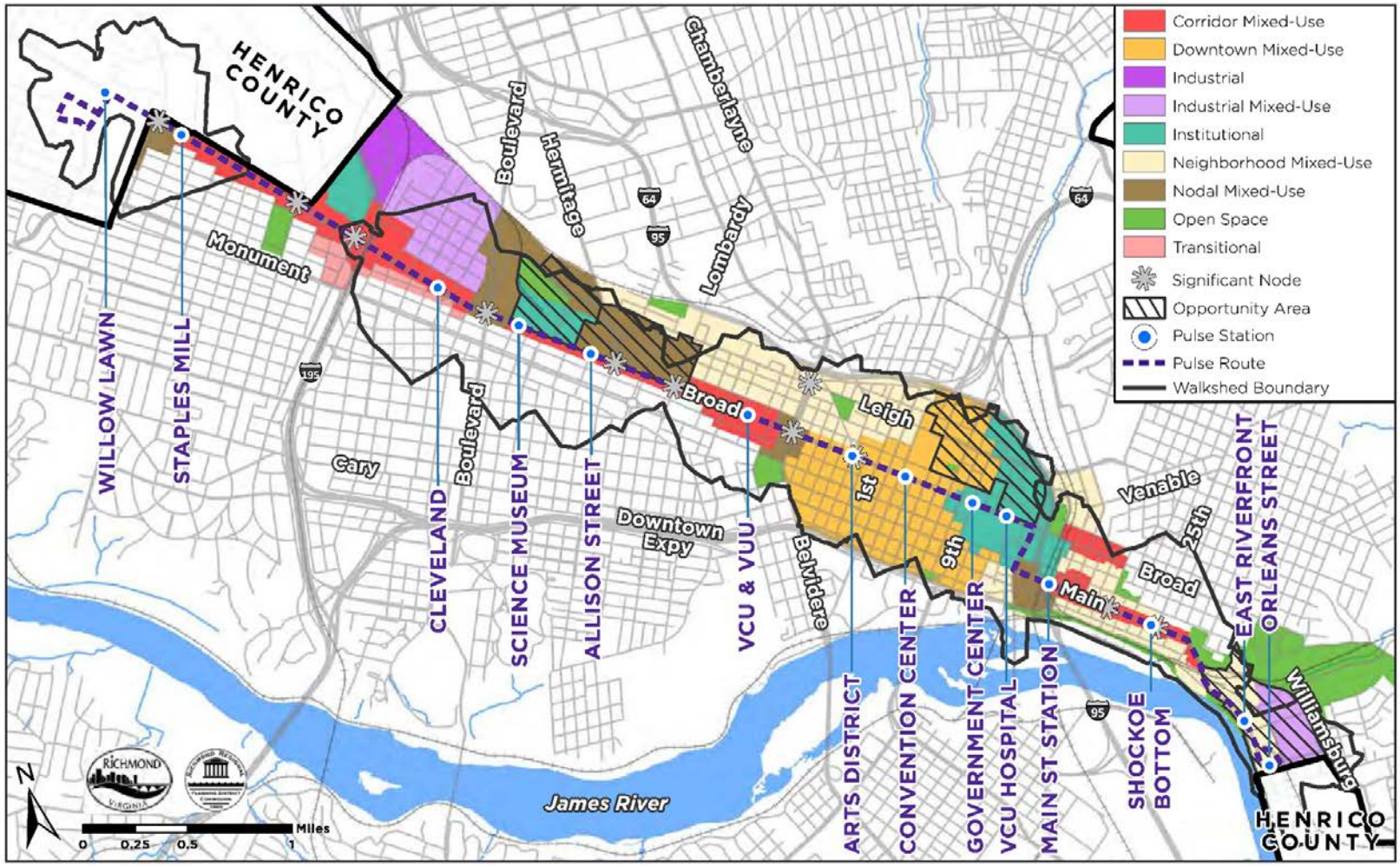


Figure 2.5 Existing Land Use
Source: City of Richmond Assessor's Office

Figure 17 Pulse BRT Corridor – Future Land Use Map



3.2 Historic System Performance

This section explores past conditions and presents analysis on the historic GRTC fixed route system as well as Specialized Transit Services contracted by GRTC. This represents the baseline from which a new Richmond Transit Network Plan was conceived in 2017. The system statistics represent a network that has incrementally evolved since the last major TDP was prepared. The larger scale changes now being implemented by GRTC, namely the Pulse BRT and Richmond Transit Network Plan recommendations should further benefit performance in the future. The performance measures herein concentrate not only upon GRTC internal tracking, but also incorporate a review of the Richmond Regional Transportation Planning Organization (TPO) and SB1140 Performance-Based Funding Allocation Study metrics. To perform this analysis, data has been gathered from the most recent and readily available sources. GRTC and systemwide NTD data range from 2014-2016. New analysis from recently completed studies has also been included by reference.

3.2.1 *System Overview*

Overall system statistics and performance measures for 2015 are provided in Table 3-5. Total ridership across all services of 9,167,869 represents a 10.1 percent decline from the last TDP reporting for 2010.

Table 3-5 2015 GRTC System Statistics and Performance Measures

2015 GRTC System Statistics	Fixed Route	Specialized Transportation	Vanpool
Ridership	8,435,747	364,171	367,951
Operating Expense	$36,873,988	$6,670,304	$1,828,986
Fare Revenue	$8,520,715	$833,965	$1,495,051
Vehicle Revenue Miles	4,284,042	2,717,693	4,875,806
Vehicle Revenue Hours	394,662	146,066	92,466
Vehicles Operated in Max. Service	118	59	151
Passenger Miles Traveled	29,760,354	3,134,783	31,503,564
Farebox Recovery	23.1%	12.5%	81.7%
Directional Route Miles	535		
VA SB 1140 Performance Measures			
Passengers Per Revenue Hour	21.37	2.49	3.98
Passengers Per Revenue Mile	1.97	0.13	0.08
Net Cost Per Passenger	$3.36	$16.03	$0.91

3.2.2 *Key Richmond Regional Performance Measures*

As the designated Metropolitan Planning Organization (MPO) for the Richmond region, the Richmond Regional Transportation Planning Organization (RRTPO) has developed and tracks trends in a variety of transportation system performance measures. Specific transit performance measures are included within two broad categories that align within the context of state (VTrans/SMART SCALE) and regional (plan2040) goal development:

1. Multimodal Connectivity and Access to Employment – Improves accessibility and interconnectivity of various transportation modes for all system users.
2. Safety and Security – Provide transportation improvements that increase safety and security for all system users.

GRTC supports many other categories where there are no specific transit metrics, for example with "Transportation and Land Use Integration" and "Environmental and Air Quality" measures. The most recent progress report (December, 2016) presents performance trend results from 2009-2015. Highlights for transit specific measures are presented in Table 3-6. The full summary for all regional performance measures is included in the Appendix.

Table 3-6 Richmond TPO Performance Measures and Changes Since Last TDP

Richmond Regional TPO Performance Measures		
MEASURE	**2014 (or most recent)**	**2011 (last TDP)**
Annual Transit Revenue Miles per Capita	20.6	28.5
Annual Passenger Miles Traveled Per Capita	145.2	139.1
Transit Trips Per Capita	18.8	27.1
Number of Registered Vanpools	141 (FY 2016)	117
Regional Households and Jobs Served by Transit (percent)	42.3% Housing (2012) 53.5% Employment (2012)	N/A
Annual Transit Crashes/Incidents per 100 Million Passenger Miles Traveled	88.12	101.8

Note that for the Regional Households and Jobs Served by Transit metric, the previous Richmond Regional TPO methodology was reported as being based upon the 2012 Socioeconomic Data Report at the TAZ level. Only the households and employment within the urbanized area in the region were considered, not the whole region. A TAZ area was considered to have access if it contained 1 or more transit stops. These metrics were revisited as a component of the Richmond Transit Network Plan with respect to access within the City of Richmond only. The new methodology for residential access was to use 2014 5-year estimates from the US Census American Community Survey dataset. Job calculations were based upon block level data from LEHD's LODES 2014 dataset. The Richmond Transit Network Plan preserved the access afforded by the historic transit network.

These systemwide measures reveal that the level of service GRTC provides has decreased in recent years. The service levels have also not kept pace with an increasing population in the Richmond region. While fixed route ridership was negatively impacted by the loss of VCU service in 2012, the specialized services and Vanpools have experienced greater ridership growth.

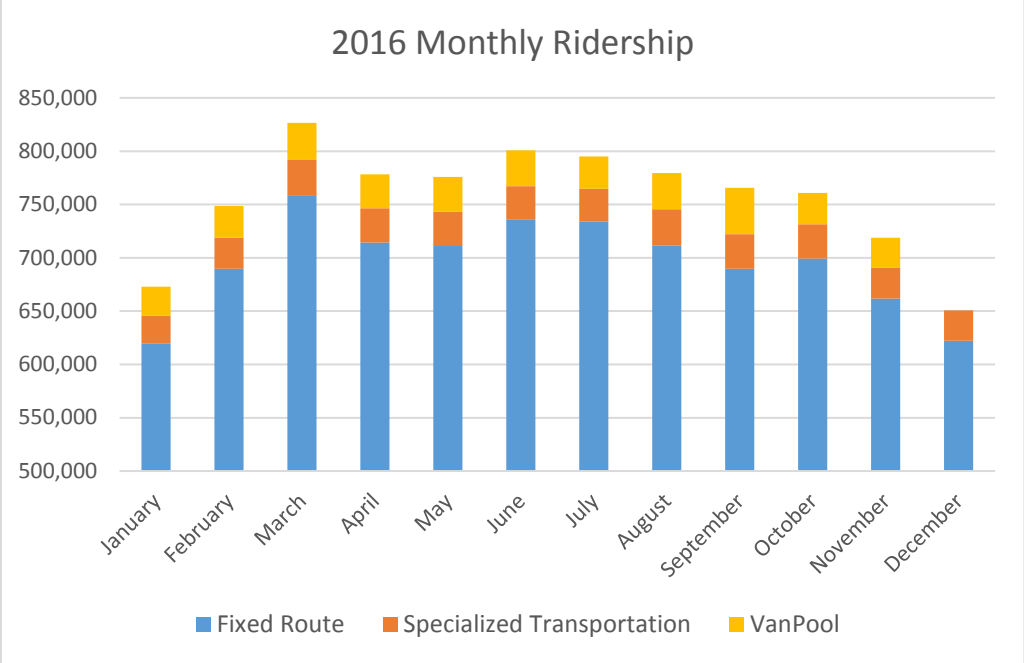
3.2.3 *Ridership Analysis*

This section looks specifically at the characteristics of GRTC's ridership. The variability of service provided by month, day of the week, and hour has been reviewed. Much of the reporting is focused on the fixed route system, with specialized services details provided to compare the scale of operations. The ridership data available is more recent that the NTD systemwide information, and reveal modest ridership growth from 2015.

3.2.3.1 Monthly

Figure 3-8 details 2016 monthly ridership for all GRTC Fixed Route, Specialized Services and Vanpool modes. Total reported ridership in 2016 was 8,543,964. The monthly variability of ridership is attributable to the fixed route system, as the other modes reflect relatively stable ridership throughout the year. In 2016, the highest monthly ridership occurred in March, with a combined total of 826,437 or 8 percent above the monthly average for the year. Ridership is lowest during the winter months, with January ridership 12 percent below the monthly average for the year. For Specialized Services, an average of 30,000 monthly passengers are carried on approximately 25,000 monthly trips.

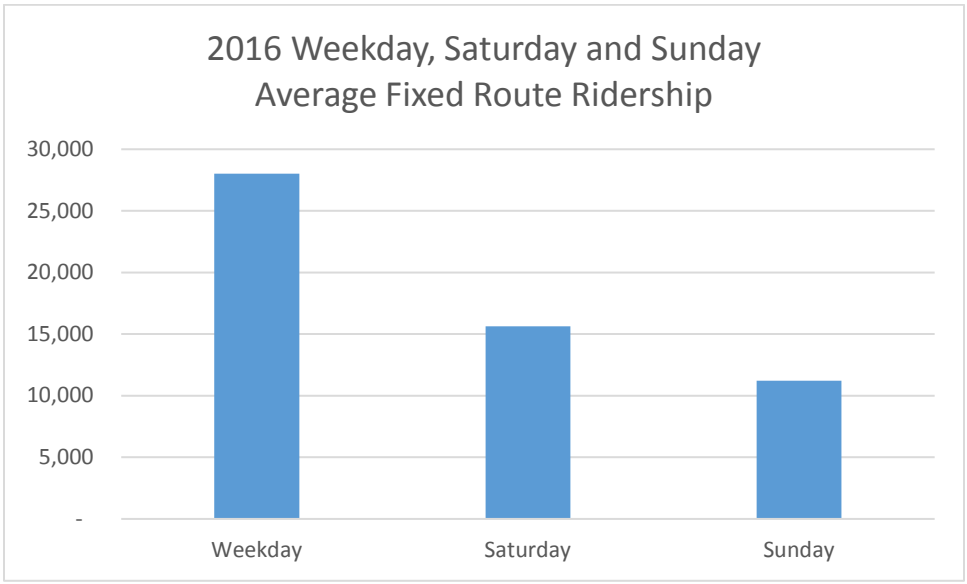
Figure 18 GRTC Monthly Ridership



3.2.3.2 Daily

For fixed route services, average weekday ridership in 2016 was approximately 28,000 passengers. Saturday average daily ridership of 15,600 and Sunday average daily ridership of 11,200 represented approximately 56 percent and 40 percent respectively of the weekday ridership (See Figure 3-9). Approximately 1,100 – 1,200 daily Specialized Service trips are provided.

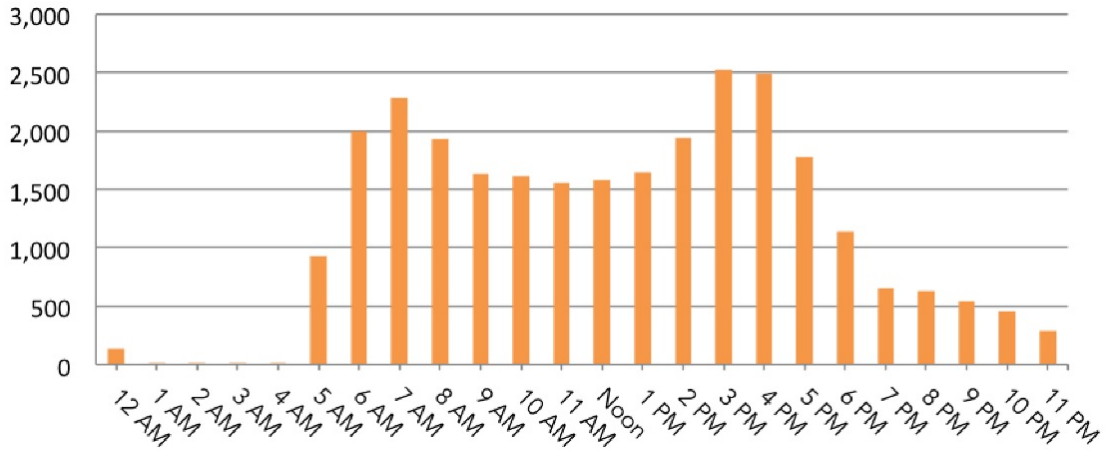
Figure 19 Daily Averages for Fixed Route Ridership



3.2.3.3 Boardings Per Hour

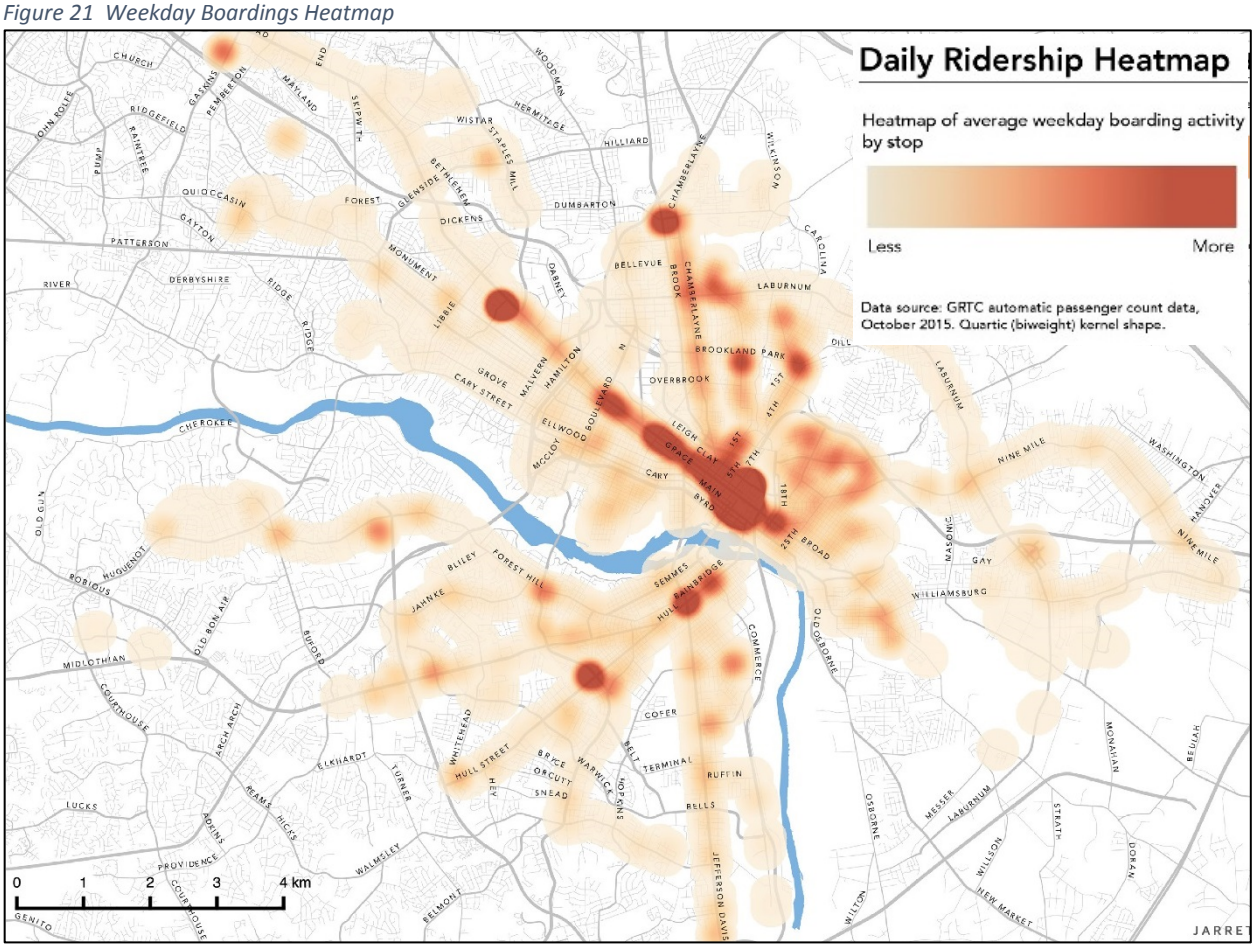
Passenger demand varies by time of day, with the need to provide peak capacity a significant component to overall fixed route transit costs. As a part of the GRTC Transit Network Plan, the existing peak-oriented service and boardings were studied (see Figure 3-10). The number of boardings on GRTC's historic network was highest during the weekday morning and afternoon peaks (6-8 AM and 2-5 PM) than at other times, reflecting both higher demand and the increased services provided by GRTC at these times. While crowding is often associated with peak service, further analysis as a component of the Richmond Transit Network Plan Study also indicated that buses tended to be more crowded during the midday than the AM peak, reflecting some mismatch between service demand and service provided.

Figure 20 GRTC Weekday Boardings by Hour



A composite map showing average weekday boarding activity (see Figure 3-11) reveals how fixed route ridership is distributed across the system. Approximately 89% of the daily boardings on the fixed route network are at stops within Richmond, with Downtown and the Broad Street corridor showing highest boarding activity. Another 11% of total boardings occur in Henrico County, with the largest concentrations at Willow Lawn, Brookhill, Azalea, and the Gaskins Road Park and Ride Lot. Less than 1% of remaining boardings occur in Chesterfield County and Petersburg.

Figure 21 Weekday Boardings Heatmap



3.2.4 *Fixed Route Performance by Historical Route*

This section details the performance of the GRTC network at a more detailed level. For route-based metrics, the results are further compiled according to the GRTC route type categories in order to account for the variation in performance of these different routes. A route by route accounting of every fixed route service has not been presented since the existing service will not reflect the network once the Richmond Transit Network Plan route structure and schedules are implemented. As GRTC will maintain the same route type categorizations for the new network, these historical averages provide a suitable benchmark for future comparison of performance trends. For each route type category, general operating statistics are presented in Table 3-7.

Table 3-7 Annual Operating Statistics for GRTC Fixed Route Categories

Annual Operating Statistics ROUTE TYPE	Total Routes	Ridership	Rev. Miles	Rev. Hours	Farebox Revenue	Operating Expenses
Core Arterial	7	3,712,910	1,298,249	125,446	$3,418,788	$11,009,152
Arterial	11	2,149,612	1,227,287	108,415	$1,963,708	$10,407,394
Community Radial	14	2,097,553	970,511	92,192	$1,909,411	$8,229,933
Circulator/Feeder/Connector	4	212,649	183,377	13,047	$206,315	$1,555,037
Express/Special	9	371,241	507,792	14,462	$829,361	$4,306,076
Overall System	**45**	**8,543,964**	**4,187,216**	**353,562**	**$8,327,583**	**$35,507,592**

Corresponding performance metrics for each route type, including the average, best route and worst route are summarized in Table 3-8 through Table 3-12. The seven routes classified as Core Arterial are the most productive. In 2016, this classification of service accounted for 43 percent of all ridership and 35 percent of all revenue hours of service. This route classification includes the Route 6, the currently best performing GRTC route, which will be transitioned into the Pulse BRT service. Additional information on farebox recovery, on-time performance, and operating speeds are provided to track future performance of the Richmond Transit Network Plan. In general, the more productive routes are also the slowest routes in terms of average speed. Actually achieving higher speeds will be essential to the success and affordability of the new higher-frequency services envisioned in the Richmond Transit Network Plan final recommendations.

Table 3-8 2016 Sample Booking Core Arterial Route Performance

ROUTE	Route #	Daily Trips	Pass./ Mile	Pass./ Hour	Net $ / Pass.	Farebox Recovery	Percent On Time	Avg. Speed
Overall 7 Routes	**N/A**	**690**	**3.12**	**28.90**	**$2.93**	**32%**	**70%**	**9.3**
Best Route	6	141	3.96	31.77	$2.22	37%	74%	8.0
Worst Route	7	78	1.81	24.66	$5.05	22%	62%	13.6

Table 3-9 2016 Sample Booking Arterial Route Performance

ROUTE	Route #	Daily Trips	Pass./ Mile	Pass./ Hour	Net $ / Pass.	Farebox Recovery	Percent On Time	Avg. Speed
Overall 11 Routes	**N/A**	**516**	**1.88**	**18.92**	**$5.64**	**19%**	**68%**	**10.1**
Best Route	73	71	2.06	23.00	$4.36	25%	74%	11.2
Worst Route	24	44	1.59	13.36	$8.22	14%	73%	8.4

Table 3-10 2016 Sample Booking Community Radial Route Performance

ROUTE	Route #	Daily Trips	Pass./ Mile	Pass./ Hour	Net $ / Pass.	Farebox Recovery	Percent On Time	Avg. Speed
Overall 14 Routes	**N/A**	**621**	**2.45**	**21.56**	**$ 4.29**	**25%**	**76%**	**8.8**
Best Route	43	70	5.15	36.04	$1.47	48%	81%	7.0
Worst Route	21	10	1.03	8.95	$10.61	11%	75%	8.7

Table 3-11 2016 Sample Booking Circulator/Feeder Route Performance

ROUTE	Route #	Daily Trips	Pass./ Mile	Pass./ Hour	Net $ / Pass.	Farebox Recovery	Percent On Time	Avg. Speed
Overall 4 Routes	**N/A**	**103**	**1.25**	**15.47**	**$8.90**	**14%**	**74%**	**12.4**
Best Route	18	26	1.41	19.39	$6.89	17%	60%	13.7
Worst Route	93	24	0.64	7.28	$15.60	8%	79%	11.3

Table 3-12 2016 Sample Booking Express/Special Route Performance

ROUTE	Route #	Daily Trips	Pass./ Mile	Pass./ Hour	Net $ / Pass.	Farebox Recovery	Percent On Time	Avg. Speed
Overall 9 Routes	**N/A**	**116**	**1.01**	**23.46**	**$8.52**	**24%**	**70%**	**23.3**
Best Route	29	26	1.30	34.06	$6.36	24%	70%	26.3
Worst Route	95	12	0.49	14.94	$20.18	16%	60%	30.7

Table 3-8 through Table 3-12 Notes: August 2016 sample booking used, candidates for Best/Worst Route needed a minimum of 10 daily trips for consideration

3.2.5 *Specialized Services Performance*

The GRTC Specialized Transportation Services provide ADA-mandated paratransit for individuals who cannot otherwise use the fixed route services as well as for trips for individuals requiring curb-to-curb mobility assistance beyond the fixed route service area. A representative breakdown of the services provided, both the type and to which jurisdiction, is presented in Table 3-13. Trips are balanced among jurisdictions, with Henrico County total trip (10,800) only slightly above the City of Richmond trips (10,289) for the months sampled. CARE Plus service encompasses trip origins or destination location more than 3/4 of a mile from GRTC's fixed route bus line or if travel is desired to a destination in Henrico County on a day or time when GRTC's fixed route buses are not running in Henrico County. By this definition and due to the dense route coverage in the City of Richmond there are limited CARE Plus trips within the City.

Table 3-13 Specialized Services 2017 Sample Month Operating Statistics

TRIP TYPE	Trips	Total Passengers	Percent
CARE - City of Richmond	9685	12552	44.4%
CARE - Henrico	5280	7081	25.0%
CARE Plus - City of Richmond	604	814	2.9%
CARE Plus - Henrico County	5600	7211	25.5%
C-Van - City of Richmond	83	83	0.3%
C-Van - Henrico County	274	473	1.7%
Chesterfield County	48	69	0.2%
Total Trips	**21574**	**28283**	

GRTC issued a new contract in 2017 to outsource Specialized Services operations. The previous contract hourly service rate was $32.05. Unsatisfactory contract performance was a reason for seeking a new provider, evidenced by over $120,000 in liquidated damages incurred on the previous contract since January 2017 until contract termination. As provision of the new contract documentation provided to potential new providers, GRTC compiled performance metrics for a representative month (May 2017) as shown in Table 3-14. Additionally, average phone queue time for a representative week (June 4-10 2017) was just under 6 minutes (5:52).

Table 3-14 Specialized Services Sample Month Performance

Specialized Service Performance	Occurrence	Percent
Trips longer than 90 minutes	850	3.9%
Pick-ups more than 15 minutes late	5,186	24.0%
No Shows	1,411	6.5%
Cancellations	3,901	18.1%
Total Trips	21,574	

3.2.6 *Facilities and Equipment*

This Richmond Transit Network Plan recommendations will drastically reduce the number of people who are waiting at a transfer center during the day because high-frequency bus lines will facilitate transfers along Broad Street and throughout downtown. However, a transfer facility will still be required at night and on Sundays, when low-frequency lines meet downtown, and space to park many buses at once is needed. GRTC continues to explore options for a permanent transfer plaza in Downtown Richmond. The current temporary plaza was placed into service in 2014. In October 2016, GRTC submitted an unsolicited offer for nine city-owned parcels at West Grace and North Adams Street, which combined would amount to two-thirds of an acre. This location is approximately 10 blocks west of the existing plaza. A five-story structure was estimated to include 12 bus bays and a parking for no more than 350 parking spaces.

GRTC has relatively new facilities, including headquarters and maintenance shop (2010), and a CNG refueling facility (2015). GRTC's fleet has not been experiencing an expansion, having declined from 166 fixed route vehicles during the last major TDP study to 145 vehicles in 2017. Therefore, GRTC facilities have sufficient capacity to sustain maintenance/storage and accommodate shifts in the fleet, such as

the new Pulse BRT vehicles. The useful service life for GRTC buses is 12 years, 10 years for mini-buses, and 4-5 years for cutaways and support vehicles. A total of 95 fixed route vehicles and 87 paratransit vehicles (entire fleet) are scheduled to be replaced during the next six years. The current year vehicle replacement schedule from that replacement program is presented in Table 3-15. Future year vehicle replacement will need to be re-evaluated as the Richmond Transit Network Plan's level of service may result in adjustments to the overall size of the fixed route fleet.

Table 3-15 GRTC Vehicle Replacement Program for 2017

STATUS	Fixed Route	Special Services
Vehicles Eligible for Replacement in the Current Year	0	20
Unretired Vehicles from Previous Years	42	35
Total Vehicles Eligible for Replacement	42	55
Vehicle Replacements Added to Fleet in the Current Year	18	35
Unretired Vehicles - Carry Over to Future Years	24	20
Percent of Fleet Eligible to Retire but Still in Service	16.6%	24.4%

Current spare ratios of 25 percent for fixed route and 39 percent for specialized services reflect past trends and fluctuations. The fixed route fleet size has been slowly contracting, due to lower amounts of service provided and the Specialized Services fleet has been increasing. Current NTD data on the fleet from 2015 is presented in Table 3-16.

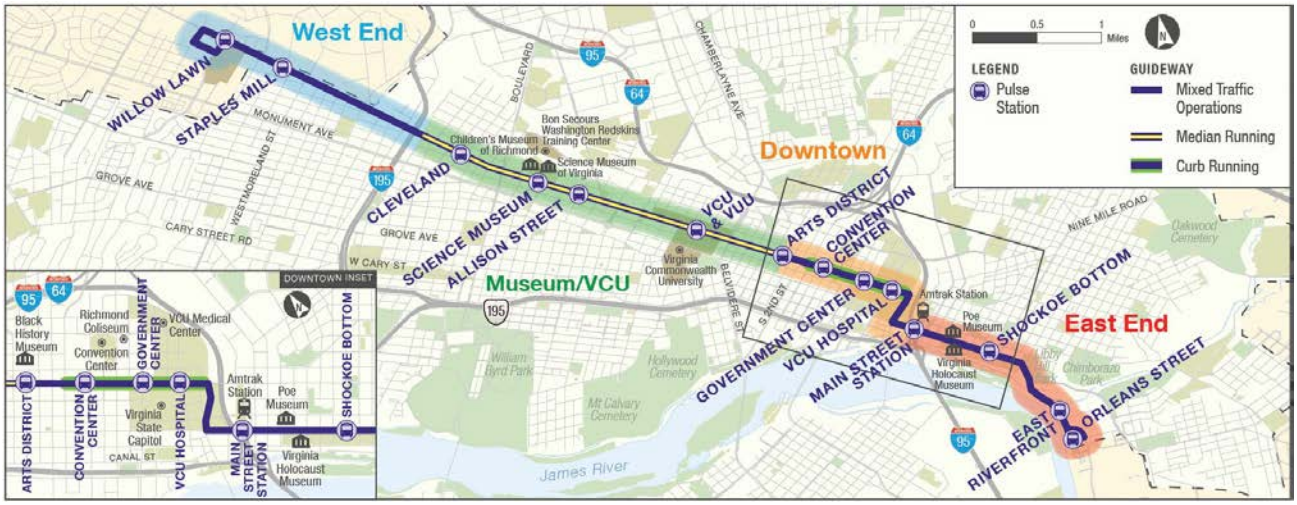
Table 3-16 GRTC Fleet Statistics

MODE	Total Vehicles	Percent Spare	Avg. Mileage (miles)	Avg. Age (years)	Reported Failures	Avg. Failure Distance (miles)
Fixed Route	147	25%	252,500	7.5	633	7,259
Specialized Services	82	39%	195,402	5.0	339	9,245

3.3 GRTC Pulse Implementation

The GRTC Pulse BRT project (see Figure 3-12) will provide service from Willow Lawn in the west to Rocketts Landing in the east, including fourteen stations and more than three miles of dedicated travel lanes. Pulse buses will arrive at stations every 10 minutes on-peak and every 15 minutes off-peak. Planned hours of operation will be 5:30 a.m. to 1:00 a.m. on weekdays and 6:00 a.m. to 1:00 a.m. on weekends. Preliminary engineering was completed and construction began in late 2016. June 30, 2018 is the contractual fixed completion date. BRT vehicles have been delivered.

Figure 22 Pulse BRT Map



Other features of the GRTC Pulse include:

- Modern bus rapid transit vehicles (Gillig 40 ft. CNG BRT Plus)
- Operations in mixed-traffic of the route and on dedicated transit-way of the route (2.6 miles in the median and 0.6 miles on the curbside).
- Level boarding to reduce dwell times and improve ease of mobility.
- Real-time information (technology that communicates when the next vehicle will be arriving at the station).
- Off-board fare collection system to allow passenger to purchase tickets and/or validate fares before boarding.
- Informational kiosks and amenities at the station stops.
- Accessibility for the disabled community, as well as for bicycles, baby strollers, etc.
- Transit signal priority for the BRT vehicles and queue jump operation at selected intersections.

3.4 Richmond Transit Network Plan Recommendations

The Richmond Transit Network plan was a city-led transit planning effort to redesign transit service within the city to better connect with the new Pulse BRT and update transit service for a changing city. The planning effort by the City was completed in March 2017. GRTC began the effort to implement the recommendations of the Richmond Transit Network Plan in March 2017 and has incorporated complementary updates to the transit network in Henrico County. The implementation of the network changes has been branded as "Your New GRTC Transit System" and implementation is expected with the opening of the Pulse BRT on June 24, 2018.

The completely new network was designed within the existing operating budget (FY 2017 – FY 2018) for fixed-route service in the City of Richmond. Similar recommendations were also prepared for Henrico County's portion of GRTC's services. The implvementation of these recommendations will coincide with the opening of the Pulse BRT. The Richmond Transit Network extends beyond just integrating BRT services, and addressed the basic underlying policy for providing service and its relationship to ridership and customer preferences.

The historic system had a primary focus on rush-hour-service, and much less frequency or convenience was provided to the riding public at other times. The plan began with a categorization of the existing service into frequency of service in the midday, to capture a baseline of service not impacted by rush hour peaks. Figure 3-13 depicts routes as color-coded by this frequency. These frequency designations correlate with the presence or absence of weekend service. Peak-only and express routes do not operate on weekends. Routes that do operate on weekends generally have lower frequency, and shorter span, than in their weekday schedules.

The network study and frequency mapping revealed that GRTC's routes are often highly variable, and not so easily categorized throughout the day. Timed connections are impractical when every route has a fairly unique frequency, and in the historic system only a few connections could allow for a timed transfer at the downtown Temporary Transfer Plaza. Other factors affecting frequency, and ultimately the convenience to riders and ability to maximize ridership included:

- Approximately 50 percent of historic service was designed to maximize ridership and 50 percent designed to maintain coverage to areas that are not productive nor cost effective but respond to a specific need or request.
- GRTC routes are, on average, fairly slow, even compared to other urban transit services running in congested environments.
- Due to a lack of layover facilities in outlying locations (when the bus would be empty), operator breaks currently occur mid-route, as needed, and therefore with riders on-board the dwelling bus.
- Many bus stops are too close to one another, requiring the bus to slow down, stop, and then re-enter traffic constantly, for very small numbers of passengers at each stop.

The Richmond Transit Network Plan process led by the City was highly participatory, including three stages of public input, stakeholder workshops and design retreats. In total, nearly two dozen public meetings were held, three major online public surveys were conducted, with hundreds of responses, and dozens of stakeholders participated in three major workshops. Input gathered was used to weigh trade-offs and adjustments to incorporate into a new network. Input was also gathered on the needs

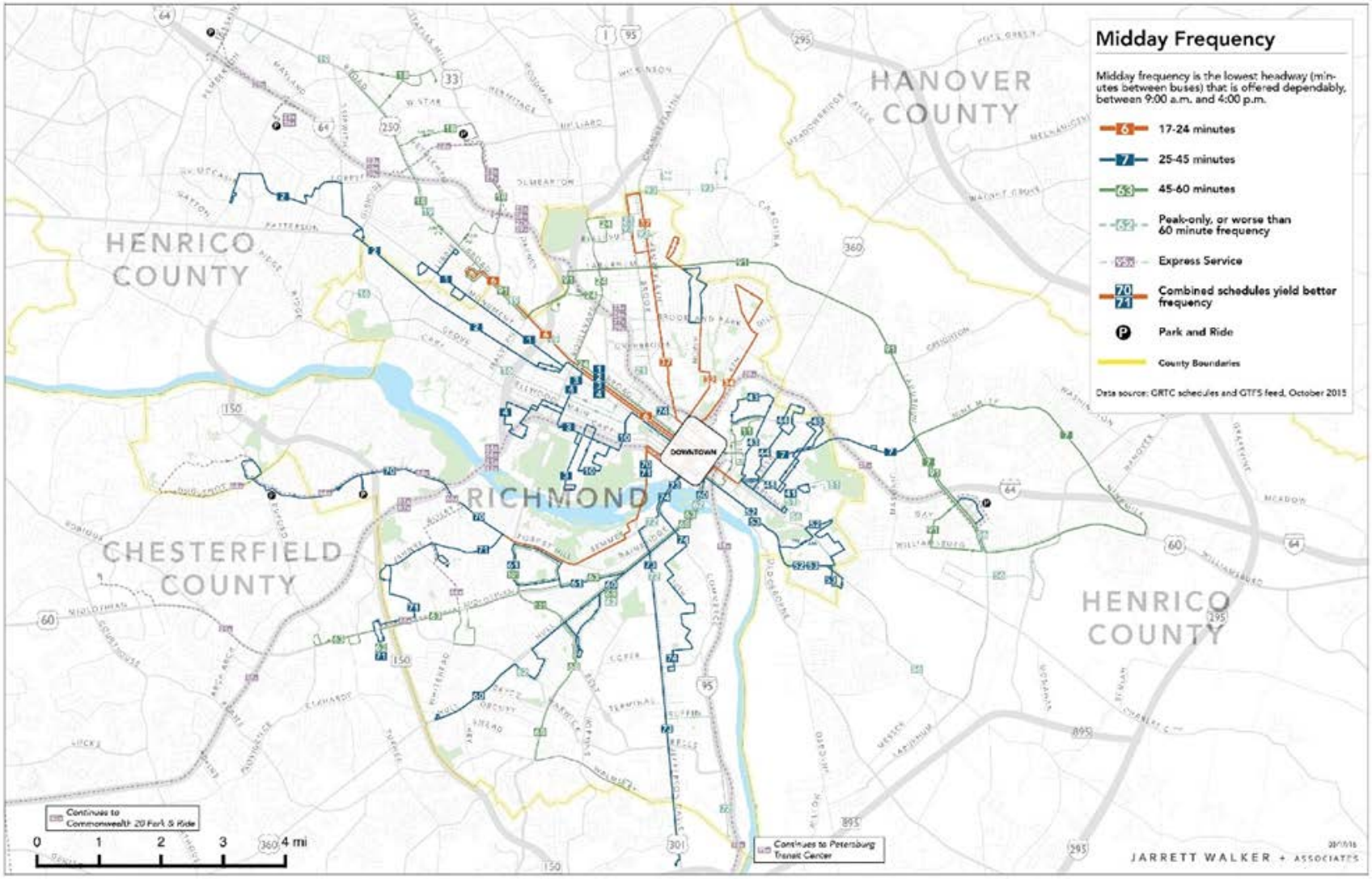
and desires for continuing improvements to the transit network in the City beyond the immediate redesign.

The final recommended network by the City, as reported in the Final Recommended Network in March 2017, presented the results of stakeholders and the public adopting a new policy to allocate 70 percent of available transit funds to pursue maximum ridership, with the remaining 30 percent to provide coverage in places where ridership is naturally low. The network was also designed to accelerate bus speeds, with the assumption that bus stops in the urban, walkable parts of Richmond would be spaced on average of every three blocks, or about 1,000 feet. The Final Recommended Network of routes and frequencies from the Richmond Transit Network Plan is presented in Figure 3-14 and Figure 3-15.

GRTC took over the efforts from the City of Richmond to work on implementing the recommendations in March 2017. GRTC hosted a series of public meetings on the recommendations in March and April 2017 to give the public more opportunities to comment on the recommended changes. Adjustments to the recommendations were made and another series of public meetings were held in August 2017 with a set of revised recommendations, including changes in Henrico County. Adjustments that were made include revisions to the route numbers to ensure they were consistent and did not add to confusion, adding the Mosby Street loop to Route 5 in the East End, shifting the western terminus of the Fulton area routes from the Rocketts Landing BRT to 24th Street BRT station, extending the Ruffin Bells Shuttle route to extend to Southside Plaza and extending the termini of Routes 2c and 20 to cover a little more area south and east of Broad Rock. These changes are relatively minor compared and retain the overall network structure designed during the RTNP process.

GRTC has continued to make relatively minor updates to the routing, frequency of service, and span of service for the recommended changes based on public feedback. The recommended routing of service as of August 2017 is shown in Figures 3-16 and 3-17.

Figure 23 Historic GRTC Routes Categorized by Frequency



Note: Routes that do not operate midday, or have many hours between trips in the midday, are shown in light blue. Routes that make non-stop express trips from outlying areas into Richmond also make few or no trips in the midday, and they are shown in violet.

Figure 24 Richmond Transit Network Plan Recommended Routes and Frequencies

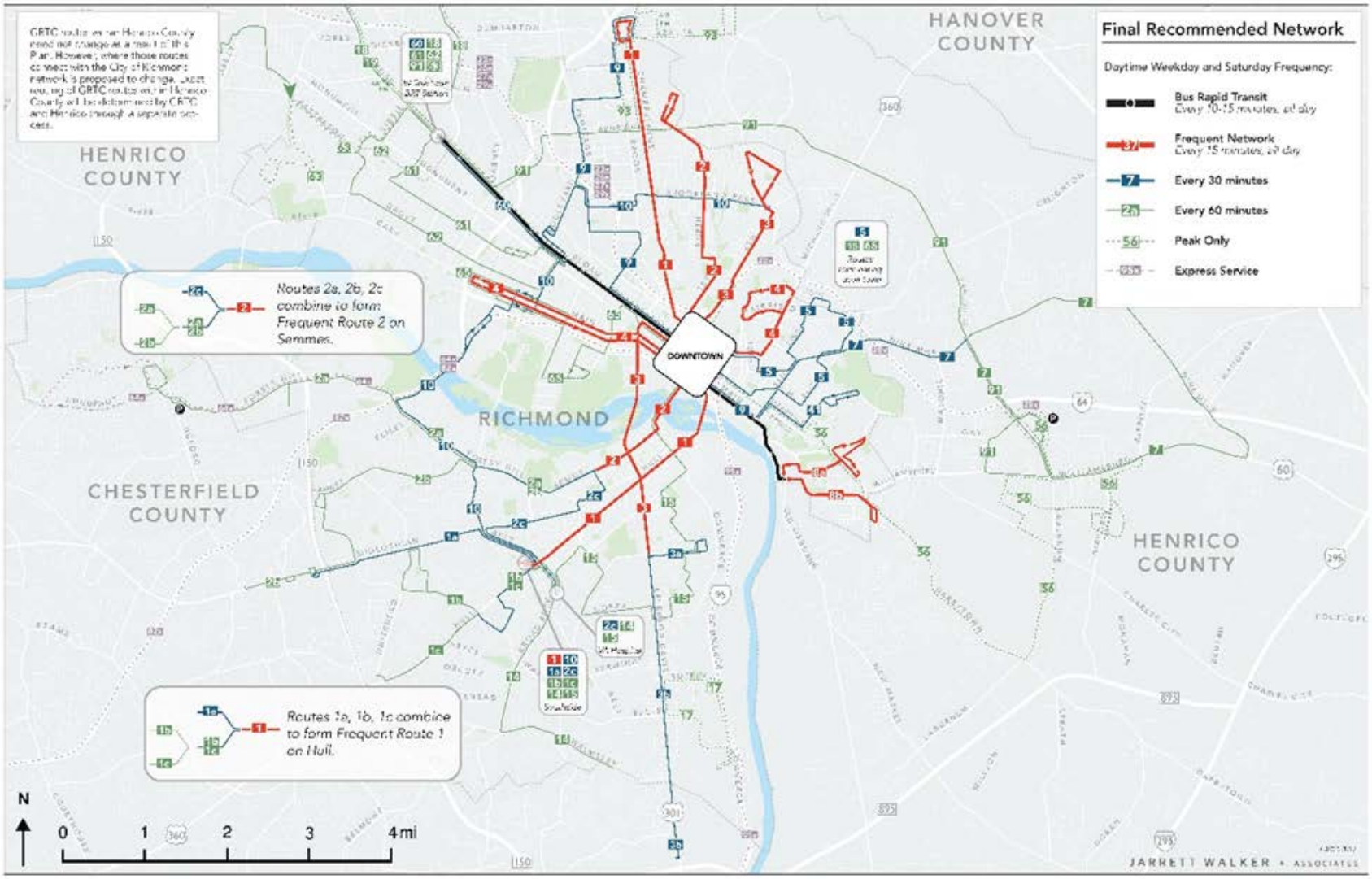


Figure 25 Richmond Transit Network Plan Recommended Routes and Frequencies – Downtown Detail

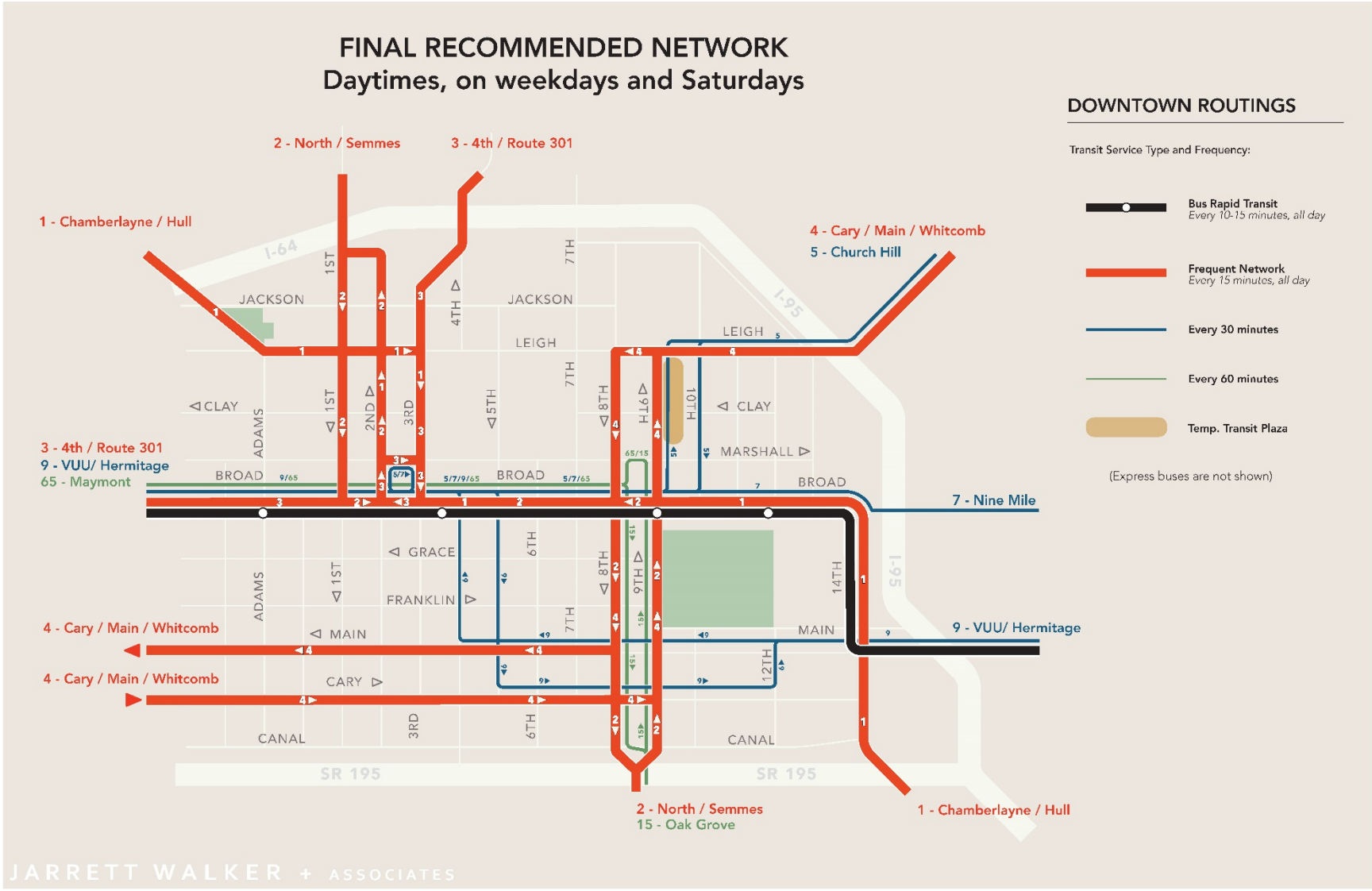


Figure 26 Richmond Transit Network Plan Recommended Routes and Frequencies (August 2017)

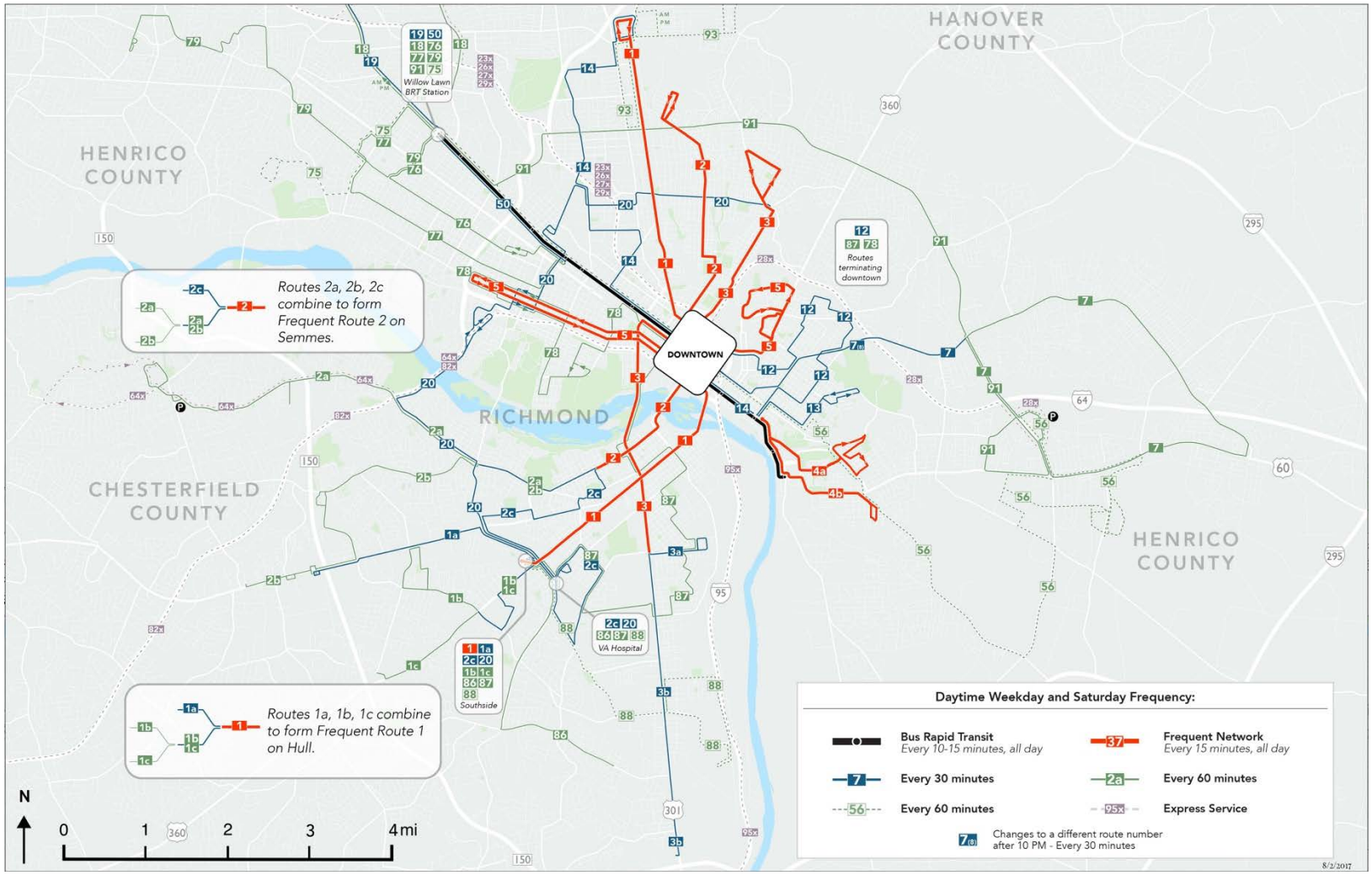
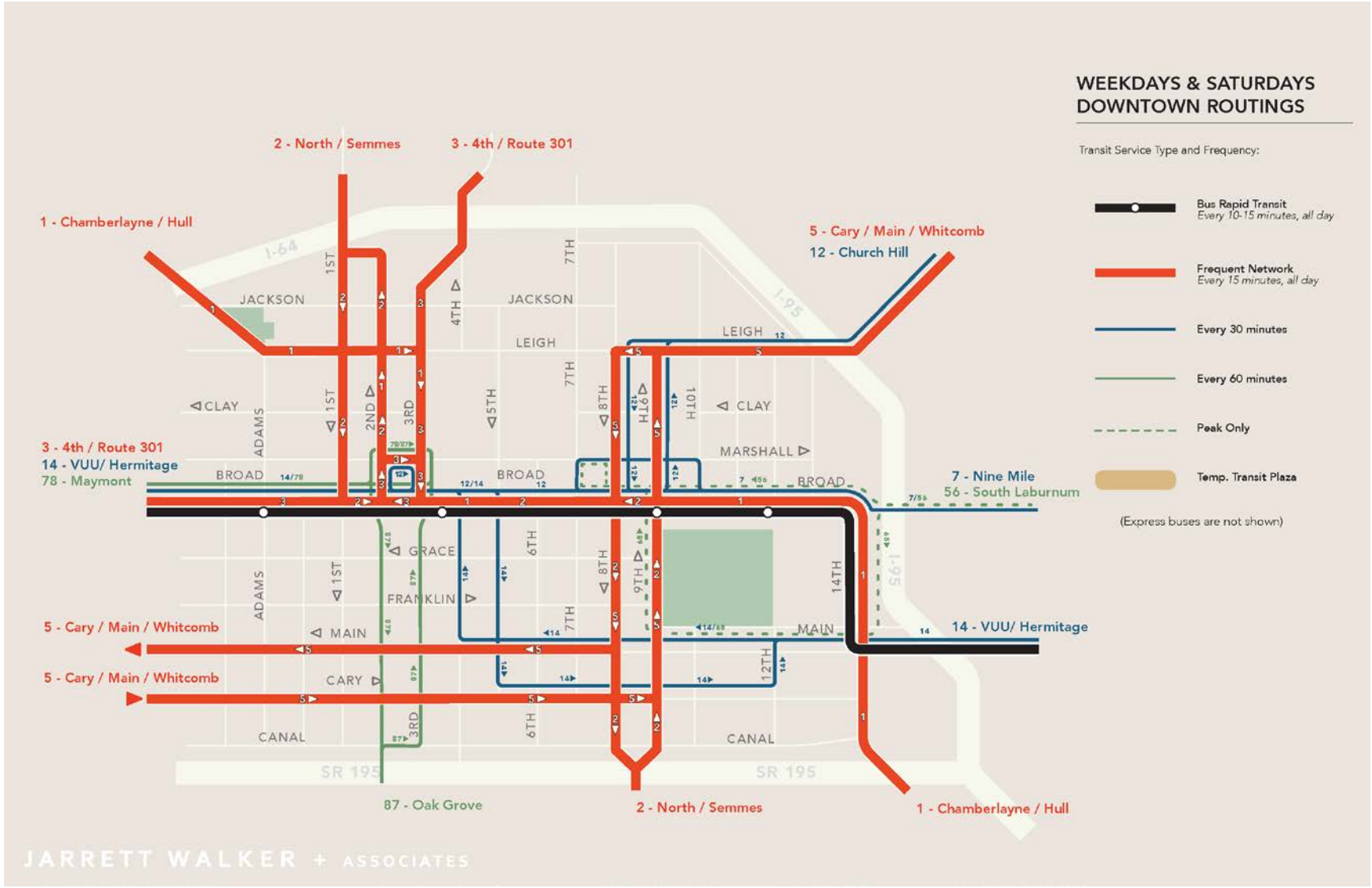


Figure 27 Your New GRTC Transit System Recommended Routes and Frequencies – Downtown Detail (August 2017)



In addition to public input, certain principles of good transit design are also reflected in the final network, namely:

- **Consistent frequencies:** Routes will have consistent headways, or frequencies.
- **Consistent route spacing:** The spacing between parallel routes should be consistent across the city, to the extent that the street network allows it.
- **Directness**: Routes are designed to be as direct as possible between major activity centers.
- **Through routing across town**: Routes may cross the City of Richmond, passing through downtown but not necessarily terminating there.

The principles of the new recommendations were to improve span of service and midday frequencies to result in a more streamlined and comprehensible system. Ridership is anticipated to benefit from increased access to higher frequency, longer running, and higher speed service. The difference between the service spans and frequencies of routes in the historic network and the recommended network are presented in Figure 3-18 and Figure 3-19.

Figure 28 Historic GRTC Routes Frequencies and Span of Service

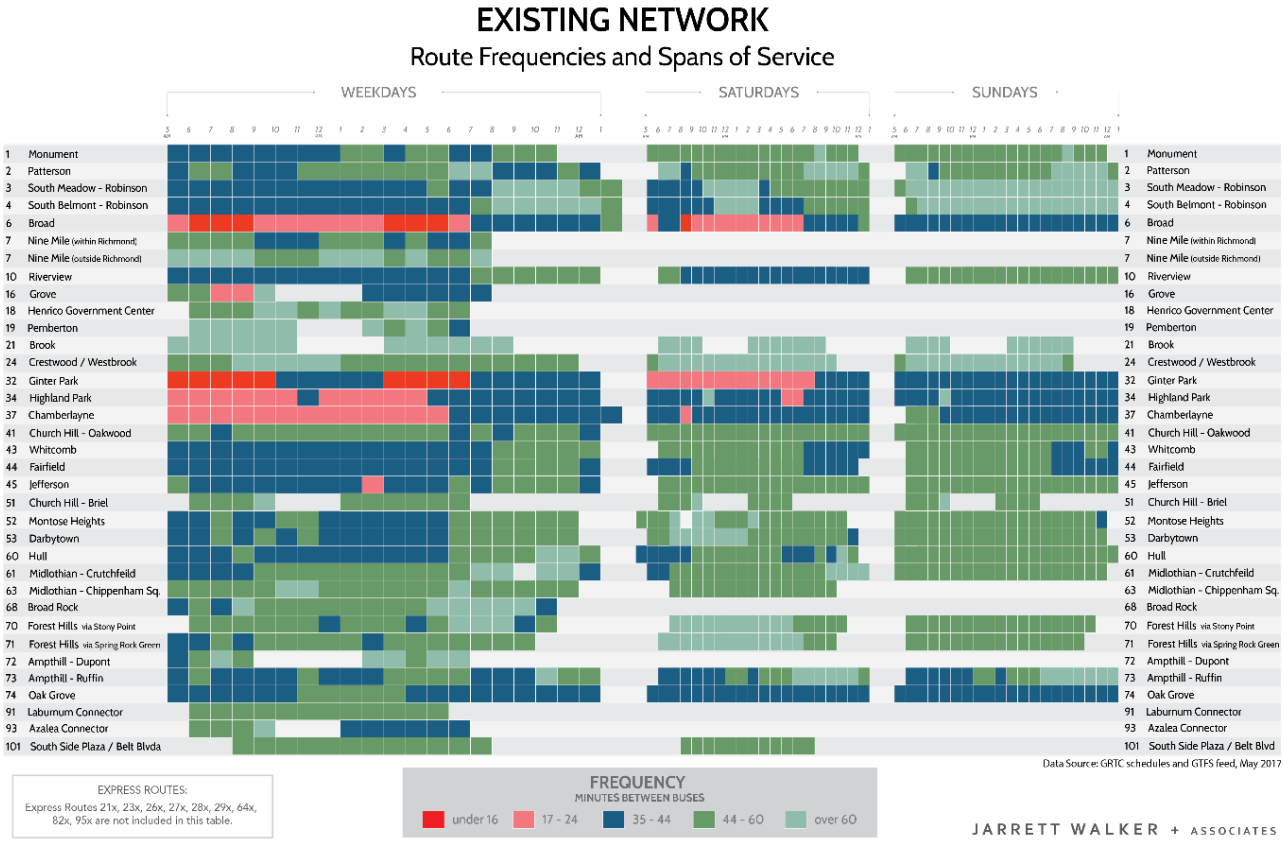
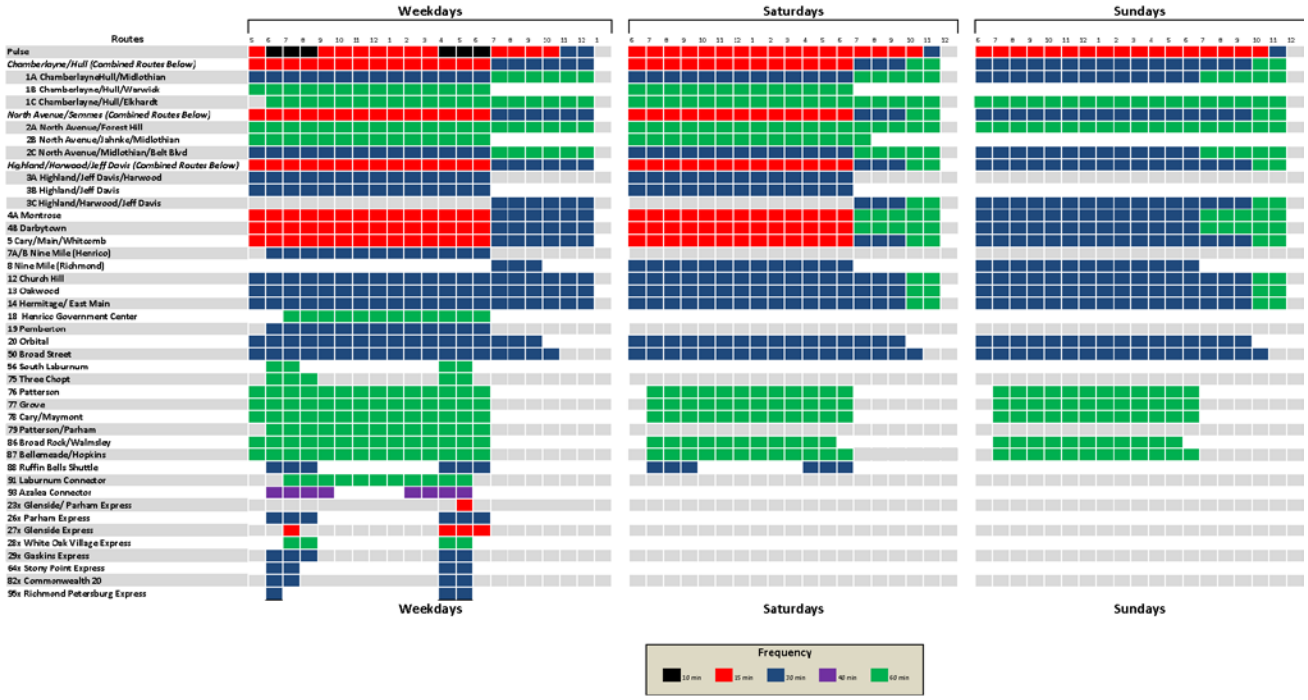


Figure 29 Your New GRTC Transit System Route Frequencies and Span of Service (July 2017)



The higher frequency routes will enable transfers between routes wherever they intersect on Broad Street or at other downtown locations. All new lower frequency services on weekdays and Saturday envisioned in the Richmond Transit Network Plan (20, 30, 60 minute frequencies) would maintain service through the current temporary transfer plaza and can shift to permanent transfer center in the future. A central transfer location remains important as bus frequencies drop in the evening and on Sunday. Nothing in the Final Recommended Networks precludes making improvements to the Transfer Plaza or moving it to another location (as long as that location is central to downtown).

The combined improvements of the Pulse BRT service plus the clockface schedules, more frequent service on the busiest corridors, easier connections and through routing of service through downtown from the RTNP is expected to improve access for many people in the GRTC service area. The analysis of the draft RTNP network in January 2017 showed that the new network would increase the percentage of people near frequent service from none today to over 100,000 people with the new network and BRT. And the number of jobs near frequent service will increase from none today to over 100,000 with the BRT and the new network.

Access improvements will be particularly strong for people connecting from the northside and southside to the west end with the new orbital route providing a more direct service. Access will also be dramatically better for direct trips from northside to southside along one of the new through routes (Routes 1, 2, and 3) and for east-west trips along the Pulse BRT and Route 5 because those trips will now have direct service through downtown.

GRTC conducted a Major Change and Service Equity Analysis as part of its Title VI obligations to assess the impacts of this major service change to protected populations, specifically minority and low-income populations. Based on the analysis, the changes proposed in the RTNP would result in an overall increase in service of 19% and minority residents would see 68% of the increase in service, compared to

non-minority residents, who would only see 32% of the service increase. Thus, the analysis concluded that there would be no disparate impact to minority populations, but in fact, minority populations would benefit more than non-minority. Similarly, GRTC analyzed impacts to low-income populations and the results showed that low-income populations would see 24% of the increase in service, less than the 76% that non-low-income populations would see, but still above the threshold that would cause a disproportionate burden.

3.4.1 *Henrico County Choices and Concepts*

Following the RTNP process, and in tandem with the planning for this Transit Development Plan, Henrico County and GRTC engaged in a more detailed planning process to consider short and long-term improvements in the County's transit network and to ensure the seams between the transit network in the City and County coordinated in clear and sensible ways.

In the summer and fall of 2017, GRTC and the County produced a set of draft short-term recommendations and long-term concepts for how to grow and expand the transit network in Henrico.

Figure 30 Short-Term Henrico Map

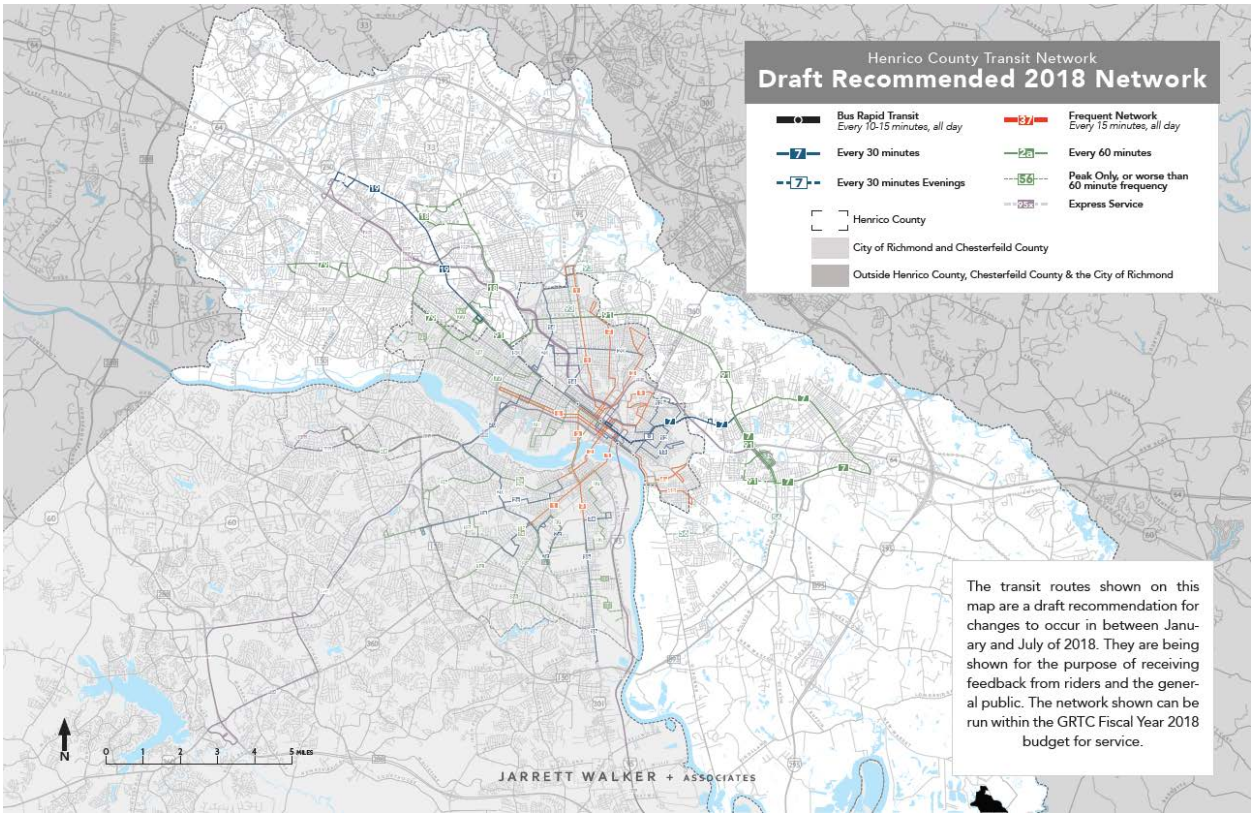


Figure 30 shows the map of the short-term recommendations that were presented to the public in a series of three public meetings in the fall of 2017. The major changes included in the short-term recommendations were

- Extension of Route 79 (the replacement for the Route 2 Regency in Henrico County) to Gayton and Gaskins Roads.

- Shifting the eastern terminus of Route 19 to Willow Lawn (instead of downtown) and increasing the frequency to every 30 minutes.
- Simplification of Route 18 to operate primarily in a two-way pattern on Staples Mill Road from Willow Lawn with improved service to the Staples Mill Amtrak Station. The route would also operate through Libbie Mill.
- Changing Route 7 to a consistent every 30-minute frequency on the trunk route and every hour on the branches and extension of both branches to provide every 30-minute service to Richmond International Airport.

These short-term recommendations were designed to be cost neutral relative to the County's expected 2017-2018 funding for transit. All of these changes were considered further through this TDP process. Most are expected to be implemented with the rollout of the Pulse BRT and RTNP network changes on June 24, 2018.

Figure 31 and Figure 32 show the two long-term concepts for expanding transit in the county. These concepts assumed that funding for fixed route transit could increase by fivefold, to about $22 million per year (in 2017 dollars). One concept showed how to expand in a way that maximizes ridership per dollar spent. The other concept showed how to expand in a way that maximized the coverage of service.

Responses from the public, stakeholders and other indicated a general preference for moving toward a path in between the two concepts, with stakeholders preferring a direction closer to the Ridership Concept.

Figure 31 Henrico County Long-Term Ridership Concept

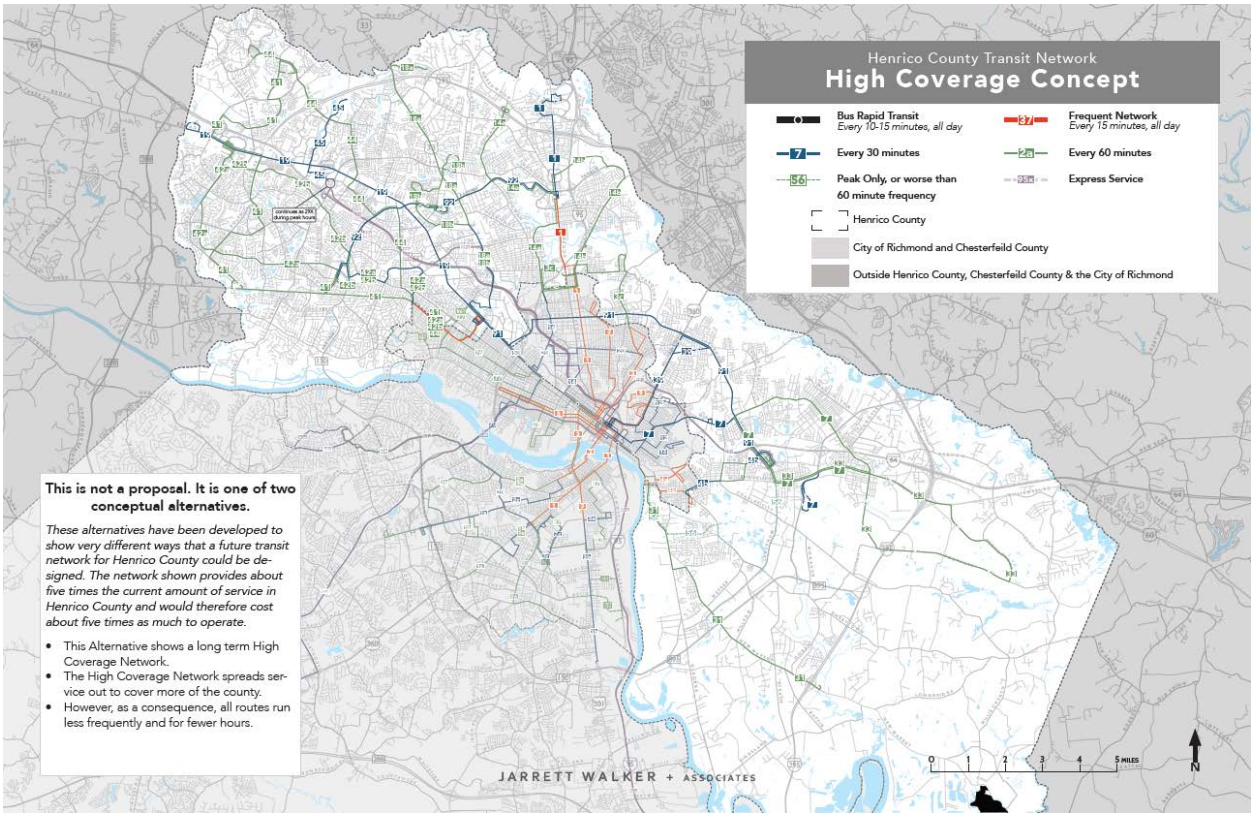
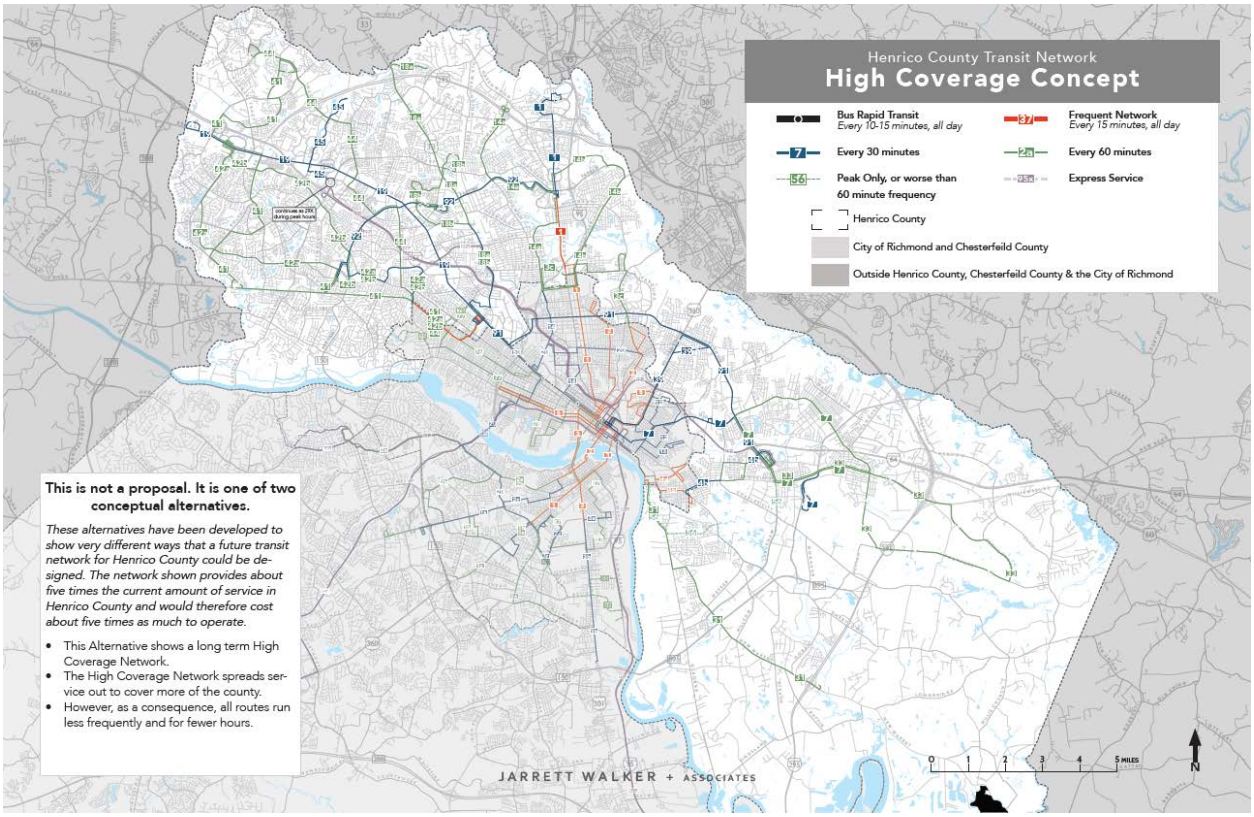


Figure 32 Henrico County Long-Term Coverage Concept



3.4.2 *Corridor Analysis*

In order to translate past performance into the recommended route structure as a result of the Richmond Transit Network Plan, this TDP will translate route-level information that captures both networks as found in 13 representative service corridors. The corridors do not cover the totality of GRTC fixed route service, but highlight critical areas of the entire network. These corridors will provide a baseline for future evaluation upon implementation of the new network design. These corridors are depicted in Figure 3-20 through Figure 3-33. Each corridor detail map provides operating statistics and the future overlay of the new network route and frequencies over the historic system. The initial phases of this TDP will require monitoring of these corridors to determine the benefits (ridership, speed) from the changes implemented and to identify needed adjustments as the new system matures.

Figure 33 GRTC Corridor Analysis Key Map

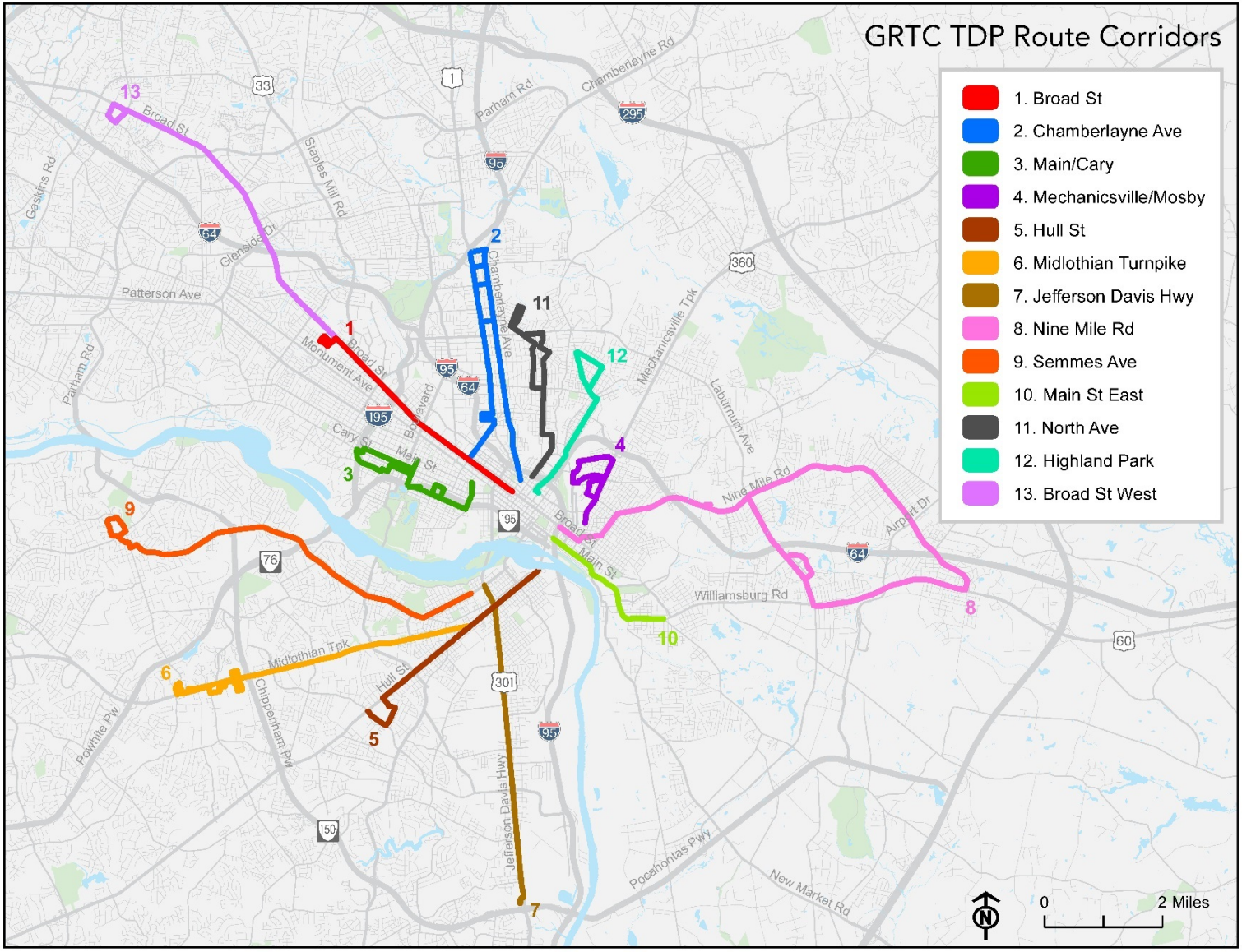


Figure 34 Broad St Corridor Existing Routes, Boardings and Alightings, and Future Routes

1. Broad St Corridor

Broad St Corridor: Existing

Routes 6, 1, 2, 3, 4, 10

Total Boardings
2,507

Total Alightings
2,459

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
6	17	2,774	31.8
1	40	484	17.2
2	43	691	15.5
3	38	581	18.5
4	37	561	18.4
10	32	485	18.3

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

Broad St Corridor : Future

Route Frequency
BRT
15 Min
30 Min
60 Min

Figure 35 Chamberlayne Ave. Corridor Existing Routes, Boardings and Alightings, and Future Routes

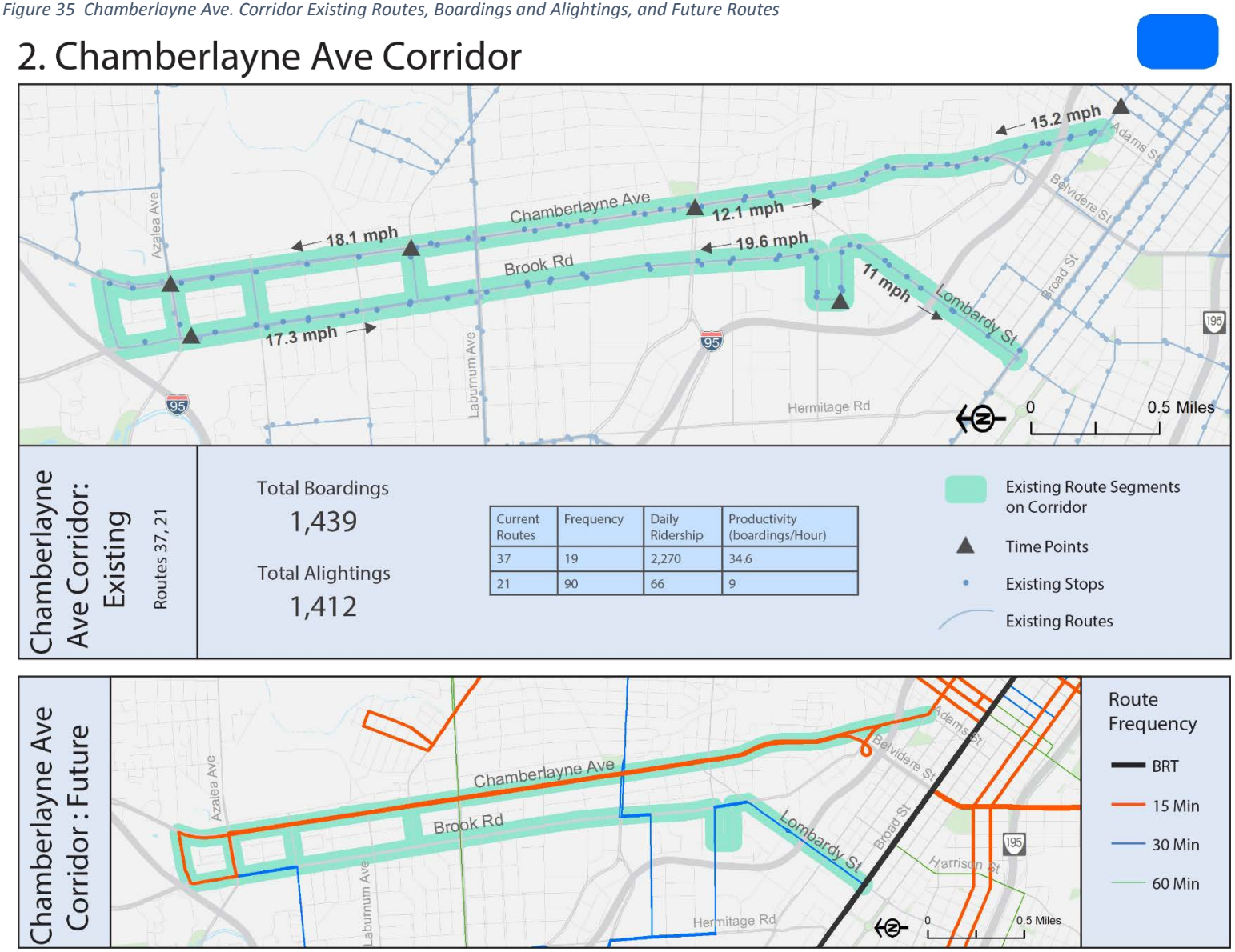


Figure 36 North Avenue Corridor Existing Routes, Boardings and Alightings, and Future Routes

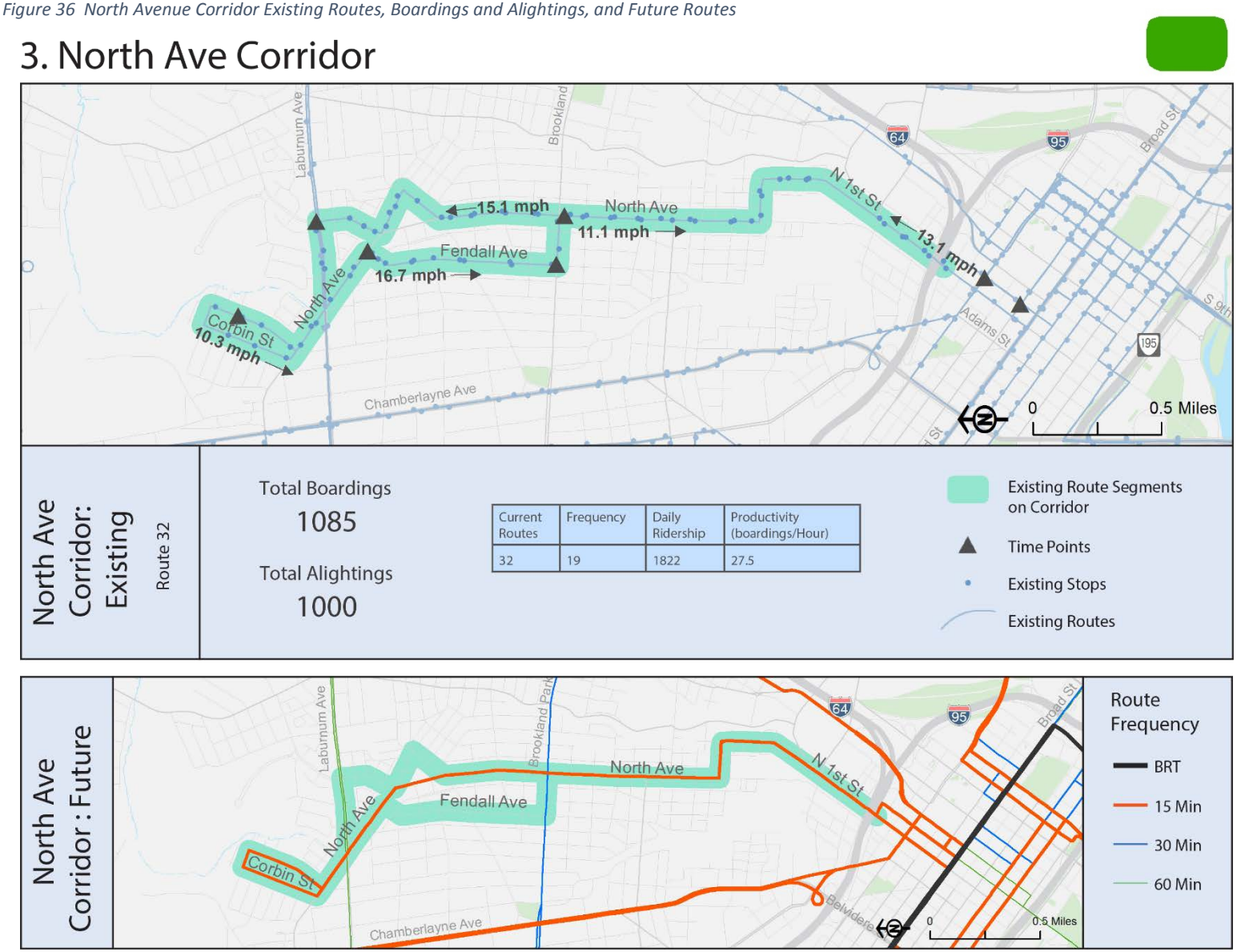
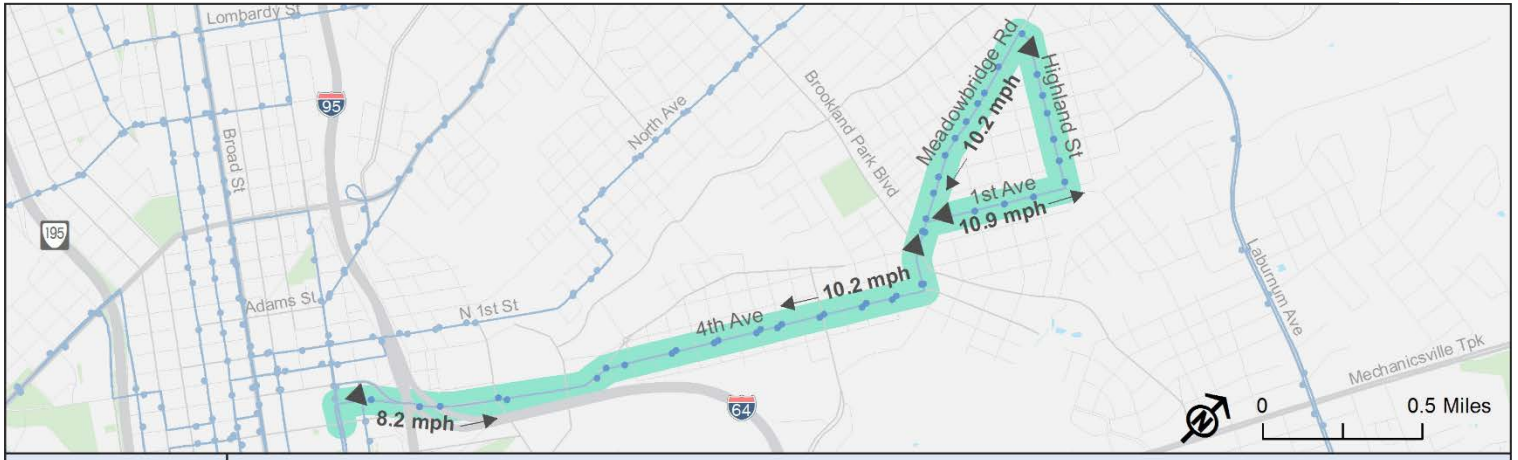


Figure 37 Highland Park Corridor Existing Routes, Boardings and Alightings, and Future Routes

4. Highland Park Corridor



Highland Park Corridor: Existing Route 34

Total Boardings
735

Total Alightings
687

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
34	21	1195	27.0

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

Figure 38 Mechanicsville/Mosby Corridor Existing Routes, Boardings and Alightings, and Future

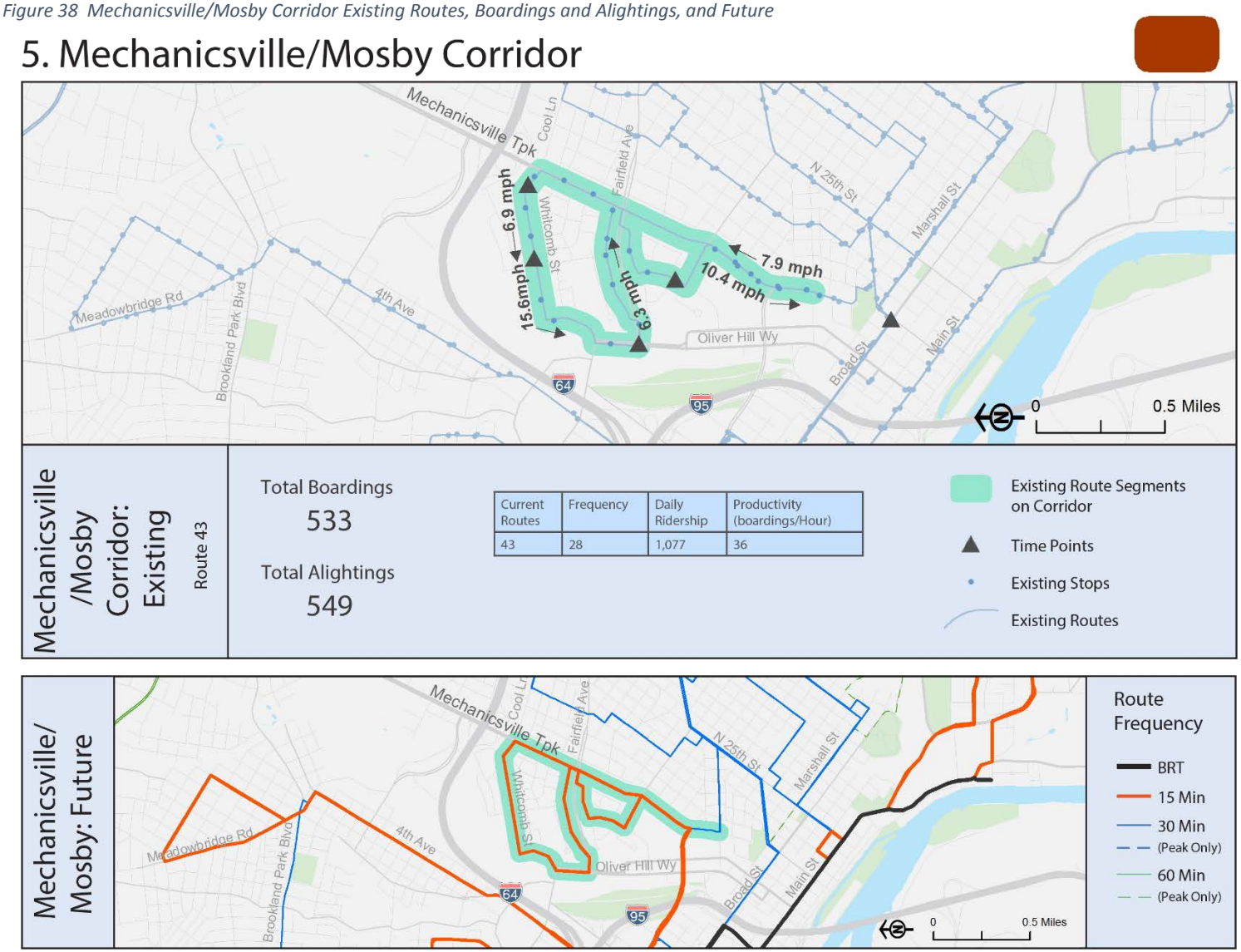


Figure 39 Nine Mile Road Corridor Existing Routes, Boardings and Alightings, and Future Routes

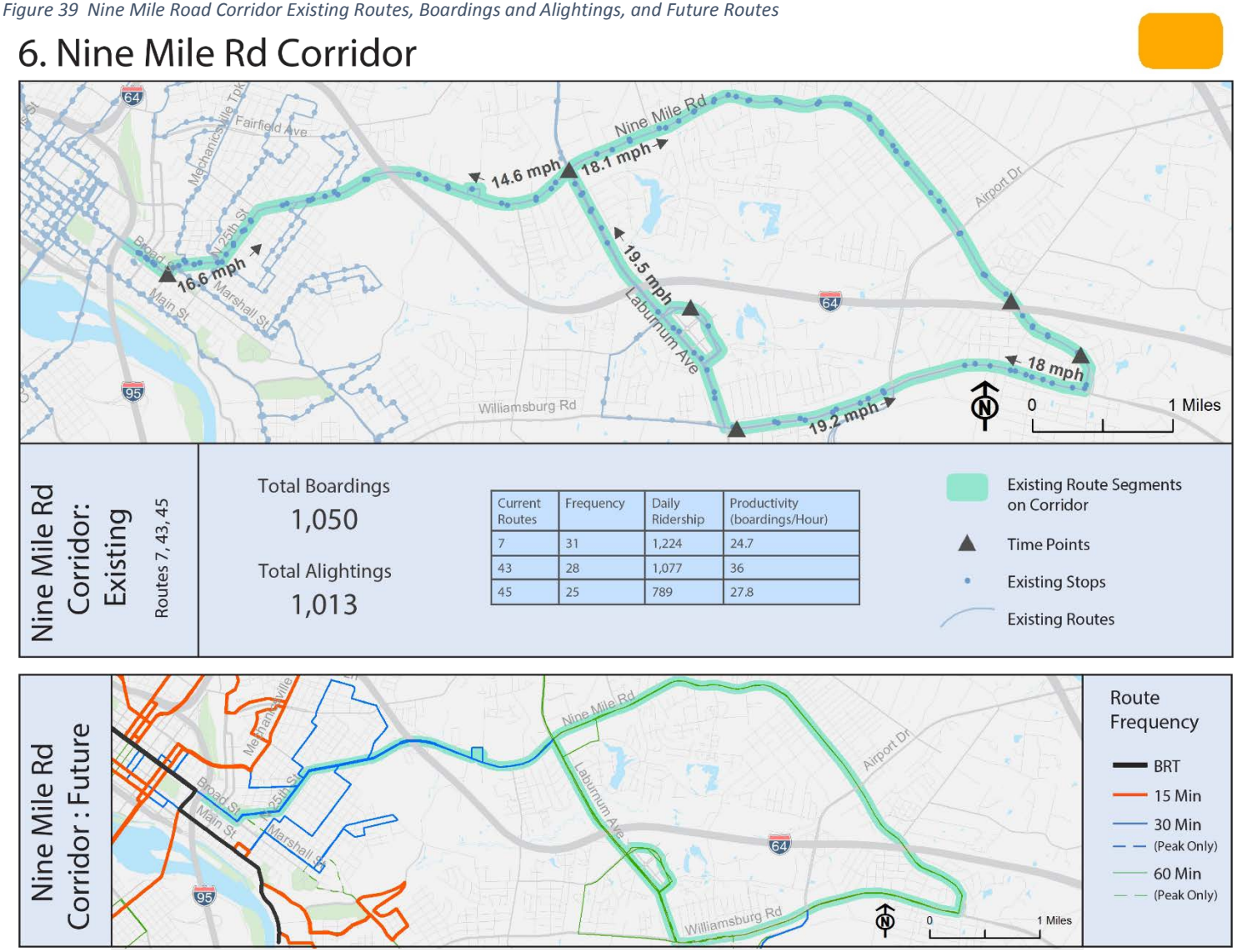


Figure 40 Main Street East Corridor Existing Routes, Boardings and Alightings, and Future Routes

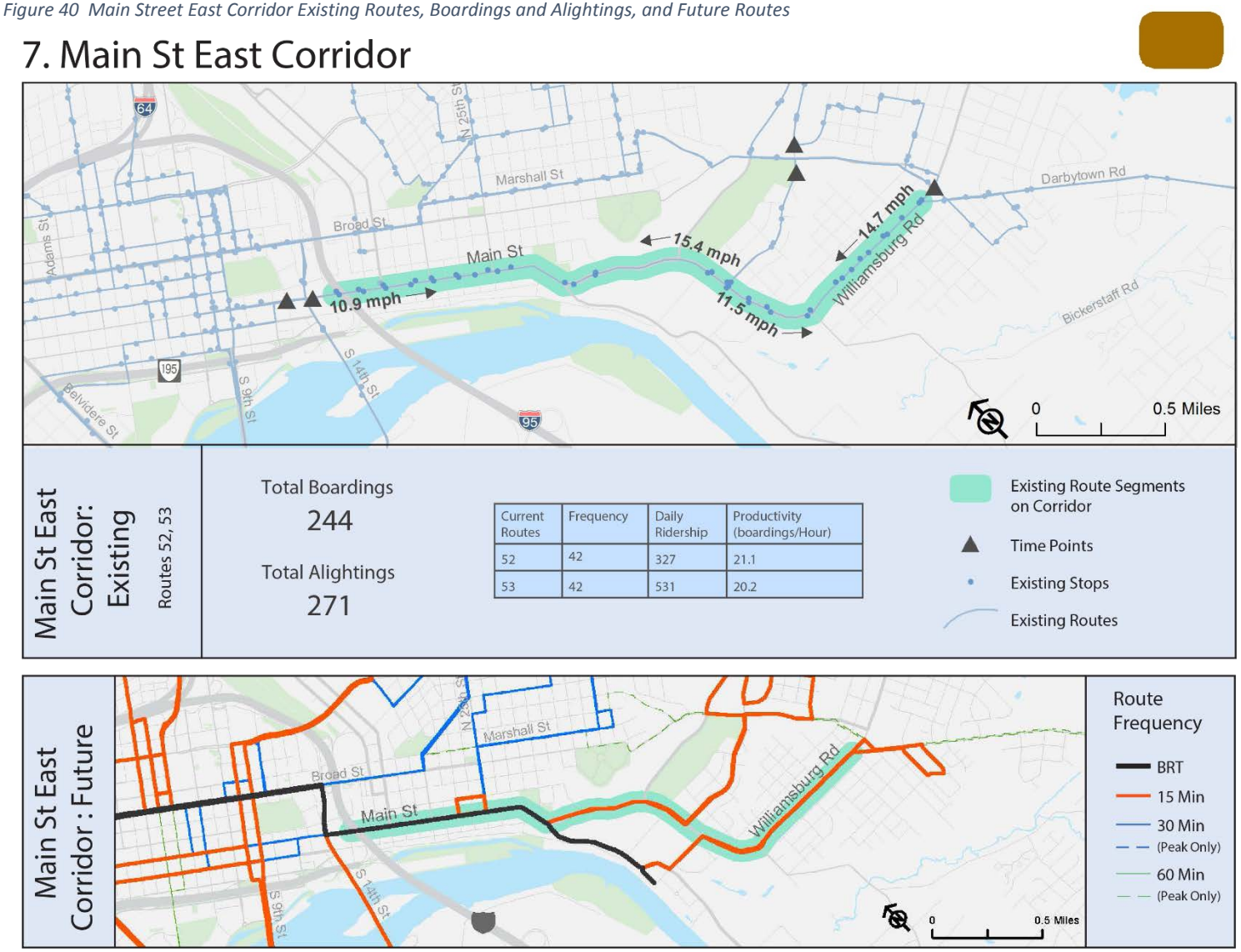
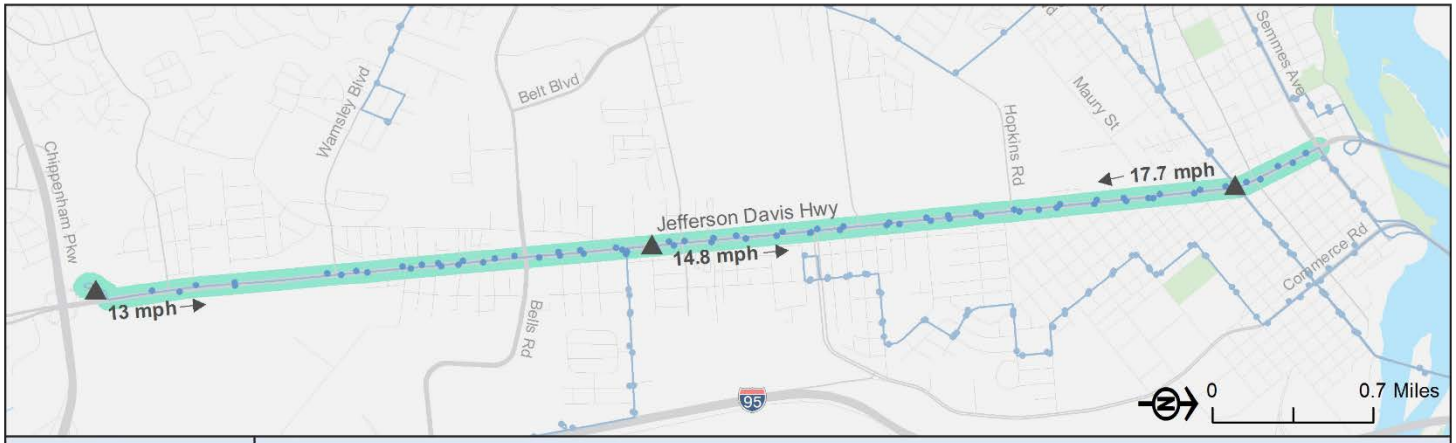


Figure 41 Jefferson Davis Highway Corridor Existing Routes, Boardings and Alightings, and Future Routes

8. Jefferson Davis Highway Corridor



Jefferson Davis Corridor: Existing
Routes 72, 73

Total Boardings
686

Total Alightings
687

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
72	45	147	17.7
73	29	1,038	23

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

Figure 42 Hull Street Corridor Existing Routes, Boardings and Alightings, and Future Routes

9. Hull St Corridor

Hull St Corridor: Existing

Routes 60, 68, 61, 63

Total Boardings
829

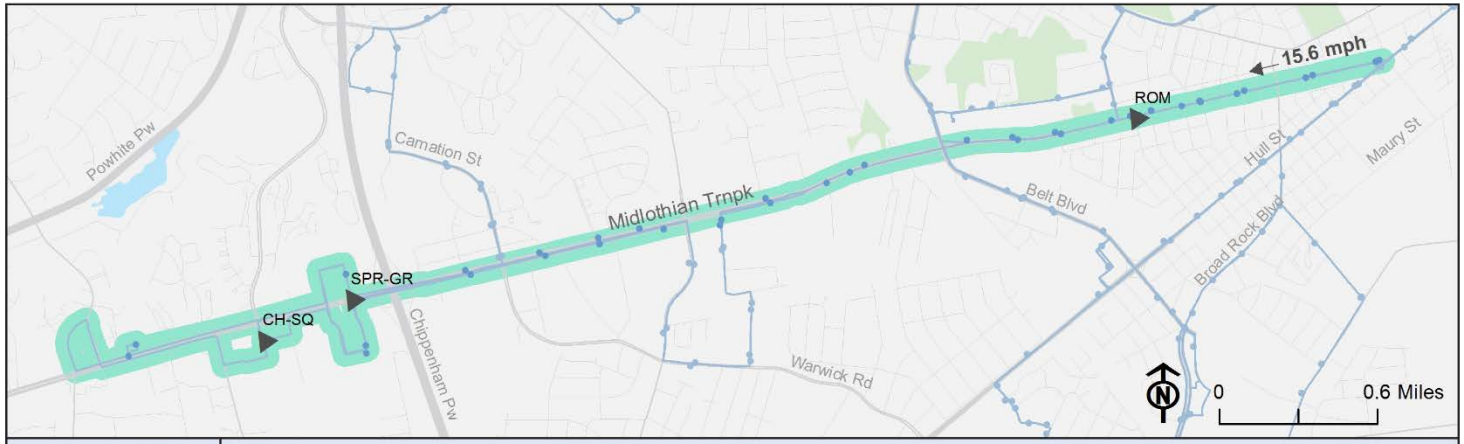
Total Alightings
1,024

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
60	34	1,460	27.2
68	52	639	21.7
61	43	507	16.5
63	56	740	24.2

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

Figure 43 Midlothian Turnpike Corridor Existing Routes, Boardings and Alightings, and Future Routes

10. Midlothian Turnpike Corridor



Midlothian Corridor: Existing

Routes 61, 63

Total Boardings
402

Total Alightings
439

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
61	43	507	16.5
63	56	740	24.2

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

Figure 44 Semmes Avenue Corridor Existing Routes, Boardings and Alightings, and Future Routes

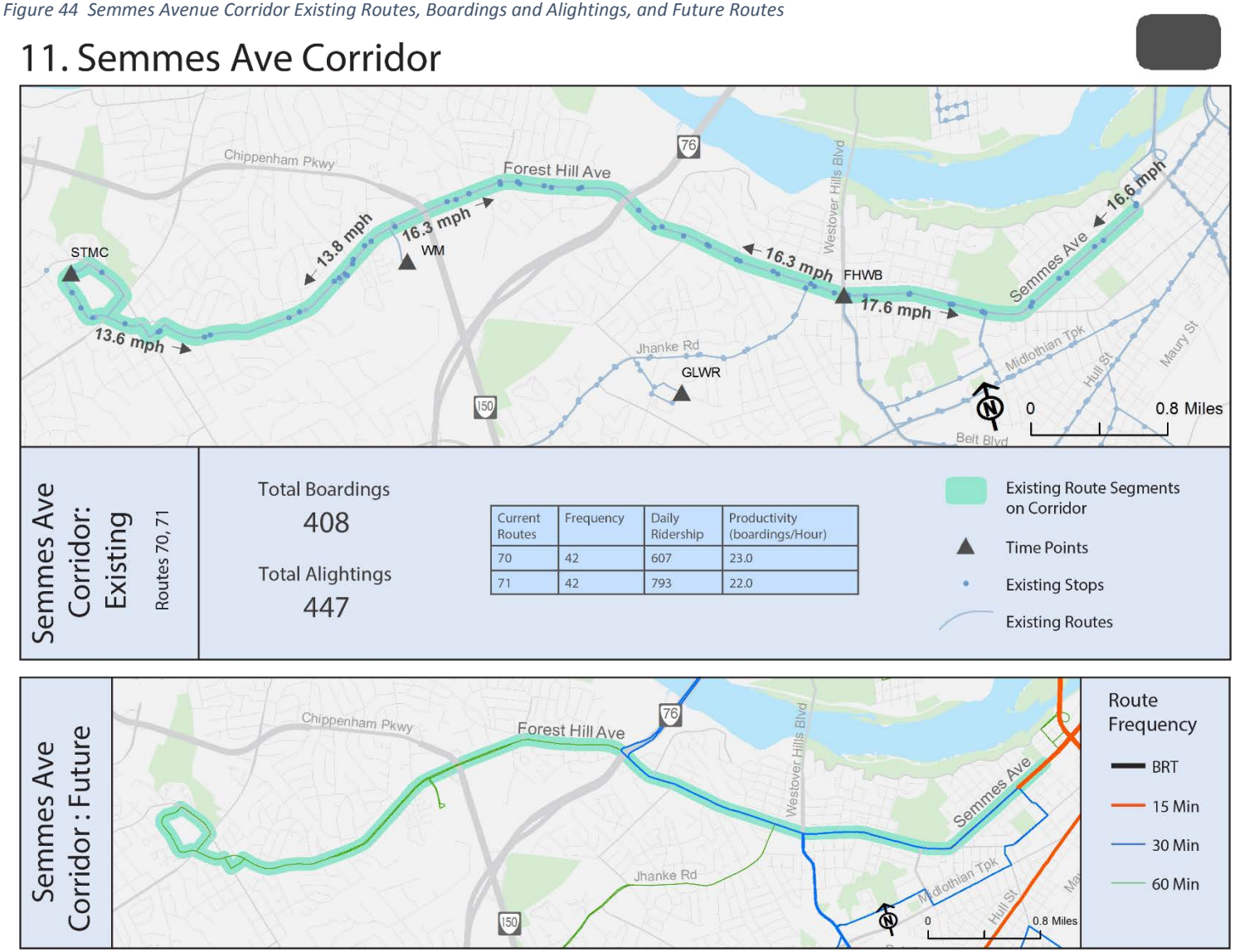


Figure 45 Main/Cary Corridor Existing Routes, Boardings and Alightings, and Future Routes

12. Main/Cary Corridor

Main/Cary Corridor: Existing

Routes 3, 4, 10

Total Boardings
331

Total Alightings
336

Current Routes	Frequency	Daily Ridership	Productivity (boardings/Hour)
3	38	581	18.5
4	37	561	18.4
10	32	485	18.2

Existing Route Segments on Corridor
Time Points
Existing Stops
Existing Routes

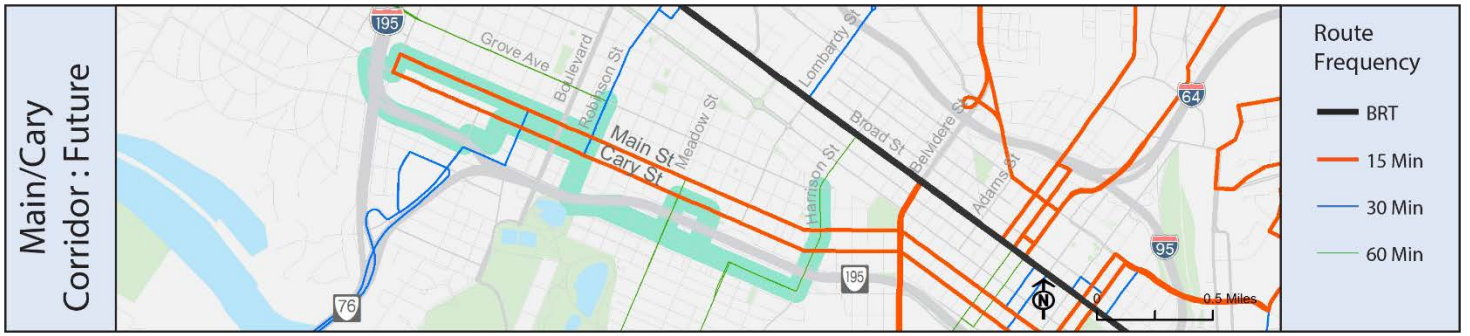
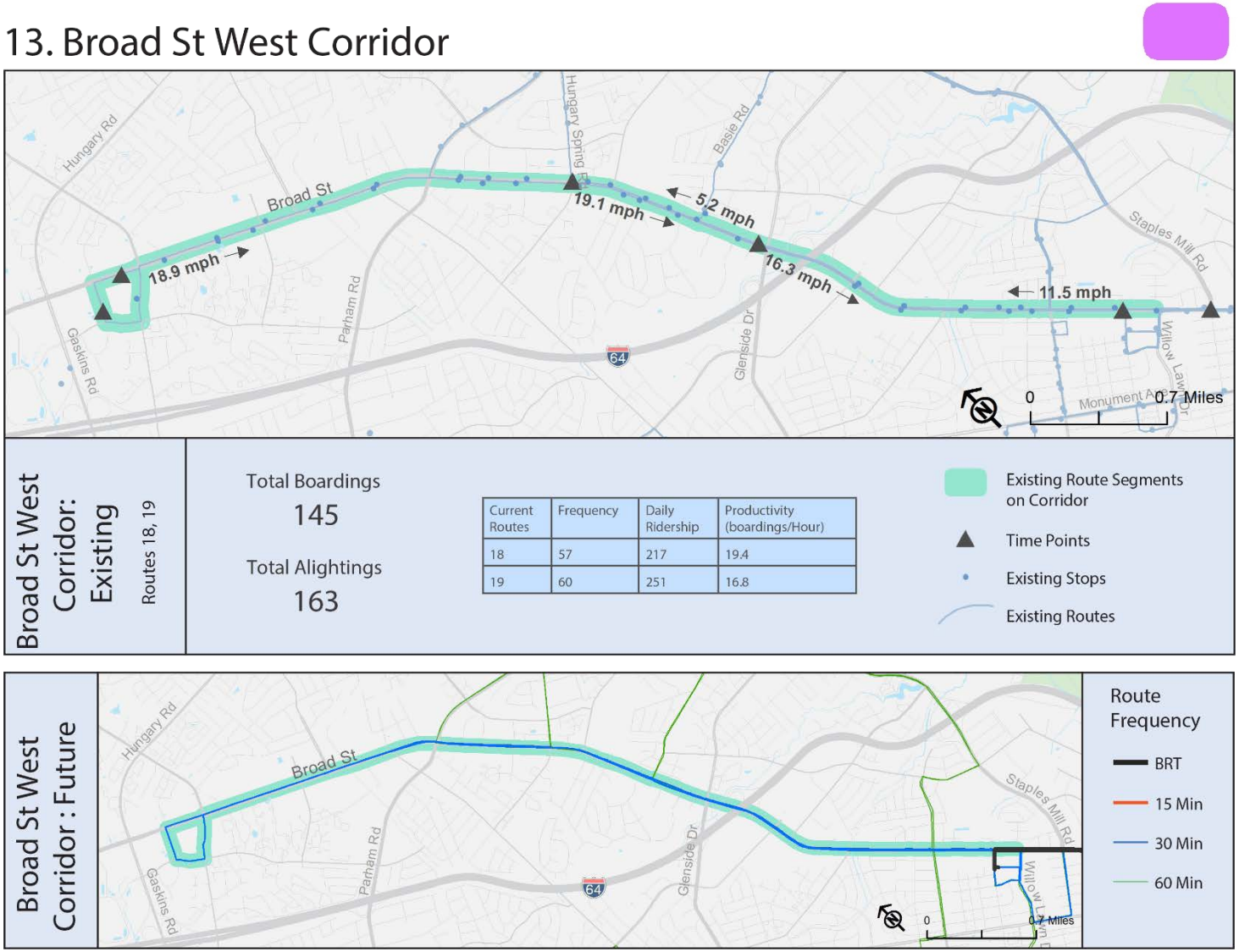


Figure 46 Broad Street West Corridor Existing Routes, Boardings and Alightings, and Future Routes



3.5 Performance Trend Analysis

This section analyzes GRTC's fixed route and specialized service performance over three fiscal years, FY 2014, FY 2015 and FY 2016. The trends illustrate that ridership has been growing slowly and steadily in spite of continued reductions in the service provided (see Table 3-17). The result of higher ridership and less service is increased productivity, with measures for 2016 showing that costs have been contained and have been decreasing. Farebox revenue has declined, but overall operating expenses have declined as well, resulting in a lower net cost per passenger.

Table 3-17 Fixed Route Service Trends

Fixed Route Trends	2014	2015	2016	% Change
Ridership	8,351,424	8,435,747	**8,543,964**	2.31%
Revenue Miles	4,345,056	4,284,042	**4,187,216**	-3.63%
Revenue Hours	382,796	394,662	**353,562**	-7.64%
Passengers / Revenue Mile	1.92	1.97	**2.04**	6.16%
Passengers / Revenue Hour	21.82	21.37	**24.17**	10.76%
Farebox Revenue	$9,231,345	$8,520,715	**$8,327,583**	-9.79%
Operating Expense	$37,697,868	$36,873,988	**$35,507,592**	-5.81%
Net Cost / Passenger	$3.41	$3.36	**$3.18**	-6.67%
Cost / Revenue Mile	$8.44	$8.58	**$8.48**	0.47%
Cost / Revenue Hour	$94.21	$91.52	**$93.24**	-1.03%

All performance trends indicate that specialized transit is growing in terms of ridership and service delivery (see Table 3-18). The services being provided are becoming more efficient, with declining expenses and costs per passenger. The cost efficiencies may be a result of savings through a contract service provided, however certain cost savings may have come at the expense of the service quality.

Table 3-18 Specialized Service Trends

System Trends	2014	2015	2016	% Change
Ridership	354,716	364,171	375,336	5.81%
Revenue Hours	149,248	146,066	153,726	3.00%
Passengers / Revenue Hour	2.38	2.49	2.44	2.73%
Operating Expense	$6,928,186	$6,735,483	**$6,689,938**	-3.44%
Total Cost / Passenger	$19.53	$18.50	$17.82	-8.74%

3.6 Service Evaluation

This section presents an evaluation of the historic GRTC system and findings from analysis to date prior to implementation of new Pulse BRT and high-frequency network changes. Continual monitoring of this performance in the near-term will be imperative to determine the effect of the fixed route reorganization in improving upon system performance targets or in order to identify a need for specific route modifications.

3.6.1 *Key Performance Indicators*

Many transit agencies establish Key Performance Indicators to be shared in both public and internal reporting to allow for accountability. GRTC currently performs internal route-based measures to trigger re-evaluation of underperforming service. On a quarterly/booking basis, GRTC staff review the performance of the routes by how they compare to their category average performance measures (See Figure 3-36). The data is based on APC/AVL data, and GFI farebox data.

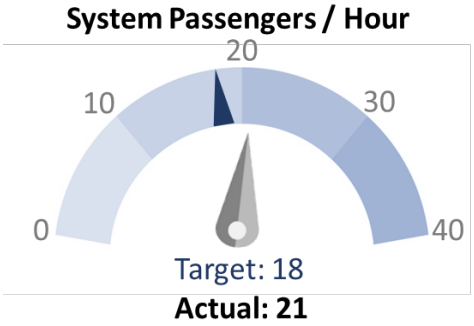
Figure 47 GRTC Performance Monitoring Approach

Category	Route	Pass/Hrs	Pass/Mi	Net$/Pass	Farebox	Pass/Trip	OTP	
Community Radial	**10**	16.29	2.12	$ 5.58	20%	8.11	74%	
Community Radial	**16**	10.25	0.97	$ 10.97	11%	7.50	73%	
Community Radial	**19**	16.08	1.22	$ 8.39	22%	11.04	55%	
Community Radial	**21**	6.95	0.78	$ 18.24	7%	5.18	74%	
Community Radial	**41**	15.73	2.18	$ 5.58	20%	5.83	93%	
Community Radial	**43**	31.85	4.55	$ 1.69	45%	15.76	88%	
Community Radial	**44**	23.93	3.51	$ 2.80	33%	11.56	89%	
Community Radial	**45**	25.41	3.12	$ 2.99	32%	10.57	86%	
Community Radial	**51**	17.57	2.10	$ 5.27	22%	6.57	84%	
Community Radial	**52**	18.85	1.93	$ 6.03	19%	9.63	80%	
Community Radial	**53**	18.48	2.01	$ 4.94	23%	9.01	74%	
Community Radial	**72**	17.77	1.59	$ 6.46	18%	12.85	80%	
Community Radial	**74**	17.90	1.88	$ 5.54	21%	11.90	69%	
Pass (Less than 40% Below)	Avg	**18.23**	**2.15**	**$ 6.50**	**23%**	**9.65**	**78%**	**Pass**
Watch	40% Below Avg	**10.94**	**1.29**	**$ 9.10**	**14%**	**5.79**	**70%**	**Watch**
Fail	50% Below Avg	**9.12**	**1.08**	**$ 9.75**	**11%**	**4.83**	**55%**	**Fail**

External reporting may be a tangible way to gauge the progress of the new network changes GRTC will undertake at the outset of this TDP planning horizon. The Key Performance Indicators would be those most critical to success of the newer high frequency service. External reporting to the public would touch upon only high-level system performance, while employees could receive more frequent updates and much more detailed performance measurement reports as part of a larger performance program. As with the current quarterly analysis conducted by GRTC staff, this reporting would be analyzed to determine where opportunities for improvement exist. A high-level presentation of such reporting using the historic network data and the latest GRTC performance targets from Chapter 2 follows:

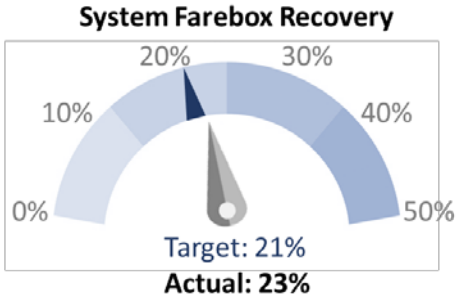
Key Performance Indicator**: Passengers / Revenue Hour**

A universal transit industry measure of service productivity is obtained by counting the number of unlinked passenger trips for each hour the bus operates. The use of unlinked passenger trips essentially counts each time a person boards a vehicle as a passenger. Based on the recent booking, GRTC's system wide passengers per revenue hour is currently 21.4, which exceeds the performance target of 18 passengers per revenue hour. In relationship to the amount of service GRTC is providing, the resulting ridership is low. GRTC's peer average in this measure is over 27 passengers per hour. GRTC allows different standards for each route category, to reflect different service characteristics. Of the GRTC historic routes, 14 did not achieve this performance target set for their route category. The entire group of four Circulator/Feeder/Connector routes did not achieve their target of 22 passengers per revenue hour. The group average was 15.5 passengers per revenue hour. GRTC does not specify a minimum threshold for this measure, however any route that is performing at 50% of the average will be targeted for service adjustments to improve performance.



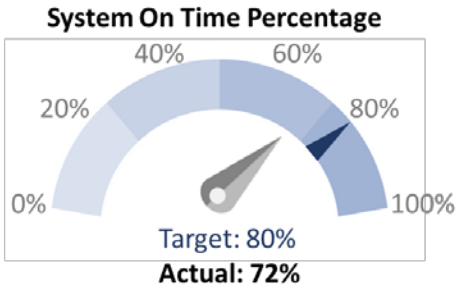
Key Performance Indicator: **Farebox Recovery**

The amount of trip cost directly paid by passengers is an important system management and operations metric. GRTC has a system wide goal of 21% farebox recovery for the system, with specific route category targets of 12 – 30 percent depending upon the route type. The GRTC targets are typically 2 percent below the average for all route categories. Based on recent booking data, the fixed route system average is around 18 – 25 percent, with the variability due to monthly ridership fluctuations given the fixed service costs. A total of 16 routes in the most recent booking did not achieve the target for their route category. GRTC's farebox recovery ratios have been relatively stable over the last few years, around 23 – 24 percent even while fare revenue has been declining.



Key Performance Indicator**: On-time Performance**

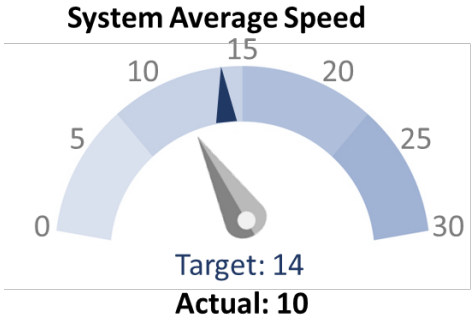
Transit on-time performance is a leading indicator of service reliability. Industry benchmarks typically define on-time as the percentage of actual arrival times that are between one minute early and five minutes late at designated points along transit routes. Very few GRTC routes met the on-time performance standard of 80% set by GRTC. Based on recent booking data, the fixed route system average is around 70 – 72 percent. The historic Community Radial Route 41 – Church Hill and Route 44 – Fairfield/Fairmount has the best on-time performance of 94 percent and 89 percent respectively. A total of six of 13 routes in the Community Radial category achieve this threshold.



Many factors affect bus on-time performance. Some are within GRTC's control (e.g., mechanical or scheduling issues). Others, such as traffic or unplanned detours, are not. The Richmond Transit Network Plan addressed many of these issues in its network re-design. Contributing factors impacting GRTC on-time performance are discussed in the Network Analysis section.

Key Performance Indicator: **Speed**

Analysis from both the Transportation Research Board and the National Transit Database indicate that average transit speeds across the nation are steadily eroding. Studies suggest the average city bus route gets 0.45 percent slower every year. GRTC's new network is highly dependent upon significant improvements in operating speeds over the current performance. GRTC has performance targets of 10-13 mph for Core routes and 13 – 15 mph for Urban routes. Currently, 21 of GRTC's historic routes operate below 10mph, with some of these routes being the most productive. The GRTC system average speed is 10.1mph.



Characteristics of slower speed service include frequent stops and short passenger trips. Bus stop spacing has a major impact on the transit vehicle speed, and GRTC is and will continue to pursue bus stop consolidation within the urban core. Optimum bus stop spacing represents a trade-off between rider convenience (stops with short walking distances) and vehicle speed. Spacing typically varies by land use type, robustness of the pedestrian network, and population density.

3.6.2 *Network Analysis Findings*

Key conclusions from the analysis of service conducted during the preparation of the Richmond Transit Network Plan include the following:

- Many routes run on shared streets (such as Broad Street), but GRTC buses are not allowed to pass another bus at a stop, even when there are two lanes in the same direction. Thus if one bus is delayed at a stop on Broad Street, many buses can end up "bunched" behind it. This no-passing rule is unusual among urban transit systems.
- Most routes are not scheduled to have a break at the end of the line (when the bus is empty), so that operators can visit a restroom or so that the route can get back on schedule if it is behind. Instead, breaks currently happen in-route, as operators need them, and therefore with riders on-board the dwelling bus. This reduces travel speed.
- Over the past decade, the amount of fixed route transit service GRTC provides has stagnated. Geographical coverage has increased during this same time, resulting in less frequent service systemwide.
- GRTC spending on Specialized Services has grown significantly. In comparing spending since 2004, GRTC now spends 62 percent more on paratransit, and 11 percent more on fixed route transit. Spending growth has been accompanied by ridership growth. The relative cost for providing these services has been declining recently, even while ridership increases.
- GRTC has historically concentrated its maximum service for the AM and PM rush hour peaks. Analysis of boarding information indicates that GRTC's peak-only routes are less productive than most of its all-day routes. Productivity is highest in the midday and afternoon, rather than during rush hours. Rush hour buses, which are provided at extra expense, are less crowded than midday and afternoon buses.
- With a lack of clock face frequency - GRTC is currently able to time just a few connections each day at the downtown Temporary Transfer Plaza.
- Express routes do not provide service to the Temporary Service Plaza. However, some Express routes do go outbound, to suburban destinations, and could be used in combination with the GRTC local network to improve Richmond residents' access to suburban jobs. One of the main purposes of transit centers, in many cities, is to host timed-connections among infrequent Express routes and local routes.

3.6.3 *Peer System Comparisons*

This section details the results of a comparative trend analysis for GRTC and a peer group of similar transit operations. Establishing a transit peer group is not an exact science, but benchmarking guidance was utilized from the Transit Cooperative Research Program (TCRP) Report 141 – A Methodology for Performance Measurement and Peer Comparison in the Public Transportation Industry. The peer comparisons are focused on current and past operational efficiency and effectiveness. As such, peers are closely aligned in terms of service provided and total operational expenses. Where possible, the prioritized selection of other transit systems operating within similarly sized state capitals was also included in the selection criteria to capture comparable service area environments. The peer matching was performed via a software system which compiles and contrasts data reported to the National Transit Database.

A total of seven peers were identified for GRTC (see Table 3-19). Six primary criteria were responsible for aligning matches, namely: revenue hours, revenue miles, peak vehicles, service area population, unlinked passenger trips, and total fixed route operating expense. GRTC aligned very closely with these peer operating characteristics. The largest differences from the peer average were the service area population and the total ridership. For the service area population, GRTC does not appear to have recently updated its service area population, so it is likely under reporting this information. Therefore, the larger peer group average population is deemed an acceptable difference. The peer group ridership average is almost 25 percent greater than GRTC, however when considering that this is achieved with only an average of 3 percent more service hours, this may be indicative of the lower productivity previously observed with GRTC routes. Additional peer agency service characteristics are provided in Figure x to indicate further similarities and differences in the quantity of service provided. From this information, it can be seen that GRTC operates in a region that has greater population density and the service span provided exceeds most of it peers. It should be noted that other factors, such as the presence of a major college, prevailing labor rates, dedicated funding mechanisms, and topography can all contribute to the different results observed among these peers.

Peer group performance measures are presented in Table 3-20. GRTC is underperforming with regards to the peer averages, however the trend analysis depicted indicates it is starting to realign with the peer group and the lower levels of performance are either not getting worse or slightly improving. GRTC differs most from the peers in terms of passengers per revenue hour. A total of eight of the historic GRTC routes exceed the peer group average of 27.37 passengers per revenue hour. Additional peer comparisons and trend analysis is presented in Table 3-21 through Table 3-23.

Table 3-19 Peer Matching Criteria (above) and Additional Area/Service Characteristics (below)

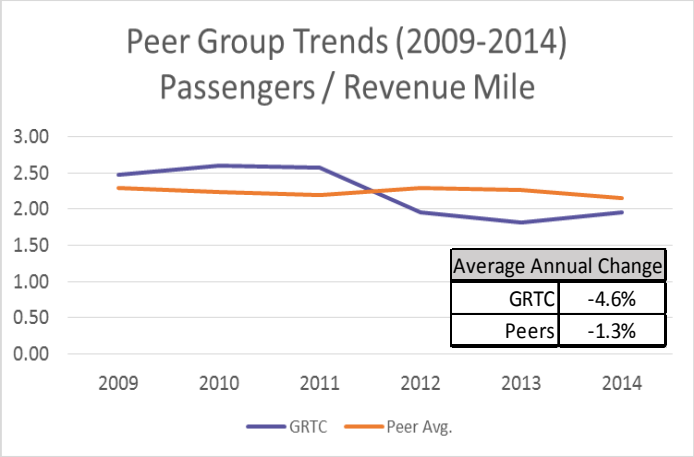
Agency	City	State	Rev Hours	Rev Miles	Peak Veh.	Service Area Pop	Unlinked Trips	Total Op Expenses
Greater Richmond Transit Company	*Richmond**	*VA*	*382,796*	*4,345,056*	*124*	*449,572*	*8,476,693*	*$37,697,868*
Spokane Transit Authority	Spokane	WA	392,087	5,446,828	112	409,271	11,324,434	$45,605,199
Pioneer Valley Transit Authority	Springfield	MA	329,052	4,450,987	141	551,543	11,424,516	$30,341,612
CTTRANSIT New Haven Division	Hartford*	CT	333,660	3,688,395	97	531,314	9,526,684	$41,142,811
CNY Centro, Inc.	Syracuse	NY	272,088	3,030,193	121	467,025	9,280,158	$37,305,668
Metropolitan Transit Authority	Nashville*	TN	434,710	5,714,650	137	626,681	9,213,344	$45,947,647
Interurban Transit Partnership	Grand Rapids	MI	414,109	5,124,640	127	482,740	11,990,619	$34,139,788
City of Albuquerque Transit Dept.	Albuquerque	NM	400,419	5,424,859	131	661,629	13,009,047	$39,270,584
PEER GROUP AVG:			**369,865**	**4,653,201**	**124**	**522,472**	**10,530,687**	**$38,931,397**
GRTC Difference			3.4%	-7.1%	0.2%	-16.2%	-24.2%	-3.3%
Standard Deviation (+/-)			53,843	946,805	14	87,774	1,613,725	5,340,964
Variation			14.6%	20.3%	11.4%	16.8%	15.3%	13.7%

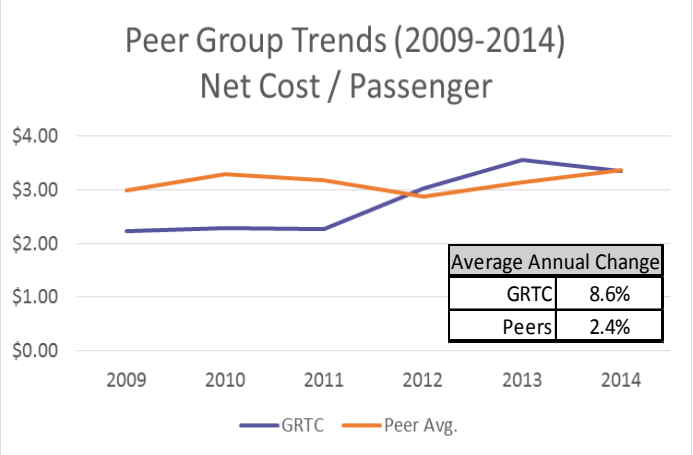
* Denotes a state capital

	Service Area (sq. mi)		Population Density		Number of Routes		Route Miles		Weekday Span	
Agency	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Greater Richmond Transit Company	*227*	*7*	*1,980*	*2*	*37*	*5*	*535*	*4*	*22.0*	*3*
Spokane Transit Authority	248	5	1,650	**5**	36	6	653	3	20.2	6
Pioneer Valley Transit Authority	302	4	1,826	**4**	46	3	825	2	22.8	2
CTTRANSIT New Haven Division	456	2	1,165	**7**	20	8	513	5	20.5	4
CNY Centro, Inc.	248	5	1,883	**3**	56	1	393	8	23.0	1
Metropolitan Transit Authority	484	1	1,295	**6**	55	2	862	1	20.2	5
Interurban Transit Partnership	185	8	2,609	**1**	28	7	499	7	20.0	7
City of Albuquerque Transit Department	361	3	1,139	**8**	40	4	500	6	19.7	8

Table 3-20 Virginia Performance Metrics Peer Comparisons

Peer System Analysis	Passengers/ Rev. Hour		Passengers/ Rev. Mile		Net Cost/ Passenger	
Agency	Value	Rank	Value	Rank	Value	Rank
Greater Richmond Transit Company	*22.14*	*6*	*1.95*	*6*	*$3.35*	*5*
Spokane Transit Authority	28.88	4	2.08	5	$3.28	4
Pioneer Valley Transit Authority	34.72	1	2.57	3	$2.06	1
CTTRANSIT New Haven Division	28.55	5	2.58	2	$3.43	6
CNY Centro, Inc.	34.11	2	3.06	1	$2.65	3
Metropolitan Transit Authority	21.19	7	1.61	7	$3.81	7
Interurban Transit Partnership	28.96	3	2.34	4	$2.09	2
City of Albuquerque Transit Department	20.41	8	1.07	8	$6.30	8
PEER GROUP AVERAGE	**27.37**		**2.16**		**$3.37**	
GRTC Difference from Average	**-23.6%**		**-10.6%**		**-0.7%**	





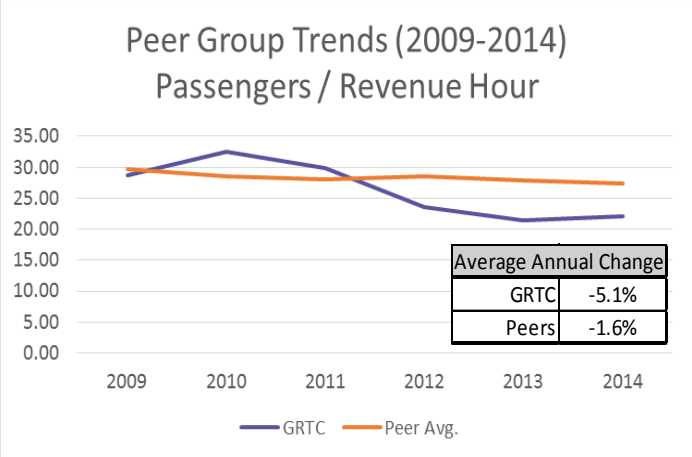
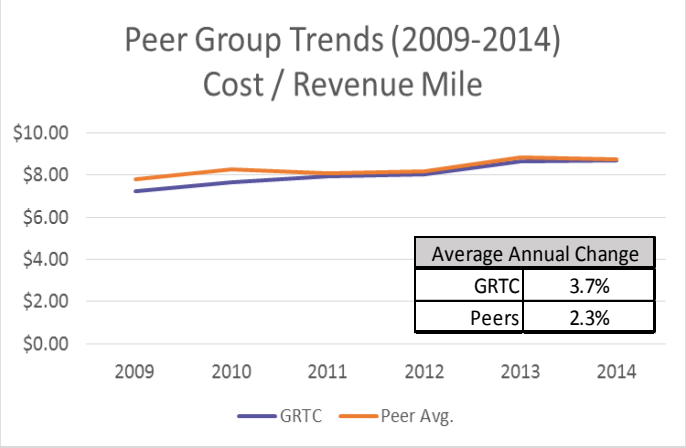
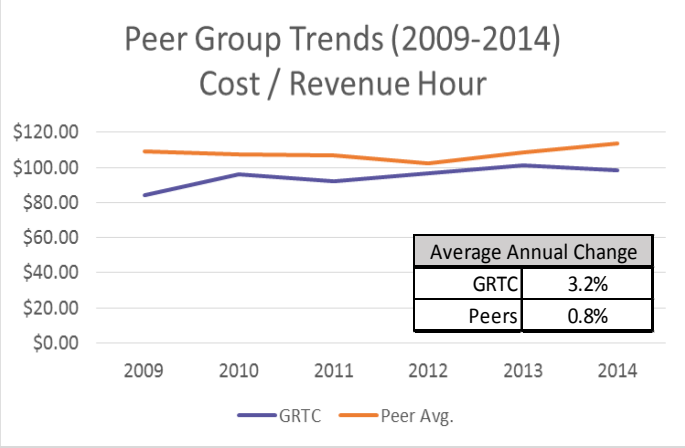


Table 3-21 Efficiency Performance Peer Comparisons

Peer System Analysis	Cost/Rev. Vehicle Hour		Cost/Rev. Vehicle Mile		Cost/ Vehicle*	
Agency	Value	Rank	Value	Agency	Value	Rank
Greater Richmond Transit Company	$98.48	3	$8.68	6	$304,015	4
Spokane Transit Authority	$116.31	5	$8.37	5	$407,189	7
Pioneer Valley Transit Authority	$92.21	2	$6.82	2	$215,189	1
CTTRANSIT New Haven Division	$123.31	6	$11.15	7	$424,153	8
CNY Centro, Inc.	$137.11	7	$12.31	8	$308,311	5
Metropolitan Transit Authority	$105.70	4	$8.04	3	$335,384	6
Interurban Transit Partnership	$82.44	1	$6.66	1	$268,817	3
City of Albuquerque Transit Dept.	$154.42	8	$8.11	4	$220,515	2
PEER GROUP AVERAGE	***$113.75***		***$8.77***		***$310,447***	
GRTC Difference from Average	**-15.5%**		**-1.0%**		**-2.1%**	

** Vehicles Operated in Maximum Service*





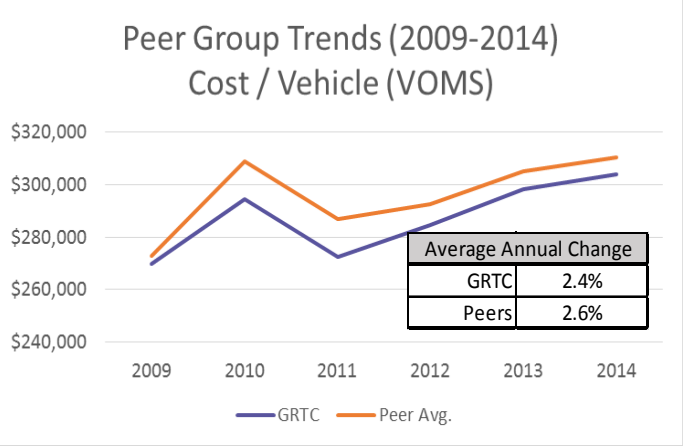
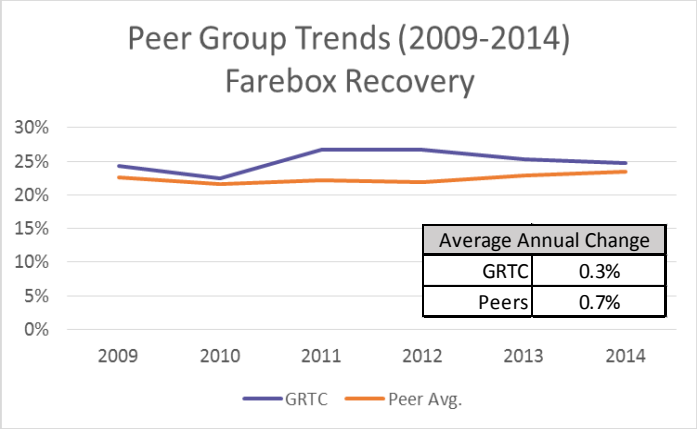
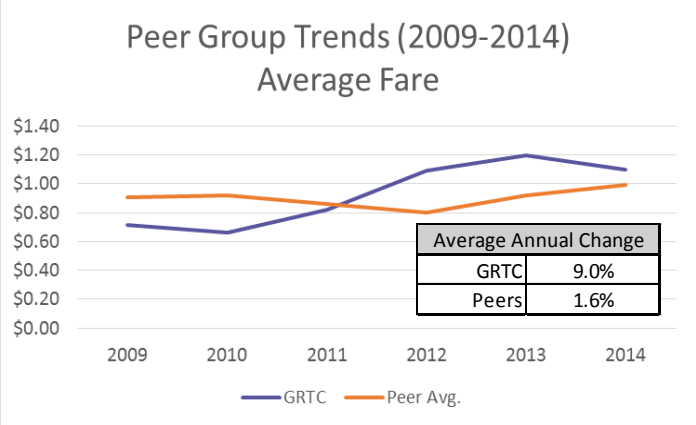


Table 3-22 Revenue Performance Peer Comparisons

Peer System Analysis	Farebox Recovery		Revenue / Vehicle Hour		Average Fare	
Agency	**Value**	**Rank**	**Value**	**Agency**	**Value**	**Rank**
Greater Richmond Transit Company	24.7%	3	$24.32	5	$1.10	4
Spokane Transit Authority	18.6%	7	$21.62	7	$0.75	7
Pioneer Valley Transit Authority	22.4%	5	$20.69	8	$0.60	8
CTTRANSIT New Haven Division	20.7%	6	$25.51	3	$0.89	5
CNY Centro, Inc.	34.1%	1	$46.81	1	$1.37	1
Metropolitan Transit Authority	23.6%	4	$24.95	4	$1.18	3
Interurban Transit Partnership	26.5%	2	$21.86	6	$0.75	6
City of Albuquerque Transit Dept.	16.7%	8	$25.76	2	$1.26	2
PEER GROUP AVERAGE	*23.4%*		*$26.44*		*$0.99*	
GRTC Difference from Average	**5.2%**		**-8.7%**		**10.0%**	





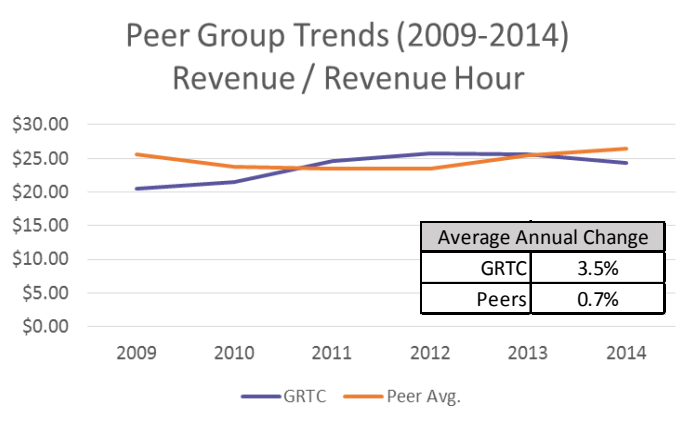
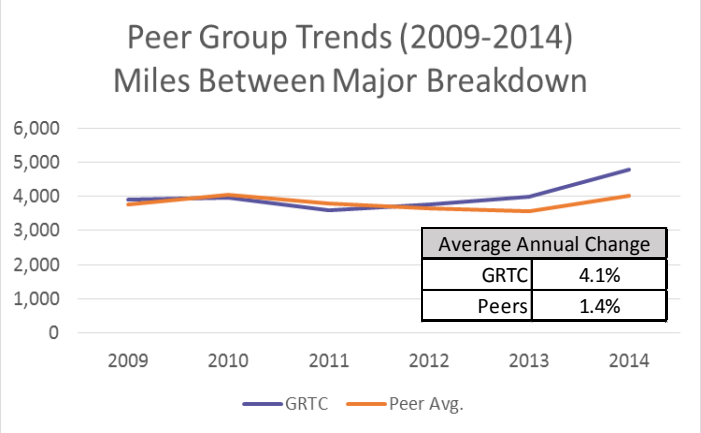
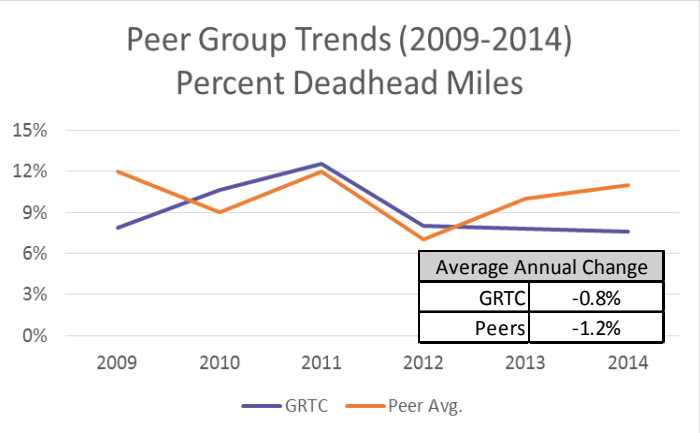
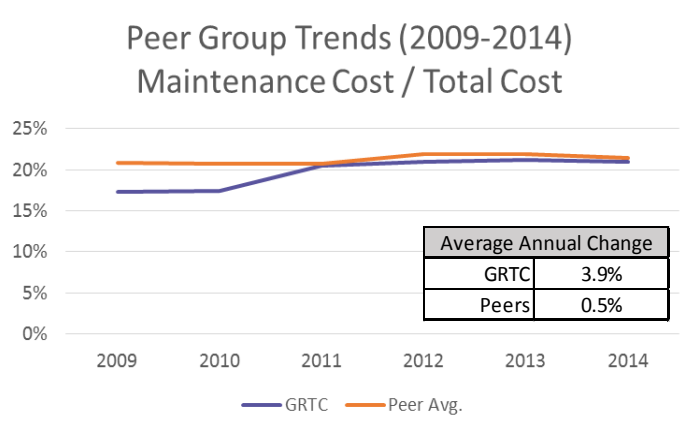


Table 3-23 Fleet Performance Peer Comparisons

Peer System Analysis	Maint. Cost/ Total Cost		Miles / Breakdown		Deadhead Percent	
Agency	**Value**	**Rank**	**Value**	**Agency**	**Value**	**Rank**
Greater Richmond Transit Company	21.0%	6	4,785	5	7.6%	3
Spokane Transit Authority	20.2%	5	6,019	7	7.9%	4
Pioneer Valley Transit Authority	19.7%	3	1,472	2	5.3%	2
CTTRANSIT New Haven Division	22.8%	7	1,372	1	9.2%	6
CNY Centro, Inc.	30.1%	8	7,871	8	9.0%	5
Metropolitan Transit Authority	19.7%	4	4,922	6	12.1%	7
Interurban Transit Partnership	18.4%	1	2,592	3	5.1%	1
City of Albuquerque Transit Dept.	19.4%	2	3,168	4	34.8%	8
PEER GROUP AVERAGE	*21.4%*		*4,025*		*11.4%*	
GRTC Difference from Average	**-2.0%**		**15.9%**		**-50.1%**	







CHAPTER 4: IDENTIFICATION OF SHORT- AND LONG-TERM TRANSIT NEEDS

The various planning efforts within the region in the last five years have identified a number of possible service improvements for enhancement or expansion of GRTC service. The implementation of the Pulse BRT, the RTNP network changes and the small adjustments to Henrico's network to coordinate with the RTNP changes represent a significant amount of change being implemented at the outset of this TDP planning period. As GRTC monitors and makes adjustments to fine tune the new network design, it is equally important to identify other service enhancements that would logically build upon the implementation of these initial changes. This chapter evaluates various enhancements that would follow a year or more after BRT, RNTP, and Henrico changes are finalized and successful. The prioritizing of need, proper sequencing, and impact to system will be outlined in the sections that follow.

4.1 Demographics

4.1.1 *Population Density*

Population density is a good predictor of transit ridership because more residents in a small area mean more potential riders served by fewer buses and stops.

Figure 4-1 displays population density by census block group for the GRTC service area for the Greater Richmond region (including the Cities of Petersburg and Colonial Heights).

The highest regional population density is in the City of Richmond, where there are 3,393 residents per square mile (see Figure 4-1). The two included Tri-Cities, Colonial Heights and Petersburg, follow, with 2,189 and 1,396 residents per square mile, respectively. Henrico County has the highest population density of any county, with 1,301 residents per square mile. Chesterfield County follows with 751 residents per square mile. Hanover has 214 residents per square mile, and the remaining jurisdictions have fewer than 150 residents per square mile.

4.1.1.1 Chesterfield County

Most of Chesterfield has low population density. Only Wilkinson Terrace in Chesterfield has more than 7,500 residents per square mile. Meadowdale at S Beulah Road, Walmsley Boulevard between Hull Street and Powhite, The Grove and Courthouse Green all have moderate levels of population density due to multi-family residential uses.

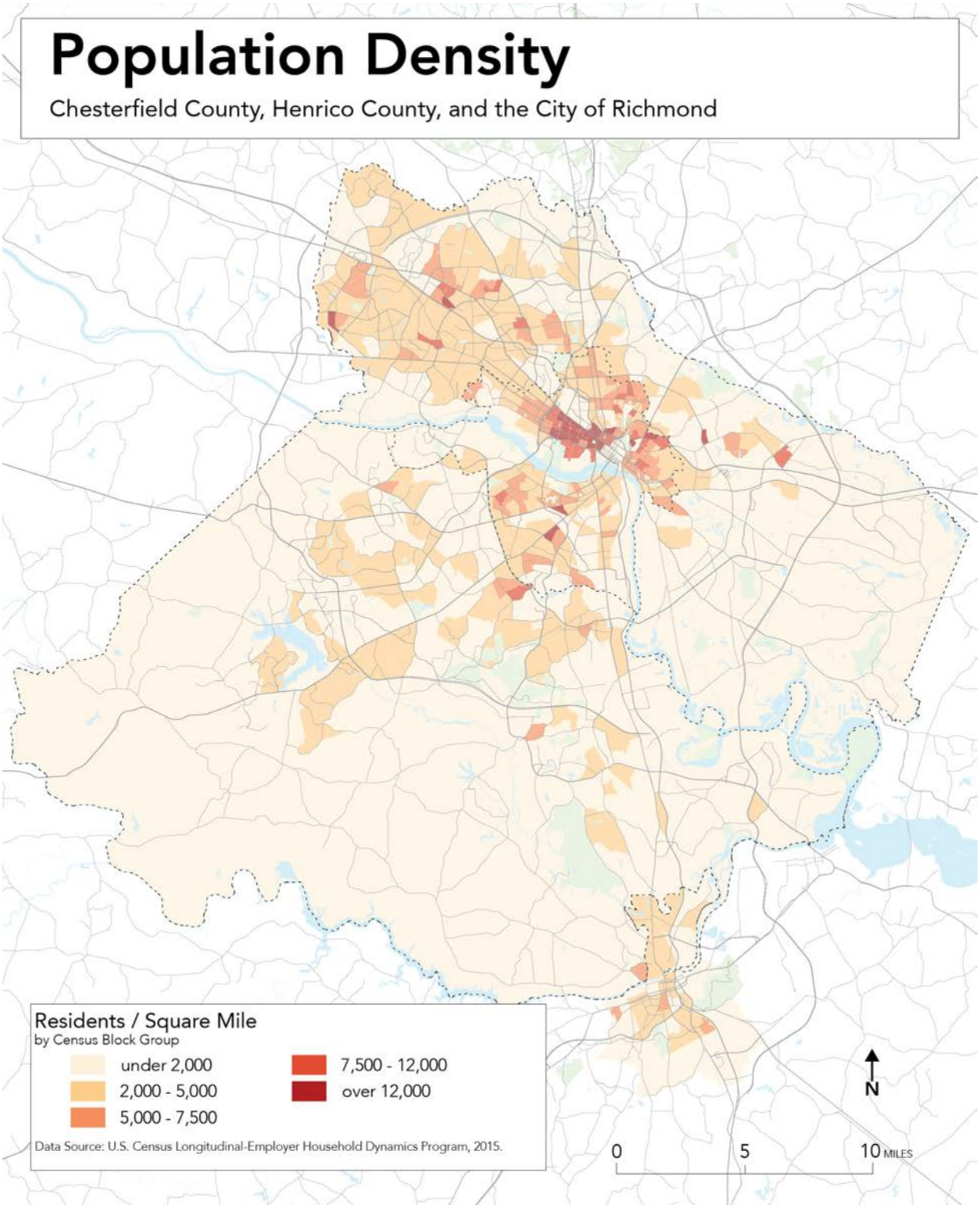
4.1.1.2 City of Richmond

The City of Richmond has the highest population density in the region. This includes large areas such as The Fan, the VCU area, the Museum District and Downtown with over 12,000 residents per square mile. Dense population centers also include Gilpin, Eastview, Mosby Court, Swansboro and Southwood.

4.1.1.3 Henrico County

Henrico County includes several high-density areas as well as many moderately-dense areas. The highest-density areas in Henrico are Seven Gables, Gayton and the area between Mayland and Parham.

Figure 48 Population Density for Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.1.2 *Projected Demographic Changes*

This section reviews demographics in the Greater Richmond region, which includes the regional core (the City of Richmond, Henrico County and Chesterfield County) as well as the surrounding five rural and suburban counties and Petersburg. Table 4-1 shows demographics for 2015 and Table 4-2 shows projected demographics for 2028.

Table 4-1 Demographics by Jurisdiction, 2015

	Area (sq mi)	Current Demographics (2015)						
		Total	White	Black	Asian	Hispanic*	Senior (65+)	Density (per sq mi)
Charles City	183	7,118	2,914	3,432	19	119	1,438	39
Chesterfield	437	328,176	209,074	74,545	11,269	25,423	40,037	751
Colonial Heights	8	17,515	13,446	2,286	613	875	3,433	2,189
Goochland	290	21,721	16,795	3,869	288	499	4,018	75
Hanover	474	101,340	85,830	9,424	1,494	2,532	15,100	214
Henrico	245	318,864	176,493	94,245	23,505	16,867	42,728	1,301
New Kent	223	19,560	15,607	2,397	151	476	2,738	88
Petersburg	23	32,123	5,025	24,758	365	1,439	4,915	1,396
Powhatan	262	28,207	23,526	3,458	153	557	4,175	108
Richmond	63	213,735	85,328	103,918	4,733	13,580	24,366	3,393
Total	**2,208**	**1,088,359**	**634,038**	**322,332**	**42,590**	**62,367**	**142,948**	**493**

Source: 2015 American Community Survey 5-Year Estimates: Table S0101: Age and Sex, Table B02001: Race, Table DP05.
**White, Black and Asian counts do not include Hispanic.*

Table 4-2 Projected Demographics by County, 2028

	Area (sq mi)	2028 Projected Demographics (Weldon Cooper)						
		Total	White	Black	Asian	Hispanic*	Senior (65+)	Density
Charles City	183	7,559	3,017	3,300	54	300	2,248	41
Chesterfield	437	385,722	203,329	64,600	22,823	81,215	70,994	883
Colonial Heights	8	17.082	11,655	1,503	1,068	2,245	4,207	2,135
Goochland	290	25,455	18,205	4,375	490	1,847	7,070	88
Hanover	474	116,401	91,397	9,468	3,503	8,760	26,506	246
Henrico	245	361,879	166,384	84,082	45,310	53,503	67,469	1,477
New Kent	223	25,984	19,444	3,035	448	1,911	6,146	117
Petersburg	23	30,601	4,007	21,225	491	3,976	6,204	1,330
Powhatan	262	31,765	24,928	3,894	327	1,938	8,094	121
Richmond	63	240.058	75,584	96,913	10,735	48,626	31,469	3,810
Total	**2,208**	**1,242,505**	**617,950**	**292,395**	**85,249**	**204,320**	**230,406**	**563**

*Source: Interpolated from 2020 and 2030 Population Projections, Weldon Cooper Center for Public Service, 2017. Some totals may not sum due to rounding. *White, Black and Asian counts do not include Hispanic.*

The Richmond Region is projected to grow by 14 percent by 2028 with an expected addition of 154,146 new residents. The largest growth is expected in New Kent (33 percent increase) with a growth of 12 to 18 percent in all other localities except Charles City, which will grow modestly, and Colonial Heights and Petersburg, which will shrink slightly.

4.1.3 *Minority Populations*

In the Richmond region, the majority of current transit riders identify as racial minorities. Non-white residents (including Hispanics) are expected to continue growing as a share of the region's population – from 42 percent today to 50 percent by 2028. Table 4-3 includes the changes in population and racial demographics projected through 2028.

Table 4-3 Change in Racial Demographics, 2015-2028

	Population Change	Percentage Change, 2015-2028				
		Overall	White	Black	Asian	Hispanic*
Charles City	441	+ 6.2%	+ 3.5%	- 3.9%	+ 185.6%	+ 152.1%
Chesterfield	57,546	+ 17.5%	- 2.7%	- 13.3%	+ 102.5%	+ 219.5%
Colonial Heights	-433	- 2.5%	- 13.3%	- 34.3%	+ 74.3%	+ 156.6%
Goochland	3,734	+ 17.2%	+ 8.4%	+ 13.1%	+ 70.0%	+ 270.1%
Hanover	15,061	+ 14.9%	+ 6.5%	+ 0.5%	+ 134.5%	+246.0%
Henrico	43,015	+ 13.5%	- 5.7%	- 10.8%	+ 92.8%	+ 217.2%
New Kent	6,424	+ 32.8%	+ 24.6%	+26.6%	+ 196.4%	+301.5%
Petersburg	-1,522	- 4.7%	- 20.3%	- 14.3%	+ 34.6%	+ 176.3%
Powhatan	3,558	+ 12.6%	+ 6.0%	+ 12.6%	+ 113.4%	+247.9%
Richmond	26,323	+ 12.3%	- 11.4%	- 6.7%	+ 126.8%	+258.1%
Total	**154,146**	**+ 14.2%**	**- 2.5%**	**- 9.3%**	**+ 100.2%**	**+ 227.6%**

*Source: 2015 American Community Survey 5-Year Estimates: Tables S0101, B02001 and DP05; Interpolated from 2020 and 2030 Population Projections, Weldon Cooper Center for Public Service, 2017. Some totals may not sum due to rounding.*White, Black and Asian counts do not include Hispanic.*

Figure 4-2 displays the distribution of population by racial identification. Each dot represents 50 people, but the dots are randomly distributed within the Census Block Group based on the racial and ethnic makeup of that block groups. Dots closer together indicate higher population density (such as in The Fan/VCU area in Richmond or the Gayton area of Henrico) while dots more widely spaced indicate lower population density (such as the Winterpock area in Chesterfield).

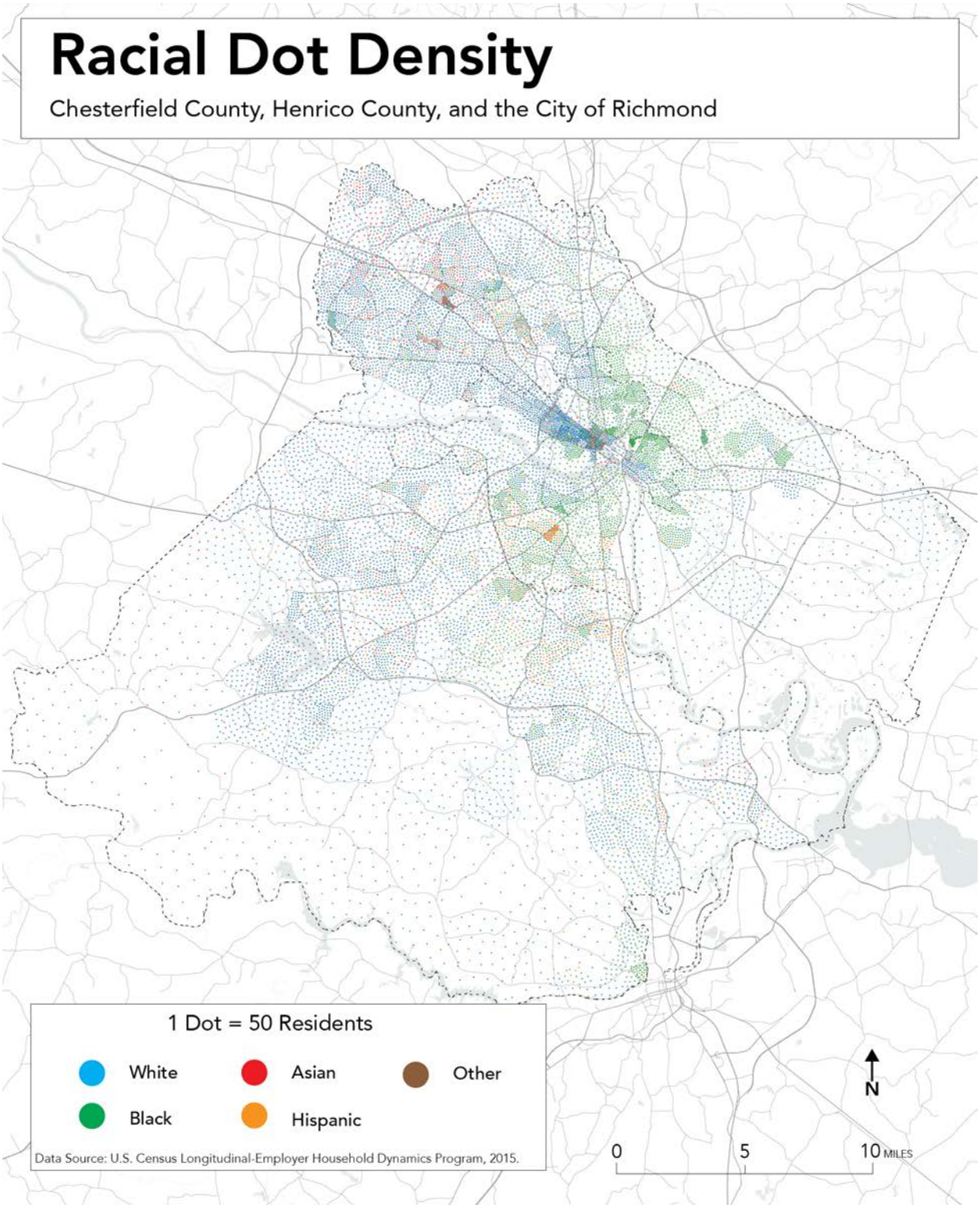
4.1.3.1.1 Chesterfield County

Chesterfield population is 22 percent black, 7 percent Hispanic and 3 percent Asian. There is a high concentration of black residents in Wilkinson Terrace, Meadowdale and Ettrick, near Virginia State University. There is a high concentration of Hispanic residents east of Route 1 between Bellwood Rd and Chippenham Pkwy.

4.1.3.1.2 City of Richmond

56 percent of Richmond's population identifies as a racial/ethnic minority. The City of Richmond's minority population is 48 percent black, 6 percent Hispanic and 2 percent Asian. There are high

Figure 49 Racial Dot Density Map for Chesterfield, Henrico and the City of Richmond



concentrations of black residents in Northside and the East End, in areas such as Gilpin, Mosby Court and Whitcomb, as well as east of Chamberlayne Avenue and south of 195 in Randolph. South of the river in Richmond, there are high concentrations of black residents in Manchester, Swansboro and between Forest Hill Avenue and Midlothian Turnpike. There is a high concentration of Hispanic residents in Southwood/McGuire Manor.

4.1.3.1.3 Henrico County

53 percent of Henrico's population identifies as a racial/ethnic minority. Henrico's minority population is 24 percent black, 16 percent Hispanic and 13 percent Asian. There are high concentrations of black residents in Highland Springs, Montrose, Essex Village, north of Azalea Ave, west of Wilkinson, Hunter's Ridge (near Gayton) and around White Oak Village. There is a high concentration of Hispanic residents near Regency Square Mall as well as between Staples Mill and Broad Street around Glenside. There is a high concentration of Asian residents north of Parham between Broad Street and I-64.

4.1.4 *Poverty Density*

This section reviews poverty density in the region. Figure 4-3 displays the density of households in poverty across the region and Figure 4-3 and Figure 4-4 display the percent of households in poverty.

4.1.4.1.1 Chesterfield County

Chesterfield County has very little poverty density because it has very low population density. However, 25-50 percent of households living around the Jeff Davis corridor in Walmsley, Bensley and Bellwood are living in poverty (see Figure 4-4).

4.1.4.1.2 City of Richmond

Most of the poverty density within the three jurisdictions that GRTC serves exists in the City of Richmond for a variety of spatial and historical reasons. Richmond has dense concentrations of poverty in public housing complexes like Gilpin Court, Fairfield Court, Mosby Court and Creighton Court. There are also poverty concentrations in low-cost housing complexes in North Church Hill, Swansboro and Southwood. Additionally, the Museum District and the Fan have large population of VCU students with low incomes.

In most of the City of Richmond, especially in Southside, Northside and the East End, more than 25 percent of residents are living in poverty. Gilpin Court and North Church Hill are the only two areas in the City where more than 75 percent of households are in poverty.

4.1.4.1.3 Henrico County

Henrico county has several concentrations of 2,500-5,000 residents per square mile in poverty in moderately-dense pockets such as Seven Gables and south of Darbytown Road near Fulton. Henrico County also has several pockets of 1,000-2,5000 residents per square mile in poverty in the area between Gayton and Lauderdale south of Ridgefield Parkway; inside the triangle formed by Gayton, Gaskins and Patterson Avenue; Pinedale Farms; the area around J. R. Tucker High School; Maple Springs; the Wistar Road area; the area around Dumbarton Road between Route 1 and Lakeside Avenue; and Essex Village. There are only two areas in Henrico where more than 50 percent of residents live in poverty: Essex Village and south of Darbytown Road near Fulton.

Figure 50 Poverty Density in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond

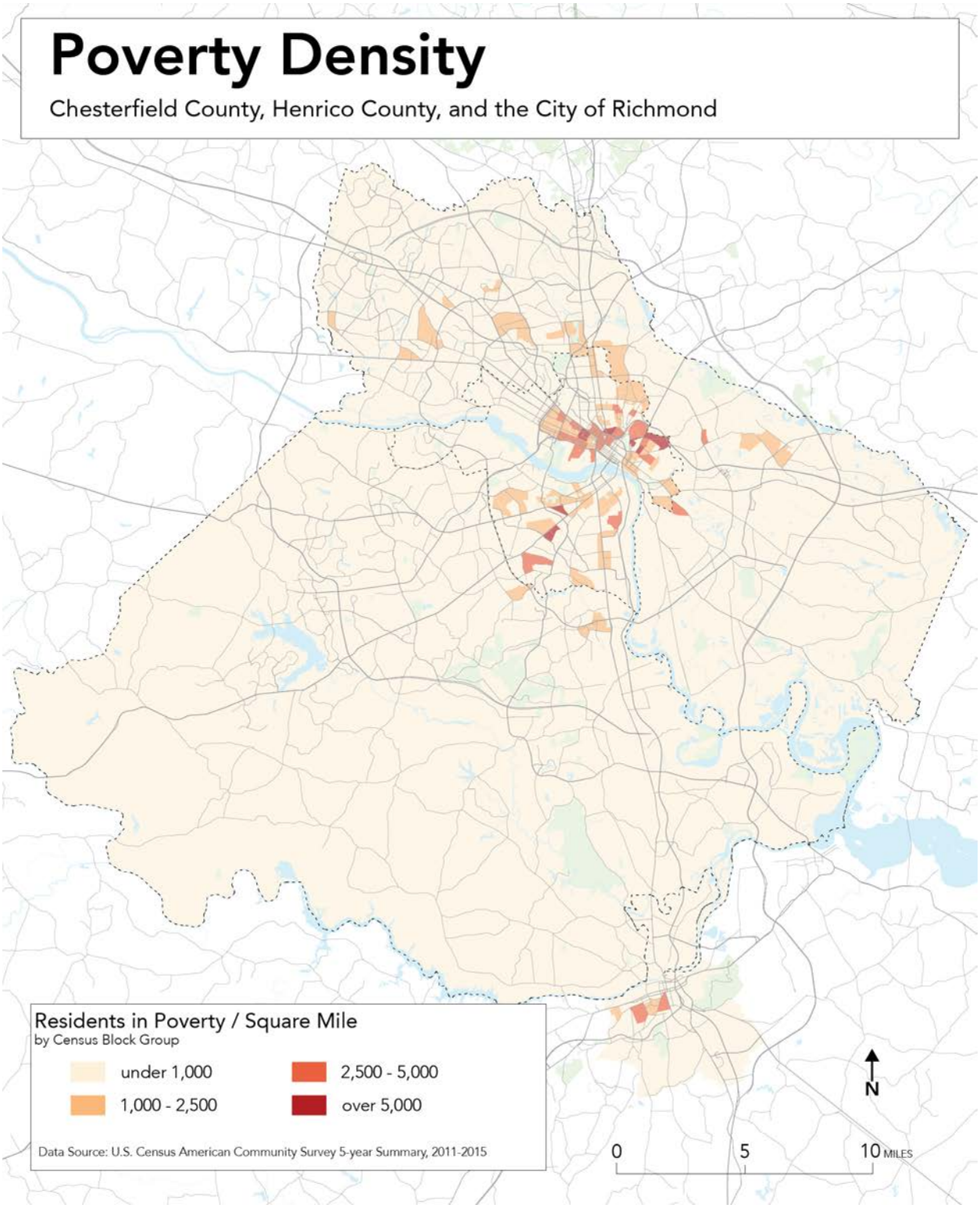
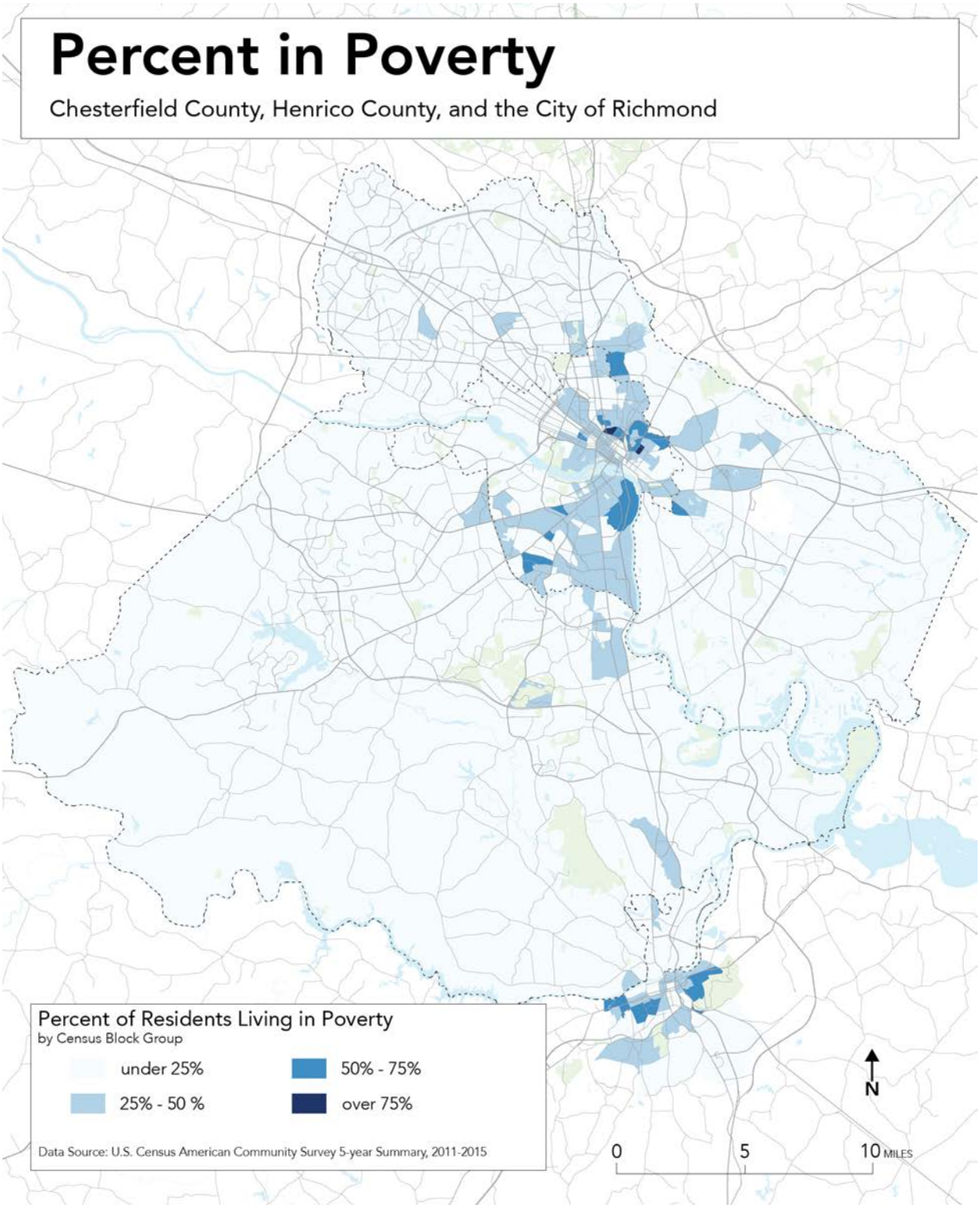


Figure 51 Percent of Households in Poverty in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.1.5 *Seniors*

Seniors (those aged 65+) are a population group with potential transit rider growth because many people feel less comfortable driving as they age but still have transportation needs. The share of seniors (residents age 65 and older) is projected to grow by 5.5 percentage points by 2028. All localities in the region are expected to see a growth in their senior population. This echoes a national trend as many in the Baby Boomer generation reach retirement age. Rural counties like Charles City, Goochland, New Kent, Powhatan are expected to see their senior share increase by more than 9 percentage points by 2028. The City of Richmond and Henrico are expected to house 4 percentage points fewer of the region's seniors in 2028 than they do today. This means that in 2028, the majority (54.4 percent) of the region's seniors may be living in localities without significant fixed-route transit services.

Table 4-4 Seniors, 2015 and 2028

	2015 Population	2015 Seniors (65+)	2015 % Seniors	2015 % of region's seniors	2028 Projected Pop.	2028 Seniors (65+)	2028 % Seniors	2028 % of region's seniors	2015-2028 Perc. Pt. Change
Charles City	7,118	1,438	20.2%	1.0%	7,543	2,260	30.0%	1.0%	9.8%
Chesterfield	328,176	40,037	12.2%	28.0%	385,228	71,406	18.5%	30.8%	6.3%
Colonial Heights	17,515	3,433	19.6%	2.4%	17,082	4,207	24.6%	1.8%	5.0%
Goochland	21,721	4,018	18.5%	2.8%	25,430	7,118	28.0%	3.1%	9.5%
Hanover	101,340	15,100	14.9%	10.6%	116,207	26,719	23.0%	11.5%	8.1%
Henrico	318,864	42,728	13.4%	29.9%	361,307	67,813	18.8%	29.3%	5.4%
New Kent	19,560	2,738	14.0%	1.9%	25,981	6,223	24.0%	2.7%	10.0%
Petersburg	32,123	4,915	15.3%	3.4%	30,601	6,204	20.3%	2.7%	10.0%
Powhatan	28,207	4,175	14.8%	2.9%	31,725	8,160	25.7%	3.5%	10.9%
Richmond	213,735	24,366	11.4%	17.0%	239,567	31,554	13.2%	13.6%	1.8%
Total	**1,088,359**	**142,948**	**13.1%**	**100.0%**	**1,240,671**	**231,664**	**18.7%**	**100.0%**	**5.5%**

Source: 2015 ACS 5-year Estimates: Tables S0101, B02001 and DP05; 2020 & 2030 Projections, Weldon Cooper, 2017. Some totals may not sum due to rounding.

4.1.5.1 Senior Density

This section reviews senior density in the region. Figure 4-5 displays the density of seniors per square mile by census block group based on the Census Bureau estimates from 2011 to 2015. Figure 4-6 displays the percent of seniors in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond. The highest concentrations of seniors are often near large seniors-only residential complexes or in areas with a high overall population density. In Chesterfield, there are many seniors living in Brandermill Woods, in Bon Air (in The Crossings and The Laurels) and east of Powhite in Encompass Home Health & Hospice – Richmond.

In the City of Richmond's southside, there are high concentrations of seniors in Swansboro, Forest Hill Terrace, Westover and Granite. In the City of Richmond north of the river, there are high concentrations of seniors east of Boulevard between Broad Street and Floyd Avenue, near Monument and Lombardy as well as in pockets of population density such as Gilpin, Eastview and Brauers. Major senior facilities include Brookdale Imperial Plaza, the Hermitage and Dominion Place.

In Henrico, there are high concentrations of seniors in Westminster Canterbury, St Mary's Woods, Symphony Manor of Richmond, Brookdale Gayton Terrace, Lexington Court and Lakewood.

Figure 52 Senior Density in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond

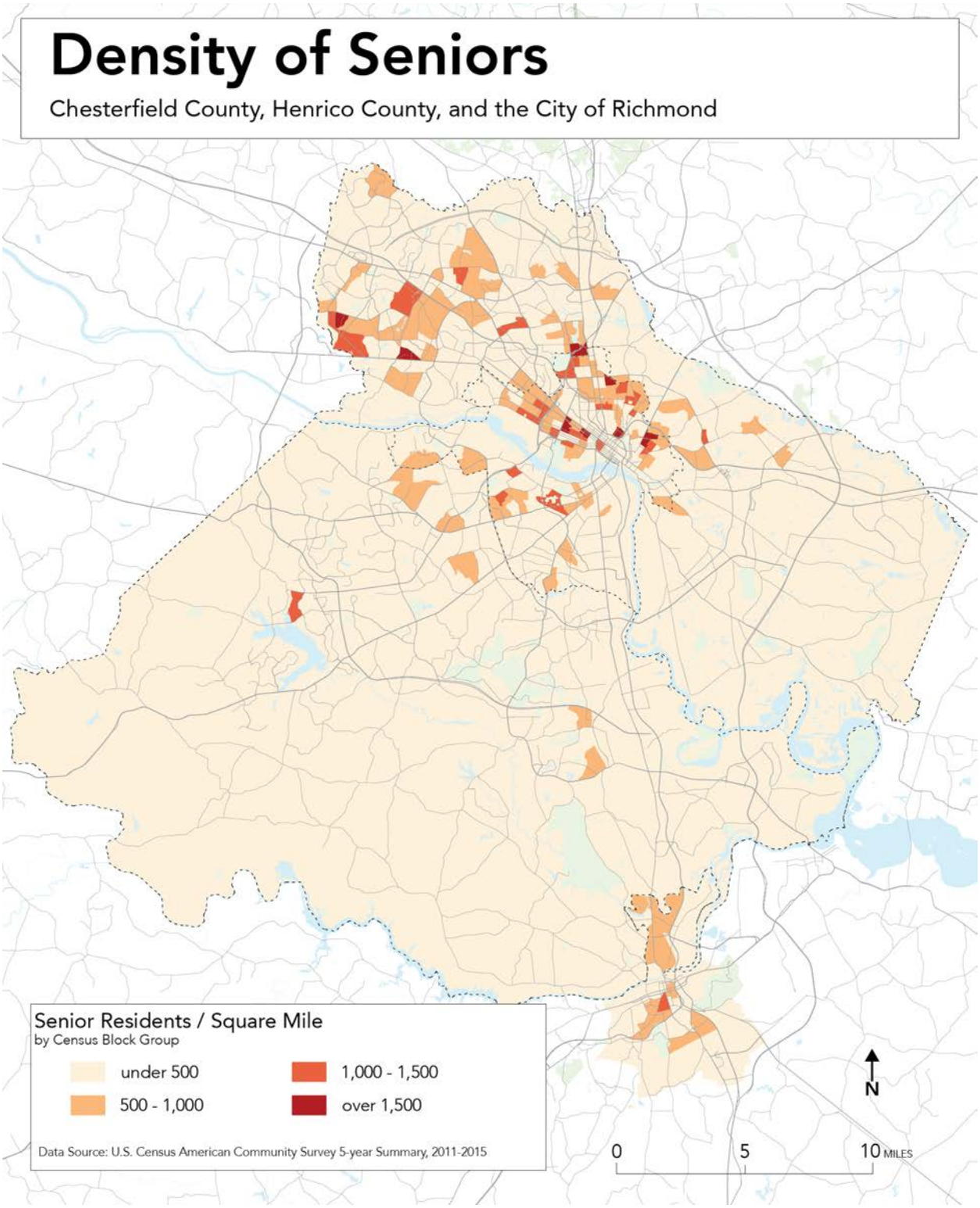
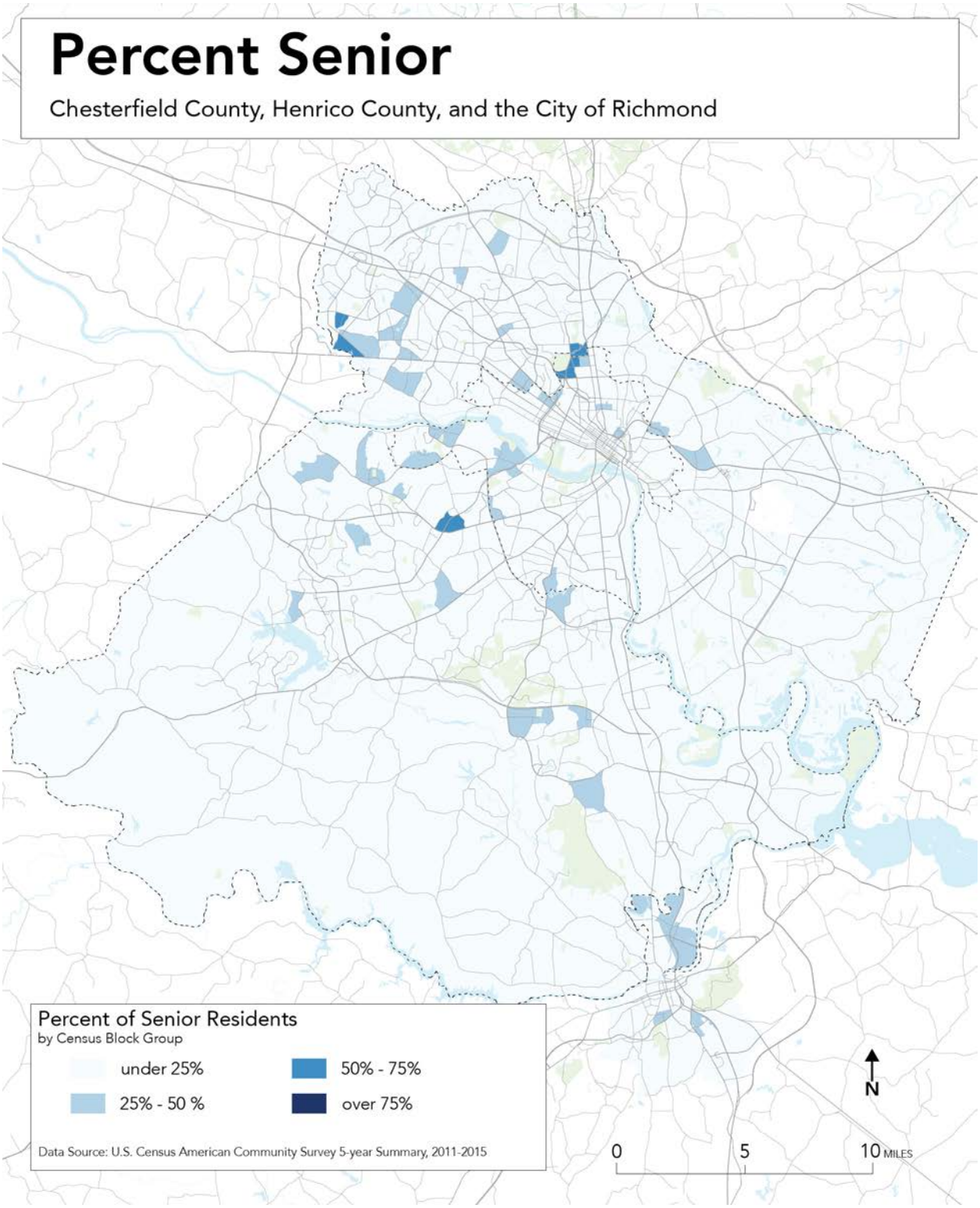


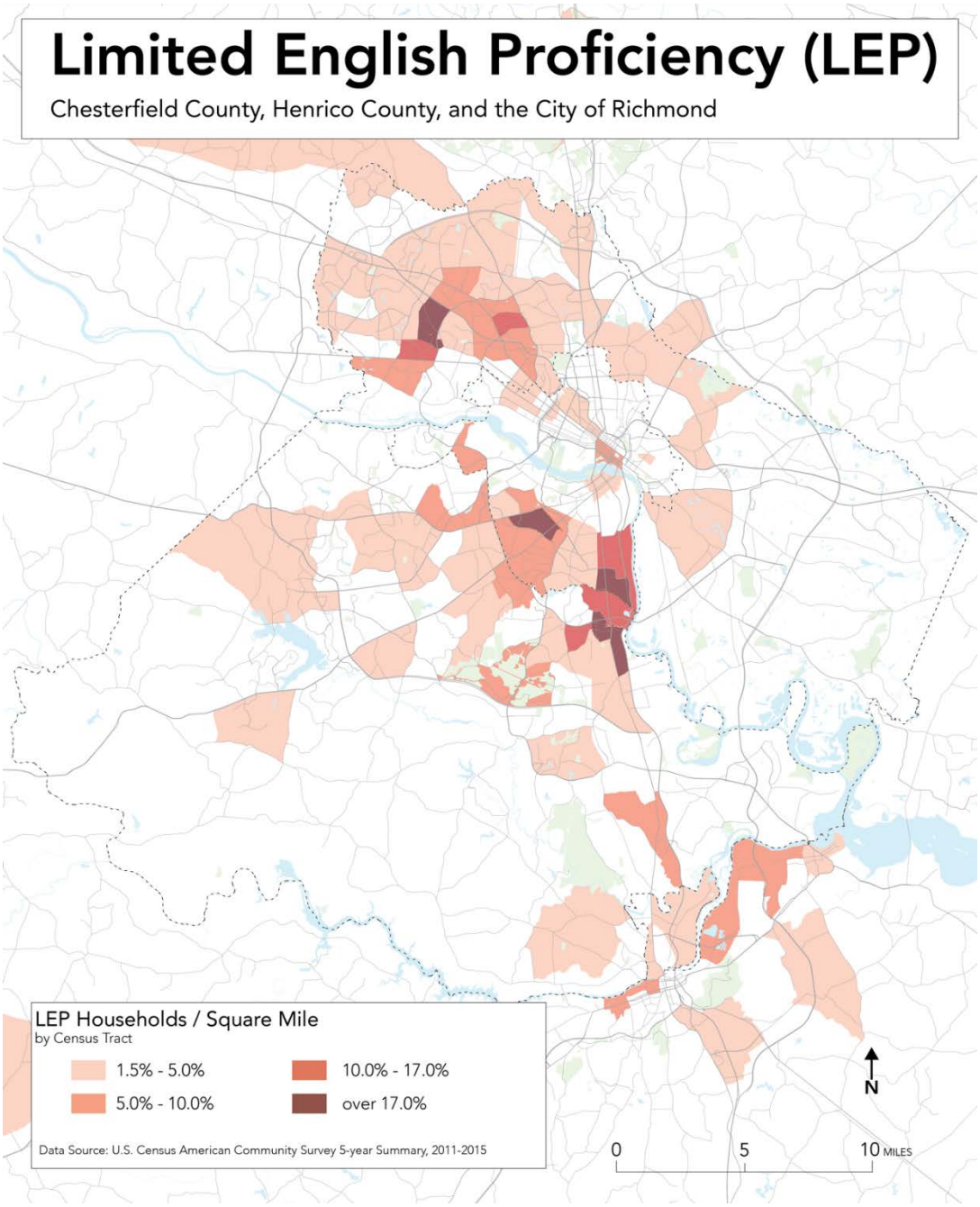
Figure 53 Percent of Seniors in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.1.6 *Limited English Proficiency Populations*

People with limited or low proficiency in English are an important focus for transit service because of the special need to communicate with them effectively to serve them and because they are often also low-income. Figure 4-7 shows the density of Low English Proficiency (LEP) households in the region. There are dense concentrations of LEP households south of the river, along Jefferson Davis Highway in the City and Chesterfield County, along and west of Belt Boulevard and Midlothian Turnpike near German School Road, and in western Henrico along Parham Road, south of Broad Street.

Figure 54 Density of Low English Proficiency Households in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.1.7 *Employment Density*

The distribution of jobs and employment opportunities can be a good predictor of transit ridership because a large portion of regional travel is commuting to and from work. There are 435,208 workers aged 16 years or older in Chesterfield, Henrico and the City of Richmond and another 119,334 in the surrounding region.[8] [9] In 2016, 8,614 commuters (2 percent of the workforce) in Chesterfield, Henrico and the City of Richmond got to work via public transit. Thus, there are large number of possible future commuter transit trips.[10]

Figure 4-7 displays the concentration of jobs in Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond.

4.1.7.1.1 Chesterfield County

Chesterfield County has employment concentration in the Chesterfield Government Center complex (southeast of Courthouse and Ironbridge Roads); Midlothian Turnpike just west of Powhite; and the triangle formed by Robius, Huguenot and Midlothian Turnpike (which includes Chesterfield Towne Center, Huguenot Village Shopping Center and Johnston Willis hospital).

4.1.7.1.2 City of Richmond

The City of Richmond has the highest employment concentration area in the region, with over 50,000 jobs in the VCU Health/Biotech Park area north of Broad Street. Other pockets of moderate employment density (15,000-50,000 jobs) include Carytown, VCU and Downtown south of Broad Street. The Chippenham Hospital area is a notable pocket of employment density in the City of Richmond's southside.

4.1.7.1.3 Henrico County

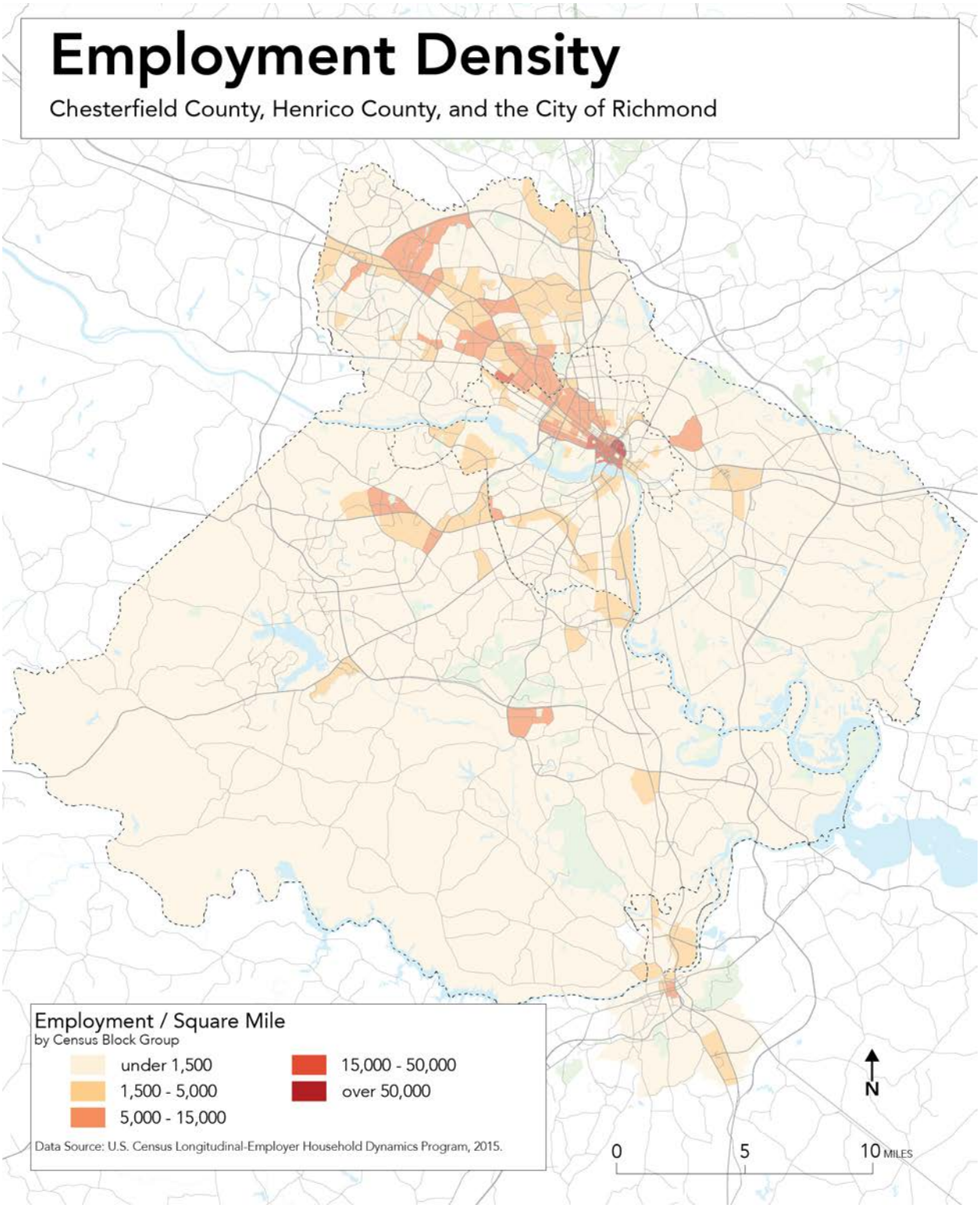
Henrico County has moderate employment concentrations in Short Pump (along Lauderdale, and along Broad west of Pump Road); the area between Innsbrook and Pemberton; the area around Regency Square Mall; the area around the Henrico Government Center; the triangle formed by I-64, Broad Street and Hungary Springs Road; along Forest Avenue west of Glenside/Horsepen; the triangle formed by I-64, Broad Street and Westwood Avenue; as well as the triangle formed by Creighton, Nine Mile and Laburnum.

[8] 2016 American Community Survey, 5-Year Estimate; Table S0801

[9] The surrounding region includes Charles City, Goochland, Hanover, New Kent and Powhatan as well as the tri-cities (Colonial Heights, Hopewell and Petersburg)

[10] 2016 American Community Survey, 5-Year Estimate; Table S0801

Figure 55 Employment Density for Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.1.8 *Activity Density*

Activity density occurs where there are high concentrations of both jobs and residents in an area. Areas with high activity density may generate strong all-day transit demand because the area contains a mix of origins and destinations for trips throughout the day. Figure 4-8 shows residential density (in purple) overlapping with employment density (in orange). Darker colors indicate high numbers of jobs or residents per square mile.

4.1.8.1.1 Chesterfield County

Chesterfield County has no areas of high job or residential concentration but contains many pockets of moderate residential and employment density. Chesterfield County has moderate activity density in the Bon Air, North Arch and Meadowdale areas, as well as around Chesterfield Town Center, Commonwealth Center, Hull Street between Courthouse Road and Genito Road and the Chesterfield Government Center.

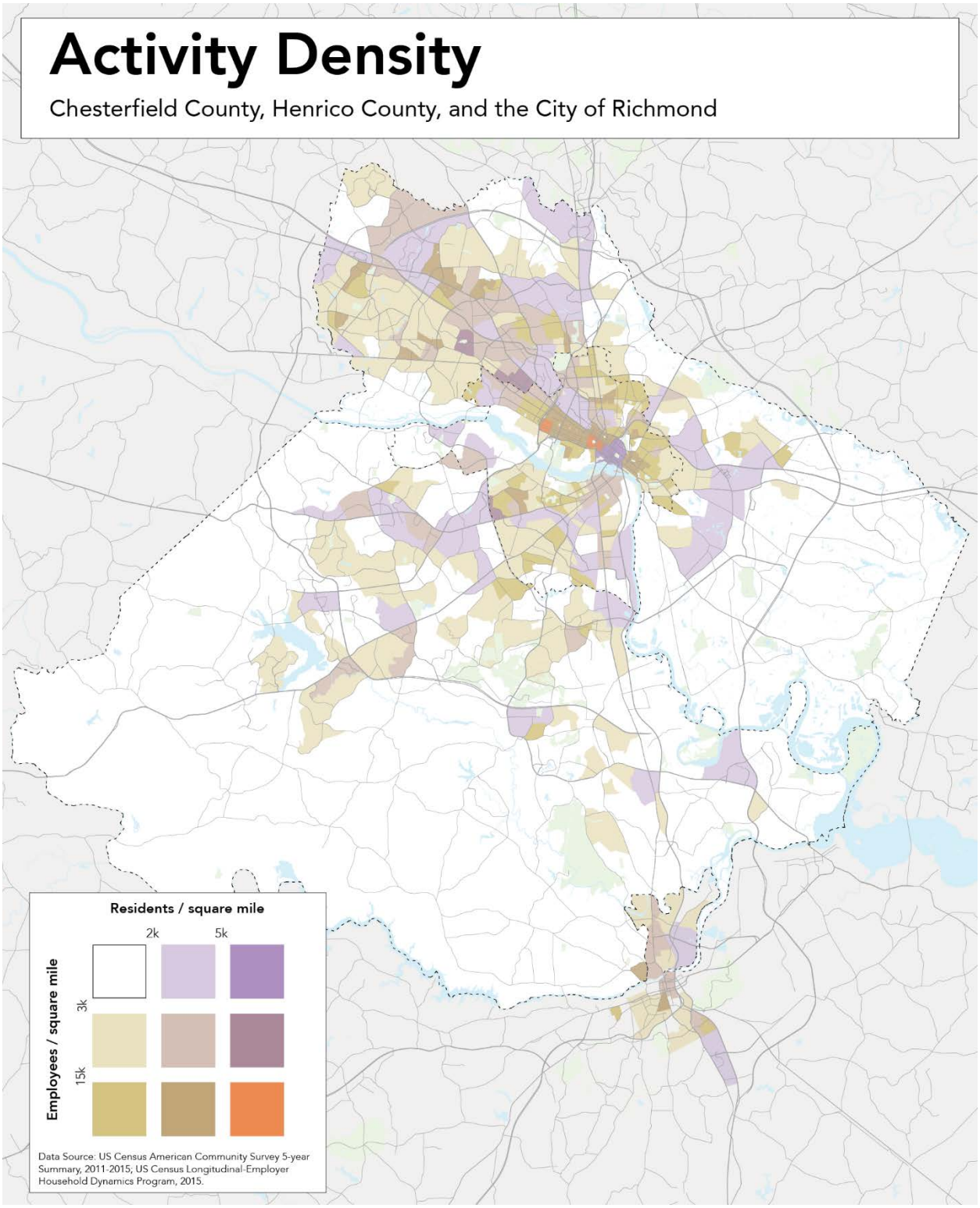
4.1.8.1.2 City of Richmond

The City of Richmond is the only jurisdiction in the region with high Activity Density areas. These high Activity Density areas are Carytown and the VCU area south of Broad Street between Laurel and Foushee. The City of Richmond has high residential concentration in the Fan/Museum District and high employment density downtown. As well, large portions of the City have moderate activity density levels due to overall high density in the City.

4.1.8.1.3 Henrico County

Henrico County has moderate job concentrations in Short Pump, along the Broad Street corridor between Parham and Gaskins, along Patterson Avenue between Gaskins and Parham, in Gayton between Lauderdale and Ridgefield Pkwy and in Lakeside west of Lakeside Avenue. Henrico County has moderate resident and job concentrations in the Willow Lawn area and near Regency Square Mall (at Parham and Quioccasin).

Figure 56 Activity Density for Chesterfield, Henrico, Petersburg, Colonial Heights and the City of Richmond



4.2 Service Needs

The demographic analysis in Section 4.1 identifies transit-oriented populations such as seniors, households in poverty and minority communities. It also identifies the kinds of employment and residential density that drives higher transit ridership. Identifying those areas likely to drive higher transit ridership helps focus service improvements to those communities and destinations.

Types of proposed improvements include:

- **Increased span of service** – increasing the span of service means that bus routes operate for more hours. This means that destinations are accessible by transit for a larger portion of the day and that transit is a transportation option for more trips in the early morning, evening and late night.
- **Increased frequency** – increasing the frequency, or number of buses per hour, increases capacity along a route. It also makes the route more attractive and useful to potential riders because routes with higher frequency have shorter waits. Long waits, especially at night or in inclement weather, can be a barrier to using transit.
- **Increased Sunday frequency** – increasing the frequency of service on Sundays moves towards a transit system that is equally frequent 7 days a week. Higher frequency makes routes more attractive and useful to potential users because routes with higher frequency have shorter waits. This makes transit a more attractive option for many Sunday trips.
- **Route Extension** – extending a route increases the area served to include new residents and destinations. Route extensions also expand the overall area served by the transit network. This means that residents in other parts of the network can reach more places and people by transit.

See Section 4.3 below for a more detailed description of which service improvements target which focus areas and populations.

In addition to the service needs identified above, there are also more general needs for improved and safer access to bus stops in large parts of the GRTC service area. Many stops are not fully ADA compliant, or lack ADA accessible curb ramps at nearby intersections. In more suburban parts of the service areas there are inadequate pedestrian accommodations at intersections, so it is unsafe for riders to access stops in both directions.

Some of these issues are being addressed currently by two significant projects, one in the City of Richmond and the other in Henrico County. In the City, CMAQ funding is being used in Fiscal Years 2019, 2020, and 2022 to make improvements to sidewalks near high use bus stops, including adding curb ramps and other ADA accessible improvements. In Henrico County, VDOT has recently implemented $1.9 million in pedestrian improvements to portions of West Broad Street from Willow Lawn to Forest Avenue, including new crosswalks, pedestrian signal heads and sidewalk improvements.

The Greater RVA Transit Vision Plan included a long-range analysis of land use, demographics, and transit propensity (types of residents, employment, and travel flows indicative of transit markets). This analysis supported the long-range recommendations in the plan including nine high quality service corridors (BRT or Enhanced Local service), more extensive fixed route networks in Henrico County and portions of Chesterfield projected to have supportive development densities, more cross-county connections, and circulator routes at the ends of commuter and high quality routes to serve activity centers such as Chester and Ashland.

4.3 Service Development

The sections that follow describe the various service improvements considered in each of the three main jurisdictions served by GRTC (the City of Richmond, Henrico County, and Chesterfield County). The improvements are organized by jurisdiction and then by whether they primarily focus on ridership goals (maximizing ridership per dollar spent) or coverage goals (maximizing the number of people or jobs near service, irrespective of ridership potential).

4.3.1 *Service Improvements in the City of Richmond*

The follow sections detail the service improvements considered in the City of Richmond and incudes detail on the routing, frequency and span of service provided and the markets those improvements would service.

4.3.1.1 Improvements Focused on Ridership Goals

Increase the frequency of Route 20 from 30-minute to 15-minute frequency to improve connections between high frequency corridors (BRT, Routes 1, 2, 3 and 5) and provide better access from Northside and Southside of the city to the West End without having to go downtown. Also extend span of service to 1am to match other high frequency routes (currently ends at 10pm).

- Would provide better connections across the city without having to go downtown.
- Provides better access for commuters, shoppers and many others.
- Increasing frequency from 30-minute to 15-minute
- Identified during the Richmond Transit Network Plan as a key improvement to providing better connections across the city.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to frequent service with this improvement (within ¼ mile).

Service Improvement SI:03
Route 20

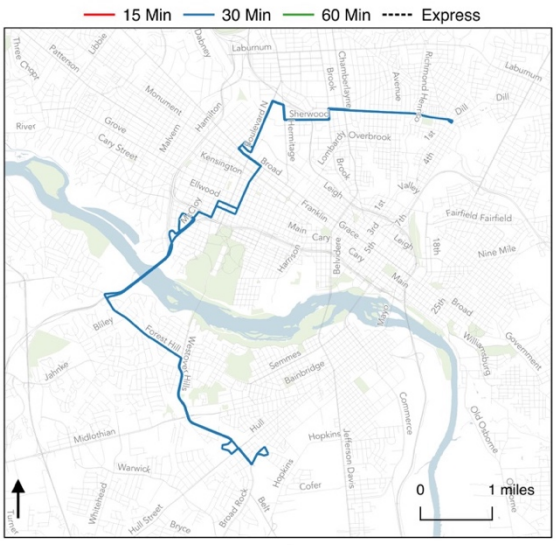
Routing: No change

Frequency: Increase frequency on weekdays and Saturday to every 15 minutes (6am-7pm).

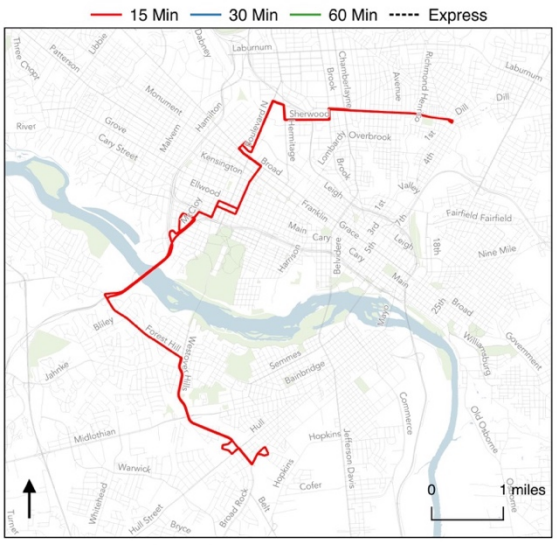
Span: Extend span from midnight to 1am.

Additional Residents		Additional Jobs	
11,600	1.27%	7,600	1.55%

Additional Residents In Poverty		Additional Minority Residents	
2,000	1.68%	5,700	1.35%



Existing System



Service Improvement

Extend the span of high frequency service (15-minute frequency) on Routes 1, 2, 3, 4a, 4b, 5, and 20 to 10pm every evening.

- Intended ridership market: shoppers, lifeline, service workers.
- Increasing span of high-frequency (every 15-minute) service to run later in the evening on the planned high-frequency routes.
- Identified during the Richmond Transit Network Plan as a desired improvement to reduce waiting times, provide easier connections and more reliable service later in the evenings.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to frequent service in the evenings (7-10pm).

Service Improvement SI:87
Route 01

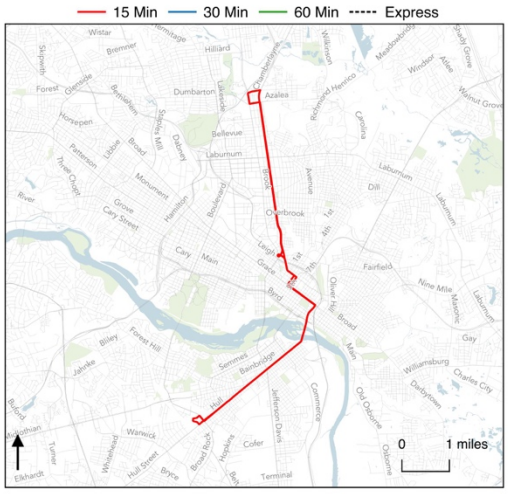
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
17,100	1.88%	15,500	3.14%

Additional Residents In Poverty		Additional Minority Residents	
5,500	4.58%	12,400	2.96%



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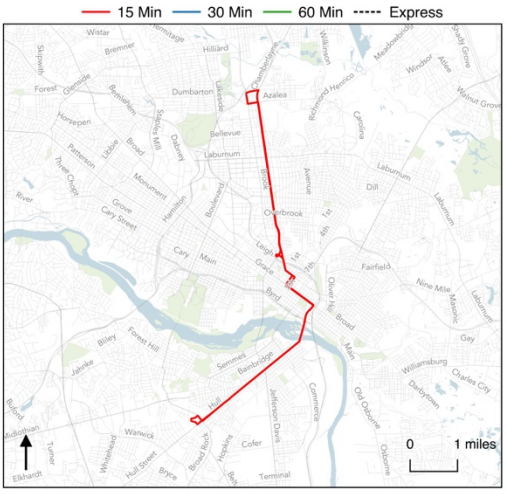


Service Improvement

Service Improvement SI:88
Route 02

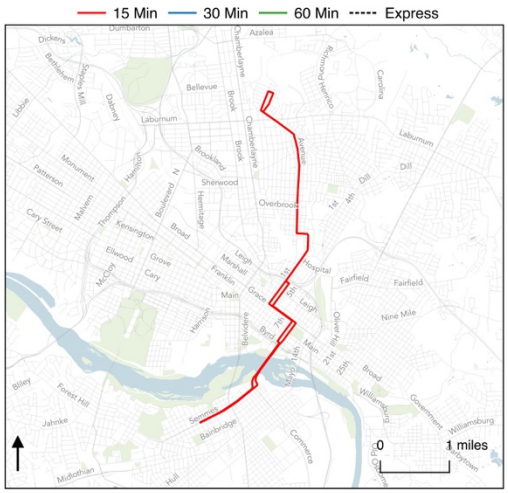
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
12,900	1.42%	17,600	3.58%

Additional Residents In Poverty		Additional Minority Residents	
4,300	3.58%	10,400	2.47%



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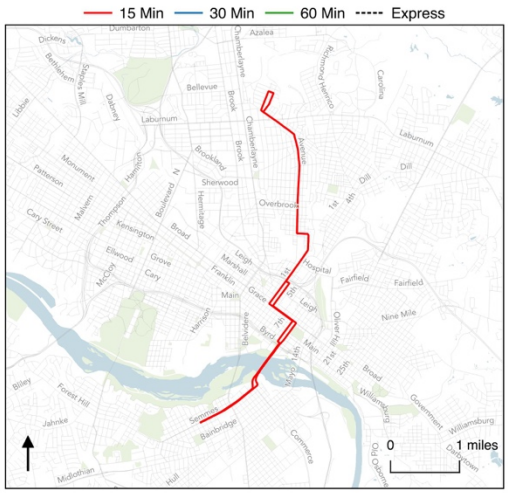


Service Improvement

Service Improvement SI:89
Route 03

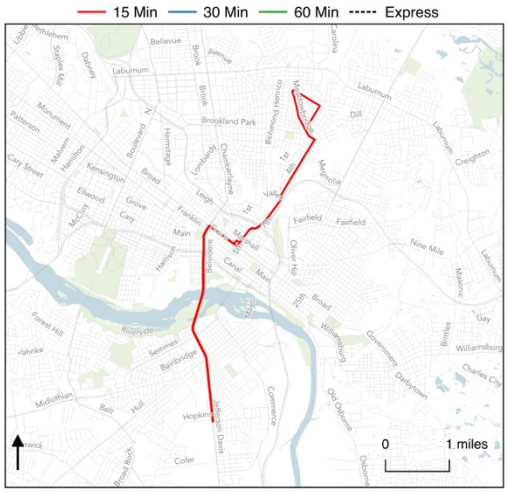
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
16,100	1.77%	21,800	4.43%

Additional Residents In Poverty		Additional Minority Residents	
5,100	4.25%	12,100	2.87%



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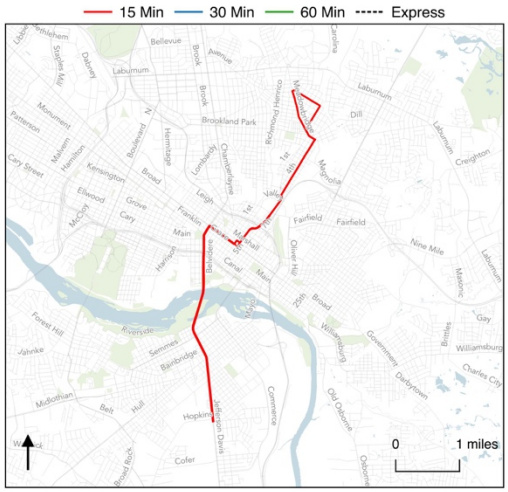


Service Improvement

Service Improvement SI:90
Route 4A

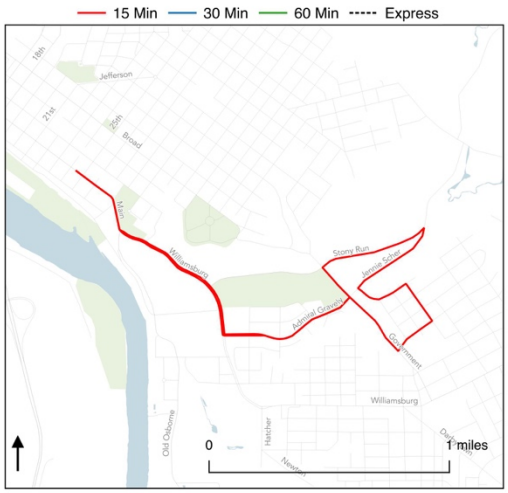
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
3,500	0.39%	300	0.07%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.80%	2,500	0.58%



Existing System

Service Improvement

Service Improvement SI:91
Route 4B

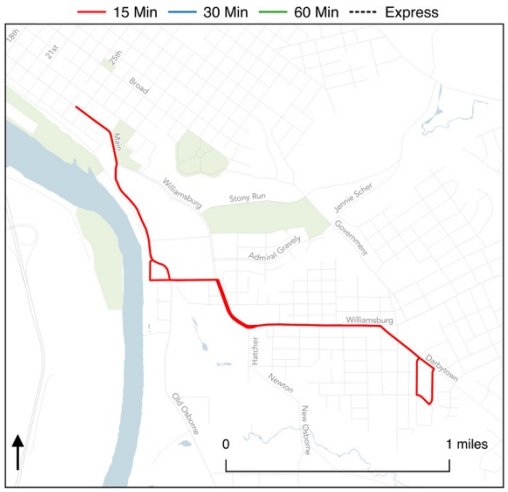
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
3,100	0.35%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.81%	2,400	0.58%



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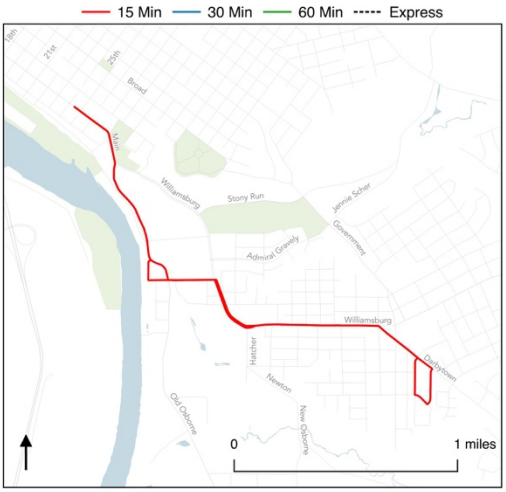


Service Improvement

Service Improvement SI:92
Route 05

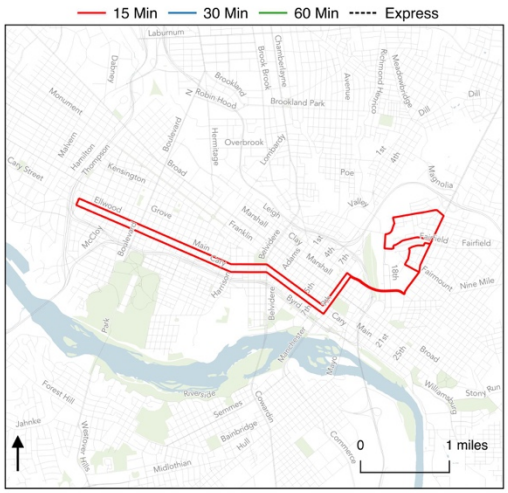
Routing: No change

Frequency: Increase the frequency to every 15-minutes from 7pm to 10pm (curently every 30-minutes)

Span: No change

Additional Residents		Additional Jobs	
25,500	2.80%	32,900	6.69%

Additional Residents In Poverty		Additional Minority Residents	
8,200	6.77%	13,300	3.16%



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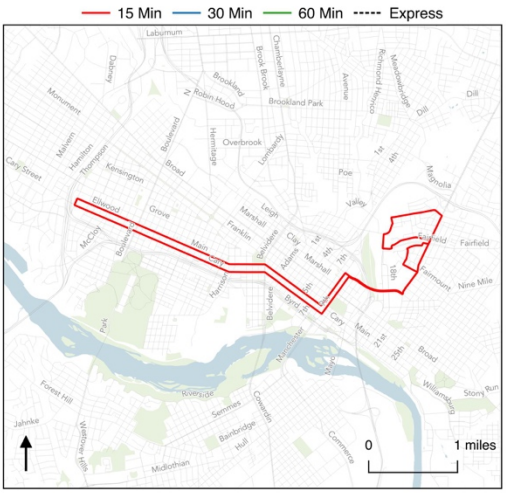


Service Improvement

Increase the frequency of Routes 1, 2, 3, 4a, 4b, 5 and 20 to every 15 minutes on Sundays from 6am to 7pm.

- Intended ridership market: commuters, shoppers, lifeline.
- Increasing frequency of Sunday service to be equal to the frequencies provided on Monday through Saturday.
- Identified during the Richmond Transit Network Plan as a desired improvement in service to provide easier mobility and better access on Sundays, particularly for service and retail workers but also for shoppers.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to frequent service on Sundays with each route improvement.

Service Improvement SI:14
Route 01

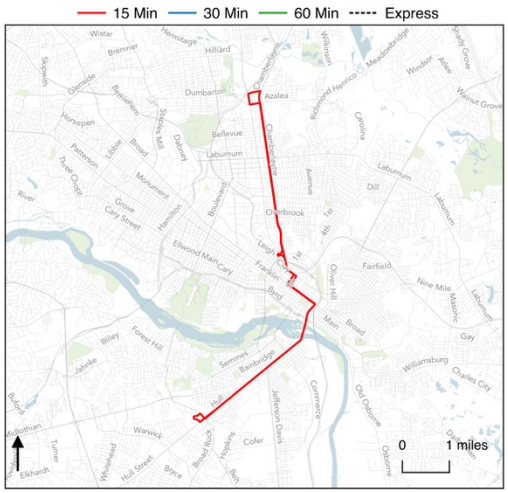
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
17,100	1.88%	15,500	3.14%

Additional Residents In Poverty		Additional Minority Residents	
5,500	4.58%	12,400	2.96%



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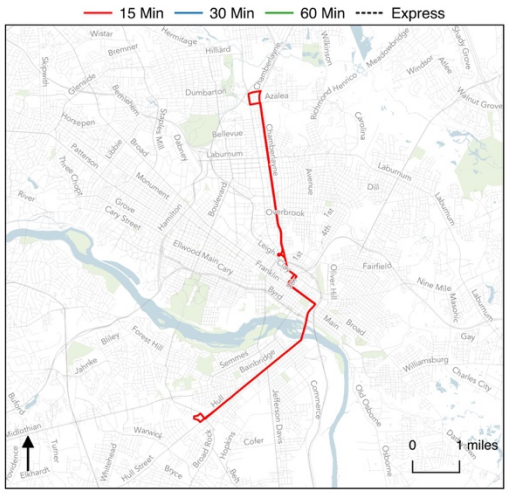


Service Improvement

Service Improvement SI:15
Route 02

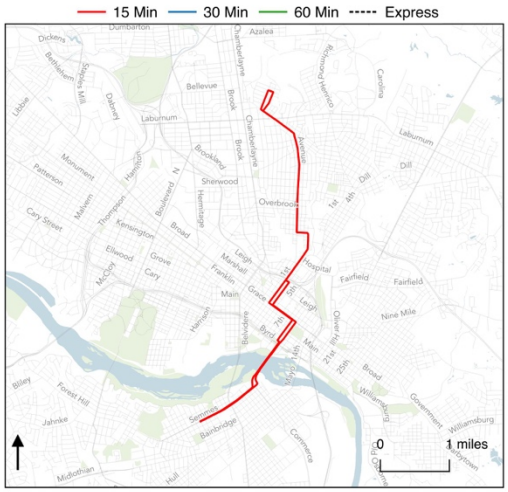
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
12,900	1.42%	17,600	3.58%

Additional Residents In Poverty		Additional Minority Residents	
4,300	3.58%	10,400	2.47%



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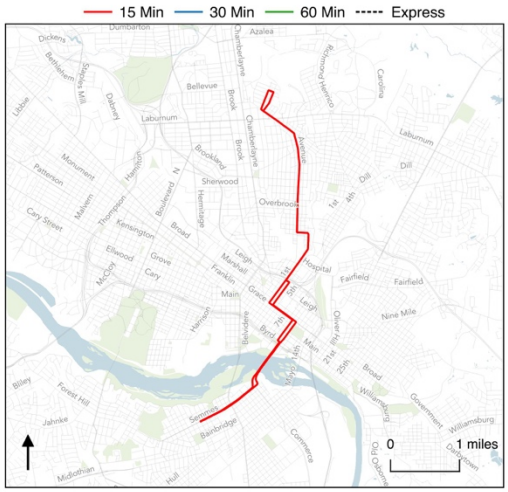


Service Improvement

Service Improvement SI:16
Route 03

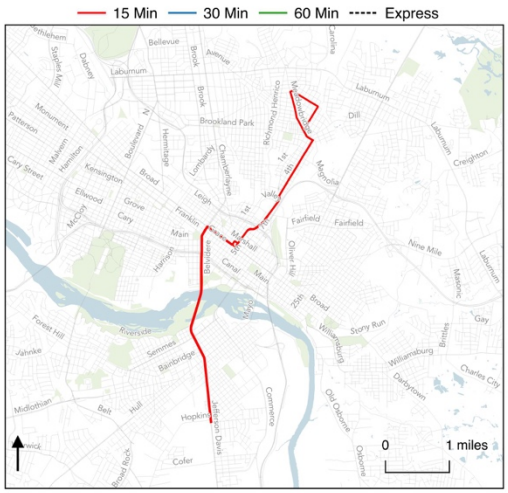
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
16,100	1.77%	21,800	4.43%

Additional Residents In Poverty		Additional Minority Residents	
5,100	4.25%	12,100	2.87%



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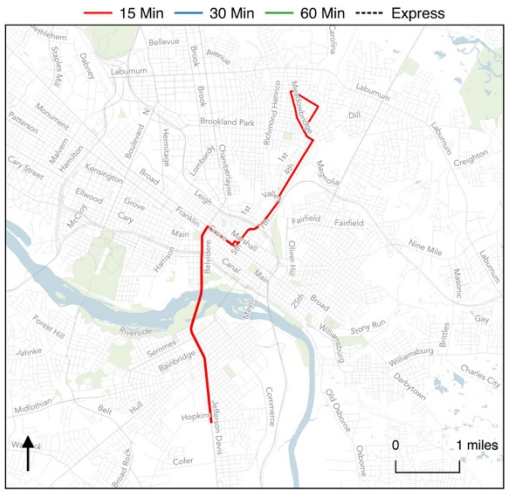


Service Improvement

Service Improvement SI:17
Route 4A

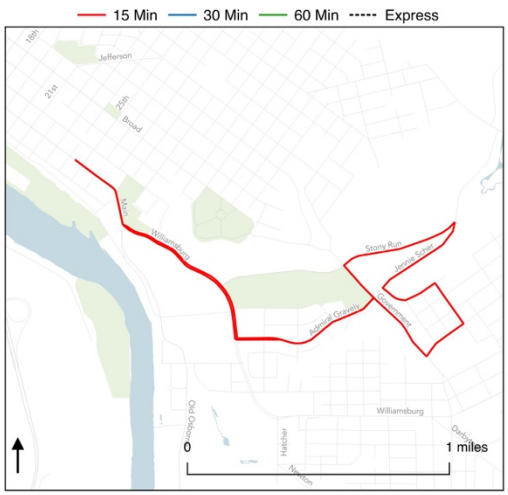
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
3,500	0.39%	300	0.07%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.80%	2,500	0.58%



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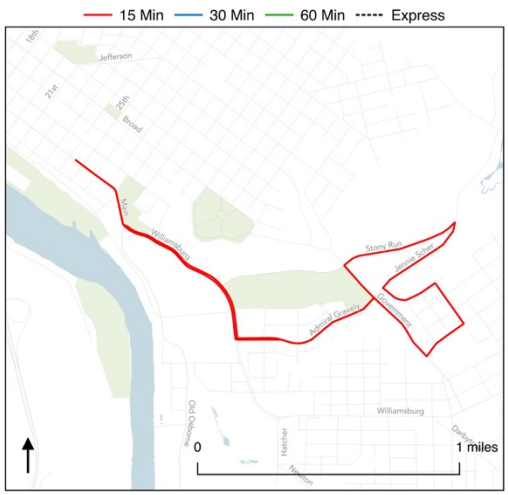


Service Improvement

Service Improvement SI:18
Route 4B

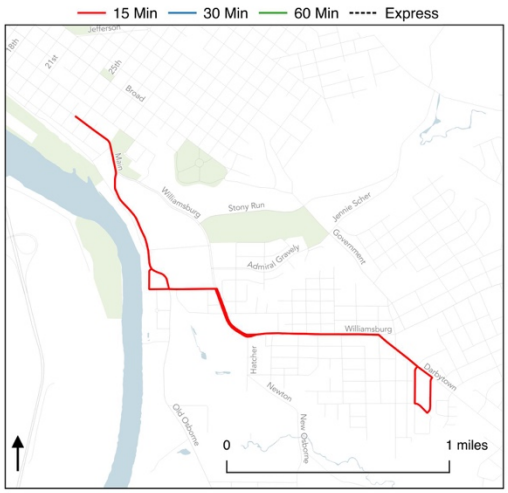
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
3,100	0.35%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.81%	2,400	0.58%



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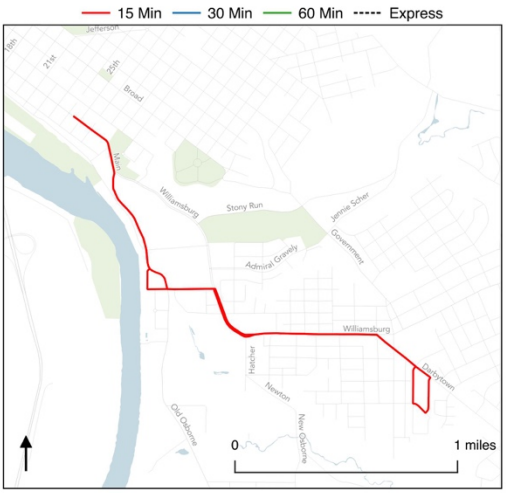


Service Improvement

Service Improvement SI:19
Route 05

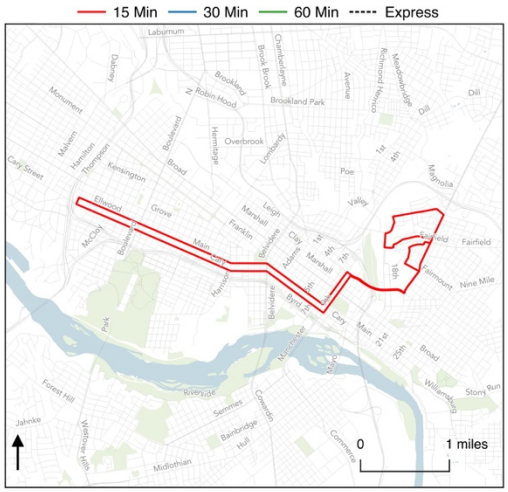
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

Span: No change

Additional Residents		Additional Jobs	
25,500	2.80%	32,900	6.69%

Additional Residents In Poverty		Additional Minority Residents	
8,200	6.77%	13,300	3.16%



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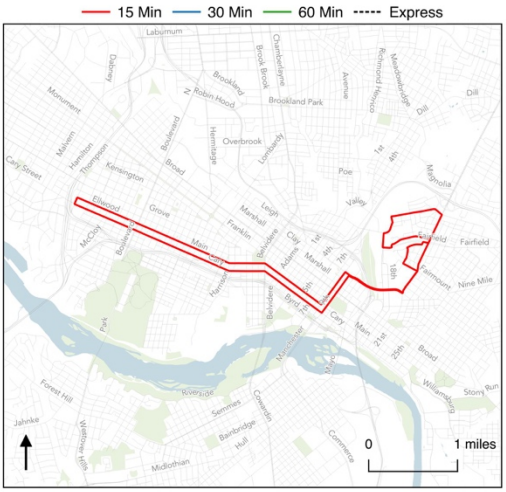


Service Improvement

Service Improvement SI:20
Route 20

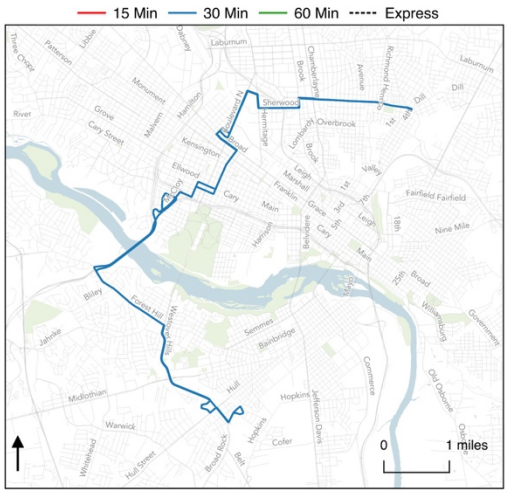
Routing: No change

Frequency: Increase frequency on Sundays to every 15 minutes (6am-7pm)

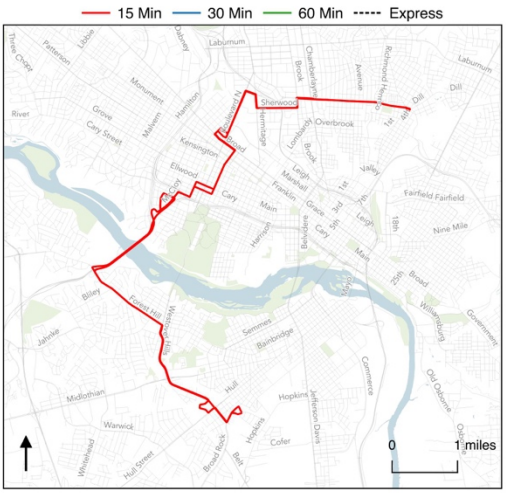
Span: No change

Additional Residents		Additional Jobs	
22,000	2.42%	11,600	2.36%

Additional Residents In Poverty		Additional Minority Residents	
4,300	3.59%	12,100	2.88%



Existing System



Service Improvement

Increase the frequency of Route 12 from 30-minute to 15-minute frequency to improve access from East End locations to downtown and the rest of the region.

- Would provide better access from the East End to downtown and other destinations with less waiting.
- Provides better access for low income residents and many others in the East End.
- Increases frequency from 30-minute to 15-minute

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to frequent service with this improvement.

Service Improvement SI:37
Route 12

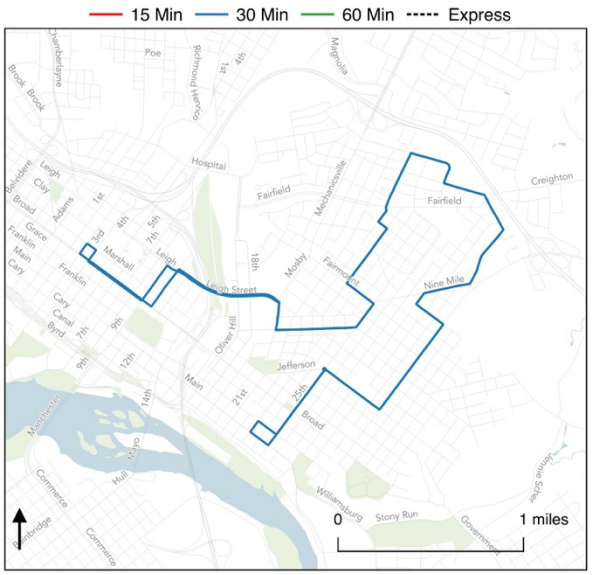
Routing: No change

Frequency: Increase frequency to every 15 minutes.

Span: No change

Additional Residents		Additional Jobs	
9,900	1.09%	1,300	0.27%

Additional Residents In Poverty		Additional Minority Residents	
3,800	3.18%	8,100	1.93%



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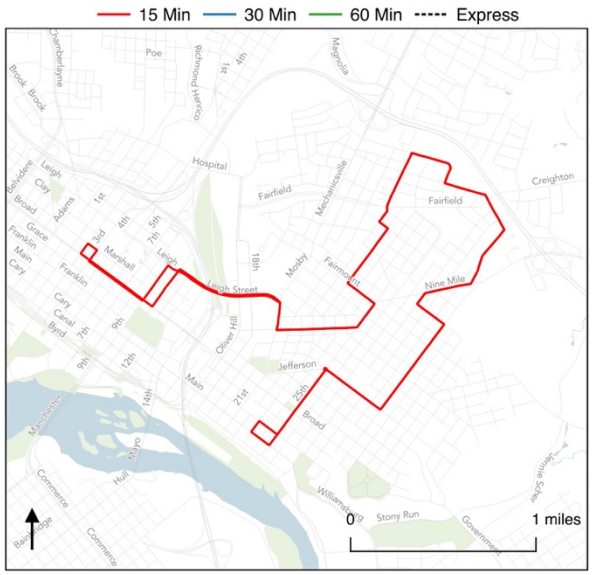


Service Improvement

4.3.1.2 Improvements Focused on Coverage Goals

Operate Route 88 all-day (5am-10pm) and extend to Midlothian Turnpike and Chippenham Pkwy via Warwick Road to replace branch of Route 1b. Increase the frequency of Route 1c to every 30 minutes.

- Intended ridership market: commuters, shoppers, lifeline
- In combination with Route 1a service, this route would provide effective 15-minute service along Midlothian from German School Road to Spring Rock Green.
- Will provide more service along the active Midlothian corridor and could be a precursor to additional service farther west on Midlothian.
- Would increase the span of service on Route 88 to provide all day service from Southside Plaza to the Jefferson Davis and Commerce Road Corridors.
- Changes to Route 1c would result in 30-minute service along Hull Street Road out to Elkhardt Road.
- Identified during the Richmond Transit Network Plan as a desired improvement in service for the Midlothian corridor and to provide better connections within Southside Richmond.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service in the mid-day and evening due to these changes.

Service Improvement SI:93
Route 88

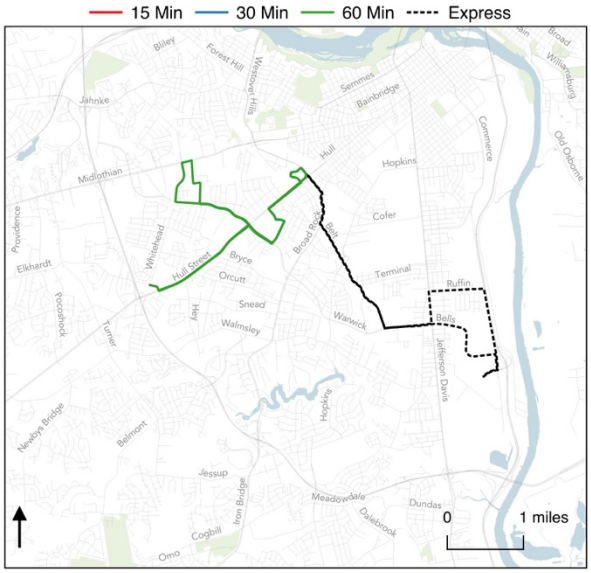
Routing: Extend Route 88 to Midlothian and Spring Rock Green via Hull and Warwick. Remove branch Route 1b.

Frequency: Offset schedule of Routes 1a and 88 to provide effective 15-minute service on Midlothian Turnpike from Spring Rock Green to German School Rd. Increase the frequency of branch Route 1c to every 30 minutes.

Span: Extend span of Route 88 to provide service from to 5am-10pm on weekdays and 6am to 10pm on weekends.

Additional Residents		Additional Jobs	
2,000	0.22%	3,900	0.80%

Additional Residents In Poverty		Additional Minority Residents	
600	0.49%	1,600	0.39%



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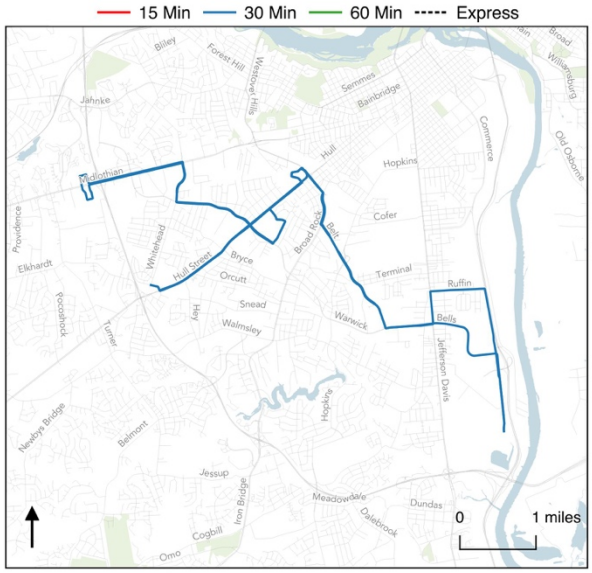


Service Improvement

Extend evening service on low frequency routes to 10pm (Routes 76, 77, 78, 86, 87, 89).

- Intended ridership market: commuters, shoppers, lifeline.
- Increasing span of service to run later in the evening on low-frequency routes.
- Identified during the Richmond Transit Network Plan as a desired improvement in service for less dense parts of Richmond, particularly the West End.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service in the evenings (7pm-10pm) with each route change.

Service Improvement SI:06
Route 76

Routing: No change

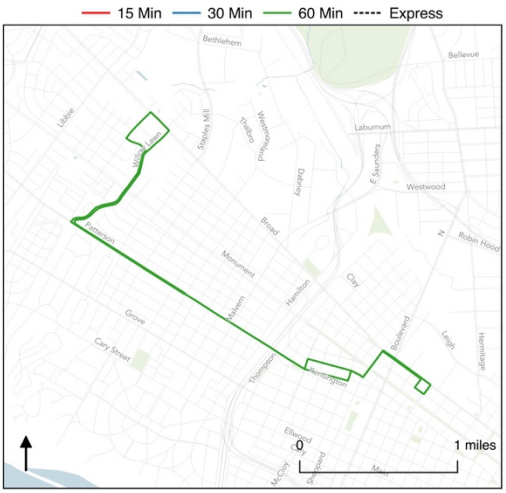
Frequency: No change

Span: Extend to 10pm.

Additional Residents		Additional Jobs	
7,500	0.82%	3,000	0.61%

Additional Residents In Poverty		Additional Minority Residents	
700	0.57%	1,000	0.24%

Existing System



Service Improvement

Service Improvement SI:07
Route 77

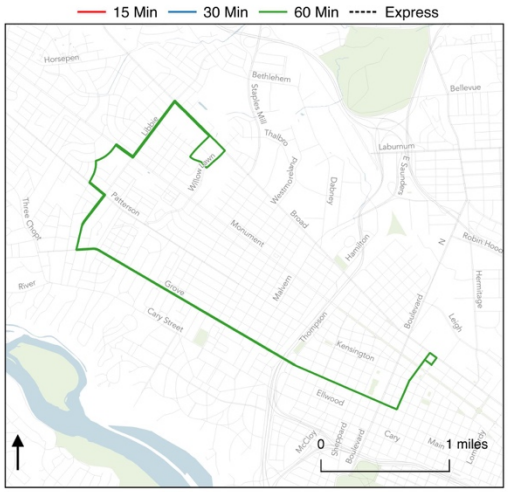
Routing: No change

Frequency: No change

Span: Extend to 10pm.

Additional Residents		Additional Jobs	
8,300	0.92%	8,600	1.75%

Additional Residents In Poverty		Additional Minority Residents	
400	0.37%	1,000	0.24%



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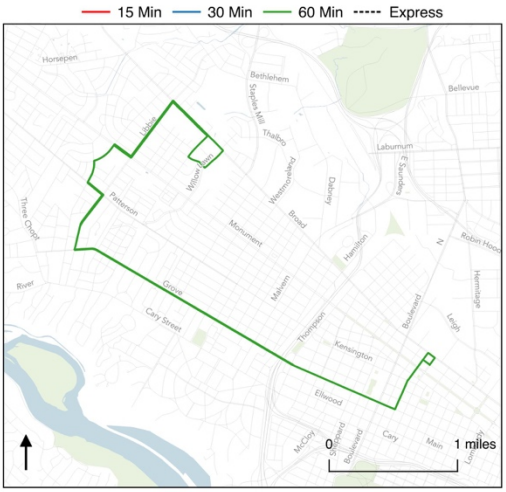


Service Improvement

Service Improvement SI:08
Route 78

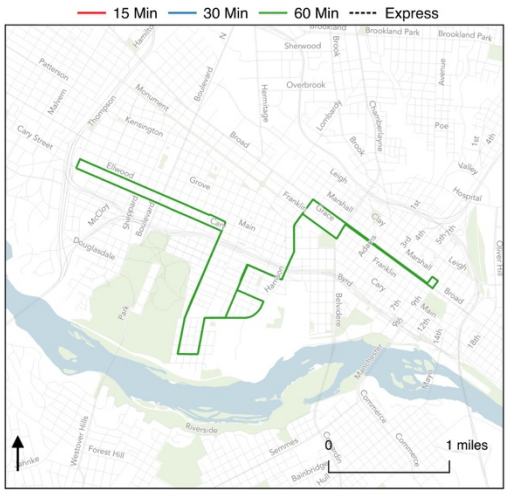
Routing: No change

Frequency: No change

Span: Extend to 10pm.

Additional Residents		Additional Jobs	
3,200	0.35%	500	0.11%

Additional Residents In Poverty		Additional Minority Residents	
800	0.66%	2,300	0.54%



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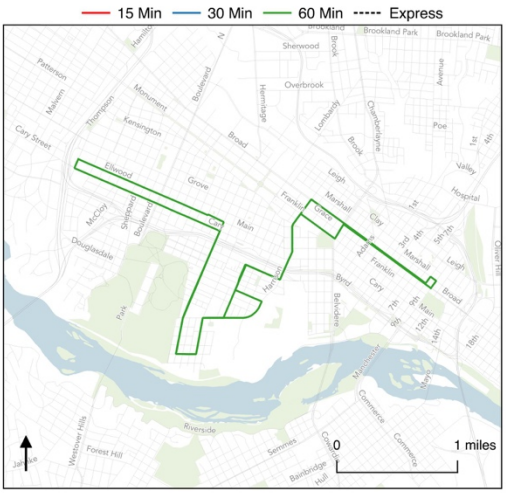


Service Improvement

Service Improvement SI:09
Route 87

Routing: No change

Frequency: No change

Span: Extend to 10pm.

Additional Residents		Additional Jobs	
3,000	0.32%	1,100	0.23%

Additional Residents In Poverty		Additional Minority Residents	
900	0.77%	2,600	0.63%

Existing System

Service Improvement

Service Improvement SI:11
Route 86

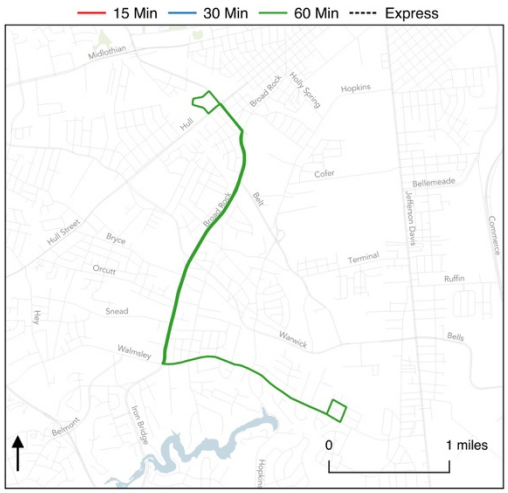
Routing: No change

Frequency: No change

Span: Extend to 10pm.

Additional Residents		Additional Jobs	
5,700	0.63%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
1,500	1.28%	4,800	1.15%



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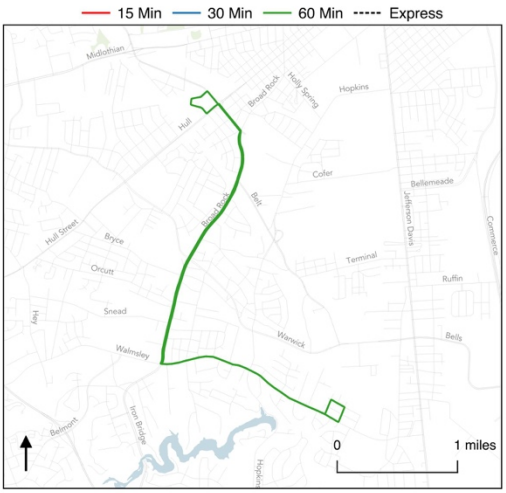


Service Improvement

Extend Route 77 (Grove Avenue) to downtown.

- Intended ridership market: lifeline, students.
- Extending Route 77 via Grove Avenue, through VCU, along a path similar to the current Route 16.
- Would provide a one seat ride from the Westhampton area to downtown instead of forcing a transfer at Robinson and Broad.
- Identified during the Richmond Transit Network Plan as a desired improvement to provide additional coverage within the Fan.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service (be within 1/4 mile of a bus stop) in the mid-day with this improvement.

Service Improvement SI:12
Route 77

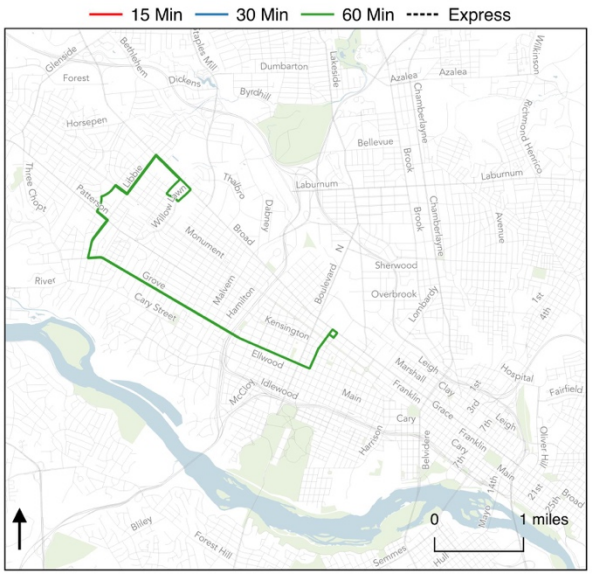
Routing: Extend eastern terminus froom Robinson/Broad to downtown via Grove Ave.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
1,000	0.11%	300	0.07%

Additional Residents In Poverty		Additional Minority Residents	
200	0.17%	100	0.02%



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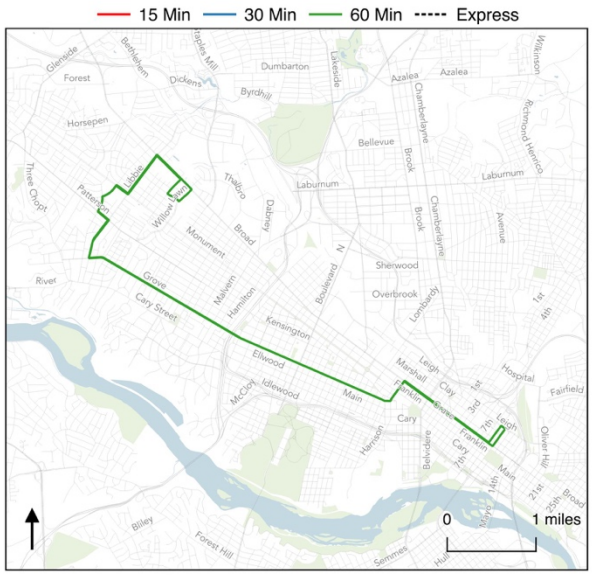


Service Improvement

Extend night service to 2am on Routes 1, 2, 3, 4a, 4b, 5, 8, 12, 13, 14, 20, 50.

- Intended ridership market: service workers, lifeline.
- Identified during the Richmond Transit Network Plan as a desired improvement to provide transit access for those who work late nights.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service from 1-2am with each route improvement.

Service Improvement SI:22
Route 01

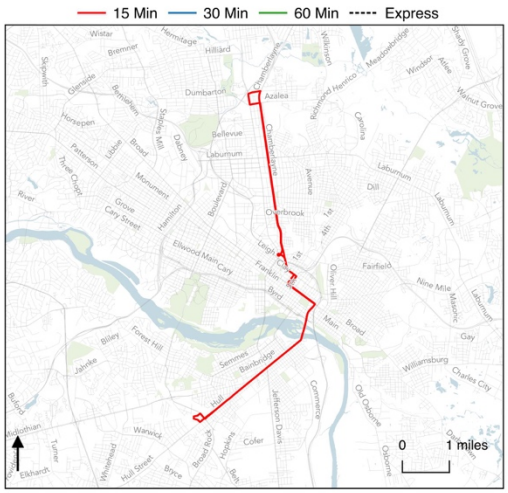
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
9,300	1.03%	30,100	6.11%

Additional Residents In Poverty		Additional Minority Residents	
3,400	2.85%	6,600	1.56%



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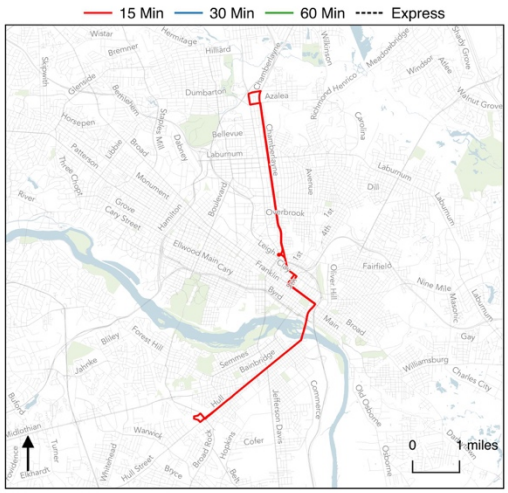


Service Improvement

Service Improvement SI:23
Route 02

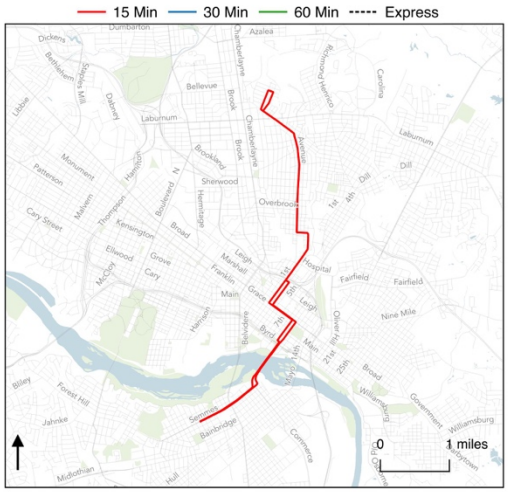
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
13,800	1.52%	28,700	5.83%

Additional Residents In Poverty		Additional Minority Residents	
4,600	3.84%	10,800	2.56%



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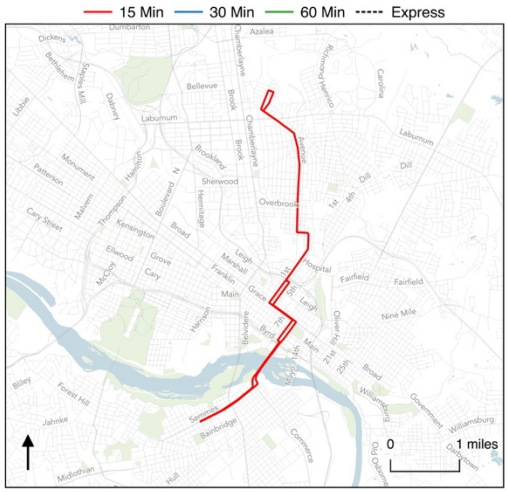


Service Improvement

Service Improvement SI:24
Route 03

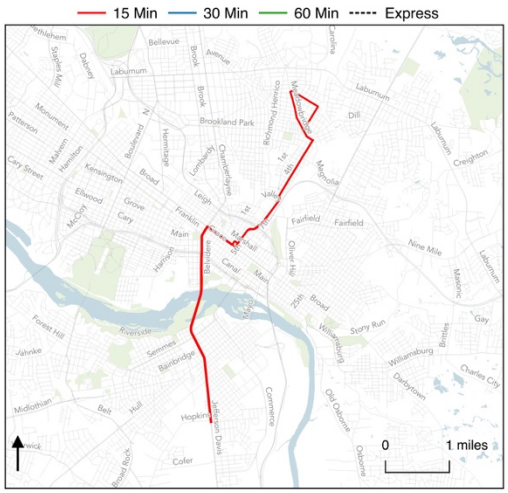
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
18,500	2.03%	33,100	6.74%

Additional Residents In Poverty		Additional Minority Residents	
5,800	4.81%	12,900	3.07%



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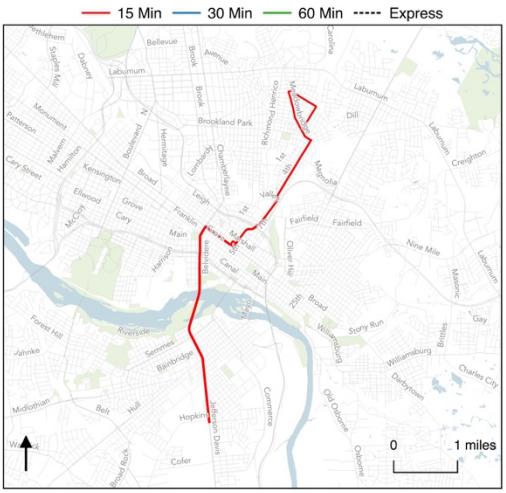


Service Improvement

Service Improvement SI:25
Route 4A

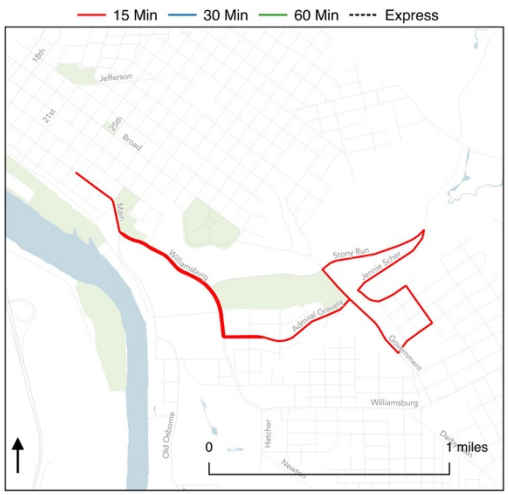
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
3,900	0.43%	400	0.09%

Additional Residents In Poverty		Additional Minority Residents	
1,100	0.90%	2,800	0.65%



Existing System

Service Improvement

Service Improvement SI:26
Route 4B

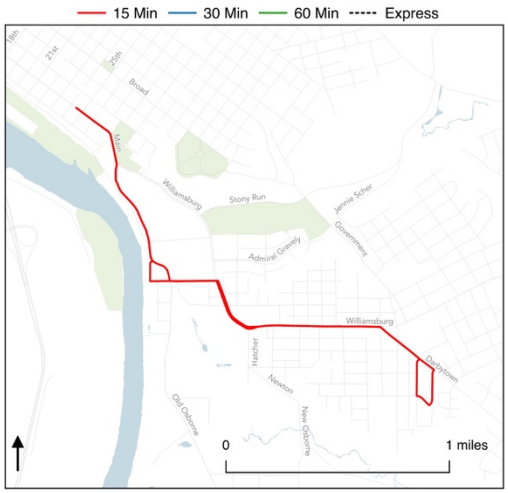
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
3,700	0.41%	600	0.11%

Additional Residents In Poverty		Additional Minority Residents	
1,100	0.95%	2,900	0.68%



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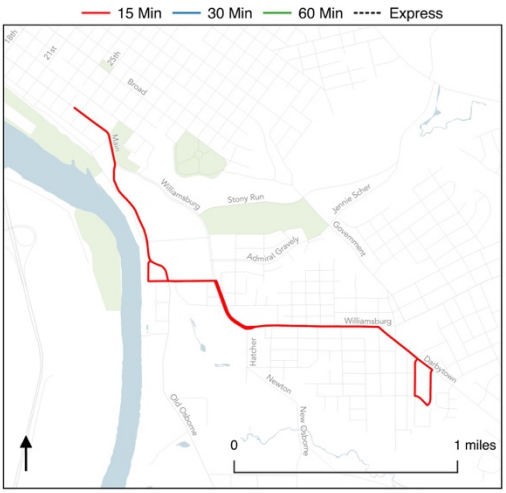


Service Improvement

Service Improvement SI:27
Route 05

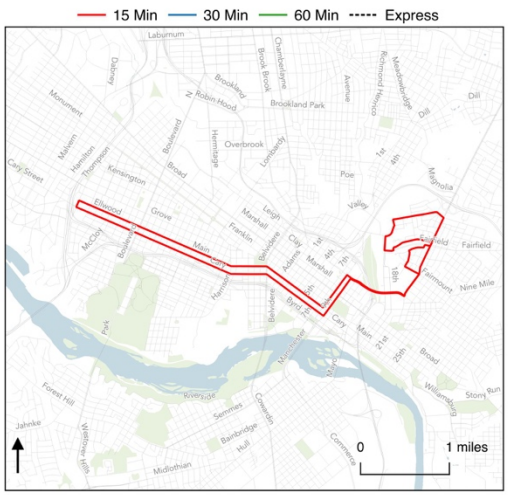
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
27,800	3.06%	49,000	9.97%

Additional Residents In Poverty		Additional Minority Residents	
8,600	7.16%	14,600	3.48%



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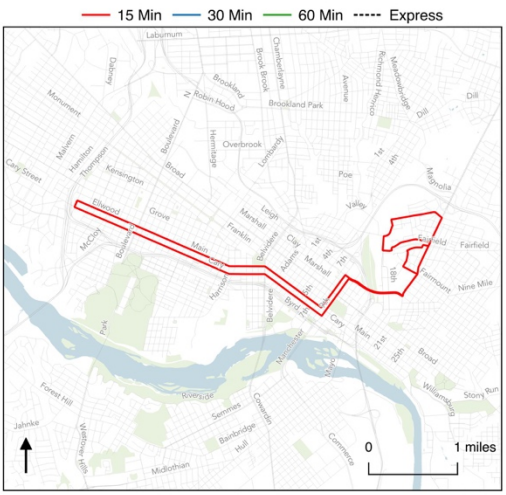


Service Improvement

Service Improvement SI:28
Route 08

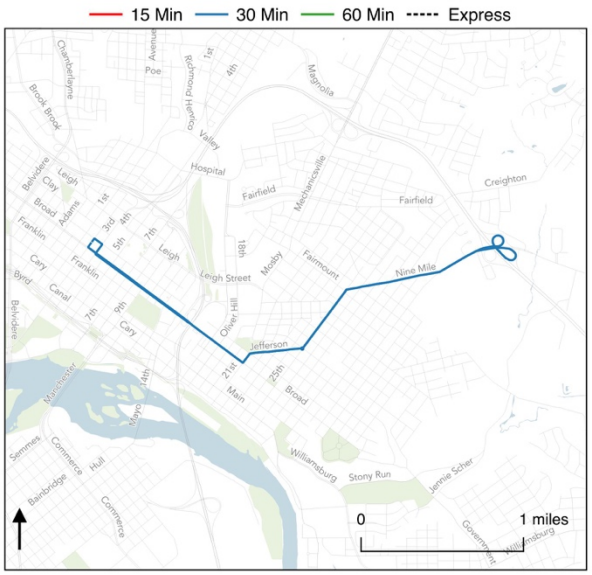
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
7,200	0.79%	22,600	4.59%

Additional Residents In Poverty		Additional Minority Residents	
2,400	1.96%	5,200	1.23%



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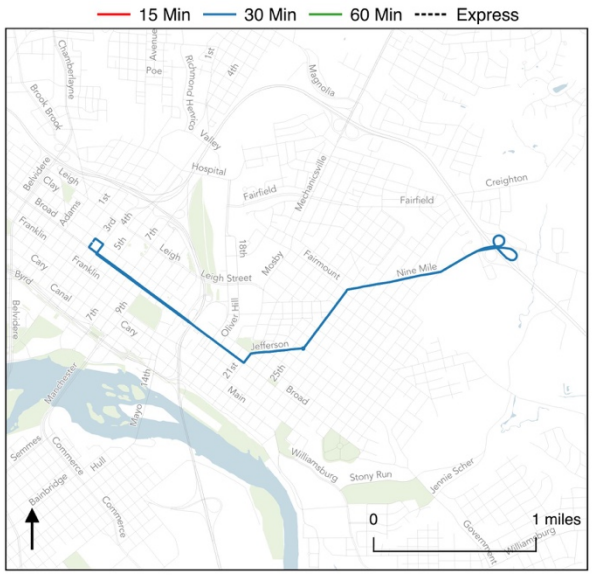


Service Improvement

Service Improvement SI:29
Route 12

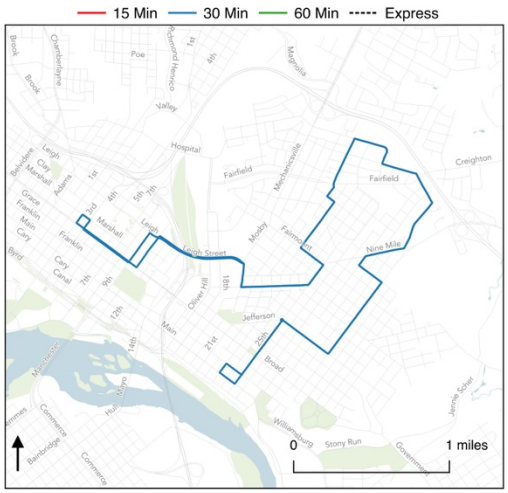
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
15,000	1.65%	29,000	5.90%

Additional Residents In Poverty		Additional Minority Residents	
6,100	5.09%	12,200	2.89%



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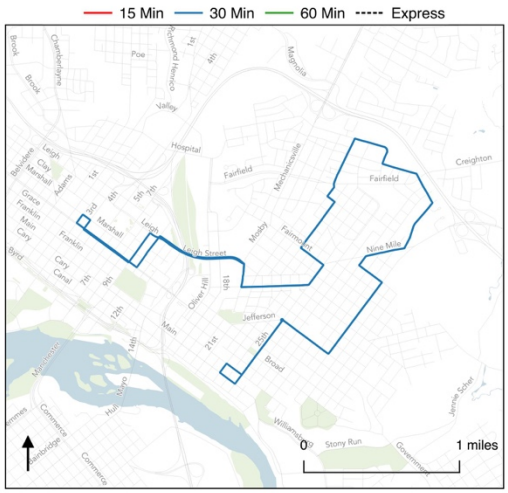


Service Improvement

Service Improvement SI:30
Route 13

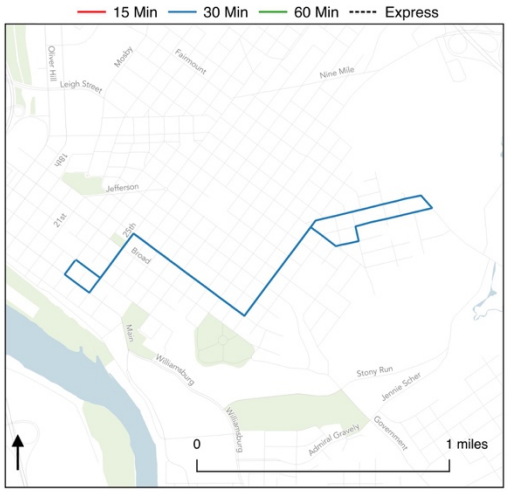
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
4,100	0.45%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
700	0.54%	2,400	0.56%



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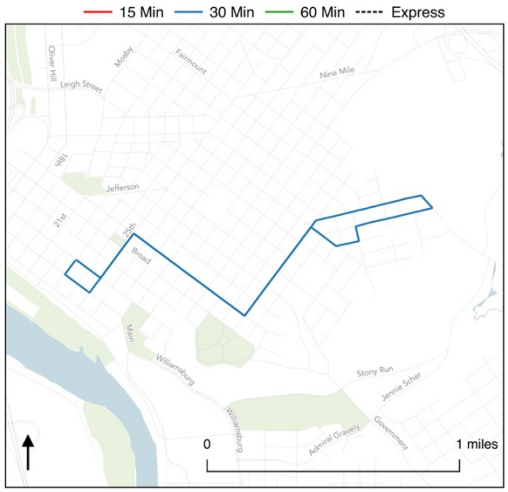


Service Improvement

Service Improvement SI:31
Route 14

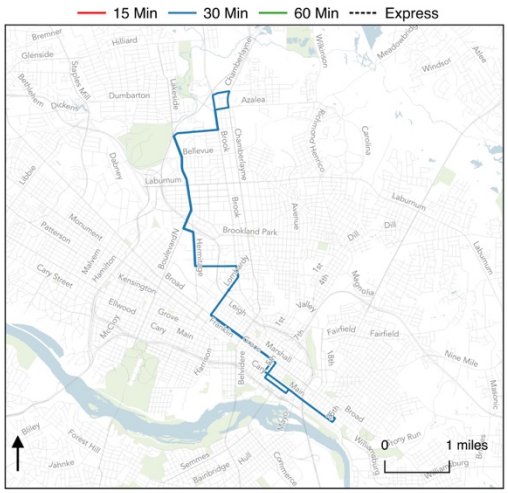
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
13,800	1.51%	29,700	6.03%

Additional Residents In Poverty		Additional Minority Residents	
3,500	2.94%	6,000	1.44%



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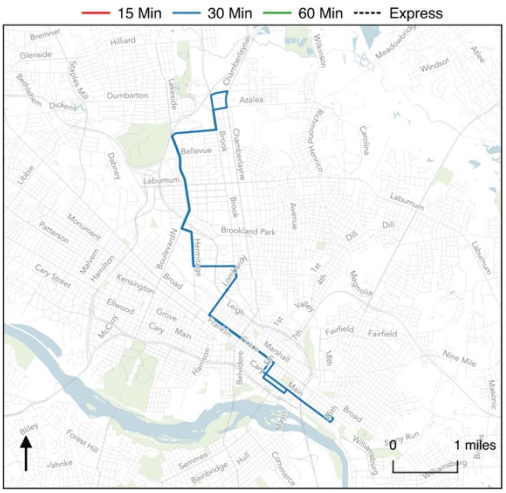


Service Improvement

Service Improvement SI:32
Route 20

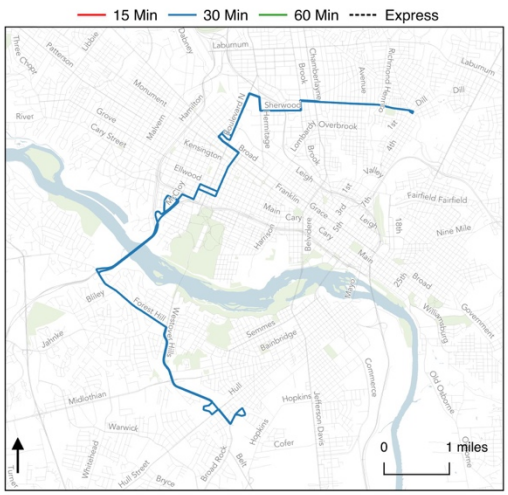
Routing: No change

Frequency: No change

Span: Extend to 2am (assuming already extended to midnight).

Additional Residents		Additional Jobs	
23,700	2.60%	13,200	2.69%

Additional Residents In Poverty		Additional Minority Residents	
4,400	3.69%	11,500	2.73%



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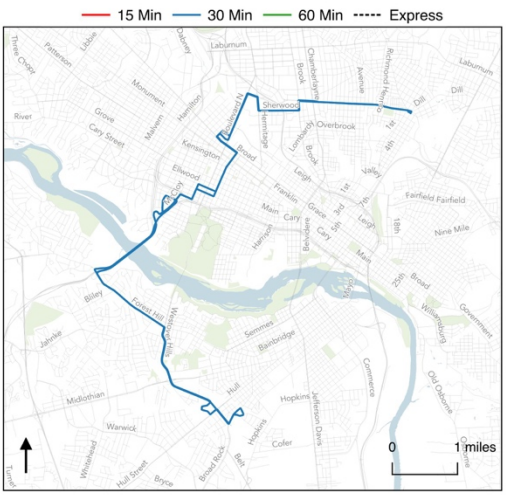


Service Improvement

Service Improvement SI:34
Route 50

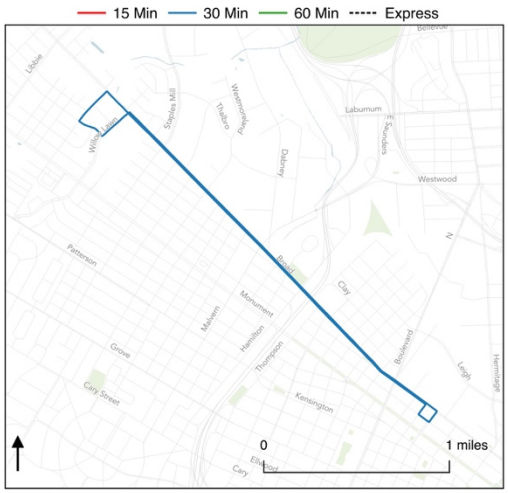
Routing: No change

Frequency: No change

Span: Extend to 2am.

Additional Residents		Additional Jobs	
6,500	0.72%	11,200	2.28%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.80%	1,200	0.29%



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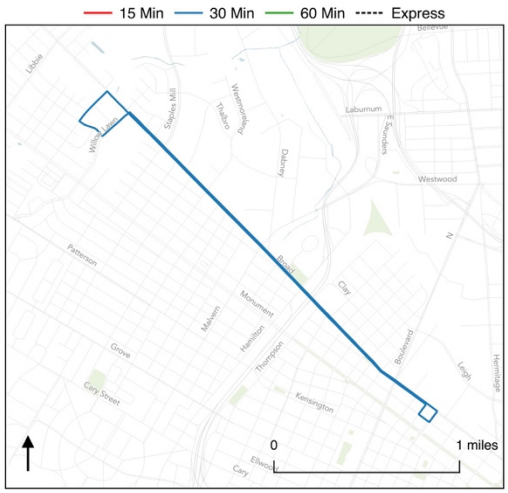


Service Improvement

Extend Route 2a to reach Stony Point Fashion Park.

- Intended ridership market: lifeline, commuters, shoppers.
- Extend Route 2a via Huguenot Road and Chippenham Parkway to Stony Point Fashion Park
- Identified during the Richmond Transit Network Plan as a desired improvement to provide additional coverage in Southside and a connection to this large shopping mall and job center.

Service Improvement SI:35
Route 2A

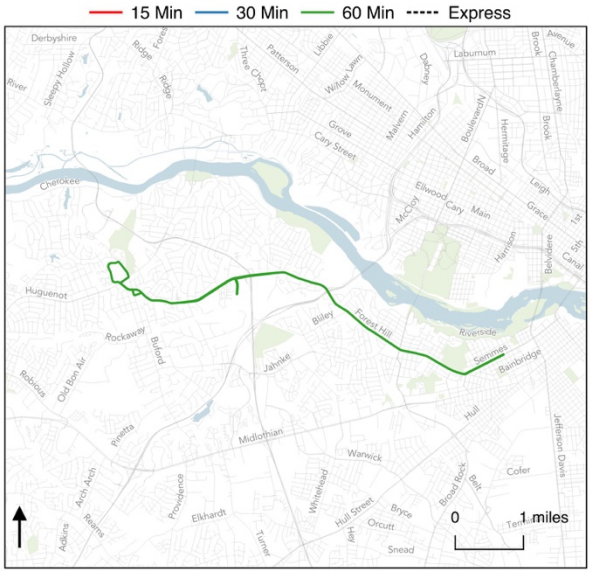
Routing: Extend to Stoney Point Fasion Park.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
1,500	0.17%	1,300	0.26%

Additional Residents In Poverty		Additional Minority Residents	
100	0.07%	300	0.08%



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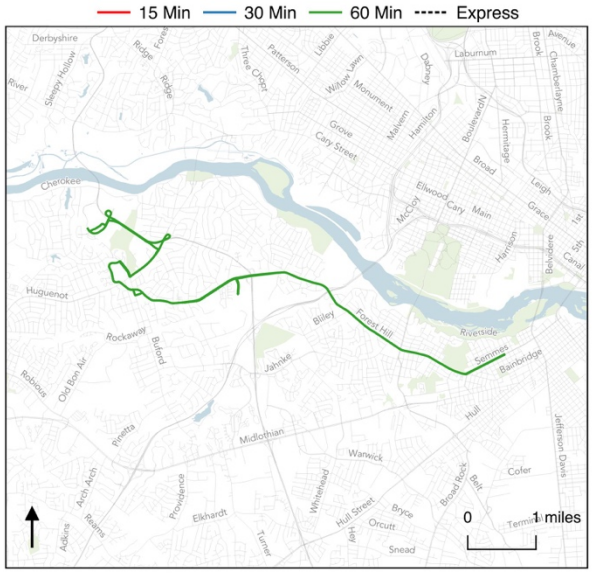


Service Improvement

Improve all service in the city to at least 30-minute frequency during the day and add 15-minute frequency service to Nine Mile Road corridor in East End

- Increase daytime frequency of Routes 76, 77, 78, 86 and 87 to 30-minutes.
- Increase span of service on Route 8 to all day on weekday and overlap with Route 7 to provide 15-minute frequency of service from Downtown to Nine Mile and Laburnum.
- Extend Route 8 from Downtown to southside terminating at Southside Plaza. Route would follow Commerce, Maury, Clopton, Midlothian, Crutchfield and Belt in order to replace Route 2c branch.
- With Route 2c replaced by Route 8, Routes 2a and 2b can be increased to 30 minute frequency. This will extend the 15-minute frequency portion of Route 2 to Forest Hill and Jahnke.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to evening service with this group of improvements. Additional residents and jobs would have access to frequent service with the improvements to Route 8 in the East End.

Service Improvement SI:83
Route 2 & 8

Routing: Extend Route 8 to Southside to take over parts of Routes 2c. Remove branch Route 2c

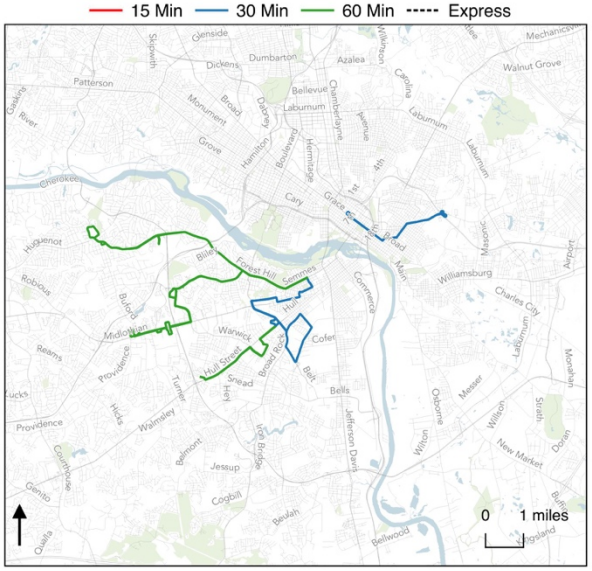
Frequency: Increase the frequency of Routes 2a and 2b to every 30 minutes.

Span: Extend span of Route 8 so that it runs in tandem with Route 7 to provide 15-minute service during the day in the East End.

Additional Residents		Additional Jobs	
11,400	1.25%	8,900	1.82%

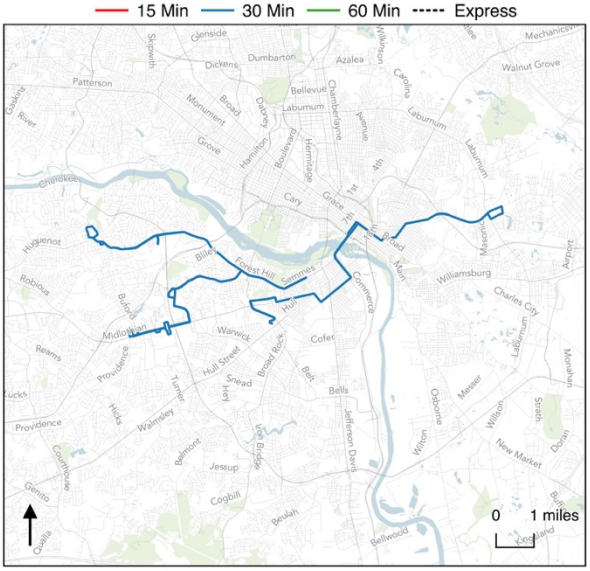
Additional Residents In Poverty		Additional Minority Residents	
2,400	2.03%	8,400	2.01%

15 Min 30 Min 60 Min ----- Express



Existing System

15 Min 30 Min 60 Min ----- Express



Service Improvement

Service Improvement SI:78
Route 76

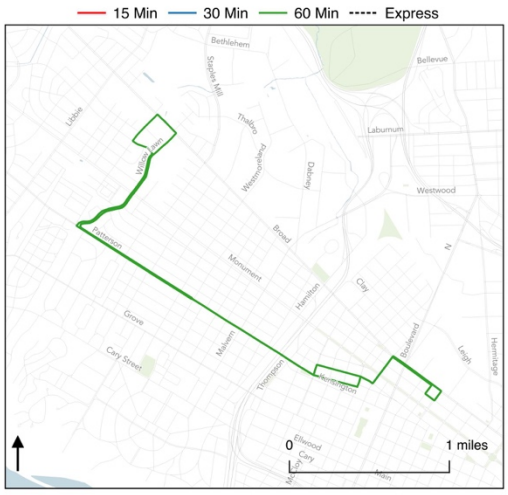
Routing: No change

Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
7,500	0.82%	3,000	0.61%

Additional Residents In Poverty		Additional Minority Residents	
700	0.57%	1,000	0.24%



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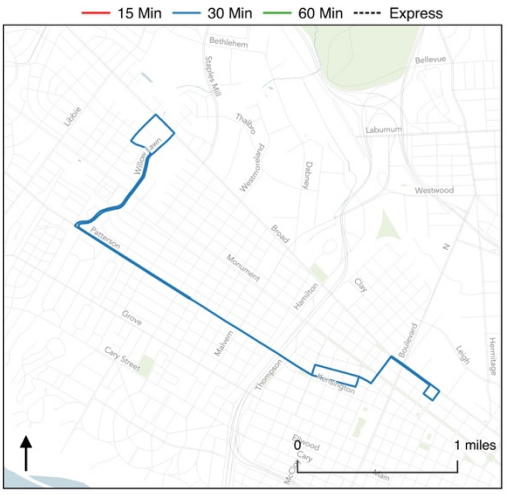


Service Improvement

Service Improvement SI:79
Route 77

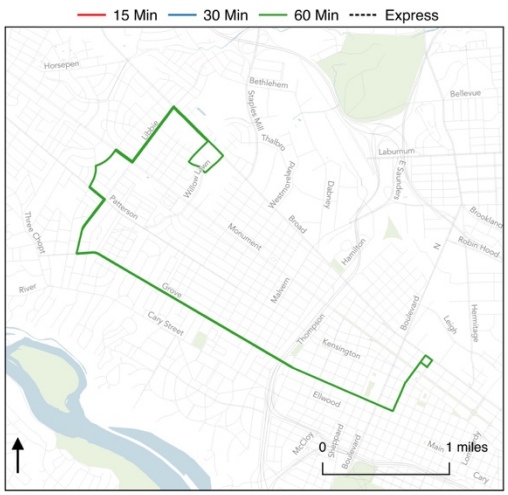
Routing: No change

Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
8,300	0.92%	8,600	1.75%

Additional Residents In Poverty		Additional Minority Residents	
400	0.37%	1,000	0.24%



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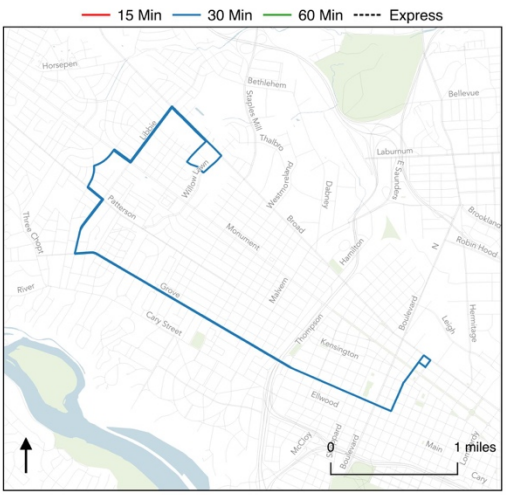


Service Improvement

Service Improvement SI:80
Route 78

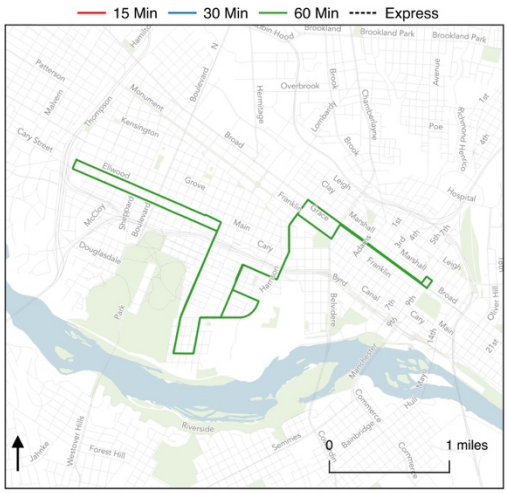
Routing: No change

Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
3,200	0.35%	500	0.11%

Additional Residents In Poverty		Additional Minority Residents	
800	0.66%	2,300	0.54%



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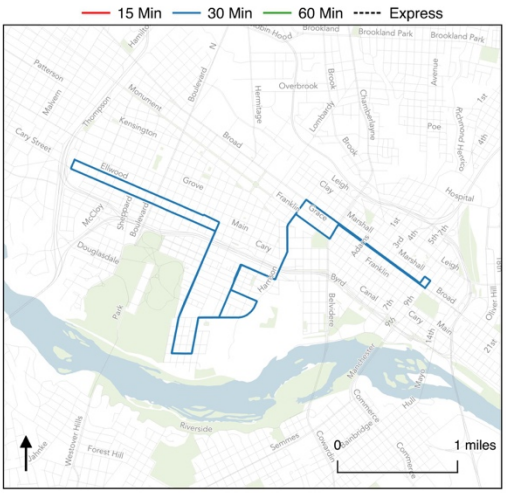


Service Improvement

Service Improvement SI:81
Route 87

Routing: No change

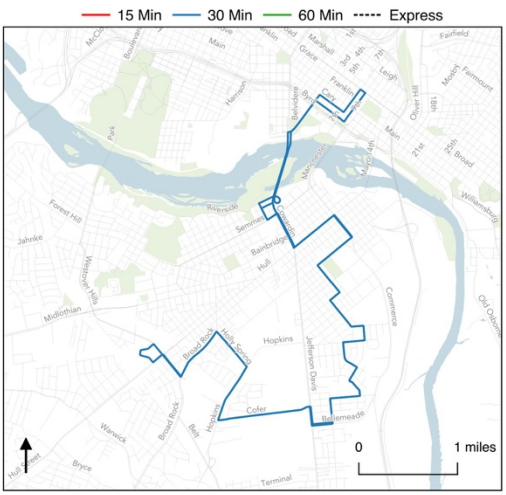
Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
3,000	0.32%	1,100	0.23%

Additional Residents In Poverty		Additional Minority Residents	
900	0.77%	2,600	0.63%

Existing System



Service Improvement

Service Improvement SI:82
Route 86

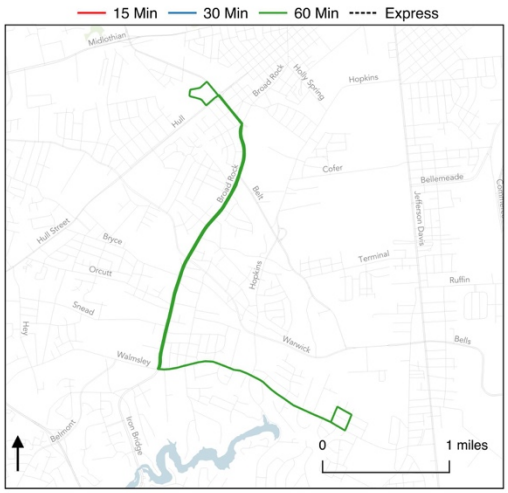
Routing: No change

Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
5,700	0.63%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
1,500	1.28%	4,800	1.15%



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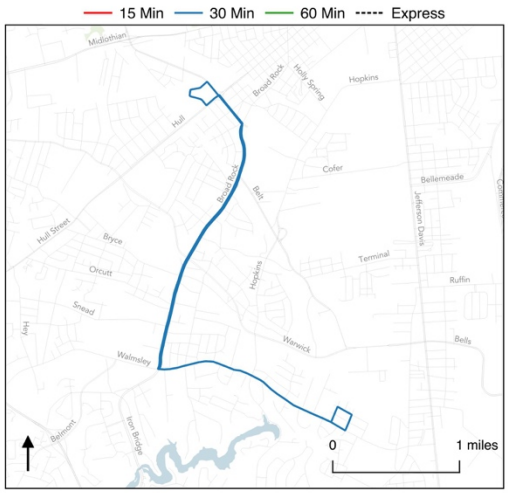


Service Improvement

4.3.2 *Service Improvements in Henrico County*

4.3.2.1 Improvements Focused on Ridership Goals

Extend Route 19 to Short Pump with a terminus at Bon Secours Parkway/Wegmans Drive.

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Connects to major employment centers along Broad Street, like Innsbrook.
- Connects to regional shopping centers like Short Pump Towne Center.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:40
Route 19

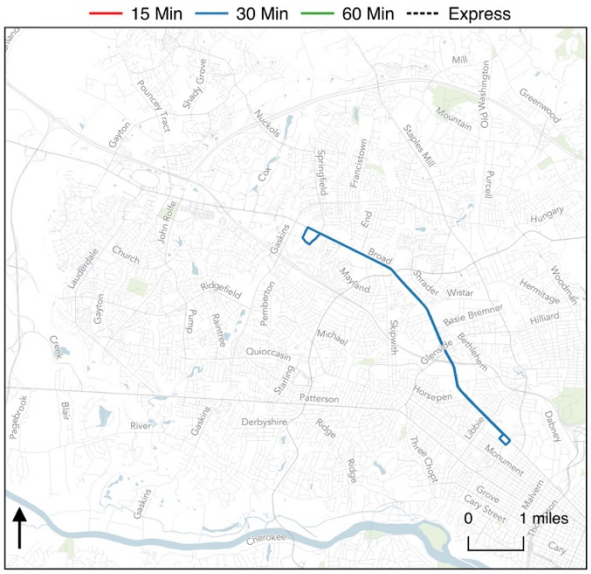
Routing: Extend to Short Pump terminating at Bon Secours Parkway/Wegmans Drive.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
4,200	0.46%	7,800	1.59%

Additional Residents In Poverty		Additional Minority Residents	
200	0.19%	1,800	0.44%



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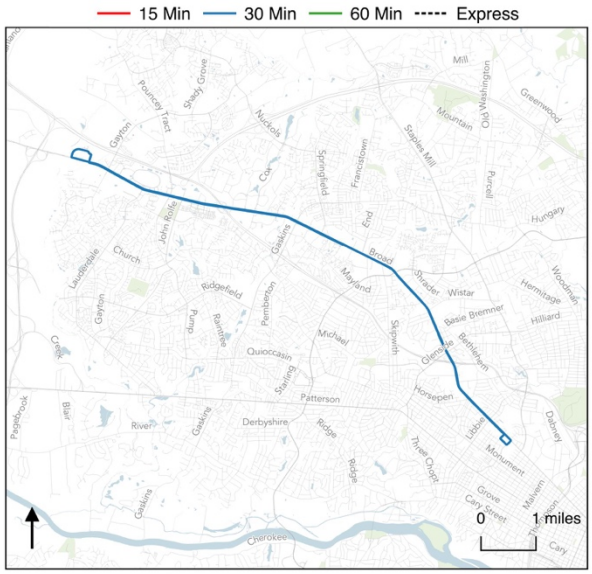


Service Improvement

Revise and simplify Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north to a one-way loop around Parham, Shrader and Wistar, serving the Henrico County Government Center.

- Intended ridership market: commuters, lifeline, retail workers, shoppers, Amtrak riders.
- Sets the frequency of service to a standard clockface (60 minutes instead of variable).
- Connects to major employment centers along Staples Mill and provides a simpler route that is easier to follow.
- Provides two-way, all-day service to the Amtrak Staples Mill Station.
- Identified during the TDP as an important connection to jobs, shopping and Amtrak.
- First step in improved service on Staples Mill Road.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:39
Route 18

Routing: Simplify route for two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill and then terminate in a one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.

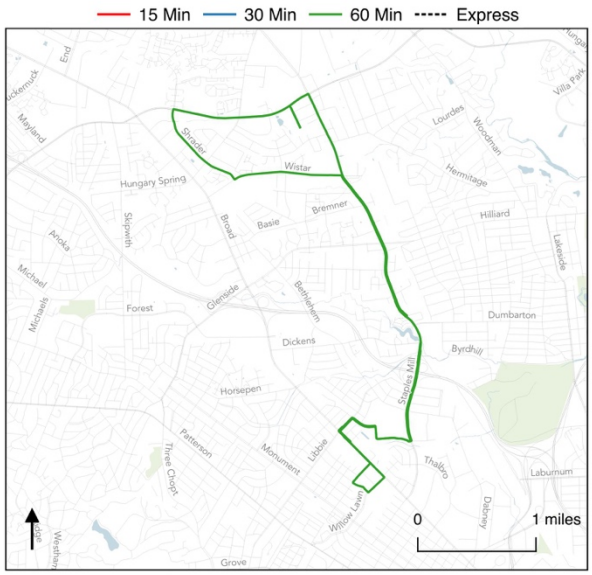
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
600	0.07%	3,500	0.72%

Additional Residents In Poverty		Additional Minority Residents	
100	0.07%	200	0.04%

Existing System



Service Improvement

Add evening service (until 11pm) to Routes 7, 18, 19, 79, 91.

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Extends the span of service from about 7pm to 11pm on most routes, providing better access to retail and service workers and shoppers.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service in the evening with each route improvement.

Service Improvement SI:41
Route 07

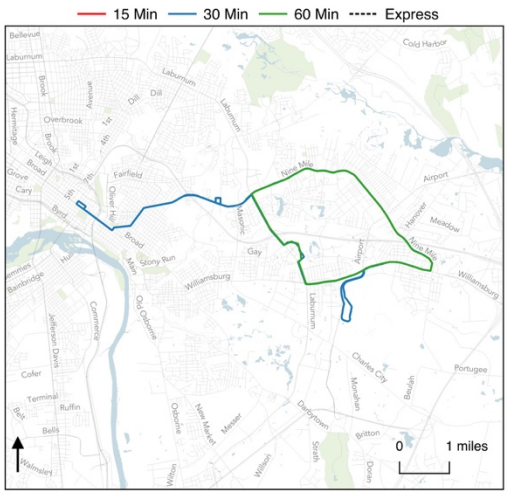
Routing: No change

Frequency: No change

Span: Extend evening span to 11pm.

Additional Residents		Additional Jobs	
10,600	1.16%	6,600	1.35%

Additional Residents In Poverty		Additional Minority Residents	
2,100	1.76%	7,200	1.71%



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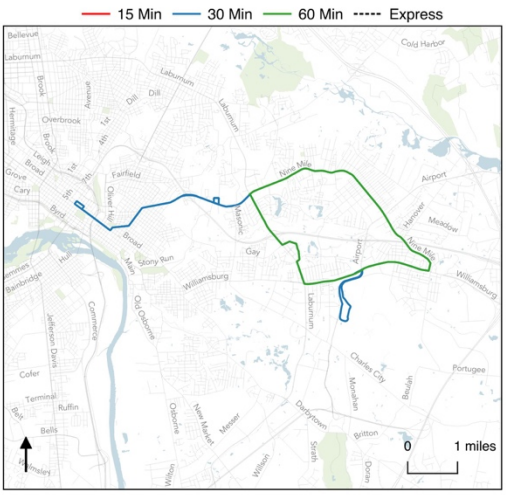


Service Improvement

Service Improvement SI:42
Route 18

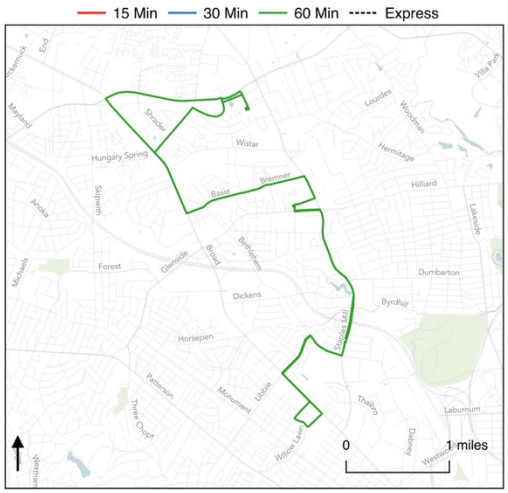
Routing: No change

Frequency: No change

Span: Extend evening span to 11pm.

Additional Residents		Additional Jobs	
13,300	1.46%	14,300	2.90%

Additional Residents In Poverty		Additional Minority Residents	
2,400	1.96%	7,200	1.70%



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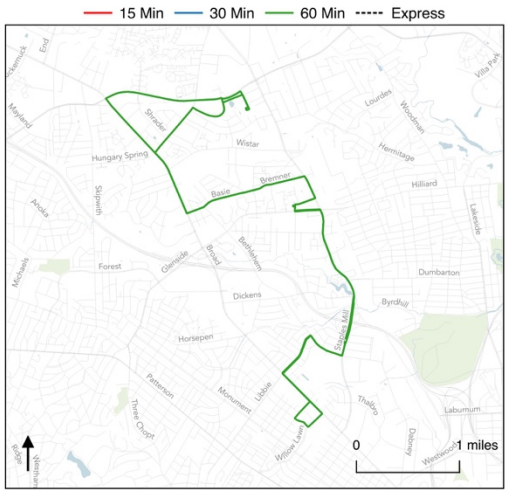


Service Improvement

Service Improvement SI:43
Route 19

Routing: No change

Frequency: No change

Span: Extend evening span to 11pm.

Additional Residents		Additional Jobs	
10,700	1.18%	12,400	2.51%

Additional Residents In Poverty		Additional Minority Residents	
1,200	0.96%	5,300	1.25%

Existing System

Service Improvement

Service Improvement SI:44
Route 79

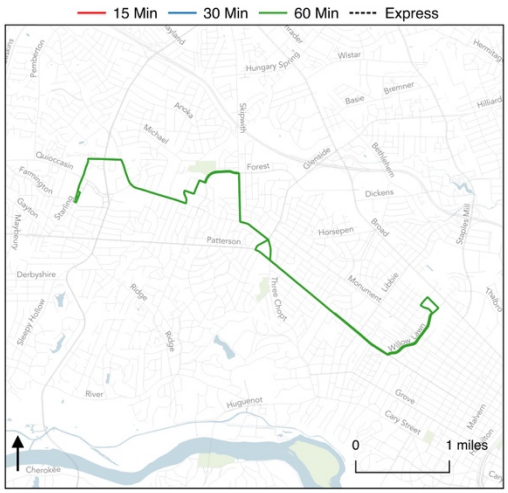
Routing: No change

Frequency: No change

Span: Extend evening span to 11pm.

Additional Residents		Additional Jobs	
10,800	1.18%	13,500	2.73%

Additional Residents In Poverty		Additional Minority Residents	
1,200	1.01%	3,200	0.75%



Existing System

Service Improvement

Service Improvement SI:45
Route 91

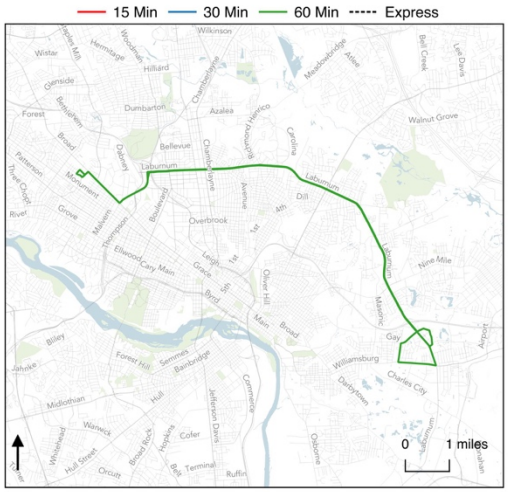
Routing: No change

Frequency: No change

Span: Extend evening span to 11pm.

Additional Residents		Additional Jobs	
11,100	1.22%	8,700	1.77%

Additional Residents In Poverty		Additional Minority Residents	
2,200	1.83%	8,200	1.95%



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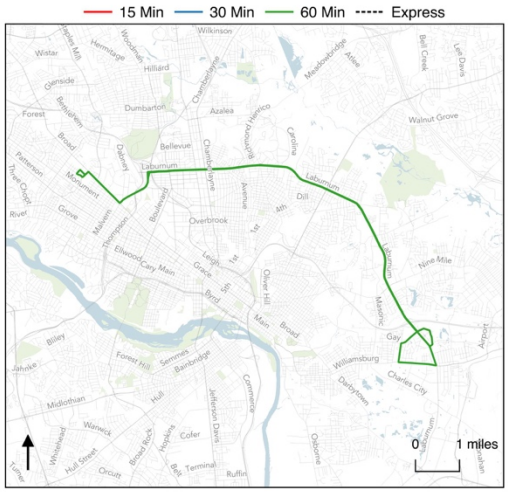


Service Improvement

Add weekend service (Saturday and Sunday, 6am to 11pm) to Routes 7, 18, 19, 79, 91.

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Extends the span of service from about 7pm to 11pm on most routes, providing better access to retail and service workers and shoppers.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to service on weekends with each route improvement.

Service Improvement SI:36
Route 07

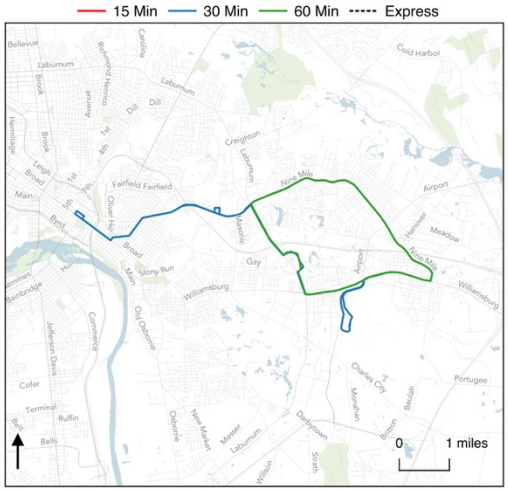
Routing: No change

Frequency: No change

Span: Add weekend service on Saturday and Sunday from 6am-11pm.

Additional Residents		Additional Jobs	
10,800	1.18%	6,900	1.40%

Additional Residents In Poverty		Additional Minority Residents	
2,100	1.78%	7,300	1.73%



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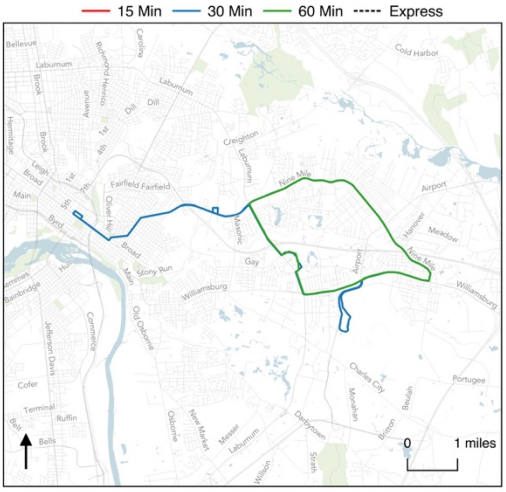


Service Improvement

Service Improvement SI:47
Route 18

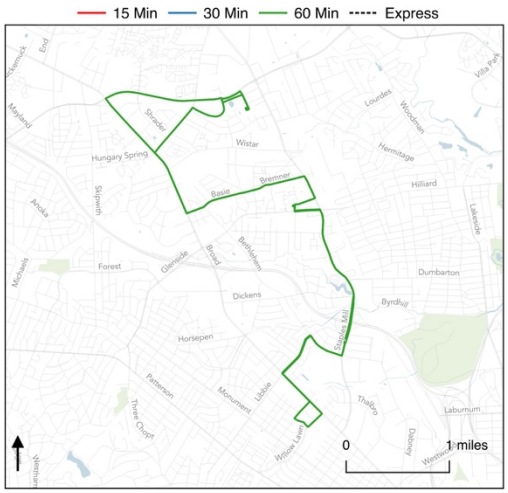
Routing: No change

Frequency: No change

Span: Add weekend service on Saturday and Sunday from 6am-11pm.

Additional Residents		Additional Jobs	
13,300	1.46%	14,300	2.90%

Additional Residents In Poverty		Additional Minority Residents	
2,400	1.96%	7,200	1.70%



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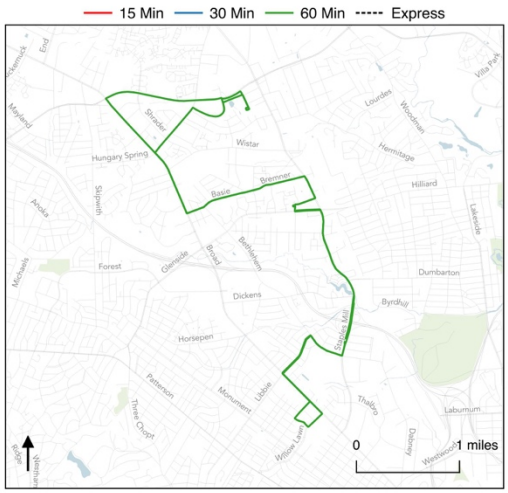


Service Improvement

Service Improvement SI:48
Route 19

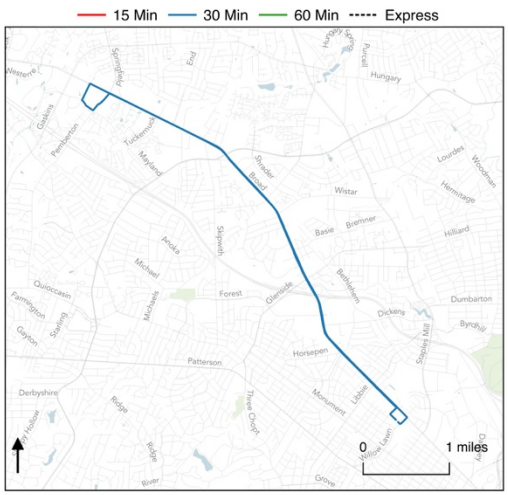
Routing: No change

Frequency: No change

Span: Add weekend service on Saturday and Sunday from 6am-11pm.

Additional Residents		Additional Jobs	
10,700	1.18%	12,400	2.51%

Additional Residents In Poverty		Additional Minority Residents	
1,200	0.96%	5,300	1.25%



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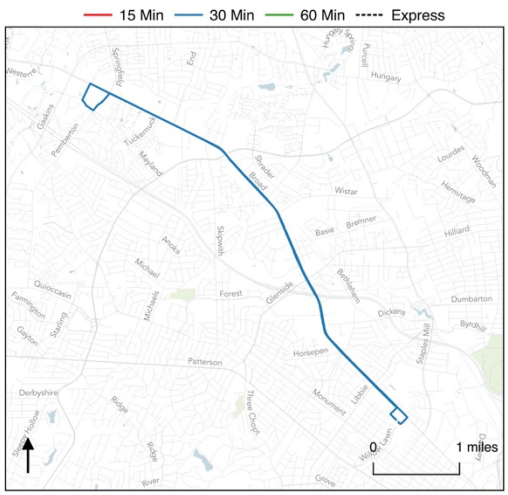


Service Improvement

Service Improvement SI:49
Route 79

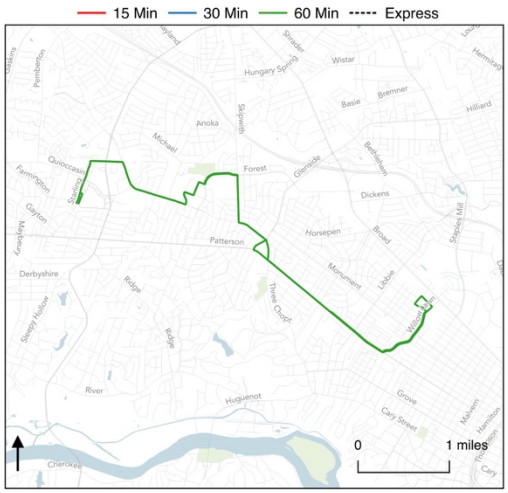
Routing: No change

Frequency: No change

Span: Add weekend service on Saturday and Sunday from 6am-11pm.

Additional Residents		Additional Jobs	
10,800	1.18%	13,500	2.73%

Additional Residents In Poverty		Additional Minority Residents	
1,200	1.01%	3,200	0.75%



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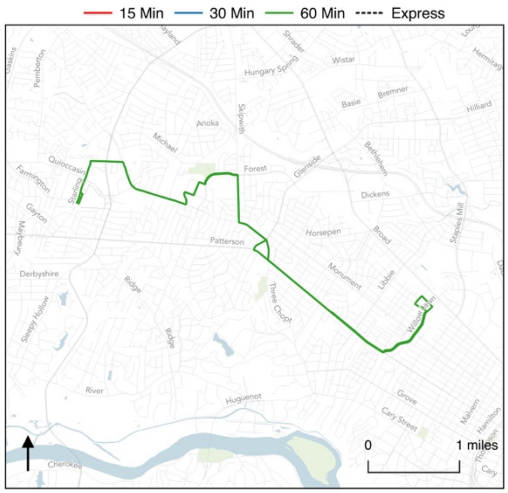


Service Improvement

Service Improvement SI:50
Route 91

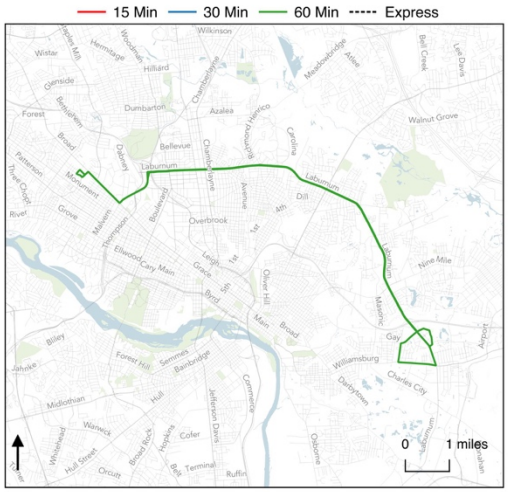
Routing: No change

Frequency: No change

Span: Add weekend service on Saturday and Sunday from 6am-11pm.

Additional Residents		Additional Jobs	
11,100	1.22%	8,700	1.77%

Additional Residents In Poverty		Additional Minority Residents	
2,200	1.83%	8,200	1.95%



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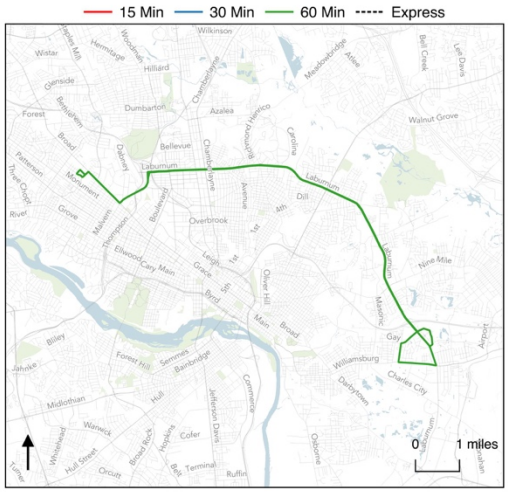


Service Improvement

Increase the frequency of major Henrico Routes to 30-minutes all day (Routes 18, 79, 91).

- Intended ridership market: commuters, lifeline, retail workers, shoppers, Amtrak riders (Route 18).
- Provides a faster connection directly from the East End to the West End of Henrico (Route 91).
- Provides better connections to major shopping centers like Willow Lawn and White Oak Village (Route 91)
- Provides better connection to major employment centers along Staples Mill (Route 18)
- Provides better service to the Amtrak Staples Mill Station (Route 18)
- Provides better access to major shopping destinations of Willow Lawn and Regency Square (Route 79)
- Identified during the TDP as an important connection to jobs, shopping and Amtrak.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to 30-minute service with each route improvement.

Service Improvement SI:51
Route 91

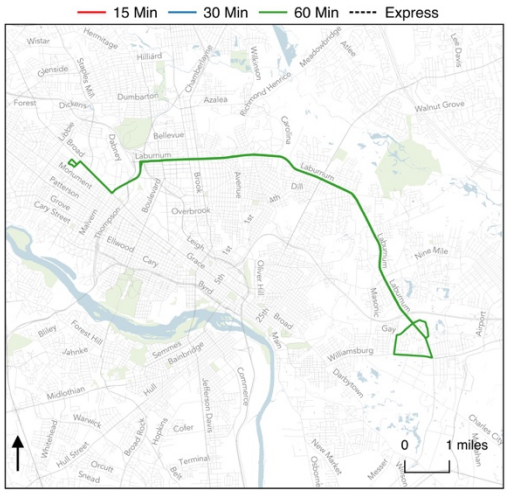
Routing: No change

Frequency: Increase frequency to every 30 minutes.

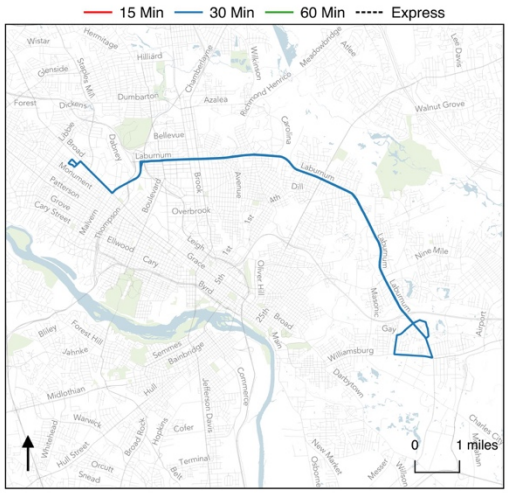
Span: No change

Additional Residents		Additional Jobs	
11,100	1.22%	8,700	1.77%

Additional Residents In Poverty		Additional Minority Residents	
2,200	1.83%	8,200	1.95%



Existing System



Service Improvement

Service Improvement SI:52
Route 18

Routing: No change

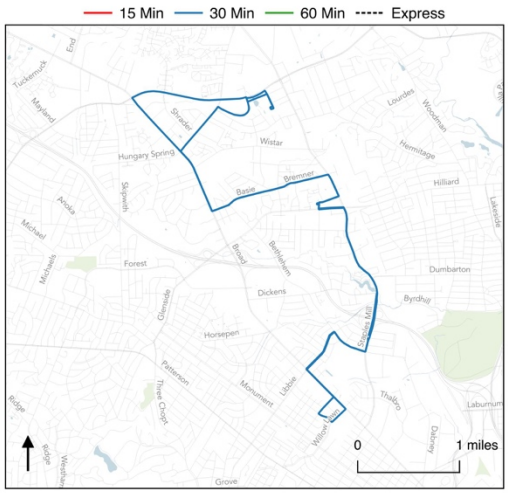
Frequency: Increase frequency to every 30 minutes.

Span: No change

Additional Residents		Additional Jobs	
13,300	1.46%	14,300	2.90%

Additional Residents In Poverty		Additional Minority Residents	
2,400	1.96%	7,200	1.70%

Existing System



Service Improvement

Service Improvement SI:86
Route 79

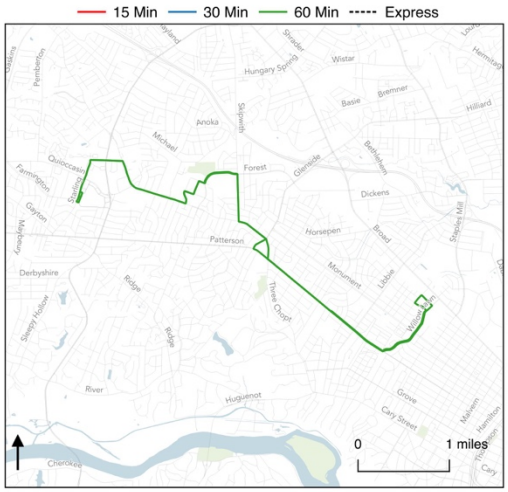
Routing: No change

Frequency: Increase frequency to every 30-minutes.

Span: No change

Additional Residents		Additional Jobs	
10,800	1.18%	13,500	2.73%

Additional Residents In Poverty		Additional Minority Residents	
1,200	1.01%	3,200	0.75%



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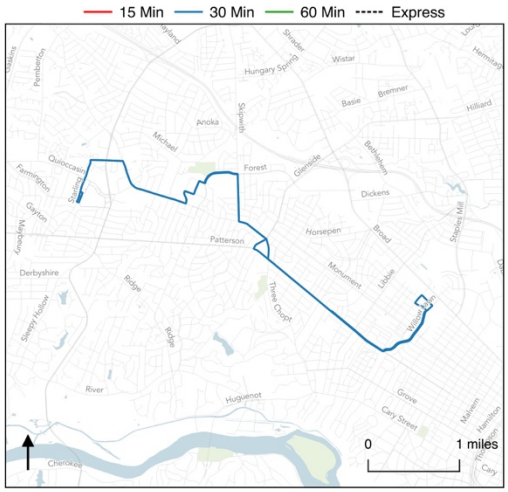


Service Improvement

Add extension to Route 29 via Cox Road to Nuckols Road to serve Innsbrook and possibly an additional Park and Ride lot near Twin Hickory and Nuckols.

- Intended ridership market: commuters, reverse commuters.
- Extends express service to the major job center at Innsbrook, providing useful reverse commute service for workers in the office park.
- Provides useful reverse commute service for other workers in the Broad Street corridor with connections to future Broad Street service on an extended Route 19
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement. This only includes people within walking distance of stops. It does not include people who would drive to the proposed park-and-ride facility.

Service Improvement SI:53
Route 29

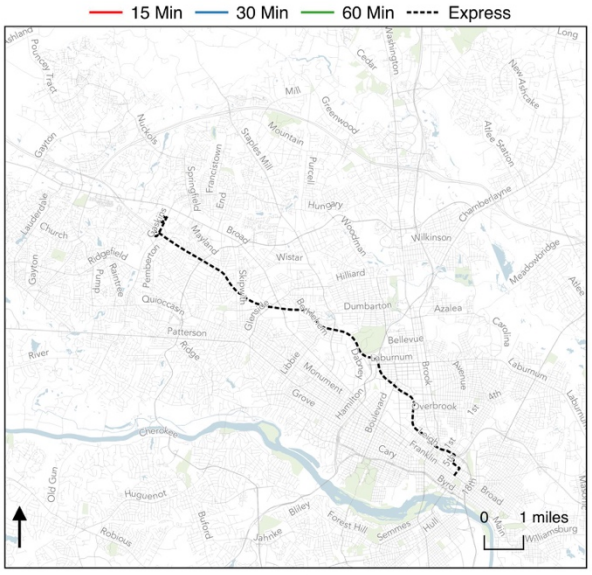
Routing: Extend route through Innsbrook to a new park and ride in Twin Hickory.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
3,400	0.37%	8,600	1.74%

Additional Residents In Poverty		Additional Minority Residents	
100	0.09%	1,400	0.32%



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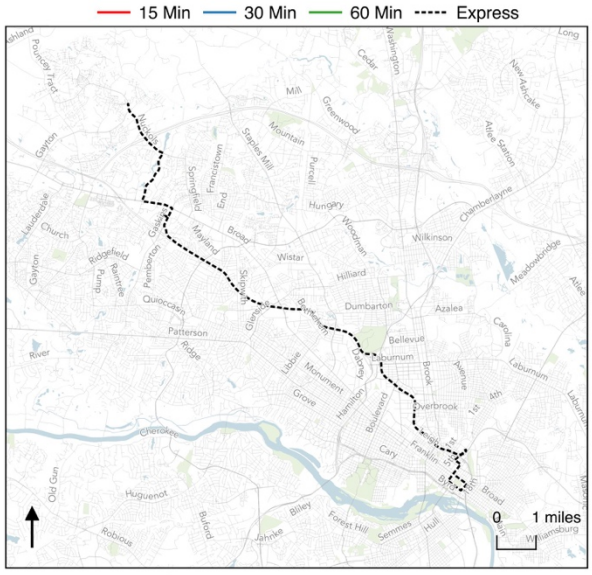


Service Improvement

Add new Route 22x from Short Pump to Downtown with 4-5 trips per peak period. Service would originate at a park and ride lot near Broad and Gayton and use the downtown express drop off and pickup loop.

- Intended ridership market: commuters, reverse commuters.
- Provides useful reverse commute service for other workers in the Broad Street corridor with connections to future Broad Street service on an extended Route 19.
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement. This only includes people within walking distance of stops. It does not include people who would drive to the proposed park-and-ride facility.

Service Improvement SI:84
Route 22

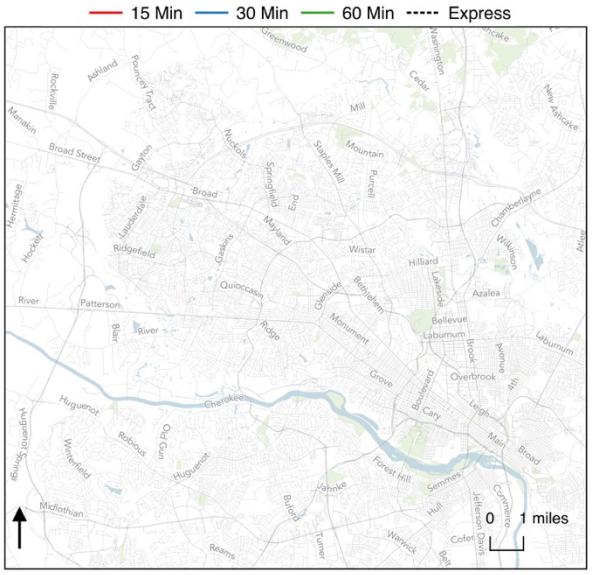
Routing: New express route from downtown to a new park and ride in Short Pump.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
300	0.04%	500	0.10%

Additional Residents In Poverty		Additional Minority Residents	
0	0.01%	100	0.02%



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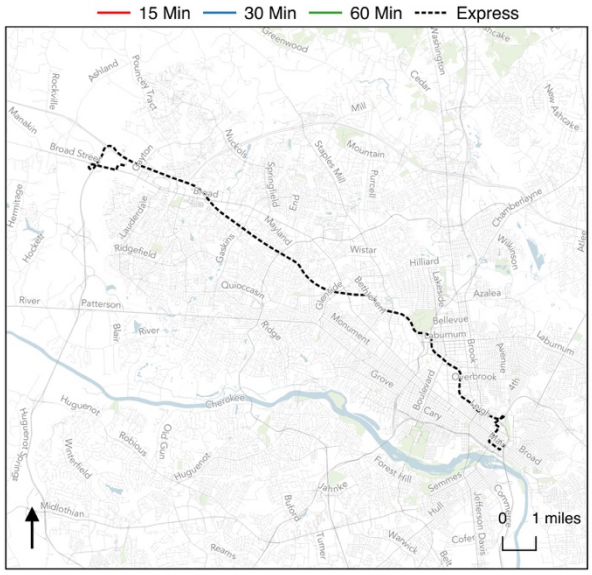


Service Improvement

Extend Route 1 via Brook Road to the shopping center at Brook Road and Parham Road with a future extension to Virginia Center Commons.

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Connects to major employment centers along Brook Road.
- Connects to major shopping centers.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with each improvement.

Service Improvement SI:54
Route 01

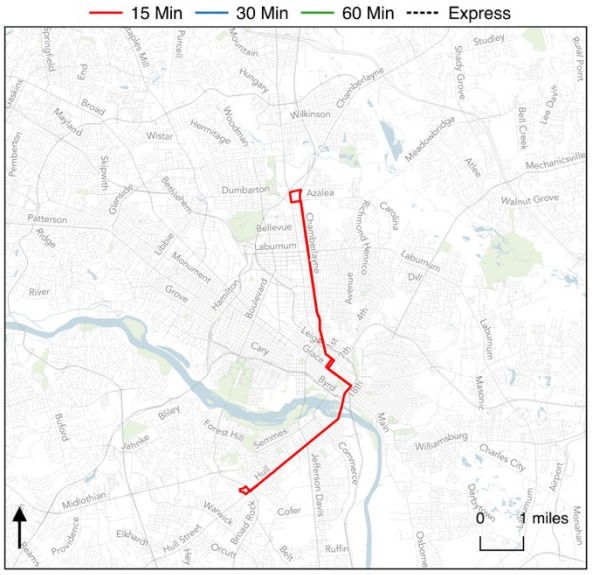
Routing: Extend route (at every 30-minutes) to Brook Rd and Parham.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
1,800	0.20%	1,800	0.37%

Additional Residents In Poverty		Additional Minority Residents	
400	0.31%	1,000	0.24%



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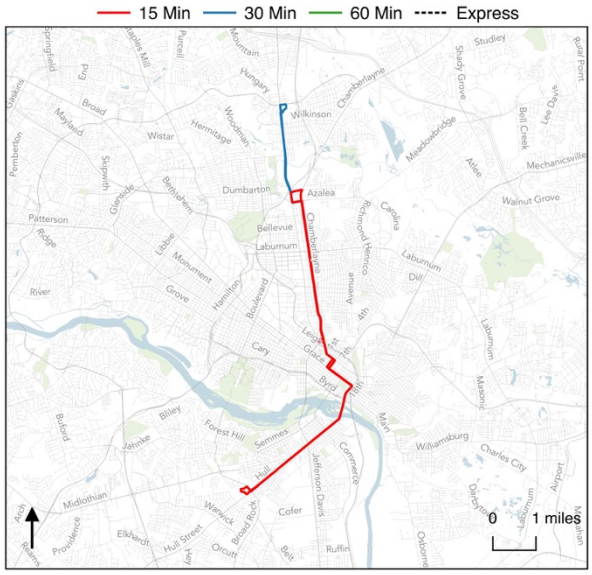


Service Improvement

Service Improvement SI:55
Route 01

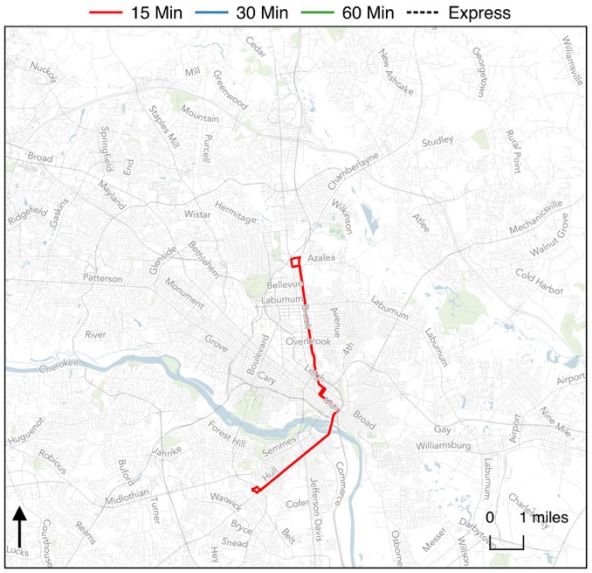
Routing: Extend route (at every 30-minutes) to Virginia Center Commons.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
4,200	0.46%	3,700	0.76%

Additional Residents In Poverty		Additional Minority Residents	
600	0.48%	2,100	0.49%



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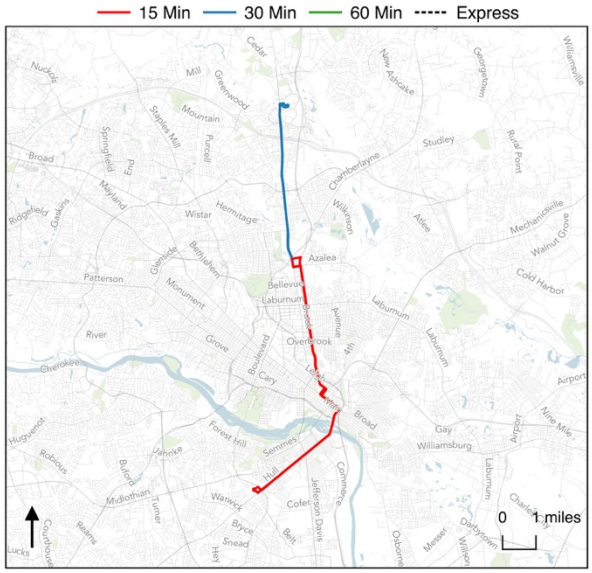


Service Improvement

Add a new route (39) at 30-minute frequency that would extend from downtown Richmond via Mosby and Mechanicsville Turnpike to Laburnum Avenue. This route could be integrated with the City's Route 5 and operate as a branch of that line while the current terminal loop (via Ford Ave) would be the other branch.

- Intended ridership market: commuters, lifeline, shoppers.
- Connects to areas of significant high need populations along Mechanicsville Turnpike
- Connects to shopping destinations along Mechanicsville Turnpike
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.
- Could be extended to Hanover County in the future.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:56
Route 39

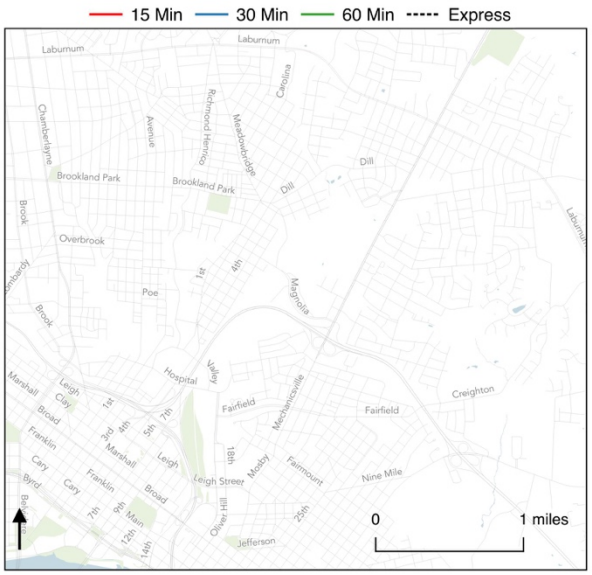
Routing: Create a new 30-minute route between Downtown and Mechanicsville via Laburnum/Mosby/Mechanicsville.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
1,600	0.18%	600	0.12%

Additional Residents In Poverty		Additional Minority Residents	
200	0.14%	1,400	0.34%



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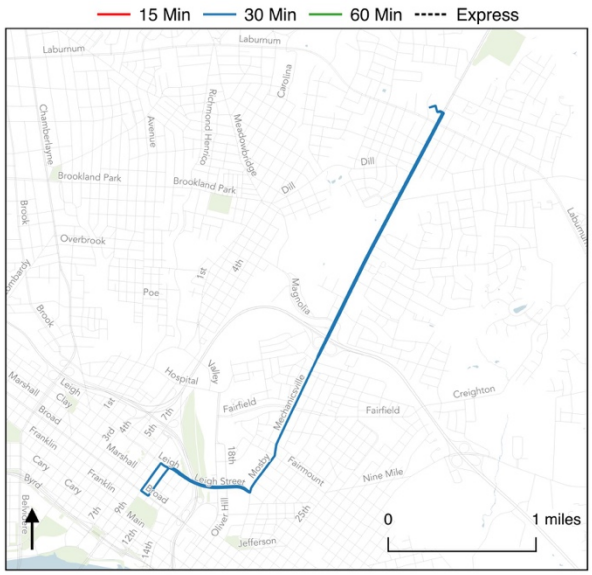


Service Improvement

Add a new route (92) on Parham Road from Brook Road to Regency Square. This route could be extended to Stony Point Fashion Park in the City of Richmond.

- Intended ridership market: commuters, lifeline, shoppers.
- Provides useful orbital service from northern Henrico to the West End making intra-county connections much easier.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:57
Route 92

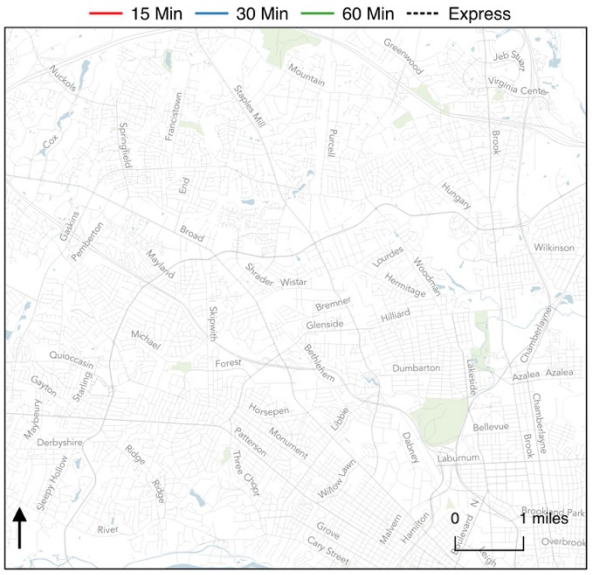
Routing: Create a new route along Parham Road from Brook Road to Regency Square.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
6,100	0.67%	4,800	0.98%

Additional Residents In Poverty		Additional Minority Residents	
600	0.51%	2,800	0.66%



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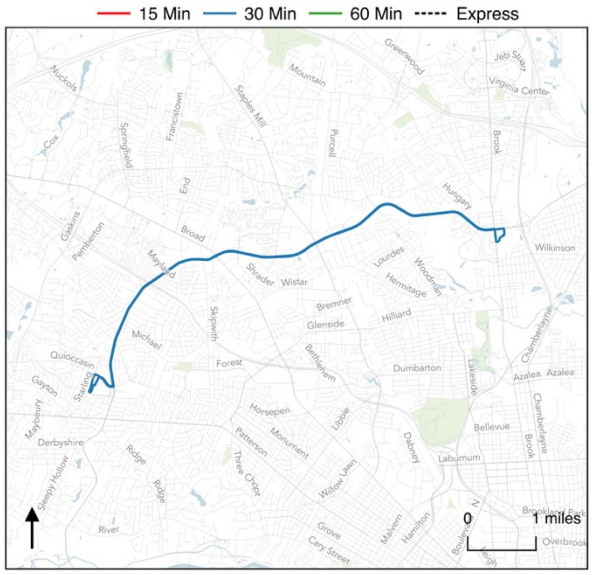


Service Improvement

Increase the frequency of Route 7 to every 15 minutes on the trunk and every 30 minutes on the branches in cooperation with the City of Richmond.

- Intended ridership market: commuters, lifeline, retail workers, shoppers
- Provides a faster connection directly from the East End to the City.
- Provides better connections to major shopping centers like White Oak Village.
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to frequent service with this improvement.

Service Improvement SI:59
Route 07

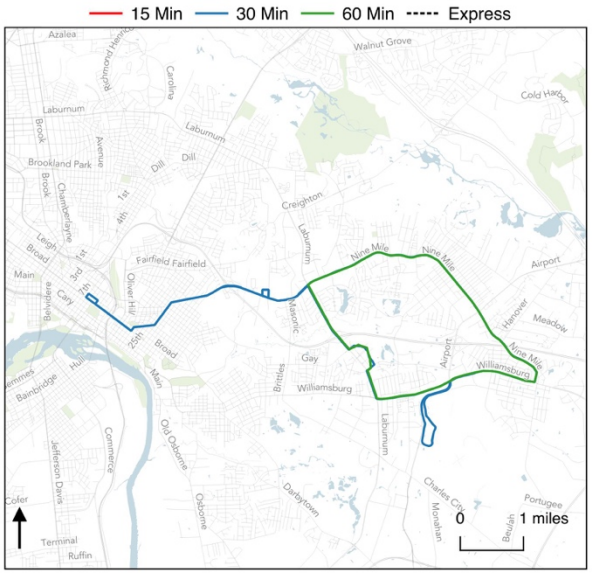
Routing: No change

Frequency: Increase frequency to every 15 minutes on the trunk and every 30 minutes on the branches.

Span: No change

Additional Residents		Additional Jobs	
15,800	1.74%	7,900	1.60%

Additional Residents In Poverty		Additional Minority Residents	
3,900	3.23%	11,200	2.66%



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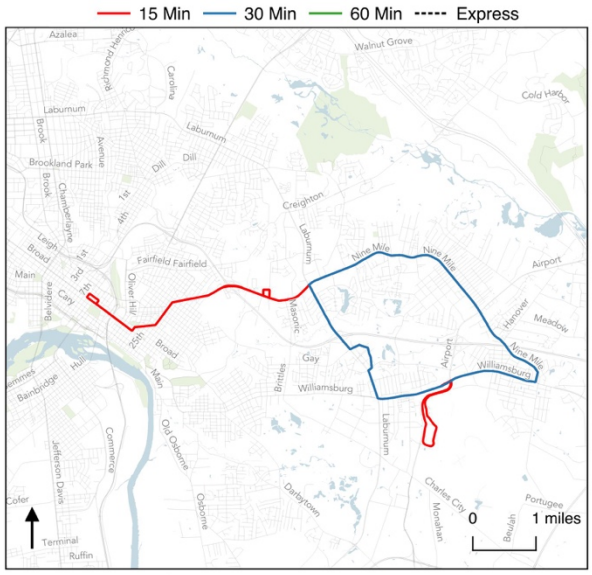


Service Improvement

4.3.2.2 Improvements Focused on Coverage Goals

Add new Route 30x from Virginia Center Commons to Downtown with 4-5 trips per peak period. Service would originate at a park and ride lot near Virginia Center Commons Mall and use the downtown express drop off and pickup loop.

- Intended ridership market: commuters, reverse commuters.

- Provides useful reverse commute service for other workers in the Brook Road corridor with connections to future Brook Road service on an extended Route 1.
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement. This only includes people within walking distance of stops. It does not include people who would drive to the proposed park-and-ride facility.

Service Improvement SI:85
Route 30

Routing: New express route from downtown to a new park and ride at Virginia Center Commons.

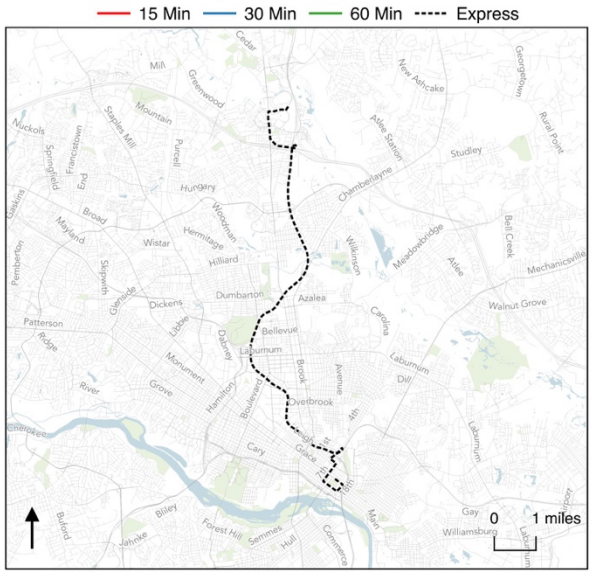
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
200	0.02%	300	0.06%

Additional Residents In Poverty		Additional Minority Residents	
0	0.00%	100	0.02%

Existing System



Service Improvement

Extend Route 4b from Henrico Arms to White Oak Village via Williamsburg Road and Gay Avenue.

- Intended ridership market: commuters, lifeline, shoppers
- Connects to areas of significant high need populations along Williamsburg Road.
- Connects to shopping destinations at White Oak Village
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:58
Route 4B

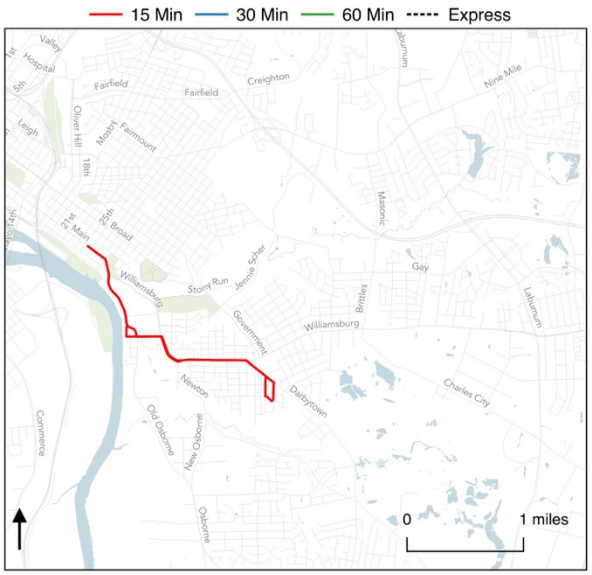
Routing: Extend Route 4b (at every 30 minutes) to White Oak Village via Williamsburg Rd and Gay Ave.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
1,800	0.20%	100	0.03%

Additional Residents In Poverty		Additional Minority Residents	
300	0.25%	1,300	0.31%



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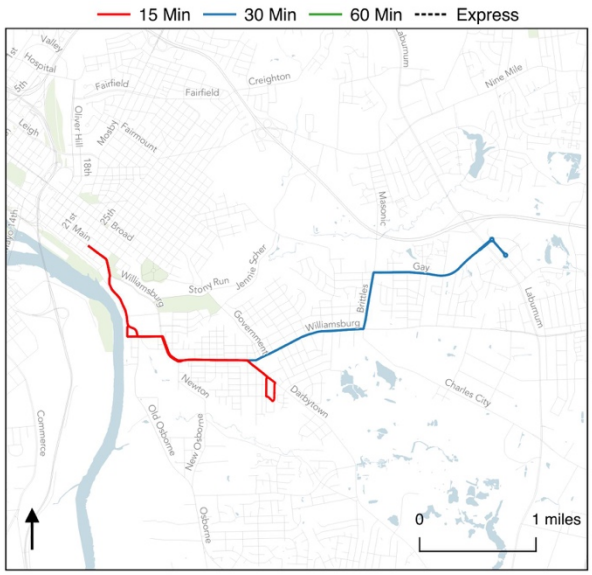


Service Improvement

4.3.3 *Service Improvements in Chesterfield County*

4.3.3.1 Improvements Focused on Ridership Goals

Extend Route 82x to Chesterfield Career and Technical Center

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Provides a connection to a new park and ride lot and to a key educational facility.
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:72
Route 82

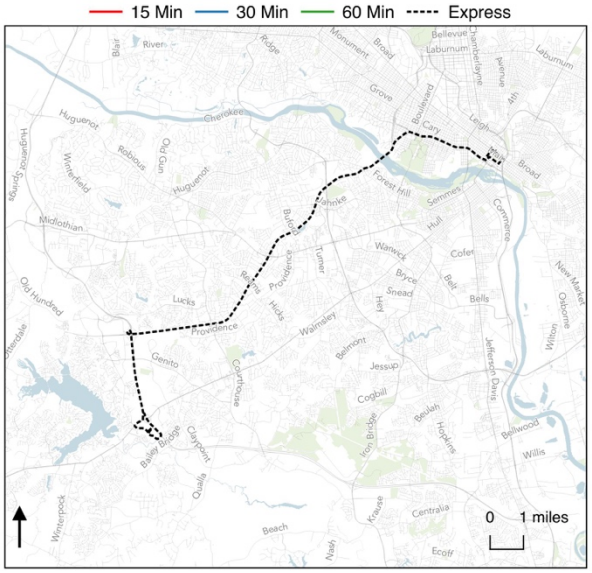
Routing: Extend to a new Park and Ride at the Career and Tech Center (Old Clover High School)

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
2,400	0.26%	1,700	0.35%

Additional Residents In Poverty		Additional Minority Residents	
100	0.06%	600	0.14%



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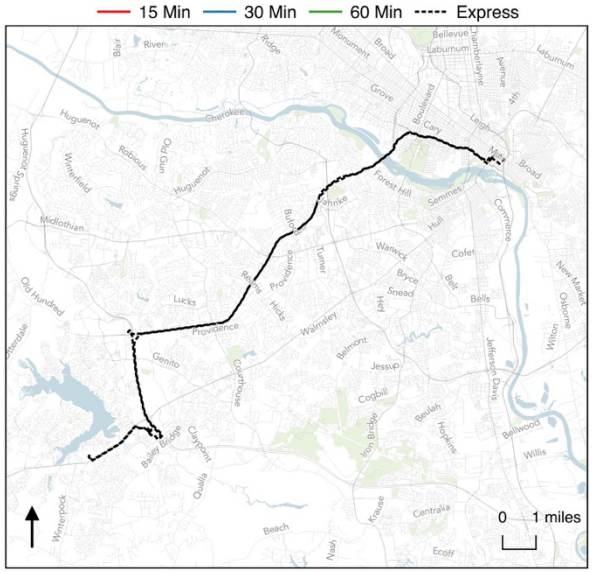


Service Improvement

Extend Route 2b to Arboretum Place.

- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Provides a connection to shopping destinations and employment centers along Midlothian Turnpike.
- Identified during the TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:60
Route 2B

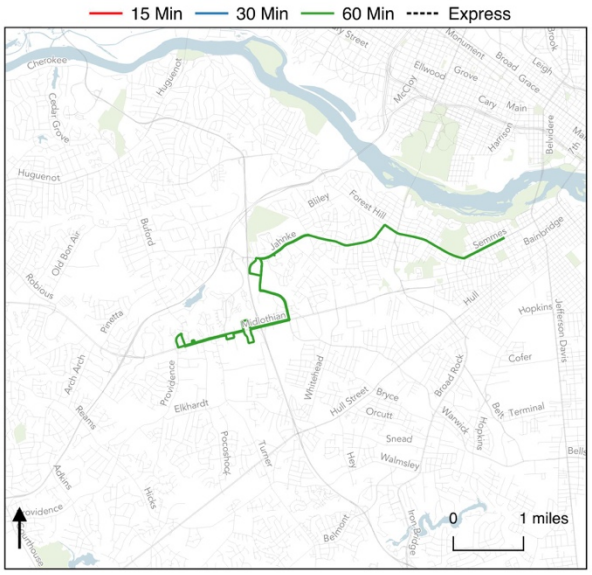
Routing: Extend to Arboretum Place.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
2,000	0.22%	3,000	0.60%

Additional Residents In Poverty		Additional Minority Residents	
200	0.14%	1,000	0.23%



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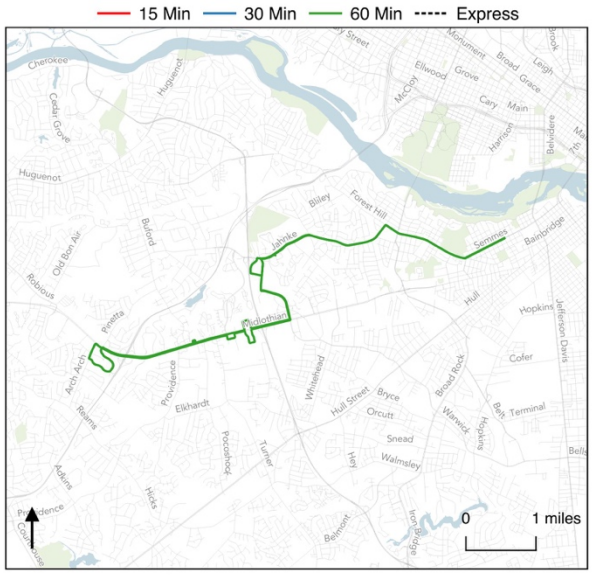


Service Improvement

Extend Route 1a (every 30 minutes) to Chesterfield Towne Center.

- Then to Old Buckingham/Woolridge.
- Then to Westchester Commons. Beyond Old Buckingham/Woolridge, branch to serve JTCC.
- Intended ridership market: commuters, lifeline, retail workers, shoppers.
- Provides a connection to shopping destinations and employment centers along Midlothian Turnpike.
- Multi-step process of providing service along Midlothian Turnpike.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with each improvement.

Service Improvement SI:61
Route 1A

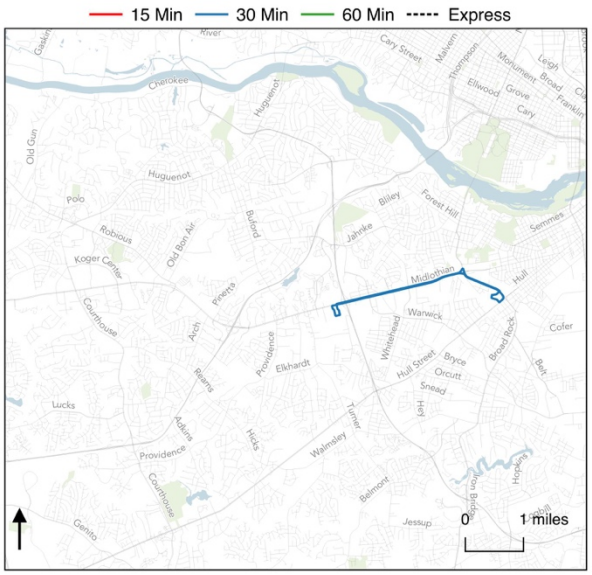
Routing: Extend to Chesterfield Town Center

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
3,400	0.37%	6,800	1.39%

Additional Residents In Poverty		Additional Minority Residents	
300	0.24%	1,300	0.31%



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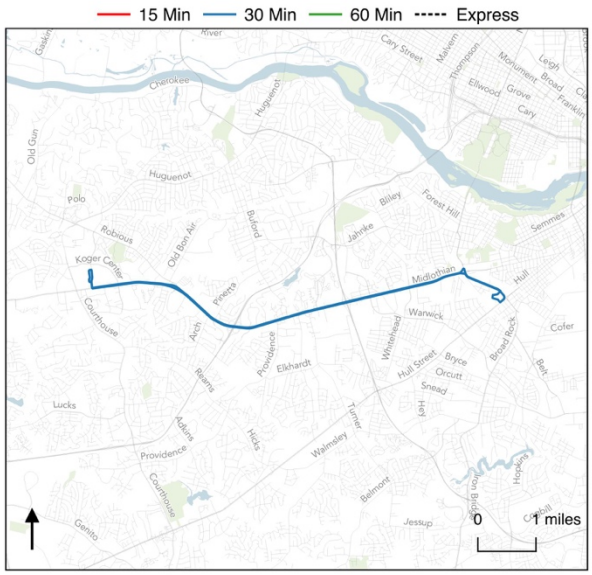


Service Improvement

Service Improvement SI:62
Route 1A

Routing: Extend to Old Buckingham/Woolridge.

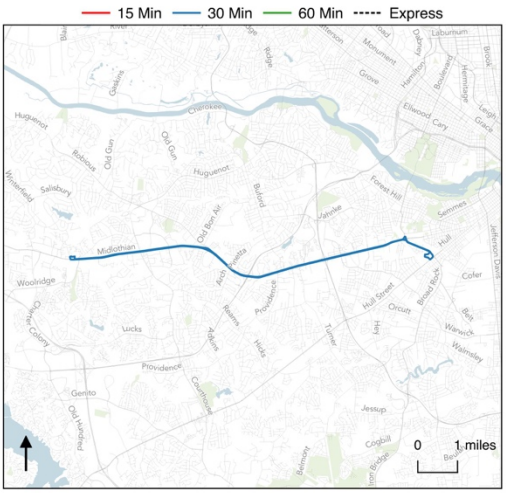
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
5,200	0.57%	7,300	1.48%

Additional Residents In Poverty		Additional Minority Residents	
400	0.31%	1,700	0.41%

Existing System



Service Improvement

Service Improvement SI:63
Route 1A

Routing: Extend to Westchester Commons.

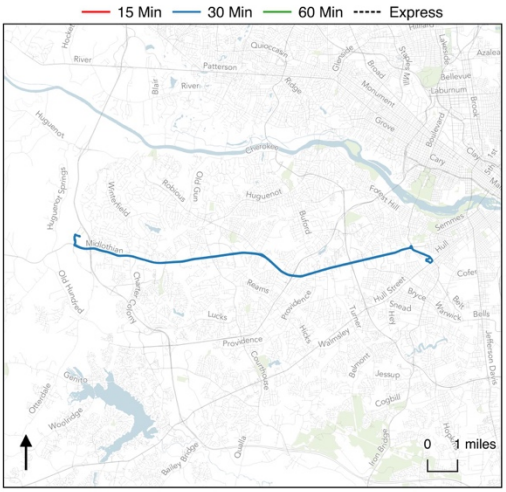
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
7,300	0.80%	8,300	1.68%

Additional Residents In Poverty		Additional Minority Residents	
500	0.41%	2,200	0.53%

Existing System



Service Improvement

Extend Route 1c to Genito Road with future extension to Woodlake Shopping Center.

- Intended market: lifeline, commuters, retail workers, shoppers.
- Provides a connection to shopping destinations and employment centers along Hull Street.
- Multi-step process of providing service along Hull Street.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with each improvement.

Service Improvement SI:65
Route 1C

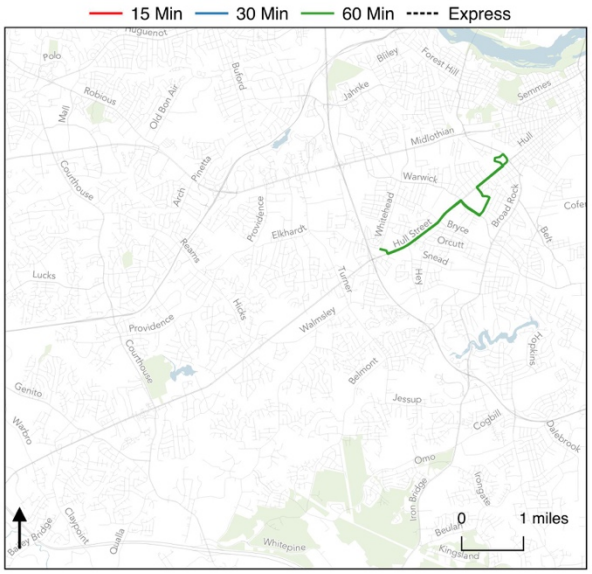
Routing: Extend to Genito Road.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
4,200	0.46%	2,000	0.40%

Additional Residents In Poverty		Additional Minority Residents	
300	0.25%	2,000	0.48%



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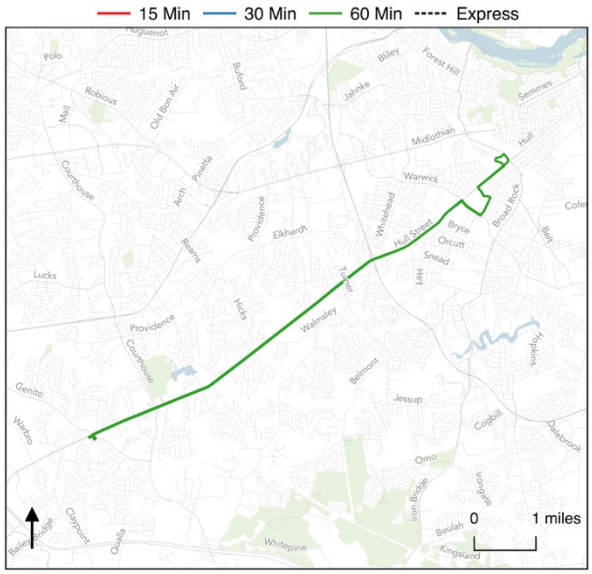


Service Improvement

Service Improvement SI:66
Route 1C

Routing: Extend to Woodlake Shopping Center.

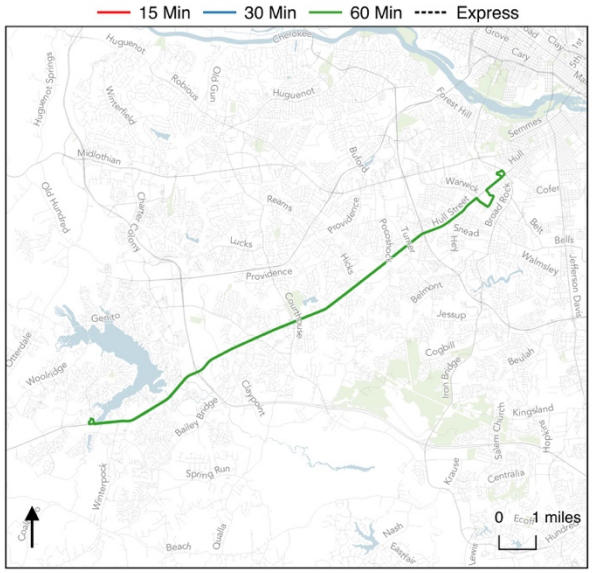
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
8,800	0.97%	4,100	0.83%

Additional Residents In Poverty		Additional Minority Residents	
600	0.47%	3,200	0.77%

Existing System



Service Improvement

Extend Route 3b to John Tyler Community College near Route 10.

- Intended market: lifeline, commuters, retail workers, shoppers.
- Provides a connection to shopping destinations and employment centers along Jefferson Davis Highway.
- Provides a connection to the community college.
- Multi-step process of providing service along Jefferson Davis Highway.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:68
Route 3B

Routing: Extend to John Tyler Community College (JTCC) at Route 10.

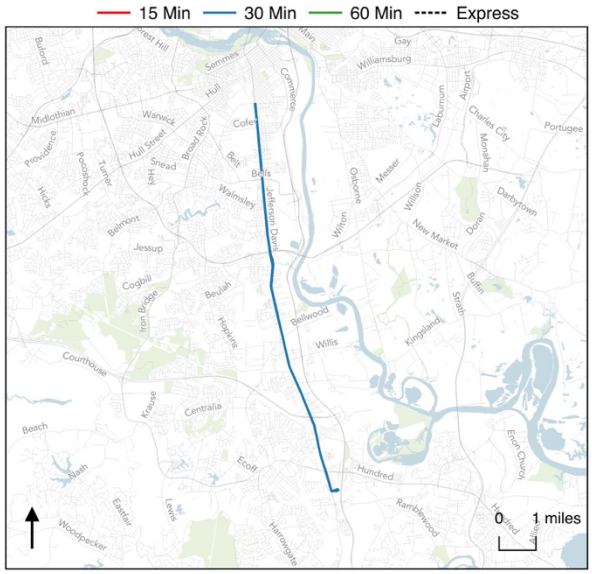
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
5,100	0.56%	2,700	0.55%

Additional Residents In Poverty		Additional Minority Residents	
1,000	0.81%	2,800	0.66%

Existing System



Service Improvement

4.3.3.2 Improvements Focused on Coverage Goals

Extend and branch Route 86 (30-minute trunk, 60-minute branches) along Route 10 to the Chesterfield Government Center near Route 288 with a future extension to John Tyler Community College.

- Intended market: lifeline, commuters, retail workers, shoppers.
- Provides a connection to shopping destinations and employment centers along Iron Bridge Road.
- Provide a connection to Chesterfield County Government Center.
- Multi-step process of providing service along Iron Bridge Road.
- Identified during the Vision Plan and TDP as an important connection to jobs, residents and shopping.

The maps below show the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with each improvement.

Service Improvement SI:70
Route 86

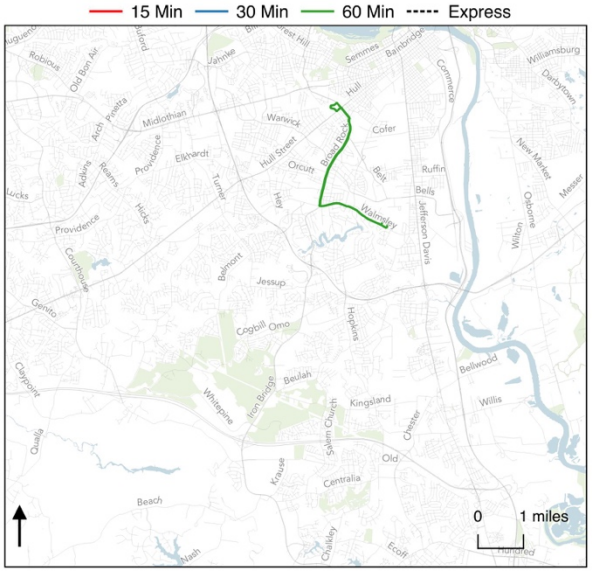
Routing: Extend route and branch to serve Route 10 to Chesterfield Government Center. Branches will have 60-minute frequencies.

Frequency: No change

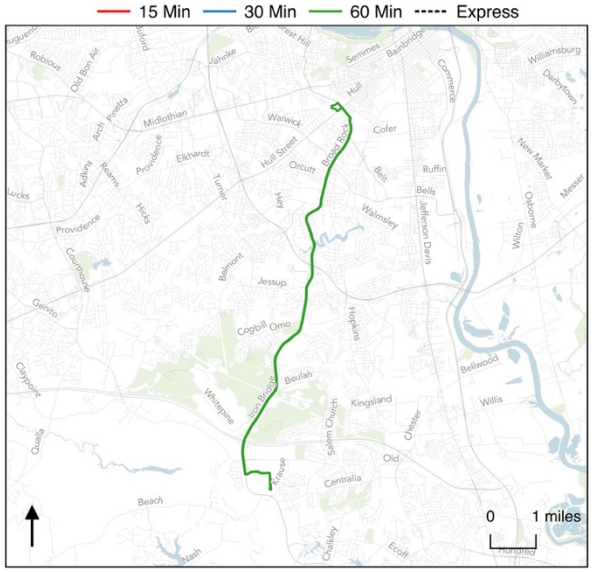
Span: No change

Additional Residents		Additional Jobs	
2,200	0.24%	5,800	1.19%

Additional Residents In Poverty		Additional Minority Residents	
-300	-0.22%	700	0.18%



Existing System



Service Improvement

Service Improvement SI:71
Route 86

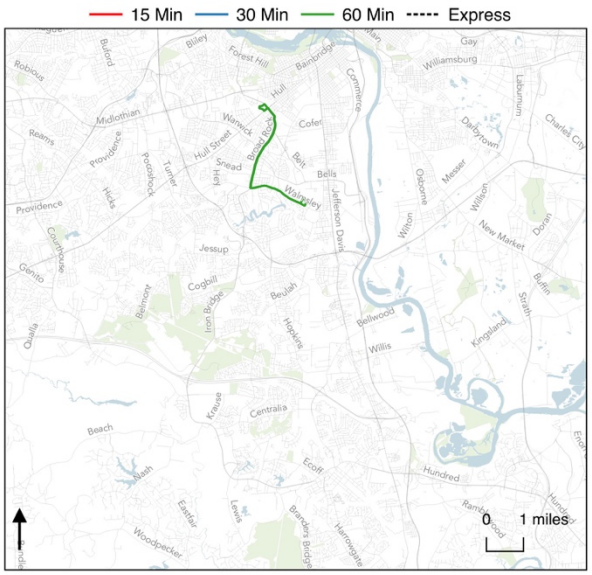
Routing: Extend Route 86 at a 30-minute frequency and branch to serve Rt 10 to JTCC. Branches will have 60-minute frequencies.

Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
6,900	0.76%	7,000	1.42%

Additional Residents In Poverty		Additional Minority Residents	
200	0.20%	2,400	0.57%



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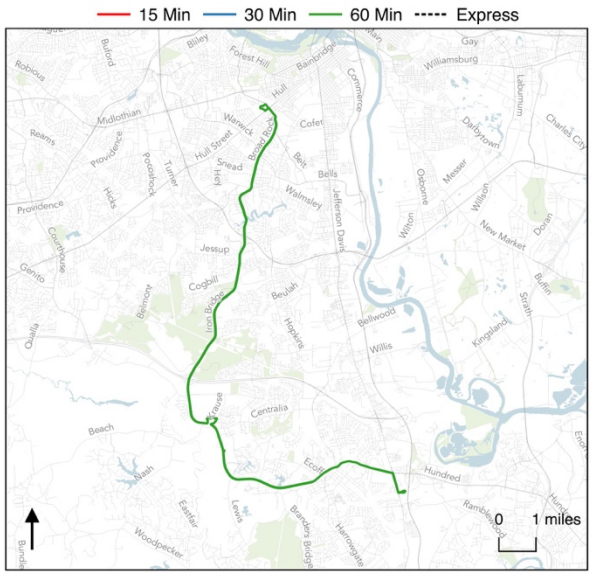


Service Improvement

Add a new express route (83x) with 3-4 trips per peak period from a new park and ride lot at Cogbill Road and Chippenham Parkway to downtown.

- Intended ridership market: commuter.
- Provides useful peak commute service for workers in the Cogbill Road and Hopkins Road areas to reach downtown jobs.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement. This only includes people within walking distance of stops. It does not include people who would drive to the proposed park-and-ride facility.

Service Improvement SI:73
Route 90

Routing: New express route from downtown to a new park and ride at Cogbill Rd and Chippenham Pkwy.

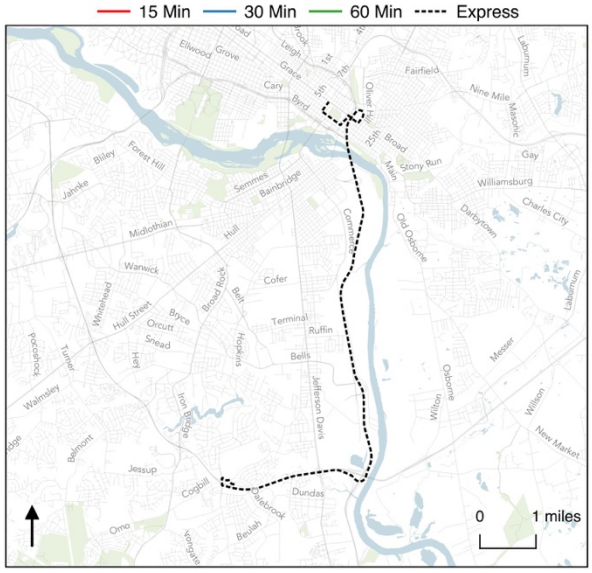
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
500	0.06%	400	0.08%

Additional Residents In Poverty		Additional Minority Residents	
100	0.04%	300	0.07%

Existing System



Service Improvement

Add a new local route (89) with hourly service forming a loop along Dundas, Meadowdale, Hopkins, Cogbill and Jefferson Davis Highway. Would connect to Route 3b/3c at the Food Lion.

- Intended ridership market: shoppers, lifeline, service workers.
- Provides a valuable connection for residents along this route to major shopping destinations on Hopkins and Jefferson Davis Highway.

The map below shows the change in service and the additional residents, residents in poverty, minority residents and jobs that would have access to any transit service with this improvement.

Service Improvement SI:74
Route 89

Routing: New local route operating in a loop from the Food Lion on Jefferson Davis Hwy along Meadowdale, Hopkins and Cogbill Rd.

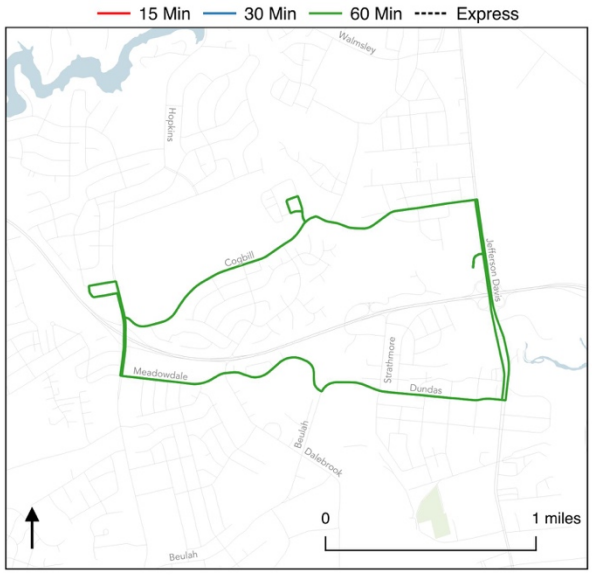
Frequency: No change

Span: No change

Additional Residents		Additional Jobs	
6,900	0.76%	1,200	0.24%

Additional Residents In Poverty		Additional Minority Residents	
1,200	1.02%	4,900	1.16%

Existing System



Service Improvement

4.3.4 *Identifying Service Improvements*

The proposed service improvements shown above are summarized below, along with estimate of the operations cost and the number of people and jobs served by these proposed improvements. Operating costs are based on the current average cost of $100 per revenue hour per the National Transit Database 2015 reported costs and revenue hours of service. Operating costs shown are the cost of the increase in service, over and above the current cost to operate a given route. For example, SI:06 would extend the evening span of Route 76 to 10pm, from its current end time of 7pm. The annual operating cost of those three hours of service per day above the current cost to operate that route is about $80,000. For all service improvements, the costs shown are only for annual operating costs, the costs do not include the capital costs for additional buses to run new or additional service.

In the tables below, capital costs are estimated only for major or minor capital improvements. Improvements are sorted by jurisdiction and numbered in no particular order. These service improvements were developed based on recommendations in the Greater RVA Transit Vision Plan, the Richmond Transit Network Plan, consultation with local transportation planning staff and input from public meetings. Note that costs in Chapter 4 tables are in current year dollars, unlike the Chapter 6 figures which are in year-of-expenditure dollars (i.e., incorporate anticipated inflation).

Table 4-5 Table of Service Improvements

Project ID	Improvement Description	Improvement Type	Est. Cost	Jurisdiction
SI:01	Construct a Southside Transfer Center (near Hull St and Belt Blvd) to provide connections between Routes 1a, 1b, 1c, 2c, 86, 87, 88 and layover for Routes 86, 87, 88. Facility should include 6 bus bays & driver break/layover needs	Capital	$3,000,000	City of Richmond
SI:02	Construct a downtown transfer Center with 13 bus bays & driver break/layover needs	Capital	$18,000,000	City of Richmond
SI:03	Increase frequency on Route 20 (Orbital) from 30-minutes to 15-minutes and extend service from midnight to 1am.	Service	$2,120,000	City of Richmond
SI:05	Conduct Feasibility Study for two additional BRT corridor within the City of Richmond and possibly extending into surrounding jurisdictions.	Service	$1,600,000	City of Richmond
SI:06	Extend Evening Span of Service to 10pm on Route 76 (Patterson).	Service	$80,000	City of Richmond
SI:07	Extend Evening Span of Service to 10pm on Route 77 (Grove).	Service	$150,000	City of Richmond
SI:08	Extend Evening Span of Service to 10pm on Route 78 (Cary/Maymont).	Service	$150,000	City of Richmond
SI:09	Extend Evening Span of Service to 10pm on Route 87 (Bellemeade/Hopkins).	Service	$150,000	City of Richmond
SI:10*	Extend Evening Span of Service to 10pm on Route 88 (Ruffin Bells Shuttle).	Service	$150,000	City of Richmond
SI:11	Extend Evening Span of Service to 10pm on Route 86 (Broad Rock/Walmsley).	Service	$77,000	City of Richmond
SI:12	Extend Route 77 (Patterson) to downtown. The route currently terminates at Robinson.	Service	$70,000	City of Richmond
SI:14	Increase Sunday frequency on Route 1 (Chamberlayne/Hull) to 15-minutes with service from 6am-7pm.	Service	$200,000	City of Richmond
SI:15	Increase Sunday frequency on Route 2 (North Ave/Semmes) to 15-minutes with service from 6am-7pm.	Service	$150,000	City of Richmond
SI:16	Increase Sunday frequency on Route 3 (Highland/Harwood/Jeff Davis) to 15-minutes with service from 6am-7pm.	Service	$230,000	City of Richmond
SI:17	Increase Sunday frequency on Route 4a (Montrose) to 15-minutes with service from 6am-7pm.	Service	$80,000	City of Richmond

Project ID	Improvement Description	Improvement Type	Est. Cost	Jurisdiction
SI:18	Increase Sunday frequency on Route 4b (Darbytown) to 15-minutes with service from 6am-7pm.	Service	$80,000	City of Richmond
SI:19	Increase Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm.	Service	$150,000	City of Richmond
SI:20	Increase Sunday frequency on Route 20 (Orbital) to 15-minutes with service from 6am-7pm.	Service	$2,370,000	City of Richmond
SI:22	Extend span of service on Route 1 (Chamberlayne/Hull) to 2am.	Service	$60,000	City of Richmond
SI:23	Extend span of service on Route 2 (North Ave/Semmes) to 2am.	Service	$90,000	City of Richmond
SI:24	Extend span of service on Route 3 (Highland/Harwood/Jeff Davis) to 2am.	Service	$90,000	City of Richmond
SI:25	Extend span of service on Route 4a (Montrose) to 2am.	Service	$60,000	City of Richmond
SI:26	Extend span of service on Route 4b (Darbytown) to 2am.	Service	$60,000	City of Richmond
SI:27	Extend span of service on Route 5 (Cary/Main/Whitcomb) to 2am.	Service	$90,000	City of Richmond
SI:28*	Extend span of service on Route 8 (Nine Mile, Richmond only) to 2am.	Service	$200,000	City of Richmond
SI:29	Extend span of service on Route 12 (Church Hill) to 2am.	Service	$70,000	City of Richmond
SI:30	Extend span of service on Route 13 (Oakwood) to 2am.	Service	$40,000	City of Richmond
SI:31	Extend span of service on Route 14 (Hermitage/East Main) to 2am.	Service	$100,000	City of Richmond
SI:32	Extend span of service on Route 20 (Orbital) to 2am, assuming that service already extends to midnight.	Service	$2,270,000	City of Richmond
SI:33	Extend span of service on Route 20 (Orbital) to 2am, assuming that service already extends to 1am.	Service	$440,000	City of Richmond
SI:34	Extend span of service on Route 50 (Broad Street local) to 2am.	Service	$220,000	City of Richmond
SI:35	Extend Route 2a (North Avenue/Forest Hill) to Stony Point Fasion Park.	Service	$410,000	City of Richmond
SI:37	Increase the frequency of Route 12 to 15 minutes.	Service	$848,000	City of Richmond
SI:78	Increase the frequency of Route 76 to every 30-minutes	Service	$790,000	City of Richmond
SI:79	Increase the frequency of Route 77 to every 30-minutes	Service	$930,000	City of Richmond
SI:80	Increase the frequency of Route 78 to every 30-minutes	Service	$930,000	City of Richmond
SI:81	Increase the frequency of Route 87 to every 30-minutes	Service	$1,550,000	City of Richmond
SI:82	Increase the frequency of Route 86 to every 30-minutes	Service	$790,000	City of Richmond
SI:83	Extend span of Route 8 so that it runs in tandem with Route 7 to provide 15-minute service during the day. Extend Route 8 to Southside to take over parts of Route 2c . Increase the frequency of Routes 2a and 2b to every 30 minutes.	Service	$3,780,000	City of Richmond
SI:87	Extend span of frequent service (15 minute) on Route 1 from 7pm to 10pm on Man-Sat	Service	$790,000	City of Richmond

Project ID	Improvement Description	Improvement Type	Est. Cost	Jurisdiction
SI:88	Extend span of frequent service (15 minute) on Route 2 from 7pm to 10pm on Man-Sat	Service	$640,000	City of Richmond
SI:89	Extend span of frequent service (15 minute) on Route 3 from 7pm to 10pm on Man-Sat	Service	$660,000	City of Richmond
SI:90	Extend span of frequent service (15 minute) on Route 4a from 7pm to 10pm on Man-Sat	Service	$320,000	City of Richmond
SI:91	Extend span of frequent service (15 minute) on Route 4b from 7pm to 10pm on Man-Sat	Service	$320,000	City of Richmond
SI:92	Extend span of frequent service (15 minute) on Route 5 from 7pm to 10pm on Man-Sat	Service	$640,000	City of Richmond
SI:93	Extend span of service on Route 88 (Ruffin Bells Shuttle) to all day and extend to Midlothian and Spring Rock Green via Hull and Warwick to replace branch Route 1b. Offset schedule with Route 1a to provide 15-minute service from Southside Plaza to Spring Rock Green.	Service	$2,800,000	City of Richmond
SI:36	Add weekend service on Route 7 (Nine Mile, Henrico) from 6am-11pm.	Service	$1,230,000	Henrico
SI:38	Route 79 would terminate at Willow Lawn and extend to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd). The route would also extend north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Tree Chopt.	Service	$60,000	Henrico
SI:39	Simplify Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.	Service	$0	Henrico
SI:40	Extend Route 19 (Pemberton) to Short Pump. The route will terminate at Bon Secours Parkway/Wegmans Drive).	Service	$850,000	Henrico
SI:41	Extend span of service on Route 7 (Nine Mile, Henrico) to 11pm.	Service	$1,230,000	Henrico
SI:42	Extend span of service on Route 18 (Henrico Government Center) to 11pm.	Service	$200,000	Henrico
SI:43	Extend span of service on Route 19 (Pemberton) to 11pm.	Service	$200,000	Henrico
SI:44	Extend span of service on Route 79 (Patterson/Parham) to 11pm.	Service	$200,000	Henrico
SI:45	Extend span of service on Route 91 (Laburnum Connector) to 11pm.	Service	$200,000	Henrico
SI:47	Add weekend service on Route 18 (Henrico Government Center) from 6am-11pm.	Service	$200,000	Henrico
SI:48	Add weekend service on Route 19 (Pemberton) from 6am-11pm.	Service	$820,000	Henrico
SI:49	Add weekend service on Route 79 (Patterson/Parham) from 6am-11pm.	Service	$200,000	Henrico
SI:50	Add weekend service on Route 91 (Laburnum Connector) from 6am-11pm.	Service	$530,000	Henrico

Project ID	Improvement Description	Improvement Type	Est. Cost	Jurisdiction
SI:51	Increase frequency on Route 91 (Laburnum Connector) from 60-minute to 30-minute.	Service	$2,300,000	Henrico
SI:52	Increase frequency on Route 18 (Henrico Government Center) from 60-minute to 30-minute.	Service	$1,480,000	Henrico
SI:53	Extend Route 29X via Cox Rd to Nuckols Rd to serve Innsbrook. An additional Park and Ride lot could be created near Twin Hickory/Nuckols.	Service	$150,000	Henrico
SI:54	Extend Route 1 to shopping center at Brook/Parham.	Service	$950,000	Henrico
SI:55	Extend Route 1 along Brook Road to Virginia Center Commons.	Service	$2,090,000	Henrico
SI:56	Create a new 30-minute route (Route 39) between Downtown and Mechanicsville via Mosby. *The route could potentially integrate with Route 5.*	Service	$1,400,000	Henrico
SI:57	Create a new route (Route 92) along Brook Road and Parham to Regency. This route could be extended to Stony Point Fashion Park.	Service	$2,170,000	Henrico
SI:58	Extend Route 4b to White Oak Village via Williamsburg Rd/Gay Ave.	Service	$1,130,000	Henrico
SI:59	Increase frequency on Route 7 (Nine Mile) to 15-minutes (30 on branches). This route requires coordination between Henrico County and the City of Richmond.	Service	$1,690,000	Henrico
SI:84	New express route (22x) from Short Pump to downtown.	Service	$770,000	Henrico
SI:85	New express route (30x) from Virginia Center Commons to downtown.	Service	$540,000	Henrico
SI:86	Increase the frequency of Route 79 to every 30-minutes	Service	$940,000	Henrico
SI:60	Extend Route 2b (North Ave/Jahnke/Midlothian) to Arboretum Place.	Service	$80,000	Chesterfield
SI:61*	Extend Route 1a (Chamberlayne/Hull) to Chesterfield Town Center	Service	$770,000	Chesterfield
SI:62	Extend Route 1a (Chamberlayne/Hull) to Old Buckingham/Woolridge.	Service	$1,140,000	Chesterfield
SI:63*	Extend Route 1a (Chamberlayne/Hull) to Westchester Commons. This route will serve John Tyler Community College (JTCC).	Service	$1,730,000	Chesterfield
SI:65	Extend Route 1c (Chamberlayne/Hull/Elkhardt) to Genito Road.	Service	$1,140,000	Chesterfield
SI:66	Extend Route 1c (Chamberlayne/Hull/Elkhardt) to Woodlake Shopping Center.	Service	$2,110,000	Chesterfield
SI:68	Extend Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.	Service	$1,010,000	Chesterfield
SI:70	Extend Route 86 at a 30-minute frequency and branch to serve Route 10 to Chesterfield Government Center. Branches will have 60-minute frequencies.	Service	$1,240,000	Chesterfield
SI:71	Extend Route 86 at a 30-minute frequency and branch to serve Rt 10 and JTCC. Branches will have 60-minute frequencies.	Service	$1,680,000	Chesterfield

Project ID	Improvement Description	Improvement Type	Est. Cost	Jurisdiction
SI:72	Extend Route 82 to a new Park and Ride lot at the Career and Technical Center (Old Clover Leaf High School)	Service	$77,000	Chesterfield
SI:73	Create a new express route (89x) from a new park and ride at Cogbill Road and Chippenham Parkway to downtown.	Service	$460,000	Chesterfield
SI:74	Create a new local route operating in a loop from the Food Lion on Jefferson Davis Hwy along Meadowdale, Hopkins and Cogbill Rd.	Service	$810,000	Chesterfield

**These improvements were identified in the planning process but do not fall within the 10-year planning horizon.*

4.4 Linking Demographic Findings to Service Improvements

The demographic analysis above examined population density, minority populations, households in poverty, senior populations, employment density and population density to help direct future transit improvements to areas and along corridors with high concentrations of destinations and likely future transit riders.

4.4.1 *City of Richmond*

4.4.1.1 Population Density

Different densities of people and land use patterns support different types of transit. Generally, the denser the activity (i.e. the more people living and working) in an area, the more advanced the transit system that can be supported. More advanced transit options typically have higher quality facilities and more frequent service.

The following recommendations provide increased frequency to serve high population-density areas:

- **The East End:**
  - Increasing Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm.
  - Increasing frequency on Route 7 (Nine Mile, Henrico) to 15-minutes at peaks (6-9am and 3-6pm) and extending the route to the Airport.
  - Extending the span of service on Route 5 (Cary/Main/Whitcomb) and Route 12 (Church Hill) to 2am.
- **Randolph:**
  - Increasing Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm and extending service to 2am as well as extending evening service to 10pm on Route 78 (Cary/Maymont).
- **The Fan and Museum District:**
  - Increasing Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm.

  - Extend Evening Span of Service to 10pm on Route 76 (Patterson), Route 77 (Grove) and Route 78 (Cary/Maymont) and to 2am on Route 5 (Cary/Main/Whitcomb), Route 14 (Hermitage/East Main) and Route 20 (Orbital).
  - Increasing frequency on Route 20 (Orbital) from 30-minutes to 15-minutes and extending service from midnight to 1am.
- **Fulton:**
  - Increasing Sunday frequency on Route 4b (Darbytown) to 15-minutes with service from 6am-7pm, extending service to 2am and extending the route to White Oak Village via Williamsburg Rd/ Gay Ave.
- **VCU:**
  - Increasing Sunday frequency to 15-minutes with service from 6am-7pm on Route 3 (Highland/Harwood/Jeff Davis) and Route 5 (Cary/Main/Whitcomb).
  - Extending Evening Span of Service to 10pm on Route 78 (Cary/Maymont).
  - Extending span of service to 2am on Route 3 (Highland/Harwood/Jeff Davis), Route 5 (Cary/Main/Whitcomb) and Route 14 (Hermitage/East Main).
- **Jackson Ward and Gilpin:**
  - Increasing Sunday frequency to 15-minutes with service from 6am-7pm on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis).
  - Extending evening service to 10pm on Route 78 (Cary/Maymont).
  - Extending span of service to 2am on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis) and Route 14 (Hermitage/East Main).
- **Eastern Northside:**
  - Increasing Sunday frequency to 15-minutes with service from 6am-7pm on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis).
  - Extending Evening Span of Service to 2am on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis).

4.4.1.2 Access to Jobs:

4.4.1.2.1 Downtown Jobs Corridor:

The distribution of jobs and employment opportunities can be a good predictor of transit ridership because a large portion of regional travel is commuting to and from work.

The largest employment concentration in the region is Downtown Richmond. Routes that stop in downtown bring people to/from a variety of residential neighborhoods to/from downtown to access a variety of jobs and other destinations. The following routes serve downtown: 1, 2, 3, 5, 12, 14, 78, 87.

The following improvement improve access to downtown:

- Increasing Sunday frequency on Route 1 (Chamberlayne/Hull) to 15-minutes with service from 6am-7pm.
- Increasing frequency on Route 1a west of Midlothian Turnpike from 30-minutes to 15-minutes and extend span of service.

- Extending span of service on Route 1 (Chamberlayne/Hull) to 2am.
- Extending span of service on Route 2 (North Ave/Semmes) to 2am.

4.4.1.2.2 Other Jobs Corridors:

The City of Richmond has other jobs corridors outside of downtown, such as West Broad, Cary/Main, the Diamond/Scott's Addition, Willow Lawn, Chippenham Hospital, Belt Boulevard and VCU. The following improvements increase access to jobs corridors:

- Increasing frequency on Route 20 (Orbital) from 30-minutes to 15-minutes and extending service from midnight to 1am improves access to the Fan/Museum District and Scott's Addition/Diamond area.
- Extending Evening Span of Service to 10pm on Route 78 (Cary/Maymont) and to 2am on Route 5 (Cary/Main/Whitcomb) as well as increasing Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm improves access to the Main/Cary area.
- Extending the span of service to 2am on Route 14 (Hermitage/East Main) improves access to the Diamond and Scott's Addition area.
- Extending span of service to 2am on Route 50 (Broad Street local) improves access to West Broad/Willow Lawn.
- Extend Evening Span of Service to 10pm on Route 76 (Patterson) and Route 77 (Grove) improves access to Willow Lawn, Libbie and St. Mary's Hospital.
- Increasing frequency from 30-minutes to 15-minutes on Route 1a west of Midlothian Turnpike and Route 20 (Orbital), extending Evening Span of Service to 10pm on Route 87 (Bellemeade/Hopkins) and to 2am on Route 20 (Orbital) and increasing Sunday frequency to 15-minutes with service from 6am-7pm on Route 20 (Orbital) improves access to the Belt Boulevard corridor.
- The following improvements increase access to the VCU area:
    - Increasing Sunday frequency to 15-minutes with service from 6am-7pm on Route 3 (Highland/Harwood/Jeff Davis) and Route 5 (Cary/Main/Whitcomb).
    - Extending Evening Span of Service to 10pm on Route 78 (Cary/Maymont).
    - Extending span of service to 2am on Route 3 (Highland/Harwood/Jeff Davis), Route 5 (Cary/Main/Whitcomb) and Route 14 (Hermitage/East Main).

4.4.1.3 Access to Senior Populations

The following improvements increase access to large senior populations:

- Extending the span of service on to 2am improves access for caregivers who work shifts around the clock. The following routes provide this improvement near a concentration of seniors:
    - On Route 1 (Chamberlayne/Hull) and Route 3 (Highland/Harwood/Jeff Davis) in eastern northside.
    - On Route 2 (North Ave/Semmes) along North Avenue near Laburnum near I-64.
    - On Route 5 (Cary/Main/Whitcomb) and Route 12 (Church Hill) in North Church Hill and in the Fan/Near West End.
    - On Route 14 (Hermitage/East Main) near several large senior centers in Northside and in the Fan/Near West End.

  - On Route 20 (Orbital) in the Fan and Near West End.
  - On Route 50 (Broad Street local) along Broad in the Near West End.
- Extend Evening Span of Service to 10pm on Route 76 (Patterson), Route 77 (Grove) and Route 78 (Cary/Maymont) increases access for seniors living in the Fan/Near West End.
- Increasing weekday frequency on Route 20 (Orbital) from 30-minutes to 15-minutes improves access to seniors living in the Northrop area Midlothian Turnpike east of Belt Boulevard.
- Increasing Sunday frequency to 15-minutes with service from 6am-7pm improves access to seniors who will now have increased mobility options throughout the week:
  - On Route 1 (Chamberlayne/Hull) and Route 3 (Highland/Harwood/Jeff Davis) in eastern Northside.
  - On Route 2 (North Ave/Semmes) to serve large senior population along North Avenue south of Laburnum.
  - On Route 5 (Cary/Main/Whitcomb) in North Church Hill and in the Fan/Near West End.
  - On Route 20 (Orbital) in the Fan and Near West End.
- Route extensions increase the number of seniors who can reach destinations around the city without needing to own or operate a vehicle:
  - Extending Route 2a (North Avenue/Forest Hill) to Stony Point Fasion Park and extending Route 2b (North Ave/Jahnke/Midlothian) to Arboretum Place improves access to seniors living in the Northrop area Midlothian Turnpike east of Belt Boulevard and along Jahnke Road near Chippenham hospital.

4.4.1.4 Populations in Poverty

The following routes improve access for areas with high concentrations of communities in poverty:

- Increasing Sunday frequency to 15-minutes with service from 6am-7pm improves access to provide consistent, frequent transportation throughout the week:
  - On Route 1 (Chamberlayne/Hull) for residents of Gilpin, Northside, Southwood and Piney Knolls.
  - On Route 2 (North Ave/Semmes) for residents of Gilpin, Northside and the area southeast of Midlothian Turnpike and Belt Boulevard.
  - On Route 3 (Highland/Harwood/Jeff Davis) for residents of Northside, Hillside Court and Oak Grove.
  - On Route 4a (Montrose) and 4b (Darbytown) for residents of Fulton.
  - On Route 5 (Cary/Main/Whitcomb) for residents in the East End, VCU area, Fan/Museum district and Randolph neighborhood.
  - On Route 12 (Church Hill) for residents in the East End.
  - On Route 14 (Hermitage/East Main) for residents in the VCU area and Fan/Museum District.
  - On Route 20 (Orbital) for residents in Northside and the Fan/Museum District.
- Increasing evening span until 10pm:
  - On Route 78 (Cary/Maymont) improves access to the VCU, Fan, Museum District and Randolph.
  - On Route 87 (Bellemeade/Hopkins) improves access for residents of Hillside Court south of Oak Grove.

  - On Route 76 (Patterson) and Route 77 (Grove) improves access for residents of the Fan and Museum District.
- Increasing evening span on Route 20 (Orbital) to 1am improves access for residents in Northside and the Fan/Museum District.
- Extending Route 4b to White Oak Village via Williamsburg Rd/ Gay Ave would increase the number of destinations accessible to residents of Fulton.
- Increasing frequency on Route 7 (Nine Mile, Henrico) to 15-minutes at peaks (6-9am and 3-6pm) and extending the route to the Airport improves access for residents in the East End and increases access to jobs in the airport area.
- Extending Route 1c south to Turner Rd, Genito Road and Woodlake Shopping Center improves access for residents of Southwood and Piney Knolls.
- Extending Route 86 and branch to serve Route 10 to Irongate Rd, Route 10 to Chesterfield Government Center and JTCC increases the number of destinations available to residents of Piney Knolls.
- Increasing evening span until 2am:
  - On Route 1 (Chamberlayne/Hull) for residents of Gilpin, Northside, Southwood and Piney Knolls.
  - On Route 2 (North Ave/Semmes) for residents of Gilpin, Northside and the area southeast of Midlothian Turnpike and Belt Boulevard.
  - On Route 3 (Highland/Harwood/Jeff Davis) for residents of Northside, Hillside Court and Oak Grove.
  - On Route 4a (Montrose) and 4b (Darbytown) for residents of Fulton.
  - On Route 5 (Cary/Main/Whitcomb) and Route 12 (Church Hill) in North Church Hill and in the Fan/Near West End.
  - On Route 12 (Church Hill) for residents in the East End.On Route 20 (Orbital) in the Fan and Near West End.
  - On Route 14 (Hermitage/East Main) for residents in the VCU area and Fan/Museum District.

4.4.1.5 Minority Populations

The following improvements increase access for the Hispanic population in Southwood and throughout Southside:

- The following route extensions increase the number of jobs and other destinations accessible by this population:
  - Extending Route 1a west to Chesterfield Town Center, Old Buckingham/Woolridge, Westchester Commons and John Tyler Community College (JTCC).
  - Extend Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR) and John Tyler Community College (JTCC) at Route 10.
  - Extend Route 86 and branch to serve Route 10 to Irongate Rd, Route 10 to Chesterfield Government Center and JTCC.
- Extending Evening Span of Service to from 5am – 7pm or 10pm on Route 87 (Bellemeade/Hopkins) and Route 88 (Ruffin Bells Shuttle) increases transportation options and widens the number of jobs accessible by transit.

The following improvements increase access for the black population in Northside east of Chamberlayne, the East End, North Church Hill, Union Hill, Fulton, Gilpin, Carver, Randolph and throughout central and eastern Southside:

- Extending the span of service on to 2am on the following routes improves access for residents and increases the number of jobs accessible by transit to include shifts ending late: Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis), Route 4a (Montrose), Route 4b (Darbytown), On Route 5 (Cary/Main/Whitcomb), Route 12 (Church Hill), Route 13 (Oakwood) and Route 20 (Orbital).
- Increase Sunday frequency to 15-minute service from 6am – 7pm on Route 1 (Chamberlayne/Hull), Route 2 (North Ave/Semmes), Route 3 (Highland/Harwood/Jeff Davis), Route 4a (Montrose), Route 4b (Darbytown), Route 5 (Cary/Main/Whitcomb), Route 20 (Orbital).
- Route extensions increase the number of residents who can reach destinations around the city with transit:
    - Extending Route 1 north along Brook Road to Virginia Center Commons.
    - Extending Route 1a west to Chesterfield Town Center, Old Buckingham/Woolridge, Westchester Commons and John Tyler Community College (JTCC).
    - Extending Route 1c south to Turner Rd, Genito Road and Woodlake Shopping Center.

4.4.2 *Henrico*

4.4.2.1 Population Density

The following recommendations improve access to high and moderately-dense populations centers in Henrico:

- **Seven Gables:**
    - Extending span of service to 11pm on Route 7 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
    - Adding weekend service from 6am-11pm on Route 8 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
    - Increasing frequency on Route 91 (Laburnum Connector) from 60-minute to 30-minute.
- **Gayton:**
    - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Tree Chopt.
- **Area between Mayland and Parham:**
    - Extending the span of service to 11pm and adding weekend service 6am-11pm on Route 79 (Patterson/Parham).

Adding weekend service from 6am-11pm and increasing frequency from 60-minute to 30-minute on Route 18 (Henrico Government Center).

4.4.2.2 Access to Jobs

The following improvements would increase access to high-employment areas and corridors in Henrico County:

- **Short Pump:**

  - Extending Route 19 (Pemberton) to Short Pump, terminating at Bon Secours Parkway/Wegmans Drive).
  - Adding weekend on Route 19 (Pemberton) from 6am-11pm.
  - Expanding span of service on Route 19 (Pemberton) to 11pm.
- **Area between Innsbrook and Pemberton:**
  - Extending Route 29X via Cox Rd to Nuckols Rd to serve Innsbrook and possibly constructing an additional Park and Ride lot near Twin Hickory/Nuckols.
  - Extending span of service on Route 19 (Pemberton) to 11pm.
  - Adding weekend service on Route 19 (Pemberton) from 6am-11pm.
- **The Regency Square Mall Area**
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Three Chopt.
  - Extending span of service to 11pm and adding weekend service from 6am-11pm on Route 79 (Patterson/Parham).
- **The Henrico Government Center:**
  - Simplifying Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.
  - Adding weekend service from 6am-11pm and increasing frequency from 60-minute to 30-minute on Route 18 (Henrico Government Center).
- **The triangle formed by I-64, Broad Street and Hungary Springs Road:**
  - Extending Route 19 (Pemberton) to Short Pump, extending the span of service to 11pm and adding weekend service from 6am-11pm.
  - Simplifying Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.
- **Forest Avenue west of Horsepen:**
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and west on Forest Ave to Three Chopt.
- **The triangle formed by I-64, Broad Street and Westwood Avenue:**
  - Simplifying Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.
  - Extending Route 19 (Pemberton) to Short Pump. The route will terminate at Bon Secours Parkway/Wegmans Drive).
- **The triangle formed by Creighton, Nine Mile and Laburnum:**
  - Extending span of service to 11pm on Route 7 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
  - Adding weekend service from 6am-11pm on Route 8 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
  - Increasing frequency on Route 91 (Laburnum Connector) from 60-minute to 30-minute.

4.4.2.3 Access to Seniors

The following recommendations would improve access to senior concentrations in Henrico County:

- **Westminster Canterbury:** *Already well-served by Route 14 (Hermitage/East Main) (current Route 24 (Hermitage))*
- **St Mary's Woods:**
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Three Chopt.
  - Extending the span of service to 11pm and adding weekend service from 6am-11pm on Route 79 (Patterson/Parham).

Additionally, there is a large cluster of senior centers in the Far West End that could be served by future improvements: Symphony Manor of Richmond, Brookdale Gayton Terrace, Lexington Court and Lakewood.

4.4.2.4 Populations in Poverty

The following recommendations would improve access to communities in poverty in Henrico County:

- **Seven Gables:**
  - Extending span of service to 11pm on Route 7 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
  - Adding weekend service from 6am-11pm on Route 8 (Nine Mile, Henrico) and Route 91 (Laburnum Connector).
  - Increasing frequency on Route 91 (Laburnum Connector) from 60-minute to 30-minute.
- **South of Darbytown Road near Fulton (high density):**
  - Extending route 4b to White Oak Village via Williamsburg Rd/Gay Avenue.
- **The triangle formed by Gayton, Gaskins and Patterson Avenue:**
  - Extending span of service on Route 79 (Patterson/Parham) to 11pm.
  - Adding weekend service on Route 79 (Patterson/Parham) from 6am-11pm.
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Three Chopt.
- **Pinedale Farms (Three Chopt and Pemberton):**
  - Extending span of service on Route 79 (Patterson/Parham) to 11pm.
  - Adding weekend service on Route 79 (Patterson/Parham) from 6am-11pm.
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Three Chopt.
- **Area around J. R. Tucker High School:**
  - Creating Route 92 along Brook Road and Parham to Regency. This could be extended to Stony Point Fashion Park.
  - Adding weekend service from 6am-11pm and extend the weekday span of service on route 19 (Pemberton) to 11pm. Extend the route to Short Pump.
  - Adding weekend on Route 19 (Pemberton) from 6am-11pm.
  - Expanding span of service on Route 19 (Pemberton) to 11pm.
- **Maple Springs:**
  - Simplifying Route 18 to provide 2-way service from Willow Lawn.

- Extending the span of service on Route 18 (Henrico Government Center) to 11pm.
- Adding weekend service from 6am-11pm on Route 18 (Henrico Government Center).
- Increasing frequency on Route 18 from 60 minutes to 30 minutes.
- Creating a new route (Route 92) along Brook Road and Parham to Regency.

- **The Wistar Road area:**
  - Adding weekend service from 6am-11pm and extend the weekday span of service on route 19 (Pemberton) to 11pm. Extend the route to Short Pump.
  - Simplifying Route 18 to provide 2-way service from Willow Lawn.
  - Extending the span of service on Route 18 (Henrico Government Center) to 11pm.
  - Adding weekend service from 6am-11pm on Route 18 (Henrico Government Center).
  - Increasing frequency on Route 18 from 60 minutes to 30 minutes.
  - Creating a new route (Route 92) along Brook Road and Parham to Regency.
- **Area around Dumbarton Road between Route 1 and Lakeside Avenue:**
  - Creating a new route (Route 92) along Brook Road and Parham to Regency.
  - Extending Route 1 to shopping Center at Brook/Parham and then along Brook Road to Virginia Center Commons.
- **Essex Village**
  - Extending span of service on Route 91 (Laburnum) to 11pm.
  - Adding weekend service on Route 91 from 6am-11pm.
  - Increasing frequency from 60 minutes to 30 minutes of Route 91.

There is an additional community in poverty between Gayton and Lauderdale south of Ridgefield Parkway that could be served by future improvements.

4.4.2.5 Minority Populations

The following recommendations will improve access to/from minority communities in Henrico:

- **Highland Springs:**
  - Extending the span of service on Route 7 (Nine Mile/Henrico) to 11pm.
  - Increasing frequency on Route 7 to 15 minutes (30 on branches).
  - Adding weekend service on Route 8 (Nine Mile/Henrico) from 6am-11pm.
- **White Oak Village Area:**
  - Extending the span of service on Route 7 (Nine Mile/Henrico) to 11pm.
  - Increasing frequency on Route 7 to 15 minutes (30 on branches).
  - Adding weekend service on Route 8 (Nine Mile/Henrico) from 6am-11pm.
  - Extending Route 4b to White Oak Village via Williamsburg Rd/Gay Avenue.
  - Extending span of service on Route 91 (Laburnum) to 11pm.
  - Adding weekend service on Route 91 from 6am-11pm.
  - Increasing frequency from 60 minutes to 30 minutes of Route 91.
- **Montrose:**
  - Extending the span of service on Route 7 (Nine Mile/Henrico) to 11pm.
  - Increasing frequency on Route 7 to 15 minutes (30 on branches).
  - Adding weekend service on Route 8 (Nine Mile/Henrico) from 6am-11pm.
  - Extending Route 4b to White Oak Village via Williamsburg Rd/Gay Avenue.

  - Extending span of service on Route 91 (Laburnum) to 11pm.
  - Adding weekend service on Route 91 from 6am-11pm.
  - Increasing frequency from 60 minutes to 30 minutes of Route 91.
- **Essex Village:**
  - Extending span of service on Route 91 (Laburnum) to 11pm.
  - Adding weekend service on Route 91 from 6am-11pm.
  - Increasing frequency from 60 minutes to 30 minutes of Route 91.
- **North of Azalea Ave/ West of Wilkinson:**
  - Extending Route 1 to shopping Center at Brook/Parham and then along Brook Rd to Virginia Center Commons.
  - *This area will also be well-served by improvements to Route 1 (Chamberlayne/Hull) and Route 14 (Hermitage/East Main) within the City of Richmond.*
- **Regency Square Mall:**
  - Extending span of service on Route 79 (Patterson/Parham) to 11pm.
  - Adding weekend service on Route 79 (Patterson/Parham) from 6am-11pm.
  - Extending Route 79 to Gayton Crossing Shopping Center (Quioccasin & Gayton Rd) and north on Horsepen/Glenside to Forest Ave and West on Forest Ave to Three Chopt.
- **Between Staples Mill and Broad Street around Glenside:**
  - Adding weekend on Route 19 (Pemberton) from 6am-11pm.
  - Expanding span of service on Route 19 (Pemberton) to 11pm.
  - Extending Route 19 (Pemberton) to Short Pump, terminating at Bon Secours Parkway/Wegmans Drive).
  - Simplifying Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.

There is an additional minority community in Hunter's Ridge, near Gayton that could be served by future improvements.

4.4.3 *Chesterfield*

4.4.3.1 Population Density

The following recommendations improve access to moderate population density areas:

- **Meadowdale at S Beulah Road:**
  - Extending Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR).
  - Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.
- **Walmsley Boulevard between Hull Street and Powhite:**
  - Extending Route 1c (Chamberlayne/Hull/Elkhardt) to Genito Road.
  - Extending Route 1c (Chamberlayne/Hull/Elkhardt) to Woodlake Shopping Center.
- **Courthouse Green:**
  - Extending Route 86 at a 30-minute frequency and branch to serve Route 10 to Chesterfield Government Center. Branches will have 60-minute frequencies.

- Extending Route 86 at a 30-minute frequency and branch to serve Route 10 to JTCC. Branches will have 60-minute frequencies.

There are additional moderate population density areas in Wilkinson Terrace and The Grove that could be served by future improvements.

4.4.3.2 Access to Jobs

The following recommendations improve access to areas with a concentration of jobs:

- **Chesterfield Government Center complex (southeast of Courthouse and Ironbridge Roads):**
  - Extending Route 86 at a 30-minute frequency and branch to serve Route 10 to Chesterfield Government Center. Branches will have 60-minute frequencies.
  - Extending Route 86 at a 30-minute frequency and branch to serve Route 10 to JTCC. Branches will have 60-minute frequencies.
- **Midlothian Turnpike just west of Powhite:**
  - Extending Route 2b (North Ave/Jahnke/Midlothian) to Arboretum Place.
  - Extending Route 1a (Chamberlayne/Hull) to Chesterfield Town Center.
  - Extending Route 1a (Chamberlayne/Hull) to Old Buckingham/Woolridge.
  - Extending Route 1a (Chamberlayne/Hull) to Westchester Commons. This route will serve John Tyler Community College (JTCC).
- **The triangle formed by Robius, Huguenot and Midlothian Turnpike (which includes Chesterfield Towne Center, Huguenot Village Shopping Center and Johnston Willis hospital):**
  - Extending Route 1a (Chamberlayne/Hull) to Chesterfield Town Center.
  - Extending Route 1a (Chamberlayne/Hull) to Old Buckingham/Woolridge.
  - Extending Route 1a (Chamberlayne/Hull) to Westchester Commons. This route will serve John Tyler Community College (JTCC).

4.4.3.3 Populations in Poverty

The following recommendations improve access to areas with moderate concentrations of households in poverty:

- **Bensley:**
  - Extending Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR).
  - Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.
- **Bellwood:**
  - Extending Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR).
  - Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.

4.4.3.4 Minority Populations

The following recommendations improve access to areas with moderate minority populations:

- **Meadowdale:**
  - Extending Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR).

  - Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.
- **East of Route 1 between Bellwood Rd and Chippenham Pkwy:**
  - Extending Route 3b (Highland/Jeff Davis) to Dwight Road (DSCR).
  - Extending Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.

There are additional minority communities Wilkinson Terrace and Ettrick, near Virginia State University, which could be served by future improvements.

4.5 Service Enhancements Timeline

4.5.1 *Status of Current Schedule of Projects*

The Pulse BRT project is under construction with stations and right of way improvements on-going as of January 2017. Construction should be complete by the contractual deadline of June 30, 2018. After appropriate testing by GRTC, service is expected to begin on the Pulse BRT approximately 90 days after the completion of construction.

The major service changes associated with the Richmond Transit Network Plan will begin alongside the opening of the Pulse BRT. Route schedules are under development with completion of new schedules expected in February 2018. GRTC has already started a major public education and outreach campaign to inform existing and new riders of the changes in routes that will occur with the opening of the New GRTC Network. That campaign is expected to continue through the opening of the new network.

4.5.2 *Timeline of Service Enhancements*

Table 4-6 displays the timeline of enhancements and outlines which years are included in short-, mid- and long-term planning categories. Additionally, the first 6 years are considered part of the constrained budget while the remaining 4 years are considered unconstrained.

The projects below have been selected and prioritized for implementation in the short, medium, long and beyond long-term based on public input through the TDP and Transit Network Plan processes, internal staff recommendations and the likelihood of local jurisdictions providing funding for each improvement. Specifically, the project team and GRTC coordinated with transportation planning staff in each jurisdiction to review possible service improvements and how they might align with public comments on recent planning projects like the RTNP, Greater RVA Transit Vision Plan and any preferences for any improvements or the likelihood of support from each jurisdiction for improvements.

Consideration was also given to logical expansions and extensions in the timing of recommended improvements. For example, SI:57 which would add a new route to Parham Road in Henrico is recommended in 2028, late in the planning horizon. As an orbital route, the Parham Road route would function better once service on Brook Road, Staples Mill Road, Broad Street, and Quioccasin Road is improved and extended so that the new route on Parham has multiple, higher frequency connections feeding into it.

Because so much will change with the GRTC network in the year immediately following this TDP, it is likely that significant follow up will be needed to further vet these recommendations and consider new ones as the new network and Pulse BRT cause changes to how riders use the system, attract new riders, and otherwise create new challenges and opportunities for transit in the Richmond region. Therefore,

additional public outreach and consultation will be completed for these recommendations before they are implemented.

Table 4-6 Service Improvements Timeline

6 Year Constrained Window						Unconstrained			
Short-Term (1-3 years)			Mid-Term (4-6 years)			Long-Term (6-10 years)			
2019	2020	2021	2022	2023	2024	2025	2026	2027	2028

It is important to note that all service enhancements are contingent on local funding support for expanding service, beyond the regular financial support for maintaining the existing system. Regional collaboration may yield opportunities for some of the identified projects (particularly capital projects) to be funded through other means (such as Regional Surface Transportation Funds), however these regional funding sources are generally limited to capital projects and would therefore not fund most service enhancements, which require ongoing operational funding.

In addition, GRTC continues to have conversations with other regional partners who provide transportation services, like the University of Richmond and Virginia Commonwealth University, about collaborating on service, creating better connections, and providing better service. This collaboration is evidenced by the new U-Pass program that GRTC has developed to improve the pass options and flexibility for the universities to provide to students.

4.5.2.1 Short-Term (1-3 years)

GRTC expects minimal service changes in the first two years within the City of Richmond as the agency will need time to see how the significant changes happening with the RTNP and Pulse BRT implementations will change ridership and operating patterns. In particular, GRTC and the City will need to coordinate closely as the Pulse BRT and the RTNP are implemented to ensure all new routes and the BRT are meeting their expected operating speeds and that transfer activity is being appropriately accommodated. Two key projects to ensure seamless transfers are the Southside and Downtown transfer centers. The Southside transfer center is programmed in 2019 and the Downtown transfer center is programmed in 2020.

One service improvement is programmed in 2020 in the City, the extension of Route 77 (Grove Avenue) to downtown to provide additional coverage and reduce the need for transfers. A major improvement is programmed in 2021 to significantly improve access in Southside with more frequent service and better connections.

Significant increases in service are planned in Henrico in the short-term due to interest from the public and decision-makers in expanded service. Service expansions in Henrico have been programmed with major extensions to new areas with major job centers first (Short Pump and Brook and Parham) and then adding evening service in 2020.

For Chesterfield, one new express route is planned to service Cogbill Road and the 82x is planned to be extended to the Career and Technical Center.

Table 4-7 Short-Term Improvements

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
2019						
SI:39	Simplify Route 18 to provide two-way service from Willow Lawn via Broad to Libbie, through Libbie Mill, to Staples Mill north. The route would then one-way loop around Parham, Shrader and Wistar, servicing the Henrico County Government Center.	Henrico	-696	-13,403	0	$0
SI:40	Extend Route 19 (Pemberton) to Short Pump. The route will terminate at Bon Secours Parkway/Wegmans Drive).	Henrico	8,538	127,437	1	$853,800
SI:41	Extend span of service on Route 7 (Nine Mile, Henrico) to 11pm.	Henrico	2,040	128,132	0	$1,228,400
SI:43	Extend span of service on Route 19 (Pemberton) to 11pm.	Henrico	2,040	12,281	0	$204,000
SI:45	Extend span of service on Route 91 (Laburnum Connector) to 11pm.	Henrico	2,040	26,306	0	$204,000
SI:46	Add weekend service on Route 7 (Nine Mile) from 6am-11pm.	Henrico	12,284	66,213	0	$1,228,400
SI:48	Add weekend service on Route 19 (Pemberton) from 6am-11pm.	Henrico	8,214	80,475	0	$821,400
SI:50	Add weekend service on Route 91 (Laburnum Connector) from 6am-11pm.	Henrico	5,304	60,349	0	$530,400
SI:54	Extend Route 1 to shopping center at Brook/Parham.	Henrico	7,016	59,751	1	$701,600
2020						
SI:12	Extend Route 77 (Patterson) to downtown via Grove, Harrison and Broad.	Henrico	696	21,374	1	$69,600
SI:44	Extend span of service on Route 79 (Patterson/Parham) to 11pm.	Henrico	2,040	13,576	0	$204,000
SI:72	Extend route 82x to a new Park and Ride at the old Clover Hill High School.	Chesterfield	765	16,708	1	$76,500
2021						
SI:06	Extend Evening Span of Service to 10pm on Route 76 (Patterson).	Richmond	765	5,546	0	$76,500
SI:07	Extend Evening Span of Service to 10pm on Route 77 (Grove).	Richmond	1,530	9,272	0	$153,000
SI:08	Extend Evening Span of Service to 10pm on Route 78 (Cary/Maymont).	Richmond	1,530	9,601	0	$153,000
SI:09	Extend Evening Span of Service to 10pm on Route 87 (Bellemeade/Hopkins).	Richmond	1,530	16,057	0	$153,000
SI:11	Extend Evening Span of Service to 10pm on Route 86 (Broad Rock/Walmsley).	Richmond	765	6,946	0	$76,500
SI:53	Extend Route 29X via Cox Rd to Nuckols Rd to serve Innsbrook. An additional Park and Ride lot could be created near Twin Hickory/Nuckols.	Henrico	1,530	26,806	1	$153,000
SI:93	Make network changes to routes 88, 1b and 1c.	Richmond	28,000	286,102	2	$2,800,000

4.5.2.2 Mid-Term (3-10 years)

For the mid-term, there are more service improvements planned in the City. In 2022, GRTC plans to extend the evening service to 10pm on routes 76, 77, 78, 86 and 87, to provide more consistent service

hours across all routes in the system before increase frequency of service of extending routes to new areas.

In 2023, service on Route 20 would be improved to every 15 minutes to improve connectivity between routes and create easier connections across the city that do not require going downtown

In 2024, service improvements would include increasing the frequency on Route 12 to every 15 minutes and extending late night service to 2am on Routes 1, 2, 3, 4a, 4b and 5.

In Henrico, planned service improvements include adding weekend service for Routes 7, 19, 79 and 91, extending Route 1 to Virginia Center Commons and adding a new express from Virginia Center Commons in 2022. In 2024, the frequency of Route 91 would be increased to every 30 minutes to provide better connections across the county and between radial routes.

One improvement is planned in Chesterfield in 2024, the extension of Route 3b along Jefferson Davis Highway to John Tyler Community College.

Table 4-8 Mid-Term Improvements

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
2022						
SI:36	Add weekend service on Route 7 (Nine Mile) from 6am-11pm.	Henrico	12,284	66,213	0	$1,228,400
SI:49	Add weekend service on Route 79 (Patterson/Parham) from 6am-11pm.	Henrico	2,040	13,576	0	$204,000
SI:55	Extend Route 1 along Brook Road to Virginia Center Commons.	Henrico	31,928	141,926	2	$1,392,800
SI:78	Increase frequency to 30-minutes on Route 76 (Patterson).	Richmond	7,914	57,456	1	$791,400
SI:79	Increase frequency to 30-minutes on Route 77 (Grove).	Richmond	9,293	95,918	1	$929,300
SI:80	Increase frequency to 30-minutes on Route 78 (Cary/Maymont).	Richmond	9,293	99,321	1	$929,300
SI:81	Increase frequency to 30-minutes on Route 87 (Bellemeade/Hopkins).	Richmond	15,498	166,115	2	$1,549,800
SI:82	Increase frequency to 30-minutes on Route 86 (Broad Rock/Walmsley).	Richmond	7,914	71,859	1	$791,400
SI:83	Extend span of Route 8 so that it runs in tandem with Route 7 to provide 15-minute service during the day. Extend Route 8 to Southside to take over parts of Route 2c. Increase the frequency of Routes 2a and 2b to every 30 minutes.	Richmond	37,764	1,615,070	5	$3,776,400
SI:85	Create a new express route (30x) from Virginia Center Commons to downtown.	Henrico	5,355	79,499	4	$535,500
2023						
SI:03	Increase frequency on Route 20 (Orbital) from 30-minutes to 15-minutes and extend service from midnight to 1am.	Richmond	21,225	251,658	5	$2,122,500
2024						
SI:51	Increase frequency on Route 91 (Laburnum Connector) from 60-minute to 30-minute.	Henrico	22,974	280,286	2	$2,297,400
SI:68	Extend Route 3b (Highland/Jeff Davis) to John Tyler Community College (JTCC) at Route 10.	Chesterfield	10,115	135,295	3	$1,011,500

4.5.2.3 Long-Term (7-10 years)

Long-term improvements in the City of Richmond in 2025 include adding frequent service in the evenings (from 7-10pm) to improve access in the evenings and encourage higher ridership and an extension of Route 2a to Stony Point Fashion Park to provide transit access to this major shopping destination.

In 2026, late night service would be extended to 2am on Routes 12, 13, 14, 20, and 50 to increase late night access for service workers and others who work late. Also, a set of improvements would bring all service in the City to at least every 30-minutes to increase ridership and provide better access across major destinations in the city. In 2027, service on Routes 1, 2, 3, 4a, 4b and 5 would be provided at every 15-minutes on Sundays, providing 7-day a week frequency service on those routes, which would provide consistency for the frequent network in the City and provide more reliable and frequent service for retail and service workers on weekends and shoppers.

In Henrico, improvements in 2025 include weekend and evening service on Route 18, a new express route from Short Pump to downtown and increasing the frequency of Route 7 to every 15 minutes. In 2027, Routes 18 and 79 would have their frequency increased to every 30 minutes and three new routes would be added: one serving Mechanicsville Turnpike, one serving Williamsburg Avenue to White Oak and one serving Parham Road.

For Chesterfield, in 2025, Route 2b would be extended along Midlothian to Arboretum. In 2027, Route 1a would be extended to Chesterfield Town Center and in 2028, Route 1c would be extended to Hull and Genito. The intention with this route phasing is to prioritize extending service to the densest and most job rich areas first, where ridership is likely to be highest.

Table 4-9 Long-Term Improvements

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
2025						
SI:35	Extend Route 2a (North Avenue/Forest Hill) to Stony Point Fashion Park.	Richmond	4,066	58,046	1	$406,600
SI:42	Extend span of service on Route 18 (Henrico Government Center) to 11pm.	Henrico	2,040	16,075	0	$204,000
SI:47	Add weekend service on Route 18 (Henrico Government Center) from 6am-11pm.	Henrico	2,040	16,075	0	$204,000
SI:59	Increase frequency on Route 7 (Nine Mile) to 15-minutes (30 on branches).	Henrico	16,927	196,109	4	$1,692,700
SI:60	Extend Route 2b (North Ave/Jahnke/Midlothian) to Arboretum Place.	Chesterfield	765	27,682	1	$76,500.00
SI:73	Create a new express route (89x) from downtown to a new park and ride at Cogbill Road and Chippenham Parkway.	Chesterfield	4,590	67,932	3	$459,000
SI:84	Create a new express route (22x) from Short Pump to downtown.	Henrico	7,650	116,923	6	$765,000
SI:87	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 1 (Chamberlayne/Hull).	Richmond	7,886	90,168	0	$788,600
SI:88	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 2 (North Avenue/Semmes)	Richmond	6,432	62,893	0	$643,200
SI:89	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 3.	Richmond	6,588	69,167	0	$658,800

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
SI:90	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 4a.	Richmond	3,216	25,441	0	$321,600
SI:91	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 4b.	Richmond	3,216	25,147	0	$321,600
SI:92	Extend span of frequent service (15 minute) from 7pm to 10pm on Man-Sat on Route 5.	Richmond	6,432	61,177	0	$643,200
2026						
SI:37	Increase the frequency of Route 12 to 15 minutes.	Richmond	8,480	110,579	2	$848,000
2027						
SI:14	Increase Sunday frequency on Route 1 (Chamberlayne/Hull) to 15-minutes from 6am-7pm.	Richmond	2,030	26,225	0	$203,000
SI:15	Increase Sunday frequency on Route 2 (North Ave/Semmes) to 15-minutes from 6am-7pm.	Richmond	1,508	19,348	0	$150,800
SI:16	Increase Sunday frequency on Route 3 (Highland/Harwood/Jeff Davis) to 15-minutes with service from 6am-7pm.	Richmond	2,262	21,278	0	$226,200
SI:17	Increase Sunday frequency on Route 4a (Montrose) to 15-minutes with service from 6am-7pm.	Richmond	754	7,827	0	$75,400
SI:18	Increase Sunday frequency on Route 4b (Darbytown) to 15-minutes with service from 6am-7pm.	Richmond	754	7,736	0	$75,400
SI:19	Increase Sunday frequency on Route 5 (Cary/Main/Whitcomb) to 15-minutes with service from 6am-7pm.	Richmond	1,508	18,820	0	$150,800
SI:20	Increase Sunday frequency on Route 20 (Orbital) to 15-minutes with service from 6am-7pm.	Richmond	23,708	291,490	4	$2,370,800
SI:22	Extend span of service on Route 1 (Chamberlayne/Hull) to 2am.	Richmond	637	8,403	0	$63,700
SI:23	Extend span of service on Route 2 (North Ave/Semmes) to 2am.	Richmond	875	7,955	0	$87,500
SI:24	Extend span of service on Route 3 (Highland/Harwood/Jeff Davis) to 2am.	Richmond	927	8,748	0	$92,700
SI:25	Extend span of service on Route 4a (Montrose) to 2am.	Richmond	620	3,218	0	$62,000
SI:26	Extend span of service on Route 4b (Darbytown) to 2am.	Richmond	620	3,181	0	$62,000
SI:27	Extend span of service on Route 5 (Cary/Main/Whitcomb) to 2am.	Richmond	875	7,738	0	$87,500
SI:29	Extend span of service on Route 12 (Church Hill) to 2am.	Richmond	701	5,816	0	$70,100
SI:30	Extend span of service on Route 13 (Oakwood) to 2am.	Richmond	365	2,492	0	$36,500
SI:31	Extend span of service on Route 14 (Hermitage/East Main) to 2am.	Richmond	985	10,317	0	$98,500
SI:33	Extend span of service on Route 20 (Orbital) to 2am, assuming that service already extends to 1am.	Richmond	4,392	54,022	0	$439,200
SI:34	Extend span of service on Route 50 (Broad Street local) to 2am.	Richmond	2,196	12,407	0	$219,600
SI:52	Increase frequency on Route 18 (Henrico Government Center) from 60-minute to 30-minute.	Henrico	14,824	171,280	1	$1,482,400
SI:56	Create a new 30-minute route (Route 39) between Downtown and Mechanicsville/Laburnum via Mosby. *The route could potentially integrate with Route 5.*	Henrico	13,928	113,235	2	$1,392,800

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
SI:62	Extend Route 1a (Chamberlayne/Hull) to Old Buckingham/Woolridge.	Chesterfield	11,430	148,704	5	$1,143,000
SI:86	Increase frequency of Route 79 to every 30 minutes.	Henrico	9,351	105,335	1	$935,100
2028						
SI:57	Create a new route (Route 92) along Brook Road and Parham to Regency. *This route could be extended to Stony Point Fashion Park.*	Henrico	21,709	232,319	4	$2,170,900
SI:58	Extend Route 4b to White Oak Village via Williamsburg Rd/ Gay Ave.	Henrico	7,016	56,004	3	$701,600
SI:65	Extend Route 1c (Chamberlayne/Hull/Elkhardt) to Genito Road.	Chesterfield	11,430	133,617	2	$1,143,000

4.5.2.4 Longer-Term (10+ years)

Improvements beyond the ten-year horizon include route extensions in Chesterfield County with new service on Iron Bridge Road and Meadowdale.

Table 4-10 Longer-Term Improvements

Project ID	Improvement Description	Jurisdiction	Revenue Hours	Revenue Miles	Peak Vehicles	Incremental Cost
2029						
SI:70	Extend Route 86 at a 30-minute frequency and branch to serve Route 10 to Chesterfield Government Center. Branches will have 60-minute frequencies.	Chesterfield	12,444	106,916	3	$1,244,400
2030						
SI:66	Extend Route 1c (Chamberlayne/Hull/Elkhardt) to Woodlake Shopping Center.	Chesterfield	21,077	255,803	4	$2,107,700
SI:71	Extend Route 86 (Broad Rock/Walmsley) at a 30-minute frequency and branch to serve Rt 10 to JTCC. Branches will have 60-minute frequencies.	Chesterfield	16,824	174,587	11	$1,682,400
SI:74	Create a new local route operating in a loop from the Food Lion on Jefferson Davis Hwy along Meadowdale, Hopkins and Cogbill Road	Chesterfield	8,064	56,721	5	$806,400

4.5.3 *Title VI Response*

No current or planned service improvements were developed as a direct response to the most recent Title VI Service Equity Assessment.

4.5.4 *Issues that may impact Implementation*

There are several key issues that would affect the implementation of the above planned service and capital improvements. First among those issues would be the need for local jurisdictions to provide funding to support these improvements. For most improvements, local jurisdictions would likely have to fund 60-70% of the annual operating cost.

A second major issue that could affect implementation is that all of these service improvements are predicated on the successful implementation of the Pulse BRT and the RTNP service changes. In particular, the RTNP service changes assume that GRTC can increase its system wide speed, in part through the route streamlining and in part through stop consolidation. If service speeds do not increase, or if they decrease over time due to general traffic congestion, then increased funding would need to be

allocated to maintain the existing service instead frequency and coverage levels. A decrease in system-wide speed would also occasion the need for local jurisdictions to work with GRTC to determine where local traffic and curb management policies and infrastructure can be improved to support fast and reliable transit service.

A third major issue that could affect implementation is possible changes to the state funding for capital investments. State projections from DRPT indicate that funding may be constrained in the future, and capital investment support from DRPT may not be as generous as in the past, if state funding streams are not increased. Decreased capital funding from DRPT could imperil bus purchases or facility investments that are planned in these service improvements.

4.5.5 *Coordination efforts with other Providers*

Ongoing coordination with providers in the region is essential to developing and maintaining useful transit access within the Richmond region. One area for possible coordination is with Access Chesterfield the human transit service provider in Chesterfield County. If planned service improvements into Chesterfield County occur, there might be overlap between service areas covered by GRTC Paratransit and Access Chesterfield's similar service. Careful coordination would be needed between both agencies where service areas overlap to minimize costs for both providers.

GRTC is currently coordinating with Petersburg Area Transit as GRTC provides the 95x Express Service from Petersburg to Richmond. Continued coordination between the agencies if GRTC service expands further south is important to find possible connection opportunities between the agencies and regions.

4.5.6 *Coordination efforts with other Agencies*

Implementation of the high quality transit corridors identified in the Greater RVA Transit Vision Plan, or otherwise expanding BRT in the region, will require coordination among the local governments, GRTC, DRPT, and the Federal Transit Administration (FTA). FTA has a discretionary grant program for large-scale transit improvements providing new service such as BRT. The new service grants fall into two categories, New Starts and Small Starts. The Small Starts program is for projects less than $300M in total capital cost, and with less than $100M total grant request from FTA. Based on the information in the Greater RVA Transit Vision Plan, it is likely all of the proposed BRT lines/extensions would fall into this program. This is a highly competitive program that transit agencies across the country pursue. The planning process can take several years, and funding availability from FTA is not a given. Projects must demonstrate their eligibility through a planning process that analyzes FTA's project justification criteria and financial commitment. The Small Starts eligibility and evaluation factors are summarized briefly below.

BRT eligibility – the project must have more than 50 percent of the route operating on dedicated right-of-way during peak periods; must be branded as a distinct service; must have defined stations that are accessible to those with disabilities and provide shelter and travel information; must provide faster travel times through congested intersections via signal priority; must meet service headway and span criteria such as 15-minute headways all day, or 10-minute peak headways and 20-minute off-peak headways. There is an exception to the dedicated right-of-way requirement for "corridor-based BRT."

Project Justification Criteria (50% of the project rating):

> Land Use – FTA's rating is based on evaluation of *existing* conditions including corridor land use, station area development, pedestrian facilities and accessibility for those with disabilities,

parking supply, and availability of affordable housing. Land use density and affordable housing are the main drivers of the score on this measure.

Cost-Effectiveness – This measure is calculated as the ratio of the annualized capital federal share of the project to the number of trips projected on the project (i.e, federal cost per passenger). The ridership projection is based on either a current year estimate or the average of the current year and a future (10-year or 20-year) projection of ridership.

Mobility Improvements – This measure is based on the number of trips made on the proposed service, with a weight of 2.0 applied to trips made by transit-dependent riders.

Congestion Relief – The incremental number of new transit trips made with the investment in place is FTA's measure of congestion relief.

Environmental Benefits – The FTA environmental factors include change in air quality pollutants, change in vehicle emissions, change in greenhouse gas emissions, and safety. FTA provides detailed data with which to make these calculations, based in large part on the calculated change in VMT.

Economic Development – This is a relatively qualitative measure based on the existing plans and policies, as well as market conditions, in the project corridor. Components of the evaluation include growth management policies, transit-supportive corridor policies, zoning, tools to implement transit-supportive plans and policies, performance of those tools, potential impact of the transit project on regional development, and plans or policies to increase affordable housing in the project corridor

Local Financial Commitment (50% of the project rating):

The local financial commitment rating has four components. It begins with a rating of three factors: the current financial condition for both operating and capital investments of the project sponsor and/or funding parties; the commitment of funds for capital share and ongoing operation and maintenance costs; and the reasonableness of the financial plan to withstand funding shortfalls or cost overruns. FTA provides specific criteria for these measures. The fourth component is share of cost requested of FTA. If the three financial factors have a rating of medium or better (which is essential to qualify) and the project sponsor requests less than 50% of the project cost, then the overall rating is elevated one level.

The combined project justification and local financial commitment ratings must be medium or better to qualify for funding, but the funding is competitive, so a medium rating (or better) does not guarantee that FTA funds can be obtained. Note that The Pulse BRT did not receive FTA Small Starts funding, but rather, was awarded a $24.9 million TIGER grant from USDOT, which provided the federal portion of the project's capital funding. The TIGER grant program was renamed the BUILD program in 2018, and it is an annual discretionary grant program of the USDOT.

CHAPTER 5: IMPLEMENTATION PLAN

This chapter quantifies the capital improvements necessary for implementing the service enhancements identified in Chapter 4. All elements of this chapter form the basis for a capital improvement program (CIP) to guide GRTC throughout a ten-year planning horizon. Primary capital components include the fleet (replacements, ongoing maintenance, and expansion) and facilities (stations, operation/ maintenance facilities, and park and rides). Essential maintenance, rehabilitation, and state of good repair projects are emphasized to inform GRTC's ongoing transit asset management program. Funding for project costs will be identified from federal, state, and local sources. This chapter will distinguish those projects in the CIP which GRTC reasonably anticipates local funding to be available, and those with no current funding allocated.

5.1 Rolling Stock Utilization

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

5.1.1 *Fleet Inventory*

As of December 2017, GRTC has a fleet of 159 vehicles for fixed-route revenue service and 86 vehicles for their specialized demand-responsive revenue service. GRTC also maintains a fleet of 13 support vehicles, including driver shuttle vans, wreckers, and road supervision SUVs. Fifty-six percent of the entire fleet is CNG fueled. A total of 54 vehicles are identified as on order or to be delivered within the calendar year 2018. All 10 vehicles dedicated for the Pulse BRT system, anticipated to begin revenue service in 2018 as well, are accounted for in GRTC's current fleet roster.

The following adjustments were made to the Federal Transit Administration Useful Life Benchmark (ULB) in this inventory reporting. A ULB of 14 years for over the road buses, including commuter buses, was used which is specified by FTA and 2-years in excess of current GRTC ULB reporting. A ULB of 8 years for cutaway vans was used for Specialized Services. This is 3 years in excess of current GRTC ULB reporting, yet reflects a lower ULB than prescribed by the FTA. This ULB was established based on the observed actual retirement of GRTC vans, which routinely exceeded their initial 5-year benchmark. All future ULB adjustments in subsequent years should be informed with a qualitative condition assessment as part of the GRTC Asset Management program (see next section).

All vehicle information for GRTC's fixed route, specialized services and support vehicles is provided in Table 5-1, Table 5-2 and Table 5-3. All 2003 fixed route vehicles are scheduled for retirement pending arrival of vehicles on order for FY2018 delivery. Vehicle replacement and retirement analysis in the subsequent sections will begin starting with FY2019.

Table 5-1 GRTC Fixed Route Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2003	Gillig Phantom	40	43	14	16	801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816
2003	Gillig Low Floor	40	38	14	9	102, 103, 104, 105, 108, 109, 113, 114, 115
2007	MCI D 4500CT	45	57	14	3	1501, 1502, 1503
2008	Gillig Low Floor	40	38	14	18	301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318
2009	Chevy C 5500	29	24	10	8	1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708
2010	Gillig Low Floor	40	38	14	13	901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913
2011	MCI D 4500CT	45	57	14	5	1504, 1505, 1506, 1507, 1508
2012	Gillig Low Floor	40	38	14	8	401, 402, 403, 404, 405, 406, 407, 408
2012	International / El Dorado Passport	29	24	10	6	140, 141, 142, 143, 144, 145
2013	Gillig Low Floor	40	38	14	8	201, 202, 203, 204, 205, 206, 207, 208
2014	Gillig Low Floor	40	38	14	34	250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 501, 502, 503, 504, 505, 506, 507, 508, 701, 702, 703, 704, 705
2017	Gillig Low Floor (BRT Plus)	40	38	14	10	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013
2017	Gillig Low Floor	40	38	14	10	2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110
2017	Gillig Low Floor	35	32	14	4	2121, 2122, 2123, 2124
2017	Gillig Low Floor	30	28	14	4	2131, 2132, 2133, 2134
2018	Gillig Low Floor **Not in Service** (Delivery est. 3/2018)	40	38	14	20	2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217
2018	Gillig Low Floor **Not in Service** (Delivery est. 3/2018)	30	28	14	6	2231, 2232, 2233, 2234, 2235, 2236
Total Fleet (In Service):					**159**	

Table 5-2 GRTC Specialized Service Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
2009	Ford E-350 StarTrans	24	12	8	16	1803, 1807, 1810, 1813, 1814, 1816, 1817, 1818, 1819, 1822, 1824, 1827, 1833, 1836, 1837, 1838
2012	Chevrolet Supreme	24	12	8	5	1450, 1451, 1452, 1453, 1454
2012	Ford E-F450 StarTrans	28	20	8	15	1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854
2013	Ford E-F450 StarTrans	28	20	8	15	1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874
2016	Ford E-F450 StarTrans	28	20	8	12	1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891
2017	Ford E-F450 StarTrans	28	20	8	23	1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923
				Total Fleet (In Service):	**86**	

Table 5-3 GRTC Support Vehicle Fleet Inventory

Year	Make/Model	Length (Feet)	Capacity	FTA ULB (Years)	Number of Vehicles	Unit Number
1991	Ford Wrecker	N/A	N/A	N/A	1	T-302
1997	GMC Dump Truck	N/A	N/A	N/A	1	M-51
1998	Ford E-350 Pop Top	N/A	N/A	N/A	1	M-56
2004	GMC Van	N/A	15	8	2	1313, 1315
2005	GMC Van	N/A	15	8	2	1317, 1318
2005	Ford Explorer 4x4	N/A	N/A	8	1	V-30
2007	Chevrolet Impala	N/A	N/A	8	1	V-33
2007	Ford	N/A	N/A	8	1	V-36
2010	Ford Escape 4x4	N/A	N/A	8	3	T-63, T-64, T-65
				Total Fleet Support:	**13**	

5.1.2 *Vehicle Asset Management*

On July 26, 2016, FTA published a Final Rule for Transit Asset Management (TAM) in Federal Register Volume 81, Number 143. The rule requires FTA grantees to develop asset management plans for their public transportation assets, including vehicles, facilities, equipment, and other infrastructure. The TAM final rule divides providers into two size categories, with GRTC regarded as a Tier 1 agency with over 101 vehicles. GRTC will report the age of all vehicles to the National Transit Database and OLGA. The FTA will review the performance of revenue vehicles (Rolling Stock) and service vehicles (Equipment), by asset class, by calculating the percentage of vehicles that have met or exceeded the useful life benchmark (ULB). Currently, a total of 84.3 percent of fixed route and 81.4 percent of specialized service vehicles are within the designated ULB.

GRTC will continue to prioritize a state of good repair strategy, which can be summarized as follows:

- Adherence to an established a set of maintenance policies for its buses and other vehicles, with specific milestones specified at 6,000-mile intervals.
- Preventive maintenance inspections every 6,000 miles for buses, and every 3,000 miles for other vehicles. This includes taking oil samples at each inspection. In addition, GRTC uses AVM2 vehicle monitoring devices on all of its buses.
- GRTC will make decisions about major overhauls on an as-needed basis, in part based on review of oil sample results. GRTC currently estimates it performs approximately 20 to 24 overhauls per year.
- Buses are replaced on a useful life benchmark/condition assessment cycle in accordance with FTA guidelines, subject to available funds.

5.1.3 *Vehicle Replacement*

In FY2018, the delivery of all on-order vehicles will allow for a one-to-one replacement of vehicles beyond their ULB. Thereafter, from FY2019-2028, GRTC's baseline fleet requirements would entail retiring a total of 197 vehicles, but only replacing 169 vehicles. This is primarily due to a reduction in the vehicles operated in maximum service (VOMS) as envisioned in the new network plan. GRTC currently estimates a reduction of approximately 20 vehicles to result in a total of 101 VOMS once the network plan is implemented. ***GRTC does recognize that this VOMS estimate is contingent on improvements to average route travel speeds being realized, as identified in the network planning assumptions.*** To further account for this, the GRTC baseline vehicle replacement plan allows for a higher spare ratio in the initial years and gradually reduces the spare ratio from 33.1 percent in FY2019 to 20.9 percent by FY2022. No adjustments to the VOMS (60) and spare ratio (30 percent) have been assumed for Specialized Service operations through FY2028.

GRTC is anticipated to replace retired vehicles with vehicles of a similar size and will continue the conversion of its fleet to CNG. An identified 23 vehicle replacement for the Specialized Service fleet in FY2018 would replace 5 gasoline and 18 diesel fueled vehicles and result in a 100 percent CNG paratransit fleet.

The baseline vehicle replacement schedule and analysis is presented in Table 5-4 and Table 5-5. This estimate differs from GRTC's last TDP estimate in FY2016 and the Five Year Capital Budget FY2020-FY2024 reported to OLGA, and represents 83 fewer new vehicles from FY2019-FY2024. This is primarily due to the gradual reduction in fleet size and the slightly longer ULB for all vehicles than previously reported. For all Baseline and Expansion scenarios, some adjustments were made to avoid large procurements in one single year. This may entail spreading expenditures across several years and extending some vehicles beyond the ULB (reported as a percent in all tables). Adjusting these expenditures does not impact the timing of new expansion projects from Chapter 4 and as further detailed in the next section.

Table 5-4 GRTC Fixed Route Baseline Vehicle Replacement Schedule

	Fiscal Year										
	FY2018	**FY2019**	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**FY2028**
Carryover	159	159	154	151	147	140	140	134	134	134	134
Retire	23	10	3	10	14	0	13	5	8	8	14
New	23	5	0	6	7	0	7	5	8	8	10
Total Fleet	**159**	**154**	**151**	**147**	**140**	**140**	**134**	**134**	**134**	**134**	**130**
VOMS	101	101	101	101	101	101	101	101	101	101	101
Spare Ratio	36.5%	34.4%	33.1%	31.3%	27.9%	27.9%	24.6%	24.6%	24.6%	24.6%	22.3%
Exceeding ULB	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.7%

Table 5-5 GRTC Specialized Service Baseline Vehicle Replacement Schedule

	Fiscal Year										
	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Carryover	86	86	86	86	86	86	86	86	86	86	86
Retire	23	10	10	12	3	3	9	23	23	10	10
New	23	10	10	12	3	3	9	23	23	10	10
Total Fleet	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**
VOMS	60	60	60	60	60	60	60	60	60	60	60
Spare Ratio	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%
Exceeding ULB	0.0%	0.0%	0.0%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Total replacement costs were calculated using base vehicle costs for four vehicle types. Vehicle costs can vary from peer agency procurements and readily available independent cost estimates due to agency-specific charges for technology, optional equipment, contingency and delivery charges. These representative ranges were compiled from recent FY2015-FY2018 purchases and escalated to current year dollars. FY2018 vehicle cost estimates used in these calculations include:

- 45’ CNG Commuter Bus $820,000
- 40’ CNG Heavy Duty Bus $620,000
- 35’ CNG Heavy Duty Bus $580,000
- CNG Cutaway Van $110,000

All FY2018 vehicles on order with a probable delivery date are treated as already expended costs. Future vehicle replacement costs are projected to increase at 4 percent per year beginning with FY2019. The results of the baseline vehicle replacement program, identifying the vehicle type by replacement year and subsequent overall cost is presented in Table 5-6.

Table 5-6 GRTC Fleet Baseline Vehicle Replacement By Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
45’ CNG Commuter	0	0	3	0	0	0	5	0	0	0
40’ CNG Bus	0	0	3	2	0	7	0	8	8	5
35’ CNG Bus	0	0	0	0	0	0	0	0	0	5
CNG Van	15	10	12	8	3	9	23	23	10	10
Total Vehicles	15	10	18	10	3	16	28	31	18	20
Annual Cost (000s)	**$1,720**	**$1,190**	**$6,320**	**$2,460**	**$400**	**$6,610**	**$8,490**	**$9,890**	**$8,250**	**$9,940**

Total baseline vehicle replacement cost estimates from FY2019-FY2024 is $18.7 million (72 vehicles) with a ten-year FY2019-FY2028 estimate of $55.3 million (169 vehicles) in year of expenditure dollars.

5.1.3.1 Sources and amount of funding

GRTC has identified Capital Budget Item 11.13.01 to represent the purchase of three (3) fixed route 40' buses, for a total cost of $1,545,000. GRTC will allocate $1,545,000 of section 5339 apportionment. State matching is expected at 68% and local matching at 4% with the City of Richmond. Final delivery of vehicles is anticipated prior to the beginning of FY2021.

GRTC has identified Capital Budget Item 11.12.15 for the replacement of 21 paratransit vehicles in FY2019. GRTC will allocate $2,340,975 of section 5339 apportionment. State matching is expected at 68% and local matching at 4% with the City of Richmond.

5.1.4 *Vehicle Expansion*

For GRTC to operate the services identified in Chapter 4, the fleet would need to be expanded above its current size beginning in FY2023. Due to minimal expansion services during the first year following the new network plan implementation (FY2019) and GRTC's reduced VOMs due to anticipated system plan savings, the fleet can still be reduced to 150 total fixed route vehicles by FY2021. Starting in FY2022, new expansion services will require the fleet to ultimately grow to 212 total fixed route vehicles by FY2028 with a VOMs of 168 vehicles. For estimating purposes, expansion services were estimated to require 75 percent 40' heavy-duty buses and 25 percent 35' heavy-duty buses, which may be more conservative than the actual demand may warrant. This future fleet mix reflects GRTC's continued commitment to right-sizing their fleet by growing the roster of less than 40' vehicles.

From FY2019-FY2024 GRTC's fixed route fleet expansion would require 34 additional vehicles over baseline, and from FY2019-FY2028 a requirement for 81 vehicles above baseline replacement during the same periods. The baseline Specialized Service fleet was used pending any specific determination of necessary coverage area expansion and associated vehicle needs. All new vehicles are CNG fueled. The expansion vehicle replacement schedule and analysis is presented in Table 5-7 and Table 5-8.

Table 5-7 GRTC Fixed Route Expansion Vehicle Replacement Schedule

	Fiscal Year										
	FY2018	**FY2019**	**FY2020**	**FY2021**	**FY2022**	**FY2023**	**FY2024**	**FY2025**	**FY2026**	**FY2027**	**FY2028**
Carryover	159	159	154	153	150	158	165	169	187	192	202
Retire	23	10	3	10	12	1	13	0	13	8	14
New	23	5	2	7	20	8	17	18	18	18	24
Total Fleet	**159**	**154**	**153**	**150**	**158**	**165**	**169**	**187**	**192**	**202**	**212**
VOMS	101	103	103	108	125	130	135	149	151	161	168
Spare Ratio	36.5%	33.1%	32.7%	28.0%	20.9%	21.2%	20.1%	20.3%	21.4%	20.3%	20.8%
Exceeding ULB	1.3%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	2.7%	0.0%	0.0%	4.7%

Table 5-8 GRTC Specialized Service Expansion Vehicle Replacement Schedule

	Fiscal Year										
	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Carryover	86	86	86	86	86	86	86	86	86	86	86
Retire	23	10	10	12	3	3	9	23	23	10	10
New	23	10	10	12	3	3	9	23	23	10	10
Total Fleet	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**	**86**
VOMS	60	60	60	60	60	60	60	60	60	60	60
Spare Ratio	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%
Exceeding ULB	0.0%	0.0%	0.0%	3.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The results of the expansion vehicle acquisitions and baseline replacement program for the existing fleet is presented in Table 5-9.

Table 5-9 GRTC Fleet Expansion Vehicle Acquisition and Baseline Replacement By Vehicle and Annual Cost

	Fiscal Year									
	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028
Vehicle Type										
45’ CNG Commuter	0	0	3	0	0	0	0	5	0	0
40’ CNG Bus	0	1	4	12	7	15	15	11	16	16
35’ CNG Bus	0	1	0	3	1	2	3	2	2	8
CNG Van	15	10	12	8	3	9	23	23	10	10
Total Vehicles	15	12	19	23	11	26	41	41	28	34
Annual Cost (000s)	**$1,720**	**$2,490**	**$7,020**	**$11,670**	**$6,300**	**$14,200**	**$17,370**	**$19,290**	**$16,570**	**$21,930**

Total baseline vehicle replacement cost estimates from FY2019-FY2024 is $43.4 million (106 vehicles) with a ten-year FY2019-FY2028 estimate of $118.6 million (250 vehicles) in year of expenditure dollars.

5.1.4.1 Sources and amount of funding

No funding allocated at this time.

5.1.5 *Baseline and Expansion Comparisons*

This section contrasts baseline and expansion implementation requirements. Figure 5-1 represents the total annual vehicle replacements required for the ten-year period from FY2019-FY2028 for both baseline and expansion plans. Figure 5-2 represents the net effect on the total GRTC fleet size over the same ten-year period as a result of the baseline and expansion vehicle acquisition and replacement programs. Figure 5-3 represents the cumulative expenditure over the entire 10-year duration between the baseline and expansion programs.

Figure 5-1 Annual Vehicle Procurements FY2019-FY2028

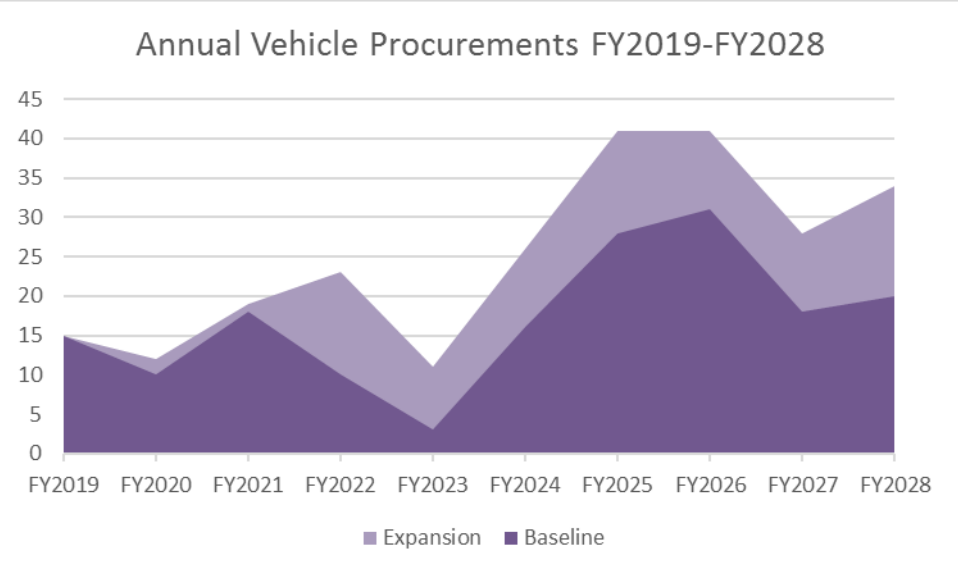


Figure 5-2 Total Fleet Size FY2019-FY2028

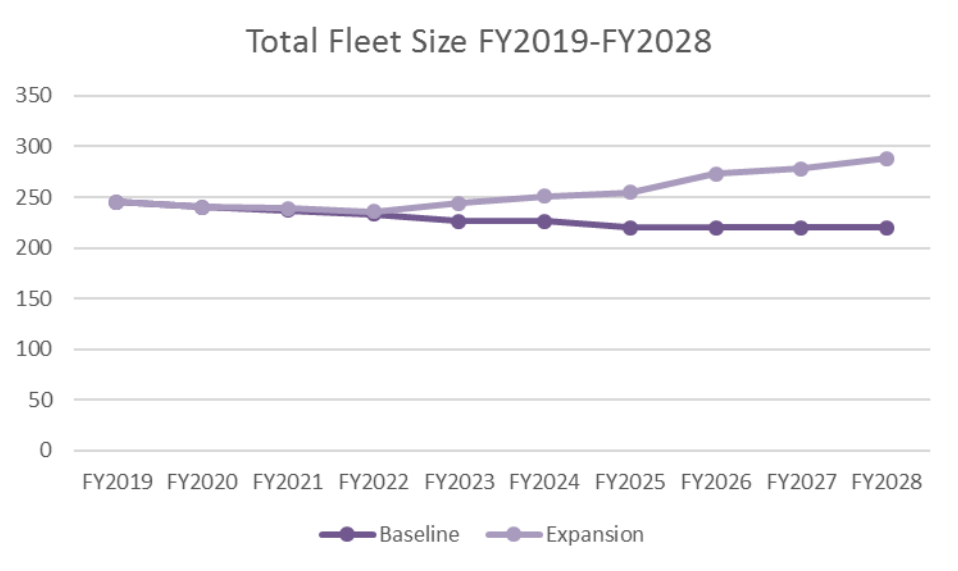
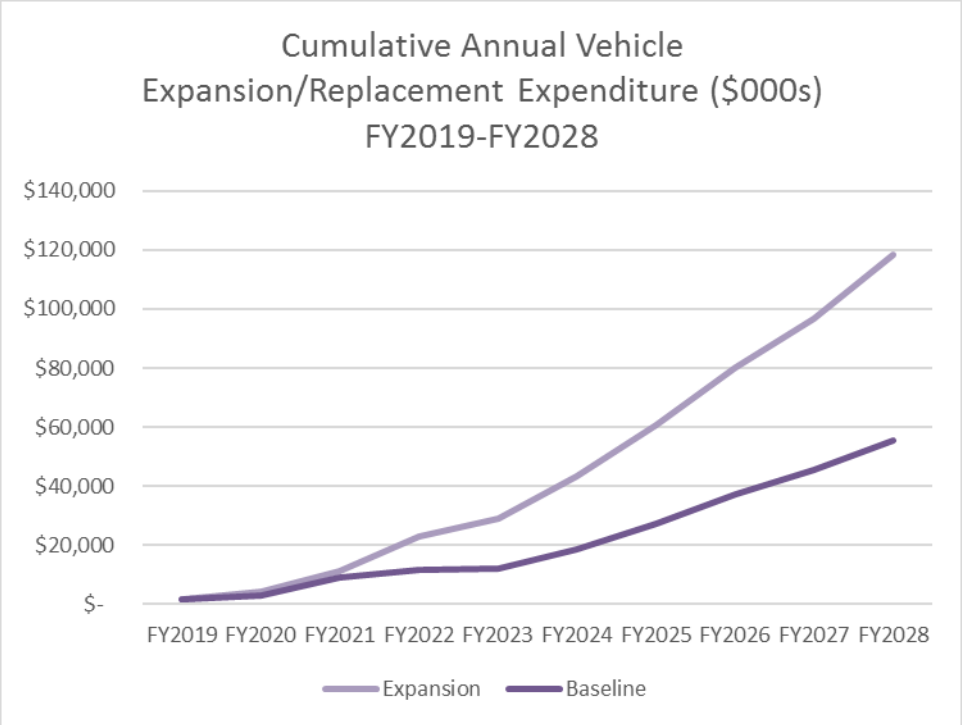


Figure 5-3 Cumulative Annual Vehicle Expansion/Replacement Expenditure FY2019-FY2028



5.1.6 *Support Vehicle/Vanpool Capital Implementation Requirements*

GRTC utilizes a fleet of 13 supervisory and maintenance vehicles to handle all operational issues. As of FY2018, three (3) road supervisor vehicles have exceeded their eight-year ULB. GRTC also has four (4) passenger vans used to transport customers, shuttle drivers/agency personnel, and for training functions. These vehicles are also in excess of their ULB. GRTC has identified the immediate need to procure a medium duty wrecker with wheel dolly for support vehicles and Specialized Service vehicles. In addition, a new MV1 style road supervision vehicle has been identified to provide ADA accommodations (ramp, wheelchair securement).

GRTC has an ongoing need for vehicles used in its rideshare contracts established with Vanpool vendors. GRTC does not own the vehicles, but provides a subsidy based on the van pool passenger size. In exchange, the Vanpool is required to provide data on usage for the National Transit Database, which has a positive impact on GRTC's funding sources that are allocated based on ridership. This financial incentive allows the formation of a Vanpool to be more attractive to potential users by reducing the cost associated with using the Vanpool vehicle. The capital consumed is equivalent to the depreciation of the vehicles in use in the transit service during the period of the contract.

5.1.6.1 Sources and amount of funding

The replacement of support vehicles is identified as Capital Budget Item 11.42.11 with a total cost of $737,000. This includes the replacement of 10 vehicles, primarily supervisor vehicles, a wrecker, and ADA-accessible vehicles. GRTC will allocate $737,000 of section 5307 apportionment. State matching is expected at 17% and local matching at 4% with the City of Richmond. This capital project is to be complete in FY2019.

To meet GRTC's ongoing need for capital contribution toward vehicles used in its Vanpool rideshare contracts coordinated through RideFinders, a total amount of $550,000 has been identified. GRTC will allocate $550,000 of FY2018 section 5307 apportionment for the Capital Cost of Contracting throughout FY2019.

5.2 Major System Maintenance and Operations Facilities

GRTC does not have a separate asset management plan document. However, rolling stock replacement, permanent transfer plaza facilities, and park and rides are incorporated into planning documents for asset management purposes. Assessment of facilities are performed on an as-needed basis. In recent years GRTC performed a needs assessment for its existing facility, and based on this assessment performed electrical work that could not be deferred. In addition, GRTC estimates conditions of assets worth over $5,000 and purchased with grant money in accordance with FTA guidelines.

Identified projects in GRTC's current Capital Assistance program with DRPT and those identified during the TDP are documented further in this section.

5.2.1 *Maintenance Facility*

GRTC has identified a need to mill and replace asphalt paving in approximately 17 areas of severe cracking and pot holes, remove asphalt and replace with concrete between the fueling bay and the wash bay and between the underground fuel farm and the fueling bay, and repair cracks and seal coat the entire employee/visitors parking lot along with similar repairs to the bus storage areas, main entry drive (Lordly Lane owned by GRTC) and the bus entry/exit drive, and re-painting of all parking spaces. GRTC will also design and construct two property entry signs. GRTC has also identified a need to initiate and complete Phase 1 of a 5-phase project to make necessary updates to the administrative building. These updates include interior painting of the public areas and updating the lighting.

At the time of its design and construction of the current GRTC Maintenance Facility, the combined fleet was 264 vehicles. The overall fleet has contracted since that time and the combined fleet will not exceed that design level until FY2026 under the expansion plan. GRTC estimates that the current facility capacity will be exceeded with a combined fleet of 275 vehicles. Any further Specialized Service expansion or other fleet additions that would require the total fleet to exceed this capacity will necessitate the exploration of an expanded maintenance facility or satellite garages. Henrico County may wish to initiate a satellite maintenance facility to directly support expanded services in the County, which by FY 2026 accounts for 22 expansion vehicles in the unconstrained plan in addition to existing baseline Henrico County service. The fiscal constraints, as outlined in Chapter 6, are anticipated to reduce the overall magnitude of GRTC's fleet expansion. As a result, the construction of a satellite facility or expansion of the East Belt Boulevard facility is not currently programmed during the fiscally constrained ten-year (FY2019-FY2028) analysis period for this TDP.

5.2.1.1 Sources and Amount of Funding

For the surface lot replacement (Capital Budget Item 11.44.05), at total cost of $1,243,750 has been identified. GRTC will allocate $1,218,750 of FHWA funds and $25,000 of section 5307 apportionment. State matching is expected at 34% and local matching at 4% with the City of Richmond. The project schedule is from 7/01/2018-6/30/2019. The FTA useful life for this resurfacing is 15 years.

The administrative facility updates (Phase 1) have been identified as Capital Budget Item 11.44.03, with a total cost of $140,000. GRTC will allocate $60,000 of FHWA funds and $80,000 of section 5307 apportionment. State matching is expected at 34% and local matching at 4% with the City of Richmond.

Phase 1 is scheduled to be complete by 6/30/2018. No FTA useful life specified for this component of a multi-phase project.

5.2.2 *Multi-Modal Transfer Center*

GRTC has identified a project to locate, acquire a site, design and construct an efficient operating permanent mobility center that uses alternative energy, is LEED certified, safe and secure, and that creates and supports economic and downtown revitalization efforts while also providing a local multi-modal transportation hub. The transfer center is intended to support a variety of transportation modes, such as local bus, bike, taxi, shuttle, Segway, shared cars, and electric vehicles, all on a single site and within a single building. It may include additional space to accommodate limited administrative offices, retail spaces, security and police spaces, and a community meeting room. This facility was identified as a need for the new network plan during evening line up and weekend operations when bus frequency is reduced. The project focus area is bordered by 14th Street to the east and Belvedere Street on the west and Leigh Street on the north with Canal Street to the south.

For the purposes of this TDP Update, total capital costs were developed based upon preliminary GRTC specifications for a 13-bus bay configuration. The full facility cost estimate is provided in Table 5-8.

Table 5-10 Multi-Modal Transfer Center Cost Estimate

	Cost Range (FY2018 Dollars)	
	Low	**High**
Facility with no parking garage		
Site Acquisition	$2,000,000	$3,600,000
Design	$1,000,000	$3,000,000
Facility	$2,230,000	$3,825,000
Bus Circulation	$2,107,000	$4,672,500
TOTAL	**$7,337,000**	**$15,097,500**

5.2.3 *Sources and Amount of Funding*

GRTC has identified this project with a total cost of $15,100,000. GRTC will allocate $9,200,000 of funds received from Davis Ave. sale. State matching is expected at 34% and local matching at 4% with the City of Richmond. The project is estimated to be complete by the conclusion of FY2021.

5.2.4 *Southside Transit Plaza*

The City of Richmond and GRTC have identified a transit center located on the southside of Richmond in the Hull Street/Belt Blvd. vicinity as a necessary component for implementing the new network plan. This project will include site acquisition/NEPA compliance process, as well as, an architectural and engineering design/construction phase. Depending on final site selection and design programming the project may include site demolition and environmental clean-up, design/construction of 3,000 – 4,000 SF transfer facility with passenger waiting areas. Estimated project costs also include up to ten (10) bus bays, bus/vehicle/pedestrian circulation and wayfinding signage, street scaping, and canopies for shelter from the weather. The estimated cost range for this project is provided in Table 5-9.

Table 5-11 Southside Transit Plaza Cost Estimate

	Cost Range (FY2018 Dollars)	
	Low	High
Southside Plaza		
Site Acquisition	$400,000	$600,000
Design	$300,000	$600,000
Facility	$1,290,000	$2,000,000
Bus Circulation	$1,104,000	$1,645,000
TOTAL:	**$3,094,000**	**$4,845,000**

5.2.4.1 Sources and Amount of Funding

GRTC has allocate $1,000,000 of section 5307 apportionment (62%) toward this project. State matching is expected at 34% and local matching at 4% with the City of Richmond. The project is estimated to be complete by the conclusion of FY2020.

5.2.5 *End of Line Restroom Facilities*

This project is not currently identified in GRTC's capital program. It is directly associated with a finding from the Richmond Transit Network Plan whereby bus speeds are being impacted due to drivers making relief stops during revenue service due to a lack of facilities at the end-of-line layover locations. Ideally, routes can be designed so that end of line restroom facilities can be found at major activity centers, stores or other existing locations. Also, it can be hard to ensure consistent access to restrooms from businesses. And for high frequency service, it is critical to have end of line restroom facilities so as not to disrupt headways on those routes.

This project provides a per unit capital cost with a generalized land acquisition cost for each installation. Identification of specific routes needed facilities and their associated location will occur during the evaluation of bus speeds during the initial years of the new network plan implementation. An optional additional cost was included for the provision of a public restroom within the same structure. The estimated cost range for each end of line driver/public restroom facility is provided in Table 5-12.

Table 5-12 End of Line Driver/Public Restroom Cost Estimate

Unit Cost	Cost Range (FY2018 Dollars)	
	Low	High
End of Line Restrooms – DRIVER ONLY		
Site Acquisition	$7,500	$12,000
Design	$15,000	$20,000
Facility	$80,000	$120,000
TOTAL:	**$102,500**	**$152,000**
End of Line Restrooms – SEPARATE DRIVER & PUBLIC		
Site Acquisition	$7,500	$12,000
Design	$7,000	$11,000
Facility	$120,000	$175,000
TOTAL	$134,500	$198,000

5.2.5.1 Sources and Amount of Funding

No funding allocated at this time.

5.2.6 *Park and Ride Facilities*

Park and ride improvements have been identified by GRTC at three locations in Henrico County. This includes a reconfiguration and expansion and new facilities in anticipation of new network services. These projects are not currently identified in GRTC's capital program and are a direct result of the TDP process. The estimated cost range for each park and ride facility is provided in Table 5-11.

Table 5-13 Park and Ride Facilities Cost Estimate

	Cost Range (FY2018 Dollars)	
	Low	High
Gaskins Road (VDOT #284)		
Design	$30,000	$42,000
Redesign Bus Turnaround	$325,000	$400,000
Two Shelters	$10,000	$15,000
Lighting	$40,000	$50,000
TOTAL:	**$405,000**	**$507,000**
Vicinity of Broad and North Gayton (NEW)		
Site Acquisition	$525,000	$650,000
Design	$24,000	$42,000
Surface parking for 100 cars	$250,000	$325,000
Two Shelters	$10,000	$15,000
Lighting	$50,000	$75,000
TOTAL:	**$859,000**	**$1,107,000**

	Cost Range (FY2018 Dollars)	
	Low	High
Vicinity of Nuckols and Twin Hickory (NEW)		
Site Acquisition	$525,000	$650,000
Design	$24,000	$42,000
Surface parking for 100 cars	$250,000	$325,000
Two Shelters	$10,000	$15,000
Lighting	$50,000	$75,000
TOTAL:	**$859,000**	**$1,107,000**

5.2.6.1 Sources and Amount of Funding

No funding is allocated at this time. GRTC will coordinate with regional partners, including Henrico County, Richmond Regional TPO, DRPT and others to identify possible funding sources including Smart Scale, Regional Surface Transportation Funds, Congestion Mitigation/Air Quality grant or other grant sources.

5.3 Passenger Amenities

With the opening of the Pulse BRT service, GRTC will have completed the consolidation, relocation, or removal of stops along this corridor based on a BRT Technical Assistance Study. . A total of four stops will be consolidated into the new BRT stations. A total of seven stops will be relocated, using the existing signage and furnishings. A total of fourteen stops will be removed in their entirety. Sidewalks will be repaired as required at locations where elements are removed. BRT associated projects are not considered as new capital projects for the purposes of this TDP. GRTC does identify in its Capital Assistance documentation a funding need for the purchase, installation and removal of various shelters throughout the system as needed. Specific areas of need include East End, Broad Street and Staples Mills.

5.3.1.1 Sources and Amount of Funding

GRTC has identified this project as Capital Budget Item 11.32.10, with a total cost of $670,000. GRTC will allocate $670,000 of section 5307 apportionment. State matching is expected at 34% and local matching at 4% with the City of Richmond. These funds are to be expended in FY2019 with an FTA useful life of 15 years for the shelters.

5.4 New Technology Systems or Upgrades

GRTC has indicated that the agency's software systems have aged to the point of obsolescence. Additionally, GRTC users are requiring additional functionality to meet the growing demands of providing transit services to the Greater Richmond area. Through various technology and system upgrade projects, GRTC identifies the need for:

- Upgrade of various hardware items such as computers, servers, network switches, security devices, wireless access points, and related hardware support.
- Replacement and acquisition of various IT hardware throughout the system which includes PC's, Monitors, Switches, Projectors, etc.
- Specific software upgrades for:
    - CLEVER Support Agreement
    - GTRC Mobile App

  - RDP – Remote Desktop Service
  - Shortel
  - Routematch
  - Tableau
  - Great Plains Maintenance
  - Hastus Maintenance
  - ParaTransit Software Maintenance
  - NavTeQ
  - ADP Software System
  - GRTC Software Application Upgrades
  - Citrix Update
- Update the Emergency Alarm system and replace cameras throughout the main facility, maintenance facility and parking areas.

5.4.1 *Sources and amount of funding*

GRTC has categorized the replacement of ADP Hardware, Capital Budget item 11.42.07 and 11.42.08, with a total project cost of $762,000 and $1,212,910 respectively . GRTC will fully allocated these funds from their section 5307 apportionment. State matching is expected at 17% and local matching at 4% with the City of Richmond. These expenditures will be made in FY2019 and the FTA useful life for these projects is given as 4 years.

For the ongoing need to replace miscellaneous office equipment, GRTC has identified a total project cost of $62,000. GRTC will allocate $62,000 of section 5307 apportionment. State matching is expected at 17% and local matching at 4% with the City of Richmond. The project schedule is from 7/01/2018-6/30/2019. The FTA useful life this replacement project is 4 years.

For security equipment, GRTC has identified Capital Budget Item 11.42.09 with a total cost of $375,000. GRTC will allocate $375,000 of section 5307 apportionment. State matching is expected at 17% and local matching at 4% with the City of Richmond. The FTA useful life this project is 10 years.

CHAPTER 6: Financial Plan

6.1 Introduction

This financial plan outlines the anticipated operating and capital costs and revenues associated with the Greater Richmond Transit Company (GRTC) Transit Development Plan (TDP). The purpose of developing a financial plan is twofold: it allows GRTC to determine how much service and how many of the TDP recommendations can be funded in the constrained operating plan, and it provides GRTC with a forecast of the operating and capital funding needs necessary to support those transit services. The financial forecasts in this chapter covers a ten-year period from FY 2019 to FY 2028. All cost and revenue projections are provided in year of expenditure dollars.

This financial plan represents the adjustment of projected annual operating and capital costs into alignment with identified financial resources. Consequently, it is through the development of the TDP's financial plan that transit agencies determine which service improvements can be realistically achieved and when those service improvements should be implemented. Revenue assumed is further categorized by federal, state, and local funding sources to further assess necessary project commitments, match percentages, and capital reserves.

6.2 Assumptions

In order to project operating costs across a ten-year period, a number of financial assumptions must be made. The Financial Plan uses the baseline cost of operating the service, projected from a retrospective analysis starting with the FY 2015 budget. Similarly, a capital budget was created based on the timing for expenditures for the capital needs outlined in the FY2019 Capital Improvement Plan. Adjustments to GRTC's prior reporting of capital needs made as a result of both network plan implementation on this TDP analysis are presented in Chapter 5. To the greatest degree possible, growth assumptions are based on historical data, input from agency staff, and DRPT TDP guidance. Where assumptions differ, the most conservative (lowest revenue growth, highest cost growth) assumption was utilized.

6.2.1 *Operating Revenue Assumptions*

GRTC services are supported by a combination of passenger fare revenues, purchased service contracts, charter and special services, advertising, Federal and State operating assistance funds, general fund contributions from the City of Richmond and other local support revenues. Operating support revenues are categorized from those generated by the operations (e.g. fare revenues, purchased transportation, charters) and direct operating contributions from the federal, state and local government levels.

Revenue assumptions consider the GRTC Pulse service expansion commencing in FY 2019. Systemwide fare revenue is initially held constant in FY2020 (per GRTC budgeting) and modest growth is anticipated which will accelerate to 2 percent growth per year by FY 2028. GRTC Pulse service and other route expansion provides most of the initial growth in operating revenues. New service is conservatively estimated to result in lower fare recovery than the current system average, reflecting anticipated productivity for off peak and more suburban-oriented service expansions.

For passenger revenue, the plan projects growth in the FY 2018 and FY 2019 baseline of 8 percent and 2 percent, respectively, based on budgeted GRTC revenue. Historically, passenger revenues have comprised between 19 and 24 percent of GRTC revenues whereas purchased service revenues have comprised 15 and 17 percent.

6.2.2 *Operating Cost Assumptions*

Systemwide operating costs generally increase after a transit project or expansion goes into revenue service requiring additional subsidies to continue operating and maintaining the transit system. GRTC's operating costs fall generally into two broad categories: administration and operations. Broken down further, operating costs encompass equipment and maintenance; transportation; planning, scheduling and marketing; insurance and safety; general administration and taxes; and purchased service and Vanpool. The Financial Plan uses a number of assumptions to forecast future operating costs for GRTC. Projections account for overall baseline operating costs to grow at a rate of 3 percent per year beyond FY 2021 to account for general inflation and other cost increases. Baseline operating costs prior to FY 2021 are anticipated to grow 9 percent in FY 2018; 4 percent in FY 2019; and 3 percent in FY 2020. Expansion operating expenses are tied to the growth in expansion service revenues. To forecast the cost of TDP recommendations, the Financial Plan uses the expansion plan cost contained in Chapter 4 and adjusts costs into the appropriate year of expenditure dollars.

6.2.3 *Capital Cost Assumptions*

Capital costs assumptions are derived from GRTC's FY 2019 Capital Assistance reporting and the FY2020 - FY 2024 Capital Budget. Updated figures for vehicle replacements and facilities costs were utilized from Chapter 5. Facility cost estimates derived during this TDP Update represent an opinion of probable cost based upon project scope and specifications at a pre-planning/design phase. Assumptions have been made based on the historical information from a similar type or other recently estimated project(s) by GRTC or their peers. The pricing used reflects the probable construction costs for the scheduled time period of the project. This estimate assumes a competitive bid situation, and is an opinion of probable costs based on fair market value, and is not a prediction of the anticipated low bid. This estimate assumes no control over the cost of labor and materials, the General Contractor's or any subcontractor's method of determining price or competitive bidding and market conditions. Finally, representative land acquisition costs were used when specific locations have yet to be determined for future facilities.

All capital expenditures assume the completion of BRT service expansion. Facility design is scheduled to occur in the immediate timeframe to reflect the dependence on several elements of the new GRTC network plan on having transfer facilities in place to complement the new service. For the Downtown Transfer Center, GRTC will allocate $9.2 million from the sale of the former Davis Avenue facility toward matching contributions. All other funding match and participation is based upon input from DRPT on the availability of state assistance (see next section).

6.2.3.1 Capital Funding Implications

With fiscal uncertainties on the horizon at both the federal and state levels, there may be potential impacts on GRTC's capital budget. Although most of GRTC's capital revenues are derived from Federal formula and discretionary programs, the State also provides an important source of funding.

In 2007, the Virginia General Assembly enacted HB 3202 authorizing the Commonwealth Transportation Board to issue $3 billion in Transportation Capital Projects Revenue (CPR) bonds with a minimum of 20 percent, or $600 million in total, dedicated to transit annually over a ten-year period ending in 2018. The Commonwealth has provided matching funds to local transit agencies, averaging 45 percent of total statewide public transportation capital investments. The ability for the Commonwealth and its local governments to continue providing critically needed funding to sustain these investments and keep transit systems in a state of good repair is at risk due to the expiration of the Capital Project Revenue bond proceeds.

It is important to recognize that the majority (approximately 80 percent) of transit capital funds are currently dedicated to the replacement of existing assets such as buses, maintenance facilities, or technology in order to maintain them in a state of good repair. The Commonwealth will only be able to support rolling stock replacement at a match rate of approximately 28 percent as compared to the historical level of 68 percent participation.

In 2013, the General Assembly enacted HB 2313 generating new transportation revenues. However, a portion of those increased revenues to public transportation were contingent upon Congressional enactment of the Marketplace Fairness Act, which, to date, has not occurred. The 2015 General Assembly addressed this lack of congressional action through the enactment of HB 1887. It redirected approximately $40 million annually in dedicated transportation revenues to the transit capital program beginning in 2017. The remainder of funding for transit capital needs is covered by federal and local funding.

During the 2016 General Assembly Session, HB 1359 established the Transit Capital Project Revenue Advisory Board within DRPT to examine the effects of the loss of state transit capital funds, identify additional sources of revenue, and develop proposals for prioritization of transit capital funds. HB 1359 charged the Revenue Advisory Board to identify replacement funding sources for transit capital investments and to explore a prioritization process for funding transit capital investments.

6.3 Operating Budget

Baseline revenues through FY 2020 represent existing budget information from GRTC. Revenues projected from FY 2021 through FY 2028 are derived from their proportion of annual operations cost using baseline averages. Federal contributions are 10 percent on average, City of Richmond contributions grow from 27 percent to 30 percent following expansion of City services beginning in FY2022. Average State contributions are 20 percent of operations cost. The remaining revenue sources contribute 19 percent on average. Purchased transportation revenue grows from 21 percent to 27 percent of all revenue to reflect the expansions in Henrico and Chesterfield County. The Henrico share of revenue is based on a percentage of the expansion service costs cited in the TDP operations plan. Henrico accounts for 47 percent of the total average service expansion costs, which is reflected in the contribution as shown in the Table 6-1.

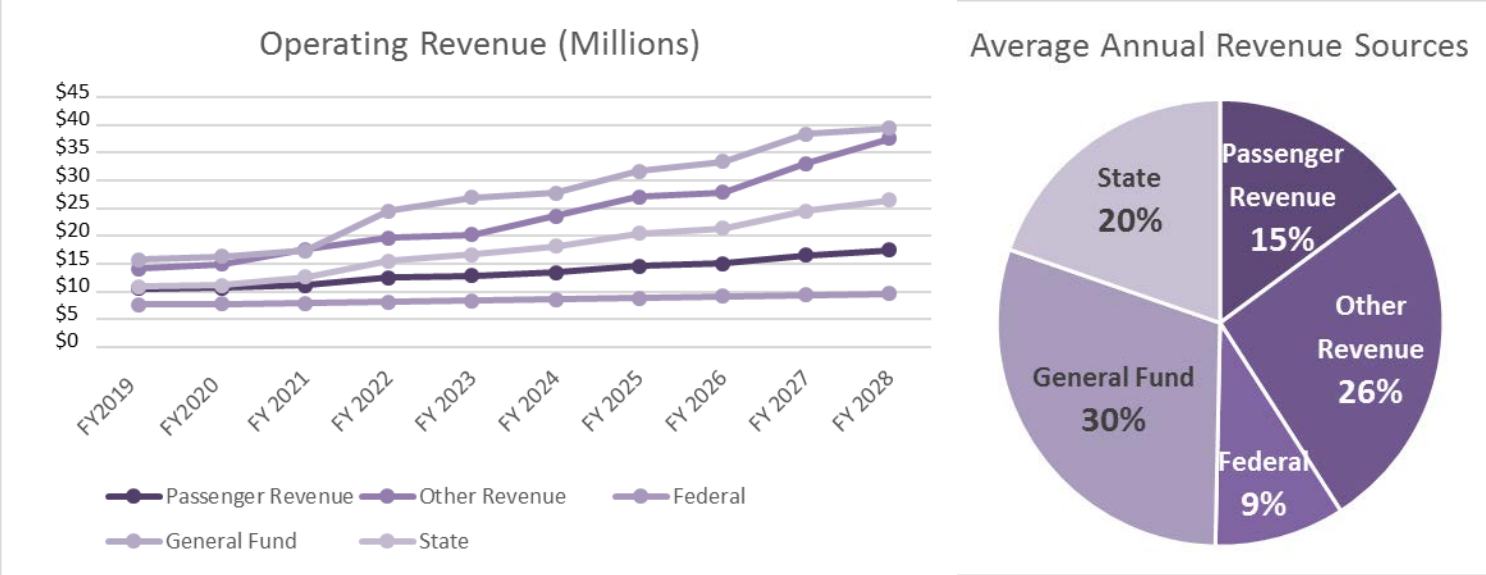
Baseline revenues are projected to grow at a rate of 3 percent annually to balance the growth in baseline operations cost. Projected TDP expansion revenues are derived from their proportion of annual operations cost, using the same average revenue methodology as the baseline. Revenues currently match the rate of TDP operating cost growth for all expansion services. This results in an anticipated growth in revenue of 55% from FY 2019 to FY 2024. The average annual growth rate of revenue is 10 percent during this same time period, with the largest increases of 15 and 21 percent in FY2019 and FY2022 respectively, which correspond with implementation of significant expansion services as outlined in Chapter 4. Any remaining budget shortfalls after the other sources are accounted for are expected to be paid through the City's General Fund or other local contributions from neighboring jurisdictions.

Table 6-1 GRTC FY 2019 – FY 2028 Operating Revenue Projections ($000s)

Fiscal Years	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
GRTC Operating Revenue Projections										
Fare Revenue	**$10,569**	**$10,622**	**$11,154**	**$12,474**	**$12,881**	**$13,441**	**$14,588**	**$15,022**	**$16,545**	**$17,441**
Baseline	$9,991	$9,991	$10,126	$10,227	$10,330	$10,433	$10,642	$10,854	$11,072	$11,293
Expansion	$577	$631	$1,027	$2,246	$2,551	$3,008	$3,947	$4,168	$5,474	$6,148
Purchased Service	**$12,667**	**$13,247**	**$15,874**	**$17,977**	**$18,516**	**$21,735**	**$25,197**	**$25,953**	**$31,031**	**$35,531**
Baseline	$8,627	$8,832	$9,136	$9,410	$9,692	$9,983	$10,283	$10,591	$10,909	$11,236
Expansion	$4,040	$4,414	$6,738	$8,567	$8,824	$11,752	$14,914	$15,361	$20,122	$24,295
Charter/ Special Service	**$337**	**$337**	**$383**	**$394**	**$406**	**$418**	**$431**	**$444**	**$457**	**$471**
Advertising/Interest/Income/Other Income	**$1,164**	**$1,376**	**$1,269**	**$1,308**	**$1,347**	**$1,387**	**$1,429**	**$1,472**	**$1,516**	**$1,561**
Subtotal Operating Revenues	**$24,737**	**$25,582**	**$28,679**	**$32,152**	**$33,150**	**$36,982**	**$41,644**	**$42,890**	**$49,548**	**$55,004**
Operating Contributions from Federal, State and Local Sources										
Federal	**$7,622**	**$7,748**	**$7,876**	**$8,112**	**$8,356**	**$8,606**	**$8,864**	**$9,130**	**$9,404**	**$9,686**
Baseline	$7,622	$7,748	$7,876	$8,112	$8,356	$8,606	$8,864	$9,130	$9,404	$9,686
State	**$10,896**	**$11,196**	**$12,620**	**$15,577**	**$16,724**	**$18,194**	**$20,539**	**$21,467**	**$24,582**	**$26,450**
Baseline	$9,742	$9,934	$10,565	$11,084	$11,621	$12,177	$12,646	$13,132	$13,635	$14,154
Expansion	$1,154	$1,261	$2,055	$4,493	$5,103	$6,017	$7,893	$8,335	$10,947	$12,296
Local (Richmond)	**$15,777**	**$16,377**	**$17,331**	**$24,541**	**$26,941**	**$27,749**	**$31,707**	**$33,376**	**$38,346**	**$39,496**
Baseline	$15,777	$16,377	$16,877	$17,383	$17,905	$18,442	$18,995	$19,565	$20,152	$20,756
Expansion	$0	$0	$454	$7,157	$9,036	$9,307	$12,712	$13,811	$18,194	$18,740
Local (Other)	**$21**	**$21**	**$24**	**$25**	**$26**	**$27**	**$27**	**$28**	**$29**	**$30**
Subtotal Operating Contributions	**$34,315**	**$35,341**	**$37,851**	**$48,255**	**$52,047**	**$54,576**	**$61,138**	**$64,002**	**$72,361**	**$75,663**
TOTAL REVENUE	**$59,052**	**$60,924**	**$66,530**	**$80,407**	**$85,196**	**$91,557**	**$102,782**	**$106,892**	**$121,910**	**$130,667**

The following graph shows the various operating revenues for the TDP period. General Fund revenue, followed by State and passenger fares, compose the largest revenue sources.

Figure 57 GRTC FY 2019 – FY 2028 Operating Revenue Projections and Sources



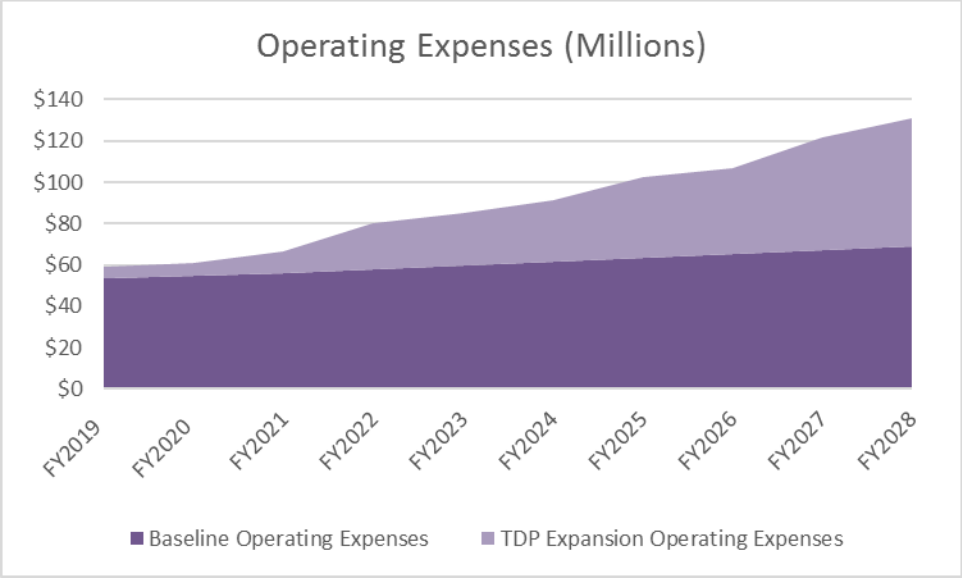
As with the revenue projections, baseline costs through FY 2020 are from budgeted data from GRTC. Projected baseline costs from FY 2021 through FY 2028 use a 3 percent escalation rate. TDP costs are based on the annual vehicle service hour expansion plan contained in Chapter 4, and factoring the cost per vehicle service hour. The vehicle service hour cost for expansion services ($100 per hour) is increased by 3 percent annually, beginning in FY 2021. TDP costs are summarized as well as separated by jurisdiction (City of Richmond, Chesterfield County, and Henrico County) to show the cost impact for each service area.

Table 6-2 GRTC FY 2019 – FY 2028 Operating Cost Projections ($000s)

Fiscal Years	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Annual Change in Revenue Hours	**57,024**	**3,501**	**35,650**	**121,644**	**21,225**	**41,569**	**71,848**	**8,480**	**45,717**	**40,155**
Total Operating Expenses	**$59,052**	**$60,924**	**$66,530**	**$80,407**	**$85,196**	**$91,557**	**$102,782**	**$106,892**	**$121,910**	**$130,667**
Cost Category										
Baseline	$53,280	$54,618	$56,256	$57,944	$59,682	$61,473	$63,317	$65,216	$67,173	$69,188
Expansion	$5,772	$6,306	$10,274	$22,463	$25,514	$30,085	$39,465	$41,675	$54,737	$61,478
Cost Allocation										
Richmond	$0	$0	$649	$10,225	$12,909	$13,296	$18,160	$19,730	$25,991	$26,771
Henrico	$5,772	$6,227	$9,544	$12,154	$12,519	$15,537	$19,384	$19,966	$25,290	$29,696
Chesterfield	$0	$79	$81	$84	$86	$1,252	$1,921	$1,979	$3,456	$5,011

The following graph shows the growth in operating costs for the TDP period. Expansion services costs increase more significantly starting in FY 2021 through FY 2028 as additional services are implemented.

Figure 58 GRTC Operating Cost Projection



6.4 Capital Budget

For this TDP, a new capital program has been prepared for GRTC broadly reflecting vehicle, facility and other capital expenditures. The total ten-year capital expenditure for all service enhancements is anticipated to be $167.1 million. This represents $70.6 million above baseline. The majority (90 percent) of all non-baseline capital expenditures are for an expanded vehicle fleet to accommodate new services. Significant baseline facility expenditure ($21.6 million) is primarily associated with the design and construction of a permanent downtown transfer center. This center is identified as a component of the new network plan, has already been programmed by GRTC in its capital projections, and only a more accurate cost estimate has been developed during this TDP update. GRTC may also require a satellite maintenance facility due to growth in its combined vehicle fleet and capacity limitations at its current operations facility. This need is not currently anticipated within the next ten years, and the eventual timing due to fleet growth should be monitored during annual TDP updates due to the uncertain nature of the new network plan to reduce peak fleet requirements.

From FY 2019 – FY 2024, capital expenditures peak in FY 2021 with the anticipated construction of the new downtown transfer center also coinciding with a large baseline vehicle replacement need. All technology, maintenance, and other capital expenditures are all associated with baseline expenditure growth of 3 percent per year.

Current funding participation for capital expenditures is anticipated to reflect 40% Federal, 49% State, and 11% derived from local funding sources. All expenditures were adjusted based upon reasonable assumed resources.

Table 6-3 GRTC FY 2019 – FY 2028 Capital Budget Annual Summary ($000s)

Fiscal Years	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Project Costs										
Fleet	$2,453	$2,589	$7,411	$11,870	$6,360	$14,198	$17,370	$19,285	$16,723	$22,087
Facilities	$4,440	$6,077	$9,119	$1,486	$100	$103	$0	$109	$113	$116
Other	$3,660	$2,284	$2,301	$2,319	$2,337	$2,355	$2,391	$2,427	$2,465	$2,503
Cost Subtotal	$10,553	$10,950	$18,831	$15,675	$8,797	$16,656	$19,761	$21,822	$19,300	$24,706
Project Revenues										
Federal	$5,896	$6,311	$9,855	$6,340	$3,631	$5,811	$6,661	$7,291	$6,683	$8,216
State	$3,541	$1,689	$4,859	$8,080	$4,465	$9,836	$11,979	$13,301	$11,454	$15,102
Local	$1,116	$2,951	$4,117	$1,255	$701	$1,009	$1,120	$1,230	$1,163	$1,388
Funding Subtotal	$10,553	$10,950	$18,831	$15,675	$8,797	$16,656	$19,761	$21,822	$19,300	$24,706
Previously Approved	$8,343	$9,768	$5,777	$10,244	$7,691	-	-	-	-	-

Figure 59 GRTC Capital Cost Projection

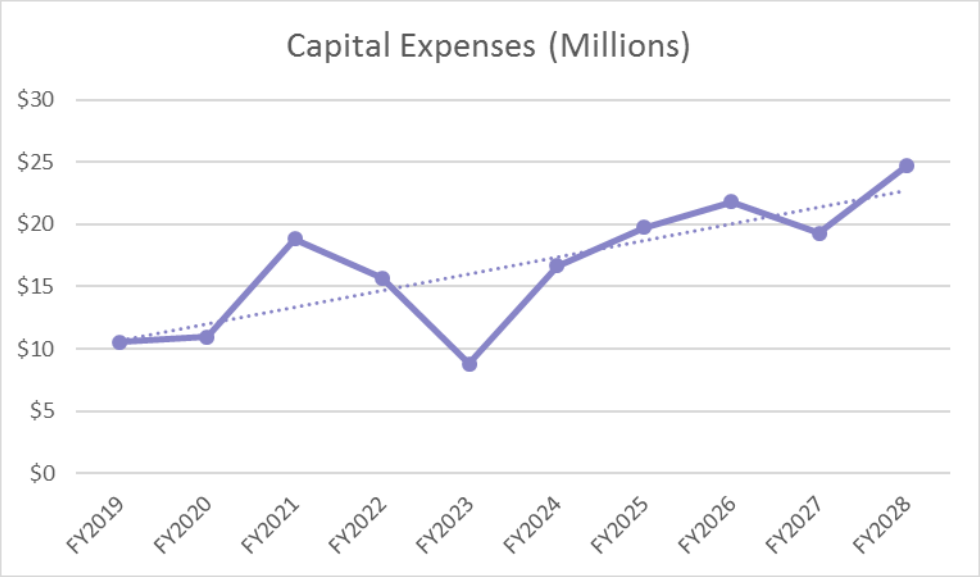


Table 6-4 GRTC FY 2019 – FY 2028 Capital Budget Totals ($000s)

Fiscal Years	Ten Year TOTAL
Project Costs	
Fleet	$120,346
Facilities	$21,663
Other	$25,042
Cost Subtotal	$167,051
Project Revenue	
Federal	$66,694
State	$84,306
Local	$16,052
Funding Subtotal	$167,051
Previously Approved	$41,823

6.5 Conclusions

Over the next 10 years, GRTC expects significant expansion of the service offered through further frequency increases and serving new destinations. All expansions will be associated with changes to the funding sources that will support such sustained growth.

With the addition of TDP expansion services, the system's operating budget expands by 49 percent above the projected baseline costs over the 10-year planning horizon. These costs will result in significant impacts to Henrico County, the City General Fund and State as much of this expansion is funded through these sources, similar to the funding proportions from these same sources for baseline expenses.

For capital expenditures, GRTC will remain focused on keeping its fleet right-sized and in a state of good repair. Major capital investments will expand passenger amenities directly associated with the new network plan implementation. Reliance on State revenue and general fund contributions will remain for capital investment, along with Federal participation at the current rates at a minimum.

Appendix A: Resolution

Forthcoming.

Appendix B: Triennial Review

The most recent Triennial Review can be found at the link below:

http://www.ridegrtc.com/media/annual_reports/Triennial_Review_FY_2016.pdf

Appendix C: Title VI Report

The most Title VI Report can be found at the link below:

http://ridegrtc.com/media/main/Service_and_Fare_Equity_Analysis_April_2018_Changes_10_11_17.pdf

Appendix D: OLGA Fleet Inventory, June 2018

*Fleet Inventory**

Year	Type	Values Count of Description	Average of Mileage
1998	Bus Std 35 FT	2	362,499
2003	Bus Std 40 FT	15	484,346
2007	Bus Std 40 FT	3	294,696
2008	Bus Std 40 FT	18	353,606
2009	Bus < 30 FT	8	152,108
2010	Bus Std 40 FT	13	333,850
2011	Bus Std 40 FT	5	223,172
2012	Bus < 30 FT	6	88,526
	Bus Std 40 FT	8	211,164
2013	Bus Std 40 FT	6	180,601
2014	Bus Std 35 FT	5	133,647
	Bus Std 40 FT	27	173,974
2016	Bus Std 40 FT	1	4,361
2017	Bus < 30 FT	4	29,738
	Bus Std 35 FT	4	26,793
	Bus Std 40 FT	22	18,731
2018	Bus Std 40 FT	17	0
Grand Total:		**174**	207,285

**Fleet data in the main document is from an earlier month and may not exactly match this data.*

*Para-Transit Fleet Inventory**

Year	Type	Values Count of Description	Average of Mileage
2010	Van	16	222,808
2012	Van	19	193,962
2014	Van	15	14,927
2016	Van	12	85,753
2017	Van	23	21,699
2018	Sedan	8	3,163
Grand Total:		**93**	**97,070**

**Fleet data in the main document is from an earlier month and may not exactly match this data.*

Appendix E: Budget Retrospective

Table A-1 GRTC Operating Budget Retrospective ($000s)

Fiscal Years	2015	2016	2017	2018
Revenue				
Fares	$9,170,006	$8,667,193	$8,230,012	$10,031,333
Purch. Service/ Charter/Special Service	$7,155,275	$7,230,912	$7,055,820	$8,009,406
Advertising/Interest/ Other	$ 535,885	$ 542,148	$ 550,122	$ 486,140
Federal	$4,550,908	$6,058,344	$6,371,231	$7,953,215
State	$9,652,221	$ 8,856,372	$9,845,984	$10,413,594
Local	$12,518,200	$ 12,512,056	$12,320,000	$14,503,188
TOTAL:	$43,582,495	$ 43,867,025	$44,373,169	$51,396,876
Operating Cost				
Transportation and Maintenance	$25,488,431	$24,966,623	$24,407,392	$27,534,879
General Administration	$13,840,246	$14,618,561	$14,153,203	$17,743,767
Purch. Service and Vanpool	$5,007,905	$ 5,350,085	$5,549,009	$6,118,230
TOTAL:	$44,336,582	$ 44,935,269	$44,109,604	$51,396,876

Appendix F : Regional Performance Measures

The Richmond Regional Transportation Planning Organization uses the following transit-related metrics for regional planning:

- Percent of households with access to transit
- Percent of employees with access to transit
- General Ridership Satisfaction