Transit Strategic Plan

Petersburg Area Transit

November 2021

Prepared By:

Kimley»Horn

CTG Connetics Transportation Group

Table of Contents

List of Figures

List of Tables

1 System Overview and Strategic Vision

Chapter 1 of the Transit Strategic Plan (TSP) provides an overview of Petersburg Area Transit (PAT) and the strategic vision of the agency. The overview of PAT includes an introduction to the service area and transit system, as well as current/recent initiatives. A more detailed description of the agency, including the history, organizational structure, and services provided, can be found in Appendix A. The strategic vision section presents PAT's overall vision for providing transit service, as well as specific goals, objectives, service design standards, and performance standards to advance the strategic vision.

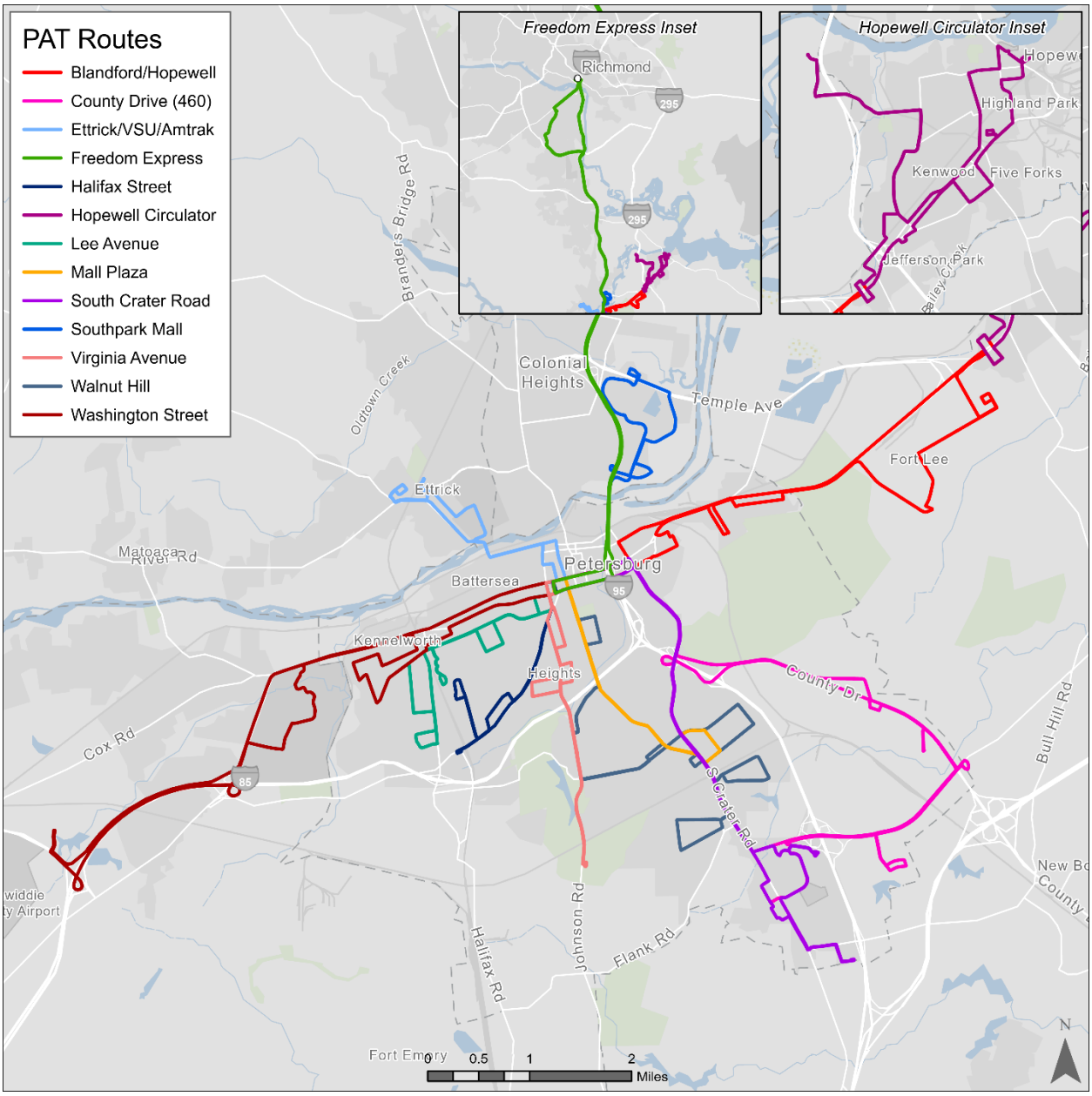
1.1 System Overview

The system overview describes the PAT service area, the transit services provided within the service area, and ongoing initiatives. Additional information on these topics is provided in Appendix A.

1.1.1 Services Provided and Areas Served

PAT provides fixed-route transit and ADA paratransit services throughout the city of Petersburg, which is located approximately 25 miles south of Richmond in southeast Virginia. Transit service extends into the cities of Hopewell and Colonial Heights, as well as portions of Prince George, Dinwiddie, and Chesterfield counties. In addition, PAT operates the Freedom Express route, an express route with four daily round trips between Petersburg and Richmond. Excluding the Freedom Express route, the PAT service area is approximately 7 square miles with a population of about 72,000. In Fiscal Year (FY) 2019, before the COVID-19 pandemic, PAT served 410,000 passenger trips, including both fixed-route and paratransit service. A system map is shown in Figure 1-1.

Figure 1-1. PAT System Map



The existing fixed route network includes twelve local routes and one express route. All of the local fixed routes operate on 60-minute headways. The local fixed routes begin weekday service between 5:45 am and 6:45 am. Saturday service operates with a start time one hour later than weekday service. Service ends on weekdays and Saturdays at the same time, with the final buses returning to Petersburg Station by 7:05 pm. The Freedom Express route operates on weekdays only, with two morning round trips and two afternoon round trips. Fixed route service accounted for about 400,400 passenger trips in FY 2019.

PAT operates ADA paratransit service in the cities of Petersburg, Hopewell, and Colonial Heights, and the counties of Prince George, Dinwiddie, and South Chesterfield (Ettrick), and anywhere within ¾ of a mile from PAT's fixed route service. The service is available from 5:15 am to 6:15 pm on weekdays, and 6:00 am to 6:15 pm on Saturdays. PAT operates six paratransit vehicles during maximum service and recorded approximately 9,300 passenger trips in FY 2019.

1.1.2 Current/Recent Initiatives

PAT has several initiatives for improving transit service in the area. These initiatives are noted below with additional details provided in Appendix A.

Peoples Advantage Federal Credit Union (PAFCU) Partnership

In 2020, PAT formed a partnership with PAFCU. Under the partnership agreement, PAFCU provided $5,000 to PAT in return for PAFCU branding on a PAT bus. Both parties also agreed to publicly support the partnership through referrals and on their respective websites. PAT and PAFCU plan to meet annually to discuss improvements.

GTFS (General Transit Feed Specification) Update

In 2021, the Virginia Department of Rail and Public Transportation (DRPT) worked with a vendor to create and/or update the General Transit Feed Specification (GTFS) datasets for all transit agencies statewide. PAT is a participating agency in this statewide initiative. The updated GTFS dataset will allow PAT to make route and schedule information available to online mapping applications such as Google Maps.

APC/AVL System Update

PAT's current Automated Passenger Counters (APC) and Automatic Vehicle Location (AVL) system from RouteMatch has proven unreliable to the point of being unusable. PAT is currently looking into potential grants that could help secure a new APC/AVL system from another vendor.

1.2 Strategic Vision

As part of the TSP process, PAT drafted a vision statement that is intended to capture the spirit of PAT's core mission in the community:

Provide the Petersburg community with safe, reliable, and accessible transit service to expand access to opportunities and enhance quality of life.

A critical component of forming the strategic vision of the agency is having a greater understanding of service priorities. Given the reality of finite funding, every transit agency must make difficult decisions regarding resource allocation. This dilemma requires agencies to evaluate and choose how they would like to distribute resources among competing interests. Tradeoffs in the provision of transit service need to be discussed and weighed so that the agency can deliberately and effectively design service that meets the needs of the community.

To facilitate decisions on how PAT prioritizes service within the confines of these tradeoffs, PAT staff participated in discussions with key stakeholders on the list of priorities below. Additional information on the stakeholder interviews is included in Chapter 2. While there was not total agreement on the tradeoffs between all parties, the general consensus of the stakeholders and PAT staff were for the following priorities:

- **Frequency vs coverage –** PAT prioritizes *coverage*. Many residents in Petersburg rely on transit service to reach employment, medical care, and access to food. As a result, providing greater geographic coverage and service closer to origins/destinations is more important for Petersburg residents than higher frequency service that may be located farther away from origins/destinations. In addition, much of Petersburg is made up of low-density development that would not support high frequency transit service.
- **Walking vs waiting –** PAT prioritizes *waiting*. Walking long distances to bus routes is not always a realistic request for many riders because of mobility impairments/difficulties that make doing so difficult. Additionally, there are safety concerns associated with the existing pedestrian infrastructure that also make waiting a more attractive alternative.
- **Boardings vs distance travelled –** PAT prioritizes *boardings*. Commuter service that covers long distances is not a prominent transit market in Petersburg. With the exception of the Freedom Express route that operates express service between Petersburg and Richmond, the majority of PAT's service is designed for local trips. Total ridership metrics such as boardings, therefore, are a more appropriate measure of PAT's success than distance-travelled metrics.
- **Peak hour vs all-day service –** PAT prioritizes *all-day service*. Similar to the tradeoff discussion above, Petersburg does not have particularly high peak-hour commuter market. PATs ridership is not heavily concentrated around peak times, as in areas with large commuter markets. Therefore, service that operates for most or all of the day is likely to be more useful to riders in Petersburg than more service offered during peak hours.
- **Serving specific population groups –** Reaching specific populations is considered a critical element of providing transit service. Populations that are disproportionately mobility impaired and/or transit reliant, such as populations that are elderly, minority, or disabled, and households that fall into low-income and/or no/low vehicle are groups that PAT strives to serve. Section 2.2 provides additional information on the sociodemographic makeup of Petersburg with a special focus on transit dependent populations.

The strategic vision and tradeoff priorities were used to form the basis for PAT's goals and objectives discussed in the next section. In addition, these priorities helped guide the service recommendations discussed in Chapter 3 of the TSP.

1.2.1 Goals and Objectives

The 2019 PAT Transit Development Plan (TDP) developed an entirely new set of goals and objectives from the previous TDP in 2010. As part of the TSP, PAT has fine-tuned these goals and objectives to make them more focused and strategic. A slight reordering of the goals from

the TDP took place to provide greater emphasis on Goal 2, which focuses on improving awareness of PAT services.

The goals are intended to serve as guidelines for PAT's short- and long-term future. The objectives are the specific actions for attaining the goals. PAT's five goals are listed below, followed by updated objectives and the associated strategies and measures to evaluate each of the goals. The goals and objectives should be reviewed annually by PAT to assess progress and update as needed to address the changing needs of the Petersburg community.

Goals

1. Provide a safe and dependable transportation service for the Petersburg community
2. Improve awareness of PAT services to increase ridership and access to service
3. Increase mobility to the Petersburg community through convenient access to employment areas, medical facilities, shopping centers, schools, and community agencies
4. Improve the efficiency and effectiveness of service to better meet the transportation needs of the community
5. Strengthen organizational processes to ensure continuity of services

Goal 1: **Provide a safe and dependable transportation service for the Petersburg community**

Objective 1.1: Continually promote the safety of PAT employees and passengers

Strategy	Measure
Conduct safety/security drills	• Safety review completed by Homeland Security every five years • Percentage of drivers that had trail checks and on-board evaluations completed per year • Number of facility inspections completed by Safety Coordinator per year
Monitor frequency of accidents	• Accident frequency rate • Percentage of drivers engaged in ten or more trainings per year on techniques to reduce the most frequent cause of PAT responsible accidents • Percentage of employees drug and alcohol tested

Objective 1.2: Perform timely and appropriate fleet maintenance to limit service breakdowns

Strategy	Measure
Implement asset management plan that includes vehicle and equipment replacement	• Consistent with DRPT's Group Transit Asset Management (TAM) Plan • Provide vehicle and equipment data to DRPT to support updates to the Group TAM Plan as required • Monitor measures per FTA Fleet Management Plan • Percentage of preventive maintenance of vehicles conducted on time per recommended schedule
Monitor in-service breakdowns	• Mean distance between in-service breakdowns • Track frequency, type, and cause of in-service breakdown • Number of road calls

Goal 2: Improve awareness of PAT services to increase ridership and access to service

Objective 2.1: Provide the public with relevant, up-to-date, and easily accessible information on PAT service

Strategy	Measure
Maintain accurate schedules and route maps on website	• Post route maps on website • Review route maps annually to check for accuracy • Number of website hits and/or downloads
Provide timely notice of service changes	• Percent of major service change announcements provided at least two weeks prior to service changes • Route maps and schedules updated on website at least two weeks prior to planned change
Engage the community through a targeted social media campaign (e.g. Facebook, Instagram)	• Number of views

Objective 2.2: Develop consistent PAT brand

Strategy	Measure
Develop standards for infrastructure and vehicles to improve uniformity	• Completion of standards and development of implementation plan for consistent branding of vehicles and bus stops
Develop PAT marketing campaign	• Dissemination of information through multiple media streams

Goal 3: Increase mobility to the Petersburg community through convenient access to employment areas, medical facilities, shopping centers, schools, and community agencies

Objective 3.1: Evaluate potential demand to expand cost-effective transit service

Strategy	Measure
Coordinate and partner with community stakeholders to understand need and increase awareness of service to targeted areas	• Track and monitor ridership to targeted areas (specific targeted areas to be determined with area stakeholders and may vary year to year) • Percentage of the population with access to PAT services

Objective 3.2: Support regional planning efforts to enhance mobility

Strategy	Measure
Coordinate with the MPO on the development of the Long Range Transportation Plan (LRTP) to ensure the vision for mobility in the Petersburg area and PAT's service goals align	• Active participation in Tri-Cities Area MPO committees • PAT input into LRTP (every four years)

Goal 4: Improve the efficiency and effectiveness of service to better meet the transportation needs of the community

Objective 4.1: Develop a data-driven approach to evaluate and restructure routes, schedules, and frequency of PAT service (contingent on data availability)

Strategy	Measure
Monitor ridership to calculate performance at the route and stop level	• Ridership performance for each route by time of day and by stop • Passengers per vehicle revenue hour • Passengers per vehicle revenue mile
Monitor on-time performance by route and systemwide	• On-time performance statistics as seen in service design standards
Conduct annual rider survey	• Number of people participating in survey
Monitor operating costs to calculate route performance	• Operating cost per vehicle revenue hour • Operating cost per vehicle revenue mile • Operating cost per passenger

Objective 4.2: Improve use of technology to effectively monitor service

Strategy	Measure
Implement automatic vehicle location (AVL) technology for real-time tracking of vehicles	• Successful installation and utilization of AVL
Implement automatic passenger counter (APC) technology	• Successful installation and utilization of APC data
Participate with DRPT and peer agencies in the evaluation of technologies to improve service monitoring	• Actively participate in meetings, workshops, and studies to evaluate technology options

Goal 5: Strengthen organizational processes to ensure continuity of services

Objective 5.1: Promote continued advancement of PAT

Strategy	Measure
Develop and employ a strategy for workforce development to ensure employees have the appropriate skills to effectively perform their duties	• Number of trainings conducted • Implement and develop employee evaluation process
Establish an annual process for reviewing and adjusting goals and objectives	• Complete annual TSP reporting update

Objective 5.2: Improve coordination with state and federal agencies

Strategy	Measure
Coordinate with DRPT on capital and operational funding applications	• Participation in DRPT hosted grant trainings and workshops • Submission of grant applications that meet requirements (complete, on time, and included in other planning documents) and advance to scoring process • Participation in DRPT quarterly reviews
Improve compliance with state and federal regulations	• Number of findings from compliance reviews • Participation in FTA training

1.2.2 Service Design Standards

Service design standards are measures intended to guide how existing service should be modified and/or how new service should be implemented. PAT does not currently have an adopted set of design standards; however, a set of service design standards were developed as part of the 2019 TDP, and have been updated for the TSP.

Scheduling for Local Route Service

- Service Frequency:
  - Maximum of 60-minute headways
- Span of Service:
  - Weekday service from 6 am until 6 pm
  - Saturday service from 7 am until 6 pm

Route Design

- Service Areas:
  - Residential areas with population densities ≥ 10 persons per acre
  - Employment areas with employment densities ≥ 10 jobs per acre
  - Major health centers
  - Colleges and universities without transit
  - Major shopping centers with > 25 stores or > 100,000 square feet of retail area
  - Social services and government centers
- Bus Stops:
  - 5 to 8 stops per mile in core
  - 3 to 5 stops per mile outside of core, as needed based on land use
  - Walking distance to stops (e.g. ¼ mile for high density areas)
  - Bus stop signs on designated pole at all bus stops
  - Bus stop signs maintained in good condition, clearly visible, and retain their reflectivity
  - Shelters at stops with 50 or more boardings a day
  - Benches at stops with at least 25 boardings a day

Service Reliability

- Schedules should include at least 10% recovery time (15% preferred) to account for minor unexpected delays

System Efficiency

- Serve high density population and employment areas to maximize ridership

Safety and Security

- Compliance with PAT's safety plan

Customer Service

- Update route maps and schedules when service changes are implemented

Multimodal Connectivity

- Consider multimodal connections (rail, other bus service, bike, pedestrian) when deploying new service or modifying existing service

Regulatory Compliance

- Compliance with Title VI regulations for when deploying new service or modifying existing service

1.2.3 Performance Standards

Like service design standards, PAT does not currently have an official set of performance standards; however, performance standards based were developed as part of the TSP. These metrics are intended to set a minimum baseline for operation to evaluate existing service.

Service that does not meet these standards should be analyzed in greater detail for possible modification. Like many of the metrics utilized in this chapter, recording and tracking performance standards is heavily dependent on the availability of data. It may not be possible to calculate some of the metrics due to current unavailability of some datasets. The performance standards are therefore included with the intent that PAT will utilize these metrics when the datasets do become available.

It should also be noted that many of the metrics rely on annual system averages. This approach ensures that systemwide changes in performance do not create a situation where none or all of the routes are flagged for performance issues. It is possible for external events to occur that are outside of PAT's control that influence the performance of the system year to year. The system averages in these metrics utilize 2019 data but should be updated annually.

Ridership – Review route if ridership on a route is less than half of the system average

- Passengers per mile less than 0.4 weekdays / 0.3 Saturday (system averages are 0.8 / 0.6)
- Passengers per hour less than 4.8 weekday / 3.9 Saturday (system averages are 9.6 / 7.8)

Cost Efficiency – Review route if metric is less than half of the system average for farebox recovery or double the system average for cost

- Farebox recovery < 4.9% (system average is 9.8%)
- Cost per mile > $12.49 (system average is $6.47)
- Cost per hour > $135.80 (system average is $67.90)
- Cost per trip > $17.18 (system average is $8.59)

Safety – Review route if thresholds are exceeded

- Accidents > 1 per 100,000 miles
- Injuries > 1 per 1,000,000 miles

System Accessibility

- Systemwide 75% of Petersburg's population/employment has service within ¼ mile

Schedule Adherence

- No missed trips
- No early departures
- Less than 90% of all trips late (as defined by more than 5 minutes late)

2 System Performance and Operations Analysis

Chapter 2 of the TSP evaluates the existing transit services and the environment in which PAT operates the service. Due to the non-typical transportation trends resulting from the COVID-19 pandemic, data from FY 2019, the last full year of pre-pandemic data, was used to evaluate PAT's existing transit service. FY 2019 service statistics, route and schedule design standards, and input from both the public and key stakeholders were used to benchmark PAT's existing service. Transit market demand was reviewed using demographic data. System-level and route-level statistics were used to assess performance in terms of ridership, cost efficiency, and system accessibility. In addition, the efficiency of PAT's transit network was evaluated, with consideration of on-time performance and connectivity. Existing opportunities to collaborate with nearby transit providers were also identified. The results from this chapter are used in Chapter 3 to inform the planned improvements and modifications.

2.1 System and Service Data

This section provides current information on the transit system, including key high-level service statistics, discussion of design standards, as well as a summary of public and stakeholder feedback on the service.

2.1.1 Current Fiscal Year Data

Data from the National Transit Database (NTD) was used to calculate system-level service statistics. Table 2-1 provides perspective on the size of PAT's transit system and the area it serves. Out of the 41 NTD reporters in the Commonwealth of Virginia, PAT operates the 17th highest revenue hours and has the 24th highest vehicles operated in maximum service. The annual operating costs for PAT are 18th highest in the Commonwealth.

Table 2-1. PAT Existing Service Summary

FY 2019 Service Statistics	
Service Area Population	72,422
Service Area Population Density (Population per Square Mile)	10,346
Service Area Square Miles	7
Operating Costs	$3,611,752
Number of Vehicles in Peak Service	18
Revenue Hours	56,662
Revenue Miles	596,052
Days of Week in Operation	6
Average Headway	60

1. Source: National Transit Database (NTD) FY 2019 data.

2.1.2 Existing Route Design Standards

As noted in Section 1.2.2, PAT does not currently have a set of officially adopted service design standards. However, service design standards were developed as part of the 2019 TDP, and then updated for the 2021 TSP. The service design standards that relate to route design are listed below:

- Service Areas:
  - Residential areas with population densities ≥ 10 persons per acre
  - Employment areas with employment densities ≥ 10 jobs per acre
  - Major health centers
  - Colleges and universities without transit
  - Major shopping centers with > 25 stores or > 100,000 square feet of retail area
  - Social services and government centers
- Bus Stops:
  - 5 to 8 stops per mile in core
  - 3 to 5 stops per mile outside of core, as needed based on land use
  - Walking distance to stops (e.g. ¼ mile for high density areas)
  - Bus stop signs on designated pole at all bus stops
  - Bus stop signs maintained in good condition, clearly visible, and retain their reflectivity
  - Shelters at stops with 50 or more boardings a day
  - Benches at stops with at least 25 boardings a day

2.1.3 Existing Schedule Standards

As mentioned above, PAT does not currently have an officially adopted set of service design standards. The service design standards discussed in Section 1.2.2 also contain scheduling standards, including service coverage and span of service standards:

- Service Coverage:
  - Minimum of 60-minute headways
- Span of Service:
  - Weekday service from 6 am until 6 pm
  - Saturday service from 7 am until 6 pm

2.1.4 Survey

A survey was conducted in late 2018 to gain insight into the demographic characteristics and travel behaviors of riders and non-riders, as well as gather feedback from the community on the existing impressions of the service and desired improvements. Responses collected through the survey are summarized in the following sections and used to inform the planned improvements and modifications presented in the next chapter.

2.1.4.1 Survey Methodology

The survey was developed using MetroQuest, a web-based platform specializing in public engagement. The survey was made available online via a link on the City of Petersburg's

website and was accessible from computers and mobile devices. In addition, a paper version of the survey was also distributed and collected at PAT's transfer center. The survey was available from October 5, 2018 to November 15, 2018.

2.1.4.2 Survey Results

A total of 96 people participated in the survey, including 53 respondents via web or mobile device and 43 respondents via paper surveys. To understand the needs of the community and rider market, survey respondents were asked if they ride the bus frequently, ride the bus less frequently than they previously had, or do not ride the bus. The survey responses were organized by respondents' identification of themselves as a "Frequent Rider", "Less Frequent Rider", or "Non-Rider" and the results for these three categories were summarized. The survey also asked all respondents (riders and non-riders) to indicate origins and destinations of frequent trips, as well as how they would prioritize investments to the transit system.

2.1.4.2.1 Frequent Rider Results

Frequency

A total of 60 respondents indicated that they were frequent riders of PAT. The majority (67%) indicated they used the system four or more days a week and an additional 12% rode the bus two to three days a week.

Table 2-2. Riding Frequency of Frequent Riders

Riding Frequency	Response Frequency
1 day a week	3%
2-3 days a week	12%
4 or more days a week	67%
less than once a month	10%
once or twice a month	8%

1. Source: PAT Public Outreach Survey Results, 2018

Reason for Riding

When asked to indicate the reasons that respondents use transit, the most common motive for taking transit was not having a vehicle available (67%), followed by trying to save money (28%), being disabled or unable to drive (15%) and being less stressful (13%). The results indicate there is a very large percentage of PAT riders who are transit dependent and underscores the importance of PAT's role to provide mobility in the Petersburg community.

Table 2-3. Reasons for Riding the Bus

Reasons for Riding the Bus	Response Frequency
I don't have a car	67%
To save money	28%
I'm disabled or unable to drive	15%
It's less stressful	13%
To save or better utilize time	5%
It's difficult or expensive to park	5%
It's a safer way to travel	0%

1. Sum of responses may be more than 100% because respondents had the option of choosing multiple categories.
2. Source: PAT Public Outreach Survey Results, 2018

Socioeconomic Data

Respondents that frequently use the transit system were primarily female (63%), lived in a household without an automobile (53%), and had a household income less than $15,000 (46%). Respondent ages varied, with ages 60 or older being the most common at 23%, followed by 20 to 29 (21%), 50 to 59 (21%), and 40 to 49 (19%).

2.1.4.2.2 Less Frequent Rider Results

Respondents who indicated they use the transit system less often than they once did were asked the reason for less frequent usage. The most common reason provided for not taking the bus as often was using other travel modes (38%), including walking, biking, Uber/Lyft, or taxi. Fare changes (13%) and gasoline becoming cheaper (8%) were the least common reasons respondents provided for riding the bus less often.

Table 2-4. Reasons for Riding the Bus Less Frequently

Reasons for Riding the Bus Less Frequently	Response Frequency
I use other travel modes (walking, biking, Uber/Lyft, taxi)	38%
Service hours were reduced	33%
My route was eliminated	29%
I prefer to drive	21%
I get a ride from a friend	21%
Fare changes	13%
Gas has become cheaper	8%
Other	8%

1. Sum of responses may be more than 100% because respondents had the option of choosing multiple categories
2. Source: PAT Public Outreach Survey Results, 2018

2.1.4.2.3 Non-Rider Results

About 18% of survey respondents indicated that they did not ride the bus. Table 2-5 summarizes the reasons respondents provided for not riding the bus. Some of the most common responses were that the bus takes too long or isn't frequent enough (35%) and that respondents need a car because their schedule varies a lot (18%). These results may indicate that increasing the frequency and/or flexibility of the transit system may lead to new riders. In addition, twelve percent of the non-rider respondents stated that they did not know how to use the service and six percent didn't know the service existed. These responses may indicate that greater public outreach efforts could help to increase awareness of the service and attract new riders.

Table 2-5. Reasons for Not Riding the Bus

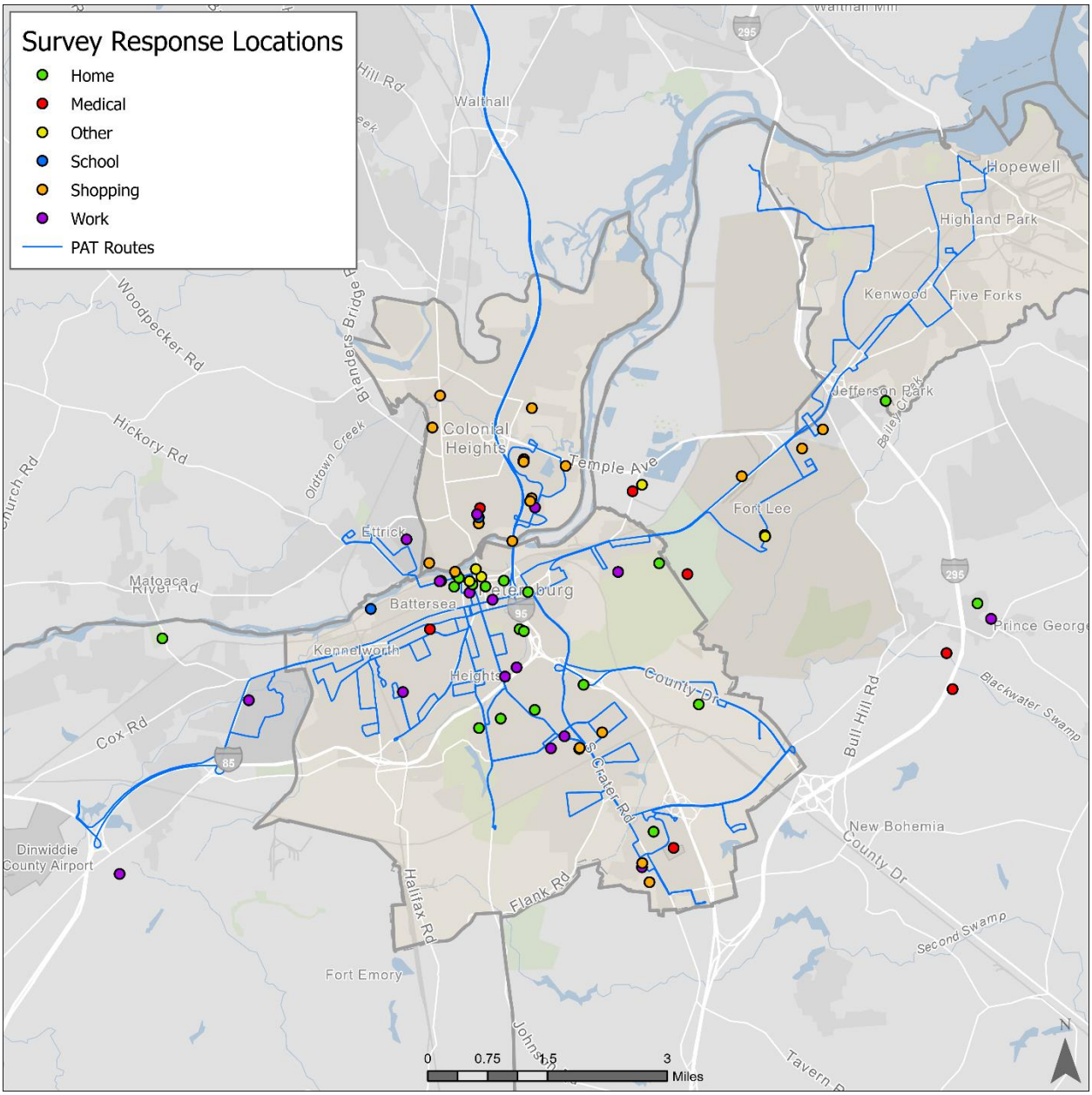
Reasons for Not Riding the Bus	Response Frequency
It takes too long or isn't frequent enough	35%
I need a car because my schedule varies a lot	18%
I prefer to drive	18%
I don't know how to use the service	12%
I prefer to use other travel modes	12%
Cost	12%
I didn't know the service existed	6%
Other	6%

1. Sum of responses may be more than 100% because respondents had the option of choosing multiple categories.
2. Source: PAT Public Outreach Survey Results, 2018

2.1.4.2.4 Origin-Destination Locations

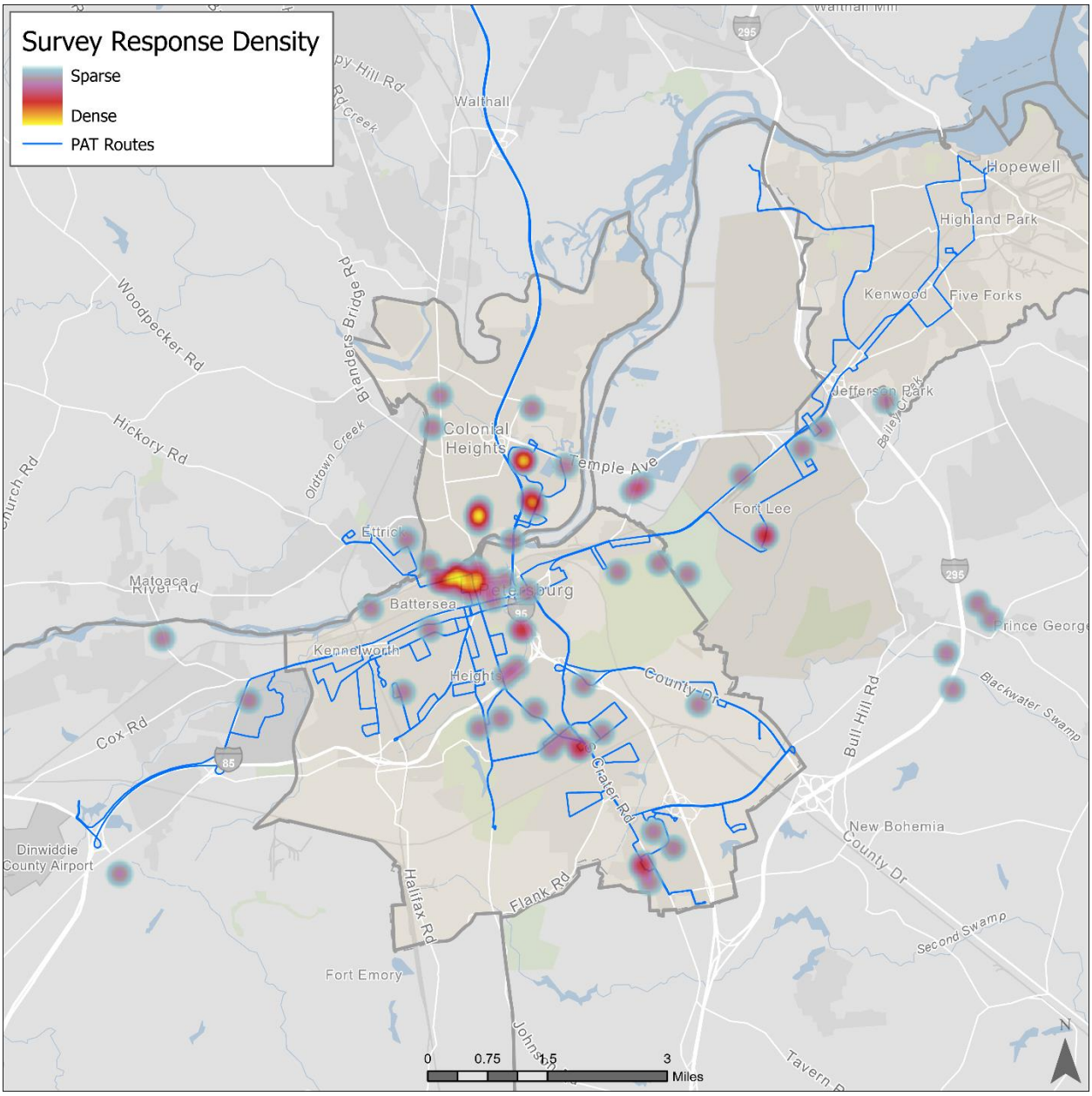
All online survey respondents (frequent rider, less frequent riders, and non-riders) were asked to map their typical travel patterns on an online map using markers for "Home", "Medical", "School", "Shopping", "Work", and "Other". Figure 2-1 shows the results of the respondents' trip origin and destination locations by trip and Figure 2-2 shows the intensity of responses. The greatest concentration of origins and destinations was in downtown Petersburg. Additional clusters of markers were in Food Lion and Grays Shopping Center area, at the Walmart and medical buildings on South Crater Road, and in the Southpark Mall area. Few survey respondents identified origin or destination locations on the western side of Petersburg (including the areas of along Virginia Ave, Halifax Street, Lee Avenue, and Washington Street) or along the Ettrick/VSU route. Areas that survey respondents are traveling to/from that do not currently have service include several areas of Colonial Heights and in Prince George County along I-295.

Figure 2-1. Origin-Destination Survey Locations



Source: PAT Public Outreach Survey Results, 2018

Figure 2-2. Origin-Destination Survey Locations Heatmap



Source: PAT Public Outreach Survey Results, 2018

2.1.4.2.5 Improvements

All survey respondents (frequent rider, less frequent riders, and non-riders) were asked how they would allocate PAT's budget to improve the transit system. Each respondent had the opportunity to "invest" up to ten coins in one or more of eight potential categories. Table 2-6 shows the results of the survey responses. Categories where respondents indicated the greatest investments should be made included more frequent service, extended weekday hours, extended weekend hours, and more direct bus service. Respondents indicated that lowest investments should be made to reduce fairs and on bicycle and pedestrian enhancements.

Table 2-6. Priority Improvements to Transit System

Improvements	Total Coins Invested
More frequent service	58
Extended weekday hours	53
Extended weekend hours	53
More direct bus service	47
Stop and station amenities	37
Safety and security improvements	32
Lower fares	15
Bicycle and pedestrian enhancements	11

1. Source: PAT Public Outreach Survey Results, 2018

2.1.5 Support for Transit

Stakeholder interviews were conducted in January and February of 2020 to better understand the support for transit in the community and to identify unmet transit needs. Each stakeholder interview consisted of a series of open-ended questions prompting participants to provide feedback on PAT's current operations as well as how PAT could improve the service to better meet the needs of the community. Organizations that participated in the stakeholder interviews included:

1) City of Petersburg Economic Development
2) City of Petersburg Community Affairs
3) Petersburg City Public Schools
4) Fort Lee
5) Virginia State University
6) City of Hopewell
7) Tri-Cities MPO
8) Riverside Regional Jail
9) People's Advantage Federal Credit Union

Interview responses are summarized in the following sections. Questions related to the tradeoffs discussion in Chapter 1 were also discussed during the stakeholder interviews but are not included in this summary to avoid duplicative content.

1) What does PAT do really well?

Stakeholders appreciated the increased mobility PAT provides to Petersburg area residents, enabling them to reach daily destinations including work, school, and shopping. It was clear from the interviews that the stakeholders were grateful for PAT's ability to operate a reliable service and willingness to make changes based on the needs of the community. Key points from the interviews included:

- PAT provides an important service to residents of Petersburg to get residents where they need to go, such as work, school, and shopping.

- Many residents in Petersburg do not have other means of transportation, so they rely on the service.
- PAT's service is reliable because they maintain the schedule.
- PAT responds to the needs of the community and adapts as those needs change. For example, when Social Services moved from its downtown location, PAT ensured that transit service was modified to serve the new Social Services location.

2) What could PAT improve?

Responses to this question generally revolved around improving communication materials, improving data collection/reporting, increasing access to service, and increasing hours of operation and frequency of service. Key points from the interviews included:

- Much of the community is not aware of where or when the service operates due to lack of accessible information. Schedules and maps could be improved online and made more available at locations such as bus stops.
- Data collection and reporting on ridership and customer feedback could be improved to better inform stakeholders how the service is being used and help inform improvement recommendations.
- Pedestrian access to bus stops and passenger amenities, such as shelters and benches, could be improved.
- The span of service could be extended later in the day to better serve passengers making return trips after work. Currently, some passengers take PAT to get to work, but must find another way to get home.
- Frequency of trips could be increased to provide passengers more flexibility for catching the bus.

3) What are primary trip purposes and locations of the community/constituents?

Nearly all responses from stakeholders on this question identified home, work, school, shopping, or medical destinations as primary trip purposes. Other locations sited included Social Services, City Hall, the library, and the courthouse.

4) What days of the week/times of day are your community/constituents using PAT service? Does this change seasonally?

In general, stakeholders indicated the greatest demand for PAT service was weekdays during normal business hours, with the peak ridership times occurring during the morning and late afternoon commute time. Except for school-related trips, which tend to be fewer in the summer, no significant seasonal changes in PAT demand were noted.

5) Do you feel there are any unmet transit service needs for your community/constituents?

The biggest unmet transit service need identified by stakeholders was hours of operation. Responses indicated that due to current service hours, people with job shifts extending later into the evening could not use PAT service for their trip home. In addition, extending the evening hours of the service would increase transportation options for students attending afterschool events and activities.

6) How important is the PAT service to your community/constituents? How do they benefit from the service?

Stakeholders emphasized the critical role that PAT plays in improving the mobility and, therefore, opportunity of Petersburg residents. Every stakeholder group acknowledged the importance of PAT to enable residents who don't have access to another form of transportation to get to work, school, and other daily activities reliably.

7) Are there locations currently unserved that warrant transit service?

Most stakeholders did not identify any unserved locations warranting transit service. Some stakeholder stated PAT's existing coverage was sufficient and others indicated they were unable to identify additional locations needing transit service due to a lack of understanding of where the service operates today or a lack of data to identify locations needing service. One specific type of destination identified as unserved and potentially warranting transit service was higher education. While PAT currently provides service to VSU, PAT does not serve Richard Bland College of William and Mary or John Tyler Community College.

2.2 Evaluation of Transit Market Demand and Underserved Areas

To understand the demand for public transportation services in the Petersburg area, a transit market assessment was completed. The assessment evaluated factors that influence demand for transit, such as land use, employment, population, and demographics, inside of and adjacent to the current PAT service area. The findings from the assessment were used to identify potential opportunities for expanding service to underserved areas. The assessment and potential opportunities are discussed in the following sections.

2.2.1 Transit Demand and Underserved Area Evaluation

The demand for public transportation is influenced by a variety of factors. These factors include population and employment density, the prevalence of transportation disadvantaged populations, major activity generators, parking availability and cost, and the cost of driving a personal automobile (monetary and time). In most urban settings, population and employment density are typically the most effective indicators of transit patronage.

Transit markets are commonly grouped into two categories: choice riders and transit-dependent riders. Choice riders are those who have adequate financial and physical means to operate a private automobile but choose to ride transit as a personal choice or out of convenience. Choice riders are more commonplace in high-density metropolitan areas, where factors such parking availability and the cost of driving due to long commutes or traffic congestion increase the advantage of riding transit versus driving. Transit dependent riders are those who utilize transit services due to lack of financial resources or physical ability to own or operate a personal automobile. Compared to choice riders, transit dependent riders tend to use transit for a larger variety of trip purposes beyond work commuting, including shopping, medical appointments, and social activities.

In small urban and suburban settings, such as Petersburg, the demand for transit is typically driven by transit dependent riders. Other factors that may attract choice riders, such as limited

parking availability and a high cost of driving, are less common in Petersburg. The following section looks at land use, population, and employment (which are strong indicators of transit demand among choice riders), and minority, elderly, low income, limited-English proficiency, and disability populations (which are strong indicators of transit demand for transit-dependent riders) for the Petersburg area.

2.2.1.1 Land-Use, Employment, Population, and Demographics

This section reviews a total of eight topics: land use, employment, population, minority population, elderly population, low-income households, limited-English proficiency population, and population with disability. Land use was reviewed using satellite imagery and street maps. Population and employment datasets were provided by the Tri-Cities MPO at the TAZ level for the years 2017 and 2045. The remaining demographic variables (minority population, elderly population, low-income households, limited-English proficiency population, and population with disability), all utilize U.S. Census Five-Year (2015-2019) American Community Survey (ACS) data by Census Block Group (CBG).

Land Use

PAT service area is centered around the city of Petersburg and extends into portions of the cities of Hopewell and Colonial Heights, as well as Prince George, Dinwiddie, and Chesterfield counties. Excluding the Freedom Express service that operates between Petersburg and Richmond, PAT's service area covers an area of 55 square miles, assuming a ¾ mile buffer around the fixed route alignments (as required for paratransit services under Federal ADA regulations). This service area has a total of about 53,900 jobs, 96,500 people, and 40,300 households (Tri-Cities MPO 2017 data).

An aerial image of the service area is shown in Figure 2-3 to provide a general understanding of the development patterns. Much of the development in Petersburg consists of low-density residential areas (less than five people per acre). However, a downtown core is located at the northern edge of the city. The transit center is in the downtown core and is bound by Wythe Street (to the south), Washington Street (to the north), Union Street (to the east) and Market Street (to the west). Petersburg has convenient access to interstate highways I-85 and I-95, which both intersect the city. The largest commercial corridor in the area is located along South Crater Road, with several strip mall developments between Sycamore Street and Rives Road.

Employment

Employment density (jobs per acre) by TAZ in the PAT service area is shown in Figure 2-4. Estimates for the year 2021 were calculated using a straight-line interpolation of the 2017 and 2045 datasets from the Tri Cities MPO. The PAT service area primarily consists of low-density employment (five or less jobs per acre). The few locations in PAT's service area with higher employment densities are near Fort Lee, downtown Petersburg, Southpark Mall, and downtown Hopewell.

Table 2-7 provides a quantitative comparison of jobs in Petersburg and the surrounding area. PAT fixed route service operates through areas with higher employment density than the average for Petersburg as a whole (1.77 jobs per acre compared to 0.86 jobs per acre).

Population

Population density (people per acre) by TAZ in the PAT service area is shown in Figure 2-5. Estimates for the year 2021 were calculated using a straight-line interpolation of the 2017 and 2045 datasets from the Tri Cities MPO. Several locations identified as having high employment density also have high population densities, including Fort Lee, downtown Petersburg, and downtown Hopewell. Other locations, such as the area west of downtown Petersburg, have higher population densities but were not identified as having high employment density.

Table 2-8 provides a comparison of population density in Petersburg and the surrounding jurisdictions, as well as within 0.25 miles of PAT's fixed route network. Petersburg has higher population density than Dinwiddie, Prince George, and Chesterfield counties, but slightly lower population density than the cities of Colonial Heights and Hopewell. As was the case for employment density, PAT fixed route service operates through areas with higher population density than the average for Petersburg as a whole (3.35 people per acre compared to 2.39 people per acre).

Minority Population

Transit service to minority populations is critical to ensure fair and equitable access to community services and opportunities. The density of minority populations, defined as any race other than white alone, is shown at the Census Block Group (CBG) level in Figure 2-6. It should be noted that the color scale thresholds used on the minority population density map differ from the other demographic maps (elderly, low income, limited-English proficiency, and disability poplutions) because the minority population density is significantly higher than any other measured demographic variable.

Overall, Petersburg has a higher density of minority population compared to the surrounding area. The area with the largest minority population is found in the neighborhoods just south of downtown Petersburg, which have a minority population density of over five people per acre. These neighborhoods are primarily served by Virginia Avenue and Halifax Street PAT routes. Another neighborhood with a high density of minority populations is located east of South Crater Road, behind the Walnut Hill Shopping Center. The highest minority population density in the service area is in Ettrick, which is served by the Ettrick/VSU/Amtrak PAT route. Additionally, the City of Hopewell has some CBGs with high minority population densities along both sides of Oaklawn Boulevard, where the Hopewell Circulator operates.

Table 2-9 compares the minority populations in Petersburg and the surrounding areas with the minority population within 0.25 miles of PAT fixed routes. Overall, PAT has strong coverage in neighborhoods with high minority population densities. PAT's fixed route service operates through areas with an overall minority population density of 1.78 people per acre, which is consistent with the average minority population density for the city of Petersburg.

Elderly Population

The density of elderly populations, defined as people aged 65 and over, is shown in at the CBG level in Figure 2-7. High elderly population densities exist throughout much of

Petersburg but are especially prevalent along Halifax Street and the areas east of Halifax Street such as Shore Street and Harding Street. These areas are well covered by the Halifax Street and Virginia Avenue routes. Similar to other demographic variables (total population, minority, and disability), the neighborhood east of South Crater Road, behind the Walnut Hill Plaza Shopping Center, also has a higher density of elderly populations. This neighborhood is well served by the Walnut Hill and Mall/Plaza routes.

Table 2-10 compares the elderly population density for Petersburg and the surrounding areas with the elderly population density within 0.25 miles of PAT's fixed route service. PAT's fixed route service operates through areas with slightly higher elderly population densities (0.39 elderly people per acre) than the average elderly population density for the city Petersburg as a whole (0.36 elderly people per acre). The cities of Colonial Heights (0.73 elderly people per acre) and Hopewell (0.53 elderly people per acre) have the highest densities of the region.

Low-Income Population

Transit service to low-income populations is important because these populations are more likely to utilize transit and less likely to have alternative transportation options. The density of low-income populations, defined as households below the poverty level, is shown at the CBG level in Figure 2-8. Areas in Petersburg with higher densities of low-income households are primarily located around downtown Petersburg and in the older neighborhoods between Halifax Street and Farmer Street. This area is served by the Halifax Street route, which operates along the southern edge of this area, and the Lee Avenue route that operates along the northern edge.

Table 2-11 shows a comparison of low-income household density for Petersburg and the surrounding area with the low-income household density within 0.25 miles of PAT's fixed route network. PAT serves areas with slightly higher low-income household densities (0.24 low-income households per acre) than the average low-income household density for the city of Petersburg as whole (0.21 low-income households per acre). Hopewell has the highest density of low-income households (0.34 low-income households per acre) in the region.

Limited-English Proficiency Population

The density of limited-English proficiency populations is shown at the CBG level in Figure 2-9. Limited-English proficiency populations included the combined categories of "Speak English not well" and "Speak English not at all". The results indicated that very few people in Petersburg or the surrounding areas fall into these categories of limited-English proficiency. In addition, Table 2-12 shows that the density of limited-English proficiency populations served by PAT routes is consistent with the densities observed elsewhere in the area.

Population with Disability

The density of populations living with a disability is shown in Figure 2-10. Areas in Petersburg with higher densities of populations with disability exist in the neighborhoods west and southwest of downtown Petersburg, especially along Halifax Street and the

surrounding areas, as well as neighborhoods on both sides of South Crater Road. In addition, Hopewell has several areas with higher population with disability densities, including the neighborhoods off of Courthouse Road which are served by the Hopewell Circulator. In Colonial Heights high densities of population with disability are present along Boulevard.

Table 2-13 compares the population with disability densities for Petersburg and the surrounding areas with the population with disability density within 0.25 miles of PAT's fixed route network. Both the cities of Hopewell and Colonial Heights have slightly higher densities of population with disability than both Petersburg as a whole and the PAT service area. The population with access to PAT fixed routes that has a disability is estimated to be about 7,900. It should be noted that this estimate only includes the population within 0.25 miles of fixed route service and PAT paratransit provides service for those within 0.75 miles of fixed routes.

Figure 2-3. Satellite Imagery of Petersburg

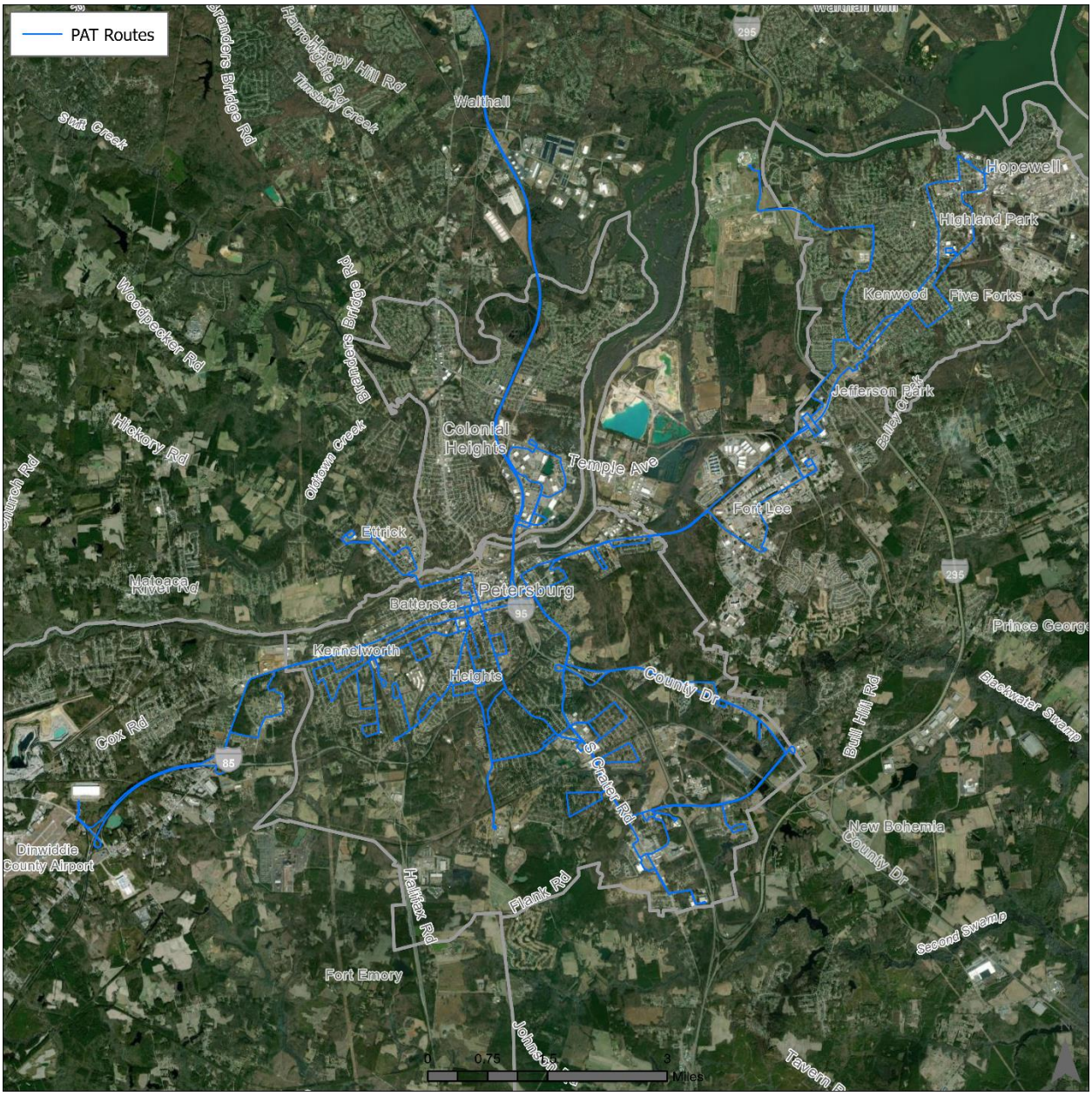
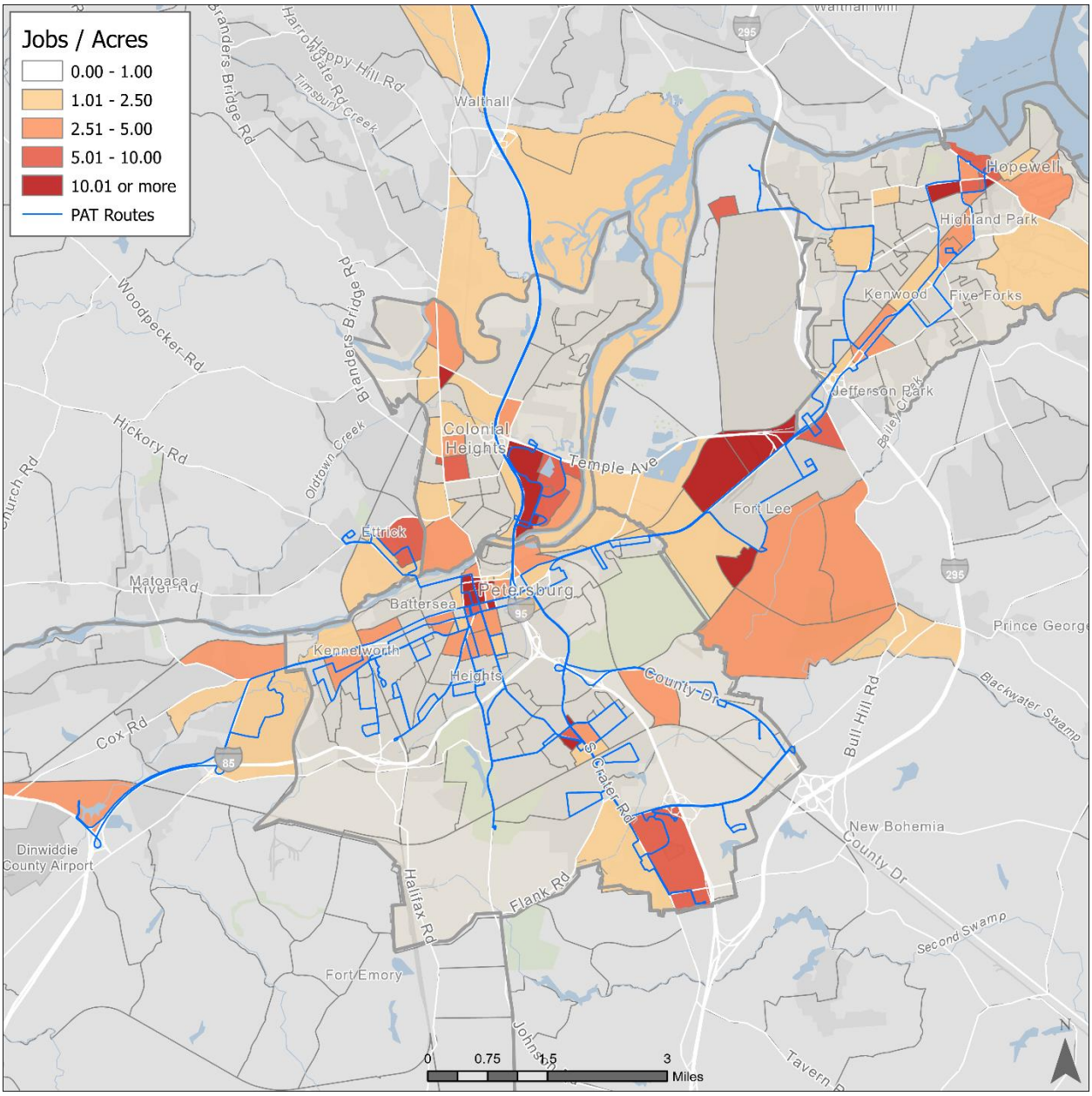


Figure 2-4. Employment Density

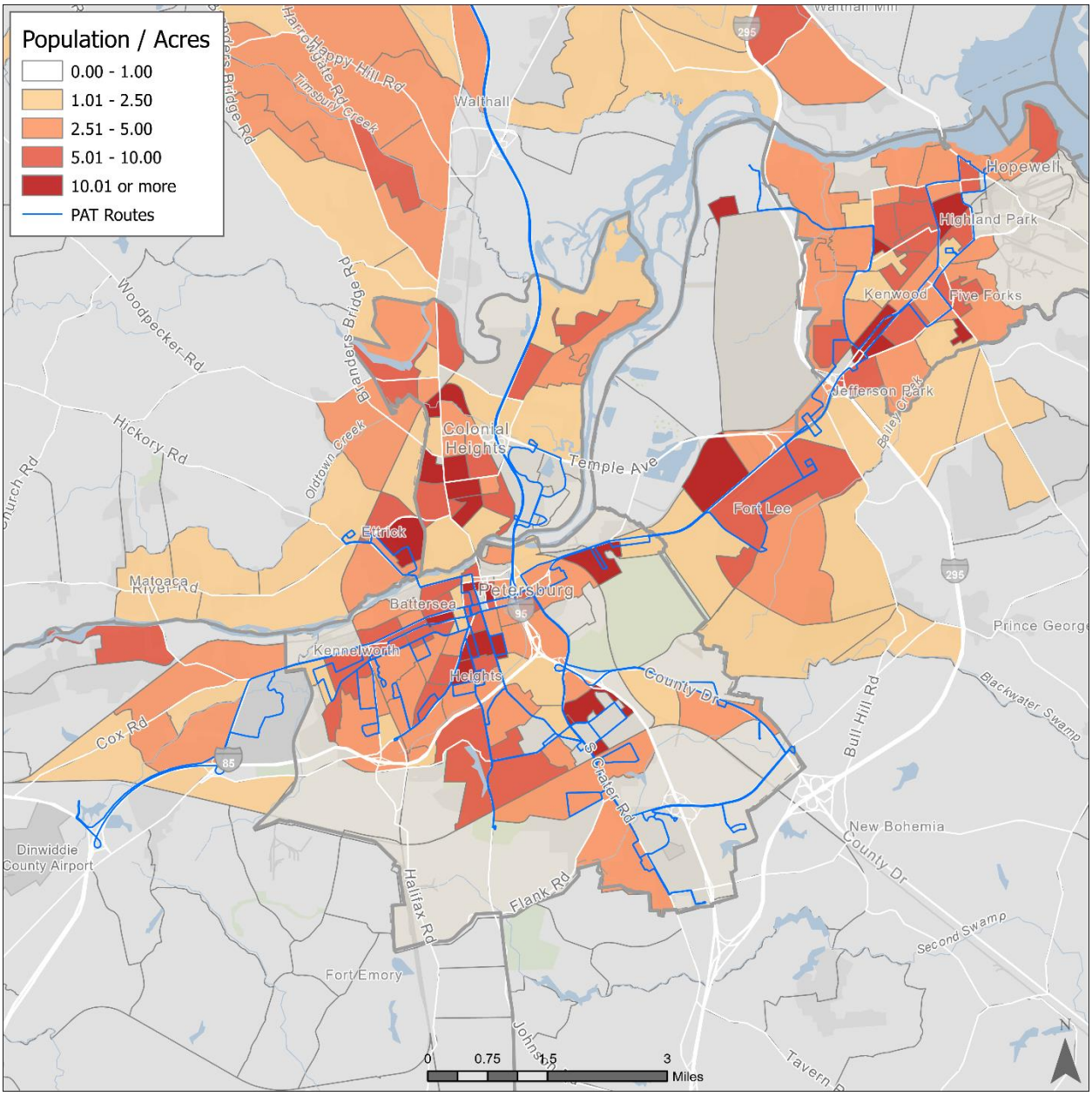


Source: Tri-Cities Area MPO 2017 and 2045 by TAZ (Interpolated to Year 2021)

Table 2-7. Employment in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Employment	12,640	31,275	137,613	9,433	8,885	7,214	31,905
Density	0.86	1.77	0.49	1.89	0.03	1.04	0.18

Figure 2-5. Population Density

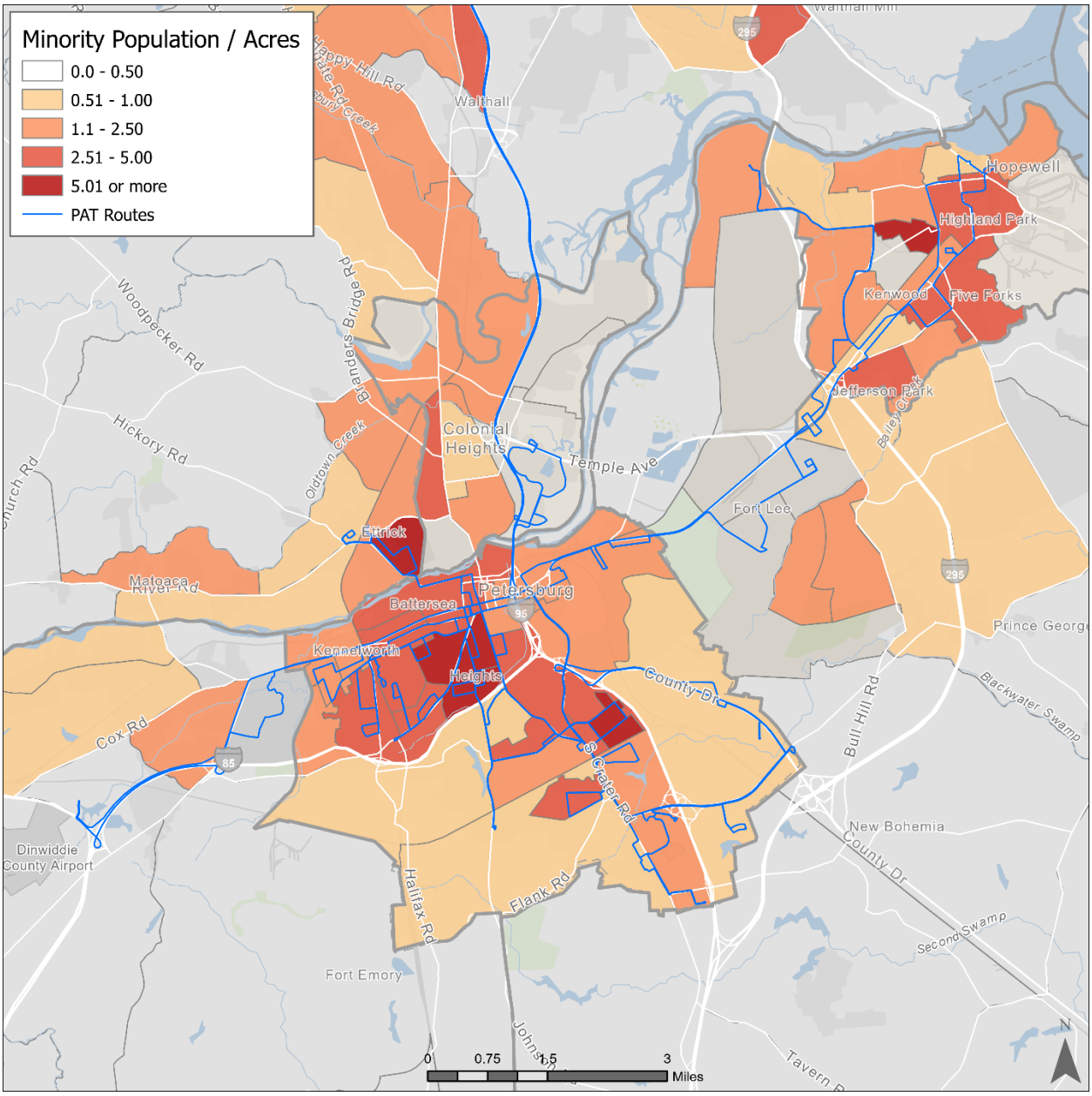


Source: Tri-Cities Area MPO 2017 and 2045 by TAZ (Interpolated to Year 2021)

Table 2-8. Population in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Population	35,163	59,062	354,590	17,350	29,361	22,867	43,658
Density	2.39	3.35	1.27	3.48	0.09	3.30	0.24

Figure 2-6. Minority Population Density

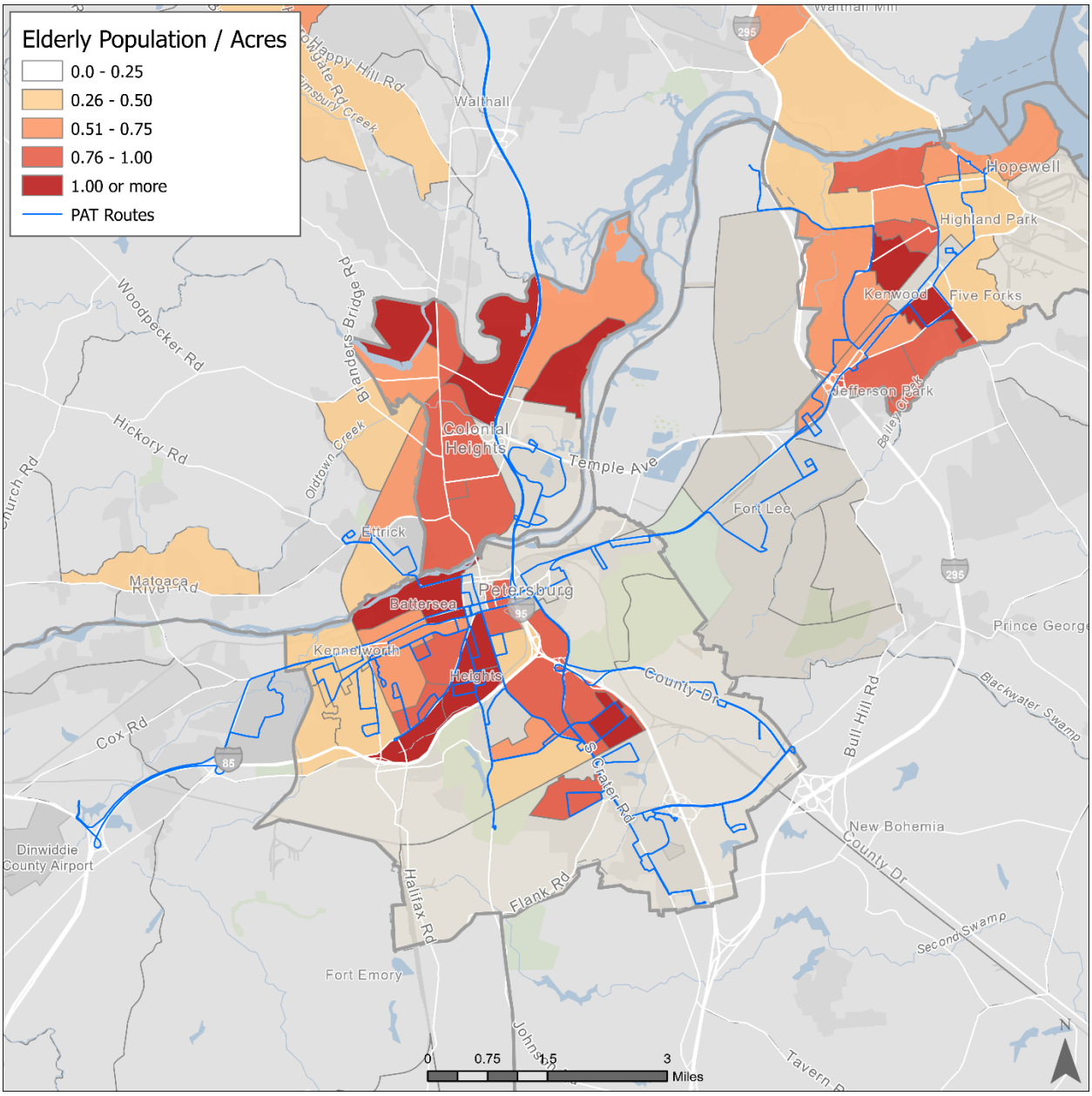


Source: U.S. Census 5-Year (2015-2019) ACS Data by CBG

Table 2-9. Minority Population in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Minority Population	26,161	0	114,331	4,357	10,232	11,420	16,273
Density	1.78	1.78	0.41	0.87	0.03	1.65	0.09

Figure 2-7. Elderly Population Density

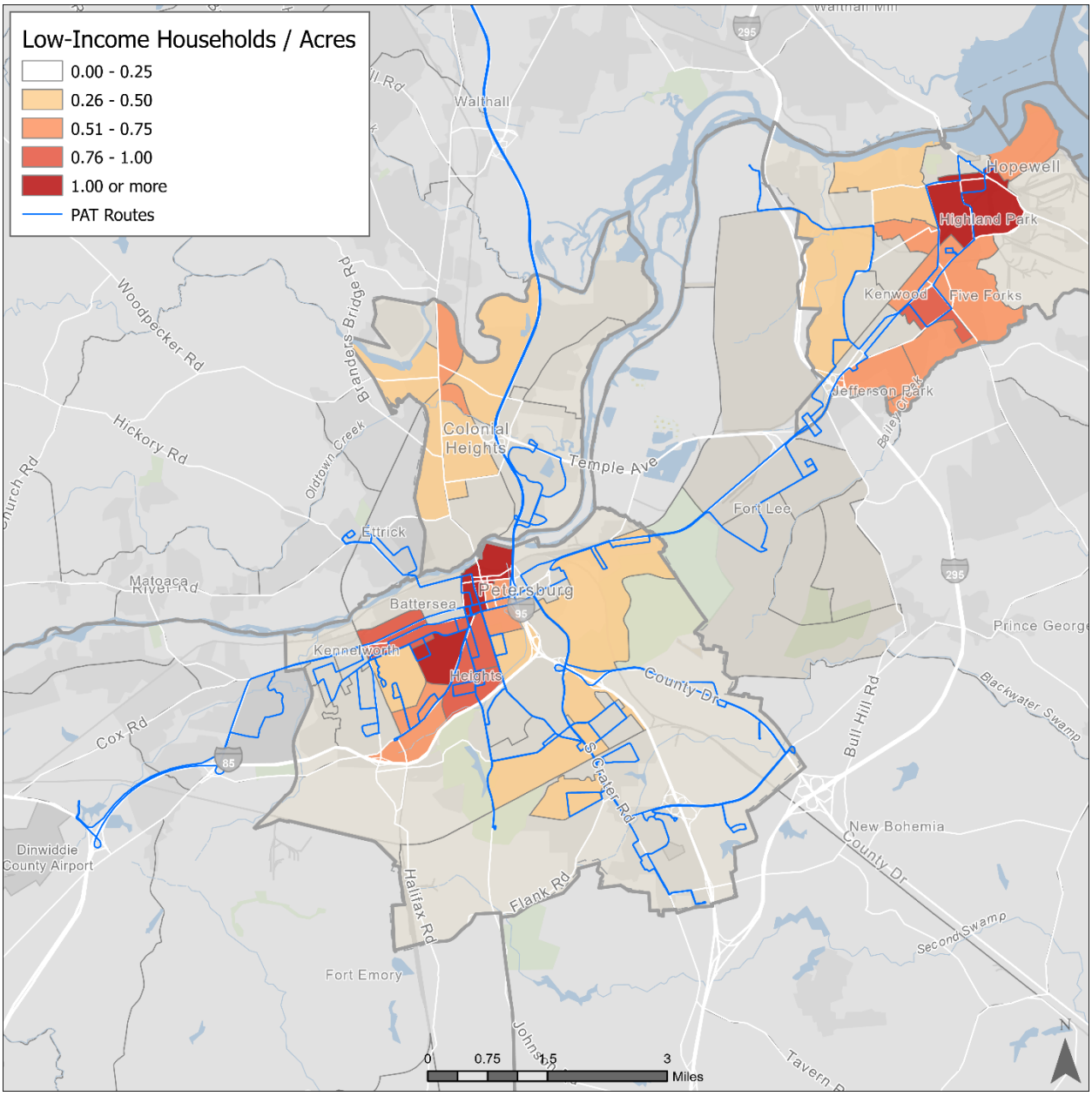


Source: U.S. Census 5-Year (2015-2019) ACS Data by CBG

Table 2-10. Elderly Population in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Elderly Population	5,314	0	51,162	3,665	4,952	3,692	5,429
Density	0.36	0.39	0.18	0.73	0.02	0.53	0.03

Figure 2-8. Low-Income Household Density

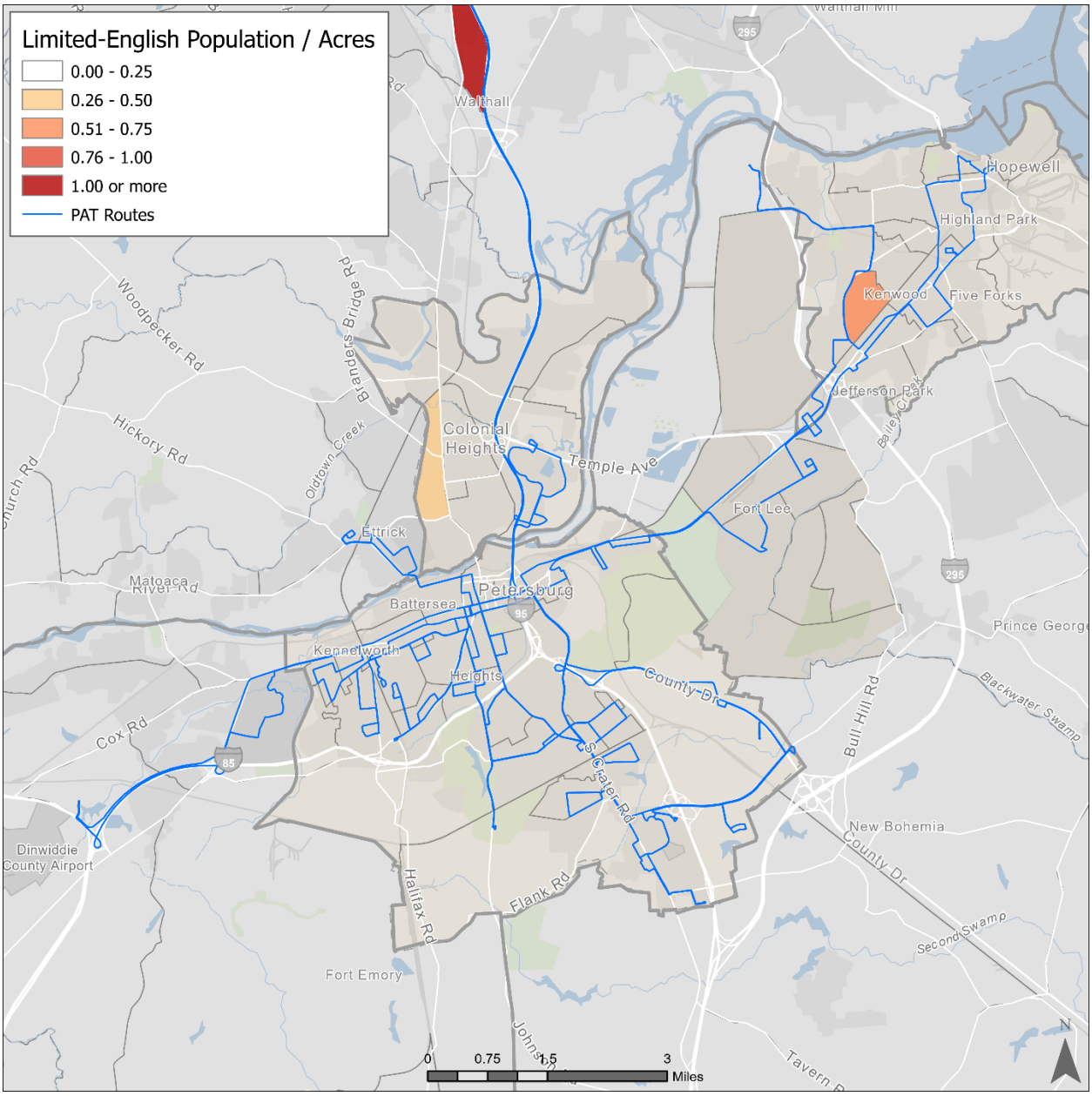


Source: U.S. Census 5-Year (2015-2019) ACS Data by CBG

Table 2-11. Low-Income Households in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Low-Income Households	3,078	4,223	7,541	892	1,370	2,383	1,012
Density	0.21	0.24	0.03	0.18	0.00	0.34	0.01

Figure 2-9. Limited-English Proficiency Population Density

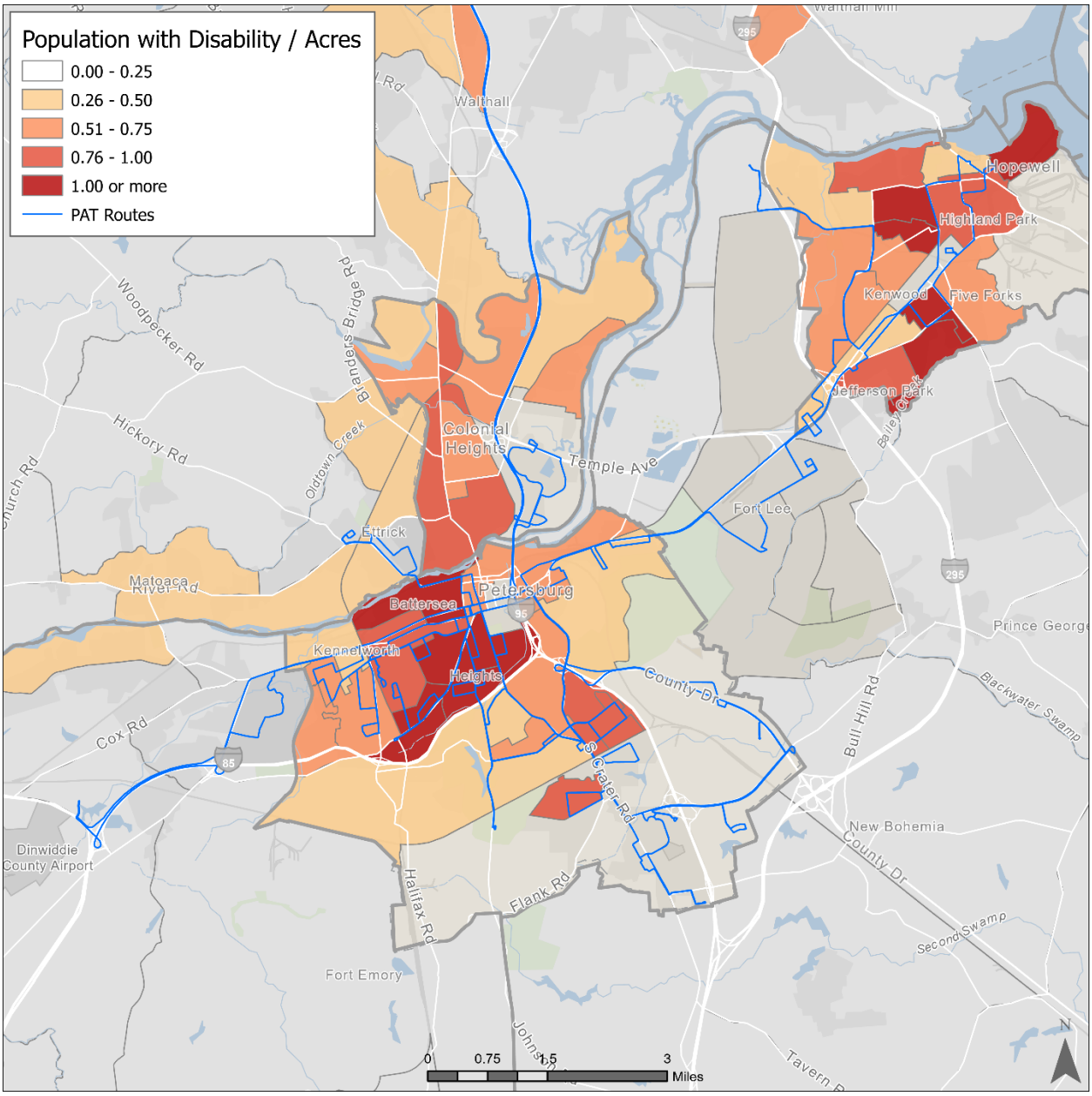


Source: U.S. Census 5-Year (2015-2019) ACS Data by CBG

Table 2-12. Limited-English Proficiency Population in Petersburg and Surrounding Areas

Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Limited-English Population	373	548	8,299	212	198	316	117
Density	0.03	0.03	0.03	0.04	0.00	0.05	0.00

Figure 2-10. Population with Disability Density



Source: U.S. Census 5-Year (2015-2019) ACS Data by CBG

Table 2-13. Population with Disability in Petersburg and Surrounding Areas

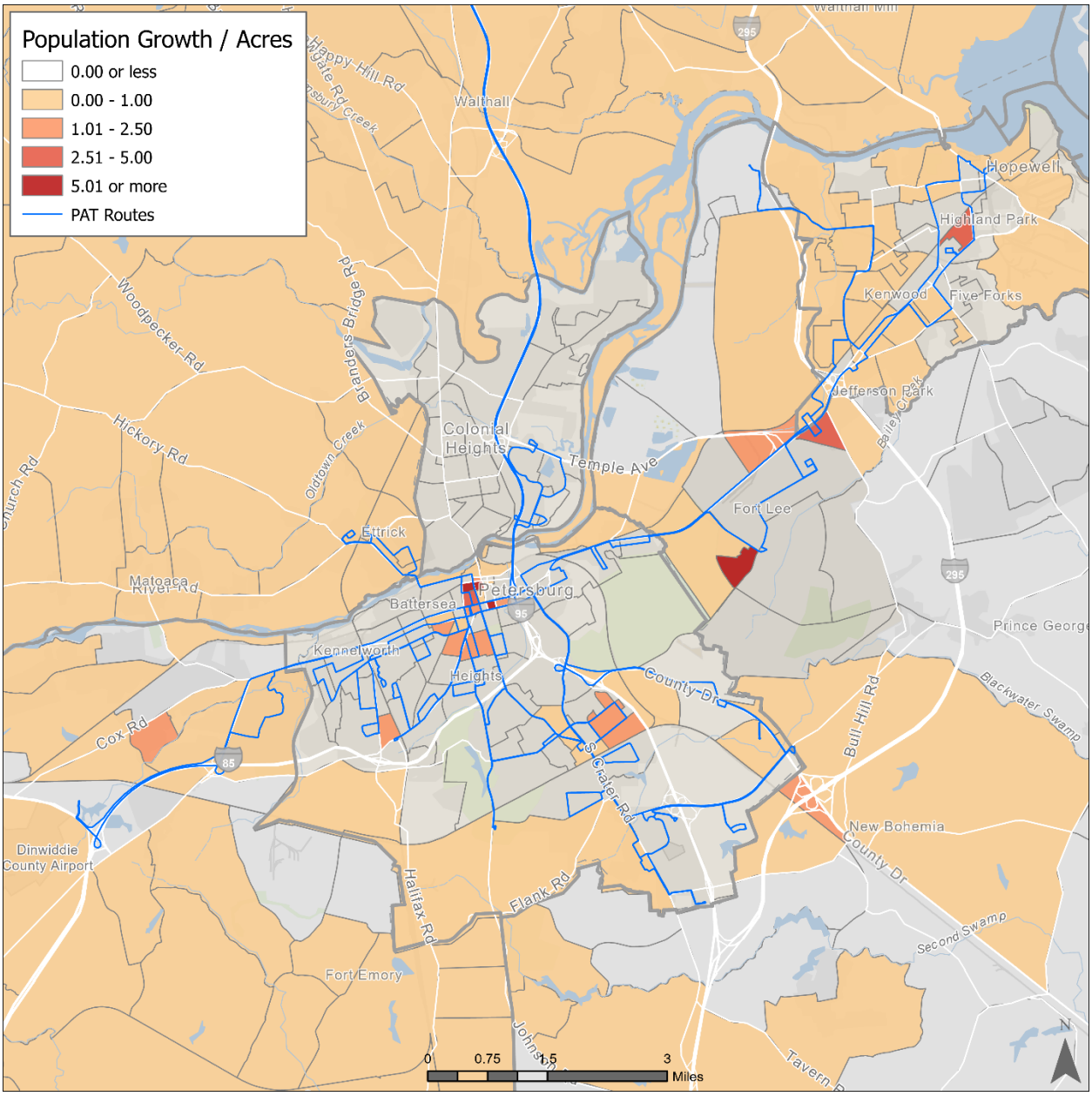
Location	Petersburg	PAT Fixed Routes	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Prince George
Acres	14,682	17,645	279,653	4,987	324,680	6,929	180,363
Population with Disability	6,556	7,911	33,505	2,550	4,026	4,198	4,251
Density	0.45	0.45	0.12	0.51	0.01	0.61	0.02

2.2.1.2 Projected 10-Year Growth

Tri-Cities MPO population and employment data for the years 2017 and 2045 was used to project trends over the next ten years to understand the future needs of the community and plan for appropriate levels of service. The current year (2021) and the 10-year horizon (2031) population and employment were estimated using a straight-line interpolation method. Figure 2-11 shows the projected change in population between 2021 and 2031, and Figure 2-12 shows the results for the projected change in employment over the same ten-year period. Highlights from the analysis are as follows:

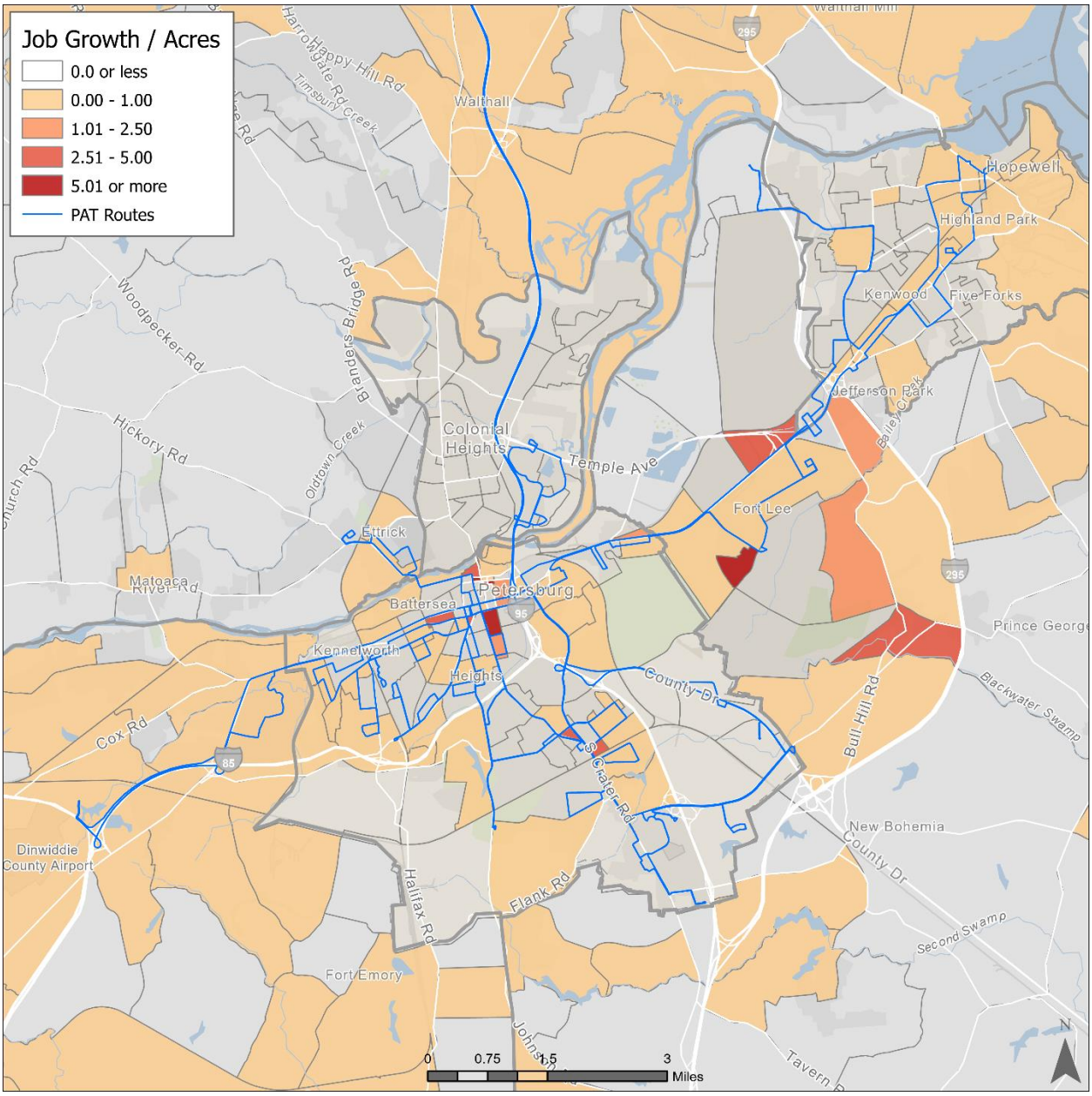
- Nearly all of Petersburg and the surrounding areas is anticipated to experience little to no population or employment growth over the next ten years.
- A few exceptions to this trend include:
    - Downtown Petersburg shows some of the highest population and job growth in the area. Within downtown Petersburg, the northern areas currently served by Ettrick/VSU/Amtrak route, as well as the area between South Sycamore Street and South Jefferson Street show high density growth.
    - The population in the neighborhood east of Walnut Hill Shopping Center, currently served by Walnut Hill route is also projected to grow over the ten-year time frame.
    - The area of Highland Park in Hopewell is projected to see population growth. This area is served by the Hopewell Circulator.
    - Portions of Fort Lee are projected to experience increases in population and employment over the next ten years. The Blandford/Hopewell route currently serves Fort Lee.

Figure 2-11. Projected Population Growth (2021 to 2031) Density



Source: Tri-Cities Area MPO 2017 and 2045 by TAZ (Interpolated for Years 2021 and 2031)

Figure 2-12. Projected Employment Growth (2021 to 2031) Density



Source: Tri-Cities Area MPO 2017 and 2045 by TAZ (Interpolated for Years 2021 and 2031)

2.2.2 Transit Demand and Underserved Area Opportunities for Improvement

Examination of the transit market demand revealed that PAT provides strong coverage to the populations that are most likely to utilize and benefit from transit service. PAT fixed route service reaches the areas within Petersburg that have high densities of populations likely to use and benefit from transit service. The areas identified as having the greatest transit demand were the

neighborhoods southwest of downtown, along Halifax Street, as well as the neighborhoods east of South Crater Road behind Walnut Hill Plaza Shopping Center. These areas are well served by existing PAT routes.

The market analysis, coupled with the public outreach and stakeholder input discussed in the previous sections, also provided insight on some areas where potential improvements could be made. Below is a list of observations and potential opportunities for improvement:

- The demographic analysis indicated that Hopewell has strong market demand for transit. Although the Hopewell Circulator provides service to this area, Hopewell may benefit from additional or modified service that is quicker or more direct.
- The demographic analysis revealed that the County Drive (460) corridor reaches fewer transit-supportive populations than other PAT routes, which may indicate a lower market demand for transit on this route. The productivity of the Country Drive (460) route should be reviewed to assess if changes in service are warranted.
- Outside of the existing PAT service area, Colonial Heights showed the greatest market demand for transit. Should there be public and political interest, Colonial Heights, in particular along Boulevard, could benefit from additional service.
- The survey responses and stakeholder interviews indicated that some people are not familiar with the transit system. Increasing the availability of descriptive information on the service along with targeted marketing campaigns could help improve awareness and ridership.
- The survey responses and stakeholder interviews also indicated riders would like to be able to use the transit system later in the evening to make return trips from work. Extending the span of service later into the evening on weekdays and Saturdays would fulfill this need. However, the associated cost of extending service hours is great and would require additional funding.

2.3 Performance Evaluation

This section assesses the existing performance of PAT's transit service using common industry metrics and compares them to the standards set in Chapter 1. PAT service was evaluated at both the system level and route level where possible. Opportunities for improvement were identified based on the results of the performance standards analysis.

2.3.1 Performance Evaluation

The performance of fixed-route and demand response transit service was evaluated on ridership, cost efficiency, safety, and system accessibility metrics. The results of this evaluation are discussed in the following sections.

2.3.1.1 Ridership and Cost Efficiency

PAT ridership, costs, and service data was collected from NTD for the five-year period from 2015 to 2019. Table 2-14 summarizes the operating measures for fixed route service. These operating measures were used to calculate system-wide performance measures for PAT fixed route service, which are shown in Table 2-15. Key findings on PAT's fixed route service are:

- Overall, PAT's operating expenses for fixed-route transit service increased over the five-year analysis period. Over the same time period, fare revenues decreased.
- Ridership fluctuated significantly over the five-year period. Passenger trips were lowest in 2018 and highest in 2017. The number of passenger trips in 2017 were more than 50% higher than the number of trips in 2018.
- PAT's performance metrics were particularly strong in 2017. Since 2017, performance has generally declined.
- The farebox recovery ratio shows a steady decrease over the five-year period. The consistency in decreasing farebox recovery ratio may justify additional investigation into potential reasons why this may be occurring.

Table 2-14. Fixed-Route Operating Measures

Operational Measure	2015	2016	2017	2018	2019
Operating Expenses	$2,985,320	$3,487,490	$3,122,888	$3,263,919	$3,440,916
Fare Revenues	$469,684	$470,652	$406,507	$375,592	$337,872
Annual Unlinked Trips	399,117	487,768	521,693	332,310	400,443
Annual Vehicle Revenue Miles	487,494	515,301	402,075	566,274	532,160
Annual Vehicle Revenue Hours	42,912	51,088	50,738	52,466	50,675

Source: NTD (2015 - 2019)

Table 2-15. Fixed-Route Performance Measures

Performance Measure	2015	2016	2017	2018	2019
Operating Expenses per Vehicle Revenue Mile	$6.12	$6.77	$7.77	$5.76	$6.47
Operating Expenses per Vehicle Revenue Hour	$69.57	$68.26	$61.55	$62.21	$67.90
Operating Expenses per Passenger Trip	$7.48	$7.15	$5.99	$9.82	$8.59
Trips per Vehicle Revenue Mile	0.8	0.9	1.3	0.6	0.8
Trips per Vehicle Revenue Hour	9.3	9.5	10.3	6.3	7.9
Farebox Recovery Ratio	15.7%	13.5%	13.0%	11.5%	9.8%

Operating and performance measures were also summarized for PAT's demand response service in Table 2-16 and Table 2-17, respectively. Key findings on PAT's demand response service are:

- Operating expenses were highest for demand response in 2015 and decreased significantly in 2016. Since 2016, demand-response operating expenses have steadily increased.
- Fare revenues and passenger trips both show an increasing trend from 2015 to 2017, followed by slight decreases in 2018 and 2019.

- Overall, 2017 was the most efficient year across all of the performance measures. Since 2017, the service has become more expensive in terms of cost per revenue mile, cost per revenue hour, and cost per passenger trip. However, 2019 performance was still more efficient than 2015, primarily due to strong ridership.

Table 2-16. Demand-Response Operating Measures

Operational Measure	2015	2016	2017	2018	2019
Operating Expenses	$175,343	$113,924	$127,348	$167,422	$170,836
Fare Revenues	$11,291	$13,070	$18,570	$17,834	$16,213
Annual Unlinked Trips	6,403	7,596	10,311	10,420	9,286
Annual Vehicle Revenue Miles	42,515	47,005	73,972	76,296	63,892
Annual Vehicle Revenue Hours	7,608	8,235	6,941	7,108	5,987

Source: NTD (2015 - 2019)

Table 2-17. Demand-Response Performance Measures

Performance Measure	2015	2016	2017	2018	2019
Operating Expenses per Vehicle Revenue Mile	$4.12	$2.42	$1.72	$2.19	$2.67
Operating Expenses per Vehicle Revenue Hour	$23.05	$13.83	$18.35	$23.55	$28.53
Operating Expenses per Passenger Trip	$27.38	$15.00	$12.35	$16.07	$18.40
Trips per Vehicle Revenue Mile	0.2	0.2	0.1	0.1	0.1
Trips per Vehicle Revenue Hour	0.8	0.9	1.5	1.5	1.6
Farebox Recovery Ratio	6.4%	11.5%	14.6%	10.7%	9.5%

In addition, route-level performance was evaluated to understand productivity at a more granular level. PAT farebox and service data for the last three months in FY 2019 (April, May, and June) were reviewed and performance metrics were calculated for weekdays and Saturdays. Route performance was evaluated based on the following criteria set in Chapter 1:

Ridership – Review route if ridership on a route drops below half of the system average.

- Passengers per mile less than 0.4 on weekdays or 0.3 on Saturday (system averages are 0.8 and 0.6)
- Passengers per hour less than 4.8 on weekdays or 3.9 on Saturday (system averages are 9.6 and 7.7)

Cost Efficiency – Review route if metric is less than half of the system average for farebox recovery or greater than twice the system average for cost.

- Farebox recovery < 4.9% (system average is 9.8%)
- Cost per mile > $12.49 (system average is $6.47)

- Cost per hour > $135.80 (system average is $67.90)
- Cost per passenger trip > $17.18 (system average is $8.59)

Route-level performance metrics are shown in Table 2-18 for weekdays and Table 2-19 for Saturdays. Key findings include:

- Overall, most routes are meeting or exceeding the performance standards thresholds set in Chapter 1 for both weekdays and Saturdays.
- The Richmond Express was the only route that did not meet the performance standards for both passengers per revenue mile and cost per passenger on weekdays. However, the Richmond Express is the only express route in the system and, as a result, these thresholds are not as applicable.
- Lee Avenue and the interlined routes of Mall Plaza and Ettrick/VSU/Amtrak were the only local routes that did not to meet the performance threshold for passenger per revenue hour on weekdays. The Mall Plaza and Ettrick/VSU/Amtrak interlined routes also did not meet this threshold on Saturdays. These routes may warrant review.
- The farebox recovery ratio was the performance metric with the highest number of deficient routes. Five routes (some of which are combined in the tables due to data collection methods) failed to meet the performance standard threshold of 4.9% farebox recovery on weekdays. These routes included Halifax Street, Virginia Avenue, Lee Avenue, Mall Plaza, and Ettrick/VSU/Amtrak.
- In addition, the farebox recovery ratio threshold was not met on five routes on Saturdays. The five routes with a farebox recovery ratio less than 4.9% on Saturdays included County Drive (460), Halifax Street, Virginia Avenue, Mall Plaza, and Ettrick/VSU/Amtrak. While Lee Avenue was not identified as a route with Saturday farebox recovery ratio below the performance standard threshold, it should be noted that on Saturdays PAT interlines the Washington Street and Lee Avenue routes resulting in the recorded data being combined. It is likely that the Lee Avenue route also has a low farebox recovery ratio on Saturdays, similar to the route's performance on weekdays.

Table 2-18. Route-Level Performance Measures (Weekdays)

Route(s)	Passenger per Revenue Mile		Passenger per Revenue Hour		Cost per Revenue Mile		Cost per Passenger		Farebox Recovery Ratio	
	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank
Blandford/Hopewell	1.3	3	15.3	2	$5.66	5	$4.44	2	11.6%	2
County Drive (460)	0.6	9	9.1	4	$4.85	3	$7.49	4	8.5%	5
Halifax Street / Virginia Avenue	0.8	5	4.8	8	$11.75	10	$14.09	8	3.2%	10
Hopewell Circulator	0.4	10	9.3	3	$3.09	2	$7.27	3	10.3%	3
Lee Avenue	0.7	8	3.7	10	$12.44	11	$18.55	10	2.3%	11
Mall Plaza / Ettrick	0.7	7	4.2	9	$11.32	9	$16.35	9	3.4%	9
Richmond Express	0.1	11	1.7	11	$2.62	1	$40.97	11	8.5%	4
South Crater Road	1.5	1	20.7	1	$4.85	3	$3.28	1	21.4%	1
South Park Mall	1.3	2	7.8	6	$11.32	8	$8.73	6	6.9%	7
Walnut Hill	0.7	6	8.7	5	$5.66	5	$7.82	5	7.3%	6
Washington St	0.9	4	7.6	7	$8.06	7	$8.96	7	6.3%	8

Table 2-19. Route-Level Performance Measures (Saturday)

Route(s)	Passenger per Revenue Mile		Passenger per Revenue Hour		Cost per Revenue Mile		Cost per Passenger		Farebox Recovery Ratio	
	Total	Rank	Total	Rank	Total	Rank	Total	Rank	Total	Rank
Blandford/Hopewell	1.0	3	12.0	2	$5.66	4	$5.64	2	9.5%	2
County Drive (460)	0.3	9	4.2	8	$4.85	2	$16.11	8	3.8%	7
Halifax Street / Virginia Avenue	1.0	4	4.9	7	$13.45	9	$13.83	7	3.4%	8
Hopewell Circulator	0.4	8	7.8	4	$3.09	1	$8.68	4	8.5%	3
Mall Plaza / Ettrick	0.5	7	3.1	9	$11.32	7	$21.88	9	2.3%	9
South Crater Road	1.3	2	18.4	1	$4.85	2	$3.69	1	20.1%	1
South Park Mall	1.4	1	8.5	3	$11.32	7	$7.99	3	7.0%	4
Walnut Hill	0.6	6	7.7	5	$5.66	4	$8.88	5	5.9%	5
Washington St / Lee Avenue	0.8	5	6.0	6	$8.81	6	$11.28	6	5.1%	6

2.3.1.2 Safety

Five years of accident data (2016 to 2020) was provided by PAT and reviewed to understand the number and severity of accidents per year. Accidents are categorized by PAT as either major or minor. In addition, PAT also keeps a record of whether the PAT

driver was “At Fault” or “Not at Fault” for the incident. The safety performance standards established in Chapter 1 include:

Safety – Review route if thresholds are exceeded.

- Accidents > 1 per 100,000 miles
- Injuries > 1 per 1,000,000 miles

PAT did not record any accidents resulting in injury over the five-year period. There were, however, a number of incidents recorded that were classified as “At Fault” by the PAT bus operator. PAT accidents for 2016 through 2020 are summarized Table 2-20. Table 2-21 provides the number and rate of accidents where a PAT operator was found “At Fault” for both total accidents and major accidents. Key findings included:

- The total number of accidents has doubled from 7 to 14 between 2016 and 2020.
- In 2020, PAT had the highest number of accidents where the operator was “At Fault”.
- When considering the major accidents at fault only, PAT exceeded the accident rate threshold of 1 accident per 100,000 revenue miles for three of the past five years.

Table 2-20. Accident Data by Severity and Fault

Year	2016	2017	2018	2019	2020	Grand Total
Major Accidents						
Not at Fault	3		1	2	2	8
At Fault	1	1		2		4
Total	**4**	**1**	**1**	**4**	**2**	**12**
Minor Accidents						
Not at Fault	2	3	5	4	1	15
Questionable				1		1
At Fault	1	7	4	5	11	28
Total	**3**	**10**	**9**	**10**	**12**	**44**
Grand Total	**7**	**11**	**10**	**14**	**14**	**56**

Source: PAT

Table 2-21. Accident Rate for Major and Total At Fault Accidents

Accident Type	2016	2017	2018	2019	2020
Major At Fault Accidents	1	1	0	2	0
Major At Fault Accidents Rate (per 100,000 Revenue Miles)	2.4	2.1	0.0	2.6	0.0
Total At Fault Accidents	2	8	4	7	11
Total At Fault Accidents Rate (per 100,000 Revenue Miles)	4.7	17.0	5.4	9.2	17.2

Source: PAT

2.3.1.3 System Accessibility

System accessibility was evaluated as the total population, employment, low-income households, and minority population within 0.25 miles of the transit network. Chapter 1 performance standards included the following system accessibility metric:

System Accessibility – Review transit coverage if population/employment fall below the identified threshold.

- Systemwide 75% of Petersburg's population/employment has service within ¼ mile.

Using the 2017 and 2045 data for population and employment from the Tri-Cities MPO dataset and interpolating data to 2021, the total population in Petersburg was 35,163 people and total employment was 12,640 jobs. The population in Petersburg within 0.25 miles of a PAT route was 29,215, or 83.1% of the total residents in Petersburg. The number of jobs in Petersburg within 0.25 miles of a PAT route was 10,522, or 83.2% of the total jobs in Petersburg. PAT's system, therefore, meets the system accessibility performance standards.

For a more in-depth analysis of accessibility, population, employment, low-income households, and minority population were analyzed at the route level. A comparison of these metrics by route is shown in Table 2-22 (population and employment) and Table 2-23 (low-income households and minority population). Key findings included:

- The Hopewell Circulator and Blandford/Hopewell routes reach the greatest total population. This is at least in part due to the circuitous and long alignments of these routes. When controlling for area covered, these routes rank in the middle of all PAT routes for population density.
- Both the short and long pattern of the Virginia Avenue route, as well as the Lee Avenue and Halifax Street routes, cover areas with high population density. It should be noted that the cost efficiency performance of these routes was lower than most routes in the system, particularly in the farebox recovery ratio metric.
- South Crater Road, the best performing route in the system, has relatively low accessibility to population, when compared to other PAT routes, indicating it is important to maintain connections between the South Crater Road route and other PAT routes.
- The Southpark Mall route ranks highest of all PAT fixed routes for access to jobs. Although this route operates outside of the city limits of Petersburg, the route provides beneficial access to jobs for the residents of Peterburg.
- The short pattern of Virginia Avenue route gives access to the greatest number of low-income households and minority populations. Although Virginia Avenue is not a high performing ridership or cost efficiency route, great care should be given if any changes are made to this route because of the populations it serves. It is likely that the population living along this route depend on transit for mobility.
- The Blandford/Hopewell, County Drive (460), and Southpark Mall routes have the lowest densities of low-income households and minority populations of all PAT routes.

Table 2-22. Fixed-Route Population and Jobs Accessibility

Route	Acres		Population				Jobs			
	Total	Rank	Total	Rank	Density	Rank	Total	Rank	Density	Rank
Blandford/Hopewell	2,818	(4)	13,975	(2)	4.96	(7)	11,092	(1)	3.94	(2)
County Drive (460)	3,204	(2)	6,004	(8)	1.87	(14)	5,262	(5)	1.64	(11)
Ettrick/VSU/Amtrak	1,081	(11)	5,741	(10)	5.31	(5)	4,008	(7)	3.71	(3)
Freedom Express Stops	470	(15)	613	(15)	1.30	(15)	839	(15)	1.78	(8)
Halifax Street	1,000	(13)	5,388	(11)	5.39	(4)	1,734	(14)	1.73	(9)
Hopewell Circulator	3,647	(1)	14,922	(1)	4.09	(10)	5,476	(4)	1.50	(15)
Lee Avenue	1,214	(8)	6,881	(5)	5.67	(3)	2,100	(11)	1.73	(10)
Mall Plaza	1,076	(12)	5,332	(12)	4.95	(8)	3,297	(9)	3.06	(4)
South Crater Road	2,305	(5)	6,367	(7)	2.76	(11)	6,501	(3)	2.82	(5)
Southpark Mall	1,443	(7)	3,390	(14)	2.35	(13)	7,507	(2)	5.20	(1)
Virginia Avenue	660	(14)	4,164	(13)	6.31	(1)	1,801	(13)	2.73	(6)
Virginia Avenue (High School Pattern)	1,126	(9)	6,705	(6)	5.96	(2)	1,819	(12)	1.62	(12)
Walnut Hill	2,271	(6)	9,868	(3)	4.34	(9)	3,662	(8)	1.61	(13)
Washington Street	1,120	(10)	5,873	(9)	5.24	(6)	2,396	(10)	2.14	(7)
Washington Street (Amazon Pattern)	2,912	(3)	7,953	(4)	2.73	(12)	4,627	(6)	1.59	(14)
Transit System	17,645	-	59,062	-	3.35	-	31,275	-	1.77	-

Table 2-23. Fixed-Route Low-Income Households and Minority Population Accessibility

Route	Low Income Households				Minority Population			
	Total	Rank	Density	Rank	Total	Rank	Density	Rank
Blandford/Hopewell	438	(12)	0.16	(15)	2,776	(13)	0.99	(15)
County Drive (460)	566	(7)	0.18	(14)	4,187	(6)	1.31	(13)
Ettrick/VSU/Amtrak	343	(14)	0.32	(10)	3,269	(11)	3.02	(6)
Freedom Express Stops	281	(15)	0.60	(3)	1,258	(15)	2.68	(9)
Halifax Street	674	(3)	0.67	(2)	4,111	(7)	4.11	(2)
Hopewell Circulator	1,363	(1)	0.37	(8)	7,079	(1)	1.94	(11)
Lee Avenue	661	(4)	0.54	(4)	4,571	(4)	3.76	(3)
Mall Plaza	477	(11)	0.44	(7)	3,764	(8)	3.50	(4)
South Crater Road	613	(6)	0.27	(11)	4,720	(3)	2.05	(10)
Southpark Mall	355	(13)	0.25	(12)	1,797	(14)	1.25	(14)
Virginia Avenue	535	(8)	0.81	(1)	3,183	(12)	4.82	(1)
Virginia Avenue (High School Pattern)	512	(10)	0.46	(6)	3,309	(10)	2.94	(7)
Walnut Hill	722	(2)	0.32	(9)	6,574	(2)	2.89	(8)
Washington Street	523	(9)	0.47	(5)	3,495	(9)	3.12	(5)
Washington Street (Amazon Pattern)	625	(5)	0.21	(13)	4,569	(5)	1.57	(12)
All PAT Routes	4,223	-	0.00	-	31,410	-	0.00	-

2.3.2 Performance Based Opportunities for Improvement

The performance evaluation provided useful information to better understand individual route performance and identify potential opportunities for PAT to modify the service and provide better mobility options to the Petersburg community. Some potential opportunities included:

- The South Crater Road route significantly outperforms other PAT routes in terms of ridership and cost efficiency. This suggests that additional resources may be warranted for this corridor.
- The farebox recovery ratios on the Halifax Street, Virginia Avenue, Lee Avenue, Mall Plaza, Ettrick/VSU/Amtrak, and County Drive routes do not meet the performance standards defined in Chapter 1 for weekdays and/or Saturdays. The low performance of these routes justifies additional review of these routes. Great care, however, is needed in altering these routes because all of these routes operate through areas that have high densities of transit-dependent populations. Therefore, it may be advisable to delay any major changes to these routes until a new APC system can be installed and passenger location data can be analyzed to ensure that service changes have a minimal impact on populations that rely on the service.
- The County Drive (460) route operates through areas without high population densities or high transit dependent population densities. An alignment change of this route may provide an opportunity to serve to areas with greater need.

2.4 Operating and Network Efficiency Evaluation

This section evaluates the operating efficiency of the transit network using available data. Ideally, operating and network efficiency would be analyzed with APC/AVL datasets, but due to technological difficulties, reliable APC/AVL data was not available for PAT's transit system. PAT is currently researching vendors to install new APC/AVL hardware and this data will hopefully be available in the future. In light of the absence of APC/AVL data, operating and network efficiency were evaluated primarily through scheduling analysis and an interview with the PAT operations manager.

2.4.1 Efficiency Evaluation

Efficiency in transit service is strongly tied to the scheduling and timing of routes. Too much time in the schedule results in buses with long dwell times and layovers. Too little time in the schedule results in late trips and missed connections. For this section, schedules of PAT fixed route service were evaluated to determine where potential improvements could be made.

2.4.1.1 Frequency

All PAT local fixed routes operate on 60-minute headways. Half (six) of the local routes are designed to require a 60-minute cycle time (the combined round trip running time and layover time), and therefore require the use of a single vehicle. The other half of the local routes require a 30-minute cycle time and are interlined with another 30-minute cycle time route for a combined requirement of a single vehicle for two routes. The three sets of interlined routes are: 1) Ettrick/VSU/Amtrak and Mall/Plaza, 2) Halifax Street and Virginia Avenue, and 3) Lee Avenue

and Washington Street. While interlining these routes creates operational efficiency, it should be recognized that it also creates the need for two separate pulses when operating a pulse system.

A pulse system refers to an operational technique, typically used at a transfer center, that involves scheduling several routes to arrive and depart at the same time throughout the day. Petersburg operates two pulses, one at 15 minutes past the hour (Blandford/Hopewell, Ettrick/VSU/Amtrak, Halifax Street, South Crater Road, Southpark Mall, and Washington Street) and one at 45 minutes past the hour (County Drive (460), Lee Avenue, Mall Plaza, Virginia Avenue, and Walnut Hill). The drawback of operating two pulses is that some connections between routes at the transfer center require a 30-minute wait time.

Overall, scheduling all routes to operate at 60-minute headways, with several routes operating a full 60-minute cycle time and other routes operating 30-minute cycle times that are interlined balances efficiency in operations and passenger connections well.

2.4.1.2 Span

On weekdays the earliest route (County Drive (460)) begins service at 5:45 AM, and the latest routes (Blandford/Hopewell, South Crater Road, and Southpark Mall) end service at 7:05 PM. Saturday service is virtually the same as weekday service, with an hour later start time on every route (the only difference being the Freedom Express route not operating on Saturdays).

2.4.1.3 Speed

Table 2-24 shows the current scheduled trip length and distance, as well as calculated speeds for all routes. Speeds were calculated based on schedule time since actual recorded speeds would require APC/AVL data that is currently unavailable. Routes with multiple patterns (Virginia Avenue and Washington Street) are shown separately because of the large differences in distances that result in different speed calculations. Speed calculations assumed the entire trip length time, which includes five minutes of layover; therefore, speeds shown represent the minimum speeds required for schedule adherence. Key findings included:

- Overall, minimum required route speeds have significant variability. This could be due to high variance in traffic speeds. However, this could also present an opportunity to adjust schedule times or make alterations to route alignments to improve schedule adherence or offer service to additional areas.
- The Amazon pattern of the Washington Street route requires the vehicle to travel at higher than typical speeds. Although much of this pattern follows higher speed arterial roadways the required minimum route speed for this route could be challenging to achieve and may result in schedule adherence issues.
- With the extension of the South Crater Road route to the new Social Services location, the route requires a minimum speed of 13.1 mph to maintain the schedule. South Crater Road is well known for significant commercial activity and traffic congestion, which may make the minimum average speed challenging to achieve.

Table 2-24. Fixed-Route Pattern Minimum Required Speed Calculations

Route (Pattern)	Trip Length (Minutes)	Distance (Miles)	Speed (Miles/Hour)	Speed Rank
Blandford/Hopewell	60	14.4	14.4	5
County Drive (460)	60	19.1	19.1	4
Ettrick/VSU/Amtrak	30	6.3	12.6	9
Freedom Express	120	52.0	26.0	2
Halifax Street	30	5.7	11.4	12
Hopewell Circulator	60	19.4	19.4	3
Lee Avenue	30	7.2	14.4	5
Mall Plaza	30	6.0	12.0	11
South Crater Road	60	13.1	13.1	7
Southpark Mall	60	7.3	7.3	14
Virginia Avenue	30	3.3	6.6	15
Virginia Avenue (High School Pattern)	30	6.3	12.6	9
Walnut Hill	60	12.9	12.9	8
Washington Street	30	5.3	10.6	13
Washington Street (Amazon Pattern)	30	16.3	32.6	1

2.4.1.4 Reliability

Maintaining schedules is especially important for service reliability when the transit agency operates on a pulse system, as PAT does (more details on the pulse system are provided above in Section 2.4.1.1).

One relevant factor for service reliability is an agency's policy on waiting for late vehicles. PAT's current policy for late arrivals at the Petersburg Station is for operators to communicate with dispatch should the bus fall behind schedule along the route. Connecting routes at Petersburg Station are advised to wait for a late vehicle for up to five minutes past scheduled departure time so that all passengers have the chance to make the desired connection. If a vehicle falls behind schedule more than five minutes, then a tripper is dispatched to replace the late vehicle.

For an understanding of route specific reliability, an interview was conducted with the PAT operations manager. A summary of the key takeaways from the interview are provided below, focusing on the five routes that have demonstrated on-time-performance issues. Blandford/Hopewell, Ettrick/VSU/Amtrak, Halifax Street, Lee Avenue, Mall Plaza, Virginia Avenue, Walnut Hill, and Washington Street Routes were not identified as having on-time performance issues and are therefore not discussed in this section.

1. **Freedom Express** – This route has the worst on-time performance of all PAT routes. The primary reason for the poor on-time performance is that the route travels on I-95 for a large portion of the route, which experiences a significant amount of traffic congestion. Vehicular crashes on I-95 often force the Freedom Express route

to detour to Jefferson Davis Highway. A secondary reason for the poor on-time performance is the road construction on Broad Street in Richmond, which also forces detours.

2. **South Crater Road** – This route has the second worst on-time performance of all PAT routes and the worst on-time performance of all local routes. The South Crater Road route typically has trouble maintaining the schedule every day from roughly 11 AM to 4 PM. The route experiences traffic congestion for a significant portion of the route alignment on South Crater Road. This route is also the best performing route in terms of ridership productivity, which increases delay as greater numbers of passengers board and alight the vehicle at numerous stops. Passenger volumes are so high on this route that a tripper is deployed for nearly every trip in the schedule. Occasionally, two trippers are required for relief from overcrowding. One of the greatest challenges with this route is managing the high demand for travel to the commercial development along the South Crater Road corridor. Demand tends to be highest on Fridays and Saturdays, as well as during the first week of every month.
3. **County Drive (460)** – This route has the third worst on-time performance in the transit system. County Drive (460) was a poor performing route before the alignment was modified to serve South Crater Road at the end of line. The route currently has very strong ridership due to the demand to access the South Crater Road area and occasionally requires a tripper to provide relief from overcrowding. This route is also subject to the heavy traffic congestion, present on both South Crater Road and County Drive. The fare free period during the pandemic has made it more difficult to maintain on-time performance because of the high passenger loads.
4. **Southpark Mall** – This route has the fourth worst on-time performance in the transit system. Most of the on-time performance issues tend to occur early in the month and on Fridays and Saturdays when there is increased ridership and traffic congestion. Plans that involve extending this route to businesses on Puddledock Road would make schedule adherence even more difficult for the Southpark Mall route.
5. **Hopewell Circulator** – This route also experiences on-time performance issues. The primary cause of delay are at-grade train crossings on Winston Churchill Drive (one direction), 15th Avenue (one direction), Mesa Drive (two directions), and River Road (two directions). Delays from trains tend to occur most frequently from approximately 1 PM to 3 PM. In addition, serving Riverside Regional Jail requires a deviation that makes the route exceedingly long.

2.4.2 Efficiency Based Opportunities for Improvement

The results of the efficiency analysis indicate that there are several potential opportunities to improve the transit network:

- PAT schedules are written with Petersburg Station arrivals and departures at the same time every hour and do not show layover times. Writing schedules with arrival times earlier than departure times would provide passengers a greater understanding of how much time they have to make a connection at the transfer location. Industry standard is

at least a 10% recovery time (15% recovery time is preferred) to account for minor delays. This standard is included in the Service Design Standards in Chapter 1.

- The very high variability in scheduled speeds among the fixed routes suggest that it may be beneficial to conduct a more thorough scheduling analysis once an AVL system is operational. The high variability could be due to traffic conditions and roadway environment, which AVL data could verify. However, the high variability in speeds among routes could be due to scheduling inefficiencies. Schedules without enough time lead to late trips and missed connections. Schedules with too much time provide opportunities to extend routes and provide access to more locations.
- Increasing the frequency of service could provide more opportunities for riders to connect to the system. Most of the routes run on 60-minute headways and increasing some of the best performing routes to 30 minutes would give riders more travel options. Additionally, the interview with the operations manager revealed that several of the routes regularly require trippers to accommodate large volumes of passengers. If select routes improved to 30-minute frequency, PAT would likely no longer need to operate these trippers.
- Several routes in the system require high speeds to stay on schedule. One possible solution to maintain coverage and improve on-time-performance is to provide more direct routing, which would also facilitate faster travel. Currently many of the routes include deviations into neighborhoods. Minimizing these deviations and creating more direct routes would make the routes easier to understand and allow for shorter travel times.

2.5 Analysis of Opportunities to Collaborate with Other Transit Providers

2.5.1 Collaboration Analysis

There are several other transit service providers that operate either within or nearby the PAT service area, shown below:

- **Greater Richmond Transit Company (GRTC):** GRTC operates service between downtown Richmond and Petersburg Station. Conversely, PAT operates the Freedom Express that runs from Petersburg Station to McGuire Medical Center and downtown Richmond. PAT and GRTC coordinate to ensure smooth operation at Petersburg Station. Passengers must pay full fare when transferring from one system to the other.
- **Blackstone Area Bus (BABS):** BABS operates the Dinwiddie Express, which runs service from Blackstone to Petersburg Station twice in the morning and twice in the evening.
- **Amtrak:** Amtrak has a station in Ettrick, which is served by the Ettrick/VSU/Amtrak route.
- **Greyhound:** There are five Greyhound routes that serve Peterburg Station.

2.5.2 Collaboration Based Opportunities for Improvement

Discussion on potential collaboration efforts yielded several opportunities for potential coordination among agencies to create more convenient transfers between transit networks.

- Currently, passengers must pay full fares when transferring between transit systems. Passengers that may be travelling long distances to get to job opportunities, such as at Kings Dominion for summer work, must pay several fares to reach their final destination. Collaboration on a single fare payment system to ease the burden on passengers making such trips would be beneficial.

3 Planned Improvements and Modifications

Chapter 3 of the TSP prioritizes planned service improvements and modifications over the next ten years. The results of the system performance and operations analysis presented in Chapter 2 were used to assess PAT's needs and develop service improvement recommendations to address those needs. Factors considered in the development of recommendations included the performance of existing routes, input from the public and stakeholders on community preferences, and demographic assessments indicating neighborhoods in Petersburg with a greater need for transit services. Details including maps, operating statistics, ridership estimates, and rationale for implementation are outlined for the service improvement recommendations discussed in this chapter. The recommendations are prioritized and grouped into timeframes for short-term (1 to 3 years), mid-term (3 to 7 years), and long-term (7 to 10 years). Recommendations that may not be feasible over the ten-year timeframe are designated as unconstrained. The operating impacts of the planned service changes, including the required service hours and miles, are also discussed in this chapter.

3.1 Planned Service Improvements

This section describes planned service improvement projects for PAT. For programming purposes, estimates of resources required for implementation are provided for each project. The existing revenue hours, revenue miles, peak vehicles, operating costs, and ridership are compared to proposed figures to show the impacts of the recommended changes. Revenue hours, revenue miles, and peak vehicles were calculated using existing and proposed schedules and route alignment measurements.

In addition, operating costs and ridership counts were estimated for each of the service plans to help prioritize projects. Operating costs were calculated using a simplified operating and maintenance cost model using a unit cost of $70.56 per revenue vehicle hour, which was calculated using PAT's FY 2019 total operating and maintenance costs divided by the total number of revenue hours operated by the agency and then inflated to FY 2021 dollars. It should be noted that using a single unit cost per revenue hour can overestimate the cost of additional service because certain costs, such as many administrative positions and equipment, are fixed regardless of the amount of service operated. In addition, solely using revenue hours to estimate total operating costs does not account for any additional costs or savings incurred when revenue miles are altered. Increasing/decreasing revenue miles will increase/decrease variable costs such as fuel consumption and maintenance schedules of vehicles, ultimately changing the overall operating costs. Despite these caveats, using a single unit cost per revenue vehicle hour provides a reasonably accurate estimation of expected project costs.

Ridership counts reported for the existing routes were taken from FY 2019 ridership data provided by PAT, which was the most recent available data disaggregated at the route level that was not impacted by the COVID-19 pandemic. Proposed ridership estimates for each project were calculated using the existing FY 2019 ridership data. In most cases, route changes were minimal (e.g. the elimination of minor route alignment deviations) and therefore no estimated changes in ridership were expected. For route changes that were more significant, ridership was estimated using existing route productivity and elasticity factors. For example, improving the

headway of a route from 60 minutes to 30 minutes results in doubling the number of revenue hours operated on the route, and should therefore result in increased in ridership. However, research shows that demand (riders) and supply (revenue hours) do not always increase at a one-to-one ratio. To calculate ridership estimates, the existing productivity (expressed as riders per revenue hour) was applied to the increase in revenue hours with an elasticity factor of 50%. This method accounts for the diminishing returns observed on increasing service at the beginning/end of the service span. More specific details on ridership estimate assumptions are included with each of the route change descriptions.

3.1.1 Blandford/Hopewell Alignment Change

Service Changes: The proposed changes for the Blandford/Hopewell route are shown in Figure 3-1. The proposed alignment continues to operate between Petersburg Station and Fort Lee via Washington Street and Oaklawn Boulevard but removes the existing deviation on Richmond Avenue. In addition, the alignment is also changed along Washington Street just east of I-95, where the route continues a linear alignment instead of deviating onto Old Wythe Street and East Bank Street. The existing deviation onto Culpepper Avenue and Slagle Avenue is retained. The proposed alignment serves this neighborhood in both directions however instead of only the outbound direction.

Figure 3-1. Alignment of Existing Blandford / Hopewell Route and Proposed Blandford / Hopewell Route

A comparison of service under the existing Blandford/Hopewell route and proposed Blandford/Hopewell route is shown in Table 3-1. The result of removing several deviations and adding bidirectional service on the Culpepper Avenue and Slagle Avenue deviation is a slight increase in annual revenue miles. Headways and revenue hours are proposed to remain unchanged, resulting in no projected change to the peak vehicle requirement of one bus or to the operating costs. Because the service changes are minimal, no changes to ridership are expected.

Table 3-1. Annual Statistics for Existing Blandford / Hopewell Route and Proposed Blandford / Hopewell Route

	Existing Blandford / Hopewell	Proposed Blandford / Hopewell	Change Over Existing
Revenue Hours	3,876	3,876	0
Revenue Miles	56,626	56,983	357
Peak Vehicles	1	1	0
Operating Cost[1]	$273,500	$273,500	$0
Ridership	48,000	48,000	0

1. Estimated operating costs reported in FY 2021 dollars

Rationale:

- The Blandford/Hopewell route serves the Fort Lee market, providing a direct connection from the post to downtown Petersburg. The historically strong ridership on this route indicates that changes to this route should be minimal.
- Small mid-route deviations can cause several minutes of delay for passengers and should focus on areas where ridership justifies a deviation. Eliminating deviations and staying on Washington Street and Wythe Street reduce travel times for passengers and the frustration incurred in out-of-direction travel. Maintaining service on the Culpepper Avenue and Slagle Street deviation is warranted to serve the low-income housing in the area.
- Serving Culpepper Avenue and Slagle Street on both inbound and outbound trips eliminates the need for riders to cross Washington Street on the inbound direction, leading to a safer access/egress for many passengers.
- While it is good practice to avoid large one-way loops, the restrictive nature of access to Fort Lee does not allow for the loop to be removed.

3.1.2 County Drive (460) Alignment Change

Service Changes: The proposed changes for the County Drive (460) route are shown in Figure 3-2. The proposed changes to the alignment include the elimination of the deviations on Stedman Drive, Meadowbrook Street, and Robertson Street. In addition, the alignment is proposed to use I-95 from downtown Petersburg to Winfield Road, instead of using Crater Road.

It should also be noted that there may be a future desire for transit service to operate to the Amazon Fulfillment Center at 7000 Hardware Drive in Prince George. Should there be sufficient interest from the public and from private partners, service to the facility could materialize by making select trips with the County Drive (460) route. However, this service would necessitate removing service from Wagner Road and Medical Park Boulevard and realigning the route to operate through low density areas in Prince George with very low transit demand. Furthermore, the long distance of a route serving Amazon would likely make operating the route with a single vehicle with 60-minute headways a challenge. For these reasons, a route alignment change to

serve the Amazon Fulfillment Center in Prince George was not recommended as part of the TSP.

Figure 3-2. Alignment of Existing County Drive (460) Route and Proposed County Drive (460) Route

A comparison of service under the existing County Drive (460) route and proposed County Drive (460) route is shown in Table 3-2. Because the proposed changes are minor, the route will continue to use the same schedule, revenue hours, and peak vehicles. The number of revenue miles will decrease slightly due to the elimination of the deviations. Ridership is expected to remain the same.

Table 3-2. Annual Statistics for Existing County Drive (460) Route and Proposed County Drive (460) Route

	Existing County Drive 460	Proposed County Drive 460	Change Over Existing
Revenue Hours	3,927	3,927	0
Revenue Miles	75,060	67,081	-7,979
Peak Vehicles	1	1	0
Operating Cost[1]	$277,100	$277,100	$0
Ridership	30,000	30,000	0

1. Estimated operating costs reported in FY 2021 dollars

Rationale:

- County Drive (460) serves a low-income market that would otherwise not have access to transit. Service to the Walmart Supercenter and healthcare facilities on Medical Park Boulevard provide critical access to shopping, jobs, and medical services.
- Short deviations from the main line into neighborhoods along this route are proposed for removal because they increase travel times for most passengers. These neighborhoods are only short distances from the proposed route and are, therefore, walkable for most riders and should not have an impact on ridership. However, some deviations along routes are worth the additional time. For example, the Pinetree Drive deviation produces high ridership that justifies the time spent deviating from the main line.
- Instead of serving South Crater Road near downtown Petersburg, the proposed route alignment uses I-95, which shortens the total trip length. County Drive (460) is the second longest route in the system and shortening the alignment will add recovery time to the schedule and help drivers maintain the schedule. Removal of the section of the route along South Crater Road is also advisable because there is duplicative service here (the South Crater Road route also serves this section).

3.1.3 Walnut Hill and Mall Plaza Alignment Change and Virginia Avenue Elimination

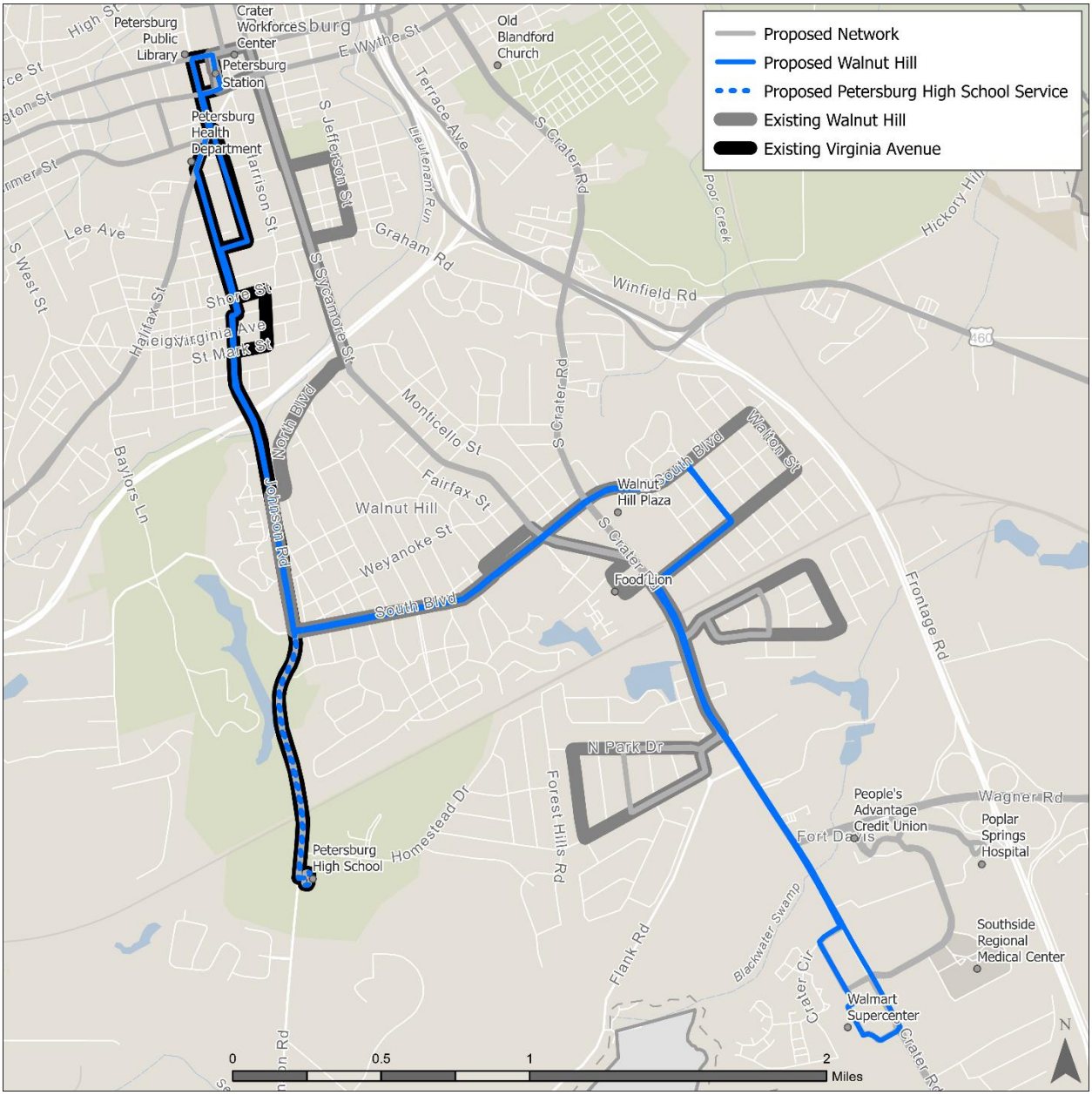
This project involves interdependent changes to three routes (Walnut Hill, Mall Plaza, and Virginia Avenue), and, therefore, these changes should be implemented at the same time. A description of the alignment changes to the Walnut Hill route and elimination of the Virginia Avenue route are presented first, followed by a description of the changes to the Mall Plaza route. The cumulative result of changes to all three routes is provided at the end of this section.

Walnut Hill and Virginia Avenue

Service Changes: The proposed changes for the Walnut Hill route are shown in Figure 3-3. Several major alignment shifts are proposed for the Walnut Hill route, as well as the elimination of the Virginia Avenue route. The southbound Walnut Hill service from downtown Petersburg transitions from Sycamore Street to High Pearl Street, following a similar alignment to the existing Virginia Avenue route, and then resumes existing service on Johnson Road to South

Boulevard. Service will operate to Petersburg High School four times a day, similar to the existing Virginia Avenue route. The proposed Walnut Hill route will continue to serve the neighborhood east of Walnut Hill Shopping Center; however, the route will be shorted and use Bishop Street instead of Walton Street within the neighborhood. Instead of deviating through the other neighborhoods along South Crater Road, the Walnut Hill route will maintain a more direct alignment on South Crater Road, with the southern terminus of the route proposed to be extended to the Walmart Supercenter. The other neighborhood circulation currently served by the existing Walnut Hill route will be completed by the Mall Plaza route.

Figure 3-3. Alignment of Existing Walnut Hill and Virginia Avenue Routes and Proposed Walnut Hill Route



A comparison of service under the existing Virginia Avenue and Walnut Hill routes and the proposed Walnut Hill route is shown in Table 3-3. Revenue hours, revenue miles, and the number of peak vehicles will decrease due to the elimination of the Virginia Avenue route. Ridership is expected to remain at current levels because the neighborhoods previously served by the Virginia Avenue Route will shift to the Walnut Hill Route.

Table 3-3. Annual Statistics for Existing Virginia Avenue and Walnut Hill Routes and Proposed Walnut Hill Route

	Existing Virginia Avenue	Existing Walnut Hill	Proposed Walnut Hill	Change Over Existing
Revenue Hours	1,747	3,927	3,927	-1,747
Revenue Miles	15,181	50,733	48,778	-17,136
Peak Vehicles	0.5	1	1	-0.5
Operating Cost[1]	$123,300	$277,100	$277,100	-$123,300
Ridership[2]	15,000	23,000	38,000	0

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 100% of existing ridership on the Walnut Hill and Virginia Avenue routes

Rationale:

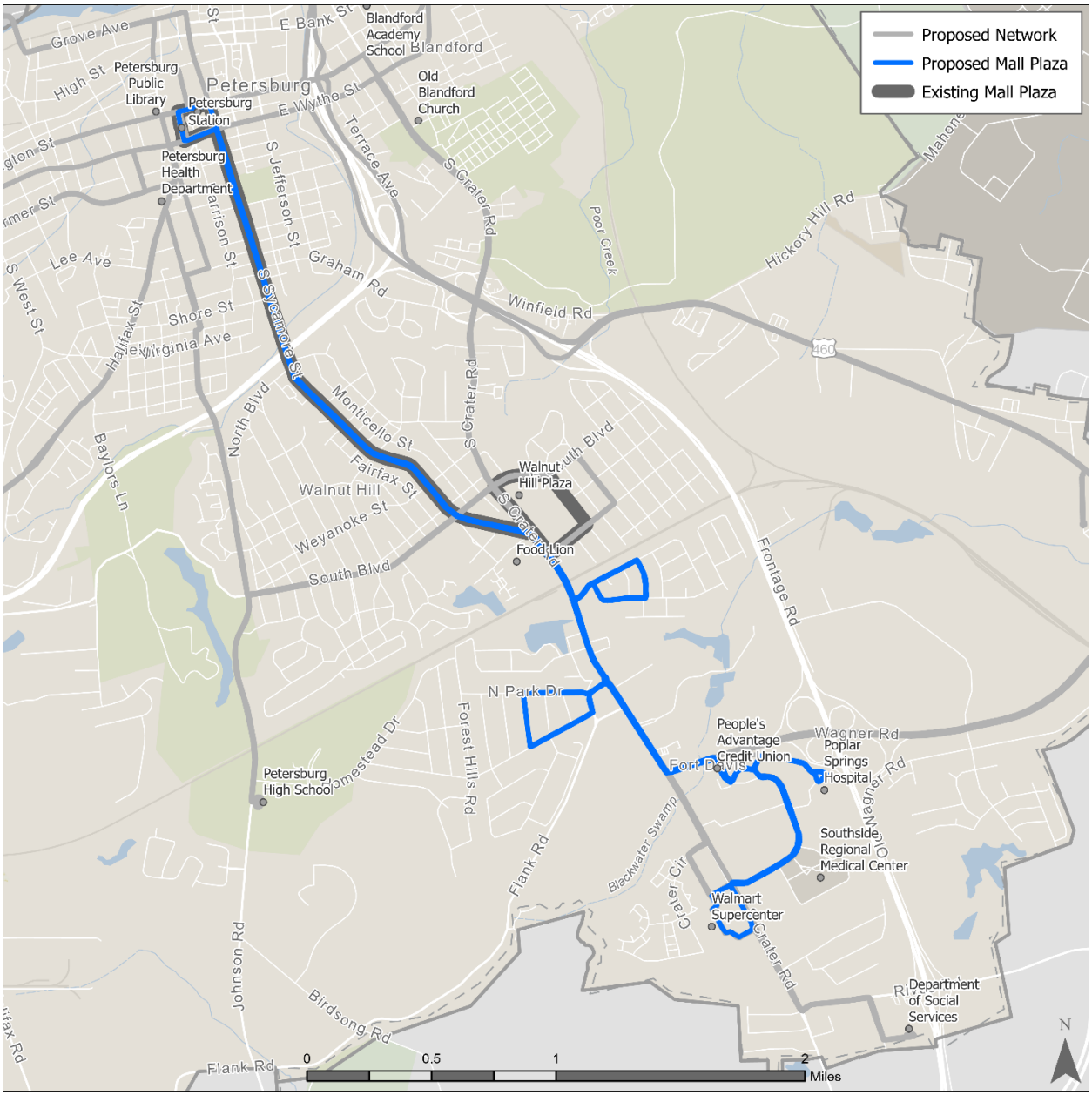
- Operating Walnut Hill and Mall Plaza on Sycamore Street provides an oversupply relative to the demand. The ridership along this corridor would be more appropriately served by a single route instead of two, presenting an opportunity to realign one of the routes through another neighborhood.
- Realigning the Walnut Hill route from Sycamore Street to High Pearl Street makes the entire route of Virginia Avenue expendable without a reduction in service coverage. In addition, this proposed change provides the neighborhoods along Virginia Avenue with a direct one-seat ride to the shopping along South Crater Road.
- Reducing the number of deviations off South Crater Road served by the Walnut Hill route enables this route to serve to the Walmart Supercenter (one of the most heavily utilized stops in the transit network).
- The linear alignment of the proposed Walnut Hill route also allows the route to serve Petersburg High School four times a day without sacrificing on-time performance.

Mall Plaza

Service Changes: As discussed above, the Virginia Avenue route is proposed to be eliminated because the proposed alignment of Walnut Hill provides coverage for the existing Virginia Avenue service area. The resources saved with the elimination of the Virginia Avenue route can be used to operate a dedicated vehicle on Mall Plaza. This redistribution of resources enables the Mall Plaza route to serve the neighborhoods off Holly Hill Drive and Flank Road previously served by the Walnut Hill route. Additionally, the route has time to travel farther south to the hospital and medical services on Medical Park Boulevard and finally the Walmart Supercenter.

It should also be noted that this service change would require a shift in the interlining of routes. Currently, the Halifax Street route is interlined with the Virginia Avenue route and the Ettrick/VSU/Amtrak route is interlined with the Mall Plaza route. The proposed changes would require Halifax Street to be interlined with Ettrick/VSU/Amtrak. This should have little to no impact on scheduling. The existing and proposed Mall Plaza route alignments are shown in Figure 3-4.

Figure 3-4. Alignment of Existing Mall Plaza Route and Proposed Mall Plaza Route



A comparison of service under the existing Mall Plaza route and the proposed Mall Plaza route is shown in Table 3-4. The proposed service doubles the number of peak vehicles required and

the operating cost due to the reallocation of the Virginia Avenue route resources to Mall Plaza. With a more linear alignment, the route can travel a greater distance resulting in more than double the revenue miles of the existing Mall Plaza route. The extension of the Mall Plaza route to Medical Park Boulevard and the Walmart Supercenter, as well as the service into the neighborhoods previously served by the Walnut Hill route, is projected to increase ridership on the proposed Mall Plaza route.

Table 3-4. Annual Statistics for Existing Mall Plaza Route and Proposed Mall Plaza Route

	Existing Mall Plaza	Proposed Mall Plaza	Change Over Existing
Revenue Hours	1,721	3,468	1,747
Revenue Miles	21,585	54,600	33,015
Peak Vehicles	0.5	1.0	0.5
Operating Cost[1]	$121,500	$244,800	$123,3000
Ridership[2]	16,000	22,000	6,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 100% of existing ridership on the Mall Plaza route and 10% of existing ridership on the South Crater Road route.

Rationale:

- The Walmart Supercenter is an attractive location for transit service, as evidenced by the strong ridership along the South Crater Road route and public outreach survey feedback. Providing additional service in this area helps connect more riders to desired destinations.
- Two of the three neighborhoods currently served by Walnut Hill will be served by Mall Plaza instead. Rebalancing the responsibility of serving these neighborhoods gives both the Walnut Hill and Mall Plaza routes the opportunity to serve more of the South Crater Road corridor, which has the highest demand for transit in all of Petersburg.
- Instead of penetrating deep into the neighborhoods off South Crater Road, as the existing Walnut Hill route operates, transit service will turn approximately halfway through the neighborhoods to save time. This will allow the route to serve deviations in both directions and give passengers consistent inbound and outbound travel patterns.
- Serving the hospital and medical services on Medical Park Boulevard first before continuing to Walmart gives riders a shorter ride to medical service destinations. This would be highly beneficial for passengers travelling to Medical Park Boulevard because the high volume of ridership at Walmart and Social Services oftentimes leads to long dwell times and delays.

Virginia Avenue, Walnut Hill, and Mall Plaza Summary

The previous two sections described changes to three routes: Virginia Avenue, Walnut Hill, and Mall Plaza. Table 3-5 summarizes the cumulative operating impacts of these changes. The combined result is no change to total revenue hours, peak vehicles required, or operating cost. The revenue miles increase slightly because the proposed route alignments make better use of

the resources available. The overall ridership impact is likely to be positive, estimated here to be an increase of about 6,000 riders annually.

Table 3-5. Annual Statistics for Existing Virginia Avenue, Mall Plaza, and Walnut Hill Routes and Proposed Mall Plaza and Walnut Hill Routes

	Existing Virginia Avenue, Mall Plaza, and Walnut Hill	Proposed Mall Plaza and Walnut Hill	Change Over Existing
Revenue Hours	7,395	7,395	0
Revenue Miles	87,498	103,378	15,880
Peak Vehicles	2.0	2.0	0
Operating Cost[1]	$521,900	$521,900	$0
Ridership[2]	54,000	60,000	6,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes 100% of the existing ridership on the Virginia Avenue and Mall Plaza routes and 110% of the existing ridership on the South Crater Road route.

Rationale:

- The combined changes to all three routes (Virginia Avenue, Walnut Hill, and Mall Plaza) redistribute resources to provide less overlapping service where there is lower demand and more overlapping service where there is greater demand. Sycamore Street will have less service that in the existing system, which is justified by lower ridership observed by PAT staff in this area, as well as the results of the Chapter 2 analysis. South Crater Road will have more service, which reflects the high demand and existing ridership in this area.
- South Crater Road has the greatest transit demand in the PAT network and offering more service and more opportunities for one seat rides to this area is highly desirable. The combined Virginia Avenue, Walnut Hill, and Mall Plaza service changes add two more vehicles per hour to the South Crater Road corridor, providing a much larger portion of the Petersburg population with a one-seat ride to reach jobs and shopping on South Crater Road.
- Much of the service to neighborhoods in the existing system is only operated in a single direction (inbound or outbound). The proposed changes operate service to the neighborhoods in both directions, which provides riders with consistent travel patterns in both the inbound and outbound directions. This eliminates the excessively long walk or travel times in one direction that occur when service is only provided in one direction. Serving neighborhoods in both directions is feasible without increasing the running time because the alignments in these neighborhoods are shortened.

3.1.4 Halifax Street Alignment Change

Halifax Street

Service Changes: The proposed changes for the Halifax Street Route are shown in Figure 3-5.The revised Halifax Street route removes the deviation on Custer Street and reduces

the length of penetration along Patterson Street. These proposed changes will help to streamline service and make the alignment easier for customers to understand.

A change to how the Halifax Street route is interlined is also proposed. The route is currently interlined with the Virginia Avenue route, with each route sharing one-half of a driver block. The Virginia Avenue route is proposed to be eliminated, with the alignment served by the revised Walnut Hill route (see previous section on Walnut Hill) and, as a result, the Halifax Street route will instead be interlined with the Ettrick/VSU/Amtrak route.

Figure 3-5. Alignment of Existing Halifax Street Route and Proposed Halifax Street Route

A comparison of service under the existing Halifax Street route and proposed Halifax Street route is shown in Table 3-6. Because the proposed changes are minimal, there is little change to the operating requirements. There is a slight decrease in revenue miles due to the reduction in deviations but no estimated changes in revenue hours, peak vehicles required, operating cost, or ridership.

Table 3-6. Annual Statistics for Existing and Proposed Halifax Street Route

	Existing Halifax Street	Proposed Halifax Street	Change Over Existing
Revenue Hours	1,887	1,887	0
Revenue Miles	22,423	19,653	-2,770
Peak Vehicles	1	1	0
Operating Cost[1]	$133,100	$133,100	$0
Ridership	15,000	15,000	0

1. Estimated operating costs reported in FY 2021 dollars

Rationale:

- Removing the deviation on Custer Street and reducing the length of penetration along Patterson Street reduces travel times for passengers boarding/alighting on other sections of the route. Although this will increase the walking distances for some passengers, the increased walking distances are less than 0.25 miles.

3.1.5 Lee Avenue Alignment Change

Lee Avenue

Service Changes: The proposed changes for the Lee Avenue route are shown in Figure 3-6. Several minor alignment changes are proposed for Lee Avenue. The revised route will no longer deviate off Farmer Street to serve Lee Avenue and will operate on Pleasants Lane in both directions instead of operating a one-way loop with Youngs Road. The route will also continue farther south on Youngs Road and turn left on Boydton Plan Road to connect to the Halifax Street route at the Texaco gas station. Due to the elimination of service on Lee Avenue, it is recommended that the name of the route be changed to Farmer Street.

Figure 3-6. Alignment of Existing Lee Avenue Route and Proposed Farmer Street Route

Implementing the changes to the Lee Avenue route results in only minor changes to the service statistics, shown in Table 3-7. The proposed route alignment is slightly longer than the existing alignment, which creates additional revenue miles. Revenue hours, vehicles, operating cost, and ridership are all expected to remain constant because the recommended changes are minor.

Table 3-7. Annual Statistics for Existing Lee Avenue Route and Proposed Lee Avenue Route

	Existing Lee Avenue	Proposed Lee Avenue	Change Over Existing
Revenue Hours	1,747	1,747	0
Revenue Miles	26,169	30,420	4,251
Peak Vehicles	1	1	0
Operating Cost[1]	$123,300	$123,300	$0
Ridership[2]	27,000	27,000	0

1. Estimated operating costs reported in 2021 dollars

Rationale:

- Removing the deviations to low-ridership areas reduces travel times for passengers boarding/alighting on other sections of the route. Although this will increase the walking distances for some passengers, the increased walking distances are all less than 0.25 miles.
- Removing the one-way loops will enable passengers to board and alight the bus at the same location, rather than keeping track of a more complicated service that operates on one street in one direction, and another street in the opposite direction.
- Routing the alignment to the Texaco on Halifax Street creates a new connection to the Halifax Street route, giving passengers additional opportunities to connect and travel throughout the network.
- The Lee Avenue route should be renamed for Farmer Street because the proposed route would no longer travel on Lee Avenue.

3.1.6 Hopewell Circulator and Southpark Mall Alignment Change

Hopewell Circulator/Southpark Mall

Service Changes: The existing Hopewell Circulator route operates between downtown Hopewell and the Food Lion on Oaklawn Boulevard, where it connects to the Blandford/Hopewell route. The Southpark Mall route currently runs service from Petersburg Station to Southpark Mall. The Hopewell Circulator and Southpark Mall routes are proposed to be combined into a single service operating from downtown Hopewell along Oaklawn Boulevard, along Puddledock Road, connecting to Southpark Mall, and then to downtown Petersburg. The existing alignments of the Hopewell Circulator and the Southpark Mall routes and the proposed alignment of the combined route are shown in Figure 3-7.The proposed alignment would also modify service to the Riverside Regional Jail to become on-demand. When service is requested to the jail, the bus would operate from downtown Hopewell along Broadway Avenue and River Road to reach the Riverside Regional Jail and then return to the normal the fixed route pattern at 6th Avenue.

Figure 3-7. Alignment of Existing Hopewell Circulator Route and Southpark Mall Route and Proposed Hopewell / Southpark Mall Route

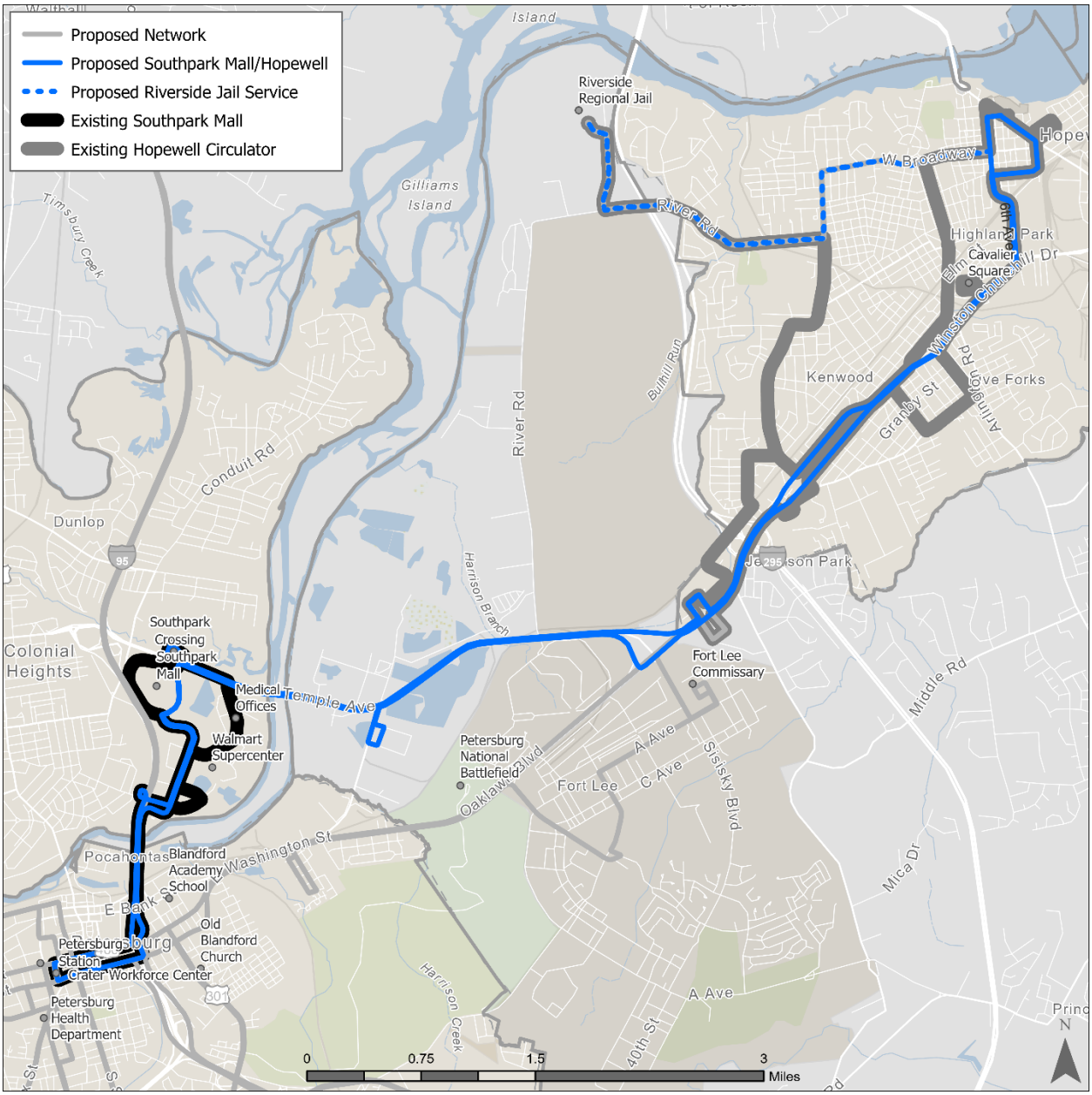


Table 3-8 shows a comparison of service under the existing Hopewell Circulator and Southpark Mall routes and the proposed combined Hopewell Circulator/Southpark Mall route. The number of buses required to operate the modified service will remain the same since the proposed combined route will require the same number of buses as the two existing routes. In addition, since the span of service will remain the same, the revenue hours under the proposed route will also remain the constant. The total revenue miles will decrease due to the shorter total distance of the combined route. Ridership on the combined route is expected to be similar to the total of the two existing routes.

Table 3-8. Annual Statistics for Existing Hopewell Circulator and Southpark Mall Routes and Proposed Hopewell / Southpark Mall Route

	Existing Hopewell	Existing Southpark Mall	Proposed Hopewell / Southpark Mall	Change Over Existing
Revenue Hours	3,927	3,876	7,803	0
Revenue Miles[1]	76,311	28,555	97,921	-6,945
Peak Vehicles	1	1	2	0
Operating Cost[2]	$277,100	$273,500	$550,600	$0
Ridership[3]	28,000	26,000	54,000	0

1. Revenue miles for the proposed route assumes service to the Riverside Regional Jail twice daily.
2. Estimated operating costs reported in FY 2021 dollars
3. Estimated ridership assumes capturing 100% of existing ridership on the Hopewell and Southpark Mall routes

Rationale:

- In the existing PAT network, passengers in Hopewell wishing to access the rest of the PAT service area must first transfer to the Blandford/Hopewell route. The proposed alignment provides Hopewell riders with a one-seat ride connection to Petersburg Station, reducing the need to transfer for many riders.
- Because the Blandford/Hopewell route serves Fort Lee on the outbound trip, Hopewell passengers who use the Blandford/Hopewell route to transfer to the Hopewell Circulator are forced to clear Fort Lee security causing delays related to security. The proposed route will reduce delays and travel time for Hopewell riders since the route does not enter Fort Lee.
- Service to the businesses along Puddledock Road is a desired improvement. The proposed Hopewell/Southpark Mall route adds service to these businesses to meet this need and improve access to the medical offices along Puddledock Road.
- In the existing alignment, there is long out-of-direction travel to the Riverside Regional Jail. Placing the on-demand service to Riverside Regional Jail at the end of the route, rather than mid-route, reduces the out-of-direction travel delay for riders traveling to/ from downtown Hopewell.
- The connection to the Blandford/Hopewell Route at the Food Lion is proposed to remain under the new service. This connection provides passengers originating at Fort Lee with more convenient access to Southpark Mall (instead of having to travel to downtown Petersburg and then transfer to the Southpark Mall route).
- There is currently an oversupply of service to Riverside Regional Jail relative to the number of people riding to this destination. In a recent survey, the Riverside Regional Jail had 34 total passengers over a one-month survey period. While ridership to Riverside Regional Jail is low PAT recognized the need to provide service to the facility. The reduction in service from hourly to an on-demand service is more fitting for this demand.

3.1.7 South Crater Road Alignment Change

South Crater Road

Service Changes: Minor alignment changes are proposed for the South Crater Road route. Instead of serving Medical Park Boulevard in the inbound direction, as the South Crater Road route currently operates, the proposed route will serve the Walmart Supercenter and continue along South Crater Road, turning around at the Department of Social Services. Service along Medical Park Boulevard will be eliminated from the South Crater Road route, but the remainder of the route alignment will stay intact. Figure 3-8 shows the proposed changes for the South Crater Road route.

In addition, it is recommended to increase the service frequency of the South Crater Road route. The current South Crater Road route has only one vehicle scheduled to operate the alignment. However, the high ridership on the South Crater Road Route has caused PAT to operate an additional vehicle, or tripper, that is dispatched immediately following the scheduled vehicle. Although trippers are traditionally utilized in transit service on occasion when ridership is unexpectedly and overwhelmingly high, the tripper on the South Crater Road route operates on nearly every trip on every day. Due to the high usage of the tripper, it is recommended to improve the service frequency of the South Crater Road route from 60 minutes to 30 minutes, formalizing the use of the tripper as an additional vehicle on the route.

Figure 3-8. Alignment of Existing South Crater Road Route and Proposed South Crater Road Route

A comparison of service under the existing South Crater Road route and the proposed South Crater Road route is shown in Table 3-9. The statistics in the existing South Crater Road route assume the tripper vehicle operates on every trip of every service day. Even though this service is not reflected in the schedule, it is a more accurate depiction of current operations than calculating the service requirements for a single vehicle. The results of the comparison of the existing and proposed services, therefore, is minimal. There is a small reduction in revenue miles due to the elimination of service along Medical Park Boulevard. There is also an assumed ridership loss of 10% resulting from the reduction in service to Medical Park Boulevard. It should

be noted that service to Medical Park Boulevard will continue to be provided with the Mall Plaza route.

Table 3-9. Annual Statistics for Existing South Crater Road Route and Proposed South Crater Road Route

	Existing South Crater Road Route	Proposed South Crater Road Route	Change Over Existing
Revenue Hours	7,752	7,752	0
Revenue Miles	51,463	46,972	-4,492
Peak Vehicles	2	2	0
Operating Cost[1]	$547,000	$547,000	$0
Ridership[2]	61,000	55,000	-6,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 90% of the existing ridership on the South Crater Road route

Rationale:

- The South Crater Road route is PAT's most productive route. Because the route is direct and serves desirable destinations, most of the existing alignment is recommended to be maintained.
- PAT recently modified service on the South Crater Road route to serve the new Social Services location and this service change created longer travel times for passengers traveling to Medical Park Boulevard. Removing service on Medical Park Boulevard from the South Crater Road route makes the entire route bi-directional, and therefore reduces the time passengers are on the bus before reaching their destination.
- Moving the service to Medical Park Boulevard from the South Crater Road route to the Mall Plaza route provides more direct service on both routes. Passengers on the Mall Plaza route can access Medical Park Boulevard without first traveling to Walmart and Social Services and passengers on the South Crater Road route can access Walmart without first traveling to Medical Park Boulevard.
- Formalizing a second vehicle on South Crater Road rather than constantly using a tripper makes the service easier to understand for passengers. The schedule for South Crater Road service should be written so that a vehicle departs Petersburg Station every 30 minutes, providing passengers more frequent service on the South Crater Road route.

3.1.8 Blandford/Hopewell Weekday Headway Improvement

Service Changes: The Blandford/Hopewell route currently operates at 60-minute headways. This project proposes to improve the headway to 30 minutes on weekdays, while maintaining 60-minute headways on Saturdays. Implementing this recommendation would require one additional vehicle, bringing the peak vehicle requirement to two vehicles to operate this service.

Table 3-10 compares the annual statistics for the Blandford/Hopewell service under 60-minute headways and 30-minute weekday headways (and maintaining 60-minute headways on Saturdays). Increasing the frequency of the service to twice an hour doubles the operating costs

on weekdays. The ridership is expected to increase at a rate of 50% of the existing service. While Table 3-10 shows annual operating requirements, it should also be noted that this service change would also require capital funds to purchase one additional vehicle.

Table 3-10. Annual Statistics for Increasing Weekday Frequency on Blandford / Hopewell Route

	Existing 60-Min Headway Blandford / Hopewell Route	Proposed 30-Min Weekday Headway Blandford / Hopewell Route	Change Over Existing
Revenue Hours	3,876	7,149	3,273
Revenue Miles	56,983	105,086	48,103
Peak Vehicles	1	2	1
Operating Cost[1]	$273,500	$504,400	$230,900
Ridership[2]	48,000	72,000	24,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes 150% of the existing ridership on the Blandford/Hopewell route

Rationale:

- Ridership on the Blandford/Hopewell route is strong. Increasing the frequency of this route would benefit passengers who are already using the service, as well as encourage new riders to use the service.
- Increasing the number of routes operating at 30-minute headways will give riders more flexibility and improve connectivity in the system.

3.1.9 Hopewell/Southpark Mall Weekday Headway Improvement

Service Changes: The project described in section 3.1.6 identified adjustments to the Hopewell/Southpark Mall routes to combine the two separate routes into a single route with a two-hour roundtrip run time. The existing service as well as the proposed service requires a total of two vehicles to operate 60-minute headways. This project calls for an additional two vehicles to improve the headway from 60 minutes to 30 minutes on weekdays, while maintaining 60-minute headways on Saturdays.

Table 3-11 compares the annual statistics for the Hopewell/Southpark Mall under 60-minute headways (as described in section 3.1.6) to operations with 30-minute weekday headways (and maintaining 60-minute headways on Saturdays). On an annual basis, this increase in frequency would double the revenue hours, revenue miles, and peak vehicles required on weekdays. Implementing the recommendation would require about $464,800 in additional operating funds and result in approximately 27,000 additional riders (an increase of approximately 50% of the existing ridership). It should also be noted that these service changes would also require capital funds to purchase two additional vehicles.

Table 3-11. Annual Statistics for Increasing Weekday Frequency on Hopewell / Southpark Mall Route

	Existing 60-Min Headway Hopewell / Southpark Mall Route	Proposed 30-Min Headway Hopewell / Southpark Mall Route	Change Over Existing
Revenue Hours	7,803	14,391	6,588
Revenue Miles	97,921	189,577	91,656
Peak Vehicles	2	4	2
Operating Cost[1]	$550,600	$1,015,400	$464,800
Ridership[2]	54,000	81,000	27,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 150% of existing ridership

Rationale:

- Ridership data shows that the Southpark Mall route and the Hopewell Circulator route are high performing routes. As a result, increasing the frequency of this combined route would likely result in additional ridership.
- Increasing the number of routes operating at 30-minute headways will give riders more flexibility and improve connectivity in the system.

3.1.10 Mall Plaza Weekday Headway Improvement

Service Changes: The existing Mall Plaza route, as well as the extended Mall Plaza route (as described in section 3.1.3), operate at 60-minute headways. This project assumes the proposed changes in section 3.1.3 have been implemented and the Mall Plaza route operates from Petersburg Station to the Walmart Supercenter on South Crater Road. This project calls for an additional vehicle to reducing the headways from 60 minutes to 30 minutes on weekdays, while maintaining 60-minute headways on Saturday.

Table 3-12 compares the annual statistics for the proposed Mall Plaza route under 60-minute headways and 30-minute headways (and maintaining 60-minute headways on Saturdays). As a result of this project, the revenue hours, revenue miles, peak vehicles, and operating costs double on weekdays. The ridership is expected to increase at a rate of 50% of the existing ridership per hour due to the increase in service. This translates to an annual increase of about 11,000 riders. It should also be noted that this service change would also require capital funds to purchase one additional vehicle.

Table 3-12. Annual Statistics for Increasing Weekday Frequency on Mall Plaza Route

	Existing 60-Min Headway Mall Plaza Route	Proposed 30-Min Headway Mall Plaza Route	Change Over Existing
Revenue Hours	3,468	6,379	2,911
Revenue Miles	54,600	101,509	46,909
Peak Vehicles	1	2	1
Operating Cost[1]	$244,800	$450,100	$205,300
Ridership[2]	22,000	33,000	11,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 150% of existing ridership

Rationale:

- The proposed alignment of Mall Plaza (as described in section 3.1.3) is expected to make this route one of the stronger performing routes in the PAT transit network. Increasing the frequency of this route is expected to further increase ridership.
- Increasing the number of routes operating at 30-minute headways will give riders more flexibility and improve connectivity in the system.

3.1.11 Weekday Span of Service Increase

Service Changes: The existing PAT weekday service operates from approximately 6 AM to 7 PM. The proposed additional service would extend service on weekdays for all PAT routes. Table 3-13 compares the current operational requirements for weekday service with the requirements necessary to extend service by one or two additional hours. The increased cost associated with the extended service would be approximately $180,000 per hour annually. Ridership for the additional hours is estimated to be about 60% of the average daily ridership per revenue hour due to the lower demand later in the day.

Table 3-13. Annual Statistics for Increasing Weekday Span of Service

		Proposed Weekday Service Operating One Additional Hour		Proposed Weekday Service Operating Two Additional Hours	
	Existing Weekday Service	Proposed	Change Over Existing	Proposed	Change Over Existing
Revenue Hours	34,055	36,605	2,550	39,155	5,100
Revenue Miles	458,268	488,883	30,615	519,498	61,230
Peak Vehicles	11	11	0	11	0
Operating Cost[1]	$2,402,900	$2,582,900	$180,000	$2,762,900	$360,000
Ridership	280,000	295,000	15,000	310,000	30,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 60% of the average riders per weekday hours for the additional hours of service

Rationale:

- The public outreach survey results detailed in Chapter 2 showed the community's desire for PAT service to extend later in the day.
- Increasing the span of service improves rider access without increasing capital costs.
- Extending the span of service to later in the day may also increase ridership earlier in the day, as additional riders may be attracted to use the service if a later return trip is available.

3.1.12 Saturday Span of Service Increase

Service Changes: The existing PAT Saturday service operates from approximately 7 AM to 7 PM. The proposed service extension would provide one or two additional hours of service for all PAT routes on Saturday. Table 3-14 compares the existing operational requirements for Saturday service with the requirements necessary to extend service by one or two additional hours. The increased cost associated with this expanded service would be $36,000 per hour annually. Ridership is estimated to increase by about 2,000 annual riders for each additional hour and by about 4,000 annual riders for two additional hours of span. This estimated ridership assumes about 60% of the average riders per Saturday for the additional hours of service due to the lower demand later in the day.

Table 3-14. Annual Statistics for Increasing Saturday Span of Service

		Proposed Saturday Service Operating One Additional Hour		Proposed Saturday Service Operating Two Additional Hours	
	Existing Weekday Service	Proposed	Change Over Existing	Proposed	Change Over Existing
Revenue Hours	5,967	6,477	510	6,987	1,020
Revenue Miles	72,804	78,927	6,123	85,050	12,246
Peak Vehicles	10	10	0	10	0
Operating Cost[1]	$421,000	$457,000	$36,000	$493,000	$72,000
Ridership	56,000	58,000	2,000	60,000	4,000

1. Estimated operating costs reported in FY 2021 dollars
2. Estimated ridership assumes capturing 60% of the average riders per weekday hours for the additional hours of service

Rationale:

- The public outreach survey results detailed in Chapter 2 identified increased service on Saturday as a desire of the community.
- Increasing the span of service improves rider access without increasing capital costs.

3.1.13 Sunday Service Implementation

Service Changes: PAT currently operates six days a week. This project proposes extending operations to seven days a week by adding Sunday service. Sunday service is assumed to

operate on the same schedule as the existing Saturday service from approximately 7 AM to 7 PM.

Table 3-15 summarizes the proposed Sunday service. Revenue hours, revenue miles, and peak vehicle requirements are expected to be the same as existing Saturday service. The operating costs for Sunday service would be an additional $421,000 a year. Because increasing the span of service does not translate to ridership increases at the same rate as existing service, Sunday ridership is expected to be approximately 60% of the existing Saturday ridership. This project would not require additional vehicles, and therefore, would not require additional capital funding to begin operation.

Table 3-15. Annual Statistics for Implementing Sunday Service

	Proposed Sunday Service
Revenue Hours[1]	5,967
Revenue Miles[1]	72,804
Peak Vehicles[1]	10
Operating Cost[2]	$421,000
Ridership[3]	201,000

1. Sunday service mirrors Saturday service in terms of operating requirements
2. Estimated operating costs reported in FY 2021 dollars
3. Estimated ridership assumes capturing 60% of the current Saturday service ridership

Rationale:

- Sunday service would enable riders to reach places of employment seven days a week, offering greater opportunity and flexibility for workers to reach jobs.
- Sunday service is the largest gap in service for the PAT system. Eliminating this gap would provide more comprehensive service.
- While the operational investment in Sunday service would be great, the capital cost of adding Sunday service would be minimal.

3.1.14 Petersburg to Emporia Service Implementation

Service Changes: PAT has indicated a potential desire to provide service between Petersburg and Emporia and is initiating conversations with the City of Emporia. The proposed Emporia route would operate from Petersburg Station to Emporia via I-95/US 301. Additional study would be needed to determine specific operations but stops along the route could include Templeton at Exit 41, Stony Creek at Exit 31, Jarratt at Exit 20, and Emporia at Exit 11. The proposed route is assumed to have a total of three round trips every weekday (two in the morning and one in the evening). The estimated roundtrip length of the route is 95 miles and would take approximately two hours.

Table 3-16 summarizes the estimated operating requirements of the Emporia route. The new service would require a single vehicle to operate, with an associated operated cost of about

$108,000 annually. It should also be noted that operation of the Emporia would also require capital funds to purchase one additional vehicle.

Table 3-16. Annual Statistics for Emporia Route

	Proposed Emporia Service
Revenue Hours[1]	1,530
Revenue Miles[2]	72,675
Peak Vehicles	1
Operating Cost[3]	$108,000

1. Revenue hours assumes three 2-hour round trips daily
2. Revenue miles assumes approximately 95 miles per round trip
3. Estimated operating costs reported in FY 2021 dollars

Rationale:

- This project improves the connection between Petersburg and Emporia, increasing transportation options for residents in nonurbanized areas along this corridor.
- The cities of Petersburg and Emporia have voiced a desire to connect the cities with transit service, dating back to at least 2015.

3.2 Prioritization of Planned Service Improvements

The projects identified in this chapter help to address the identified transit needs of the Petersburg community. Planning for the implementation of these projects over the ten-year TSP horizon will allow PAT to properly prepare for the operating expenses and capital costs associated with the service improvements. Projects are prioritized as high, medium, or low priority levels for implementation based on how well the projects are anticipated to address the transit needs identified in Chapter 2. The ability to fund projects using existing funding sources is also factored into the project prioritization.

Projects are organized into short-term (1-3 years), mid-term (3 to 7 years), and long-term (7 to 10 years) timeframes based on the priority level and the readiness of the project. Specific years are assigned to each project to show the year-by-year progression of the short, mid, and long-term plans over the TSP lifespan. An annual summary of the short-, mid-, and long-term recommendations, including projected additional operating and capital costs associated with the projects, is shown in Table 3-17.

The short-term plan (FY 2021 to FY 2023) does not increase service hours or peak vehicles required and is primarily focused on alignment changes to better meet the needs of the Petersburg community. One of the priorities identified for the PAT transit system is the need to increase service along South Crater Road, a corridor with one of the highest travel demand in the city. The existing South Crater Road route regularly becomes overcrowded and PAT often operates an additional vehicle on the route for relief. The short-term plan directly addresses the need for more service on South Crater Road by realigning the Mall Plaza and Walnut Hill routes to extend farther south, allowing these routes to reach more destinations on South Crater Road. In addition, the South Crater Road alignment change formalizes the second vehicle that

currently operates on South Crater Road, providing 30-minute headways on this route. These improvements to service on South Crater Road are made without eliminating service to other areas in Petersburg. Although some passengers will be asked to walk slightly longer distances, all existing passengers in the existing service area will still have access to transit. In addition to the improved service on South Crater Road, the short-term plan also includes other minor adjustments to existing routes. All of the route modifications in the short-term plan are “high” priority, and were intentionally designed to be cost neutral for both operating and capital costs.

The mid-term plan (FY 2024 to FY 2027), which calls for an increase in span of service by one hour for both the weekday and Saturday service, is categorized as “medium” priority. Increasing the service hours of PAT service is something that has been requested by the Petersburg community but should be done cautiously. Extending the service hours by one hour at a time allows PAT to review the success of the increased service and slow the implementation if necessary. The additional cost of extending weekday service by one hour on all routes is estimated to be about $180,000 annually. For Saturdays, the cost for one additional hour of service is estimated to be about $36,000 annually. One advantageous aspect of the service span extension projects is that no additional capital expenditures are required because there is no change to the peak vehicle requirement.

The long-term plan (FY 2028 to FY 2030) is also categorized as “medium priority” and calls for increasing the span of service by one additional hour on top of the mid-term plan span of service increase. Because the additional service in the long-term plan represents the same incremental difference as in the mid-term plan, the additional operating costs are estimated to also be $180,000 annually for weekdays and $36,000 annually for Saturdays.

The remaining projects from the previous section that were not included in the short-, mid-, or long-term plans were included in the unconstrained plan and categorized as “low priority”. These projects require the identification of additional funding to implement but are included as part of PAT’s long-term vision. Inclusion of these projects in the unconstrained plan provides PAT a more complete understanding of unmet and unfunded needs, allowing staff to focus on advancing projects to meet those needs.

Table 3-17. Prioritization of Planned Service Improvements

	Fiscal Year		Project	Priority Level	Additional Annual Operating Costs	Additional Capital Costs
Short-Term Plan	2021	-	-	-	-	-
	2022	3.1.1	Blandford/Hopewell alignment change	High	$0	$0
		3.1.2	County Drive (460) alignment change	High	$0	$0
		3.1.3	Walnut Hill and Mall Plaza alignment change and Virginia Avenue elimination	High	$0	$0
		3.1.4	Halifax Street alignment change	High	$0	$0
		3.1.5	Lee Avenue alignment change	High	$0	$0
		3.1.6	Hopewell Circulator and Southpark Mall alignment change	High	$0	$0
		3.1.7	South Crater Road alignment change	High	$0	$0
	2023	-	-	-	-	-
Mid-Term Plan	2024	3.1.11	Increasing weekday span of service by one hour	Medium	$180,000	$0
	2025	3.1.12	Increasing Saturday span of service by one hour	Medium	$36,000	$0
	2026	-	-	-	-	-
	2027	-	-	-	-	-
Long-Term Plan	2028	3.1.11	Increasing weekday span of service by one hour	Medium	$180,000	$0
	2029	3.1.12	Increasing Saturday span of service by one hour	Medium	$36,000	$0
	2030	-	-	-	-	-
Unconstrained Plan	Beyond 2030	3.1.8	Blandford/Hopewell weekday headway improvement (60 min to 30 min)	Low	$230,900	$144,000
		3.1.9	Hopewell/Southpark weekday Mall headway improvement (60 min to 30 min)	Low	$464,800	$288,000
		3.1.10	Mall Plaza weekday headway improvement (60 min to 30 min)	Low	$205,300	$144,000
		3.1.13	Sunday service implementation	Low	$421,000	$0
		3.1.14	Petersburg to Emporia service implementation	Low	$108,000	$144,000

1. All costs stated in FY 2021 dollars

3.3 Service Development

A summary of the operating impacts of the planned service changes is shown in Table 3-18. The impact of each planned service improvement on revenue hours and revenue miles is presented for the projects in the short-term, mid-term, long-term, and unconstrained plans.

Although the short-term plan covers a three-year period from FY 2021 to FY 2023, all the projects are planned for implementation in FY 2022 to allow PAT to make all route changes as single and cohesive effort. This will allow for all changes to be communicated to the public at the same time and only ask passengers to adjust to the new network once instead of several times. The overall impact of the short-term plan improvements on operating requirements is minimal in terms of revenue hours and revenue miles. The projects are estimated to have a negligible impact on revenue hours and only add about 10,532 additional revenue miles annually.

The mid-term plan, which covers FY 2024 to FY 2027, is made up of projects to increase both the weekday and Saturday service span by one hour. The weekday span of service is proposed to increase by one hour in FY 2024 and the Saturday span of service is proposed to increase by one hour in FY 2025. The increase of the weekday span of service is planned first because there is expected to be a greater demand for this service. Increasing the weekday span of service is a much larger project and requires a total of 2,550 additional revenue hours and 30,615 additional revenue miles annually. Saturday span expansion, by comparison, requires about 510 additional revenue hours and 6,123 additional revenue miles annually.

The long-term plan, which covers FY 2028 to FY 2030, includes the same two projects from the mid-term: increasing the span of service by one additional hour on weekdays (FY 2028) and Saturdays (FY 2029). These projects assume that the increased span of service improvements in the mid-term plan have been completed successfully, resulting in a cumulative service span expansion of two hours for both weekdays and Saturdays compared with the existing span. Service span expansion is added incrementally to allow PAT the opportunity to review the success of the increased service and slow the implementation if necessary.

The unconstrained improvements are not given a timeframe or year because funding has not been identified for these projects. Operating impacts of these projects are included as a reference in the case that the funding landscape changes or these projects increase in priority.

Table 3-18. Service Development

	Fiscal Year		Project	Annual Service Hours Change	Annual Service Miles Change
Short-Term Plan	2021	-	-	-	-
	2022	3.1.1	Blandford/Hopewell alignment change	0	357
		3.1.2	County Drive (460) alignment change	0	-7,979
		3.1.3	Walnut Hill and Mall Plaza alignment change and Virginia Avenue elimination	0	15,880
		3.1.4	Halifax Street alignment change	0	-2,770
		3.1.5	Lee Avenue alignment change	0	4,251
		3.1.6	Hopewell Circulator and Southpark Mall alignment change	0	-6,945
		3.1.7	South Crater Road alignment change	0	-4,492
	2023	-	-	-	-
Mid-Term Plan	2024	3.1.11	Increasing weekday span of service by one hour	2,550	30,615
	2025	3.1.12	Increasing Saturday span of service by one hour	510	6,123
	2026	-	-	-	-
	2027	-	-	-	-
Long-Term Plan	2028	3.1.11	Increasing weekday span of service by one hour	2,550	30,615
	2029	3.1.12	Increasing Saturday span of service by one hour	510	6,123
	2030	-	-	-	-
Unconstrained Plan	Beyond 2030	3.1.8	Blandford/Hopewell weekday headway improvement (60 min to 30 min)	3,273	48,103
		3.1.9	Hopewell/Southpark Mall weekday headway improvement (60 min to 30 min)	6,588	91,656
		3.1.10	Mall Plaza weekday headway improvement (60 min to 30 min)	2,911	46,909
		3.1.13	Sunday service Implementation	5,967	72,804
		3.1.14	Petersburg to Emporia service implementation	1,530	72,675

4 Implementation Plan

Chapter 4 of the TSP details the necessary steps and capital investments required to carry out the recommended operations and service improvements detailed in Chapter 3. The implementation plan identifies the steps needed to maintain a state of good repair on existing assets as well as the additional capital needs for any planned expansion or modifications to service. As discussed in Chapter 3, PAT does not intend to make service changes that would trigger the need for additional capital expenditures over the ten-year TSP lifespan. Therefore, this chapter primarily focuses on the capital requirements to replace aging assets to maintain a state of good repair.

4.1 Asset Management

Transit agencies that receive federal funding from the Federal Transit Administration (FTA) must create and maintain a Transit Asset Management (TAM) plan for rolling stock, non-revenue vehicles, facilities, and other equipment. The requirements of the TAM plan vary based on the classification of the agency as either Tier I or Tier II, which is determined by the presence of rail and the size of the agency's fleet. In Virginia, DRPT develops and maintains the Tier II plans for all Tier II-eligible agencies, whereas the Tier I agencies are responsible for their own TAM plans. PAT is classified as a Tier II agency and participates in the DRPT-developed group TAM plan.

In addition to using the DRPT group TAM plan, PAT maintains a Fleet, Facilities, and Equipment Maintenance Plan that guides PAT's planned maintenance of assets. This document, which was most recently updated in December 2018, details the preventive maintenance strategy undertaken by PAT to maximize equipment life, minimize cost, and to ensure employee and public safety. The purposes of the Fleet, Facilities, and Equipment Maintenance Plan are to:

- Maintain and implement the vehicle preventive maintenance program consistent with manufacturer's recommendation
- Track maintenance cost via line-item budget analysis, which is reviewed by the director monthly
- Ensure vehicle reliability, which is measured by vehicle downtime and road calls
- Ensure vehicle operating efficiency, which is measured by cost per mile and miles per gallon (mpg) of fuel
- Ensure vehicles are available to meet all peak service requirements
- Ensure vehicles are clean and comfortable for passengers
- Ensure facility upkeep and repair supporting the vehicle maintenance mission
- Ensure a safe operating vehicle and the safety of employees performing vehicle and facility maintenance
- Ensure federally funded equipment is kept in a safe and operational condition

A good maintenance strategy enables PAT to maximize the useful life of assets. However, even well-maintained vehicles, facilities, and other capital assets eventually reach the end of their useful life and must be replaced because they become less reliable. PAT uses the DRPT useful

life guidelines for FTA grants to plan for the replacement of aging assets. The following sections outline PAT's replacement plan for replacing revenue and non-revenue vehicles, vehicle maintenance and operations facilities, passenger amenities, and technology and ITS.

4.1.1 Revenue and Non-Revenue Vehicles

An overview of PAT's existing vehicle fleet is discussed in Section A.6.1, including an inventory of fixed-route vehicles (Table A-4), paratransit vehicles (Table A-5), and support vehicles (Table A-6). PAT currently owns a total of 15 vehicles for fixed-route service, nine vehicles for paratransit service, and 12 support vehicles. An additional six vehicles have been ordered and will be added to the fixed-route fleet in FY 2022 for a total of 21 fixed-route vehicles.

4.1.1.1 Vehicle Replacement Assumptions

PAT's existing fleet is composed of a variety of vehicle makes and models, with various passenger seating capacities. Maintaining a diverse fleet is oftentimes challenging because each vehicle requires specialized knowledge and replacement parts. Moving forward, PAT intends to standardize the fixed-route and paratransit fleets by replacing aging vehicles with fewer makes and models to establish greater consistency.

Currently, fixed-route service is operated with large heavy-duty transit buses and medium medium-duty transit buses. While the large heavy-duty transit buses are all the same make and model (2013 32-passenger Gillig), the medium-medium duty transit buses are a mix of makes and models. Moving forward, PAT intends to replace all medium medium-duty transit buses with Ford E-550 vehicles. The seating capacity of the Ford E-550 is well suited to serve on PAT's lower demand routes, while the larger Gillig vehicles operate on the higher ridership routes. For paratransit service, PAT intends to purchase Ford E-450 vehicles. Table 4-1 shows estimated replacement vehicle costs for these assumed replacement vehicles. The FY 2021 vehicle replacement costs are based on recent vehicle purchase costs. The FY 2022 to FY 2030 vehicle replacement costs include a 4% annual escalation rate to account for inflation.

Table 4-1. Vehicle Costs by Year ($1,000s, YOE$)

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Bus (>30-ft)	$649	$675	$702	$730	$759	$790	$821	$854	$888	$924
Bus (<30-ft)	$128	$133	$138	$144	$150	$156	$162	$168	$175	$182
Paratransit Fleet	$74	$77	$80	$83	$87	$90	$94	$97	$101	$105
Support Vehicle Fleet	$45	$47	$49	$51	$53	$55	$57	$59	$62	$64

1. All costs in $1,000s
2. All costs assume a 4% annual escalation rate

Table 4-2 shows the vehicle useful life benchmarks for years and miles using the DRPT useful life guidelines for FTA grants. These benchmarks were used as a basis point for replacement of existing PAT vehicles. In addition to the benchmarks, PAT considered the total vehicle replacement cost in each year of the TSP when determining the timing of replacement. As a result, PAT elected to defer replacement in some years in order to keep capital costs more manageable for a single year. Figure 4-1 compares the vehicle replacement costs per year under a scenario where PAT strictly follows the useful life benchmarks versus PAT's plan to

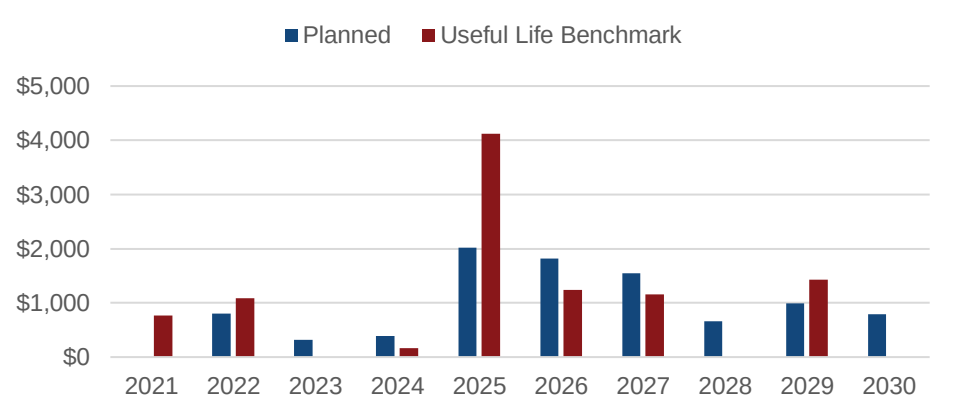
defer replacement of select vehicles. This figure shows that the projected costs for vehicle replacement would be exceedingly high in some years if every vehicle was replaced the same year it met its useful life benchmark. Distributing the costs over several years lessens the burden in any single year.

Table 4-2. Vehicle Useful Life

Vehicle Category	Useful Life	
	Years	Miles
Large heavy-duty transit buses 35'-40'	12	500,000
Small heavy-duty transit buses 30'	10	350,000
Medium medium-duty transit buses 25'-35'; Sprinter bus	7	200,000
Medium light-duty transit buses 25'-35', BOC vehicles, Expansion vans	5	150,000
Light-duty vehicles (vans, sedans, light-duty buses); Support vehicles; BOC (15- 19 passenger), < 30 ft	4	100,000

1. Source: DRPT Minimal Asset Useful Life Standards for FTA Grants; FTA Circular 5010.1D

Figure 4-1. Annual Vehicle Replacement Costs using Useful Life Benchmark Versus Planned Replacement ($1,000s, YOE$)



4.1.1.2 Vehicle Replacement Plan Summary

Table 4-3 shows the planned replacement of vehicles by make, year, and type from FY 2021 to FY 2030. As of 2021, three paratransit vehicles and all twelve of the support vehicles have met or exceeded the useful life guidelines in terms of age. The total replacement cost of all these vehicles is estimated to be $762,000 (in FY 2021 dollars). Since replacing all 15 vehicles in a single year would be very costly and because many of the support vehicles are operating well and have low utilization rates, PAT has elected to spread the replacement costs over several years.

Table 4-3. Vehicle Replacement Plan by Existing Make/Type

Vehicle Type	Existing Make / Year	Existing Type	Planned Replacement Type	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Fixed Route													
Bus (>30-ft)	Gillig / 2013	35-foot Bus	35-foot Gillig	-	-	-	-	2	2	-	-	-	-
	Freightliner / 2016	30-footTrolley	35-foot Gillig	-	-	-	-	-	-	1	-	-	-
Bus (<30-ft)	Ford / 2015	E-450	Ford E-550	-	-	1	-	-	-	-	-	-	1
	Chevrolet / 2018	E-4500	Ford E-550	-	-	-	-	3	-	-	-	-	-
	Chevrolet / 2020	E-4500	Ford E-550	-	-	-	-	-	-	3	3	-	-
	New Vehicles	-	Ford E-550	-	6	-	-	-	-	-	-	3	3
Paratransit													
Paratransit Fleet	Chevrolet / 2012	2500	Ford E-450	-	-	1	-	-	-	-	1	-	-
	Ford / 2016	E-450	Ford E-450	-	-	-	2	-	-	-	-	2	-
	Ford / 2017	E-450	Ford E-450	-	-	-	2	-	-	-	-	2	-
	Ford / 2019	E-450	Ford E-450	-	-	-	-	-	2	-	-	-	-
	Ford / 2021	E-450	Ford E-450	-	-	-	-	-	-	2	-	-	-
Support Vehicles													
Various	Various	Various	Various	-	-	2	1	1	1	1	1	1	1

Table 4-4. Vehicle Capital Needs ($1,000s, YOE$)

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Replacement Vehicles										
Bus (>30-ft)	-	-	-	-	2	2	1	-	-	-
Bus (<30-ft)	-	6	1	-	3	-	3	3	3	4
Paratransit Fleet	-	-	1	4	-	2	2	1	4	-
Support Vehicle Fleet	-	-	2	1	1	1	1	1	1	1
Total Vehicles	**0**	**6**	**4**	**5**	**6**	**5**	**7**	**5**	**8**	**5**
Replacement Costs ($1,000s)										
Bus (>30-ft)	-	-	-	-	$1,518	$1,579	$821	-	-	-
Bus (<30-ft)	-	$799	$138	-	$449	-	$486	$505	$526	$729
Paratransit Fleet	-	-	$80	$333	-	$180	$187	$97	$405	-
Support Vehicle Fleet	-	-	$97	$51	$53	$55	$57	$59	$62	$64
Total Costs	**-**	**$799**	**$316**	**$384**	**$2,020**	**$1,814**	**$1,551**	**$662**	**$992**	**$793**

1. All costs in $1,000s
2. All costs assume a 4% annual escalation rate

4.1.1.3 Fixed-Route Vehicle Fleet

All of PAT's fixed-route vehicles are planned for replacement over the course of the 10-year TSP timeframe. This includes 15 vehicles that are currently in operation, as well as the six additional vehicles that have been ordered and will be added to the existing fleet in FY 2022. It should be noted that the six vehicles that have already been ordered are replacing vehicles that have already been disposed of.

All medium medium-duty vehicles are planned to be replaced with Ford E-550s. The useful life of this category of vehicles is 7 years or 200,000 miles and these vehicles cost approximately $128,000 (FY 2021 dollars). The larger, 35-ft Gillig vehicles that operate on PAT's higher ridership routes (e.g., South Crater Road) were manufactured in 2013 and will be replaced with similarly sized vehicles in FY 2025 and FY 2026 in order to spread the cost of these vehicles over multiple years. The useful life on this category of vehicle is 12 years or 500,000 miles and these vehicles cost approximately $649,000 (FY 2021 dollars). The only trolley vehicle in the fleet is expected to be replaced with the same vehicle type as the 35-ft Gilligs.

The planned fixed-route vehicle fleet purchases over the TSP timeframe will enable PAT to retire and sell older rolling stock and replace with a more consistent line of vehicles. In addition, since the replacements are scheduled to occur over multiple years rather than all at once, future replacements will also be more spread out.

4.1.1.4 Paratransit Vehicle Fleet

PAT anticipates replacement of 14 paratransit vehicles that will meet or exceed the useful life over the TSP lifecycle. PAT's strategy for replacement of paratransit vehicles considers useful life standards as well as the timing of fixed-route vehicle replacement needs so that the capital costs are not exceedingly high in any given year. The next planned replacement of paratransit vehicles is scheduled for FY 2023. The largest replacement of paratransit vehicles will occur in FY 2024 and FY 2029, with the planned replacement of four vehicles in each of these years. The paratransit replacement vehicles are planned to be medium light-duty vehicles (Ford E-450), with a seating capacity of thirteen to fourteen passengers. The useful life of this type of vehicle is five years or 150,000 miles and costs approximately $74,000 (FY 2021 dollars).

4.1.1.5 Support Vehicle Fleet

Although all 12 of PAT's support vehicles have met the useful life in terms of years, the continued maintenance and light use of these vehicles warrants deferral of replacement. PAT does not anticipate an immediate need for replacement of any support vehicles in FY 2021 or FY 2022. However, by FY 2023 the average age of the support vehicle fleet will be over 10 years and scheduling for replacements of the aging support vehicle fleet will be needed. The replacement for the support vehicles is strategically chosen in years when other capital needs are not high. PAT plans to replace two support vehicles in FY 2023 and one vehicle per year afterwards. The cost of support vehicles is approximately $45,000 (FY 2021 dollars).

4.1.2 Vehicle Maintenance and Operations Facilities

PAT's operating, maintenance (including fueling), and vehicle storage facility is located at 309 Fairgrounds Road. The facility was built in 1981. Due to the age of the facility, PAT plans to replace with a new maintenance facility within this TSP lifecycle. The process is planned to

begin with a feasibility study conducted in FY 2023, followed by the design and engineering of the facility in FY 2024. Construction is anticipated to occur in FY 2025 and is expected to cost $15 to $20 million dollars. This estimate assumes that the new facility will be built on city-owned property. The cost estimate will be refined as part of the feasibility study and engineering design. PAT also plans to purchase shop equipment for the maintenance facility that would enable more maintenance to be completed inhouse. Purchasing additional shop equipment is programmed for years FY 2021, FY 2023, and FY 2025.

The administration building located at 100 W. Washington Street is expected to require renovation, including bathroom renovations and other necessary repairs to the building. These renovations are planned to occur in FY 2022 and will cost approximately $100,000. Table 4-5 summarizes the anticipated years and costs for PAT's vehicle maintenance and operations facilities capital needs.

Table 4-5. Vehicle Maintenance and Operations Facilities Capital Needs ($1,000s, YOE$)

Project	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Rehab/Renovation of Admin Building	-	$100	-	-	-	-	-	-	-	-
Feasibility study for Maintenance Facility	-	-	$40	-	-	-	-	-	-	-
Design & Engineering of Maintenance Facility	-	-	-	$500	-	-	-	-	-	-
Construction of Maintenance Facility (low to high range)	-	-	-	-	$15,000 to $20,000	-	-	-	-	-
Purchase Shop Equipment	$53	-	$101	-	$107	-	-	-	-	-
Total	**$53**	**$100**	**$141**	**$500**	**$15,107 to 20,107**	**$0**	**$0**	**$0**	**$0**	**$0**

1. All costs in $1,000s

4.1.3 Passenger Amenities

PAT plans to upgrade existing passenger amenities in FY 2021, including the purchase and installation of approximately 400 bus stop signs. In addition to signage, PAT plans to add 7 benches to high ridership locations in FY 2021. Table 4-6 shows the estimated costs for the new signs and benches. Additional passenger amenity needs are not anticipated during the ten-year TSP lifecycle.

Table 4-6. Passenger Amenities Capital Needs ($1,000s, YOE$)

Project	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Signs	$33	-	-	-	-	-	-	-	-	-
Benches	$17	-	-	-	-	-	-	-	-	-
Total	**$50**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

1. All costs in $1,000s

4.1.4 Technology and ITS

Table 4-7 summarizes PAT's technology and ITS capital needs over the course of the ten-year TSP, including computer hardware, radios, security equipment, and automated passenger counters (APCs). PAT plans to replace computer hardware for employees in FY 2022, FY 2026, and FY 2030. Vehicle radios are planned to be purchased in FY 2023. In FY 2023, PAT plans to purchase security camera equipment to cover areas that were not captured by the previous security equipment purchased in FY 2020. Replacement of security equipment purchased in FY 2020 is scheduled for FY 2030. Lastly, APCs will be purchased and installed in 16 vehicles in FY 2023 so that PAT can measure and track passenger counts at the stop level, totaling approximately $240,000 at $15,000 each.

Table 4-7. Technology and ITS Capital Needs ($1,000s, YOE$)

Project	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
ADP Hardware	-	$30	-	-	-	$30	-	-	--	$30
Radios	-	-	$20	-	-	-	-	-	-	-
Security Equipment	-	-	$40	-	-	-	-	-	-	$75
Automated Passenger Counters (APCs)	-	-	$240	-	-	-	-	-	-	-
Total	**$0**	**$30**	**$300**	**$0**	**$0**	**$30**	**$0**	**$0**	**$0**	**$105**

1. All costs in $1,000s

4.2 Capital Implementation Plan

Table 4-8 shows a detailed year-by-year implementation plan for FY 2021 to FY 2030. Since the planned service modifications in Chapter 3 do not require additional capital funding, the capital implementation plan is based entirely on maintaining a state of good repair. Although the asset management replacement activities are not directly related to the projects described in Chapter 3, they were grouped into the same timeframes of short- (FY 2021 – FY 2023), mid- (FY 2024 – FY 2027), and long-term (FY 2028 – FY 2030) for consistency.

Table 4-8. Capital Implementation Plan ($1,000s, YOE$)

	Fiscal Year	Project Type	Project Description	Project Cost	Annual Capital Cost
Short-Term Plan	2021	Facilities	Purchase shop equipment	$53	$103
		Passenger Amenities	Signs and benches	$50	
	2022	Vehicle Replacement	Replace 6 fixed-route vehicles	$799	$929
		Facilities	Rehab/renovation of admin building	$100	
		Technology and ITS	ADP Hardware	$30	
	2023	Vehicle Replacement	Replace 1 fixed-route, 1 paratransit, and 2 support vehicles	$316	$757
		Facilities	Feasibility study for maintenance facility, purchase shop equipment	$141	
		Technology and ITS	Radios, security equipment, and APCs	$300	
Mid-Term Plan	2024	Vehicle Replacement	Replace 4 paratransit and 1 support vehicles	$384	$884
		Facilities	Design and Engineering of Maintenance Facility	$500	
	2025	Vehicle Replacement	Replace 5 fixed-route and 1 support vehicles	$2,020	$17,127 to $22,127
		Facilities	Construction of Maintenance Facility; purchase shop equipment	$15,107 to 20,107	
	2026	Vehicle Replacement	Replace 2 fixed-route, 2 paratransit, and 1 support vehicle	$1,814	$1,844
		Technology and ITS	ADP hardware	$30	
	2027	Vehicle Replacement	Replace 4 fixed-route, 2 paratransit, and 1 support vehicle	$1,551	$1,551
Long-Term Plan	2028	Vehicle Replacement	Replace 3 fixed-route, 1 paratransit, and 1 support vehicle	$662	$662
	2029	Vehicle Replacement	Replace 3 fixed-route, 4 paratransit, and 1 support vehicle	$992	$992
	2030	Vehicle Replacement	Replace 4 fixed-route and 1 support vehicle	$793	$898
		Technology and ITS	ADP hardware and security equipment	$105	

1. All costs in $1,000s
2. All Vehicle costs assume a 4% annual escalation rate

5 Financial Plan

Chapter 5 of the TSP presents the financial plan and provides projections of the anticipated expenditures and revenues over the ten-year TSP timeframe. This chapter is organized into two sections, the first section discusses the projected operating and maintenance costs and funding sources, and the second section discusses the projected capital costs and funding sources.

Due to the non-typical transportation trends and relief funding resulting from the COVID-19 pandemic, financial projections presented in each section are based on a combination of historical data sources provided by PAT. In many cases data from FY 2019, the last full year of pre-pandemic data, was relied on to estimate future year expenditures and revenues, assuming a return to more “normal” transit operations in future years. However, additional information was available for FY 2021 and FY 2022, and, as a result, projections for these fiscal years were based on the estimates from the DRPT Six-Year Improvement Program (SYIP). FY 2023 to FY 2030 estimates were projected using standard escalation rates, data from the SYIP, and reasonable estimates based on current and historical conditions.

As with any projection, the uncertainty in the financial plan increases the further into the future it extends. There is additional uncertainty in some projections because of the disruption caused by the COVID-19 pandemic at the onset of the ten-year timeframe. The pandemic-related impacts are discussed throughout this chapter in the areas that are most affected. While the focus of this chapter is on financial projections, a five-year retrospective of operating and capital expenses is provided in Appendix B for recent historical context.

5.1 Operating and Maintenance Costs and Funding Sources

This section provides details on the projected expenditures and the corresponding levels of funding required to create a balanced operating and maintenance budget over the next ten years. For budgeting and federal reimbursement purposes, PAT breaks operating and maintenance costs into two categories, operating costs and preventive maintenance costs. For consistency, the operating and maintenance costs discussed in this chapter are also broken out into these two categories.

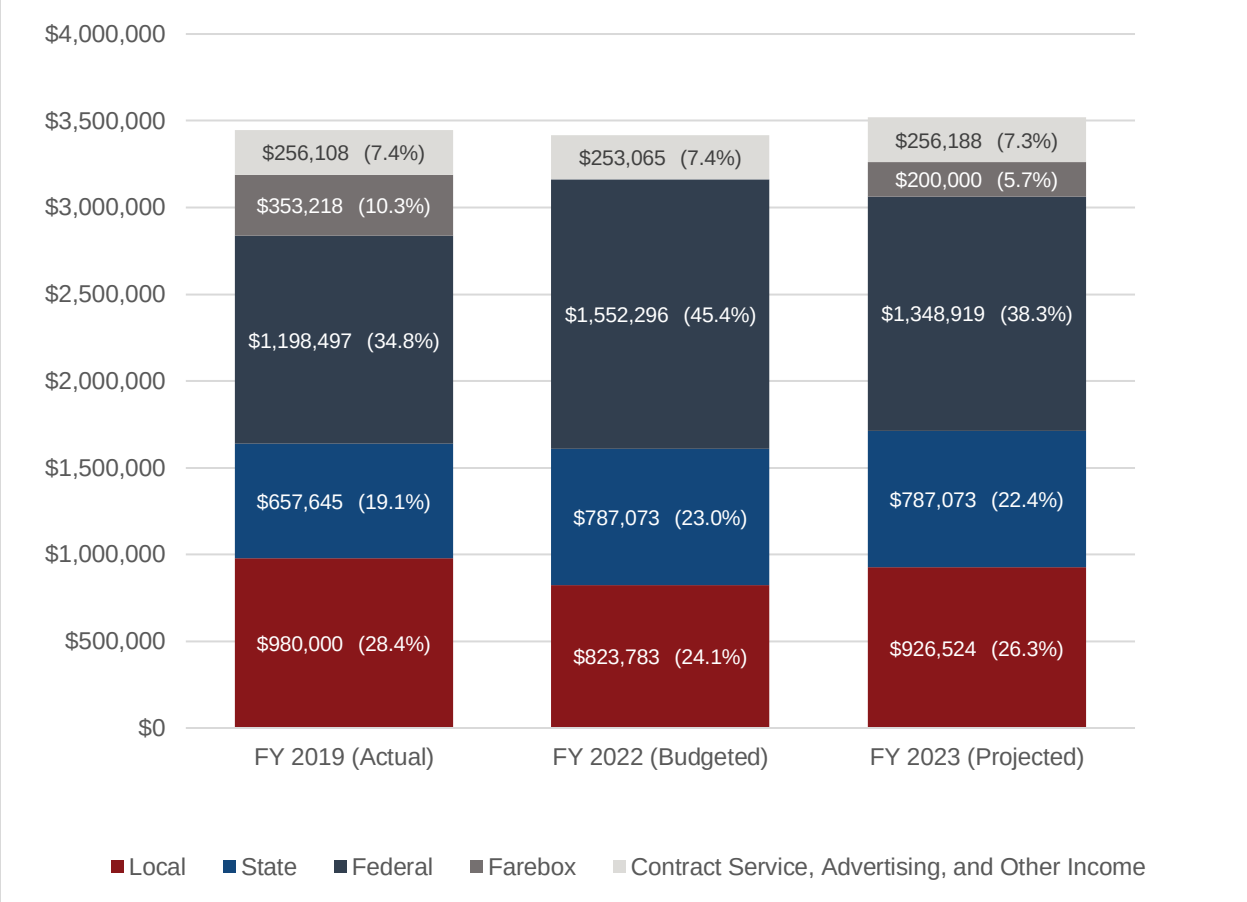
The future operating costs for PAT were projected using the FY 2022 DRPT SYIP estimates and the future preventive maintenance costs for PAT were projected using the FY 2021-2022 Proposed Operating Budget for the City of Petersburg. Future projections for PAT’s operating and preventive maintenance costs were based on FY 2022 budgets rather than FY 2019 since PAT’s operations over the past year remained relatively consistent with pre-pandemic service and the FY 2022 budgets better reflect PAT’s long-term staffing levels.

A comparison chart of FY 2019 (actual), FY 2022 (budgeted), and FY 2023 (projected) operating budgets by revenue source is shown in Figure 5-1, revealing consistent total operating costs but fluctuations in revenue sources. The FY 2022 federal funding was unusually high due to the additional Federal COVID-19 relief funding, but federal funding is not expected to remain at FY 2022 levels in future years. As a result, FY 2019 was used as a baseline year for future year federal revenue projections, which are assumed to increase 3% annually. In addition, PAT had no farebox revenue in FY 2022 due to a decision to provide fare-free service

during the pandemic. There continues to be uncertainty regarding the return to fare collection for PAT; however, for this TSP, projected farebox revenue was based on a modified baseline year of FY 2019.

With operating costs anticipated to remain consistent with FY 2022 levels and federal funding anticipated to decrease, additional funding will be needed in order to maintain a balanced budget, which is discussed in greater detail in the Ten-Year Financial Plan Scenarios section.

Figure 5-1. Operating Revenue Sources (FY 2019 Actual, FY 2022 Budgeted, FY 2023 Projected)



PAT's preventive maintenance costs are also expected to remain consistent with FY 2022 budgeted levels. Revenue sources for preventive maintenance are expected to continue to be 80% federal funds and 20% local match, consistent with past years. More details on projected preventive maintenance costs and revenues are provided in the following sections.

5.1.1 Revenue Assumptions

PAT generates operating and maintenance revenue that is categorized into seven categories: farebox revenue, contract service, advertising, federal funding, state funding, local funding, and

other income. Future years beyond the already budgeted FY 2022 are based on the following assumptions:

5.1.1.1 Farebox Revenue

Fare collection was suspended in FY 2020 due to the COVID-19 pandemic. Although PAT has not yet determined when fare collection will resume, fare collection is assumed to resume in FY 2023 for the purposes of the financial plan. In FY 2019, the last full year of pre-pandemic data, PAT's farebox revenue was 353,218. In FY 2020, which was partially impacted by fare collection suspension, the farebox revenue was $247,913. In light of the uncertainty surrounding the pandemic, including future ridership and timing of a return to fare collection, this financial plan assumes a conservative estimate off $200,000 in farebox revenue for FY 2023 to FY 2030 for the existing service. This assumption should be revisited if/when fare collection resumes. If additional service is implemented, farebox revenue is anticipated to increase proportional to the increase in ridership projected for new service additions. Farebox revenue was estimated to increase at a rate of $0.84 per additional passenger trip (based on FY 2019 fixed route NTD data).

5.1.1.2 Contract Service

Contract service revenue comes from contracts with the City of Hopewell, Greyhound, and Riverside Regional Jail. The total annual amount of revenue from contract service is budgeted at $241,969 in FY 2022 and is expected to remain the same over the course of the TSP lifespan.

5.1.1.3 Advertising

Advertising revenue was negatively impacted by the COVID-19 pandemic. In FY 2021, the advertising revenue was approximately $5,000, which equates to half of what had been generated in pre-pandemic years. In FY 2022, the budgeted advertising revenue in the DRPT SYIP is $7,000. PAT expects advertising revenue to rebound in FY 2023 assuming the pandemic related impacts subside. Beginning with FY 2023, advertising revenue is projected to return to pre-pandemic levels of approximately $10,000 annually. In FY 2024 to FY 2030, advertising revenue is projected to increase at a 3% annual escalation rate.

5.1.1.4 Federal Funding

Federal funding levels have experienced significant pandemic-related fluctuations in the first two years of the financial plan (FY 2021 and FY 2022) due to an influx of federal relief funds. Federal funding is not expected to remain at these levels in future years; consequently, federal funding in FY 2019 was assumed as a baseline. For operating costs, federal funding levels from FY 2019 were escalated by 3% annually for funding projections in FY 2023 through FY 2030. For preventive maintenance costs, federal funding was assumed to be 80% of total preventive maintenance costs each year.

5.1.1.5 State Funding

State funding is anticipated to generally increase over the next ten years with some year-to-year fluctuation. Total state operating assistance projections were obtained for FY 2022 to FY 2027 from the FY 2022 SYIP. Projected changes in total operating assistance funding over this period were calculated on a year-over-year basis and are summarized in Table 5-1. These projections

were then used for the purposes of estimating PAT's anticipated funding from the state. For FY 2023 to FY 2027, the year-over-year percent change from the FY 2022 SYIP was applied to PAT's state funding from the previous year to approximate the operating assistance provided by the state. For FY 2028 through FY 2030, the average annual percentage change from FY 2022 to FY 2027 (1.05%) was applied to PAT's state funding from the previous year to get the future year estimate.

Table 5-1. State Operating Assistance Anticipated Rate Change

Year	Percent Change from Previous Year
FY 2022 to FY 2023	0.00%
FY 2023 to FY 2024	-2.14%
FY 2024 to FY 2025	3.41%
FY 2025 to FY 2026	3.26%
FY 2026 to FY 2027	0.73%

1. Average FY 2022-FY 2027 annual change is 1.05%

While this approximation of state funding gives a sense of the anticipated state operating assistance, state funding for future years is likely to change and the exact amount will depend on a variety of factors including an evaluation of PAT's performance compared to other transit agencies in Virginia. In 2018 the Virginia General Assembly passed a statute requiring transit grant funding to be based on performance (Section 33.2-1526.1 of the Code of Virginia). Prior to this change, the funding allocation for each transit agency was based on the share of each agency's operating costs to the total operating costs for all transit providers that receive state assistance. Performance-based allocation of state transit operating funding, which began in FY 2020, accounts for both the size of the agency and three years of performance trends of the agency. Sizing metrics are used to correlate funding allocations with the size of the agency and include operating cost (50%), ridership (30%), revenue vehicle hours (10%), and revenue vehicle miles (10%). The sizing allocation is then adjusted based on a comparison of performance trends of the agency to statewide trends for five performance metrics:

- Passengers per Revenue Vehicle Hour
- Passengers per Revenue Vehicle Mile
- Operating Cost per Revenue Vehicle Hour
- Operating Cost per Revenue Vehicle Mile
- Operating Cost per Passenger

Because the allocation of performance-based funding is dependent on PAT's performance relative to the performance of all transit agencies statewide, it is difficult to project state funding amounts. As a result, the analysis presented in this chapter assumes that the state funding received by PAT is proportional to the statewide operations funding increases projected in the FY 2022 SYIP.

5.1.1.6 Local Funding

Local funding projections are estimated annually for inclusion in the City of Petersburg operating budget produced by the City Manager and City Staff and approved by the City Council. For preventive maintenance costs, local funding was assumed to be 20% of total preventive maintenance costs each year as a match to the assumed 80% federal funding. The operating and maintenance budget must ultimately reflect a balanced budget, and, as a result local funding for operating for all years was assumed to cover the remaining balance of costs after all other revenue sources are applied.

5.1.1.7 Other Income

Other income refers to all other revenues that do not fit in any of the aforementioned revenue sources. This category is typically made up of revenue from selling retired vehicles and therefore changes from year to year. The projected other income for FY 2022 was based on the budgeted figure from the DRPT SYIP, with future years inflated by 3% annually.

5.1.2 Ten-Year Financial Plan Scenarios

Two ten-year financial plan scenarios were developed: a baseline scenario and a service changes scenario. The baseline scenario assumes no service changes are implemented over the TSP timeframe and the service changes scenario assumes the service changes discussed in Chapter 3 are implemented. The revenue hours are constant for all years in the baseline scenario and increase to reflect the timing of the proposed service changes in the service change scenario. Projected operating expenses reflect an assumed 3% escalation rate each year as well as additional operating expenses associated with any increased service.

5.1.2.1 Baseline Scenario

In the baseline scenario, shown in Table 5-2, operating costs are expected to increase by $951,000 and preventive maintenance costs are expected to increase by $280,000 between FY 2021 to FY 2030 due to inflation. Federal funding is expected to decrease from the FY 2021 and FY 2022 COVID-19 pandemic relief funding levels. Assuming no additional federal COVID-19 pandemic relief funding, FY 2023 federal revenues are expected to decrease by $203,000 from FY 2022 levels. This reduction in federal funding will result in a gap requiring a need to increase local funding. The reintroduction of fares could help to offset some of the decrease in federal funding, but the timing and implementation of reinstating fare is yet to be determined.

5.1.2.2 Service Changes Scenario

The service changes scenario, shown in Table 5-3, assumes the service expansion discussed in Chapter 3 of this TSP is implemented, resulting in additional operating costs. The service changes assumed include weekday service span expansion of one hour in both FY 2024 and FY 2028 and Saturday service span expansion of one hour in both FY 2025 and FY 2029. To account for the increase in operating costs due to inflation and service expansion, additional funding will need to be secured. The farebox revenue is expected to increase as service is implemented, which is projected to offset about $29,000 of the $564,000 required to operate the service, resulting in a net increase of $535,000 by FY 2030. Without additional revenues from other sources, implementing the new service would require an increase of $535,000 in local funding for operations to maintain a balanced budget.

In addition to the increase in operating costs, preventive maintenance costs are anticipated to increase. By FY2030, the preventive maintenance costs are expected to increase from $970,000 to $1,414,000 proportional to increase in revenue hours and due to inflation, representing an increase of $163,000 compared to the scenario with no service changes. The local funding required for the preventive maintenance would therefore grow from $194,000 to $283,000 by FY 2030, representing a difference of $33,000 compared to the scenario with no service changes.

Table 5-4 compares the total revenue hours, operating costs, and preventive maintenance costs of the baseline and service changes scenarios. By the end of the ten-year timeframe, the total revenue hours, including the service additions, increases to 53,120 hours in FY 2030, the total operating costs increases to $4,891,000, and the total preventive maintenance costs increases to $1,414,000. By FY 2030, the difference in operating costs between the baseline and service changes scenario is $563,000 and the difference in preventive maintenance costs between the two scenarios is $163,000.

Table 5-2. Projected PAT Operating and Maintenance Costs and Revenues Under Baseline Scenario ($1000s, YOE$)

Fiscal Year	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Revenue Hours	47,000	47,000	47,000	47,000	47,000	47,000	47,000	47,000	47,000	47,000
Total Operating Cost	$3,376	$3,416	$3,519	$3,624	$3,733	$3,845	$3,960	$4,079	$4,202	$4,328
Total Preventive Maintenance Cost	$970	$987	$1,017	$1,047	$1,079	$1,111	$1,145	$1,179	$1,214	$1,251
Expected Operating Revenue Sources										
Farebox	$0	$0	$200	$200	$200	$200	$200	$200	$200	$200
Contract Service	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242
Advertising	$5	$7	$10	$10	$11	$11	$11	$12	$12	$12
Federal	$2,018	$1,552	$1,349	$1,389	$1,431	$1,474	$1,518	$1,564	$1,611	$1,659
State	$771	$787	$787	$770	$796	$822	$828	$837	$837	$846
Local	$340	$824	$927	$1,008	$1,048	$1,091	$1,156	$1,220	$1,295	$1,363
Other Income	$0.0	$4.1	$4.2	$4.3	$4.5	$4.6	$4.7	$4.9	$5.0	$5.2
Expected Preventive Maintenance Revenue Sources										
Federal	$776	$790	$814	$838	$863	$889	$916	$943	$971	$1,001
Local	$194	$197	$203	$209	$216	$222	$229	$236	$243	$250

1. Revenue hours remain constant under baseline scenario.
2. Total operating costs for FY 2021 and FY 2022 are from DRPT SYIPs. Total preventive maintenance costs for FY 2021 and FY 2022 are from City of Petersburg FY 2021-22 Proposed Operating Budget. Future year operating and preventive maintenance costs are inflated 3% annually.
3. Farebox revenues assume continuation of fare-free service until FY 2023. FY 2023 to FY 2030 assumes conservative but consistent farebox revenues.
4. Contract service revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2030 are not expected to change.
5. Advertising revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 is expected to return to pre-pandemic levels and escalate by 3% annually.
6. Federal funding revenues for operating for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2030 federal funding operating revenues assume FY 2019 (pre-pandemic) levels of funding with annual escalation of 3%. Federal funding for preventive maintenance are assumed to cover 80% of total preventive maintenance costs.
7. State funding revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2027 assume consistency with DRPT's SYIP overall state funding levels. FY 2028 to FY 2030 assume growth is consistent with the average annual state funding growth from FY 2022 to FY 2027.
8. Local funding for operating for all years covers remaining amount of funds required to balance the budget. Local funding for preventive maintenance is assumed to cover 20% of total preventive maintenance costs.
9. Other income revenues for FY 2021 and FY 2022 are from DRPT SYIPs. Future years increase with annual escalation of 3%.
10. All costs in $1,000s.

Table 5-3. Projected PAT Operating and Maintenance Costs and Revenues Under Service Change Scenario ($1000s, YOE$)

Fiscal Year	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Revenue Hours	47,000	47,000	47,000	49,550	50,060	50,060	50,060	52,610	53,120	53,120
Total Operating Cost	$3,376	$3,416	$3,519	$3,821	$3,976	$4,095	$4,218	$4,566	$4,749	$4,891
Total Preventive Maintenance Cost	$970	$987	$1,017	$1,104	$1,149	$1,184	$1,219	$1,320	$1,372	$1,414
Expected Operating Revenue Sources										
Farebox	$0	$0	$200	$213	$214	$214	$214	$227	$229	$229
Contract Service	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242
Advertising	$5	$7	$10	$10	$11	$11	$11	$12	$12	$12
Federal	$2,018	$1,552	$1,349	$1,389	$1,431	$1,474	$1,518	$1,564	$1,611	$1,659
State	$771	$787	$787	$770	$796	$822	$828	$837	$837	$846
Local	$340	$824	$927	$1,192	$1,277	$1,327	$1,399	$1,680	$1,813	$1,898
Other Income	$0.0	$4.1	$4.2	$4.3	$4.5	$4.6	$4.7	$4.9	$5.0	$5.2
Expected Preventive Maintenance Revenue Sources										
Federal	$776	$790	$814	$883	$919	$947	$975	$1,056	$1,098	$1,131
Local	$194	$197	$203	$221	$230	$237	$244	$264	$274	$283

1. Revenue hours increase based on service plans described in Chapter 3.
2. Total operating costs for FY 2021 and FY 2022 are from DRPT SYIPs. Total preventive maintenance costs for FY 2021 and FY 2022 are from City of Petersburg FY 2021-22 Proposed Operating Budget. Future years operating costs include service changes described in Chapter 3 and are inflated 3% annually. Future year preventive maintenance costs increase proportional to revenue hours and are inflated 3% annually.
3. Farebox revenues assume continuation of fare-free service until FY 2023. Future years assume conservative farebox revenues with increases based on ridership estimates from Chapter 3 for additional service.
4. Contract service revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2030 are not expected to change.
5. Advertising revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 is expected to return to pre-pandemic levels and escalate by 3% annually.
6. Federal funding revenues for operating for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2030 federal funding operating revenues assume FY 2019 (pre-pandemic) levels of funding with annual escalation of 3%. Federal funding for preventive maintenance are assumed to cover 80% of total preventive maintenance costs.
7. State funding revenues for FY 2021 and FY 2022 are from DRPT SYIPs. FY 2023 to FY 2027 assume consistency with DRPT's SYIP overall state funding levels. FY 2028 to FY 2030 assume growth is consistent with the average annual state funding growth from FY 2022 to FY 2027.
8. Local funding for operating for all years covers remaining amount of funds required to balance the budget. Local funding for preventive maintenance is assumed to cover 20% of total preventive maintenance costs.
9. Other income revenues for FY 2021 and FY 2022 are from DRPT SYIPs. Future years increase with annual escalation of 3%.
10. All costs in $1,000s.

Table 5-4. Projected Operating and Maintenance Costs for Service Additions ($1000s, YOE$)

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Existing System										
Fixed Route Revenue Hours	42,700	42,700	42,700	42,700	42,700	42,700	42,700	42,700	42,700	42,700
Paratransit Revenue Hours	4,300	4,300	4,300	4,300	4,300	4,300	4,300	4,300	4,300	4,300
Existing Operating Costs	$3,376	$3,416	$3,519	$3,624	$3,733	$3,845	$3,960	$4,079	$4,202	$4,328
Existing Preventive Maintenance Cost	$970	$987	$1,017	$1,047	$1,079	$1,111	$1,145	$1,179	$1,214	$1,251
Service Additions										
Additional Revenue Hours (yearly improvement)				2,550	510			2,550	510	
Additional Operating Cost (yearly increase)				$197	$41			$221	$46	
Additional Preventive Maintenance Cost (yearly increase)				$57	$12			$64	$13	
Cumulative Additional Fixed Route Operating Cost				$197	$243	$250	$258	$487	$547	$564
Cumulative Additional Preventive Maintenance Cost				$57	$70	$72	$75	$141	$158	$163
Totals										
Total Revenue Hours	47,000	47,000	47,000	49,550	50,060	50,060	50,060	52,610	53,120	53,120
Total Operating Cost	$3,376	$3,416	$3,519	$3,821	$3,976	$4,095	$4,218	$4,566	$4,749	$4,891
Total Preventive Maintenance Cost	$970	$987	$1,017	$1,104	$1,149	$1,184	$1,219	$1,320	$1,372	$1,414

1. Costs are stated in year of expenditure dollars, with the assumed annual escalation rate of 3%.
2. Operational changes include only changes that incur additional operating costs.
3. All costs in $1,000s.

5.2 Capital Costs and Funding Sources

The anticipated capital costs presented in this section are driven by the implementation plan presented in Chapter 4 and are grouped into vehicle purchase costs and facility and other capital costs. Chapter 4 should be referenced for additional information regarding the planning of these capital purchases.

5.2.1 Vehicle Purchase Costs and Funding Sources

PAT's vehicle replacement schedule discussed in Chapter 4 shows the anticipated new vehicle needs for each year in the TSP timeframe and ranges from zero (FY 2021) to seven vehicles (FY 2027). Anticipated vehicle costs by year are shown in

Table 5-5. On average, PAT's vehicle purchase costs for FY 2021 to FY 2030 are approximately $1,037,000 annually (YOE$). FY 2025 is expected to have the largest vehicle replacement costs at $2,020,000 (YOE$), followed by FY 2026 at $1,814,000 (YOE$) and FY 2027 at $1,551,000 (YOE$).

Funding for vehicle purchase costs is expected to come from three sources: federal, state, and local. The composition of funding sources, in terms of percentages, is based on the following assumptions: 28% from federal, 68% from state, and 4% from local. Therefore, funding amounts will vary based on the vehicle replacement needs for each year outlined in Chapter 4.

Similar to the state operating assistance, the 2018 Virginia General Assembly reformed state capital assistance grant programs to include a prioritization process for allocating limited capital funds to the most critical projects. Under the new capital assistance prioritization process, which began in FY 2020, transit capital projects are classified into one of three categories:

- State of Good Repair (SGR)
- Minor Enhancement (MIN)
- Major Expansion (MAJ)

Each category of capital projects has its own scoring approach for prioritization. SGR projects are evaluated based on an asset condition score (age and mileage) and a service impact score (operating efficiency; frequency, travel time, and/or reliability; accessibility and/or customer experience; and safety and security). MIN projects are scored based on the service impact score alone. MAJ projects are scored based on congestion mitigation, economic development, accessibility, safety, environmental quality, and land use. For PAT, vehicle purchases will fall into the SGR classification and will be scored as such. Facility improvements and other capital cost projects will fall into the MIN category if the project cost is $2 million or less and into the MAJ category if the project cost exceeds $2 million.

Table 5-5. Financial Plan for Funding Vehicle Purchases ($1000s, YOE$)

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Vehicle Costs										
Bus (<30-ft)	-	-	-	-	$1,518	$1,579	$821	-	-	-
Bus (30-ft)	-	$799	$138	-	$449	-	$486	$505	$526	$729
Paratransit Fleet	-	-	$80	$333	-	$180	$187	$97	$405	-
Support Vehicle Fleet	-	-	$97	$51	$53	$55	$57	$59	$62	$64
Total Vehicle Costs	-	$799	$316	$384	$2,020	$1,814	$1,551	$662	$992	$793
Anticipated Funding Sources										
Federal	$0	$224	$88	$107	$566	$508	$434	$185	$278	$222
State	$0	$543	$215	$261	$1,374	$1,234	$1,055	$450	$675	$539
Local	$0	$32	$13	$15	$81	$73	$62	$26	$40	$32

1. Vehicle costs identified in Chapter 4 of the TSP.
2. Vehicle purchases assume 28% funding through FTA (Section 5339 program), 68% funding from State, and the remaining 4% funding from local
3. All costs in $1,000s

5.2.2 Facility Improvement and Other Capital Costs and Funding Sources

In addition to vehicle costs, PAT has capital needs to improve facilities, passenger amenities, and technology over the course of the TSP life cycle. Table 5-6 shows the anticipated capital cost by category by year, as well as anticipated revenue from federal, state, and local funding sources. The greatest local funding need occurs in FY 2025, where a need of $804,300 in local funding is estimated, primarily due to the 10% local match expected for construction of the bus maintenance facility. The next greatest local funding need occurs in FY 2023, when the design and engineering of the bus maintenance facility is anticipated.

As with vehicle purchase costs, the facility improvements and other capital costs are accounted for by a combination of federal, state, and local dollars. Also, similar to the vehicle purchase costs, the funding for these capital costs is expected to remain at a split of 28% federal, 68% state, and 4% local, with state funding tied to project prioritization scores for all improvements except the maintenance facility. PAT is planning to apply to DRPT's Technical Assistance MERIT competitive grant program for the feasibility study for the maintenance facility, which if selected would provide 50% in state funding and the remaining 50% is assumed to come from local funding sources. PAT is also planning to apply for grant funding for the construction of the maintenance facility. For the purposes of the financial plan, PAT assumed a split of 80% Federal funding from FTA 5339, 16% state funding (through a Major Expansion category of the Capital Assistance MERIT grants program), and 4% local funding. If grant funding is not secured PAT would need to find additional funding sources or delay the maintenance facility project.

Table 5-6. Financial Plan for Funding Facility Improvements and other Capital Costs ($1000s, YOE$)

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Anticipated Costs										
Facilities										
Rehab/Renovation of Admin Building		$100.0								
Feasibility study for Maintenance Facility			$40.0							
Design & Engineering of Maintenance Facility				$500.0						
Construction of Maintenance Facility					$20,000.0					
Purchase Shop Equipment	$53.0		$101.0		$107.0					
Passenger Amenities										
Signs	$33.0									
Benches	$17.0									
Technology										
ADP Hardware		$30.0				$30.0				$30.0
Radios			$20.0							
Security Equipment			$40.0							$75.0
Automated Passenger Counters (APCs)			$240.0							
Total	$103.0	$130.0	$441.0	$500.0	$20,107.0	$30.0	$0.0	$0.0	$0.0	$105.0
Anticipated Funding Sources										
Federal	$28.8	$36.4	$112.3	$140.0	$16,030.0	$8.4	$0.0	$0.0	$0.0	$29.4
State	$70.0	$88.4	$292.7	$340.0	$3,272.8	$20.4	$0.0	$0.0	$0.0	$71.4
Local	$4.1	$5.2	$36.0	$20.0	$804.3	$1.2	$0.0	$0.0	$0.0	$4.2

1. Facility improvement costs identified in Chapter 4 of TSP.
2. The feasibility study for the maintenance facility is anticipated to be 50% state funded and 50% locally funded.
3. Construction of the bus maintenance facility assumes a cost of $20,000,000 (the upper end of the range presented in Chapter 4). Funding sources include 80% Federal funding from FTA 5339, 16% state funding (through a Major Expansion category of the Capital Assistance MERIT grants program), and 4% local funding.
4. All capital and facility purchases (with the exception of the maintenance facility) assume 28% funding through FTA (Section 5339 program), 68% funding from State, and the remaining 4% from local funding.
5. All costs in $1,000s.

Transit Strategic Plan Appendices

Petersburg Area Transit

November 2021

Prepared By:

Kimley»Horn

CTG Connetics Transportation Group

Table of Contents

List of Figures

List of Tables

A. Agency Profile and System Overview

A.1 History

The City of Petersburg has been operating public transportation service in Petersburg and the surrounding region since 1977. Privately operated bus service was available prior to 1977; however, by the early 1970's ridership was declining and operation of the service was no longer profitable. To avoid the loss of service to the community, the City of Petersburg took over privately operated service from Tri Cities Coaches, which consisted of nine bus routes that served the cities of Petersburg, Colonial Heights, and Hopewell, as well as parts of Chesterfield and Prince George counties. By the early 1990's, Petersburg Area Transit (PAT) had reduced its service area to only include the City of Petersburg and the Ettrick area of Chesterfield County and was operating highly productive routes, averaging 38 passenger trips per revenue hour for fixed-route service, and over one million annual riders. By the late 1990's however, annual ridership had decreased to about 630,000 and the productivity of the routes decreased to 21 passenger trips per revenue hour. As a response, PAT's 1999 Transit Development Plan (TDP) discussed the need for regional service. The addition of several routes outside the City, including Ettrick, Southpark Mall, Blandford/Hopewell, and Washington Street, followed in the coming years.

More recently, PAT has endeavored to improve mobility in the Petersburg area through increasing transit options. In 2009, PAT opened the Petersburg Multimodal Passenger Station (Petersburg Station) in downtown Petersburg. The Petersburg Station offers a centralized location for connections among local buses, as well as regional connections via Greater Richmond Transit Company (GRTC), Blackstone Area Bus System (BABS), and Greyhound. Shortly after, in 2010, service was added to the City of Hopewell via the Hopewell Circulator, funded with Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds. When CMAQ funding ended after three years, the City of Hopewell began providing funding to continue operation of the route.

A.2 Governance

The City of Petersburg has a council/manager form of government. PAT is administered as a city governmental service and governed by the City Council. For representation, the city is divided into seven wards (geographically contiguous areas of similar population size), each of which elects a city council member for a term of four years. The City Council has the responsibility of electing one of its members as Mayor and one as Vice Mayor, as well as hiring a City Manager. Operation of PAT falls under the responsibility of the Deputy City Manager for Development, who reports to the City Manager. There are currently no advisory committees in place specifically for transit purposes.

Names of councilmembers, as well as position and term dates, are listed in Table A-1. City Council terms end in 2024 for even ward numbers and 2022 for odd ward numbers.

Table A-1. Petersburg City Council

Ward	Member	Position	Term End Date
Ward 1	Treska Wilson-Smith	Councilwoman	2022
Ward 2	Darrin Hill	Councilman	2024
Ward 3	Samuel Parham	Mayor	2022
Ward 4	Charlie Cuthbert	Councilman	2024
Ward 5	W. Howard Myers	Councilman	2022
Ward 6	Annette Smith-Lee	Vice Mayor	2024
Ward 7	John A. Hart, Sr.	Councilman	2022

A.3 Organizational Structure

PAT operates under the Deputy City Manager for Development, Tangela Innis. PAT's Director is Charles Koonce Jr. There are five additional management-level staff. In total there are 59 PAT employees, most of which are full-time. The PAT organizational chart is shown in Figure A-1. The City of Petersburg directly operates PAT, without any outside contracted transportation services, except for facility security contractors.

A.4 Services Provided and Areas Served

PAT provides fixed-route transit service as well as ADA paratransit services in the cities of Petersburg, Hopewell, and Colonial Heights, and portions of the counties of Prince George, Dinwiddie, and Chesterfield. PAT added limited fixed route service to Richmond in 2020. PAT directly operates thirteen fixed routes, which are detailed in Section A.4.1. In addition, paratransit services are discussed in Section A.4.2 and bicycle and pedestrian accommodations are described in Section A.4.3.

A.4.1 Fixed Route Service

PAT's fixed routes operate Monday through Friday from 5:45 am until 7:05 pm, and on Saturday from 6:45 am until 7:05 pm. PAT operates 12 local routes, all of which operate 60-minute headways. Six of the twelve local routes require a single vehicle to operate (406 County Drive, Blandford, City of Hopewell, Southpark Mall, South Crater Road, and Walnut Hill). The remaining routes require 0.5 vehicles each via interlining, a scheduling technique used to create operational efficiency. Round trips on interlined routes require 30 minutes, and thus two routes can be operated by a single vehicle given a 60-minute headway. Below are the three pairs of interlined routes:

1. Ettrick/VSU/Amtrak and Mall Plaza
2. Lee Avenue and Washington
3. Halifax Street and Virginia Avenue

PAT's only express route, the Freedom Express operates from Petersburg to Richmond, requiring one vehicle to operate four round trips a day. Table A-2 summarizes PAT's fixed-route service, which is followed by individual descriptions for each route.

Figure A-1. Petersburg Area Transit Organizational Chart

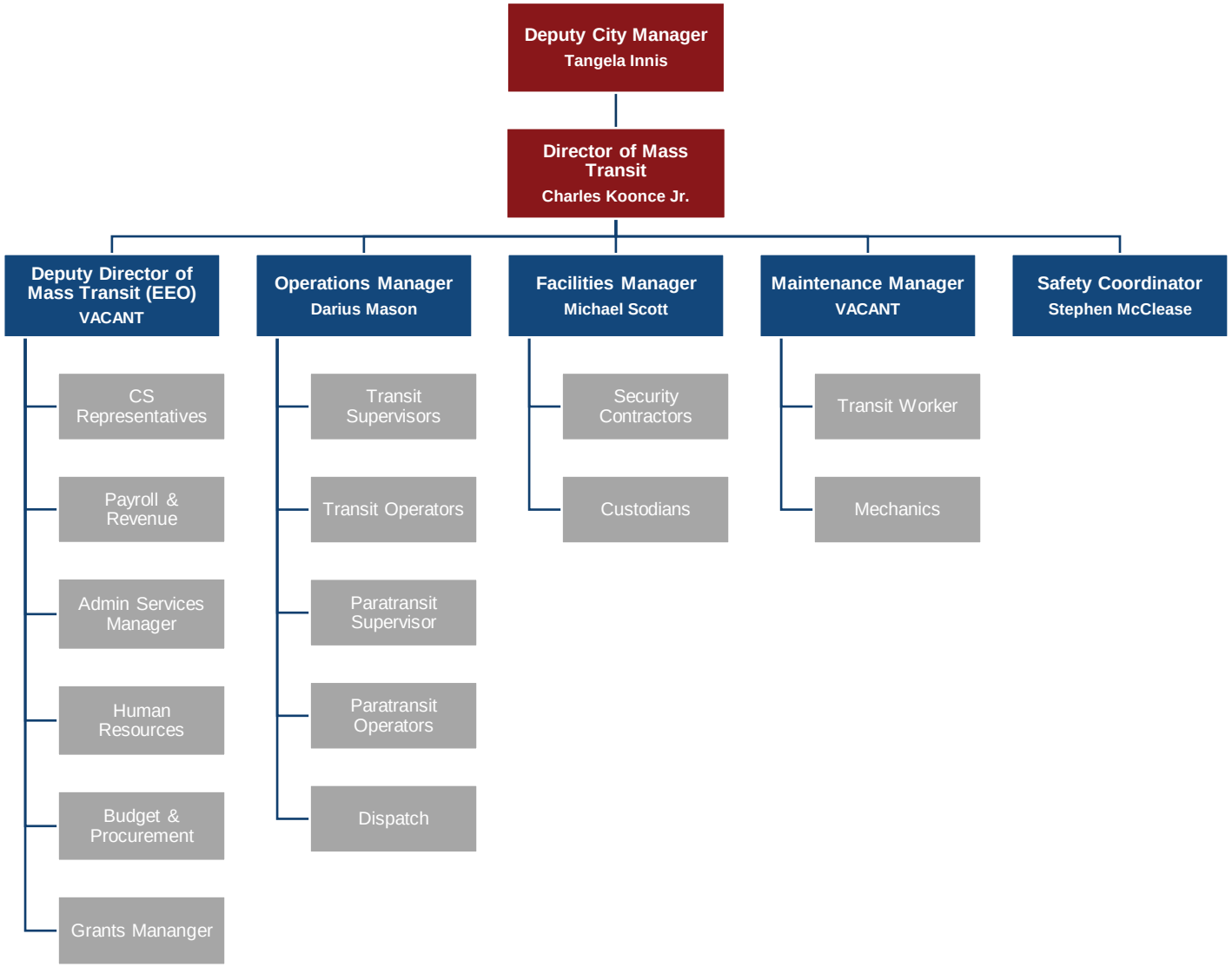


Table A-2. Fixed-Route Service Summary

Route	Weekday Service					Weekend Service				
	Headway	Daily Trips	Vehicles Req.	Service Start	Service End	Headway	Daily Trips	Vehicles Req.	Service Start	Service End
Blandford/Hopewell	60 min	13	1	6:15 AM	7:05 PM	60 min	12	1	7:15 AM	7:05 PM
County Drive (460)	60 min	13	1	5:45 AM	6:45 PM	60 min	12	1	6:45 AM	6:45 PM
Ettrick/VSU/Amtrak	60 min	13	0.5	6:15 AM	6:45 PM	60 min	12	0.5	7:15 AM	6:45 PM
Halifax Street	60 min	13	0.5	6:15 AM	6:45 PM	60 min	12	0.5	7:15 AM	6:45 PM
Hopewell Circulator	60 min	13	1	5:45 AM	6:45PM	60 min	12	1	6:45 AM	6:45 PM
Lee Avenue	60 min	12	0.5	6:45 AM	6:15 PM	60 min	11	0.5	7:45 AM	6:15 PM
Mall Plaza	60 min	12	0.5	6:45 AM	6:10 PM	60 min	11	0.5	7:45 AM	6:10 PM
South Crater Road	60 min	13	1	6:15 AM	7:05 PM	60 min	12	1	7:15 AM	7:05 PM
Southpark Mall	60 min	13	1	6:15 AM	7:05 PM	60 min	12	1	7:15 AM	7:05 PM
Virginia Avenue	60 min	12	0.5	6:45 AM	6:10 PM	60 min	12	0.5	6:45 AM	6:10 PM
Walnut Hill	60 min	13	1	5:45 AM	6:45 PM	60 min	12	1	6:45 AM	6:45 PM
Washington Street	60 min	13	0.5	6:15 AM	6:45 PM	60 min	12	0.5	7:15 AM	6:45 PM
Freedom Express	120 min	4	1	7:45 AM	4:35 PM	-	-	-	-	-

1. Vehicles required statistic indicates the resources necessary to operate route at designated frequencies. Vehicle requirements of less than one represent interlined routes.

Blandford/Hopewell

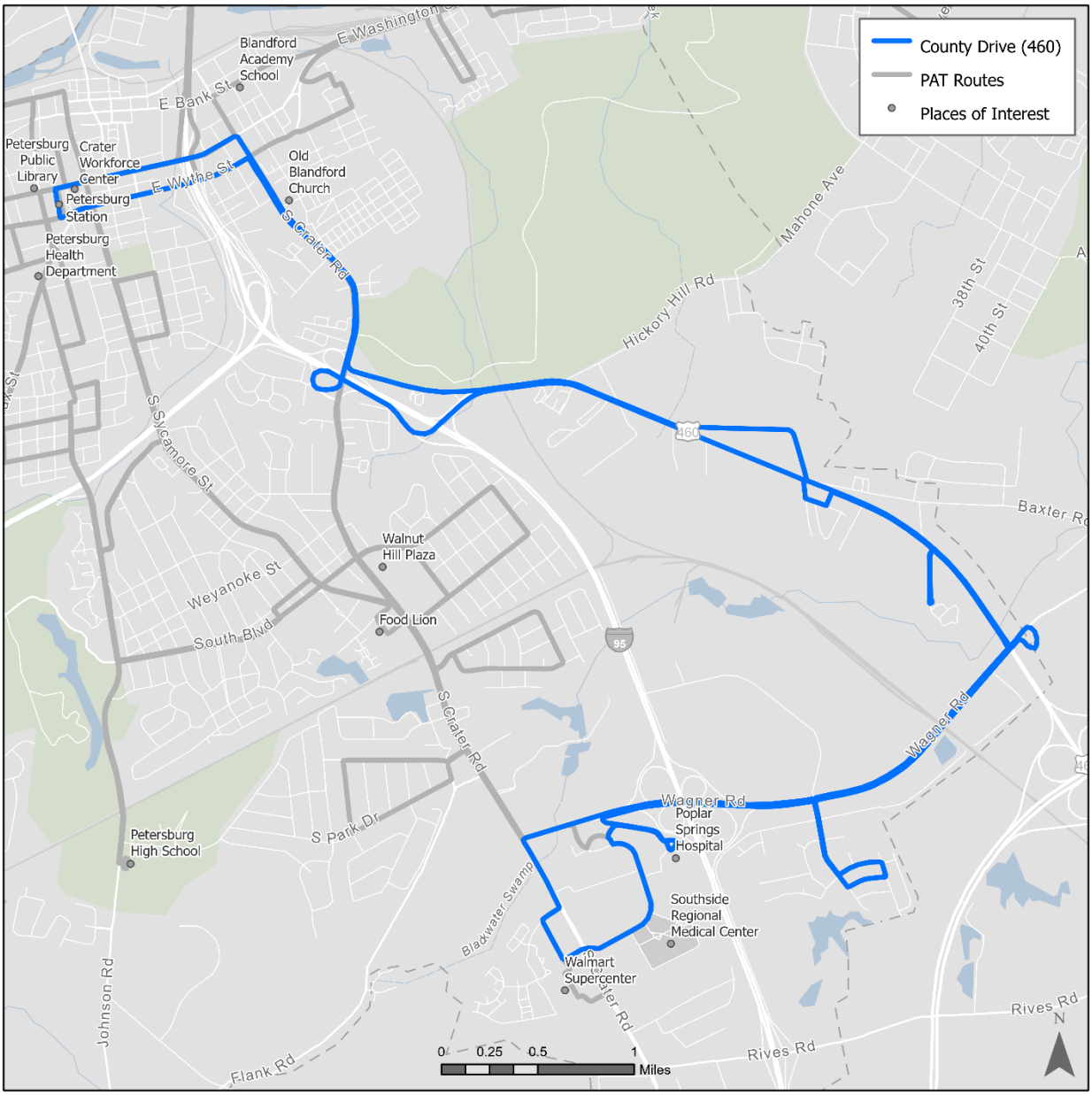
The Blandford/Hopewell route provides access from the Petersburg Station in downtown Petersburg to Fort Lee via Oaklawn Blvd, ending at The Crossings Shopping Center just west of I-295. This route operates 13 trips on weekdays from 6:15 am until 7:05 pm, and 12 trips Saturdays from 7:15 am until 7:05 pm. The Blandford/Hopewell route operates on a 60-minute headway, requiring one vehicle. Figure A-2 shows the route alignment for Blandford/Hopewell.

Figure A-2. Blandford/Hopewell Route Alignment

County Drive (460)

The County Drive (460) route travels from the Petersburg Station in downtown Petersburg to the Southside Regional Medical Center via County Drive and Wagner Road. There are 13 trips on weekdays from 5:45 am until 6:45 pm, and 12 trips on Saturdays from 6:45 am until 6:45 pm. Each round trip takes 50 minutes, requiring one vehicle to operate with a 60-minute headway. Figure A-3 shows the route alignment of County Drive (460).

Figure A-3. County Drive (460) Route Alignment



Ettrick/VSU/Amtrak

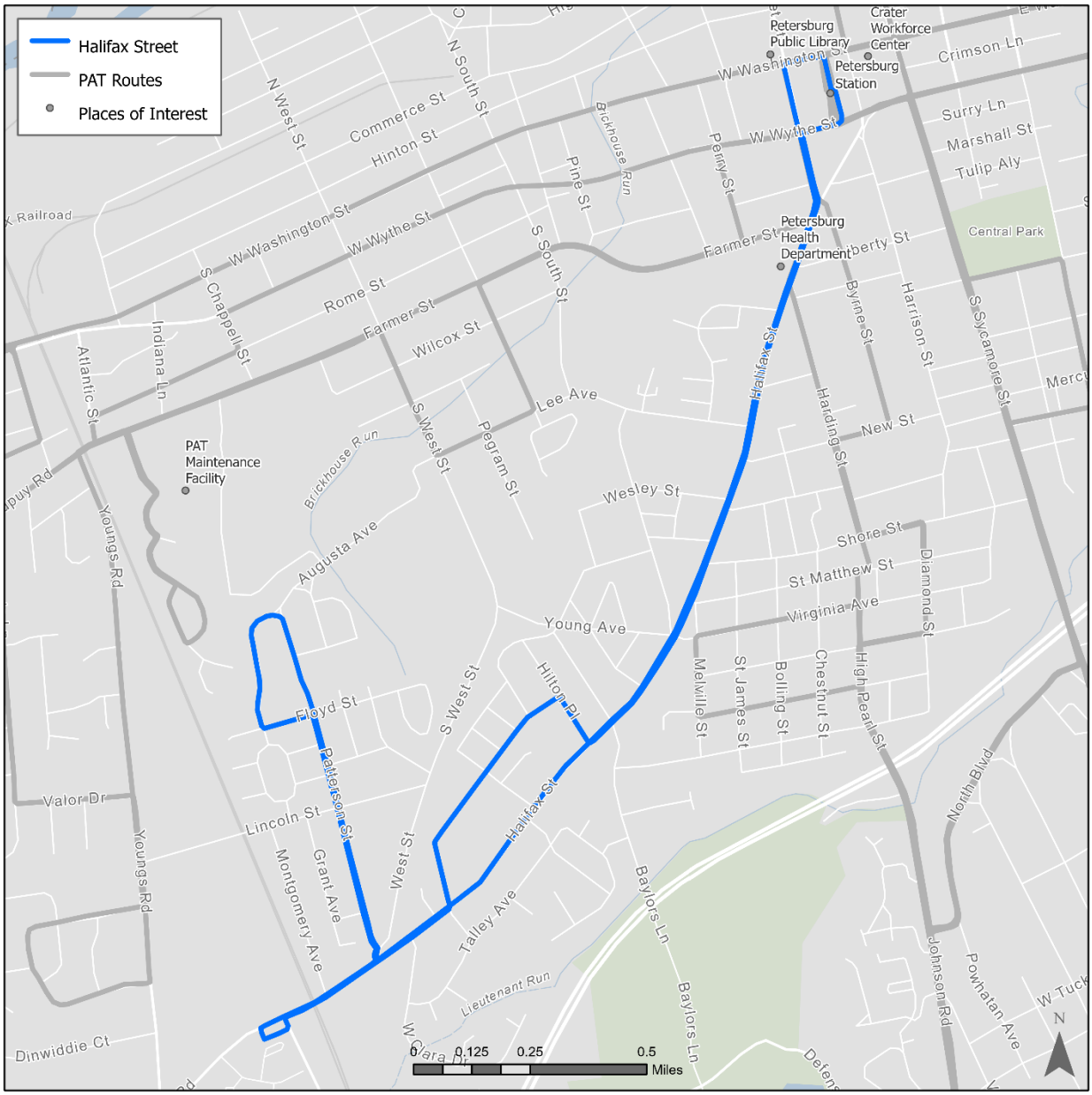
The Ettrick/VSU/Amtrak route operates from the Petersburg Station in downtown Petersburg to Virginia State University (VSU) in Chesterfield County (Ettrick), and then to the Food Lion before serving the Petersburg Amtrak Station. There are 13 trips made every weekday with service beginning at 6:15 am and ending at 6:45 pm. On Saturdays, service begins at 7:15 am and ends at 6:45 pm, operating a total of 12 trips throughout the day. It takes about 20 minutes to run the Ettrick/VSU/Amtrak route. PAT interlines this route with the Mall Plaza route to operate both routes with a single vehicle on a 60-minute headway. Figure A-4 shows the route alignment for Ettrick/VSU/Amtrak.

Figure A-4. Ettrick/VSU/Amtrak Route Alignment

Halifax Street

The Halifax Street route serves the Halifax Street corridor, connecting the adjacent neighborhoods to the Petersburg Station in downtown Petersburg. This route operates 13 trips on weekdays from 6:15 am until 6:45 pm, and 12 trips on Saturdays from 7:15 am until 6:45 pm. It takes 25 minutes for a round trip on the Halifax Street route. Halifax Street route is interlined with Virginia Avenue route for operational efficiency. It requires one vehicle to operate the Halifax Street route and the Virginia Avenue route with 60-minute headways. Figure A-5 shows the route alignment for Halifax Street.

Figure A-5. Halifax Street Route Alignment



Hopewell Circulator

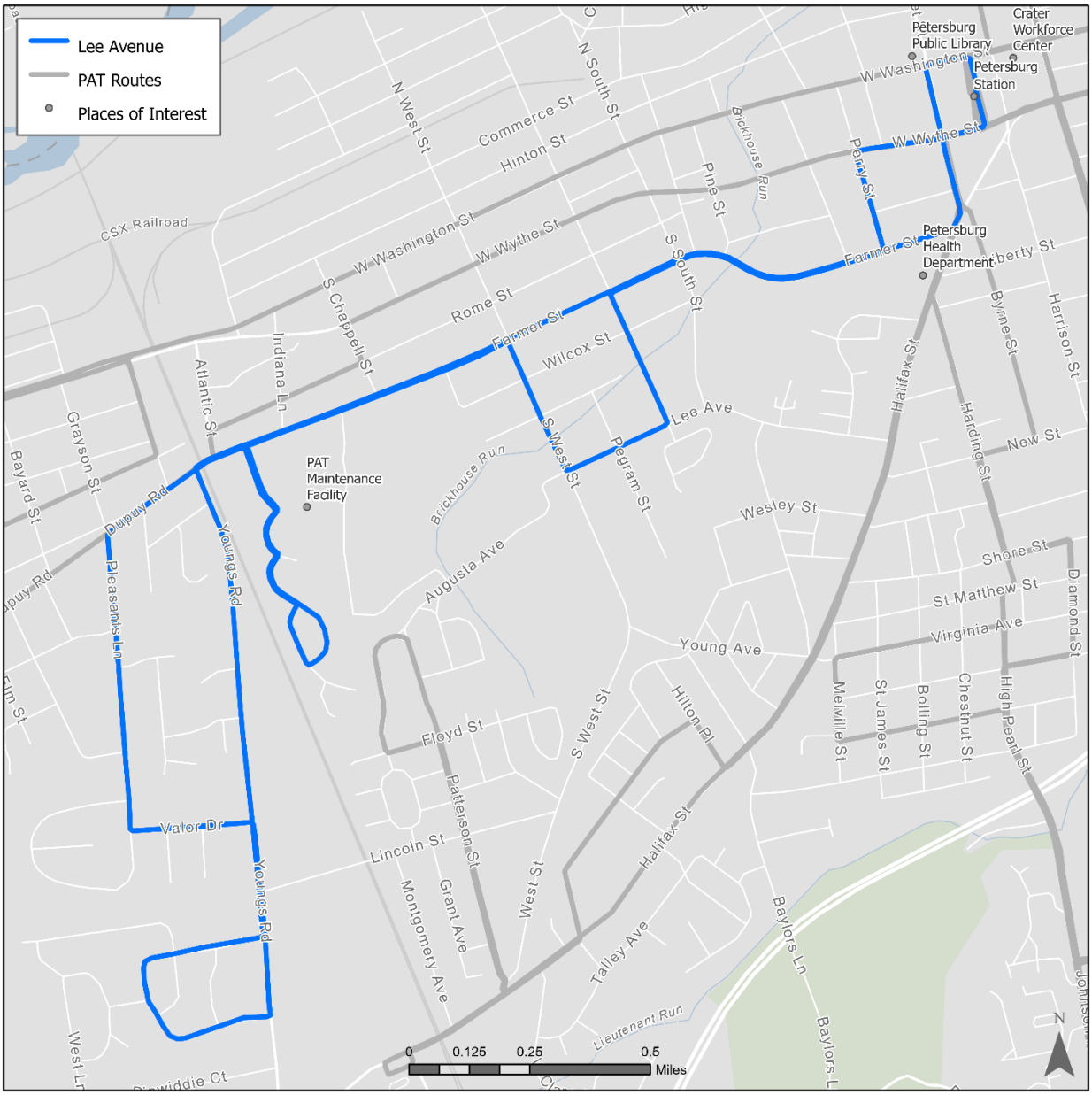
The Hopewell Circulator route connects the City of Hopewell to the Blandford/Hopewell route via a connection point at the Food Lion off Tri City Drive. This route also serves the Appomattox Regional Library in Hopewell, the John Randolph Medical Center, and the Riverside Regional Jail. There are 13 trips made on weekdays, starting at 5:45 am and ending at 6:45 pm, and 12 trips made on Saturdays from 6:45 am to 6:45 pm. The circulator takes 60 minutes to make each round trip, requiring one vehicle to operate with a 60-minute headway. It should be noted that the Hopewell Circulator schedule does not include recovery time, operating on a tight schedule. Figure A-6 shows the route alignment for the Hopewell Circulator.

Figure A-6. Hopewell Circulator Route Alignment

Lee Avenue

The Lee Avenue route departs Petersburg Station and heads west along Gill Street, deviating to serve Lee Avenue before serving the neighborhoods of Pecan Acres and Western Hills. Lee Avenue also provides service to the Petersburg Health Department and the PAT maintenance facility. In total, there are 12 trips made on weekdays, from 6:45 am to 6:15 pm, and 11 trips made on Saturdays from 7:45 am to 6:15 pm. The Lee Avenue route takes about 25 minutes to operate. PAT interlines this route with the Washington Street route to run both routes with a single vehicle on a 60-minute headway. Figure A-7 shows the route alignment for Lee Avenue.

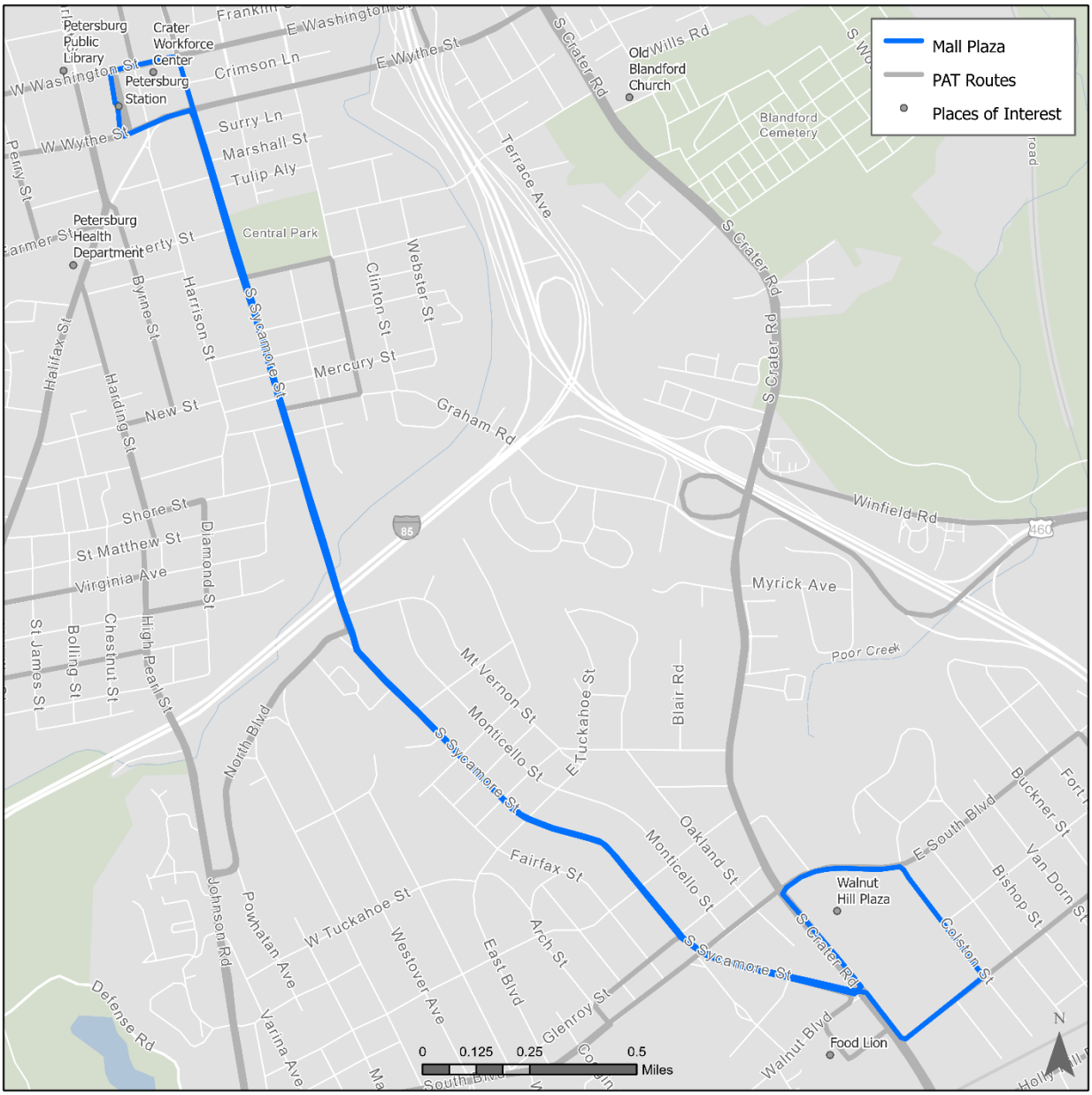
Figure A-7. Lee Avenue Route Alignment



Mall Plaza

The Mall Plaza route connects the Petersburg Station in downtown Petersburg to Walnut Hill Plaza and nearby Food Lion via Sycamore Street. The Mall Plaza route makes 12 trips Mondays-Fridays providing service from 6:45 am to 6:10 pm. On Saturdays there is one less trip, creating service that starts at 7:45 am and ends at 6:10 pm. Each round trip requires 25 minutes. PAT operates the Mall Plaza route with a vehicle that is interlined with the Ettrick/VSU/Amtrak route, thereby requiring one vehicle to operate both routes at a 60-minute headway. The route alignment for Mall Plaza can be found in Figure A-8.

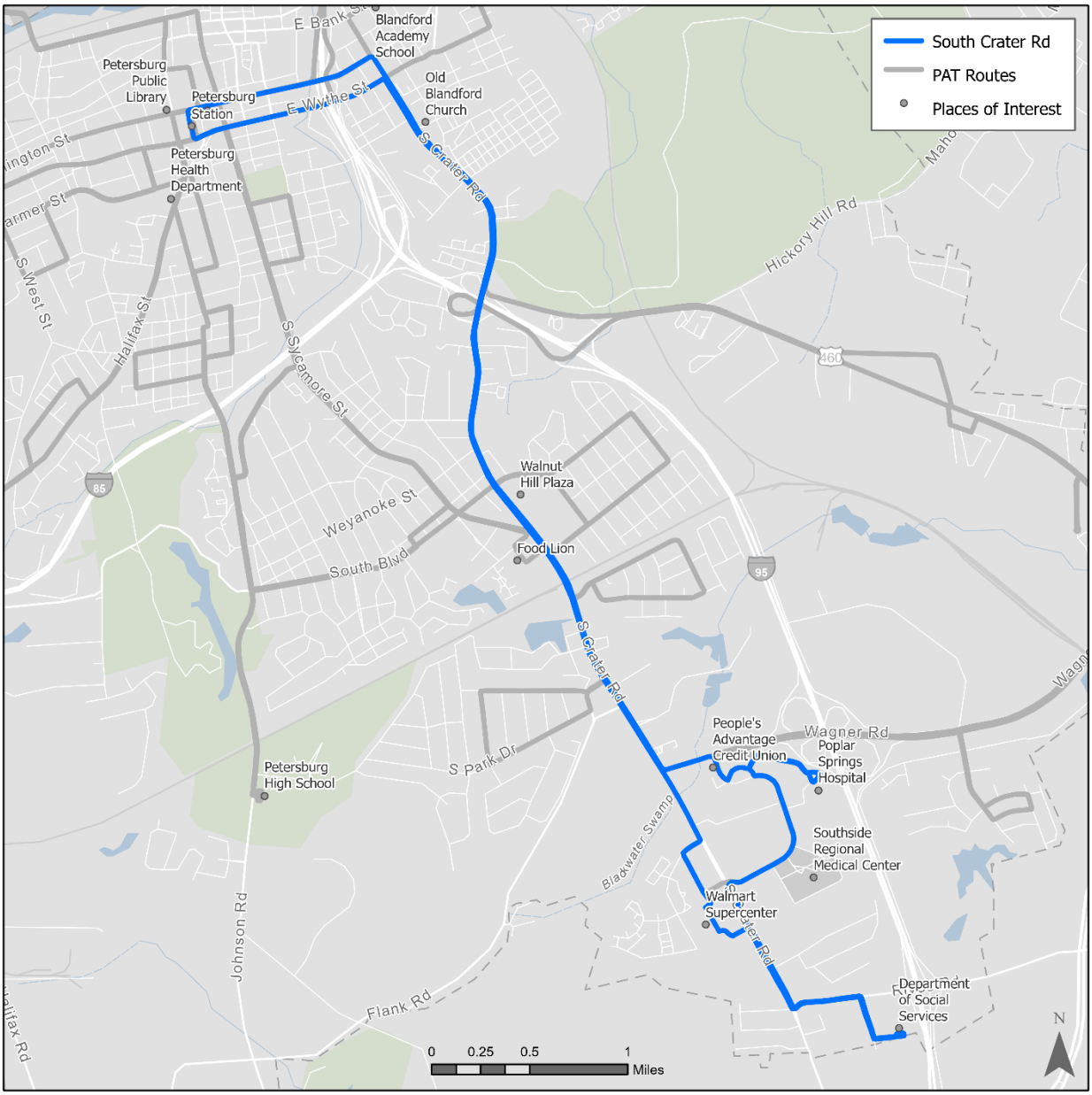
Figure A-8. Mall Plaza Route Alignment



South Crater Road

The South Crater Road route provides service from downtown Petersburg to Walnut Hill Plaza, Peoples Advantage Federal Credit Union, Southside Regional Medical Center, Walmart, and Department of Social Services via Crater Road. This route operates 13 trips on weekdays and 12 trips on Saturdays. Weekday service starts at 6:15 am and ends at 7:05 pm, while Saturday service starts an hour later at 7:15 am and ends at 7:05 pm. It takes 55 minutes to run each round trip, thereby requiring one bus to operate on 60-minute headways. Figure A-9 shows the route alignment for South Crater Road.

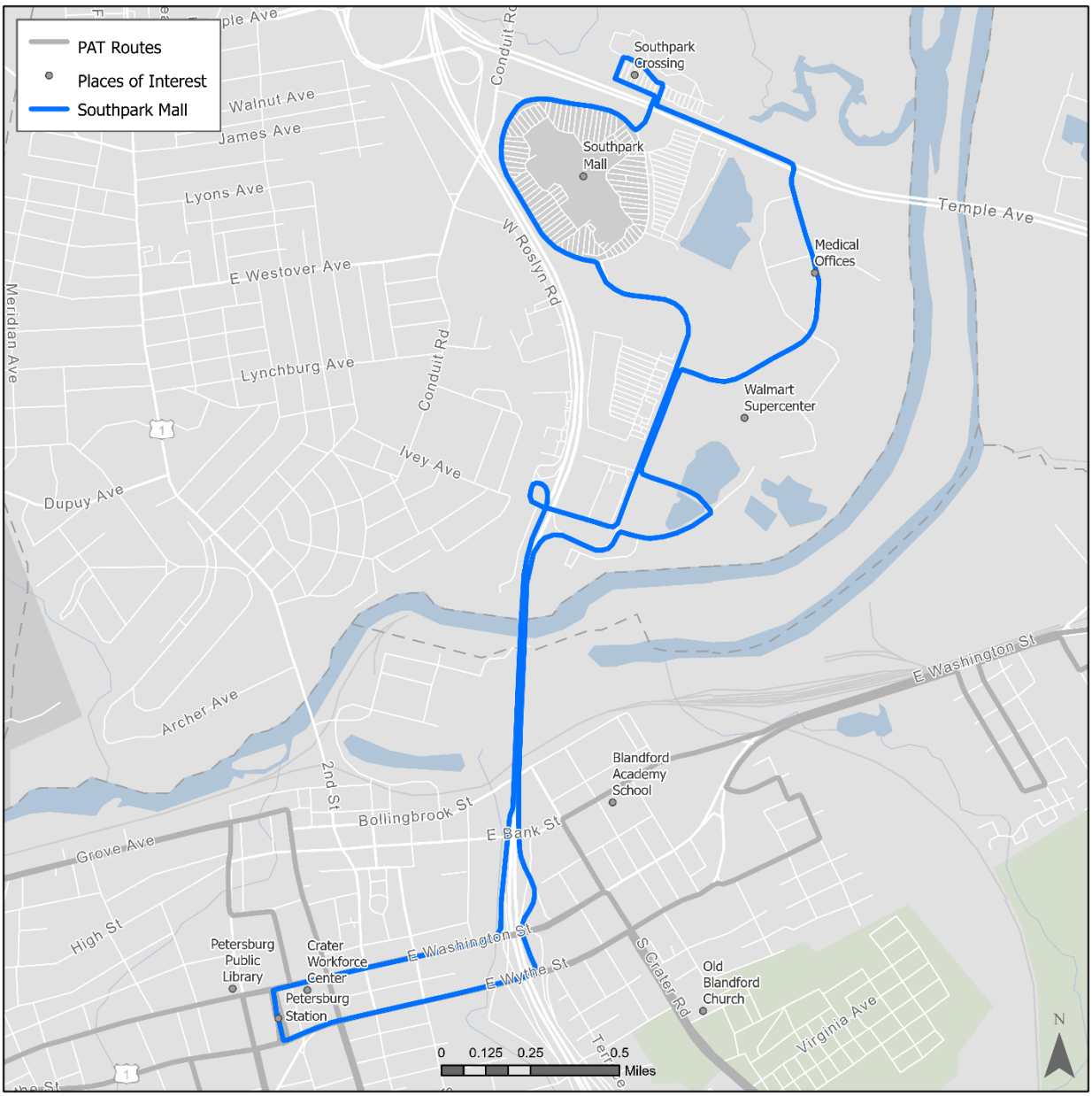
Figure A-9. South Crater Road Route Alignment



Southpark Mall

The Southpark Mall route travels from the Petersburg Station northeast to the Southpark Mall, Walmart, and nearby medical offices via I-95. The route begins service at 6:15 am and ends at 7:05 pm on weekdays, while Saturday service runs from 7:15 am and ends at 7:05 pm. A total of 13 round trips are made on weekdays and 12 on Saturdays. Each round trip takes about 45 minutes to operate, requiring one vehicle to operate a 60-minute headway. Figure A-10 shows the route alignment for Southpark Mall.

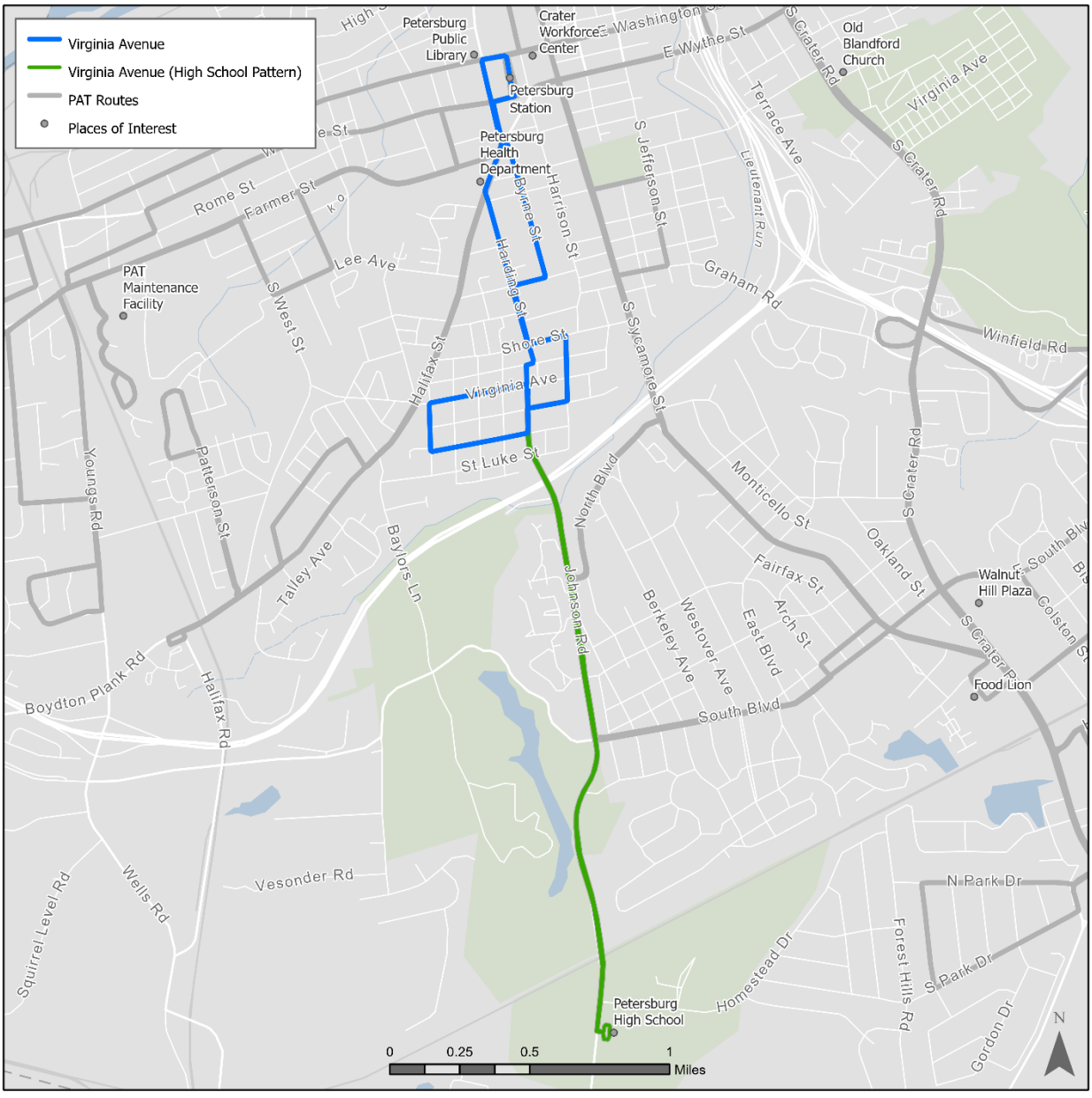
Figure A-10. Southpark Mall Route Alignment



Virginia Avenue

The Virginia Avenue route connects nearby neighborhoods along Harding Street and High Pearl Street east of Halifax Street to the Petersburg Health Department and Petersburg Station. On select weekday trips, a secondary pattern of Virginia Avenue operates farther south, serving Petersburg High School. The Virginia Avenue route operates from 6:45 am until 6:10 pm on weekdays and on Saturdays. There are 12 round trips on weekdays, four of which operate to the high school. On Saturdays, the schedule is consistent for all 12 trips. PAT interlines the Virginia Avenue and Halifax Street routes which together require a single vehicle and operate 60-minute headways for both routes. Figure A-11 shows the route alignment.

Figure A-11. Virginia Avenue Route Alignment



Walnut Hill

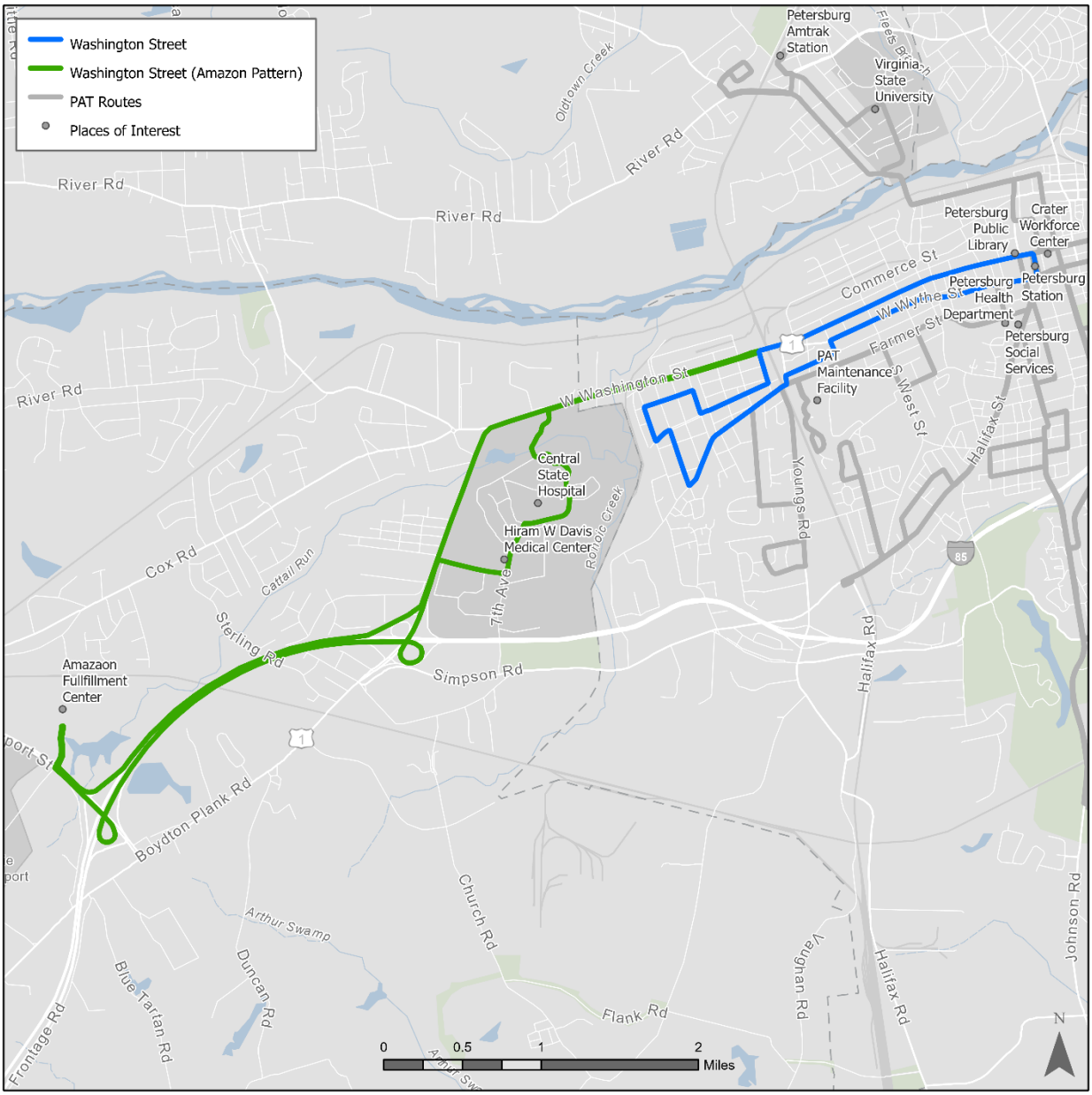
The Walnut Hill route operates from the Petersburg Station in downtown Petersburg to the Walnut Hill Plaza via Sycamore Street and South Boulevard. This route also serves the Battlefield Park, Holly Hill Drive, and North Park Drive neighborhoods. The Walnut Hill Route makes 13 trips Monday to Friday, providing service from 5:45 am to 6:45 pm. On Saturdays there are 12 trips, providing service from 6:45 am to 6:45 pm. Each round trip takes 55 minutes. PAT operates the Walnut Hill route with a single vehicle on a 60-minute headway. The route alignment for Walnut Hill can be found in Figure A-12.

Figure A-12. Walnut Hill Route Alignment

Washington Street

The Washington Street route operates from the Petersburg Station west along Washington Street and Wythe Street to the neighborhoods off Ferndale Avenue. This route operates 13 trips on weekdays from 6:15 am until 6:45 pm, and 12 trips on Saturdays from 7:15 am until 6:45 pm. Each round trip requires 25 minutes. The Washington Street route and Lee Avenue route are interlined and operate together on 60-minute headways with a single vehicle. In addition, the route operates select trips to Seward Luggage, Amazon Fulfillment Center, and Aldi three times a day. Figure A-13 shows the route alignment for Washington Street.

Figure A-13. Washington Street Route Alignment



Freedom Express

The Freedom Express route runs from Petersburg Station to McGuire Medical Center, to downtown Richmond, where it makes stops at 7th Street and Franklin Street and Medical College of Virginia/Virginia Commonwealth University. The Freedom Express operates four round trips daily, departing Petersburg Station at 7:15 am, 9:15 am, 1:15 pm, and 3:15 pm. Each round trip requires approximately 80 minutes. Although the route was designed specifically for Veterans, the service is available to any patron requiring service to the medical centers. Figure A-14 shows the Freedom Express route alignment.

Figure A-14. Freedom Express Route Alignment

A.4.2 Paratransit Service

PAT offers curb to curb (door to door upon request) ADA paratransit services with wheelchair-equipped vans for senior citizens (aged 70 or older), Medicare card holders, and persons with disabilities (temporary or permanent per ADA qualifications). The service operates within the city limits of Petersburg, Colonial Heights, and Hopewell, and the counties of Prince George, Dinwiddie, and South Chesterfield (Ettrick). The service also operates in areas within ¾ of a mile from PAT's fixed routes. Paratransit service is available weekdays from 5:15 am until 6:15 pm and Saturdays from 6:00 am until 6:15 pm. The maximum number of vehicles operated in peak service is six. Reservations can be made in advance from the day before the trip up to 14 days before the trip by calling the PAT administrative offices 24 hours a day, seven days a week. Reservations are confirmed either the same day of the request or the following morning.

A.4.3 Access to Transit System

PAT has been working to provide riders with bicycle and pedestrian accommodation improvements to provide better access to the transit system. Bicycle racks that accommodate up to two bikes have been installed on all buses. In addition, pedestrian accommodations in the form of curb cutouts and bus shelters are present throughout much of the system. In 2014 and 2015, PAT upgraded most of the bus stops within the city limits to include curb cuts for safer and easier boarding and alighting. However, outside the city limits there are many areas with limited sidewalk and other pedestrian accommodations, including bus stops that do not meet ADA standards. All new bus stops are built to meet ADA standards.

PAT does not have specific guidelines for the design or placement of bus shelters, although the design is consistent throughout most of the system. Shelters are made of metal and glass and sit on a concrete slab with a bench. Shelters are consistent throughout the service area except for in Colonial Heights at the Southpark Mall and at Blandford Academy Schools, which differ slightly in design.

A.5 Fare Structure, Payments, and Purchasing

For fixed-route service, PAT passengers have the option of purchasing fares on board the vehicle with cash or pre-purchasing daily, weekly, or monthly passes. The transit passes may be purchased at one of two locations: 1) Petersburg Multimodal Passenger Station at 100 W. Washington Street; or 2) People's Advantage Federal Credit Union at 110 Wagner Road. In 2016, PAT attempted to expand the available options for obtaining fares by purchasing three Ticket Vending Machines (TVMs). However, despite repeated repair attempts, the TVMs were unfortunately never operational.

PAT's fare structure is summarized in Table A-3. In order to receive the discounted price available to seniors, citizens with a qualifying disability, and Medicare cardholders, passengers must present an I.D. issued by PAT. Adults riding the bus may bring two children with them at no additional cost (one child under the age of six and one infant). Since the last TDP in 2019, the price of a standard single fare has remained at $1.75. It should also be noted that, because of the pandemic, PAT has been running fare free service since March 2020. The timing of fare reinstatement is undetermined because of the uncertain nature of the pandemic.

There are no transfer agreements with other agencies. As a result, passengers transferring to another service (e.g. the GRTC Route 95X and BABS Dinwiddie Connector) must pay full fare when boarding those services. Transfers within the PAT system, however, are available at no additional cost for up to one hour.

Table A-3. Petersburg Area Transit Fare Structure

Fare Category	Full Price	Discounted Price[1]
One Fare	$1.75	$0.85
Transfer	Free[2]	Free[2]
One-Day Pass	$3.50	$1.75
Seven-Day Pass	$12.00	$6.00
Thirty-One Day Pass	$44.00	$22.00
Freedom Express Fare	$3.50	N/A

1. Discounted price is available to seniors, citizens with a qualifying disability, and Medicare cardholders only
2. Free transfer is available up to one hour only

A.6 Transit Asset Management

A.6.1 Fleet

PAT currently has a total of 15 vehicles for fixed-route service and 9 vehicles for paratransit service. The fixed-route service fleet is made up of a mix of gasoline, diesel, and a single FLEX fuel system vehicle, which operates on gasoline and propane. The paratransit vehicles are mostly gasoline powered, but also include three FLEX fuel vehicles. All revenue vehicles have fareboxes, information displays, and security cameras. PAT also has 12 support vehicles consisting of sport utility vehicles, trucks, and vans. Table A-4, Table A-5, and Table A-6 summarize the vehicle fleet for fixed-route, paratransit, and support vehicles, respectively.

The Federal Transit Administration (FTA) published a Final Rule for Transit Asset Management in July 2016 requiring FTA grantees to develop asset management plans. Agencies have the option of developing their own transit asset management (TAM) plan. In the Commonwealth of Virginia, PAT is one of the operators opting to use DRPT's statewide TAM plan, which is permitted under the FTA rule. The TAM plan covers public transportation assets including vehicles, facilities, equipment, and other infrastructure.

Table A-4. Fixed-Route Vehicle Inventory

Quantity	Make	Type	Year	Seating Capacity	Fuel Type
4	Gillig	35-foot Bus	2013	32	Diesel
1	Ford	E-450	2015	22	FLEX[1]
1	Freightliner	30-footTrolley	2016	29	Diesel
3	Chevrolet	E-4500	2018	21	Gasoline
6	Chevrolet	E-4500	2020	23	Gasoline

1. FLEX fuel is a combination of gasoline and propane

Table A-5. Paratransit Vehicle Inventory

Quantity	Make	Type	Year	Seating Capacity	Fuel Type
1	Chevrolet	2500	2012	14	FLEX[1]
2	Ford	E-450	2016	12	FLEX[1]
2	Ford	E-450	2017	12	Gasoline
2	Ford	E-450	2019	12	Gasoline
2	Ford	E-450	2021	13	Gasoline

1. FLEX fuel is a combination of gasoline and propane

Table A-6. Support Vehicle Inventory

Quantity	Make	Type	Year	Seating Capacity	Fuel Type
1	GMC	4500	1997	3	Diesel
1	Dodge	1500	2002	3	Gasoline
1	Chevrolet	2500	2009	3	Gasoline
1	Ford	E-450 (snow plow)	2015	5	Diesel
1	Ford	SUV	2005	5	Gasoline
1	Ford	SUV	2013	5	Gasoline
3	Ford	SUV	2014	5	FLEX[1]
1	Jeep	SUV	2014	5	Gasoline
2	Ford	F-150	2016	3	Gasoline

1. FLEX fuel is a combination of gasoline and propane

A.6.2 Facilities

PAT has major facilities at two locations in Petersburg. The PAT administrative offices and Petersburg Station are located in downtown Petersburg at 100 W. Washington Street. PAT's operating, maintenance (including fueling), and vehicle storage facility is located at 309 Fairgrounds Road near the Pecan Acres neighborhood.

A.7 Transit Security Program

PAT has taken various measures to protect riders, employees, and the public as part of an overall transit security program. One major element of the program is the system security and emergency preparedness plan (SSEPP). Although PAT currently has an SSEPP in the case of an emergency, PAT is working on an update using the FTA template. The SSEPP includes program roles and responsibilities, threat and vulnerability resolution processes, and steps for evaluation and modification of the SSEPP. In the event of an emergency or natural disaster, the public safety director can activate the emergency operation center (located in the 100 West Washington Street building) where stakeholders and decision makers can meet to deal with the emergency.

The US Department of Homeland Security conducted a security assessment of PAT in 2016. In addition, PAT has prepared training material and plans to conduct drills to prepare for potential emergency situations. PAT will be coordinating with the fire and police departments to conduct these training drills. Additionally, PAT has communicated the need to conduct active shooter training with Homeland Security.

PAT also utilizes several security features on vehicles and at stations and facilities. Vehicles are equipped with fire extinguishers, panic buttons, radios, and cameras that have audio and visual capabilities. Petersburg Station and the operating, maintenance, and storage facilities are equipped with cameras, motion detectors, alarm systems, fire suppression systems, and key fob systems.

While there is no official public awareness program campaigning for safety on the transit system, passengers are actively encouraged to contact security in the event of an emergency. In addition, per FTA's Public Transportation Agency Safety Plan (PTASP) Final Rule, PAT developed a safety plan that includes the processes and procedures necessary for implementing Safety Management Systems (SMS), including safety risk management, safety assurance, and safety promotion. This plan was approved by Petersburg City Council in July 2020.

A.8 Intelligent Transportation Systems Program

PAT's intelligent transportation systems (ITS) program consists of several components to improve operations and provide information to riders. PAT has experienced technical challenges with some elements of their ITS program over recent years, which has resulted in a desire to improve the program.

- **Automatic Vehicle Location (AVL):** Although RouteMatch vehicle tracking systems are currently installed on all PAT fixed-route buses, the system has had numerous technical difficulties and has proven to be unreliable. As a result, the AVL location data has not been usable. PAT is currently investigating options for grant applications to secure a new APC vendor.
- **Automated Passenger Counters (APCs):** APCs were installed on PAT's fixed-route vehicles, which were also part of the RouteMatch installation package. However, technical difficulties have caused the APC data to be unusable.

- **Information Displays:** Illuminators, or information displays, are installed on all vehicles and show the route name and number, as well as emergency information or route changes.
- **Scheduling and run cutting software:** Scheduling for fixed routes is completed by PAT transit supervisors. They do not use specialized software for scheduling or run cutting. The paratransit service, however, does utilize specialized software for schedules. Paratransit vehicles use CTS software, which is a system that translates trip requests into trip assignments before dispersing the requests to drivers.
- **Maintenance systems:** Fleet Maintenance Pro software is utilized to keep track of maintenance.
- **Transit Signal Prioritization (TSP):** PAT has considered adding TSP to the ITS program via meetings with Tri-Cities Area MPO as well as TSP vendors. PAT concluded, however, that the current levels of congestion in the Tri-Cities area does not warrant the additional expense of TSP.

A.9 Data Collection and Ridership/Revenue Reporting Method

PAT collects data on both fixed-route vehicles and paratransit vehicles. Fixed-route vehicles are equipped with electronic Genfare farebox systems, specifically the Odyssey system. The electronic farebox system collects money and counts passengers for all PAT operated fixed routes. Ridership reports are generated and compared to manual counts of ridership daily input by drivers into tablets installed in each fixed-route vehicle. Conversely, paratransit vehicles operate without electronic fareboxes, instead relying on simple fareboxes that riders deposit fares into. Paratransit ridership is recorded with the CTS system that schedules trips. In addition, drivers use Driver-Vehicle Inspection Report (DVIR) books located in each vehicle to track mileage of both fixed-route and paratransit vehicles.

Operating as a city governmental service, PAT uses the same accounting procedures and reporting methods as the City of Petersburg. Accounting and Payroll systems use the AS-400 System and BAI Municipal Software (“Bright”), which is the financial system of record for the City. Financial audits are completed annually by third-party auditors through the City of Petersburg Finance Department.

Reporting at the state level is completed once a month through the Online Grant Administration (OLGA) system. Monthly reports include operating statistics such as passenger trips, revenue miles, revenue hours, financial expenditures, and revenues. Reporting at the federal level to the National Transit Database (NTD) is completed annually by October 31st. NTD reporting includes similar operating statistics and financial figures as the monthly state-level reporting.

A.10 Coordination with Other Transportation Service Providers

There are several transportation service providers in the Petersburg area, however PAT currently has limited partnerships to coordinate with these services.

- **Greater Richmond Transit Company (GRTC):** GRTC operates the 95X Richmond / Petersburg Express route, which provides a connection from the Petersburg Station to downtown Richmond. The route runs Monday through Friday with two round trips in the

morning and two round trips in the evening. Fares for the Richmond/Petersburg Express are $3.50 per one-way trip.

- **Blackstone Area Bus (BABS):** BABS operates the Dinwiddie Express, which operates services from Blackstone (roughly 40 miles west of Petersburg), to the Petersburg Station. The Dinwiddie Express stops at the Petersburg Station twice in the morning and twice in the afternoon. Fares for the Dinwiddie Express are $0.50 per one-way trip.
- **Greyhound:** Greyhound has five routes (1006, 1008, 1011, 1051, and 1078) that stop at the Petersburg Station. Routes traveling north generally serve Richmond, VA and routes traveling south serve South Hill, VA or Raleigh, NC.
- **Taxi Companies:** There are numerous taxicab providers in and around Petersburg, including Yellow Cab of Colonial Heights, Pink Transportation Taxi, ReadyRideGo, Tri-CityTaxi, and Steve's Taxi.
- **Transportation Network Companies (TNCs):** Both Uber and Lyft operate in the Tri-Cities area.

A.11 Public Outreach/Engagement/Involvement

PAT public outreach is primarily accomplished through City Council meetings. Meetings are generally held twice a month and are open to the public. Dates, times, agendas, and minutes for City Council meetings are posted on the City of Petersburg website. PAT service and policy changes, such as changes to routes or fares, are discussed at these meetings and public comment is welcomed. PAT and the City Council communicate service and policy changes with the public regularly through the City of Petersburg website and through social media platforms.

PAT is also active in promoting the available services through educational efforts. One such example is through public outreach to Hopewell High School in early 2020 before the COVID-19 pandemic. PAT staff visited the high school and gave an overview of the transit services available and answered questions on how to use the service. Additional outreach activities will be planned following the pandemic recovery.

A.12 Current Initiatives

There have been several recent developments that affect the provision of transit service in the area, such as the partnership with Peoples Advantage Federal Credit Union, the Freedom Mobility Program, and technology updates.

Peoples Advantage Federal Credit Union (PAFCU) Partnership

PAT formed a partnership with PAFCU in 2020 that provides several benefits to each party. Below is a summary of the agreements:

PAFCU:

- Donate $5,000 towards funding a bus
- Offer financial education and credit score analysis to PAT employees
- Provide low interest vehicle financing
- Sell PAT fares

- Refer individuals to PAT
- Promote partnership on the PAFCU website

PAT:

- Wrap bus with PAFCU brand
- Provide tickets at PAFCU branches
- Provide access to employees, riders, and partners
- Promote partnership to employees
- Allow PAFCU mobile branch access to PAT premises

Freedom Mobility Program

The Freedom Express operates from Petersburg Station to McGuire Veterans Hospital, to downtown Richmond. The route was specifically designed for use by Veterans, although any patron requiring service to McGuire Medical Center and VCU Medical Center in Richmond is welcome to utilize the service. Prior to FY21, PAT had a DRPT grant that funded the route. The grant has expired however, and PAT has fully supported the route since. The cost of the service is $3.50 per one-way trip. Table A-7 shows schedule information, which includes all stops and times.

Table A-7. Freedom Express Route Schedule

Depart Petersburg Station	McGuire Medical Center	GRTC Bus Stop at 7th and Franklin	MCU/VCU 11th and Marshall	Arrive at Petersburg Station
7:15 AM	7:45 AM	8:02 AM	8:05 AM	8:35 AM
9:15 AM	9:45 AM	10:02 AM	10:05 AM	10:35 AM
1:15 PM	1:45 PM	2:02 PM	2:05 PM	2:35 PM
3:15 PM	3:45 PM	4:02 PM	4:05 PM	4:35 PM

Technology Updates (General Transit Feed Specification and APC/AVL)

As mentioned in section A.8, PAT has been working to remedy the ongoing challenges with the APC/AVL system. Once an APC/AVL system is operational, passengers will have live location information of PAT vehicles, giving passengers a much better understanding of when their bus will arrive at their chosen stop location. In addition, DRPT worked with a vendor in early 2021 to update the GTFS (general transit feed specification) data. The previous GTFS dataset was from 2016. This effort will enable passengers to plan transit trips on any device capable of running Google Maps, such as computers, tablets, and smart phones. Combined, the APC/AVL and GTFS initiatives will provide information to passengers that makes using the system easier and more convenient.

B. Five-Year Retrospective of Finances

Figure B-1. Five-Year (Pre-Pandemic) Retrospective of Operating Revenues

Fiscal Year	Farebox Revenue	Federal	State	Local	Other	Total
FY 2016	$470,652	$1,219,013	$549,439	$298,163	$272,216	$2,809,483
FY 2017	$425,077	$881,036	$729,707	$1,168,372	$46,044	$3,250,236
FY 2018	$393,426	$620,763	$840,618	$1,544,074	$32,460	$3,431,341
FY 2019	$353,218	$1,198,497	$657,645	$980,000	$256,108	$3,445,468
FY 2020	$247,913	$1,244,189	$855,508	$1,036,932	$25,201	$3,409,743

Figure B-2. Five-Year (Pre-Pandemic) Retrospective of Capital Revenues

Fiscal Year	Federal	State	Local	Other	Total
FY 2016	$555,237	$238,776	$160,953	$0	$954,966
FY 2017	$515,751	$86,400	$118,438	$0	$720,589
FY 2018	$24,617	$0	$0	$14,202	$38,819
FY 2019	$264,909	$268,708	$34,153	$0	$567,770
FY 2020	$425,260	$542,016	$72,647	$0	$1,039,923

Figure B-3. Five-Year (Pre-Pandemic) Retrospective of Operating and Capital Expenses

Fiscal Year	Operating			Capital Total
	Fixed Route	Paratransit	Total	
FY 2016	$1,966,638	$842,845	$2,809,483	$954,966
FY 2017	$3,122,888	$127,348	$3,250,236	$720,589
FY 2018	$3,263,919	$167,422	$3,431,341	$38,819
FY 2019	$3,274,632	$170,836	$3,445,468	$567,770
FY 2020	$3,255,995	$153,748	$3,409,743	$1,039,923