Final Report:

Virginia Breeze Bus Lines Route Expansion: I-64 East-West Connection Study

March 2024

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Chapter 1
Existing Intercity Service

Study Purpose

This study is intended to develop feasible service options for the expansion of Virginia Breeze service with an east-west connection in the I-64 corridor. Current Virginia Breeze services all run in a (mostly) north-south pattern linking many towns in the commonwealth with Washington, D.C. The corridors now receiving service include:

- Valley Flyer service from Blacksburg to Washington, D.C. (originally the Virginia Breeze route),
- Capital Connector service from Martinsville/Danville to Washington, D.C. via Richmond,
- Piedmont Express service from Danville to Washington, D.C. via Lynchburg and Charlottesville, and
- Highlands Rhythm service from Bristol to Washington, D.C.

These routes have proven to be quite successful, supported by state branding, with an attractive and usable website and good marketing.

The proposed corridor differs in some ways from these routes in that it is east-west from the Hampton Roads area to the Shenandoah Valley. While it would not have the population base or opportunities for connections offered by having an end in Washington, D.C. it would link major population centers with large state and private universities, providing convenient transit access in a corridor that has not had convenient service on this routing for a very long time.

Section 5311(f) and Virginia Breeze

The Federal Transit Administration's (FTA's) Section 5311(f) program is basically a set-aside of 15% of a state's Section 5311 funding allocation (see text box on following page). DRPT has utilized this federal funding to support the operation of the four existing Virginia Breeze routes, relying on the in-kind match provisions of the FTA program to provide the local match. Under this aspect of the Section 5311(f) program, the value of unsubsidized connecting intercity bus service can be counted toward the local match required by redefining the project to include both the segment needing subsidy and the unsubsidized connecting segment. In the case of Virginia Breeze, these connecting services are all operated by Megabus from Washington, D.C. to points in the northeast corridor. For that reason is important to identify opportunities for connecting potential Virginia Breeze services to unsubsidized intercity bus service. It should be noted that the carrier providing the value of the unsubsidized connecting service has to substantiate their willingness to participate and the value in a letter to the state.

It should be noted that this is not a long-range planning study, but instead focuses on routes or services that could be implemented over the next two years. For that reason, the analysis of demographic data and the intercity bus and rail network is based on current conditions, rather than population projections or planned intercity rail services. Intercity bus services under the Virginia Section 5311(f) program are contracts for service operation, with no capital facility construction. The services are contracted based on fully-allocated operating costs with the contractor supplying the vehicles. The lead time for implementation is therefore much more limited, and the planning horizon is much more immediate.

About Section 5311(f)

FTA program guidance for the rural intercity bus program is provided in (FTA) Circular 9040.1G (49 U.S.C. 5311 – Formula Grants for Other Than Urbanized Areas), Chapter VIII, Intercity Bus. Section 5311(f) states that 15% of each state's overall Section 5311 funding allocation must be spent on rural intercity bus projects under Section 5311(f) unless the state certifies to the FTA that there are no unmet rural intercity needs, and that it has determined that there are no needs as the result of a consultation process that includes outreach to the intercity carriers and other stakeholders. Virginia has utilized this funding to support the Virginia Breeze, and has not certified that there are no unmet needs.

The Circular defines intercity bus service as "regularly scheduled bus service for the general public operating with limited stops over fixed routes connecting two or more urban areas not in close proximity, which has the capacity for transporting baggage carried by passengers, and which makes meaningful connections with scheduled intercity bus service to more distant points, if such service is available." Package express service may also be included if incidental to passenger transportation.

Services must be designed to provide for a meaningful connection with the national intercity bus network, including service to connecting points at times when passengers may make convenient connections. Services must be scheduled fixed-route services open to the general public.

The National Objectives as prescribed by FTA in the Circular are as follows:

- *To support meaningful connections between non-urbanized areas and the regional or national system of intercity bus service;*
- *To support services to meet the intercity needs of residents in non-urbanized areas; and,*
- *To support the infrastructure of the intercity bus network through planning, marketing assistance, and capital investment in facilities and equipment.*

The definition of eligible intercity bus services under this program includes services that are:

- *Open to the general public, and*
- *Fixed-route, fixed schedule, and*
- *Operated between two or more urban areas over long distances, and*
- *Capable of carrying baggage, and*
- *Providing a meaningful connection (in terms of coordinated stop locations, schedules, and information) to the national system of intercity bus transportation.*

Commuter bus service is not eligible under this program. Charter and tour services are not eligible under this program. Intercity service is not defined by the type of vehicle used (except for the requirement to carry baggage). All vehicles used to provide services under this program must be fully ADA compliant.

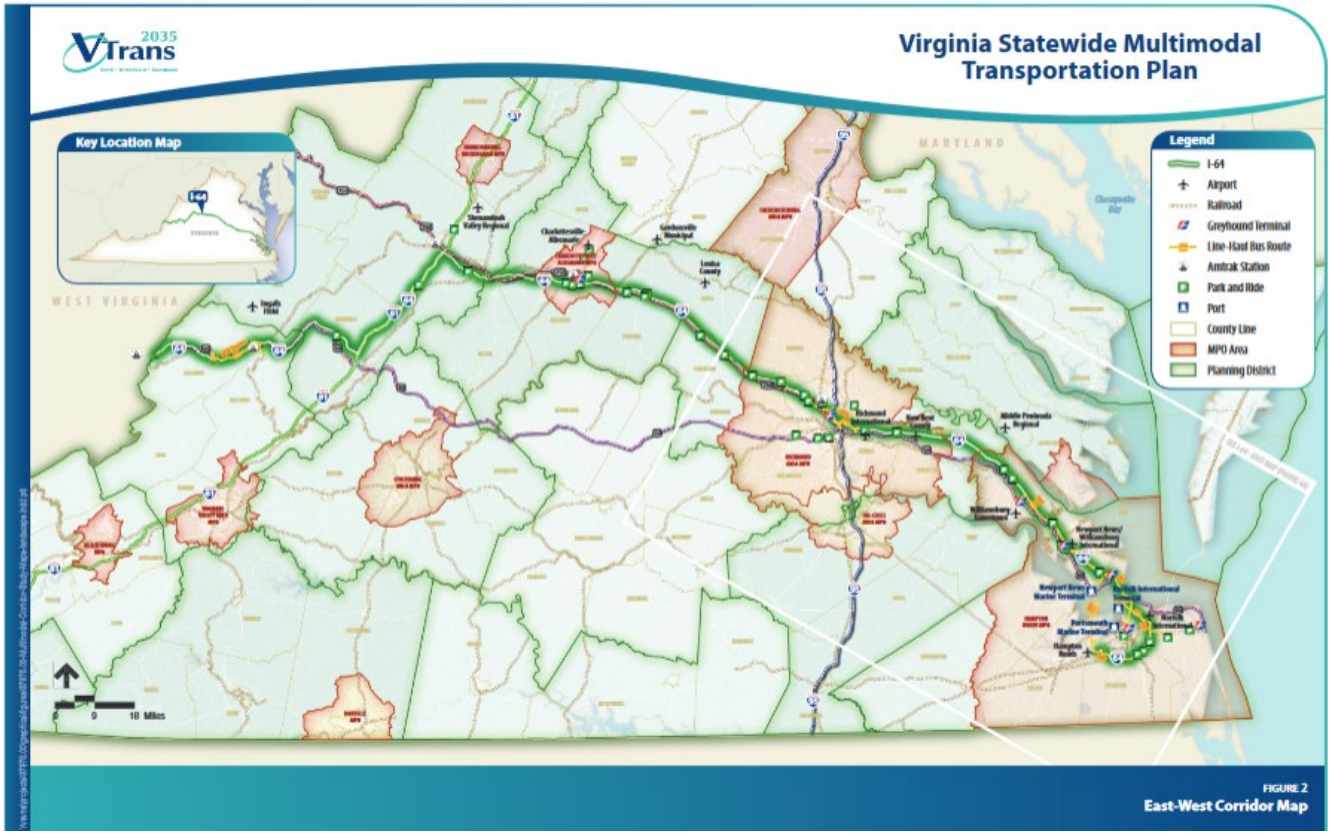
Previous Studies and Policy

VTrans Multimodal Transportation Plan

The importance of this corridor to the Commonwealth is evident from its designation as a Corridor of Statewide Significance (CoSS) in the *VTrans 2040 Multimodal Transportation Plan*. *VTrans* is Virginia's multimodal transportation plan, which is developed and adopted by the Commonwealth Transportation Board (CTB) every four years. It includes a statement of Vision and Goals for transportation investment, identifies priorities, and provides direction on implementation strategies and programs to the CTB, the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (DRPT), and regional Metropolitan Planning Organizations (MPOs).

The CoSS is the statewide network of facilities and services comprising the multimodal network connecting major centers of activity. The CoSS are the top tier of the state's transportation network, linking Regional Networks (RNs) and Urban Development Areas (UDAs). The CoSS network is defined as, "An integrated, multimodal network of transportation facilities that connect major centers of activity within and through the Commonwealth and promote the movement of people and goods essential to the economic prosperity of the state. These corridors include highways, rail lines, seaports, and airport facilities." The purpose is to support inter-regional and interstate travel. These corridors were originally established as part of VTrans 2035 in 2009 and continue to be a key element in the Commonwealth's overall transportation plan. The characteristics of the CoSS include that it is multimodal, connects major activity centers, has a high volume of travel, and provides a unique statewide function. The CoSS Needs Assessment is important in that it included the intercity bus mode in its analysis of the twelve defined corridors. Figure 1-1 presents the I-64 east-west CoSS map.

Figure 1-1: VTRANS CoSS Map—I-64 East-West Corridor



SOURCE: HTTPS://VTRANS.ORG/RESOURCES/VTRANS2035-COSS-EAST-WEST-CORRIDOR.PDF

In the 2010 CoSS Needs Assessment intercity bus stop locations were identified and services provided by Amtrak, Greyhound and Megabus were assessed in terms of the travel times, fares, and frequency as compared to an automobile trip in the same corridor (or segment). Similar analysis was performed for rail passenger and air service. In the Needs Assessment, mode choice needs were identified for major origin-destination pairs in which comparable non-auto mode options were not available. The analysis of the twelve corridors was conducted for segments within each corridor. These mode choice needs were included in the segment Summary of Needs in the overall report. While these plans do not specifically call for intercity bus in this corridor, the overall emphasis on the need for multimodal services can be seen to be supportive of enhanced intercity bus service in this corridor. The original analysis for the plan collected inventory data in 2010, when there were more Greyhound stations and more intercity bus services—the need can only have grown with the reductions in service following the COVID-19 pandemic.

Some of these needs are identified specifically as intercity transit (or rail) needs, and others as a need for more mode choices which could include intercity bus, but also commuter bus or regional rural transit services – either way, they are indicative of unmet needs for intercity or regional connectivity. In Chapter 2, the existing statewide intercity bus network is defined and compared to the CoSS structure to help identify the relationship between them at the statewide level.

2021 Commonwealth Corridor Feasibility Study

The potential demand for transportation services in this corridor was recognized by DRPT in the *2021 Commonwealth Corridor Feasibility Study*. The study assessed the feasibility of implementing rail passenger service in this corridor, projecting annual ridership of 177, 200 passengers in 2040 on four daily trips. It also estimated known capital costs of $416.5 million in 2030 dollars, and annual operating and maintenance costs of $27.55 million. Whether a rail passenger alternative is eventually developed or not, the market for intercity passenger demand in this corridor could be tested at some level by implementing quality intercity bus service at a much lower cost.

DRPT Intercity Bus Studies

DRPT consideration of intercity bus services began with an initial study in 2003, the *Intercity Bus Needs Assessment and Six-Year Plan and Program,* which inventoried existing services and presented a program for maintaining this network. This study developed high level concepts for state involvement in supporting intercity bus services in the state, but there was no decision made on state support. Also in 2003, a *Feasibility Study for Intercity Bus Service Between Hampton and Fredericksburg, Virginia* was conducted, focusing on that single corridor, but in the absence of local match it was not funded. Subsequently, service needs across the state were addressed by the 2013 *Virginia Statewide Intercity Bus Study*. This study served as the basis for DRPT's direct involvement supporting rural intercity bus services, including the model of contracted service used initially for the "Virginia Breeze" service between Blacksburg and Washington, D.C.

The success of the Virginia Breeze led DRPT to conduct another study, the *Virginia Breeze Expansion Alternatives Analysis* conducted in 2018-2019. This statewide study focused on the needs of the Commonwealth beyond the original Virginia Breeze corridor, and it included significant outreach as well as technical analysis. Outreach efforts for that study included a call for east-west service, with two routings suggested: The I-64 corridor connecting Harrisonburg-Staunton, Charlottesville with Richmond and Hampton Roads, and a more southerly route connecting Blacksburg and Roanoke to Richmond via 460/360. Neither was included in the four corridors recommended. Two of those recommended for initial implementation are now in service: Capital Connector (Martinsburg-Richmond-Washington, D.C.), and the Piedmont Express (Danville-Washington, D.C.). Subsequently KFH provided analysis for DRPT regarding intercity service in the I-81 Corridor from Bristol. Service has now been implemented there as the Highlands Rhythm.

A subsequent analysis of one of the other recommended routes, the *Intercity Bus Service Needs Assessment* from October 2022*,* focused on the U.S. 17 Corridor between Hampton Roads and Washington, D.C. It identified a potential option but noted that all of the alternatives would have a low farebox recovery and a high per passenger subsidy. No Virginia Breeze service has been implemented in that corridor to date.

In this project, DRPT looks in depth at a different alternative, building upon previous statewide work and the analysis and input from previous studies, applying similar methodologies but looking in depth at this corridor identified through the rail planning process. Recent ridership experience and user input from the other Virginia Breeze routes are used to help to better understand changes in the demand for intercity bus service that could modify earlier findings. This route has had local interest and support in previous studies, and experience from the other studies suggests that local input is extremely useful in designing appropriate services to meet needs that are much more apparent to local stakeholders—for example the need to connect international students to Dulles Airport emerged as a key need during the original statewide intercity bus study. This study includes input from the communities along the corridor. In addition, there is consideration of the other existing bus and rail services in this corridor, and how new service could complement and coordinate with these other services to offer connections with existing services, rail and bus, to begin to provide more of a network and offer more travel opportunities.

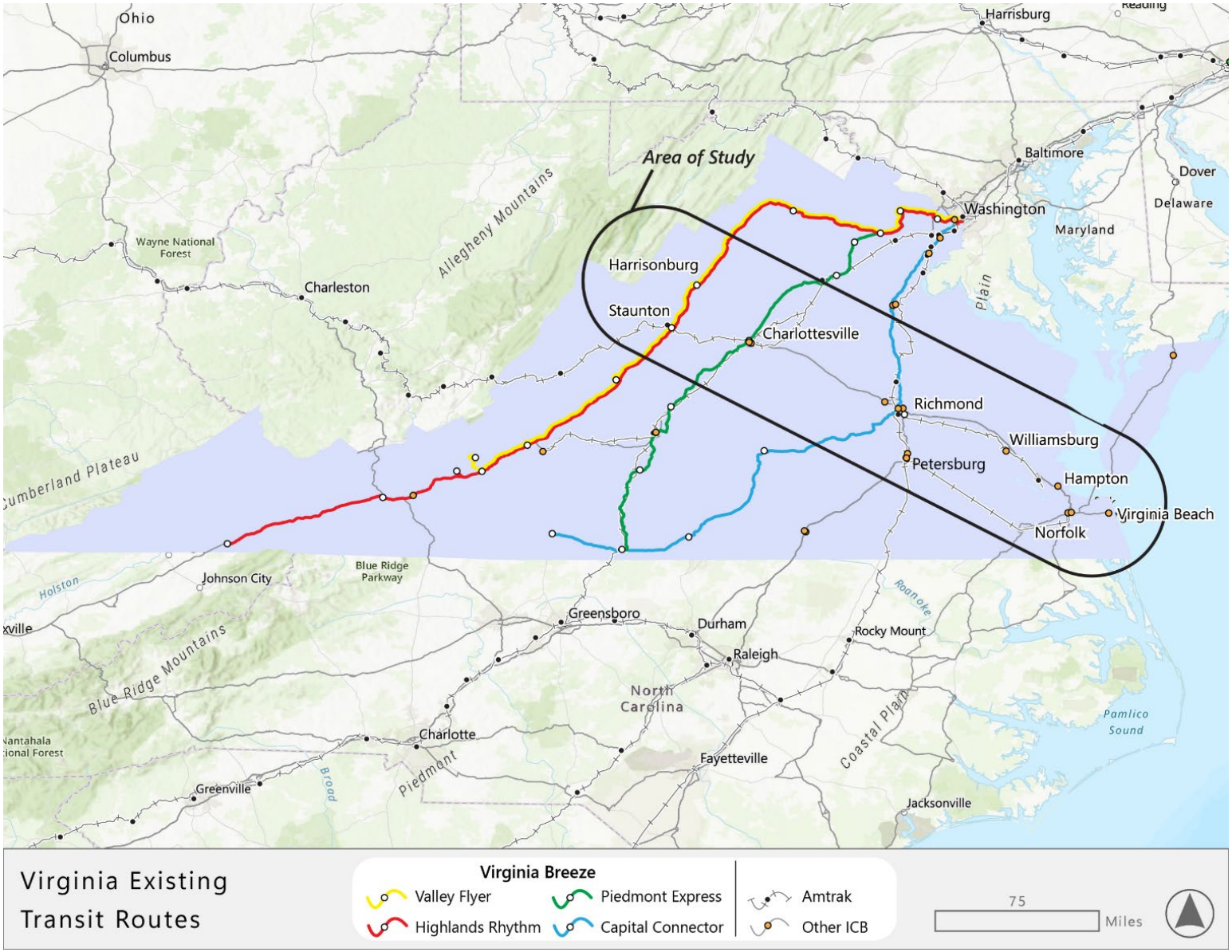
Existing Intercity Services

The focus of this study is the area depicted in Figure 1-2, which shows the outlines of the existing intercity bus network with the current Virginia Breeze routes highlighted.

There is some type of intercity bus or rail passenger service on every segment of this corridor except the U.S. 460 route between Norfolk and Petersburg—but there is no through route that would offer a single-seat ride between any two potential stops. A trip between the endpoints would require at least one transfer and likely more depending on the origin and destination of the trip—and with one exception none of these different services have coordinated schedules, so the wait times could be significant.

To inventory the existing services, the study team compiled a single Excel spreadsheet showing all the modes and carriers and the times of their stops at places in this corridor. That sheet is too wide to print, but each of the significant providers and their services are presented in the following sections.

Figure 1-2: Intercity Bus Services in Study Area



Greyhound Lines

Greyhound is still the only intercity bus operator with a national network, and it continues to provide the connective ticketing and information network for the national interline ticketing system through the National Bus Traffic Association. The national ticketing network is provided through a firm called Transcor Data Services (TDS), which provides ticketing for Greyhound and 35 other intercity carriers as a single system. It describes itself as the national intercity bus network. Following the purchase of Greyhound by Flix Mobility, the TDS system was included in the new Flixbus/Greyhound ticketing system. It should be noted that other operators have ticketing systems that operate outside the TDS network, and that there are efforts to improve the connectivity of these separate systems to support interline ticketing. The "national intercity bus network," a term used in the FTA guidance for the Section 5311(f) program, is not defined by FTA.

Greyhound is still recovering its service levels and ridership following the COVID-19 pandemic. When the pandemic occurred, ridership on its network fell to 20 percent or so of its pre-pandemic levels. To maintain the connectivity of the network, Greyhound suspended some low ridership services and reduced frequencies to minimal levels on most of the remaining services. Many of these services have not been reinstated or brought back to their previous levels. Consequently, current service levels are low. In the Roanoke to Richmond and Hampton Roads to Richmond corridors there is service, but the frequencies are low. Most non-urbanized stops have been eliminated.

Hampton Roads to Richmond

There are two remaining daily round-trip schedules per day from Hampton Roads origins to Richmond (and return), shown in Greyhound's Timetables 420 and 422. In Table 422, Schedule 1084 operates between Virginia Beach, Norfolk and Richmond westbound with stops in Hampton and Williamsburg (no service on Tuesday and Wednesdays). It is actually part of an overnight bus from Philadelphia, which also serves the Eastern Shore on its way to Virginia Beach. In Table 420 the daily eastbound trip (3570) leaves Richmond at 10:20 a.m. and makes a stop in Hampton but not in Williamsburg on its way to Norfolk—it continues on to New York. The westbound trip (3569) starts in New York, arriving at Norfolk at 4:15 a.m., and arriving in Richmond at 7:05 a.m. It does stop in Williamsburg. The other pair of schedules (1084 and 3561) serve Virginia Beach, Norfolk, Hampton and Williamsburg before terminating in Richmond. Schedule 3561 does not operate on Tuesdays and Wednesdays. Persons wishing to continue west or coming from the west must transfer in Richmond—all Greyhound schedules meet at the Greyhound station. Thus the service is very limited – there is daily service only eastbound with no stop in Williamsburg, and the two schedules (one each way) that do serve Williamsburg operate only five-days per week.

Hampton Roads Connections to North Carolina

As noted above, one of the Greyhound schedules between Norfolk and Richmond is actually part of a through schedule that operates up the Eastern Shore to New York, and another serving Virginia Beach continues on to Philadelphia. There is also a connecting route linking North Carolina with the Greyhound service in Norfolk. Timetable 423 includes Schedule 4845 leaving Hampton at 9:30 a.m., Norfolk at 10:10

a.m. daily stopping in a number of small eastern North Carolina cities before reaching Raleigh at 2:55 p.m. The early departure from Norfolk allows persons from the Northeast on Schedule 3569 to connect and reach North Carolina destinations after an overnight trip. The return trip leaves Raleigh at 5:40 p.m., arriving in Norfolk at 10:25 p.m., leaving ten minutes later to arrive in Hampton at 11:05 p.m.

Table 417 presents connecting service between Richmond and Myrtle Beach, South Carolina, with Virginia stops in Richmond, Hampton and Norfolk. Schedule 0387 leaves Richmond at 5:10 a.m., Hampton at 7:15 a.m., and Norfolk at 7:55 a.m. Northbound Schedule 0388 arrives in Norfolk at 9:30 p.m., Hampton at 10:15 p.m., and Richmond at 11:45 p.m. These North Carolina connections are funded by North Carolina DOT under their Section 5311(f) program.

Roanoke-Charlottesville-Richmond

Greyhound also operates service between Roanoke, Lynchburg, Charlottesville and Richmond. Table 144 includes two daily round-trips between Nashville, Tennessee and Richmond. Only one trip each way makes stops in Wytheville, Roanoke, Lynchburg and Charlottesville. Schedule 1512 arrives in Roanoke at 4:30 a.m., leaving at 5:10 a.m., arriving in Lynchburg at 6:15 a.m. leaving five minutes later to arrive in Charlottesville at 7:40 a.m. leaving ten minutes later to arrive in Richmond at 9:05 a.m. Westbound, Schedule 1521 leaves Richmond at 7:50 a.m., in Charlottesville from 9:10 to 9:20, in Lynchburg at 10:40 a.m. leaving five minutes later to arrive in Roanoke at 11:50 a.m. After leaving Roanoke at 12:35 p.m., its next stop is Wytheville—there are no stops in Christiansburg or Blacksburg.

Greyhound Connections Across Virginia

As can be seen in the previous service descriptions, the remaining Greyhound service east-west across Virginia is quite limited—one daily round-trip from Roanoke to Richmond, one daily round-trip between Richmond and Virginia Beach (with no Williamsburg stop in one direction), and one trip five days per week between Richmond and Virginia Beach. On Greyhound's website connecting service from Roanoke to Hampton is shown to take six hours and 30 minutes; from Roanoke to Norfolk seven hours and 25 minutes—leaving once per day at 5:10 a.m.

Greyhound does have significant service north-south through Richmond to other points within and outside Virginia. Table 424 shows five daily round-trips between Richmond and Atlanta, with Virginia stops in Petersburg (two of the five) and South Hill (one of the five). Table 400 shows one daily round-trip between Richmond and Jacksonville, Florida, with no other Virginia stops. Table 427 shows one daily round-trip between Richmond and Knoxville, Tennessee, with no other Virginia stops. From the northeast, Table 124 shows six daily round-trips between Richmond and Washington, where they connect to New York services.

This highlights a significant issue considering the degree to which Greyhound services connect internally – the Greyhound station in Richmond has been sold, and at some point in the near future there will be a need for a new Greyhound station that meets the need for safe waiting areas for connecting passengers. Because the Greyhound service from the northeast does not continue through but ends in

Richmond most passengers need to transfer to one of the many services that continues south or west. Options for curbside service will not provide a safe, weather-protected waiting area for these many connecting passengers.

Flixbus

Flixbus is relatively new to the North American bus scene, but it is the largest intercity bus company in the western world. Based in Germany, it purchased Greyhound Lines from FirstGroup of the U.K. in October 2022. It has now combined Greyhound's ticketing system with its own platform, and it is implementing new and combined services. Flixbus is a technology company that identifies markets, partners with local or regional companies to operate service, markets the service under its brand, and sells the tickets. It does not own any buses or facilities (other than those of its subsidiary Greyhound Lines). To this point, Flixbus has operated as a curbside provider, without terminals but using on-street stops.

In the I-64 corridor Flixbus currently serves the Charlottesville-Richmond market as part of a service from Charlottesville to New York. The stop in Charlottesville is on campus. There are some ticketing restrictions for those intending to travel on just this segment. The stop in Richmond is on the plaza in front of Main Street Station, The service is operated daily, one round-trip per day. Flixbus also operates two daily roundtrips between Richmond and Williamsburg. The Williamsburg stop is at the train station, which is also the WATA main transfer point, the Greyhound stop and the Amtrak rail station.

Megabus

Prior to the COVID-19 pandemic, Megabus served several routes in Virginia. Current services are limited to a daily service between Washington, D.C. and Atlanta through Richmond. Megabus (or its parent company Coach USA) is the contractor for Virginia Breeze, and under that brand it provides service on all four of the Virginia Breeze routes: the Valley Flyer, Highland Rhythm, Piedmont Express and Capital Connector. None of these routes provide east-west service on the I-64 corridor, though the Valley Flyer, Piedmont Express and Capitol Connector routes all intersect with I-64 (in Staunton, Charlottesville and Richmond respectively). Megabus has its own ticketing platform. Virginia Breeze ticketing is done through the Megabus ticketing platform, and the Virginia Breeze services and destinations are all shown on the Megabus website.

Ourbus

Ourbus is a technology company, not a transportation operating company. It identifies potential intercity bus markets based on its own research and input from potential customers that ask for specific routes or schedules. It then contracts with intercity or charter bus companies that have the required operating authority, insurance, etc. to actually operate the trips. In that sense it is similar to Flixbus. Ourbus services generally do not operate daily, and their schedules may be focused on university holidays or other specific events—essentially providing service only at peak demand times.

In the I-64 corridor its website offers service on routes linking Blacksburg and Harrisonburg with Charlottesville, Richmond and Norfolk. As an example, its next scheduled service between Blacksburg and Charlottesville is part of a trip being operated by Gunther Charters from Blacksburg to Washington, D.C. on March 2. Its website does not show the next scheduled trip on that run—trips are arranged within the next month, so dates beyond that are not shown. The next trip from Blacksburg to Norfolk is on March 1, with stops in Radford, Richmond, Williamsburg and Norfolk—all at or near universities. In effect Ourbus aggregates individual ticket sales into a group and charters buses if there is enough demand.

Intercity Passenger Rail Service-Amtrak

Amtrak Rail Passenger Service

There is Amtrak service provided in several corridors that overlap or intersect with the I-64 east-west corridor, and the greatest amount of service is provided by the Amtrak services that have been developed with DRPT support, though there are some services provided by the Amtrak national network that also operate through this corridor.

Norfolk-Richmond-Washington

There are two daily round-trip trains between Norfolk and New York, with stops in Petersburg, Richmond's Main Street Station, Ashland, Fredericksburg. Quantico and Alexandria. One of these schedules each way has a dedicated Amtrak Thruway bus connection to/from Newport News.

Newport News-Richmond-Washington

There is also a daily round-trip from Newport News to Washington, D.C. with stops in Williamsburg, both Richmond stations, Ashland, Fredericksburg, Quantico, Woodbridge and Alexandria.

Roanoke-Charlottesville-Washington-New York

With DRPT support, additional Amtrak rail passenger service is operated from Roanoke to Washington, D.C. There is a daily train that leaves Roanoke early in the morning, with stops in Lynchburg and Charlottesville on the way to Washington, D.C., with additional stops in Culpeper, Manassas, Burke Centre and Alexandria. It operates Monday through Friday leaving at 6:20 a.m., with a weekend schedule leaving at 8:45 a.m. Return trips offer Monday-Friday Roanoke arrivals at 10:06 p.m., weekends at 9:59 p.m. A second service leaves Roanoke daily at 4:30 p.m., with the return trip arriving at 1:13 p.m. Smartway bus service connects Virginia Tech in Blacksburg with the Roanoke trains.

Additional Intersecting North-South Amtrak Services

The Crescent

A long-distance Amtrak train from New York to New Orleans, the Crescent has stops at Alexandria, Manassas, Culpeper, Charlottesville, Lynchburg and Danville. Currently it operates Thursday through Saturday southbound, and Tuesday through Friday and Saturdays and Sundays northbound.

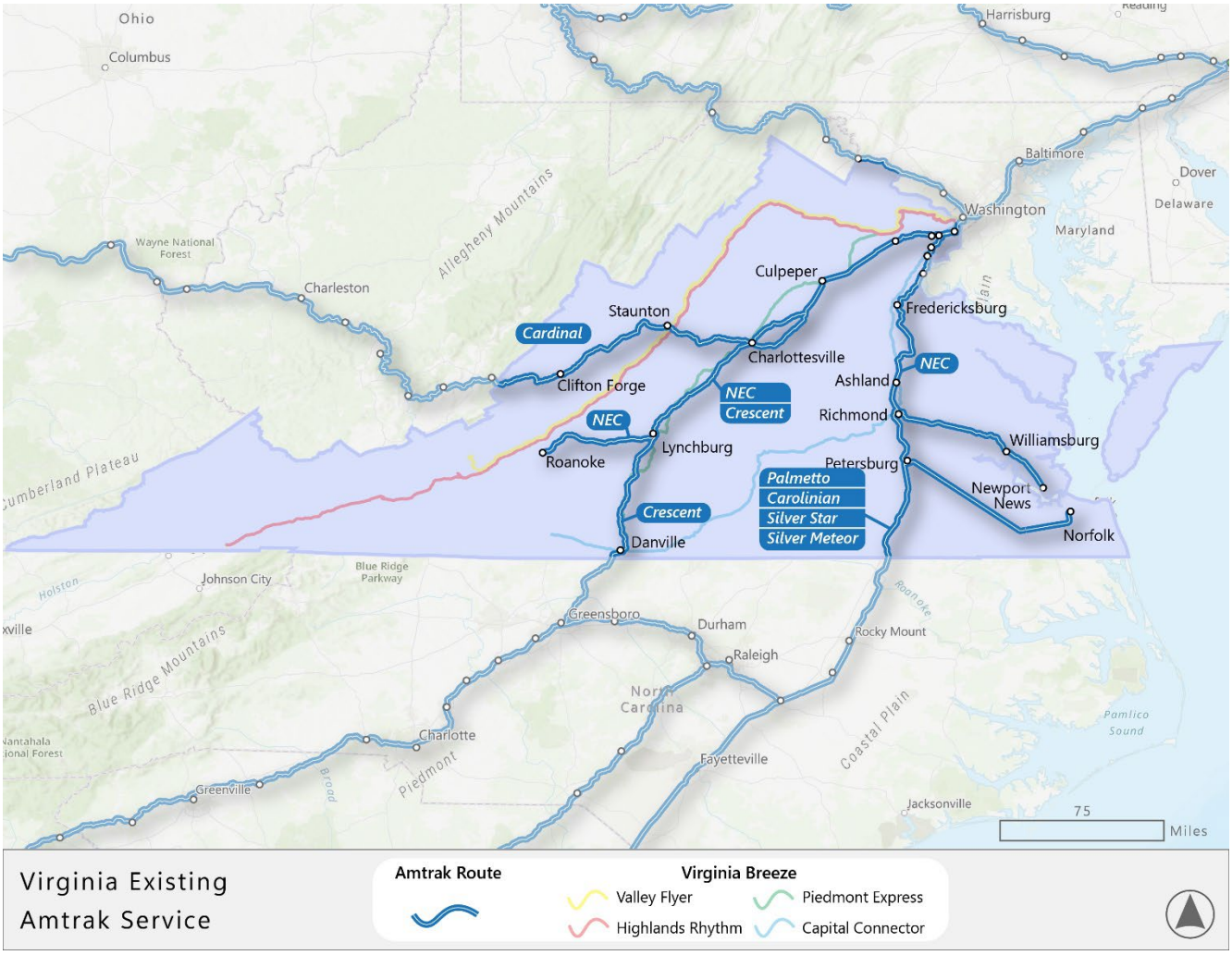
The Cardinal

The Cardinal operates three days per week between New York and Chicago. Eastbound trains operate Wednesday, Friday, and Sunday; westbound trains operate the same days. Virginia stops include Alexandria, Burke Centre, Manassas, Culpeper, Charlottesville and Clifton Forge.

Richmond Services

In addition to the Hampton Roads trains that go through Richmond, there are numerous north-south trains that serve Richmond but do not provide any coverage in the I-64 corridor. Rather, they offer connection opportunities north and south from the corridor. There are six Northeast Regional trains to/from points in the northeast (three to/from Boston, one from Springfield, the rest from New York); the New York-Savannah Palmetto, the New York-Charlotte Carolinian, the New York Miami Silver Star and Silver Meteor. On weekdays this offers ten services to/from or through Richmond.

Figure 1-3: Virginia Existing Amtrak Service



Local Transit

Local transit is potentially important to this assessment of intercity needs in several ways. One is that the availability of local transit services to intercity stop locations at times when intercity services make stops allows local access for intercity trips without the need for a personal vehicle or a taxi- or Uber/Lyft trip. Related to that is the potential for intercity services to facilitate those connections and have some amenities for waiting passengers if they share the stop with local transit. Finally, there is the possibility that some longer distance services provided by local transit operators could meet some of the possible need for intercity service, for example if a commuter bus serves a location considered as an intercity stop. There is local public transit in each of the cities in the I-64 corridor—two of the services operate longer distance routes that could be considered as intercity links, the Afton Express and HRT Max commuter services between Virginia Beach and Norfolk.

Afton Express

The Afton Express provides the only current bus service between Staunton and Charlottesville. Operated by Central Shenandoah Planning District Commission (along with local BRITE transit service in the Staunton-Fishersville area), the Afton Express is a commuter service between Staunton, Waynesboro, and Charlottesville. It operates weekdays, with service eastbound to Charlottesville in the morning and westbound in the evening. Eastbound service includes four morning and one evening trip, westbound service includes one morning and six afternoon/evening trips. There is no stop in Crozet, and there are multiple stops in Charlottesville.

Hampton Roads Transit (HRT)

HRT provides an extensive network of fixed-route bus services serving the entire region, along with the required ADA paratransit. If there was connectivity to intercity stops, this network would provide access to the longer distance services, but HRT is not a provider of intercity services that might be eligible for funding Section 5311(f), as even its longer routes are within the Urbanized Area.

There are HRT routes that might be considered as long routes with a potential to connect passengers to intercity services. The previous MAX services are being rebranded as 757 Express routes, offering 15-minute headways during peak hours from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. on weekdays. The 20 from Virginia Beach to Downtown Norfolk has just been converted to 757 Express. MAX routes not yet rebranded that could connect with intercity bus service include:

- Route 960 (MAX) Virginia Beach/Norfolk—Hourly service between 5:39 a.m. and 7:39 p.m. from Norfolk, and 6:30 a.m. to 7:39 p.m. from Virginia Beach. There is Saturday and Sunday service with shorter spans (later morning start, earlier evening end).

- Route 961 (MAX) Downtown Norfolk, Hampton Transit Center, Newport News Transit Center, and Newport News Shipbuilding offering service between 4:55 a.m. and 10:15 p.m. every half hour during the morning and evening peaks, with hourly service mid-day and after 5:15 p.m. Saturday service has a similar span with hourly service all day, and on Sunday the hourly service only operates between 7:00 a.m. and 8:00 p.m.

- Route 921—Newport News Transit Center to Williamsburg Transportation Center provides one a.m. and one p.m. trip per day, weekdays, between these two hubs.

These two routes offers the combination of span and frequency that could facilitate some connections to intercity services that terminate in either Norfolk or Virginia Beach—assuming that the stops were co-located. The Norfolk Downtown Transit Center is 1.2 miles from the Norfolk Amtrak Station, which is the Amtrak, Amtrak Thruway Bus, and Greyhound stop, and Megabus departs from Virginia Beach—so current services are not co-located, nor are they located at transit hubs. The Hampton Transit Center is also a Greyhound stop, and the new Newport News Transit Center will also be a multimodal transportation center with Amtrak rail and Thruway Bus service in addition to HRT Routes 106 and 107.

Summary and Conclusions

The review of existing and planned intercity services in the I-64 corridor D.C. corridor revealed that there is some type of intercity bus or rail service between the Hampton Roads area (Norfolk, Hampton, Newport News and Virginia Beach), Richmond, Charlottesville. Lynchburg and Roanoke.

Current Greyhound and Megabus services are minimal, having been reduced during the pandemic. Flixbus is introducing new services in select corridors, including two segments in the I-64 corridor. There is no intercity bus or rail service between Charlottesville and Staunton or Harrisonburg. Though there is commuter bus service it would be difficult to coordinate existing schedules to travel beyond Charlottesville.

Though there is some level of intercity bus service or commuter bus service on each of the possible route segments in the I-64 corridor, there is no single-seat ride the length of it—the closest option is the connecting service offered by Greyhound between Roanoke-Charlottesville-Richmond and Richmond-Virginia Beach services, which include a minimum hour and fifteen-minute connection in Richmond.

In addition:

- The frequency of existing intercity bus connections across the corridor is now very minimal, to the level of a trip per day each way between Roanoke and Richmond, two trips per day between Charlottesville and Richmond, four trips per day between Richmond and Williamsburg, and two trips between Richmond and Virginia Beach.

- There is little national network intercity bus service from the Hampton Roads stops to North Carolina or the Eastern Shore, limiting the potential for feeder connections or in-kind miles (remaining service to/from North Carolina is already subsidized by North Carolina).

- There is substantial north-south service to/from all the larger potential stops in the I-64 corridor offering service to/from the northeast (Washington and New York), so there is little need for east-west service to be scheduled to make connections with these services—a potential rider need not travel to the east or west to catch service to/from the north.

The lack of service frequency everywhere but Richmond means that options involving a connection to other unsubsidized intercity services are only feasible in Richmond.

One other consideration is that none of the existing services in the I-64 corridor make an airport connection. The connection to Dulles Airport has been a significant ridership generator for other Virginia Breeze services, potentially a connection to either the Charlottesville Albemarle Airport or the Richmond International Airport would provide some additional access and ridership for service in this market.

Chapter 2
Demographics

Introduction

This chapter examines the extent to which the study area between Virginia Beach and the Staunton/Harrisonburg area along the I-64 corridor has potential needs for intercity bus service. It identifies areas of high relative need based on the density and percentage of potentially transit dependent populations. Additionally, it identifies places that are likely to be intercity bus destinations, including military bases, medical centers, Veterans Affairs facilities, educational institutions, and recreational attractions. By overlaying the existing bus network with potential origin areas of high need and potential destinations, the analysis reveals key intercity connections and gaps. Much of the current network is responsive to the needs identified within this chapter.

While this chapter focuses on the study area along the I-64 corridor, needs in that area are identified as part of an updated statewide demographic analysis using the latest US Census data, including the 2020 Census and the latest American Community Survey (ACS) data which is the 2017-2021 Five-Year data.

Demographic Analysis – Trip Origins

In previous intercity bus studies, KFH has used Census data to identify locations where there is some level of density of persons more likely to need public transportation. These groups include:

- Overall population density,
- Young adults 18-24,
- Older adults ages 65 years or older,
- Persons living at or below the poverty line, and
- Autoless households

One aspect of needs assessment is the coverage of intercity services. The total population with a ten-mile radius of existing stops and also within a 25-mile radius is identified to assess the degree to which the population has access to intercity services. Need is assessed by looking at the population in Census block groups within each of these categories as compared to the state average, and then classifying the Block Groups in one of five categories from Low Need to Very High Need. In addition, these factors are combined to create two Transit Dependence Indices, one reflecting the level of need based on the percentage of the population in that area with that need, and the other reflecting the number and density of the population in each area with that need.

This methodology was used in the *Virginia Breeze Expansion Alternatives Analysis* performed in 2018-2019. The needs analysis in that study will be used as the basis for focusing on the I-64 Corridor from Virginia Beach to Staunton/Harrisonburg.

Methodology

For the demographic analysis, Census data was gathered at the block group level for each of four needs categories (young adults, older adults, persons living below the poverty level, and autoless households). The four categories were combined into aggregate measures of need including density and percentage.

Transportation services are typically prioritized in areas with greater population densities; however, it is also important to look at the percentage of transit dependent populations. Substantial percentages of transit dependent populations indicate a high proportion of people who may need transit, though spread out over large and primarily rural areas. The scale used for the demographic analysis ranges from "Very Low" to "Very High," reflecting demographic characteristics in relation to the statewide average. See Table 2-1 for an explanation of the indexed values.

Table 2-1: Demographic Measurement Scale

Index Category	Value Relative to State Average (SA)
Very Low	Less than 1x SA
Low	Between 1x and 1.33x SA
Moderate	Between 1.33x and 1.67x SA
High	Between 1.67 SA and 2x SA
Very High	2x SA or more

Analysis of Unmet Transit Needs

It is important to recognize that identifying areas of high relative transit need is not the same as forecasting ridership. Mapping the density and percentage of transit dependent persons can highlight potential demand. However, rural areas especially may not have the density to support intercity bus service, even if it is subsidized. Such areas may be candidates for rural feeder services, particularly if operated by local transit providers.

Population Density

As of the 2020 Census, approximately 8,631,393 people live in the Commonwealth of Virginia. If the population was evenly distributed across the entire state, the population would be about two-hundred persons per square mile. However, since the 2010 Census, the population of the state and the study area has remained unevenly distributed with urbanized regions, small urban clusters and sparsely populated rural and wilderness areas. In Virginia, a strong majority of the state's population has nearby access to the intercity bus network. The population within 25 miles of an intercity bus stop represents an estimated 90% (or 7.7 million) of the state population, while the population within 10 miles of an intercity bus stop represents 72.8% (or 6.3 million) of the state population. About 1.4 million or 16.2% of the population lives between 10-25 miles from an intercity bus stop. The population density of the state and intercity bus network is displayed in Figure 2-1.

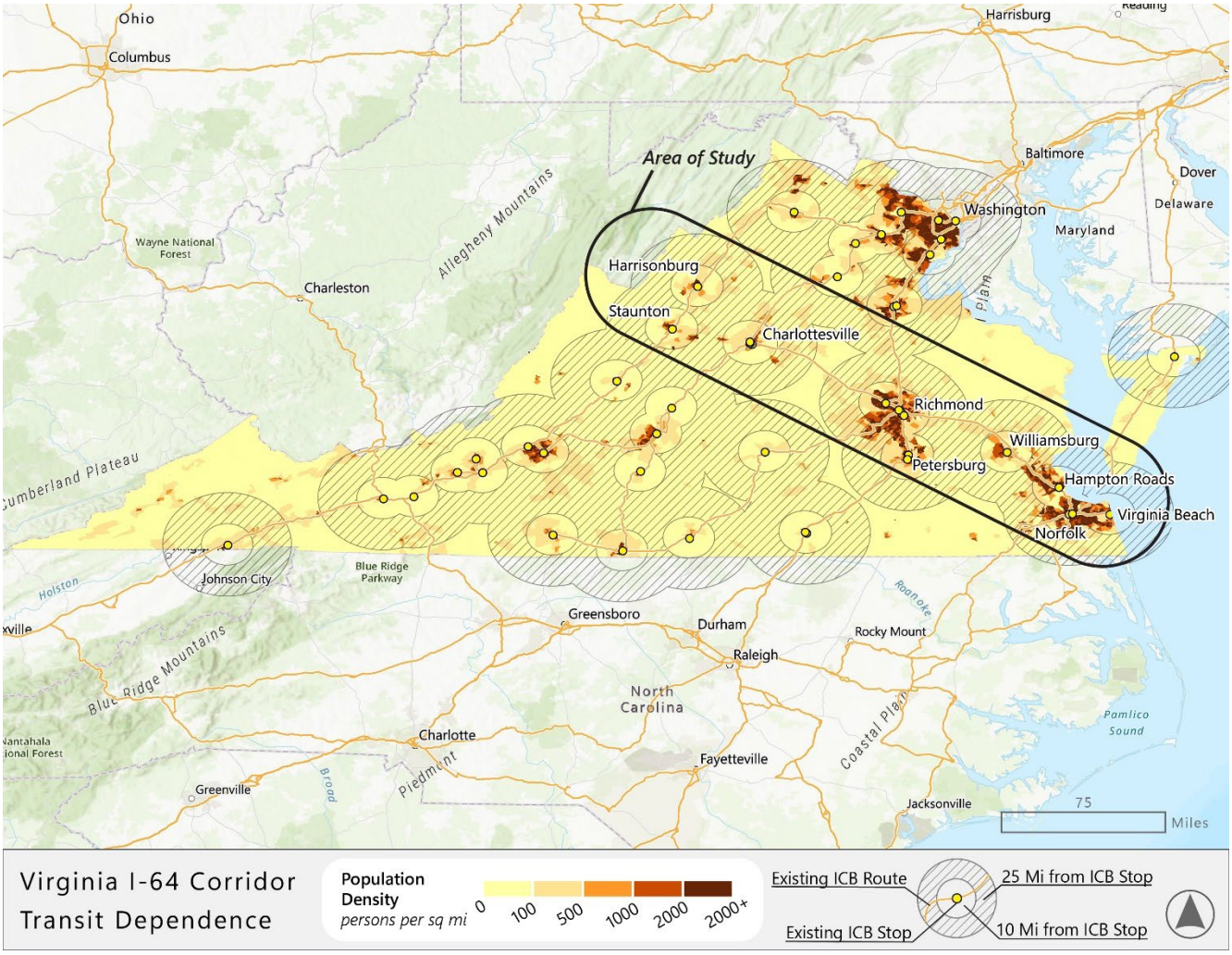
The study area includes multiple urbanized areas, including the Hampton Roads area, Williamsburg, Richmond, Petersburg, Charlottesville, Staunton, and Harrisonburg. Beyond the urbanized areas and places beyond 10 miles of an existing intercity bus stop, there are few block groups with a population density of 1000 people/square mile or more which could support intercity bus service. These block groups are typically found in small, but still relatively dense cities such as Waynesboro, Smithfield, and Suffolk. Table 2-2 lists the largest population centers within the study area by population. The vast majority of the block groups in the study area have less than 100 people per square mile.

Table 2-2: Population of Towns and Places in the Study Area

Town	2020 Population
Virginia Beach	459,471
Chesapeake	249,415
Norfolk	238,001
Richmond	226,618
Newport News	186,243
Hampton	137,158
Portsmouth	97,915
Suffolk	94,326
Harrisonburg	51,810
Charlottesville	46,554
Petersburg	33,457
Staunton	25,754

SOURCE: 2020 CENSUS

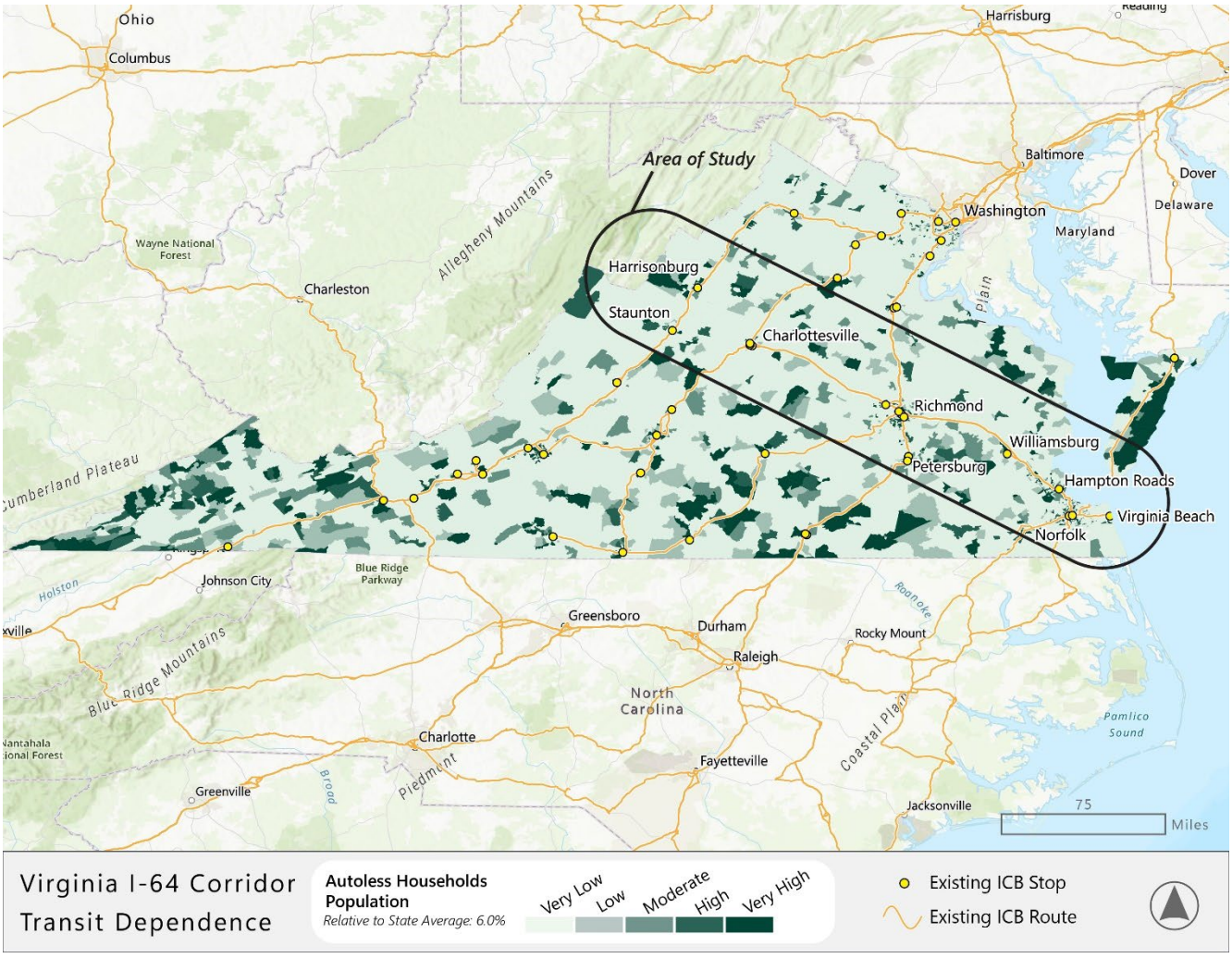
Figure 2-1: Population Density and Proximity to Intercity Bus Network



Autoless Households

Even though the majority of the study area is highly rural, there are some block groups with a higher concentration of households (relative to the state average) that do not own a car (Figure 2-2). These block groups are found in the major urban areas of Virginia Beach, Hampton Roads, Williamsburg, Richmond, Charlottesville, Staunton, and Harrisonburg and in some more rural areas such as southeast of Richmond and northwest of Harrisonburg.

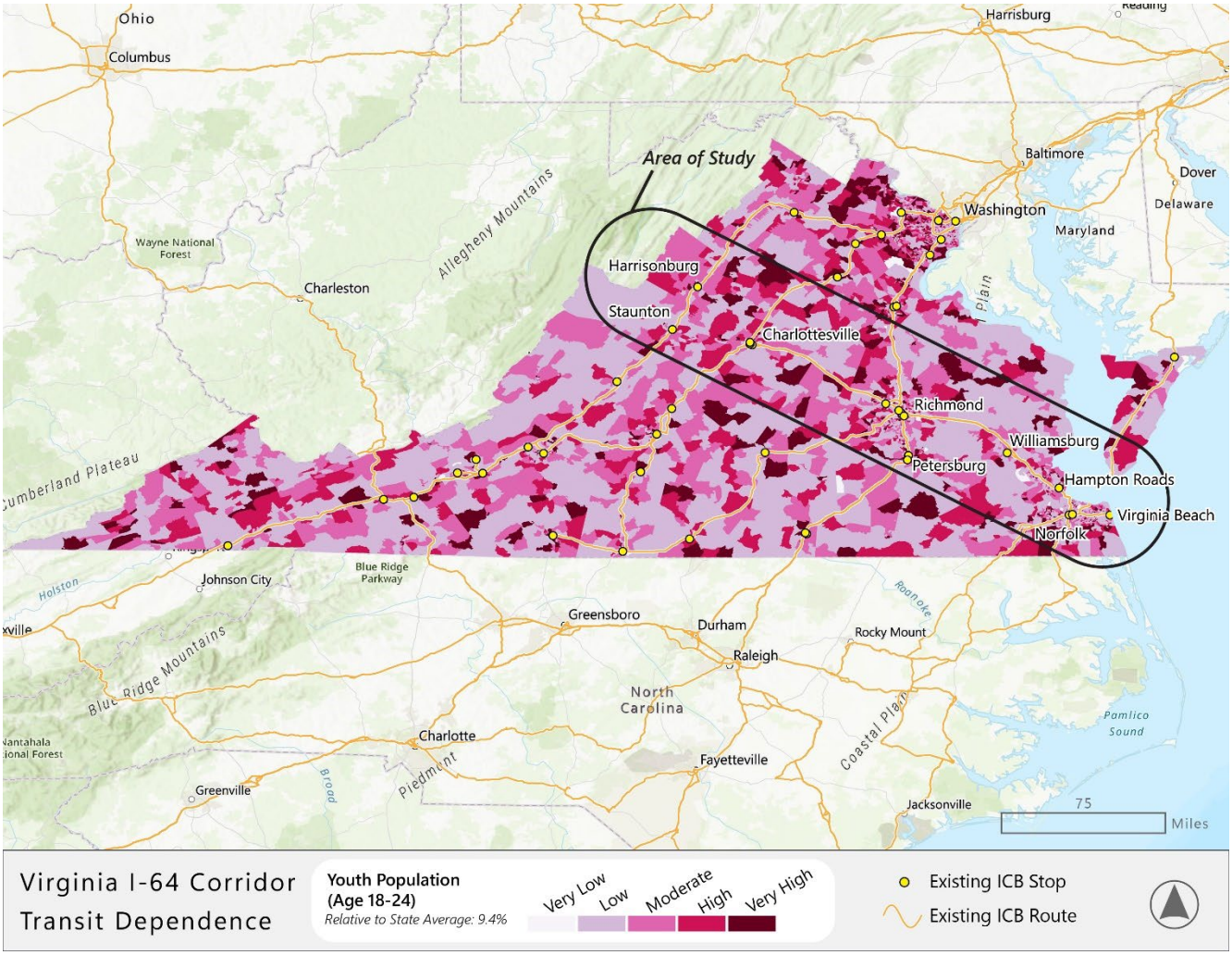
Figure 2-2: Autoless Households



Younger Adults

Concentrations of younger adults (ages 18 to 24) are largely dispersed throughout the state but within the study area, these block groups are primarily found in the outer core and suburbs of Richmond, throughout Norfolk, and in colleges and universities found in each of the main urban areas (Figure 2-3).

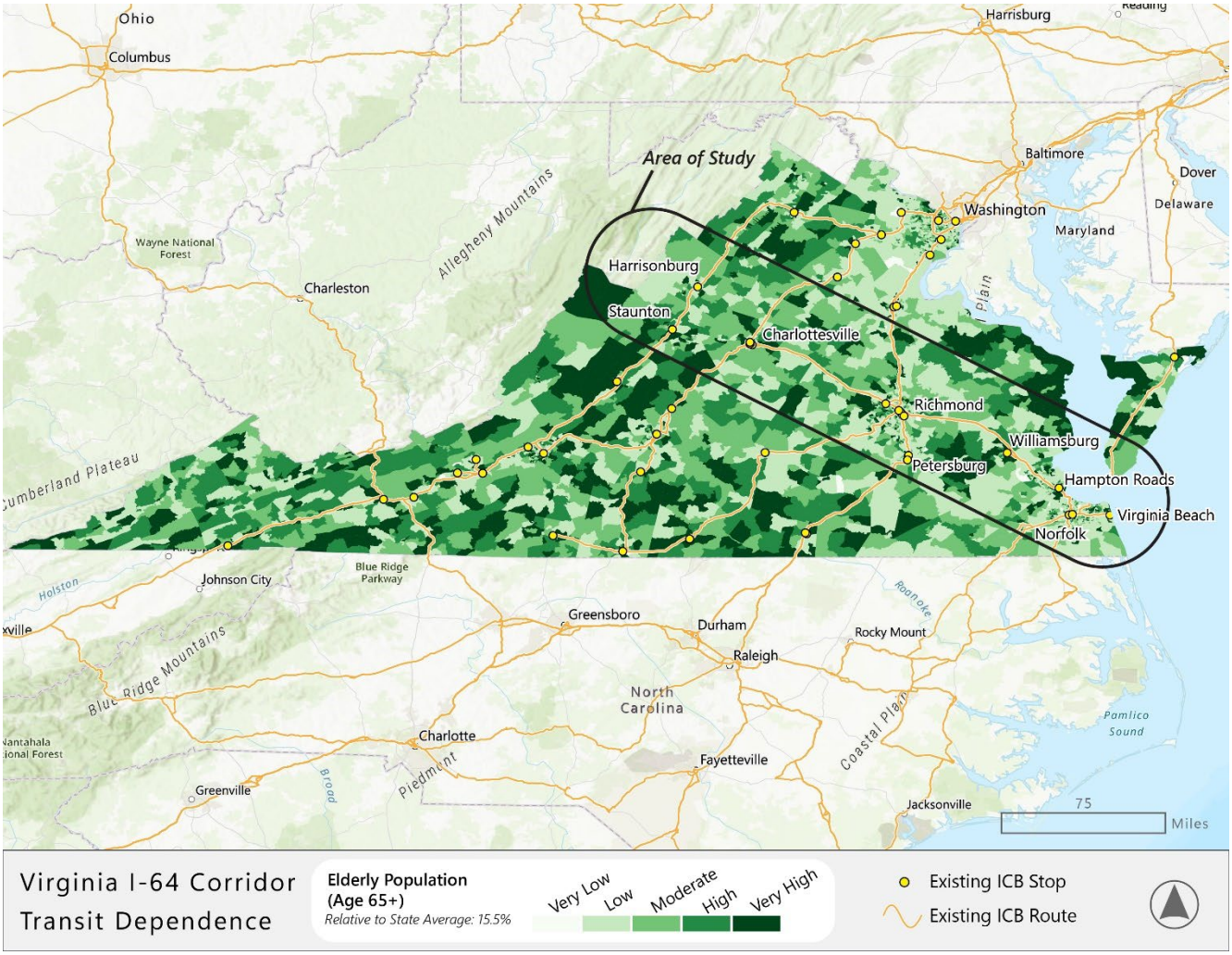
Figure 2-3: Younger Adults



Older Adults

The study area includes many large block groups with high to very high concentrations of older adults age 65+ (Figure 2-4). Many of these block groups are found in rural areas between Richmond and Williamsburg and outside of Staunton, with more urban block groups found around Virginia Beach and Charlottesville.

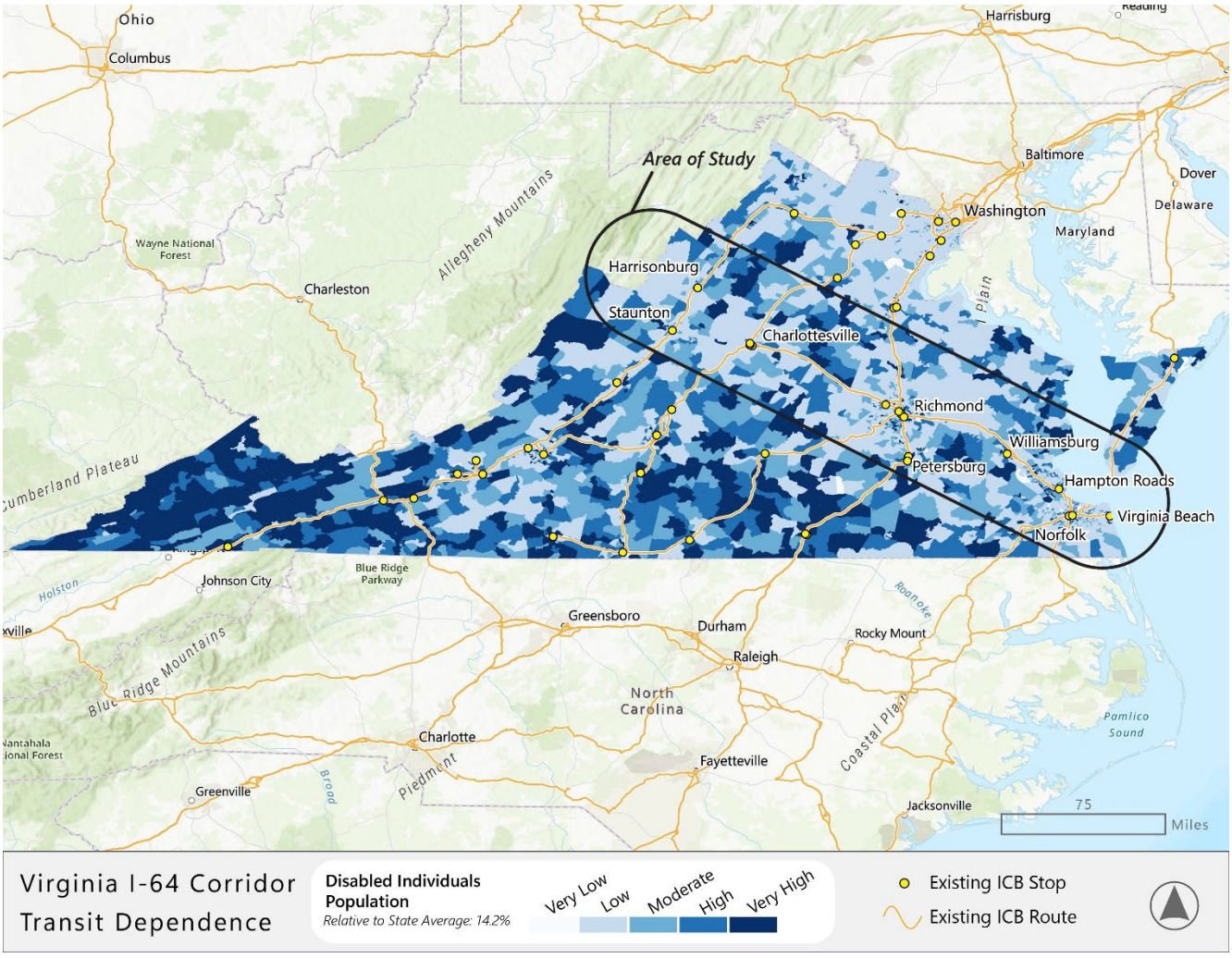
Figure 2-4: Older Adults



Individuals with Disabilities

As is the case with areas with higher concentrations of older adults, individuals with disabilities are concentrated in rural parts of the study area including northeast of Williamsburg, southeast of Richmond, and east of Harrisonburg. (Figure 2-5). Of the urban areas along the I-64 corridor, Norfolk, Hampton Roads, and Richmond have the highest concentrations of individuals with disabilities, while Charlottesville stands out as having a particularly low concentration of these populations.

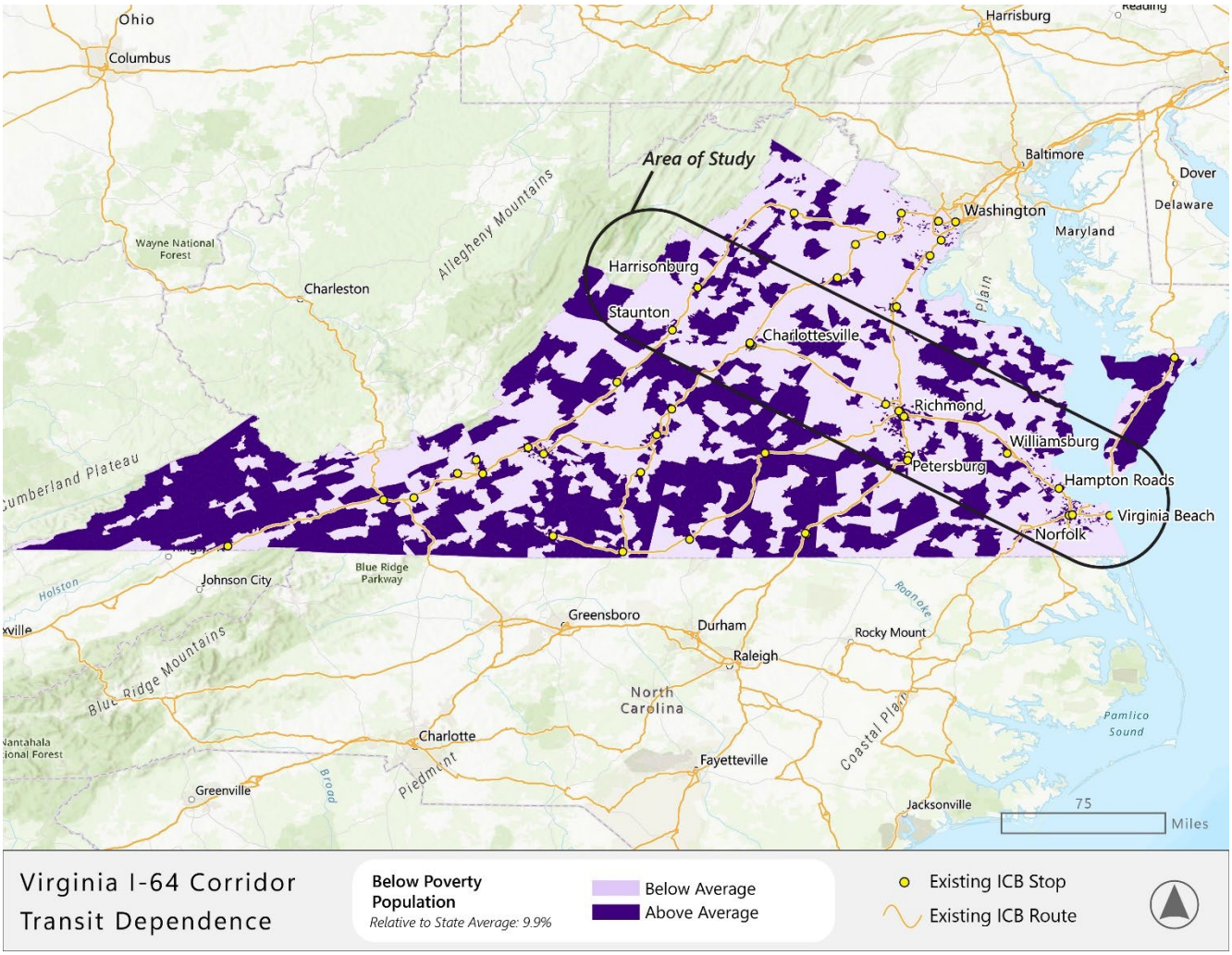
Figure 2-5: Individuals with Disabilities



Populations Below the Poverty Line

As seen in Figure 2-6, there are some block groups with above-average concentrations of people living below the poverty line in the study area including in and around Richmond, Norfolk, and Harrisonburg and in rural block groups scattered throughout the region.

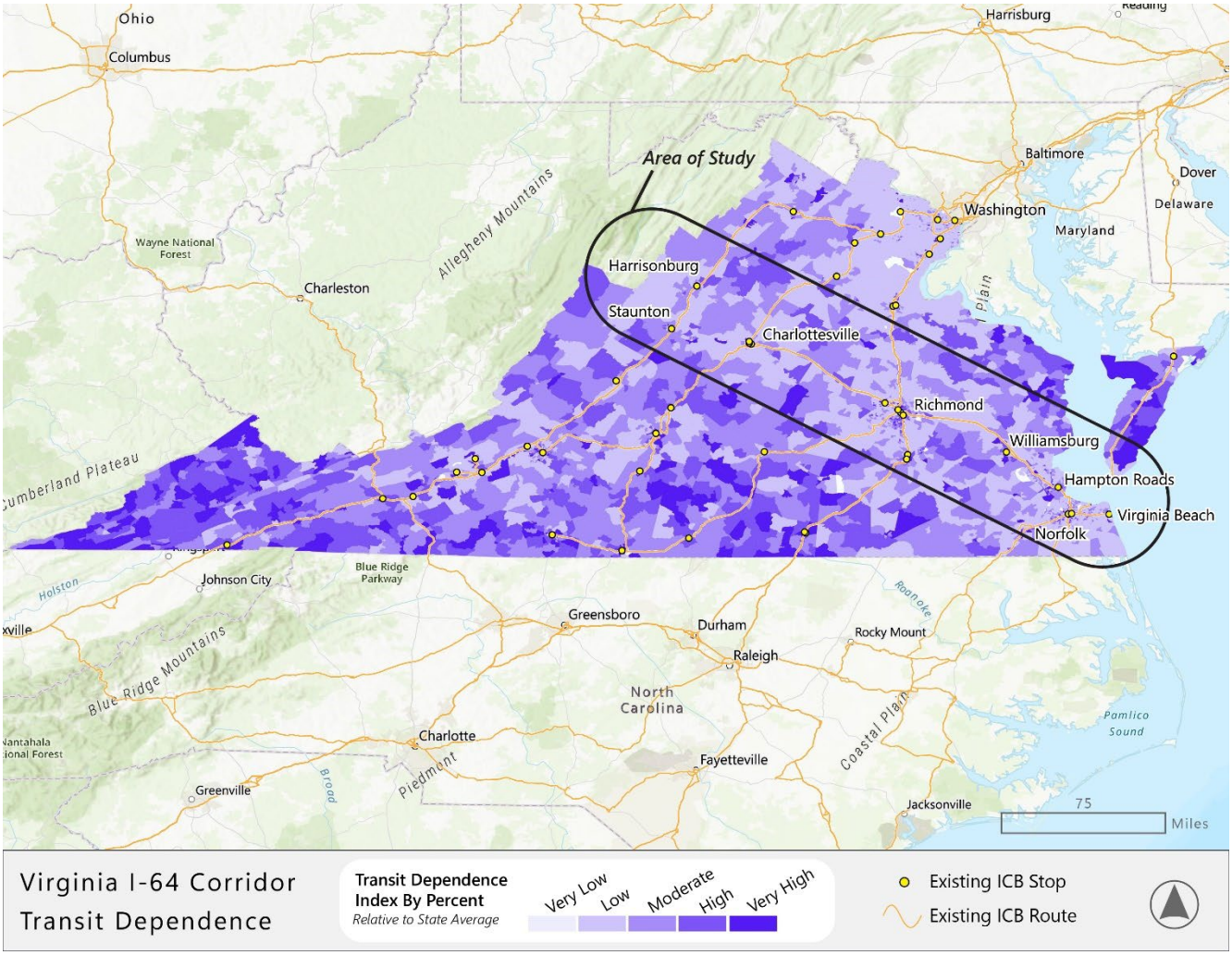
Figure 2-6: Population Below the Poverty Line



Transit Dependence Index Percentage (TDIP)

The Transit Dependence Index Percentage scores block groups based on their overall relative transit dependence excluding population density. Compared to regions like the Virginia Eastern Shore or the southwest corner of the state, the I-64 corridor has a relatively low concentration of high TDIP block groups. Nevertheless, many regions of the study area contain block groups with Very High or High TDIP designations (Figure 2-7). These areas include Richmond, Norfolk, and Hampton Roads with High and Medium concentrations around Staunton and Harrisonburg.

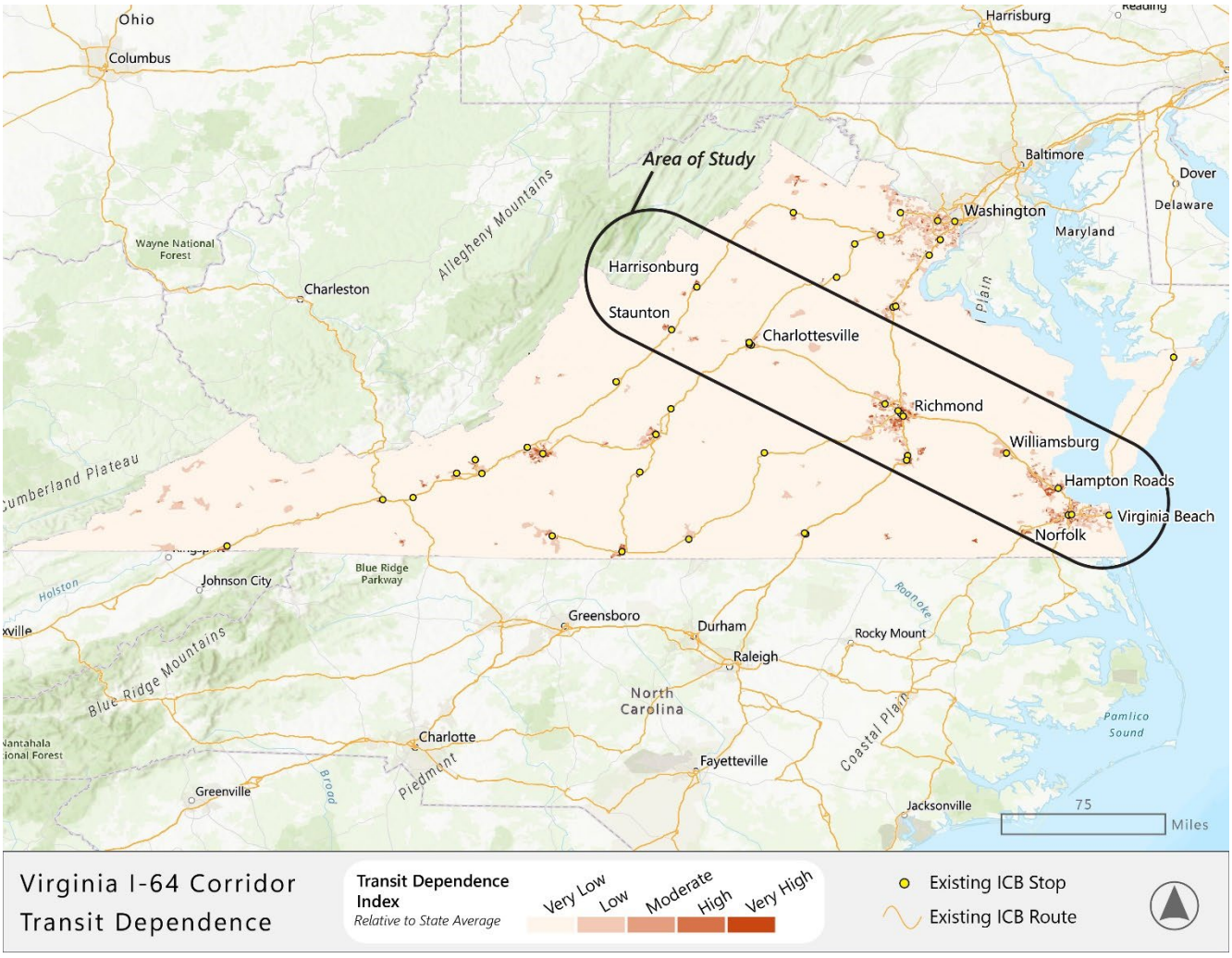
Figure 2-7: Transit Dependence Index Percentage (TDIP)



Transit Dependence Index Based on Population Density (TDID)

The Transit Dependence Index based on population density scores block groups based on their overall relative transit dependence including population density (Figure 2-8). Given the low population density of much of Virginia outside the metro areas, most of the state's area is classified as "Low" need. However, each of the major population centers within the I-64 corridor contain Very High TDI block groups, highlighting the demand for an intercity bus route connecting each of these cities.

Figure 2-8: Transit Dependence Index (TDID)



Potential Destinations

Potential destinations for intercity trips are identified by finding the location and scale of key institutions that might generate intercity bus ridership. These include:

- Four-year colleges and universities
- Veterans Affairs medical facilities
- Recreational attractions
- Major medical centers
- Military bases

Trip generators from the study area between Virginia Beach and Staunton/Harrisonburg were identified. While most identified trip generators are located within 10 miles of an intercity stop, there are exceptions.

Colleges and Universities

Institutions of higher education are found in each of the major population centers within the study area and have the potential to generate significant ridership due to the high population of autoless individuals among the student body and the frequency with which these students travel home throughout the year. The potential for high ridership is further supported by the fact that these institutions are typically located close to the downtown core of each city where an intercity bus stop or local transit hub would be located.

Medical Facilities

Major medical facilities are found throughout the study area with notable concentrations in Richmond and Norfolk. These sites may draw bus riders traveling from a smaller city to a larger one to seek specialized medical treatment, but they also may draw riders traveling from rural areas off the I-64 corridor, emphasizing the need for any potential Virginia Breeze expansion to connect with local bus service.

Military Bases

The study area is home to various types of military bases, which also serve as a residential community and a place of employment. Most bases are concentrated in the Hampton Roads area except for Rivanna Station near Charlottesville, Fort Lee in Petersburg, and two smaller military sites near Richmond.

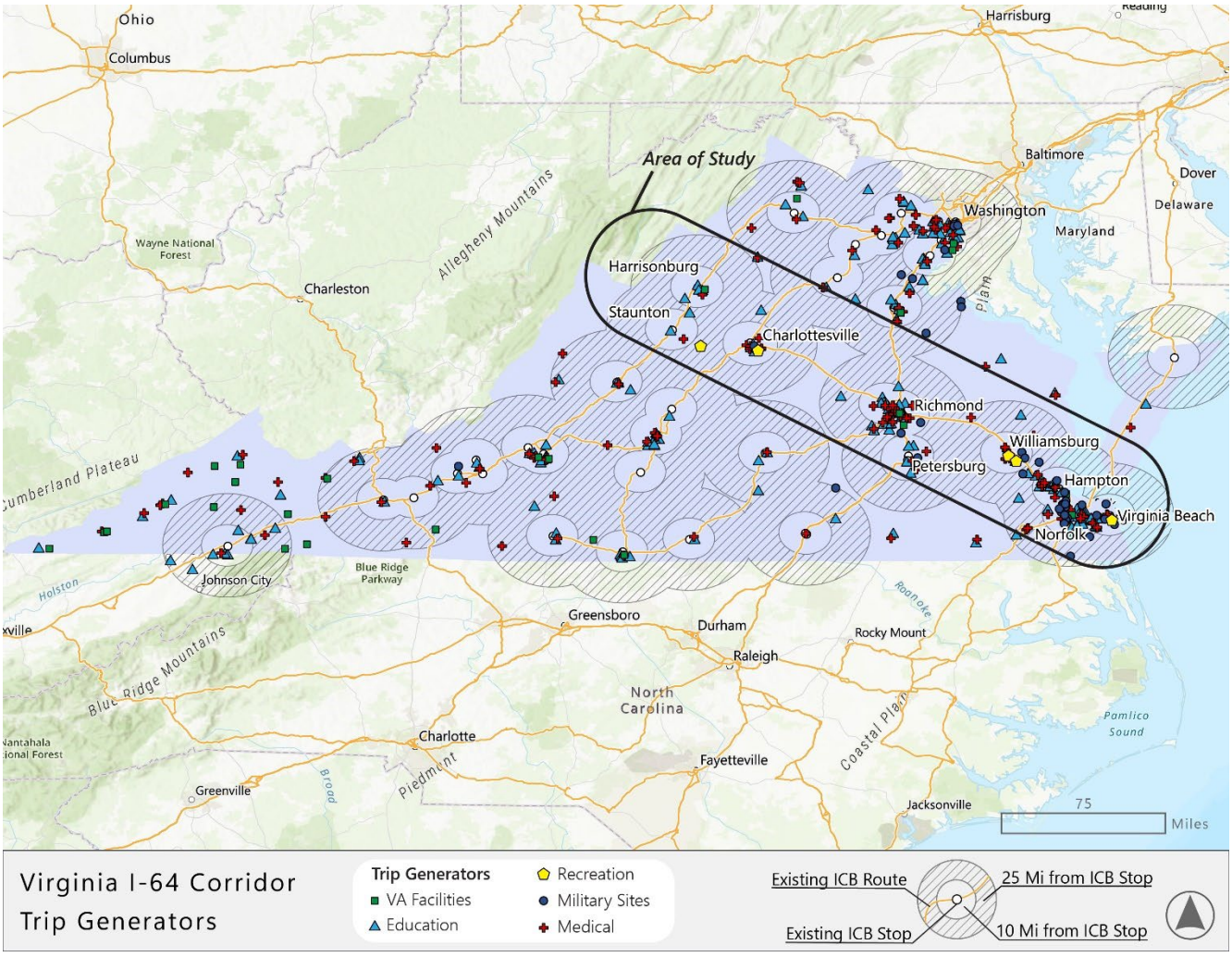
VA Medical Facilities

Within the study area, multiple VA facilities can be found within 10 miles of an intercity bus stop, making them strong candidates for generating trips along the I-64 corridor. These facilities are found in Norfolk, Hampton, Richmond, and Harrisonburg.

Recreational Attractions

The region features several amusement parks, tourist attractions, and recreational areas which draw visitors from around Virginia and beyond. Most of these sites including the Virginia Aquarium in Virginia Beach, Colonial Williamsburg and Busch Gardens in Williamsburg, and Monticello in Charlottesville are within 10 miles of an intercity bus stop. The only exception is the entrance to Shenandoah National Park about 12 miles southeast of Staunton.

Figure 2-9: Trip Generators in Study Area



Summary

In terms of coverage, the current intercity network (broadly defined to include some long distance commuter transit routes) provides a high degree of coverage to Virginia's population. As of 2020, approximately 72.8% of Virginia's residents (an increase of 2% since the last study using 2012-2016 ACS data) live within ten miles of an intercity bus stop or station, and 90% (a decrease of 1.4%) live within twenty-five miles. Overall, there has been a slight decrease (about 1.4%) in Virginia residents who live more than twenty-five miles from an intercity bus stop, which are generally rural areas, but also a slight increase in residents living within ten miles from an intercity bus stop.

This suggests that large urbanized areas continue to grow and that they have some intercity bus service. Meanwhile, about 1,400,000 people or 16.2% of the population live between 10-25 miles from an intercity bus stop, which is larger than the population that live more than 25 miles away from a stop (about 931,000 people or 10.8% of the population).

The TDI analysis shown in Figure 2-8 shows that the I-64 corridor contains the highest concentration of transit dependent populations outside of the D.C. area, making it a prime candidate for expanding intercity bus service. The ability for this predominantly northwest-southeast route to provide connectivity to the four existing Virginia Breeze routes could further boost potential ridership.

Chapter 1 identified existing intercity service, and local transit that could provide regional trips or connect with intercity service. Accessing intercity bus services from the parts of the study area that are not in proximity to existing intercity bus stops by using local transit is theoretically possible for some, but there are no current arrangements for such connectivity. If new intercity services were to be implemented in the I-64 corridor, there are local transit services that could provide access to it, particularly if the appropriate information was made available to potential users.

Chapter 3
Stakeholder and Community Engagement

Introduction

This chapter summarizes the stakeholder engagement process and the input that was received during the development of this plan. Through this process, feedback was obtained on the current Virginia Breeze routes, and importantly, on a potential route along the I-64 corridor. Overall, this information will assist in the identification of alternative routes. This chapter is divided into the following sections:

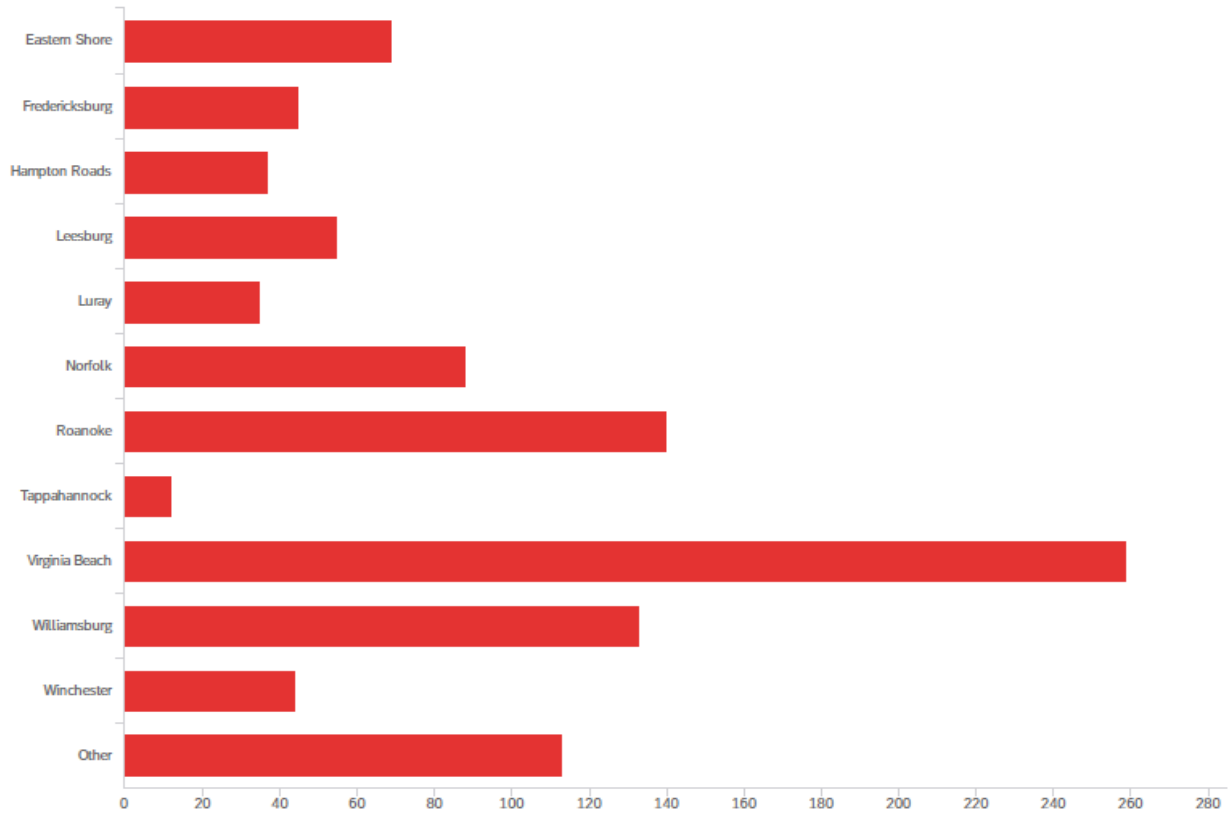
- **Virginia Breeze Current Ridership Survey** – Summary of a survey provided by DRPT that provided the opportunity to gather opinions from current riders.
- **Stakeholder Survey** – Summary of a survey that was provided to gather opinions from stakeholders.
- **Stakeholder Workshops** – A review of the feedback from local stakeholders regarding a potential new route.
- **General Community Survey** – Summary of a survey that was provided to gather opinions from the general public.

Virginia Breeze Current Ridership Survey

DRPT conducted a survey of previous Virginia Breeze passengers in September 2023. Previous riders were surveyed to better understand satisfaction levels with current Virginia Breeze routes. DRPT received 663 surveys in total.

Within the satisfaction survey DRPT sent to current Virginia Breeze riders, the participants were asked if there were any new destinations in Virginia that they would like to visit but are not currently served. Twenty-five percent of respondents stated Virginia Beach and 14% stated Roanoke. Some of the destinations mentioned in the other category include Lynchburg, Charlottesville, Richmond, and Harrisonburg, as shown in Figure 3-1.

Figure 3-1: Destinations in Virginia that Need Service



When the participants were asked which route was used most frequently, 60% of respondents stated the Valley Flyer from Blacksburg to D.C.

The survey also asked about the participants' annual income levels. A majority of respondents (31% and 20% respectively) stated that they make less than $25,000, or $25,000 - $50,000. Only 17% of respondents stated that they make $101,000 or higher annually.

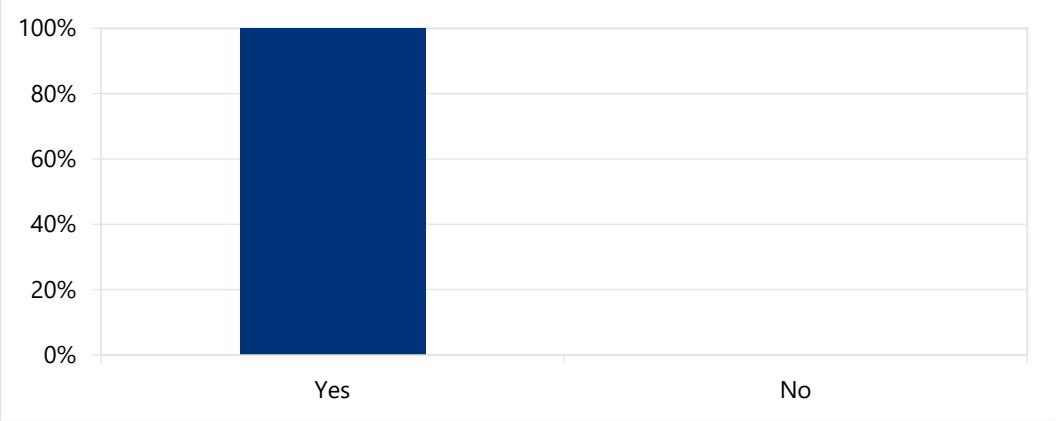
Next, riders were asked about their age group. Twenty-three percent of respondents stated that they were 65 or older, while 21% of respondents stated that they were between 18 and 24 years of age.

Stakeholder Survey

DRPT, along with KFH Group, sent out a stakeholder survey through SurveyMonkey to Planning District Commissions, Metropolitan Planning Organizations, Transit Operators, and Economic Development Organizations. The surveys were sent through MailChimp on November 30th and December 4th. In total, KFH Group received 30 participant responses. Appendix A includes the survey questionnaires for these groups. They were tailored somewhat to each group.

The first question asked whether participants believed there is a need for service within the I-64 corridor. All 30 participants stated that there is a need for service going East-West along the I-64 corridor, as seen in Figure 3-2.

Figure 3-2: Need for Service in the I-64 Corridor



Participants were also asked whether the need for intercity connections were ever identified in any studies or plans. Thirty-eight percent of respondents answered yes. A few respondents stated that they have verbally heard from community members of a need for intercity connections. Current studies that mention intercity connections include:

- Regional Transit Partnership TJPDC/Charlottesville-Albemarle County MPO
- Regional Transit Vision Plan
- City of Lexington's Comprehensive Plan
- BRITE TDP
- SAW and HRMPOS Long Range Plans

Next, participants were asked to rank different cities and towns with highest priority, medium priority and lowest priority. The top locations that were ranked the highest priority included Charlottesville and Richmond, 90% and 93%, respectively. The response for the stops that participants believe have the highest priority are shown in Figure 3-3. As shown in Figure 3-4, the top locations that were ranked medium priority included Hampton, Waynesboro, and Roanoke, 61%, 58%, and 57% respectively. Participants were also asked to rank lowest priority and the top locations included Lexington and Williamsburg, 38% and 24%, respectively.

Figure 3-3: Highest Priority Stops

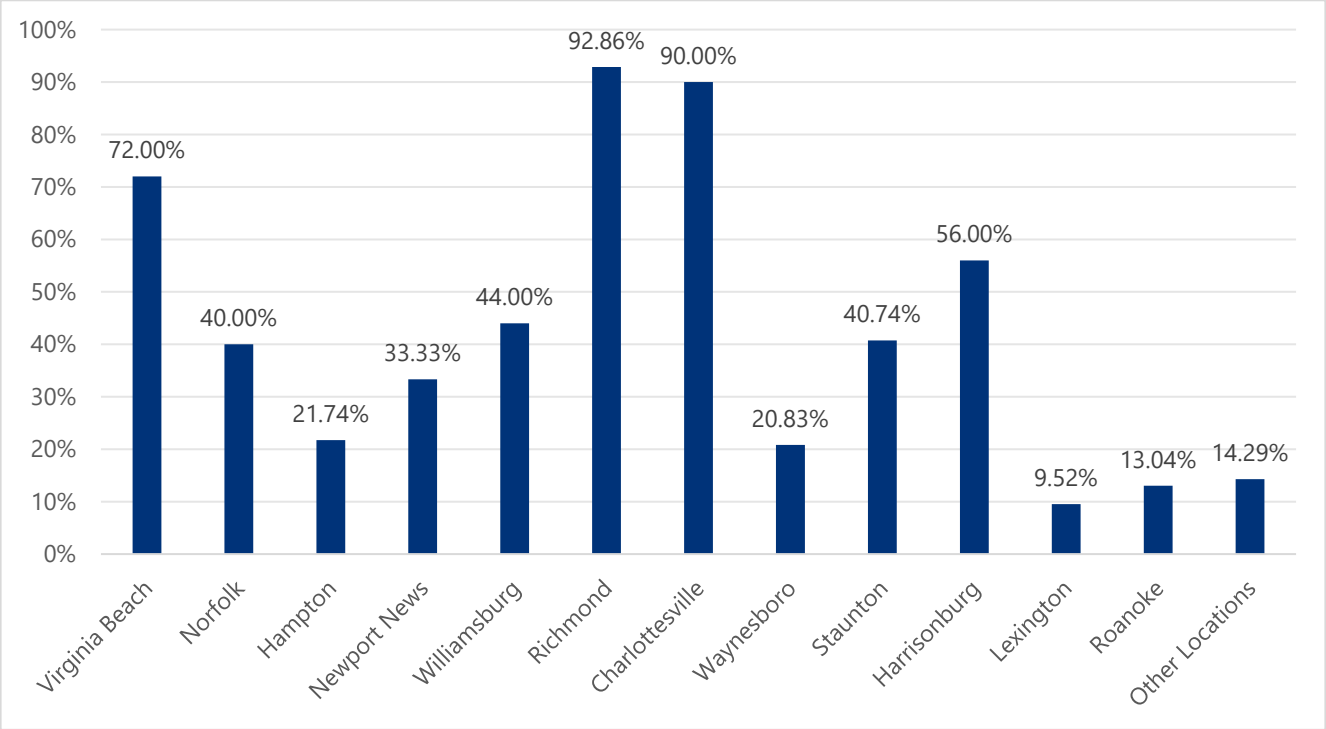


Figure 3-4: Medium Priority Stops

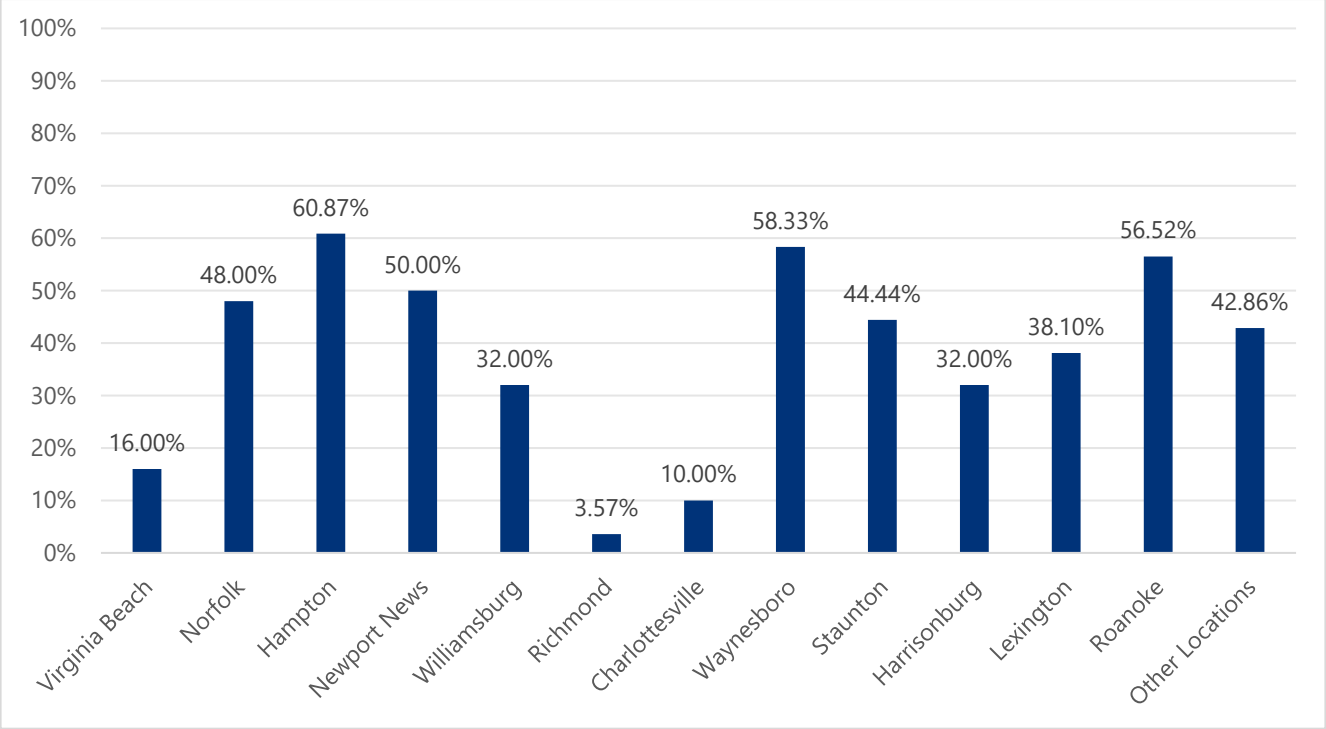
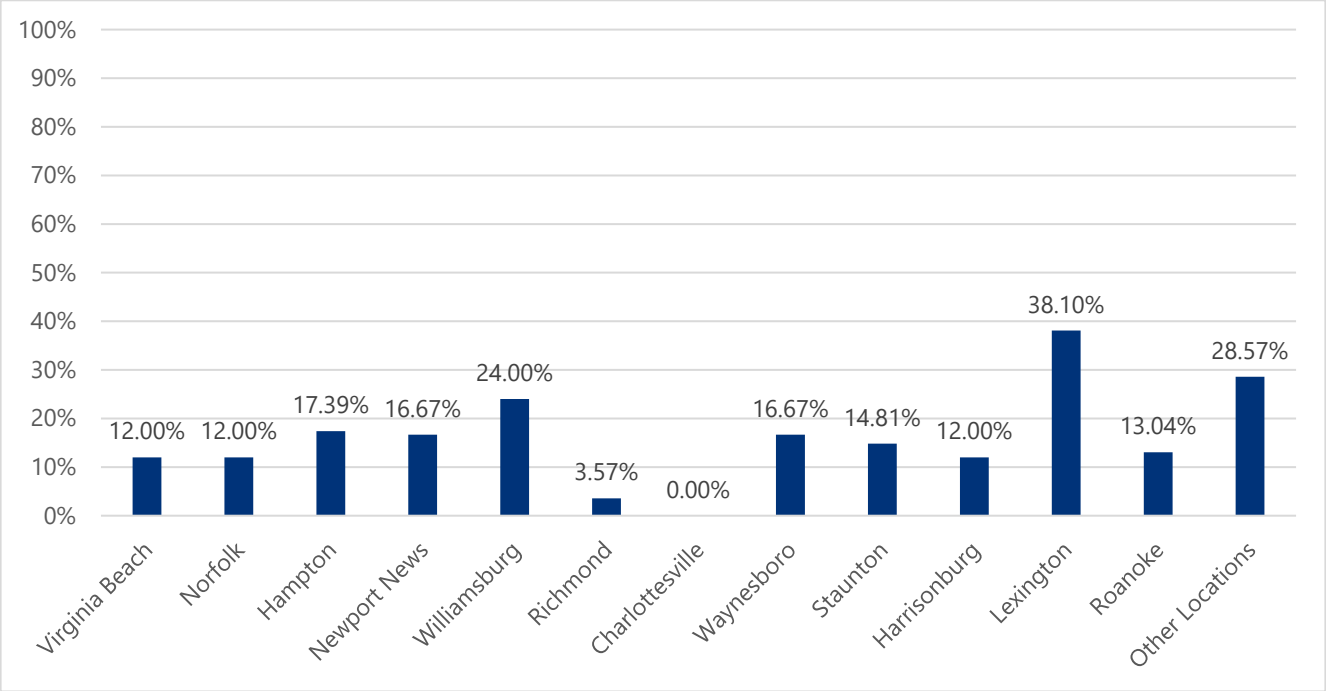


Figure 3-5: Lowest Priority Stops



Participants were also asked about other locations that should be considered for a stop along a new route. Twenty-three respondents stated other locations that should be considered, which included:

- Godwin Hall/Godwin Transit Center at JMU
- UVA Campus
- Charlottesville airport
- Richmond airport
- Richmond Main Street Station
- Staples Mill Station
- Route 64 E Exit 107 Park and Ride (to be built)
- Amtrak Station in Charlottesville
- Staunton Crossing Park and Ride Lot
- Waynesboro Park and Ride Lot

Next, respondents were asked about the direction of the possible route should it only operate one round-trip per day. The question mentioned it would operate westbound in the morning and eastbound later in the day. Twenty-five participants responded, but only five respondents felt it would be beneficial to run westbound in the AM and eastbound in the PM. Twenty of the respondents stated that going eastbound in the AM and westbound in the PM would be most beneficial for riders.

Respondents were also asked whether two round-trips a day would address their needs best. Of the twenty-three responses, fourteen respondents stated that it would be ideal or good to have two round-trips a day. A few respondents mentioned that two round-trips a day may be useful during the summer or on weekends.

Stakeholder Workshops

KFH Group with DPRT hosted three separate workshops, which included December 12th at 10:00 a.m., December 13th at 7:00 p.m., and December 14th at 10:00 a.m. The meeting invitations and links were sent out with the surveys to Planning District Commissions, Metropolitan Planning Organizations, Transit Operators, and Economic Development Organizations on November 30th and December 4th. In total, the workshops had three participants, one participant on December 13th and two participants on December 14th. Appendix B presents information on the participants.

During the workshops, the participants were asked the necessity for an East-West intercity connection, as well as possible stops along the route. Connections for colleges and universities were highlighted as a major connection point. It was noted that many students reside in different areas of Virginia and would need an option getting to and from universities and colleges. UVA was another college that was mentioned needing a connection for both students and medical needs. One participant mentioned it would be beneficial starting in the West and going towards the East.

The participants were asked about possible stops along the I-64 corridor, and some answers included:

- Staples Mill Amtrak station in Richmond
- Main Street Amtrak station in Richmond
- Richmond Airport
- Newport News

When the stakeholders were asked about current services, one mentioned an issue with ticketing services. Specifically making it possible to buy a ticket without a Smartphone or computer. Without options of buying a ticket in person, the digital barrier will remain an issue for some people.

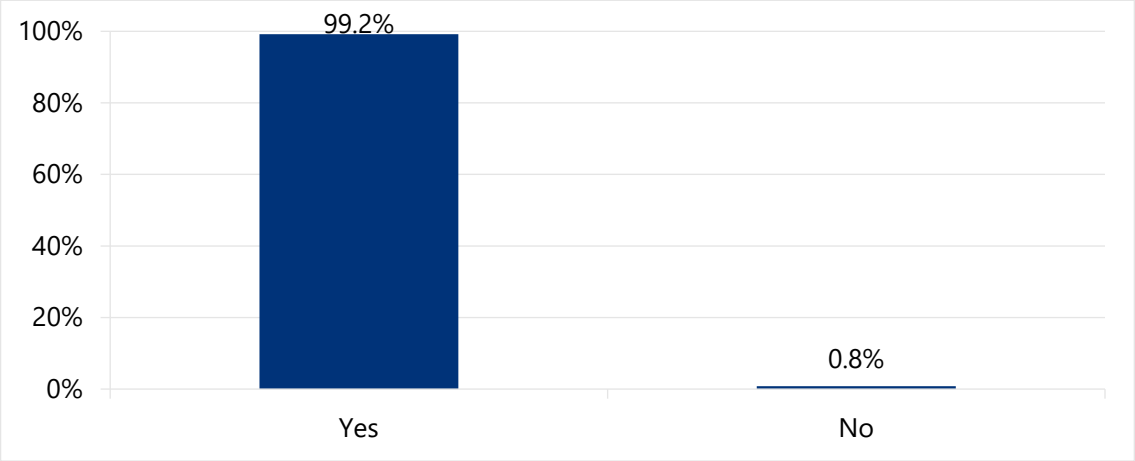
General Community Survey

On December 11th, 2023, KFH Group and DRPT sent out a link for a general survey. Overall, the survey received 1,396 responses. The survey was distributed by DRPT's communication staff. Appendix C presents the questionnaire.

Survey Results

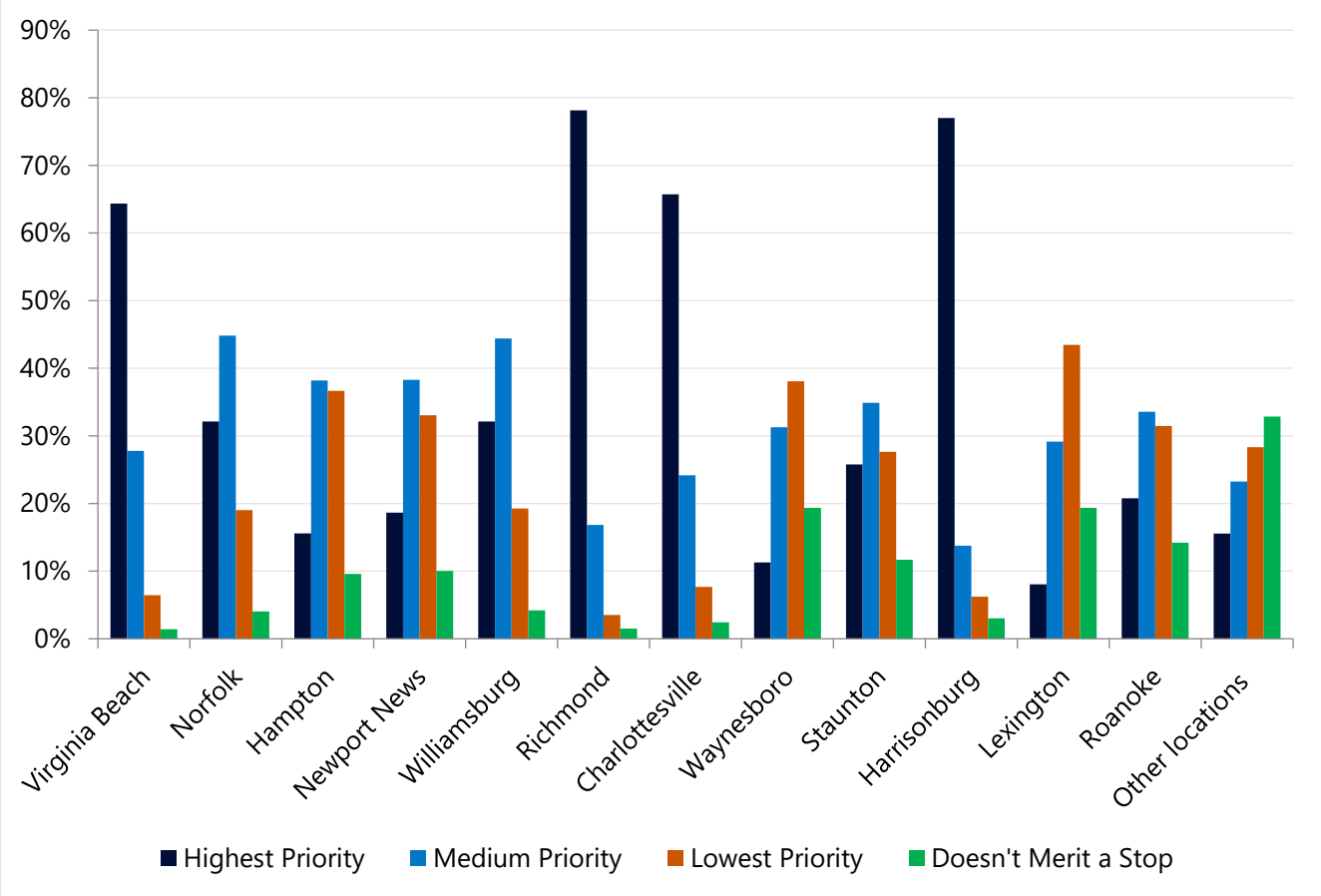
Participants were asked whether they believe there is a need for new service along the I-64 corridor and 99.2% of participants stated yes there is a need, as seen in Figure 3-6.

Figure 3-6: Need for Service



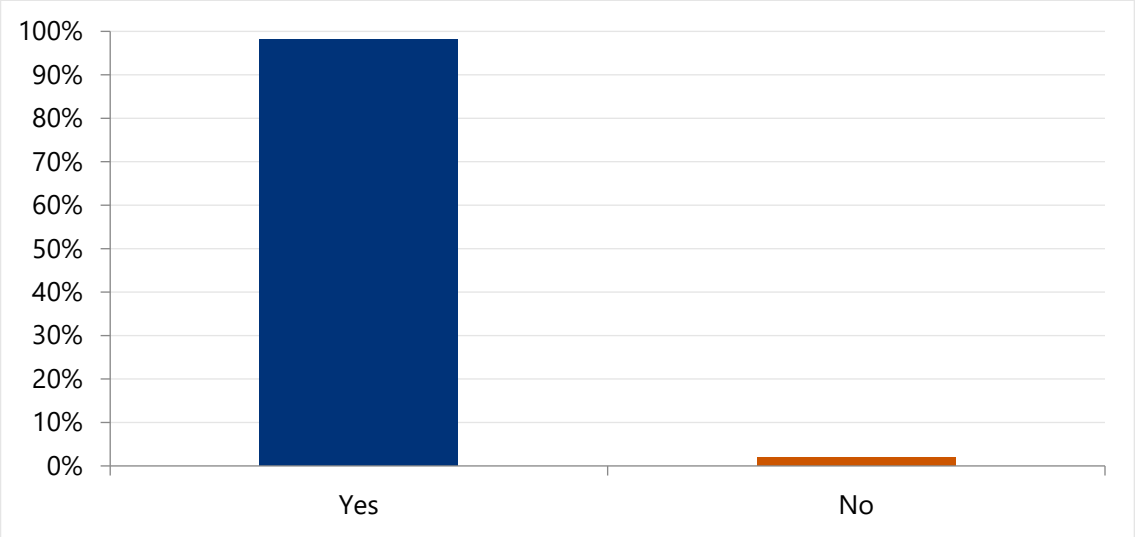
Respondents were asked to rank the priority of potential stop locations along the corridor. Figure 3-7 shows the ranking of highest priority to "doesn't merit a stop." The top four stops with highest priority are Richmond, Harrisonburg, Charlottesville, and Virginia Beach.

Figure 3-7: Priority of Potential Stops



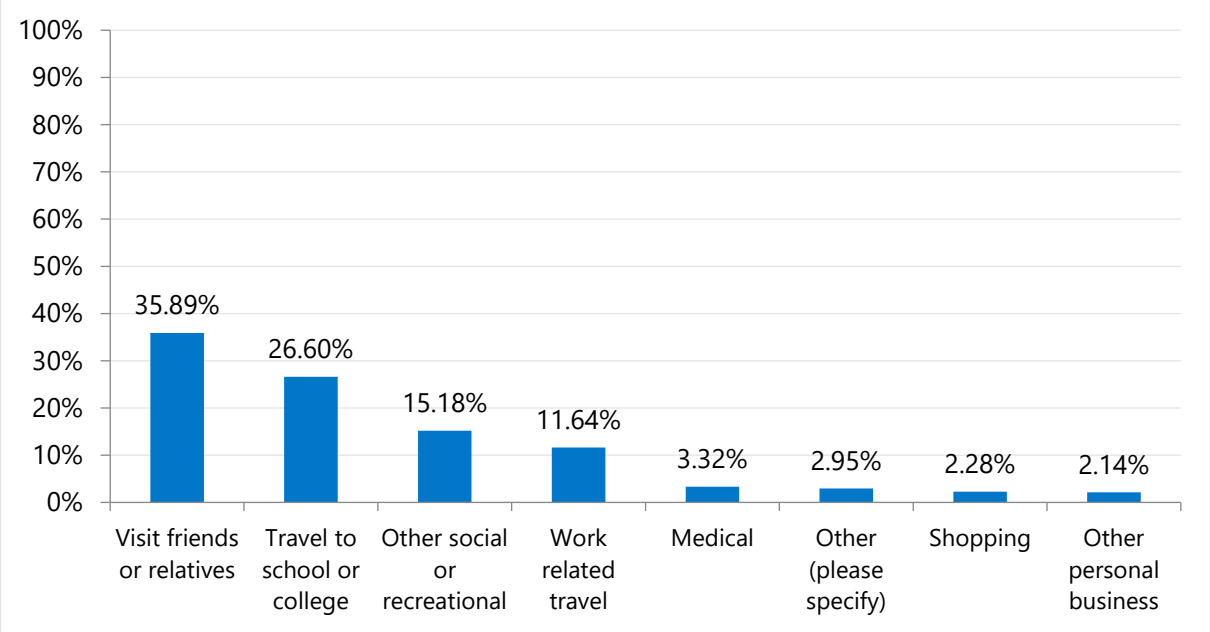
Next, participants were asked whether any adult in the household had traveled at least 50 miles or more one way in the past 12 months. As seen in Figure 3-8, 98% of respondents stated that someone in their household had traveled.

Figure 3-8: Household Traveled At Least 50 Miles in The Past 12 Months



Participants were also asked about the reasoning for the trip and the top three reasons included visiting friends or family, travel to school or college, and for other social or recreational outings, as seen in Figure 3-9.

Figure 3-9: Reasons for Trip



Next, participants were asked about mode of travel within the last 12 months. Figure 3-10 shows the breakdown of modes, with the top three being car, plane, and Virginia Breeze.

Figure 3-10: Modes of Transportation

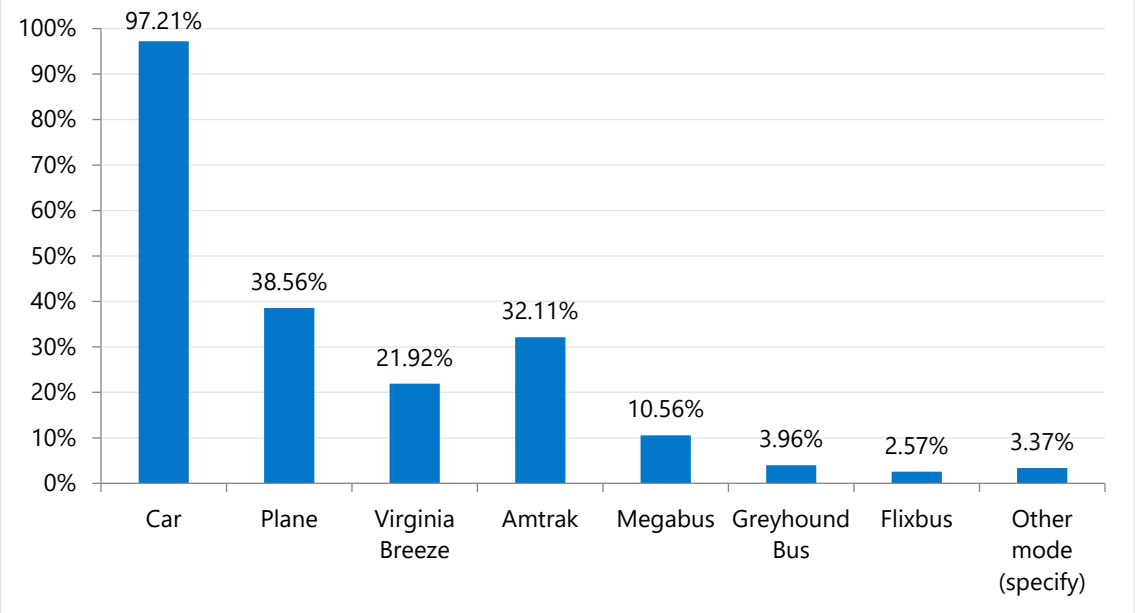
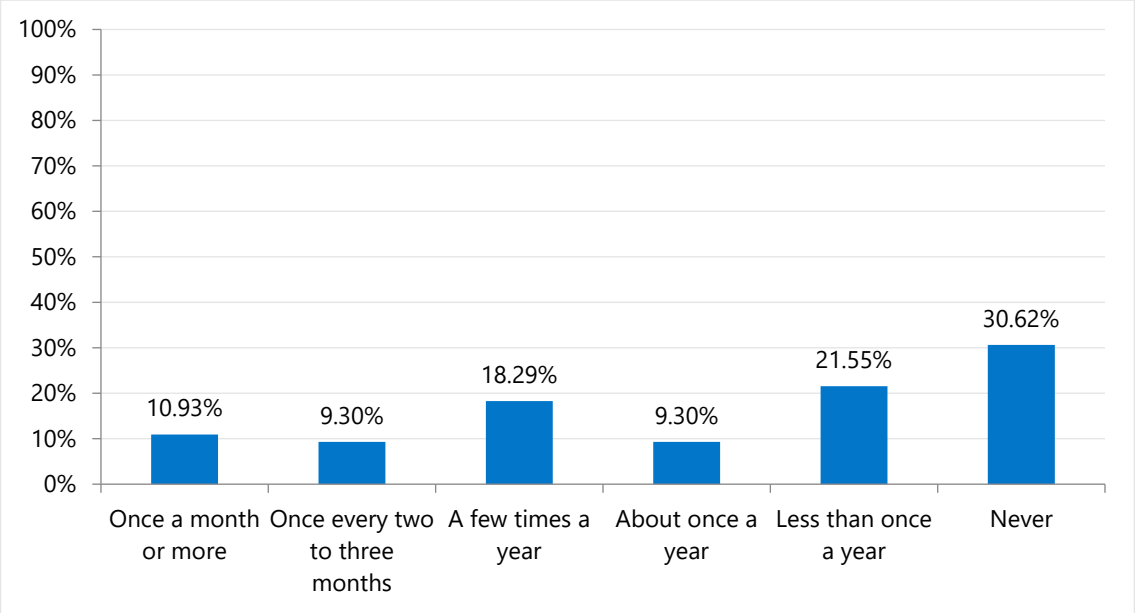


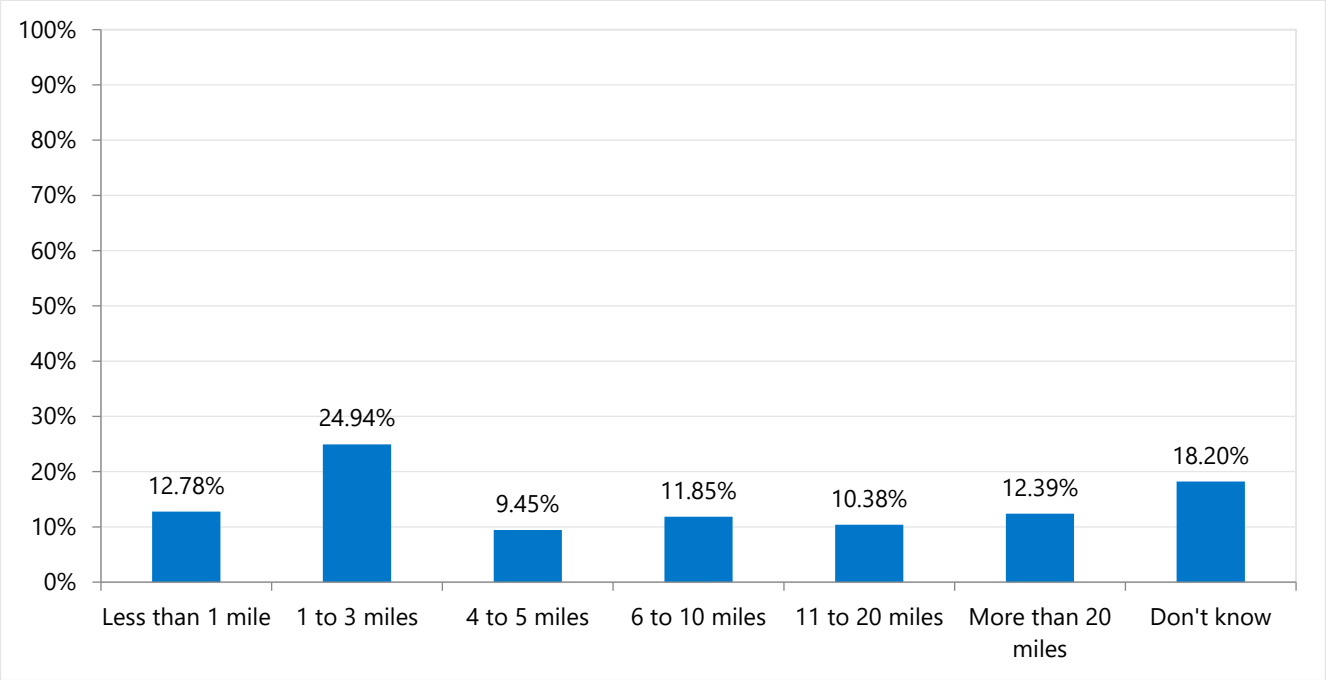
Figure 3-11 shows how often participants travel on intercity buses. Approximately 31 percent of respondents stated that they never use intercity bus services.

Figure 3-11: How Often Participants Use Intercity Services



Participants were asked how many miles their house is from an intercity bus terminal or stop. A majority of respondents stated that they are within 3 miles of a stop or terminal. Figure 3-12 shows how close participants are to a terminal or stop.

Figure 3-12: Miles to Closest Terminal or Stop



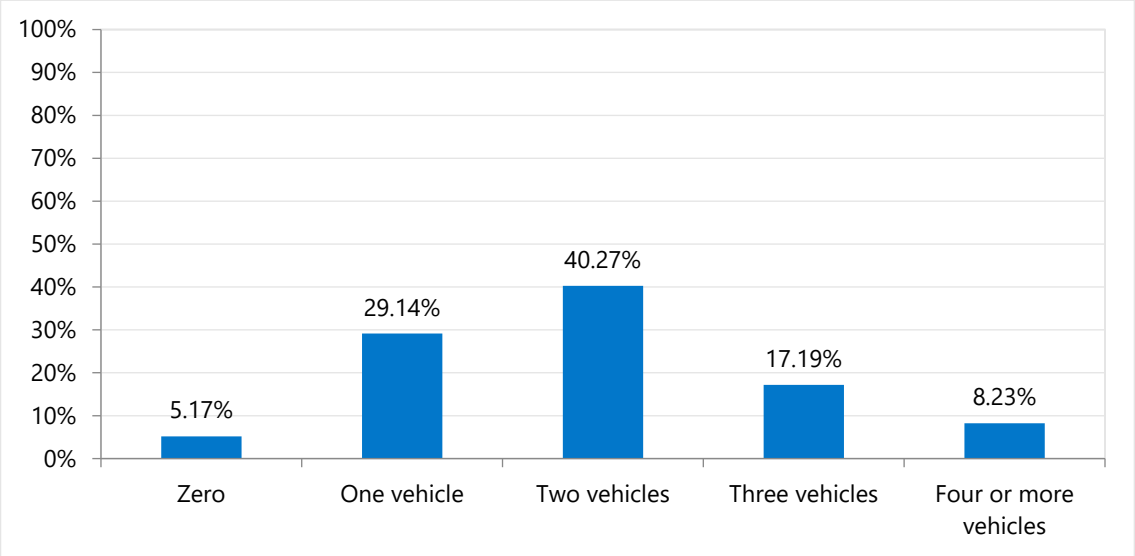
Participants were asked to comment on the top three ways to improve intercity bus services in Virginia. Desired improvements included:

- Additional service to make connections (east-west cities)
- More cost effective
- Connection between JMU and Richmond or UVA
- Bus being on-time
- Alignment of timetables with other transportation services
- Alignment of timetables with college schedules
- Reliable Wi-Fi and power outlets
- Increased frequency
- Increased advertising/marketing

Participant Demographics

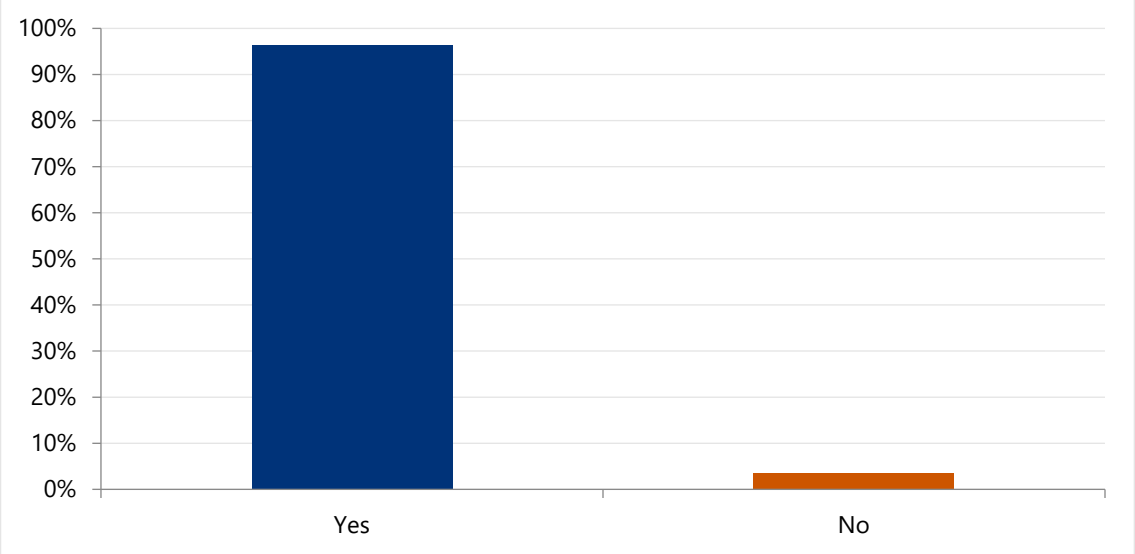
Participants were asked about how many vehicles are available for regular use within their household. As seen in Figure 3-13, only 5% of the respondents had no vehicle.

Figure 3-13: Number of Available Vehicles



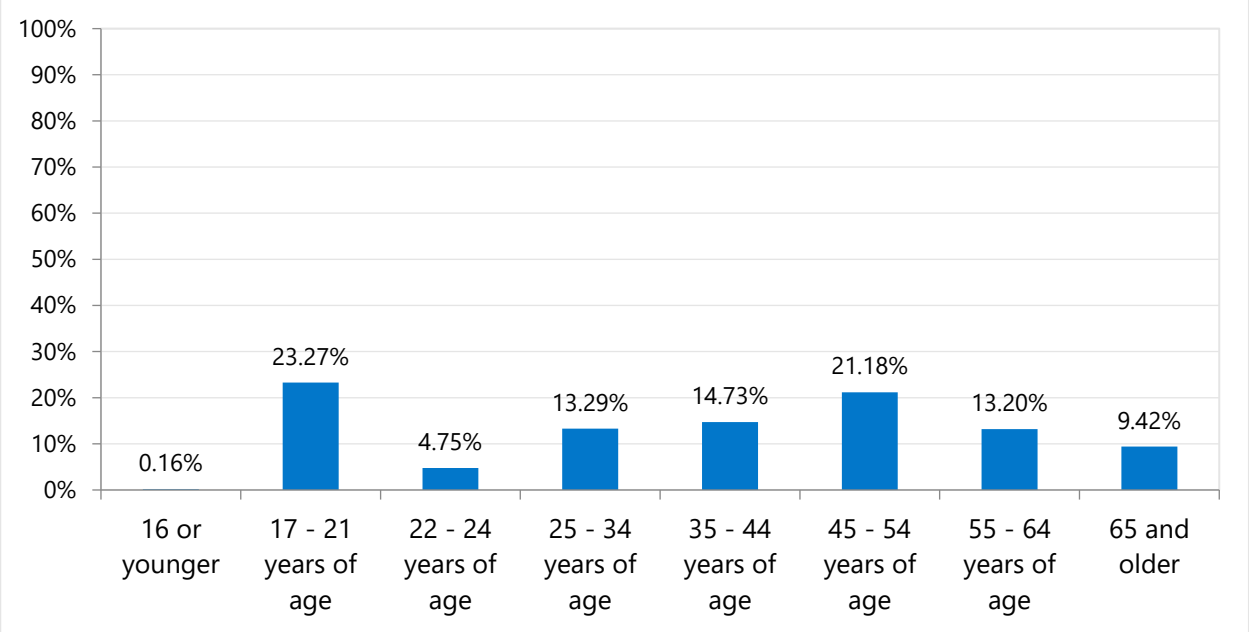
Next, participants were asked about whether they have a valid driver's license and 96% stated that they do have a valid license, as seen in Figure 3-14.

Figure 3-14: Valid Driver's License



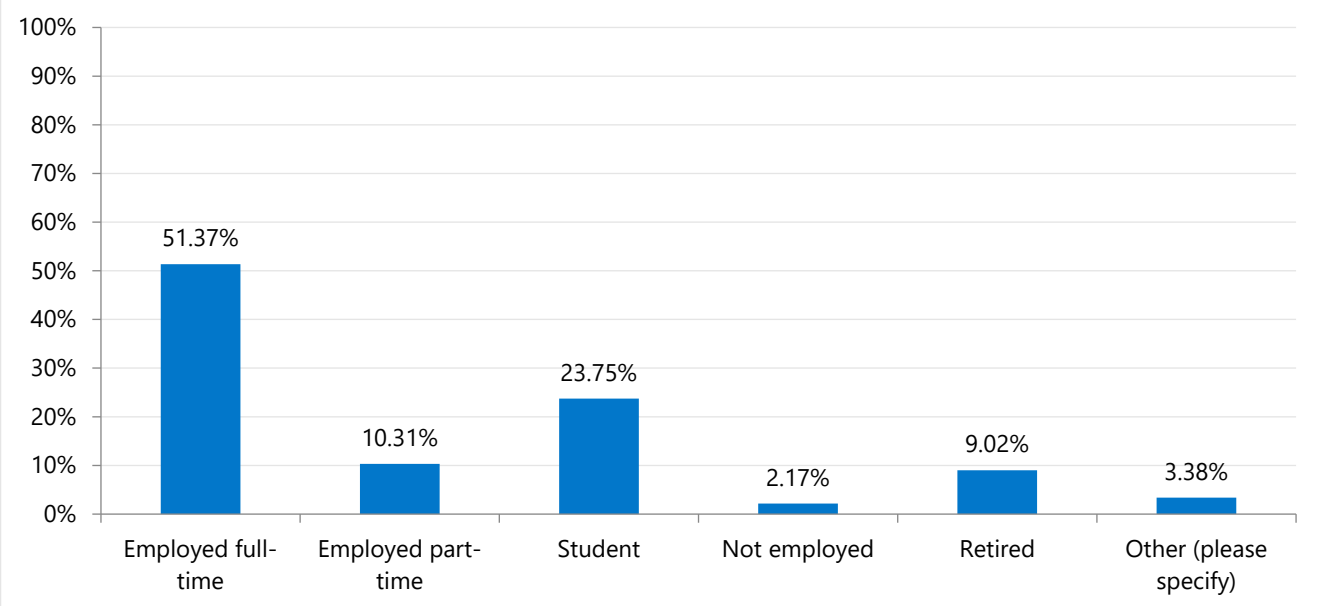
Participants were also asked about their age group. As seen in Figure 3-15, a majority of the respondents were over the age of 35, but 23% of the respondents were between the ages of 17 and 21.

Figure 3-15: Age Groups



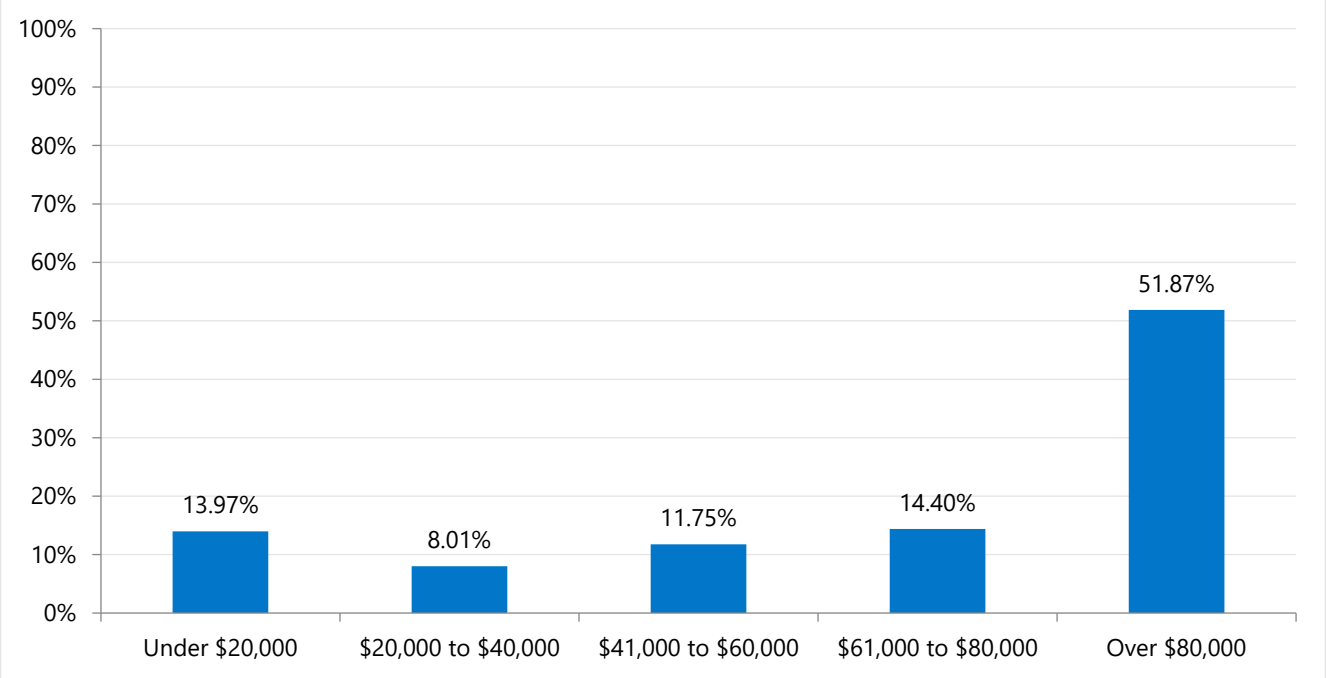
Participants were also asked about their employment status. As shown in Figure 3-16, a majority of the respondents are employed full-time.

Figure 3-16: Employment Status



Participants were also asked about their estimated annual household income. As seen in Figure 3-17, a majority of the respondents (52%) stated that they make over $80,000.

Figure 3-17: Annual Household Income



Finally, participants were asked about which city or town they live in., which include:

- Afton
- Alexandria
- Amelia
- Arlington
- Ashburn
- Ashland
- Blacksburg
- Bridgewater
- Broadway
- Carrollton
- Carson
- Centreville
- Charlottesville
- Chesapeake
- Chesterfield
- Churchville
- Clinton
- Crozet
- Danville
- Dayton
- Elkton
- Fishersville
- Fredericksburg
- Hagerstown
- Hampton
- Harrisonburg
- Lexington
- Lurary
- Manassas
- Mechanicsville
- Midlothian
- New Kent
- New Market
- Newport News
- Norfolk
- Portsmouth
- Richmond
- Roanoke
- Rockingham
- Stafford
- Staunton
- Sterling
- Suffolk
- Virginia Beach
- Washington DC
- Waynesboro
- Williamsburg
- Winchester
- Yorktown

Participants were asked about which cities or towns were final destinations for long-distance trips, which include:

- Airports
- Albany, NY
- Alexandria
- Asheville, NC
- Blacksburg
- Charlottesville
- Richmond
- Williamsburg
- Washington DC
- Virginia Beach
- Roanoke
- Eastern Shore, MD
- Fredericksburg
- Hampton
- Harrisonburg
- Virginia Beach
- JMU
- Manasses
- Newport News
- Norfolk
- Williamsburg
- Staunton

As can be seen, a number of these locations are in the I-64 east-west corridor, potentially served by new service in that corridor.

Summary and Conclusions

A question included in the latest on-board survey of Virginia Breeze riders showed strong interest in new services to points in the I-64 corridor among current riders—particularly service to Virginia Beach, Williamsburg, and Roanoke-but also Hampton.

Surveys and follow-up interviews with stakeholders in the planning organizations and transit systems in the region revealed a high level of support for implementation of new east-west Virginia Breeze services in the I-64 corridor, with shared stops at key modal connection points. Input from this group favored service to Staunton and Harrisonburg at the western end of the route.

A broader survey of community members in Virginia also showed a great deal of interest in terms of a very high number of responses (1,396) for a survey of this type, with a very high level of support for new east-west intercity bus service via I-64 (98%). Key stops favored by these survey respondents included Virginia Beach, Richmond, Norfolk and Harrisonburg. Most respondents make long-distance trips (over 50 miles) using personal vehicles, air service, Amtrak and Virginia Breeze. Most trips are made to visit friends or family, travel to school or college, and for other social or recreational outings. The population responding to this survey included intercity bus users, but most participants also had personal vehicles available and a driver's license. Over 60 percent are employed outside the home, and about 24 percent are students.

Overall there is a high level of support for developing and implementing new east-west Virginia Breeze bus service in the I-64 corridor among current riders, the planning community, and the broader community.

Chapter 4
Alternatives, Analysis and Recommendations

Introduction

This chapter presents and analyses different alternatives for implementing Virginia Breeze service in the I-64 corridor between Hampton Roads and the I-81 corridor. These options were developed based on consideration of the populations and demographics of towns and cities in the corridor, existing intercity services, potential for connectivity with other transit systems, travel times, and estimated costs. An estimate of ridership is also included in this chapter.

Service Options for the I-64 Corridor

Alternative Stops/Route Configuration

Though the focus of this project is on a particular corridor with a number of obvious stops at major cities, there are a number of options that can be imagined, each with its advantages and disadvantages.

Some key questions include the number of stops, and which ones. In general, most intercity bus riders travel ten miles or fewer to a stop, so it is possible to measure the resident population within that catchment area and compare that number to other potential stops. More population will translate into more ridership. However, too many stops extend the trip times, adding costs and discouraging ridership. Another factor is the desire to provide connectivity to local transit and to other intercity services. Increased connectivity adds access and potential ridership. Local transit service could provide first-mile/last-mile access. The proposed alternatives try to strike a balance between population coverage, the number of stops, and connection opportunities.

Other considerations include the need to have services that can be comfortably operated by a single driver within the Federal Motor Carrier Safety Administration's mandated ten-hour maximum service day. At the same time, it may be possible to have a single bus operate a round-trip within a day, when the day is defined as approximately 7:00 a.m. to 11:00 p.m. or so—it would just require two drivers, one in each direction.

At the east end, the question is which stops to include in the Hampton Roads region—whether to include Virginia Beach (and if so where the stop should be located), and whether to stop in Norfolk, Newport News or Hampton (all three, or which ones).

Between Hampton Roads and Richmond there are two basic options: One uses I-64, and would include a stop in Williamsburg, which is part of the overall Urbanized Area. There could be a stop on I-64 at New Kent, but there is little population base. The other major route alternative would go from Norfolk to Petersburg and then Richmond, with stops in Suffolk and Petersburg. Suffolk is now a non-urbanized area, its residents count as rural. Serving rural residents is an FTA requirement for Section 5311(f) funding.

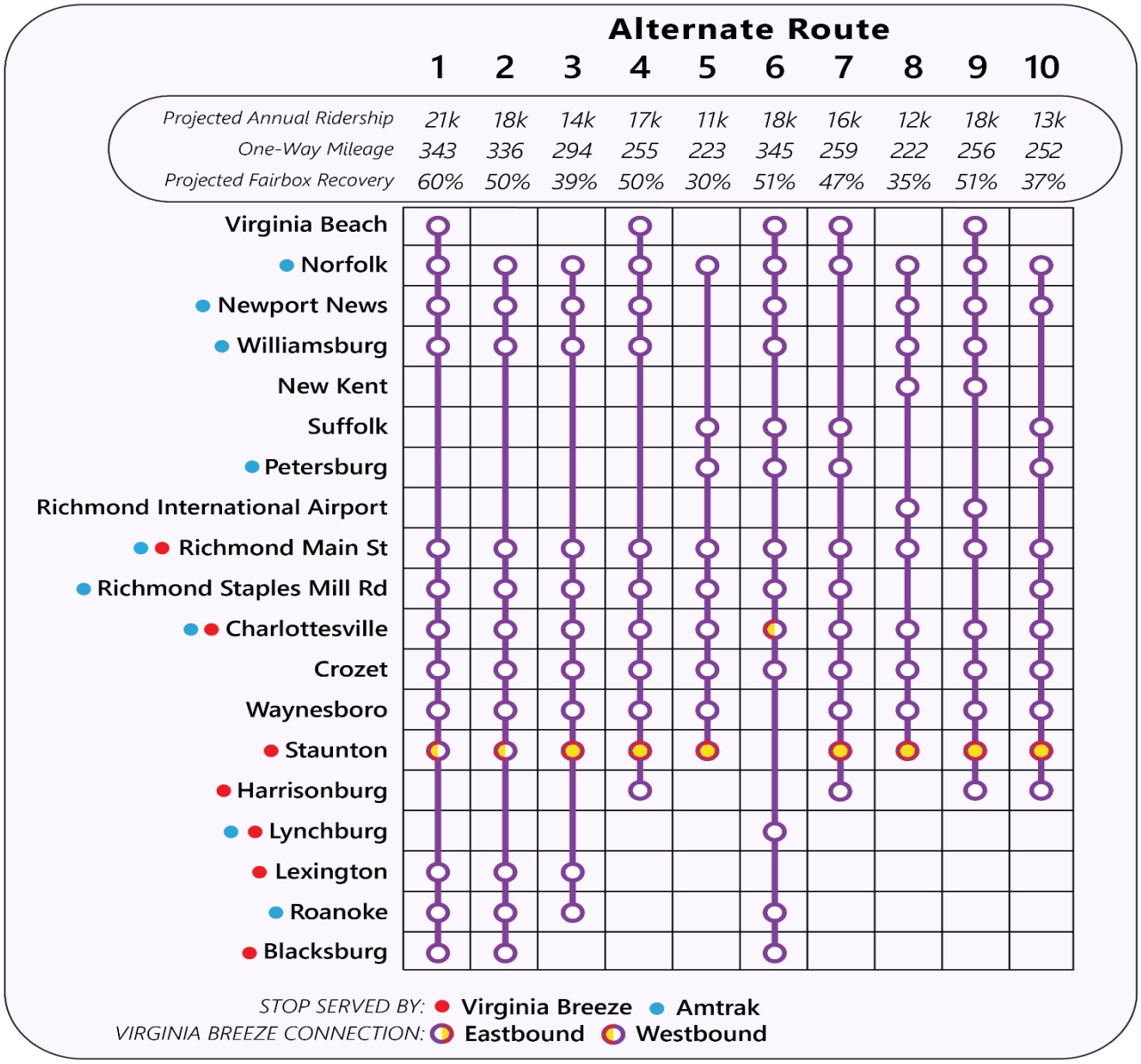
In Richmond potential stops include Richmond International Airport, the Main Street Amtrak station, and the Staples Mill Amtrak station, each of which provides intercity connectivity. The airport would be the largest potential commercial airport stop in this corridor, and it could be accessed either from Williamsburg or Petersburg. The plaza in front of Main Street station is the current stop location for the other Virginia Breeze route serving Richmond, the Capital Connector. It is also the stop for Megabus and Flixbus services, but Amtrak frequencies and routes are limited. Staples Mill station offers more potential rail connections, but no other intercity bus. A major unknown factor is that the largest intercity bus stop in Richmond, the Greyhound Station, is currently for sale, and there are a number of Greyhound routes that connect at that station, and there is no current plan for where these transfer functions could be served. Ideally all the intercity bus operators would be a single facility, co-located with Amtrak and a Greater Richmond Transit Company (GRTC) station, but that is not in the near-term future.

There are few stop location opportunities between Richmond and Charlottesville. Potentially a stop at a park and ride lot to serve the western suburbs could be added, but the additional population served would be low. In Charlottesville there are potential stops on the University of Virginia campus (where Flixbus stops), at the current Virginia Breeze stop at Arlington Boulevard and Barracks Road, or at the Amtrak station (which also has service from an Amtrak Thruway bus to Richmond). A single stop would be best, one in close proximity to the campus.

At the western end of the route there are a number of potential options. In terms of route design, a major problem is that the populations likely to drive demand are in Harrisonburg, Blacksburg and Roanoke, rather than in Staunton where I-64 connects with I-81. There is a need to provide convenient service linking to the key student markets on the west end, which are located in Blacksburg or Harrisonburg. This argues for direct service to one or another, and a convenient connection to reach the other--either a connection south to Blacksburg, or north to Harrisonburg. Also, Waynesboro and Fishersville are now both part of the Staunton/Harrisonburg Urbanized Area. The major potential non-urbanized stop in this segment is Crozet, between Charlottesville and Waynesboro.

Given these considerations, seven alternatives were developed. Others are possible, depending on input, other options could be created combining or changing combinations, for example adding Virginia Beach to another option that does not include it. Frequencies were assumed to be the same as the other Virginia Breeze routes, one round-trip per day to provide a basic level of coverage. The ten alternatives are presented graphically in Figure 4-1.

Figure 4-1: Alternative Service Patterns



Potential Timetables

Table 4-1 presents potential timetables for all these alternatives. The elapsed time between stops was developed from the current public timetables of the different carriers operating intercity services in this corridor. Segment times were developed for each segment from the currently provided services to that city-pair, and so they assume current speeds and station access/dwell times. For implementation they should be checked, as there may be a need for adjustment enable real-world operation. Each alternative is described on the following pages.

Table 4-1: Potential Timetables for Alternatives

	Alt #1: VB - Blacksburg		Alt #2: Norfolk - Blacksburg		Alt #3: Norfolk - Roanoke		Alt #4: VB - Harrisonburg		Alt #5: Norfolk - Staunton (RT 460)	
	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM
	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up
Virginia Beach	7:55 AM	10:25 PM					7:00 AM	10:35 PM		
Norfolk	8:40 AM	9:40 PM	8:40 AM	9:40 PM	7:45 AM	9:50 PM	7:45 AM	9:50 PM	6:55 AM	10:40 PM
Suffolk									7:35 AM	10:00 PM
Newport News	9:25 AM	8:55 AM	9:25 AM	8:55 PM	8:25 AM	9:10 PM	8:25 AM	9:10 PM		
Williamsburg	9:55 AM	8:25 PM	9:55 AM	8:25 PM	8:55 AM	8:40 PM	8:55 AM	8:40 PM		
New Kent										
Petersburg									9:10 AM	8:25 PM
Richmond International Airport										
Richmond Main Street Station	10:55 AM	7:25 PM	10:55 AM	7:25 PM	9:55 AM	7:40 PM	9:55 AM	7:40 PM	9:55 AM	7:40 PM
Richmond Staples Mill Road Station	11:15 AM	7:05 PM	11:15 AM	7:05 PM	10:15 AM	7:20 PM	10:15 AM	7:20 PM	10:15 AM	7:20 PM
Charlottesville	11:45 AM	6:35 PM	11:45 AM	6:35 PM	11:45 AM	5:50 PM	11:45 AM	5:50 PM	11:45 AM	5:50 PM
Crozet	12:10 PM	6:10 PM	12:10 PM	6:10 PM		5:25 PM	12:10 AM	5:25 PM	12:10 AM	5:25 PM
Waynesboro	12:35 PM	5:45 PM	12:35 PM	5:45 PM	12:35 PM	5:00 PM	12:35 PM	5:00 PM	12:35 PM	5:00 PM
Staunton	1:00 PM	5:20 PM	1:00 PM	5:20 PM	1:00 PM	4:35 PM	1:00 PM	4:35 PM	1:00 PM	4:35 PM
Harrisonburg							1:35 PM	4:00 PM		
Lynchburg										
Lexington	12:20 PM	4:40 PM	12:20 PM	4:40 PM	12:20 PM	3:55 PM				
Roanoke	1:20 PM	3:40 PM	1:20 PM	3:40 PM	1:20 PM	2:55 PM				
Blacksburg	2:10 PM	2:50 PM	2:10 PM	2:50 PM						

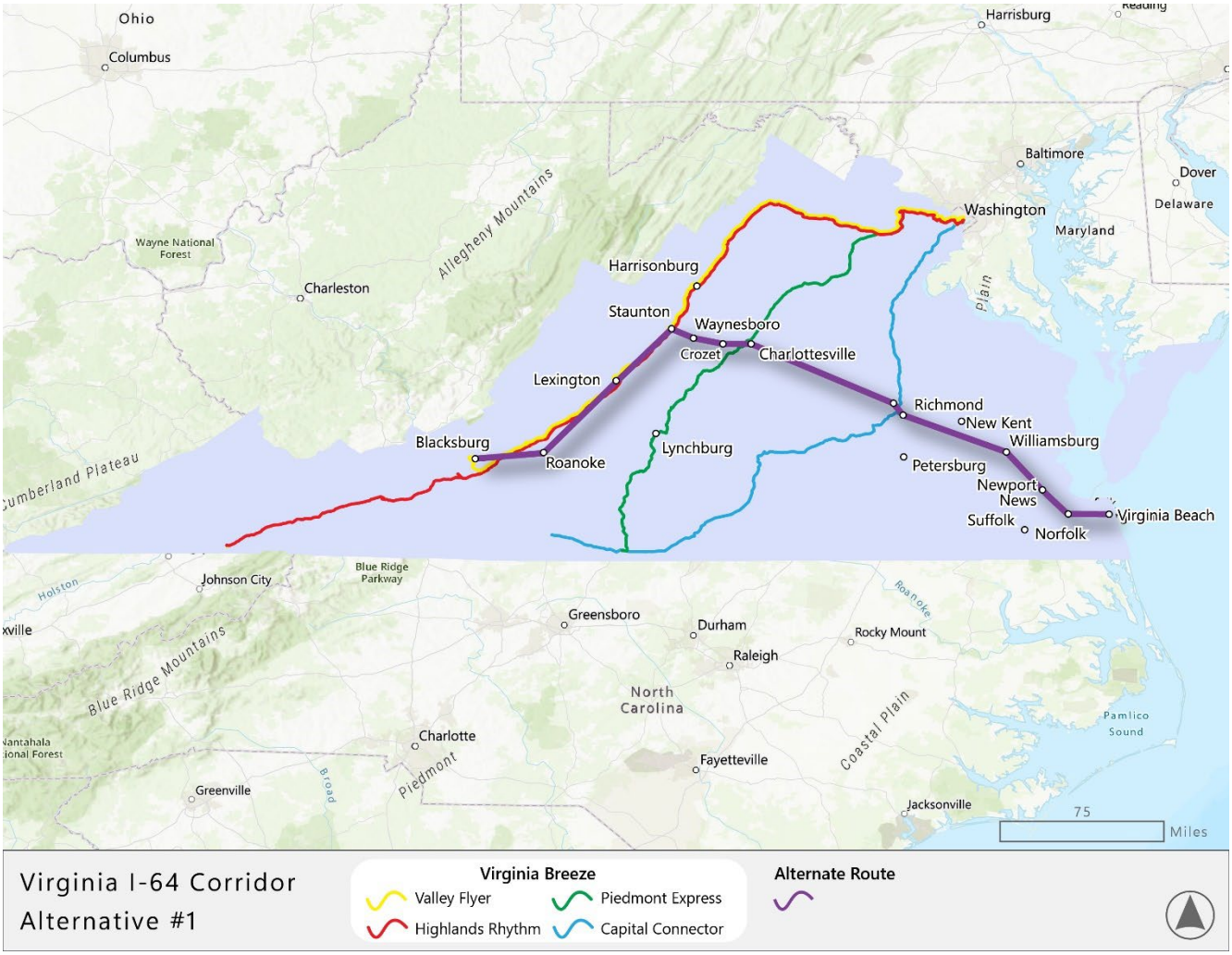
	Alt #6: Norfolk - Lynchburg - Blacksburg		Alt #7: VB - Harrisonburg (RT 460)		Alt #8: Norfolk - Staunton		Alt #9: VB - Harrisonburg		Alt #10: Norfolk - Harrisonburg (RT 460)	
	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM	WB AM	EB PM
	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up	Read Down	Read Up
Virginia Beach			6:10 AM	11:25 PM			7:00 AM	10:35 PM		
Norfolk	6:20 AM	10:45 PM	6:55 AM	10:40 PM	7:45 AM	9:50 PM	7:45 AM	9:50 PM	6:55 AM	10:40 PM
Suffolk			7:35 AM	10:00 PM					7:35 AM	10:00 PM
Newport News	7:05 AM	9:55 PM			8:25 AM	9:10 PM	8:25 AM	9:10 PM		
Williamsburg	7:35 AM	9:25 PM			8:55 AM	8:40 PM	8:55 AM	8:40 PM		
New Kent					9:30 AM	8:05 PM	9:30 AM	8:05 PM		
Petersburg			9:10 AM	8:25 PM					9:10 AM	8:25 PM
Richmond International Airport					9:55 AM	7:40 PM	9:55 AM	7:40 PM		
Richmond Main Street Station	8:35 AM	8:25 PM	9:55 AM	7:40 PM	10:15 AM	7:20 PM	10:15 AM	7:20 PM	9:55 AM	7:40 PM
Richmond Staples Mill Road Station	8:55 AM	8:05 PM	10:15 AM	7:20 PM					10:15 AM	7:20 PM
Charlottesville	10:25 AM	6:35 PM	11:45 AM	5:50 PM	11:45 AM	5:50 PM	11:45 AM	5:50 PM	11:45 AM	5:50 PM
Crozet			12:10 AM	5:25 PM	12:10 PM	5:25 PM	12:10 AM	5:25 PM	12:10 AM	5:25 PM
Waynesboro			12:35 PM	5:00 PM	12:35 PM	5:00 PM	12:35 PM	5:00 PM	12:35 PM	5:00 PM
Staunton			1:00 PM	4:35 PM	1:00 PM	4:35 PM	1:00 PM	4:35 PM	1:00 PM	4:35 PM
Harrisonburg			1:35 PM	4:00 PM			1:35 PM	4:00 PM	1:35 PM	4:00 PM
Lynchburg	11:55 AM	5:05 PM								
Lexington										
Roanoke	1:15 PM	3:45 PM								
Blacksburg	2:05 PM	2:55 PM								

Connection with existing Virginia Breeze route =

Alternative 1: Virginia Beach to Blacksburg via Staunton

Figure 4-2 presents a map of Alternative 1, Virginia Beach to Blacksburg. It is the longest route, 343 miles, 8:25 hours each way. It would require two buses and two drivers to provide convenient arrival and departure times. It does serve the largest population and has the highest estimated demand. However, Harrisonburg residents are not served directly, and connecting service would need to be designed. A Harrisonburg/JMU connection at Staunton would be needed, connecting the southbound Valley Flyer to the eastbound I-64 service, or the westbound I-64 service to the southbound Valley Flyer. The eastbound I-64, or the westbound 1-64 to the northbound Valley Flyer could only work if the Highland Rhythm added a Staunton stop—but it does not go all the way to Blacksburg, only to Christiansburg which means Virginia Tech students would face a second transfer. The Staunton to Blacksburg section duplicates service miles already operated by the Valley Flyer and the Highlands Rhythm, and the additional time required each way is over two hours.

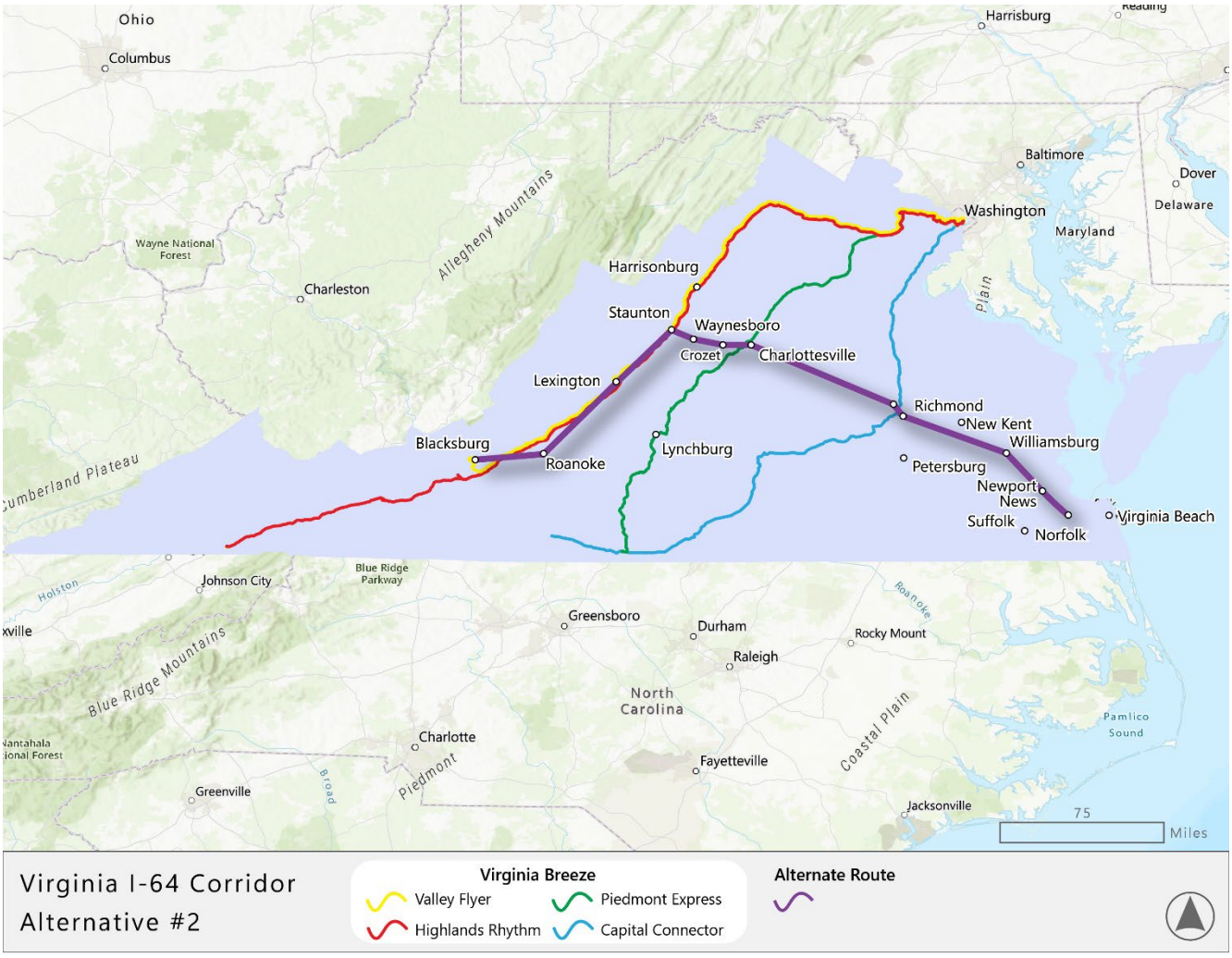
Figure 4-2: Map of Alternative 1: Virginia Beach to Blacksburg via Staunton



Alternative 2: Norfolk to Blacksburg

Figure 4-3 presents a map of Alternative 2, which is the same as Alternative 1, but service starts and ends in Norfolk, rather than Virginia Beach. Virginia Beach riders would need to take transit to the Norfolk Amtrak/bus station to connect. This option would reduce the miles and hours needed to operate the service, but it drops Virginia Beach (largest population stop on the route) to save 45 minutes and seven miles each way.

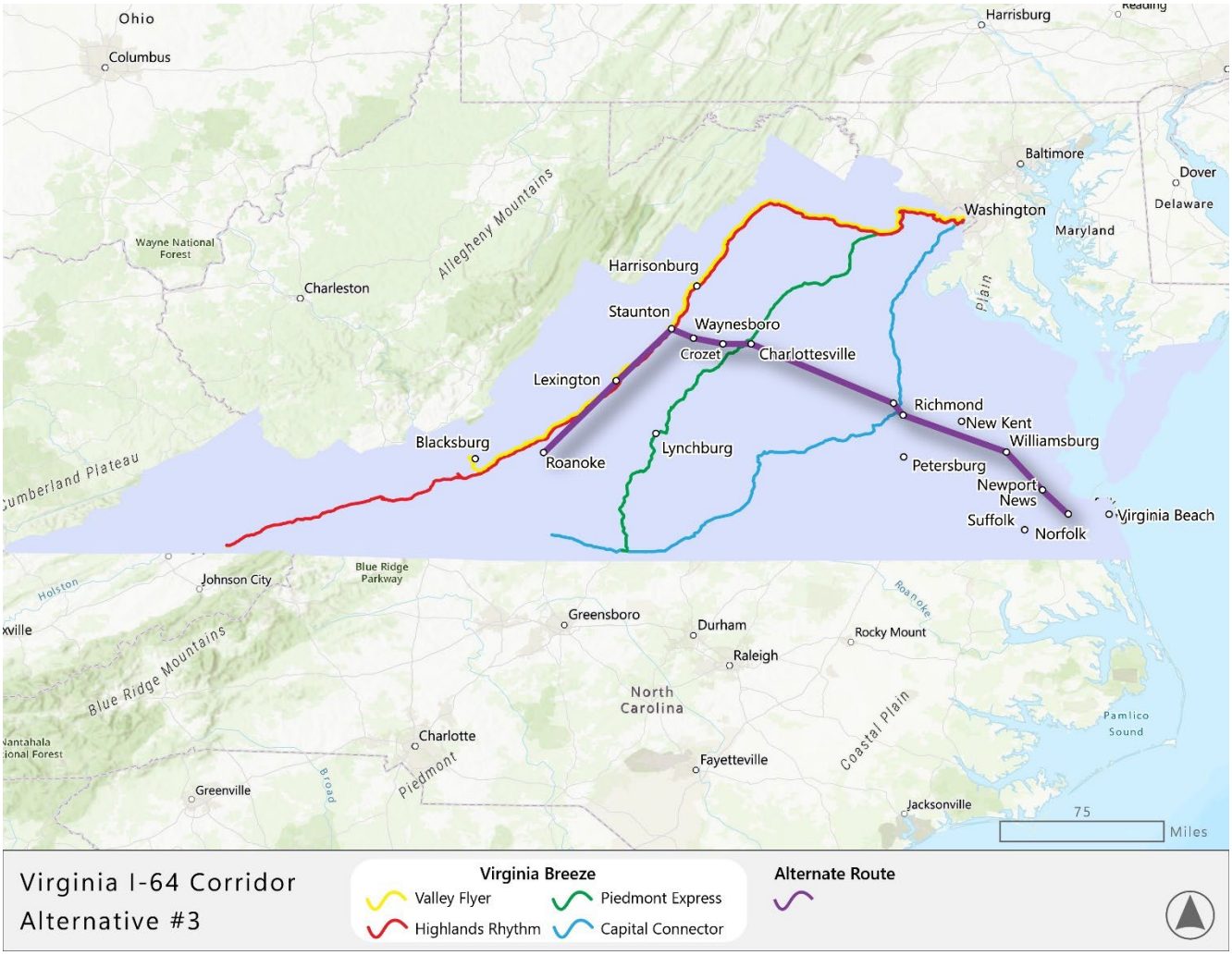
Figure 4-3: Norfolk to Blacksburg via Staunton



Alternative 3: Norfolk to Roanoke

Figure 4-4 presents Alternative 3, Norfolk to/from Roanoke via Staunton. This option would further reduce the costs and travel time by having the western end of the service in Roanoke. It would save another 50 minutes and 42 miles as compared to Alternative 2, but forces riders from Virginia Tech and Blacksburg (likely a significant number) to use Smartway buses to connect from Blacksburg to Roanoke—as they now do to connect with the Amtrak service to Washington, D.C. Riders travelling to/from Virginia Beach would also face a transit connection.

Figure 4-4: Norfolk to Roanoke via Staunton



Alternative 4: Virginia Beach to Harrisonburg

Figure 4-5 presents Alternative 4, Virginia Beach to Harrisonburg. This option serves the I-64 corridor, including the population of Virginia Beach. It adds Harrisonburg and James Madison University to Staunton as an origin/destination population on the west end. This routing includes a single stop in a Non-Urbanized area, in Crozet.

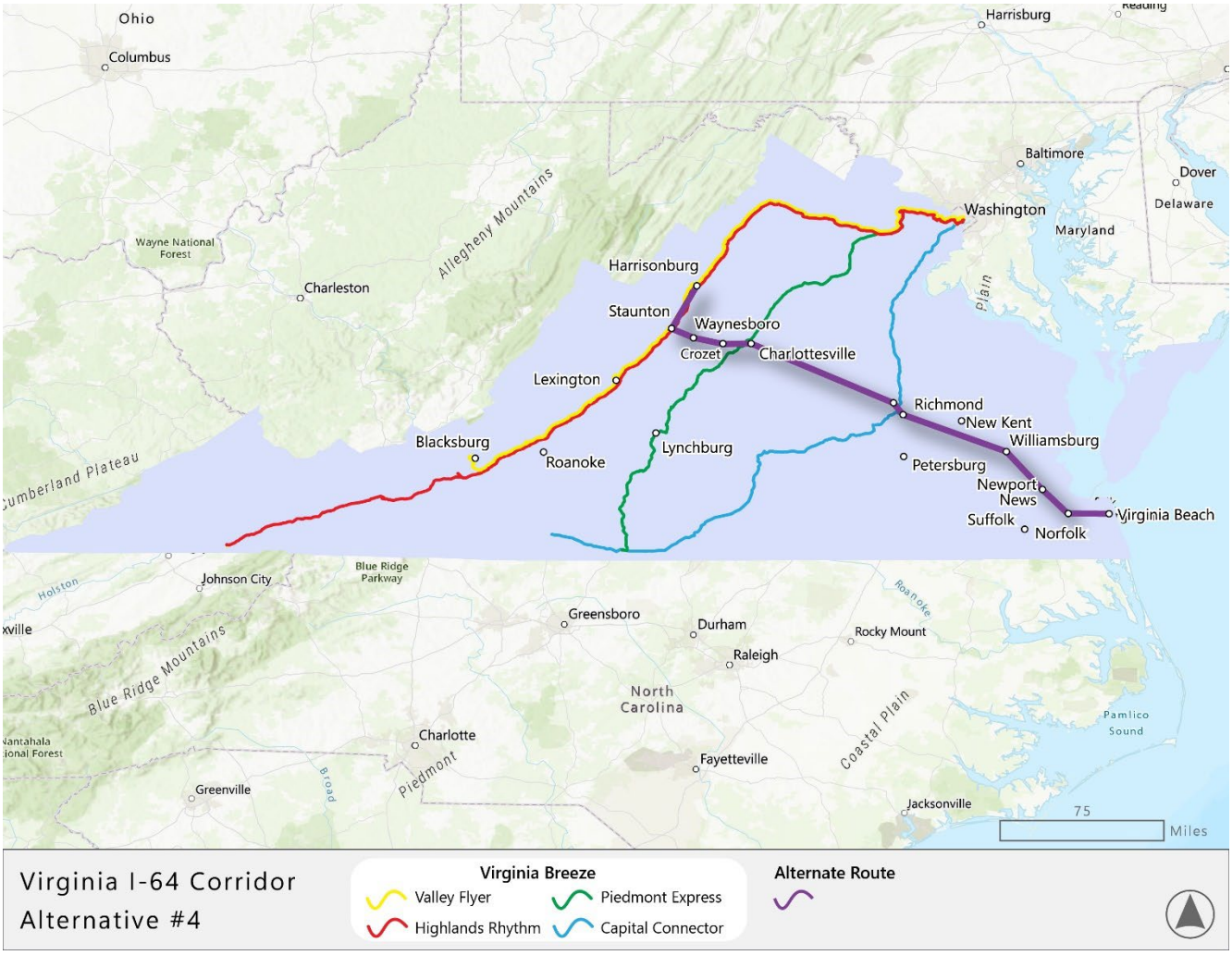
It would require passengers to transfer to either the Valley Flyer or Highland Rhythm to connect to Blacksburg/Christiansburg. It includes no Roanoke service so it would not compete with existing Greyhound Roanoke-Richmond service). Table 4-3 presents a timetable for this option showing the connections.

A one bus option involving shorter mileage, and a lower time is possible using the Valley Flyer as a connection from westbound I-64 service to the southbound Valley Flyer in Staunton but making the afternoon connection from the northbound Highland Rhythm to the eastbound I-64 service, as shown in the right-hand columns of the timetable in Table 4-2. The connection with the Highland Rhythm would be made in Harrisonburg (unless a stop was added in Staunton). Potentially the eastbound afternoon trip could start earlier in the day. With the one coach option for making a daily round-trip, there would be limited time overnight to service the bus. Also, using the Highland Rhythm as the connection in one direction would require Blacksburg riders to transfer in Christiansburg, adding a second transfer to their journey.

Table 4-2: Alternative 4 Timetable Options for Connecting Service

Alt #4: Virginia Beach - Harrisonburg with Connection to Blacksburg						
Westbound			AM Eastbound Option		PM Eastbound Option	
1-64 Bus	Valley Flyer		Valley Flyer	I-64 Bus	Highlands Rhythm	I-64 Bus
WB AM	Southbound		Northbound	EB AM	Northbound	EB PM
Read Down	Read Down		Read Up	Read Up		Read Up
7:00 AM		**Virginia Beach**		3:30 PM		10:35 PM
7:45 AM		**Norfolk**		2:45 PM		9:50 PM
		Suffolk				
8:25 AM		**Newport News**		1:55 PM		9:10 PM
8:55 AM	From	**Williamsburg**		1:25 PM		8:40 PM
	Washington	**New Kent**				
		Petersburg	To		To	
		Richmond International Airport	Washington		Washington	
9:55 AM		**Richmond Main Street Station**		12:25 PM		7:40 PM
10:15 AM		**Richmond Staples Mill Road Station**		12:15 PM		7:20 PM
11:45 AM		**Charlottesville**		11:45 AM		5:50 PM
12:10 AM		**Crozet**		11:20 AM		5:25 PM
12:35 PM		**Waynesboro**		10:55 AM		5:00 PM
1:00 PM		Staunton		10:30 AM		4:35 PM
	1:30 PM	Staunton	*10:10 AM*	9:40 AM		
1:35 PM		**Harrisonburg**		9:05 AM	3:30 PM	4:00 PM
	2:15 PM	**Lexington**	*9:30 AM*		*No Stop*	
	3:30 PM	**Christiansburg**	8:15 AM		1:15 PM	
	3:50 PM	**Blacksburg**	*8:00 AM*		*No Stop*	

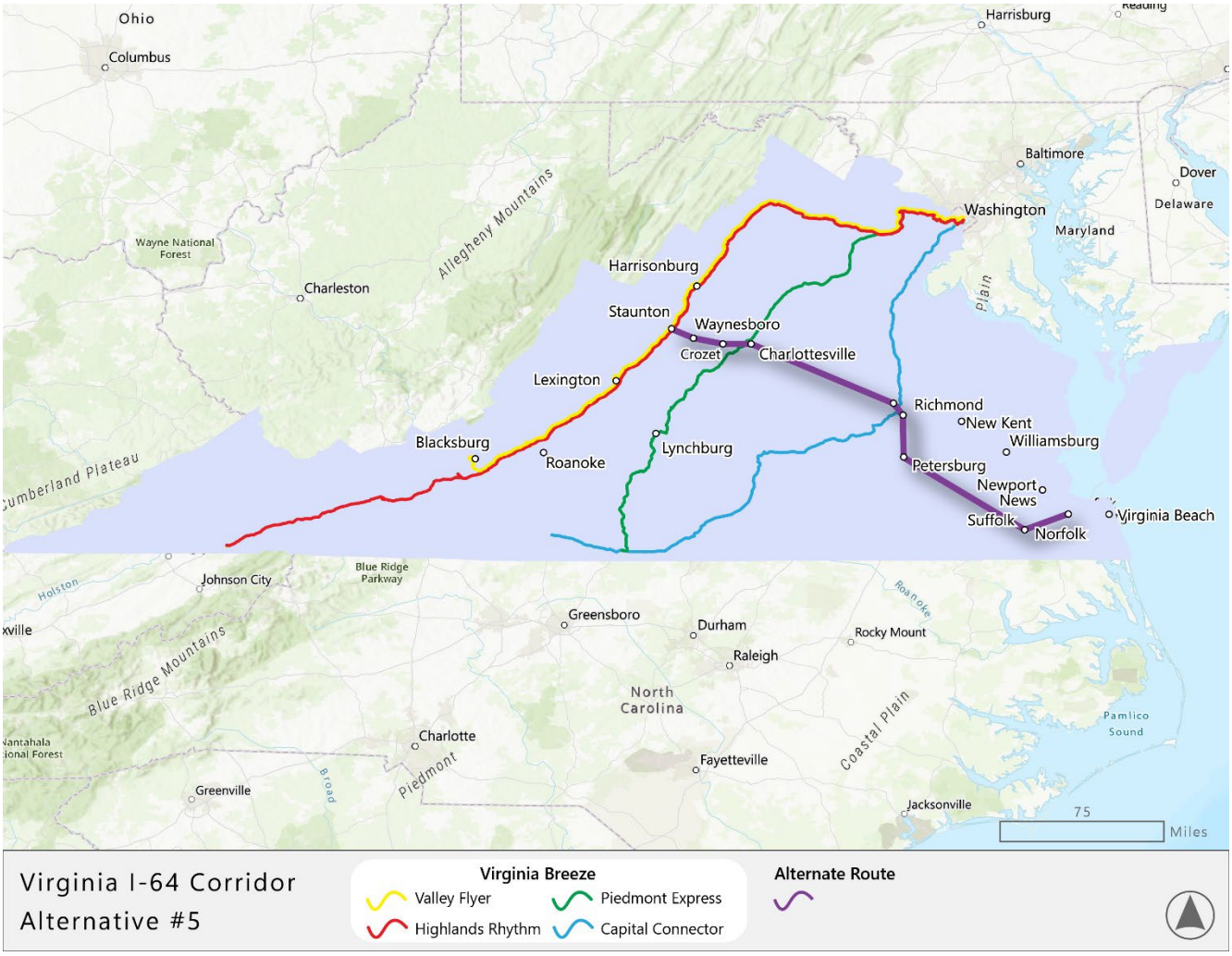
Figure 4-5: Virginia Beach to Harrisonburg



Alternative 5: Norfolk to Staunton via Suffolk and Petersburg

Figure 4-6 presents Alternative 5, Norfolk to Staunton via Suffolk and Petersburg. This is the shortest route in terms of miles and time (though not by much), it serves Non-Urbanized Suffolk, instead of serving Hampton, Newport News, Williamsburg and Non-Urbanized New Kent. Williamsburg is already served by Amtrak, Greyhound, and Flixbus. A same day round-trip is possible. Like the previous alternative, for the one-bus option the eastbound I-64 bus would require a new Highland Rhythm stop in Staunton if it was to make connections to the I-81 services. Also using the Highland Rhythm there is no direct connection from Blacksburg, a transit ride to the stop in Christiansburg would be needed, making the eastbound trip a two-transfer affair.

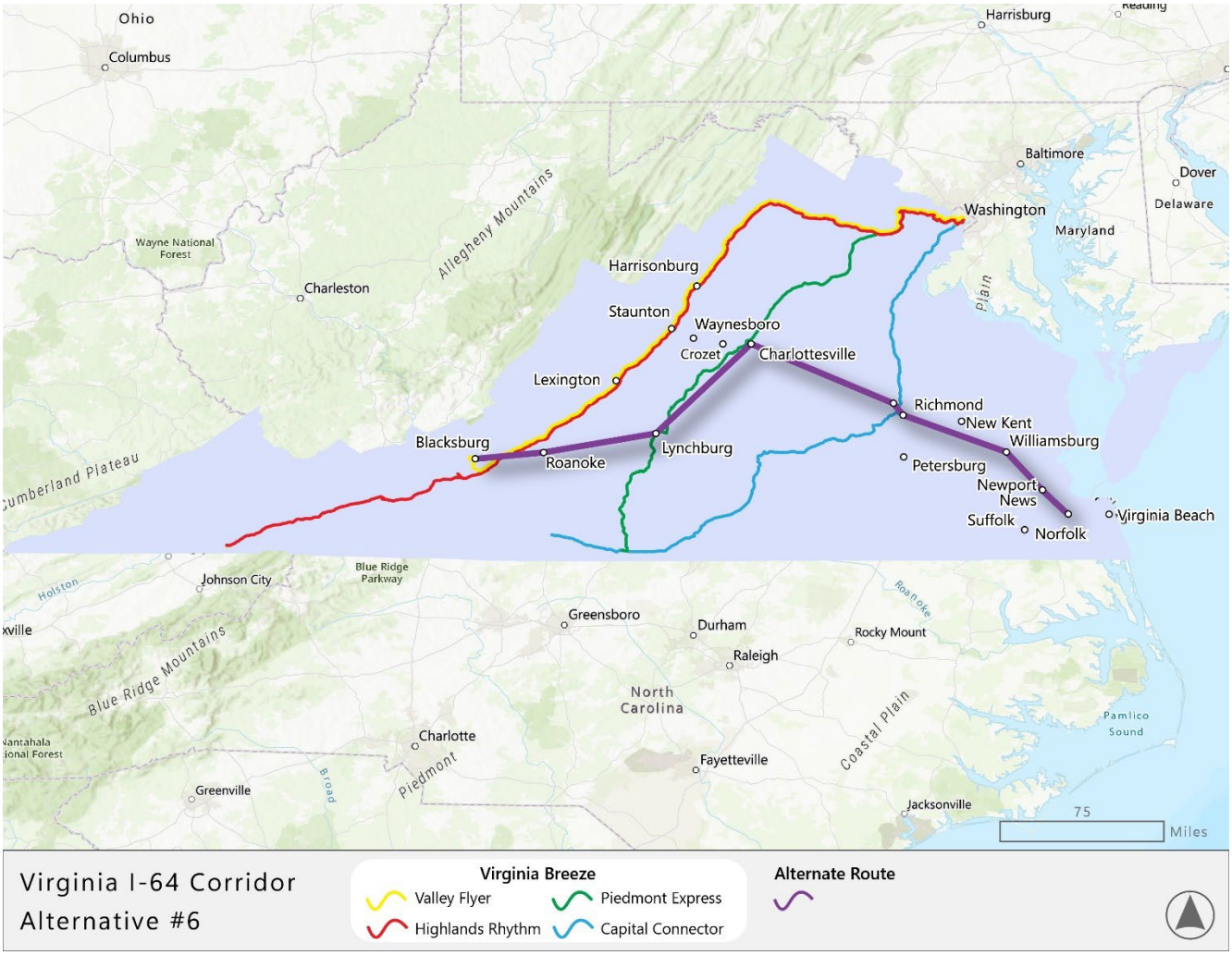
Figure 4-6: Norfolk to Staunton via Suffolk and Petersburg



Alternative 6: Virginia Beach to Blacksburg via Lynchburg and Roanoke.

Figure 4-7 presents Alternative 6, Virginia Beach to Blacksburg via Lynchburg and Roanoke. This is the longest of the ten options in time and miles, and it does serve both high-population/student areas at the route ends. It would not serve Harrisonburg and James Madison University, and there is no reasonable connection to reach those populations. It duplicates Greyhound's Roanoke-Lynchburg-Charlottesville-Richmond route, though at different times. It also covers much of the same service area as the Amtrak service from Roanoke.

Figure 4-7: Virginia Beach to Blacksburg via Lynchburg and Roanoke



Alternative 7: Virginia Beach to Harrisonburg via Suffolk and Petersburg

Figure 4-8 presents Alternative 7, Virginia Beach to Harrisonburg via Suffolk and Petersburg. This route combines the schedules and opportunities for connections of Alternative 4 with a different routing between Norfolk and Richmond, serving the non-urbanized stop in Suffolk. This trades some ridership for an additional non-urbanized stop, serving a stop that has no current intercity bus or rail service. It would further support the use of Section 5311(f) funding. It could have essentially the same connectivity options with the Valley Flyer and Highland Rhythm, as shown in Table 4-3, which presents a potential timetable for this option.

Figure 4-8: Virginia Beach to Harrisonburg via Suffolk and Petersburg

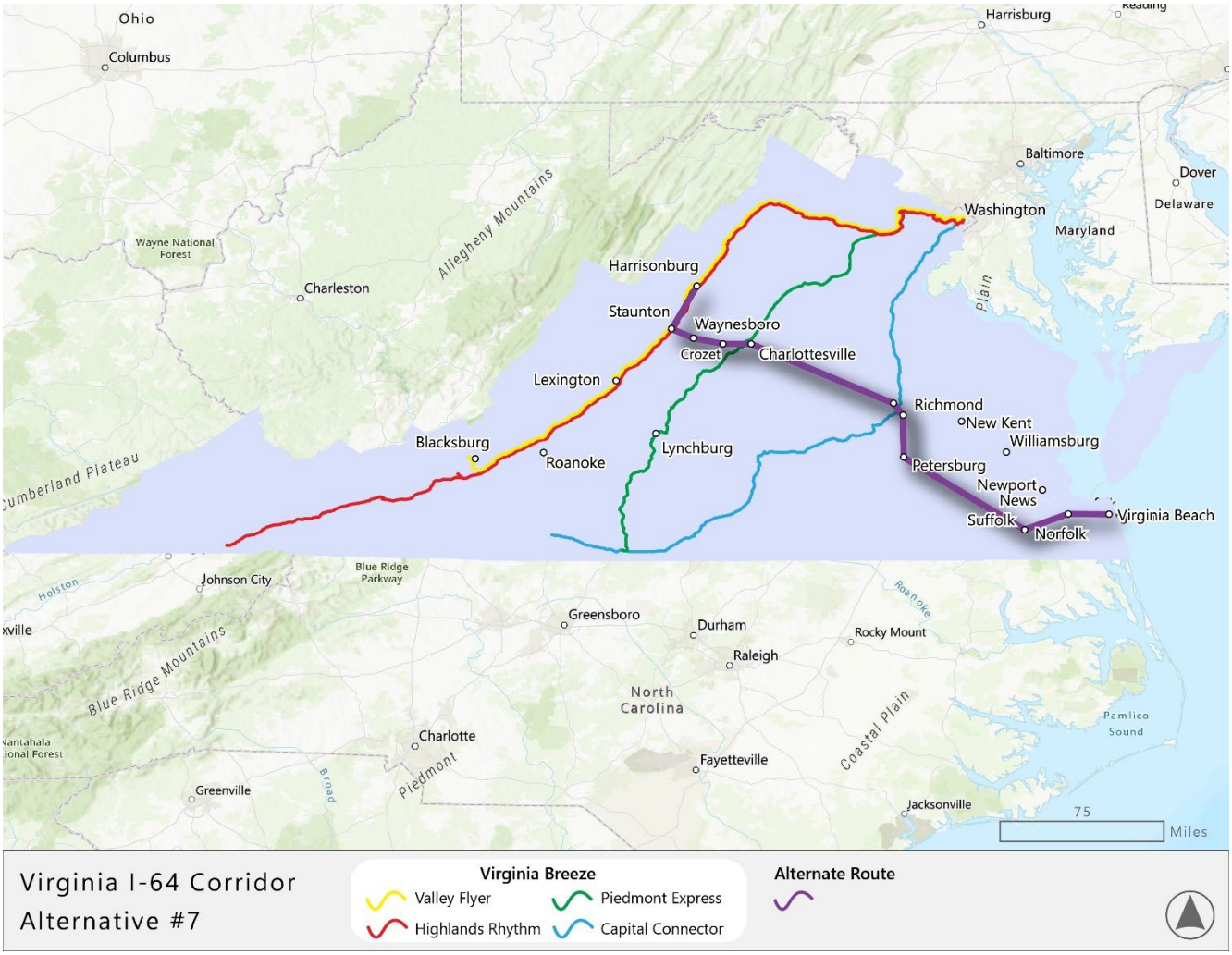


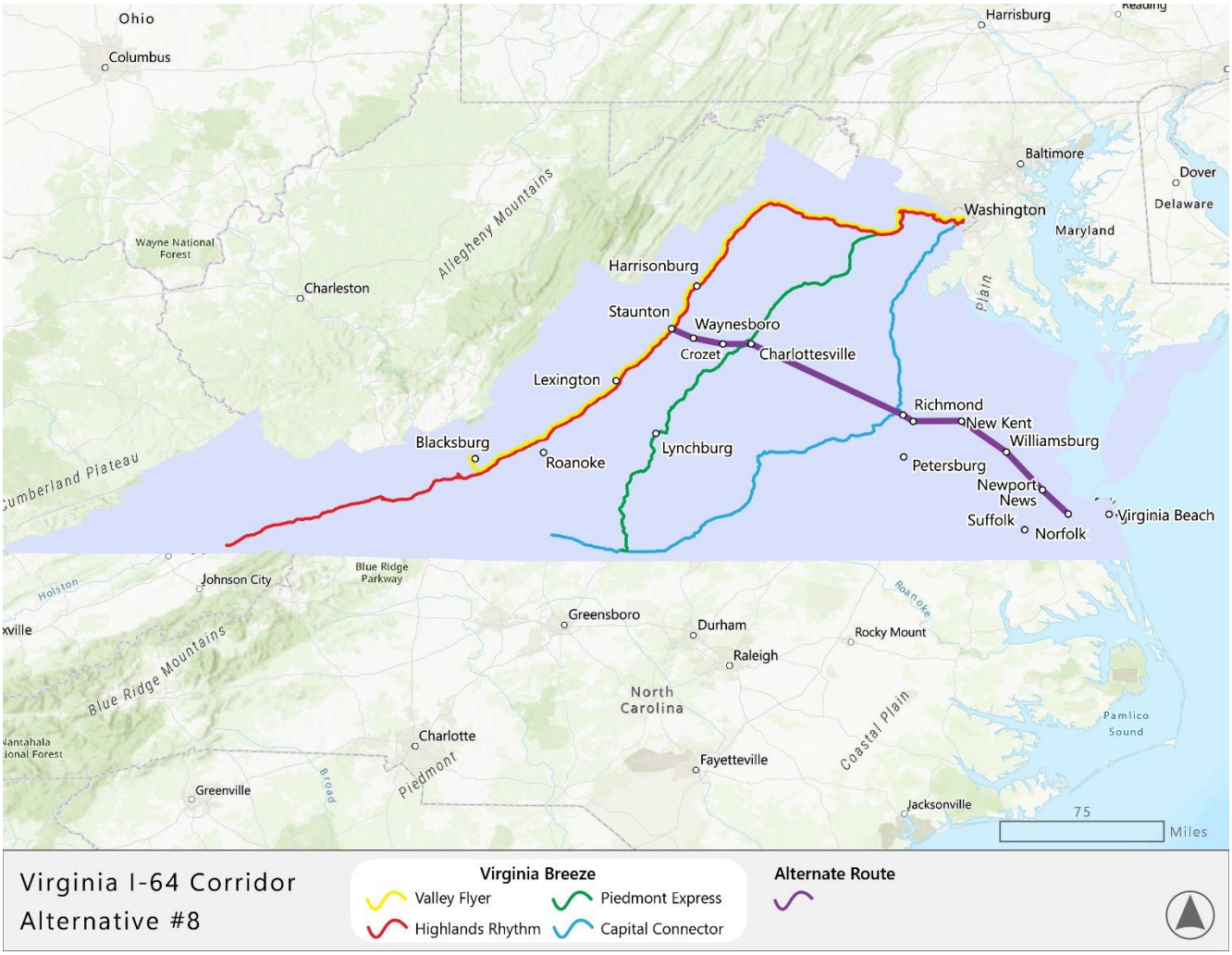
Table 4-3: Alternative 7 Potential Timetable Options for Connecting Service.

Alt #7: Virginia Beach - Harrisonburg via Rt. 460 with Connection to Blacksburg						
Westbound			AM Eastbound Option		PM Eastbound Option	
1-64 Bus	Valley Flyer		Valley Flyer	I-64 Bus	Highlands Rhythm	I-64 Bus
WB AM	Southbound		Northbound	EB AM	Northbound	EB PM
Read Down	Read Down		Read Up	Read Up		Read Up
6:10 AM		**Virginia Beach**		4:10 PM		11:25 PM
6:55 AM		**Norfolk**		3:25 PM		10:40 PM
7:35 AM		**Suffolk**		2:45 PM		10:00 PM
		Newport News				
	From	**Williamsburg**				
	Washington	**New Kent**				
9:10 AM		**Petersburg**	To	1:10 PM	To	8:25 PM
		Richmond International Airport	Washington		Washington	
9:55 AM		**Richmond Main Street Station**		12:25 PM		7:40 PM
10:15 AM		**Richmond Staples Mill Road Station**		12:15 PM		7:20 PM
11:45 AM		**Charlottesville**		11:45 AM		5:50 PM
12:10 AM		**Crozet**		11:20 AM		5:25 PM
12:35 PM		**Waynesboro**		10:55 AM		5:00 PM
1:00 PM		Staunton		10:30 AM		4:35 PM
	1:30 PM	Staunton	*10:10 AM*	9:40 AM		
1:35 PM		**Harrisonburg**		9:05 AM	3:30 PM	4:00 PM
	2:15 PM	**Lexington**	*9:30 AM*		*No Stop*	
	3:30 PM	**Christiansburg**	*8:15 AM*		*1:15 PM*	
	3:50 PM	**Blacksburg**	*8:00 AM*		*No Stop*	

Alternative 8: Norfolk to Staunton via New Kent

Figure 4-9 presents Alternative 8: Norfolk to Staunton via New Kent. This route is the shortest of all ten alternatives at 222 miles and deviates from previous alternatives in its inclusion of New Kent, a non-urbanized stop, and Richmond International Airport. To maintain the total of two stops in Richmond, Staples Mill Station is eliminated. This route would have the lowest operating cost of any alternative.

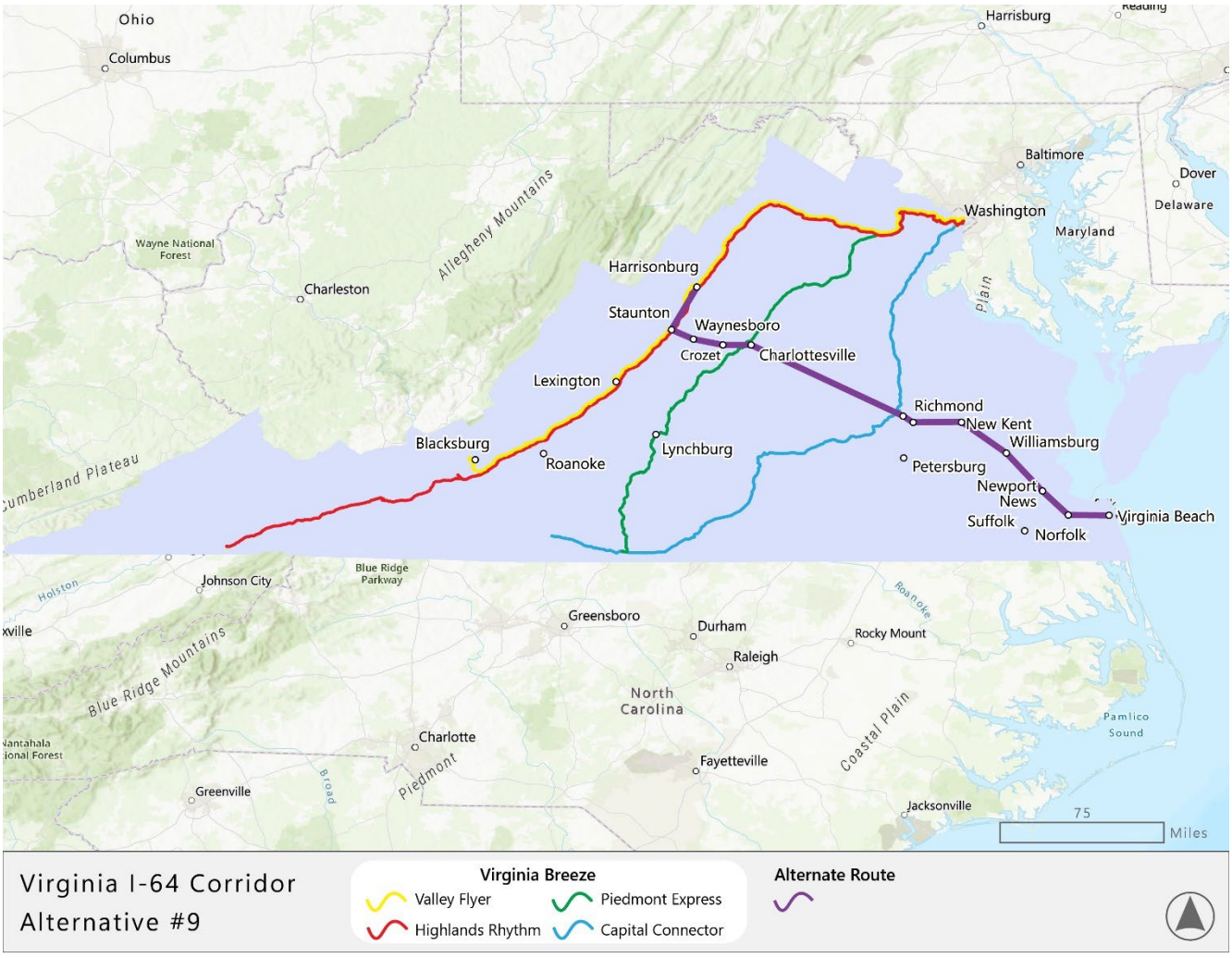
Figure 4-9: Norfolk to Staunton via New Kent



Alternative 9: Virginia Beach to Harrisonburg via New Kent

Figure 4-10 presents Alternative 9, Virginia Beach to Harrisonburg via New Kent. This route matches Alternative 4 except New Kent added to prioritize Section 5311(f) funding and with Richmond Staples Mill Amtrak replaced with Richmond International Airport, which actually reduces the overall population within the 10-mile study catchment areas. It could also be scheduled to permit connections to Blacksburg/Christiansburg on the I-81 services.

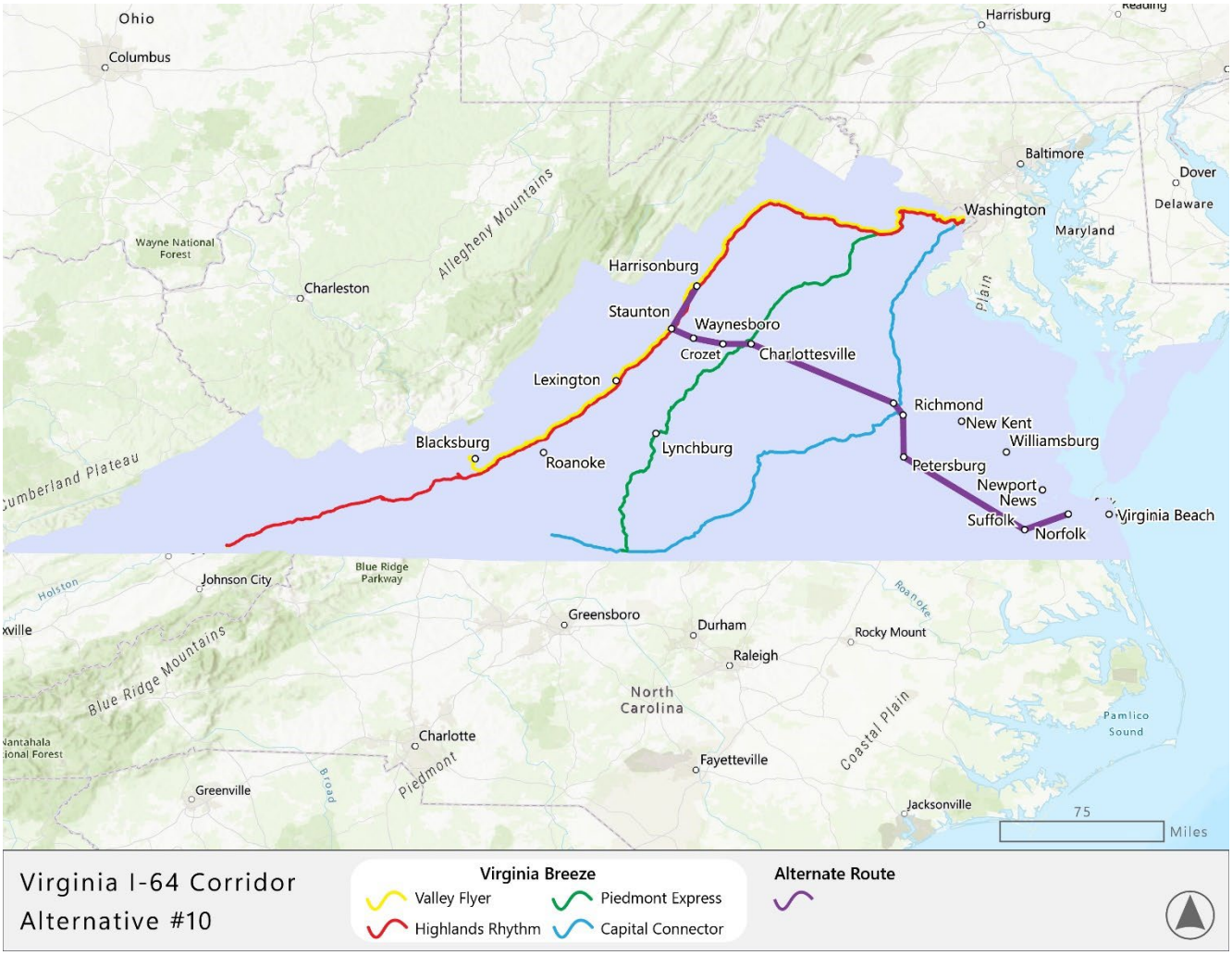
Figure 4-10: Virginia Beach to Harrisonburg via New Kent



Alternative 10: Norfolk to Harrisonburg via Suffolk and Petersburg

Figure 4-11 presents Alternative 10, Norfolk to Harrisonburg via Suffolk and Petersburg. This alternative follows the route of Alternative 7 but with the route originating in Norfolk rather than Virginia Beach.

Figure 4-11: Norfolk to Harrisonburg via Suffolk and Petersburg



Operating Characteristics for each Route: Estimated cost, Ridership, Revenue, and Performance

Table 4-4 presents data summarizing the potential costs, ridership, revenue, net deficit and performance for each of the alternatives.

Table 4-4: Route Alternative Performance Summary

	Alternative:	Corridor Population (10 Miles)	One-Way Miles	Annual Miles- One Daily Round-Trip	One-Way Travel Time (Minutes)	trip rate=.02	Projected Annual Ridership Per Route-Mile	Projected Ridership Per Trip
1	Virginia Beach-Blacksburg via Roanoke	2,774,341	343	250,390	515	55,487	61	29
2	Norfolk-Blacksburg via Roanoke	2,567,704	336	245,280	470	51,354	52	24
3	Norfolk-Roanoke	2,467,201	294	214,620	415	49,344	46	18
4	Virginia Beach-Harrisonburg	2,513,383	255	186,150	395	50,268	69	24
5	Norfolk-Staunton (via Rt 460)	2,004,928	223	162,790	365	40,099	47	14
6	Virginia Beach-Blacksburg via Lynchburg	2,782,372	345	251,850	470	55,647	52	25
7	Virginia Beach-Harrisonburg (via Rt 460)	2,307,530	259	189,070	445	46,151	62	22
8	Norfolk-Staunton (inc. New Kent)	2,105,661	222	162,060	315	42,113	54	16
9	Virginia Beach-Harrisonburg (inc. New Kent)	2,408,263	256	186,880	445	48,165	70	25
10	Norfolk-Harrisonburg via (via Rt 460)	2,100,893	252	183,960	460	42,018	52	18

	Alternative:	Annual Operating Cost: Year 2 Contract Rates for P.E. = $5.60	Projected Annual Revenue (@ $0.17 per passenger-mile) (2)	Projected Net Operating Deficit	Projected Subsidy Per Rider	Projected Farebox Recovery
1	Virginia Beach-Blacksburg via Roanoke	$1,402,184	$844,912	$557,272	$26.54	60%
2	Norfolk-Blacksburg via Roanoke	$1,373,568	$689,724	$683,844	$39.08	50%
3	Norfolk-Roanoke	$1,201,872	$465,564	$736,308	$54.54	39%
4	Virginia Beach-Harrisonburg	$1,042,440	$523,451	$518,989	$29.66	50%
5	Norfolk-Staunton (via Rt 460)	$911,624	$274,658	$636,966	$60.66	30%
6	Virginia Beach-Blacksburg via Lynchburg	$1,410,360	$728,433	$681,927	$37.88	52%
7	Virginia Beach-Harrisonburg (via Rt 460)	$1,058,792	$486,091	$572,701	$35.79	46%
8	Norfolk-Staunton (inc. New Kent)	$907,536	$312,487	$595,049	$49.59	34%
9	Virginia Beach-Harrisonburg (inc. New Kent)	$1,046,528	$540,518	$506,010	$28.11	52%
10	Norfolk-Harrisonburg via (via Rt 460)	$1,030,176	$384,275	$645,901	$49.68	37%

(1) Passenger-miles estimated at total one-way route length times the number of estimated riders, times .69 which is the calculated average trip length for Virginia Breeze riders.
(2) Does not include incremental ridership and revenue from passengers on potential connecting services to Blacksburg/Christiansburg.

Estimated Operating Costs

Estimated operating costs were developed by assuming one-round trip per day, 365 days per year. The GIS based one-way route miles were multiplied by the Virginia Breeze contract cost per mile for the second year of the current contract. The rate for the Piedmont Express was used, $5.60 mile fully-allocated cost.

Estimated Demand

Several approaches were developed and applied, including the use of the TCRP-147 model used in previous Virginia Breeze planning studies, which produced estimates significantly higher than the existing Virginia Breeze ridership levels. Several metrics were developed based on the existing Virginia Breeze ridership, and in the end the relationship between student populations and ridership was used to produce estimates that were more plausible.

These were adjusted downward to reflect the fact that all of the other routes have the Washington region (and connecting Megabus service) at one end, and that two of the routes have an international airport hub (Dulles Airport) as a major ridership component. Also, several of the potential stops have intercity bus and rail services that likely would accommodate varying percentages of the projected demand for the stop, so the adjustment factors were tailored to try and account for this—based on expert judgement, as we do not have any data on the ridership on Greyhound, Flixbus, or Amtrak services.

Because these are estimates combining the observed data on Virginia Breeze ridership, Census data on populations and student populations, and information on existing services—together with judgement, they should be regarded and used with some caution as order-of-magnitude estimates. That is why they are rounded to the nearest 500. The variation in estimates between the routes is plausible, based on the difference in the student populations served and the availability of alternative services. Appendix D discusses the basis for the estimated ridership in more detail. The estimates are included in Table 4-4.

Estimated Revenue

Revenue was estimated from the ridership. Intercity bus fares vary with distance and can be expressed in terms of cents per mile. Existing Virginia Breeze fare levels vary somewhat between routes, with Blacksburg-Washington at $0.185 per mile for a ticket a week in advance, and Danville to Washington at $0.17 per mile for a ticket a week in advance. In this analysis the $0.17 figure was used for estimates to provide a more conservative estimate. Lower fare rates would yield lower revenues and higher net deficit estimates. To develop an estimate of revenue it was assumed that the average distance traveled by a passenger would be 69% of the end-to-end route length, calculated from the average trip length on the Valley Flyer. This accounts for the fact that not all passengers would be traveling the entire length of the route, and since the fare paid is proportional to the distance traveled the revenue per passenger would need to reflect an average passenger trip length less than the full end-to-end length.

Net Operating Deficit

The net operating deficit was calculated by subtracting the estimated revenue from the estimated costs for each route—it was assumed that this would be the subsidy requirement.

Performance Measures

Farebox Recovery

Farebox recovery was estimated by dividing the estimated fare revenue by the operating cost to give the percentage of the operating costs covered by fares.

Subsidy per Passenger

The net operating deficit was divided by the estimated ridership, assuming that the entire net operating deficit will be subsidized.

Boardings Per Vehicle Trip

The average boardings per vehicle trip was estimated by dividing the estimated ridership by the number of vehicle trips. At one round-trip per day that is 730 annual vehicle trips.

Route Assessment Considerations

Despite the fact that there is basically a single corridor under consideration, there are clearly many possible combinations of routes and stops. There are several factors to consider in selecting an alternative (or two).

Route Length

The extension of the route to the westernmost and easternmost possibilities—Blacksburg and Virginia Beach is an open question. At the eastern end, Virginia Beach is the largest municipal population in the state, and it has essentially no intercity bus service. Virginia Beach residents could take HRT bus service to connect to intercity service at Norfolk, but that adds a transfer each way—potentially early in the morning or very late at night. At the western end, serving Blacksburg adds a large potential ridership from the student population, but routings via Staunton would involve additional miles and hours, and consequently costs. Also there are already two Virginia Breeze services on this section of I-81.

A routing from Charlottesville to Blacksburg via Lynchburg and Roanoke is more direct, but it duplicates existing Greyhound service between Roanoke, Lynchburg, Charlottesville and Richmond; and Amtrak service between Roanoke, Lynchburg and Charlottesville.

From a cost/revenue perspective the additional cost of service between Staunton and Blacksburg may be largely offset by the increased revenue potential of serving Blacksburg, but such a service would require two buses (and drivers) and comes closer to the mandated maximum 10 hours of service FMCSA requirement. It also eliminates service to Harrisonburg. Alternatives 4 and 7 provide service through Staunton to Harrisonburg, and if carefully scheduled could offer connections in Staunton or Harrisonburg that would provide service to Blacksburg/Christiansburg.

Section 5311(f) Funding

Use of Section 5311(f) funding calls for service linking non-urbanized (rural) residents to urban areas and the national intercity bus network (via a meaningful connection). In this corridor the Urbanized Areas have grown to encompass many towns, and so the potential non-urbanized stops are Suffolk, New Kent, and Crozet. A routing via Suffolk and Route 460 between Norfolk and Richmond also adds Petersburg (Urbanized), but it eliminates service to Williamsburg and New Kent. The difference in ridership potential is not large, and Williamsburg does have some existing intercity bus and Amtrak service, while Suffolk does not. Crozet can be included in any alternative. It has local transit service provided by JAUNT, but the Afton Express commuter service from Staunton to Charlottesville does not have a stop in Crozet, so Virginia Breeze service would provide additional long-distance access.

In-kind match is the other key issue—the other Virginia Breeze routes are able to take advantage of this provision in the FTA Section 5311(f) program allowing the 50% non-federal share of operating projects to be provided by valuing connecting unsubsidized intercity bus service. This is relatively easy to accomplish for the other Virginia Breeze routes connecting in Washington, D.C. because of the amount of unsubsidized intercity bus service in the northeast. For this route, it is problematic with no stop in Washington.

There is very limited unsubsidized intercity bus service connecting with this proposed service. Megabus offers a daily round-trip between Richmond and Washington, and a daily round-trip between Richmond and Atlanta. There is more Greyhound service through Richmond, but Greyhound will not provide in-kind match for service that is not part of the national interline ticketing system, as they see that as not providing the federally-required "meaningful connection with the national intercity bus network." In addition, Greyhound would likely view portions of this route as competitive, and they do not provide in-kind match for competing services.

As noted in Chapter 1, there is no FTA definition of the "national intercity bus network." and the experience of Virginia Breeze in using the value of connecting Megabus services as in-kind match demonstrates that Greyhound is not the only potential source of in-kind match. Megabus is not part of the national interline ticketing system, but Coach USA/Megabus is currently looking at new partnerships for interline ticketing that could include services that are not directly competitive with existing Megabus service. There may be potential for in-kind miles through this expanded network.

Projected Performance Assessment

Table 4-4 provides estimates of key performance measures for each route alternative. As might be expected the best performance is found on the routes with the lowest cost, i.e., the shortest routes. However, because the longest routes serve the highest populations, and have the highest ridership and higher fares, their overall performance is not much worse. The assessment suggests that Virginia Beach should be included on the route as it adds ridership for a relatively small incremental cost (compare Alternatives 1 and 2) At the western end, the extra cost of routes to Roanoke and Blacksburg via Lynchburg is offset by the likely higher ridership (Alternatives 1,2, and 6) which is likely why Greyhound continues to operate service on this corridor without subsidy.

Recommendations: Alternative 4, with two buses, offers the second lowest subsidy per passenger, and the second highest population coverage, and the second highest estimated ridership. Alternative 9 adds the stop in New Kent to Alternative 4 but eliminates one of the Richmond stops—but again has similar performance and could be scheduled to make the Valley Flyer connections in Staunton. The two bus option provides connections to Blacksburg both ways on the existing Valley Flyer route. Connections to the Valley Flyer in Staunton provide for more convenient times if using two buses, which also provides for adequate service time at either end. The main potential issue is the possibility of overload situations at Staunton for westbound I-64 buses connecting to the southbound Valley Flyer--particularly at holidays. This may not be an issue if there are second (or more) sections on the Valley Flyer, or by running the I-64 bus on to Blacksburg –it becomes the second section (two and half hours each way). These alternatives would both provide a single-seat ride to/ from Harrisonburg. Alternative 7 offers a similar opportunity for connecting service in Staunton to serve Blacksburg, but it serves Suffolk and Petersburg rather than Newport News, Williamsburg and New Kent, with some loss of ridership and revenue.

The inclusion of stops in New Kent, Suffolk and Crozet is primarily to address the goal (and Section 5311(f) requirement) that services funded under this program serve rural populations, technically defined as residents of non-urbanized areas. It should be noted that serving Suffolk means not serving Williamsburg, which has a larger potential ridership—but which also has existing Amtrak, Greyhound and Flixbus service. Serving or not serving Crozet has limited schedule impact but is not likely to generate much ridership. It should be noted that some unknown proportion of riders who board in an urbanized area have come to that station from the rural non-urbanized area, and in that sense buses serving urbanized stops are also serving non-urbanized persons. If Suffolk alternatives are not chosen, a stop in New Kent should be scheduled to add non-urbanized population coverage.

Strategies

As can be seen from the number of alternatives developed and evaluated, there are many possibilities depending on DRPT policy regarding the requirements for the use of Section 5311(f) funding, the availability of local match other than in-kind from connecting unsubsidized intercity bus service, competition with existing unsubsidized service, and potential duplication of service in existing corridors.

Because of the risks related to the estimations of ridership and revenue (in the absence of an established statewide intercity bus demand network model), it is suggested that funding for any of the more likely options include a 20% contingency factor. Focusing on the Alternatives 4, 7 and 9, the projected net operating costs (from Tale 4-4) are shown in Table 4-5 with the contingency.

Table 4-5: Projected Net Operating Costs

Alternatives	Estimated Net Deficit:	Funding Need with Contingency
Alternative 4: Virginia Beach-Harrisonburg	$ 519,000	$622,800
Alternative 7: Virginia Beach-Harrisonburg (via Rt. 460)	$573,000	$687,600
Alternative 9: Virginia Beach-Harrisonburg (incl. New Kent)	$506,000	$607,200

Given that the exact operating requirements and final choices are not yet finalized, applying for the $687,600 amount would be the safest strategy.

The main issue will be the need for match—the non-federal share of the operating deficit. As noted above, these routes do not have the kinds of unsubsidized connecting services that DRPT has been able to use as in-kind match for the other Virginia Breeze routes because of the many possible connections in Washington. A possibility might be the Megabus service to/from Atlanta, which stops in Richmond at 10:10 a.m. southbound and 8:50 p.m. northbound—which do not fit well with the proposed timetables for the I-64 Virginia Breeze route. This may require a change in DRPT policy to provide the local match as state cash match. In that case, the project definition could be limited to the I-64 service, the deficit could be funded 50% with Section 5311(f), and the required 50% local match would be the state funds—potentially $303,600 to $343,800.

A source of these funds may be the Transit Ridership Incentive Program (TRIP) program, which has Regional Connectivity as an eligible project: "The improvement and expansion of routes with regional significance" is deemed an eligible project type, according to DRPT program documentation. The I-64 services proposed in this study serve and connect five of the eligible Regions, six if you include the connection to Blacksburg that is envisioned.

Appendix A
Stakeholder Survey

Virginia Breeze DRPT I-64 Transit Operators and Regional Planning Agency Survey

This study is focused on determining if there are unmet intercity bus needs in the areas of Virginia between Virginia Beach and Harrisonburg/Staunton. The Virginia Department of Rail and Public Transportation (DRPT) has implemented rural intercity bus service under the Virginia Breeze brand (see https://virginiabreeze.org/ for more information), and is interested in knowing if there are additional needs for additional connections to offer east-west bus service across the Commonwealth.

By intercity bus service we mean:

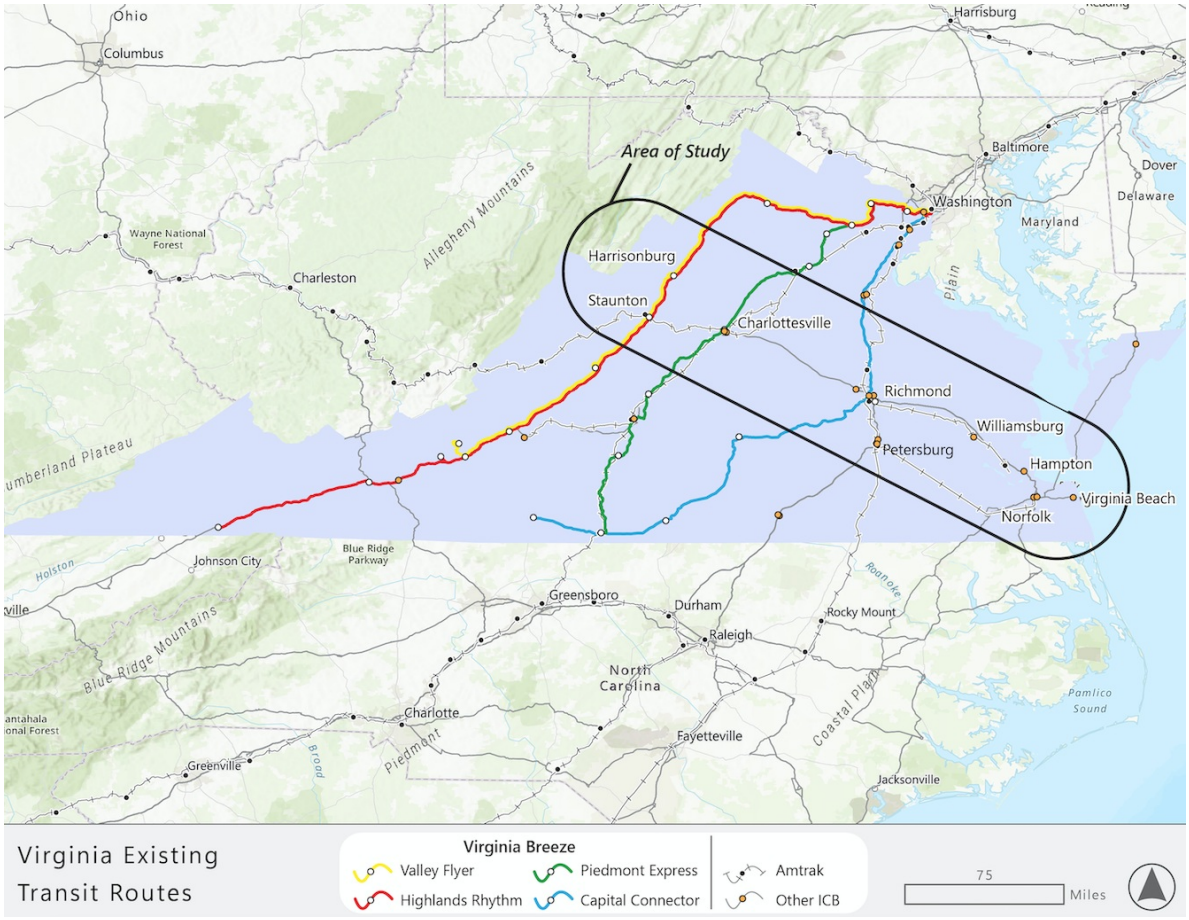
- Regularly scheduled bus service for the general public that operates with limited stops over fixed routes connecting two or more urban areas not in close proximity
- Has the capacity for transporting baggage carried by passengers
- Makes meaningful connections with scheduled intercity bus service to more distant points, if such service is available (think Greyhound- or Megabus-type service)

Current Virginia Breeze services are operated on four routes (see map):

- Valley Flyer: Blacksburg to Washington, D.C. via I-81 and I-66
- Highlands Rhythm: Bristol to Washington, D.C. via I-81 and I-66
- Piedmont Express: Danville to Washington, D.C. via U.S. 29
- Capitol Connector: Martinsville to Richmond and Washington, D.C.

There is additional intercity bus service provided by other firms, including Greyhound, Megabus and Flixbus—along with Amtrak rail passenger service and connecting bus services.

Please help us by answering the following questions:



1. DRPT is considering development of East-West Virginia Breeze Intercity bus service in the I-64 corridor - As you can see from the map, the study area extends from Virginia Beach to the I-81 corridor currently served by the Valley Flyer. Do you think there is a need for service in this corridor?

- ◯ Yes
- ◯ No

Comment

2. Has a need for intercity connections ever been identified in any of your studies or plans, such as Transit Strategic Plans (TSPs), Transit Development Plans (TDPs), or other transportation plans?

- ◯ Yes
- ◯ No

Please describe

3. In this study area, which cities or towns do you think should be considered as stop locations? Please rank them in order of importance, with number 1 being the highest priority, 3 being the lowest priority and 0 being doesn't merit a stop. Please rank 3 answers for the highest priority, no more than 3 for medium priority, and as many as you'd like for lowest priority or no stop.

	1 - Highest priority	2 - Medium priority	3 - Lowest priority	0 - Doesn't merit a stop
Virginia Beach	◯	◯	◯	◯
Norfolk	◯	◯	◯	◯
Hampton	◯	◯	◯	◯
Newport News	◯	◯	◯	◯
Williamsburg	◯	◯	◯	◯
Richmond	◯	◯	◯	◯
Charlottesville	◯	◯	◯	◯
Waynesboro	◯	◯	◯	◯
Staunton	◯	◯	◯	◯
Harrisonburg	◯	◯	◯	◯
Lexington	◯	◯	◯	◯
Roanoke	◯	◯	◯	◯
Other Locations (maybe cities, towns, park and ride lots, etc.)	◯	◯	◯	◯

Other locations (maybe cities, towns, park and ride lots, etc)

4. In your service area/region, are there particular stop locations that you think should be considered, based on a need to provide connectivity to local transit, the national intercity bus network, Amtrak, and park and ride opportunities? This could be a transit hub, a train station, a university, etc.

5. Do any of these stop locations that you can identify offer shelter, heating/air - conditioning, seating, restrooms, security?

6. In terms of schedule frequency, if we can only offer one round-trip per day, would it be better to operate westbound in the morning with an eastbound return later in the day or vice versa?

7. Are two round-trips required to address the needs?

8. Please leave your information if you would like more information regarding the study.

Name	
Organization	
Email Address	
Phone Number	

Appendix B
Information on the Participants

Appendix B:

Name	Organization
Dan Motta	PlanRVA
Rob Case	Hampton Roads MPO
Erin Yancey	City of Harrisonburg Public Works Department

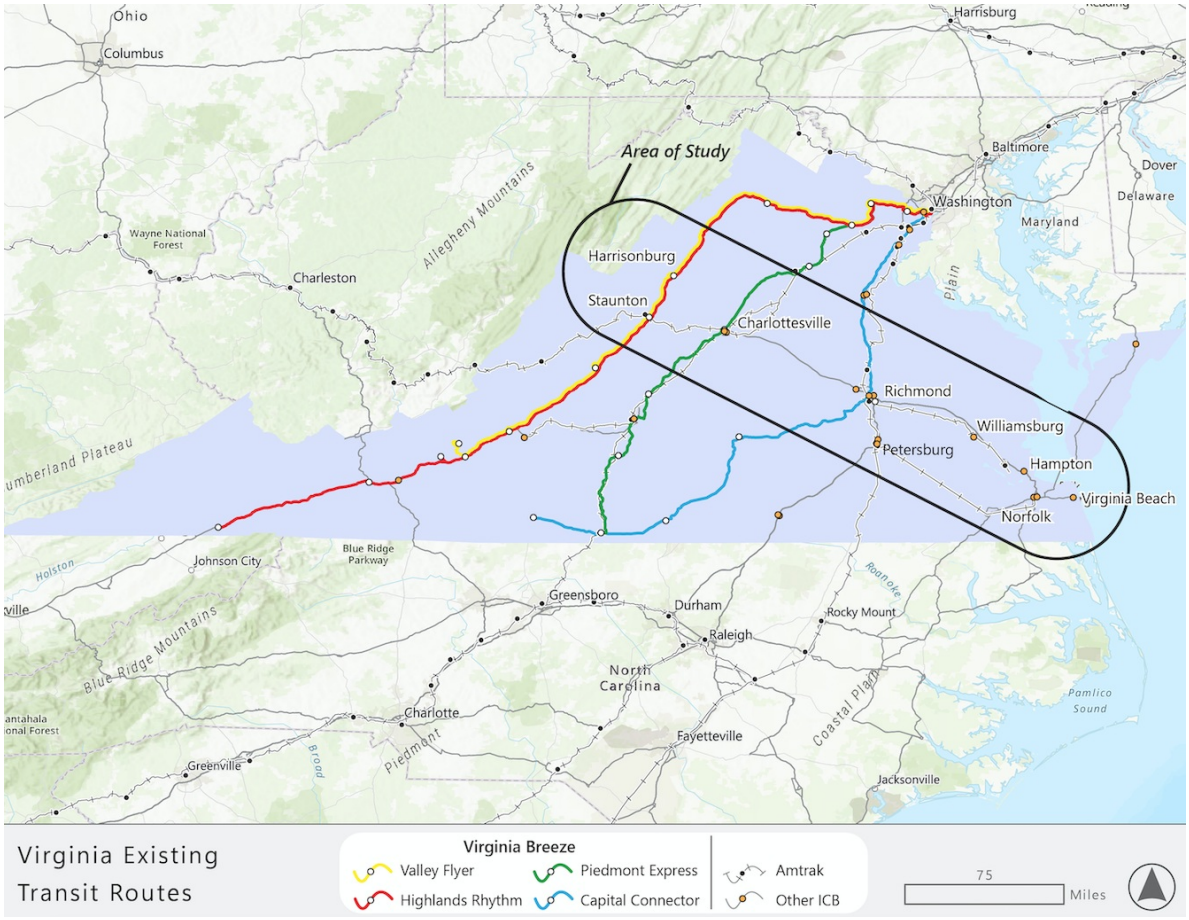
Appendix C
General Survey Questions

Virginia Breeze I-64 General Survey of Unmet Needs

This study is focused on determining if there are unmet intercity bus needs in the areas of Virginia between Virginia Beach and Harrisonburg/Staunton. The Virginia Department of Rail and Public Transportation (DRPT) has implemented rural intercity bus service under the Virginia Breeze brand (see https://virginiabreeze.org/ for more information), and is interested in knowing if there are additional needs for additional connections to offer east-west bus service across the Commonwealth.

Current Virginia Breeze services are operated on four routes (see map):

- Valley Flyer: Blacksburg to Washington, D.C. via I-81 and I-66
- Highlands Rhythm: Bristol to Washington, D.C. via I-81 and I-66
- Piedmont Express: Danville to Washington, D.C. via U.S. 29
- Capitol Connector: Martinsville to Richmond and Washington, D.C.



There is additional intercity bus service provided by other firms, including Greyhound, Megabus and Flixbus—along with Amtrak rail passenger service and connecting bus services.

Please help us by answering the following questions:

Travel Needs

The following questions will help us understand your intercity travel needs.

1. DRPT is considering development of East-West Virginia Breeze Intercity bus service in the I-64 corridor - As you can see from the map, the study area extends from Virginia Beach to the I-81 corridor currently served by the Valley Flyer. Do you think there is a need for service in this corridor?

- ◯ Yes
- ◯ No

Comment

2. In this study area, which cities or towns do you think should be considered as stop locations? Please rank them in order of importance, with number 1 being the highest priority, 3 being the lowest priority and 0 being doesn't merit a stop. Please rank 3 answers for the highest priority, no more than 3 for medium priority, and as many as you'd like for lowest priority or no stop.

	1 - Highest priority	2 - Medium priority	3 - Lowest priority	0 - Doesn't merit a stop
Virginia Beach	◯	◯	◯	◯
Norfolk	◯	◯	◯	◯
Hampton	◯	◯	◯	◯
Newport News	◯	◯	◯	◯
Williamsburg	◯	◯	◯	◯
Richmond	◯	◯	◯	◯
Charlottesville	◯	◯	◯	◯
Waynesboro	◯	◯	◯	◯
Staunton	◯	◯	◯	◯
Harrisonburg	◯	◯	◯	◯
Lexington	◯	◯	◯	◯
Roanoke	◯	◯	◯	◯
Other locations (maybe cities, towns, park and ride lots, etc)	◯	◯	◯	◯

Other locations (maybe cities, towns, park and ride lots, etc)

3. Which city/town do you live in?

4. What towns/cities outside of your home county are final destinations for long-distance trips?

5. Have you or any other adult in your household traveled at least 50 miles or more one way in the past 12 months?

- ◯ Yes
- ◯ No

6. What was the primary purpose of this trip? (Only select one answer)

- ◯ Visit friends or relatives
- ◯ Shopping
- ◯ Other social or recreational
- ◯ Work related travel
- ◯ Travel to school or college
- ◯ Medical
- ◯ Other personal business
- ◯ Other (please specify)

7. Which of these modes have you or someone in your household used for intercity travel in the past 12 months? (Check all that apply)

- ☐ Car
- ☐ Plane
- ☐ Virginia Breeze
- ☐ Amtrak
- ☐ Greyhound Bus
- ☐ Flixbus
- ☐ Megabus
- ☐ Other mode (specify)

8. For the long distance trips you or someone in your household have made, using one or more of the above modes, what cities were the final destinations for each of your trips?

City, State, Mode

City, State, Mode

City, State, Mode

City, State, Mode

DRPT
VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION

Virginia Breeze I-64 General Survey of Unmet Needs

Bus Travel

These next few questions are about intercity bus travel.

9. How often do you travel on intercity buses? (Check one)

- ◯ Once a month or more
- ◯ Once every two to three months
- ◯ A few times a year
- ◯ About once a year
- ◯ Less than once a year
- ◯ Never

10. How many miles is your home from the most convenient intercity bus terminal or stop? (Select one)

- ◯ Less than 1 mile
- ◯ 1 to 3 miles
- ◯ 4 to 5 miles
- ◯ 6 to 10 miles
- ◯ 11 to 20 miles
- ◯ More than 20 miles
- ◯ Don't know

11. If you could, what three things would you do to improve intercity bus service in Virginia?

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Virginia Breeze I-64 General Survey of Unmet Needs

Demographics

Please tell us a little about yourself for demographic purposes. We will not share your individual response. The information you provide will be summarized to describe the general characteristics of all respondents that completed this survey.

12. How many motor vehicles are available for regular use by members of your household, including yourself? (This can include cars, vans, motorcycles, etc. Please check one)

- ◯ Zero
- ◯ One vehicle
- ◯ Two vehicles
- ◯ Three vehicles
- ◯ Four or more vehicles

13. Do you have a valid driver's license?

- ◯ Yes
- ◯ No

14. Please check your age group

- ◯ 16 or younger
- ◯ 17 - 21 years of age
- ◯ 22 - 24 years of age
- ◯ 25 - 34 years of age
- ◯ 35 - 44 years of age
- ◯ 45 - 54 years of age
- ◯ 55 - 64 years of age
- ◯ 65 and older

15. What is your employment status?

- ◯ Employed full-time
- ◯ Employed part-time
- ◯ Student
- ◯ Not employed
- ◯ Retired
- ◯ Other (please specify)

16. What is your estimated annual household income?

- ◯ Under $20,000
- ◯ $20,000 to $40,000
- ◯ $41,000 to $60,000
- ◯ $61,000 to $80,000
- ◯ Over $80,000

17. If a language other than English, how well do you speak English?

- ◯ Very well
- ◯ Well
- ◯ Not well
- ◯ Not at all

18. What language do you prefer to speak at home?

- ◯ English
- ◯ Spanish
- ◯ French
- ◯ Vietnamese
- ◯ Korean
- ◯ Other (please specify)

19. Are you of Hispanic or Latino descent?

- ◯ Yes
- ◯ No

20. Which of the following best describes your race?

- ◯ Asian
- ◯ Black or African American
- ◯ American Indian or Alaska Native
- ◯ White
- ◯ Native Hawaiian or Other Pacific Islander
- ◯ Multi-racial
- ◯ Other (please specify)

21. If you would like additional information about this study, including any additional meetings, reports, etc., please share your contact information:

Name/Title	
Organization	
Mailing Address	
Address 2	
City/Town	
State/Province	
ZIP/Postal Code	
Country	
Email Address	
Phone Number	

Thank you!

For more information about this study, please contact Fred Fravel at ffravel@kfhgroup.com or Avery Daugherty@drpt.virginia.gov

Title VI/ADA Notice
The Virginia Breeze Intercity Bus service and the Virginia Department of Rail and Public Transportation (DRPT) gives public notice of its policy to assure full compliance with Title VI of the Civil Rights Act of 1964 and all related statutes.

Title VI requires that no person in the United States shall on the grounds of race, color, or national origin, be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which DRPT receives federal financial assistance.

Any person who believes that he or she has, individually, or as a member of any specific class of persons, been excluded from the participation in, been denied the benefits of, or been otherwise subjected to discrimination under any program or activity for which DRPT provides assistance and believes the discrimination is based upon race, color, or national origin has the right to file a formal complaint.

A complaint must be submitted within 180 days of the alleged discriminatory act. Complaints may also be filed with the US Federal Transit Administration (FTA).

If a complaint addresses DRPT, you may file the complaint through email via the link below, by phone or in writing.

For complainants who may be unable to file a written complaint, verbal information will be accepted by the Virginia Department of Rail and Public Transportation at 804.786.4440.

To submit a formal complaint or to request additional information on Title VI obligations for both DRPT and the Virginia Breeze Intercity Bus service, please contact DRPT as noted below:

Virginia Department of Rail and Public Transportation

Attn: Title VI Compliance Officer

600 East Main Street, Suite 2102
Richmond, VA 23219

drptpr@drpt.virginia.gov

Appendix D
Demand Estimation Methodology

Introduction

Demand projections for the I-64 corridor alternatives are based around the assumption that college students will drive a significant proportion of the ridership on the new route. This assumption results from two supporting data points:

1. On existing Virginia Breeze routes, ridership at each stop is strongly correlated with the college-enrolled population of that stop. Figure D-1 presents a plot of this correlation which yields an R^2 value of 0.59, considerably higher than that of the correlation (R^2 = 0.09) between ridership and total population (Figure D-2).

   Harrisonburg, home to James Madison University, and Blacksburg, home to Virginia Tech University, stand out for having the highest annual ridership of all plotted stops (Washington DC and Dulles were excluded from this analysis as outliers). Blacksburg, in particular, is of note for generating almost three times as much ridership as Richmond despite possessing approximately one-fifth the population.

   These college towns likely generate such high ridership because they possess fewer alternative forms of public transit (e.g. regular Amtrak service, private bus lines) as do larger cities such as Richmond and because the Virginia Breeze stops in these towns are located directly on their respective college campuses. This makes the service more attractive for JMU and VT students than it is for Virginia Commonwealth University students, for instance, who have to travel the 1.5 miles to Richmond Main Street Station to access the Piedmont Express line.

2. The Virginia Breeze rider survey, conducted in 2023, shows that one-fifth of survey respondents were between 18-24 years old, further supporting the theory that college students make up a significant portion of the system's ridership.

Figure D-1: Correlation between Virginia Breeze stop-level ridership and college-enrolled population.

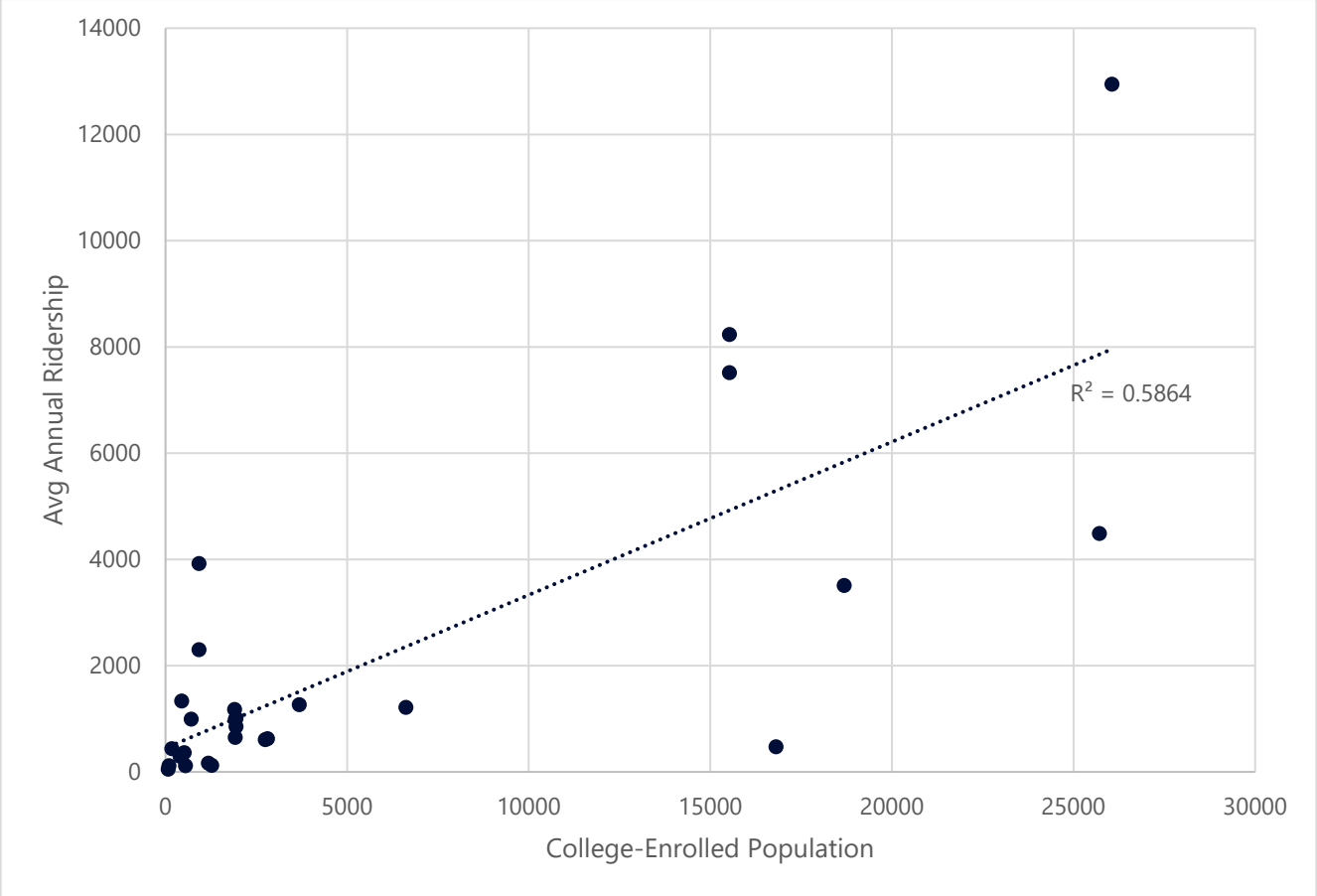
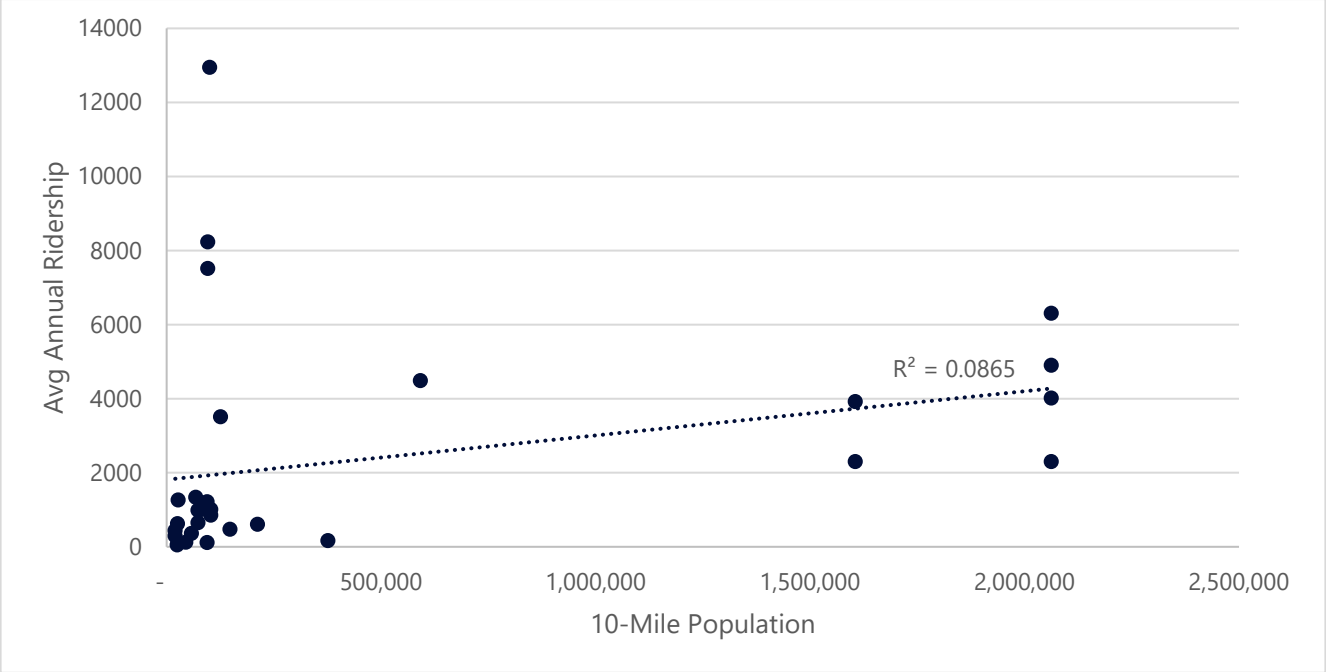


Figure D-2: Correlation between Virginia Breeze stop-level ridership and 10-mile total population



Methodology

Ridership at each proposed stop along the I-64 corridor was calculated by using the line-of-best-fit (shown in Figure D-3) to estimate stop-level ridership based on the college-enrolled population in that city. Figure D-2 shows the proposed stops plotted along this line. For instance, Norfolk's total college-enrolled population is 25,646 which yields an estimated annual ridership of 7,840. For each stop, the community college population was then estimated using enrollment data and subtracted from the college-enrolled population. The reasoning for this adjustment is that community college students are primarily drawn from the local community and thus would be unlikely to use intercity bus to travel home during school breaks. After calculating stop-level demand, one final adjustment is made to each number based on the amount of existing intercity bus and train service through that city. These adjustments are arbitrary but based on the relative levels of service in each city.

After the adjustments have been made, for all ten alternative routes, these stop-level ridership estimates were summed to generate route-level ridership estimates. These estimates are presented in Table D-1. Table D-2 presents the performance overview of the existing Virginia Breeze routes as a point of comparison.

Several factors influenced the lowering of each route's projected ridership:

- All existing Virginia Breeze begin and end in Washington DC, the largest population center and travel destination in the region. While the I-64 route will serve more major population centers than any existing route, it will not serve Washington DC

- Dulles International Airport is currently the second-most popular stop served by Virginia Breeze – on the Valley Flyer route alone, almost as many riders annually begin or end their trip at Dulles (11,108) than ride all stops of the Capital Connector combined (11,785). The I-64 route will not directly serve any airports of this size and scope. Dulles is an international airport and a United Airlines hub, which makes it a major draw for connections.

- The four current Virginia Breeze routes all have between 6-9 stops whereas the alternatives range from 9-13 stops. The additional stops decrease the average speed along the route, reducing its attractiveness compared to other transportation alternatives.

Figure D-3: Correlation between Virginia Breeze stop-level ridership and college-enrolled population.

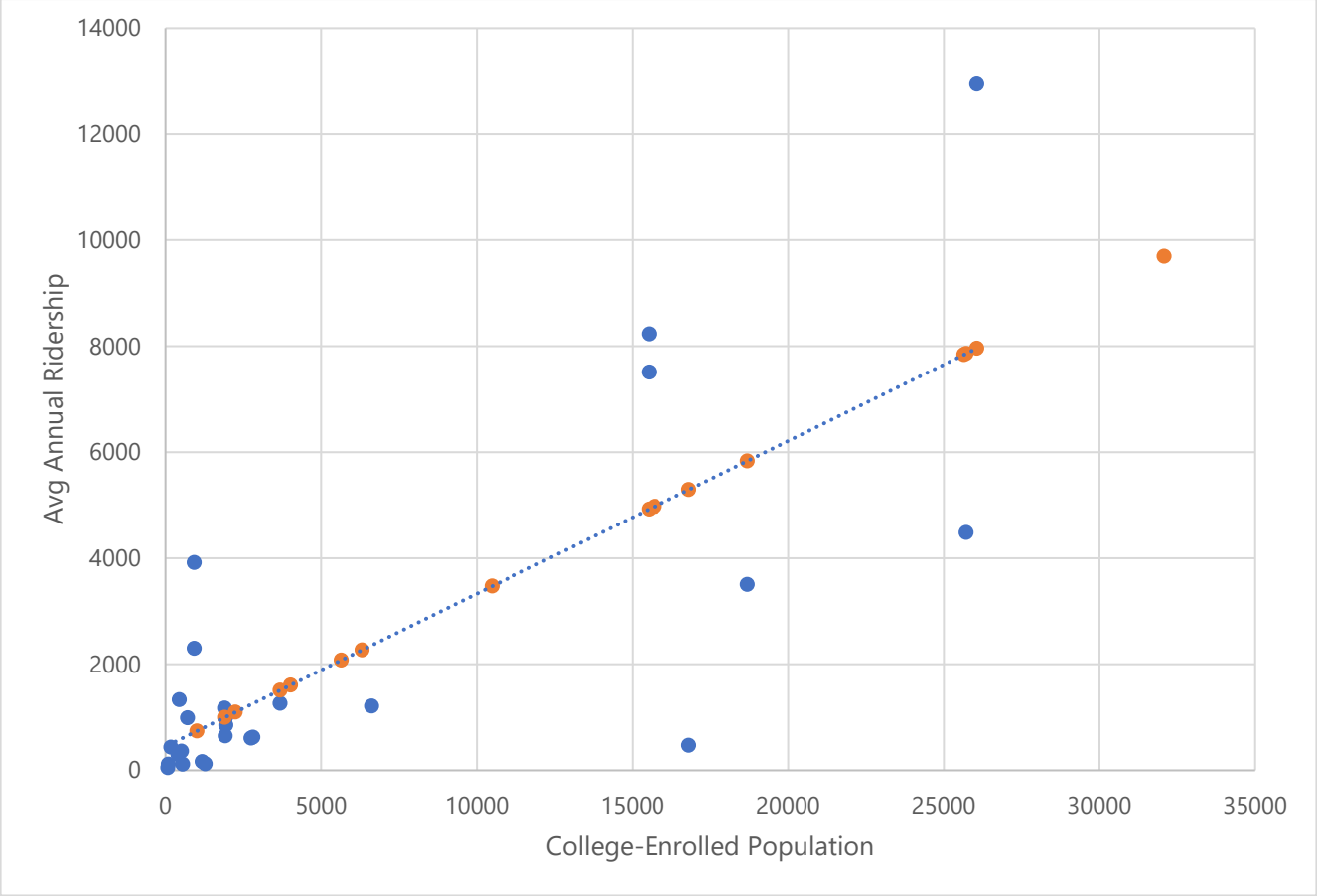


Table D-1: Route-level I-64 corridor initial ridership estimates

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10
Projected Ridership	21,000	17,500	13,500	17,500	10,500	18,000	16,000	12,000	18,000	13,000
Mileage	343	336	294	255	223	345	259	222	256	252
Annual Ridership per Route-Mile	61	52	46	68	48	52	63	55	70	51

Table D-2: Existing Virginia Breeze Route Performance Metrics

	Valley Flyer	Capital Connector	Piedmont Express	Highlands Rhythm
Projected Ridership	46,407	11,785	10,291	24,418
Mileage	305	292	272	406
Annual Ridership per Route-Mile	152	40	38	60